

**PCGK : Pressure Case Gamma**  
**PCDC: Pressure Case Directional**



**1 : 600 / 1 : 240**

[illegible]

## WELL INFORMATION

|   |                  |                  |                  |  |  |
|---|------------------|------------------|------------------|--|--|
| <b>MWD Run Number</b>                   | 100              | 200              | 300              |  |  |
| <b>Date run completed</b>               | 09-Sep-14        | 10-Sep-14        | 13-Sep-14        |  |  |
| <b>Rig Bit Number</b>                   | 2                | 3                | 4                |  |  |
| <b>Bit Size (in)</b>                    | 8.750            | 8.750            | 6.125            |  |  |
| <b>Tool Nominal OD (in)</b>             | 6.750            | 6.750            | 4.750            |  |  |
| <b>Log Start Depth (MD, ft)</b>         | 1,217.00         | 4,915.00         | 6,049.00         |  |  |
| <b>Log End Depth (MD, ft)</b>           | 4,915.00         | 6,049.00         | 10,023.00        |  |  |
| <b>Drill or Wipe</b>                    | Drill            | Drill            | Drill            |  |  |
| <b>Drill/Wipe Start Date and Time</b>   | 09-Sep-14 02:35  | 09-Sep-14 22:45  | 11-Sep-14 12:20  |  |  |
| <b>Drill/Wipe End Date and Time</b>     | 09-Sep-14 15:25  | 10-Sep-14 08:00  | 13-Sep-14 05:00  |  |  |
| <b>Min Inc (deg) @ Depth (MD, ft)</b>   | 0.26 @ 4,860.00  | 0.19 @ 4,953.00  | 84.13 @ 6,084.00 |  |  |
| <b>Max Inc (deg) @ Depth (MD, ft)</b>   | 11.91 @ 2,491.00 | 80.08 @ 5,995.00 | 94.29 @ 9,675.00 |  |  |
| <b>Bit TFA(in2) / Bit Type</b>          | 0.74 / PDC       | 0.86 / PDC       | 0.75 / PDC       |  |  |
| <b>Flow Rate (gpm)</b>                  | 596.50           | 563.11           | 284.49           |  |  |
| <b>Max AV (fpm) / CV (fpm) @ MWD</b>    | N/A / N/A        | N/A / N/A        | N/A / N/A        |  |  |
| <b>Fluid Type</b>                       | Fresh Water Gel  | Fresh Water Gel  | Fresh Water Gel  |  |  |
| <b>Density (ppg) / Viscosity (spqt)</b> | 8.90 / 37.00     | 10.50 / 37.00    | 10.60 / 35.00    |  |  |
| <b>Filtrate CL (ppm)</b>                | 200.00           | 200.00           | 200.00           |  |  |
| <b>pH / Fluid Loss (mptm)</b>           | 9.50 / 0         | 9.90 / 0         | 9.50 / 0         |  |  |
| <b>PV (cP) / YP (lbf2)</b>              | 11 / 7.00        | 12 / 8.00        | 7 / 7.00         |  |  |
| <b>% Solids / % Sand</b>                | 10 / .15         | 11.4 / .2        | 10.9 / .15       |  |  |
| <b>% Oil / Oil:Water Ratio</b>          | N/A / N/A        | N/A / N/A        | N/A / N/A        |  |  |
| <b>Rm @ Measured Temp (degF)</b>        | N/A @ N/A        | N/A @ N/A        | N/A @ N/A        |  |  |
| <b>Rmf @ Measured Temp (degF)</b>       | N/A @ N/A        | N/A @ N/A        | N/A @ N/A        |  |  |
| <b>Rmc @ Measured Temp (degF)</b>       | N/A @ N/A        | N/A @ N/A        | N/A @ N/A        |  |  |
| <b>Max Tool Temp (in) @ Temp (degF)</b> | 115.00 / 200M    | 151.00 / 200M    | 210.10 / 200M    |  |  |

|                               |               |               |              |  |  |
|-------------------------------|---------------|---------------|--------------|--|--|
| Max Tool Temp (degF) / Source | 145.90 / PCM  | 154.30 / PCM  | 213.40 / PCM |  |  |
| Rm @ Max Tool Temp (degF)     | N/A @ N/A     | N/A @ N/A     | N/A @ N/A    |  |  |
| Lead MWD Engineer             | Paul Kock     | Paul Kock     | Paul Kock    |  |  |
| Customer Representative       | Justin Fields | Justin Fields | Dave Nielsen |  |  |

## SENSOR INFORMATION

### Downhole Processor Information

|                           |                 |                 |                 |  |  |
|---------------------------|-----------------|-----------------|-----------------|--|--|
| Tool Type                 | PCM             | PCM             | PCM             |  |  |
| Software Version          | 5.93            | 5.93            | 5.93            |  |  |
| Sub Serial Number         | 11404274        | 11404274        | 12310756        |  |  |
| Insert Serial Number      | 11400845        | 11400845        | 11055866        |  |  |
| Date and Time Initialized | 08-Sep-14 15:51 | 08-Sep-14 15:51 | 10-Sep-14 06:21 |  |  |
| Date and Time Read        | 10-Sep-14 15:54 | 10-Sep-14 16:01 | 13-Sep-14 20:52 |  |  |
| ECMB SW Version           | N/A             | N/A             | N/A             |  |  |

### Directional Sensor Information

|                        |          |          |          |  |  |
|------------------------|----------|----------|----------|--|--|
| Tool Type              | PCDC     | PCDC     | PCDC     |  |  |
| Distance From Bit (ft) | 53.05    | 52.12    | 62.19    |  |  |
| Software Version       | 6.21     | 6.21     | 6.21     |  |  |
| Sub Serial Number      | 11404274 | 11404274 | 12310756 |  |  |
| Sonde Serial Number    | 11297588 | 11297588 | 11833253 |  |  |
| Sensor ID Number       | N/A      | N/A      | N/A      |  |  |
| Toolface Offset (deg)  | 192.04   | 148.58   | 7.58     |  |  |

### Gamma Ray Sensor Information

|                              |          |          |          |  |  |
|------------------------------|----------|----------|----------|--|--|
| Tool Type                    | PCG      | PCG      | PCG      |  |  |
| Distance From Bit (ft)       | 47.95    | 47.02    | 57.09    |  |  |
| Recorded Sample Period (sec) | 10       | 10       | 10       |  |  |
| Software Version             | 8.15     | 8.15     | 8.15     |  |  |
| Sub Serial Number            | 11404274 | 11404274 | 12310756 |  |  |
| Insert/Sonde Serial Number   | 11680972 | 11680972 | 11293339 |  |  |

## 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 6002 ft. MD to 6049 ft. MD.
7. Gaps in Gamma/ROP in lateral section due to Pason errors; no wiping per Co Man.

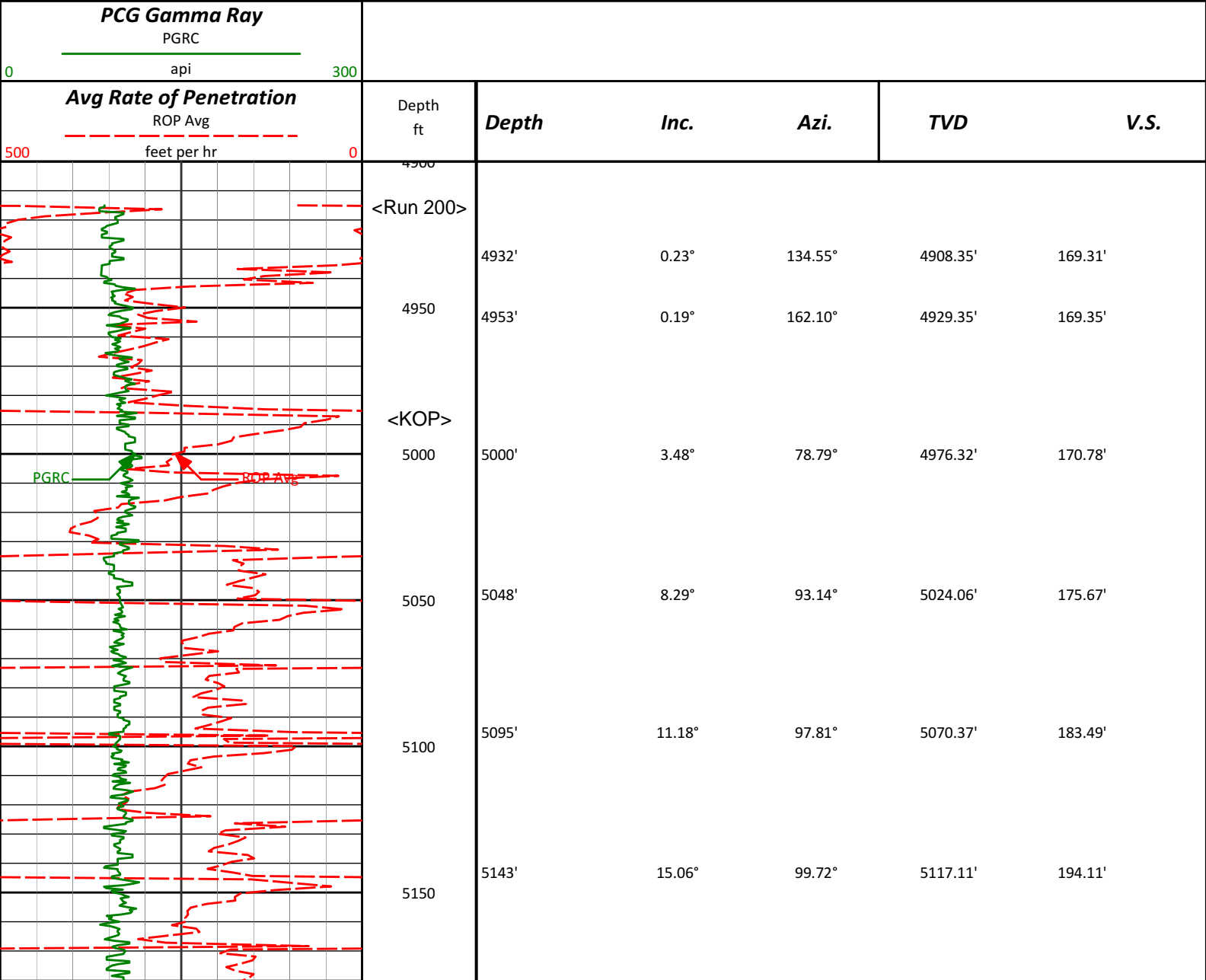
WARRANTY

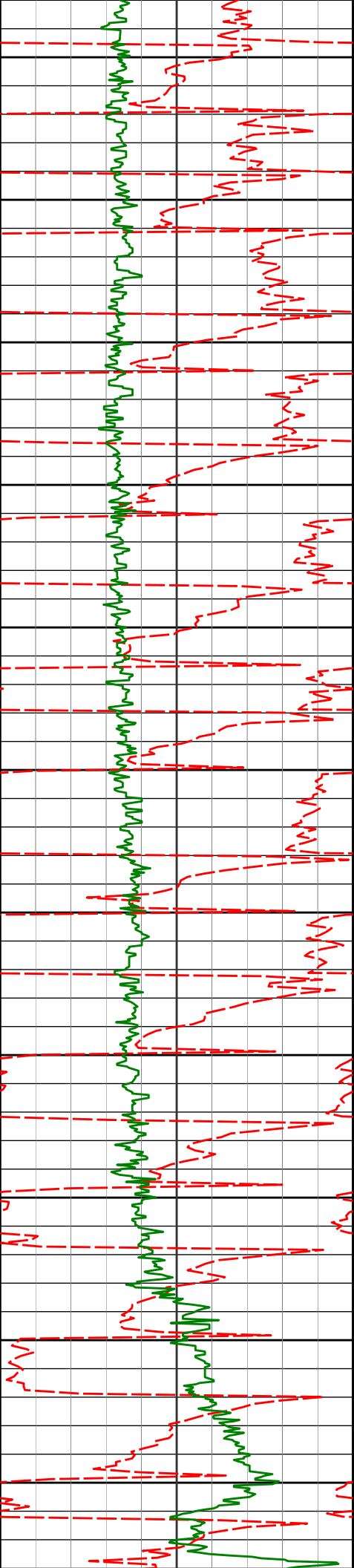
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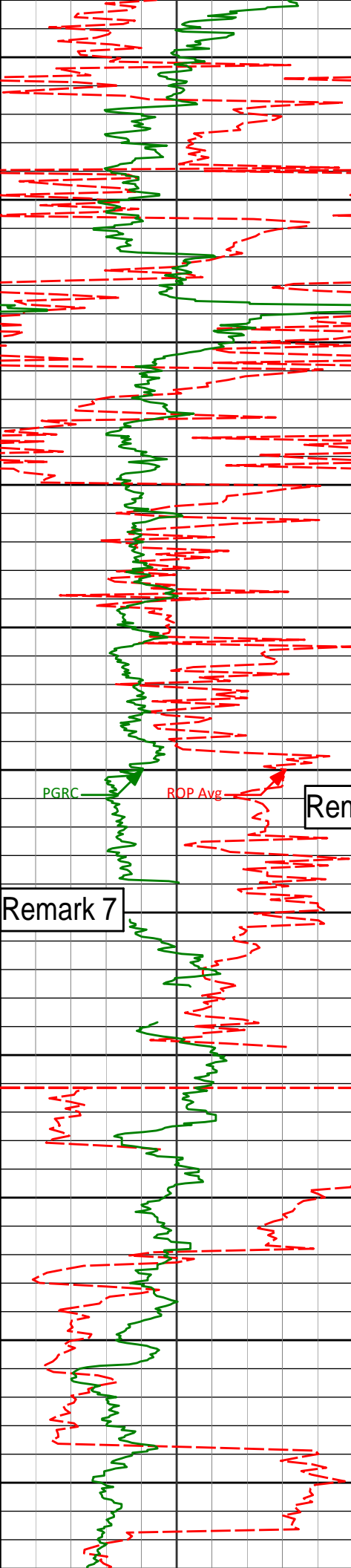
MD Main Log 1:600

