



1 : 240

[illegible]

WELL INFORMATION

| | | | | | |
|---|------------------|------------------|------------------|--|--|
| MWD Run Number | 100 | 200 | 300 | | |
| Date run completed | 13-Mar-13 | 14-Mar-13 | 17-Mar-13 | | |
| Rig Bit Number | 2 | 3 | 4 | | |
| Bit Size (in) | 8.750 | 8.750 | 6.125 | | |
| Tool Nominal OD (in) | 6.750 | 6.750 | 4.750 | | |
| Log Start Depth (MD, ft) | 817.00 | 5,844.00 | 6,977.00 | | |
| Log End Depth (MD, ft) | 5,844.00 | 6,977.00 | 10,701.00 | | |
| Drill or Wipe | Drill | Drill | Drill | | |
| Drill/Wipe Start Date and Time | 12-Mar-13 22:00 | 13-Mar-13 21:38 | 15-Mar-13 20:10 | | |
| Drill/Wipe End Date and Time | 13-Mar-13 12:15 | 14-Mar-13 11:45 | 17-Mar-13 07:20 | | |
| Min Inc (deg) @ Depth (MD, ft) | .07 @ 918.00 | .69 @ 5,832.00 | 85.46 @ 7,329.00 | | |
| Max Inc (deg) @ Depth (MD, ft) | 14.69 @ 3,088.00 | 81.48 @ 6,922.00 | 93.82 @ 7,234.00 | | |
| Bit TFA(in2) / Bit Type | .75 / PDC | .86 / PDC | .46 / PDC | | |
| Flow Rate (gpm) | 560.00 | 540.00 | 270.00 | | |
| Max AV (fpm) / CV (fpm) @ MWD | 477.1 / 477.1 | 356.1 / 356.1 | 442.9 / 442.9 | | |
| Fluid Type | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel | | |
| Density (ppg) / Viscosity (spqt) | 8.90 / 29.00 | 10.35 / 37.00 | 10.05 / 37.00 | | |
| Filtrate CL (ppm) | 1,500.00 | 1,400.00 | 1,400.00 | | |
| pH / Fluid Loss (mptm) | 8.80 / N/A | 9.90 / N/A | 9.00 / N/A | | |
| PV (cP) / YP (lbf2) | 3 / 2.00 | 12 / 9.00 | 11 / 8.00 | | |
| % Solids / % Sand | 3.20 / 0.30 | 8.4 / .3 | 8.30 / 0.30 | | |
| % Oil / Oil:Water Ratio | N/A / N/A | N/A / N/A | N/A / N/A | | |
| Rm @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | N/A @ N/A | | |
| Rmf @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | N/A @ N/A | | |
| Rmc @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | N/A @ N/A | | |
| Max Tool Temp (deg F) / S | 144.78 / PDM | 128.88 / PDM | 228.88 / PDM | | |

| | | | | | |
|-------------------------------|--------------|--------------|--------------|--|--|
| Max Tool Temp (degF) / Source | 141.70 / PCM | 160.83 / PCM | 209.20 / PCM | | |
| Rm @ Max Tool Temp (degF) | N/A @ N/A | N/A @ N/A | N/A @ N/A | | |
| Lead MWD Engineer | Robert Ley | Robert Ley | Robert Ley | | |
| Customer Representative | Roger Foster | Roger Foster | Roger Foster | | |

SENSOR INFORMATION

Downhole Processor Information

| | | | | | |
|---------------------------|-----------------|-----------------|-----------------|--|--|
| Tool Type | PCM | PCM | PCM | | |
| Software Version | 5.76 | 5.76 | 5.76 | | |
| Sub Serial Number | 246473 | 246473 | 11744843 | | |
| Insert Serial Number | 11680730 | 11680730 | 11680730 | | |
| Date and Time Initialized | 12-Mar-13 14:24 | 12-Mar-13 14:24 | 14-Mar-13 20:11 | | |
| Date and Time Read | 14-Mar-13 18:18 | 14-Mar-13 18:12 | 17-Mar-13 19:21 | | |
| ECMB SW Version | N/A | N/A | N/A | | |

Directional Sensor Information

| | | | | | |
|------------------------|----------|----------|----------|--|--|
| Tool Type | PCDC | PCDC | PCDC | | |
| Distance From Bit (ft) | 56.00 | 55.00 | 65.00 | | |
| Software Version | 6.21 | 6.21 | 6.21 | | |
| Sub Serial Number | 246473 | 246473 | 11744843 | | |
| Sonde Serial Number | 10919505 | 10919505 | 10919505 | | |
| Sensor ID Number | N/A | N/A | N/A | | |
| Toolface Offset (deg) | 111.82 | 170.61 | 125.81 | | |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|----------|----------|--|--|
| Tool Type | PCG | PCG | PCG | | |
| Distance From Bit (ft) | 49.07 | 48.10 | 57.92 | | |
| Recorded Sample Period (sec) | 10 | 10 | 10 | | |
| Software Version | 8.15 | 8.15 | 8.15 | | |
| Sub Serial Number | 246473 | 246473 | 11744843 | | |
| Insert/Sonde Serial Number | 11579843 | 11579843 | 11579843 | | |

REMARKS

1. All depths are measured depths and are calibrated to the driller' pipe tally and are measured from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The Following smoothing parameters have been applied to the data"

PGRC (Gamma Ray Corrected):

Interval Resolution: 0.5 feet
Coercion Distance: 0.6 feet
Gap Fill: 3.0 feet

ROPA (Rate of Penetration):

