

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



1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	07-Mar-13	08-Mar-13			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	1,079.89	7,144.17			
Log End Depth (TVD, ft)	7,144.17	7,201.22			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	05-Mar-13 00:40	07-Mar-13 11:35			
Drill/Wipe End Date and Time	06-Mar-13 22:20	07-Mar-13 21:00			
Min Inc (deg) @ Depth (TVD, ft)	.17 @ 6,162.69	60.91 @ 7,150.66			
Max Inc (deg) @ Depth (TVD, ft)	56.63 @ 7,134.59	84.77 @ 7,200.08			
Bit TFA(in2) / Bit Type	.86 / PDC	.92 / Tricone			
Flow Rate (gpm)	525.00	460.00			
Max AV (fpm) / CV (fpm) @ MWD	484.0 / N/A	N/A / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.50 / 27.00	9.80 / 40.00			
Filtrate CL (ppm)	1,800.00	1,500.00			
pH / Fluid Loss (mptm)	8.10 / 8.00	8.00 / 0			
PV (cP) / YP (lbf2)	2 / 1.00	17 / 11.00			
% Solids / % Sand	1.4 / .1	3 / .3			
% 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 (deg F) @ C	170.05 / 326.09	122.55 / 252.59			

Max Tool Temp (degF) / Source	170.37 / PCM	182.55 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 170.37	N/A @ 182.55			
Lead MWD Engineer	Ryan White	Ryan White			
Customer Representative	Travis Laurence	Travis Laurence			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	11331929	11331929			
Insert Serial Number	11680744	10809551			
Date and Time Initialized	03-Mar-13 19:43	06-Mar-13 22:33			
Date and Time Read	07-Mar-13 09:10	08-Mar-13 03:24			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	50.00	50.00			
Software Version	6.21	6.21			
Sub Serial Number	11331929	11331929			
Sonde Serial Number	11062125	11478107			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	185.63	256.84			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	52.46	52.46			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11331929	11331929			
Insert/Sonde Serial Number	11293276	11681021			

REMARKS

1. All depths are true vertical bit 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. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified
5. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):

Interval Resolution: 0.5 ft

Interval Distance: 0.6 ft

Gap Fill: 3.0 ft

ROPA (Average Rate of Penetration):

Interval Resolution: 0.5 ft

Interval Distance: 1.2 ft

Gap Fill : 3.0 ft

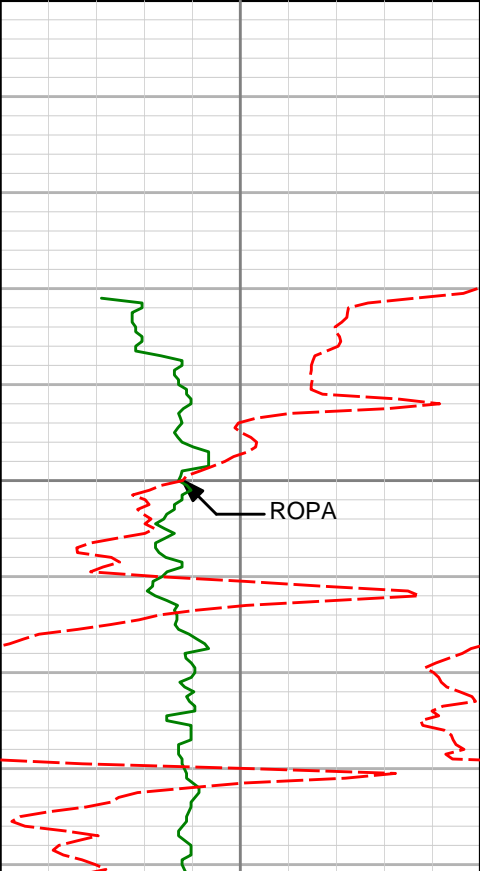
6. INSITE version 7.4.1

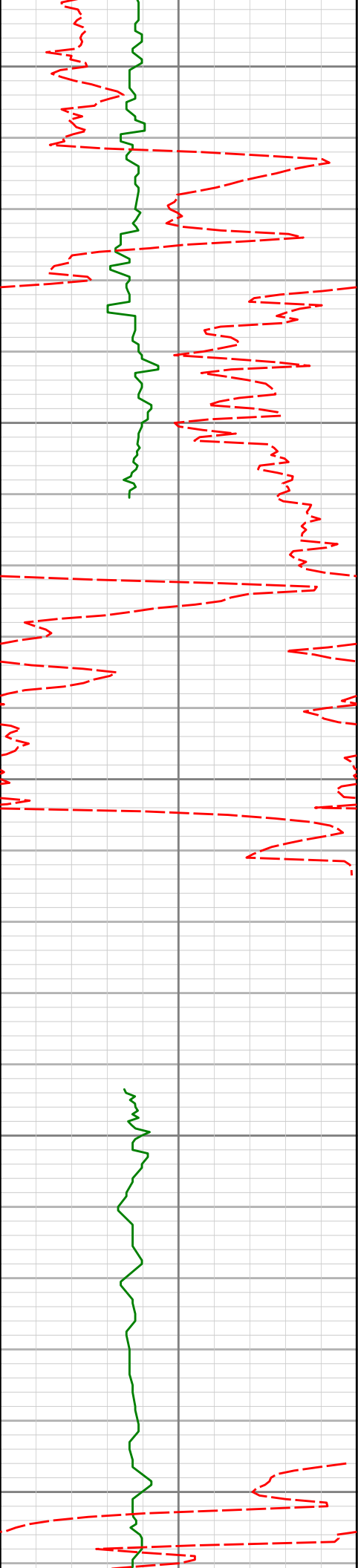
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1:240 TVD Detail Log

Gamma CG Cor (PGRC) api						
0	300					
Avg Rate of Penetration (ROPA) feet per hr		TVD ft				
500	0		Depth	Inc	Azi	TVD V/S
		1100				
		1110'	0.74°	32.97°	1109.88'	-9.56'



1150

1200

1250

1300

1350

1202'

1.49°

307.07°

1201.87'

-10.78'

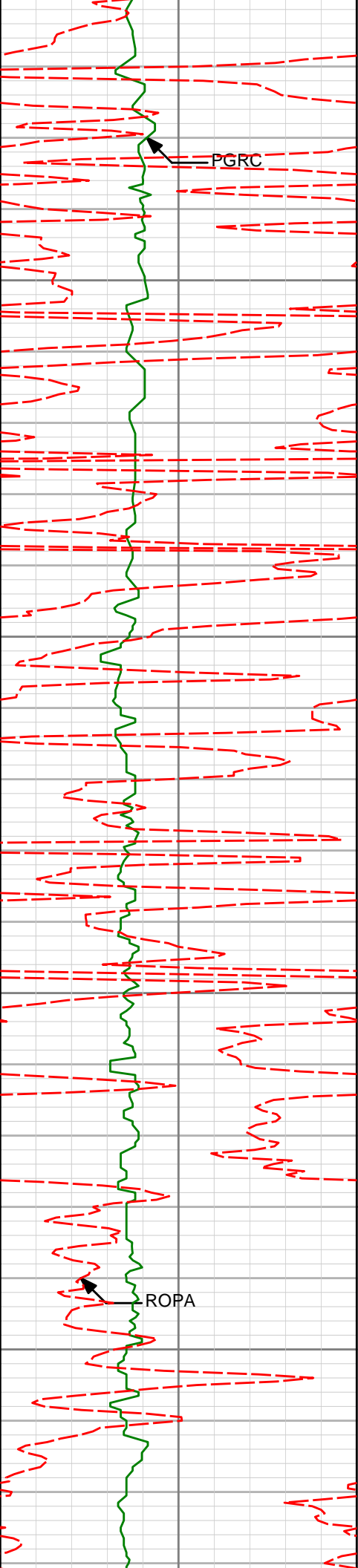
1294'

1.65°

269.68°

1293.84'

-11.50'



PGRC

ROPA

1386'

1.59°

230.00°

1385.80'

-10.67'

1400

1450

1500

1539'

