

PCG Pressure Case Gamma PCD Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	24-Feb-14	25-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)	633.95	5,826.54			
Log End Depth (TVD, ft)	5,826.54	6,520.21			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	22-Feb-14 14:30	24-Feb-14 12:00			
Drill/Wipe End Date and Time	23-Feb-14 07:15	25-Feb-14 01:30			
Min Inc (deg) @ Depth (TVD, ft)	0.10 @ 5,599.55	0.52 @ 5,883.54			
Max Inc (deg) @ Depth (TVD, ft)	9.16 @ 3,899.21	81.71 @ 6,513.21			
Bit TFA(in2) / Bit Type	0.98 / PDC	0.98 / PDC			
Flow Rate (gpm)	589.20	571.37			
Max AV (fpm) / CV (fpm) @ MWD	417.0 / NA	417.4 / NA			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	9.25 / 45.00	10.50 / 51.00			
Filtrate CL (ppm)	2,800.00	3,000.00			
pH / Fluid Loss (mptm)	9.20 / 7	9.70 / 10			
PV (cP) / YP (lbf2)	12 / 16.00	13 / 18.00			
% Solids / % Sand	5.7 / 0.20	9.9 / 0.25			
% Oil / Oil:Water Ratio	0 / 0:95	0 / 0:95			
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA			
Max Tool Temp (degF) / S	150.47 / PCM	150.47 / PCM			

Max Tool Temp (degF) / Source	158.47 / PCM	158.47 / PCM			
Rm @ Max Tool Temp (degF)	NA @ NA	NA @ NA			
Lead MWD Engineer	Adam Sampson	Adam Sampson			
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	22-Feb-14 09:14	01-Jan-70 00:00			
Date and Time Read	25-Feb-14 08:02	25-Feb-14 07:56			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	55.00	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)	94.93	139.94			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.94	46.66			
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 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

WARRANTY

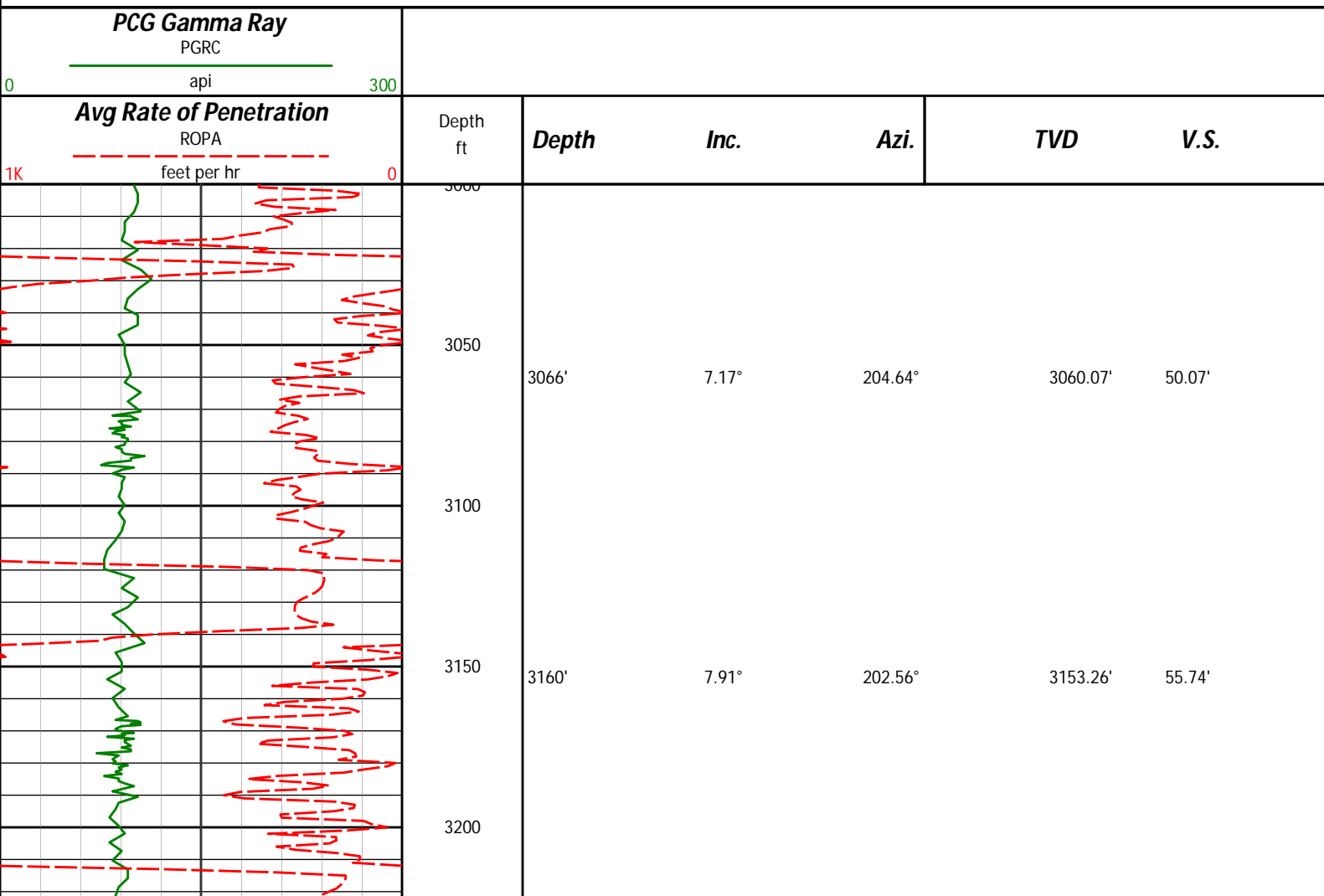
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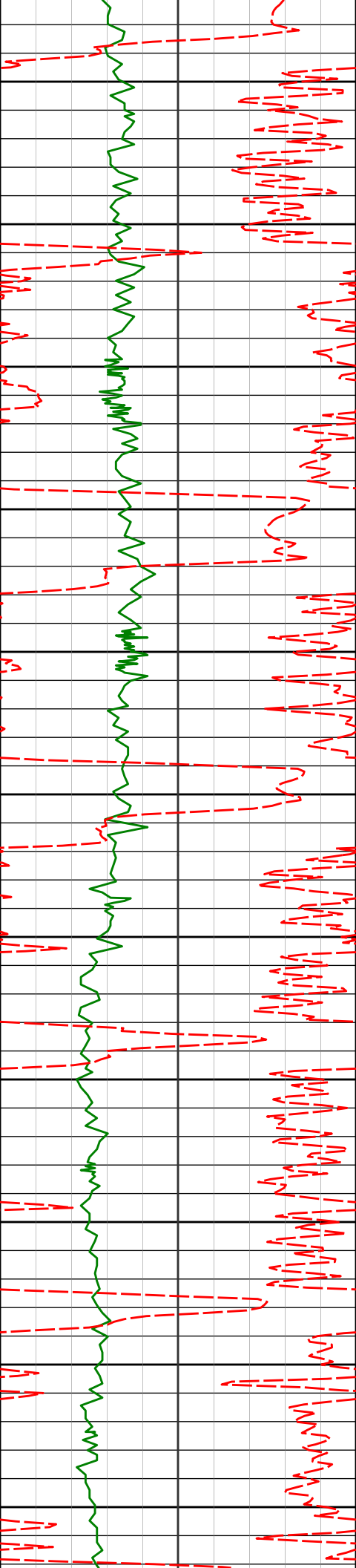
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Sperry Drilling Services

