HALLIBURTON | Sperry Drilling

PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 240

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 27' 17.46" North Long: 104° 23' 38.76" West
Well	: Wells Ranch AA26-63HN
Company	: Noble Energy
Rig	: H&P 322

Company : **Noble Energy**
Rig : **H&P 322**
Well : **Wells Ranch AA26-63HN**
Field : **Wattenberg**
Country : **USA**
API Number : **05-123-37566**

LOCATION

Latitude : **40° 27' 17.46" North**
Longitude : **104° 23' 38.76" West**
UTM Easting = 3307747.424 ft
UTM Northing = 1410561.244 ft

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **4792.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

MD LOG

Elev. KB **N/A**
DF **4816.00 ft**
GL **4792.00 ft**
WD **N/A**

Depth Logged : **975.00 ft** To **11,570.00 ft**
Date Logged : **16-Oct-13** To **23-Oct-13**
Total Depth MD : **11,570.00 ft** TVD : **6,706.56 ft**
Spud Date : **15-Oct-13**

Unit No. : **11210425** Job No. :**CA-XX-0900808839**
Plot Type : **Final**
Plot Date : **23-Oct-13**

Run No.	Borehole Record (MD) Size	From	To
2	8.750 in	975.00 ft	5,993.00 ft
3	8.750 in	5,993.00 ft	7,016.00 ft
4	6.125 in	7,016.00 ft	11,570.00 ft

Run No.	Borehole Record (MD) Size	From	To

Casing Record (MD) Size	Weight	From	To
9.625 in	36.00 lbpf	SURFACE	965.00 ft
7.000 in	26.00 lbpf	SURFACE	7,006.00 ft

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	17-Oct-13	18-Oct-13	23-Oct-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	975.00	5,993.00	7,016.00		
Log End Depth (MD, ft)	5,993.00	7,016.00	11,570.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	16-Oct-13 20:00	17-Oct-13 21:30	20-Oct-13 16:00		
Drill/Wipe End Date and Time	17-Oct-13 11:45	18-Oct-13 14:15	23-Oct-13 03:00		
Min Inc (deg) @ Depth (MD, ft)	0.18 @ 1,104.00	1.11 @ 6,023.00	85.49 @ 7,047.00		
Max Inc (deg) @ Depth (MD, ft)	14.19 @ 3,753.00	81.24 @ 6,961.00	92.13 @ 8,849.00		
Bit TFA(in2) / Bit Type	0.75 / PDC	0.90 / PDC	0.65 / PDC		
Flow Rate (gpm)	556.05	561.80	289.36		
Max AV (fpm) / CV (fpm) @ MWD	401.4 / 401.4	446.7 / 446.7	564.4 / 564.4		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.80 / 28.00	10.70 / 39.00	9.52 / 35.00		
Filtrate CL (ppm)	1,800.00	2,100.00	21.00		
pH / Fluid Loss (mptm)	9.10 / N/A	9.60 / N/A	9.10 / N/A		
PV (cP) / YP (lhf2)	1 / 3.00	15 / 9.00	8 / 8.00		
% Solids / % Sand	.4 / .1	11 / 1	6.40 / 0.37		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		

Max Tool Temp (degF) / Source	150.10 / PCM	162.80 / PCM	221.80 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Juan Pablo Centeno	Juan Pablo Centeno	Robert Ley		
Customer Representative	Jeremy Stolz	Jeremy Stolz	Jeremy Stolz		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	12134692	11331930	11750423		
Insert Serial Number	11400855	11400855	10997273		
Date and Time Initialized	16-Oct-13 01:44	01-Jan-70 00:00	19-Oct-13 12:40		
Date and Time Read	18-Oct-13 21:03	18-Oct-13 21:12	23-Oct-13 13:17		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58.00	55.00	61.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	12134692	11331930	11750423		
Sonde Serial Number	11833053	11833053	11145692		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	261.42	20.47	121.01		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.99	48.50	54.37		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	12134692	11331930	11750423		
Insert/Sonde Serial Number	11293390	11293390	11293312		

REMARKS

1. All depths are true vertical depths and are calibrated to the driller' pipe tally and are measured from the drill floor.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded (memory data) unless otherwise stated.

4. The Following smoothing parameters have been applied to the data"

PGXR (Gamma Ray CG):
Interval Resolution: 0.5 feet
Coercion Distance: 0.6 feet
Gap Fill: 3.0 feet

ROPA (Rate of Penetration):
Interval Resolution: 0.5 feet
Coercion Distance: 1.2 feet

5. Due to issues with the top drive and Pason we are missing data:

Gamma: 6340 ft to 6356 ft and 7435 ft to 7444 ft
ROP: 6388 ft to 6407 ft and 7490 ft to 7498 ft

WARRANTY

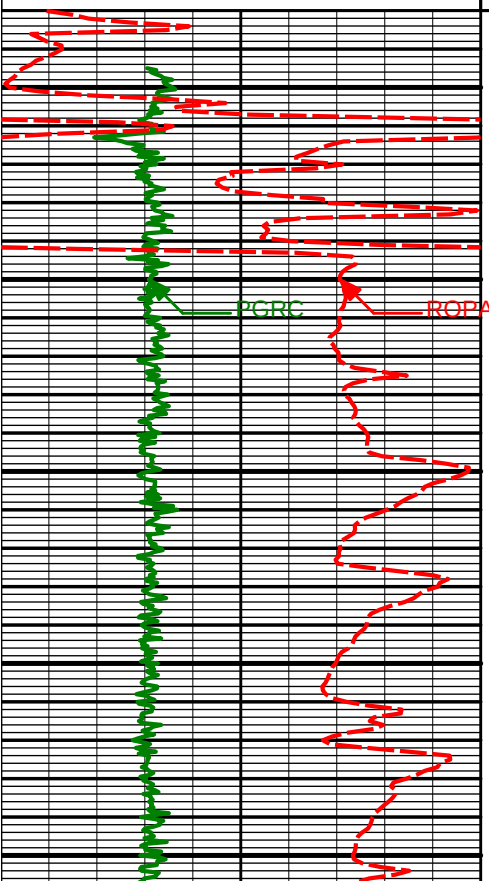
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

