

DGR Dual Gamma Ray



1 : 240

[illegible]

WELL INFORMATION

| | | | | | |
|-----------------------------------------|------------------|-------------------|--|--|--|
| MWD Run Number | 100 | 200 | | | |
| Date run completed | 08-Jul-13 | 12-Jul-13 | | | |
| Rig Bit Number | 0100 | 0200 | | | |
| Bit Size (in) | 8.750 | 6.125 | | | |
| Tool Nominal OD (in) | 6.750 | 4.750 | | | |
| Log Start Depth (MD, ft) | 1,101.00 | 8,320.00 | | | |
| Log End Depth (MD, ft) | 8,320.00 | 12,461.00 | | | |
| Drill or Wipe | Drill | Drill | | | |
| Drill/Wipe Start Date and Time | 04-Jul-13 02:00 | 09-Jul-13 15:00 | | | |
| Drill/Wipe End Date and Time | 07-Jul-13 17:50 | 11-Jul-13 12:46 | | | |
| Min Inc (deg) @ Depth (MD, ft) | .28 @ 1,197.00 | 87.16 @ 10,107.00 | | | |
| Max Inc (deg) @ Depth (MD, ft) | 87.57 @ 8,269.00 | 92.78 @ 11,904.00 | | | |
| Bit TFA(in2) / Bit Type | .86 / PDC | .61 / PDC | | | |
| Flow Rate (gpm) | 590.00 | 270.40 | | | |
| Max AV (fpm) / CV (fpm) @ MWD | 420.0 / 276.0 | 446.0 / 358.0 | | | |
| Fluid Type | Fresh Water Gel | Fresh Water Gel | | | |
| Density (ppg) / Viscosity (spqt) | 9.60 / 44.00 | 9.80 / 42.00 | | | |
| Filtrate CL (ppm) | 1,100.00 | 1,000.00 | | | |
| pH / Fluid Loss (mptm) | 8.90 / 8.90 | 9.00 / 9.00 | | | |
| PV (cP) / YP (lbf2) | 13 / 14.00 | 15 / 14.00 | | | |
| % Solids / % Sand | 7.5 / .5 | 8 / .25 | | | |
| % Oil / Oil:Water Ratio | N/A / N/A | N/A / N/A | | | |
| Rm @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | | | |
| Rmf @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | | | |
| Rmc @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | | | |
| Max Tool Temp (deg F) @ 100 ft | 112.00 / 100 ft | 112.75 / 100 ft | | | |

| | | | | | |
|-------------------------------|--------------------|--------------------|--|--|--|
| Max Tool Temp (degF) / Source | 412.20 / PCM | 243.76 / HCIM | | | |
| Rm @ Max Tool Temp (degF) | N/A @ 412.20 | N/A @ 243.76 | | | |
| Lead MWD Engineer | Ryan White | Ryan White | | | |
| Customer Representative | Travis Kruckenburg | Travis Kruckenburg | | | |

SENSOR INFORMATION

Downhole Processor Information

| | | | | | |
|---------------------------|-----------------|-----------------|--|--|--|
| Tool Type | PCM | HCIM | | | |
| Software Version | 5.84 | 88.56 | | | |
| Sub Serial Number | 11341324 | 11512743 | | | |
| Insert Serial Number | 11145605 | 11862991 | | | |
| Date and Time Initialized | 02-Jul-13 15:28 | 09-Jul-13 08:33 | | | |
| Date and Time Read | 08-Jul-13 03:46 | 01-Jan-70 00:00 | | | |
| ECMB SW Version | N/A | N/A | | | |

Directional Sensor Information

| | | | | | |
|------------------------|----------|----------|--|--|--|
| Tool Type | PCDC | PCDC | | | |
| Distance From Bit (ft) | 51.00 | 48.84 | | | |
| Software Version | 6.21 | 6.21 | | | |
| Sub Serial Number | 11341324 | 11626952 | | | |
| Sonde Serial Number | 11180292 | 11180292 | | | |
| Sensor ID Number | N/A | N/A | | | |
| Toolface Offset (deg) | 221.14 | 83.19 | | | |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|-----------|--|--|--|
| Tool Type | PCG | DGR | | | |
| Distance From Bit (ft) | 54.08 | 70.75 | | | |
| Recorded Sample Period (sec) | 10 | 8 | | | |
| Software Version | 8.15 | N/A | | | |
| Sub Serial Number | 11341324 | 11512743 | | | |
| Insert/Sonde Serial Number | 11579843 | 120163225 | | | |

REMARKS

1. All depths are measured bit depths, referenced to the driller's pipe tally and are measured from the drill floor, unless otherwise specified.

2. No depth corrections have been made for pipe stretch or compression.

3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham 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:

PGRC (Corrected Gamma Ray):

Interval Resolution: 0.5 ft

Interval Distance: 0.6 ft

Gap Fill: 3.0 ft

ROPA (Average Rate of Penetration):

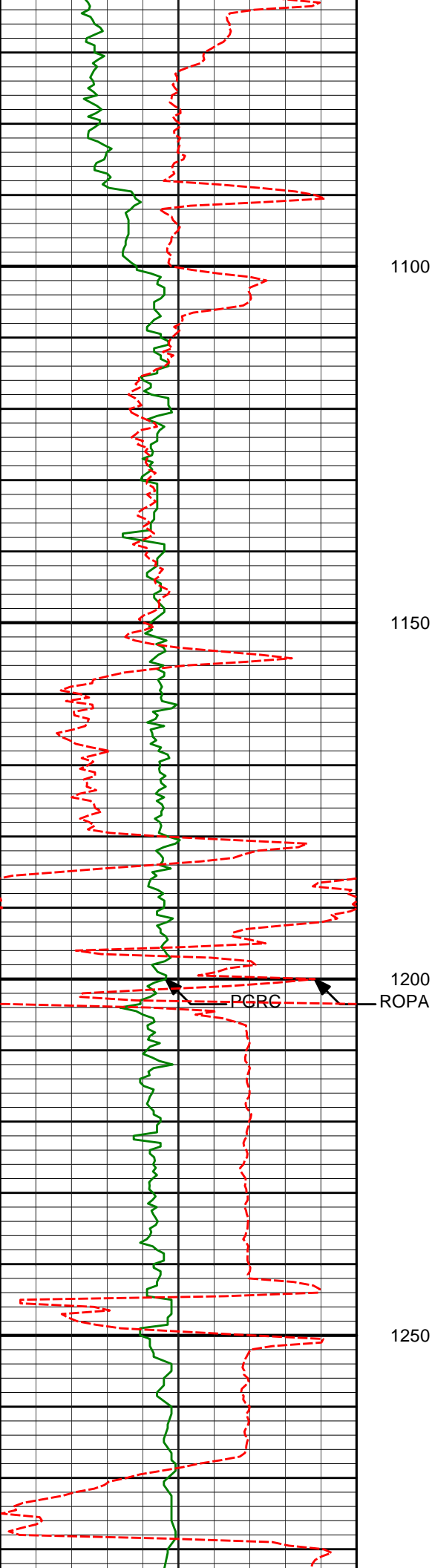
Interval Resolution: 0.5 ft

Interval Distance: 1.2 ft

Gap Fill : 3.0 ft

6. INSITE version 7.4.10





1129'

0.35°

324.27°

1128.97'

5.30'

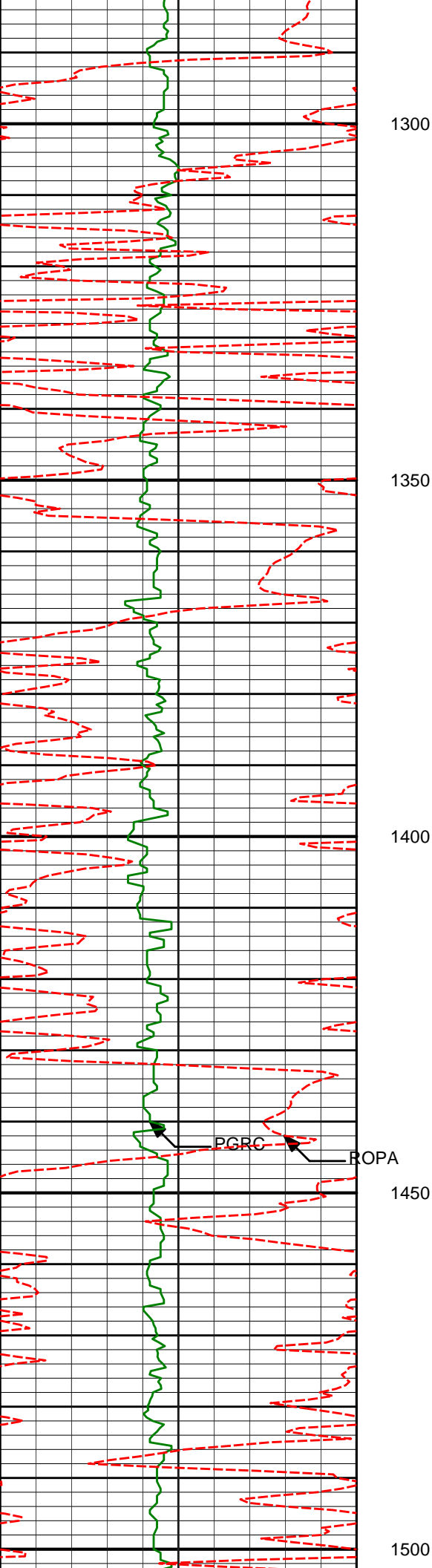
1197'

0.28°

38.76°

1196.97'

5.60'



| | | | | |
|-------|-------|---------|----------|-------|
| 1289' | 1.66° | 317.07° | 1288.95' | 6.79' |
|-------|-------|---------|----------|-------|

1300

1350

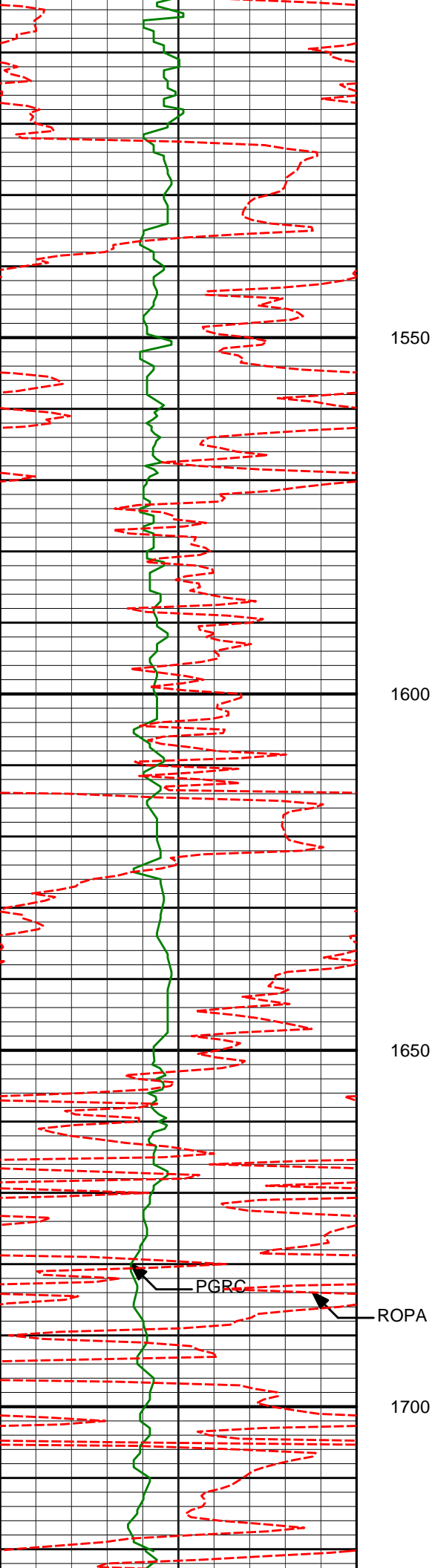
| | | | | |
|-------|-------|---------|----------|-------|
| 1381' | 3.26° | 306.80° | 1380.87' | 9.48' |
|-------|-------|---------|----------|-------|

1400

1450

| | | | | |
|-------|-------|---------|----------|--------|
| 1473' | 4.68° | 304.45° | 1472.64' | 13.44' |
|-------|-------|---------|----------|--------|

1500



1565'

5.84°

298.25°

1564.26'

18.15'

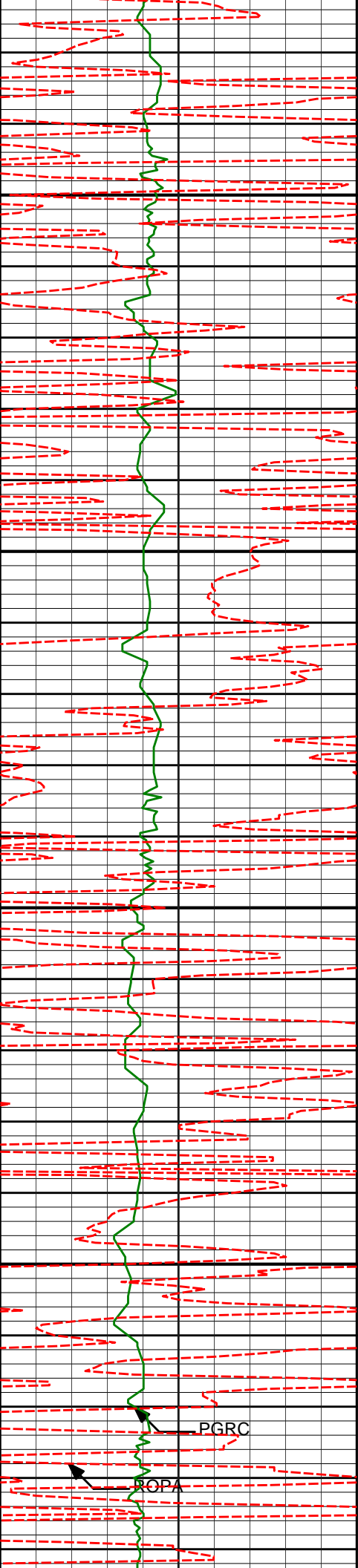
1657'

6.94°

297.59°

1655.68'

23.42'



1750

1749'

7.77°

298.57°

1746.93'

29.51'

1800

1840'

9.62°

295.06°

1836.88'

36.31'

1850

1900

PGRC

POPA

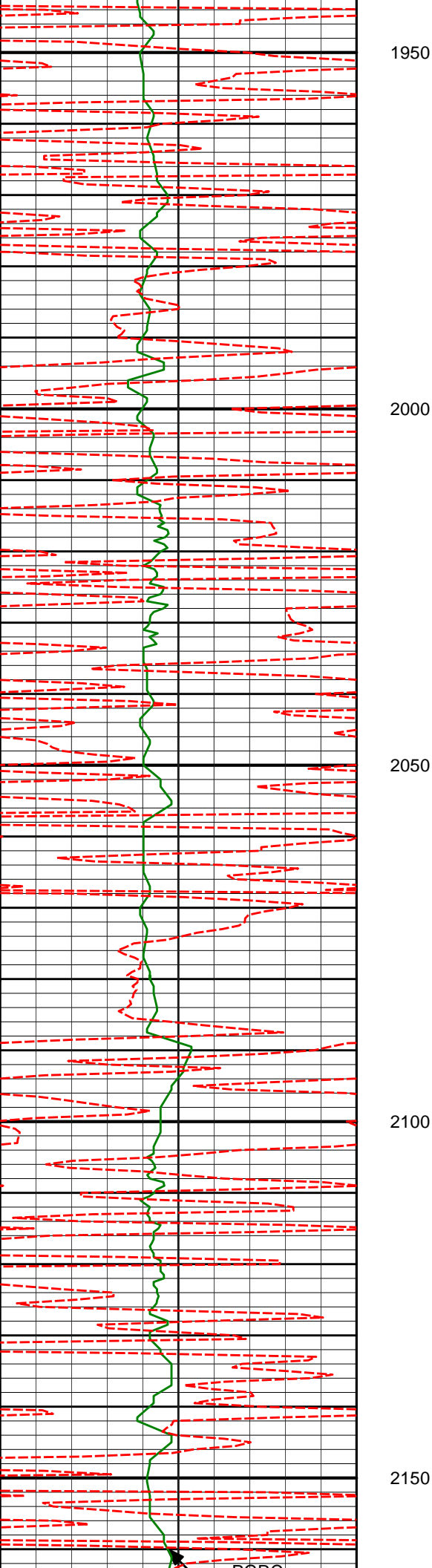
1931'

10.38°

296.77°

1926.49'

43.97'



2022'

11.47°

295.90°

2015.84'

52.43'

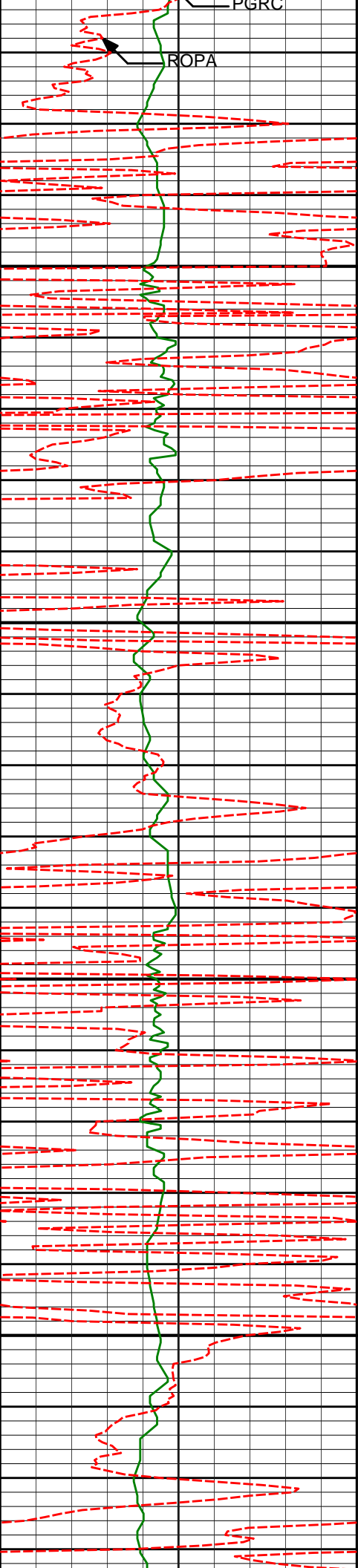
2113'

