

PCG Pressure Case Gamma Ray  
PCDC Pressure Case Directional



Company : Noble Energy									
Rig : PD 829									
Well : Loeffler K1-69-1HN-A1									
Field : Wattenburg									
Country : USA									
API Number : 05-123-37735									
LOCATION					Other Services Directional Drilling				
Latitude : 40° 20' 38.04" North Longitude : 104° 44' 2.26" West UTM Easting = 3,213,523.657 ft UTM Northing = 1,369,045.751 ft									
Country : USA									
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## WELL INFORMATION

MWD Run Number	100				
Date run completed	10-Sep-13				
Rig Bit Number	2				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (MD, ft)	644.00				
Log End Depth (MD, ft)	7,581.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	06-Sep-13 21:00				
Drill/Wipe End Date and Time	09-Sep-13 20:00				
Min Inc (deg) @ Depth (MD, ft)	0.38 @ 966.00				
Max Inc (deg) @ Depth (MD, ft)	79.39 @ 7,531.00				
Bit TFA(in2) / Bit Type	0.84 / PDC				
Flow Rate (gpm)	578.86				
Max AV (fpm) / CV (fpm) @ MWD	321.2 / 250.5				
Fluid Type	Fresh Water Gel				
Density (ppg) / Viscosity (spqt)	9.17 / 39.00				
Filtrate CL (ppm)	700.00				
pH / Fluid Loss (mptm)	9.50 / 7				
PV (cP) / YP (lbf2)	13 / 10.00				
% Solids / % Sand	8.50 / 0.25				
% 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 (degF) / C	178.78 / 82.1				

Max Tool Temp (degF) / Source	172.78 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 172.78				
Lead MWD Engineer	Tyrell Foran				
Customer Representative	Kevin Campbell				

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM				
Software Version	5.84				
Sub Serial Number	11404283				
Insert Serial Number	11227547				
Date and Time Initialized	06-Sep-13 05:37				
Date and Time Read	10-Sep-13 07:27				
ECMB SW Version	N/A				

### Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	50.00				
Software Version	6.21				
Sub Serial Number	11404283				
Sonde Serial Number	12174339				
Sensor ID Number	N/A				
Toolface Offset (deg)	195.97				

### Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	55.81				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404283				
Insert/Sonde Serial Number	11579811				

## REMARKS

1. All depths are true vertical bit depths, referenced to the Drillers 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" for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.

4. All data is stored data unless otherwise specified.

5. The following smoothing parameters have been applied to the data:

PCG GR XHI -Range (Gamma CG Cor)  
Interval Resolution: .5  
Interval Distance: .6  
Gap Fill: 3

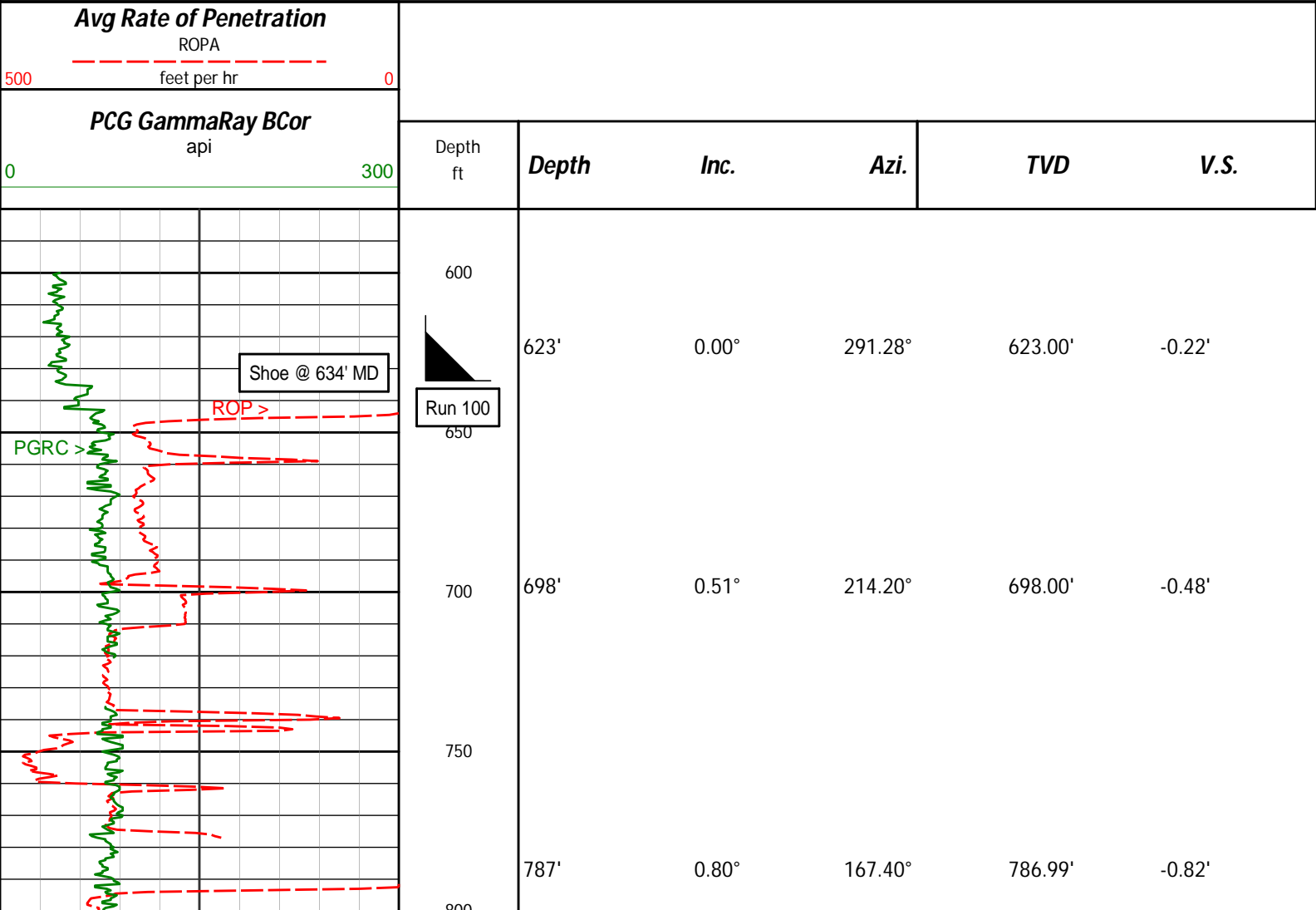
ROPA (Average Rate of Penetration)  
Interval Resolution: .5  
Interval Distance: 1.2  
Gap Fill: 3

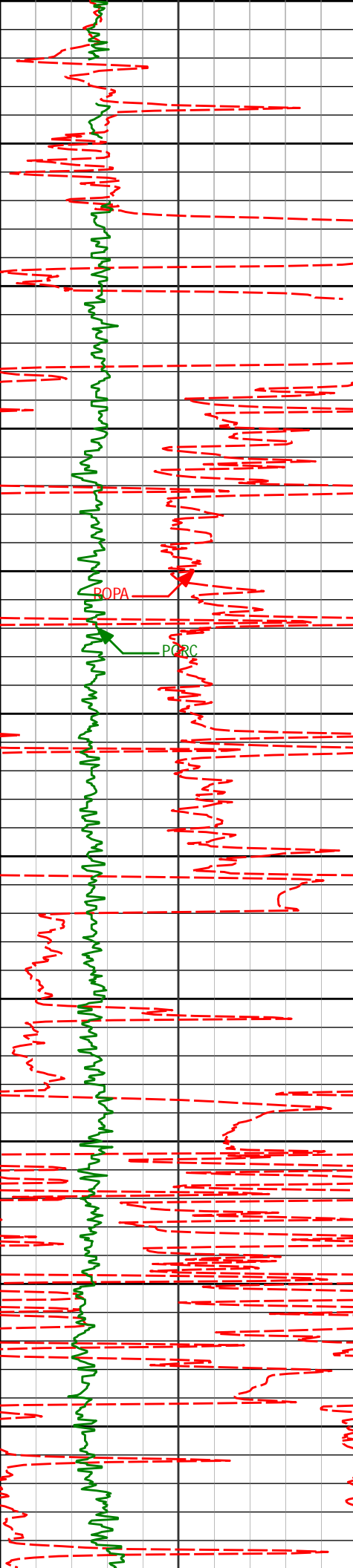
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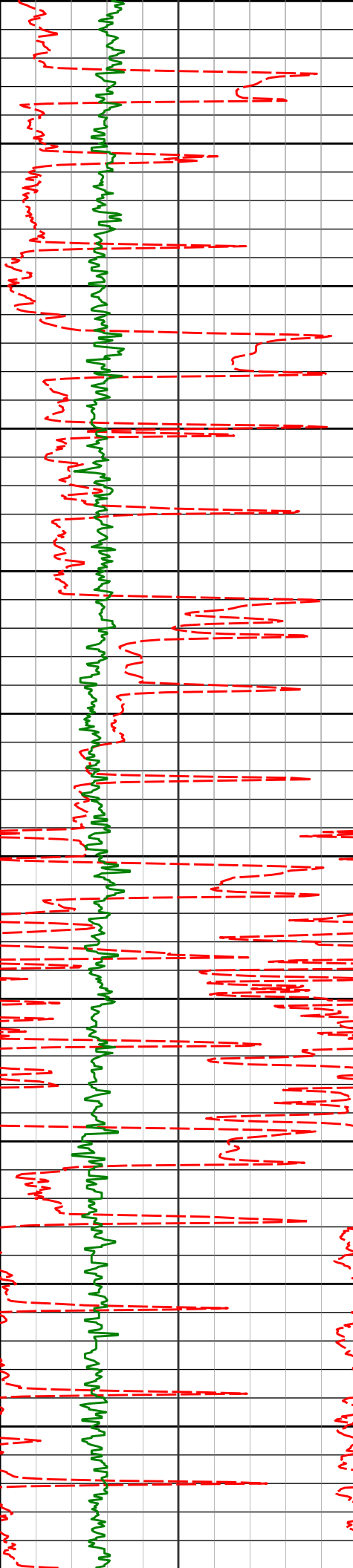
HALLIBURTON  
Sperry Drilling Services  
TVD Detail Log 1:600

Noble Energy  
Loeffler K1-69-1HN  
PD 829  
Sec.1-T4N-R66W

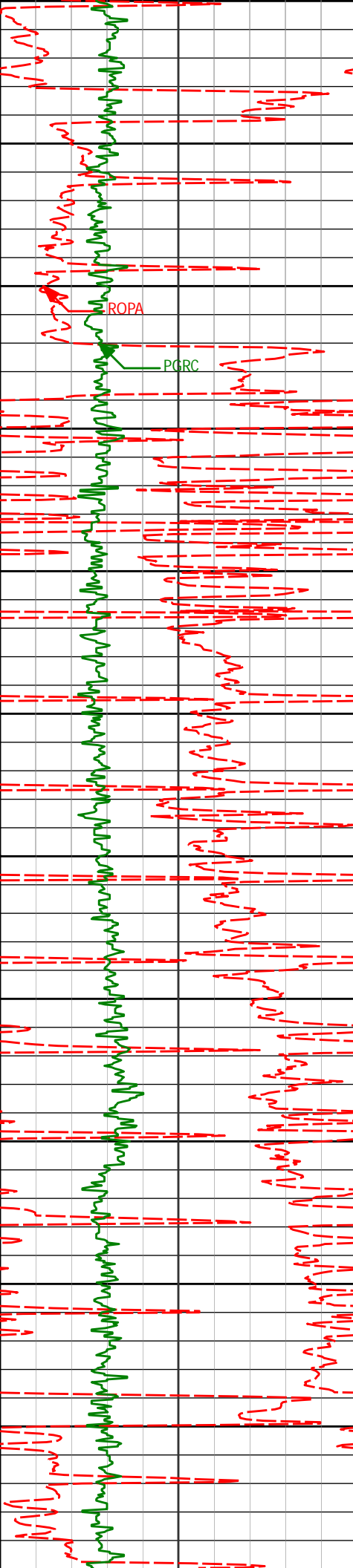




800				
850				
877'	0.63°	265.66°	876.99'	-1.35'
900				
950				
966'	0.38°	219.55°	965.98'	-2.07'
1000				
1015				
1025				
1056'	0.77°	301.77°	1055.98'	-2.73'
1100				
1135'	0.99°	307.48°	1134.97'	-3.48'
1150				
1200				
1229'	3.78°	347.51°	1228.89'	-3.73'
1250				
1300				
1323'	5.15°	354.87°	1322.60'	-2.67'
1350				

