

PCGK - Pressure Case Gamma



1 : 240

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 13' 52.24" North Long: 104° 56' 38.28" West
Well	: Kerbs 4C-14HZ
Company	: Anadarko PC
Rig	: Xtreme 22
LOCATION	
Latitude : 40° 13' 52.24" North Longitude : 104° 56' 38.28" West	Company : Anadarko PC Rig : Xtreme 22 Well : Kerbs 4C-14HZ Field : Wattenberg Country : USA API Number : 00051233839700
UTM Easting = 3,155,245.661 ft UTM Northing = 1,327,546.761 ft	Other Services Directional Drilling

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	01-Mar-14	12-Mar-14			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,095.00	7,578.00			
Log End Depth (MD, ft)	7,578.00	16,938.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	26-Feb-14 00:00	03-Mar-14 15:15			
Drill/Wipe End Date and Time	28-Feb-14 14:26	10-Mar-14 19:45			
Min Inc (deg) @ Depth (MD, ft)	0.20 @ 1,131.00	85.87 @ 10,645.00			
Max Inc (deg) @ Depth (MD, ft)	83.48 @ 7,508.00	93.09 @ 8,138.00			
Bit TFA(in2) / Bit Type	2.23 / N/A	1.86 / N/A			
Flow Rate (gpm)	628.37	290.23			
Max AV (fpm) / CV (fpm) @ MWD	0.0 / N/A	400.0 / N/A			
Fluid Type	Native/Spud Mud	Mineral Oil Bas			
Density (ppg) / Viscosity (spqt)	10.20 / 52.00	9.00 / 61.00			
Filtrate CL (ppm)	1,600.00	55,000.00			
pH / Fluid Loss (mptm)	9.20 / 4	N/A / N/A			
PV (cP) / YP (lbf2)	15 / 14.00	17 / 11.00			
% Solids / % Sand	10.00 / 0.3	10.00 / 0.03			
% Oil / Oil:Water Ratio	1.00 / N/A	63.00 / 69:31			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (deg F) @ 100 ft	224.00 / 20M	140.00 / 20M			

Max Tool Temp (degF) / Source	264.00 / PCM	412.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 264.00	N/A @ 297.8			
Lead MWD Engineer	Caleb Jones	Clay Wass			
Customer Representative	Jack Saunders	Scott Hancock			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.76			
Sub Serial Number	11023840	12334776			
Insert Serial Number	11680769	11680716			
Date and Time Initialized	24-Feb-14 16:23	02-Mar-14 20:23			
Date and Time Read	01-Mar-14 16:59	12-Mar-14 05:11			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	68.38	63.43			
Software Version	6.21	6.21			
Sub Serial Number	11023840	12334776			
Sonde Serial Number	11297620	11297595			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	342.40	99.70			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	63.65	53.30			
Recorded Sample Period (sec)	10	15			
Software Version	8.15	8.15			
Sub Serial Number	11023840	12334776			
Insert/Sonde Serial Number	11579809	11293285			

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

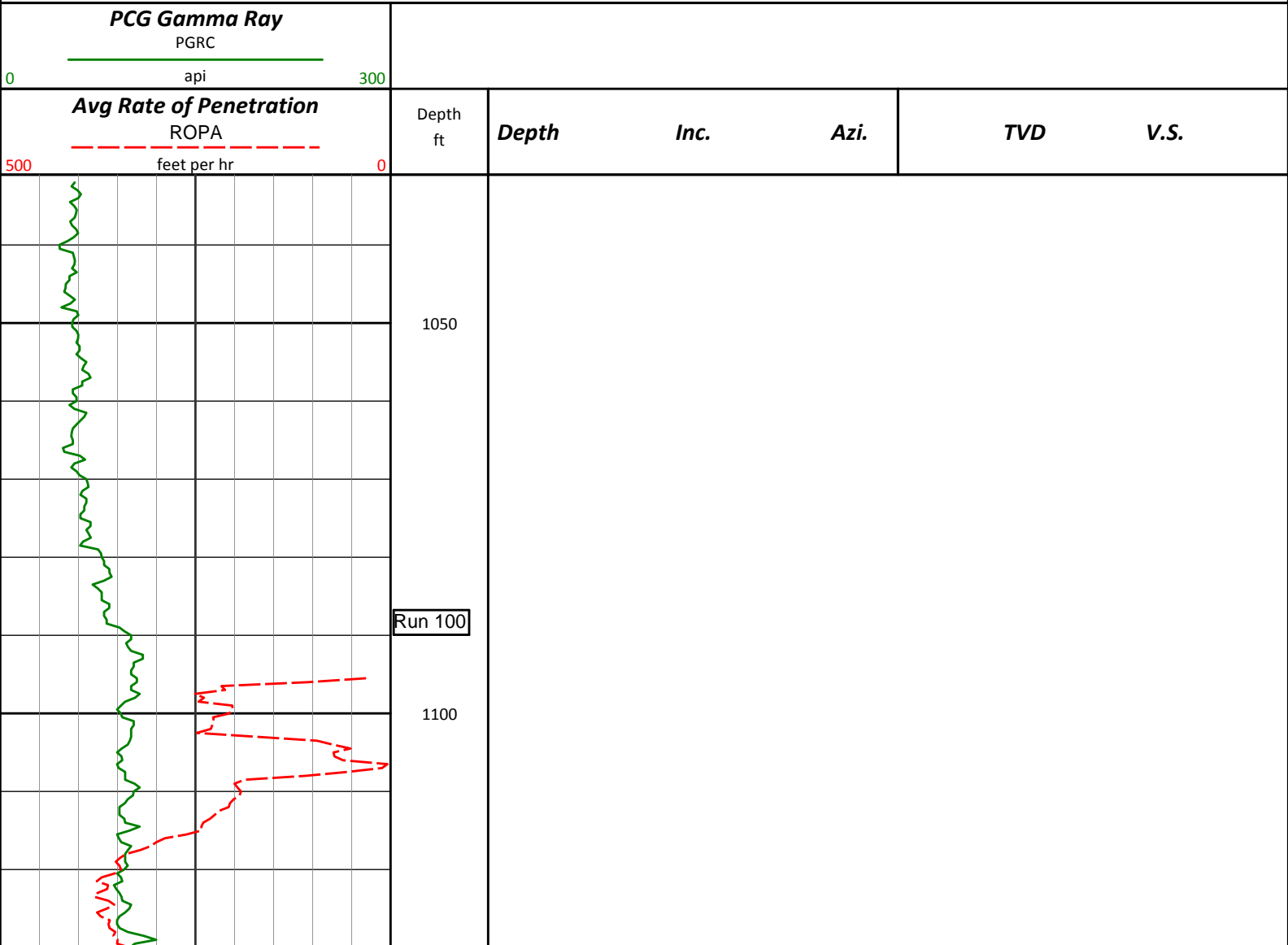
Insite version: 8.0

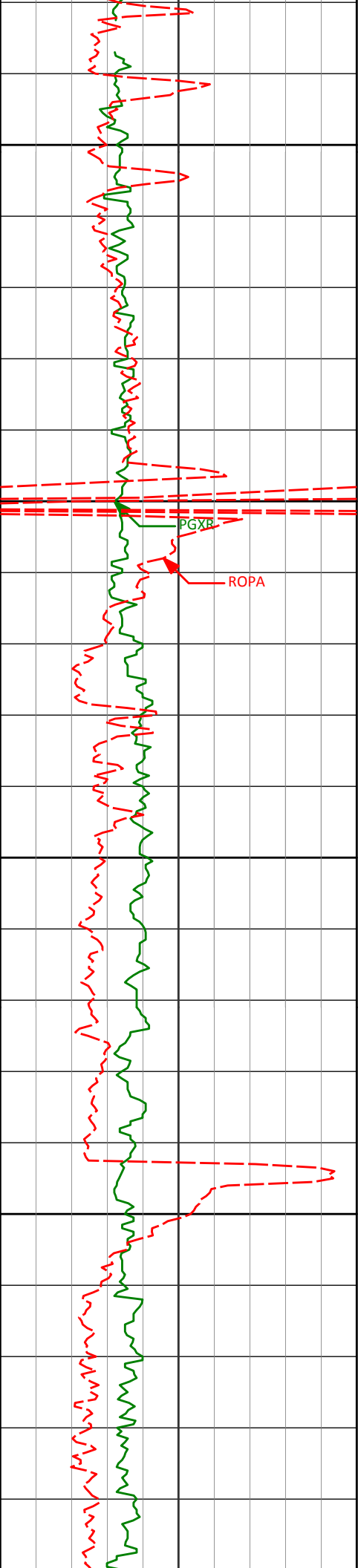
WARRANTY

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HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

Anadarko Petroleum Corp.
Kerbs 4C-14HZ
Xtreme 22
Sec. 13-T3N-R68W





1150

1200

1250

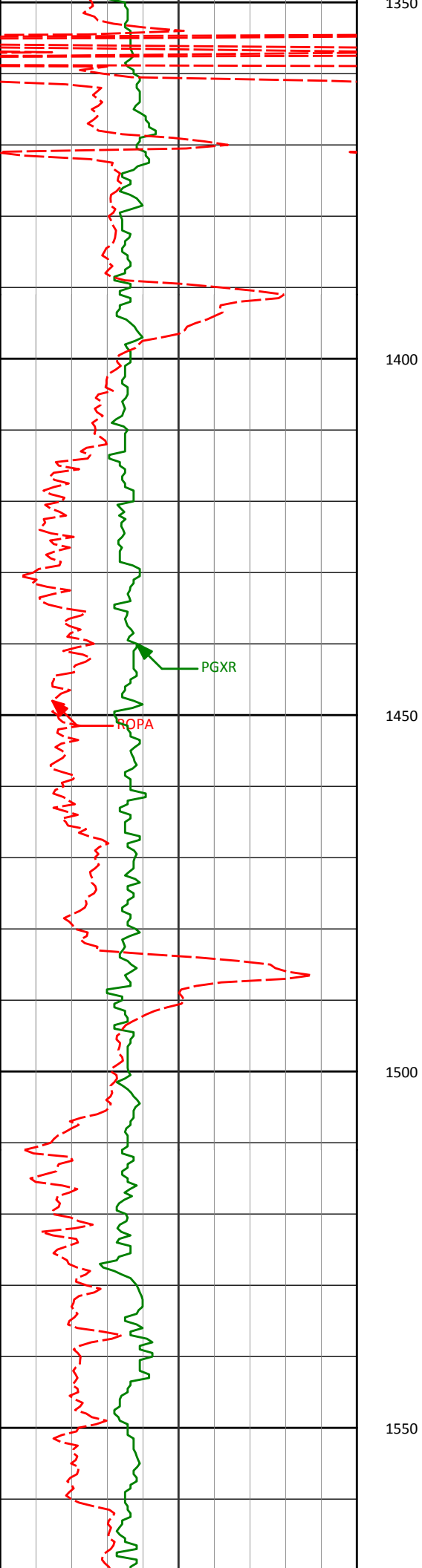
1300

1131' 0.20° 325.11° 1130.98' 4.19'

PGXR

ROPA

1320' 0.39° 311.09° 1319.97' 4.85'



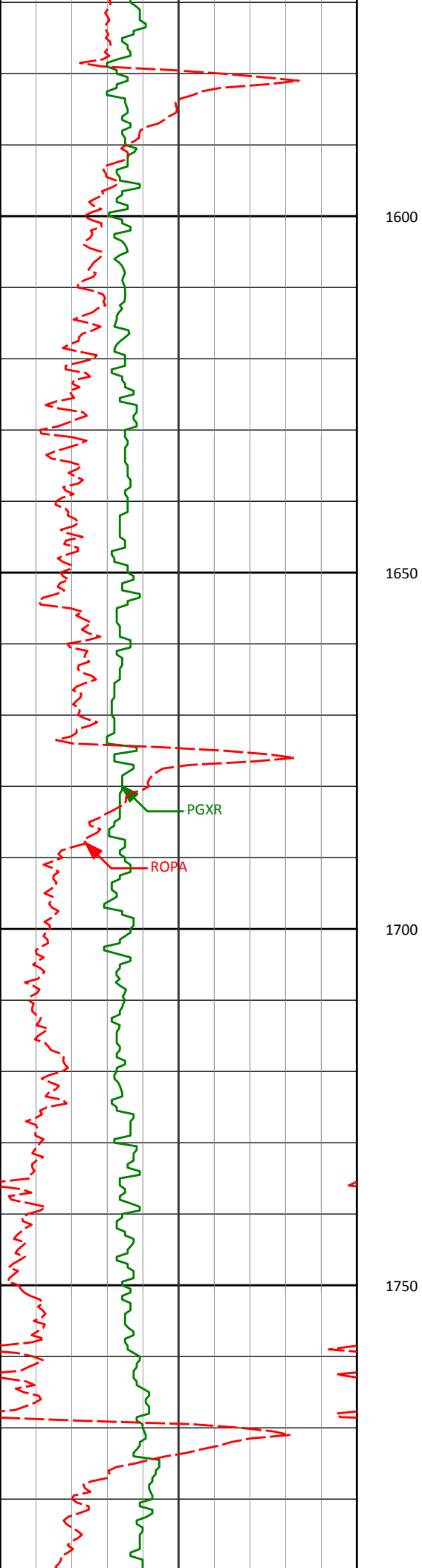
1509'

0.31°

328.21°

1508.97'

5.60'



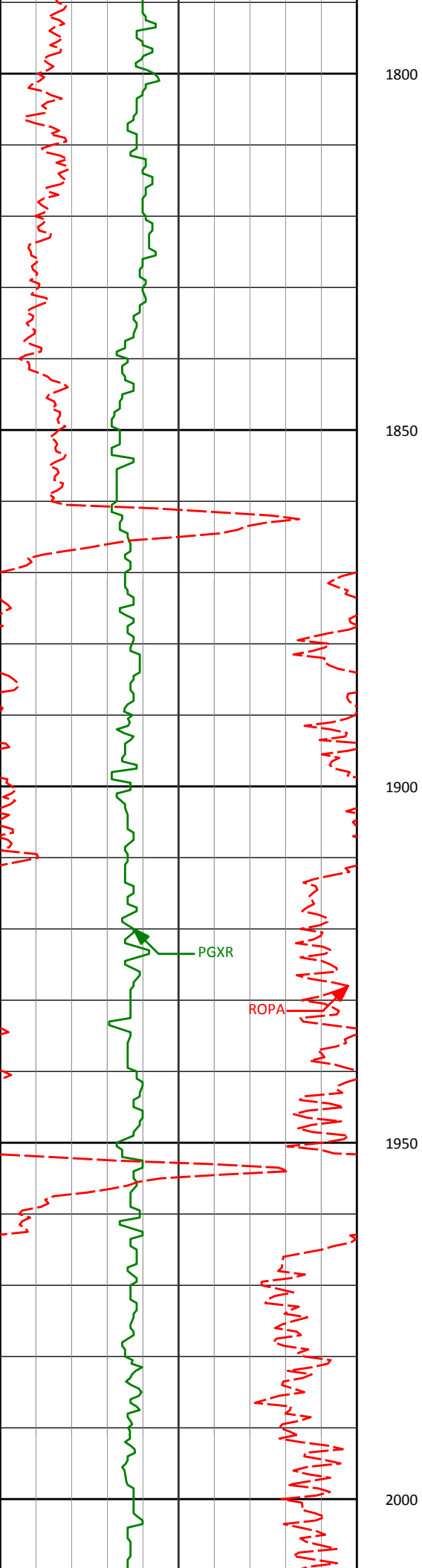
1699'

0.72°

53.69°

1698.97'

4.90'



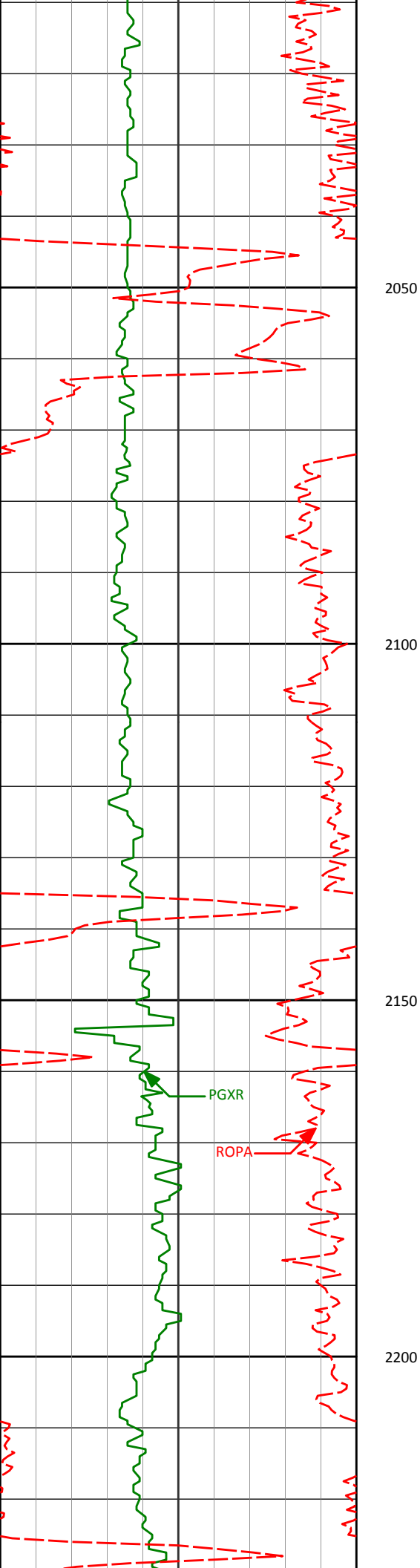
1882'

0.99°

46.98°

1881.94'

2.80'



2050

2100

2150

2200

PGXR

ROPA

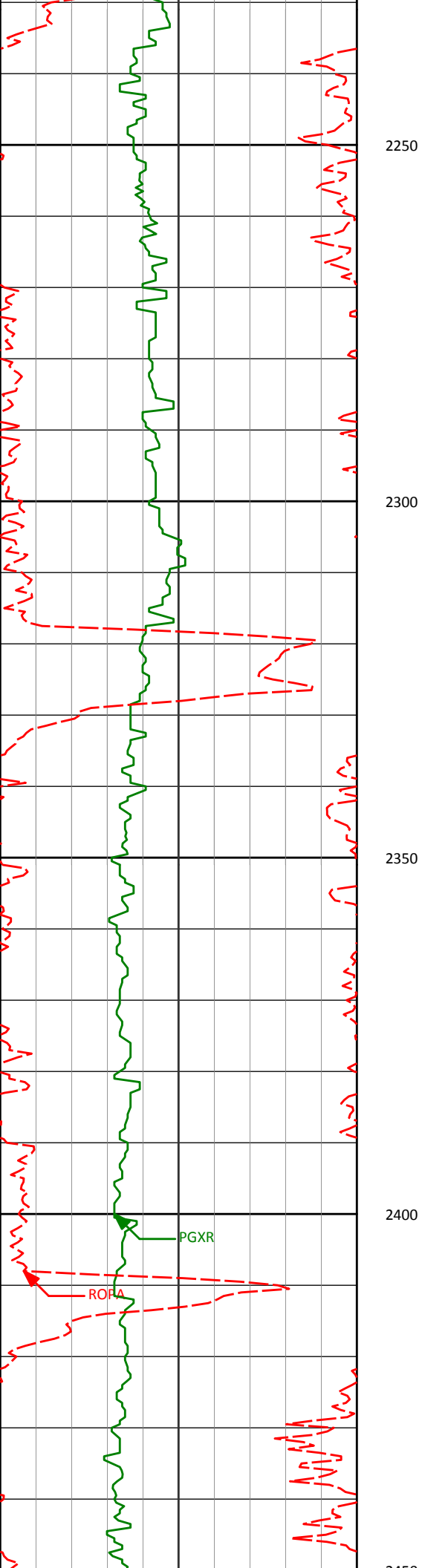
2064'

0.28°

280.88°

2063.94'

2.08'



2247'

0.72°

281.67°

2246.93'

3.64'

2250

2300

2350

2400

2430'

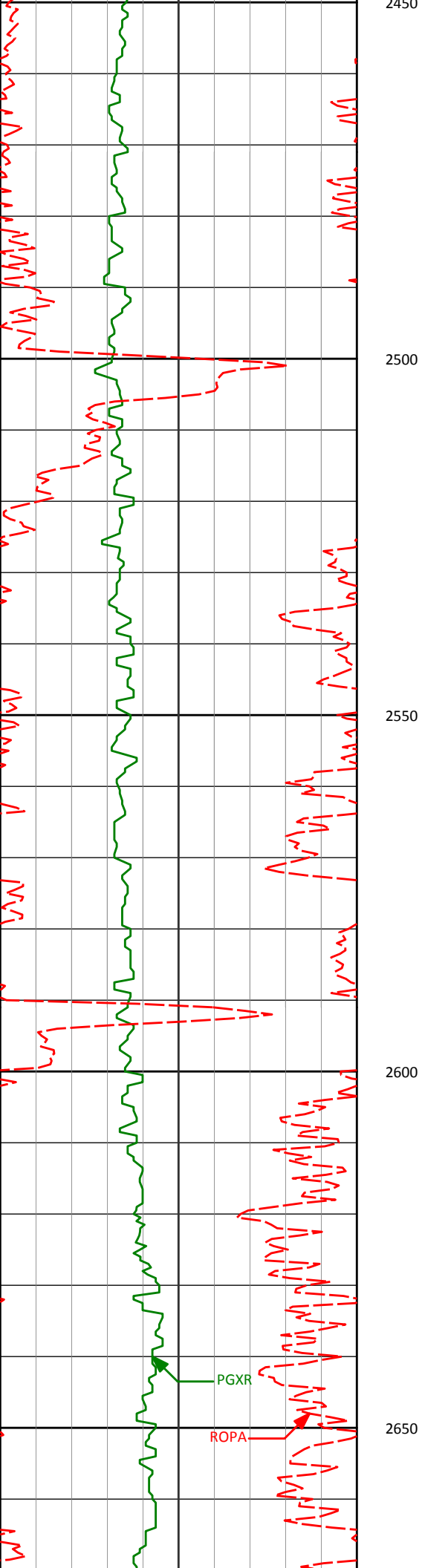
0.44°

186.02°

2429.92'

