

PCG Pressure Case Gamma PCD Pressure Case Directional

Country : USA									
Field : Wattenberg									
Location : Lat: 40° 14' 52.48" North Long: 104° 33' 11.27" West									
Well : Marie D04-74-1HN									
Company : Noble Energy									
Rig : H&P 343									
LOCATION									
Latitude : 40° 14' 52.48" North Longitude : 104° 33' 11.27" West					Other Services				
UTM Easting = 3,264,299,690 ft UTM Northing = 1,334,566,430 ft					Directional Drilling				
Permanent Datum : Ground Level Elevation : 4720.00 ft									
Log Measured From : Drill Floor 24.00 ft Above Permanent Datum									
Drilling Measured From : Drill Floor									
TVD LOG									
Depth Logged : 686.97 ft To 6,771.68 ft									
Date Logged : 21-Dec-13 To 06-Jan-14									
Total Depth MD : 11,217.00 ft TVD: 6,771.68 ft									
Spud Date : 22-Dec-13									
Unit No. : 11610115									
Job No. : CA-XX-0900918600									
Plot Type : Final									
Plot Date : 09-Jan-14									
Run No.									
Borehole Record (TVD)									
Size From To									
Run No.									
Size From To									
Casing Record (TVD)									
Size Weight From To									
SURFACE 676.97 ft									
SURFACE 6,799.94 ft									

WELL INFORMATION

MWD Run Number	100	600	700		
Date run completed	25-Dec-13	02-Jan-14	03-Jan-14		
Rig Bit Number	2	7	8		
Bit Size (in)	8.750	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750	6.750		
Log Start Depth (TVD, ft)	686.97	6,109.01	6,187.77		
Log End Depth (TVD, ft)	6,794.67	6,187.77	6,800.62		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	24-Dec-13 00:45	02-Jan-14 04:15	02-Jan-14 18:00		
Drill/Wipe End Date and Time	25-Dec-13 00:45	02-Jan-14 11:45	03-Jan-14 08:15		
Min Inc (deg) @ Depth (TVD, ft)	0.13 @ 6,363.98	1.93 @ 6,132.00	10.96 @ 6,225.27		
Max Inc (deg) @ Depth (TVD, ft)	10.38 @ 2,114.07	7.03 @ 6,177.85	85.13 @ 6,796.61		
Bit TFA(in2) / Bit Type	0.98 / PDC	0.92 / Mill	0.98 / PDC		
Flow Rate (gpm)	588.64	425.00	557.35		
Max AV (fpm) / CV (fpm) @ MWD	473.0 / 500.0	417.0 / 400.0	375.0 / 425.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.60 / 35.00	9.60 / 40.00	9.60 / 40.00		
Filtrate CL (ppm)	1,300.00	1,900.00	2,000.00		
pH / Fluid Loss (mptm)	9.30 / 8	10.50 / 10	10.20 / 8		
PV (cP) / YP (lbf2)	9 / 7.00	13 / 9.00	10 / 10.00		
% Solids / % Sand	5.0 / 0.25	6.2 / .1	6 / .15		
% Oil / Oil:Water Ratio	NA / NA	NA / NA	NA / NA		
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Max Tool Temp (in F) / S	177.04 / PCM	187 / PCM	187 / PCM		

Max Tool Temp (degF) / Source	177.64 / PCM	137 / PCM	167 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA		
Lead MWD Engineer	Gary Eifert	Gary Eifert	Gary Eifert		
Customer Representative	Matt Settles	Matt Settles	Matt Settles		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11341330	11341330	11341330		
Insert Serial Number	11400989	10997273	10997273		
Date and Time Initialized	23-Dec-13 01:21	01-Jan-70 00:00	01-Jan-70 00:00		
Date and Time Read	26-Dec-13 15:23	03-Jan-14 15:06	03-Jan-14 15:13		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	55.00	56.00	53.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341330	11341330	11341330		
Sonde Serial Number	11478007	11477956	11477956		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	242.03	246.54	335.50		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	47.97	49.77	45.87		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	1341330	1341330	1341330		
Insert/Sonde Serial Number	11293391	12037425	12037425		

REMARKS

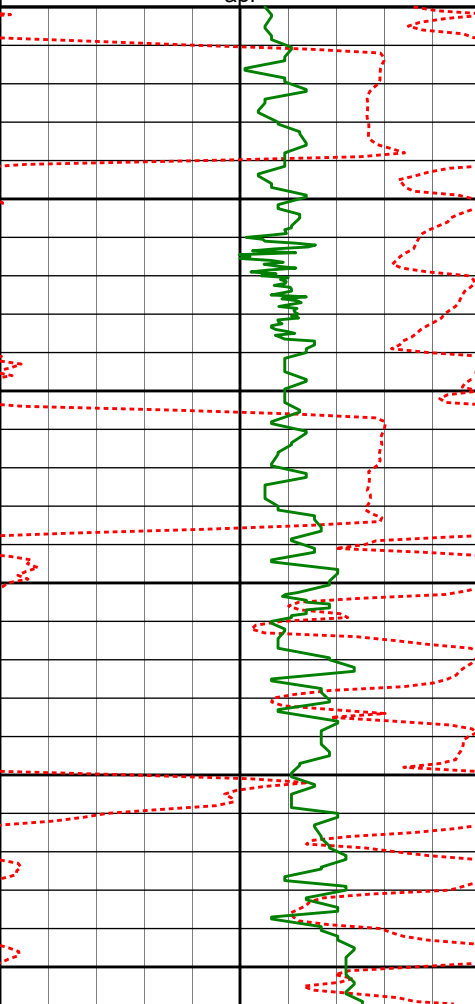
1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water 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 8.0

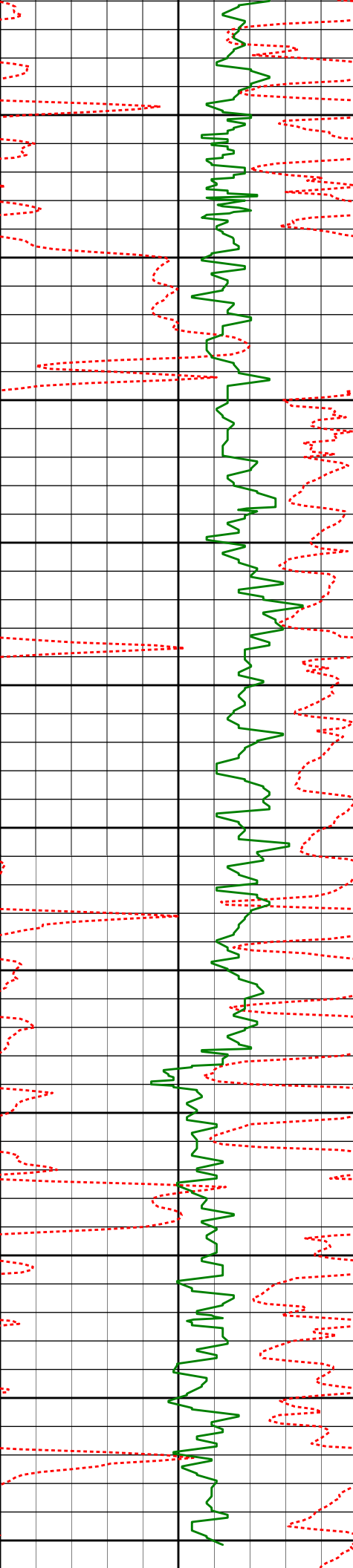
WARRANTY

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HALLIBURTON

TVD Main Log 1:600

Average Rate of Penetration ROPA						
1K0						
feet per hr						
PCG Gamma Ray PGRC		True Vertical Depth (ft) 1:600	Depth	Inc	Azi.	TVDV.S.
0200api						
		3000'				
		3050'	3067'	3.12°	138.43°	3050.62'-143.03'
		3100'				
		3150'	3162'	0.57°	131.82°	3145.57'-145.22'
		3200'				
		3250'	3257'	0.71°	99.12°	3240.56'-145.60'



3300'

3352'

0.24°

189.77°

3335.56'

-145.87'

3350'

3400'

3446'

0.81°

324.08°

3429.55'

-145.54'

3450'

3500'

3541'

1.09°

334.68°

3524.54'

-144.20'

3550'

3600'

3636'

1.07°

301.34°

3619.53'

-142.96'

3650'

3700'

3731'

0.81°

292.61°

3714.51'

-142.28'

3750'

3800'

