

**PCGC : Pressure Case Gamma**  
**PCDC: Pressure Case Directional**



**1 : 600 / 1 : 240**

|   |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|
| Country : USA   |  |  |  |  |  |  |  |  |  |
| Field : Wattenberg  |  |  |  |  |  |  |  |  |  |
| Location : Lat: 40°33' 56.05" North<br>Long: 104°31' 38.10" West  |  |  |  |  |  |  |  |  |  |
| Well : Furrow State USX AB16-62-1HNL                              |  |  |  |  |  |  |  |  |  |
| Company : Noble Energy  |  |  |  |  |  |  |  |  |  |
| Rig : H&P 315   |  |  |  |  |  |  |  |  |  |
| LOCATION  |  |  |  |  |  |  |  |  |  |
| Latitude : 40°33' 56.05" North<br>Longitude : 104°31' 38.10" West |  |  |  |  | Other Services<br>Directional Drilling |  |  |  |  |
| UTM Easting = 3,270,253.853 ft<br>UTM Northing = 1,450,360.338 ft |  |  |  |  |  |  |  |  |  |
| Permanent Datum : Ground Level Elevation : 4830.00 ft             |  |  |  |  |  |  |  |  |  |
| Log Measured From : Drill Floor 24.00 ft Above Permanent Datum    |  |  |  |  |  |  |  |  |  |
| Drilling Measured From : Drill Floor                              |  |  |  |  |  |  |  |  |  |
| MD LOG  |  |  |  |  |  |  |  |  |  |
| Depth Logged : 773.00 ft To 16,367.00 ft                          |  |  |  |  |  |  |  |  |  |
| Date Logged : 26-Jan-13 To 05-Feb-13                              |  |  |  |  |  |  |  |  |  |
| Total Depth MD : 16,367.00 ft TVD : 6,928.18 ft                   |  |  |  |  |  |  |  |  |  |
| Spud Date : 26-Jan-13   |  |  |  |  |  |  |  |  |  |
| Unit No. : 11610113   |  |  |  |  |  |  |  |  |  |
| Job No. : CA-XX-0900135797  |  |  |  |  |  |  |  |  |  |
| Plot Type : Final   |  |  |  |  |  |  |  |  |  |
| Plot Date : 06-Feb-13   |  |  |  |  |  |  |  |  |  |
| Borehole Record (MD)  |  |  |  |  |  |  |  |  |  |
| Run No. Size From To  |  |  |  |  |  |  |  |  |  |
| 2 8.750 in 714.00 ft 6.165.00 ft                                  |  |  |  |  |  |  |  |  |  |
| 3 8.750 in 6.165.00 ft 7.352.00 ft                                |  |  |  |  |  |  |  |  |  |
| 4 6.125 in 7.352.00 ft 11.999.00 ft                               |  |  |  |  |  |  |  |  |  |
| 5 6.125 in 11.999.00 ft 15.700.00 ft                              |  |  |  |  |  |  |  |  |  |
| 6 6.125 in 15.700.00 ft 16.367.00 ft                              |  |  |  |  |  |  |  |  |  |
| Size From To  |  |  |  |  |  |  |  |  |  |
| 7.000 in 26.00 lbpf SURFACE 7.340.00 ft                           |  |  |  |  |  |  |  |  |  |
| Casing Record (MD)  |  |  |  |  |  |  |  |  |  |
| Run No. Size From To  |  |  |  |  |  |  |  |  |  |
| Weight From To  |  |  |  |  |  |  |  |  |  |
| SURFACE 7.340.00 ft   |  |  |  |  |  |  |  |  |  |

## WELL INFORMATION

|  |                  |                  |                  |                   |                   |
|--|------------------|------------------|------------------|-------------------|-------------------|
| <b>MWD Run Number</b>                      | 100              | 200              | 300              | 400               | 500               |
| <b>Date run completed</b>                  | 28-Jan-13        | 30-Jan-13        | 02-Feb-13        | 04-Feb-13         | 06-Feb-13         |
| <b>Rig Bit Number</b>                      | 2                | 3                | 4                | 5                 | 6                 |
| <b>Bit Size (in)</b>                       | 8.750            | 8.750            | 6.125            | 6.125             | 6.125             |
| <b>Tool Nominal OD (in)</b>                | 6.750            | 6.750            | 4.750            | 4.750             | 4.750             |
| <b>Log Start Depth (MD, ft)</b>            | 714.00           | 6,165.00         | 7,352.00         | 11,999.00         | 15,700.00         |
| <b>Log End Depth (MD, ft)</b>              | 6,165.00         | 7,352.00         | 11,999.00        | 15,700.00         | 16,367.00         |
| <b>Drill or Wipe</b>                       | Drill            | Drill            | Drill            | Drill             | Drill             |
| <b>Drill/Wipe Start Date and Time</b>      | 27-Jan-13 17:30  | 28-Jan-13 20:10  | 31-Jan-13 08:00  | 02-Feb-13 10:00   | 04-Feb-13 10:10   |
| <b>Drill/Wipe End Date and Time</b>        | 28-Jan-13 11:20  | 29-Jan-13 23:35  | 01-Feb-13 18:22  | 04-Feb-13 12:00   | 04-Feb-13 22:04   |
| <b>Min Inc (deg) @ Depth (MD, ft)</b>      | .22 @ 2,788.00   | 11.12 @ 6,215.00 | 87.11 @ 7,407.00 | 87.65 @ 13,918.00 | 88.12 @ 16,101.00 |
| <b>Max Inc (deg) @ Depth (MD, ft)</b>      | 12.54 @ 6,014.00 | 82.60 @ 7,298.00 | 92.28 @ 7,976.00 | 92.22 @ 15,532.00 | 90.68 @ 15,626.00 |
| <b>Bit TFA(in2) / Bit Type</b>             | .75 / PDC        | .75 / PDC        | .86 / PDC        | .75 / PDC         | .75 / PDC         |
| <b>Flow Rate (gpm)</b>                     | 596.20           | 546.29           | 285.37           | 276.49            | 270.00            |
| <b>Max AV (fpm) / CV (fpm) @ MWD</b>       | N/A / N/A        | N/A / N/A        | 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  | Fresh Water Gel   | Fresh Water Gel   |
| <b>Density (ppg) / Viscosity (spqt)</b>    | 9.05 / 30.00     | 10.40 / 39.00    | 9.22 / 34.00     | 9.36 / 33.00      | 9.63 / 33.00      |
| <b>Filtrate CL (ppm)</b>                   | 1,500.00         | 1,400.00         | 1,300.00         | 1,400.00          | 1,600.00          |
| <b>pH / Fluid Loss (mptm)</b>              | 9.40 / 0         | 9.00 / 9         | 8.80 / 9         | 8.80 / 11         | 8.70 / 11         |
| <b>PV (cP) / YP (lbf2)</b>                 | 5 / 6.00         | 15 / 14.00       | 6 / 8.00         | 7 / 5.00          | 7 / 7.00          |
| <b>% Solids / % Sand</b>                   | 5.1 / 0.25       | 10.9 / 0.20      | 5 / 0.20         | 5.4 / 0.20        | 2.6 / 0.20        |
| <b>% Oil / Oil:Water Ratio</b>             | N/A / N/A        | N/A / N/A        | 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        | 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        | 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        | N/A @ N/A         | N/A @ N/A         |
| <b>Max Tool Temp (in) @ Depth (MD, ft)</b> | 153.10 / 70M     | 125.50 / 70M     | 200.00 / 70M     | 215.00 / 70M      | 250.05 / 70M      |

|                               |               |               |              |              |              |
|-------------------------------|---------------|---------------|--------------|--------------|--------------|
| Max Tool Temp (degF) / Source | 150.10 / PCM  | 165.58 / PCM  | 236.82 / PCM | 245.03 / PCM | 253.35 / PCM |
| Rm @ Max Tool Temp (degF)     | N/A @ 150.10  | N/A @ 165.58  | N/A @ 236.82 | N/A @ 245.03 | N/A @ 253.35 |
| Lead MWD Engineer             | Paul Kock     | Paul Kock     | Paul Kock    | Paul Kock    | Paul Kock    |
| Customer Representative       | Martin Suarez | Martin Suarez | Dave Neilson | Dave Nielsen | Dave Nielsen |

## SENSOR INFORMATION

### Downhole Processor Information

|                           |                 |                 |                 |                 |                 |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Tool Type                 | PCM             | PCM             | PCM             | PCM             | PCM             |
| Software Version          | 5.76            | 5.76            | 5.76            | 5.76            | 5.76            |
| Sub Serial Number         | 11331929        | 11331929        | 11694613        | 11694613        | 11694613        |
| Insert Serial Number      | 11400989        | 11400989        | 11145582        | 11400989        | 11145582        |
| Date and Time Initialized | 27-Jan-13 07:34 | 27-Jan-13 07:34 | 30-Jan-13 17:51 | 01-Feb-13 23:08 | 04-Feb-13 17:46 |
| Date and Time Read        | 30-Jan-13 05:45 | 30-Jan-13 05:26 | 02-Feb-13 03:24 | 05-Feb-13 00:03 | 06-Feb-13 09:37 |
| ECMB SW Version           | N/A             | N/A             | N/A             | N/A             | N/A             |

### Directional Sensor Information

|                        |          |          |          |          |          |
|------------------------|----------|----------|----------|----------|----------|
| Tool Type              | PCDC     | PCDC     | PCDC     | PCDC     | PCDC     |
| Distance From Bit (ft) | 54.94    | 51.95    | 58.85    | 57.62    | 57.62    |
| Software Version       | 6.21     | 6.21     | 6.21     | 6.21     | 6.21     |
| Sub Serial Number      | 11331929 | 11331929 | 11694613 | 11694613 | 11694613 |
| Sonde Serial Number    | 11297623 | 11297623 | 10993516 | 11297623 | 10993516 |
| Sensor ID Number       | N/A      | N/A      | N/A      | N/A      | N/A      |
| Toolface Offset (deg)  | 114.67   | 83.49    | 75.47    | 71.70    | 71.70    |

### Gamma Ray Sensor Information

|                              |          |          |          |          |          |
|------------------------------|----------|----------|----------|----------|----------|
| Tool Type                    | PCG      | PCG      | PCG      | PCG      | PCG      |
| Distance From Bit (ft)       | 49.84    | 46.85    | 53.77    | 52.54    | 52.54    |
| Recorded Sample Period (sec) | 10       | 10       | 10       | 10       | 10       |
| Software Version             | 8.15     | 8.15     | 8.15     | 8.15     | 8.15     |
| Sub Serial Number            | 11331929 | 11331929 | 11694613 | 11694613 | 11694613 |
| Insert/Sonde Serial Number   | 11293393 | 11293393 | 11121369 | 11293393 | 11121369 |

## 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 7.4.20
6. End of Run 200. Gap between build and lateral section is due to Gamma sensor measure point to bit distance during the build run. Last Gamma datapoint is at 7305 ft. MD. Gamma cannot be measured within cased hole, and collection resumes after drilling through cement at 7352 ft MD.

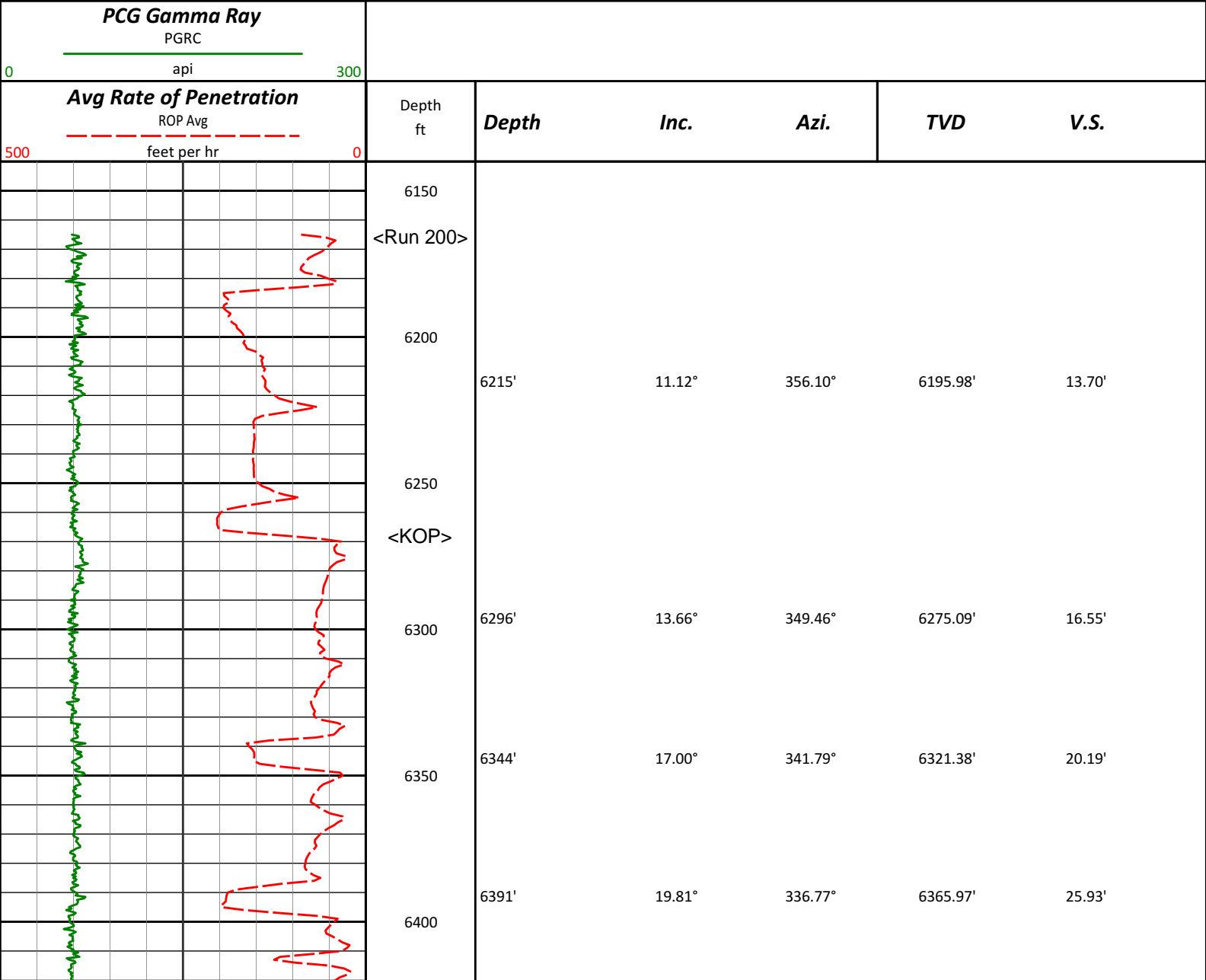
WARRANTY

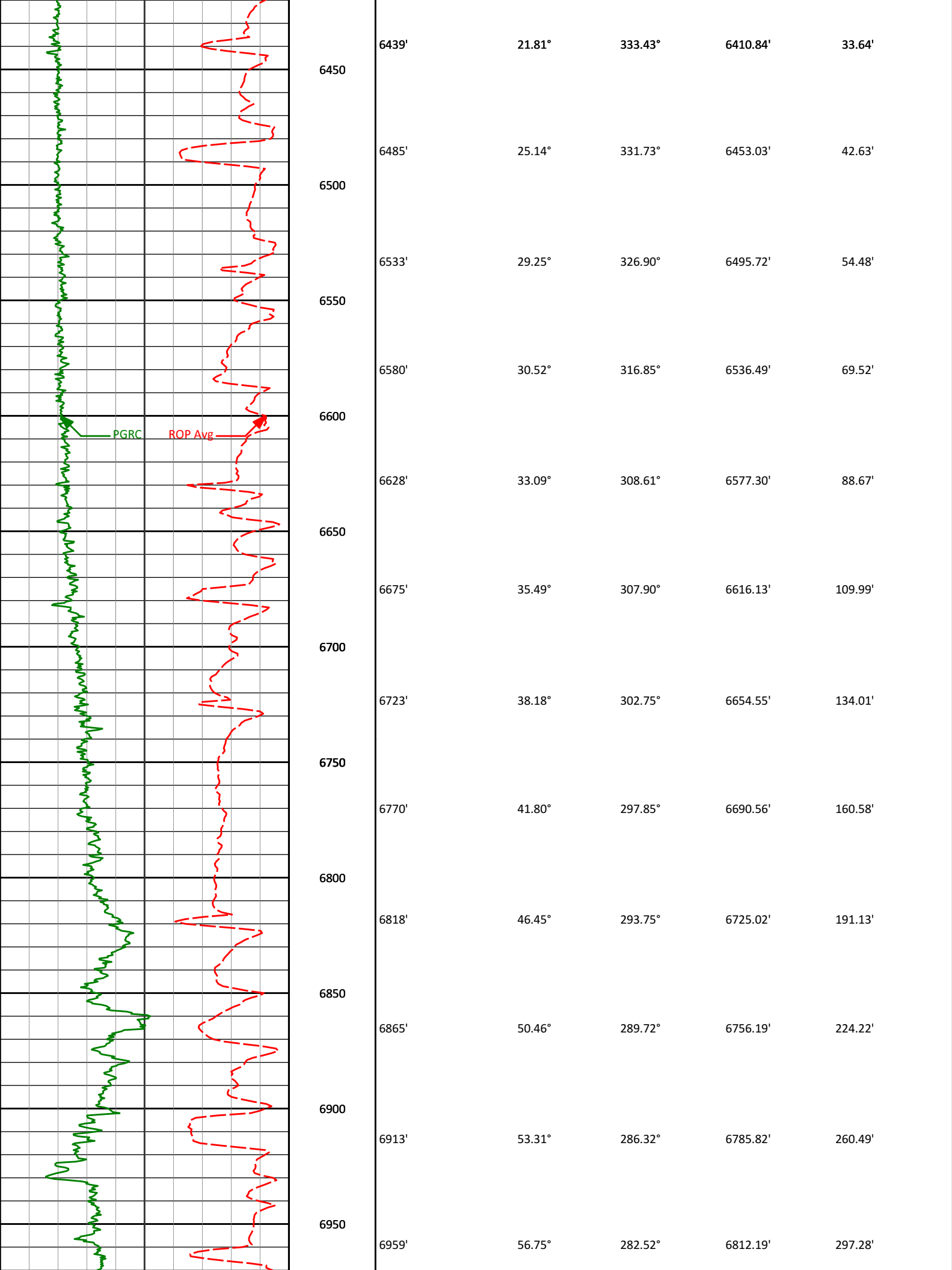
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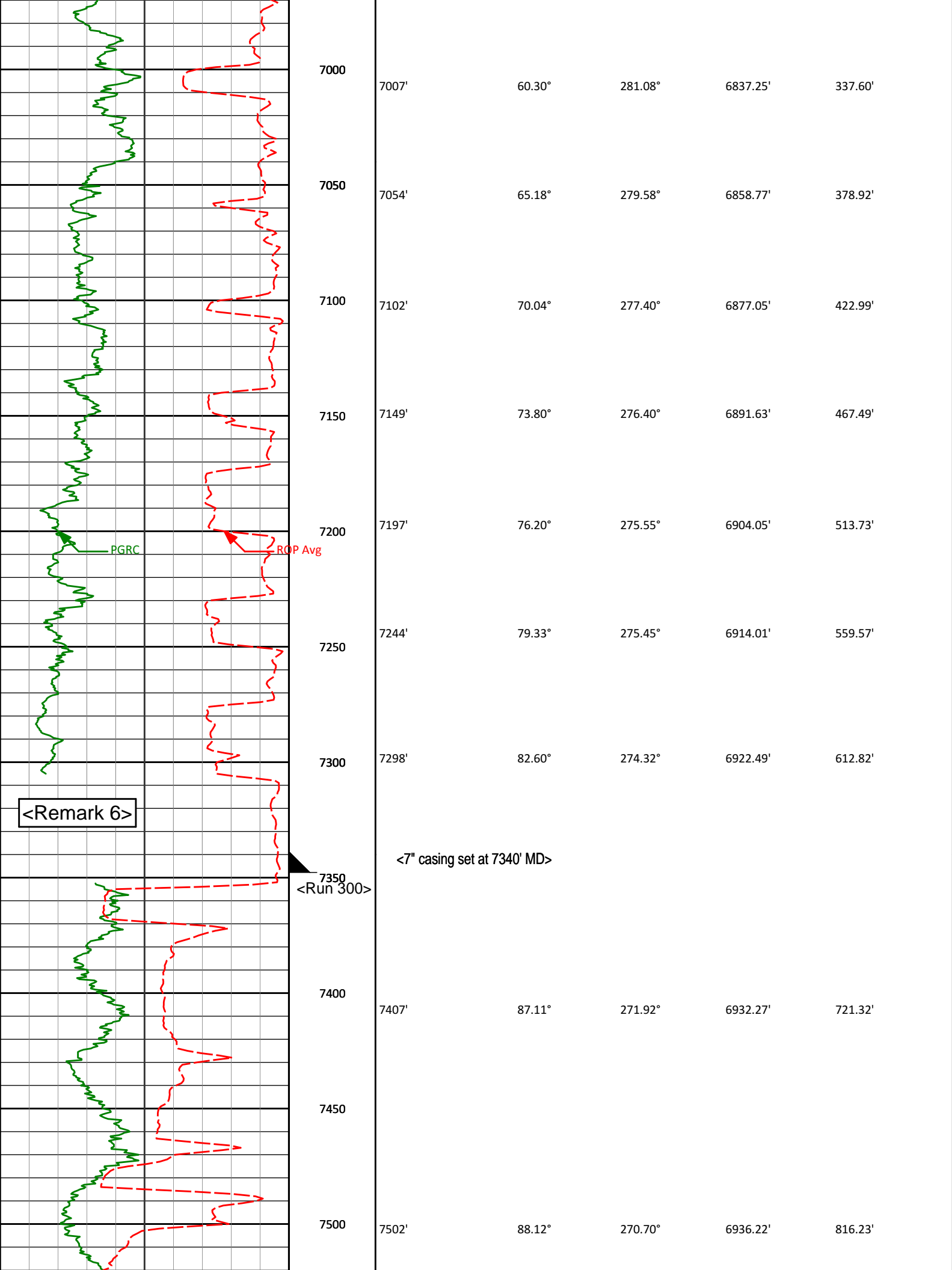
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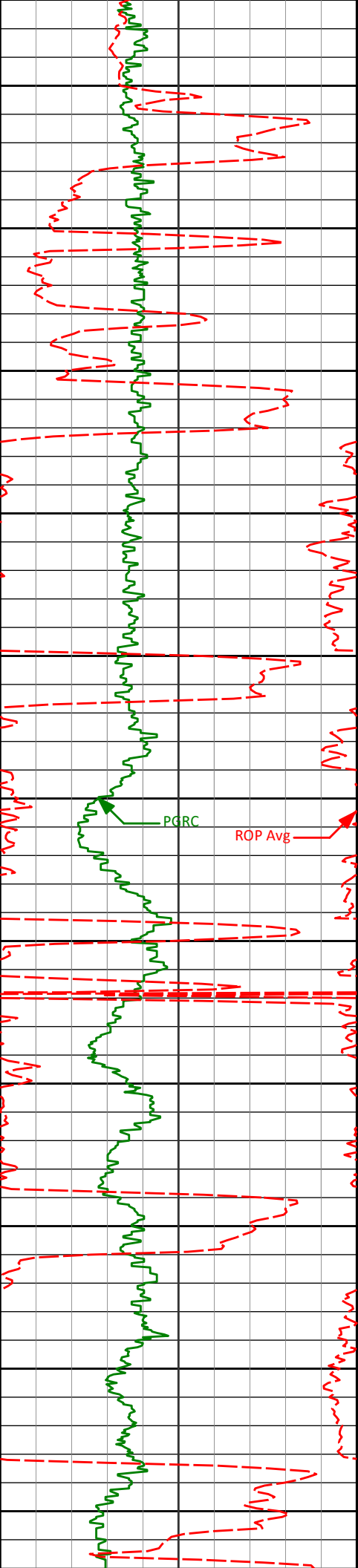
MD Main Log 1:600

