

PCG Pressure Case Gamma
PCD Pressure Case Directional

Country : USA			
Field : Wattenburg			
Location : Lat: 40° 28' 10.49" North Long: 104° 21' 19.15" West			
Well : Wells Ranch AE20-63HN			
Company : Noble Energy			
Rig : H&P 343			
LOCATION		Other Services	
Latitude : 40° 28' 10.49" North Longitude : 104° 21' 19.15" West		Directional Drilling	
UTM Easting = 3,318,469.331 ft UTM Northing = 1,415,964.117 ft			
Permanent Datum : Ground Level		Elev. KB NA	
Log Measured From : Drill Floor		DF 4809.00 ft	
Drilling Measured From : Drill Floor		GL 4785.00 ft	
		WD NA	
Depth Logged : 970.00 ft To 10,717.00 ft		Unit No. :	
Date Logged : 26-Sep-13 To 02-Oct-13		Job No. : CA-XX-0900775406	
Total Depth MD : 10,717.00 ft TVD: 6,532.35 ft		Plot Type : Final	
Spud Date : 26-Sep-13		Plot Date : 03-Oct-13	
Run No.	Borehole Record (MD)		Borehole Record (MD)
	Size From To	Run No. Size From To	
2	8.750 in 970.00 ft 5,846.00 ft		
3	8.750 in 5,846.00 ft 6,914.00 ft		
4	6.125 in 6,914.00 ft 10,717.00 ft		
		Casing Record (MD)	
	Size Weight From To		
	9.625 in 36.00 lbpf SURFACE 960.00 ft		
	7.000 in 26.00 lbpf SURFACE 6,904.00 ft		

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	28-Sep-13	30-Sep-13	02-Oct-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.75		
Log Start Depth (MD, ft)	970.00	5,846.00	6,914.00		
Log End Depth (MD, ft)	5,846.00	6,914.00	10,717.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	28-Sep-13 02:00	28-Sep-13 22:45	01-Oct-13 03:45		
Drill/Wipe End Date and Time	28-Sep-13 15:00	29-Sep-13 19:45	02-Oct-13 08:30		
Min Inc (deg) @ Depth (MD, ft)	.04 @ 1,273.00	4.17 @ 5,901.00	85.28 @ 7,044.00		
Max Inc (deg) @ Depth (MD, ft)	10.34 @ 2,979.00	82.42 @ 6,857.00	93.39 @ 9,216.00		
Bit TFA(in2) / Bit Type	.86 / PDC	.86 / PDC	.86 / PDC		
Flow Rate (gpm)	596.58	551.88	270.00		
Max AV (fpm) / CV (fpm) @ MWD	465.0 / NA	413.0 / NA	401.4 / NA		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.00 / 29.00	10.30 / 37.00	9.40 / 32.00		
Filtrate CL (ppm)	2,600.00	2,500.00	2,300.00		
pH / Fluid Loss (mptm)	10.00 / NA	9.70 / NA	8.90 / NA		
PV (cP) / YP (Ihf2)	4 / 4.00	12 / 11.00	6 / 4.00		
% Solids / % Sand	4.7 / .25	9.7 / .12	5.4 / 0.24		
% Oil / Oil:Water Ratio	0 / 0:95	0 / 0:95	0 / 0:95		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
MWD Run Number	100	200	300		

Max Tool Temp (degF) / Source	172.78 / PCM	172.78 / PCM	226.10 / PCM		
Rm @ Max Tool Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Lead MWD Engineer	Brett Vandergon	Brett Vandergon	Brett Vandergon		
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404301	11404301	12187588		
Insert Serial Number	11227514	11227514	11400840		
Date and Time Initialized	27-Sep-13 15:58	01-Jan-70 00:00	30-Sep-13 05:50		
Date and Time Read	30-Sep-13 02:44	30-Sep-13 02:50	02-Oct-13 18:33		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	57.00	64.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404301	11404301	12187588		
Sonde Serial Number	12177530	12177530	11902117		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	168.92	194.46	284.21		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.89	50.00	57.46		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404301	11404301	12187588		
Insert/Sonde Serial Number	11579776	11579776	11579845		

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 annual 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 7.4.2

WARRANTY

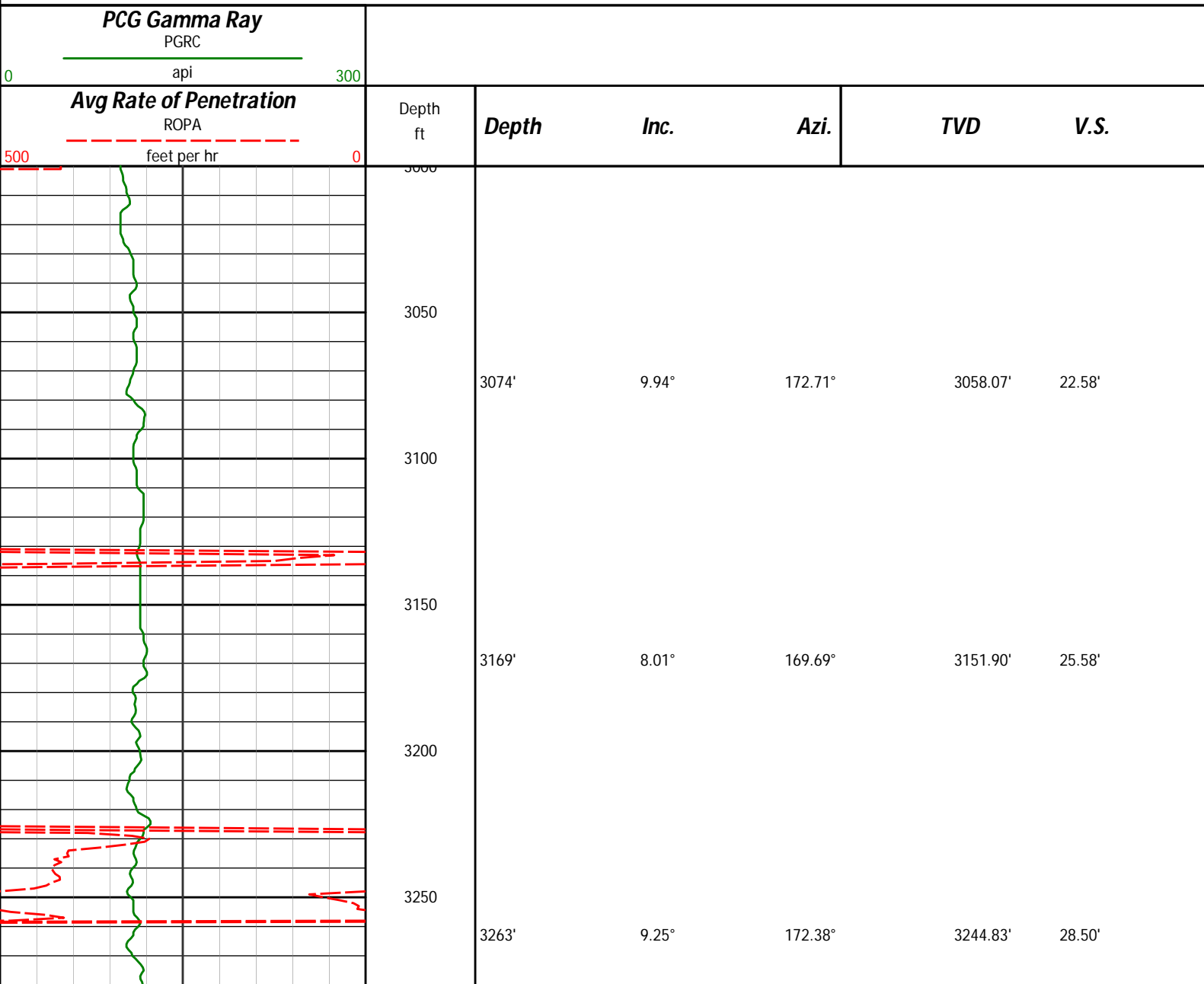
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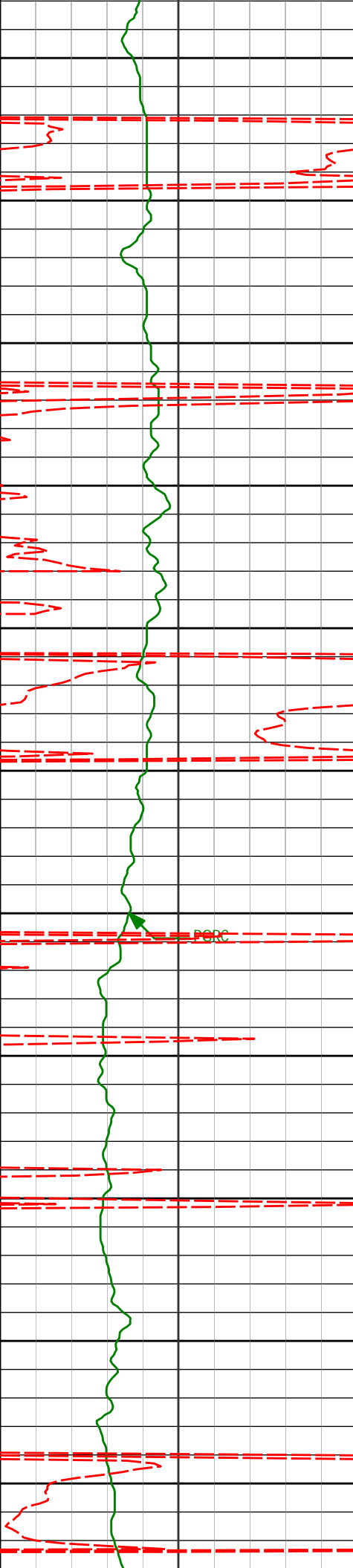
HALLIBURTON

Sperry Drilling Services

MD Main Log 1:600

Noble Energy
Wells Ranch AE20-63HN
H&P 343
T6N-R62W





3300

3350

3400

3450

3500

3550

3600

3650

3700

3750

3800

3358'

8.17°

176.00°

3338.74'

30.74'

3453'

6.02°

169.28°

3433.01'

32.75'

3548'

7.69°

168.71°

3527.32'

35.51'

3643'

8.69°

166.66°

3621.35'

39.11'

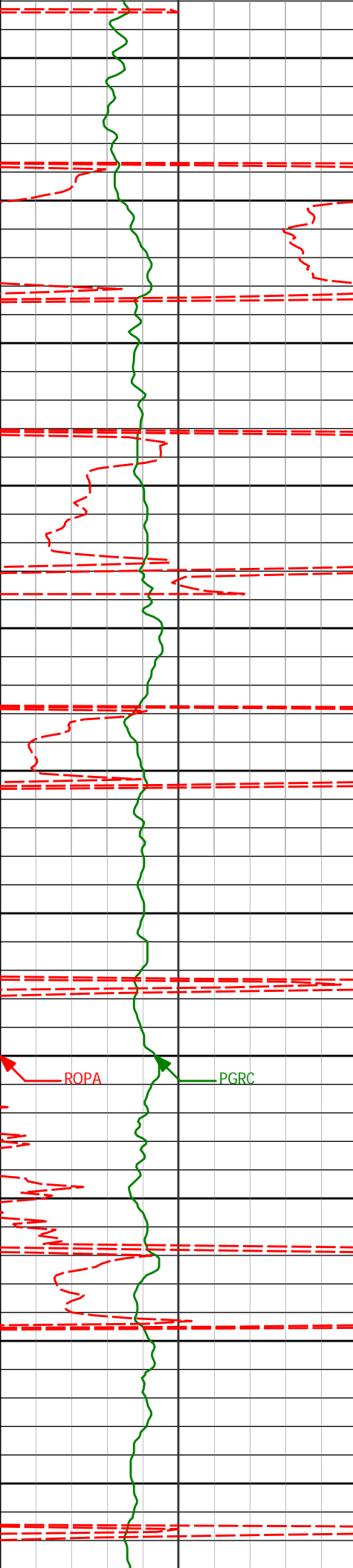
3738'

9.61°

167.45°

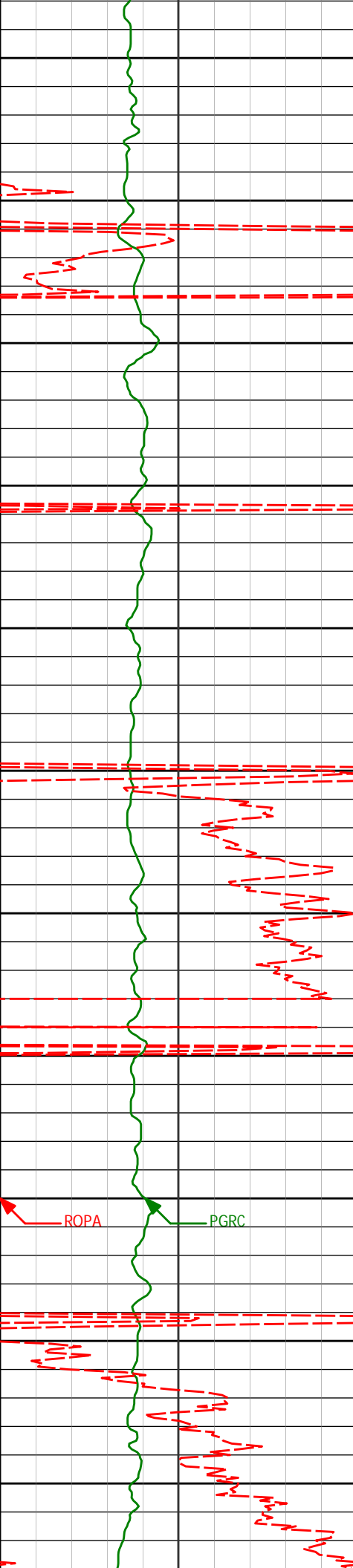
3715.14'

43.27'

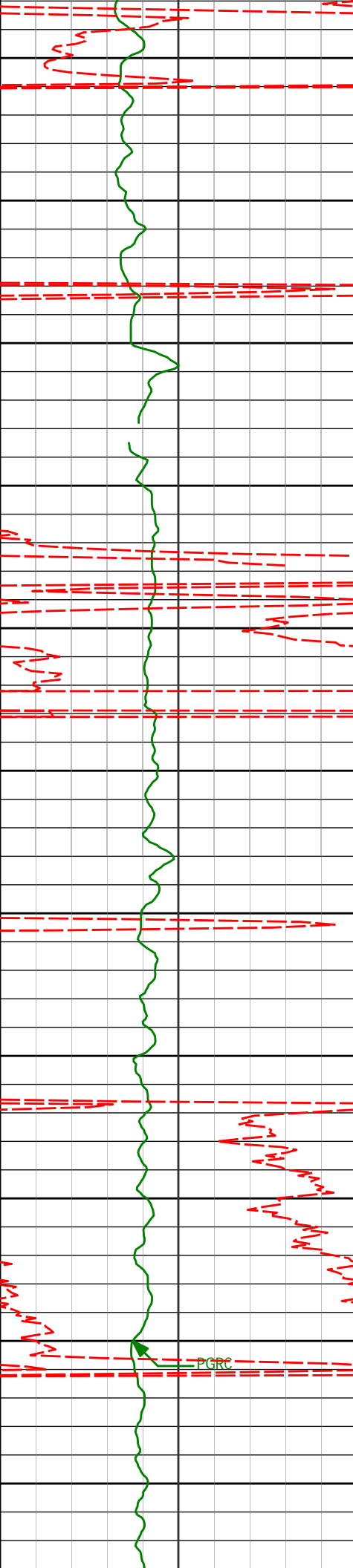


3850
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350

3833'	8.45°	167.02°	3808.97'	47.33'
3928'	4.71°	180.01°	3903.33'	49.47'
4023'	2.33°	207.75°	3998.15'	48.87'
4117'	1.99°	251.25°	4092.09'	46.55'
4212'	2.22°	262.99°	4187.02'	43.21'
4307'	2.29°	297.68°	4281.95'	39.67'