Noble Energy, Inc  
Rohn State LD03-63-1HN  
H&P 273  
T9N R58W

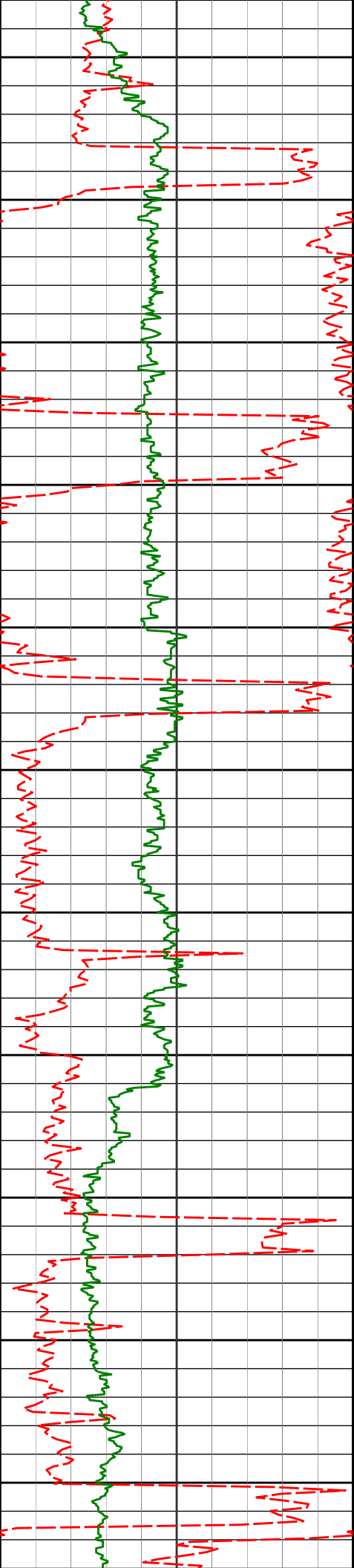




|      |       |        |        |          |         |
|------|-------|--------|--------|----------|---------|
| 5200 | 5190' | 17.81° | 92.37° | 5162.19' | 207.19' |
| 5250 | 5238' | 21.73° | 91.94° | 5207.36' | 223.33' |
| 5300 | 5285' | 24.20° | 93.35° | 5250.63' | 241.54' |
| 5350 | 5332' | 26.72° | 91.86° | 5293.06' | 261.62' |
| 5400 | 5379' | 31.06° | 90.46° | 5334.20' | 284.23' |
| 5450 | 5427' | 36.32° | 92.62° | 5374.12' | 310.72' |
| 5500 | 5474' | 38.98° | 93.43° | 5411.33' | 339.21' |
| 5550 | 5522' | 41.76° | 95.91° | 5447.90' | 369.94' |
| 5600 | 5569' | 44.96° | 95.32° | 5482.07' | 401.76' |
| 5650 | 5617' | 48.89° | 96.59° | 5514.85' | 436.29' |
| 5700 | 5664' | 52.86° | 98.42° | 5544.50' | 472.01' |
|      | 5712' | 58.24° | 96.01° | 5571.65' | 510.83' |



|                             |       |        |        |          |          |
|-----------------------------|-------|--------|--------|----------|----------|
| 5750                        | 5759' | 63.81° | 90.88° | 5594.42' | 551.58'  |
| 5800                        | 5806' | 68.13° | 87.26° | 5613.56' | 594.43'  |
| 5850                        | 5853' | 70.07° | 87.97° | 5630.32' | 638.32'  |
| 5900                        | 5900' | 73.67° | 87.86° | 5644.94' | 682.95'  |
| 5950                        | 5947' | 78.58° | 87.22° | 5656.21' | 728.55'  |
| 6000                        | 5995' | 80.08° | 87.28° | 5665.10' | 775.71'  |
| Remark 6                    |       |        |        |          |          |
| <7" casing set at 6039' MD> |       |        |        |          |          |
| Remark 7                    |       |        |        |          |          |
| <Run 300><br>6050           |       |        |        |          |          |
| 6100                        | 6084' | 84.13° | 88.28° | 5677.32' | 863.81'  |
| 6150                        | 6176' | 85.68° | 88.22° | 5685.49' | 955.38'  |
| 6200                        |       |        |        |          |          |
| 6250                        | 6269' | 88.64° | 87.31° | 5690.09' | 1048.21' |



6300

6350

6400

6450

6500

6550

6600

6650

6700

6750

6800

6362'

90.15°

85.96°

5691.07'

1141.19'

6454'

91.36°

91.27°

5689.85'

1233.06'

6549'

89.66°

89.35°

5689.01'

1327.79'

6643'

91.76°

89.33°

5687.85'

1421.62'

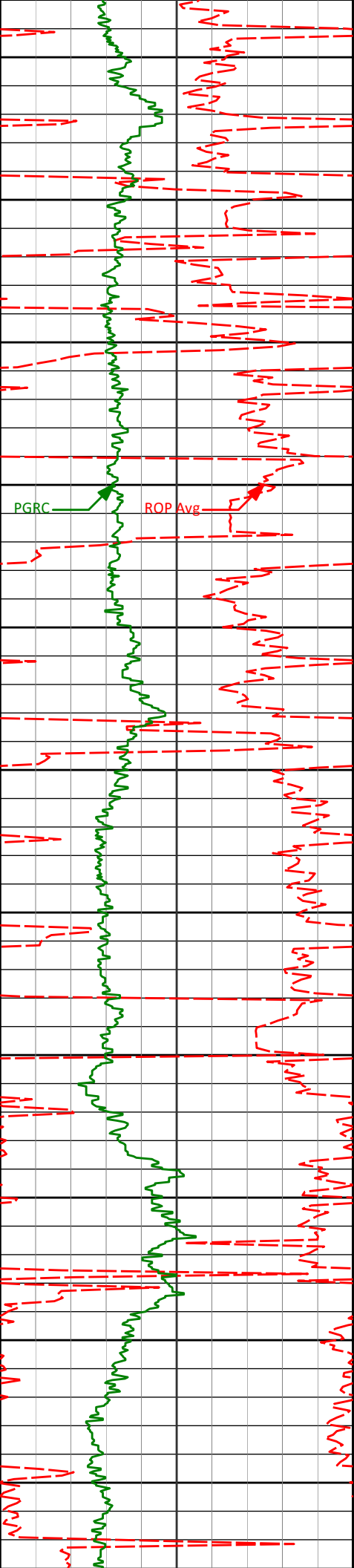
6738'

90.99°

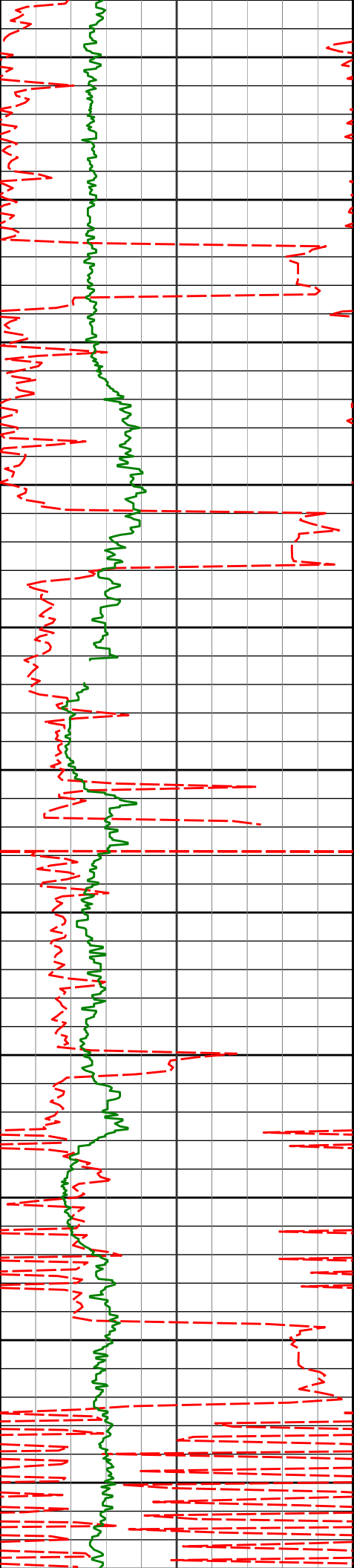
88.51°

5685.57'

1516.47'



|       |       |        |        |          |          |
|-------|-------|--------|--------|----------|----------|
|       | 6833' | 91.57° | 89.13° | 5683.45' | 1611.34' |
| 6850  |       |        |        |          |          |
| 6900  |       |        |        |          |          |
| 6928' |       | 91.39° | 89.86° | 5681.00' | 1706.14' |
| 6950  |       |        |        |          |          |
| 7000  |       |        |        |          |          |
| 7023' |       | 89.54° | 88.60° | 5680.23' | 1800.98' |
| 7050  |       |        |        |          |          |
| 7100  |       |        |        |          |          |
| 7118' |       | 90.09° | 89.10° | 5680.54' | 1895.87' |
| 7150  |       |        |        |          |          |
| 7200  |       |        |        |          |          |
| 7212' |       | 88.40° | 88.27° | 5681.78' | 1989.76' |
| 7250  |       |        |        |          |          |
| 7300  |       |        |        |          |          |
| 7307' |       | 89.26° | 88.42° | 5683.72' | 2084.66' |
| 7350  |       |        |        |          |          |



7400

7402'

90.43°

88.11°

5683.98'

2179.59'

7450

7500

7497'

89.97°

88.11°

5683.65'

2274.53'

7550

7600

7591'

88.55°

87.17°

5684.86'

2368.48'

7650

7700

7686'

89.60°

87.48°

5686.39'

2463.44'

7750

7800

7781'

91.79°

87.70°

5685.24'

2558.40'

7850

7900

7876'

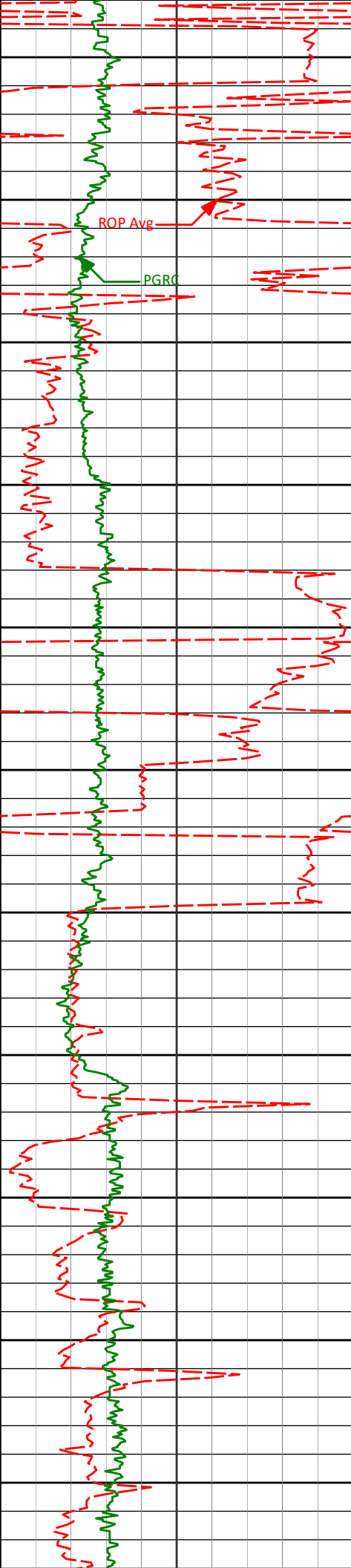
90.43°

88.25°

5683.40'

2653.32'





7950

7971'

88.89°

89.48°

5683.97'

2748.20'

8000

8050

8065'

90.77°

90.19°

5684.25'

2841.99'

8100

8150

8159'

