

PCG Pressure Case Gamma PCD Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	15-Feb-14	16-Feb-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	634.99	5,945.98			
Log End Depth (TVD, ft)	5,945.98	6,633.94			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	14-Feb-14 21:30	15-Feb-14 23:00			
Drill/Wipe End Date and Time	15-Feb-14 13:30	16-Feb-14 09:30			
Min Inc (deg) @ Depth (TVD, ft)	0.21 @ 707.99	0.63 @ 5,983.98			
Max Inc (deg) @ Depth (TVD, ft)	8.85 @ 3,714.03	82.85 @ 6,628.48			
Bit TFA(in2) / Bit Type	0.98 / PDC	1.24 / PDC			
Flow Rate (gpm)	588.18	540.00			
Max AV (fpm) / CV (fpm) @ MWD	434.0 / 500.0	477.0 / 245.0			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.80 / 28.00	10.25 / 36.00			
Filtrate CL (ppm)	2,300.00	2,500.00			
pH / Fluid Loss (mptm)	10.20 / 44	9.40 / 8			
PV (cP) / YP (lbf2)	2 / 2.00	10 / 10.00			
% Solids / % Sand	2.2 / .35	8.20 / 0.25			
% Oil / Oil:Water Ratio	NA / NA	NA / NA			
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Max Tool Temp (in F) / S	116.00 / PCM	116.00 / PCM			

Max Tool Temp (degF) / Source	412.20 / PCM	412.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA			
Lead MWD Engineer	Gary Eifert	Gary Eifert			
Customer Representative	Johnny Sanchez	Johnny Sanchez			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11342275	11342275			
Insert Serial Number	10997273	10997273			
Date and Time Initialized	14-Feb-14 16:03	01-Jan-70 00:00			
Date and Time Read	16-Feb-14 14:47	16-Feb-14 15:10			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	53.00			
Software Version	6.21	6.21			
Sub Serial Number	11342275	11342275			
Sonde Serial Number	11477956	11477956			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	343.96	343.52			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.80	46.62			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11342275	11342275			
Insert/Sonde Serial Number	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

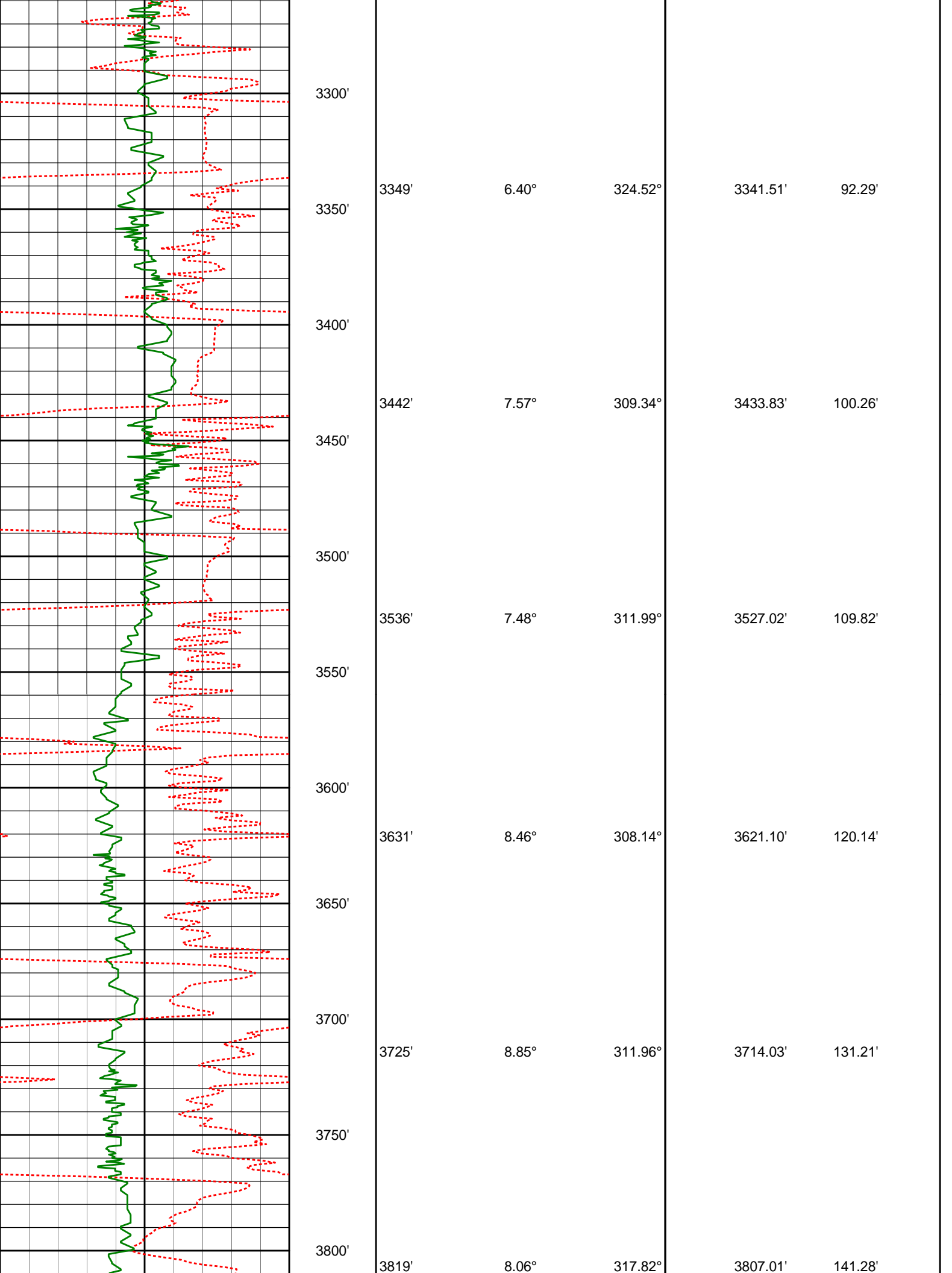
WARRANTY

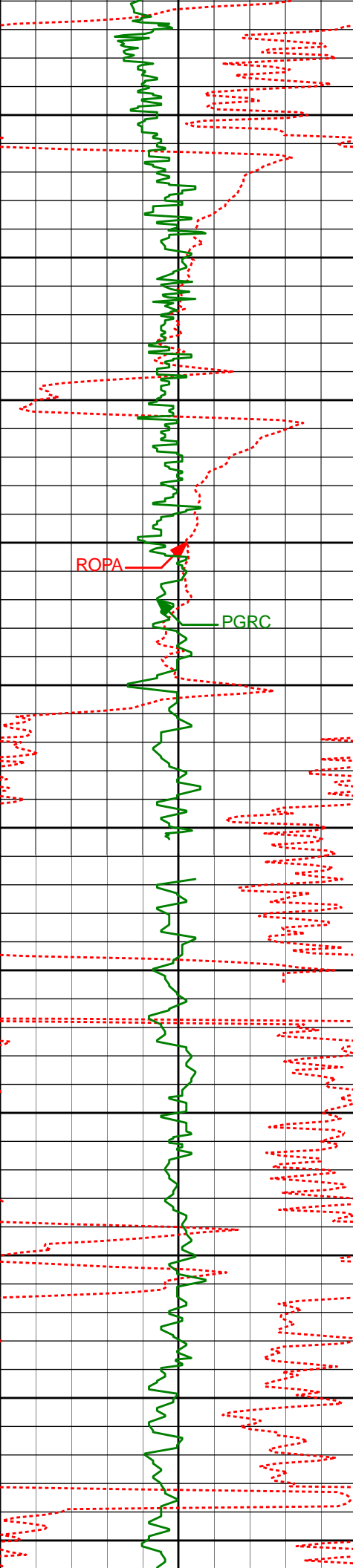
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TVD Main Log 1:600

Average Rate of Penetration ROPA						
1K0						
feet per hr						
PCG Gamma Ray BCorr PGRC		True Vertical	Depth	Inc	Azi.	TVD
0200		Depth (ft) 1:600				
api						
		3000'				
		3050'	3066'	5.61°	326.23°	3060.23'
		3100'				
		3150'	3160'	6.30°	325.65°	3153.73'
		3200'				
		3250'	3254'	6.65°	325.98°	3247.13'





3850'

3900'

3950'

4000'

4050'

4100'

4150'

4200'

4250'

4300'

4350'

3914'

5.41°

327.56°

3901.35'

148.40'

4007'

1.42°

332.12°

3994.17'

151.42'

4102'

0.70°

122.65°

4089.16'

151.50'

4197'

0.75°

123.13°

4184.15'

150.47'

