



1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	16-Aug-13	17-Aug-13			
Rig Bit Number	100	200			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (MD, ft)	585.00	7,267.00			
Log End Depth (MD, ft)	7,267.00	7,862.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	13-Aug-13 15:22	14-Aug-13 17:41			
Drill/Wipe End Date and Time	13-Aug-13 15:22	14-Aug-13 17:41			
Min Inc (deg) @ Depth (MD, ft)	.68 @ 1,012.00	39.96 @ 7,309.00			
Max Inc (deg) @ Depth (MD, ft)	25.06 @ 7,166.00	83.56 @ 7,813.00			
Bit TFA(in2) / Bit Type	.97 / PDC	.97 / PDC			
Flow Rate (gpm)	595.73	520.00			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.80 / 43.00	9.80 / 45.00			
Filtrate CL (ppm)	1,800.00	1,800.00			
pH / Fluid Loss (mptm)	9.30 / 5	9.30 / 5			
PV (cP) / YP (lbf2)	13 / 12.00	13 / 13.00			
% Solids / % Sand	7.7 / 3	7 / 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) / S	122.22 / 122	122.22 / 122			

Max Tool Temp (degF) / Source	120.00 / 120	120.00 / 120			
Rm @ Max Tool Temp (degF)	N/A @ 120.00	N/A @ 120.00			
Lead MWD Engineer	Patrick Lane	Patrick Lane			
Customer Representative	Stan Walters	Stan Walters			

SENSOR INFORMATION

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	51.06	46.56			
Software Version	6.21	6.21			
Sub Serial Number	11341332	11341332			
Sonde Serial Number	11638536	11062040			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	208.34	37.89			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	56.01	51.51			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341332	11341332			
Insert/Sonde Serial Number	11680969	11293337			

Pulser Controller Sensor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
PIC Software Version	1.40	1.40			
Sub/HOC Serial Number	11341332	11341332			
Insert/Probe/Module SN	11680772	11145558			
Battery Serial Number	N/A	N/A			
Valve Insert SN	N/A	N/A			
DC Insert Serial Number	N/A	N/A			
Choke Size (32nd)	N/A	N/A			
Driver Current (amps)	N/A	N/A			
Driver SMI Current (amps)	N/A	N/A			
Boot Strap Version	4,130.00	4,130.00			

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

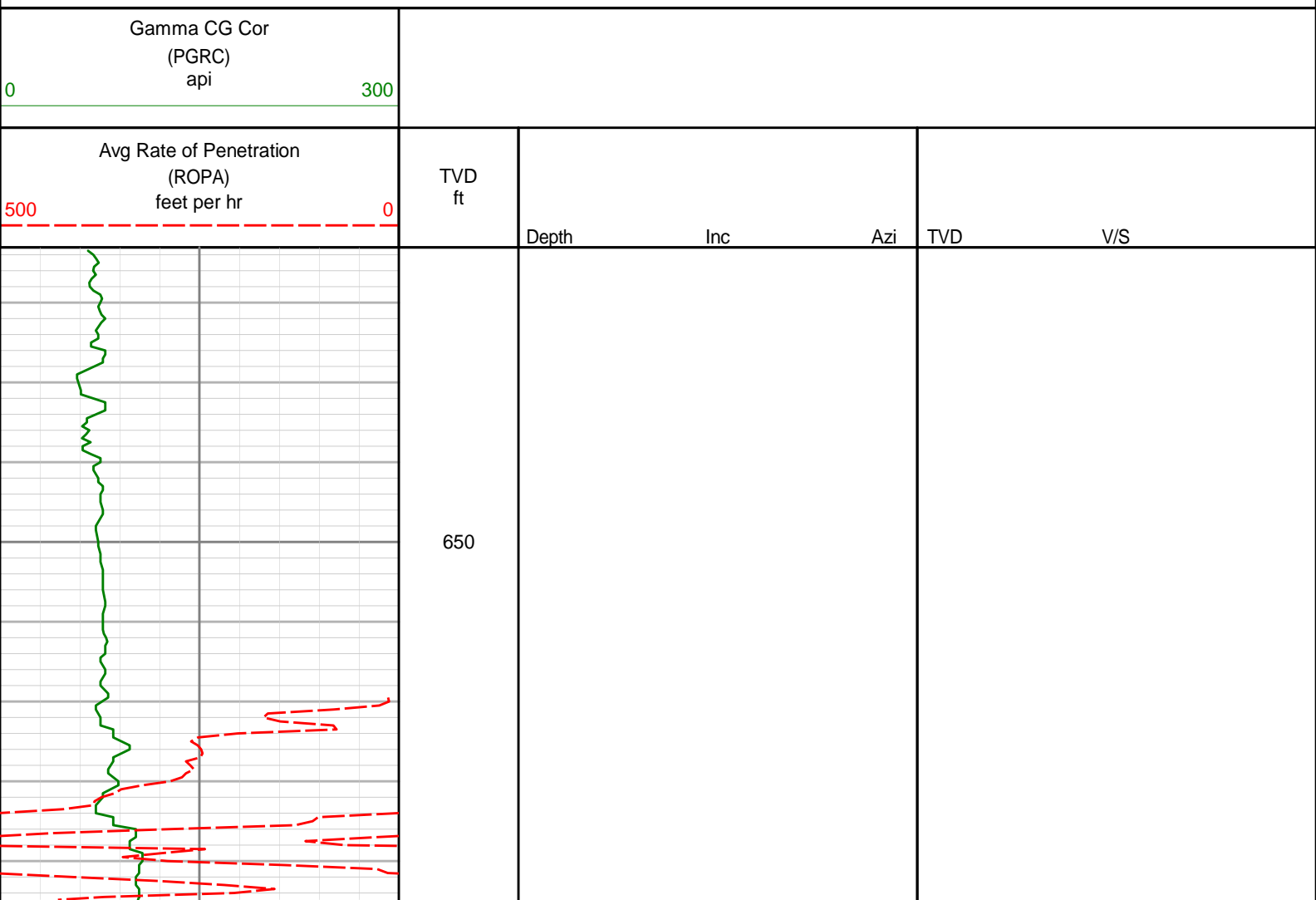
Gap Fill: 3.0 ft

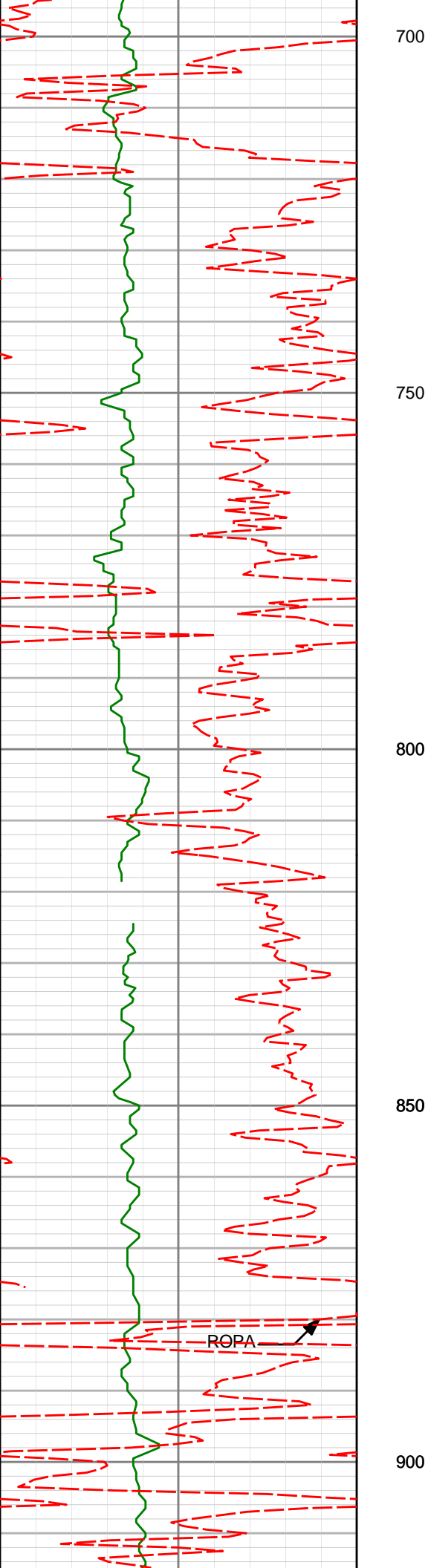
WARRANTY

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1:240 TVD Detail Log





737'

2.04°

219.12°

736.94'

3.46'

829'