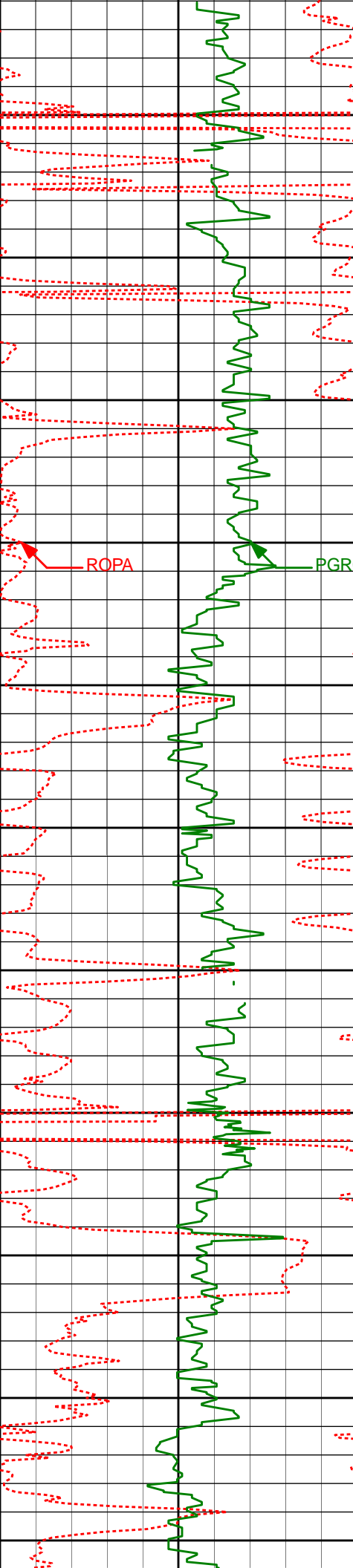
3825'

1.30°

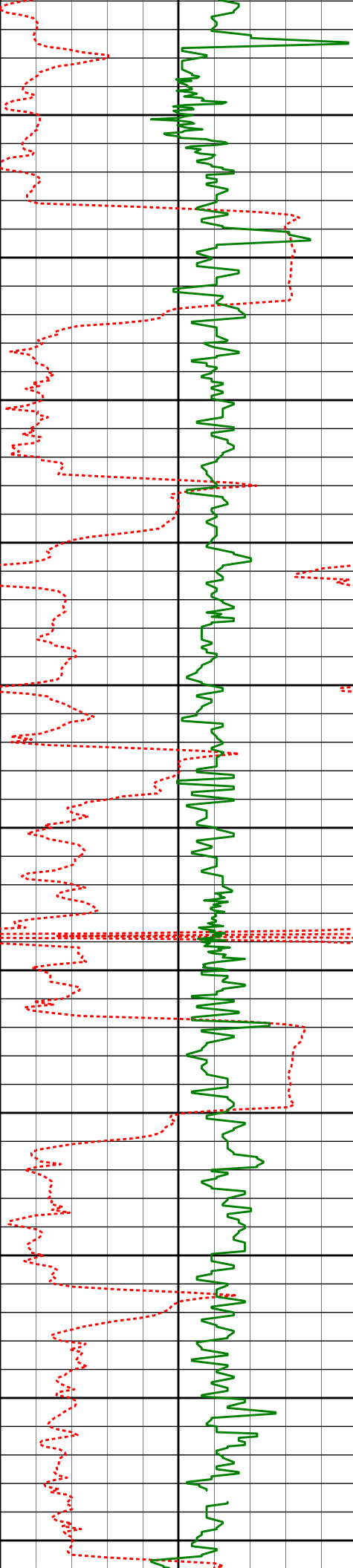
299.40°

3808.50'

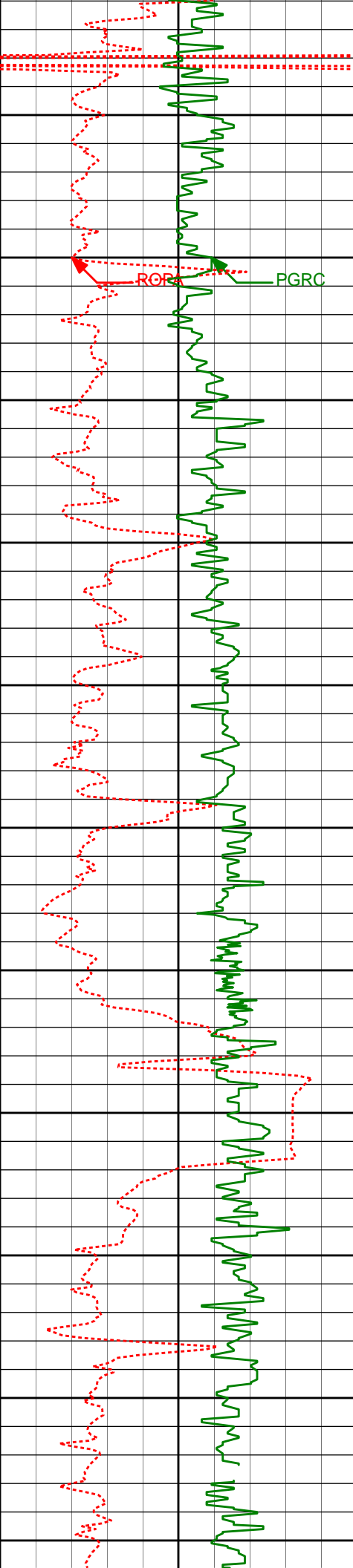
-141.55'



3850'					
3900'	3920'	1.13°	302.52°	3903.47'	-140.57'
3950'					
4000'	4015'	0.97°	323.20°	3998.46'	-139.46'
4050'					
4100'	4110'	0.71°	337.67°	4093.45'	-138.30'
4150'					
4200'	4205'	0.84°	357.43°	4188.44'	-137.07'
4250'					
4300'	4300'	0.79°	47.40°	4283.43'	-135.92'
4350'					



4395'	0.65°	28.27°	4378.42'	-134.97'
4400'				
4450'				
4490'	1.03°	109.12°	4473.42'	-134.75'
4500'				
4550'				
4584'	0.86°	94.18°	4567.40'	-135.03'
4600'				
4650'				
4679'	0.84°	84.06°	4662.39'	-134.97'
4700'				
4750'				
4800'				
4850'	1.33°	131.43°	4852.36'	-136.19'
4900'				



4950'

5000'

5050'

5100'

5150'

5200'

5250'

5300'

5350'

5400'

5450'

4964'

5058'

5248'

5343'

5438'

1.41°

1.34°

1.64°

1.79°

1.94°

121.07°

122.05°

96.51°

163.60°

165.67°

4947.34'

5041.31'

5231.25'

5326.21'

5421.16'

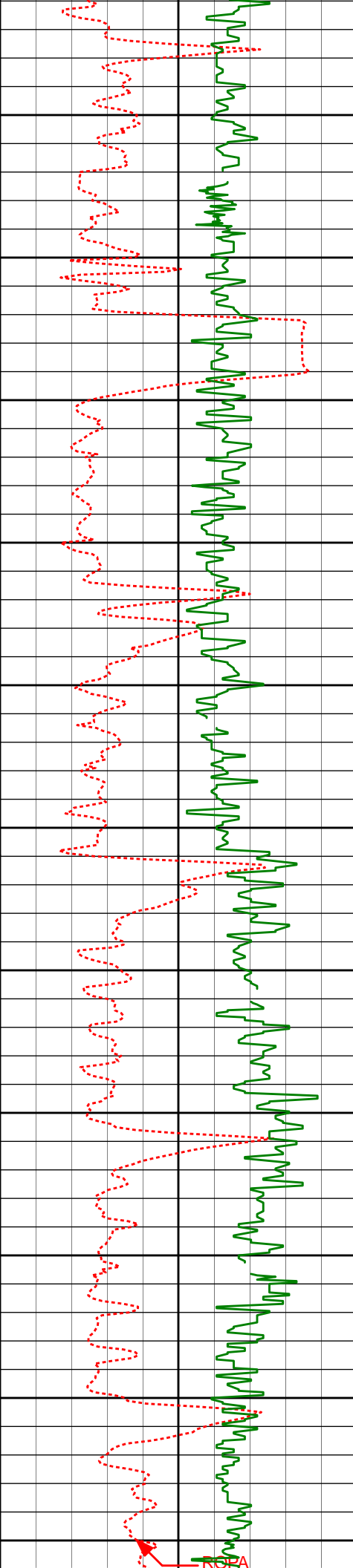
-137.47'

-138.59'

-139.94'

-141.46'

-144.42'



5500'

5532'	1.49°	183.32°	5515.12'	-147.17'
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5550'

5600'

5627'	1.20°	224.84°	5610.10'	-149.13'
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5650'

5700'

5722'	1.21°	219.09°	5705.08'	-150.66'
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5750'

5800'

5817'	1.21°	229.95°	5800.05'	-152.12'
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5850'