4.84'

2450



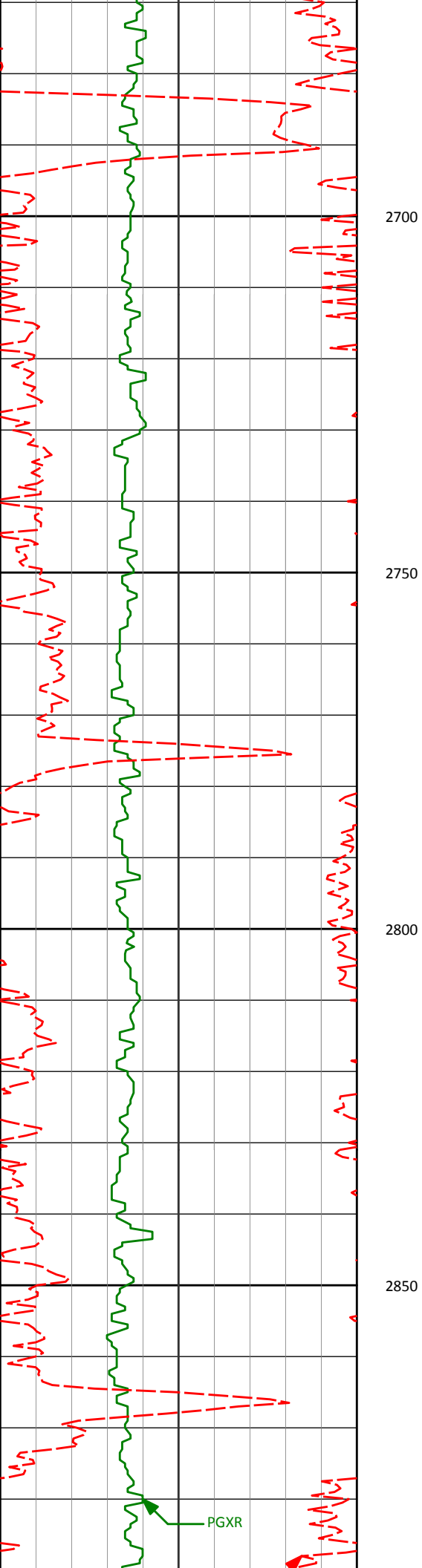
2612'

0.57°

212.53°

2611.92'

5.42'



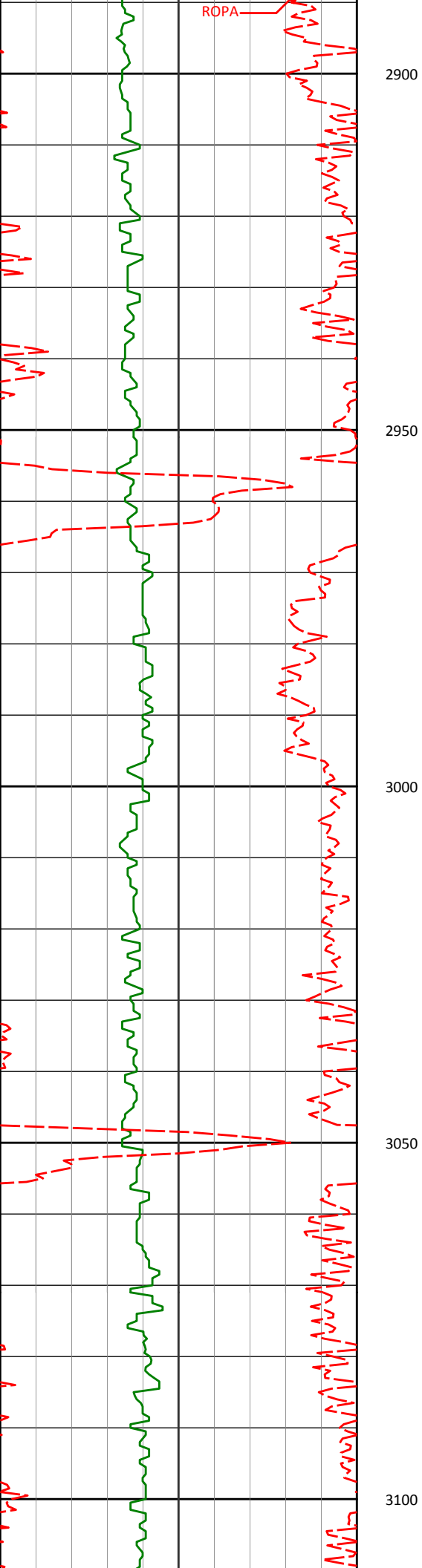
2795'

0.68°

37.39°

2794.91'

5.25'



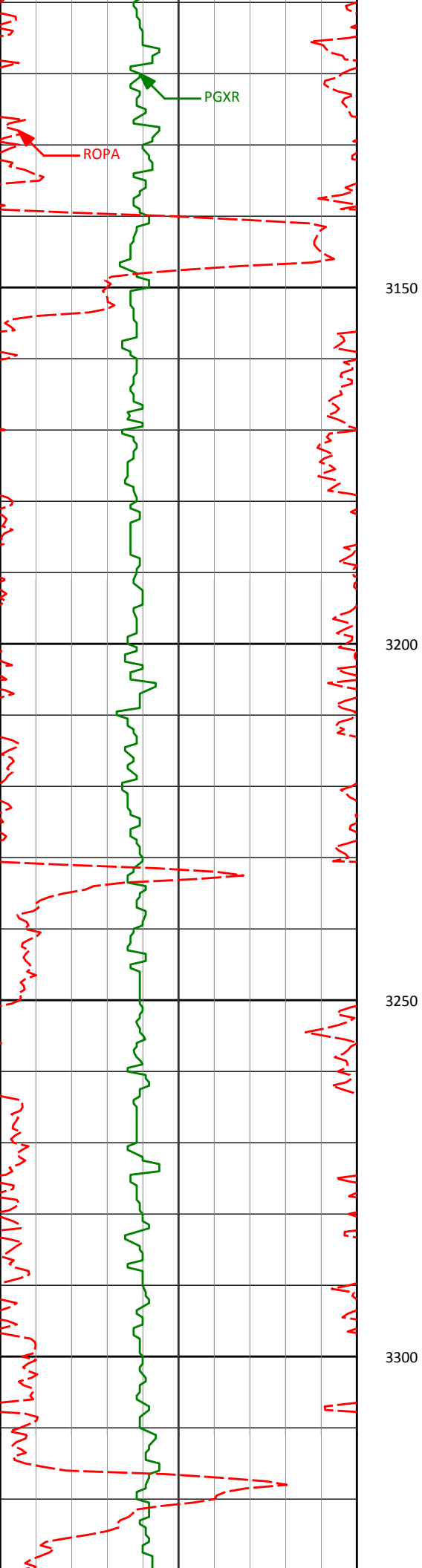
2978'

0.65°

29.80°

2977.90'

4.05'



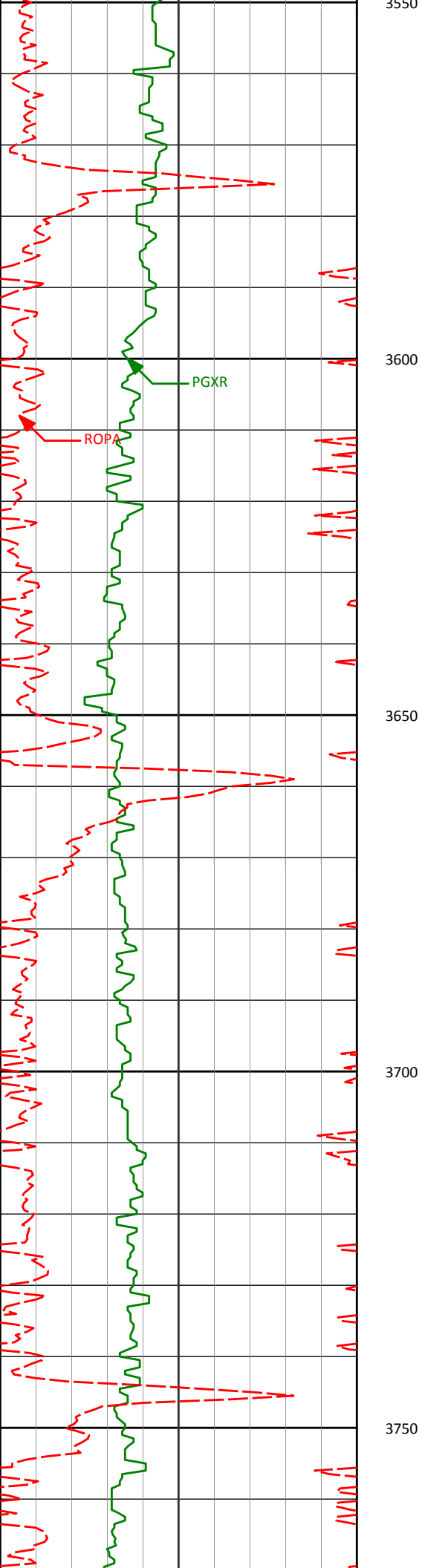
3160'

0.59°

52.19°

3159.89'

2.79'



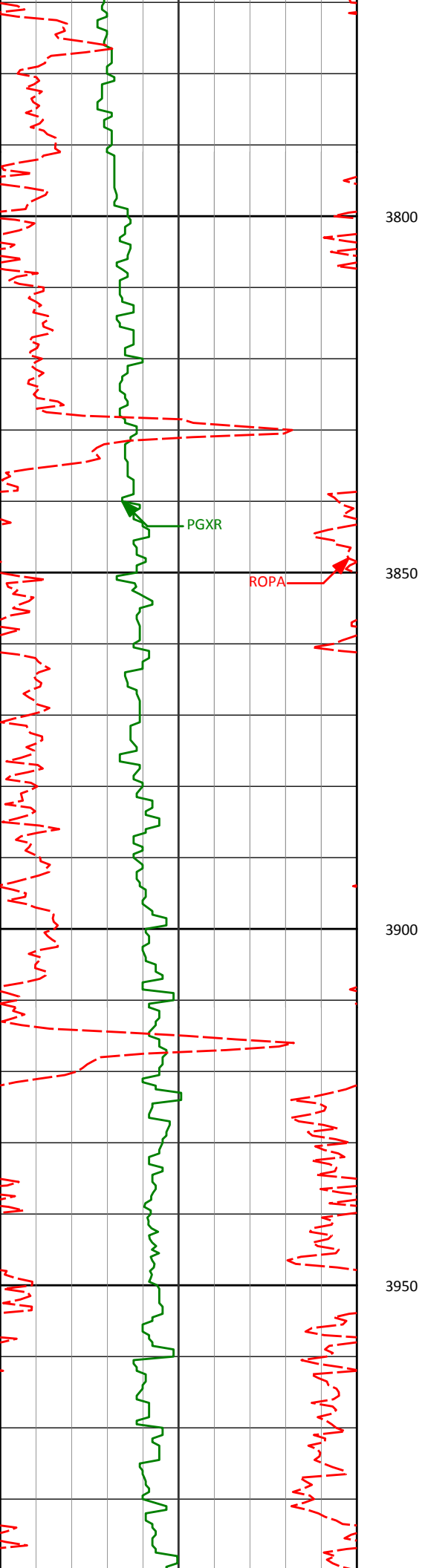
3673'

0.25°

309.40°

3672.87'

0.72'



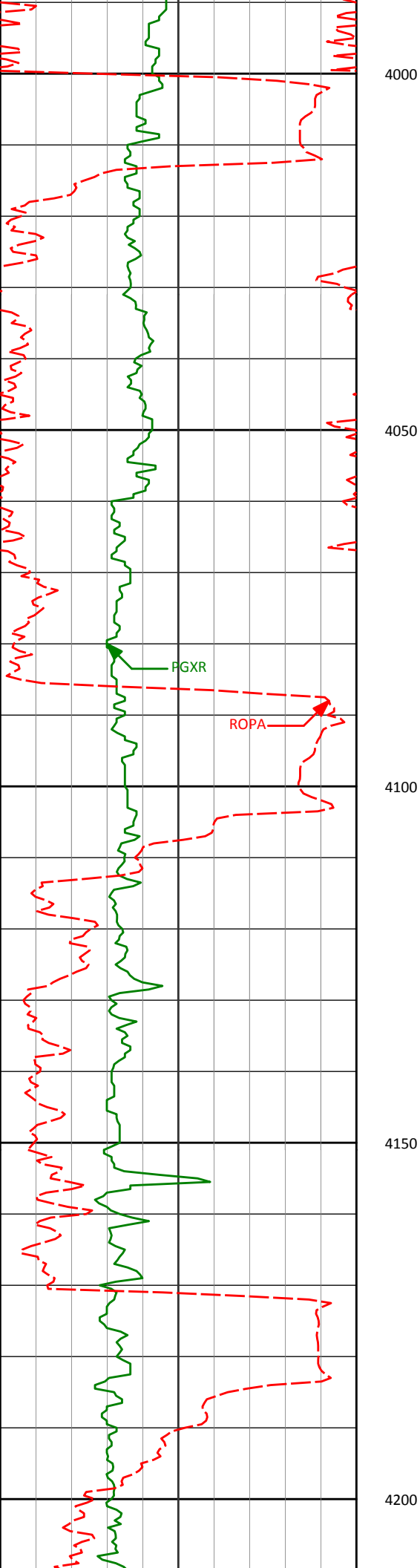
3845'

0.32°

292.37°

3844.87'

1.45'



4016'

1.45°

315.36°

4015.85'

3.40'

4050

4100

4150

4187'

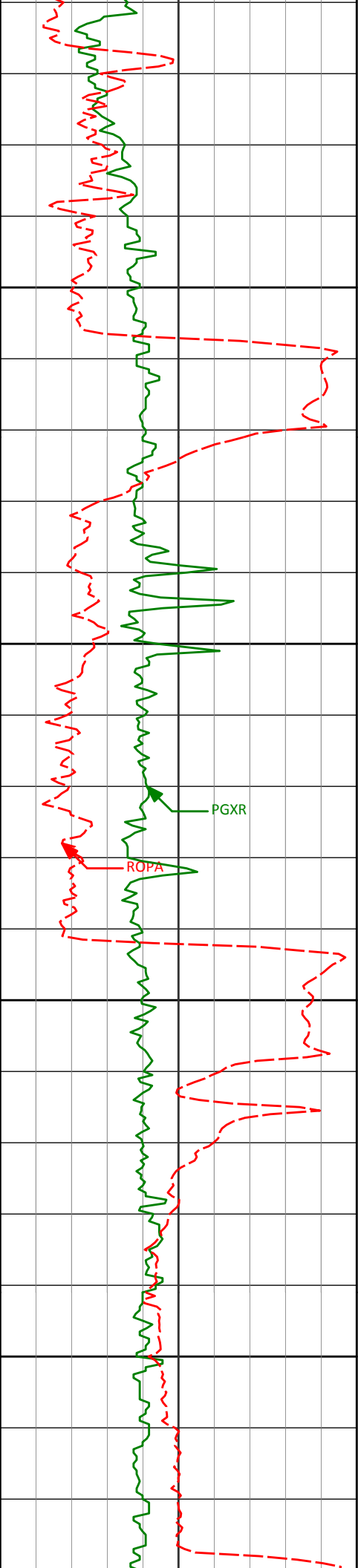
4.69°

332.62°

4186.58'

8.06'

4200



4250

4300

PGXR

ROPA

4350

4400

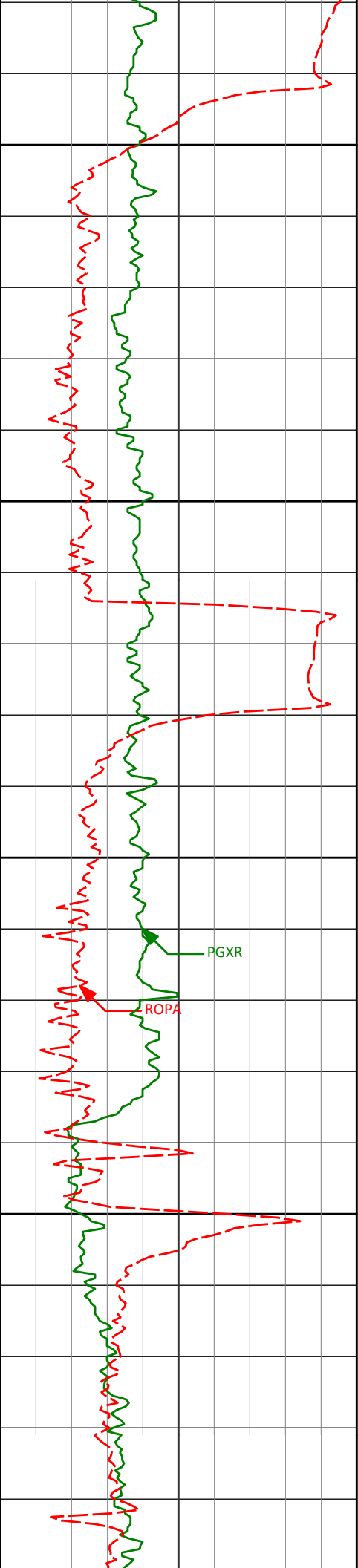
4358'

8.54°

349.32°

4356.43'

13.46'



4450

4500

4530'

11.40°

6.23°

4525.85'

13.72'

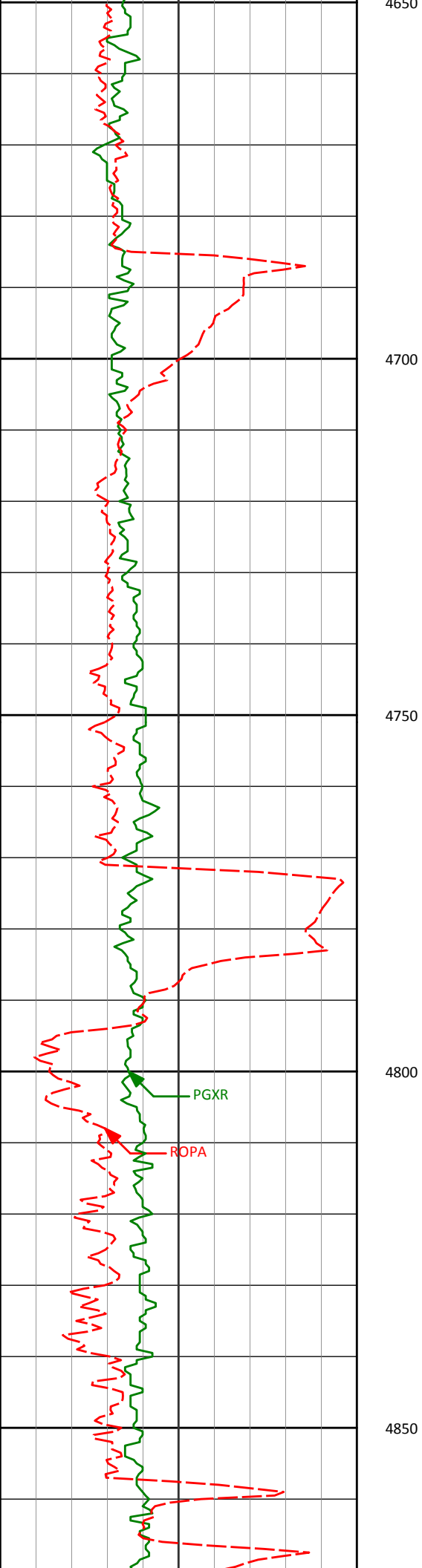
4550

PGXR

ROPA

4600

4650



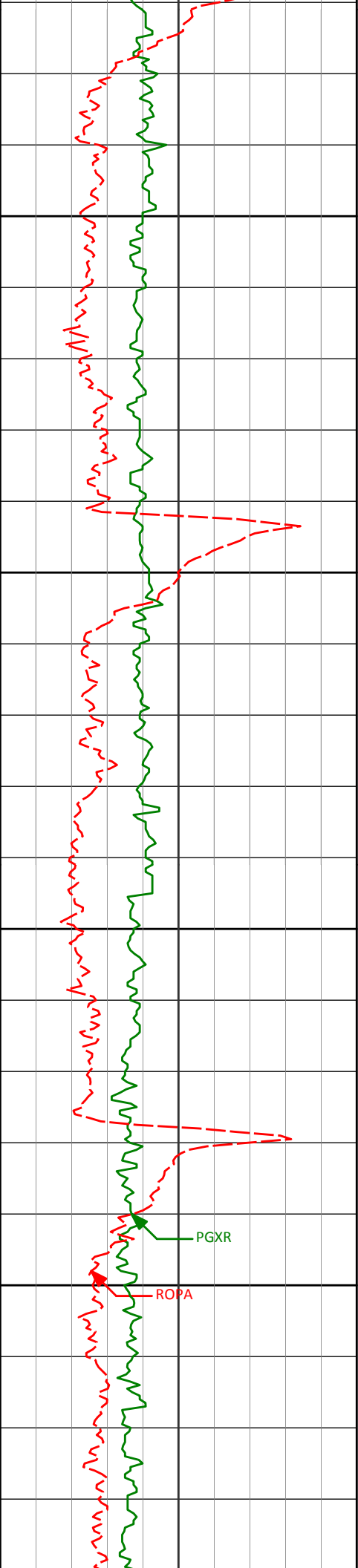
4701'

