

PCGK - Pressure Case Gamma



1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	30-Sep-14	19-Nov-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)	1,364.00	8,122.00			
Log End Depth (MD, ft)	8,122.00	12,680.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	26-Sep-14 21:30	16-Nov-14 15:30			
Drill/Wipe End Date and Time	29-Sep-14 17:30	18-Nov-14 19:22			
Min Inc (deg) @ Depth (MD, ft)	1.29 @ 7,072.00	87.90 @ 10,694.00			
Max Inc (deg) @ Depth (MD, ft)	89.92 @ 8,122.00	90.77 @ 8,477.00			
Bit TFA(in2) / Bit Type	1.84 / PDC	PDC / 1.8404			
Flow Rate (gpm)	615.21	304.84			
Max AV (fpm) / CV (fpm) @ MWD	500.0 / 500.0	N/A / N/A			
Fluid Type	Native/Spud Mud	Mineral Oil Bas			
Density (ppg) / Viscosity (spqt)	9.25 / 37.00	9.40 / 50.00			
Filtrate CL (ppm)	2,100.00	224,274.00			
pH / Fluid Loss (mptm)	9.60 / 6	N/A / N/A			
PV (cP) / YP (lbf2)	12 / 14.00	10 / 9.00			
% Solids / % Sand	3.20 / N/A	8.50 / 0.01			
% Oil / Oil:Water Ratio	1.00 / N/A	59.50 / N/A			
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 Temp (degF) / RPM	125.00 / RPM	224.40 / RPM			

Max Tool Temp (degF) / Source	185.02 / PCM	231.42 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 185.02	N/A @ 231.42			
Lead MWD Engineer	Clay Wass	Clay Wass			
Customer Representative	Scott Hancock	Murl Lemkul			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11341335	12310750			
Insert Serial Number	11227484	11227484			
Date and Time Initialized	26-Sep-14 14:05	15-Nov-14 11:17			
Date and Time Read	30-Sep-14 04:16	19-Nov-14 14:43			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.00	40.71			
Software Version	6.21	6.21			
Sub Serial Number	11341335	12310750			
Sonde Serial Number	11901799	11901799			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	84.11	80.48			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	44.73	45.67			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11311335	12310750			
Insert/Sonde Serial Number	12037413	12037413			

REMARKS

1. Depths are True Vertical Depths, referenced to Driller's pipe tally, and measure from the rig floor.
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 based fluids.
4. All data presented is recorded 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

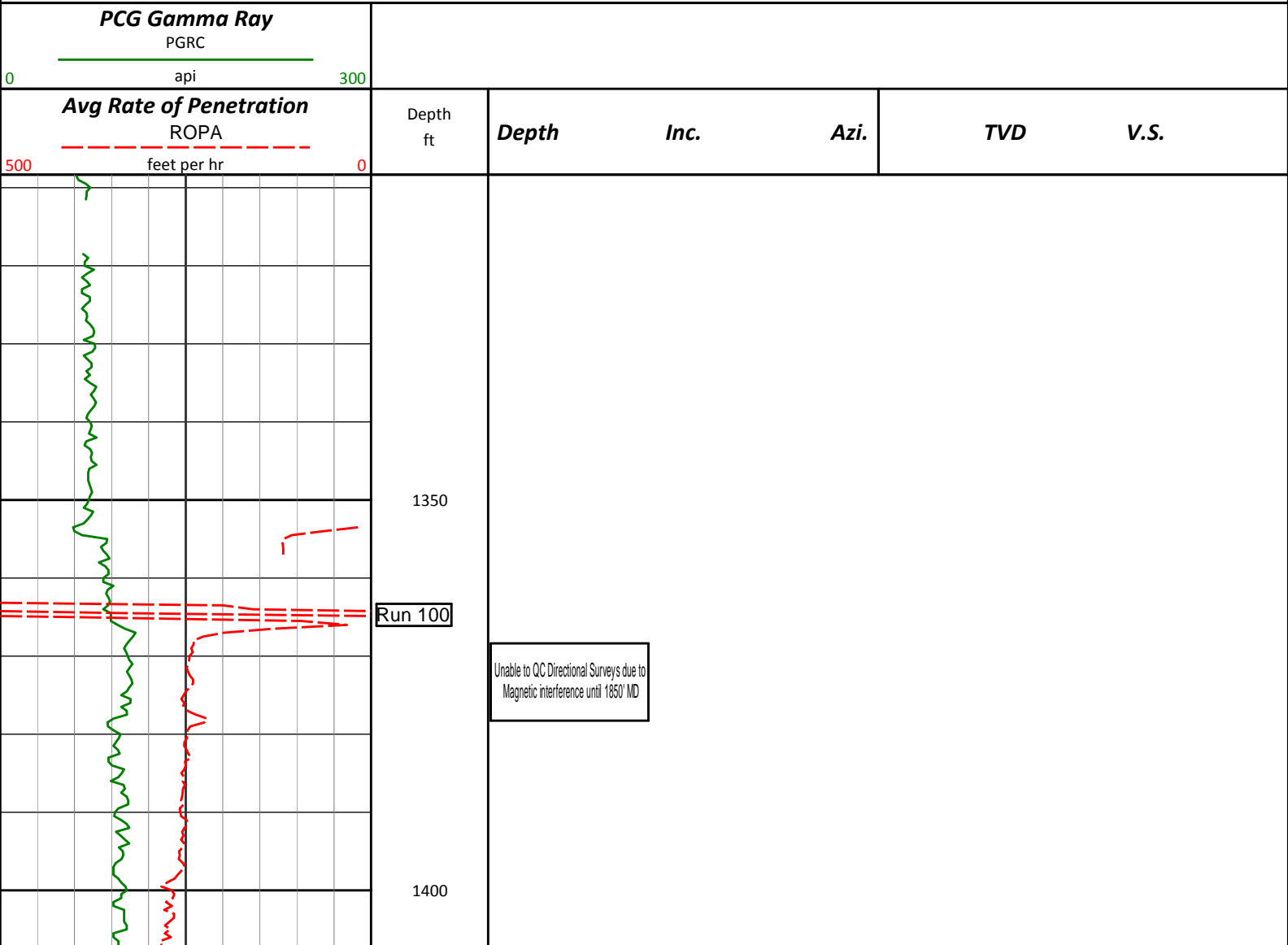
ROPA (Average Rate of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

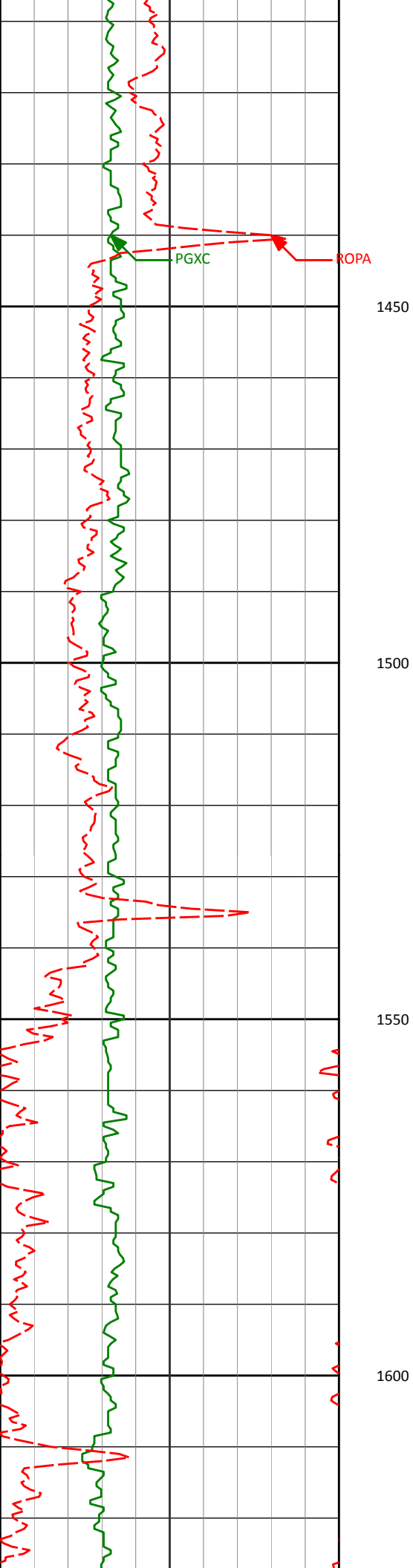
WARRANTY

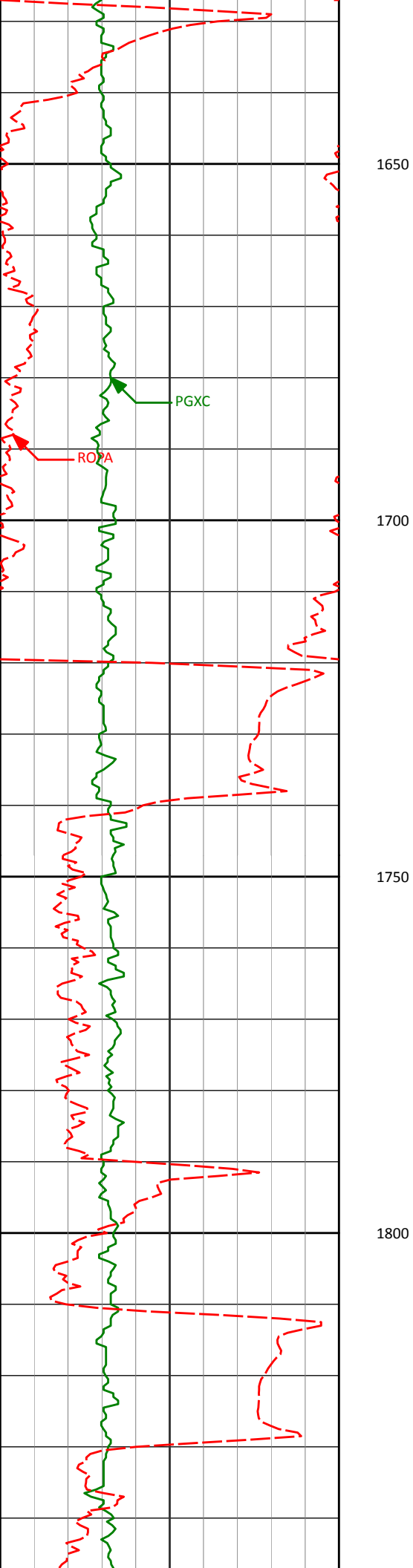
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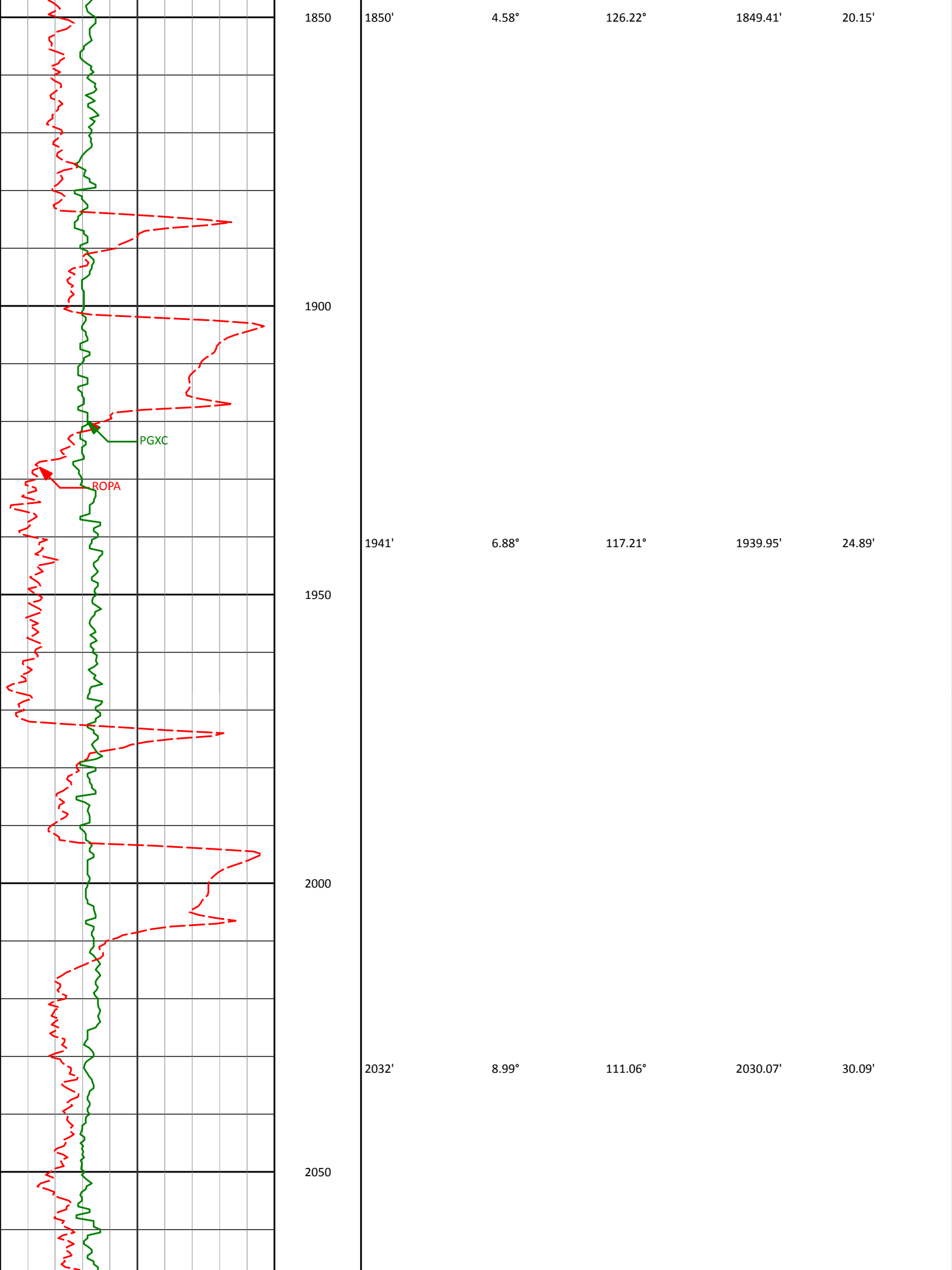
HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

Anadarko Petroleum Corp.
Sack 37C-6HZ
Xtreme 22
Sec. 31-T1N-R67W









1850

1900

1950

2000

2050

1850'

1941'

2032'

4.58°

6.88°

8.99°

126.22°

117.21°

111.06°

1849.41'

1939.95'

2030.07'