Noble Energy, Inc  
Furrow State USX AB16-62-1HNL  
H&P 315  
T7N R64W









7550

7600

7650

7700

7750

7800

7850

7900

7950

8000

8050

7596'

89.14°

269.32°

6938.47'

910.15'

7691'

89.17°

267.85°

6939.88'

1004.98'

7786'

91.35°

267.77°

6939.45'

1099.73'

7881'

91.97°

266.85°

6936.69'

1194.38'

7976'

92.28°

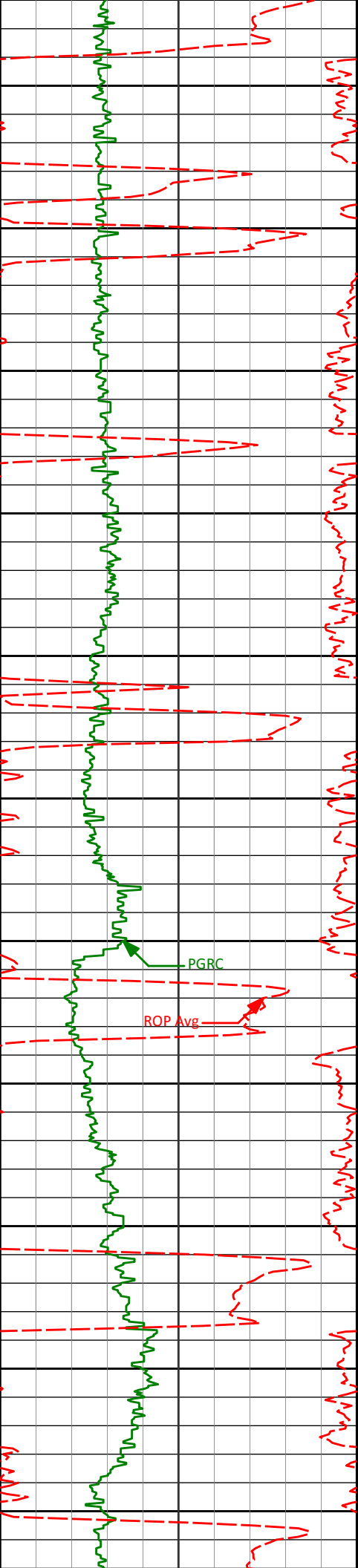
267.93°

6933.17'

1289.02'

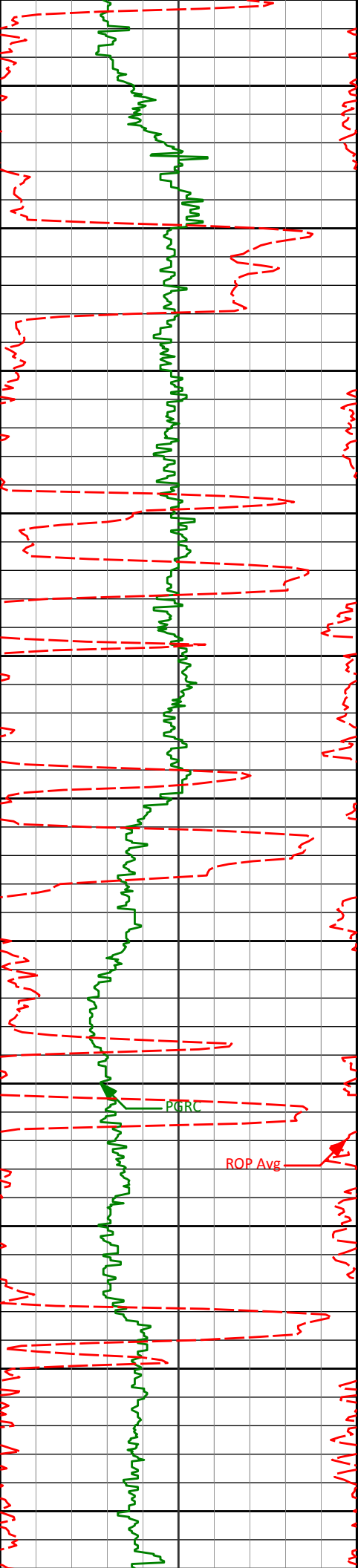
PGRC

ROP Avg



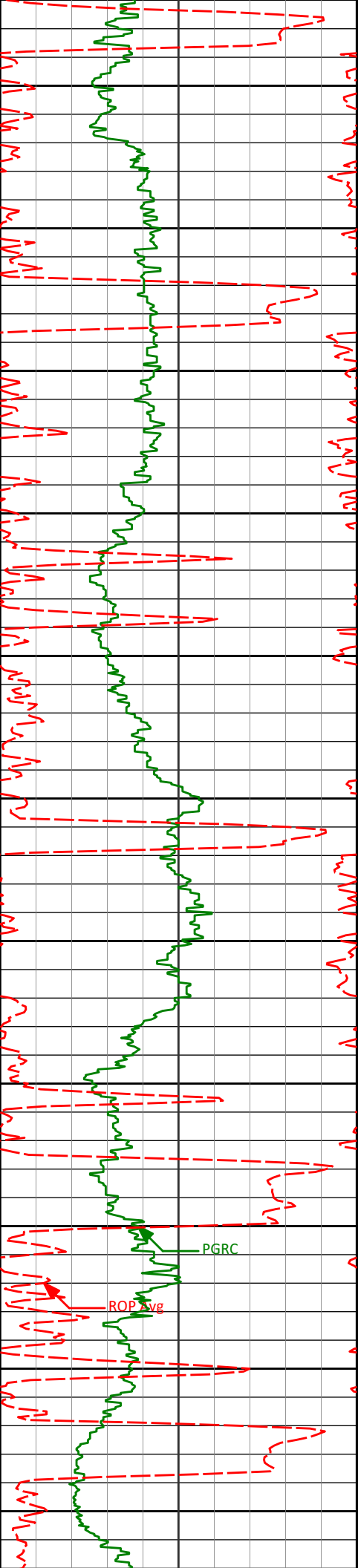
|      |  |  |  |  |
|------|--|--|--|--|
| 8100 |  |  |  |  |
|      |  |  |  |  |
| 8150 |  |  |  |  |
|      |  |  |  |  |
| 8200 |  |  |  |  |
|      |  |  |  |  |
| 8250 |  |  |  |  |
|      |  |  |  |  |
| 8300 |  |  |  |  |
|      |  |  |  |  |
| 8350 |  |  |  |  |
|      |  |  |  |  |
| 8400 |  |  |  |  |
|      |  |  |  |  |
| 8450 |  |  |  |  |
|      |  |  |  |  |
| 8500 |  |  |  |  |
|      |  |  |  |  |
| 8550 |  |  |  |  |
|      |  |  |  |  |
| 8600 |  |  |  |  |

|       |        |         |          |          |
|-------|--------|---------|----------|----------|
| 8071' | 91.08° | 269.60° | 6930.39' | 1383.83' |
| 8166' | 89.54° | 268.37° | 6929.88' | 1478.70' |
| 8261' | 89.94° | 267.97° | 6930.31' | 1573.50' |
| 8356' | 90.77° | 268.86° | 6929.73' | 1668.32' |
| 8451' | 91.17° | 269.55° | 6928.11' | 1763.20' |
| 8546' | 90.55° | 269.91° | 6926.68' | 1858.12' |



|      |       |        |         |          |          |
|------|-------|--------|---------|----------|----------|
| 8650 | 8641' | 90.46° | 270.42° | 6925.84' | 1953.08' |
| 8700 |       |        |         |          |          |
| 8750 | 8736' | 89.04° | 269.24° | 6926.25' | 2048.01' |
| 8800 |       |        |         |          |          |
| 8850 | 8831' | 88.12° | 269.21° | 6928.60' | 2142.88' |
| 8900 |       |        |         |          |          |
| 8950 | 8926' | 89.04° | 269.38° | 6930.95' | 2237.75' |
| 9000 |       |        |         |          |          |
| 9050 | 9020' | 89.39° | 268.79° | 6932.24' | 2331.62' |
| 9100 |       |        |         |          |          |
| 9150 | 9115' | 90.00° | 268.95° | 6932.75' | 2426.49' |





9200

9210'

89.97°

269.20°

6932.78'

2521.37'

9250

9300

9305'

89.20°

267.55°

6933.47'

2616.19'

9350

9400

9400'

90.22°

267.76°

6933.95'

2710.93'

9450

9500

9495'

90.80°

267.98°

6933.11'

2805.69'

9550

9600

9590'

90.71°

267.39°

6931.86'

2900.42'

PGRC

ROP Avg

9650

9700

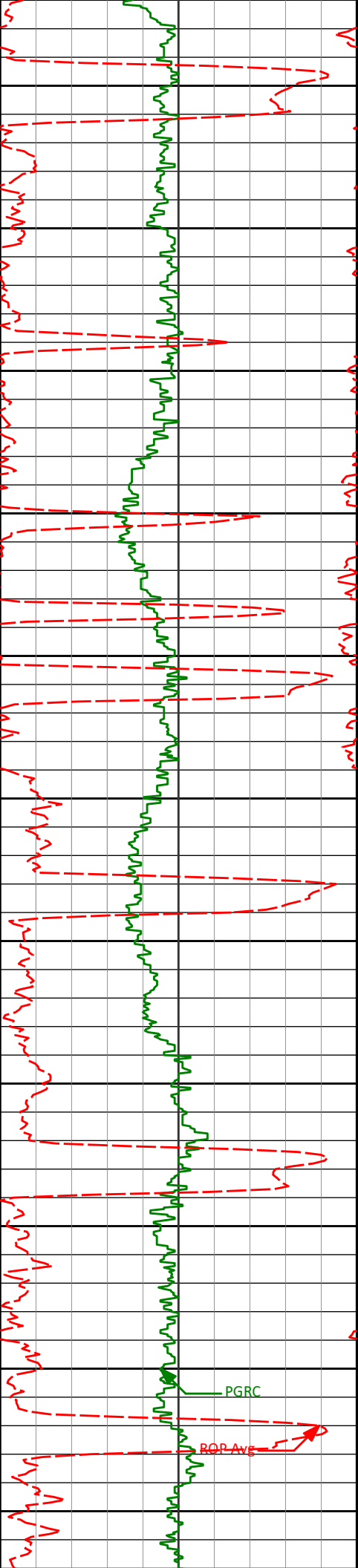
9685'

90.19°

267.92°

6931.12'

2995.16'



9750

9780'

89.23°

268.68°

6931.60'

3089.97'

9800

9850

9875'

89.29°

268.14°

6932.83'

3184.78'

9900

9950

9970'

90.31°

268.68°

6933.16'

3279.60'

10000

10050

10065'

90.56°

269.42°

6932.44'

3374.48'

10100

10150

10160'

90.06°

269.74°

6931.93'

3469.40'

10200

PGRC

ROP-Avg

10250

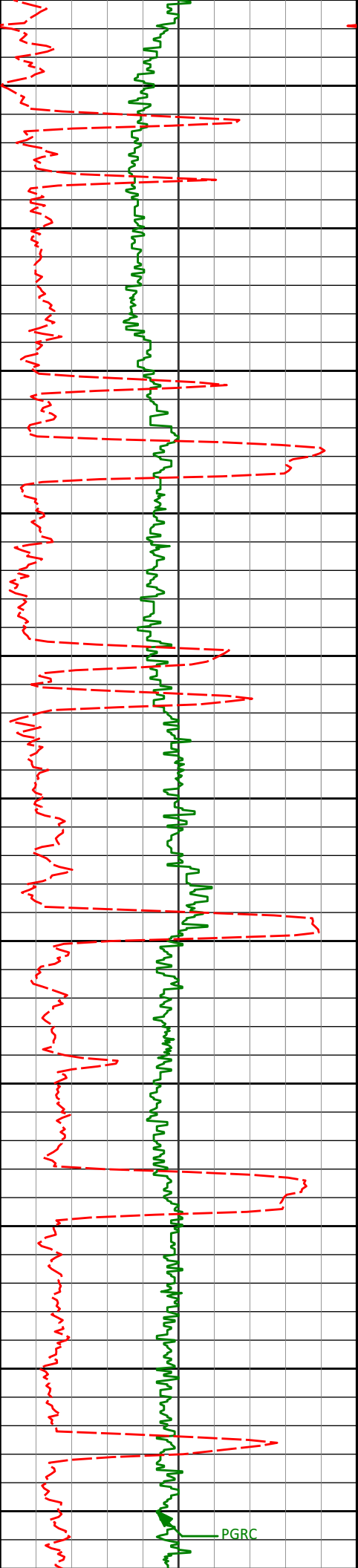
10252'

88.40°

269.28°

6933.17'

3561.31'



10300

10350

10400

10450

10500

10550

10600

10650

10700

10750

10800

10345'

89.75°

269.39°

6934.67'

3654.20'

10438'

89.72°

269.58°

6935.10'

3747.12'

10531'

90.03°

269.51°

6935.29'

3840.04'

10624'

90.62°

269.97°

6934.77'

3932.97'

10716'

89.75°

269.60°

6934.47'

4024.91'

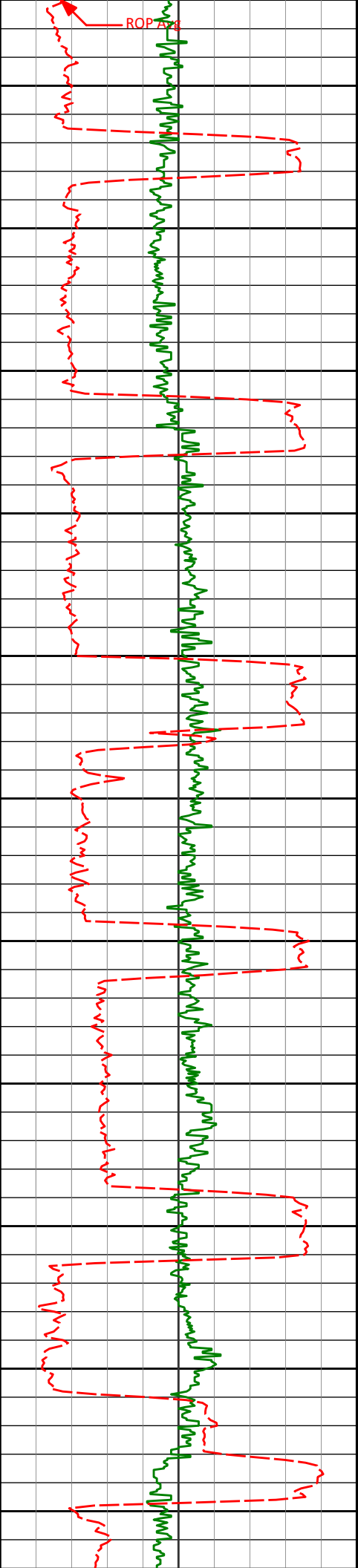
10808'

89.72°

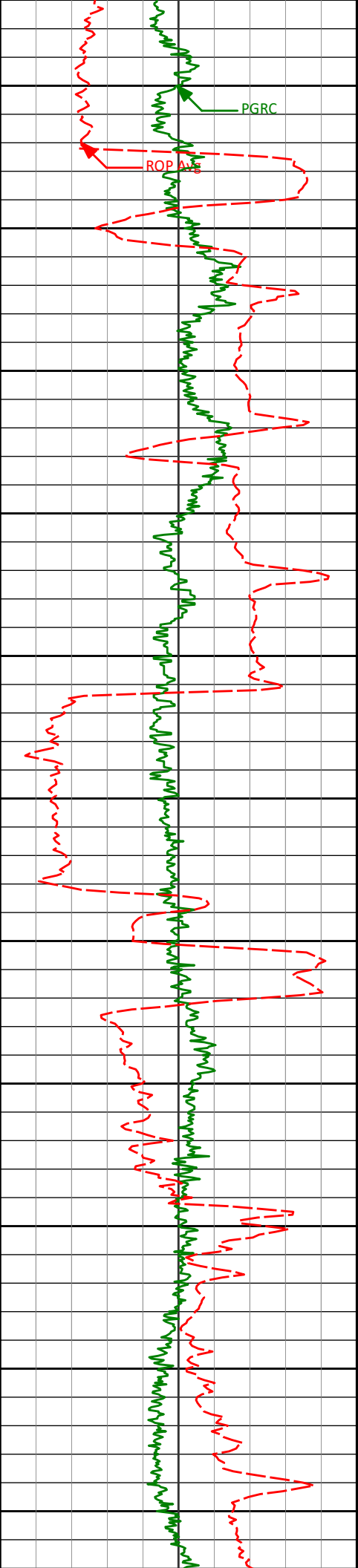
267.23°

6934.89'

4116.73'



|       |        |        |         |          |          |
|-------|--------|--------|---------|----------|----------|
| 10850 |        |        |         |          |          |
| 10900 | 10901' | 89.78° | 266.85° | 6935.29' | 4209.39' |
| 10950 |        |        |         |          |          |
| 11000 | 10994' | 90.00° | 266.92° | 6935.47' | 4302.04' |
| 11050 |        |        |         |          |          |
| 11100 | 11086' | 90.77° | 269.53° | 6934.85' | 4393.84' |
| 11150 |        |        |         |          |          |
| 11200 | 11180' | 90.59° | 270.48° | 6933.74' | 4487.78' |
| 11250 |        |        |         |          |          |
| 11300 | 11273' | 89.14° | 269.82° | 6933.96' | 4580.73' |
| 11350 |        |        |         |          |          |
|       | 11365' | 88.86° | 269.64° | 6935.57' | 4672.65' |



11400

11450

11500

11550

11600

11650

11700

11750

11800

11850

11900

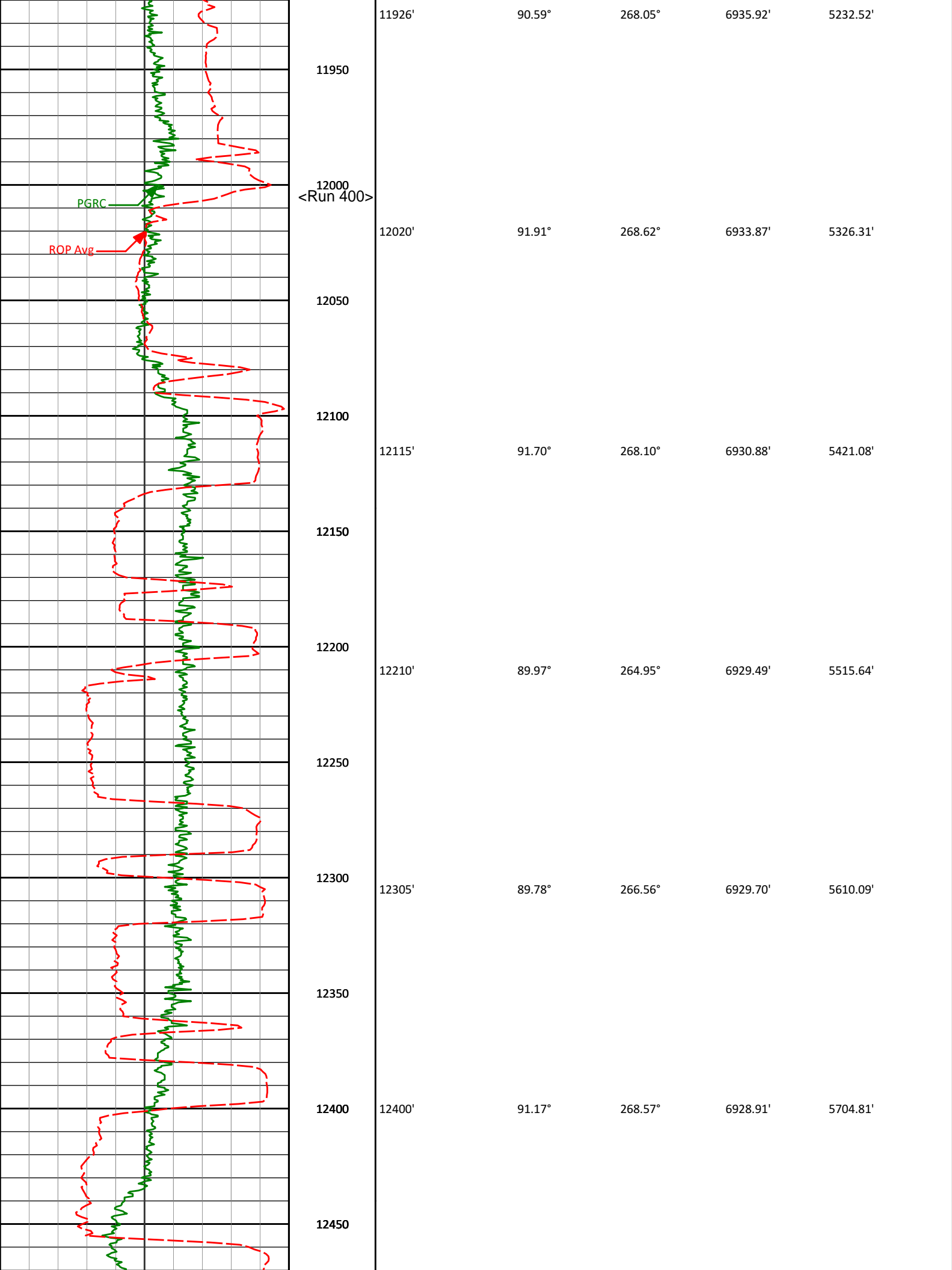
|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11458' | 89.72° | 268.25° | 6936.72' | 4765.52' |
|--------|--------|---------|----------|----------|

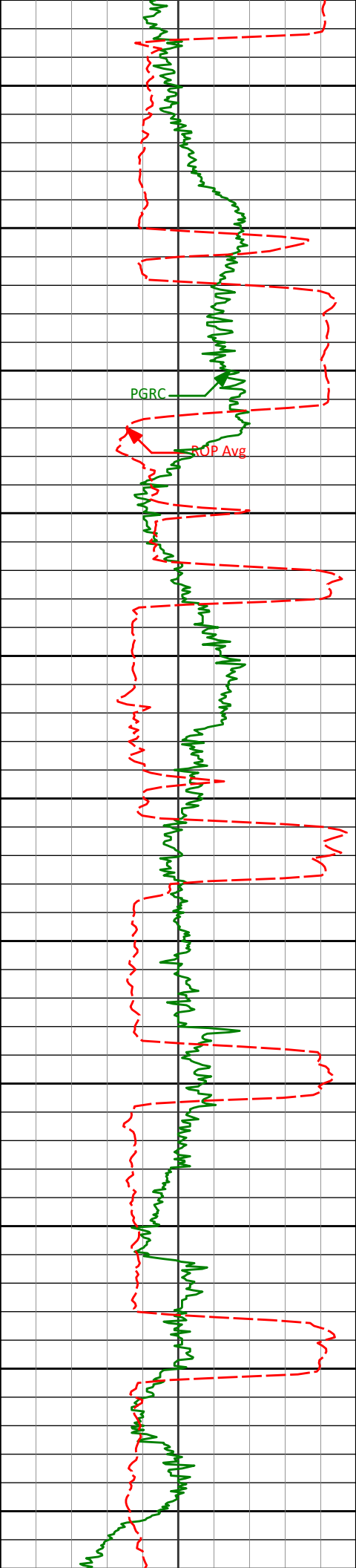
|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11550' | 90.56° | 267.73° | 6936.50' | 4857.30' |
|--------|--------|---------|----------|----------|

|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11643' | 90.22° | 267.82° | 6935.87' | 4950.06' |
|--------|--------|---------|----------|----------|

|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11736' | 89.47° | 268.59° | 6936.12' | 5042.86' |
|--------|--------|---------|----------|----------|

|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11831' | 90.09° | 268.61° | 6936.48' | 5137.70' |
|--------|--------|---------|----------|----------|





