

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	06-Apr-15	11-Apr-15			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.790			
Log Start Depth (MD, ft)	1,228.00	7,550.00			
Log End Depth (MD, ft)	7,550.00	12,703.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	04-Apr-15 14:40	08-Apr-15 00:30			
Drill/Wipe End Date and Time	06-Apr-15 11:28	10-Apr-15 23:35			
Min Inc (deg) @ Depth (MD, ft)	0.22 @ 6,400.00	87.69 @ 9,858.00			
Max Inc (deg) @ Depth (MD, ft)	87.59 @ 7,505.00	91.85 @ 12,377.00			
Bit TFA(in2) / Bit Type	1.49 / PDC	0.98 / PDC			
Flow Rate (gpm)	607.64	307.19			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	9.00 / 57.00	9.95 / 47.00			
Filtrate CL (ppm)	2,200.00	2,400.00			
pH / Fluid Loss (mptm)	9.40 / 4	9.60 / 4			
PV (cP) / YP (lbf2)	14 / 15.00	18 / 13.00			
% Solids / % Sand	6.9 / 0.20	10.00 / 0.20			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / 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 Tool Temp (in F) / S	475.00 / PCM	330.00 / PCM			

Max Tool Temp (degF) / Source	175.21 / PCM	236.82 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Matt Busche	Matt Busche			
Customer Representative	Frank Kinney	Sam Taylor			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11341340	12310752			
Insert Serial Number	11400840	11680779			
Date and Time Initialized	04-Apr-15 02:27	06-Apr-15 13:20			
Date and Time Read	06-Apr-15 19:05	11-Apr-15 15:57			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	42.66	40.30			
Software Version	6.21	6.21			
Sub Serial Number	11341340	12310752			
Sonde Serial Number	11902169	11638621			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	166.32	187.54			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.61	45.25			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341340	12310752			
Insert/Sonde Serial Number	11293376	11579811			

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. All data presented is recorded unless otherwise specified. Run 200 gamma is real time data.
4. Data gap due to Pason freeze and subsequent loss of depth tracking.
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):

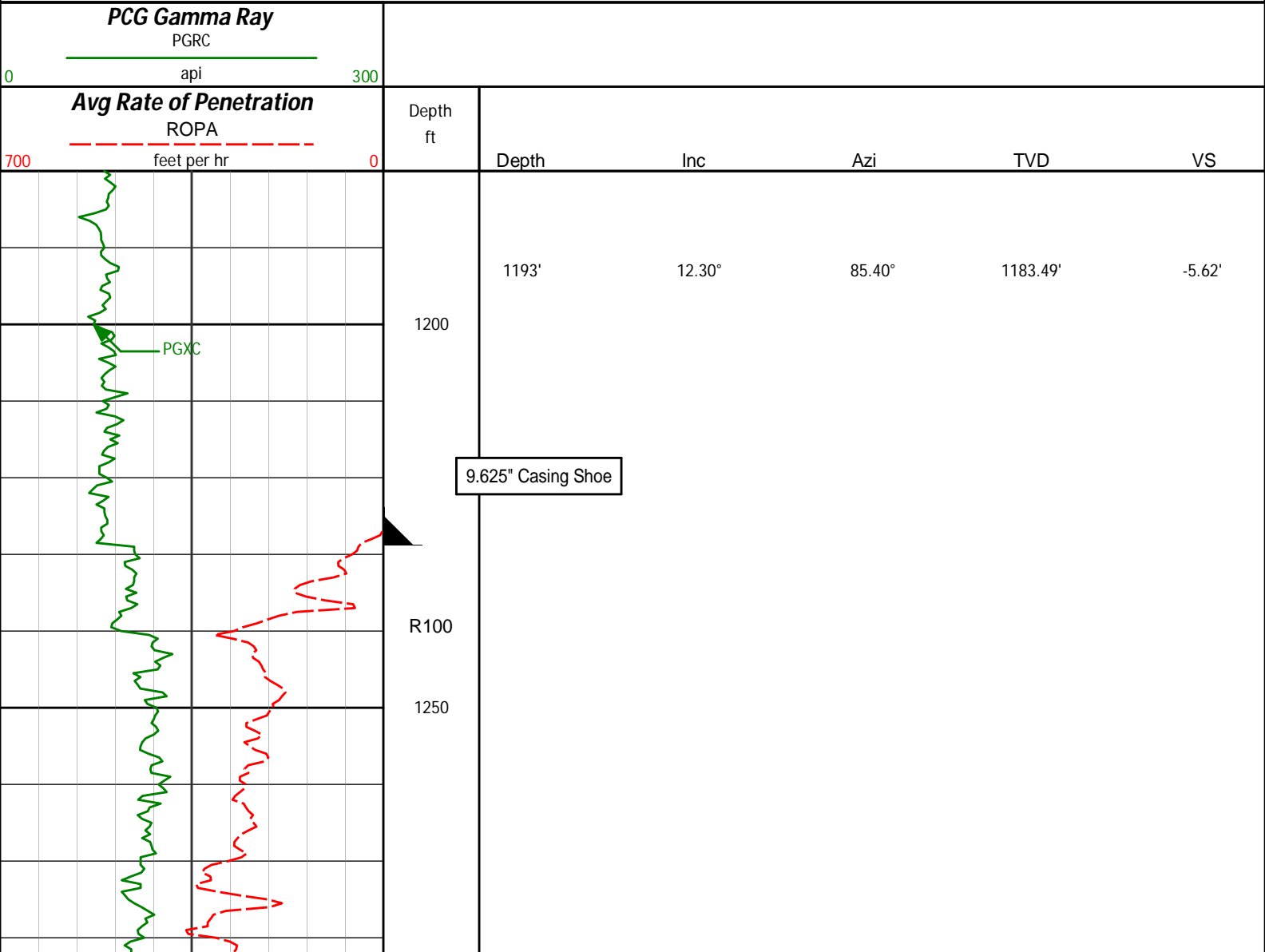
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

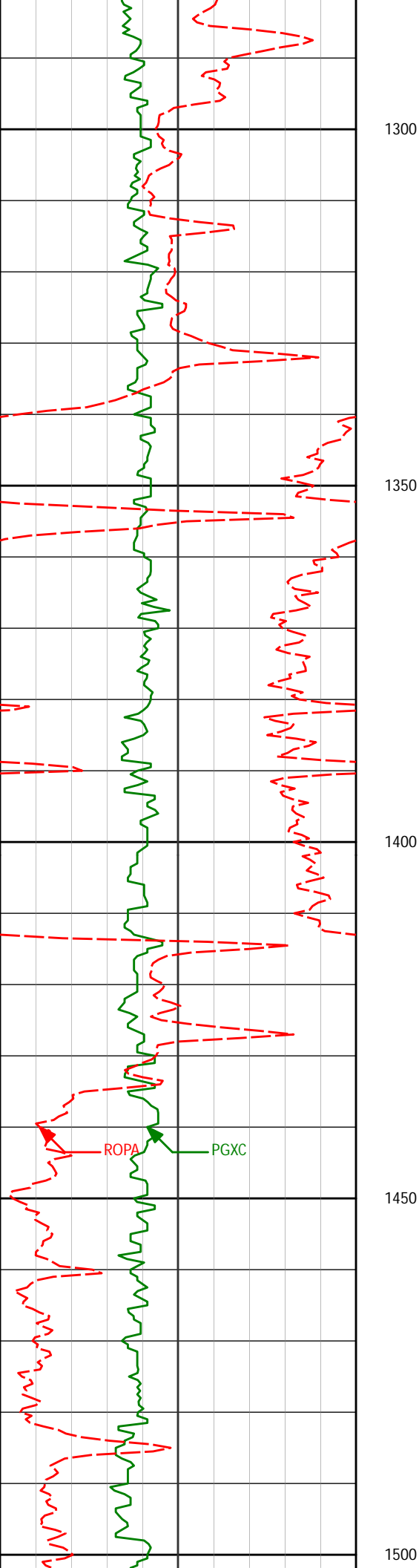
WARRANTY

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HALLIBURTON
Sperry Drilling Services

MD Detail Log 1:240





1285'

12.69°

84.43°

1273.31'

-7.39'

1300

1350

1380'

13.16°

85.06°

1365.91'

-9.34'

1400

1450

1474'

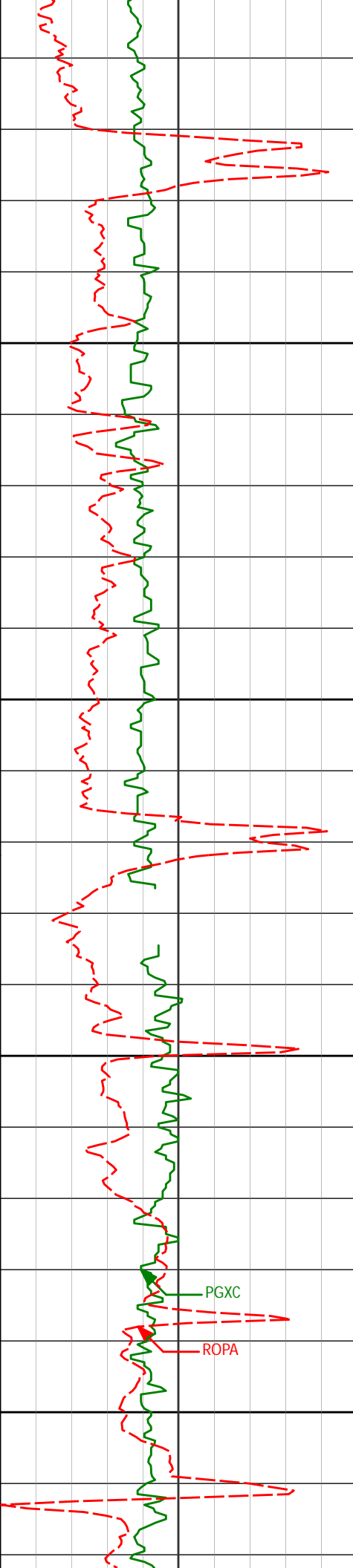
13.34°

84.48°

1457.40'

-11.31'

1500



1550

1571'

13.65°

86.09°

1551.73'

-13.18'

1600

1650

1664'

13.41°

85.81°

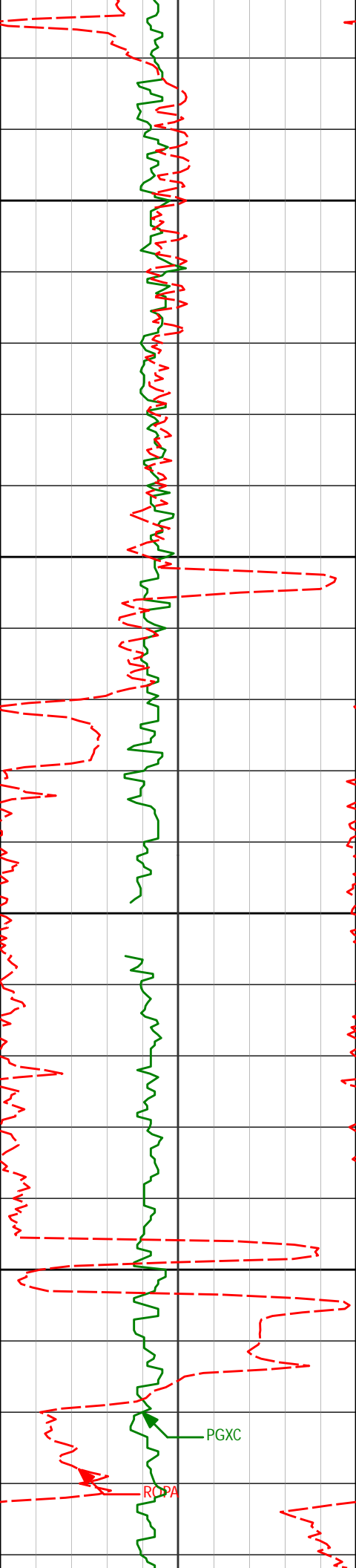
1642.15'

-14.72'

1700

PGXC

ROPA



1750

1800

1850

1900

1758'

12.94°

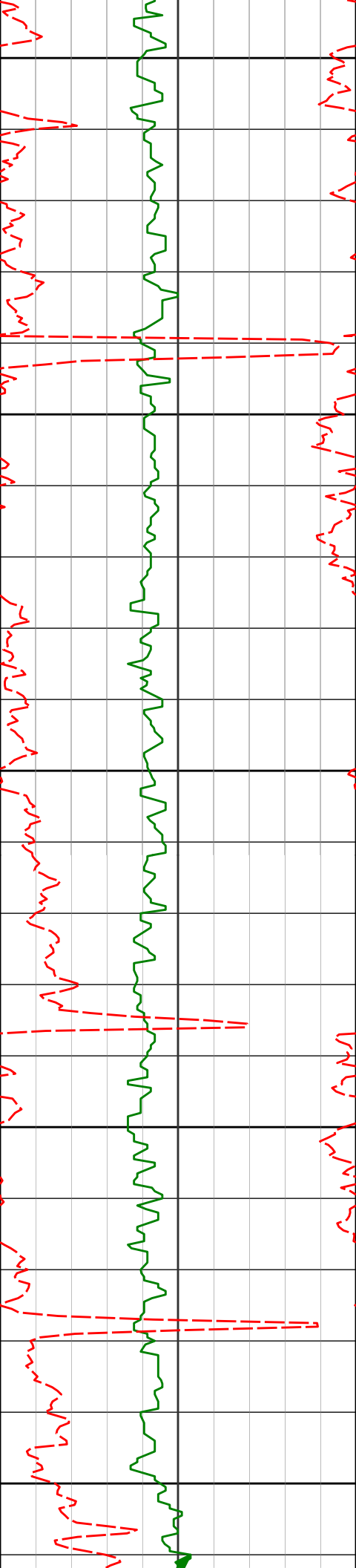
86.14°

1733.67'

-16.23'

PGXC

ROPA



1945'

11.02°

83.51°

1916.59'

-19.68'

1950

2000

2050

2100

2150

2038'

10.82°

83.03°

2007.91'

-21.75'

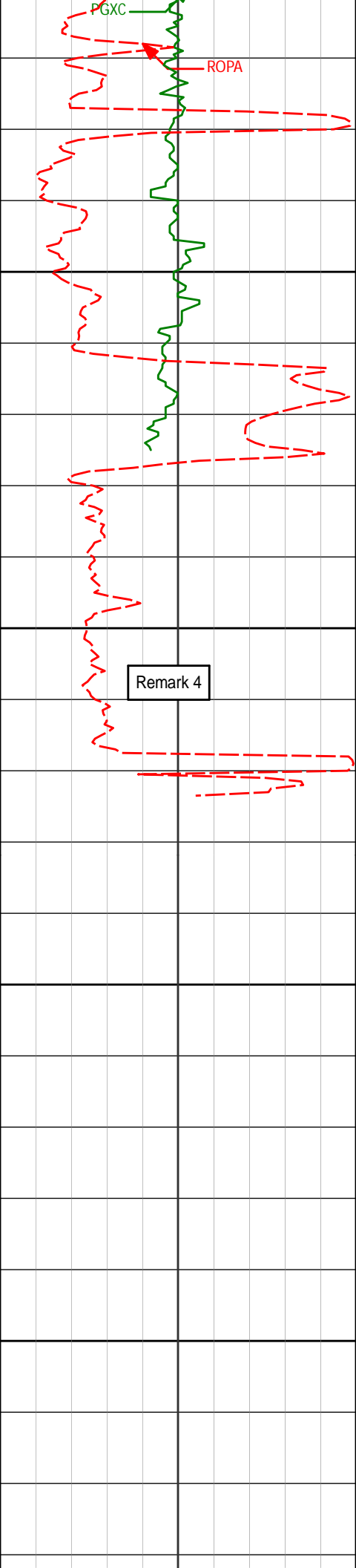
2131'