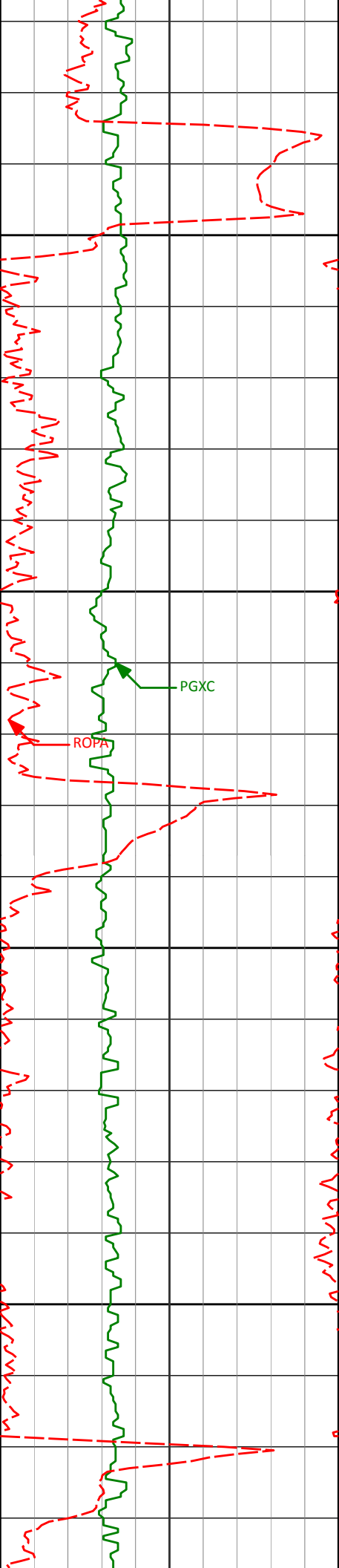
20.15'

24.89'

30.09'

PGXC

ROPA



2100

2123'

10.94°

106.40°

2119.70'

35.29'

2150

PGXC

ROPA

2200

2215'

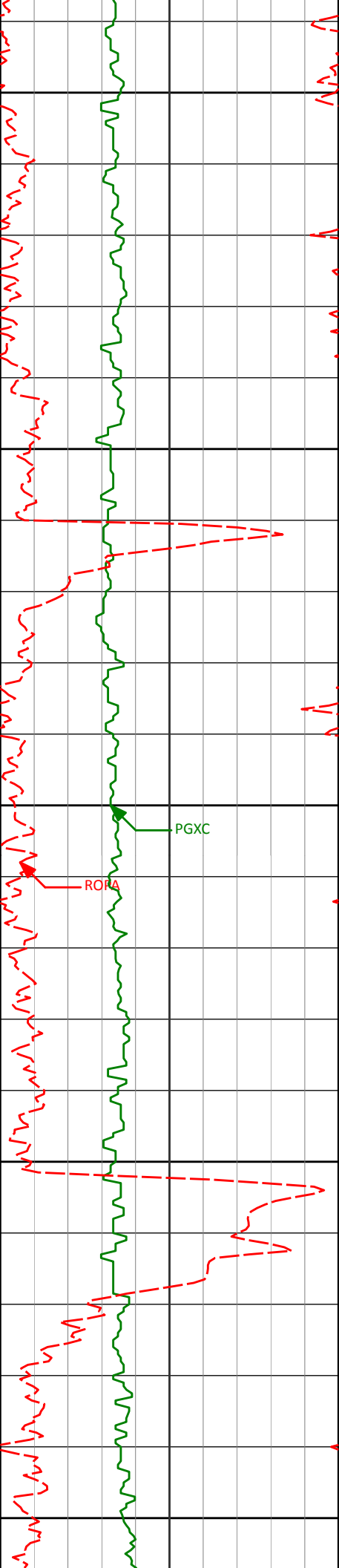
11.35°

106.17°

2209.96'

40.50'

2250



2300

2306'

10.64°

107.24°

2299.29'

45.71'

2350

2400

2397'

9.84°

107.97°

2388.84'

50.80'

2450

2489'

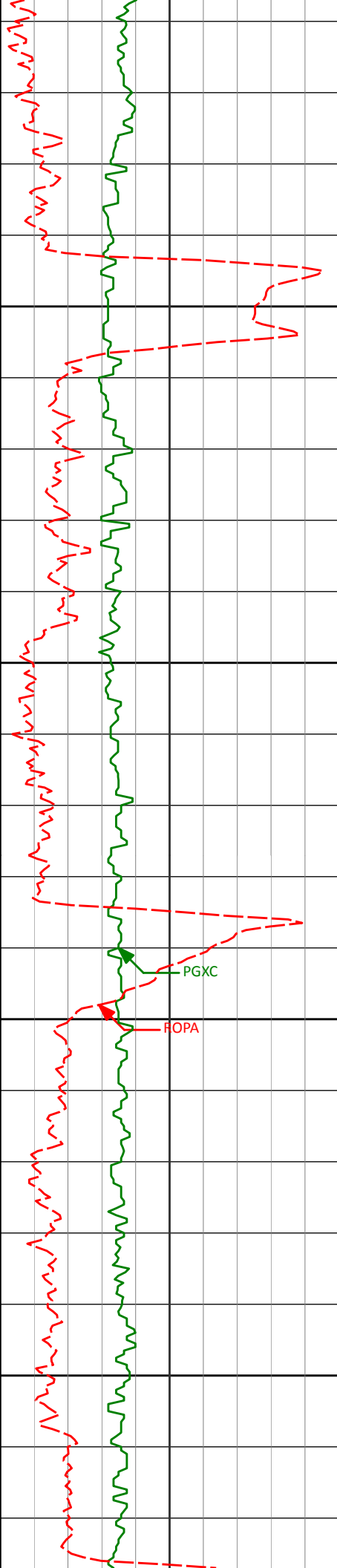
10.30°

113.37°

2479.42'

56.69'

2500



2550

2580'

11.46°

114.43°

2568.79'

63.87'

2600

2650

2672'

10.85°

114.77°

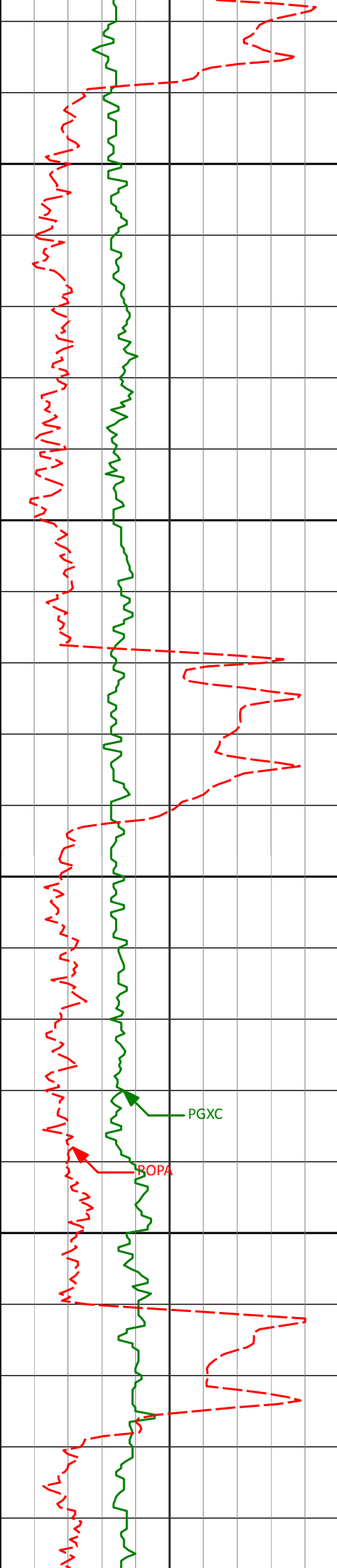
2659.05'

71.49'

2700

PGXC

ROPA



2750

2764'

10.77°

115.37°

2749.42'

79.01'

2800

2850

2856'

10.72°

112.27°

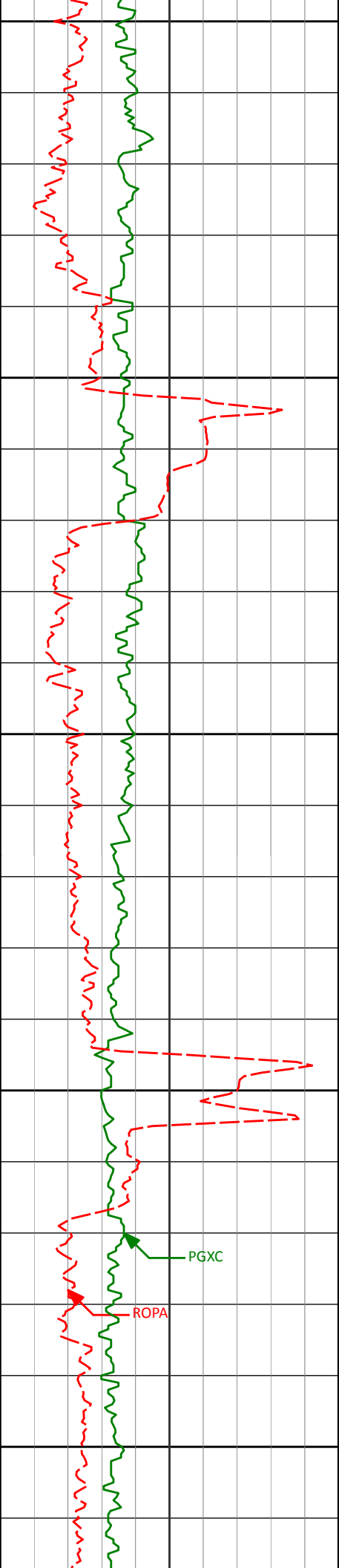
2839.80'

86.15'

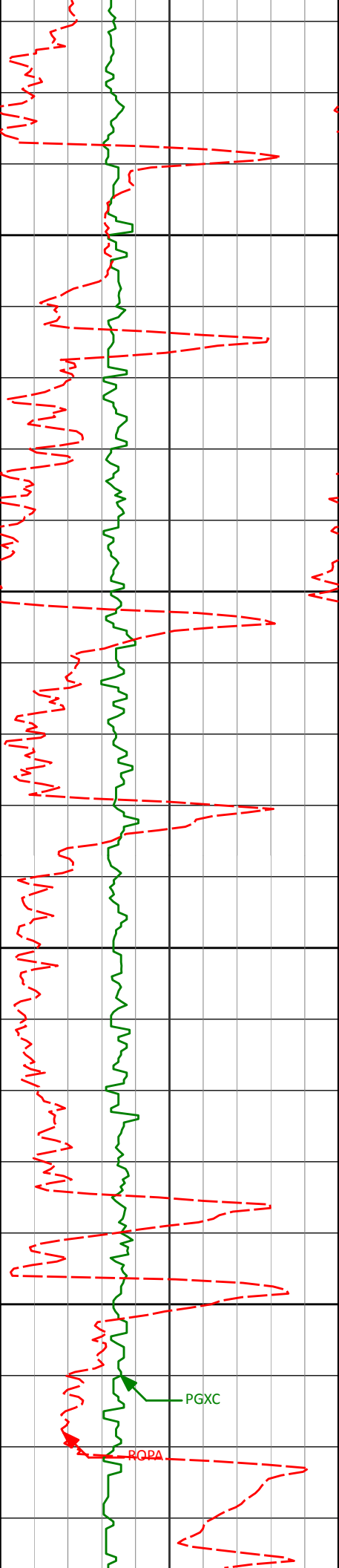
2900

PGXC

BOPA



2948'	11.80°	108.68°	2930.03	92.63'
3131'	11.28°	110.56°	3109.33'	105.37'



3200

3250

3300

3350

3315'

10.10°

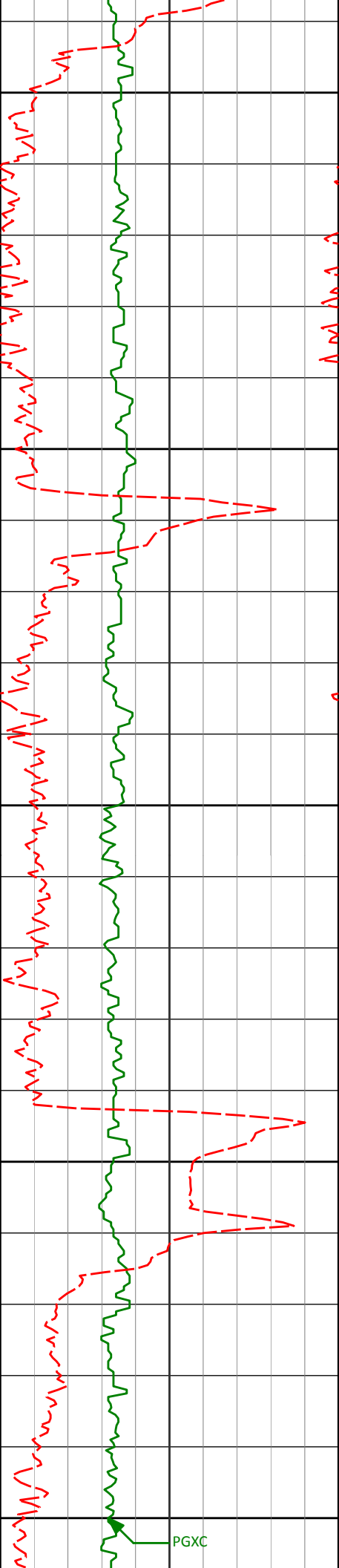
111.41°

3290.14'

118.01'

PGXC

ROPA



3400

3450

3486'

9.92°

111.14°

3458.53'

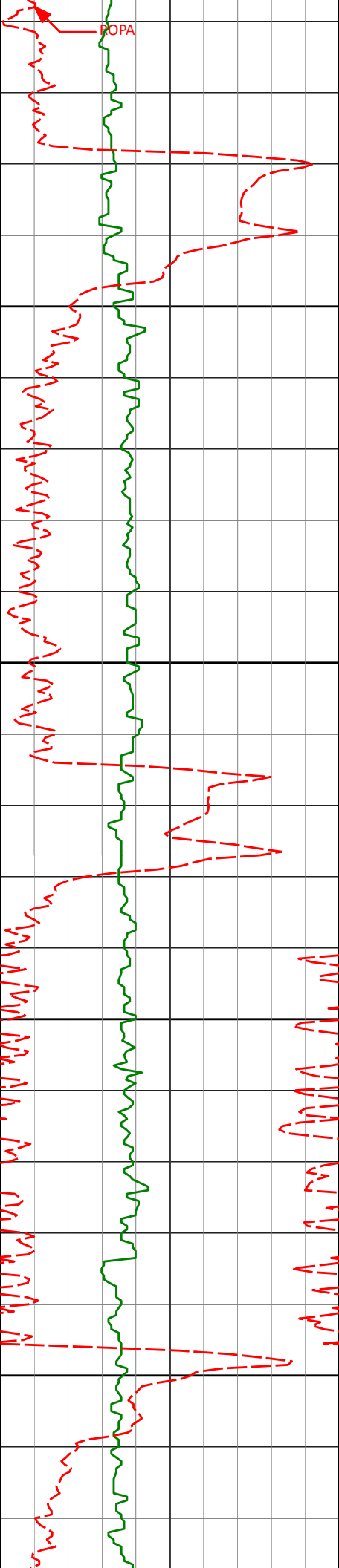
129.17'

3500

3550

3600

PGXC



3650

3657'