4400	4402'	1.82°	294.07°	4376.89'	36.54'
4450					
4500	4497'	0.96°	18.93°	4471.87'	35.35'
4550					
4600	4592'	1.36°	38.02°	4566.85'	36.21'
4650					
4700	4687'	1.17°	48.61°	4661.83'	37.55'
4750					
4800	4782'	1.04°	39.58°	4756.81'	38.76'
4850					
4900	4877'	1.18°	49.46°	4851.79'	39.98'



4950

4972'

0.35°

291.40°

4946.79'

40.41'

5000

5050

5067'

0.20°

207.20°

5041.79'

40.07'

5100

5150

5162'

0.34°

305.81°

5136.79'

39.76'

5200

5250

5257'

0.47°

5.76°

5231.78'

39.54'

5300

5350

5352'

0.39°

159.32°

5326.78'

39.69'

5400

PGRC

5450

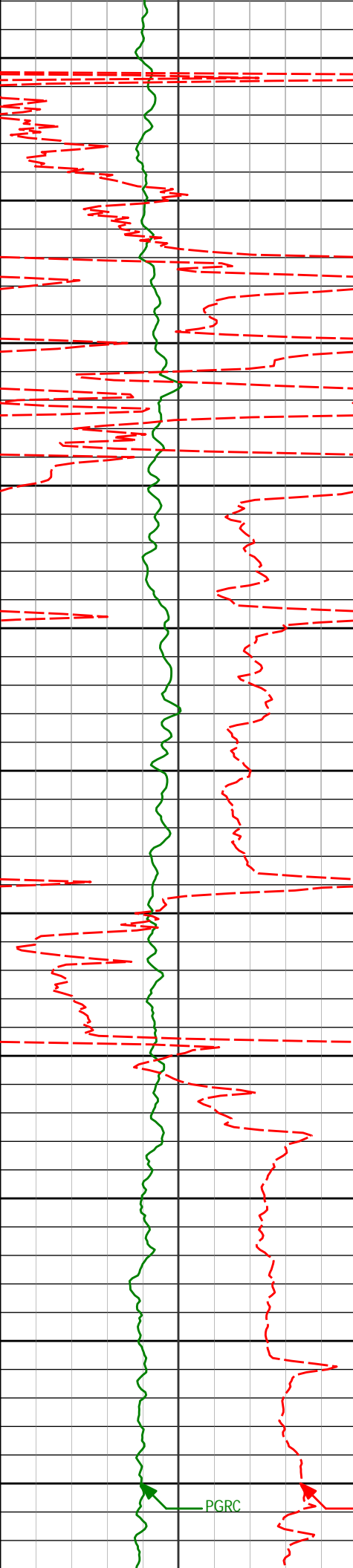
5446'

0.18°

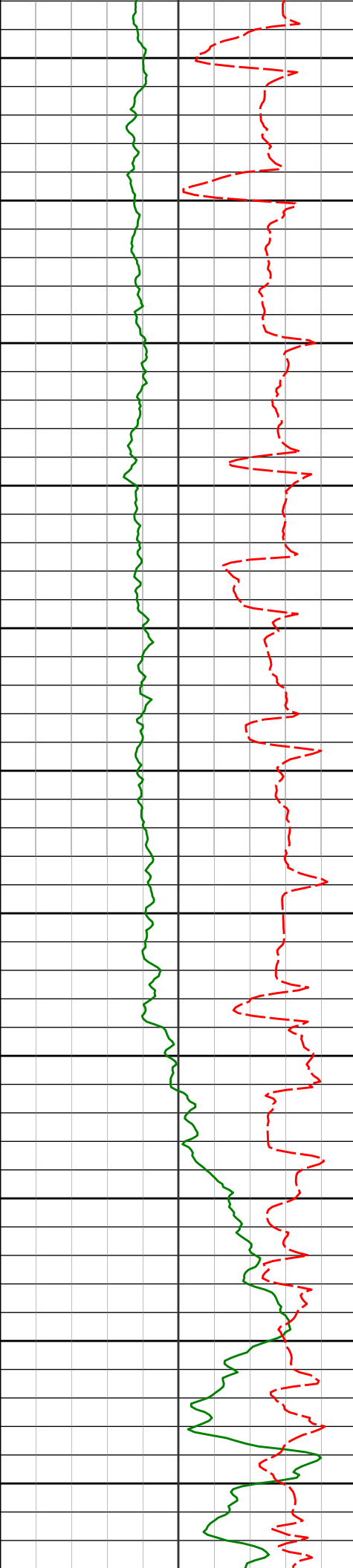
169.84°

5420.78'

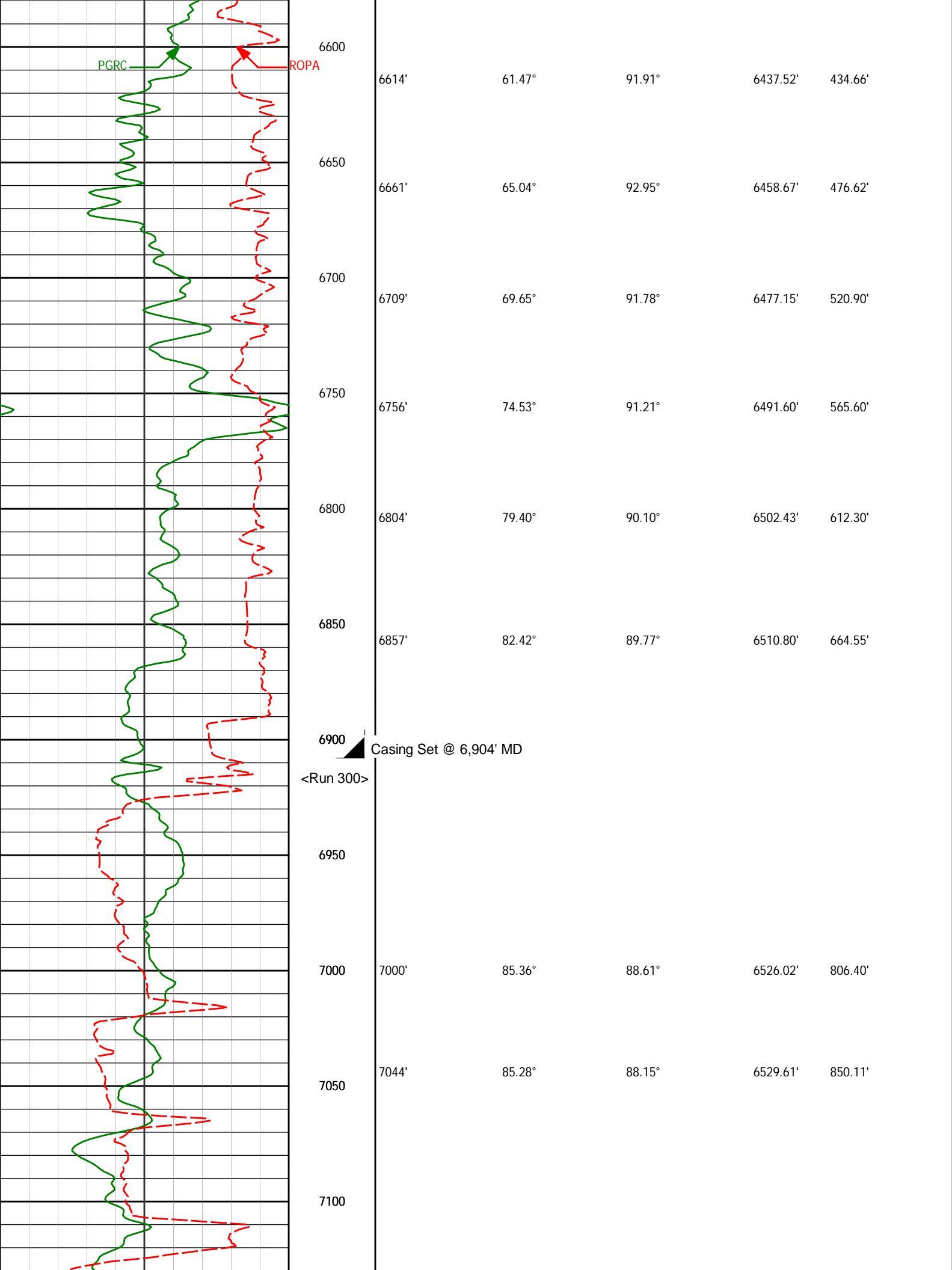
39.85'



5500					
5550	5541'	0.53°	105.88°	5515.78'	40.32'
5600					
5650	5636'	0.51°	124.74°	5610.78'	41.11'
5700					
5750	5731'	0.79°	148.22°	5705.77'	41.84'
5800	5789'	0.81°	125.54°	5763.76'	42.41'
<Run 200> 5850					
5900	5901'	4.17°	83.32°	5875.65'	47.10'
5950	5949'	9.99°	79.19°	5923.26'	52.86'
6000	5996'	14.90°	78.59°	5969.14'	62.68'

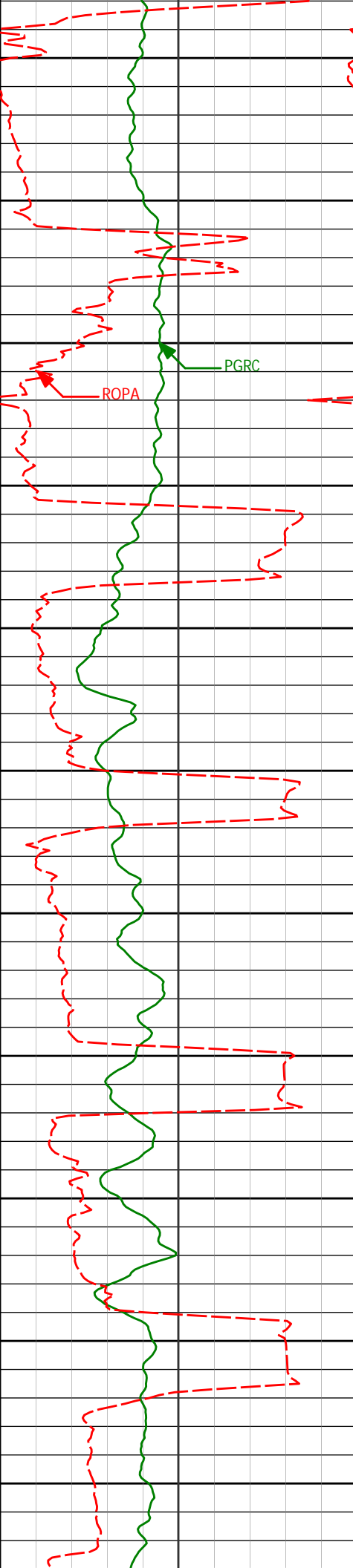


	6044'	17.89°	79.86°	6015.19'	75.84'
6050					
	6091'	21.30°	80.15°	6059.46'	91.19'
6100					
	6139'	25.00°	82.22°	6103.59'	109.66'
6150					
	6186'	29.42°	85.09°	6145.38'	130.85'
6200					
	6234'	32.40°	86.71°	6186.55'	155.32'
6250					
	6281'	36.36°	87.41°	6225.34'	181.71'
6300					
	6329'	41.22°	89.28°	6262.74'	211.67'
6350					
	6376'	45.77°	90.55°	6296.83'	243.96'
6400					
	6424'	48.08°	90.90°	6329.61'	278.99'
6450					
	6471'	51.45°	90.67°	6359.96'	314.84'
6500					
	6519'	55.13°	91.21°	6388.65'	353.28'
6550					
	6566'	59.71°	91.61°	6413.95'	392.86'

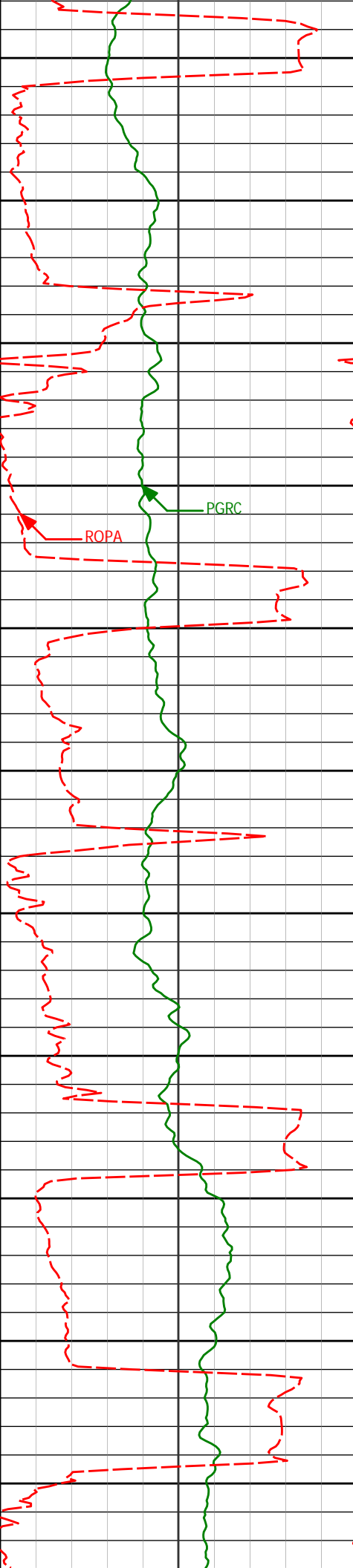




7136'	86.14°	87.93°	6536.49'	941.50'
7150				
7150				
7150				
7150				
7200				
7228'	87.41°	88.13°	6541.67'	1033.00'
7250				
7250				
7250				
7250				
7300				
7320'	88.98°	88.76°	6544.56'	1124.65'
7350				
7350				
7350				
7350				
7400				
7413'	91.88°	89.45°	6543.86'	1217.42'
7450				
7450				
7450				
7450				
7500				
7508'	91.67°	90.31°	6540.92'	1312.23'
7550				
7550				
7550				
7550				
7600				
7603'	90.49°	89.36°	6539.13'	1407.06'
7650				
7650				
7650				
7650				



7700	7698'	89.35°	87.93°	6539.26'	1501.78'
7750					
7793'	7793'	90.80°	88.65°	6539.14'	1596.44'
7800					
7850					
7888'	7888'	86.76°	87.39°	6541.16'	1691.04'
7900					
7950					
7982'	7982'	87.35°	86.53°	6545.99'	1784.38'
8000					
8050					
8077'	8077'	87.35°	87.81°	6550.38'	1878.78'
8100					
8150					
8172'	8172'	90.65°	87.64°	6552.04'	1973.34'
8200					



8250

8267'

90.46°

88.63°

6551.12'

2067.99'

8300

8350

8362'

92.07°

89.34°

6549.02'

2162.72'

8400

8450

8457'

88.49°

88.57°

6548.56'

2257.46'

8500

8550

8552'

87.53°

88.24°

6551.86'

2352.09'

8600

8650

8647'

88.27°

88.83°

6555.34'

2446.73'