12.29°

295.91°

2104.89'

61.49'



2200

2207'

13.44°

298.73°

2196.53'

72.09'

2250

2300

2302'

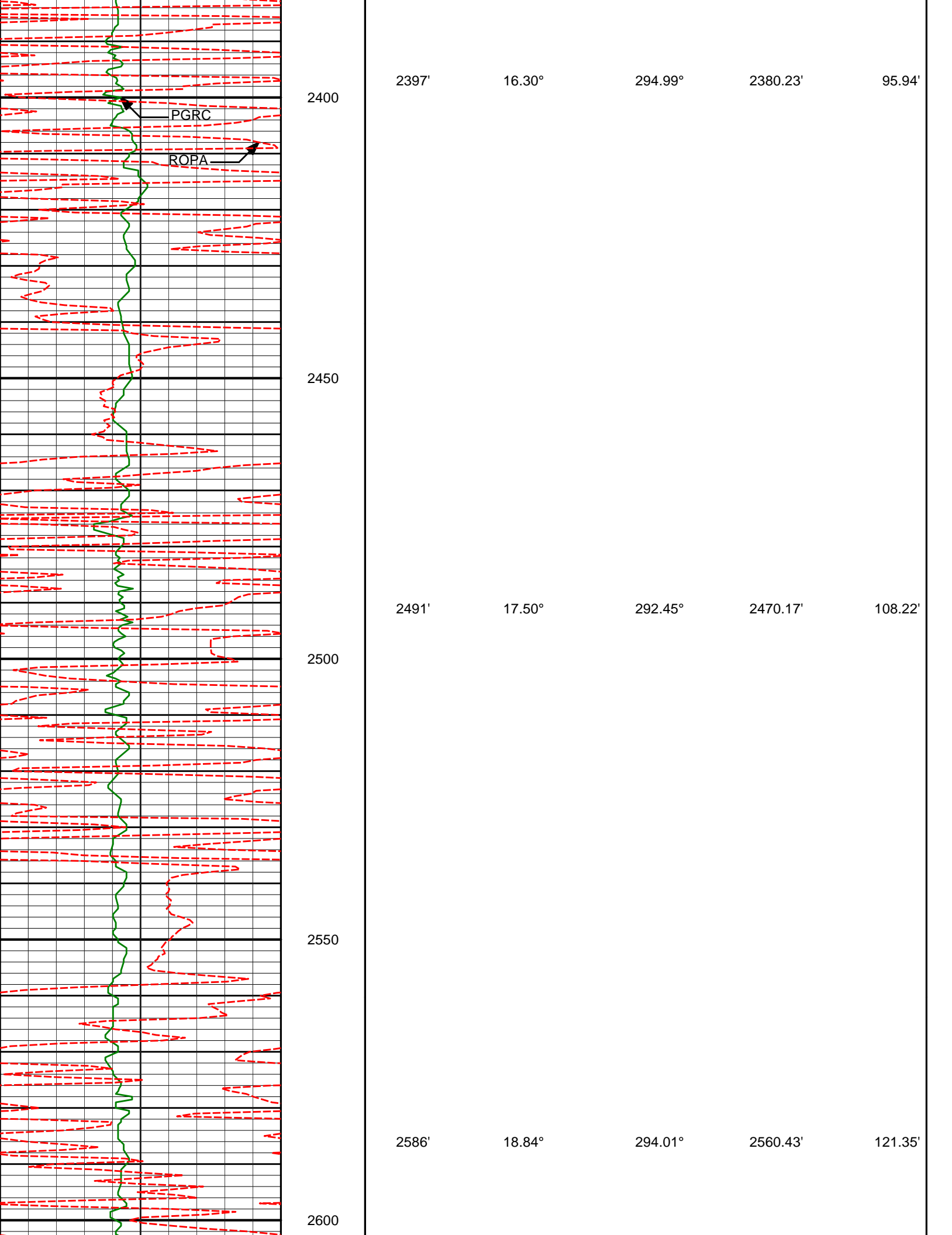
14.68°

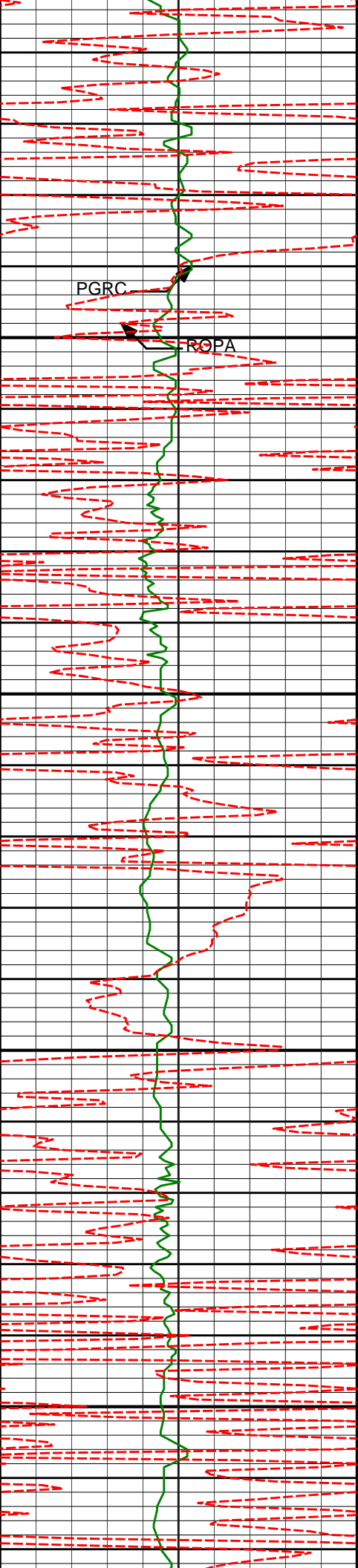
296.22°

2288.68'

83.79'

2350





2650

2680'

16.63°

292.03°

2649.95'

133.96'

2700

2750

2775'

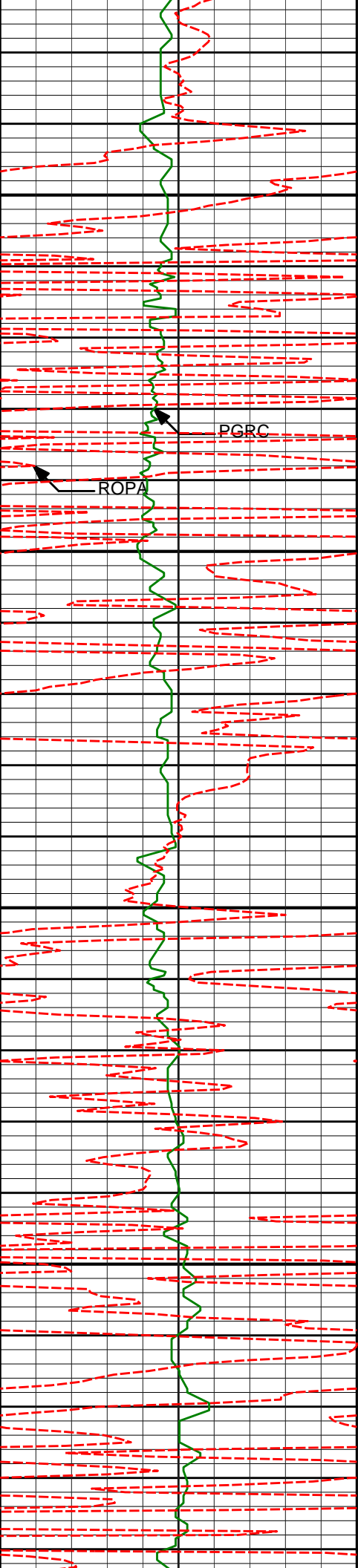
18.53°

293.27°

2740.51'

146.41'

2800



2850

2870'

18.22°

291.92°

2830.67'

159.37'

PGRC

ROPAL

2900

2950

2964'

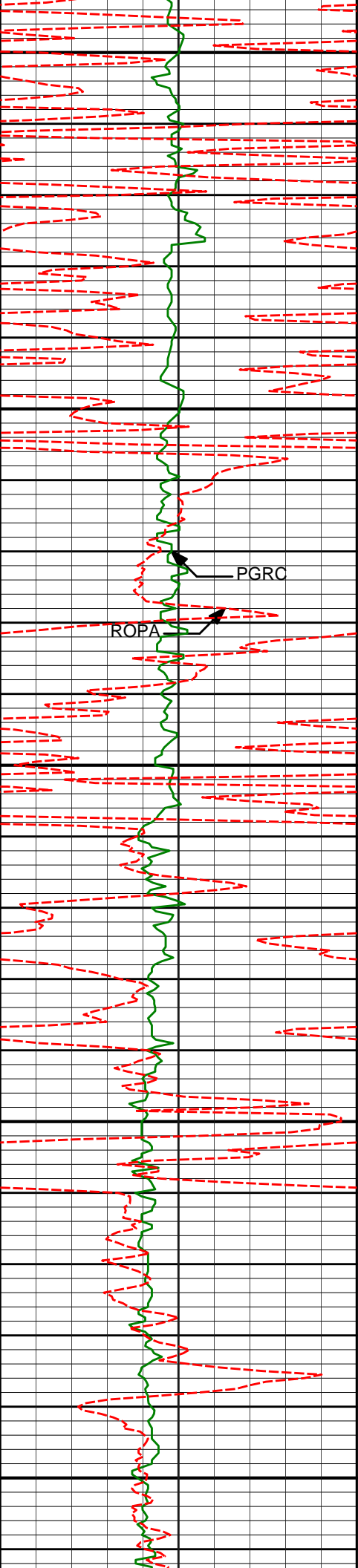
19.35°

292.80°

2919.66'

172.35'

3000



3050

3059'

17.48°

292.01°

3009.79'

185.25'

3100

PGRC

ROPA

3150

3153'

19.15°

291.87°

3099.03'

197.73'

3200

3250

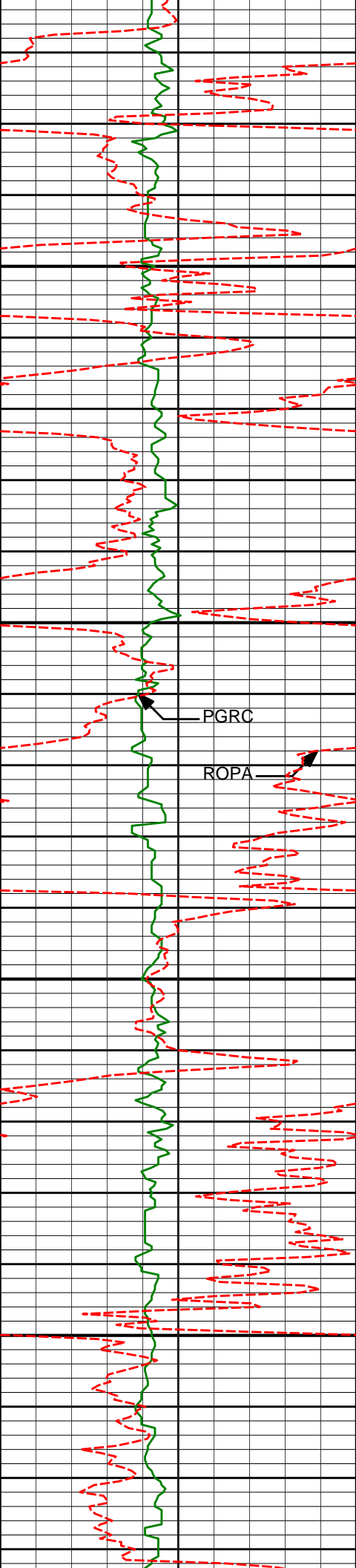
3248'

18.21°

291.30°

3189.02'

210.40'



3300

3343'

17.42°

291.25°

3279.47'

222.37'

3350

PGRC

ROPA

3400

3437'

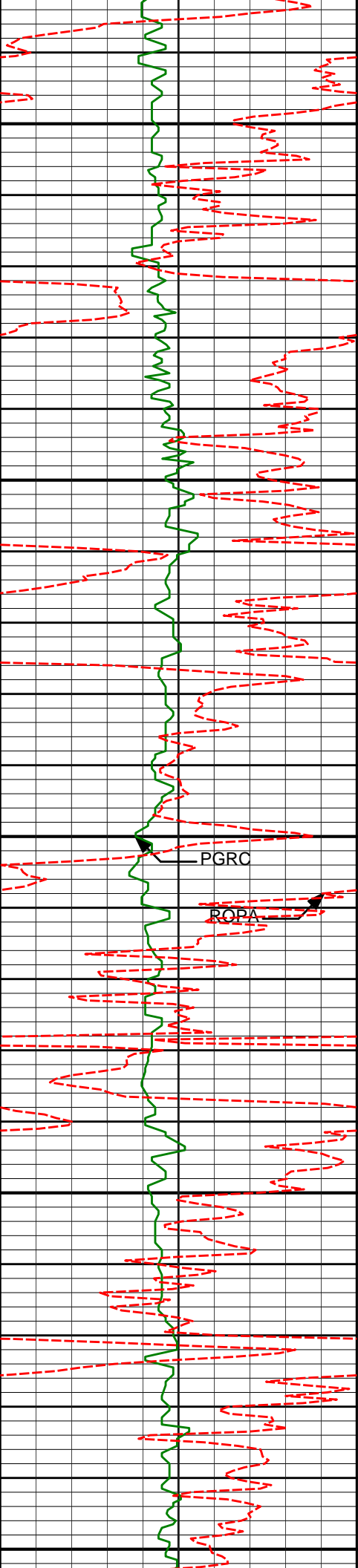
18.86°

296.79°

3368.80'

235.72'

3450



3500

3532'

17.77°

296.50°

3458.98'

250.51'

3550

3600

PGRC

ROPA

3626'

18.65°

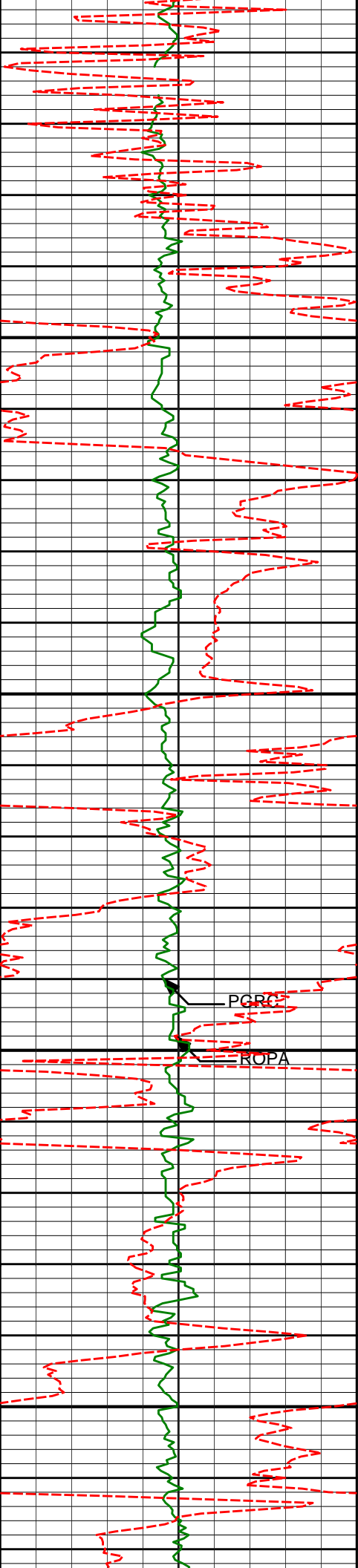
293.87°

3548.28'

264.38'

3650

3700



| | | | | |
|-------|--------|---------|----------|---------|
| 3721' | 16.38° | 294.09° | 3638.87' | 277.37' |
|-------|--------|---------|----------|---------|

3750

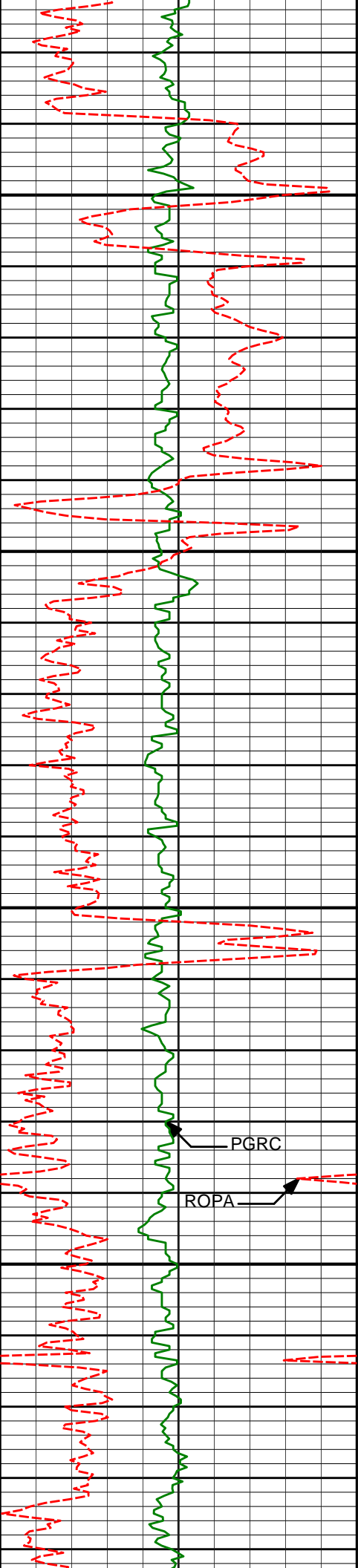
3800

| | | | | |
|-------|--------|---------|----------|---------|
| 3816' | 16.63° | 295.08° | 3729.95' | 289.88' |
|-------|--------|---------|----------|---------|