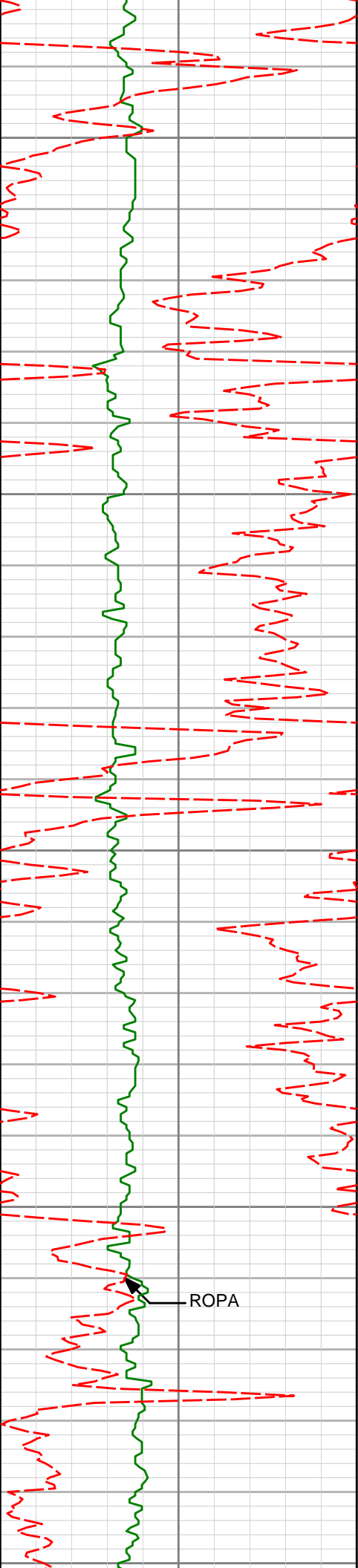
1.27°

228.87°

1538.76'

-8.19'

1550



1600

1650

1700

1750

1800

1723'

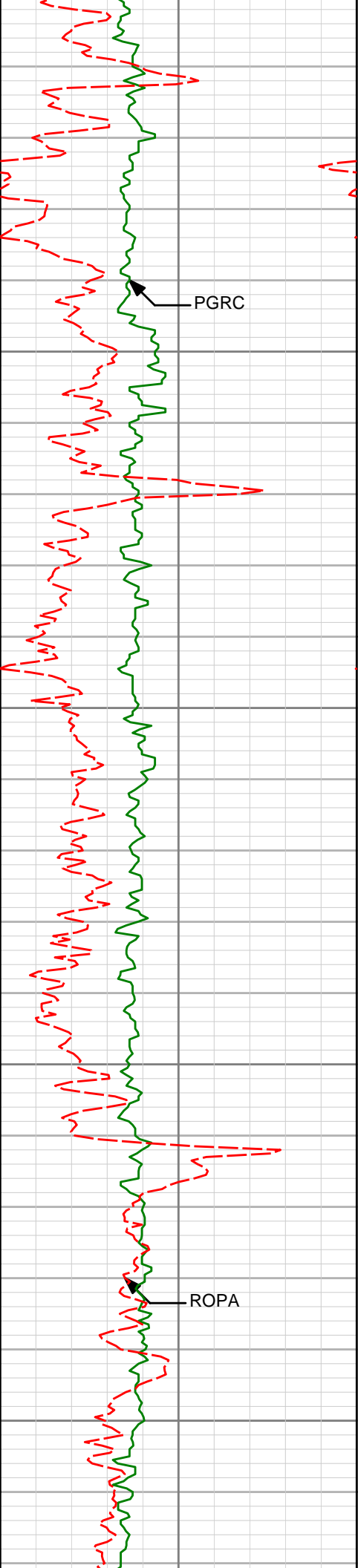
1.35°

238.28°

1722.71'

-5.70'

ROPA



1850

1900

1950

2000

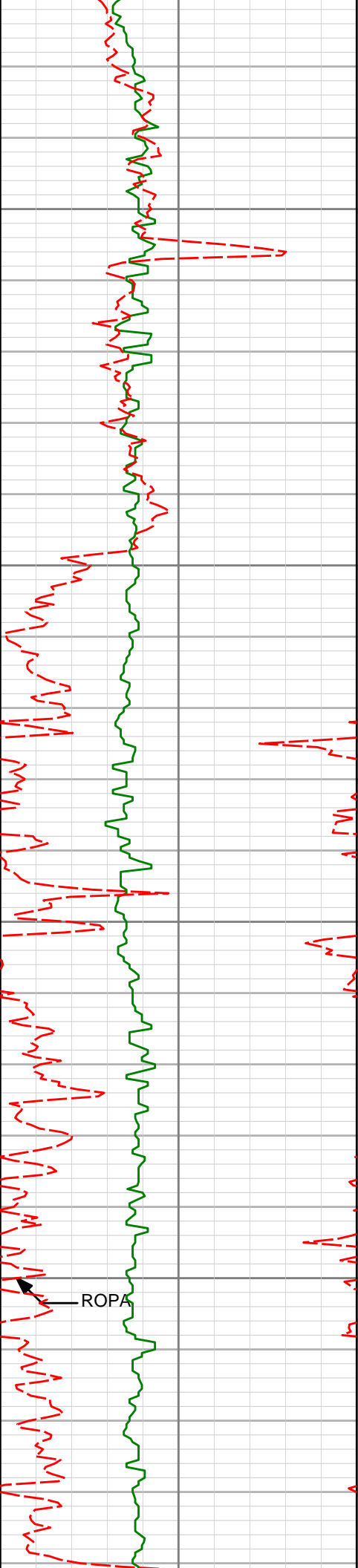
1907'

1.36°

254.57°

1906.66'

-3.97'



2050

2100

2150

2200

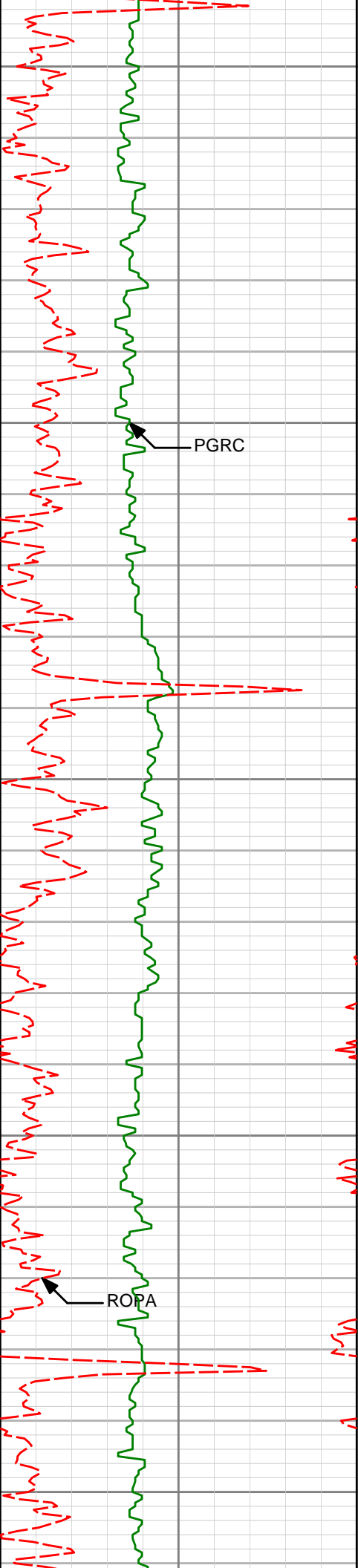
2096'

0.73°

262.91°

2095.63'

-3.23'



2250

2285'

0.83°

229.12°

2284.61'

-2.19'

2300

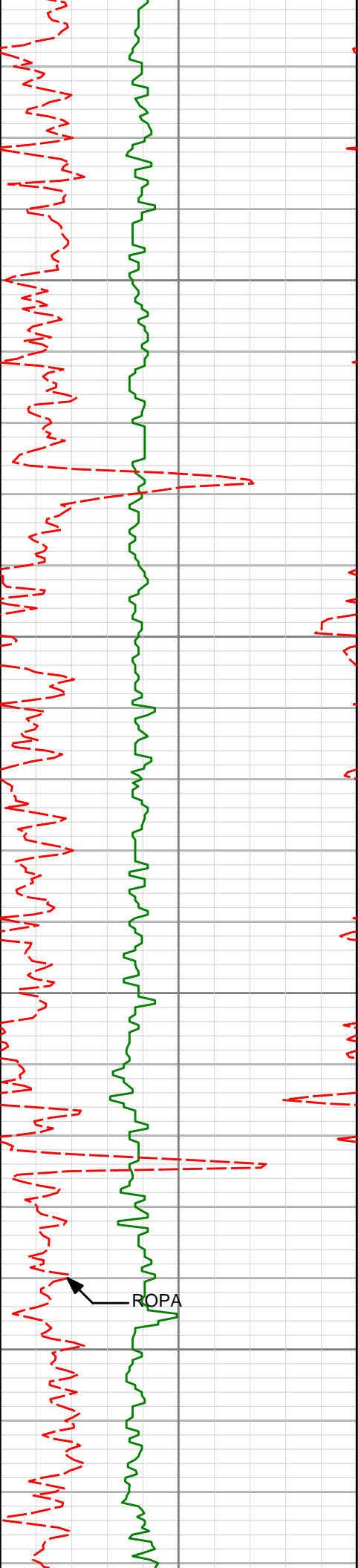
PGRC

2350

2400

ROPA

2450



2474'