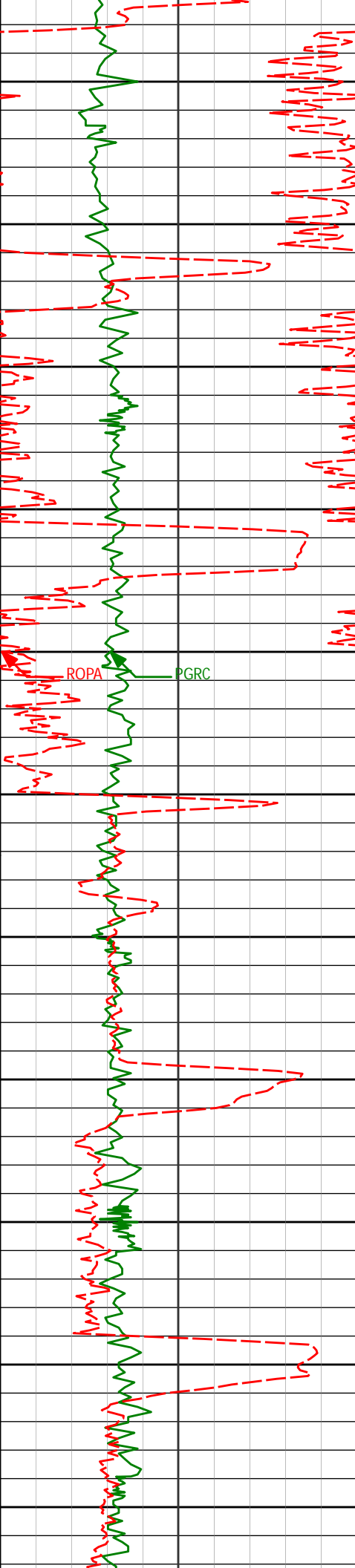
TVD Main Log 1:600

Noble Energy
Wells Ranch AA35-64-1AHNA
H&P 343
T6N-R63W





3250	3254'	8.52°	204.26°	3246.30'	61.89'
3300					
3350	3349'	6.83°	205.18°	3340.44'	67.94'
3400					
3450	3443'	8.32°	202.59°	3433.62'	73.67'
3500					
3550	3536'	8.41°	200.69°	3525.63'	79.48'
3600					
3650	3631'	8.50°	200.44°	3619.60'	85.25'
3700					
3750	3725'	8.69°	201.03°	3712.54'	91.08'



3800

3819'

9.08°

199.99°

3805.41'

97.06'

3850

3900

3914'

9.16°

199.35°

3899.21'

103.06'

3950

4000

4008'

7.77°

200.45°

3992.19'

108.61'

4050

4100

4103'

7.36°

201.99°

4086.36'

113.90'

4150

4200

4197'

6.56°

199.45°

4179.67'

118.64'

4250

4300

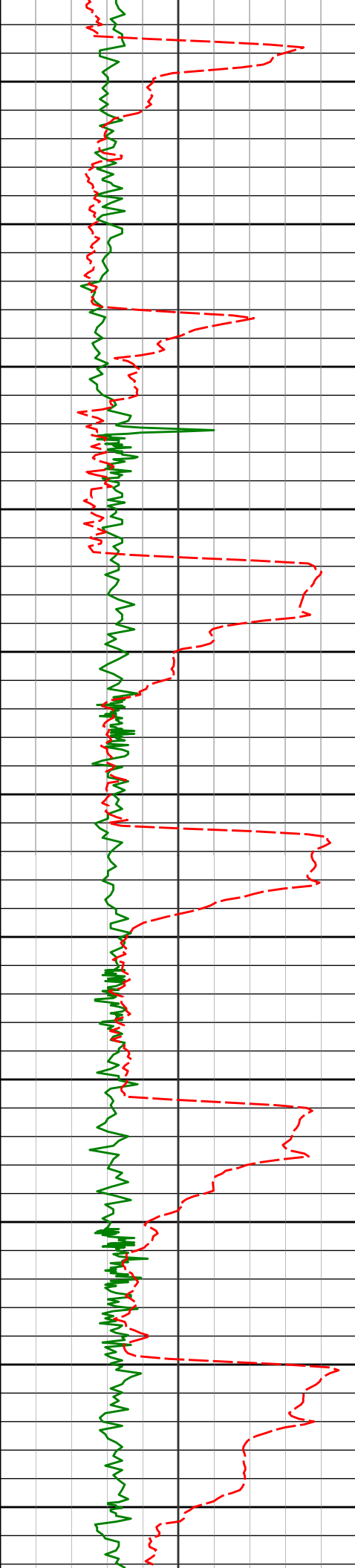
4292'

6.29°

202.65°

4274.07'

123.10'



4350

4387'

5.59°

202.92°

4368.56'

127.50'

4400

4450

4482'

5.35°

205.38°

4463.13'

131.74'

4500

4550

4577'

4.03°

200.98°

4557.81'

135.30'

4600

4650

4671'

2.68°

198.28°

4651.64'

137.52'

4700

4750

4766'

1.55°

182.82°

4746.58'

138.50'

4800

4850

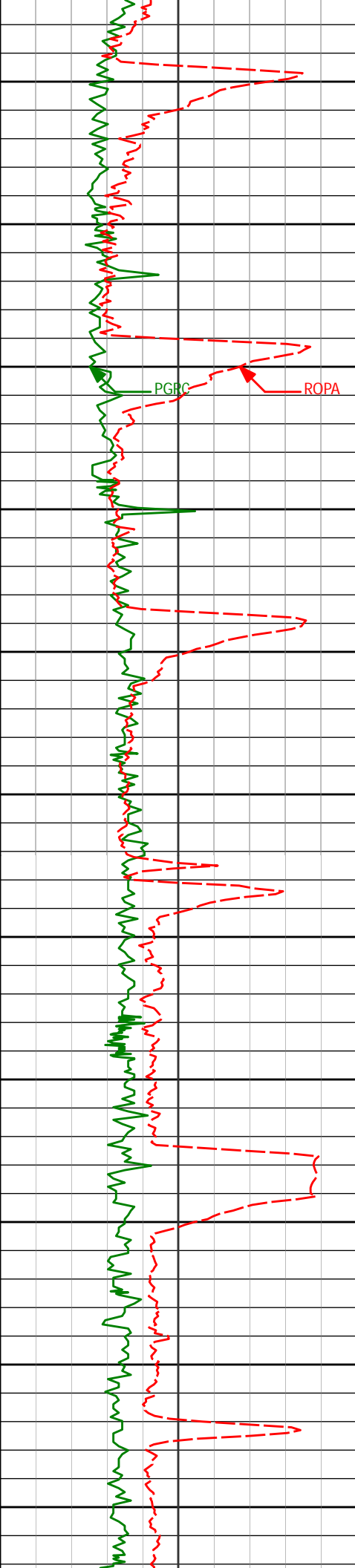
4861'

0.50°

179.98°

4841.56'

138.67'



4900

4955'

0.25°

208.24°

4935.56'

138.81'

4950

5000

PGRC

ROPA

5050'

0.43°

150.53°

5030.56'

138.77'

5050

5100

5145'

0.43°

214.75°

5125.55'

138.83'

5150

5200

5240'

0.41°

234.08°

5220.55'

139.34'

5250

5300

5335'

0.38°

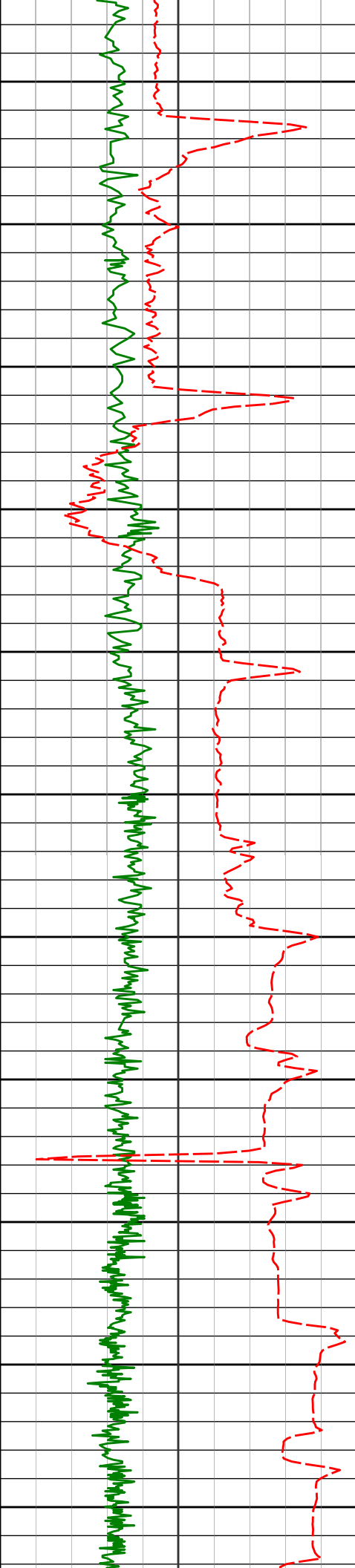
269.39°

5315.55'

139.95'

5350

5400



Run 200

5450

5500

5550

5600

5650

5700

5750

5800

5850

5900

5950

5525'