3850

3900

| | | | | |
|-------|--------|---------|----------|---------|
| 3910' | 18.32° | 296.80° | 3819.61' | 303.58' |
|-------|--------|---------|----------|---------|



3950

4000

4050

4100

4005'

19.93°

299.56°

3909.37'

319.73'

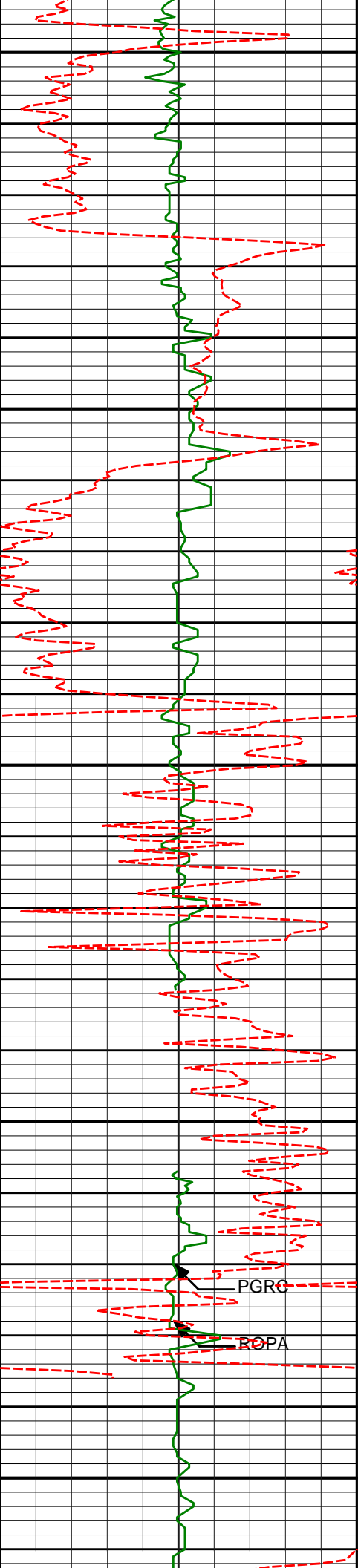
4099'

18.05°

298.58°

3998.25'

336.00'



4150

4194'

17.62°

295.68°

4088.68'

350.63'

4200

4250

4288'

16.84°

295.80°

4178.46'

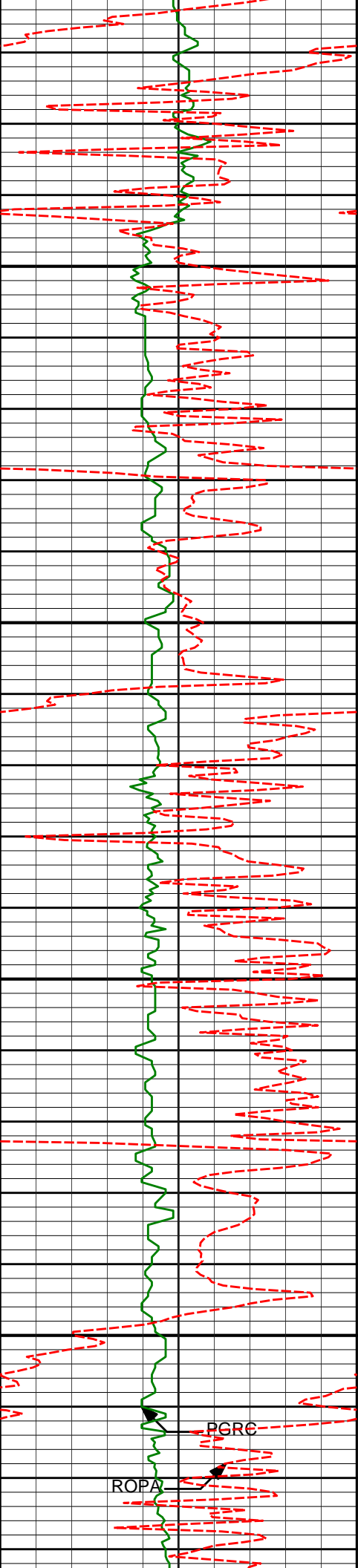
364.04'

4300

PGRC

BOPA

4350



4383'

17.00°

297.90°

4269.35'

377.81'

4400

4450

4478'

19.21°

293.22°

4359.64'

391.87'

4500

4550

PGRC

ROPA

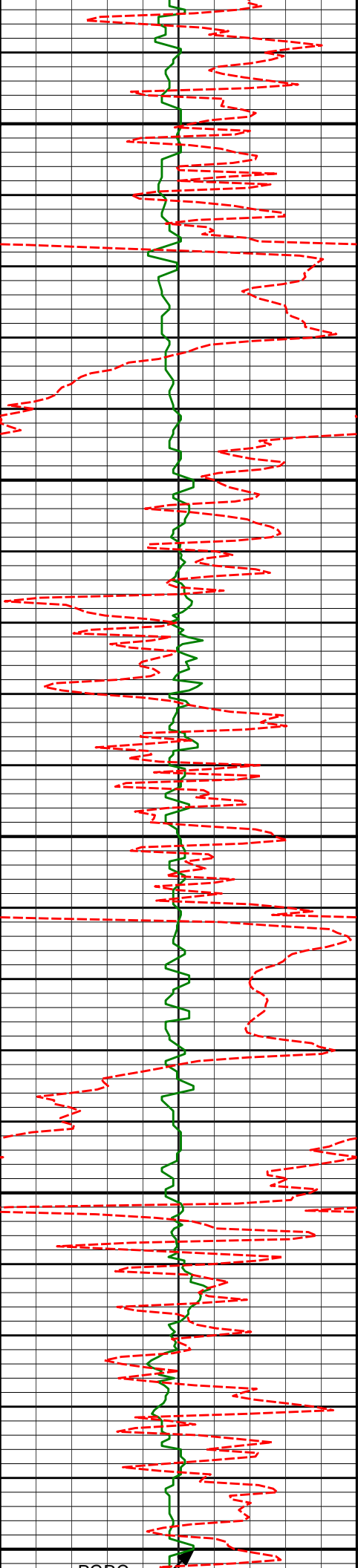
4572'

20.79°

295.65°

4447.98'

406.72'



4600

4650

4700

4750

4800

4667'

19.68°

291.92°

4537.12'

421.57'

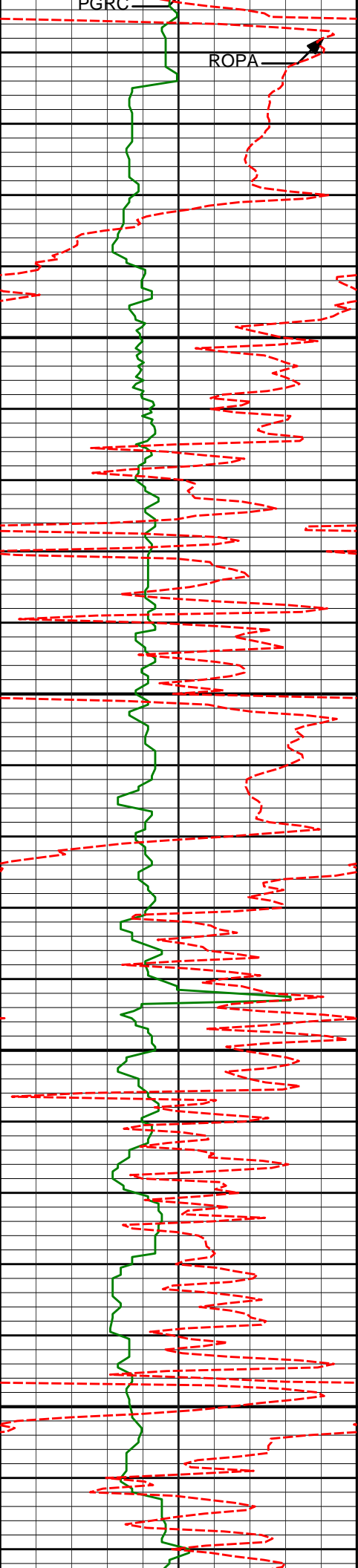
4761'

18.86°

290.77°

4625.85'

434.38'



4850

4856'

20.55°

289.41°

4715.28'

446.95'

4900

4950

4950'

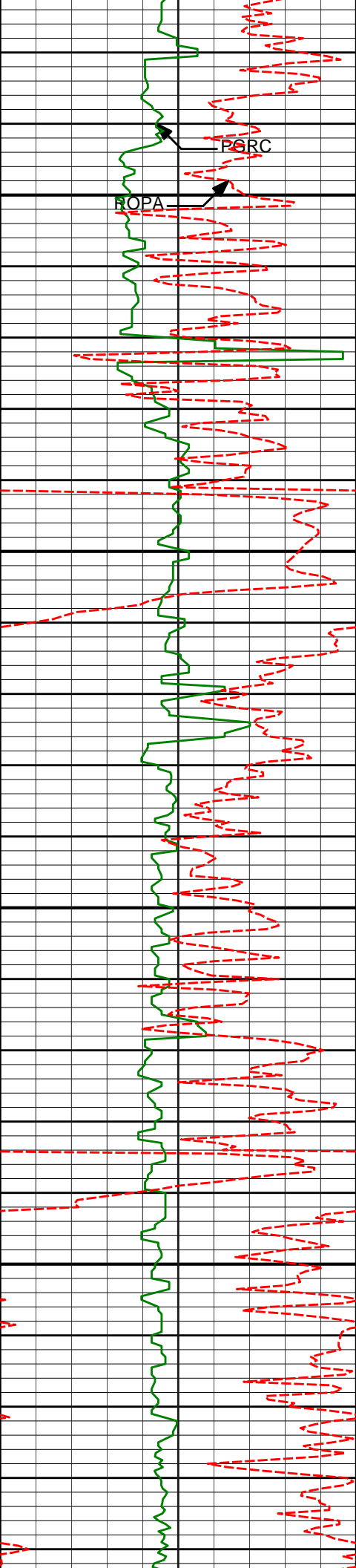
20.86°

289.77°

4803.21'

459.74'

5000



5050

5100

5150

5200

5045'

19.43°

290.13°

4892.39'

472.51'

5140'

19.94°

290.86°

4981.84'

485.29'

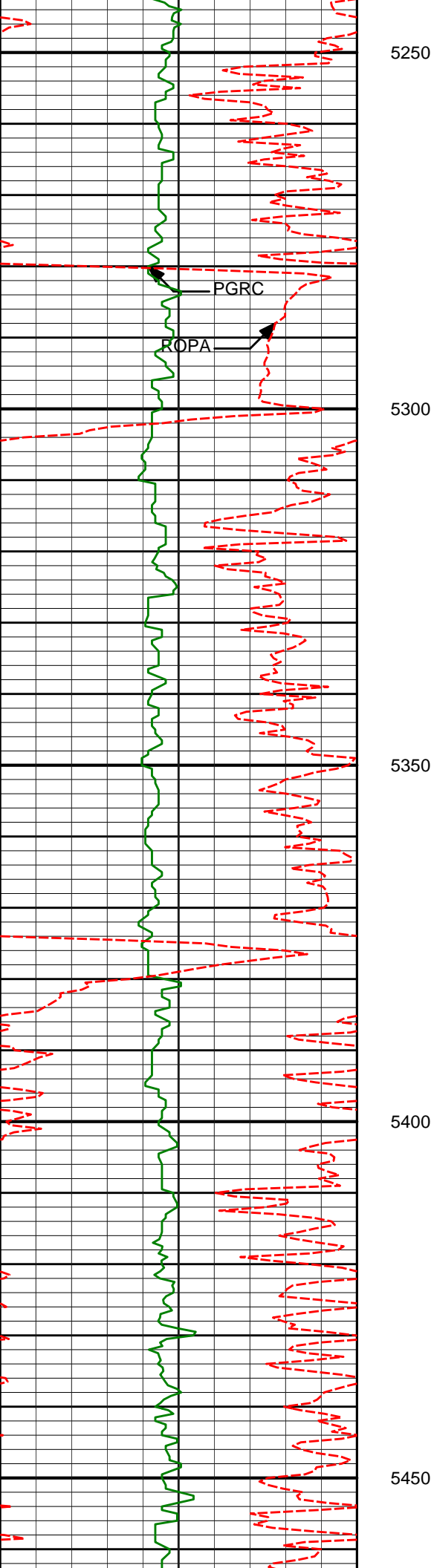
5234'

19.20°

290.94°

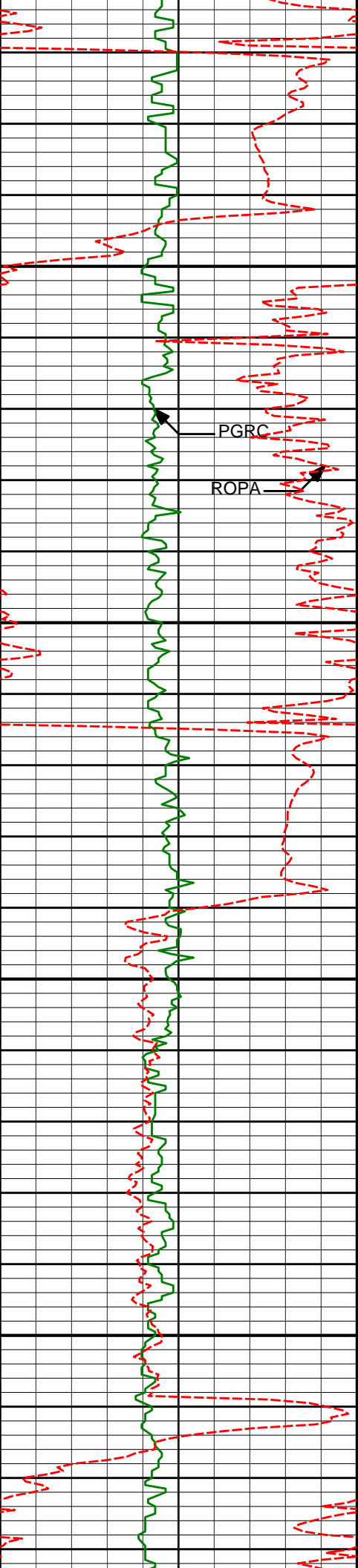
5070.41'

498.07'



| | | | | |
|-------|--------|---------|----------|---------|
| 5329' | 19.75° | 295.17° | 5159.98' | 512.00' |
|-------|--------|---------|----------|---------|

| | | | | |
|-------|--------|---------|----------|---------|
| 5423' | 18.29° | 296.13° | 5248.85' | 526.70' |
|-------|--------|---------|----------|---------|



5500

5518'

17.90°

294.06°

5339.15'

540.62'

PGRC

ROPA

5550

5600

5612'

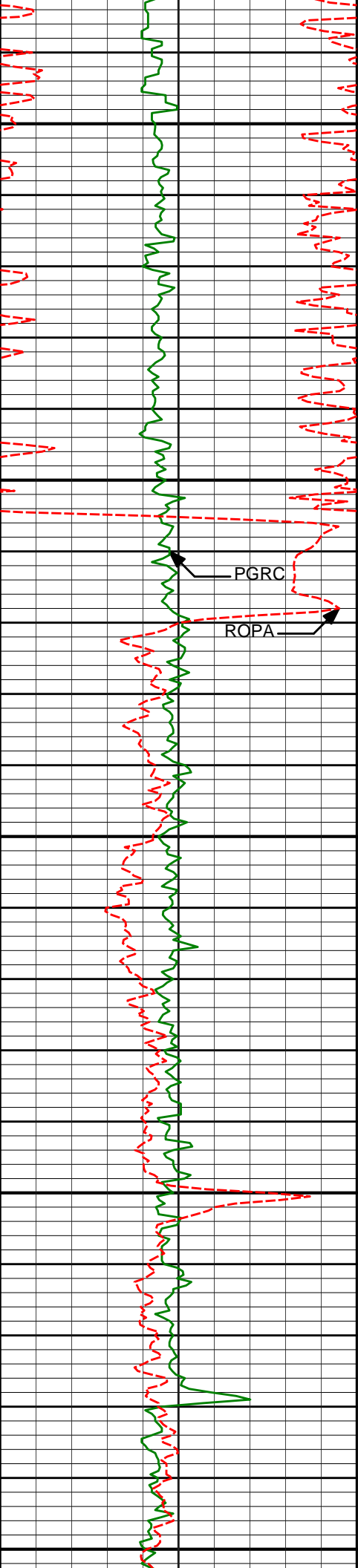
19.32°

289.92°

5428.24'

553.26'

5650



5700

5707'

18.09°

290.71°

5518.22'

565.34'

5750

PGRC

ROPA

5800

5802'

17.49°

288.14°

5608.68'

576.43'