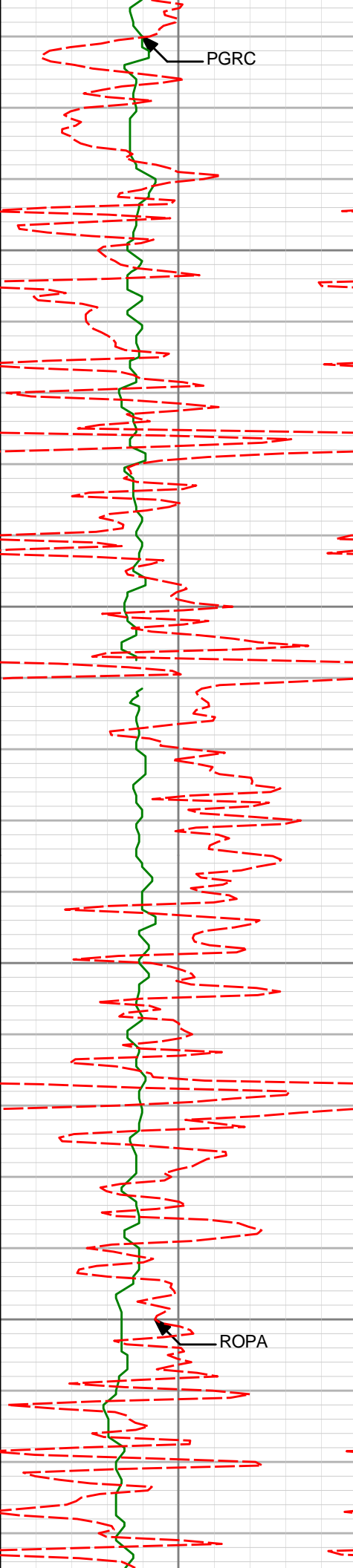
1.99°

215.77°

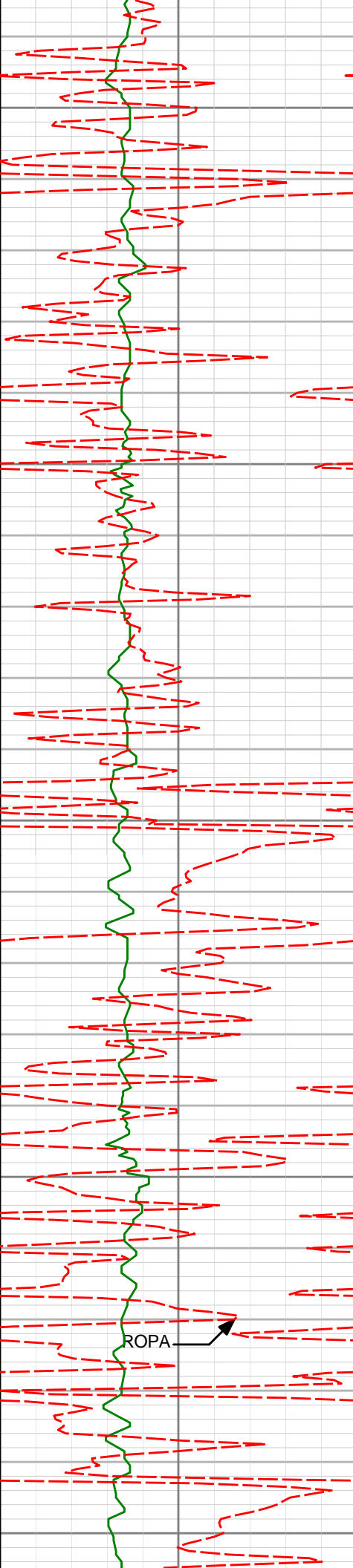
828.88'

5.42'

ROPA



920'	0.96°	240.73°	919.85'	7.01'
950				
1000				
1012'	0.68°	258.35°	1011.84'	8.21'
1050				
1100				
1104'	0.75°	262.56°	1103.83'	9.34'



1150

1200

1250

1300

1350

1196'

0.76°

266.17°

1195.82'

10.55'

1287'

2.38°

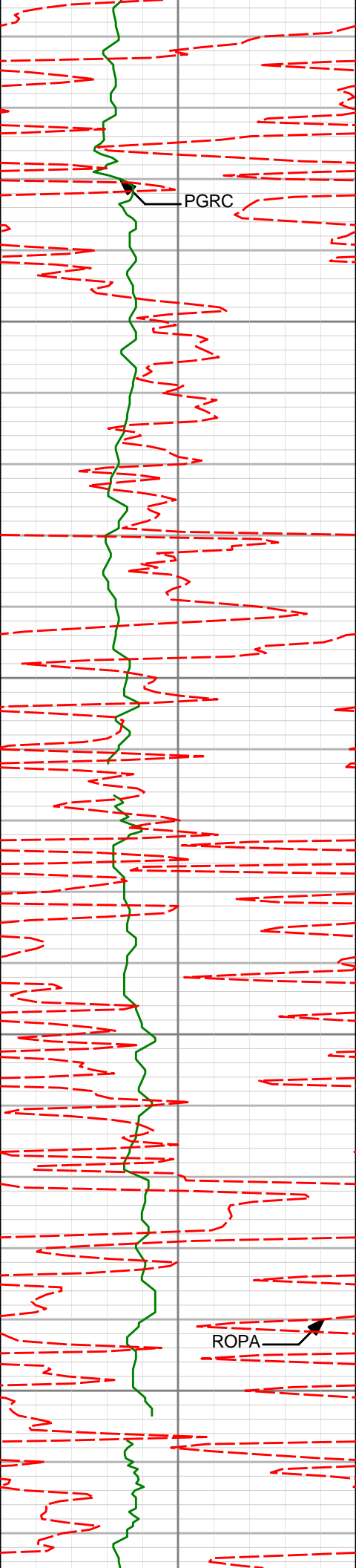
0.82°

1286.80'

11.13'

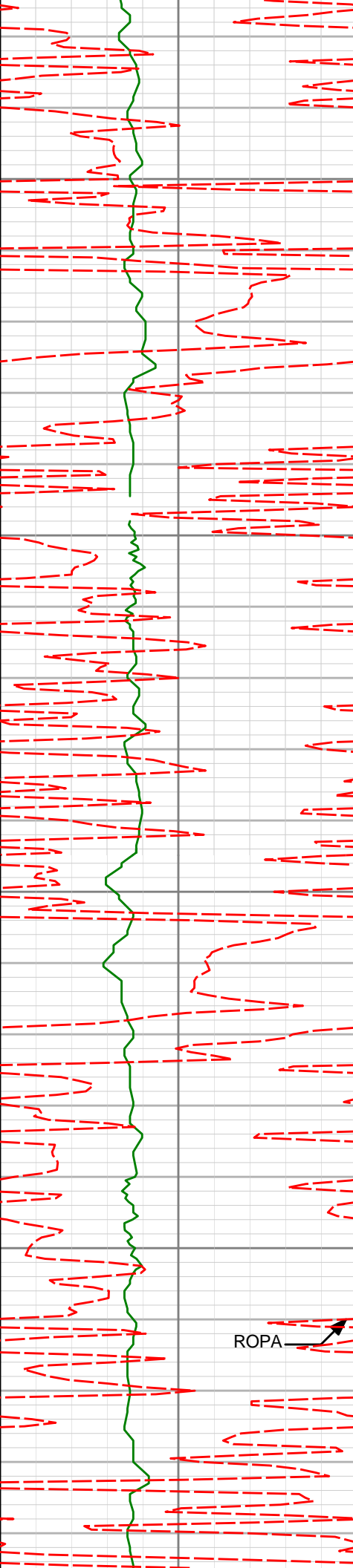
ROPA





PGRC

ROPA



1600

1650

1700

1750

1654'

7.10°

6.43°

1652.18'

7.02'

1746'

9.00°

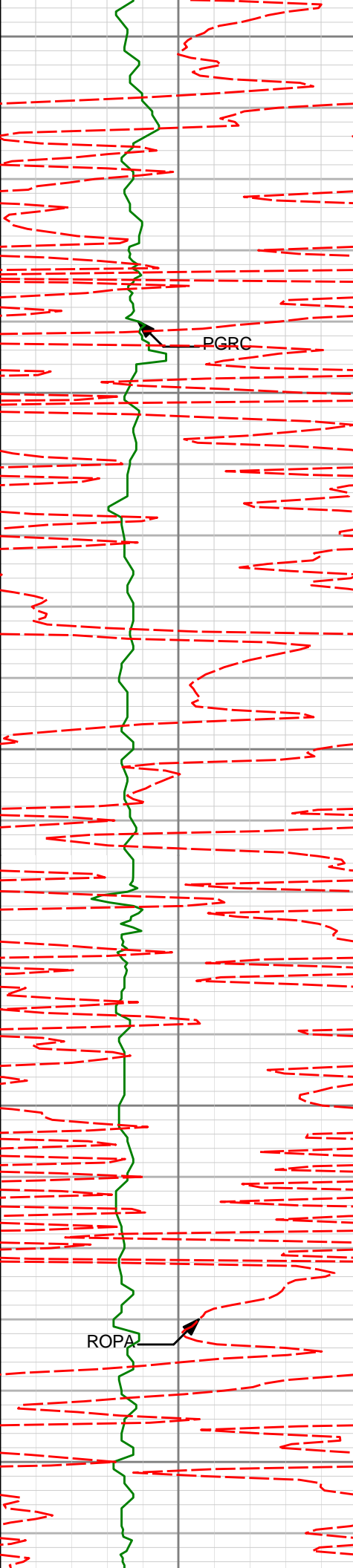
16.29°

1743.28'

4.39'

ROPA





1800

1838'

11.35°

17.24°

1833.82'

-0.28'

PGRC

1850

1900

1929'

12.78°

14.83°

1922.81'

-5.48'

1950

ROPA

2000

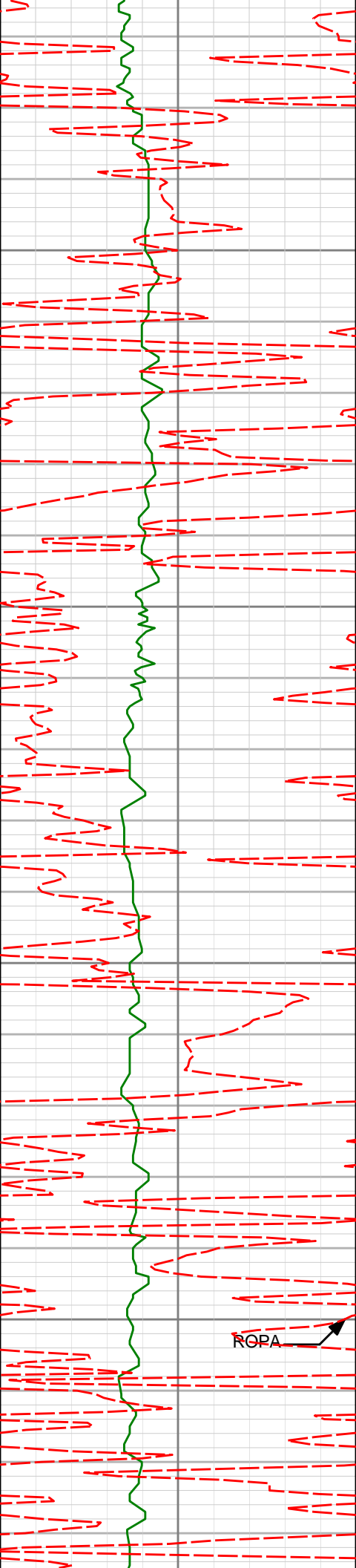
2021'