90.28°

91.48°

5683.39'

2935.66'

8200

8250

8254'

88.03°

87.06°

5684.79'

3030.47'

8300

8350

8348'

89.69°

87.81°

5686.66'

3124.42'

8400

8450

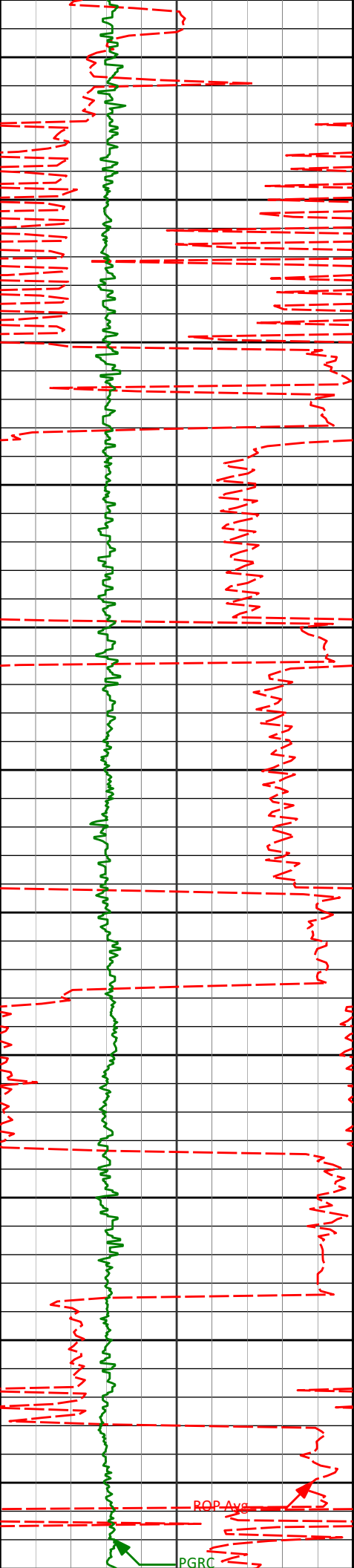
8443'

89.66°

85.83°

5687.20'

3219.41'



8500

8538'

89.66°

82.90°

5687.76'

3314.36'

8550

8600

8633'

89.32°

83.78°

5688.61'

3409.24'

8650

8700

8727'

89.75°

83.55°

5689.36'

3503.16'

8750

8800

8822'

89.69°

83.21°

5689.82'

3598.05'

8850

8900

8917'

89.32°

84.64°

5690.64'

3692.98'

8950

9000

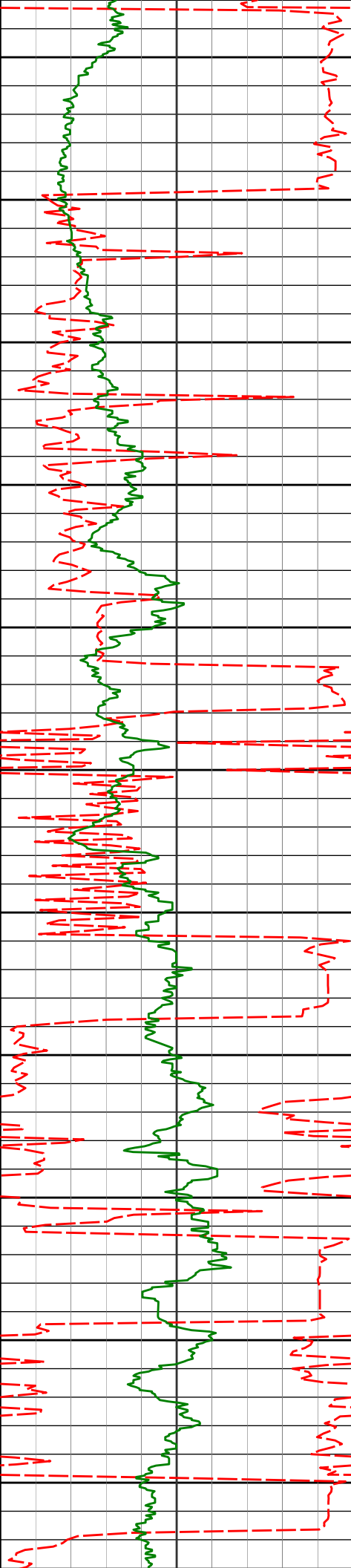
9012'

89.20°

84.44°

5691.87'

3787.94'



9050

9100

9150

9200

9250

9300

9350

9400

9450

9500

9550

9107'

89.66°

90.95°

5692.82'

3882.85'

9201'

91.39°

91.18°

5691.96'

3976.48'

9296'

92.28°

90.72°

5688.92'

4071.09'

9391'

91.45°

90.48°

5685.82'

4165.74'

9485'

91.11°

90.57°

5683.72'

4259.43'

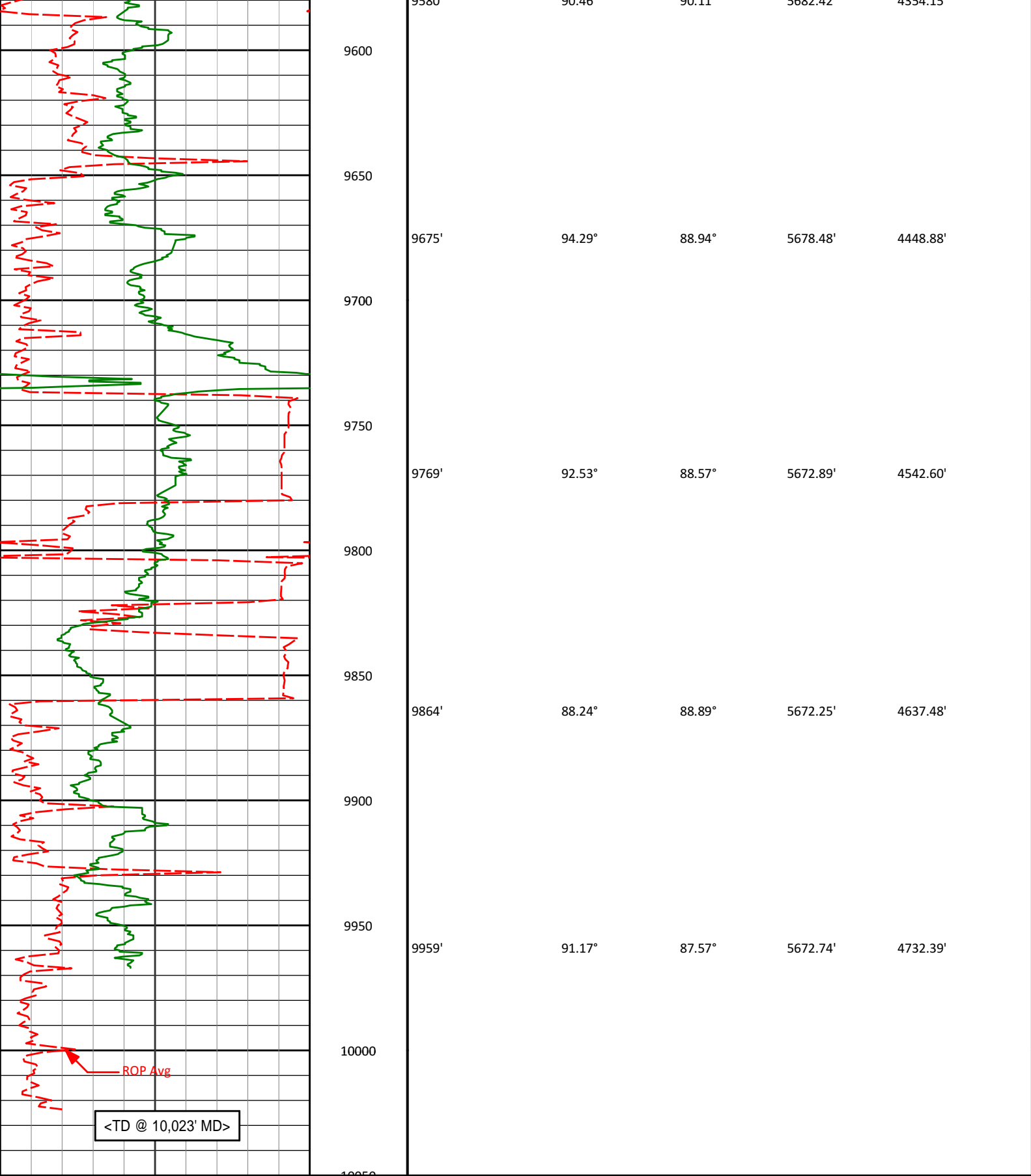
9580'

90.46°

90.11°

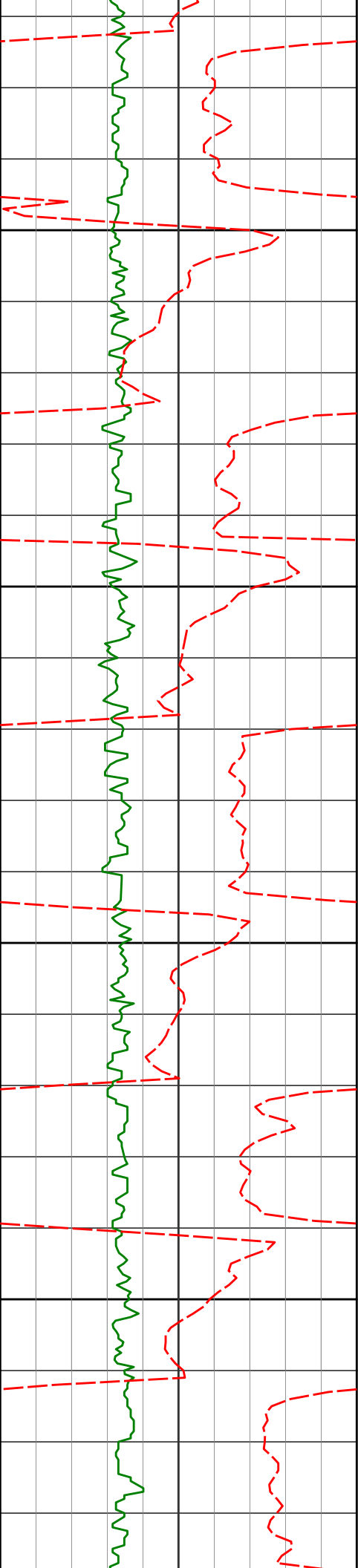
5682.42'

4354.15'



|  |  |             |              |             |             |            |             |
|--|--|-------------|--------------|-------------|-------------|------------|-------------|
| <b>Avg Rate of Penetration</b><br>ROP Avg<br>feet per hr |  | Depth<br>ft | <b>Depth</b> | <b>Inc.</b> | <b>Azi.</b> | <b>TVD</b> | <b>V.S.</b> |
| <b>PCG Gamma Ray</b><br>PGRC<br>api                      |  |             |              |             |             |            |             |





5100

5095'

11.18°

97.81°

5070.37'

183.49'

5150

5143'

15.06°

99.72°

5117.11'

194.11'

5200

5190'

17.81°

92.37°

5162.19'

207.19'

5250

5238'

21.73°

91.94°

5207.36'

223.33'

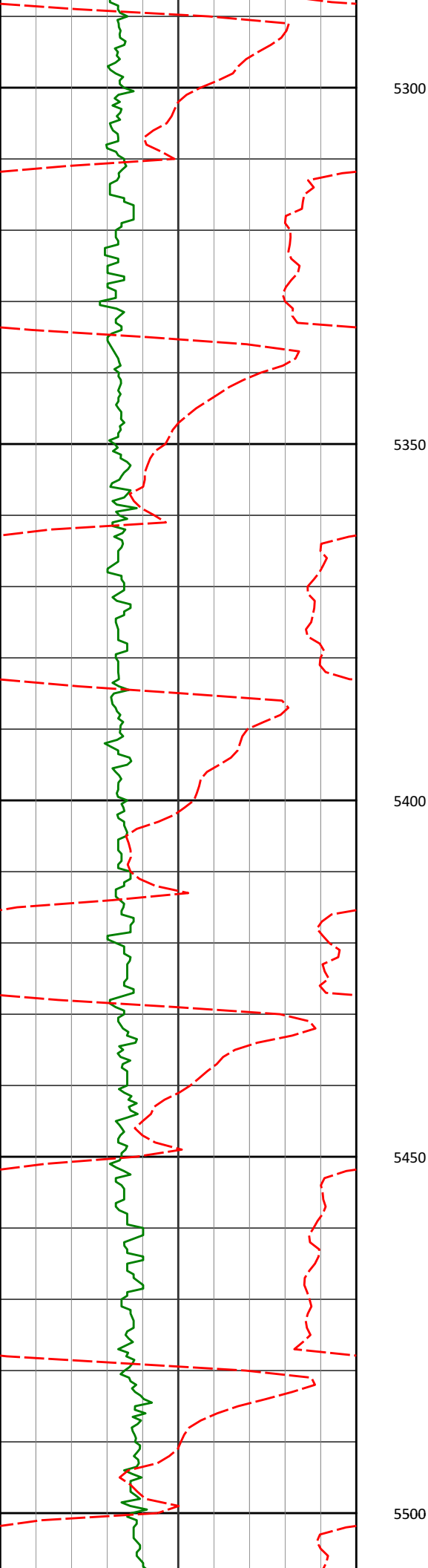
5285'

