

PCGK - Pressure Case Gamma

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	05-May-14	07-May-14	27-May-14	31-May-14	
Rig Bit Number	0100	0200	0300	0400	
Bit Size (in)	8.750	8.750	6.125	6.125	
Tool Nominal OD (in)	6.750	6.750	4.750	4.750	
Log Start Depth (MD, ft)	1,250.00	5,093.06	7,600.00	14,607.00	
Log End Depth (MD, ft)	5,093.06	7,600.00	14,607.00	16,807.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	04-May-14 14:50	05-May-14 15:30	22-May-14 17:25	28-May-14 07:25	
Drill/Wipe End Date and Time	05-May-14 15:00	07-May-14 14:00	27-May-14 00:45	30-May-14 13:20	
Min Inc (deg) @ Depth (MD, ft)	0.22 @ 1,877.00	1.15 @ 6,624.00	86.16 @ 10,849.00	88.38 @ 14,970.00	
Max Inc (deg) @ Depth (MD, ft)	11.02 @ 3,839.00	89.93 @ 7,600.00	92.82 @ 13,428.00	91.65 @ 15,483.00	
Bit TFA(in2) / Bit Type	2.23 / PDC	2.23 / PDC	1.86 / PDC	1.86 / PDC	
Flow Rate (gpm)	588.56	587.57	273.76	268.11	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	472.3 / 0.0	N/A / N/A	N/A / N/A	
Fluid Type	Native/Spud Mud	Native/Spud Mud	Mineral Oil Bas	Mineral Oil Bas	
Density (ppg) / Viscosity (spqt)	8.50 / 33.00	9.80 / 33.00	9.60 / 63.00	9.60 / 65.00	
Filtrate CL (ppm)	1,800.00	800.00	250,000.00	250,000.00	
pH / Fluid Loss (mptm)	8.20 / 0	7.90 / 0	N/A / 2	N/A / 3	
PV (cP) / YP (lbf2)	1 / 1.00	1 / 1.00	17 / 14.00	19 / 10.00	
% Solids / % Sand	0.10 / 0.01	4.00 / 0.01	13.00 / 0.5	14.00 / 0.5	
% Oil / Oil:Water Ratio	/ N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	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	N/A @ N/A	
Max Tool Temp (in F) / S	221.00 / PCM	122.00 / PCM	222.5 / PCM	212.0 / PCM	

Max Tool Temp (degF) / Source	221.80 / PCM	163.20 / PCM	238.7 / PCM	242.9 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ 221.80	N/A @ 163.20	N/A @ 238.7	N/A @ 242.9	
Lead MWD Engineer	Clay Wass	Clay Wass	Caleb Jones	Caleb Jones	
Customer Representative	Scott Hancock	Scott Hancock	Jack Sanders	Jack Sanders	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.76	5.76	
Sub Serial Number	11342293	11342293	12310740	12310470	
Insert Serial Number	11400958	10997273	10997273	11227520	
Date and Time Initialized	03-May-14 16:55	05-May-14 16:46	20-May-14 23:06	27-May-14 05:58	
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00	27-May-14 16:15	31-May-14 10:08	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	76.99	77.04	66.00	63.91	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11342293	11342293	12310740	12310470	
Sonde Serial Number	11638521	11638501	11638501	11297564	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	225.99	231.47	204.63	132.63	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	66.97	67.02	53.68	53.79	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11342293	11342293	12310740	11297564	
Insert/Sonde Serial Number	11579788	11681025	11681025	11681022	

REMARKS

1. Depths are Measured 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

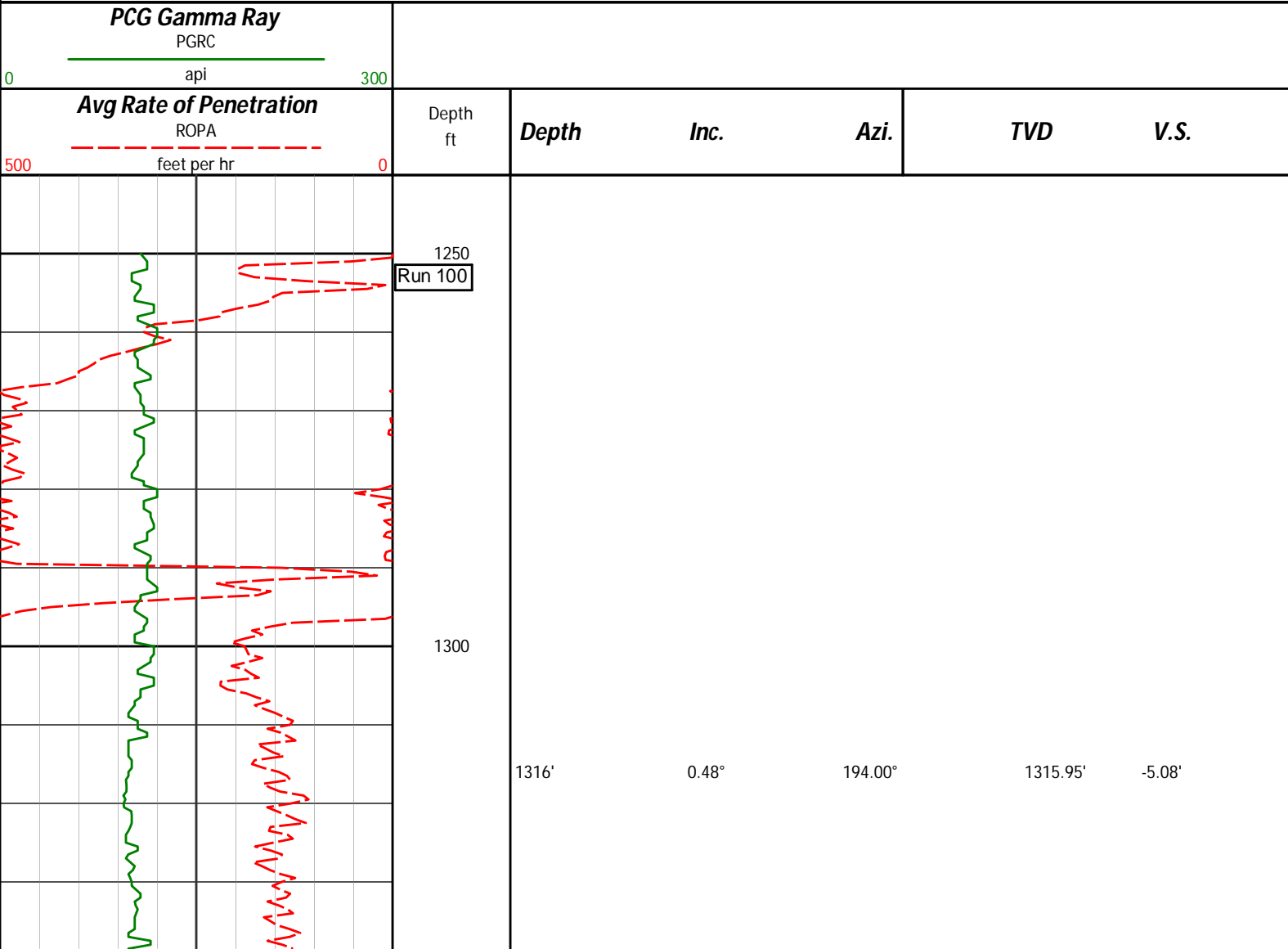
ROPA (Average Rate of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

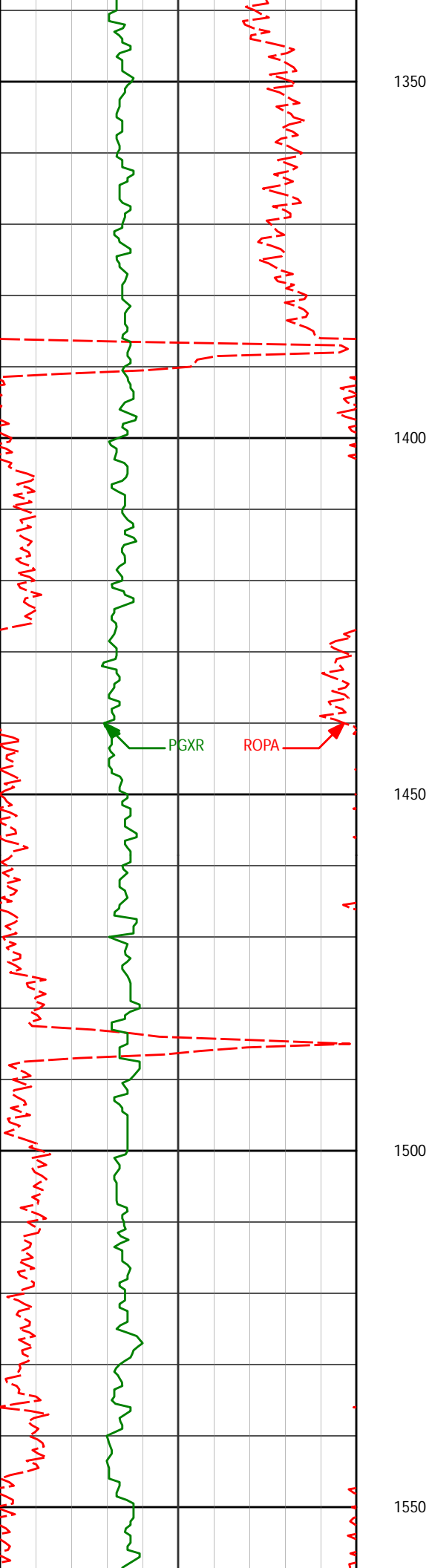
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HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Anadarko PC
Sekich State 38C-17HZ
Xtreme 22
Sec. 18-T3N-R67W





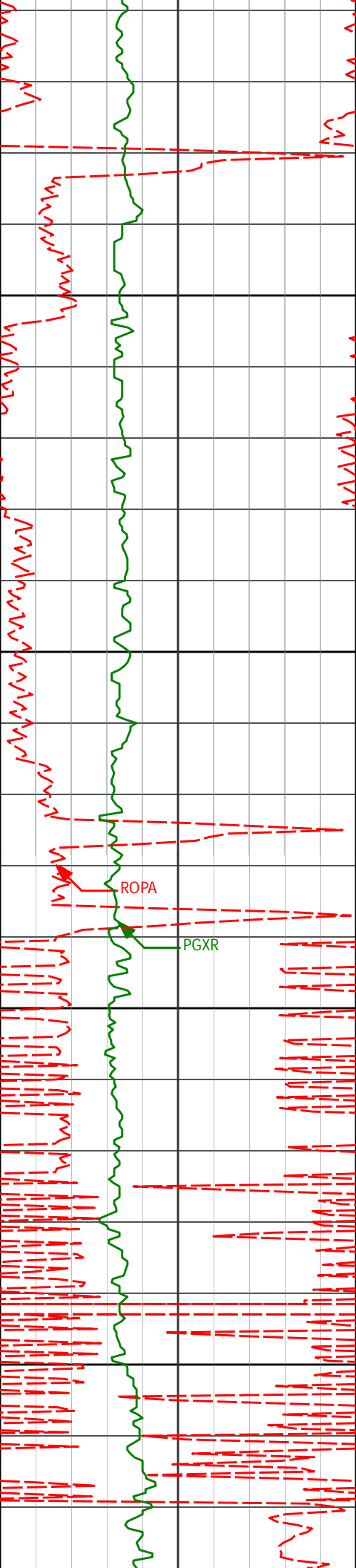
1506'

0.48°

176.33°

1505.94'

-5.22'



1600

1650

1700

1750

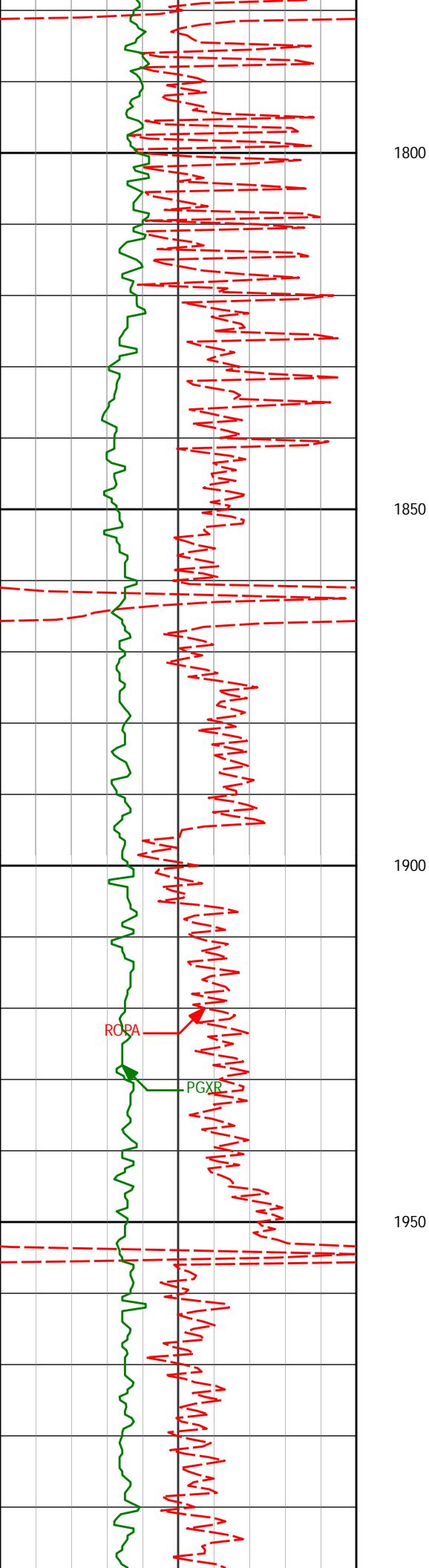
1694'

0.87°

167.87°

1693.93'

-4.86'



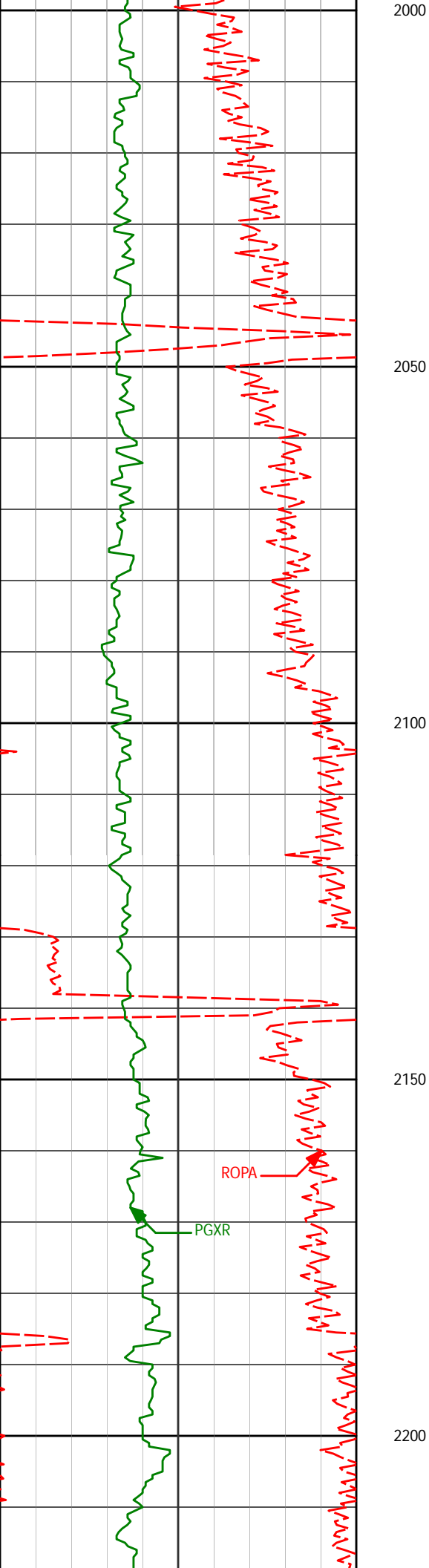
1877'

0.08°

191.12°

1876.92'

-4.59'



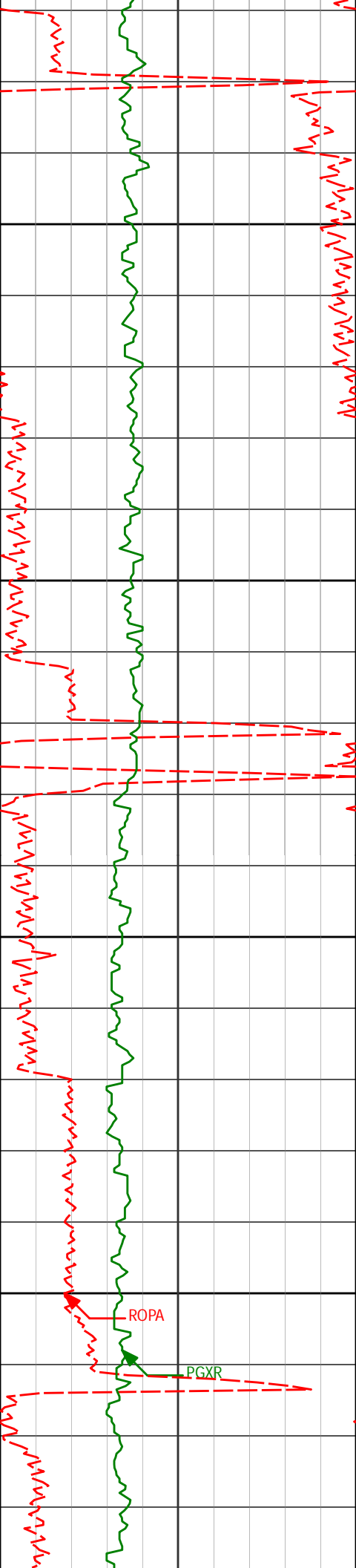
2060'

0.14°

292.29°

2059.92'

-4.83'



2242'

0.17°

285.25°

2241.92'

-5.30'

2250

2300

2350

2400

ROPA

PGXR

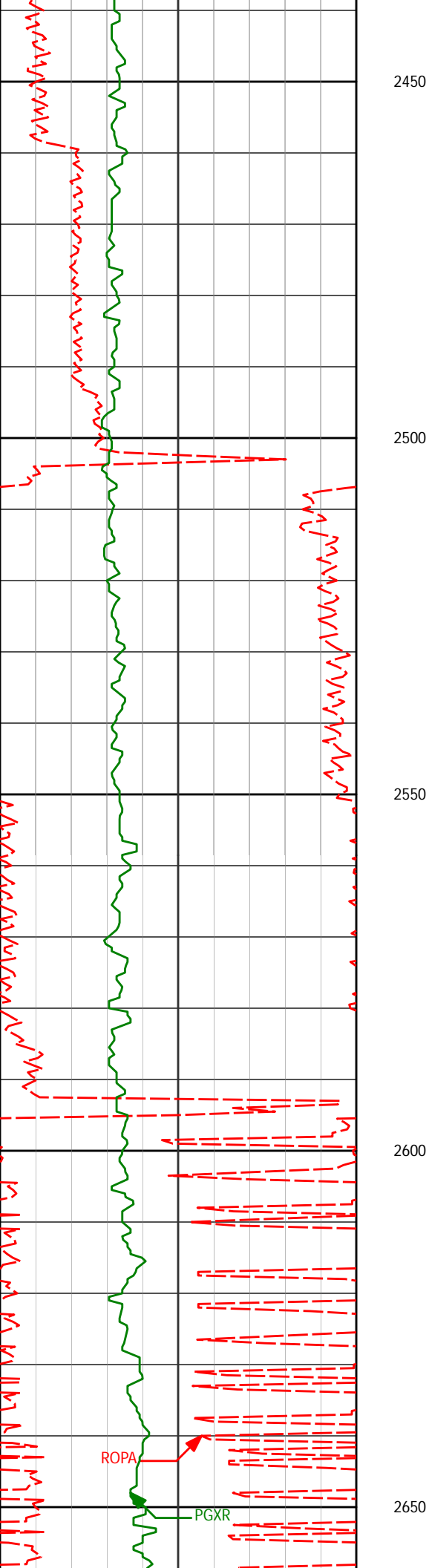
2242.92'