11.94°

9.73°

4693.31'

8.58'



4900

4950

5000

5050

PGXR

ROPA

4873'

11.07°

1.58°

4861.87'

4.81'

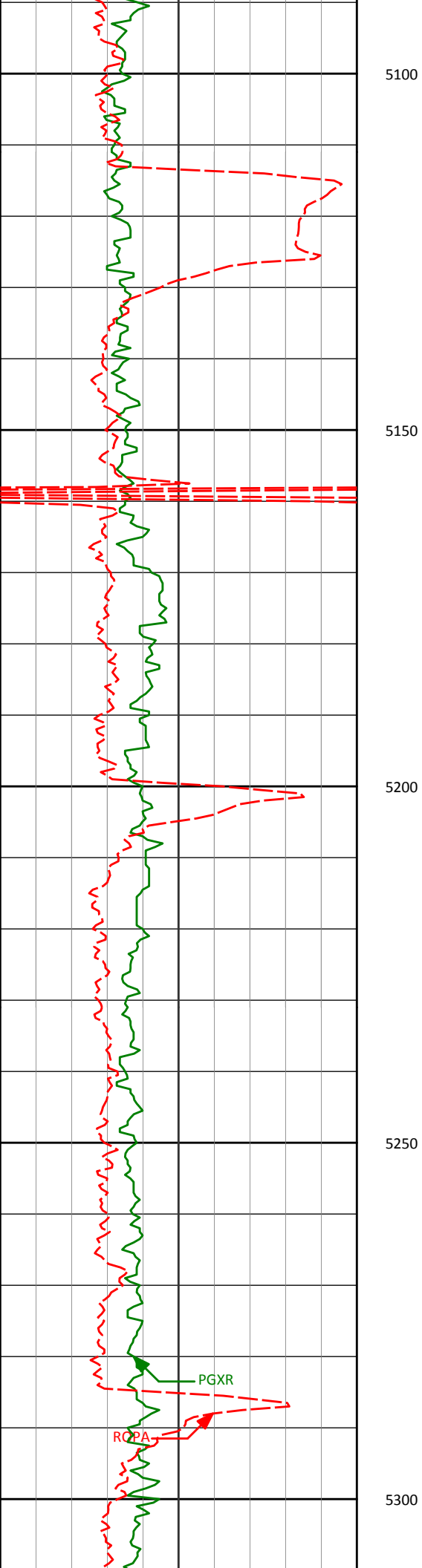
5044'

10.16°

359.31°

5029.94'

4.25'



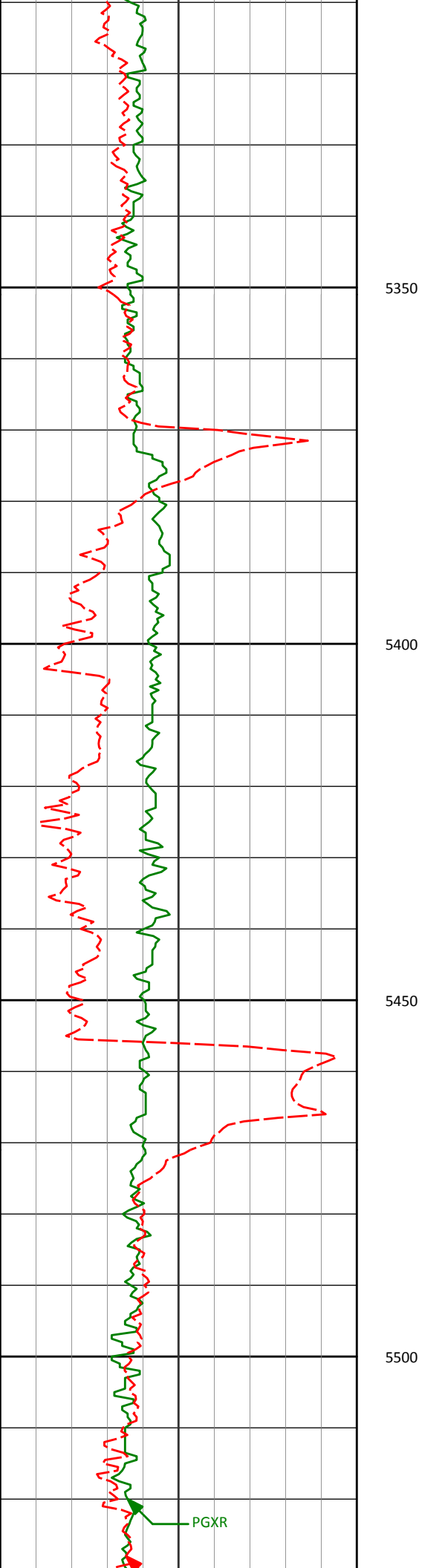
5215'

11.24°

0.60°

5197.96'

3.97'



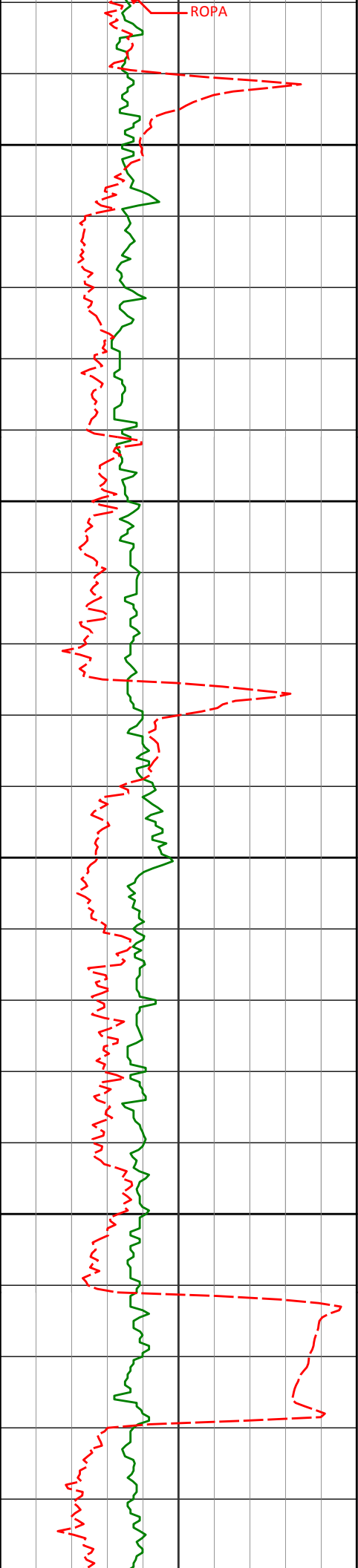
5386'

10.19°

359.72°

5365.98'

3.58'



5550

5600

5650

5700

5750

5558'

10.79°

3.19°

5535.11'

2.48'

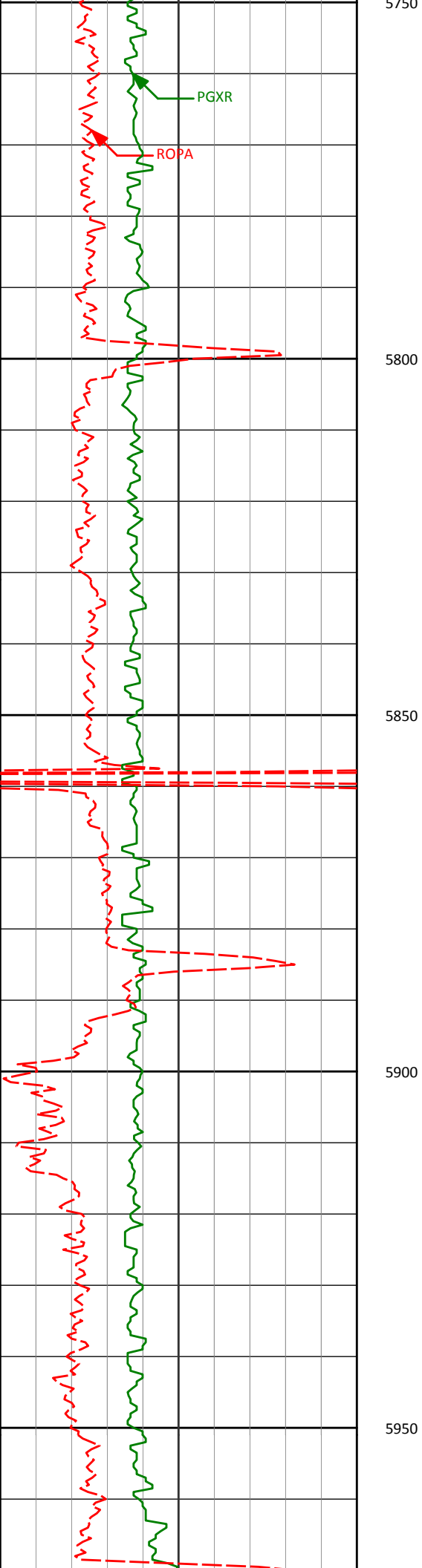
5729'

10.70°

358.65°

5703.11'

1.67'



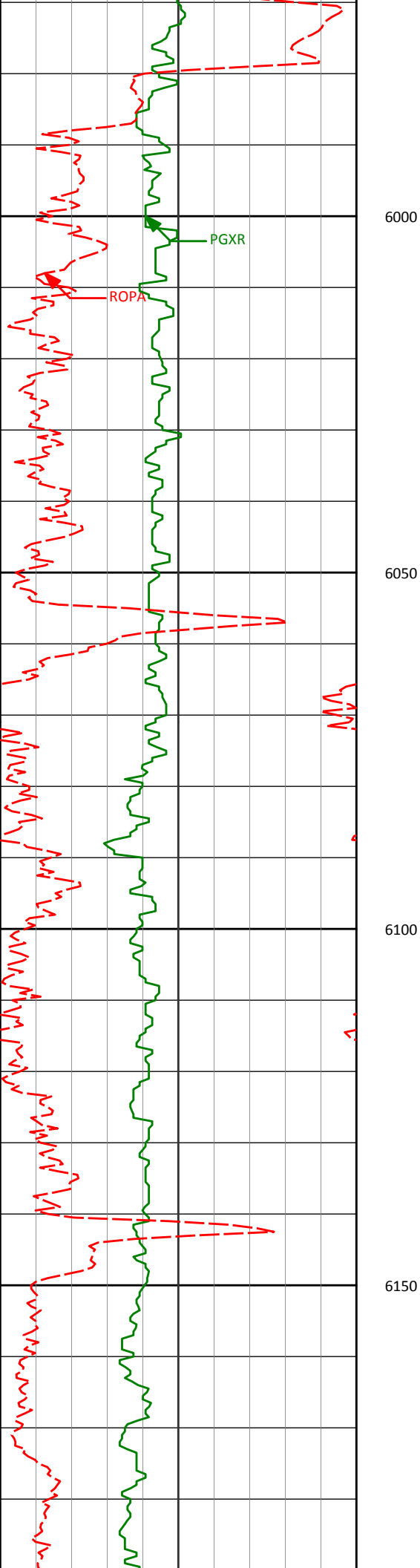
5900'

9.21°

352.42°

5871.54'

3.59'



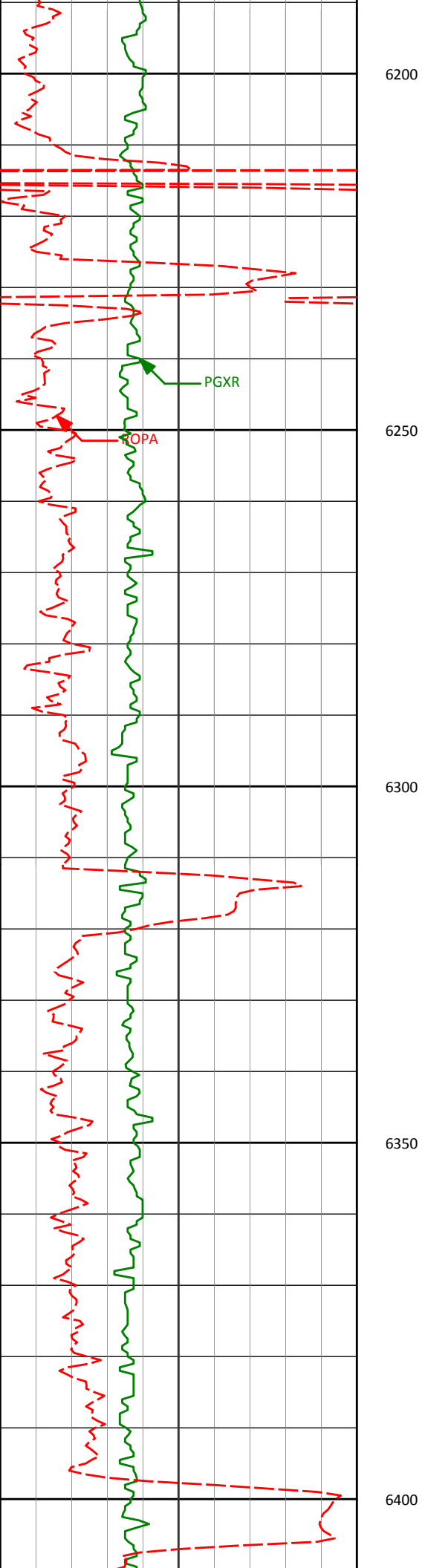
6070'

7.08°

3.94°

6039.82'

4.44'



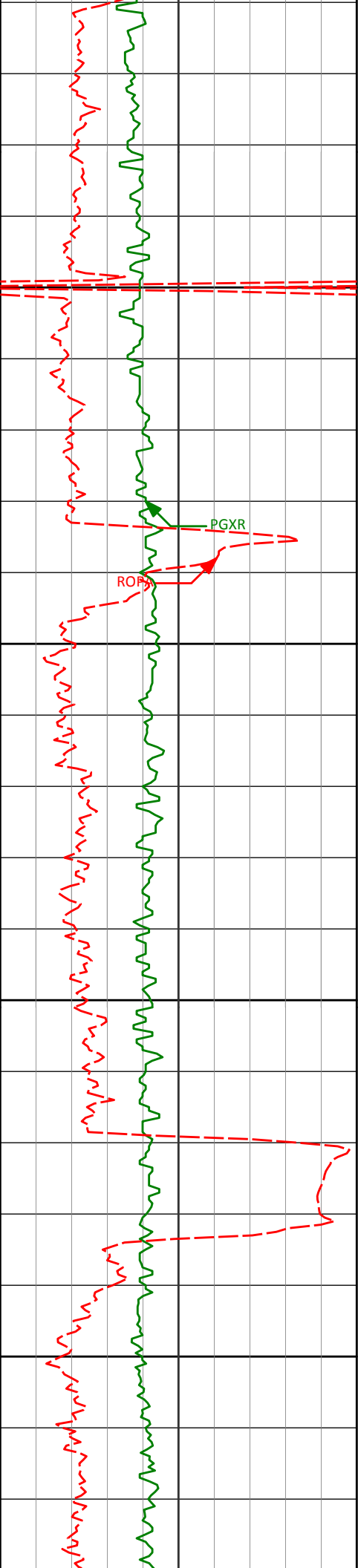
6242'

4.86°

359.72°

6210.88'

3.59'



6450

6500

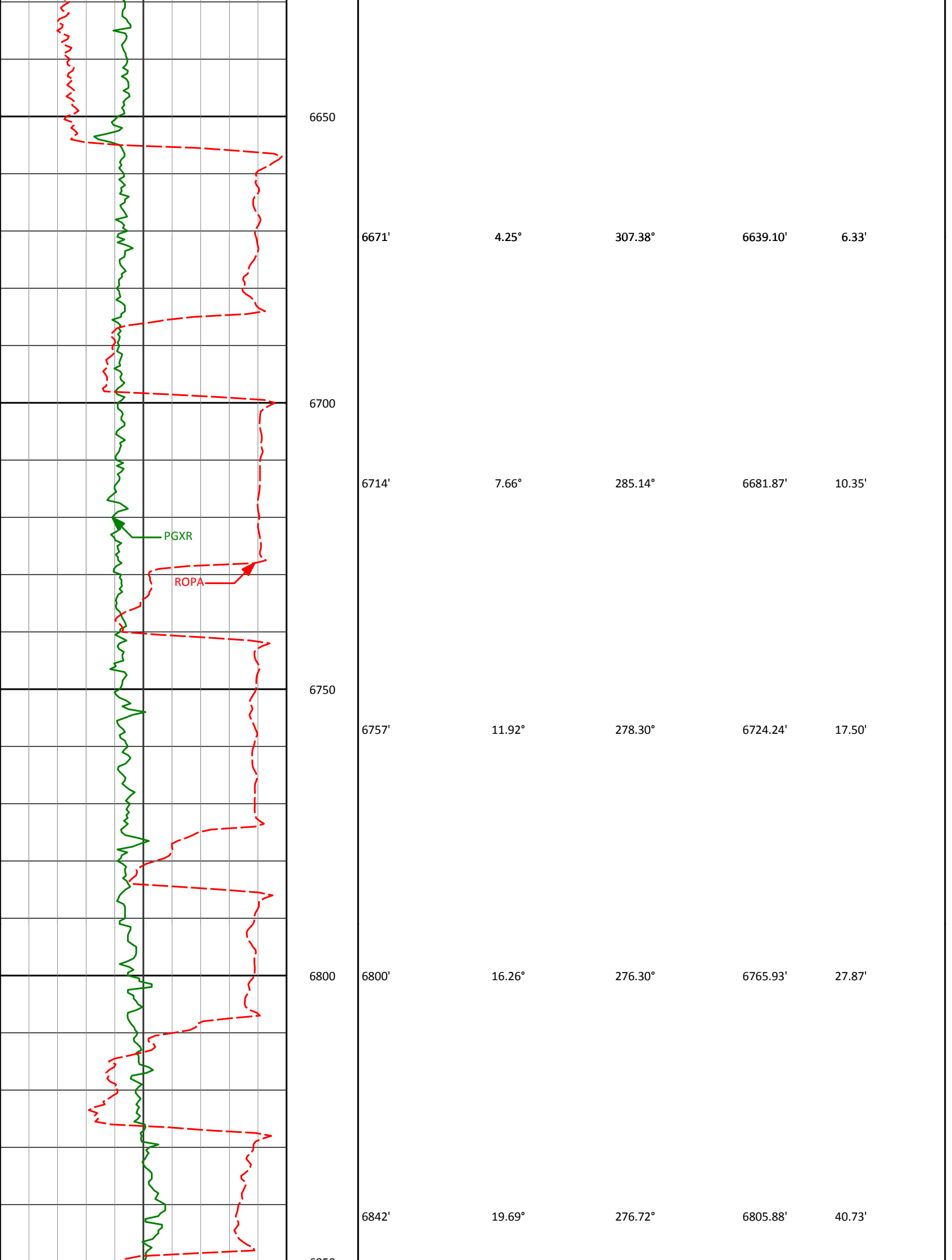
6550

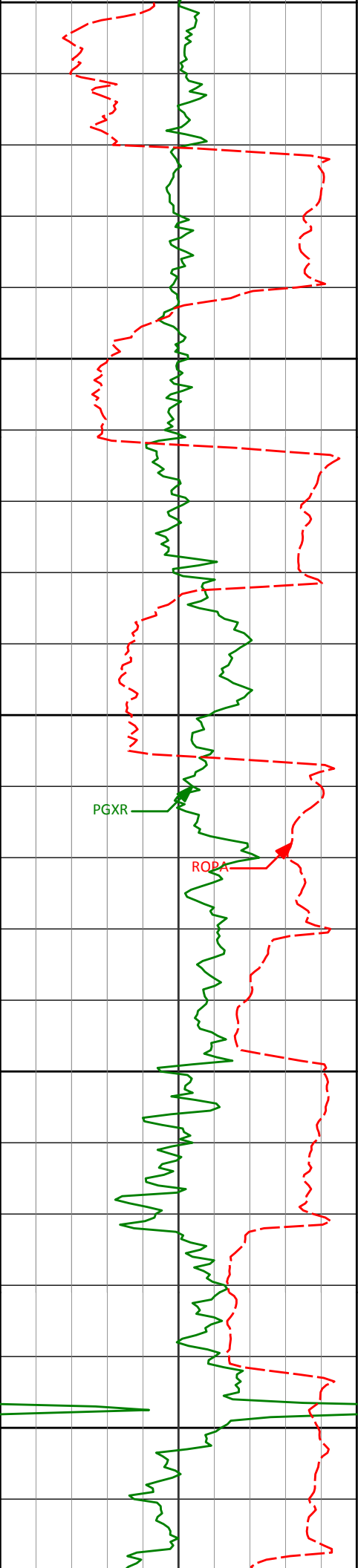
6600

6414' 3.42° 3.63° 6382.43' 3.19'

6585' 2.40° 339.47° 6553.21' 4.04'

6628' 2.37° 335.43° 6596.17' 4.71'





6850

6885'	22.15°	274.86°	6846.04'	55.99'
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6900

6928'	24.77°	271.16°	6885.48'	73.07'
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6950

