

D-C Pressure Case Directional
PCG-K Pressure Case Gamma



1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100				
Date run completed	08-Jul-13				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	1,100.97				
Log End Depth (TVD, ft)	7,606.36				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	04-Jul-13 02:00				
Drill/Wipe End Date and Time	07-Jul-13 17:50				
Min Inc (deg) @ Depth (TVD, ft)	.28 @ 1,196.97				
Max Inc (deg) @ Depth (TVD, ft)	87.57 @ 7,604.85				
Bit TFA(in2) / Bit Type	.86 / PDC				
Flow Rate (gpm)	590.00				
Max AV (fpm) / CV (fpm) @ MWD	420.0 / 276.0				
Fluid Type	Fresh Water Gel				
Density (ppg) / Viscosity (spqt)	9.60 / 44.00				
Filtrate CL (ppm)	1,100.00				
pH / Fluid Loss (mptm)	8.90 / 9.00				
PV (cP) / YP (lbf2)	13 / 14.00				
% Solids / % Sand	7.5 / .5				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (in) Temp	112.00 / 120.00				

Max Tool Temp (degF) / Source	412.20 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 412.20				
Lead MWD Engineer	Ryan White				
Customer Representative	Travis Kruckenburg				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.84				
Sub Serial Number	11341324				
Insert Serial Number	11145605				
Date and Time Initialized	02-Jul-13 15:28				
Date and Time Read	08-Jul-13 03:46				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	51.00				
Software Version	6.21				
Sub Serial Number	11341324				
Sonde Serial Number	11180292				
Sensor ID Number	N/A				
Toolface Offset (deg)	221.14				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	54.08				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11341324				
Insert/Sonde Serial Number	11579843				

REMARKS

1. All depths are true vertical depths referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded data unless otherwise specified

4. 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

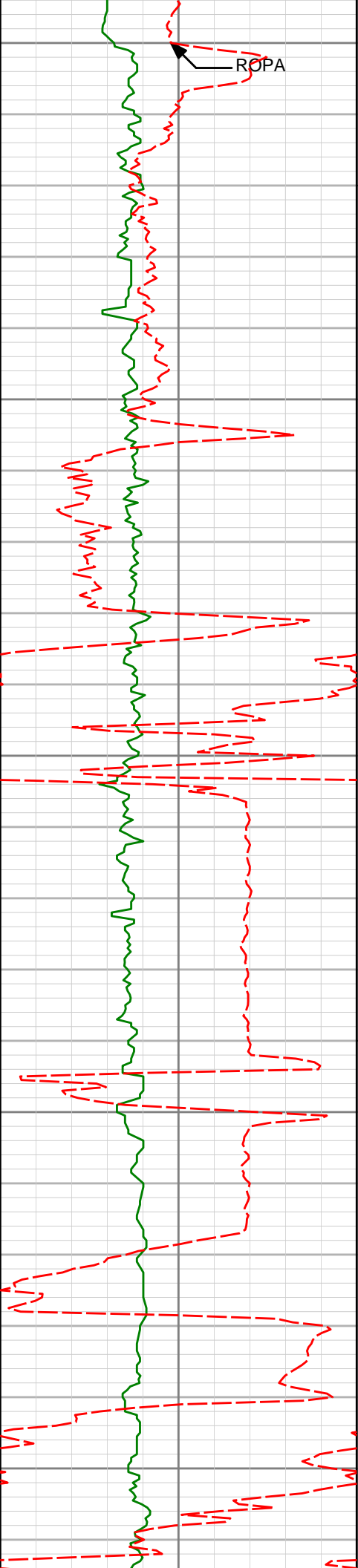
ROPA (Average Rate of Penetration):

Interval Resolution: 0.5 ft

Interval Distance: 1.2 ft

Gap Fill : 3.0 ft

5. INSITE version 7.4.1



1100

1129'

0.35°

324.27°

1128.97'

5.30'

1150

1200

1197'

0.28°

38.76°

1196.97'

5.60'

1250

1300

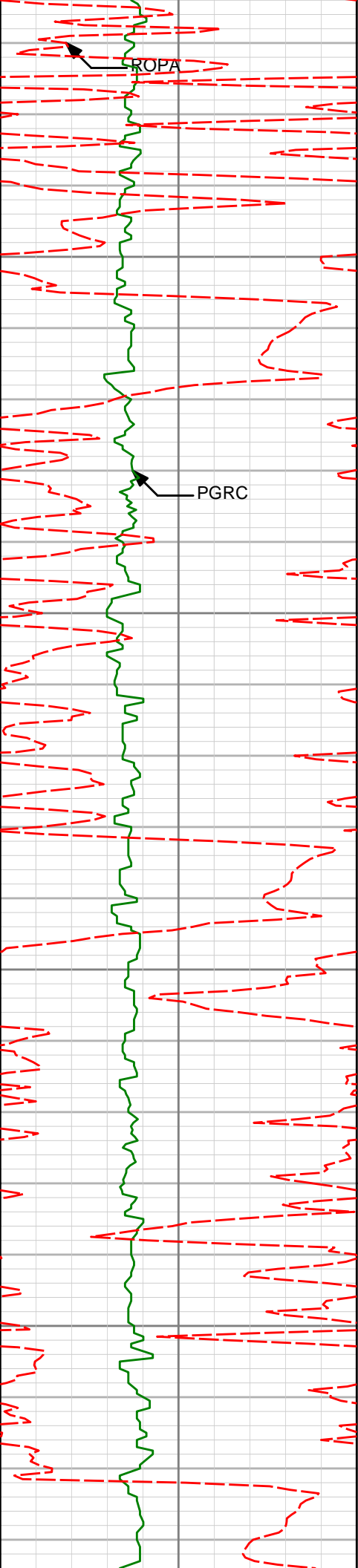
1289'

1.66°

317.07°

1288.95'

6.79'



1350

1400

1450

1500

1381'

3.26°

306.80°

1380.87'

9.48'

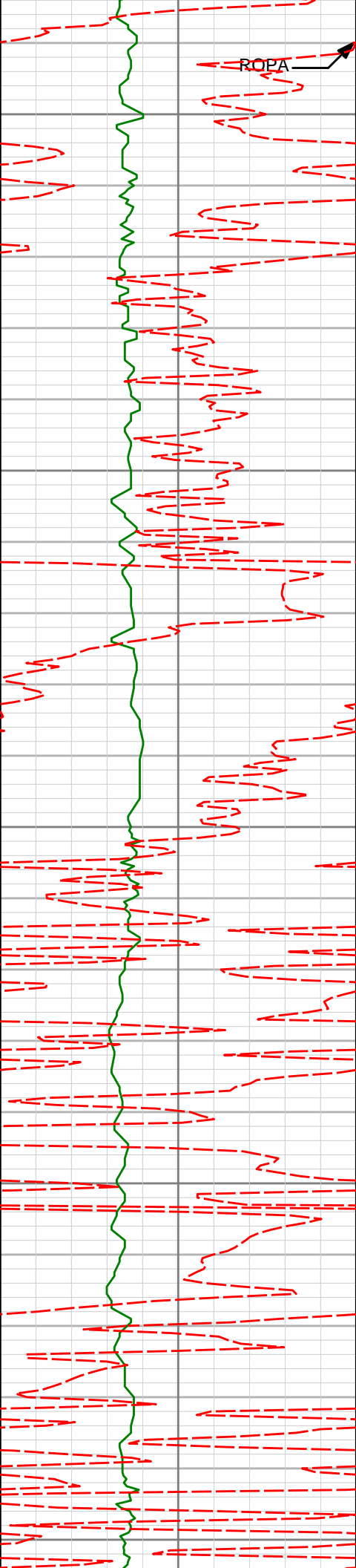
1473'

4.68°

304.45°

1472.64'

13.44'



1550

1565'

5.84°

298.25°

1564.26'

18.15'

1600

1650

1657'

6.94°

297.59°

1655.68'

23.42'

1700

1750

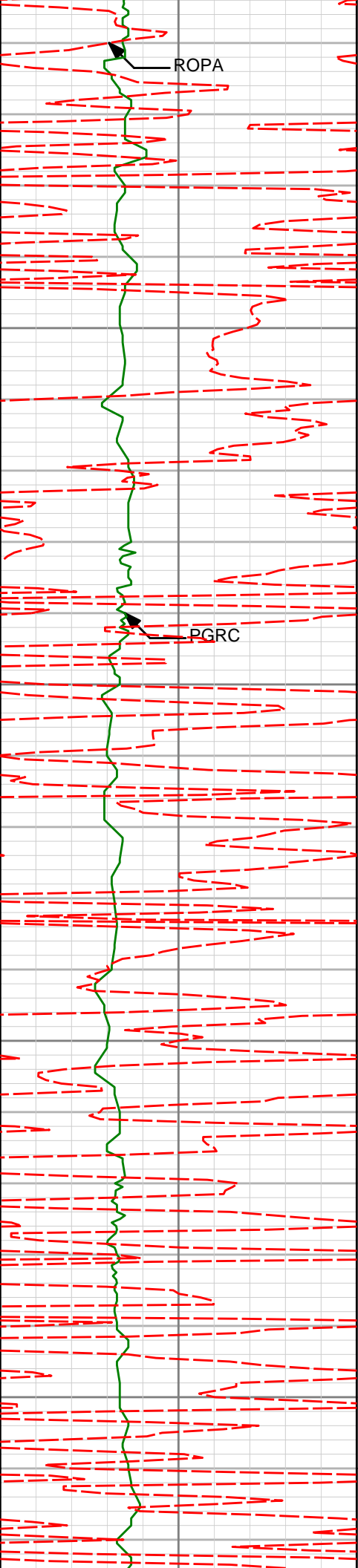
1749'

7.77°

298.57°

1746.93'

29.51'



1800

1850

1900

1950

1840'

9.62°

295.06°

1836.88'

36.31'