0.26°

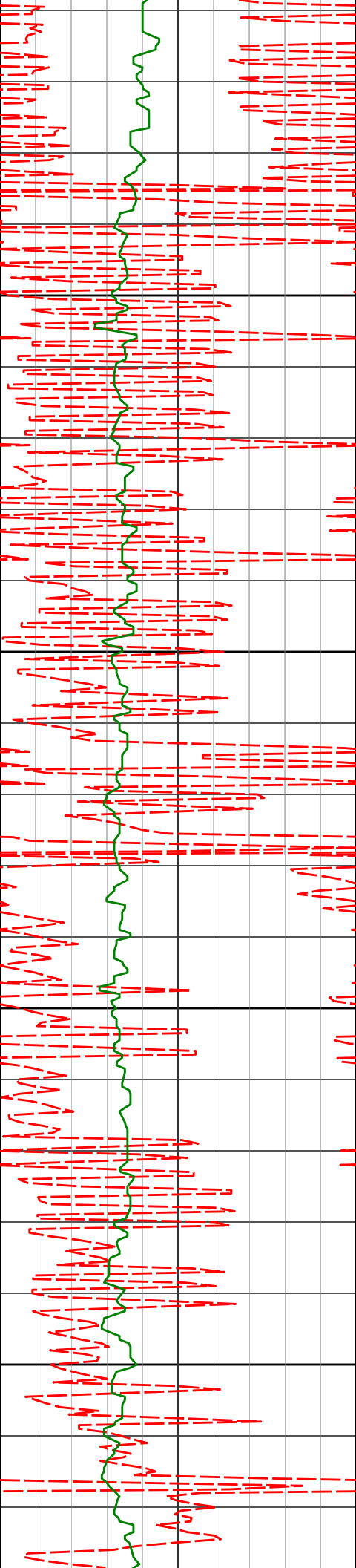
296.10°

2241.92'

-5.95'



2608' 0.25° 298.07° 2607.91' -6.68'



2700

2750

2800

2850

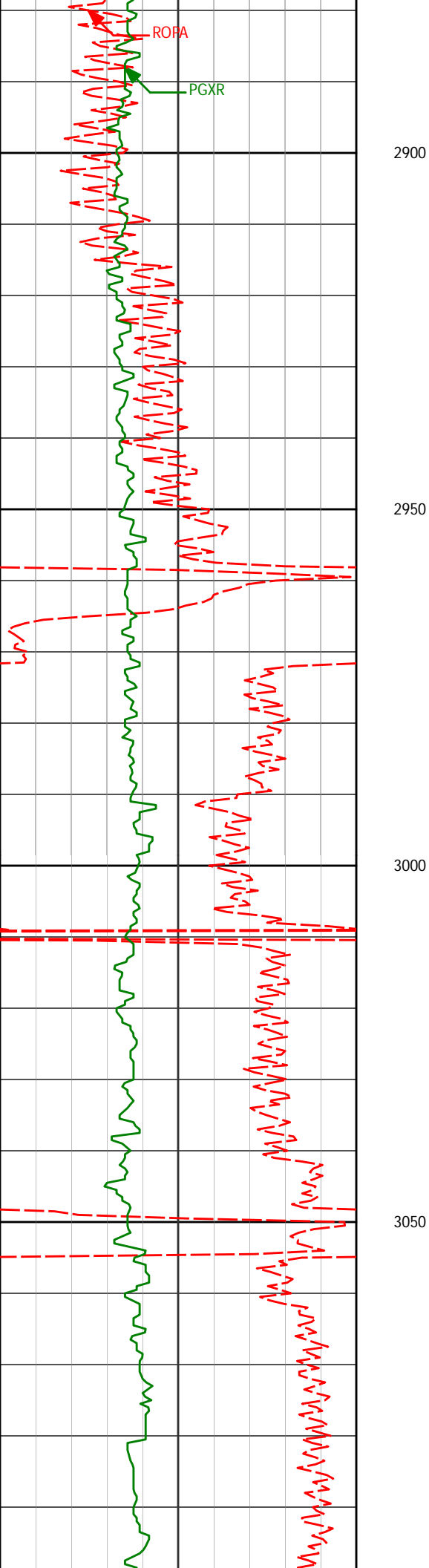
2790'

0.37°

284.96°

2789.91'

-7.61'



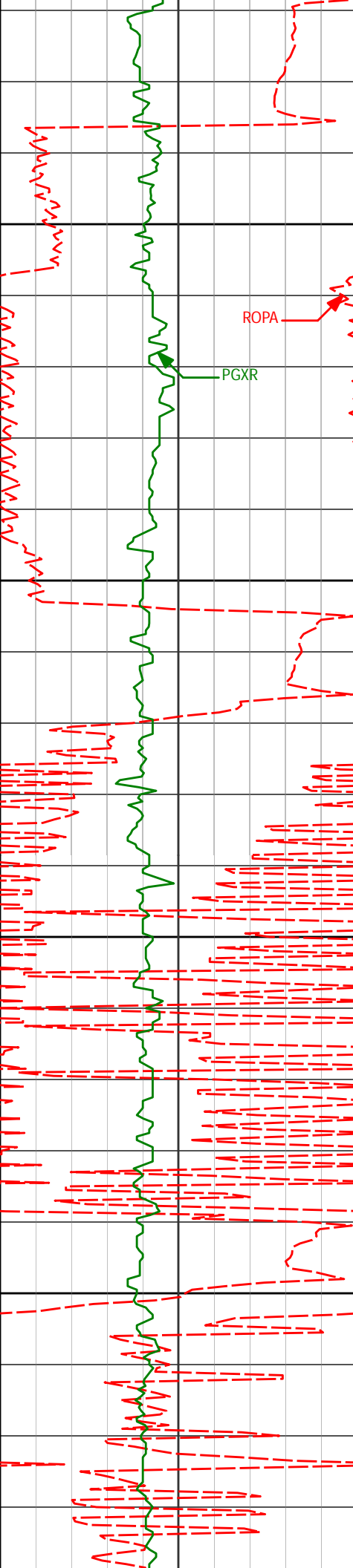
2972'

0.63°

280.67°

2971.90'

-9.15'



3326'

2.56°

196.03°

3325.83'

-11.74'

3350

ROPA

PGXR

3400

3450

3500

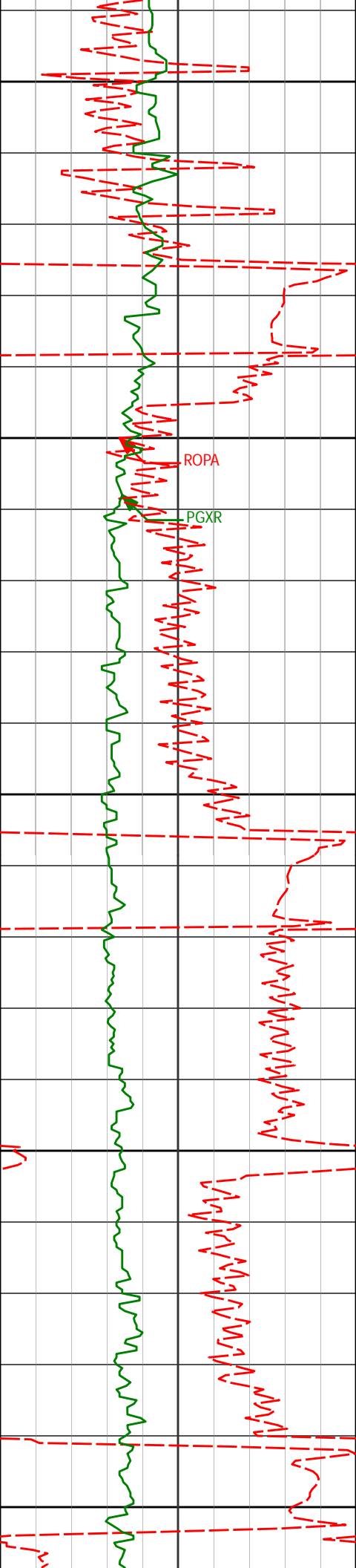
3497'

4.88°

186.07°

3496.46'

-13.54'



3550

3600

3650

3700

3750

ROPA

PGXR

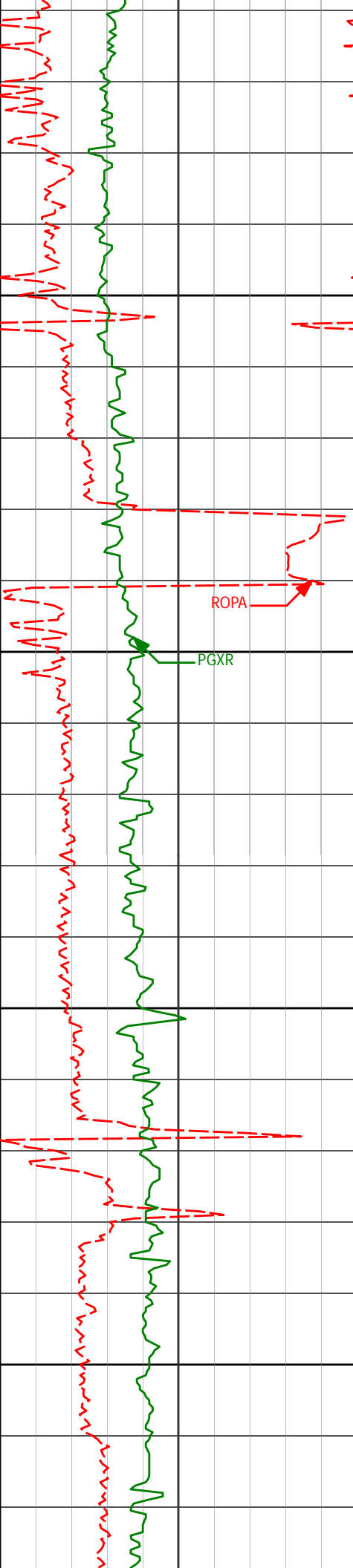
3668'

8.19°

178.51°

3666.33'

-13.94'



3800

3839'

11.02°

178.26°

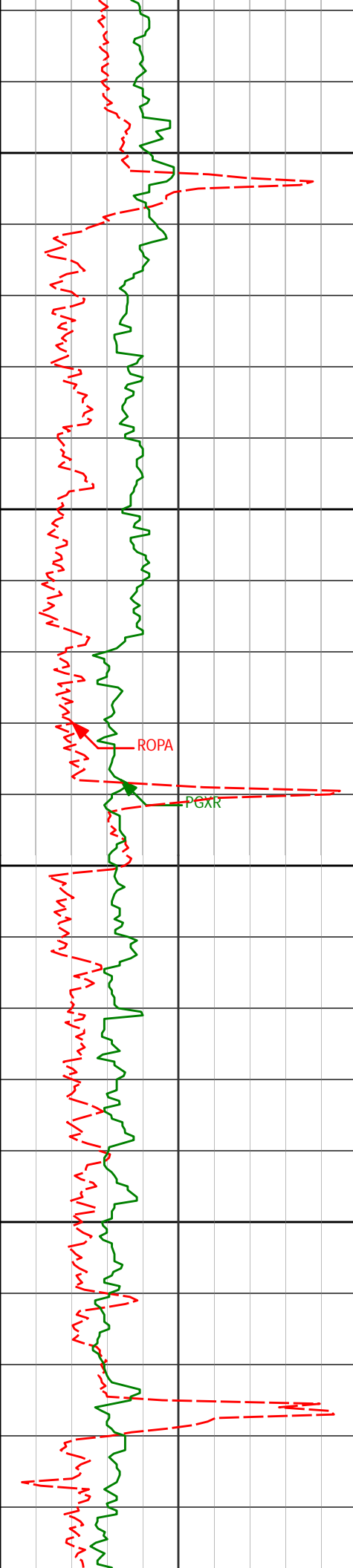
3834.92'

-13.05'

3850

3900

3950



4000

4011'

10.09°

179.76°

4004.01'

-12.41'

4050

ROPA

PGXR

4100

4150

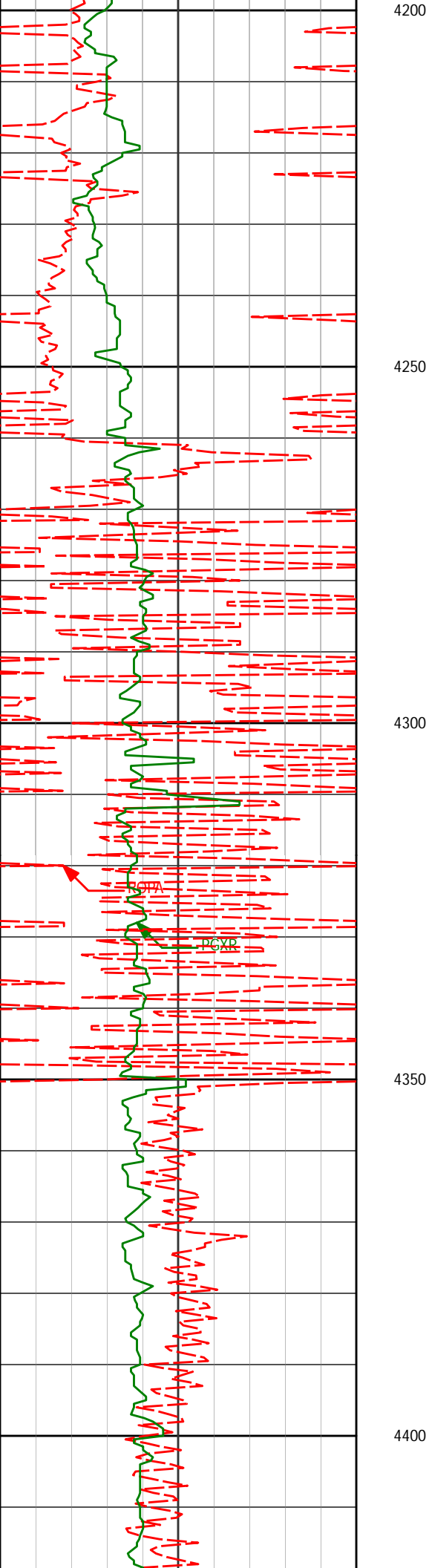
4182'

10.14°

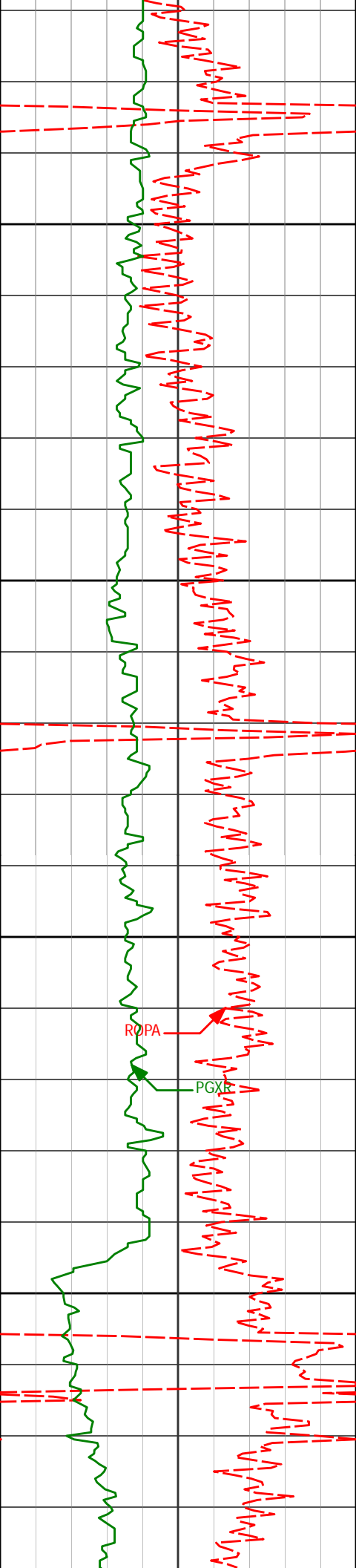
177.82°

4172.35'

-11.69'



4353'	10.08°	177.57°	4340.69'	-10.41'
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4450

4500

4550

4600

4525'

9.28°

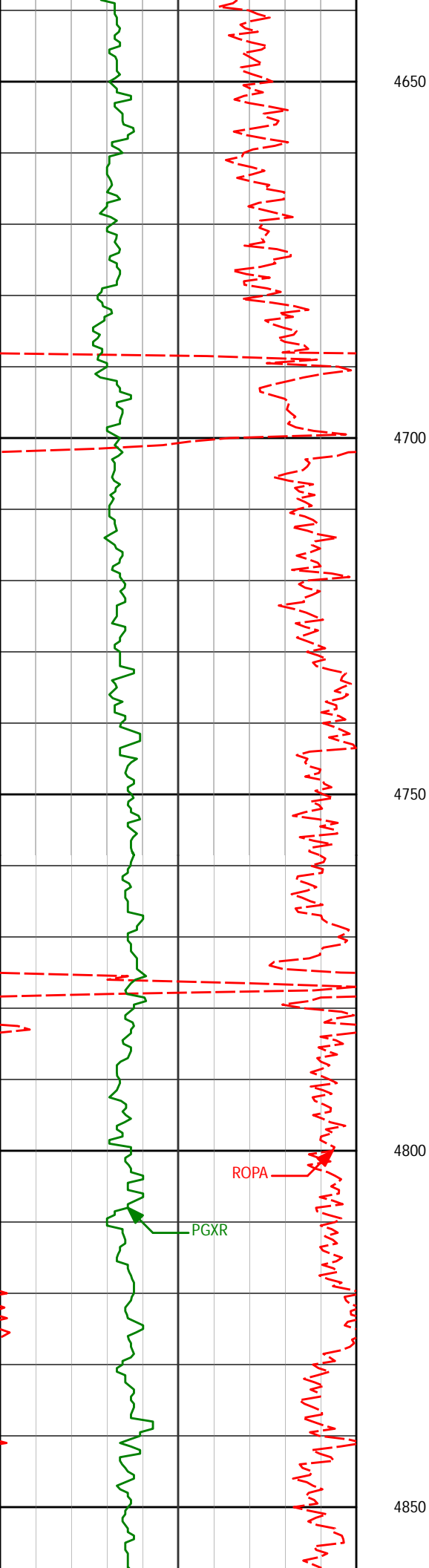
178.72°

4510.25'

-9.38'

ROPA

PGXR



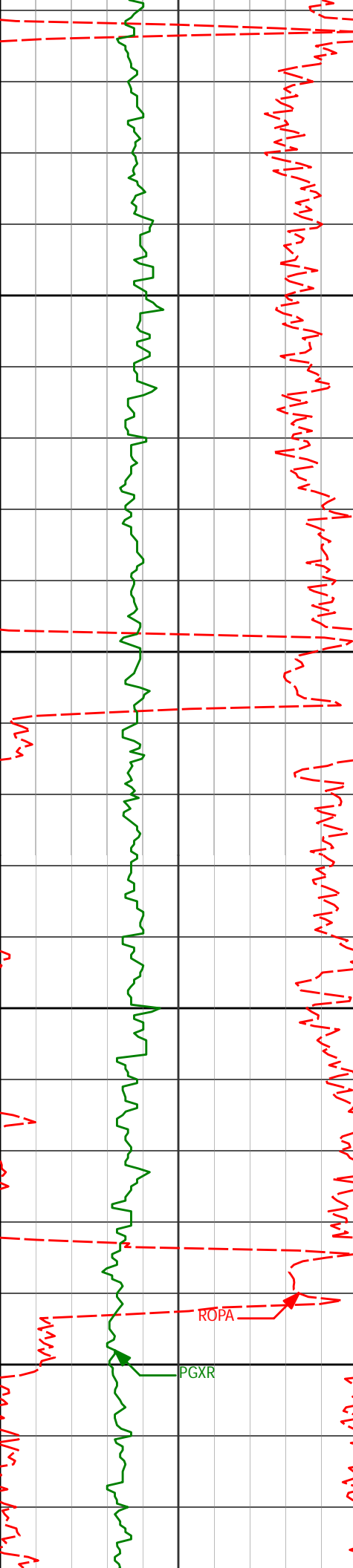
4696'