Interval Resolution: 0.5 feet
Coercion Distance: 1.2 feet
Gap Fill: 3.0 feet

Insite Version 7.3.40 build 25

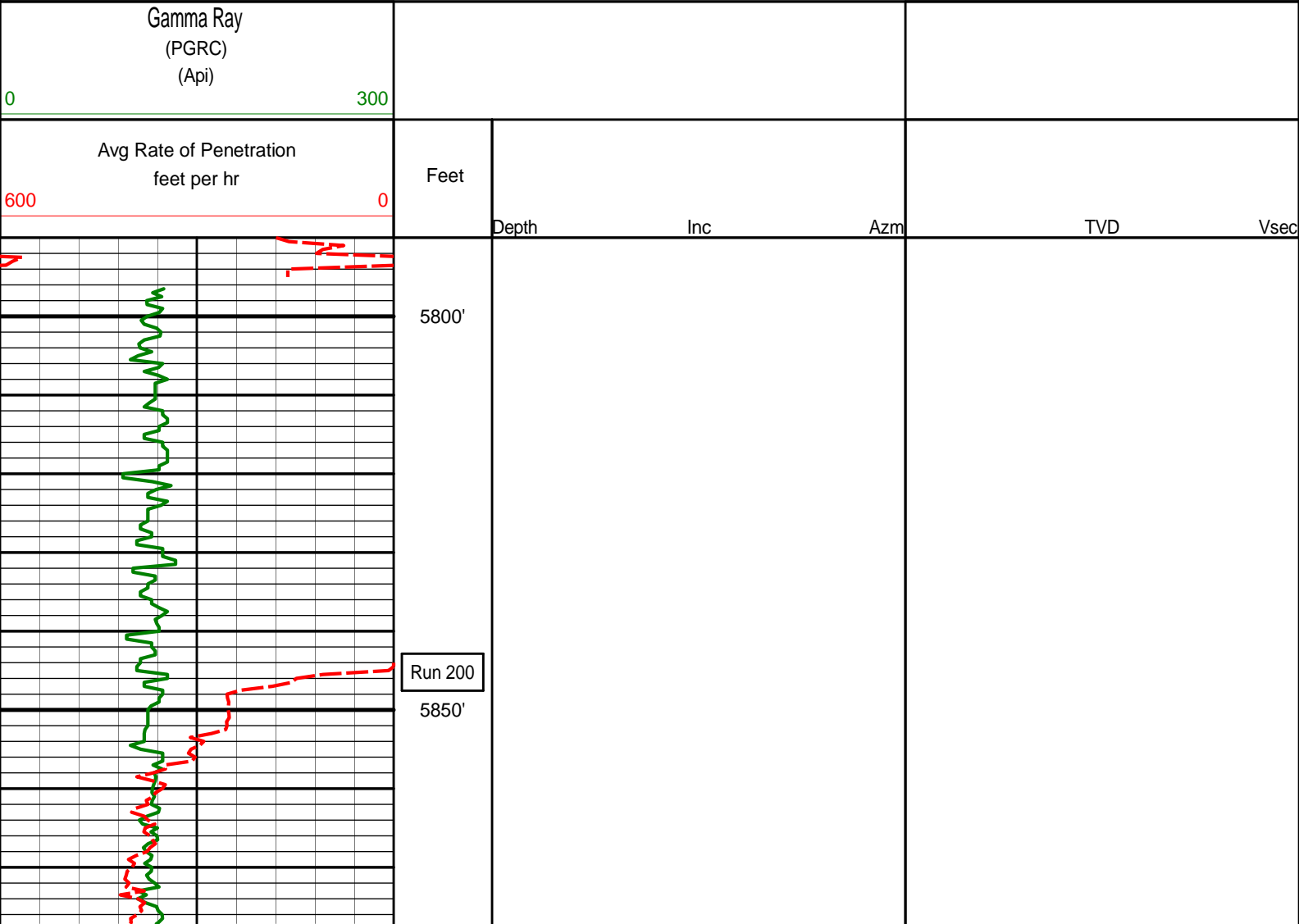
5. Survey at TD is projected to the bit

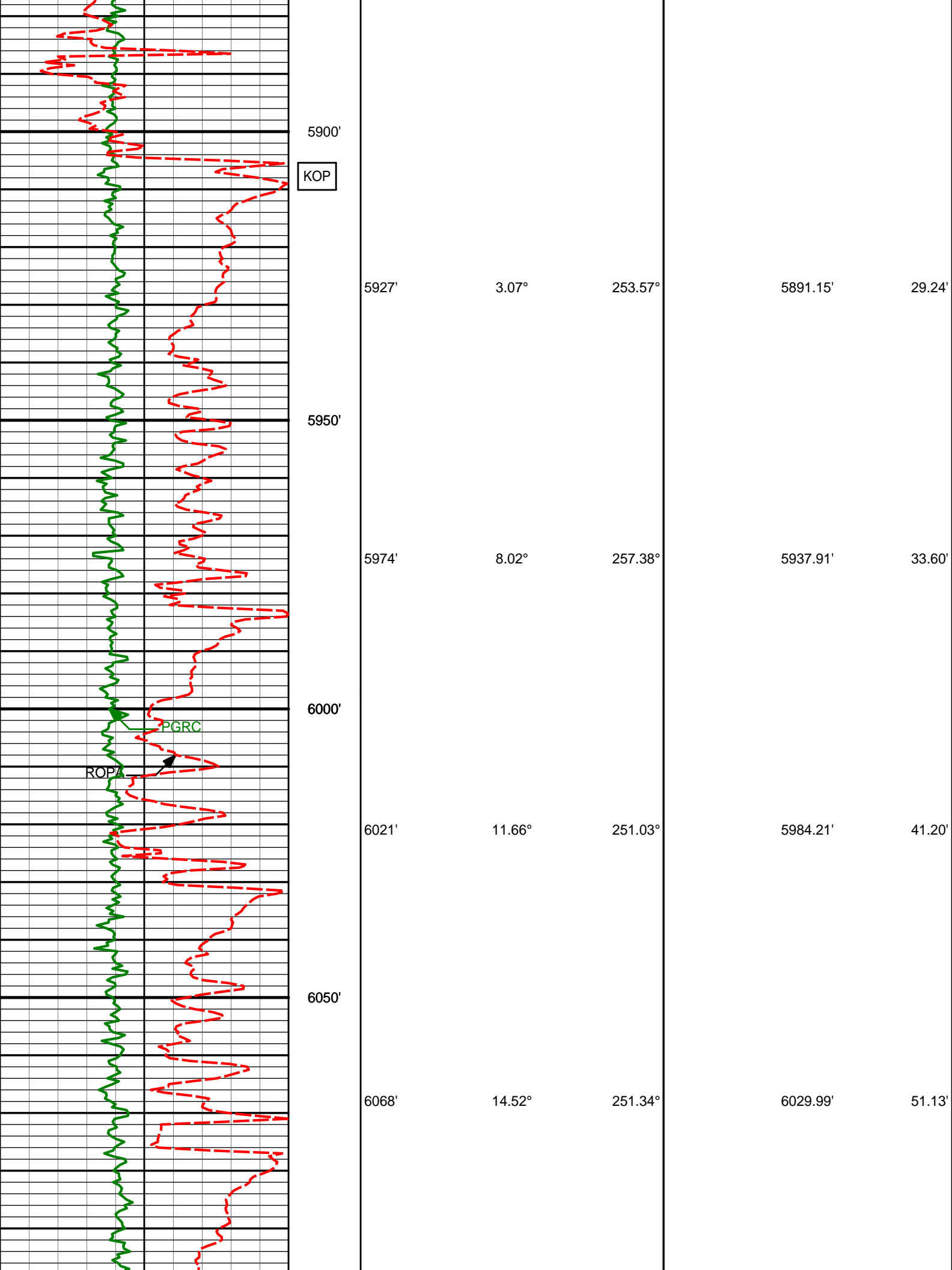
WARRANTY

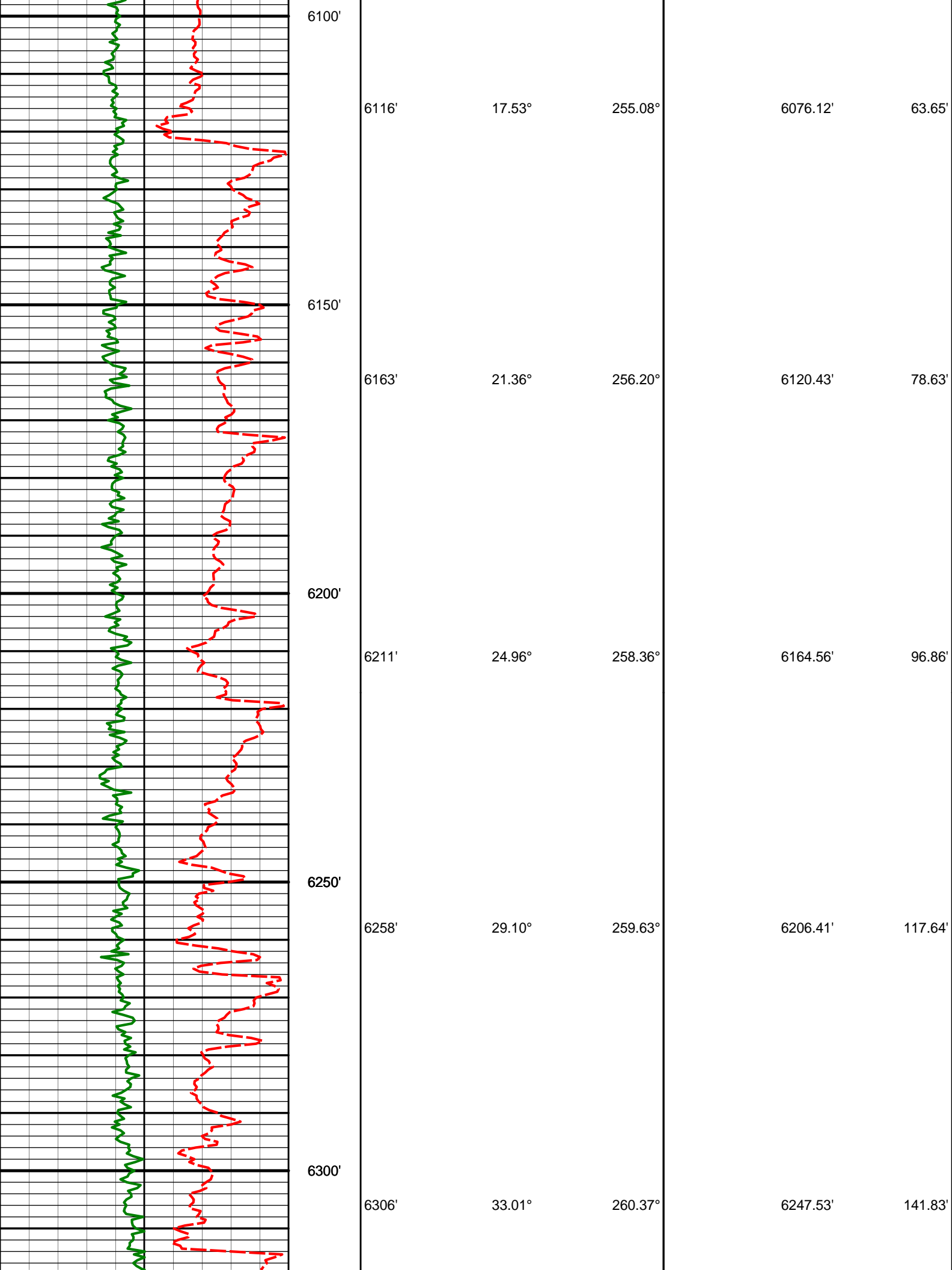
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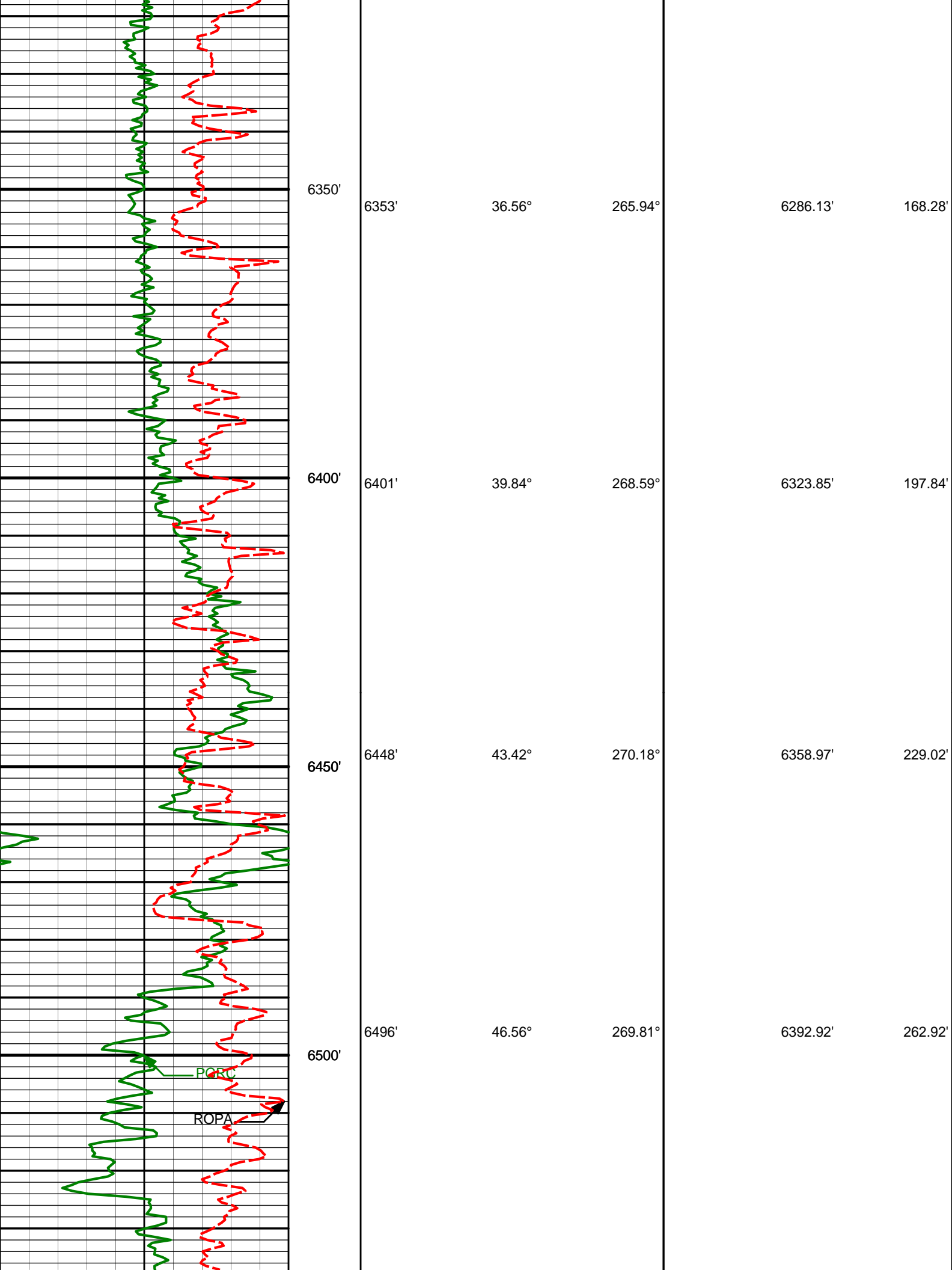
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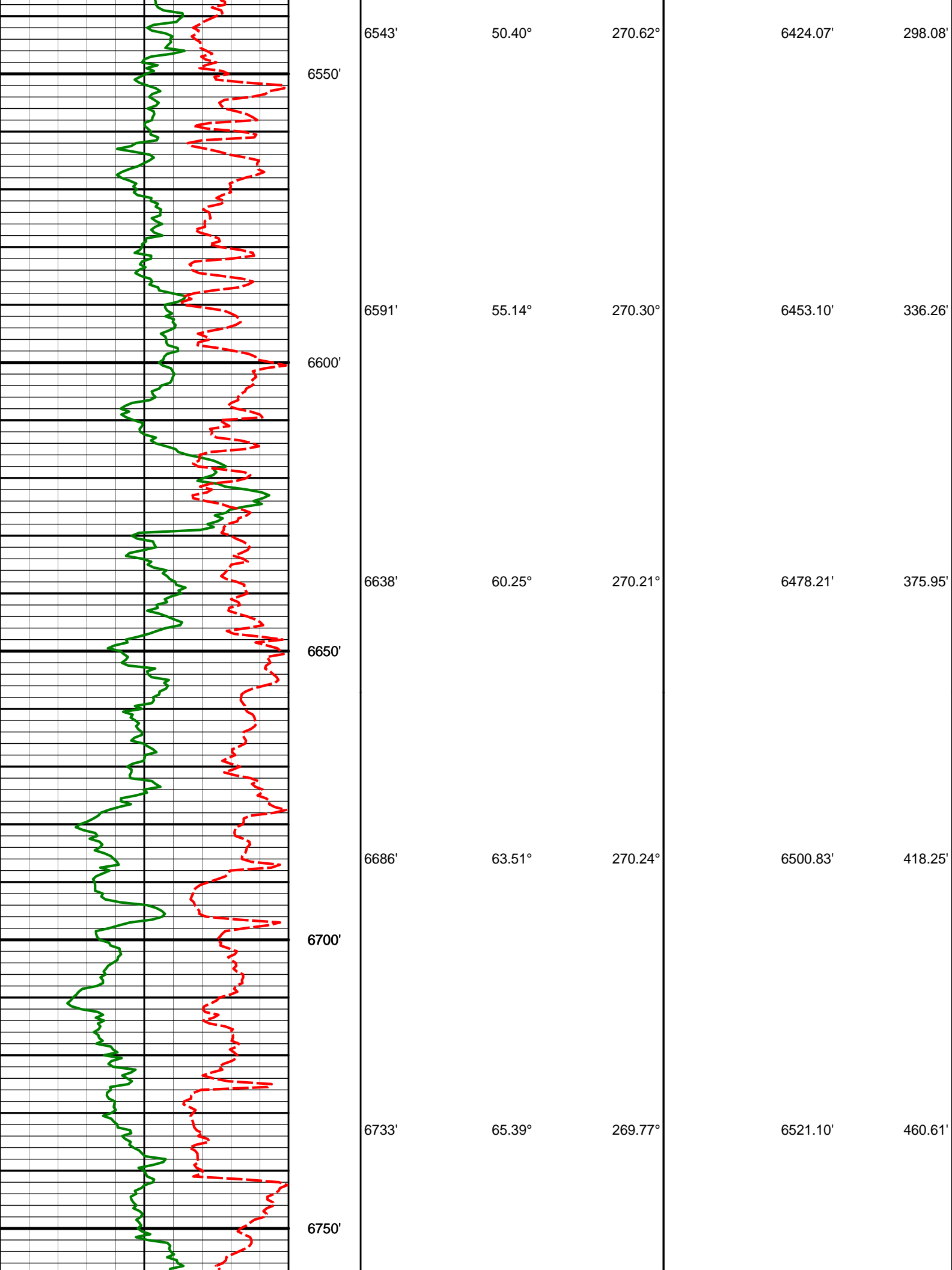
MD Detail Log 1:240