PGXR

ROBA

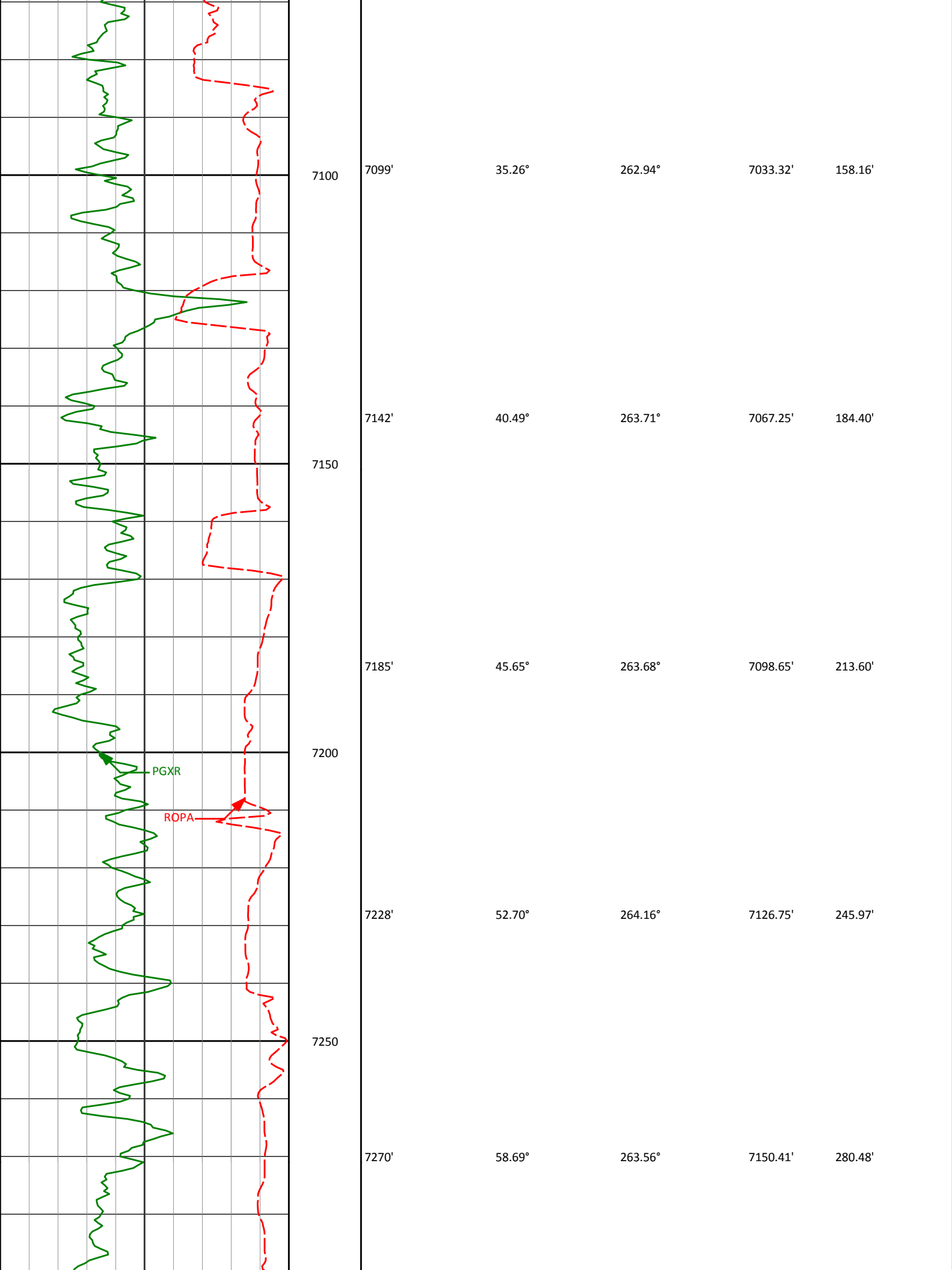
6971'	27.34°	268.43°	6924.11'	91.95'
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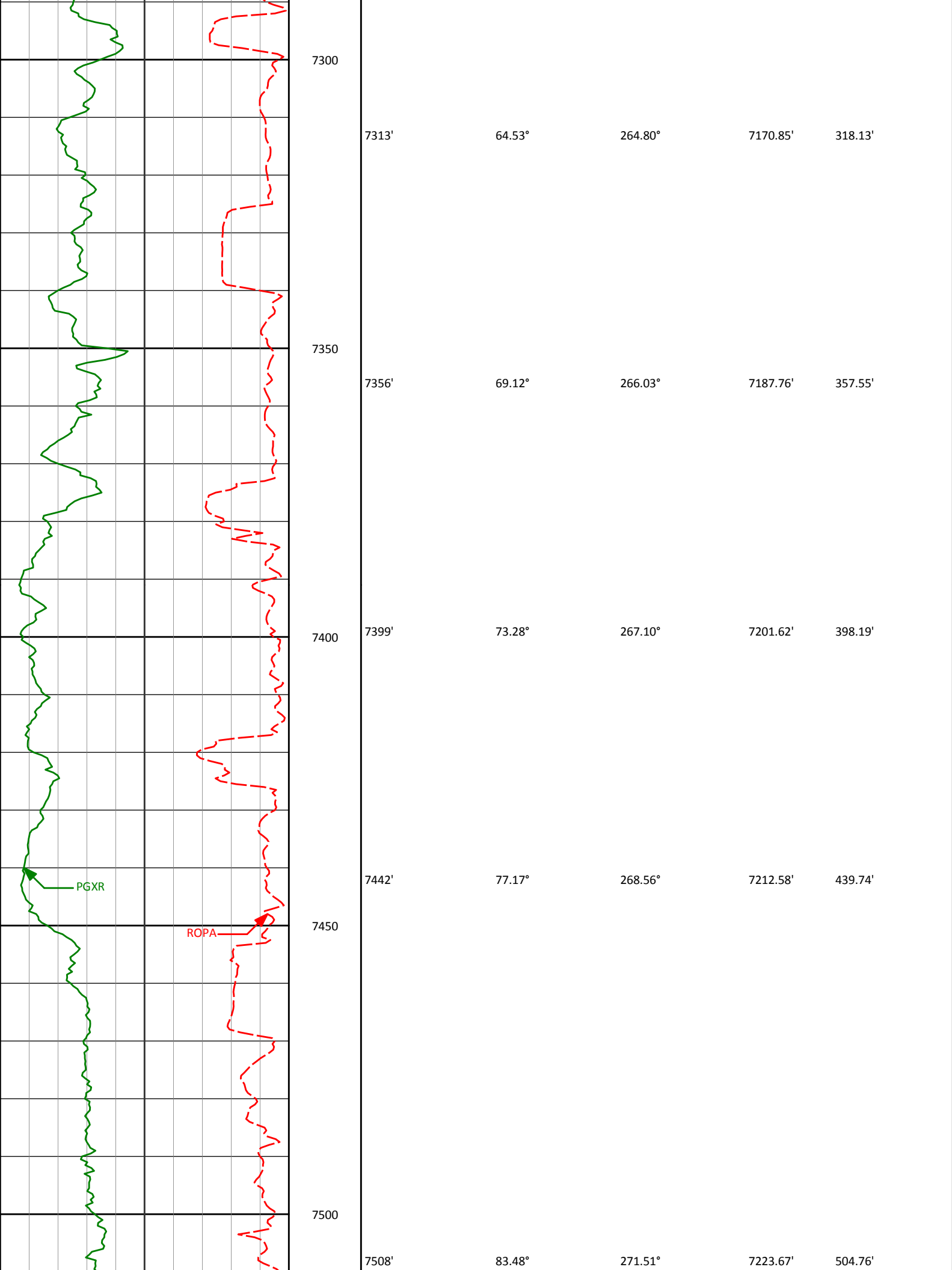
7000

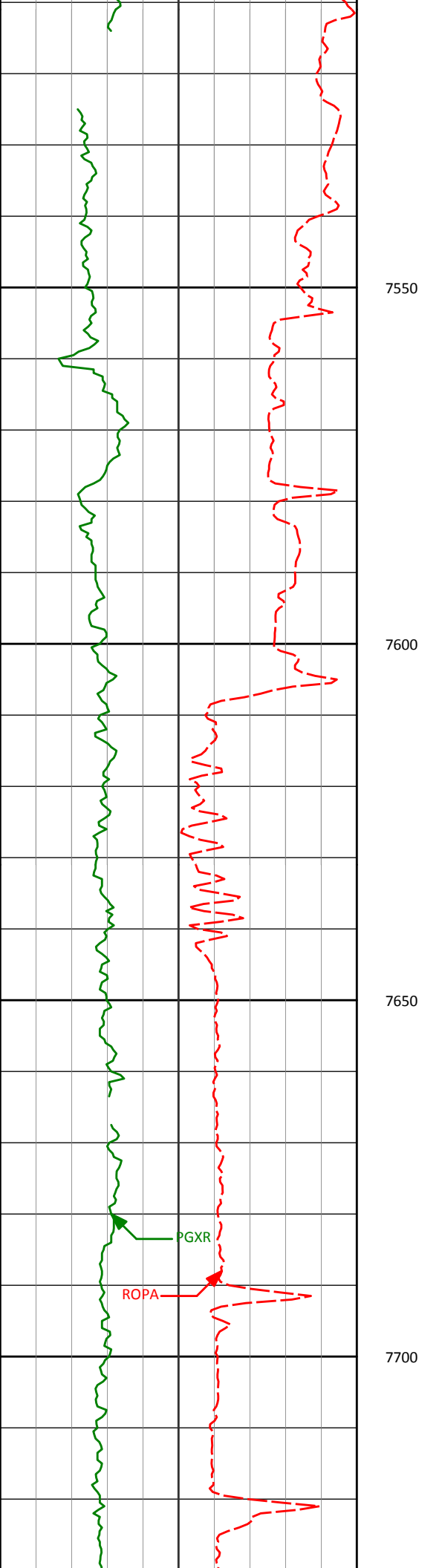
7013'	29.91°	264.37°	6960.98'	112.03'
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7050

7056'	32.82°	262.02°	6997.69'	134.27'
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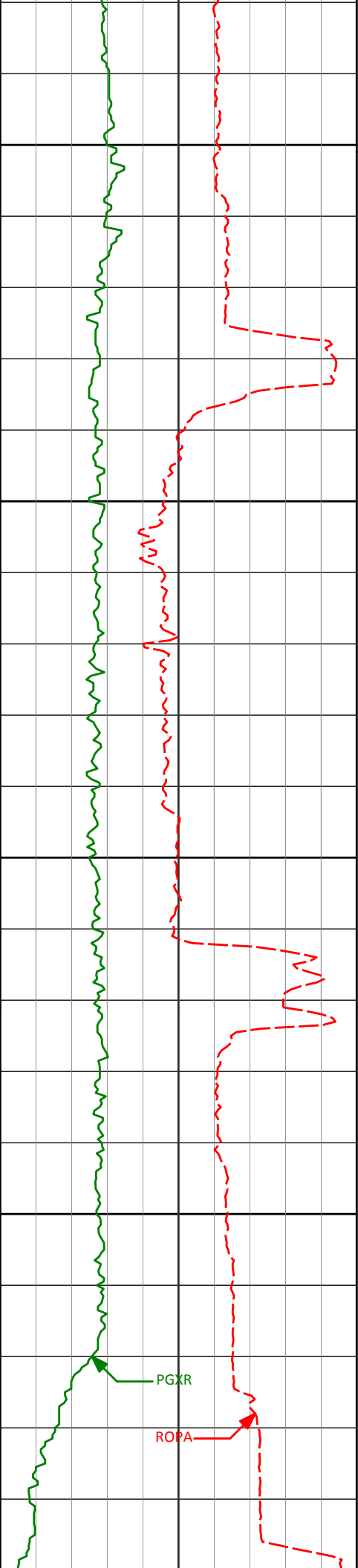
7625'

90.25°

275.14°

7230.07'

621.24'



7750

Casing @ 7568' MD

Run 0200

7800

7850

7900

PGXR

ROPA

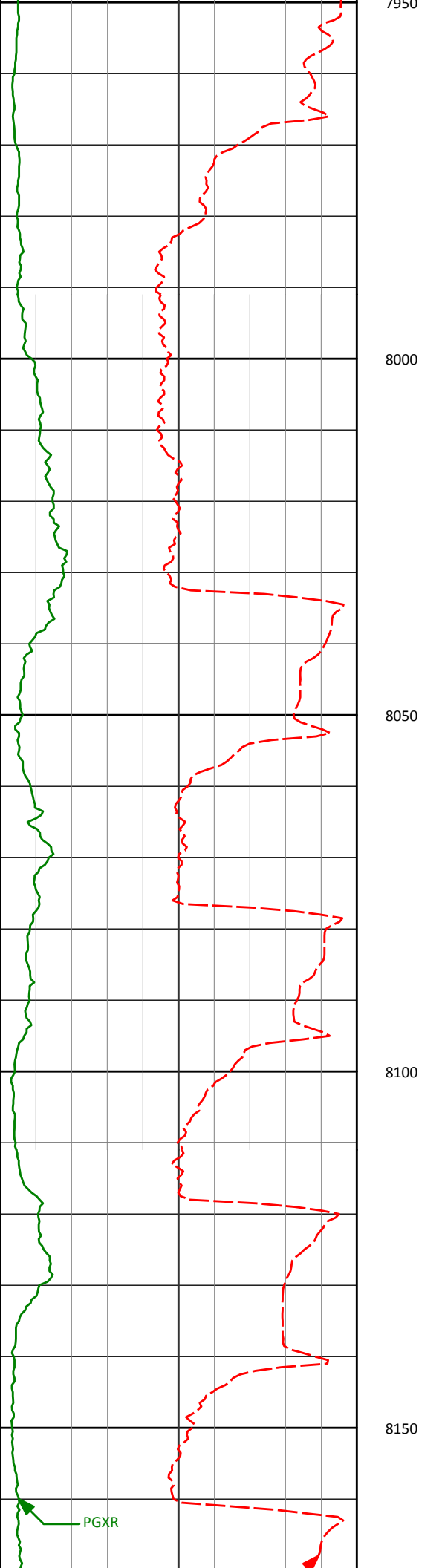
7796'

92.62°

274.08°

7225.79'

791.48'



7967'

92.56°

271.86°

7218.06'

961.98'

8000

8050

8100

8138'

93.09°

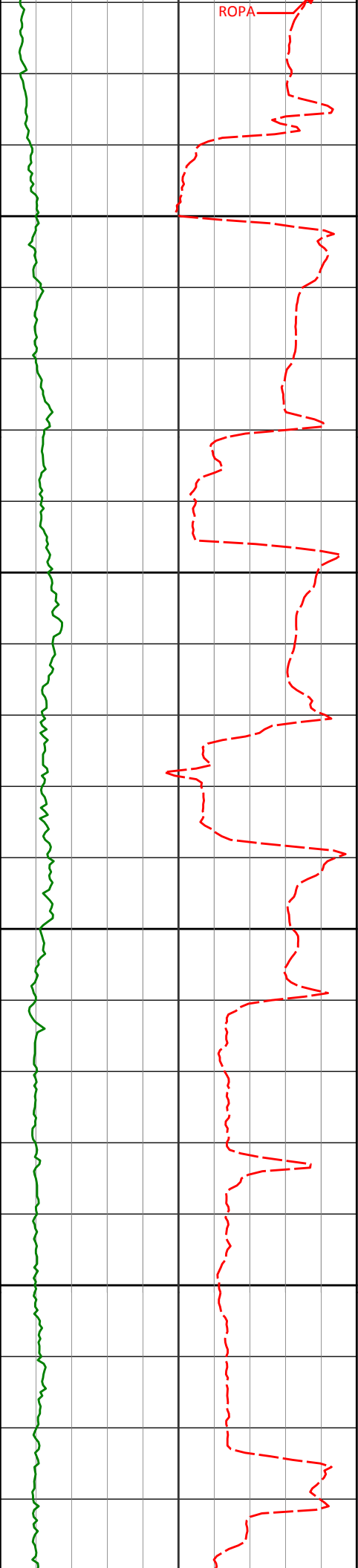
268.56°

7209.63'

1132.73'

8150

PGXR



8200

8224'

91.54°

265.85°

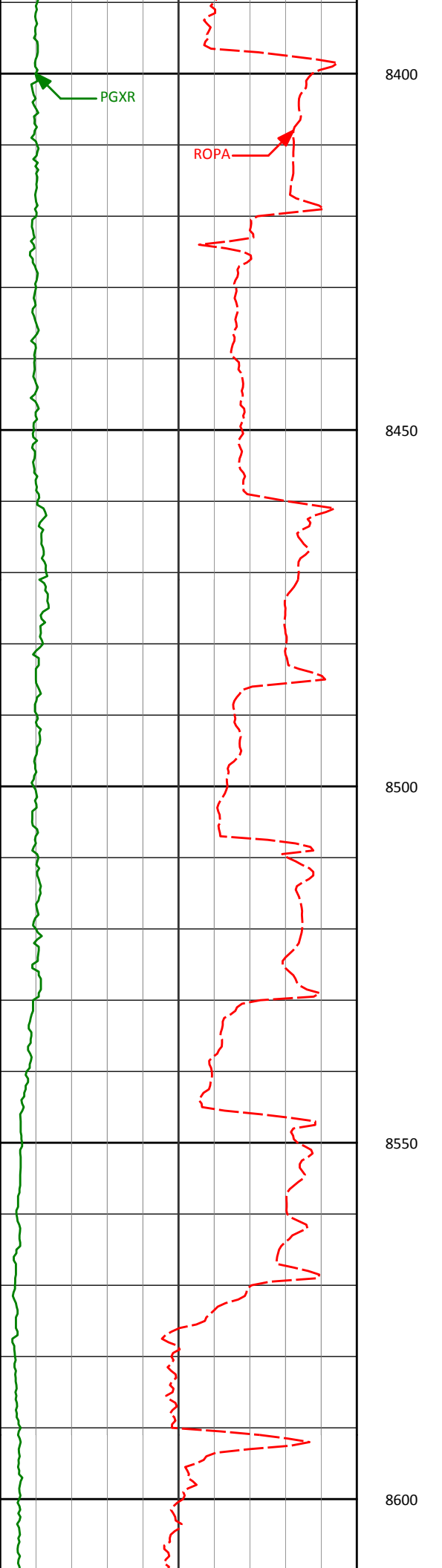
7206.15'

1218.59'

8250

8300

8350



8395'

90.03°

264.15°

7203.81'

1389.04'

8400

8450

8500

8550

8600

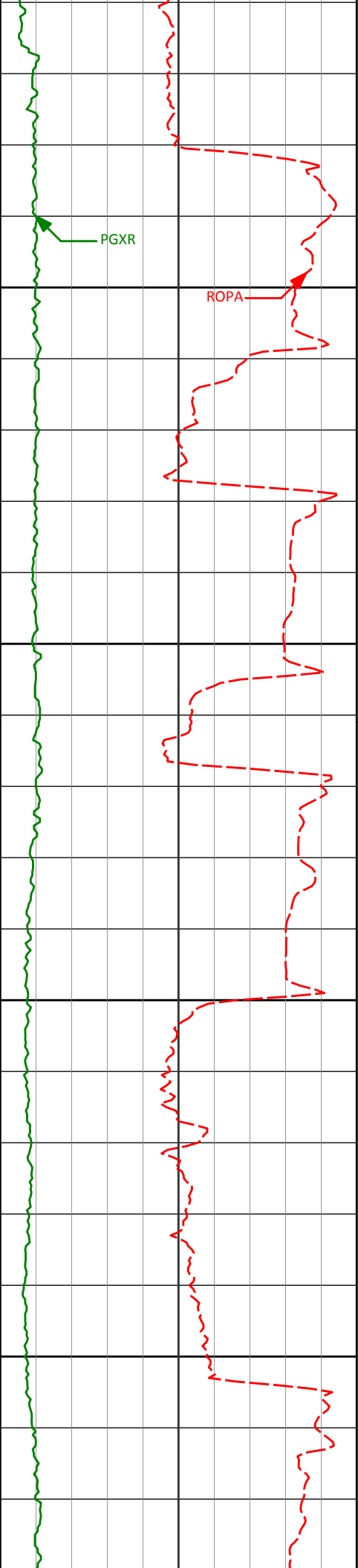
8566'

88.73°

266.24°

7205.66'

1559.53'



8650

8700

8737'

8750

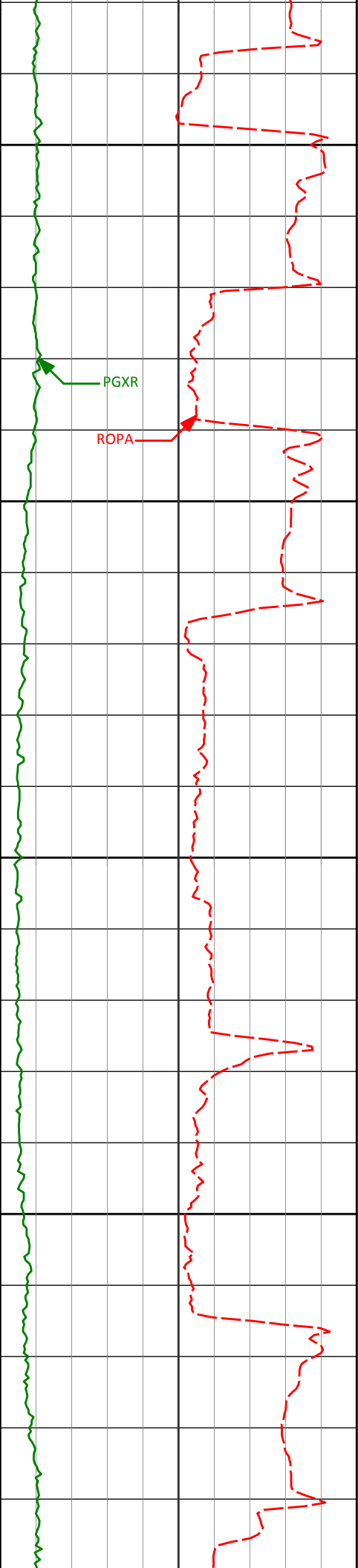
8800

88.55°

269.38°

7209.72'