12500

12550

12600

12650

12700

12750

12800

12850

12900

12950

13000

12495'

90.71°

268.42°

6927.35'

5799.63'

12590'

90.52°

269.49°

6926.32'

5894.49'

12685'

88.89°

269.08°

6926.81'

5989.39'

12780'

89.11°

269.69°

6928.47'

6084.28'

12875'

89.82°

270.13°

6929.36'

6179.22'

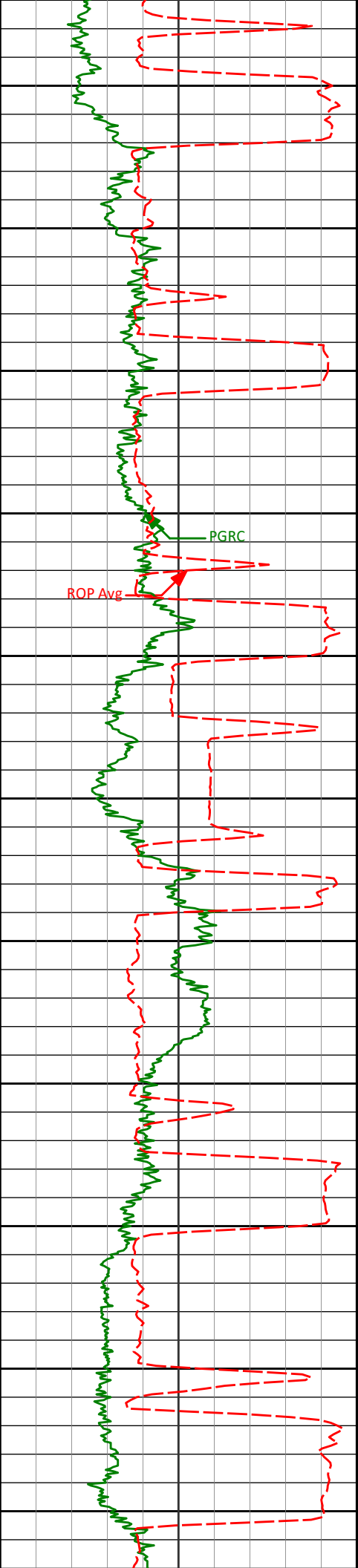
12970'

90.22°

270.60°

6929.34'

6274.19'



13050

13064'

89.69°

270.24°

6929.41'

6368.16'

13100

13150

13159'

89.91°

271.04°

6929.75'

6463.13'

13200

PGRC

ROP Avg

13250

13254'

90.00°

270.11°

6929.82'

6558.10'

13300

13350

13349'

90.06°

268.40°

6929.77'

6653.00'

13400

13450

13444'

90.71°

268.63°

6929.13'

6747.83'

13500

13550

13539'

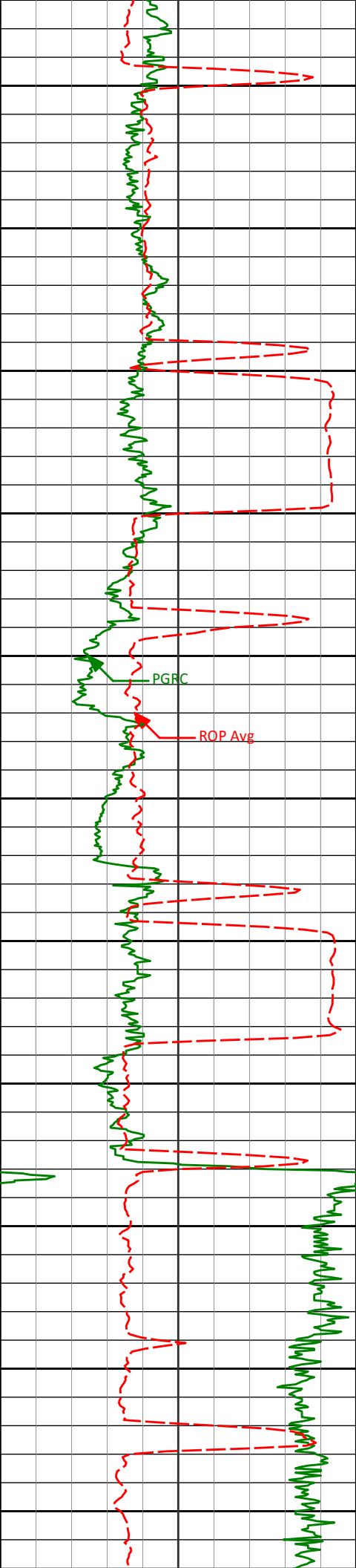
90.09°

269.92°

6928.47'

6842.73'





13600

13634'

91.14°

268.86°

6927.45'

6937.63'

13650

13700

13728'

89.35°

269.03°

6927.04'

7031.50'

13750

13800

13823'

89.08°

268.19°

6928.35'

7126.33'

13850

13900

13918'

87.65°

267.51°

6931.06'

7221.05'

13950

14000

14013'

88.77°

267.34°

6934.02'

7315.72'

14050

14100

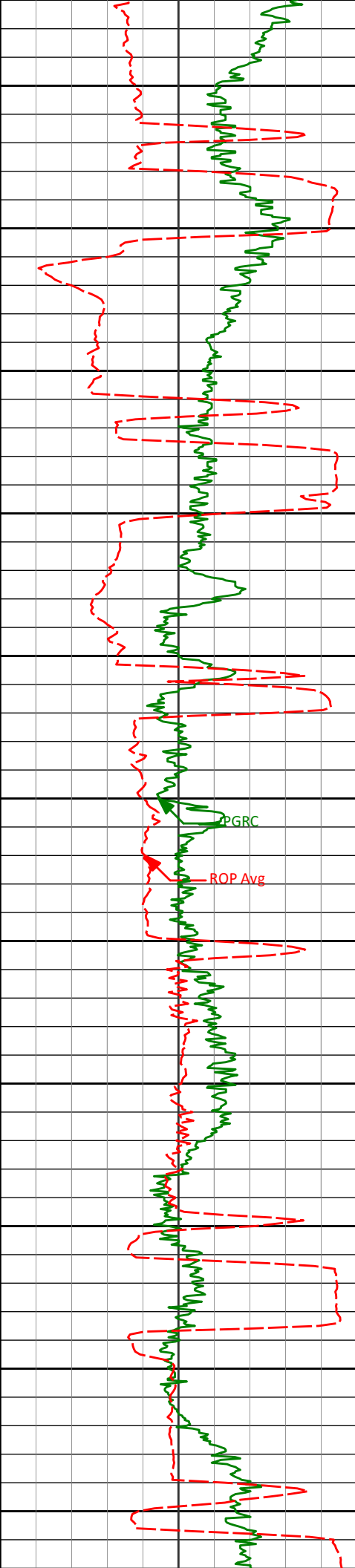
14108'

89.57°

266.68°

6935.41'

7410.36'



14150

14200

14250

14300

14350

14400

14450

14500

14550

14600

14650

14203'

90.09°

267.91°

6935.69'

7505.05'

14298'

89.48°

268.87°

6936.04'

7599.87'

14393'

88.83°

269.23°

6937.44'

7694.74'

14488'

90.22°

268.75°

6938.24'

7789.61'

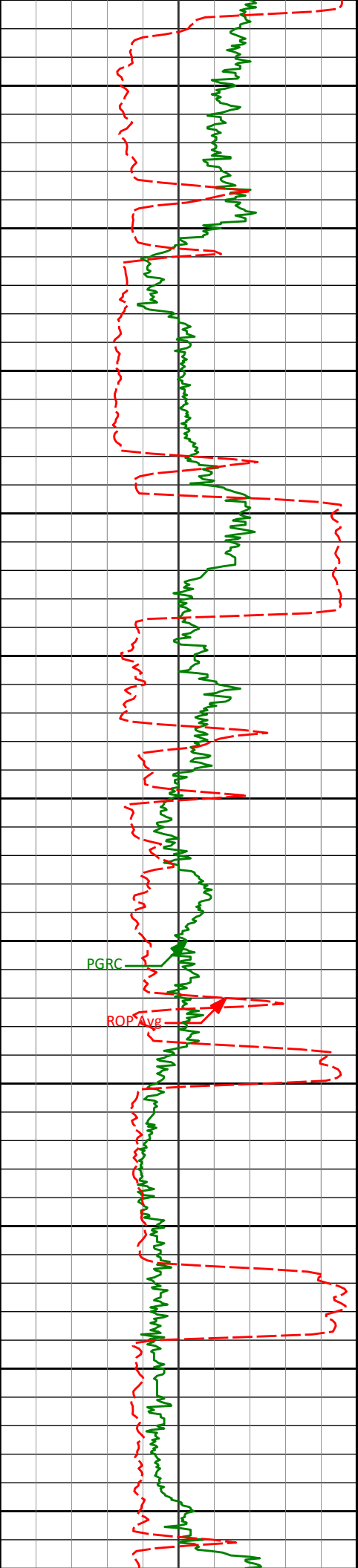
14583'

89.88°

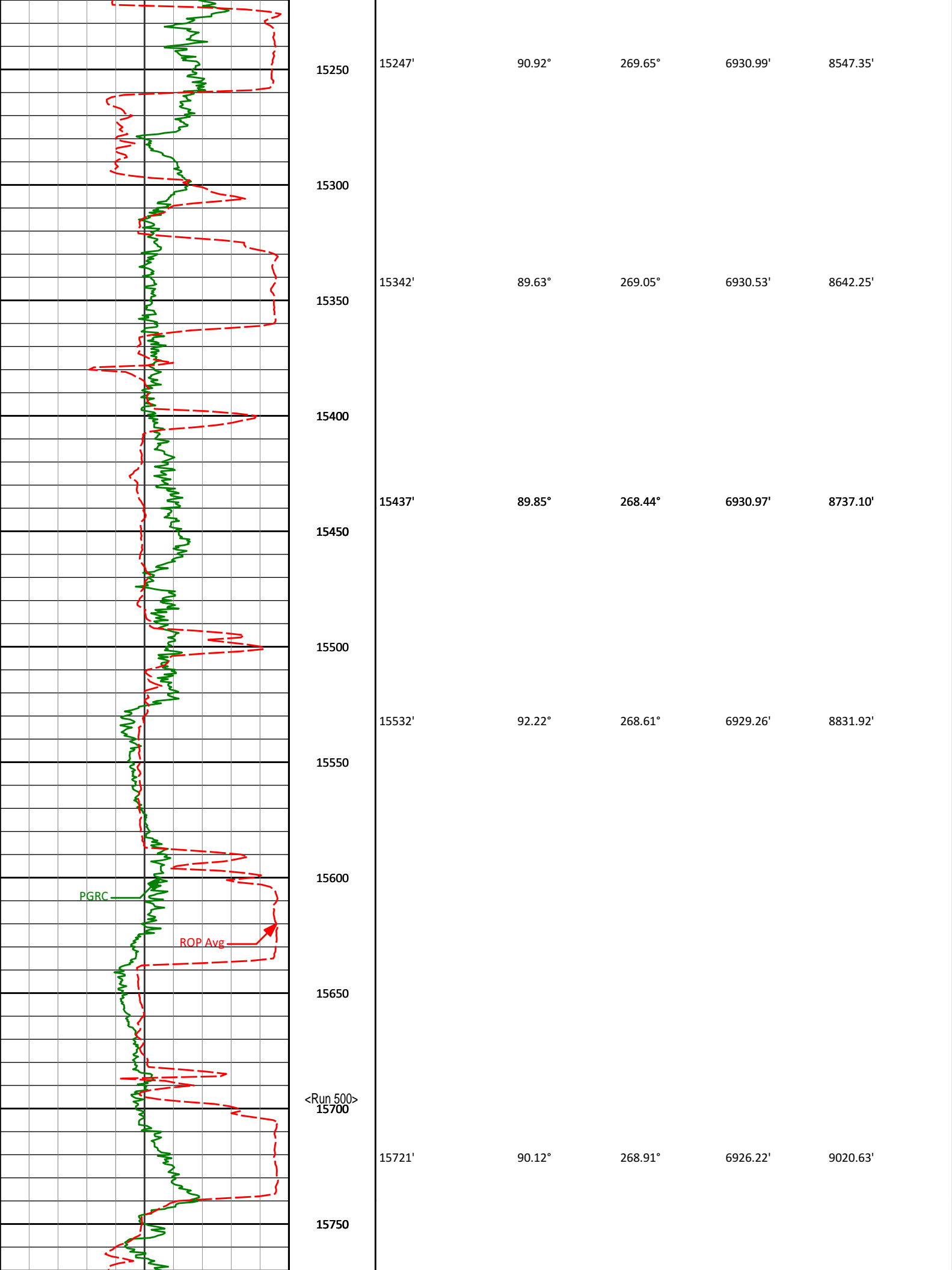
269.36°

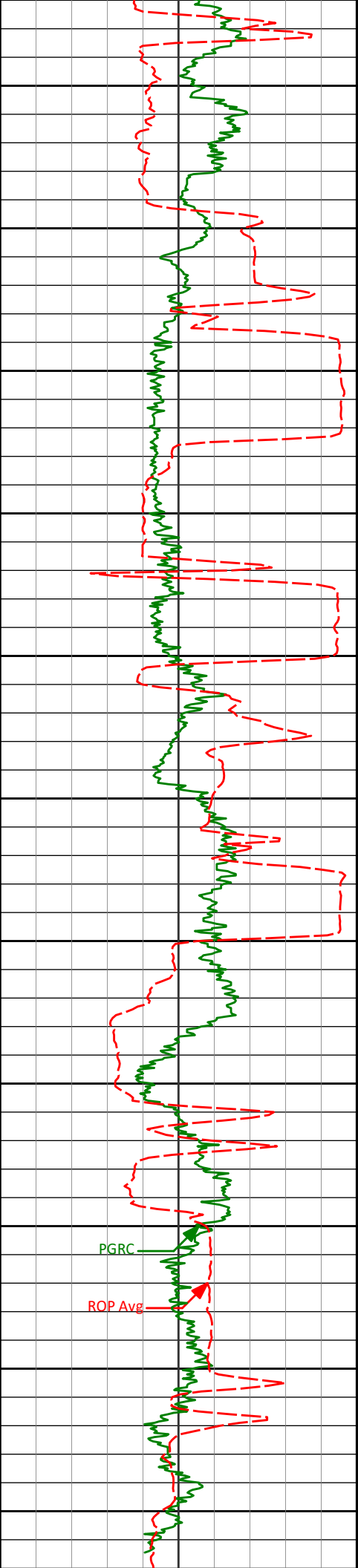
6938.16'

7884.49'



|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 14678' | 89.85° | 269.39° | 6938.38' | 7979.40' |
| 14700  |        |         |          |          |
| 14750  |        |         |          |          |
| 14773' | 91.39° | 268.67° | 6937.36' | 8074.27' |
| 14800  |        |         |          |          |
| 14850  |        |         |          |          |
| 14868' | 89.66° | 268.86° | 6936.49' | 8169.12' |
| 14900  |        |         |          |          |
| 14950  |        |         |          |          |
| 14962' | 90.25° | 267.71° | 6936.57' | 8262.93' |
| 15000  |        |         |          |          |
| 15050  |        |         |          |          |
| 15057' | 91.17° | 267.62° | 6935.39' | 8357.67' |
| 15100  |        |         |          |          |
| 15150  | 91.60° | 269.21° | 6933.09' | 8452.46' |
| 15200  |        |         |          |          |





15800

15816'

90.34°

269.15°

6925.83'

9115.50'

15850

15900

15911'

90.09°

269.14°

6925.48'

9210.39'

15950

16000

16006'

89.32°

271.80°

6925.96'

9305.35'

16050

16100

16101'

88.12°

270.80°

6928.08'

9400.32'

16150

16200

PGRC

ROP Avg

16250

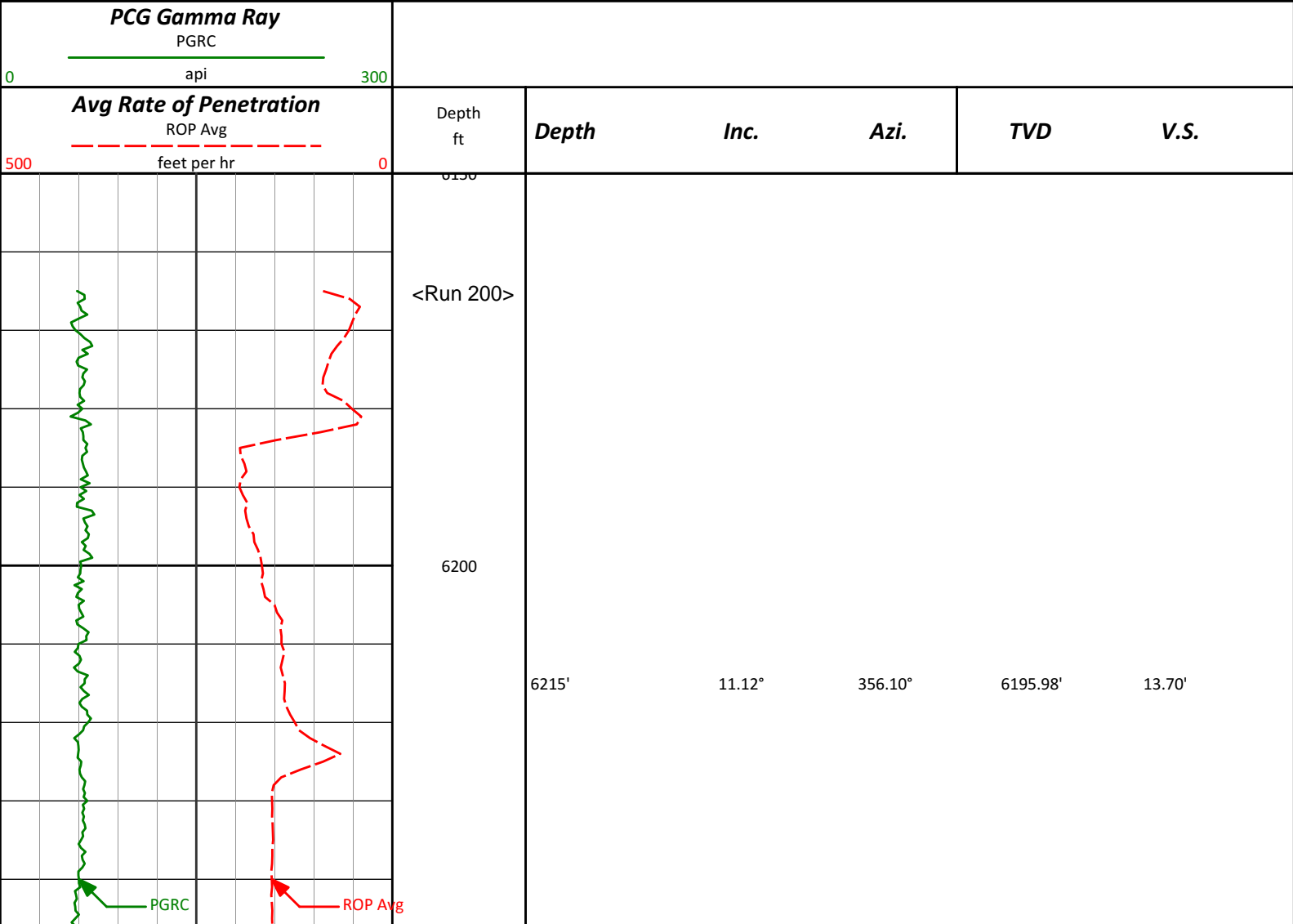
16300

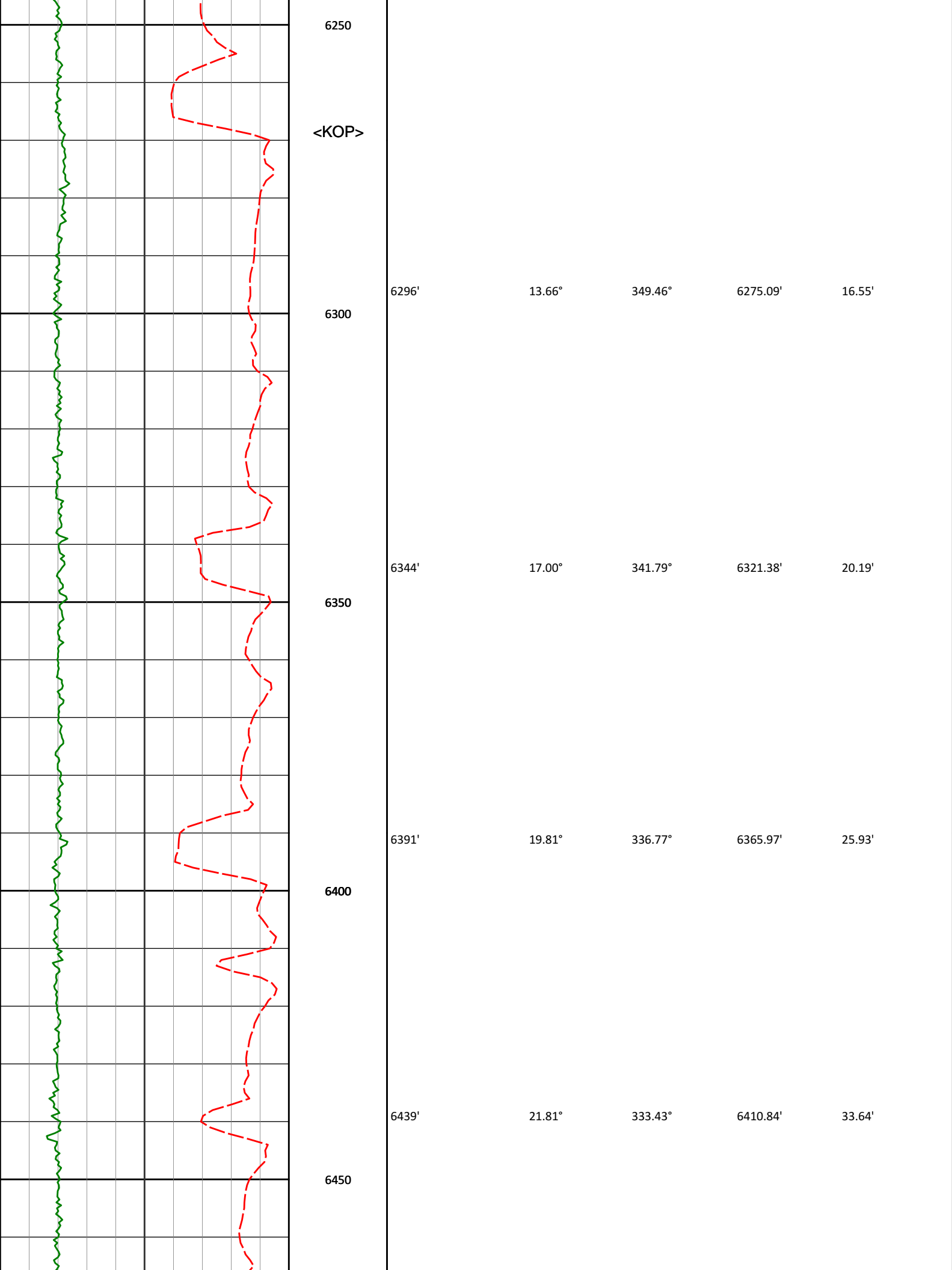


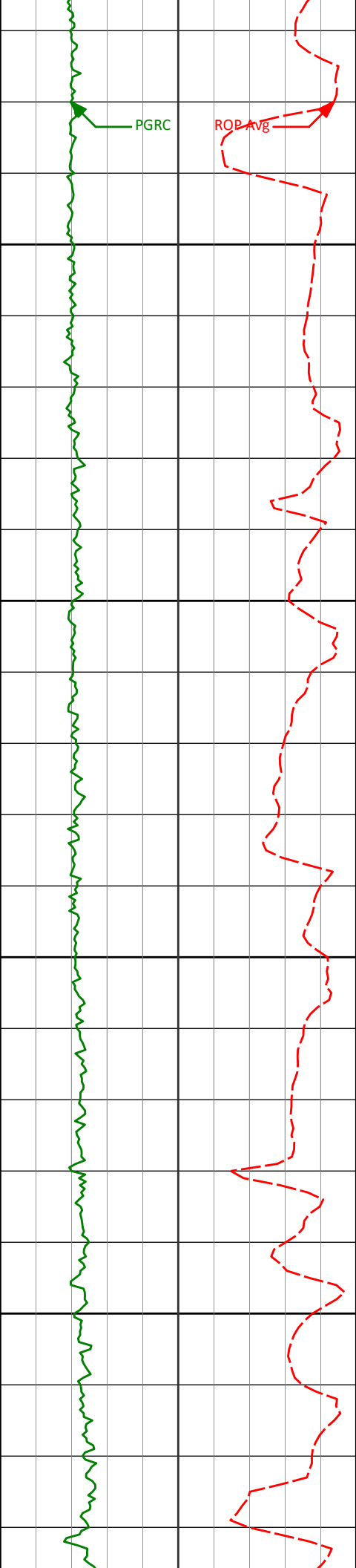
| Avg Rate of Penetration |             | Depth<br>ft | Depth | Inc. | Azi. | TVD | V.S. |
|-------------------------|-------------|-------------|-------|------|------|-----|------|
| ROP Avg                 |             |             |       |      |      |     |      |
| 500                     | feet per hr | 0           |       |      |      |     |      |
| PCG Gamma Ray           |             |             |       |      |      |     |      |
| PGRC                    |             |             |       |      |      |     |      |
| 0                       | api         | 300         |       |      |      |     |      |