10.15°

82.11°

2099.35'

-23.94'



2200

2225'

11.04°

84.13°

2191.75'

-26.00'

2250

Remark 4

2300

2318'

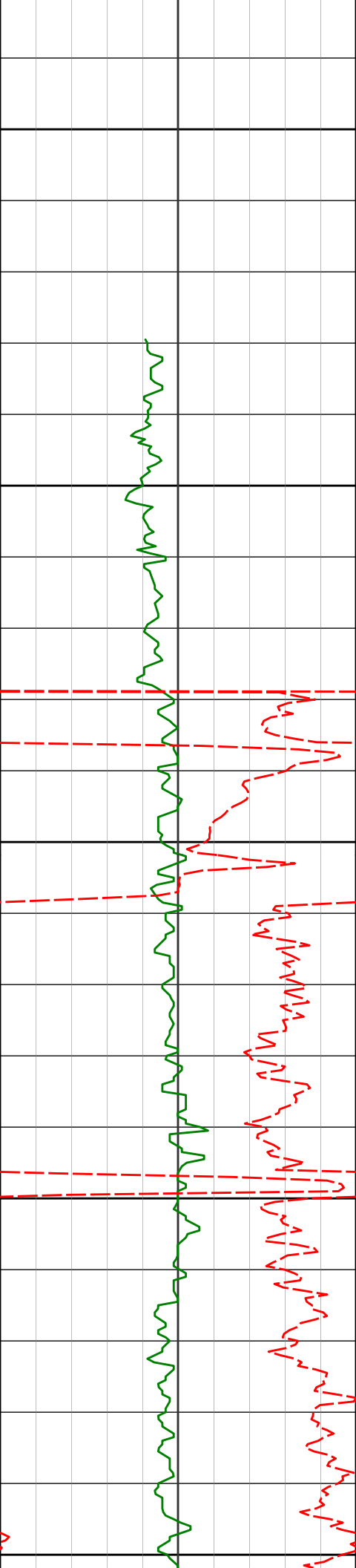
10.62°

83.85°

2283.09'

-27.84'

2350



2400

2411'

9.81°

82.24°

2374.62'

-29.83'

2450

2500

2505'

11.03°

91.96°

2467.07'

-30.61'

2550

2600

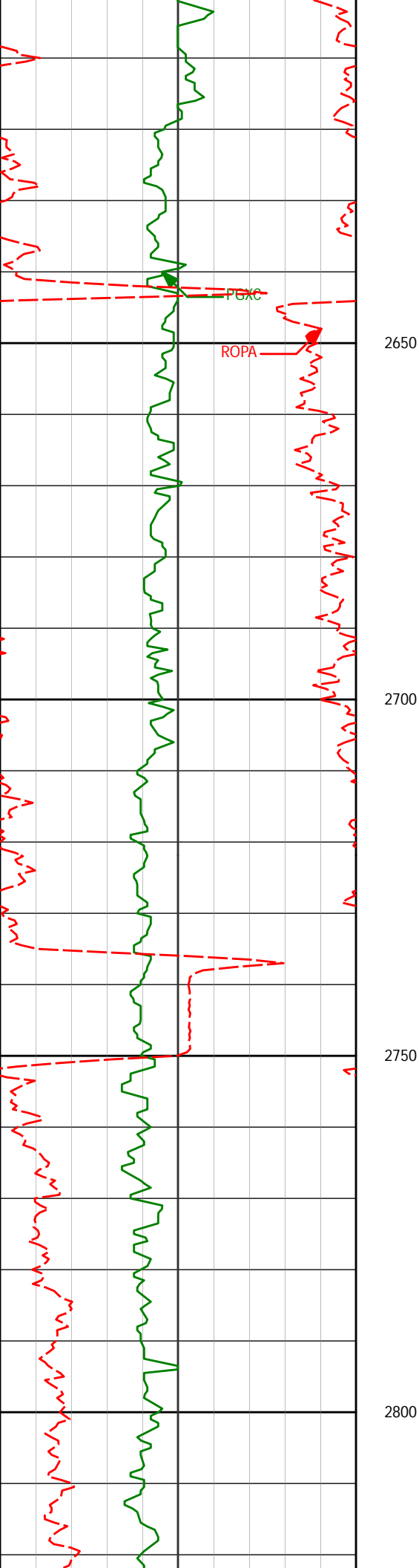
2598'

10.35°

90.97°

2558.46'

-30.17'



2691'

10.24°

91.43°

2649.96'

-29.83'

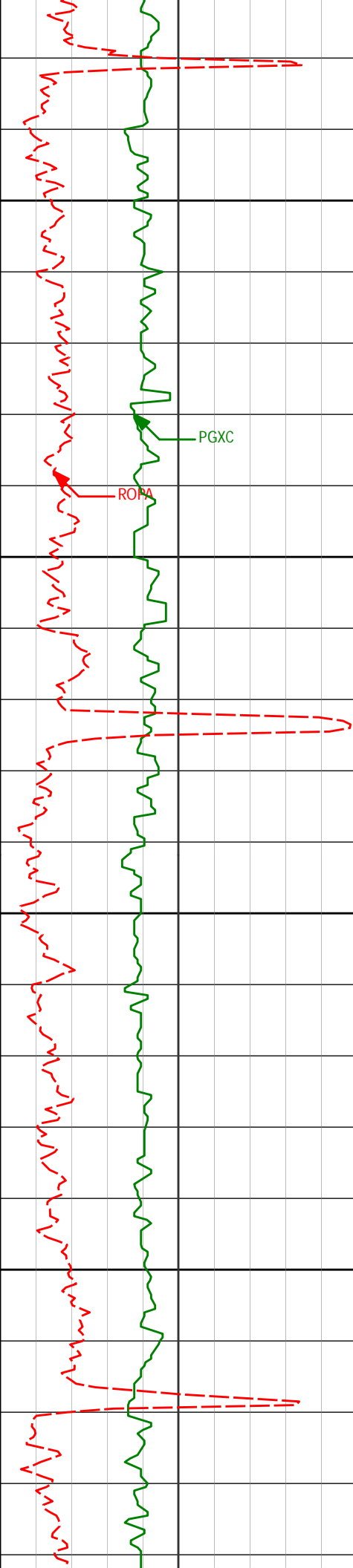
2785'

10.48°

91.75°

2742.43'

-29.36'



2850

2878'

10.66°

90.79°

2833.85'

-28.99'

PGXC

ROFA

2900

2950

2972'

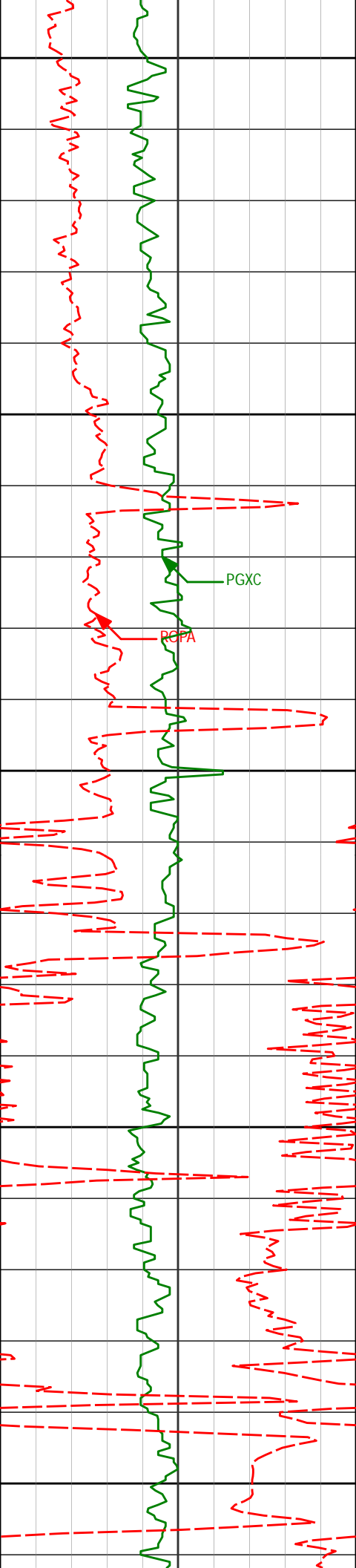
10.57°

90.30°

2926.24'

-28.83'

3000



3050

3065'

10.65°

91.17°

3017.65'

-28.62'

3100

PGXC

PGPA

3150

3159'

9.92°

92.14°

3110.14'

-28.15'

3200

3250

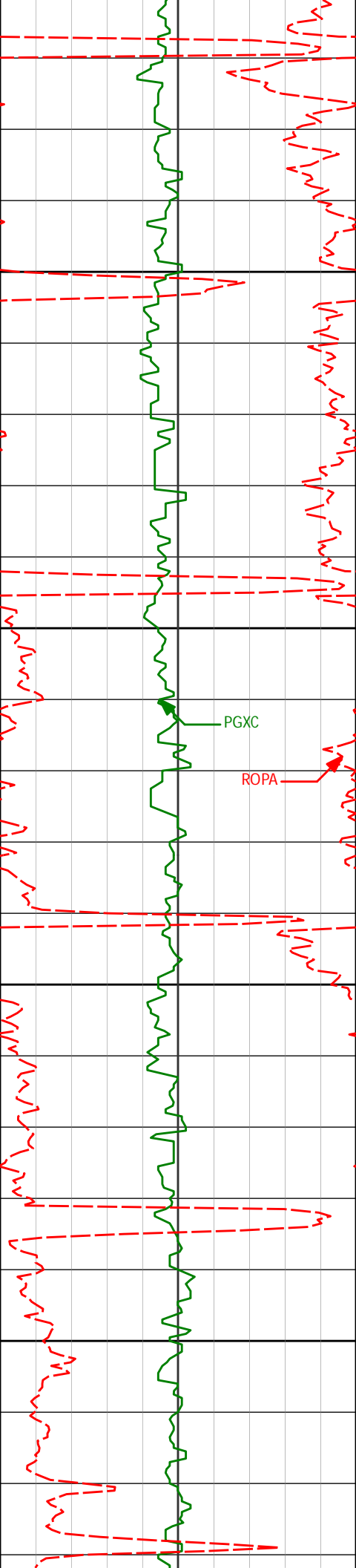
3253'

10.92°

86.40°

3202.59'

-28.41'



3300

3350

3400

3450

PGXC

ROPA

3343'

9.97°

83.82°

3291.10'

-29.79'

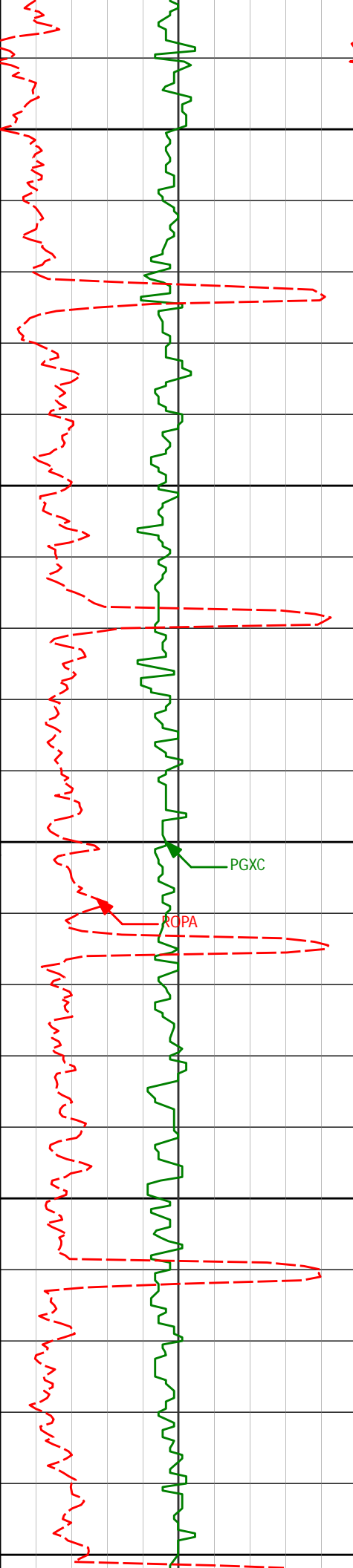
3433'

9.20°

83.68°

3379.85'

-31.42'



3500

3523'

8.48°

81.98°

3468.78'

-33.15'

3550

3600

PGXC

RCPA

3613'

7.78°

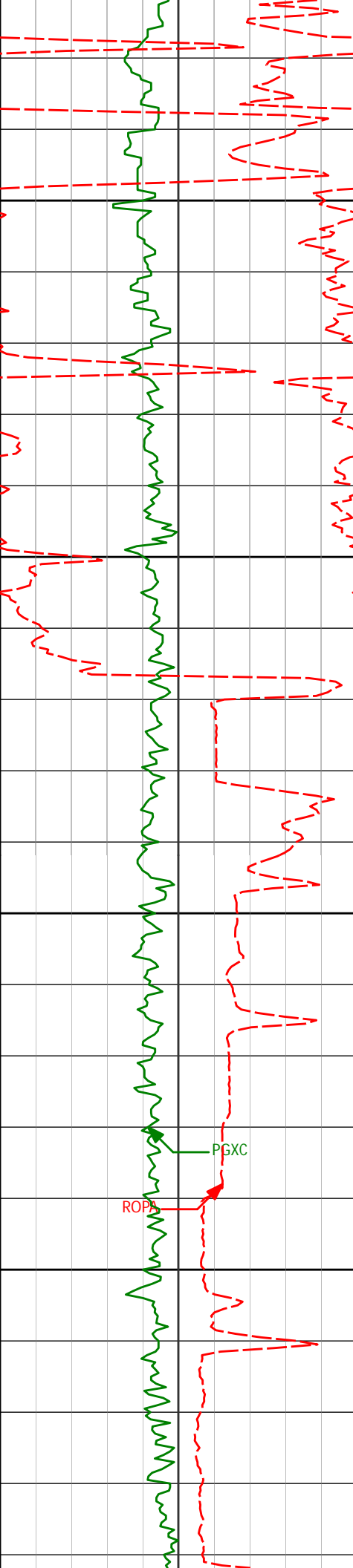
81.05°

3557.87'

-35.03'

3650

3700



3950

3973'

3.42°

63.86°

3916.15'

-43.68'

4000

4050

4063'

2.96°

65.10°

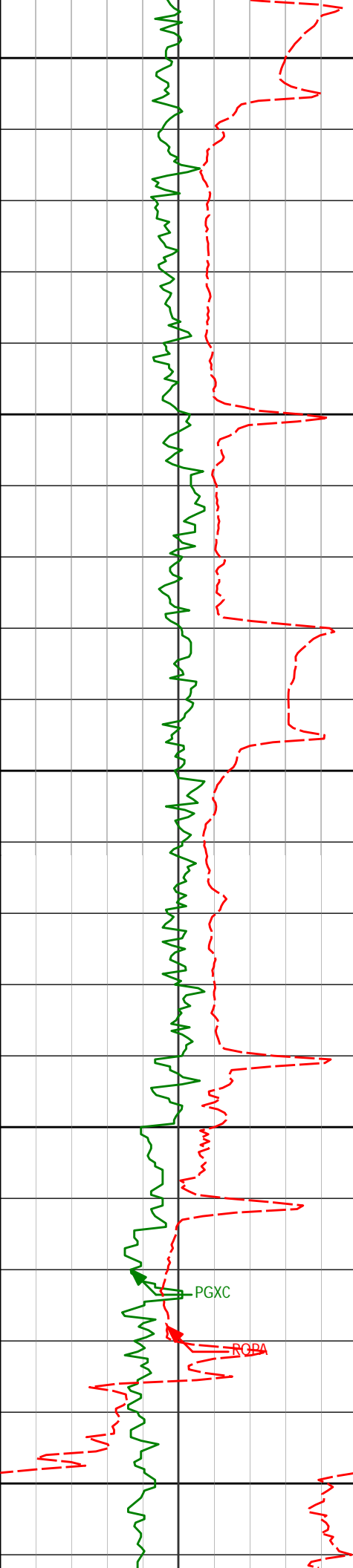
4006.01'