1.57°

217.48°

2473.57'

0.77'

2500

2550

2600

2650

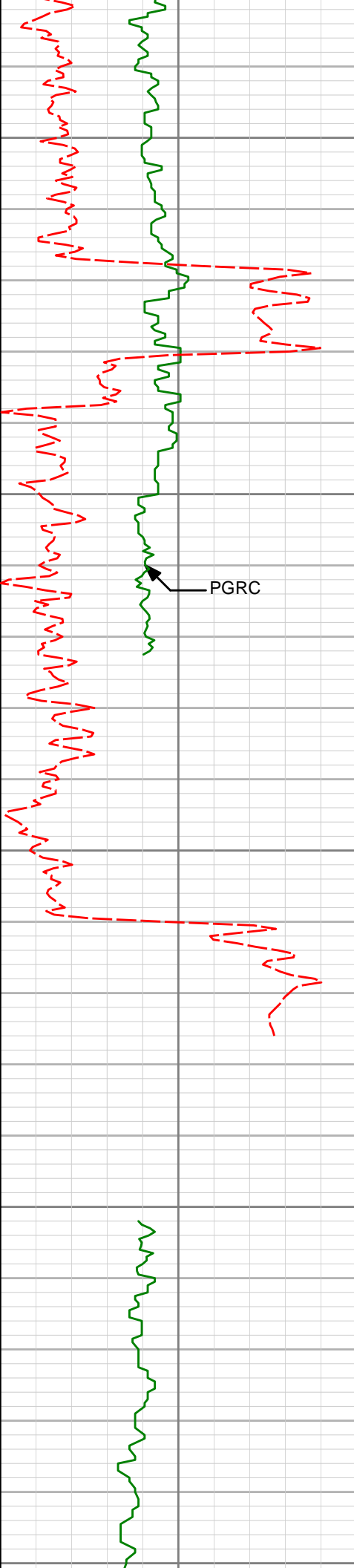
2664'

1.63°

249.37°

2663.50'

3.79'



2700

2750

2800

2850

2900

2758'

2.05°

234.67°

2757.45'

5.23'

2853'

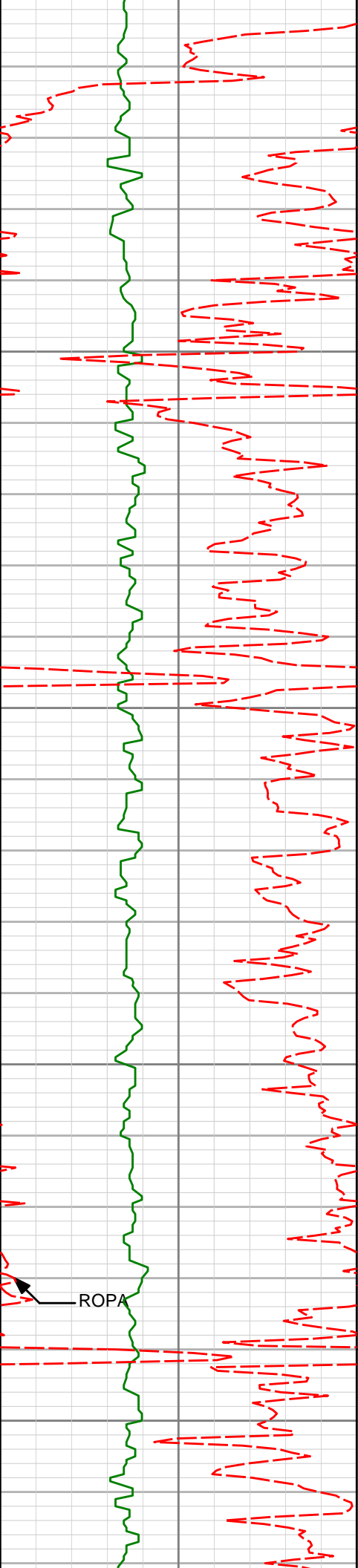
2.78°

259.68°

2852.37'

6.62'

PGRC



2950

3000

3050

3100

2948'

3.24°

283.43°

2947.24'

6.41'

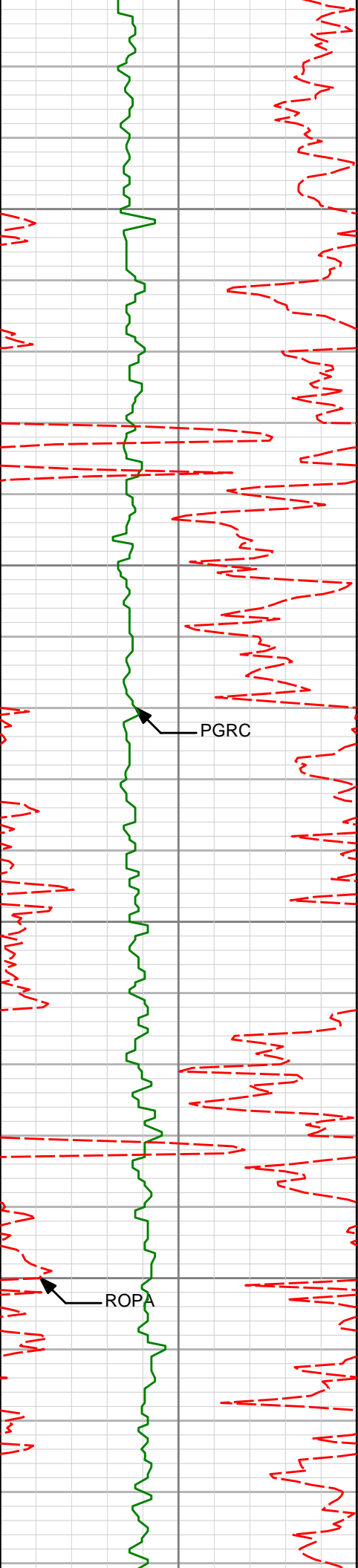
3042'

3.34°

280.46°

3041.08'

5.30'



3150

3200

PGRC

3232'

2.86°

279.90°

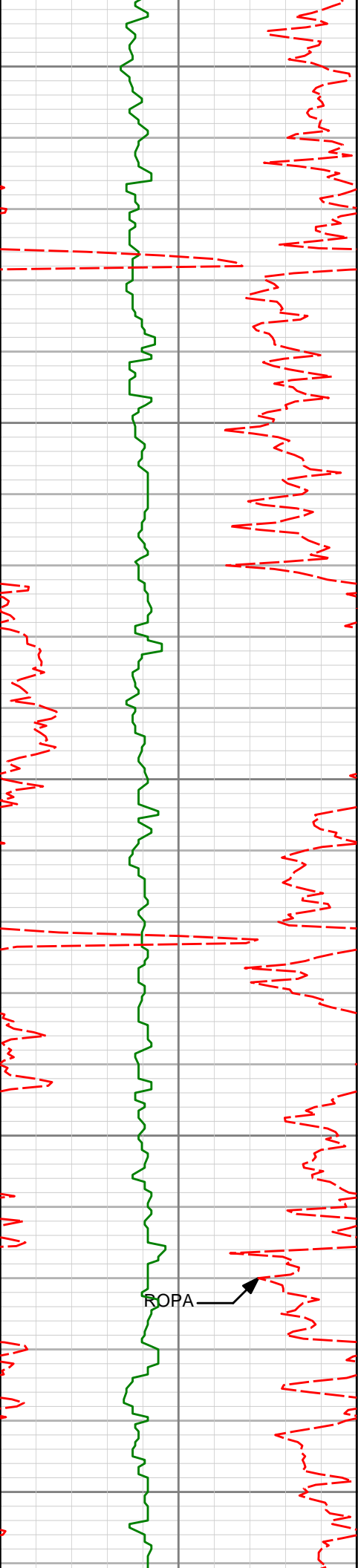
3230.81'

3.48'

3250

3300

ROPA



3350

3400

3450

3500

3550

3421'

