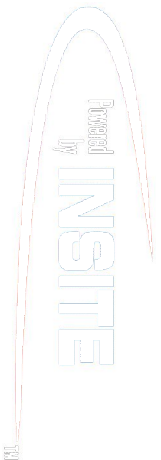


PCDC - Pressure Case Directional

PCGK - Pressure Case Gamma



1 : 600 / 1 : 240

| | | | |
|---|------------------------------------|--------------------------------|----------------------|
| Country : USA | | | |
| Field : Wattenberg | | | |
| Location : Lat: 40° 19' 56.50" North Long: 104° 48' 46.84" West | | | |
| Well : SHABLE K08-68-1HN | | | |
| Company : Noble | | | |
| Rig : H&P 321 | | | |
| LOCATION | | Other Services | |
| Latitude : 40° 19' 56.50" North Longitude : 104° 48' 46.84" West | | Directional Drilling | |
| UTM Easting = 3,191,522.810 ft UTM Northing = 1,364,661.400 ft | | | |
| Permanent Datum : Ground Level | | Elevation : 4715.00 ft | Elev. KB N/A |
| Log Measured From : Drill Floor | | 30.00 ft Above Permanent Datum | DF 4745.00 ft |
| Drilling Measured From : Drill Floor | | MD LOG | GL 4715.00 ft |
| | | | WD N/A |
| Depth Logged : 633.00 ft To 17,456.00 ft | | Unit No. : 11210424 | |
| Date Logged : 20-Jul-14 To 04-Aug-14 | | Job No. : CA-XX-0901457114 | |
| Total Depth MD : 17,456.00 ft TVD: 7,135.94 ft | | Plot Type : Final | |
| Spud Date : 20-Jul-14 | | Plot Date : 03-Aug-14 | |
| Run No. | Borehole Record (MD) | | Borehole Record (MD) |
| | Size From To | Run No. | Size From To |
| 100 | 8.750 in 633.00 ft 6,438.00 ft | | |
| 200 | 8.750 in 6,439.00 ft 7,491.00 ft | | |
| 300 | 6.125 in 7,492.00 ft 7,492.00 ft | | |
| 400 | 6.125 in 7,492.00 ft 12,450.00 ft | | |
| 500 | 6.125 in 16,247.00 ft 17,456.00 ft | | |
| | | Size Casing Record (MD) | Weight From To |
| | | 9.625 in 34.90 lbpf SURFACE | 623.00 ft |
| | | 7.000 in 26.00 lbpf SURFACE | 7,481.00 ft |
| | | | |
| | | | |
| | | | |
| | | | |

| WELL INFORMATION | | | | | |
|----------------------------------|------------------|------------------|-----------------|------------------|-------------------|
| MWD Run Number | 100 | 200 | 300 | 400 | 500 |
| Date run completed | 22-Jul-14 | 23-Jul-14 | 24-Jul-14 | 26-Jul-14 | 03-Aug-14 |
| Rig Bit Number | 2 | 3 | 4 | 5 | 7 |
| Bit Size (in) | 8.750 | 8.750 | 6.125 | 6.125 | 6.125 |
| Tool Nominal OD (in) | 6.880 | 6.880 | 4.840 | 4.840 | 4.840 |
| Log Start Depth (MD, ft) | 633.00 | 6,436.00 | 7,491.00 | 7,491.00 | 16,247.00 |
| Log End Depth (MD, ft) | 6,436.00 | 7,491.00 | 7,491.00 | 12,450.00 | 17,456.00 |
| Drill or Wipe | Drill | Drill | Drill | Drill | Drill |
| Drill/Wipe Start Date and Time | 21-Jul-14 16:06 | 23-Jan-14 01:12 | 24-Jul-14 10:46 | 24-Jul-14 18:51 | 01-Aug-14 23:34 |
| Drill/Wipe End Date and Time | 22-Jul-14 15:37 | 23-Jul-14 11:52 | 24-Jul-14 10:46 | 26-Jul-14 04:21 | 03-Aug-14 03:41 |
| Min Inc (deg) @ Depth (MD, ft) | 0.11 @ 6,190.00 | 0.89 @ 6,474.00 | NA @ NA | 84.66 @ 7,511.00 | 88.61 @ 16,764.00 |
| Max Inc (deg) @ Depth (MD, ft) | 13.27 @ 3,917.00 | 80.06 @ 7,437.00 | NA @ NA | 91.54 @ 8,314.00 | 91.67 @ 16,385.00 |
| Bit TFA(in2) / Bit Type | 1.05 / PDC | 1.74 / PDC | 0.86 / PDC | 0.75 / PDC | 0.46 / PDC |
| Flow Rate (gpm) | 598.40 | 584.50 | 300.00 | 350.00 | 312.39 |
| Max AV (fpm) / CV (fpm) @ MWD | NA / NA | NA / NA | NA / NA | NA / NA | NA / NA |
| Fluid Type | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel |
| Density (ppg) / Viscosity (spqt) | 8.55 / 29.00 | 10.30 / 36.00 | 9.05 / 31.00 | 10.10 / 35.00 | 9.27 / 34.00 |
| Filtrate CL (ppm) | 1,500.00 | 2,000.00 | 2,050.00 | 2,050.00 | 1,500.00 |
| pH / Fluid Loss (mptm) | 8.50 / 16 | 9.30 / 9 | 9.10 / 12 | 9.00 / 9 | 9.90 / 7 |
| PV (cP) / YP (lhf2) | 2 / 2.00 | 10 / 10.00 | 4 / 3.00 | 7 / 10.00 | 7 / 10.00 |
| % Solids / % Sand | 1.70 / 0.10 | 9.70 / 0.25 | 4 / .1 | 6.00 / 0.15 | 6.30 / 0.30 |
| % Oil / Oil:Water Ratio | NA / NA | NA / NA | NA / NA | NA / NA | 0.50 / NA |
| Rm @ Measured Temp (degF) | NA @ NA | NA @ NA | NA @ NA | NA @ NA | NA @ NA |
| Rmf @ Measured Temp (degF) | NA @ NA | NA @ NA | NA @ NA | NA @ NA | NA @ NA |
| Rmc @ Measured Temp (degF) | NA @ NA | NA @ NA | NA @ NA | NA @ NA | NA @ NA |
| MWD Run Number | 100 | 200 | 300 | 400 | 500 |

| | | | | | |
|-------------------------------|-----------------|-----------------|-----------------|-----------------|--------------|
| Max Tool Temp (degF) / Source | 162.80 / PCM | 171.20 / PCM | 80.01 / PCM | 238.70 / PCM | 268.30 / PCM |
| Rm @ Max Tool Temp (degF) | NA @ 162.80 | NA @ 171.20 | NA @ 80.01 | NA @ 238.70 | NA @ 268.30 |
| Lead MWD Engineer | Kyle Wass | Kyle Wass | Kyle Wass | Kyle Wass | Kyle Wass |
| Customer Representative | Stetson Nielsen | Stetson Nielsen | Stetson Nielsen | Stetson Nielsen | Jim Turner |

SENSOR INFORMATION

Downhole Processor Information

| | | | | | |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Tool Type | PCM | PCM | PCM | PCM | PCM |
| Software Version | 5.93 | 5.93 | 5.93 | 5.93 | 5.93 |
| Sub Serial Number | 241717 | 241717 | 241717 | 12396737 | 12396737 |
| Insert Serial Number | 11145509 | 11145509 | 11145509 | 11620311 | 11620311 |
| Date and Time Initialized | 20-Jul-14 10:04 | 20-Jul-14 10:04 | 23-Jul-14 22:37 | 24-Jul-14 14:13 | 01-Aug-14 10:33 |
| Date and Time Read | 23-Jul-14 17:07 | 23-Jul-14 17:07 | 24-Jul-14 16:46 | 26-Jul-14 17:46 | 03-Aug-14 15:55 |
| 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) | 56.00 | 54.00 | 64.00 | 64.00 | 64.00 |
| Software Version | 6.21 | 6.21 | 6.21 | 6.21 | 6.21 |
| Sub Serial Number | 241717 | 241717 | 241717 | 12396737 | 12396737 |
| Sonde Serial Number | 11297620 | 11297620 | 11297620 | 10993517 | 10993517 |
| Sensor ID Number | N/A | N/A | N/A | N/A | N/A |
| Toolface Offset (deg) | 199.77 | 238.05 | 75.00 | 75.00 | 270.75 |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|----------|----------|----------|----------|
| Tool Type | PCG | PCG | PCG | PCG | PCG |
| Distance From Bit (ft) | 48.98 | 47.01 | 66.64 | 66.64 | 66.63 |
| Recorded Sample Period (sec) | 10 | 10 | 10 | 10 | 10 |
| Software Version | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 |
| Sub Serial Number | 241717 | 241717 | 241717 | 12396737 | 12396737 |
| Insert/Sonde Serial Number | 11579840 | 11579840 | 11579840 | 11579832 | 11579832 |

REMARKS

1. All depths are calibrated to driller's pipe tally and are measured from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
 - 1: 600 Log
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
 - 1: 240 Log
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
 - ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft

Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft

6. Insite Version V8.0.10

WARRANTY

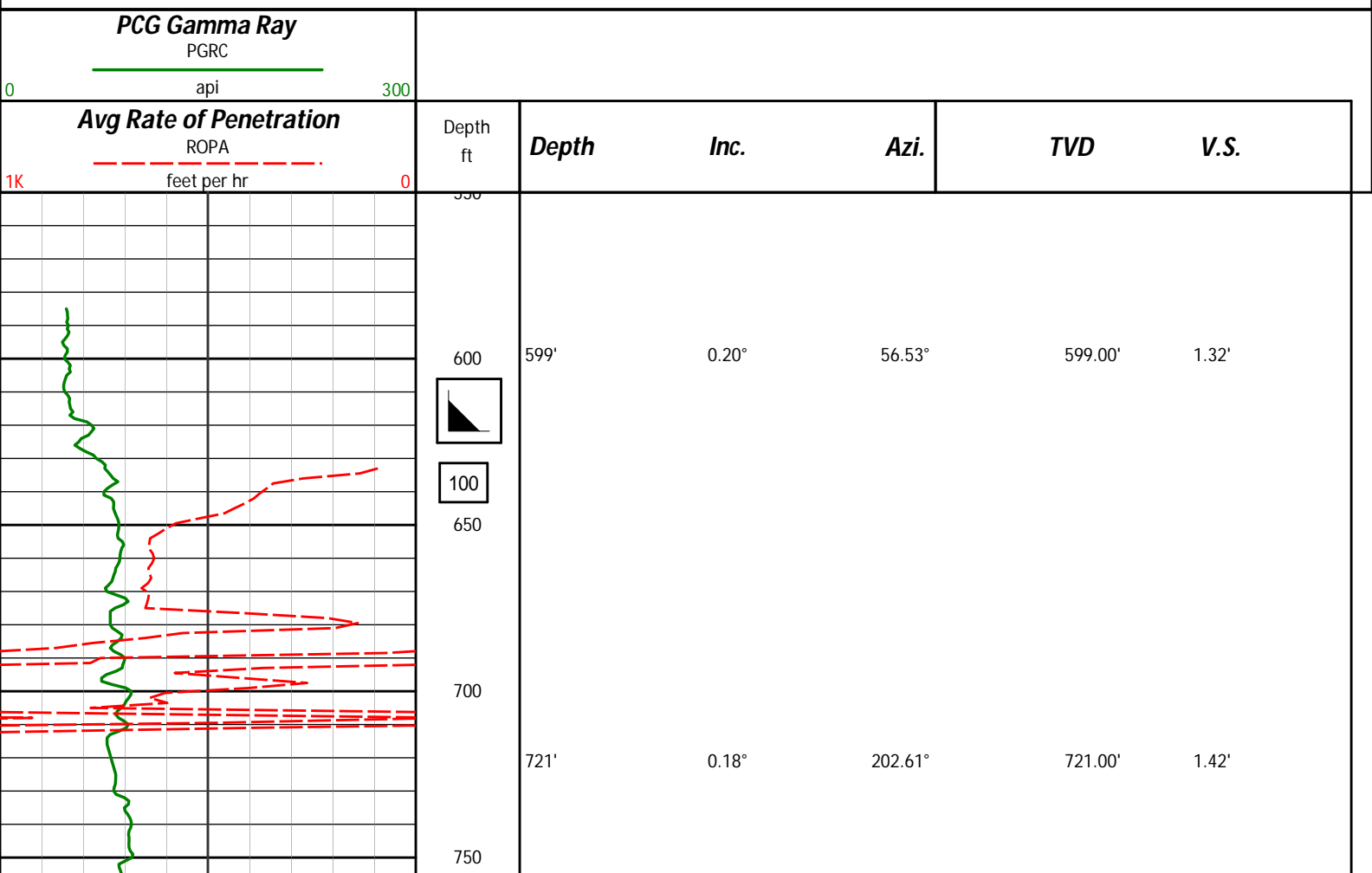
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES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

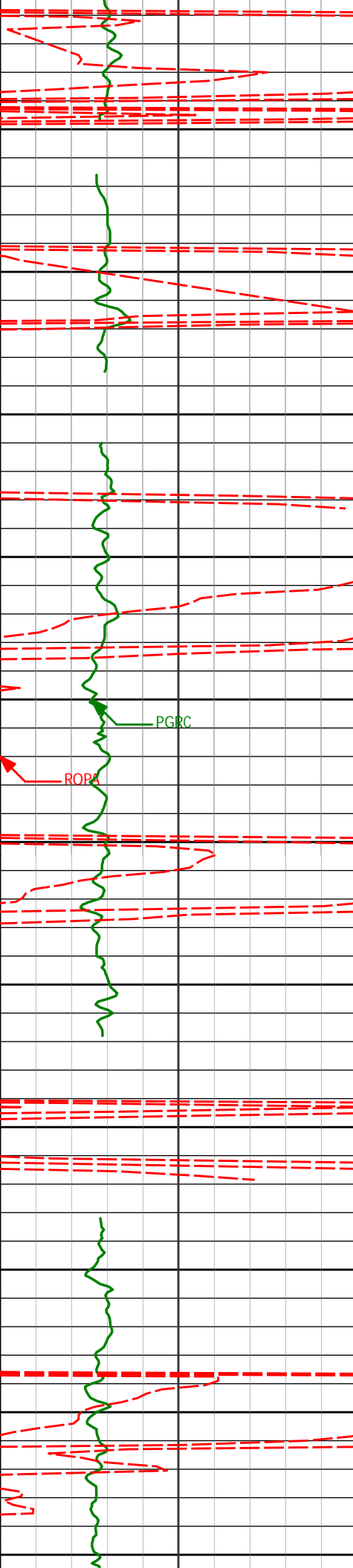
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Sperry Drilling Services

TVD Correlation Log 1:600

Noble Energy
Shable K08-68-1HN
H&P 321
Sec. 7-T4N-R66W





800

813'

0.34°

214.58°

813.00'

1.23'

850

900

905'

0.25°

204.07°

905.00'

1.01'

950

1000

996'

0.37°

169.13°

995.99'

1.01'

1050

1100

1089'

0.51°

169.39°

1088.99'

1.17'

1150

1200

1180'

0.50°

170.79°

1179.99'

1.34'

1250

1300

1273'

0.58°

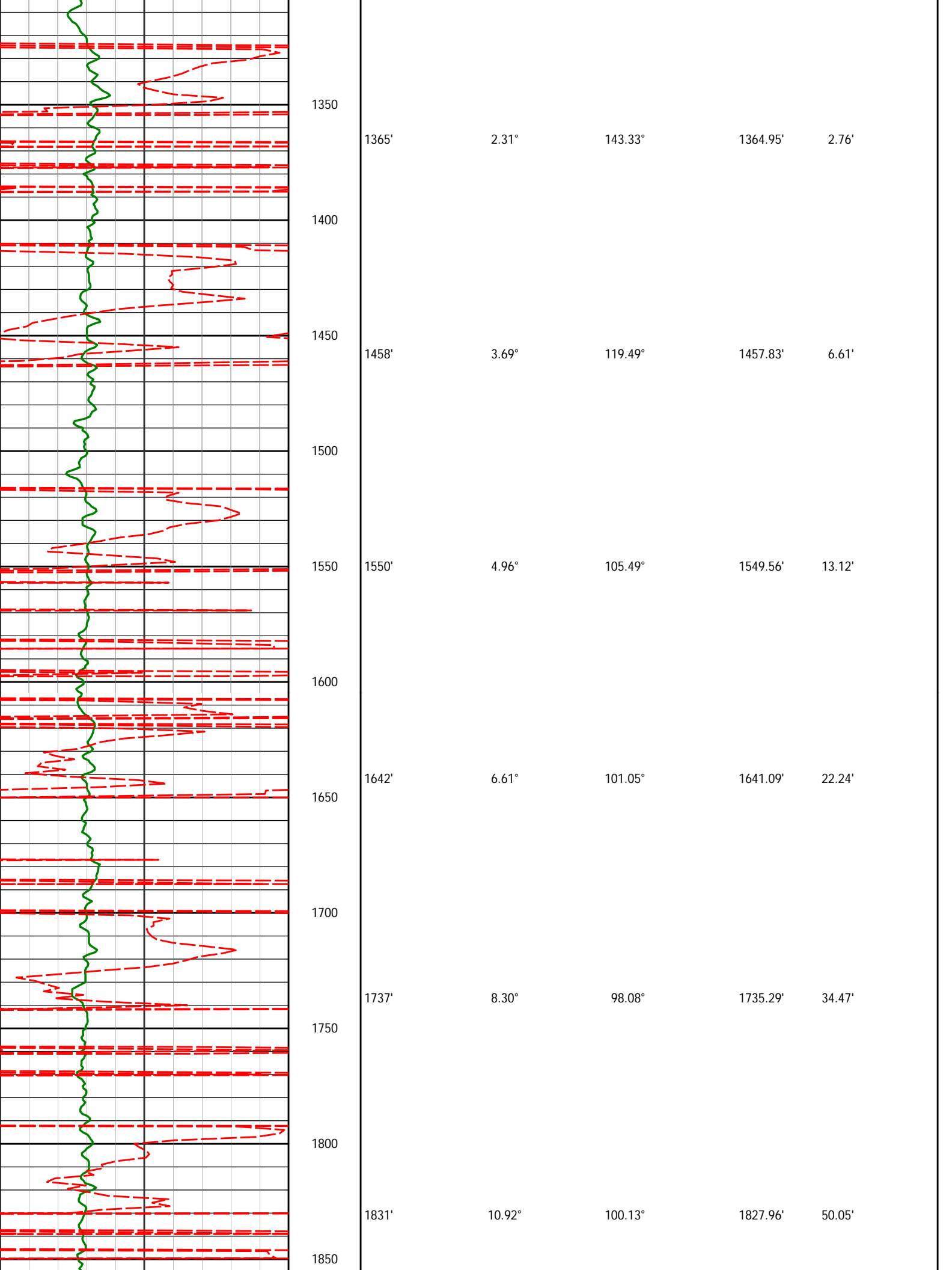
171.95°

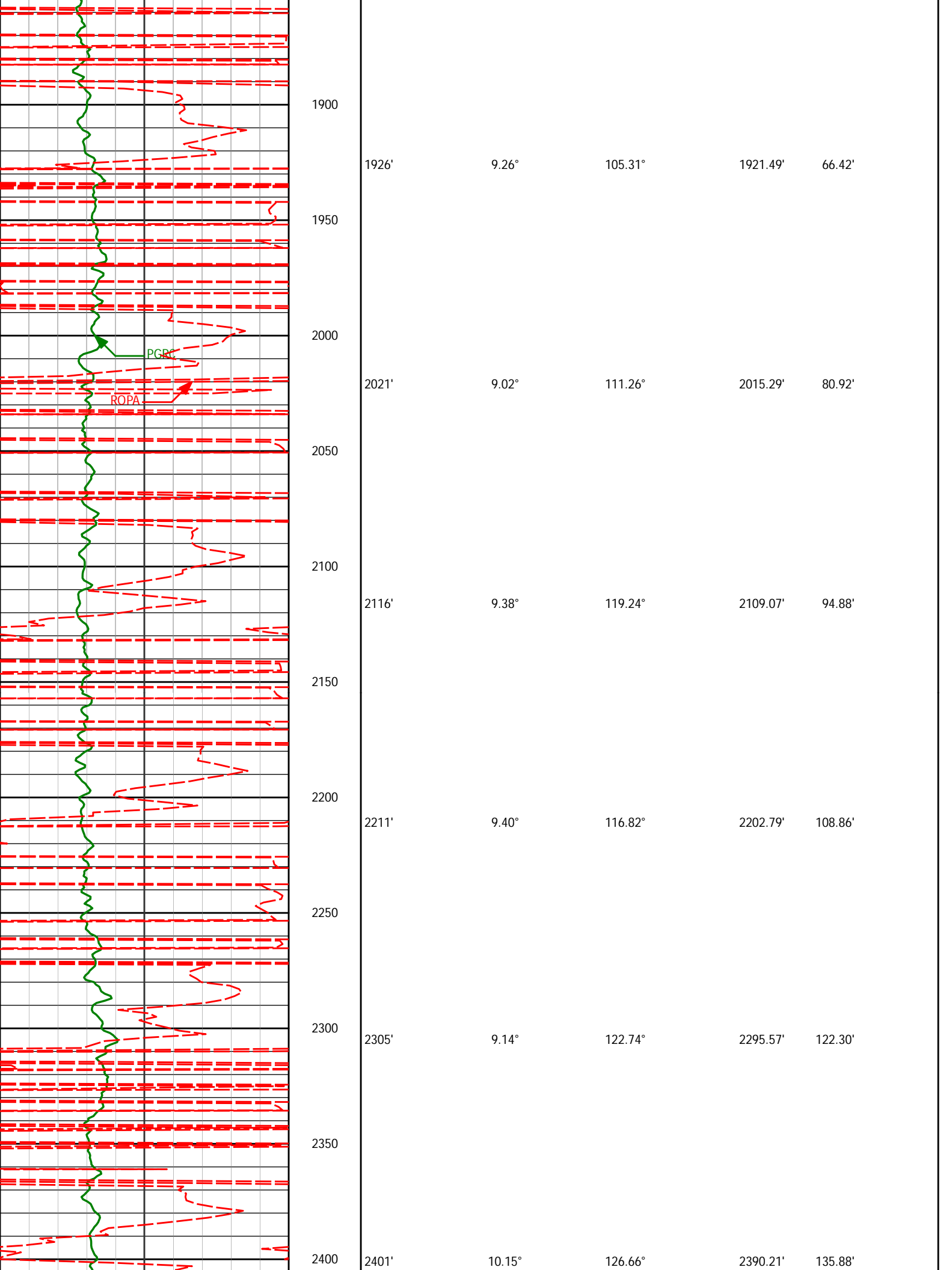
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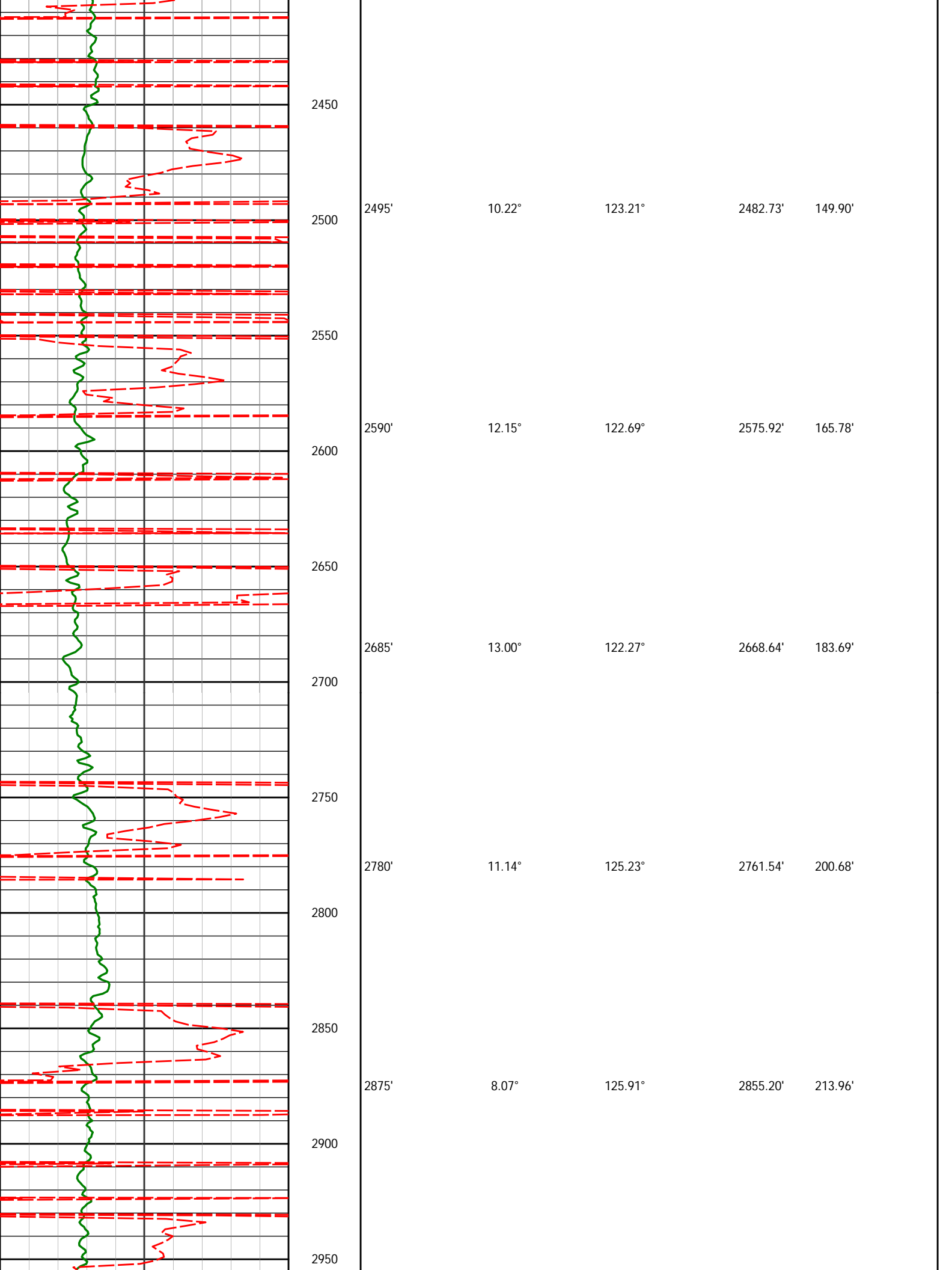
1.51'

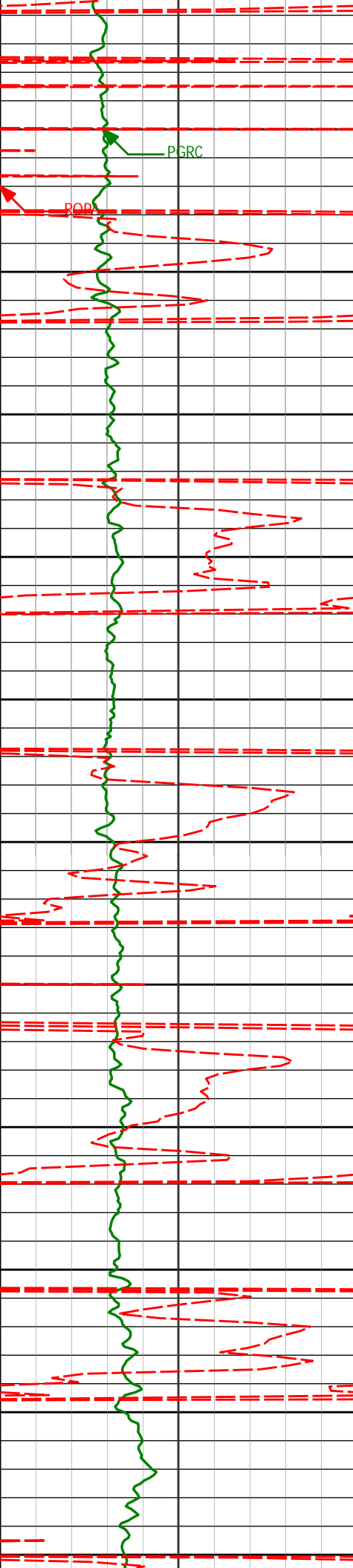
PGRC

ROPA









2969' 6.59° 126.76° 2948.43' 223.93'

3000

3050

3064' 6.78° 114.89° 3042.78' 233.61'

3100

3150

3159' 6.47° 114.31° 3137.15' 243.76'

3200

3250

3253' 8.48° 110.05° 3230.35' 255.29'