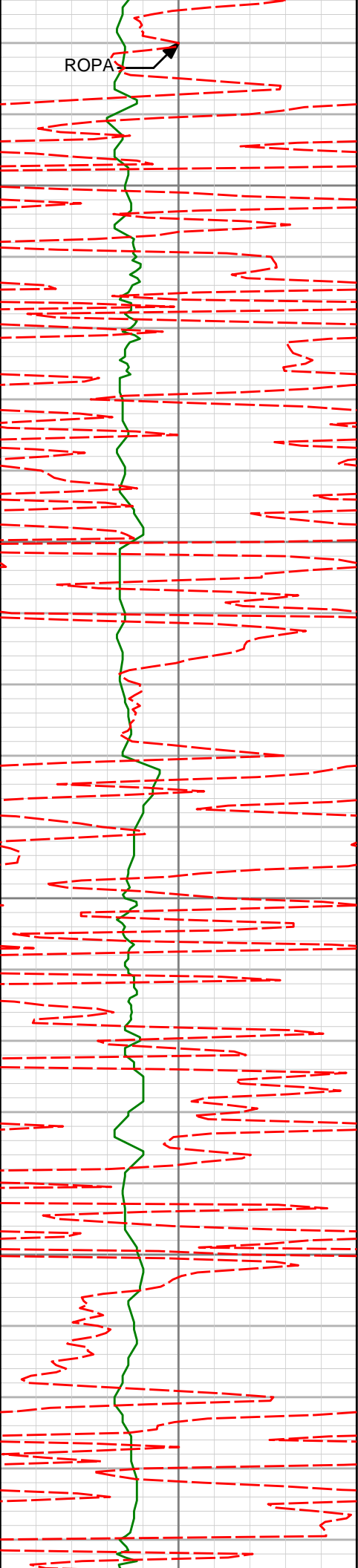
1931'

10.38°

296.77°

1926.49'

43.97'



2000

2022'

11.47°

295.90°

2015.84'

52.43'

2050

2100

2113'

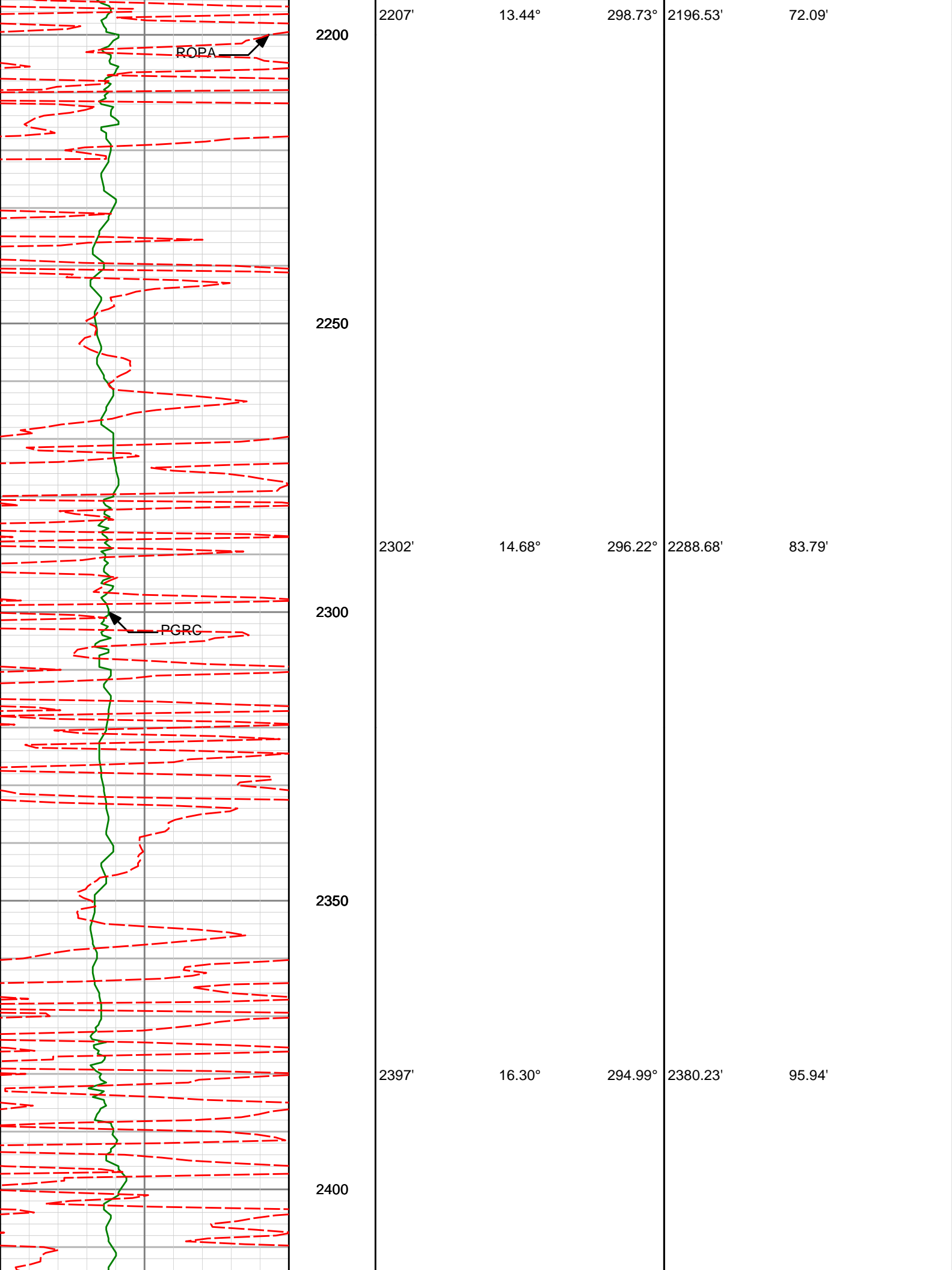
12.29°

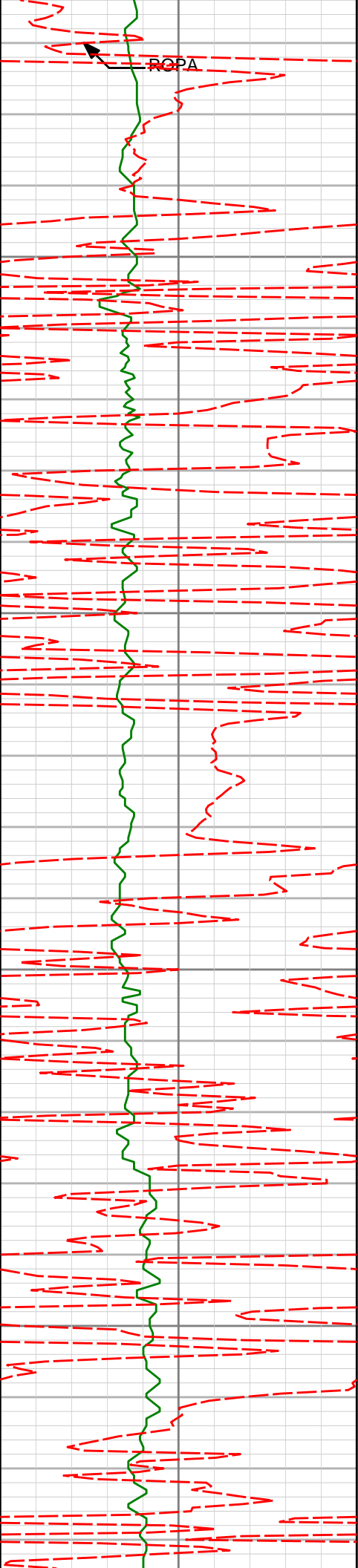
295.91°

2104.89'

61.49'

2150





2450

2491'

17.50°

292.45°

2470.17'

108.22'

2500

2550

2586'

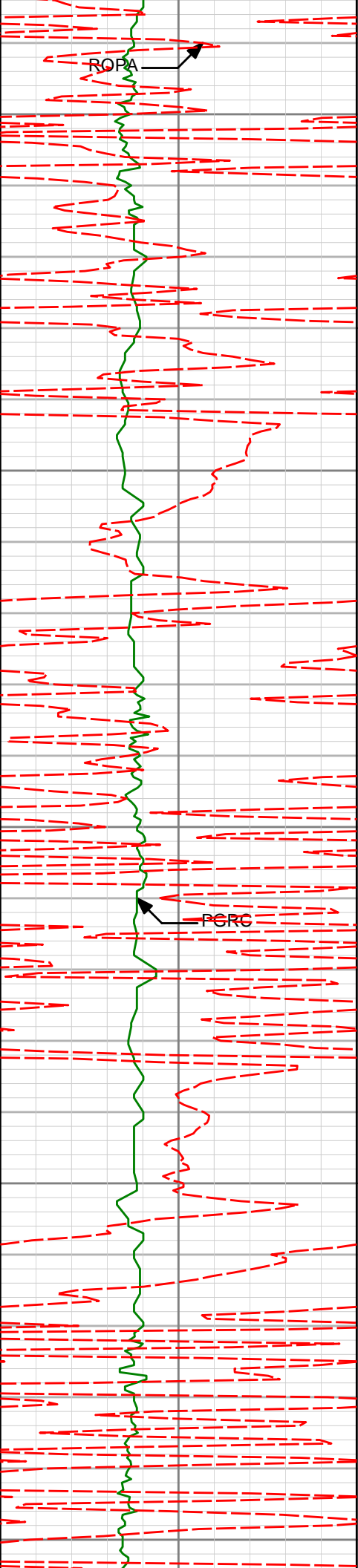
18.84°

294.01°

2560.43'

121.35'

2600



2650

2680'

16.63°

292.03°

2649.95'

133.96'

2700

2775'

18.53°

293.27°

2740.51'

146.41'

2750

2800

2870'

