

PCGC: Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	200	300	400		
Date run completed	06-Aug-14	07-Aug-14	10-Aug-14		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	625.00	5,303.00	6,362.00		
Log End Depth (MD, ft)	5,303.00	6,362.00	10,300.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	05-Aug-14 13:10	06-Aug-14 08:00	08-Aug-14 03:30		
Drill/Wipe End Date and Time	06-Aug-14 01:15	06-Aug-14 22:30	09-Aug-14 21:00		
Min Inc (deg) @ Depth (MD, ft)	0.10 @ 902.00	1.09 @ 5,337.00	85.43 @ 6,369.00		
Max Inc (deg) @ Depth (MD, ft)	8.09 @ 2,591.00	80.80 @ 6,307.00	94.54 @ 6,745.00		
Bit TFA(in2) / Bit Type	0.74 / PDC	0.86 / PDC	0.75 / PDC		
Flow Rate (gpm)	597.50	567.05	290.00		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	10.80 / 35.00	9.50 / 30.00	10.70 / 34.00		
Filtrate CL (ppm)	150.00	150.00	200.00		
pH / Fluid Loss (mptm)	9.60 / 7	9.20 / 0	9.60 / 0		
PV (cP) / YP (lbf2)	12 / 8.00	4 / 4.00	9 / 4.00		
% Solids / % Sand	11.00 / 0.20	7.00 / 0.10	8.40 / 0.20		
% Oil / Oil:Water Ratio	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		
Rmf @ Measured Temp (degF)	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		
Max Tool Temp (in) @ Temp (degF)	171.00 / 320M	167.07 / 320M	217.00 / 420M		

Max Tool Temp (degF) / Source	171.20 / PCM	167.97 / PCM	217.60 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Juan Pablo Centeno	Juan Pablo Centeno	Paul Kock		
Customer Representative	Justin Fields	Justin Fields	Justin Fields		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	245494	245494	12365893		
Insert Serial Number	11620315	11620315	12001048		
Date and Time Initialized	03-Aug-14 16:51	01-Jan-70 00:00	07-Aug-14 18:35		
Date and Time Read	07-Aug-14 05:51	07-Aug-14 05:56	10-Aug-14 16:21		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	53.93	53.24	64.87		
Software Version	6.21	6.21	6.21		
Sub Serial Number	245494	245494	12365893		
Sonde Serial Number	11638628	11638628	11297623		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	334.88	47.59	347.38		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.83	48.14	59.77		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	245494	245494	12365893		
Insert/Sonde Serial Number	11579806	11579806	11293276		

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
 - All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
 - All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.
5. INSITE version 8.0.20
6. Gamma presented inside casing/cement from 6313 ft. MD to 6362 ft. MD.

WARRANTY

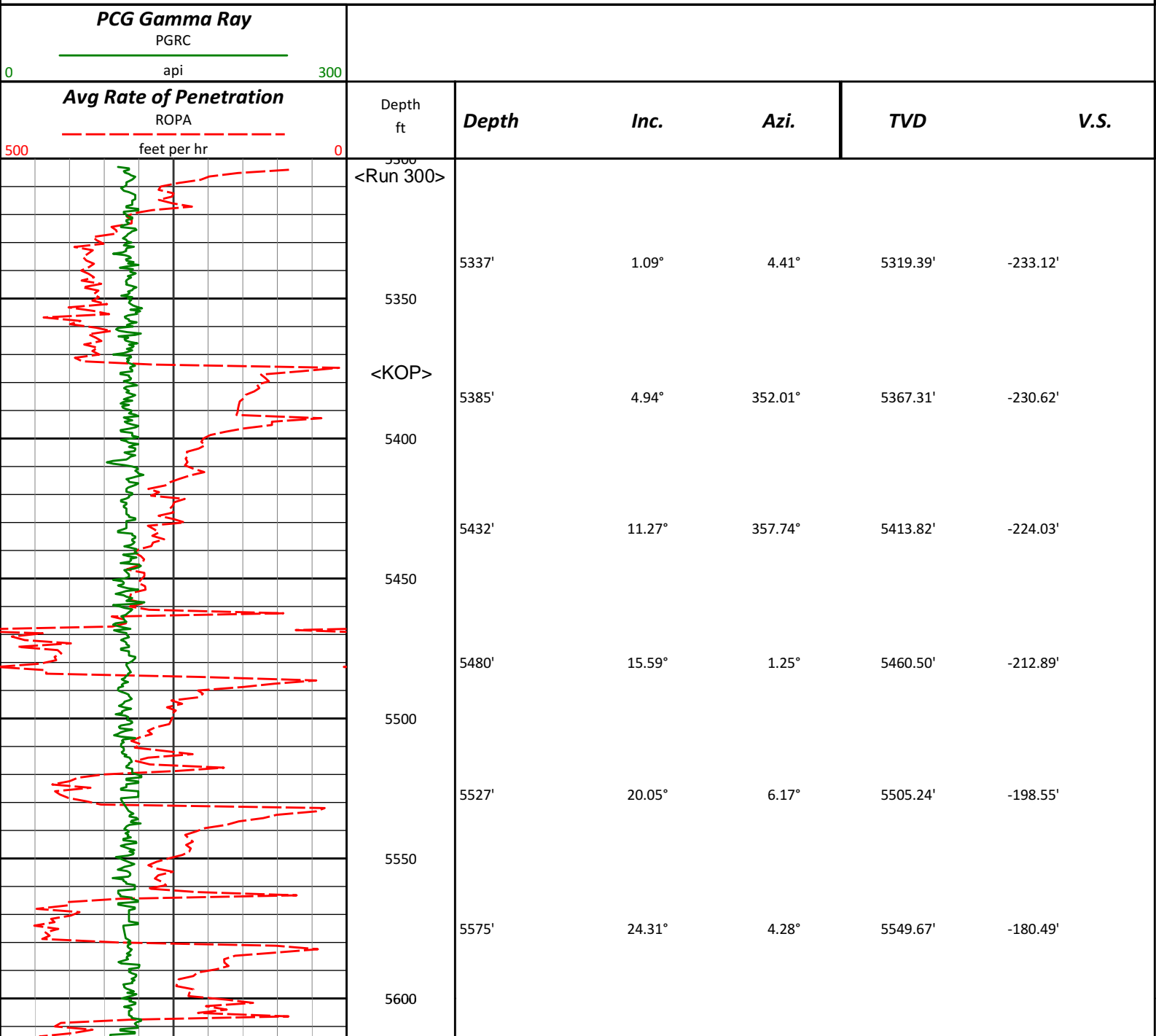
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS

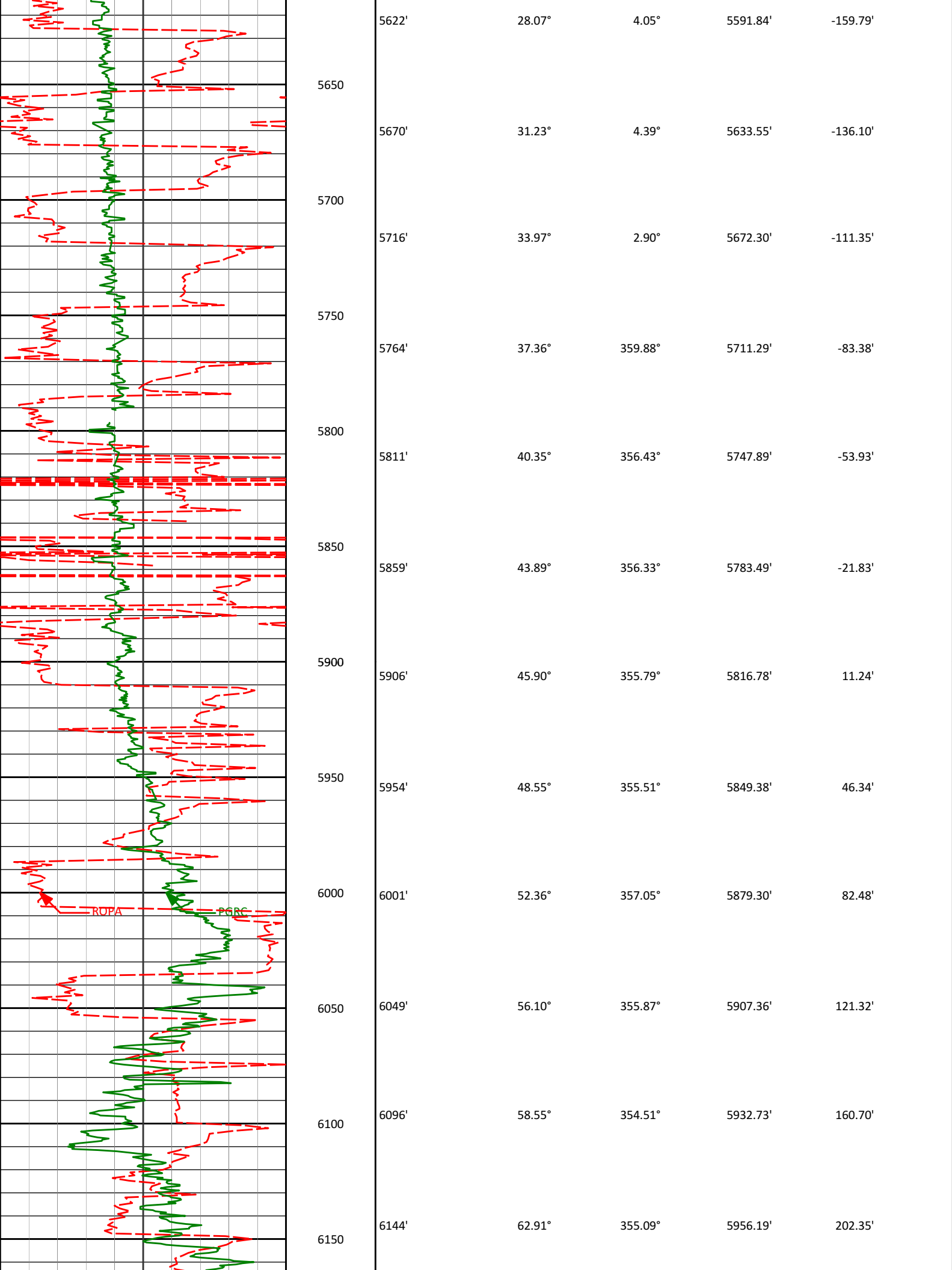
THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