3300

3350

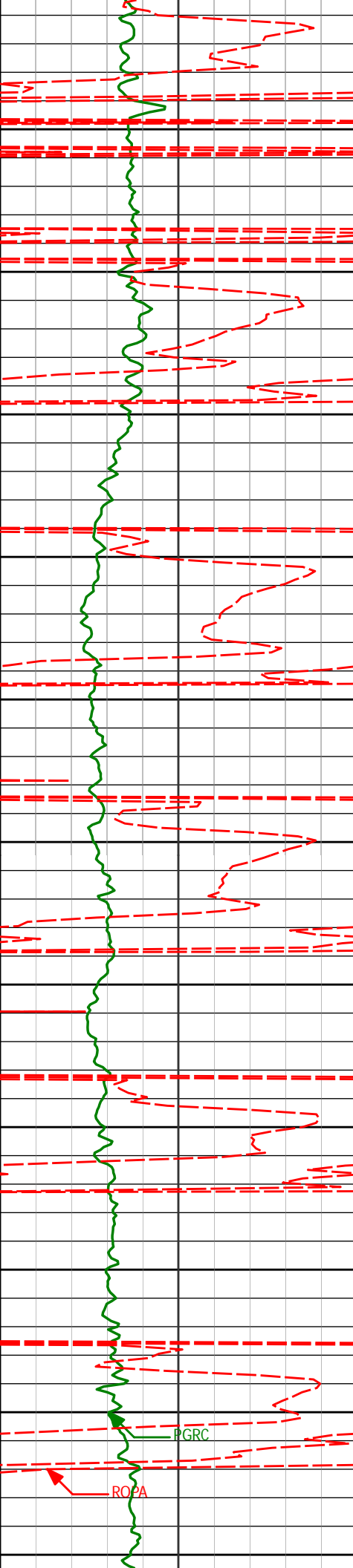
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3400

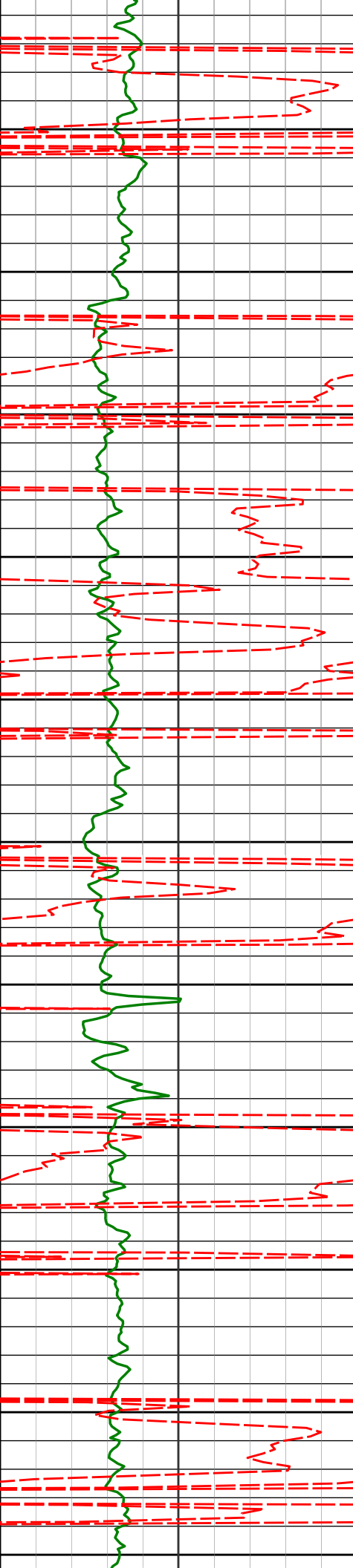
3450

3443' 9.50° 129.68° 3417.74' 282.89'

3500



| | | | | |
|-------|--------|---------|----------|---------|
| 3538' | 9.18° | 125.73° | 3511.48' | 295.47' |
| 3550 | | | | |
| 3600 | | | | |
| 3633' | 9.01° | 123.19° | 3605.29' | 308.20' |
| 3650 | | | | |
| 3700 | | | | |
| 3727' | 10.54° | 116.79° | 3697.92' | 322.36' |
| 3750 | | | | |
| 3800 | | | | |
| 3822' | 12.55° | 113.14° | 3791.00' | 339.94' |
| 3850 | | | | |
| 3900 | | | | |
| 3917' | 13.27° | 118.15° | 3883.60' | 359.42' |
| 3950 | | | | |
| 4000 | | | | |
| 4011' | 12.76° | 125.29° | 3975.19' | 377.87' |
| 4050 | | | | |



4100

4106'

9.30°

128.63°

4068.42'

392.88'

4150

4200

4201'

6.89°

131.78°

4162.47'

403.49'

4250

4300

4295'

6.51°

127.69°

4255.83'

412.21'

4350

4400

4390'

5.36°

121.54°

4350.32'

420.48'

4450

4500

4485'

5.24°

123.57°

4444.91'

428.07'

4550

4600

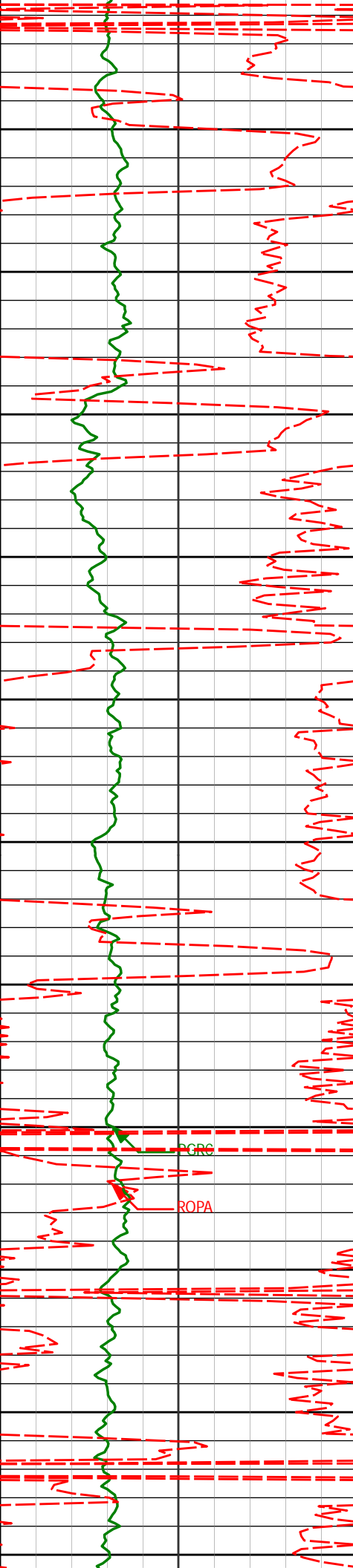
4580'

3.92°

124.83°

4539.60'

434.53'



4650

4674'

2.09°

141.41°

4633.47'

438.37'

4700

4750

4769'

0.75°

172.90°

4728.44'

439.61'

4800

4850

4864'

0.28°

149.93°

4823.44'

439.84'

4900

4950

4958'

1.01°

239.15°

4917.43'

439.27'

5000

5050

5053'

0.83°

239.21°

5012.42'

438.00'

5100

5150

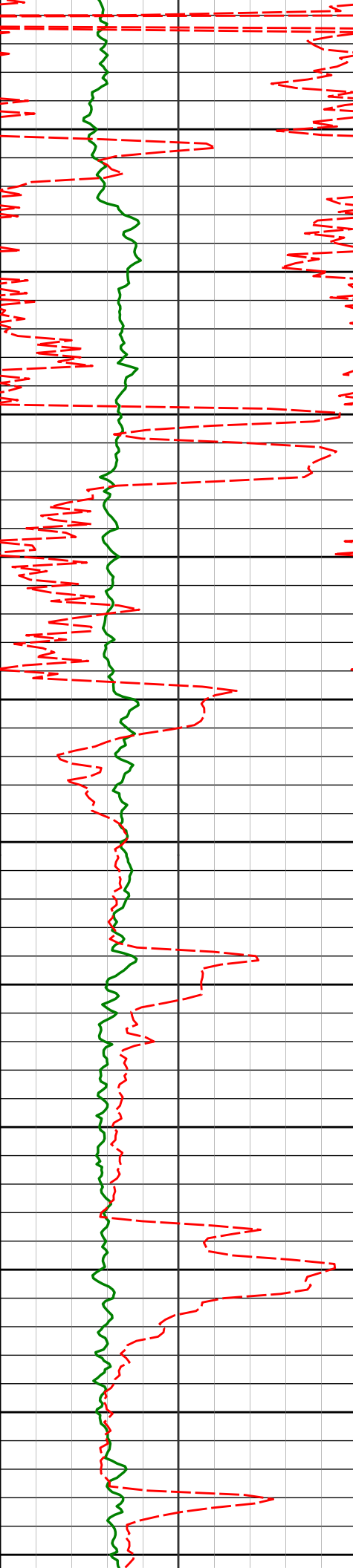
5148'

1.16°

253.86°

5107.41'

436.51'



5200

5243'

1.50°

255.84°

5202.38'

434.41'

5250

5300

5337'

1.18°

318.57°

5296.36'

432.56'

5350

5400

5432'

0.91°

320.10°

5391.34'

431.37'

5450

5500

5527'

1.13°

327.64°

5486.33'

430.33'

5550

5600

5622'

0.50°

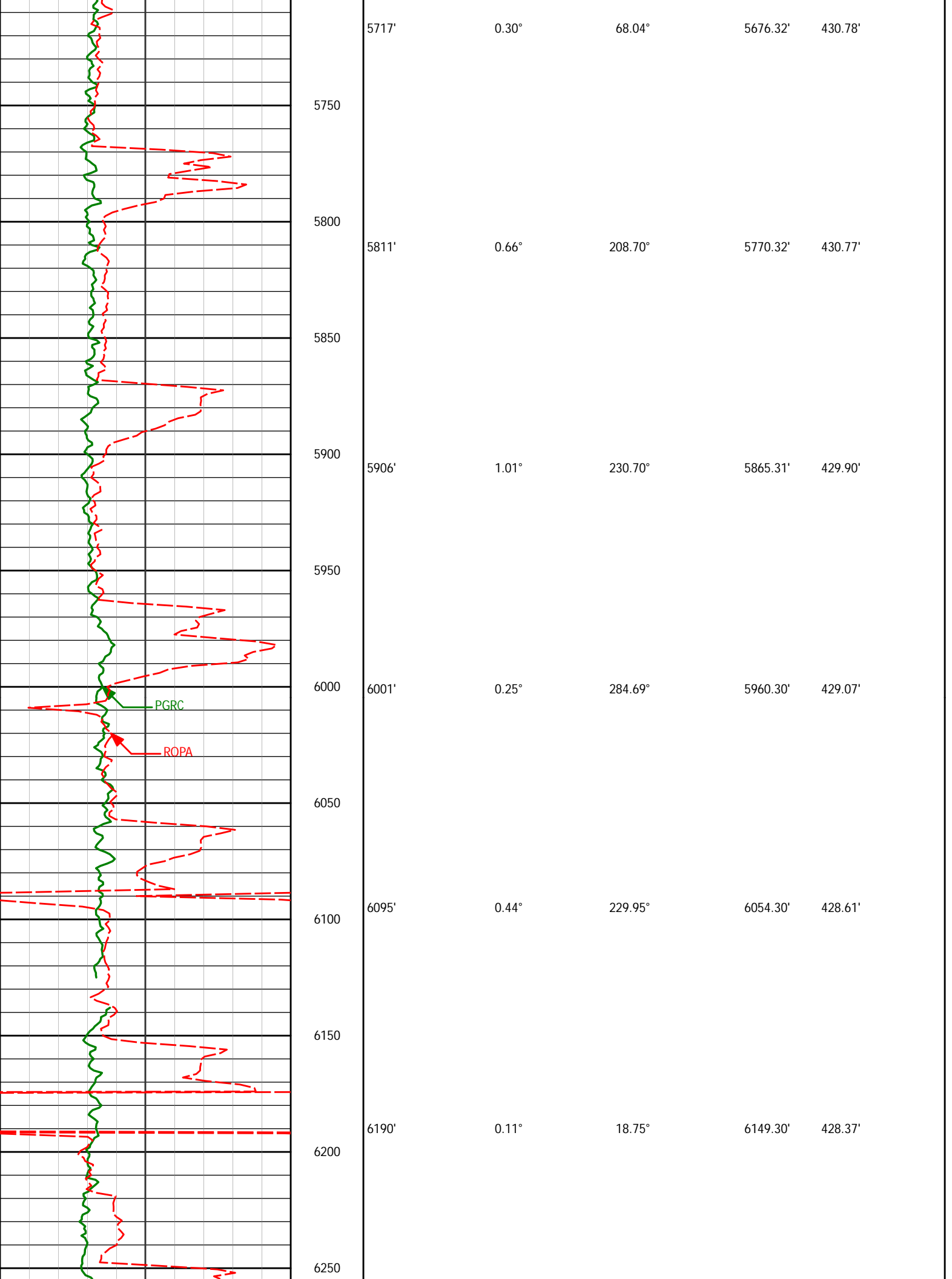
69.83°

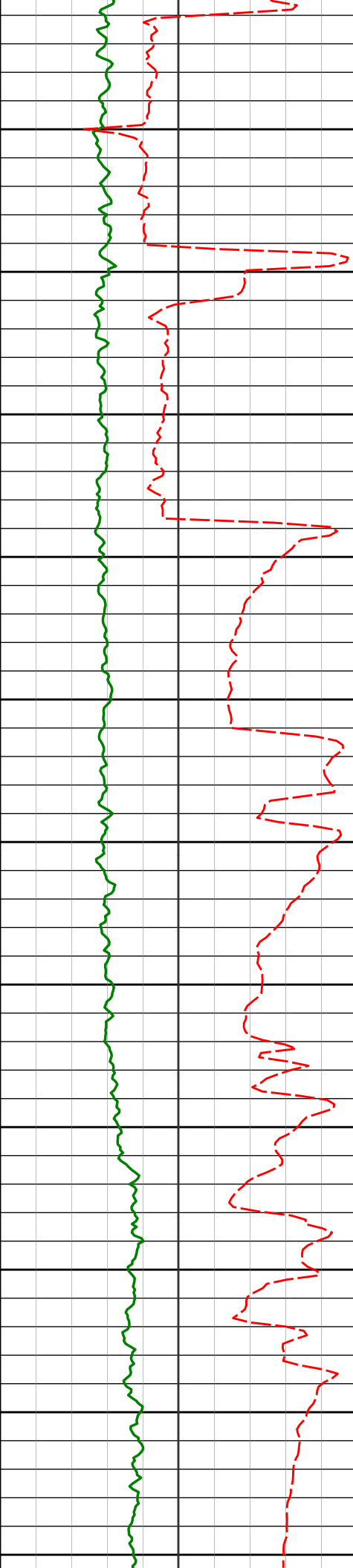
5581.32'

430.17'

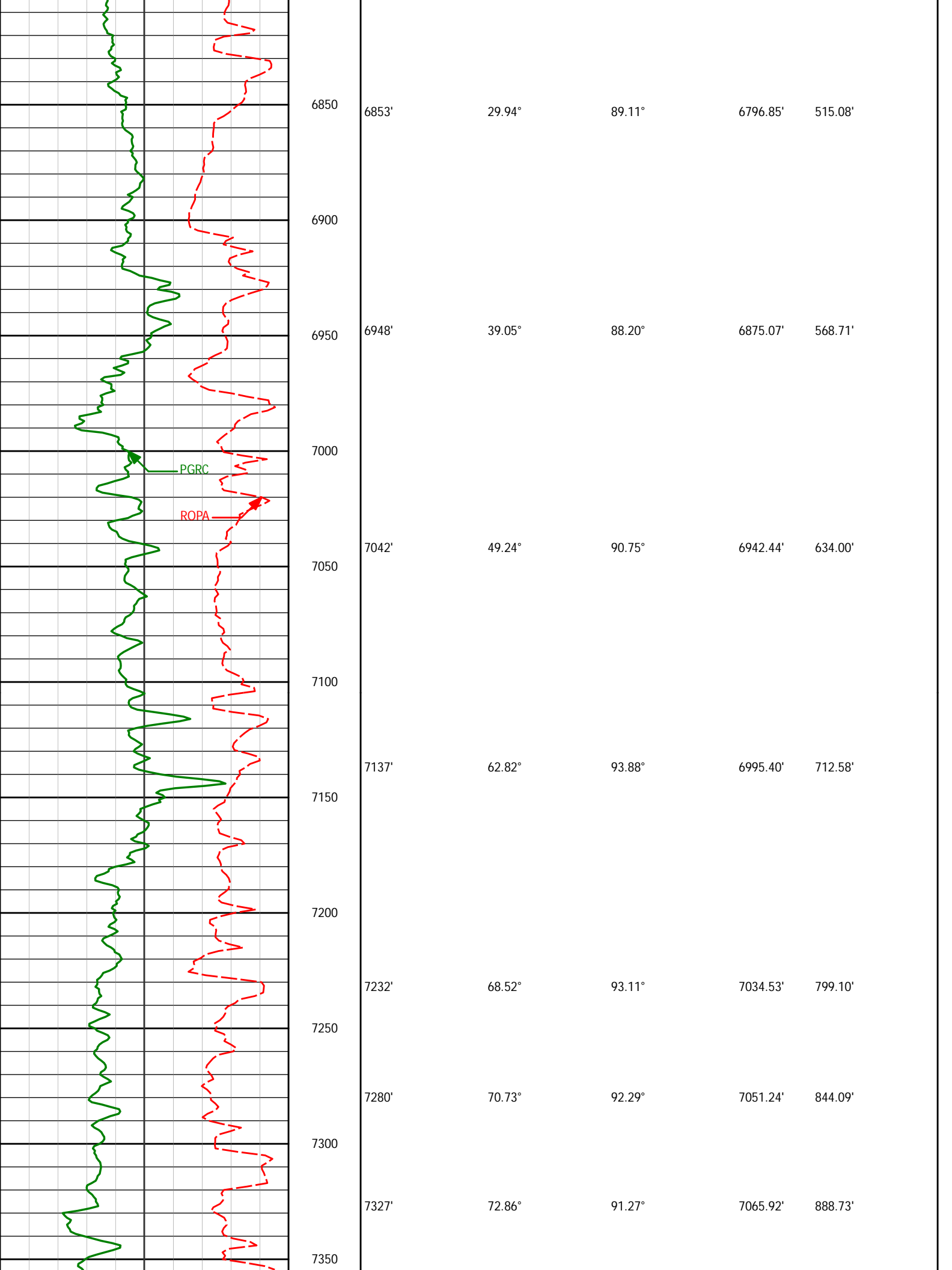
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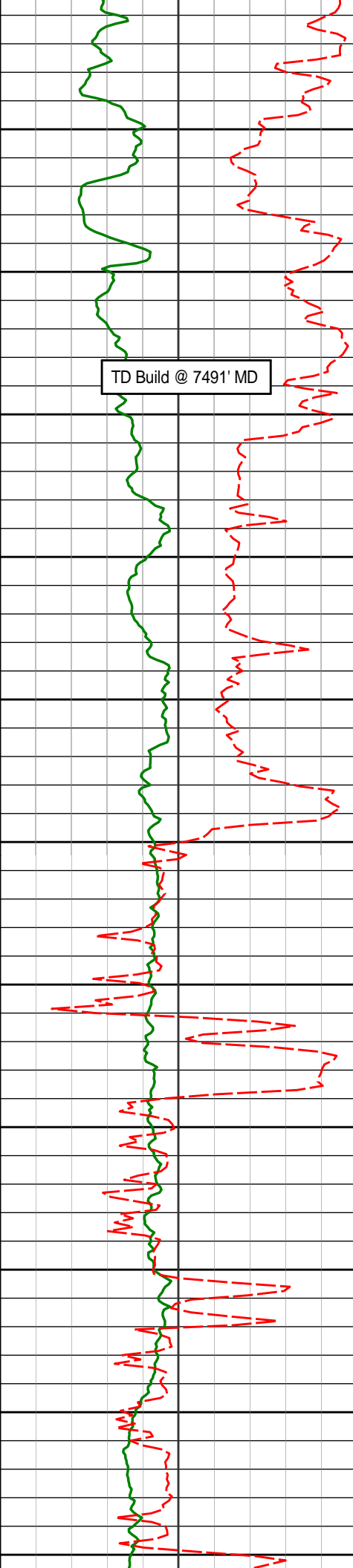
5700





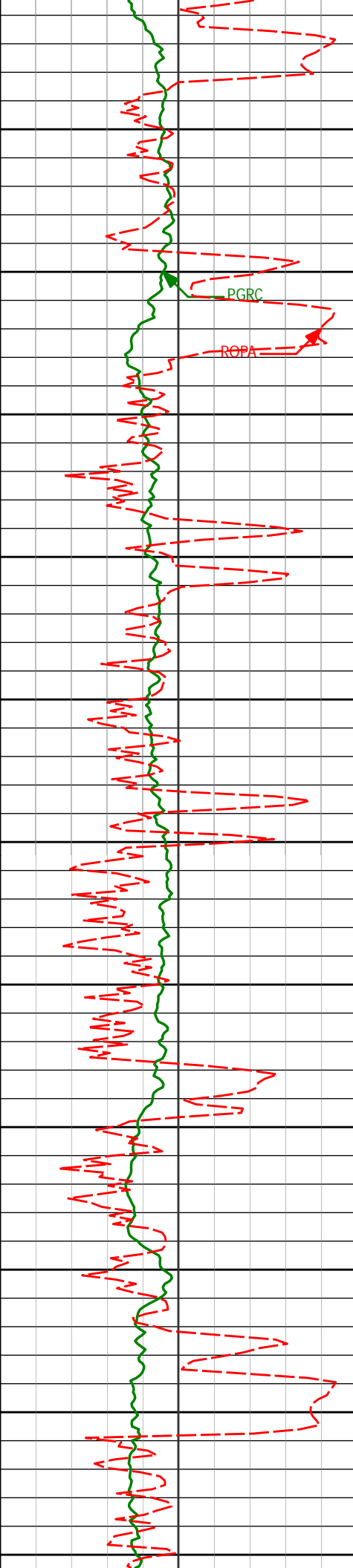
| | | | | |
|----------------------|--------|---------|----------|---------|
| 6285' | 0.61° | 249.68° | 6244.30' | 427.92' |
| 6300 | | | | |
| 6350 | | | | |
| 6380' | 0.68° | 253.38° | 6339.29' | 426.93' |
| 6400 | | | | |
| 6450 | | | | |
| <div>200</div> 6474' | 0.89° | 273.24° | 6433.28' | 425.67' |
| 6500 | | | | |
| 6550 | | | | |
| 6569' | 6.35° | 77.64° | 6528.11' | 430.02' |
| 6600 | | | | |
| 6650 | | | | |
| 6664' | 14.72° | 78.99° | 6621.43' | 446.86' |
| 6700 | | | | |
| 6750 | | | | |
| 6758' | 20.49° | 85.32° | 6711.00' | 474.83' |
| 6800 | | | | |



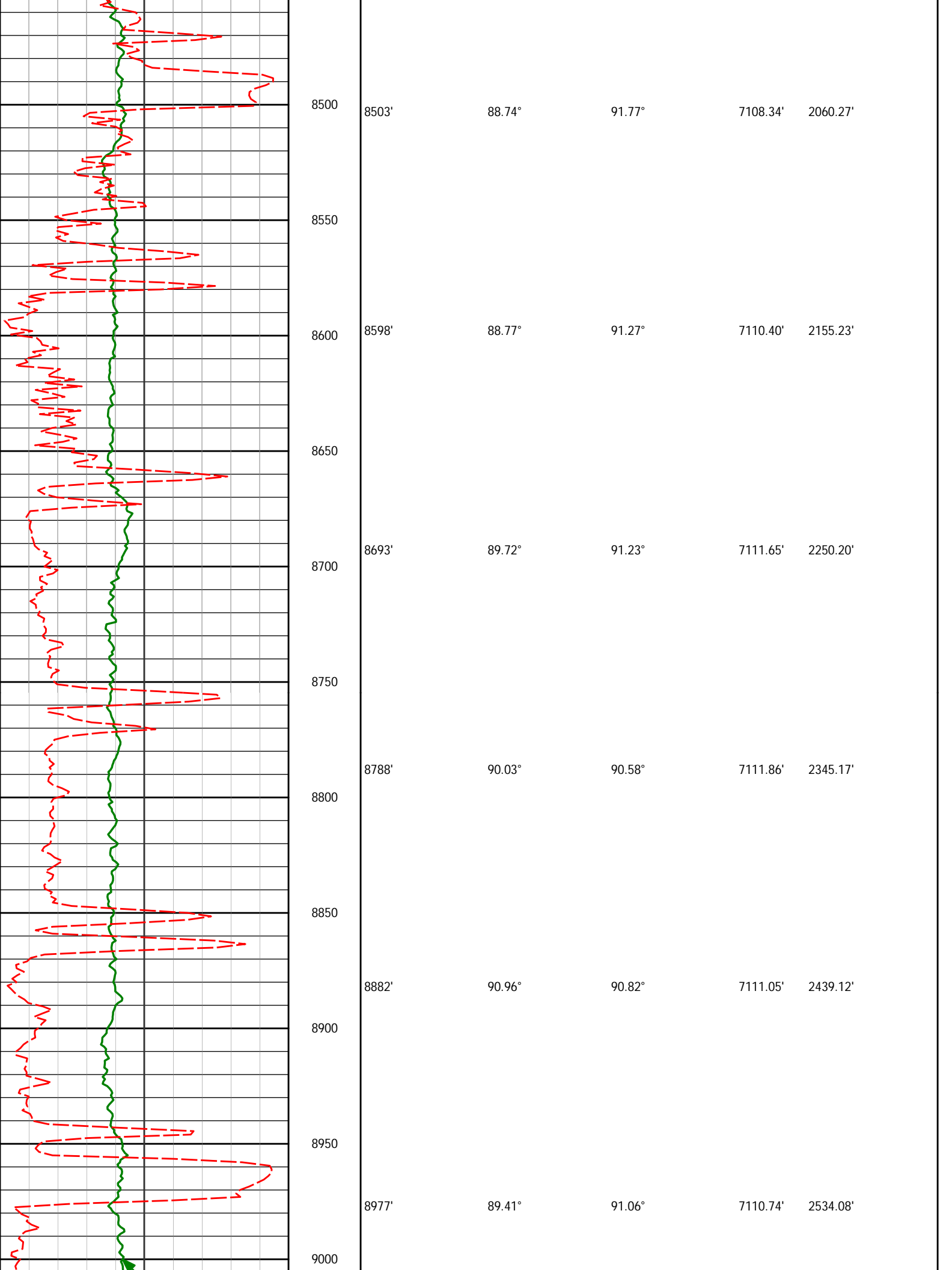


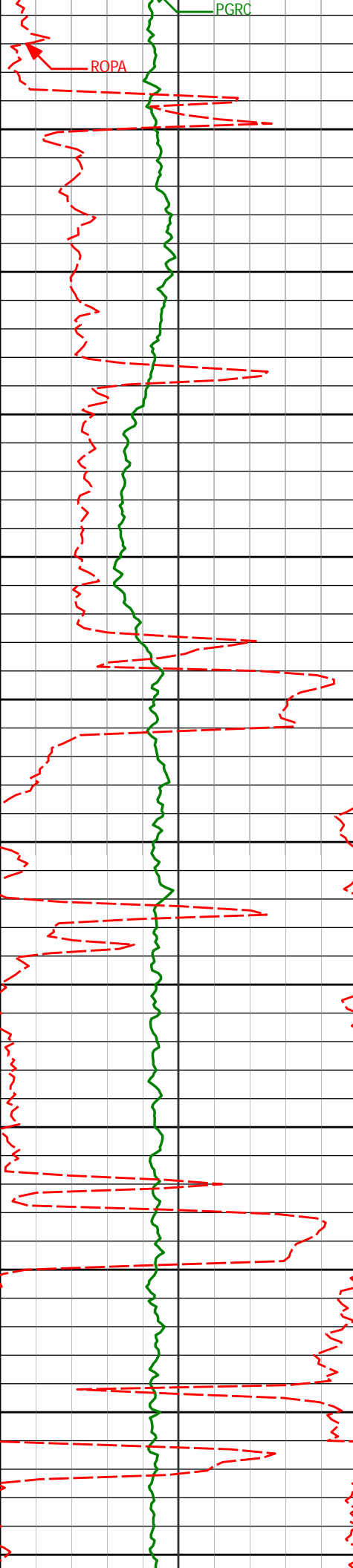
300/400

| | | | | |
|-------|--------|--------|----------|----------|
| 7375' | 76.89° | 91.64° | 7078.44' | 935.05' |
| 7400 | | | | |
| 7437' | 80.06° | 92.00° | 7090.83' | 995.79' |
| 7450 | | | | |
| 7500 | | | | |
| 7511' | 84.66° | 90.90° | 7100.66' | 1069.10' |
| 7550 | | | | |
| 7561' | 85.21° | 90.65° | 7105.08' | 1118.88' |
| 7600 | | | | |
| 7650 | | | | |
| 7653' | 87.38° | 90.36° | 7111.02' | 1210.63' |
| 7700 | | | | |
| 7744' | 89.75° | 90.18° | 7113.30' | 1301.53' |
| 7750 | | | | |
| 7800 | | | | |
| 7840' | 90.40° | 89.63° | 7113.18' | 1397.43' |
| 7850 | | | | |
| 7900 | | | | |



| | | | | |
|-------|--------|--------|----------|----------|
| 7935' | 90.96° | 91.07° | 7112.05' | 1492.36' |
| 7950 | | | | |
| 8000 | | | | |
| 8029' | 89.78° | 92.23° | 7111.44' | 1586.34' |
| 8050 | | | | |
| 8100 | | | | |
| 8124' | 90.34° | 92.36° | 7111.34' | 1681.34' |
| 8150 | | | | |
| 8200 | | | | |
| 8219' | 90.86° | 91.73° | 7110.35' | 1776.33' |
| 8250 | | | | |
| 8300 | | | | |
| 8314' | 91.54° | 91.72° | 7108.36' | 1871.31' |
| 8350 | | | | |
| 8400 | | | | |
| 8408' | 89.88° | 91.57° | 7107.19' | 1965.29' |
| 8450 | | | | |