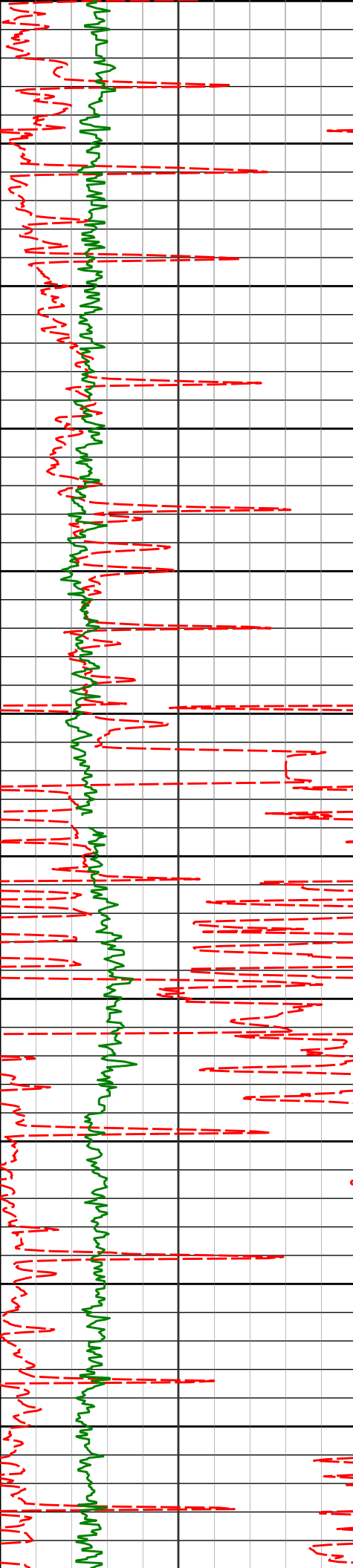


1350				
1400				
1418'	7.45°	356.32°	1417.02'	-0.44'
1450				
1500				
1512'	9.52°	357.45°	1509.99'	2.81'
1550				
1600				
1606'	10.34°	351.94°	1602.58'	5.96'
1650				
1700				
1700'	10.83°	350.17°	1694.98'	8.26'
1750				
1794'	12.20°	351.80°	1787.09'	10.76'
1800				
1850				
1889'	11.14°	348.85°	1880.13'	13.10'
1900				



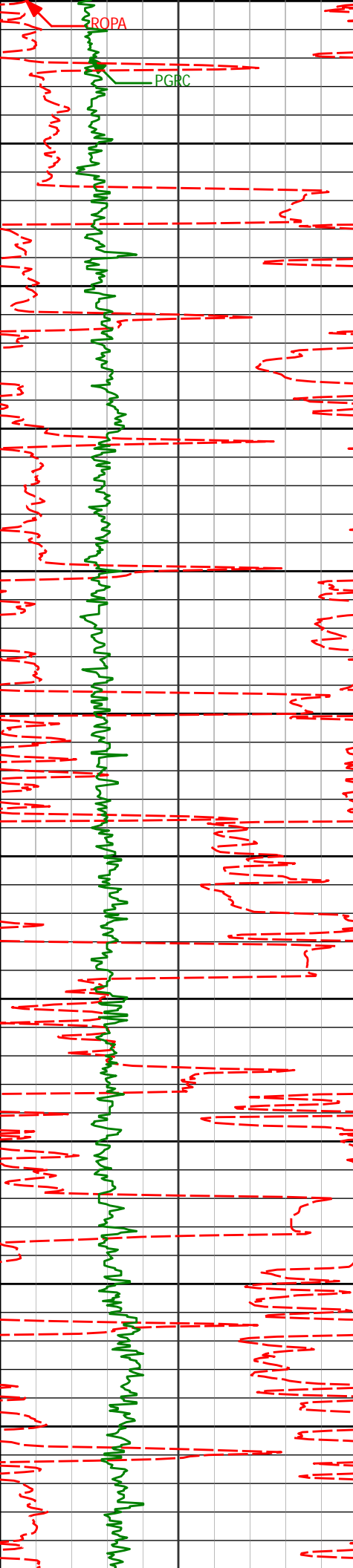
1900  
1950  
2000  
2050  
2100  
2150  
2200  
2250  
2300  
2350  
2400  
2450

1983'	12.73°	348.76°	1972.09'	14.94'
2077'	13.28°	356.75°	2063.69'	18.41'
2171'	12.79°	355.93°	2155.26'	23.16'
2265'	12.20°	354.27°	2247.04'	27.30'
2359'	10.60°	350.23°	2339.18'	30.21'
2451'	12.68°	354.87°	2429.29'	33.23'



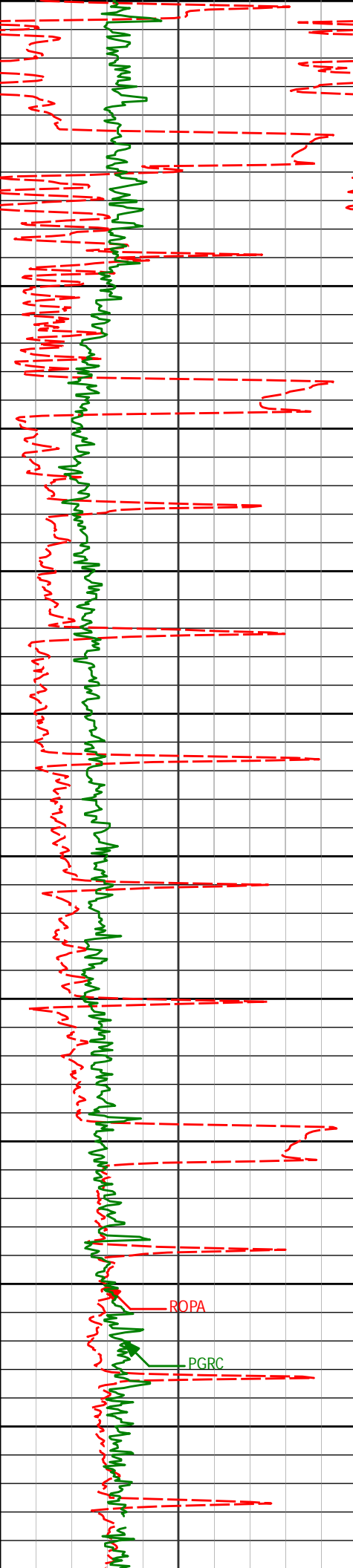
2450  
2500  
2550  
2600  
2650  
2700  
2750  
2800  
2850  
2900  
2950  
3000

2513'	12.44°	354.38°	2489.80'	35.86'
2602'	12.47°	355.22°	2576.71'	39.66'
2692'	13.95°	355.66°	2664.32'	43.96'
2781'	12.38°	351.43°	2750.99'	47.58'
2871'	10.48°	348.83°	2839.20'	49.71'
2961'	10.11°	348.19°	2927.75'	51.15'



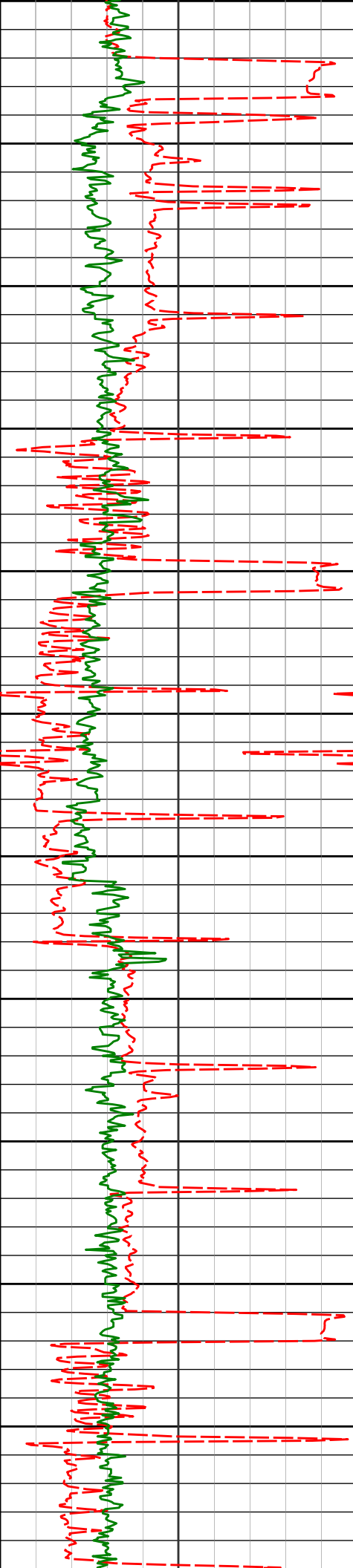
3000	3050'	9.57°	345.83°	3015.44'	52.12'
3050					
3100	3140'	11.49°	345.02°	3103.92'	52.70'
3150					
3200	3230'	10.64°	338.45°	3192.25'	52.24'
3250					
3300	3319'	9.50°	345.70°	3279.88'	51.83'
3350					
3400	3409'	9.92°	346.26°	3368.59'	52.52'
3450	3498'	11.37°	348.41°	3456.06'	53.68'
3500					
3550	3588'	9.26°	343.12°	3544.60'	54.42'





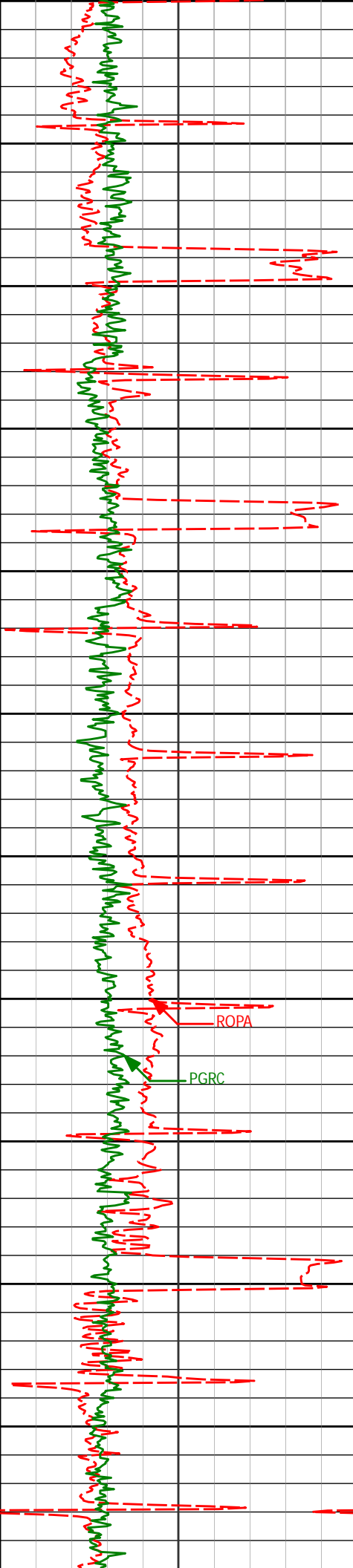
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3678'	10.77°	343.55°	3633.22'	54.41'
3767'	11.93°	352.11°	3720.49'	55.83'
3857'	12.90°	352.21°	3808.38'	58.79'
3946'	13.14°	351.61°	3895.09'	61.76'
4036'	10.83°	353.94°	3983.13'	64.78'
4126'	9.72°	350.01°	4071.68'	67.20'



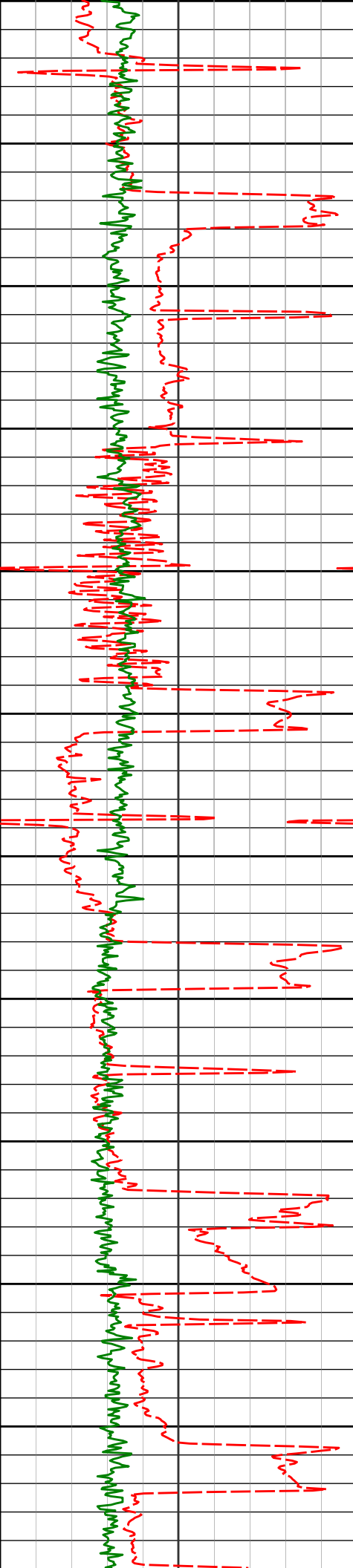
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4650

4215'	11.51°	349.73°	4159.15'	69.05'
4305'	10.82°	347.97°	4247.45'	70.72'
4394'	11.80°	350.76°	4334.72'	72.56'
4484'	10.94°	349.21°	4422.96'	74.61'
4573'	10.75°	347.84°	4510.37'	76.11'
4663'	10.71°	353.85°	4598.80'	78.29'



