



1:240 / 1:600

[illegible]

| MWD Run Number | 100 | 200 | 300 | 400 | 500 |
|----------------|-----|-----|-----|-----|-----|
|----------------|-----|-----|-----|-----|-----|

| | | | | | |
|---|------------------|-----------------|------------------|------------------|------------------|
| MWD Run Number | 100 | 200 | 300 | 400 | 500 |
| Date run completed | 06-Nov-12 | 07-Nov-12 | 08-Nov-12 | 10-Nov-12 | 11-Nov-12 |
| Rig Bit Number | 2 | 3 | 3 | 4 | 5 |
| Bit Size (in) | 8.750 | 8.750 | 8.750 | 6.125 | 6.125 |
| Tool Nominal OD (in) | 6.750 | 6.750 | 6.750 | 4.750 | 4.750 |
| Log Start Depth (MD, ft) | 743.00 | 6,000.00 | 6,268.00 | 7,137.00 | 8,321.00 |
| Log End Depth (MD, ft) | 6,000.00 | 6,268.00 | 7,137.00 | 8,321.00 | 8,795.00 |
| Drill or Wipe | Drill | Drill | Drill | Drill | Drill |
| Drill/Wipe Start Date and Time | 05-Nov-12 04:34 | 06-Nov-12 10:20 | 07-Nov-12 03:57 | 09-Nov-12 10:08 | 10-Nov-12 07:00 |
| Drill/Wipe End Date and Time | 06-Nov-12 00:36 | 06-Nov-12 20:17 | 07-Nov-12 22:00 | 09-Nov-12 22:08 | 11-Nov-12 13:00 |
| Min Inc (deg) @ Depth (MD, ft) | .33 @ 1,370.00 | .50 @ 6,007.00 | 14.96 @ 6,292.00 | 85.28 @ 7,137.00 | 90.40 @ 8,353.00 |
| Max Inc (deg) @ Depth (MD, ft) | 16.46 @ 2,686.00 | 9.78 @ 6,197.00 | 85.28 @ 7,137.00 | 93.98 @ 7,783.00 | 95.89 @ 8,732.00 |
| Bit TFA(in2) / Bit Type | .75 / PDC | .86 / PDC | .86 / PDC | .46 / PDC | .46 / PDC |
| Flow Rate (gpm) | 567.79 | 556.00 | 548.24 | 267.50 | 260.00 |
| Max AV (fpm) / CV (fpm) @ MWD | 360.0 / 420.0 | 360.0 / 420.0 | 434.7 / 376.0 | 333.0 / 385.0 | 420.0 / 360.0 |
| Fluid Type | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel | Fresh Water Gel |
| Density (ppg) / Viscosity (spqt) | 9.15 / 30.00 | 9.15 / 30.00 | 10.50 / 56.00 | 9.10 / 30.00 | 9.10 / 34.00 |
| Filtrate CL (ppm) | 1,900.00 | 1,900.00 | 2,050.00 | 2,300.00 | 2,500.00 |
| pH / Fluid Loss (mptm) | 9.00 / 21 | 9.00 / 21 | 9.60 / 7 | 10.30 / 11 | 8.60 / 8 |
| PV (cP) / YP (lbf2) | 4 / 5.00 | 4 / 5.00 | 17 / 19.00 | 4 / 6.00 | 7 / 6.00 |
| % Solids / % Sand | 4.50 / 0.25 | 4.50 / 0.25 | 12.00 / 0.25 | 5.00 / 0.08 | 3.50 / 0.15 |
| % Oil / Oil:Water Ratio | N/A / N/A | N/A / N/A | 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 | N/A @ N/A | N/A @ N/A |
| Rmf @ Measured Temp (degF) | N/A @ N/A | N/A @ N/A | 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 | N/A @ N/A | N/A @ N/A |
| Max Tool Temp (deg F) @ S | 158.48 / PDM | 154.00 / PDM | 154.10 / PDM | 157.54 / PDM | 149.33 / PDM |

| | | | | | |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|
| Max Tool Temp (degF) / Source | 150.10 / PCM | 154.30 / PCM | 171.10 / PCM | 197.51 / PCM | 412.20 / PCM |
| Rm @ Max Tool Temp (degF) | N/A @ N/A | N/A @ N/A | N/A @ N/A | N/A @ N/A | N/A @ N/A |
| Lead MWD Engineer | Adam Sampson | Adam Sampson | Adam Sampson | Adam Sampson | Adam Sampson |
| Customer Representative | Jim Turner | Jim Turner | Jim Turner | Roger Foster | Roger Foster |

SENSOR INFORMATION

Downhole Processor Information

| | | | | | |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Tool Type | PCM | PCM | PCM | PCM | PCM |
| Software Version | 5.76 | 5.76 | 5.76 | 5.76 | 5.76 |
| Sub Serial Number | 11400829 | 11400829 | 11400829 | 11400829 | 11854098 |
| Insert Serial Number | 11400829 | 11400829 | 11680770 | 11400829 | 11680770 |
| Date and Time Initialized | 04-Nov-12 04:19 | 04-Nov-12 04:19 | 06-Nov-12 22:51 | 08-Nov-12 08:06 | 10-Nov-12 01:07 |
| Date and Time Read | 07-Nov-12 01:45 | 07-Nov-12 01:52 | 08-Nov-12 03:10 | 10-Nov-12 05:01 | 10-Nov-12 21:56 |
| 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) | 55.00 | 54.00 | 52.00 | 62.00 | 63.00 |
| Software Version | 6.21 | 6.21 | 6.21 | 6.21 | 6.21 |
| Sub Serial Number | 11854098 | 11854098 | 11854098 | 11854098 | 11854098 |
| Sonde Serial Number | 11638494 | 11638494 | 11478107 | 11638494 | 11478007 |
| Sensor ID Number | N/A | N/A | N/A | N/A | N/A |
| Toolface Offset (deg) | 340.30 | 322.50 | 260.90 | 322.20 | 124.30 |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|----------|----------|----------|----------|
| Tool Type | PCG | PCG | PCG | PCG | PCG |
| Distance From Bit (ft) | 64.50 | 47.91 | 46.26 | 65.50 | 64.41 |
| Recorded Sample Period (sec) | 10 | 10 | 10 | 10 | 10 |
| Software Version | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 |
| Sub Serial Number | 11854098 | 11854098 | 11854098 | 11854098 | 11854098 |
| Insert/Sonde Serial Number | 11293409 | 11293409 | 11681026 | 11293409 | 11681026 |

WELL INFORMATION

| | | | | | |
|----------------------------------|-------------------|--|--|--|--|
| MWD Run Number | 600 | | | | |
| Date run completed | 12-Nov-12 | | | | |
| Rig Bit Number | 6 | | | | |
| Bit Size (in) | 6.125 | | | | |
| Tool Nominal OD (in) | 4.750 | | | | |
| Log Start Depth (MD, ft) | 8,795.00 | | | | |
| Log End Depth (MD, ft) | 11,166.00 | | | | |
| Drill or Wipe | Drill | | | | |
| Drill/Wipe Start Date and Time | 11-Nov-12 22:00 | | | | |
| Drill/Wipe End Date and Time | 12-Nov-12 05:30 | | | | |
| Min Inc (deg) @ Depth (MD, ft) | 84.41 @ 10,154.00 | | | | |
| Max Inc (deg) @ Depth (MD, ft) | 94.22 @ 10,628.00 | | | | |
| Bit TFA(in2) / Bit Type | .46 / PDC | | | | |
| Flow Rate (gpm) | 270.00 | | | | |
| Max AV (fpm) / CV (fpm) @ MWD | 355.0 / 350.0 | | | | |
| Fluid Type | Fresh Water Gel | | | | |
| Density (ppg) / Viscosity (spqt) | 9.15 / 31.00 | | | | |
| Filtrate CL (ppm) | 2,700.00 | | | | |
| pH / Fluid Loss (mptm) | 9.80 / 9 | | | | |
| PV (cP) / YP (lhf2) | 4 / 6.00 | | | | |
| % Solids / % Sand | 4.20 / 0.06 | | | | |
| % Oil / Oil:Water Ratio | N/A / N/A | | | | |

| | | | | | |
|-------------------------------|--------------|--|--|--|--|
| Rm @ Measured Temp (degF) | N/A @ N/A | | | | |
| Rmf @ Measured Temp (degF) | N/A @ N/A | | | | |
| Rmc @ Measured Temp (degF) | N/A @ N/A | | | | |
| Max Tool Temp (degF) / Source | 223.41 / PCM | | | | |
| Rm @ Max Tool Temp (degF) | N/A @ N/A | | | | |
| Lead MWD Engineer | Adam Sampson | | | | |
| Customer Representative | Roger Foster | | | | |

SENSOR INFORMATION

Downhole Processor Information

| | | | | | |
|---------------------------|-----------------|--|--|--|--|
| Tool Type | PCM | | | | |
| Software Version | 5.76 | | | | |
| Sub Serial Number | 11854098 | | | | |
| Insert Serial Number | 11400829 | | | | |
| Date and Time Initialized | 10-Nov-12 14:15 | | | | |
| Date and Time Read | 12-Nov-12 14:41 | | | | |
| ECMB SW Version | N/A | | | | |

Directional Sensor Information

| | | | | | |
|------------------------|----------|--|--|--|--|
| Tool Type | PCDC | | | | |
| Distance From Bit (ft) | 63.00 | | | | |
| Software Version | 6.21 | | | | |
| Sub Serial Number | 11854098 | | | | |
| Sonde Serial Number | 11478107 | | | | |
| Sensor ID Number | N/A | | | | |
| Toolface Offset (deg) | 79.41 | | | | |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|--|--|--|--|
| Tool Type | PCG | | | | |
| Distance From Bit (ft) | 64.41 | | | | |
| Recorded Sample Period (sec) | 10 | | | | |
| Software Version | 8.15 | | | | |
| Sub Serial Number | 11854098 | | | | |
| Insert/Sonde Serial Number | 11293409 | | | | |

REMARKS

1. All depths are calibrated to driller's pipe tally and are measured depth 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:
PGRC (Gamma CG):
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: 0.6 ft

Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

6. Insite Version 7.4.1

WARRANTY

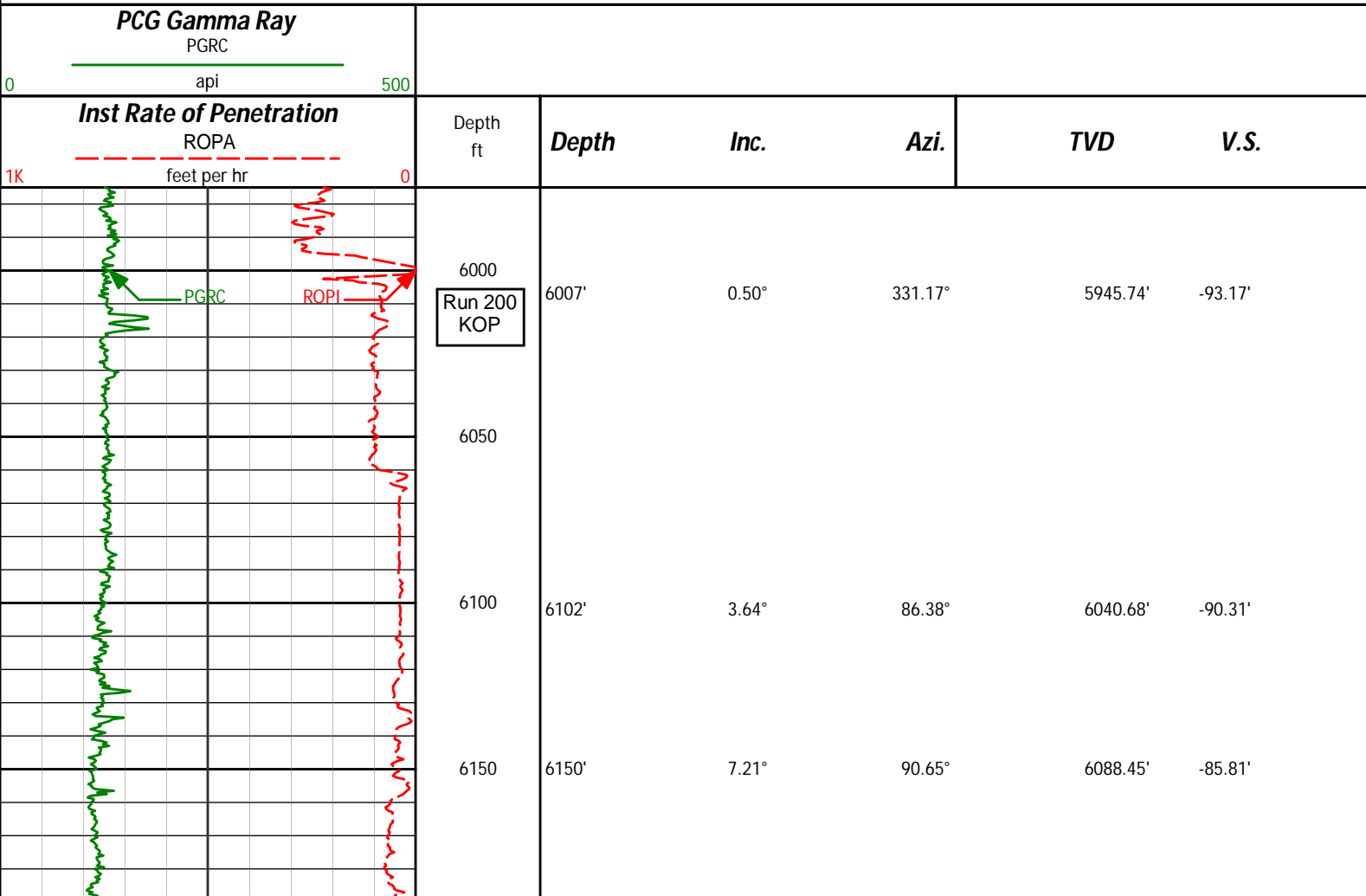
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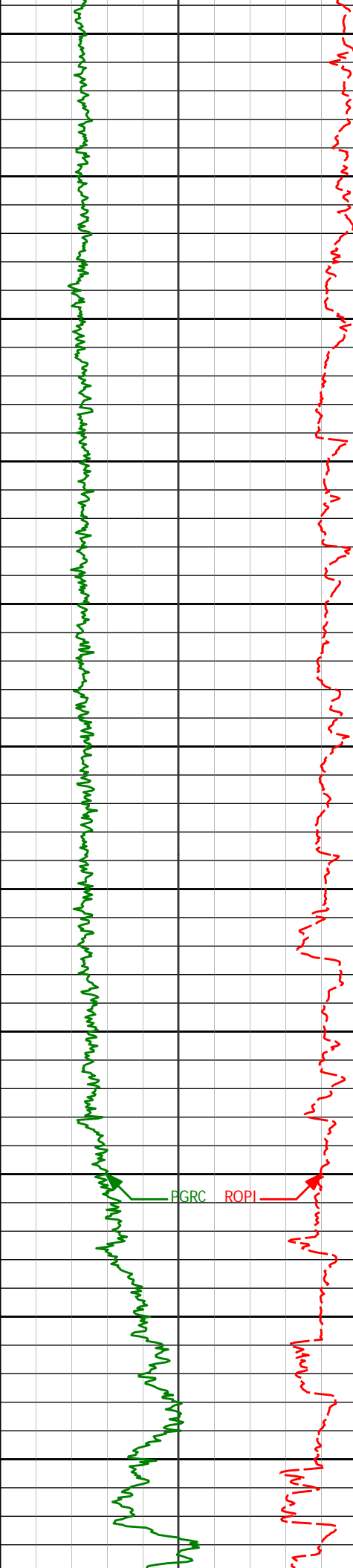
HALLIBURTON

