



# PCG Pressure Case Gamma PCD Pressure Case Directional

Country : USA				
Field : Wattenberg				
Location : Lat: 40° 29' 32.60" North Long: 104° 24' 45.14" West				
Well : WR State PC USX AA16-69-1HNL				
Company : Noble Energy				
Rig : H&P 343				
LOCATION				
Latitude : 40° 29' 32.60" North Longitude : 104° 24' 45.14" West		Company : Noble Energy Rig : H&P 343 Well : WR State PC USX AA16-69-1HNL Field : Wattenberg Country : USA API Number : 05-123-36182		
UTM Easting = 3,302,448.84 ft UTM Northing = 1,424,072.28 ft				
Permanent Datum : Ground Level		Elevation : 4778.00 ft		
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum		
Drilling Measured From : Drill Floor		MD LOG		
Depth Logged : 677.00 ft To 16,315.00 ft		Unit No. : 11610115		
Date Logged : 22-Dec-12 To 06-Jan-13		Job No. : CA-XX-0900062162		
Total Depth MD : 16,315.00 ft TVD : 6,744.40 ft		Plot Type : Final		
Spud Date : 22-Dec-12		Plot Date : 06-Jan-13		
Run No.	Borehole Record (MD)		Borehole Record (MD)	
	Size	From	To	To
2	8.750 in	677.00 ft	5,988.00 ft	
3	8.750 in	5,988.00 ft	6,738.00 ft	
4	8.750 in	6,738.00 ft	6,880.00 ft	
5	8.750 in	6,880.00 ft	7,050.00 ft	
6	6.125 in	7,050.00 ft	7,568.00 ft	
7	6.125 in	7,568.00 ft	12,600.00 ft	9.625 in
8	6.125 in	12,600.00 ft	15,370.00 ft	7.000 in
9	6.125 in	15,370.00 ft	16,315.00 ft	

## WELL INFORMATION

MWD Run Number	100	200	300	400	500
Date run completed	25-Dec-12	26-Dec-12	26-Dec-12	28-Dec-12	29-Dec-12
Rig Bit Number	2	3	4	5	6
Bit Size (in)	8.750	8.750	8.750	8.750	6.125
Tool Nominal OD (in)	6.750	6.750	6.750	6.750	4.750
Log Start Depth (MD, ft)	677.00	5,988.00	6,738.00	6,880.00	7,050.00
Log End Depth (MD, ft)	5,988.00	6,738.00	6,880.00	7,050.00	7,568.00
Drill or Wipe	Drill	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	23-Dec-12 23:00	25-Dec-12 07:15	26-Dec-12 11:00	27-Dec-12 07:00	29-Dec-12 13:00
Drill/Wipe End Date and Time	24-Dec-12 21:45	26-Dec-12 01:00	26-Dec-12 13:30	27-Dec-12 18:30	29-Dec-12 19:30
Min Inc (deg) @ Depth (MD, ft)	0 @ 677.00	.34 @ 6,018.00	51.37 @ 6,778.00	69.80 @ 6,920.00	90.62 @ 7,429.00
Max Inc (deg) @ Depth (MD, ft)	14.04 @ 2,977.00	47.00 @ 6,730.00	61.35 @ 6,873.00	85.96 @ 6,996.00	91.17 @ 7,239.00
Bit TFA(in2) / Bit Type	.90 / PDC	.86 / PDC	.86 / PDC	.92 / Tricone	.86 / PDC
Flow Rate (gpm)	565.41	527.78	500.00	492.50	270.83
Max AV (fpm) / CV (fpm) @ MWD	380.0 / 300.0	380.0 / 275.0	380.0 / 275.0	342.6 / 275.0	394.7 / 350.0
Fluid Type	Native/Spud Mud	Native/Spud Mud	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	9.00 / 28.00	10.40 / 34.00	11.00 / 35.00	11.10 / 37.00	9.30 / 30.00
Filtrate CL (ppm)	2,700.00	2,700.00	2,600.00	2,800.00	2,800.00
pH / Fluid Loss (mptm)	9.90 / NA	8.50 / NA	8.40 / NA	8.20 / NA	8.10 / NA
PV (cP) / YP (lbf2)	4 / 2.00	10 / 9.00	13 / 9.00	14 / 12.00	6 / 4.00
% Solids / % Sand	4.2 / 1.50	4.7 / 0.50	12.2 / .3	12.4 / .25	5.2 / .15
% Oil / Oil:Water Ratio	0 / 0:95	0 / 0:95	0 / 0:95	0 / 0:95	0 / 0:95
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	NA @ NA
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	NA @ NA
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	NA @ NA
Mud Weight (lb/gal)	11.10 / 12.00	11.10 / 12.00	11.10 / 12.00	11.10 / 12.00	11.10 / 12.00

Max Tool Temp (degF) / Source	141.70 / PCM	153.79 / PCM	163.20 / PCM	154.30 / PCM	187.48 / PCM
Rm @ Max Tool Temp (degF)	NA @ 141.70	NA @ 153.79	NA @ 163.20	NA @ NA	NA @ NA
Lead MWD Engineer	Gary Eifert	Gary Eifert	Gary Eifert	Gary Eifert	Gary Eifert
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez

## 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	245494	245494	245494	245494	11744843
Insert Serial Number	11400826	11400826	11680786	11680786	11400826
Date and Time Initialized	22-Dec-12 22:11	22-Dec-12 22:11	26-Dec-12 02:39	26-Dec-12 02:39	27-Dec-12 23:45
Date and Time Read	26-Dec-12 08:32	26-Dec-12 08:41	28-Dec-12 00:54	28-Dec-12 01:02	29-Dec-12 23:12
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)	57.00	55.00	54.00	54.00	67.00
Software Version	6.21	6.21	6.21	6.21	6.21
Sub Serial Number	245494	245494	245494	245494	11744843
Sonde Serial Number	10859920	10859920	11638573	11638573	10859920
Sensor ID Number	N/A	N/A	N/A	N/A	N/A
Toolface Offset (deg)	143.39	26.79	353.07	94.65	115.20

Gamma Ray Sensor Information					
Tool Type	PCG	PCG	PCG	PCG	PCG
Distance From Bit (ft)	49.40	48.16	47.14	46.98	59.66
Recorded Sample Period (sec)	10	10	10	10	10
Software Version	8.15	8.15	8.15	8.15	8.15
Sub Serial Number	11909583	11909583	11909583	11909583	11744843
Insert/Sonde Serial Number	11680972	11680972	11681015	11681015	11680972

WELL INFORMATION					
MWD Run Number	600	700	800		
Date run completed	02-Jan-13	04-Jan-13	06-Jan-13		
Rig Bit Number	7	8	9		
Bit Size (in)	6.125	6.125	6.125		
Tool Nominal OD (in)	4.750	4.750	4.750		
Log Start Depth (MD, ft)	7,568.00	12,600.00	15,370.00		
Log End Depth (MD, ft)	12,600.00	15,435.00	16,315.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	30-Dec-12 04:00	02-Jan-13 11:00	05-Jan-13 03:15		
Drill/Wipe End Date and Time	01-Jan-13 20:00	04-Jan-13 06:30	05-Jan-13 23:45		
Min Inc (deg) @ Depth (MD, ft)	87.28 @ 9,803.00	87.81 @ 12,995.00	86.23 @ 15,656.00		
Max Inc (deg) @ Depth (MD, ft)	91.63 @ 9,423.00	92.50 @ 13,660.00	92.81 @ 16,315.00		
Bit TFA(in2) / Bit Type	.86 / PDC	.86 / PDC	.86 / PDC		
Flow Rate (gpm)	272.68	268.10	270.00		
Max AV (fpm) / CV (fpm) @ MWD	401.4 / 350.0	401.4 / 350.0	400.0 / 350.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.10 / 30.00	9.13 / 33.00	9.30 / 32.00		
Filtrate CL (ppm)	2,700.00	2,800.00	2,500.00		
pH / Fluid Loss (mptm)	8.60 / NA	8.20 / NA	8.30 / NA		
PV (cP) / YP (lbf2)	7 / 6.00	9 / 9.00	8 / 9.00		
% Solids / % Sand	3.9 / 0.10	4.90 / 0.25	5.50 / 0.15		
% 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		
Max Tool Temp (degF) / Source	217.60 / PCM	250.56 / PCM	239.54 / PCM		
Rm @ Max Tool Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Lead MWD Engineer	Gary Eifert	Gary Eifert	Gary Eifert		
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11744843	11744843	11744843		
Insert Serial Number	11619996	11400826	11619996		
Date and Time Initialized	29-Dec-12 21:00	01-Jan-13 21:26	04-Jan-13 11:42		
Date and Time Read	02-Jan-13 04:26	04-Jan-13 17:32	06-Jan-13 08:53		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	65.00	65.00	69.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11744843	11744843	11744843		
Sonde Serial Number	11478054	10859920	11478054		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	205.82	117.30	230.69		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	57.67	57.66	62.34		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11744843	11744843	11744843		
Insert/Sonde Serial Number	11579840	11680972	11579840		

## 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 7.4.01

WARRANTY

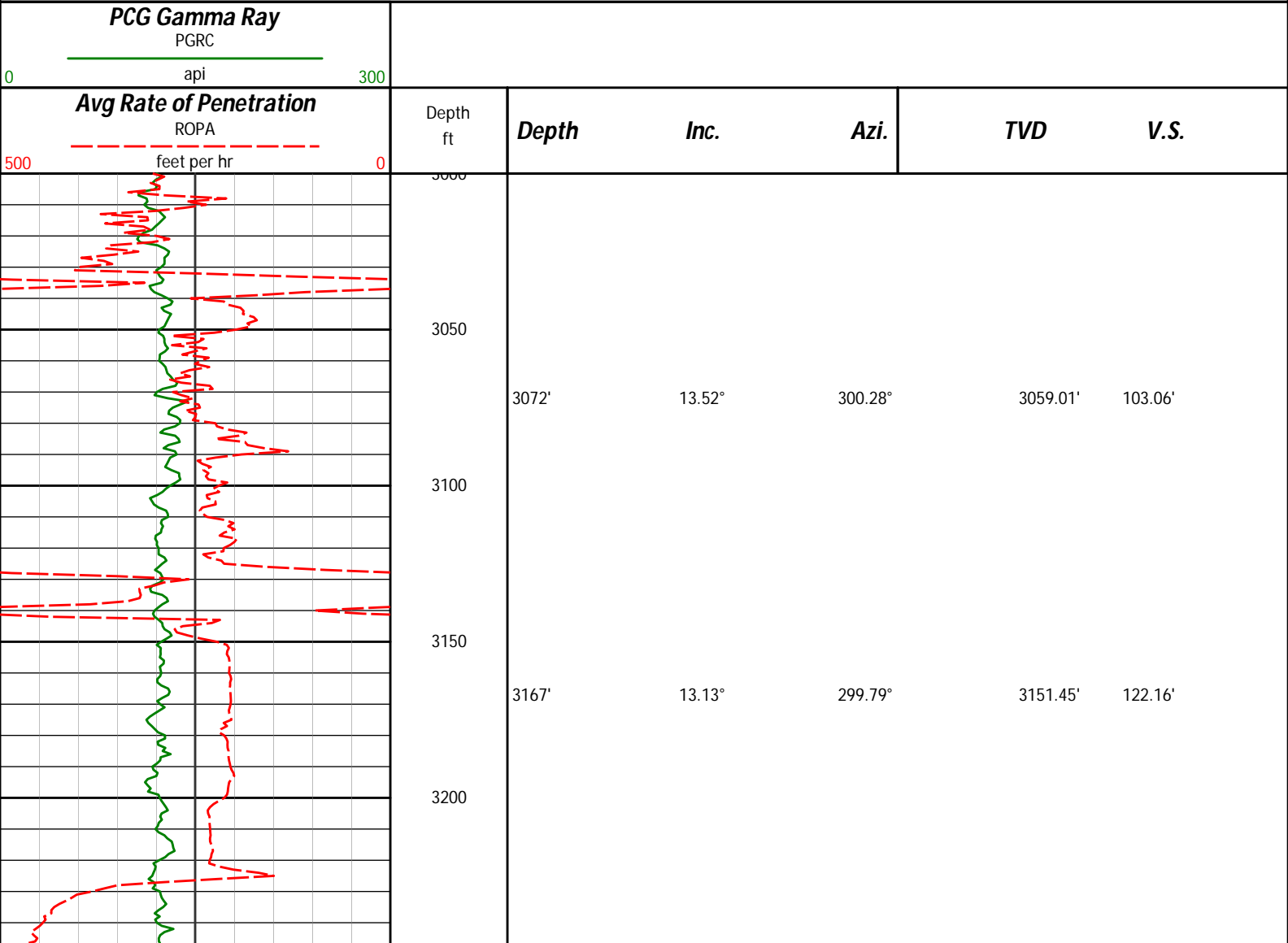
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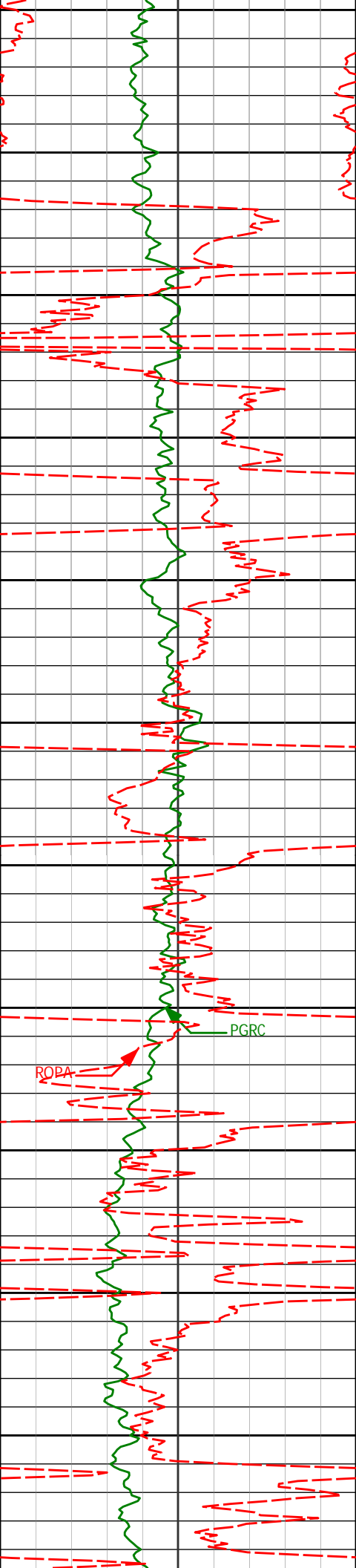
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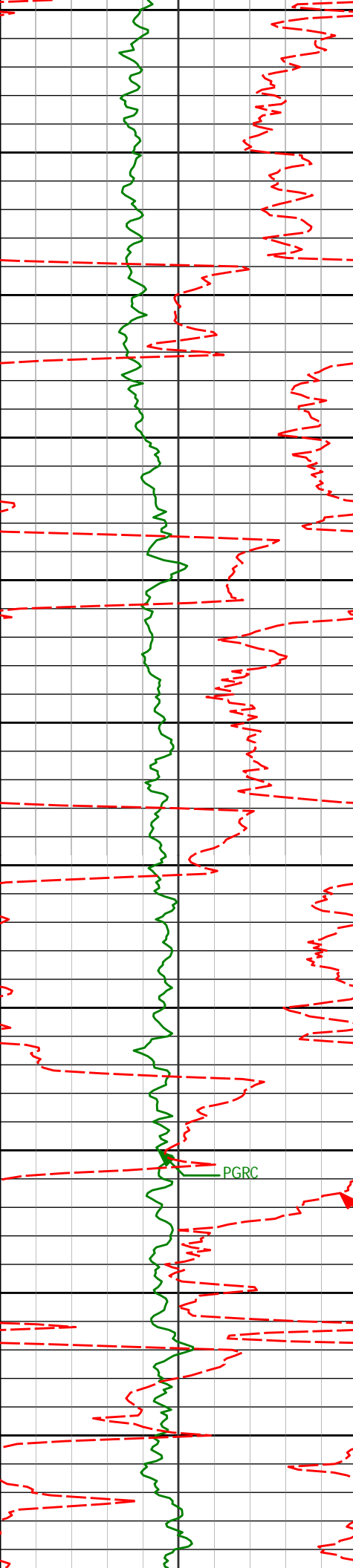
MD Main Log 1:600

Noble Energy  
Wells Ranch State PC USX AA16-69-1HNL  
H&P 343  
T6N-R63W



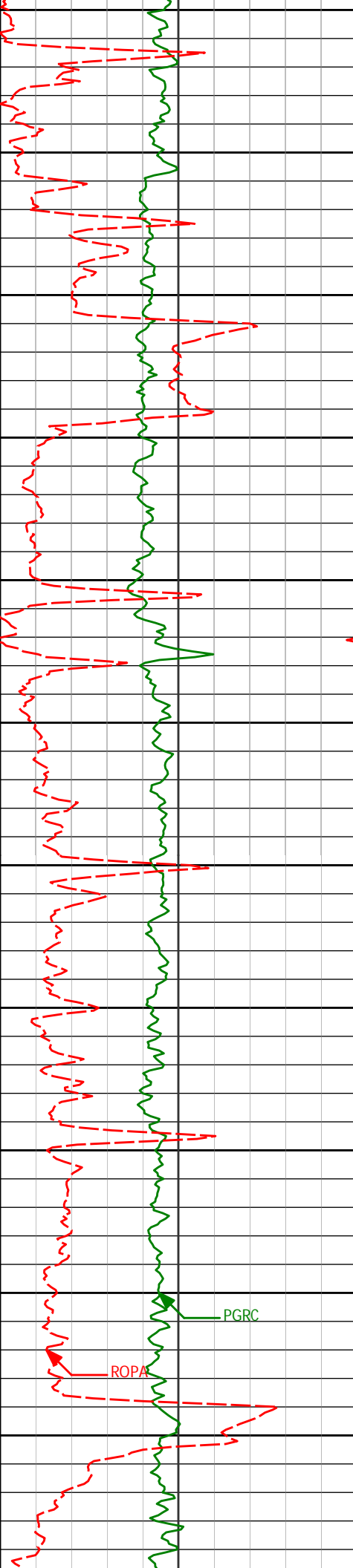


3262'	12.84°	299.02°	3244.02'	140.88'
3357'	12.05°	301.76°	3336.79'	158.67'
3452'	11.43°	303.90°	3429.80'	175.04'
3547'	12.01°	310.13°	3522.82'	190.56'
3642'	12.99°	304.84°	3615.57'	207.03'
3737'	13.48°	303.34°	3708.05'	225.19'



3800  
3850  
3900  
3950  
4000  
4050  
4100  
4150  
4200  
4250  
4300

3832'	13.64°	302.54°	3800.40'	244.03'
3927'	12.06°	300.07°	3893.02'	262.19'
4022'	10.16°	299.44°	3986.24'	278.19'
4117'	8.23°	297.74°	4080.01'	291.59'
4212'	5.05°	297.50°	4174.36'	301.38'
4307'	3.05°	310.26°	4269.12'	307.07'



4350

4400

4450

4500

4550

4600

4650

4700

4750

4800

4850

4402'

3.00°

309.56°

4363.99'

310.95'

4497'

1.27°

317.29°

4458.92'

313.61'

4592'

1.18°

311.45°

4553.90'

315.07'

4687'

1.14°

332.46°

4648.88'

316.26'

4782'

1.19°

345.91°

4743.86'

316.96'

4877'

0.76°

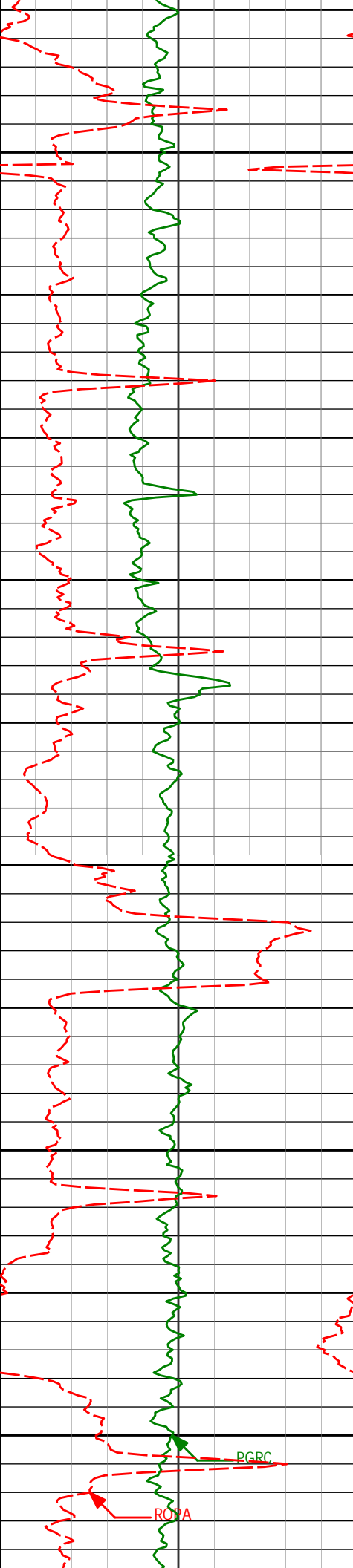
22.34°

4838.85'

316.98'

PGRC

ROPA



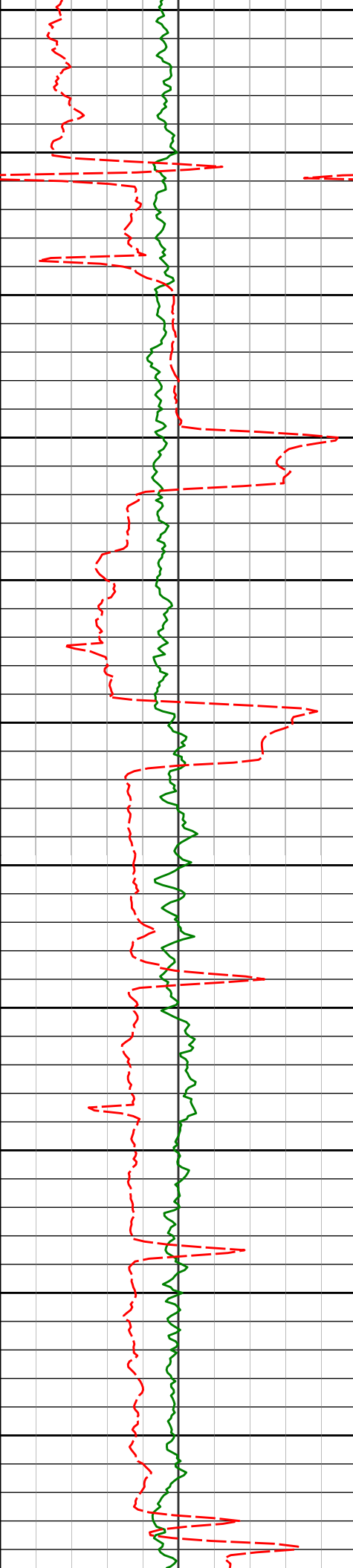
4900  
4950  
5000  
5050  
5100  
5150  
5200  
5250  
5300  
5350  
5400

4972'	0.56°	9.34°	4933.84'	316.68'
5067'	0.49°	14.09°	5028.84'	316.52'
5162'	0.43°	347.94°	5123.84'	316.50'
5257'	0.40°	209.48°	5218.83'	316.74'
5352'	0.57°	236.39°	5313.83'	317.29'

PGRC

ROYA





5450

5500

5550

5600

5650

5700

5750

5800

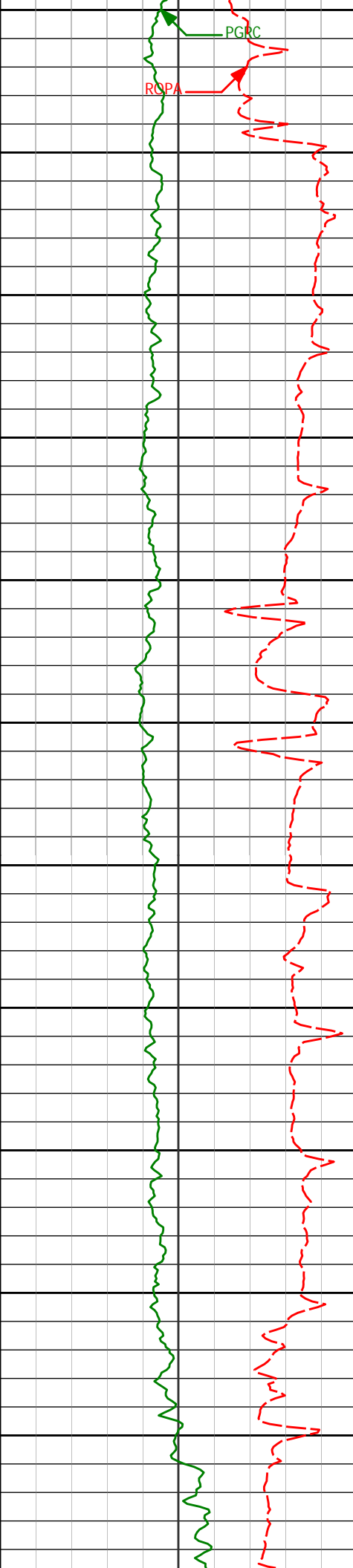
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5900