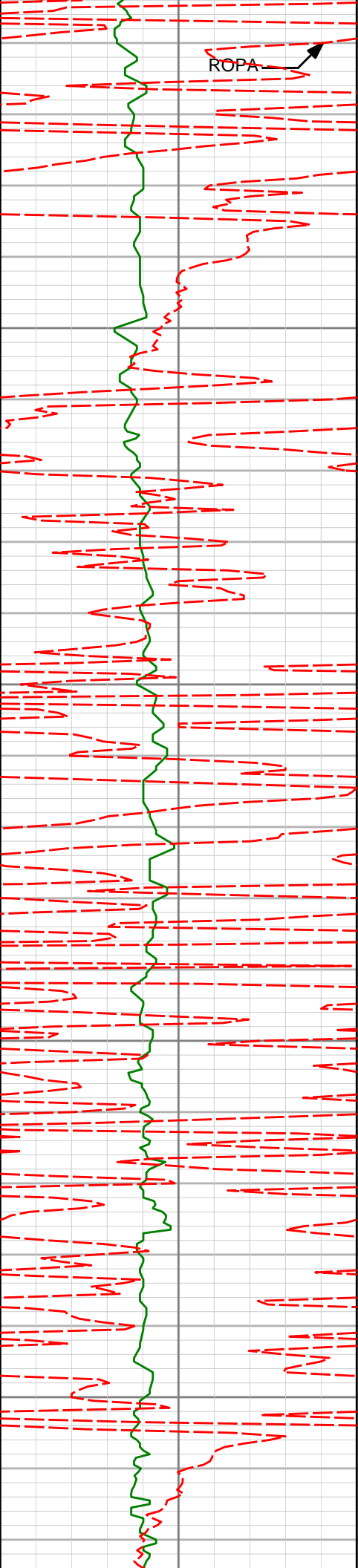
18.22°

291.92°

2830.67'

159.37'

2850



2900

2950

3000

3050

2964'

19.35°

292.80°

2919.66'

172.35'

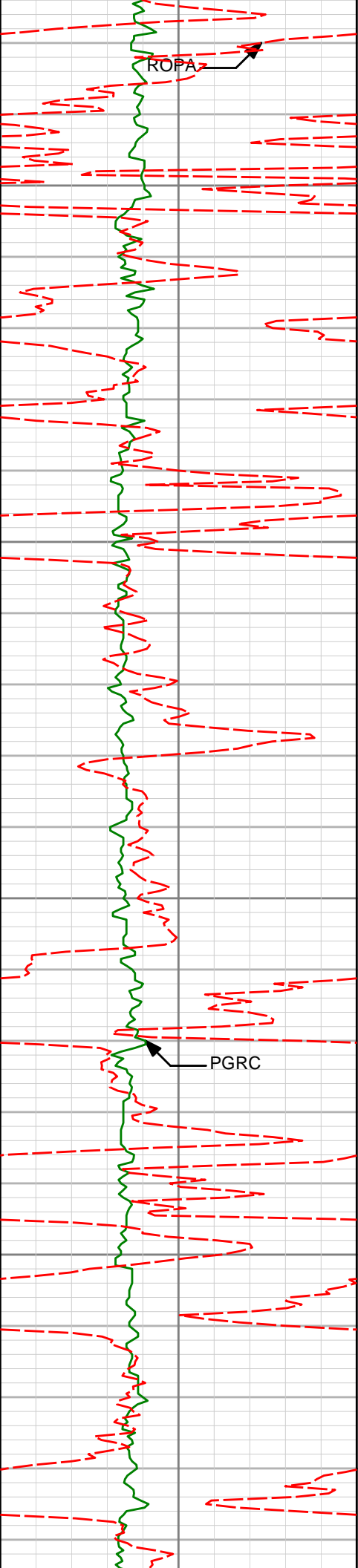
3059'

17.48°

292.01°

3009.79'

185.25'



3100

3150

3200

3250

3153'

3248'

3343'

19.15°

18.21°

17.42°

291.87°

291.30°

291.25°

3099.03'

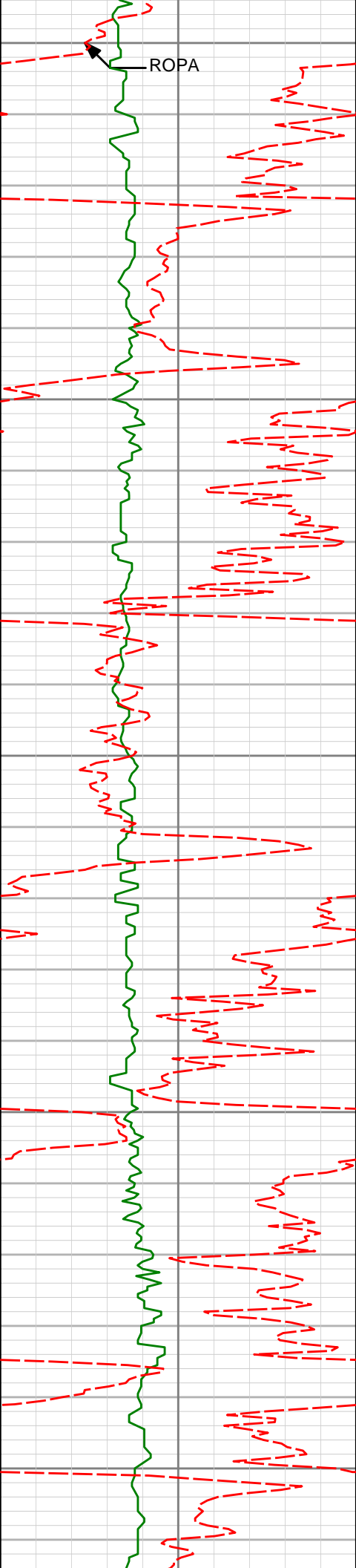
3189.02'

3279.47'

197.73'

210.40'

222.37'



3300

ROPA

3350

3437'

18.86°

296.79°

3368.80'

235.72'

3400

3450

3532'

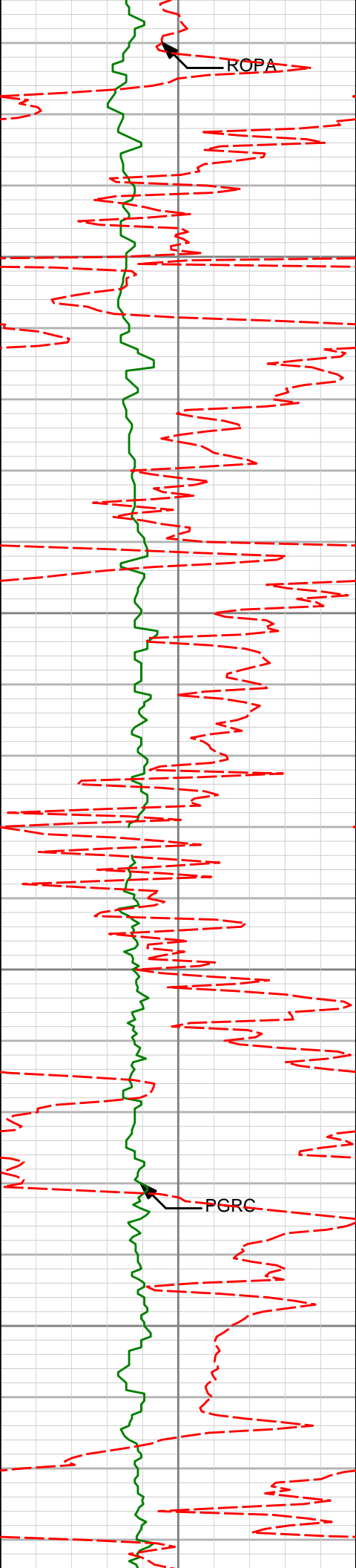
17.77°

296.50°

3458.98'

250.51'

3500



3550

3600

3650

3700

3626'

18.65°

293.87°

3548.28'

264.38'

3721'

16.38°

294.09°

3638.87'

277.37'

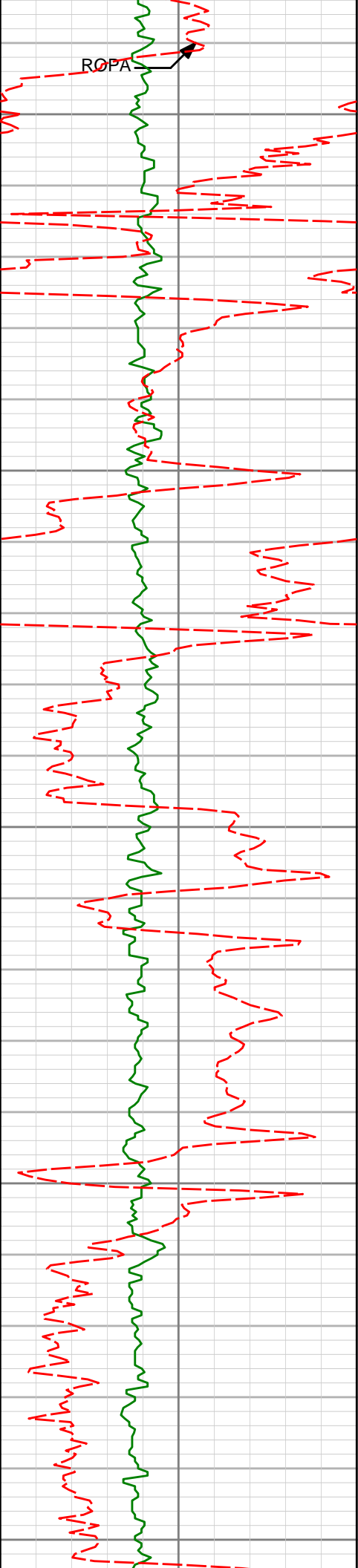
3816'

16.63°

295.08°

3729.95'

289.88'



3750

3800

3850

3900

3950

3910'

18.32°

296.80°

3819.61'

303.58'