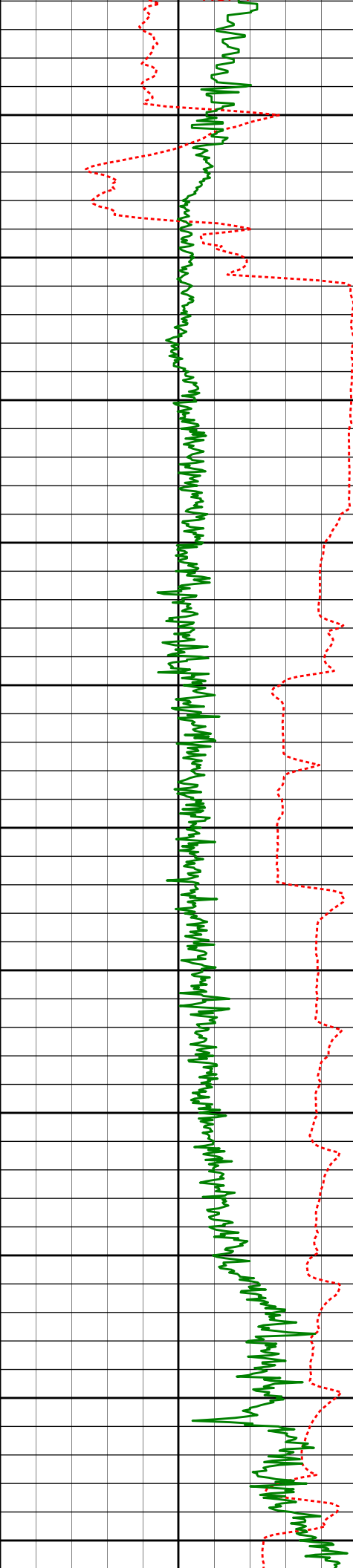
5900'

5912'	1.11°	232.80°	5895.03'	-153.37'
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5950'

6000'

6007'	0.91°	211.53°	5990.02'	-154.61'
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Run 600

6050'

6100'

6150'

6200'

6250'

6300'

6350'

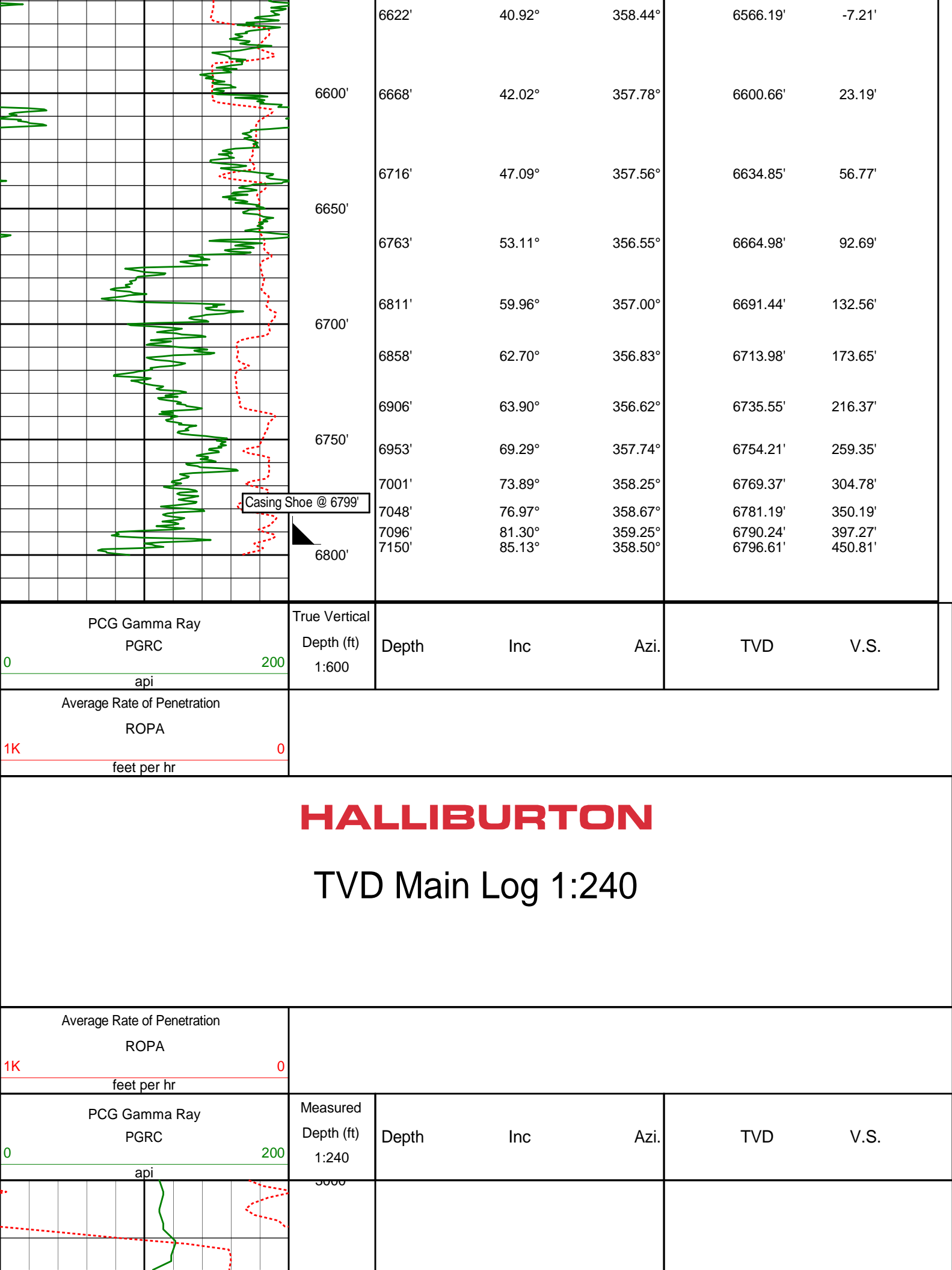
6400'

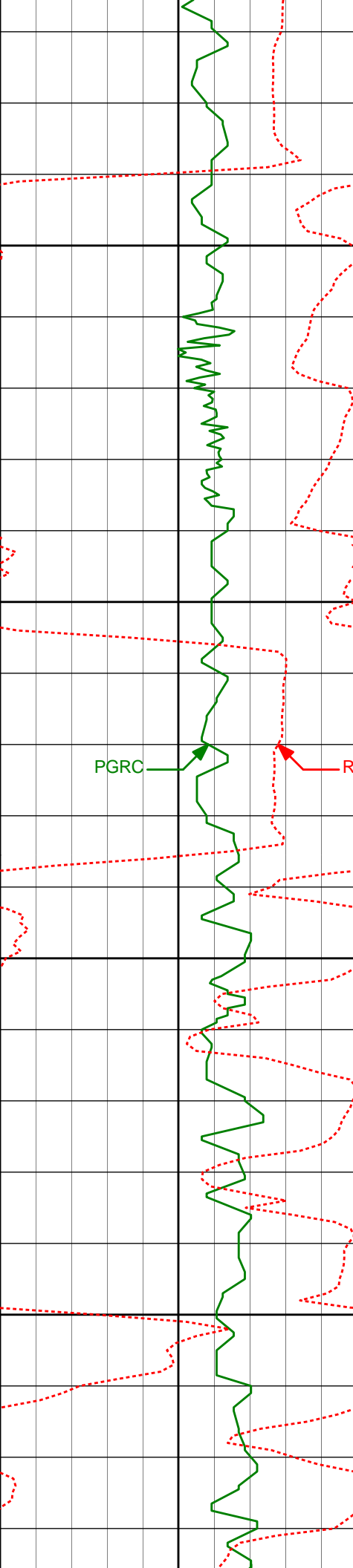
6450'

6500'

6550'

6101'	0.61°	209.81°	6084.01'	-155.69'
6149'	1.93°	90.80°	6132.00'	-155.91'
6195'	7.03°	71.55°	6177.85'	-154.92'
6243'	10.96°	44.13°	6225.27'	-150.54'
6290'	12.09°	35.80°	6271.32'	-143.16'
6338'	11.36°	31.62°	6318.32'	-134.89'
6384'	15.95°	24.90°	6363.01'	-125.15'
6432'	21.36°	16.16°	6408.49'	-110.61'
6479'	27.44°	9.32°	6451.28'	-91.57'
6527'	34.95°	4.16°	6492.31'	-66.83'
6574'	39.88°	0.59°	6529.64'	-38.29'





3050'

3067'

3.12°

138.43°

3050.62'

-143.03'

3100'

PGRC



ROPA



3150'

3162'

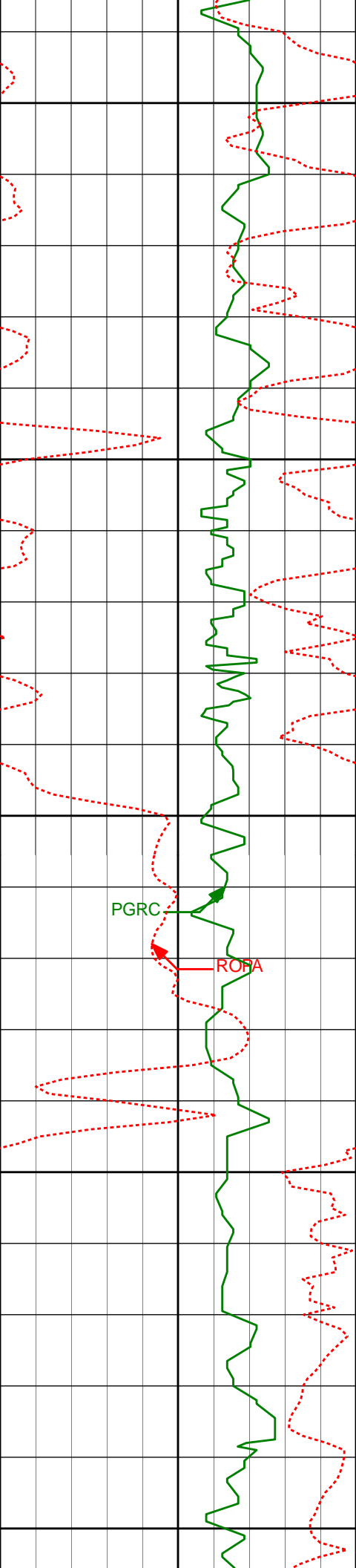
0.57°

131.82°

3145.57'