9050

9071'

89.94°

90.63°

7111.27'

2628.04'

9100

9150

9166'

90.74°

90.79°

7110.71'

2722.99'

9200

9250

9261'

88.89°

90.54°

7111.02'

2817.94'

9300

9350

9356'

89.54°

90.15°

7112.32'

2912.87'

9400

9450

9451'

88.83°

90.58°

7113.67'

3007.79'

9500

9550

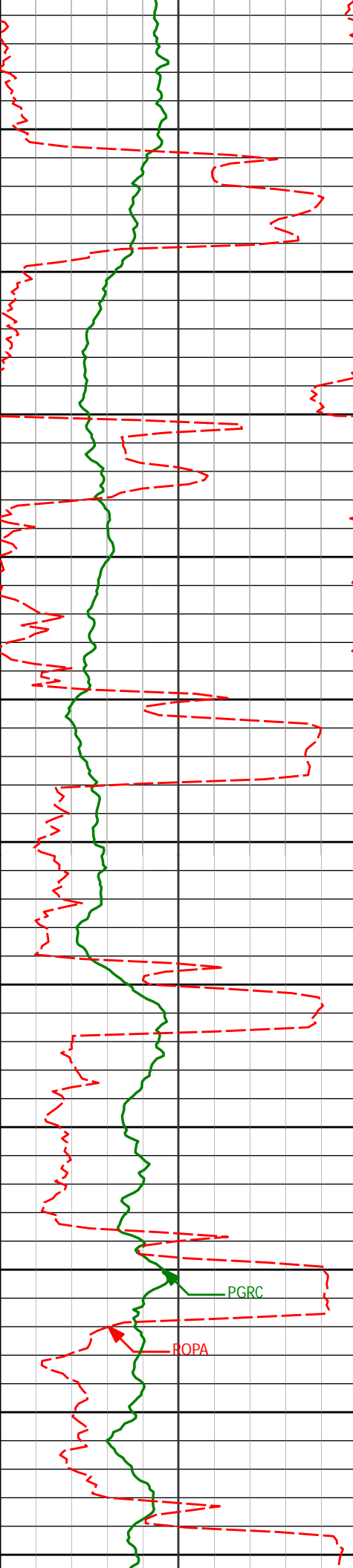
9545'

89.57°

90.44°

7114.98'

3101.73'



9600

9640'

9650

9700

9734'

9750

9800

9829'

9850

9900

9924'

9950

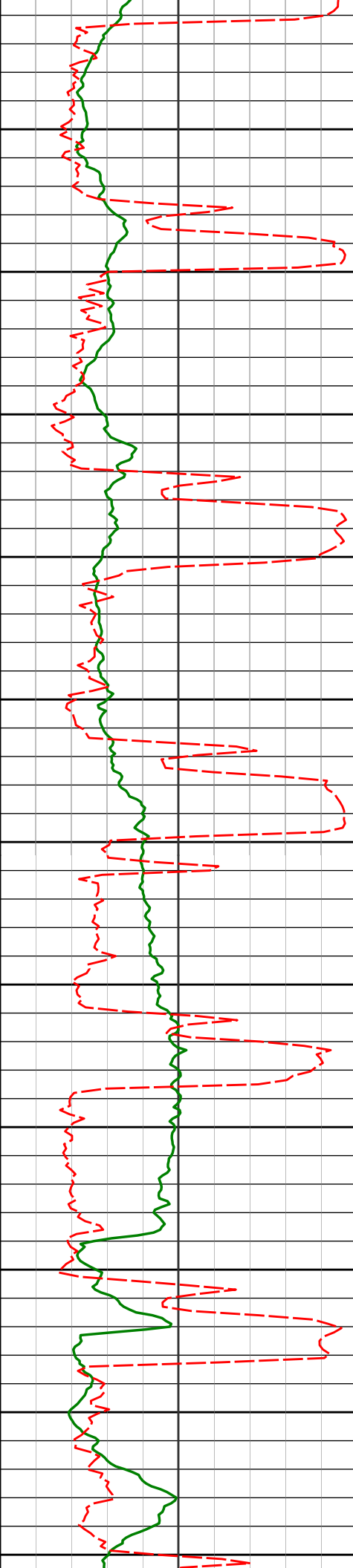
10000

10019'

10050

10100

| | | | | |
|--------|--------|--------|----------|----------|
| | 89.72° | 91.59° | 7115.57' | 3196.70' |
| 9640' | | | | |
| 9734' | 91.14° | 91.44° | 7114.87' | 3290.68' |
| 9829' | 91.26° | 91.58° | 7112.88' | 3385.64' |
| 9924' | 91.14° | 91.18° | 7110.89' | 3480.61' |
| 10019' | 90.80° | 91.50° | 7109.28' | 3575.57' |



10150

10200

10250

10300

10350

10400

10450

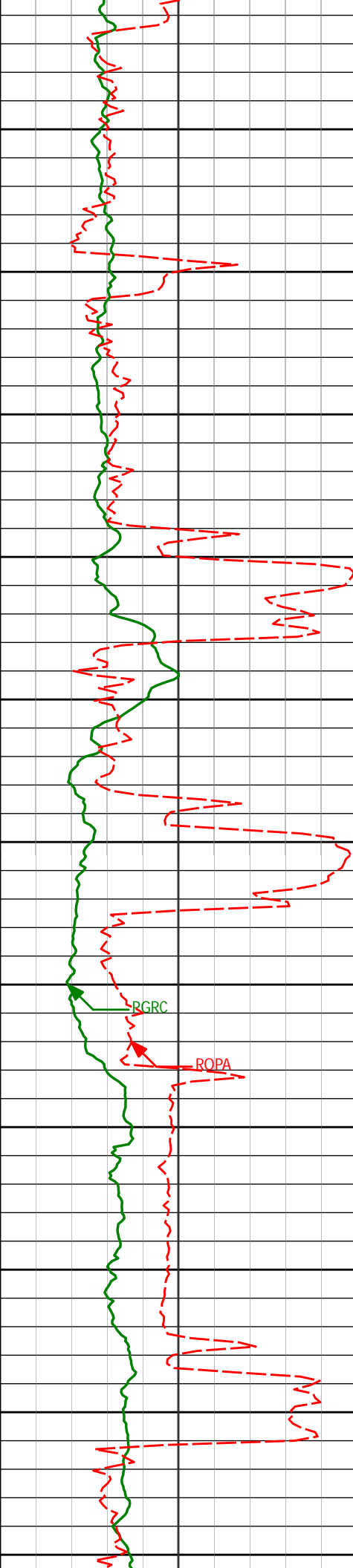
10500

10550

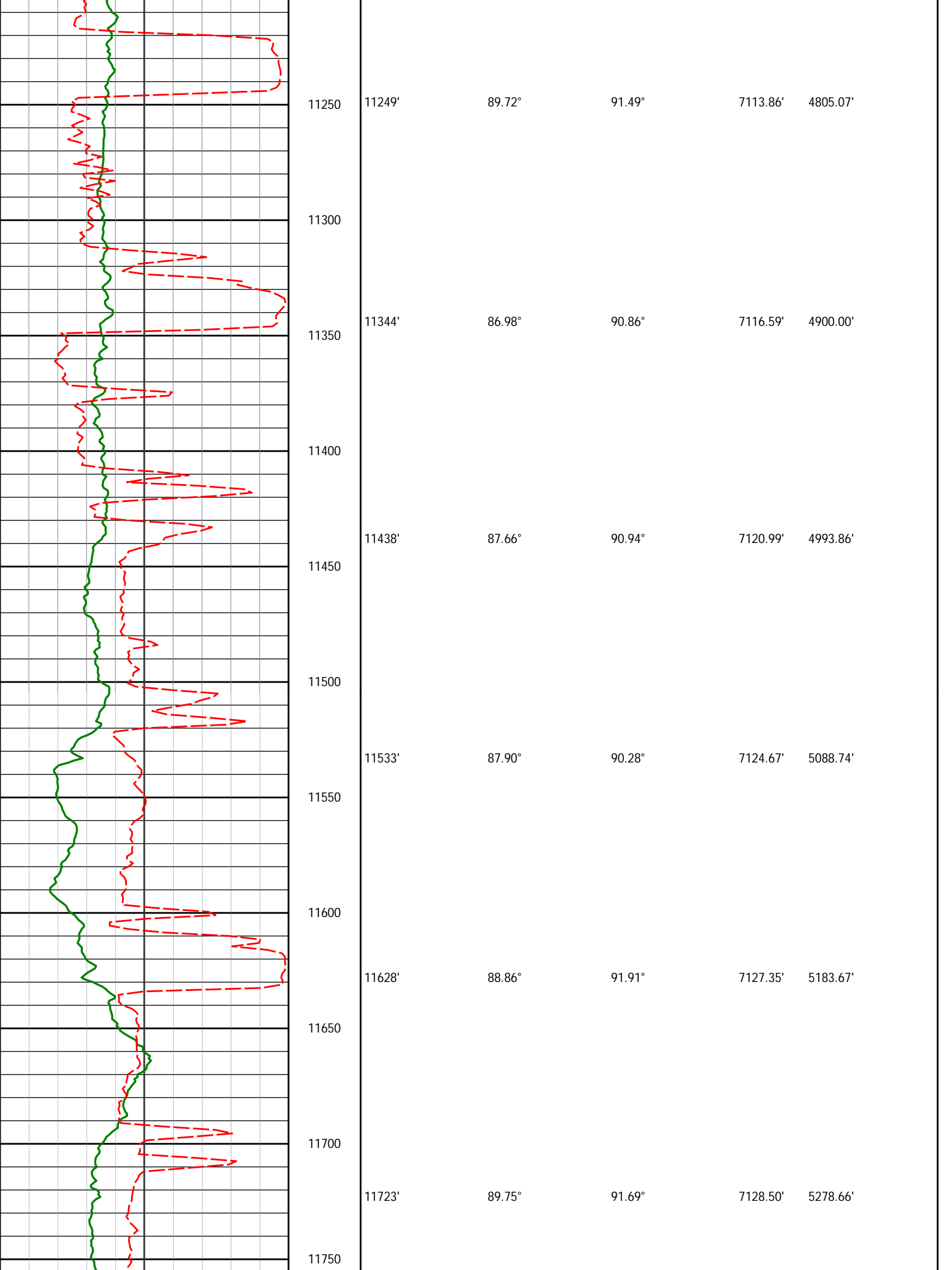
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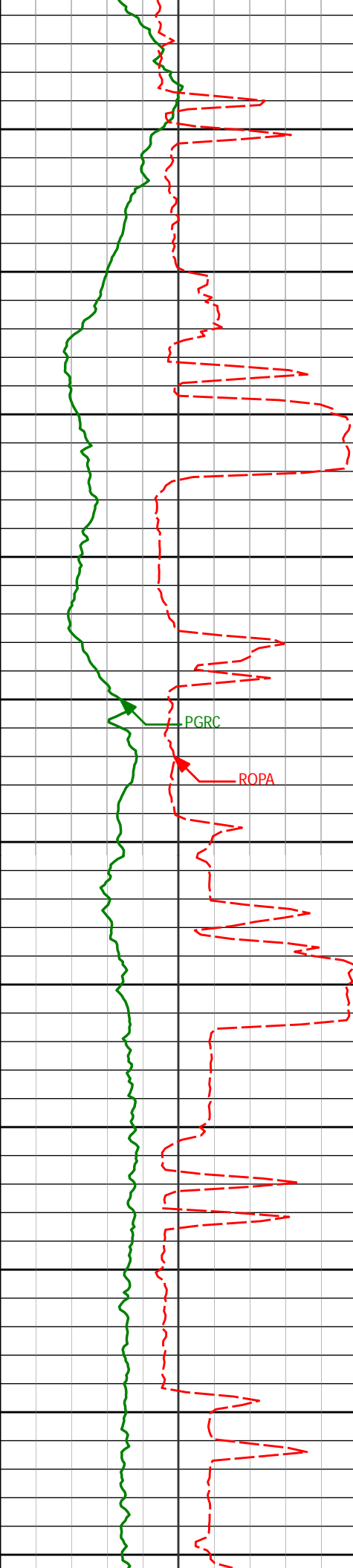
10650

| | | | | |
|--------|--------|--------|----------|----------|
| 10114' | 89.69° | 91.91° | 7108.87' | 3670.56' |
| 10208' | 90.31° | 91.95° | 7108.87' | 3764.56' |
| 10303' | 89.75° | 91.94° | 7108.82' | 3859.56' |
| 10397' | 89.23° | 92.20° | 7109.66' | 3953.55' |
| 10492' | 89.29° | 91.88° | 7110.89' | 4048.54' |
| 10587' | 88.12° | 91.53° | 7113.03' | 4143.50' |



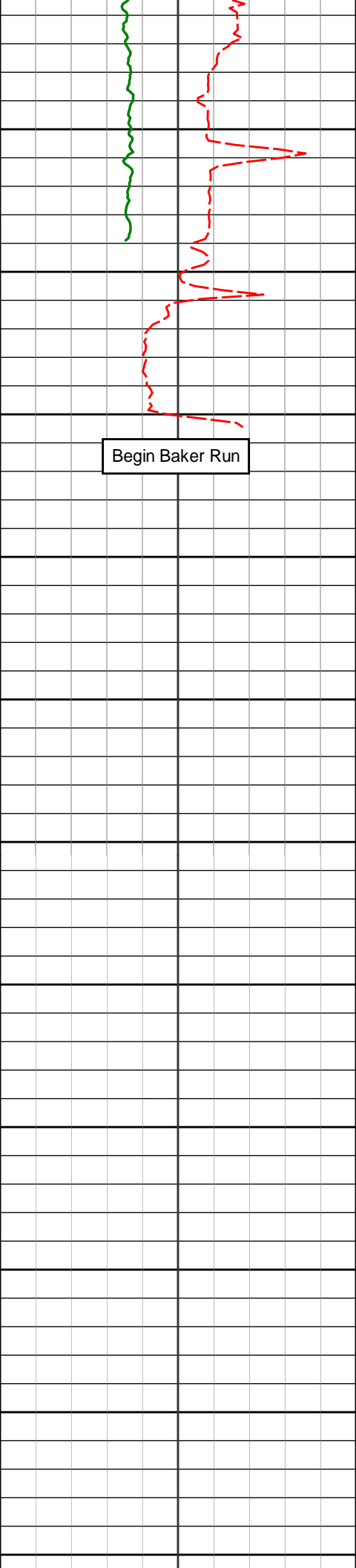
| | | | | |
|--------|--------|--------|----------|----------|
| 10681' | 88.49° | 91.10° | 7115.81' | 4237.44' |
| 10700 | | | | |
| 10750 | | | | |
| 10776' | 89.51° | 88.98° | 7117.47' | 4332.34' |
| 10800 | | | | |
| 10850 | | | | |
| 10871' | 91.51° | 90.65° | 7116.63' | 4427.22' |
| 10900 | | | | |
| 10950 | | | | |
| 10966' | 89.57° | 91.57° | 7115.73' | 4522.19' |
| 11000 | | | | |
| 11050 | | | | |
| 11060' | 90.93° | 90.69° | 7115.32' | 4616.16' |
| 11100 | | | | |
| 11150 | | | | |
| 11155' | 90.56° | 90.60° | 7114.09' | 4711.10' |
| 11200 | | | | |





11800
11850
11900
11950
12000
12050
12100
12150
12200
12250
12300

| | | | | |
|--------|--------|--------|----------|----------|
| 11818' | 90.71° | 90.49° | 7128.12' | 5373.63' |
| 11913' | 90.74° | 92.37° | 7126.92' | 5468.60' |
| 12007' | 91.51° | 91.79° | 7125.08' | 5562.58' |
| 12102' | 90.46° | 92.49° | 7123.44' | 5657.56' |
| 12196' | 89.66° | 91.98° | 7123.34' | 5751.56' |
| 12291' | 90.31° | 91.61° | 7123.37' | 5846.55' |



12350

12386'

89.60°

90.81°

7123.44'

5941.53'

12400

12450

12449'

90.00°

92.87°

7123.66'

6004.52'

12500

12550

12541'

92.96°

93.78°

7121.29'

6096.47'

12600

12650

12634'

95.87°

96.01°

7114.13'

6189.09'

12700

12750

12800

12850

12726'

92.53°

95.58°

7107.39'

6280.68'

12818'

91.63°

94.85°

7104.05'

6372.51'

| Station | Distance (ft) | Bearing | Angle (°) | Easting (ft) | Northing (ft) |
|---------|---------------|---------|-----------|--------------|---------------|
| 12900 | 12913' | 89.69° | 93.23° | 7102.96' | 6467.46' |
| 12950 | | | | | |
| 13000 | 13008' | 89.16° | 93.33° | 7103.91' | 6562.44' |
| 13050 | | | | | |
| 13100 | 13103' | 89.07° | 92.91° | 7105.38' | 6657.42' |
| 13150 | | | | | |
| 13200 | 13198' | 89.01° | 91.14° | 7106.97' | 6752.40' |
| 13250 | | | | | |
| 13300 | 13293' | 89.56° | 91.67° | 7108.16' | 6847.38' |
| 13350 | | | | | |
| 13400 | 13388' | 90.03° | 91.54° | 7108.50' | 6942.37' |

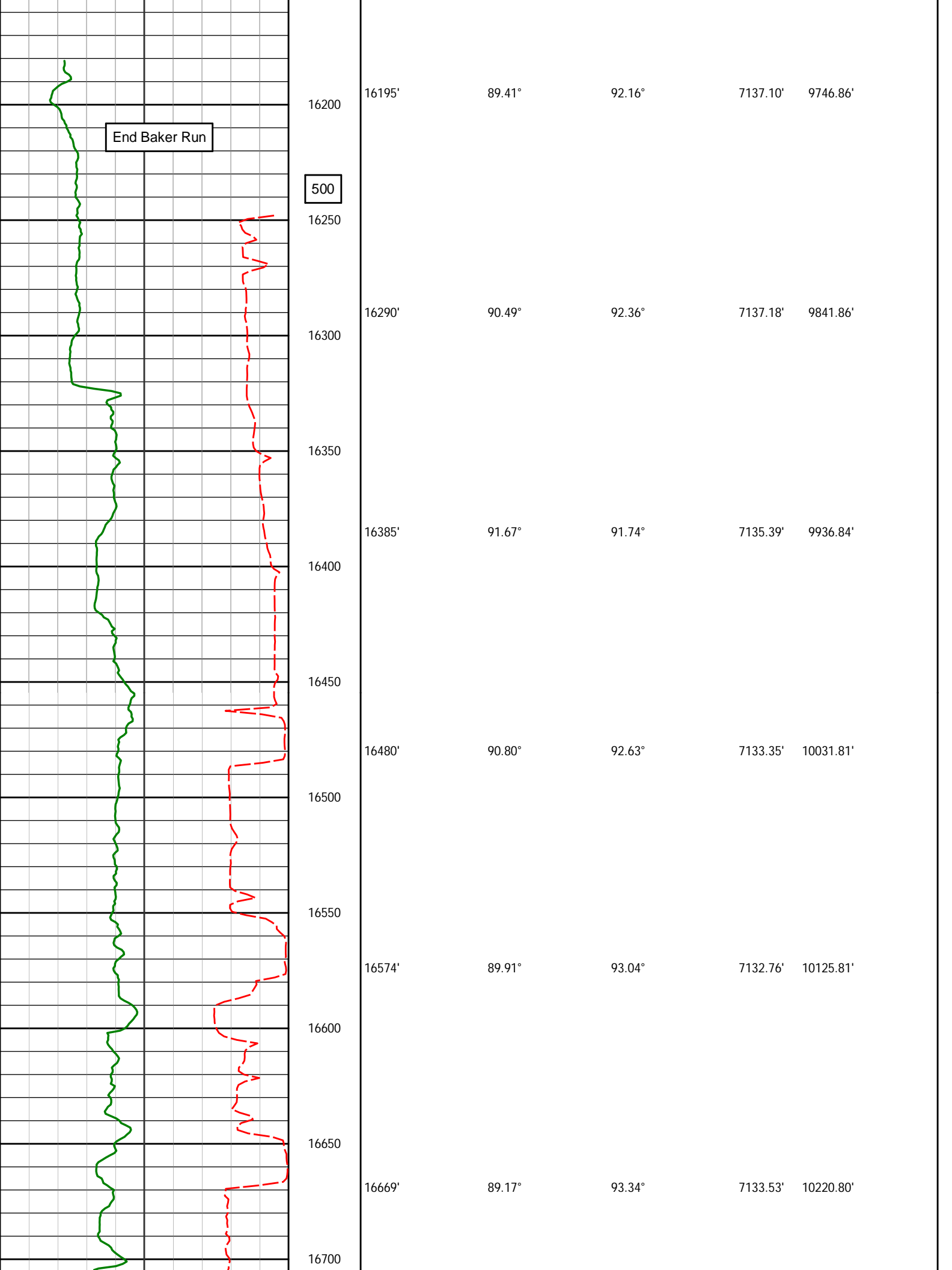
| Station | Distance | Bearing | Latitude | Longitude |
|---------|----------|---------|----------|-------------------|
| 13450 | 13483' | 89.56° | 91.43° | 7108.84' 7037.35' |
| 13500 | | | | |
| 13550 | 13578' | 88.95° | 91.51° | 7110.07' 7132.33' |
| 13600 | | | | |
| 13650 | 13672' | 88.98° | 91.99° | 7111.77' 7226.31' |
| 13700 | | | | |
| 13750 | 13767' | 89.01° | 90.80° | 7113.44' 7321.28' |
| 13800 | | | | |
| 13850 | 13862' | 89.07° | 89.86° | 7115.03' 7416.20' |
| 13900 | | | | |
| 13950 | | | | |

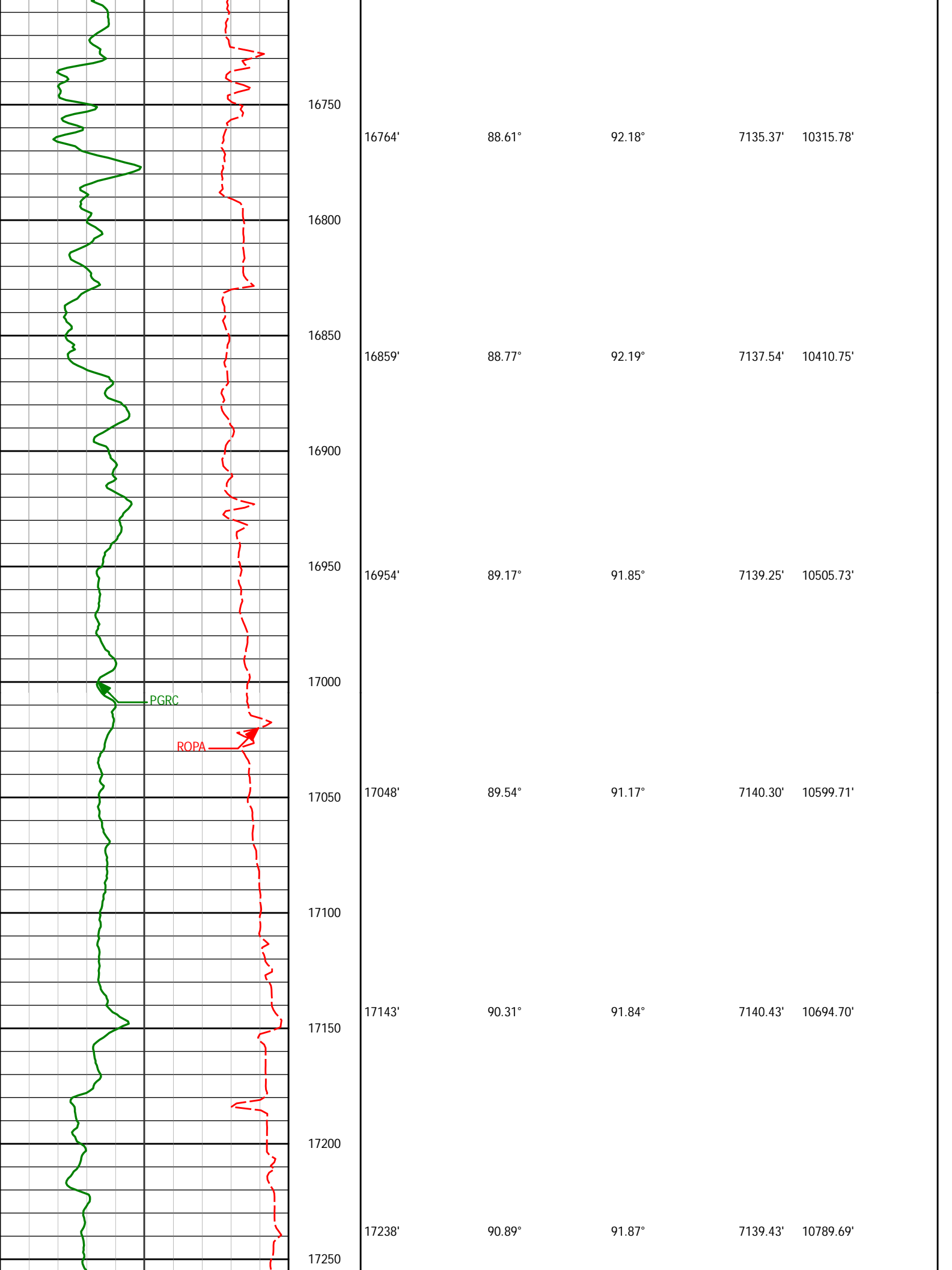
| Station | Distance (ft) | Bearing | Angle (°) | Latitude (ft) | Longitude (ft) |
|---------|---------------|---------|-----------|---------------|----------------|
| 13950 | | 89.32° | | 7116.33' | 7509.06' |
| 14000 | | | | | |
| 14050 | 14050' | 89.79° | 88.99° | 7117.07' | 7603.88' |
| 14100 | | | | | |
| 14150 | 14145' | 89.17° | 89.84° | 7117.93' | 7698.74' |
| 14200 | | | | | |
| 14250 | 14240' | 89.39° | 90.71° | 7119.13' | 7793.66' |
| 14300 | | | | | |
| 14350 | 14334' | 89.34° | 91.82° | 7120.17' | 7887.63' |
| 14400 | | | | | |
| 14450 | 14429' | 89.13° | 92.68° | 7121.44' | 7982.63' |
| 14500 | | | | | |