5850

5900

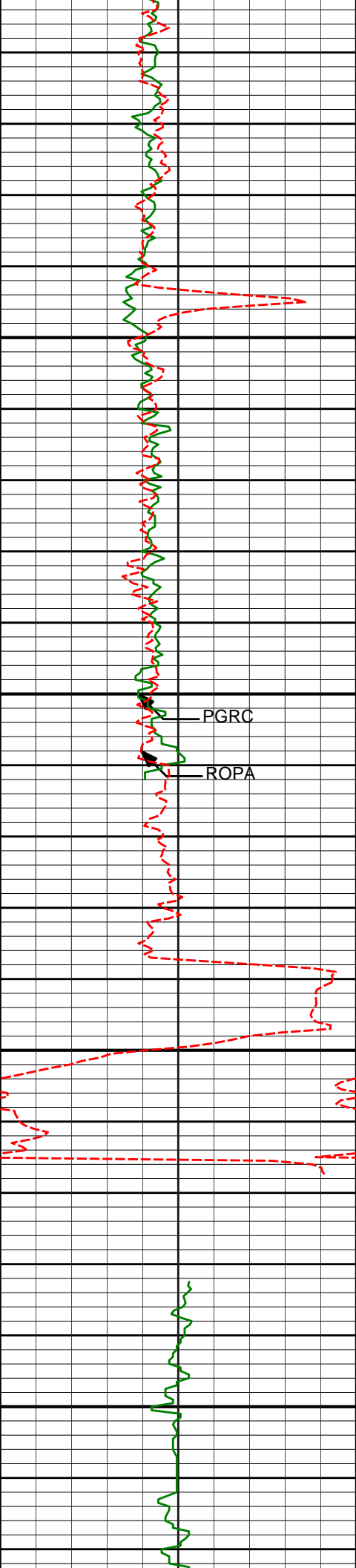
5896'

15.17°

287.79°

5698.88'

585.91'



5950

5991'

14.03°

287.88°

5790.82'

594.44'

6000

PGRC

ROPA

6050

6085'

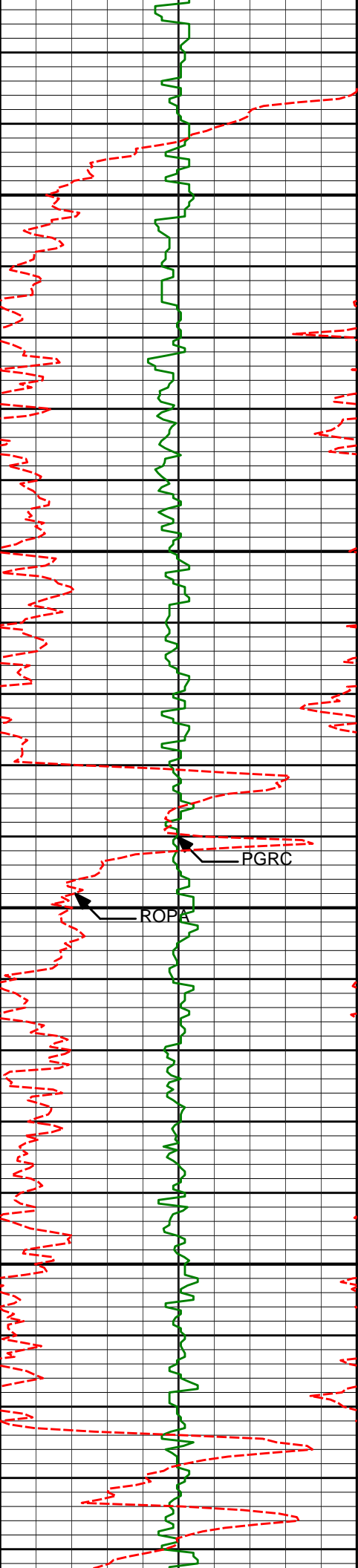
11.04°

287.20°

5882.57'

601.62'

6100



6150

6180'

9.09°

287.86°

5976.10'

607.45'

6200

6250

6274'

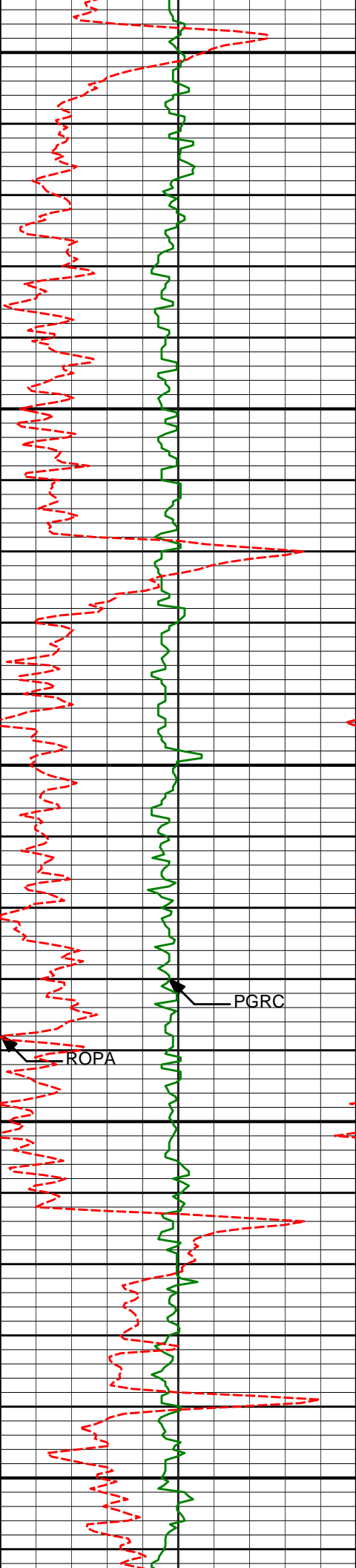
7.53°

288.17°

6069.11'

612.33'

6300



6350

6369'

5.78°

284.31°

6163.47'

616.01'

6400

6450

6464'

3.99°

281.14°

6258.12'

618.24'

PGRC

ROPA

6500

6550

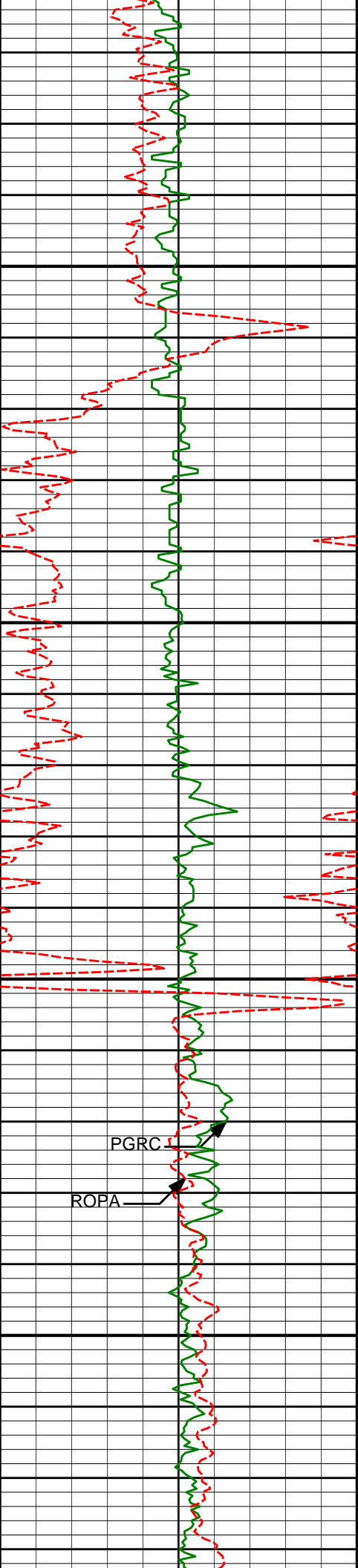
6558'

2.90°

286.11°

6351.95'

619.82'



6600

6650

6700

6750

6653'

2.18°

285.67°

6446.85'

621.19'

PGRC

ROPA

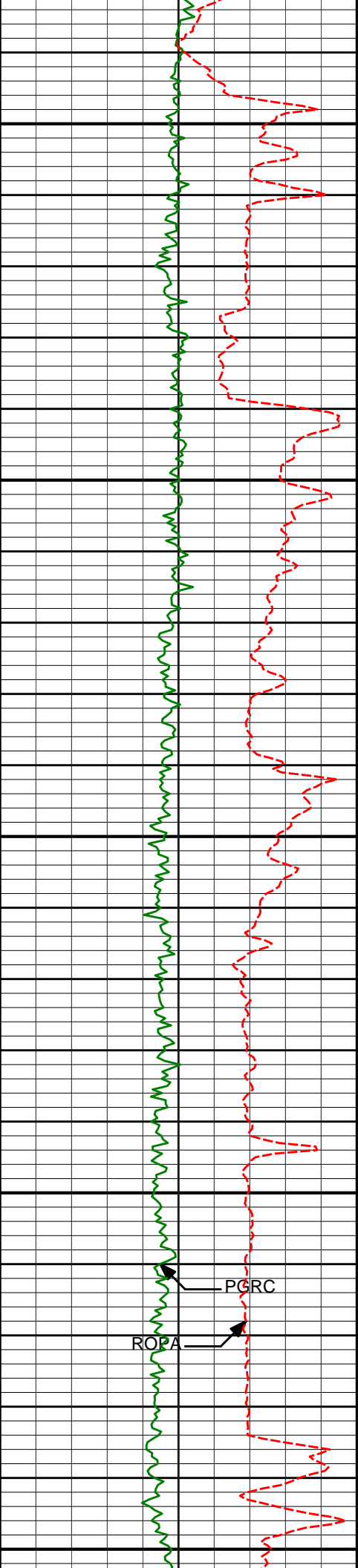
6747'

1.64°

283.33°

6540.80'

622.14'



6800

6850

6900

6950

7000

6842' 2.51° 291.58° 6635.74' 623.39'

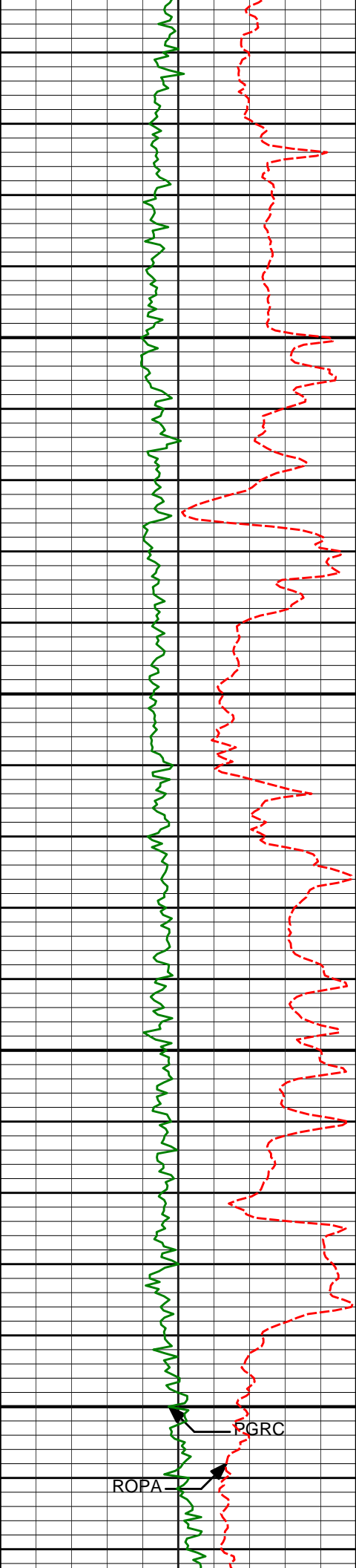
6873' 5.26° 297.72° 6666.66' 624.40'

6905' 8.08° 299.11° 6698.44' 626.35'

6937' 10.15° 303.91° 6730.04' 629.24'

6968' 10.36° 305.00° 6760.54' 632.60'

7000' 10.74° 311.17° 6792.00' 636.45'



7050

7100

7150

7200

7031'

11.11°

321.31°

6822.44'

640.89'

7063'

11.96°

322.09°

6853.80'

646.12'

7094'

13.18°

324.42°

6884.05'

651.73'

7126'

14.45°

329.54°

6915.13'

658.35'

7157'

15.61°

333.20°

6945.07'

665.60'

7189'

17.05°

334.62°

6975.78'

673.89'

7220'

19.04°

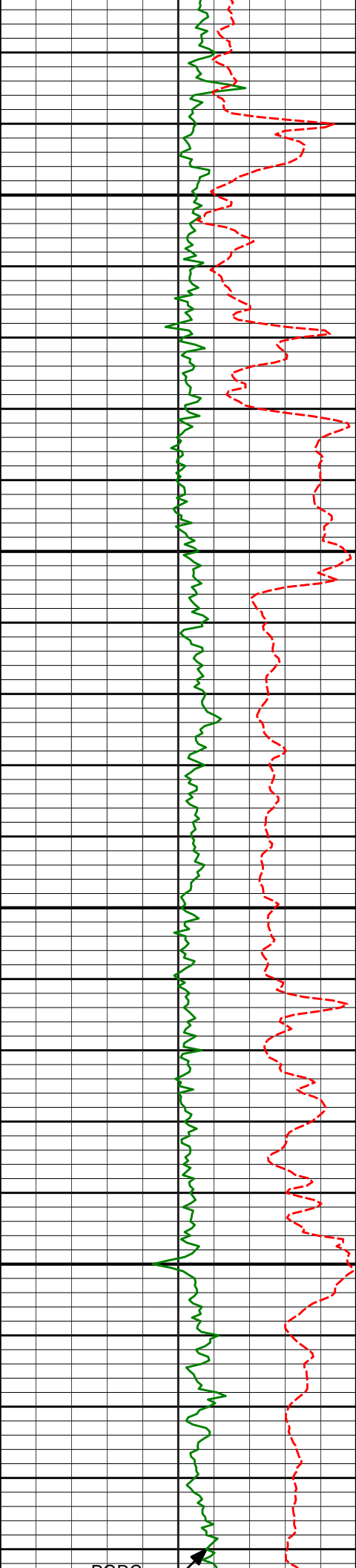
337.50°

7005.25'

682.86'

ROPA

RGRC



7250

7252'

20.40°

339.95°

7035.37'

693.11'

7300

7283'

21.76°

346.20°

7064.30'

703.93'

7350

7315'

22.64°

351.03°

7093.93'

715.88'

7346'

24.28°

356.31°

7122.37'

728.19'

7400

7378'

25.01°

0.27°

7151.46'

741.52'

7409'

26.52°

0.72°

7179.38'

754.97'

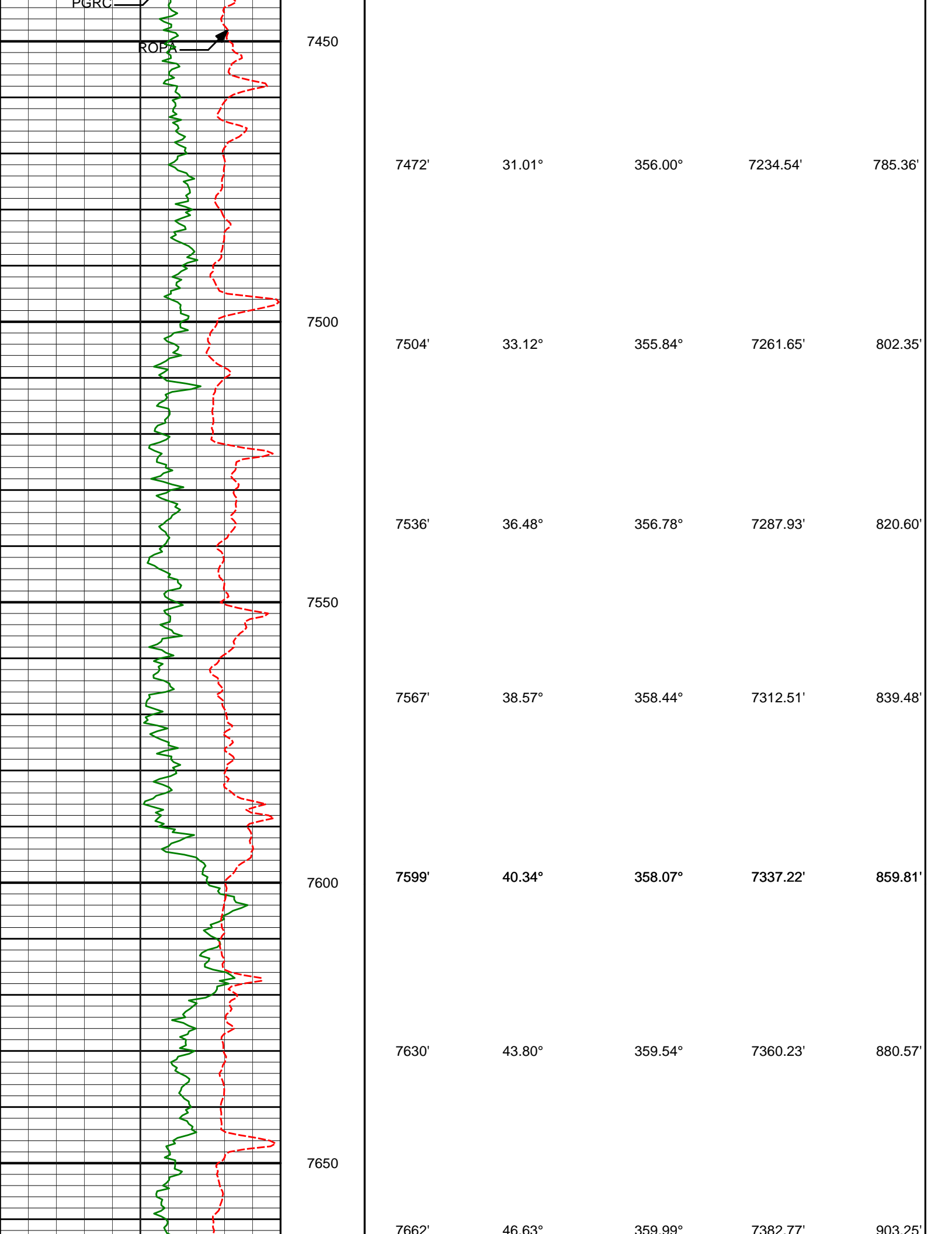
7441'