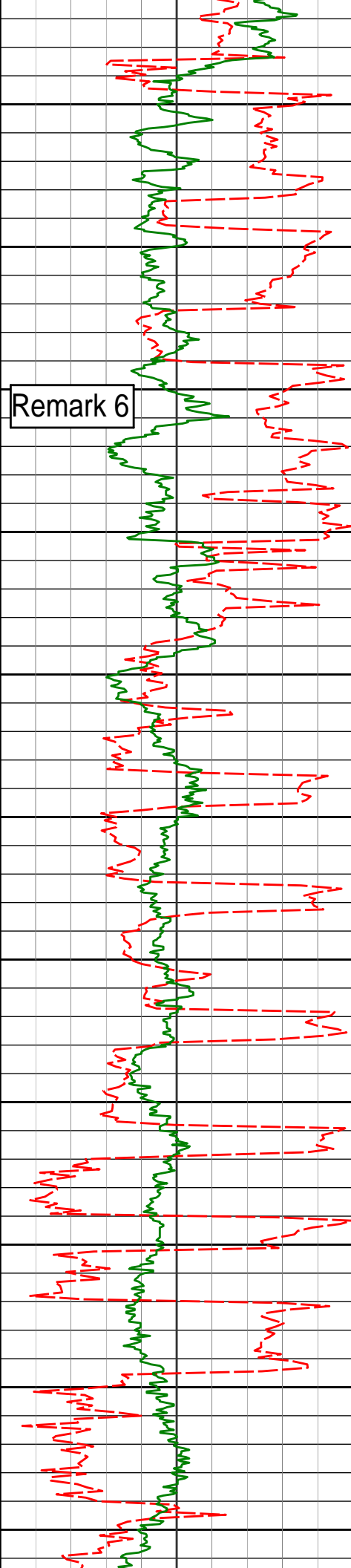
HALLIBURTON
Sperry Drilling Services

MD Main Log 1:600

Noble Energy, Inc
Rainbow LC28-74-1HNA
H&P 273
T9N R59W

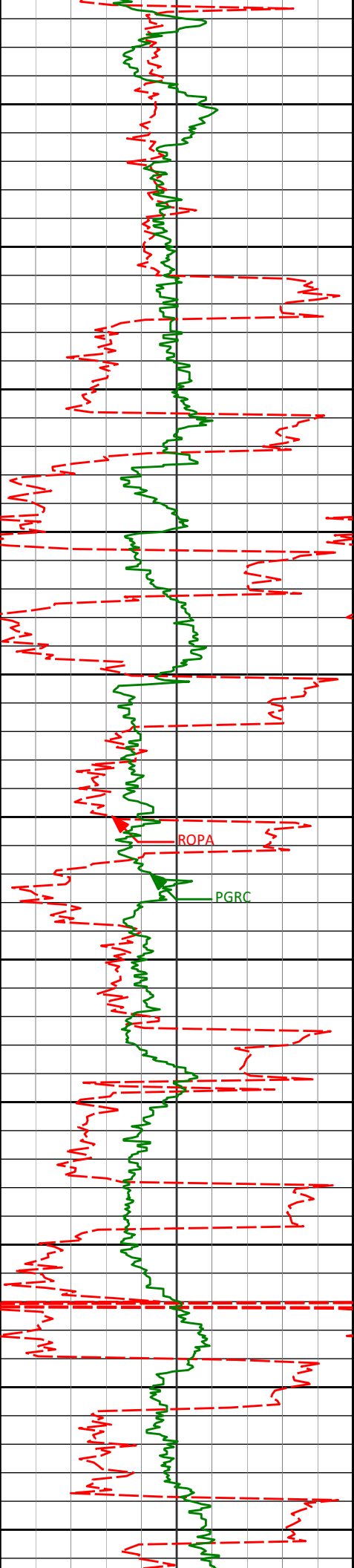




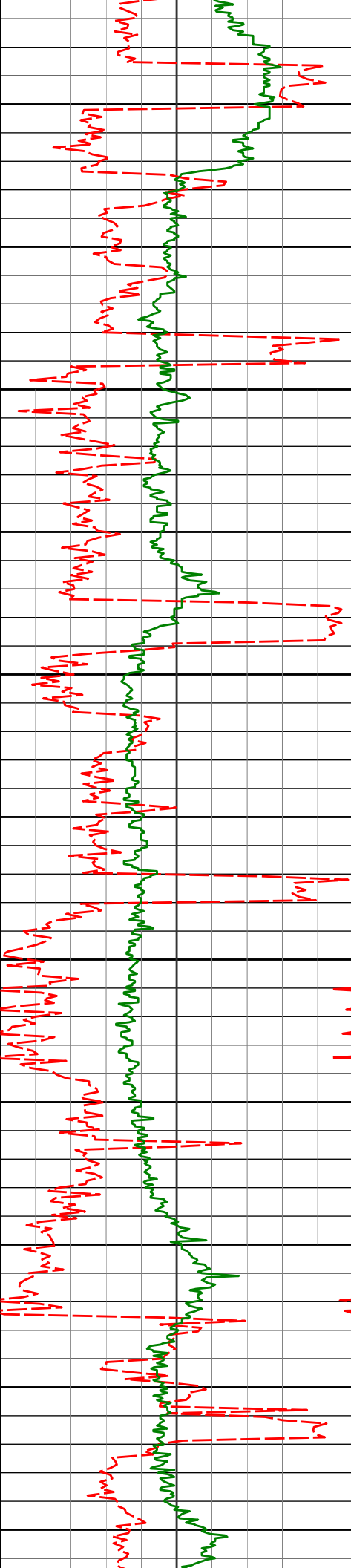


Remark 6

6200	6191'	69.50°	355.57°	5975.15'	245.16'
6250	6239'	74.54°	357.56°	5989.96'	290.69'
6300	6285'	78.90°	358.30°	6000.52'	335.40'
6350	6307'	80.80°	358.29°	6004.40'	357.04'
	<7" casing set at 6352' MD>				
	<Run 400>				
6400	6369'	85.43°	357.71°	6011.83'	418.52'
6450	6461'	86.55°	357.56°	6018.26'	510.17'
6500					
6550	6556'	88.49°	356.00°	6022.38'	604.88'
6600					
6650	6650'	92.65°	355.86°	6021.44'	698.55'
6700					



6750	6745'	94.54°	355.38°	6015.48'	793.01'
6800					
6850	6840'	94.32°	354.81°	6008.15'	887.30'
6900					
6950	6934'	91.32°	355.52°	6003.53'	980.77'
7000					
7050	7029'	93.53°	358.58°	5999.50'	1075.49'
7100					
7150	7124'	93.17°	358.53°	5993.95'	1170.27'
7200					
7250	7219'	91.36°	0.06°	5990.20'	1265.17'



7300

7314'

89.07°

0.65°

5989.84'

1360.16'

7350

7400

7409'

87.41°

1.11°

5992.75'

1455.11'

7450

7500

7503'

87.93°

0.06°

5996.57'

1549.03'

7550

7600

7598'

89.72°

359.73°

5998.52'

1644.00'

7650

7700

7693'

90.49°

359.67°

5998.34'

1738.99'

7750

7800

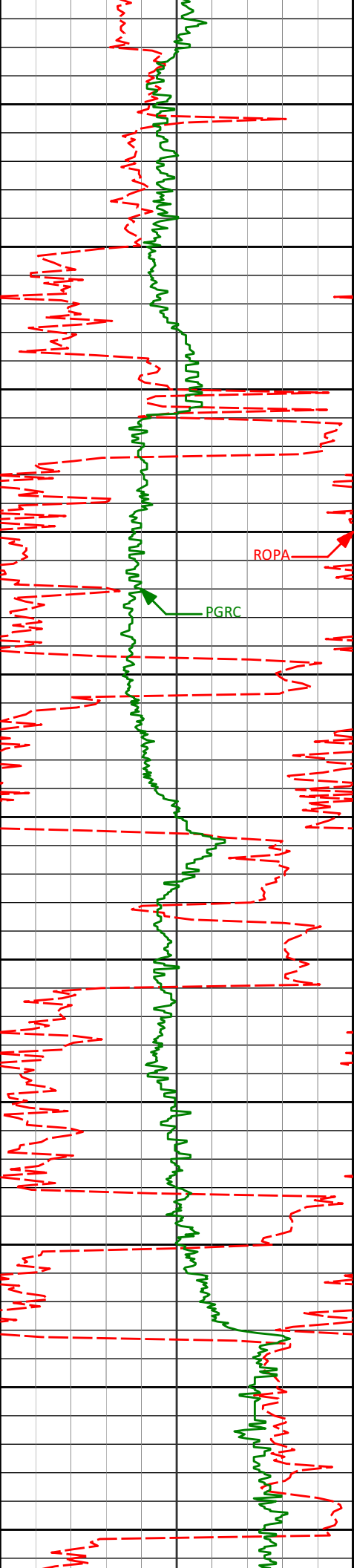
7788'

89.23°

359.25°

5998.57'

1833.97'



7850

7883'

90.92°

0.40°

5998.44'

1928.96'

7900

7950

7978'

91.57°

1.98°

5996.37'

2023.93'

8000

ROPA

PGRC

8050

8073'

91.14°

0.79°

5994.12'

2118.89'

8100

8150

8168'

90.99°

1.59°

5992.36'

2213.87'

8200

8250

8263'

90.65°

1.40°

5991.00'

2308.84'

8300

8350

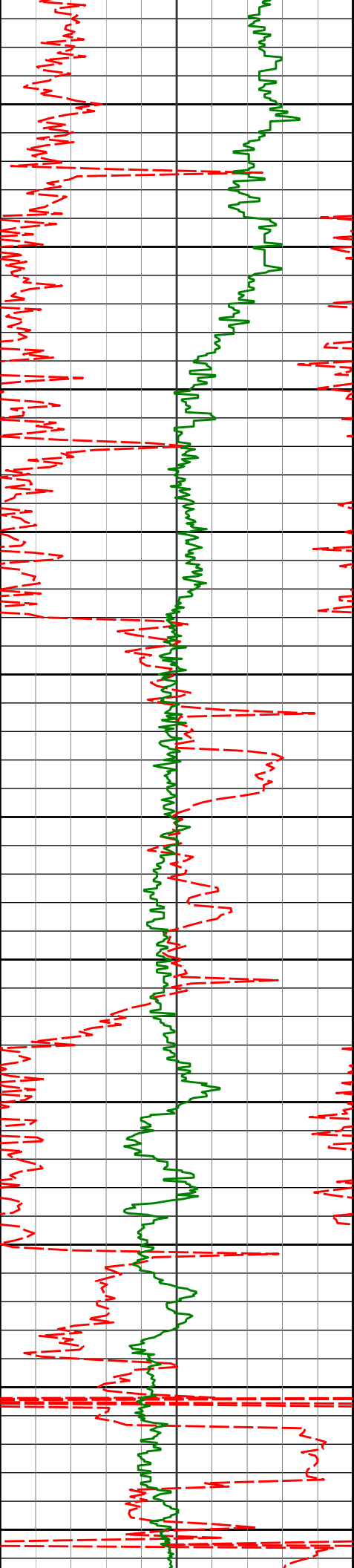
8357'

89.01°

0.64°

5991.28'

2402.83'



8400

8450

8500

8550

8600

8650

8700

8750

8800

8850

8900

8452'

88.52°

0.69°

5993.33'

2497.81'

8546'

89.04°

1.05°

5995.33'

2591.79'

8641'

88.40°

0.68°

5997.45'

2686.76'

8736'

88.15°

0.85°

6000.31'

2781.72'

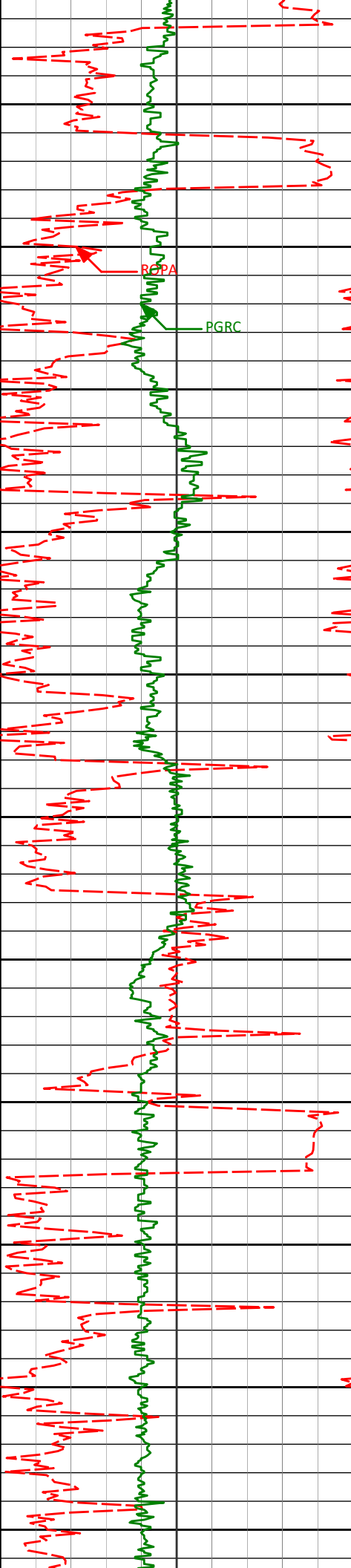
8831'