HALLIBURTON

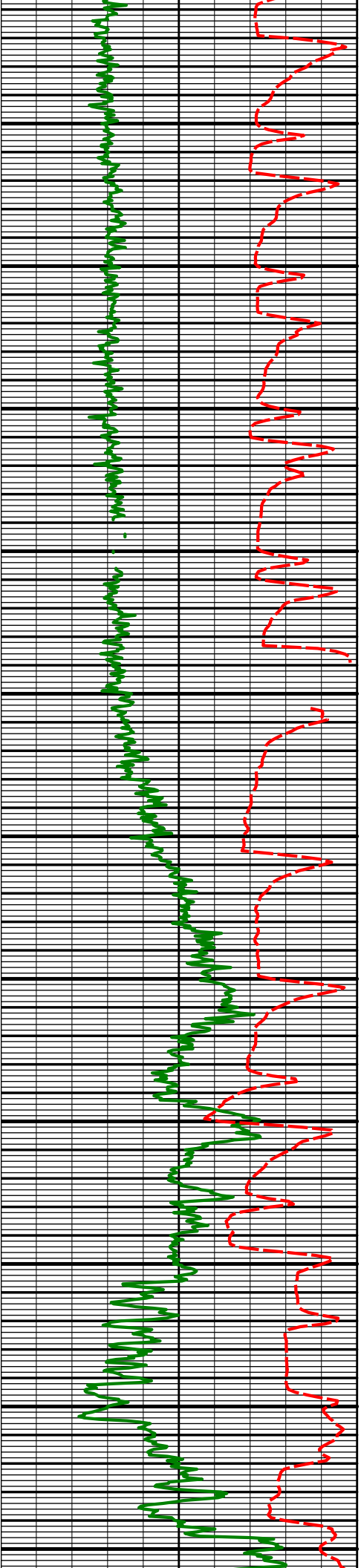
TVD Detail Log 1:600

Gamma Ray Cor
(PGRC)
(Api)
0 300

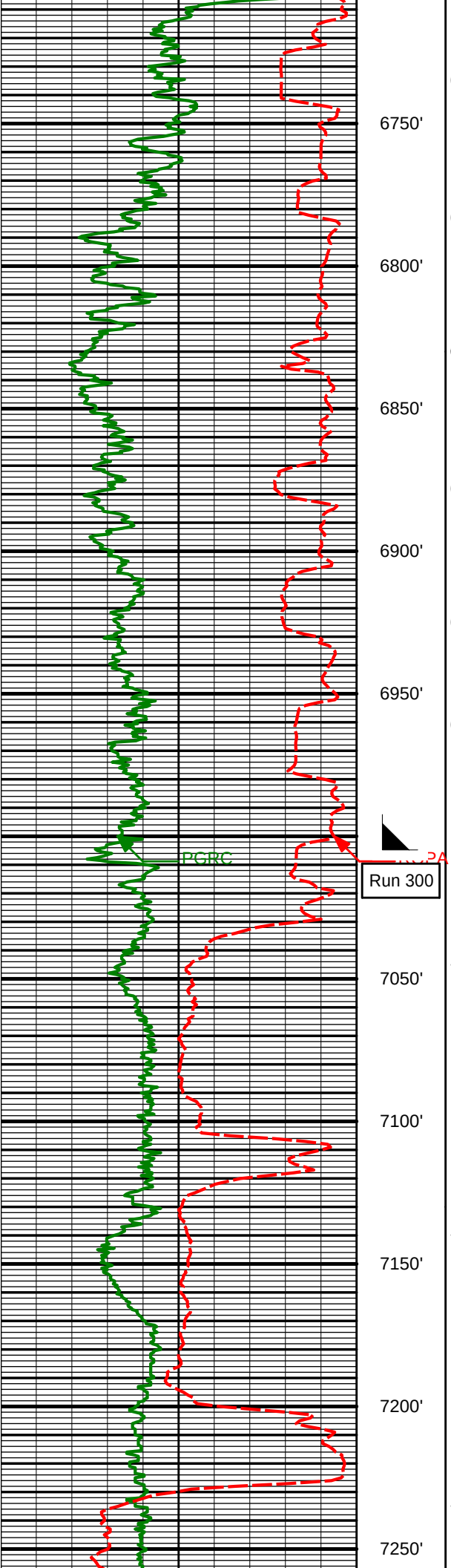
Avg Rate of Penetration
feet per hr
600 0



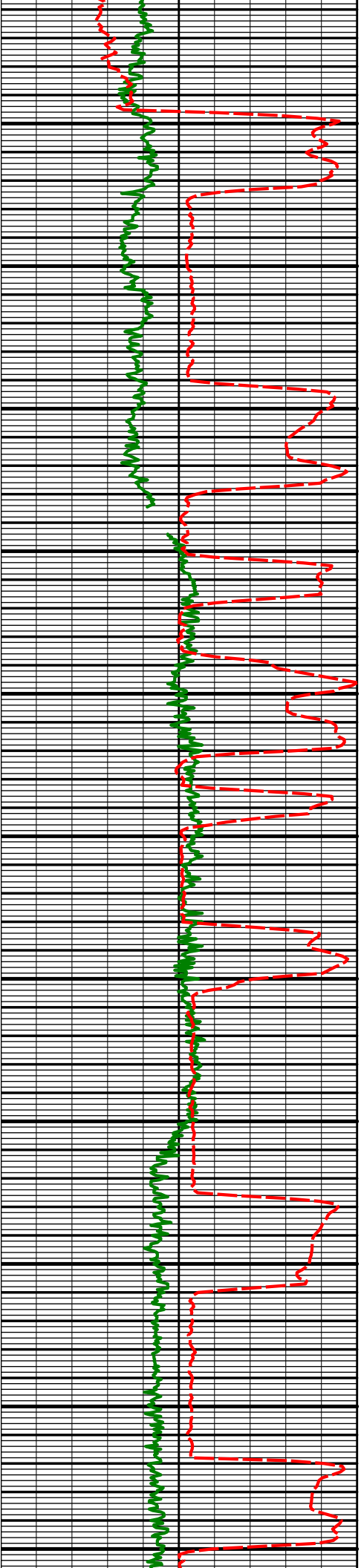
Feet	Depth	Inc	Azm	TVD	Vsec
	5935'	1.20°	58.06°	5890.96'	173.27'
5950'					
Run 200					
6000'					
	6023'	1.11°	53.55°	5978.94'	171.73'
KOP					
	6070'	2.58°	258.59°	6025.93'	172.39'
6100'					
	6118'	8.04°	259.46°	6073.70'	176.80'
6150'					



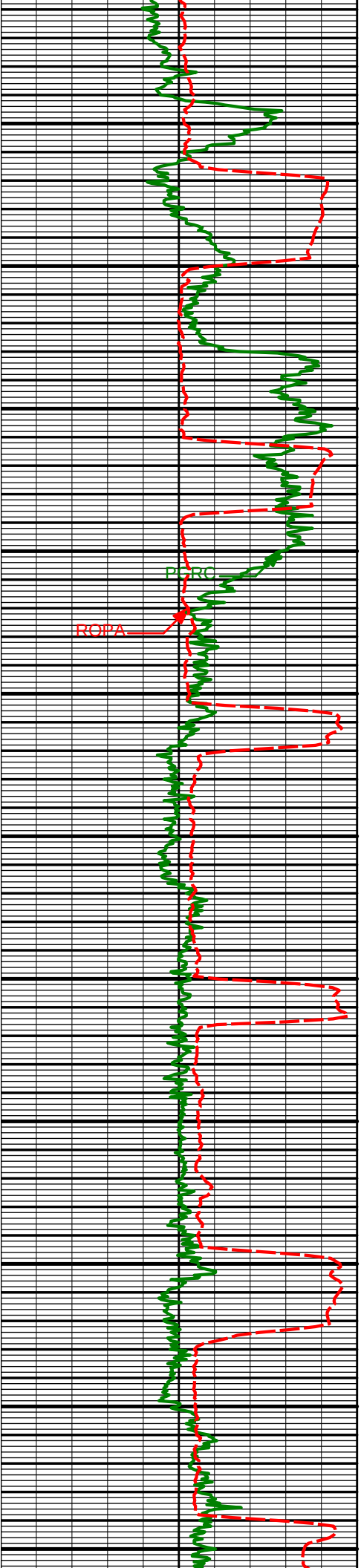
6165'	11.87°	259.39°	6119.99'	184.88'
6213'	15.40°	259.79°	6166.63'	196.14'
6260'	18.33°	264.39°	6211.60'	209.74'
6308'	20.91°	274.01°	6256.82'	225.77'
6355'	24.03°	275.68°	6300.25'	243.48'
6403'	28.99°	272.83°	6343.19'	264.64'
6450'	34.70°	270.45°	6383.10'	289.28'
6498'	42.21°	268.96°	6420.66'	319.03'
6545'	47.85°	269.69°	6453.87'	352.19'
6593'	52.38°	270.53°	6484.64'	388.89'
6640'	55.01°	271.02°	6512.46'	426.59'
6688'	58.05°	270.59°	6538.93'	466.45'