-45.85'

4100

PGXC

ROP



4150

4153'

2.04°

73.39°

4095.92'

-47.28'

4200

4250

4243'

1.61°

10.18°

4185.88'

-48.99'

4300

PGXC

ROBA

4333'

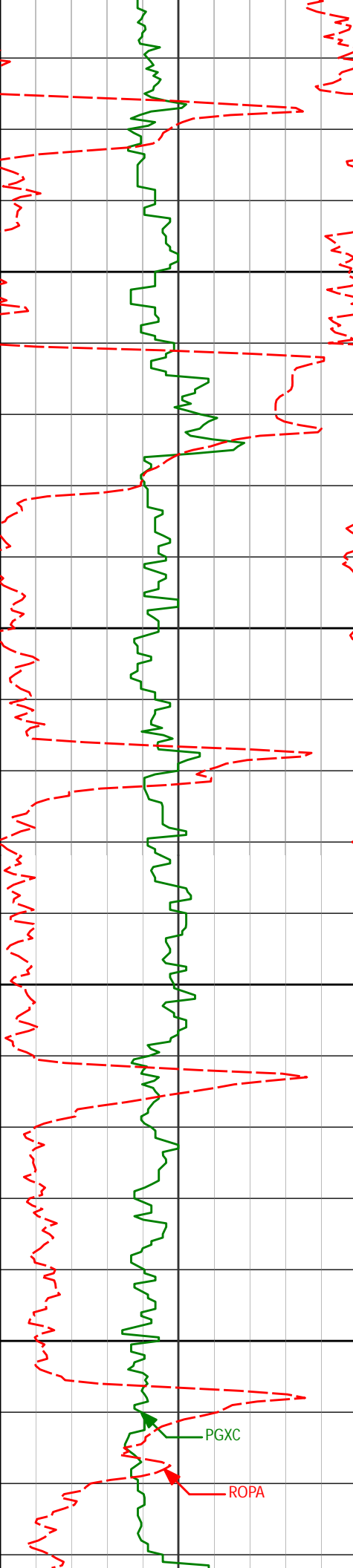
1.75°

357.96°

4275.84'

-51.60'

4350



4400

4450

4500

4550

4423'

1.27°

331.41°

4365.81'

-53.85'

4513'

1.16°

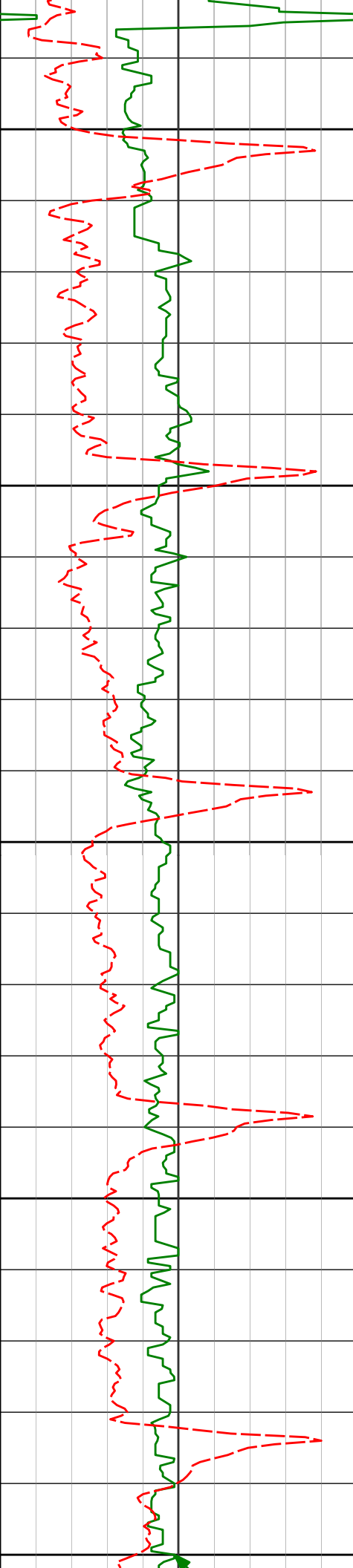
305.09°

4455.79'

-55.25'

PGXC

ROPA



4600

4603'

1.37°

295.34°

4545.77'

-56.24'

4650

4700

4693'

1.42°

292.19°

4635.75'

-57.12'

4750

4800

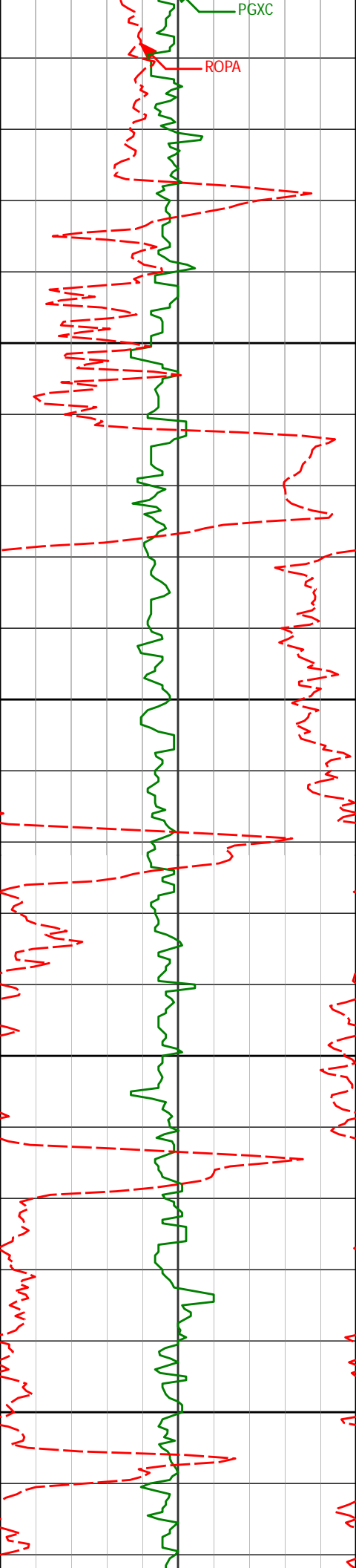
4783'

1.58°

285.40°

4725.72'

-57.87'



4850

4900

4950

5000

4872'

1.14°

251.50°

4814.69'

-57.91'

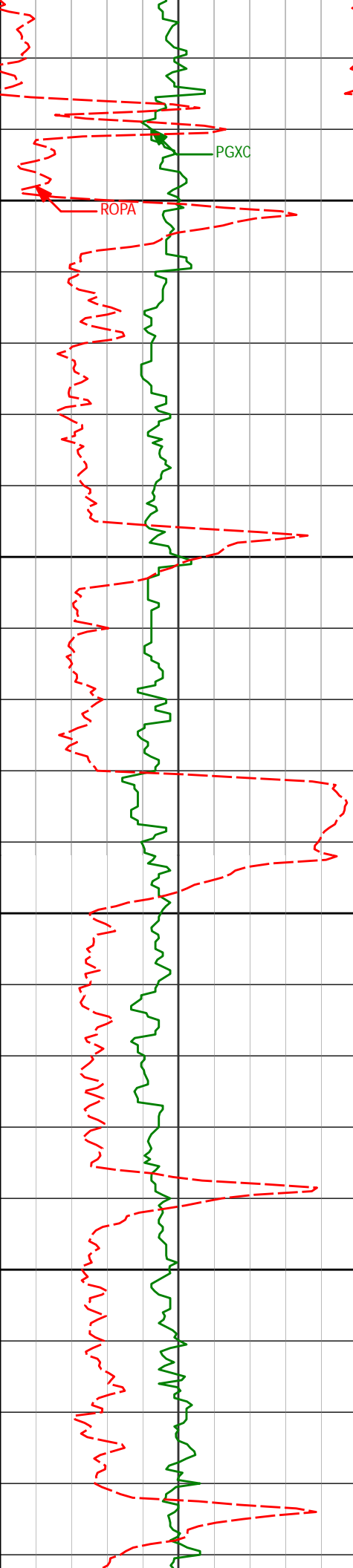
4962'

1.65°

229.55°

4904.67'

-56.79'



5050

5052'

1.81°

240.24°

4994.62'

-55.24'

5100

5142

1.00

220.11

5084.00

-33.99

5150

5200

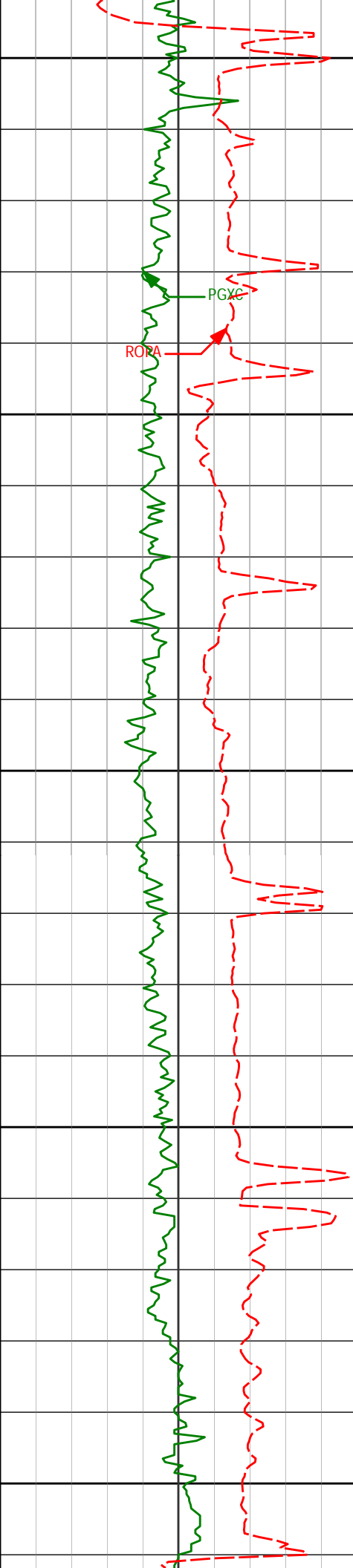
5232'

1.03°

183.98°

5174.58'

-52.65'



5250

PGXC

ROPA

5300

5321'

1.12°

184.13°

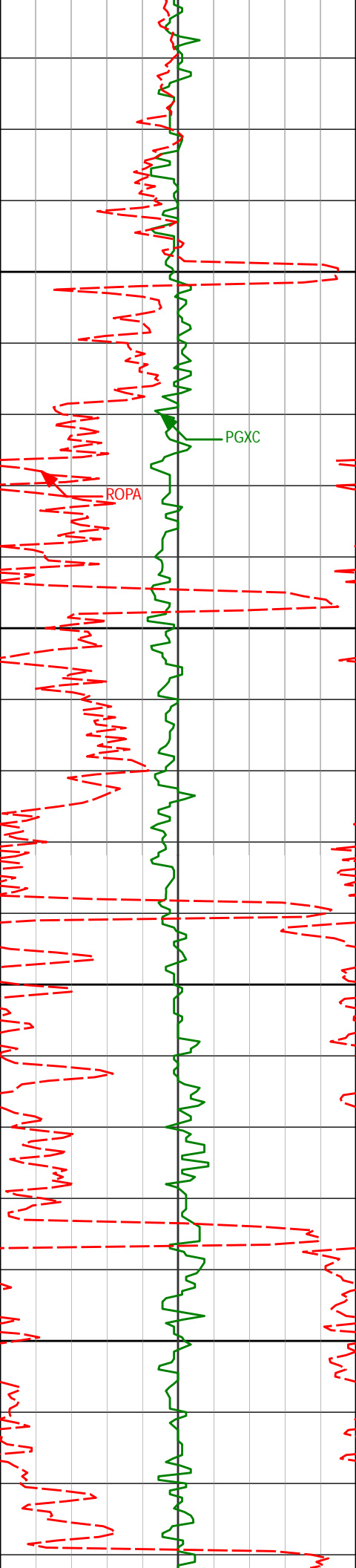
5263.57'

-50.98'

5350

5400

5450



5500

5500'

0.74°

166.45°

5442.54'

-48.11'

5550

5590'

0.58°

173.74°

5532.54'

-47.09'

5600

5650

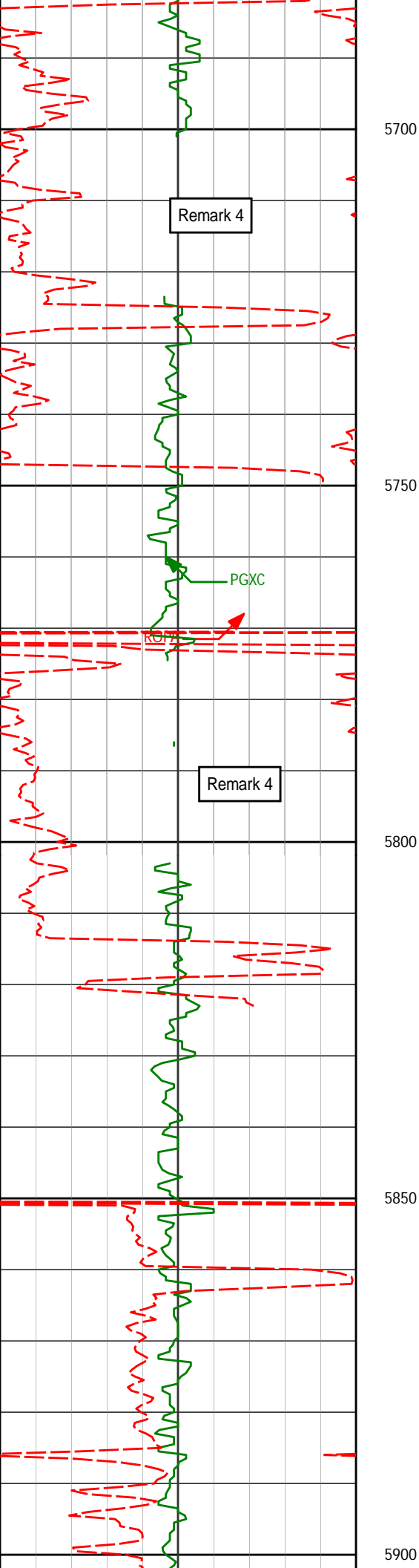
5680'

0.46°

157.53°

5622.53'

-46.30'



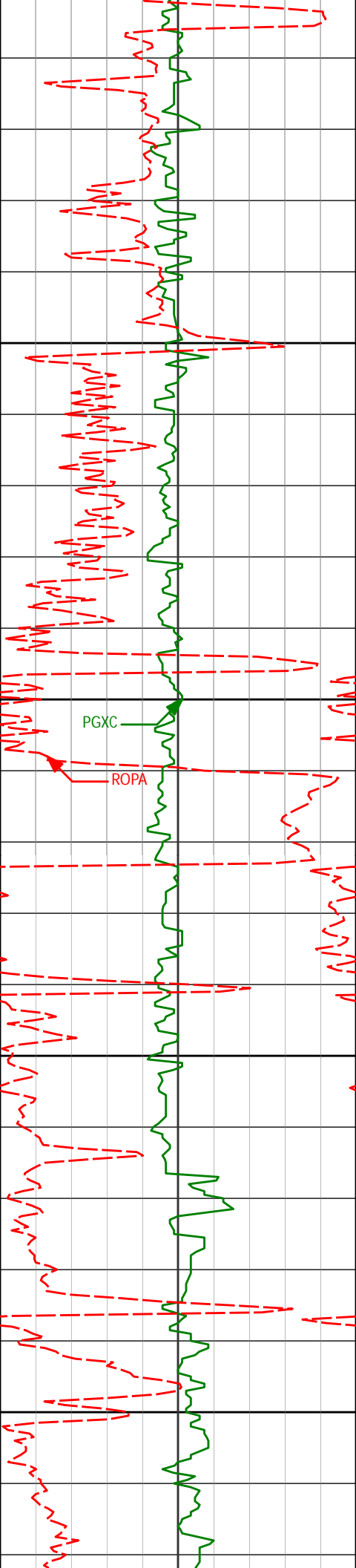
5860'