86.14°

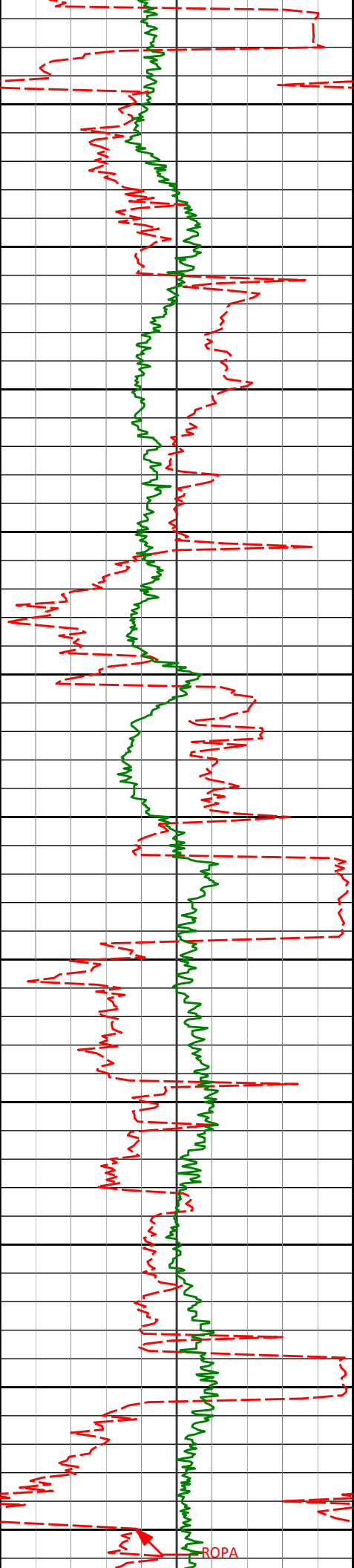
0.41°

6005.04'

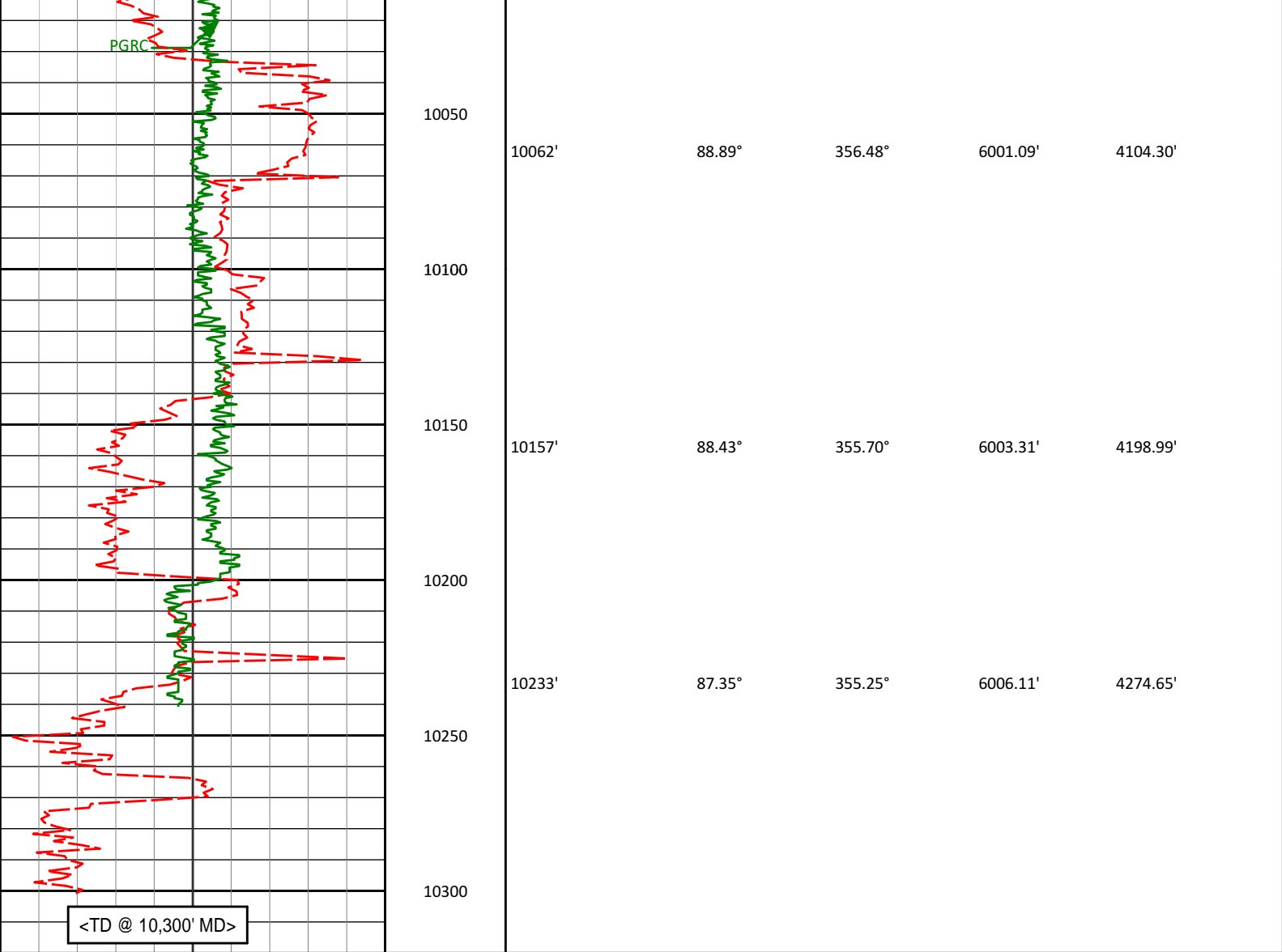
2876.60'



8926'	89.20°	359.54°	6008.90'	2971.50'
8950				
9000				
9020'	90.96°	357.45°	6008.77'	3065.43'
9050				
9100				
9115'	91.14°	357.61°	6007.03'	3160.29'
9150				
9200				
9210'	89.41°	355.80°	6006.57'	3255.07'
9250				
9300				
9305'	89.07°	355.70°	6007.83'	3349.73'
9350				
9400				
9399'	89.82°	355.15°	6008.74'	3443.35'
9450				



9500	9494'	91.39°	355.36°	6007.74'	3537.95'
9550					
9600	9589'	90.55°	355.72°	6006.13'	3632.57'
9650					
9700	9683'	91.20°	354.87°	6004.69'	3726.17'
9750					
9800	9778'	91.73°	357.01°	6002.26'	3820.83'
9850					
9900	9873'	89.41°	355.87°	6001.32'	3915.58'
9950					
10000	9968'	90.99°	359.05°	6000.99'	4010.43'



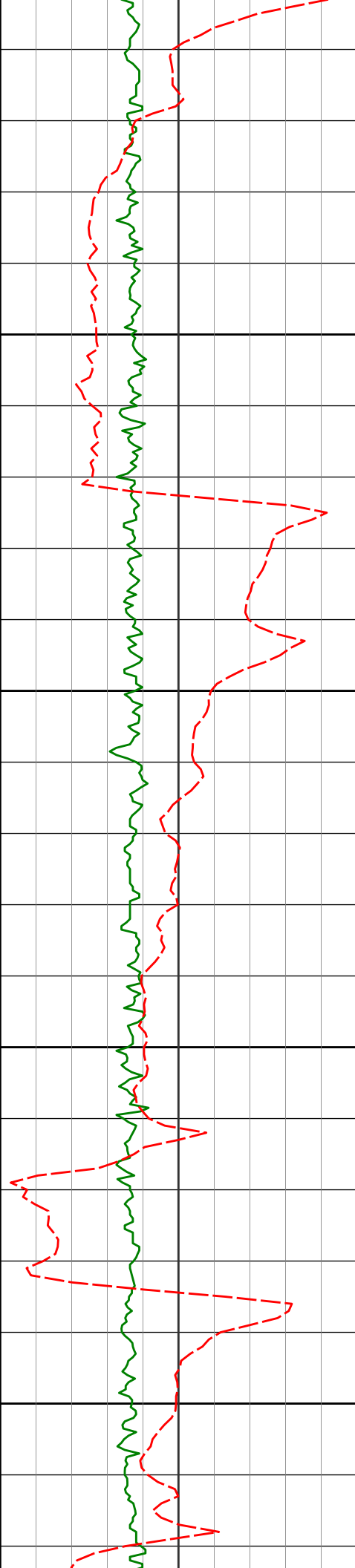
Avg Rate of Penetration ROPA feet per hr		Depth ft	Inc.	Azi.	TVD	V.S.
PCG Gamma Ray PGRC api						

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy, Inc
Rainbow LC28-74-1HNA
H&P 273
T9N R59W

PCG Gamma Ray PGRC api						
Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD V.S.

		5300				
		5300				



<Run 300>

5337'

5350

<KOP>

5385'

5400

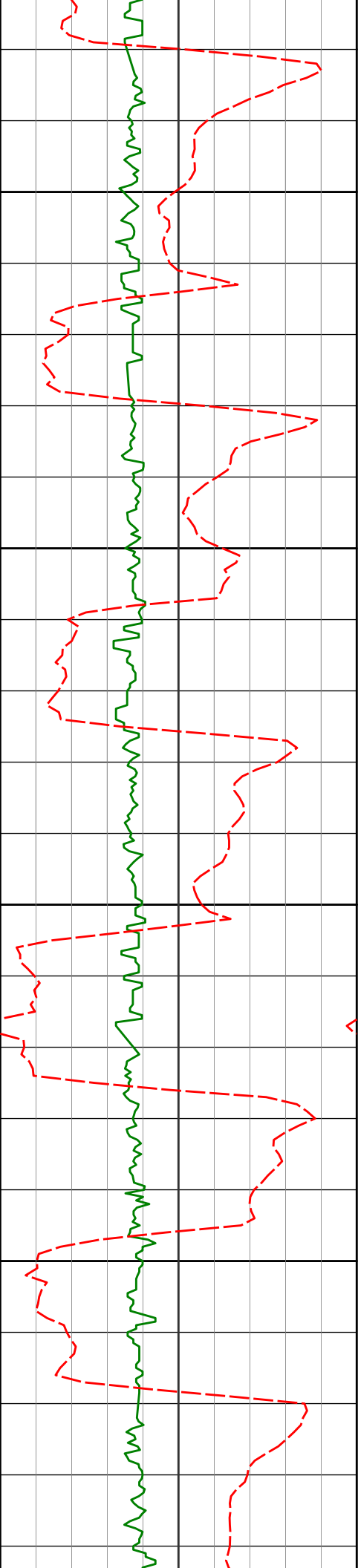
5432'

5450

5480'