8700

8750

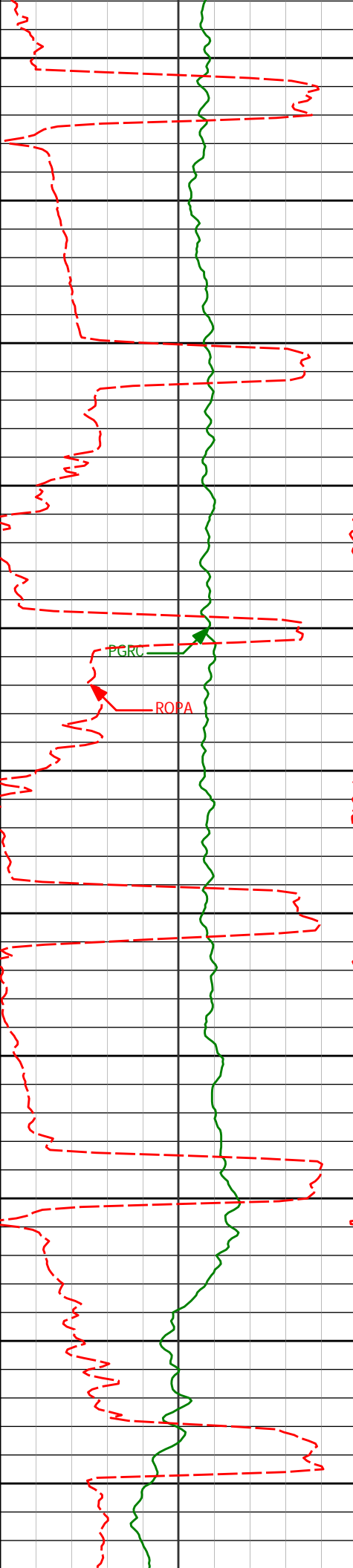
8742'

90.09°

89.15°

6556.70'

2541.48'



8800

8837'

90.86°

89.02°

6555.91'

2636.25'

8850

8900

8932'

91.23°

89.39°

6554.18'

2731.02'

8950

9000

9026'

90.83°

88.11°

6552.49'

2824.73'

9050

9100

9121'

91.79°

88.55°

6550.32'

2919.39'

9150

9200

9216'

93.39°

89.12°

6546.03'

3014.03'

9250

9300

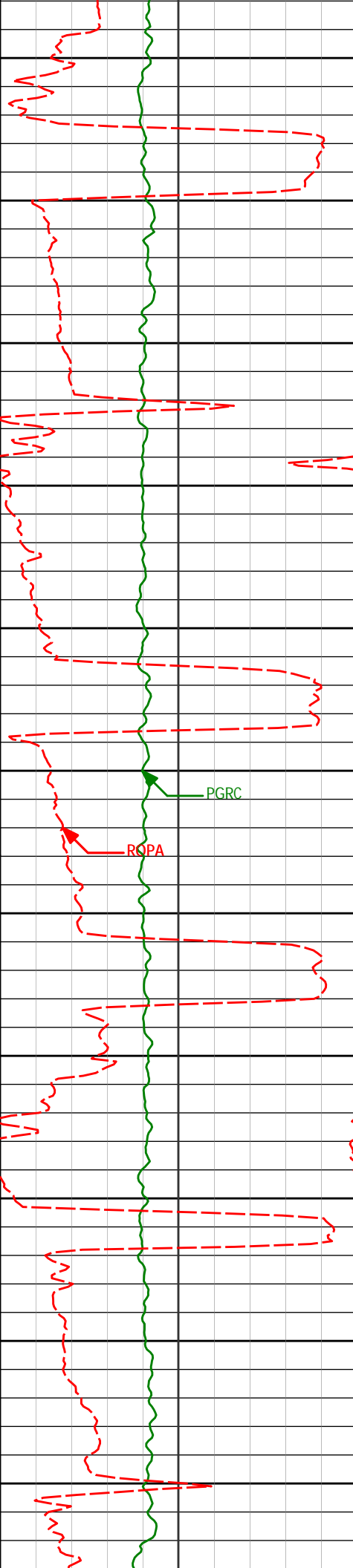
9311'

92.65°

87.68°

6541.02'

3108.58'



9350

9400

9450

9500

9550

9600

9650

9700

9750

9800

9850

9406'

90.37°

89.44°

6538.52'

3203.25'

9501'

90.34°

87.95°

6537.93'

3297.97'

9596'

90.22°

88.03°

6537.46'

3392.60'

9691'

90.56°

89.01°

6536.82'

3487.30'

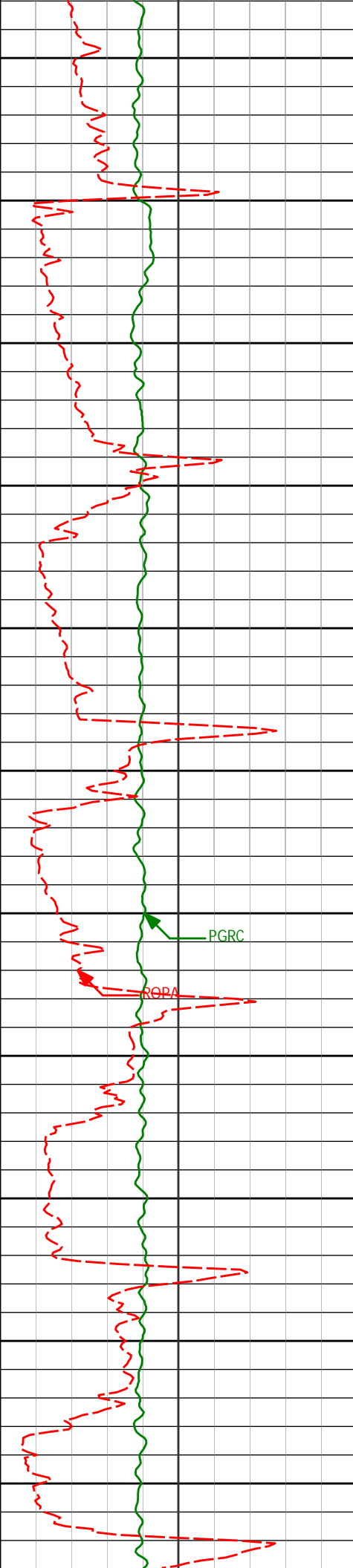
9786'

89.35°

89.78°

6536.89'

3582.10'



9900

9950

10000

10050

10100

10150

10200

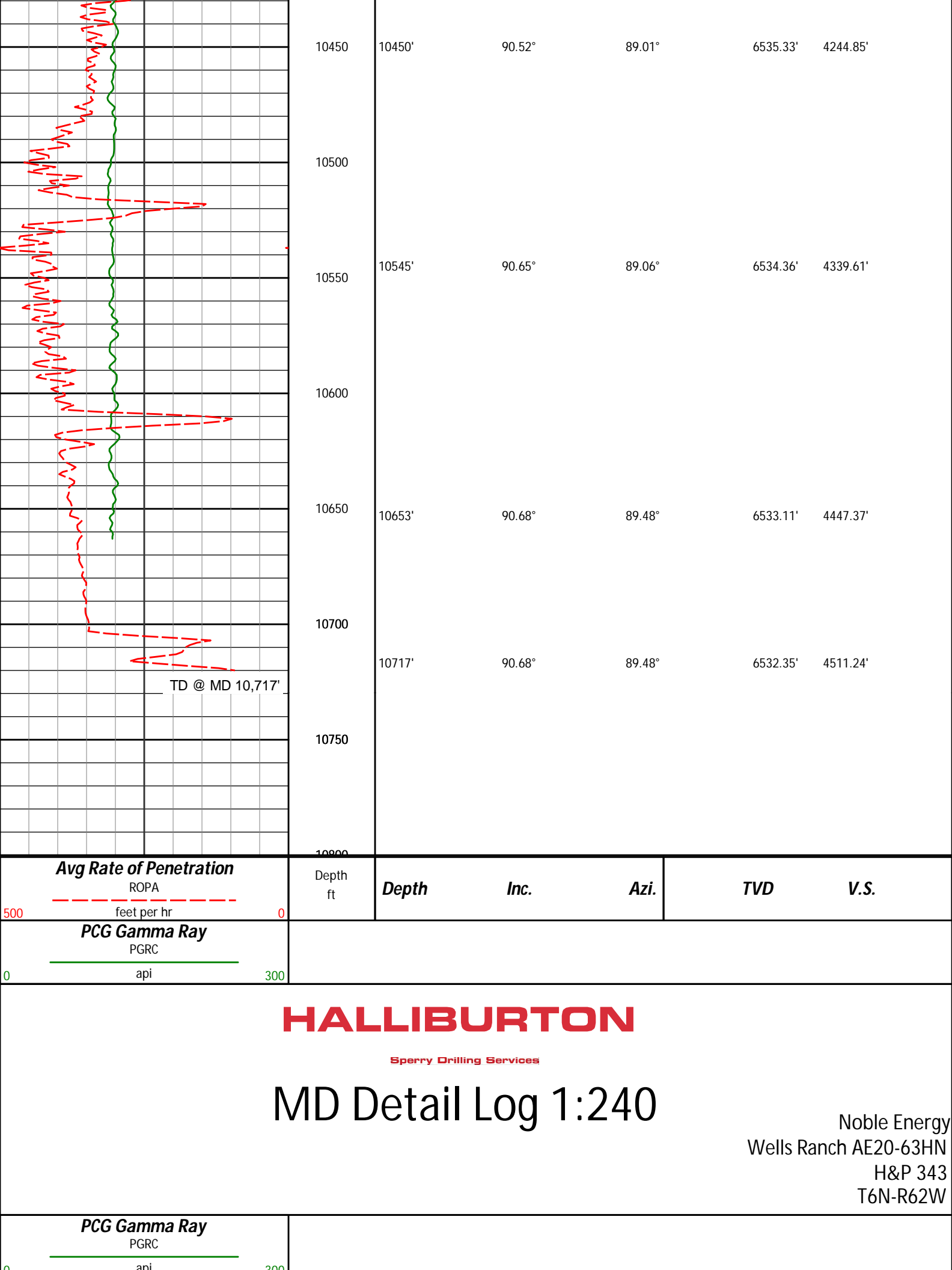
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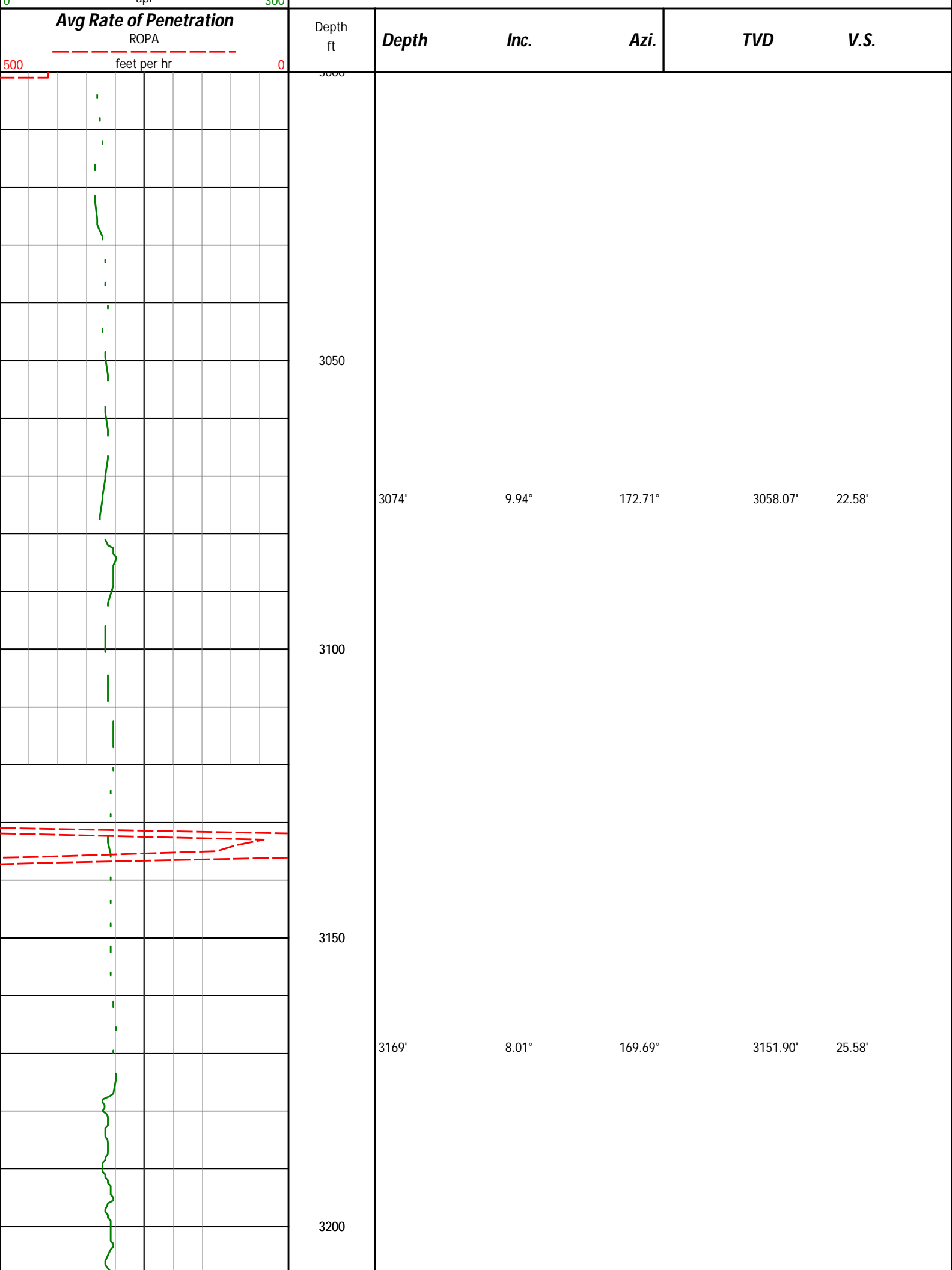
10300

10350

10400

9881'	89.38°	90.21°	6537.95'	3676.96'
9976'	89.85°	89.54°	6538.58'	3771.81'
10071'	90.31°	89.77°	6538.45'	3866.64'
10166'	90.52°	89.90°	6537.76'	3961.49'
10261'	90.49°	89.51°	6536.93'	4056.33'
10355'	90.46°	88.79°	6536.15'	4150.10'







3250

3300

3350

3400

3263'

9.25°

172.38°

3244.83'

28.50'

3358'

8.17°

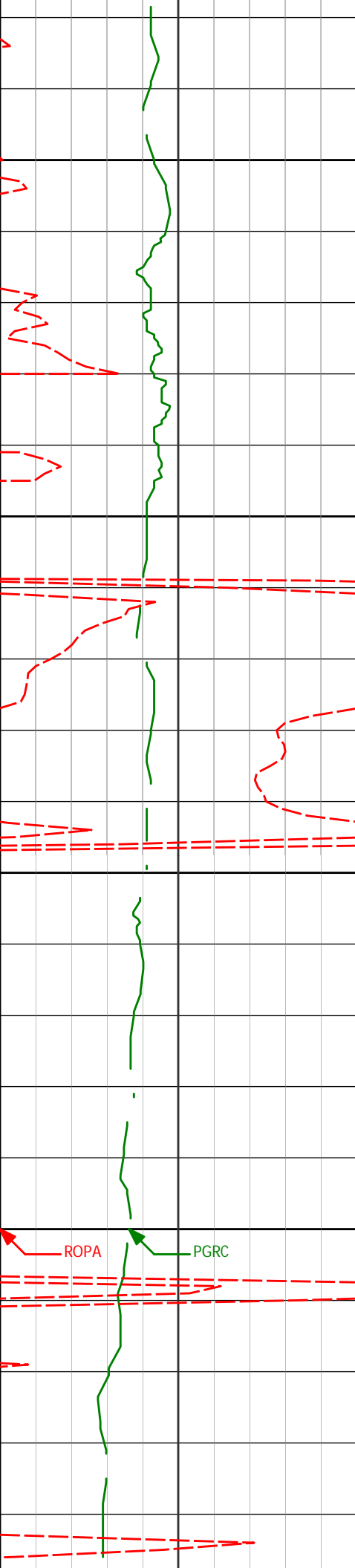
176.00°

3338.74'

30.74'

ROPA

PGRC



3450

3453'

6.02°

169.28°

3433.01'

32.75'

3500

3550

3548'

7.69°

168.71°

3527.32'

35.51'