10.33°

175.20°

4678.75'

-7.72'



4900

4950

5000

5050

4867'

9.57°

174.99°

4847.17'

-5.11'

5038'

8.93°

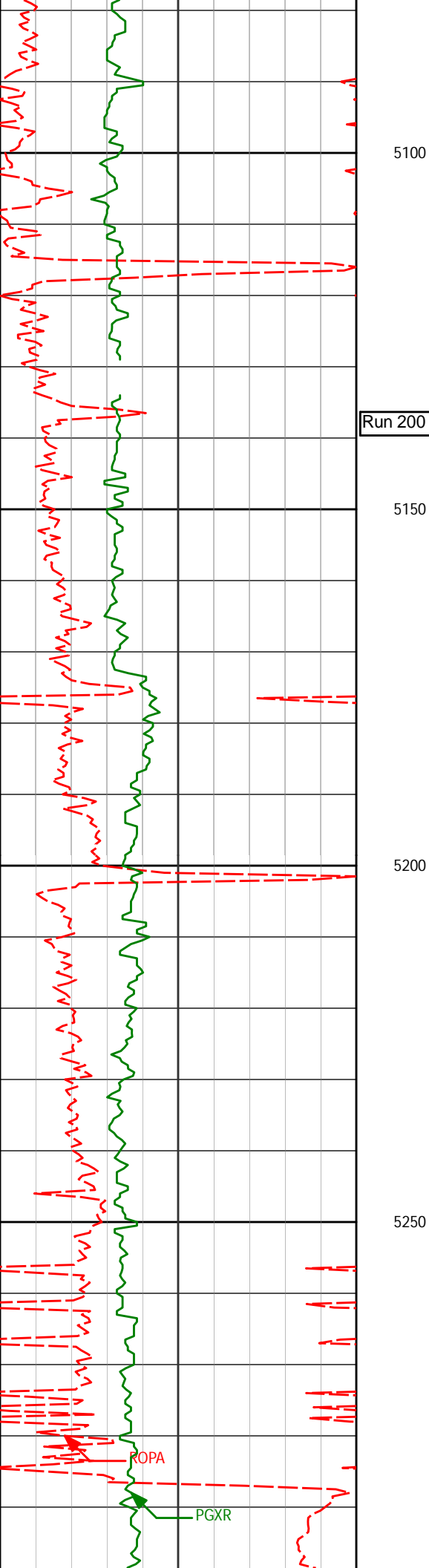
180.96°

5015.95'

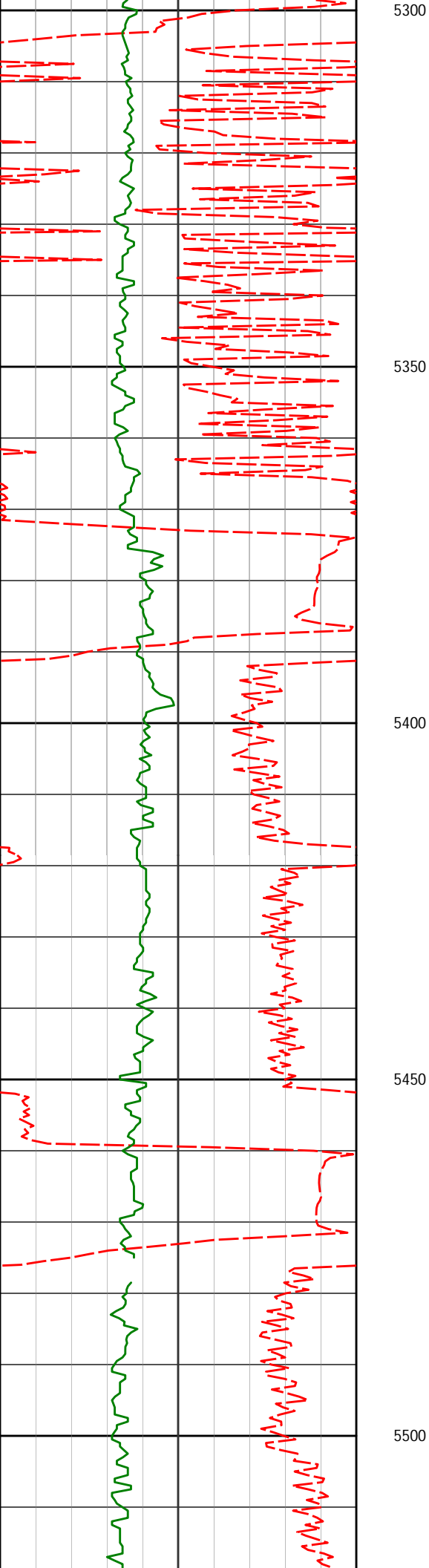
-4.02'

ROPA

PGXR



5210' 7.73° 180.50° 5186.14' -4.28'



5381'

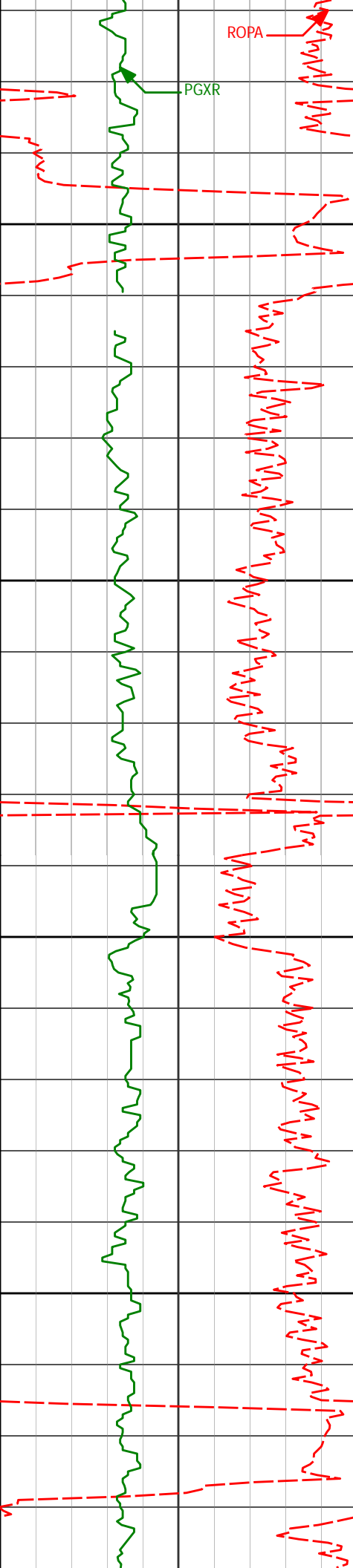
9.11°

181.50°

5355.29'

-4.67'

5500



5550

5552'

10.31°

181.24°

5523.84'

-5.28'

5600

5650

5700

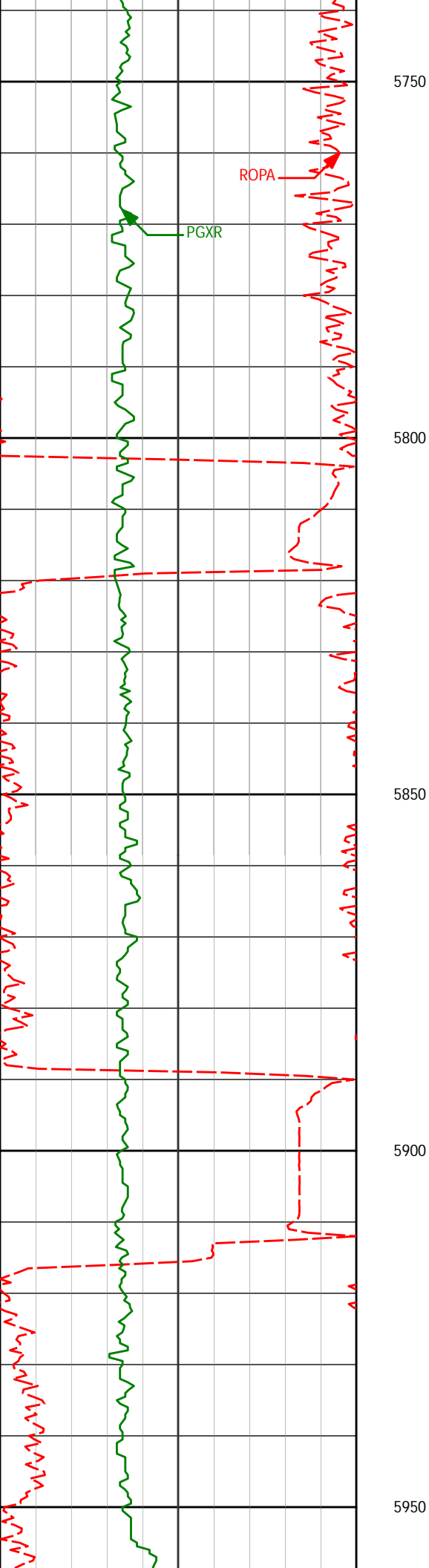
5724'

8.27°

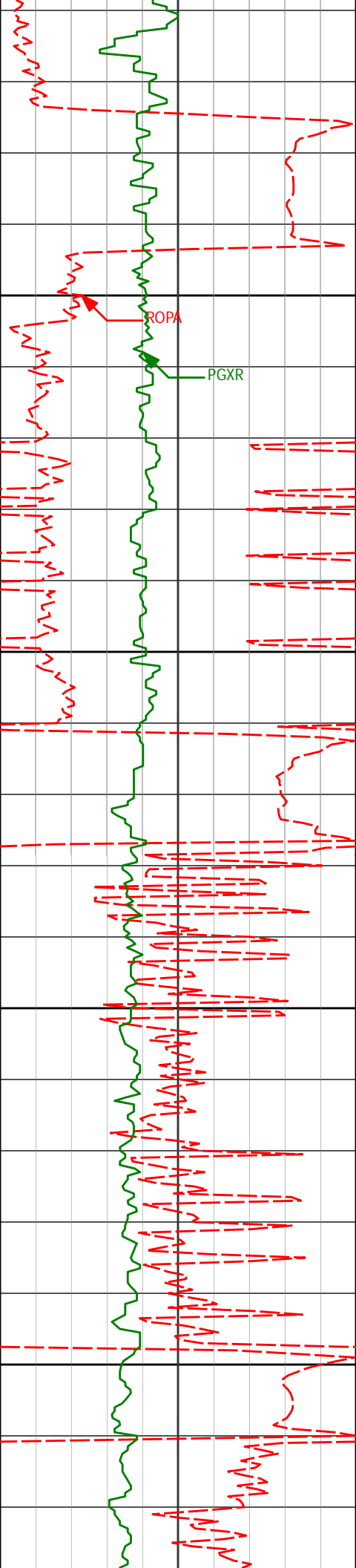
178.75°

5693.57'

-5.27'



5895' 8.58° 183.84° 5862.73' -5.79'



6000

6050

6100

6150

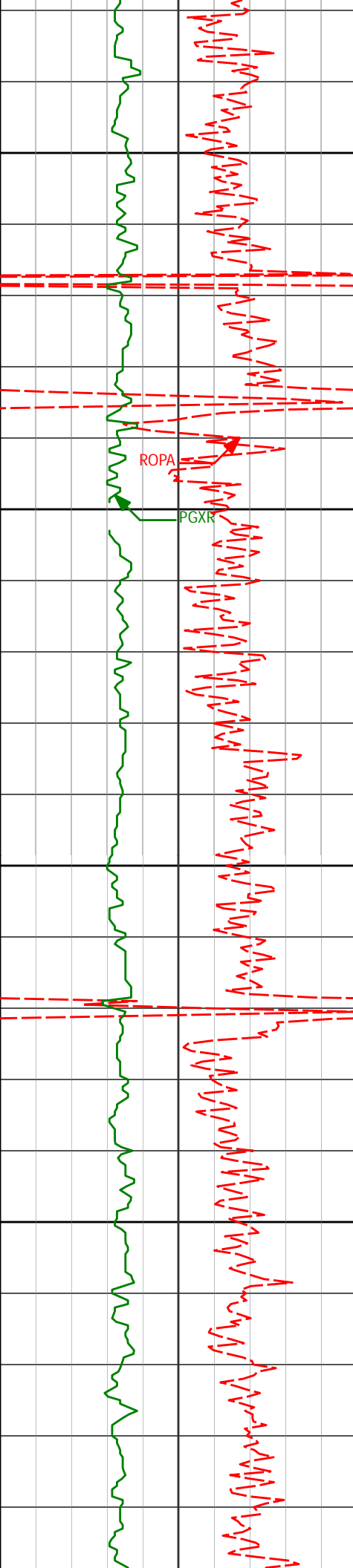
6067'

9.49°

183.38°

6032.59'

-7.42'



6200

6238'

7.39°

184.59°

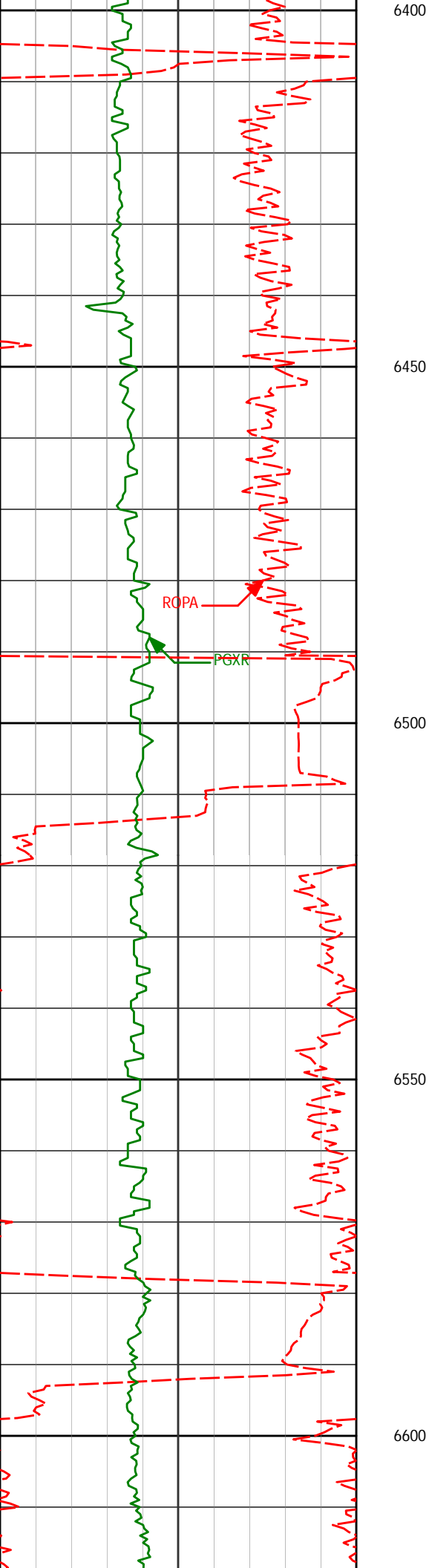
6201.73'

-9.06'

6250

6300

6350



6410'

4.18°

186.58°

6372.83'

-10.62'

6450

6500

6550

6581'

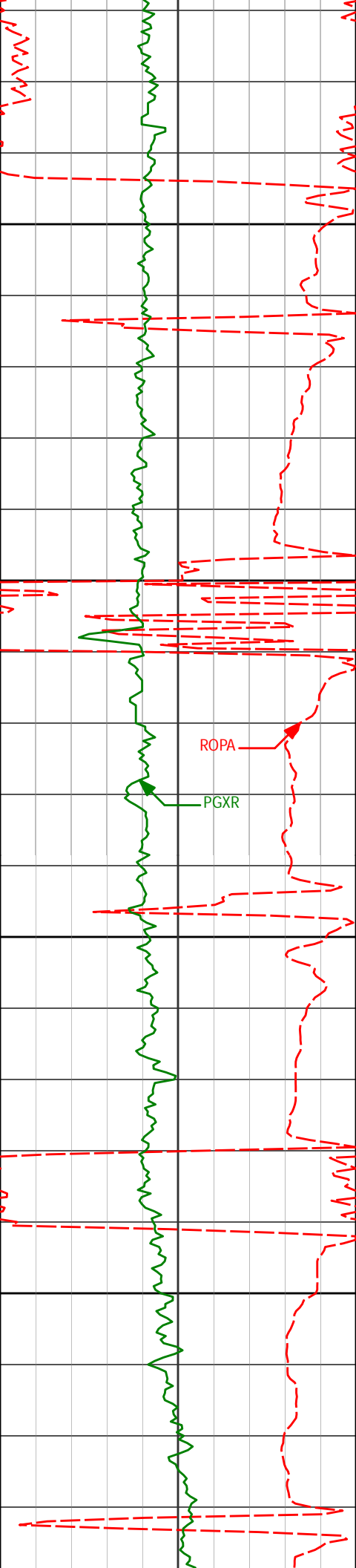
1.27°

236.08°

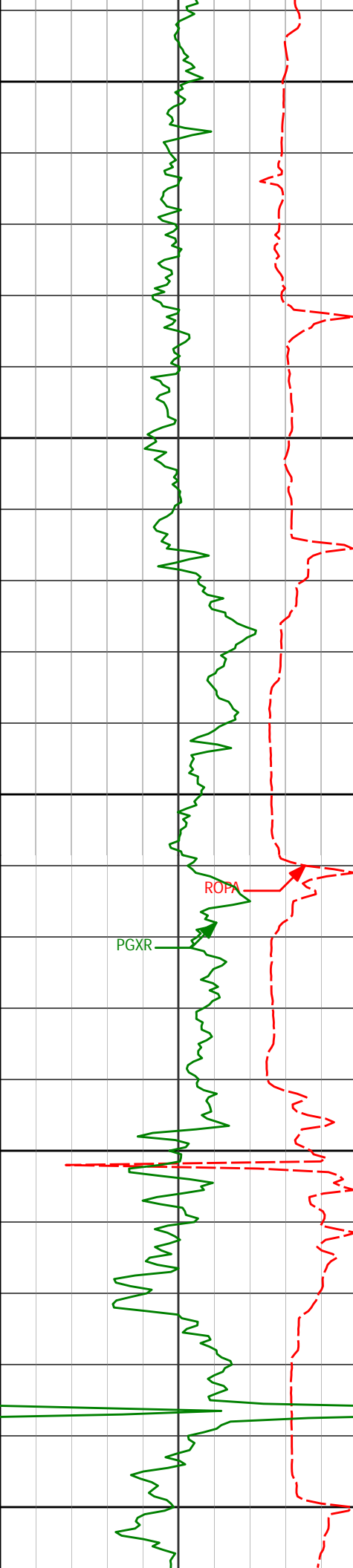
6543.64'

-12.89'

6600



6624'	1.15°	261.48°	6586.63'	-13.71'
6650				
6667'	1.76°	69.62°	6629.62'	-13.52'
6700				
6710'	4.81°	74.40°	6672.55'	-11.17'
6750				
6753'	7.96°	82.94°	6715.28'	-6.48'
6795'	10.86°	87.50°	6756.71'	0.36'
6800				
6838'	14.20°	86.76°	6798.68'	9.68'



6850

6900

6950

7000

7050

6881'

18.45°

82.12°

6839.94'

21.69'

6924'

22.80°

84.05°

6880.17'

36.71'

6966'

27.76°

86.52°

6918.14'

54.58'

7009'

30.66°

88.29°

6955.67'

75.54'