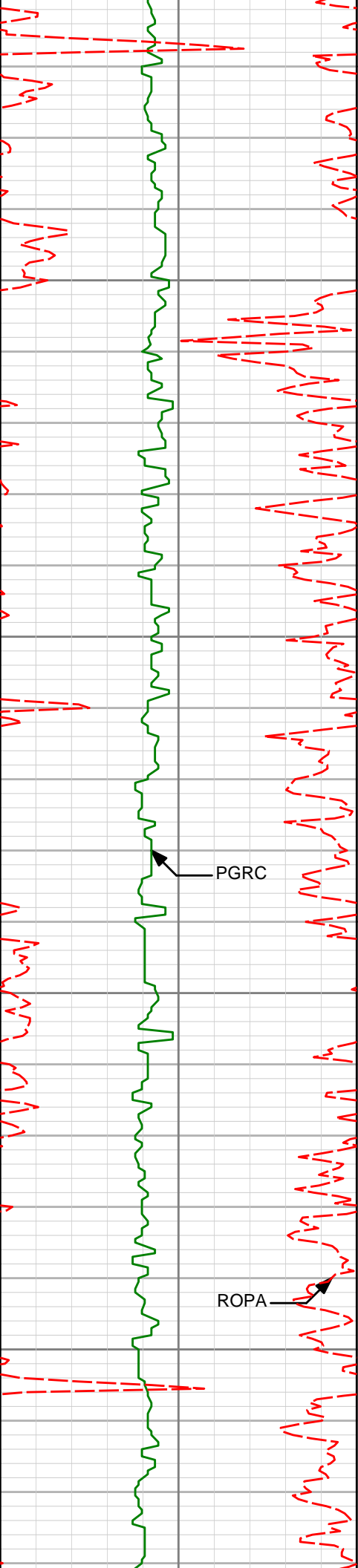
2.64°

278.73°

3419.59'

2.01'

ROPA



3600

3611'

2.83°

279.65°

3609.37'

0.56'

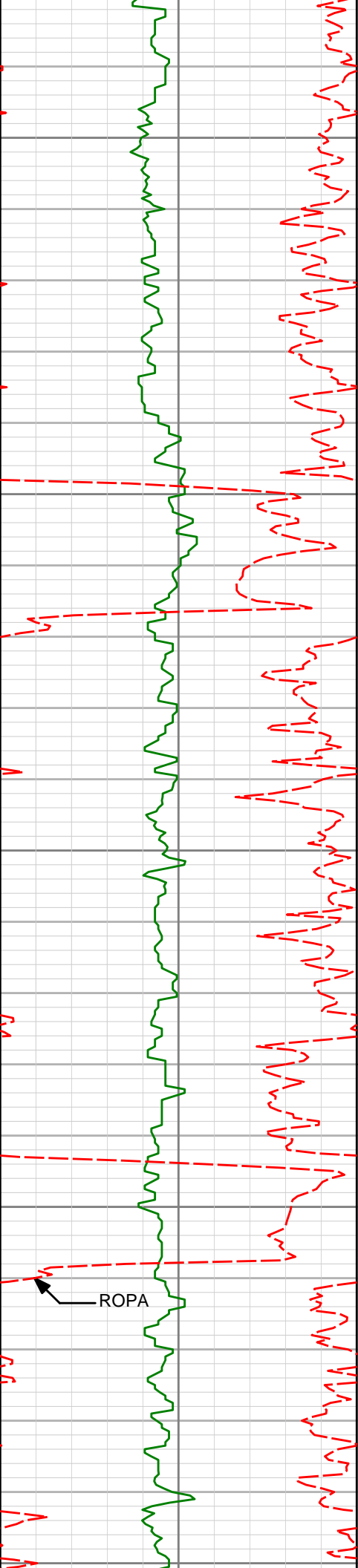
3650

PGRC

3700

ROPA

3750



3800

3800'

2.44°

259.52°

3798.17'

0.51'

3850

3900

3895'

2.36°

264.65°

3893.09'

1.06'

3950

3989'

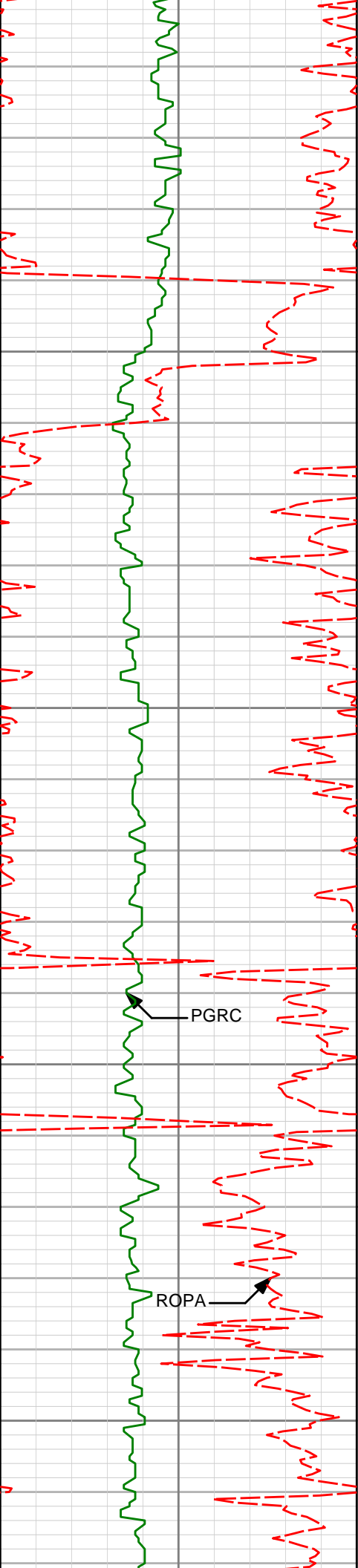
2.20°

317.80°

3987.03'

-0.10'

4000



4050

4100

4150

4200

4084'

1.18°

294.76°

4081.99'

-1.86'

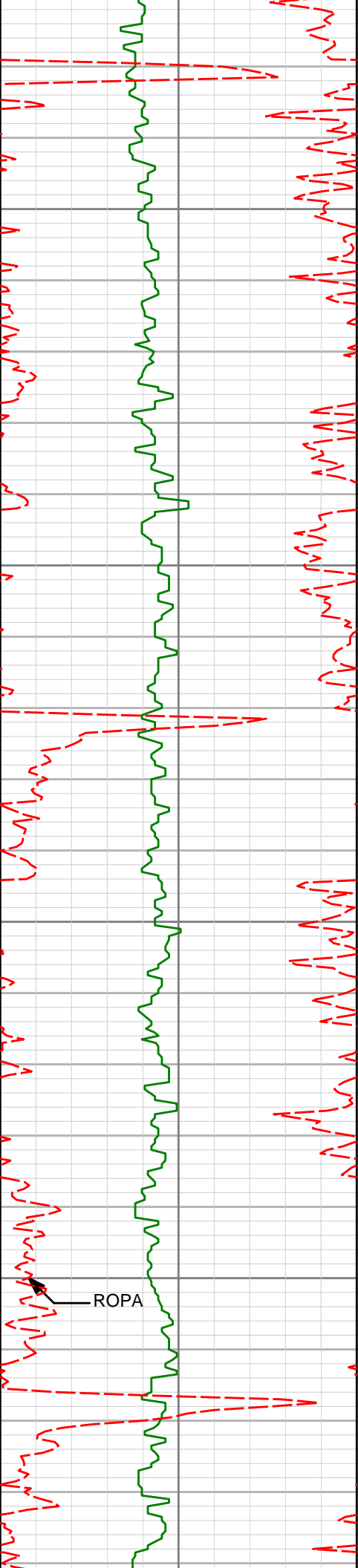
4178'

1.24°

282.08°

4175.96'

-2.48'



4250

4300

4350

4400

ROPA

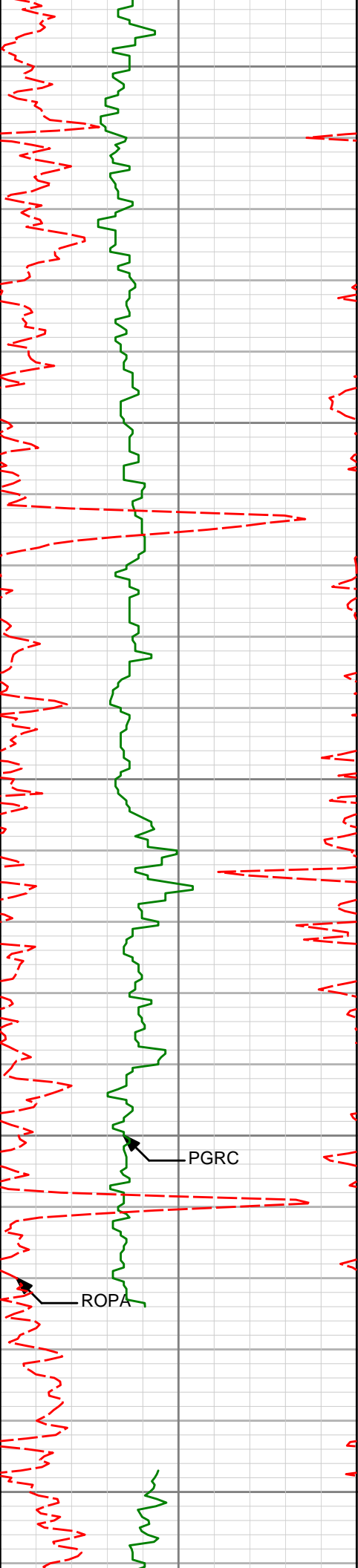
4273'