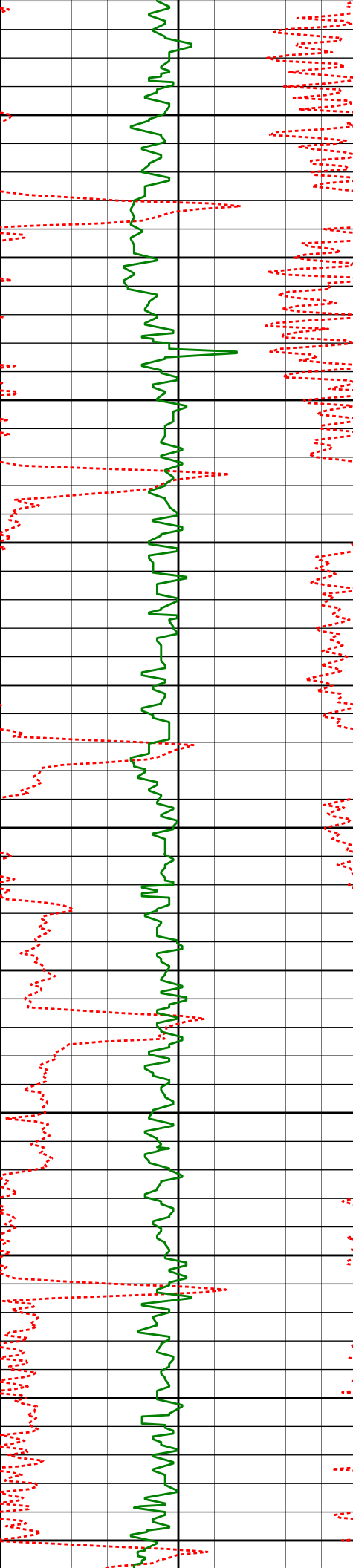
4292'

0.68°

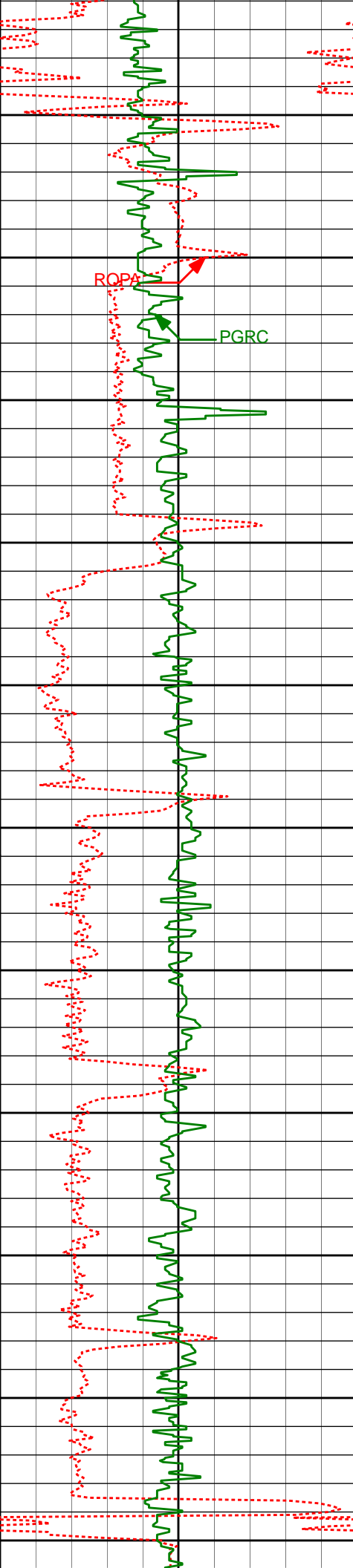
108.86°

4279.14'

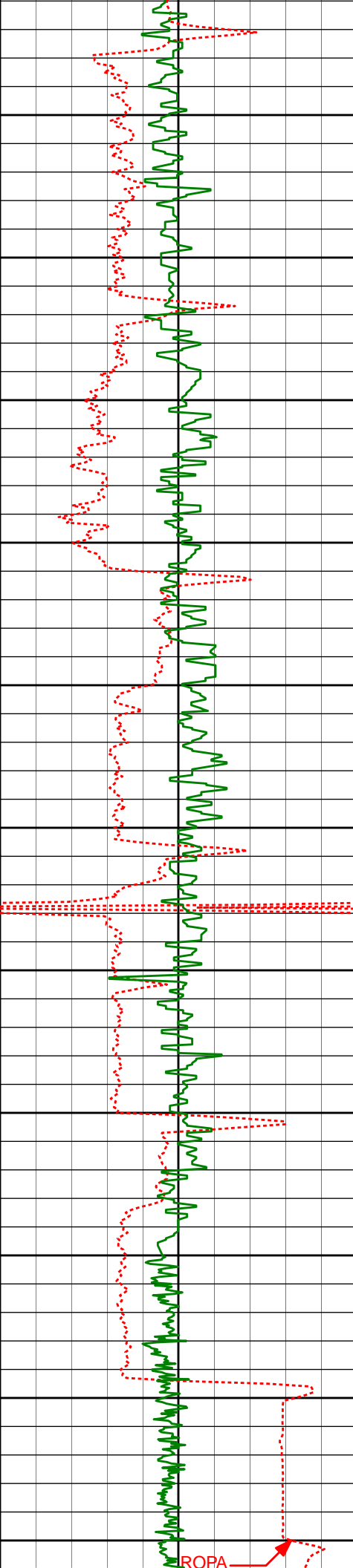
149.41'



4387'	0.50°	71.13°	4374.14'	148.48'
4400'				
4450'				
4482'	0.70°	28.84°	4469.13'	147.82'
4500'				
4550'				
4577'	1.39°	36.21°	4564.12'	146.90'
4600'				
4650'				
4671'	1.47°	43.23°	4658.09'	145.46'
4700'				
4750'				
4766'	0.68°	126.59°	4753.07'	144.18'
4800'				
4850'				
4861'	1.06°	184.98°	4848.06'	143.77'
4900'				



4955'	0.98°	186.38°	4942.05'	143.89'
5050'	0.78°	165.78°	5037.04'	143.78'
5240'	0.74°	148.19°	5227.02'	142.76'
5335'	0.83°	134.67°	5322.01'	141.92'
5430'	0.33°	146.85°	5417.01'	141.26'



Run 200

5950'

6000'

5525'

0.59°

140.08°

5512.00'

140.78'

5550'

5619'

0.48°

128.94°

5606.00'

140.14'

5650'

5713'

0.54°

134.00°

5700.00'

139.50'

5750'

5808'

0.54°

139.01°

5794.99'

138.87'

5850'

5903'

0.62°

127.08°

5889.99'

138.15'

5900'

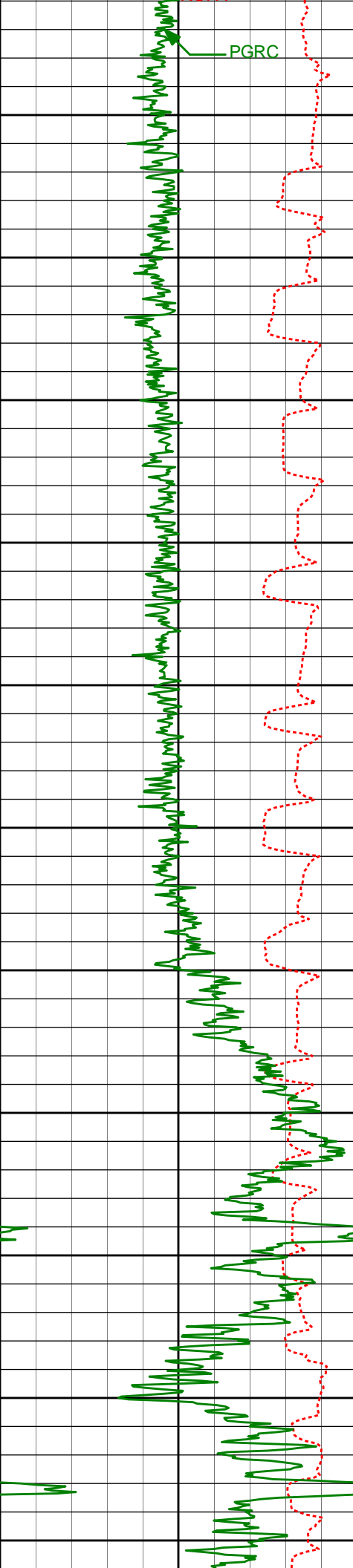
5997'

0.63°

133.13°

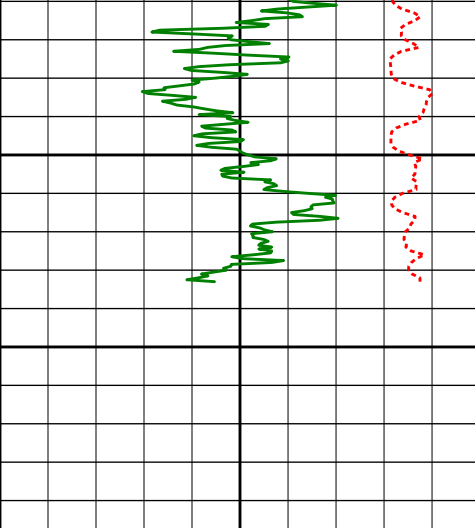
5983.98'