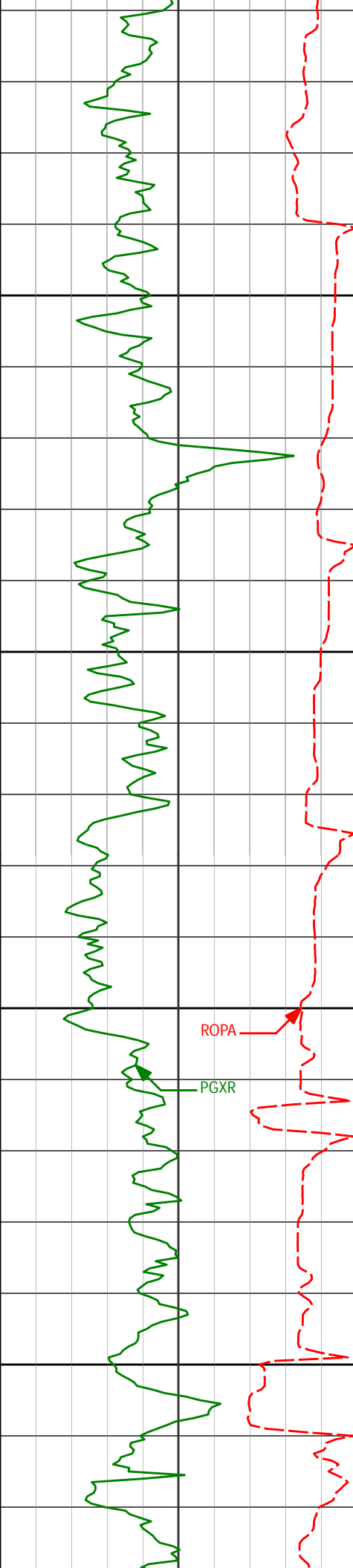
7052'

36.51°

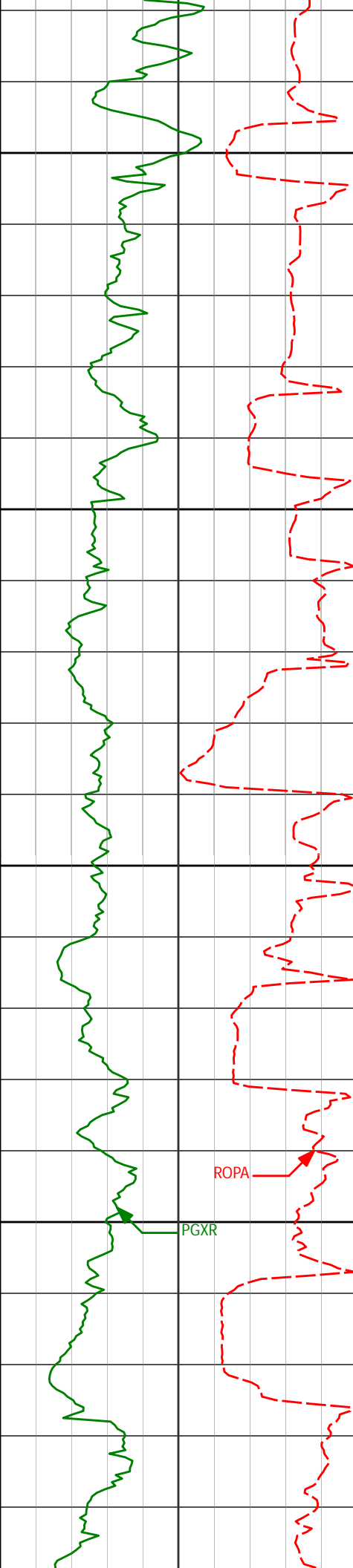
88.63°

6991.47'

99.30'



7095'	41.75°	89.64°	7024.82'	126.42'
7100				
7138'	47.26°	89.96°	7055.47'	156.55'
7150				
7181'	52.86°	91.12°	7083.07'	189.51'
7200				
7223'	58.28°	91.44°	7106.81'	224.13'
7250				
7266'	62.38°	91.85°	7128.09'	261.47'



7300

7309'

67.32°

90.20°

7146.36'

300.38'

7350

7352'

71.39°

89.24°

7161.51'

340.61'

7400

7394'

74.72°

88.90°

7173.75'

380.77'

7450

7437'

77.42°

89.70°

7184.10'

422.50'

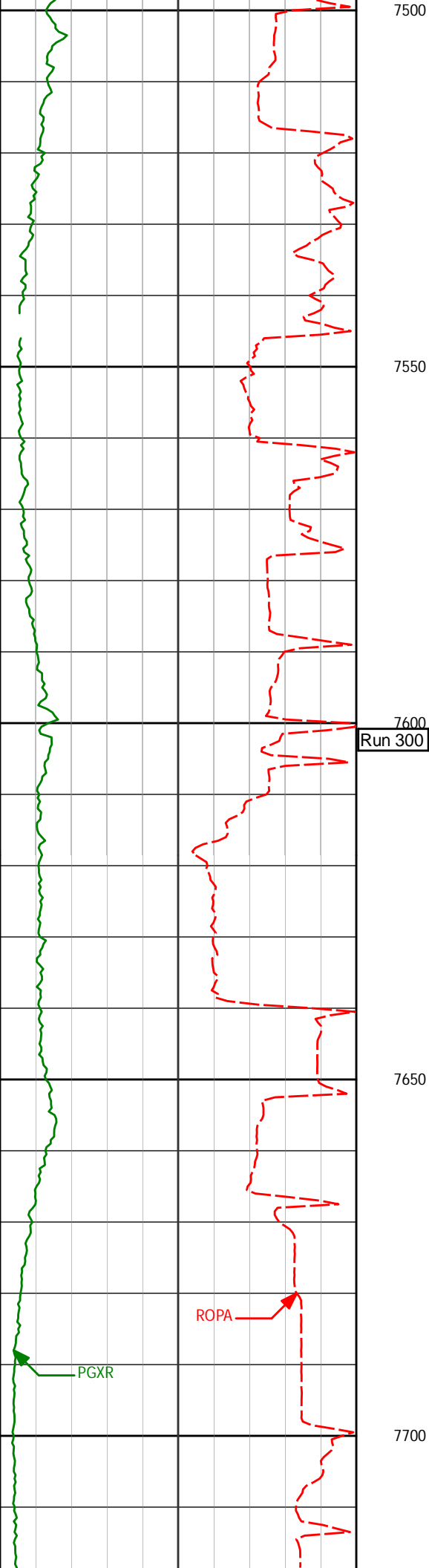
7480'

81.03°

89.62°

7192.14'

464.73'



7522'

84.35°

89.25°

7197.48'

506.38'

7600

Run 300

7650

7659'

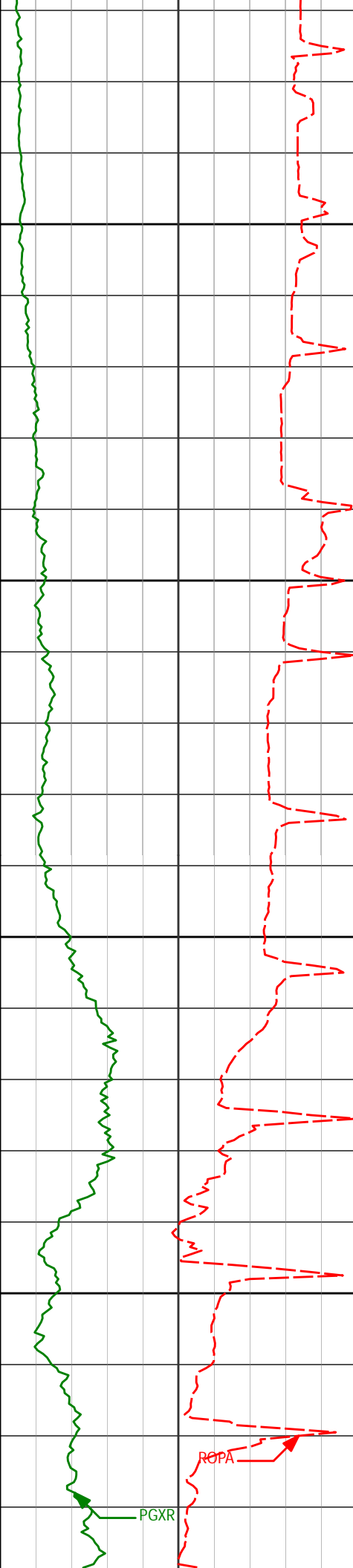
91.59°

89.45°

7202.33'

643.19'

7700



7750

7800

7850

7900

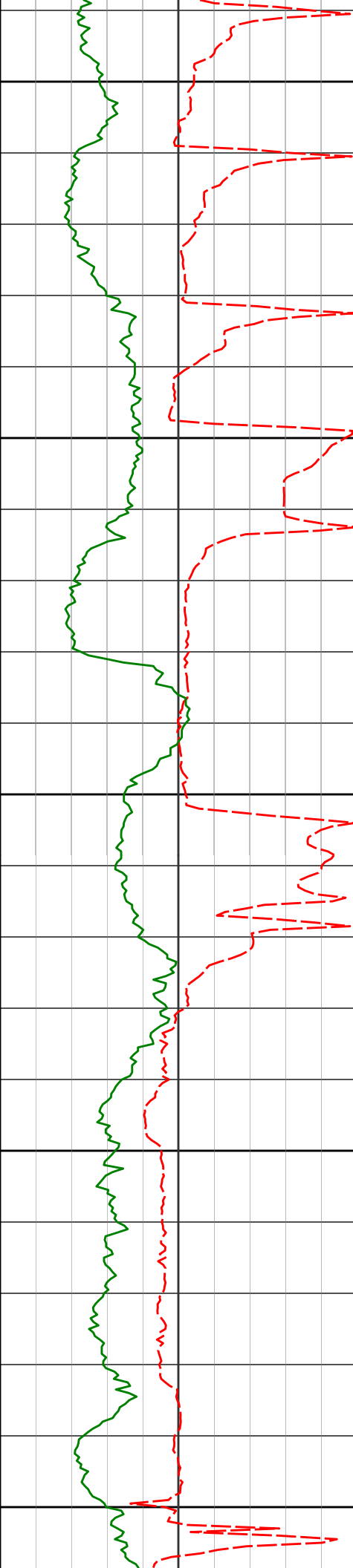
7830'

89.94°

90.96°

7200.05'

814.16'



7950

8000

8050

8100

8150

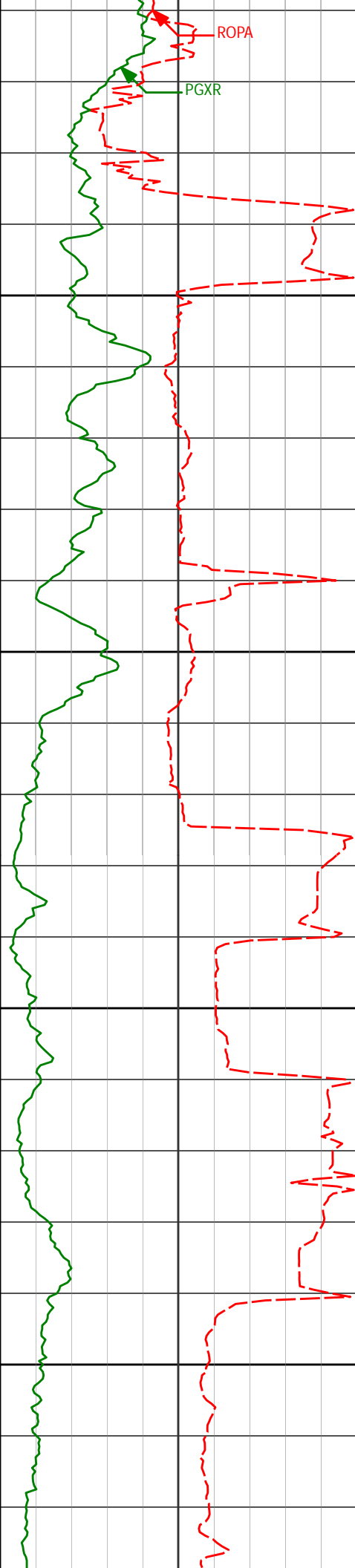
8001'

91.06°

91.74°

7198.56'

985.11'



8172'

87.37°

90.06°

7200.90'

1156.05'

8200

8250

8300

8343'

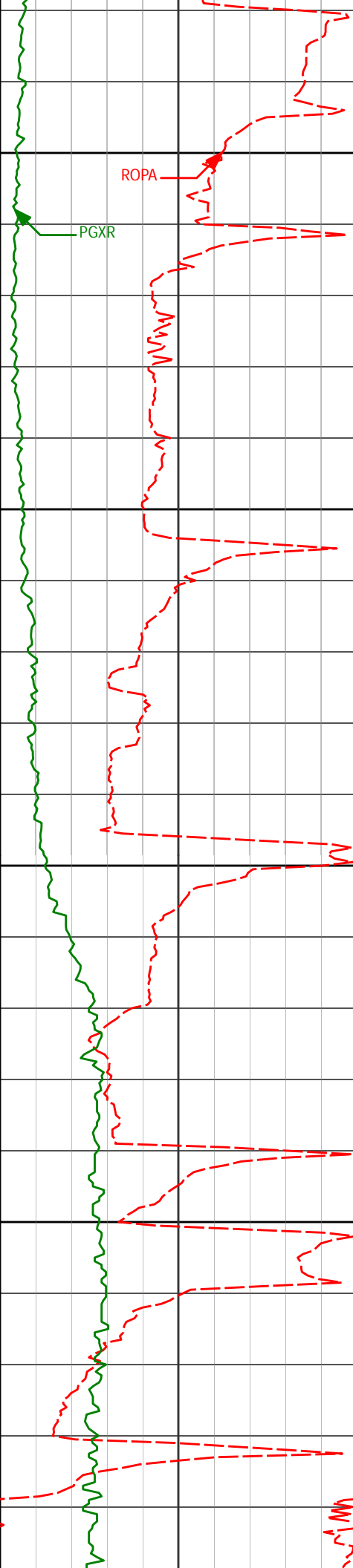
91.19°

88.50°

7203.05'

1326.98'

8350



8400

8450

8500

8550

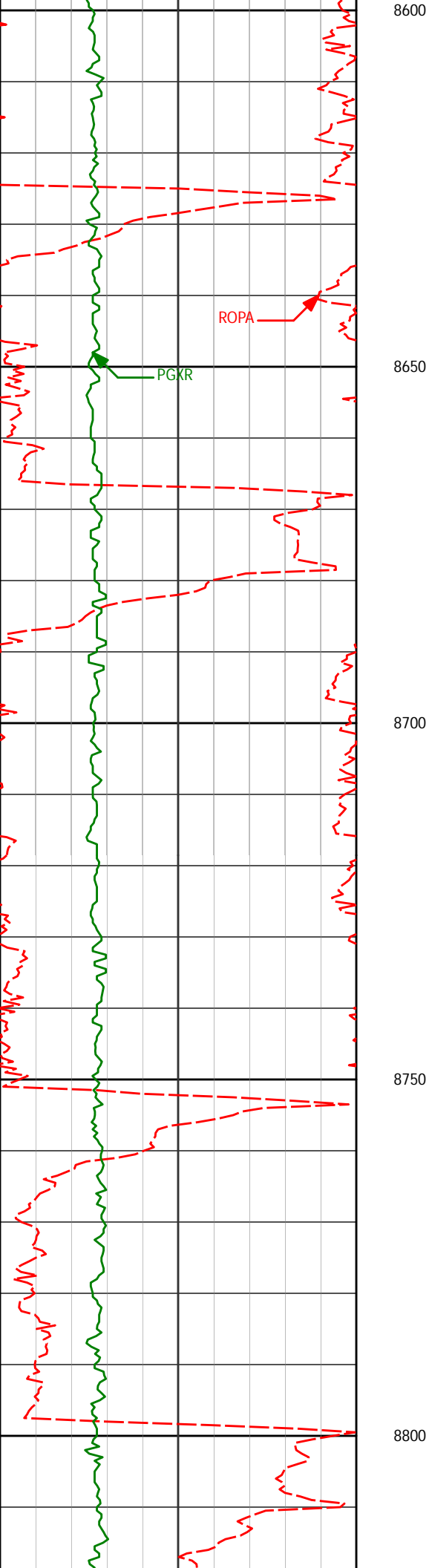
8515'

89.06°

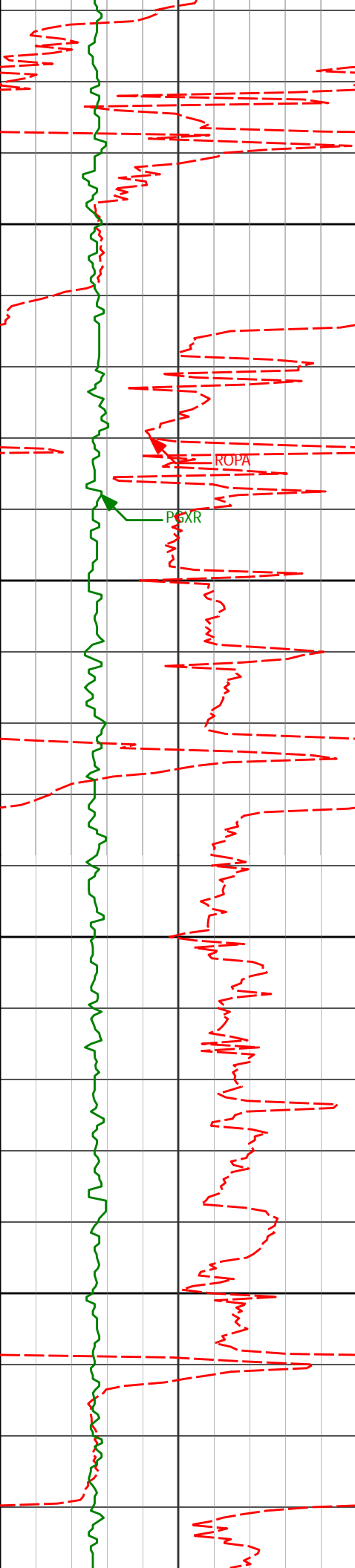
90.23°

7202.68'

1498.94'



8686' 89.74° 89.72° 7204.47' 1669.93'



8850

8858'

90.23°

89.69°

7204.51'

1841.93'

8900

8950

9000

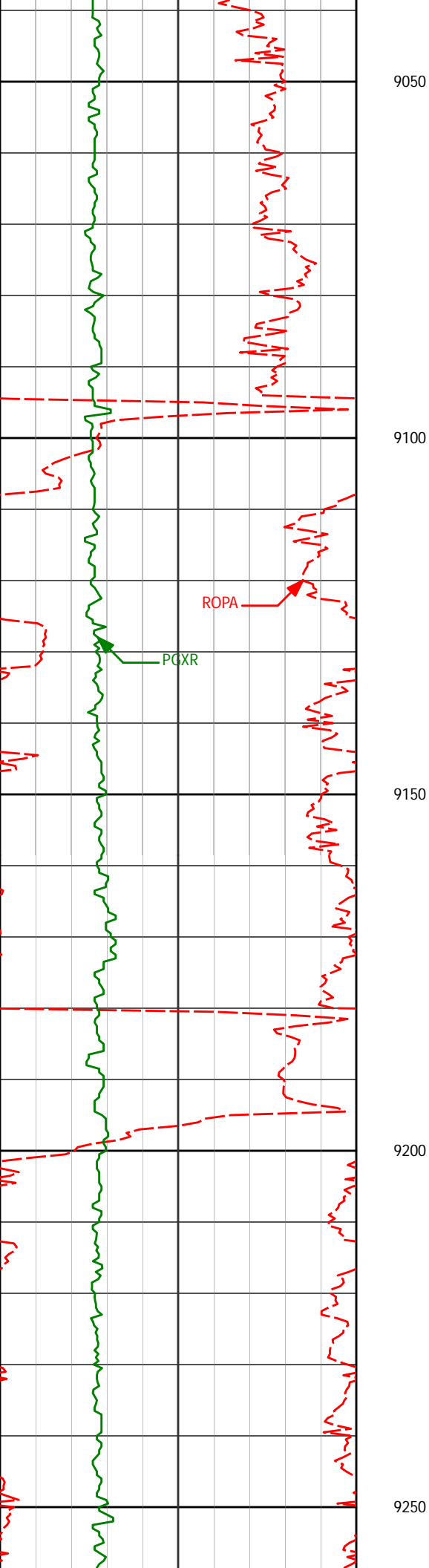
9029'