24.20°

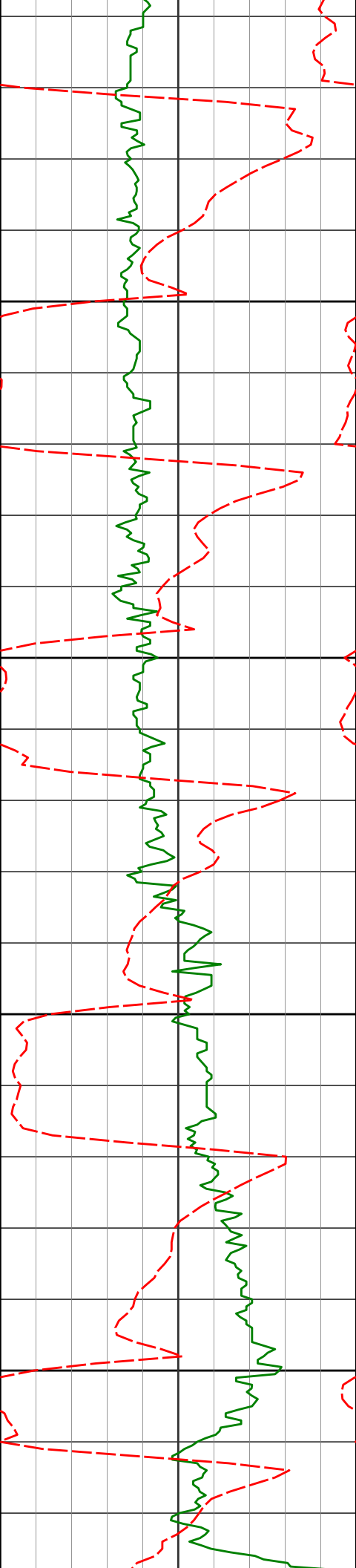
93.35°

5250.63'

241.54'



|       |        |        |          |         |
|-------|--------|--------|----------|---------|
| 5300  |        |        |          |         |
| 5332' | 26.72° | 91.86° | 5293.06' | 261.62' |
| 5350  |        |        |          |         |
| 5379' | 31.06° | 90.46° | 5334.20' | 284.23' |
| 5400  |        |        |          |         |
| 5427' | 36.32° | 92.62° | 5374.12' | 310.72' |
| 5450  |        |        |          |         |
| 5474' | 38.98° | 93.43° | 5411.33' | 339.21' |
| 5500  |        |        |          |         |



5522'

41.76°

95.91°

5447.90'

369.94'

5550

5569'

44.96°

95.32°

5482.07'

401.76'

5600

5617'

48.89°

96.59°

5514.85'

436.29'

5650

5664'

52.86°

98.42°

5544.50'

472.01'

5700

5712'

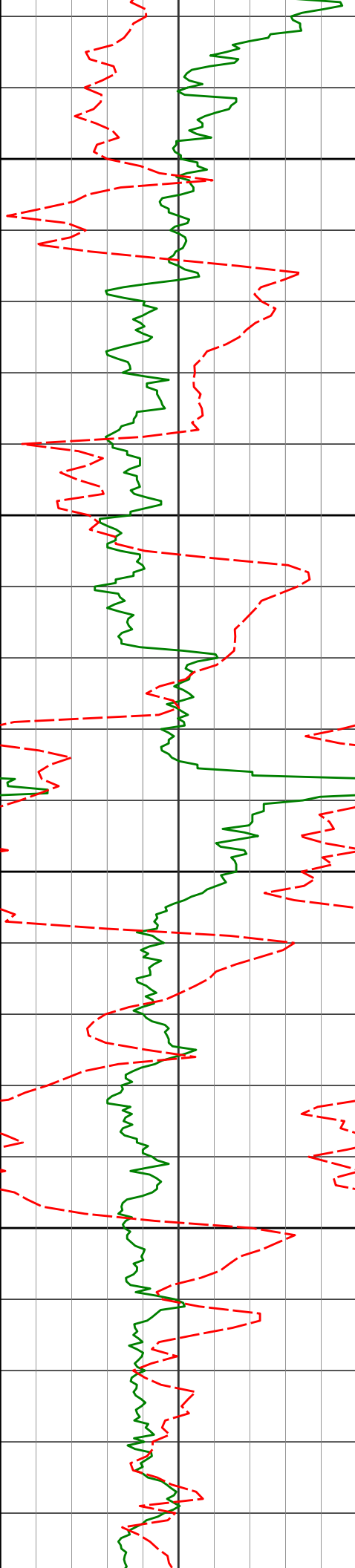
58.24°

96.01°

5571.65'

510.83'





5750

5759'

63.81°

90.88°

5594.42'

551.58'

5800

5806'

68.13°

87.26°

5613.56'

594.43'

5850

5853'

70.07°

87.97°

5630.32'

638.32'

5900

5900'

73.67°

87.86°

5644.94'

682.95'

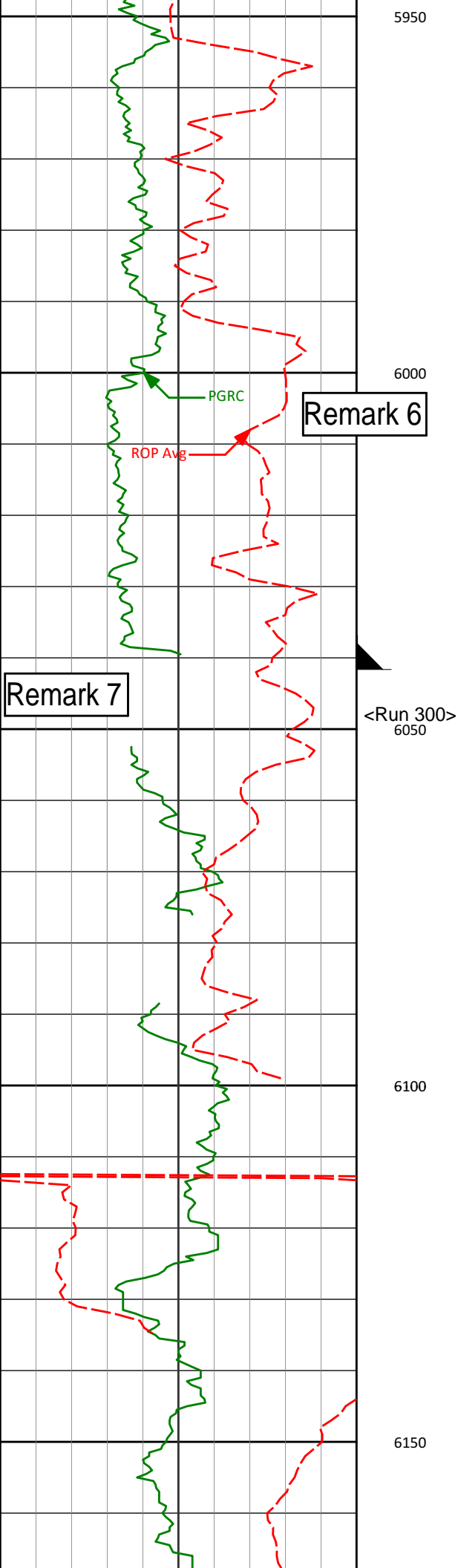
5947'

78.58°

87.22°

5656.21'

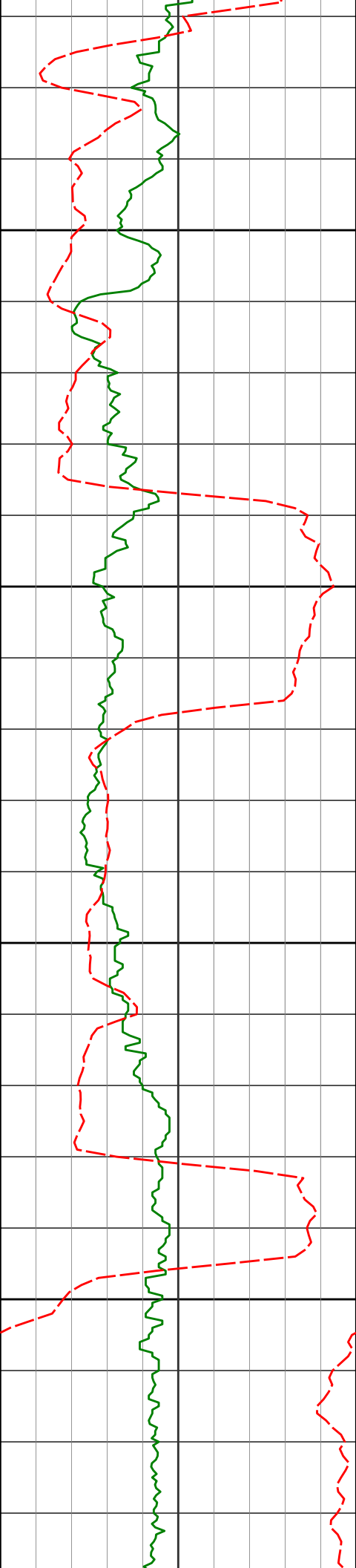
728.55'



Remark 6

Remark 7

|                             |        |        |          |         |
|-----------------------------|--------|--------|----------|---------|
| 5950                        |        |        |          |         |
| 5995'                       | 80.08° | 87.28° | 5665.10' | 775.71' |
| 6000                        |        |        |          |         |
| <7" casing set at 6039' MD> |        |        |          |         |
| <Run 300><br>6050           |        |        |          |         |
| 6084'                       | 84.13° | 88.28° | 5677.32' | 863.81' |
| 6100                        |        |        |          |         |
| 6150                        |        |        |          |         |



6176'

85.68°

88.22°

5685.49'

955.38'

6200

6250

6269'

88.64°

87.31°

5690.09'

1048.21'

6300

6350

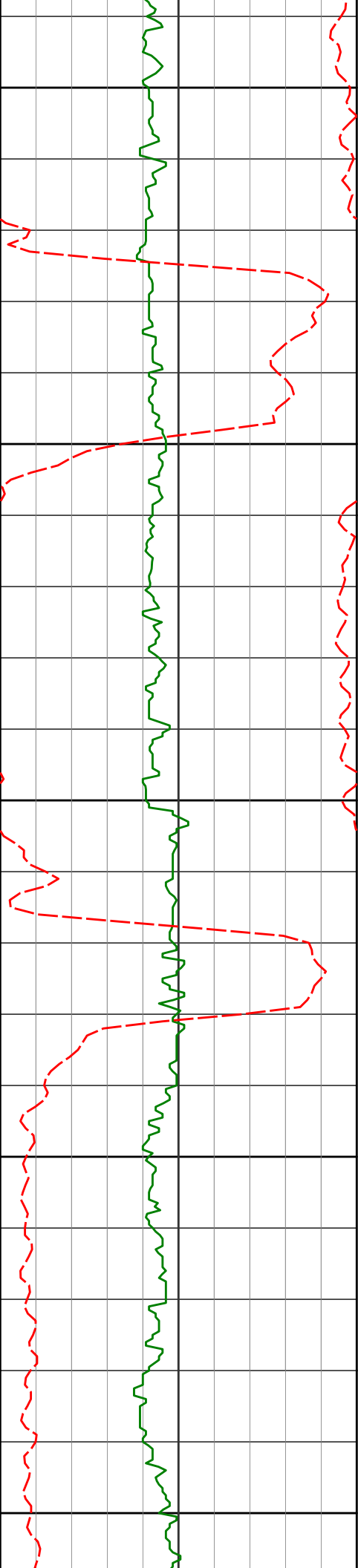
6362'

90.15°

85.96°

5691.07'

1141.19'



6400

6450

6500

6550

6600

6454'

91.36°

91.27°

5689.85'

1233.06'