3600

ROPA

PGRC

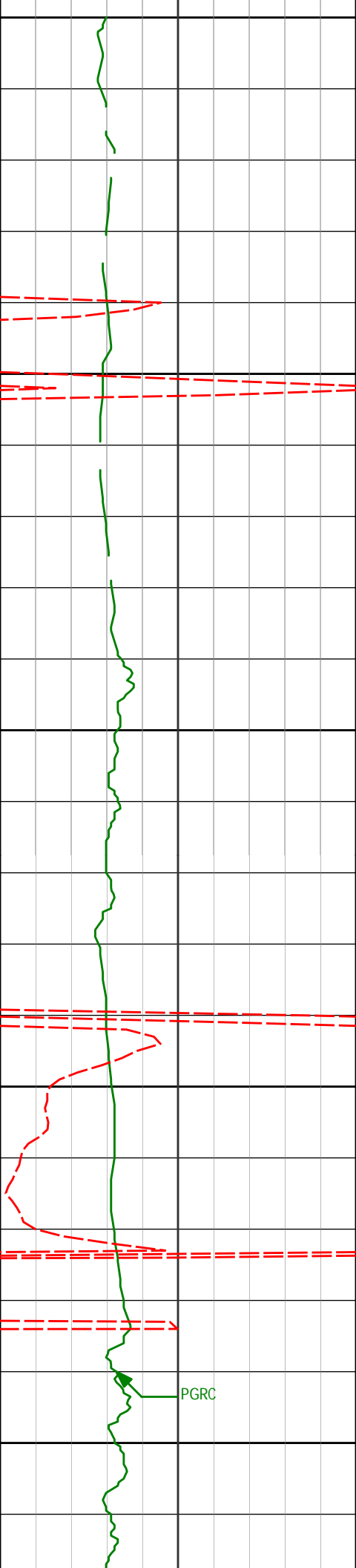
3643'

8.69°

166.66°

3621.35'

39.11'



3650

3700

3750

3800

3850

3738'

9.61°

167.45°

3715.14'

43.27'

3833'

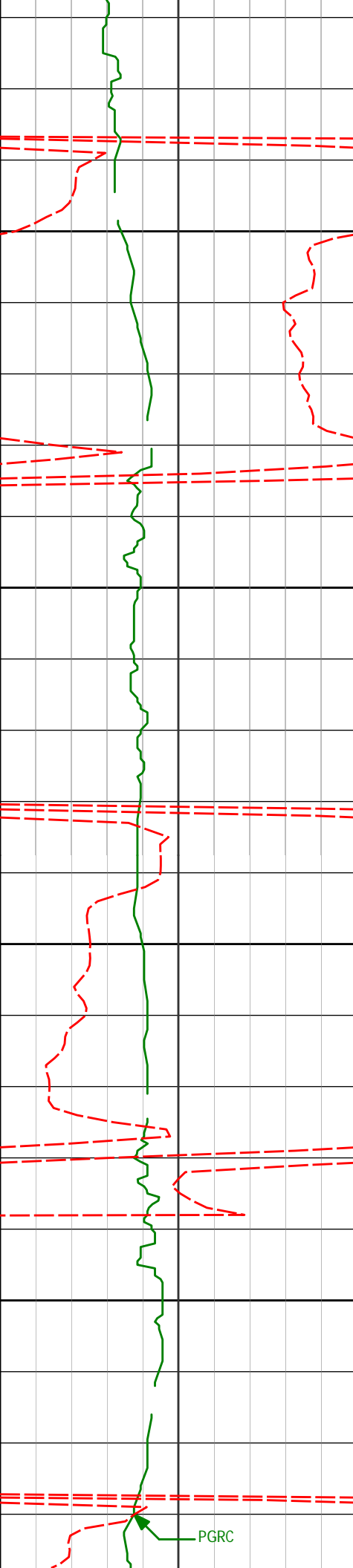
8.45°

167.02°

3808.97'

47.33'

PGRC



3900

3950

4000

4050

3928'

4.71°

180.01°

3903.33'

49.47'

4023'

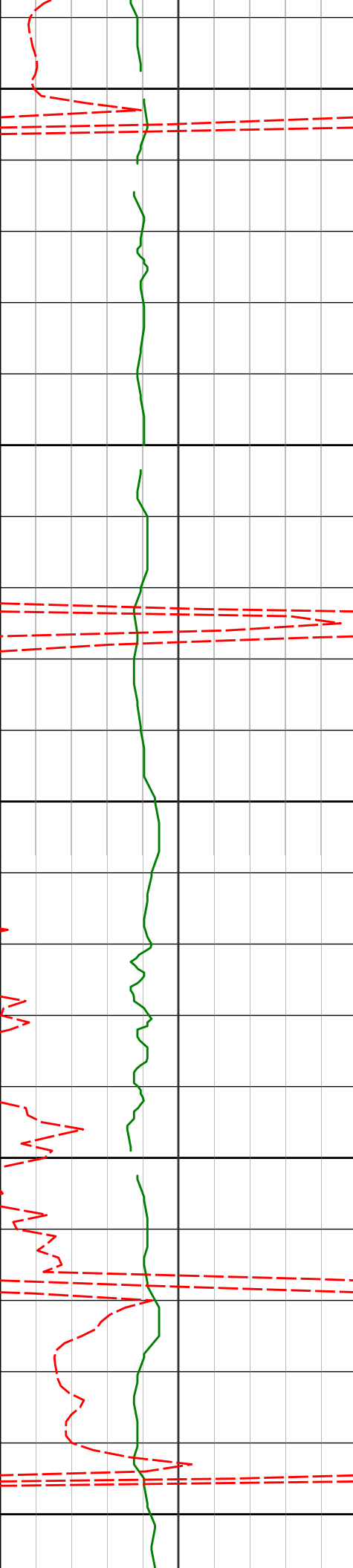
2.33°

207.75°

3998.15'

48.87'

PGRC



4100

4117'

1.99°

251.25°

4092.09'

46.55'

4150

4200

4212'

2.22°

262.99°

4187.02'

43.21'

4250

4300

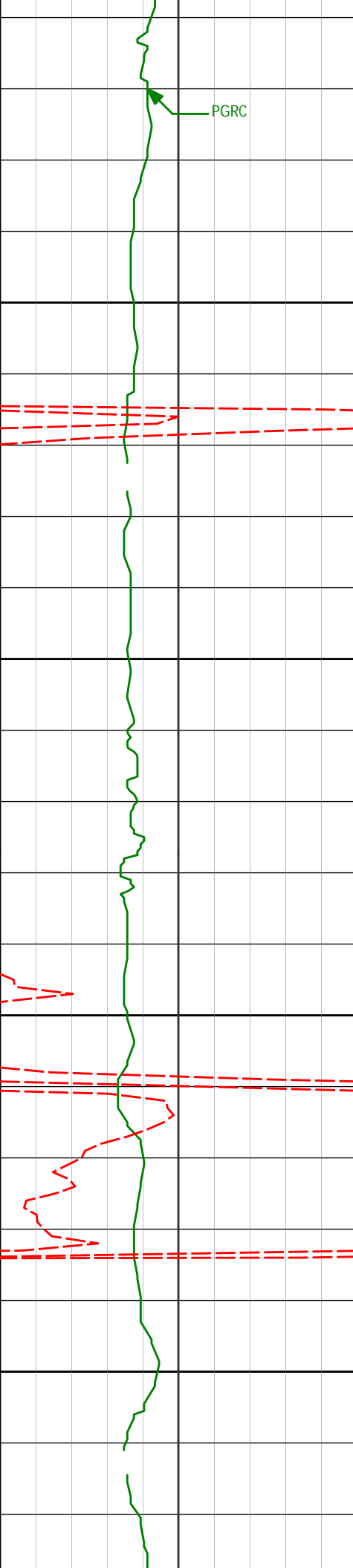
4307'

2.29°

297.68°

4281.95'

39.67'



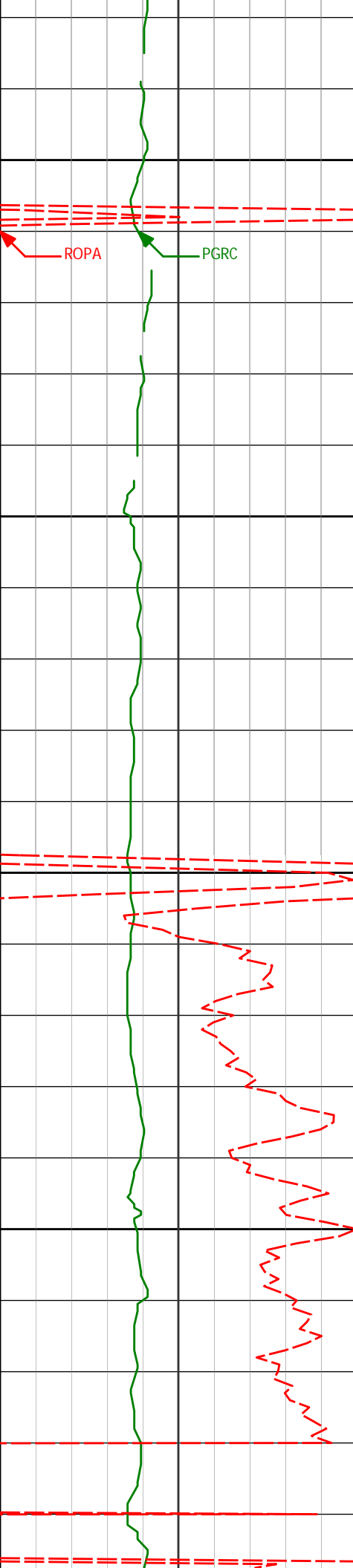
4350

4400

4450

4500

4350'	27.13°	27.13°	4376.89'	36.54'
4402'	1.82°	294.07°	4376.89'	36.54'
4497'	0.96°	18.93°	4471.87'	35.35'



4550

4600

4650

4700

4592'

1.36°

38.02°

4566.85'

36.21'

4687'

1.17°

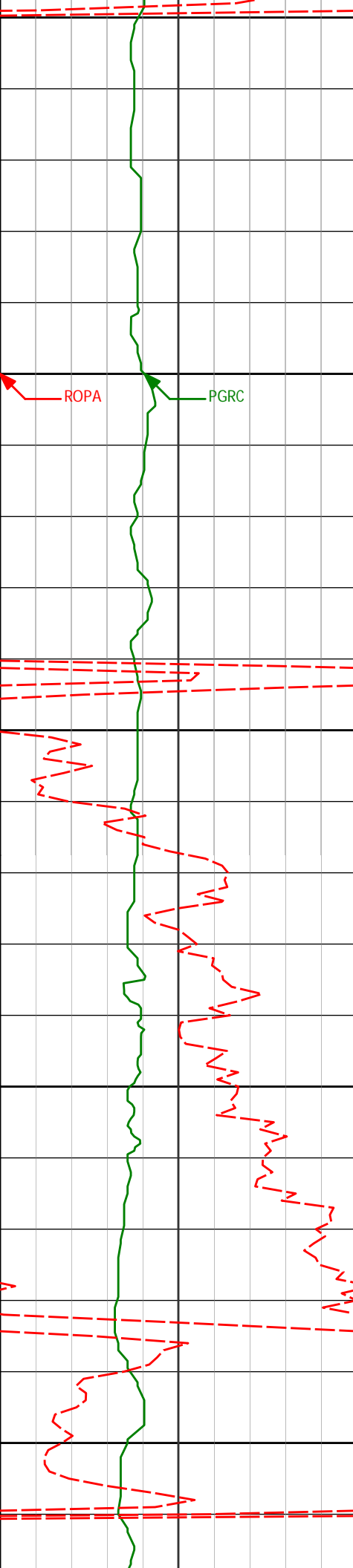
48.61°

4661.83'

37.55'

ROPA

PGRC



4750

4782'

1.04°

39.58°

4756.81'

38.76'

4800

4850

4877'

1.18°

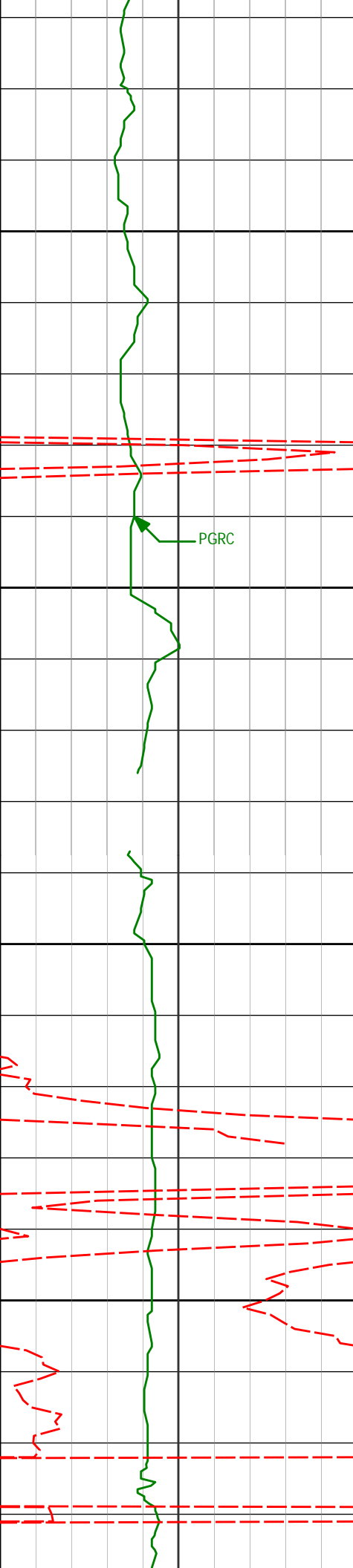
49.46°

4851.79'

39.98'

4900

4950



4972'	0.35°	291.40°	4946.79'	40.41'
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5000

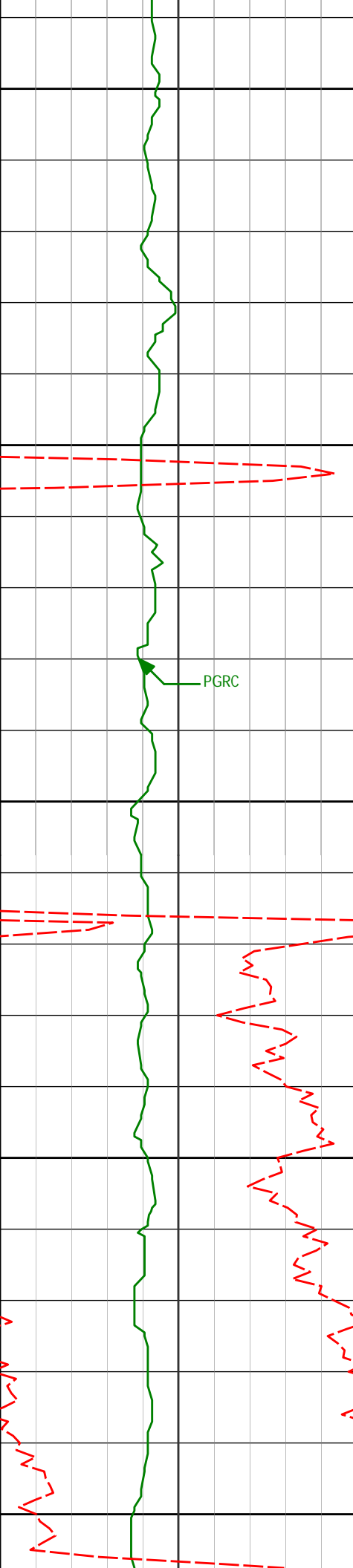
5050

5067'	0.20°	207.20°	5041.79'	40.07'
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5100

5150

5162'	0.34°	305.81°	5136.79'	39.76'
-------	-------	---------	----------	--------



5200

5250

5300

5350

5400

5257'

0.47°

5.76°

5231.78'

39.54'