4650  
4700  
4750  
4800  
4850  
4900  
4950  
5000  
5050  
5100  
5150  
5200

4753'	9.42°	355.14°	4687.41'	81.31'
4842'	9.93°	350.06°	4775.15'	83.68'
4932'	11.62°	350.36°	4863.56'	85.69'
5022'	11.53°	350.60°	4951.73'	87.92'
5111'	10.16°	349.29°	5039.13'	89.84'
5201'	11.03°	350.38°	5127.60'	91.71'



5291'	9.65°	348.23°	5216.14'	93.40'
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5250

5300

5380'	10.54°	354.53°	5303.76'	95.60'
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5350

5400

5470'	9.17°	353.60°	5392.43'	98.46'
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5450

5500

5560'	10.22°	348.31°	5481.15'	100.42'
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5550

5600

5649'	11.13°	344.05°	5568.61'	101.20'
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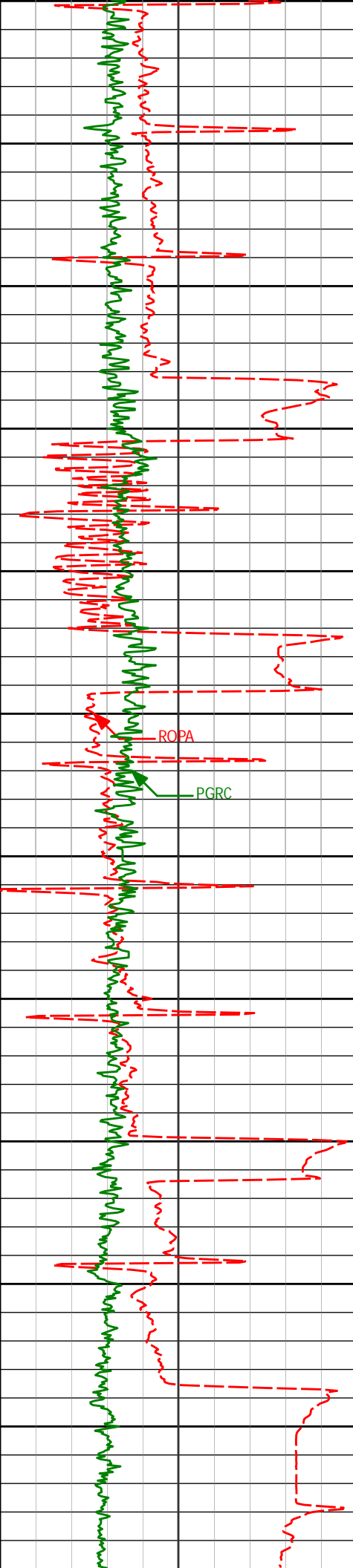
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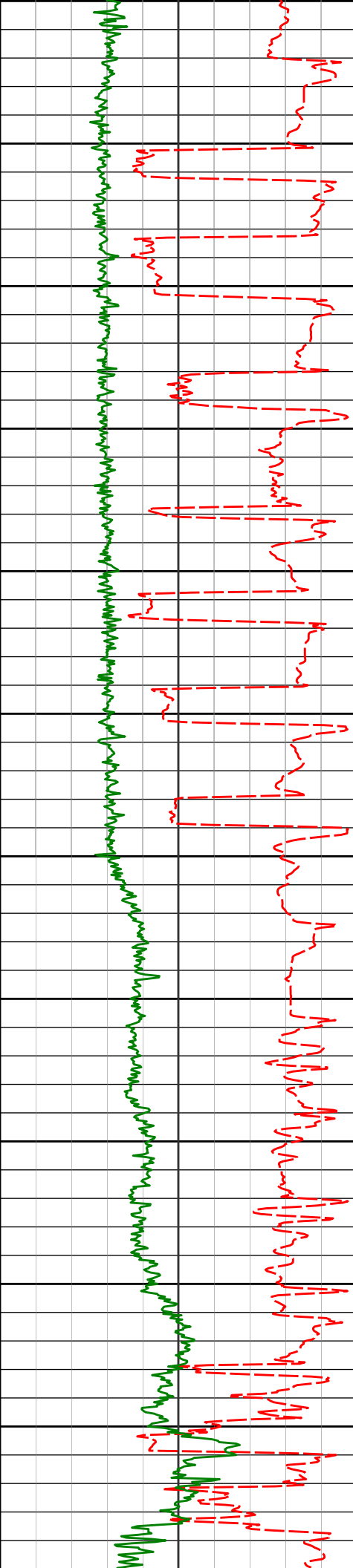
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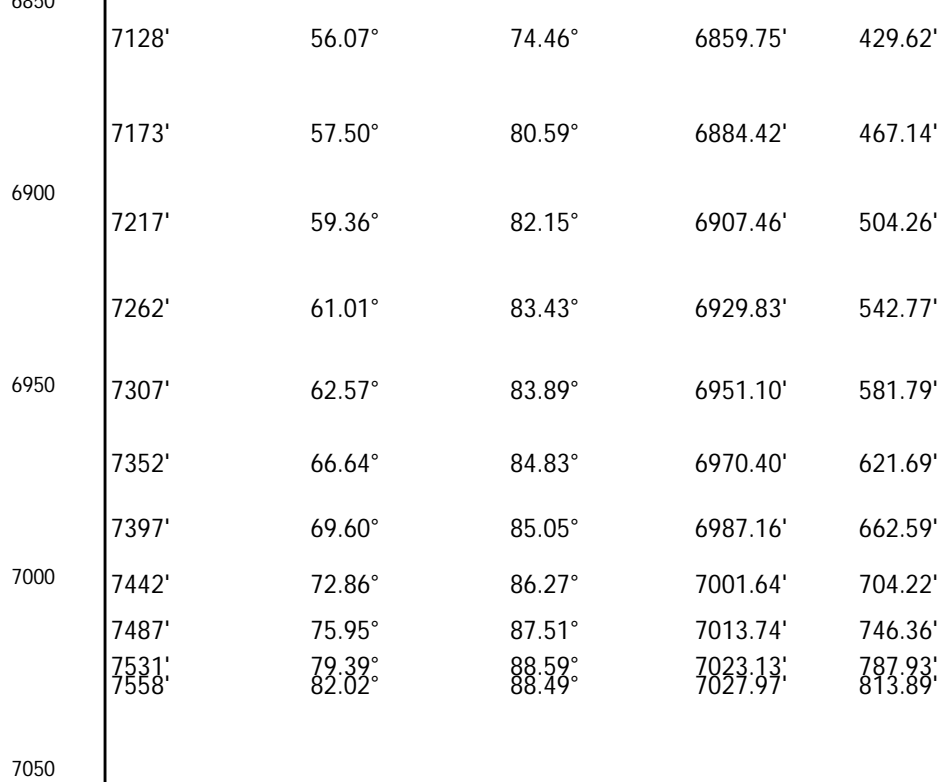


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5800  
5850  
5900  
5950  
6000  
6050  
6100  
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6200  
6250  
6300

5918'	9.37°	350.81°	5832.63'	106.73'
6008'	10.84°	348.88°	5921.23'	108.49'
6097'	11.61°	358.92°	6008.54'	111.69'
6187'	9.46°	353.91°	6097.02'	115.47'
6277'	9.98°	357.15°	6185.72'	118.68'
6322'	10.30°	357.89°	6230.02'	120.61'
6366'	14.31°	1.50°	6273.00'	123.29'



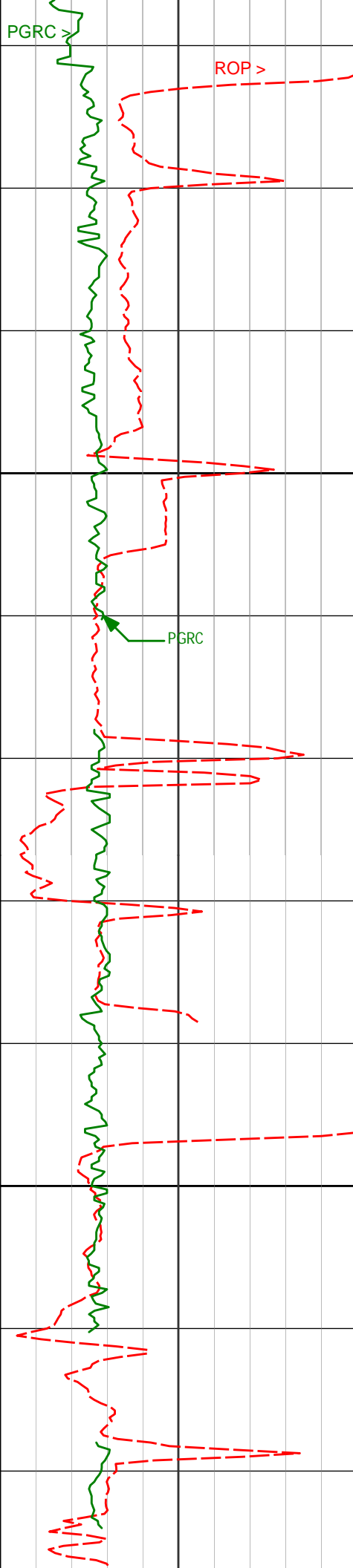
6300	6411'	19.89°	2.40°	6316.00'	127.52'
6350	6456'	23.62°	1.06°	6357.78'	132.75'
6400	6501'	25.23°	358.75°	6398.75'	138.03'
6450	6545'	28.37°	355.17°	6438.03'	142.66'
6500	6590'	32.70°	356.68°	6476.78'	147.64'
6550	6635'	36.33°	358.67°	6513.85'	153.95'
6600	6680'	37.97°	5.06°	6549.73'	162.59'
6650	6725'	38.05°	11.27°	6585.20'	174.19'
6700	6769'	40.45°	21.53°	6619.31'	189.37'
6750	6814'	43.47°	29.32°	6652.79'	209.53'
6800	6859'	43.82°	37.72°	6685.38'	233.33'
6850	6904'	45.46°	47.66°	6717.44'	260.47'
	6948'	47.31°	56.90°	6747.83'	290.14'
	6993'	48.56°	64.71°	6778.00'	322.70'
	7038'	51.86°	67.72°	6806.80'	357.00'
	7083'	53.94°	70.00°	6833.94'	392.78'
6950					



**HALLIBURTON**  
**Sperry Drilling Services**  
**TVD Detail Log 1:240**

Noble Energy  
Loeffler K1-69-1HN  
PD 829  
Sec.1-T4N-R66W

<div><div>Avg Rate of Penetration</div><div>ROPA</div><div><div>500</div><div>feet per hr</div><div>0</div></div></div>																			
<div><div>PCG Gamma Ray BCorr</div><div>api</div><div><div>0</div><div></div><div>300</div></div></div>										Depth ft	Depth	Inc.	Azi.	TVD	V.S.				
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Run 100

700

698'

0.51°

214.20°

698.00'

-0.48'

PGRC

800

787'

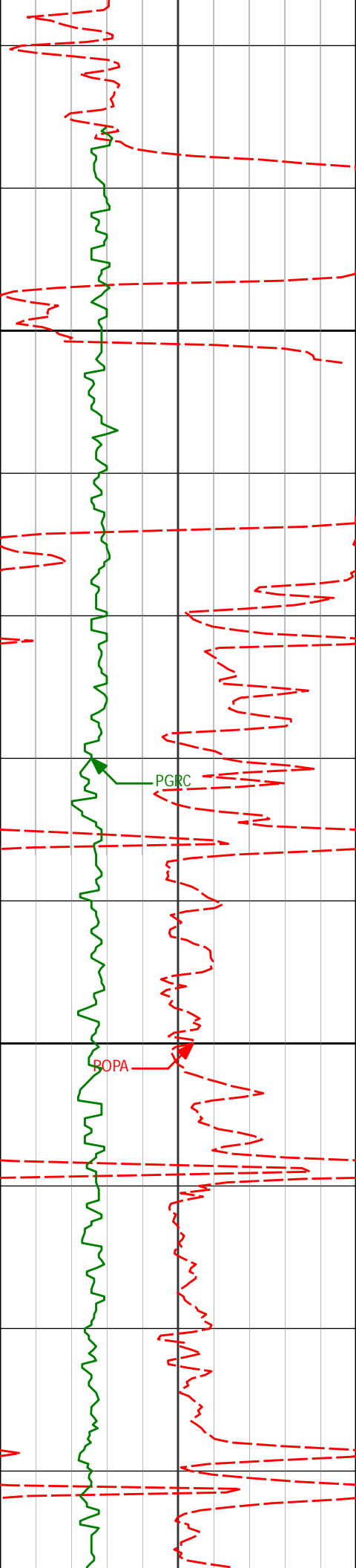
0.80°

167.40°

786.99'

-0.82'





877'

0.63°

265.66°

876.99'

-1.35'

900

966'

0.38°

219.55°

965.98'

-2.07'

1000

1056'

0.77°

301.77°

1055.98'

-2.73'



1100

1135'

0.99°

307.48°

1134.97'

-3.48'