1730.39'



8850

8900

8950

9000

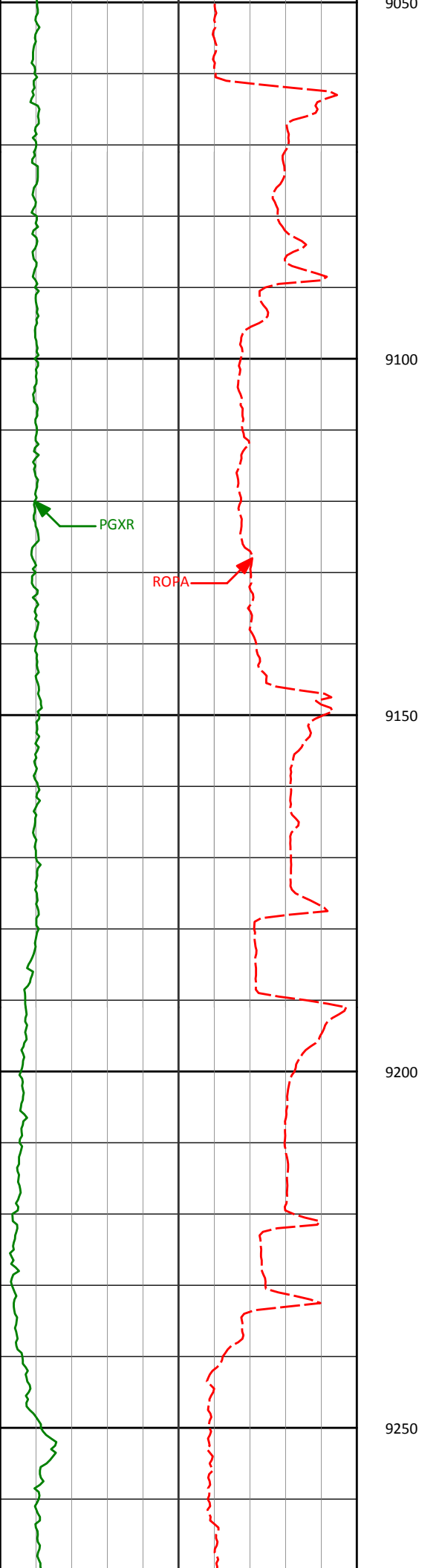
8909'

87.93°

271.97°

7215.00'

1902.26'



9080'

89.26°

271.52°

7219.20'

2073.07'

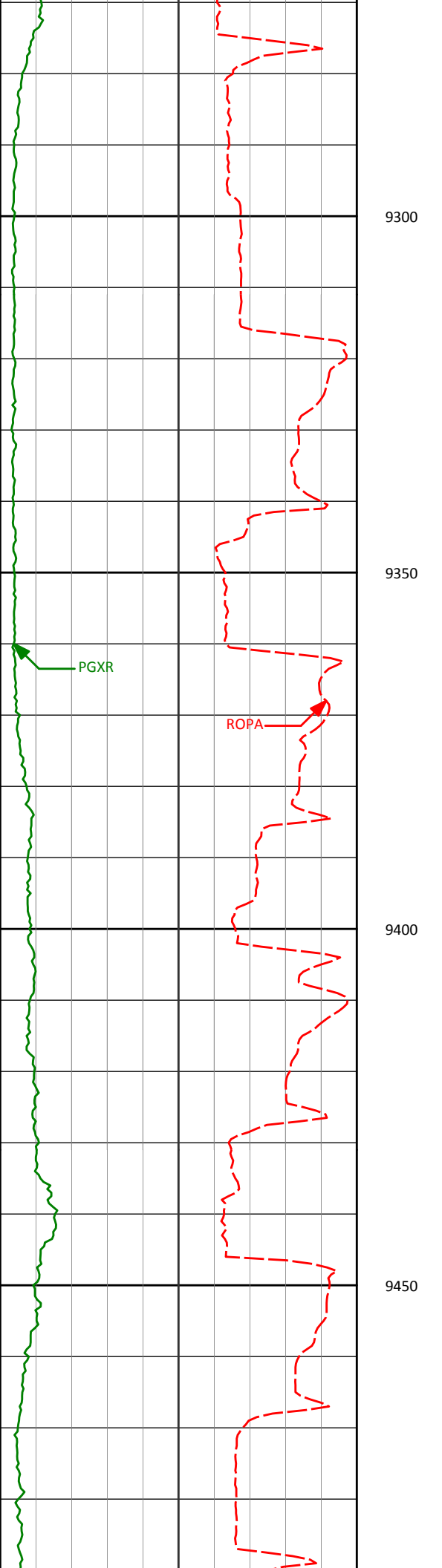
9252'

87.41°

267.92°

7224.20'

2244.96'



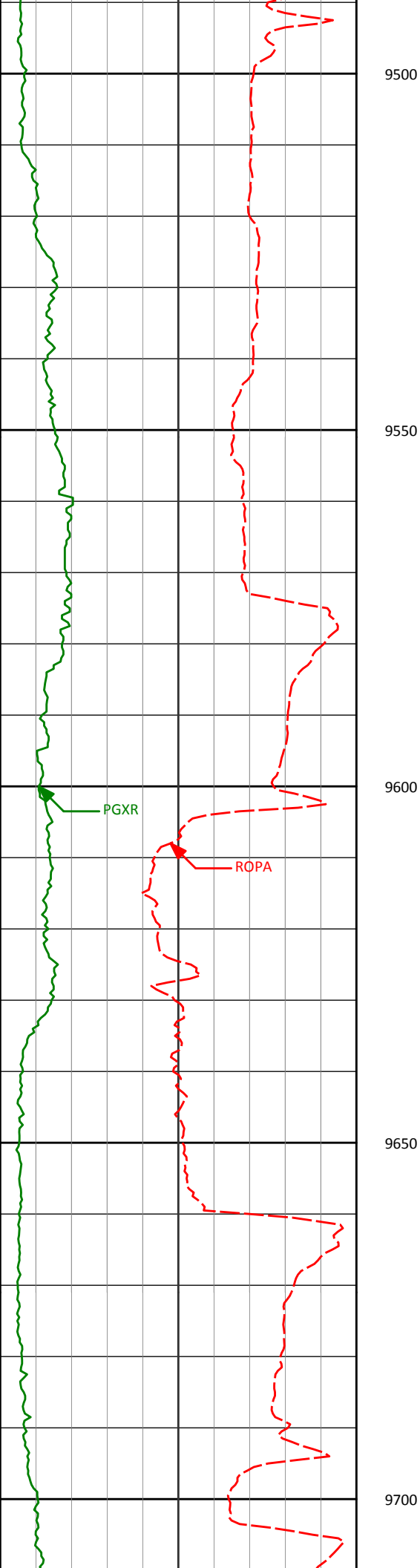
9423'

87.68°

268.68°

7231.52'

2415.76'



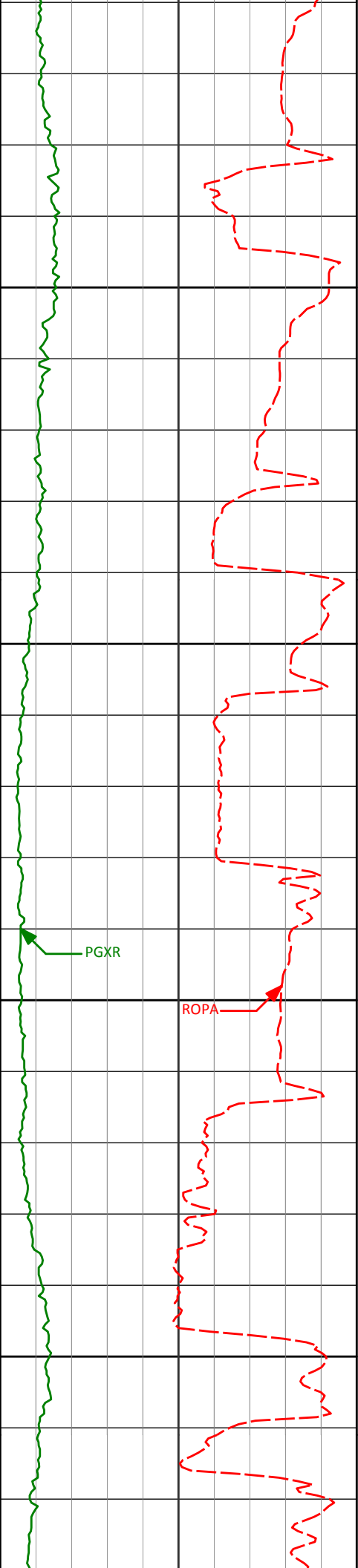
9595'

90.62°

270.39°

7234.07'

2587.72'



9750

9766'

88.18°

270.25°

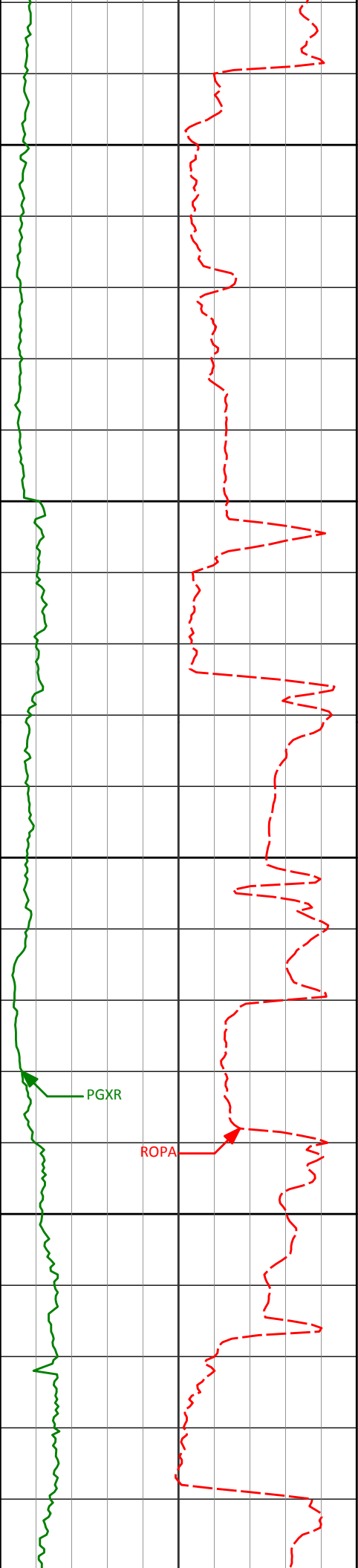
7235.86'

2758.68'

9800

9850

9900



9950

10000

10050

10100

9937'

89.69°

273.37°

7239.04'

2929.48'

PGXR

ROPA

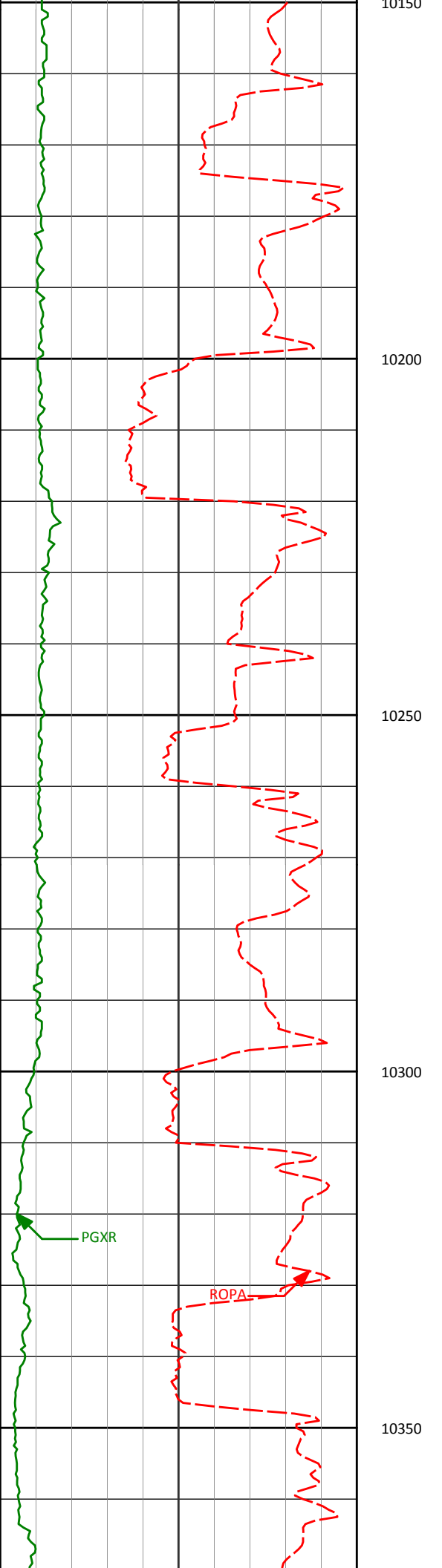
10108'

90.22°

273.56°

7239.18'

3100.07'



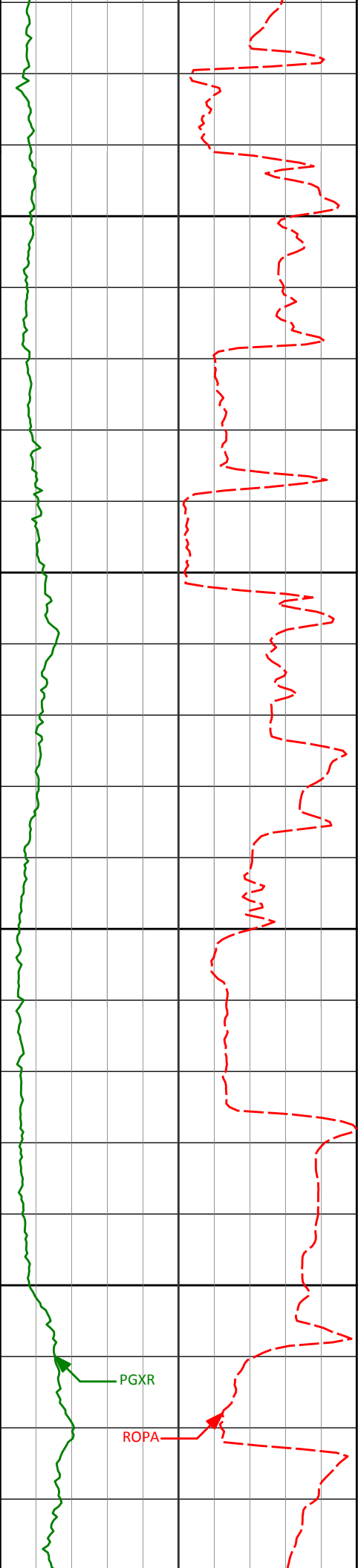
10279'

88.98°

271.97°

7240.37'

3270.77'



10400

10450

10500

10550

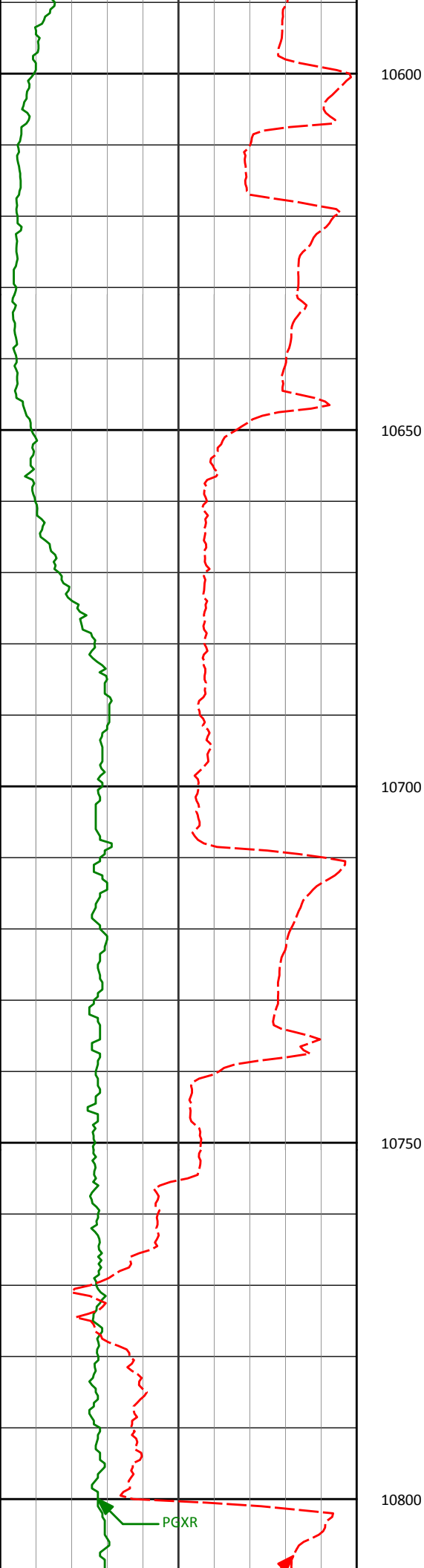
10462'

87.50°

270.32°

7245.99'

3453.60'



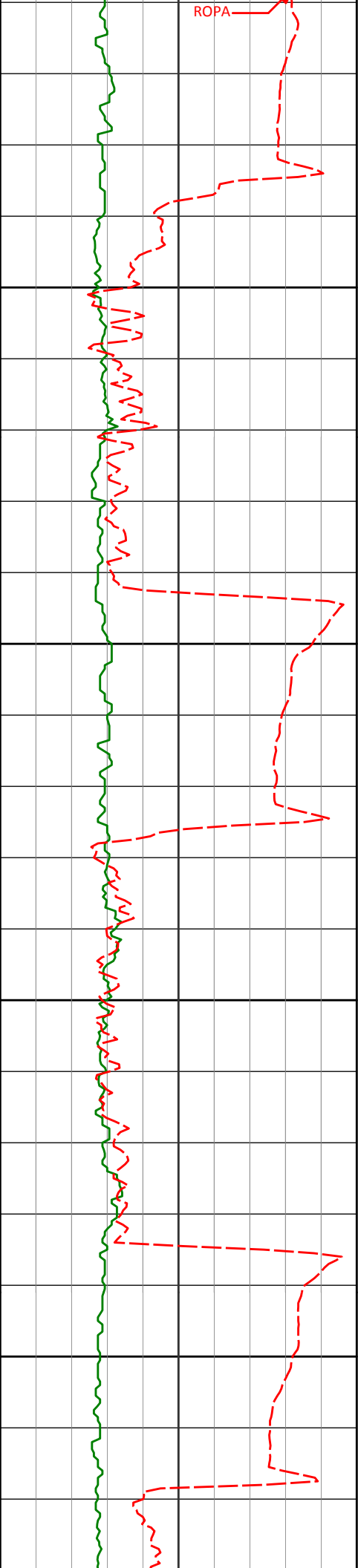
10645'

85.87°

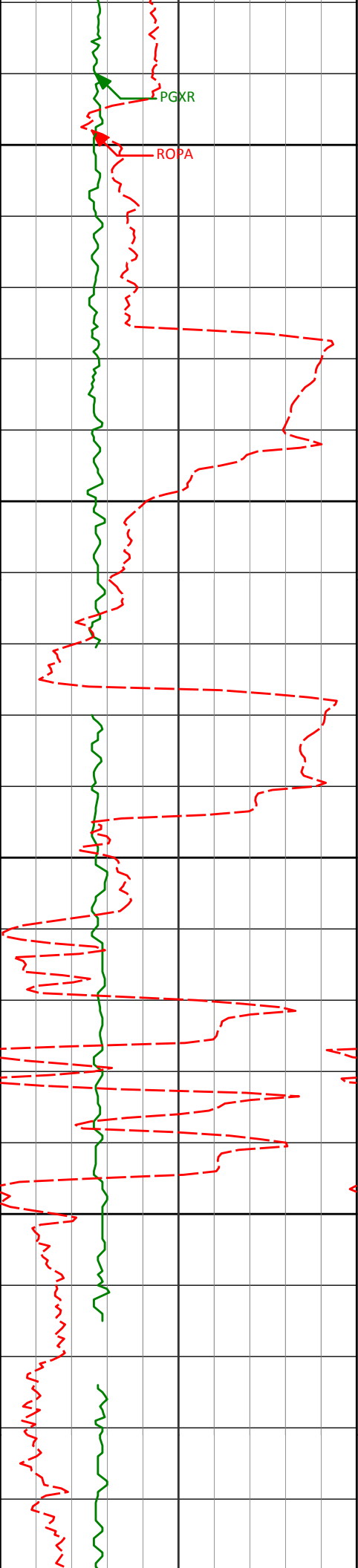
270.70°

7256.57'

3636.26'



10827'	86.49°	270.36°	7268.70'	3817.82'
10850				
10900				
10950				
11000				
11010'	89.57°	270.13°	7274.99'	4000.67'