137.35'



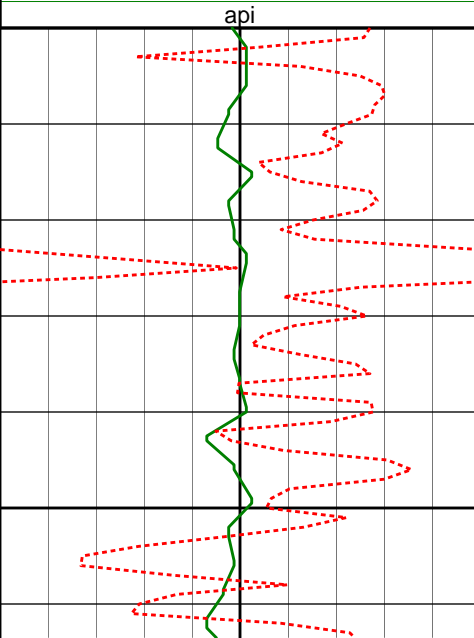
PGRC

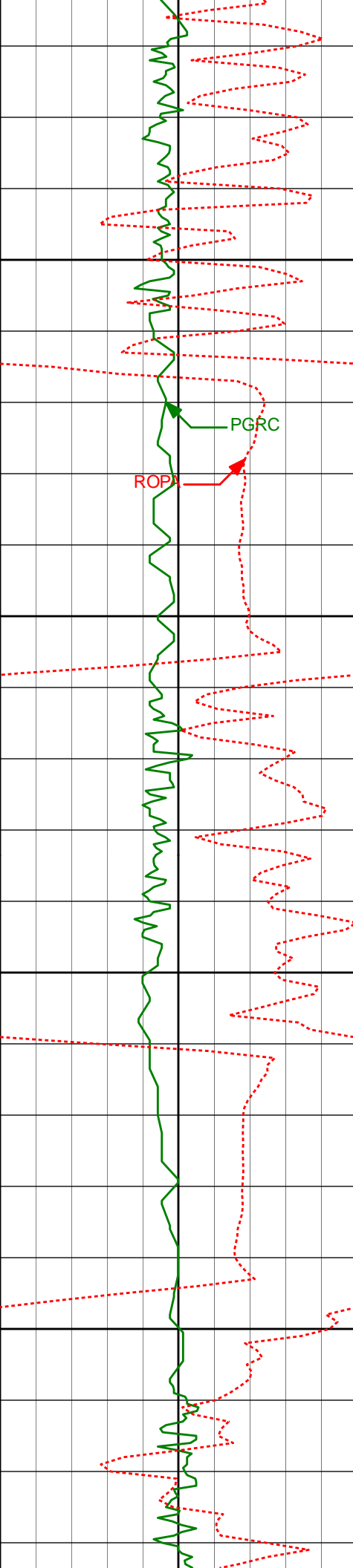
6045'	3.49°	255.19°	6031.95'	138.55'
6050'				
6092'	8.77°	259.38°	6078.67'	143.43'
6100'				
6140'	12.18°	257.73°	6125.86'	151.92'
6150'				
6187'	14.69°	258.90°	6171.57'	162.55'
6200'				
6235'	17.97°	263.01°	6217.63'	175.82'
6250'				
6282'	23.50°	266.77°	6261.57'	192.33'
6300'				
6330'	27.69°	269.42°	6304.85'	213.03'
6350'				
6377'	31.44°	270.40°	6345.73'	236.20'
6425'	37.12°	272.93°	6385.38'	263.22'
6400'				
6472'	42.53°	275.44°	6421.46'	293.27'
6450'				
6520'	47.74°	275.87°	6455.31'	327.20'
6566'	51.60°	271.84°	6485.08'	362.22'
6500'				
6614'	56.46°	269.81°	6513.27'	401.05'
6660'	59.59°	270.30°	6537.63'	440.05'
6550'				

	6708'	63.16°	269.93°	6560.62'	482.16'
	6755'	66.11°	269.93°	6580.75'	524.61'
	6803'	69.20°	268.80°	6599.00'	568.96'
	6850'	73.58°	269.38°	6613.99'	613.45'
	6921'	82.85°	270.97°	6628.48'	682.85'
	Casing Shoe @ 6633'				
	6650'				
	6700'				
PCG Gamma Ray BCorr PGRC 0 200 api	True Vertical Depth (ft) 1:600	Depth	Inc	Azi.	TVD V.S.
Average Rate of Penetration ROPA 1K 0 feet per hr					

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TVD Main Log 1:240

Average Rate of Penetration ROPA 1K0 feet per hr						
PCG Gamma Ray BCorr PGRC 0200 api	Measured Depth (ft) 1:240 3000'	Depth	Inc	Azi.	TVD	V.S.
	3050'					
	3066'	5.61°	326.23°	3060.23'	74.01'	



3100'

3150'

3200'

3250'

3160'

6.30°

325.65°

3153.73'

79.70'

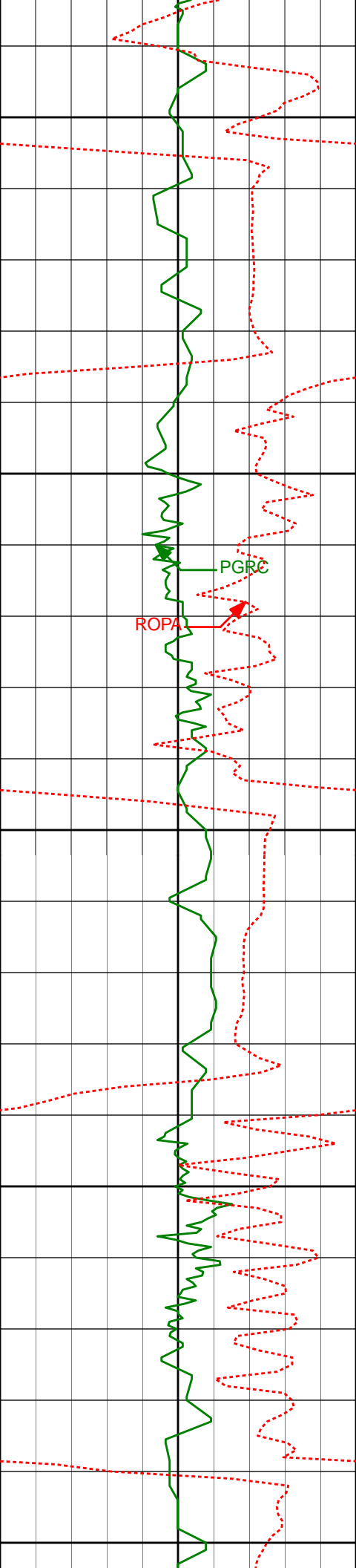
3254'

6.65°

325.98°

3247.13'

85.90'



3300'

3349'

6.40°

324.52°

3341.51'

92.29'

3350'

PGRC

ROPA

3400'

3442'

7.57°

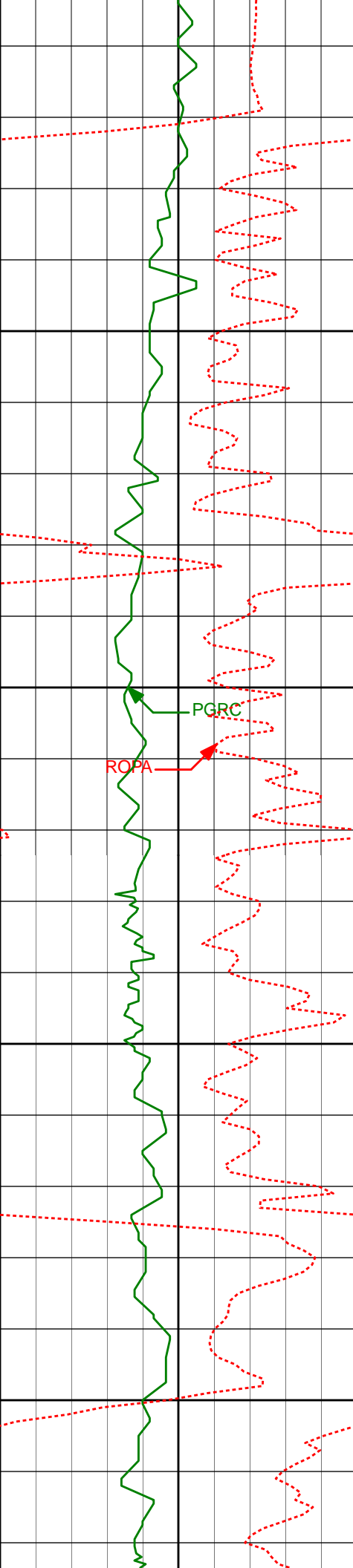
309.34°

3433.83'