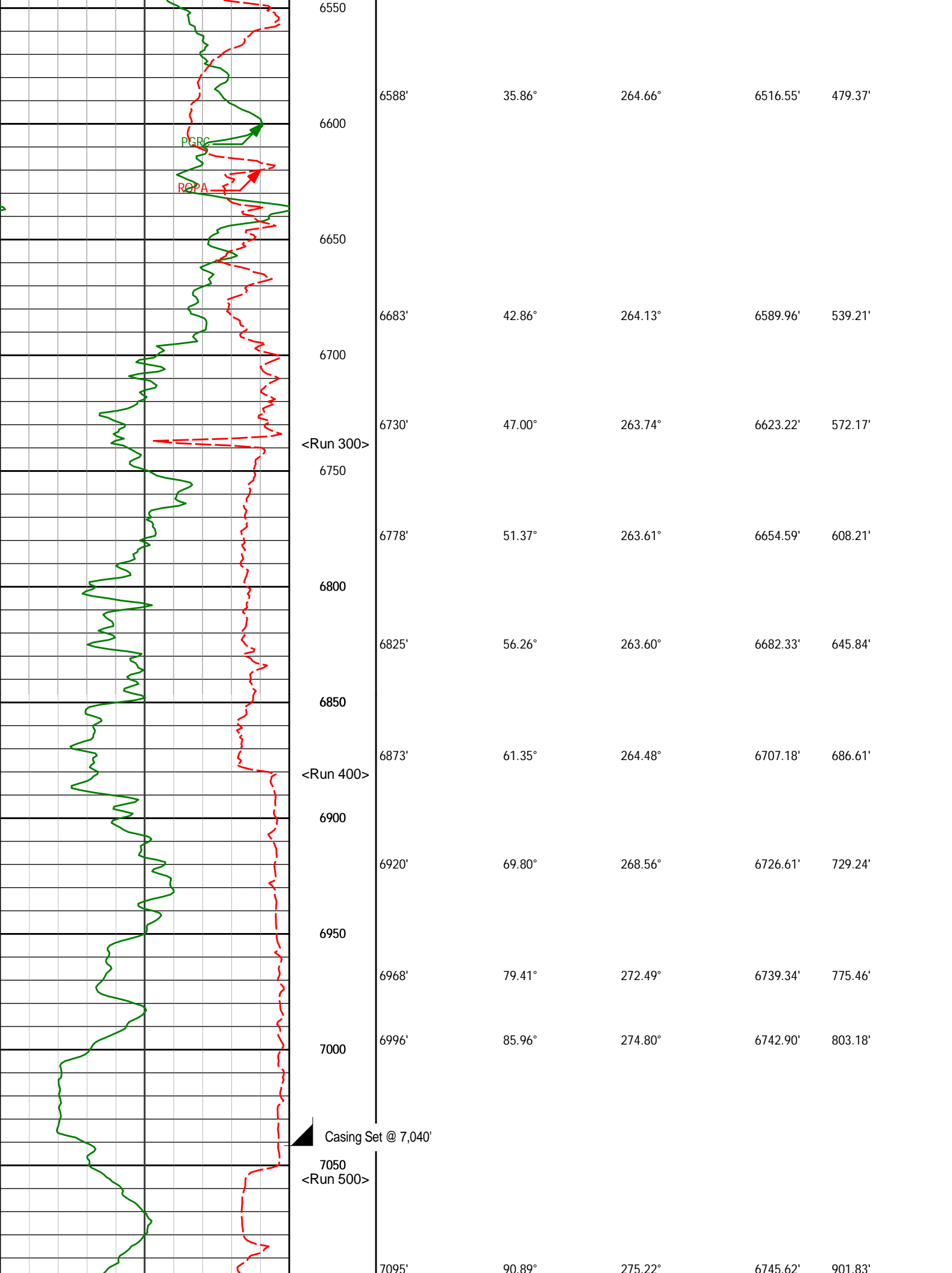
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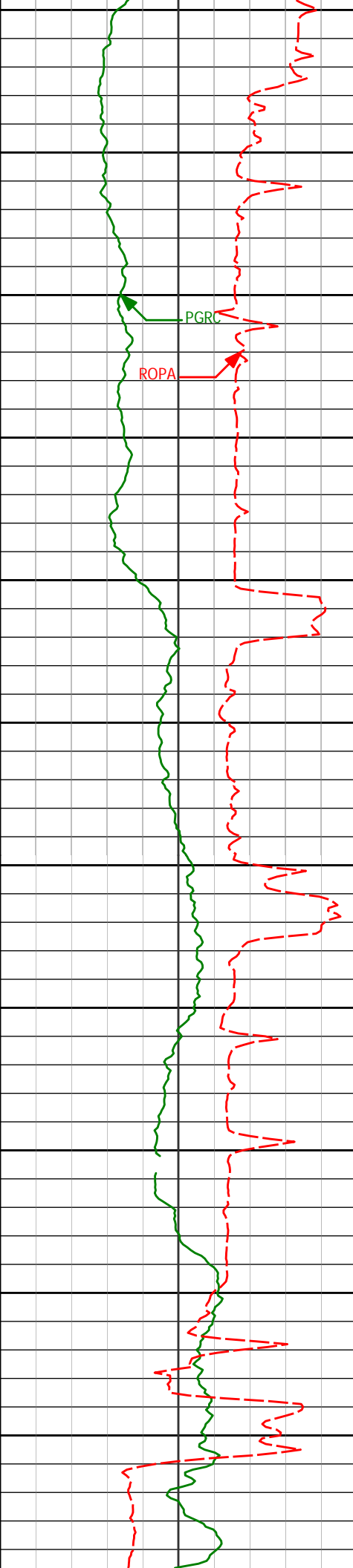
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5447'	1.30°	236.98°	5408.82'	318.37'
5542'	1.46°	229.22°	5503.79'	320.38'
5637'	1.06°	172.48°	5598.77'	321.16'
5732'	1.02°	108.06°	5693.76'	320.23'
5827'	0.81°	113.42°	5788.75'	318.80'
5922'	0.07°	183.80°	5883.74'	318.18'



6000				
6018'	0.34°	0.54°	5979.74'	318.18'
6050				
6065'	1.09°	293.39°	6026.74'	318.60'
6100				
6113'	5.20°	292.14°	6074.66'	321.04'
6150				
6160'	9.04°	281.15°	6121.29'	326.66'
6200				
6208'	12.54°	280.80°	6168.43'	335.50'
6250				
6255'	12.82°	282.58°	6214.28'	345.63'
6300				
6303'	15.35°	275.38°	6260.84'	357.17'
6350				
6350'	18.50°	272.81°	6305.80'	370.83'
6400				
6398'	22.25°	270.03°	6350.79'	387.53'
6450				
6445'	26.18°	269.40°	6393.65'	406.81'
6500				
6493'	29.09°	267.61°	6436.17'	429.05'
6540'	31.80°	265.29°	6476.68'	452.79'





7100				
7150	7143'	90.68°	274.38°	6744.96' 949.70'
7200				
7250	7239'	91.17°	274.38°	6743.41' 1045.49'
7300				
7350	7334'	90.62°	272.49°	6741.93' 1140.37'
7400				
7450	7429'	90.62°	271.29°	6740.91' 1235.34'
7500	7501'	90.80°	270.78°	6740.02' 1307.34'
	7524'	90.86°	270.51°	6739.68' 1330.33'
7550				
	<Run 600>			
7600				
	7619'	88.86°	269.35°	6739.91' 1425.32'



7650

7700

7750

7800

7850

7900

7950

8000

8050

8100

8150

7713'	89.07°	268.75°	6741.61'	1519.26'
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7808'	89.17°	268.41°	6743.07'	1614.19'
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7903'	88.83°	268.29°	6744.73'	1709.09'
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7998'	88.58°	269.32°	6746.87'	1804.01'
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8093'	90.68°	269.31°	6747.49'	1898.98'
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8188'	90.25°	268.73°	6746.72'	1993.93'
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8200

8250

8283'

90.06°

268.05°

6746.47'

2088.85'

8300

8350

8379'

89.44°

266.62°

6746.88'

2184.68'

8400

8450

8474'

90.59°

270.06°

6746.85'

2279.58'

8500

8550

8569'

90.22°

269.03°

6746.19'

2374.56'

8600

8650

8664'

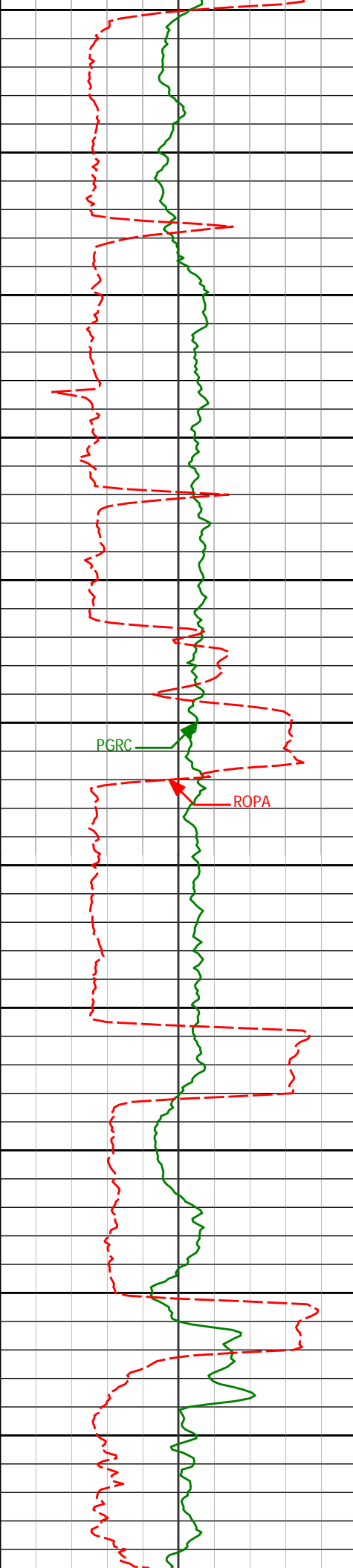
89.26°

269.79°

6746.62'

2469.53'

8700



8750

8758'

90.65°

272.11°

6746.70'

2563.52'

8800

8850

8853'

90.15°

271.62°

6746.04'

2658.50'

8900

8950

8948'

90.37°

272.16°

6745.60'

2753.48'

9000

PGRC

ROPA

9050

9043'

90.59°

274.31°

6744.81'

2848.38'

9100

9150

9138'

90.74°

272.59°

6743.71'

2943.26'

9200

9250

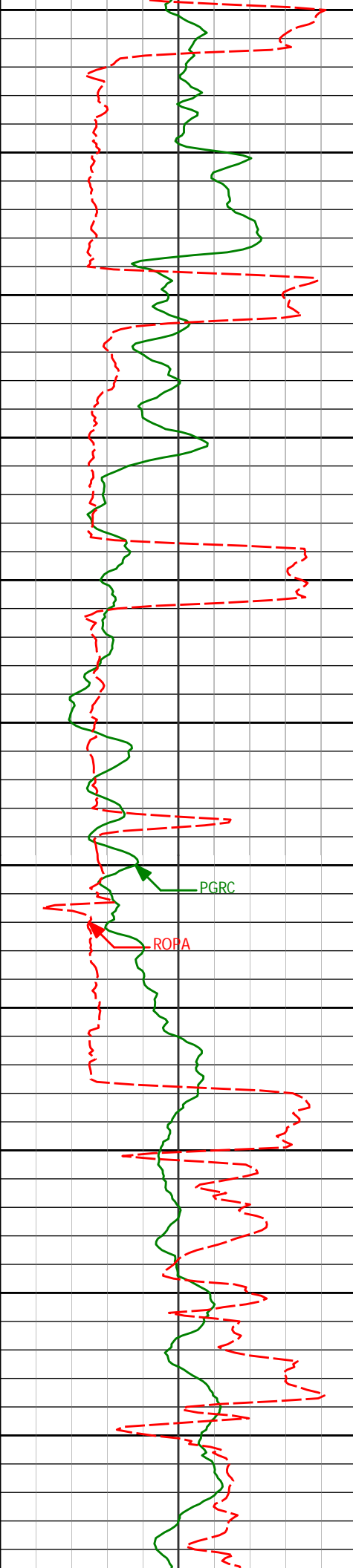
9233'

89.29°

269.74°

6743.68'

3038.25'



9300

9328'

90.59°

269.45°

6743.79'

3133.23'

9350

9400

9423'

91.63°

267.76°

6741.95'

3228.14'

9450

9500

9518'

88.80°

265.76°

6741.59'

3322.90'

9550

9600

9613'

87.44°

264.91°

6744.71'

3417.43'

9650

9700

9708'

88.24°

267.02°

6748.29'

3512.03'

9750

9800

9803'

87.28°

268.52°

6752.00'

3606.82'





9850

9900

9950

10000

10050

10100

10150

10200

10250

10300

10350

9898'

89.69°

268.89°

6754.51'

3701.73'

9993'

90.43°

268.92°

6754.41'

3796.68'

10088'

89.88°

267.55°

6754.15'

3891.59'

10183'

90.80°

269.59°

6753.59'

3986.51'

10278'

90.28°

269.06°

6752.69'

4081.48'

10373'

90.46°

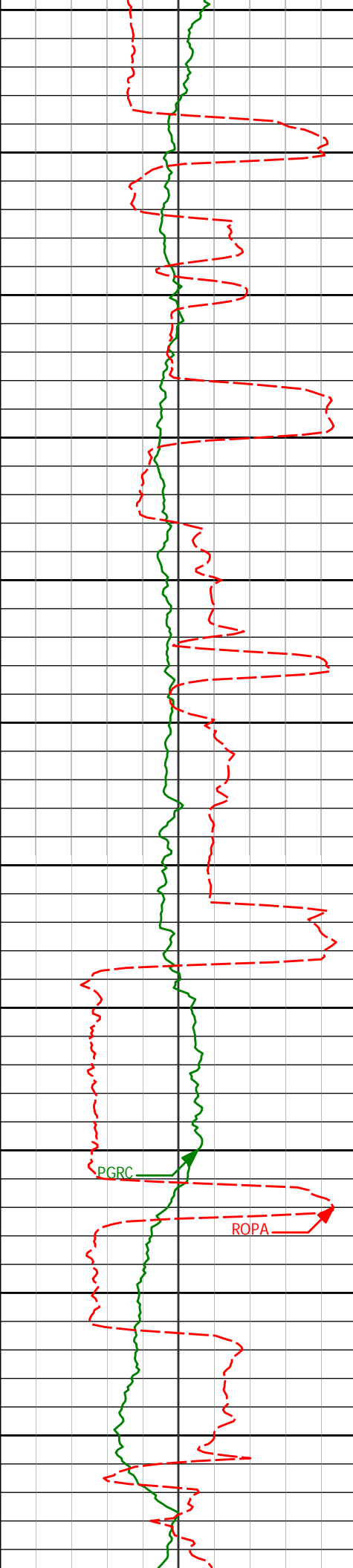
268.94°

6752.08'

4176.44'

PGRC

ROPA



10400

10450

10500

10550

10600

10650

10700

10750

10800

10850

10900

10467'	90.77°	268.44°	6751.07'	4270.37'
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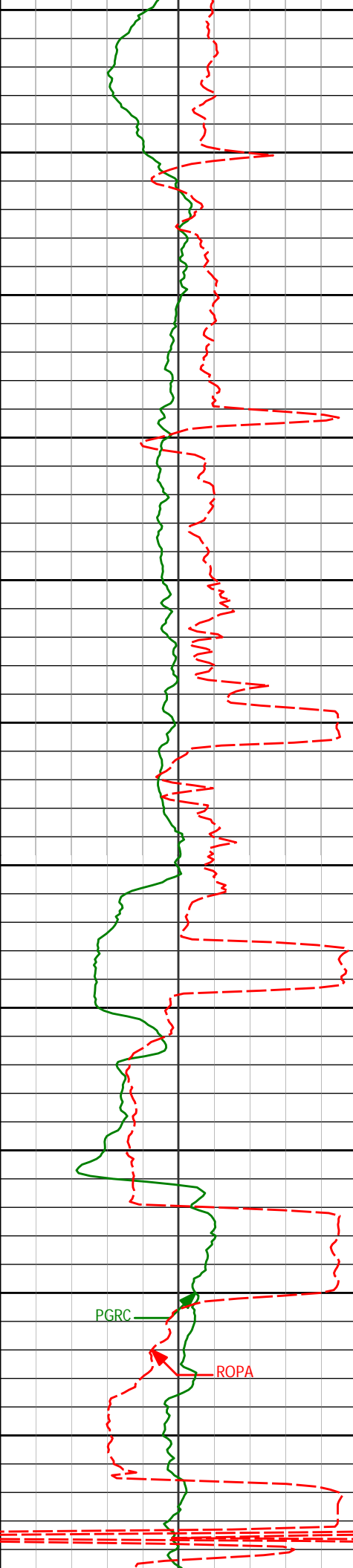
10560'	90.46°	270.33°	6750.07'	4363.34'
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10654'	89.38°	270.48°	6750.19'	4457.33'
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10748'	90.40°	271.56°	6750.37'	4551.33'
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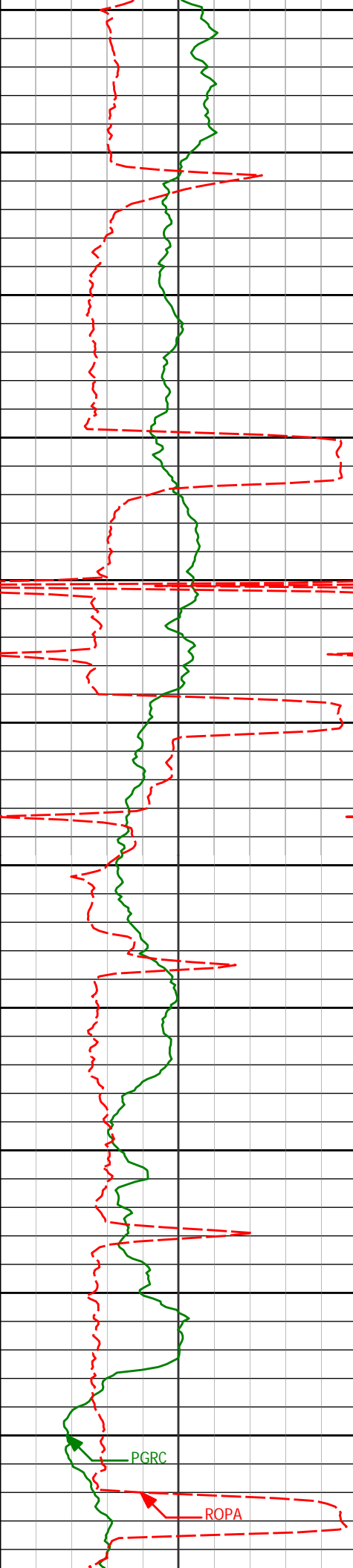
10841'	91.05°	271.48°	6749.19'	4644.31'
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10935'	91.20°	271.07°	6747.35'	4738.29'
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10950  
11000  
11050  
11100  
11150  
11200  
11250  
11300  
11350  
11400  
11450

11027'	90.68°	270.51°	6745.84'	4830.28'
11119'	89.60°	267.63°	6745.61'	4922.23'
11212'	89.69°	266.59°	6746.19'	5015.04'
11306'	89.32°	266.90°	6747.00'	5108.81'
11400'	88.61°	269.36°	6748.69'	5202.69'
11493'	90.22°	270.12°	6749.64'	5295.67'



11500  
11550  
11600  
11650  
11700  
11750  
11800  
11850  
11900  
11950  
12000

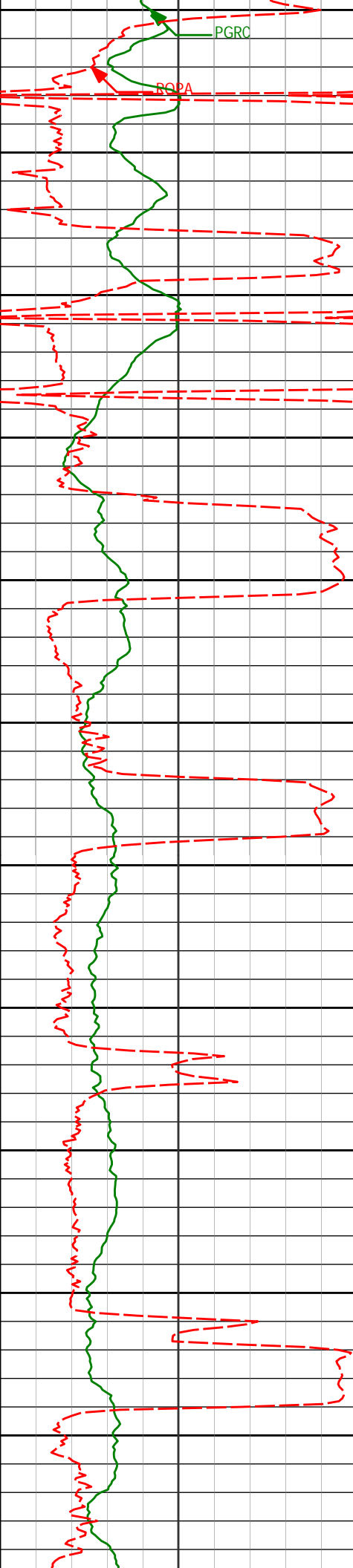
11585'	89.69°	268.63°	6749.72'	5387.64'
11678'	90.34°	269.72°	6749.69'	5480.61'
11769'	90.86°	270.15°	6748.74'	5571.59'
11862'	90.65°	269.64°	6747.51'	5664.58'
11956'	90.34°	268.66°	6746.70'	5758.54'

PGRC

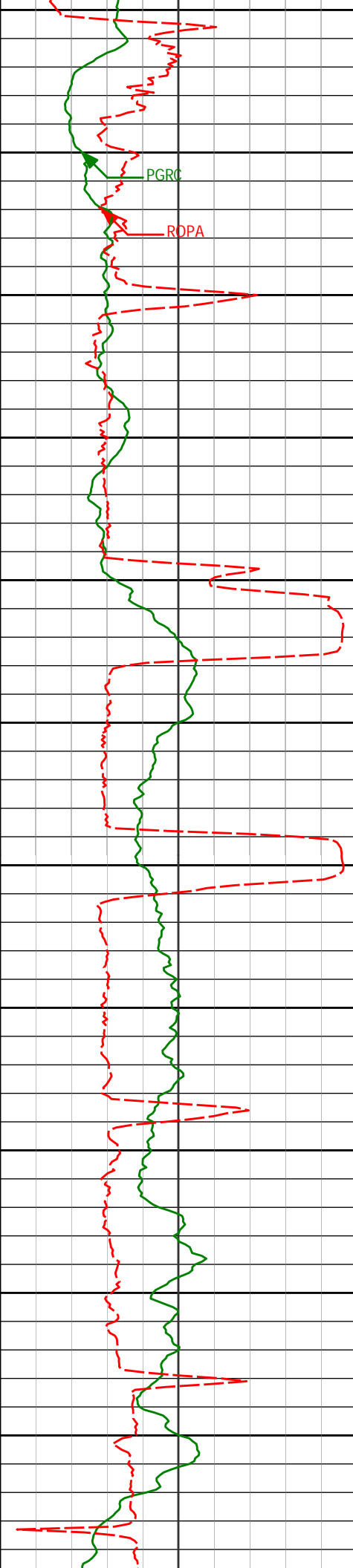
ROPA



12050	12051'	90.74°	268.58°	6745.81'	5853.47'
12100					
12150	12146'	90.71°	267.97°	6744.61'	5948.37'
12200					
12250	12241'	87.72°	267.91°	6745.92'	6043.24'
12300					
12350	12330'	87.41°	269.22°	6749.70'	6132.10'
12400					
12450	12425'	89.11°	269.84°	6752.59'	6227.03'
12500					
12550	12520'	90.31°	269.37°	6753.08'	6322.01'



<Run 700>				
12600	12615'	90.74°	268.02°	6752.21' 6416.94'
12650				
12700	12710'	91.23°	268.53°	6750.57' 6511.84'
12750				
12800	12805'	90.06°	269.93°	6749.50' 6606.80'
12850				
12900	12900'	89.57°	270.43°	6749.81' 6701.80'
12950				
13000	12995'	87.81°	268.71°	6751.98' 6796.75'
13050				
13100	13090'	90.40°	270.14°	6753.46' 6891.70'



13150

13185'	91.33°	269.50°	6752.03'	6986.68'
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13200

13250

13280'	91.85°	268.40°	6749.40'	7081.59'
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13300

13350

13375'	91.17°	269.70°	6746.89'	7176.52'
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13400

13450

13470'	90.49°	271.36°	6745.52'	7271.50'
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13500