PGRC

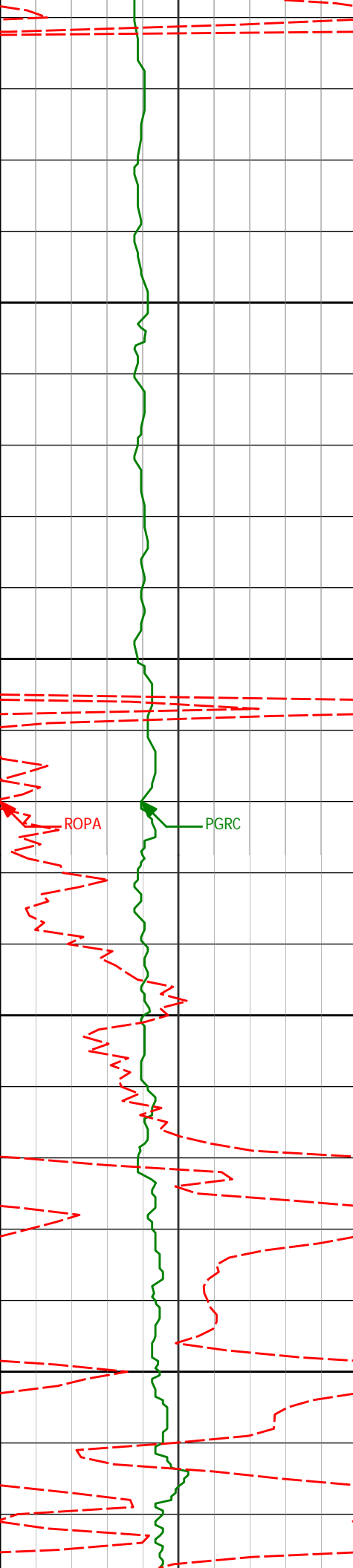
5352'

0.39°

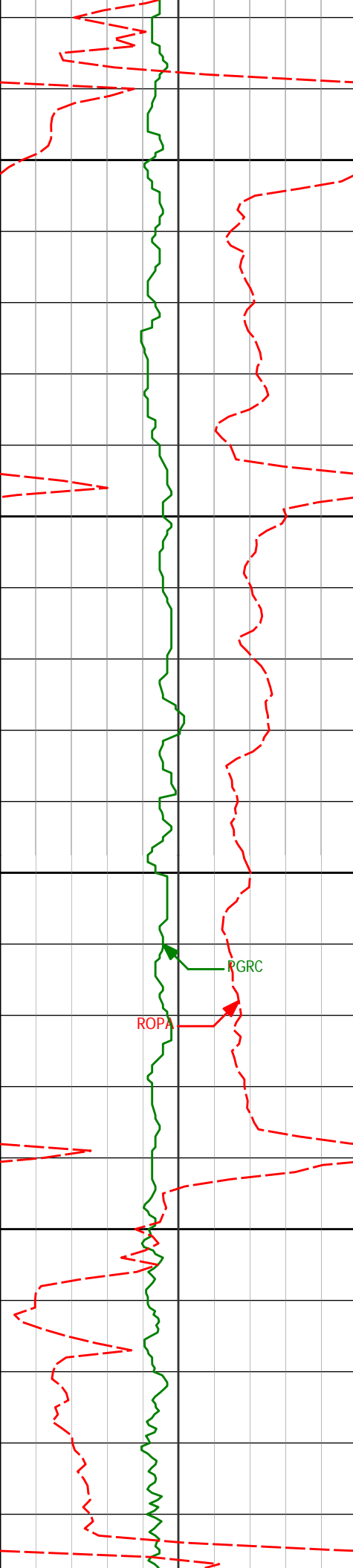
159.32°

5326.78'

39.69'



5446'	0.18°	169.84°	5420.78'	39.85'
5450				
5500				
5541'	0.53°	105.88°	5515.78'	40.32'
5550				
5600				



5636'	0.51°	124.74°	5610.78'	41.11'
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5650

5700

5731'	0.79°	148.22°	5705.77'	41.84'
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5750

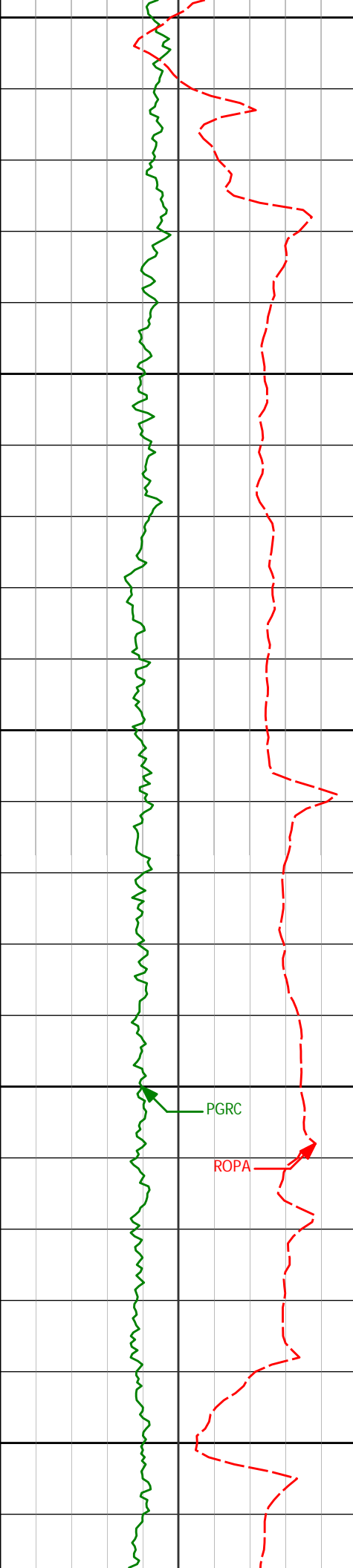
PGRC

ROPA

5789'	0.81°	125.54°	5763.76'	42.41'
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5800

<Run 200>



5850

5900

5950

6000

6050

5901'

4.17°

83.32°

5875.65'

47.10'

5949'

9.99°

79.19°

5923.26'

52.86'

5996'

14.90°

78.59°

5969.14'

62.68'

6044'

17.89°

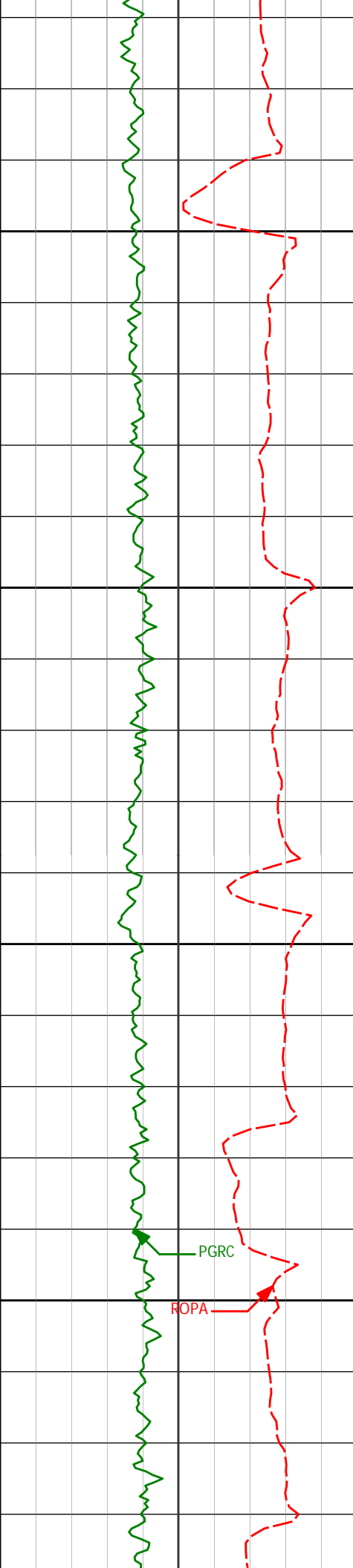
79.86°

6015.19'

75.84'

PGRC

ROPA



6100

6150

6200

6250

6091'

21.30°

80.15°

6059.46'

91.19'

6139'

25.00°

82.22°

6103.59'

109.66'

6186'

29.42°

85.09°

6145.38'

130.85'

6234'

32.40°

86.71°

6186.55'

155.32'

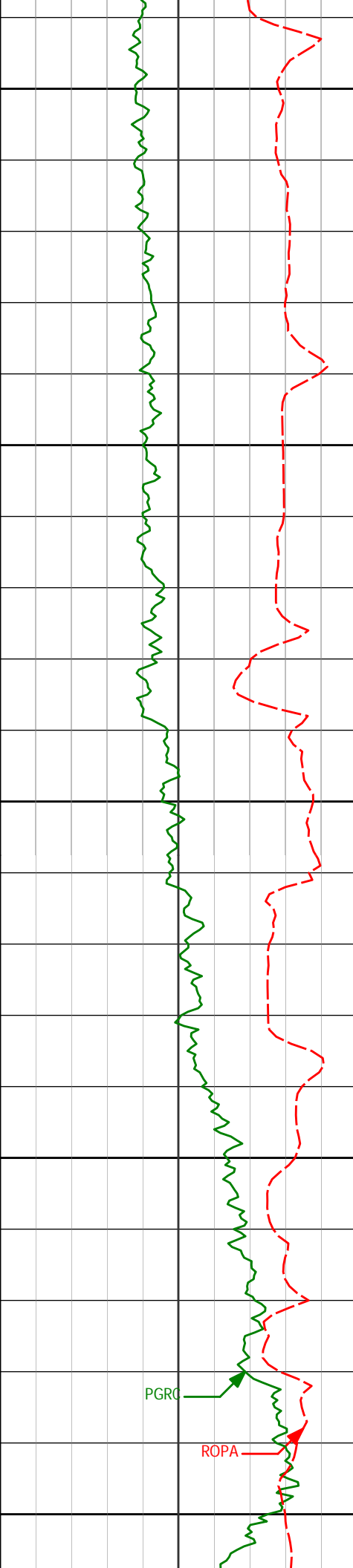
6281'

36.36°

87.41°

6225.34'

181.71'



6300

6329'

41.22°

89.28°

6262.74'

211.67'

6350

6376'

45.77°

90.55°

6296.83'

243.96'

6400

6424'

48.08°

90.90°

6329.61'

278.99'

6450

6471'

51.45°

90.67°

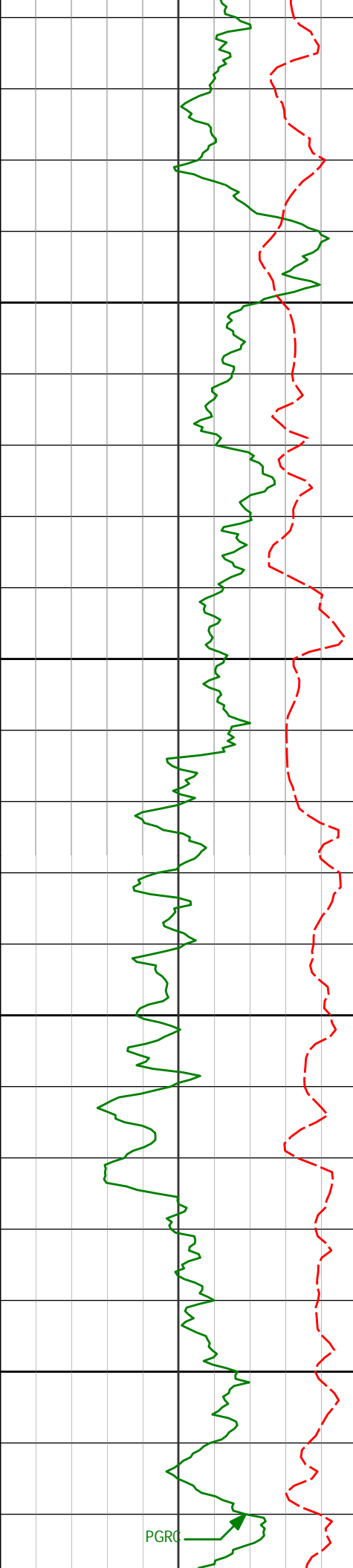
6359.96'

314.84'

PGRC

ROPA

6500



6550

6600

6650

6700

6519'

55.13°

91.21°

6388.65'

353.28'

6566'

59.71°

91.61°

6413.95'

392.86'

6614'

61.47°

91.91°

6437.52'

434.66'

6661'

65.04°

92.95°

6458.67'

476.62'

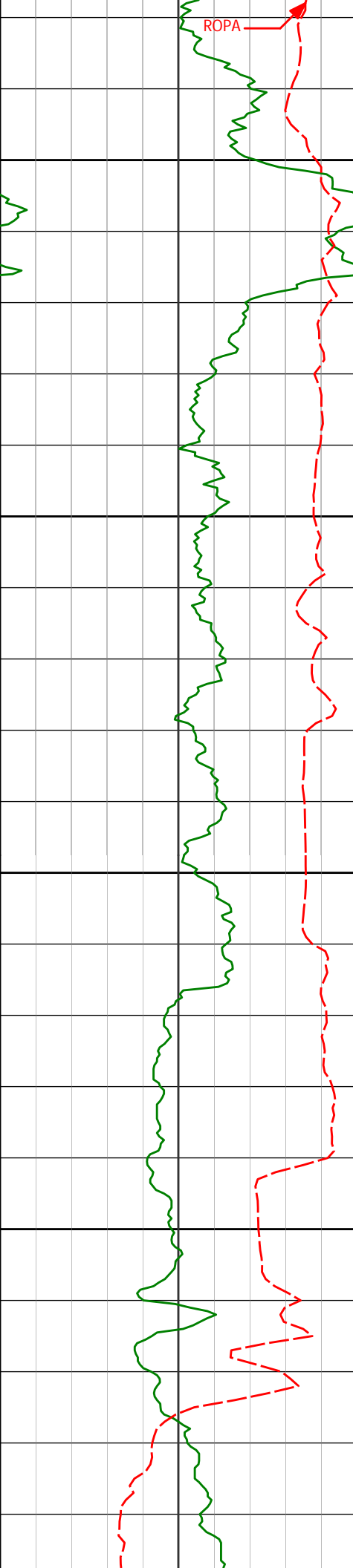
6709'

69.65°

91.78°

6477.15'

520.90'



ROPA

6750

6756'

74.53°

91.21°

6491.60'

565.60'

6800

6804'

79.40°

90.10°

6502.43'

612.30'

6850

6857'

82.42°

89.77°

6510.80'

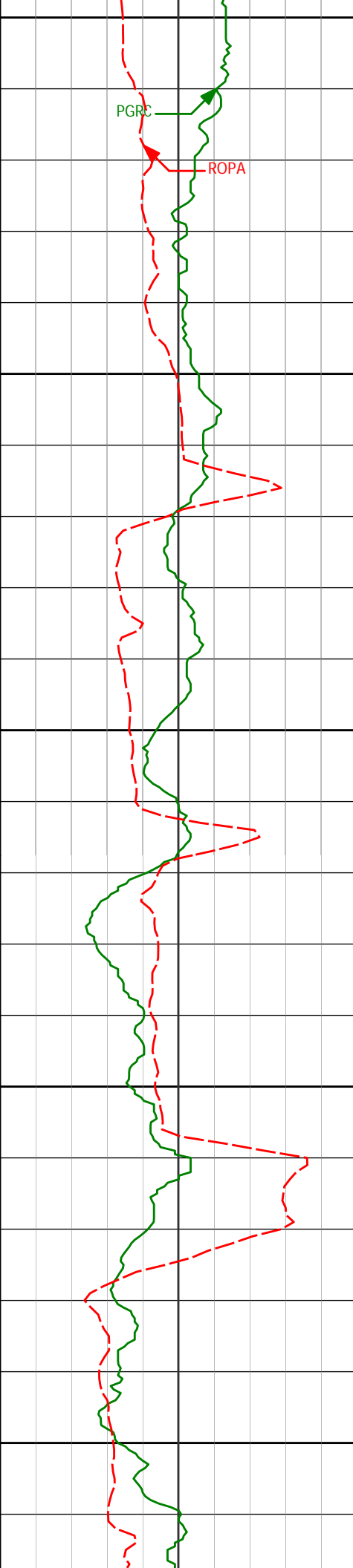
664.55'