0.77°

106.41°

5802.53'

-45.30'



5950

5950'

1.12°

116.42°

5892.51'

-44.73'

6000

PGXC

ROPA

6040'

0.42°

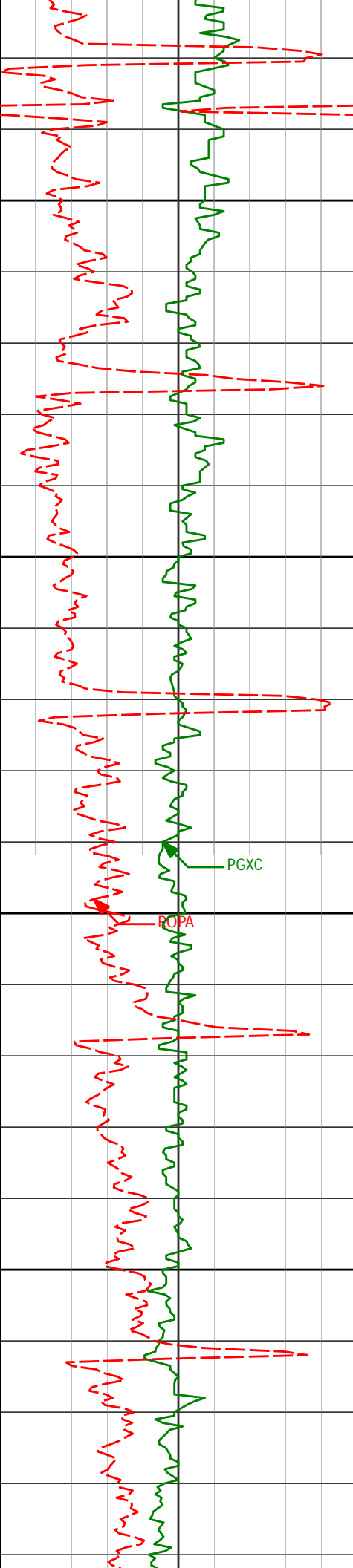
191.34°

5982.51'

-44.02'

6050

6100



6130'

0.65°

203.79°

6072.50'

-43.23'

6150

6200

6220'

0.74°

189.29°

6162.50'

-42.19'

PGXC

POPA

6250

6300

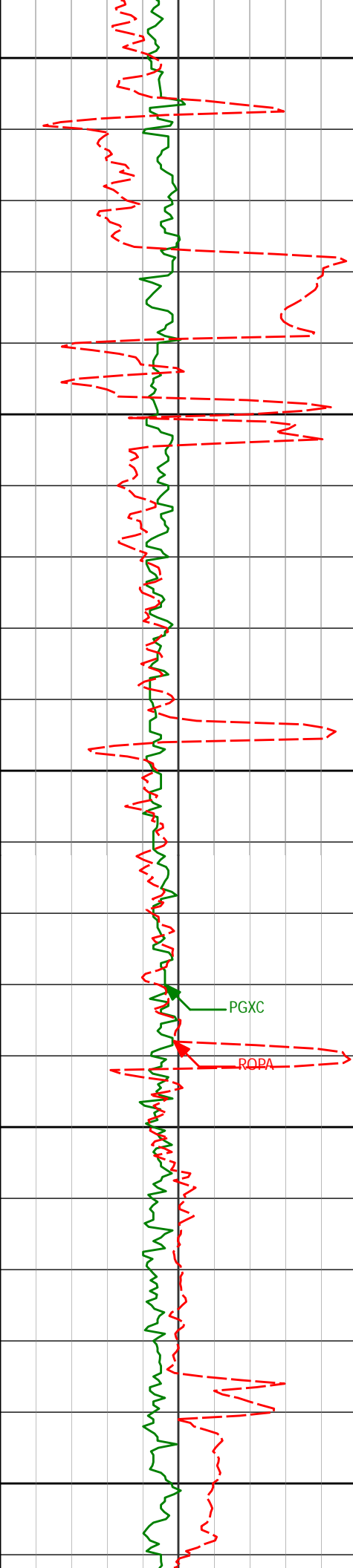
6310'

1.06°

186.72°

6252.48'

-40.79'



6350

6400

6450

6500

6550

6400'

0.22°

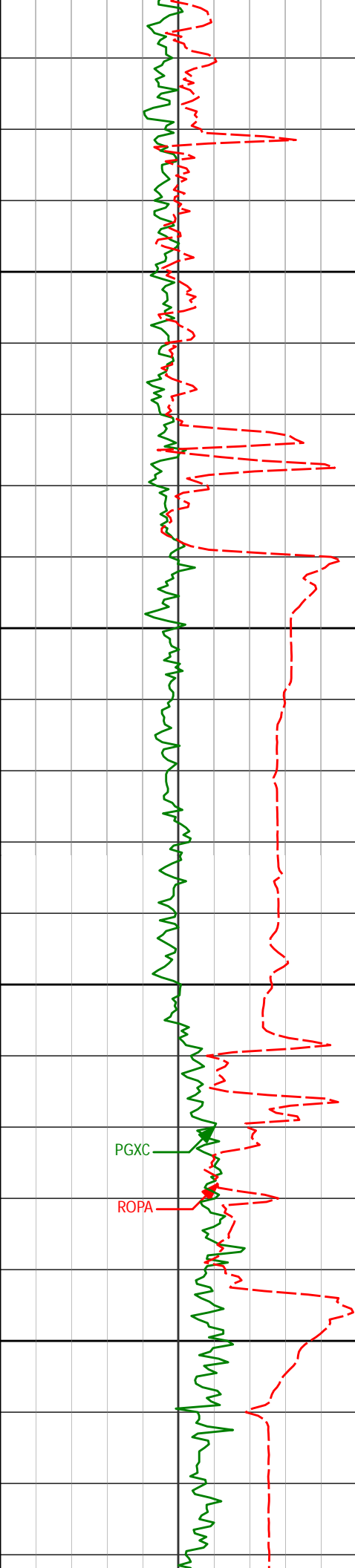
229.75°

6342.48'

-39.85'

PGXC

ROPA



6600

6650

6700

6750

6580'

0.74°

191.72°

6522.47'

-38.49'

6670'

7.07°

180.52°

6612.22'

-32.37'

6759'

14.75°

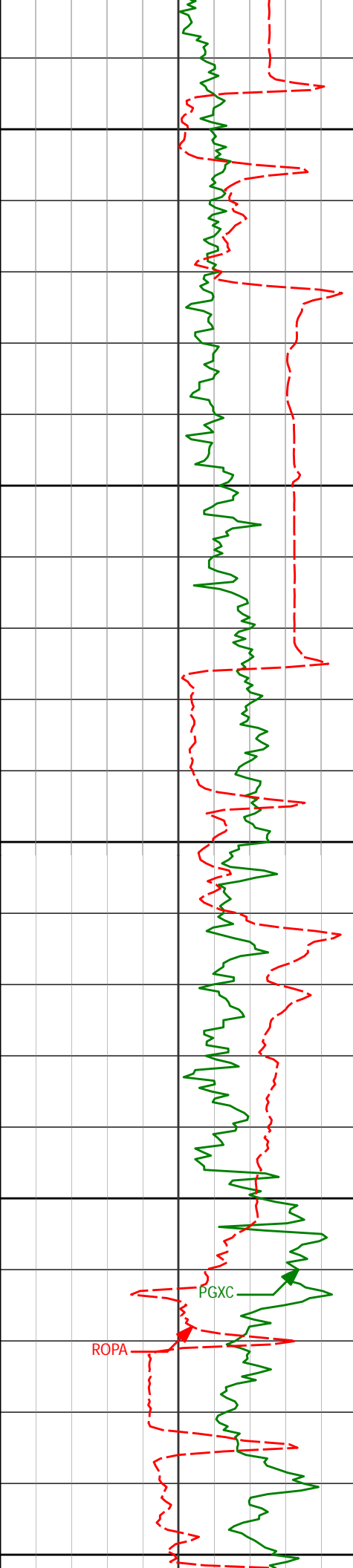
184.81°

6699.54'

-15.58'

PGXC

ROPA



6800

6850

6900

6950

7000

6849'

24.37°

182.75°

6784.25'

14.45'

6939'

31.01°

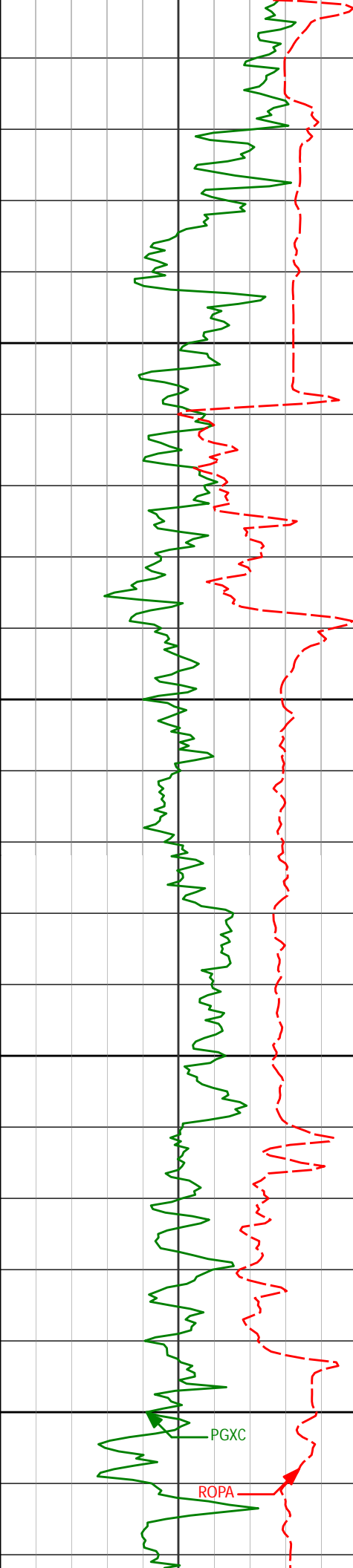
182.63°

6863.90'

56.21'

PGXC

ROPA



7050

7100

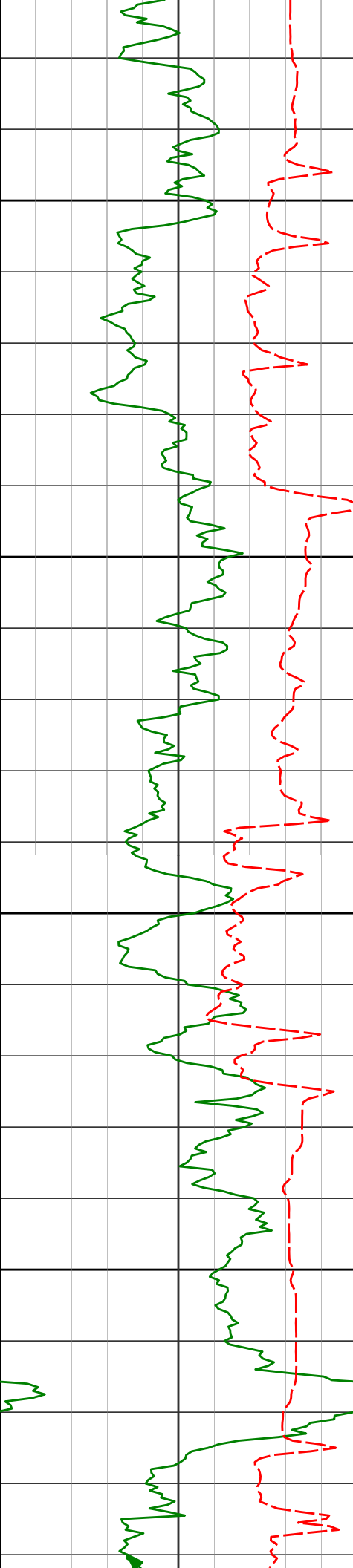
7150

7200

7029'	38.25°	179.43°	6937.91'	107.30'
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7119'	47.62°	176.22°	7003.74'	168.47'
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7209'	57.45°	180.26°	7058.43'	239.76'
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7250

7300

7350

7400

7300'

7390'

65.40°

75.06°

181.84°

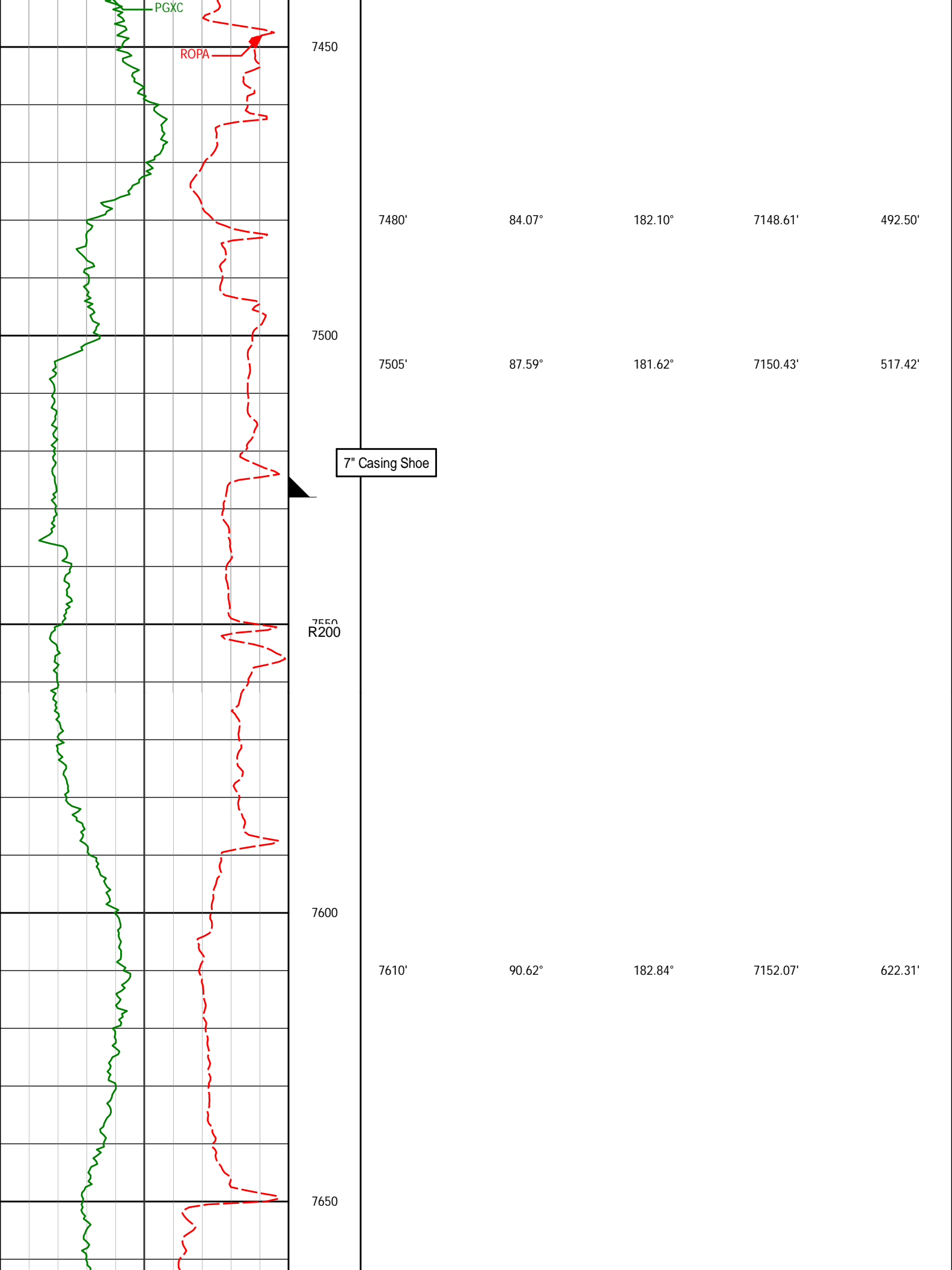
182.15°

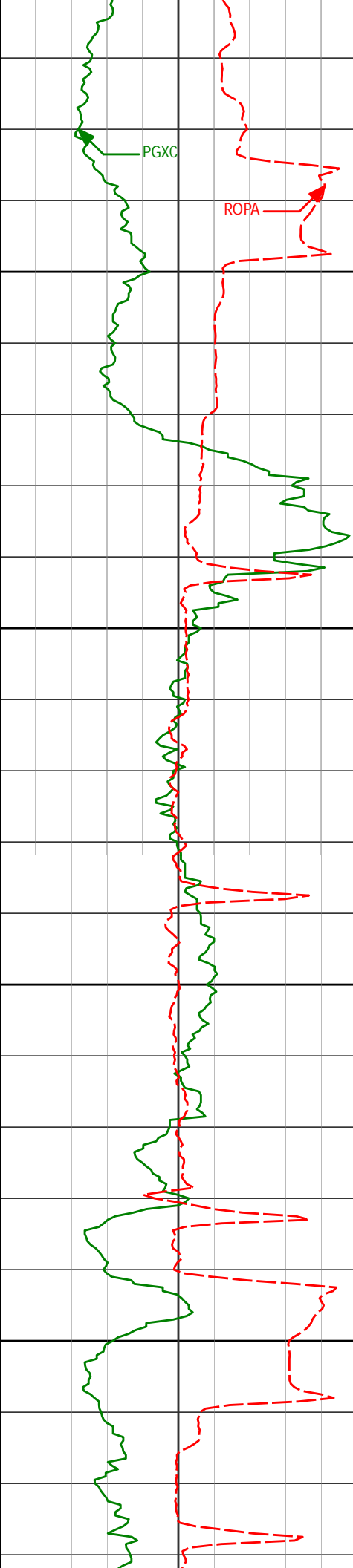
7101.92'