100.26'

3450'

3500'



3550'

3600'

3650'

3700'

3536'

3631'

3725'

7.48°

8.46°

8.85°

311.99°

308.14°

311.96°

3527.02'

3621.10'

3714.03'

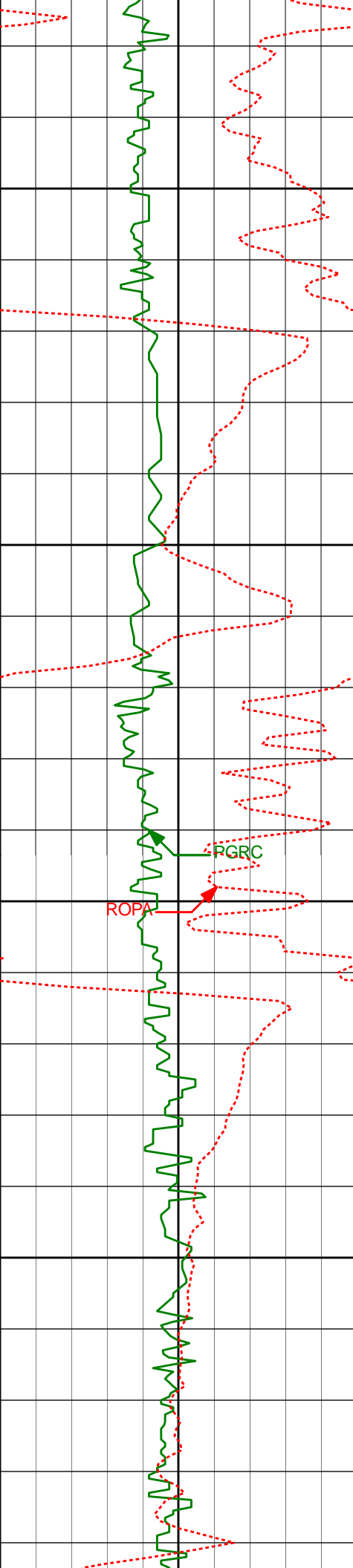
109.82'

120.14'

131.21'

PGRC

ROPA



3750'

3800'

3850'

3900'

3819'

8.06°

317.82°

3807.01'

141.28'

RGRC

ROPA

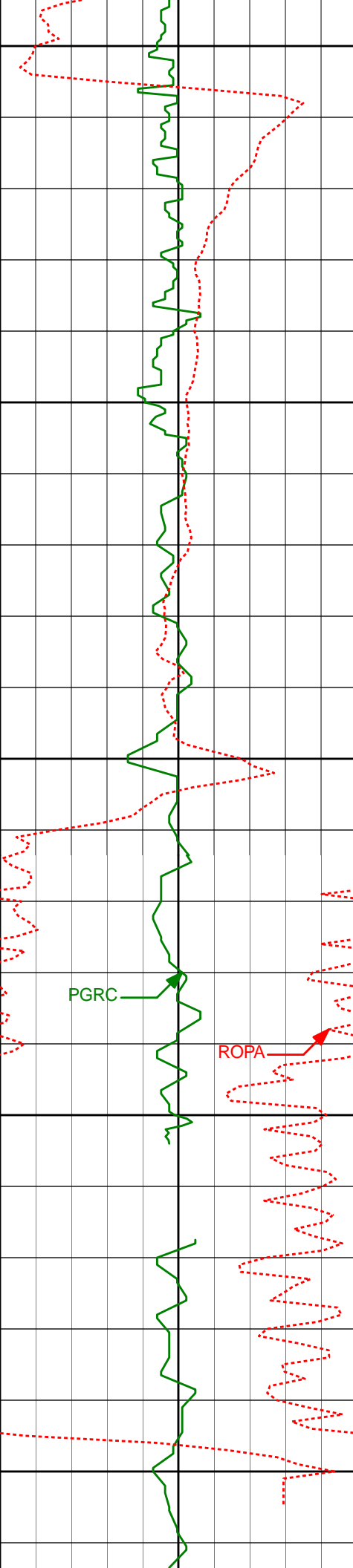
3914'

5.41°

327.56°

3901.35'

148.40'



3950'

4007'

1.42°

332.12°

3994.17'

151.42'

4000'

4050'

PGRC

ROPA

4102'

0.70°

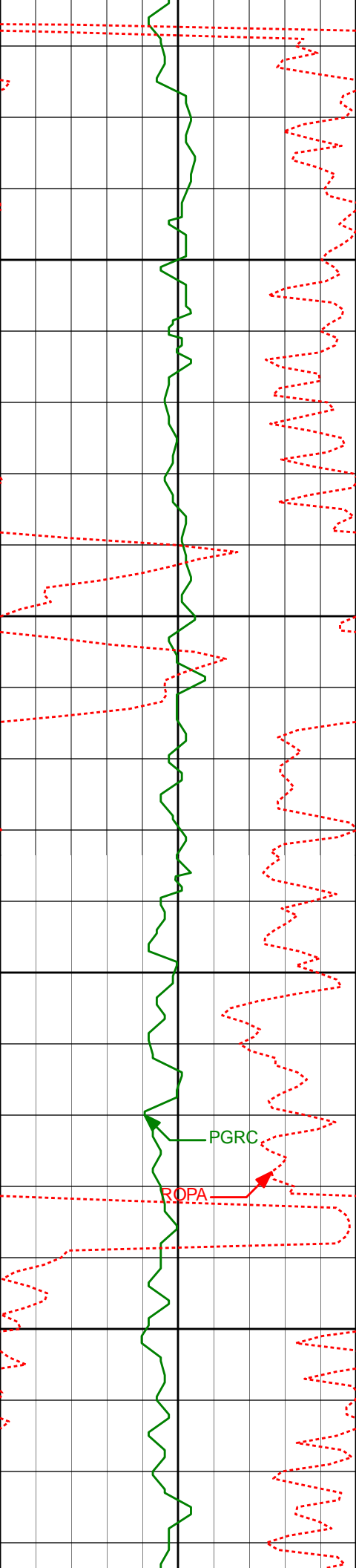
122.65°

4089.16'

151.50'

4100'

4150'



4197'

0.75°

123.13°

4184.15'

150.47'

4200'

4250'

4292'

0.68°

108.86°

4279.14'

149.41'

4300'

PGRC

ROPA

4350'

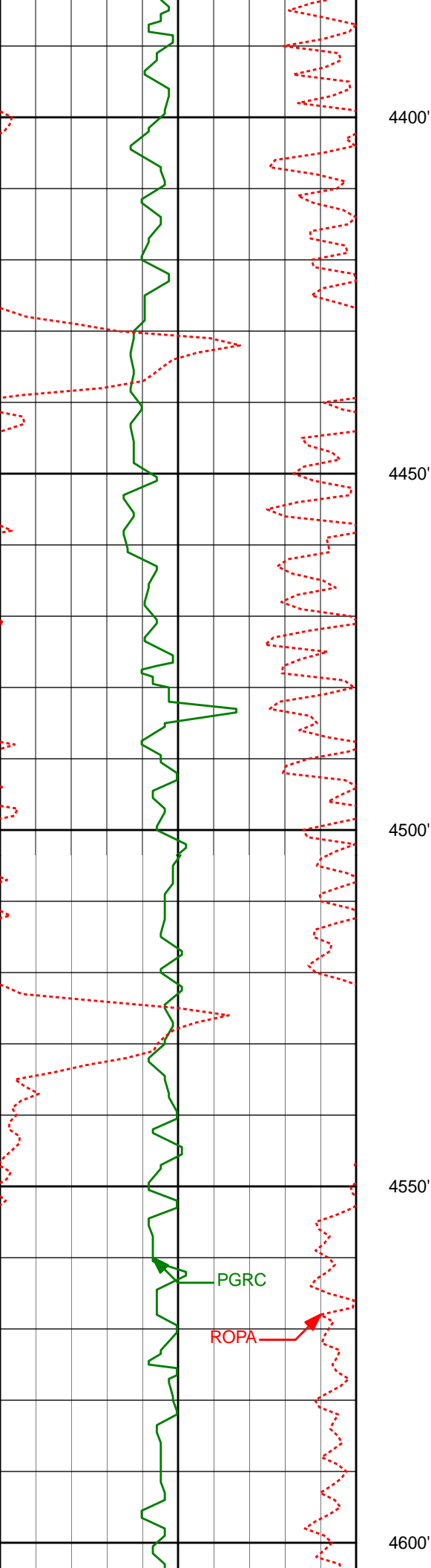
4387'

0.50°

71.13°

4374.14'

148.48'



4400'

4450'

4500'

4550'

4600'

4482'

0.70°

28.84°

4469.13'

147.82'

4577'