11050

11100

11150

11200

11250

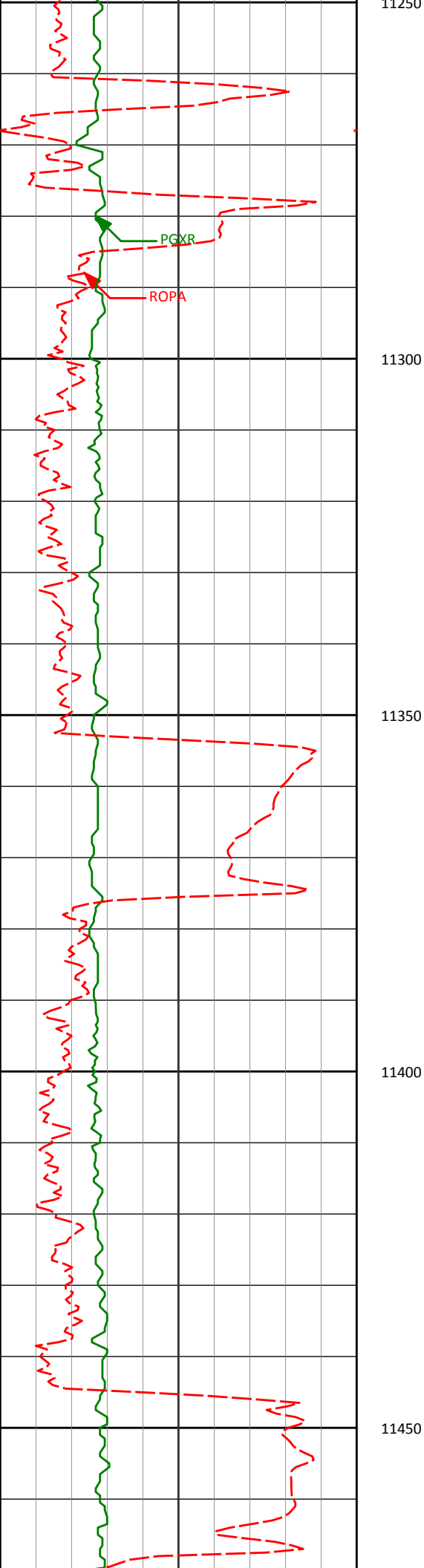
11193'

88.80°

268.18°

7277.59'

4183.64'



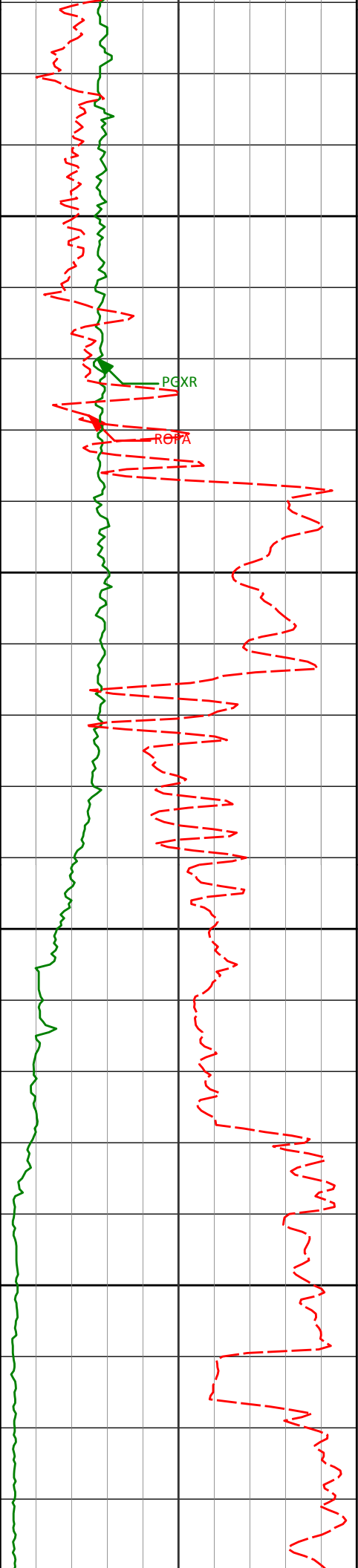
11376'

90.68°

267.92°

7278.42'

4366.58'



11500

11550

11600

11650

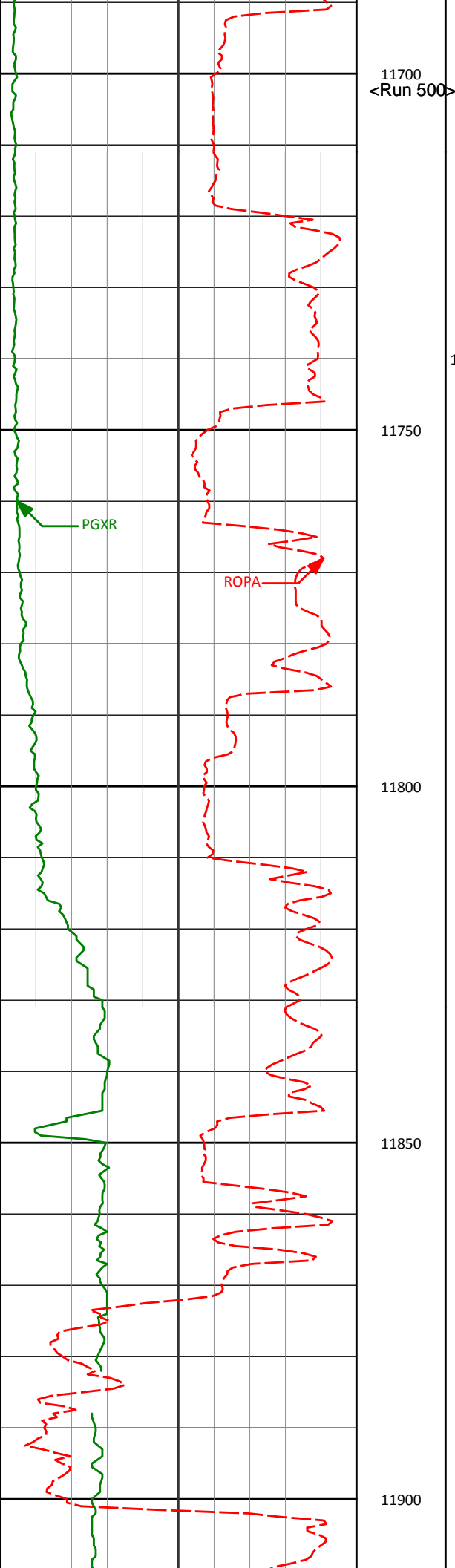
11559'

90.37°

267.09°

7276.75'

4549.46'



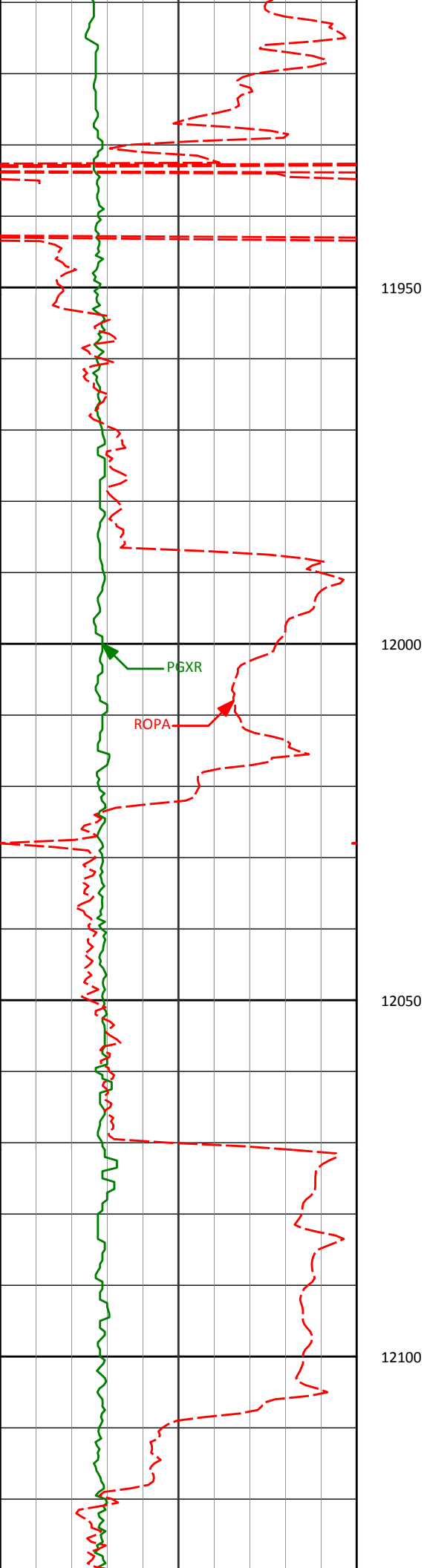
11740'

88.86°

266.55°

7277.96'

4730.25'



11917'

86.36°

266.40°

7285.34'

4906.84'

11950

12000

12050

12089'

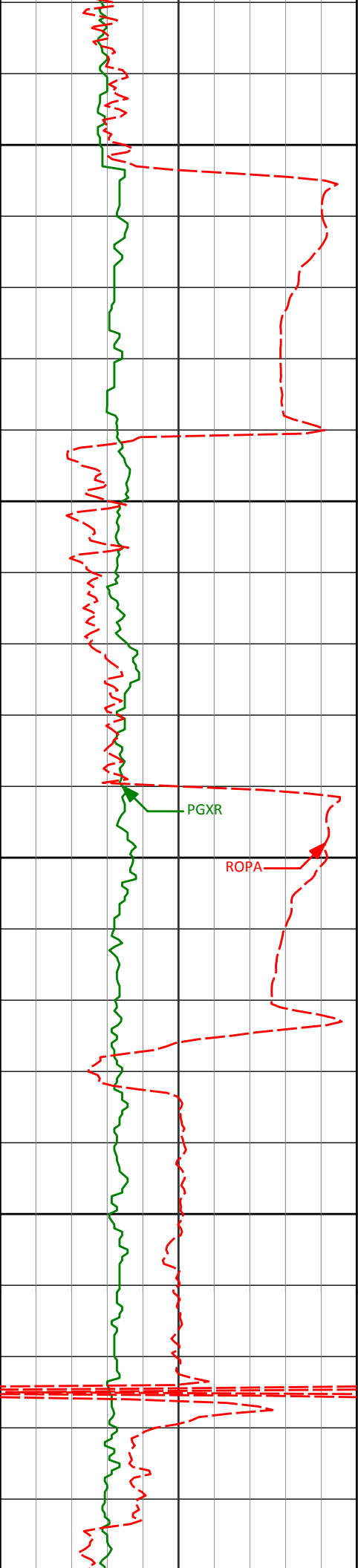
87.47°

268.07°

7294.60'

5078.45'

12100



12150

12200

12250

12300

12350

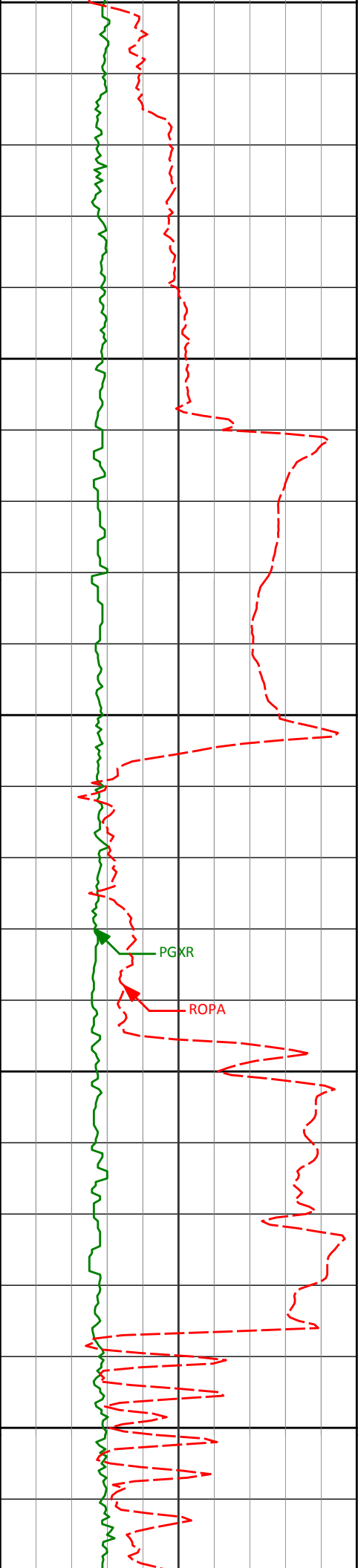
12260'

90.40°

270.26°

7297.78'

5249.39'



12350

12400

12431'

12450

12500

12550

92.06°

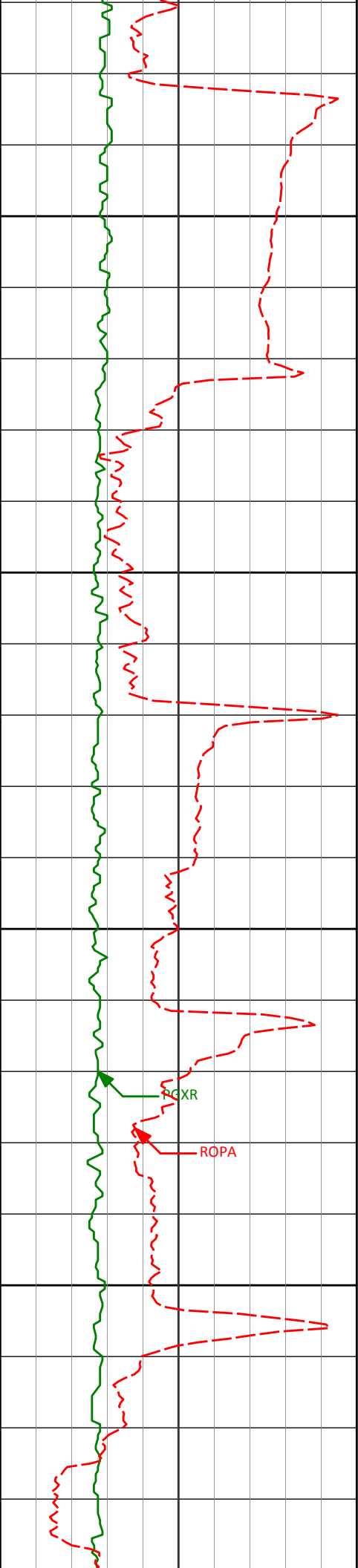
269.19°

7294.11'

5420.34'

PGXR

ROPA



12600

12650

12700

12750

12602'

12774'

90.86°

90.09°

269.94°

268.90°

7289.75'

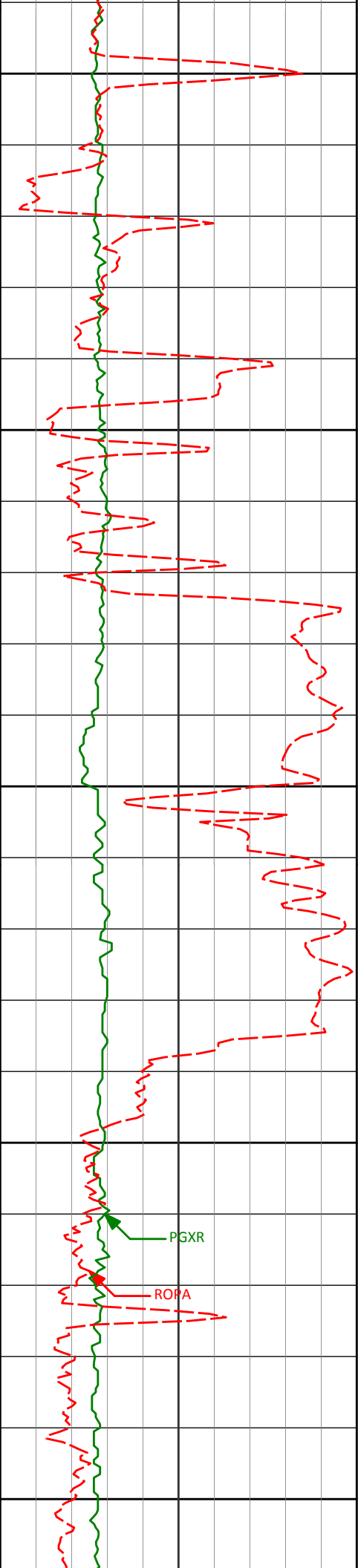
7288.32'

5591.28'

5763.27'

RGXR

ROPA



12800

12850

12900

12945'

12950

13000

PGXR

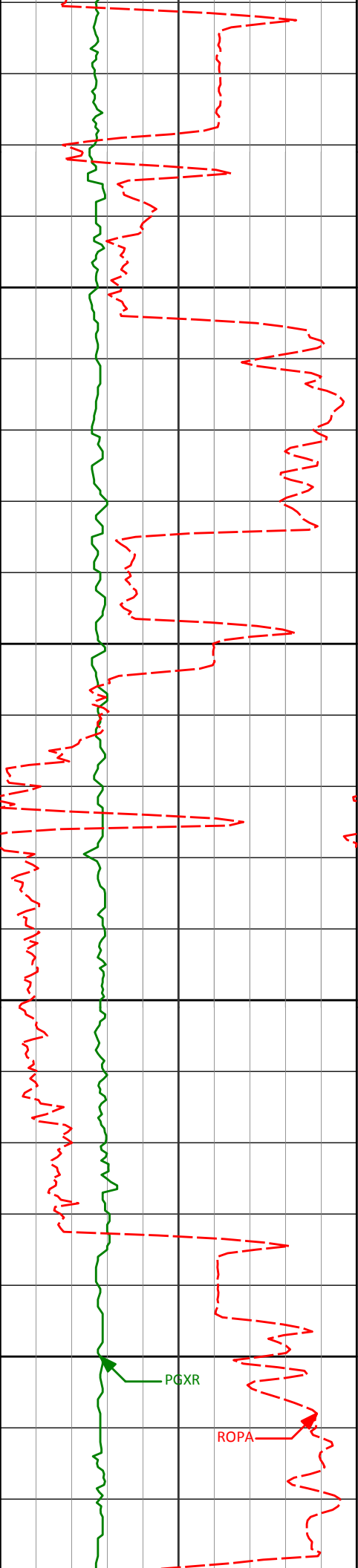
RORA

88.09°

268.72°

7291.04'

5934.23'



13050

13100

13150

13200

13116'

87.90°

268.02°

7297.02'

6105.09'

13202'

89.97°

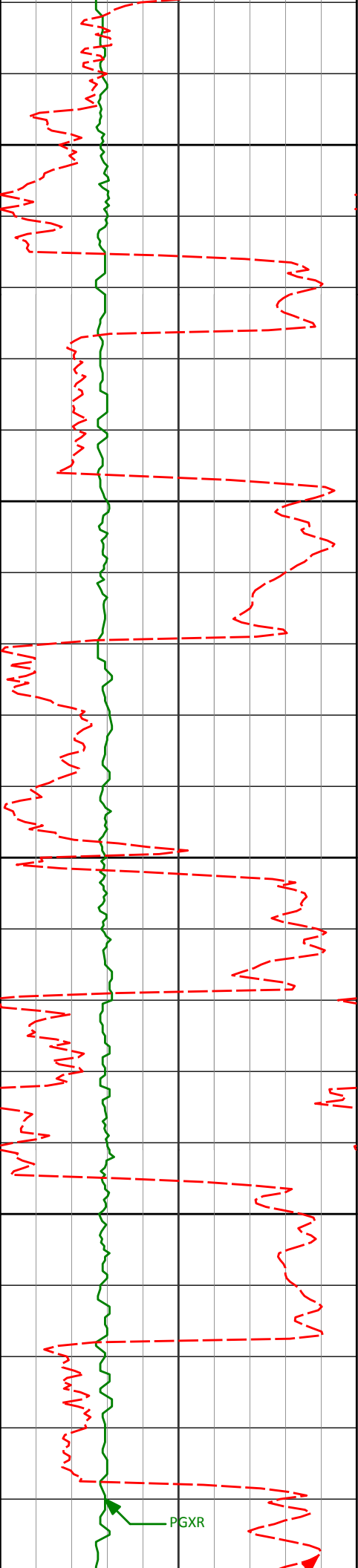
268.61°

7298.62'

6191.05'

PGXR

ROPA



13250

13300

13350

13374'