10.81°

108.90°

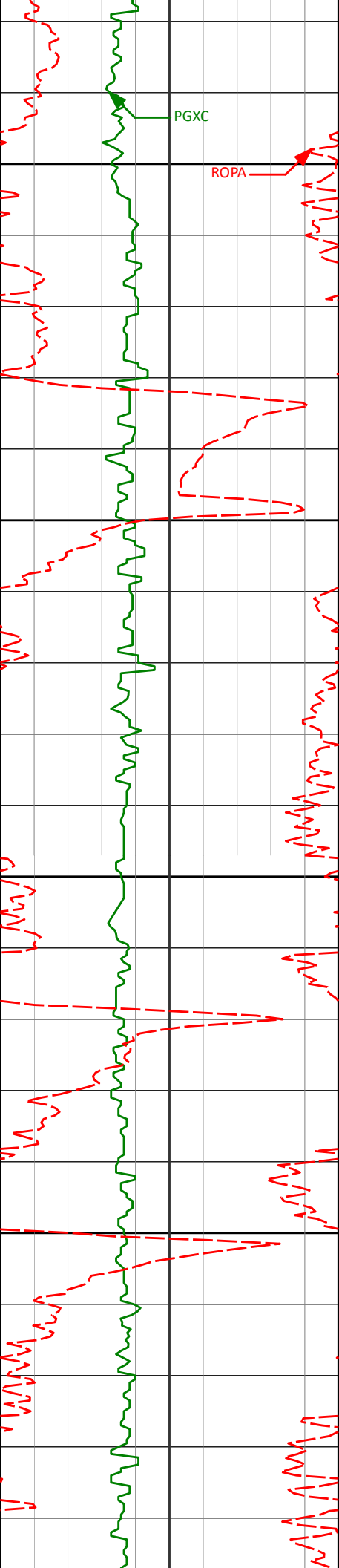
3626.74'

140.06'

3700

3750

3800



PGXC

ROPA

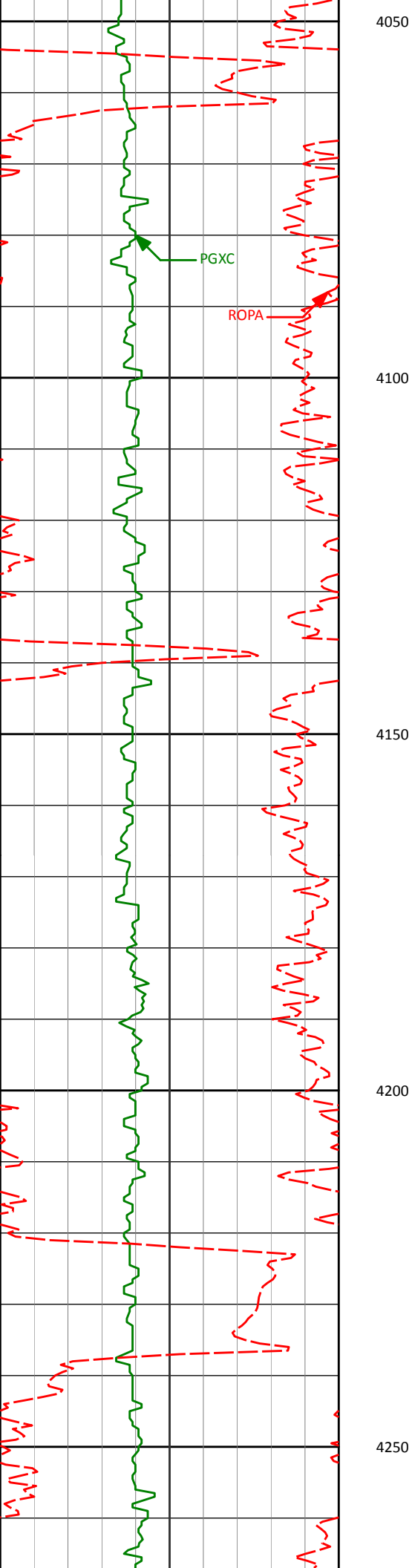
3850

3900

3950

4000

3828'	10.25°	104.53°	3794.86	149.47'
3998'	11.22°	101.05°	3961.89'	156.85'



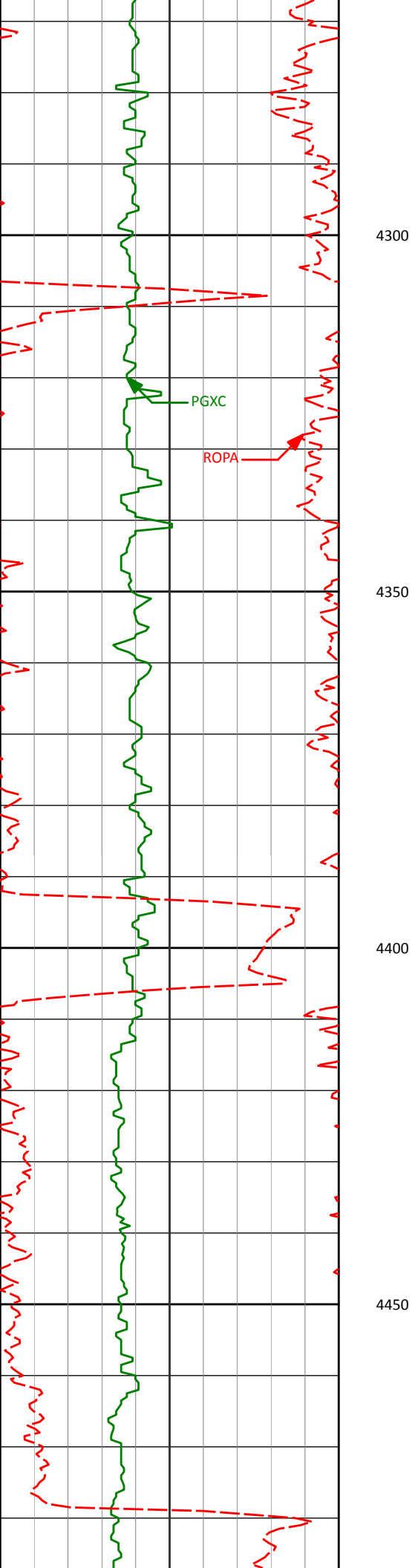
4170'

9.98°

103.50°

4130.95'

163.95'



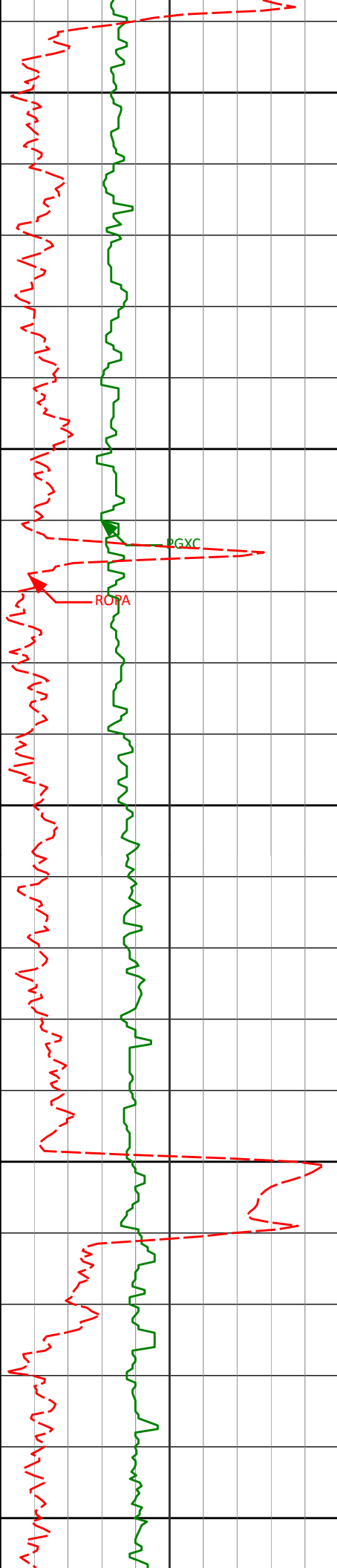
4341'

9.27°

117.19°

4299.57'

174.06'



4500

4511'

11.43°

123.89°

4466.80'

190.07'

4550

GXC

ROPA

4600

4650

4682'

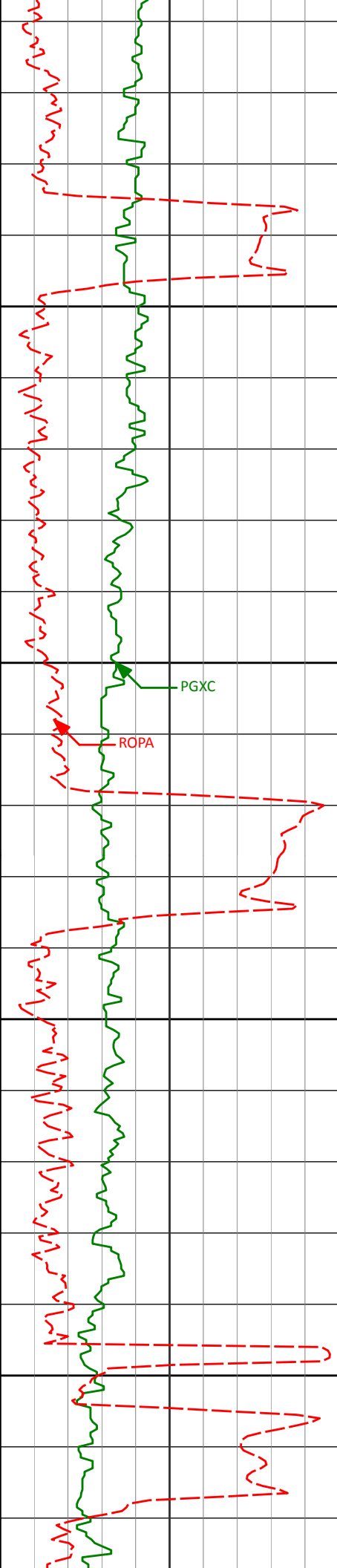
10.43°

121.83°

4634.69'

208.04'

4700



4750

4800

4850

4900

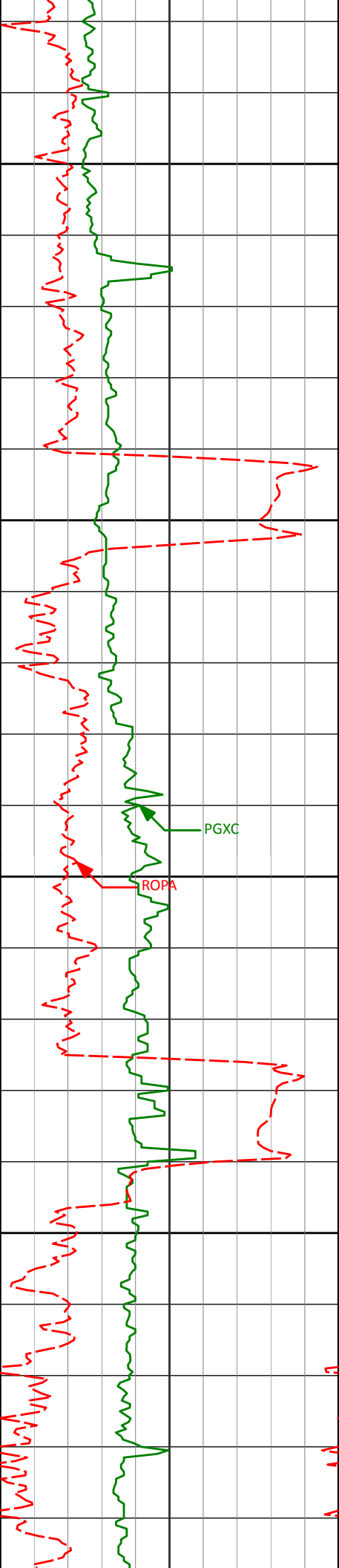
4853'

11.65°

114.45°

4802.53'

223.74'



4950

5000

5022'

13.61°

112.57°

4967.44'

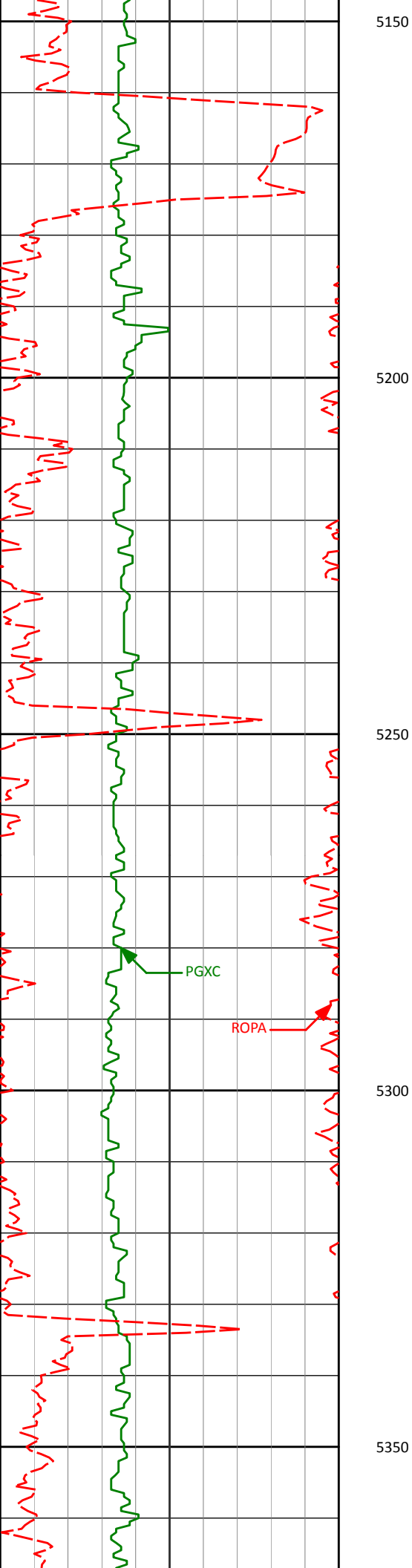
238.89'

5050

ROPA

PGXC

5100



5193'

12.33°

100.54°

5134.10'

250.44'

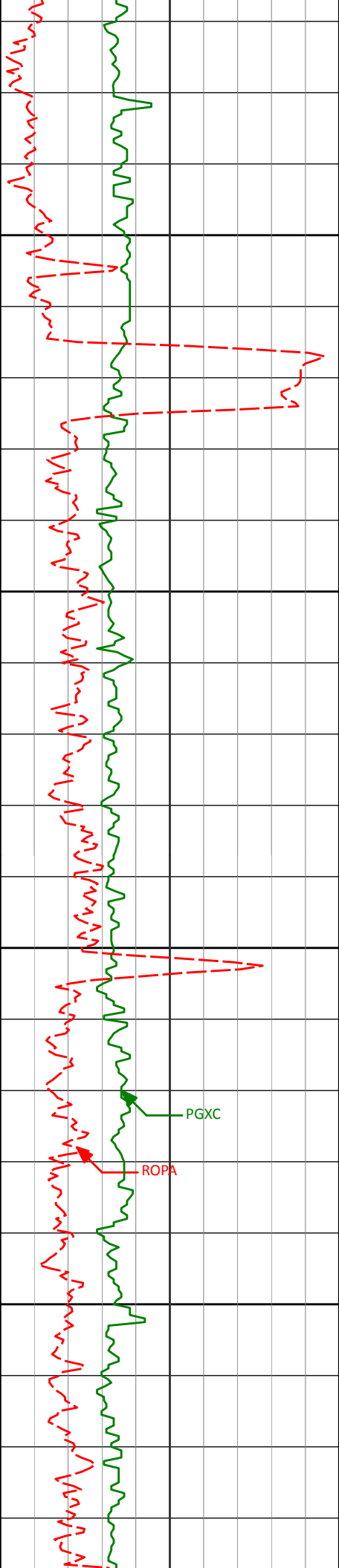
5364'