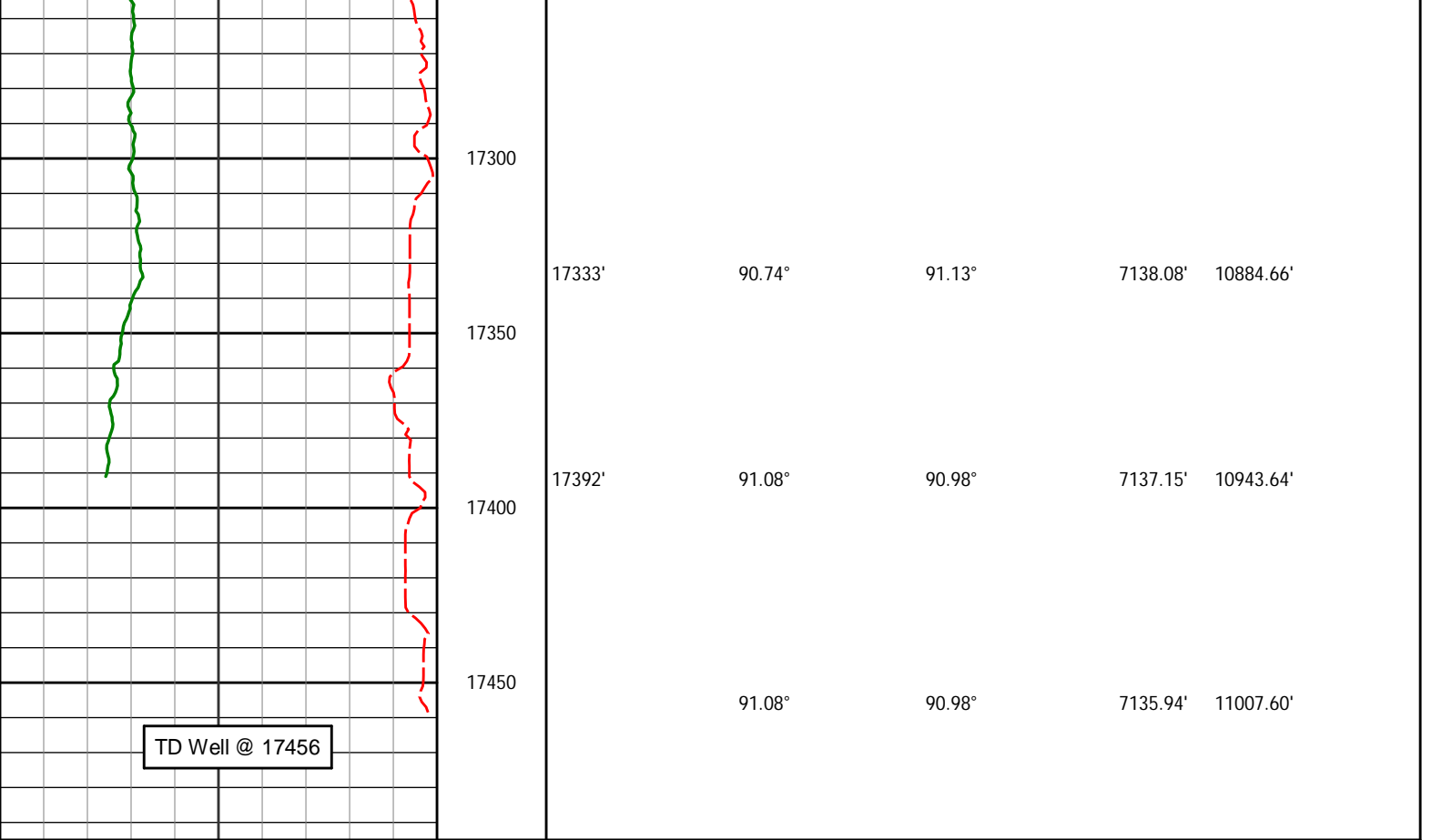
[illegible]

| Station | Distance (ft) | Bearing | Angle (°) | Latitude (ft) | Longitude (ft) |
|---------|---------------|---------|-----------|---------------|----------------|
| 15100 | 15093' | 90.00° | 87.91° | 7131.87' | 8645.54' |
| 15150 | | | | | |
| 15200 | 15188' | 90.82° | 89.02° | 7131.19' | 8740.31' |
| 15250 | | | | | |
| 15300 | 15282' | 88.98° | 90.91° | 7131.35' | 8834.21' |
| 15350 | | | | | |
| 15400 | 15378' | 89.47° | 90.91° | 7132.65' | 8930.17' |
| 15450 | | | | | |
| 15500 | 15472' | 88.95° | 90.72° | 7133.94' | 9024.12' |
| 15550 | | | | | |
| 15600 | 15567' | 89.78° | 90.37° | 7135.00' | 9119.06' |

[illegible]





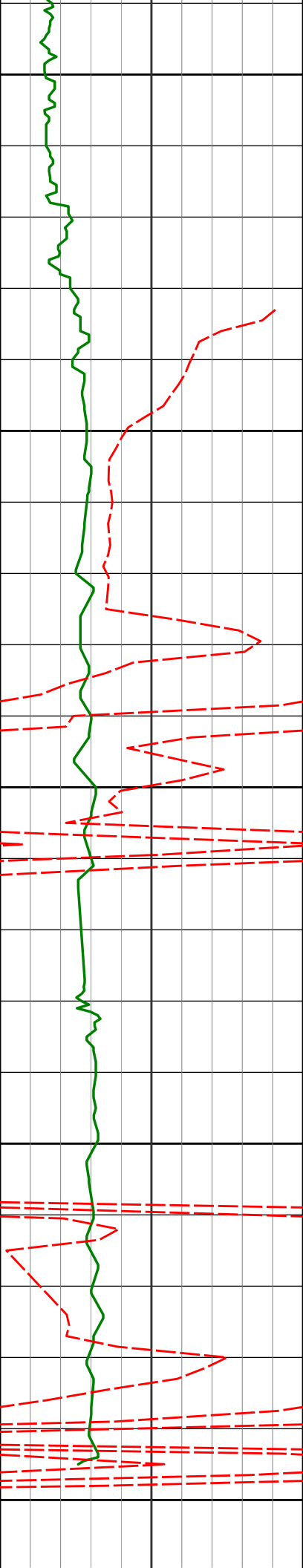


| | | | | | | | |
|--|--|-------------|-------|------|------|-----|------|
| <div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div> | | Depth ft | Depth | Inc. | Azi. | TVD | V.S. |
| <div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div> | | | | | | | |

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy
Shable K08-68-1HN
H&P 321
Sec. 7-T4N-R66W

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



Run 100

600

650

700

750

800

599'

0.20°

56.53°

599.00'

1.32'

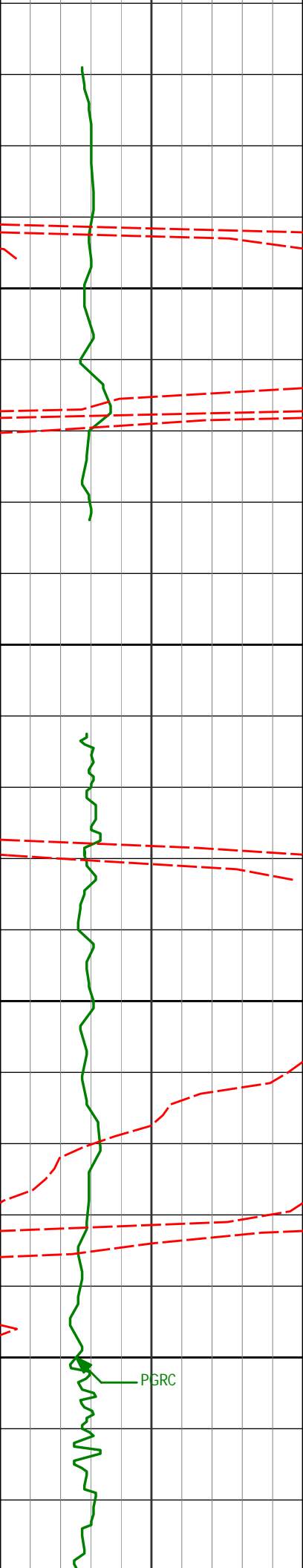
721'

0.18°

202.61°

721.00'

1.42'



850

900

950

1000

PGRC

813'

0.34°

214.58°

813.00'

1.23'

905'

0.25°

204.07°

905.00'

1.01'

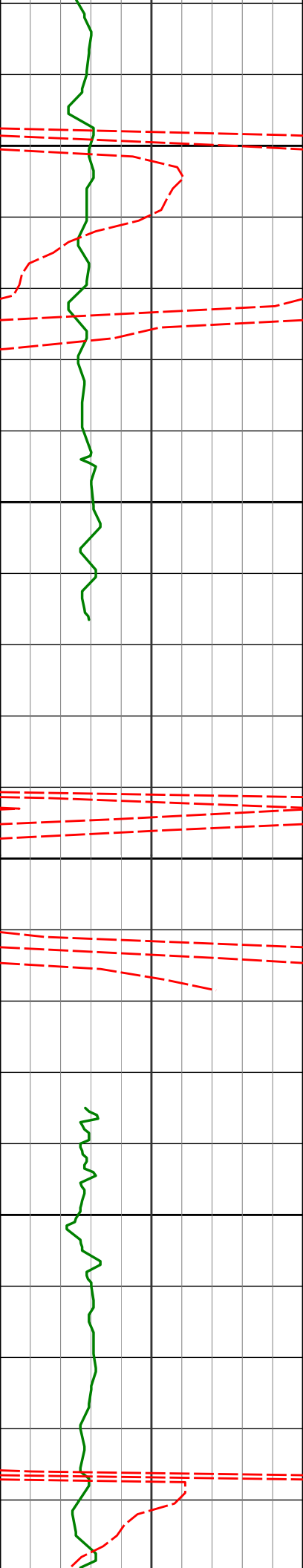
996'

0.37°

169.13°

995.99'

1.01'



1050

1100

1150

1200

1250

1089'

0.51°

169.39°

1088.99'

1.17'

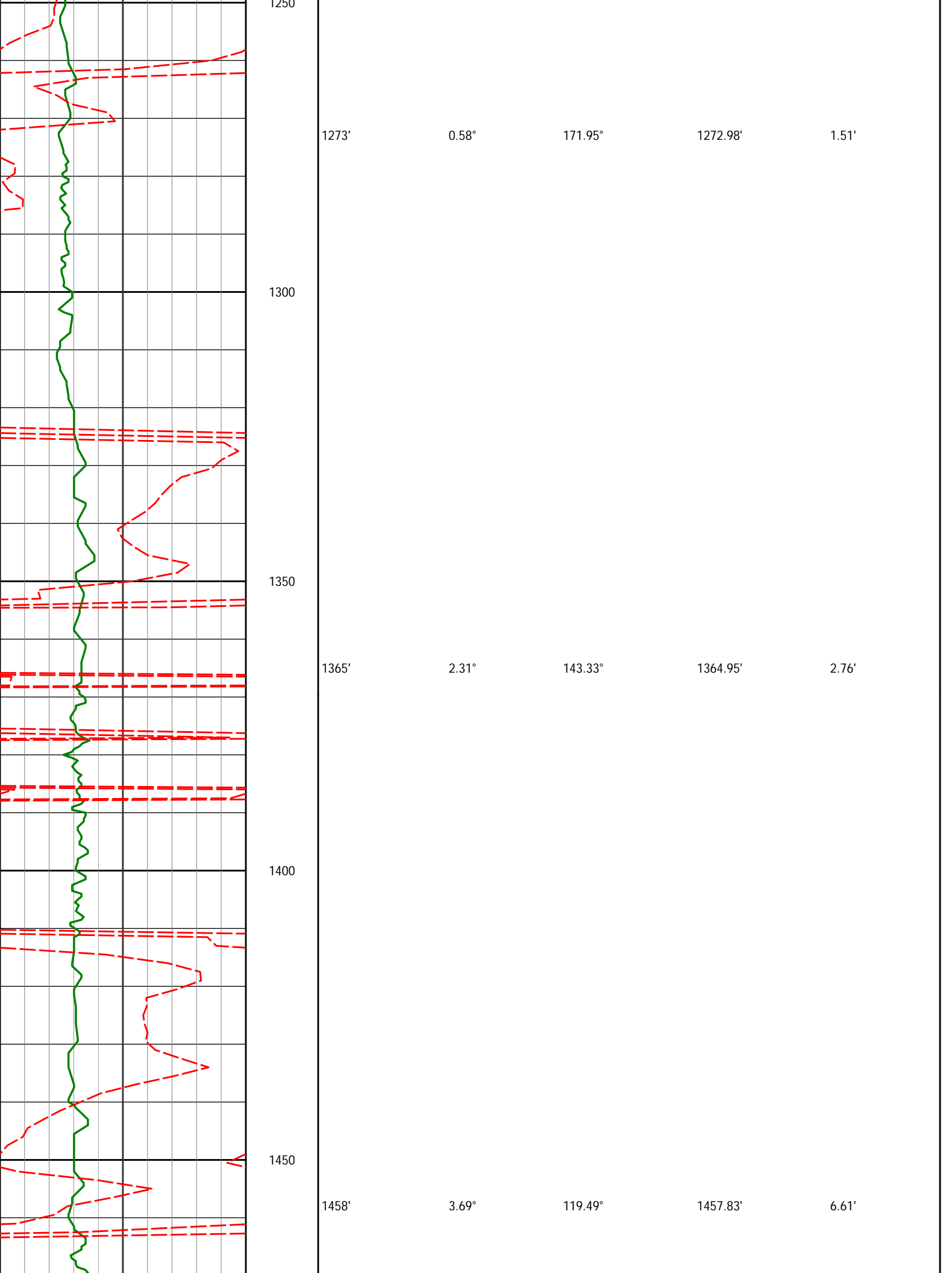
1180'

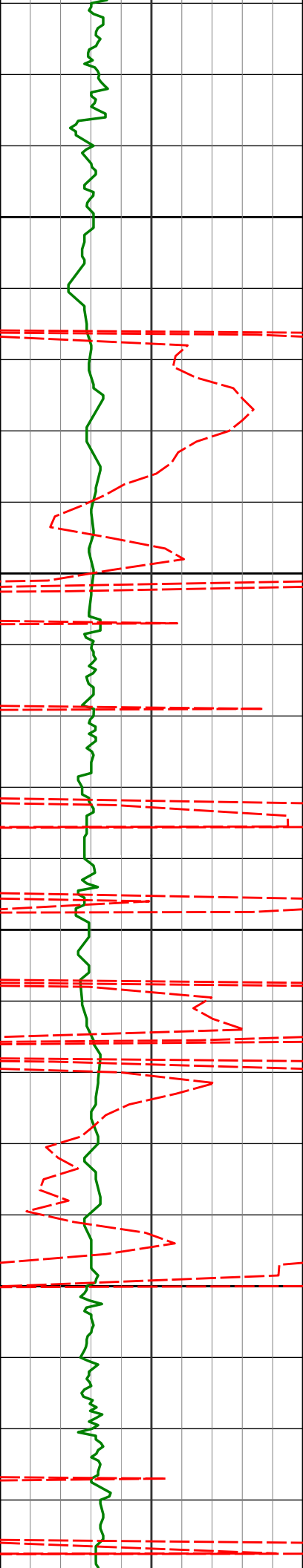
0.50°

170.79°

1179.99'

1.34'





1500

1550

1600

1650

1550'

4.96°

105.49°

1549.56'

13.12'

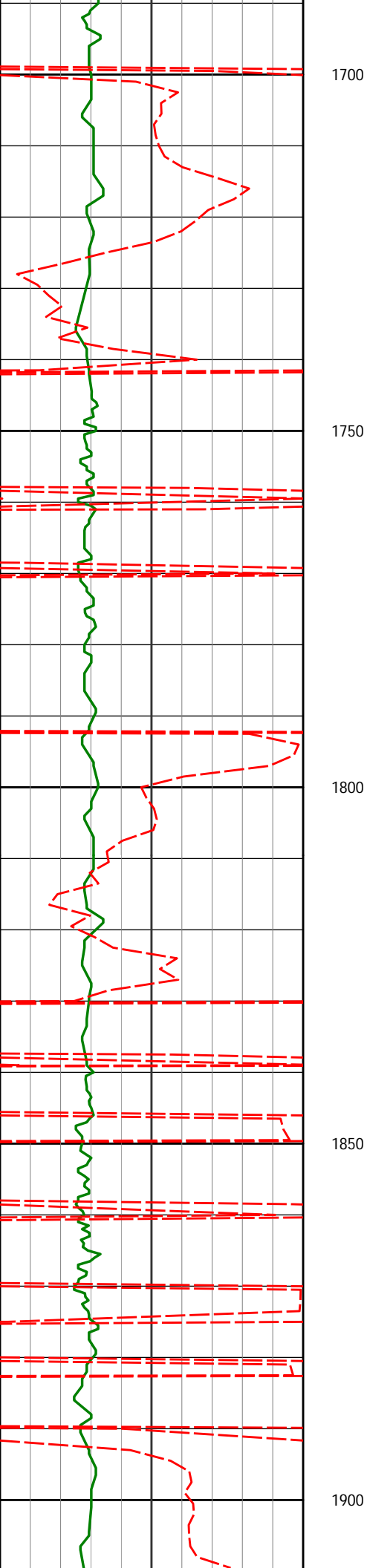
1642'

6.61°

101.06°

1641.09'

22.24'



1737'

8.30°

98.08°

1735.29'

34.47'

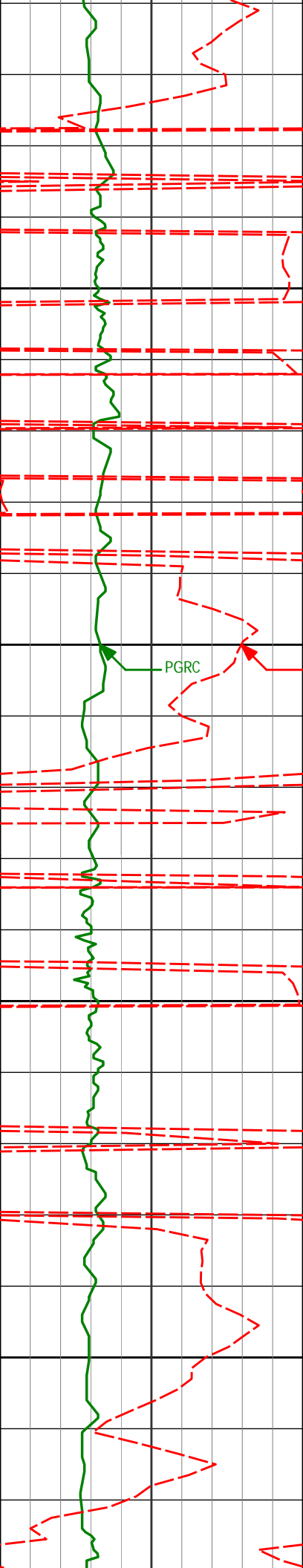
1831'

10.92°

100.14°

1827.96'

50.05'



1926'

9.26°

105.32°

1921.49'

66.42'

1950

2000

PGRC

ROPA

2021'

9.02°

111.27°

2015.29'

80.92'

2050

2100

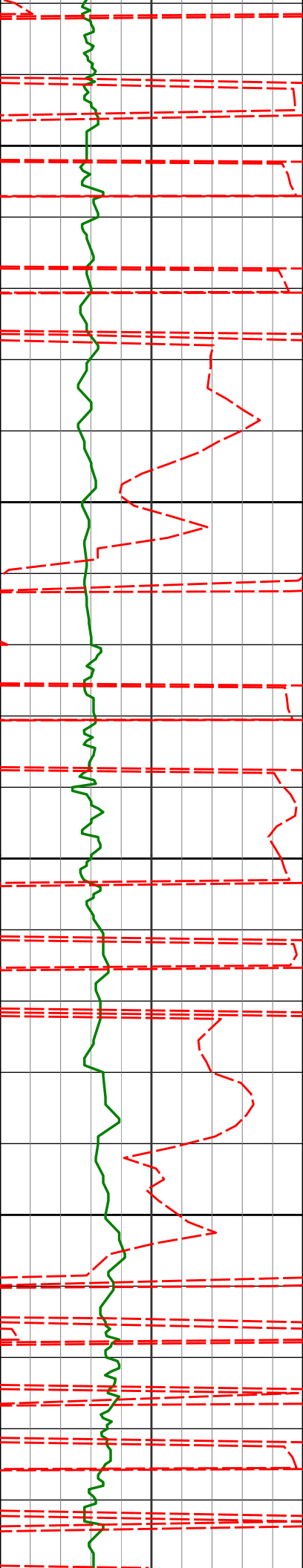
2116'

9.38°

119.24°

2109.07'

94.88'



2150

2200

2250

2300

2350

2211'

9.40°

116.83°

2202.79'

108.86'

2305'

9.14°

122.74°

2295.57'

122.30'



2400

2450

2500

2550

2401'

2495'

10.15°

10.22°

126.66°

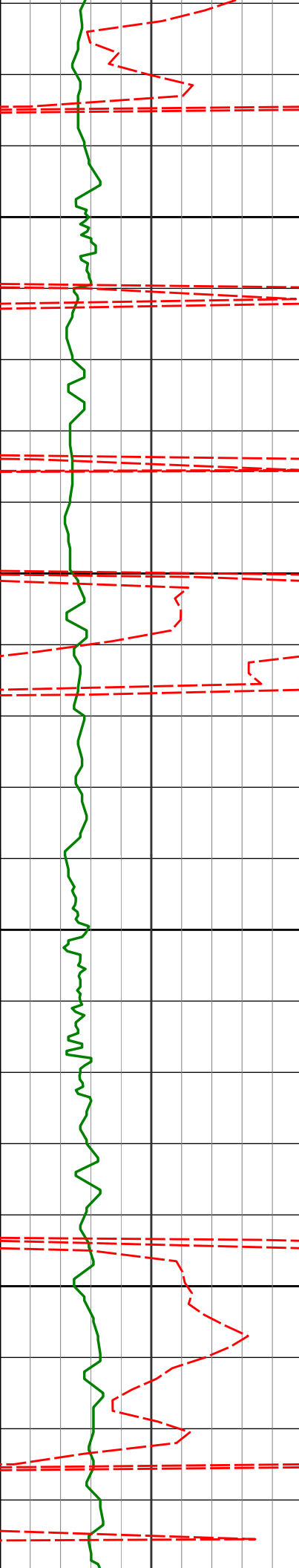
123.21°

2390.21'

2482.73'

135.88'

149.90'



2600

2650

2700

2750

2590'

12.15°

122.69°

2575.92'

165.78'

2685'

13.00°

122.27°

2668.64'

183.69'

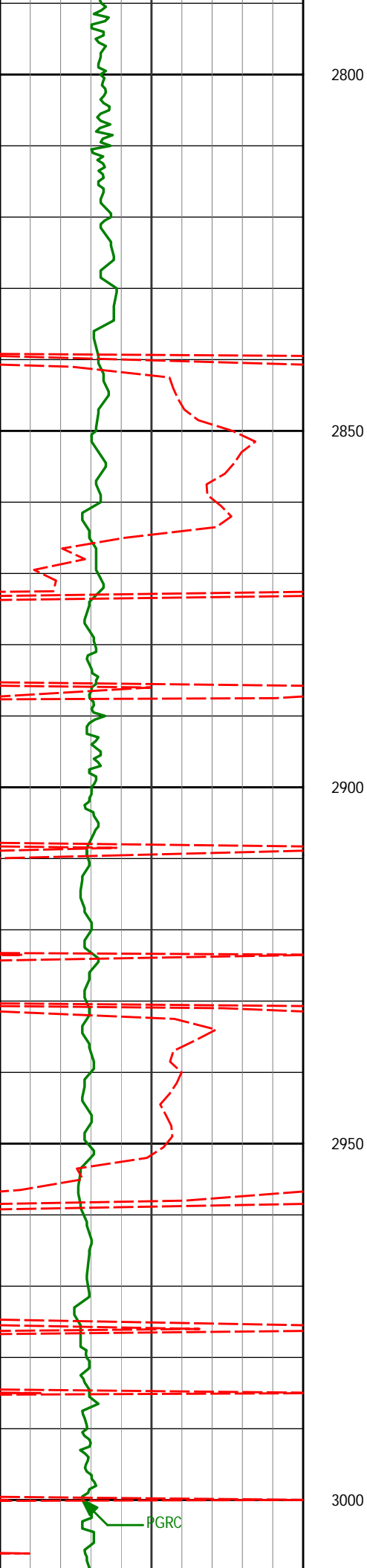
2780'

11.14°

125.23°

2761.54'

200.68'



2875'

8.07°

125.91°

2855.20'

213.96'

2969'

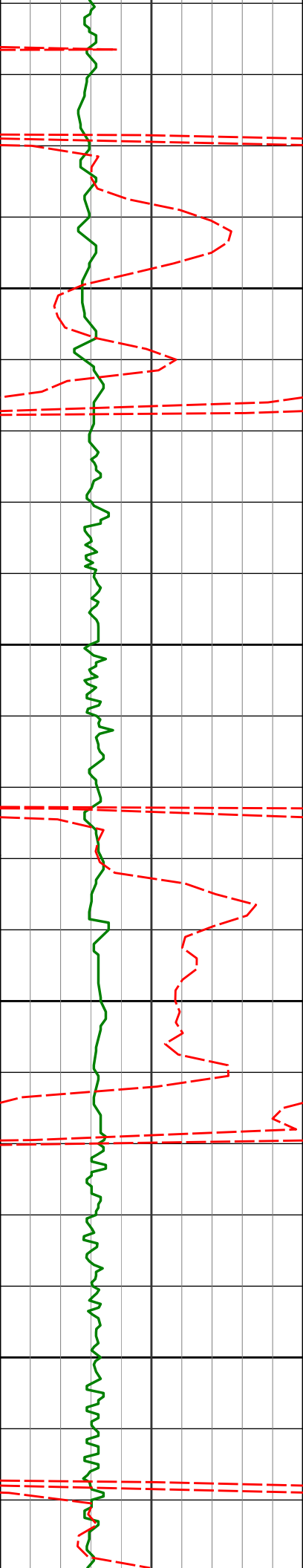
6.59°

126.76°

2948.43'

223.93'

PGRC



3050

3064'

6.78°

114.89°

3042.78'

233.61'

3100

3150

3159'

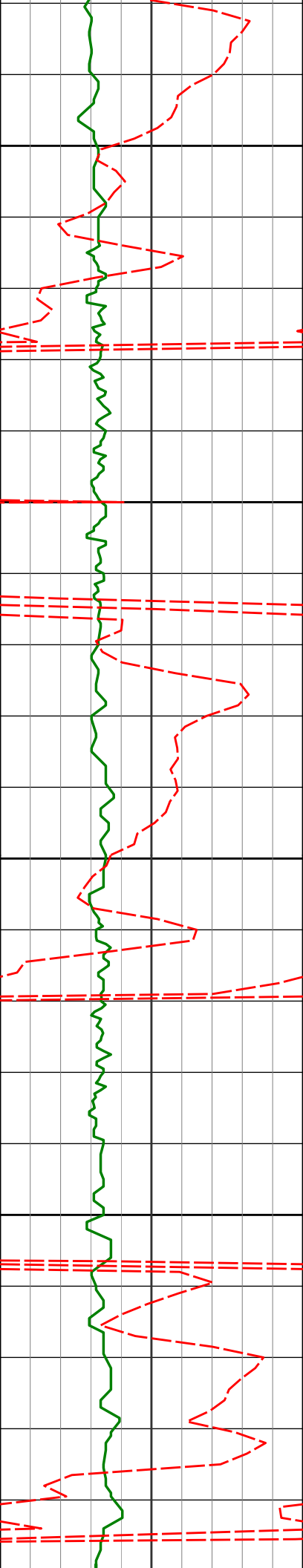
6.47°

114.31°

3137.15'

243.76'

3200



3250

3253'

8.48°

110.05°

3230.35'

255.29'

3300

3350

3348'

10.04°

120.03°

3324.11'

269.31'

3400

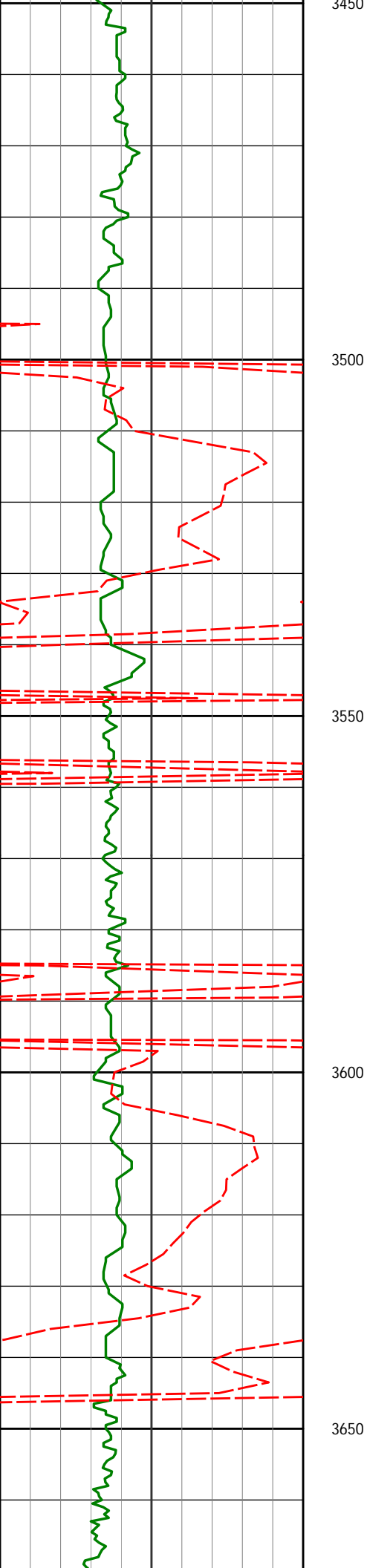
3443'