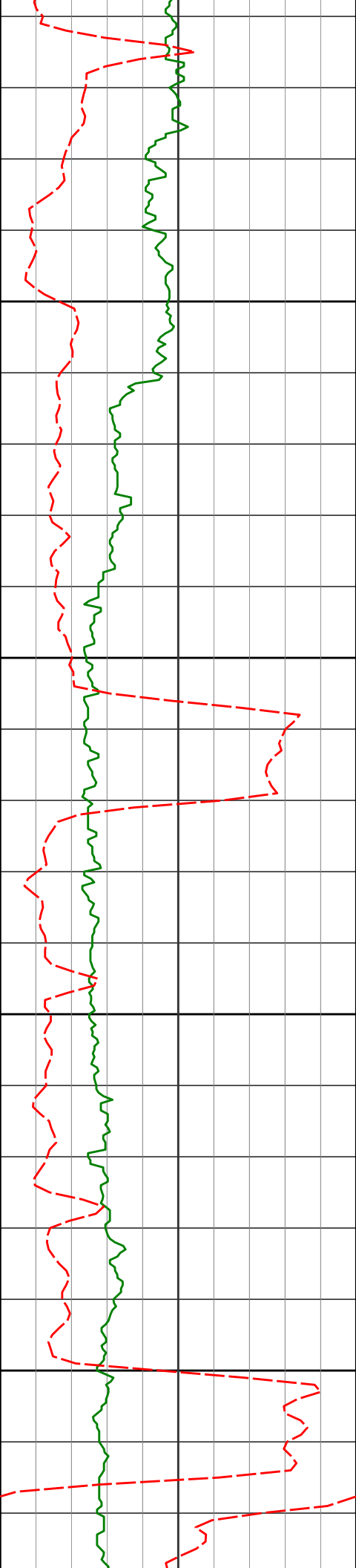
6549'

89.66°

89.35°

5689.01'

1327.79'



6650

6700

6750

6800

6643'

91.76°

89.33°

5687.85'

1421.62'

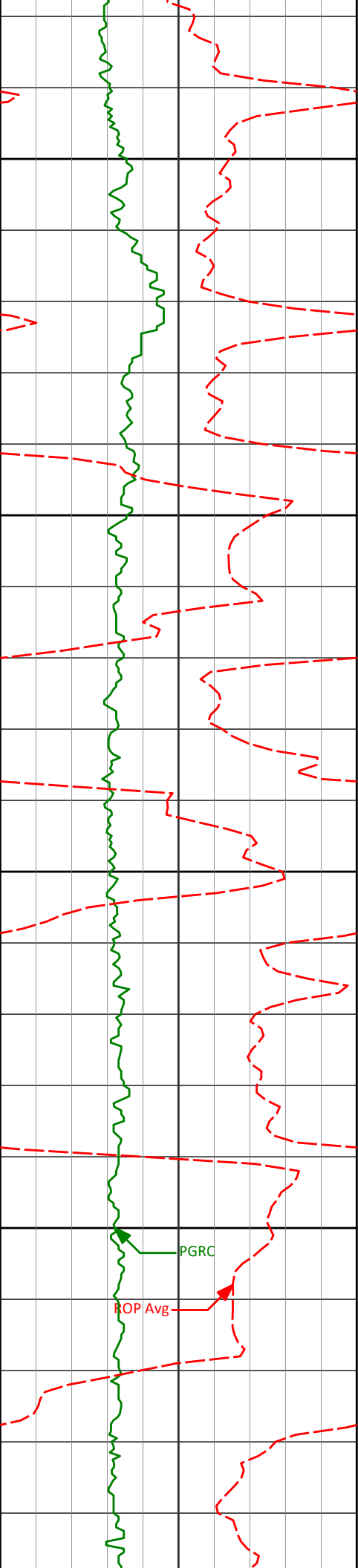
6738'

90.99°

88.51°

5685.57'

1516.47'



6833'

91.57°

89.13°

5683.45'

1611.34'

6850

6900

6950

7000

6928'

91.39°

89.86°

5681.00'

1706.14'

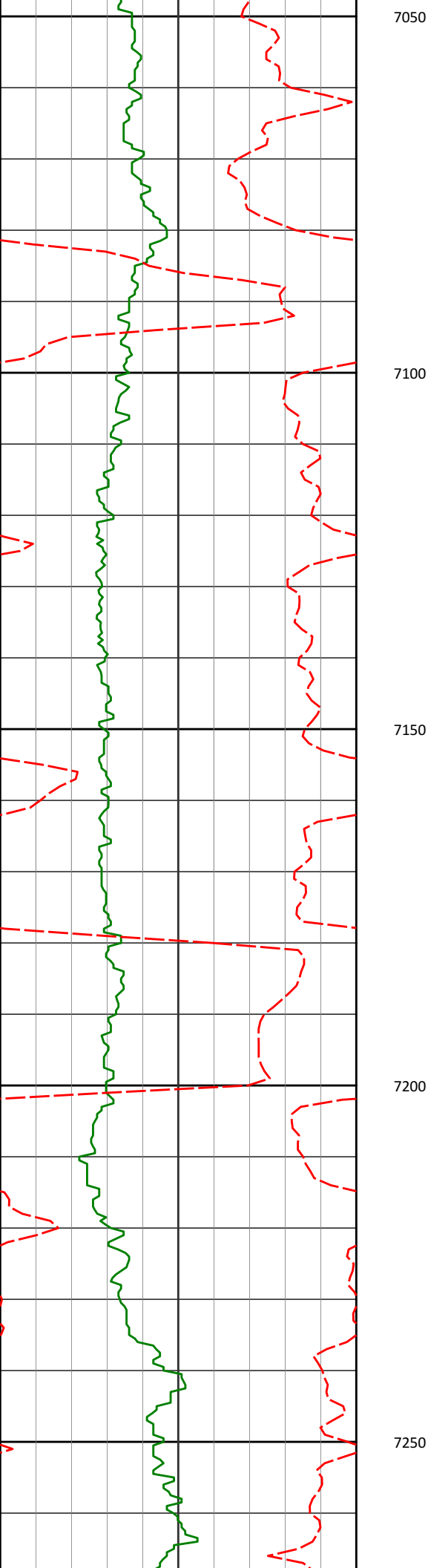
7023'

89.54°

88.60°

5680.23'

1800.98'



7118'

90.09°

89.10°

5680.54'

1895.87'

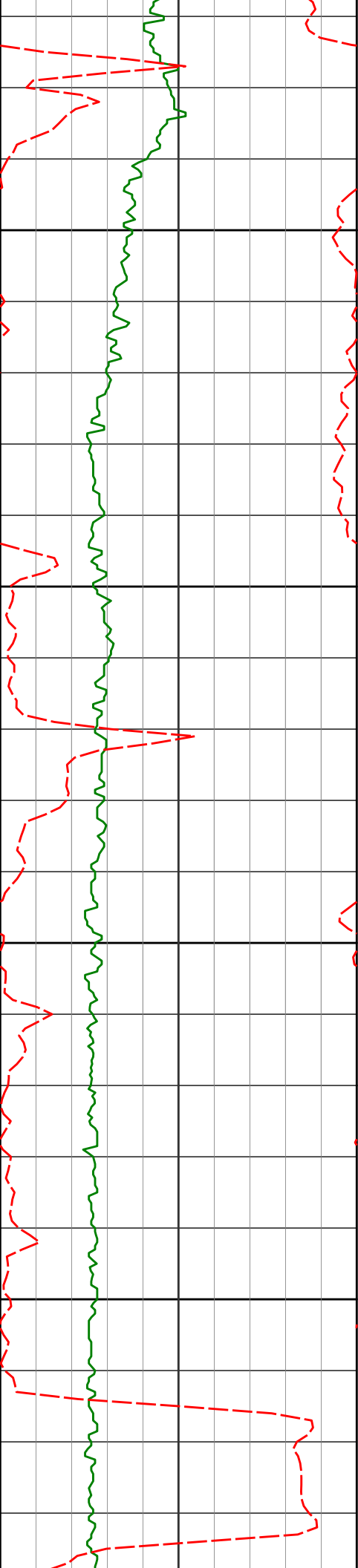
7212'

88.40°

88.27°

5681.78'

1989.76'



7300

7307'

89.26°

88.42°

5683.72'

2084.66'

7350

7400

7402'

90.43°

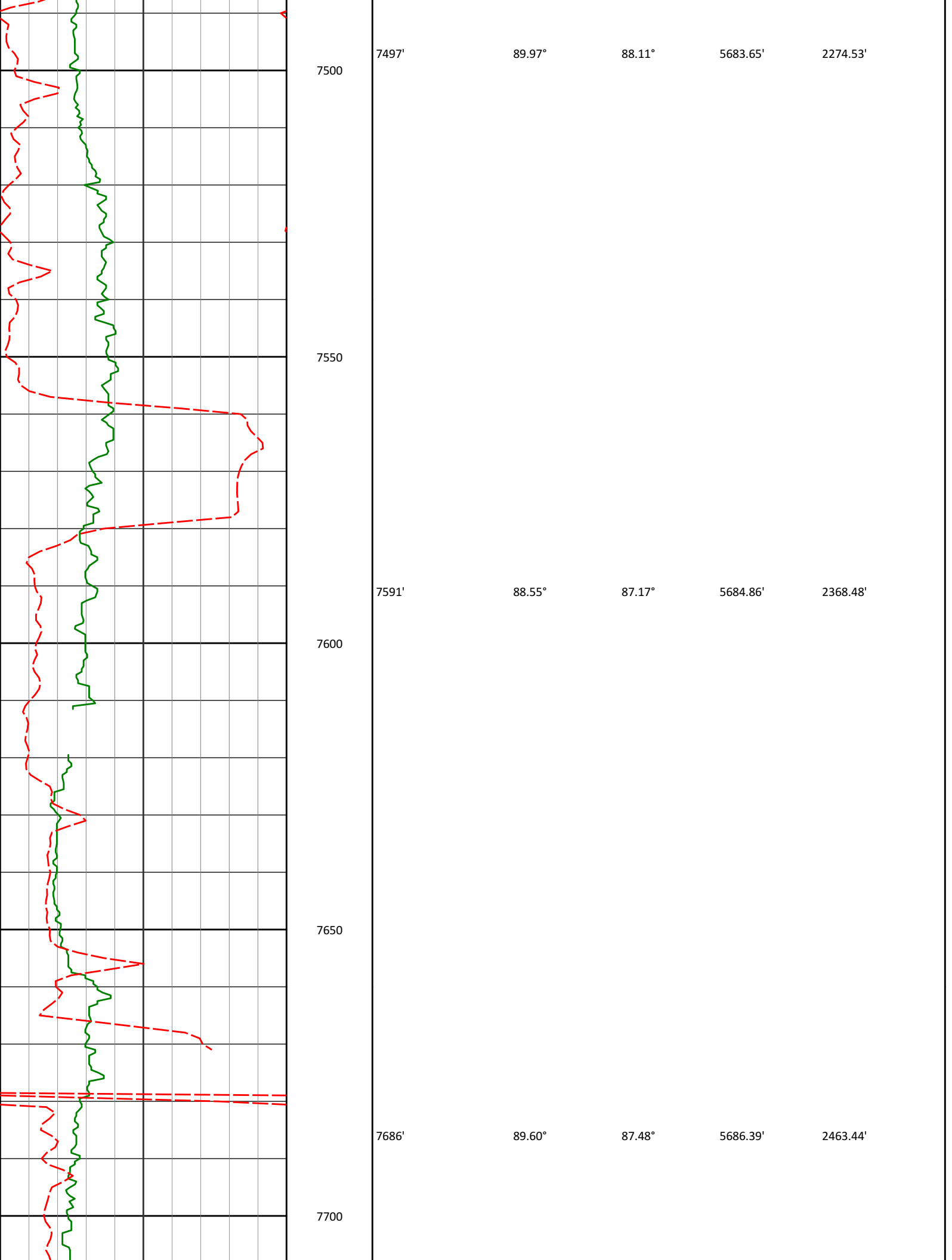
88.11°

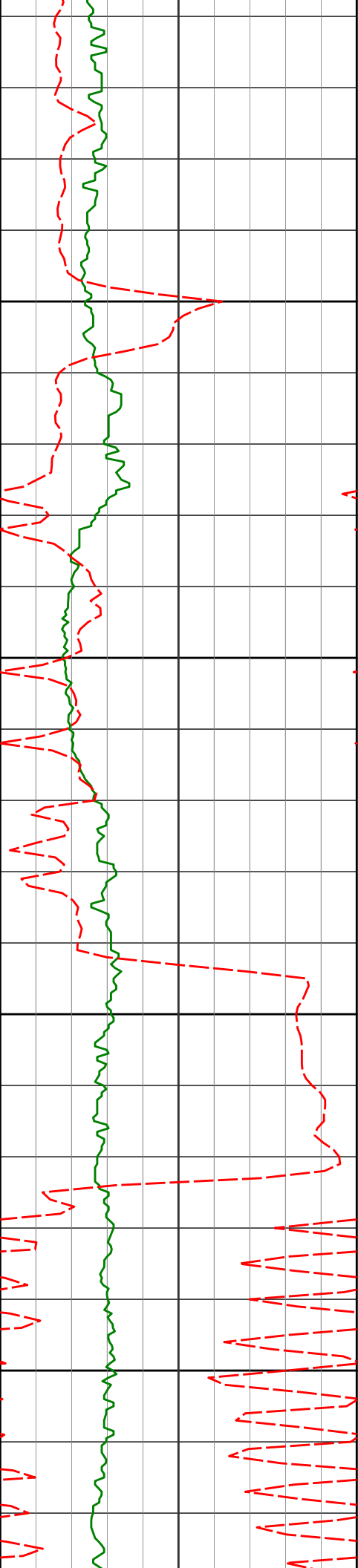
5683.98'