5500

5337'	1.09°	4.41°	5319.39'	-233.12'
5385'	4.94°	352.01°	5367.31'	-230.62'
5432'	11.27°	357.74°	5413.82'	-224.03'
5480'	15.59°	1.25°	5460.50'	-212.89'



5527'

20.05°

6.17°

5505.24'

-198.55'

5550

5575'

24.31°

4.28°

5549.67'

-180.49'

5600

5622'

28.07°

4.05°

5591.84'

-159.79'

5650

5670'

31.23°

4.39°

5633.55'

-136.10'

5700

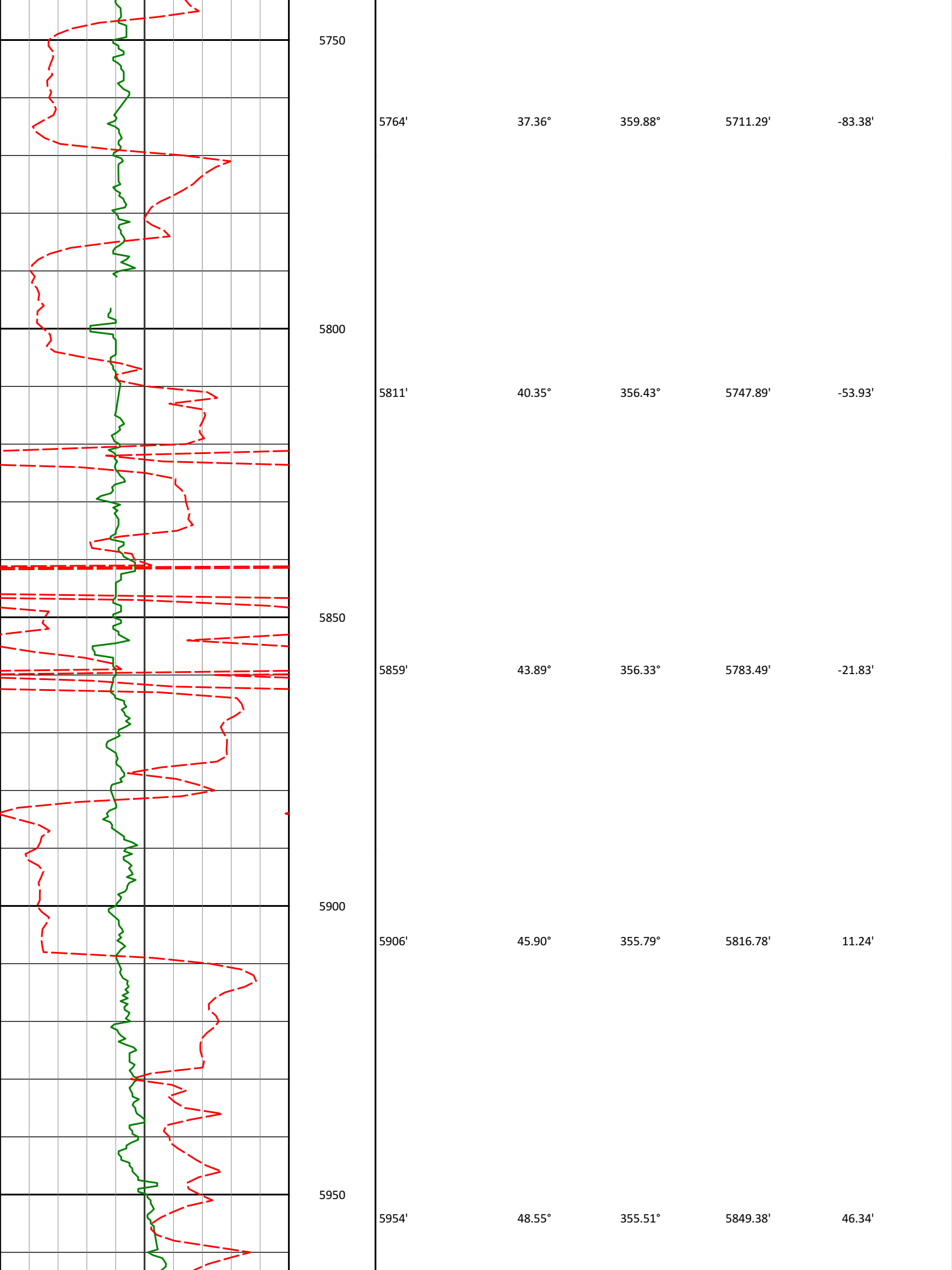
5716'

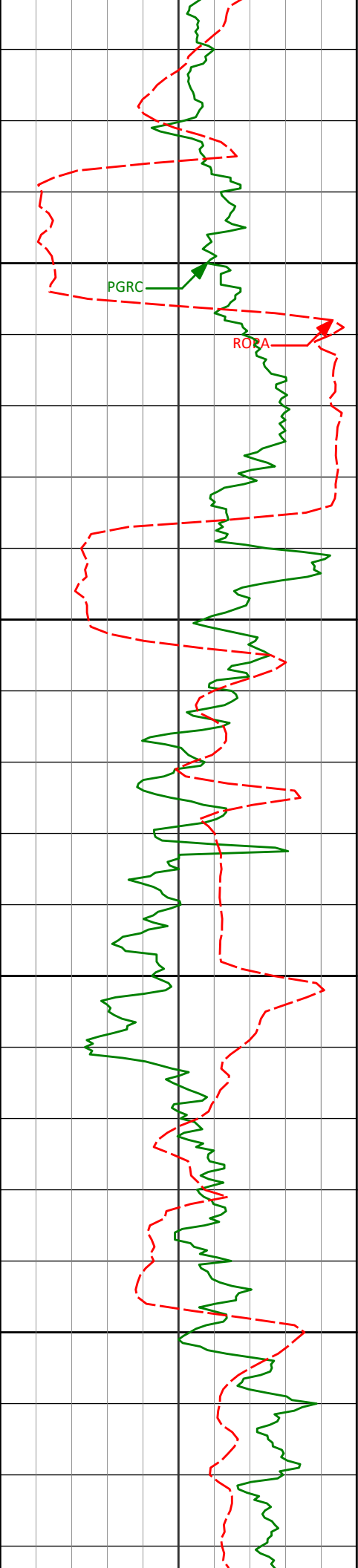
33.97°

2.90°

5672.30'

-111.35'





6000

6001'

52.36°

357.05°

5879.30'

82.48'

6050

6049'

56.10°

355.87°

5907.36'

121.32'

6100

6096'

58.55°

354.51°

5932.73'

160.70'

6150

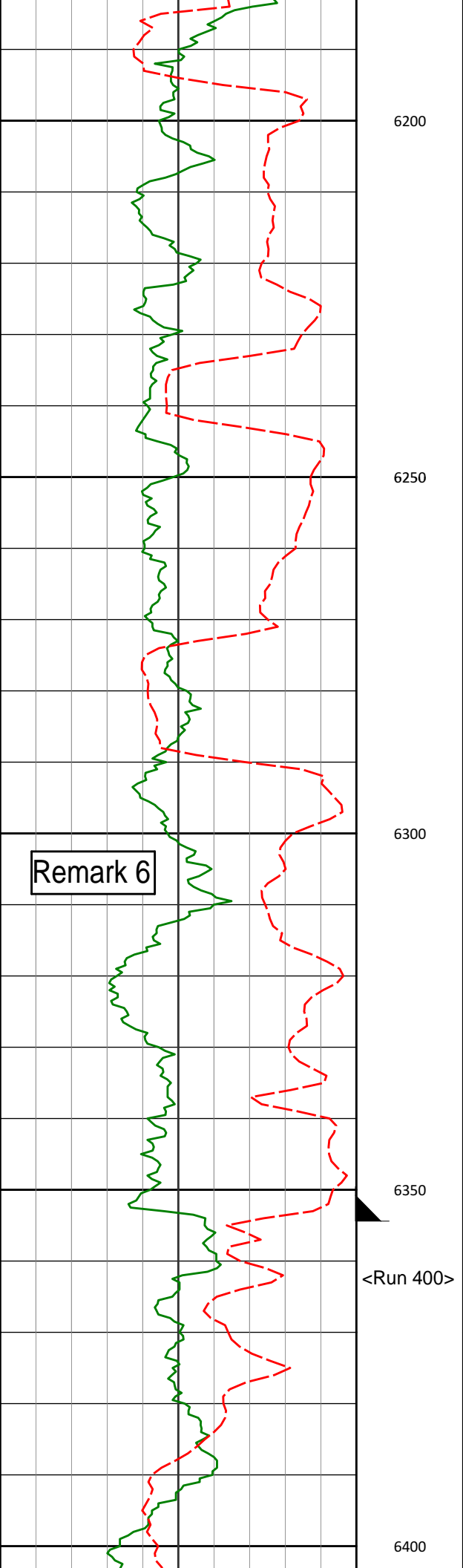
6144'

62.91°

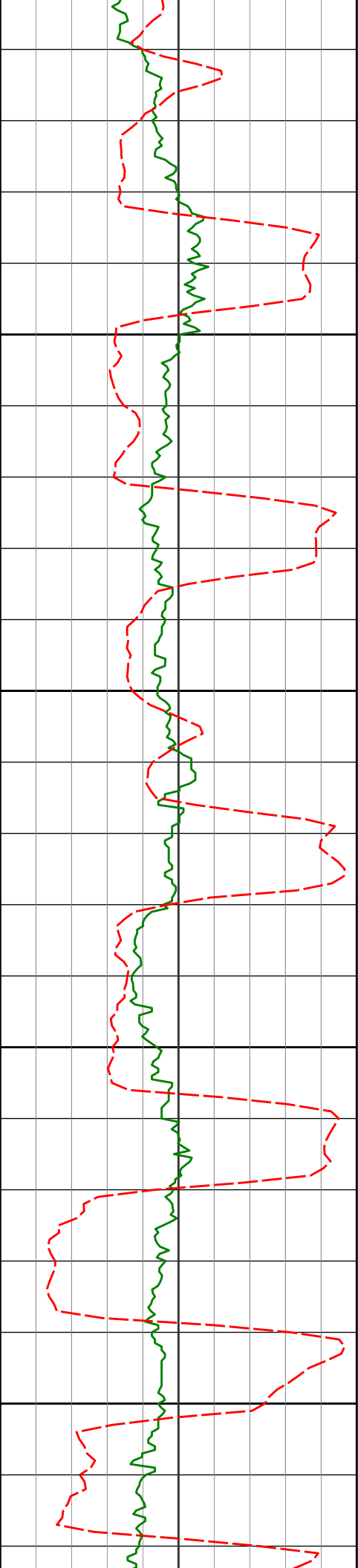
355.09°

5956.19'

202.35'



6191'	69.50°	355.57°	5975.15'	245.16'
6239'	74.54°	357.56°	5989.96'	290.69'
6285'	78.90°	358.30°	6000.52'	335.40'
6307'	80.80°	358.29°	6004.40'	357.04'
<7" casing set at 6352' MD>				
6369'	85.43°	357.71°	6011.83'	418.52'



6450

6461'

86.55°

357.56°

6018.26'

510.17'

6500

6550

6556'