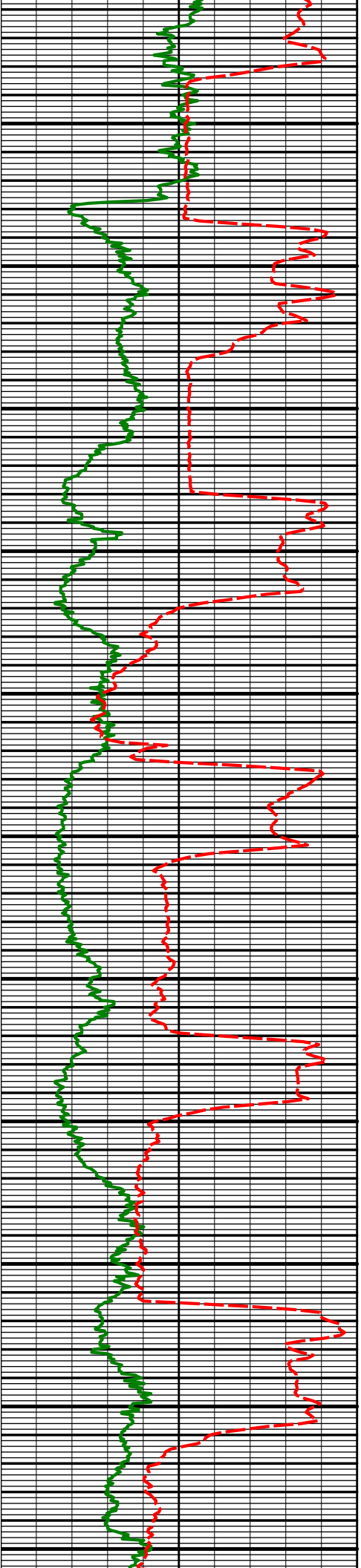
6735'	61.34°	269.85°	6562.65'	506.88'
6783'	65.36°	268.59°	6584.17'	549.67'
6830'	71.00°	268.12°	6601.64'	593.23'
6878'	75.93°	267.95°	6615.29'	639.18'
6925'	79.31°	268.03°	6625.37'	685.04'
6961'	81.24°	268.48°	6631.45'	720.47'
7047'	85.49°	271.77°	6641.39'	805.57'
7142'	88.83°	271.08°	6646.09'	899.92'
7237'	90.59°	271.44°	6646.57'	994.42'



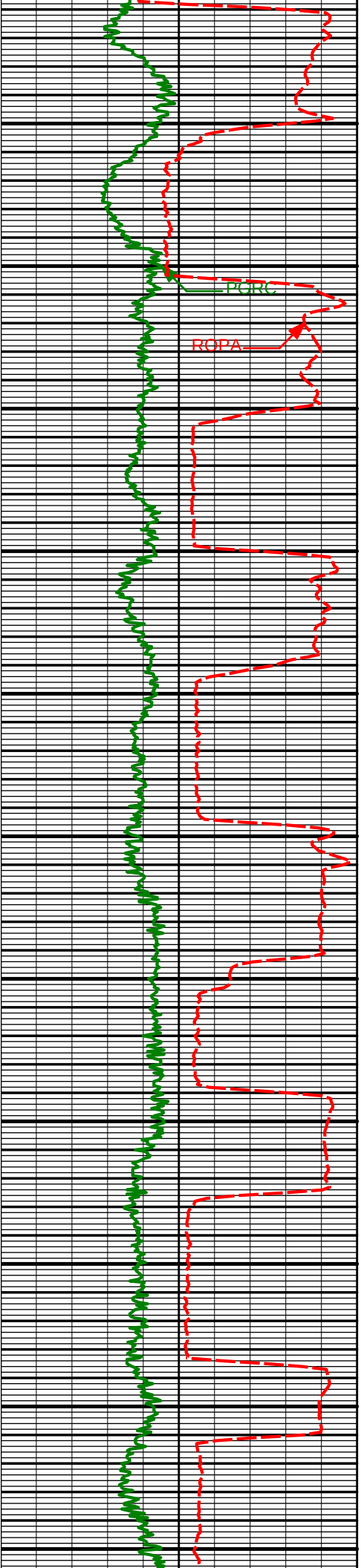
7332'	91.33°	271.48°		6644.98'	1088.87'
7427'	90.89°	272.22°		6643.14'	1183.25'
7521'	88.67°	273.16°		6643.50'	1276.49'
7616'	88.95°	272.93°		6645.47'	1370.62'
7711'	88.46°	272.74°		6647.62'	1464.80'
7806'	88.80°	272.13°		6649.89'	1559.06'



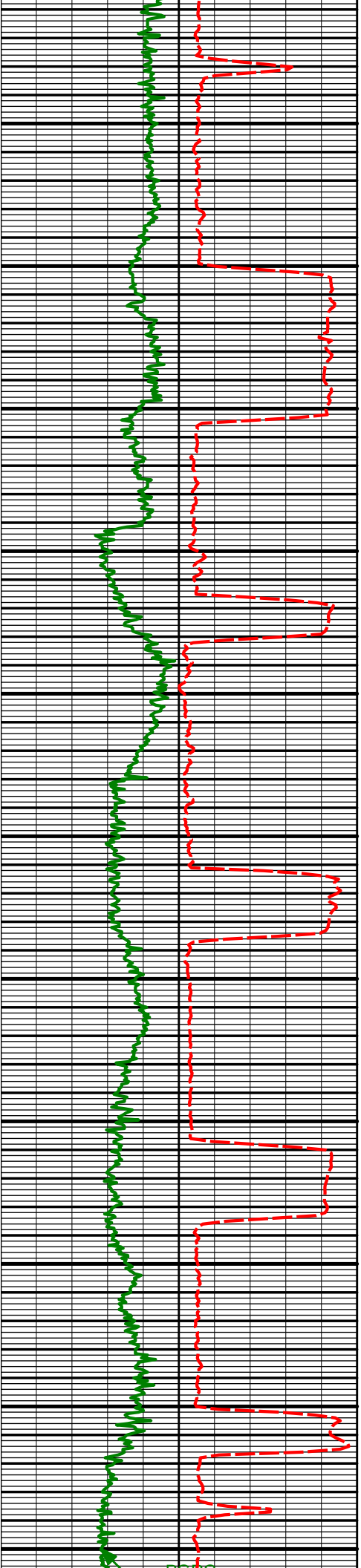
7800'	88.80°	272.13°		6649.89'	1559.00'
7901'	87.26°	271.73°		6653.16'	1653.38'
7996'	86.67°	271.92°		6658.19'	1747.65'
8091'	87.96°	270.44°		6662.64'	1842.06'
8185'	89.63°	269.72°		6664.62'	1935.72'
8280'	90.37°	271.12°		6664.62'	2030.35'



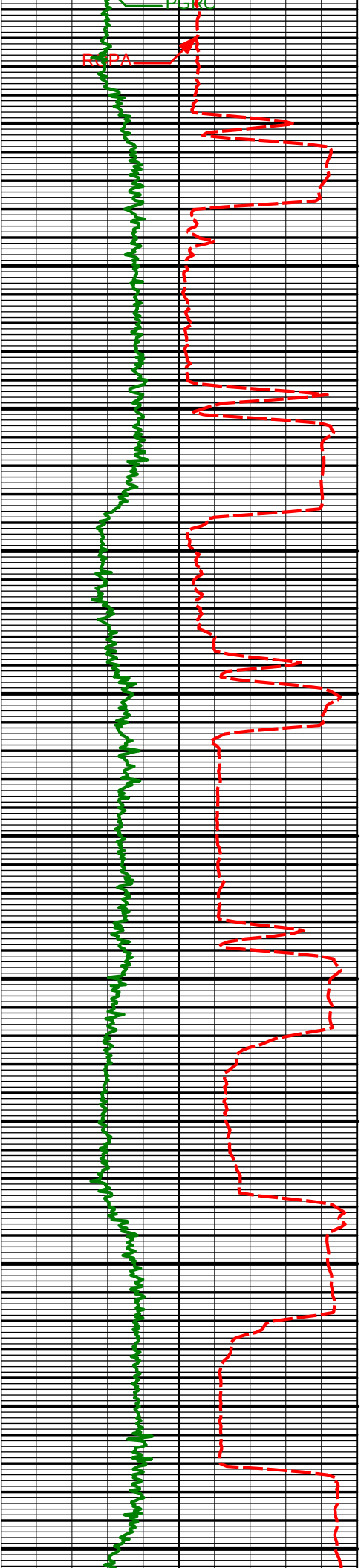
8375'	89.54°	269.47°	6664.69'	2125.00'
8470'	89.66°	269.66°	6665.35'	2219.75'
8564'	89.07°	268.57°	6666.40'	2313.55'
8659'	88.74°	266.99°	6668.21'	2408.44'
8754'	90.74°	268.31°	6668.64'	2503.36'
8849'	92.13°	268.36°	6666.26'	2598.21'