-145.22'

3200'



3250'

3300'

3350'

3400'

3450'

3257'

0.71°

99.12°

3240.56'

-145.60'

3352'

0.24°

189.77°

3335.56'

-145.87'

3446'

0.81°

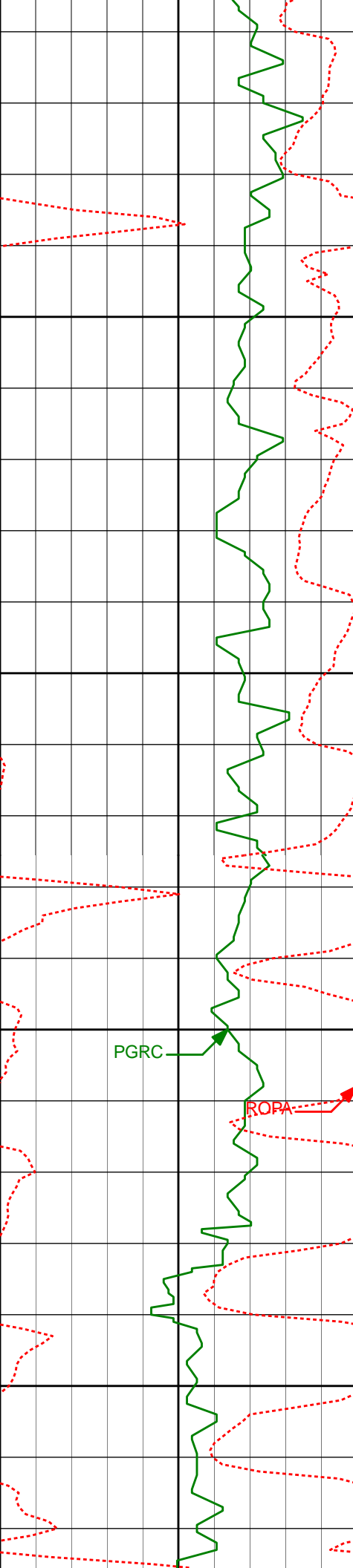
324.08°

3429.55'

-145.54'

PGRC

ROPA



3500'

3541'

1.09°

334.68°

3524.54'

-144.20'

3550'

3600'

PGRC

ROPA

3636'

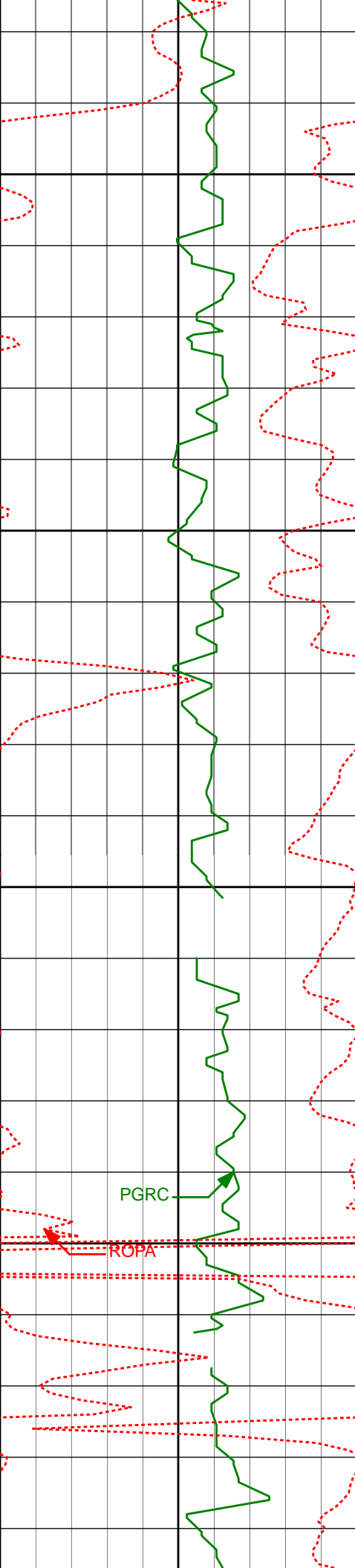
1.07°

301.34°

3619.53'

-142.96'

3650'



3700'

3731'

0.81°

292.61°

3714.51'

-142.28'

3750'

3800'

3825'

1.30°

299.40°

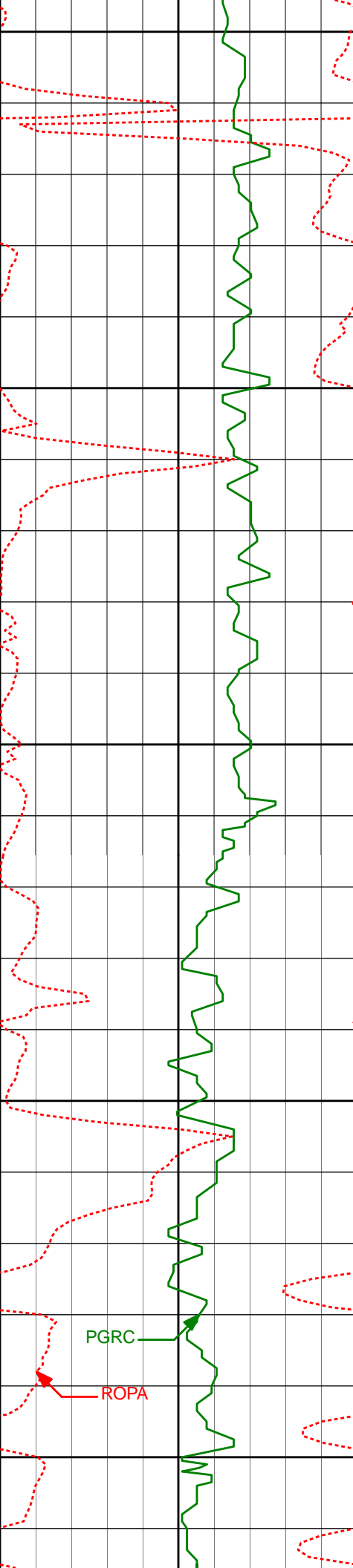
3808.50'

-141.55'

3850'

PGRC

ROPA



3900'

3950'

4000'

4050'

4100'

3920'

4015'

4110'

1.13°

0.97°

0.71°

302.52°

323.20°

337.67°

3903.47'

3998.46'

4093.45'

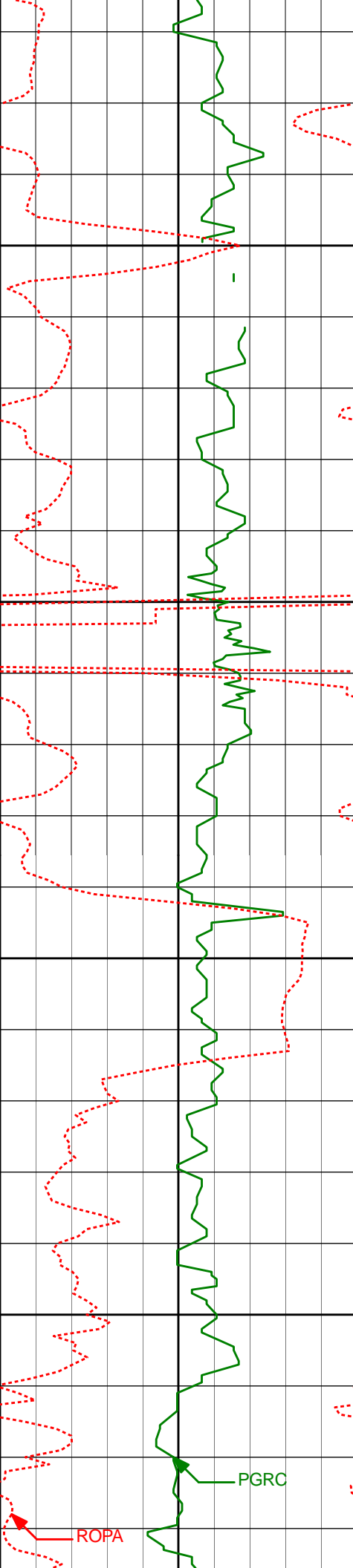
-140.57'

-139.46'

-138.30'

PGRC

ROPA



4150'

4205'

4200'

4250'

4300'

4300'

0.84°

357.43°

4188.44'

-137.07'