Sperry Drilling Services

MD Main Log 1:600

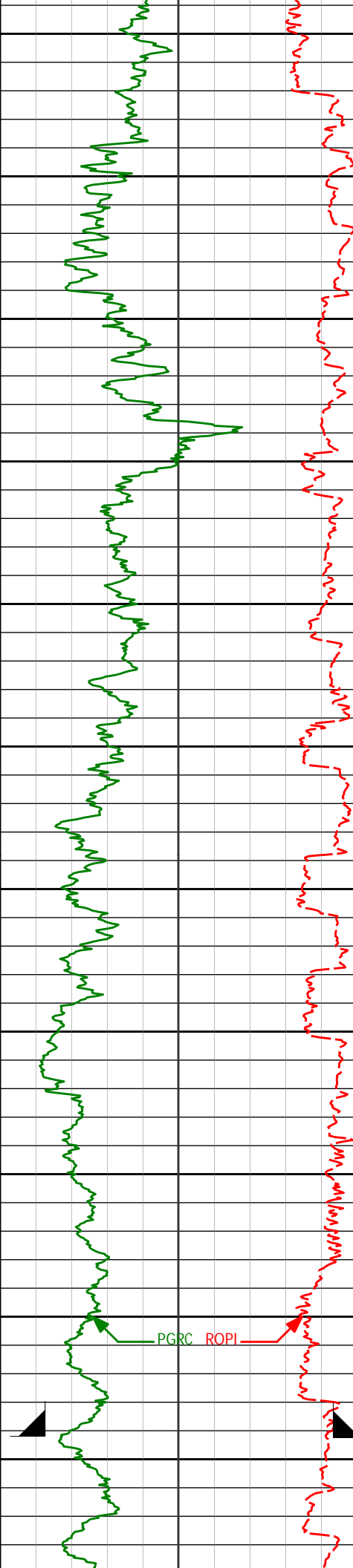
Noble
Wells Ranch AE08-64-1HN
HP 321
T6N R62W





Run 300

| | | | | | |
|------|-------|--------|--------|----------|---------|
| 6200 | 6197' | 9.78° | 90.89° | 6134.94' | -78.95' |
| 6250 | 6245' | 11.87° | 90.17° | 6182.08' | -70.04' |
| 6300 | 6292' | 14.96° | 84.76° | 6227.79' | -59.20' |
| 6350 | 6340' | 19.45° | 84.21° | 6273.63' | -45.02' |
| 6400 | 6387' | 24.31° | 85.63° | 6317.24' | -27.54' |
| 6450 | 6435' | 29.74° | 87.40° | 6359.98' | -5.82' |
| 6500 | 6481' | 34.06° | 90.65° | 6399.03' | 18.27' |
| 6550 | 6529' | 37.63° | 92.16° | 6437.93' | 45.98' |
| 6600 | 6576' | 42.00° | 91.82° | 6474.02' | 75.59' |
| 6650 | 6624' | 47.70° | 90.14° | 6508.04' | 109.00' |
| 6700 | 6671' | 52.69° | 88.47° | 6538.12' | 144.78' |
| | 6719' | 56.56° | 88.95° | 6565.90' | 183.63' |

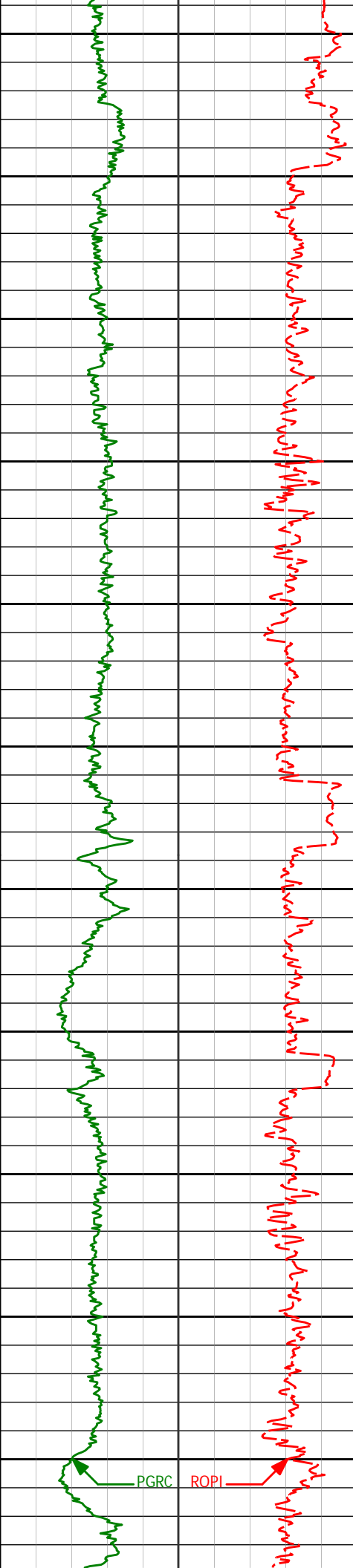


| | | | | |
|-------|--------|--------|----------|---------|
| 6750 | | | | |
| 6766' | 58.11° | 89.78° | 6591.27' | 222.85' |
| 6800 | | | | |
| 6814' | 60.22° | 90.52° | 6615.87' | 263.62' |
| 6850 | | | | |
| 6861' | 62.86° | 90.91° | 6638.27' | 304.43' |
| 6900 | | | | |
| 6909' | 67.14° | 90.80° | 6658.55' | 347.38' |
| 6950 | | | | |
| 6956' | 71.34° | 88.51° | 6675.21' | 390.91' |
| 7000 | | | | |
| 7004' | 75.45° | 87.99° | 6688.93' | 436.60' |
| 7050 | | | | |
| 7051' | 78.83° | 89.99° | 6699.39' | 482.05' |
| 7100 | | | | |
| 7085' | 81.20° | 90.86° | 6705.28' | 515.16' |
| 7150 | | | | |
| 7167' | 85.81° | 95.83° | 6714.56' | 594.93' |
| 7200 | | | | |
| 7214' | 86.39° | 95.95° | 6717.76' | 640.41' |
| 7250 | | | | |
| 7262' | 86.79° | 92.64° | 6720.61' | 687.18' |

CASING SHOE @
7242'

PGRC

ROPI



7300

7309'

87.72°

88.91°

6722.86'

733.54'

7350

7400

7404'

89.48°

87.11°

6725.18'

827.95'

7450

7500

7499'

91.88°

87.12°

6724.05'

922.52'

7550

7600

7594'

90.52°

86.72°

6722.06'

1017.12'

7650

7700

7689'

89.32°

86.64°

6722.18'

1111.77'

7750

7800

7783'

93.98°

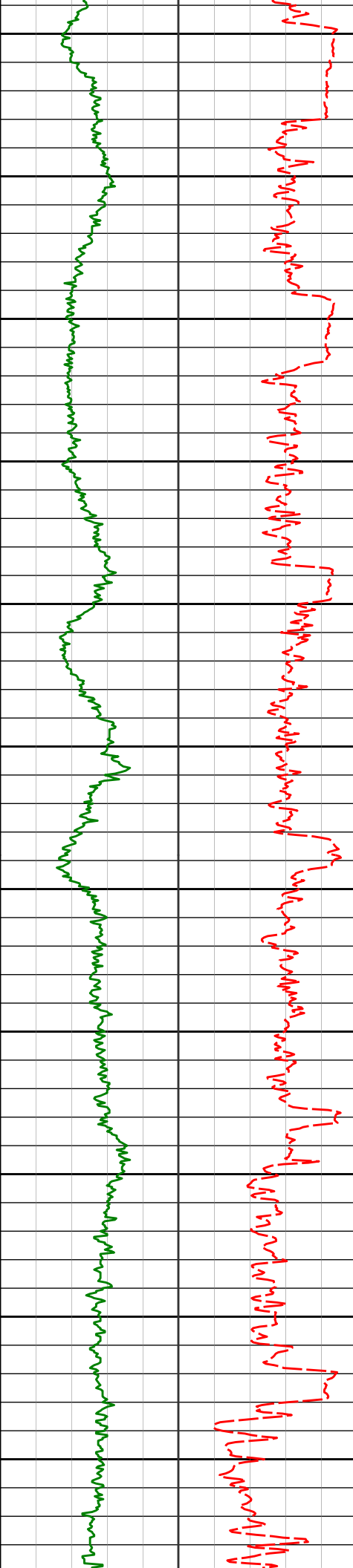
86.77°

6719.48'

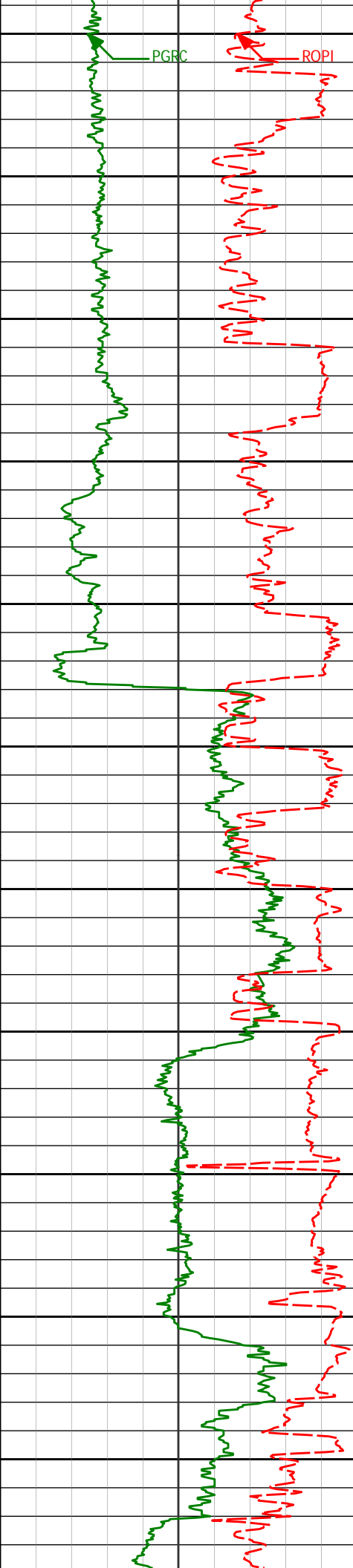
1205.36'

PGRC

ROPI



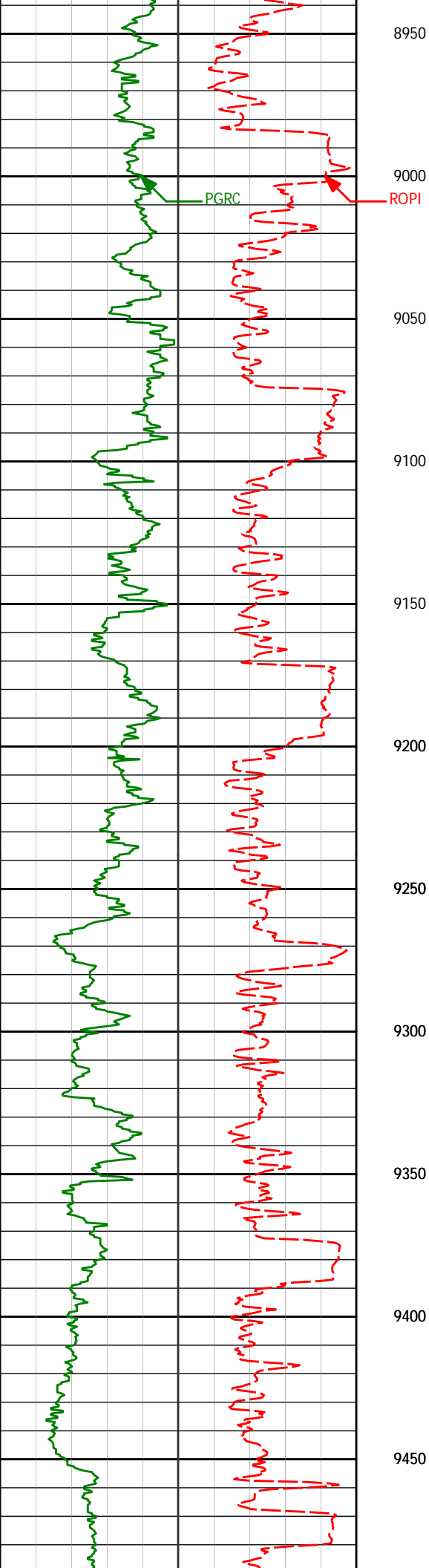
| | | | | |
|---------|--------|--------|----------|----------|
| 7850 | | | | |
| 7878' | 91.91° | 86.48° | 6714.59' | 1299.89' |
| 7900 | | | | |
| 7950 | | | | |
| 7973' | 89.48° | 86.78° | 6713.44' | 1394.54' |
| 8000 | | | | |
| 8050 | | | | |
| 8068' | 89.11° | 87.01° | 6714.62' | 1489.16' |
| 8100 | | | | |
| 8150 | | | | |
| 8163' | 88.43° | 86.71° | 6716.66' | 1583.76' |
| 8200 | | | | |
| Run 500 | | | | |
| 8250 | | | | |
| 8258' | 88.99° | 86.63° | 6718.81' | 1678.39' |
| 8300 | | | | |
| 8350 | | | | |
| 8353' | 90.40° | 86.69° | 6719.31' | 1773.05' |