9.50°

129.68°

3417.74'

282.89'



3538'

9.18°

125.73°

3511.48'

295.47'

3550

3600

3633'

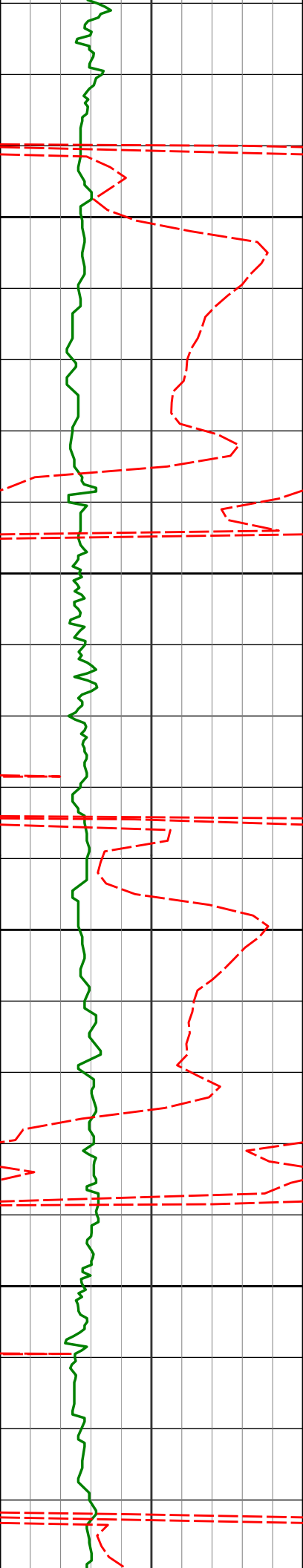
9.01°

123.19°

3605.29'

308.20'

3650



3700

3727'

10.54°

116.80°

3697.92'

322.36'

3750

3800

3822'

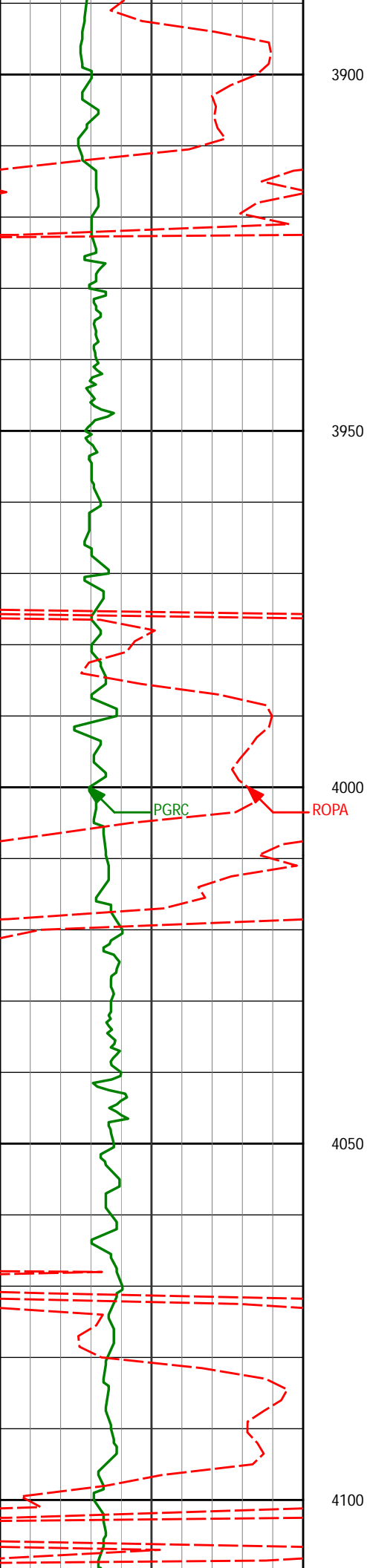
12.55°

113.14°

3791.00'

339.94'

3850



3917'

13.27°

118.15°

3883.60'

359.42'

4011'

12.76°

125.30°

3975.19'

377.87'

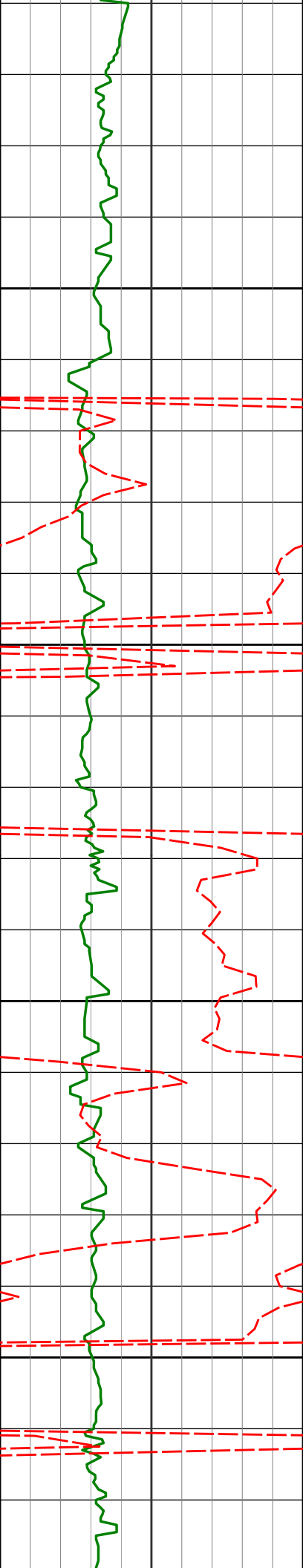
4106'

9.30°

128.63°

4068.42'

392.88'



4150

4200

4250

4300

4201'

4295'

6.89°

6.51°

131.78°

127.70°

4162.47'

4255.83'

403.49'

412.21'



4350

4390'

5.36°

121.54°

4350.32'

420.48'

4400

4450

4485'

5.24°

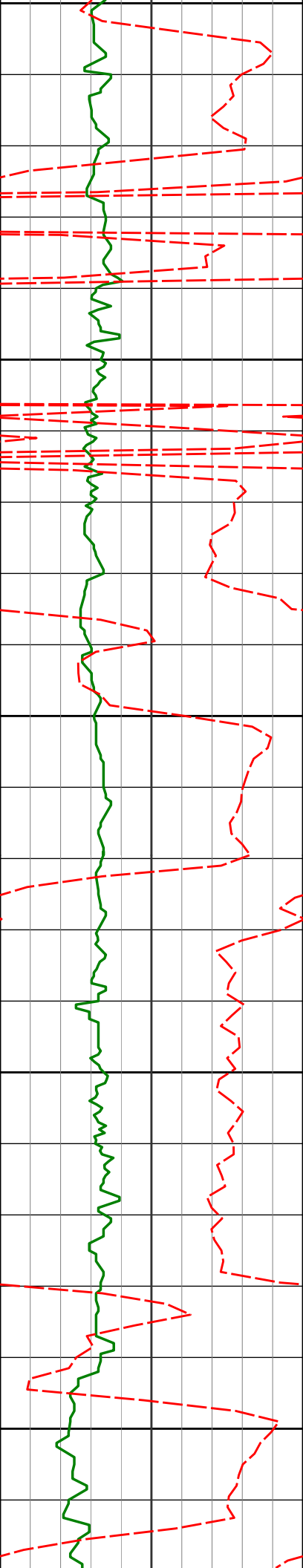
123.57°

4444.91'

428.07'

4500

4550



4550

4580'

3.92°

124.83°

4539.60'

434.53'

4600

4650

4674'

2.09°

141.41°

4633.47'

438.37'

4700

4750

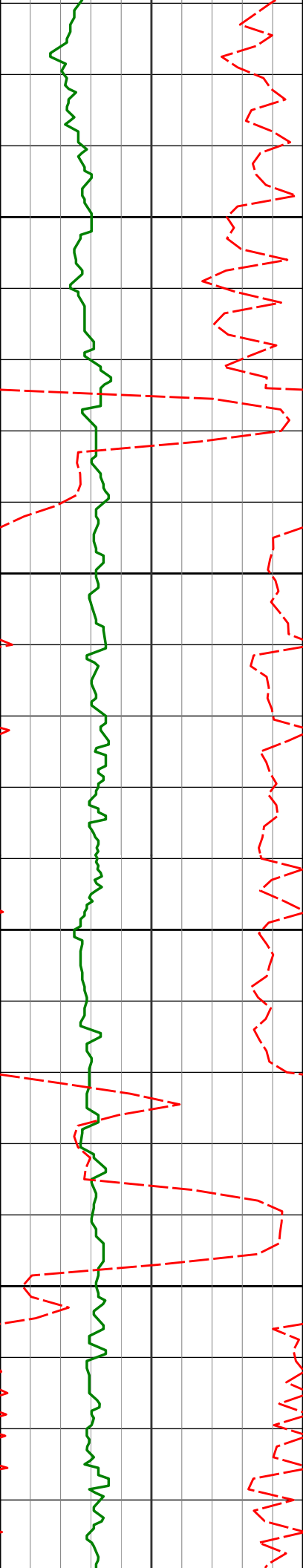
4769'

0.75°

172.90°

4728.44'

439.61'



4800

4850

4900

4950

4864'

0.28°

149.93°

4823.44'

439.84'

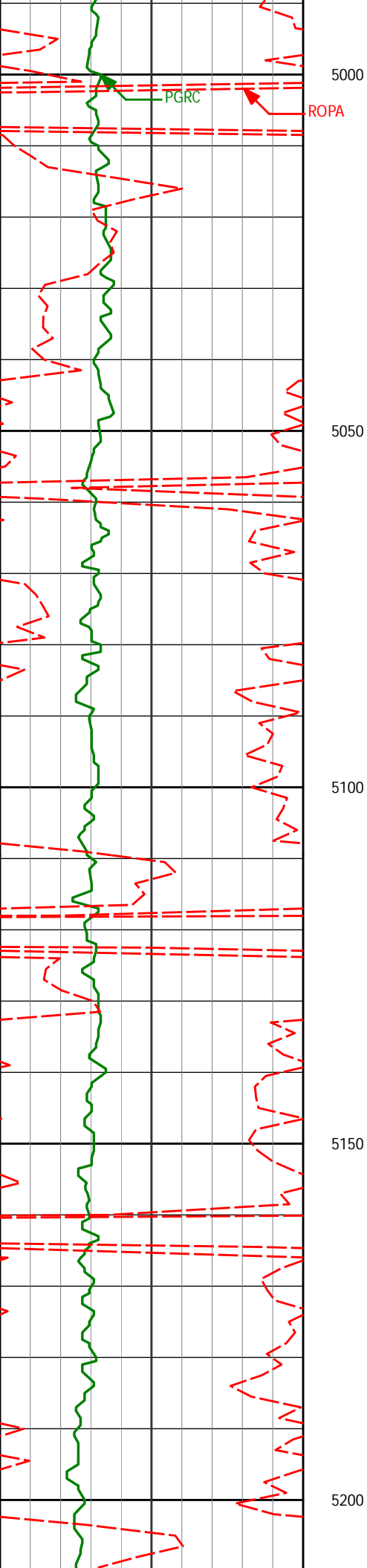
4958'

1.01°

239.15°

4917.43'

439.27'



5053'

0.83°

239.21°

5012.42'

438.00'

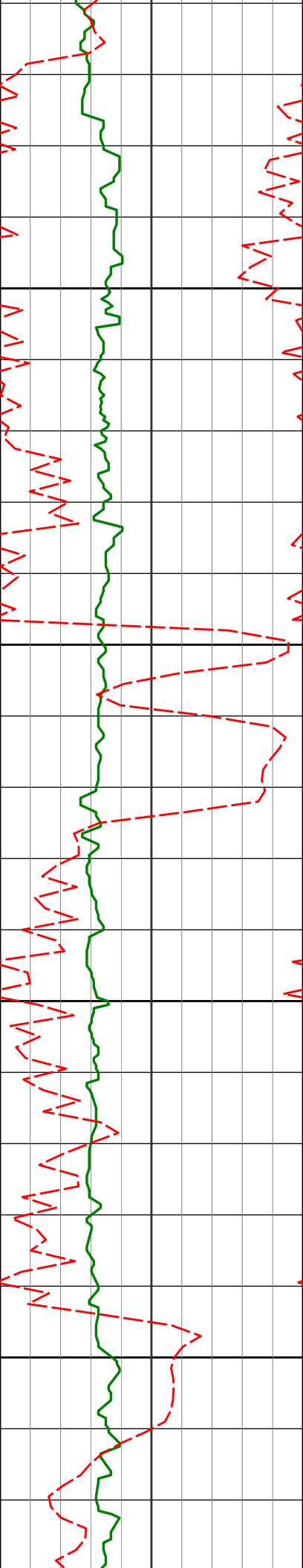
5148'

1.16°

253.86°

5107.41'

436.51'



5243'

1.50°

255.84°

5202.38'

434.41'

5250

5300

5337'

1.18°

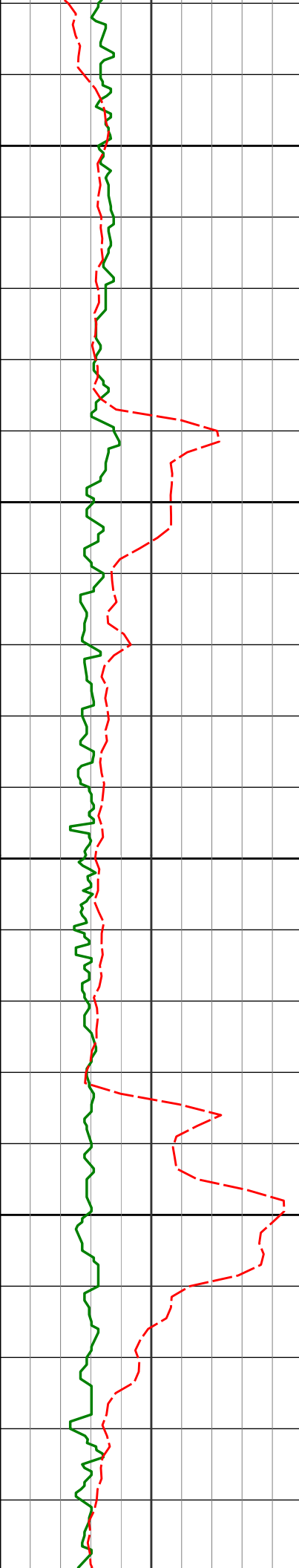
318.57°

5296.36'

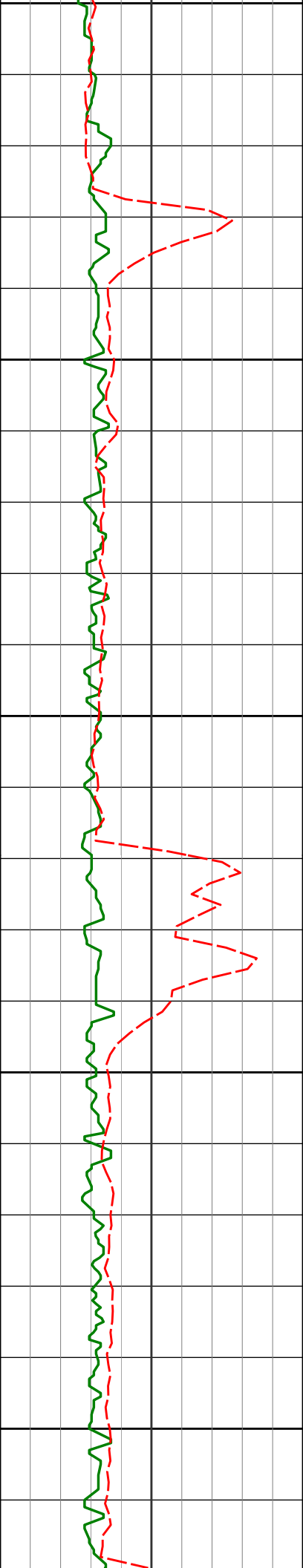
432.56'

5350

5400



| | | | | |
|-------|-------|---------|----------|---------|
| 5432' | 0.91° | 320.09° | 5391.34' | 431.37' |
| 5450 | | | | |
| 5500 | | | | |
| 5527' | 1.13° | 327.64° | 5486.33' | 430.33' |
| 5550 | | | | |
| 5600 | | | | |
| 5622' | 0.50° | 69.83° | 5581.32' | 430.17' |
| 5650 | | | | |



5650

5700

5750

5800

5850

5717'

0.30°

68.04°

5676.32'

430.78'

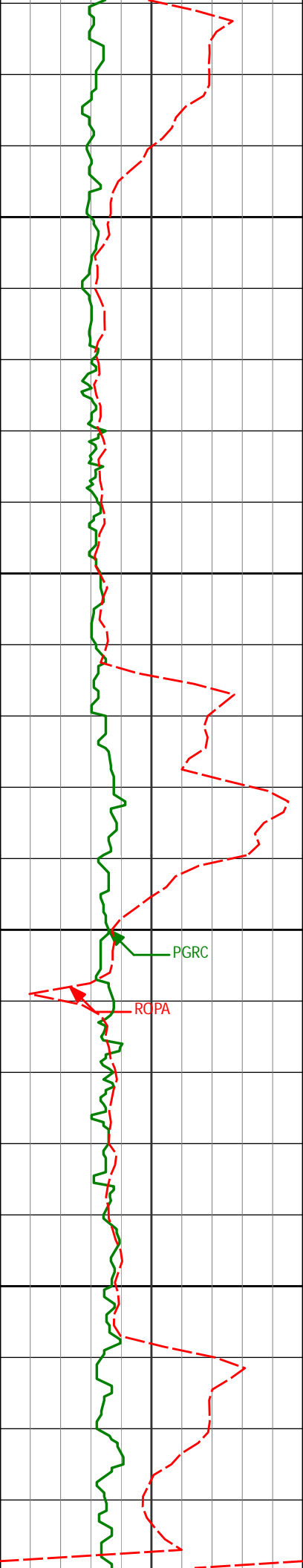
5811'

0.66°

208.70°

5770.32'

430.77'



5900

5906'

1.01°

230.70°

5865.31'

429.90'

5950

6000

6001'

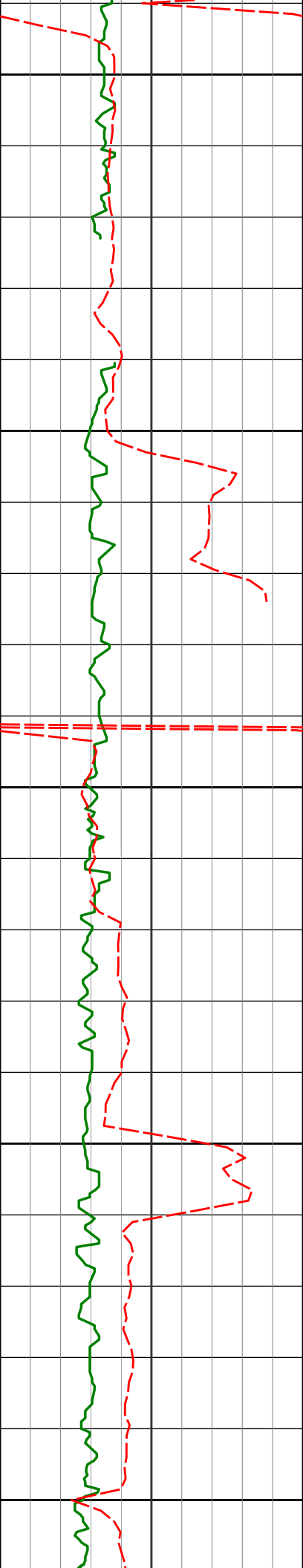
0.25°

284.69°

5960.30'

429.07'

6050



6100

6150

6200

6250

6300

6095'

0.44°

229.95°

6054.30'

428.61'

6190'

0.11°

18.75°

6149.30'

428.37'

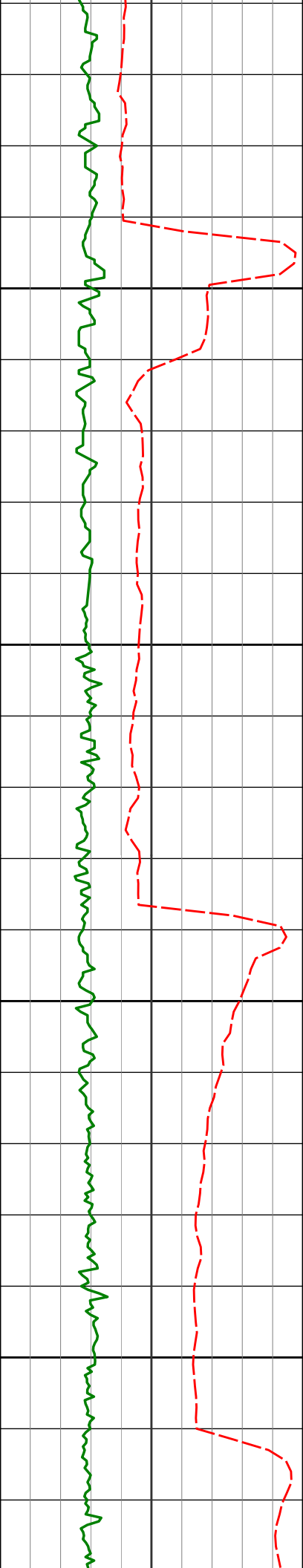
6285'

0.61°

249.68°

6244.30'

427.92'



6350

6400

6450

6500

200

6380'

0.68°

253.38°

6339.29'

426.93'

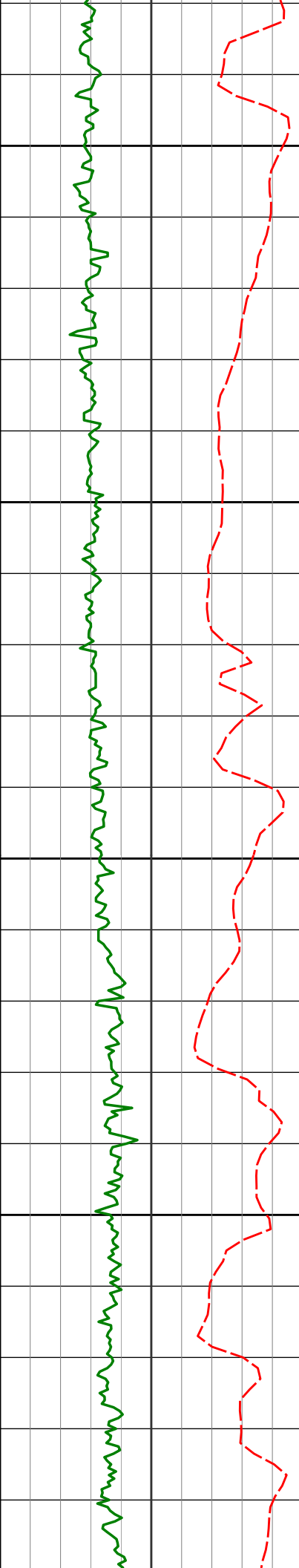
6474'

0.89°

273.24°

6433.28'

425.67'



6550

6569'

6.35°

77.64°

6528.11'

430.02'

6600

6650

6664'

14.72°

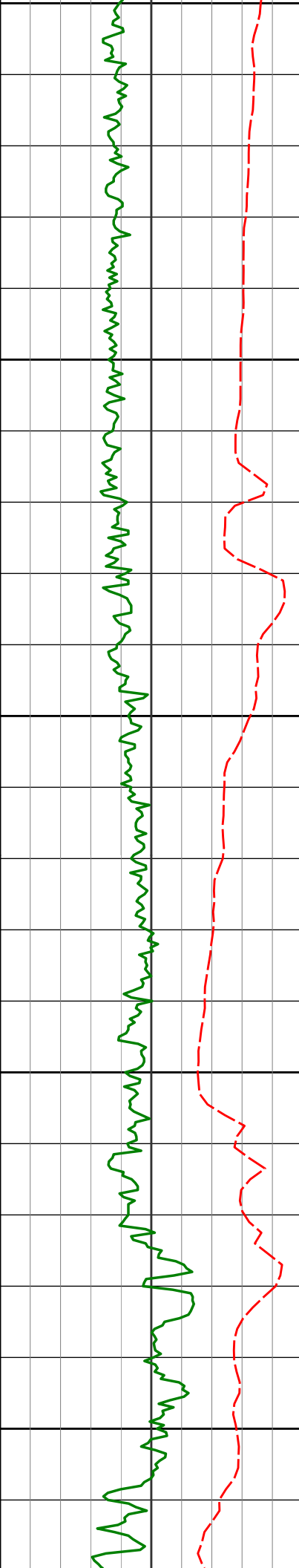
78.99°

6621.43'

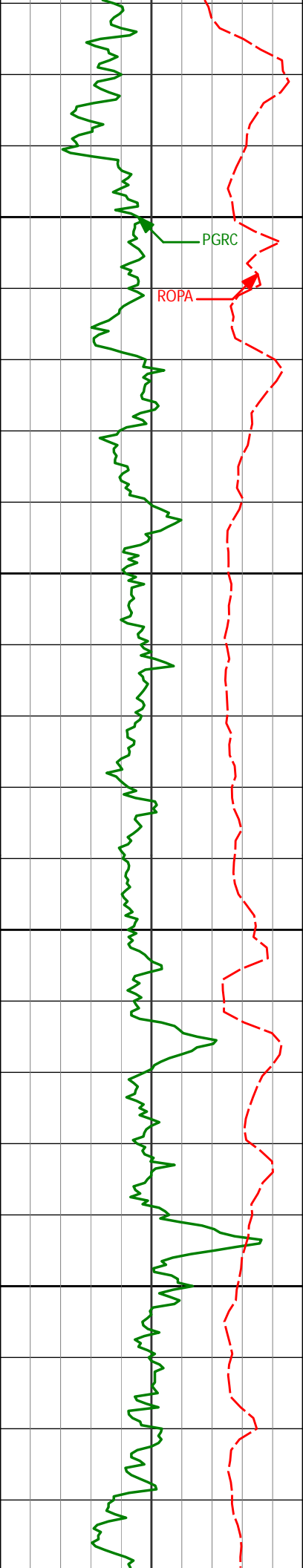
446.86'

6700

6750



| | | | | | |
|------|-------|--------|--------|----------|---------|
| 6750 | 6758' | 20.49° | 85.33° | 6711.00' | 474.83' |
| 6800 | | | | | |
| 6850 | 6853' | 29.94° | 89.12° | 6796.85' | 515.08' |
| 6900 | | | | | |
| 6950 | 6948' | 39.05° | 88.22° | 6875.07' | 568.71' |



7000

PGRC

ROPA

7050

7100

7150

7042'

49.24°

90.77°

6942.44'

634.00'

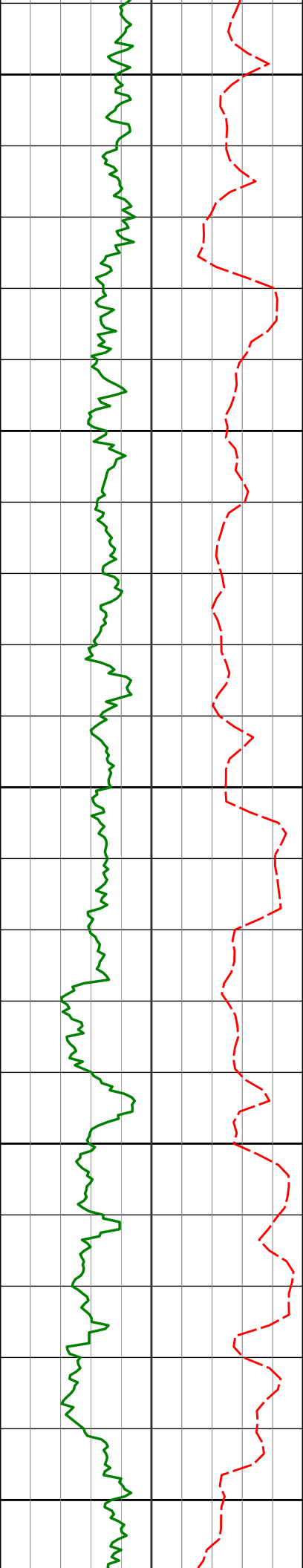
7137'

62.82°

93.93°

6995.40'

712.58'



7200

7232'

68.52°

93.17°

7034.53'

799.10'

7250

7280'

70.73°

92.36°

7051.24'

844.09'

7300

7327'