10.65°

97.21°

5301.67'

256.22'



5400

5450

5500

5550

PGXC

ROPA

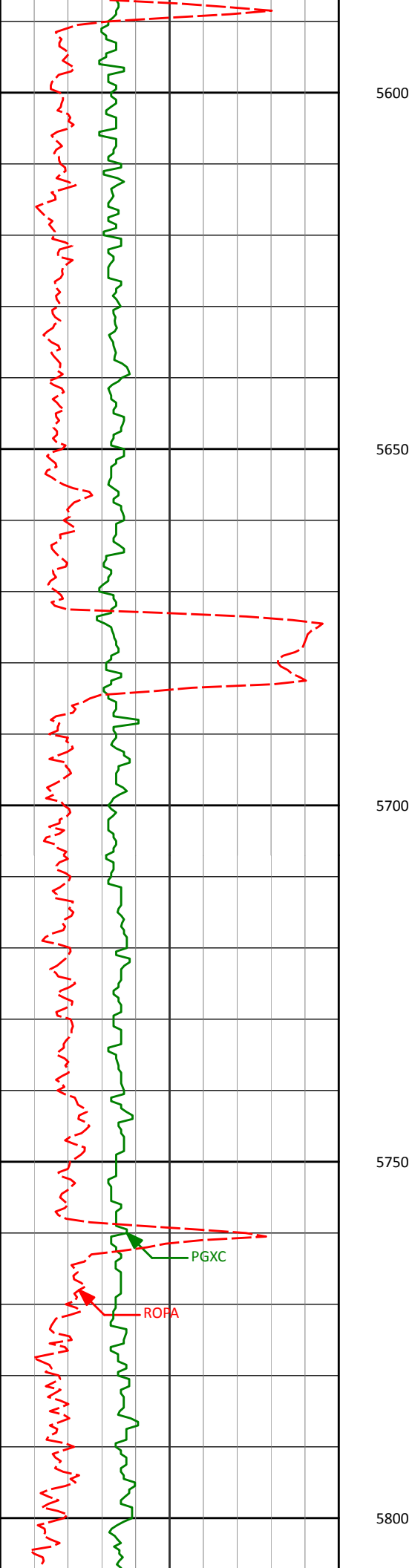
5535'

10.77°

102.21°

5469.70'

262.00'



5706'

10.13°

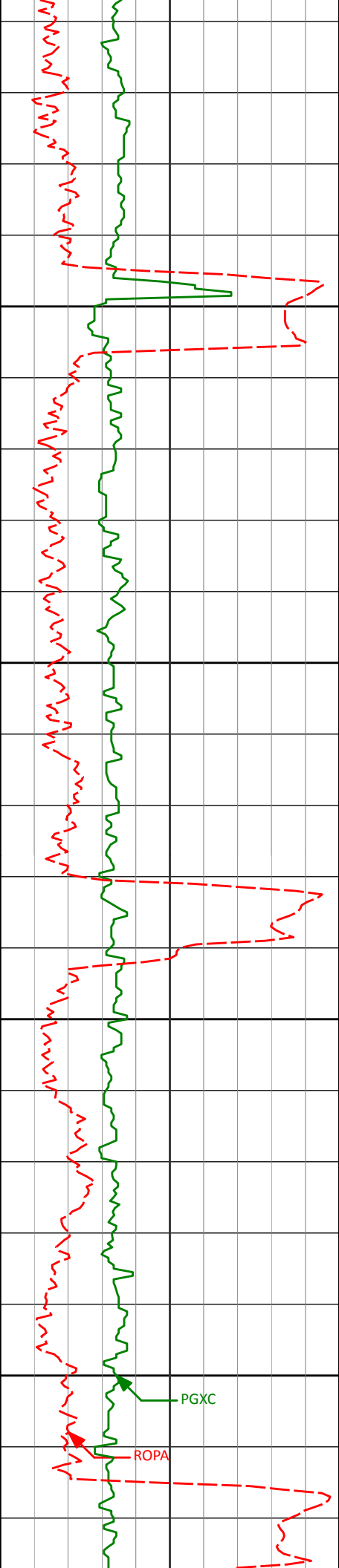
105.61°

5637.86'

269.83'

PGXC

ROFA



5850

5900

5950

6000

5877'

8.94°

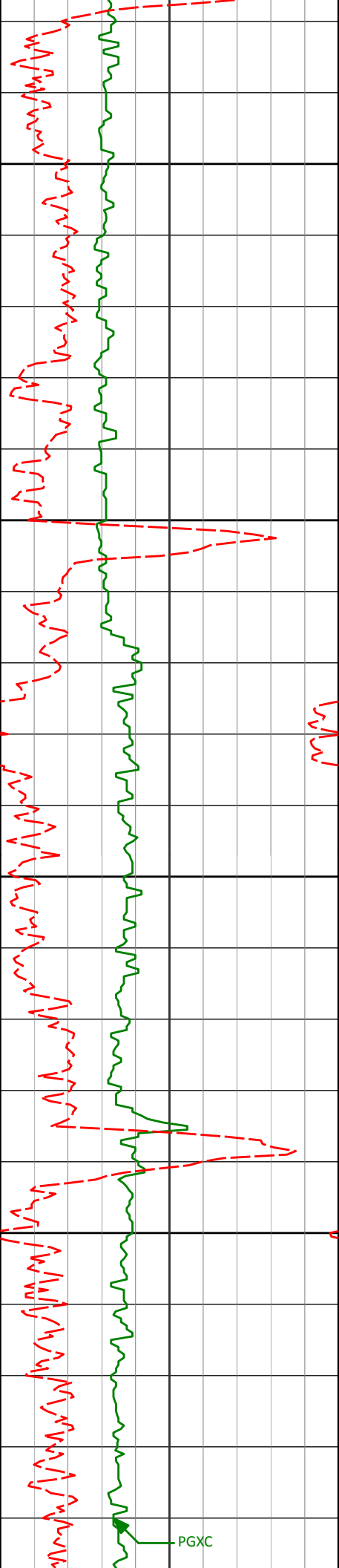
107.60°

5806.49'

278.26'

PGXC

ROPA



6050

6100

6150

6200

6047'

9.93°

103.43°

5974.19'

286.02'

6218'

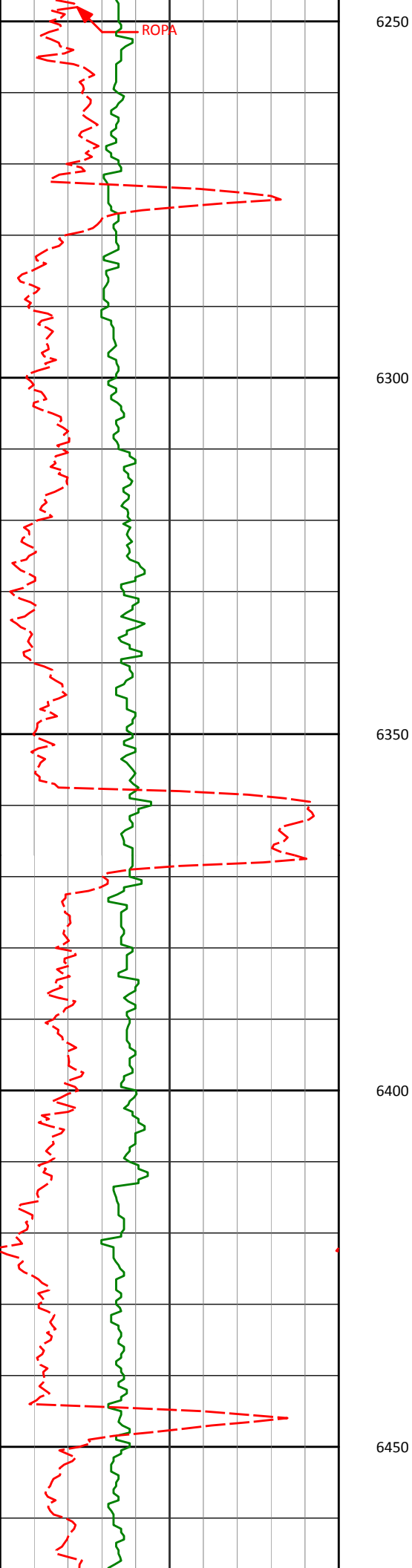
7.20°

99.92°

6143.27'

291.62'

PGXC



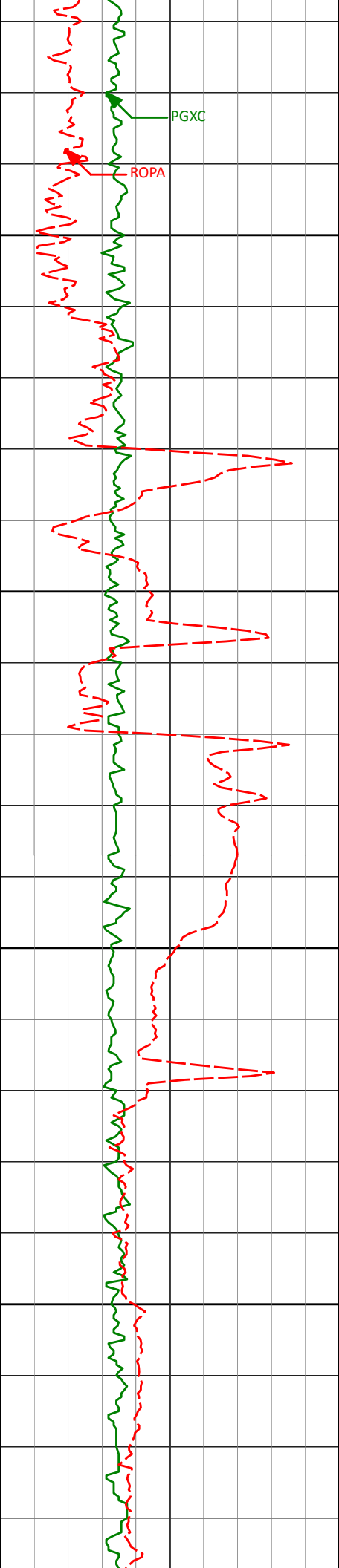
6388'

5.84°

109.55°

6312.17'

296.60'



6500

6550

6600

6650

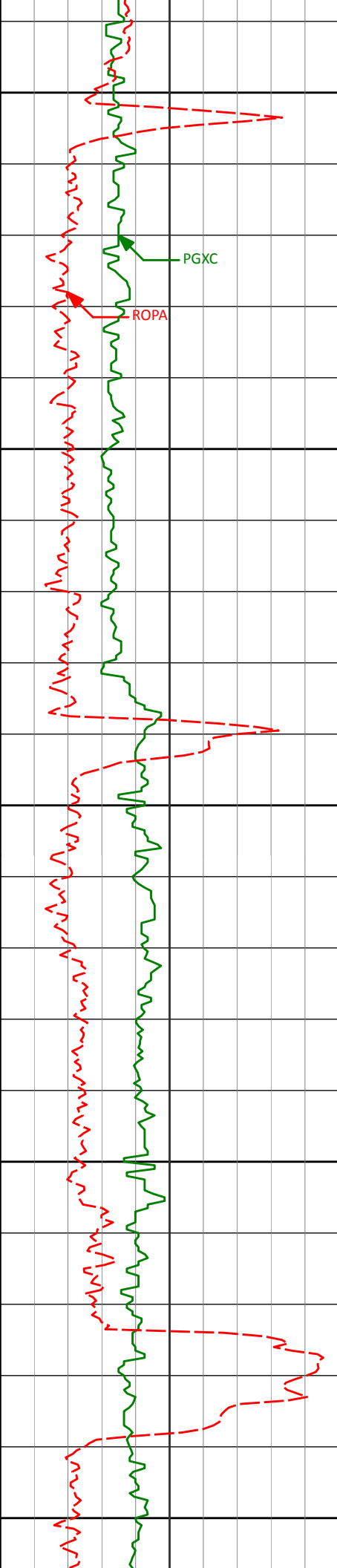
6559'

3.95°

110.12°

6482.54'

301.72'



6700

6750

6800

6850

6900

PGXC

ROPA

6730'

2.55°

115.78°

6653.26'

305.53'

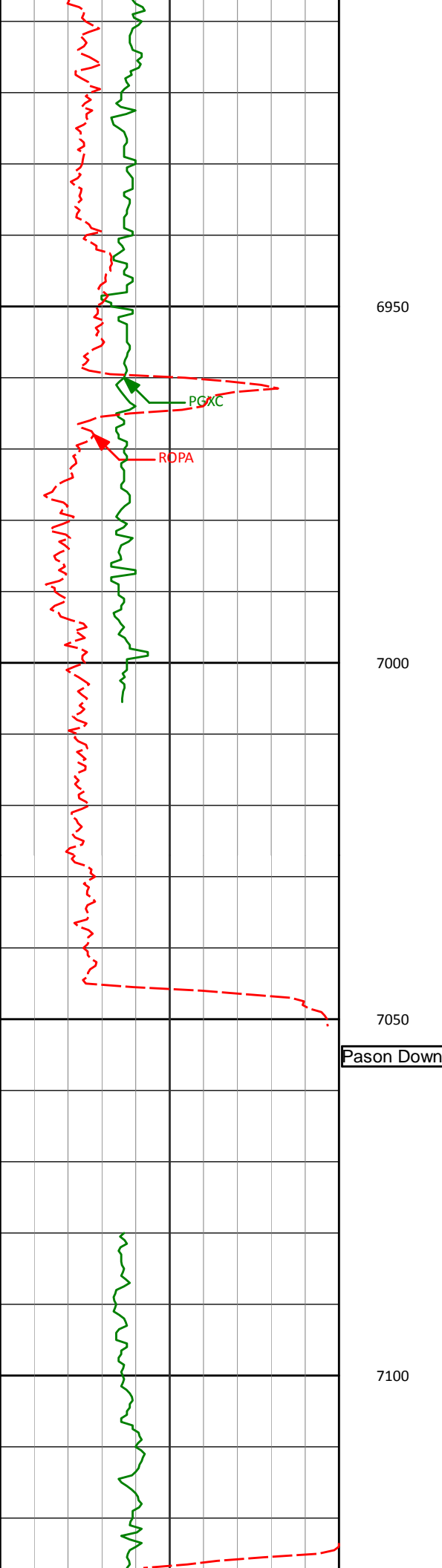
6901'

2.00°

151.44°

6824.14'

309.87'