1.27°

288.48°

4270.94'

-3.03'



4450

4462'

1.25°

292.43°

4459.90'

-4.48'

4500

4550

4600

4650

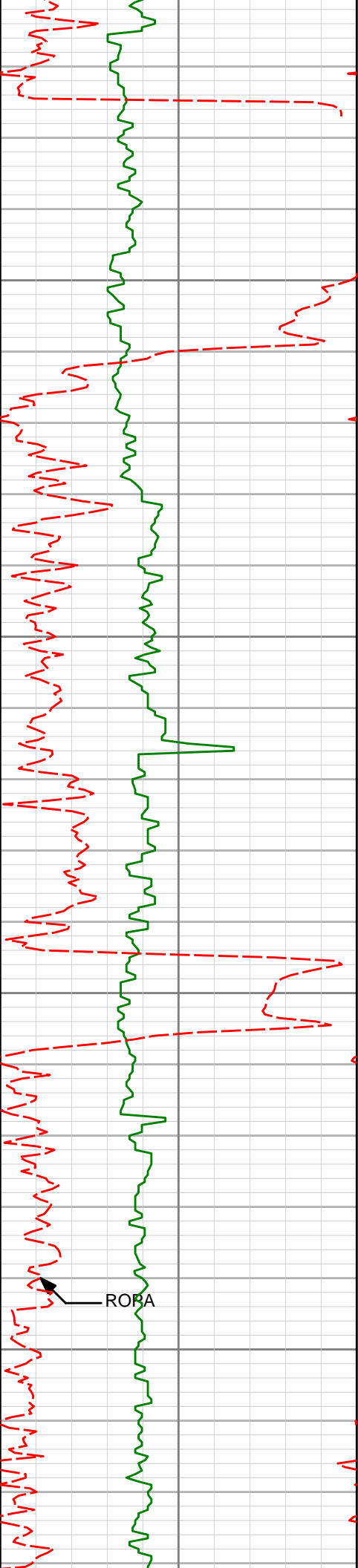
4651'

1.32°

316.42°

4648.85'

-6.85'



4700

4750

4800

4850

4746'

0.80°

307.64°

4743.83'

-8.05'

4841'

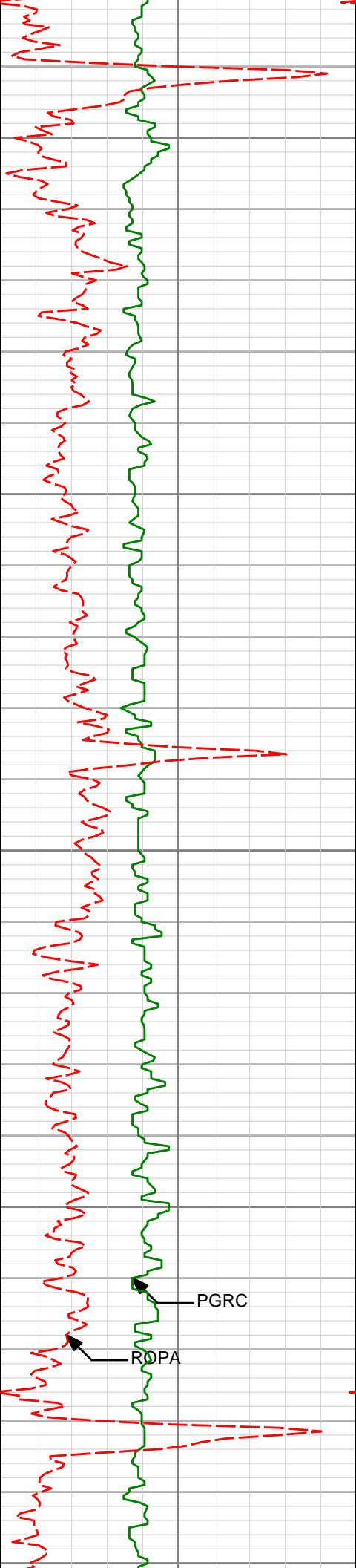
0.59°

133.26°

4838.83'

-8.12'

ROBA



4900

4950

5000

5050

5100

5030'

0.68°

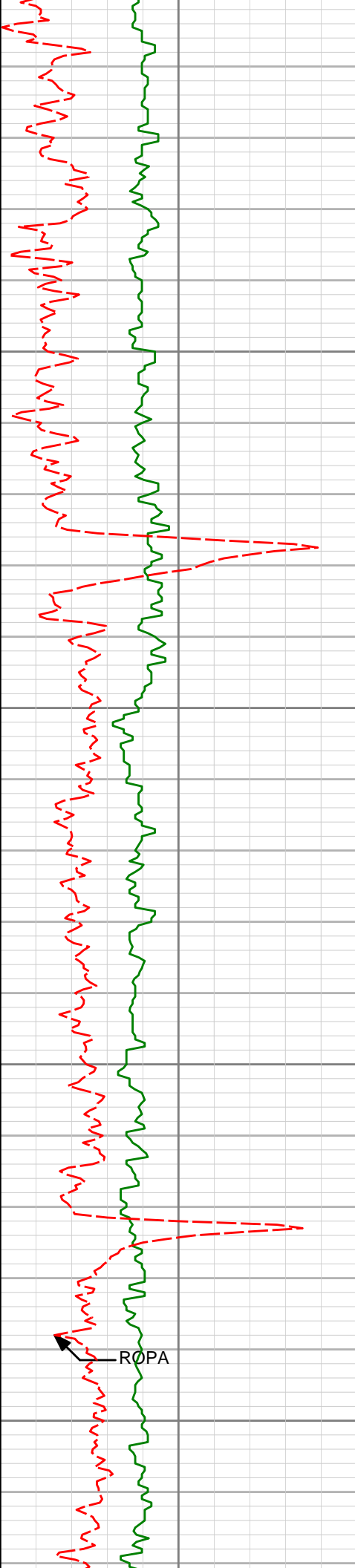
80.21°

5027.82'

-7.65'

PGRC

ROPA



5150

5200

5250

5300

5219'

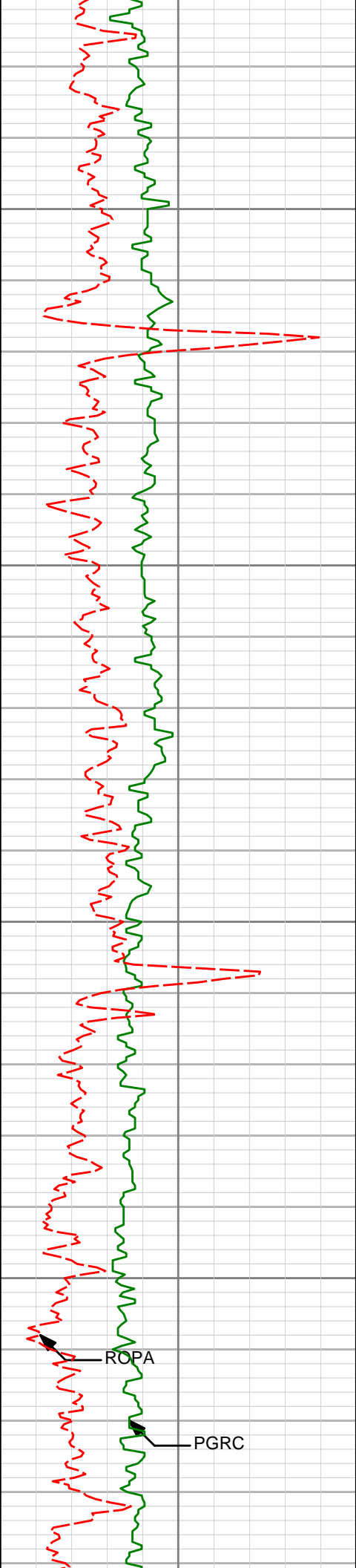
1.38°

38.57°

5216.79'

-9.62'

ROPA



5350

5400

5450

5500

5408'