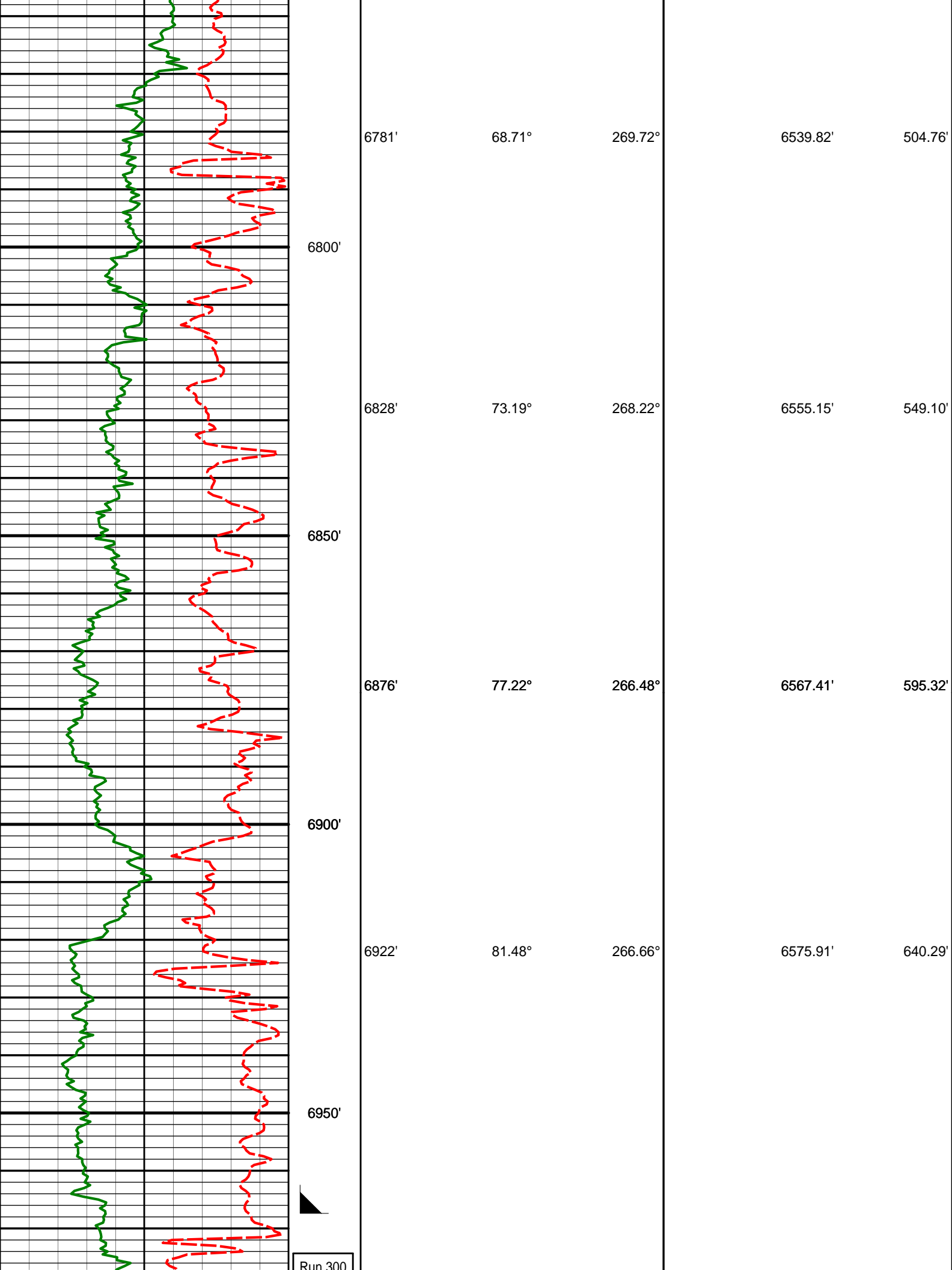


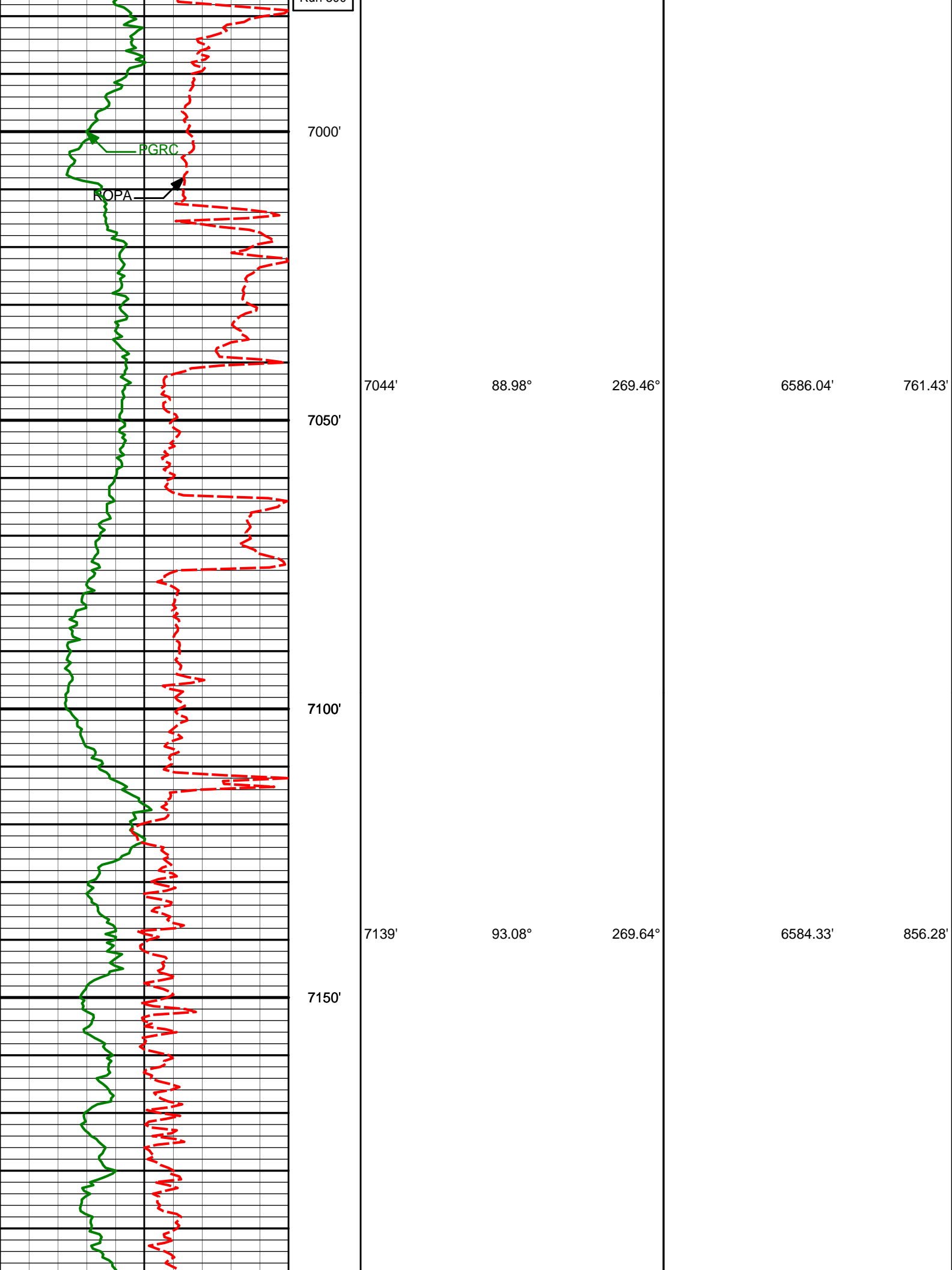


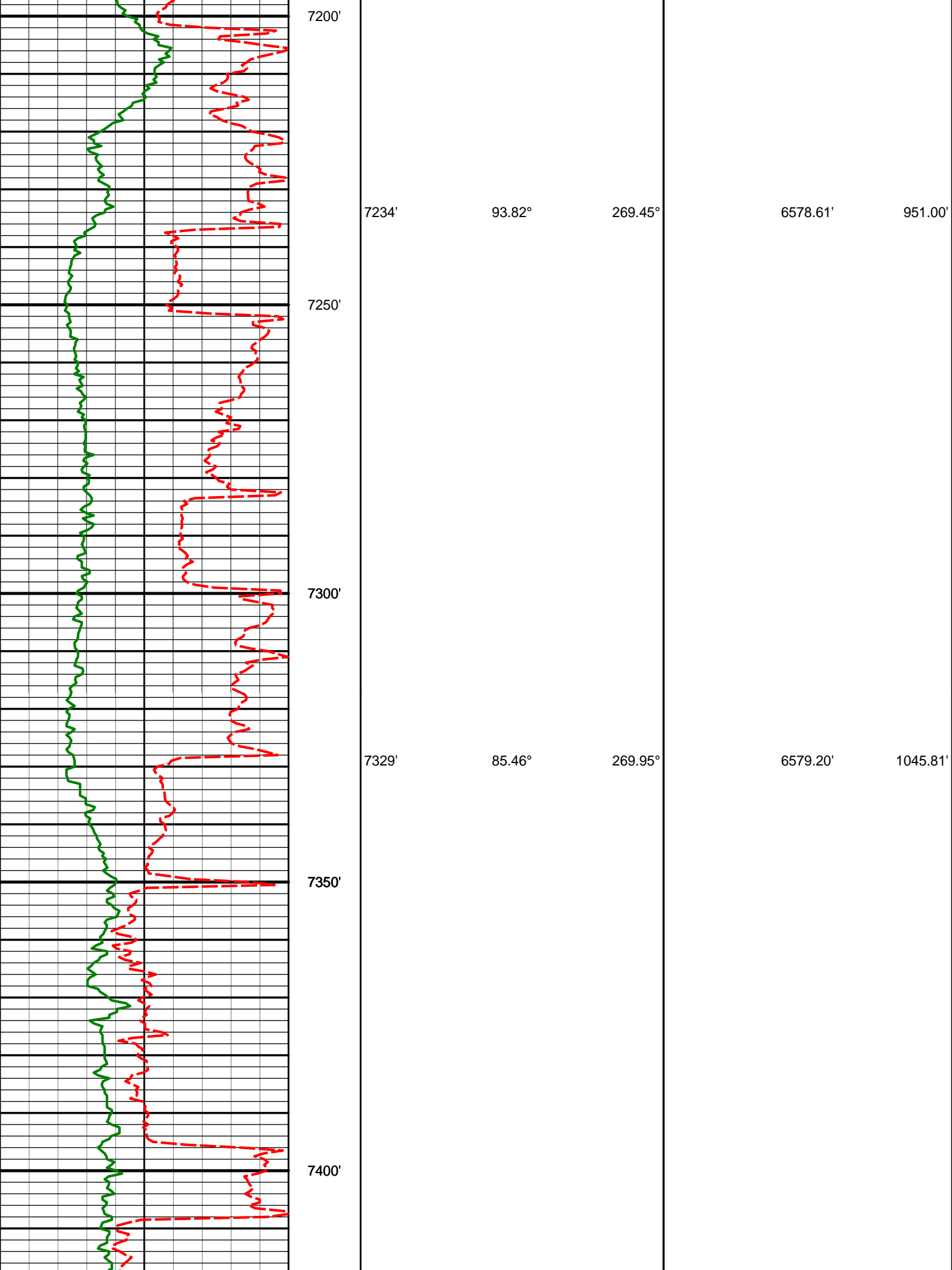


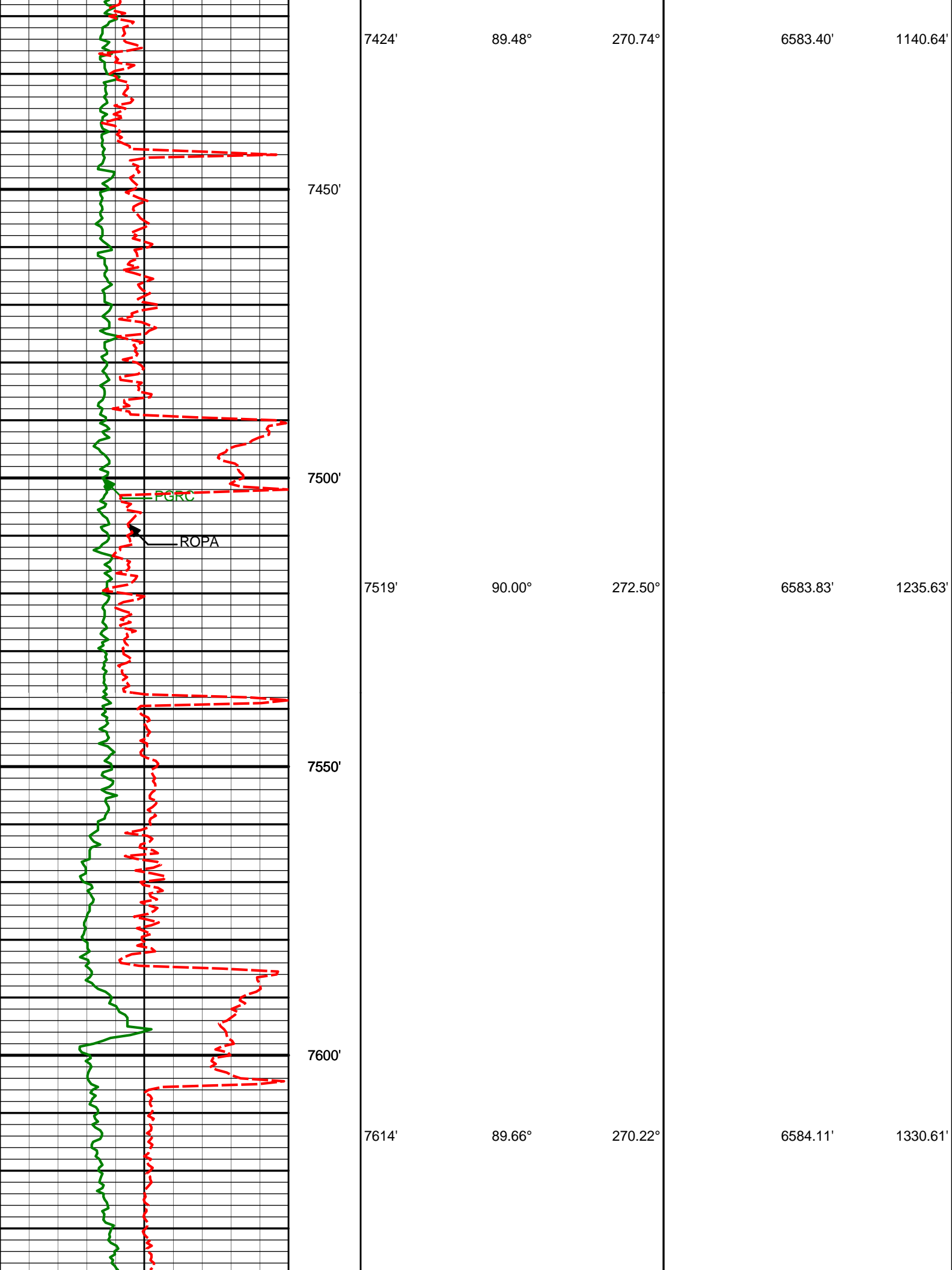


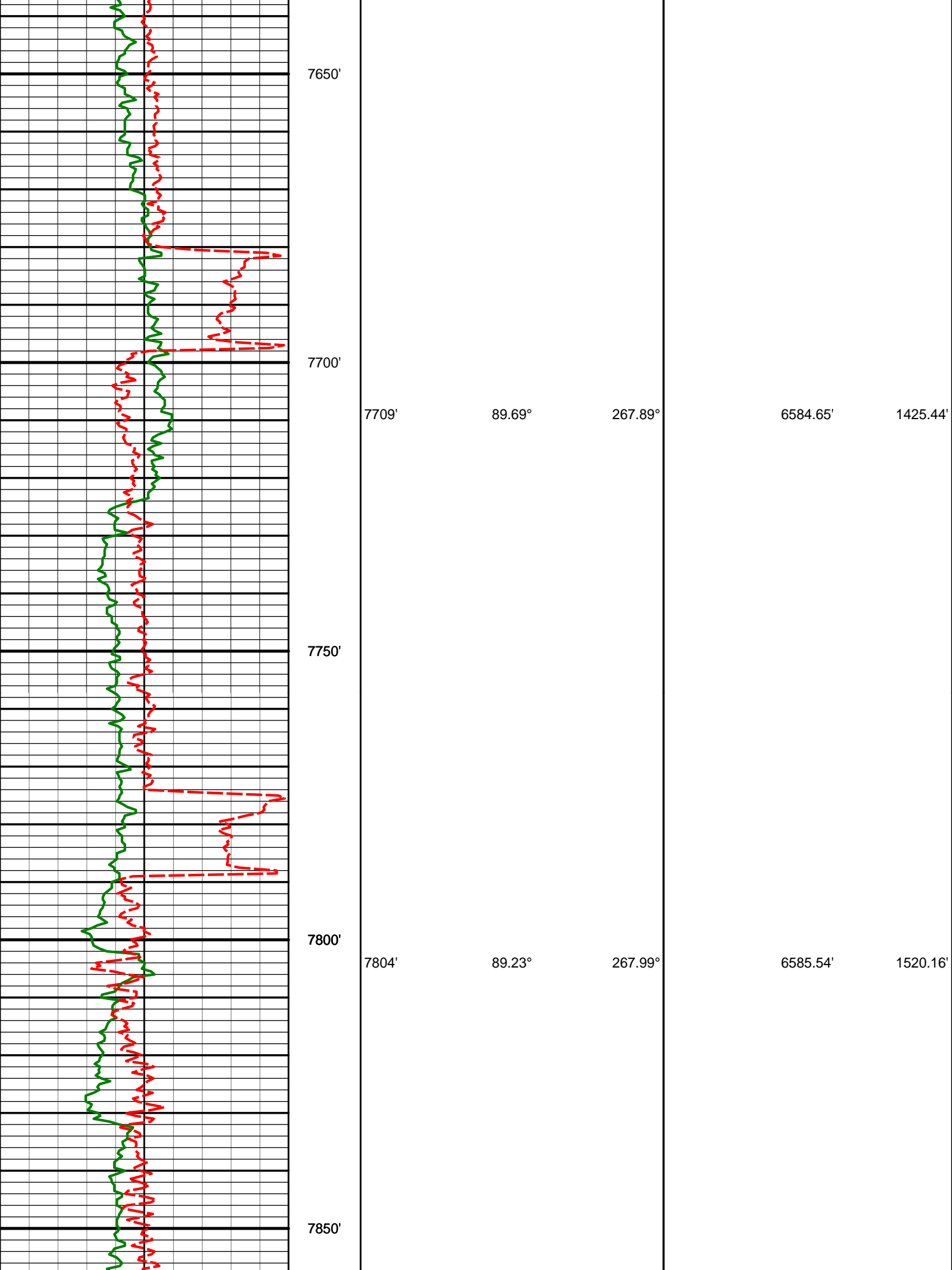