0.79°

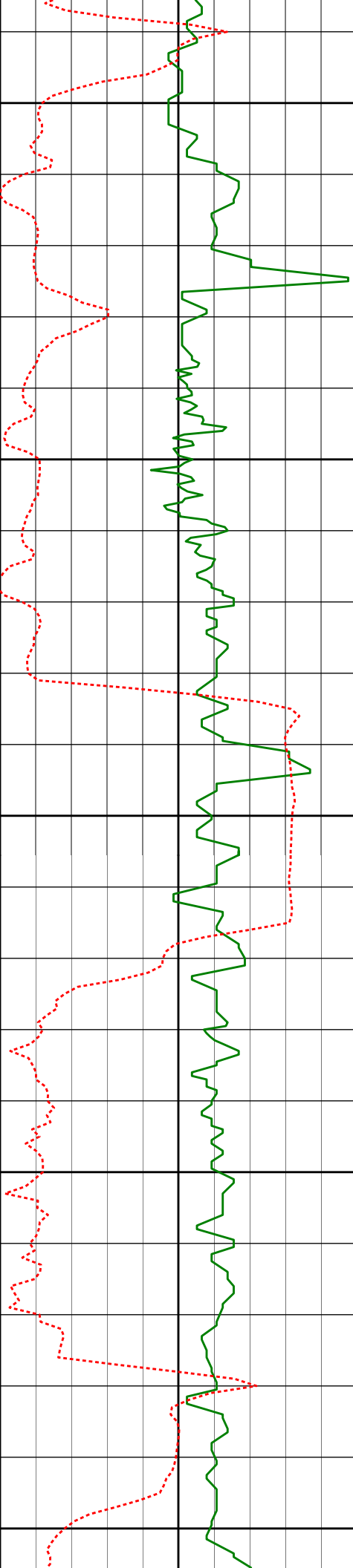
47.40°

4283.43'

-135.92'

PGRC

ROPA



4350'

4395'

0.65°

28.27°

4378.42'

-134.97'

4400'

4450'

4490'

1.03°

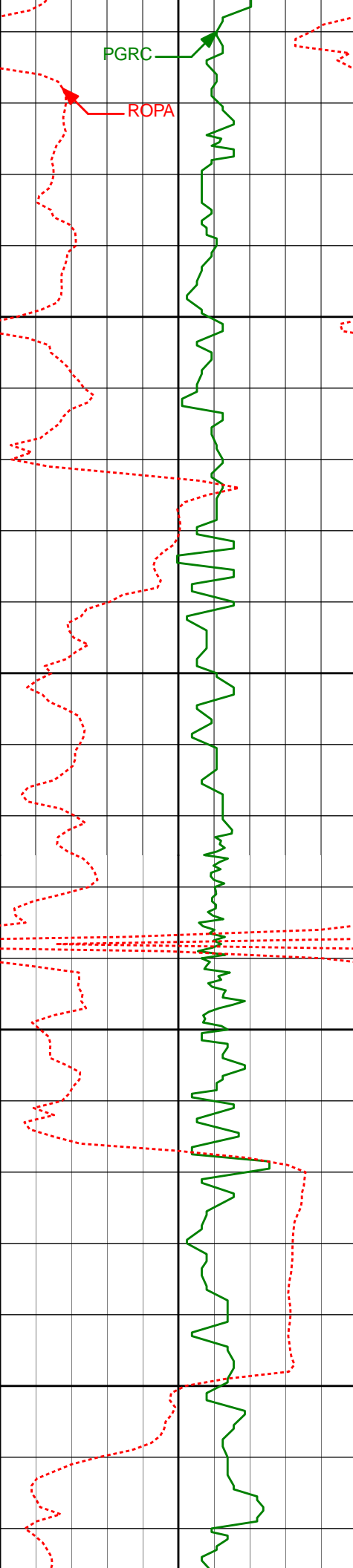
109.12°

4473.42'

-134.75'

4500'

4550'



4584'

0.86°

94.18°

4567.40'

-135.03'

4600'

4650'

4679'

0.84°

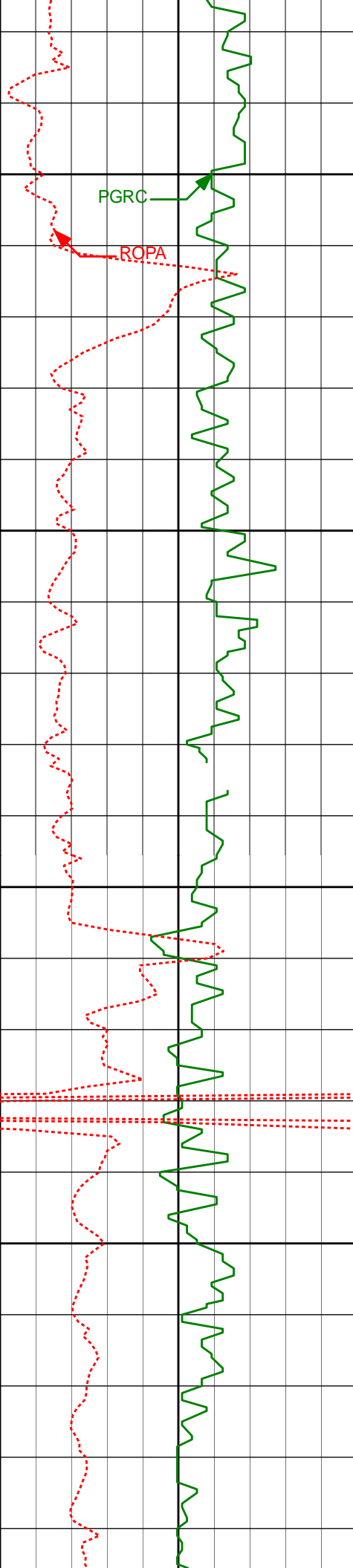
84.06°

4662.39'

-134.97'

4700'

4750'



4800'

PGRC

ROPA

4850'

4869'

1.33°

131.43°

4852.36'

-136.19'

4900'

4950'

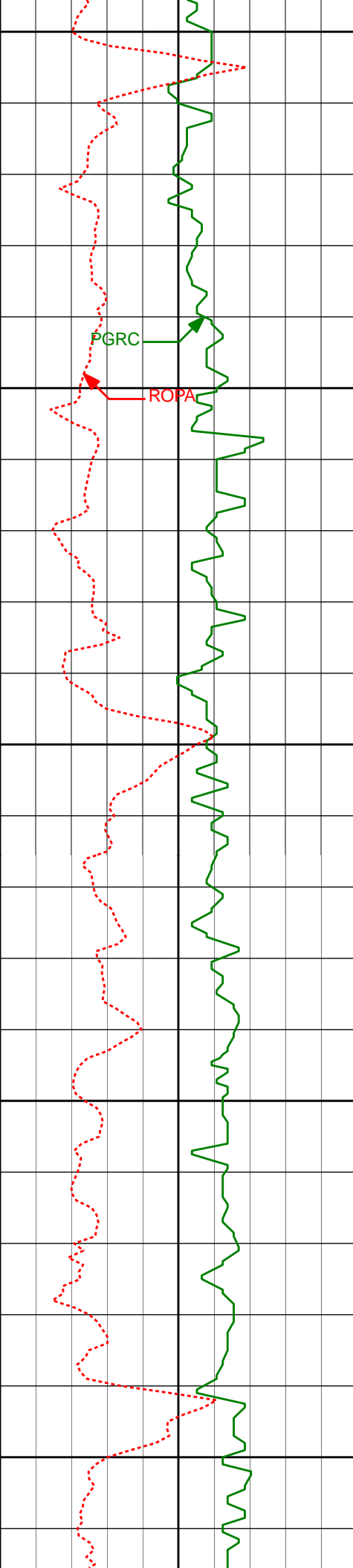
4964'

1.41°

121.07°

4947.34'

-137.47'



5000'

5050'

5100'

5150'

5200'

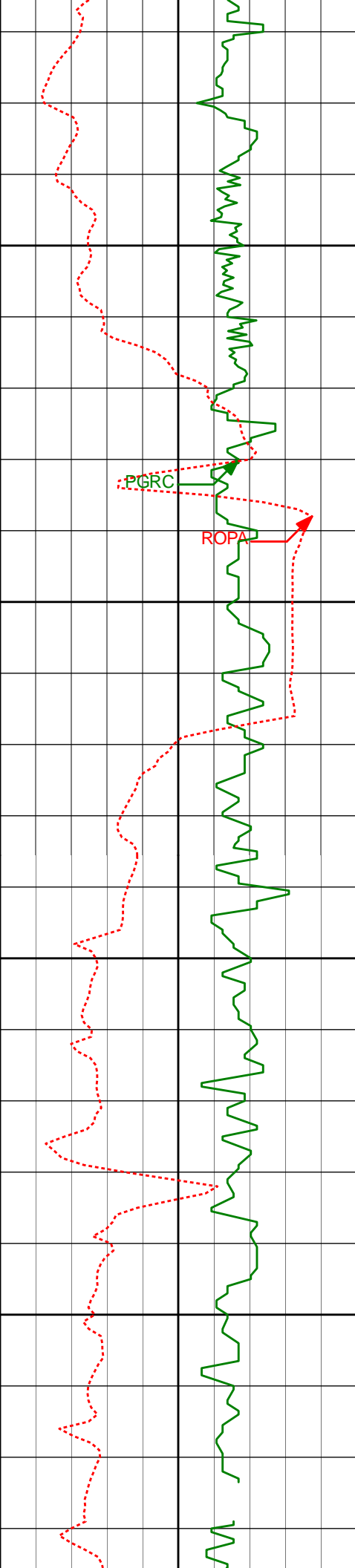
5058'