1.39°

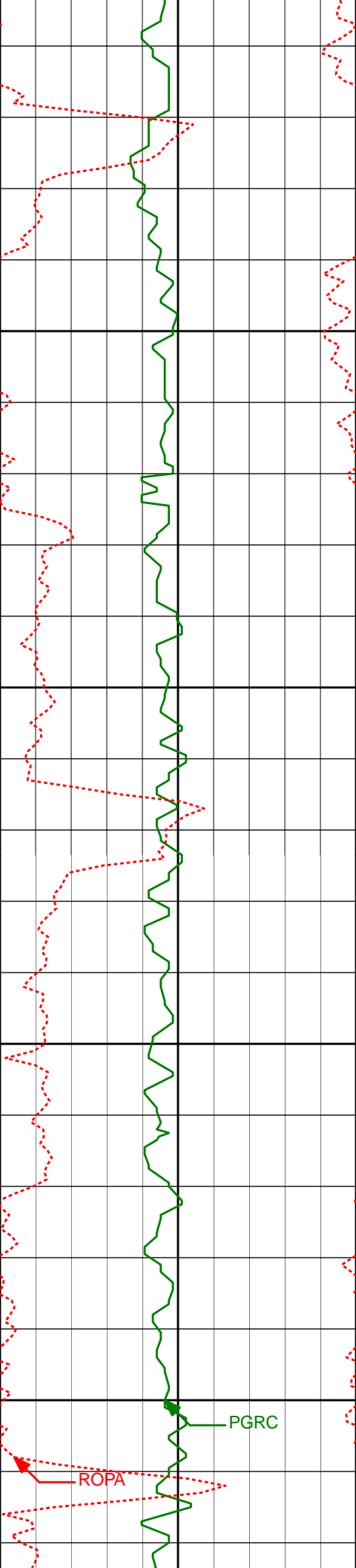
36.21°

4564.12'

146.90'

PGRC

ROPA



4650'

4671'

1.47°

43.23°

4658.09'

145.46'

4700'

4750'

4766'

0.68°

126.59°

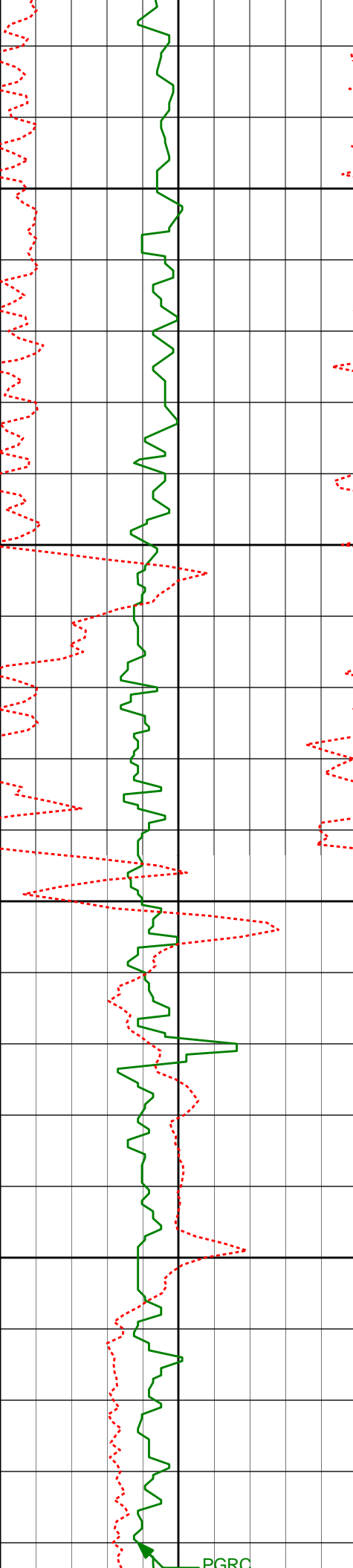
4753.07'

144.18'

4800'

PGRC

ROPA



4850'

4900'

4950'

5000'

4861'

4955'

5050'

1.06°

0.98°

0.78°

184.98°

186.38°

165.78°

4848.06'

4942.05'

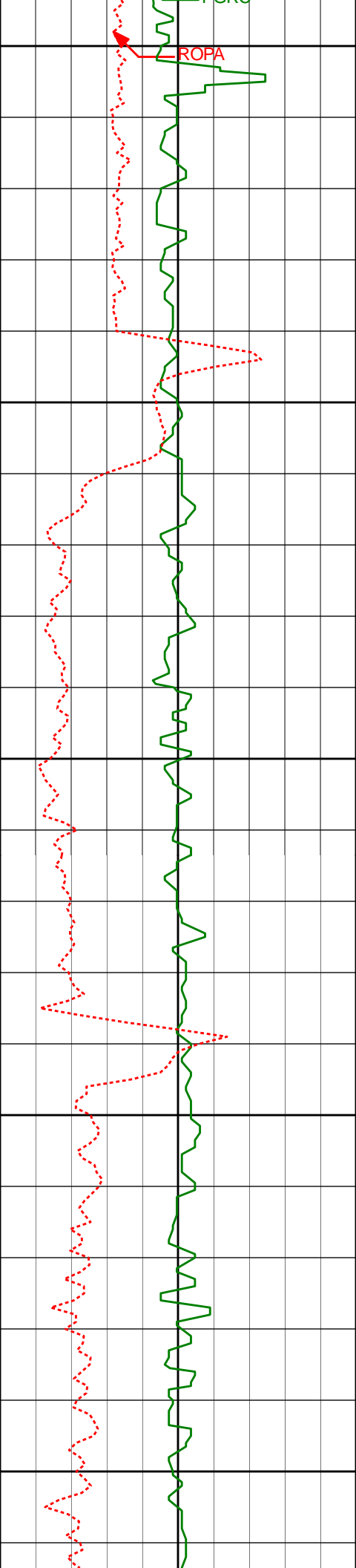
5037.04'

143.77'

143.89'

143.78'

PGRC



5050'

5100'

5150'

5200'

5250'

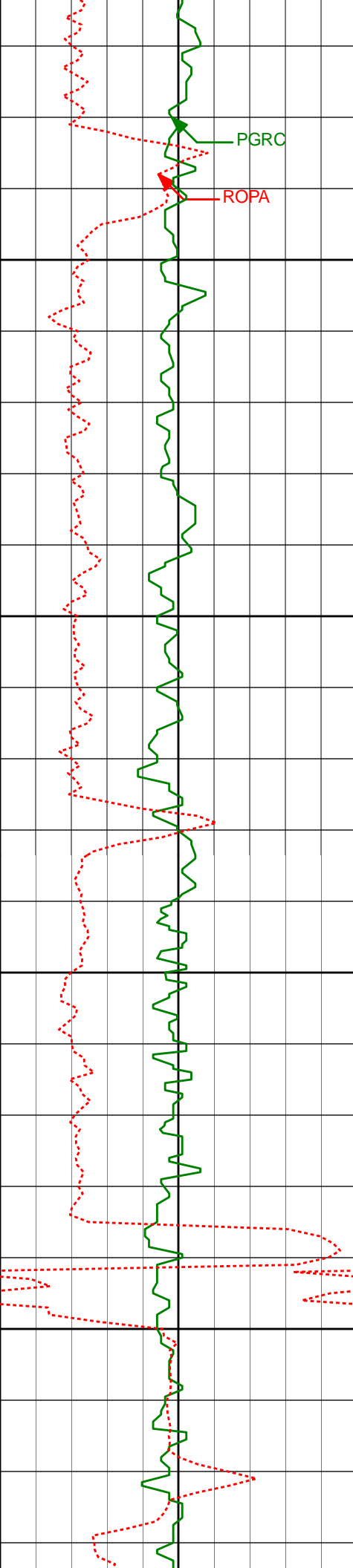
5240'

0.74°

148.19°

5227.02'

142.76'



5300'

5335'

0.83°

134.67°

5322.01'

141.92'

5350'

5400'

5430'

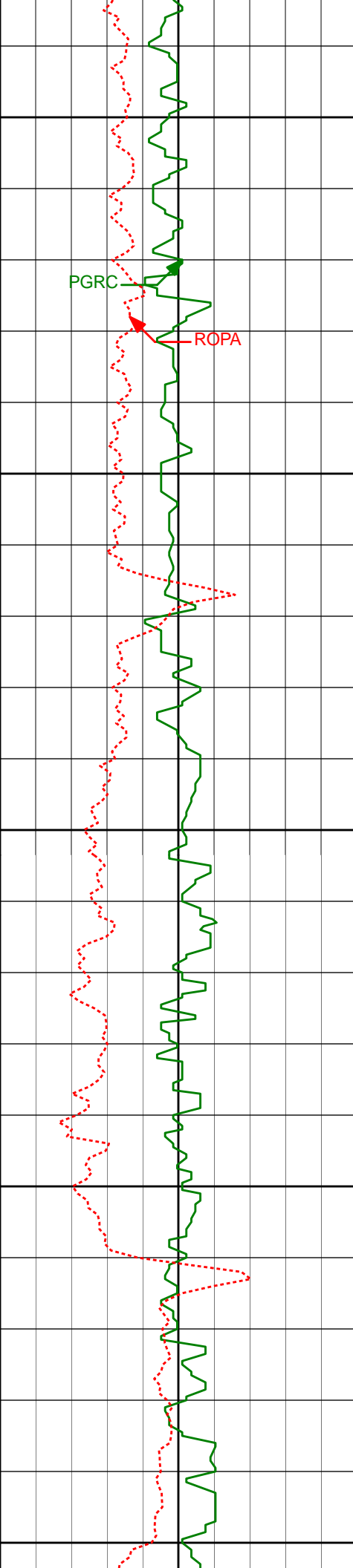
0.33°

146.85°

5417.01'