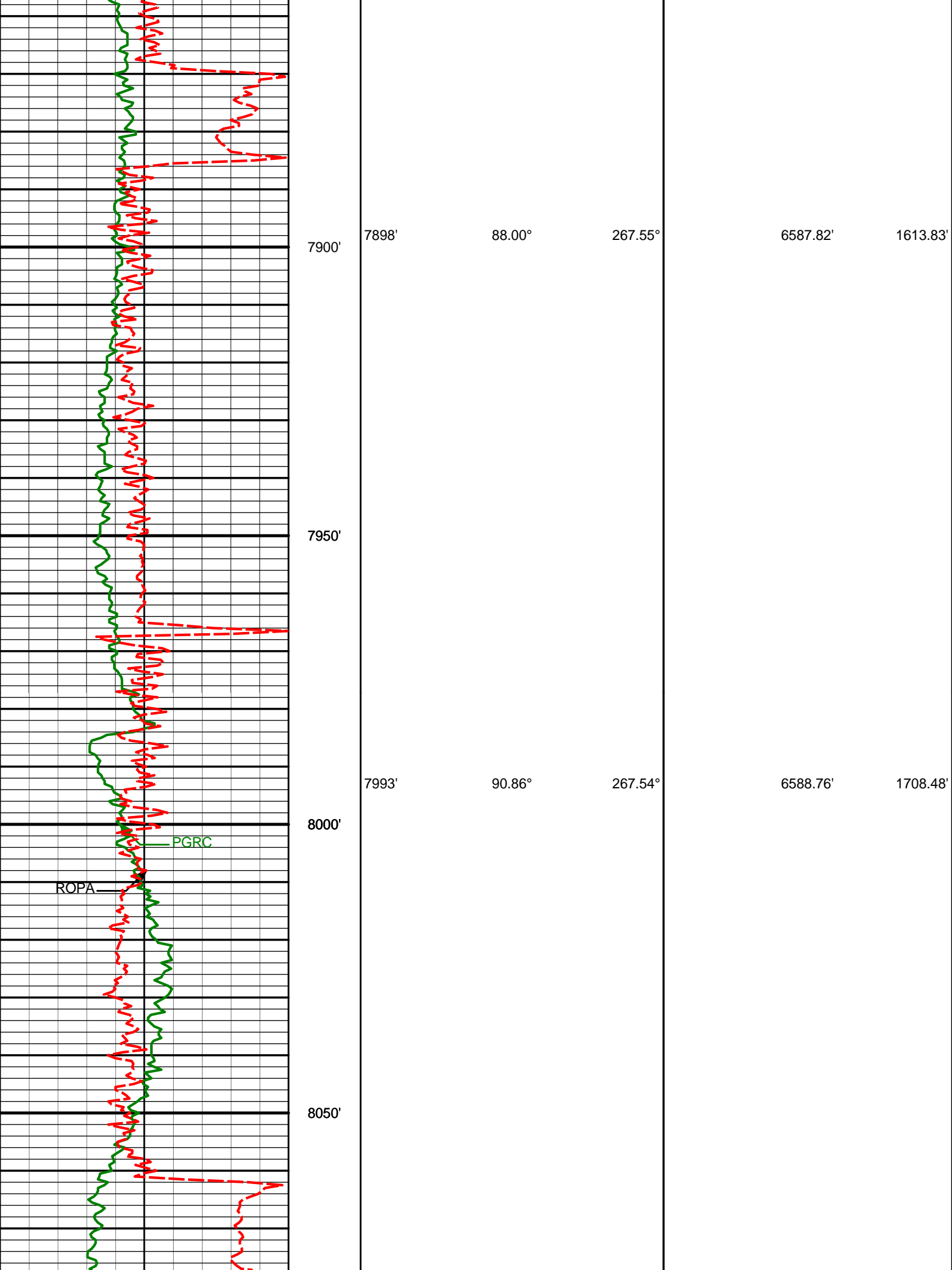


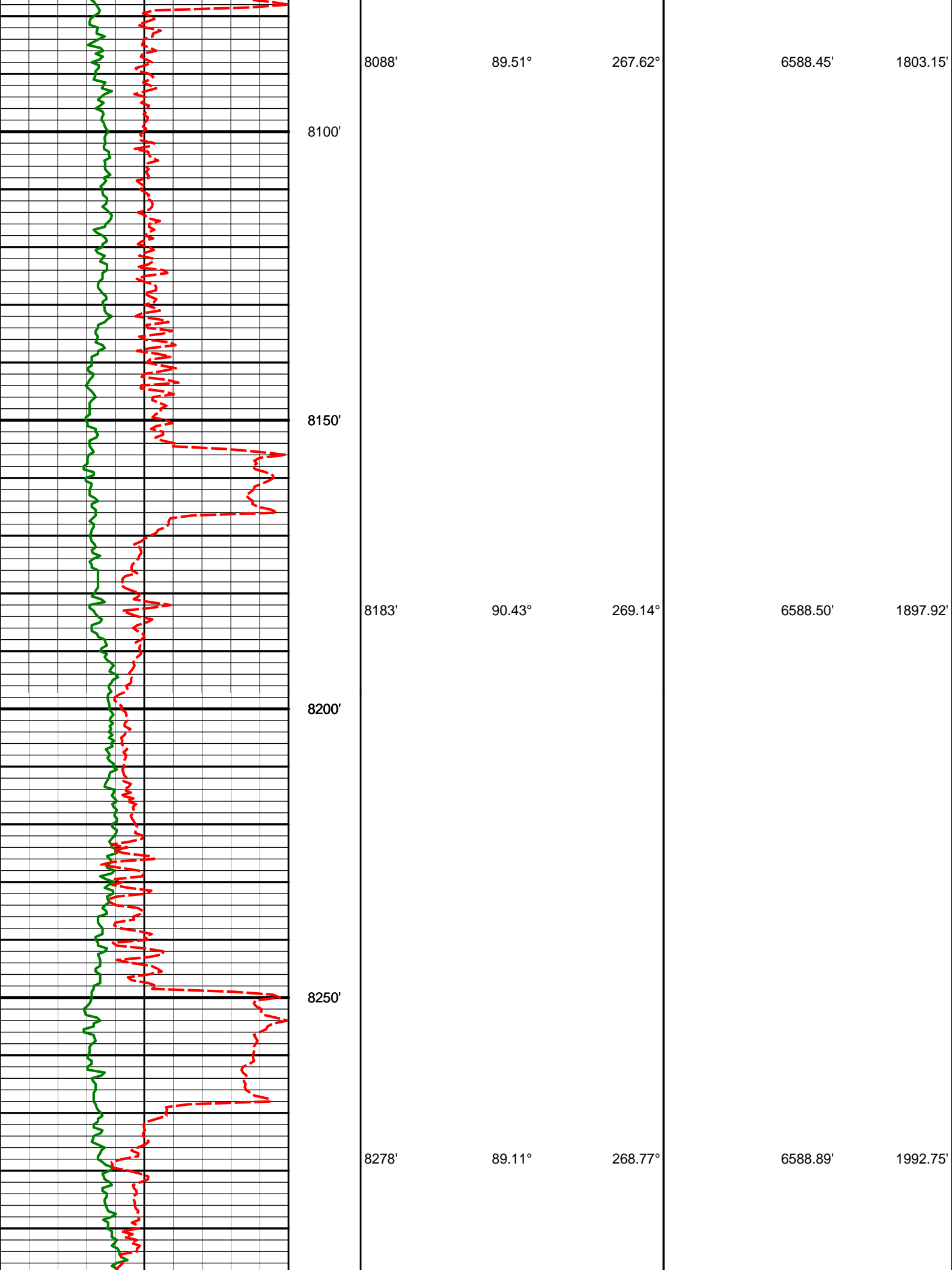


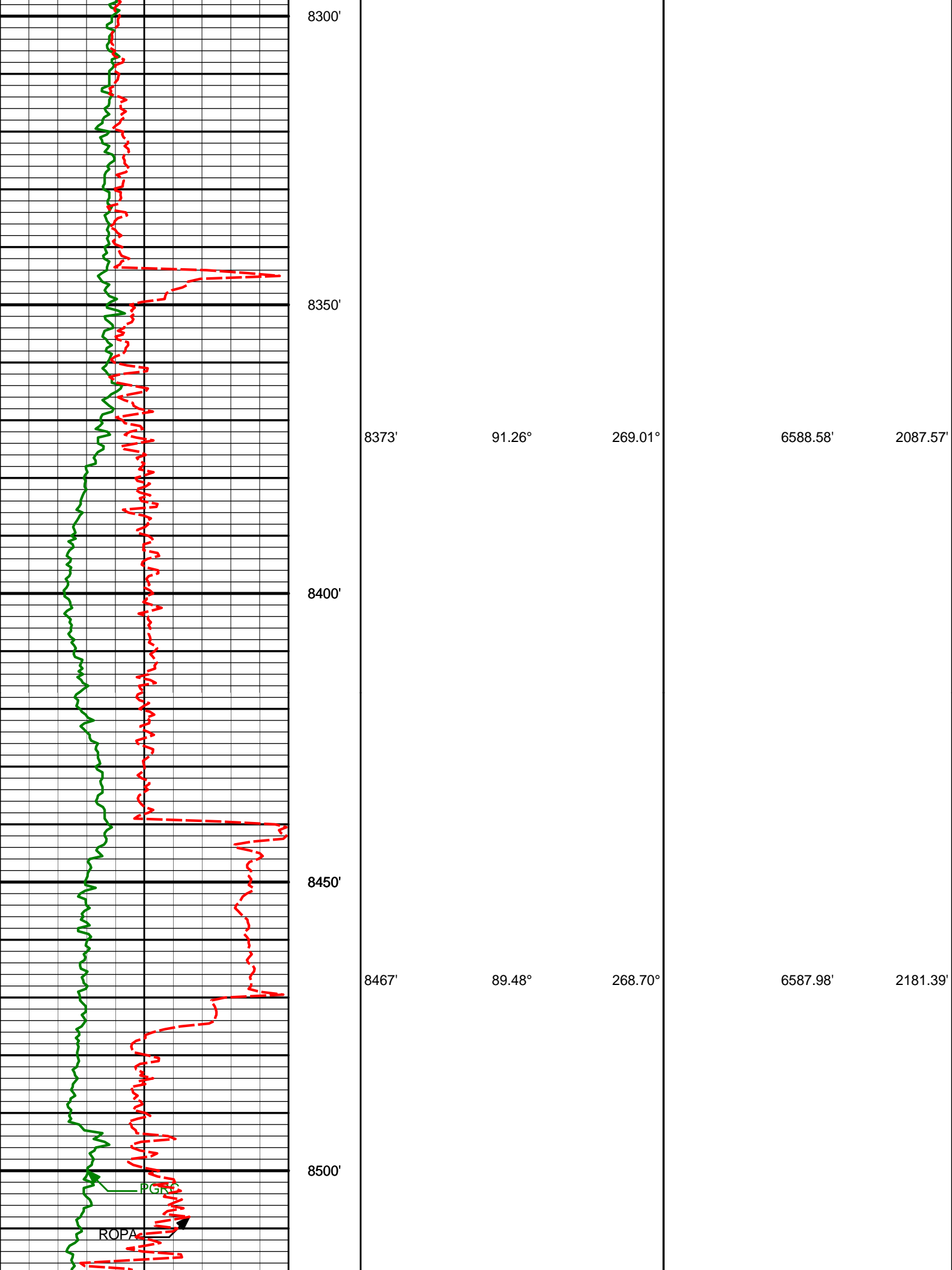














8550'

8562'

89.91°

268.66°

6588.48'

2276.20'

8600'

8650'

8658'

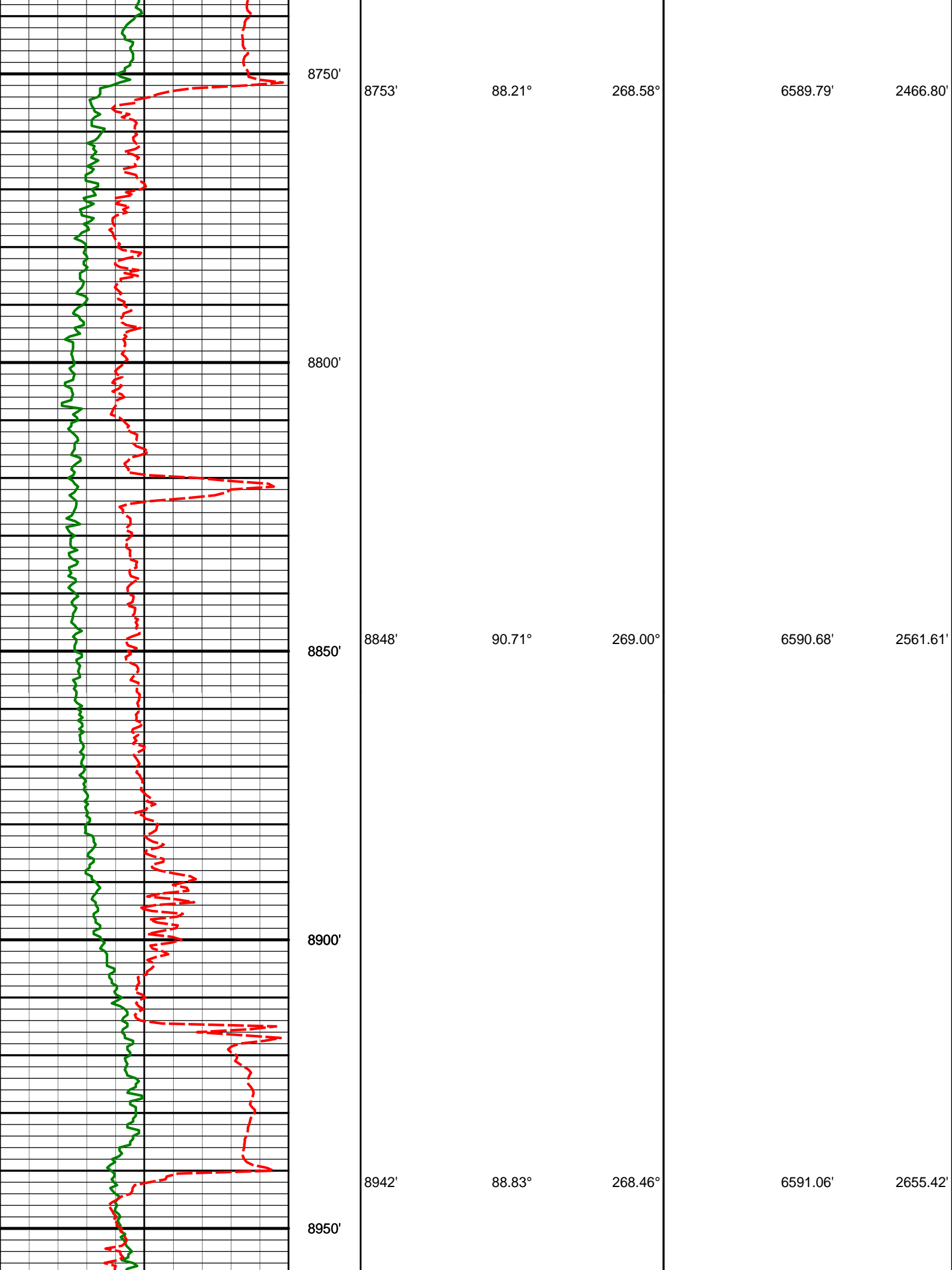