0.39°

227.17°

5505.55'

141.08'

5619'

0.10°

284.91°

5599.55'

141.40'

5714'

0.11°

323.92°

5694.54'

141.53'

5791'

0.32°

133.51°

5771.54'

141.43'

5903'

0.52°

168.65°

5883.54'

141.15'

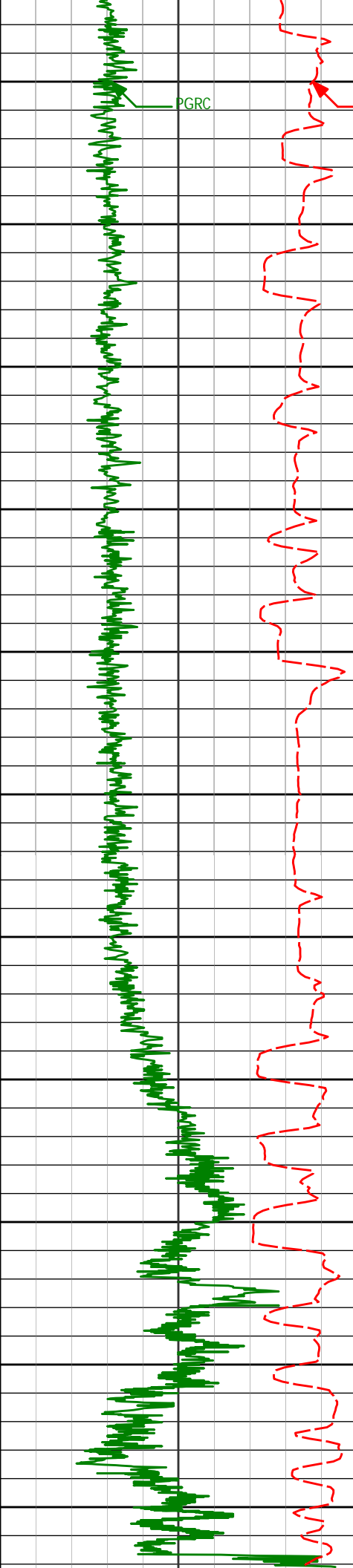
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256.94°

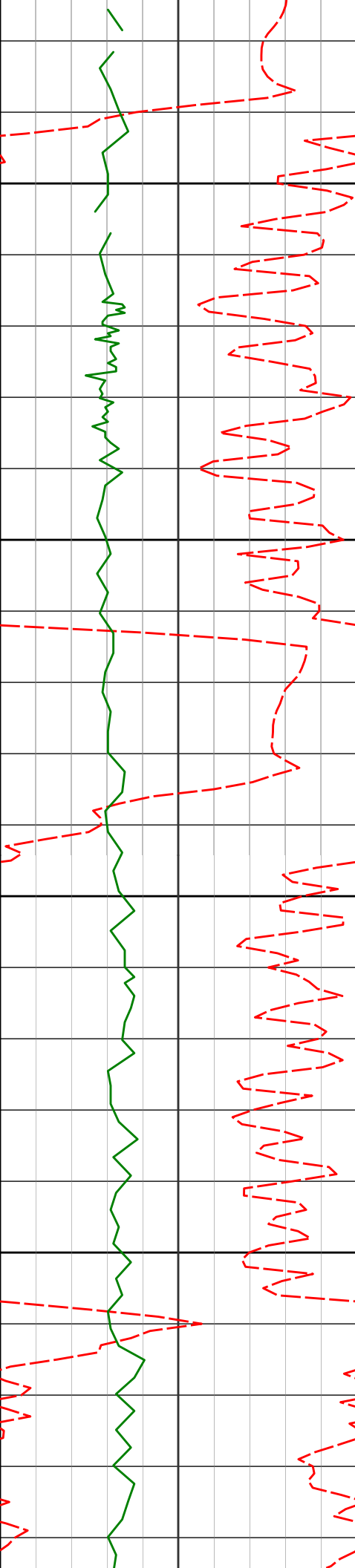
5931.48'

143.13'



6000	5997'	9.27°	259.37°	5977.12'	148.74'
	6045'	13.26°	261.11°	6024.19'	158.06'
6050					
	6091'	16.71°	263.92°	6068.62'	169.93'
6100					
	6139'	20.52°	268.99°	6114.10'	185.24'
6150					
	6186'	24.88°	274.29°	6157.45'	203.26'
6200					
	6281'	29.64°	270.02°	6241.89'	246.52'
6250					
	6329'	38.08°	268.95°	6281.71'	273.19'
6300					
	6376'	45.77°	268.54°	6316.65'	304.54'
6350					
	6424'	49.42°	268.81°	6349.02'	339.94'
	6471'	52.81°	269.73°	6378.52'	376.47'
6400					
	6519'	54.62°	269.83°	6406.92'	415.08'
	6566'	59.25°	270.16°	6432.56'	454.37'
6450					
	6614'	63.63°	270.52°	6455.50'	496.41'
	6661'	68.79°	269.56°	6474.46'	539.31'
	6709'	72.49°	268.88°	6490.37'	584.52'
6500					
	6755'	76.75°	268.66°	6502.56'	628.82'
	6812'	81.71°	269.67°	6513.21'	684.72'

TD @ TVD 6547'								
Casing set @ TVD 6,518'								
Avg Rate of Penetration								
ROP A								
feet per hr								
PCG Gamma Ray								
PGRC								
api								
Depth ft								
Inc.								
Azi.								
TVD								
V.S.								
HALLIBURTON Sperry Drilling Services TVD Detail Log 1:240								
Noble Energy Wells Ranch AA35-64-1AHNA H&P 343 T6N-R63W								
PCG Gamma Ray PGRC api								
Avg Rate of Penetration ROPA feet per hr								
Depth ft Inc. Azi. TVD V.S.								
3066' 7.17° 204.64° 3060.07' 50.07'								
3100								



3150

3160'

7.91°

202.56°

3153.26'

55.74'

3200

3250

3254'

8.52°

204.26°

3246.30'

61.89'

3300

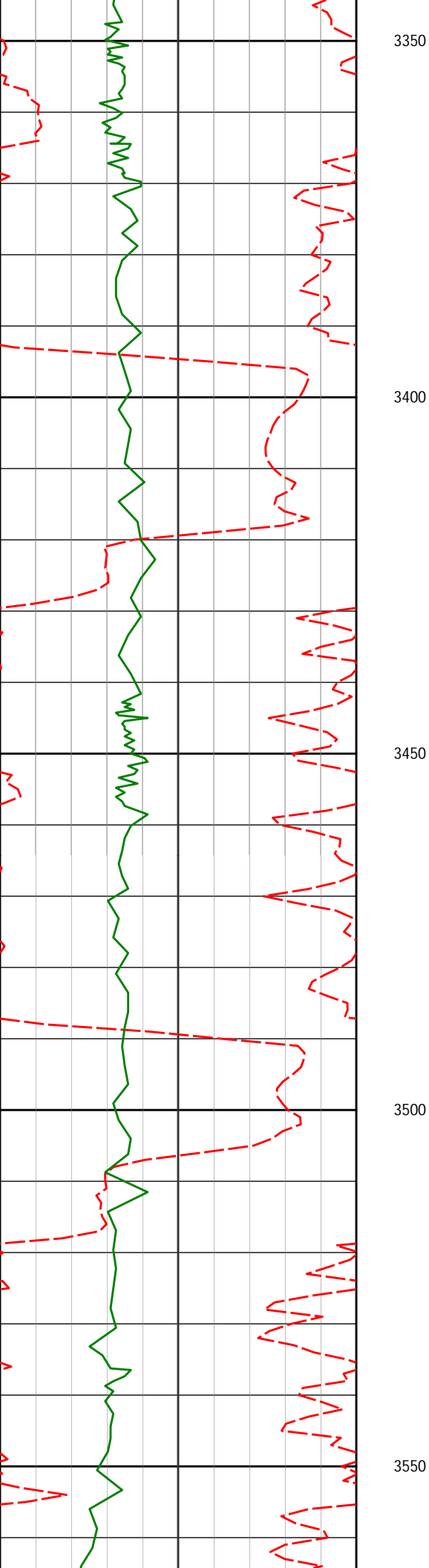
3349'

6.83°

205.18°

3340.44'

67.94'



3443'

8.32°

202.59°

3433.62'