72.86°

91.36°

7065.92'

888.73'

7350

7375'

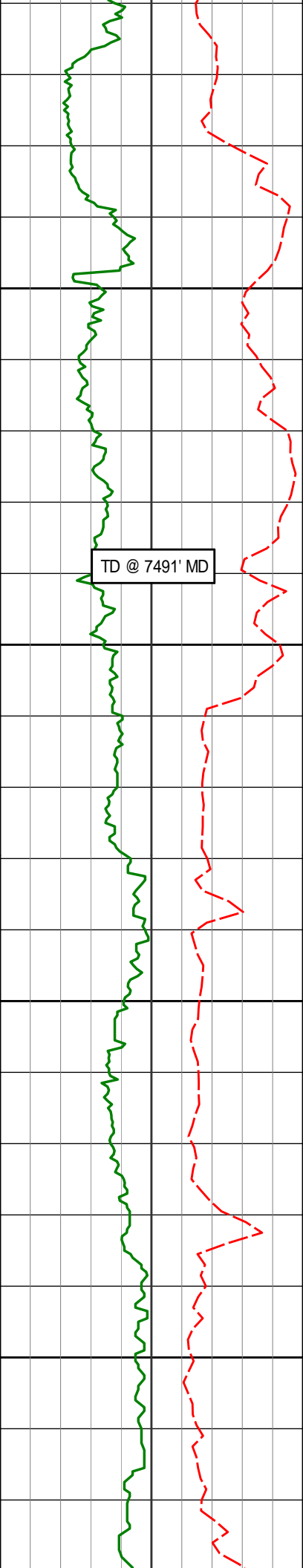
76.89°

91.75°

7078.44'

935.05'

7400



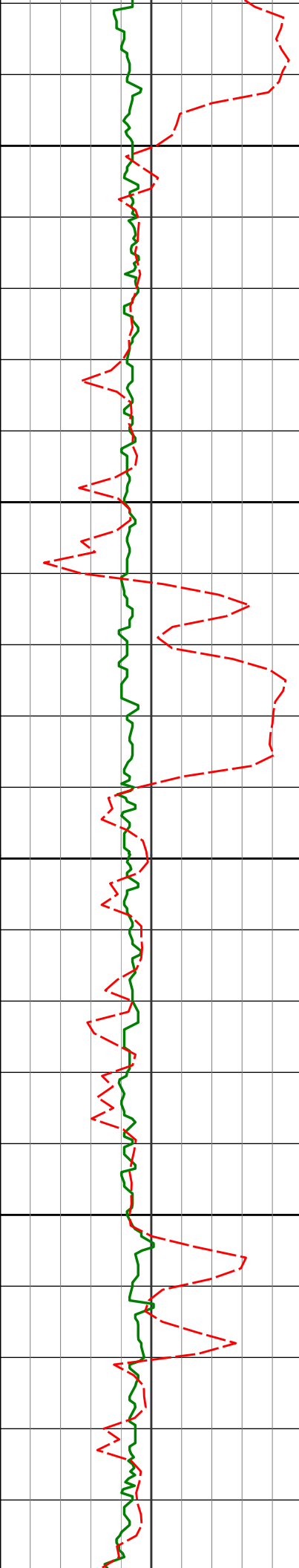
300

400

7437' 80.06° 91.90° 7090.83' 995.79'

7511' 84.66° 90.86° 7100.66' 1069.10'

7561' 85.21° 90.61° 7105.08' 1118.88'



7650

7653'

87.38°

90.32°

7111.02'

1210.63'

7700

7744'

89.75°

90.14°

7113.30'

1301.53'

7750

7800

7840'

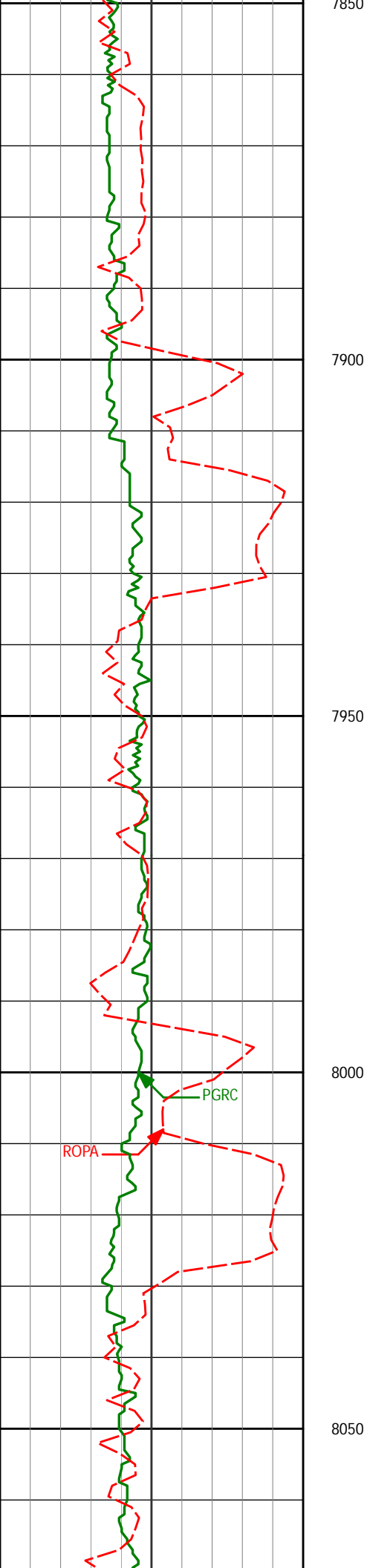
90.40°

89.59°

7113.18'

1397.43'

7850



7935'

90.96°

91.02°

7112.05'

1492.36'

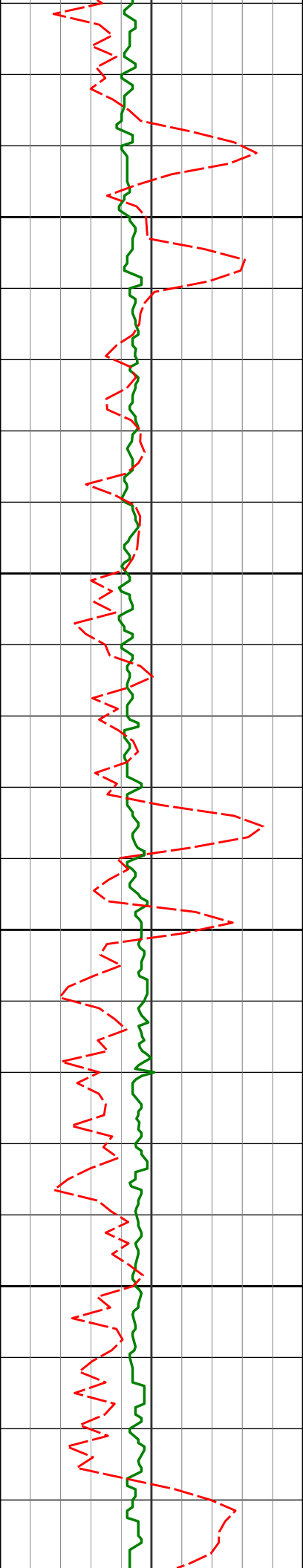
8029'

89.78°

92.19°

7111.44'

1586.34'



8100

8124'

90.34°

92.32°

7111.34'

1681.34'

8150

8200

8219'

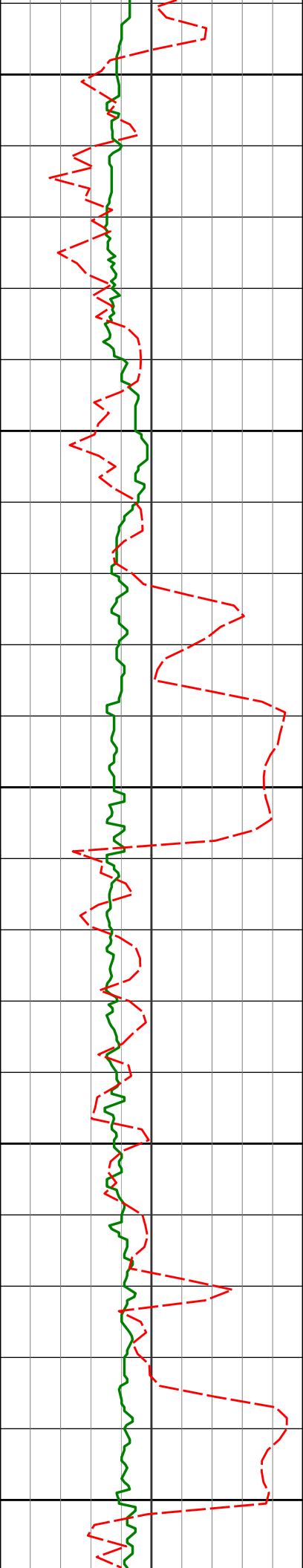
90.86°

91.69°

7110.35'

1776.33'

8250



8300

8314'

91.54°

91.68°

7108.36'

1871.31'

8350

8400

8408'

89.88°

91.53°

7107.19'

1965.29'

8450

8500

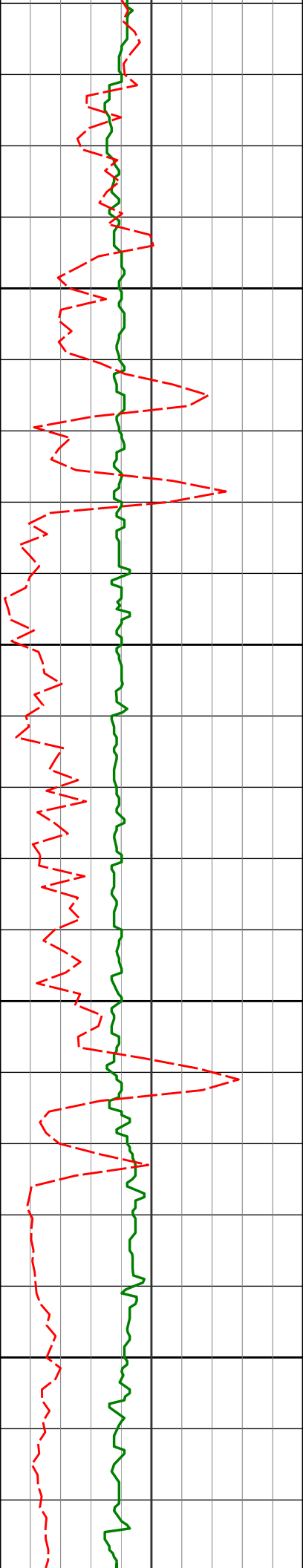
8503'

88.74°

91.73°

7108.34'

2060.27'



8550

8600

8650

8700

8598'

88.77°

91.23°

7110.40'

2155.23'

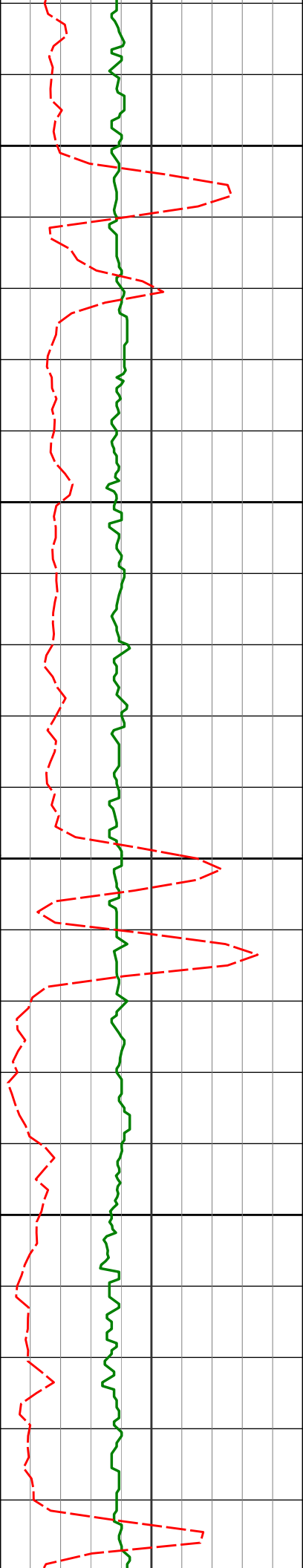
8693'

89.72°

91.19°

7111.65'

2250.20'



8750

8788'

90.03°

90.54°

7111.86'

2345.17'

8800

8850

8882'

90.96°

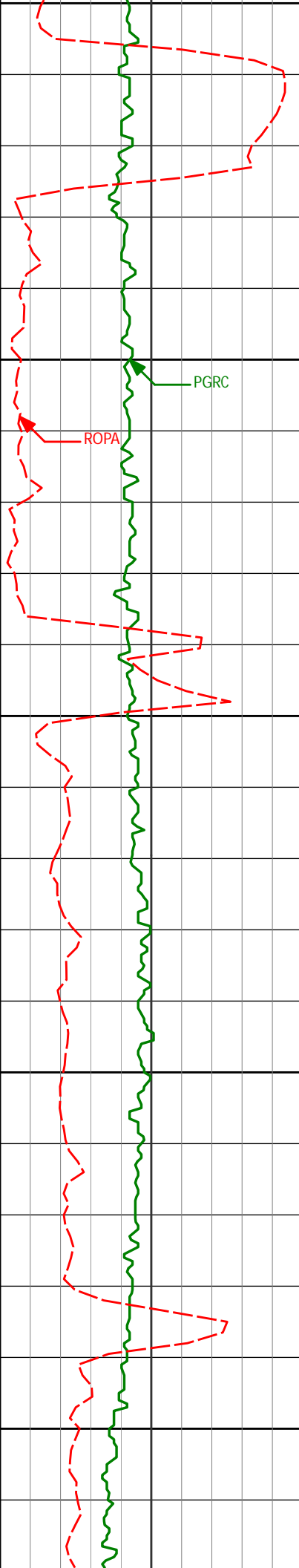
90.78°

7111.05'

2439.12'

8900

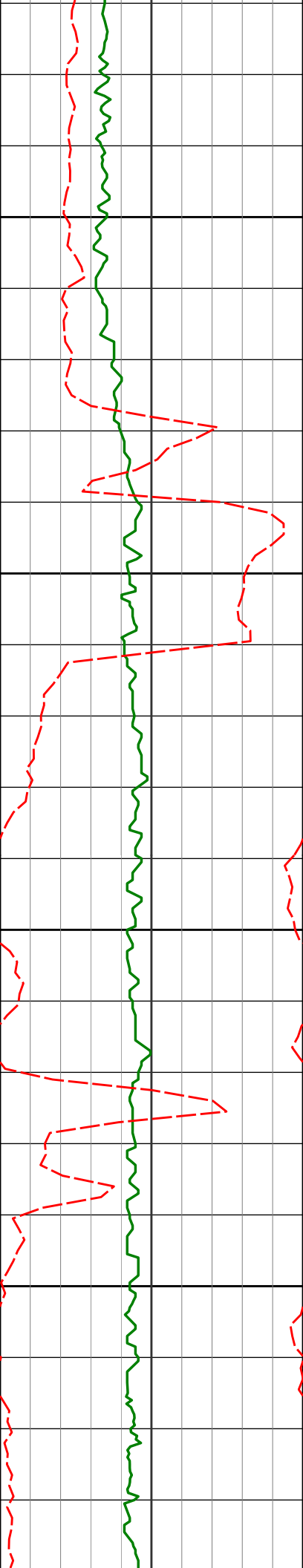
8950



| | | | | |
|-------|--------|--------|----------|----------|
| 8977' | 89.41° | 91.02° | 7110.74' | 2534.08' |
|-------|--------|--------|----------|----------|

| | | | | |
|-------|--------|--------|----------|----------|
| 9071' | 89.94° | 90.59° | 7111.27' | 2628.04' |
|-------|--------|--------|----------|----------|

| | | | | |
|-------|--------|--------|----------|----------|
| 9166' | 90.74° | 90.75° | 7110.71' | 2722.99' |
|-------|--------|--------|----------|----------|



9200

9250

9300

9350

9261'

88.89°

90.50°

7111.02'

2817.94'

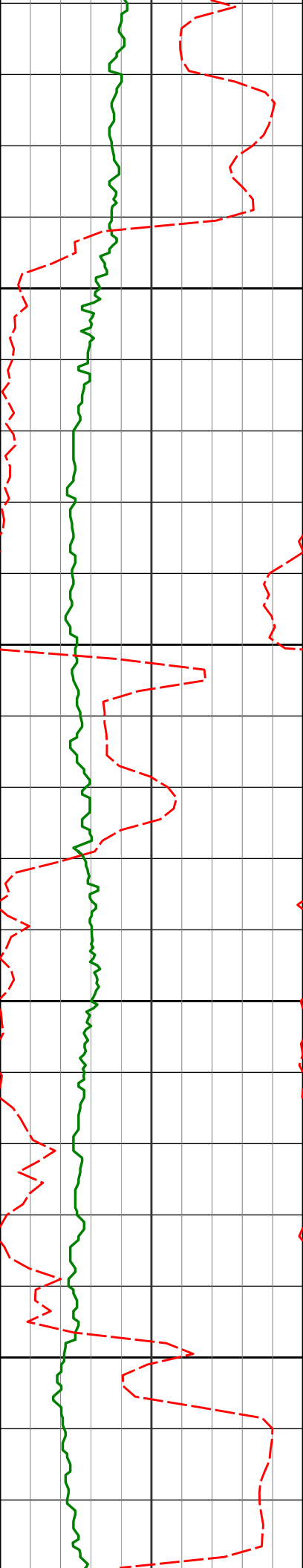
9356'

89.54°

90.11°

7112.32'

2912.87'



9640'

89.72°

91.54°

7115.57'

3196.70'

9650

9700

9734'

91.14°

91.40°

7114.87'

3290.68'

9750

9800

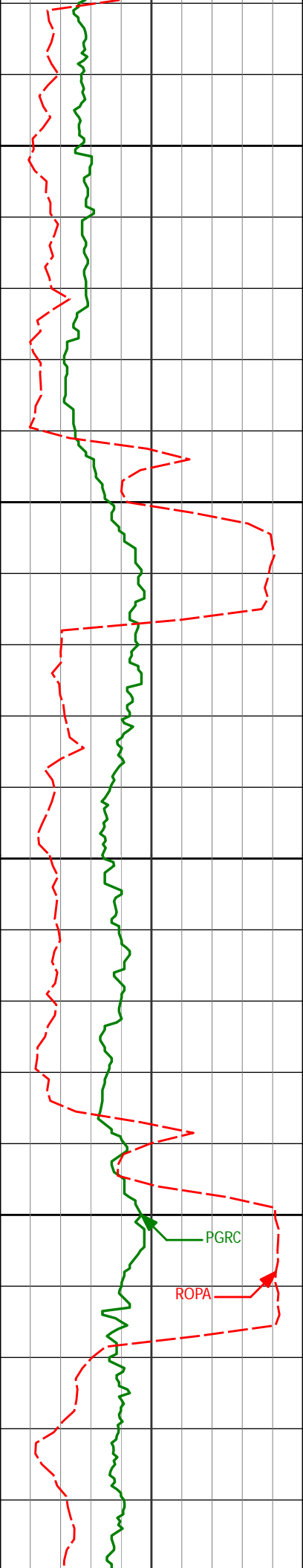
9829'

91.26°

91.54°

7112.88'

3385.64'



9850

9900

9950

10000

PGRC

ROPA

9924'

91.14°

91.14°

7110.89'

3480.61'

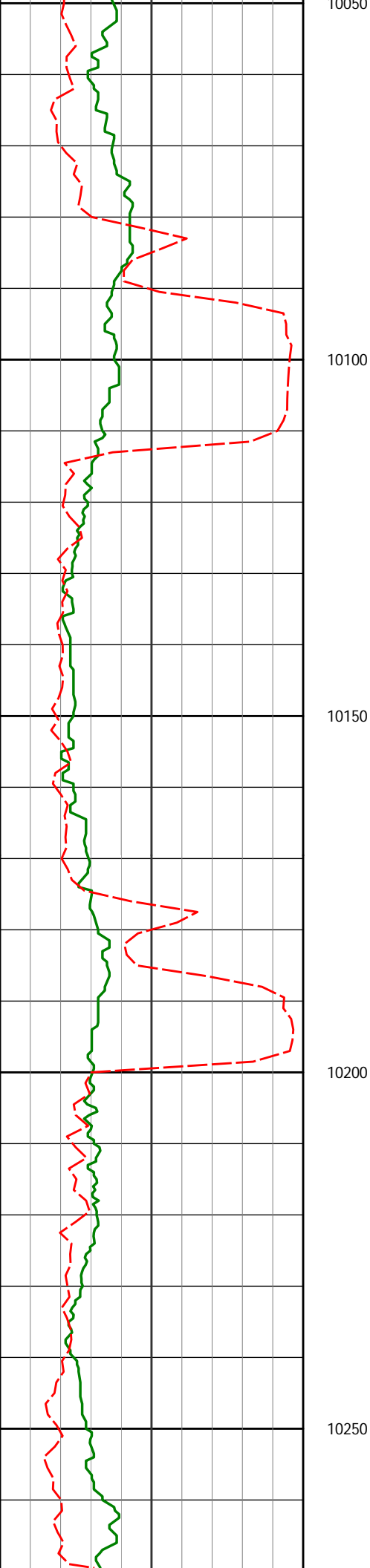
10019'

90.80°

91.46°

7109.28'

3575.57'



10114'

89.69°

91.87°

7108.87'

3670.56'

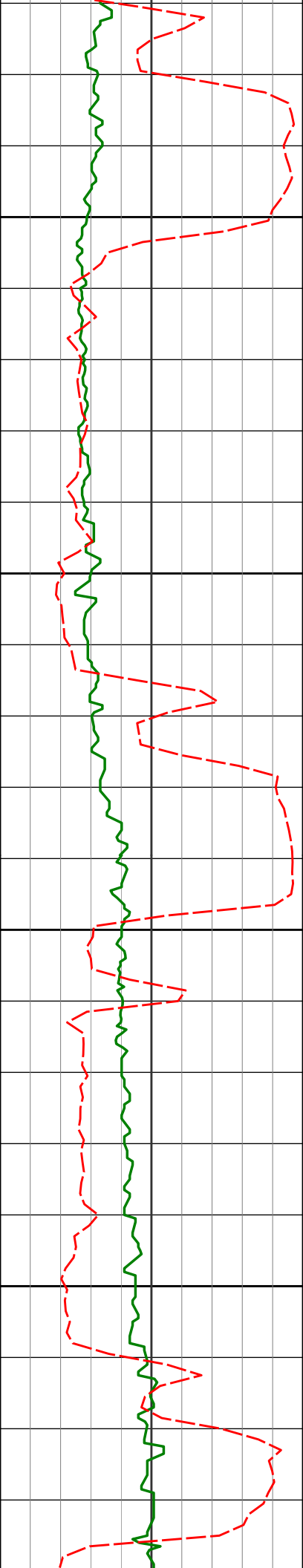
10208'

90.31°

91.91°

7108.87'

3764.56'



10300

10350

10400

10450

10303'

10397'

89.75°

89.23°

91.90°

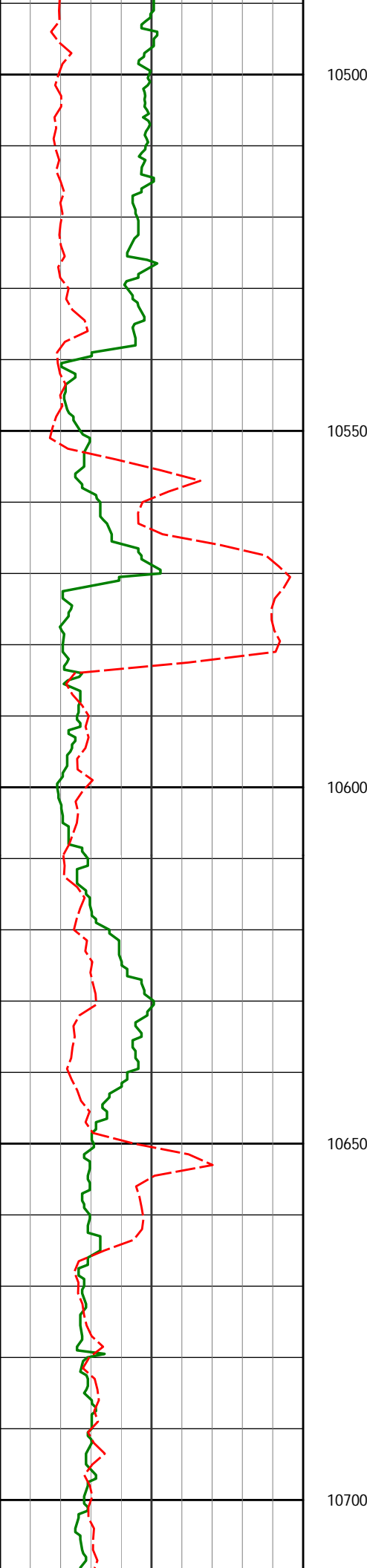
92.16°

7108.82'

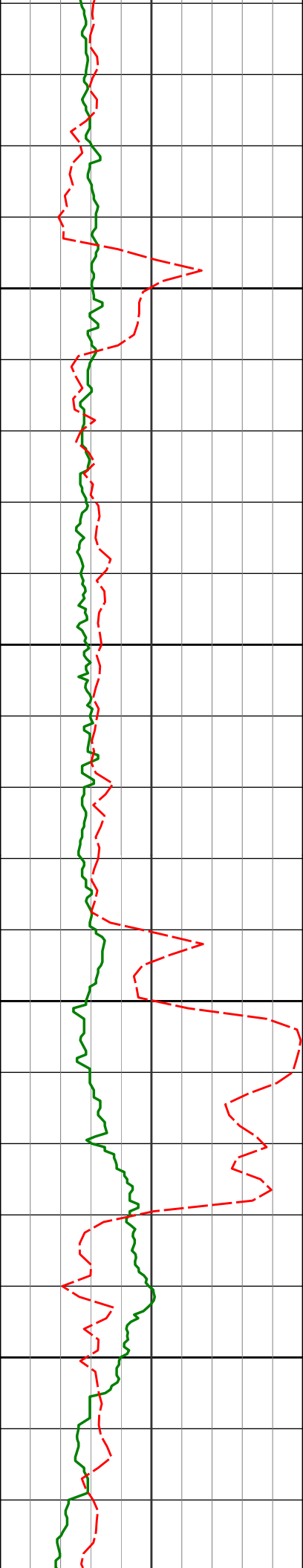
7109.66'

3859.56'

3953.55'



| | | | | |
|--------|--------|--------|----------|----------|
| 10492' | 89.29° | 91.84° | 7110.89' | 4048.54' |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 10587' | 88.12° | 91.49° | 7113.03' | 4143.50' |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 10681' | 88.49° | 91.06° | 7115.81' | 4237.44' |



10750

10776'

89.51°

88.94°

7117.47'

4332.34'

10800

10850

10871'

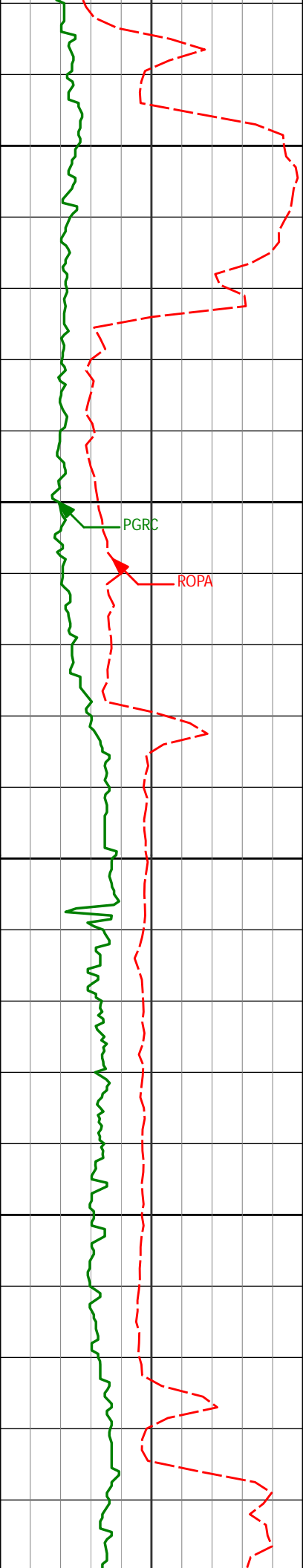
91.51°

90.61°

7116.63'

4427.22'

10900



10950

10966'

89.57°

91.53°

7115.73'

4522.19'

11000

PGRC

ROPA

11050

11060'