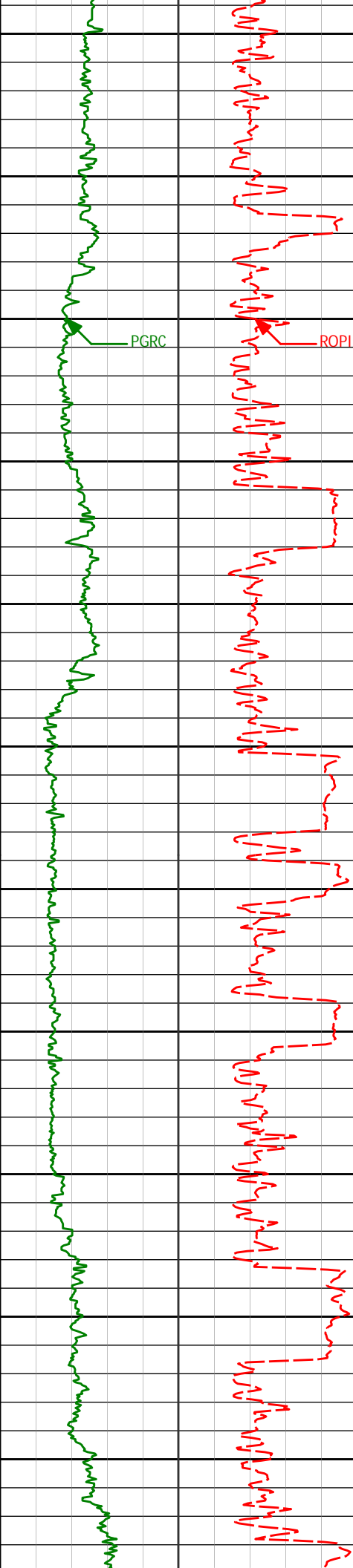
| |
|------|
| 8400 |
| 8450 |
| 8500 |
| 8550 |
| 8600 |
| 8650 |
| 8700 |
| 8750 |
| 8800 |
| 8850 |
| 8900 |

| | | | | |
|-------|--------|--------|----------|----------|
| 8448' | 91.20° | 87.05° | 6717.99' | 1867.66' |
| 8542' | 93.05° | 88.10° | 6714.50' | 1961.11' |
| 8637' | 93.76° | 89.34° | 6708.85' | 2055.25' |
| 8732' | 95.89° | 92.81° | 6700.86' | 2148.66' |
| 8827' | 91.73° | 96.13° | 6694.55' | 2241.10' |
| 8921' | 89.78° | 92.82° | 6693.30' | 2332.78' |

Run 600



| | | | | |
|-------|--------|--------|----------|----------|
| 9016' | 88.65° | 90.98° | 6694.60' | 2426.29' |
| 9111' | 87.56° | 89.51° | 6697.75' | 2520.20' |
| 9205' | 87.47° | 86.26° | 6701.83' | 2613.57' |
| 9300' | 86.14° | 86.40° | 6707.13' | 2708.12' |
| 9395' | 87.66° | 84.96° | 6712.27' | 2802.76' |



9500

9550

9600

9650

9700

9750

9800

9850

9900

9950

10000

9490'

90.80°

85.74°

6713.55'

2897.55'

9584'

91.08°

84.83°

6712.00'

2991.36'

9679'

91.76°

86.46°

6709.65'

3086.11'

9774'

90.71°

87.11°

6707.60'

3180.73'

9869'

90.43°

89.78°

6706.66'

3275.08'

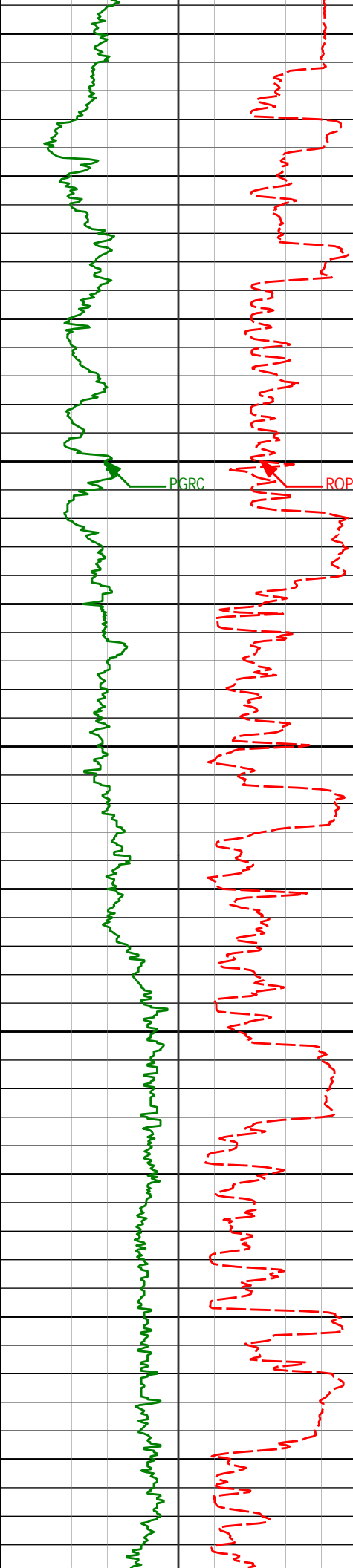
9964'

90.37°

89.71°

6706.00'

3369.16'



10050

10059'

88.46°

86.64°

6706.97'

3463.55'

10100

10150

10154'

84.41°

86.44°

6712.87'

3558.02'

10200

PGRC

ROP

10250

10249'

86.04°

86.03°

6720.78'

3652.40'

10300

10350

10344'

87.75°

85.03°

6725.92'

3747.06'

10400

10450

10438'

89.69°

86.20°

6728.02'

3840.82'

10500

10550

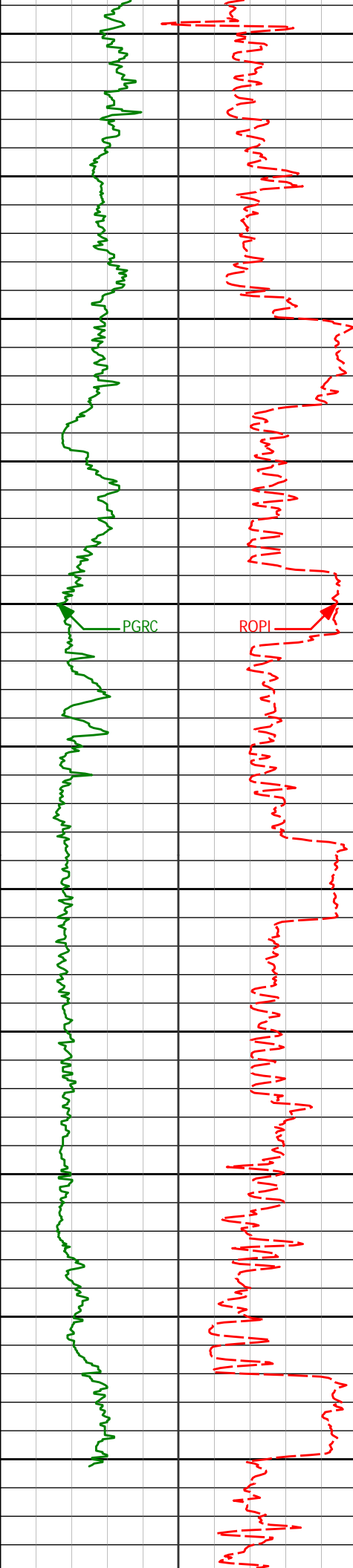
10533'

91.85°

89.16°

6726.74'

3935.29'



10600

| | | | | |
|--------|--------|--------|----------|----------|
| 10628' | 94.22° | 88.84° | 6721.71' | 4029.40' |
|--------|--------|--------|----------|----------|

10650

10700

| | | | | |
|--------|--------|--------|----------|----------|
| 10723' | 93.79° | 88.35° | 6715.07' | 4123.50' |
|--------|--------|--------|----------|----------|

10750

10800

| | | | | |
|--------|--------|--------|----------|----------|
| 10818' | 92.34° | 88.02° | 6709.98' | 4217.77' |
|--------|--------|--------|----------|----------|

10850

10900

| | | | | |
|--------|--------|--------|----------|----------|
| 10913' | 91.51° | 88.96° | 6706.79' | 4312.07' |
|--------|--------|--------|----------|----------|