73.67'

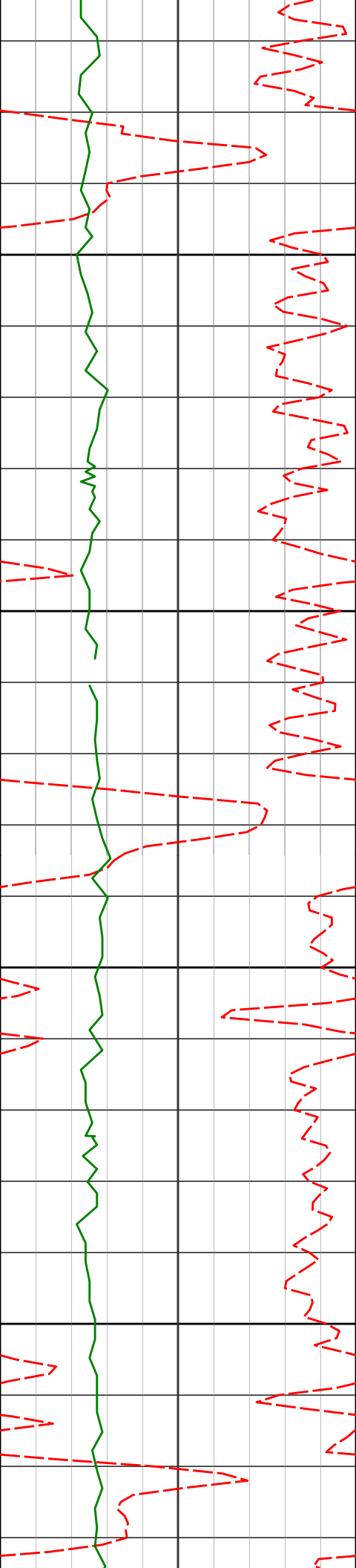
3536'

8.41°

200.69°

3525.63'

79.48'



3600

3631'

8.50°

200.44°

3619.60'

85.25'

3650

3700

3725'

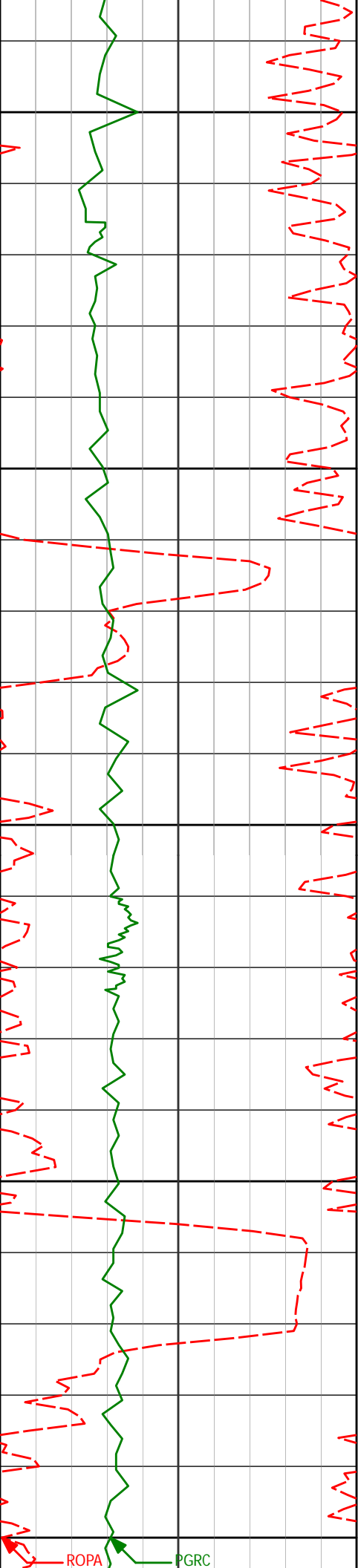
8.69°

201.03°

3712.54'

91.08'

3750



3800

3819'

9.08°

199.99°

3805.41'

97.06'

3850

3900

3914'

9.16°

199.35°

3899.21'

103.06'

3950

4008'

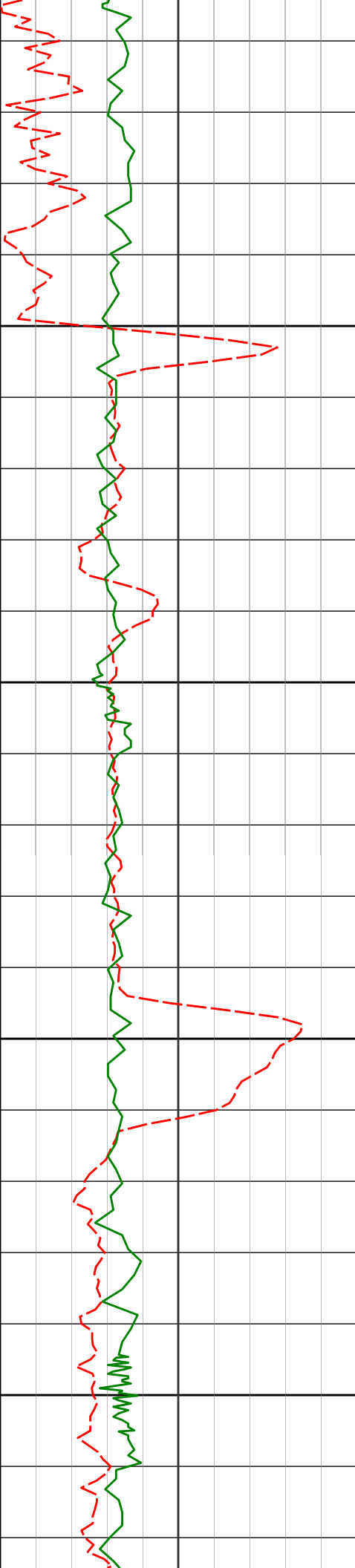
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4050

4103'

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4197'

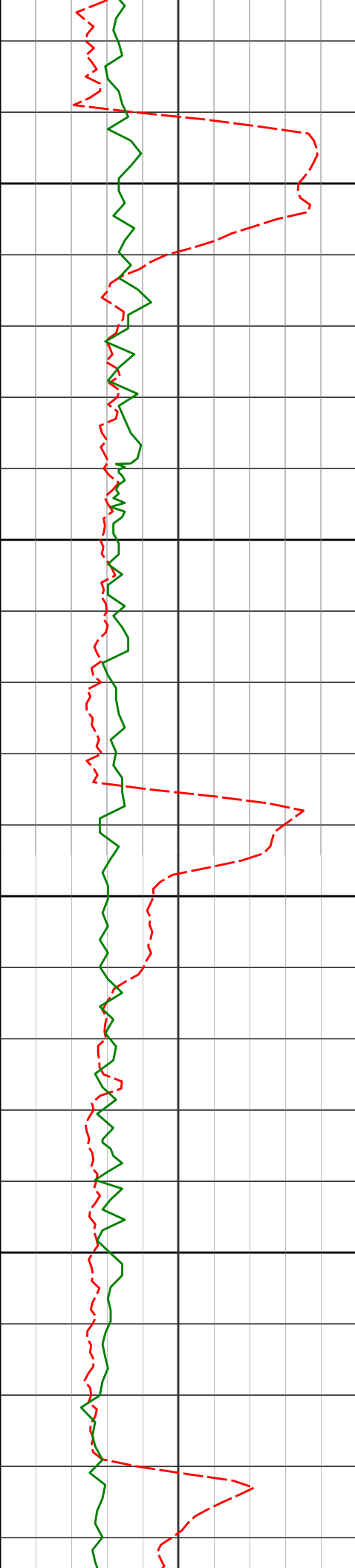
6.56°

199.45°

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118.64'

4200



4250

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202.65°

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123.10'