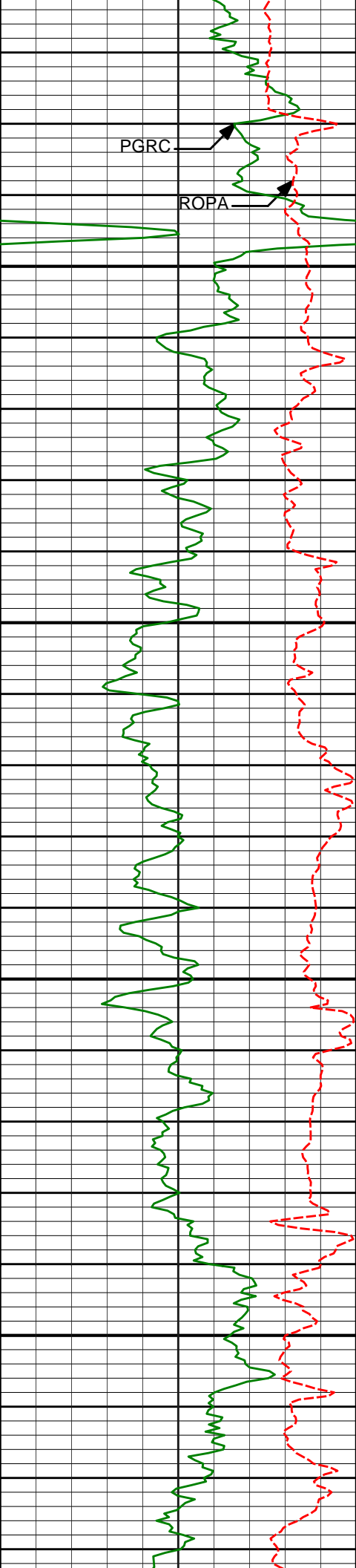
28.99°

357.38°

7207.69'

769.86'





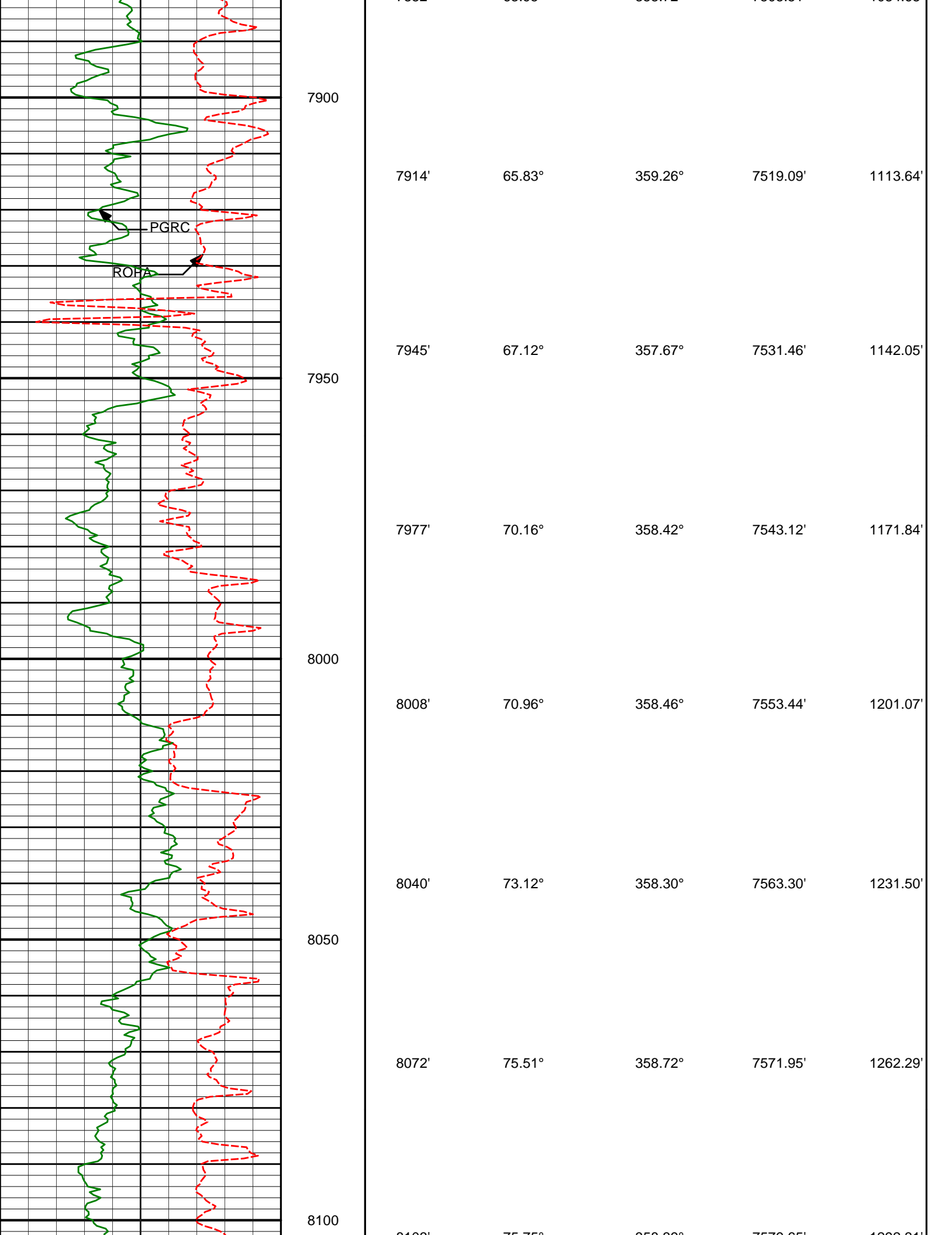
7700

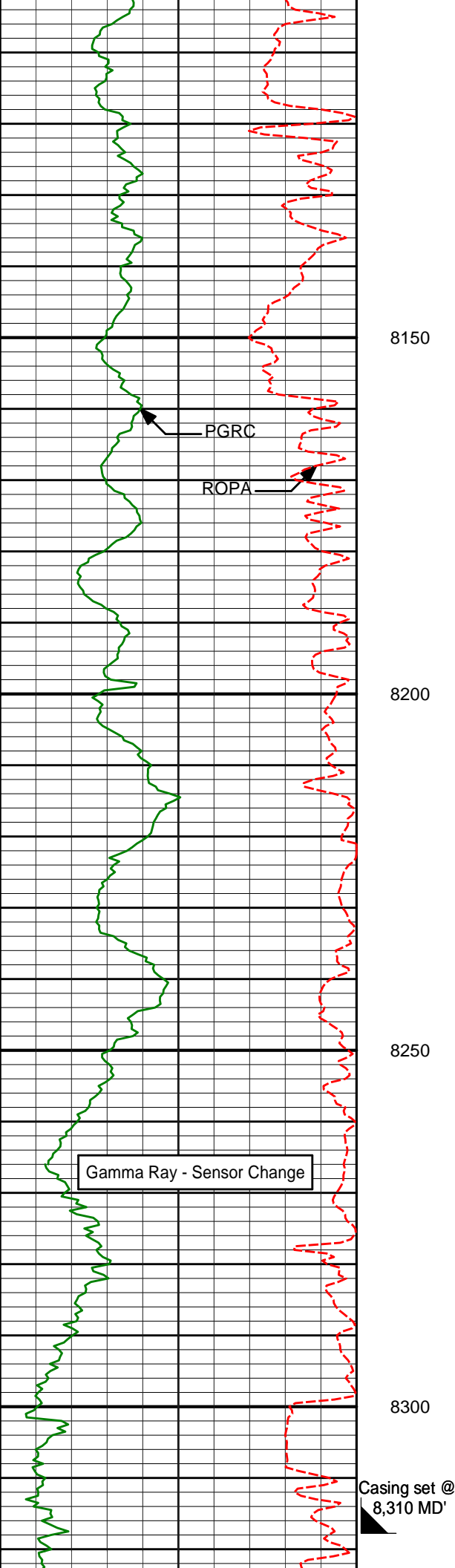
7750

7800

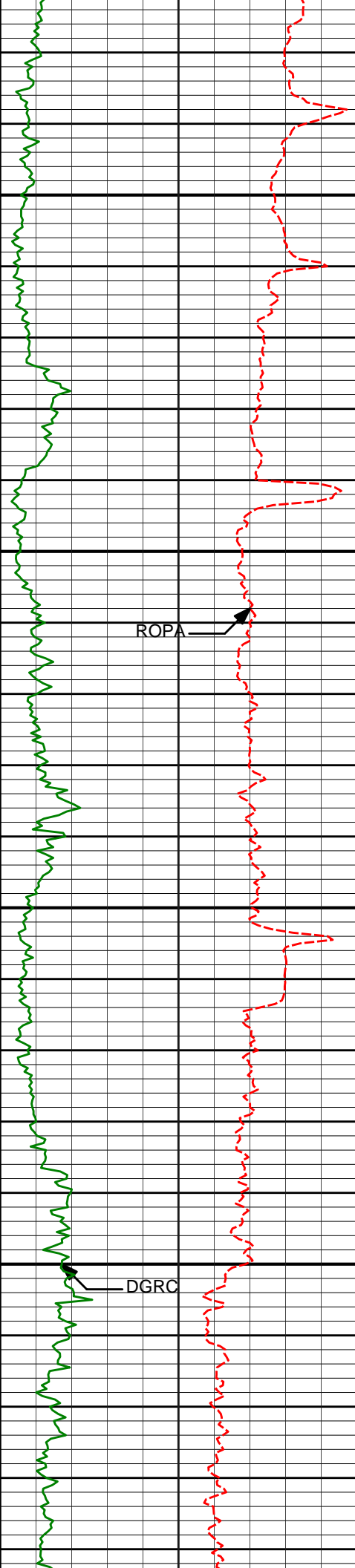
7850

| | | | | |
|-------|--------|---------|----------|----------|
| 7693' | 49.07° | 359.12° | 7403.57' | 926.21' |
| 7725' | 52.37° | 358.82° | 7423.83' | 950.96' |
| 7756' | 55.26° | 358.82° | 7442.13' | 975.97' |
| 7788' | 57.47° | 358.24° | 7459.85' | 1002.60' |
| 7819' | 60.01° | 358.12° | 7475.93' | 1029.09' |
| 7851' | 62.04° | 358.22° | 7491.43' | 1057.08' |
| 7882' | 63.95° | 358.72° | 7505.51' | 1084.68' |





| | | | | |
|------------------------|--------|---------|----------|----------|
| 8103' | 75.75° | 358.39° | 7579.65' | 1292.31' |
| 8135' | 77.29° | 357.27° | 7587.11' | 1323.42' |
| 8150' | | | | |
| 8166' | 79.96° | 356.78° | 7593.22' | 1353.81' |
| 8198' | 81.97° | 357.87° | 7598.25' | 1385.41' |
| 8200' | | | | |
| 8250' | | | | |
| 8300' | | | | |
| Casing set @ 8,310 MD' | | | | |



8350

8400

8450

8500

8342'

89.69°

359.96°

7606.60'

1528.92'

8405'

90.00°

359.56°

7606.77'

1591.85'

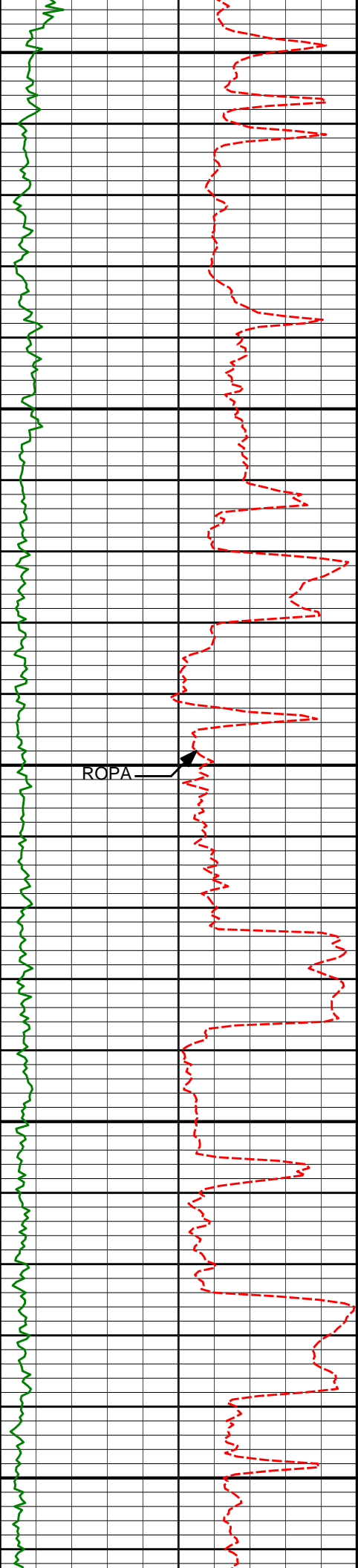
8499'

90.37°

359.14°

7606.47'

1685.76'



8550

8594'

91.05°

358.43°

7605.29'

1780.71'

8600

8650

ROPA

8689'

90.19°

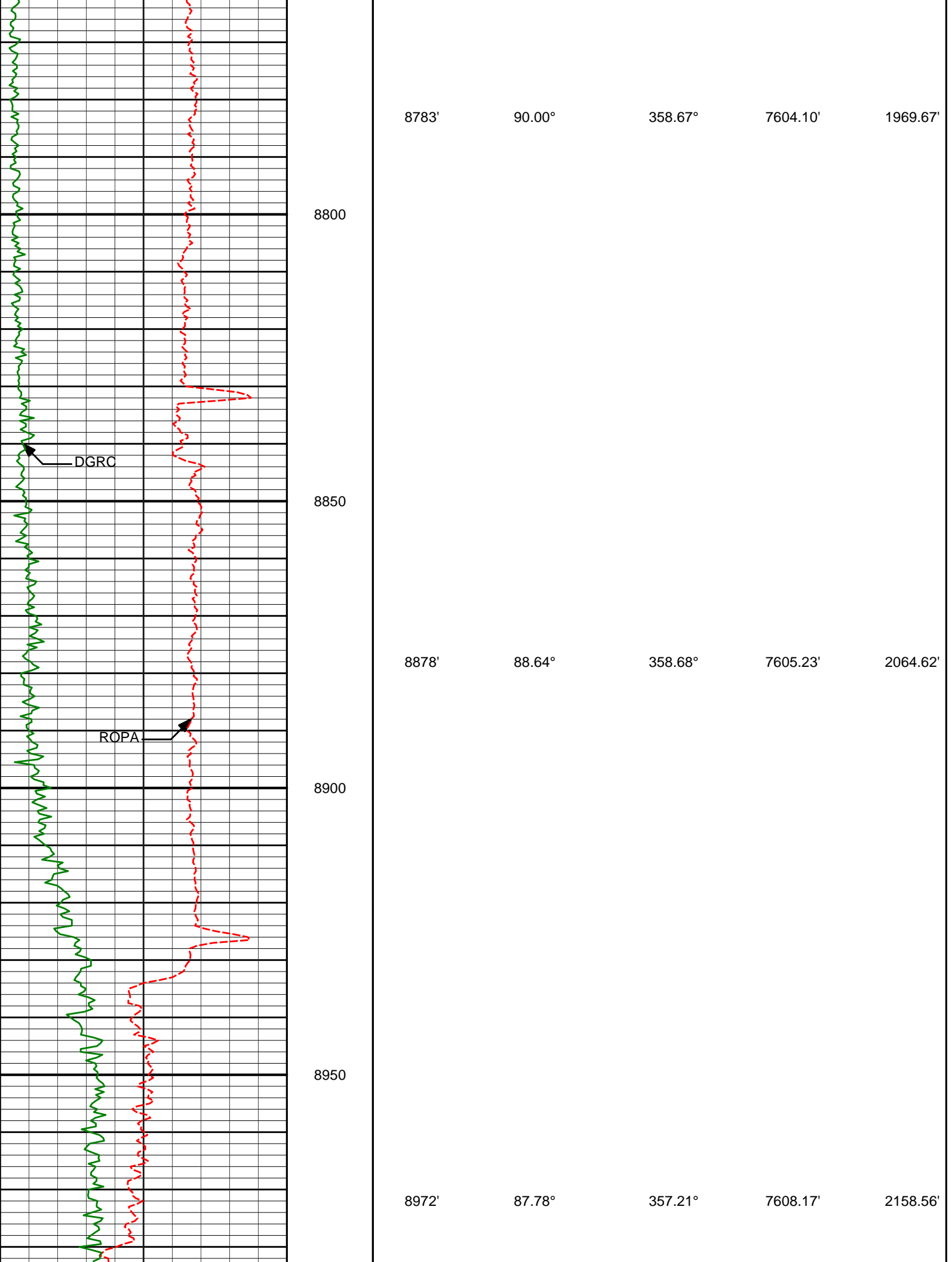
357.16°

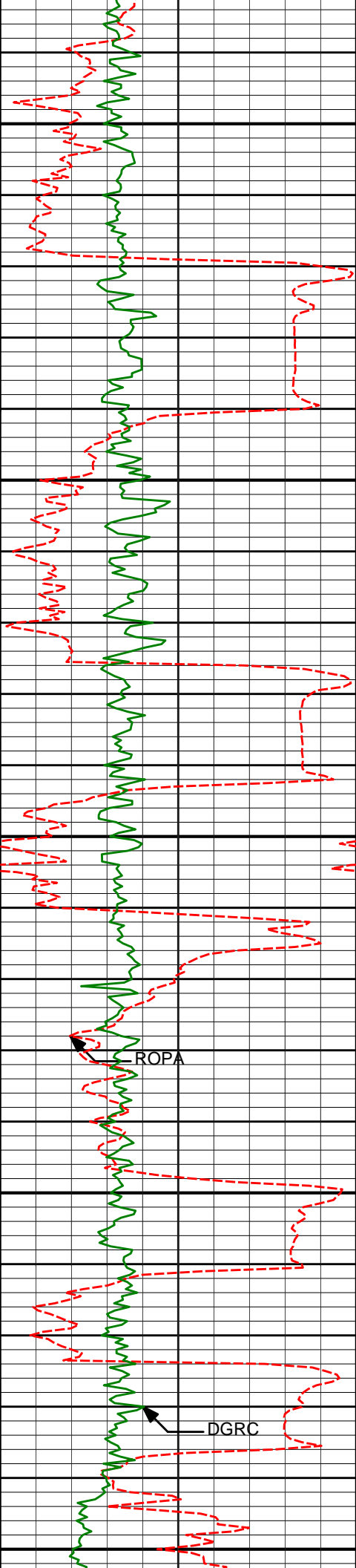
7604.26'