1.03°

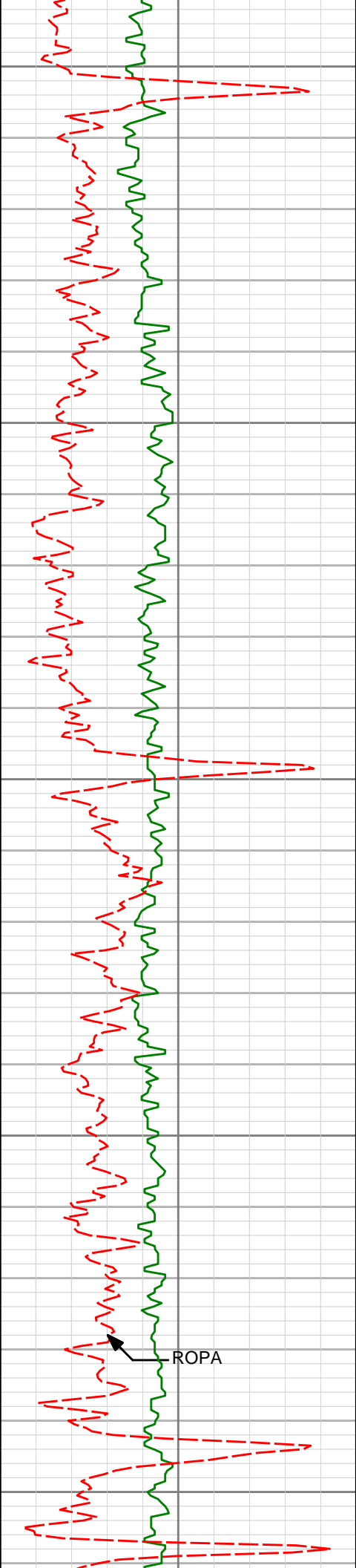
44.85°

5405.75'

-12.61'

ROPA

PGRC



5550

5600

5650

5700

5750

5597'

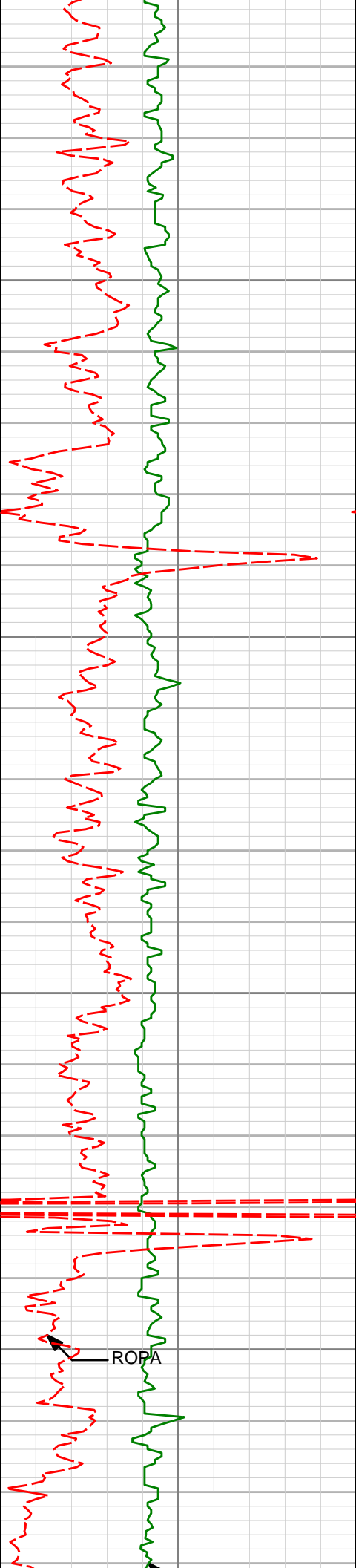
1.03°

65.47°

5594.72'

-14.52'

ROPA



5800

5850

5900

5950

5786'

0.25°

93.03°

5783.71'

-15.21'

5975'

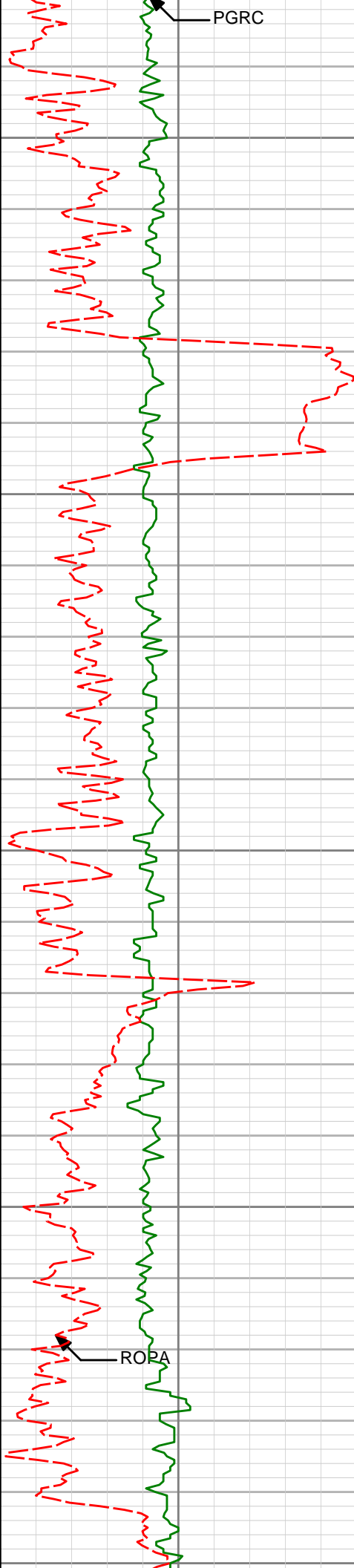
0.66°

67.13°

5972.70'

-15.61'

ROPA



6000

6050

6100

6150

6200

6070'

0.51°

11.63°

6067.70'

-16.24'

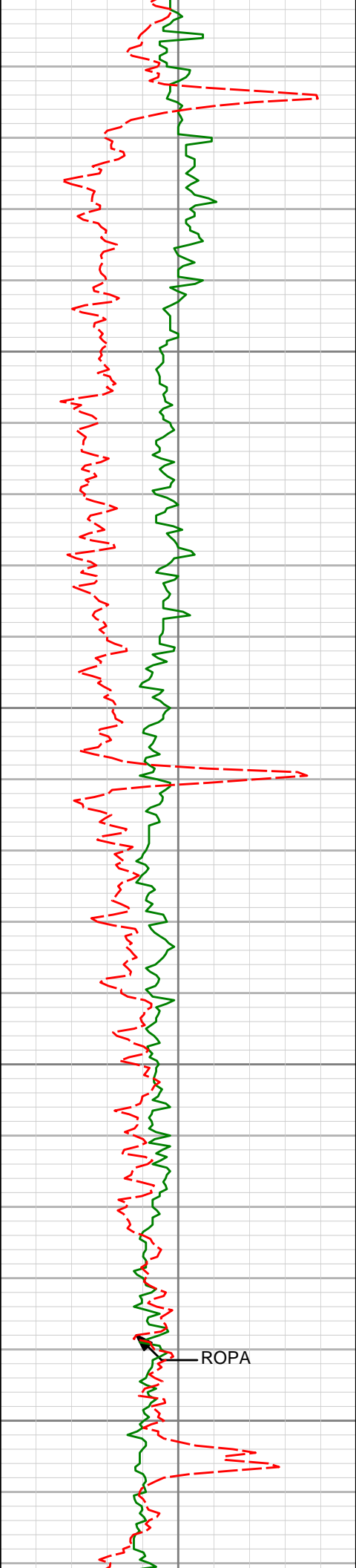
6165'

0.17°

84.01°

6162.69'

-16.67'



6250

6300

6350

6400

6354'

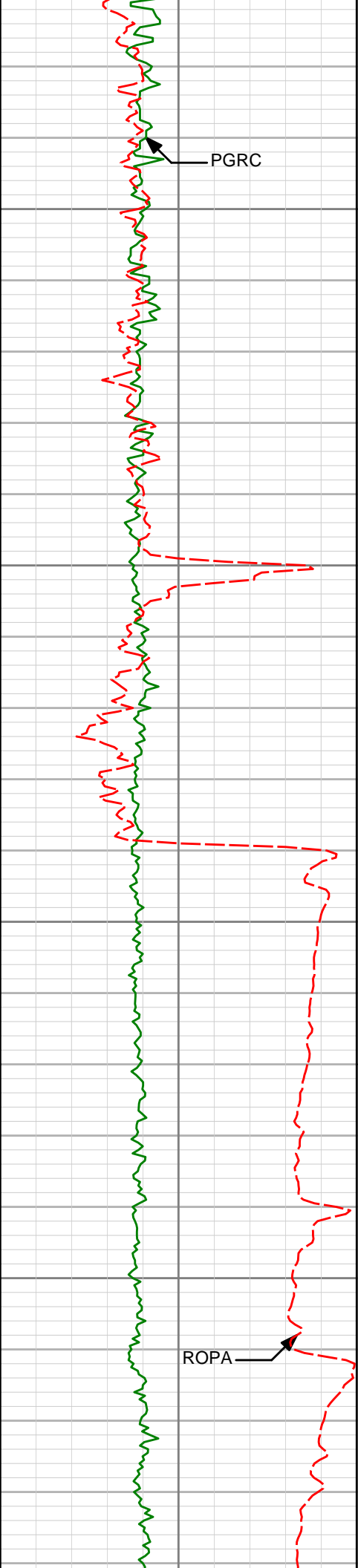
0.35°

85.93°

6351.69'