4300

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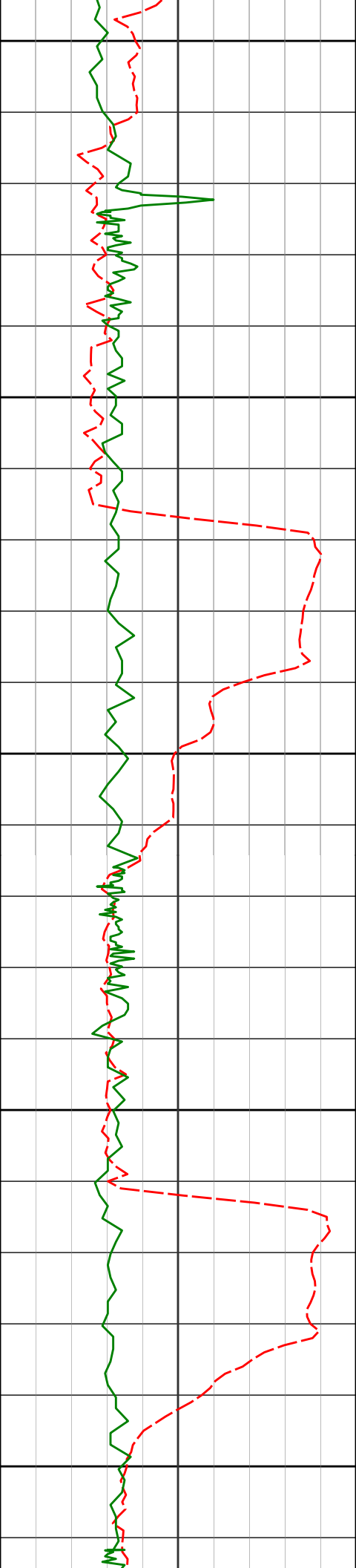
5.59°

202.92°

4368.56'

127.50'

4400



4450

4482'

5.35°

205.38°

4463.13'

131.74'

4500

4550

4577'

4.03°

200.98°

4557.81'

135.30'

4600

4650

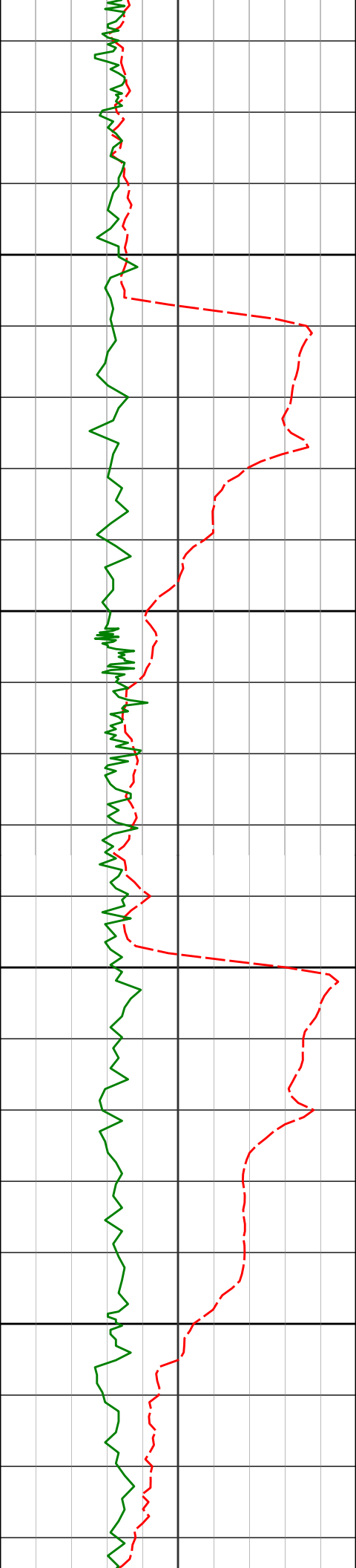
4671'

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198.28°

4651.64'

137.52'



4700

4750

4800

4850

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182.82°

4746.58'

138.50'

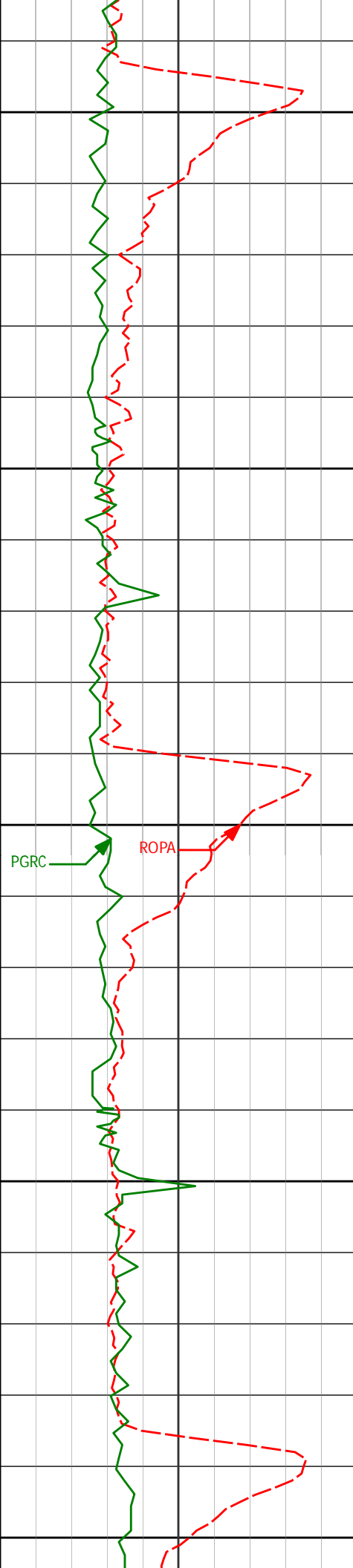
4861'

0.50°

179.98°

4841.56'

138.67'



4900

4955'

0.25°

208.24°

4935.56'

138.81'

4950

5000

5050'

0.43°

150.53°

5030.56'

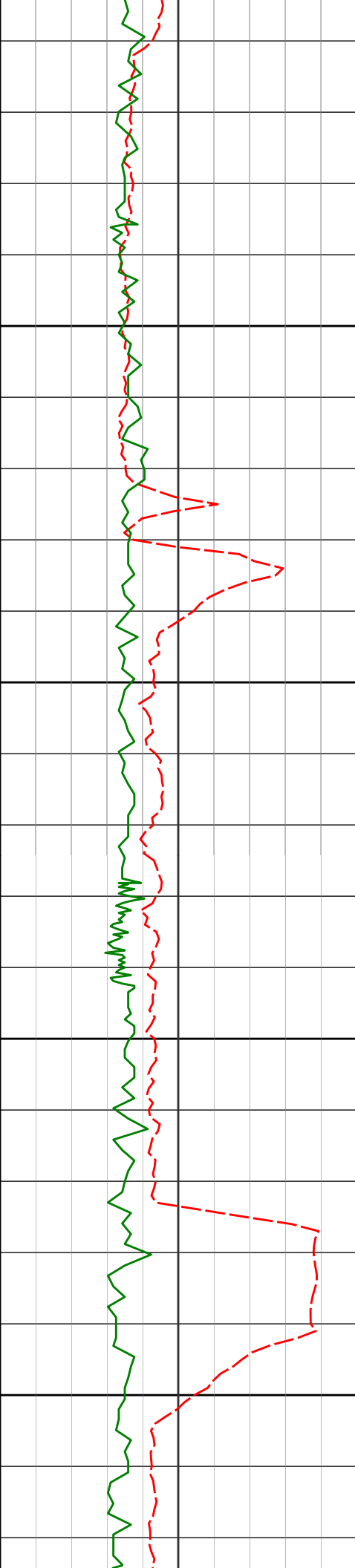
138.77'

5050

5100

PGRC

ROPA



5145'

0.43°

214.75°

5125.55'

138.83'

5150

5200

5240'

0.41°

234.08°

5220.55'

139.34'

5250

5300

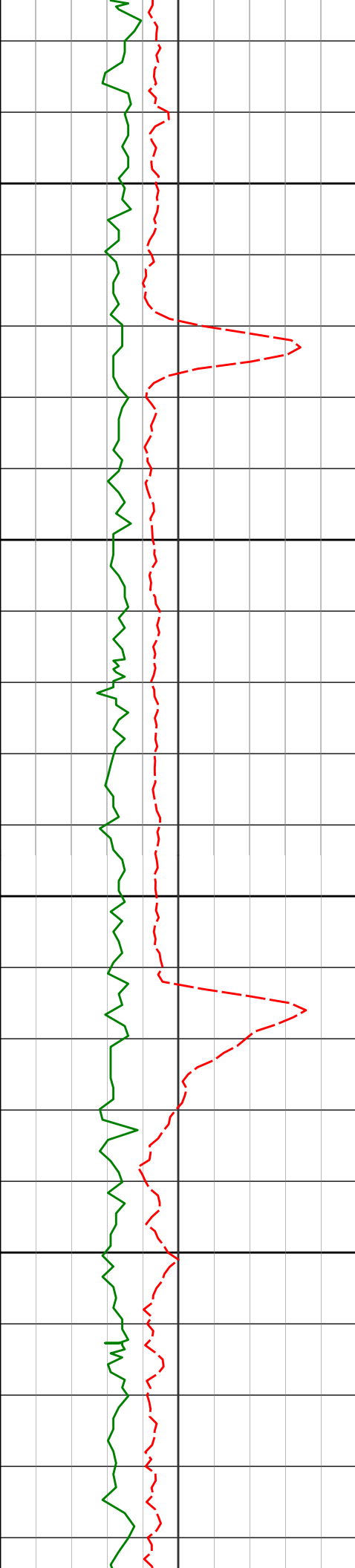
5335'