1875.69'

8700

8750





9000

9050

9100

9150

9200

9067'

88.52°

356.25°

7611.24'

2253.51'

ROPA

9161'

91.17°

356.94°

7611.49'

2347.49'

DGRC



9250

9256'

91.67°

356.04°

7609.14'

2442.46'

9300

9350

9351'

91.61°

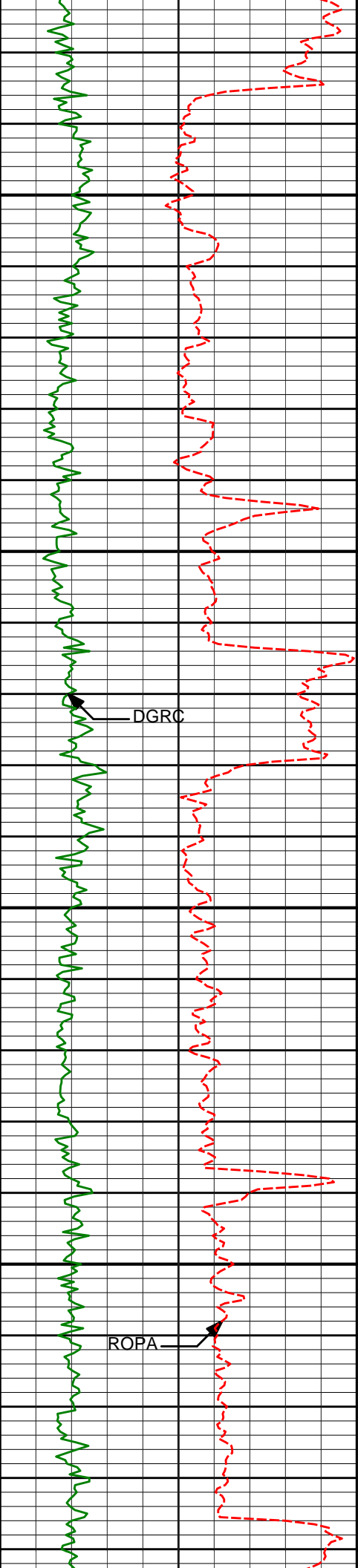
355.93°

7606.43'

2537.41'

ROPA

9400



9450

9500

9550

9600

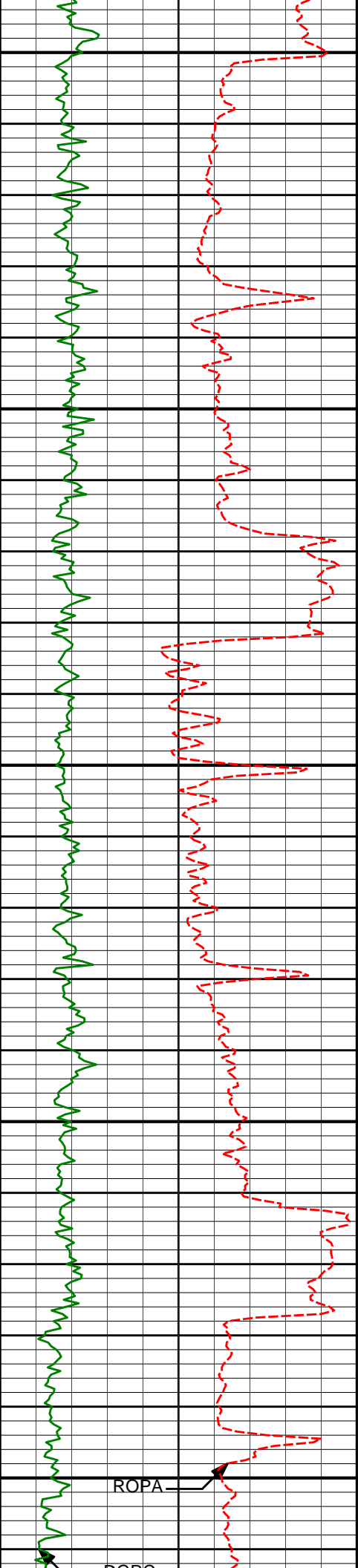
DGRC

ROPA

| | | | | |
|-------|--------|---------|----------|----------|
| 9445' | 91.11° | 357.07° | 7604.20' | 2631.38' |
|-------|--------|---------|----------|----------|

| | | | | |
|-------|--------|---------|----------|----------|
| 9540' | 88.70° | 357.61° | 7604.35' | 2726.37' |
|-------|--------|---------|----------|----------|

| | | | | |
|-------|--------|---------|----------|----------|
| 9634' | 90.49° | 357.68° | 7605.01' | 2820.35' |
|-------|--------|---------|----------|----------|



9650

9700

9750

9800

9850

9729'

89.88°

359.04°

7604.70'

2915.32'

9823'

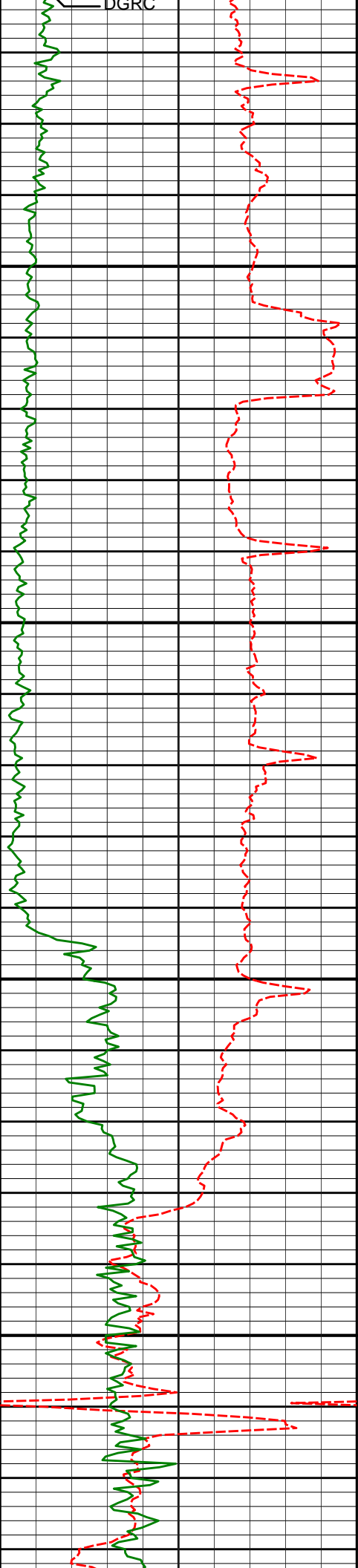
89.32°

359.15°

7605.36'

3009.25'

ROPA



9900

9918'

88.70°

359.44°

7607.00'

3104.16'

9950

10000

10012'

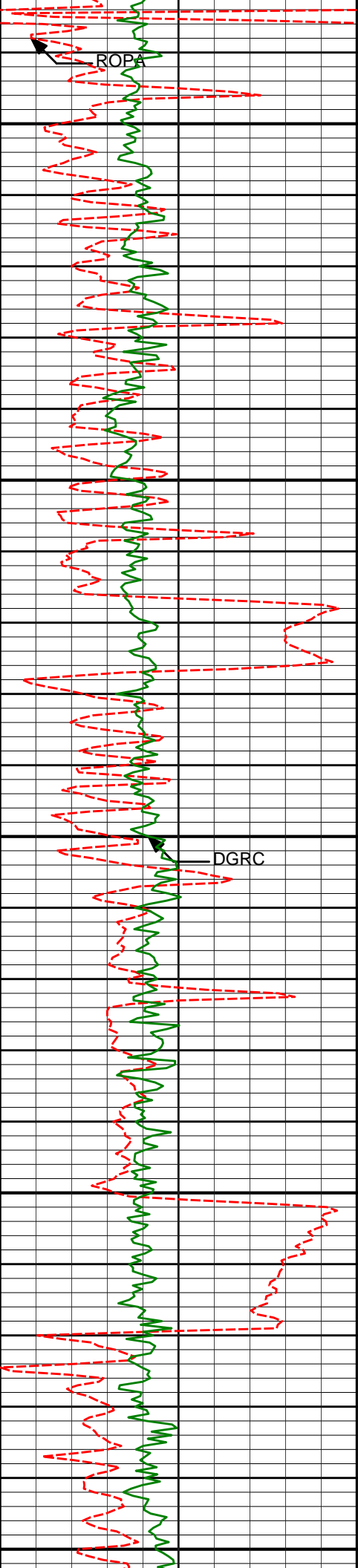
88.09°

359.22°

7609.63'

3198.04'

10050



10100

10107'

87.16°

358.92°

7613.57'

3292.90'

10150

10200

10201'

87.59°

359.28°

7617.88'

3386.73'

10250

10300

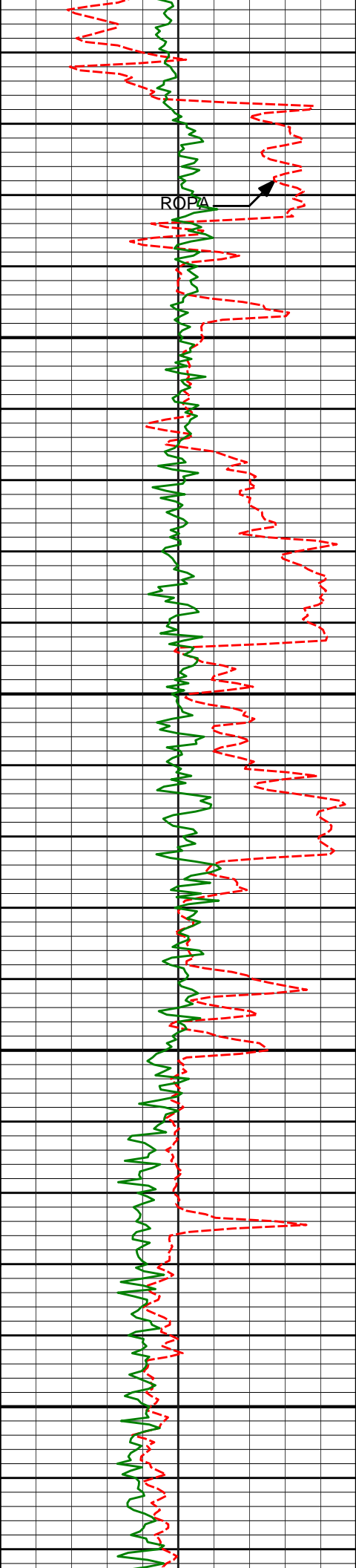
10296'

88.77°

358.88°

7620.90'

3481.62'



ROPA

10350

10391'

90.86°

358.36°

7621.21'

3576.57'

10400

10450

10485'

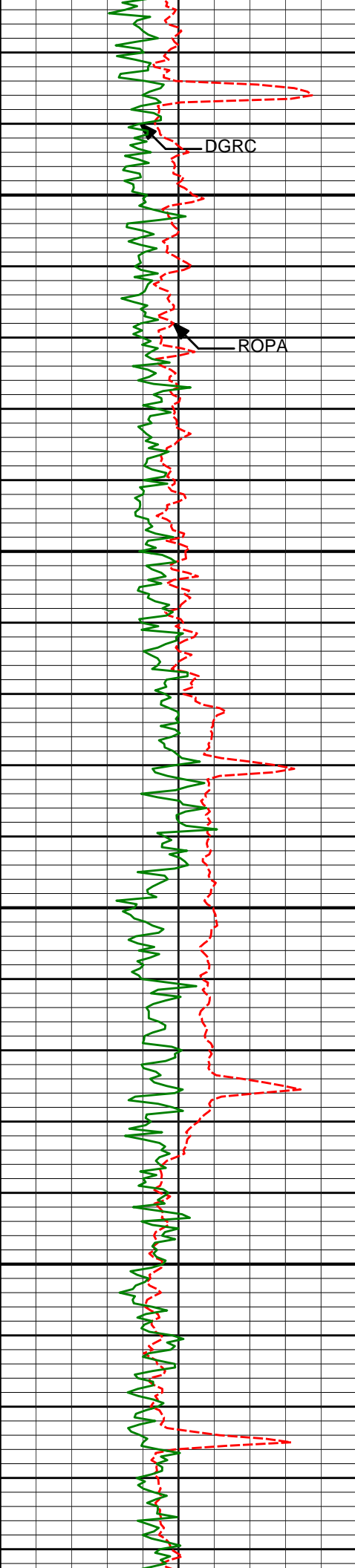
92.10°

358.18°

7618.77'

3670.51'

10500



10550

10600

10650

10700

10580'

91.17°

358.12°

7616.06'

3765.45'

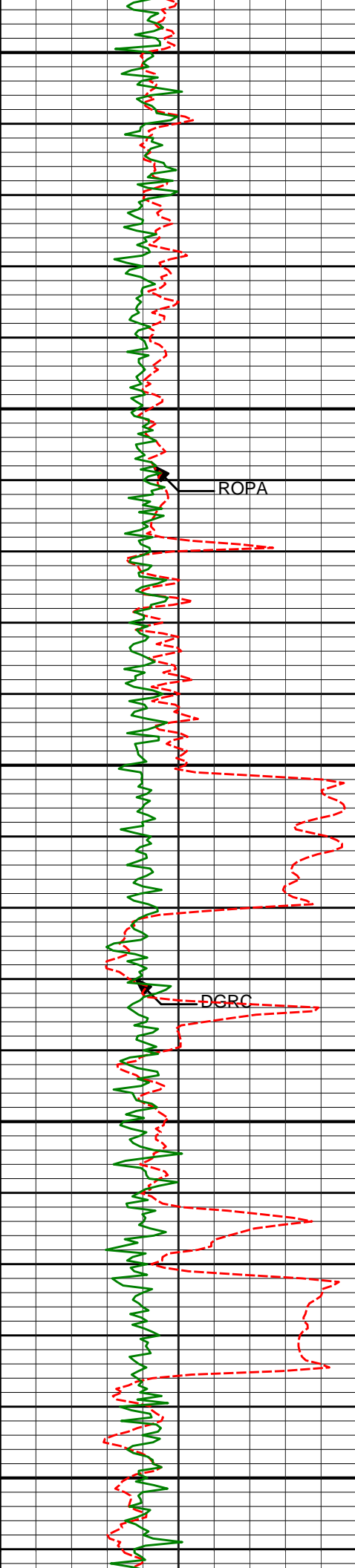
10674'

90.62°

358.27°

7614.59'

3859.42'



10750

10769'

90.06°

359.23°

7614.03'

3954.37'

10800

ROPA

10850

10864'

89.57°

359.24°

7614.34'

4049.29'

10900

DGRC

10950

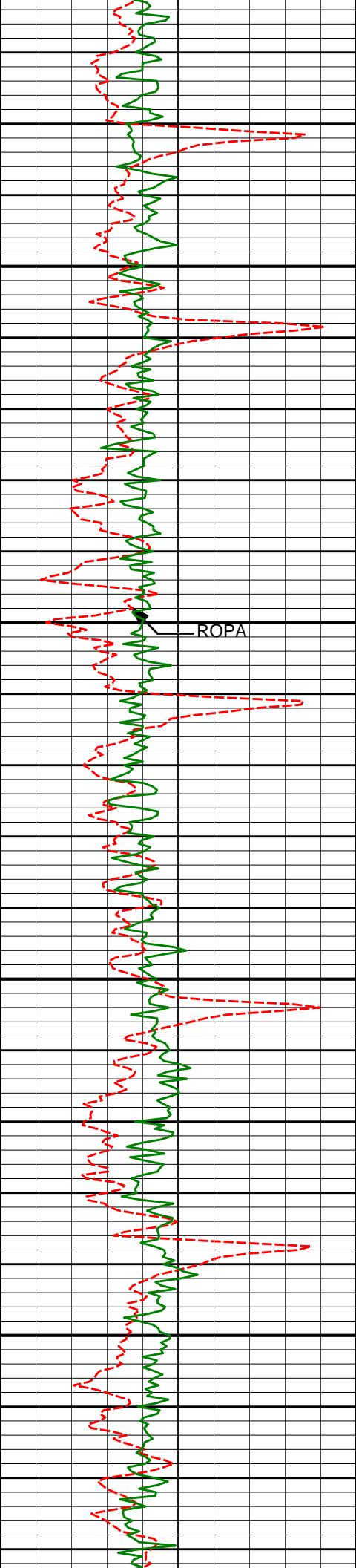
10958'