1.34°

122.05°

5041.31'

-138.59'



5250'

5300'

5350'

5400'

5248'

1.64°

96.51°

5231.25'

-139.94'

5343'

1.79°

163.60°

5326.21'

-141.46'

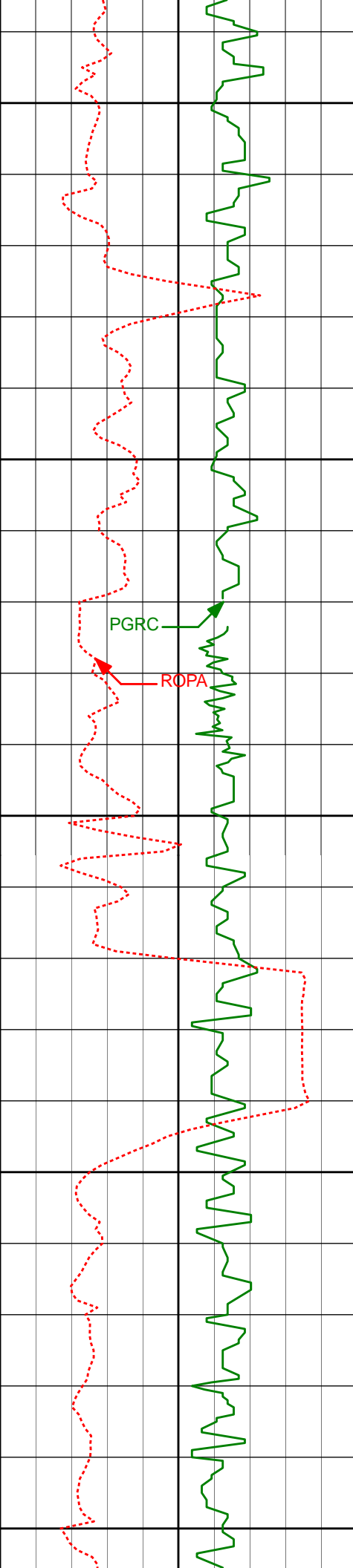
5438'

1.94°

165.67°

5421.16'

-144.42'



5450'

5500'

5550'

5600'

5650'

5532'

1.49°

183.32°

5515.12'

-147.17'

PGRC

ROPA

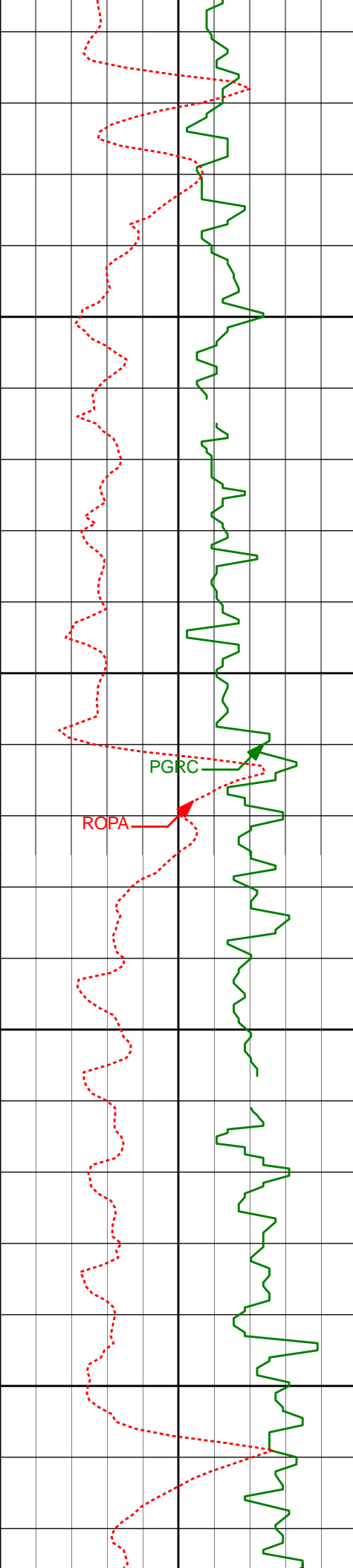
5627'

1.20°

224.84°

5610.10'

-149.13'



5700'

5722'

1.21°

219.09°

5705.08'

-150.66'

5750'

PGRC

ROPA

5800'

5817'

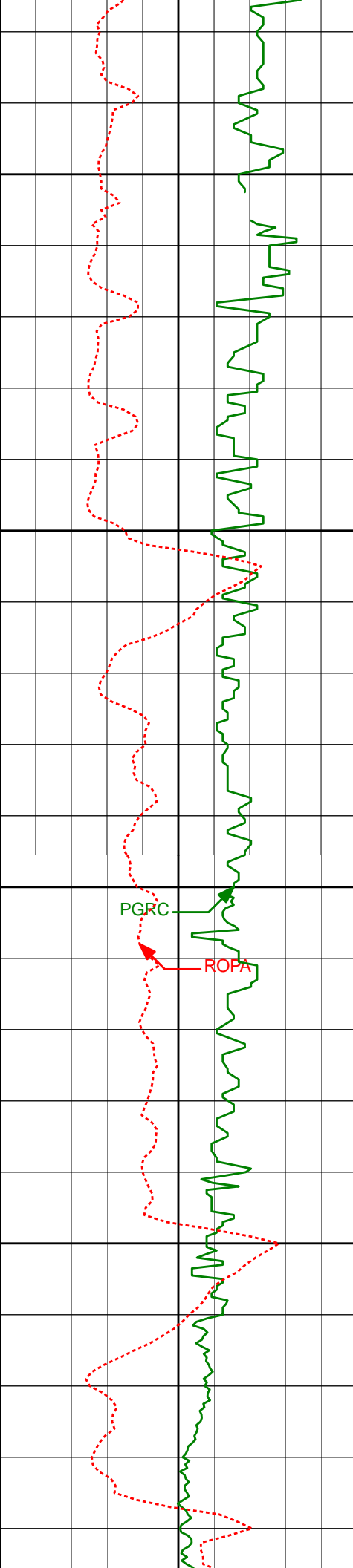
1.21°

229.95°

5800.05'

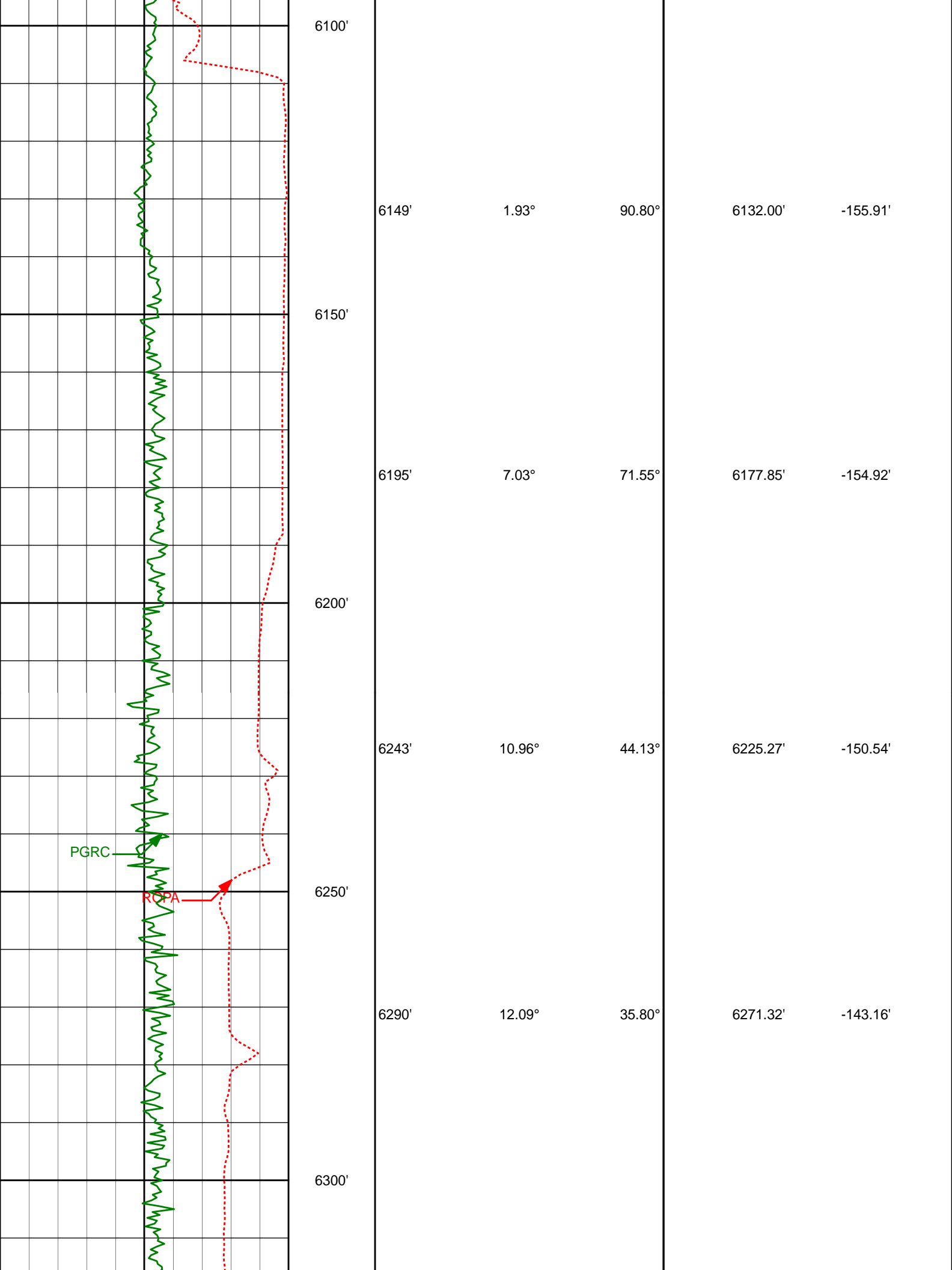
-152.12'