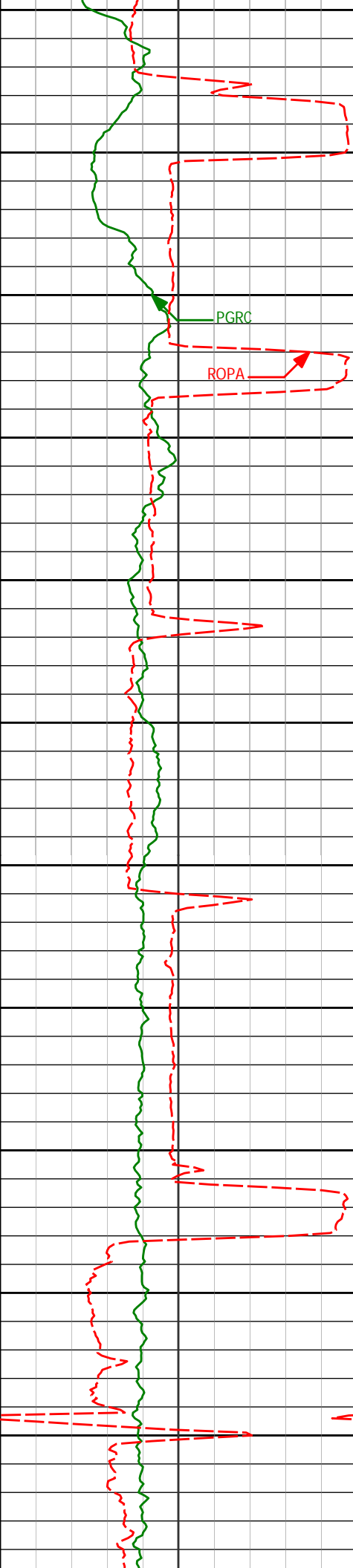
13550

13565'	91.29°	270.76°	6744.04'	7366.49'
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13600

13650

13660'	92.50°	270.66°	6740.89'	7461.44'
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13700

13750

13800

13850

13900

13950

14000

14050

14100

14150

14200

13755'

90.68°

269.25°

6738.26'

7556.38'

13850'

89.32°

269.53°

6738.26'

7651.36'

13945'

90.80°

271.01°

6738.15'

7746.35'

14040'

90.46°

268.76°

6737.11'

7841.33'

14135'

90.25°

270.55°

6736.52'

7936.30'

14230'

90.25°

272.36°

6736.11'

8031.29'





14250

14300

14325'

90.46°

273.85°

6735.52'

8126.20'

14350

14400

14420'

90.62°

273.85°

6734.63'

8221.06'

14450

14500

14515'

89.32°

270.97°

6734.68'

8316.00'

14550

14600

14610'

89.45°

269.90°

6735.70'

8411.00'

14650

14700

14705'

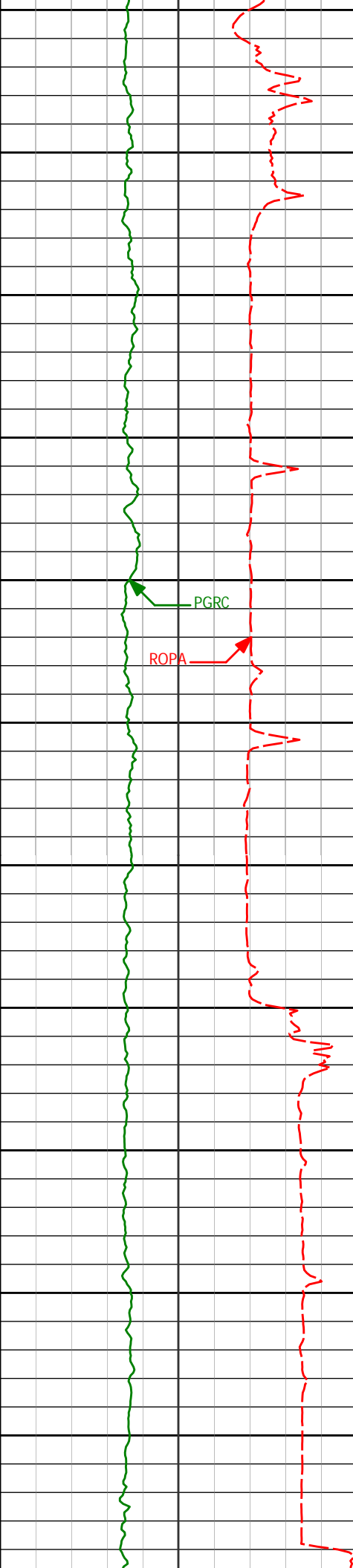
91.05°

269.51°

6735.29'

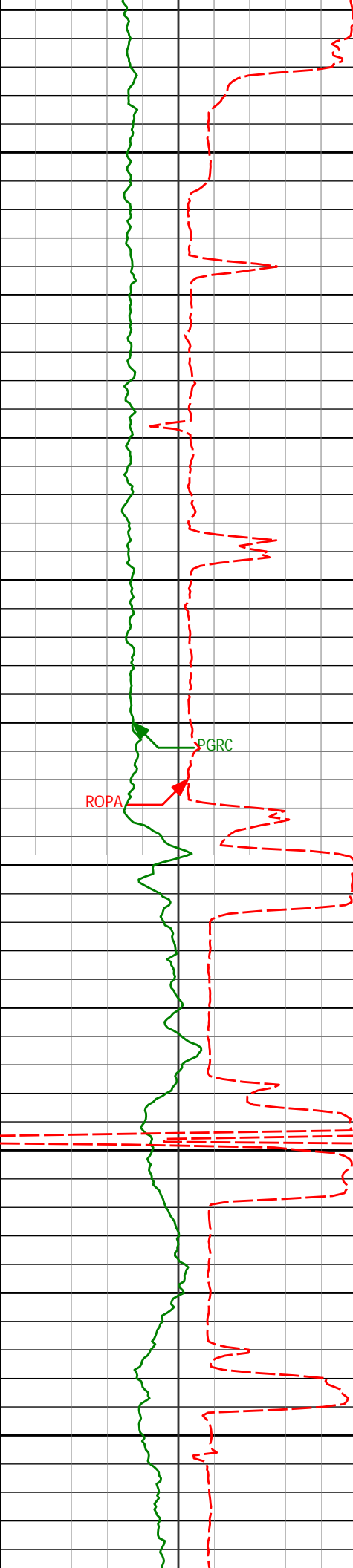
8505.98'

14750

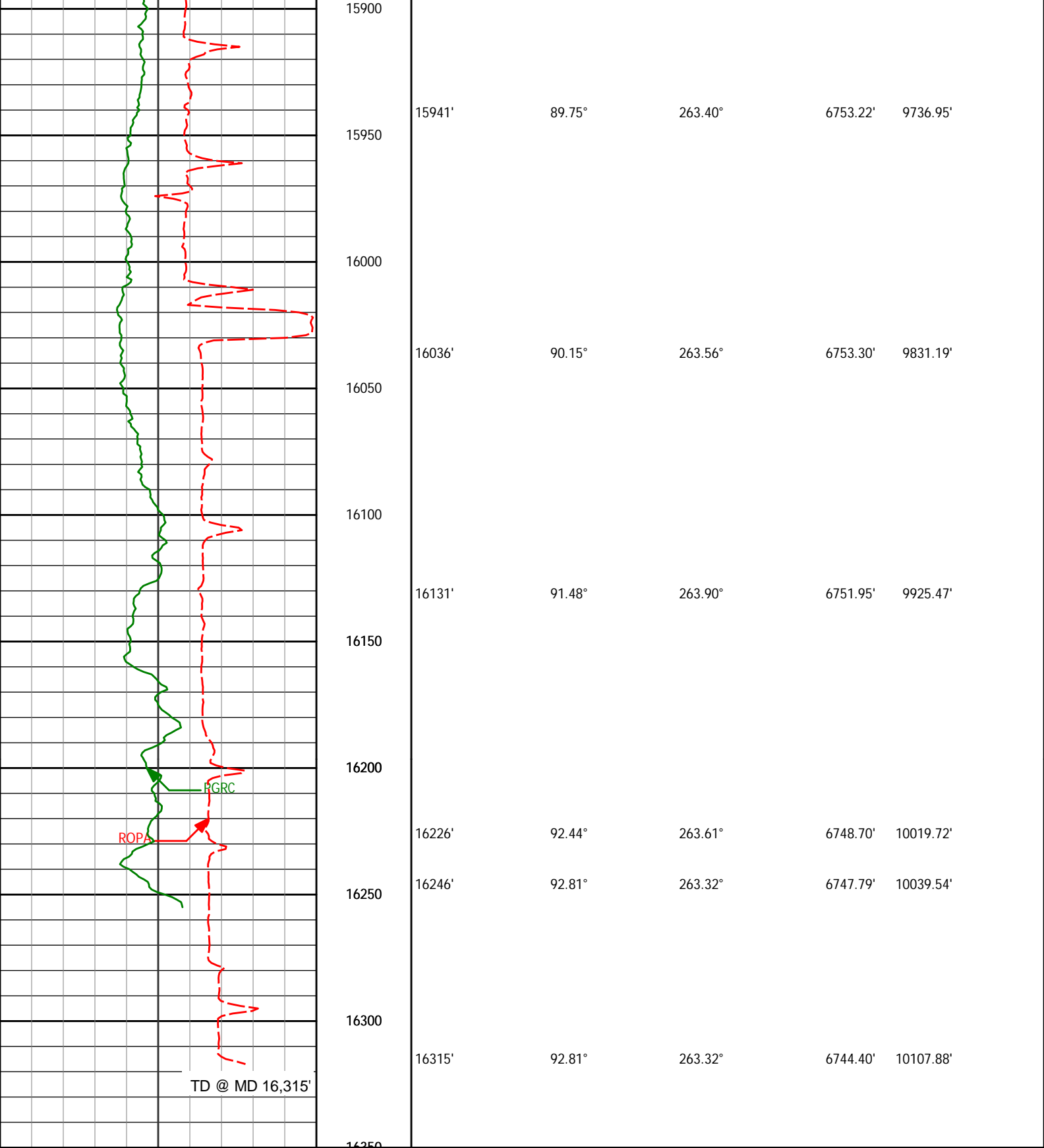


14800  
14850  
14900  
14950  
15000  
15050  
15100  
15150  
15200  
15250  
15300

14800'	90.31°	269.73°	6734.17'	8600.95'
14895'	90.06°	268.71°	6733.86'	8695.92'
14990'	89.69°	268.66°	6734.07'	8790.86'
15085'	90.31°	269.10°	6734.07'	8885.81'
15180'	90.12°	267.39°	6733.71'	8980.72'
15275'	89.26°	265.21°	6734.22'	9075.43'



15350					
<Run 800>	15371'	88.77°	266.82°	6735.88'	9171.09'
15400					
15450					
	15466'	89.54°	266.59°	6737.28'	9265.84'
15500					
15550					
	15561'	88.43°	262.97°	6738.97'	9360.30'
15600					
15650					
	15656'	86.23°	261.74°	6743.40'	9454.19'
15700					
15750					
	15751'	87.38°	264.31°	6748.69'	9548.18'
15800					
15850					
	15846'	88.70°	264.89°	6751.94'	9642.58'



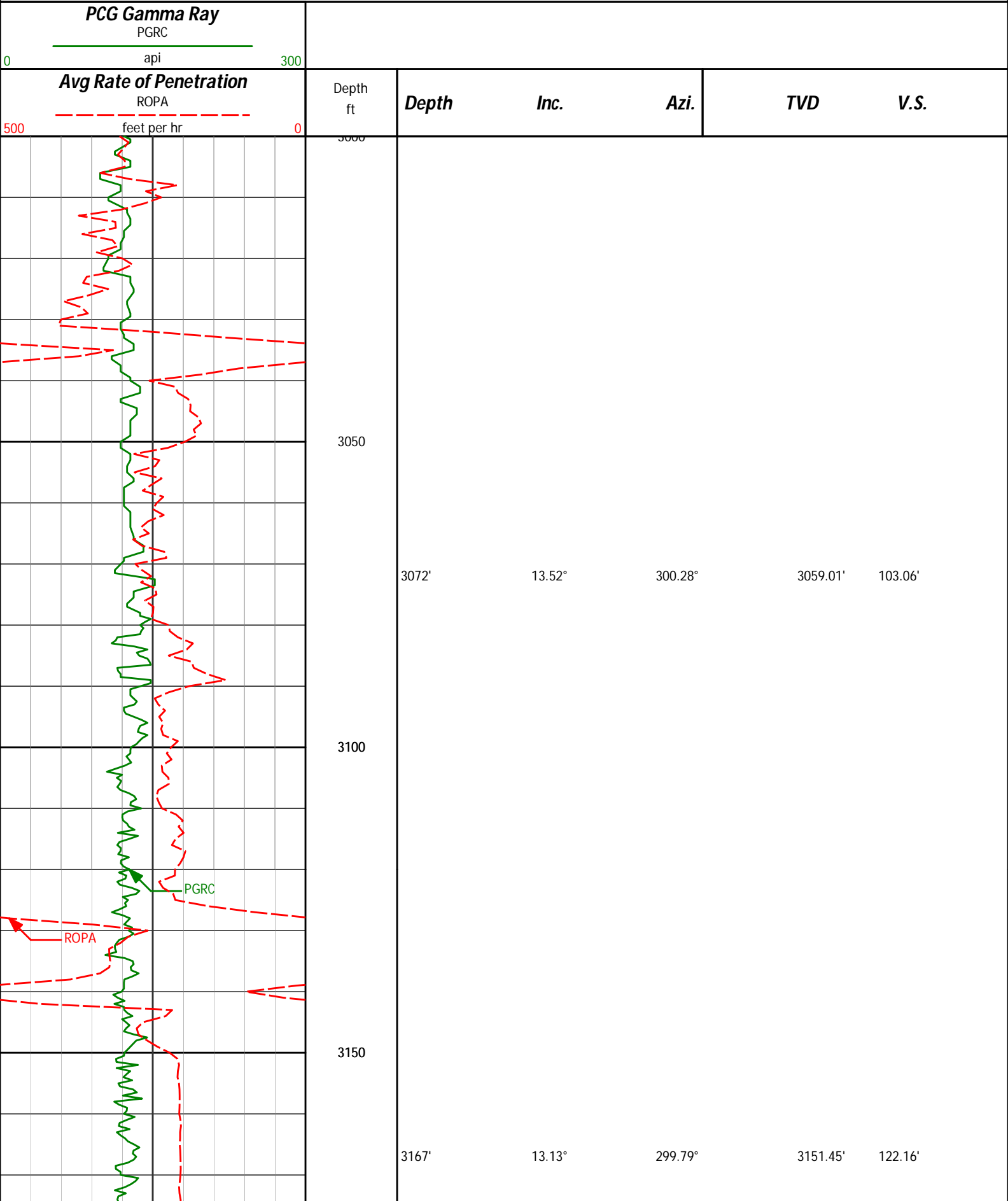
<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.			
500	0									
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>										
0	300									

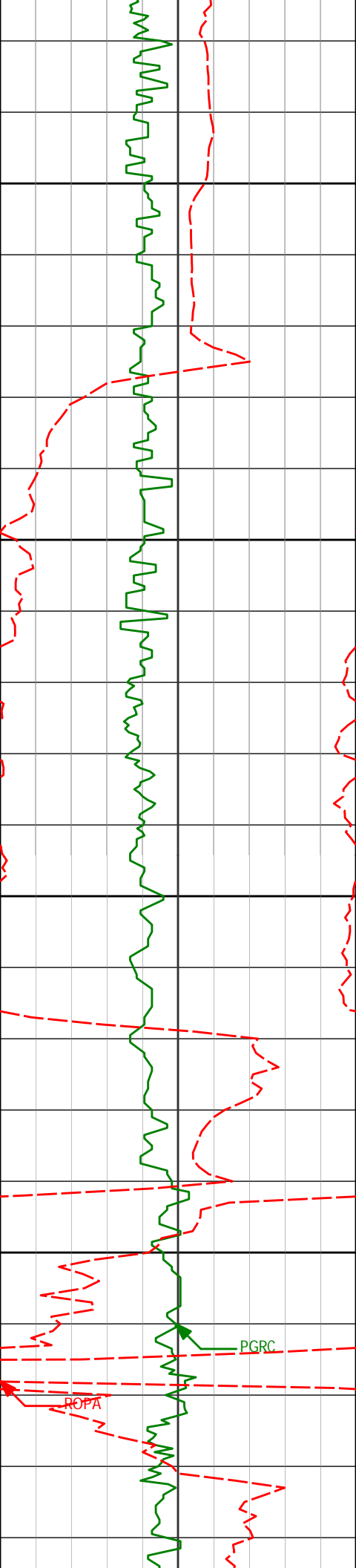
HALLIBURTON

Sperry Drilling Services

# MD Detail Log 1:240

Noble Energy  
Wells Ranch State PC USX AA16-69-1HNL  
H&P 343  
T6N-R63W





3200

3250

3300

3350

3262'

12.84°

299.02°

3244.02'

140.88'

3357'

12.05°

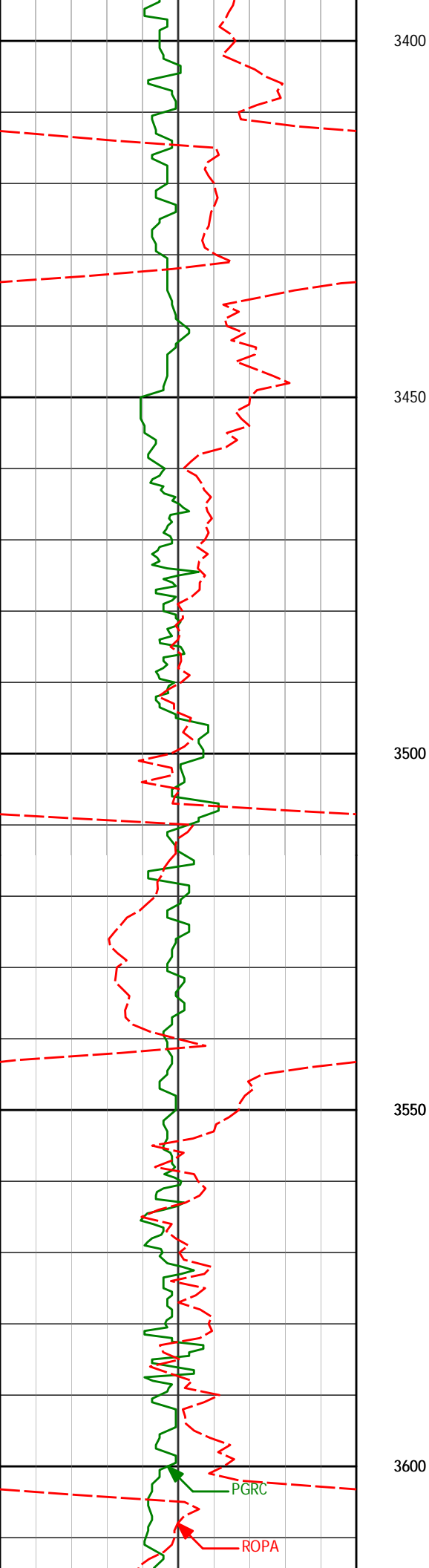
301.76°

3336.79'

158.67'

PGRC

ROPA

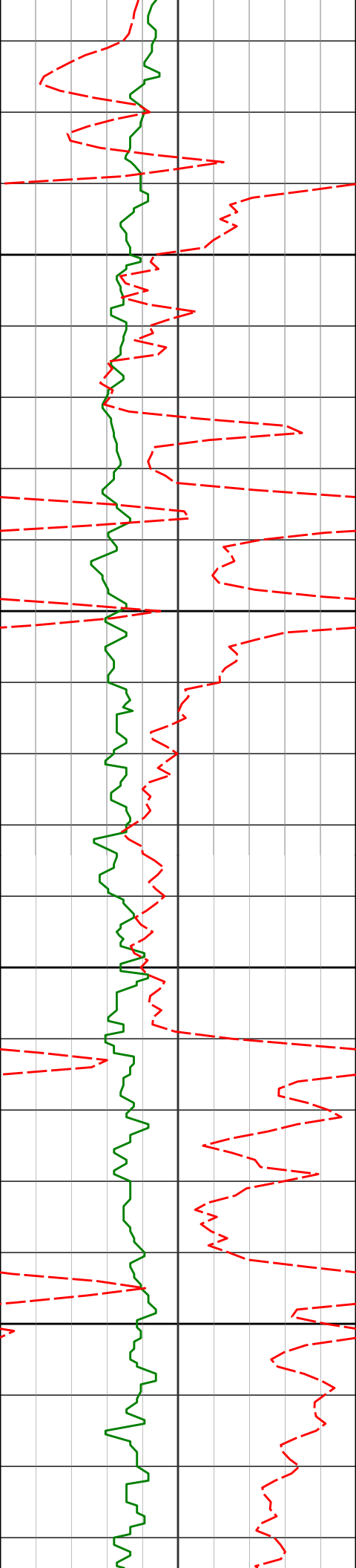


3452'	11.43°	303.90°	3429.80'	175.04'
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3547'	12.01°	310.13°	3522.82'	190.56'
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PGRC

ROPA



3642'

12.99°

304.84°

3615.57'

207.03'

3650

3700

3737'

13.48°

303.34°

3708.05'

225.19'

3750

3800

3832'

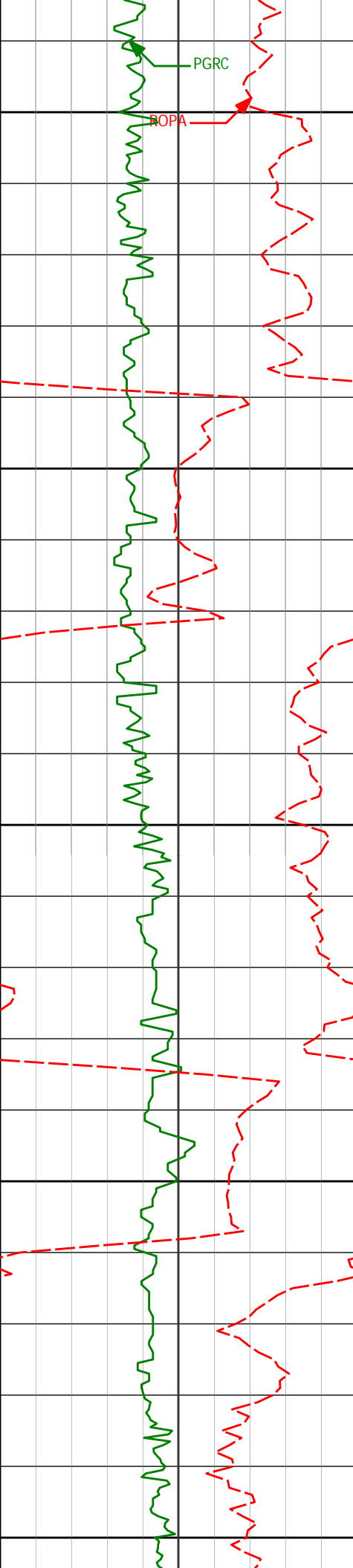
13.64°

302.54°

3800.40'

244.03'





3850

3900

3950

4000

4050

3927'

12.06°

300.07°

3893.02'

262.19'

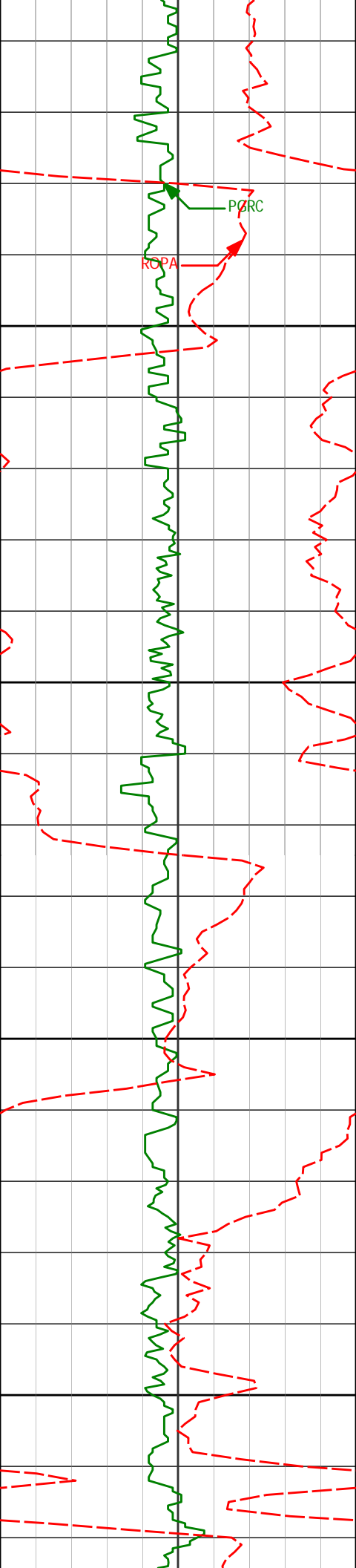
4022'

10.16°

299.44°

3986.24'

278.19'



4100

4117'

8.23°

297.74°

4080.01'

291.59'

4150

4200

4212'

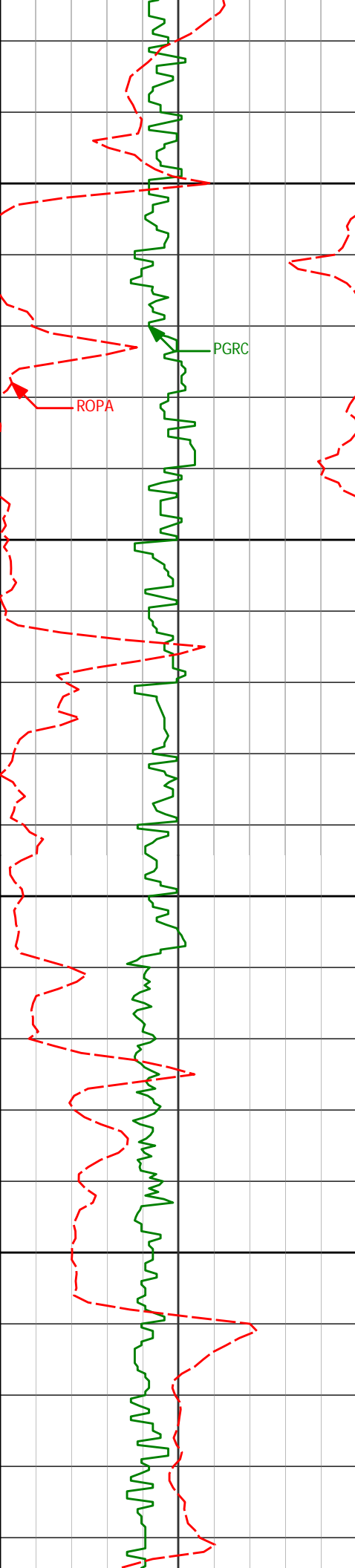
5.05°

297.50°

4174.36'