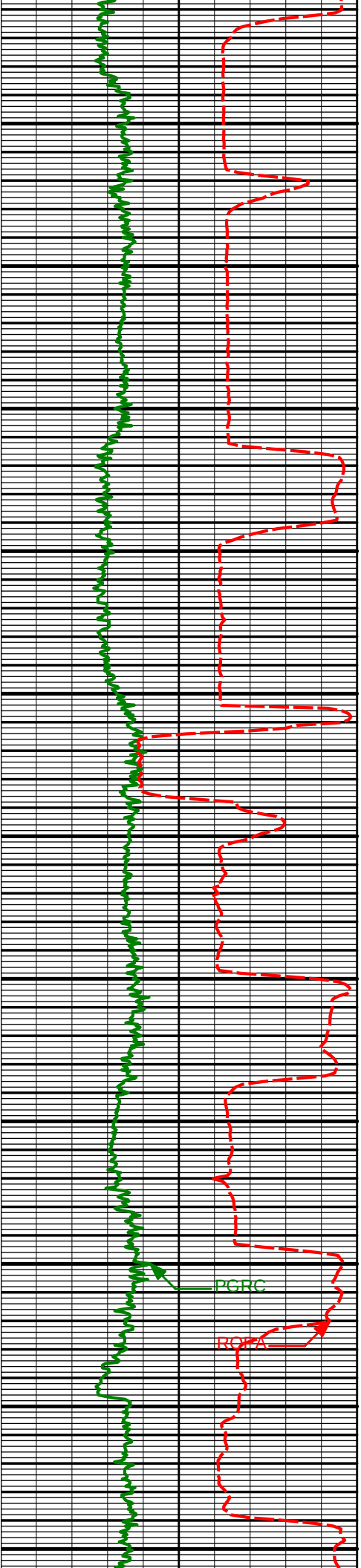
8944'	91.29°	268.06°	6663.43'	2693.05'
9039'	90.77°	268.44°	6661.72'	2787.91'
9134'	90.59°	270.61°	6660.59'	2882.66'
9229'	89.51°	270.68°	6660.51'	2977.26'
9324'	87.25°	271.19°	6663.20'	3071.77'
9419'	87.07°	269.37°	6667.90'	3166.30'



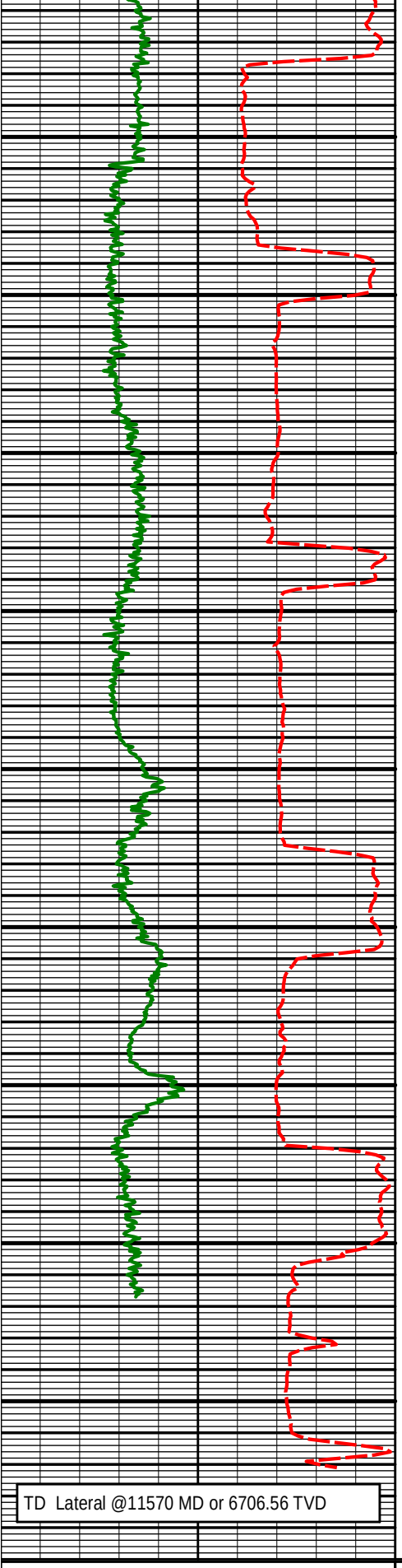
9513'	90.34°	269.81°	6670.03'	3260.02'
9609'	86.52°	269.37°	6672.66'	3355.71'
9704'	87.44°	269.81°	6677.66'	3450.32'
9798'	87.94°	270.56°	6681.45'	3543.91'
9893'	87.75°	270.59°	6685.02'	3638.46'
9988'	88.64°	269.88°	6688.02'	3733.07'



10083'	89.72°	270.43°	6689.38'	3827.74'
10177'	87.93°	269.85°	6691.30'	3921.39'
10272'	89.04°	269.66°	6693.81'	4016.08'
10367'	90.09°	269.34°	6694.54'	4110.83'
10462'	90.09°	271.36°	6694.39'	4205.47'
10557'	87.50°	271.08°	6696.38'	4299.96'



10557'	87.50°	271.08°	6696.38'	4299.96'
10652'	89.85°	271.31°	6698.58'	4394.44'
10747'	90.00°	269.81°	6698.71'	4489.05'
10841'	89.01°	269.33°	6699.52'	4582.80'
10936'	88.37°	269.19°	6701.69'	4677.56'
11032'	89.54°	269.89°	6703.44'	4773.29'



Depth	Inc	Azm	TVD	Vsec
11126'	87.90°	268.68°	6705.54'	4867.04'
11221'	87.84°	267.68°	6709.07'	4961.86'
11316'	90.80°	267.89°	6710.20'	5056.76'
11411'	90.99°	269.86°	6708.71'	5151.57'
11509'	90.68°	270.47°	6707.29'	5249.22'
11570'	90.68°	270.47°	6706.56'	5309.98'

Avg Rate of Penetration
feet per hr
600 0

Feet

Gamma Ray Cor
(PGRC)