-16.74'

ROPA



6450

6492'

0.31°

160.49°

6489.69'

-16.41'

6500

6543'

1.32°

170.93°

6540.68'

-15.70'

6550

6575'

4.56°

180.45°

6572.64'

-14.06'

6600

6606'

6.87°

183.24°

6603.48'

-10.98'

6638'

9.20°

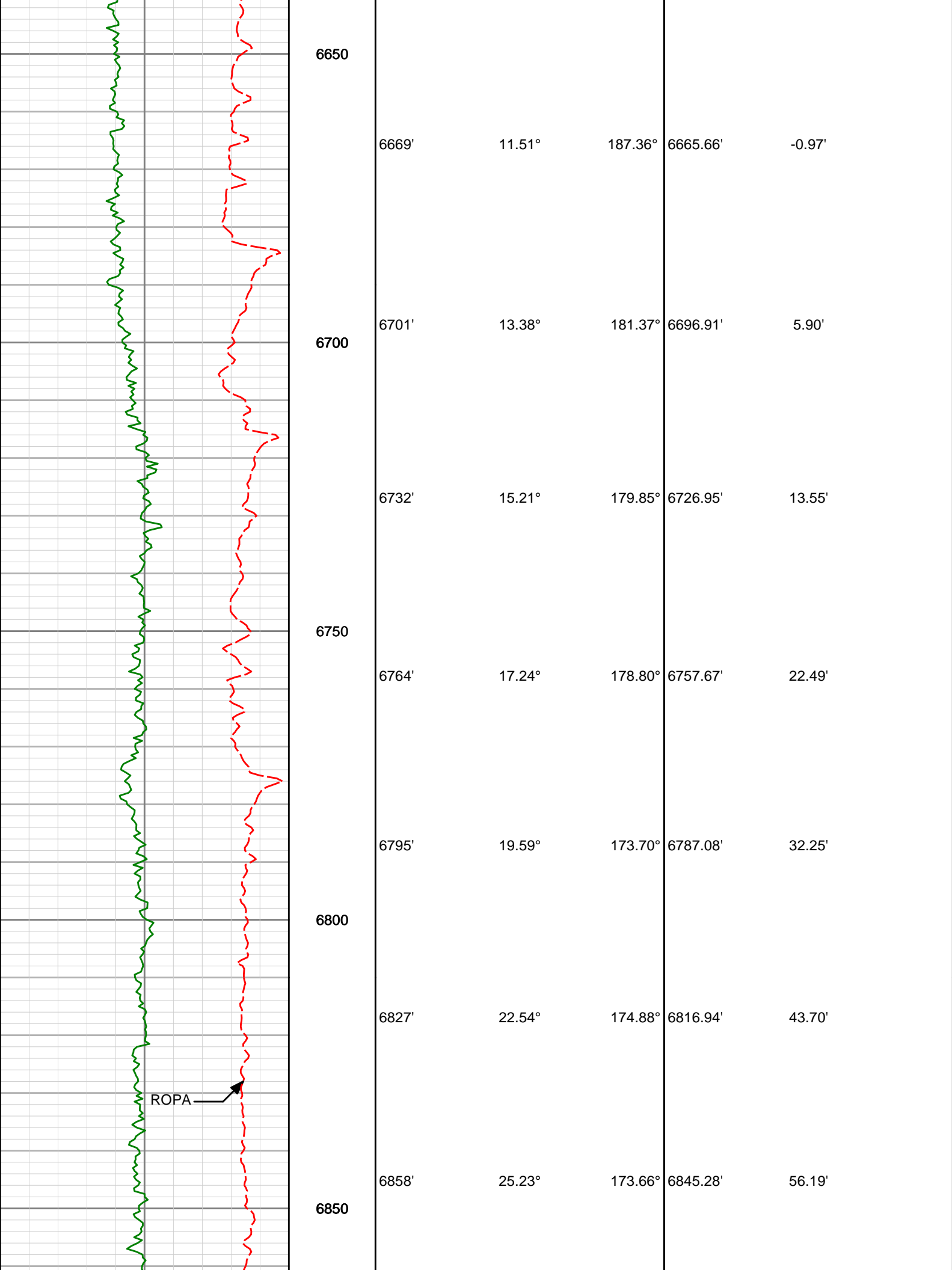
183.76°

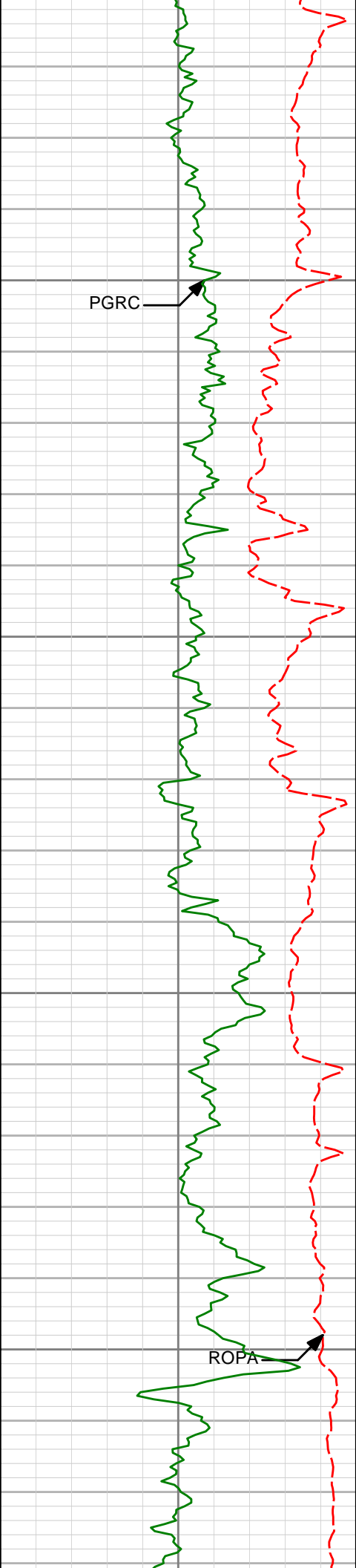
6635.17'

-6.51'