2179.59'

7450







7750

7781'

91.79°

87.70°

5685.24'

2558.40'

7800

7850

7876'

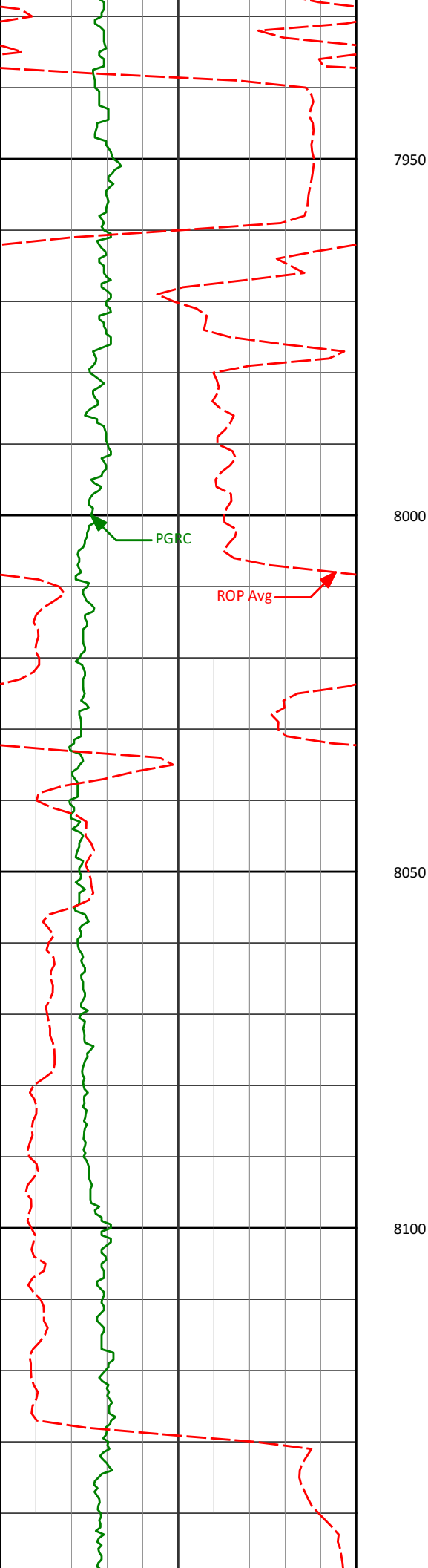
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88.25°

5683.40'

2653.32'

7900



7971'

88.89°

89.48°

5683.97'

2748.20'

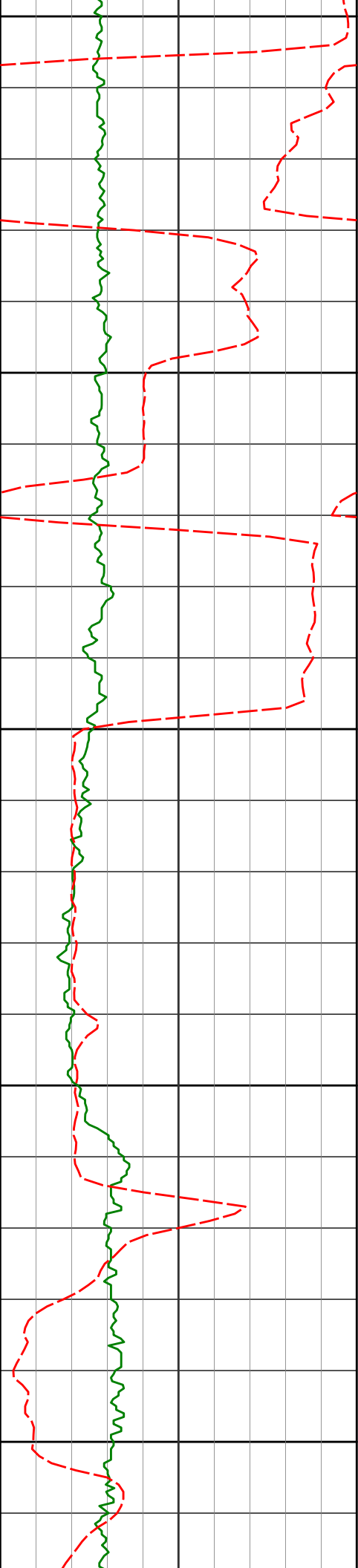
8065'

90.77°

90.19°

5684.25'

2841.99'



8150

8159'

90.28°

91.48°

5683.39'

2935.66'

8200

8250

8254'

88.03°

87.06°

5684.79'

3030.47'

8300

8350

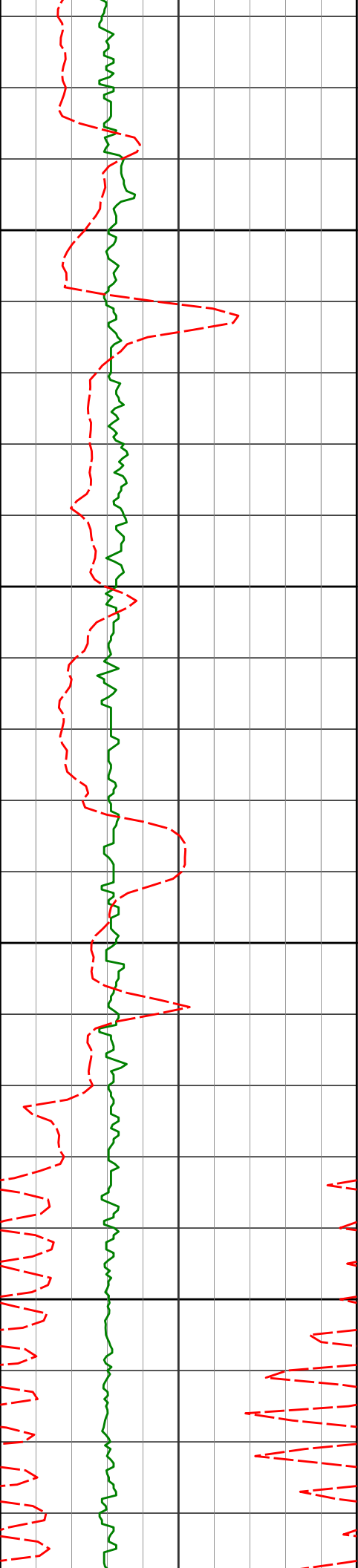
8348'

89.69°

87.81°

5686.66'

3124.42'



8400

8443'

89.66°

85.83°

5687.20'

3219.41'

8450

8500

8538'

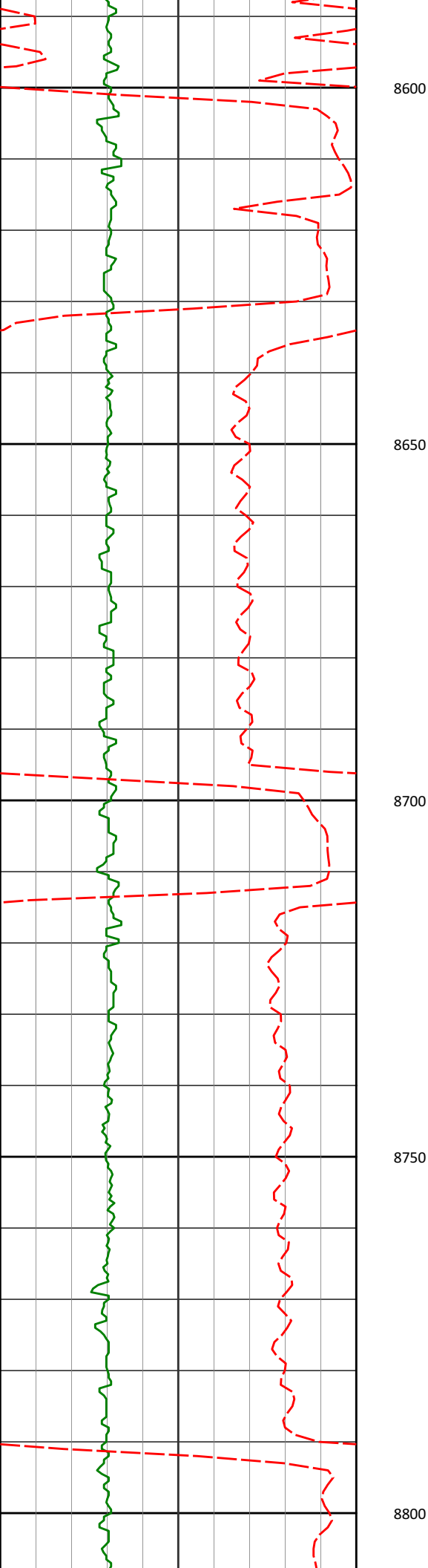
89.66°

82.90°

5687.76'

3314.36'

8550



8633'

89.32°

83.78°

5688.61'

3409.24'

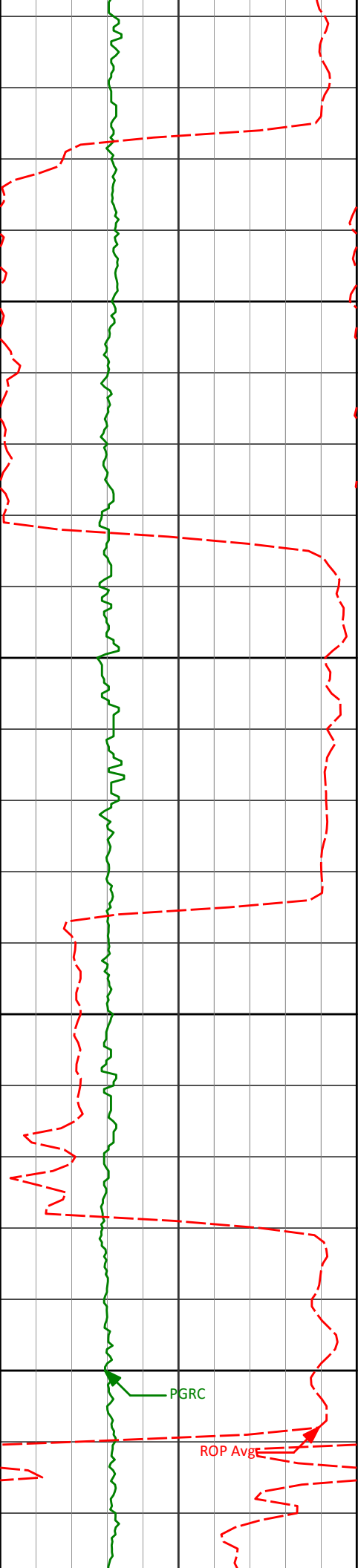
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89.75°

83.55°

5689.36'

3503.16'



8822'

89.69°

83.21°

5689.82'

3598.05'

8850

8900

8917'

89.32°

84.64°

5690.64'

3692.98'

8950

9000

PGRC

ROP Avg

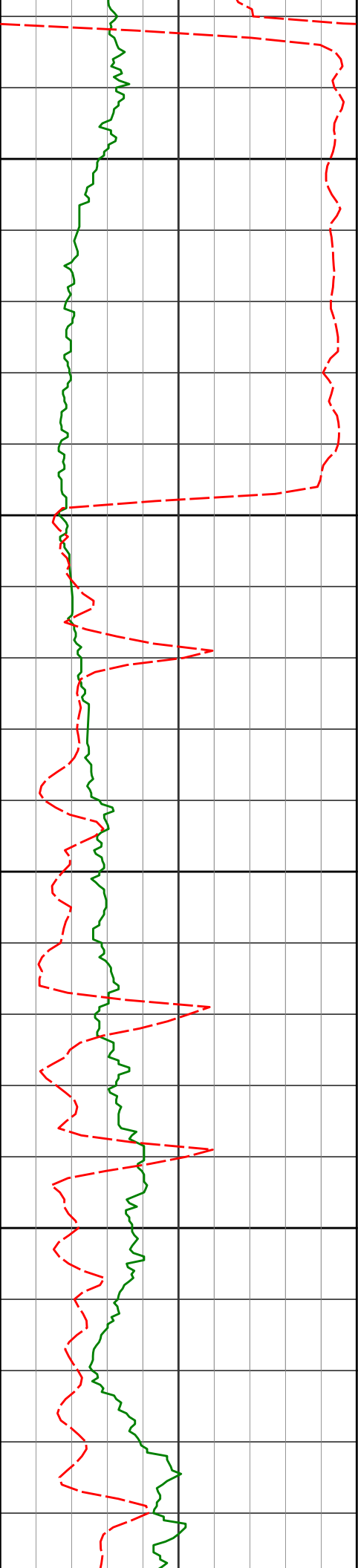
9012'

89.20°

84.44°

5691.87'

3787.94'