89.62°

88.47°

7204.73'

2012.89'



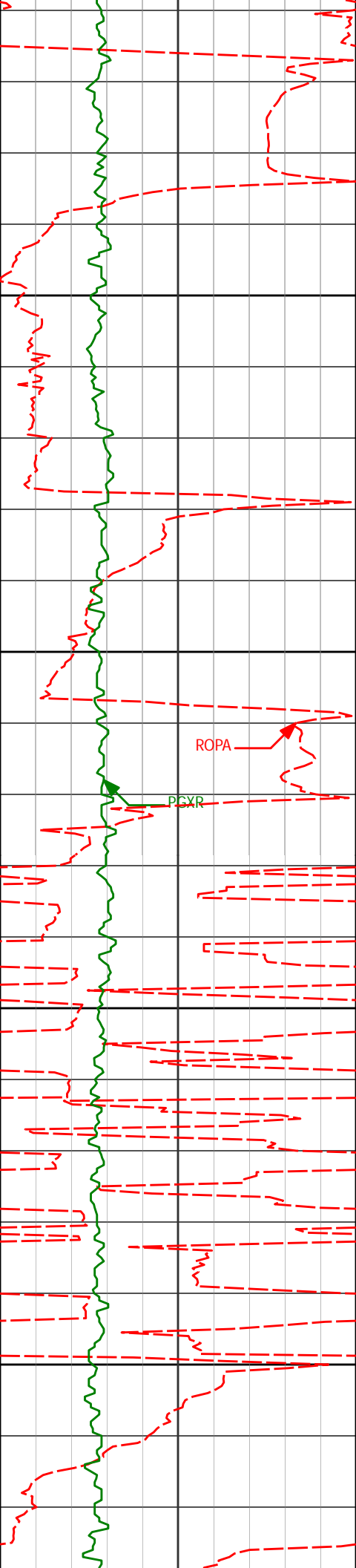
9200'

89.65°

88.66°

7205.82'

2183.82'



9300

9350

9400

9450

ROPA

PCXR

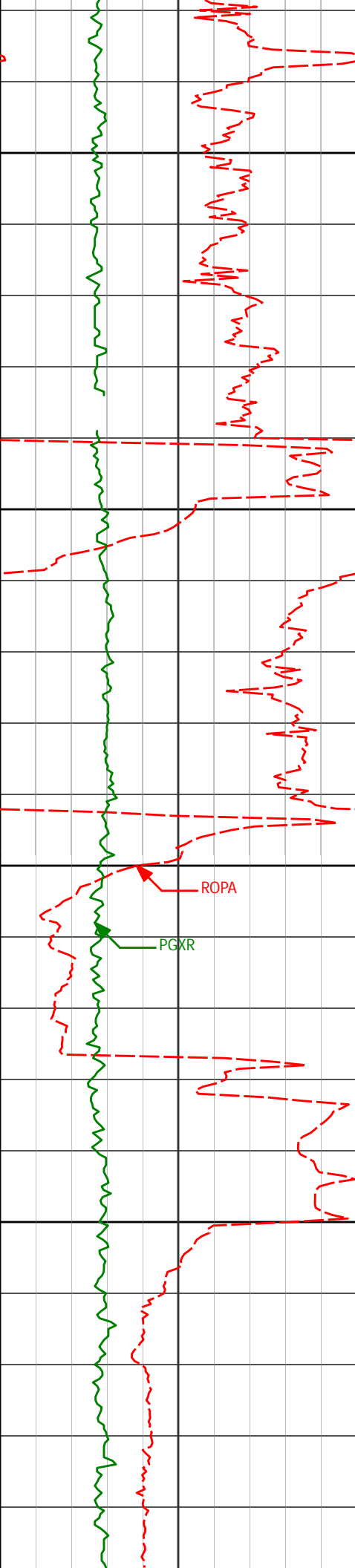
9384'

90.60°

90.88°

7205.42'

2367.81'



9500

9550

9567'

89.12°

89.81°

7205.87'

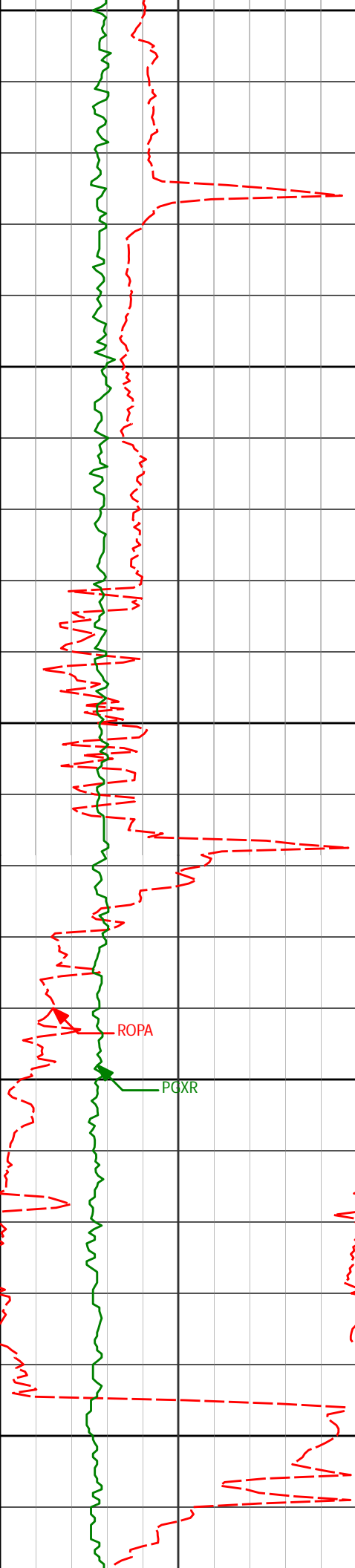
2550.80'

9600

ROPA

PGXR

9650



9700

9750

9800

9850

9900

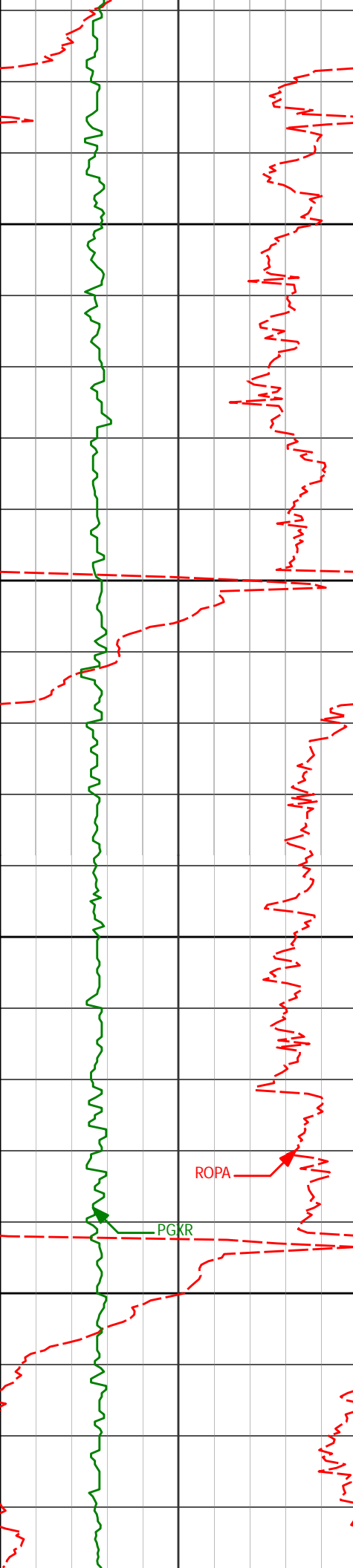
9751'

90.69°

89.97°

7206.18'

2734.79'



9935'

90.42°

90.68°

7204.39'

2918.78'

9950

10000

10050

ROPA

PGKR

10100

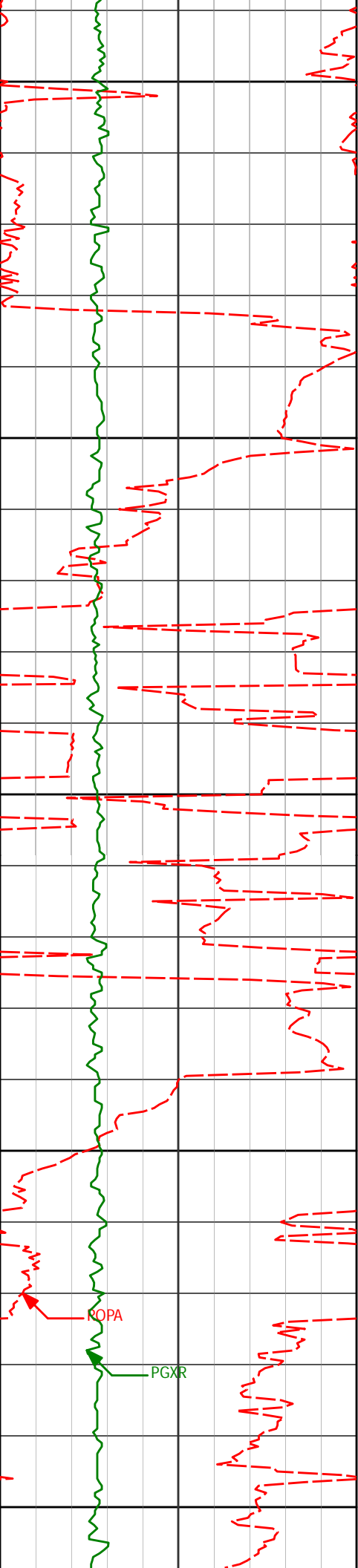
10119'

90.32°

89.30°

7203.20'

3102.77'



10150

10200

10250

10300

10350

10302'

90.14°

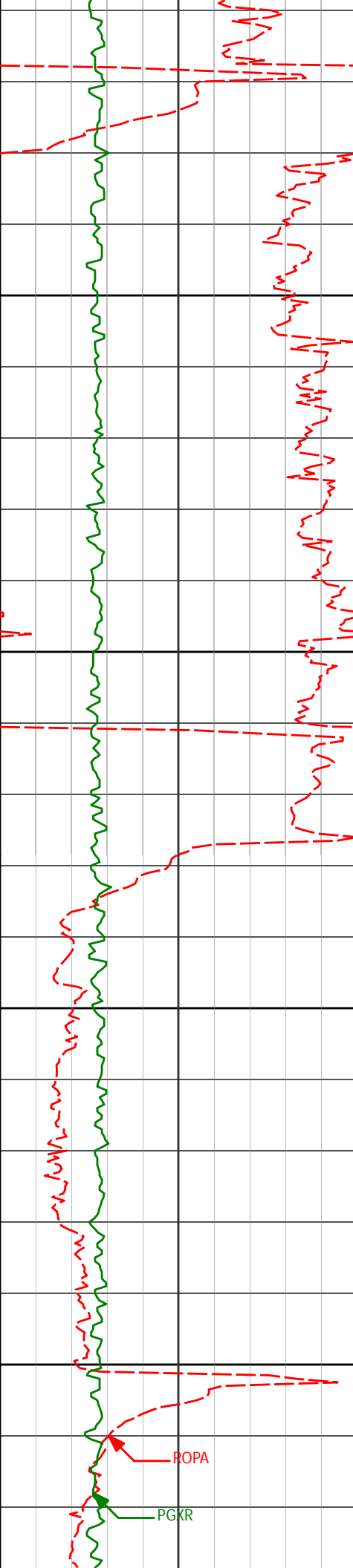
90.31°

7202.47'

3285.76'

ROPA

PGXR



10400

10450

10500

10550

10486'

90.20°

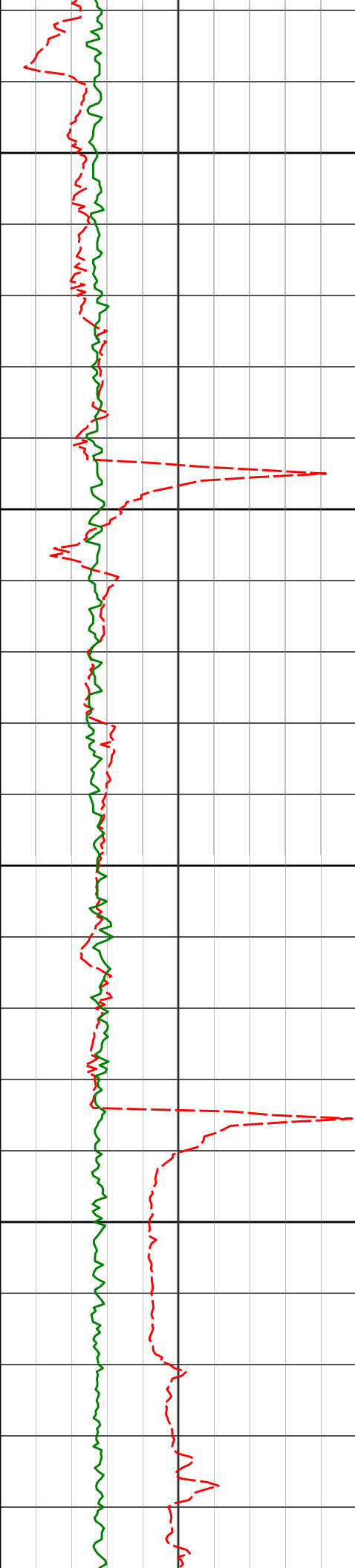
91.24°

7201.92'

3469.75'

ROPA

PGKR



10600

10650

10700

10750

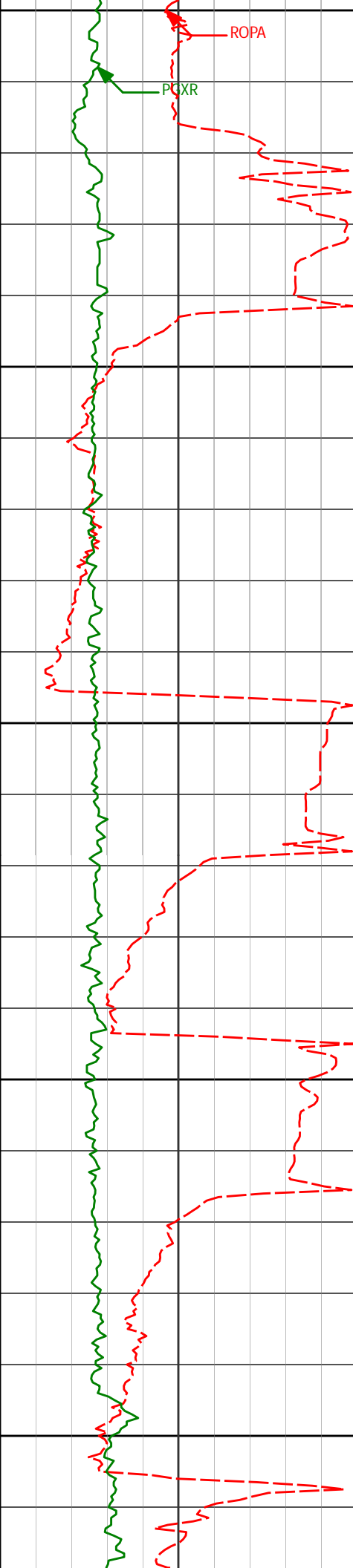
10668'

89.83°

89.68°

7201.88'

3651.74'



ROPA

PGXR

10800

10850

10900

10950

11000

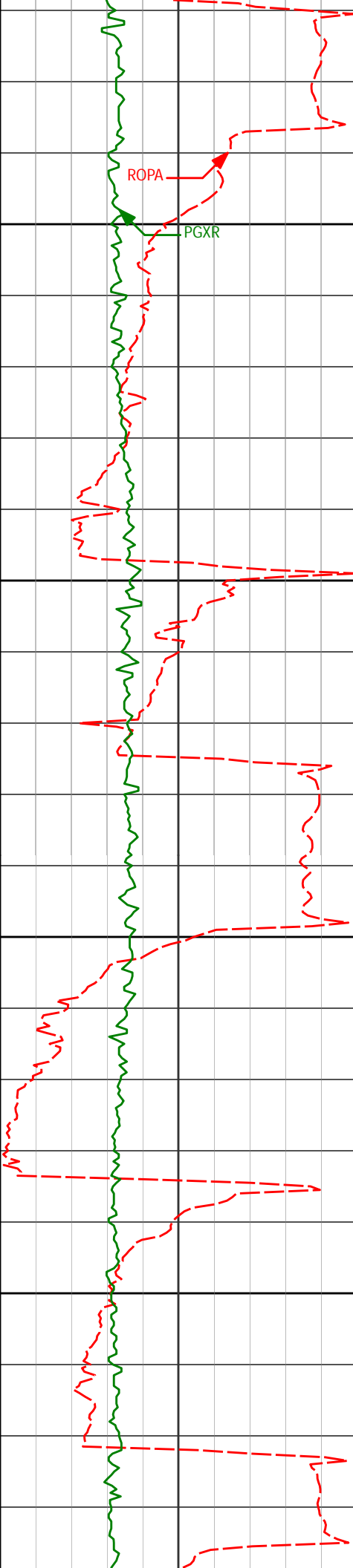
10849'

86.16°

86.41°

7208.21'

3832.45'



11033'

91.31°

86.99°

7212.27'

4016.01'

11050

11100

11150

11200

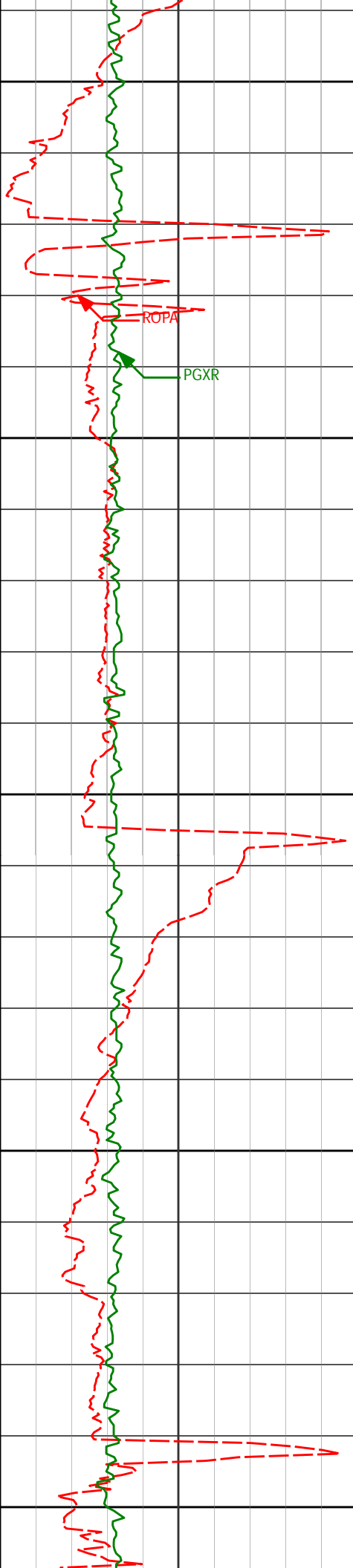
11204'

91.53°

89.47°

7208.03'

4186.85'