13.87°

12.15°

2012.33'

-10.36'



2050

2100

2150

2200

2113'

13.31°

6.81°

2101.76'

-13.89'

2204'

14.18°

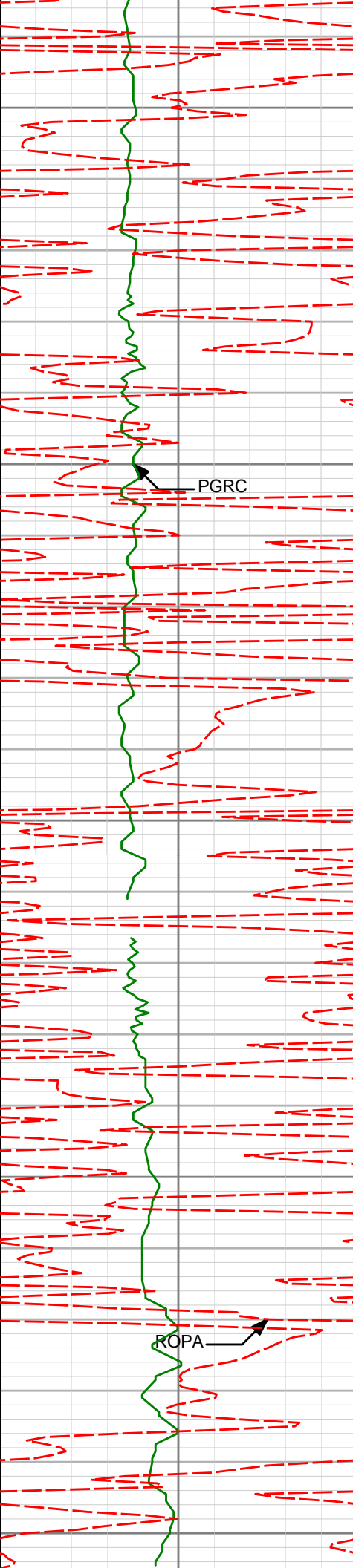
8.82°

2190.16'

-16.80'

ROPA





2250

2295'

12.86°

5.13°

2278.63'

-19.37'

2300

PGRC

2350

2387'

12.87°

7.83°

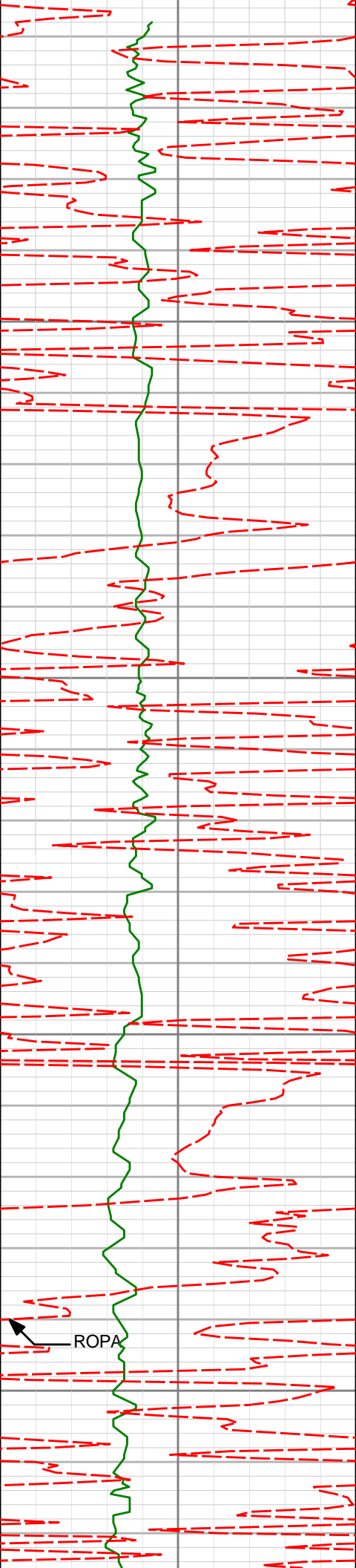
2368.32'

-21.63'

2400

ROPA

2450



2482'

13.30°

9.61°

2460.86'

-24.85'

2500

2550

2577'

13.53°

16.17°

2553.27'

-29.72'

2600

2650

2672'

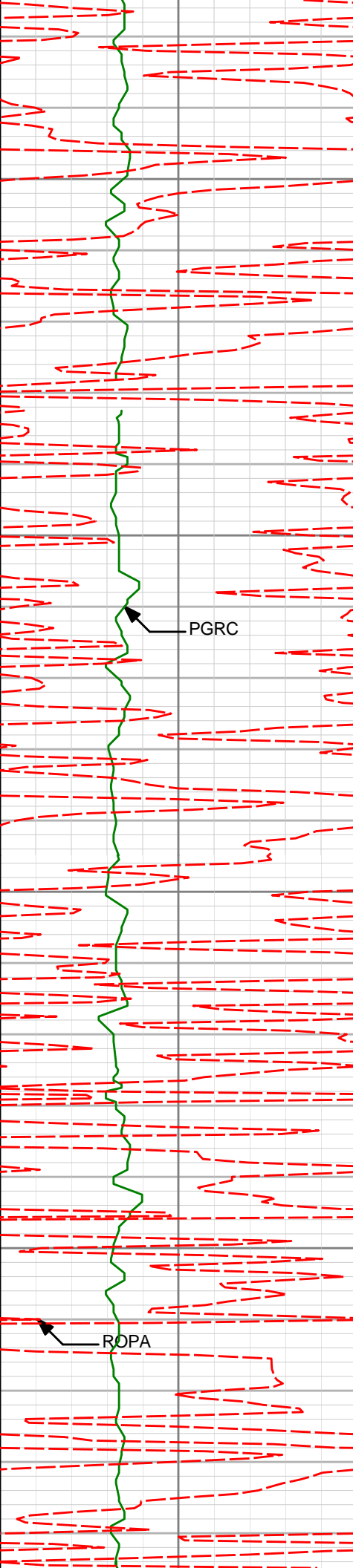
15.21°

20.88°

2645.30'

-37.22'

ROPA



2700

2750

2800

2850

PGRC

ROPA

2766'

15.20°

20.45°

2736.01'

-45.88°

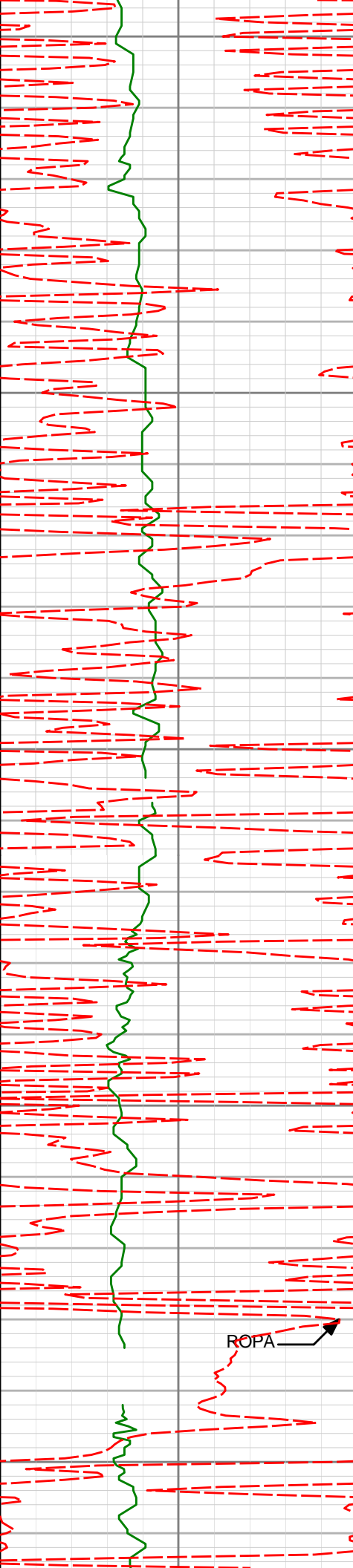
2861'

15.10°

18.94°

2827.71'

-54.20°



2900

2956'

15.14°

17.40°

2919.42'

-61.88'

2950

3000

3051'

12.94°

15.44°

3011.58'

-68.38'