10950

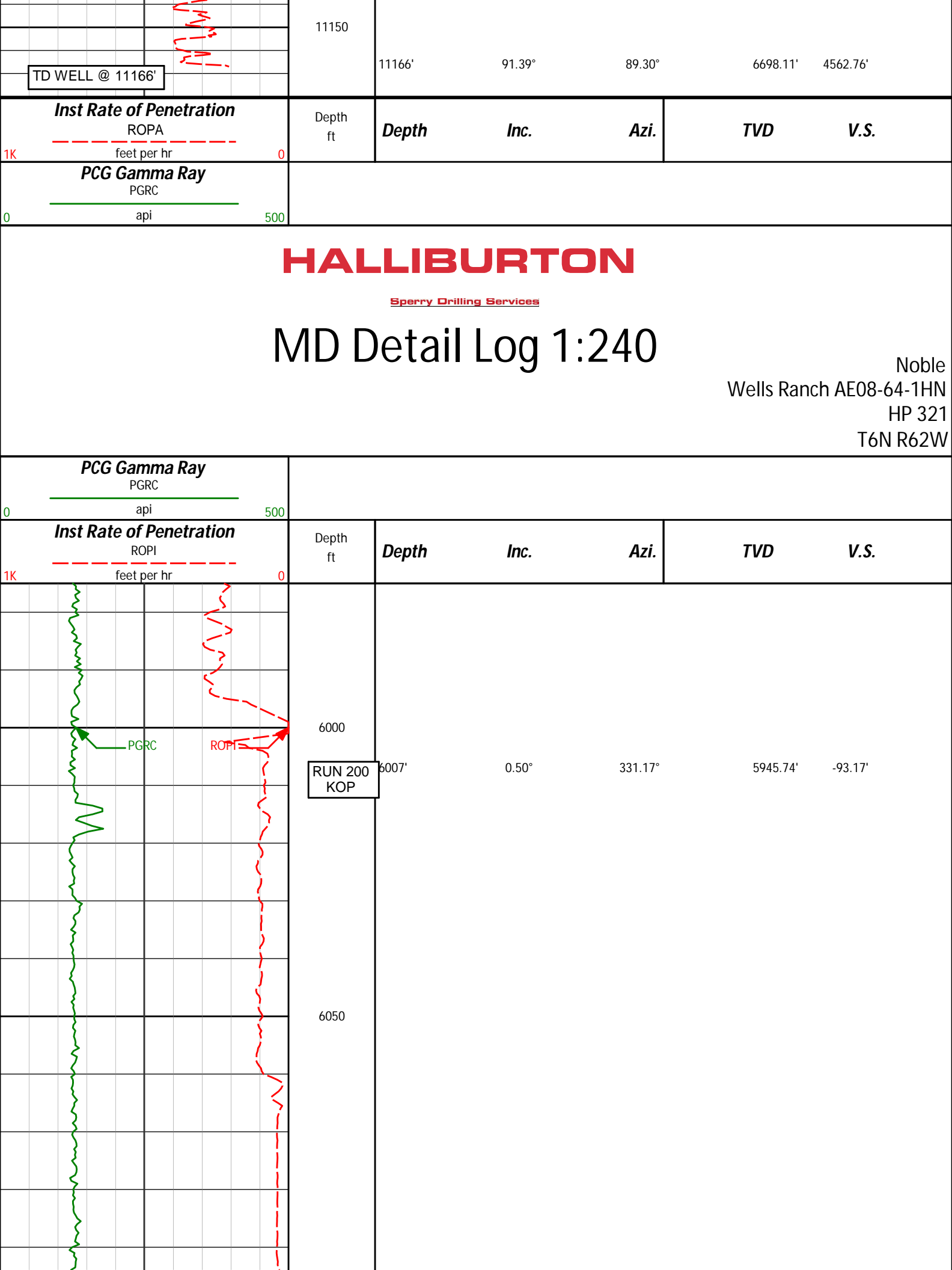
11000

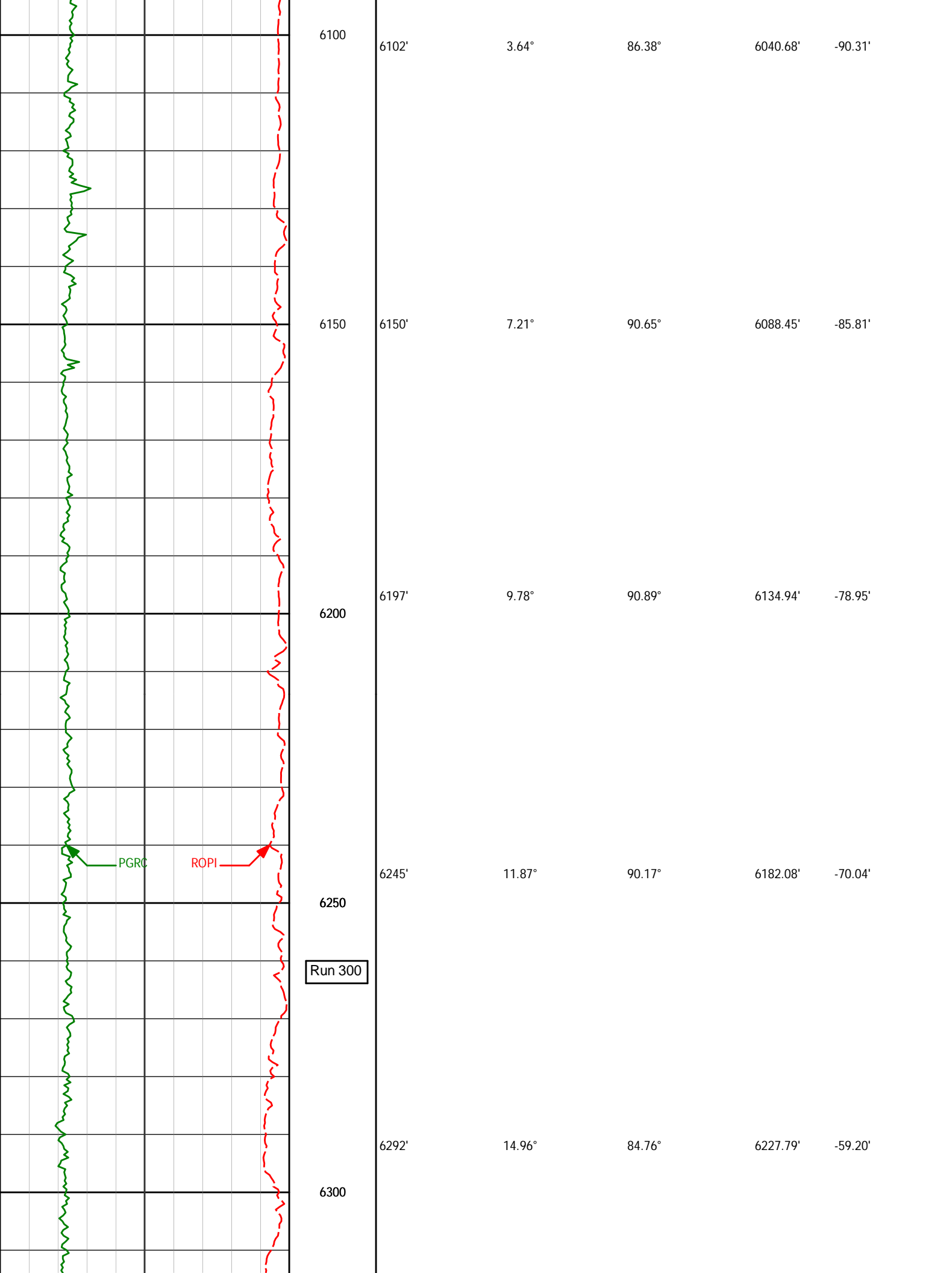
| | | | | |
|--------|--------|--------|----------|----------|
| 11008' | 92.87° | 89.39° | 6703.16' | 4406.21' |
|--------|--------|--------|----------|----------|

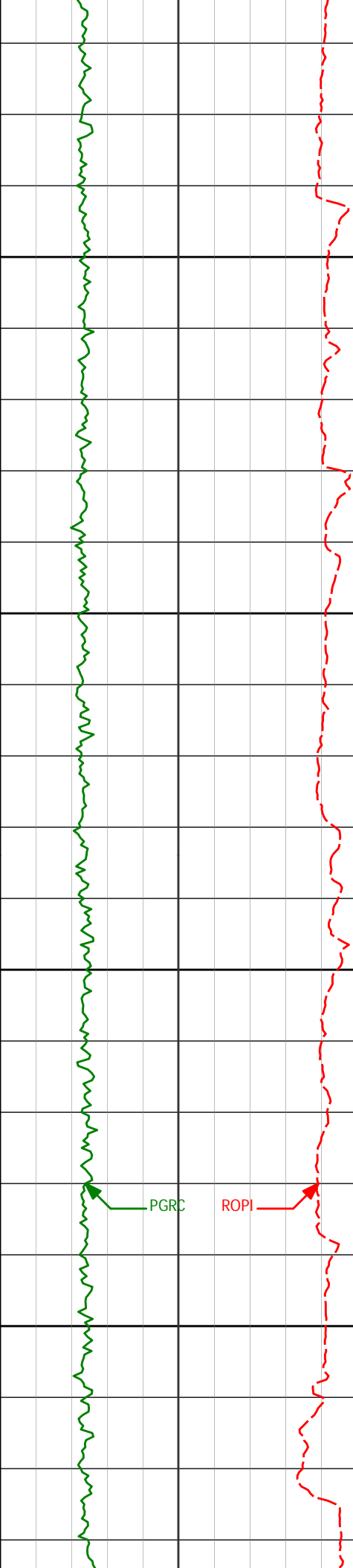
11050

11100

| | | | | |
|--------|--------|--------|----------|----------|
| 11103' | 91.39° | 89.30° | 6699.64' | 4500.32' |
|--------|--------|--------|----------|----------|







6350

6400

6450

6500

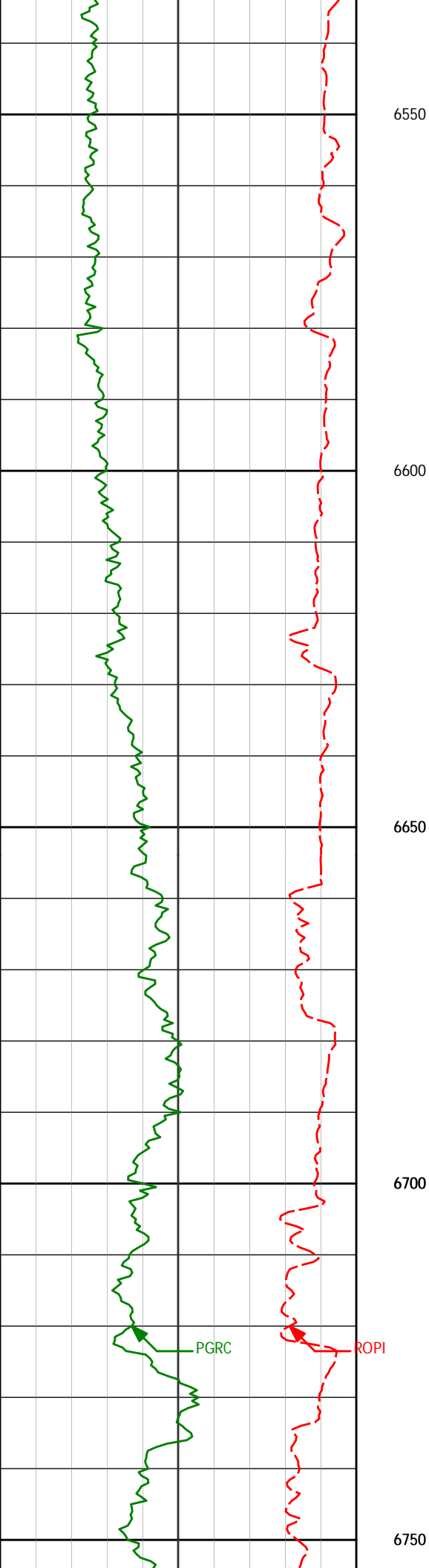
| | | | | |
|-------|--------|--------|----------|---------|
| 6340' | 19.45° | 84.21° | 6273.63' | -45.02' |
|-------|--------|--------|----------|---------|

| | | | | |
|-------|--------|--------|----------|---------|
| 6387' | 24.31° | 85.63° | 6317.24' | -27.54' |
|-------|--------|--------|----------|---------|

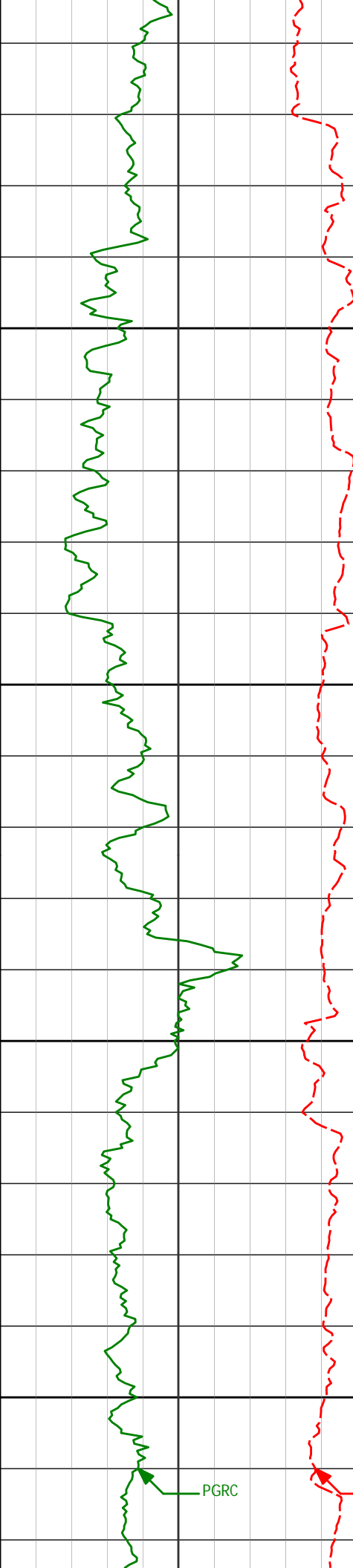
| | | | | |
|-------|--------|--------|----------|--------|
| 6435' | 29.74° | 87.40° | 6359.98' | -5.82' |
|-------|--------|--------|----------|--------|

| | | | | |
|-------|--------|--------|----------|--------|
| 6481' | 34.06° | 90.65° | 6399.03' | 18.27' |
|-------|--------|--------|----------|--------|

| | | | | |
|-------|--------|--------|----------|--------|
| 6529' | 37.63° | 92.16° | 6437.93' | 45.98' |
|-------|--------|--------|----------|--------|



| | | | | |
|-------|--------|--------|----------|---------|
| 6576' | 42.00° | 91.82° | 6474.02' | 75.59' |
| 6624' | 47.70° | 90.14° | 6508.04' | 109.00' |
| 6671' | 52.69° | 88.47° | 6538.12' | 144.78' |
| 6719' | 56.56° | 88.95° | 6565.90' | 183.63' |



6800

6850

6900

6950

6766'

58.11°

89.78°

6591.27'

222.85'

6814'

60.22°

90.52°

6615.87'

263.62'

6861'

62.86°

90.91°

6638.27'

304.43'

6909'

67.14°

90.80°

6658.55'

347.38'

6956'

71.34°

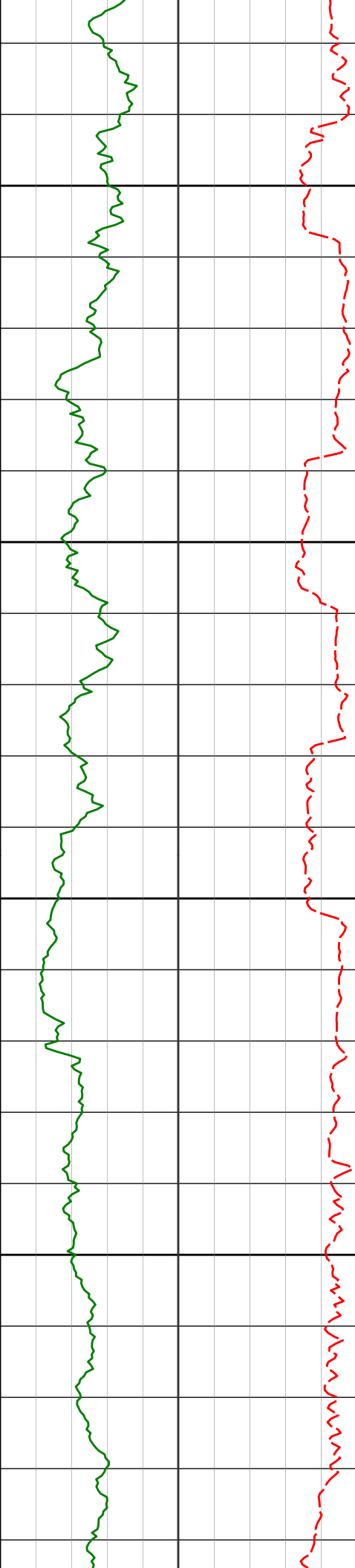
88.51°

6675.21'

390.91'

PGRC

ROPI



7000

7004'

75.45°

87.99°

6688.93'

436.60'

7050

7051'

78.83°

89.99°

6699.39'

482.05'

7085'

81.20°

90.86°

6705.28'

515.16'