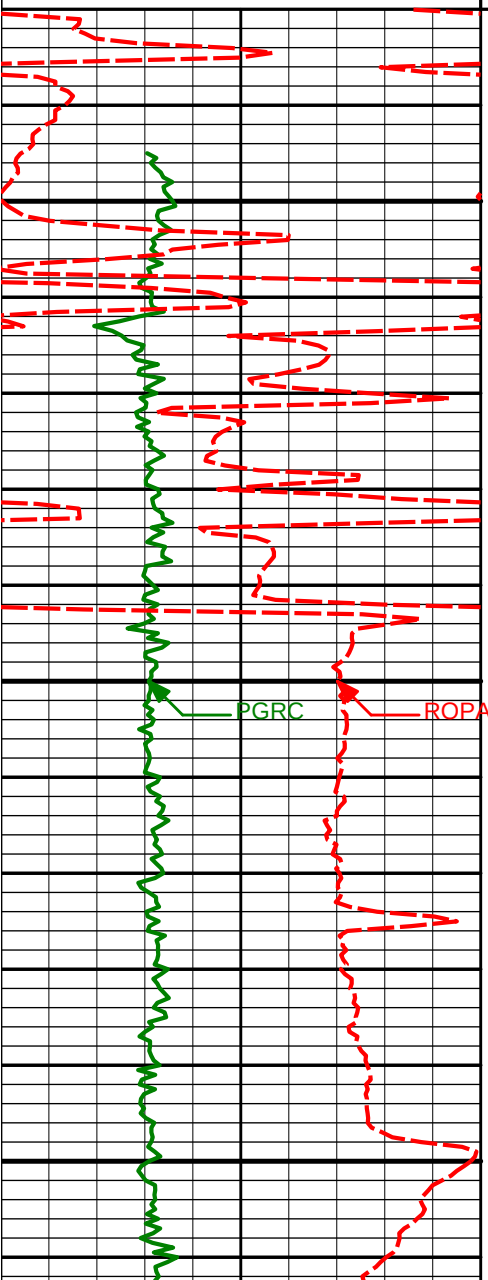
(Api)
0 300

HALLIBURTON

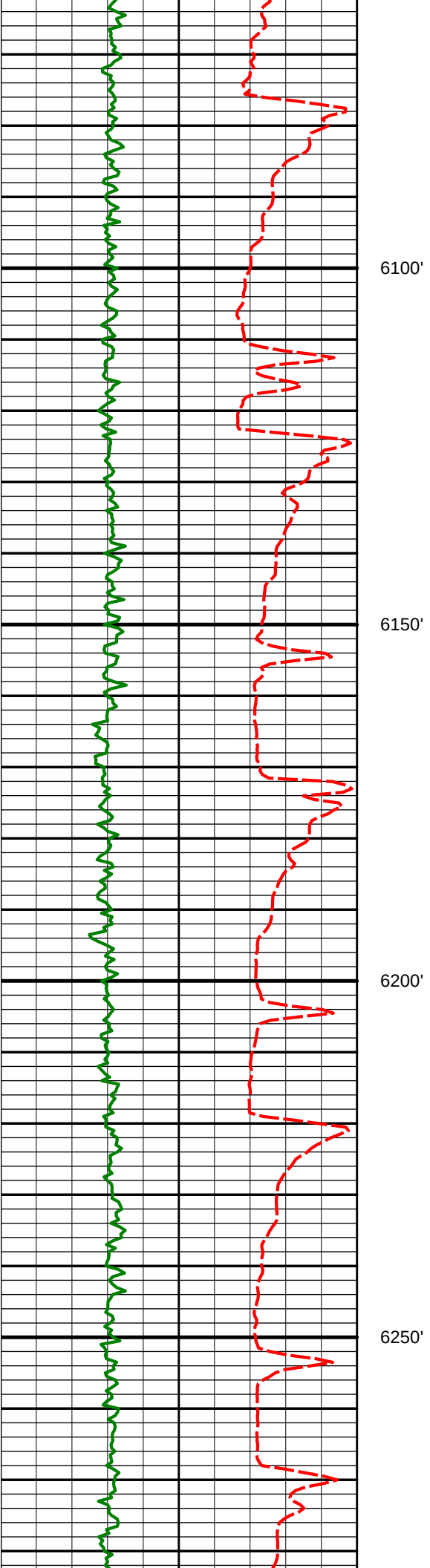
TVD Detail Log 1:240

Gamma Ray Cor
(PGRC)
(Api)
0 300

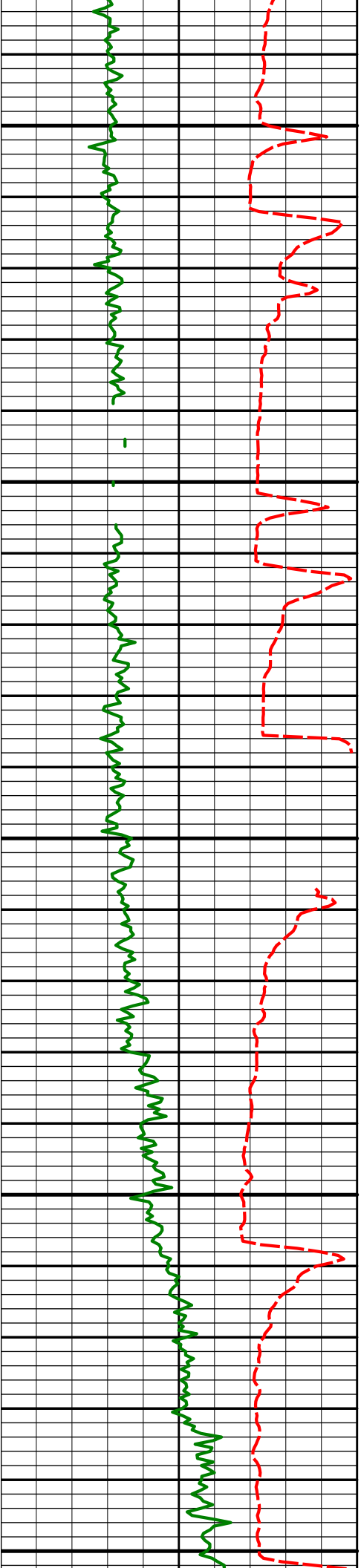
Avg Rate of Penetration
feet per hr
600 0



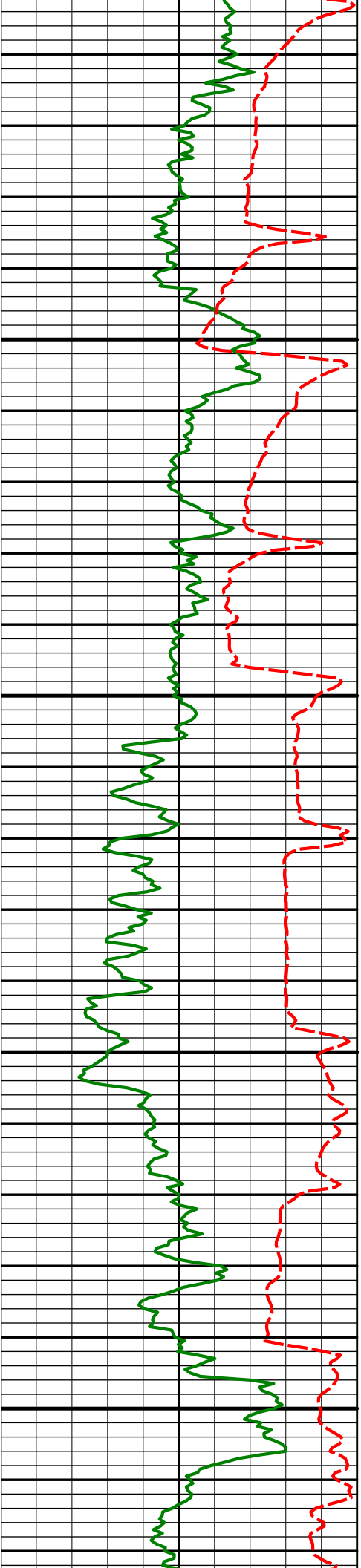
Feet	Depth	Inc	Azm	TVD	Vsec
	5935'	1.20°	58.06°	5890.96'	173.27'
5950'					
Run 200					
6000'					
	6023'	1.11°	53.55°	5978.94'	171.73'
6050'					
KOP					