1200

PGRC

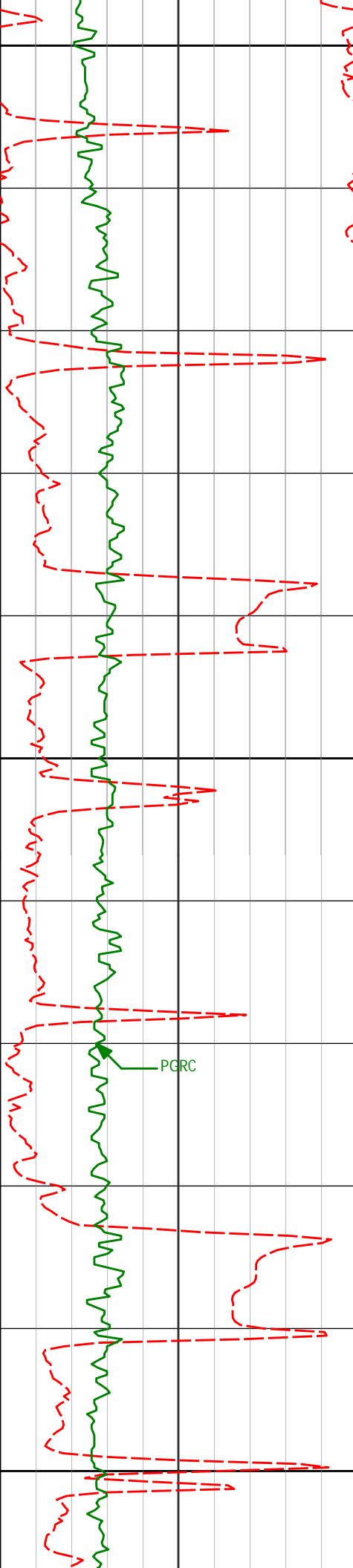
1229'

3.78°

347.51°

1228.89'

-3.73'



1300

1323'

5.15°

354.87°

1322.60'

-2.67'

1400

1418'

7.45°

356.32°

1417.02'

-0.44'

PGRC

1500

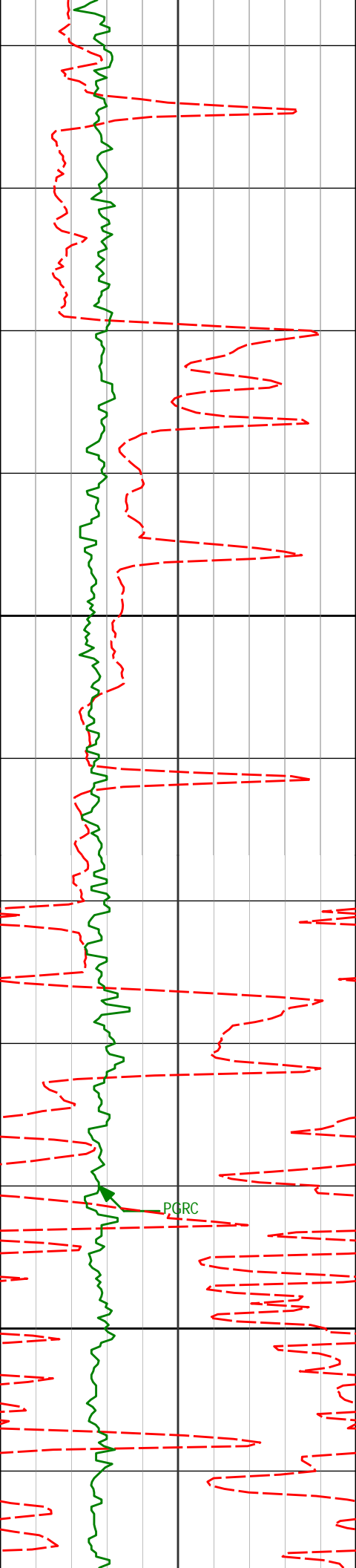
1512'

9.52°

357.45°

1509.99'

2.81'



1600

1606'

10.34°

351.94°

1602.58'

5.96'

1700

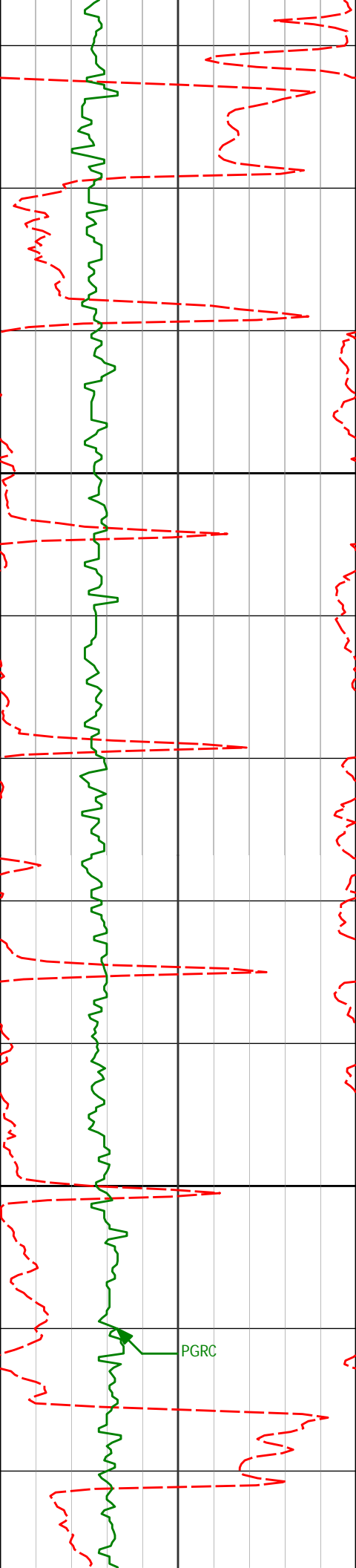
1700'

10.83°

350.17°

1694.98'

8.26'



1800

1900

1794'

12.20°

351.80°

1787.09'

10.76'

1889'

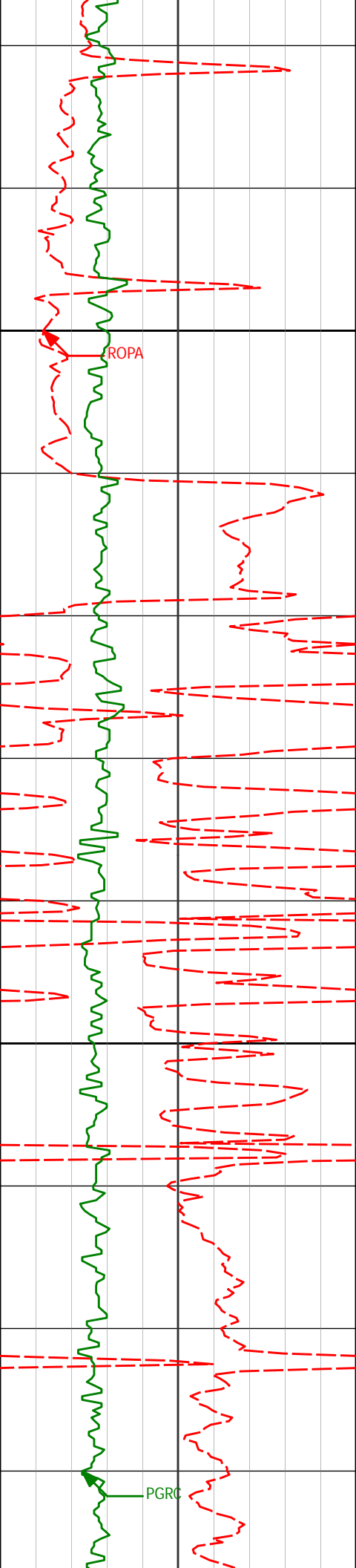
11.14°

348.85°

1880.13'

13.10'

PGRC



2000

2100

1983'

12.73°

348.76°

1972.09'

14.94'

2077'

13.28°

356.75°

2063.69'

18.41'

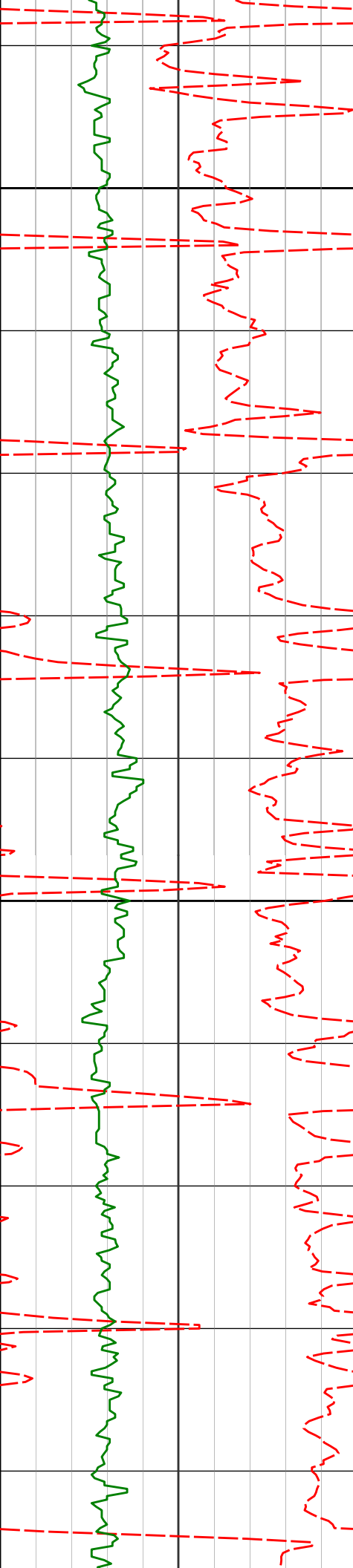
2171'

12.79°

355.93°

2155.26'

23.16'



2200

2265'

12.20°

354.27°

2247.04'

27.30'

2300

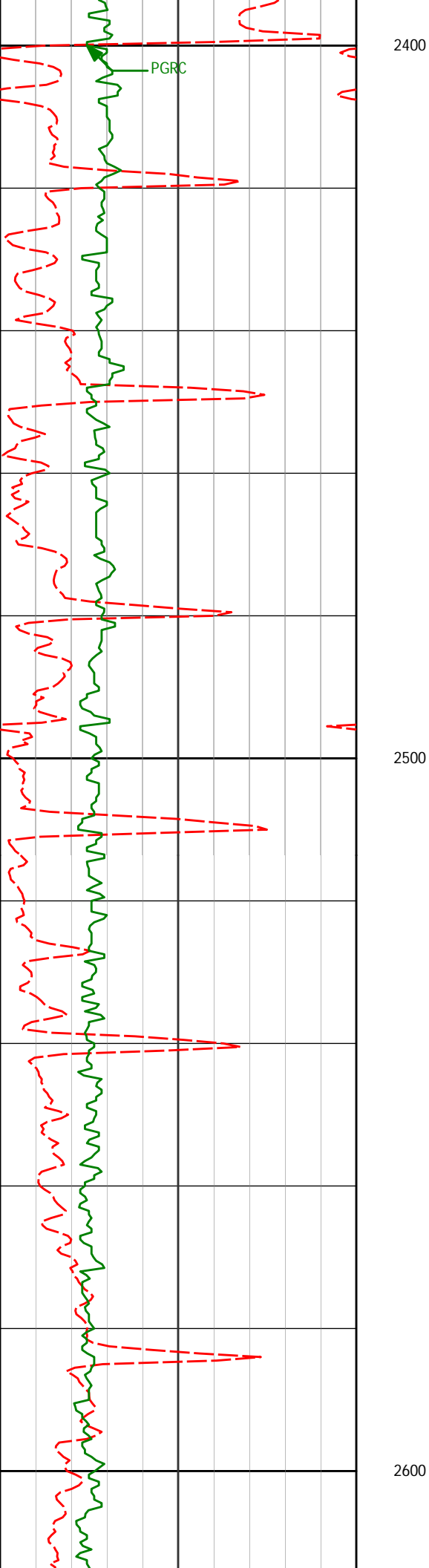
2359'

10.60°

350.23°

2339.18'

30.21'