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

Noble Energy, Inc  
Furrow State USX AB16-62-1HNL  
H&P 315  
T7N R64W

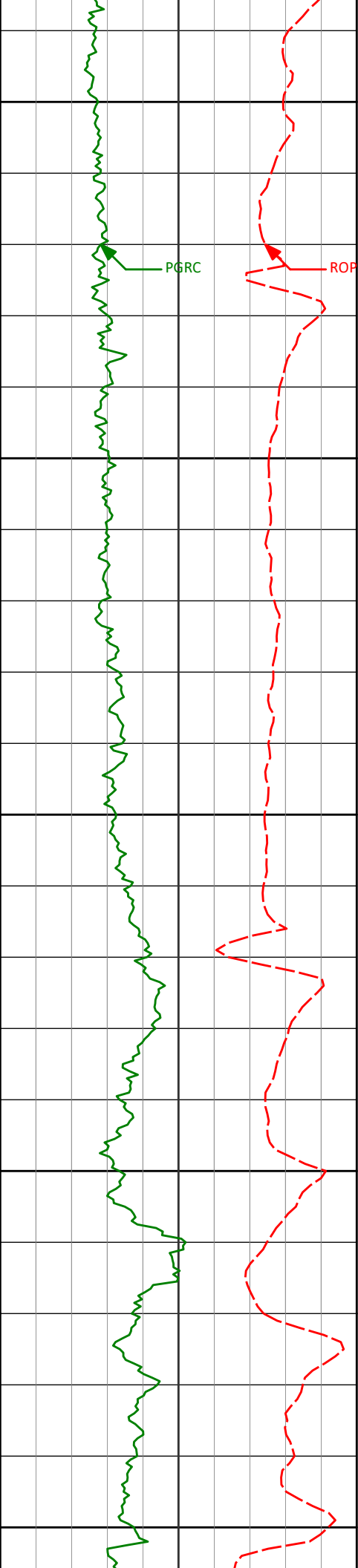






|       |        |         |          |         |
|-------|--------|---------|----------|---------|
| 6485' | 25.14° | 331.73° | 6453.03' | 42.63'  |
| 6533' | 29.25° | 326.90° | 6495.72' | 54.48'  |
| 6580' | 30.52° | 316.85° | 6536.49' | 69.52'  |
| 6628' | 33.09° | 308.61° | 6577.30' | 88.67'  |
| 6675' | 35.49° | 307.90° | 6616.13' | 109.99' |





6700

6723'

38.18°

302.75°

6654.55'

134.01'

6750

6770'

41.80°

297.85°

6690.56'

160.58'

6800

6818'

46.45°

293.75°

6725.02'

191.13'

6850

6865'

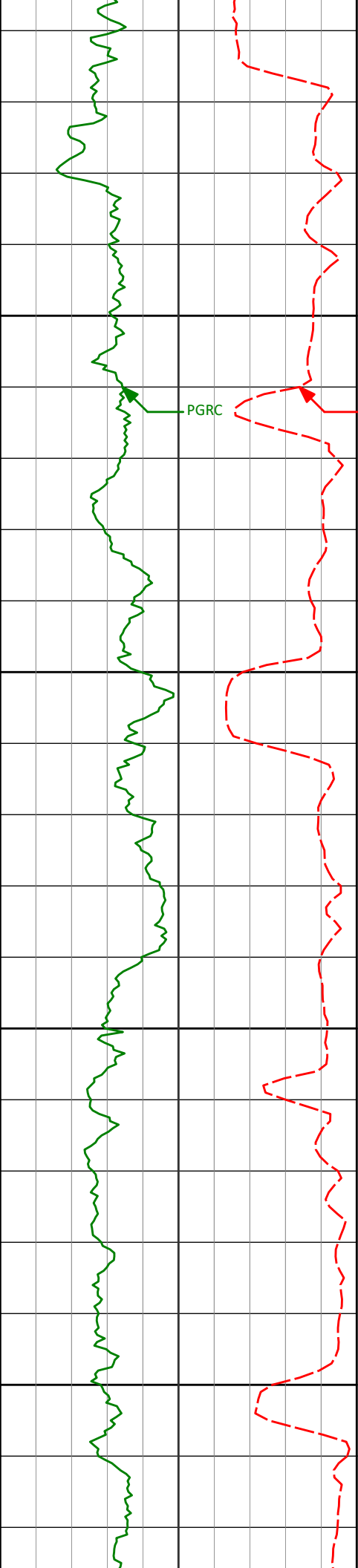
50.46°

289.72°

6756.19'

224.22'

6900



6950

7000

7050

7100

6913'

53.31°

286.32°

6785.82'

260.49'

6959'

56.75°

282.52°

6812.19'

297.28'

7007'

60.30°

281.08°

6837.25'

337.60'

7054'

65.18°

279.58°

6858.77'

378.92'

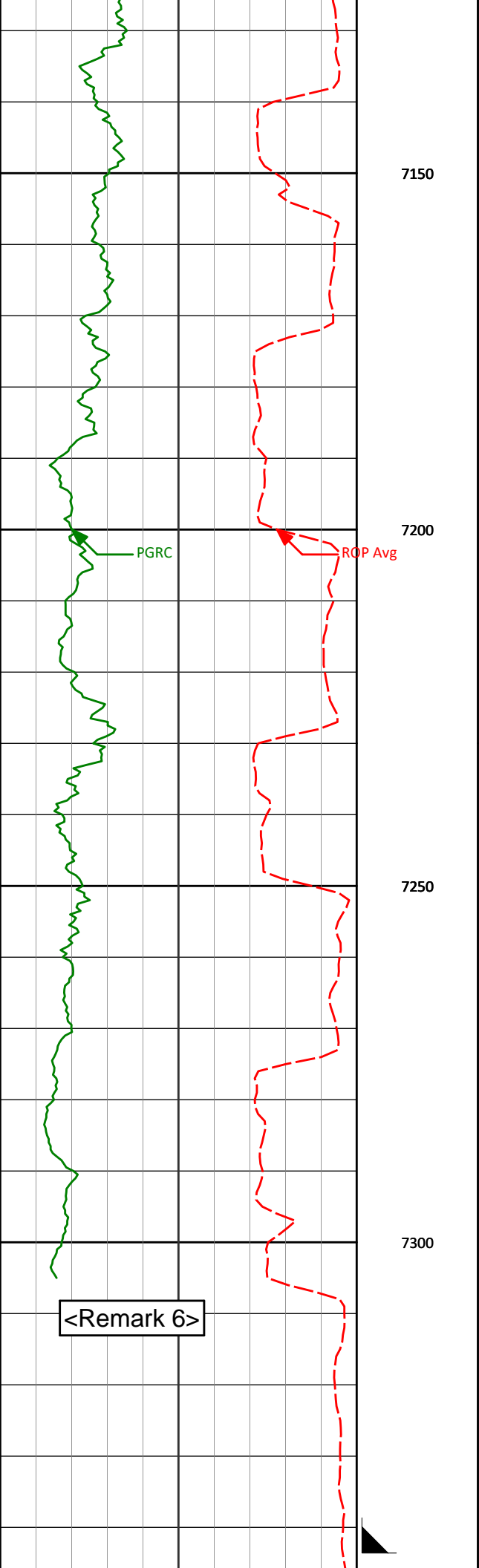
7102'

70.04°

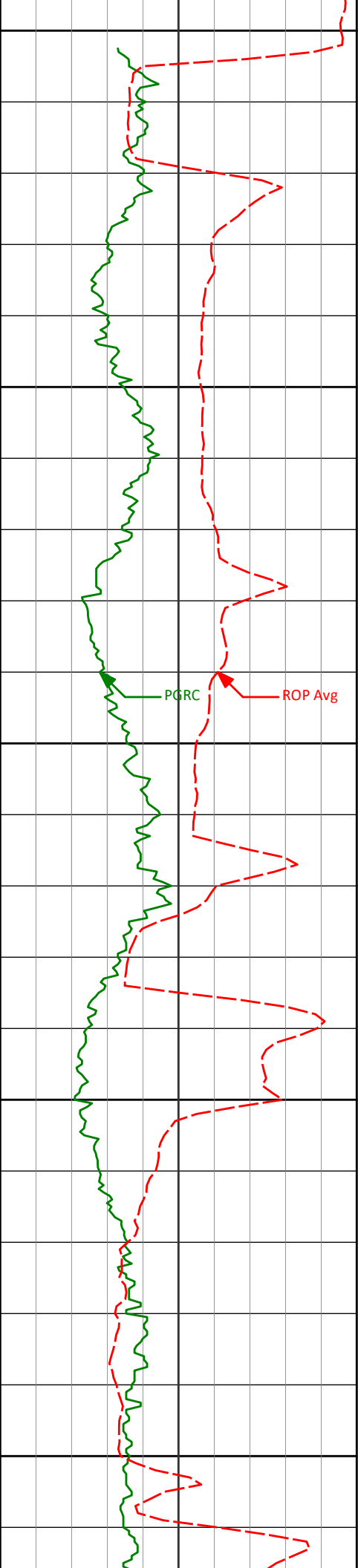
277.40°

6877.05'

422.99'



|                             |        |         |          |         |
|-----------------------------|--------|---------|----------|---------|
| 7149'                       | 73.80° | 276.40° | 6891.63' | 467.49' |
| 7197'                       | 76.20° | 275.55° | 6904.05' | 513.73' |
| 7244'                       | 79.33° | 275.45° | 6914.01' | 559.57' |
| 7298'                       | 82.60° | 274.32° | 6922.49' | 612.82' |
| <7" casing set at 7340' MD> |        |         |          |         |



7350  
<Run 300>

7400

7407'

87.11°

271.92°

6932.27'

721.32'

PGRC

ROP Avg

7450

7500

7502'

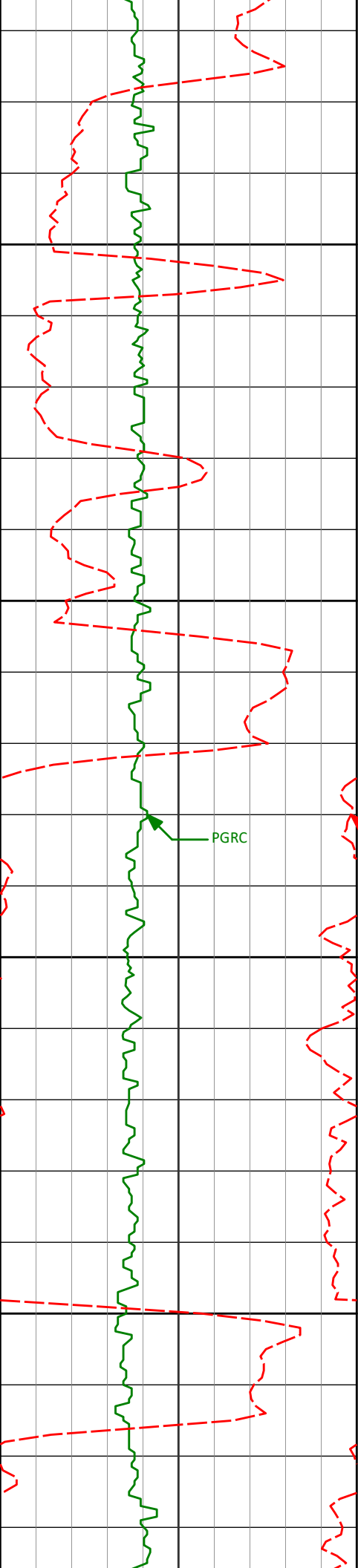
88.12°

270.70°

6936.22'

816.23'

7550



7600

7650

7700

7750

7596'

89.14°

269.32°

6938.47'

910.15'

7691'

89.17°

267.85°

6939.88'

1004.98'

7706'

89.25°

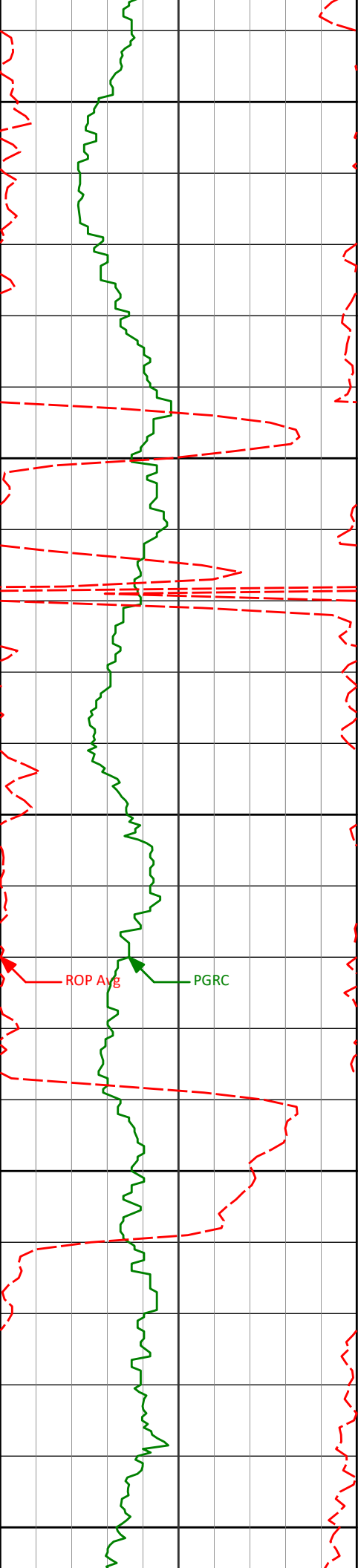
267.77°

6939.45'

1000.73'

PGRC

ROP Avg



7800

7850

7900

7950

8000

7881'

91.97°

266.85°

6936.69'

1194.38'

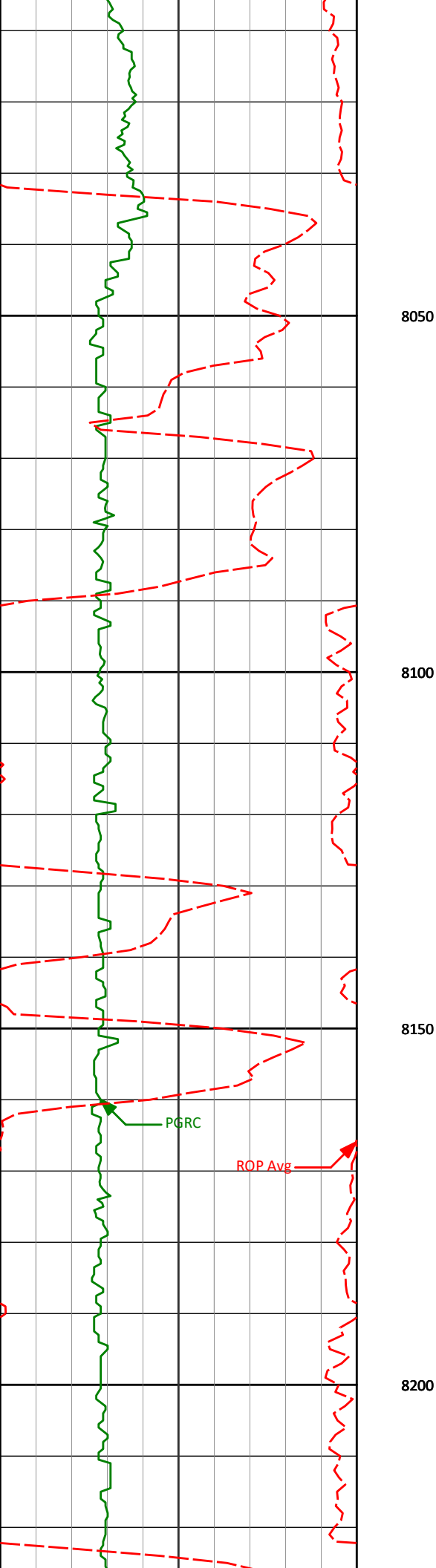
7976'

92.28°

267.93°

6933.17'

1289.02'



8071'

91.08°

269.60°

6930.39'

1383.83'

8050

8100

8150

8166'

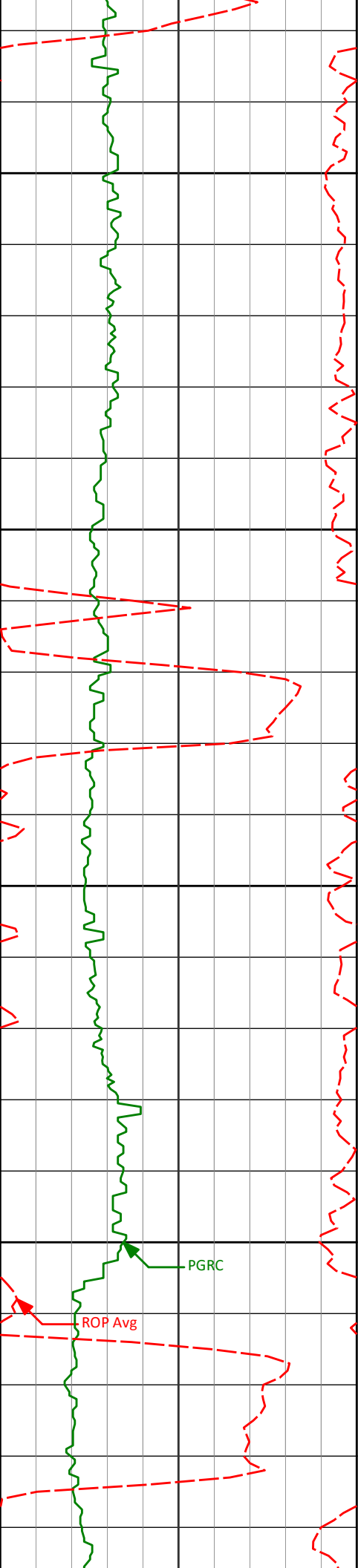
89.54°

268.37°

6929.88'

1478.70'

8200



8250

8261'

89.94°

267.97°

6930.31'

1573.50'

8300

8350

8356'

90.77°

268.86°

6929.73'

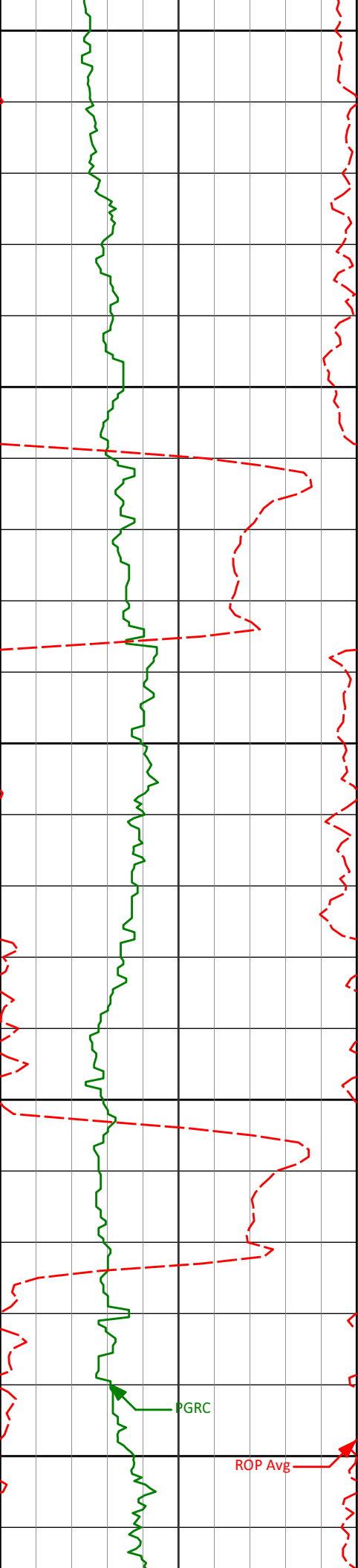
1668.32'

8400

PGRC

ROP Avg





8450

8500

8550

8600

8650

8451'

91.17°

269.55°

6928.11'

1763.20'

8546'

90.55°

269.91°

6926.68'

1858.12'

8641'