90.15°

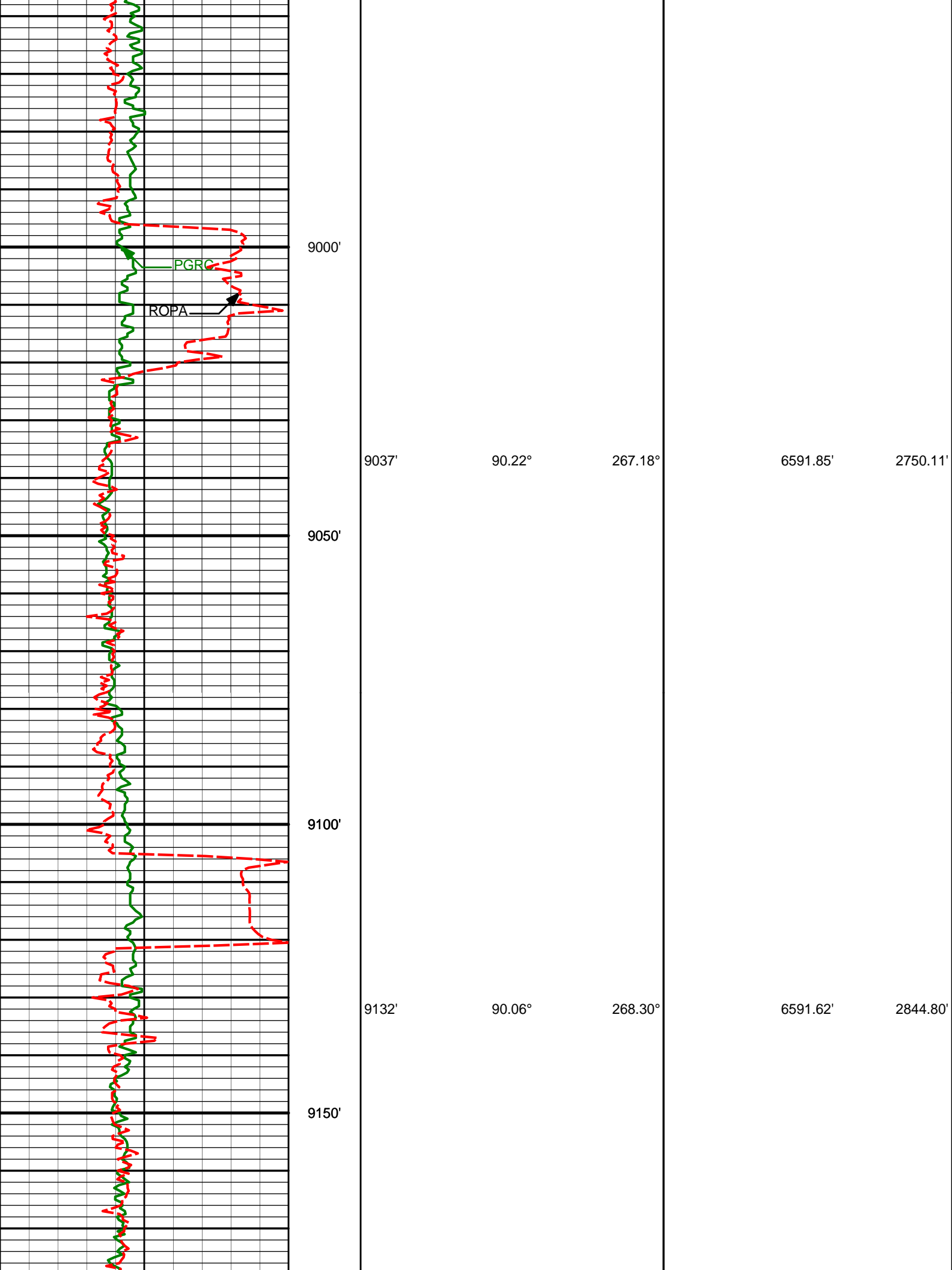
268.81°

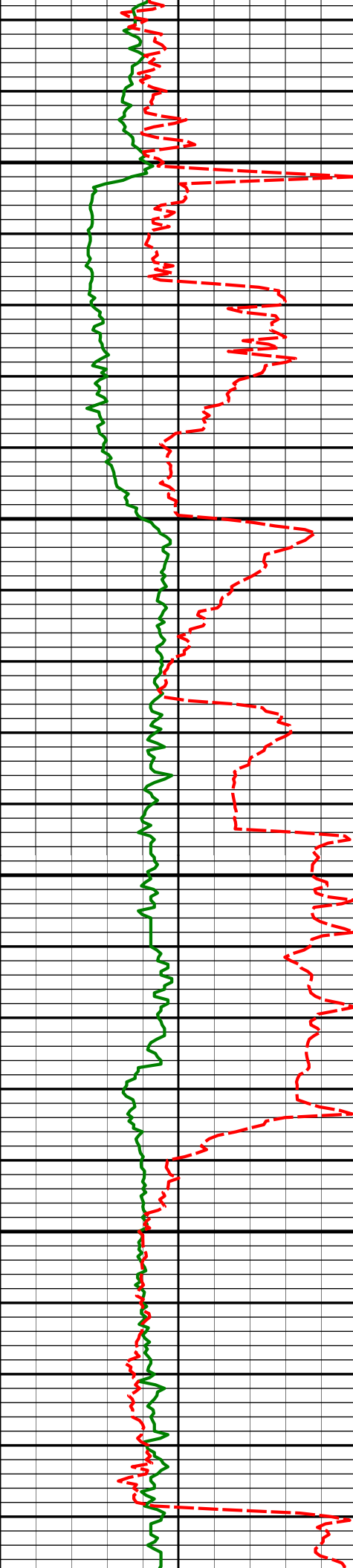
6588.43'

2372.01'

8700'







9200'

9227'

91.66°

268.12°

6590.20'

2939.54'

9250'

9300'

9322'