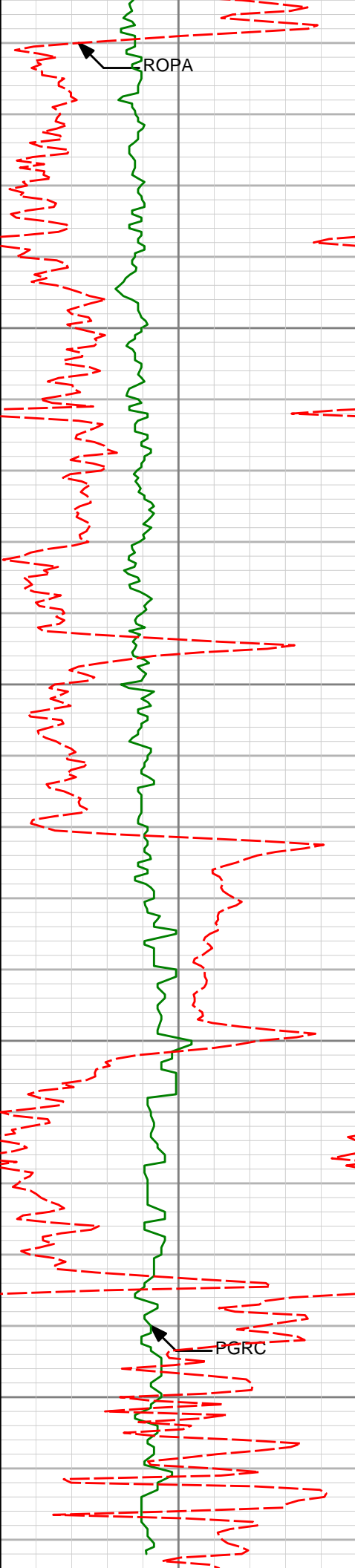
4005'

19.93°

299.56°

3909.37'

319.73'



4000

4050

4100

4150

4099'

4194'

18.05°

17.62°

298.58°

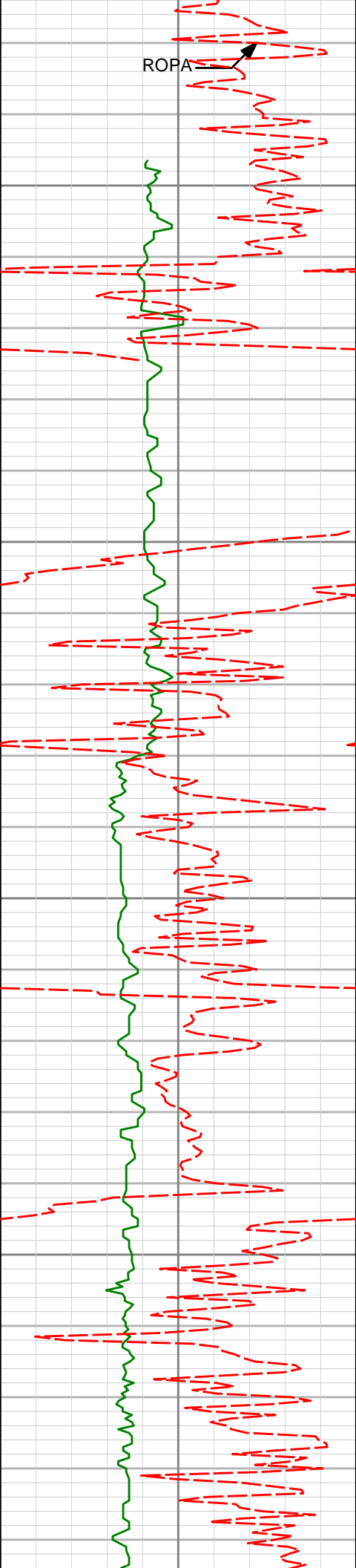
295.68°

3998.25'

4088.68'

336.00'

350.63'



4288'	16.84°	295.80°	4178.46'	364.04'
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4200

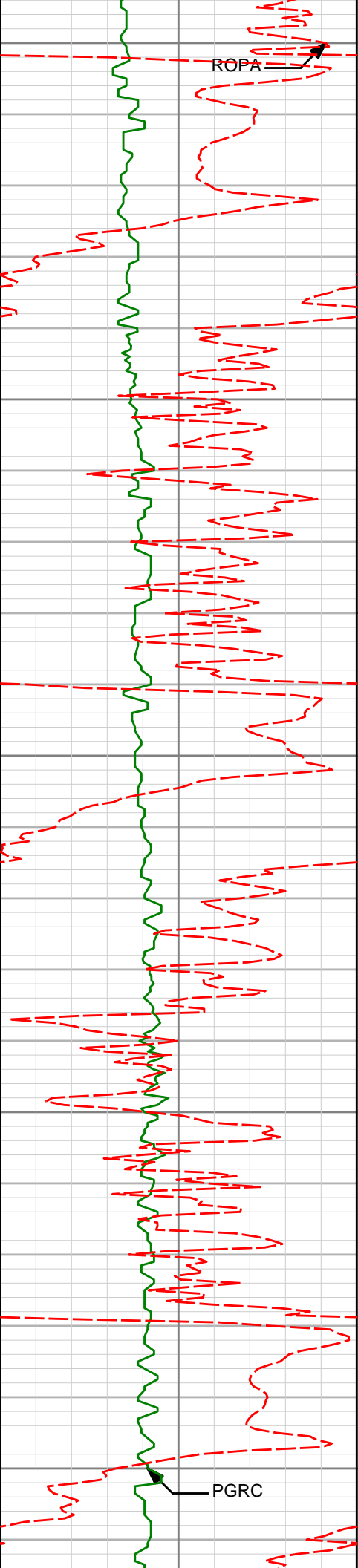
4250

4383'	17.00°	297.90°	4269.35'	377.81'
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4300

4350

4478'	19.21°	293.22° 293.22°	4359.64'	391.87'
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4400

ROPA

4450

4500

4550

4600

PGRC

4572'

20.79°

295.65°

4447.98'

406.72'

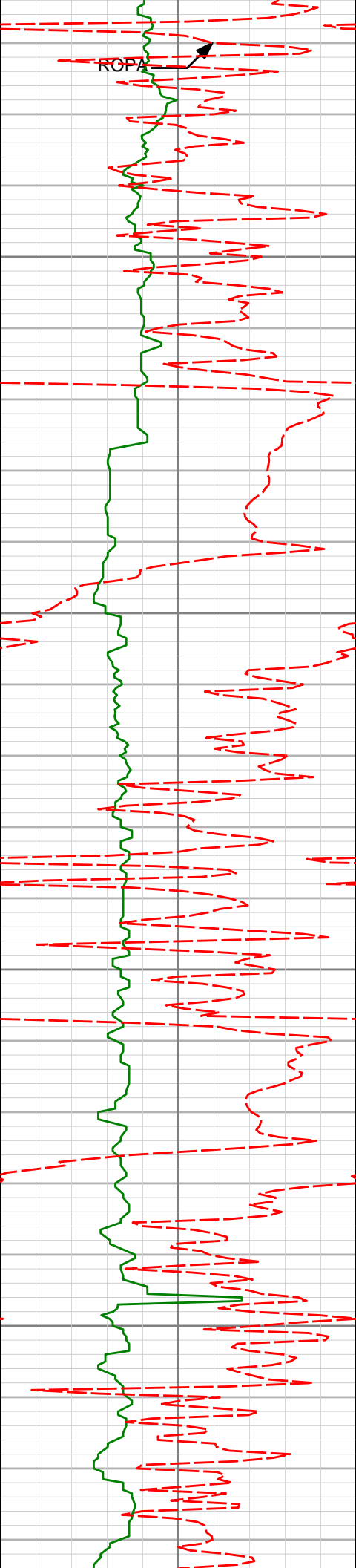
4667'

19.68°

291.92°

4537.12'

421.57'



4650

4700

4750

4800

4761'

18.86°

290.77°

4625.85'

434.38'

4856'

20.55°

289.41°

4715.28'

446.95'

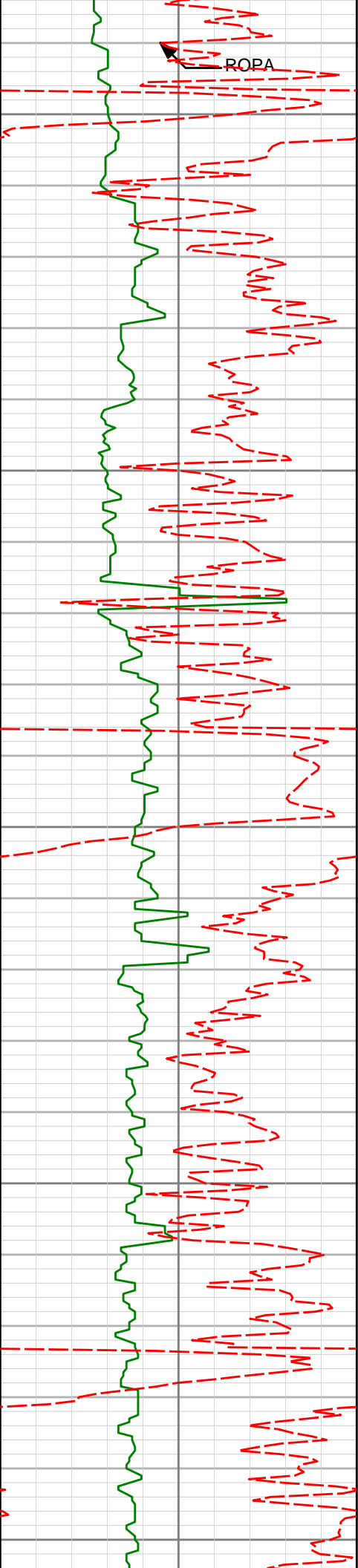
4950'

20.86°

289.77°

4803.21'

459.74'



4850

4900

4950

5000

5050

5045'

19.43°

290.13°

4892.39'

472.51'