90.46°

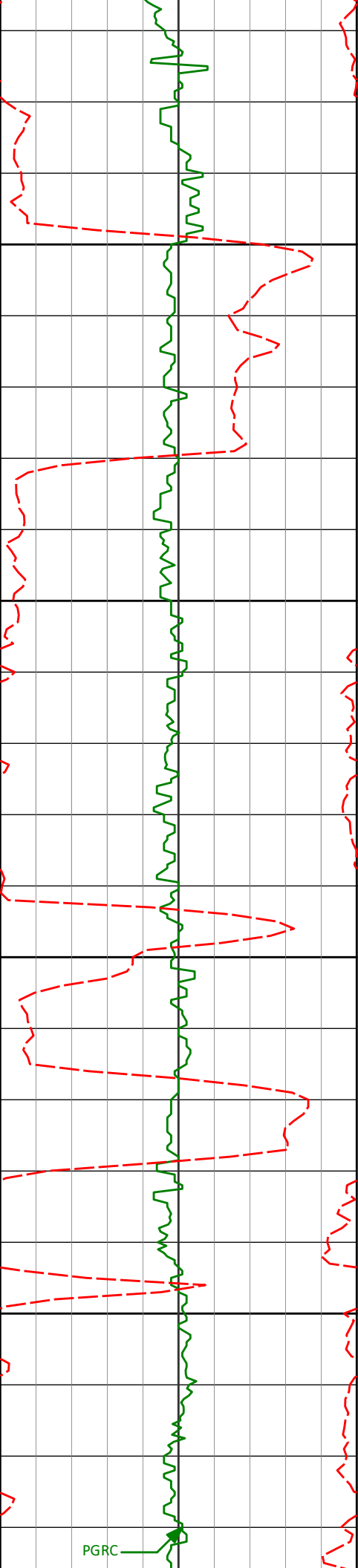
270.42°

6925.84'

1953.08'

GRC

ROP Avg



8700

8736'

89.04°

269.24°

6926.25'

2048.01'

8750

8800

8831'

88.12°

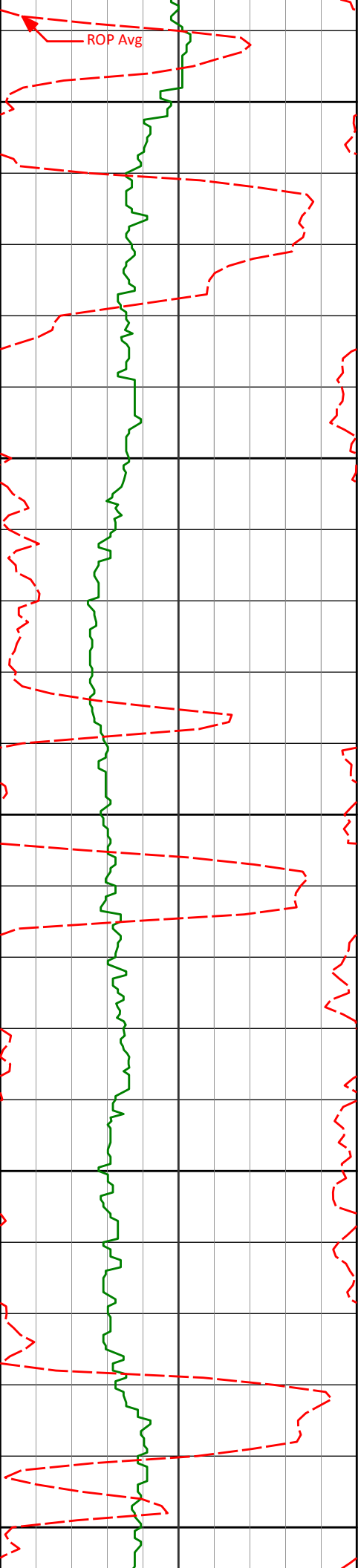
269.21°

6928.60'

2142.88'

8850

PGRC



8900

8926'

89.04°

269.38°

6930.95'

2237.75'

8950

9000

9020'

89.39°

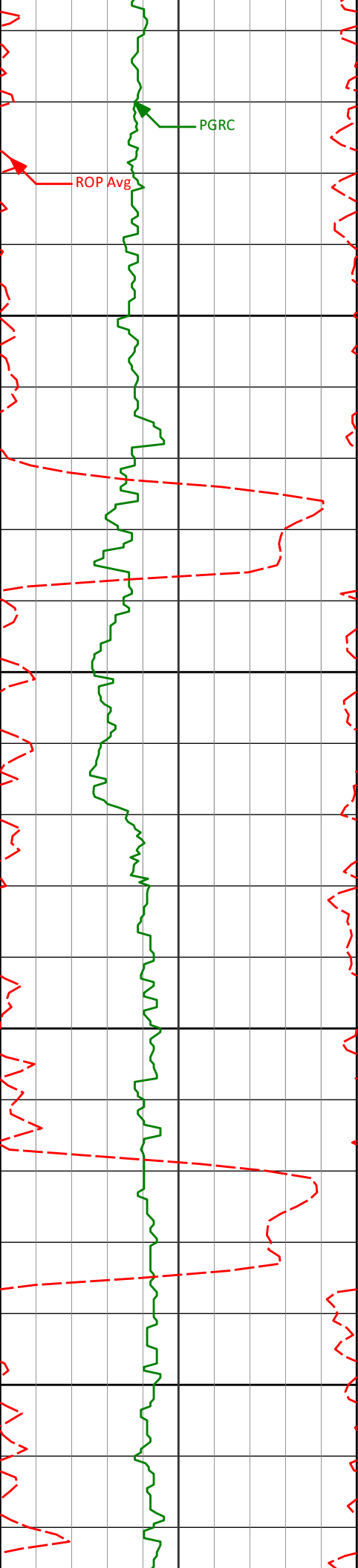
268.79°

6932.24'

2331.62'

9050

9100



9115'

90.00°

268.95°

6932.75'

2426.49'

PGRC

ROP Avg

9150

9200

9210'

89.97°

269.20°

6932.78'

2521.37'

9250

9300

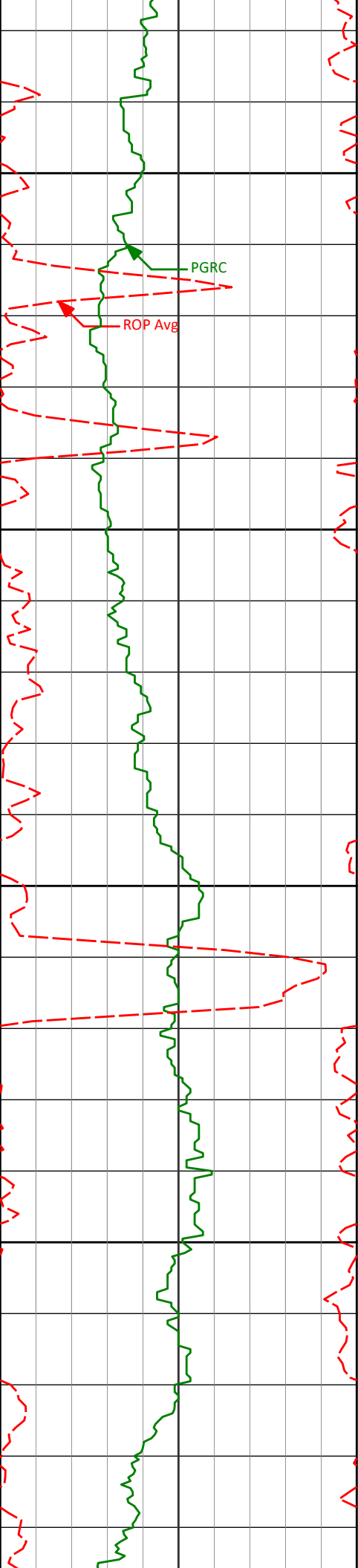
9305'

89.20°

267.55°

6933.47'

2616.19'



9350

PGRC

ROP Avg

9400

9400'

90.22°

267.76°

6933.95'

2710.93'

9450

9495'

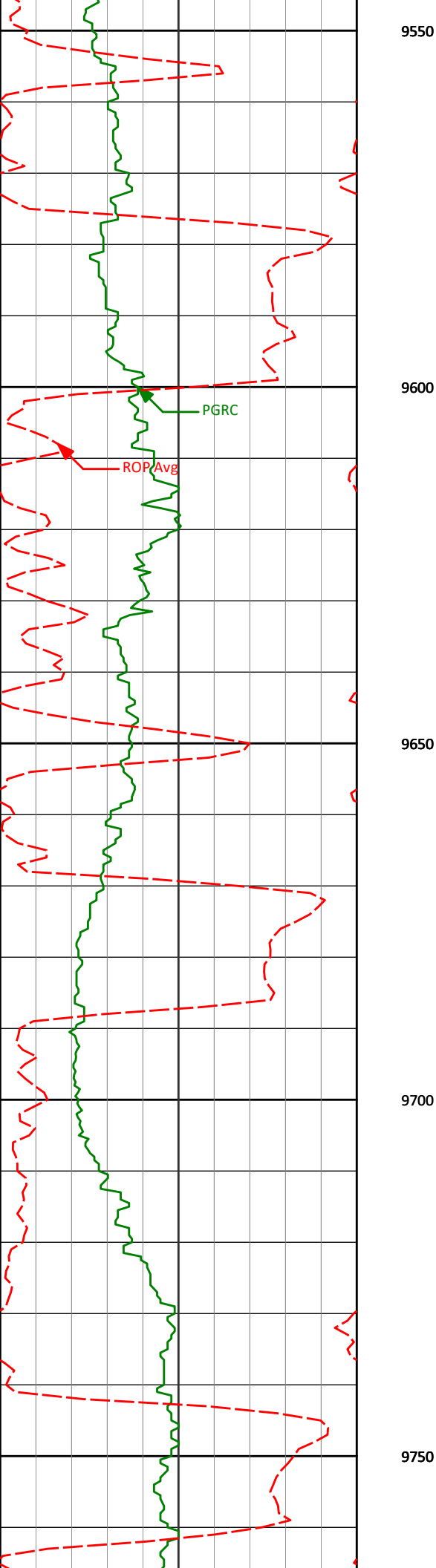
90.80°

267.98°

6933.11'

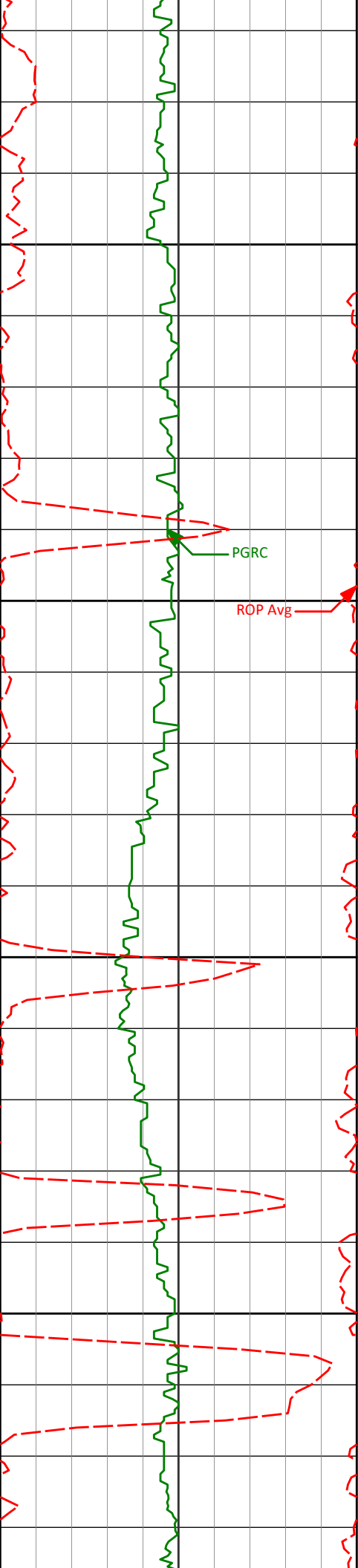
2805.69'

9500



|       |        |         |          |          |
|-------|--------|---------|----------|----------|
| 9590' | 90.71° | 267.39° | 6931.86' | 2900.42' |
|-------|--------|---------|----------|----------|

|       |        |         |          |          |
|-------|--------|---------|----------|----------|
| 9685' | 90.19° | 267.92° | 6931.12' | 2995.16' |
|-------|--------|---------|----------|----------|



9800

9850

9900

9950

9780'

89.23°

268.68°

6931.60'

3089.97'

9875'

89.29°

268.14°

6932.83'

3184.78'

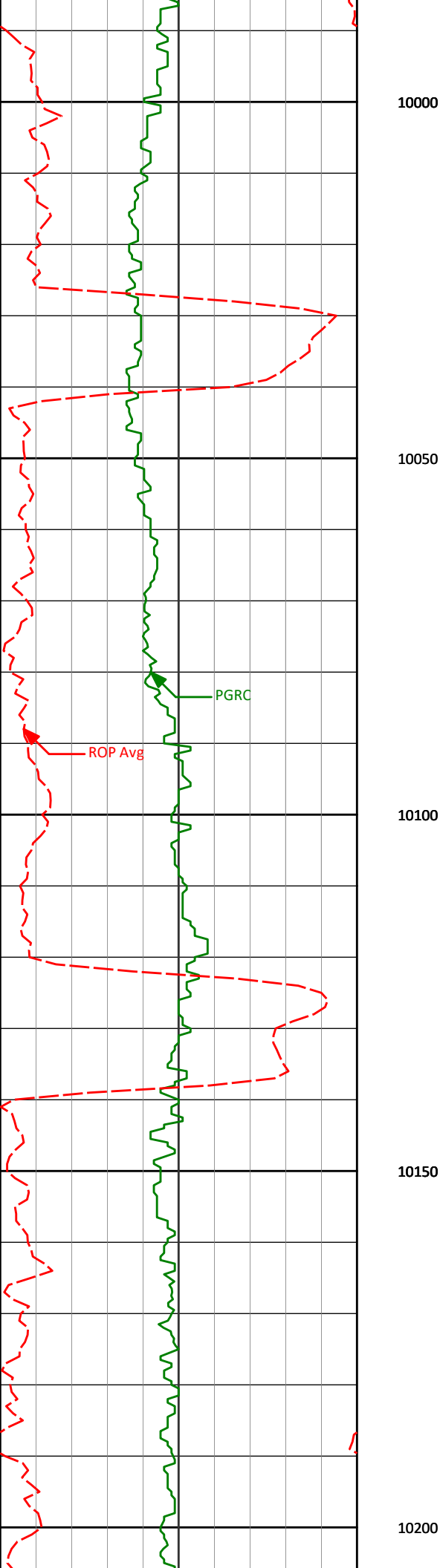
9970'

90.31°

268.68°

6933.16'

3279.60'



10065'

90.56°

269.42°

6932.44'

3374.48'

10160'

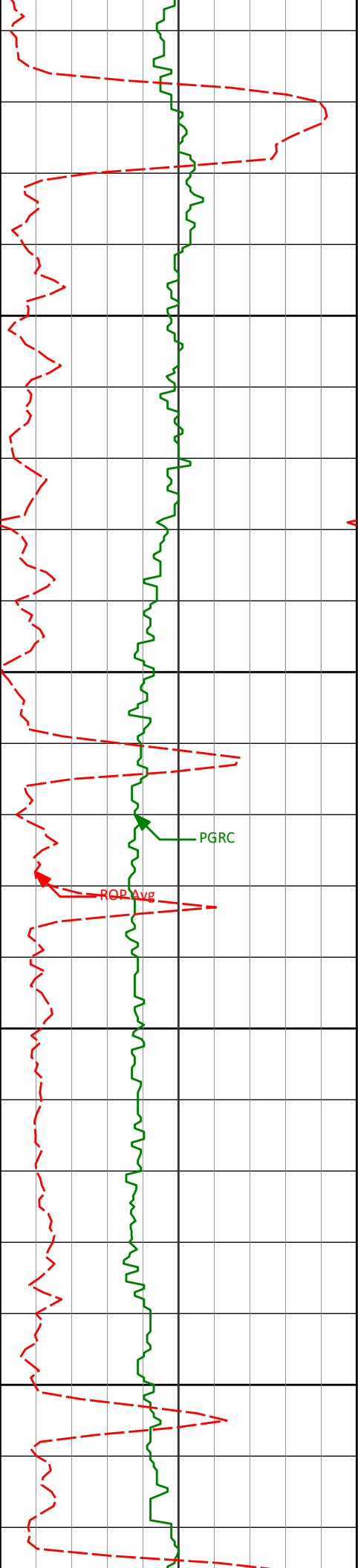
90.06°

269.74°

6931.93'

3469.40'





10250

10252'

88.40°

269.28°

6933.17'

3561.31'

10300

PGRC

ROP Avg

10350

10345'

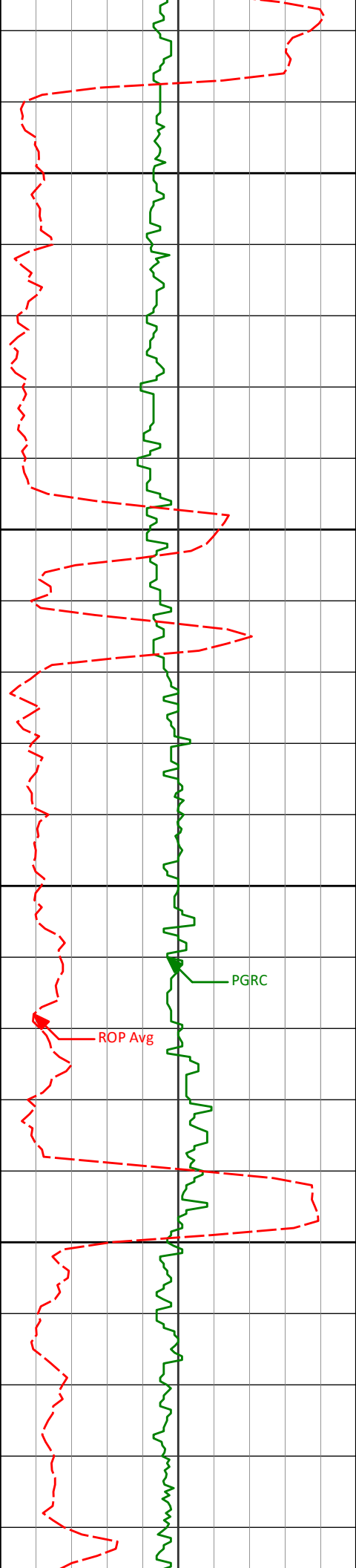
89.75°

269.39°

6934.67'

3654.20'

10400



10438'

89.72°

269.58°

6935.10'

3747.12'

10450

10500

10531'

90.03°

269.51°

6935.29'

3840.04'

10550

PGRC

ROP Avg

10600

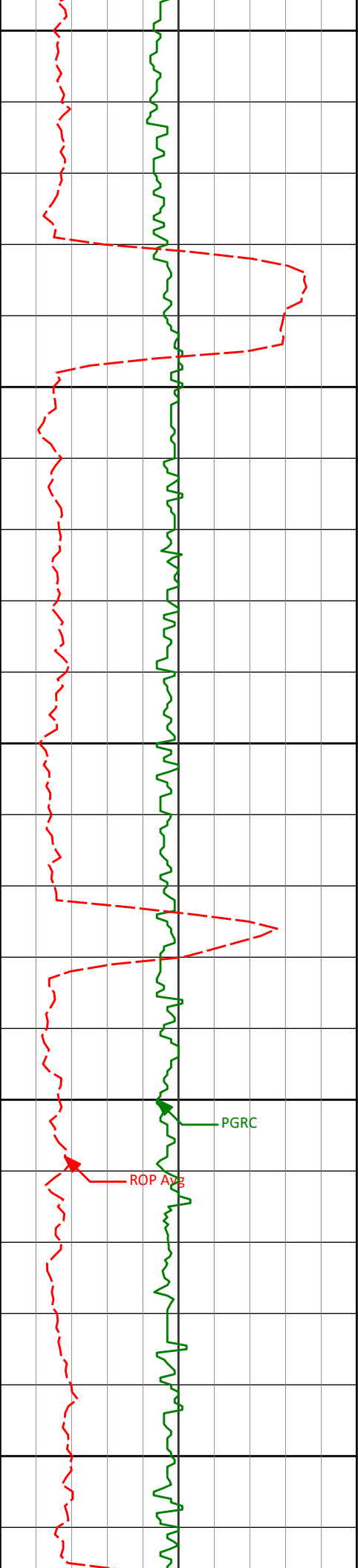
10624'

90.62°

269.97°

6934.77'

3932.97'



10650

10700

10750

10800

10850

10716'

89.75°

269.60°

6934.47'

4024.91'

10808'

89.72°

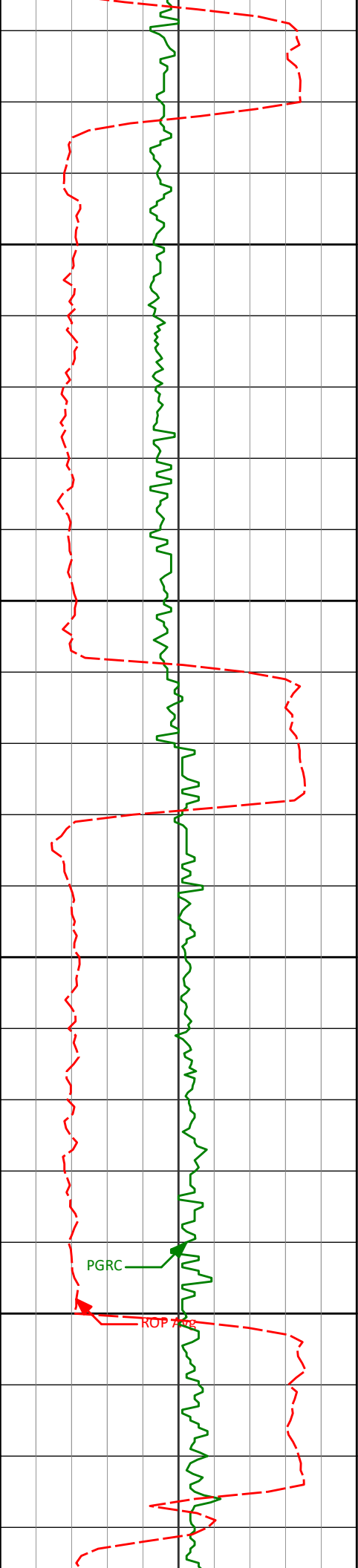
267.23°

6934.89'

4116.73'

ROP Avg

PGRC



10900

10950

11000

11050

10901'

10994'

89.78°

90.00°

266.85°

266.92°

6935.29'

6935.47'

4209.39'

4302.04'

PGRC

ROP 7/22

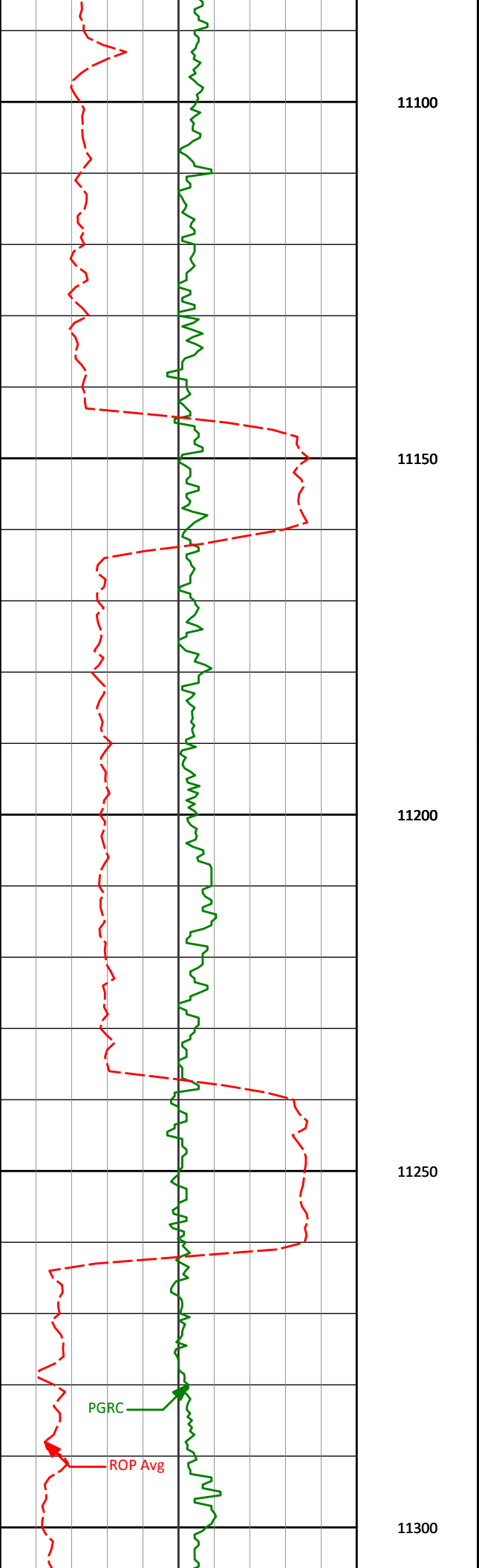
11096'