11250

11300

11350

11400

11450

PGXR

ROPA

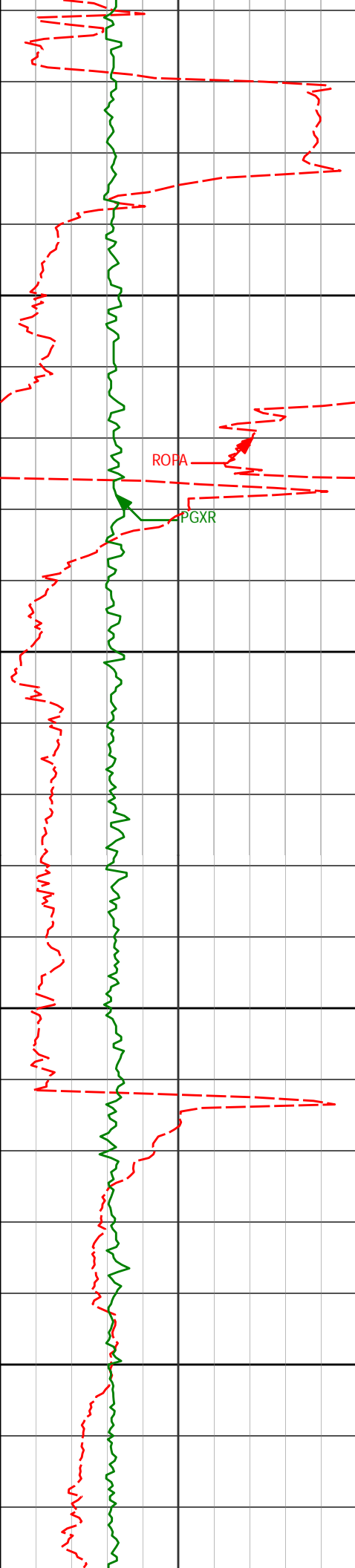
11375'

90.48°

89.85°

7205.03'

4357.81'



11500

11550

11600

11650

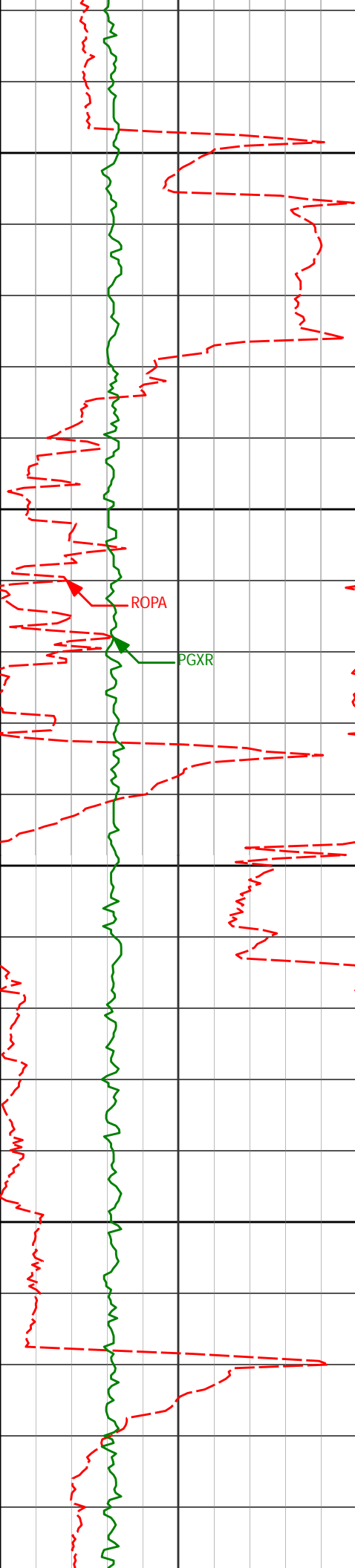
11546'

90.33°

90.44°

7203.82'

4528.81'



11700

11717'

90.51°

90.70°

7202.57'

4699.80'

11750

ROPA

PGXR

11800

11850

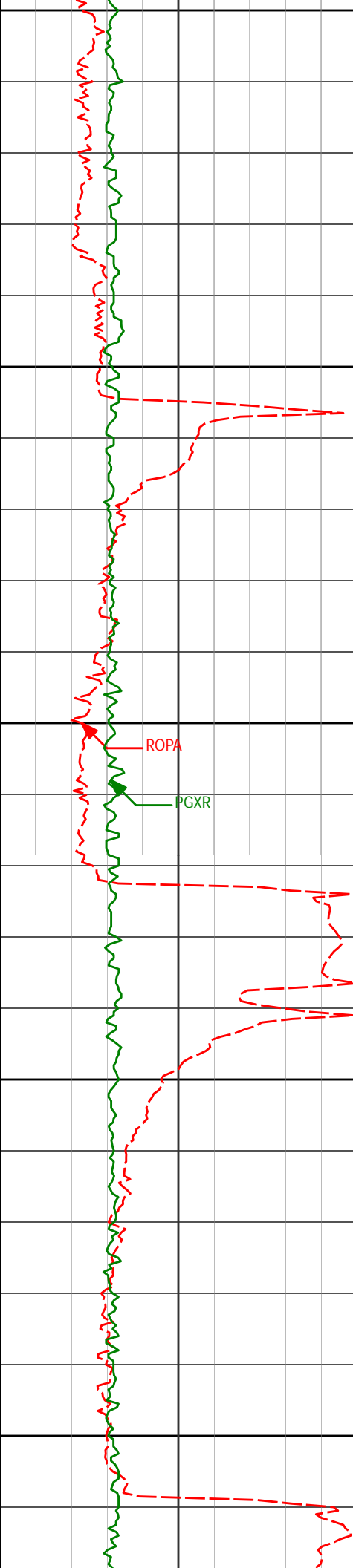
11888'

90.79°

91.30°

7200.63'

4870.77'



11900

11950

12000

12050

12100

ROPA

PGXR

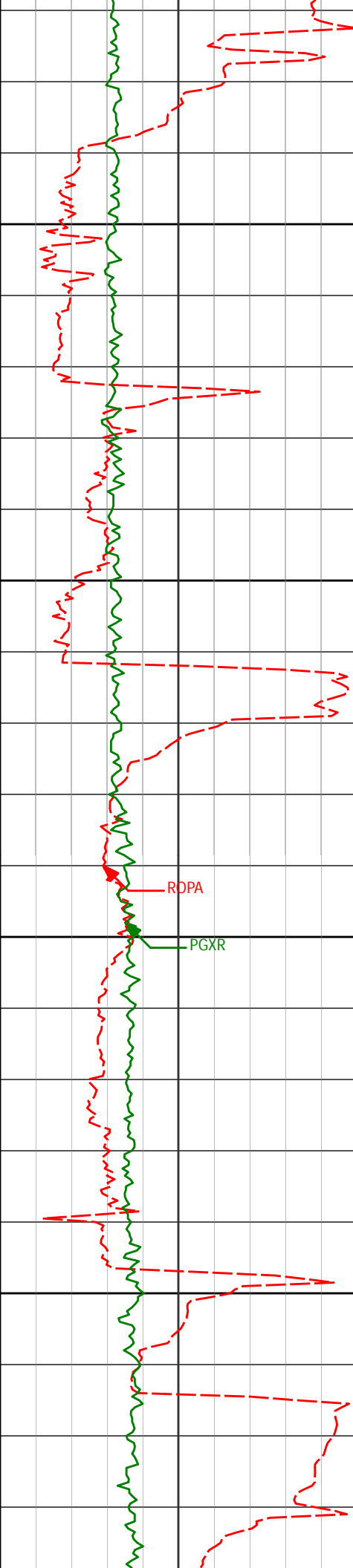
12059'

90.26°

92.77°

7199.06'

5041.66'



12150

12200

12250

12300

ROPA

PGXR

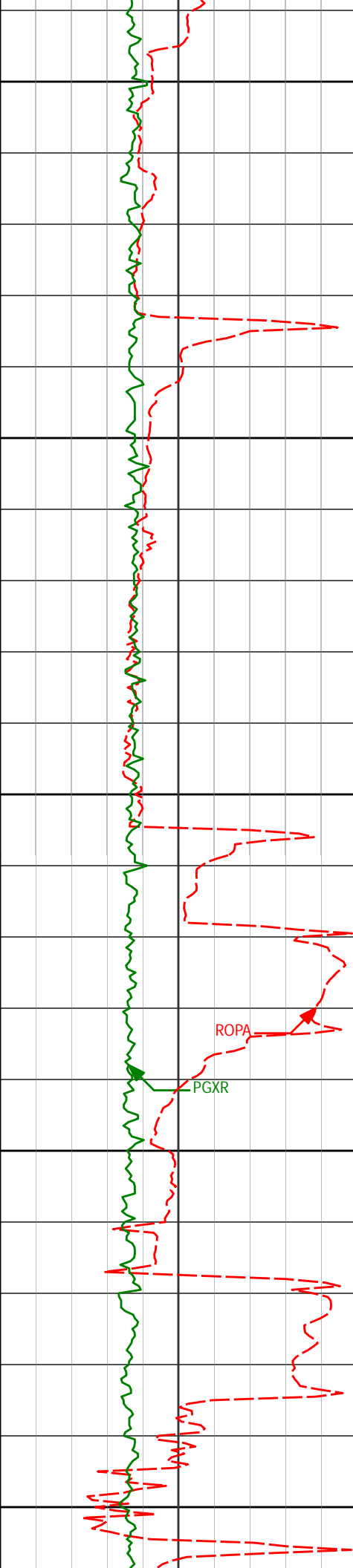
12231'

89.55°

94.31°

7199.35'

5213.36'



12350

12400

12450

12500

12550

12402'

90.02°

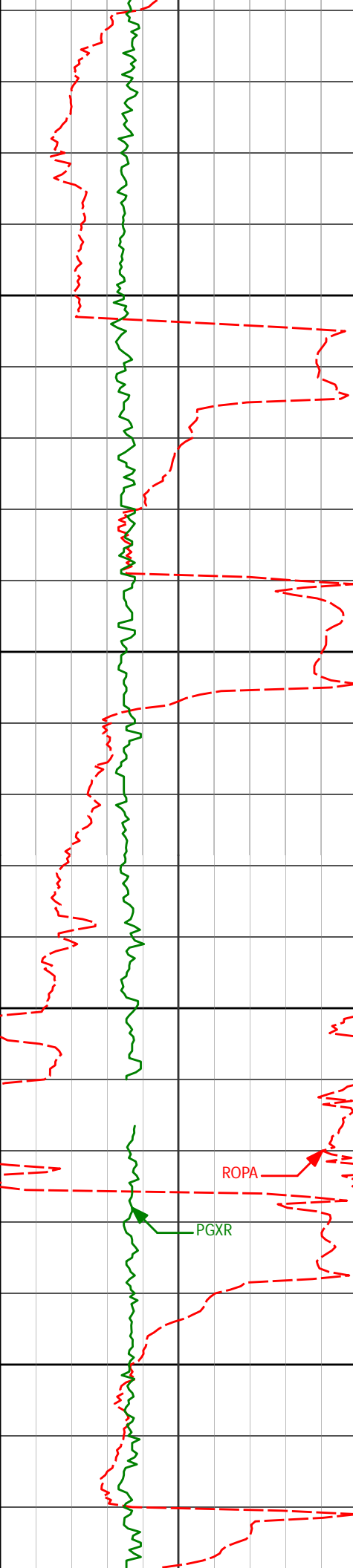
92.32°

7199.99'

5384.08'

ROPA

PGXR



12573'

91.25°

93.53°

7198.10'

5554.87'

12600

12650

12700

ROPA

PGXR

12745'

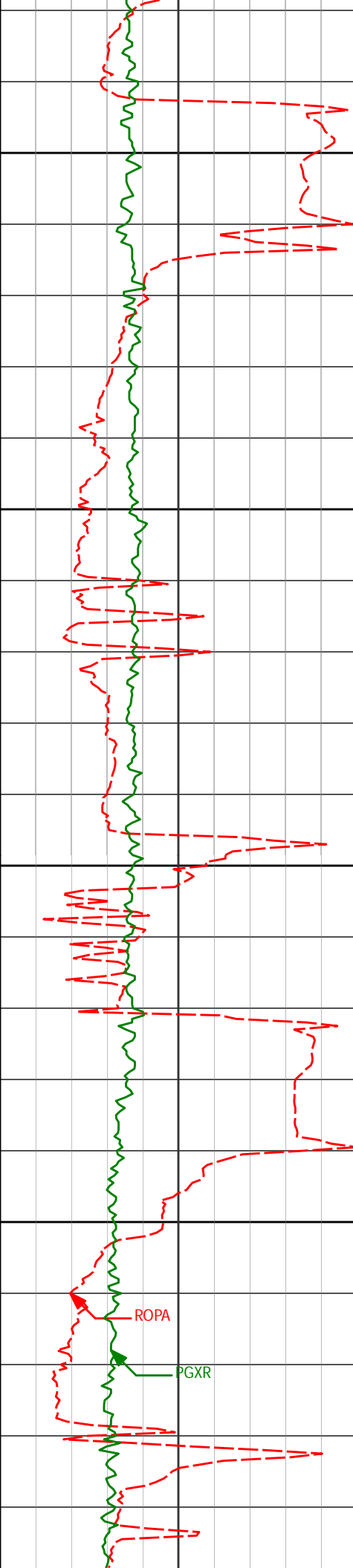
89.09°

96.28°

7197.59'

5726.25'

12750



12800

12850

12900

12950

12915'

89.37°

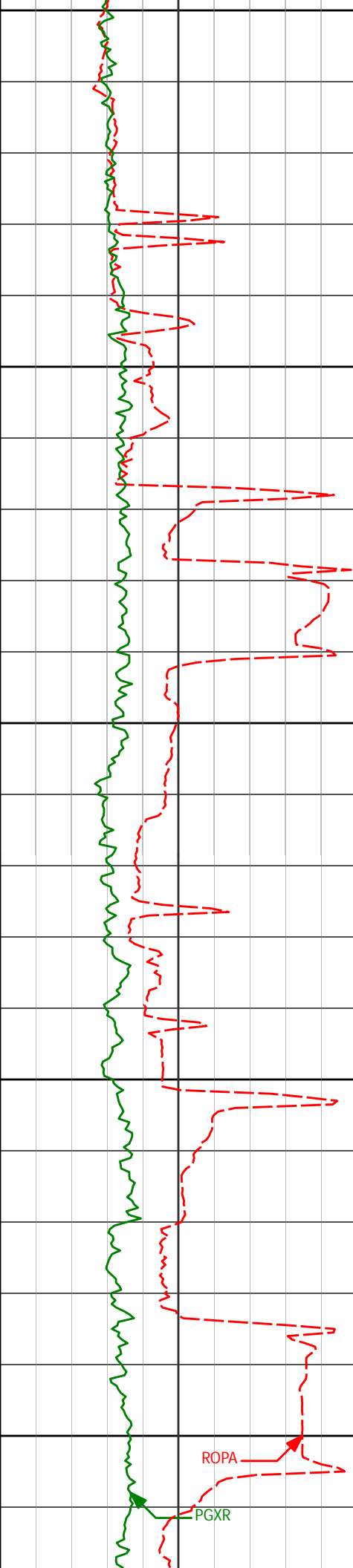
95.11°

7199.87'

5895.43'

ROPA

PGXR



13000

13050

13100

13150

13200

13086'

91.13°

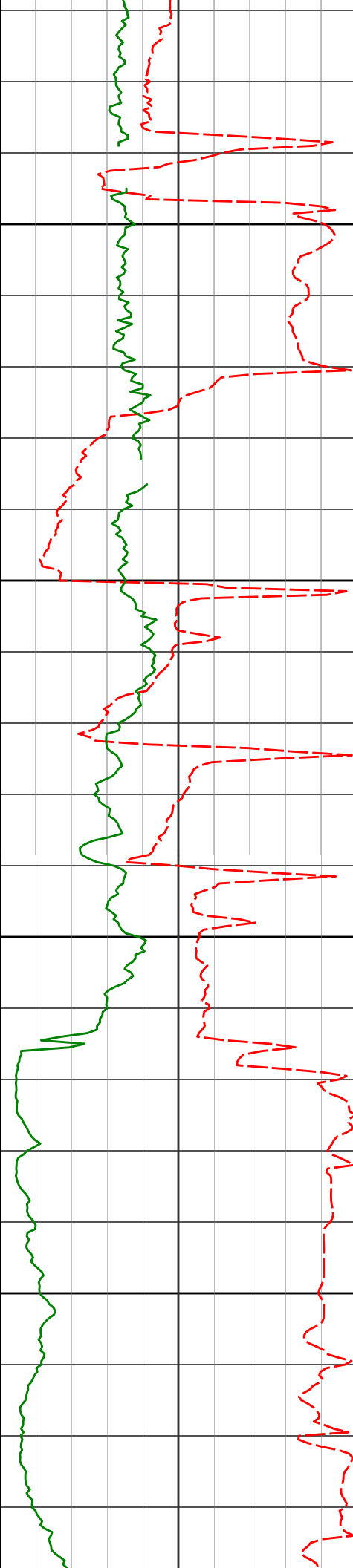
94.52°

7199.12'

6065.86'

ROPA

PGXR



13250

13300

13350

13400

13257'

91.46°

94.43°

7195.26'

6236.33'

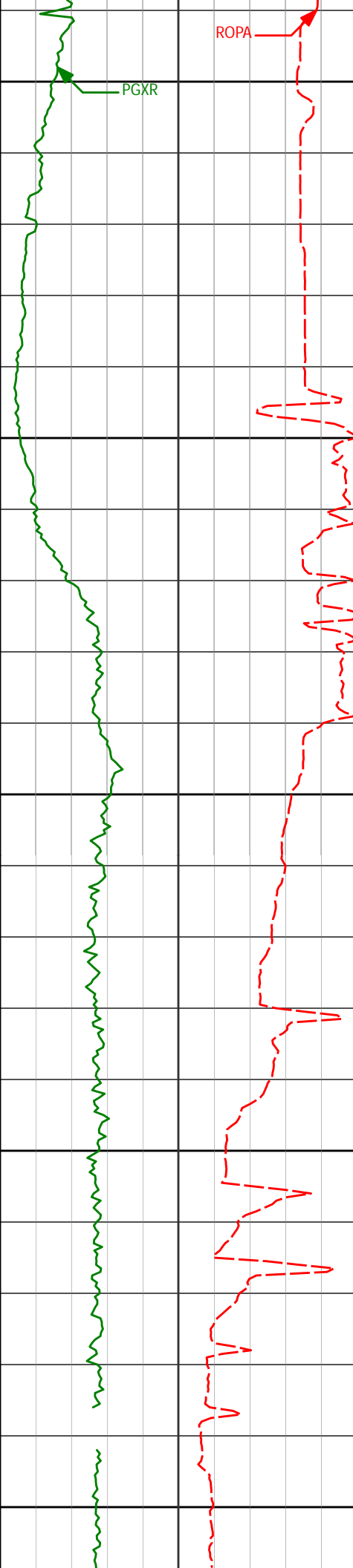
13428'

92.82°

95.28°

7188.87'

6406.63'



13450

13500

13550

13600

13650

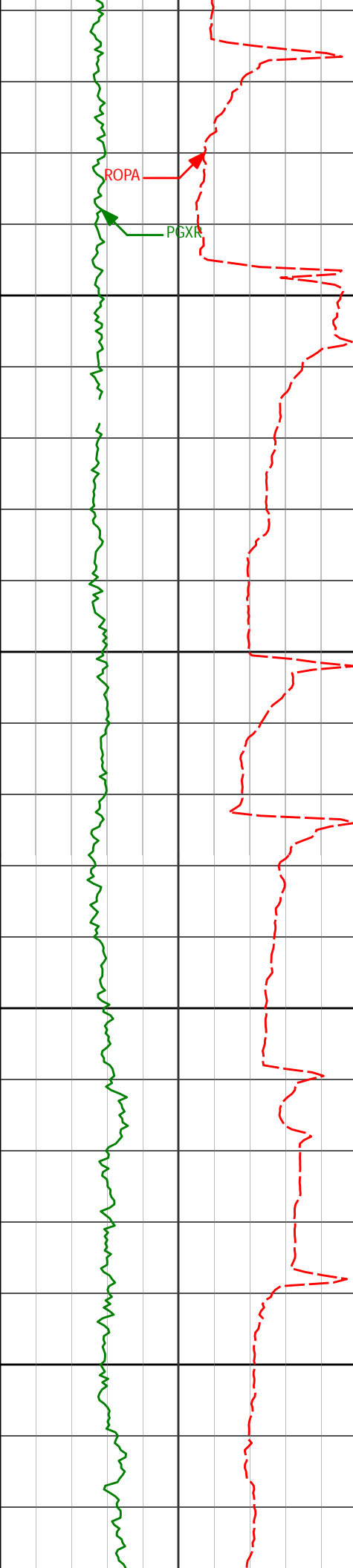
13599'