301.38'

4250



4300

4307'

3.05°

310.26°

4269.12'

307.07'

PGRC

ROP

4350

4400

4402'

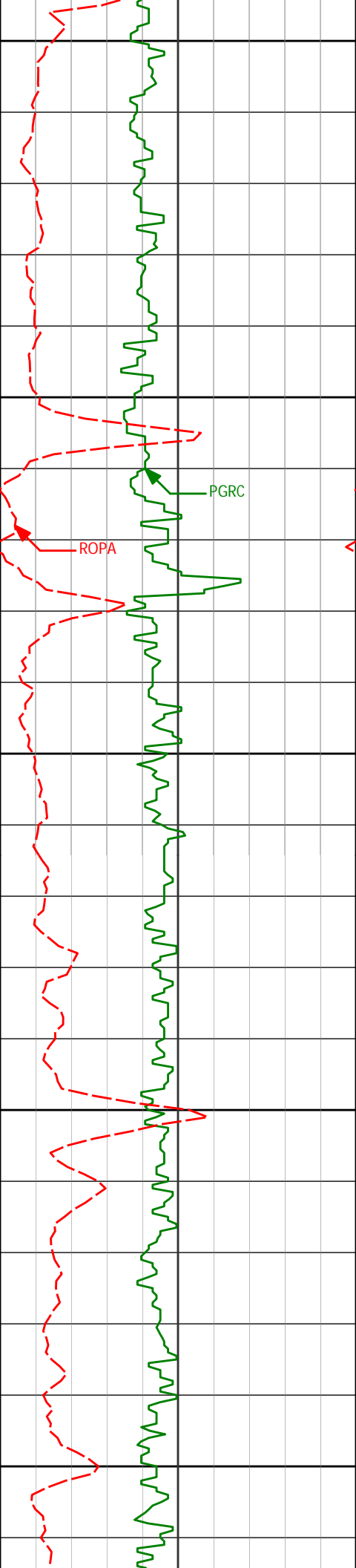
3.00°

309.56°

4363.99'

310.95'

4450



4500

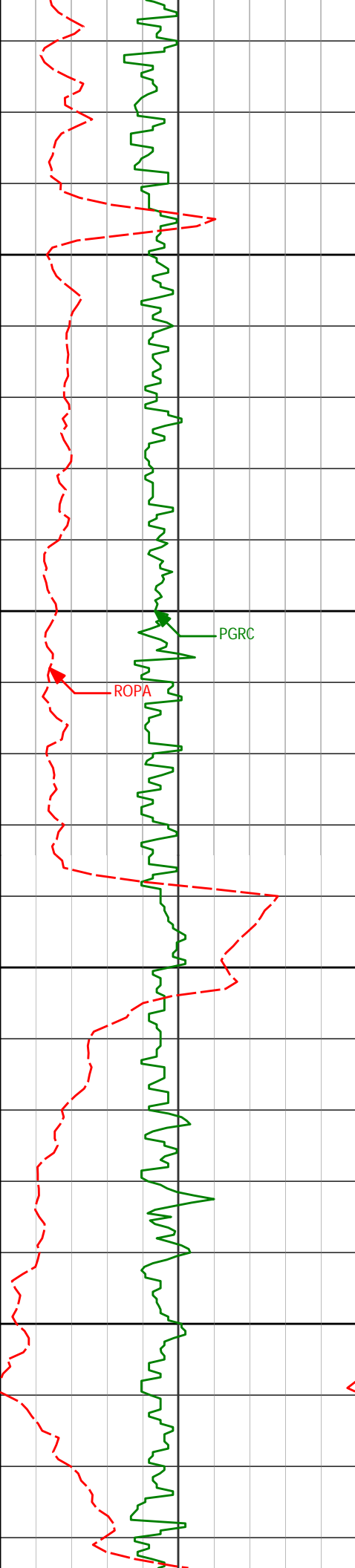
4550

4600

4650

4700

4497'	1.27°	317.29°	4458.92'	313.61'
4592'	1.18°	311.45°	4553.90'	315.07'
4687'	1.14°	332.46°	4648.88'	316.26'



4750

4782'

1.19°

345.91°

4743.86'

316.96'

4800

PGRC

ROPA

4850

4877'

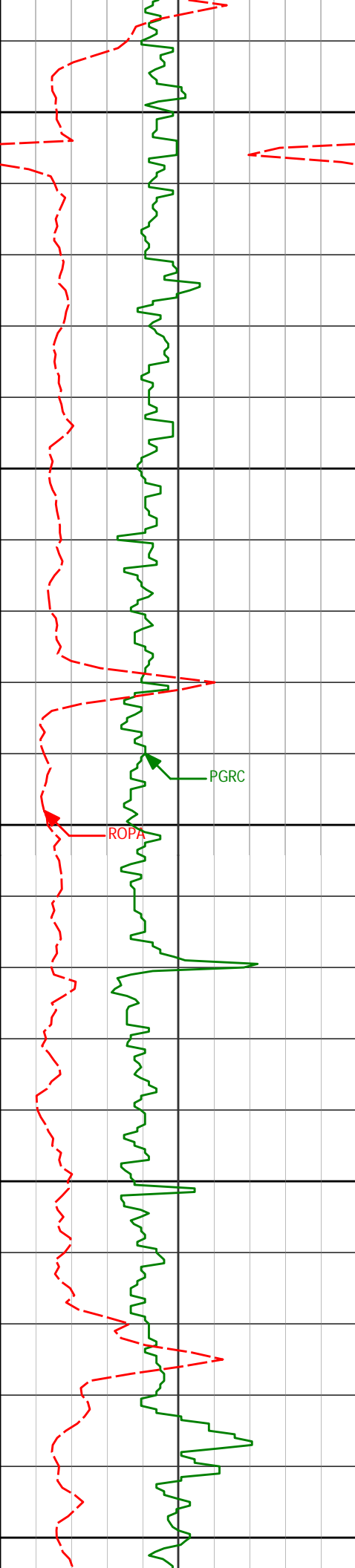
0.76°

22.34°

4838.85'

316.98'

4900



4950

4972'

0.56°

9.34°

4933.84'

316.68'

5000

5050

5067'

0.49°

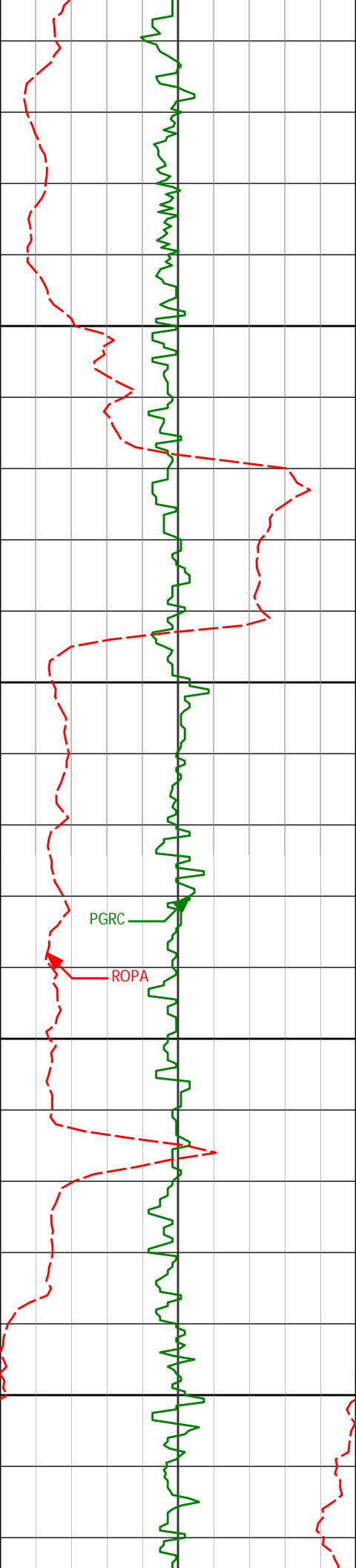
14.09°

5028.84'

316.52'

5100

5150



5162'

0.43°

347.94°

5123.84'

316.50'

5200

5250

5257'

0.40°

209.48°

5218.83'

316.74'

PGRC

ROPA

5300

5350

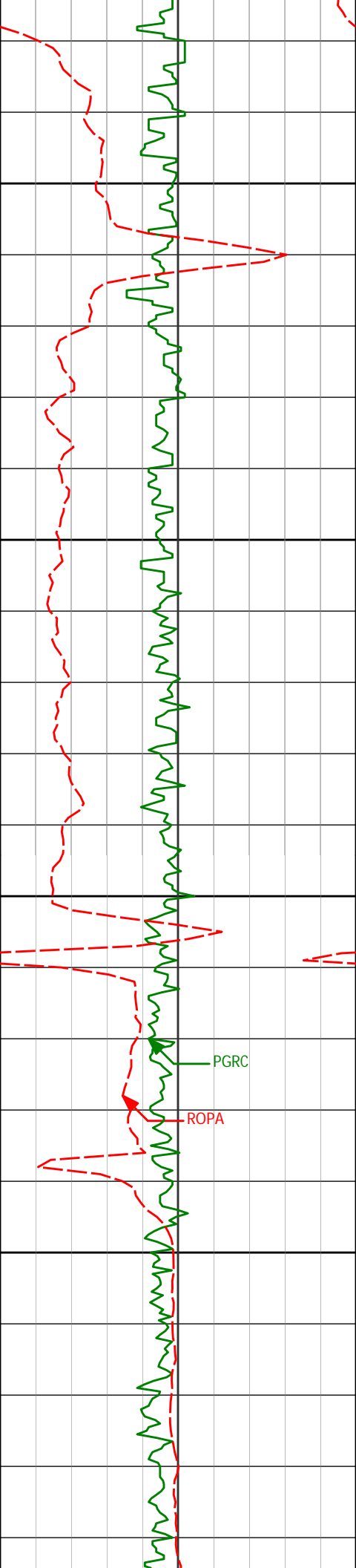
5352'

0.57°

236.39°

5313.83'

317.29'



5400

5450

5500

5550

5447'

1.30°

236.98°

5408.82'

318.57'

5542'

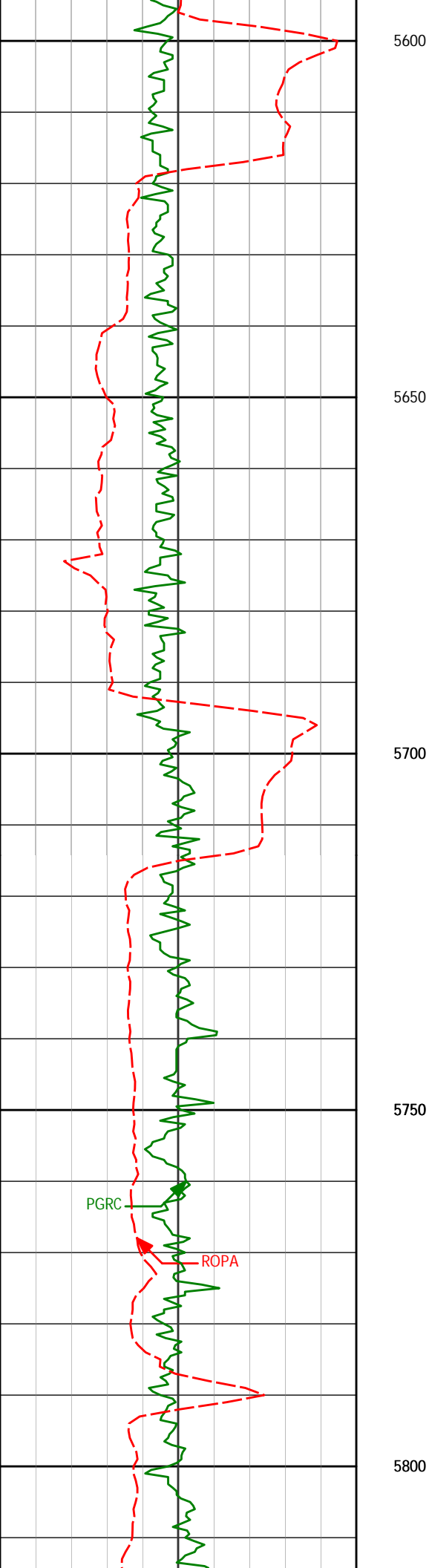
1.46°

229.22°

5503.79'

320.38'





5637'

1.06°

172.48°

5598.77'

321.16'

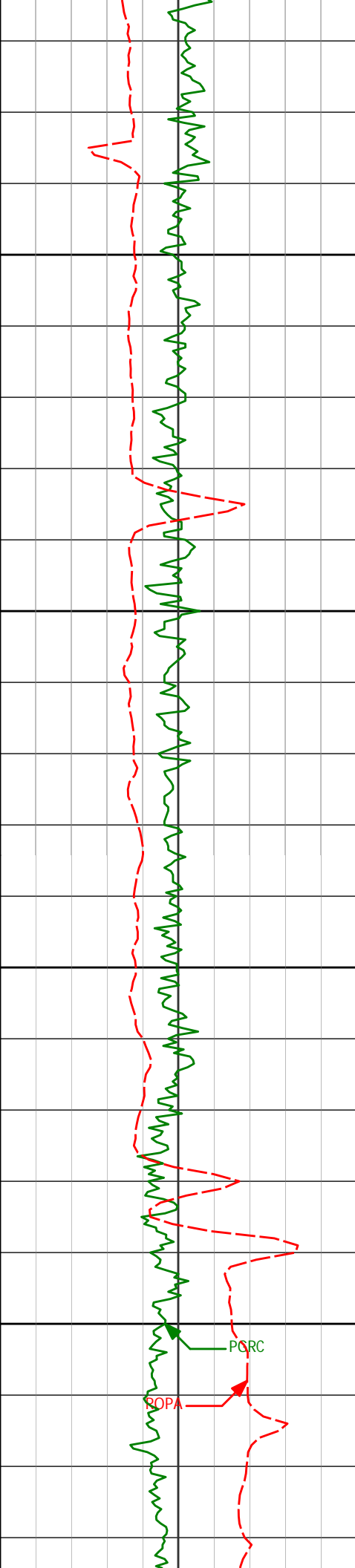
5732'

1.02°

108.06°

5693.76'

320.23'



<Run 200>

5827'

0.81°

113.42°

5788.75'

318.80'

5850

5900

5922'

0.07°

183.80°

5883.74'

318.18'

5950

6000

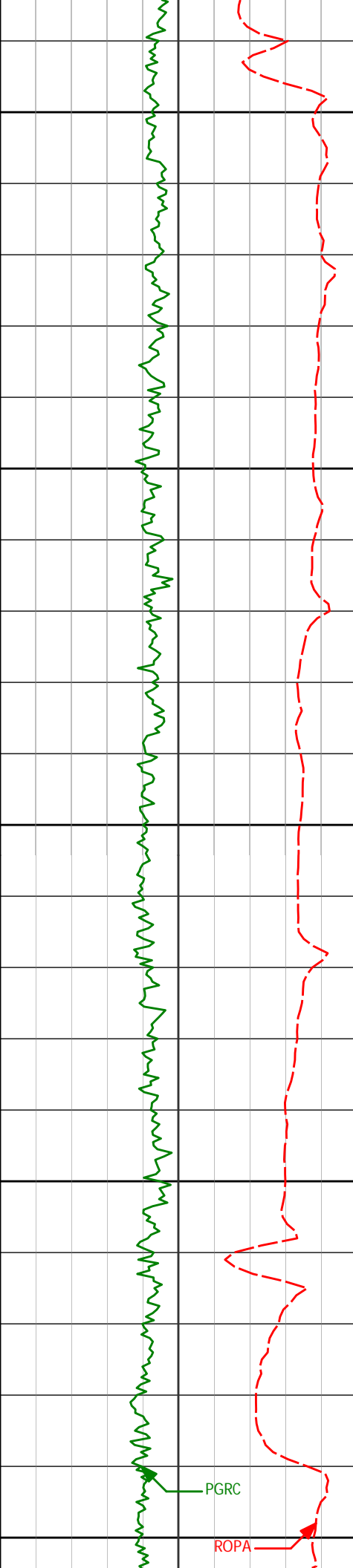
6018'

0.34°

0.54°

5979.74'

318.18'



6050

6065'

1.09°

293.39°

6026.74'

318.60'

6100

6113'

5.20°

292.14°

6074.66'

321.04'

6150

6160'

9.04°

281.15°

6121.29'

326.66'

6200

6208'

12.54°

280.80°

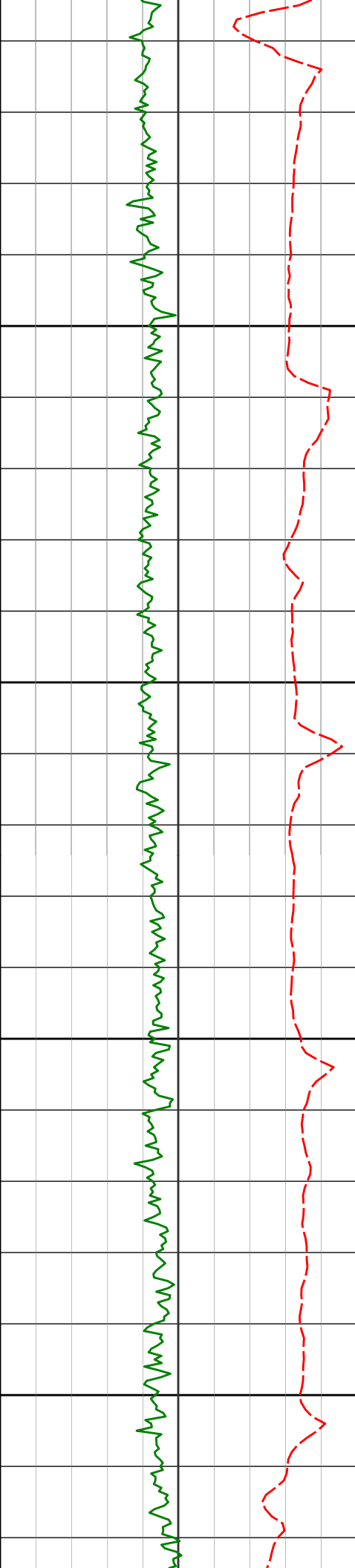
6168.43'

335.50'

6250

PGRC

ROPA



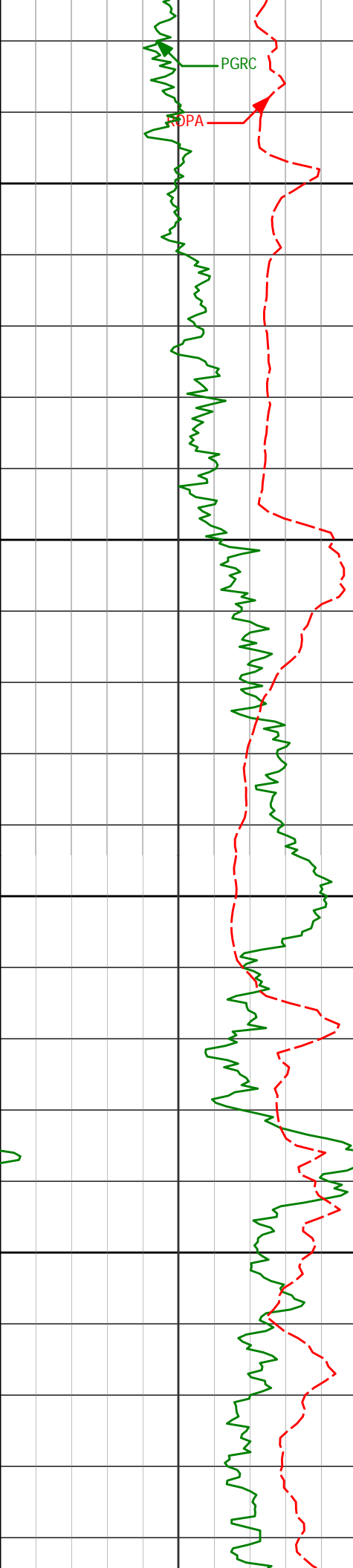
6300

6350

6400

6450

6255'	12.82°	282.58°	6214.28'	345.63'
6303'	15.35°	275.38°	6260.84'	357.17'
6350'	18.50°	272.81°	6305.80'	370.83'
6398'	22.25°	270.03°	6350.79'	387.53'
6445'	26.18°	269.40°	6393.65'	406.81'



6500

6550

6600

6650

6493'

29.09°

267.61°

6436.17'

429.05'

6540'

31.80°

265.29°

6476.68'

452.79'

6588'

35.86°

264.66°

6516.55'

479.37'

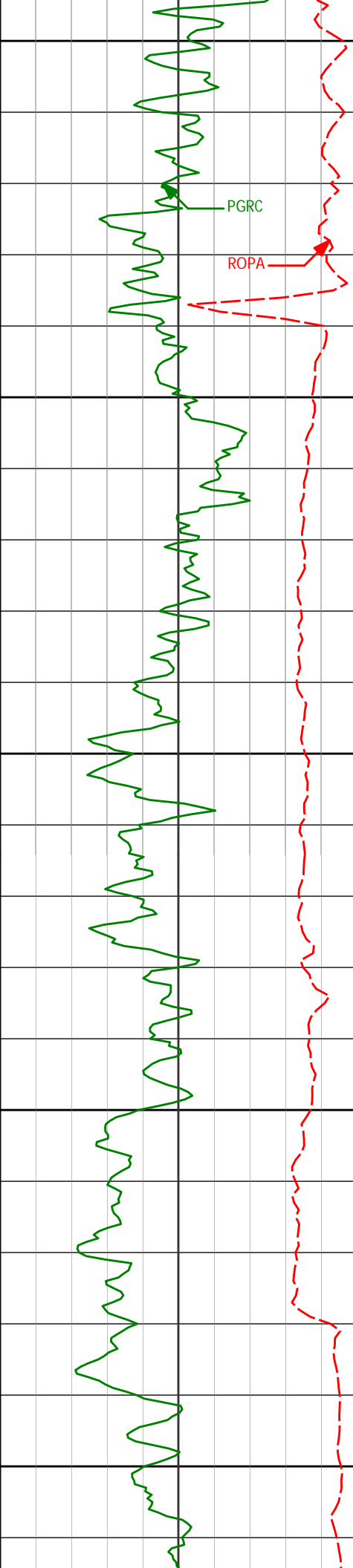
6683'

42.86°

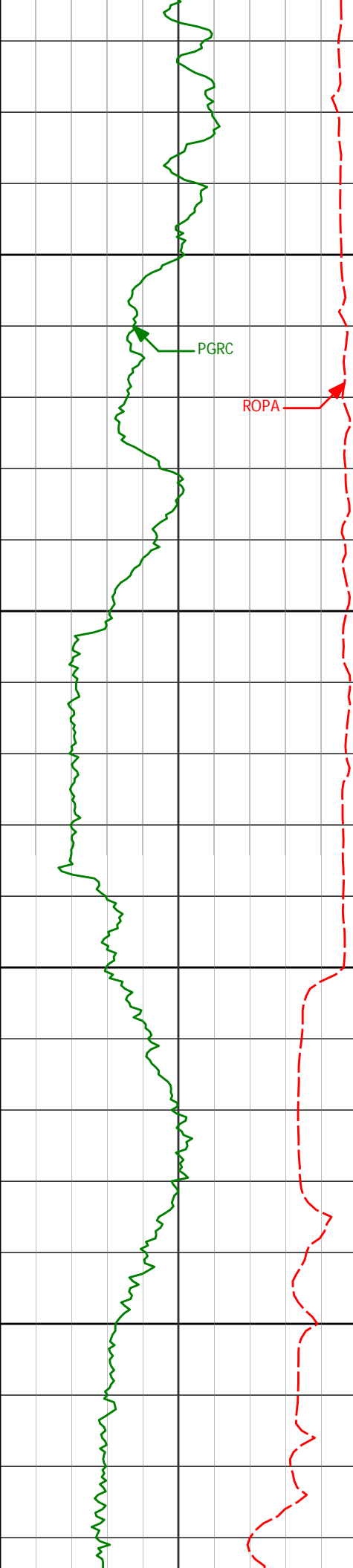
264.13°

6589.96'

539.21'



6700				
6730'	47.00°	263.74°	6623.22'	572.17'
6750				
6778'	51.37°	263.61°	6654.59'	608.21'
6800				
6825'	56.26°	263.60°	6682.33'	645.84'
6850				
6873'	61.35°	264.48°	6707.18'	686.61'
6900				




6920' 69.80° 268.56° 6726.61' 729.24'

6950

6968' 79.41° 272.49° 6739.34' 775.46'