3050

ROPA

3100

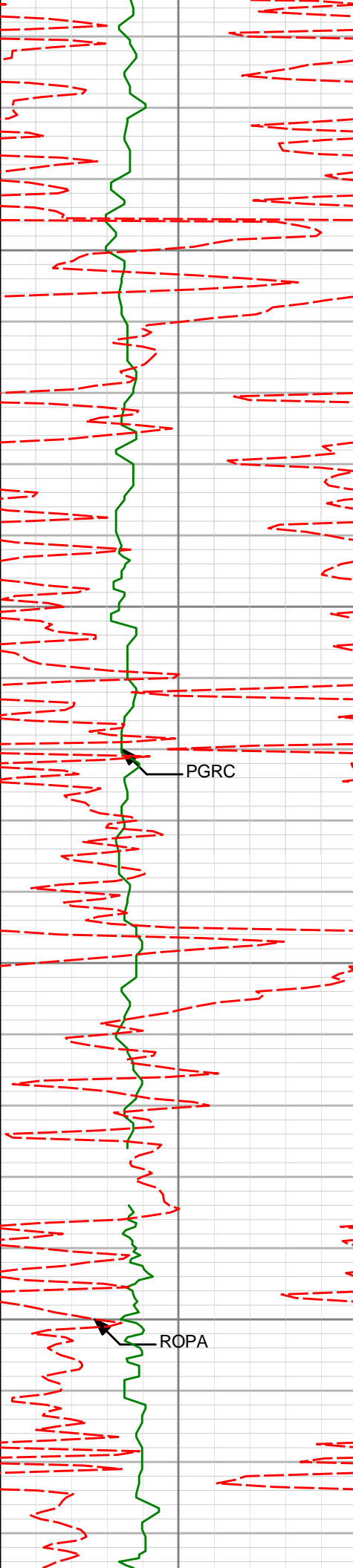
3146'

14.62°

18.45°

3103.84'

-74.97'



3150

3200

3250

3300

PGRC

ROPA

3240'

12.45°

16.97°

3195.22'

-81.64'

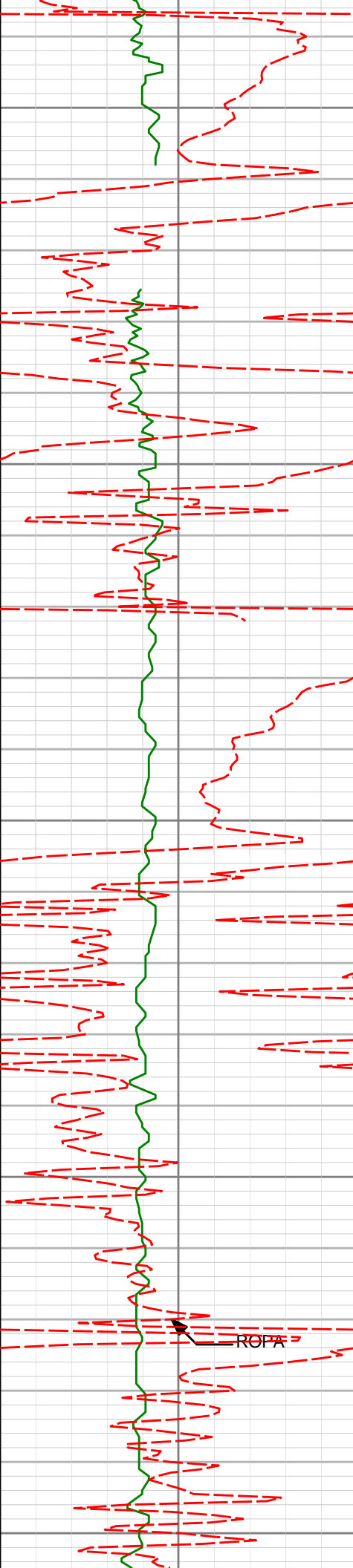
3335'

9.87°

15.29°

3288.42'

-86.74'



3350

3430'

11.89°

16.65°

3381.71'

-91.66'

3400

3450

3525'

14.66°

16.53°

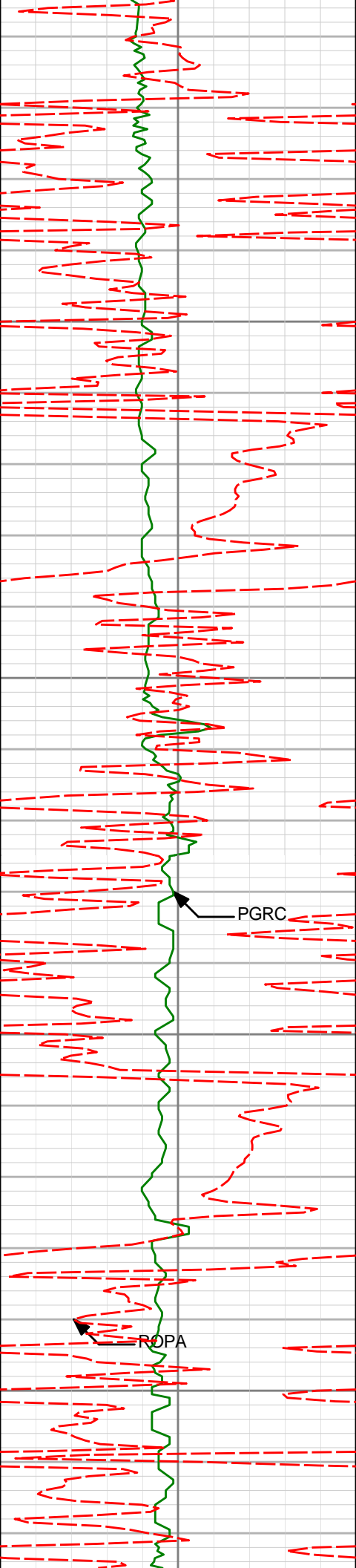
3474.16'

-97.84'

3500

3550

ROPA



3620'

11.85°

11.33°

3566.62'

-103.13'

3600

3650

3715'

12.72°

4.99°

3659.45'

-105.91'

PGRC

3700

ROPA

3750

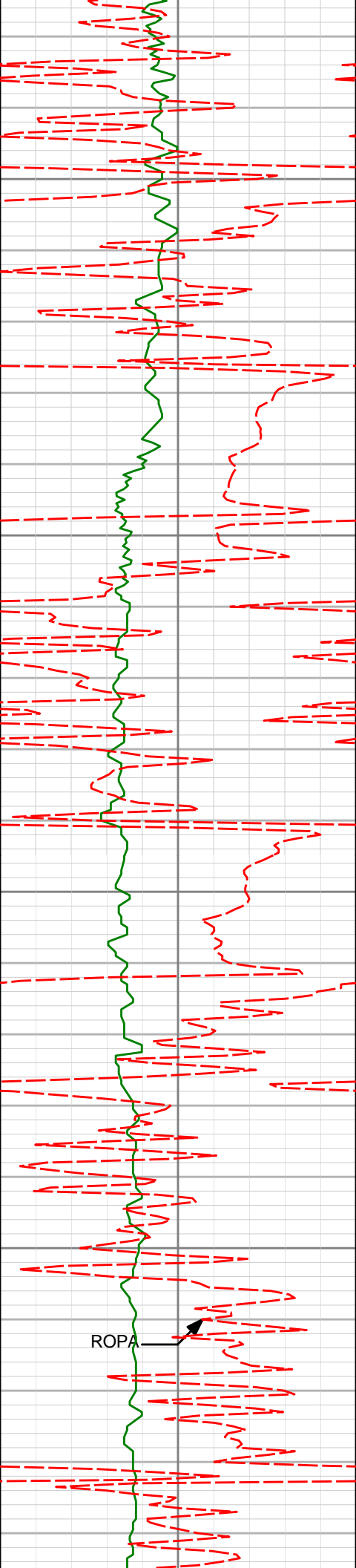
3805'

12.52°

12.55°

3747.28'

-108.85'



3800

3899'

13.05°

14.93°

3838.95'

-113.76'

3850

3900

3994'

17.88°

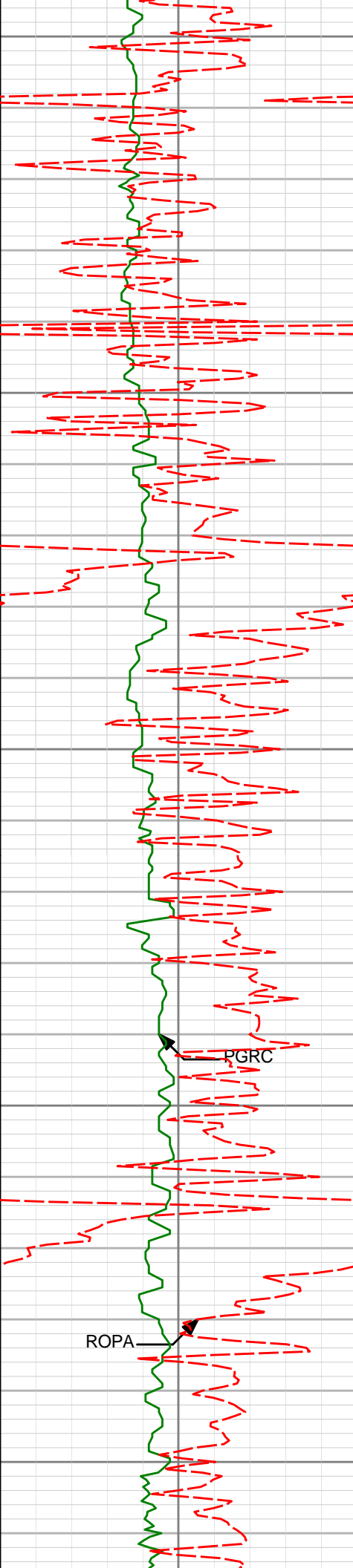
15.96°

3930.49'

-120.48'

3950

ROPA



4000

4088'

16.93°

13.95°

4020.18'

-127.70'

4050

4100

4183'

15.85°

12.43°

4111.32'

-133.78'