6900



Casing Set @ 6,904' MD

<Run 300>



6950

PGRC

ROPA

7000

7000'

85.36°

88.61°

6526.02'

806.40'

7050

7044'

85.28°

88.15°

6529.61'

850.11'

7100

7136'

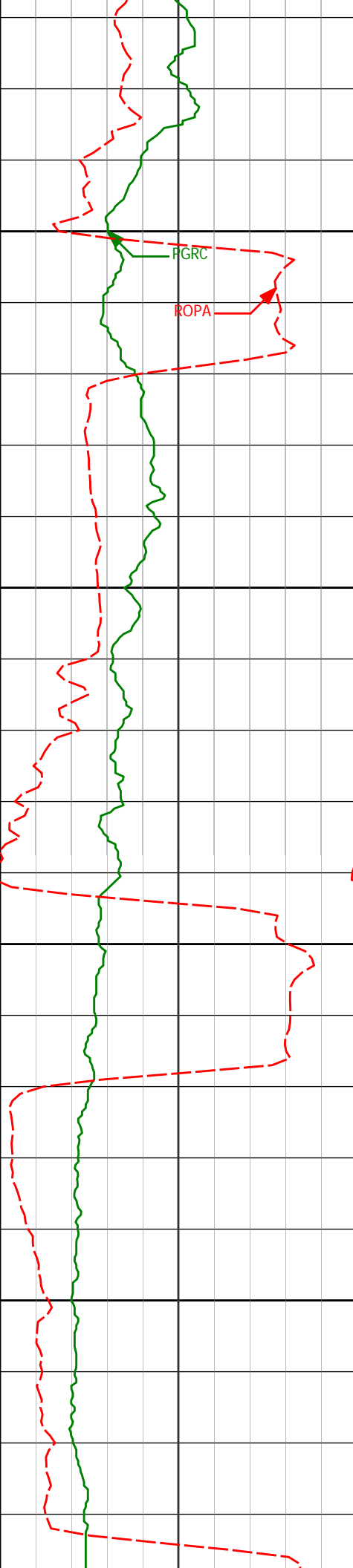
86.14°

87.93°

6536.49'

941.50'

7150



7200

7250

7300

7350

HGRC

ROPA

7228'

87.41°

88.13°

6541.67'

1033.00'

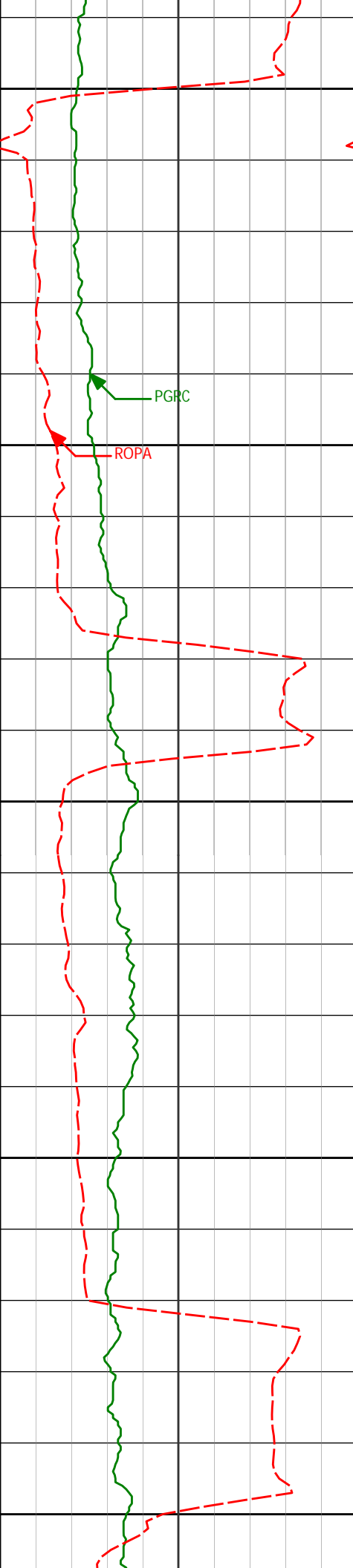
7320'

88.98°

88.76°

6544.56'

1124.65'



7400

7413'

91.88°

89.45°

6543.86'

1217.42'

7450

7500

7508'

91.67°

90.31°

6540.92'

1312.23'

7550

7600

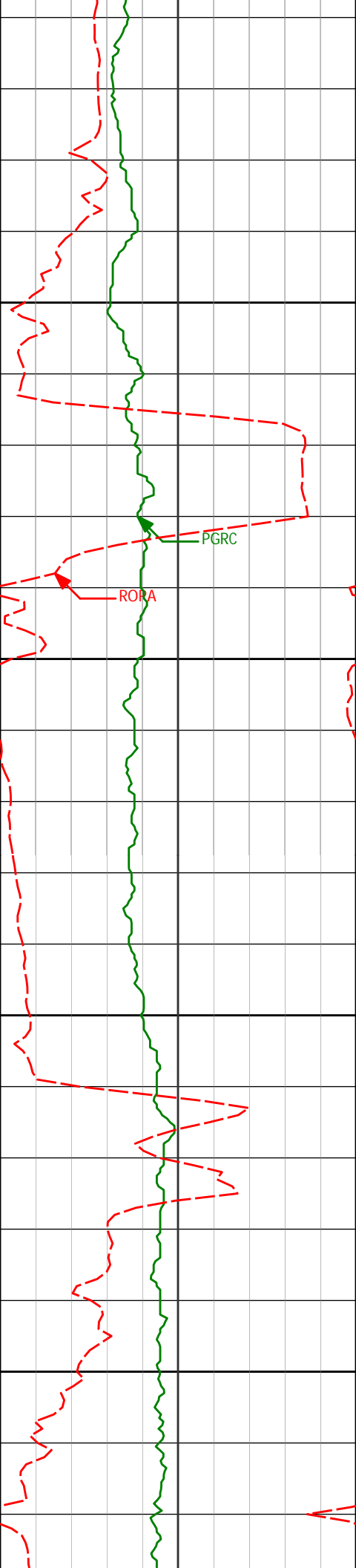
7603'

90.49°

89.36°

6539.13'

1407.06'



7650

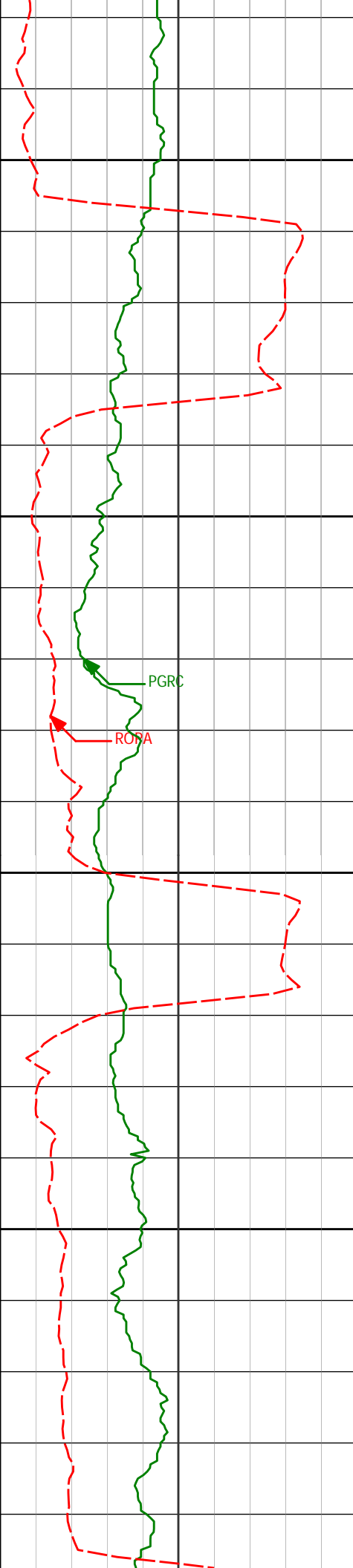
7700

7750

7800

7698'	89.35°	87.93°	6539.26'	1501.78'
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7793'	90.80°	88.65°	6539.14'	1596.44'
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7850

7888'

86.76°

87.39°

6541.16'

1691.04'

7900

7950

7982'

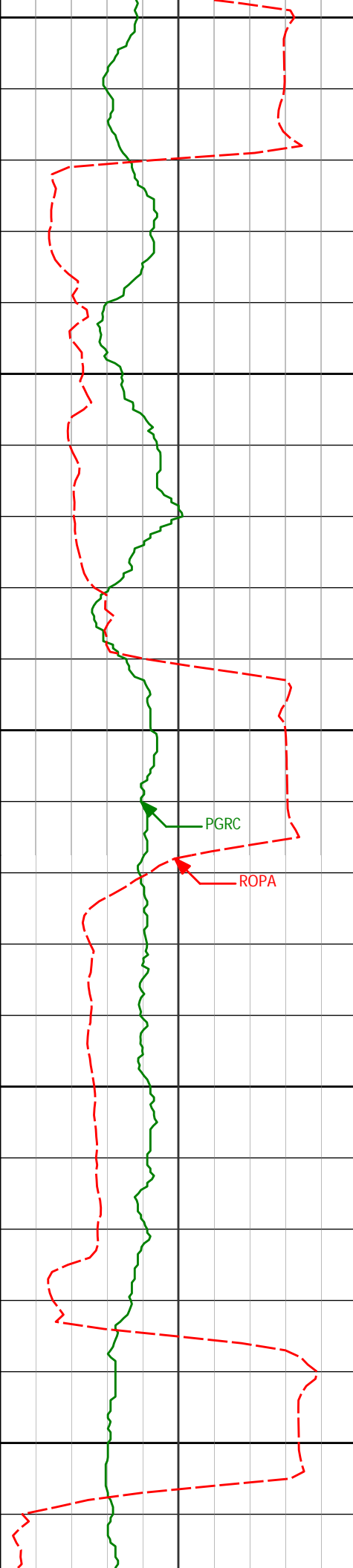
87.35°

86.53°

6545.99'

1784.38'

8000



8050

8077'

87.35°

87.81°

6550.38'

1878.78'

8100

8150

PGRC

ROPA

8172'

90.65°

87.64°

6552.04'

1973.34'

8200

8250

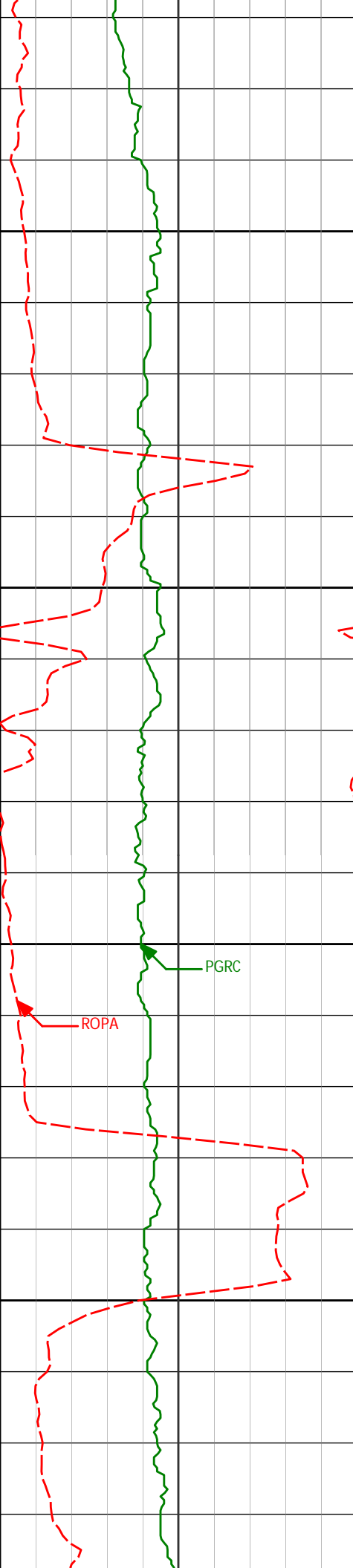
8267'

90.46°

88.63°

6551.12'

2067.99'



8300

8350

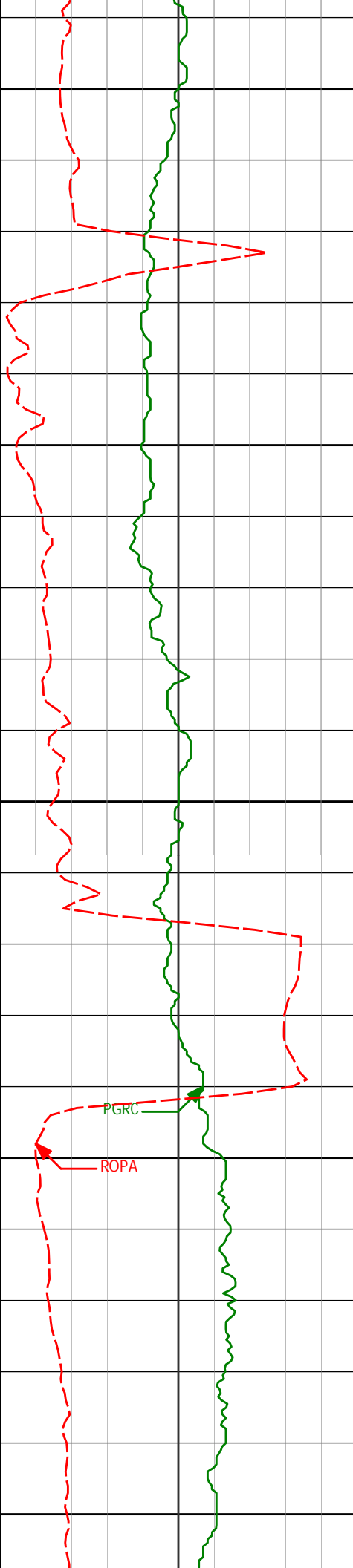
8400

8450

PGRC

ROPA

8287'	92.15°	88.85°	6557.12'	2337.77'
8362'	92.07°	89.34°	6549.02'	2162.72'
8457'	88.49°	88.57°	6548.56'	2257.46'



8500

8550

8600

8650

8700

8552'

87.53°

88.24°

6551.86'

2352.09'

8647'

88.27°

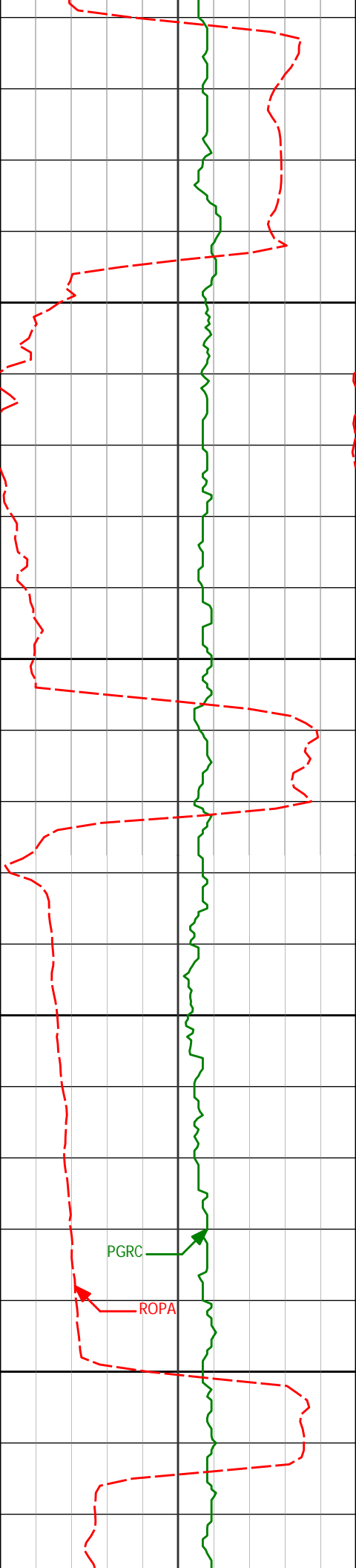
88.83°

6555.34'