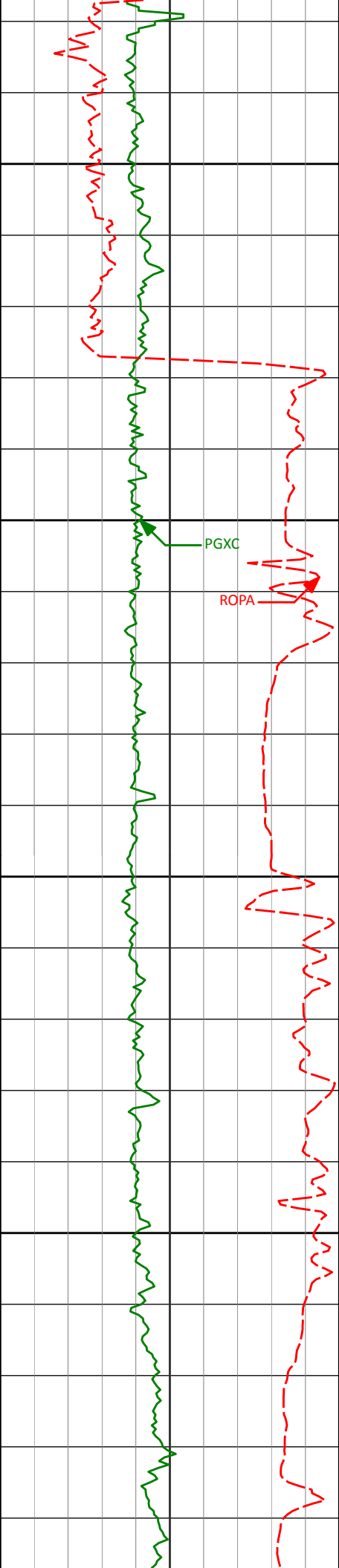
7072'

1.29°

151.21°

6995.07'

314.20'



7150

7157'

2.20°

165.05°

7080.03'

316.63'

7200

7200'

4.32°

178.10°

7122.95'

319.05'

PGXC

ROPA

7250

7243'

9.03°

188.85°

7165.65'

324.00'

7286'

11.44°

191.29°

7207.96'

331.50'

7300

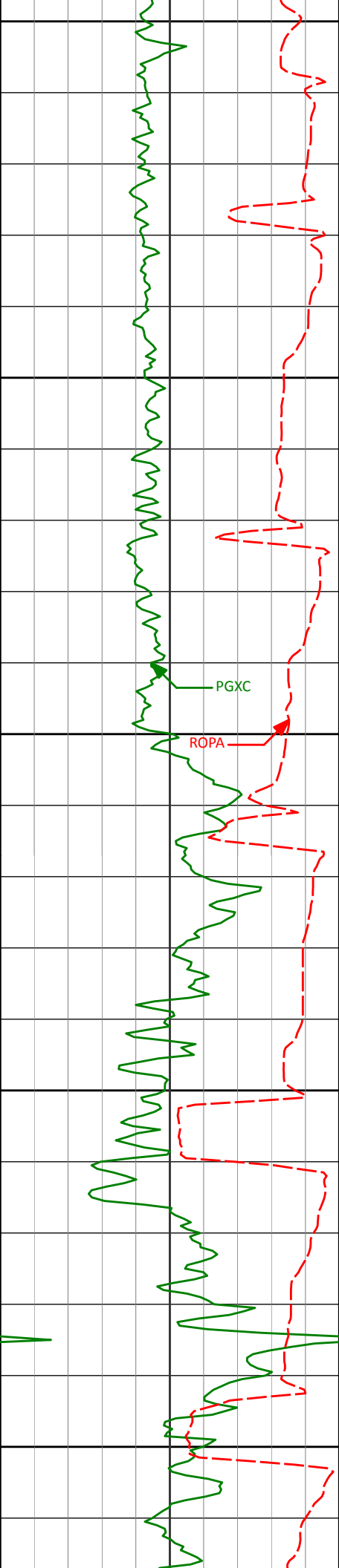
7328'

15.34°

190.68°

7248.82'

341.02'



7350

7371'

18.51°

188.99°

7289.95'

353.33'

7400

7414'

23.46°

187.10°

7330.08'

368.54'

7450

7457'

28.54°

187.27°

7368.72'

387.20'

7500

7500'

33.34°

185.05°

7405.59'

409.14'

7550

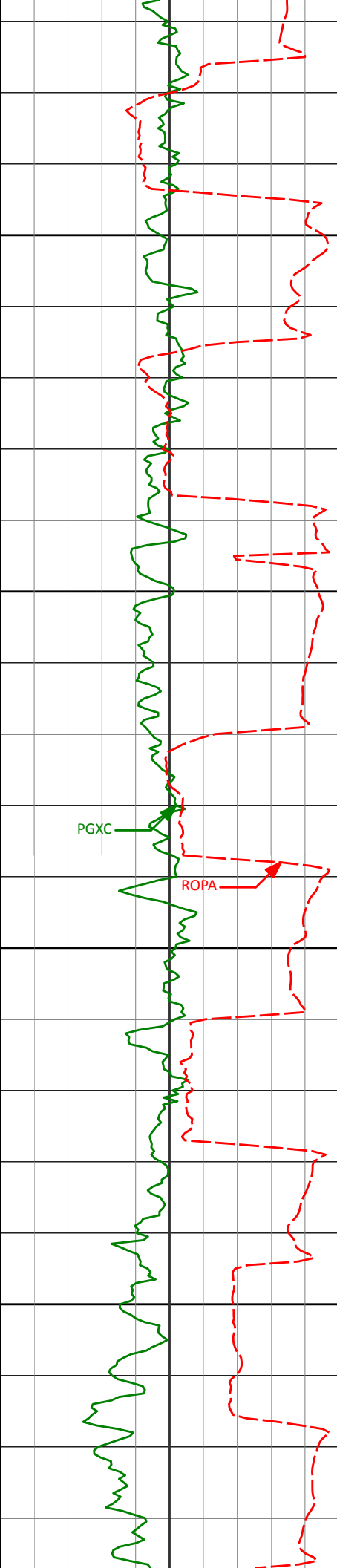
7543'

38.48°

182.93°

7440.41'

434.27'



7600

7650

7700

7750

7586'

41.81°

181.79°

7473.27'

461.94'

7629'

44.35°

180.81°

7504.68'

491.29'

7671'

47.88°

180.31°

7533.79'

521.55'

7714'

51.50°

178.94°

7561.60'

554.33'

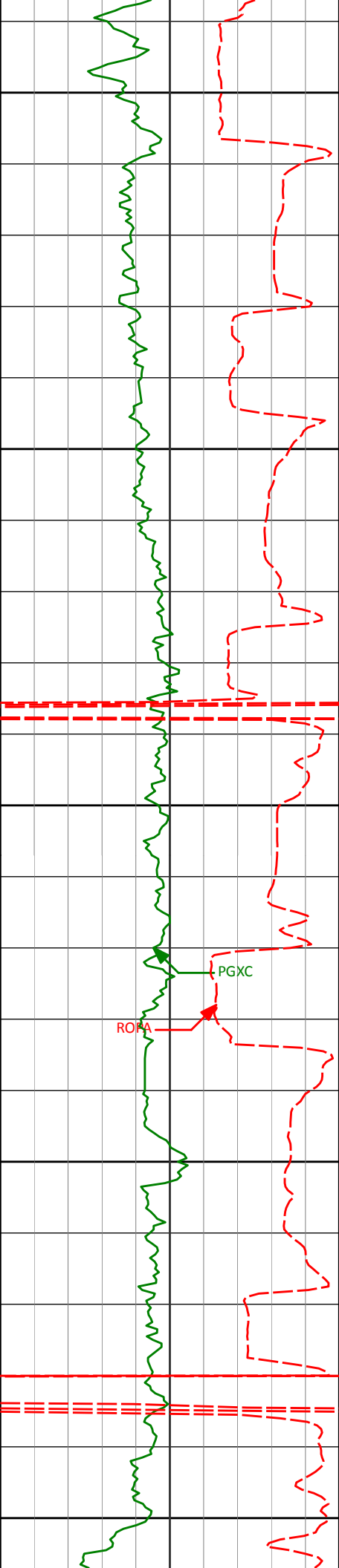
7757'

54.27°

178.78°

7587.55'

588.62'



7800

7800'

56.87°

178.71°

7611.86'

624.08'

7843'

62.18°

178.03°

7633.66'

661.12'

7850

7886'

66.87°

179.44°

7652.15'

699.93'

7900

7928'

71.63°

179.56°

7667.02'

739.19'

7950

7971'

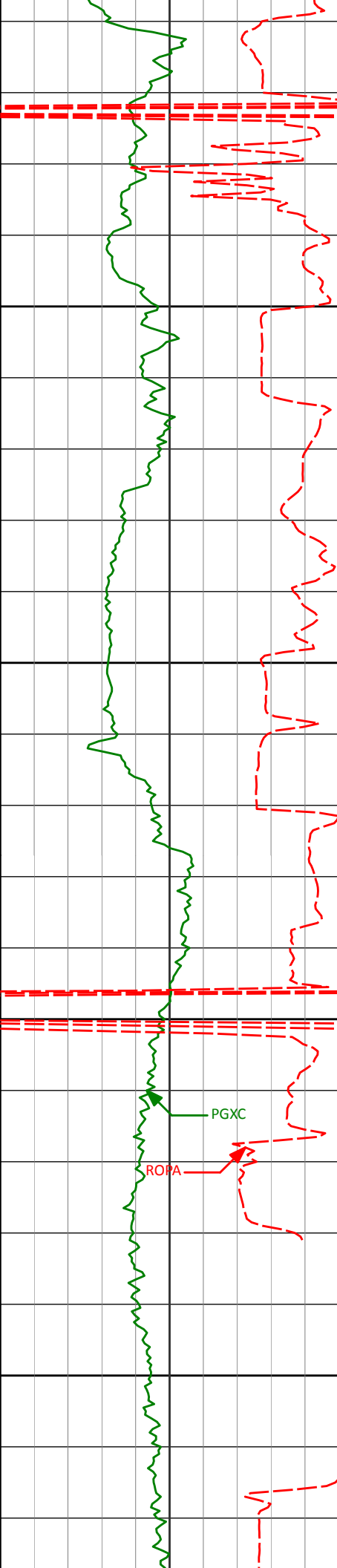
76.66°

178.55°

7678.77'

780.54'

8000



8013'

80.12°

177.32°

7687.22'

821.66'

8050

8069'

85.35°

177.49°

7694.30'

877.17'

8100

Casing @ 8112' MD

Run 200

8150

PGXC

ROPA

8172'

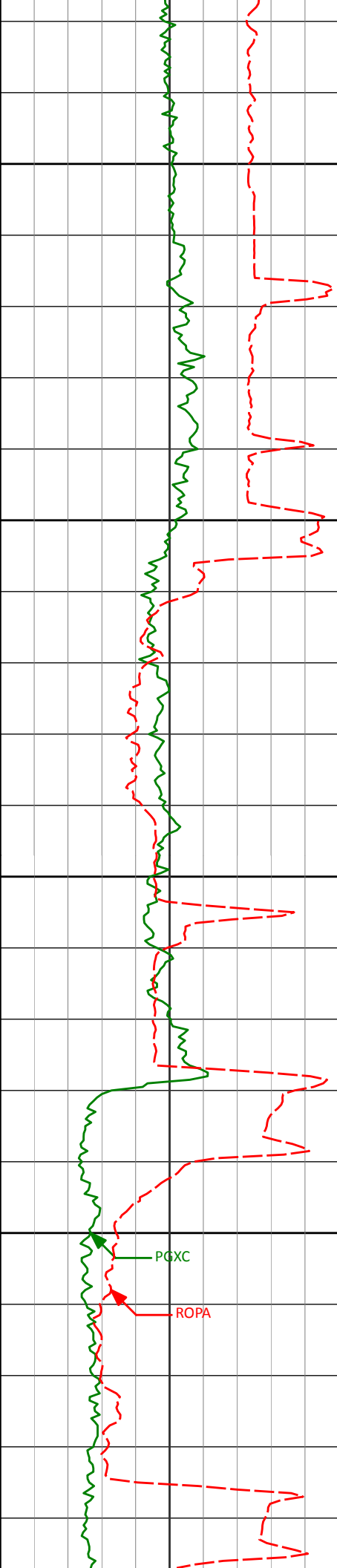
89.35°

178.51°

7699.06'

980.01'

8200



8250

8300

8350

8400

8309'

90.55°

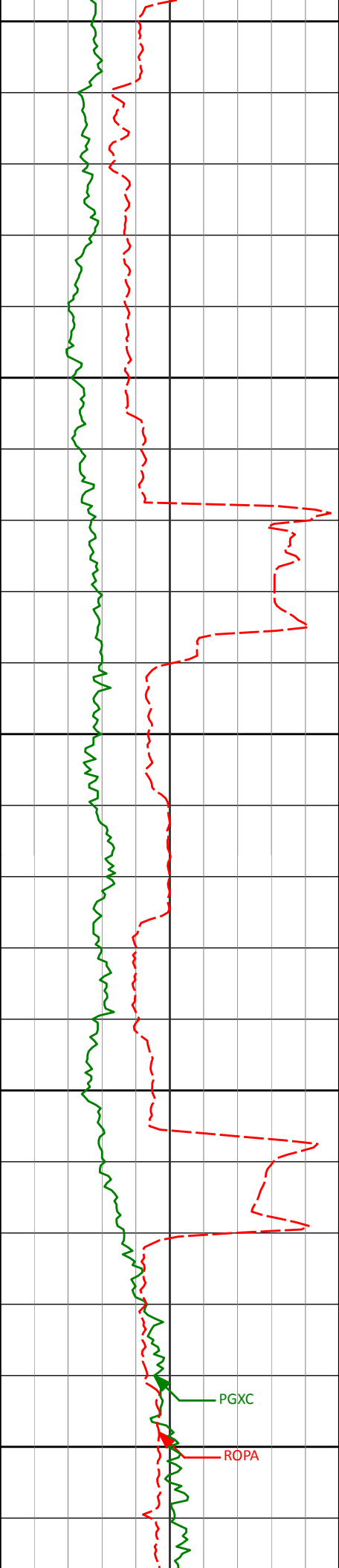
177.91°

7699.18'

1116.99'

PGXC

ROPA



8450

8477'

90.77°

177.97°

7697.25'

1284.93'

8500

8550

8600

8650

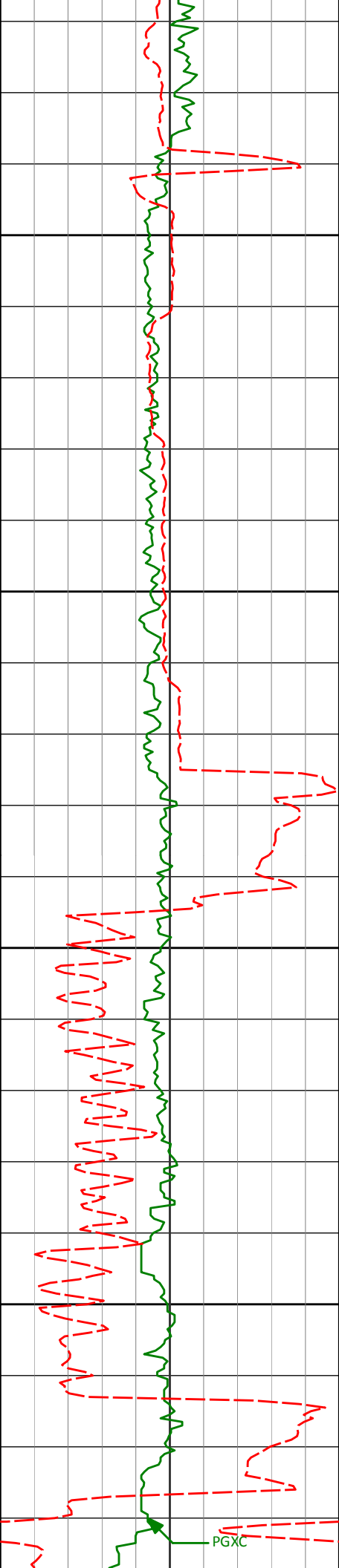
8647'