4150

ROPA

4200

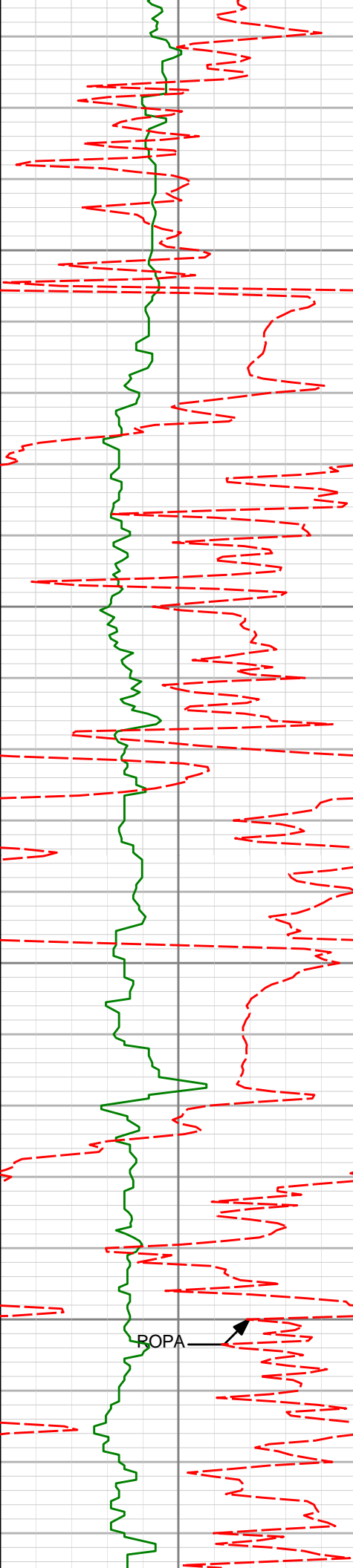
4278'

13.54°

12.75°

4203.21'

-138.97'



4250

4300

4350

4400

ROPA

4372'

13.35°

11.28°

4294.63'

-143.48'

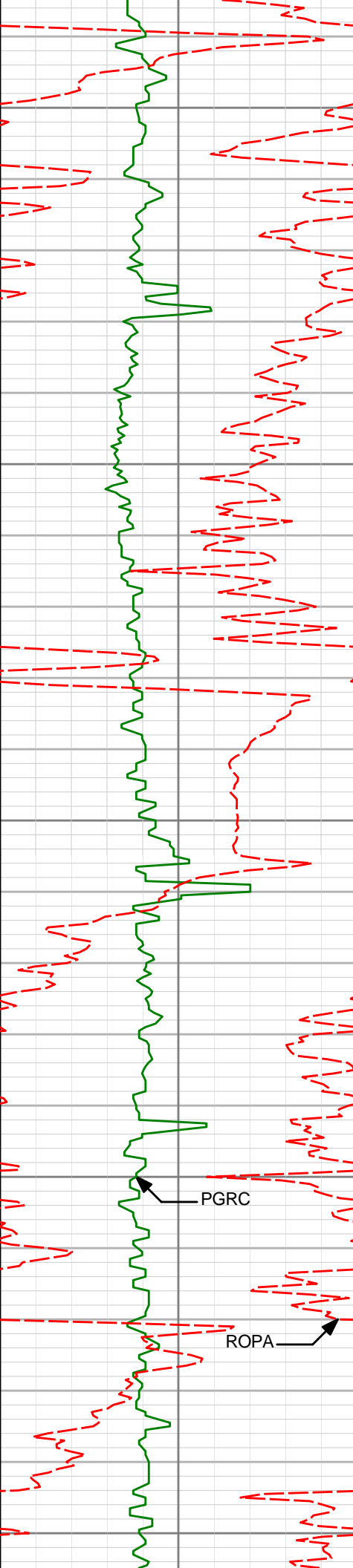
4467'

14.65°

15.10°

4386.81'

-148.71'



4450

4500

4550

4600

4650

4561'

12.66°

11.99°

4478.15'

-153.90'

4656'

14.78°

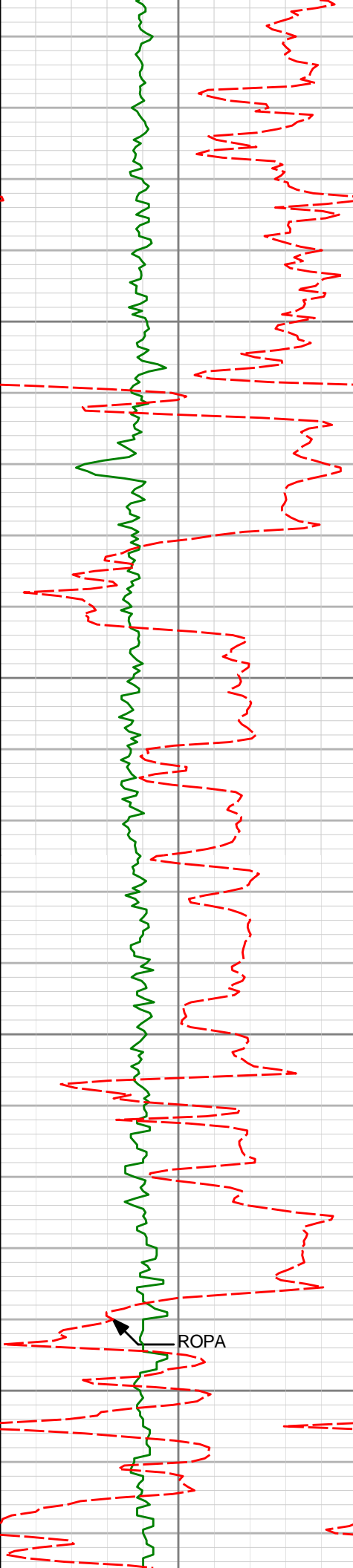
18.15°

4570.44'

-159.80'

PGRC

ROPA



4700

4750

4800

4850

4751'

14.19°

18.05°

4662.42'

-167.14'

4845'

15.15°

19.95°

4753.35'

-174.86'

4940'

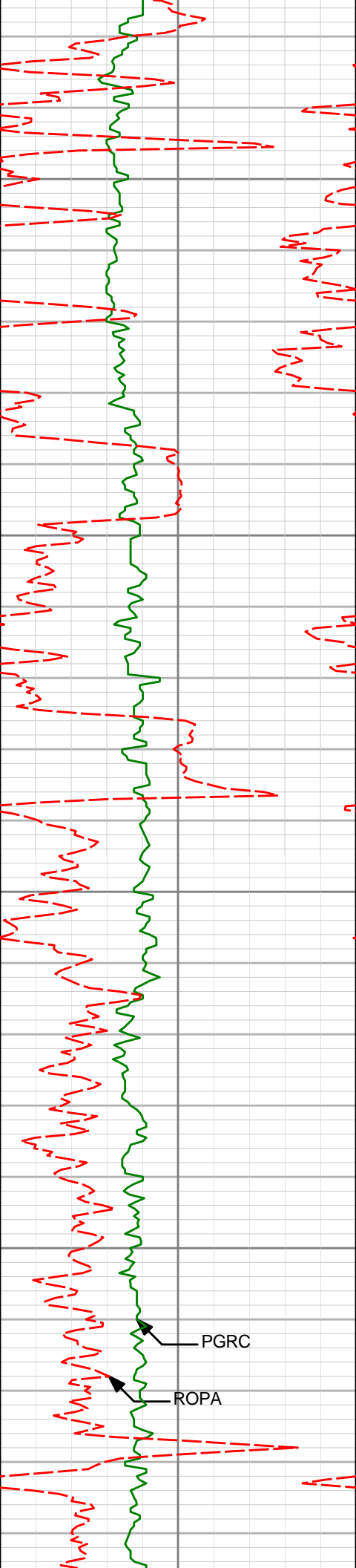
15.41°

13.40°

4845.00'

-181.97'

ROPA



4900

4950

5000

5050

5034'

15.63°

12.33°

4935.57'

-187.52'

5129'

14.32°

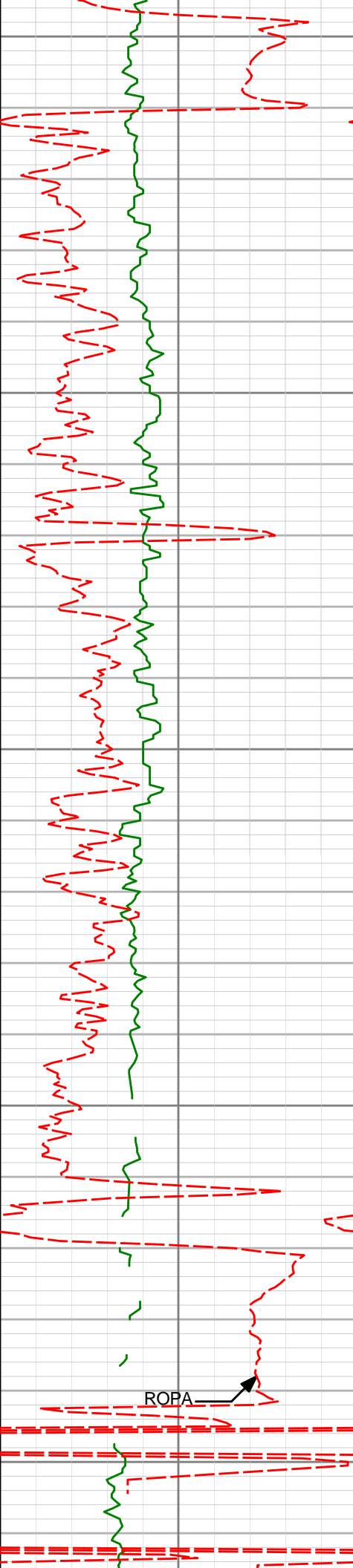
10.73°

5027.35'