7000

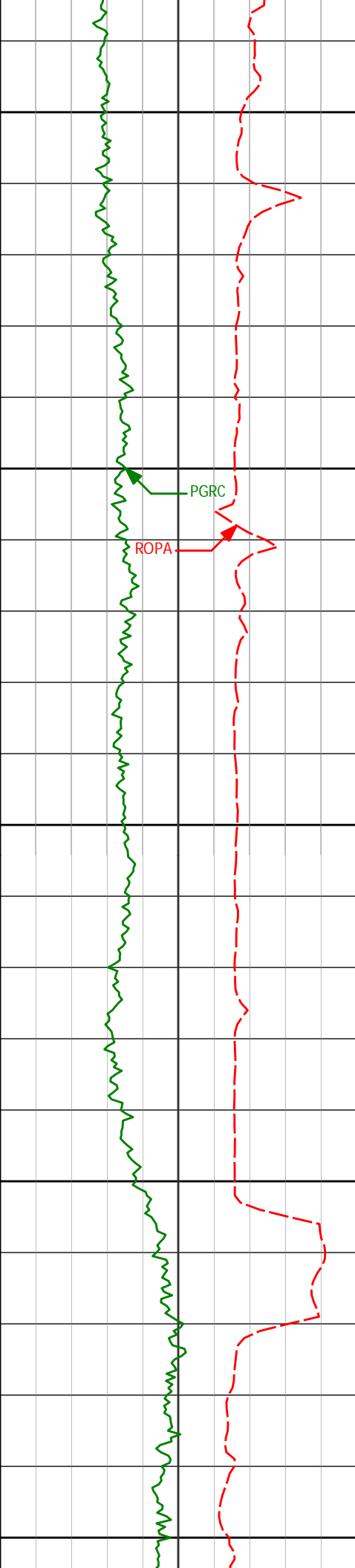
6996' 85.96° 274.80° 6742.90' 803.18'

 Casing Set @ 7,040'

7050  
<Run 500>

7100

7095' 90.89° 275.22° 6745.62' 901.83'



7150

7200

7250

7300

7350

7143'

90.68°

274.38°

6744.96'

949.70'

7239'

91.17°

274.38°

6743.41'

1045.49'

7334'

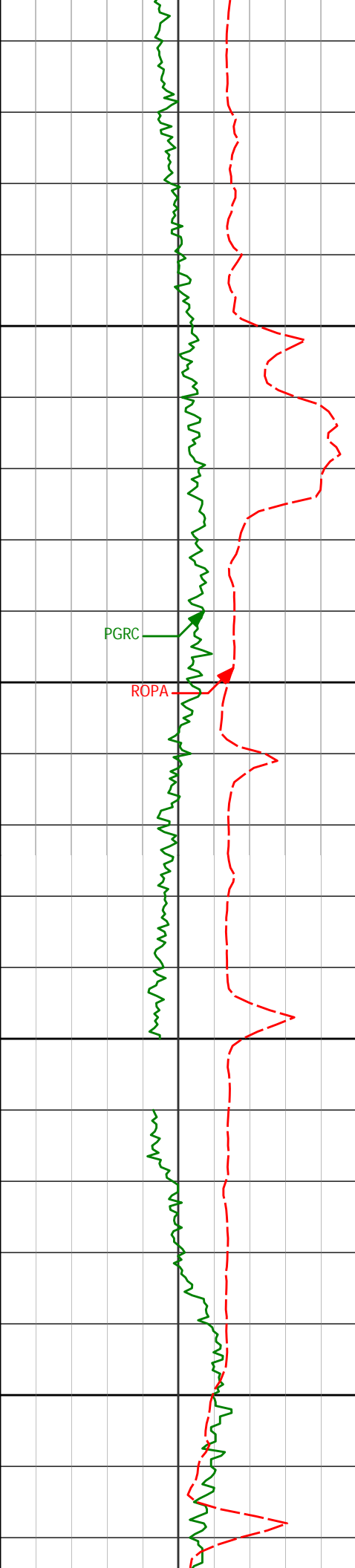
90.62°

272.49°

6741.93'

1140.37'





7400

7429'

90.62°

271.29°

6740.91'

1235.34'

7450

7500

7501'

90.80°

270.78°

6740.02'

1307.34'

7524'

90.86°

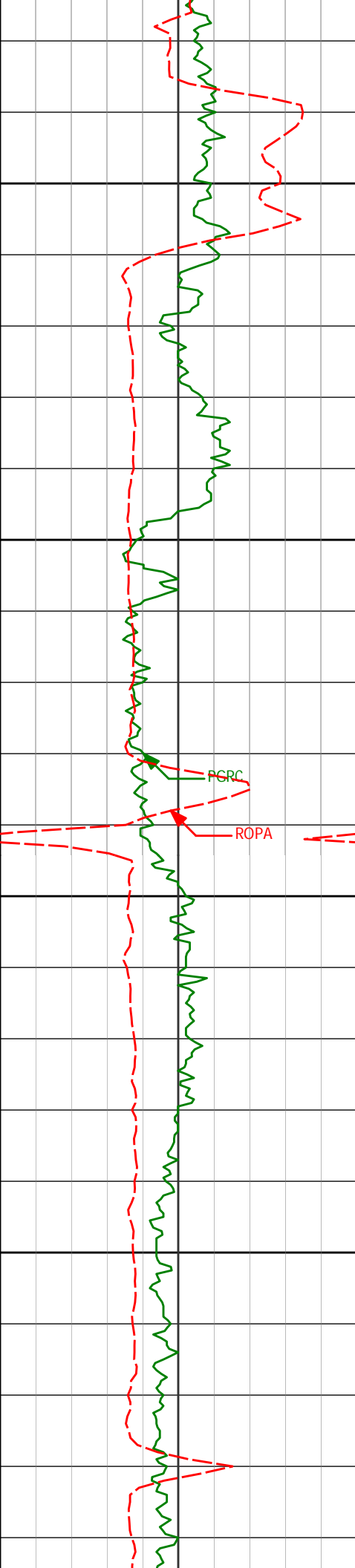
270.51°

6739.68'

1330.33'

7550

<Run 600>



7600

7650

7700

7750

7619'

88.86°

269.35°

6739.91'

1425.32'

7713'

89.07°

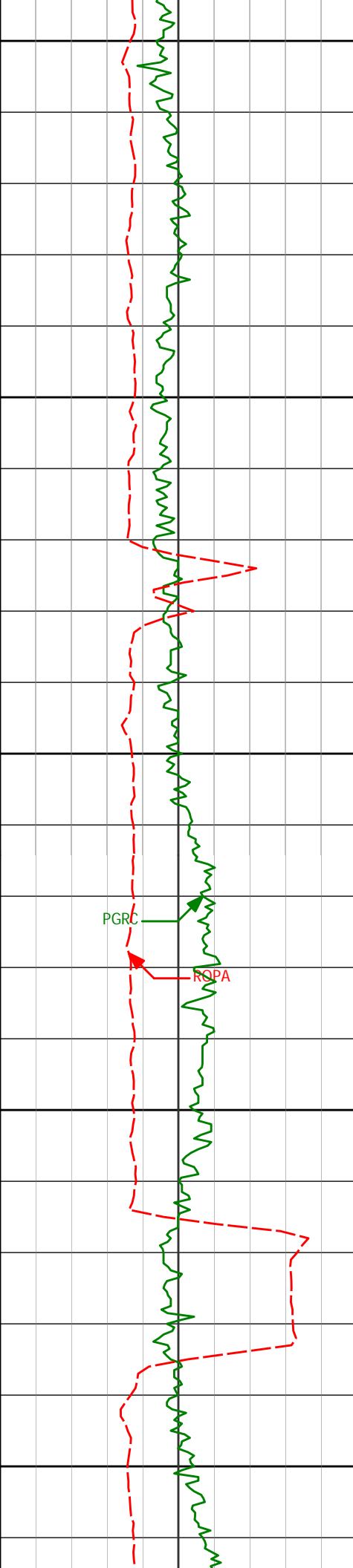
268.75°

6741.61'

1519.26'

RORC

ROPA



7800

7808'

89.17°

268.41°

6743.07'

1614.19'

7850

7900

7903'

88.83°

268.29°

6744.73'

1709.09'

PGRC

ROPA

7950

8000

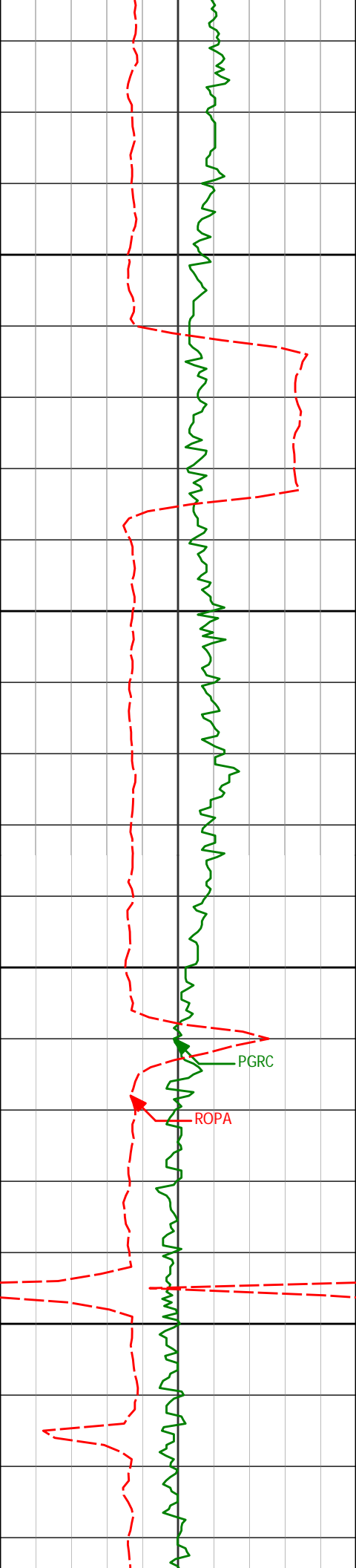
7998'

88.58°

269.32°

6746.87'

1804.01'



8050

8093'

90.68°

269.31°

6747.49'

1898.98'

8100

8150

PGRC

ROPA

8188'

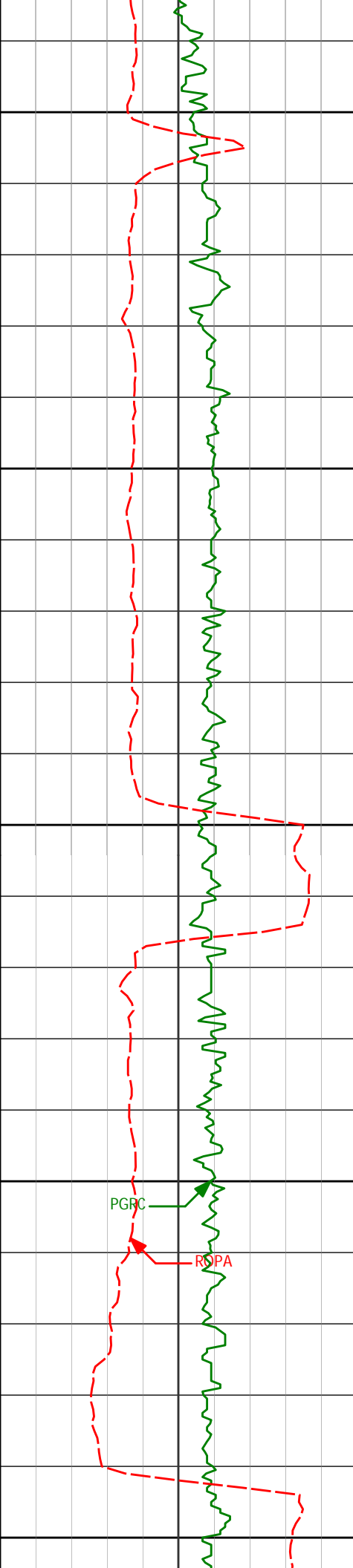
90.25°

268.73°

6746.72'

1993.93'

8200



8250

8283'

90.06°

268.05°

6746.47'

2088.85'

8300

8350

8379'

89.44°

266.62°

6746.88'

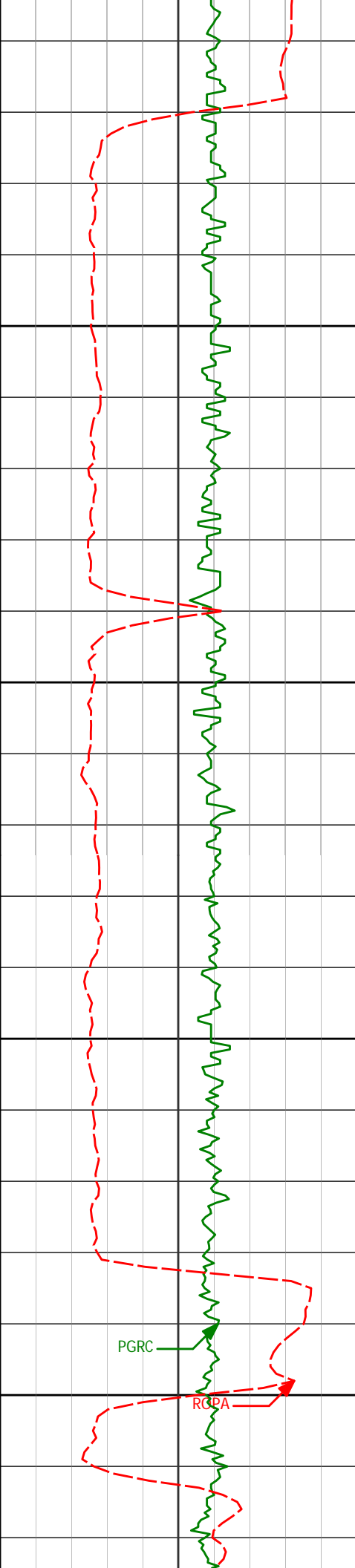
2184.68'

8400

PGRC

RSPA

8450



8474'

90.59°

270.06°

6746.85'

2279.58'

8500

8550

8569'

90.22°

269.03°

6746.19'

2374.56'

8600

8650

PGRC

RCPA

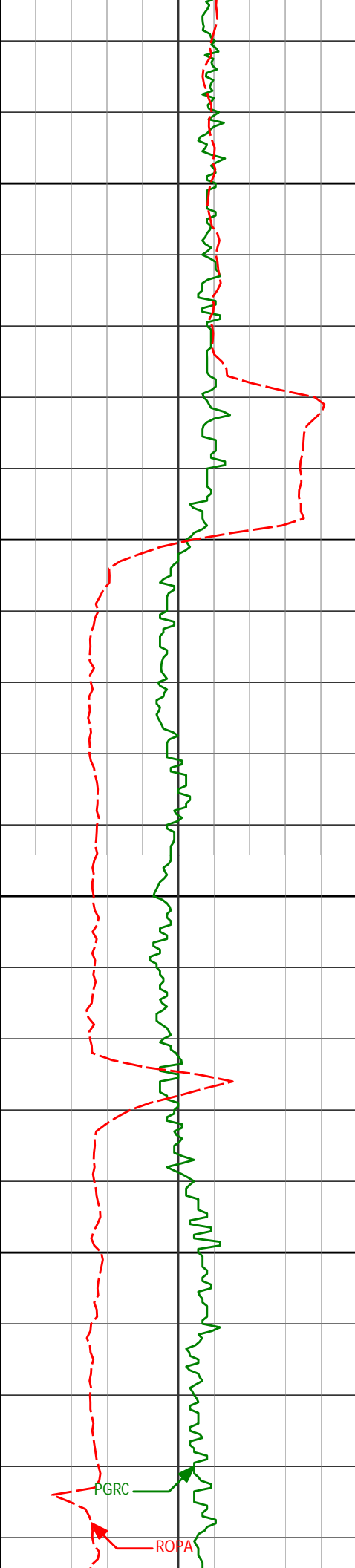
8664'

89.26°

269.79°

6746.62'

2469.53'



8700

8750

8800

8850

8758'

90.65°

272.11°

6746.70'

2563.52'

8853'

90.15°

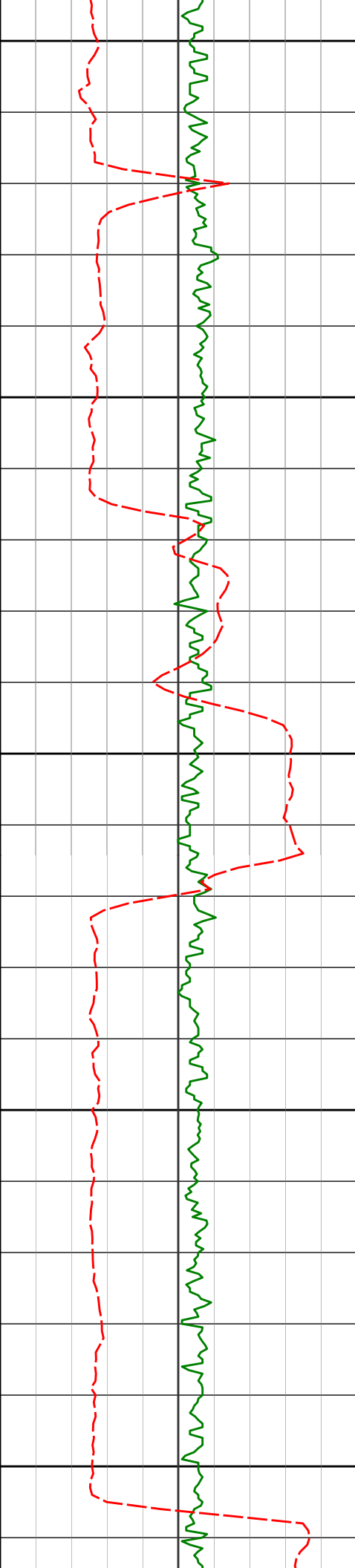
271.62°

6746.04'

2658.50'

PGRC

ROPA



8900

8950

9000

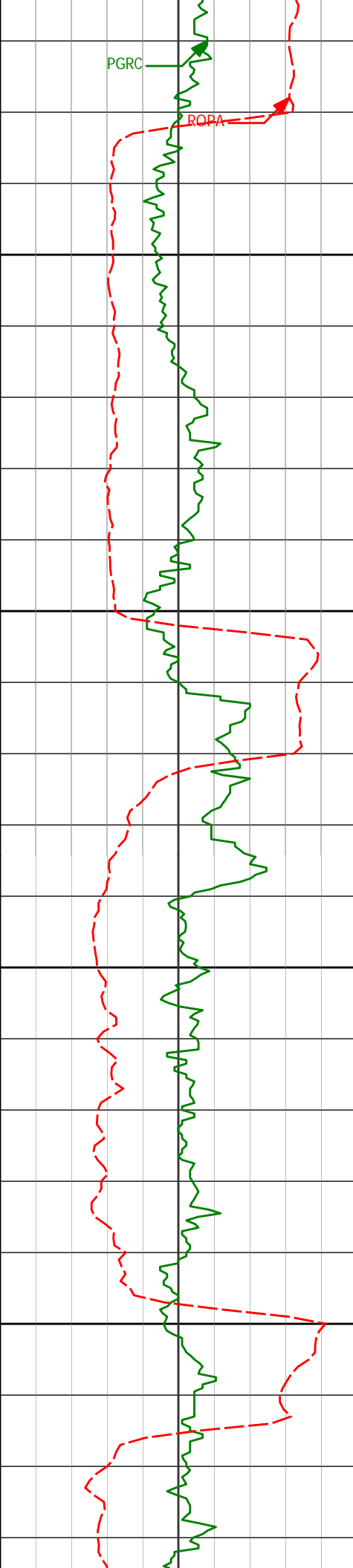
9050

9100

8948'	90.37°	272.16°	6745.60'	2753.48'
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9043'	90.59°	274.31°	6744.81'	2848.38'
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9138'	90.74°	272.59°	6743.71'	2943.26'
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9150

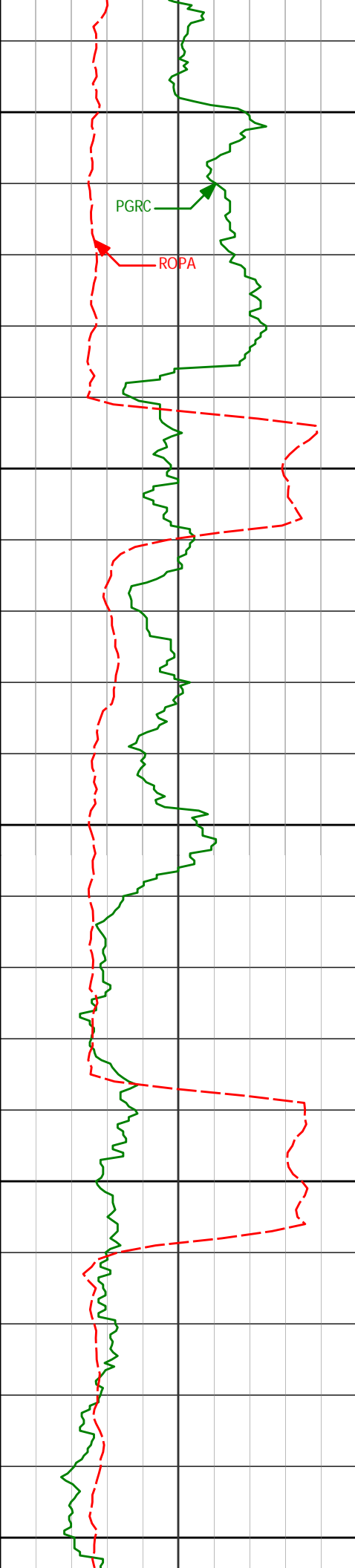
9200

9233'	89.29°	269.74°	6743.68'	3038.25'
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9250

9300

9328'	90.59°	269.45°	6743.79'	3133.23'
-------	--------	---------	----------	----------



9350

9400

9450

9500

9550

9423'

91.63°

267.76°

6741.95'

3228.14'

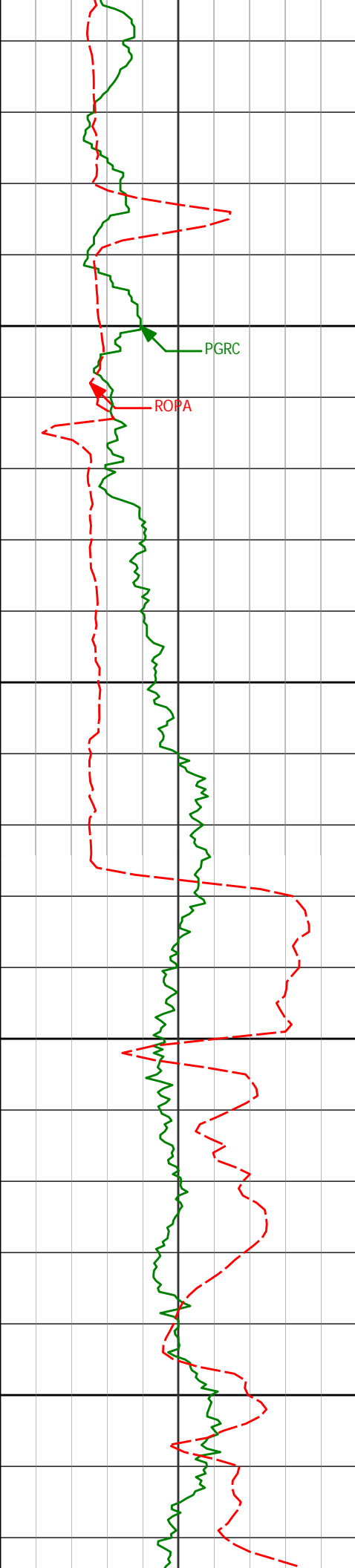
9518'

88.80°

265.76°

6741.59'

3322.90'



9600

9650

9700

9750

9613'

87.44°

264.91°

6744.71'

3417.43'

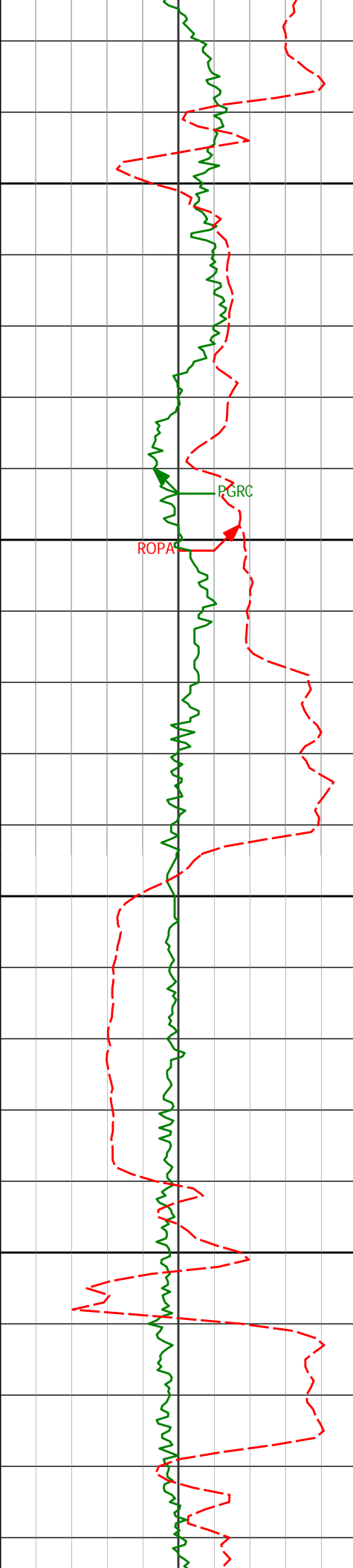
9708'

88.24°

267.02°

6748.29'