89.99°

97.36°

7184.68'

6576.56'



13700

13750

13770'

89.12°

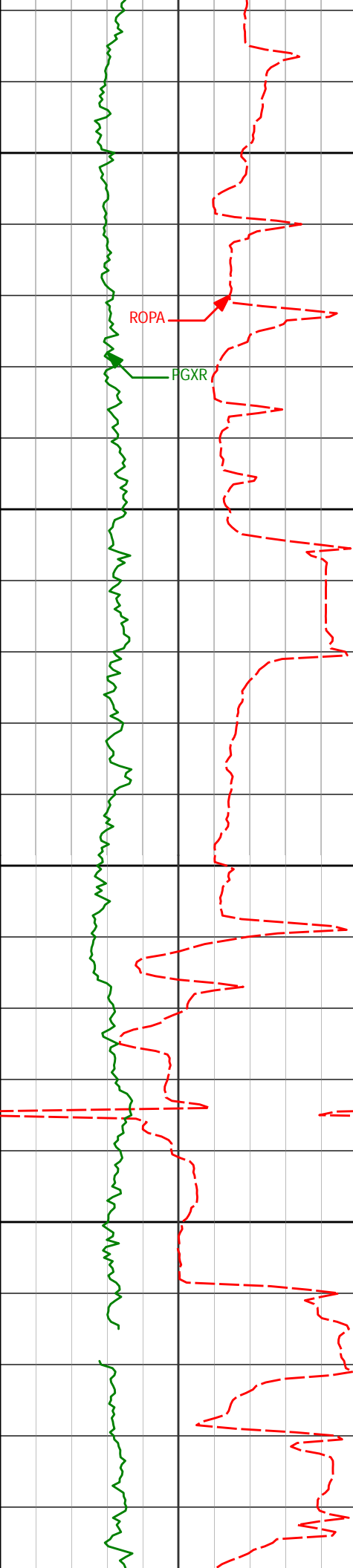
98.33°

7186.01'

6746.01'

13800

13850



13900

ROPA

FGXR

13950

14000

14050

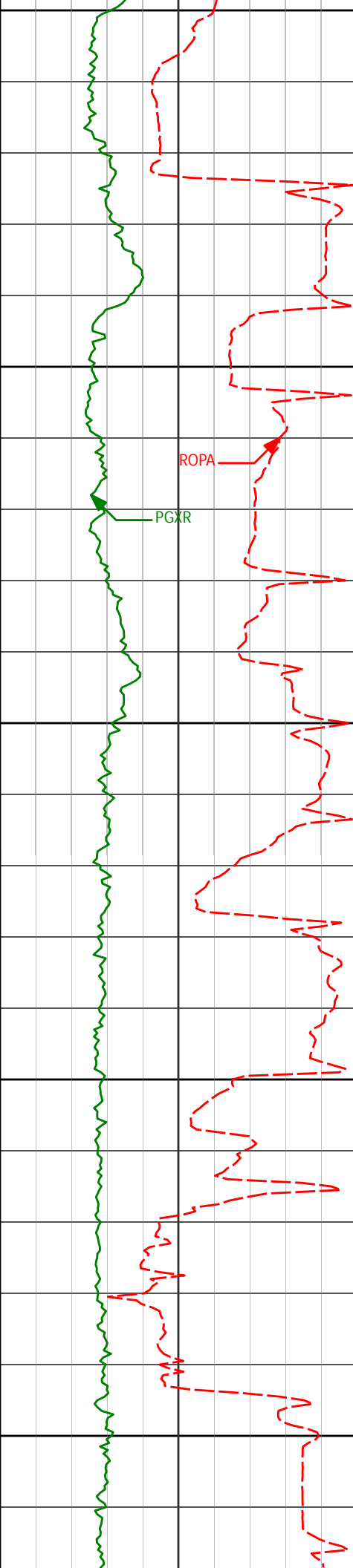
13942'

91.50°

97.98°

7185.08'

6916.32'



14100

14113'

90.51°

95.68°

7182.08'

7086.12'

14150

ROPA

PGXR

14200

14250

14284'

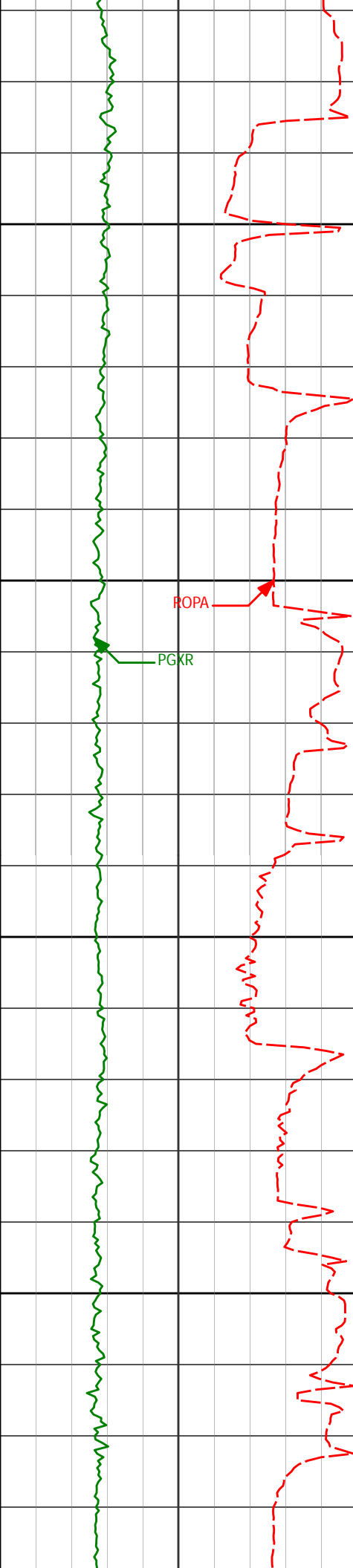
91.40°

91.31°

7179.23'

7256.76'

14300



14350

14400

14450

14500

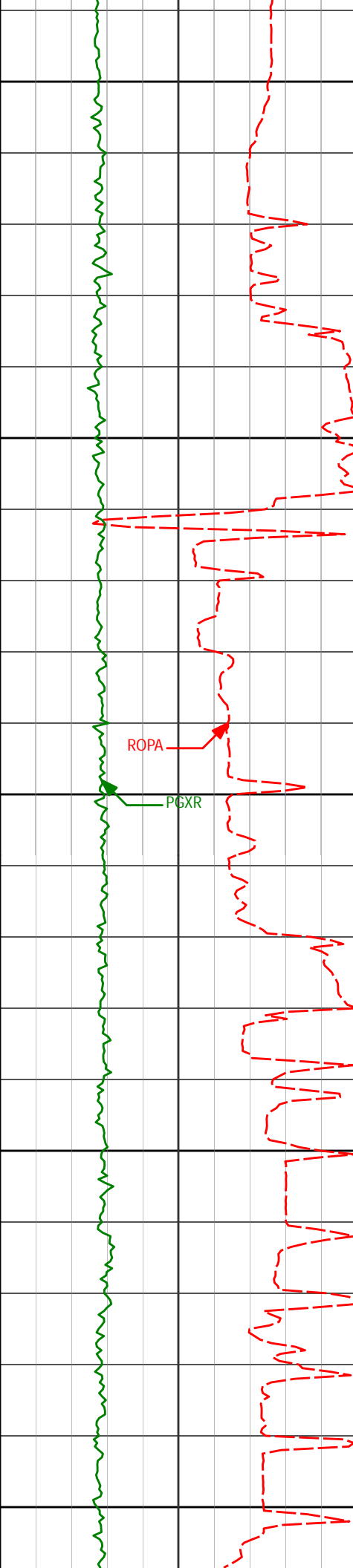
14455'

89.62°

87.66°

7177.71'

7427.71'



14550

14600

Run 400

14627'

89.65°

86.16°

7178.80'

7599.42'

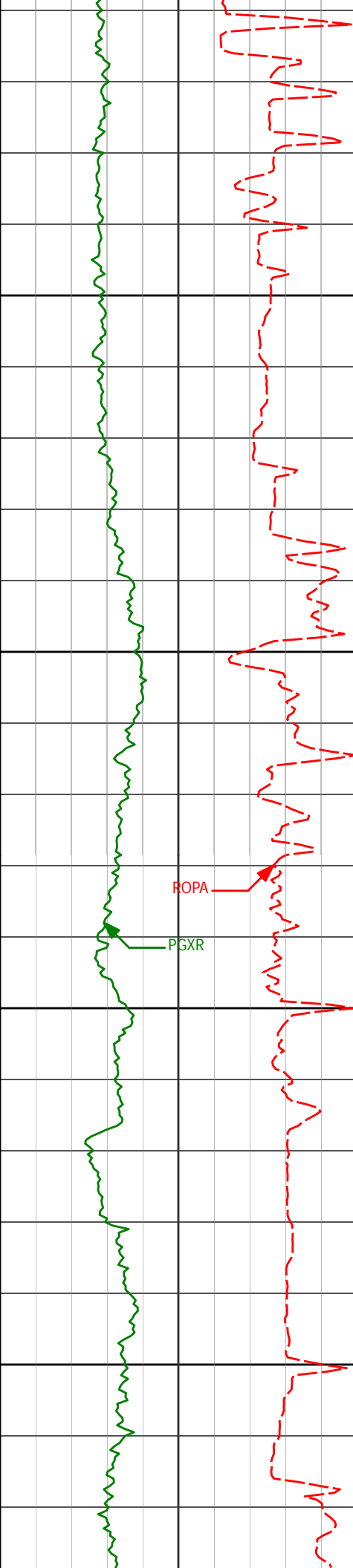
ROPA

PGXR

14650

14700

14750



14800

14850

14900

14950

14798'

88.73°

85.05°

7181.22'

7769.86'

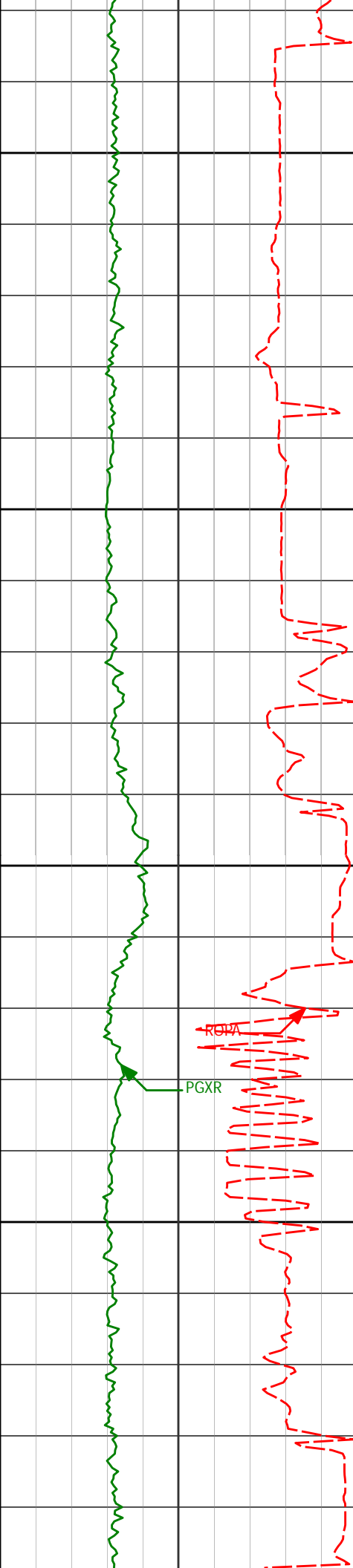
14970'

88.38°

81.98°

7185.56'

7940.64'



15000

15050

15100

15141'

15150

PGXR

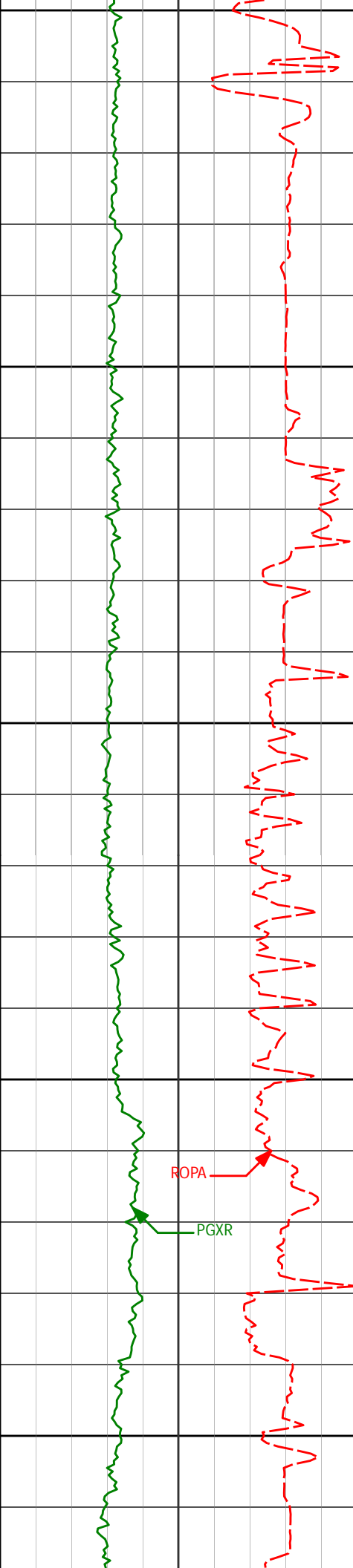
RQPA

89.74°

83.12°

7188.36'

8110.10'



15200

15250

15300

15350

15400

15312'

90.39°

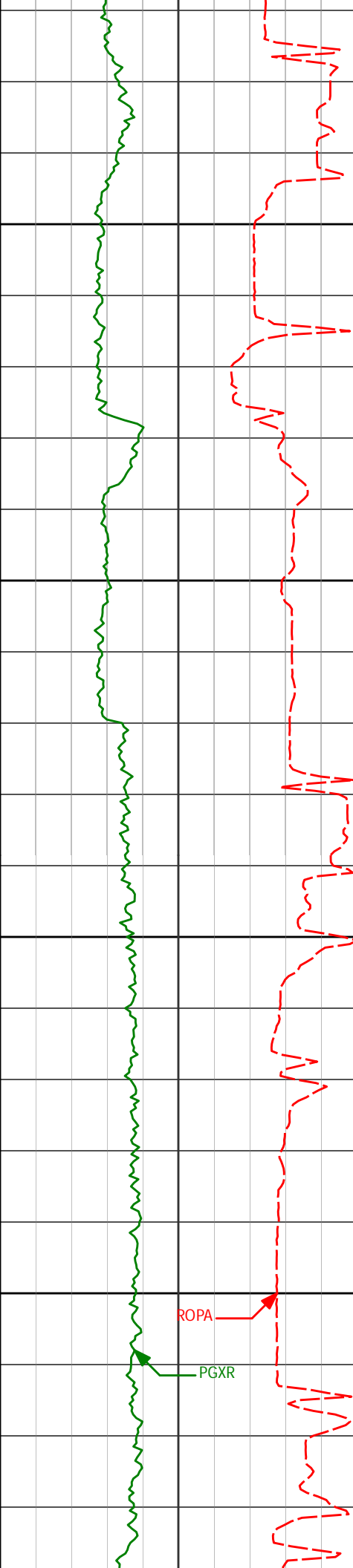
85.02°

7188.17'

8280.13'

ROPA

PGXR



15450

15483'

91.65°

82.74°

7185.13'

8450.07'

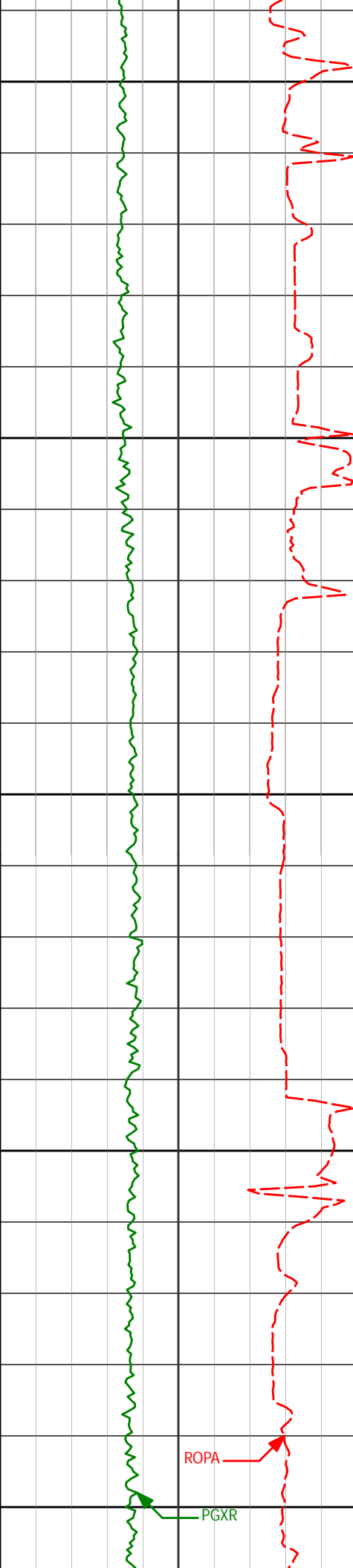
15500

15550

15600

ROPA

PGXR



15650

15654'

90.51°

85.97°

7181.90'

8620.14'

15700

15750

15800

15825'

89.74°

86.00°

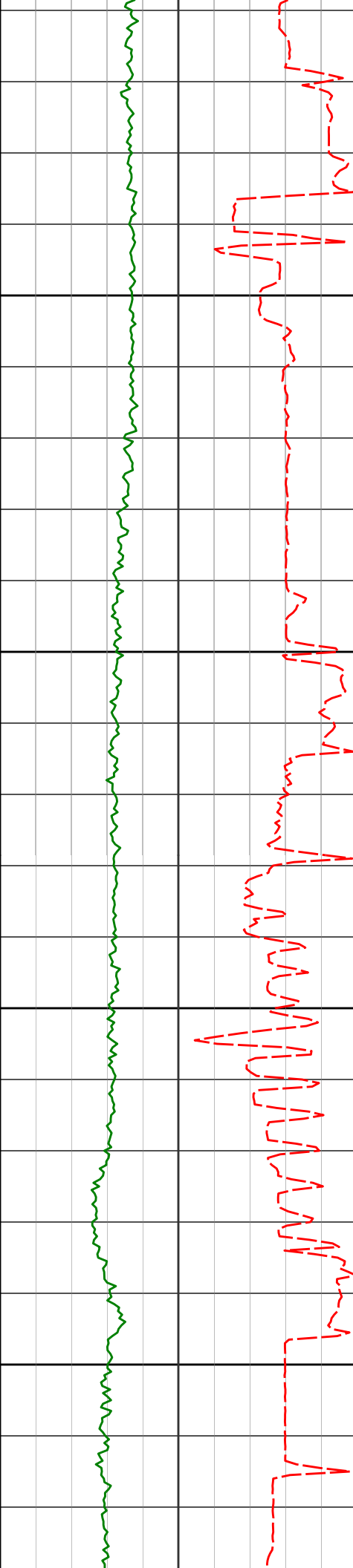
7181.53'

8790.69'