89.88°

178.60°

7696.28'

1454.90'



8700

8750

8800

8850

8817'

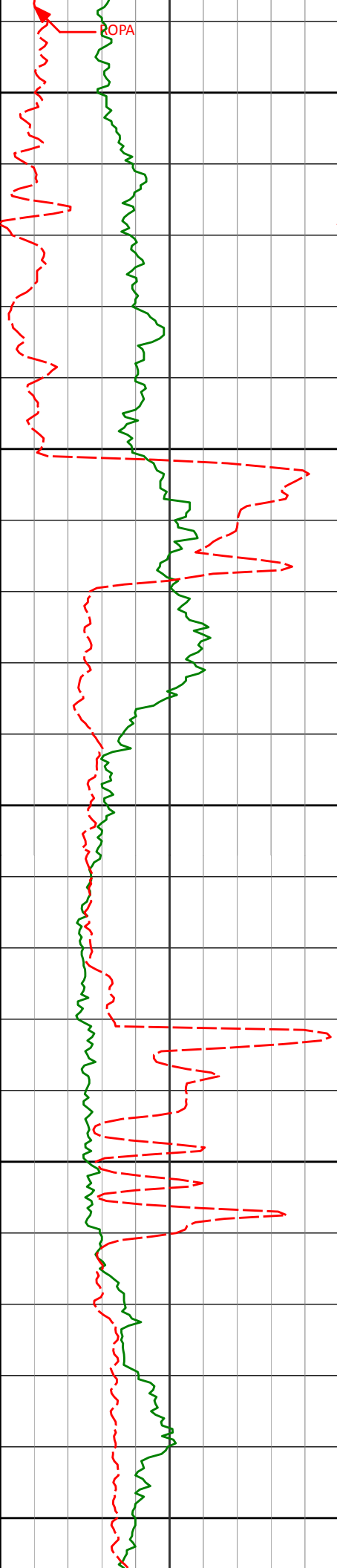
90.55°

179.44°

7695.64'

1624.90'

PGXC



8900

8950

8988'

90.18°

178.89°

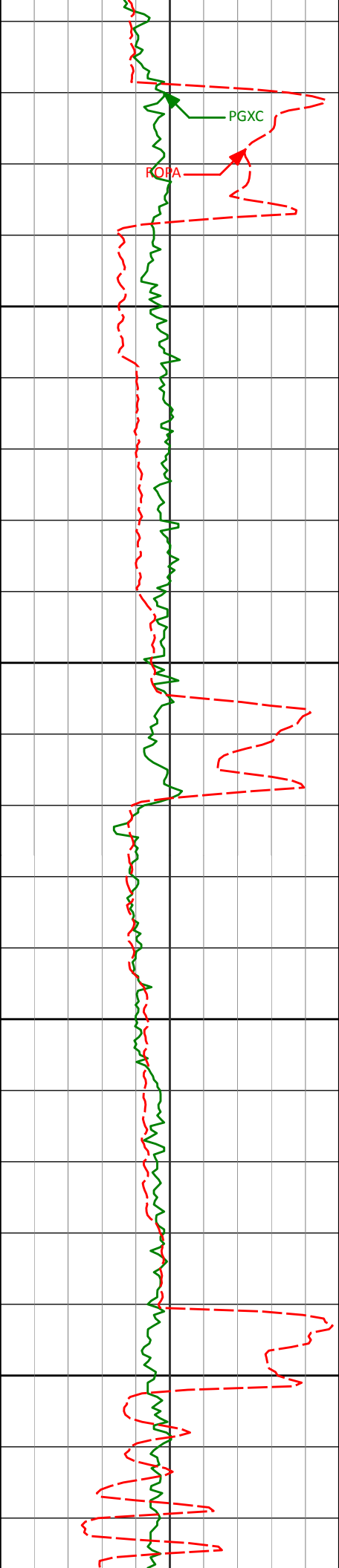
7694.55'

1795.89'

9000

9050

9100



9150

9158'

89.91°

178.80°

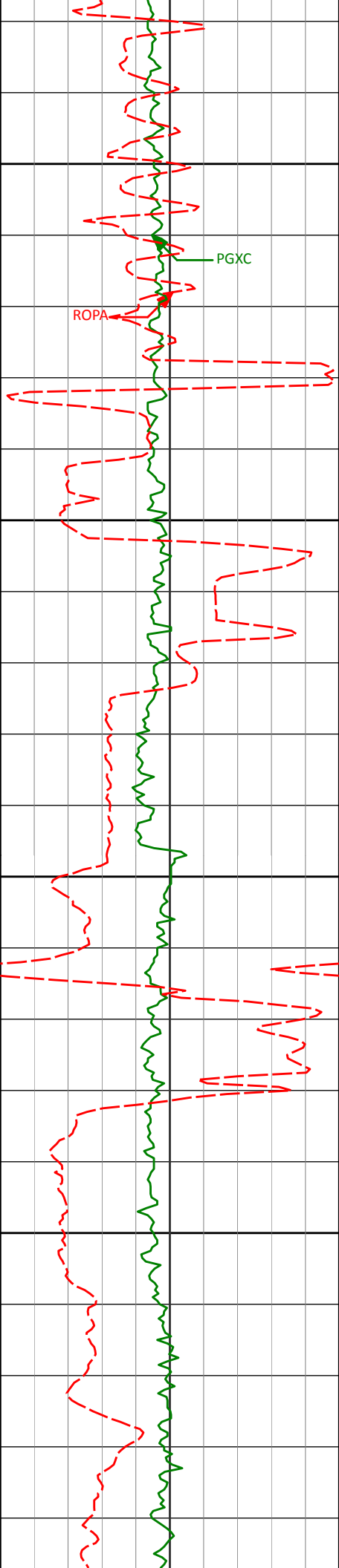
7694.42'

1965.89'

9200

9250

9300



9350

9400

9450

9500

PGXC

ROPA

9329'

89.48°

178.96°

7695.33'

2136.88'

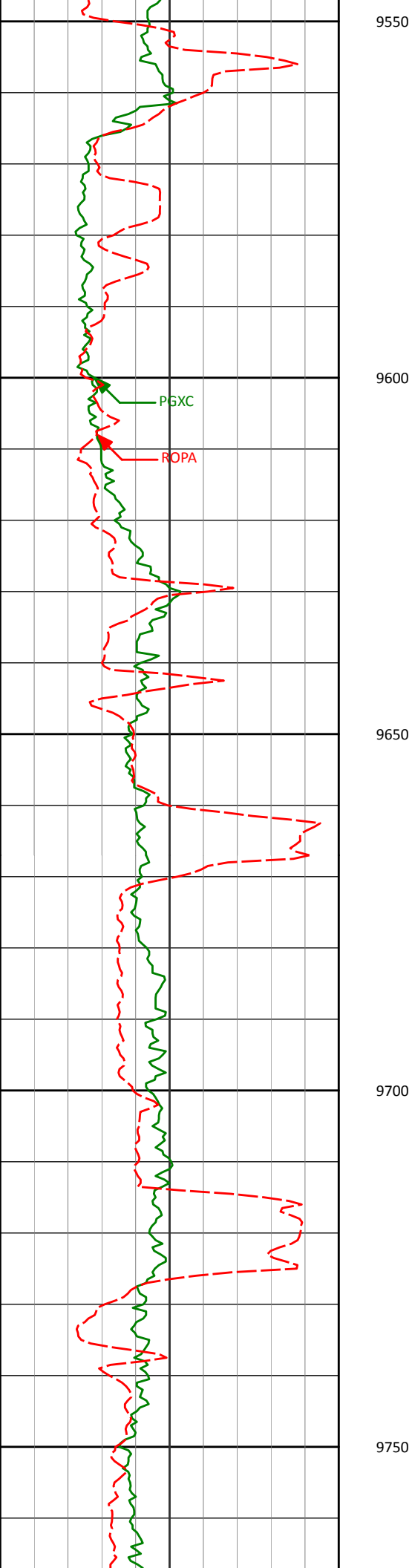
9501'

89.04°

179.97°

7697.55'

2308.87'



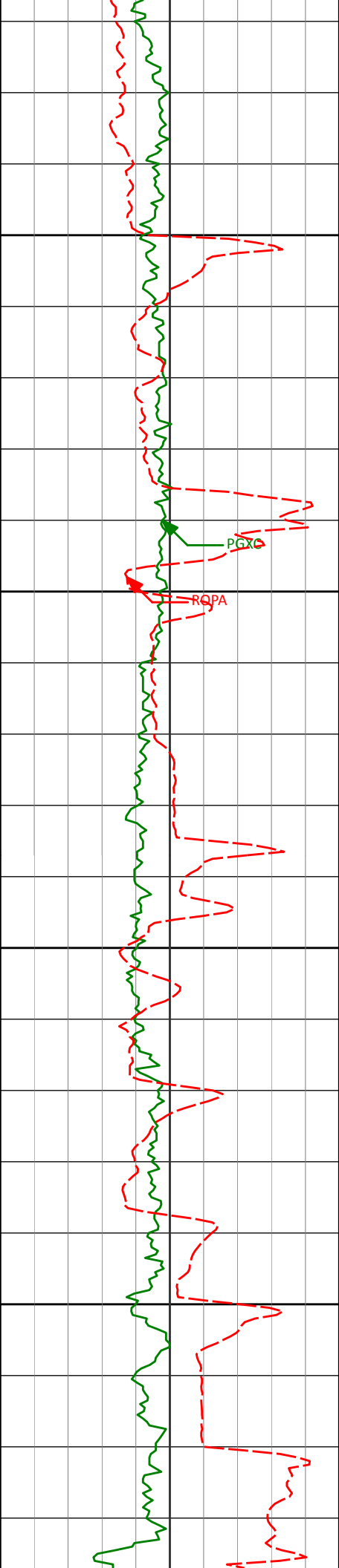
9672'

90.34°

179.51°

7698.48'

2479.85'



9800

9843'

9850

9900

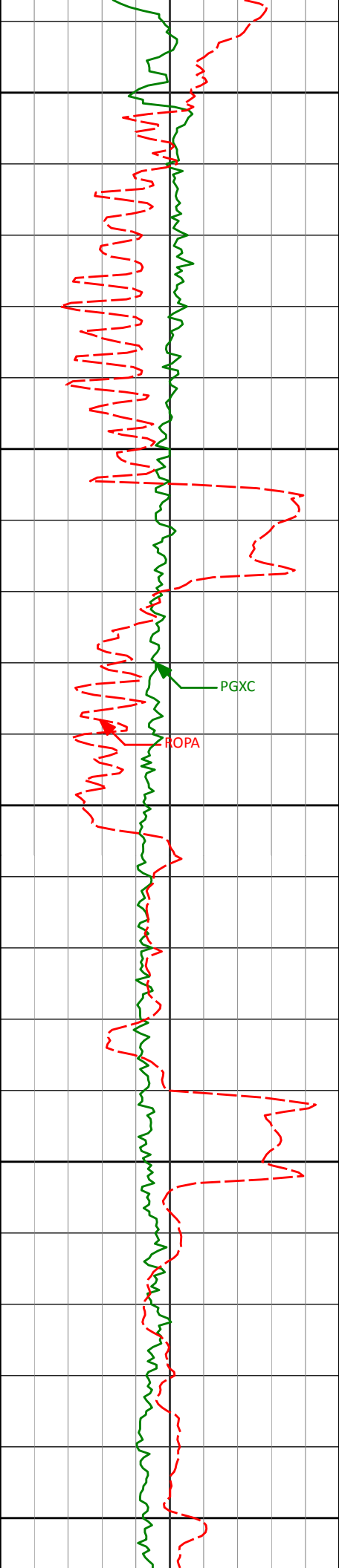
9950

89.45°

178.75°

7698.79'

2650.85'



10000

10013'

90.00°

178.37°

7699.61'

2820.83'

10050

PGXC

ROPA

10100

10150

10182'

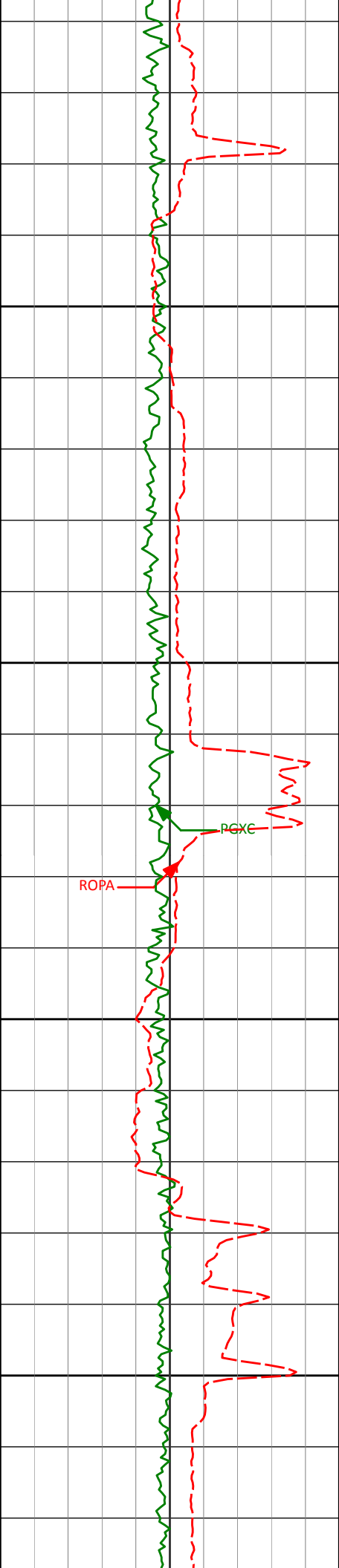
88.58°

178.74°

7701.70'

2989.80'

10200



10250

10300

10350

10400

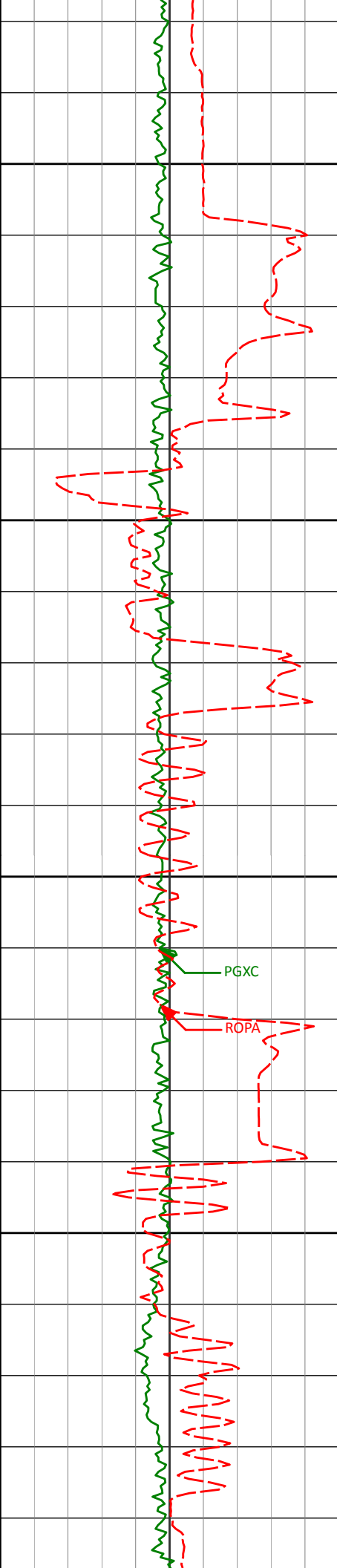
10353'