3512.03'



9800

9850

9900

9950

9803'

87.28°

268.52°

6752.00'

3606.82'

9898'

89.69°

268.89°

6754.51'

3701.73'

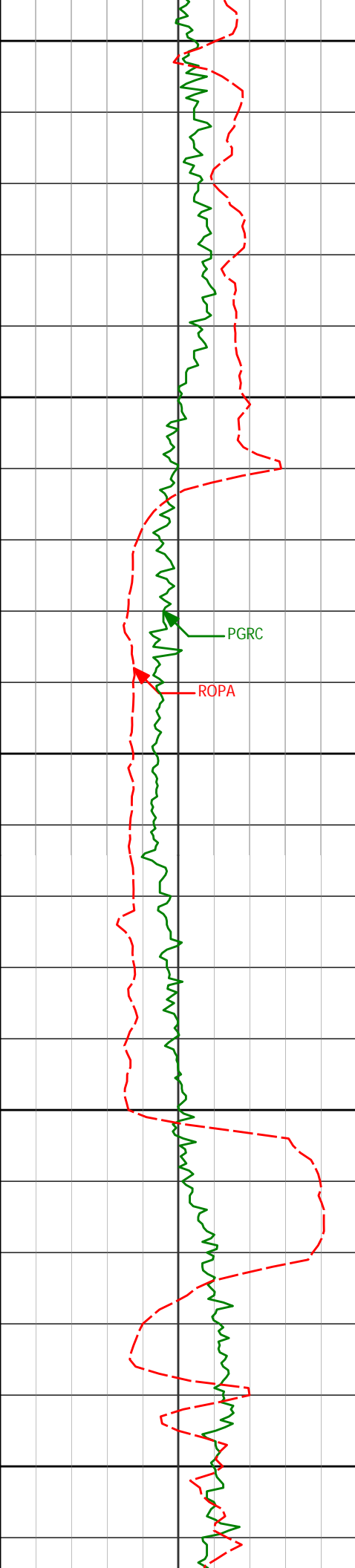
9993'

90.43°

268.92°

6754.41'

3796.68'



10000

10050

10100

10150

10200

PGRC

ROPA

10088'

89.88°

267.55°

6754.15'

3891.59'

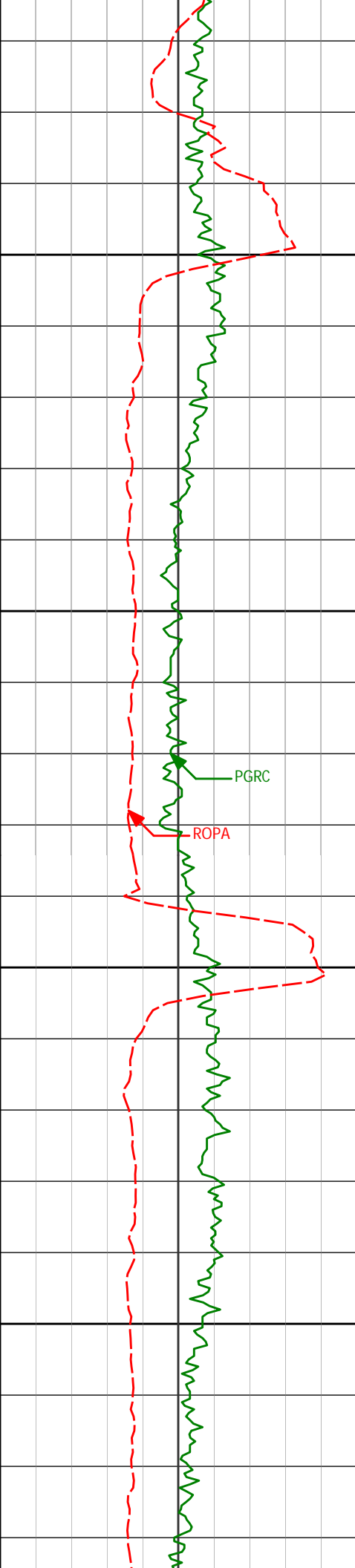
10183'

90.80°

269.59°

6753.59'

3986.51'



10250

10278'

90.28°

269.06°

6752.69'

4081.48'

10300

PGRC

ROPA

10350

10373'

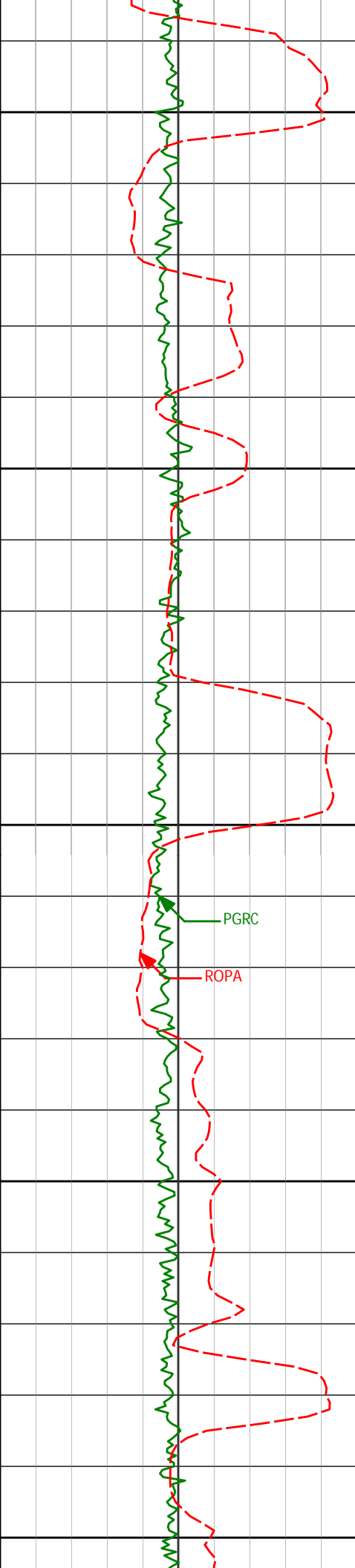
90.46°

268.94°

6752.08'

4176.44'

10400



10450

10467'

90.77°

268.44°

6751.07'

4270.37'

10500

10550

10560'

90.46°

270.33°

6750.07'

4363.34'

PGRC

ROPA

10600

10650

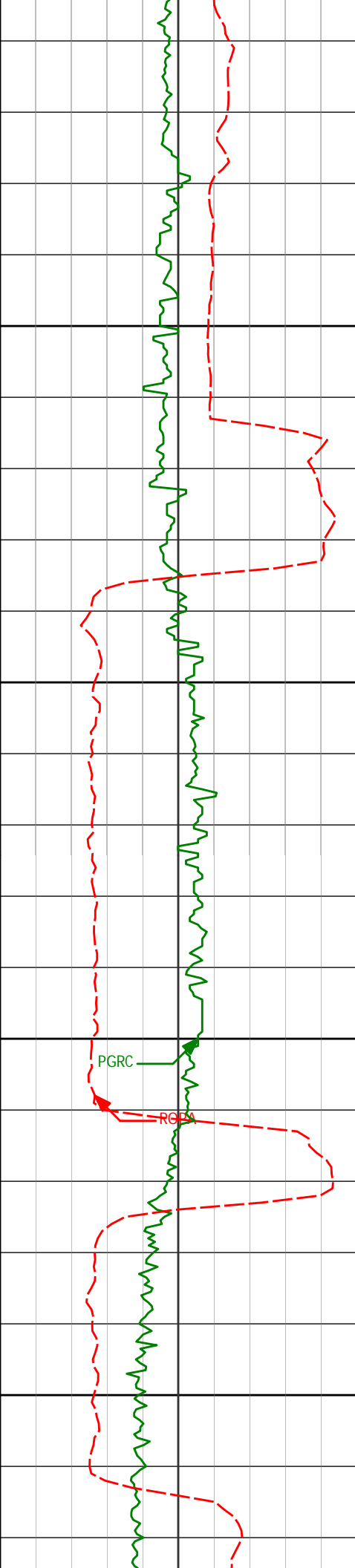
10654'

89.38°

270.48°

6750.19'

4457.33'



10700

10750

10800

10850

10748'

10841'

90.40°

91.05°

271.56°

271.48°

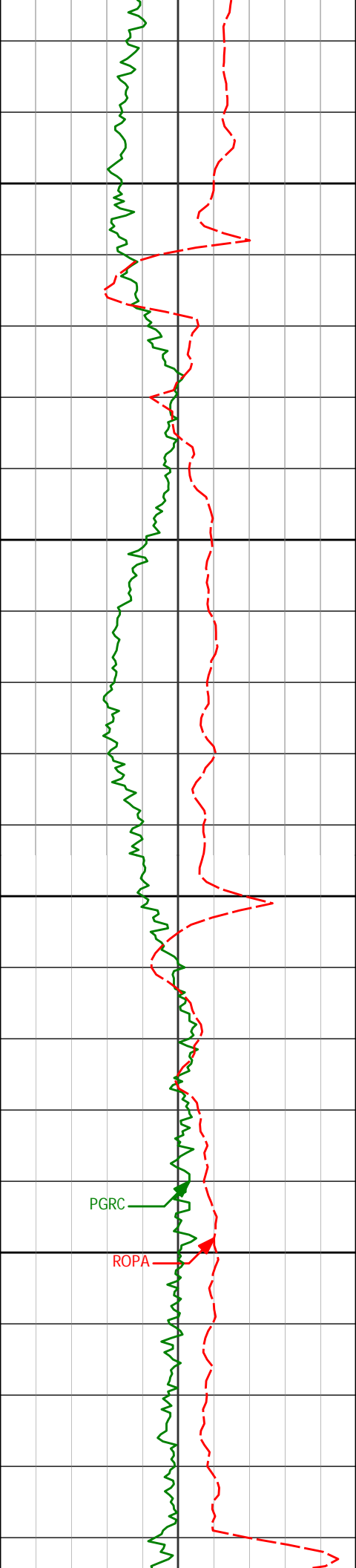
6750.37'

6749.19'

4551.33'

4644.31'





10900

10935'

91.20°

271.07°

6747.35'

4738.29'

10950

11000

11027'

90.68°

270.51°

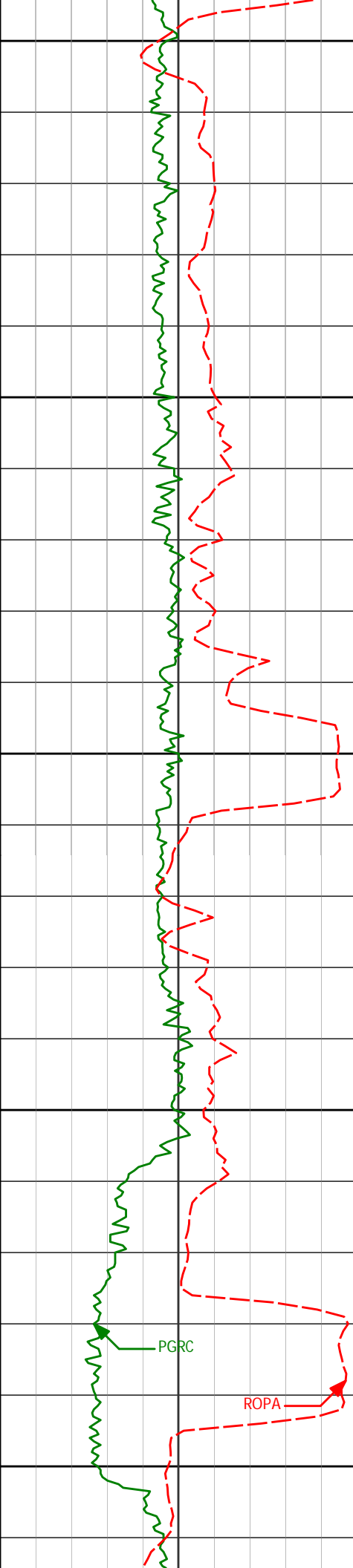
6745.84'

4830.28'

11050

PGRC

ROPA



11100

11119'

89.60°

267.63°

6745.61'

4922.23'

11150

11200

11212'

89.69°

266.59°

6746.19'

5015.04'

11250

11300

11306'

89.32°

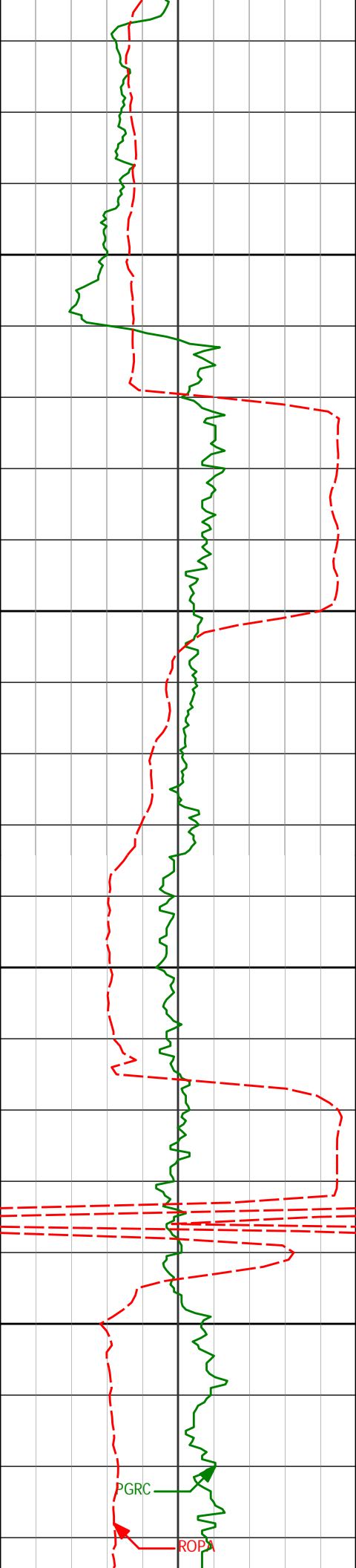
266.90°

6747.00'

5108.81'

PGRC

ROPA



11350

11400

11450

11500

11400'

88.61°

269.36°

6748.69'

5202.69'

11493'

90.22°

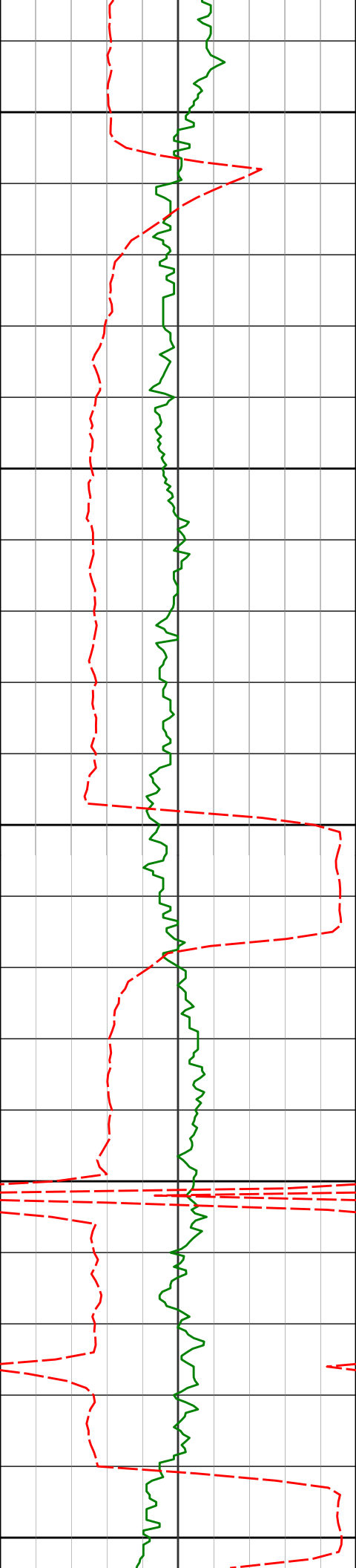
270.12°

6749.64'

5295.67'

PGRC

ROPX



11550

11585'

89.69°

268.63°

6749.72'

5387.64'

11600

11650

11678'

90.34°

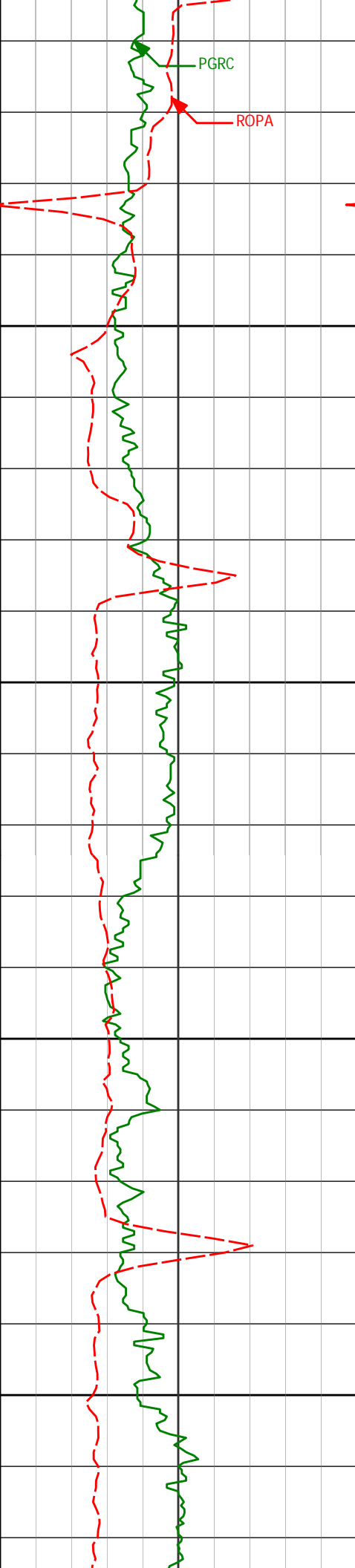
269.72°

6749.69'

5480.61'

11700

11750



11769'

90.86°

270.15°

6748.74'

5571.59'

11800

11850

11862'

90.65°

269.64°

6747.51'

5664.58'

11900

11950

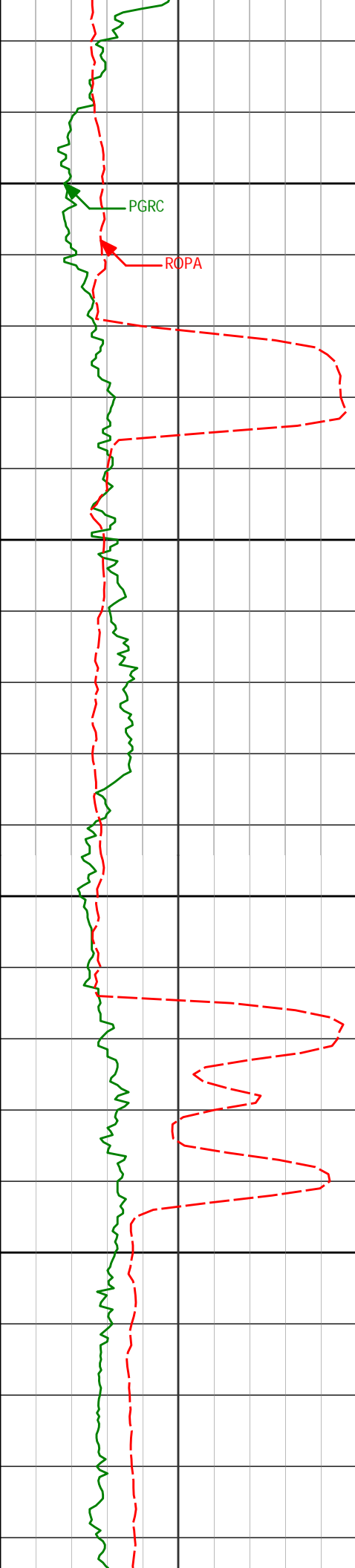
11956'

90.34°

268.66°

6746.70'

5758.54'



12000

12050

12100

12150

12051'

90.74°

268.58°

6745.81'

5853.47'

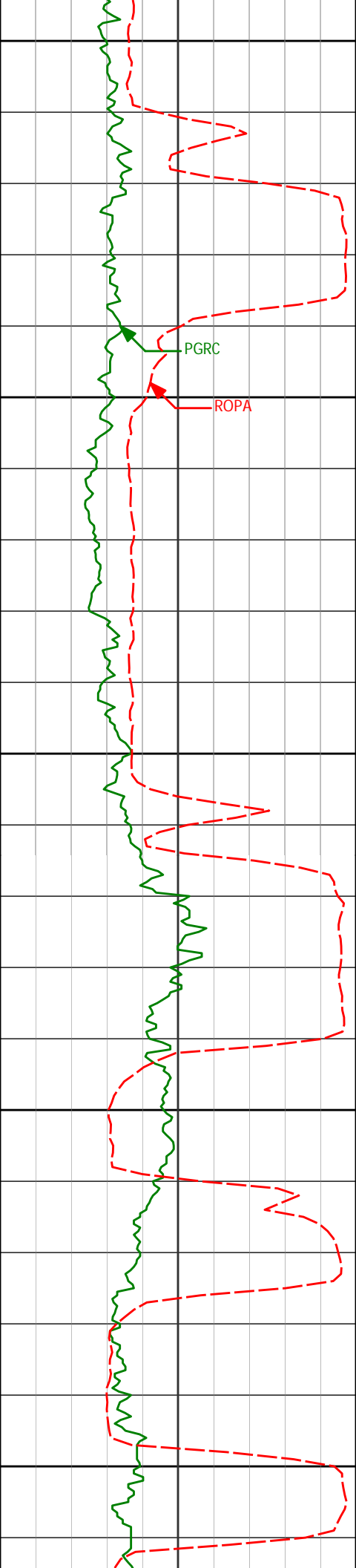
12146'

90.71°

267.97°

6744.61'

5948.37'



12200

12241'

87.72°

267.91°

6745.92'

6043.24'

12250

12300

12330'

87.41°

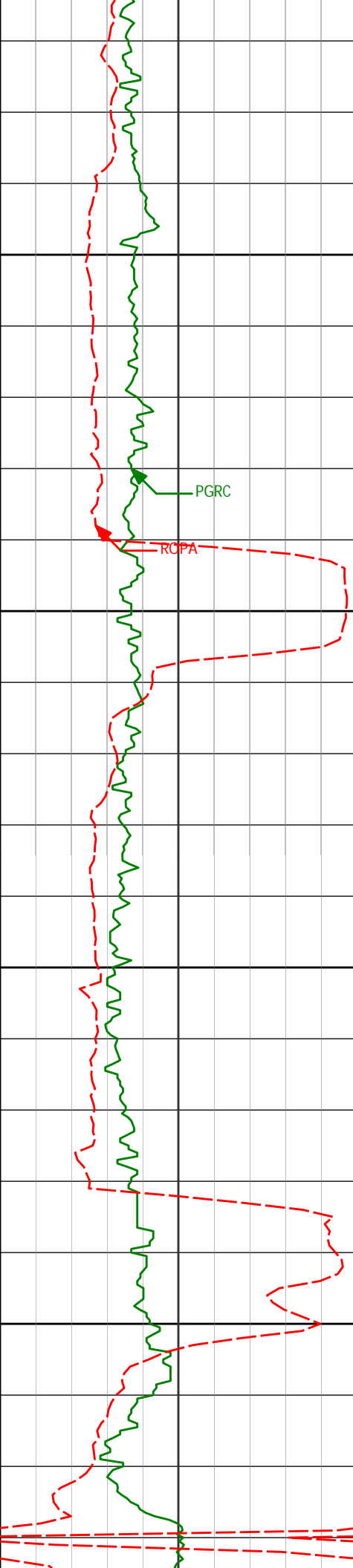
269.22°

6749.70'

6132.10'

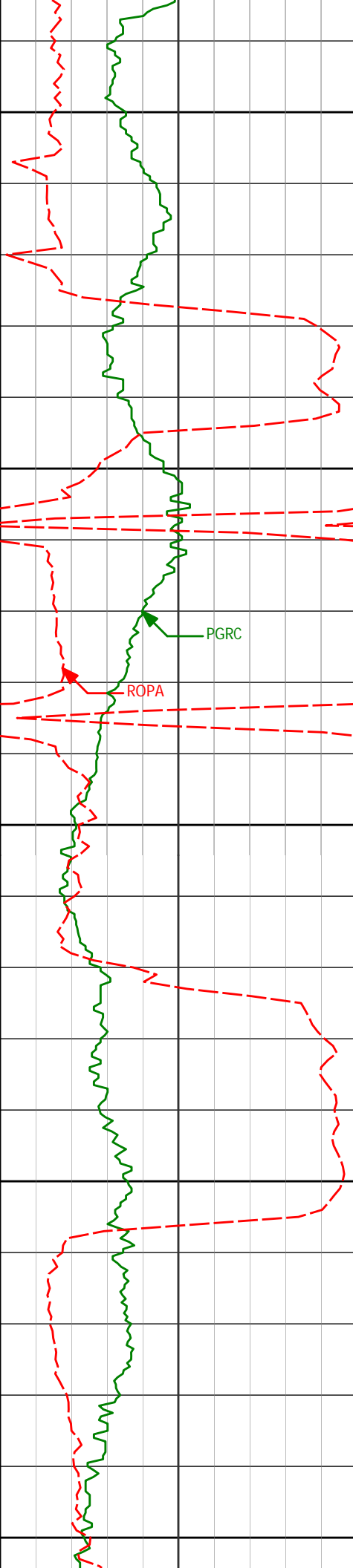
12350

12400



Run	Length	Angle	Length	Length	Length
12450	12425'	89.11°	269.84°	6752.59'	6227.03'
12500					
12550	12520'	90.31°	269.37°	6753.08'	6322.01'
12600					
<Run 700>	12615'	90.74°	268.02°	6752.21'	6416.94'