7100

7150

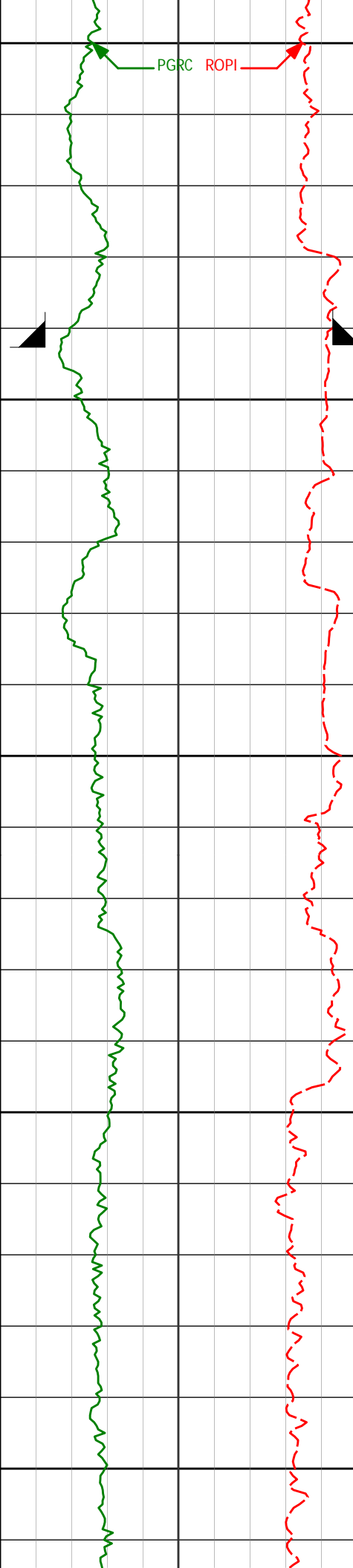
7167'

85.81°

95.83°

6714.56'

594.93'



CASING SHOE @
7242'

7200

7214'

86.39°

95.95°

6717.76'

640.41'

7250

7262'

86.79°

92.64°

6720.61'

687.18'

7300

7309'

87.72°

88.91°

6722.86'

733.54'

7350

7400

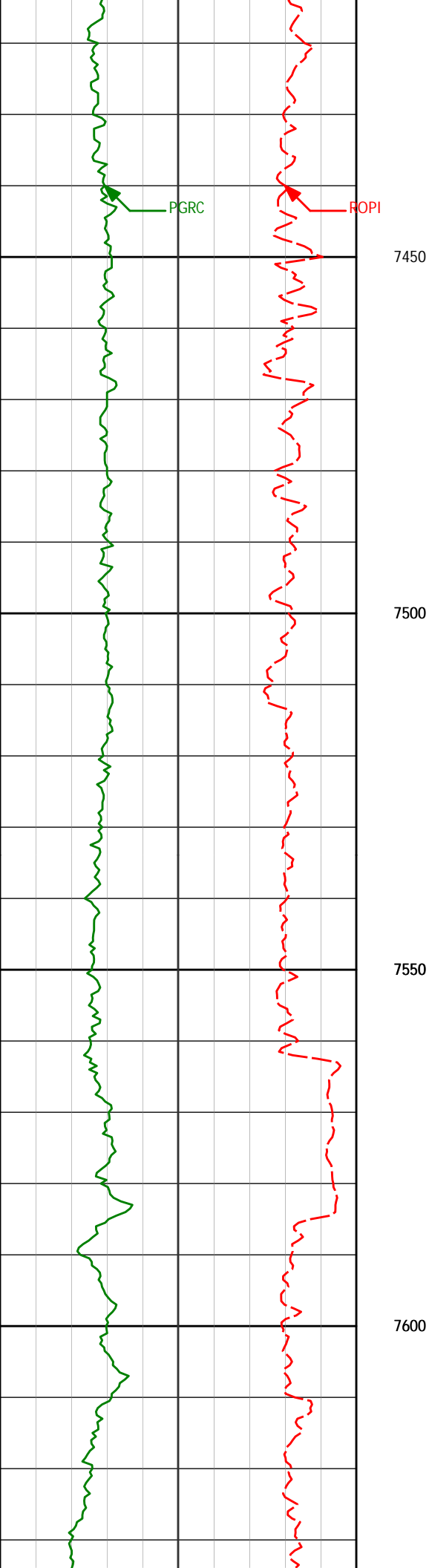
7404'

89.48°

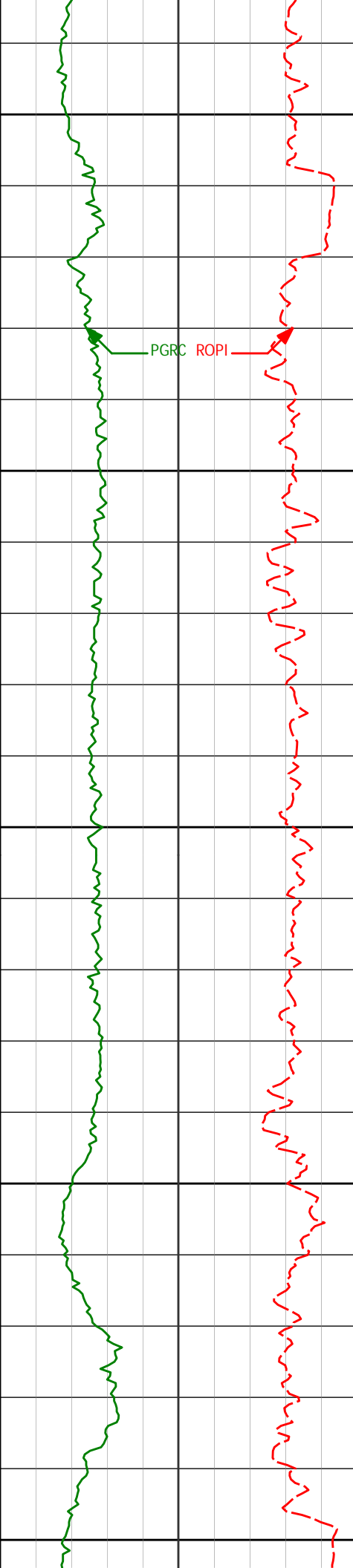
87.11°

6725.18'

827.95'



| | | | | |
|-------|--------|--------|----------|----------|
| 7499' | 91.88° | 87.12° | 6724.05' | 922.52' |
| 7594' | 90.52° | 86.72° | 6722.06' | 1017.12' |



7650

7700

7750

7800

7850

7689'

89.32°

86.64°

6722.18'

1111.77'

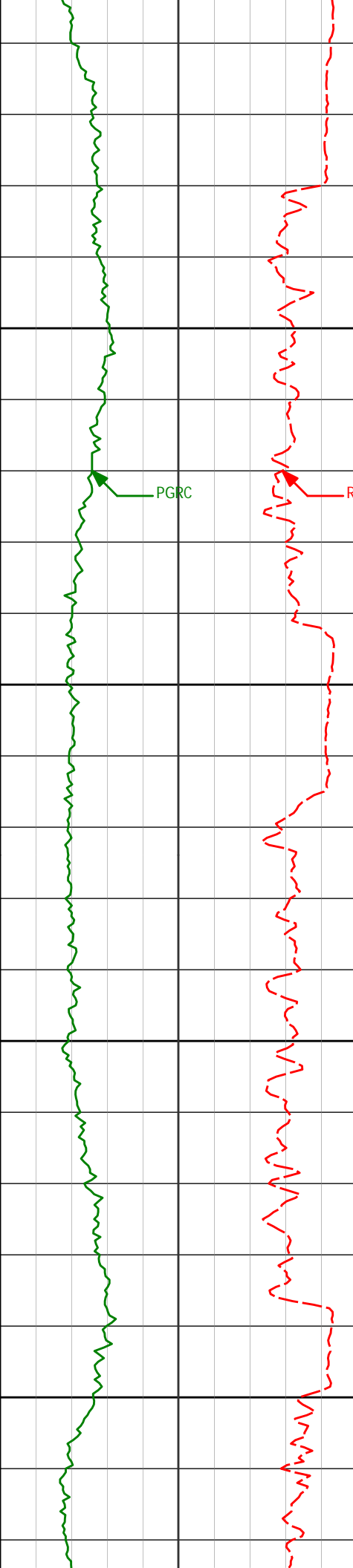
7783'

93.98°

86.77°

6719.48'

1205.36'



7900

7950

8000

8050

7878'

91.91°

86.48°

6714.59'

1299.89'

7973'

89.48°

86.78°

6713.44'

1394.54'

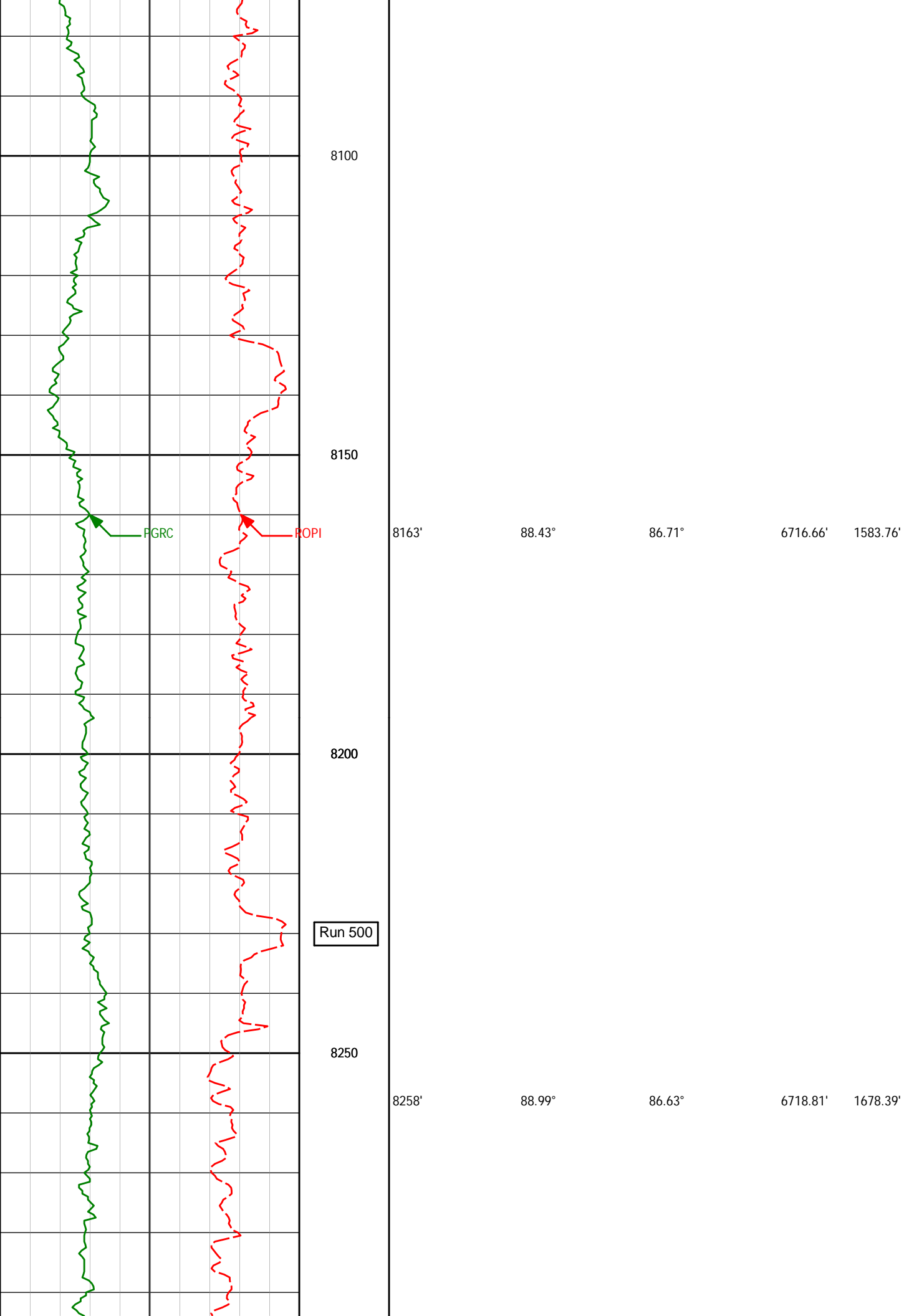
8068'

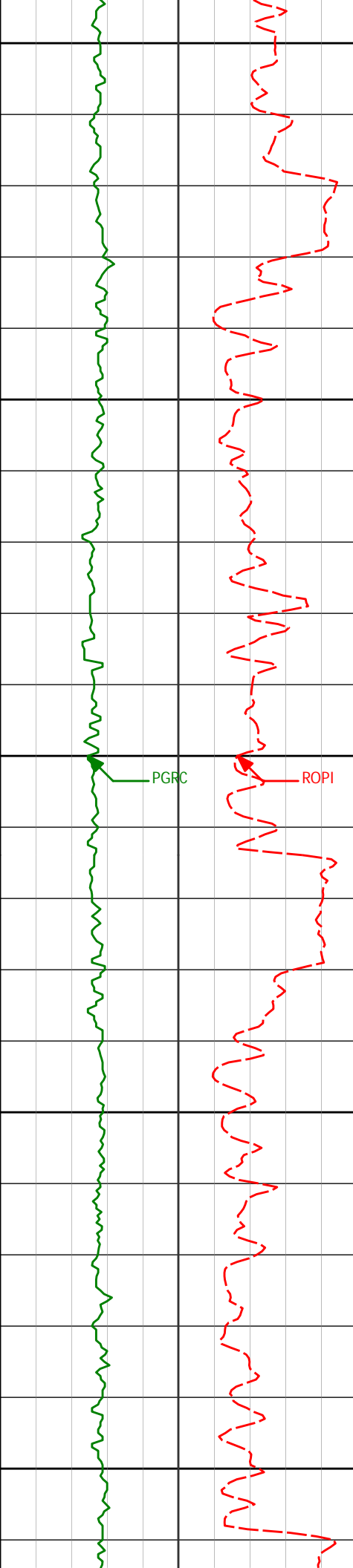
89.11°

87.01°

6714.62'

1489.16'





8300

8350

8400

8450

8500

PGRC

ROPI

8353'

90.40°

86.69°

6719.31'

1773.05'