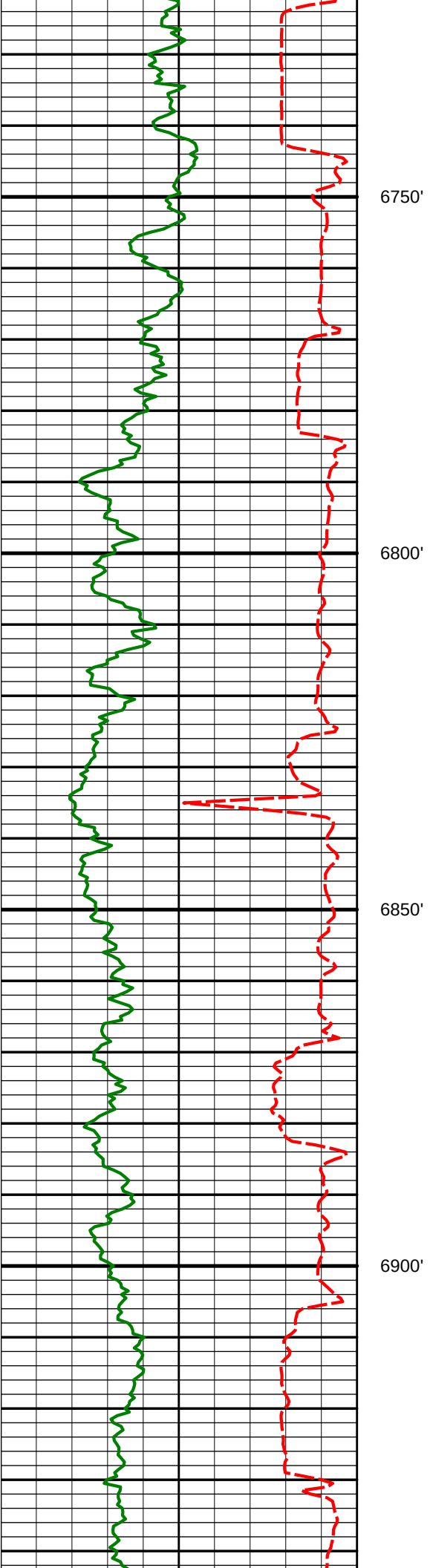
6070'	2.58°	258.59°	6025.93'	172.39'
6118'	8.04°	259.46°	6073.70'	176.80'
6165'	11.87°	259.39°	6119.99'	184.88'
6213'	15.40°	259.79°	6166.63'	196.14'
6260'	18.33°	264.39°	6211.60'	209.74'



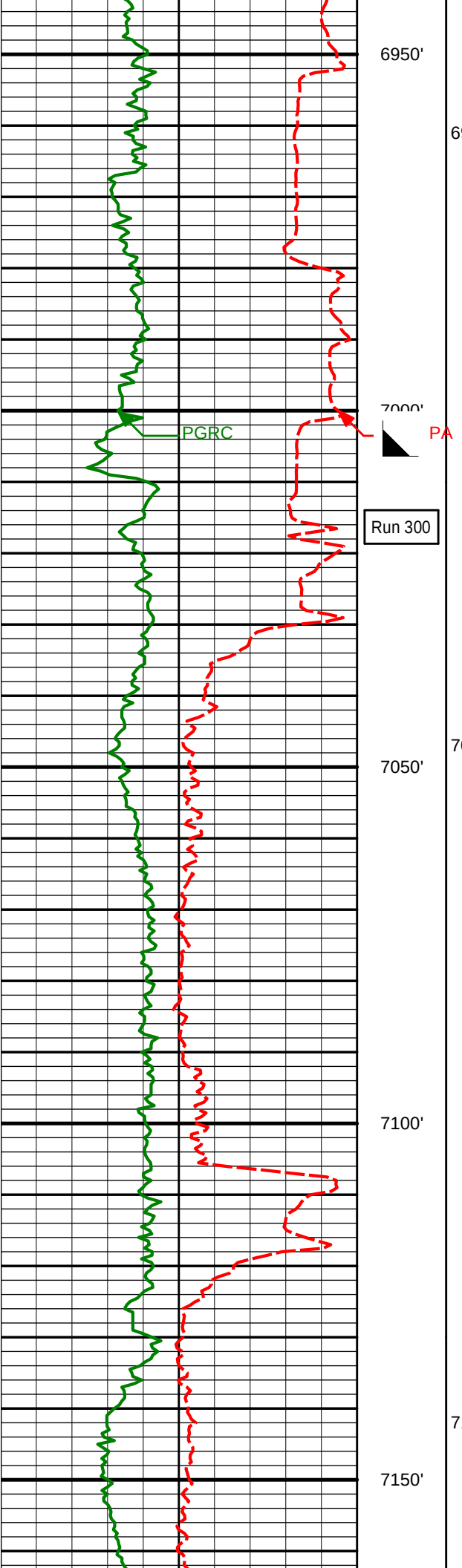
6308'	20.91°	274.01°	6256.82'	225.77'
6355'	24.03°	275.68°	6300.25'	243.48'
6403'	28.99°	272.83°	6343.19'	264.64'
6450'	34.70°	270.45°	6383.10'	289.28'
6498'	42.21°	268.96°	6420.66'	319.03'



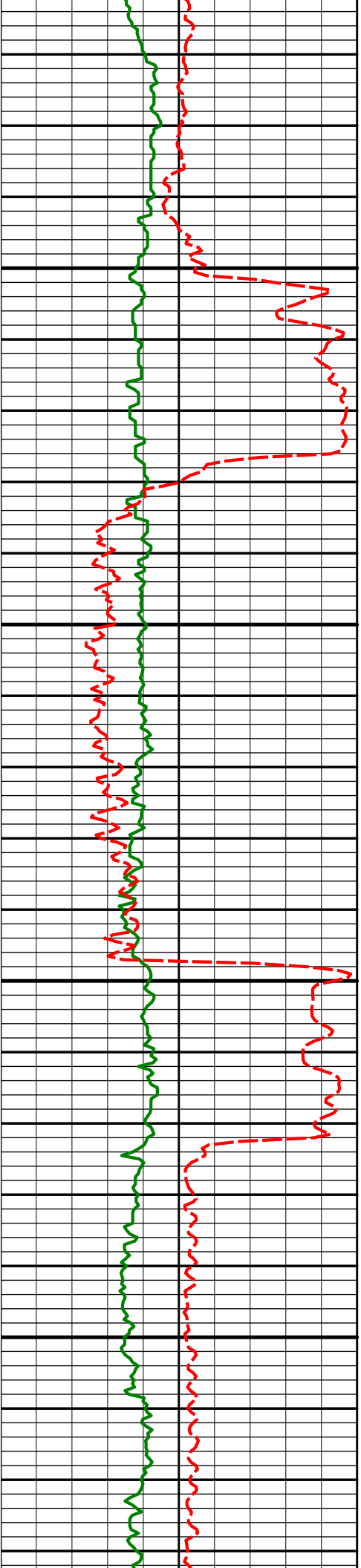
6545'	47.85°	269.69°	6453.87'	352.19'
6593'	52.38°	270.53°	6484.64'	388.89'
6640'	55.01°	271.02°	6512.46'	426.59'
6688'	58.05°	270.59°	6538.93'	466.45'