91.11°

357.58°

7613.78'

4143.26'



11000

11050

11100

11150

ROPA

11053'

91.11°

356.56°

7611.94'

4238.24'

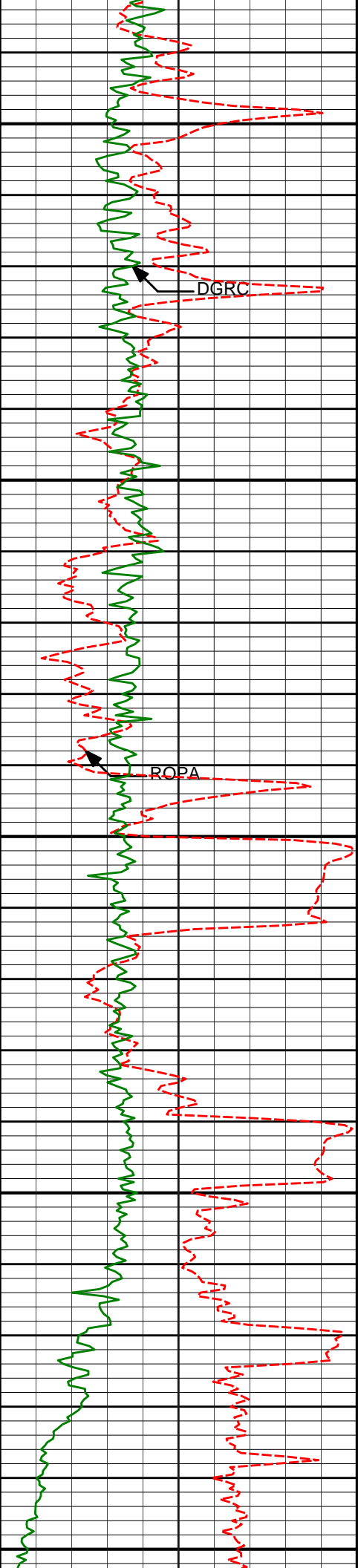
11148'

90.68°

356.43°

7610.45'

4333.22'



11200

DGRC

11250

ROPA

11300

11350

11400

11242'

91.61°

356.23°

7608.58'

4427.20'

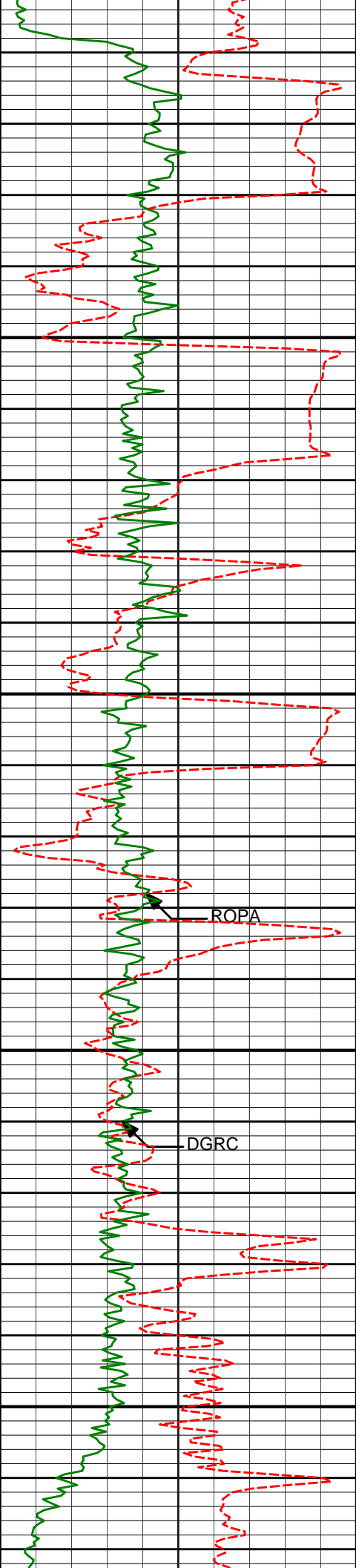
11337'

88.89°

355.73°

7608.17'

4522.17'



| | | | | |
|--------|--------|---------|----------|----------|
| 11431' | 87.22° | 354.63° | 7611.36' | 4616.07' |
|--------|--------|---------|----------|----------|

11450

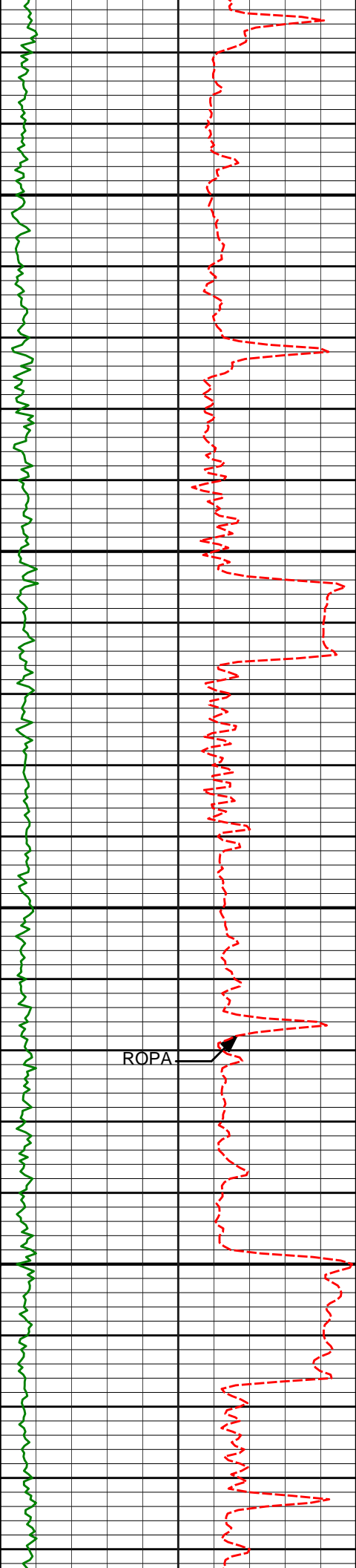
11500

| | | | | |
|--------|--------|---------|----------|----------|
| 11526' | 90.06° | 354.43° | 7613.61' | 4710.95' |
|--------|--------|---------|----------|----------|

11550

11600

| | | | | |
|--------|--------|---------|----------|----------|
| 11621' | 88.64° | 353.34° | 7614.69' | 4805.80' |
|--------|--------|---------|----------|----------|



11650

11700

11750

11800

ROPA

11715'

89.57°

352.46°

7616.15'

4899.55'

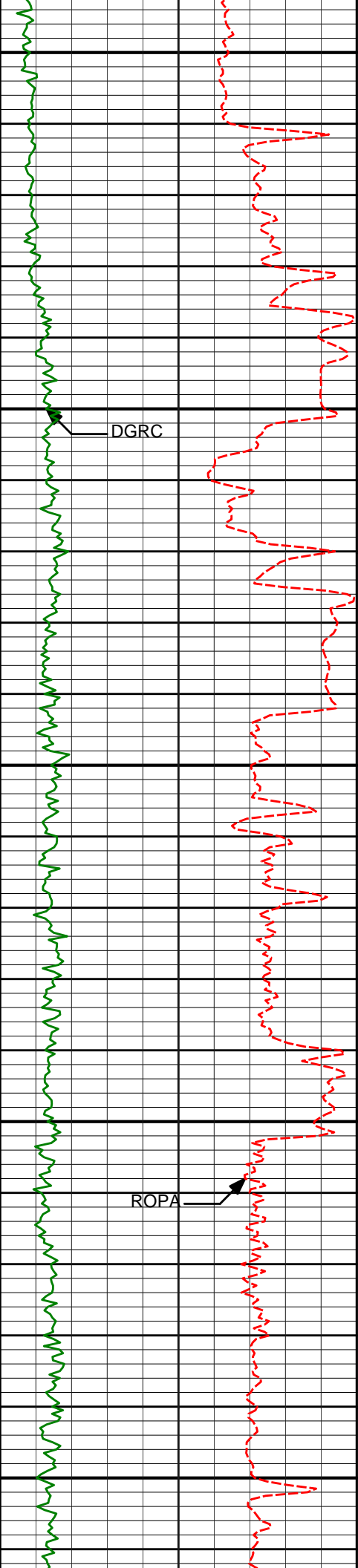
11810'

91.24°

351.61°

7615.49'

4994.19'



11850

11900

11950

12000

12050

DGRC

ROPA

11904'

92.78°

353.28°

7612.19'

5087.84'

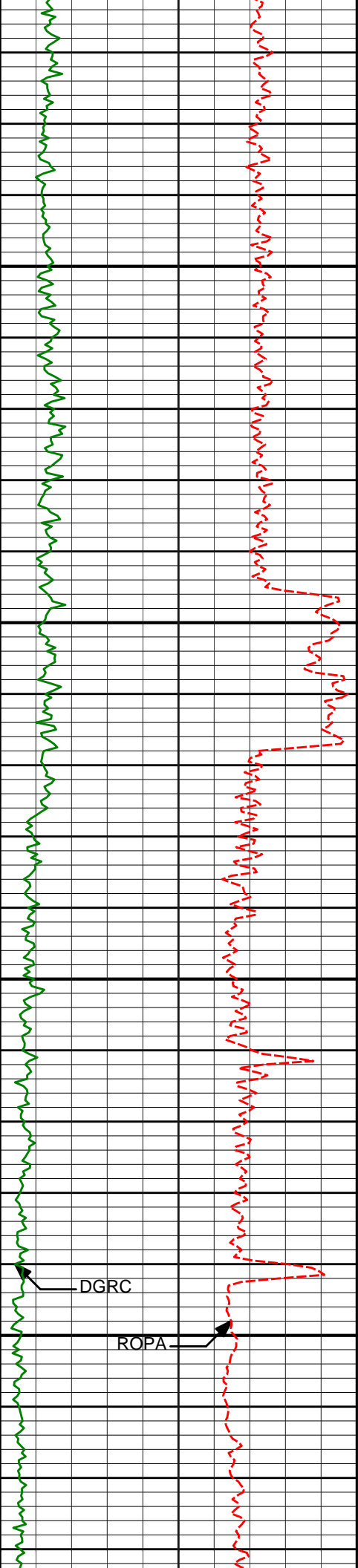
11999'

89.94°

354.94°

7609.94'

5182.68'



12100

12150

12200

12250

12094'

92.60°

355.42°

7607.84'

5277.60'

12188'

88.95°

354.81°

7606.57'

5371.53'

DGRC

ROPA

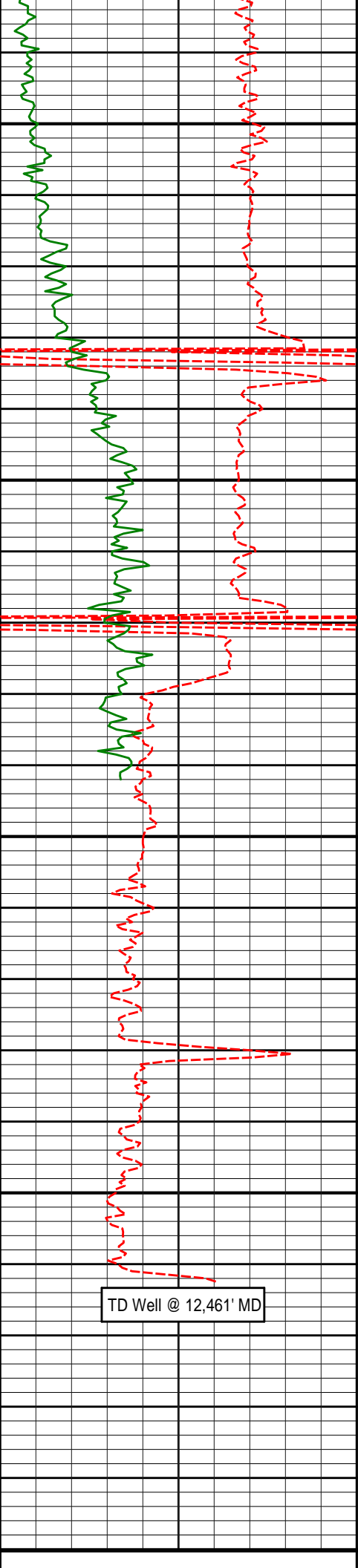
12094'

92.60°

355.42°

7607.84'

5277.60'



12300

12350

12400

12450

12500

| | | | | |
|--------|--------|---------|----------|----------|
| 12283' | 89.26° | 355.09° | 7608.06' | 5466.46' |
| 12410' | 87.53° | 353.79° | 7611.62' | 5593.28' |
| 12461' | 87.53° | 353.79° | 7613.82' | 5644.15' |

| | | | | | | |
|-----------------------------------------------------------------------------------------------|------------------------|-------|-----|-----|-----|----|
| Gamma Ray KclBh (DGRC) api | Depth ft 1 : 240 | DEPTH | INC | AZI | TVD | VS |
| 0 | 250 | | | | | |
| Avg Rate of Penetration (ROPA) feet per hr | | | | | | |
| 500 | | | | | | |
| PCG Gamma Ray BCorr (PGRC) api | | | | | | |
| 0 | 250 | | | | | |
| <div> <div>HALLIBURTON</div> <div>Sperry Drilling</div> <div>MD 1:240 Detail Log</div> </div> | | | | | | |



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.
Turkey Springs 3C-14HZ
Wattenburg
Weld Colorado
USA
CA-XX-0900302896
Survey's tied on to surface gyro's.

| Measured Depth (feet) | Inclination (degrees) | Direction (degrees) | Vertical Depth (feet) | Latitude (feet) | Departure (feet) | Vertical Section (feet) | Dogleg (deg/100ft) |
|-----------------------------|--------------------------|------------------------|-----------------------------|--------------------|---------------------|-------------------------------|-----------------------|
| 1025.00 | 0.31 | 342.14 | 1024.97 | 4.66 N | 2.06 W | 4.76 | TIE-IN |
| 1129.00 | 0.35 | 324.27 | 1128.97 | 5.18 N | 2.33 W | 5.30 | 0.10 |
| 1197.00 | 0.28 | 38.76 | 1196.97 | 5.48 N | 2.35 W | 5.60 | 0.56 |
| 1289.00 | 1.66 | 317.07 | 1288.95 | 6.63 N | 3.11 W | 6.79 | 1.78 |
| 1381.00 | 3.26 | 306.80 | 1380.87 | 9.17 N | 6.12 W | 9.48 | 1.80 |
| 1473.00 | 4.68 | 304.45 | 1472.64 | 12.86 N | 11.30 W | 13.44 | 1.55 |
| 1565.00 | 5.84 | 298.25 | 1564.26 | 17.20 N | 18.52 W | 18.15 | 1.40 |
| 1657.00 | 6.94 | 297.59 | 1655.68 | 21.99 N | 27.57 W | 23.42 | 1.20 |
| 1749.00 | 7.77 | 298.57 | 1746.93 | 27.53 N | 37.96 W | 29.51 | 0.91 |
| 1840.00 | 9.62 | 295.06 | 1836.88 | 33.70 N | 50.24 W | 36.31 | 2.11 |
| 1931.00 | 10.38 | 296.77 | 1926.49 | 40.61 N | 64.45 W | 43.97 | 0.90 |
| 2022.00 | 11.47 | 295.90 | 2015.84 | 48.26 N | 79.91 W | 52.43 | 1.21 |
| 2113.00 | 12.29 | 295.91 | 2104.89 | 56.44 N | 96.77 W | 61.49 | 0.90 |
| 2207.00 | 13.44 | 298.73 | 2196.53 | 66.07 N | 115.35 W | 72.09 | 1.39 |
| 2302.00 | 14.68 | 296.22 | 2288.68 | 76.69 N | 135.83 W | 83.79 | 1.46 |
| 2397.00 | 16.30 | 294.99 | 2380.23 | 87.64 N | 158.72 W | 95.94 | 1.74 |
| 2491.00 | 17.50 | 292.45 | 2470.17 | 98.62 N | 183.74 W | 108.22 | 1.50 |
| 2586.00 | 18.84 | 294.01 | 2560.43 | 110.32 N | 210.96 W | 121.35 | 1.50 |
| 2680.00 | 16.63 | 292.03 | 2649.95 | 121.54 N | 237.30 W | 133.96 | 2.44 |
| 2775.00 | 18.53 | 293.27 | 2740.51 | 132.61 N | 263.78 W | 146.41 | 2.04 |
| 2870.00 | 18.22 | 291.92 | 2830.67 | 144.11 N | 291.42 W | 159.37 | 0.56 |
| 2964.00 | 19.35 | 292.80 | 2919.66 | 155.63 N | 319.41 W | 172.35 | 1.24 |
| 3059.00 | 17.48 | 292.01 | 3009.79 | 167.08 N | 347.15 W | 185.25 | 1.98 |