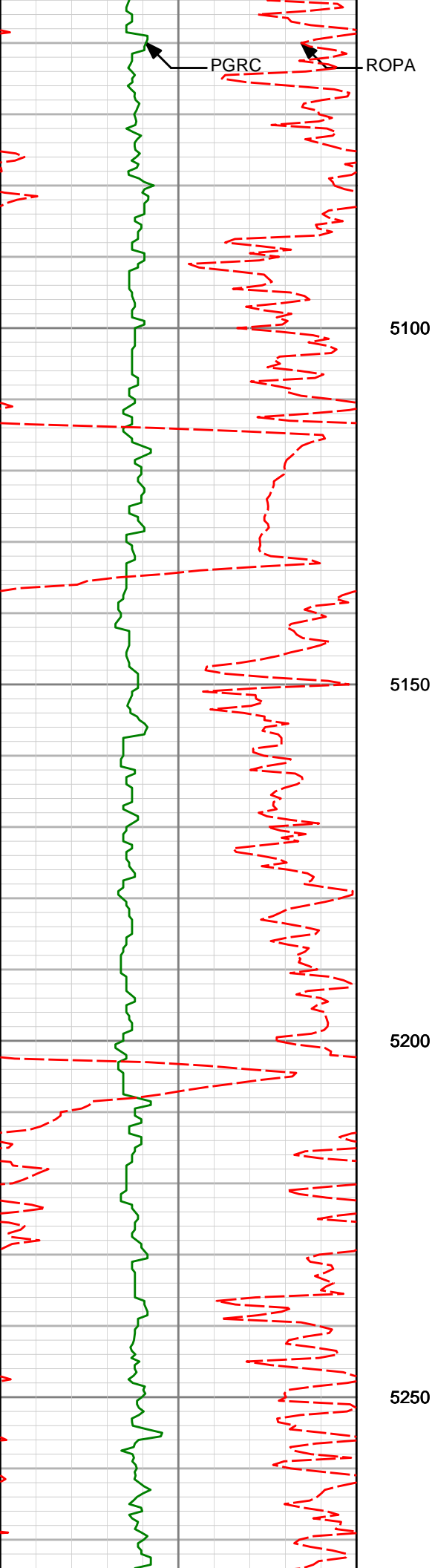
5140'

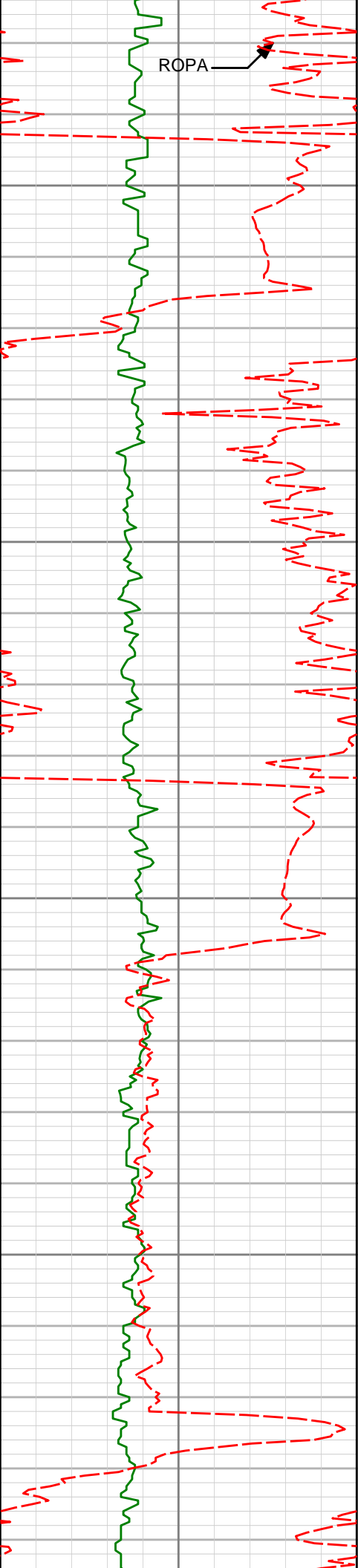
19.94°

290.86°

4981.84'

485.29'





ROP



5300

5350

5400

5450

5518'

17.90°

294.06°

5339.15'

540.62'

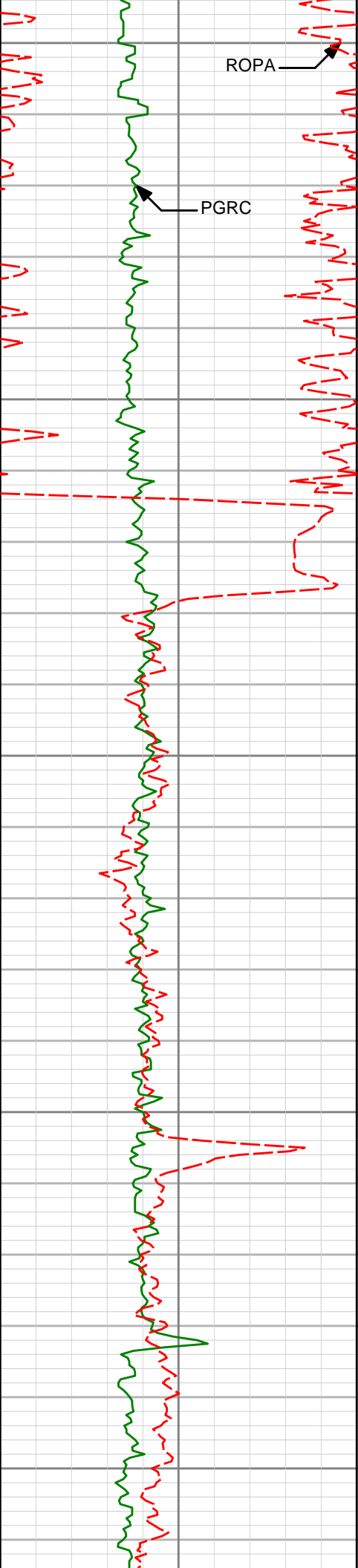
5612'

19.32°

289.92°

5428.24'

553.26'



5500

5550

5600

5650

5700

ROPA

PGRC

5707'

18.09°

290.71°

5518.22'

565.34'

5802'

17.49°

288.14°

5608.68'

576.43'

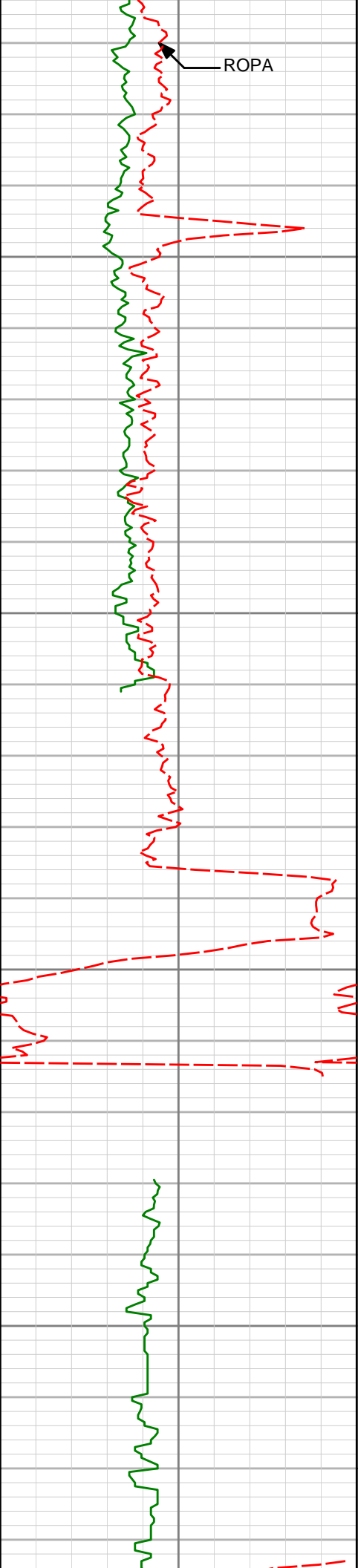
5896'

15.17°

287.79°

5698.88'

585.91'



5750

5800

5850

5900

5991'

14.03°

287.88°

5790.82'

594.44'

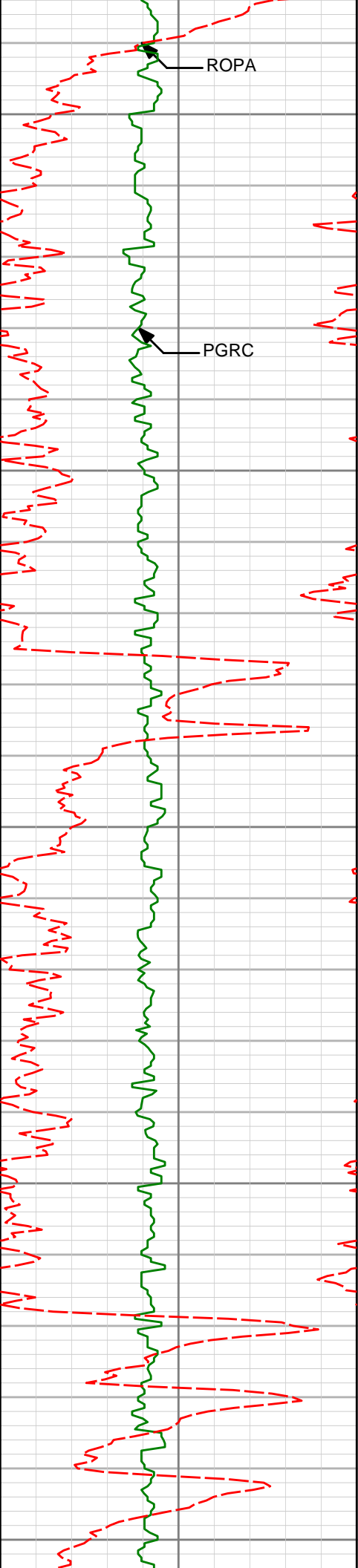
6085'

11.04°

287.20°

5882.57'