7132.33'

319.59'

404.14'





7700

7700'

90.43°

181.29°

7151.25'

712.25'

7750

7800

7850

7790'

91.57°

181.22°

7149.68'

802.21'

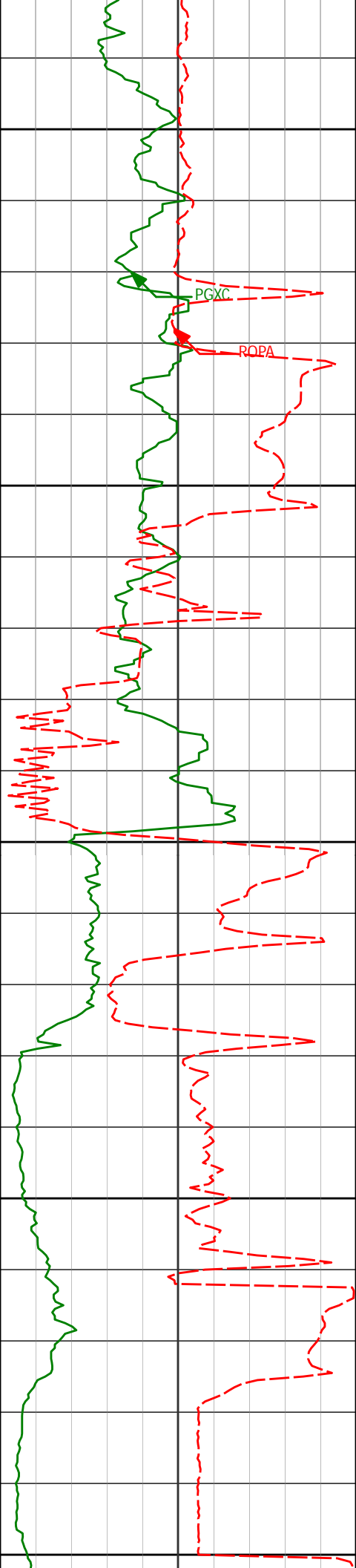
7880'

91.35°

180.13°

7147.38'

892.17'



7900

PGXC

ROPA

7950

7970'

90.43°

178.74°

7145.99'

982.15'

8000

8050

8060'

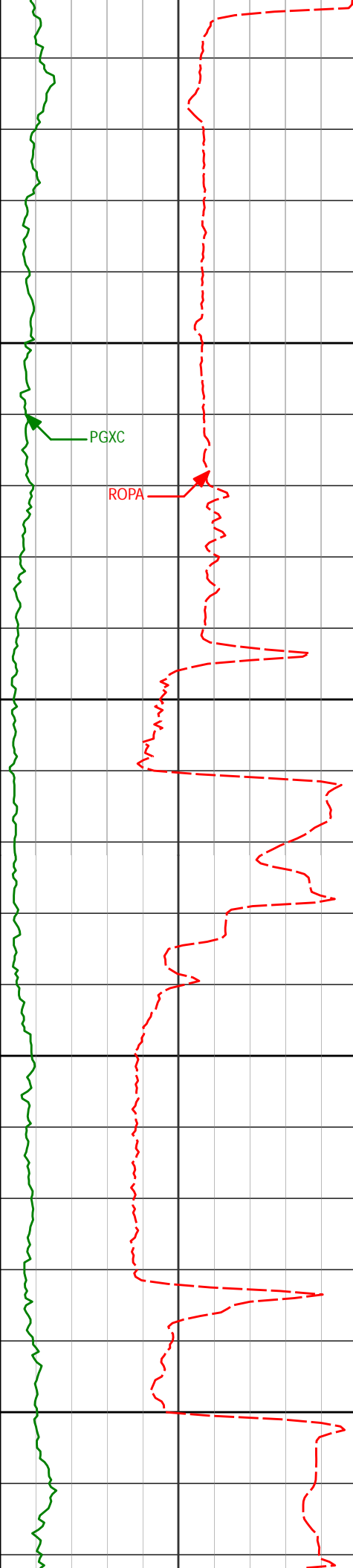
89.75°

177.77°

7145.84'

1072.11'

8100



8150

8150'

90.37°

177.70°

7145.75'

1162.04'

8200

8240'

89.88°

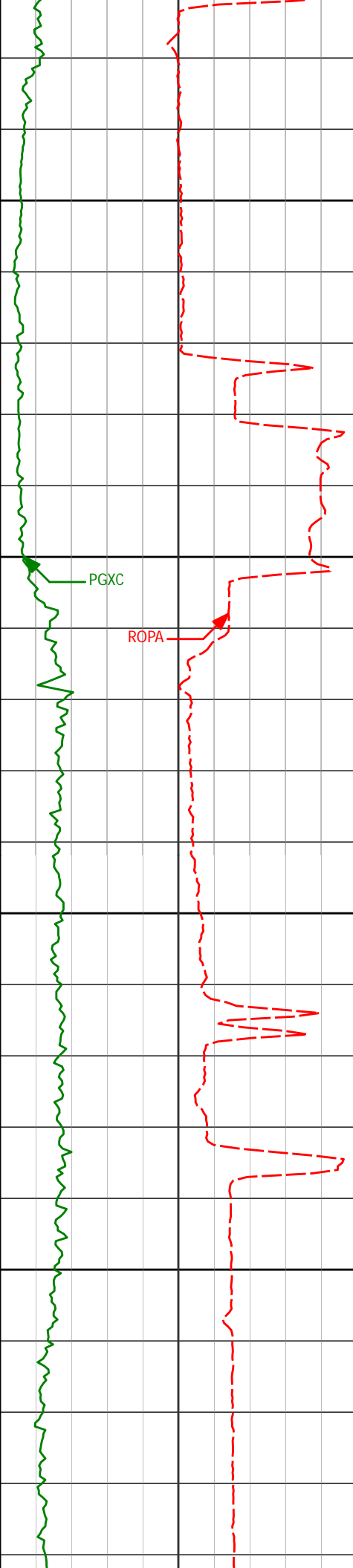
177.89°

7145.55'

1251.97'

8250

8300



8350

8400

8450

8500

8330'

89.17°

178.83°

7146.30'

1341.93'

8420'

88.98°

180.19°

7147.75'

1431.91'

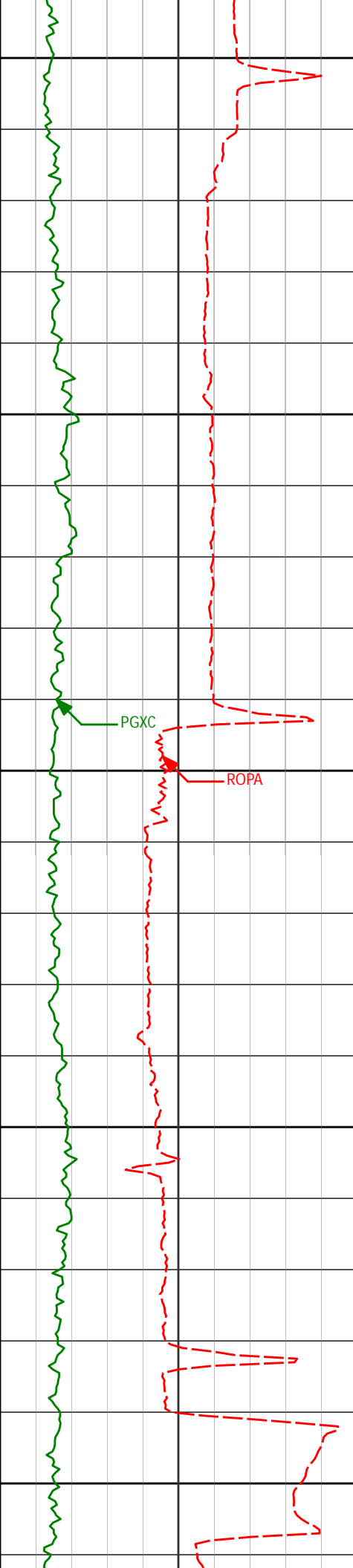
8510'

88.58°

179.88°

7149.67'

1521.89'



8550

8600

8650

8700

8750

8600'

89.32°

179.77°

7151.32'

1611.87'

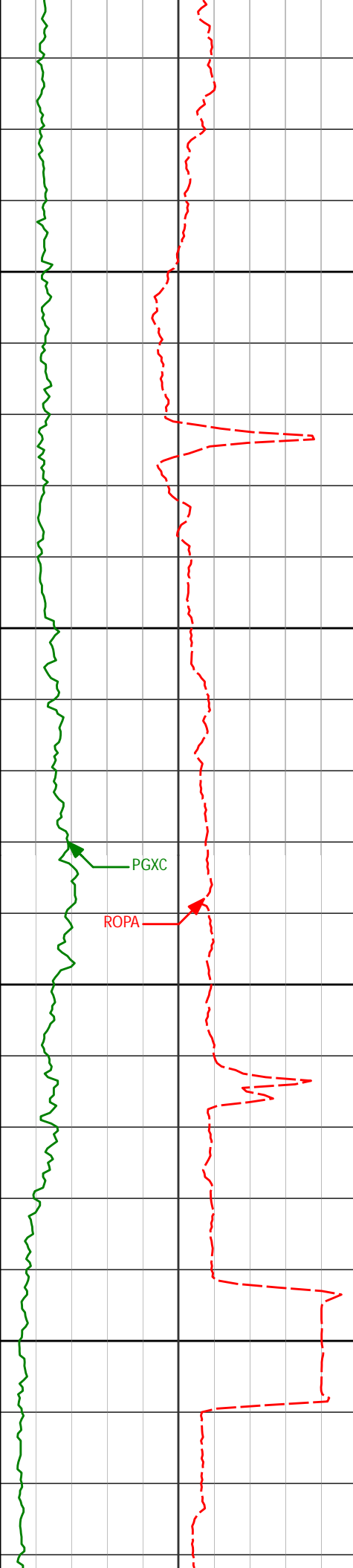
8690'

90.49°

180.16°

7151.47'

1701.87'



8800

8850

8900

8950

8780'

88.18°

179.82°

7152.51'

1791.86'

8870'

89.44°

179.45°

7154.38'

1881.84'

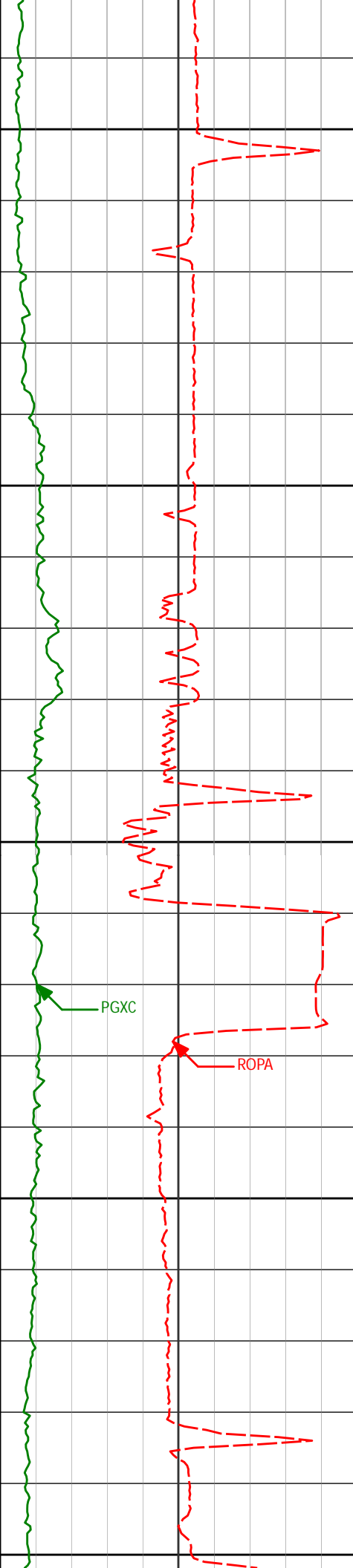
8960'

88.74°

179.55°

7155.81'

1971.82'



9000

9050

9100

9150

9200

9049'

89.97°

179.76°

7156.81'

2060.81'

9139'

89.91°

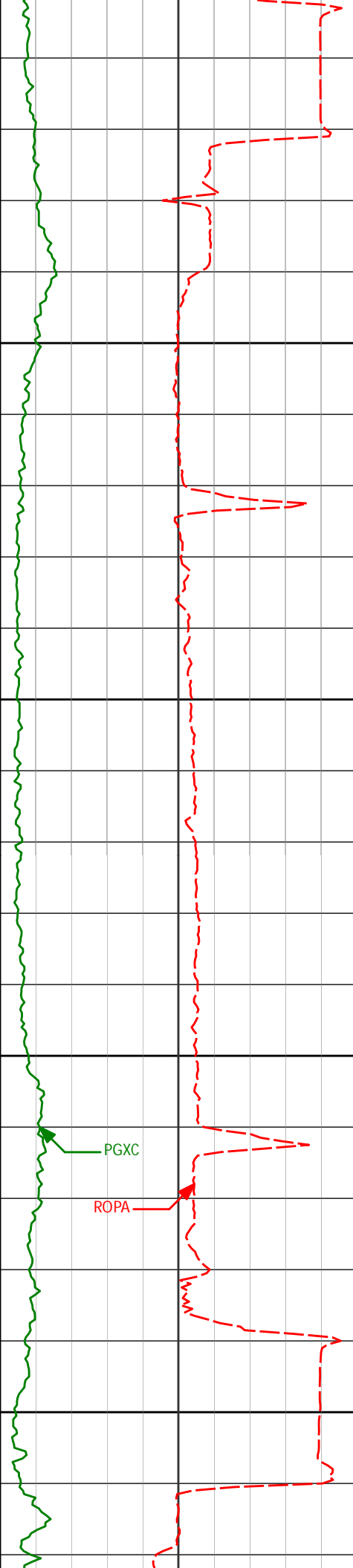
181.26°

7156.91'