141.26'

5450'



5500'

5525'

0.59°

140.08°

5512.00'

140.78'

PGRC

ROPA

5550'

5600'

5619'

0.48°

128.94°

5606.00'

140.14'

5650'

5700'

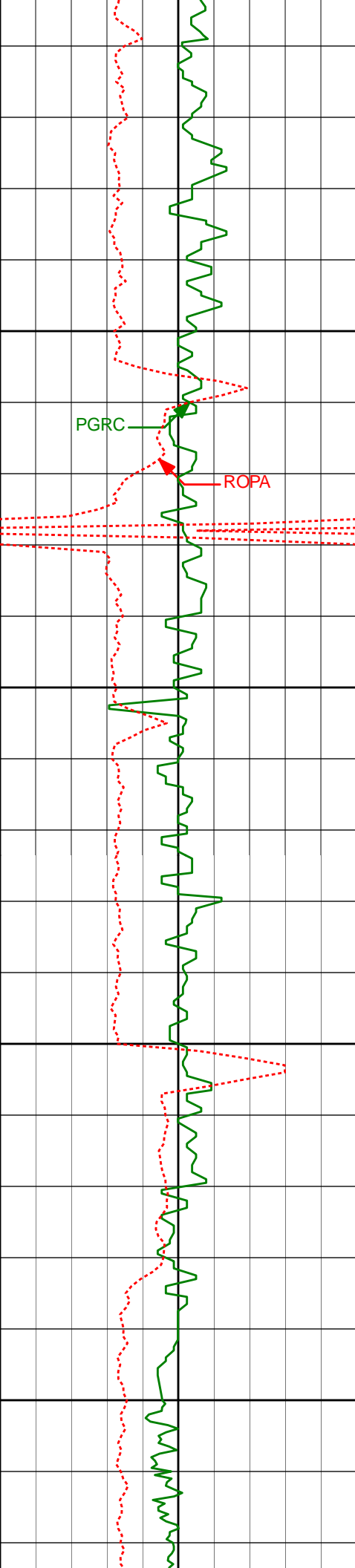
5713'

0.54°

134.00°

5700.00'

139.50'



5750'

PGRC

ROPA

5800'

5850'

5900'

5808'

0.54°

139.01°

5794.99'

138.87'

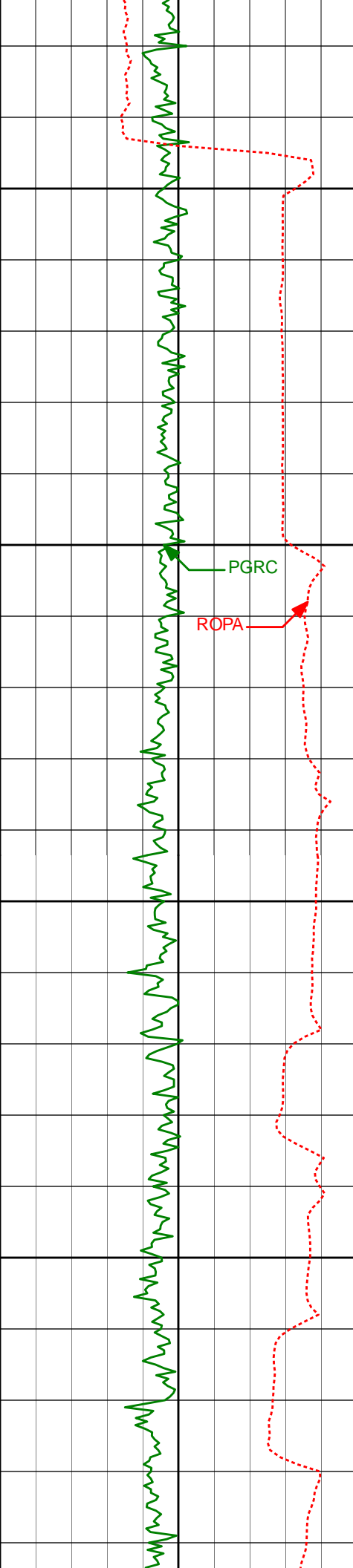
5903'

0.62°

127.08°

5889.99'

138.15'



Run 200

5950'

5997'

0.63°

133.13°

5983.98'

137.35'

6000'

PGRC

ROPA

6045'

3.49°

255.19°

6031.95'

138.55'

6050'

6092'

8.77°

259.38°

6078.67'

143.43'

6100'

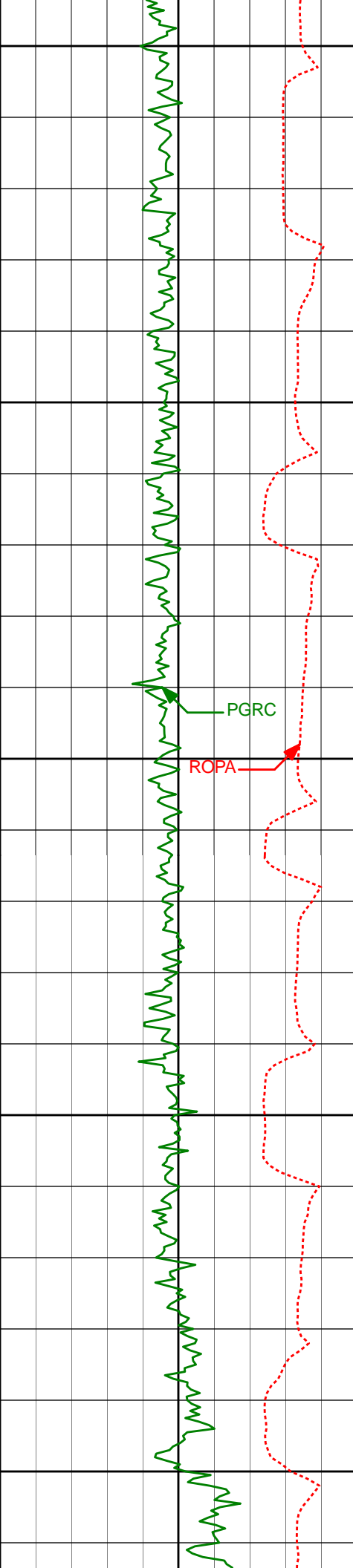
6140'

12.18°

257.73°

6125.86'

151.92'



6150'

6187'

14.69°

258.90°

6171.57'

162.55'

6200'

6235'

17.97°

263.01°

6217.63'

175.82'

6250'

6282'

23.50°

266.77°

6261.57'

192.33'

6300'

6330'

27.69°

269.42°

6304.85'

213.03'

6350'