9050

9100

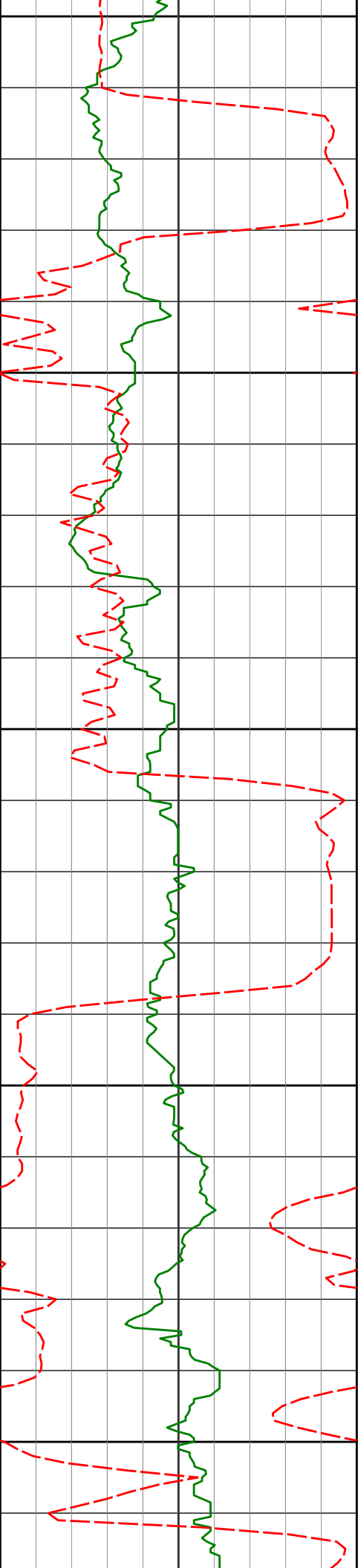
9150

9200

|       |        |        |          |          |
|-------|--------|--------|----------|----------|
| 9107' | 89.66° | 90.95° | 5692.82' | 3882.85' |
|-------|--------|--------|----------|----------|

|       |        |        |          |          |
|-------|--------|--------|----------|----------|
| 9201' | 91.39° | 91.18° | 5691.96' | 3976.48' |
|-------|--------|--------|----------|----------|





9250

9300

9350

9400

9450

9296'

92.28°

90.72°

5688.92'

4071.09'

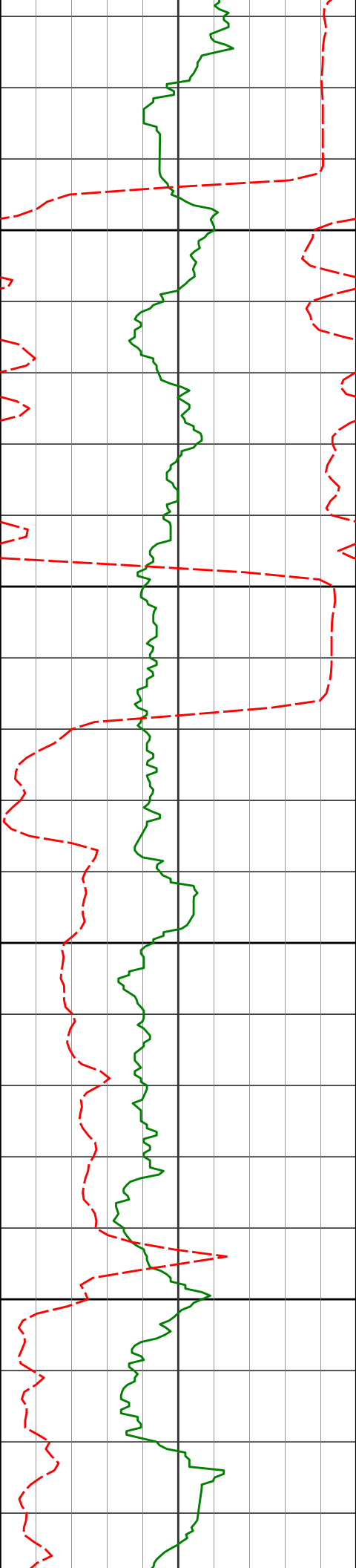
9391'

91.45°

90.48°

5685.82'

4165.74'



9485'

91.11°

90.57°

5683.72'

4259.43'

9500

9550

9580'

90.46°

90.11°

5682.42'

4354.15'

9600

9650

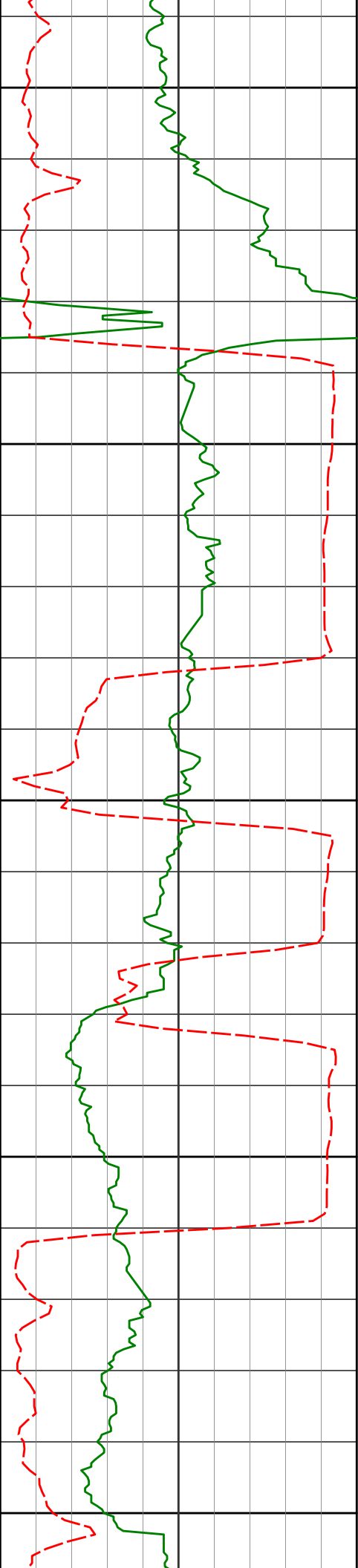
9675'

94.29°

88.94°

5678.48'

4448.88'



9700

9750

9800

9850

9900

9769'

92.53°

88.57°

5672.89'

4542.60'

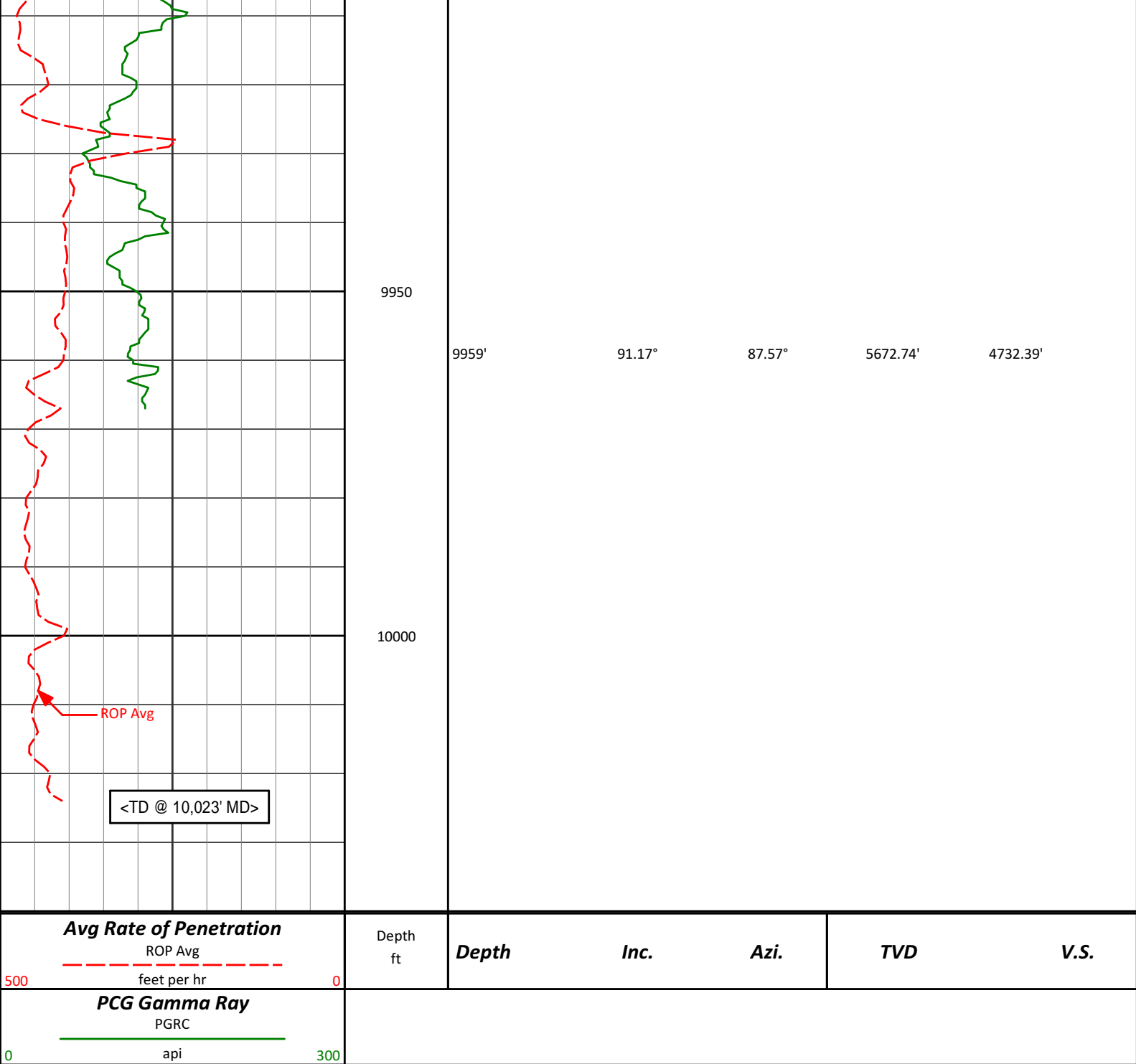
9864'

88.24°

88.89°

5672.25'

4637.48'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

**Noble Energy  
Rohn State LD03-63-1HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901647800**

| Measured<br>Depth<br>(feet) | Inclination<br>(degrees) | Direction<br>(degrees) | Vertical<br>Depth<br>(feet) | Latitude<br>(feet) | Departure<br>(feet) | Vertical<br>Section<br>(feet) | Dogleg<br>(deg/100ft) |
|-----------------------------|--------------------------|------------------------|-----------------------------|--------------------|---------------------|-------------------------------|-----------------------|
| 0.00                        | 0.00                     | 0.00                   | 0.00                        | 0.00 N             | 0.00 E              | 0.00                          | TIE-IN                |
| 350.00                      | 0.70                     | 229.39                 | 349.99                      | 1.39 S             | 1.62 W              | -1.71                         | 0.20                  |
| 800.00                      | 0.70                     | 142.99                 | 799.97                      | 5.38 S             | 2.05 W              | -2.42                         | 0.21                  |
| 1200.00                     | 1.00                     | 294.19                 | 1199.95                     | 5.90 S             | 3.77 W              | -4.16                         | 0.41                  |