2150.80'

PGXC

ROPA



9250

9300

9350

9400

9229'

89.38°

181.92°

7157.46'

2240.77'

9319'

90.74°

180.90°

7157.37'

2330.74'

PGXC

ROPA

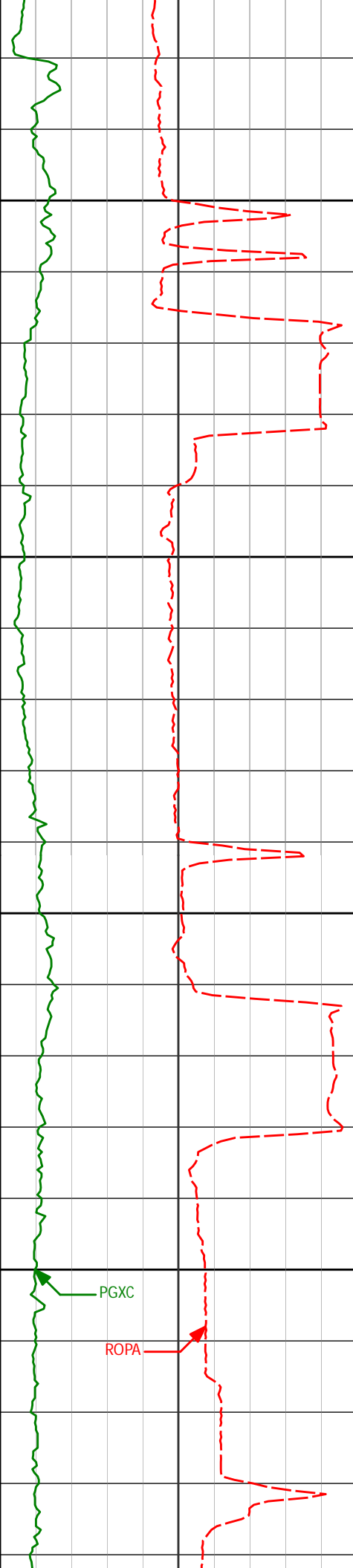
9409'

90.34°

181.51°

7156.52'

2420.71'



9450

9500

9550

9600

9498'

89.41°

181.72°

7156.72'

2509.68'

9588'

88.83°

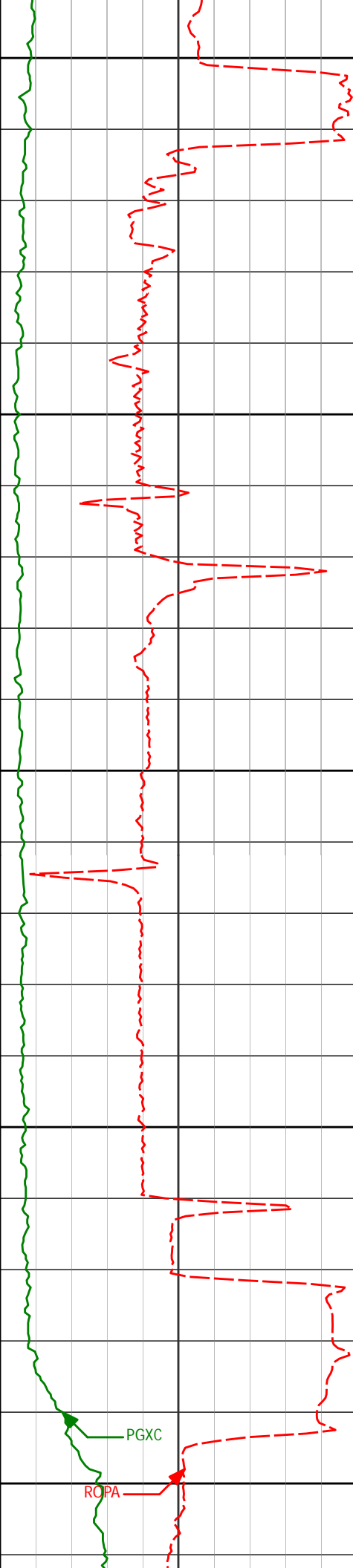
181.71°

7158.10'

2599.63'

PGXC

ROPA



9650

9678'

88.12°

181.71°

7160.49'

2689.56'

9700

9750

9768'

89.72°

181.38°

7162.19'

2779.51'

9800

9850

9858'

87.69°

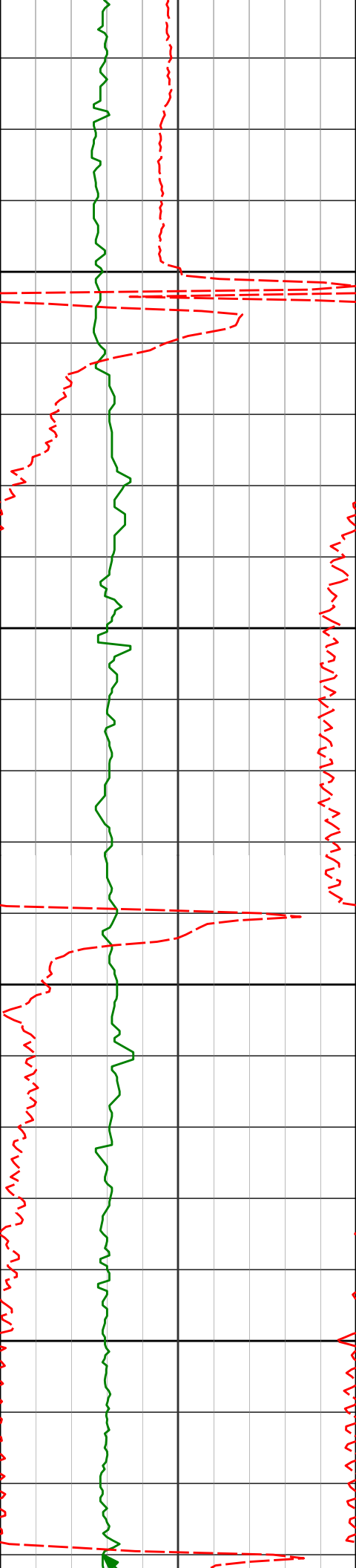
181.79°

7164.22'

2869.44'

PGXC

ROPA



9900

9950

10000

10050

9947'

88.03°

181.12°

7167.55'

2958.35'

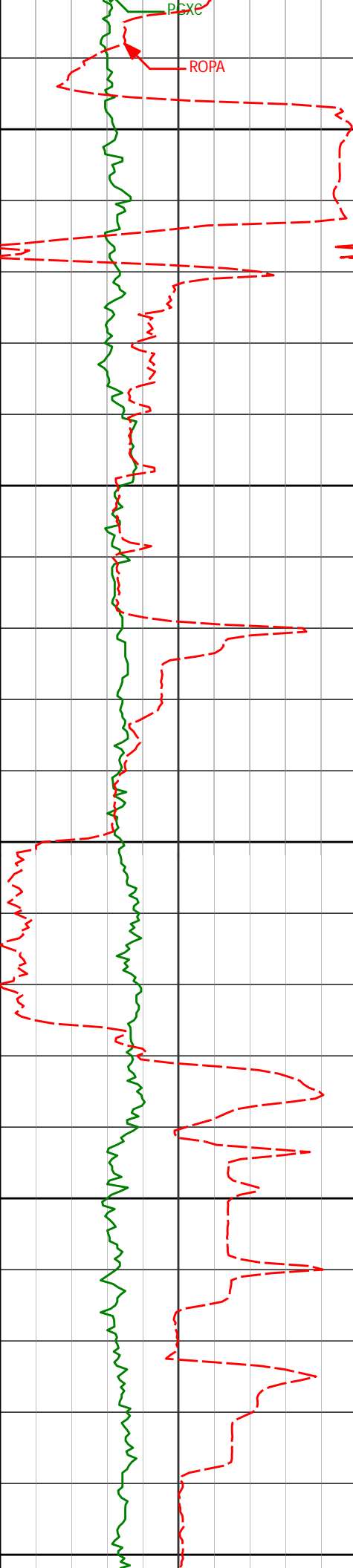
10037'

88.18°

181.39°

7170.52'

3048.28'



10100

10150

10200

10250

10300

10127'

88.55°

179.39°

7173.09'

3138.24'

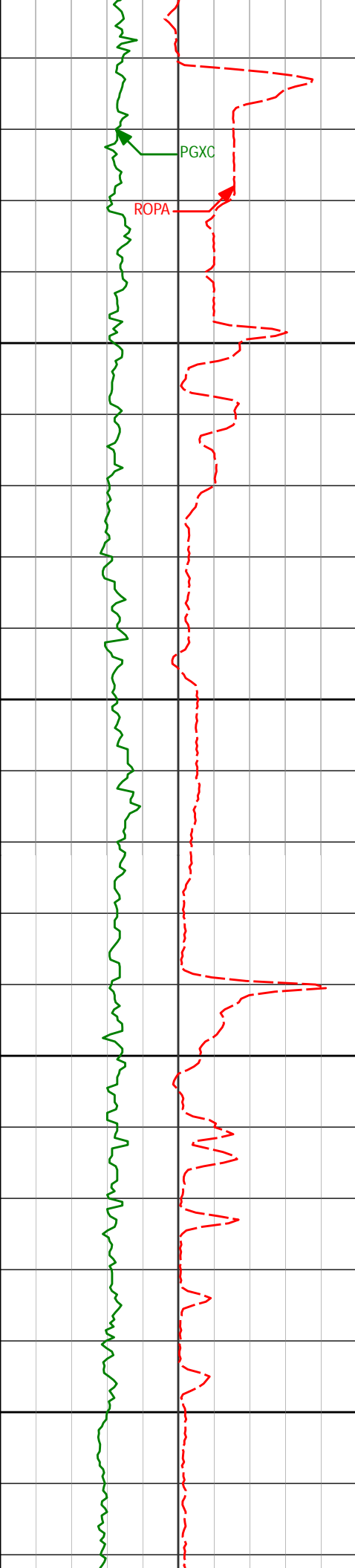
10217'

89.17°

179.28°

7174.88'

3228.22'



10307'

89.66°

178.68°

7175.80'

3318.20'

10350

10400

10450

10500

10397'

89.94°

178.28°

7176.11'

3408.16'

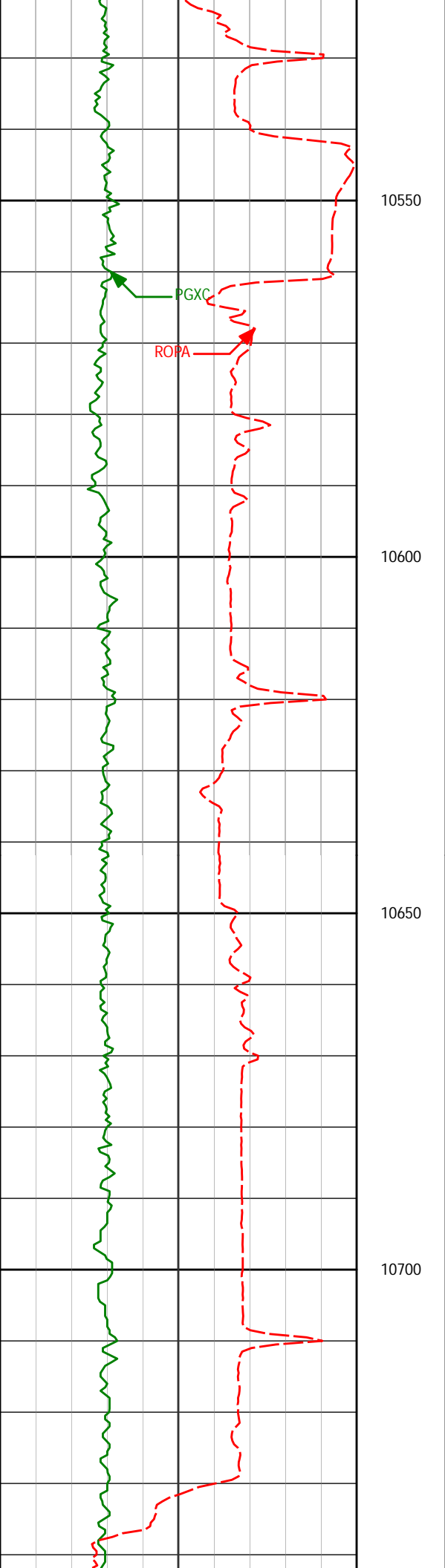
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90.37°

178.20°

7175.87'

3498.12'



10576'

89.11°

179.93°

7176.28'

3587.10'

10600

10650

10666'

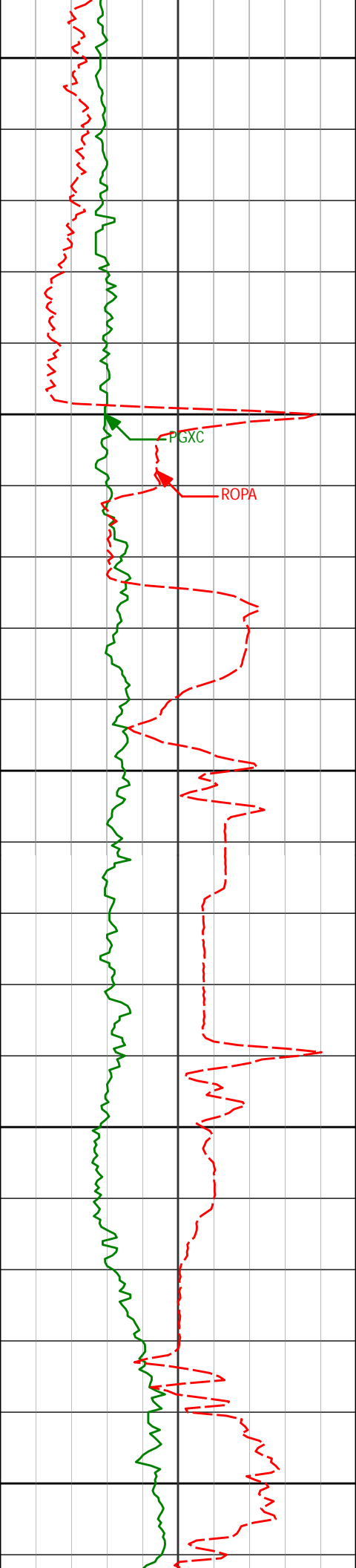
89.45°

179.01°

7177.41'

3677.09'

10700



10750

10756'

88.18°

177.76°

7179.27'

3767.03'

10800

PGXC

ROPA

10846'

88.86°

177.23°

7181.59'

3856.91'

10850

10900

10936'

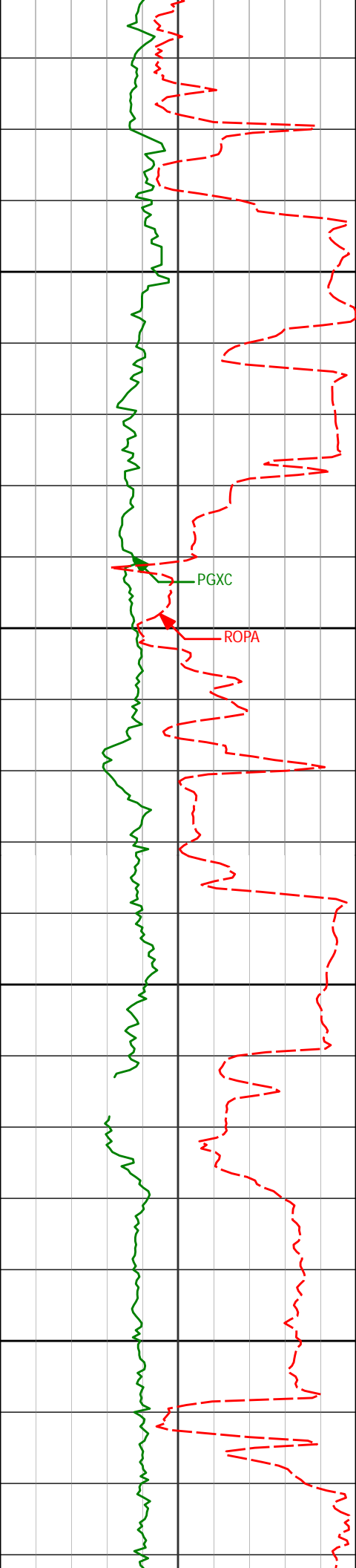
88.55°

176.68°

7183.63'