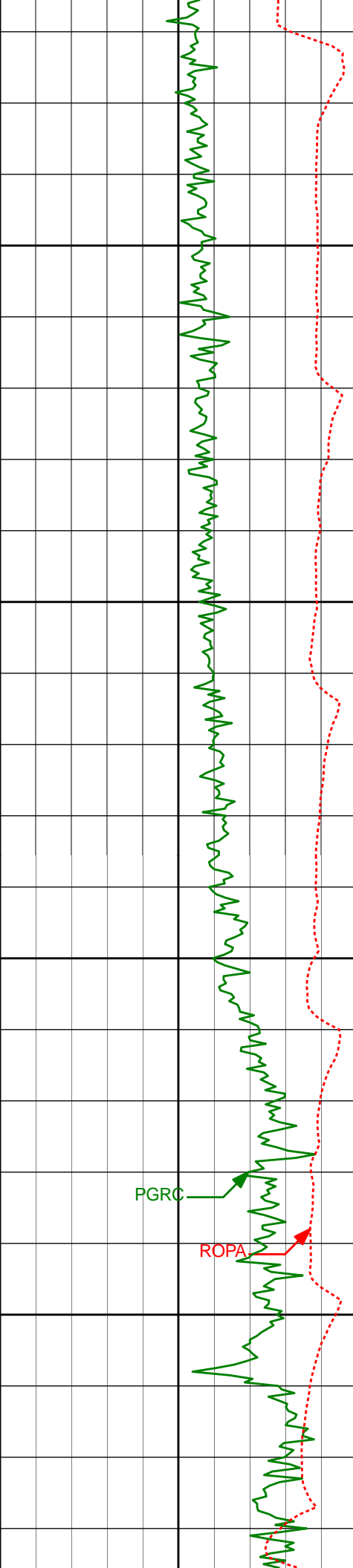
5850'



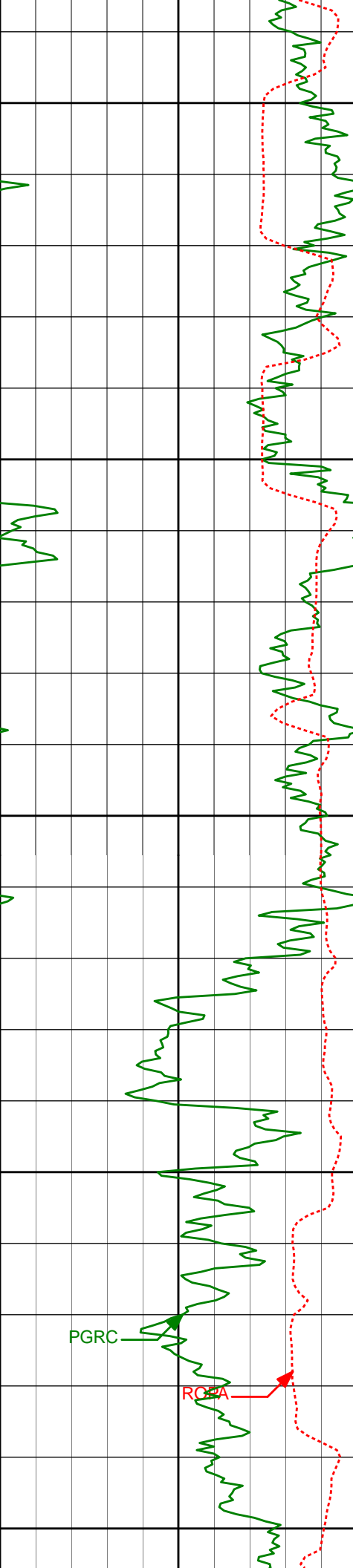
Run 600

5912'	1.11°	232.80°	5895.03'	-153.37'
5900'				
5950'				
6007'	0.91°	211.53°	5990.02'	-154.61'
6000'				
6050'				
6101'	0.61°	209.81°	6084.01'	-155.69'





6338'	11.36°	31.62°	6318.32'	-134.89'
6350'				
6384'	15.95°	24.90°	6363.01'	-125.15'
6400'				
6432'	21.36°	16.16°	6408.49'	-110.61'
6450'				
6479'	27.44°	9.32°	6451.28'	-91.57'
6527'	34.95°	4.16°	6492.31'	-66.83'
6500'				
6574'	39.88°	0.59°	6529.64'	-38.29'



6550'

6622'

40.92°

358.44°

6566.19'

-7.21'

6600'

6668'

42.02°

357.78°

6600.66'

23.19'

6650'

6716'

47.09°

357.56°

6634.85'

56.77'

6700'

6763'

53.11°

356.55°

6664.98'

92.69'

6811'

59.96°

357.00°

6691.44'

132.56'

6858'

62.70°

356.83°

6713.98'

173.65'

6906'

63.90°

356.62°

6735.55'

216.37'

6750'

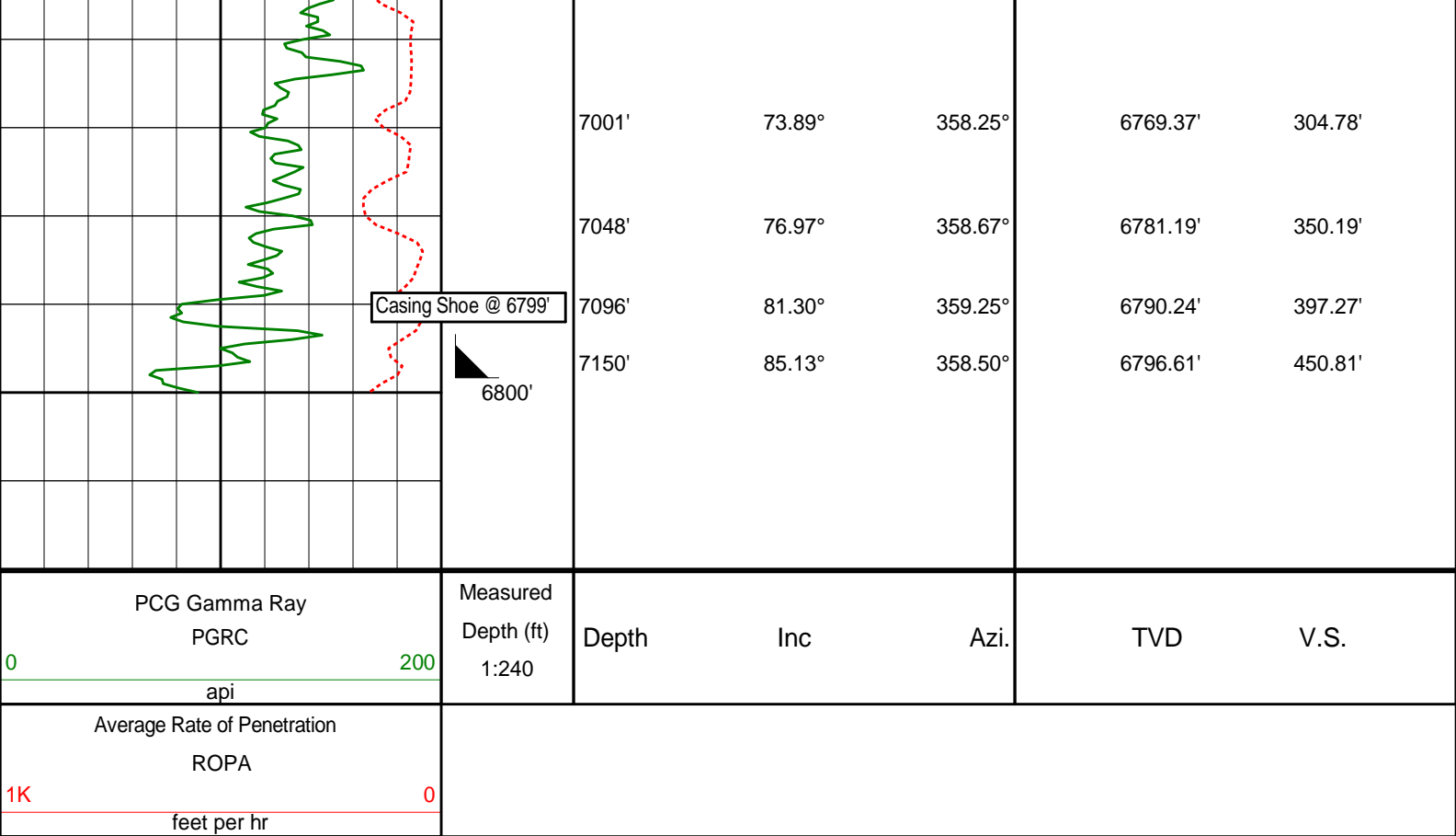
6953'