90.93°

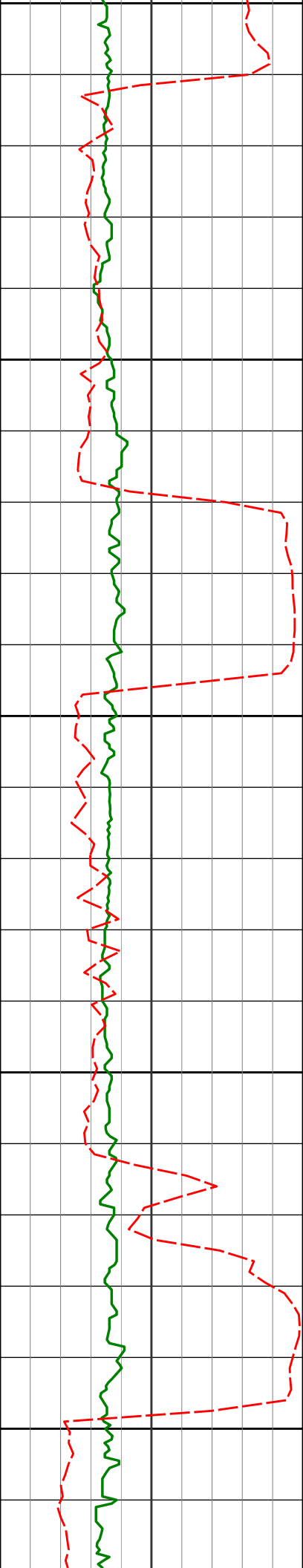
90.65°

7115.32'

4616.16'

11100

11150



11150
11200
11250
11300
11350

11155'

90.56°

90.56°

7114.09'

4711.10'

11249'

89.72°

91.45°

7113.86'

4805.07'

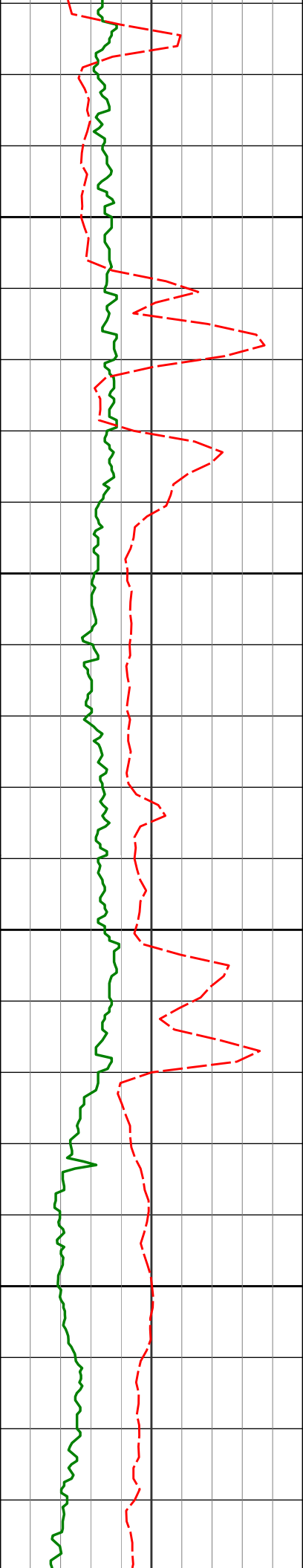
11344'

86.98°

90.82°

7116.59'

4900.00'



11400

11438'

11450

11500

11533'

11550

87.66°

90.90°

7120.99'

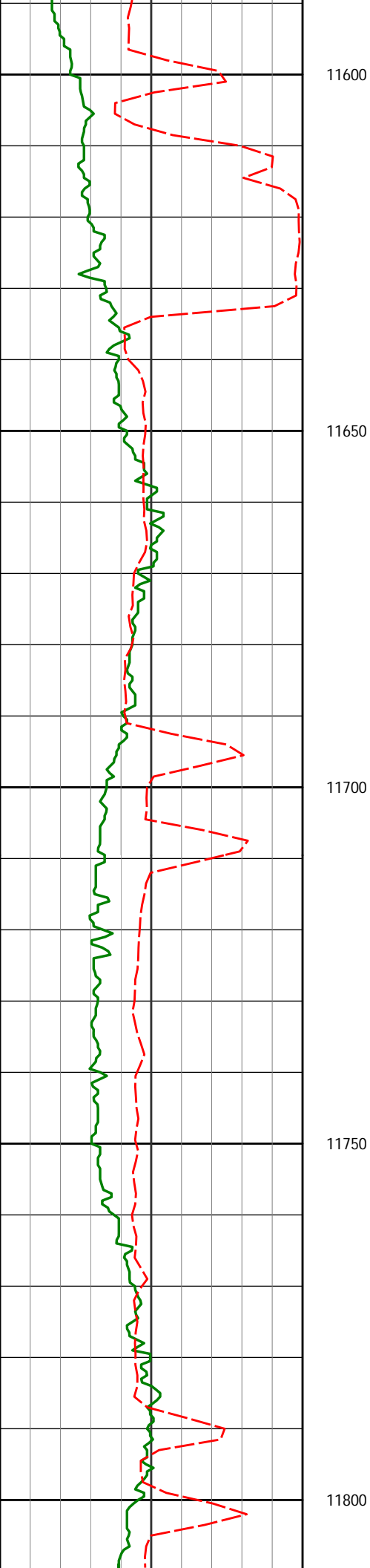
4993.86'

87.90°

90.24°

7124.67'

5088.74'



11628'

88.86°

91.87°

7127.35'

5183.67'

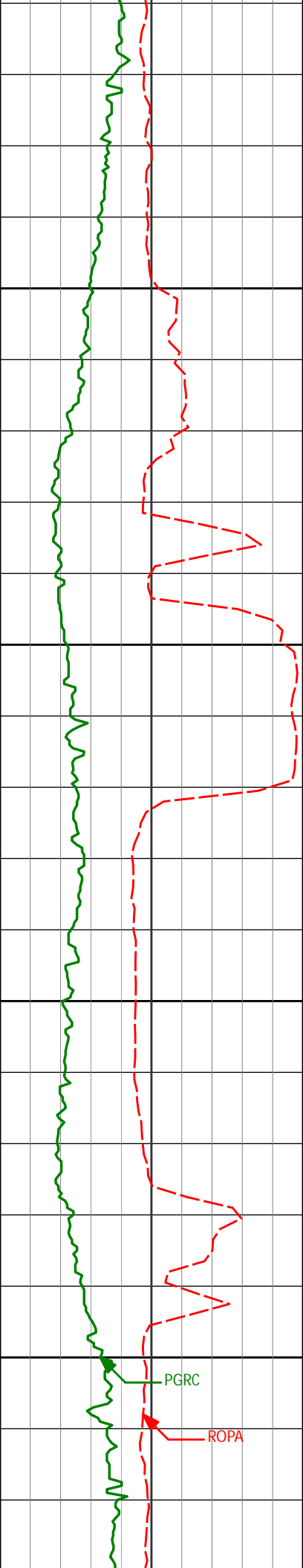
11723'

89.75°

91.65°

7128.50'

5278.66'



11818'

90.71°

90.45°

7128.12'

5373.63'

11850

11900

11913'

90.74°

92.33°

7126.92'

5468.60'

11950

12000

PGRC

ROPA

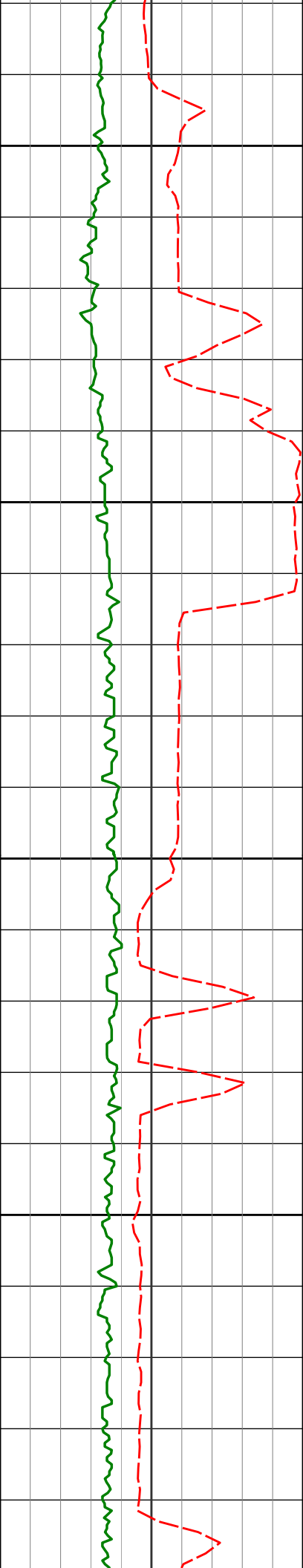
12007'

91.51°

91.75°

7125.08'

5562.58'



12050

12100

12150

12200

12102'

90.46°

92.45°

7123.44'

5657.56'

12196'

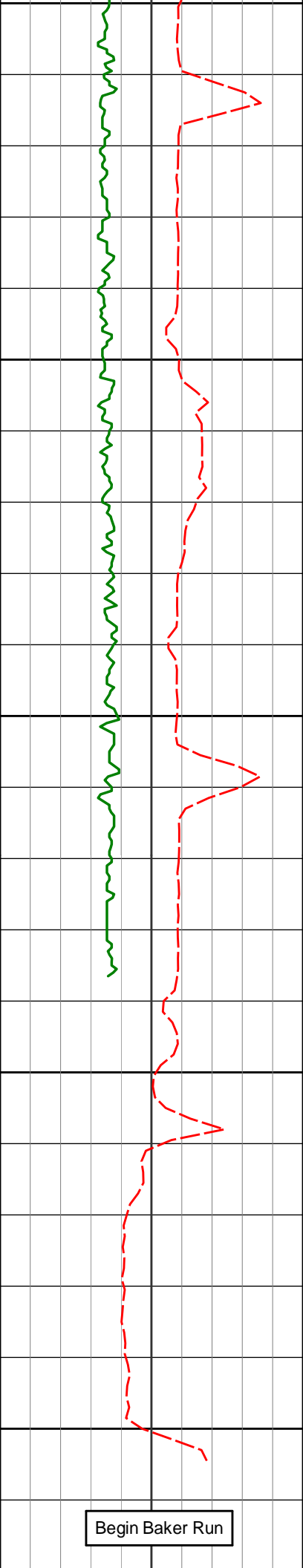
89.66°

91.94°

7123.34'

5751.56'

12250



12291'

90.31°

91.57°

7123.37'

5846.55'

12300

12350

12386'

89.60°

90.77°

7123.44'

5941.53'

12400

12450

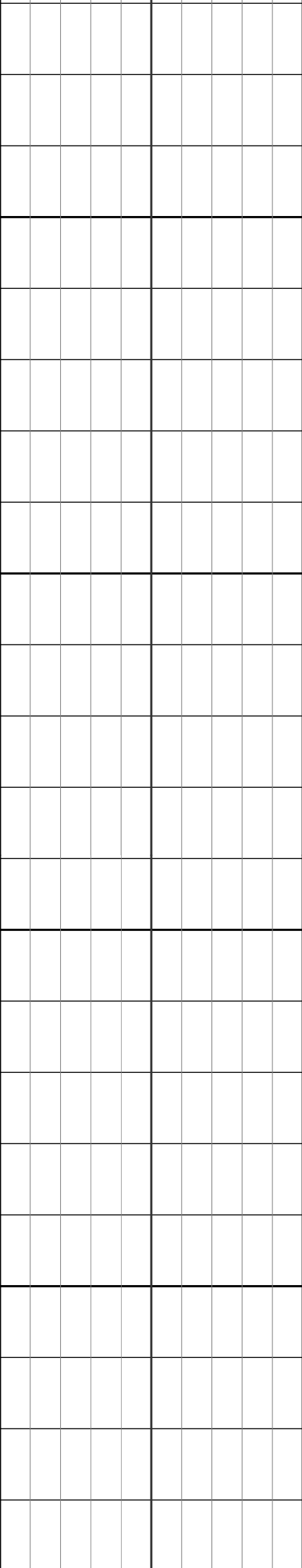
12449'

90.00°

92.87°

7123.66'

6004.52'



12500

12541'

92.96°

93.78°

7121.29'

6096.47'

12550

12600

12634'

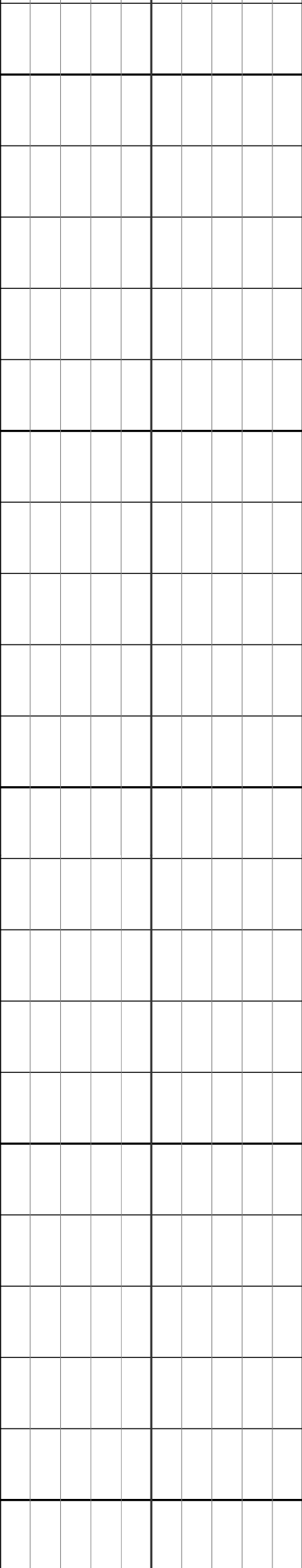
95.87°

96.01°

7114.13'

6189.09'

12650



12700

12726'

92.53°

95.58°

7107.39'

6280.68'

12750

12800

12818'

91.63°

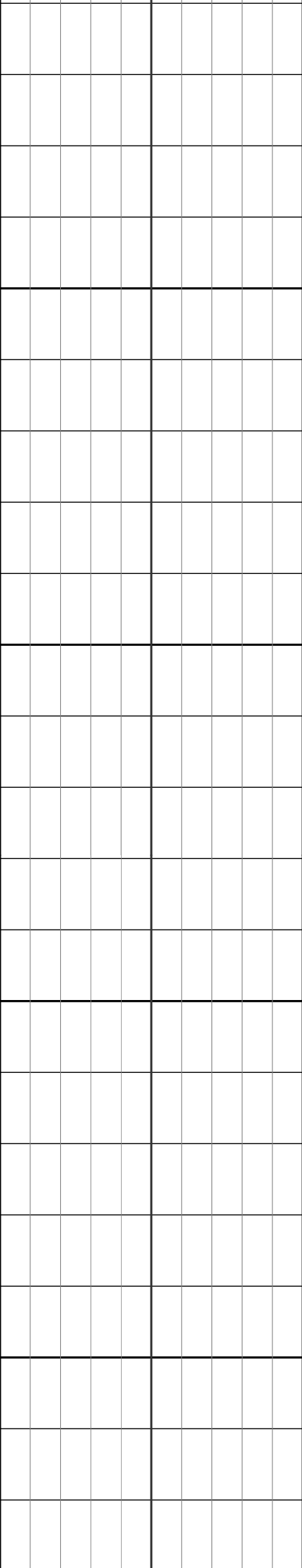
94.85°

7104.05'

6372.51'

12850

12900



12950

13000

13050

13100

12913'

89.69°

93.23°

7102.96'

6467.46'

13008'

89.16°

93.33°

7103.91'

6562.44'

13103'

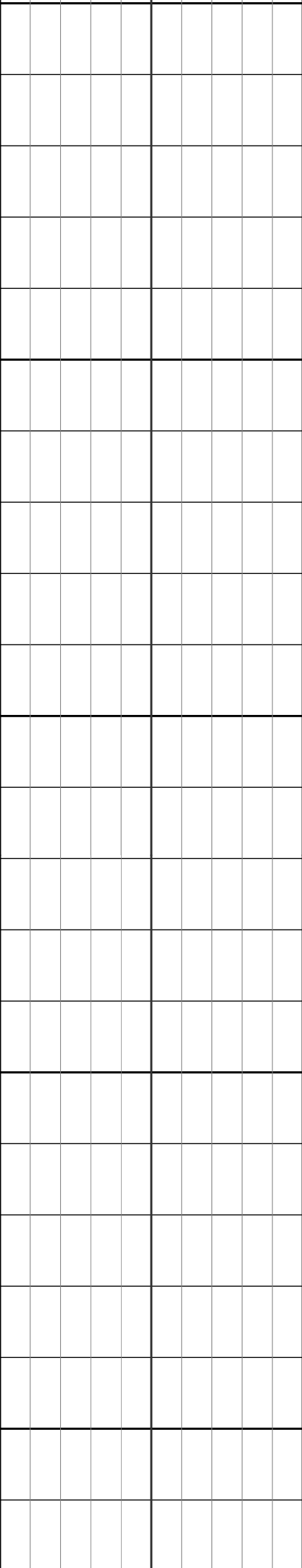
89.07°

92.91°

7105.38'

6657.42'

| Station | Distance (ft) | Bearing | Angle (°) | Latitude (ft) | Longitude (ft) |
|---------|---------------|---------|-----------|---------------|----------------|
| 13150 | | | | | |
| 13200 | 13198' | 89.01° | 91.14° | 7106.97' | 6752.40' |
| 13250 | | | | | |
| 13300 | 13293' | 89.56° | 91.67° | 7108.16' | 6847.38' |
| 13350 | | | | | |



13350

13388'

90.03°

91.54°

7108.50'

6942.37'

13400

13450

13483'

89.56°

91.43°

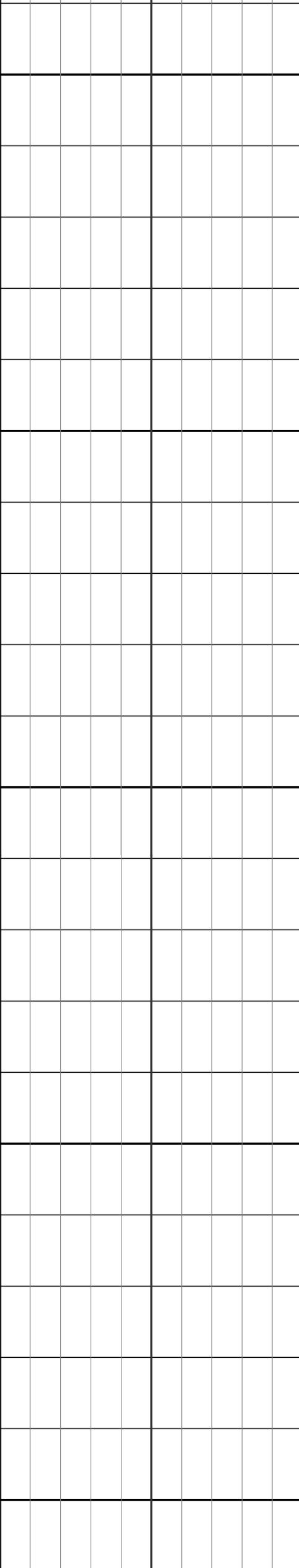
7108.84'

7037.35'

13500

13550

[illegible]



13800

13850

13900

13950

14000

13862'

89.07°

89.86°

7115.03'

7416.20'

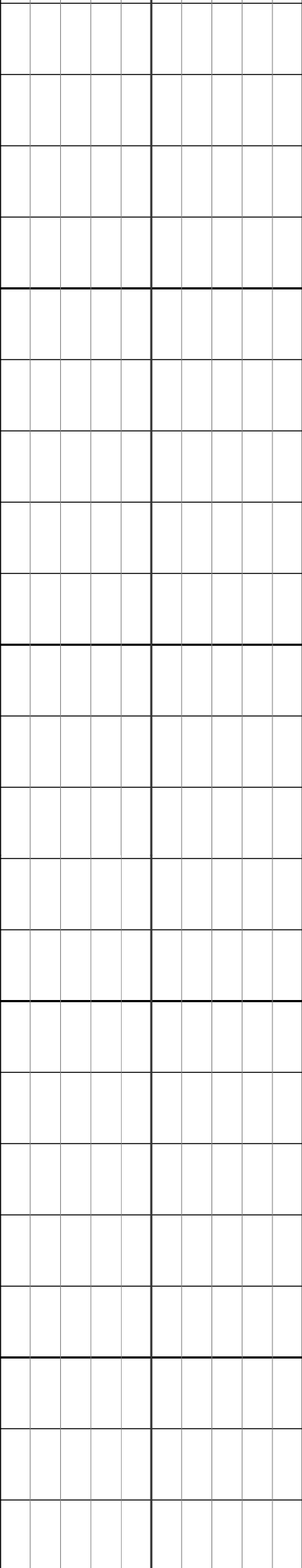
13955'

89.32°

89.00°

7116.33'

7509.06'



14050

14050'

89.79°

88.99°

7117.07'

7603.88'

14100

14145'

89.17°

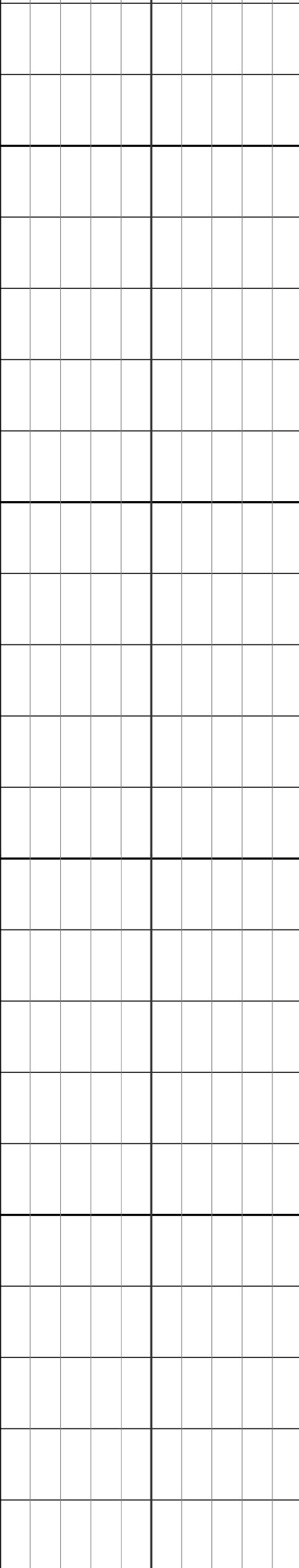
89.84°

7117.93'

7698.74'

14150

14200



14250

14300

14350

14400

14240'

89.39°

90.71°

7119.13'

7793.66'

14334'

89.34°

91.82°

7120.17'

7887.63'

14429'

89.13°

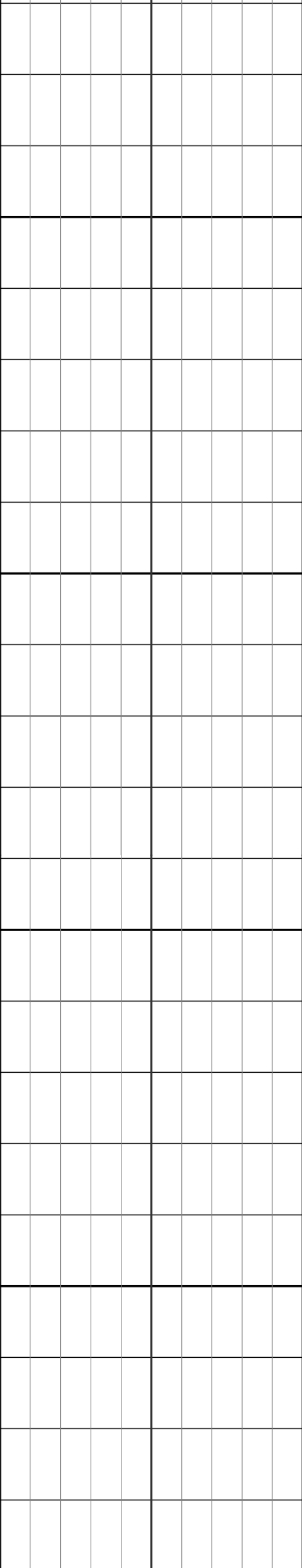
92.68°

7121.44'

7982.63'

14450

| Station | Distance | Angle | Distance | Distance |
|---------|----------|--------|----------|----------|
| 14450 | | | | |
| 14500 | | | | |
| 14524' | 89.78° | 92.61° | 7122.34' | 8077.62' |
| 14550 | | | | |
| 14600 | | | | |
| 14619' | 89.69° | 91.86° | 7122.78' | 8172.62' |
| 14650 | | | | |



14700

14714'

88.58°

89.92°

7124.22'

8267.56'

14750

14800

14808'

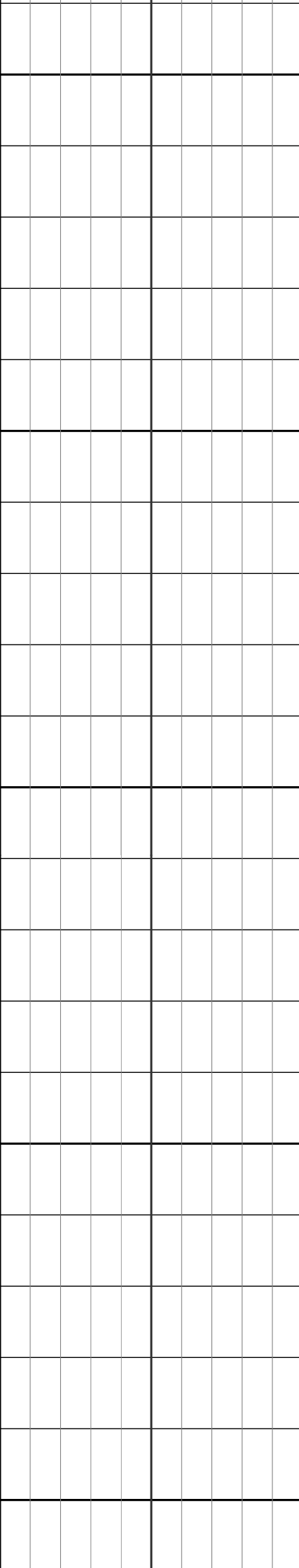
88.49°

88.83°

7126.62'

8361.40'

14850



14900

14903'

88.55°

88.10°

7129.07'

8456.13'

14950

15000

14998'

89.04°

88.09°

7131.07'

8550.84'

15050

15100

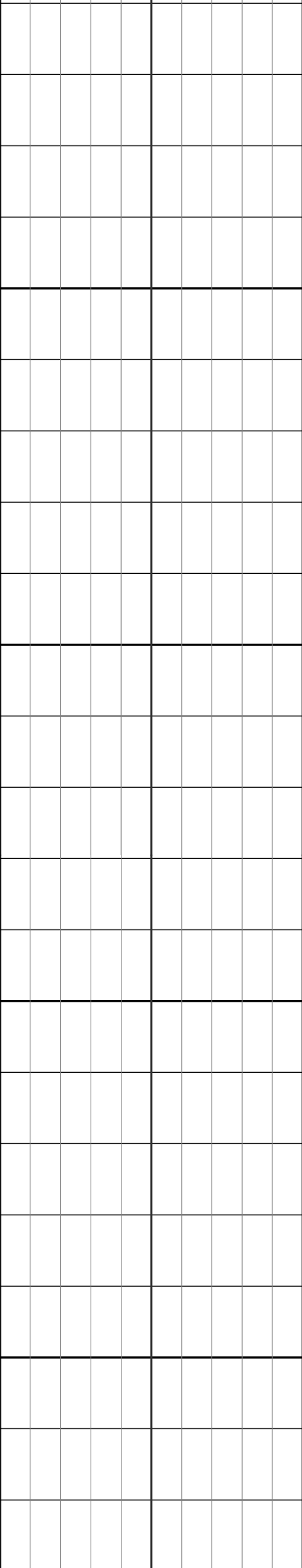
15093'

90.00°

87.91°

7131.87'

8645.54'



15150

15188'

90.82°

89.02°

7131.19'

8740.31'

15200

15250

15282'