2446.73'

PGRC

ROPA



8750

8800

8850

8900

8742'

90.09°

89.15°

6556.70'

2541.48'

8837'

90.86°

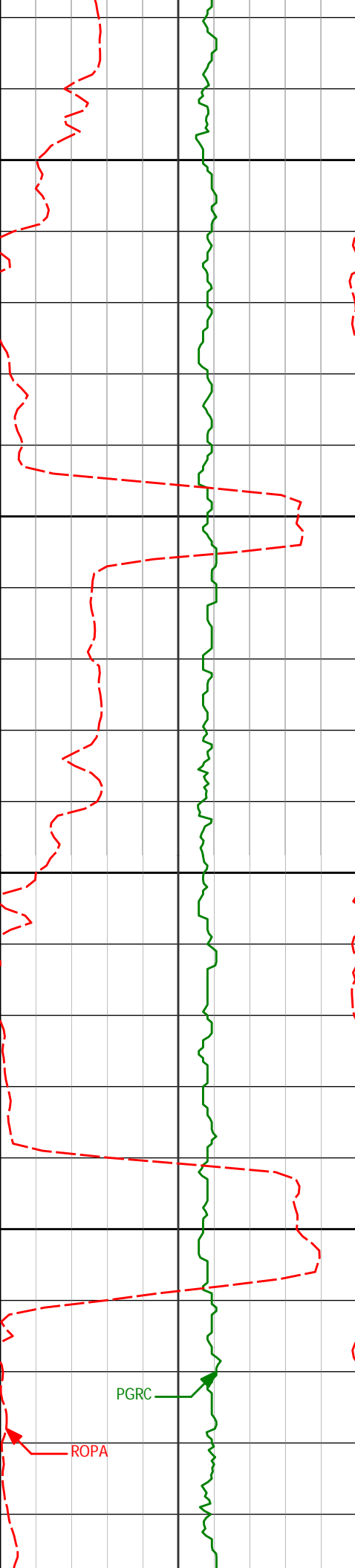
89.02°

6555.91'

2636.25'

PGRC

ROPA



8932'

91.23°

89.39°

6554.18'

2731.02'

8950

9000

9026'

90.83°

88.11°

6552.49'

2824.73'

9050

9100

9121'

91.79°

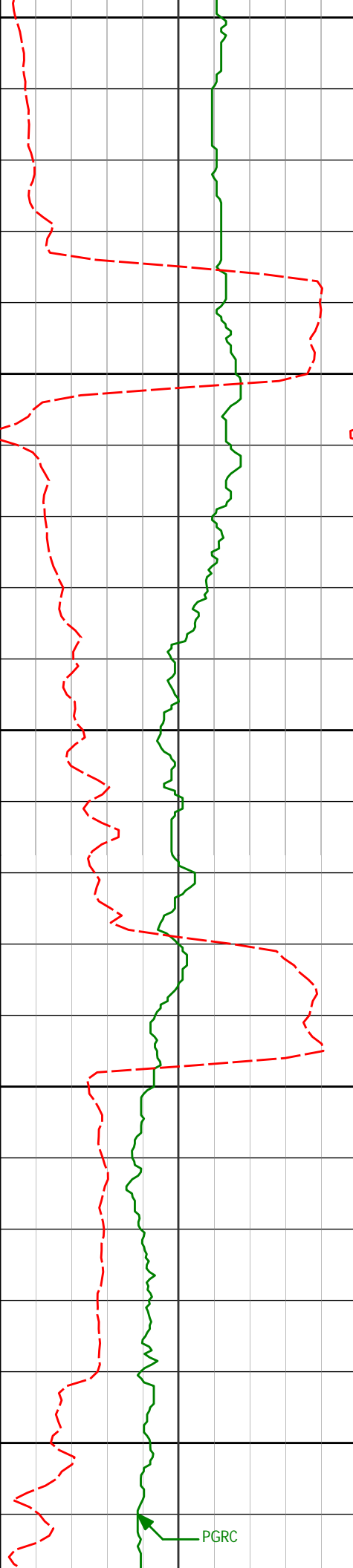
88.55°

6550.32'

2919.39'

PGRC

ROPA



9150

9200

9250

9300

9350

9216'

93.39°

89.12°

6546.03'

3014.03'

9311'

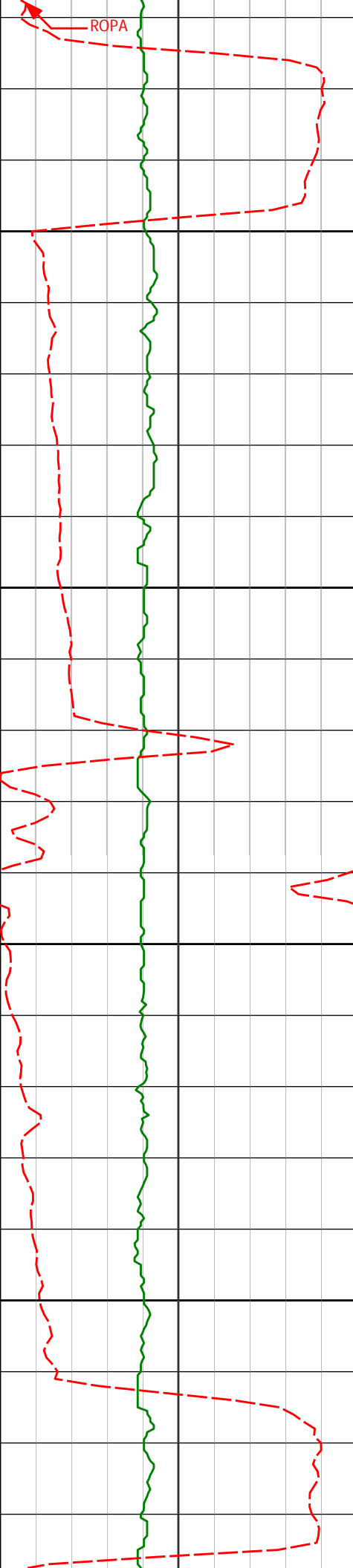
92.65°

87.68°

6541.02'

3108.58'

PGRC



9400

9450

9500

9550

9406'

90.37°

89.44°

6538.52'

3203.25'

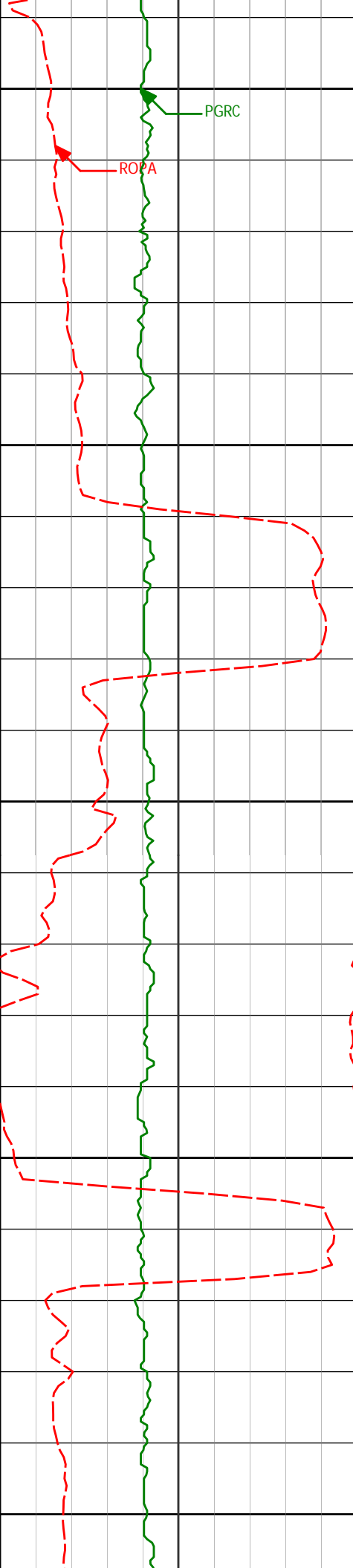
9501'

90.34°

87.95°

6537.93'

3297.97'



9596'	90.22°	88.03°	6537.46'	3392.60'
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9600

9650

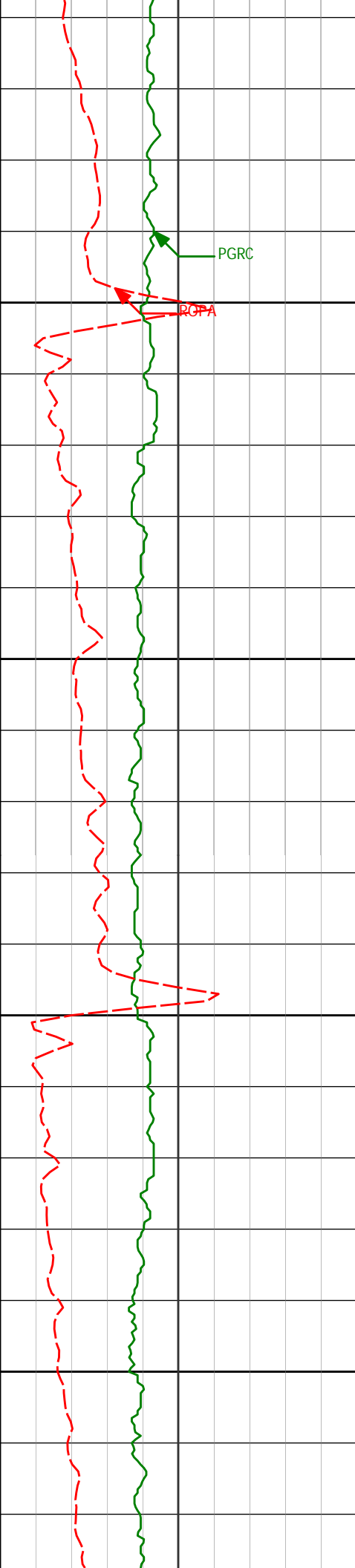
9691'	90.56°	89.01°	6536.82'	3487.30'
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9700

9750

9786'	89.35°	89.78°	6536.89'	3582.10'
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9800



9850

9881'

89.38°

90.21°

6537.95'

3676.96'

9900

9950

9976'

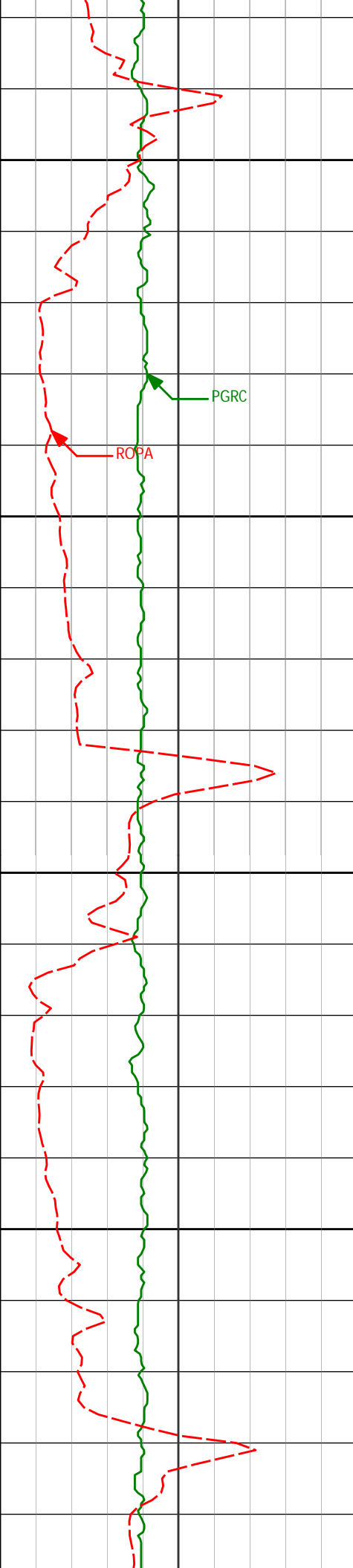
89.85°

89.54°

6538.58'

3771.81'

10000



10050

10071'

90.31°

89.77°

6538.45'

3866.64'

PGRC

ROPA

10100

10150

10166'

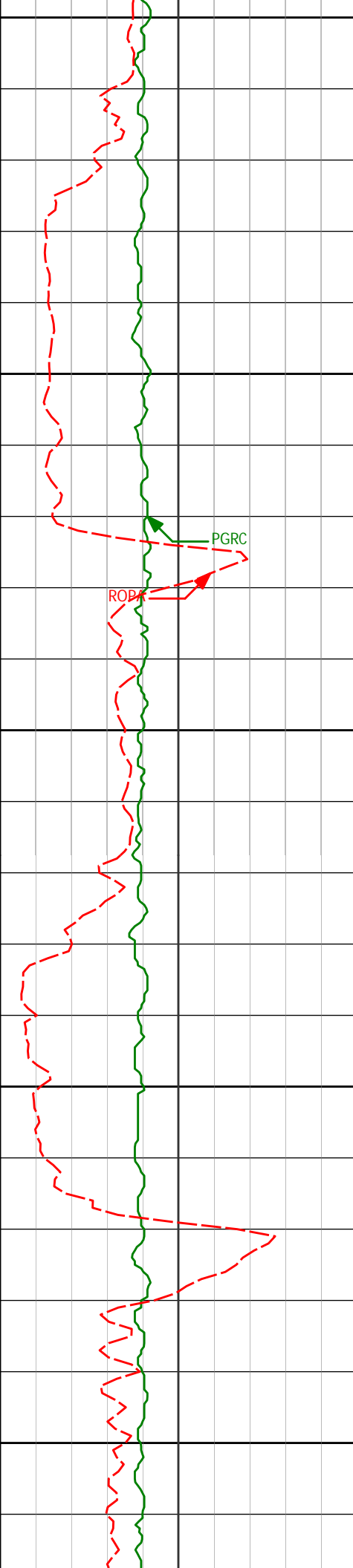
90.52°

89.90°

6537.76'

3961.49'

10200



10250

10261'

90.49°

89.51°

6536.93'

4056.33'

10300

10350

10355'

90.46°

88.79°

6536.15'

4150.10'

10400

10450

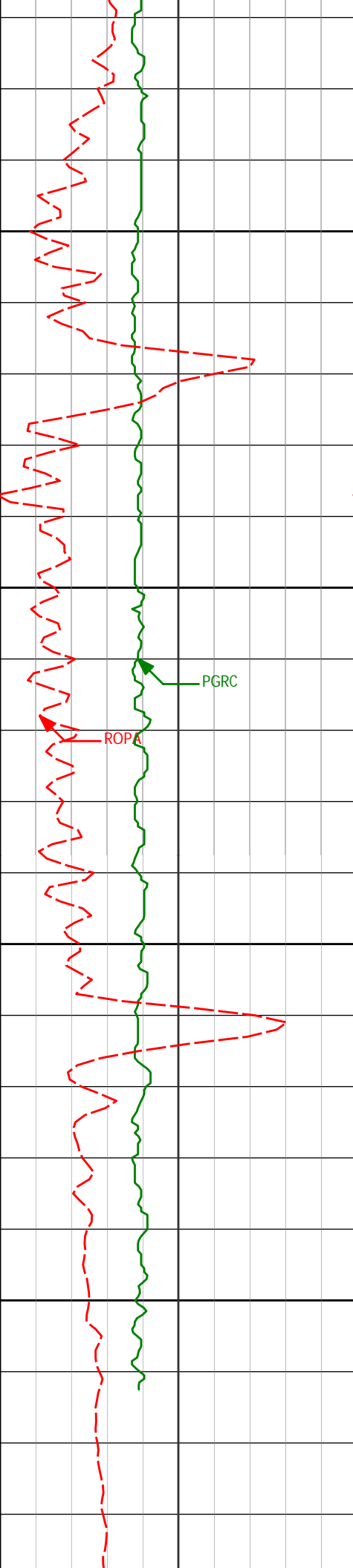
10450'