89.77°

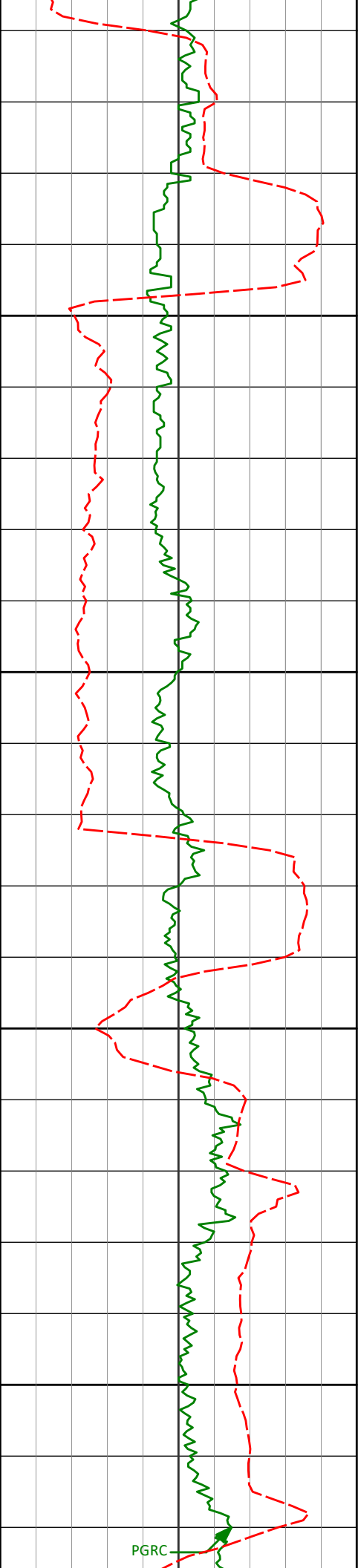
266.52°

6934.95'

4202.64'



|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 11086' | 90.77° | 269.53° | 6934.85' | 4393.84' |
| 11180' | 90.59° | 270.48° | 6933.74' | 4487.78' |
| 11273' | 89.14° | 269.82° | 6933.96' | 4580.73' |



11350

11365'

88.86°

269.64°

6935.57'

4672.65'

11400

11450

11458'

89.72°

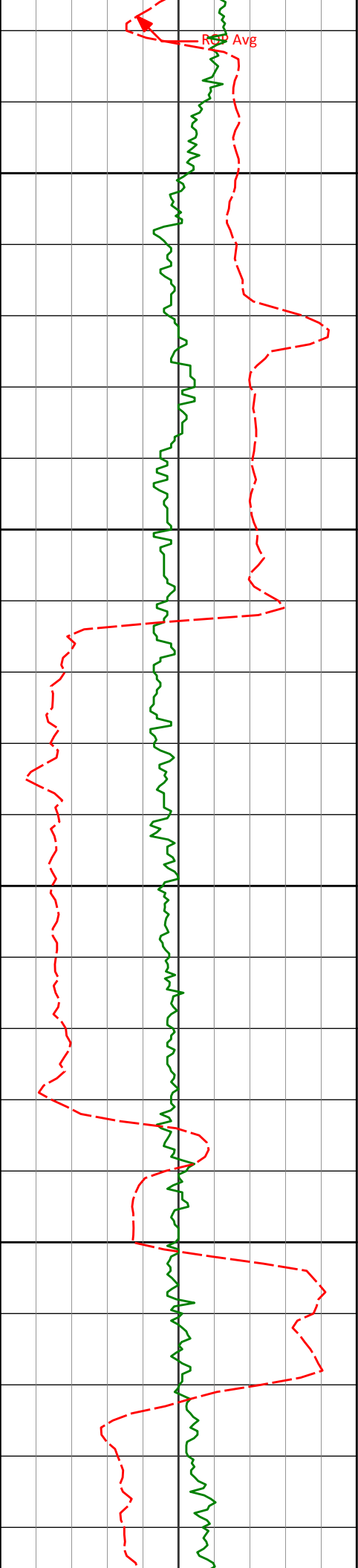
268.25°

6936.72'

4765.52'

11500

PGRC



11550

11550'

90.56°

267.73°

6936.50'

4857.30'

11600

11643'

90.22°

267.82°

6935.87'

4950.06'

11650

11700

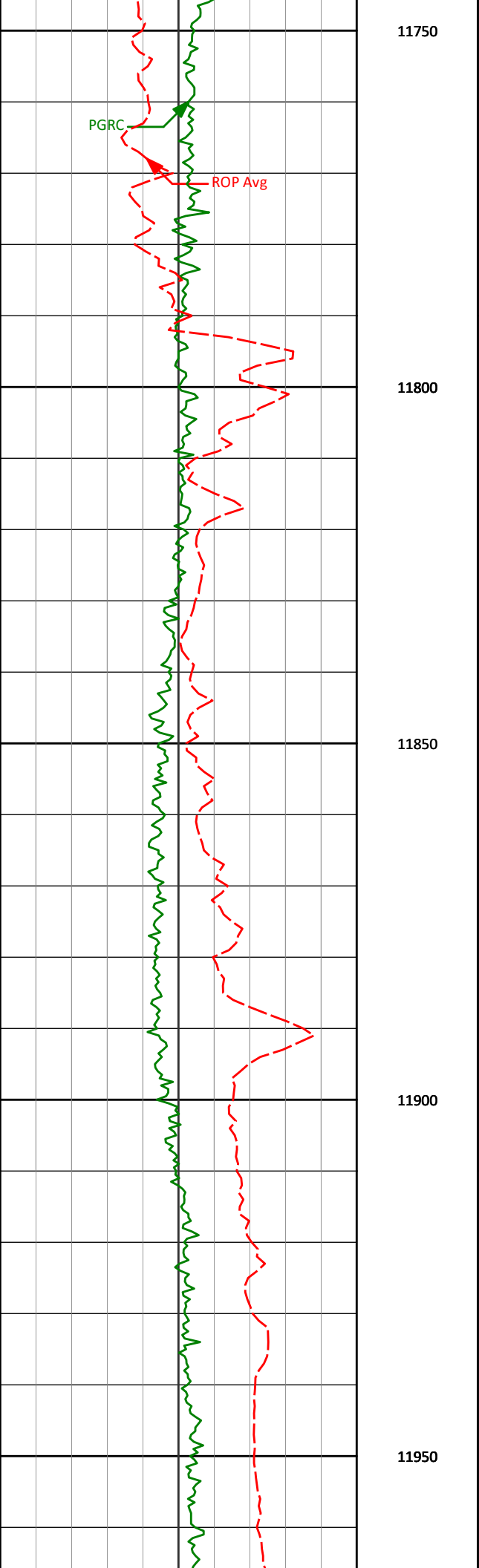
11736'

89.47°

268.59°

6936.12'

5042.86'



11831'

90.09°

268.61°

6936.48'

5137.70'

11926'

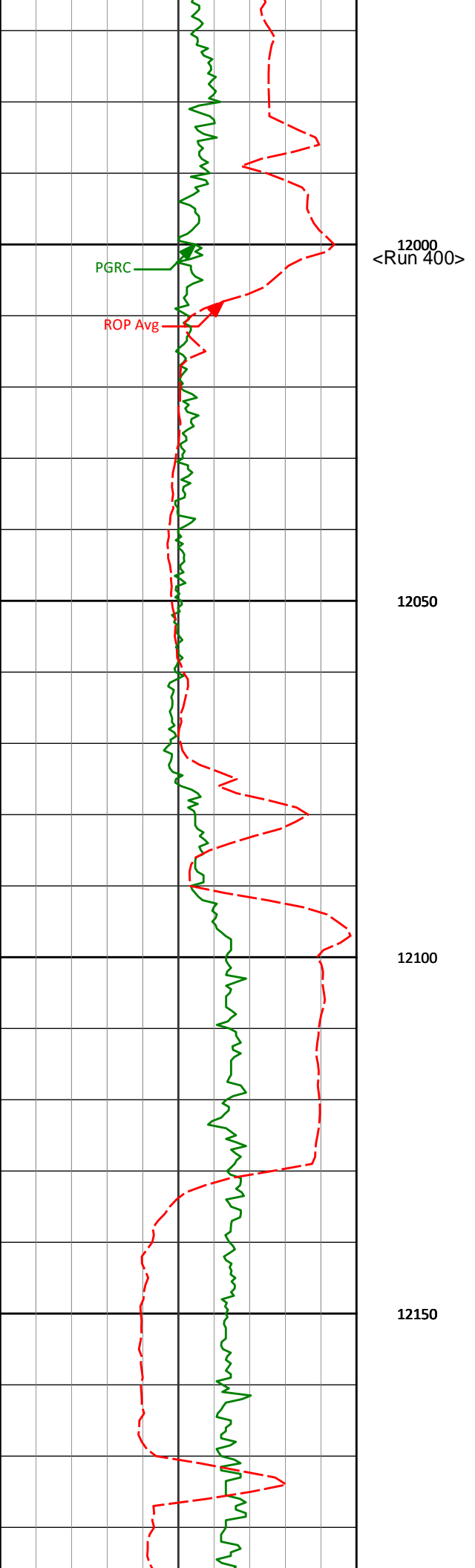
90.59°

268.05°

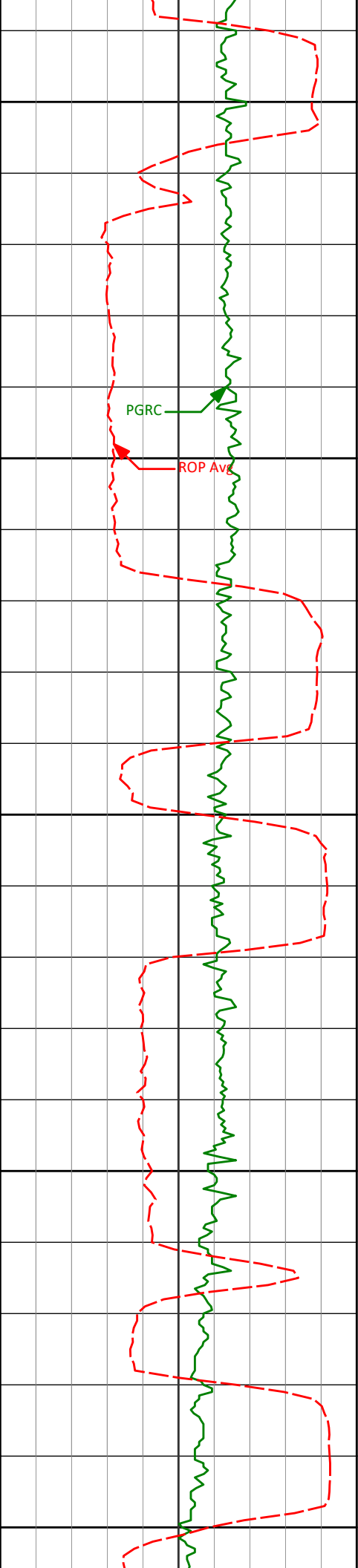
6935.92'

5232.52'





|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 12020' | 91.91° | 268.62° | 6933.87' | 5326.31' |
| 12050  |        |         |          |          |
| 12100  |        |         |          |          |
| 12115' | 91.70° | 268.10° | 6930.88' | 5421.08' |
| 12150  |        |         |          |          |



12200

12210'

89.97°

264.95°

6929.49'

5515.64'

12250

12300

12305'

89.78°

266.56°

6929.70'

5610.09'

12350

12400

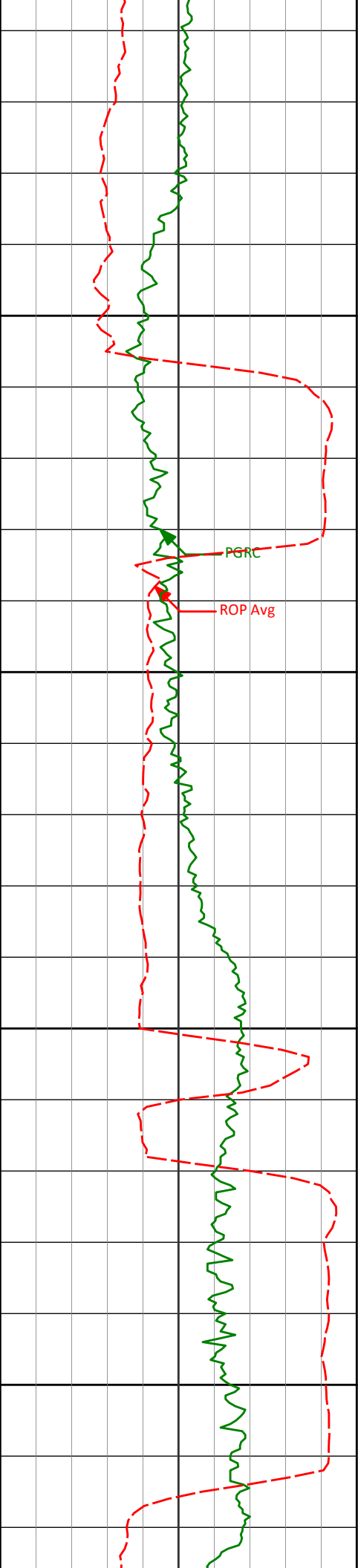
12400'

91.17°

268.57°

6928.91'

5704.81'



12450

PGRC

ROP Avg

12500

12550

12600

12495'

90.71°

268.42°

6927.35'

5799.63'

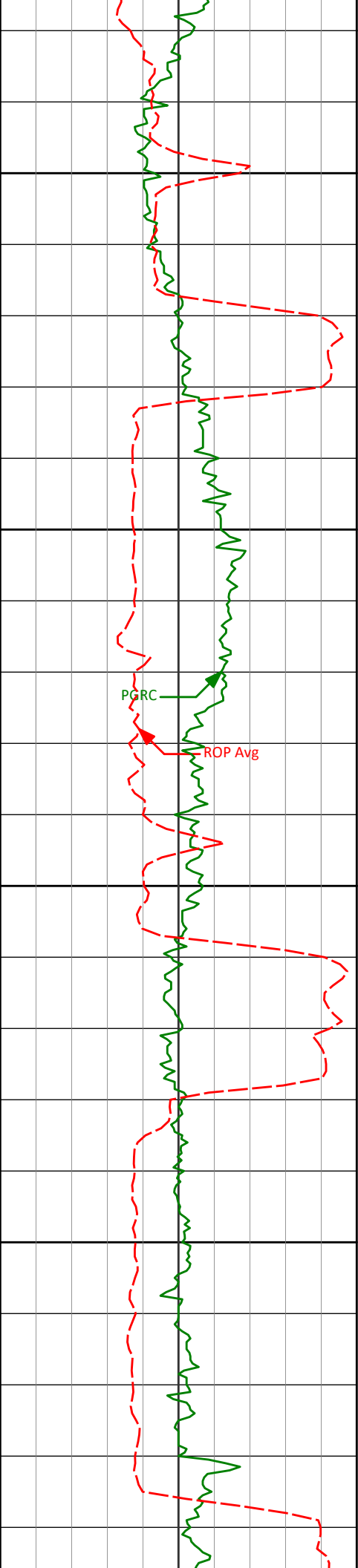
12590'

90.52°

269.49°

6926.32'

5894.49'



12650

12700

12750

12800

12685'

88.89°

269.08°

6926.81'

5989.39'

12780'

89.11°

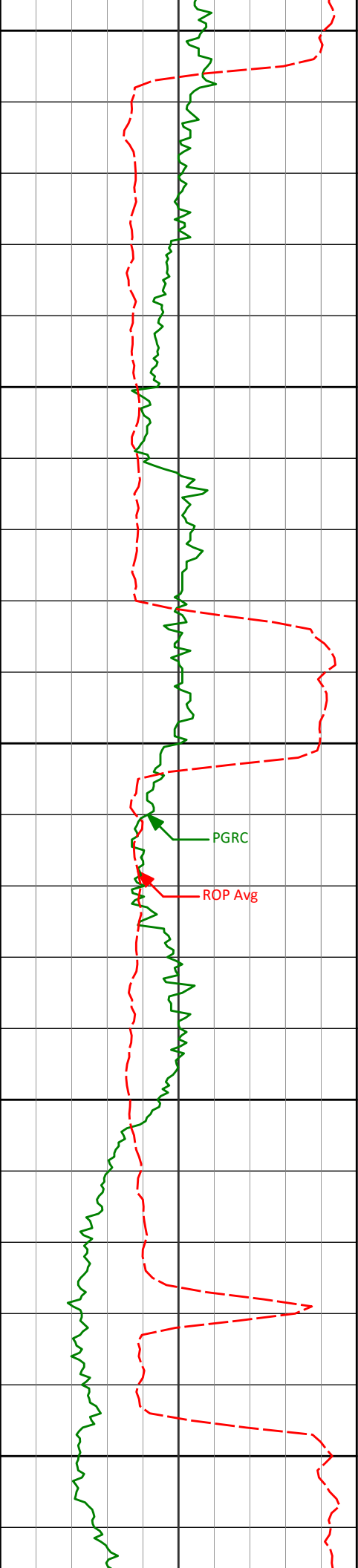
269.69°

6928.47'

6084.28'

PGRC

ROP Avg



12850

12875'

89.82°

270.13°

6929.36'

6179.22'

12900

12950

PGRC

ROP Avg

12970'

90.22°

270.60°

6929.34'

6274.19'

13000

13050

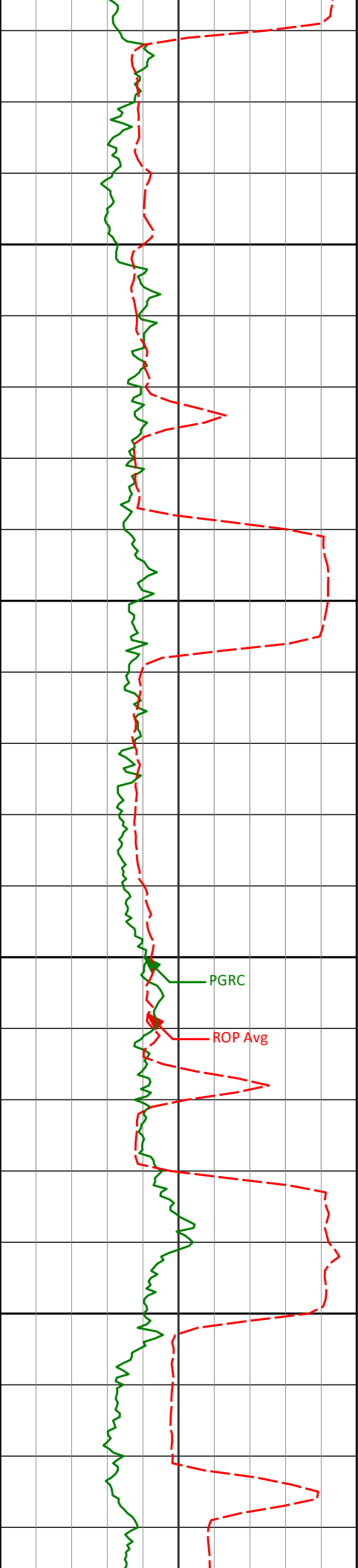
13064'

89.69°

270.24°

6929.41'

6368.16'



13100

13150

13200

13250

PGRC

ROP Avg

13159'

89.91°

271.04°

6929.75'

6463.13'

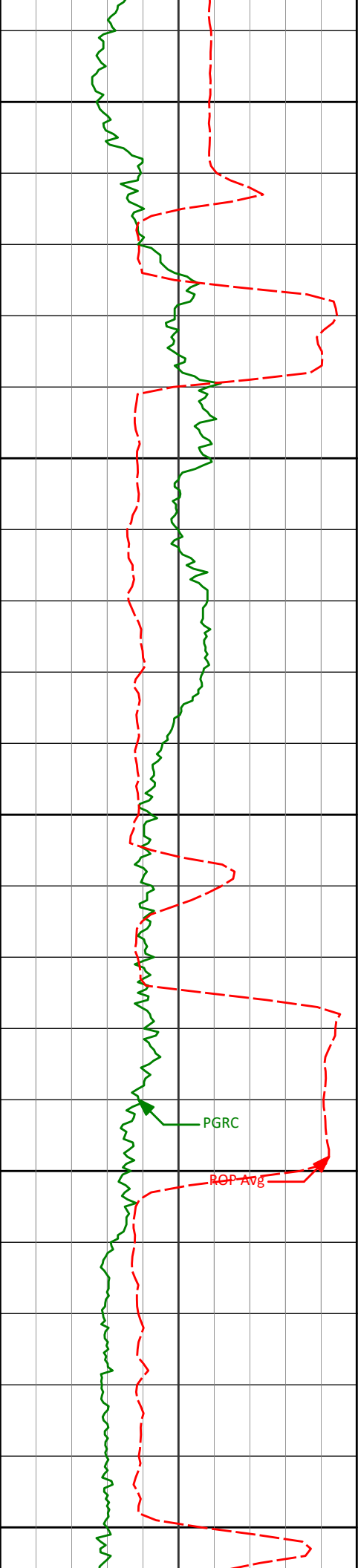
13254'

90.00°

270.11°

6929.82'

6558.10'



13300

13350

13400

13450

13500

13349'

90.06°

268.40°

6929.77'

6653.00'

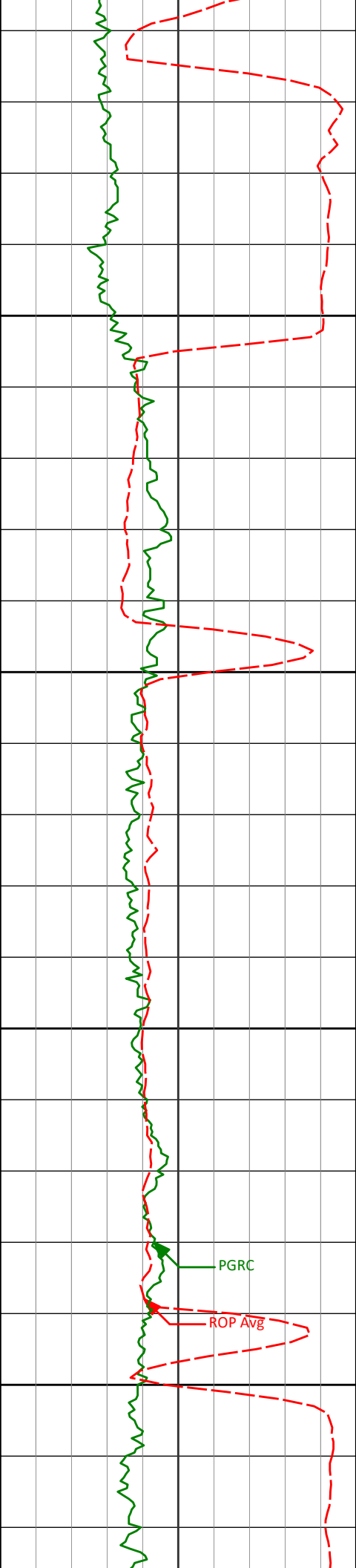
13444'