0.38°

269.39°

5315.55'

139.95'



5350

5400

5450

5500

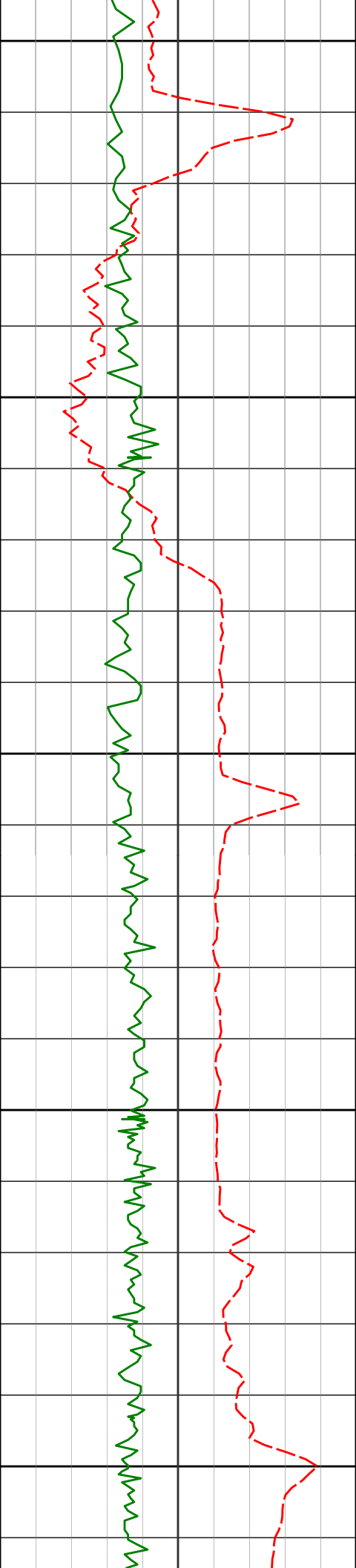
5525'

0.39°

227.17°

5505.55'

141.08'



5550

5600

5650

5700

5750

5619'

0.10°

284.91°

5599.55'

141.40'

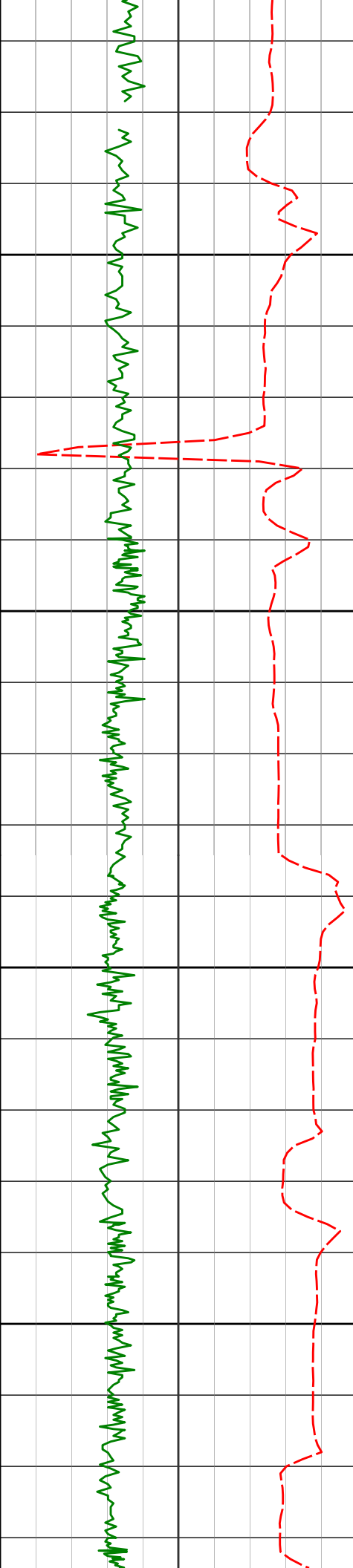
5714'

0.11°

323.92°

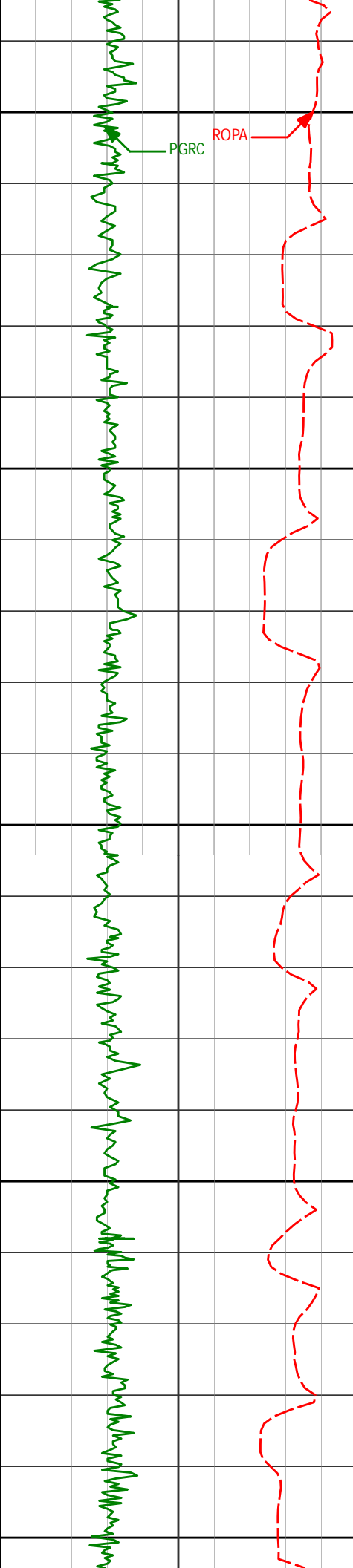
5694.54'

141.53'



Run 200

5791'	0.32°	133.51°	5771.54'	141.43'
5800				
5850				
5903'	0.52°	168.65°	5883.54'	141.15'
5900				
5951'	4.87°	256.94°	5931.48'	143.13'
5950				
5997'	9.27°	259.37°	5977.12'	148.74'



6000

6045'

13.26°

261.11°

6024.19'

158.06'

6050

6091'

16.71°

263.92°

6068.62'

169.93'

6100

6139'

20.52°

268.99°

6114.10'

185.24'

6150

6186'