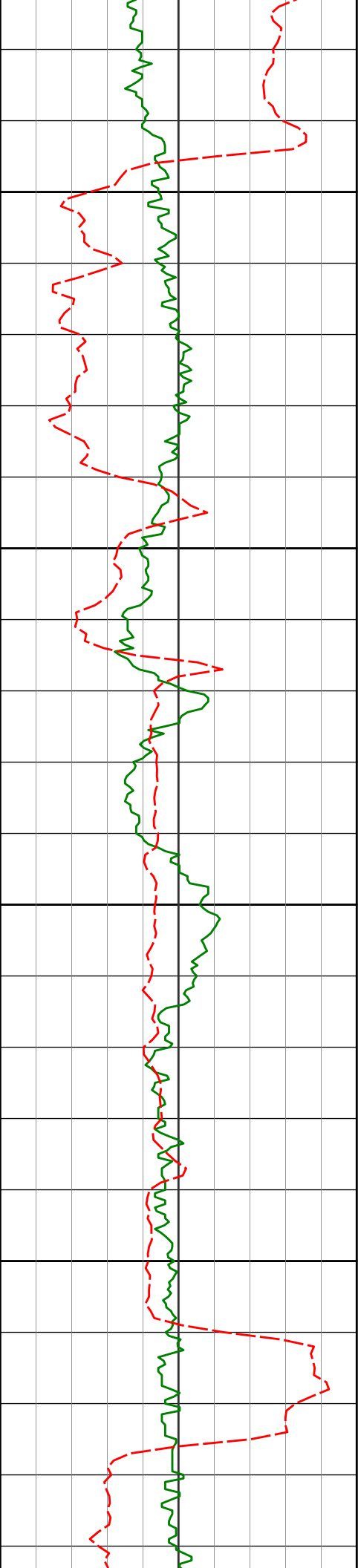
88.49°

356.00°

6022.38'

604.88'

6600



6650

6650'

92.65°

355.86°

6021.44'

698.55'

6700

6750

6745'

94.54°

355.38°

6015.48'

793.01'

6800

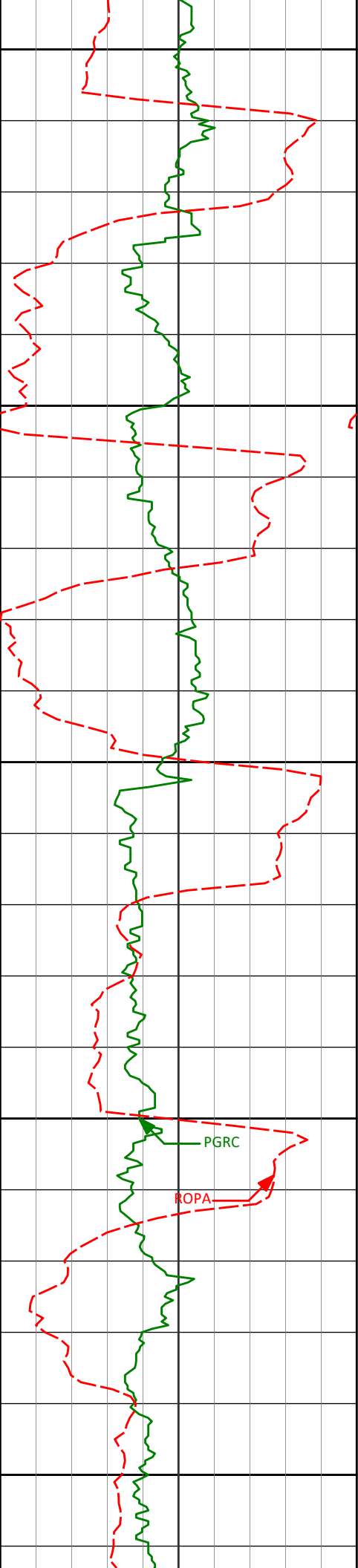
6840'

94.32°

354.81°

6008.15'

887.30'



6850

6900

6950

7000

7050

6934'

91.32°

355.52°

6003.53'

980.77'

PGRC

ROPA

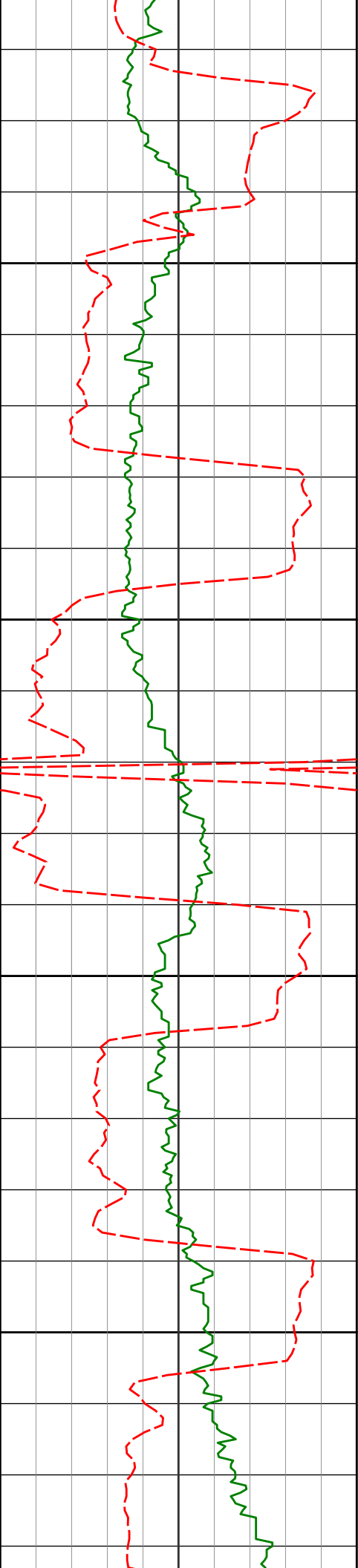
7029'

93.53°

358.58°

5999.50'

1075.49'



7100

7124'

93.17°

358.53°

5993.95'

1170.27'

7150

7200

7219'

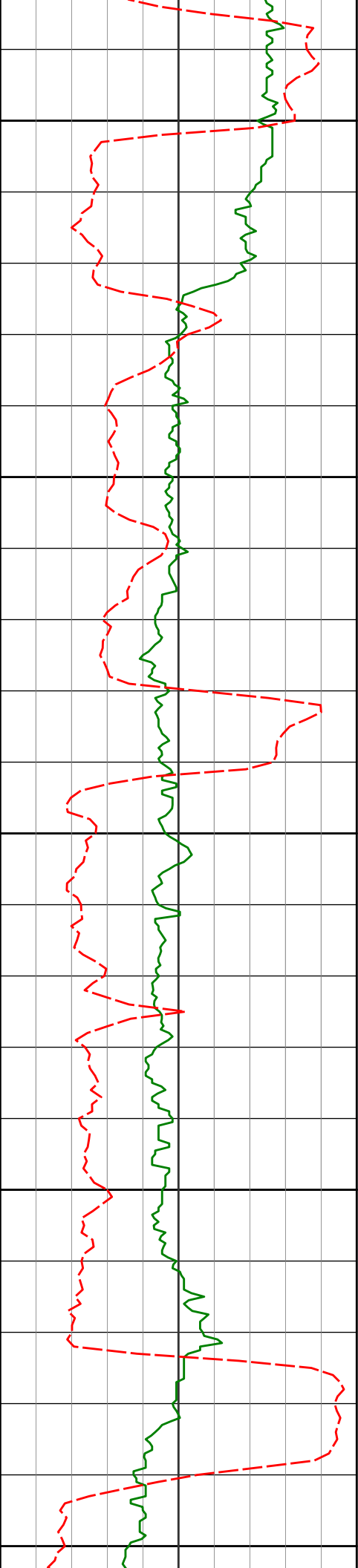
91.36°

0.06°

5990.20'

1265.17'

7250



7300

7314'

89.07°

0.65°

5989.84'

1360.16'

7350

7400

7409'

87.41°

1.11°

5992.75'

1455.11'

7450

7500

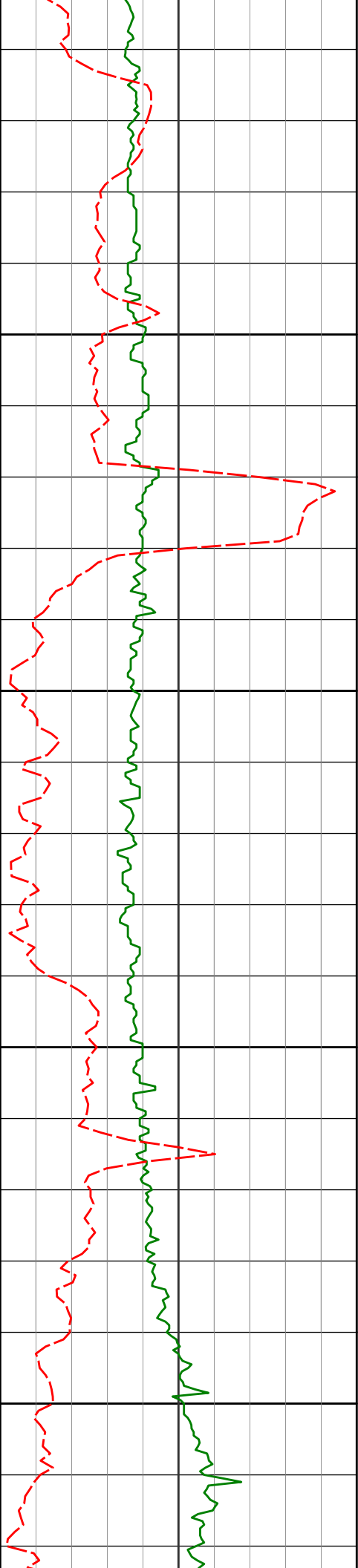
7503'

87.02°

0.06°

5996.57'

1549.02'



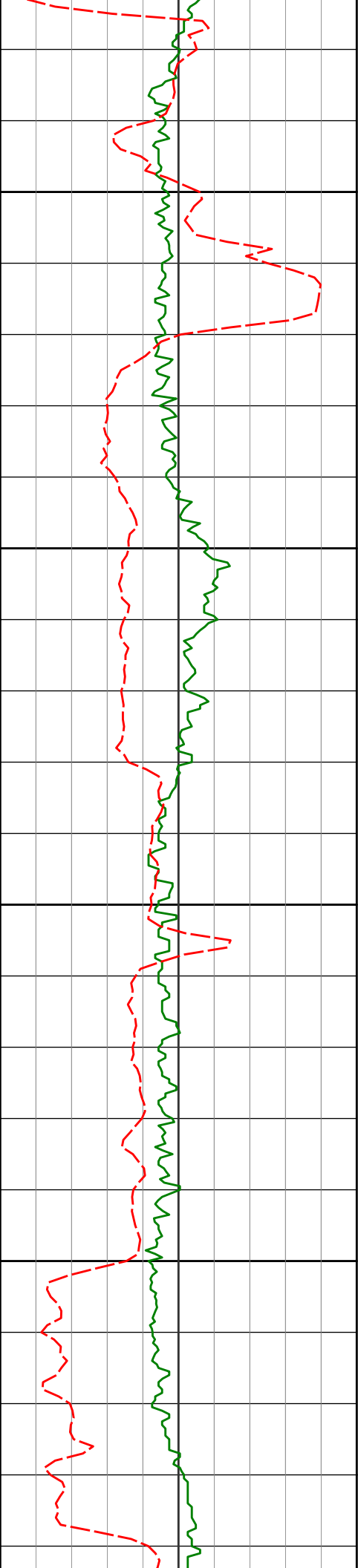
7550

7600

7650

7700

7503	87.93	0.06	5998.37	1549.03
7598'	89.72°	359.73°	5998.52'	1644.00'
7693'	90.49°	359.67°	5998.34'	1738.99'