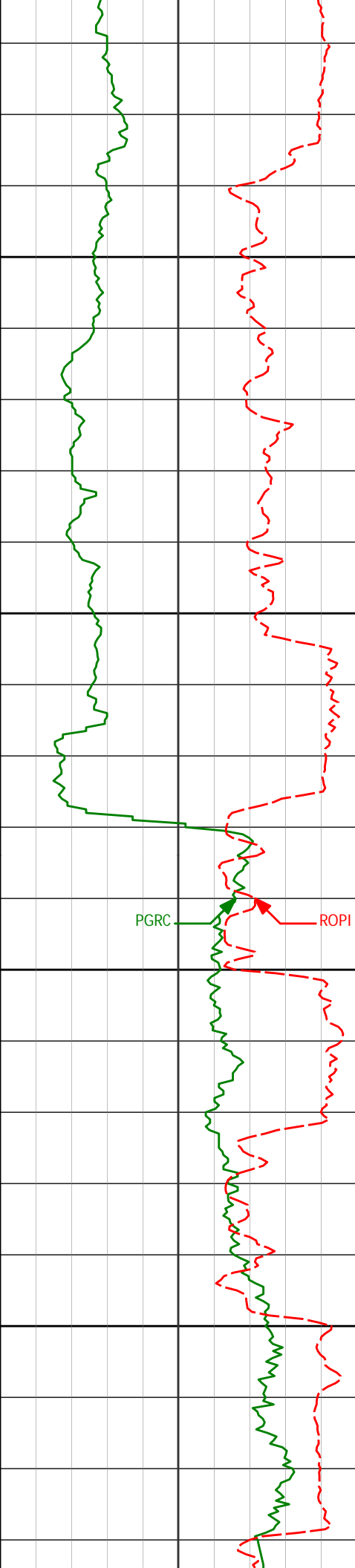
8448'

91.20°

87.05°

6717.99'

1867.66'



8542'

93.05°

88.10°

6714.50'

1961.11'

8550

8600

8637'

93.76°

89.34°

6708.85'

2055.25'

8650

8700

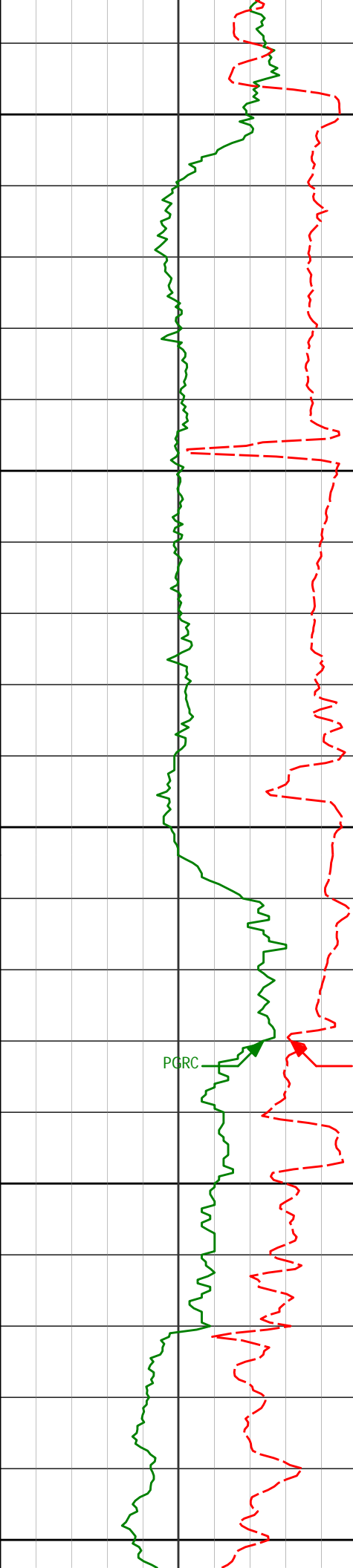
8732'

95.89°

92.81°

6700.86'

2148.66'



Run 600

8750

8800

8850

8900

8950

8827'

91.73°

96.13°

6694.55'

2241.10'

PGRC

ROPI

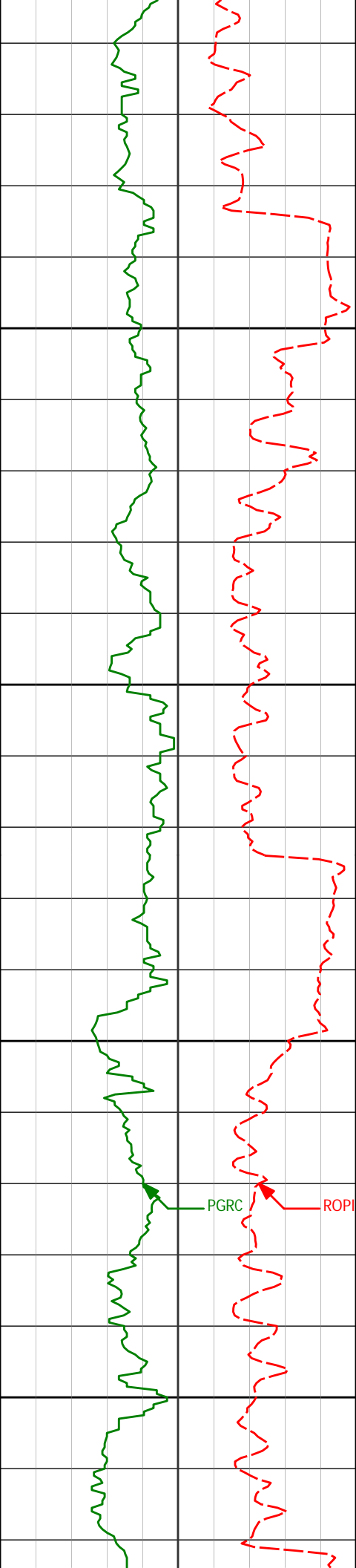
8921'

89.78°

92.82°

6693.30'

2332.78'



9000

9050

9100

9150

9016'

88.65°

90.98°

6694.60'

2426.29'

9111'

87.56°

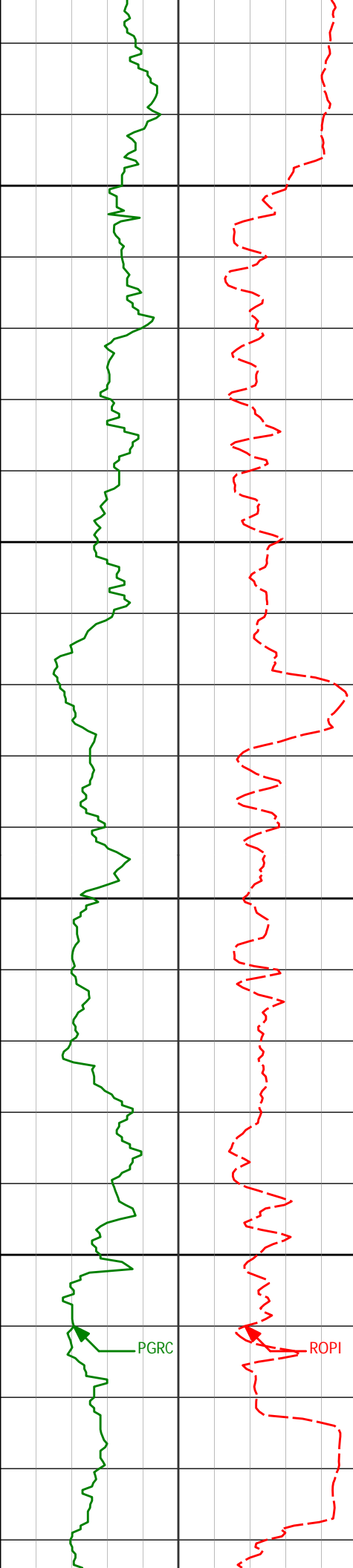
89.51°

6697.75'

2520.20'

PGRC

ROPI



9200

9205'

87.47°

86.26°

6701.83'

2613.57'

9250

9300

9300'

86.14°

86.40°

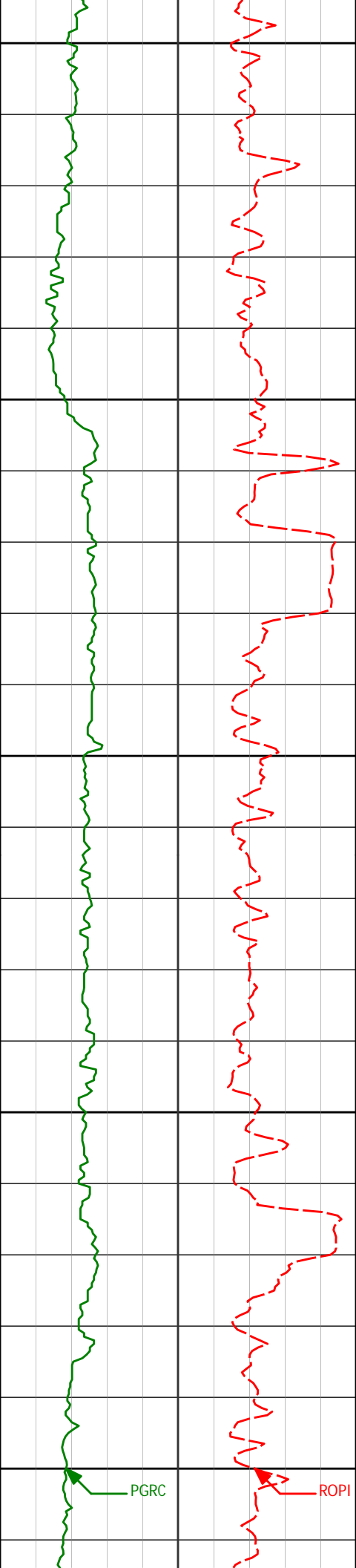
6707.13'

2708.12'

9350

PGRC

ROPI



9400

9450

9500

9550

9600

9395'

9490'

9584'

87.66°

90.80°

91.08°

84.96°

85.74°

84.83°

6712.27'

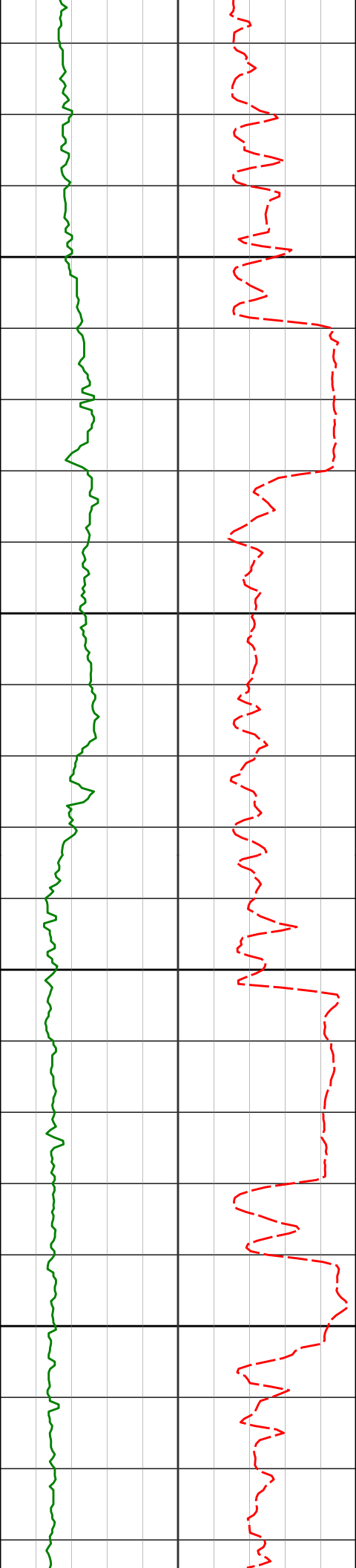
6713.55'

6712.00'

2802.76'

2897.55'

2991.36'



9650

9679'

91.76°

86.46°

6709.65'

3086.11'

9700

9750

9774'

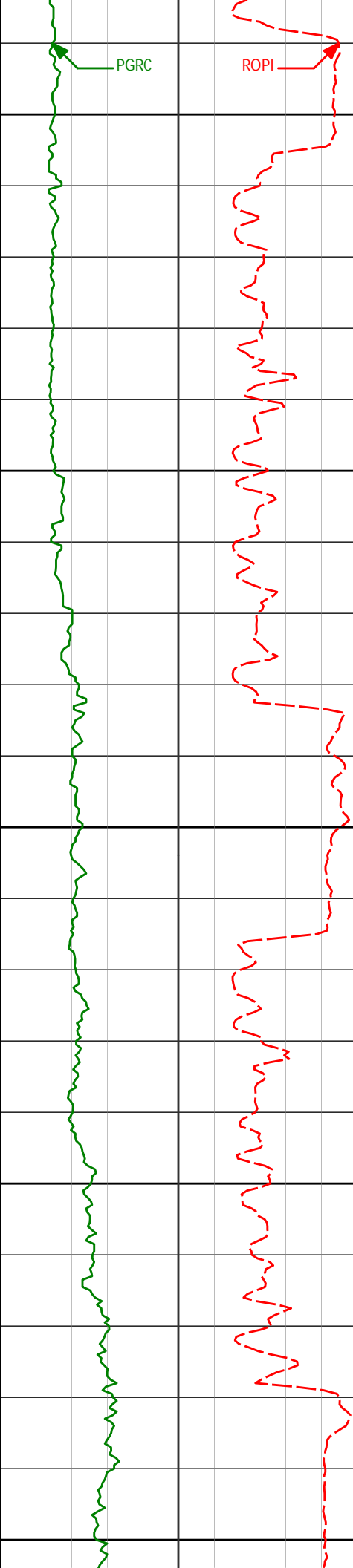
90.71°

87.11°

6707.60'

3180.73'

9800



9850

9869'

90.43°

89.78°

6706.66'

3275.08'

9900

9950

9964'