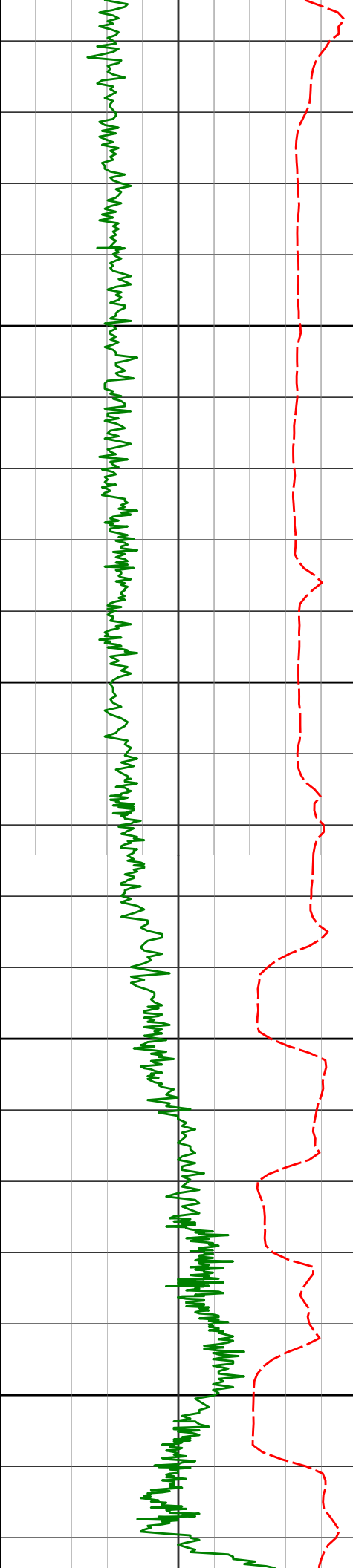
24.88°

274.29°

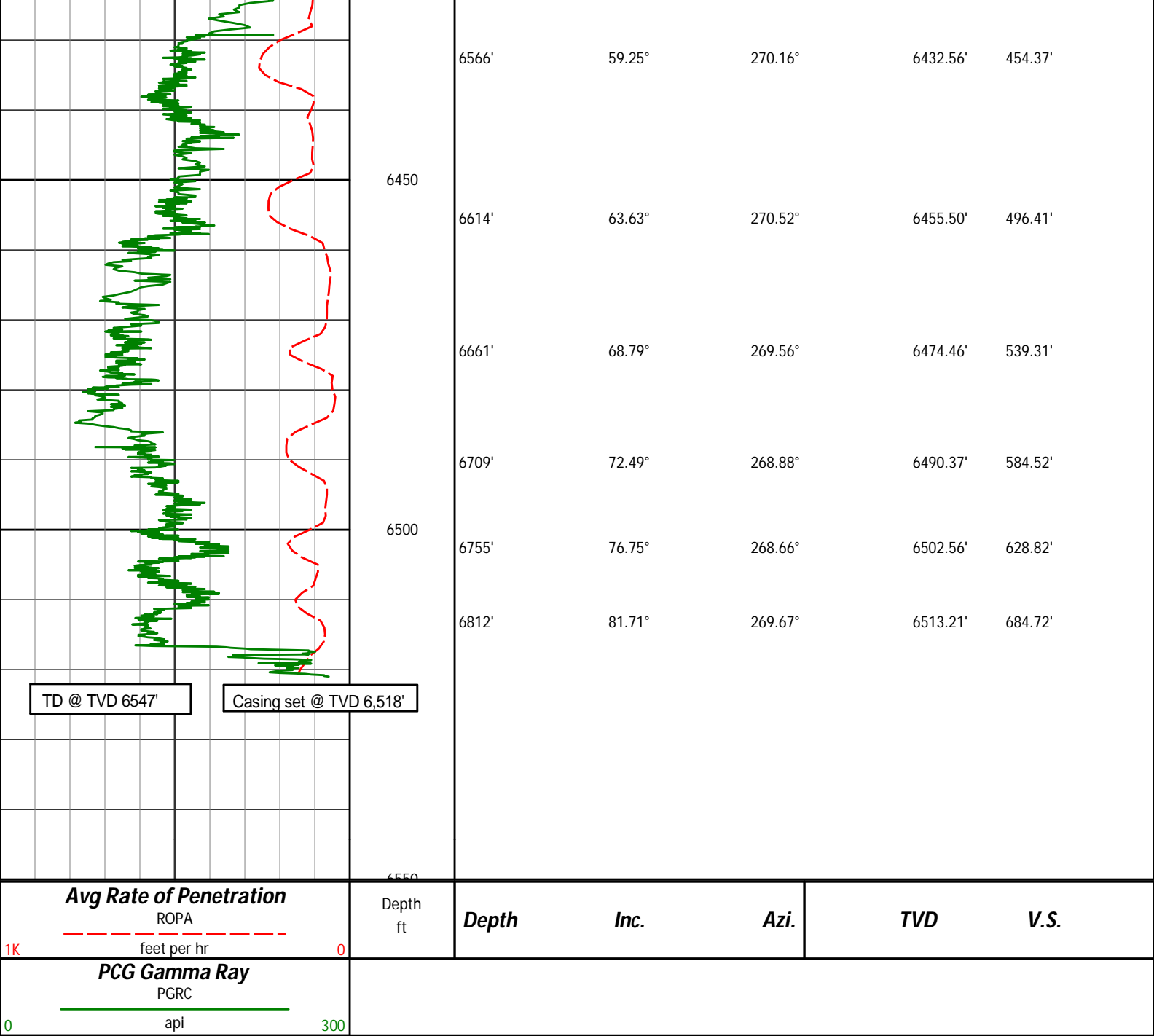
6157.45'

203.26'

6200



6250	6281'	29.64°	270.02°	6241.89'	246.52'
	6329'	38.08°	268.95°	6281.71'	273.19'
	6376'	45.77°	268.54°	6316.65'	304.54'
	6424'	49.42°	268.81°	6349.02'	339.94'
	6471'	52.81°	269.73°	6378.52'	376.47'
6400	6519'	54.62°	269.83°	6406.92'	415.08'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA35-64-1AHNA
Wattenberg
Weld Colorado
USA
CA-XX-0901018825

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
301.00	0.80	4.23	300.99	2.10 N	0.15 E	-0.29	0.27
605.00	1.00	8.43	604.95	6.84 N	0.70 E	-1.15	0.07
708.00	0.34	36.63	707.95	7.97 N	1.01 E	-1.54	0.70
802.00	0.31	27.49	801.94	8.42 N	1.30 E	-1.85	0.06
895.00	0.26	357.68	894.94	8.85 N	1.41 E	-1.99	0.17