90.52°

89.01°

6535.33'

4244.85'



10500

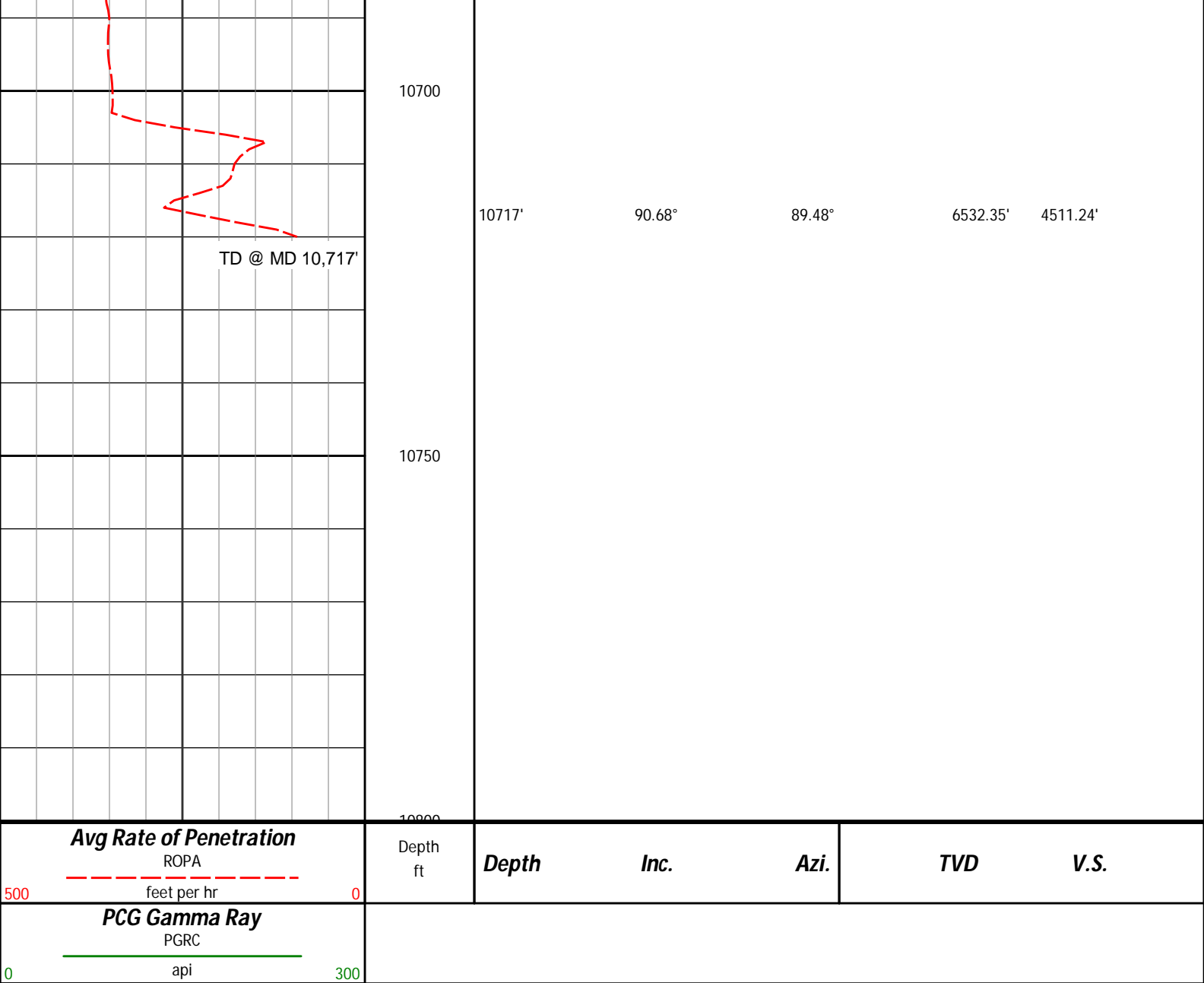
10550

10600

10650

10545' 90.65° 89.06° 6534.36' 4339.61'

10653' 90.68° 89.48° 6533.11' 4447.37'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE20-63HN
Wattenburg
Weld Colorado
USA

CA-XX-0900775406

Surveys are tied into three non-Haliburton surveys at MD 354', 643', and 940' taken with a gyro while drilling the surface hole. Final survey is a straight-line projection to bit.

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
354.00	0.10	339.14	354.00	0.29 N	0.11 W	-0.13	0.03
643.00	0.80	1.84	642.99	2.54 N	0.14 W	-0.27	0.25
940.00	0.60	349.64	939.97	6.14 N	0.35 W	-0.67	0.08
1088.00	0.22	276.45	1087.96	6.94 N	0.77 W	-1.14	0.39
1181.00	0.25	318.12	1180.96	7.11 N	1.08 W	-1.46	0.18
1273.00	0.04	32.80	1272.96	7.28 N	1.20 W	-1.59	0.26
1366.00	0.28	344.11	1365.96	7.53 N	1.24 W	-1.64	0.27
1460.00	0.43	300.63	1459.96	7.93 N	1.61 W	-2.03	0.32

1555.00	1.52	203.25	1554.95	6.96 N	2.41 W	-2.78	1.72
1649.00	3.24	185.20	1648.87	3.16 N	3.15 W	-3.31	1.97
1745.00	4.40	175.44	1744.65	3.21 S	3.10 W	-2.93	1.38
1839.00	6.17	168.91	1838.25	11.76 S	1.84 W	-1.21	1.99
1934.00	7.82	172.55	1932.54	23.18 S	0.02 W	1.21	1.80
2029.00	9.68	177.08	2026.43	37.57 S	1.22 E	3.22	2.09
2124.00	8.84	175.97	2120.19	52.83 S	2.14 E	4.95	0.90
2219.00	9.34	175.02	2214.00	67.79 S	3.33 E	6.93	0.55
2314.00	8.56	175.65	2307.84	82.52 S	4.53 E	8.91	0.83
2409.00	8.09	173.57	2401.84	96.21 S	5.82 E	10.93	0.59
2504.00	8.93	175.12	2495.79	110.20 S	7.19 E	13.04	0.92
2599.00	9.24	182.26	2589.60	125.17 S	7.52 E	14.17	1.23
2694.00	8.39	181.02	2683.48	139.72 S	7.09 E	14.52	0.92
2789.00	9.78	174.84	2777.29	154.68 S	7.70 E	15.92	1.79
2884.00	9.42	177.56	2870.96	170.49 S	8.75 E	17.81	0.61
2979.00	10.34	174.43	2964.55	186.74 S	9.91 E	19.83	1.12
3074.00	9.94	172.71	3058.07	203.36 S	11.78 E	22.58	0.53
3169.00	8.01	169.69	3151.90	218.01 S	14.00 E	25.58	2.09
3263.00	9.25	172.38	3244.83	231.94 S	16.18 E	28.50	1.39
3358.00	8.17	176.00	3338.74	246.24 S	17.66 E	30.74	1.27
3453.00	6.02	169.28	3433.01	257.87 S	19.06 E	32.75	2.42
3548.00	7.69	168.71	3527.32	269.00 S	21.23 E	35.51	1.76
3643.00	8.69	166.66	3621.35	282.22 S	24.13 E	39.11	1.10
3738.00	9.61	167.45	3715.14	296.94 S	27.51 E	43.27	0.98
3833.00	8.45	167.02	3808.97	311.48 S	30.80 E	47.33	1.22
3928.00	4.71	180.01	3903.33	322.19 S	32.37 E	49.47	4.21
4023.00	2.33	207.75	3998.15	327.80 S	31.47 E	48.87	3.01
4117.00	1.99	251.25	4092.09	330.01 S	29.03 E	46.55	1.74
4212.00	2.22	262.99	4187.02	330.77 S	25.65 E	43.21	0.51
4307.00	2.29	297.68	4281.95	330.11 S	22.14 E	39.67	1.42
4402.00	1.82	294.07	4376.89	328.61 S	19.08 E	36.54	0.51
4497.00	0.96	18.93	4471.87	327.25 S	17.96 E	35.35	2.08
4592.00	1.36	38.02	4566.85	325.61 S	18.91 E	36.21	0.58
4687.00	1.17	48.61	4661.83	324.08 S	20.34 E	37.55	0.32
4782.00	1.04	39.58	4756.81	322.77 S	21.61 E	38.76	0.23
4877.00	1.18	49.46	4851.79	321.47 S	22.90 E	39.98	0.25
4972.00	0.35	291.40	4946.79	320.73 S	23.38 E	40.41	1.45
5067.00	0.20	207.20	5041.79	320.77 S	23.03 E	40.07	0.41
5162.00	0.34	305.81	5136.79	320.75 S	22.73 E	39.76	0.44
5257.00	0.47	5.76	5231.78	320.20 S	22.54 E	39.54	0.44
5352.00	0.39	159.32	5326.78	320.11 S	22.69 E	39.69	0.88
5446.00	0.18	169.84	5420.78	320.56 S	22.83 E	39.85	0.23
5541.00	0.53	105.88	5515.78	320.83 S	23.28 E	40.32	0.50
5636.00	0.51	124.74	5610.78	321.19 S	24.05 E	41.11	0.18
5731.00	0.79	148.22	5705.77	321.99 S	24.74 E	41.84	0.40
5789.00	0.81	125.54	5763.76	322.56 S	25.29 E	42.41	0.54
5901.00	4.17	83.32	5875.65	322.55 S	29.98 E	47.10	3.22
5949.00	9.99	79.19	5923.26	321.57 S	35.80 E	52.86	12.16
5996.00	14.90	78.59	5969.14	319.60 S	45.74 E	62.68	10.45
6044.00	17.89	79.86	6015.19	317.08 S	59.05 E	75.84	6.27
6091.00	21.30	80.15	6059.46	314.35 S	74.57 E	91.19	7.26
6139.00	25.00	82.22	6103.59	311.49 S	93.21 E	109.66	7.89
6186.00	29.42	85.09	6145.38	309.15 S	114.57 E	130.85	9.81
6234.00	32.40	86.71	6186.55	307.41 S	139.16 E	155.32	6.45
6281.00	36.36	87.41	6225.34	306.05 S	165.66 E	181.71	8.47
6329.00	41.22	89.28	6262.74	305.21 S	195.70 E	211.67	10.41
6376.00	45.77	90.55	6296.83	305.18 S	228.04 E	243.96	9.86
6424.00	48.08	90.90	6329.61	305.62 S	263.10 E	278.99	4.84
6471.00	51.45	90.67	6359.96	306.11 S	298.97 E	314.84	7.18
6519.00	55.13	91.21	6388.65	306.75 S	337.44 E	353.28	7.72
6566.00	59.71	91.61	6413.95	307.73 S	377.02 E	392.86	9.77
6614.00	61.47	91.91	6437.52	309.01 S	418.81 E	434.66	3.71
6661.00	65.04	92.95	6458.67	310.80 S	460.74 E	476.62	7.85
6709.00	69.65	91.78	6477.15	312.62 S	504.99 E	520.90	9.86
6756.00	74.53	91.21	6491.60	313.78 S	549.68 E	565.60	10.45
6804.00	79.40	90.10	6502.43	314.31 S	596.43 E	612.30	10.39
6857.00	82.42	89.77	6510.80	314.25 S	648.75 E	664.55	5.73
7000.00	85.36	88.61	6526.02	312.24 S	790.91 E	806.40	2.21
7044.00	85.28	88.15	6529.61	311.00 S	834.74 E	850.11	1.06
7136.00	86.14	87.93	6536.49	307.86 S	926.43 E	941.50	0.96
7228.00	87.41	88.13	6541.67	304.70 S	1018.23 E	1033.00	1.40
7320.00	88.98	88.76	6544.56	302.21 S	1110.15 E	1124.65	1.84
7413.00	91.88	89.45	6543.86	300.75 S	1203.12 E	1217.42	3.21
7508.00	91.67	90.31	6540.92	300.55 S	1298.08 E	1312.23	0.93

7603.00	90.49	89.36	6539.13	300.28 S	1393.06 E	1407.06	1.59
7698.00	89.35	87.93	6539.26	298.03 S	1488.03 E	1501.78	1.93
7793.00	90.80	88.65	6539.14	295.20 S	1582.98 E	1596.44	1.70
7888.00	86.76	87.39	6541.16	291.92 S	1677.88 E	1691.04	4.45
7982.00	87.35	86.53	6545.99	286.94 S	1771.62 E	1784.38	1.11
8077.00	87.35	87.81	6550.38	282.26 S	1866.40 E	1878.78	1.35
8172.00	90.65	87.64	6552.04	278.49 S	1961.30 E	1973.34	3.48
8267.00	90.46	88.63	6551.12	275.39 S	2056.24 E	2067.99	1.06
8362.00	92.07	89.34	6549.02	273.71 S	2151.20 E	2162.72	1.85
8457.00	88.49	88.57	6548.56	271.98 S	2246.17 E	2257.46	3.85
8552.00	87.53	88.24	6551.86	269.34 S	2341.07 E	2352.09	1.07
8647.00	88.27	88.83	6555.34	266.91 S	2435.98 E	2446.73	1.00
8742.00	90.09	89.15	6556.70	265.24 S	2530.95 E	2541.48	1.95
8837.00	90.86	89.02	6555.91	263.72 S	2625.93 E	2636.25	0.82
8932.00	91.23	89.39	6554.18	262.40 S	2720.91 E	2731.02	0.55
9026.00	90.83	88.11	6552.49	260.35 S	2814.87 E	2824.73	1.43
9121.00	91.79	88.55	6550.32	257.58 S	2909.80 E	2919.39	1.11
9216.00	93.39	89.12	6546.03	255.65 S	3004.68 E	3014.03	1.79
9311.00	92.65	87.68	6541.02	253.00 S	3099.51 E	3108.58	1.70
9406.00	90.37	89.44	6538.52	250.62 S	3194.44 E	3203.25	3.03
9501.00	90.34	87.95	6537.93	248.45 S	3289.41 E	3297.97	1.57
9596.00	90.22	88.03	6537.46	245.12 S	3384.35 E	3392.60	0.15
9691.00	90.56	89.01	6536.82	242.67 S	3479.31 E	3487.30	1.09
9786.00	89.35	89.78	6536.89	241.67 S	3574.31 E	3582.10	1.51
9881.00	89.38	90.21	6537.95	241.66 S	3669.30 E	3676.96	0.45
9976.00	89.85	89.54	6538.58	241.45 S	3764.30 E	3771.81	0.86
10071.00	90.31	89.77	6538.45	240.88 S	3859.29 E	3866.64	0.54
10166.00	90.52	89.90	6537.76	240.60 S	3954.29 E	3961.49	0.26
10261.00	90.49	89.51	6536.93	240.11 S	4049.29 E	4056.33	0.41
10355.00	90.46	88.79	6536.15	238.72 S	4143.27 E	4150.10	0.77
10450.00	90.52	89.01	6535.33	236.90 S	4238.25 E	4244.85	0.24
10545.00	90.65	89.06	6534.36	235.30 S	4333.23 E	4339.61	0.15
10653.00	90.68	89.48	6533.11	233.92 S	4441.22 E	4447.37	0.39
10717.00	90.68	89.48	6532.35	233.34 S	4505.21 E	4511.24	0.00

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 93.05 DEGREES (GRID)
A TOTAL CORRECTION OF 7.63 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10717.00 FEET
IS 4511.25 FEET ALONG 92.96 DEGREES (GRID)**