12650

12700

12750

12800

12850

12710'

91.23°

268.53°

6750.57'

6511.84'

12805'

90.06°

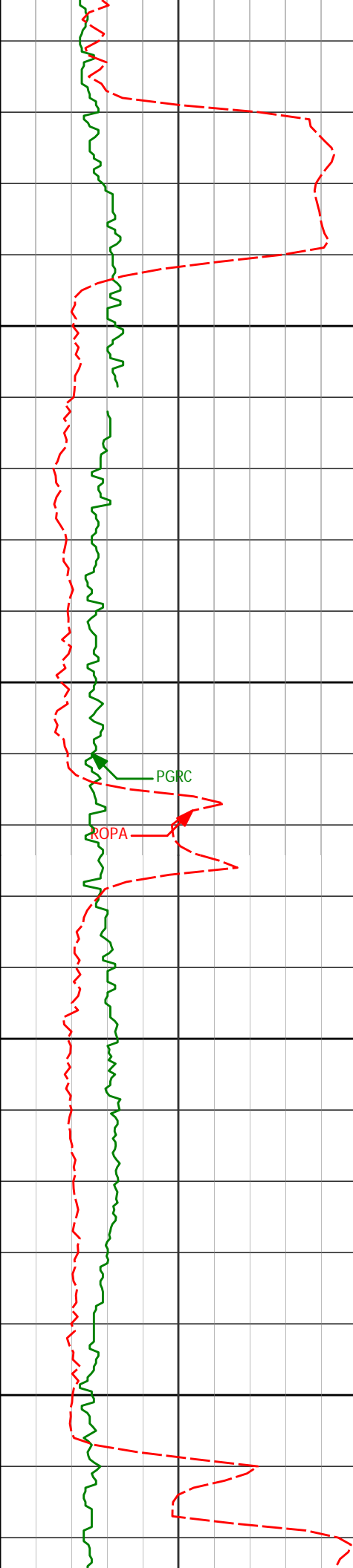
269.93°

6749.50'

6606.80'

PGRC

ROPA



12900

12900'

89.57°

270.43°

6749.81'

6701.80'

12950

PGRC

ROPA

13000

12995'

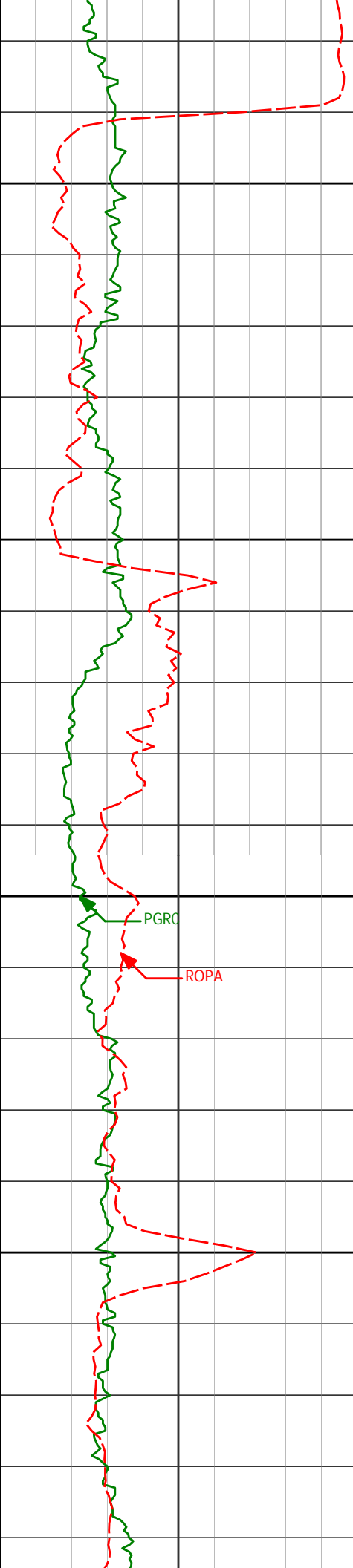
87.81°

268.71°

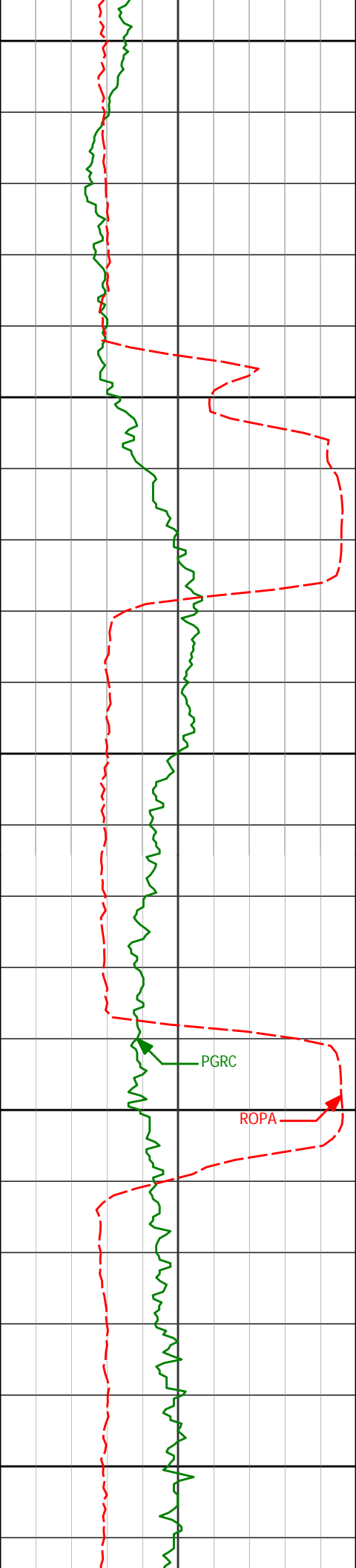
6751.98'

6796.75'

13050



13090'	90.40°	270.14°	6753.46'	6891.70'
13100				
13150				
13185'	91.33°	269.50°	6752.03'	6986.68'
13200				
13250				
13280'	91.85°	268.40°	6749.40'	7081.59'



13300

13350

13400

13450

13500

13375'

91.17°

269.70°

6746.89'

7176.52'

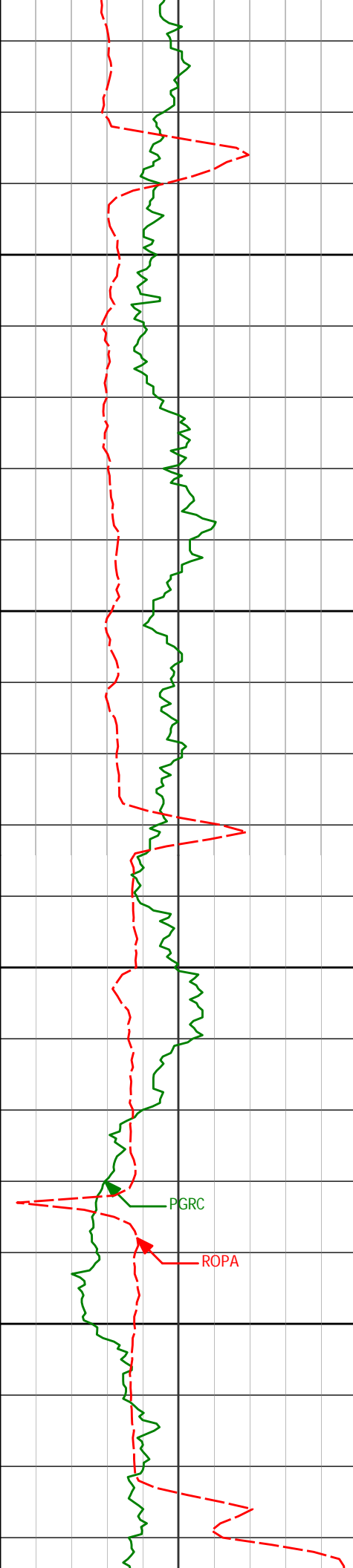
13470'

90.49°

271.36°

6745.52'

7271.50'



13550

13565'

91.29°

270.76°

6744.04'

7366.49'

13600

13650

13660'

92.50°

270.66°

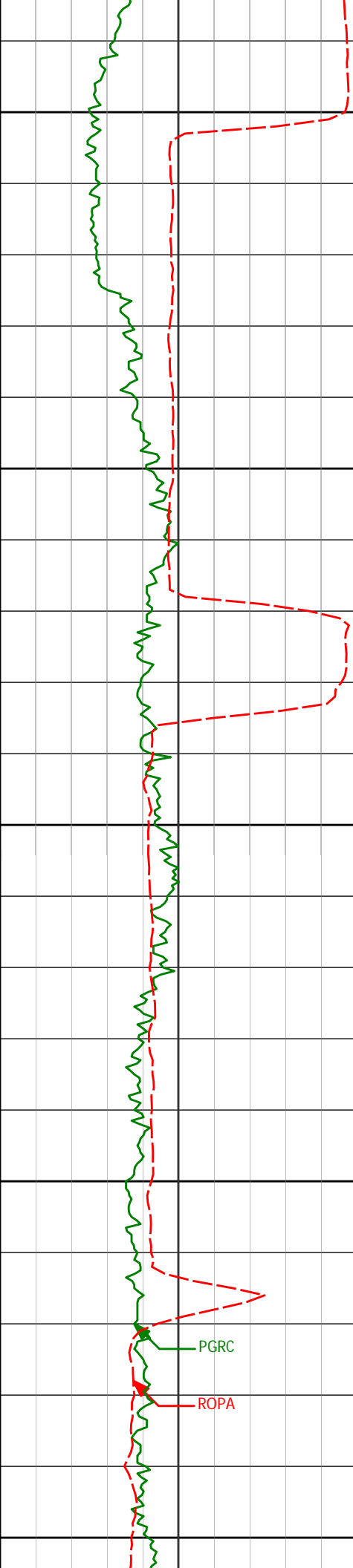
6740.89'

7461.44'

13700

PGRC

ROPA



13750

13755'

90.68°

269.25°

6738.26'

7556.38'

13800

13850

13850'

89.32°

269.53°

6738.26'

7651.36'

13900

PGRC

ROPA

13950

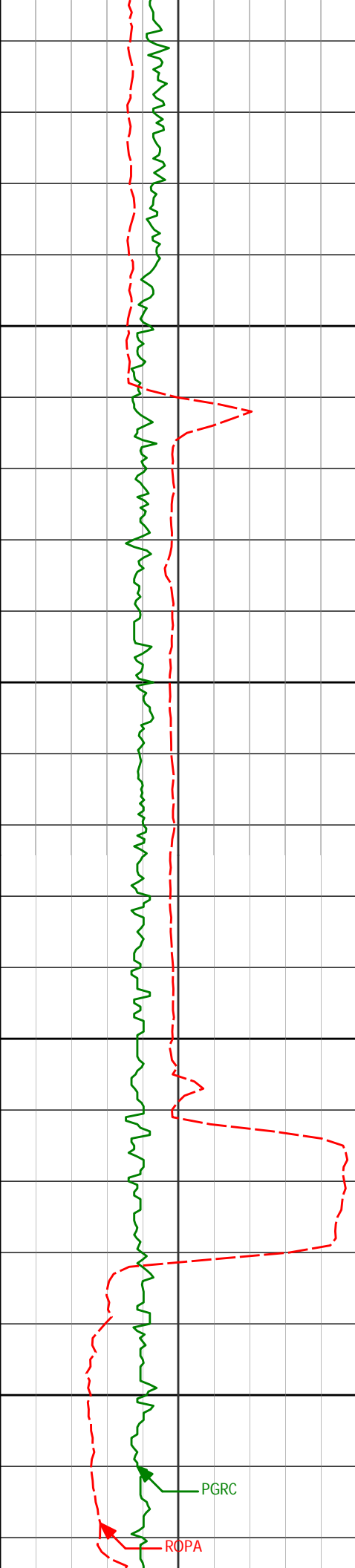
13945'

90.80°

271.01°

6738.15'

7746.35'



14000

14050

14100

14150

14040'

90.46°

268.76°

6737.11'

7841.33'

14135'

90.25°

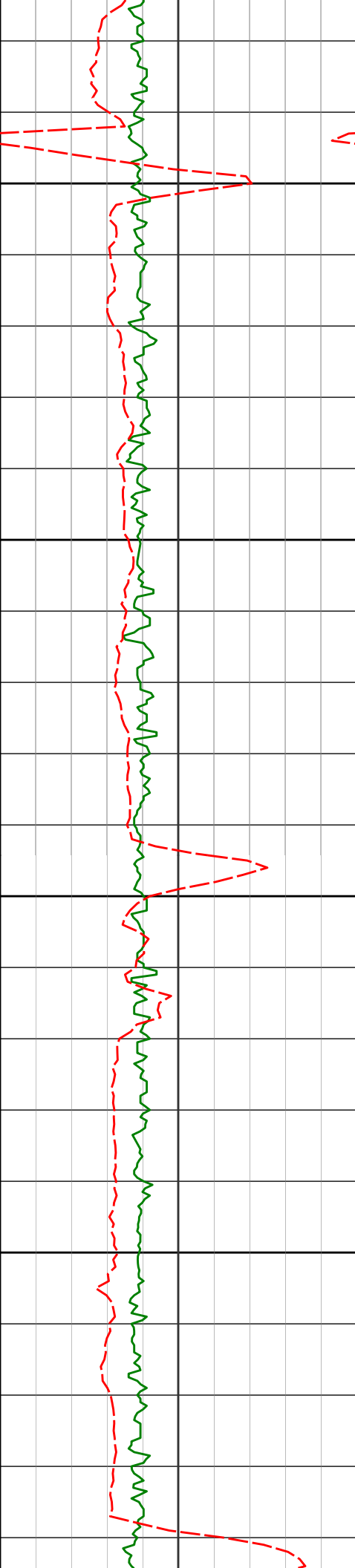
270.55°

6736.52'

7936.30'

PGRC

ROPA



14200

14230'

90.25°

272.36°

6736.11'

8031.29'

14250

14300

14325'

90.46°

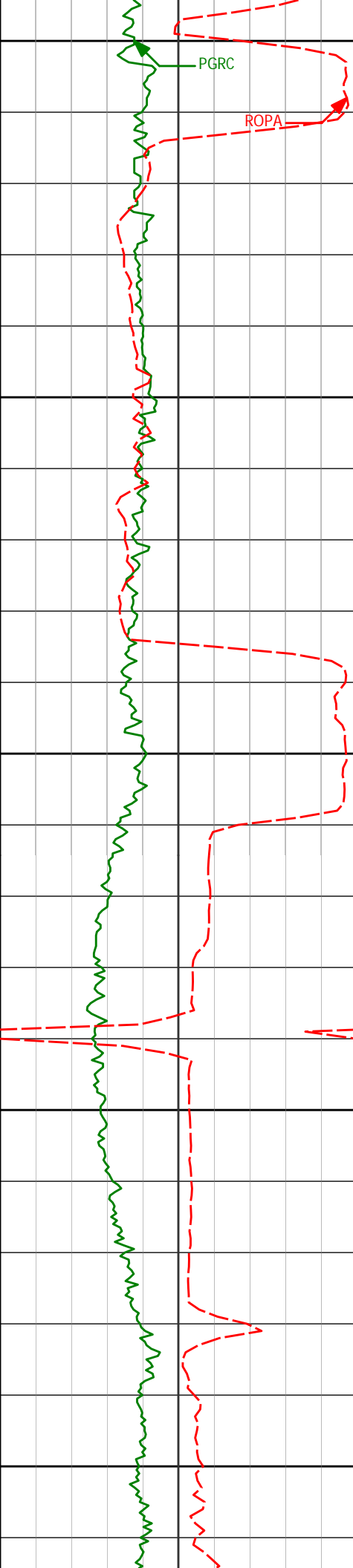
273.85°

6735.52'

8126.20'

14350





14400

PGRC

ROPA

14420'

90.62°

273.85°

6734.63'

8221.06'

14450

14500

14515'

89.32°

270.97°

6734.68'

8316.00'

14550

14600

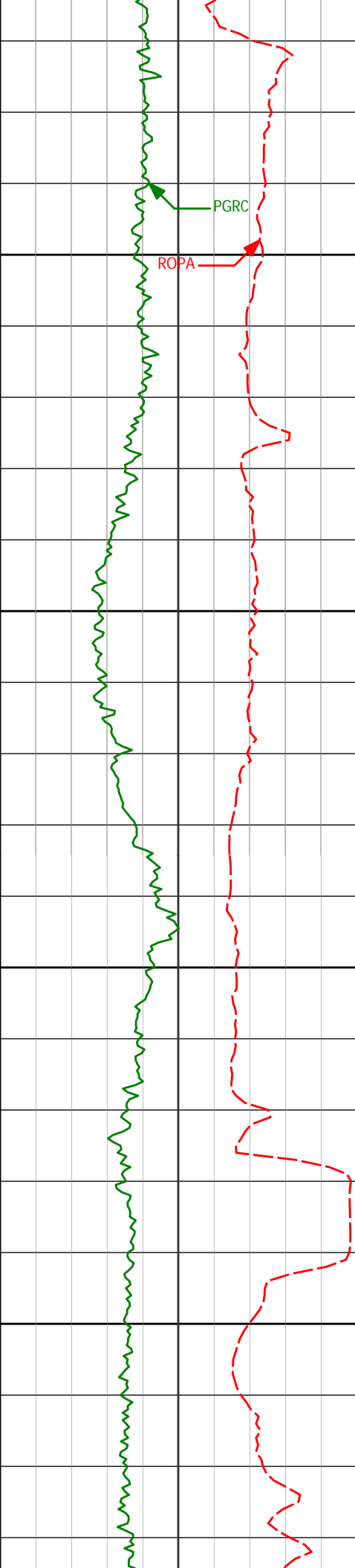
14610'

89.45°

269.90°

6735.70'

8411.00'



14650

14700

14750

14800

14705'

91.05°

269.51°

6735.29'

8505.98'

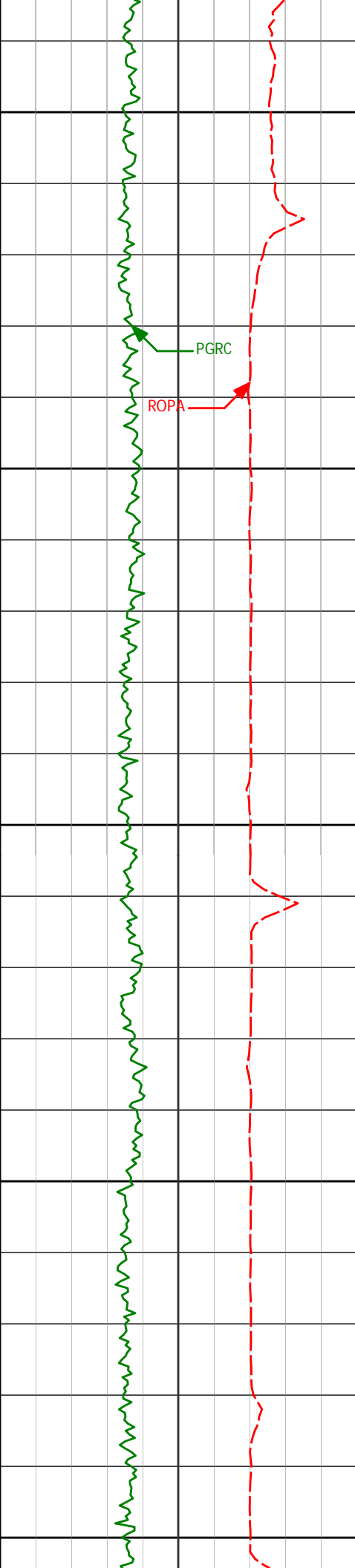
14800'

90.31°

269.73°

6734.17'

8600.95'



14850

14900

14950

15000

15050

PGRC

ROPA

14895'

90.06°

268.71°

6733.86'

8695.92'

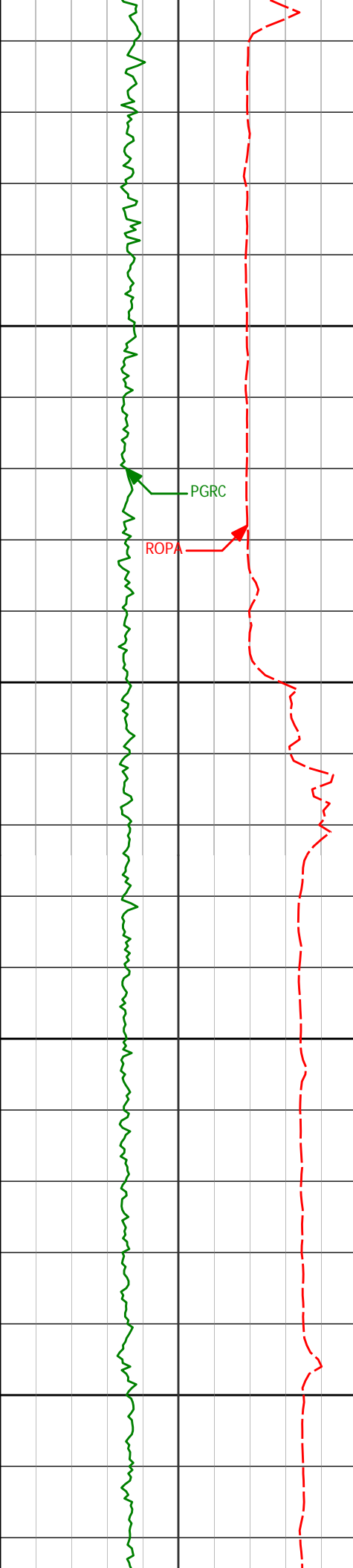
14990'

89.69°

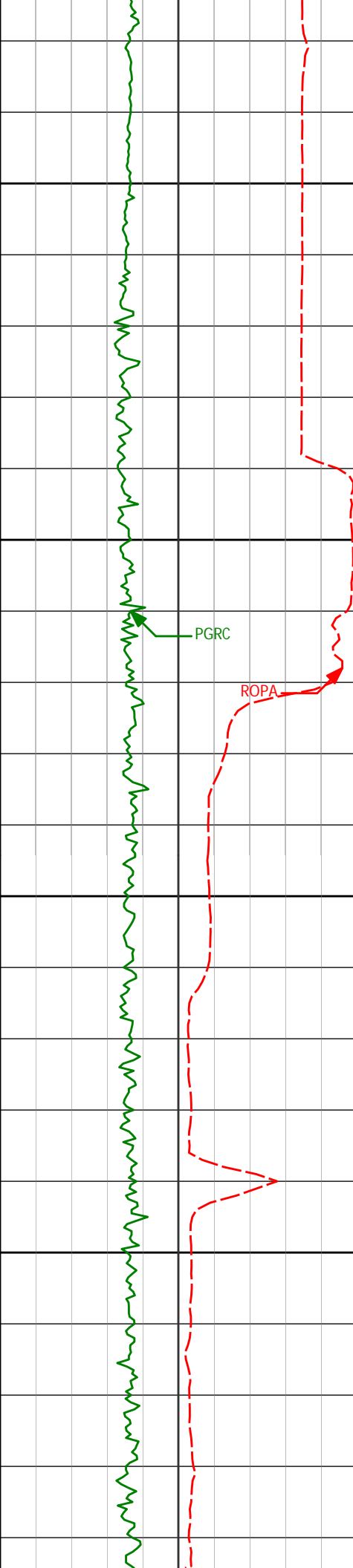
268.66°

6734.07'

8790.86'



15085'	90.31°	269.10°	6734.07'	8885.81'
15100				
15150				
15180'	90.12°	267.39°	6733.71'	8980.72'
15200				
15250				



15300

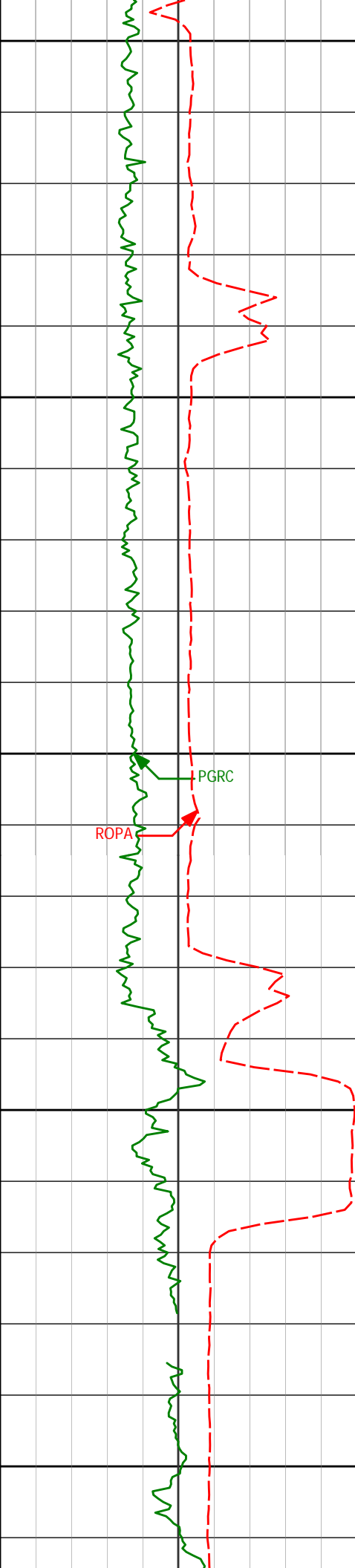
15350

<Run 800>

15400

15450

15275'	89.26°	265.21°	6734.22'	9075.43'
15371'	88.77°	266.82°	6735.88'	9171.09'
15466'	89.54°	266.59°	6737.28'	9265.84'