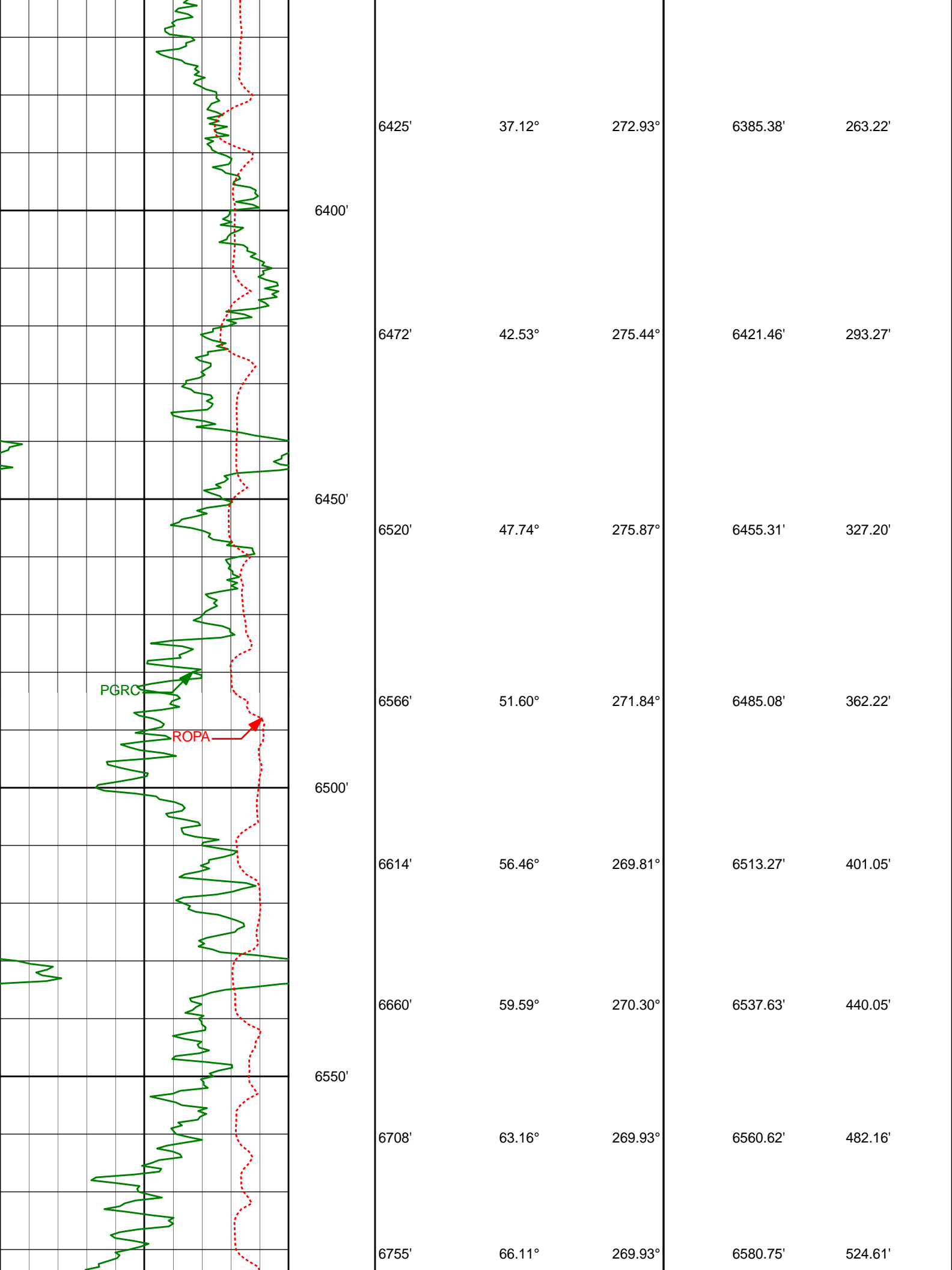
6377'

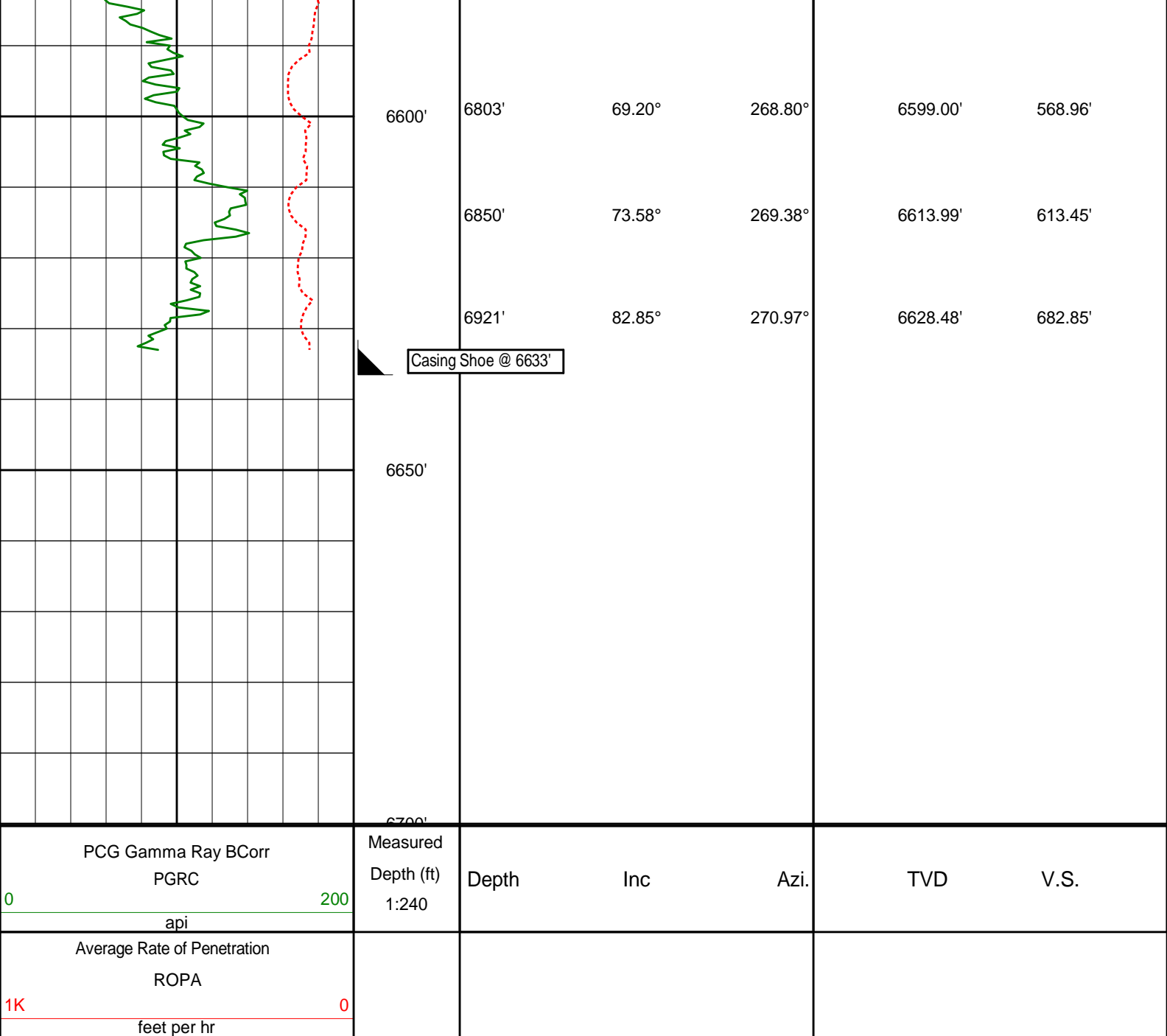
31.44°

270.40°

6345.73'

236.20'





HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA35-65-1BHNC
Wattenberg
Weld Colorado
USA
CA-XX-0901018822

The first two surveys at 355' and 600' are 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
355.00	0.60	249.63	354.99	0.65 S	1.74 W	1.72	0.17
600.00	0.60	50.03	599.99	0.27 S	1.96 W	1.95	0.48
708.00	0.21	18.77	707.99	0.28 N	1.46 W	1.47	0.40
802.00	0.46	339.08	801.98	0.80 N	1.54 W	1.57	0.35