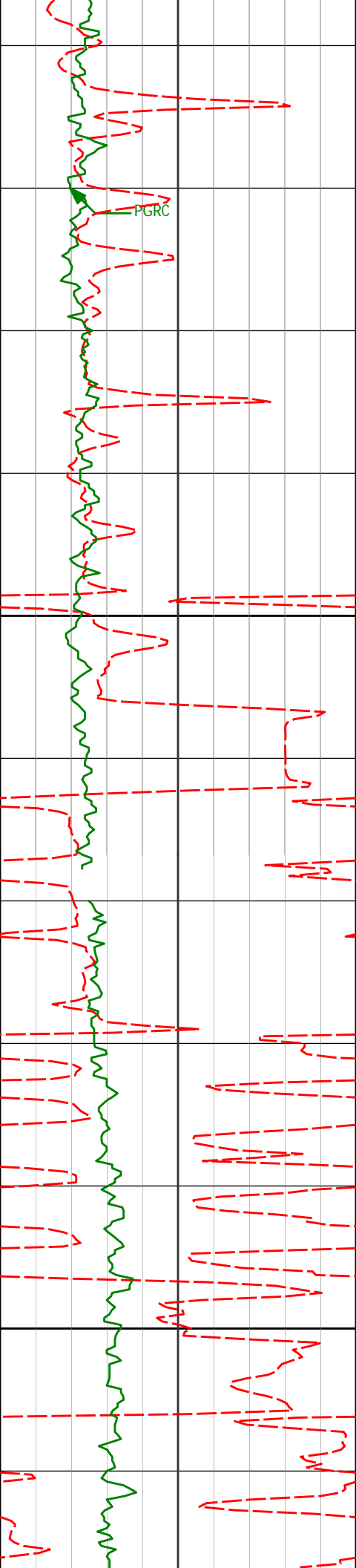


2451'	12.68°	354.87°	2429.29'	33.23'
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2513'	12.44°	354.38°	2489.80'	35.86'
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2602'	12.47°	355.22°	2576.71'	39.66'
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2692'

13.95°

355.66°

2664.32'

43.96'

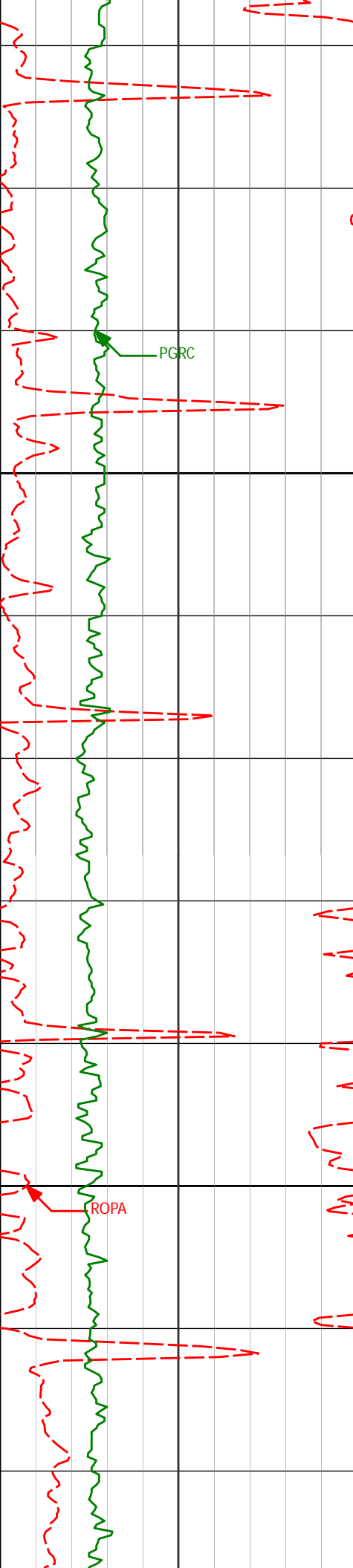
2781'

12.38°

351.43°

2750.99'

47.58'



2900

3000

2871'

10.48°

348.83°

2839.20'

49.71'

2961'

10.11°

348.19°

2927.75'

51.15'

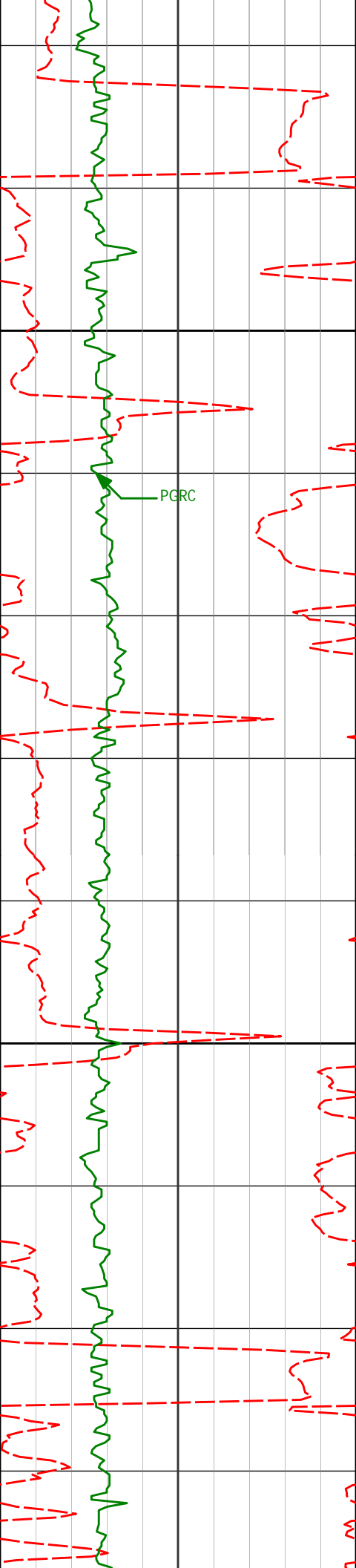
3050'

9.57°

345.83°

3015.44'

52.12'



3100

3140'

11.49°

345.02°

3103.92'

52.70'

3200

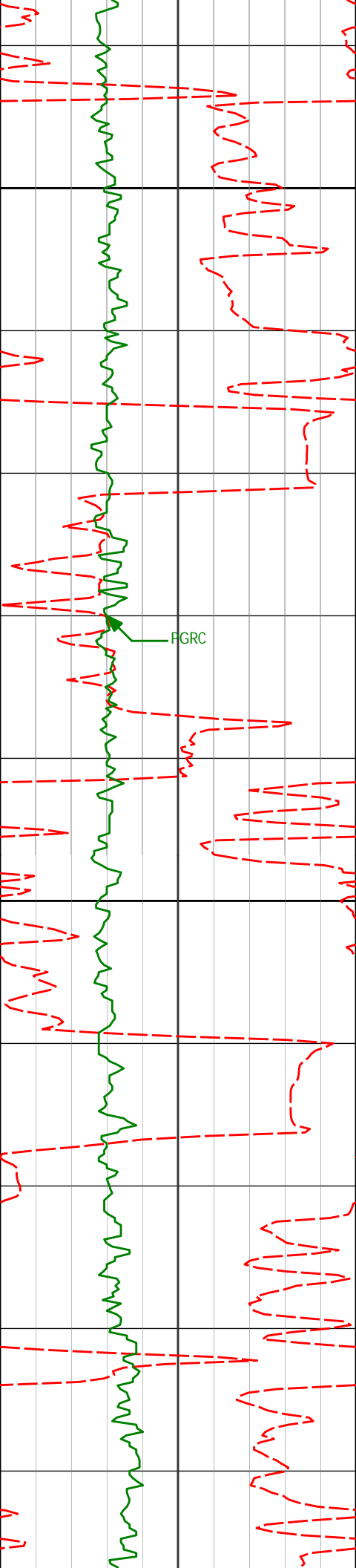
3230'

10.64°

338.45°

3192.25'

52.24'



3319'

9.50°

345.70°

3279.88'

51.83'

3300

3409'

9.92°

346.26°

3368.59'

52.52'

3400

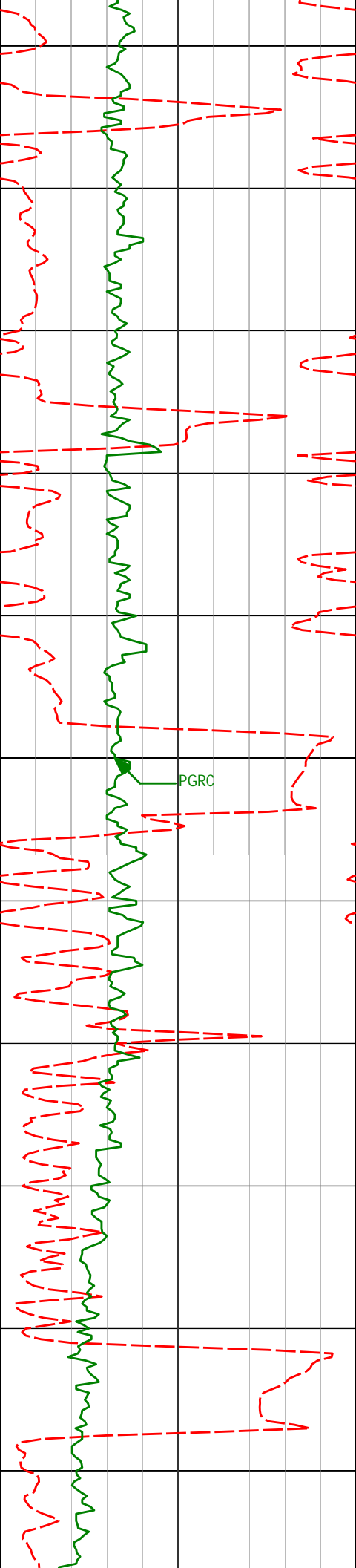
3498'

11.37°

348.41°

3456.06'

53.68'



3500

3588'

9.26°

343.12°

3544.60'

54.42'

3600

PGRC

3678'

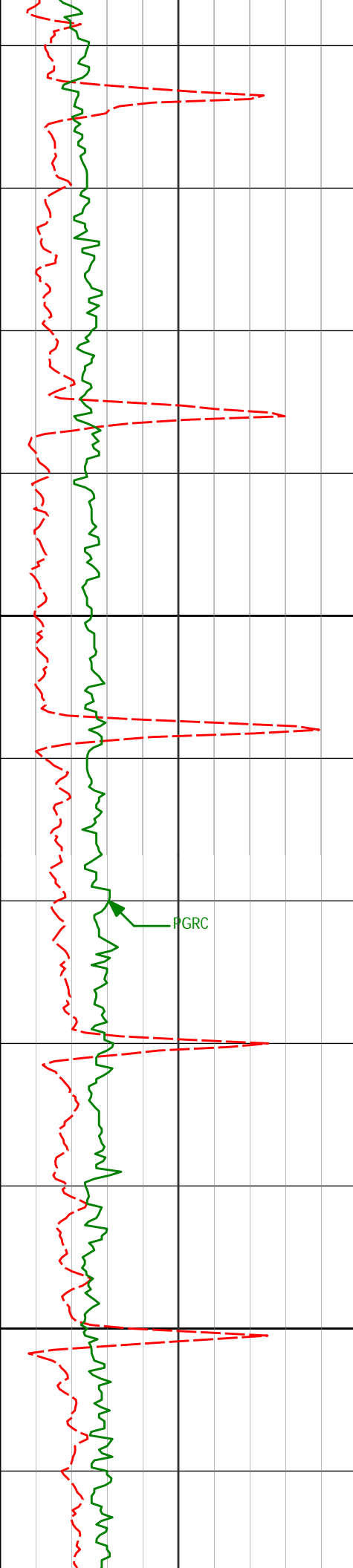
10.77°

343.55°

3633.22'

54.41'

3700



3800

3900

3767'

11.93°

352.11°

3720.49'

55.83'

3857'

12.90°

352.21°

3808.38'

58.79'

PGRC

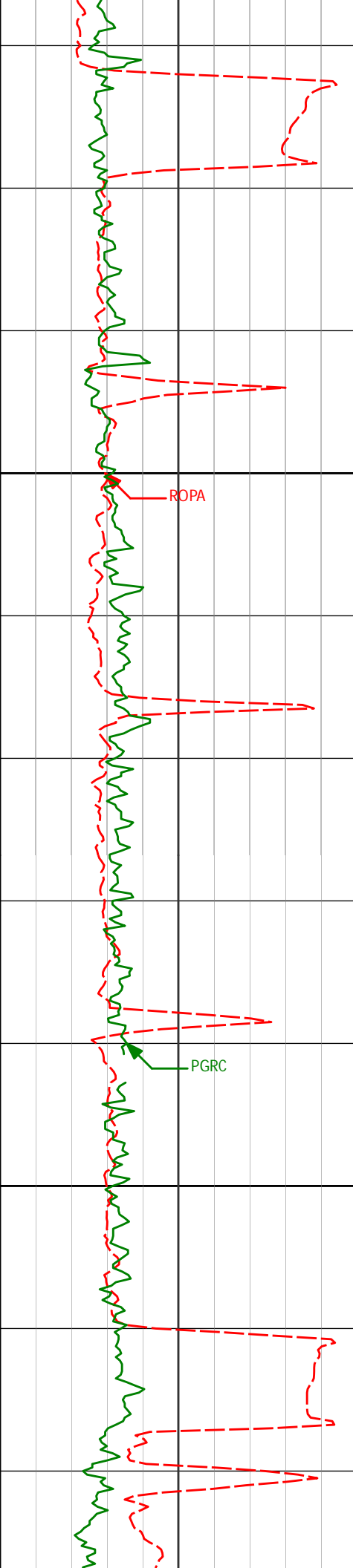
3946'

13.14°

351.61°

3895.09'

61.76'



4000

4100

4036'

10.83°

353.94°

3983.13'

64.78'