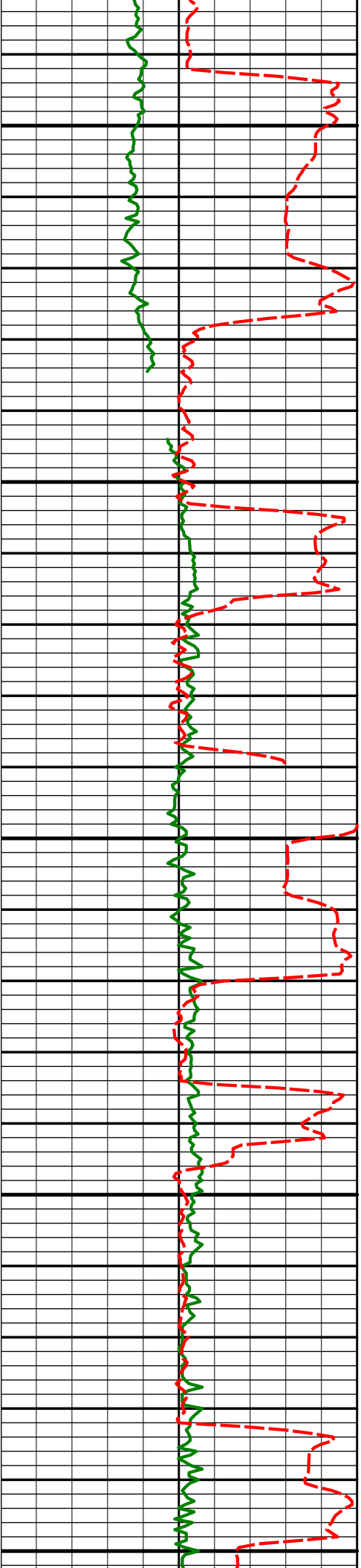
6735'	61.34°	269.85°	6562.65'	506.88'
6783'	65.36°	268.59°	6584.17'	549.67'
6830'	71.00°	268.12°	6601.64'	593.23'
6878'	75.93°	267.95°	6615.29'	639.18'
6925'	79.31°	268.03°	6625.37'	685.04'



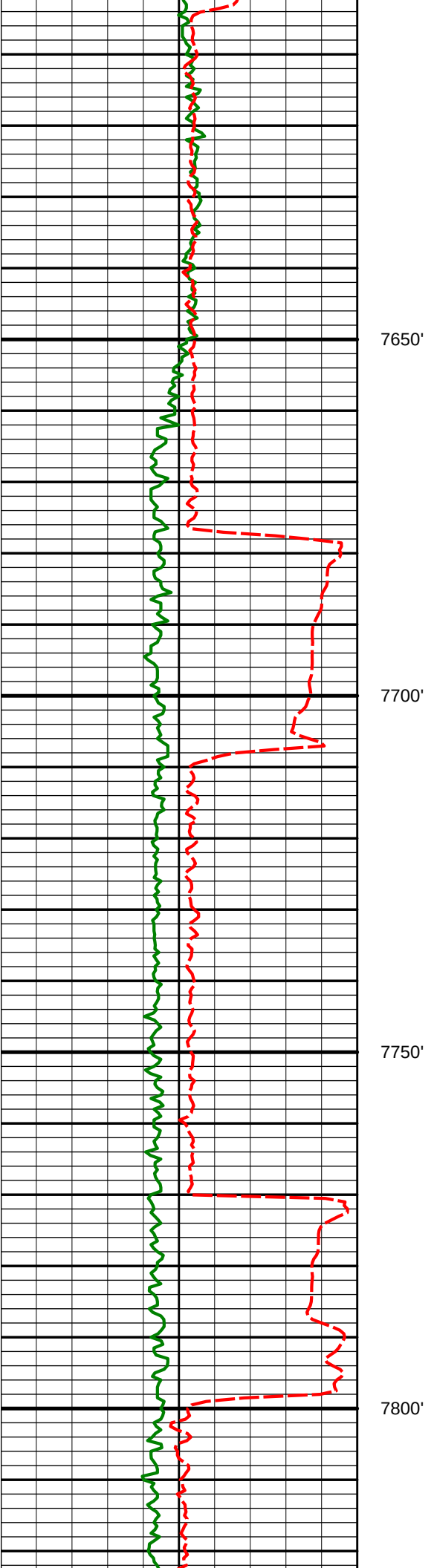
6961'	81.24°	268.48°	6631.45'	720.47'
7047'	85.49°	271.77°	6641.39'	805.57'
7142'	88.83°	271.08°	6646.09'	899.92'



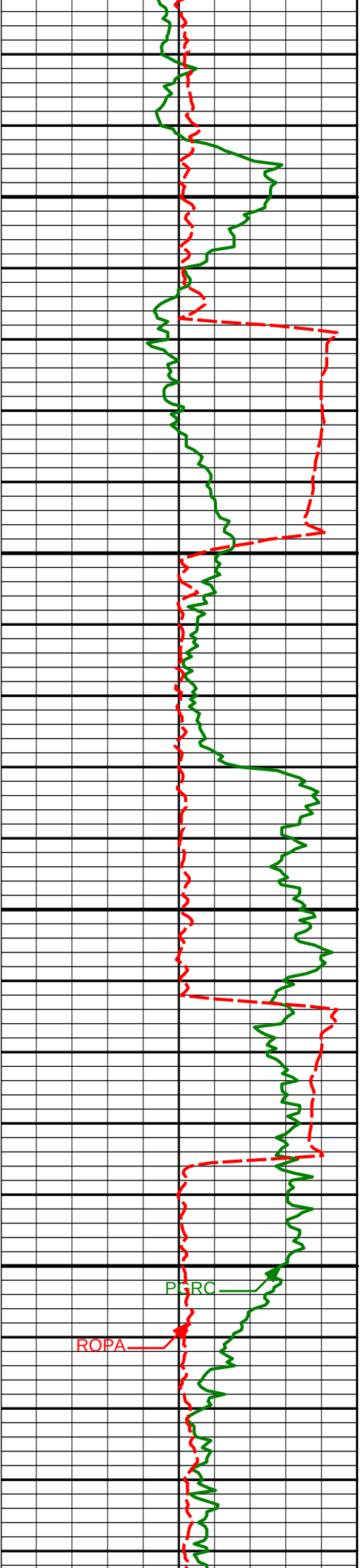
7237'	90.59°	271.44°	6646.57'	994.42'
7332'	91.33°	271.48°	6644.98'	1088.87'



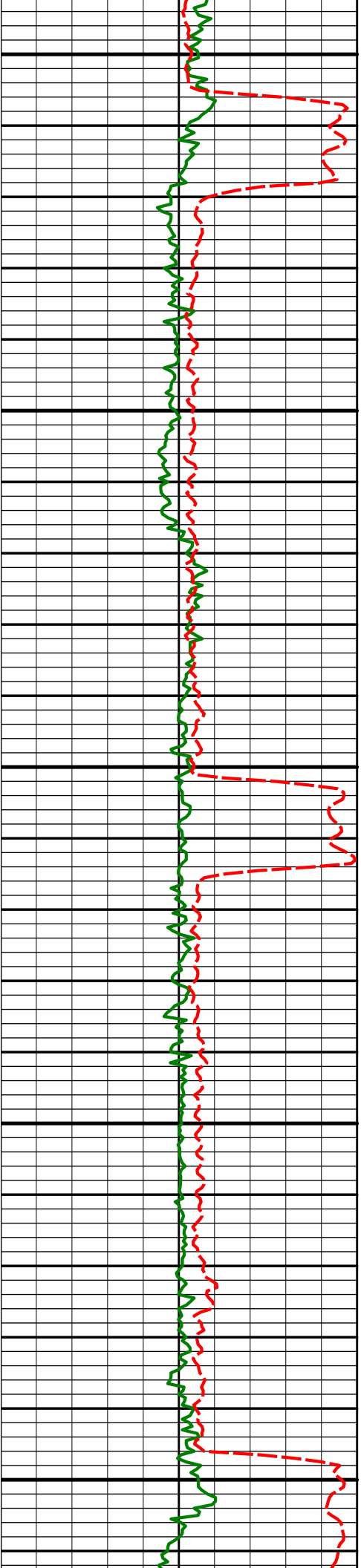
7427'	90.89°	272.22°	6643.14'	1183.25'
7521'	88.67°	273.16°	6643.50'	1276.49'