7750

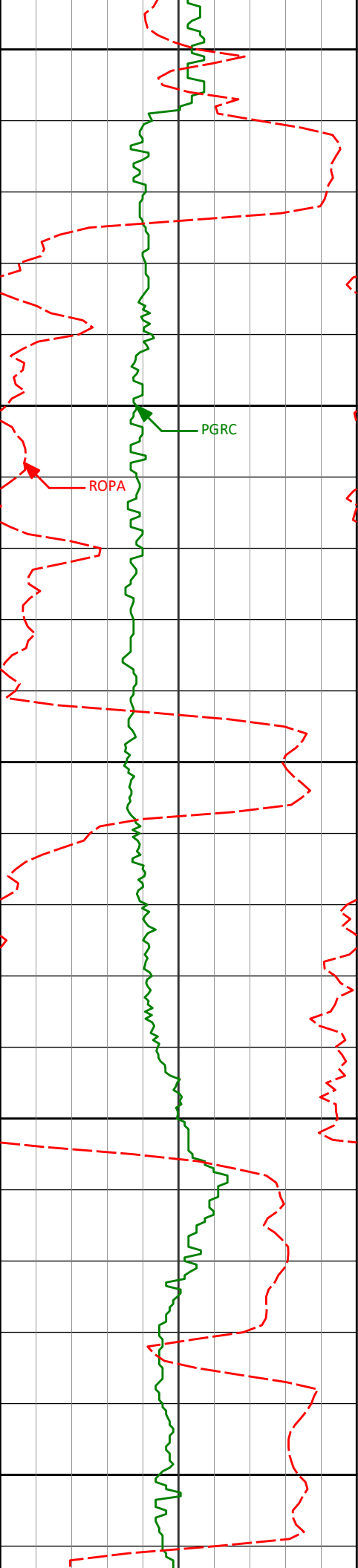
7788'	89.23°	359.25°	5998.57'	1833.97'
-------	--------	---------	----------	----------

7800

7850

7883'	90.92°	0.40°	5998.44'	1928.96'
-------	--------	-------	----------	----------

7900



7950

7978'

91.57°

1.98°

5996.37'

2023.93'

8000

PGRC

ROPA

8050

8073'

91.14°

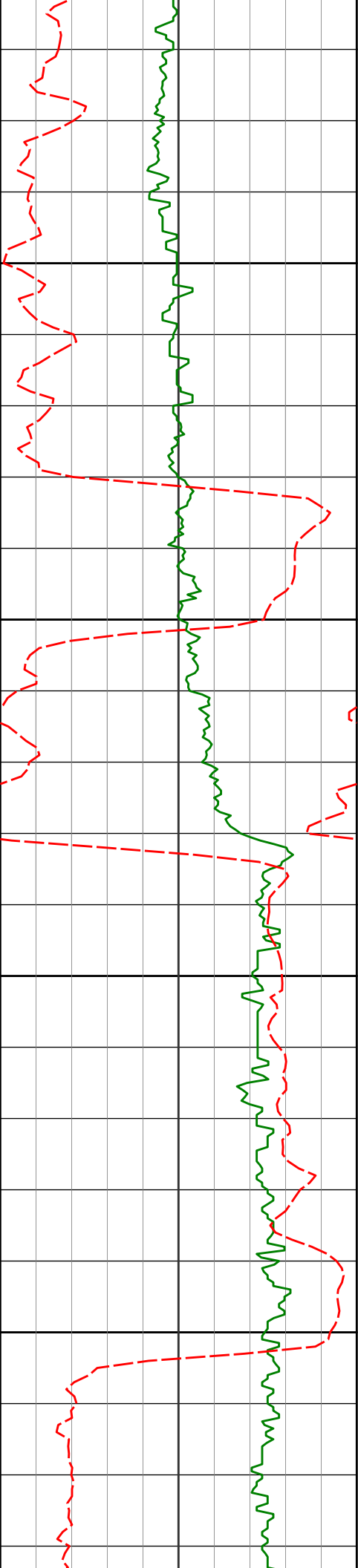
0.79°

5994.12'

2118.89'

8100

8150



8168'

90.99°

1.59°

5992.36'

2213.87'

8200

8250

8263'

90.65°

1.40°

5991.00'

2308.84'

8300

8350

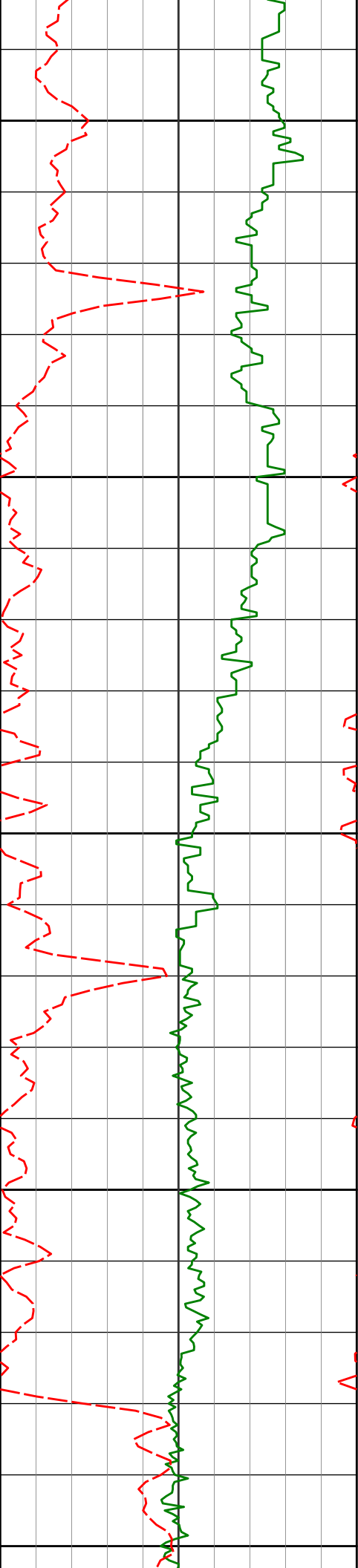
8357'

89.01°

0.64°

5991.28'

2402.83'



8400

8450

8500

8550

8600

8452'

88.52°

0.69°

5993.33'

2497.81'

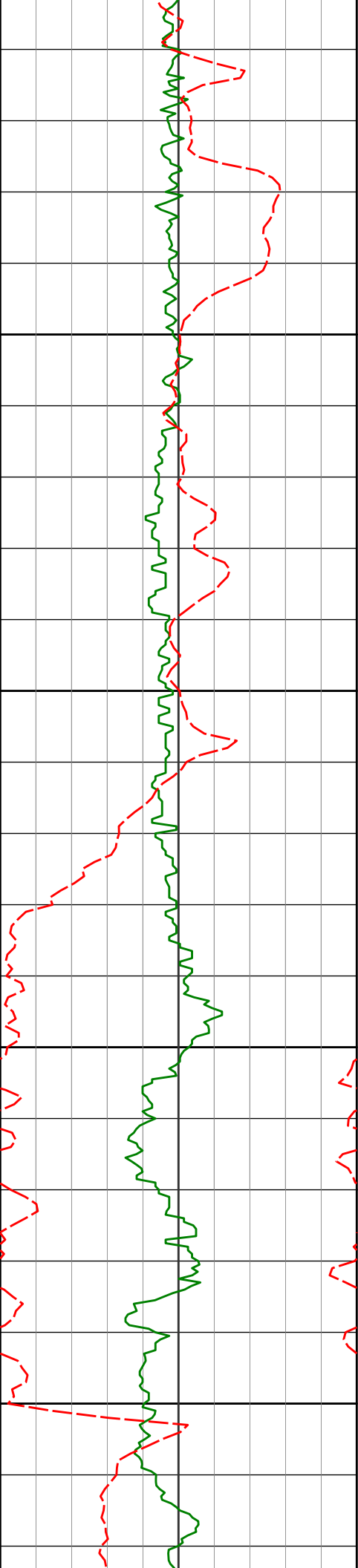
8546'

89.04°

1.05°

5995.33'

2591.79'



8650

8700

8750

8800

8641'

88.40°

0.68°

5997.45'

2686.76'

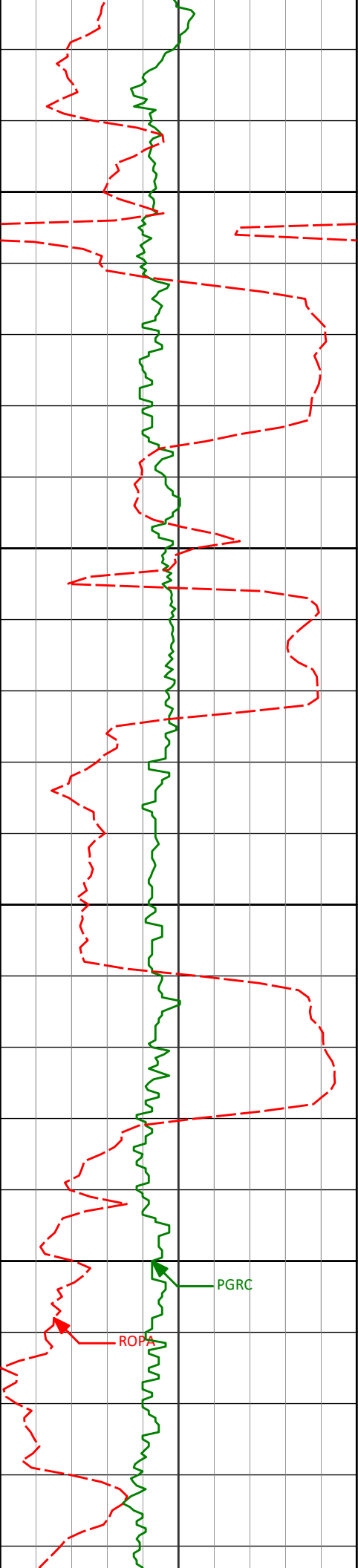
8736'

88.15°

0.85°

6000.31'

2781.72'



8831'

86.14°

0.41°

6005.04'

2876.60'

8850

8900

8926'

89.20°

359.54°

6008.90'

2971.50'

8950

9000

PGRC

ROPA

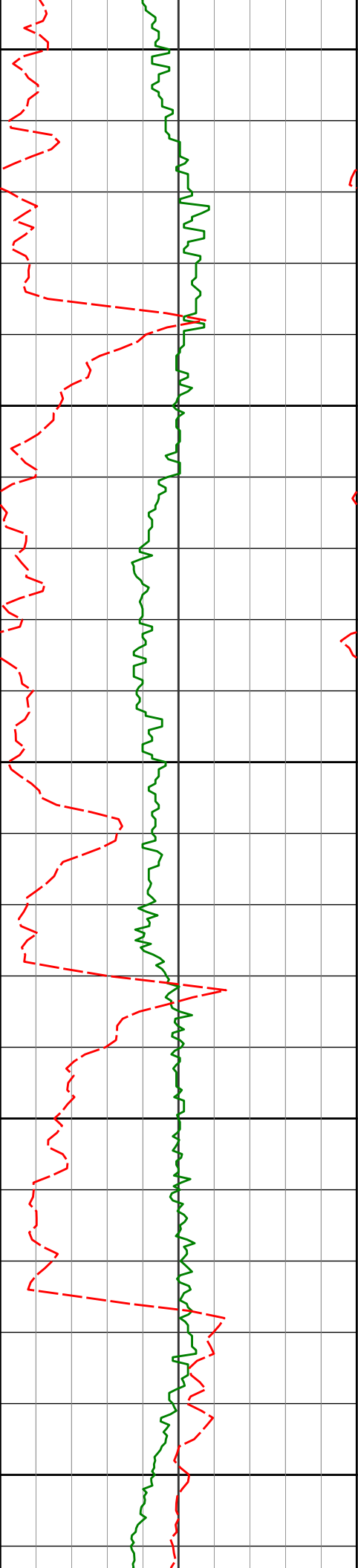
9020'