69.29°

357.74°

6754.21'

259.35'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Marie D04-74-1HN
Wattenberg
Weld Colorado
USA

CA-XX-0900918600

Tie into existing surveys at 362' and 661' provided by HP

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
362.00	0.60	44.02	361.99	1.36 N	1.32 E	1.40	0.17
661.00	0.70	45.02	660.97	3.78 N	3.70 E	3.89	0.03
808.00	1.08	45.13	807.96	5.39 N	5.32 E	5.55	0.26
900.00	0.74	64.95	899.94	6.26 N	6.47 E	6.45	0.50
992.00	0.92	63.98	991.93	6.83 N	7.67 E	7.06	0.20
1085.00	1.07	86.26	1084.92	7.22 N	9.22 E	7.49	0.44
1177.00	0.73	201.19	1176.91	6.73 N	9.86 E	7.02	1.66
1270.00	0.76	191.65	1269.91	5.57 N	9.52 E	5.86	0.14
1362.00	1.11	187.35	1361.89	4.09 N	9.29 E	4.37	0.39
1456.00	1.43	180.17	1455.87	2.01 N	9.16 E	2.29	0.38
1551.00	3.06	167.31	1550.80	1.65 S	9.72 E	-1.36	1.79
1645.00	4.31	158.66	1644.60	7.39 S	11.56 E	-7.04	1.45
1740.00	6.24	144.87	1739.20	14.94 S	15.83 E	-14.46	2.42
1834.00	7.31	139.27	1832.54	23.65 S	22.67 E	-22.96	1.33
1929.00	8.30	132.33	1926.66	32.85 S	31.68 E	-31.88	1.44
2024.00	9.58	133.43	2020.50	42.90 S	42.49 E	-41.60	1.36
2119.00	10.38	133.82	2114.07	54.27 S	54.41 E	-52.60	0.84
2213.00	9.70	128.88	2206.63	65.10 S	66.69 E	-63.06	1.16
2308.00	9.98	128.09	2300.23	75.20 S	79.40 E	-72.77	0.32
2403.00	10.06	125.65	2393.78	85.12 S	92.62 E	-82.28	0.46
2498.00	9.70	129.44	2487.37	95.04 S	105.54 E	-91.81	0.78
2593.00	8.73	127.08	2581.15	104.47 S	117.48 E	-100.87	1.09

2688.00	9.84	133.99	2674.90	114.46 S	129.07 E	-110.51	1.65
2782.00	9.70	130.40	2767.54	125.17 S	140.89 E	-120.86	0.67
2877.00	7.58	136.54	2861.46	134.91 S	151.30 E	-130.28	2.43
2972.00	5.08	141.78	2955.87	142.76 S	158.21 E	-137.92	2.69
3067.00	3.12	138.43	3050.62	148.01 S	162.53 E	-143.03	2.08
3162.00	0.57	131.82	3145.57	150.26 S	164.60 E	-145.22	2.70
3257.00	0.71	99.12	3240.56	150.66 S	165.53 E	-145.60	0.41
3352.00	0.24	189.77	3335.56	150.95 S	166.08 E	-145.87	0.79
3446.00	0.81	324.08	3429.55	150.61 S	165.66 E	-145.54	1.06
3541.00	1.09	334.68	3524.54	149.25 S	164.88 E	-144.20	0.35
3636.00	1.07	301.34	3619.53	147.97 S	163.73 E	-142.96	0.65
3731.00	0.81	292.61	3714.51	147.25 S	162.36 E	-142.28	0.31
3825.00	1.30	299.40	3808.50	146.47 S	160.81 E	-141.55	0.53
3920.00	1.13	302.52	3903.47	145.44 S	159.08 E	-140.57	0.19
4015.00	0.97	323.20	3998.46	144.29 S	157.81 E	-139.46	0.43
4110.00	0.71	337.67	4093.45	143.11 S	157.11 E	-138.30	0.35
4205.00	0.84	357.43	4188.44	141.87 S	156.85 E	-137.07	0.31
4300.00	0.79	47.40	4283.43	140.73 S	157.30 E	-135.92	0.72
4395.00	0.65	28.27	4378.42	139.81 S	158.04 E	-134.97	0.29
4490.00	1.03	109.12	4473.42	139.61 S	159.11 E	-134.75	1.19
4584.00	0.86	94.18	4567.40	139.94 S	160.61 E	-135.03	0.32
4679.00	0.84	84.06	4662.39	139.92 S	162.01 E	-134.97	0.16
4869.00	1.33	131.43	4852.36	141.24 S	165.05 E	-136.19	0.52
4964.00	1.41	121.07	4947.34	142.57 S	166.88 E	-137.47	0.27
5058.00	1.34	122.05	5041.31	143.75 S	168.80 E	-138.59	0.08
5248.00	1.64	96.51	5231.25	145.24 S	173.38 E	-139.94	0.38
5343.00	1.79	163.60	5326.21	146.81 S	175.15 E	-141.46	2.00
5438.00	1.94	165.67	5421.16	149.80 S	175.97 E	-144.42	0.18
5532.00	1.49	183.32	5515.12	152.56 S	176.29 E	-147.17	0.73
5627.00	1.20	224.84	5610.10	154.50 S	175.52 E	-149.13	1.05
5722.00	1.21	219.09	5705.08	155.99 S	174.19 E	-150.66	0.13
5817.00	1.21	229.95	5800.05	157.41 S	172.79 E	-152.12	0.24
5912.00	1.11	232.80	5895.03	158.61 S	171.29 E	-153.37	0.12
6007.00	0.91	211.53	5990.02	159.81 S	170.15 E	-154.61	0.45
6101.00	0.61	209.81	6084.01	160.89 S	169.51 E	-155.69	0.33
6149.00	1.93	90.80	6132.00	161.12 S	170.20 E	-155.91	4.76
6195.00	7.03	71.55	6177.85	160.24 S	173.64 E	-154.92	11.40
6243.00	10.96	44.13	6225.27	156.03 S	179.61 E	-150.54	11.91
6290.00	12.09	35.80	6271.32	148.83 S	185.60 E	-143.16	4.28
6338.00	11.36	31.62	6318.32	140.72 S	191.02 E	-134.89	2.34
6384.00	15.95	24.90	6363.01	131.13 S	196.06 E	-125.15	10.54
6432.00	21.36	16.16	6408.49	116.74 S	201.27 E	-110.61	12.66
6479.00	27.44	9.32	6451.28	97.81 S	205.41 E	-91.57	14.25
6527.00	34.95	4.16	6492.31	73.15 S	208.21 E	-66.83	16.59
6574.00	39.88	0.59	6529.64	44.63 S	209.34 E	-38.29	11.46
6622.00	40.92	358.44	6566.19	13.53 S	209.07 E	-7.21	3.62
6668.00	42.02	357.78	6600.66	16.92 N	208.06 E	23.19	2.59
6716.00	47.09	357.56	6634.85	50.56 N	206.69 E	56.77	10.57
6763.00	53.11	356.55	6664.98	86.55 N	204.82 E	92.69	12.90
6811.00	59.96	357.00	6691.44	126.50 N	202.58 E	132.56	14.29
6858.00	62.70	356.83	6713.98	167.68 N	200.36 E	173.65	5.85
6906.00	63.90	356.62	6735.55	210.49 N	197.90 E	216.37	2.53
6953.00	69.29	357.74	6754.21	253.56 N	195.79 E	259.35	11.66
7001.00	73.89	358.25	6769.37	299.06 N	194.20 E	304.78	9.64
7048.00	76.97	358.67	6781.19	344.52 N	192.98 E	350.19	6.61
7096.00	81.30	359.25	6790.24	391.64 N	192.13 E	397.27	9.10
7150.00	85.13	358.50	6796.61	445.25 N	191.07 E	450.81	7.23

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 1.73 DEGREES (GRID)
A TOTAL CORRECTION OF 7.82 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7150.00 FEET
IS 484.51 FEET ALONG 23.23 DEGREES (GRID)**