3946.76'

10950



11000

11026'

89.75°

177.13°

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4036.61'

11050

PGXC

ROPA

11100

11116'

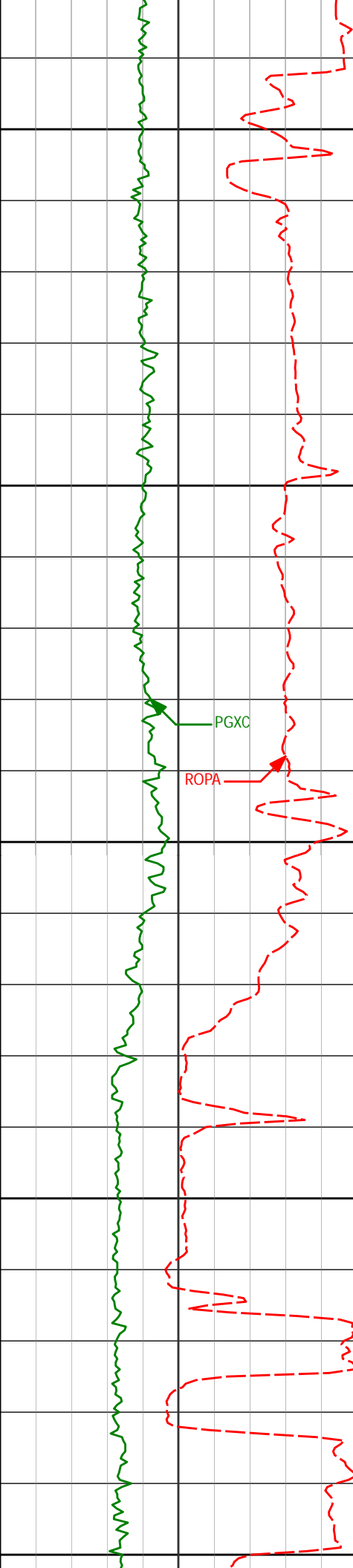
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179.03°

7184.19'

4126.55'

11150



11200

11206'

91.29°

181.62°

7182.21'

4216.52'

11250

PGXC

ROPA

11300

11296'

91.42°

181.60°

7180.08'

4306.46'

11350

11386'

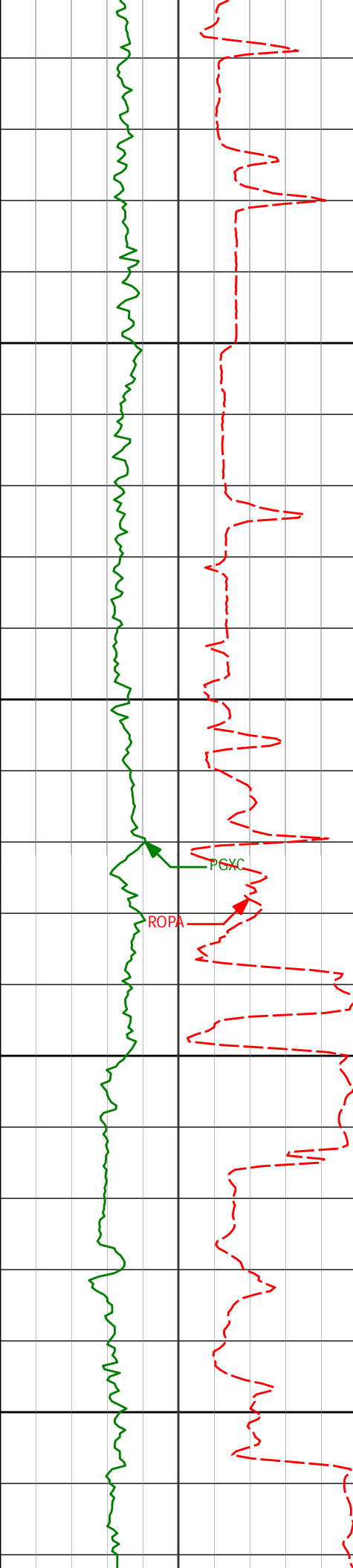
90.86°

181.09°

7178.29'

4396.42'

11400



11450

11476'

91.05°

181.38°

7176.79'

4486.39'

11500

11550

11600

11566'

90.86°

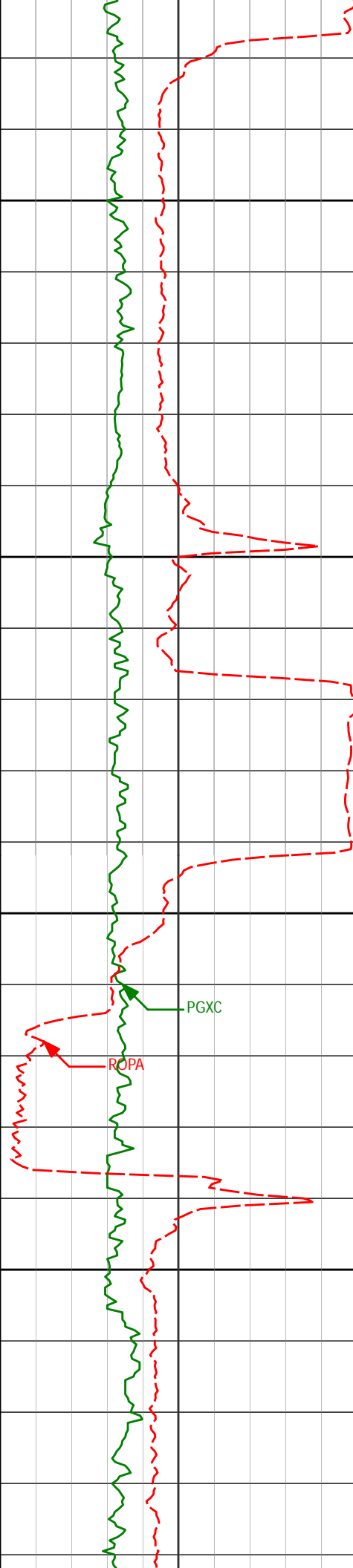
182.77°

7175.29'

4576.31'

PGXC

ROPA



11650

11656'

89.75°

183.10°

7174.81'

4666.19'

11700

11750

11746'

89.29°

181.57°

7175.57'

4756.11'

11800

11836'

90.62°

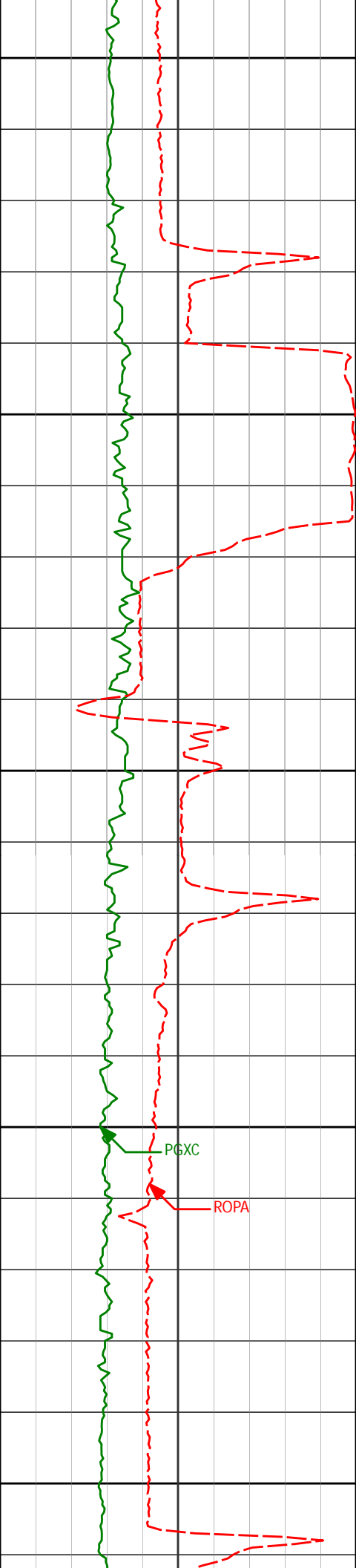
181.56°

7175.64'

4846.08'

PGXC

ROPA



11850

11900

11950

12000

12050

11926'

89.85°

181.14°

7175.27'

4936.05'

PGXC

ROPA

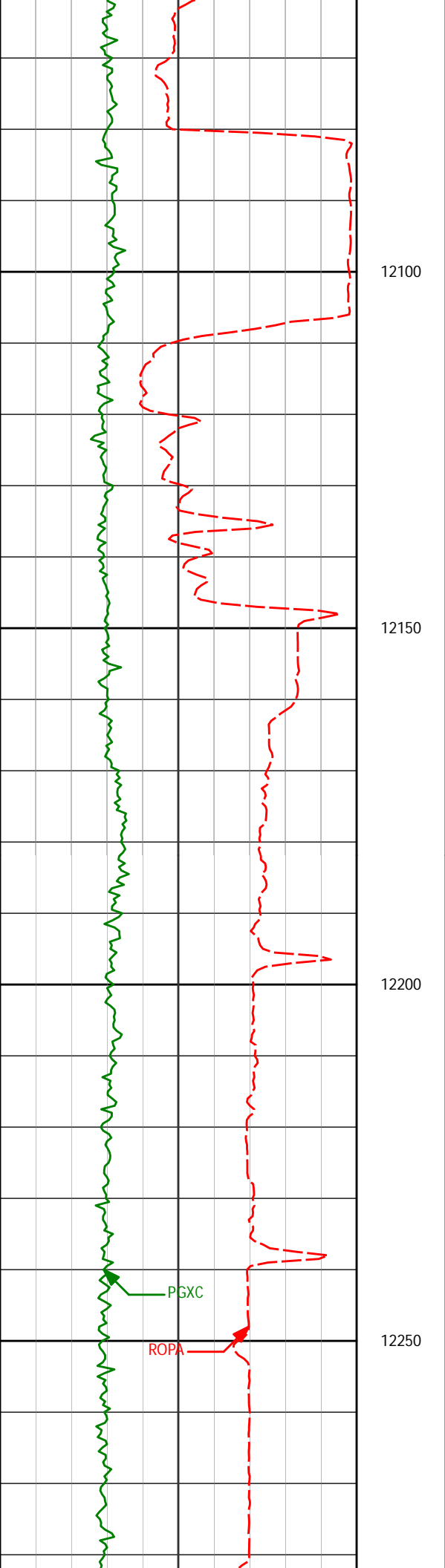
12016'

91.14°

181.11°

7174.49'

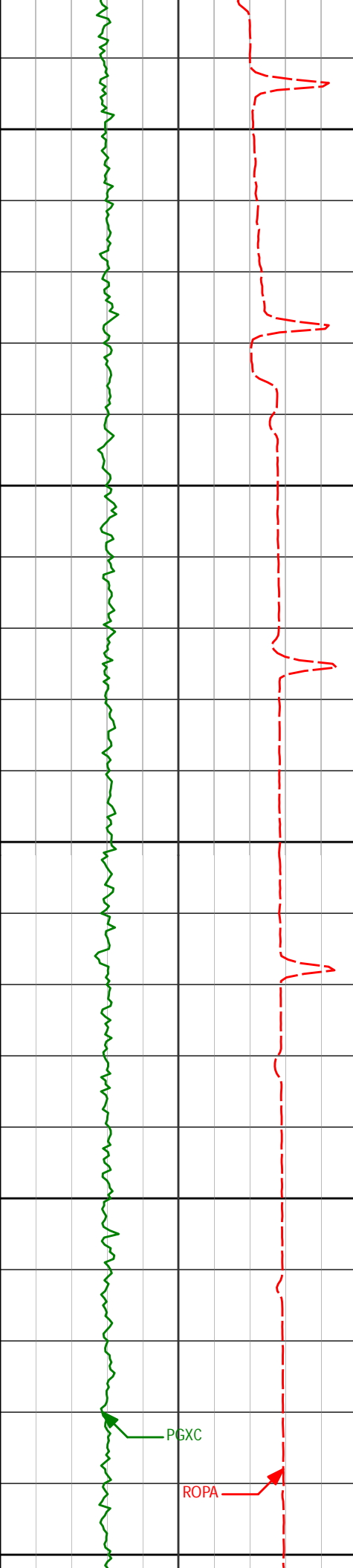
5026.03'



12100	12106'	89.60°	180.64°	7173.91'	5116.02'
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12150					
12200	12196'	90.68°	180.57°	7173.69'	5206.01'

12250



12300

12350

12400

12450

12500

12287'

91.79°

180.40°

7171.73'

5296.98'

12377'

91.85°

180.39°

7168.87'

5386.94'

12467'

91.08°

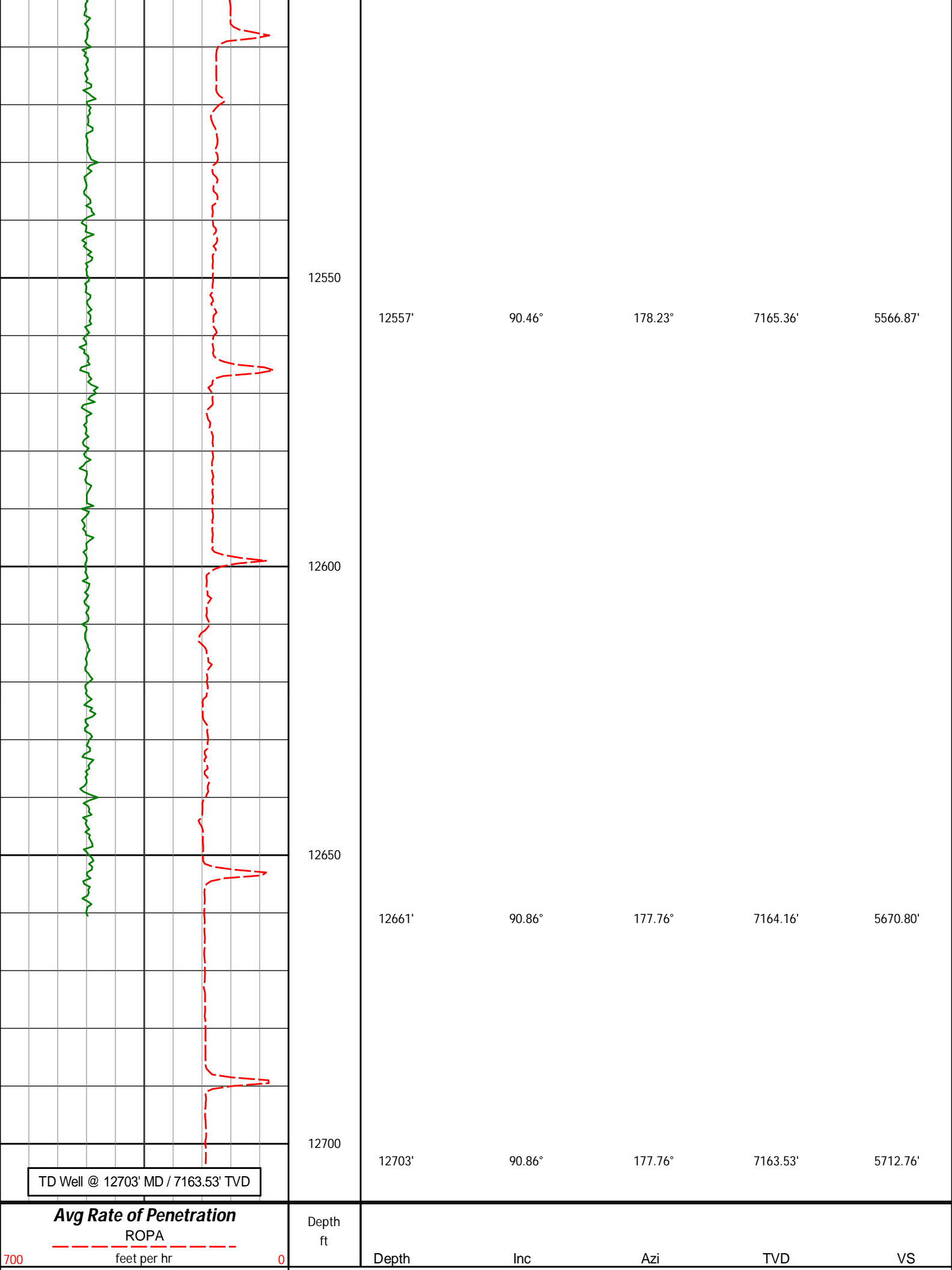
179.08°

7166.57'