88.86°

179.22°

7705.52'

3160.76'



10450

10500

10550

10600

10524'

90.18°

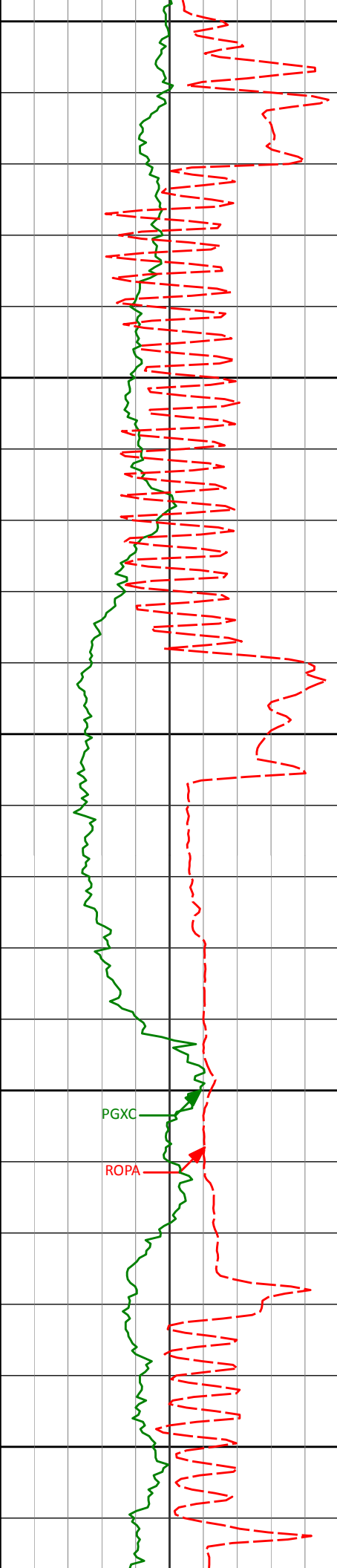
181.59°

7706.95'

3331.70'

PGXC

ROPA



10650

10694'

87.90°

181.13°

7709.80'

3501.55'

10700

10750

10800

PGXC

ROPA

10850

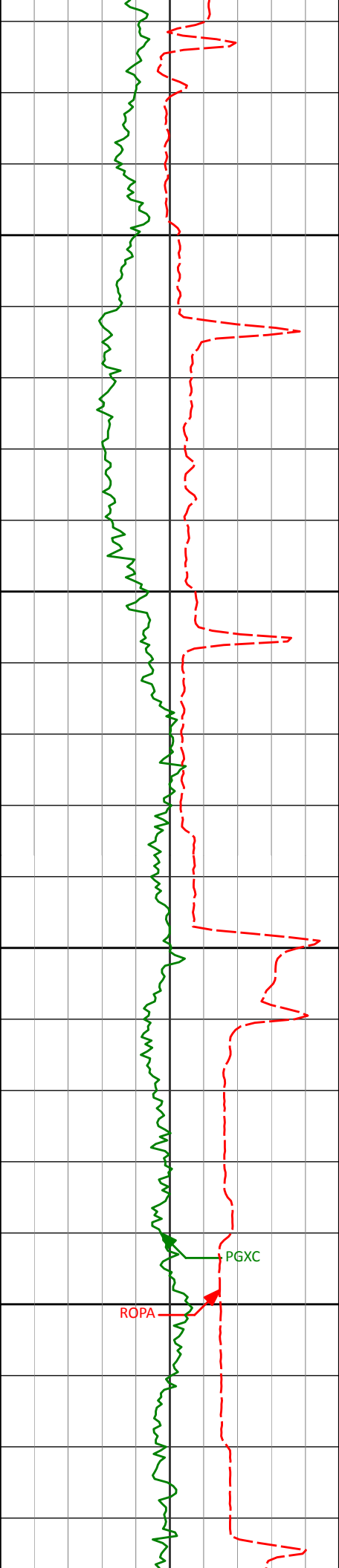
10865'

88.80°

179.34°

7714.73'

3672.44'



10900

10950

11000

11050

11036'

89.08°

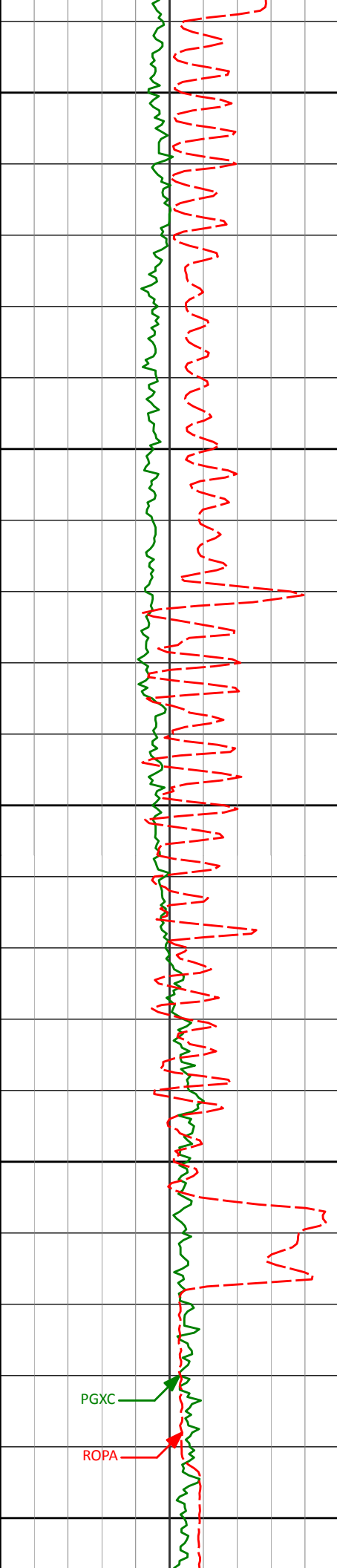
177.98°

7717.89'

3843.40'

PGXC

ROPA



11100

11150

11200

11250

11300

11206'

89.66°

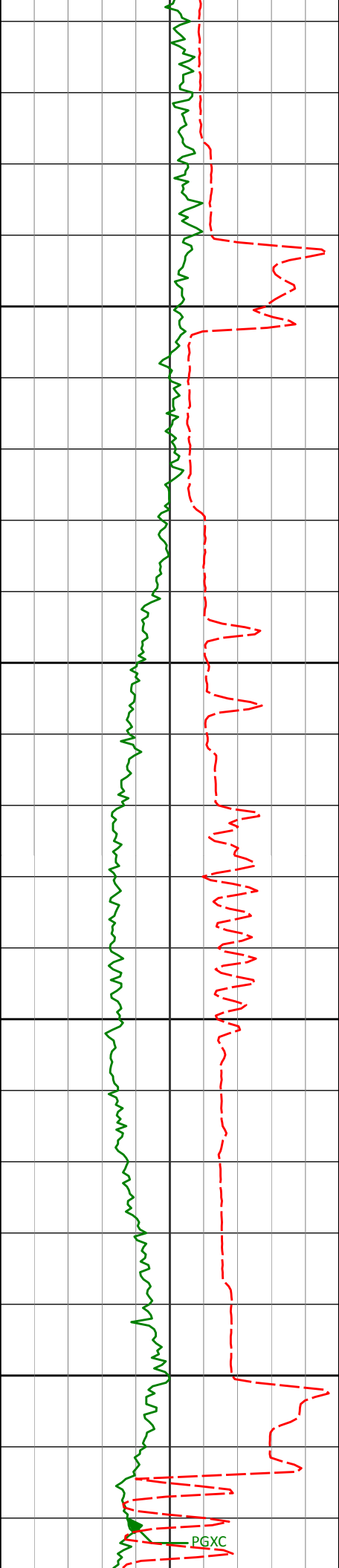
177.58°

7719.76'

4013.34'

PGXC

ROPA



11350

11378'

89.60°

179.41°

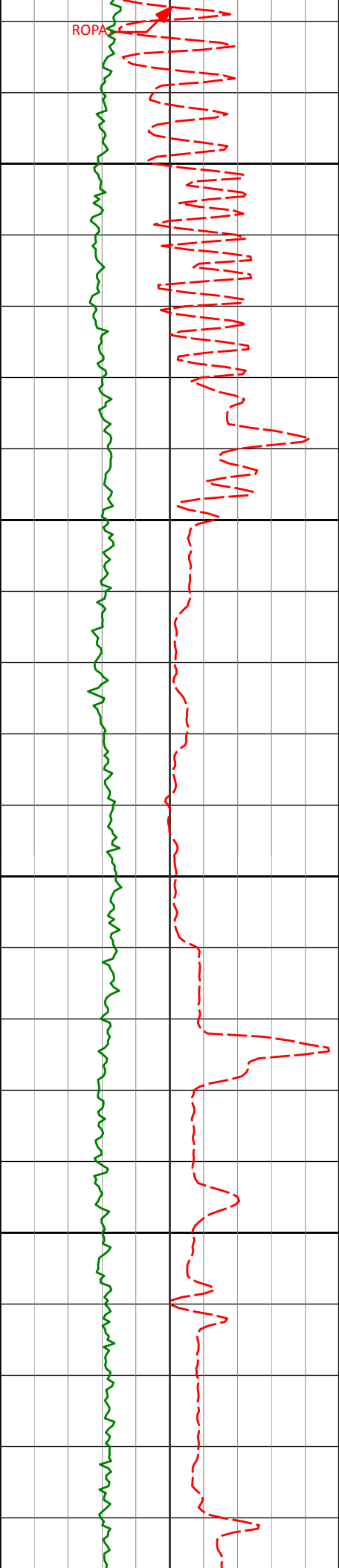
7720.87'

4185.31'

11400

11450

11500



11550

11548'

89.66°

179.58°

7721.97'

4355.31'

11600

11650

11700

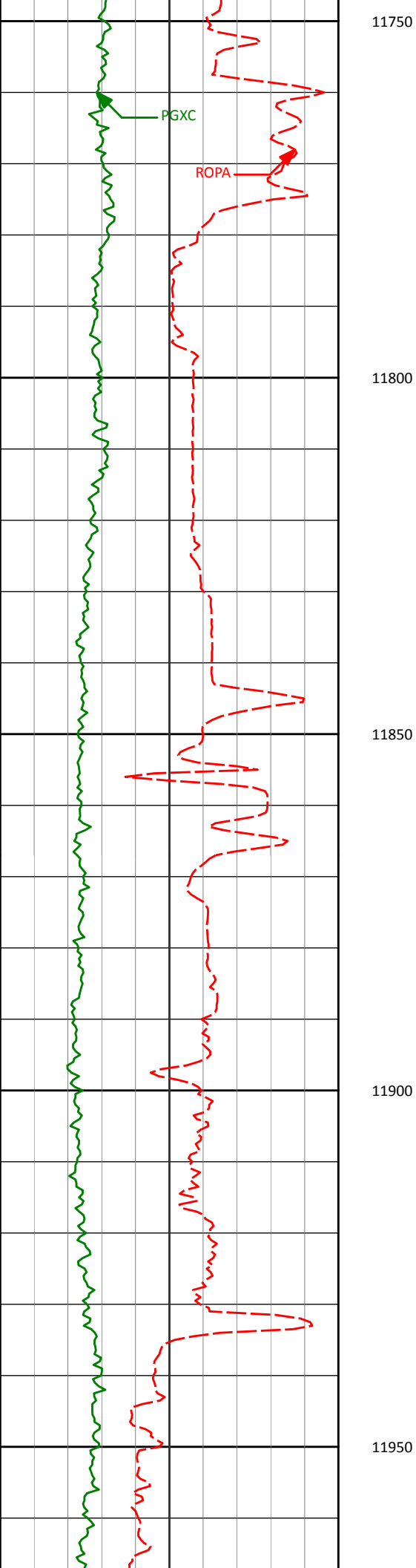
11719'

90.28°

179.70°

7722.06'

4526.30'



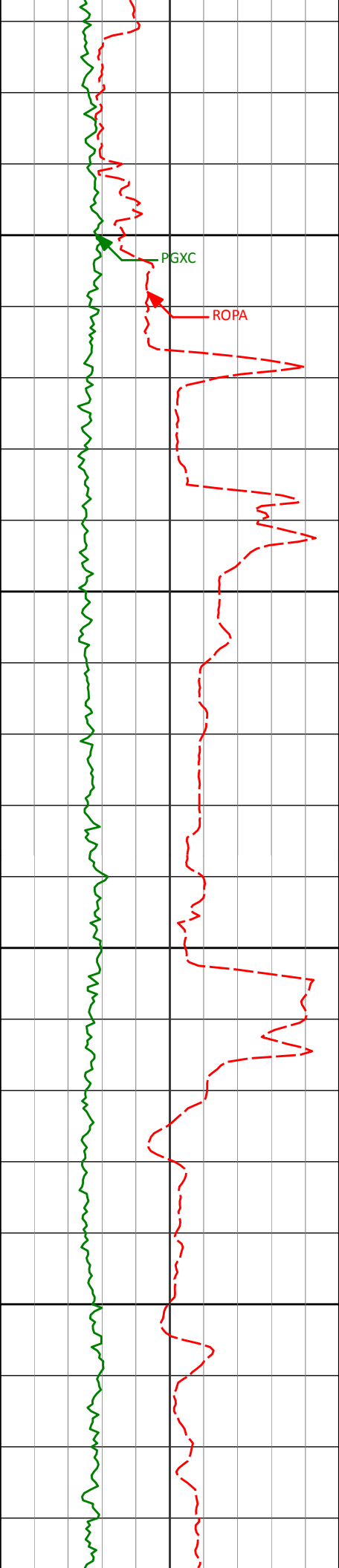
11890'

89.08°

179.04°

7723.01'

4697.29'



12000

PGXC

ROPA

12050

12061'

90.15°

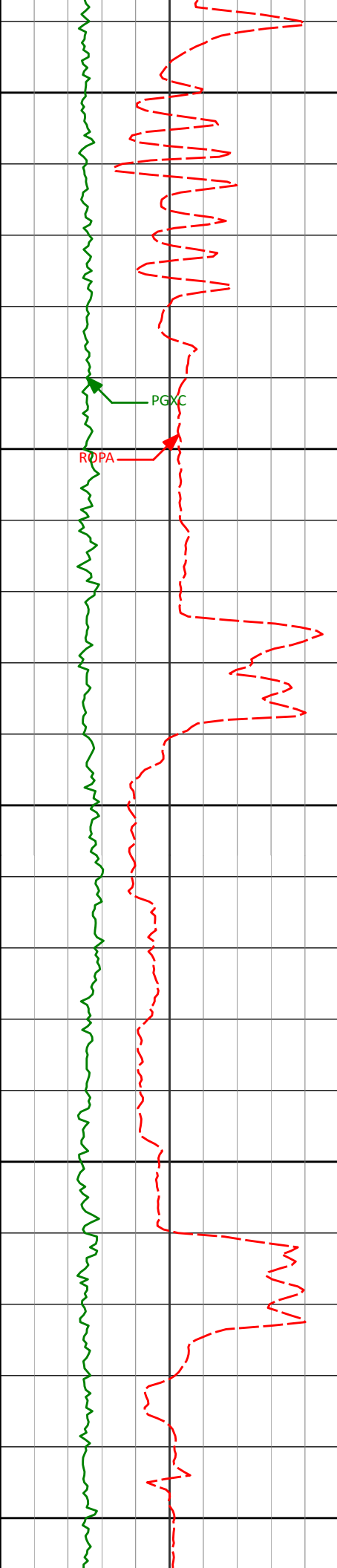
179.44°

7724.16'