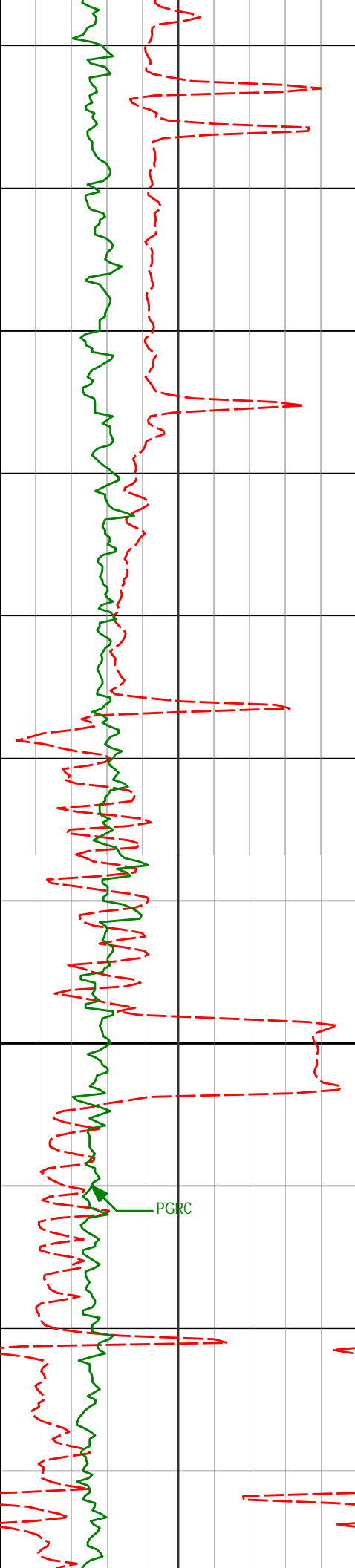
4126'

9.72°

350.01°

4071.68'

67.20'



4200

4300

PGRC

4215'

11.51°

349.73°

4159.15'

69.05'

4305'

10.82°

347.97°

4247.45'

70.72'

4394'

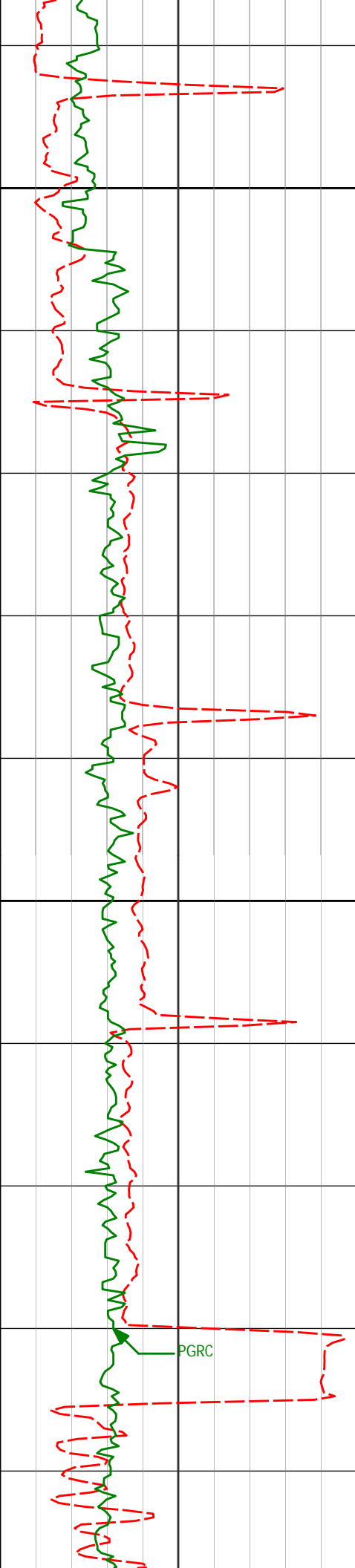
11.80°

350.76°

4334.72'

72.56'





4400

4484'

10.94°

349.21°

4422.96'

74.61'

4500

4573'

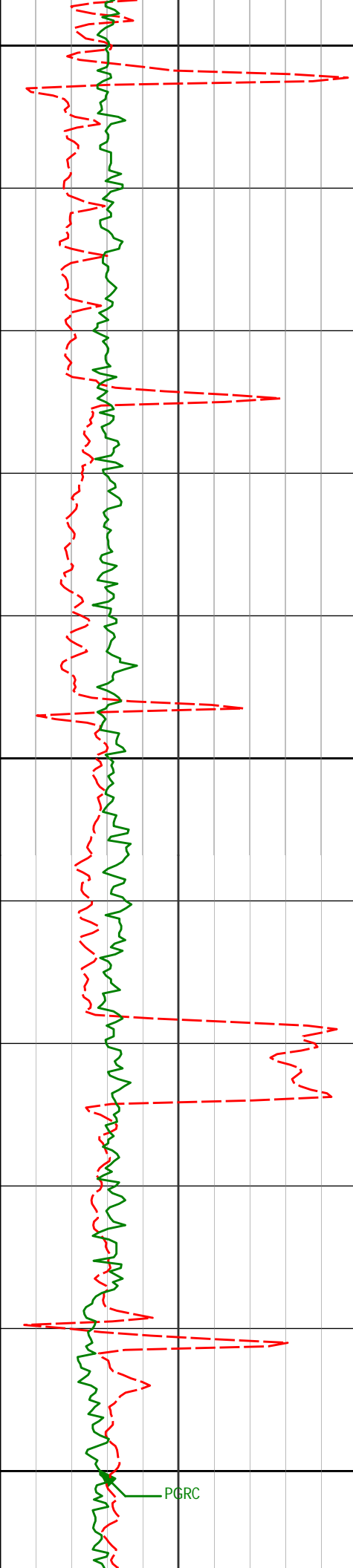
10.75°

347.84°

4510.37'

76.11'

PGRC



4600

4700

4800

4663'

4753'

4842'

10.71°

9.42°

9.93°

353.85°

355.14°

350.06°

4598.80'

4687.41'

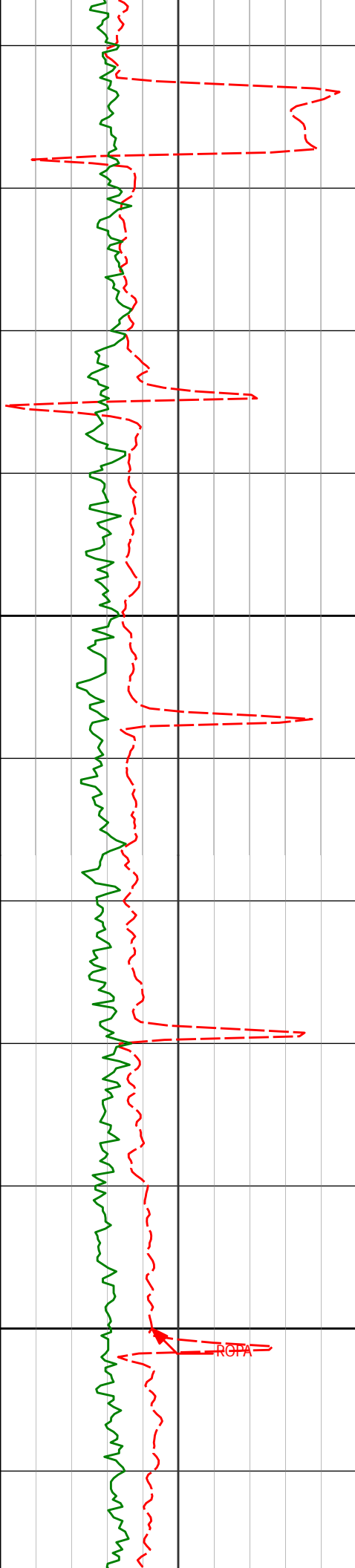
4775.15'

78.29'

81.31'

83.68'

PGRC



4900

5000

4932'

11.62°

350.36°

4863.56'

85.69'

5022'

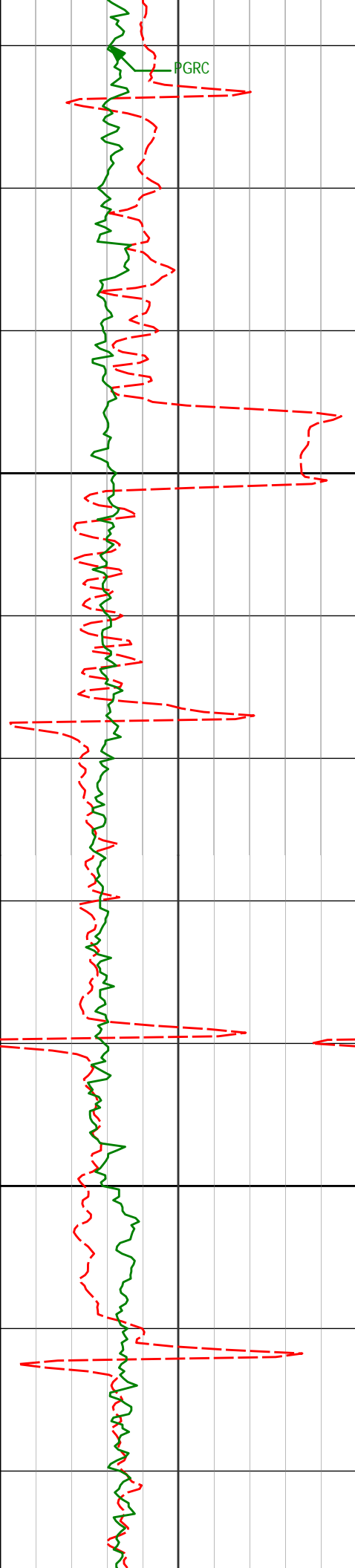
11.53°

350.60°

4951.73'

87.92'

ROPA



5111'

10.16°

349.29°

5039.13'

89.84'

5100

5201'

11.03°

350.38°

5127.60'

91.71'

5200

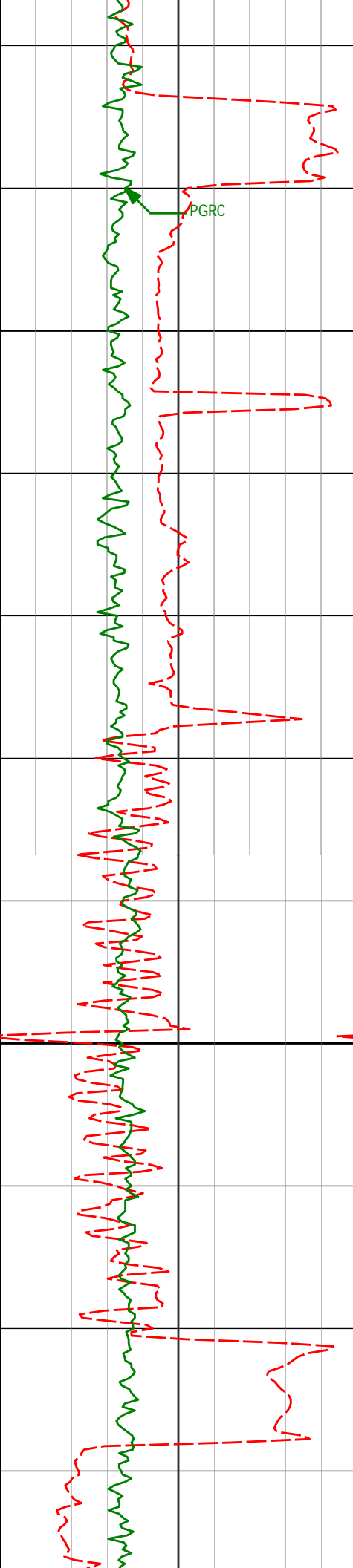
5291'

9.65°

348.23°

5216.14'

93.40'



PGRC

5300

5380'

10.54°

354.53°

5303.76'

95.60'

5470'

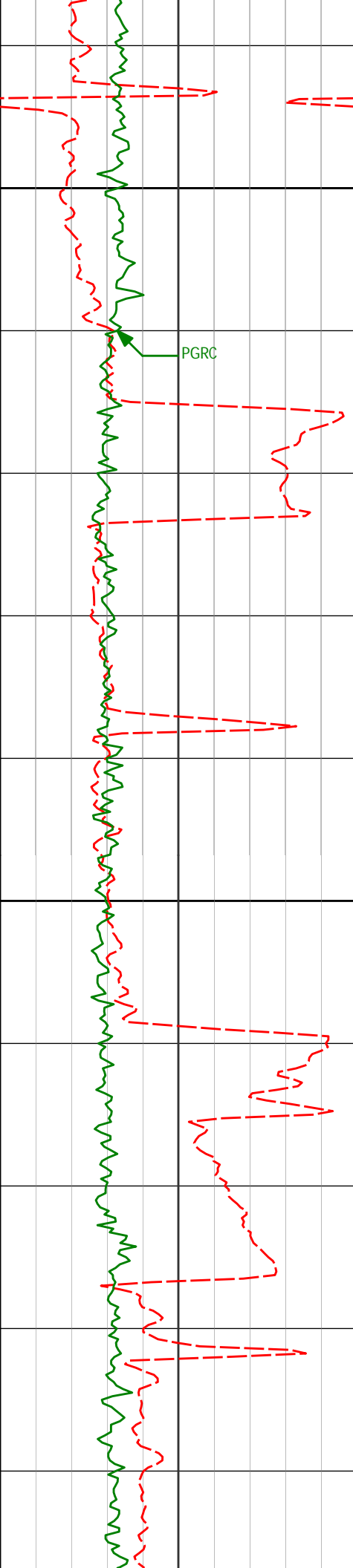
9.17°

353.60°

5392.43'