5476.90'

PGXC

ROPA



12550

12557'

90.46°

178.23°

7165.36'

5566.87'

12600

12650

12661'

90.86°

177.76°

7164.16'

5670.80'

12700

12703'

90.86°

177.76°

7163.53'

5712.76'

TD Well @ 12703' MD / 7163.53' TVD

Avg Rate of Penetration

ROPA

feet per hr

Depth
ft

Depth

Inc

Azi

TVD

VS

700

0

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
Milk 36C-28HZ
Wattenberg
Weld Colorado
USA
CA-XX-0902265607

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
90.00	0.80	103.30	90.00	0.14 S	0.61 E	0.14	0.89
153.00	0.90	77.10	152.99	0.14 S	1.52 E	0.13	0.63
212.00	1.10	92.30	211.98	0.05 S	2.54 E	0.05	0.56
272.00	1.10	93.40	271.97	0.11 S	3.69 E	0.11	0.04
331.00	1.20	89.70	330.96	0.14 S	4.87 E	0.14	0.21
395.00	1.20	82.50	394.94	0.05 S	6.21 E	0.05	0.24
458.00	1.20	82.50	457.93	0.12 N	7.52 E	-0.12	0.00
521.00	2.30	80.80	520.90	0.41 N	9.42 E	-0.41	1.75
585.00	3.90	76.80	584.80	1.11 N	12.80 E	-1.12	2.52
650.00	5.70	81.00	649.57	2.12 N	18.15 E	-2.13	2.82
712.00	6.80	86.20	711.21	2.85 N	24.85 E	-2.86	1.99
776.00	8.40	83.30	774.64	3.64 N	33.27 E	-3.65	2.57
838.00	9.90	89.10	835.85	4.26 N	43.10 E	-4.27	2.84
902.00	11.50	89.20	898.74	4.43 N	54.98 E	-4.45	2.50
964.00	11.70	89.80	959.47	4.54 N	67.45 E	-4.56	0.38
1027.00	11.80	88.70	1021.15	4.71 N	80.28 E	-4.74	0.39
1091.00	12.00	90.50	1083.78	4.80 N	93.47 E	-4.83	0.66
1193.00	12.30	85.40	1183.49	5.58 N	114.90 E	-5.62	1.09
1285.00	12.69	84.43	1273.31	7.34 N	134.73 E	-7.39	0.48
1380.00	13.16	85.06	1365.91	9.29 N	155.89 E	-9.34	0.52
1474.00	13.34	84.48	1457.40	11.25 N	177.34 E	-11.31	0.24
1571.00	13.65	86.09	1551.73	13.11 N	199.90 E	-13.18	0.50
1664.00	13.41	85.81	1642.15	14.65 N	221.60 E	-14.72	0.27
1758.00	12.94	86.14	1733.67	16.15 N	242.98 E	-16.23	0.51
1945.00	11.02	83.51	1916.59	19.58 N	281.63 E	-19.68	1.07
2038.00	10.82	83.03	2007.91	21.64 N	299.12 E	-21.75	0.24
2131.00	10.15	82.11	2099.35	23.83 N	315.91 E	-23.94	0.74
2225.00	11.04	84.13	2191.75	25.89 N	333.06 E	-26.00	1.03
2318.00	10.62	83.85	2283.09	27.71 N	350.44 E	-27.84	0.46
2411.00	9.81	82.24	2374.62	29.70 N	366.81 E	-29.83	0.92
2505.00	11.03	91.96	2467.07	30.48 N	383.74 E	-30.61	2.27
2598.00	10.35	90.97	2558.46	30.03 N	400.98 E	-30.17	0.76
2691.00	10.24	91.43	2649.96	29.68 N	417.60 E	-29.83	0.15
2785.00	10.48	91.75	2742.43	29.21 N	434.50 E	-29.36	0.26
2878.00	10.66	90.79	2833.85	28.84 N	451.55 E	-28.99	0.27
2972.00	10.57	90.30	2926.24	28.67 N	468.87 E	-28.83	0.14
3065.00	10.65	91.17	3017.65	28.45 N	485.99 E	-28.62	0.19
3159.00	9.92	92.14	3110.14	27.97 N	502.76 E	-28.15	0.80
3253.00	10.92	86.40	3202.59	28.23 N	519.74 E	-28.41	1.53
3343.00	9.97	83.82	3291.10	29.60 N	535.99 E	-29.79	1.18
3433.00	9.20	83.68	3379.85	31.23 N	550.89 E	-31.42	0.86
3523.00	8.48	81.98	3468.78	32.95 N	564.61 E	-33.15	0.85
3613.00	7.78	81.05	3557.87	34.82 N	577.20 E	-35.03	0.79
3703.00	7.04	79.31	3647.12	36.79 N	588.64 E	-37.00	0.86
3793.00	4.79	73.82	3736.63	38.87 N	597.67 E	-39.07	2.58
3883.00	4.30	69.39	3826.35	41.10 N	604.44 E	-41.31	0.67
3973.00	3.42	63.86	3916.15	43.47 N	610.00 E	-43.68	1.06
4063.00	2.96	65.10	4006.01	45.63 N	614.52 E	-45.85	0.52
4153.00	2.04	73.39	4095.92	47.07 N	618.16 E	-47.28	1.10
4243.00	1.61	10.18	4185.88	48.77 N	619.92 E	-48.99	2.16
4333.00	1.75	357.96	4275.84	51.39 N	620.10 E	-51.60	0.43
4423.00	1.27	331.41	4365.81	53.64 N	619.57 E	-53.85	0.93

4425.00	1.21	331.41	4383.81	53.94 N	619.97 E	-53.83	0.93
4513.00	1.16	305.09	4455.79	55.04 N	618.35 E	-55.25	0.63
4603.00	1.37	295.34	4545.77	56.02 N	616.63 E	-56.24	0.33
4693.00	1.42	292.19	4635.75	56.90 N	614.63 E	-57.12	0.10
4783.00	1.58	285.40	4725.72	57.65 N	612.40 E	-57.87	0.27
4872.00	1.14	251.50	4814.69	57.70 N	610.37 E	-57.91	1.01
4962.00	1.65	229.55	4904.67	56.57 N	608.54 E	-56.79	0.81
5052.00	1.81	240.24	4994.62	55.03 N	606.32 E	-55.24	0.40
5142.00	1.00	226.77	5084.60	53.78 N	604.51 E	-53.99	0.97
5232.00	1.03	183.98	5174.58	52.44 N	603.89 E	-52.65	0.82
5321.00	1.12	184.13	5263.57	50.77 N	603.77 E	-50.98	0.10
5500.00	0.74	166.45	5442.54	47.90 N	603.91 E	-48.11	0.27
5590.00	0.58	173.74	5532.54	46.88 N	604.10 E	-47.09	0.20
5680.00	0.46	157.53	5622.53	46.09 N	604.29 E	-46.30	0.21
5860.00	0.77	106.41	5802.53	45.08 N	605.72 E	-45.30	0.33
5950.00	1.12	116.42	5892.51	44.52 N	607.09 E	-44.73	0.43
6040.00	0.42	191.34	5982.51	43.81 N	607.81 E	-44.02	1.21
6130.00	0.65	203.79	6072.50	43.02 N	607.54 E	-43.23	0.28
6220.00	0.74	189.29	6162.50	41.98 N	607.24 E	-42.19	0.22
6310.00	1.06	186.72	6252.48	40.58 N	607.05 E	-40.79	0.36
6400.00	0.22	229.75	6342.48	39.64 N	606.82 E	-39.85	1.01
6580.00	0.74	191.72	6522.47	38.28 N	606.32 E	-38.49	0.32
6670.00	7.07	180.52	6612.22	32.16 N	606.15 E	-32.37	7.05
6759.00	14.75	184.81	6699.54	15.37 N	605.15 E	-15.58	8.67
6849.00	24.37	182.75	6784.25	14.66 S	603.30 E	14.45	10.71
6939.00	31.01	182.63	6863.90	56.42 S	601.34 E	56.21	7.38
7029.00	38.25	179.43	6937.91	107.51 S	600.55 E	107.30	8.29
7119.00	47.62	176.22	7003.74	168.68 S	603.03 E	168.47	10.69
7209.00	57.45	180.26	7058.43	239.97 S	605.05 E	239.76	11.48
7300.00	65.40	181.84	7101.92	319.80 S	603.55 E	319.59	8.87
7390.00	75.06	182.15	7132.33	404.35 S	600.59 E	404.14	10.74
7480.00	84.07	182.10	7148.61	492.71 S	597.32 E	492.50	10.01
7505.00	87.59	181.62	7150.43	517.62 S	596.51 E	517.42	14.21
7610.00	90.62	182.84	7152.07	622.52 S	592.42 E	622.31	3.11
7700.00	90.43	181.29	7151.25	712.45 S	589.18 E	712.25	1.74
7790.00	91.57	181.22	7149.68	802.41 S	587.21 E	802.21	1.27
7880.00	91.35	180.13	7147.38	892.38 S	586.15 E	892.17	1.24
7970.00	90.43	178.74	7145.99	982.36 S	587.04 E	982.15	1.85
8060.00	89.75	177.77	7145.84	1072.32 S	589.78 E	1072.11	1.32
8150.00	90.37	177.70	7145.75	1162.25 S	593.33 E	1162.04	0.69
8240.00	89.88	177.89	7145.55	1252.18 S	596.80 E	1251.97	0.58
8330.00	89.17	178.83	7146.30	1342.14 S	599.37 E	1341.93	1.31
8420.00	88.98	180.19	7147.75	1432.12 S	600.14 E	1431.91	1.53
8510.00	88.58	179.88	7149.67	1522.10 S	600.09 E	1521.89	0.56
8600.00	89.32	179.77	7151.32	1612.08 S	600.36 E	1611.87	0.83
8690.00	90.49	180.16	7151.47	1702.08 S	600.42 E	1701.87	1.37
8780.00	88.18	179.82	7152.51	1792.07 S	600.43 E	1791.86	2.59
8870.00	89.44	179.45	7154.38	1882.05 S	601.01 E	1881.84	1.46
8960.00	88.74	179.55	7155.81	1972.03 S	601.79 E	1971.82	0.79
9049.00	89.97	179.76	7156.81	2061.02 S	602.33 E	2060.81	1.40
9139.00	89.91	181.26	7156.91	2151.01 S	601.53 E	2150.80	1.67
9229.00	89.38	181.92	7157.46	2240.98 S	599.03 E	2240.77	0.94
9319.00	90.74	180.90	7157.37	2330.95 S	596.81 E	2330.74	1.89
9409.00	90.34	181.51	7156.52	2420.92 S	594.92 E	2420.71	0.81
9498.00	89.41	181.72	7156.72	2509.89 S	592.41 E	2509.68	1.07
9588.00	88.83	181.71	7158.10	2599.83 S	589.72 E	2599.63	0.64
9678.00	88.12	181.71	7160.49	2689.76 S	587.04 E	2689.56	0.79
9768.00	89.72	181.38	7162.19	2779.71 S	584.61 E	2779.51	1.82
9858.00	87.69	181.79	7164.22	2869.65 S	582.12 E	2869.44	2.30
9947.00	88.03	181.12	7167.55	2958.56 S	579.86 E	2958.35	0.84
10037.00	88.18	181.39	7170.52	3048.49 S	577.89 E	3048.28	0.34
10127.00	88.55	179.39	7173.09	3138.44 S	577.28 E	3138.24	2.26
10217.00	89.17	179.28	7174.88	3228.42 S	578.32 E	3228.22	0.70
10307.00	89.66	178.68	7175.80	3318.40 S	579.93 E	3318.20	0.86
10397.00	89.94	178.28	7176.11	3408.37 S	582.31 E	3408.16	0.54
10487.00	90.37	178.20	7175.87	3498.32 S	585.08 E	3498.12	0.49
10576.00	89.11	179.93	7176.28	3587.30 S	586.53 E	3587.10	2.40
10666.00	89.45	179.01	7177.41	3677.29 S	587.36 E	3677.09	1.09
10756.00	88.18	177.76	7179.27	3767.23 S	589.90 E	3767.03	1.98
10846.00	88.86	177.23	7181.59	3857.12 S	593.83 E	3856.91	0.96
10936.00	88.55	176.68	7183.63	3946.97 S	598.61 E	3946.76	0.70
11026.00	89.75	177.13	7184.96	4036.82 S	603.47 E	4036.61	1.42
11116.00	91.23	179.03	7184.19	4126.76 S	606.48 E	4126.55	2.68
11206.00	91.29	181.62	7182.21	4216.73 S	605.97 E	4216.52	2.88
11296.00	91.42	181.60	7180.08	4306.67 S	603.45 E	4306.46	0.15

11386.00	90.86	181.09	7178.29	4396.63 S	601.33 E	4396.42	0.84
11476.00	91.05	181.38	7176.79	4486.59 S	599.40 E	4486.39	0.39
11566.00	90.86	182.77	7175.29	4576.52 S	596.14 E	4576.31	1.56
11656.00	89.75	183.10	7174.81	4666.40 S	591.53 E	4666.19	1.29
11746.00	89.29	181.57	7175.57	4756.32 S	587.86 E	4756.11	1.78
11836.00	90.62	181.56	7175.64	4846.28 S	585.40 E	4846.08	1.48
11926.00	89.85	181.14	7175.27	4936.26 S	583.28 E	4936.05	0.97
12016.00	91.14	181.11	7174.49	5026.23 S	581.52 E	5026.03	1.43
12106.00	89.60	180.64	7173.91	5116.22 S	580.14 E	5116.02	1.79
12196.00	90.68	180.57	7173.69	5206.21 S	579.19 E	5206.01	1.20
12287.00	91.79	180.40	7171.73	5297.19 S	578.42 E	5296.98	1.23
12377.00	91.85	180.39	7168.87	5387.14 S	577.80 E	5386.94	0.07
12467.00	91.08	179.08	7166.57	5477.11 S	578.22 E	5476.90	1.69
12557.00	90.46	178.23	7165.36	5567.07 S	580.33 E	5566.87	1.17
12661.00	90.86	177.76	7164.16	5671.00 S	583.97 E	5670.80	0.59
12703.00	90.86	177.76	7163.53	5712.96 S	585.61 E	5712.76	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 180.02 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.46 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12703.00 FEET
IS 5742.90 FEET ALONG 174.15 DEGREES (TRUE)**

Directional surveys tied onto surface. Final survey is a straight-line projection to the bit.