90.37°

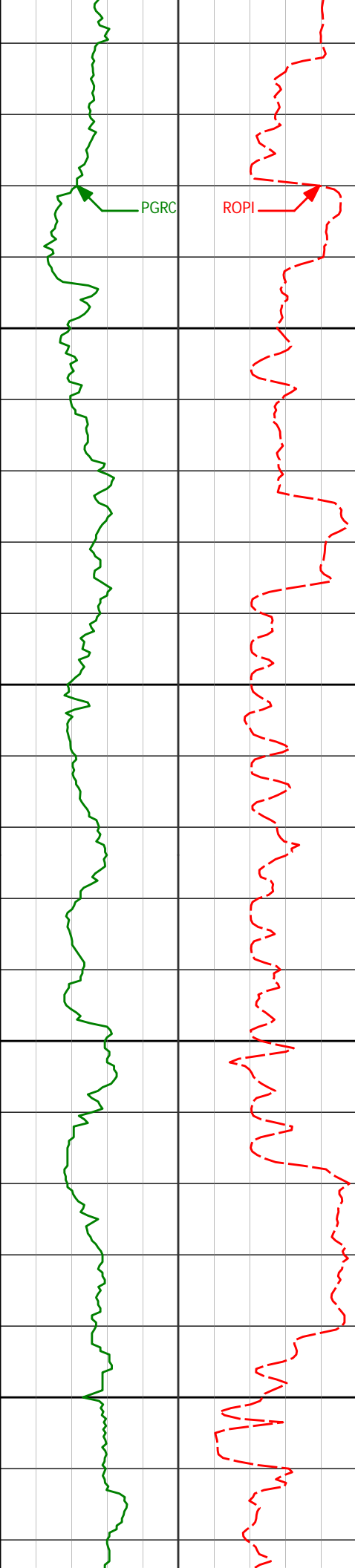
89.71°

6706.00'

3369.16'

10000

10050



10059'

88.46°

86.64°

6706.97'

3463.55'

10100

10150

10154'

84.41°

86.44°

6712.87'

3558.02'

10200

10250

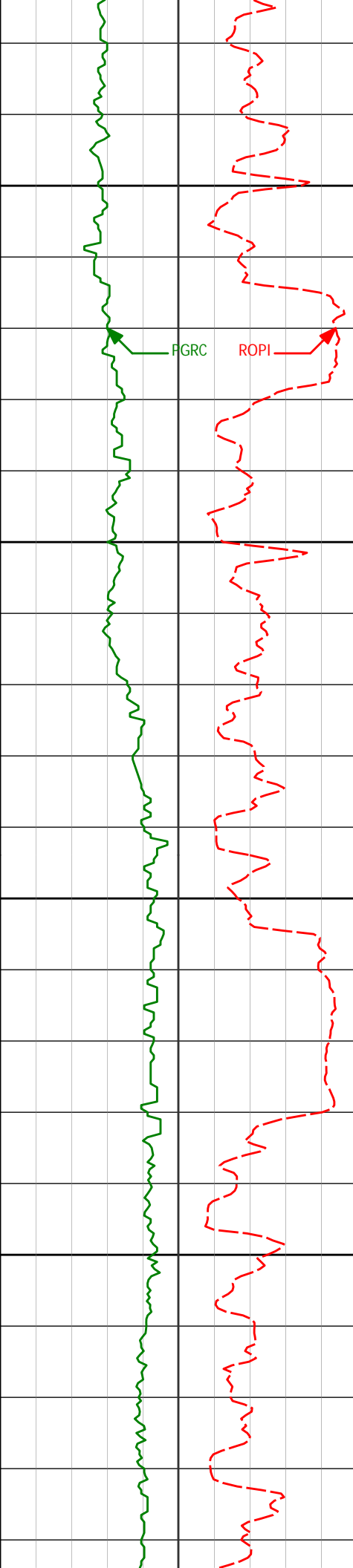
10249'

86.04°

86.03°

6720.78'

3652.40'



10300

10350

10400

10450

10344'

87.75°

85.03°

6725.92'

3747.06'

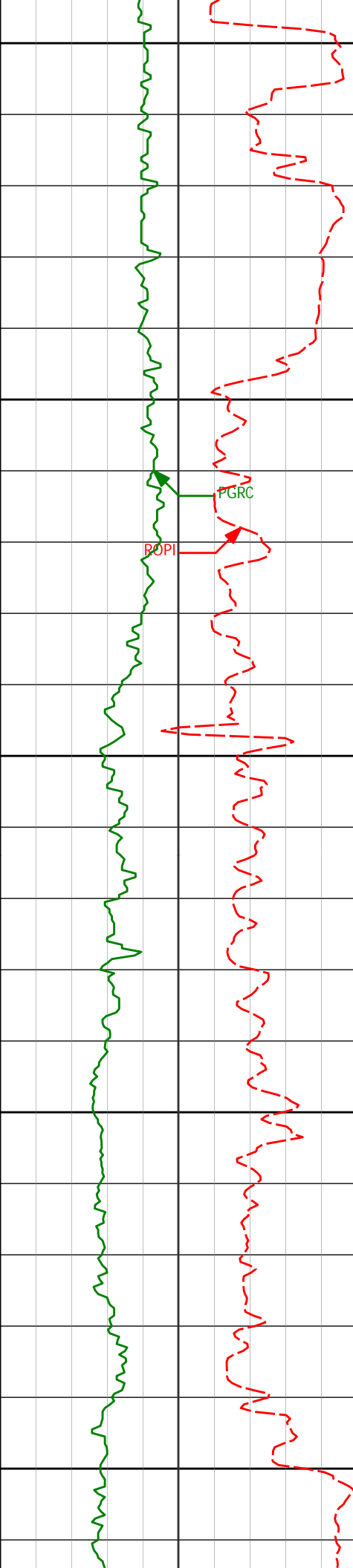
10438'

89.69°

86.20°

6728.02'

3840.82'



10500

10533'

91.85°

89.16°

6726.74'

3935.29'

10550

PGRC

POPI

10600

10628'

94.22°

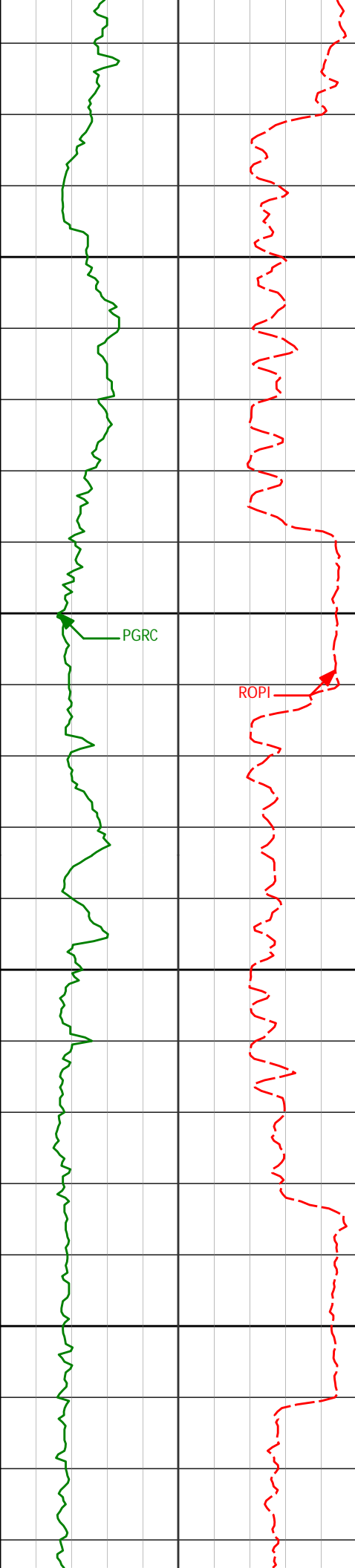
88.84°

6721.71'

4029.40'

10650

10700



10723'

93.79°

88.35°

6715.07'

4123.50'

10750

10800

PGRC

ROPI

10818'

92.34°

88.02°

6709.98'

4217.77'

10850

10900

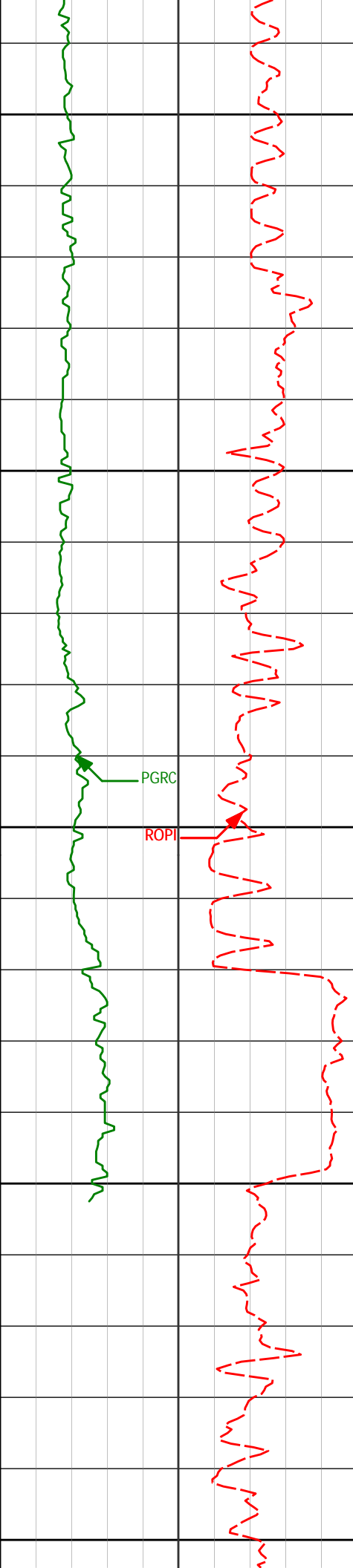
10913'

91.51°

88.96°

6706.79'

4312.07'



10950

11000

11050

11100

11150

11008'

92.87°

89.39°

6703.16'

4406.21'

11103'

91.39°

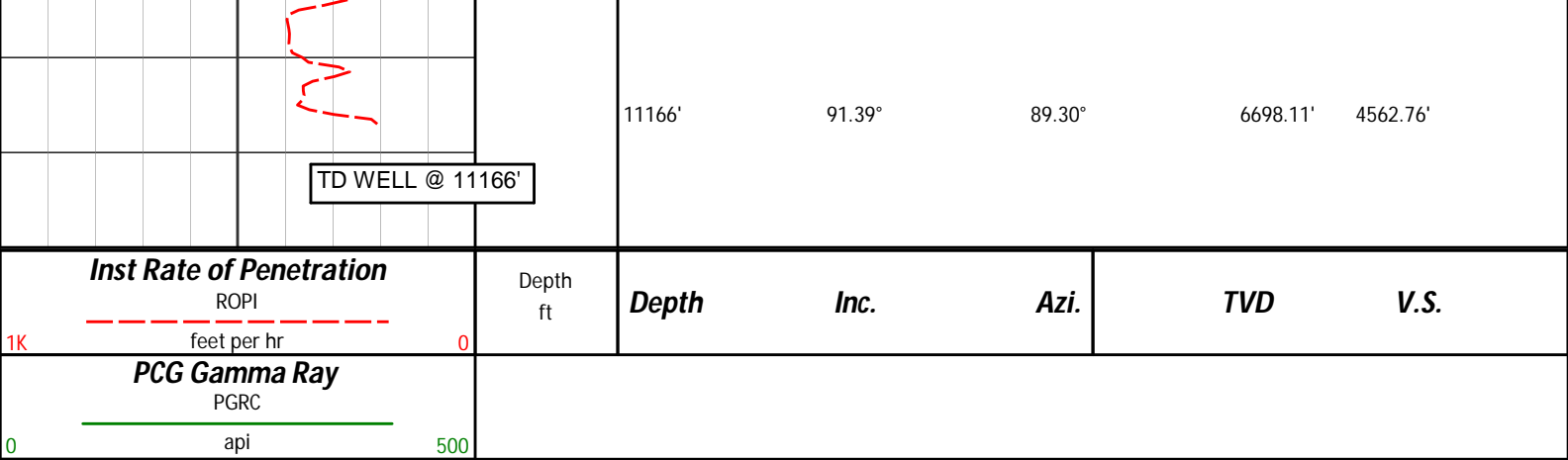
89.30°

6699.64'

4500.32'