98.46'

5400



5500

5600

5560'

10.22°

348.31°

5481.15'

100.42'

5649'

11.13°

344.05°

5568.61'

101.20'

5739'

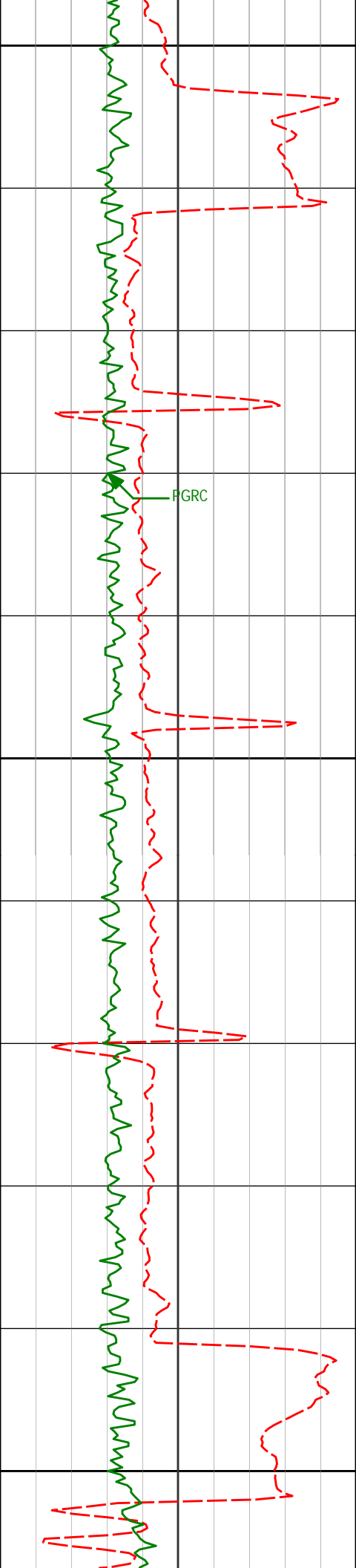
11.57°

345.91°

5656.85'

101.70'

PGR



5700

5829'

11.29°

355.55°

5745.07'

103.96'

5800

5918'

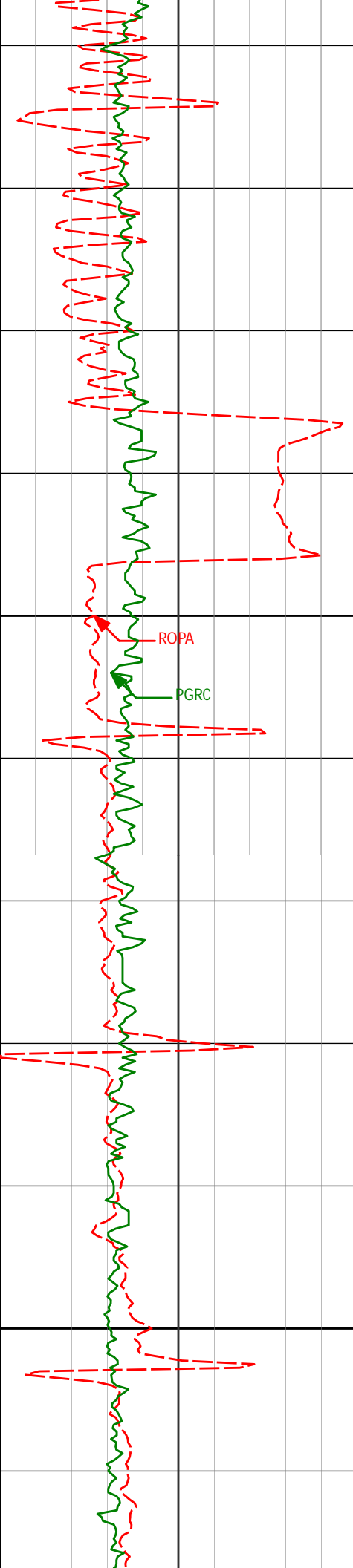
9.37°

350.81°

5832.63'

106.73'

5900



6000

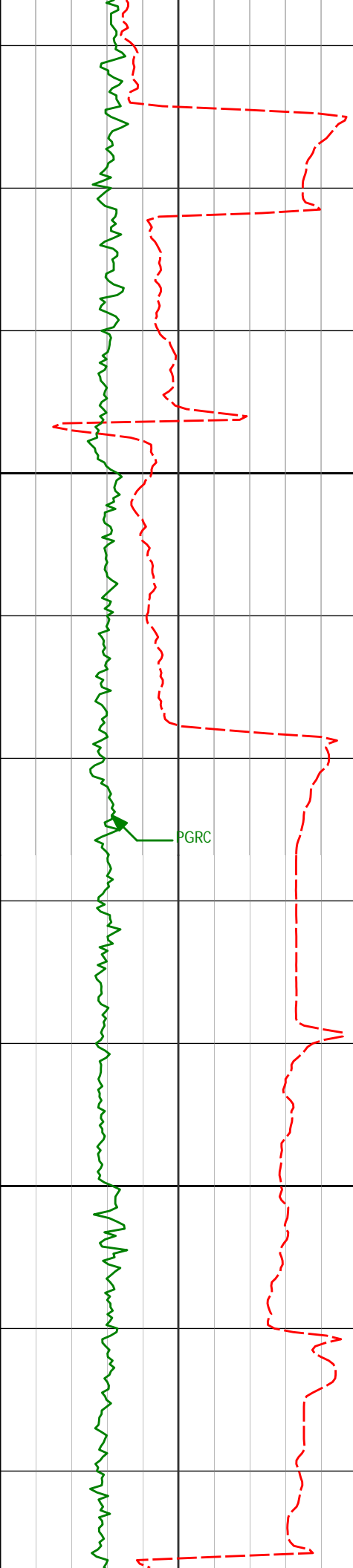
6100

6008'	10.84°	348.88°	5921.23'	108.49'
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6097'	11.61°	358.92°	6008.54'	111.69'
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6187'	9.46°	353.91°	6097.02'	115.47'
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6200

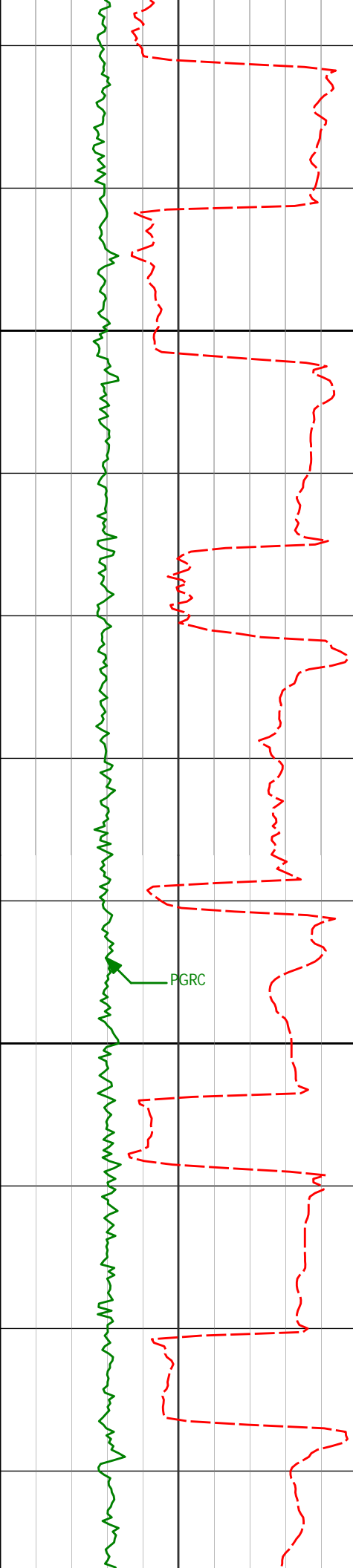
6277'	9.98°	357.15°	6185.72'	118.68'
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6322'	10.30°	357.89°	6230.02'	120.61'
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PGRC

6300

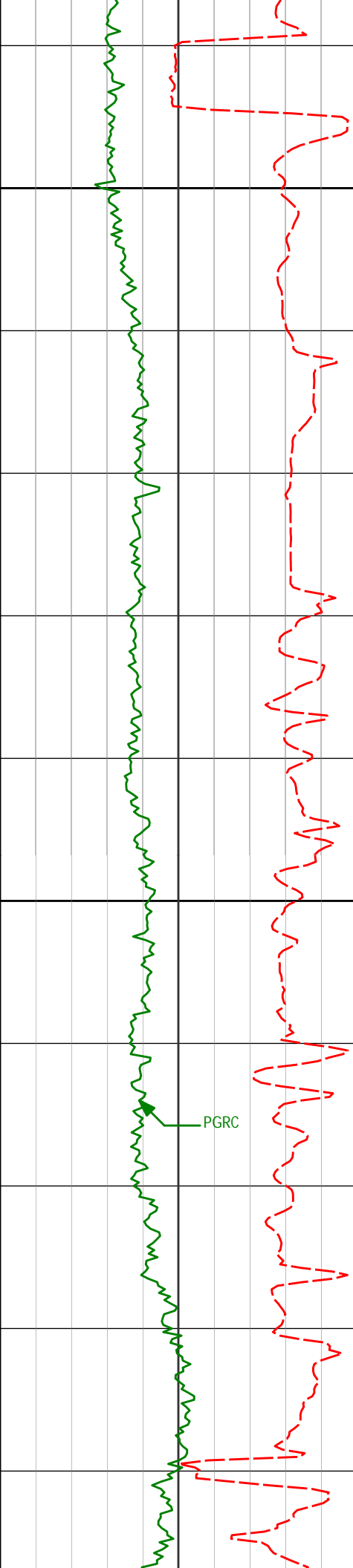
6411'	19.89°	2.40°	6316.00'	127.52'
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6400

6500

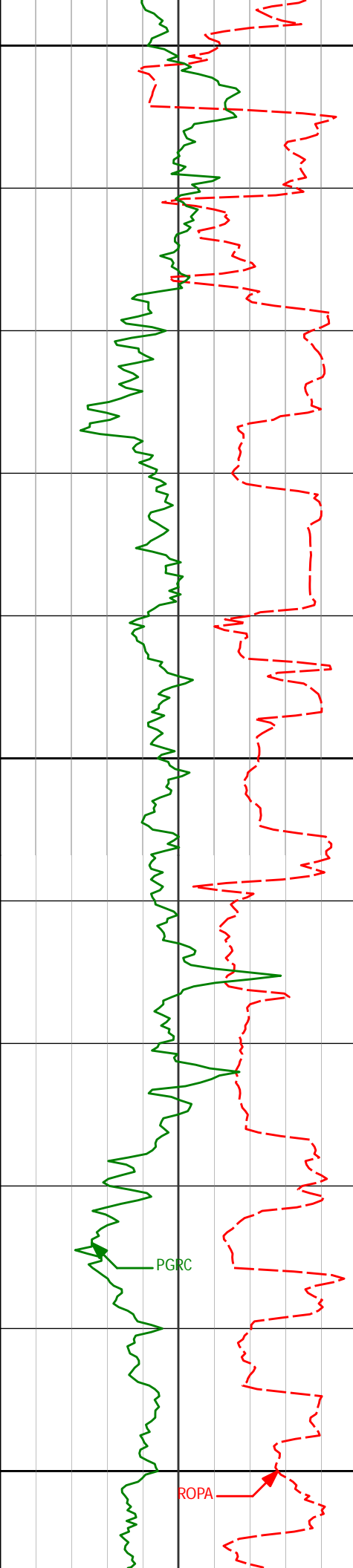
6456'	23.62°	1.06°	6357.78'	132.75'
6501'	25.23°	358.75°	6398.75'	138.03'
6545'	28.37°	355.17°	6438.03'	142.66'
6590'	32.70°	356.68°	6476.78'	147.64'
6635'	36.33°	358.67°	6513.85'	153.95'
6680'	37.97°	5.06°	6549.73'	162.59'



6600

6700

6725'	38.05°	11.27°	6585.20'	174.19'
6769'	40.45°	21.53°	6619.31'	189.37'
6814'	43.47°	29.32°	6652.79'	209.53'
6859'	43.82°	37.72°	6685.38'	233.33'
6904'	45.46°	47.66°	6717.44'	260.47'
6948'	47.31°	56.90°	6747.83'	290.14'
6993'	48.56°	64.71°	6778.00'	322.70'