90.71°

268.63°

6929.13'

6747.83'



13550

13600

13650

13700

13539'

90.09°

269.92°

6928.47'

6842.73'

13634'

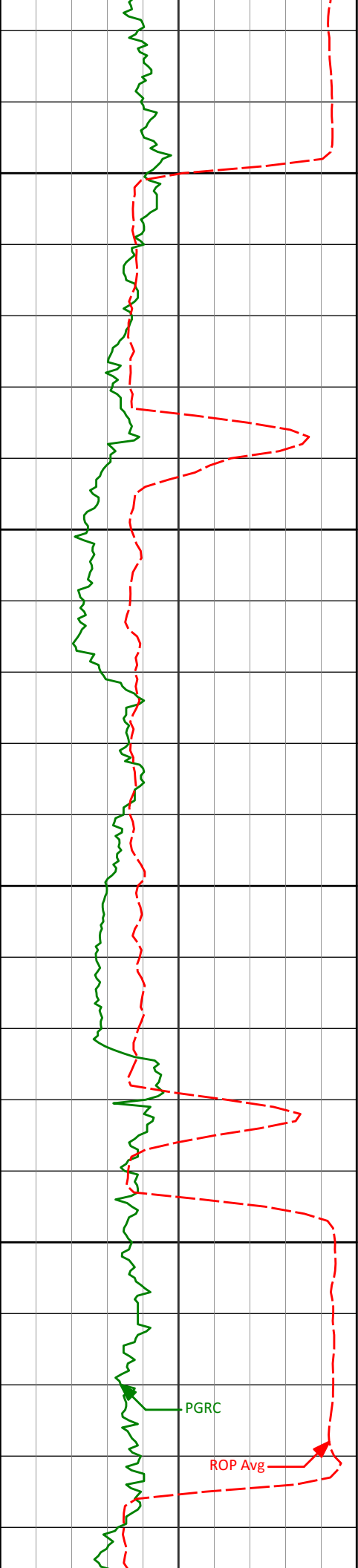
91.14°

268.86°

6927.45'

6937.63'





13750

13800

13850

13900

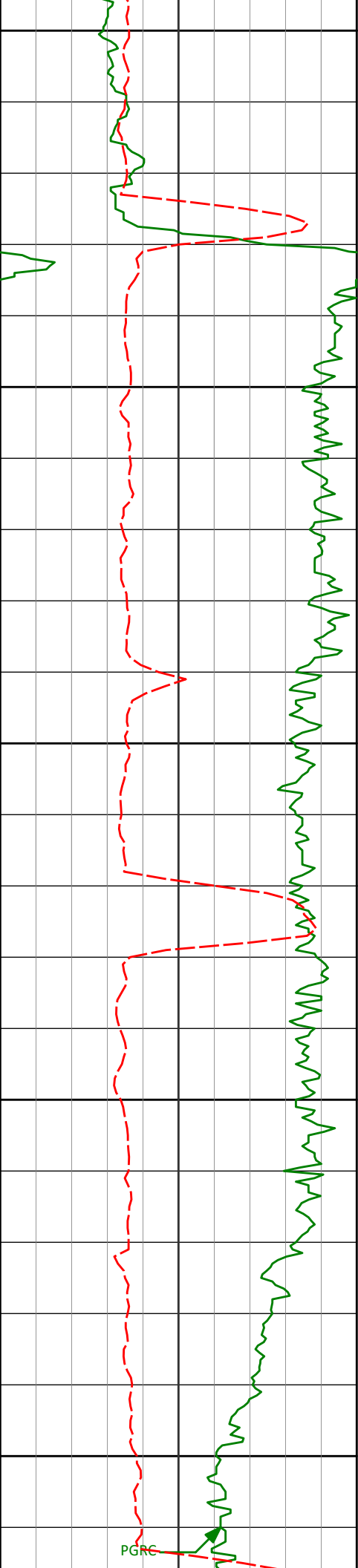
PGRC

ROP Avg

13728' 89.35° 269.03° 6927.04' 7031.50'

13823' 89.08° 268.19° 6928.35' 7126.33'

13918' 87.65° 267.51° 6931.06' 7221.05'



13950

14000

14050

14100

14150

14013'

88.77°

267.34°

6934.02'

7315.72'

14108'

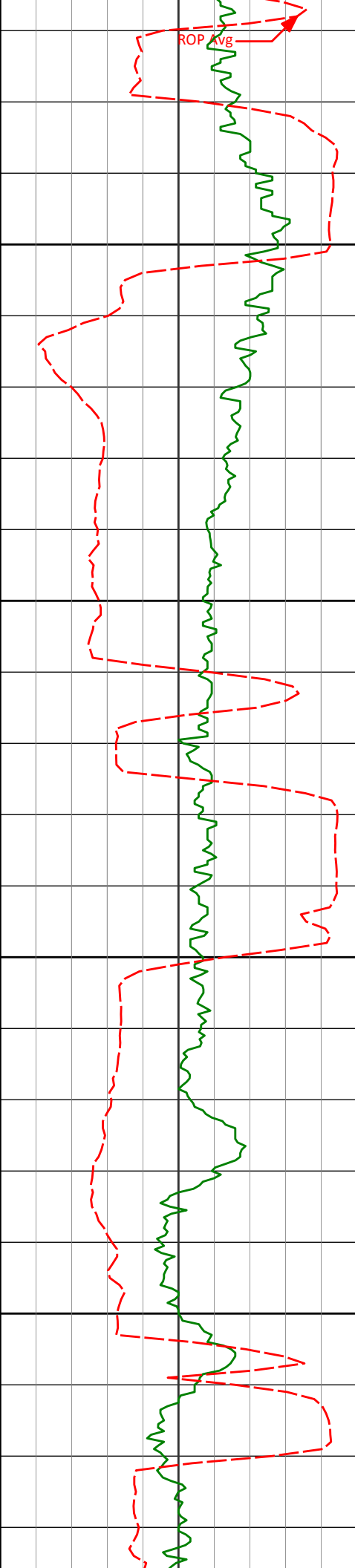
89.57°

266.68°

6935.41'

7410.36'

PGRC



14200

14203'

90.09°

267.91°

6935.69'

7505.05'

14250

14300

14298'

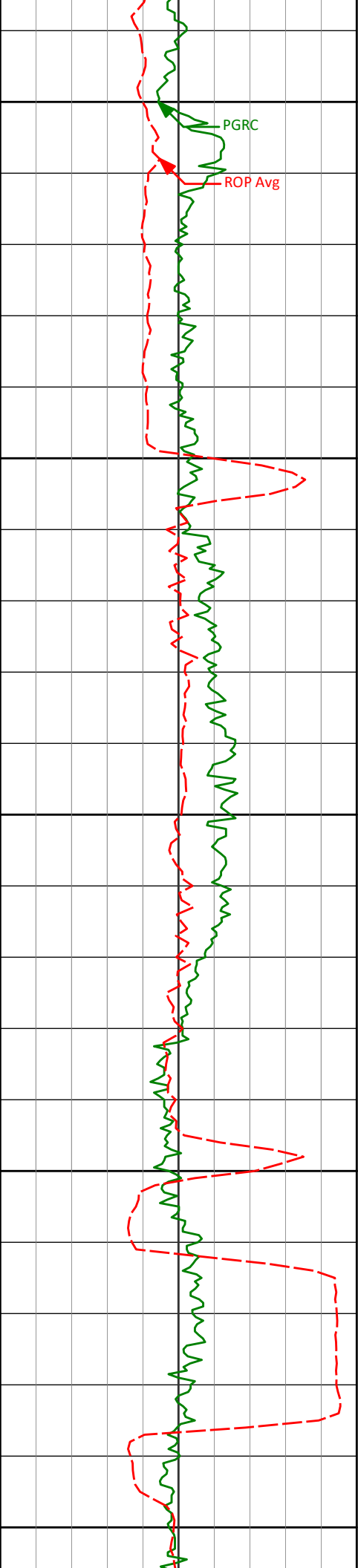
89.48°

268.87°

6936.04'

7599.87'

14350



14393'

88.83°

269.23°

6937.44'

7694.74'

14400

PGRC

ROP Avg

14450

14488'

90.22°

268.75°

6938.24'

7789.61'

14500

14550

14583'

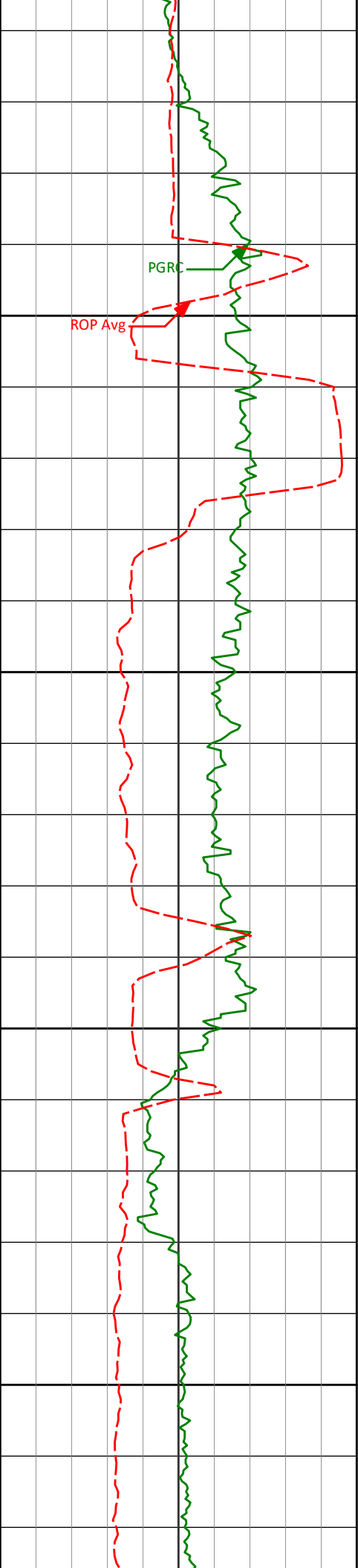
89.88°

269.36°

6938.16'

7884.49'

14600



14650

14700

14750

14800

14678'

89.85°

269.39°

6938.38'

7979.40'

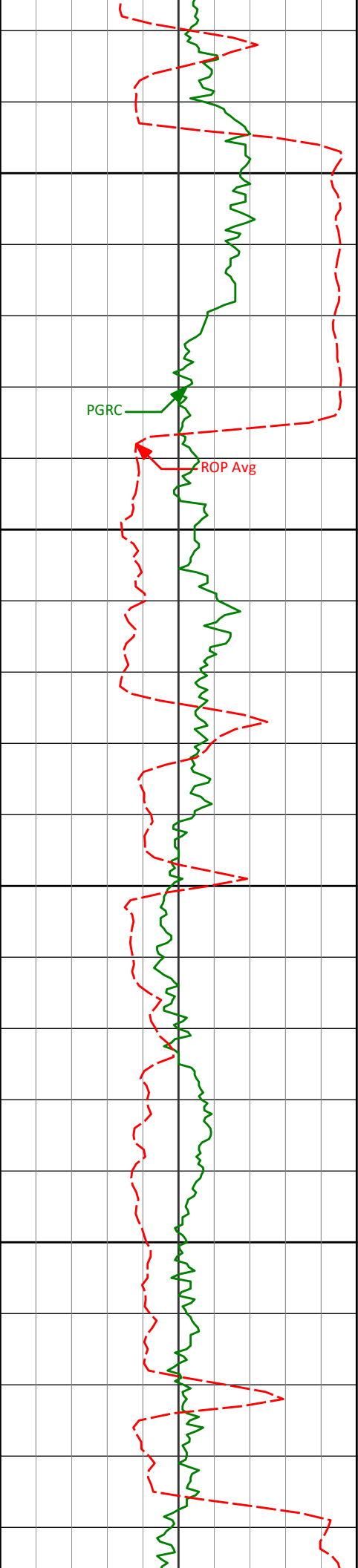
14773'

91.39°

268.67°

6937.36'

8074.27'



14850

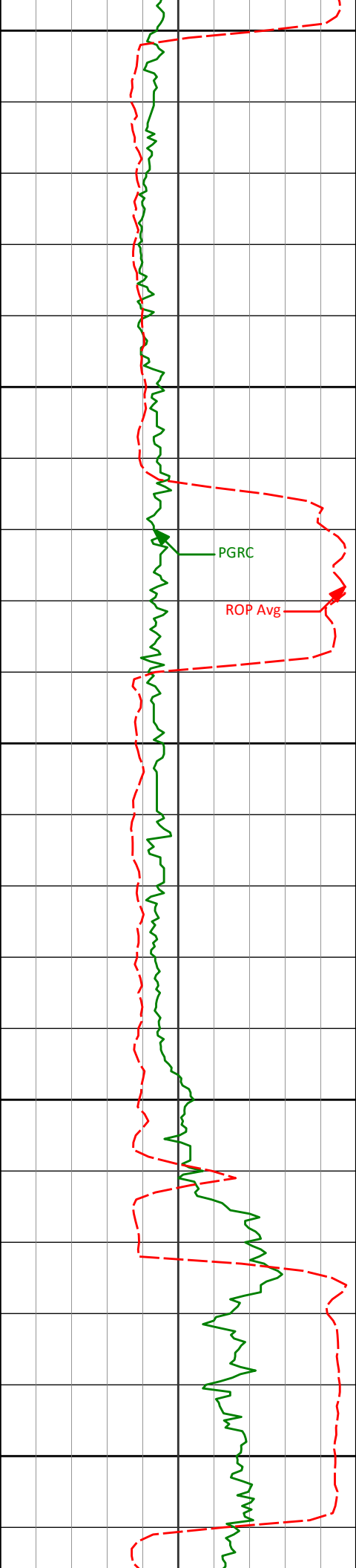
|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 14868' | 89.66° | 268.86° | 6936.49' | 8169.12' |
|--------|--------|---------|----------|----------|

14900

14950

|        |        |         |          |          |
|--------|--------|---------|----------|----------|
| 14962' | 90.25° | 267.71° | 6936.57' | 8262.93' |
|--------|--------|---------|----------|----------|

15000



15050

15057'

91.17°

267.62°

6935.39'

8357.67'

15100

PGRC

ROP Avg

15150

15152'

91.60°

269.21°

6933.09'

8452.46'

15200

15250

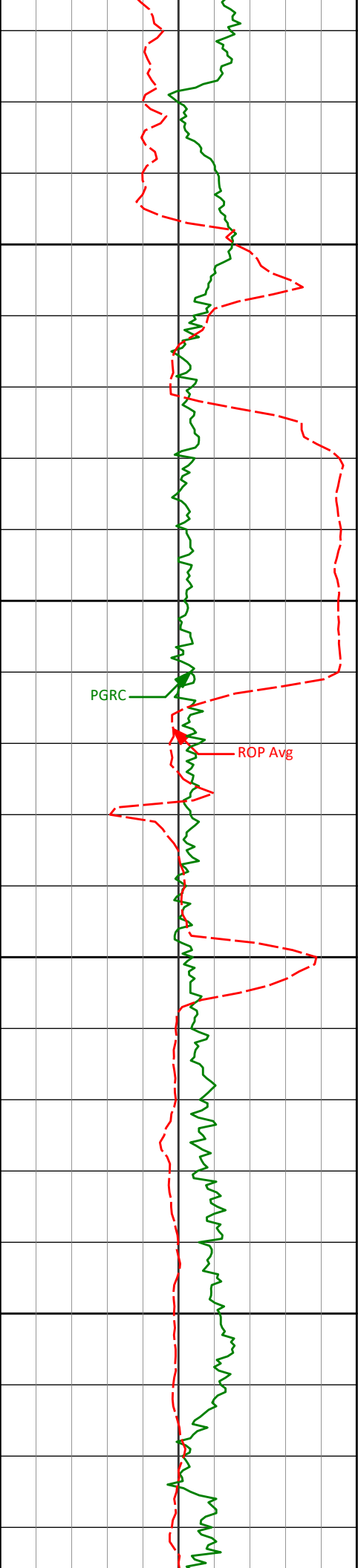
15247'

90.92°

269.65°

6930.99'

8547.35'



15300

15342'

89.63°

269.05°

6930.53'

8642.25'

15350

15400

15437'

89.85°

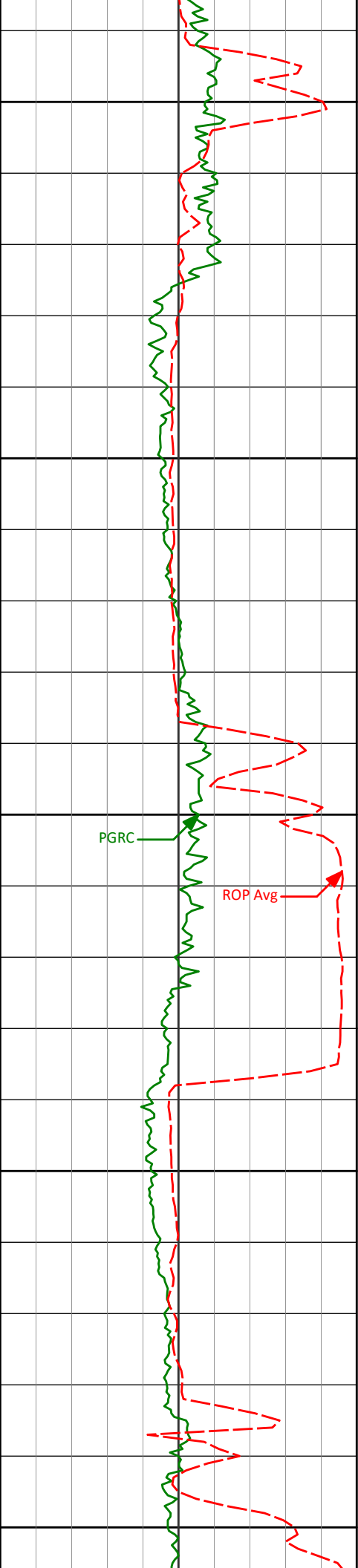
268.44°

6930.97'

8737.10'

15450





15500

15532'

92.22°

268.61°

6929.26'

8831.92'

15550

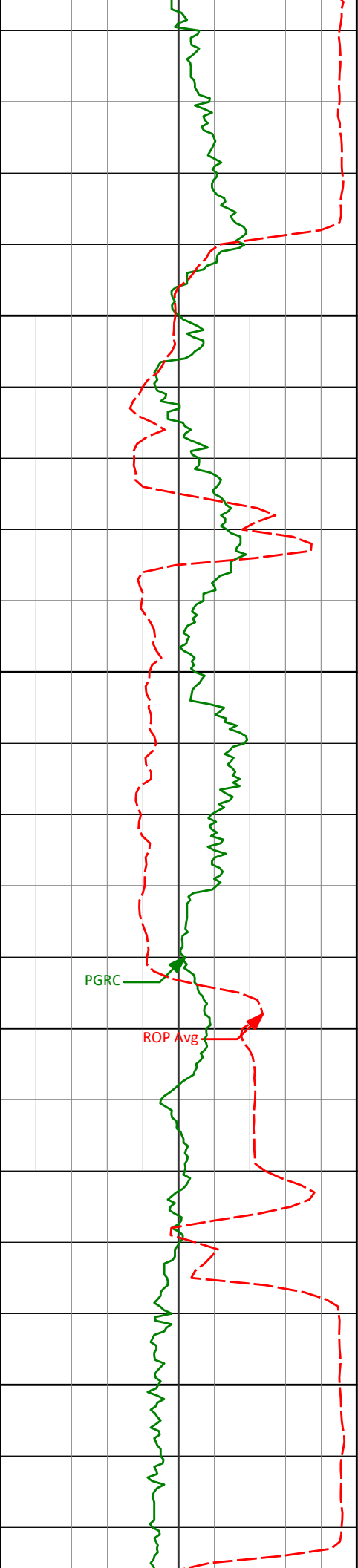
15600

PGRC

ROP Avg

15650

<Run 500>  
15700



15721'

90.12°

268.91°

6926.22'

9020.63'

15750

15800

15816'

90.34°

269.15°

6925.83'

9115.50'

PGRC

ROP Avg

15850

15900

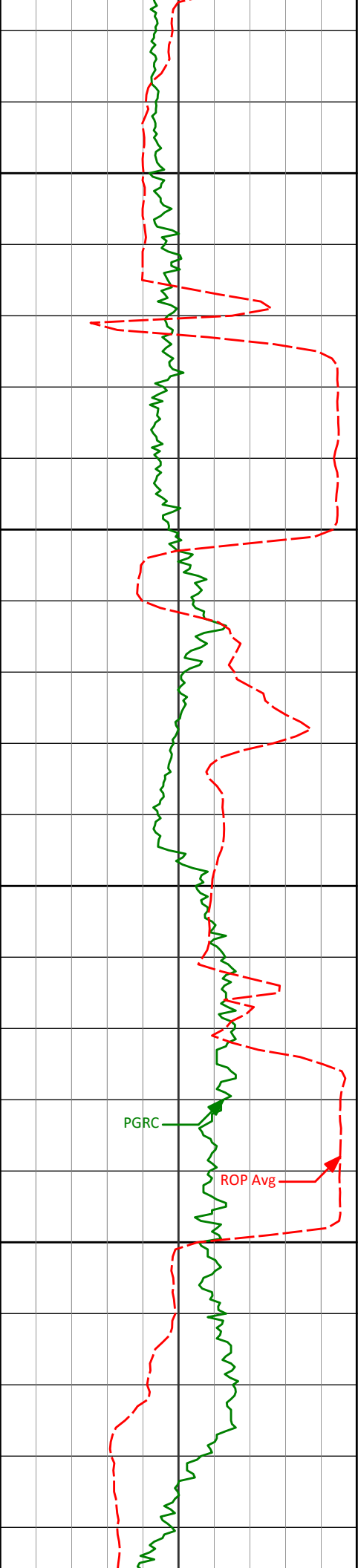
15911'

90.09°

269.14°

6925.48'

9210.39'



15950

16000

16050

16100

16006'

89.32°

271.80°

6925.96'

9305.35'