601.62'



5950

6180'

9.09°

287.86°

5976.10'

607.45'

6000

6050

6274'

7.53°

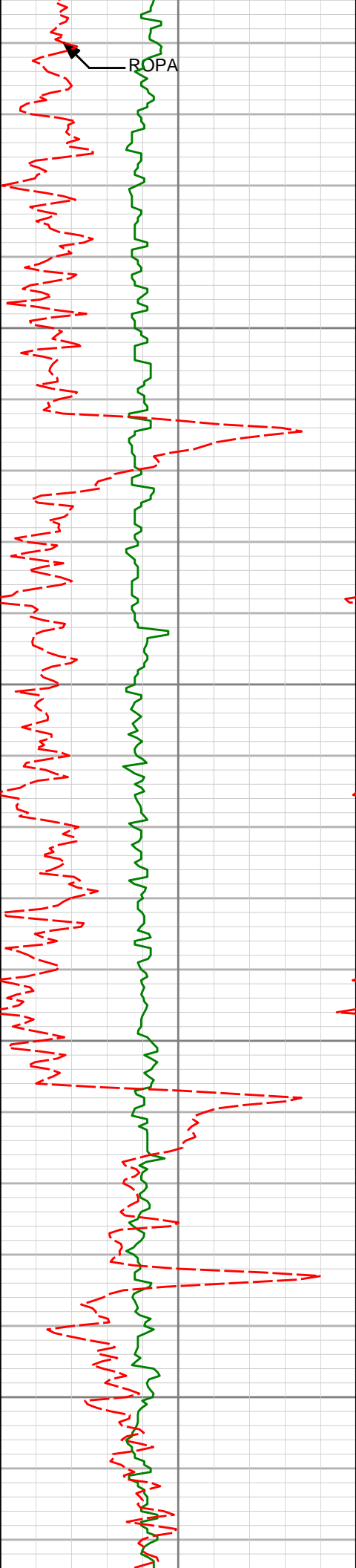
288.17°

6069.11'

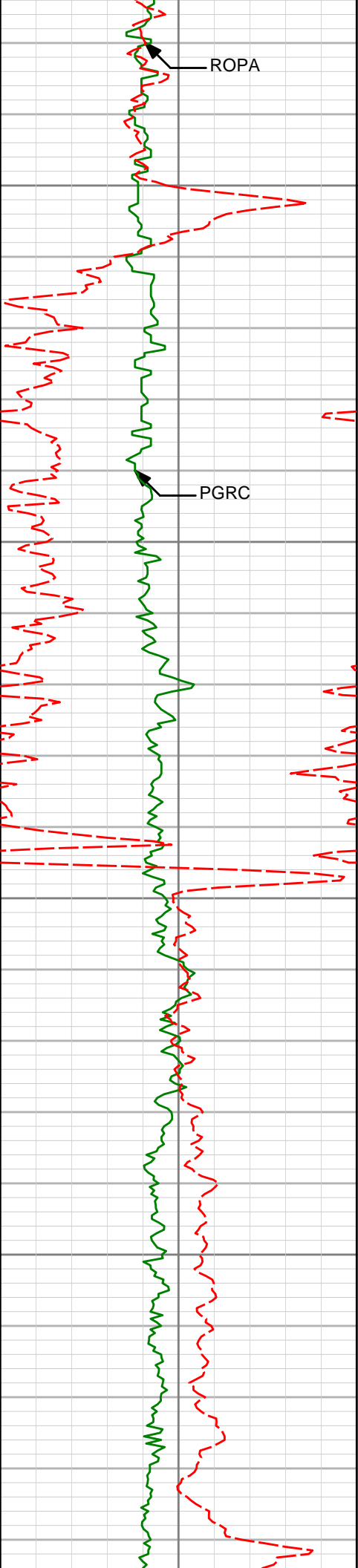
612.33'

6100

6150



	6369'	5.78°	284.31°	6163.47'	616.01'
6200					
6250	6464'	3.99°	281.14°	6258.12'	618.24'
6300					
6350	6558'	2.90°	286.11°	6351.95'	619.82'



ROPA

PGRC

6400

6450

6500

6550

6653'

2.18°

285.67°

6446.85'

621.19'

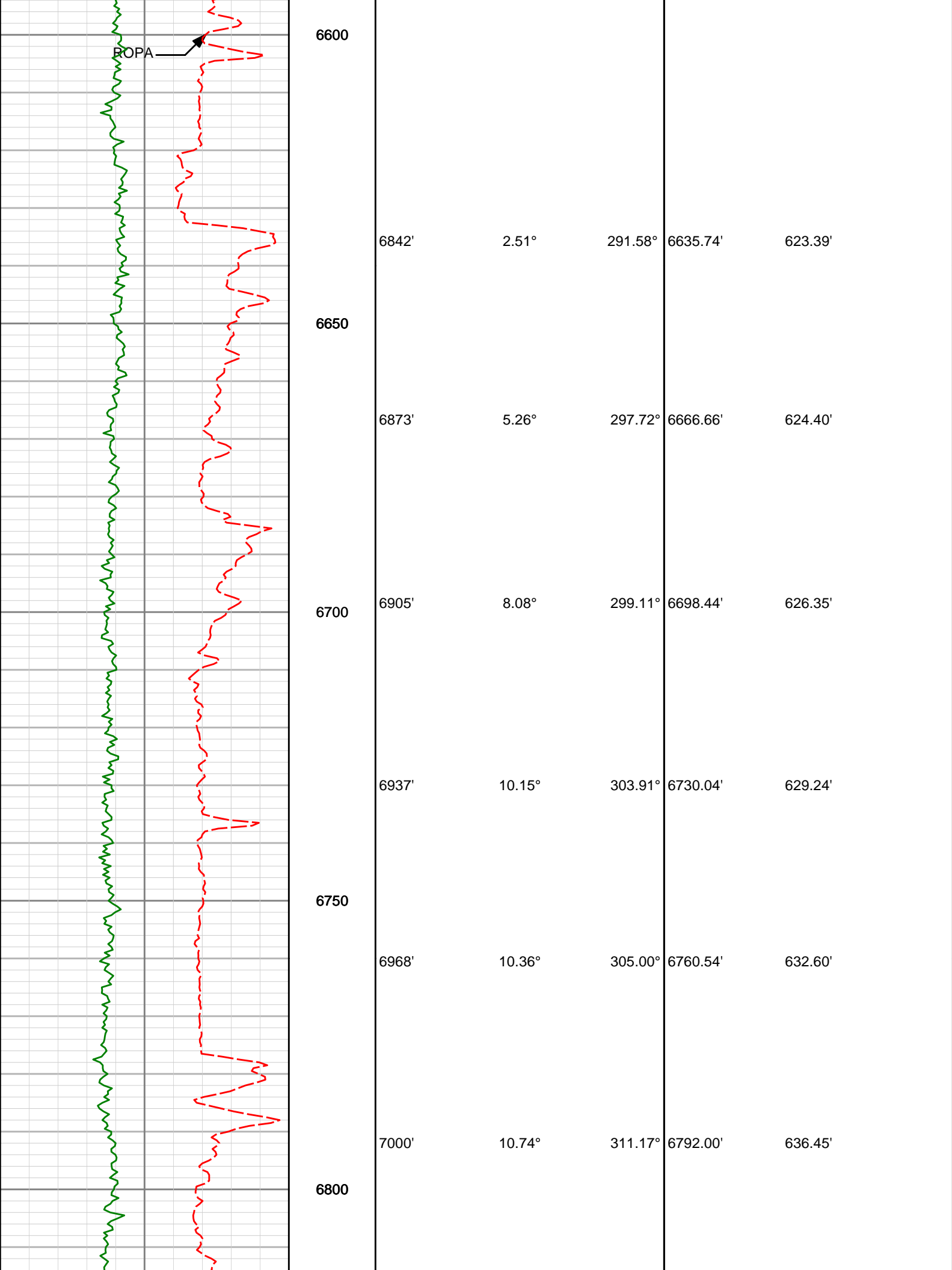
6747'

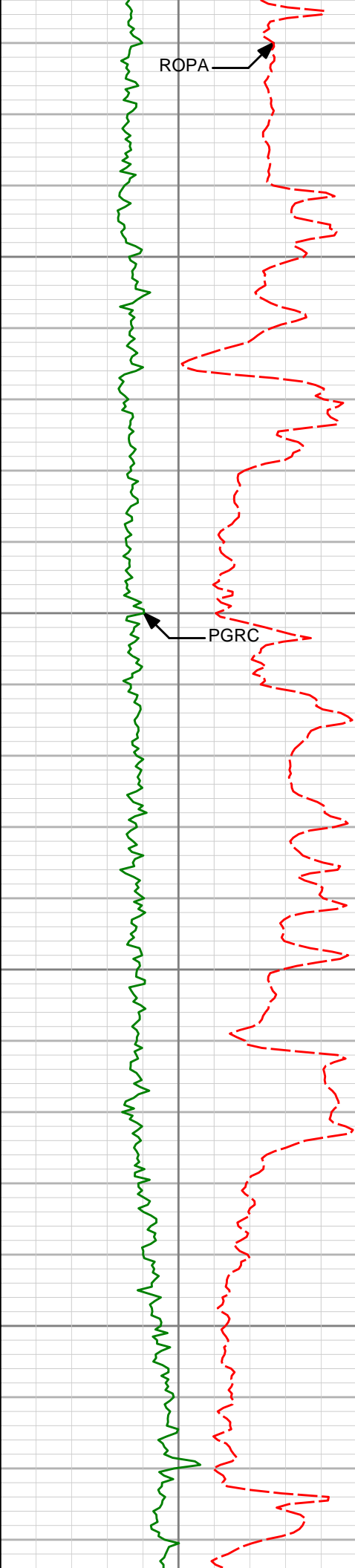
1.64°

283.33°

6540.80'

622.14'