| | | | | | | | |
|---------|-------|--------|---------|----------|-----------|---------|-------|
| 3153.00 | 19.15 | 291.87 | 3099.03 | 178.11 N | 374.55 W | 197.73 | 1.77 |
| 3248.00 | 18.21 | 291.30 | 3189.02 | 189.31 N | 402.84 W | 210.40 | 1.01 |
| 3343.00 | 17.42 | 291.25 | 3279.47 | 199.85 N | 429.92 W | 222.37 | 0.83 |
| 3437.00 | 18.86 | 296.79 | 3368.80 | 211.80 N | 456.60 W | 235.72 | 2.39 |
| 3532.00 | 17.77 | 296.50 | 3458.98 | 225.20 N | 483.29 W | 250.51 | 1.15 |
| 3626.00 | 18.65 | 293.87 | 3548.28 | 237.68 N | 509.87 W | 264.38 | 1.28 |
| 3721.00 | 16.38 | 294.09 | 3638.87 | 249.29 N | 535.99 W | 277.37 | 2.39 |
| 3816.00 | 16.63 | 295.08 | 3729.95 | 260.52 N | 560.53 W | 289.88 | 0.39 |
| 3910.00 | 18.32 | 296.80 | 3819.61 | 272.89 N | 585.90 W | 303.58 | 1.89 |
| 4005.00 | 19.93 | 299.56 | 3909.37 | 287.61 N | 613.32 W | 319.73 | 1.94 |
| 4099.00 | 18.05 | 298.58 | 3998.25 | 302.48 N | 640.05 W | 336.00 | 2.03 |
| 4194.00 | 17.62 | 295.68 | 4088.68 | 315.76 N | 665.93 W | 350.63 | 1.04 |
| 4288.00 | 16.84 | 295.80 | 4178.46 | 327.85 N | 691.02 W | 364.04 | 0.83 |
| 4383.00 | 17.00 | 297.90 | 4269.35 | 340.34 N | 715.68 W | 377.81 | 0.66 |
| 4478.00 | 19.21 | 293.22 | 4359.64 | 353.00 N | 742.32 W | 391.87 | 2.78 |
| 4572.00 | 20.79 | 295.65 | 4447.98 | 366.32 N | 771.57 W | 406.72 | 1.90 |
| 4667.00 | 19.68 | 291.92 | 4537.12 | 379.59 N | 801.61 W | 421.57 | 1.79 |
| 4761.00 | 18.86 | 290.77 | 4625.85 | 390.89 N | 830.51 W | 434.38 | 0.96 |
| 4856.00 | 20.55 | 289.41 | 4715.28 | 401.87 N | 860.60 W | 446.95 | 1.84 |
| 4950.00 | 20.86 | 289.77 | 4803.21 | 413.02 N | 891.91 W | 459.74 | 0.36 |
| 5045.00 | 19.43 | 290.13 | 4892.39 | 424.18 N | 922.66 W | 472.51 | 1.52 |
| 5140.00 | 19.94 | 290.86 | 4981.84 | 435.38 N | 952.63 W | 485.29 | 0.59 |
| 5234.00 | 19.20 | 290.94 | 5070.41 | 446.61 N | 982.04 W | 498.07 | 0.79 |
| 5329.00 | 19.75 | 295.17 | 5159.98 | 459.02 N | 1011.16 W | 512.00 | 1.60 |
| 5423.00 | 18.29 | 296.13 | 5248.85 | 472.27 N | 1038.77 W | 526.70 | 1.60 |
| 5518.00 | 17.90 | 294.06 | 5339.15 | 484.79 N | 1065.48 W | 540.62 | 0.79 |
| 5612.00 | 19.32 | 289.92 | 5428.24 | 495.98 N | 1093.29 W | 553.26 | 2.06 |
| 5707.00 | 18.09 | 290.71 | 5518.22 | 506.55 N | 1121.86 W | 565.34 | 1.32 |
| 5802.00 | 17.49 | 288.14 | 5608.68 | 516.21 N | 1149.22 W | 576.43 | 1.04 |
| 5896.00 | 15.17 | 287.79 | 5698.88 | 524.37 N | 1174.36 W | 585.91 | 2.47 |
| 5991.00 | 14.03 | 287.88 | 5790.82 | 531.70 N | 1197.15 W | 594.44 | 1.20 |
| 6085.00 | 11.04 | 287.20 | 5882.57 | 537.86 N | 1216.60 W | 601.62 | 3.18 |
| 6180.00 | 9.09 | 287.86 | 5976.10 | 542.85 N | 1232.43 W | 607.45 | 2.06 |
| 6274.00 | 7.53 | 288.17 | 6069.11 | 547.05 N | 1245.35 W | 612.33 | 1.65 |
| 6369.00 | 5.78 | 284.31 | 6163.47 | 550.17 N | 1255.90 W | 616.01 | 1.91 |
| 6464.00 | 3.99 | 281.14 | 6258.12 | 552.00 N | 1263.78 W | 618.24 | 1.90 |
| 6558.00 | 2.90 | 286.11 | 6351.95 | 553.29 N | 1269.27 W | 619.82 | 1.21 |
| 6653.00 | 2.18 | 285.67 | 6446.85 | 554.44 N | 1273.31 W | 621.19 | 0.76 |
| 6747.00 | 1.64 | 283.33 | 6540.80 | 555.23 N | 1276.34 W | 622.14 | 0.58 |
| 6842.00 | 2.51 | 291.58 | 6635.74 | 556.31 N | 1279.60 W | 623.39 | 0.96 |
| 6873.00 | 5.26 | 297.72 | 6666.66 | 557.22 N | 1281.49 W | 624.40 | 8.95 |
| 6905.00 | 8.08 | 299.11 | 6698.44 | 559.00 N | 1284.75 W | 626.35 | 8.84 |
| 6937.00 | 10.15 | 303.91 | 6730.04 | 561.67 N | 1289.06 W | 629.24 | 6.88 |
| 6968.00 | 10.36 | 305.00 | 6760.54 | 564.79 N | 1293.61 W | 632.60 | 0.93 |
| 7000.00 | 10.74 | 311.17 | 6792.00 | 568.40 N | 1298.21 W | 636.45 | 3.72 |
| 7031.00 | 11.11 | 321.31 | 6822.44 | 572.63 N | 1302.25 W | 640.89 | 6.30 |
| 7063.00 | 11.96 | 322.09 | 6853.80 | 577.66 N | 1306.21 W | 646.12 | 2.72 |
| 7094.00 | 13.18 | 324.42 | 6884.05 | 583.06 N | 1310.24 W | 651.73 | 4.26 |
| 7126.00 | 14.45 | 329.54 | 6915.13 | 589.47 N | 1314.39 W | 658.35 | 5.51 |
| 7157.00 | 15.61 | 333.20 | 6945.07 | 596.53 N | 1318.23 W | 665.60 | 4.84 |
| 7189.00 | 17.05 | 334.62 | 6975.78 | 604.62 N | 1322.19 W | 673.89 | 4.66 |
| 7220.00 | 19.04 | 337.50 | 7005.25 | 613.40 N | 1326.07 W | 682.86 | 7.03 |
| 7252.00 | 20.40 | 339.95 | 7035.37 | 623.46 N | 1329.98 W | 693.11 | 4.97 |
| 7283.00 | 21.76 | 346.20 | 7064.30 | 634.11 N | 1333.20 W | 703.93 | 8.47 |
| 7315.00 | 22.64 | 351.03 | 7093.93 | 645.96 N | 1335.58 W | 715.88 | 6.33 |
| 7346.00 | 24.28 | 356.31 | 7122.37 | 658.22 N | 1336.92 W | 728.19 | 8.59 |
| 7378.00 | 25.01 | 0.27 | 7151.46 | 671.55 N | 1337.31 W | 741.52 | 5.64 |
| 7409.00 | 26.52 | 0.72 | 7179.38 | 685.02 N | 1337.19 W | 754.97 | 4.92 |
| 7441.00 | 28.99 | 357.38 | 7207.69 | 699.92 N | 1337.46 W | 769.86 | 9.13 |
| 7472.00 | 31.01 | 356.00 | 7234.54 | 715.39 N | 1338.36 W | 785.36 | 6.87 |
| 7504.00 | 33.12 | 355.84 | 7261.65 | 732.33 N | 1339.56 W | 802.35 | 6.59 |
| 7536.00 | 36.48 | 356.78 | 7287.93 | 750.56 N | 1340.73 W | 820.60 | 10.64 |
| 7567.00 | 38.57 | 358.44 | 7312.51 | 769.42 N | 1341.51 W | 839.48 | 7.50 |
| 7599.00 | 40.34 | 358.07 | 7337.22 | 789.75 N | 1342.13 W | 859.81 | 5.56 |
| 7630.00 | 43.80 | 359.54 | 7360.23 | 810.51 N | 1342.56 W | 880.57 | 11.62 |
| 7662.00 | 46.63 | 359.99 | 7382.77 | 833.22 N | 1342.65 W | 903.25 | 8.89 |
| 7693.00 | 49.07 | 359.12 | 7403.57 | 856.20 N | 1342.83 W | 926.21 | 8.14 |
| 7725.00 | 52.37 | 358.82 | 7423.83 | 880.96 N | 1343.28 W | 950.96 | 10.33 |
| 7756.00 | 55.26 | 358.82 | 7442.13 | 905.97 N | 1343.79 W | 975.97 | 9.34 |
| 7788.00 | 57.47 | 358.24 | 7459.85 | 932.61 N | 1344.48 W | 1002.60 | 7.06 |
| 7819.00 | 60.01 | 358.12 | 7475.93 | 959.09 N | 1345.32 W | 1029.09 | 8.21 |

| | | | | | | | |
|----------|-------|--------|---------|-----------|-----------|---------|------|
| 7851.00 | 62.04 | 358.22 | 7491.43 | 987.07 N | 1346.21 W | 1057.08 | 6.33 |
| 7882.00 | 63.95 | 358.72 | 7505.51 | 1014.68 N | 1346.95 W | 1084.68 | 6.34 |
| 7914.00 | 65.83 | 359.26 | 7519.09 | 1043.65 N | 1347.46 W | 1113.64 | 6.07 |
| 7945.00 | 67.12 | 357.67 | 7531.46 | 1072.06 N | 1348.22 W | 1142.05 | 6.28 |
| 7977.00 | 70.16 | 358.42 | 7543.12 | 1101.84 N | 1349.23 W | 1171.84 | 9.74 |
| 8008.00 | 70.96 | 358.46 | 7553.44 | 1131.06 N | 1350.03 W | 1201.07 | 2.59 |
| 8040.00 | 73.12 | 358.30 | 7563.30 | 1161.49 N | 1350.89 W | 1231.50 | 6.76 |
| 8072.00 | 75.51 | 358.72 | 7571.95 | 1192.28 N | 1351.69 W | 1262.29 | 7.58 |
| 8103.00 | 75.75 | 358.39 | 7579.65 | 1222.30 N | 1352.45 W | 1292.31 | 1.29 |
| 8135.00 | 77.29 | 357.27 | 7587.11 | 1253.40 N | 1353.63 W | 1323.42 | 5.89 |
| 8166.00 | 79.96 | 356.78 | 7593.22 | 1283.75 N | 1355.21 W | 1353.81 | 8.76 |
| 8198.00 | 81.97 | 357.87 | 7598.25 | 1315.31 N | 1356.68 W | 1385.41 | 7.12 |
| 8229.00 | 84.20 | 358.54 | 7601.98 | 1346.07 N | 1357.64 W | 1416.18 | 7.50 |
| 8269.00 | 87.57 | 359.69 | 7604.85 | 1385.95 N | 1358.26 W | 1456.04 | 8.90 |
| 8342.00 | 89.69 | 359.96 | 7606.60 | 1458.93 N | 1358.48 W | 1528.92 | 2.93 |
| 8405.00 | 90.00 | 359.56 | 7606.77 | 1521.93 N | 1358.74 W | 1591.85 | 0.80 |
| 8499.00 | 90.37 | 359.14 | 7606.47 | 1615.92 N | 1359.80 W | 1685.76 | 0.60 |
| 8594.00 | 91.05 | 358.43 | 7605.29 | 1710.89 N | 1361.82 W | 1780.71 | 1.04 |
| 8689.00 | 90.19 | 357.16 | 7604.26 | 1805.81 N | 1365.47 W | 1875.69 | 1.61 |
| 8783.00 | 90.00 | 358.67 | 7604.10 | 1899.75 N | 1368.90 W | 1969.67 | 1.61 |
| 8878.00 | 88.64 | 358.68 | 7605.23 | 1994.71 N | 1371.10 W | 2064.62 | 1.43 |
| 8972.00 | 87.78 | 357.21 | 7608.17 | 2088.60 N | 1374.46 W | 2158.56 | 1.81 |
| 9067.00 | 88.52 | 356.25 | 7611.24 | 2183.40 N | 1379.87 W | 2253.51 | 1.28 |
| 9161.00 | 91.17 | 356.94 | 7611.49 | 2277.22 N | 1385.46 W | 2347.49 | 2.92 |
| 9256.00 | 91.67 | 356.04 | 7609.14 | 2372.01 N | 1391.27 W | 2442.46 | 1.07 |
| 9351.00 | 91.61 | 355.93 | 7606.43 | 2466.74 N | 1397.92 W | 2537.41 | 0.13 |
| 9445.00 | 91.11 | 357.07 | 7604.20 | 2560.54 N | 1403.65 W | 2631.38 | 1.32 |
| 9540.00 | 88.70 | 357.61 | 7604.35 | 2655.43 N | 1408.06 W | 2726.37 | 2.60 |
| 9634.00 | 90.49 | 357.68 | 7605.01 | 2749.34 N | 1411.92 W | 2820.35 | 1.91 |
| 9729.00 | 89.88 | 359.04 | 7604.70 | 2844.30 N | 1414.64 W | 2915.32 | 1.57 |
| 9823.00 | 89.32 | 359.15 | 7605.36 | 2938.29 N | 1416.13 W | 3009.25 | 0.61 |
| 9918.00 | 88.70 | 359.44 | 7607.00 | 3033.26 N | 1417.29 W | 3104.16 | 0.71 |
| 10012.00 | 88.09 | 359.22 | 7609.63 | 3127.22 N | 1418.39 W | 3198.04 | 0.70 |
| 10107.00 | 87.16 | 358.92 | 7613.57 | 3222.13 N | 1419.93 W | 3292.90 | 1.03 |
| 10201.00 | 87.59 | 359.28 | 7617.88 | 3316.02 N | 1421.41 W | 3386.73 | 0.60 |
| 10296.00 | 88.77 | 358.88 | 7620.90 | 3410.95 N | 1422.93 W | 3481.62 | 1.30 |
| 10391.00 | 90.86 | 358.36 | 7621.21 | 3505.92 N | 1425.22 W | 3576.57 | 2.28 |
| 10485.00 | 92.10 | 358.18 | 7618.77 | 3599.84 N | 1428.05 W | 3670.51 | 1.33 |
| 10580.00 | 91.17 | 358.12 | 7616.06 | 3694.75 N | 1431.12 W | 3765.45 | 0.98 |
| 10674.00 | 90.62 | 358.27 | 7614.59 | 3788.70 N | 1434.09 W | 3859.42 | 0.61 |
| 10769.00 | 90.06 | 359.23 | 7614.03 | 3883.67 N | 1436.16 W | 3954.37 | 1.17 |
| 10864.00 | 89.57 | 359.24 | 7614.34 | 3978.66 N | 1437.42 W | 4049.29 | 0.52 |
| 10958.00 | 91.11 | 357.58 | 7613.78 | 4072.62 N | 1440.03 W | 4143.26 | 2.41 |
| 11053.00 | 91.11 | 356.56 | 7611.94 | 4167.47 N | 1444.88 W | 4238.24 | 1.07 |
| 11148.00 | 90.68 | 356.43 | 7610.45 | 4262.28 N | 1450.69 W | 4333.22 | 0.48 |
| 11242.00 | 91.61 | 356.23 | 7608.58 | 4356.07 N | 1456.71 W | 4427.20 | 1.01 |
| 11337.00 | 88.89 | 355.73 | 7608.17 | 4450.83 N | 1463.36 W | 4522.17 | 2.91 |
| 11431.00 | 87.22 | 354.63 | 7611.36 | 4544.44 N | 1471.26 W | 4616.07 | 2.13 |
| 11526.00 | 90.06 | 354.43 | 7613.61 | 4638.97 N | 1480.31 W | 4710.95 | 3.00 |
| 11621.00 | 88.64 | 353.34 | 7614.69 | 4733.42 N | 1490.43 W | 4805.80 | 1.89 |
| 11715.00 | 89.57 | 352.46 | 7616.15 | 4826.68 N | 1502.04 W | 4899.55 | 1.36 |
| 11810.00 | 91.24 | 351.61 | 7615.49 | 4920.76 N | 1515.21 W | 4994.19 | 1.97 |
| 11904.00 | 92.78 | 353.28 | 7612.19 | 5013.88 N | 1527.56 W | 5087.84 | 2.43 |
| 11999.00 | 89.94 | 354.94 | 7609.94 | 5108.34 N | 1537.30 W | 5182.68 | 3.46 |
| 12094.00 | 92.60 | 355.42 | 7607.84 | 5202.97 N | 1545.28 W | 5277.60 | 2.84 |
| 12188.00 | 88.95 | 354.81 | 7606.57 | 5296.61 N | 1553.28 W | 5371.53 | 3.93 |
| 12283.00 | 89.26 | 355.09 | 7608.06 | 5391.22 N | 1561.64 W | 5466.46 | 0.43 |
| 12410.00 | 87.53 | 353.79 | 7611.62 | 5517.57 N | 1573.95 W | 5593.28 | 1.70 |
| 12461.00 | 87.53 | 353.79 | 7613.82 | 5568.22 N | 1579.46 W | 5644.15 | 0.01 |

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT

TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD

VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 356.96 DEGREES (TRUE)

A TOTAL CORRECTION OF 8.61 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT (CLOSED) AT 10421.92 FEET.

HORIZONTAL DISPLACEMENT (CLOSURE) AT 12461.00 FEET
IS 5787.90 FEET ALONG 344.16 DEGREES (TRUE)

Final survey is a projection to bit.

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