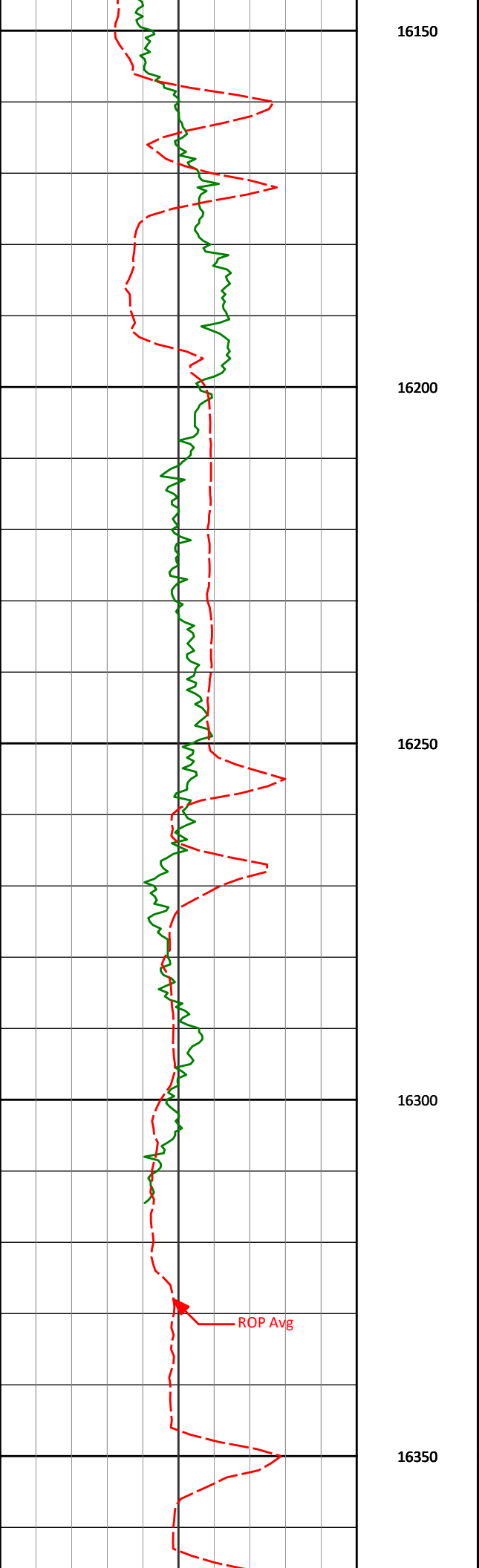
16101'

88.12°

270.80°

6928.08'

9400.32'



<TD @ 16,367' MD>

**Avg Rate of Penetration**

ROP Avg

feet per hr

PCG Gamma Ray

PGRC

api

Depth  
ft

**Depth**

**Inc.**

**Azi.**

**TVD**

**V.S.**



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

**Noble Energy  
Furrow State USX AB16-62-1HNL  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900135797**

**Survey depth 704 ft created to tie surveys onto bottom of the surface casing shoe.**

**Last survey is a projection from 16101 ft MD to TD at 16367 ft MD.**

| <i>Measured<br/>Depth<br/>(feet)</i> | <i>Inclination<br/>(degrees)</i> | <i>Direction<br/>(degrees)</i> | <i>Vertical<br/>Depth<br/>(feet)</i> | <i>Latitude<br/>(feet)</i> | <i>Departure<br/>(feet)</i> | <i>Vertical<br/>Section<br/>(feet)</i> | <i>Dogleg<br/>(deg/100ft)</i> |
|--------------------------------------|----------------------------------|--------------------------------|--------------------------------------|----------------------------|-----------------------------|--|-------------------------------|
| 704.00                               | 0.00                             | 0.00                           | 704.00                               | 0.00 N                     | 0.00 E                      | 0.00                                   | TIE-IN                        |
| 809.00                               | 0.57                             | 31.45                          | 809.00                               | 0.44 N                     | 0.27 E                      | -0.26                                  | 0.54                          |
| 1087.00                              | 0.98                             | 47.91                          | 1086.97                              | 3.22 N                     | 2.76 E                      | -2.65                                  | 0.17                          |
| 1366.00                              | 1.19                             | 36.77                          | 1365.92                              | 7.13 N                     | 6.27 E                      | -6.03                                  | 0.10                          |
| 1650.00                              | 0.89                             | 176.34                         | 1649.90                              | 7.29 N                     | 8.16 E                      | -7.92                                  | 0.69                          |
| 1935.00                              | 1.09                             | 188.33                         | 1934.86                              | 2.40 N                     | 7.91 E                      | -7.83                                  | 0.10                          |
| 2219.00                              | 0.94                             | 230.41                         | 2218.82                              | 1.77 S                     | 5.72 E                      | -5.78                                  | 0.26                          |
| 2504.00                              | 0.64                             | 285.55                         | 2503.80                              | 2.84 S                     | 2.39 E                      | -2.49                                  | 0.27                          |
| 2788.00                              | 0.22                             | 303.94                         | 2787.79                              | 2.10 S                     | 0.41 E                      | -0.48                                  | 0.15                          |
| 3073.00                              | 0.28                             | 279.69                         | 3072.78                              | 1.68 S                     | 0.73 W                      | 0.67                                   | 0.04                          |
| 3357.00                              | 0.56                             | 320.89                         | 3356.78                              | 0.49 S                     | 2.28 W                      | 2.26                                   | 0.14                          |
| 3642.00                              | 1.16                             | 257.34                         | 3641.75                              | 0.05 S                     | 5.97 W                      | 5.96                                   | 0.37                          |
| 3926.00                              | 0.81                             | 280.86                         | 3925.71                              | 0.31 S                     | 10.74 W                     | 10.72                                  | 0.19                          |
| 4211.00                              | 0.85                             | 11.94                          | 4210.69                              | 2.15 N                     | 12.27 W                     | 12.34                                  | 0.42                          |
| 4496.00                              | 0.87                             | 79.81                          | 4495.66                              | 4.61 N                     | 9.71 W                      | 9.85                                   | 0.34                          |
| 4686.00                              | 1.03                             | 26.72                          | 4685.64                              | 6.38 N                     | 7.52 W                      | 7.73                                   | 0.45                          |
| 4781.00                              | 2.35                             | 37.85                          | 4780.60                              | 8.68 N                     | 5.95 W                      | 6.23                                   | 1.43                          |
| 4876.00                              | 4.54                             | 12.29                          | 4875.42                              | 13.90 N                    | 3.95 W                      | 4.41                                   | 2.76                          |
| 4971.00                              | 6.46                             | 8.52                           | 4969.98                              | 22.86 N                    | 2.35 W                      | 3.11                                   | 2.06                          |
| 5065.00                              | 6.24                             | 7.50                           | 5063.41                              | 33.15 N                    | 0.90 W                      | 2.00                                   | 0.27                          |
| 5160.00                              | 7.36                             | 5.17                           | 5157.74                              | 44.32 N                    | 0.32 E                      | 1.15                                   | 1.21                          |
| 5255.00                              | 8.34                             | 8.46                           | 5251.85                              | 57.19 N                    | 1.88 E                      | 0.02                                   | 1.14                          |
| 5350.00                              | 8.70                             | 8.90                           | 5345.80                              | 71.11 N                    | 4.01 E                      | -1.65                                  | 0.39                          |
| 5445.00                              | 8.72                             | 5.53                           | 5439.70                              | 85.37 N                    | 5.81 E                      | -2.98                                  | 0.54                          |
| 5540.00                              | 9.23                             | 353.70                         | 5533.55                              | 100.12 N                   | 5.67 E                      | -2.35                                  | 2.01                          |
| 5634.00                              | 9.89                             | 353.04                         | 5626.24                              | 115.63 N                   | 3.86 E                      | -0.03                                  | 0.71                          |
| 5729.00                              | 10.01                            | 350.63                         | 5719.81                              | 131.88 N                   | 1.53 E                      | 2.84                                   | 0.46                          |
| 5824.00                              | 11.17                            | 351.36                         | 5813.19                              | 149.12 N                   | 1.20 W                      | 6.14                                   | 1.23                          |
| 5919.00                              | 11.94                            | 358.02                         | 5906.27                              | 168.04 N                   | 2.92 W                      | 8.49                                   | 1.62                          |
| 6014.00                              | 12.54                            | 357.44                         | 5999.11                              | 188.16 N                   | 3.72 W                      | 9.95                                   | 0.65                          |
| 6108.00                              | 11.49                            | 356.42                         | 6091.05                              | 207.69 N                   | 4.76 W                      | 11.64                                  | 1.14                          |
| 6215.00                              | 11.12                            | 356.10                         | 6195.98                              | 228.62 N                   | 6.12 W                      | 13.70                                  | 0.35                          |
| 6296.00                              | 13.66                            | 349.46                         | 6275.09                              | 245.82 N                   | 8.41 W                      | 16.55                                  | 3.60                          |

|          |       |        |         |          |           |         |       |
|----------|-------|--------|---------|----------|-----------|---------|-------|
| 6344.00  | 17.00 | 341.79 | 6321.38 | 258.06 N | 11.64 W   | 20.19   | 8.12  |
| 6391.00  | 19.81 | 336.77 | 6365.97 | 271.91 N | 16.93 W   | 25.93   | 6.87  |
| 6439.00  | 21.81 | 333.43 | 6410.84 | 287.36 N | 24.13 W   | 33.64   | 4.83  |
| 6485.00  | 25.14 | 331.73 | 6453.03 | 303.62 N | 32.58 W   | 42.63   | 7.40  |
| 6533.00  | 29.25 | 326.90 | 6495.72 | 322.43 N | 43.82 W   | 54.48   | 9.70  |
| 6580.00  | 30.52 | 316.85 | 6536.49 | 340.77 N | 58.26 W   | 69.52   | 10.98 |
| 6628.00  | 33.09 | 308.61 | 6577.30 | 357.85 N | 76.84 W   | 88.67   | 10.50 |
| 6675.00  | 35.49 | 307.90 | 6616.13 | 374.24 N | 97.64 W   | 109.99  | 5.17  |
| 6723.00  | 38.18 | 302.75 | 6654.55 | 390.83 N | 121.12 W  | 134.01  | 8.55  |
| 6770.00  | 41.80 | 297.85 | 6690.56 | 406.02 N | 147.20 W  | 160.58  | 10.19 |
| 6818.00  | 46.45 | 293.75 | 6725.02 | 420.51 N | 177.29 W  | 191.13  | 11.36 |
| 6865.00  | 50.46 | 289.72 | 6756.19 | 433.49 N | 209.96 W  | 224.22  | 10.69 |
| 6913.00  | 53.31 | 286.32 | 6785.82 | 445.14 N | 245.87 W  | 260.49  | 8.13  |
| 6959.00  | 56.75 | 282.52 | 6812.19 | 454.50 N | 282.36 W  | 297.28  | 10.09 |
| 7007.00  | 60.30 | 281.08 | 6837.25 | 462.86 N | 322.43 W  | 337.60  | 7.83  |
| 7054.00  | 65.18 | 279.58 | 6858.77 | 470.34 N | 363.52 W  | 378.92  | 10.76 |
| 7102.00  | 70.04 | 277.40 | 6877.05 | 476.87 N | 407.40 W  | 422.99  | 10.96 |
| 7149.00  | 73.80 | 276.40 | 6891.63 | 482.24 N | 451.75 W  | 467.49  | 8.25  |
| 7197.00  | 76.20 | 275.55 | 6904.05 | 487.06 N | 497.86 W  | 513.73  | 5.28  |
| 7244.00  | 79.33 | 275.45 | 6914.01 | 491.46 N | 543.58 W  | 559.57  | 6.66  |
| 7298.00  | 82.60 | 274.32 | 6922.49 | 496.00 N | 596.70 W  | 612.82  | 6.40  |
| 7407.00  | 87.11 | 271.92 | 6932.27 | 501.90 N | 705.07 W  | 721.32  | 4.68  |
| 7502.00  | 88.12 | 270.70 | 6936.22 | 504.07 N | 799.96 W  | 816.23  | 1.66  |
| 7596.00  | 89.14 | 269.32 | 6938.47 | 504.09 N | 893.93 W  | 910.15  | 1.82  |
| 7691.00  | 89.17 | 267.85 | 6939.88 | 501.75 N | 988.88 W  | 1004.98 | 1.56  |
| 7786.00  | 91.35 | 267.77 | 6939.45 | 498.12 N | 1083.81 W | 1099.73 | 2.30  |
| 7881.00  | 91.97 | 266.85 | 6936.69 | 493.66 N | 1178.66 W | 1194.38 | 1.17  |
| 7976.00  | 92.28 | 267.93 | 6933.17 | 489.34 N | 1273.50 W | 1289.02 | 1.18  |
| 8071.00  | 91.08 | 269.60 | 6930.39 | 487.29 N | 1368.43 W | 1383.83 | 2.17  |
| 8166.00  | 89.54 | 268.37 | 6929.88 | 485.60 N | 1463.41 W | 1478.70 | 2.07  |
| 8261.00  | 89.94 | 267.97 | 6930.31 | 482.57 N | 1558.36 W | 1573.50 | 0.59  |
| 8356.00  | 90.77 | 268.86 | 6929.73 | 479.95 N | 1653.32 W | 1668.32 | 1.28  |
| 8451.00  | 91.17 | 269.55 | 6928.11 | 478.64 N | 1748.30 W | 1763.20 | 0.84  |
| 8546.00  | 90.55 | 269.91 | 6926.68 | 478.19 N | 1843.28 W | 1858.12 | 0.75  |
| 8641.00  | 90.46 | 270.42 | 6925.84 | 478.47 N | 1938.28 W | 1953.08 | 0.54  |
| 8736.00  | 89.04 | 269.24 | 6926.25 | 478.18 N | 2033.27 W | 2048.01 | 1.94  |
| 8831.00  | 88.12 | 269.21 | 6928.60 | 476.90 N | 2128.23 W | 2142.88 | 0.98  |
| 8926.00  | 89.04 | 269.38 | 6930.95 | 475.73 N | 2223.20 W | 2237.75 | 0.99  |
| 9020.00  | 89.39 | 268.79 | 6932.24 | 474.23 N | 2317.18 W | 2331.62 | 0.73  |
| 9115.00  | 90.00 | 268.95 | 6932.75 | 472.35 N | 2412.16 W | 2426.49 | 0.67  |
| 9210.00  | 89.97 | 269.20 | 6932.78 | 470.82 N | 2507.14 W | 2521.37 | 0.27  |
| 9305.00  | 89.20 | 267.55 | 6933.47 | 468.13 N | 2602.10 W | 2616.19 | 1.92  |
| 9400.00  | 90.22 | 267.76 | 6933.95 | 464.25 N | 2697.02 W | 2710.93 | 1.09  |
| 9495.00  | 90.80 | 267.98 | 6933.11 | 460.71 N | 2791.95 W | 2805.69 | 0.66  |
| 9590.00  | 90.71 | 267.39 | 6931.86 | 456.87 N | 2886.86 W | 2900.42 | 0.63  |
| 9685.00  | 90.19 | 267.92 | 6931.12 | 452.98 N | 2981.78 W | 2995.16 | 0.78  |
| 9780.00  | 89.23 | 268.68 | 6931.60 | 450.17 N | 3076.73 W | 3089.97 | 1.29  |
| 9875.00  | 89.29 | 268.14 | 6932.83 | 447.53 N | 3171.69 W | 3184.78 | 0.58  |
| 9970.00  | 90.31 | 268.68 | 6933.16 | 444.90 N | 3266.65 W | 3279.60 | 1.22  |
| 10065.00 | 90.56 | 269.42 | 6932.44 | 443.32 N | 3361.63 W | 3374.48 | 0.81  |
| 10160.00 | 90.06 | 269.74 | 6931.93 | 442.63 N | 3456.63 W | 3469.40 | 0.62  |
| 10252.00 | 88.40 | 269.28 | 6933.17 | 441.84 N | 3548.61 W | 3561.31 | 1.88  |
| 10345.00 | 89.75 | 269.39 | 6934.67 | 440.76 N | 3641.59 W | 3654.20 | 1.46  |
| 10438.00 | 89.72 | 269.58 | 6935.10 | 439.92 N | 3734.59 W | 3747.12 | 0.20  |
| 10531.00 | 90.03 | 269.51 | 6935.29 | 439.18 N | 3827.58 W | 3840.04 | 0.34  |
| 10624.00 | 90.62 | 269.97 | 6934.77 | 438.76 N | 3920.58 W | 3932.97 | 0.80  |
| 10716.00 | 89.75 | 269.60 | 6934.47 | 438.41 N | 4012.58 W | 4024.91 | 1.02  |
| 10808.00 | 89.72 | 267.23 | 6934.89 | 435.86 N | 4104.54 W | 4116.73 | 2.57  |
| 10901.00 | 89.78 | 266.85 | 6935.29 | 431.06 N | 4197.41 W | 4209.39 | 0.42  |
| 10994.00 | 90.00 | 266.92 | 6935.47 | 426.00 N | 4290.27 W | 4302.04 | 0.24  |
| 11086.00 | 90.77 | 269.53 | 6934.85 | 423.15 N | 4382.22 W | 4393.84 | 2.96  |
| 11180.00 | 90.59 | 270.48 | 6933.74 | 423.15 N | 4476.21 W | 4487.78 | 1.03  |
| 11273.00 | 89.14 | 269.82 | 6933.96 | 423.39 N | 4569.21 W | 4580.73 | 1.71  |
| 11365.00 | 88.86 | 269.64 | 6935.57 | 422.95 N | 4661.19 W | 4672.65 | 0.36  |
| 11458.00 | 89.72 | 268.25 | 6936.72 | 421.24 N | 4754.17 W | 4765.52 | 1.75  |
| 11550.00 | 90.56 | 267.73 | 6936.50 | 418.01 N | 4846.11 W | 4857.30 | 1.07  |
| 11643.00 | 90.22 | 267.82 | 6935.87 | 414.40 N | 4939.03 W | 4950.06 | 0.38  |
| 11736.00 | 89.47 | 268.59 | 6936.12 | 411.49 N | 5031.99 W | 5042.86 | 1.15  |
| 11831.00 | 90.09 | 268.61 | 6936.48 | 409.16 N | 5126.96 W | 5137.70 | 0.65  |
| 11926.00 | 90.59 | 268.05 | 6935.92 | 406.39 N | 5221.91 W | 5232.52 | 0.79  |
| 12020.00 | 91.91 | 268.62 | 6933.87 | 403.65 N | 5315.85 W | 5326.31 | 1.54  |

|          |       |        |         |          |           |         |      |
|----------|-------|--------|---------|----------|-----------|---------|------|
| 12115.00 | 91.70 | 268.10 | 6930.88 | 400.94 N | 5410.76 W | 5421.08 | 0.59 |
| 12210.00 | 89.97 | 264.95 | 6929.49 | 395.18 N | 5505.56 W | 5515.64 | 3.79 |
| 12305.00 | 89.78 | 266.56 | 6929.70 | 388.15 N | 5600.30 W | 5610.09 | 1.71 |
| 12400.00 | 91.17 | 268.57 | 6928.91 | 384.12 N | 5695.20 W | 5704.81 | 2.57 |
| 12495.00 | 90.71 | 268.42 | 6927.35 | 381.62 N | 5790.16 W | 5799.63 | 0.51 |
| 12590.00 | 90.52 | 269.49 | 6926.32 | 379.89 N | 5885.13 W | 5894.49 | 1.15 |
| 12685.00 | 88.89 | 269.08 | 6926.81 | 378.70 N | 5980.12 W | 5989.39 | 1.77 |
| 12780.00 | 89.11 | 269.69 | 6928.47 | 377.68 N | 6075.10 W | 6084.28 | 0.69 |
| 12875.00 | 89.82 | 270.13 | 6929.36 | 377.53 N | 6170.10 W | 6179.22 | 0.88 |
| 12970.00 | 90.22 | 270.60 | 6929.34 | 378.14 N | 6265.09 W | 6274.19 | 0.65 |
| 13064.00 | 89.69 | 270.24 | 6929.41 | 378.83 N | 6359.09 W | 6368.16 | 0.68 |
| 13159.00 | 89.91 | 271.04 | 6929.75 | 379.89 N | 6454.08 W | 6463.13 | 0.88 |
| 13254.00 | 90.00 | 270.11 | 6929.82 | 380.85 N | 6549.08 W | 6558.10 | 0.99 |
| 13349.00 | 90.06 | 268.40 | 6929.77 | 379.61 N | 6644.07 W | 6653.00 | 1.80 |
| 13444.00 | 90.71 | 268.63 | 6929.13 | 377.16 N | 6739.03 W | 6747.83 | 0.72 |
| 13539.00 | 90.09 | 269.92 | 6928.47 | 375.95 N | 6834.02 W | 6842.73 | 1.51 |
| 13634.00 | 91.14 | 268.86 | 6927.45 | 374.95 N | 6929.01 W | 6937.63 | 1.57 |
| 13728.00 | 89.35 | 269.03 | 6927.04 | 373.21 N | 7022.99 W | 7031.50 | 1.91 |
| 13823.00 | 89.08 | 268.19 | 6928.35 | 370.91 N | 7117.95 W | 7126.33 | 0.93 |
| 13918.00 | 87.65 | 267.51 | 6931.06 | 367.34 N | 7212.84 W | 7221.05 | 1.66 |
| 14013.00 | 88.77 | 267.34 | 6934.02 | 363.07 N | 7307.70 W | 7315.72 | 1.18 |
| 14108.00 | 89.57 | 266.68 | 6935.41 | 358.12 N | 7402.55 W | 7410.36 | 1.09 |
| 14203.00 | 90.09 | 267.91 | 6935.69 | 353.64 N | 7497.45 W | 7505.05 | 1.40 |
| 14298.00 | 89.48 | 268.87 | 6936.04 | 350.97 N | 7592.41 W | 7599.87 | 1.20 |
| 14393.00 | 88.83 | 269.23 | 6937.44 | 349.40 N | 7687.38 W | 7694.74 | 0.79 |
| 14488.00 | 90.22 | 268.75 | 6938.24 | 347.73 N | 7782.36 W | 7789.61 | 1.55 |
| 14583.00 | 89.88 | 269.36 | 6938.16 | 346.16 N | 7877.35 W | 7884.49 | 0.73 |
| 14678.00 | 89.85 | 269.39 | 6938.38 | 345.12 N | 7972.34 W | 7979.40 | 0.05 |
| 14773.00 | 91.39 | 268.67 | 6937.36 | 343.51 N | 8067.32 W | 8074.27 | 1.79 |
| 14868.00 | 89.66 | 268.86 | 6936.49 | 341.46 N | 8162.29 W | 8169.12 | 1.83 |
| 14962.00 | 90.25 | 267.71 | 6936.57 | 338.64 N | 8256.25 W | 8262.93 | 1.37 |
| 15057.00 | 91.17 | 267.62 | 6935.39 | 334.77 N | 8351.16 W | 8357.67 | 0.98 |
| 15152.00 | 91.60 | 269.21 | 6933.09 | 332.15 N | 8446.09 W | 8452.46 | 1.73 |
| 15247.00 | 90.92 | 269.65 | 6930.99 | 331.20 N | 8541.06 W | 8547.35 | 0.85 |
| 15342.00 | 89.63 | 269.05 | 6930.53 | 330.13 N | 8636.05 W | 8642.25 | 1.50 |
| 15437.00 | 89.85 | 268.44 | 6930.97 | 328.05 N | 8731.03 W | 8737.10 | 0.68 |
| 15532.00 | 92.22 | 268.61 | 6929.26 | 325.60 N | 8825.97 W | 8831.92 | 2.50 |
| 15626.00 | 90.68 | 269.07 | 6926.88 | 323.69 N | 8919.92 W | 8925.75 | 1.71 |
| 15721.00 | 90.12 | 268.91 | 6926.22 | 322.02 N | 9014.90 W | 9020.63 | 0.61 |
| 15816.00 | 90.34 | 269.15 | 6925.83 | 320.41 N | 9109.89 W | 9115.50 | 0.35 |
| 15911.00 | 90.09 | 269.14 | 6925.48 | 319.00 N | 9204.88 W | 9210.39 | 0.26 |
| 16006.00 | 89.32 | 271.80 | 6925.96 | 319.78 N | 9299.87 W | 9305.35 | 2.92 |
| 16101.00 | 88.12 | 270.80 | 6928.08 | 321.93 N | 9394.81 W | 9400.32 | 1.65 |
| 16367.00 | 91.84 | 270.00 | 6928.18 | 323.79 N | 9660.76 W | 9666.18 | 1.43 |

**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 271.90 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.95 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16367.00 FEET  
IS 9666.18 FEET ALONG 271.92 DEGREES (GRID)**