-192.39'

PGRC

ROPA



5100

5223'

14.46°

11.27°

5118.40'

-196.79'

5150

5200

5318'

12.63°

8.81°

5210.75'

-200.65'

5250

ROPA

5300

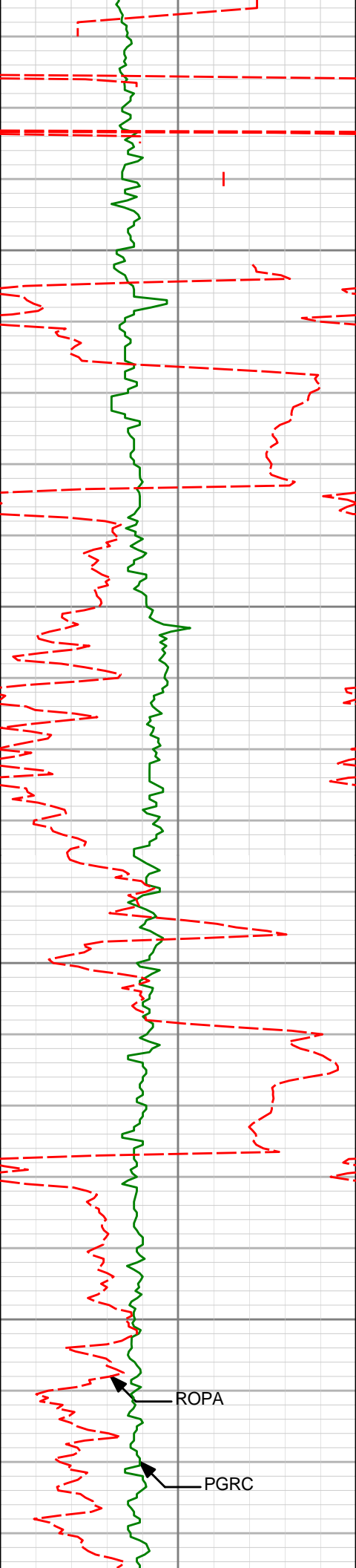
5413'

13.48°

12.64°

5303.30'

-204.62'



5350

5400

5450

5500

ROPA

PGRC

5507'

14.01°

12.93°

5394.60'

-209.52'

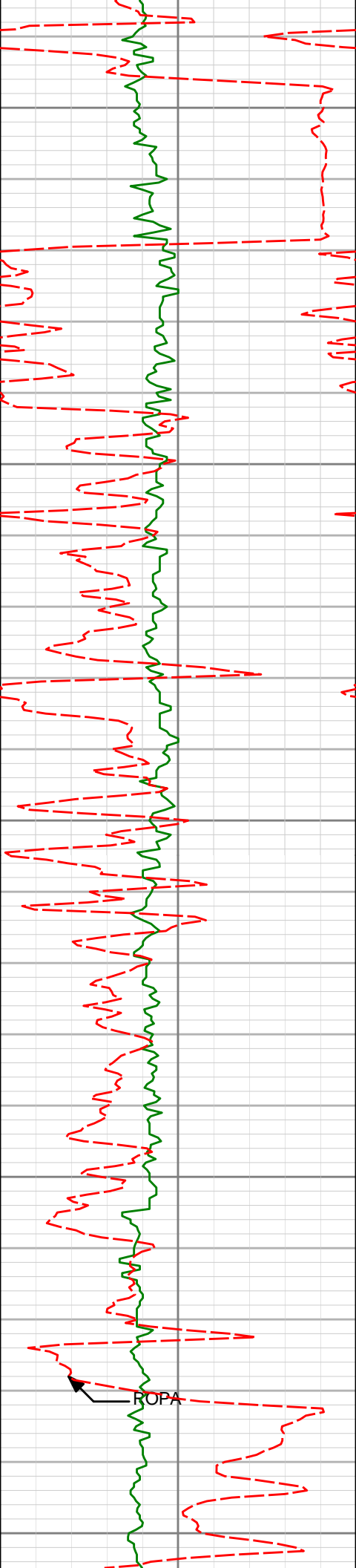
5602'

13.37°

9.82°

5486.91'

-213.92'



5550

5696'

14.47°

12.72°

5578.15'

-218.31'

5600

5650

5790'

11.91°

8.81°

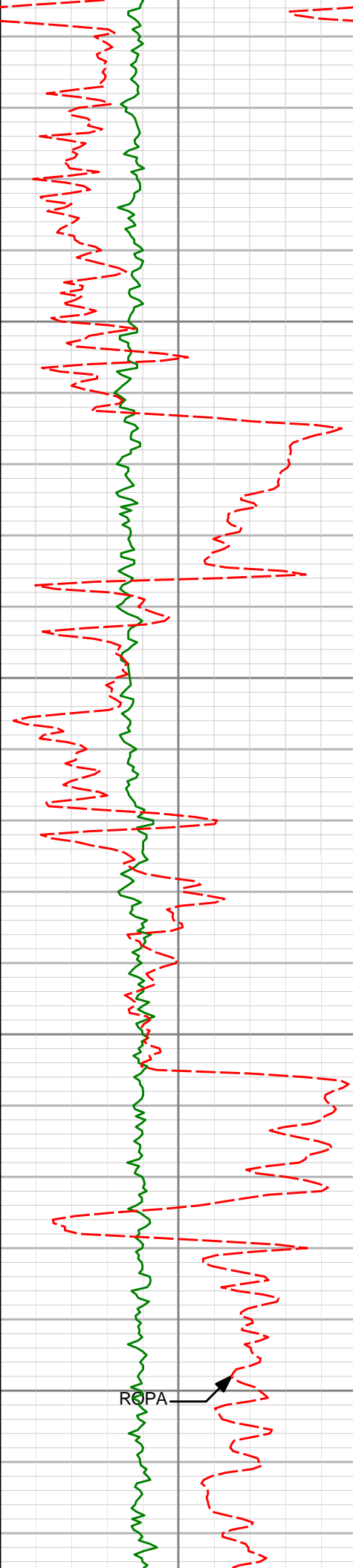
5669.66'

-222.34'

5700

5750

ROPA



5800

5850

5900

5950

5885'

11.81°

3.87°

5762.63'

-224.45'

5981'

12.37°

1.88°

5856.51'

-225.40'

6075'

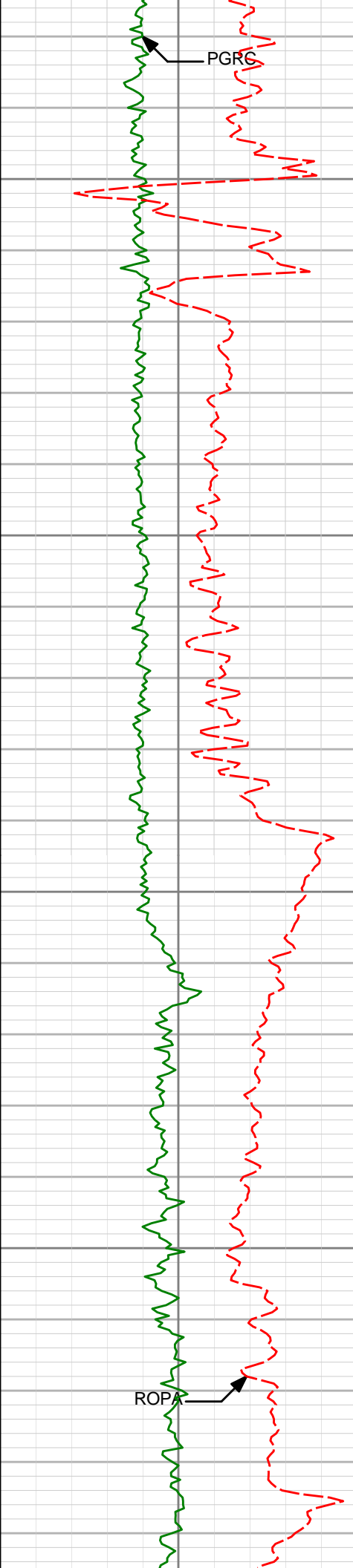
13.28°

0.70°

5948.16'

-225.81'

ROPA



6000

6050

6100

6150

6170'

11.38°

359.69°

6040.96'

-225.85'

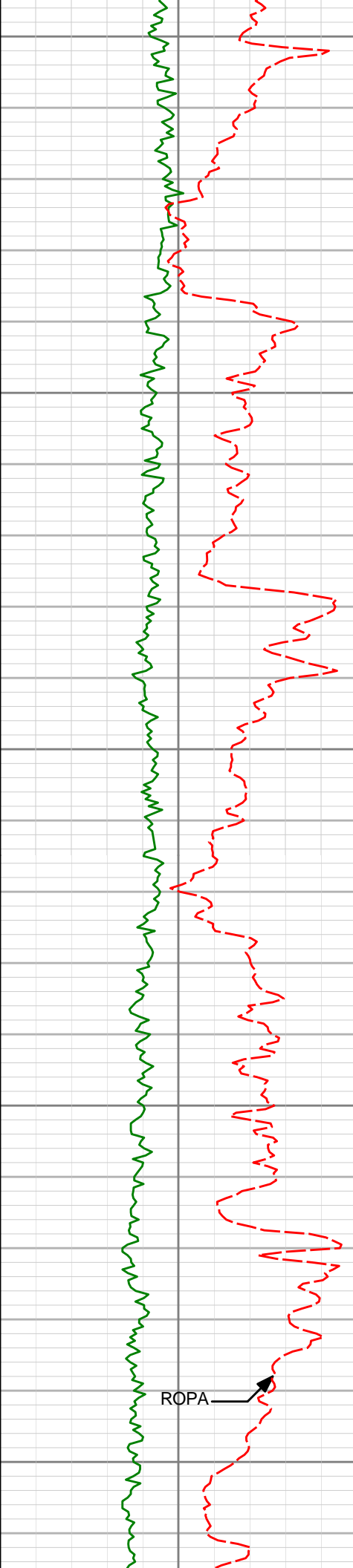
6265'