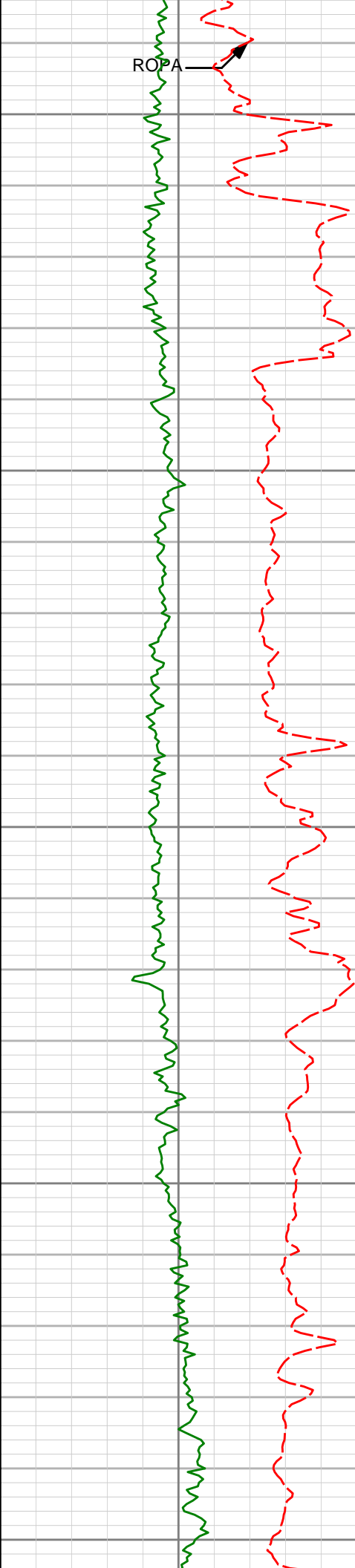
6850

6900

6950

7000

7031'	11.11°	321.31°	6822.44'	640.89'
7063'	11.96°	322.09°	6853.80'	646.12'
7094'	13.18°	324.42°	6884.05'	651.73'
7126'	14.45°	329.54°	6915.13'	658.35'
7157'	15.61°	333.20°	6945.07'	665.60'
7189'	17.05°	334.62°	6975.78'	673.89'
7220'	19.04°	337.50°	7005.25'	682.86'



ROPA

7050

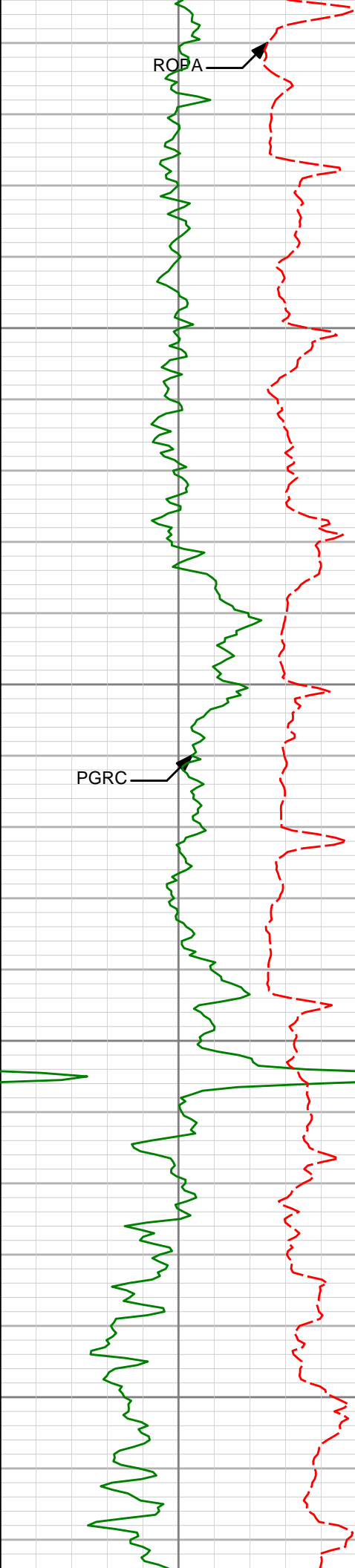
7100

7150

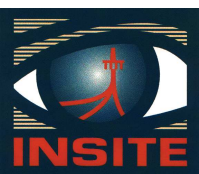
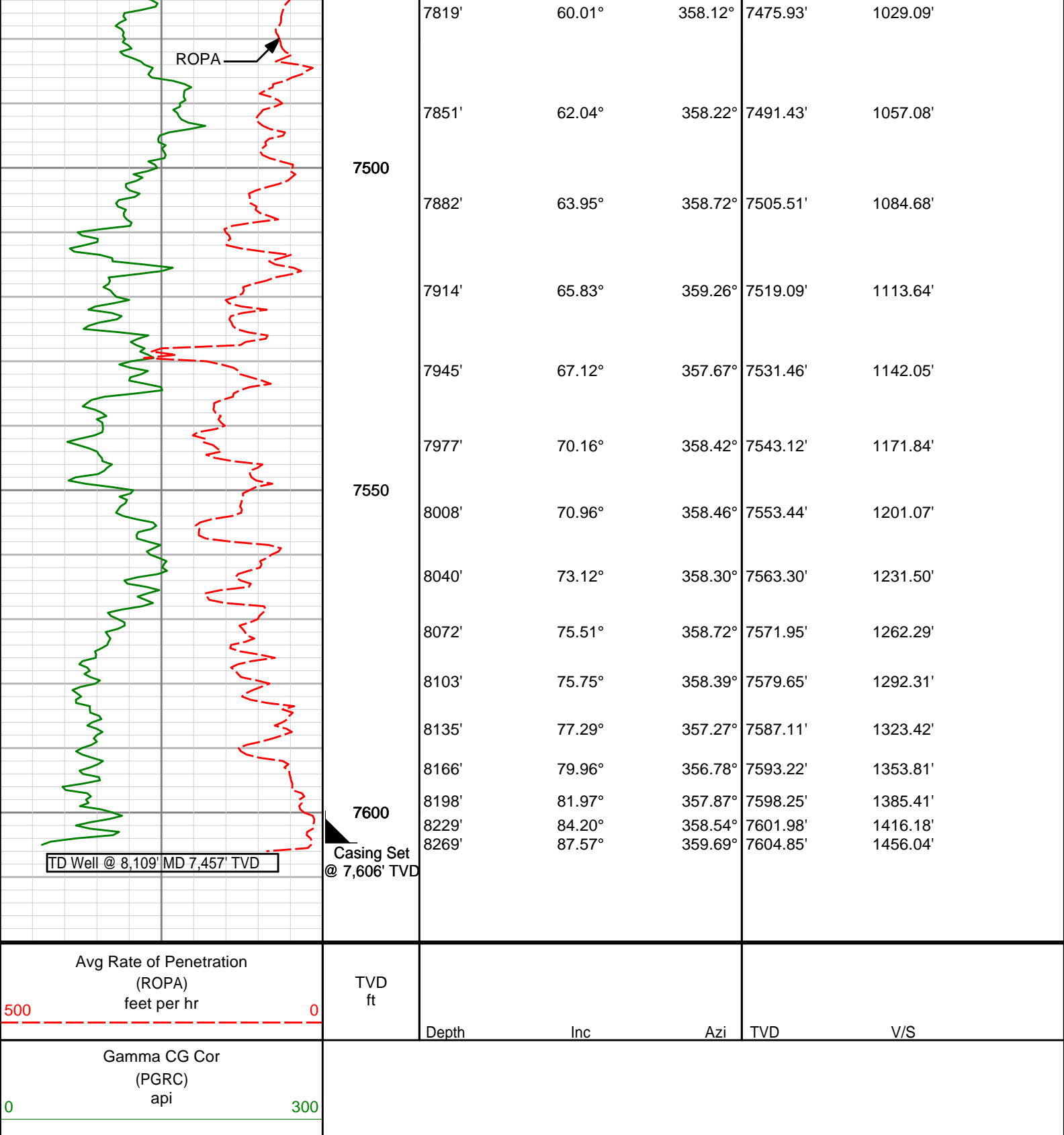
7200

7250

7252'	20.40°	339.95°	7035.37'	693.11'
7283'	21.76°	346.20°	7064.30'	703.93'
7315'	22.64°	351.03°	7093.93'	715.88'
7346'	24.28°	356.31°	7122.37'	728.19'
7378'	25.01°	0.27°	7151.46'	741.52'
7409'	26.52°	0.72°	7179.38'	754.97'
7441'	28.99°	357.38°	7207.69'	769.86'
7472'	31.01°	356.00°	7234.54'	785.36'



7300	7504'	33.12°	355.84°	7261.65'	802.35'
	7536'	36.48°	356.78°	7287.93'	820.60'
	7567'	38.57°	358.44°	7312.51'	839.48'
7350	7599'	40.34°	358.07°	7337.22'	859.81'
	7630'	43.80°	359.54°	7360.23'	880.57'
	7662'	46.63°	359.99°	7382.77'	903.25'
7400	7693'	49.07°	359.12°	7403.57'	926.21'
	7725'	52.37°	358.82°	7423.83'	950.96'
	7756'	55.26°	358.82°	7442.13'	975.97'
7450	7788'	57.47°	358.24°	7459.85'	1002.60'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.
Turkey Springs 3C-14HZ
Wattenburg
Weld Colorado
USA
CA-XX-0900302896