15500

15550

15600

15650

15700

15561'

88.43°

262.97°

6738.97'

9360.30'

PGRC

ROPA

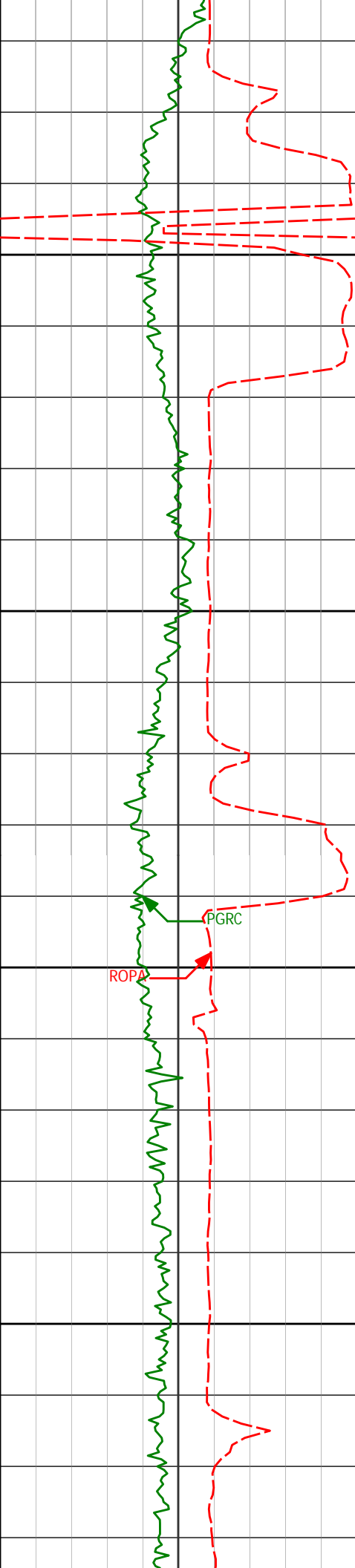
15656'

86.23°

261.74°

6743.40'

9454.19'



15750

15800

15850

15900

15751'

15846'

87.38°

88.70°

264.31°

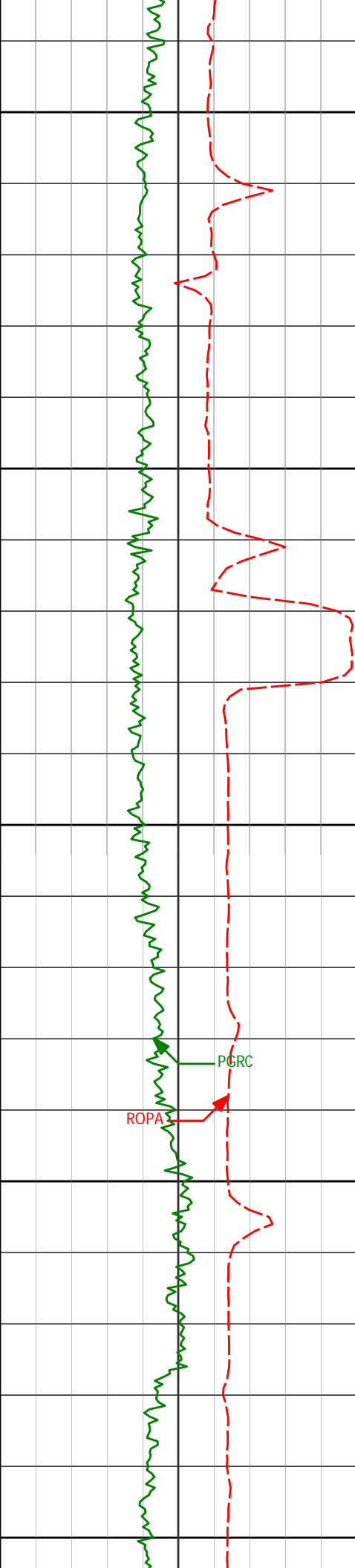
264.89°

6748.69'

6751.94'

9548.18'

9642.58'



15941'

89.75°

263.40°

6753.22'

9736.95'

15950

16000

16036'

90.15°

263.56°

6753.30'

9831.19'

16050

PGRC

ROPA

16100

16131'

91.48°

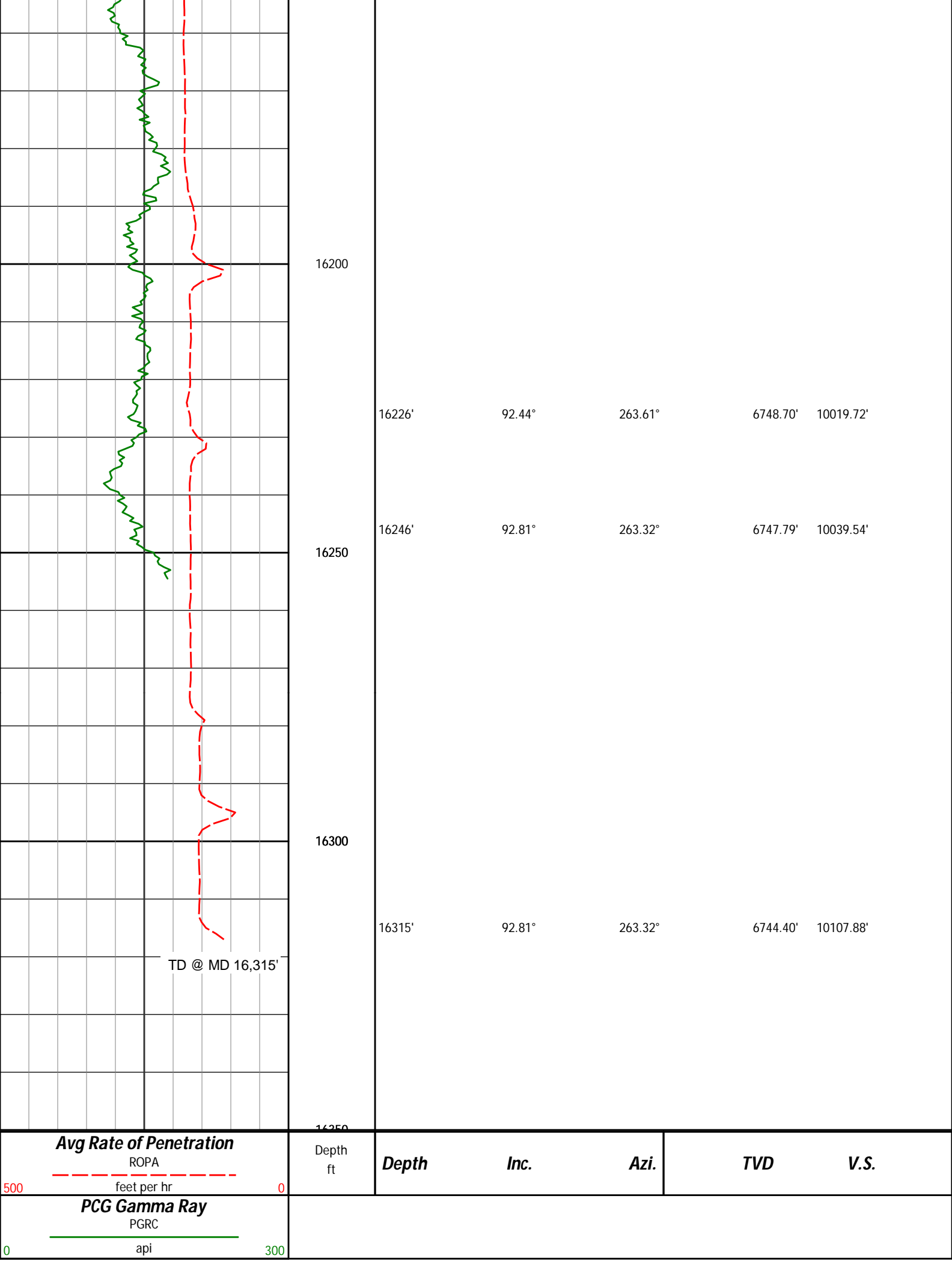
263.90°

6751.95'

9925.47'

16150







# HALLIBURTON

## DIRECTIONAL SURVEY REPORT

Noble Energy  
WR State PC USX AA16-69-1HNL  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900062162

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
677.00	0.00	0.00	677.00	0.00 N	0.00 E	0.00	0.00
809.00	0.62	74.88	809.00	0.19 N	0.69 E	-0.69	0.47
903.00	0.47	84.13	902.99	0.36 N	1.56 E	-1.56	0.19
996.00	0.49	89.66	995.99	0.40 N	2.33 E	-2.33	0.05
1088.00	0.62	104.46	1087.99	0.28 N	3.20 E	-3.20	0.21
1273.00	0.58	111.85	1272.98	0.32 S	5.03 E	-5.03	0.05
1365.00	0.47	101.69	1364.97	0.56 S	5.83 E	-5.84	0.15
1457.00	0.55	113.44	1456.97	0.82 S	6.60 E	-6.61	0.14
1647.00	0.22	348.74	1646.97	0.81 S	7.37 E	-7.38	0.37
1742.00	0.19	28.88	1741.96	0.50 S	7.40 E	-7.41	0.15
1837.00	0.35	84.07	1836.96	0.33 S	7.77 E	-7.77	0.30
1932.00	0.33	47.43	1931.96	0.11 S	8.26 E	-8.26	0.23
2027.00	0.36	102.72	2026.96	0.01 N	8.76 E	-8.76	0.34
2122.00	0.40	79.37	2121.96	0.00 N	9.37 E	-9.37	0.17
2217.00	1.98	330.99	2216.94	1.50 N	8.91 E	-8.89	2.25
2312.00	3.16	323.77	2311.84	5.04 N	6.57 E	-6.50	1.29
2407.00	5.31	315.14	2406.58	10.27 N	1.92 E	-1.79	2.35
2502.00	6.95	307.49	2501.04	16.89 N	5.74 W	5.95	1.93
2597.00	9.19	300.93	2595.09	24.28 N	16.81 W	17.11	2.54
2692.00	10.92	304.21	2688.63	33.24 N	30.76 W	31.17	1.92
2787.00	12.47	302.68	2781.65	43.84 N	46.84 W	47.38	1.66
2882.00	12.84	304.22	2874.34	55.32 N	64.20 W	64.88	0.53
2977.00	14.04	301.91	2966.74	67.35 N	82.72 W	83.55	1.38
3072.00	13.52	300.28	3059.01	79.04 N	102.09 W	103.06	0.68
3167.00	13.13	299.79	3151.45	90.00 N	121.05 W	122.16	0.43
3262.00	12.84	299.02	3244.02	100.48 N	139.65 W	140.88	0.36
3357.00	12.05	301.76	3336.79	110.82 N	157.31 W	158.67	1.03
3452.00	11.43	303.90	3429.80	121.30 N	173.56 W	175.04	0.80
3547.00	12.01	310.13	3522.82	132.92 N	188.93 W	190.56	1.47
3642.00	12.99	304.84	3615.57	145.39 N	205.25 W	207.03	1.58
3737.00	13.48	303.34	3708.05	157.57 N	223.26 W	225.19	0.63
3832.00	13.64	302.54	3800.40	169.68 N	241.95 W	244.03	0.26
3927.00	12.06	300.07	3893.02	180.67 N	259.98 W	262.19	1.76
4022.00	10.16	299.44	3986.24	189.77 N	275.86 W	278.19	2.00
4117.00	8.23	297.74	4080.01	197.05 N	289.17 W	291.59	2.05
4212.00	5.05	297.50	4174.36	202.14 N	298.90 W	301.38	3.35
4307.00	3.05	310.26	4269.12	205.71 N	304.54 W	307.07	2.29
4402.00	3.00	309.56	4363.99	208.93 N	308.39 W	310.95	0.07
4497.00	1.27	317.29	4458.92	211.28 N	311.01 W	313.61	1.84
4592.00	1.18	311.45	4553.90	212.70 N	312.46 W	315.07	0.16
4687.00	1.14	332.46	4648.88	214.19 N	313.63 W	316.26	0.45
4782.00	1.19	345.91	4743.86	215.98 N	314.31 W	316.96	0.29
4877.00	0.76	22.34	4838.85	217.52 N	314.31 W	316.98	0.77
4972.00	0.56	9.34	4933.84	218.56 N	314.00 W	316.68	0.26
5067.00	0.49	14.09	5028.84	219.41 N	313.82 W	316.52	0.08
5162.00	0.43	347.94	5123.84	220.16 N	313.80 W	316.50	0.23
5257.00	0.40	209.48	5218.83	220.22 N	314.04 W	316.74	0.82
5352.00	0.57	236.39	5313.83	219.66 N	314.59 W	317.29	0.29
5447.00	1.30	236.98	5408.82	218.82 N	315.89 W	318.57	0.77
5542.00	1.46	229.22	5503.79	217.44 N	317.71 W	320.38	0.26
5637.00	1.06	172.48	5598.77	215.78 N	318.51 W	321.16	1.31
5732.00	1.02	108.06	5693.76	214.65 N	317.59 W	320.23	1.16
5827.00	0.81	113.42	5788.75	214.12 N	316.17 W	318.80	0.23
5922.00	0.87	128.22	5883.74	213.88 N	315.55 W	318.48	0.24

5922.00	0.07	183.80	5883.74	213.80 N	315.55 W	318.18	0.84
6018.00	0.34	0.54	5979.74	214.02 N	315.55 W	318.18	0.43
6065.00	1.09	293.39	6026.74	214.34 N	315.96 W	318.60	2.15
6113.00	5.20	292.14	6074.66	215.34 N	318.40 W	321.04	8.55
6160.00	9.04	281.15	6121.29	216.86 N	324.00 W	326.66	8.64
6208.00	12.54	280.80	6168.43	218.57 N	332.82 W	335.50	7.28
6255.00	12.82	282.58	6214.28	220.66 N	342.92 W	345.63	1.03
6303.00	15.35	275.38	6260.84	222.41 N	354.44 W	357.17	6.39
6350.00	18.50	272.81	6305.80	223.36 N	368.09 W	370.83	6.90
6398.00	22.25	270.03	6350.79	223.74 N	384.79 W	387.53	8.06
6445.00	26.18	269.40	6393.65	223.64 N	404.07 W	406.81	8.39
6493.00	29.09	267.61	6436.17	223.04 N	426.32 W	429.05	6.29
6540.00	31.80	265.29	6476.68	221.54 N	450.08 W	452.79	6.28
6588.00	35.86	264.66	6516.55	219.20 N	476.69 W	479.37	8.50
6683.00	42.86	264.13	6589.96	213.30 N	536.61 W	539.21	7.38
6730.00	47.00	263.74	6623.22	209.79 N	569.61 W	572.17	8.83
6778.00	51.37	263.61	6654.59	205.78 N	605.71 W	608.21	9.11
6825.00	56.26	263.60	6682.33	201.56 N	643.40 W	645.84	10.41
6873.00	61.35	264.48	6707.18	197.30 N	684.22 W	686.61	10.72
6920.00	69.80	268.56	6726.61	194.76 N	726.89 W	729.24	19.63
6968.00	79.41	272.49	6739.34	195.22 N	773.10 W	775.46	21.52
6996.00	85.96	274.80	6742.90	196.99 N	800.80 W	803.18	24.78
7095.00	90.89	275.22	6745.62	205.63 N	899.35 W	901.83	5.00
7143.00	90.68	274.38	6744.96	209.64 N	947.18 W	949.70	1.82
7239.00	91.17	274.38	6743.41	216.97 N	1042.88 W	1045.49	0.51
7334.00	90.62	272.49	6741.93	222.66 N	1137.70 W	1140.37	2.06
7429.00	90.62	271.29	6740.91	225.80 N	1232.64 W	1235.34	1.27
7501.00	90.80	270.78	6740.02	227.09 N	1304.62 W	1307.34	0.76
7524.00	90.86	270.51	6739.68	227.35 N	1327.62 W	1330.33	1.20
7619.00	88.86	269.35	6739.91	227.24 N	1422.61 W	1425.32	2.44
7713.00	89.07	268.75	6741.61	225.68 N	1516.58 W	1519.26	0.68
7808.00	89.17	268.41	6743.07	223.34 N	1611.54 W	1614.19	0.37
7903.00	88.83	268.29	6744.73	220.60 N	1706.49 W	1709.09	0.38
7998.00	88.58	269.32	6746.87	218.61 N	1801.44 W	1804.01	1.11
8093.00	90.68	269.31	6747.49	217.47 N	1896.43 W	1898.98	2.21
8188.00	90.25	268.73	6746.72	215.85 N	1991.41 W	1993.93	0.76
8283.00	90.06	268.05	6746.47	213.18 N	2086.37 W	2088.85	0.74
8379.00	89.44	266.62	6746.88	208.71 N	2182.26 W	2184.68	1.62
8474.00	90.59	270.06	6746.85	205.95 N	2277.21 W	2279.58	3.81
8569.00	90.22	269.03	6746.19	205.19 N	2372.20 W	2374.56	1.15
8664.00	89.26	269.79	6746.62	204.21 N	2467.19 W	2469.53	1.29
8758.00	90.65	272.11	6746.70	205.78 N	2561.17 W	2563.52	2.88
8853.00	90.15	271.62	6746.04	208.87 N	2656.12 W	2658.50	0.73
8948.00	90.37	272.16	6745.60	212.00 N	2751.06 W	2753.48	0.61
9043.00	90.59	274.31	6744.81	217.36 N	2845.90 W	2848.38	2.28
9138.00	90.74	272.59	6743.71	223.07 N	2940.72 W	2943.26	1.82
9233.00	89.29	269.74	6743.68	225.00 N	3035.69 W	3038.25	3.36
9328.00	90.59	269.45	6743.79	224.33 N	3130.69 W	3133.23	1.40
9423.00	91.63	267.76	6741.95	222.02 N	3225.64 W	3228.14	2.10
9518.00	88.80	265.76	6741.59	216.64 N	3320.47 W	3322.90	3.65
9613.00	87.44	264.91	6744.71	208.92 N	3415.10 W	3417.43	1.69
9708.00	88.24	267.02	6748.29	202.23 N	3509.79 W	3512.03	2.38
9803.00	87.28	268.52	6752.00	198.53 N	3604.64 W	3606.82	1.87
9898.00	89.69	268.89	6754.51	196.38 N	3699.58 W	3701.73	2.57
9993.00	90.43	268.92	6754.41	194.57 N	3794.56 W	3796.68	0.78
10088.00	89.88	267.55	6754.15	191.64 N	3889.51 W	3891.59	1.56
10183.00	90.80	269.59	6753.59	189.27 N	3984.47 W	3986.51	2.36
10278.00	90.28	269.06	6752.69	188.15 N	4079.46 W	4081.48	0.78
10373.00	90.46	268.94	6752.08	186.49 N	4174.44 W	4176.44	0.23
10467.00	90.77	268.44	6751.07	184.34 N	4268.41 W	4270.37	0.62
10560.00	90.46	270.33	6750.07	183.33 N	4361.40 W	4363.34	2.06
10654.00	89.38	270.48	6750.19	184.00 N	4455.40 W	4457.33	1.16
10748.00	90.40	271.56	6750.37	185.68 N	4549.38 W	4551.33	1.58
10841.00	91.05	271.48	6749.19	188.14 N	4642.34 W	4644.31	0.70
10935.00	91.20	271.07	6747.35	190.23 N	4736.30 W	4738.29	0.47
11027.00	90.68	270.51	6745.84	191.49 N	4828.27 W	4830.28	0.83
11119.00	89.60	267.63	6745.61	189.99 N	4920.25 W	4922.23	3.35
11212.00	89.69	266.59	6746.19	185.30 N	5013.13 W	5015.04	1.12
11306.00	89.32	266.90	6747.00	179.96 N	5106.97 W	5108.81	0.51
11400.00	88.61	269.36	6748.69	176.89 N	5200.90 W	5202.69	2.72
11493.00	90.22	270.12	6749.64	176.46 N	5293.89 W	5295.67	1.91
11585.00	89.69	268.63	6749.72	175.46 N	5385.88 W	5387.64	1.71
11678.00	90.34	269.72	6749.69	174.12 N	5478.87 W	5480.61	1.36
11769.00	90.86	270.15	6748.74	174.02 N	5569.86 W	5571.59	0.75
11862.00	90.65	269.64	6747.51	173.85 N	5662.86 W	5664.58	0.60

11956.00	90.34	268.66	6746.70	172.46 N	5756.84 W	5758.54	1.09
12051.00	90.74	268.58	6745.81	170.17 N	5851.81 W	5853.47	0.43
12146.00	90.71	267.97	6744.61	167.31 N	5946.76 W	5948.37	0.64
12241.00	87.72	267.91	6745.92	163.89 N	6041.68 W	6043.24	3.15
12330.00	87.41	269.22	6749.70	161.67 N	6130.57 W	6132.10	1.51
12425.00	89.11	269.84	6752.59	160.88 N	6225.52 W	6227.03	1.90
12520.00	90.31	269.37	6753.08	160.22 N	6320.51 W	6322.01	1.36
12615.00	90.74	268.02	6752.21	158.06 N	6415.48 W	6416.94	1.49
12710.00	91.23	268.53	6750.57	155.20 N	6510.42 W	6511.84	0.75
12805.00	90.06	269.93	6749.50	153.92 N	6605.40 W	6606.80	1.92
12900.00	89.57	270.43	6749.81	154.22 N	6700.40 W	6701.80	0.74
12995.00	87.81	268.71	6751.98	153.51 N	6795.37 W	6796.75	2.59
13090.00	90.40	270.14	6753.46	152.56 N	6890.34 W	6891.70	3.11
13185.00	91.33	269.50	6752.03	152.26 N	6985.33 W	6986.68	1.18
13280.00	91.85	268.40	6749.40	150.52 N	7080.27 W	7081.59	1.28
13375.00	91.17	269.70	6746.89	148.95 N	7175.22 W	7176.52	1.54
13470.00	90.49	271.36	6745.52	149.82 N	7270.21 W	7271.50	1.89
13565.00	91.29	270.76	6744.04	151.58 N	7365.18 W	7366.49	1.05
13660.00	92.50	270.66	6740.89	152.75 N	7460.12 W	7461.44	1.27
13755.00	90.68	269.25	6738.26	152.68 N	7555.07 W	7556.38	2.42
13850.00	89.32	269.53	6738.26	151.66 N	7650.06 W	7651.36	1.46
13945.00	90.80	271.01	6738.15	152.11 N	7745.06 W	7746.35	2.20
14040.00	90.46	268.76	6737.11	151.91 N	7840.05 W	7841.33	2.39
14135.00	90.25	270.55	6736.52	151.34 N	7935.04 W	7936.30	1.90
14230.00	90.25	272.36	6736.11	153.75 N	8030.00 W	8031.29	1.90
14325.00	90.46	273.85	6735.52	158.90 N	8124.86 W	8126.20	1.59
14420.00	90.62	273.85	6734.63	165.28 N	8219.64 W	8221.06	0.16
14515.00	89.32	270.97	6734.68	169.27 N	8314.54 W	8316.00	3.32
14610.00	89.45	269.90	6735.70	170.00 N	8409.53 W	8411.00	1.14
14705.00	91.05	269.51	6735.29	169.51 N	8504.53 W	8505.98	1.74
14800.00	90.31	269.73	6734.17	168.88 N	8599.52 W	8600.95	0.81
14895.00	90.06	268.71	6733.86	167.58 N	8694.51 W	8695.92	1.10
14990.00	89.69	268.66	6734.07	165.41 N	8789.48 W	8790.86	0.39
15085.00	90.31	269.10	6734.07	163.55 N	8884.47 W	8885.81	0.79
15180.00	90.12	267.39	6733.71	160.64 N	8979.42 W	8980.72	1.81
15275.00	89.26	265.21	6734.22	154.51 N	9074.21 W	9075.43	2.46
15371.00	88.77	266.82	6735.88	147.83 N	9169.96 W	9171.09	1.75
15466.00	89.54	266.59	6737.28	142.37 N	9264.79 W	9265.84	0.85
15561.00	88.43	262.97	6738.97	133.73 N	9359.37 W	9360.30	3.98
15656.00	86.23	261.74	6743.40	121.11 N	9453.41 W	9454.19	2.64
15751.00	87.38	264.31	6748.69	109.60 N	9547.55 W	9548.18	2.95
15846.00	88.70	264.89	6751.94	100.66 N	9642.07 W	9642.58	1.52
15941.00	89.75	263.40	6753.22	90.97 N	9736.57 W	9736.95	1.92
16036.00	90.15	263.56	6753.30	80.18 N	9830.95 W	9831.19	0.45
16131.00	91.48	263.90	6751.95	69.81 N	9925.37 W	9925.47	1.44
16226.00	92.44	263.61	6748.70	59.48 N	10019.75 W	10019.72	1.06
16246.00	92.81	263.32	6747.79	57.21 N	10039.60 W	10039.54	2.35
16315.00	92.81	263.32	6744.40	49.20 N	10108.05 W	10107.88	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 CLOSURE OF 270.28 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.83 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16315.00 FEET  
IS 10108.17 FEET ALONG 270.28 DEGREES (GRID)**