10.49°

359.99°

6134.24'

-225.75'



6200

6360'

9.27°

359.77°

6227.83'

-225.68'

6250

6300

6455'

7.46°

9.74°

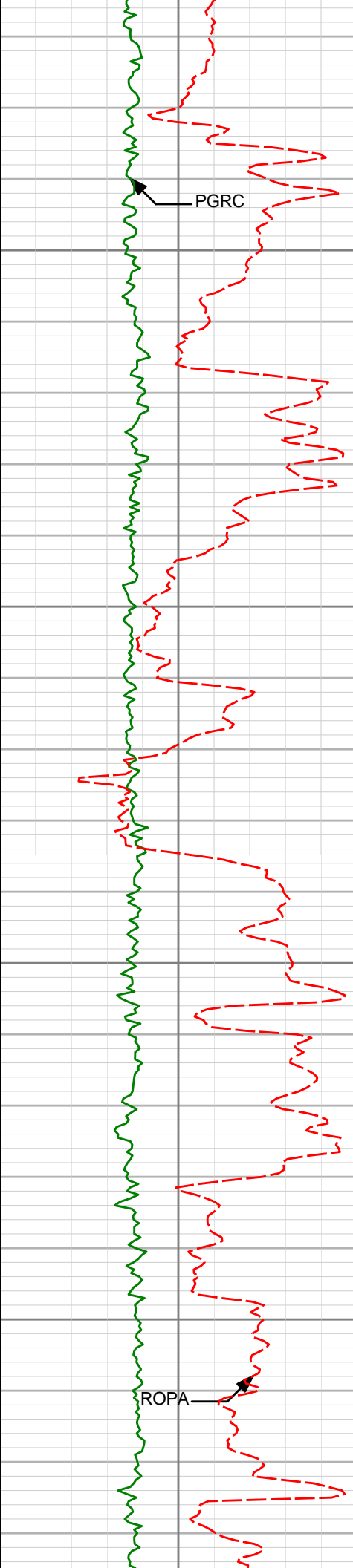
6321.82'

-226.67'

6350

ROPA

6400



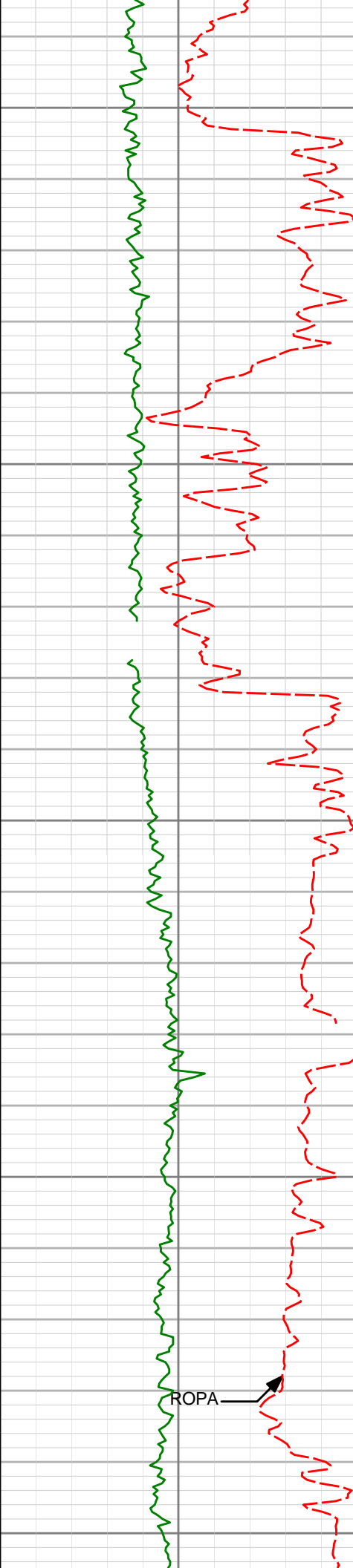
6450

6500

6550

6600

6550'	5.89°	25.93°	6416.18'	-229.82'
6644'	4.48°	23.05°	6509.79'	-233.35'
6739'	3.10°	29.76°	6604.58'	-236.06'



6650

6814'

2.07°

25.27°

6679.51'

-237.64'

6700

6834'

2.24°

27.81°

6699.49'

-237.98'

6750

6881'

0.87°

344.28°

6746.47'

-238.31'

6800

6929'

5.65°

270.72°

6794.39'

-235.84'

ROPA

6850

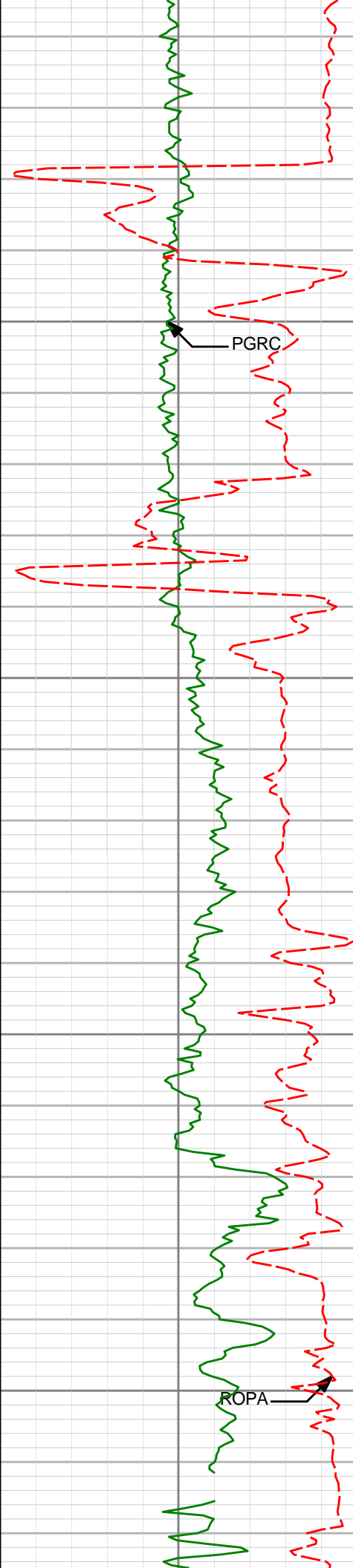
6976'

10.65°

272.50°

6840.90'

-229.19'



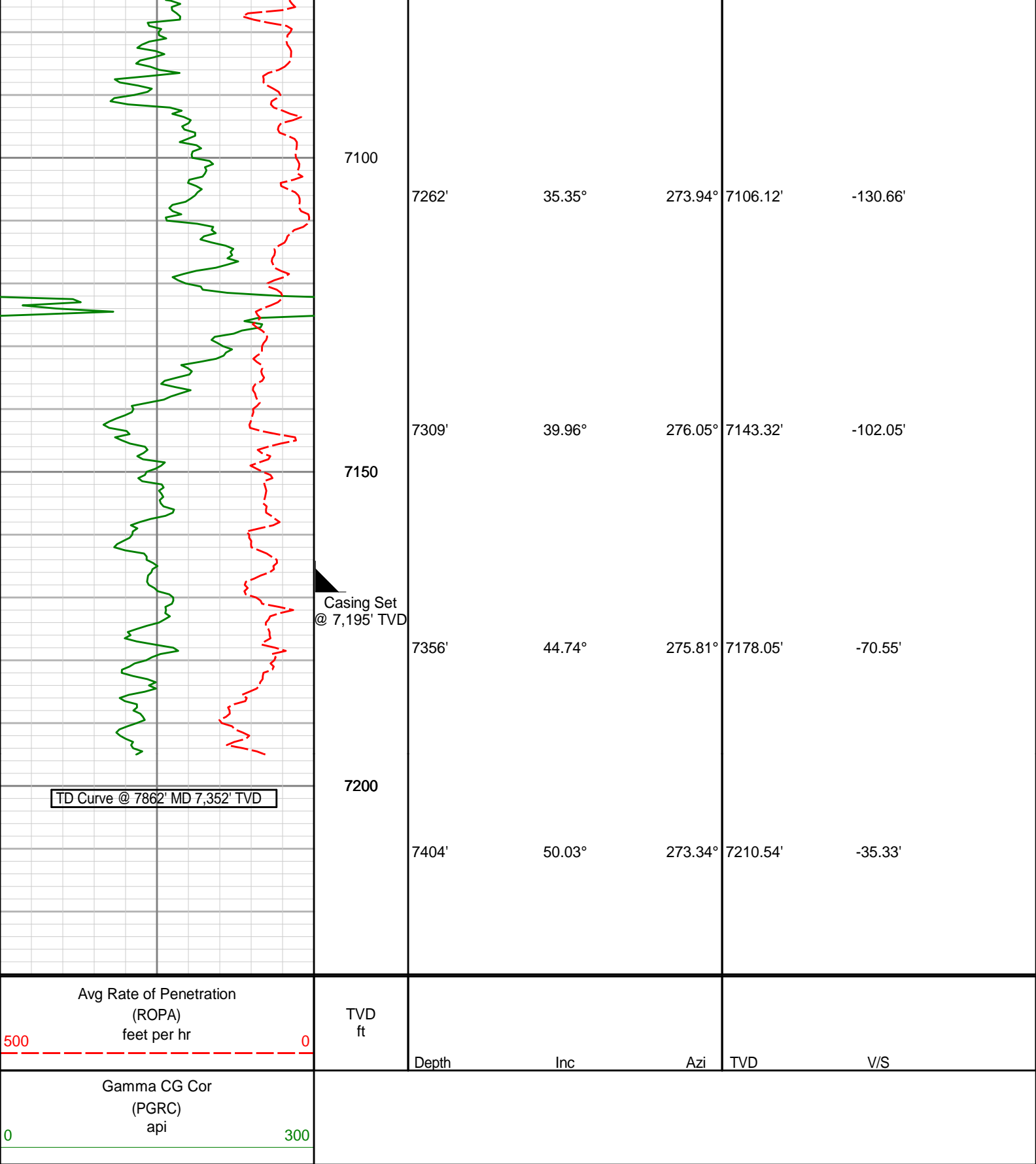
6900

6950

7000

7050

7024'	11.25°	246.83°	6888.06'	-220.45'
7071'	14.14°	256.43°	6933.91'	-210.66'
7119'	20.72°	262.54°	6979.68'	-196.54'
7166'	25.06°	266.58°	7022.97'	-178.35'
7218'	29.95°	270.56°	7069.08'	-154.37'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.