988.00	1.05	355.93	987.97	3.19 N	1.93 W	2.02	0.34
1082.00	0.97	357.82	1081.95	4.85 N	2.02 W	2.16	0.09
1173.00	1.01	358.83	1172.94	6.42 N	2.07 W	2.25	0.05
1360.00	0.91	1.32	1359.91	9.55 N	2.07 W	2.33	0.06
1548.00	0.96	350.82	1547.89	12.60 N	2.29 W	2.64	0.09
1643.00	1.05	352.59	1642.87	14.25 N	2.52 W	2.92	0.10
1737.00	1.05	333.80	1736.86	15.88 N	3.02 W	3.46	0.36
1832.00	1.14	343.31	1831.84	17.56 N	3.67 W	4.16	0.21
1927.00	1.03	343.14	1926.82	19.28 N	4.19 W	4.73	0.12
2022.00	2.91	312.83	2021.77	21.74 N	6.21 W	6.81	2.20
2118.00	2.48	314.08	2117.66	24.84 N	9.49 W	10.18	0.45
2212.00	3.60	307.20	2211.53	28.04 N	13.30 W	14.08	1.25
2307.00	5.05	309.51	2306.25	32.50 N	18.90 W	19.80	1.54
2402.00	5.91	322.51	2400.82	39.05 N	25.10 W	26.18	1.58
2497.00	7.00	322.20	2495.22	47.50 N	31.63 W	32.94	1.15
2592.00	7.10	321.36	2589.50	56.66 N	38.84 W	40.41	0.15
2687.00	5.84	321.50	2683.89	65.03 N	45.52 W	47.31	1.33
2782.00	6.73	323.18	2778.32	73.27 N	51.86 W	53.89	0.96
2876.00	6.92	323.95	2871.65	82.26 N	58.49 W	60.77	0.22
2971.00	7.71	327.97	2965.88	92.29 N	65.24 W	67.79	0.99
3066.00	5.61	326.23	3060.23	101.55 N	71.20 W	74.01	2.22
3160.00	6.30	325.65	3153.73	109.63 N	76.67 W	79.70	0.74
3254.00	6.65	325.98	3247.13	118.40 N	82.62 W	85.90	0.37
3349.00	6.40	324.52	3341.51	127.27 N	88.77 W	92.29	0.32
3442.00	7.57	309.34	3433.83	135.37 N	96.52 W	100.26	2.34
3536.00	7.48	311.99	3527.02	143.39 N	105.86 W	109.82	0.38
3631.00	8.46	308.14	3621.10	151.84 N	115.95 W	120.14	1.17
3725.00	8.85	311.96	3714.03	160.95 N	126.77 W	131.21	0.74
3819.00	8.06	317.82	3807.01	170.67 N	136.57 W	141.28	1.24
3914.00	5.41	327.56	3901.35	179.38 N	143.44 W	148.40	3.03
4007.00	1.42	332.12	3994.17	184.10 N	146.34 W	151.42	4.30
4102.00	0.70	122.65	4089.16	184.83 N	146.40 W	151.50	2.17
4197.00	0.75	123.13	4184.15	184.18 N	145.39 W	150.47	0.05
4292.00	0.68	108.86	4279.14	183.66 N	144.33 W	149.41	0.20
4387.00	0.50	71.13	4374.14	183.61 N	143.41 W	148.48	0.44
4482.00	0.70	28.84	4469.13	184.25 N	142.74 W	147.82	0.50
4577.00	1.39	36.21	4564.12	185.69 N	141.78 W	146.90	0.74
4671.00	1.47	43.23	4658.09	187.49 N	140.28 W	145.46	0.20
4766.00	0.68	126.59	4753.07	188.04 N	138.99 W	144.18	1.63
4861.00	1.06	184.98	4848.06	186.83 N	138.61 W	143.77	0.96
4955.00	0.98	186.38	4942.05	185.16 N	138.78 W	143.89	0.09
5050.00	0.78	165.78	5037.04	183.73 N	138.71 W	143.78	0.39
5240.00	0.74	148.19	5227.02	181.43 N	137.74 W	142.76	0.12
5335.00	0.83	134.67	5322.01	180.43 N	136.93 W	141.92	0.22
5430.00	0.33	146.85	5417.01	179.71 N	136.29 W	141.26	0.54
5525.00	0.59	140.08	5512.00	179.11 N	135.83 W	140.78	0.28
5619.00	0.48	128.94	5606.00	178.49 N	135.21 W	140.14	0.16
5713.00	0.54	134.00	5700.00	177.94 N	134.59 W	139.50	0.08
5808.00	0.54	139.01	5794.99	177.29 N	133.97 W	138.87	0.05
5903.00	0.62	127.08	5889.99	176.64 N	133.27 W	138.15	0.15
5997.00	0.63	133.13	5983.98	175.98 N	132.48 W	137.35	0.07
6045.00	3.49	255.19	6031.95	175.43 N	133.71 W	138.55	8.04
6092.00	8.77	259.38	6078.67	174.40 N	138.61 W	143.43	11.27
6140.00	12.18	257.73	6125.86	172.65 N	147.16 W	151.92	7.13
6187.00	14.69	258.90	6171.57	170.45 N	157.85 W	162.55	5.37
6235.00	17.97	263.01	6217.63	168.37 N	171.18 W	175.82	7.24
6282.00	23.50	266.77	6261.57	166.96 N	187.75 W	192.33	12.10
6330.00	27.69	269.42	6304.85	166.31 N	208.46 W	213.03	9.05
6377.00	31.44	270.40	6345.73	166.28 N	231.65 W	236.20	8.04
6425.00	37.12	272.93	6385.38	167.11 N	258.65 W	263.22	12.20
6472.00	42.53	275.44	6421.46	169.34 N	288.66 W	293.27	12.01
6520.00	47.74	275.87	6455.31	172.70 N	322.50 W	327.20	10.87
6566.00	51.60	271.84	6485.08	175.02 N	357.47 W	362.22	10.72
6614.00	56.46	269.81	6513.27	175.56 N	396.30 W	401.05	10.69
6660.00	59.59	270.30	6537.63	175.60 N	435.31 W	440.05	6.86
6708.00	63.16	269.93	6560.62	175.68 N	477.44 W	482.16	7.47
6755.00	66.11	269.93	6580.75	175.63 N	519.90 W	524.61	6.28
6803.00	69.20	268.80	6599.00	175.13 N	564.29 W	568.96	6.80
6850.00	73.58	269.38	6613.99	174.43 N	608.82 W	613.45	9.39
6921.00	82.85	270.97	6628.48	174.66 N	678.24 W	682.85	13.24
7054.00	89.05	272.79	6637.87	179.02 N	810.77 W	815.45	4.86
7147.00	88.64	271.65	6639.74	182.62 N	903.68 W	908.42	1.30
7240.00	89.26	270.43	6641.45	184.31 N	996.64 W	1001.40	1.47
7334.00	89.17	268.59	6642.73	183.50 N	1090.63 W	1095.33	1.96
7425.00	88.15	267.63	6644.86	180.50 N	1181.55 W	1186.13	1.54

7519.00	89.14	266.92	6647.09	176.03 N	1275.42 W	1279.83	1.30
7612.00	91.05	267.41	6646.93	171.43 N	1368.30 W	1372.55	2.12
7705.00	89.82	269.61	6646.23	169.02 N	1461.26 W	1465.41	2.71
7800.00	90.68	271.98	6645.81	170.33 N	1556.24 W	1560.39	2.65
7895.00	88.37	270.89	6646.60	172.71 N	1651.20 W	1655.38	2.69
7990.00	91.32	271.25	6646.85	174.49 N	1746.17 W	1750.36	3.13
8084.00	89.32	270.76	6646.33	176.14 N	1840.15 W	1844.35	2.19
8179.00	89.41	268.83	6647.38	175.80 N	1935.14 W	1939.29	2.03
8274.00	89.57	269.75	6648.23	174.62 N	2030.13 W	2034.21	0.98
8369.00	89.17	268.26	6649.27	172.97 N	2125.10 W	2129.10	1.62
8464.00	90.40	267.80	6649.63	169.70 N	2220.04 W	2223.92	1.38
8558.00	90.62	268.32	6648.79	166.52 N	2313.99 W	2317.73	0.60
8653.00	87.23	265.72	6650.58	161.59 N	2408.82 W	2412.39	4.50
8748.00	87.78	265.44	6654.71	154.27 N	2503.45 W	2506.78	0.65
8843.00	90.25	268.97	6656.34	149.64 N	2598.30 W	2601.46	4.53
8938.00	89.07	268.58	6656.91	147.61 N	2693.27 W	2696.34	1.31
9032.00	90.74	269.59	6657.06	146.11 N	2787.26 W	2790.25	2.08
9127.00	91.29	269.98	6655.38	145.75 N	2882.24 W	2885.19	0.71
9222.00	88.92	269.19	6655.21	145.06 N	2977.23 W	2980.12	2.63
9317.00	89.54	267.84	6656.48	142.60 N	3072.19 W	3074.97	1.56
9411.00	90.68	268.61	6656.30	139.69 N	3166.14 W	3168.80	1.46
9506.00	91.36	266.53	6654.61	135.66 N	3261.03 W	3263.55	2.30
9601.00	91.17	268.39	6652.52	131.45 N	3355.91 W	3358.27	1.97
9696.00	88.92	269.65	6652.44	129.83 N	3450.89 W	3453.17	2.71
9791.00	90.00	269.75	6653.34	129.33 N	3545.88 W	3548.11	1.14
9886.00	87.81	272.11	6655.15	130.87 N	3640.84 W	3643.08	3.39
9980.00	89.88	271.25	6657.05	133.63 N	3734.78 W	3737.05	2.38
10075.00	90.31	271.22	6656.89	135.68 N	3829.75 W	3832.05	0.45
10170.00	89.81	271.11	6656.79	137.61 N	3924.73 W	3927.04	0.54
10265.00	89.75	271.33	6657.15	139.63 N	4019.71 W	4022.04	0.24
10360.00	91.97	270.16	6655.73	140.86 N	4114.68 W	4117.01	2.64
10454.00	92.13	270.00	6652.37	141.00 N	4208.62 W	4210.92	0.24
10549.00	90.83	268.14	6649.91	139.45 N	4303.57 W	4305.79	2.39
10644.00	88.61	268.48	6650.38	136.65 N	4398.52 W	4400.63	2.36
10739.00	88.77	268.20	6652.55	133.90 N	4493.46 W	4495.45	0.34
10834.00	91.14	269.27	6652.62	131.80 N	4588.43 W	4590.32	2.74
10882.00	90.89	269.25	6651.77	131.18 N	4636.42 W	4638.27	0.52
10946.00	90.89	269.25	6650.78	130.35 N	4700.40 W	4702.21	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 271.60 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 10946.00 FEET
IS 4702.21 FEET ALONG 271.59 DEGREES (GRID)**

Final survey is a straight line projection to TD.