988.00	0.28	9.65	987.94	9.29 N	1.44 E	-2.05	0.06
1082.00	0.17	42.96	1081.94	9.62 N	1.57 E	-2.20	0.18
1173.00	0.34	15.12	1172.94	9.98 N	1.73 E	-2.39	0.23
1267.00	0.31	12.93	1266.94	10.49 N	1.86 E	-2.55	0.03
1360.00	0.28	7.82	1359.94	10.96 N	1.95 E	-2.67	0.04
1453.00	0.96	219.00	1452.93	10.58 N	1.49 E	-2.19	1.30
1548.00	1.09	210.05	1547.92	9.18 N	0.54 E	-1.14	0.22
1643.00	1.13	210.83	1642.90	7.60 N	0.40 W	-0.11	0.05
1738.00	0.64	218.63	1737.89	6.38 N	1.21 W	0.78	0.53
1833.00	0.53	228.77	1832.88	5.67 N	1.87 W	1.49	0.16
1928.00	0.37	242.63	1927.88	5.24 N	2.47 W	2.12	0.20
2023.00	0.26	319.45	2022.88	5.27 N	2.89 W	2.53	0.42
2118.00	0.58	320.18	2117.88	5.80 N	3.33 W	2.94	0.34
2213.00	1.44	216.30	2212.87	5.21 N	4.35 W	3.99	1.76
2307.00	3.13	209.12	2306.79	2.01 N	6.30 W	6.15	1.82
2402.00	4.65	206.36	2401.57	3.70 S	9.27 W	9.49	1.61
2497.00	6.07	202.31	2496.15	11.80 S	12.89 W	13.64	1.55
2592.00	6.93	202.22	2590.54	21.75 S	16.96 W	18.37	0.91
2687.00	8.28	205.83	2684.70	33.22 S	22.11 W	24.27	1.51
2782.00	7.49	204.77	2778.80	45.00 S	27.68 W	30.61	0.85
2877.00	8.40	206.62	2872.89	56.82 S	33.39 W	37.09	0.99
2971.00	8.10	206.31	2965.92	68.90 S	39.40 W	43.89	0.32
3066.00	7.17	204.64	3060.07	80.29 S	44.84 W	50.07	1.01
3160.00	7.91	202.56	3153.26	91.59 S	49.76 W	55.74	0.84
3254.00	8.52	204.26	3246.30	103.91 S	55.11 W	61.89	0.70
3349.00	6.83	205.18	3340.44	115.44 S	60.40 W	67.94	1.78
3443.00	8.32	202.59	3433.62	126.78 S	65.39 W	73.67	1.63
3536.00	8.41	200.69	3525.63	139.35 S	70.38 W	79.48	0.31
3631.00	8.50	200.44	3619.60	152.43 S	75.29 W	85.25	0.10
3725.00	8.69	201.03	3712.54	165.57 S	80.26 W	91.08	0.22
3819.00	9.08	199.99	3805.41	179.17 S	85.34 W	97.06	0.45
3914.00	9.16	199.35	3899.21	193.35 S	90.41 W	103.06	0.14
4008.00	7.77	200.45	3992.19	206.36 S	95.11 W	108.61	1.49
4103.00	7.36	201.99	4086.36	218.02 S	99.63 W	113.90	0.48
4197.00	6.56	199.45	4179.67	228.67 S	103.68 W	118.64	0.91
4292.00	6.29	202.65	4274.07	238.59 S	107.49 W	123.10	0.47
4387.00	5.59	202.92	4368.56	247.65 S	111.29 W	127.50	0.74
4482.00	5.35	205.38	4463.13	255.91 S	114.99 W	131.74	0.35
4577.00	4.03	200.98	4557.81	263.03 S	118.09 W	135.30	1.44
4671.00	2.68	198.28	4651.64	268.20 S	119.96 W	137.52	1.45
4766.00	1.55	182.82	4746.58	271.60 S	120.72 W	138.50	1.32
4861.00	0.50	179.98	4841.56	273.29 S	120.78 W	138.67	1.11
4955.00	0.25	208.24	4935.56	273.89 S	120.88 W	138.81	0.32
5050.00	0.43	150.53	5030.56	274.38 S	120.80 W	138.77	0.38
5145.00	0.43	214.75	5125.55	274.98 S	120.83 W	138.83	0.48
5240.00	0.41	234.08	5220.55	275.47 S	121.31 W	139.34	0.15
5335.00	0.38	269.39	5315.55	275.68 S	121.90 W	139.95	0.25
5525.00	0.39	227.17	5505.55	276.12 S	123.00 W	141.08	0.15
5619.00	0.10	284.91	5599.55	276.32 S	123.32 W	141.40	0.37
5714.00	0.11	323.92	5694.54	276.22 S	123.45 W	141.53	0.07
5791.00	0.32	133.51	5771.54	276.31 S	123.34 W	141.43	0.56
5903.00	0.52	168.65	5883.54	277.03 S	123.01 W	141.15	0.28
5951.00	4.87	256.94	5931.48	277.70 S	124.95 W	143.13	10.17
5997.00	9.27	259.37	5977.12	278.83 S	130.50 W	148.74	9.59
6045.00	13.26	261.11	6024.19	280.39 S	139.74 W	158.06	8.34
6091.00	16.71	263.92	6068.62	281.91 S	151.53 W	169.93	7.66
6139.00	20.52	268.99	6114.10	282.79 S	166.81 W	185.24	8.62
6186.00	24.88	274.29	6157.45	282.19 S	184.92 W	203.26	10.24
6281.00	29.64	270.02	6241.89	280.69 S	228.37 W	246.52	5.41
6329.00	38.08	268.95	6281.71	280.95 S	255.09 W	273.19	17.63
6376.00	45.77	268.54	6316.65	281.65 S	286.46 W	304.54	16.37
6424.00	49.42	268.81	6349.02	282.47 S	321.89 W	339.94	7.62
6471.00	52.81	269.73	6378.52	282.93 S	358.46 W	376.47	7.37
6519.00	54.62	269.83	6406.92	283.07 S	397.15 W	415.08	3.77
6566.00	59.25	270.16	6432.56	283.08 S	436.53 W	454.37	9.87
6614.00	63.63	270.52	6455.50	282.82 S	478.68 W	496.41	9.15
6661.00	68.79	269.56	6474.46	282.80 S	521.67 W	539.31	11.14
6709.00	72.49	268.88	6490.37	283.42 S	566.94 W	584.52	7.82
6755.00	76.75	268.66	6502.56	284.37 S	611.27 W	628.82	9.27
6812.00	81.71	269.67	6513.21	285.18 S	667.25 W	684.72	8.87
6960.00	85.62	271.39	6529.54	283.81 S	814.30 W	831.36	2.88
7053.00	85.87	271.28	6536.44	281.65 S	907.02 W	923.73	0.29
7147.00	88.21	269.97	6541.29	280.63 S	1000.88 W	1017.32	2.85
7239.00	89.63	270.50	6543.03	280.25 S	1092.86 W	1109.07	1.65

7333.00	92.50	268.16	6541.28	281.35 S	1186.82 W	1202.89	3.94
7424.00	91.39	267.94	6538.19	284.45 S	1277.72 W	1293.79	1.24
7518.00	91.29	268.26	6535.99	287.56 S	1371.64 W	1387.71	0.36
7612.00	91.26	269.19	6533.90	289.65 S	1465.59 W	1481.60	0.99
7705.00	89.88	268.93	6532.98	291.18 S	1558.57 W	1574.47	1.51
7800.00	88.64	269.24	6534.20	292.70 S	1653.55 W	1669.34	1.35
7894.00	89.08	269.41	6536.07	293.80 S	1747.52 W	1763.18	0.50
7989.00	89.42	268.82	6537.32	295.27 S	1842.50 W	1858.05	0.72
8084.00	89.63	269.49	6538.10	296.67 S	1937.49 W	1952.92	0.74
8179.00	90.58	269.52	6537.93	297.49 S	2032.48 W	2047.76	1.00
8274.00	88.71	268.17	6538.52	299.41 S	2127.46 W	2142.65	2.43
8369.00	89.23	268.15	6540.23	302.46 S	2222.39 W	2237.58	0.55
8463.00	90.09	269.24	6540.79	304.60 S	2316.36 W	2331.48	1.48
8558.00	90.43	268.20	6540.35	306.72 S	2411.34 W	2426.39	1.15
8653.00	90.03	270.08	6539.97	308.15 S	2506.32 W	2521.26	2.02
8748.00	90.74	269.71	6539.33	308.32 S	2601.32 W	2616.06	0.84
8842.00	89.78	269.78	6538.91	308.74 S	2695.32 W	2709.87	1.02
8937.00	90.12	268.24	6538.99	310.38 S	2790.30 W	2804.76	1.66
9032.00	90.19	269.66	6538.73	312.12 S	2885.28 W	2899.64	1.50
9127.00	89.20	269.89	6539.24	312.49 S	2980.28 W	2994.45	1.07
9222.00	90.03	270.11	6539.88	312.49 S	3075.27 W	3089.24	0.90
9316.00	88.34	269.46	6541.21	312.85 S	3169.26 W	3183.04	1.93
9411.00	88.80	269.38	6543.59	313.81 S	3264.22 W	3277.86	0.49
9506.00	89.01	268.54	6545.40	315.53 S	3359.19 W	3372.73	0.91
9600.00	90.93	270.45	6545.45	316.36 S	3453.18 W	3466.57	2.88
9695.00	90.12	270.87	6544.58	315.27 S	3548.17 W	3561.27	0.96
9790.00	89.82	270.37	6544.63	314.24 S	3643.16 W	3655.99	0.61
9885.00	90.19	270.31	6544.62	313.68 S	3738.16 W	3750.74	0.39
9980.00	90.00	270.37	6544.46	313.11 S	3833.16 W	3845.49	0.21
10075.00	90.00	270.20	6544.46	312.64 S	3928.16 W	3940.25	0.18
10170.00	89.85	269.50	6544.59	312.89 S	4023.16 W	4035.05	0.75
10265.00	89.63	268.94	6545.02	314.18 S	4118.14 W	4129.92	0.63
10360.00	89.88	268.83	6545.43	316.03 S	4213.13 W	4224.81	0.29
10454.00	90.56	269.57	6545.06	317.34 S	4307.11 W	4318.68	1.07
10549.00	89.04	269.33	6545.40	318.25 S	4402.11 W	4413.53	1.62
10644.00	89.32	269.92	6546.76	318.88 S	4497.09 W	4508.34	0.69
10739.00	90.12	270.02	6547.22	318.93 S	4592.09 W	4603.14	0.85
10834.00	89.45	269.82	6547.58	319.06 S	4687.09 W	4697.93	0.74
10928.00	89.91	269.62	6548.10	319.52 S	4781.09 W	4791.75	0.53
10992.00	90.12	269.52	6548.09	320.00 S	4845.09 W	4855.64	0.36
11056.00	90.12	269.52	6547.95	320.53 S	4909.08 W	4919.53	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 266.19 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 11056.00 FEET
IS 4919.54 FEET ALONG 266.26 DEGREES (GRID)**

Surveys are tied into two non-Haliburton surveys at MD 301' and 605' taken while drilling the surface section.