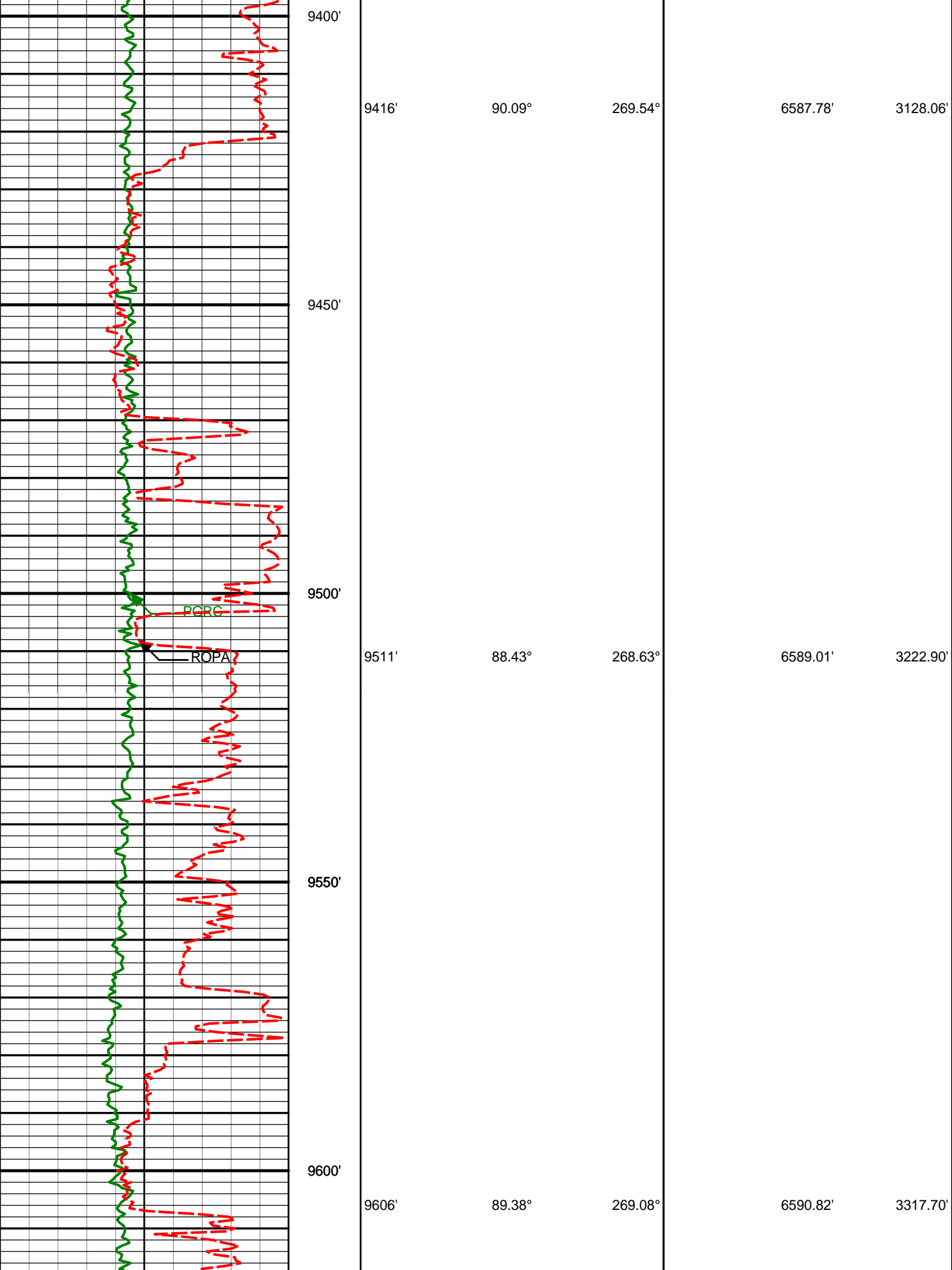
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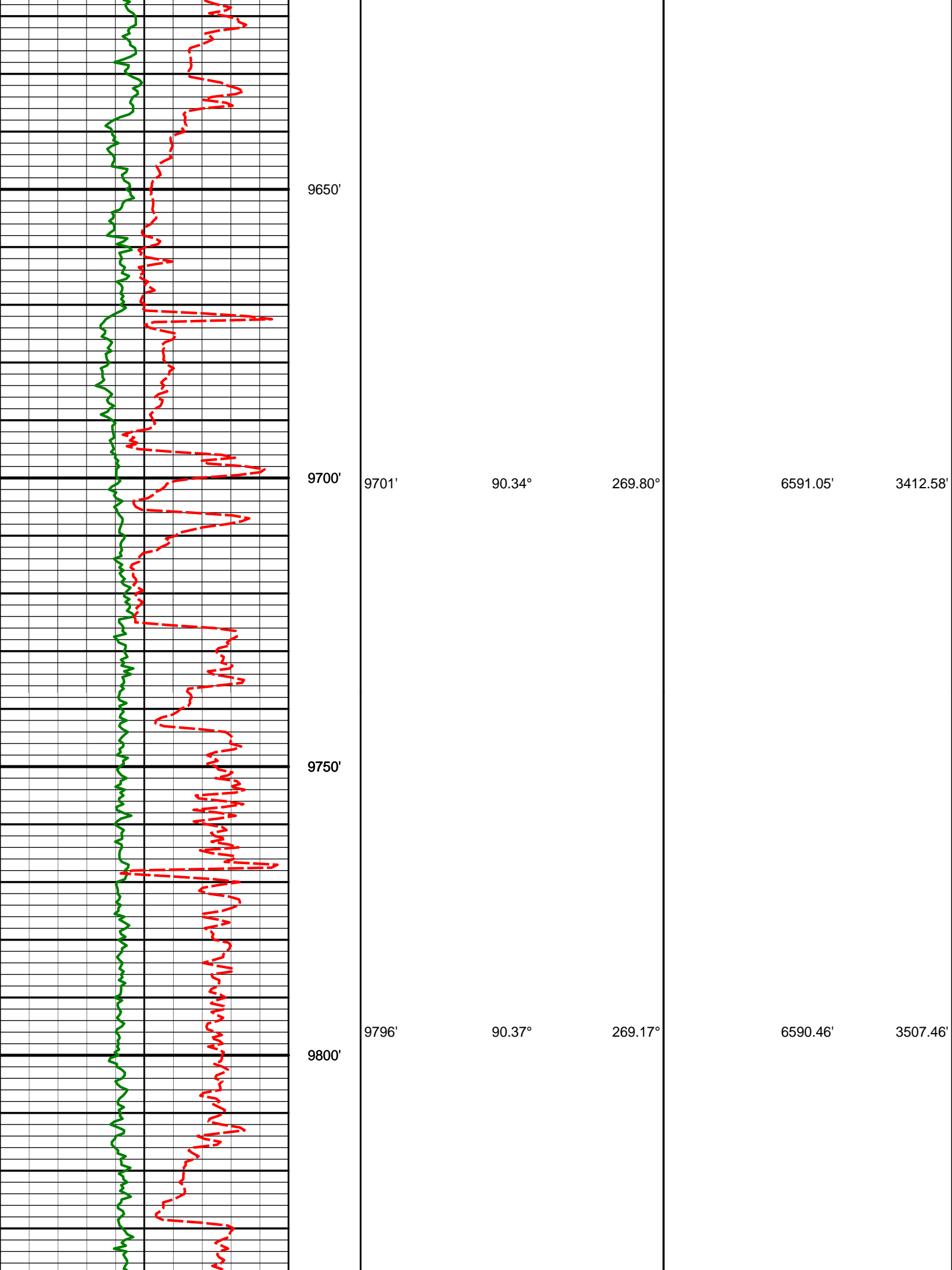
267.92°

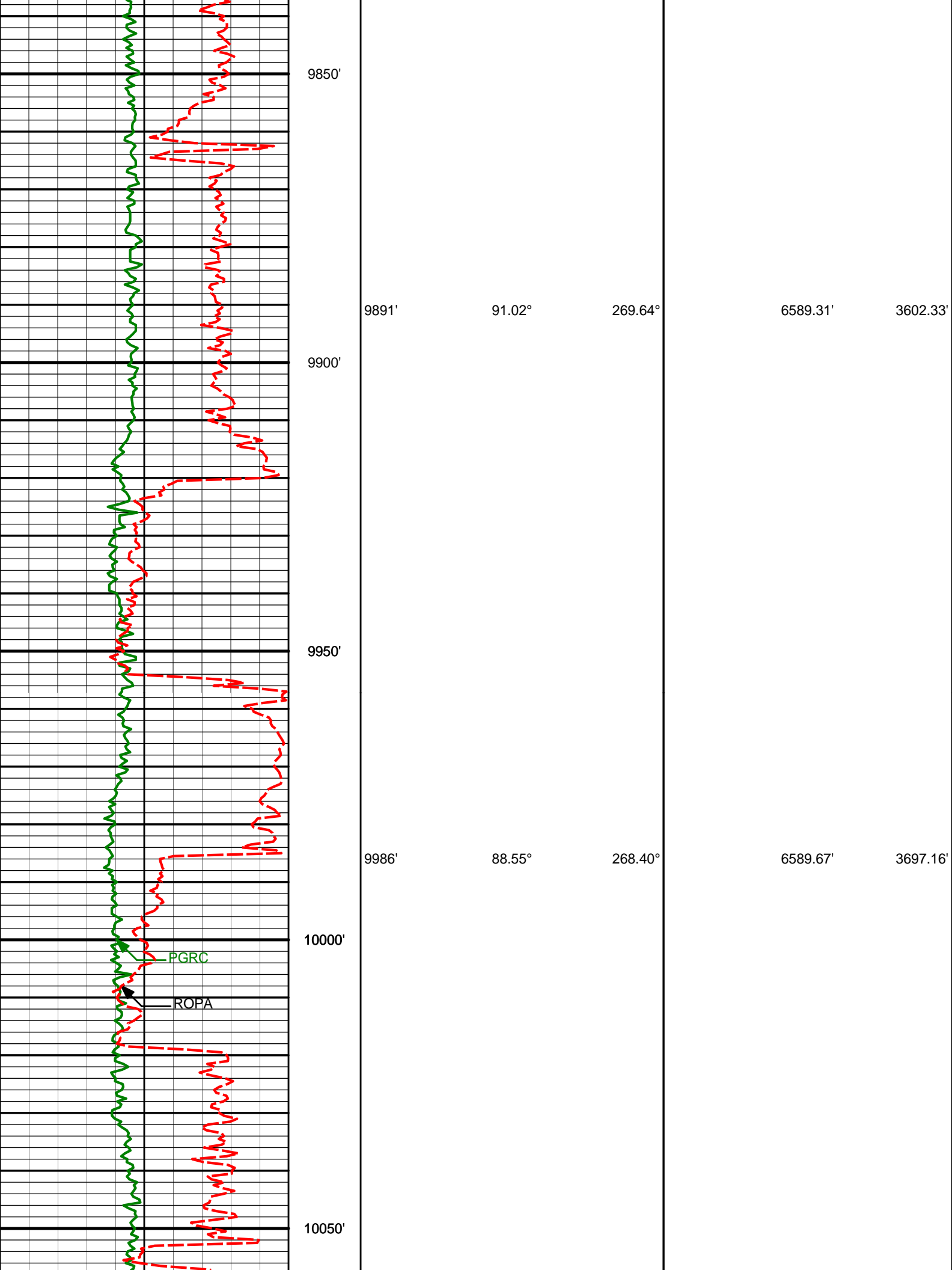
6588.33'