88.98°

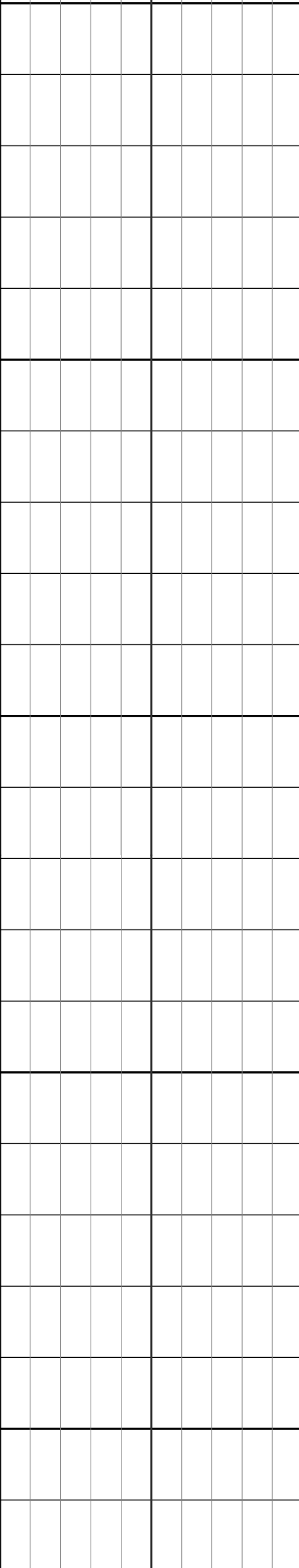
90.91°

7131.35'

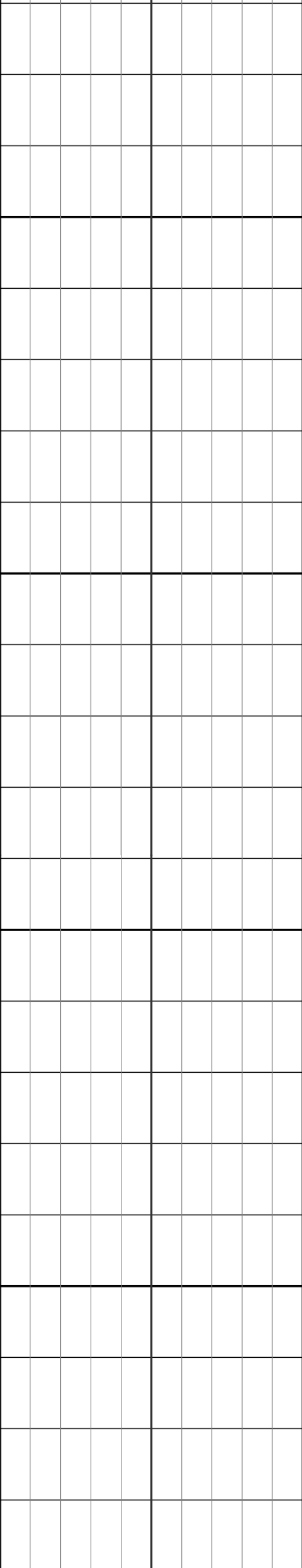
8834.21'

15300

| Station | Distance | Bearing | Angle | Distance | Distance |
|---------|----------|---------|--------|----------|----------|
| 15350 | | | | | |
| | 15378' | 89.47° | 90.91° | 7132.65' | 8930.17' |
| 15400 | | | | | |
| | | | | | |
| 15450 | | | | | |
| | 15472' | 88.95° | 90.72° | 7133.94' | 9024.12' |
| 15500 | | | | | |
| | | | | | |
| 15550 | | | | | |



| | | | | |
|--------|--------|--------|----------|----------|
| 15567' | 89.78° | 90.37° | 7135.00' | 9119.06' |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 15600 | | | | |
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| | | | | |
| | | | | |
| | | | | |
| 15650 | | | | |
| | | | | |
| 15662' | 90.06° | 90.77° | 7135.13' | 9214.01' |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 15700 | | | | |
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 15750 | | | | |
| 15757' | 90.12° | 90.72° | 7134.98' | 9308.96' |
| | | | | |



15800

15850

15900

15950

15851'

90.00°

90.81°

7134.88'

9402.92'

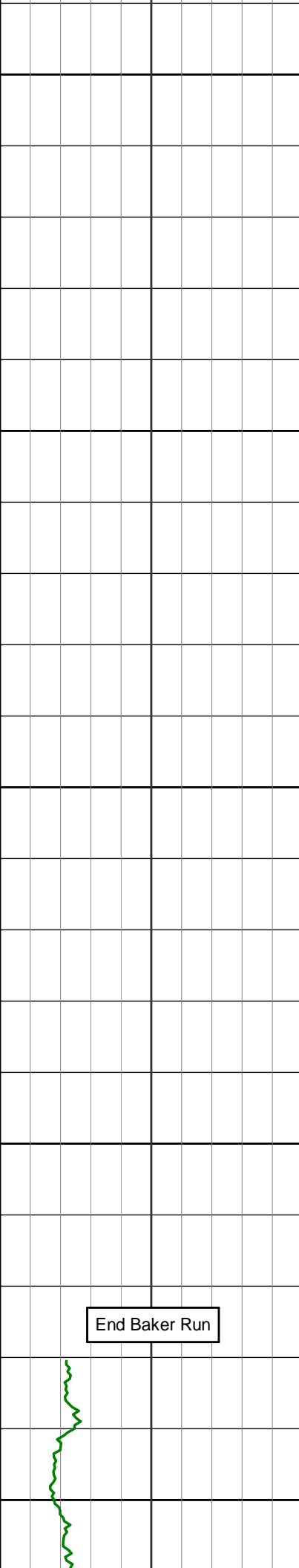
15946'

89.56°

91.01°

7135.25'

9497.89'



16000

16041'

89.56°

92.85°

7135.98'

9592.88'

16050

16100

16138'

89.66°

91.26°

7136.64'

9689.87'

16150

End Baker Run

16195'

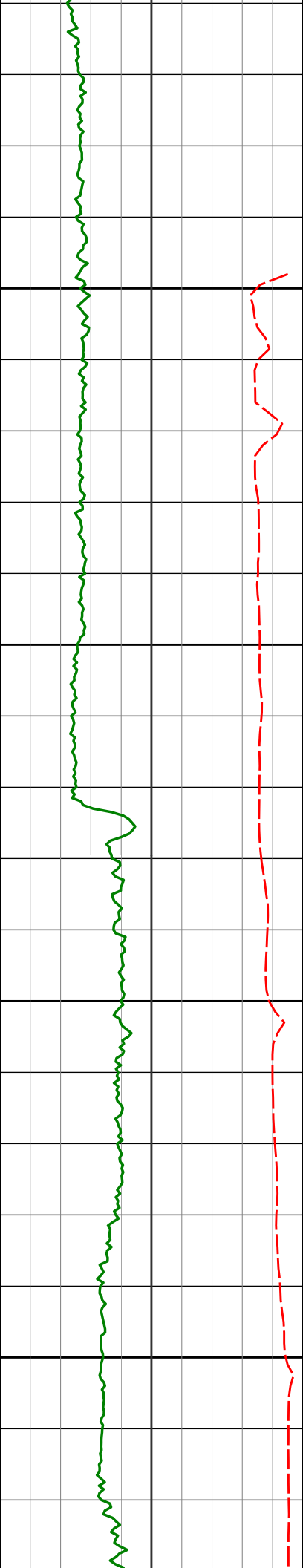
89.41°

92.07°

7137.10'

9746.86'

16200



500

16250

16290'

90.49°

92.27°

7137.18'

9841.86'

16300

16350

16385'

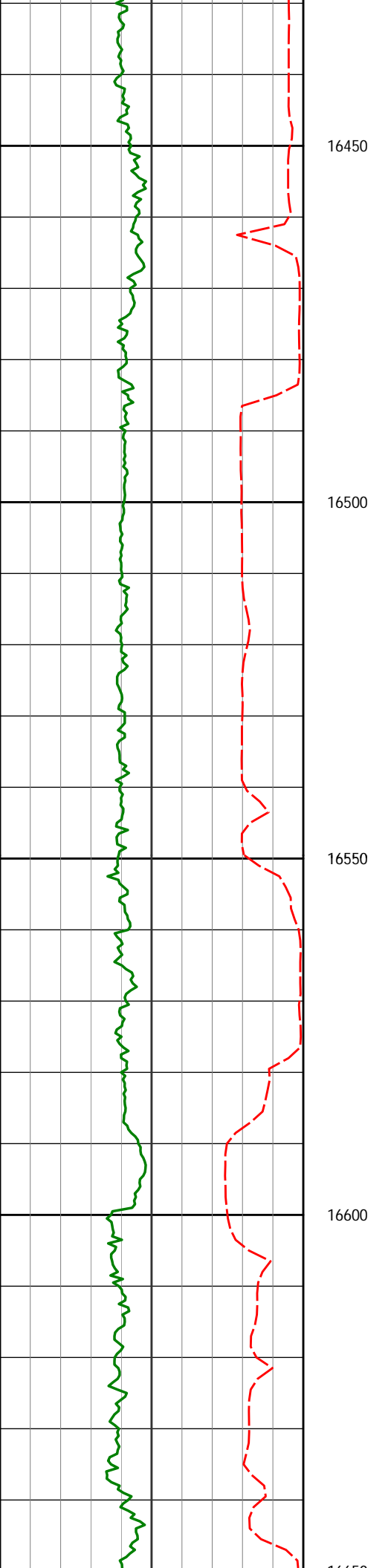
91.67°

91.65°

7135.39'

9936.84'

16400



16480'

90.80°

92.54°

7133.35'

10031.81'

16500

16550

16574'

89.91°

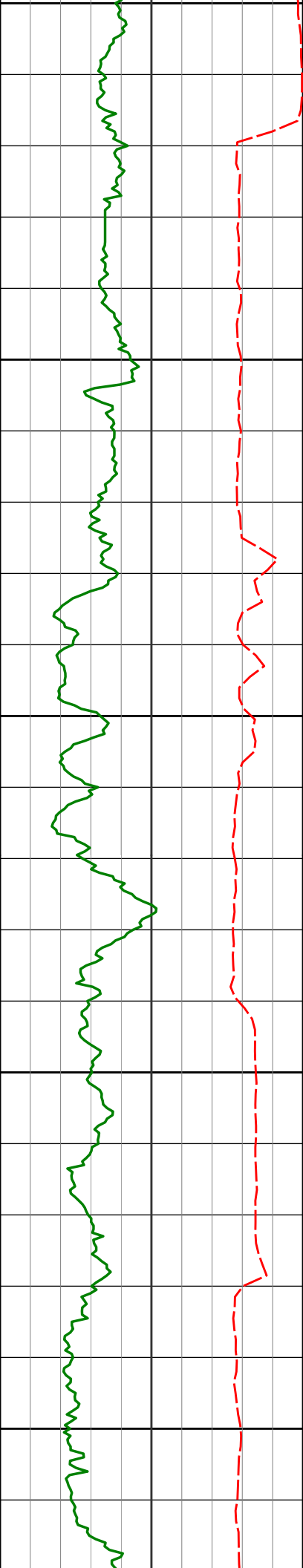
92.94°

7132.76'

10125.81'

16600

16650

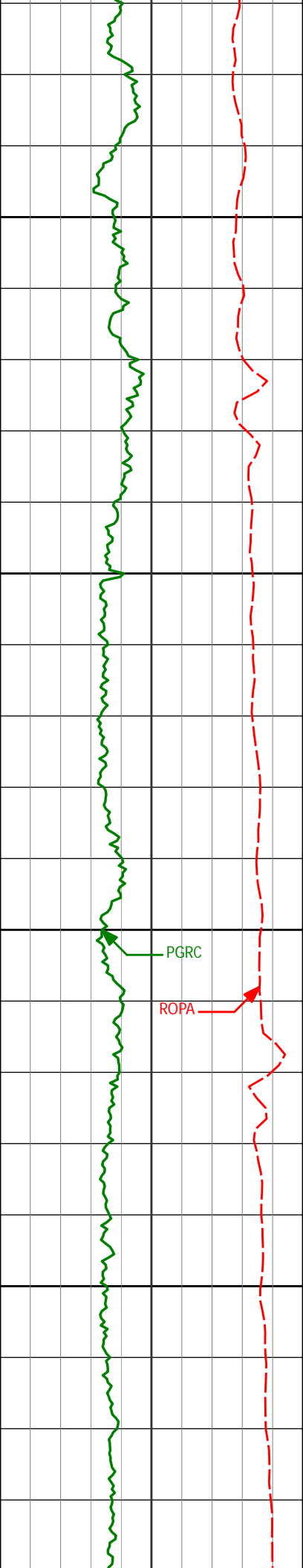


16650
16700
16750
16800
16850

16669' 89.17° 93.25° 7133.53' 10220.80'

16764' 88.61° 92.09° 7135.37' 10315.78'

16859' 88.77° 92.10° 7137.54' 10410.75'



16900

16950

17000

17050

16954'

89.17°

91.75°

7139.25'

10505.73'

PGRC

ROPA

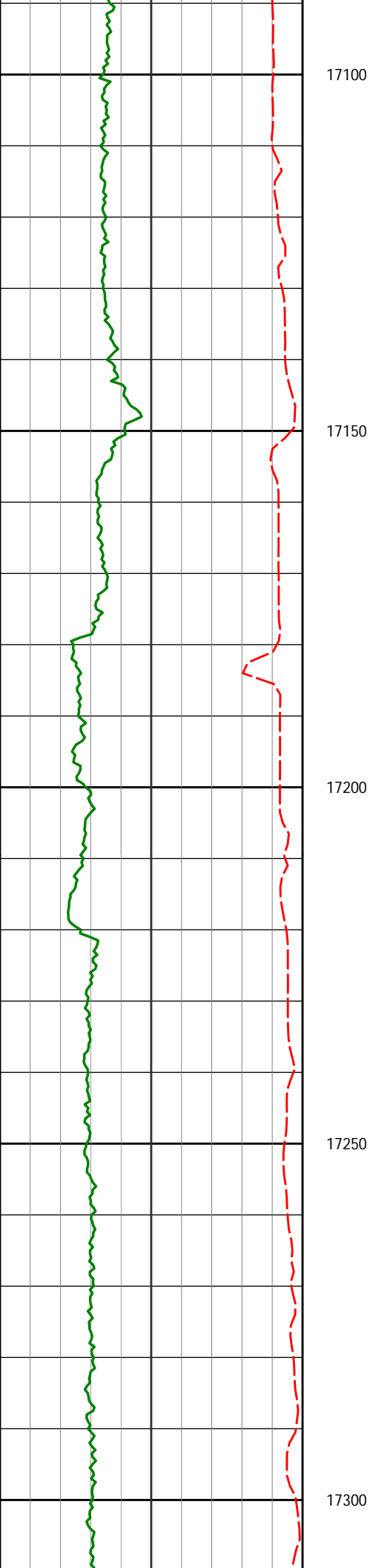
17048'

89.54°

91.08°

7140.30'

10599.71'



17143'

90.31°

91.75°

7140.43'

10694.70'

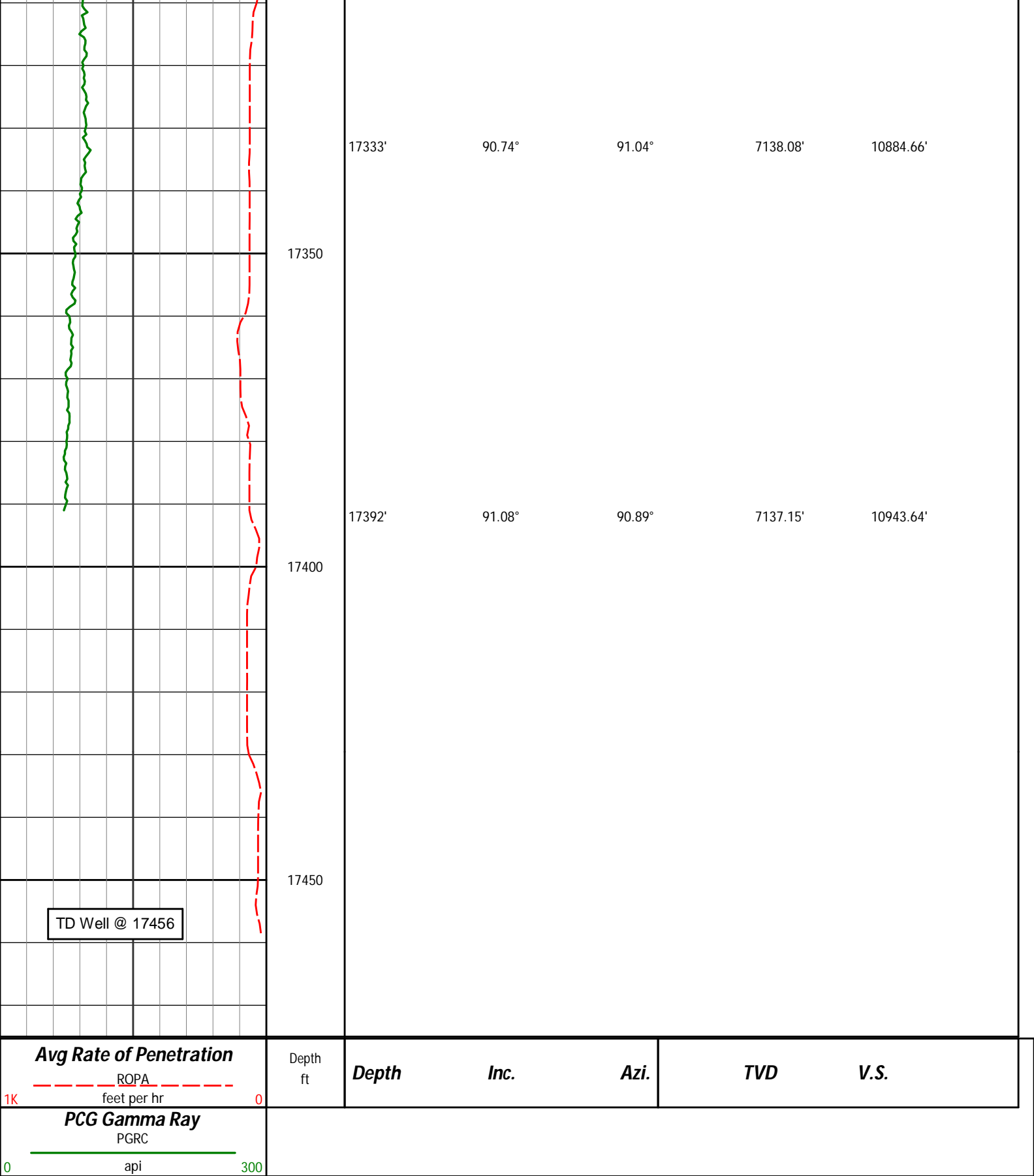
17238'

90.89°

91.77°

7139.43'

10789.69'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble
SHABLE K08-68-1HN
Wattenberg

| | | | | | | | |
|----------|-------|--------|---------|----------|-----------|---------|-------|
| 5622.00 | 0.50 | 69.83 | 5581.32 | 244.81 S | 420.05 E | 430.17 | 1.40 |
| 5717.00 | 0.30 | 68.04 | 5676.32 | 244.57 S | 420.67 E | 430.78 | 0.21 |
| 5811.00 | 0.66 | 208.70 | 5770.32 | 244.95 S | 420.64 E | 430.77 | 0.97 |
| 5906.00 | 1.01 | 230.70 | 5865.31 | 245.96 S | 419.73 E | 429.90 | 0.49 |
| 6001.00 | 0.25 | 284.69 | 5960.30 | 246.44 S | 418.88 E | 429.07 | 0.93 |
| 6095.00 | 0.44 | 229.95 | 6054.30 | 246.62 S | 418.41 E | 428.61 | 0.38 |
| 6190.00 | 0.11 | 18.75 | 6149.30 | 246.77 S | 418.16 E | 428.37 | 0.57 |
| 6285.00 | 0.61 | 249.68 | 6244.30 | 246.86 S | 417.71 E | 427.92 | 0.72 |
| 6380.00 | 0.68 | 253.38 | 6339.29 | 247.19 S | 416.70 E | 426.93 | 0.09 |
| 6474.00 | 0.89 | 273.24 | 6433.28 | 247.31 S | 415.44 E | 425.67 | 0.36 |
| 6569.00 | 6.35 | 77.64 | 6528.11 | 246.15 S | 419.84 E | 430.02 | 7.59 |
| 6664.00 | 14.72 | 78.99 | 6621.43 | 242.71 S | 436.85 E | 446.86 | 8.81 |
| 6758.00 | 20.49 | 85.32 | 6711.00 | 239.08 S | 464.99 E | 474.83 | 6.46 |
| 6853.00 | 29.94 | 89.11 | 6796.85 | 237.35 S | 505.36 E | 515.08 | 10.09 |
| 6948.00 | 39.05 | 88.20 | 6875.07 | 236.04 S | 559.09 E | 568.71 | 9.60 |
| 7042.00 | 49.24 | 90.75 | 6942.44 | 235.58 S | 624.46 E | 634.00 | 11.00 |
| 7137.00 | 62.82 | 93.88 | 6995.40 | 238.92 S | 702.98 E | 712.58 | 14.55 |
| 7232.00 | 68.52 | 93.11 | 7034.53 | 244.19 S | 789.34 E | 799.10 | 6.05 |
| 7280.00 | 70.73 | 92.29 | 7051.24 | 246.30 S | 834.29 E | 844.09 | 4.87 |
| 7327.00 | 72.86 | 91.27 | 7065.92 | 247.69 S | 878.91 E | 888.73 | 4.98 |
| 7375.00 | 76.89 | 91.64 | 7078.44 | 248.87 S | 925.22 E | 935.05 | 8.43 |
| 7437.00 | 80.06 | 92.00 | 7090.83 | 250.80 S | 985.93 E | 995.79 | 5.14 |
| 7511.00 | 84.66 | 90.90 | 7100.66 | 252.65 S | 1059.23 E | 1069.10 | 6.39 |
| 7561.00 | 85.21 | 90.65 | 7105.08 | 253.32 S | 1109.03 E | 1118.88 | 1.21 |
| 7653.00 | 87.38 | 90.36 | 7111.02 | 254.13 S | 1200.83 E | 1210.63 | 2.38 |
| 7744.00 | 89.75 | 90.18 | 7113.30 | 254.56 S | 1291.79 E | 1301.53 | 2.61 |
| 7840.00 | 90.40 | 89.63 | 7113.18 | 254.40 S | 1387.79 E | 1397.43 | 0.89 |
| 7935.00 | 90.96 | 91.07 | 7112.05 | 254.98 S | 1482.78 E | 1492.36 | 1.63 |
| 8029.00 | 89.78 | 92.23 | 7111.44 | 257.69 S | 1576.74 E | 1586.34 | 1.76 |
| 8124.00 | 90.34 | 92.36 | 7111.34 | 261.49 S | 1671.66 E | 1681.34 | 0.61 |
| 8219.00 | 90.86 | 91.73 | 7110.35 | 264.88 S | 1766.59 E | 1776.33 | 0.86 |
| 8314.00 | 91.54 | 91.72 | 7108.36 | 267.74 S | 1861.53 E | 1871.31 | 0.72 |
| 8408.00 | 89.88 | 91.57 | 7107.19 | 270.44 S | 1955.48 E | 1965.29 | 1.77 |
| 8503.00 | 88.74 | 91.77 | 7108.34 | 273.20 S | 2050.43 E | 2060.27 | 1.22 |
| 8598.00 | 88.77 | 91.27 | 7110.40 | 275.72 S | 2145.37 E | 2155.23 | 0.53 |
| 8693.00 | 89.72 | 91.23 | 7111.65 | 277.80 S | 2240.34 E | 2250.20 | 1.00 |
| 8788.00 | 90.03 | 90.58 | 7111.86 | 279.30 S | 2335.33 E | 2345.17 | 0.76 |
| 8882.00 | 90.96 | 90.82 | 7111.05 | 280.45 S | 2429.32 E | 2439.12 | 1.02 |
| 8977.00 | 89.41 | 91.06 | 7110.74 | 282.00 S | 2524.30 E | 2534.08 | 1.65 |
| 9071.00 | 89.94 | 90.63 | 7111.27 | 283.39 S | 2618.29 E | 2628.04 | 0.73 |
| 9166.00 | 90.74 | 90.79 | 7110.71 | 284.57 S | 2713.28 E | 2722.99 | 0.86 |
| 9261.00 | 88.89 | 90.54 | 7111.02 | 285.67 S | 2808.27 E | 2817.94 | 1.97 |
| 9356.00 | 89.54 | 90.15 | 7112.32 | 286.24 S | 2903.26 E | 2912.87 | 0.80 |
| 9451.00 | 88.83 | 90.58 | 7113.67 | 286.85 S | 2998.25 E | 3007.79 | 0.87 |
| 9545.00 | 89.57 | 90.44 | 7114.98 | 287.68 S | 3092.23 E | 3101.73 | 0.80 |
| 9640.00 | 89.72 | 91.59 | 7115.57 | 289.37 S | 3187.21 E | 3196.70 | 1.22 |
| 9734.00 | 91.14 | 91.44 | 7114.87 | 291.85 S | 3281.18 E | 3290.68 | 1.52 |
| 9829.00 | 91.26 | 91.58 | 7112.88 | 294.35 S | 3376.12 E | 3385.64 | 0.19 |
| 9924.00 | 91.14 | 91.18 | 7110.89 | 296.64 S | 3471.07 E | 3480.61 | 0.44 |
| 10019.00 | 90.80 | 91.50 | 7109.28 | 298.86 S | 3566.03 E | 3575.57 | 0.49 |
| 10114.00 | 89.69 | 91.91 | 7108.87 | 301.69 S | 3660.99 E | 3670.56 | 1.25 |
| 10208.00 | 90.31 | 91.95 | 7108.87 | 304.85 S | 3754.93 E | 3764.56 | 0.66 |
| 10303.00 | 89.75 | 91.94 | 7108.82 | 308.08 S | 3849.88 E | 3859.56 | 0.59 |
| 10397.00 | 89.23 | 92.20 | 7109.66 | 311.47 S | 3943.81 E | 3953.55 | 0.62 |
| 10492.00 | 89.29 | 91.88 | 7110.89 | 314.86 S | 4038.75 E | 4048.54 | 0.34 |
| 10587.00 | 88.12 | 91.53 | 7113.03 | 317.68 S | 4133.68 E | 4143.50 | 1.29 |
| 10681.00 | 88.49 | 91.10 | 7115.81 | 319.84 S | 4227.61 E | 4237.44 | 0.60 |
| 10776.00 | 89.51 | 88.98 | 7117.47 | 319.90 S | 4322.59 E | 4332.34 | 2.48 |
| 10871.00 | 91.51 | 90.65 | 7116.63 | 319.60 S | 4417.58 E | 4427.22 | 2.74 |
| 10966.00 | 89.57 | 91.57 | 7115.73 | 321.44 S | 4512.55 E | 4522.19 | 2.26 |
| 11060.00 | 90.93 | 90.69 | 7115.32 | 323.29 S | 4606.53 E | 4616.16 | 1.72 |
| 11155.00 | 90.56 | 90.60 | 7114.09 | 324.36 S | 4701.51 E | 4711.10 | 0.40 |
| 11249.00 | 89.72 | 91.49 | 7113.86 | 326.07 S | 4795.50 E | 4805.07 | 1.30 |
| 11344.00 | 86.98 | 90.86 | 7116.59 | 328.02 S | 4890.43 E | 4900.00 | 2.96 |
| 11438.00 | 87.66 | 90.94 | 7120.99 | 329.50 S | 4984.31 E | 4993.86 | 0.73 |
| 11533.00 | 87.90 | 90.28 | 7124.67 | 330.51 S | 5079.24 E | 5088.74 | 0.74 |
| 11628.00 | 88.86 | 91.91 | 7127.35 | 332.32 S | 5174.18 E | 5183.67 | 1.99 |
| 11723.00 | 89.75 | 91.69 | 7128.50 | 335.31 S | 5269.12 E | 5278.66 | 0.97 |
| 11818.00 | 90.71 | 90.49 | 7128.12 | 337.11 S | 5364.10 E | 5373.63 | 1.62 |
| 11913.00 | 90.74 | 92.37 | 7126.92 | 339.48 S | 5459.06 E | 5468.60 | 1.98 |
| 12007.00 | 91.51 | 91.79 | 7125.08 | 342.89 S | 5552.98 E | 5562.58 | 1.03 |
| 12102.00 | 90.46 | 92.49 | 7123.44 | 346.44 S | 5647.89 E | 5657.56 | 1.33 |
| 12196.00 | 89.66 | 91.98 | 7123.34 | 350.11 S | 5741.82 E | 5751.56 | 1.01 |
| 12291.00 | 90.31 | 91.61 | 7123.37 | 353.08 S | 5836.78 E | 5846.55 | 0.79 |
| 12386.00 | 89.60 | 90.81 | 7123.44 | 355.09 S | 5931.75 E | 5941.53 | 1.13 |

12449.00

90.00

92.87

7123.66

357.11 S

5994.72 E

6004.52

3.33

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 92.46 DEGREES (GRID)
A TOTAL CORRECTION OF 7.93 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12449.00 FEET
IS 6005.34 FEET ALONG 93.41 DEGREES (GRID)**

Tied in @ Surface

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