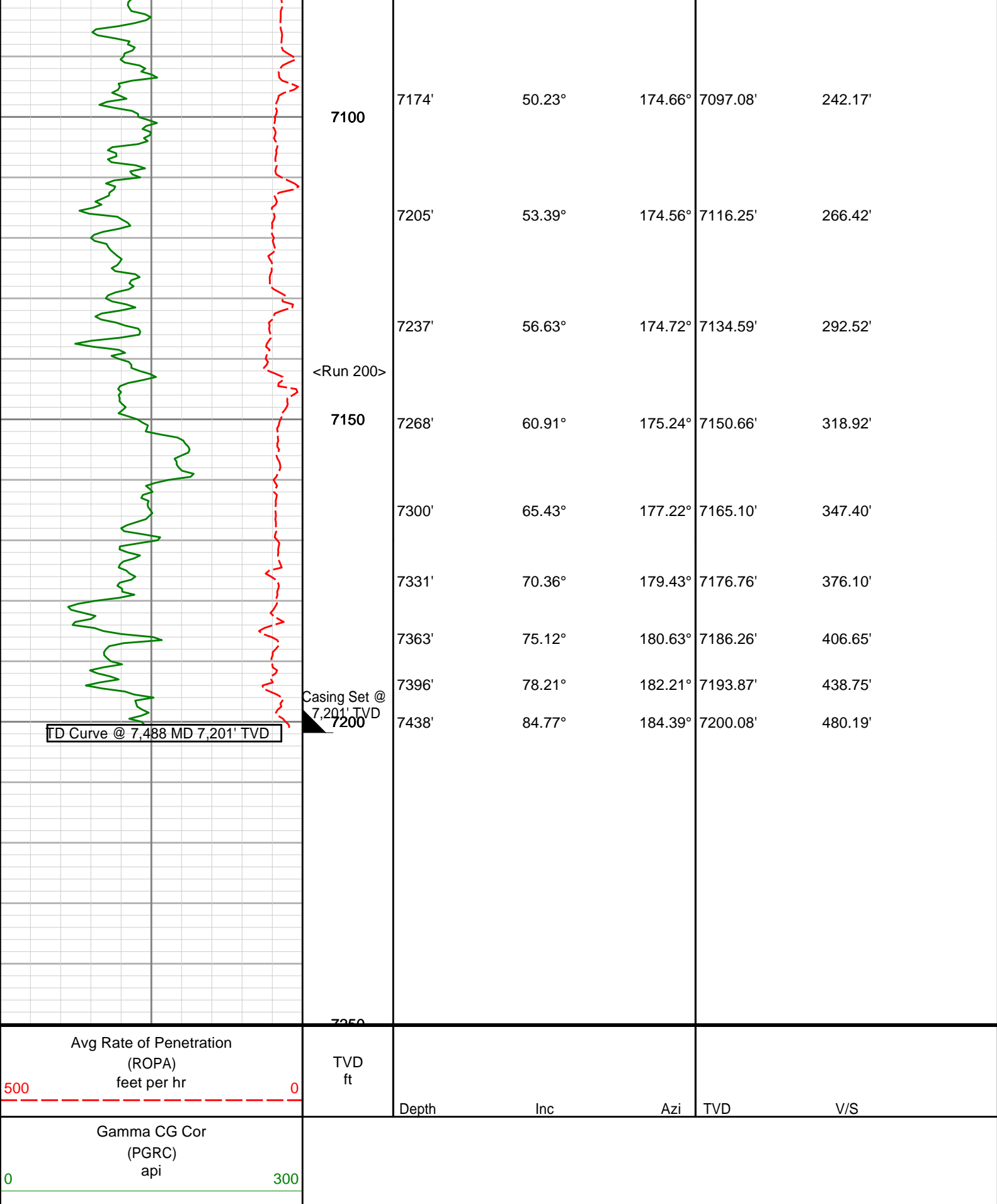
ROPA

PGRC





	6890'	27.39°	172.76°	6873.96'	70.27'
6900	6921'	29.61°	172.97°	6901.21'	84.94'
	6953'	31.29°	174.50°	6928.79'	101.06'
6950	6984'	33.79°	174.08°	6954.93'	117.65'
	7016'	35.75°	174.11°	6981.21'	135.80'
7000	7047'	38.22°	175.16°	7005.97'	154.36'
	7079'	40.82°	175.98°	7030.66'	174.66'
7050	7111'	43.85°	174.87°	7054.31'	196.14'
	7142'	47.34°	174.87°	7076.00'	218.20'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.
Crowder 16N-19HZ
Wattensburg
Weld Colorado
USA
CA-XX-0900118958

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
980.00	1.05	18.63	979.90	7.72 N	7.43 W	-7.72	TIE-IN
1110.00	0.74	32.97	1109.88	9.56 N	6.59 W	-9.56	
1202.00	1.49	307.07	1201.87	10.78 N	7.22 W	-10.78	
1294.00	1.65	269.68	1293.84	11.50 N	9.50 W	-11.50	
1386.00	1.59	230.00	1385.80	10.67 N	11.81 W	-10.67	
1539.00	1.27	228.87	1538.76	8.19 N	14.71 W	-8.19	0.21
1723.00	1.35	238.28	1722.71	5.70 N	18.10 W	-5.70	0.13
1907.00	1.36	254.57	1906.66	3.97 N	22.06 W	-3.97	0.21
2096.00	0.73	262.91	2095.63	3.23 N	25.41 W	-3.23	0.35
2285.00	0.83	229.12	2284.61	2.19 N	27.63 W	-2.19	0.24
2474.00	1.57	217.48	2473.57	0.77 S	30.24 W	0.77	0.41
2664.00	1.63	249.37	2663.50	3.79 S	34.36 W	3.79	0.46
2758.00	2.05	234.67	2757.45	5.23 S	36.98 W	5.23	0.66
2853.00	2.78	259.68	2852.37	6.62 S	40.63 W	6.62	1.33
2948.00	3.24	283.43	2947.24	6.41 S	45.51 W	6.41	1.39
3042.00	3.34	280.46	3041.08	5.30 S	50.78 W	5.30	0.21
3232.00	2.86	279.90	3230.81	3.48 S	60.88 W	3.48	0.25
3421.00	2.64	278.73	3419.59	2.01 S	69.82 W	2.01	0.12
3611.00	2.83	279.65	3609.37	0.56 S	78.77 W	0.56	0.10
3800.00	2.44	259.52	3798.17	0.51 S	87.33 W	0.51	0.53
3895.00	2.36	264.65	3893.09	1.06 S	91.27 W	1.06	0.24
3989.00	2.20	317.80	3987.03	0.10 N	94.40 W	-0.10	2.17
4084.00	1.18	294.76	4081.99	1.86 N	96.52 W	-1.86	1.27
4178.00	1.24	282.08	4175.96	2.48 N	98.39 W	-2.48	0.29
4273.00	1.27	288.48	4270.94	3.03 N	100.40 W	-3.03	0.15
4462.00	1.25	292.43	4459.90	4.48 N	104.30 W	-4.48	0.05
4651.00	1.32	316.42	4648.85	6.85 N	107.71 W	-6.85	0.29
4746.00	0.80	307.64	4743.83	8.05 N	108.99 W	-8.05	0.58
4841.00	0.59	133.26	4838.83	8.12 N	109.16 W	-8.12	1.46
5030.00	0.68	80.21	5027.82	7.65 N	107.35 W	-7.65	0.30
5219.00	1.38	38.57	5216.79	9.62 N	104.83 W	-9.62	0.52
5408.00	1.03	44.85	5405.75	12.61 N	102.21 W	-12.61	0.19
5597.00	1.03	65.47	5594.72	14.52 N	99.45 W	-14.52	0.20
5786.00	0.25	93.03	5783.71	15.21 N	97.48 W	-15.21	0.43
5975.00	0.66	67.13	5972.70	15.61 N	96.06 W	-15.61	0.24
6070.00	0.51	11.63	6067.70	16.24 N	95.47 W	-16.24	0.59
6165.00	0.17	84.01	6162.69	16.67 N	95.25 W	-16.67	0.51
6354.00	0.35	85.93	6351.69	16.74 N	94.40 W	-16.74	0.10
6492.00	0.31	160.49	6489.69	16.41 N	93.85 W	-16.41	0.29
6543.00	1.32	170.93	6540.68	15.70 N	93.71 W	-15.70	1.98
6575.00	4.56	180.45	6572.64	14.06 N	93.66 W	-14.06	10.23
6606.00	6.87	183.24	6603.48	10.98 N	93.78 W	-10.98	7.51
6638.00	9.20	183.76	6635.17	6.51 N	94.05 W	-6.51	7.28
6669.00	11.51	187.36	6665.66	0.97 N	94.61 W	-0.97	7.74
6701.00	13.38	181.37	6696.91	5.90 S	95.11 W	5.90	7.08
6732.00	15.21	179.85	6726.95	13.55 S	95.19 W	13.55	6.05
6764.00	17.24	178.80	6757.67	22.49 S	95.08 W	22.49	6.38
6795.00	19.59	173.70	6787.08	32.25 S	94.41 W	32.25	9.21
6827.00	22.54	174.88	6816.94	43.70 S	93.27 W	43.70	9.31
6858.00	25.23	173.66	6845.28	56.19 S	92.01 W	56.19	8.82
6890.00	27.39	172.76	6873.96	70.27 S	90.33 W	70.27	6.85
6921.00	29.61	172.97	6901.21	84.94 S	88.50 W	84.94	7.16
6953.00	31.29	174.50	6928.79	101.06 S	86.73 W	101.06	5.79
6984.00	33.79	174.08	6954.93	117.65 S	85.07 W	117.65	8.10
7016.00	35.75	174.11	6981.21	135.80 S	83.19 W	135.80	6.11
7047.00	38.22	175.16	7005.97	154.36 S	81.45 W	154.36	8.23
7079.00	40.82	175.98	7030.66	174.66 S	79.88 W	174.66	8.30
7111.00	43.85	174.87	7054.31	196.14 S	78.16 W	196.14	9.75
7142.00	47.34	174.87	7076.00	218.20 S	76.18 W	218.20	11.26
7174.00	50.23	174.66	7097.08	242.17 S	73.98 W	242.17	9.05

7205.00	53.39	174.56	7116.25	266.42 S	71.69 W	266.42	10.19
7237.00	56.63	174.72	7134.59	292.52 S	69.24 W	292.52	10.13
7268.00	60.91	175.24	7150.66	318.92 S	66.93 W	318.92	13.90
7300.00	65.43	177.22	7165.10	347.40 S	65.06 W	347.40	15.16
7331.00	70.36	179.43	7176.76	376.10 S	64.23 W	376.10	17.23
7363.00	75.12	180.63	7186.26	406.65 S	64.26 W	406.65	15.28
7396.00	78.21	182.21	7193.87	438.75 S	65.05 W	438.75	10.45
7438.00	84.77	184.39	7200.08	480.19 S	67.45 W	480.19	16.45

<p> 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 180.00 DEGREES (TRUE) A TOTAL CORRECTION OF 8.63 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD. HORIZONTAL DISPLACEMENT(CLOSURE) AT 7438.00 FEET IS 484.90 FEET ALONG 188.00 DEGREES (TRUE) </p>							
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