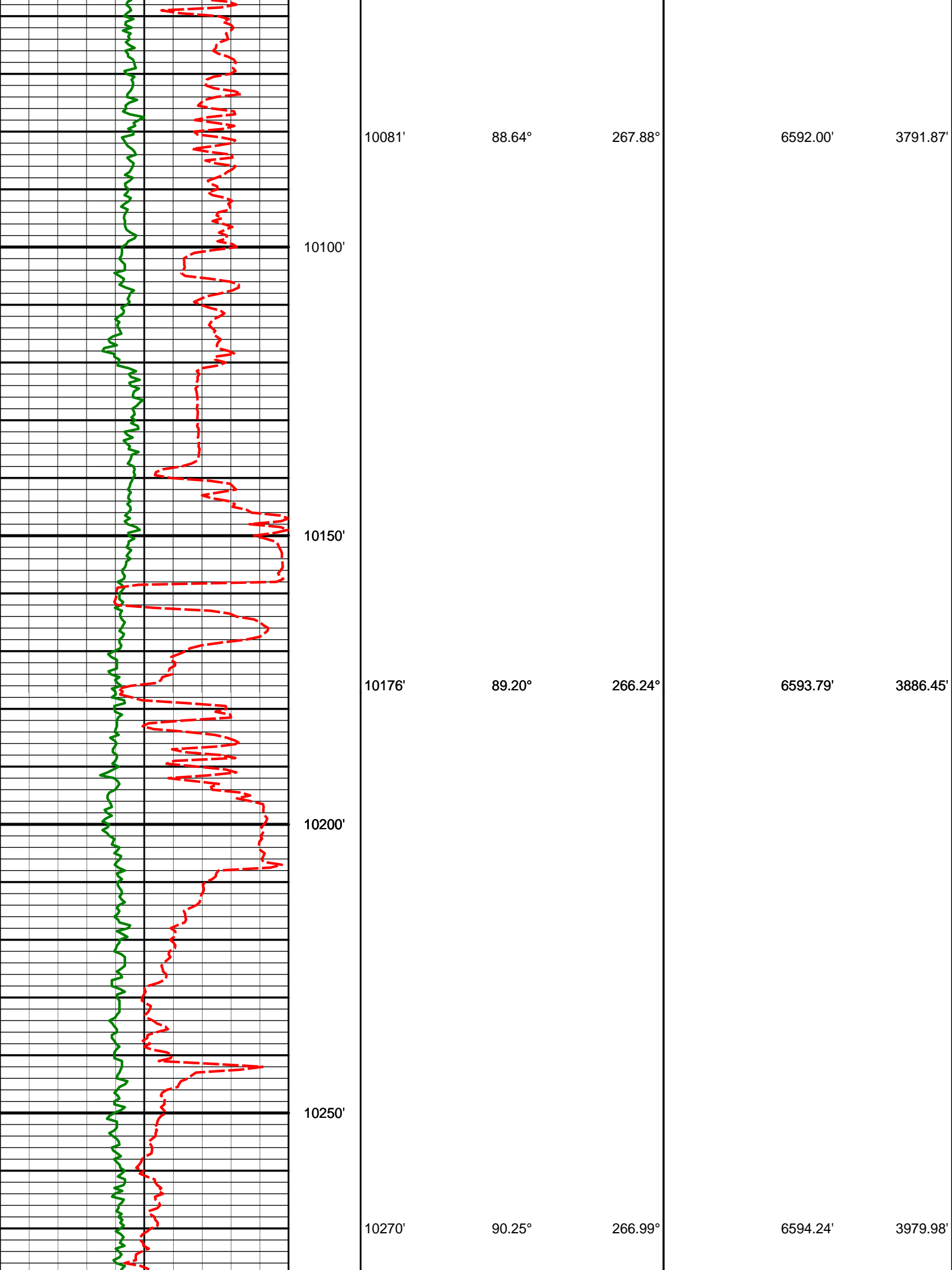
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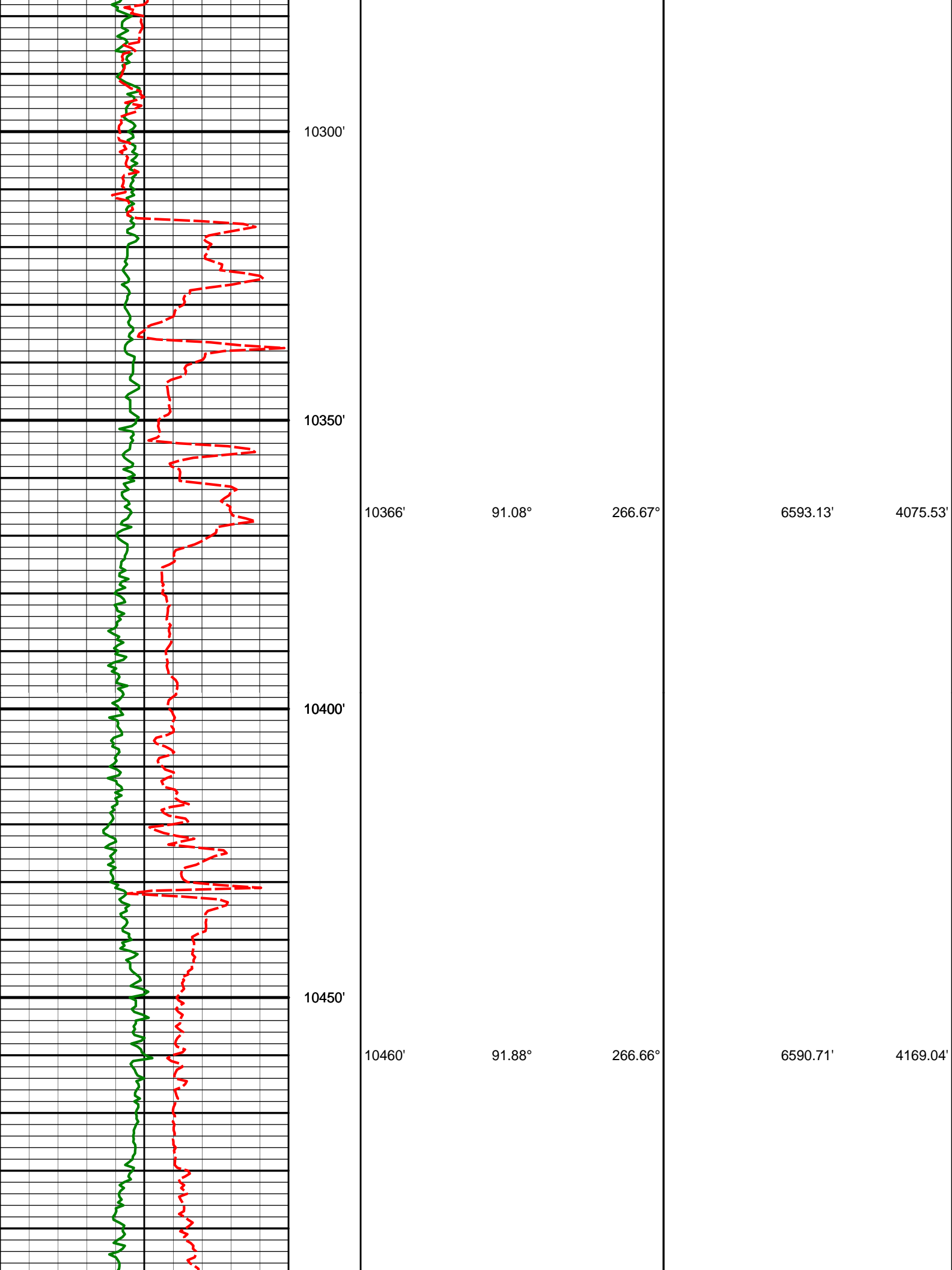
9350'

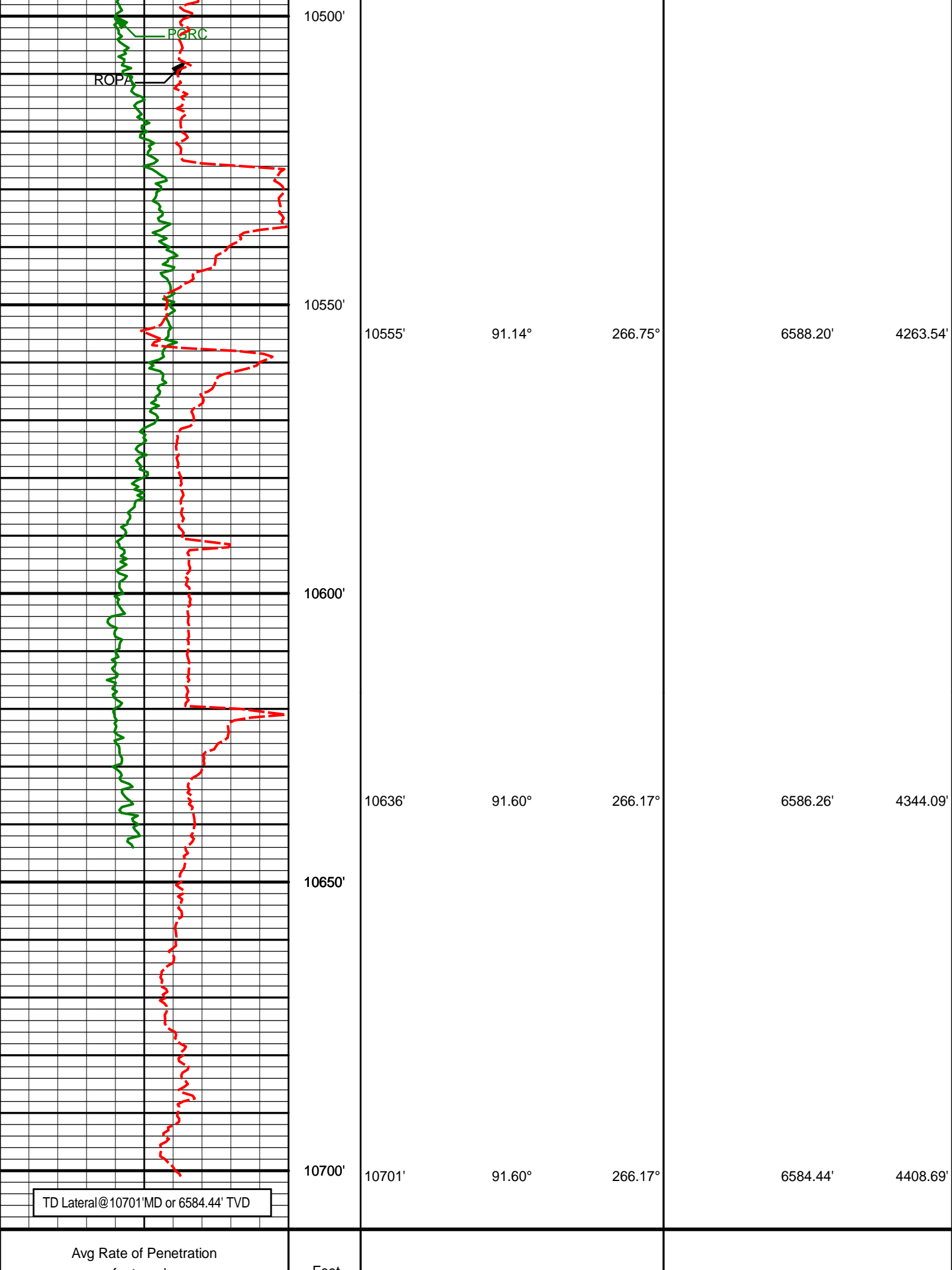













| | | | | | | | | |
|------------------------------|-----|------|-------|-----|-----|-----|------|--|
| feet per hr | | Feet | | | | | | |
| 600 | 0 | | Depth | Inc | Azm | TVD | Vsec | |
| Gamma Ray (PGRC) (Api) | | | | | | | | |
| 0 | 300 | | | | | | | |