90.96°

357.45°

6008.77'

3065.43'



9050

9100

9150

9200

9250

9115'

91.14°

357.61°

6007.03'

3160.29'

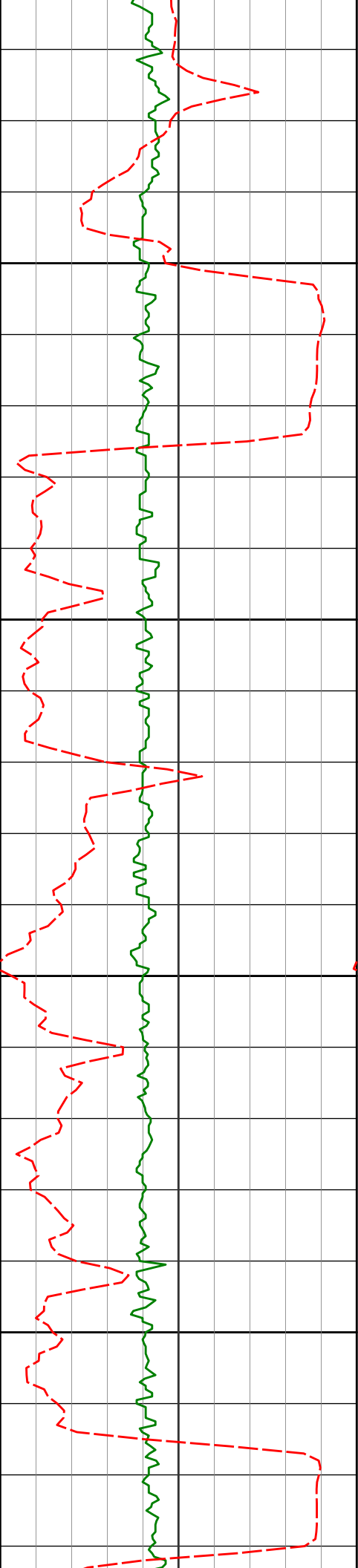
9210'

89.41°

355.80°

6006.57'

3255.07'



9300

9305'

89.07°

355.70°

6007.83'

3349.73'

9350

9400

9399'

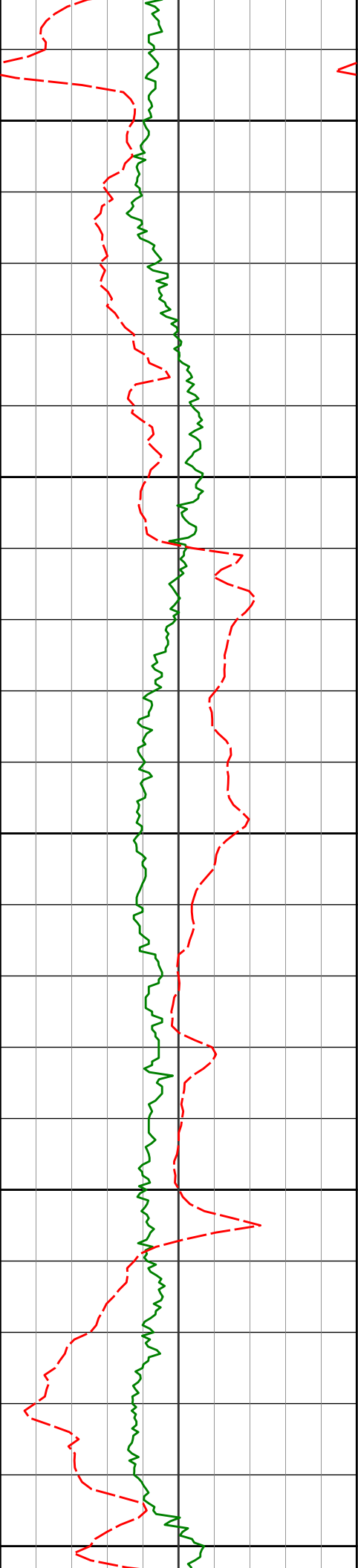
89.82°

355.15°

6008.74'

3443.35'

9450



9494'

91.39°

355.36°

6007.74'

3537.95'

9500

9550

9589'

90.55°

355.72°

6006.13'

3632.57'

9600

9650

9683'

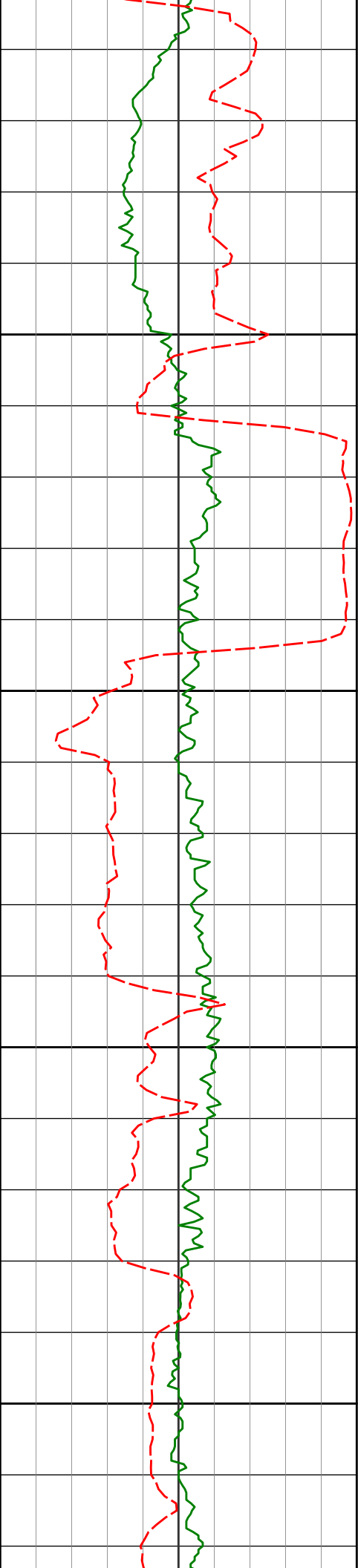
91.20°

354.87°

6004.69'

3726.17'

9700



9750

9778'

91.73°

357.01°

6002.26'

3820.83'

9800

9850

9873'

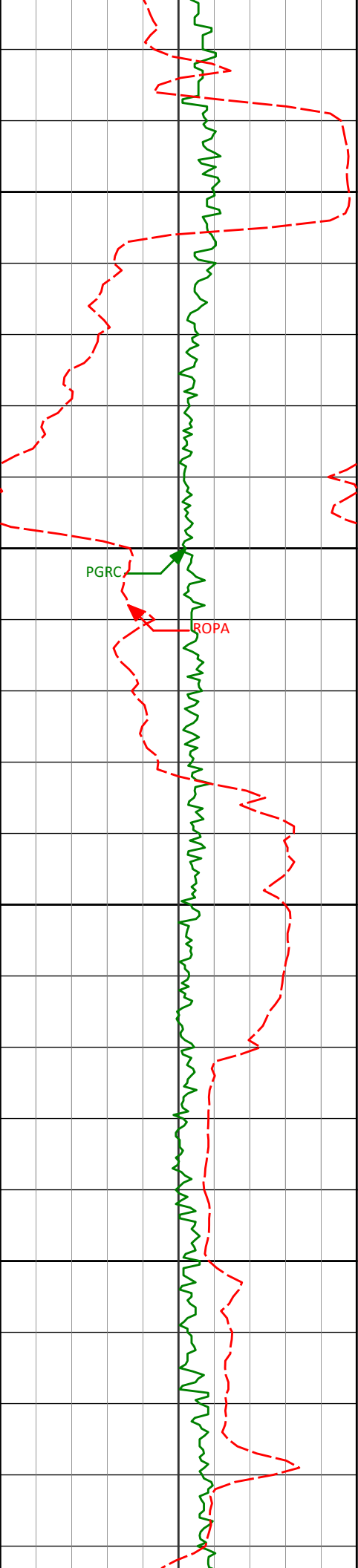
89.41°

355.87°

6001.32'

3915.58'

9900



9950

9968'

90.99°

359.05°

6000.99'

4010.43'

10000

PGRC

ROPA

10050

10062'

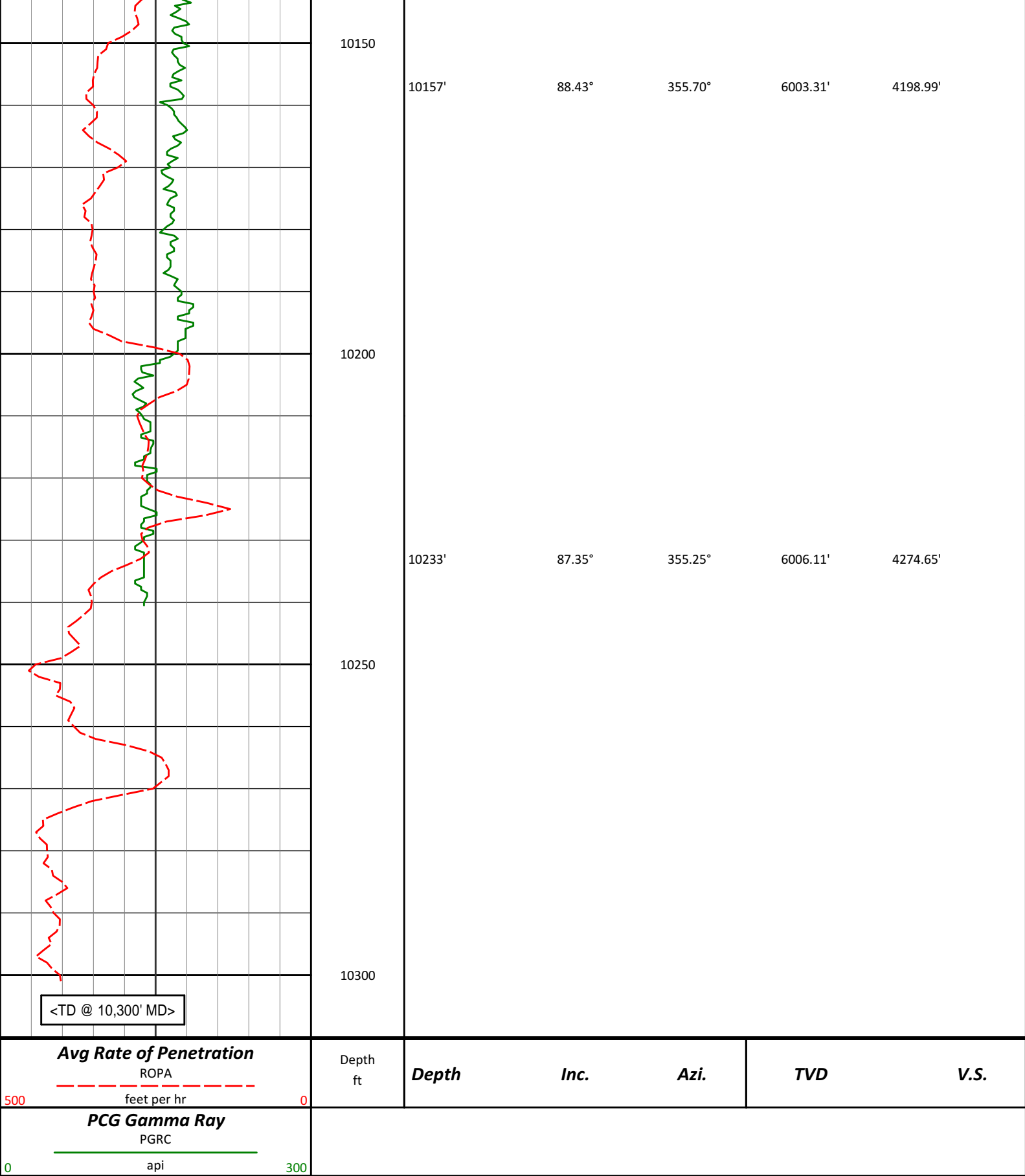
88.89°

356.48°

6001.09'