|         |       |        |         |          |           |         |       |
|---------|-------|--------|---------|----------|-----------|---------|-------|
| 1363.00 | 0.41  | 329.79 | 1362.94 | 4.81 S   | 5.36 W    | -5.68   | 0.43  |
| 1456.00 | 0.58  | 344.16 | 1455.93 | 4.06 S   | 5.66 W    | -5.92   | 0.23  |
| 1549.00 | 2.57  | 34.46  | 1548.90 | 1.89 S   | 4.61 W    | -4.73   | 2.41  |
| 1642.00 | 5.14  | 37.46  | 1641.68 | 3.13 N   | 0.90 W    | -0.68   | 2.77  |
| 1734.00 | 6.58  | 39.35  | 1733.20 | 10.48 N  | 4.95 E    | 5.66    | 1.58  |
| 1828.00 | 7.93  | 39.60  | 1826.44 | 19.64 N  | 12.50 E   | 13.82   | 1.43  |
| 1923.00 | 9.05  | 39.81  | 1920.40 | 30.43 N  | 21.46 E   | 23.50   | 1.17  |
| 2018.00 | 10.32 | 30.21  | 2014.05 | 43.52 N  | 30.53 E   | 33.44   | 2.16  |
| 2112.00 | 11.33 | 31.03  | 2106.38 | 58.71 N  | 39.52 E   | 43.46   | 1.09  |
| 2207.00 | 9.89  | 33.22  | 2199.75 | 73.53 N  | 48.80 E   | 53.74   | 1.58  |
| 2302.00 | 11.89 | 32.41  | 2293.04 | 88.62 N  | 58.52 E   | 64.47   | 2.11  |
| 2396.00 | 11.45 | 31.41  | 2385.09 | 104.75 N | 68.57 E   | 75.61   | 0.51  |
| 2491.00 | 11.91 | 31.36  | 2478.13 | 121.17 N | 78.58 E   | 86.72   | 0.48  |
| 2586.00 | 11.61 | 29.62  | 2571.13 | 137.85 N | 88.41 E   | 97.67   | 0.48  |
| 2681.00 | 11.35 | 30.17  | 2664.23 | 154.24 N | 97.83 E   | 108.20  | 0.30  |
| 2775.00 | 10.56 | 31.72  | 2756.52 | 169.57 N | 107.01 E  | 118.41  | 0.89  |
| 2870.00 | 8.97  | 39.66  | 2850.14 | 182.67 N | 116.31 E  | 128.59  | 2.20  |
| 2965.00 | 7.47  | 38.05  | 2944.16 | 193.24 N | 124.85 E  | 137.83  | 1.59  |
| 3060.00 | 7.03  | 37.03  | 3038.40 | 202.75 N | 132.16 E  | 145.78  | 0.49  |
| 3154.00 | 7.21  | 36.98  | 3131.68 | 212.05 N | 139.17 E  | 153.41  | 0.19  |
| 3249.00 | 5.68  | 40.99  | 3226.08 | 220.36 N | 145.84 E  | 160.63  | 1.68  |
| 3344.00 | 4.38  | 35.36  | 3320.71 | 226.86 N | 151.02 E  | 166.25  | 1.46  |
| 3439.00 | 2.75  | 50.35  | 3415.52 | 231.27 N | 154.87 E  | 170.39  | 1.96  |
| 3534.00 | 0.35  | 105.68 | 3510.49 | 232.65 N | 156.90 E  | 172.51  | 2.70  |
| 3629.00 | 0.52  | 123.15 | 3605.48 | 232.33 N | 157.54 E  | 173.13  | 0.23  |
| 3723.00 | 0.42  | 70.09  | 3699.48 | 232.21 N | 158.22 E  | 173.80  | 0.46  |
| 3818.00 | 0.75  | 321.68 | 3794.48 | 232.82 N | 158.17 E  | 173.79  | 1.01  |
| 3913.00 | 1.27  | 300.71 | 3889.46 | 233.84 N | 156.88 E  | 172.57  | 0.67  |
| 4008.00 | 1.59  | 312.91 | 3984.43 | 235.27 N | 155.01 E  | 170.81  | 0.46  |
| 4103.00 | 0.59  | 341.11 | 4079.41 | 236.63 N | 153.88 E  | 169.78  | 1.17  |
| 4198.00 | 0.70  | 339.15 | 4174.41 | 237.63 N | 153.52 E  | 169.48  | 0.12  |
| 4293.00 | 1.09  | 317.18 | 4269.40 | 238.84 N | 152.70 E  | 168.75  | 0.54  |
| 4387.00 | 1.47  | 323.41 | 4363.37 | 240.47 N | 151.37 E  | 167.53  | 0.43  |
| 4482.00 | 0.38  | 25.60  | 4458.36 | 241.73 N | 150.78 E  | 167.03  | 1.41  |
| 4577.00 | 0.53  | 4.24   | 4553.36 | 242.45 N | 150.95 E  | 167.25  | 0.23  |
| 4672.00 | 0.33  | 86.73  | 4648.36 | 242.90 N | 151.25 E  | 167.59  | 0.62  |
| 4766.00 | 0.62  | 79.07  | 4742.35 | 243.02 N | 152.02 E  | 168.36  | 0.31  |
| 4860.00 | 0.26  | 108.94 | 4836.35 | 243.04 N | 152.72 E  | 169.06  | 0.44  |
| 4932.00 | 0.23  | 134.55 | 4908.35 | 242.89 N | 152.98 E  | 169.31  | 0.16  |
| 4953.00 | 0.19  | 162.10 | 4929.35 | 242.82 N | 153.02 E  | 169.35  | 0.52  |
| 5000.00 | 3.48  | 78.79  | 4976.32 | 243.02 N | 154.45 E  | 170.78  | 7.38  |
| 5048.00 | 8.29  | 93.14  | 5024.06 | 243.12 N | 159.34 E  | 175.67  | 10.39 |
| 5095.00 | 11.18 | 97.81  | 5070.37 | 242.31 N | 167.24 E  | 183.49  | 6.36  |
| 5143.00 | 15.06 | 99.72  | 5117.11 | 240.63 N | 177.99 E  | 194.11  | 8.14  |
| 5190.00 | 17.81 | 92.37  | 5162.19 | 239.30 N | 191.20 E  | 207.19  | 7.33  |
| 5238.00 | 21.73 | 91.94  | 5207.36 | 238.69 N | 207.42 E  | 223.33  | 8.17  |
| 5285.00 | 24.20 | 93.35  | 5250.63 | 237.84 N | 225.74 E  | 241.54  | 5.39  |
| 5332.00 | 26.72 | 91.86  | 5293.06 | 236.93 N | 245.92 E  | 261.62  | 5.53  |
| 5379.00 | 31.06 | 90.46  | 5334.20 | 236.49 N | 268.62 E  | 284.23  | 9.34  |
| 5427.00 | 36.32 | 92.62  | 5374.12 | 235.74 N | 295.22 E  | 310.72  | 11.23 |
| 5474.00 | 38.98 | 93.43  | 5411.33 | 234.22 N | 323.88 E  | 339.21  | 5.75  |
| 5522.00 | 41.76 | 95.91  | 5447.90 | 231.67 N | 354.86 E  | 369.94  | 6.70  |
| 5569.00 | 44.96 | 95.32  | 5482.07 | 228.52 N | 386.97 E  | 401.76  | 6.85  |
| 5617.00 | 48.89 | 96.59  | 5514.85 | 224.87 N | 421.84 E  | 436.29  | 8.42  |
| 5664.00 | 52.86 | 98.42  | 5544.50 | 220.09 N | 457.97 E  | 472.01  | 8.97  |
| 5712.00 | 58.24 | 96.01  | 5571.65 | 215.15 N | 497.23 E  | 510.83  | 11.95 |
| 5759.00 | 63.81 | 90.88  | 5594.42 | 212.73 N | 538.23 E  | 551.58  | 15.21 |
| 5806.00 | 68.13 | 87.26  | 5613.56 | 213.45 N | 581.14 E  | 594.43  | 11.57 |
| 5853.00 | 70.07 | 87.97  | 5630.32 | 215.28 N | 625.00 E  | 638.32  | 4.36  |
| 5900.00 | 73.67 | 87.86  | 5644.94 | 216.90 N | 669.63 E  | 682.95  | 7.66  |
| 5947.00 | 78.58 | 87.22  | 5656.21 | 218.86 N | 715.20 E  | 728.55  | 10.53 |
| 5995.00 | 80.08 | 87.28  | 5665.10 | 221.12 N | 762.32 E  | 775.71  | 3.13  |
| 6084.00 | 84.13 | 88.28  | 5677.32 | 224.54 N | 850.39 E  | 863.81  | 4.69  |
| 6176.00 | 85.68 | 88.22  | 5685.49 | 227.34 N | 941.98 E  | 955.38  | 1.68  |
| 6269.00 | 88.64 | 87.31  | 5690.09 | 230.97 N | 1034.79 E | 1048.21 | 3.33  |
| 6362.00 | 90.15 | 85.96  | 5691.07 | 236.42 N | 1127.61 E | 1141.19 | 2.17  |
| 6454.00 | 91.36 | 91.27  | 5689.85 | 238.64 N | 1219.55 E | 1233.06 | 5.91  |
| 6549.00 | 89.66 | 89.35  | 5689.01 | 238.13 N | 1314.53 E | 1327.79 | 2.69  |
| 6643.00 | 91.76 | 89.33  | 5687.85 | 239.21 N | 1408.51 E | 1421.62 | 2.23  |
| 6738.00 | 90.99 | 88.51  | 5685.57 | 241.01 N | 1503.47 E | 1516.47 | 1.18  |
| 6833.00 | 91.57 | 89.13  | 5683.45 | 242.97 N | 1598.42 E | 1611.34 | 0.90  |

|          |       |       |         |          |           |         |      |
|----------|-------|-------|---------|----------|-----------|---------|------|
| 6928.00  | 91.39 | 89.86 | 5681.00 | 243.81 N | 1693.39 E | 1706.14 | 0.79 |
| 7023.00  | 89.54 | 88.60 | 5680.23 | 245.09 N | 1788.37 E | 1800.98 | 2.36 |
| 7118.00  | 90.09 | 89.10 | 5680.54 | 247.00 N | 1883.35 E | 1895.87 | 0.79 |
| 7212.00  | 88.40 | 88.27 | 5681.78 | 249.16 N | 1977.31 E | 1989.76 | 2.01 |
| 7307.00  | 89.26 | 88.42 | 5683.72 | 251.90 N | 2072.25 E | 2084.66 | 0.92 |
| 7402.00  | 90.43 | 88.11 | 5683.98 | 254.78 N | 2167.21 E | 2179.59 | 1.28 |
| 7497.00  | 89.97 | 88.11 | 5683.65 | 257.92 N | 2262.15 E | 2274.53 | 0.49 |
| 7591.00  | 88.55 | 87.17 | 5684.86 | 261.79 N | 2356.06 E | 2368.48 | 1.81 |
| 7686.00  | 89.60 | 87.48 | 5686.39 | 266.23 N | 2450.94 E | 2463.44 | 1.15 |
| 7781.00  | 91.79 | 87.70 | 5685.24 | 270.22 N | 2545.85 E | 2558.40 | 2.32 |
| 7876.00  | 90.43 | 88.25 | 5683.40 | 273.57 N | 2640.77 E | 2653.32 | 1.54 |
| 7971.00  | 88.89 | 89.48 | 5683.97 | 275.45 N | 2735.74 E | 2748.20 | 2.08 |
| 8065.00  | 90.77 | 90.19 | 5684.25 | 275.72 N | 2829.74 E | 2841.99 | 2.14 |
| 8159.00  | 90.28 | 91.48 | 5683.39 | 274.35 N | 2923.72 E | 2935.66 | 1.47 |
| 8254.00  | 88.03 | 87.06 | 5684.79 | 275.57 N | 3018.67 E | 3030.47 | 5.22 |
| 8348.00  | 89.69 | 87.81 | 5686.66 | 279.78 N | 3112.56 E | 3124.42 | 1.94 |
| 8443.00  | 89.66 | 85.83 | 5687.20 | 285.05 N | 3207.40 E | 3219.41 | 2.08 |
| 8538.00  | 89.66 | 82.90 | 5687.76 | 294.38 N | 3301.93 E | 3314.36 | 3.09 |
| 8633.00  | 89.32 | 83.78 | 5688.61 | 305.40 N | 3396.29 E | 3409.24 | 1.00 |
| 8727.00  | 89.75 | 83.55 | 5689.36 | 315.77 N | 3489.71 E | 3503.16 | 0.52 |
| 8822.00  | 89.69 | 83.21 | 5689.82 | 326.72 N | 3584.08 E | 3598.05 | 0.36 |
| 8917.00  | 89.32 | 84.64 | 5690.64 | 336.77 N | 3678.54 E | 3692.98 | 1.55 |
| 9012.00  | 89.20 | 84.44 | 5691.87 | 345.80 N | 3773.10 E | 3787.94 | 0.25 |
| 9107.00  | 89.66 | 90.95 | 5692.82 | 349.62 N | 3867.96 E | 3882.85 | 6.86 |
| 9201.00  | 91.39 | 91.18 | 5691.96 | 347.88 N | 3961.94 E | 3976.48 | 1.85 |
| 9296.00  | 92.28 | 90.72 | 5688.92 | 346.31 N | 4056.88 E | 4071.09 | 1.06 |
| 9391.00  | 91.45 | 90.48 | 5685.82 | 345.32 N | 4151.82 E | 4165.74 | 0.91 |
| 9485.00  | 91.11 | 90.57 | 5683.72 | 344.45 N | 4245.79 E | 4259.43 | 0.38 |
| 9580.00  | 90.46 | 90.11 | 5682.42 | 343.89 N | 4340.78 E | 4354.15 | 0.84 |
| 9675.00  | 94.29 | 88.94 | 5678.48 | 344.68 N | 4435.68 E | 4448.88 | 4.21 |
| 9769.00  | 92.53 | 88.57 | 5672.89 | 346.72 N | 4529.49 E | 4542.60 | 1.91 |
| 9864.00  | 88.24 | 88.89 | 5672.25 | 348.82 N | 4624.44 E | 4637.48 | 4.53 |
| 9959.00  | 91.17 | 87.57 | 5672.74 | 351.75 N | 4719.38 E | 4732.39 | 3.38 |
| 10023.00 | 91.17 | 87.57 | 5671.43 | 354.46 N | 4783.31 E | 4796.36 | 0.00 |

**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 86.06 DEGREES (GRID)  
A TOTAL CORRECTION OF 6.99 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10023.00 FEET  
IS 4796.42 FEET ALONG 85.76 DEGREES (GRID)**

Surface surveys at 350 ft, 800 ft and 1200 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 9959 ft MD to TD at 10023 ft MD.