15850

ROPA

PGXR



15900

15950

16000

16050

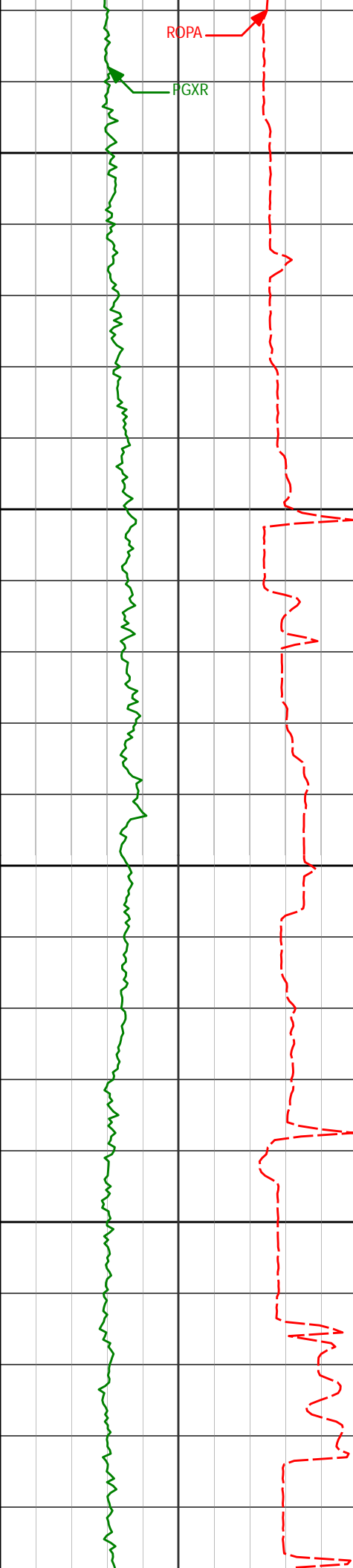
15997'

90.70°

88.58°

7180.87'

8962.46'



16100

16150

16200

16250

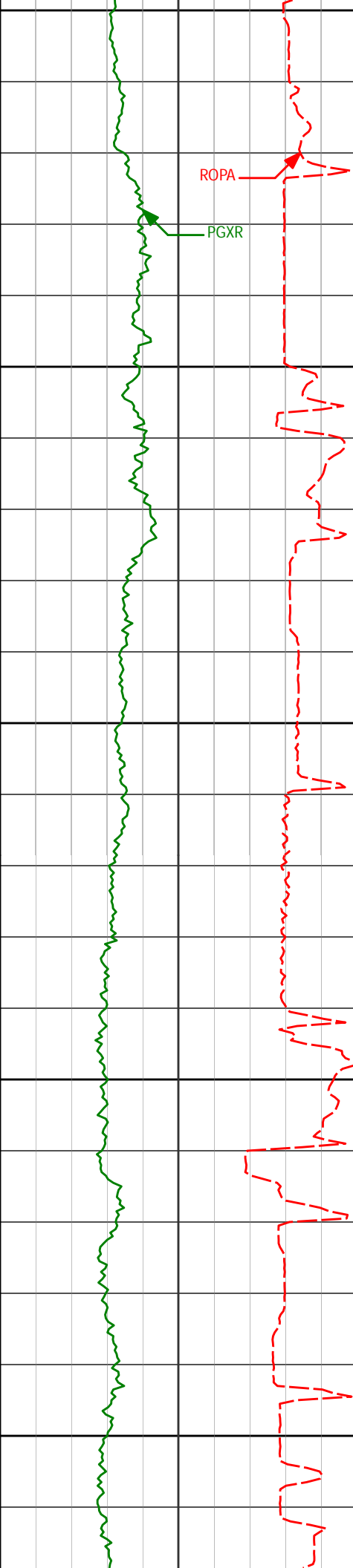
16168'

90.42°

88.11°

7179.19'

9133.36'



ROPA

PGXR

16300

16350

16400

16450

16500

16339'

90.30°

88.71°

7178.12'

9304.28'

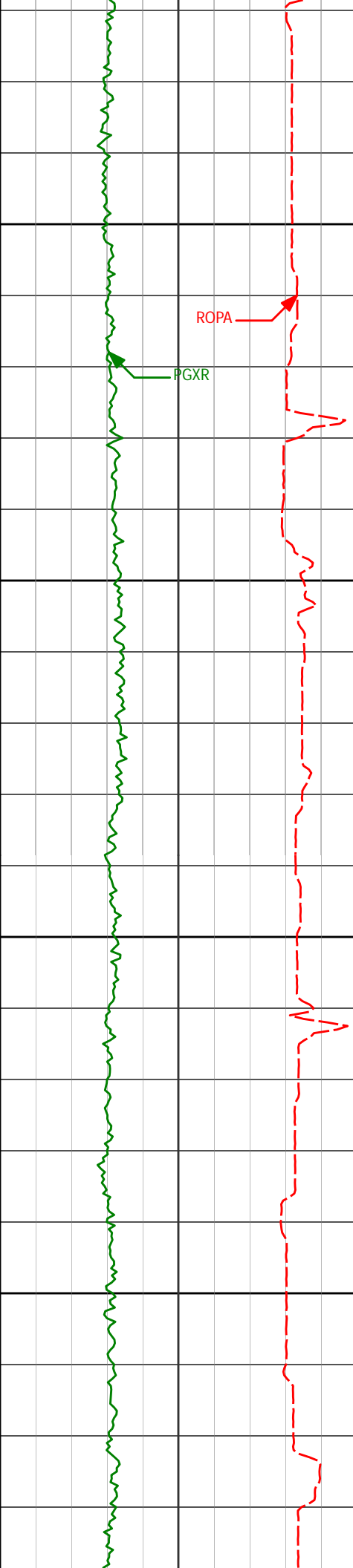
16510'

90.08°

93.28°

7177.55'

9475.21'



16550

16600

16650

16682'

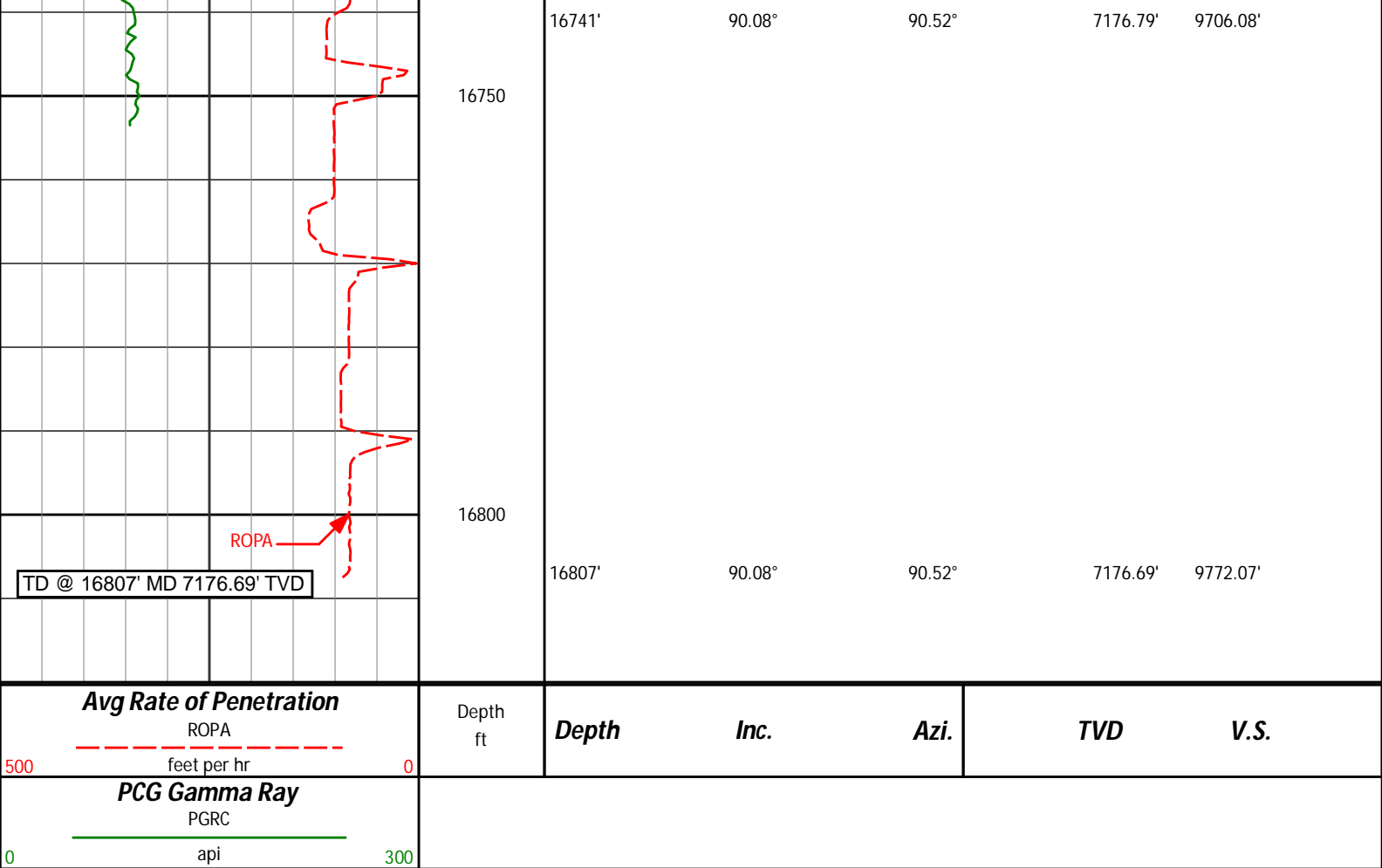
16700

90.30°

91.35°

7176.98'

9647.08'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
Sekich State 38C-17HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901272707

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1164.00	0.58	107.29	1163.95	2.30 S	5.67 W	-5.66	TIE-IN
1316.00	0.48	194.00	1315.95	3.15 S	5.09 W	-5.08	0.48
1506.00	0.48	176.33	1505.94	4.73 S	5.23 W	-5.22	0.08
1694.00	0.87	167.87	1693.93	6.92 S	4.88 W	-4.86	0.21
1877.00	0.08	191.12	1876.92	8.40 S	4.62 W	-4.59	0.43
2060.00	0.14	292.29	2059.92	8.45 S	4.85 W	-4.83	0.10
2242.00	0.17	285.25	2241.92	8.29 S	5.32 W	-5.30	0.02
2425.00	0.26	296.10	2424.92	8.03 S	5.97 W	-5.95	0.05
2608.00	0.25	298.07	2607.91	7.66 S	6.70 W	-6.68	0.01
2790.00	0.37	284.96	2789.91	7.32 S	7.62 W	-7.61	0.08
2972.00	0.63	280.67	2971.90	6.98 S	9.17 W	-9.15	0.14
3154.00	0.29	219.44	3153.90	7.15 S	10.44 W	-10.42	0.30
3326.00	2.56	196.03	3325.83	11.17 S	11.77 W	-11.74	1.34
3497.00	4.88	186.07	3496.46	22.07 S	13.59 W	-13.54	1.40
3668.00	8.19	178.51	3666.33	41.48 S	14.05 W	-13.94	1.99
3839.00	11.02	178.26	3834.92	70.00 S	13.23 W	-13.05	1.66
4011.00	10.09	179.76	4004.01	101.49 S	12.67 W	-12.41	0.56
4182.00	10.14	177.82	4172.35	131.52 S	12.04 W	-11.69	0.20
4353.00	10.08	177.57	4340.69	161.51 S	10.83 W	-10.41	0.05
4525.00	9.28	178.72	4510.25	190.40 S	9.88 W	-9.38	0.48
4696.00	10.33	175.20	4678.75	219.47 S	8.29 W	-7.72	0.71

4867.00	9.57	174.99	4847.17	248.91 S	5.77 W	-5.11	0.45
5038.00	8.93	180.96	5015.95	276.34 S	4.75 W	-4.02	0.67
5210.00	7.73	180.50	5186.14	301.25 S	5.07 W	-4.28	0.70
5381.00	9.11	181.50	5355.29	326.29 S	5.53 W	-4.67	0.81
5552.00	10.31	181.24	5523.84	355.12 S	6.21 W	-5.28	0.70
5724.00	8.27	178.75	5693.57	382.88 S	6.27 W	-5.27	1.21
5895.00	8.58	183.84	5862.73	407.90 S	6.86 W	-5.79	0.47
6067.00	9.49	183.38	6032.59	434.86 S	8.56 W	-7.42	0.53
6238.00	7.39	184.59	6201.73	459.89 S	10.27 W	-9.06	1.23
6410.00	4.18	186.58	6372.83	477.15 S	11.87 W	-10.62	1.87
6581.00	1.27	236.08	6543.64	484.40 S	14.16 W	-12.89	2.04
6624.00	1.15	261.48	6586.63	484.73 S	14.98 W	-13.71	1.27
6667.00	1.76	69.62	6629.62	484.57 S	14.79 W	-13.52	6.73
6710.00	4.81	74.40	6672.55	483.85 S	12.43 W	-11.17	7.12
6753.00	7.96	82.94	6715.28	483.00 S	7.74 W	-6.48	7.63
6795.00	10.86	87.50	6756.71	482.47 S	0.90 W	0.36	7.12
6838.00	14.20	86.76	6798.68	481.99 S	8.42 E	9.68	7.78
6881.00	18.45	82.12	6839.94	480.76 S	20.43 E	21.69	10.33
6924.00	22.80	84.05	6880.17	478.97 S	35.46 E	36.71	10.24
6966.00	27.76	86.52	6918.14	477.53 S	53.33 E	54.58	12.07
7009.00	30.66	88.29	6955.67	476.59 S	74.29 E	75.54	7.04
7052.00	36.51	88.63	6991.47	475.96 S	98.06 E	99.30	13.61
7095.00	41.75	89.64	7024.82	475.56 S	125.18 E	126.42	12.28
7138.00	47.26	89.96	7055.47	475.46 S	155.31 E	156.55	12.82
7181.00	52.86	91.12	7083.07	475.79 S	188.26 E	189.51	13.19
7223.00	58.28	91.44	7106.81	476.56 S	222.88 E	224.13	12.92
7266.00	62.38	91.85	7128.09	477.64 S	260.22 E	261.47	9.57
7309.00	67.32	90.20	7146.36	478.32 S	299.13 E	300.38	12.00
7352.00	71.39	89.24	7161.51	478.12 S	339.36 E	340.61	9.69
7394.00	74.72	88.90	7173.75	477.47 S	379.52 E	380.77	7.97
7437.00	77.42	89.70	7184.10	476.96 S	421.25 E	422.50	6.53
7480.00	81.03	89.62	7192.14	476.71 S	463.48 E	464.73	8.40
7522.00	84.35	89.25	7197.48	476.30 S	505.13 E	506.38	7.95
7659.00	91.59	89.45	7202.33	474.75 S	641.95 E	643.19	5.29
7830.00	89.94	90.96	7200.05	475.36 S	812.92 E	814.16	1.31
8001.00	91.06	91.74	7198.56	479.39 S	983.86 E	985.11	0.80
8172.00	87.37	90.06	7200.90	482.07 S	1154.79 E	1156.05	2.37
8343.00	91.19	88.50	7203.05	479.92 S	1325.73 E	1326.98	2.41
8515.00	89.06	90.23	7202.68	478.02 S	1497.70 E	1498.94	1.60
8686.00	89.74	89.72	7204.47	477.94 S	1668.69 E	1669.93	0.50
8858.00	90.23	89.69	7204.51	477.06 S	1840.68 E	1841.93	0.29
9029.00	89.62	88.47	7204.73	474.31 S	2011.66 E	2012.89	0.80
9200.00	89.65	88.66	7205.82	470.03 S	2182.60 E	2183.82	0.11
9384.00	90.60	90.88	7205.42	469.29 S	2366.59 E	2367.81	1.31
9567.00	89.12	89.81	7205.87	470.39 S	2549.57 E	2550.80	1.00
9751.00	90.69	89.97	7206.18	470.04 S	2733.57 E	2734.79	0.86
9935.00	90.42	90.68	7204.39	471.08 S	2917.55 E	2918.78	0.41
10119.00	90.32	89.30	7203.20	471.05 S	3101.55 E	3102.77	0.75
10302.00	90.14	90.31	7202.47	470.43 S	3284.54 E	3285.76	0.56
10486.00	90.20	91.24	7201.92	472.92 S	3468.52 E	3469.75	0.51
10668.00	89.83	89.68	7201.88	474.38 S	3650.51 E	3651.74	0.88
10849.00	86.16	86.41	7208.21	468.21 S	3831.24 E	3832.45	2.71
11033.00	91.31	86.99	7212.27	457.63 S	4014.83 E	4016.01	2.82
11204.00	91.53	89.47	7208.03	452.35 S	4185.68 E	4186.85	1.46
11375.00	90.48	89.85	7205.03	451.34 S	4356.65 E	4357.81	0.65
11546.00	90.33	90.44	7203.82	451.77 S	4527.64 E	4528.81	0.36
11717.00	90.51	90.70	7202.57	453.47 S	4698.63 E	4699.80	0.18
11888.00	90.79	91.30	7200.63	456.45 S	4869.59 E	4870.77	0.39
12059.00	90.26	92.77	7199.06	462.53 S	5040.47 E	5041.66	0.91
12231.00	89.55	94.31	7199.35	473.14 S	5212.13 E	5213.36	0.99
12402.00	90.02	92.32	7199.99	483.03 S	5382.84 E	5384.08	1.20
12573.00	91.25	93.53	7198.10	491.76 S	5553.60 E	5554.87	1.01
12745.00	89.09	96.28	7197.59	506.46 S	5724.94 E	5726.25	2.03
12915.00	89.37	95.11	7199.87	523.33 S	5894.08 E	5895.43	0.71
13086.00	91.13	94.52	7199.12	537.68 S	6064.47 E	6065.86	1.09
13257.00	91.46	94.43	7195.26	551.02 S	6234.91 E	6236.33	0.20
13428.00	92.82	95.28	7188.87	565.48 S	6405.17 E	6406.63	0.94
13599.00	89.99	97.36	7184.68	584.30 S	6575.05 E	6576.56	2.05
13770.00	89.12	98.33	7186.01	607.64 S	6744.44 E	6746.01	0.76
13942.00	91.50	97.98	7185.08	632.03 S	6914.69 E	6916.32	1.40
14113.00	90.51	95.68	7182.08	652.37 S	7084.43 E	7086.12	1.46
14284.00	91.40	91.31	7179.23	662.79 S	7255.05 E	7256.76	2.61
14455.00	89.62	87.66	7177.71	661.25 S	7426.00 E	7427.71	2.37
14627.00	89.65	86.16	7178.80	651.98 S	7597.74 E	7599.42	0.87

14798.00	88.73	85.05	7181.22	638.88 S	7768.22 E	7769.86	0.84
14970.00	88.38	81.98	7185.56	619.46 S	7939.04 E	7940.64	1.80
15141.00	89.74	83.12	7188.36	597.29 S	8108.57 E	8110.10	1.04
15312.00	90.39	85.02	7188.17	579.62 S	8278.65 E	8280.13	1.17
15483.00	91.65	82.74	7185.13	561.40 S	8448.63 E	8450.07	1.52
15654.00	90.51	85.97	7181.90	544.59 S	8618.74 E	8620.14	2.00
15825.00	89.74	86.00	7181.53	532.61 S	8789.32 E	8790.69	0.45
15997.00	90.70	88.58	7180.87	524.48 S	8961.11 E	8962.46	1.60
16168.00	90.42	88.11	7179.19	519.54 S	9132.03 E	9133.36	0.32
16339.00	90.30	88.71	7178.12	514.80 S	9302.96 E	9304.28	0.36
16510.00	90.08	93.28	7177.55	517.77 S	9473.89 E	9475.21	2.68
16682.00	90.30	91.35	7176.98	524.71 S	9645.74 E	9647.08	1.13
16741.00	90.08	90.52	7176.79	525.68 S	9704.73 E	9706.08	1.46
16807.00	90.08	90.52	7176.69	526.28 S	9770.73 E	9772.07	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 90.15 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.61 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16807.00 FEET
IS 9784.89 FEET ALONG 93.08 DEGREES (TRUE)**

Directional surveys tied on to gyro surveys at 1164' MD. Final survey is a projection to the bit.