4868.29'

12100

12150



12200

12232'

90.40°

178.88°

7723.34'

5039.28'

12250

12300

12350

12400

12401'

89.63°

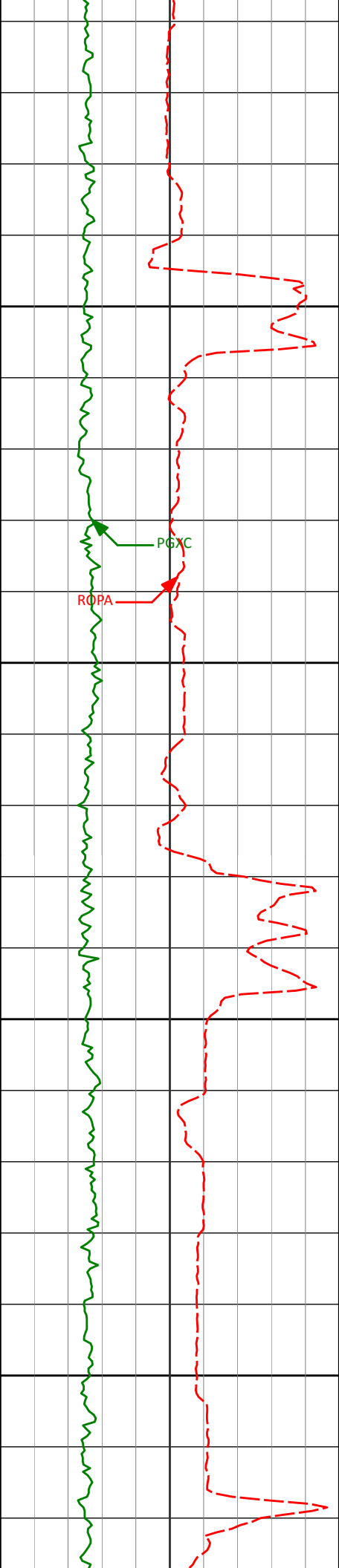
178.18°

7723.30'

5208.27'

PGXC

ROPA



12450

12500

12550

12600

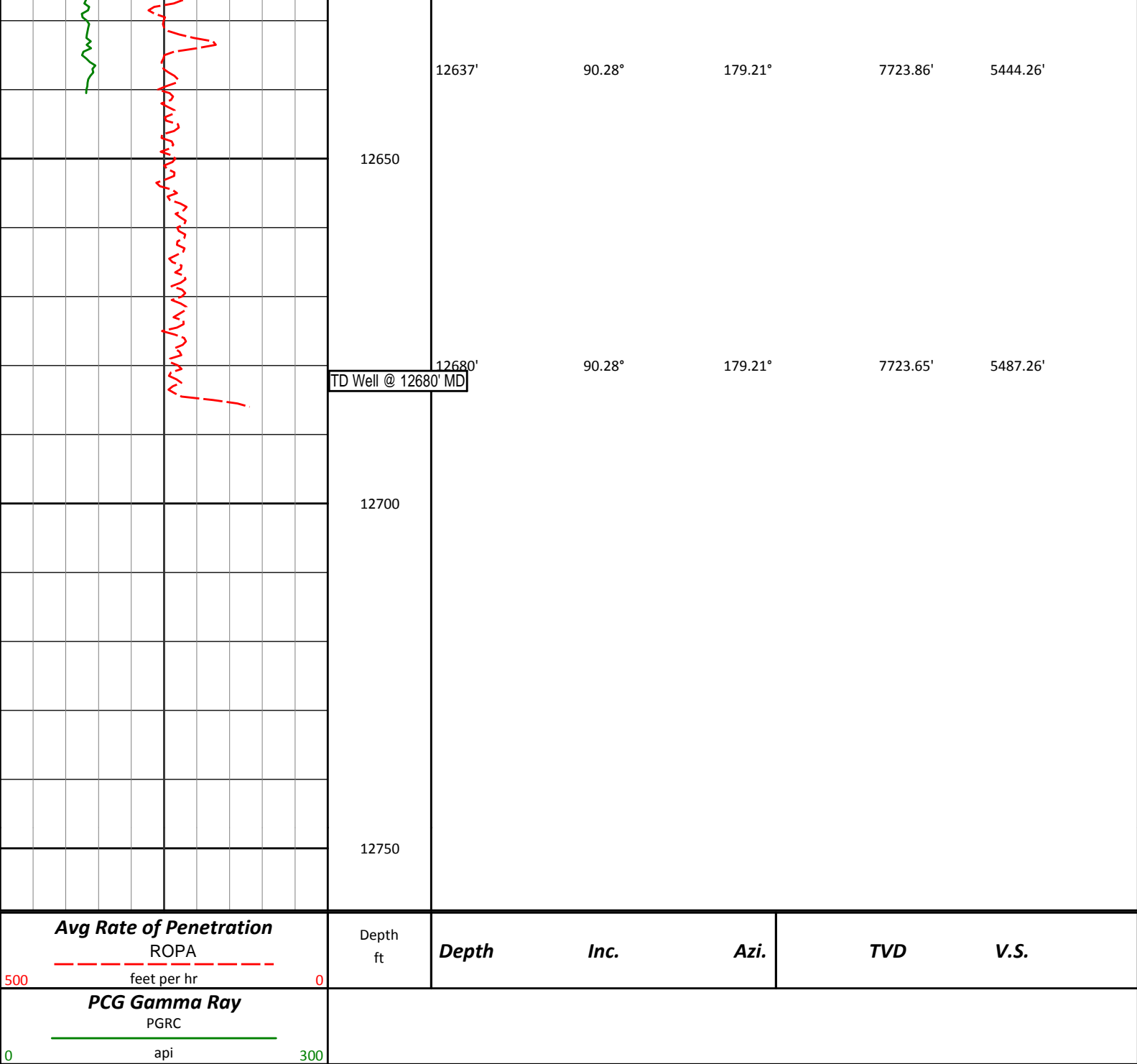
12569'

89.91°

179.22°

7723.97'

5376.26'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko PC
Sack 37N-6HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901557473

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1289.00	0.46	245.31	1288.98	5.79 S	3.06 W	5.75	TIE-IN
1850.00	4.58	126.22	1849.41	19.97 S	12.97 E	20.15	0.86
1941.00	6.88	117.21	1939.95	24.61 S	20.75 E	24.89	2.71
2032.00	8.99	111.06	2030.07	29.66 S	32.24 E	30.09	2.50

2123.00	10.94	106.40	2119.70	34.65 S	47.16 E	35.29	2.32
2215.00	11.35	106.17	2209.96	39.64 S	64.23 E	40.50	0.45
2306.00	10.64	107.24	2299.29	44.62 S	80.85 E	45.71	0.81
2397.00	9.84	107.97	2388.84	49.51 S	96.27 E	50.80	0.89
2489.00	10.30	113.37	2479.42	55.20 S	111.30 E	56.69	1.14
2580.00	11.46	114.43	2568.79	62.17 S	127.00 E	63.87	1.29
2672.00	10.85	114.77	2659.05	69.58 S	143.18 E	71.49	0.67
2764.00	10.77	115.37	2749.42	76.89 S	158.81 E	79.01	0.15
2856.00	10.72	112.27	2839.80	83.81 S	174.50 E	86.15	0.63
2948.00	11.80	108.68	2930.03	90.07 S	191.33 E	92.63	1.40
3131.00	11.28	110.56	3109.33	102.35 S	225.81 E	105.37	0.35
3315.00	10.10	111.41	3290.14	114.56 S	257.68 E	118.01	0.65
3486.00	9.92	111.14	3458.53	125.34 S	285.38 E	129.17	0.11
3657.00	10.81	108.90	3626.74	135.85 S	314.29 E	140.06	0.57
3828.00	10.25	104.53	3794.86	144.86 S	344.19 E	149.47	0.57
3998.00	11.22	101.05	3961.89	151.82 S	375.06 E	156.85	0.69
4170.00	9.98	103.50	4130.95	158.51 S	405.98 E	163.95	0.77
4341.00	9.27	117.19	4299.57	168.27 S	432.64 E	174.06	1.40
4511.00	11.43	123.89	4466.80	183.92 S	458.81 E	190.07	1.45
4682.00	10.43	121.83	4634.69	201.53 S	486.03 E	208.04	0.63
4853.00	11.65	114.45	4802.53	216.84 S	514.90 E	223.74	1.09
5022.00	13.61	112.57	4967.44	231.53 S	548.79 E	238.89	1.18
5193.00	12.33	100.54	5134.10	242.60 S	585.33 E	250.44	1.74
5364.00	10.65	97.21	5301.67	247.92 S	618.96 E	256.22	1.06
5535.00	10.77	102.21	5469.70	253.28 S	650.25 E	262.00	0.55
5706.00	10.13	105.61	5637.86	260.71 S	680.35 E	269.83	0.52
5877.00	8.94	107.60	5806.49	268.77 S	707.50 E	278.26	0.72
6047.00	9.93	103.43	5974.19	276.17 S	734.35 E	286.02	0.71
6218.00	7.20	99.92	6143.27	281.45 S	759.25 E	291.62	1.62
6388.00	5.84	109.55	6312.17	286.17 S	777.90 E	296.60	1.02
6559.00	3.95	110.12	6482.54	291.11 S	791.63 E	301.72	1.11
6730.00	2.55	115.78	6653.26	294.79 S	800.58 E	305.53	0.84
6901.00	2.00	151.44	6824.14	299.07 S	805.43 E	309.87	0.87
7072.00	1.29	151.21	6995.07	303.38 S	807.79 E	314.20	0.42
7157.00	2.20	165.05	7080.03	305.79 S	808.67 E	316.63	1.17
7200.00	4.32	178.10	7122.95	308.21 S	808.94 E	319.05	5.19
7243.00	9.03	188.85	7165.65	313.16 S	808.47 E	324.00	11.29
7286.00	11.44	191.29	7207.96	320.68 S	807.12 E	331.50	5.69
7328.00	15.34	190.68	7248.82	330.23 S	805.27 E	341.02	9.29
7371.00	18.51	188.99	7289.95	342.56 S	803.15 E	353.33	7.46
7414.00	23.46	187.10	7330.08	357.81 S	801.02 E	368.54	11.62
7457.00	28.54	187.27	7368.72	376.50 S	798.66 E	387.20	11.82
7500.00	33.34	185.05	7405.59	398.48 S	796.32 E	409.14	11.47
7543.00	38.48	182.93	7440.41	423.63 S	794.60 E	434.27	12.30
7586.00	41.81	181.79	7473.27	451.32 S	793.47 E	461.94	7.93
7629.00	44.35	180.81	7504.68	480.68 S	792.81 E	491.29	6.11
7671.00	47.88	180.31	7533.79	510.94 S	792.51 E	521.55	8.45
7714.00	51.50	178.94	7561.60	543.73 S	792.74 E	554.33	8.76
7757.00	54.27	178.78	7587.55	578.01 S	793.42 E	588.62	6.45
7800.00	56.87	178.71	7611.86	613.46 S	794.20 E	624.08	6.05
7843.00	62.18	178.03	7633.66	650.49 S	795.26 E	661.12	12.42
7886.00	66.87	179.44	7652.15	689.29 S	796.11 E	699.93	11.30
7928.00	71.63	179.56	7667.02	728.55 S	796.45 E	739.19	11.34
7971.00	76.66	178.55	7678.77	769.90 S	797.13 E	780.54	11.91
8013.00	80.12	177.32	7687.22	811.00 S	798.62 E	821.66	8.72
8069.00	85.35	177.49	7694.30	866.48 S	801.13 E	877.17	9.34
8172.00	89.35	178.51	7699.06	969.28 S	804.72 E	980.01	4.01
8309.00	90.55	177.91	7699.18	1106.21 S	809.00 E	1116.99	0.98
8477.00	90.77	177.97	7697.25	1274.09 S	815.04 E	1284.93	0.14
8647.00	89.88	178.60	7696.28	1444.01 S	820.13 E	1454.90	0.64
8817.00	90.55	179.44	7695.64	1613.98 S	823.03 E	1624.90	0.63
8988.00	90.18	178.89	7694.55	1784.96 S	825.53 E	1795.89	0.39
9158.00	89.91	178.80	7694.42	1954.93 S	828.95 E	1965.89	0.17
9329.00	89.48	178.96	7695.33	2125.89 S	832.30 E	2136.88	0.27
9501.00	89.04	179.97	7697.55	2297.87 S	833.90 E	2308.87	0.64
9672.00	90.34	179.51	7698.48	2468.86 S	834.68 E	2479.85	0.81
9843.00	89.45	178.75	7698.79	2639.83 S	837.27 E	2650.85	0.68
10013.00	90.00	178.37	7699.61	2809.78 S	841.55 E	2820.83	0.39
10182.00	88.58	178.74	7701.70	2978.71 S	845.81 E	2989.80	0.87
10353.00	88.86	179.22	7705.52	3149.64 S	848.85 E	3160.76	0.32
10524.00	90.18	181.59	7706.95	3320.61 S	847.64 E	3331.70	1.59

10694.00	87.90	181.13	7709.80	3490.53 S	843.61 E	3501.55	1.37
10865.00	88.80	179.34	7714.73	3661.45 S	842.91 E	3672.44	1.17
11036.00	89.08	177.98	7717.89	3832.37 S	846.91 E	3843.40	0.81
11206.00	89.66	177.58	7719.76	4002.23 S	853.49 E	4013.34	0.41
11378.00	89.60	179.41	7720.87	4174.16 S	858.01 E	4185.31	1.06
11548.00	89.66	179.58	7721.97	4344.15 S	859.51 E	4355.31	0.11
11719.00	90.28	179.70	7722.06	4515.14 S	860.58 E	4526.30	0.37
11890.00	89.08	179.04	7723.01	4686.12 S	862.46 E	4697.29	0.80
12061.00	90.15	179.44	7724.16	4857.10 S	864.73 E	4868.29	0.67
12232.00	90.40	178.88	7723.34	5028.08 S	867.24 E	5039.28	0.36
12401.00	89.63	178.18	7723.30	5197.02 S	871.57 E	5208.27	0.62
12569.00	89.91	179.22	7723.97	5364.98 S	875.38 E	5376.26	0.64
12637.00	90.28	179.21	7723.86	5432.97 S	876.32 E	5444.26	0.54
12680.00	90.28	179.21	7723.65	5475.97 S	876.91 E	5487.26	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 179.23 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.45 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12680.00 FEET
IS 5545.73 FEET ALONG 170.90 DEGREES (TRUE)**

Directional surveys tied onto Surface Gyros @ 1289' MD. Final Survey is a straightline projection to bit.