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy

Circle Ranch Federal LB07-62HN

Wattenberg

Weld Colorado

USA

CA-XX-0900206153

| Measured Depth (feet) | Inclination (degrees) | Direction (degrees) | Vertical Depth (feet) | Latitude (feet) | Departure (feet) | Vertical Section (feet) | Dogleg (deg/100ft) |
|-----------------------------|--------------------------|------------------------|-----------------------------|--------------------|---------------------|-------------------------------|-----------------------|
| 817.00 | 0.00 | 0.00 | 817.00 | 0.00 N | 0.00 E | 0.00 | TIE-IN |
| 918.00 | 0.07 | 199.12 | 918.00 | 0.06 S | 0.02 W | 0.02 | 0.07 |
| 1012.00 | 0.23 | 68.90 | 1012.00 | 0.04 S | 0.14 E | -0.14 | 0.30 |
| 1105.00 | 0.58 | 36.05 | 1105.00 | 0.41 N | 0.60 E | -0.58 | 0.44 |
| 1198.00 | 0.52 | 33.41 | 1197.99 | 1.14 N | 1.11 E | -1.06 | 0.07 |
| 1291.00 | 0.26 | 60.98 | 1290.99 | 1.60 N | 1.53 E | -1.46 | 0.34 |
| 1384.00 | 0.44 | 113.14 | 1383.99 | 1.57 N | 2.04 E | -1.97 | 0.37 |
| 1477.00 | 0.77 | 149.47 | 1476.98 | 0.89 N | 2.68 E | -2.64 | 0.52 |
| 1571.00 | 0.83 | 146.63 | 1570.98 | 0.22 S | 3.37 E | -3.38 | 0.08 |
| 1666.00 | 0.85 | 131.13 | 1665.97 | 1.26 S | 4.28 E | -4.33 | 0.24 |
| 1761.00 | 1.01 | 143.77 | 1760.95 | 2.40 S | 5.31 E | -5.41 | 0.27 |
| 1856.00 | 1.10 | 133.71 | 1855.94 | 3.71 S | 6.47 E | -6.61 | 0.22 |
| 1951.00 | 1.26 | 130.02 | 1950.92 | 5.01 S | 7.93 E | -8.12 | 0.19 |
| 2045.00 | 1.31 | 112.66 | 2044.89 | 6.09 S | 9.71 E | -9.95 | 0.42 |
| 2140.00 | 1.88 | 37.29 | 2139.86 | 5.27 S | 11.66 E | -11.86 | 2.11 |
| 2235.00 | 3.96 | 18.63 | 2234.74 | 0.92 S | 13.65 E | -13.67 | 2.37 |
| 2329.00 | 5.22 | 354.30 | 2328.44 | 6.41 N | 14.26 E | -13.99 | 2.44 |
| 2424.00 | 7.34 | 344.15 | 2422.87 | 16.55 N | 12.17 E | -11.49 | 2.51 |
| 2519.00 | 10.22 | 342.74 | 2516.75 | 30.44 N | 8.01 E | -6.76 | 3.03 |
| 2614.00 | 10.68 | 345.36 | 2610.17 | 47.00 N | 3.29 E | -1.37 | 0.70 |
| 2709.00 | 11.82 | 359.34 | 2703.36 | 65.26 N | 0.95 E | 1.71 | 3.10 |
| 2803.00 | 12.71 | 350.80 | 2795.22 | 85.09 N | 0.81 W | 4.29 | 2.14 |
| 2898.00 | 14.04 | 350.15 | 2887.65 | 106.76 N | 4.45 W | 8.81 | 1.41 |
| 2993.00 | 14.39 | 349.70 | 2979.74 | 129.72 N | 8.53 W | 13.82 | 0.39 |
| 3088.00 | 14.69 | 349.41 | 3071.70 | 153.18 N | 12.86 W | 19.10 | 0.33 |
| 3183.00 | 13.89 | 348.57 | 3163.75 | 176.20 N | 17.34 W | 24.52 | 0.87 |
| 3277.00 | 14.04 | 347.88 | 3254.97 | 198.41 N | 21.97 W | 30.05 | 0.24 |
| 3372.00 | 12.54 | 353.13 | 3347.43 | 219.93 N | 25.62 W | 34.58 | 2.03 |
| 3467.00 | 10.97 | 352.63 | 3440.43 | 239.13 N | 28.01 W | 37.75 | 1.66 |
| 3562.00 | 8.56 | 347.61 | 3534.05 | 255.00 N | 30.69 W | 41.08 | 2.69 |
| 3657.00 | 9.44 | 348.72 | 3627.88 | 269.54 N | 33.73 W | 44.71 | 0.95 |
| 3752.00 | 10.37 | 350.49 | 3721.47 | 285.61 N | 36.67 W | 48.30 | 1.03 |
| 3847.00 | 10.60 | 352.61 | 3814.88 | 302.71 N | 39.20 W | 51.53 | 0.47 |
| 3942.00 | 8.49 | 357.61 | 3908.56 | 318.38 N | 40.62 W | 53.59 | 2.38 |
| 4037.00 | 6.74 | 358.55 | 4002.72 | 330.97 N | 41.06 W | 54.53 | 1.85 |
| 4131.00 | 3.33 | 6.05 | 4096.34 | 339.20 N | 40.91 W | 54.72 | 3.69 |
| 4226.00 | 3.08 | 341.83 | 4191.20 | 344.37 N | 41.41 W | 55.44 | 1.44 |
| 4321.00 | 1.69 | 214.31 | 4286.16 | 345.64 N | 43.00 W | 57.07 | 4.54 |
| 4416.00 | 1.55 | 262.98 | 4381.12 | 344.33 N | 45.06 W | 59.08 | 1.41 |
| 4511.00 | 3.11 | 141.61 | 4476.08 | 342.15 N | 44.73 W | 58.66 | 4.35 |
| 4605.00 | 3.42 | 137.53 | 4569.92 | 338.08 N | 41.26 W | 55.02 | 0.41 |
| 4700.00 | 2.91 | 126.75 | 4664.78 | 334.55 N | 37.41 W | 51.04 | 0.82 |
| 4795.00 | 2.52 | 119.90 | 4759.67 | 332.06 N | 33.66 W | 47.19 | 0.53 |
| 4890.00 | 1.94 | 104.92 | 4854.60 | 330.61 N | 30.29 W | 43.77 | 0.86 |
| 4984.00 | 2.63 | 140.92 | 4948.53 | 328.52 N | 27.40 W | 40.79 | 1.66 |
| 5079.00 | 2.75 | 142.15 | 5043.43 | 325.03 N | 24.62 W | 37.87 | 0.14 |
| 5174.00 | 2.12 | 109.58 | 5138.34 | 322.65 N | 21.57 W | 34.73 | 1.57 |
| 5269.00 | 1.92 | 125.89 | 5233.29 | 321.12 N | 18.62 W | 31.72 | 0.64 |
| 5364.00 | 0.83 | 147.33 | 5328.26 | 340.88 N | 16.73 W | 28.77 | 1.16 |

| | | | | | | | |
|----------|-------|--------|---------|----------|-----------|---------|-------|
| 5364.00 | 0.83 | 117.22 | 5328.26 | 319.88 N | 16.72 W | 29.77 | 1.16 |
| 5459.00 | 1.02 | 115.64 | 5423.24 | 319.20 N | 15.35 W | 28.37 | 0.20 |
| 5554.00 | 0.82 | 149.18 | 5518.23 | 318.25 N | 14.24 W | 27.22 | 0.59 |
| 5649.00 | 0.98 | 162.10 | 5613.22 | 316.89 N | 13.64 W | 26.57 | 0.27 |
| 5744.00 | 0.84 | 184.86 | 5708.21 | 315.43 N | 13.45 W | 26.32 | 0.41 |
| 5832.00 | 0.69 | 208.29 | 5796.20 | 314.32 N | 13.76 W | 26.58 | 0.39 |
| 5927.00 | 3.07 | 253.57 | 5891.15 | 313.10 N | 16.47 W | 29.24 | 2.77 |
| 5974.00 | 8.02 | 257.38 | 5937.91 | 312.02 N | 20.88 W | 33.60 | 10.55 |
| 6021.00 | 11.66 | 251.03 | 5984.21 | 309.76 N | 28.57 W | 41.20 | 8.08 |
| 6068.00 | 14.52 | 251.34 | 6029.99 | 306.33 N | 38.65 W | 51.13 | 6.08 |
| 6116.00 | 17.53 | 255.08 | 6076.12 | 302.54 N | 51.34 W | 63.65 | 6.62 |
| 6163.00 | 21.36 | 256.20 | 6120.43 | 298.68 N | 66.50 W | 78.63 | 8.19 |
| 6211.00 | 24.96 | 258.36 | 6164.56 | 294.55 N | 84.91 W | 96.86 | 7.70 |
| 6258.00 | 29.10 | 259.63 | 6206.41 | 290.49 N | 105.87 W | 117.64 | 8.91 |
| 6306.00 | 33.01 | 260.37 | 6247.53 | 286.20 N | 130.26 W | 141.83 | 8.18 |
| 6353.00 | 36.56 | 265.94 | 6286.13 | 283.06 N | 156.86 W | 168.28 | 10.13 |
| 6401.00 | 39.84 | 268.59 | 6323.85 | 281.67 N | 186.50 W | 197.84 | 7.65 |
| 6448.00 | 43.42 | 270.18 | 6358.97 | 281.35 N | 217.71 W | 229.02 | 7.93 |
| 6496.00 | 46.56 | 269.81 | 6392.92 | 281.34 N | 251.64 W | 262.92 | 6.57 |
| 6543.00 | 50.40 | 270.62 | 6424.07 | 281.48 N | 286.83 W | 298.08 | 8.27 |
| 6591.00 | 55.14 | 270.30 | 6453.10 | 281.78 N | 325.03 W | 336.26 | 9.89 |
| 6638.00 | 60.25 | 270.21 | 6478.21 | 281.96 N | 364.74 W | 375.95 | 10.87 |
| 6686.00 | 63.51 | 270.24 | 6500.83 | 282.12 N | 407.07 W | 418.25 | 6.79 |
| 6733.00 | 65.39 | 269.77 | 6521.10 | 282.12 N | 449.47 W | 460.61 | 4.11 |
| 6781.00 | 68.71 | 269.72 | 6539.82 | 281.92 N | 493.66 W | 504.76 | 6.90 |
| 6828.00 | 73.19 | 268.22 | 6555.15 | 281.12 N | 538.07 W | 549.10 | 10.01 |
| 6876.00 | 77.22 | 266.48 | 6567.41 | 278.97 N | 584.42 W | 595.32 | 9.08 |
| 6922.00 | 81.48 | 266.66 | 6575.91 | 276.27 N | 629.53 W | 640.29 | 9.28 |
| 7044.00 | 88.98 | 269.46 | 6586.04 | 272.17 N | 750.94 W | 761.43 | 6.56 |
| 7139.00 | 93.08 | 269.64 | 6584.33 | 271.43 N | 845.91 W | 856.28 | 4.32 |
| 7234.00 | 93.82 | 269.45 | 6578.61 | 270.68 N | 940.73 W | 951.00 | 0.80 |
| 7329.00 | 85.46 | 269.95 | 6579.20 | 270.18 N | 1035.64 W | 1045.81 | 8.82 |
| 7424.00 | 89.48 | 270.74 | 6583.40 | 270.76 N | 1130.53 W | 1140.64 | 4.31 |
| 7519.00 | 90.00 | 272.50 | 6583.83 | 273.44 N | 1225.48 W | 1235.63 | 1.93 |
| 7614.00 | 89.66 | 270.22 | 6584.11 | 275.70 N | 1320.45 W | 1330.61 | 2.43 |
| 7709.00 | 89.69 | 267.89 | 6584.65 | 274.13 N | 1415.43 W | 1425.44 | 2.44 |
| 7804.00 | 89.23 | 267.99 | 6585.54 | 270.72 N | 1510.36 W | 1520.16 | 0.50 |
| 7898.00 | 88.00 | 267.55 | 6587.82 | 267.06 N | 1604.26 W | 1613.83 | 1.39 |
| 7993.00 | 90.86 | 267.54 | 6588.76 | 262.99 N | 1699.16 W | 1708.48 | 3.01 |
| 8088.00 | 89.51 | 267.62 | 6588.45 | 258.97 N | 1794.07 W | 1803.15 | 1.43 |
| 8183.00 | 90.43 | 269.14 | 6588.50 | 256.29 N | 1889.03 W | 1897.92 | 1.88 |
| 8278.00 | 89.11 | 268.77 | 6588.89 | 254.56 N | 1984.01 W | 1992.75 | 1.45 |
| 8373.00 | 91.26 | 269.01 | 6588.58 | 252.72 N | 2078.99 W | 2087.57 | 2.28 |
| 8467.00 | 89.48 | 268.70 | 6587.98 | 250.84 N | 2172.96 W | 2181.39 | 1.93 |
| 8562.00 | 89.91 | 268.66 | 6588.48 | 248.65 N | 2267.94 W | 2276.20 | 0.46 |
| 8658.00 | 90.15 | 268.81 | 6588.43 | 246.52 N | 2363.91 W | 2372.01 | 0.30 |
| 8753.00 | 88.21 | 268.58 | 6589.79 | 244.36 N | 2458.87 W | 2466.80 | 2.06 |
| 8848.00 | 90.71 | 269.00 | 6590.68 | 242.35 N | 2553.84 W | 2561.61 | 2.67 |
| 8942.00 | 88.83 | 268.46 | 6591.06 | 240.28 N | 2647.81 W | 2655.42 | 2.08 |
| 9037.00 | 90.22 | 267.18 | 6591.85 | 236.67 N | 2742.74 W | 2750.11 | 1.99 |
| 9132.00 | 90.06 | 268.30 | 6591.62 | 232.92 N | 2837.66 W | 2844.80 | 1.20 |
| 9227.00 | 91.66 | 268.12 | 6590.20 | 229.96 N | 2932.60 W | 2939.54 | 1.69 |
| 9322.00 | 90.59 | 267.92 | 6588.33 | 226.67 N | 3027.52 W | 3034.25 | 1.15 |
| 9416.00 | 90.09 | 269.54 | 6587.78 | 224.59 N | 3121.50 W | 3128.06 | 1.80 |
| 9511.00 | 88.43 | 268.63 | 6589.01 | 223.07 N | 3216.47 W | 3222.90 | 2.00 |
| 9606.00 | 89.38 | 269.08 | 6590.82 | 221.18 N | 3311.43 W | 3317.70 | 1.11 |
| 9701.00 | 90.34 | 269.80 | 6591.05 | 220.25 N | 3406.43 W | 3412.58 | 1.26 |
| 9796.00 | 90.37 | 269.17 | 6590.46 | 219.39 N | 3501.42 W | 3507.46 | 0.67 |
| 9891.00 | 91.02 | 269.64 | 6589.31 | 218.40 N | 3596.41 W | 3602.33 | 0.84 |
| 9986.00 | 88.55 | 268.40 | 6589.67 | 216.78 N | 3691.38 W | 3697.16 | 2.91 |
| 10081.00 | 88.64 | 267.88 | 6592.00 | 213.69 N | 3786.31 W | 3791.87 | 0.56 |
| 10176.00 | 89.20 | 266.24 | 6593.79 | 208.82 N | 3881.16 W | 3886.45 | 1.82 |
| 10270.00 | 90.25 | 266.99 | 6594.24 | 203.27 N | 3974.99 W | 3979.98 | 1.37 |
| 10366.00 | 91.08 | 266.67 | 6593.13 | 197.97 N | 4070.84 W | 4075.53 | 0.93 |
| 10460.00 | 91.88 | 266.66 | 6590.71 | 192.50 N | 4164.65 W | 4169.04 | 0.86 |
| 10555.00 | 91.14 | 266.75 | 6588.20 | 187.04 N | 4259.46 W | 4263.54 | 0.79 |
| 10636.00 | 91.60 | 266.17 | 6586.26 | 182.05 N | 4340.28 W | 4344.09 | 0.91 |
| 10701.00 | 91.60 | 266.17 | 6584.44 | 177.71 N | 4405.11 W | 4408.69 | 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 272.34 DEGREES (GRID)
A TOTAL CORRECTION OF 7.48 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10701.00 FEET
IS 4408.69 FEET ALONG 272.31 DEGREES (GRID)

Casing set at 6967 ft.

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