13400

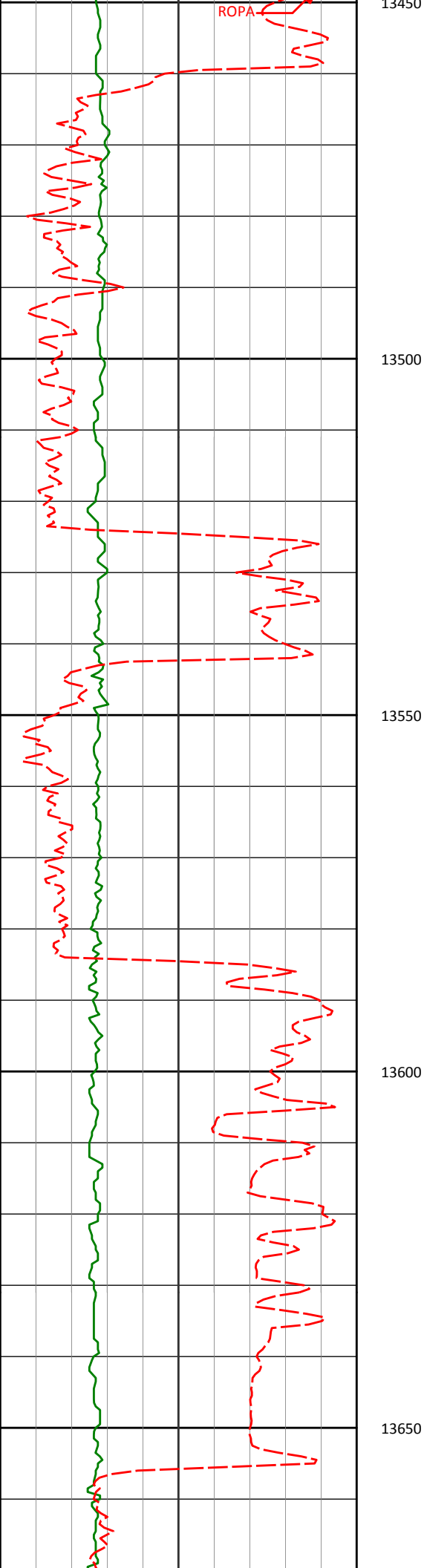
13450

90.09°

270.10°

7298.53'

6363.05'



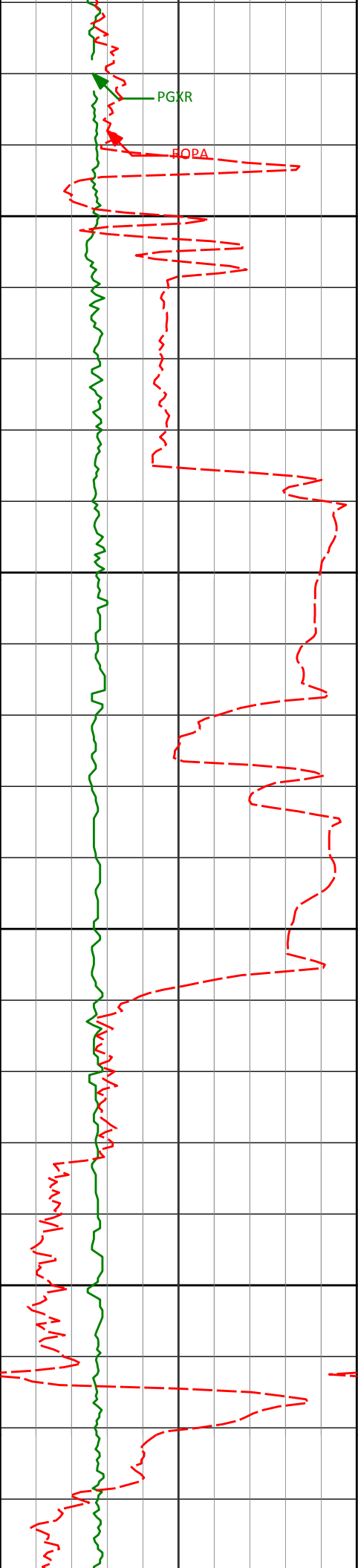
13545'

91.20°

270.88°

7296.61'

6534.01'



13700

13716'

91.02°

269.55°

7293.29'

6704.96'

13750

13800

13850

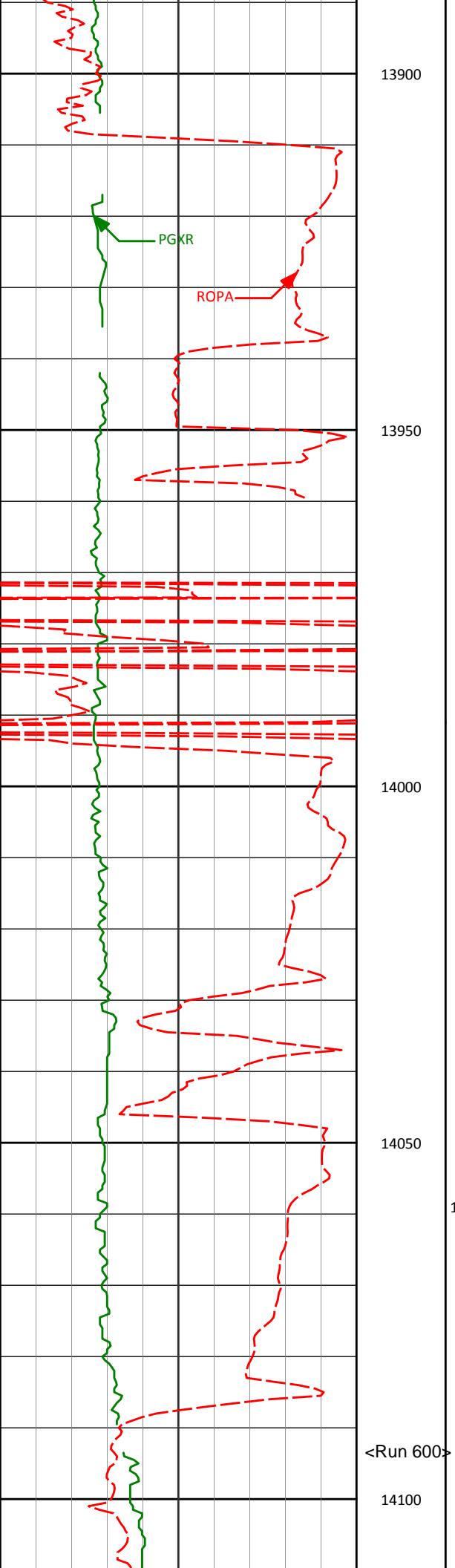
13888'

89.14°

268.72°

7293.05'

6876.94'



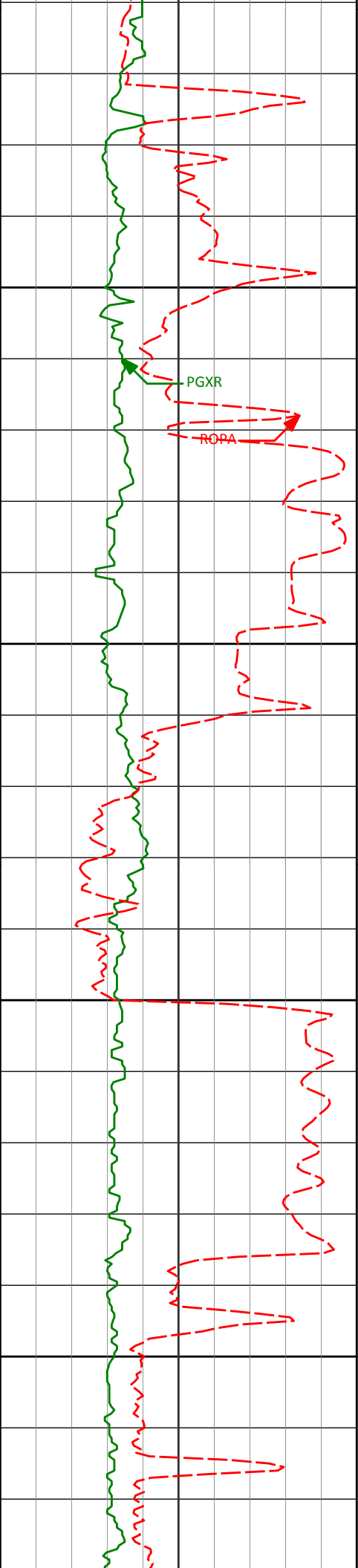
14059'

87.38°

269.46°

7298.25'

7047.85'



14150

14200

14250

14300

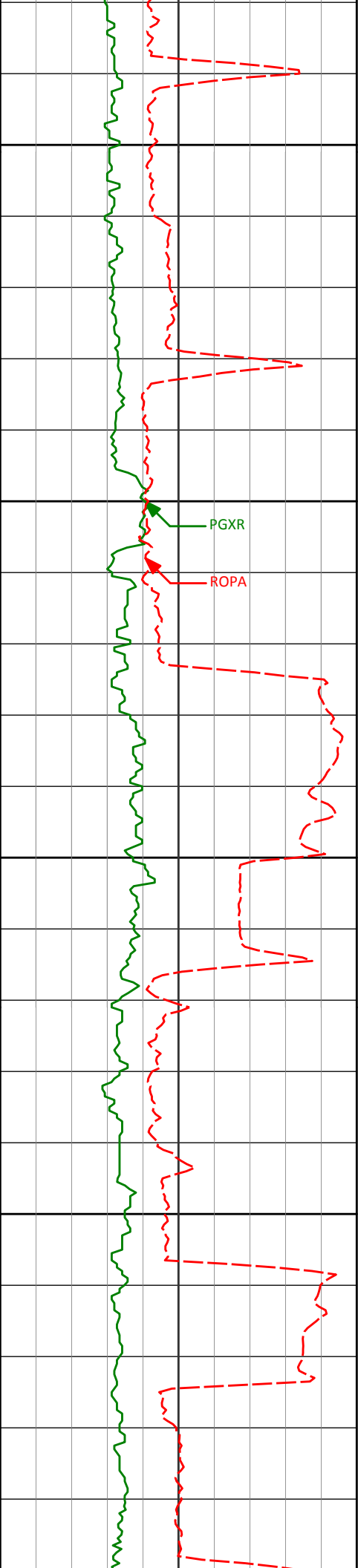
14230'

88.37°

269.50°

7304.59'

7218.73'



14350

14400

14450

14500

PGXR

ROPA

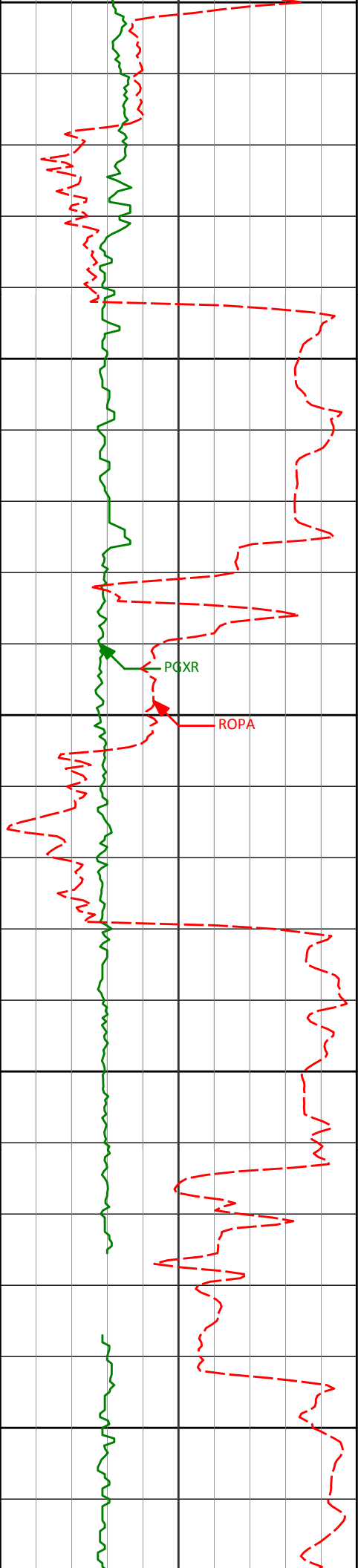
14402'

92.03°

270.28°

7303.99'

7390.70'



14573'

92.56°

269.11°

7297.14'

7561.56'

14600

14650

14700

14744'

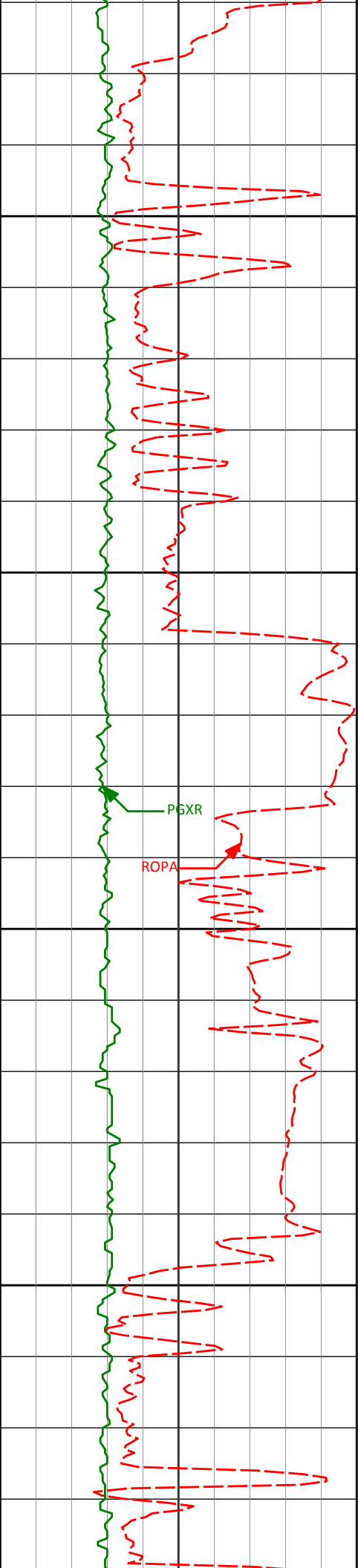
89.91°

270.47°

7293.45'

7732.49'

14750



14800

14850

14900

14950

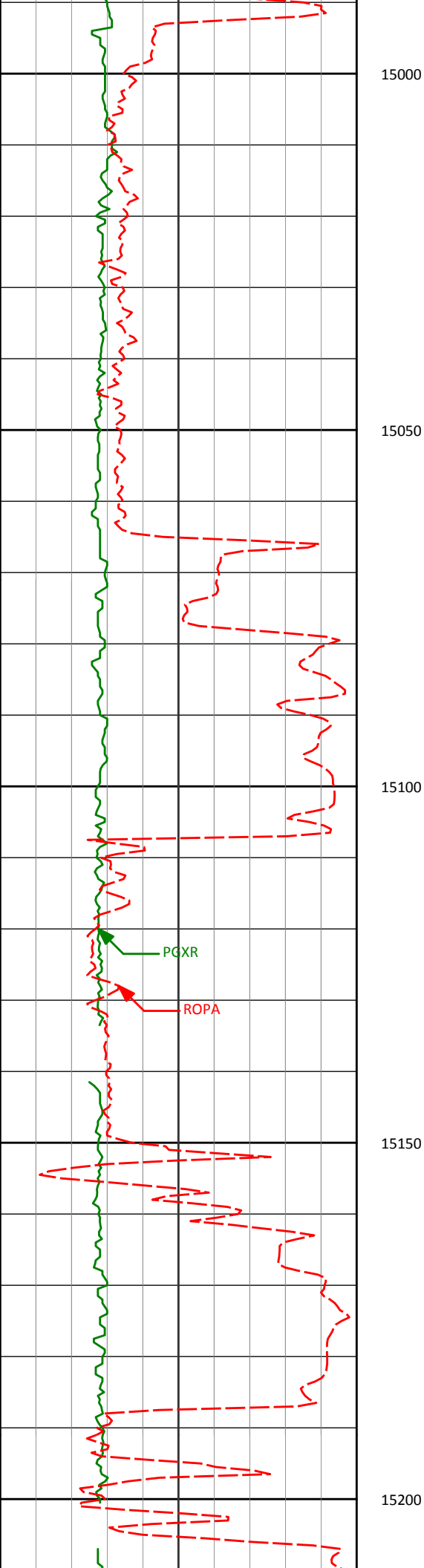
14916'

89.63°

271.09°

7294.14'

7904.45'



15087'

90.52°

270.77°

7293.92'

8075.39'

15000

15050

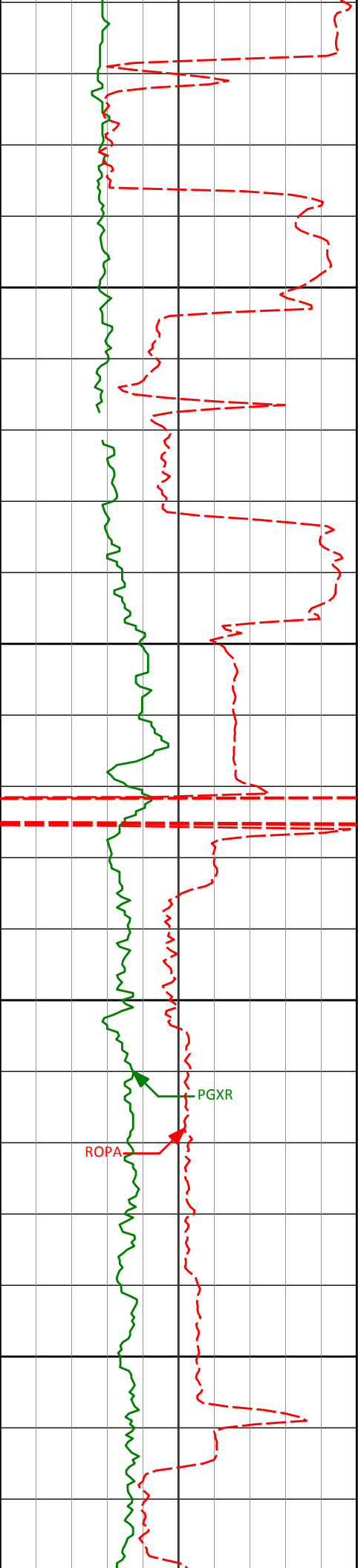
15100

15150

15200

PGXR

ROPA



15250

15259'

88.64°

269.22°

7295.18'

8247.37'

15300

15350

PGXR

ROPA

15400

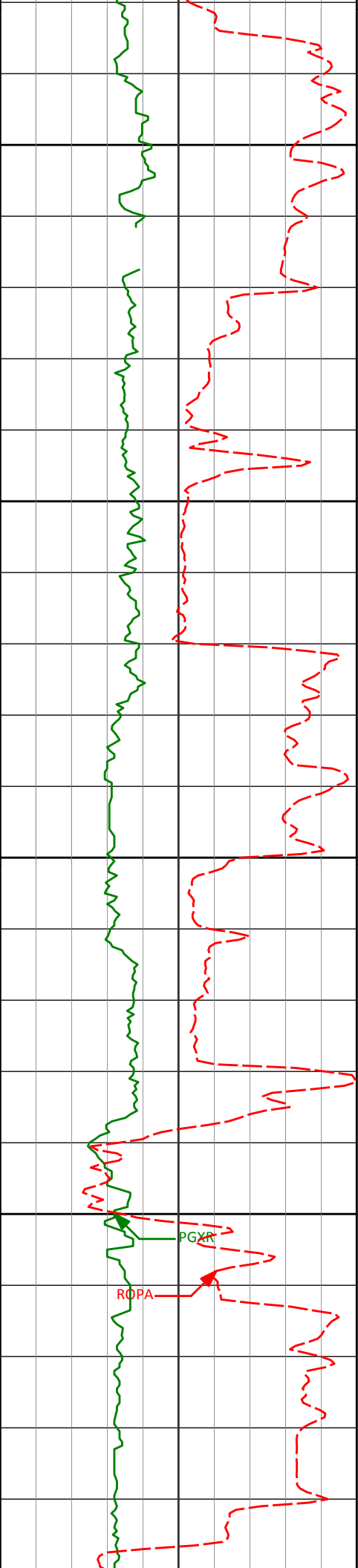
15429'

81.23°

269.24°

7295.18'

8119.25'



15450

15500

15550

15600

15602'

91.30°

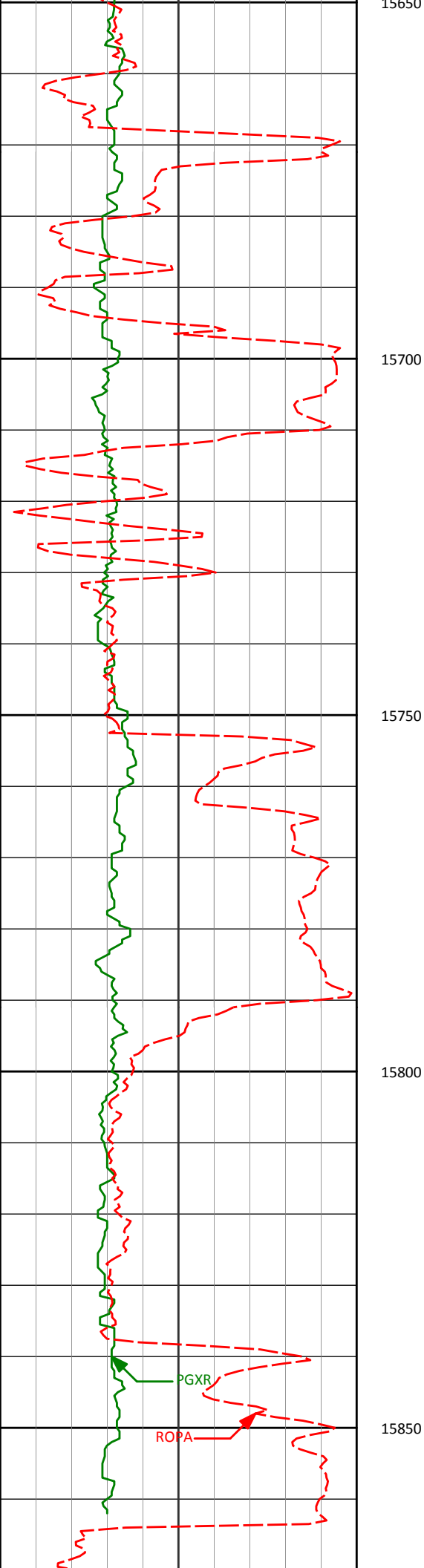
268.02°

7291.67'

8590.28'