Eisenach Federal 30C-8HZ

Wattenberg

Weld, Colorado

584.00	0.94	204.59	583.99	0.97 S	1.23 W	1.23	TIE-IN
737.00	2.04	219.10	736.94	4.22 S	3.47 W	3.46	0.75
829.00	1.99	215.75	828.88	6.79 S	5.44 W	5.42	0.14
920.00	0.96	240.72	919.85	8.45 S	7.02 W	7.01	1.31
1012.00	0.68	258.33	1011.84	8.93 S	8.23 W	8.21	0.41
1104.00	0.75	262.54	1103.83	9.12 S	9.36 W	9.34	0.10
1196.00	0.76	266.16	1195.82	9.24 S	10.57 W	10.55	0.05
1287.00	2.38	0.80	1286.80	7.39 S	11.14 W	11.13	2.81
1378.00	4.20	13.50	1377.64	2.26 S	10.34 W	10.34	2.14
1470.00	6.17	10.16	1469.26	5.88 N	8.68 W	8.69	2.17
1562.00	5.78	1.28	1560.76	15.38 N	7.71 W	7.73	1.09
1654.00	7.10	6.42	1652.18	25.66 N	6.97 W	7.02	1.56
1746.00	9.00	16.28	1743.28	38.22 N	4.31 W	4.39	2.55
1838.00	11.35	17.23	1833.82	53.78 N	0.39 E	-0.28	2.56
1929.00	12.78	14.83	1922.81	72.06 N	5.62 E	-5.48	1.66
2021.00	13.87	12.14	2012.33	92.68 N	10.54 E	-10.36	1.36
2113.00	13.31	6.79	2101.76	113.97 N	14.11 E	-13.89	1.50
2204.00	14.18	8.81	2190.16	135.39 N	17.06 E	-16.80	1.09
2295.00	12.86	5.11	2278.63	156.49 N	19.67 E	-19.37	1.73
2387.00	12.87	7.81	2368.32	176.84 N	21.97 E	-21.63	0.65
2482.00	13.30	9.60	2460.86	198.10 N	25.23 E	-24.85	0.62
2577.00	13.53	16.16	2553.27	219.55 N	30.15 E	-29.72	1.62
2672.00	15.21	20.89	2645.30	241.87 N	37.68 E	-37.22	2.16
2766.00	15.20	20.46	2736.01	264.93 N	46.39 E	-45.88	0.12
2861.00	15.10	18.94	2827.71	288.31 N	54.76 E	-54.20	0.43
2956.00	15.14	17.40	2919.42	311.85 N	62.48 E	-61.88	0.42
3051.00	12.94	15.43	3011.58	333.94 N	69.02 E	-68.38	2.37
3146.00	14.62	18.45	3103.84	355.57 N	75.65 E	-74.97	1.92
3240.00	12.45	16.97	3195.22	376.52 N	82.36 E	-81.64	2.34
3335.00	9.87	15.28	3288.42	394.17 N	87.50 E	-86.74	2.74
3430.00	11.89	16.64	3381.71	411.40 N	92.45 E	-91.66	2.14
3525.00	14.66	16.52	3474.16	432.31 N	98.67 E	-97.84	2.92
3620.00	11.85	11.31	3566.62	453.40 N	104.00 E	-103.13	3.21
3715.00	12.72	4.97	3659.45	473.39 N	106.82 E	-105.91	1.69
3805.00	12.52	12.54	3747.28	492.78 N	109.80 E	-108.85	1.85
3899.00	13.05	14.92	3838.95	512.99 N	114.74 E	-113.76	0.79
3994.00	17.88	15.96	3930.49	537.39 N	121.52 E	-120.48	5.09
4088.00	16.93	13.95	4020.18	564.54 N	128.78 E	-127.70	1.20
4183.00	15.85	12.42	4111.32	590.64 N	134.91 E	-133.78	1.22
4278.00	13.54	12.74	4203.21	614.16 N	140.15 E	-138.97	2.43
4372.00	13.35	11.27	4294.63	635.53 N	144.70 E	-143.48	0.42
4467.00	14.65	15.10	4386.81	657.89 N	149.97 E	-148.71	1.68
4561.00	12.66	11.98	4478.15	679.44 N	155.21 E	-153.90	2.26
4656.00	14.78	18.15	4570.44	701.15 N	161.14 E	-159.80	2.71
4751.00	14.19	18.05	4662.42	723.73 N	168.53 E	-167.14	0.62
4845.00	15.15	19.95	4753.35	746.23 N	176.29 E	-174.86	1.14
4940.00	15.41	13.39	4845.00	770.18 N	183.45 E	-181.97	1.84
5034.00	15.63	12.32	4935.57	794.70 N	189.04 E	-187.52	0.38
5129.00	14.32	10.72	5027.35	818.75 N	193.96 E	-192.39	1.45
5223.00	14.46	11.25	5118.40	841.68 N	198.41 E	-196.79	0.20
5318.00	12.63	8.79	5210.75	863.58 N	202.31 E	-200.65	2.02
5413.00	13.48	12.63	5303.30	884.65 N	206.32 E	-204.62	1.28
5507.00	14.01	12.92	5394.60	906.43 N	211.26 E	-209.52	0.57
5602.00	13.37	9.81	5486.91	928.47 N	215.70 E	-213.92	1.03
5696.00	14.47	12.71	5578.15	950.63 N	220.14 E	-218.31	1.39
5790.00	11.91	8.79	5669.66	971.68 N	224.21 E	-222.34	2.88
5885.00	11.81	3.84	5762.63	991.07 N	226.35 E	-224.45	1.08
5981.00	12.37	1.85	5856.51	1011.15 N	227.34 E	-225.40	0.73
6075.00	13.28	0.67	5948.16	1032.01 N	227.80 E	-225.81	1.01
6170.00	11.38	359.67	6040.96	1052.29 N	227.87 E	-225.85	2.01
6265.00	10.49	359.96	6134.24	1070.31 N	227.81 E	-225.75	0.94
6360.00	9.27	359.75	6227.83	1086.61 N	227.77 E	-225.68	1.28
6455.00	7.46	9.72	6321.82	1100.34 N	228.78 E	-226.67	2.43
6550.00	5.89	25.92	6416.18	1110.81 N	231.95 E	-229.82	2.57
6644.00	4.48	23.04	6509.79	1118.52 N	235.50 E	-233.35	1.52
6739.00	3.10	29.75	6604.58	1124.17 N	238.22 E	-236.06	1.52
6814.00	2.07	25.26	6679.51	1127.16 N	239.81 E	-237.64	1.40
6834.00	2.24	27.80	6699.49	1127.83 N	240.14 E	-237.98	0.97

6881.00	0.87	344.26	6746.47	1128.98 N	240.47 E	-238.31	3.65
6929.00	5.65	270.68	6794.39	1129.36 N	238.01 E	-235.84	11.39
6976.00	10.65	272.43	6840.90	1129.57 N	231.35 E	-229.19	10.65
7024.00	11.25	246.77	6888.06	1127.91 N	222.61 E	-220.45	10.15
7071.00	14.14	256.35	6933.91	1124.75 N	212.82 E	-210.66	7.59
7119.00	20.72	262.42	6979.68	1122.24 N	198.69 E	-196.54	14.20
7166.00	25.06	266.44	7022.97	1120.53 N	180.50 E	-178.35	9.81
7218.00	29.95	270.38	7069.08	1119.93 N	156.51 E	-154.37	10.03
7262.00	35.35	273.72	7106.12	1120.83 N	132.81 E	-130.66	12.93
7309.00	39.96	275.79	7143.32	1123.24 N	104.21 E	-102.05	10.17
7356.00	44.74	275.50	7178.05	1126.35 N	72.71 E	-70.55	10.18
7404.00	50.03	272.98	7210.54	1128.92 N	37.50 E	-35.33	11.68
7451.00	55.43	271.64	7238.99	1130.41 N	0.14 E	2.03	11.71
7499.00	62.55	269.69	7263.71	1130.87 N	40.97 W	43.14	15.24
7546.00	67.63	268.25	7283.50	1130.09 N	83.57 W	85.74	11.16
7593.00	70.16	268.08	7300.42	1128.68 N	127.39 W	129.56	5.39
7640.00	72.51	268.55	7315.46	1127.38 N	171.90 W	174.06	5.09

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 270.11 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 7640.00 FEET
IS 1140.41 FEET ALONG 351.33 DEGREES (TRUE)**

Survey Data is tied on to Gyro Data.