PGRC

ROPI



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE08-64-1HN
Weld Colorado
USA
CA-XX-0009919208

| Measured Depth (feet) | Inclination (degrees) | Direction (degrees) | Vertical Depth (feet) | Latitude (feet) | Departure (feet) | Vertical Section (feet) | Dogleg (deg/100ft) |
|-----------------------------|--------------------------|------------------------|-----------------------------|--------------------|---------------------|-------------------------------|-----------------------|
| 743.00 | 0.00 | 0.00 | 743.00 | 0.00 N | 0.00 E | 0.00 | TIE-IN |
| 819.00 | 1.07 | 326.56 | 819.00 | 0.59 N | 0.39 W | -0.30 | 1.41 |
| 1094.00 | 1.17 | 324.96 | 1093.94 | 5.04 N | 3.42 W | -2.67 | 0.04 |
| 1370.00 | 0.33 | 338.03 | 1369.92 | 8.09 N | 5.34 W | -4.13 | 0.31 |
| 1647.00 | 0.70 | 59.61 | 1646.91 | 9.68 N | 4.17 W | -2.75 | 0.26 |
| 1742.00 | 1.14 | 97.25 | 1741.90 | 9.86 N | 2.74 W | -1.30 | 0.76 |
| 1836.00 | 3.02 | 15.84 | 1835.84 | 12.12 N | 1.13 W | 0.61 | 3.26 |
| 1931.00 | 3.50 | 354.41 | 1930.69 | 17.41 N | 0.73 W | 1.76 | 1.37 |
| 2025.00 | 5.03 | 352.92 | 2024.43 | 24.36 N | 1.52 W | 1.98 | 1.64 |
| 2119.00 | 7.03 | 344.08 | 2117.91 | 33.99 N | 3.61 W | 1.28 | 2.34 |
| 2214.00 | 8.78 | 339.42 | 2212.00 | 46.37 N | 7.75 W | -1.05 | 1.96 |
| 2308.00 | 11.26 | 341.35 | 2304.56 | 61.79 N | 13.21 W | -4.25 | 2.65 |
| 2403.00 | 13.58 | 335.17 | 2397.34 | 80.70 N | 20.86 W | -9.12 | 2.82 |
| 2497.00 | 14.47 | 334.28 | 2488.53 | 101.30 N | 30.59 W | -15.81 | 0.98 |
| 2592.00 | 15.27 | 335.69 | 2580.35 | 123.39 N | 40.89 W | -22.85 | 0.92 |
| 2686.00 | 16.46 | 334.36 | 2670.77 | 146.68 N | 51.75 W | -30.27 | 1.33 |
| 2780.00 | 14.76 | 334.00 | 2761.29 | 169.46 N | 62.77 W | -37.92 | 1.81 |
| 2875.00 | 15.96 | 336.52 | 2852.90 | 192.32 N | 73.28 W | -45.06 | 1.44 |
| 2970.00 | 15.97 | 340.59 | 2944.24 | 216.63 N | 82.83 W | -51.04 | 1.18 |
| 3065.00 | 15.04 | 340.36 | 3035.78 | 240.56 N | 91.31 W | -56.02 | 0.98 |
| 3160.00 | 15.91 | 343.85 | 3127.34 | 264.68 N | 99.08 W | -60.26 | 1.34 |
| 3255.00 | 14.47 | 342.96 | 3219.01 | 288.54 N | 106.18 W | -63.88 | 1.54 |
| 3350.00 | 14.47 | 345.82 | 3311.00 | 311.40 N | 112.56 W | -66.94 | 0.75 |
| 3444.00 | 14.04 | 346.63 | 3402.11 | 333.88 N | 118.08 W | -69.19 | 0.51 |
| 3539.00 | 13.68 | 348.50 | 3494.34 | 356.09 N | 122.98 W | -70.87 | 0.60 |
| 3634.00 | 13.16 | 345.64 | 3586.75 | 377.58 N | 127.91 W | -72.68 | 0.89 |
| 3729.00 | 14.79 | 345.01 | 3678.93 | 399.77 N | 133.72 W | -75.27 | 1.72 |
| 3824.00 | 15.57 | 344.42 | 3770.62 | 423.76 N | 140.28 W | -78.33 | 0.83 |
| 3919.00 | 13.36 | 343.19 | 3862.60 | 446.54 N | 146.88 W | -81.61 | 2.34 |
| 4014.00 | 10.60 | 344.07 | 3955.53 | 465.45 N | 152.46 W | -84.43 | 2.91 |
| 4109.00 | 7.50 | 339.41 | 4049.33 | 479.66 N | 157.03 W | -86.93 | 3.35 |
| 4204.00 | 6.80 | 338.68 | 4143.59 | 490.70 N | 161.26 W | -89.53 | 0.74 |
| 4299.00 | 5.06 | 329.92 | 4238.08 | 499.57 N | 165.41 W | -92.37 | 2.06 |
| 4394.00 | 2.42 | 327.10 | 4332.87 | 504.88 N | 168.60 W | -94.77 | 2.79 |
| 4488.00 | 0.75 | 13.62 | 4426.84 | 507.15 N | 169.53 W | -95.37 | 2.11 |
| 4773.00 | 0.57 | 326.90 | 4711.82 | 510.13 N | 169.87 W | -95.28 | 0.19 |
| 5058.00 | 0.88 | 17.74 | 4996.80 | 513.41 N | 169.97 W | -94.91 | 0.24 |
| 5342.00 | 0.35 | 52.74 | 5280.78 | 516.02 N | 168.61 W | -93.19 | 0.22 |
| 5627.00 | 0.73 | 353.72 | 5565.77 | 518.35 N | 168.12 W | -92.37 | 0.22 |
| 5911.00 | 0.80 | 337.66 | 5849.75 | 522.00 N | 169.07 W | -92.79 | 0.08 |
| 5945.00 | 0.88 | 338.44 | 5889.74 | 522.42 N | 169.87 W | -92.88 | 0.88 |

| | | | | | | | |
|----------|-------|--------|---------|----------|-----------|---------|-------|
| 5945.00 | 0.80 | 332.44 | 5883.74 | 522.43 N | 169.27 W | -92.93 | 0.22 |
| 6007.00 | 0.50 | 331.17 | 5945.74 | 523.05 N | 169.60 W | -93.17 | 0.49 |
| 6102.00 | 3.64 | 86.38 | 6040.68 | 523.61 N | 166.79 W | -90.31 | 4.09 |
| 6150.00 | 7.21 | 90.65 | 6088.45 | 523.67 N | 162.25 W | -85.81 | 7.47 |
| 6197.00 | 9.78 | 90.89 | 6134.94 | 523.58 N | 155.31 W | -78.95 | 5.47 |
| 6245.00 | 11.87 | 90.17 | 6182.08 | 523.50 N | 146.30 W | -70.04 | 4.36 |
| 6292.00 | 14.96 | 84.76 | 6227.79 | 524.04 N | 135.42 W | -59.20 | 7.10 |
| 6340.00 | 19.45 | 84.21 | 6273.63 | 525.41 N | 121.30 W | -45.02 | 9.35 |
| 6387.00 | 24.31 | 85.63 | 6317.24 | 526.94 N | 103.85 W | -27.54 | 10.40 |
| 6435.00 | 29.74 | 87.40 | 6359.98 | 528.23 N | 82.09 W | -5.82 | 11.43 |
| 6481.00 | 34.06 | 90.65 | 6399.03 | 528.60 N | 57.80 W | 18.27 | 10.11 |
| 6529.00 | 37.63 | 92.16 | 6437.93 | 527.90 N | 29.71 W | 45.98 | 7.66 |
| 6576.00 | 42.00 | 91.82 | 6474.02 | 526.86 N | 0.36 E | 75.59 | 9.32 |
| 6624.00 | 47.70 | 90.14 | 6508.04 | 526.30 N | 34.19 E | 109.00 | 12.11 |
| 6671.00 | 52.69 | 88.47 | 6538.12 | 526.76 N | 70.28 E | 144.78 | 10.96 |
| 6719.00 | 56.56 | 88.95 | 6565.90 | 527.64 N | 109.40 E | 183.63 | 8.10 |
| 6766.00 | 58.11 | 89.78 | 6591.27 | 528.07 N | 148.96 E | 222.85 | 3.62 |
| 6814.00 | 60.22 | 90.52 | 6615.87 | 527.96 N | 190.17 E | 263.62 | 4.59 |
| 6861.00 | 62.86 | 90.91 | 6638.27 | 527.44 N | 231.49 E | 304.43 | 5.66 |
| 6909.00 | 67.14 | 90.80 | 6658.55 | 526.80 N | 274.97 E | 347.38 | 8.93 |
| 6956.00 | 71.34 | 88.51 | 6675.21 | 527.07 N | 318.91 E | 390.91 | 10.03 |
| 7004.00 | 75.45 | 87.99 | 6688.93 | 528.48 N | 364.87 E | 436.60 | 8.61 |
| 7051.00 | 78.83 | 89.99 | 6699.39 | 529.28 N | 410.68 E | 482.05 | 8.32 |
| 7085.00 | 81.20 | 90.86 | 6705.28 | 529.03 N | 444.16 E | 515.16 | 7.41 |
| 7167.00 | 85.81 | 95.83 | 6714.56 | 524.26 N | 525.45 E | 594.93 | 8.23 |
| 7214.00 | 86.39 | 95.95 | 6717.76 | 519.45 N | 572.09 E | 640.41 | 1.28 |
| 7262.00 | 86.79 | 92.64 | 6720.61 | 515.87 N | 619.86 E | 687.18 | 6.93 |
| 7309.00 | 87.72 | 88.91 | 6722.86 | 515.23 N | 666.80 E | 733.54 | 8.16 |
| 7404.00 | 89.48 | 87.11 | 6725.18 | 518.53 N | 761.70 E | 827.95 | 2.65 |
| 7499.00 | 91.88 | 87.12 | 6724.05 | 523.32 N | 856.57 E | 922.52 | 2.53 |
| 7594.00 | 90.52 | 86.72 | 6722.06 | 528.43 N | 951.41 E | 1017.12 | 1.49 |
| 7689.00 | 89.32 | 86.64 | 6722.18 | 533.93 N | 1046.25 E | 1111.77 | 1.27 |
| 7783.00 | 93.98 | 86.77 | 6719.48 | 539.32 N | 1140.03 E | 1205.36 | 4.96 |
| 7878.00 | 91.91 | 86.48 | 6714.59 | 544.92 N | 1234.73 E | 1299.89 | 2.20 |
| 7973.00 | 89.48 | 86.78 | 6713.44 | 550.51 N | 1329.55 E | 1394.54 | 2.58 |
| 8068.00 | 89.11 | 87.01 | 6714.62 | 555.65 N | 1424.41 E | 1489.16 | 0.46 |
| 8163.00 | 88.43 | 86.71 | 6716.66 | 560.85 N | 1519.24 E | 1583.76 | 0.78 |
| 8258.00 | 88.99 | 86.63 | 6718.81 | 566.36 N | 1614.06 E | 1678.39 | 0.59 |
| 8353.00 | 90.40 | 86.69 | 6719.31 | 571.90 N | 1708.89 E | 1773.05 | 1.49 |
| 8448.00 | 91.20 | 87.05 | 6717.99 | 577.09 N | 1803.74 E | 1867.66 | 0.92 |
| 8542.00 | 93.05 | 88.10 | 6714.50 | 581.07 N | 1897.58 E | 1961.11 | 2.27 |
| 8637.00 | 93.76 | 89.34 | 6708.85 | 583.19 N | 1992.39 E | 2055.25 | 1.49 |
| 8732.00 | 95.89 | 92.81 | 6700.86 | 581.42 N | 2087.02 E | 2148.66 | 4.28 |
| 8827.00 | 91.73 | 96.13 | 6694.55 | 574.02 N | 2181.48 E | 2241.10 | 5.60 |
| 8921.00 | 89.78 | 92.82 | 6693.30 | 566.69 N | 2275.17 E | 2332.78 | 4.08 |
| 9016.00 | 88.65 | 90.98 | 6694.60 | 563.53 N | 2370.10 E | 2426.29 | 2.28 |
| 9111.00 | 87.56 | 89.51 | 6697.75 | 563.12 N | 2465.05 E | 2520.20 | 1.92 |
| 9205.00 | 87.47 | 86.26 | 6701.83 | 566.58 N | 2558.88 E | 2613.57 | 3.46 |
| 9300.00 | 86.14 | 86.40 | 6707.13 | 572.65 N | 2653.54 E | 2708.12 | 1.41 |
| 9395.00 | 87.66 | 84.96 | 6712.27 | 579.79 N | 2748.12 E | 2802.76 | 2.20 |
| 9490.00 | 90.80 | 85.74 | 6713.55 | 587.49 N | 2842.79 E | 2897.55 | 3.41 |
| 9584.00 | 91.08 | 84.83 | 6712.00 | 595.22 N | 2936.46 E | 2991.36 | 1.01 |
| 9679.00 | 91.76 | 86.46 | 6709.65 | 602.43 N | 3031.15 E | 3086.11 | 1.86 |
| 9774.00 | 90.71 | 87.11 | 6707.60 | 607.75 N | 3125.98 E | 3180.73 | 1.30 |
| 9869.00 | 90.43 | 89.78 | 6706.66 | 610.33 N | 3220.93 E | 3275.08 | 2.82 |
| 9964.00 | 90.37 | 89.71 | 6706.00 | 610.76 N | 3315.93 E | 3369.16 | 0.10 |
| 10059.00 | 88.46 | 86.64 | 6706.97 | 613.79 N | 3410.86 E | 3463.55 | 3.80 |
| 10154.00 | 84.41 | 86.44 | 6712.87 | 619.52 N | 3505.48 E | 3558.02 | 4.27 |
| 10249.00 | 86.04 | 86.03 | 6720.78 | 625.73 N | 3599.94 E | 3652.40 | 1.77 |
| 10344.00 | 87.75 | 85.03 | 6725.92 | 633.12 N | 3694.51 E | 3747.06 | 2.08 |
| 10438.00 | 89.69 | 86.20 | 6728.02 | 640.29 N | 3788.21 E | 3840.82 | 2.41 |
| 10533.00 | 91.85 | 89.16 | 6726.74 | 644.14 N | 3883.11 E | 3935.29 | 3.86 |
| 10628.00 | 94.22 | 88.84 | 6721.71 | 645.79 N | 3977.95 E | 4029.40 | 2.52 |
| 10723.00 | 93.79 | 88.35 | 6715.07 | 648.12 N | 4072.69 E | 4123.50 | 0.69 |
| 10818.00 | 92.34 | 88.02 | 6709.98 | 651.12 N | 4167.50 E | 4217.77 | 1.56 |
| 10913.00 | 91.51 | 88.96 | 6706.79 | 653.62 N | 4262.41 E | 4312.07 | 1.32 |
| 11008.00 | 92.87 | 89.39 | 6703.16 | 654.99 N | 4357.33 E | 4406.21 | 1.50 |
| 11103.00 | 91.39 | 89.30 | 6699.64 | 656.07 N | 4452.26 E | 4500.32 | 1.56 |
| 11166.00 | 91.39 | 89.30 | 6698.11 | 656.84 N | 4515.24 E | 4562.76 | 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 CLOSURE OF 81.72 DEGREES (GRID)
A TOTAL CORRECTION OF 7.78 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11166.00 FEET
IS 4562.76 FEET ALONG 81.72 DEGREES (GRID)

Final survey projected to TD

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