PGXR

ROPA



15773'

90.77°

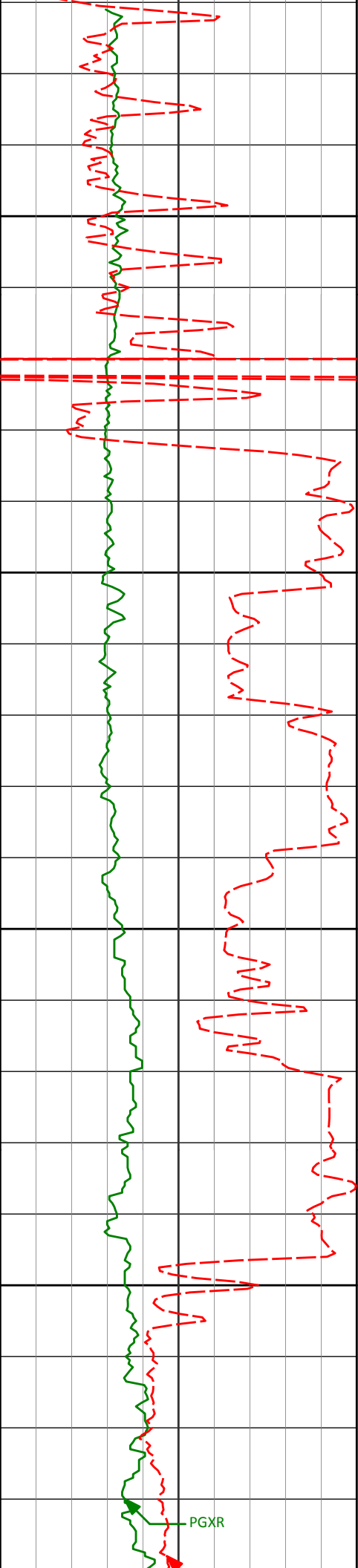
269.10°

7288.58'

8761.23'

PGXR

ROPA



15900

15945'

15950

16000

16050

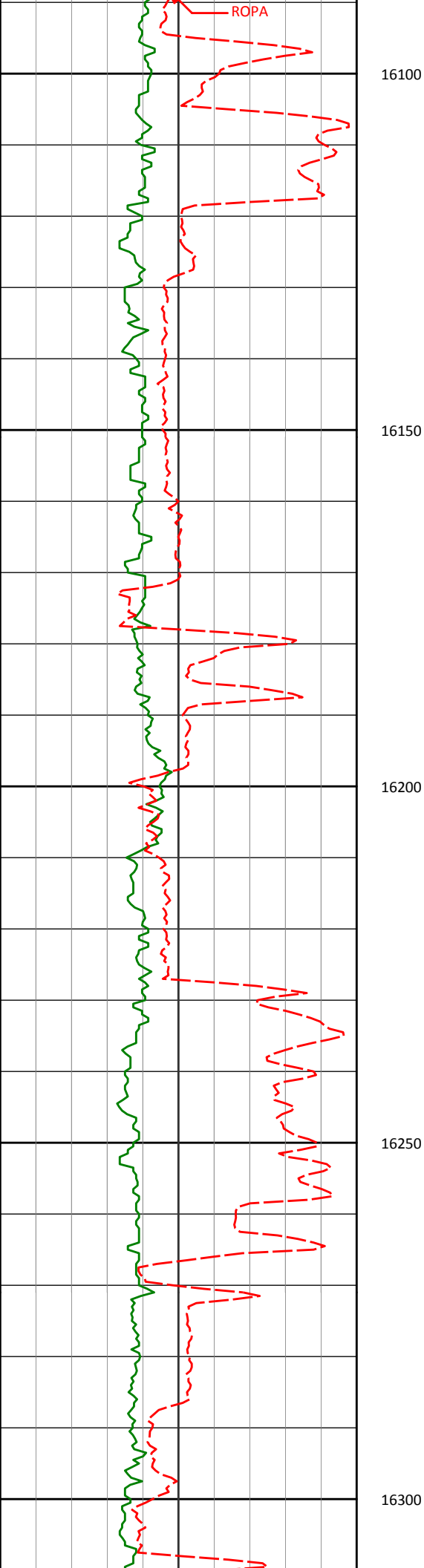
91.02°

268.79°

7285.89'

8933.20'

PGXR



16117'

88.64°

268.78°

7286.40'

9105.17'

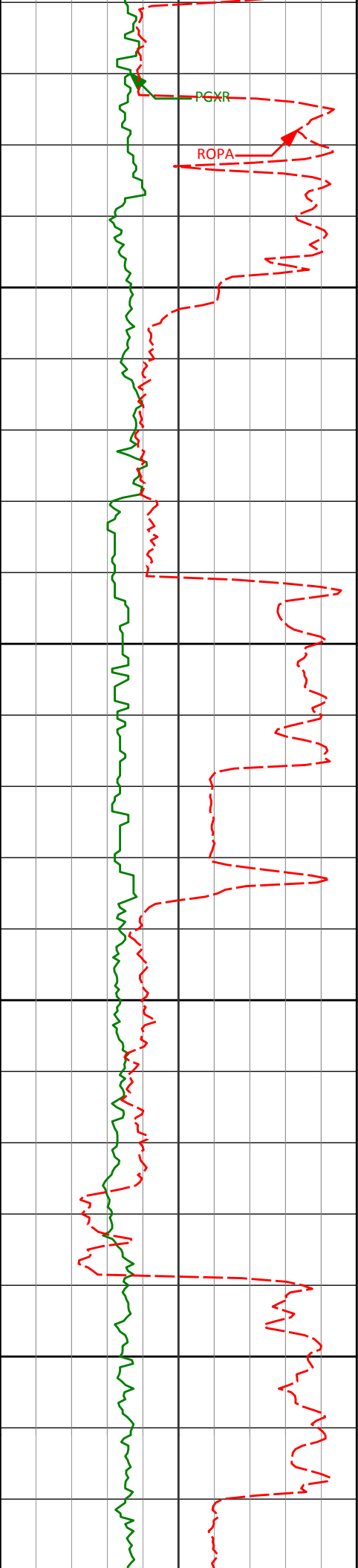
16288'

90.12°

268.18°

7288.25'

9276.13'



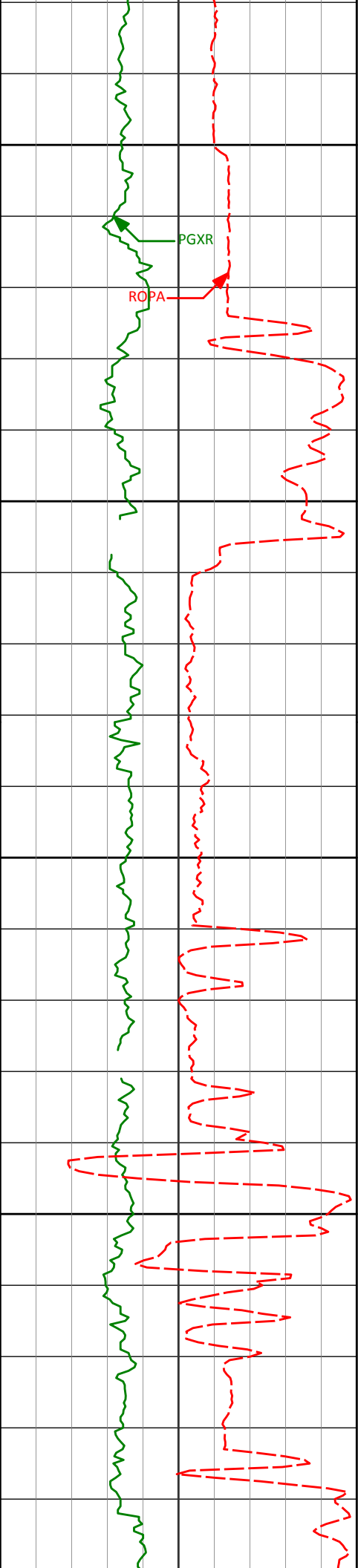
16460'

90.18°

269.29°

7287.80'

9448.11'



16550

16600

16650

16700

16545'

89.60°

268.87°

7287.96'

9533.11'

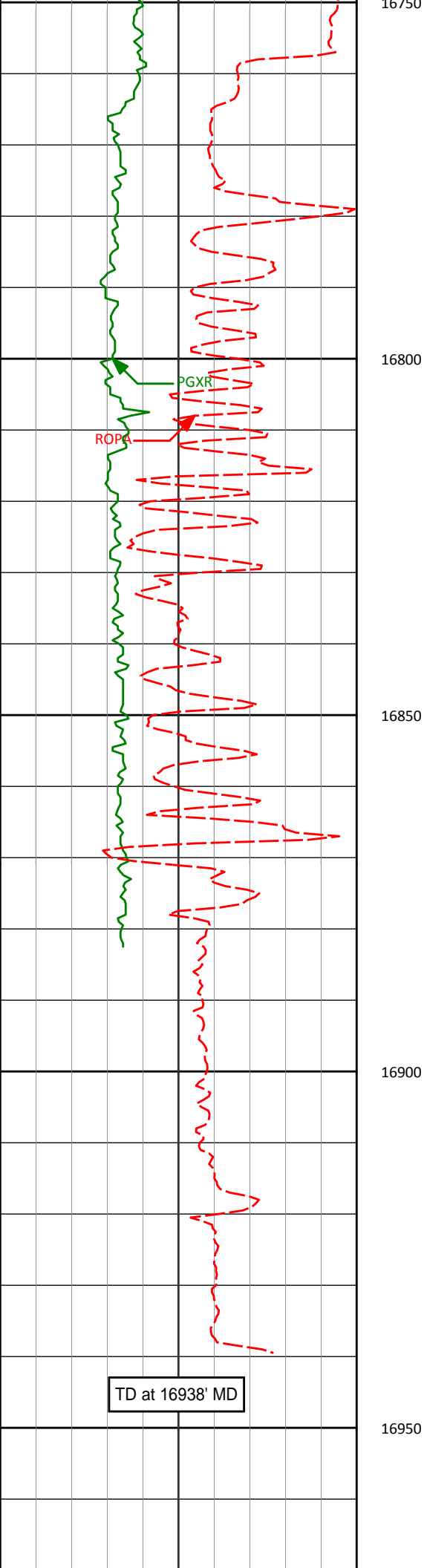
16717'

89.47°

269.46°

7289.36'

9705.10'



16873'	90.12°	268.06°	7289.92'	9861.08'
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16938'	90.12°	268.06°	7289.78'	9926.06'
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Avg Rate of Penetration <div> <div>ROPA</div> <div>feet per hr</div> </div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	0						
PCG Gamma Ray <div> <div>PGRC</div> <div>api</div> </div>							
0	300						

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko PC
Kerbs 4C-14HZ
Wattenberg
Weld Colorado
USA
CA-XX-0900984323

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
995.00	0.59	223.28	994.98	0.21 N	3.57 W	3.57	TIE-IN
1131.00	0.20	325.11	1130.98	0.11 S	4.19 W	4.19	0.49
1320.00	0.39	311.09	1319.97	0.59 N	4.86 W	4.85	0.11
1509.00	0.31	328.21	1508.97	1.45 N	5.61 W	5.60	0.07
1699.00	0.72	53.69	1698.97	2.59 N	4.92 W	4.90	0.40
1882.00	0.99	46.98	1881.94	4.35 N	2.84 W	2.80	0.16
2064.00	0.28	280.88	2063.94	5.51 N	2.13 W	2.08	0.65
2247.00	0.72	281.67	2246.93	5.82 N	3.69 W	3.64	0.24
2430.00	0.44	186.02	2429.92	5.36 N	4.89 W	4.84	0.48
2612.00	0.57	212.53	2611.92	3.90 N	5.45 W	5.42	0.14
2795.00	0.68	37.39	2794.91	3.99 N	5.28 W	5.25	0.68
2978.00	0.65	29.80	2977.90	5.76 N	4.11 W	4.05	0.05
3160.00	0.59	52.19	3159.89	7.23 N	2.85 W	2.79	0.14
3331.00	0.65	49.66	3330.88	8.39 N	1.42 W	1.34	0.04
3502.00	0.31	9.71	3501.87	9.48 N	0.60 W	0.52	0.27
3673.00	0.25	309.40	3672.87	10.17 N	0.81 W	0.72	0.17
3845.00	0.32	292.37	3844.87	10.59 N	1.55 W	1.45	0.06
4016.00	1.45	315.36	4015.85	12.31 N	3.51 W	3.40	0.68
4187.00	4.69	332.62	4186.58	20.06 N	8.24 W	8.06	1.95
4358.00	8.54	349.32	4356.43	38.76 N	13.81 W	13.46	2.49
4530.00	11.40	6.23	4525.85	68.22 N	14.34 W	13.72	2.36
4701.00	11.94	9.73	4693.31	102.45 N	9.51 W	8.58	0.52
4873.00	11.07	1.58	4861.87	136.50 N	6.05 W	4.81	1.07
5044.00	10.16	359.31	5029.94	167.99 N	5.78 W	4.25	0.59
5215.00	11.24	0.60	5197.96	199.74 N	5.79 W	3.97	0.65
5386.00	10.19	359.72	5365.98	231.53 N	5.69 W	3.58	0.62
5558.00	10.79	3.19	5535.11	262.82 N	4.86 W	2.48	0.51
5729.00	10.70	358.65	5703.11	294.67 N	4.35 W	1.67	0.50
5900.00	9.21	352.42	5871.54	324.11 N	6.53 W	3.59	1.07
6070.00	7.08	3.94	6039.82	348.05 N	7.60 W	4.44	1.57
6242.00	4.86	359.72	6210.88	365.91 N	6.91 W	3.59	1.31
6414.00	3.42	3.63	6382.43	378.32 N	6.62 W	3.19	0.85
6585.00	2.40	339.47	6553.21	386.76 N	7.55 W	4.04	0.92
6628.00	2.37	335.43	6596.17	388.41 N	8.24 W	4.71	0.40
6671.00	4.25	307.38	6639.10	390.19 N	9.87 W	6.33	5.65
6714.00	7.66	285.14	6681.87	391.91 N	13.91 W	10.35	9.43
6757.00	11.92	278.30	6724.24	393.30 N	21.07 W	17.50	10.25
6800.00	16.26	276.30	6765.93	394.60 N	31.46 W	27.87	10.15
6842.00	19.69	276.72	6805.88	396.07 N	44.33 W	40.73	8.17
6885.00	22.15	274.86	6846.04	397.61 N	59.60 W	55.99	5.93
6928.00	24.77	271.16	6885.48	398.48 N	76.69 W	73.07	6.99
6971.00	27.34	268.43	6924.11	398.39 N	95.57 W	91.95	6.59
7013.00	29.91	264.37	6960.98	397.10 N	115.64 W	112.03	7.67
7056.00	32.82	262.02	6997.69	394.43 N	137.85 W	134.27	7.34
7099.00	35.26	262.94	7033.32	391.28 N	161.72 W	158.16	5.80
7142.00	40.49	263.71	7067.25	388.23 N	187.93 W	184.40	12.21

7185.00	45.65	263.68	7098.65	385.00 N	217.10 W	213.60	12.00
7228.00	52.70	264.16	7126.75	381.56 N	249.44 W	245.97	16.42
7270.00	58.69	263.56	7150.41	377.85 N	283.92 W	280.48	14.31
7313.00	64.53	264.80	7170.85	374.03 N	321.54 W	318.13	13.82
7356.00	69.12	266.03	7187.76	370.87 N	360.93 W	357.55	10.99
7399.00	73.28	267.10	7201.62	368.44 N	401.55 W	398.19	9.96
7442.00	77.17	268.56	7212.58	366.87 N	443.09 W	439.74	9.62
7508.00	83.48	271.51	7223.67	366.93 N	508.11 W	504.76	10.53
7625.00	90.25	275.14	7230.07	373.71 N	624.65 W	621.24	6.56
7796.00	92.62	274.08	7225.79	387.45 N	795.03 W	791.48	1.52
7967.00	92.56	271.86	7218.06	396.30 N	965.62 W	961.98	1.30
8138.00	93.09	268.56	7209.63	396.93 N	1136.38 W	1132.73	1.95
8224.00	91.54	265.85	7206.15	392.73 N	1222.20 W	1218.59	3.63
8395.00	90.03	264.15	7203.81	377.83 N	1392.52 W	1389.04	1.33
8566.00	88.73	266.24	7205.66	363.51 N	1562.90 W	1559.53	1.44
8737.00	88.55	269.38	7209.72	356.98 N	1733.70 W	1730.39	1.84
8909.00	87.93	271.97	7215.00	359.00 N	1905.59 W	1902.26	1.55
9080.00	89.26	271.52	7219.20	364.21 N	2076.46 W	2073.07	0.82
9252.00	87.41	267.92	7224.20	363.37 N	2248.35 W	2244.96	2.35
9423.00	87.68	268.68	7231.52	358.30 N	2419.12 W	2415.76	0.47
9595.00	90.62	270.39	7234.07	356.91 N	2591.07 W	2587.72	1.98
9766.00	88.18	270.25	7235.86	357.86 N	2762.04 W	2758.68	1.43
9937.00	89.69	273.37	7239.04	363.26 N	2932.90 W	2929.48	2.03
10108.00	90.22	273.56	7239.18	373.60 N	3103.59 W	3100.07	0.33
10279.00	88.98	271.97	7240.37	381.85 N	3274.37 W	3270.77	1.18
10462.00	87.50	270.32	7245.99	385.50 N	3457.24 W	3453.60	1.21
10645.00	85.87	270.70	7256.57	387.13 N	3639.92 W	3636.26	0.91
10827.00	86.49	270.36	7268.70	388.81 N	3821.51 W	3817.82	0.39
11010.00	89.57	270.13	7274.99	389.59 N	4004.38 W	4000.67	1.69
11193.00	88.80	268.18	7277.59	386.89 N	4187.33 W	4183.64	1.15
11376.00	90.68	267.92	7278.42	380.66 N	4370.21 W	4366.58	1.04
11559.00	90.37	267.09	7276.75	372.70 N	4553.03 W	4549.46	0.48
11740.00	88.86	266.55	7277.96	362.66 N	4733.74 W	4730.25	0.89
11917.00	86.36	266.40	7285.34	351.78 N	4910.24 W	4906.84	1.41
12089.00	87.47	268.07	7294.60	343.50 N	5081.78 W	5078.45	1.16
12260.00	90.40	270.26	7297.78	341.01 N	5252.70 W	5249.39	2.14
12431.00	92.06	269.19	7294.11	340.19 N	5423.65 W	5420.34	1.15
12602.00	90.86	269.94	7289.75	338.89 N	5594.59 W	5591.28	0.83
12774.00	90.09	268.90	7288.32	337.15 N	5766.57 W	5763.27	0.75
12945.00	88.09	268.72	7291.04	333.60 N	5937.50 W	5934.23	1.17
13116.00	87.90	268.02	7297.02	328.74 N	6108.33 W	6105.09	0.42
13202.00	89.97	268.61	7298.62	326.21 N	6194.27 W	6191.05	2.50
13374.00	90.09	270.10	7298.53	324.28 N	6366.25 W	6363.05	0.87
13545.00	91.20	270.88	7296.61	325.74 N	6537.23 W	6534.01	0.79
13716.00	91.02	269.55	7293.29	326.38 N	6708.20 W	6704.96	0.78
13888.00	89.14	268.72	7293.05	323.78 N	6880.17 W	6876.94	1.19
14059.00	87.38	269.46	7298.25	321.07 N	7051.06 W	7047.85	1.12
14230.00	88.37	269.50	7304.59	319.52 N	7221.93 W	7218.73	0.58
14402.00	92.03	270.28	7303.99	319.19 N	7393.90 W	7390.70	2.18
14573.00	92.56	269.11	7297.14	318.28 N	7564.76 W	7561.56	0.75
14744.00	89.91	270.47	7293.45	317.65 N	7735.70 W	7732.49	1.74
14916.00	89.63	271.09	7294.14	319.99 N	7907.68 W	7904.45	0.40
15087.00	90.52	270.77	7293.92	322.77 N	8078.65 W	8075.39	0.55
15259.00	88.64	269.22	7295.18	322.75 N	8250.64 W	8247.37	1.42
15430.00	91.20	268.94	7295.42	320.01 N	8421.60 W	8418.35	1.51
15602.00	91.30	268.02	7291.67	315.45 N	8593.50 W	8590.28	0.54
15773.00	90.77	269.10	7288.58	311.15 N	8764.41 W	8761.23	0.70
15945.00	91.02	268.79	7285.89	307.98 N	8936.36 W	8933.20	0.23
16117.00	88.64	268.78	7286.40	304.34 N	9108.31 W	9105.17	1.38
16288.00	90.12	268.18	7288.25	299.80 N	9279.23 W	9276.13	0.93
16460.00	90.18	269.29	7287.80	296.00 N	9451.19 W	9448.11	0.65
16545.00	89.60	268.87	7287.96	294.64 N	9536.18 W	9533.11	0.84
16717.00	89.47	269.46	7289.36	292.13 N	9708.15 W	9705.10	0.35
16873.00	90.12	268.06	7289.92	288.76 N	9864.11 W	9861.08	0.99
16938.00	90.12	268.06	7289.78	286.56 N	9929.07 W	9926.06	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 269.48 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 16938.00 FEET
IS 9933.21 FEET ALONG 271.65 DEGREES (TRUE)

Directional surveys tied onto Gyro's @ 995' MD. Final Survey is a straightline projection to bit.

Date Printed:13 March 2014