6800

7038'	51.86°	67.72°	6806.80'	357.00'
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7083'	53.94°	70.00°	6833.94'	392.78'
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7128'	56.07°	74.46°	6859.75'	429.62'
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7173'	57.50°	80.59°	6884.42'	467.14'
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6900

7217'	59.36°	82.15°	6907.46'	504.26'
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7262'	61.01°	83.43°	6929.83'	542.77'
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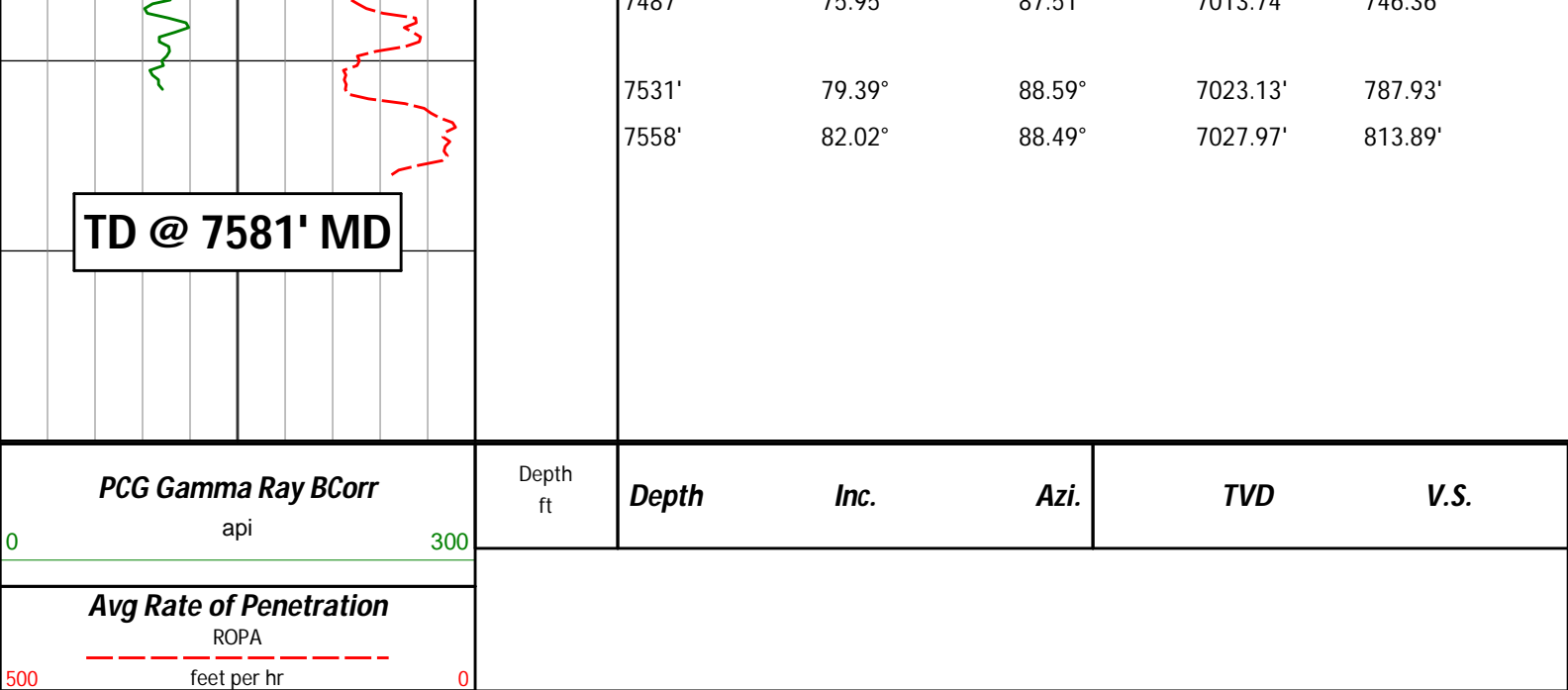
7307'	62.57°	83.89°	6951.10'	581.79'
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7352'	66.64°	84.83°	6970.40'	621.69'
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7397'	69.60°	85.05°	6987.16'	662.59'
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7000

7442'	72.86°	86.27°	7001.64'	704.22'
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## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Loeffler K1-69-1HN-A1  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0900671432

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
306.00	0.20	331.68	306.00	0.47 N	0.25 W	-0.11	0.07
623.00	0.00	291.28	623.00	0.96 N	0.52 W	-0.22	0.06
698.00	0.51	214.20	698.00	0.68 N	0.70 W	-0.48	0.67
787.00	0.80	167.40	786.99	0.25 S	0.79 W	-0.82	0.66
877.00	0.63	265.66	876.99	0.90 S	1.14 W	-1.35	1.21
966.00	0.38	219.55	965.98	1.17 S	1.82 W	-2.07	0.51
1056.00	0.77	301.77	1055.98	1.08 S	2.52 W	-2.73	0.90
1135.00	0.99	307.48	1134.97	0.38 S	3.51 W	-3.48	0.29
1229.00	3.78	347.51	1228.89	3.13 N	4.83 W	-3.73	3.28
1323.00	5.15	354.87	1322.60	10.36 N	5.87 W	-2.67	1.58
1418.00	7.45	356.32	1417.02	20.75 N	6.65 W	-0.44	2.43
1512.00	9.52	357.45	1509.99	34.59 N	7.39 W	2.81	2.21
1606.00	10.34	351.94	1602.58	50.71 N	8.92 W	5.96	1.33
1700.00	10.83	350.17	1694.98	67.76 N	11.61 W	8.26	0.63
1794.00	12.20	351.80	1787.09	86.28 N	14.53 W	10.76	1.50
1889.00	11.14	348.85	1880.13	105.22 N	17.73 W	13.10	1.28
1983.00	12.73	348.76	1972.09	124.29 N	21.51 W	14.94	1.70
2077.00	13.28	356.75	2063.69	145.23 N	24.14 W	18.41	2.00
2171.00	12.79	355.93	2155.26	166.39 N	25.49 W	23.16	0.56
2265.00	12.20	354.27	2247.04	186.65 N	27.22 W	27.30	0.74
2359.00	10.60	350.23	2339.18	205.06 N	29.68 W	30.21	1.90
2451.00	12.68	354.87	2429.29	223.45 N	32.02 W	33.23	2.48
2513.00	12.44	354.38	2489.80	236.87 N	33.28 W	35.86	0.43
2602.00	12.47	355.22	2576.71	255.99 N	35.02 W	39.66	0.21
2692.00	13.95	355.66	2664.32	276.49 N	36.65 W	43.96	1.65
2781.00	12.38	351.43	2750.99	296.62 N	38.88 W	47.58	2.07
2871.00	10.48	348.83	2839.20	314.19 N	41.91 W	49.71	2.18
2961.00	10.11	348.19	2927.75	329.96 N	45.11 W	51.15	0.44
3050.00	9.57	345.83	3015.44	344.78 N	48.52 W	52.12	0.75
3140.00	11.49	345.02	3103.92	360.69 N	52.67 W	52.70	2.14

3230.00	10.64	338.45	3192.25	377.08 N	58.04 W	52.24	1.69
3319.00	9.50	345.70	3279.88	391.85 N	62.87 W	51.83	1.91
3409.00	9.92	346.26	3368.59	406.57 N	66.55 W	52.52	0.47
3498.00	11.37	348.41	3456.06	422.61 N	70.13 W	53.68	1.69
3588.00	9.26	343.12	3544.60	438.23 N	74.02 W	54.42	2.56
3678.00	10.77	343.55	3633.22	453.23 N	78.50 W	54.41	1.68
3767.00	11.93	352.11	3720.49	470.32 N	82.12 W	55.83	2.30
3857.00	12.90	352.21	3808.38	489.49 N	84.76 W	58.79	1.07
3946.00	13.14	351.61	3895.09	509.34 N	87.58 W	61.76	0.32
4036.00	10.83	353.94	3983.13	527.87 N	89.97 W	64.78	2.62
4126.00	9.72	350.01	4071.68	543.77 N	92.18 W	67.20	1.46
4215.00	11.51	349.73	4159.15	559.91 N	95.06 W	69.05	2.01
4305.00	10.82	347.97	4247.45	577.01 N	98.43 W	70.72	0.85
4394.00	11.80	350.76	4334.72	594.16 N	101.63 W	72.56	1.25
4484.00	10.94	349.21	4422.96	611.63 N	104.71 W	74.61	1.01
4573.00	10.75	347.84	4510.37	628.04 N	108.03 W	76.11	0.36
4663.00	10.71	353.85	4598.80	644.56 N	110.70 W	78.29	1.24
4753.00	9.42	355.14	4687.41	660.21 N	112.22 W	81.31	1.46
4842.00	9.93	350.06	4775.15	675.02 N	114.16 W	83.68	1.11
4932.00	11.62	350.36	4863.56	691.60 N	117.02 W	85.69	1.88
5022.00	11.53	350.60	4951.73	709.41 N	120.00 W	87.92	0.11
5111.00	10.16	349.29	5039.13	725.90 N	122.91 W	89.84	1.56
5201.00	11.03	350.38	5127.60	742.18 N	125.83 W	91.71	0.99
5291.00	9.65	348.23	5216.14	758.06 N	128.81 W	93.40	1.59
5380.00	10.54	354.53	5303.76	773.46 N	131.10 W	95.60	1.59
5470.00	9.17	353.60	5392.43	788.78 N	132.69 W	98.46	1.52
5560.00	10.22	348.31	5481.15	803.72 N	135.11 W	100.42	1.52
5649.00	11.13	344.05	5568.61	819.71 N	139.07 W	101.20	1.35
5739.00	11.57	345.91	5656.85	836.81 N	143.65 W	101.70	0.64
5829.00	11.29	355.55	5745.07	854.35 N	146.53 W	103.96	2.14
5918.00	9.37	350.81	5832.63	870.18 N	148.36 W	106.73	2.36
6008.00	10.84	348.88	5921.23	885.72 N	151.16 W	108.49	1.68
6097.00	11.61	358.92	6008.54	902.89 N	152.95 W	111.69	2.36
6187.00	9.46	353.91	6097.02	919.30 N	153.90 W	115.47	2.60
6277.00	9.98	357.15	6185.72	934.44 N	155.07 W	118.68	0.84
6322.00	10.30	357.89	6230.02	942.36 N	155.42 W	120.61	0.77
6366.00	14.31	1.50	6273.00	951.73 N	155.42 W	123.29	9.26
6411.00	19.89	2.40	6316.00	964.95 N	154.95 W	127.52	12.42
6456.00	23.62	1.06	6357.78	981.61 N	154.46 W	132.75	8.37
6501.00	25.23	358.75	6398.75	1000.22 N	154.51 W	138.03	4.16
6545.00	28.37	355.17	6438.03	1020.02 N	155.59 W	142.66	8.01
6590.00	32.70	356.68	6476.78	1042.81 N	157.20 W	147.64	9.79
6635.00	36.33	358.67	6513.85	1068.29 N	158.21 W	153.95	8.44
6680.00	37.97	5.06	6549.73	1095.41 N	157.30 W	162.59	9.31
6725.00	38.05	11.27	6585.20	1122.81 N	153.36 W	174.19	8.49
6769.00	40.45	21.53	6619.31	1149.42 N	145.47 W	189.37	15.72
6814.00	43.47	29.32	6652.79	1176.52 N	132.52 W	209.53	13.37
6859.00	43.82	37.72	6685.38	1202.36 N	115.39 W	233.33	12.89
6904.00	45.46	47.66	6717.44	1225.52 N	93.98 W	260.47	15.93
6948.00	47.31	56.90	6747.83	1244.93 N	68.81 W	290.14	15.77
6993.00	48.56	64.71	6778.00	1261.18 N	39.68 W	322.70	13.18
7038.00	51.86	67.72	6806.80	1275.10 N	8.04 W	357.00	8.95
7083.00	53.94	70.00	6833.94	1288.04 N	25.43 E	392.78	6.13
7128.00	56.07	74.46	6859.75	1299.27 N	60.53 E	429.62	9.40
7173.00	57.50	80.59	6884.42	1307.38 N	97.26 E	467.14	11.83
7217.00	59.36	82.15	6907.46	1312.99 N	134.32 E	504.26	5.20
7262.00	61.01	83.43	6929.83	1317.89 N	173.06 E	542.77	4.42
7307.00	62.57	83.89	6951.10	1322.27 N	212.47 E	581.79	3.58
7352.00	66.64	84.83	6970.40	1326.26 N	252.91 E	621.69	9.24
7397.00	69.60	85.05	6987.16	1329.94 N	294.50 E	662.59	6.59
7442.00	72.86	86.27	7001.64	1333.16 N	336.98 E	704.22	7.69
7487.00	75.95	87.51	7013.74	1335.51 N	380.26 E	746.36	7.36
7531.00	79.39	88.59	7023.13	1336.97 N	423.21 E	787.93	8.18

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 73.38 DEGREES (GRID)  
A TOTAL CORRECTION OF 8.08 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 7531.00 FEET  
IS 1402.35 FEET ALONG 17.56 DEGREES (GRID)

Tie on to Vaughn ESS rig survey at 623' MD

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