4104.30'

10100



HALLIBURTON

Wattenberg Weld Colorado USA CA-XX-0901400547							
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
375.00	0.80	300.23	374.99	1.32 N	2.26 W	1.30	0.21
600.00	0.20	349.73	599.98	2.50 N	3.69 W	2.46	0.31
717.00	0.29	16.99	716.98	2.98 N	3.64 W	2.95	0.12
902.00	0.10	105.34	901.98	3.39 N	3.35 W	3.36	0.16
1181.00	0.25	45.02	1180.98	3.75 N	2.69 W	3.73	0.08
1460.00	0.31	349.48	1459.97	4.92 N	2.40 W	4.90	0.10
1553.00	0.29	346.53	1552.97	5.40 N	2.50 W	5.38	0.03
1645.00	0.37	3.94	1644.97	5.93 N	2.54 W	5.90	0.14
1737.00	3.04	158.94	1736.93	3.95 N	1.64 W	3.93	3.68
1832.00	5.27	155.79	1831.68	2.39 S	1.06 E	-2.38	2.36
1927.00	4.89	155.02	1926.30	10.04 S	4.56 E	-10.00	0.41
2022.00	7.17	155.78	2020.77	19.12 S	8.70 E	-19.04	2.40
2117.00	6.24	151.85	2115.12	29.08 S	13.57 E	-28.96	1.09
2212.00	7.37	162.56	2209.45	39.45 S	17.83 E	-39.29	1.78
2307.00	7.06	158.06	2303.70	50.69 S	21.84 E	-50.49	0.68
2401.00	6.74	156.56	2397.02	61.11 S	26.20 E	-60.87	0.39
2496.00	7.95	155.22	2491.24	72.19 S	31.17 E	-71.91	1.28
2591.00	8.09	154.79	2585.31	84.20 S	36.77 E	-83.87	0.16
2781.00	7.93	155.88	2773.45	108.26 S	47.82 E	-107.82	0.11
2876.00	7.92	156.46	2867.55	120.24 S	53.11 E	-119.75	0.09
2970.00	7.48	154.98	2960.70	131.72 S	58.29 E	-131.19	0.51
3065.00	6.86	158.87	3054.96	142.62 S	62.95 E	-142.04	0.82
3160.00	6.14	157.92	3149.34	152.62 S	66.90 E	-152.01	0.77
3255.00	5.32	158.08	3243.87	161.42 S	70.46 E	-160.77	0.86
3350.00	7.06	149.93	3338.31	170.56 S	75.03 E	-169.87	2.04
3445.00	7.09	149.29	3432.59	180.65 S	80.95 E	-179.91	0.09
3540.00	7.25	150.23	3526.85	190.90 S	86.92 E	-190.10	0.21
3635.00	7.49	152.50	3621.06	201.59 S	92.75 E	-200.74	0.40
3730.00	7.92	149.51	3715.20	212.72 S	98.94 E	-211.82	0.62
3825.00	7.57	148.82	3809.34	223.72 S	105.50 E	-222.75	0.39
3920.00	7.29	150.78	3903.54	234.33 S	111.68 E	-233.31	0.40
4015.00	4.28	142.75	3998.05	242.42 S	116.77 E	-241.35	3.27
4109.00	2.40	131.35	4091.88	246.51 S	120.37 E	-245.41	2.12
4204.00	2.01	124.54	4186.81	248.77 S	123.23 E	-247.64	0.49
4299.00	1.53	114.01	4281.77	250.23 S	125.76 E	-249.08	0.61
4394.00	1.57	109.87	4376.73	251.19 S	128.15 E	-250.01	0.13
4489.00	1.30	84.27	4471.70	251.52 S	130.44 E	-250.33	0.72
4583.00	1.32	67.17	4565.68	250.99 S	132.50 E	-249.78	0.42
4773.00	2.11	39.85	4755.60	247.45 S	136.76 E	-246.20	0.59
4868.00	2.02	46.13	4850.53	244.95 S	139.09 E	-243.68	0.26
4963.00	1.73	26.57	4945.48	242.51 S	140.94 E	-241.22	0.73
5058.00	1.38	10.03	5040.45	240.10 S	141.78 E	-238.81	0.59
5247.00	1.08	9.49	5229.41	236.11 S	142.46 E	-234.81	0.16
5337.00	1.09	4.41	5319.39	234.43 S	142.67 E	-233.12	0.11
5385.00	4.94	352.01	5367.31	231.93 S	142.42 E	-230.62	8.09
5432.00	11.27	357.74	5413.82	225.33 S	141.95 E	-224.03	13.57
5480.00	15.59	1.25	5460.50	214.19 S	141.91 E	-212.89	9.15
5527.00	20.05	6.17	5505.24	199.85 S	142.91 E	-198.55	10.01
5575.00	24.31	4.28	5549.67	181.81 S	144.54 E	-180.49	9.00
5622.00	28.07	4.05	5591.84	161.12 S	146.04 E	-159.79	8.00
5670.00	31.23	4.39	5633.55	137.44 S	147.79 E	-136.10	6.59
5716.00	33.97	2.90	5672.30	112.71 S	149.36 E	-111.35	6.20
5764.00	37.36	359.88	5711.29	84.74 S	150.01 E	-83.38	7.97
5811.00	40.35	356.43	5747.89	55.29 S	149.03 E	-53.93	7.84
5859.00	43.89	356.33	5783.49	23.17 S	147.00 E	-21.83	7.39
5906.00	45.90	355.79	5816.78	9.93 N	144.71 E	11.24	4.36
5954.00	48.55	355.51	5849.38	45.06 N	142.04 E	46.34	5.52
6001.00	52.36	357.05	5879.30	81.21 N	139.70 E	82.48	8.50
6049.00	56.10	355.87	5907.36	120.07 N	137.29 E	121.32	8.04
6096.00	58.55	354.51	5932.73	159.49 N	133.96 E	160.70	5.76
6144.00	62.91	355.09	5956.19	201.18 N	130.17 E	202.35	9.14
6191.00	69.50	355.57	5975.15	244.02 N	126.67 E	245.16	14.06
6239.00	74.54	357.56	5989.96	289.58 N	123.95 E	290.69	11.21

6285.00	78.90	358.30	6000.52	334.31 N	122.34 E	335.40	9.61
6307.00	80.80	358.29	6004.40	355.95 N	121.69 E	357.04	8.65
6369.00	85.43	357.71	6011.83	417.45 N	119.54 E	418.52	7.52
6461.00	86.55	357.56	6018.26	509.14 N	115.75 E	510.17	1.22
6556.00	88.49	356.00	6022.38	603.90 N	110.41 E	604.88	2.62
6650.00	92.65	355.86	6021.44	697.64 N	103.75 E	698.55	4.43
6745.00	94.54	355.38	6015.48	792.17 N	96.51 E	793.01	2.05
6840.00	94.32	354.81	6008.15	886.54 N	88.41 E	887.30	0.64
6934.00	91.32	355.52	6003.53	980.08 N	80.50 E	980.77	3.27
7029.00	93.53	358.58	5999.50	1074.85 N	75.61 E	1075.49	3.96
7124.00	93.17	358.53	5993.95	1169.66 N	73.21 E	1170.27	0.37
7219.00	91.36	0.06	5990.20	1264.57 N	72.05 E	1265.17	2.50
7314.00	89.07	0.65	5989.84	1359.56 N	72.64 E	1360.16	2.48
7409.00	87.41	1.11	5992.75	1454.50 N	74.10 E	1455.11	1.82
7503.00	87.93	0.06	5996.57	1548.42 N	75.05 E	1549.03	1.25
7598.00	89.72	359.73	5998.52	1643.39 N	74.88 E	1644.00	1.92
7693.00	90.49	359.67	5998.34	1738.39 N	74.38 E	1738.99	0.81
7788.00	89.23	359.25	5998.57	1833.38 N	73.49 E	1833.97	1.40
7883.00	90.92	0.40	5998.44	1928.38 N	73.20 E	1928.96	2.15
7978.00	91.57	1.98	5996.37	2023.33 N	75.17 E	2023.93	1.80
8073.00	91.14	0.79	5994.12	2118.27 N	77.46 E	2118.89	1.33
8168.00	90.99	1.59	5992.36	2213.24 N	79.43 E	2213.87	0.86
8263.00	90.65	1.40	5991.00	2308.19 N	81.91 E	2308.84	0.41
8357.00	89.01	0.64	5991.28	2402.18 N	83.59 E	2402.83	1.92
8452.00	88.52	0.69	5993.33	2497.15 N	84.69 E	2497.81	0.52
8546.00	89.04	1.05	5995.33	2591.11 N	86.12 E	2591.79	0.68
8641.00	88.40	0.68	5997.45	2686.08 N	87.55 E	2686.76	0.78
8736.00	88.15	0.85	6000.31	2781.03 N	88.82 E	2781.72	0.32
8831.00	86.14	0.41	6005.04	2875.90 N	89.87 E	2876.60	2.16
8926.00	89.20	359.54	6008.90	2970.81 N	89.83 E	2971.50	3.35
9020.00	90.96	357.45	6008.77	3064.77 N	87.35 E	3065.43	2.90
9115.00	91.14	357.61	6007.03	3159.66 N	83.26 E	3160.29	0.26
9210.00	89.41	355.80	6006.57	3254.50 N	77.80 E	3255.07	2.63
9305.00	89.07	355.70	6007.83	3349.23 N	70.77 E	3349.73	0.37
9399.00	89.82	355.15	6008.74	3442.92 N	63.27 E	3443.35	0.98
9494.00	91.39	355.36	6007.74	3537.59 N	55.41 E	3537.95	1.67
9589.00	90.55	355.72	6006.13	3632.29 N	48.03 E	3632.57	0.95
9683.00	91.20	354.87	6004.69	3725.96 N	40.33 E	3726.17	1.14
9778.00	91.73	357.01	6002.26	3820.68 N	33.61 E	3820.83	2.31
9873.00	89.41	355.87	6001.32	3915.49 N	27.71 E	3915.58	2.71
9968.00	90.99	359.05	6000.99	4010.38 N	23.50 E	4010.43	3.73
10062.00	88.89	356.48	6001.09	4104.29 N	19.84 E	4104.30	3.53
10157.00	88.43	355.70	6003.31	4199.05 N	13.37 E	4198.99	0.96
10233.00	87.35	355.25	6006.11	4274.76 N	7.38 E	4274.65	1.54
10300.00	87.35	355.25	6009.21	4341.45 N	1.84 E	4341.29	0.01

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 0.52 DEGREES (GRID)
A TOTAL CORRECTION OF 7.13 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10300.00 FEET
IS 4341.46 FEET ALONG 0.02 DEGREES (GRID)**

Surface surveys at 375 ft and 600 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 10233 ft MD to TD at 10300 ft MD.