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1025.00	0.31	342.14	1024.97	4.66 N	2.06 W	4.76	TIE-IN
1129.00	0.35	324.27	1128.97	5.18 N	2.33 W	5.30	
1197.00	0.28	38.76	1196.97	5.48 N	2.35 W	5.60	
1289.00	1.66	317.07	1288.95	6.63 N	3.11 W	6.79	
1381.00	3.26	306.80	1380.87	9.17 N	6.12 W	9.48	
1473.00	4.68	304.45	1472.64	12.86 N	11.30 W	13.44	1.55
1565.00	5.84	298.25	1564.26	17.20 N	18.52 W	18.15	1.40
1657.00	6.94	297.59	1655.68	21.99 N	27.57 W	23.42	1.20
1749.00	7.77	298.57	1746.93	27.53 N	37.96 W	29.51	0.91
1840.00	9.62	295.06	1836.88	33.70 N	50.24 W	36.31	2.11
1931.00	10.38	296.77	1926.49	40.61 N	64.45 W	43.97	0.90
2022.00	11.47	295.90	2015.84	48.26 N	79.91 W	52.43	1.21
2113.00	12.29	295.91	2104.89	56.44 N	96.77 W	61.49	0.90
2207.00	13.44	298.73	2196.53	66.07 N	115.35 W	72.09	1.39
2302.00	14.68	296.22	2288.68	76.69 N	135.83 W	83.79	1.46
2397.00	16.30	294.99	2380.23	87.64 N	158.72 W	95.94	1.74
2491.00	17.50	292.45	2470.17	98.62 N	183.74 W	108.22	1.50
2586.00	18.84	294.01	2560.43	110.32 N	210.96 W	121.35	1.50
2680.00	16.63	292.03	2649.95	121.54 N	237.30 W	133.96	2.44
2775.00	18.53	293.27	2740.51	132.61 N	263.78 W	146.41	2.04
2870.00	18.22	291.92	2830.67	144.11 N	291.42 W	159.37	0.56
2964.00	19.35	292.80	2919.66	155.63 N	319.41 W	172.35	1.24
3059.00	17.48	292.01	3009.79	167.08 N	347.15 W	185.25	1.98
3153.00	19.15	291.87	3099.03	178.11 N	374.55 W	197.73	1.77
3248.00	18.21	291.30	3189.02	189.31 N	402.84 W	210.40	1.01
3343.00	17.42	291.25	3279.47	199.85 N	429.92 W	222.37	0.83
3437.00	18.86	296.79	3368.80	211.80 N	456.60 W	235.72	2.39
3532.00	17.77	296.50	3458.98	225.20 N	483.29 W	250.51	1.15
3626.00	18.65	293.87	3548.28	237.68 N	509.87 W	264.38	1.28
3721.00	16.38	294.09	3638.87	249.29 N	535.99 W	277.37	2.39
3816.00	16.63	295.08	3729.95	260.52 N	560.53 W	289.88	0.39
3910.00	18.32	296.80	3819.61	272.89 N	585.90 W	303.58	1.89
4005.00	19.93	299.56	3909.37	287.61 N	613.32 W	319.73	1.94
4099.00	18.05	298.58	3998.25	302.48 N	640.05 W	336.00	2.03
4194.00	17.62	295.68	4088.68	315.76 N	665.93 W	350.63	1.04
4288.00	16.84	295.80	4178.46	327.85 N	691.02 W	364.04	0.83
4383.00	17.00	297.90	4269.35	340.34 N	715.68 W	377.81	0.66
4478.00	19.21	293.22	4359.64	353.00 N	742.32 W	391.87	2.78
4572.00	20.79	295.65	4447.98	366.32 N	771.57 W	406.72	1.90
4667.00	19.68	291.92	4537.12	379.59 N	801.61 W	421.57	1.79
4761.00	18.86	290.77	4625.85	390.89 N	830.51 W	434.38	0.96
4856.00	20.55	289.41	4715.28	401.87 N	860.60 W	446.95	1.84
4950.00	20.86	289.77	4803.21	413.02 N	891.91 W	459.74	0.36
5045.00	19.43	290.13	4892.39	424.18 N	922.66 W	472.51	1.52
5140.00	19.94	290.86	4981.84	435.38 N	952.63 W	485.29	0.59
5234.00	19.20	290.94	5070.41	446.61 N	982.04 W	498.07	0.79
5329.00	19.75	295.17	5159.98	459.02 N	1011.16 W	512.00	1.60
5423.00	18.29	296.13	5248.85	472.27 N	1038.77 W	526.70	1.60
5518.00	17.90	294.06	5339.15	484.79 N	1065.48 W	540.62	0.79
5612.00	19.32	289.92	5428.24	495.98 N	1093.29 W	553.26	2.06
5707.00	18.09	290.71	5518.22	506.55 N	1121.86 W	565.34	1.32
5802.00	17.49	288.14	5608.68	516.21 N	1149.22 W	576.43	1.04
5896.00	15.17	287.79	5698.88	524.37 N	1174.36 W	585.91	2.47
5991.00	14.03	287.88	5790.82	531.70 N	1197.15 W	594.44	1.20
6085.00	11.04	287.20	5882.57	537.86 N	1216.60 W	601.62	3.18
6180.00	9.09	287.86	5976.10	542.85 N	1232.43 W	607.45	2.06
6274.00	7.53	288.17	6069.11	547.05 N	1245.35 W	612.33	1.65
6369.00	5.78	284.31	6163.47	550.17 N	1255.90 W	616.01	1.91
6464.00	3.99	281.14	6258.12	552.00 N	1263.78 W	618.24	1.90
6558.00	2.90	286.11	6351.95	553.29 N	1269.27 W	619.82	1.21
6653.00	2.18	285.67	6446.85	554.44 N	1273.31 W	621.19	0.76
6747.00	1.64	283.33	6540.80	555.23 N	1276.34 W	622.14	0.58
6842.00	2.51	291.58	6635.74	556.31 N	1279.60 W	623.39	0.96
6873.00	5.26	297.72	6666.66	557.22 N	1281.49 W	624.40	8.95
6905.00	8.08	299.11	6698.44	559.00 N	1284.75 W	626.35	8.84
6937.00	10.15	303.91	6730.04	561.67 N	1289.06 W	629.24	6.88
6968.00	10.36	305.00	6760.54	564.79 N	1293.61 W	632.60	0.93
7000.00	10.74	311.17	6792.00	568.40 N	1298.21 W	636.45	3.72

7031.00	11.11	321.31	6822.44	572.63 N	1302.25 W	640.89	6.30
7063.00	11.96	322.09	6853.80	577.66 N	1306.21 W	646.12	2.72
7094.00	13.18	324.42	6884.05	583.06 N	1310.24 W	651.73	4.26
7126.00	14.45	329.54	6915.13	589.47 N	1314.39 W	658.35	5.51
7157.00	15.61	333.20	6945.07	596.53 N	1318.23 W	665.60	4.84
7189.00	17.05	334.62	6975.78	604.62 N	1322.19 W	673.89	4.66
7220.00	19.04	337.50	7005.25	613.40 N	1326.07 W	682.86	7.03
7252.00	20.40	339.95	7035.37	623.46 N	1329.98 W	693.11	4.97
7283.00	21.76	346.20	7064.30	634.11 N	1333.20 W	703.93	8.47
7315.00	22.64	351.03	7093.93	645.96 N	1335.58 W	715.88	6.33
7346.00	24.28	356.31	7122.37	658.22 N	1336.92 W	728.19	8.59
7378.00	25.01	0.27	7151.46	671.55 N	1337.31 W	741.52	5.64
7409.00	26.52	0.72	7179.38	685.02 N	1337.19 W	754.97	4.92
7441.00	28.99	357.38	7207.69	699.92 N	1337.46 W	769.86	9.13
7472.00	31.01	356.00	7234.54	715.39 N	1338.36 W	785.36	6.87
7504.00	33.12	355.84	7261.65	732.33 N	1339.56 W	802.35	6.59
7536.00	36.48	356.78	7287.93	750.56 N	1340.73 W	820.60	10.64
7567.00	38.57	358.44	7312.51	769.42 N	1341.51 W	839.48	7.50
7599.00	40.34	358.07	7337.22	789.75 N	1342.13 W	859.81	5.56
7630.00	43.80	359.54	7360.23	810.51 N	1342.56 W	880.57	11.62
7662.00	46.63	359.99	7382.77	833.22 N	1342.65 W	903.25	8.89
7693.00	49.07	359.12	7403.57	856.20 N	1342.83 W	926.21	8.14
7725.00	52.37	358.82	7423.83	880.96 N	1343.28 W	950.96	10.33
7756.00	55.26	358.82	7442.13	905.97 N	1343.79 W	975.97	9.34
7788.00	57.47	358.24	7459.85	932.61 N	1344.48 W	1002.60	7.06
7819.00	60.01	358.12	7475.93	959.09 N	1345.32 W	1029.09	8.21
7851.00	62.04	358.22	7491.43	987.07 N	1346.21 W	1057.08	6.33
7882.00	63.95	358.72	7505.51	1014.68 N	1346.95 W	1084.68	6.34
7914.00	65.83	359.26	7519.09	1043.65 N	1347.46 W	1113.64	6.07
7945.00	67.12	357.67	7531.46	1072.06 N	1348.22 W	1142.05	6.28
7977.00	70.16	358.42	7543.12	1101.84 N	1349.23 W	1171.84	9.74
8008.00	70.96	358.46	7553.44	1131.06 N	1350.03 W	1201.07	2.59
8040.00	73.12	358.30	7563.30	1161.49 N	1350.89 W	1231.50	6.76
8072.00	75.51	358.72	7571.95	1192.28 N	1351.69 W	1262.29	7.58
8103.00	75.75	358.39	7579.65	1222.30 N	1352.45 W	1292.31	1.29
8135.00	77.29	357.27	7587.11	1253.40 N	1353.63 W	1323.42	5.89
8166.00	79.96	356.78	7593.22	1283.75 N	1355.21 W	1353.81	8.76
8198.00	81.97	357.87	7598.25	1315.31 N	1356.68 W	1385.41	7.12
8229.00	84.20	358.54	7601.98	1346.07 N	1357.64 W	1416.18	7.50
8269.00	87.57	359.69	7604.85	1385.95 N	1358.26 W	1456.04	8.90

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 356.96 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 8269.00 FEET
IS 1940.55 FEET ALONG 315.58 DEGREES (TRUE)**

Survey Data is tied on to Gyro Data.