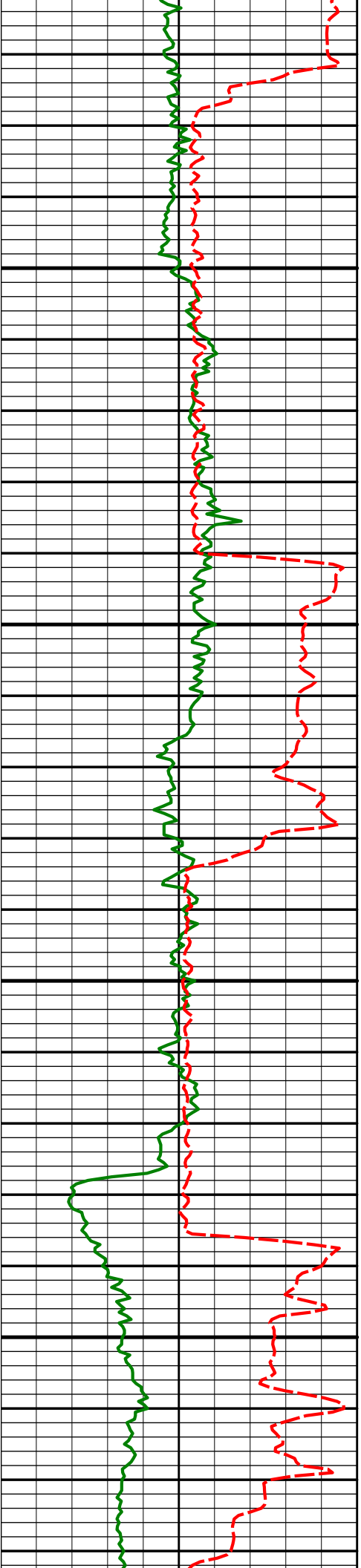
7616'	88.95°	272.93°	6645.47'	1370.62'
7711'	88.46°	272.74°	6647.62'	1464.80'
7806'	88.80°	272.13°	6649.89'	1559.06'



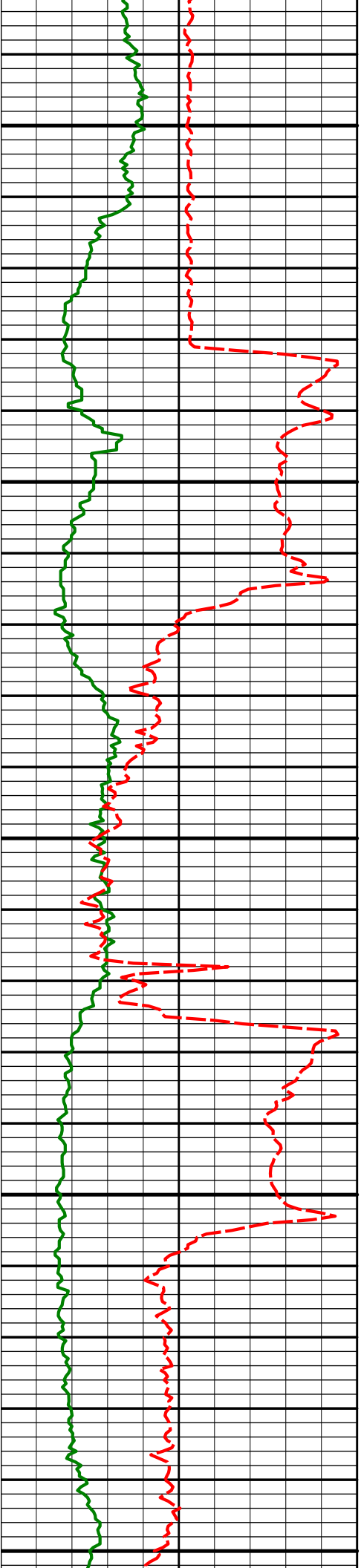
7901'	87.26°	271.73°	6653.16'	1653.38'	
7996'	86.67°	271.92°	6658.19'	1747.65'	



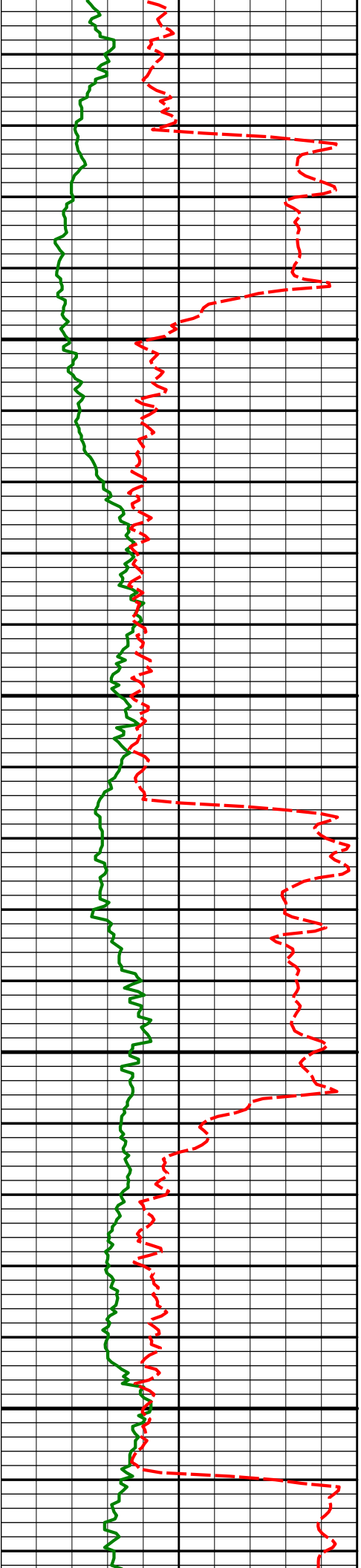
8091'	87.96°	270.44°	6662.64'	1842.06'
8185'	89.63°	269.72°	6664.62'	1935.72'



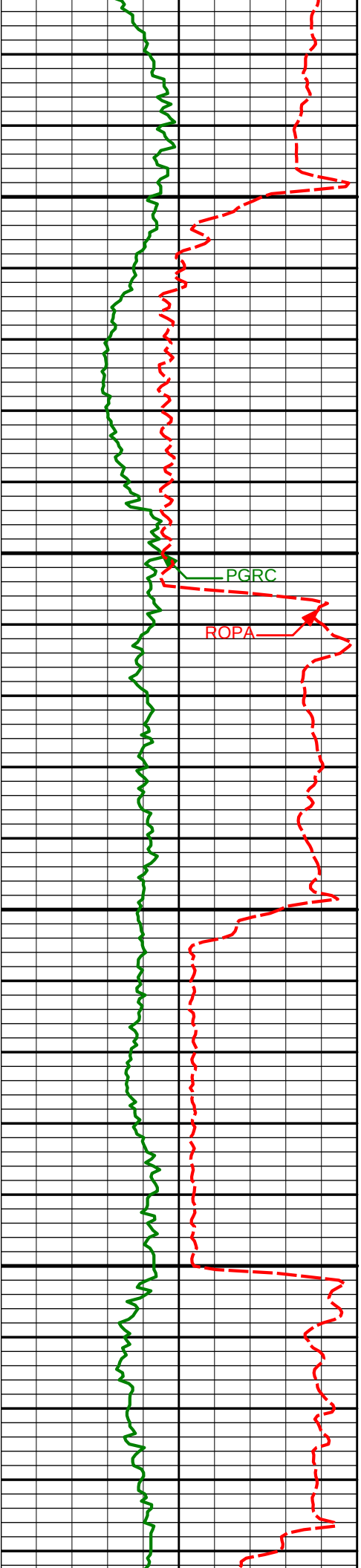
8280'	90.37°	271.12°	6664.62'	2030.35'
8375'	89.54°	269.47°	6664.69'	2125.00'
8470'	89.66°	269.66°	6665.35'	2219.75'



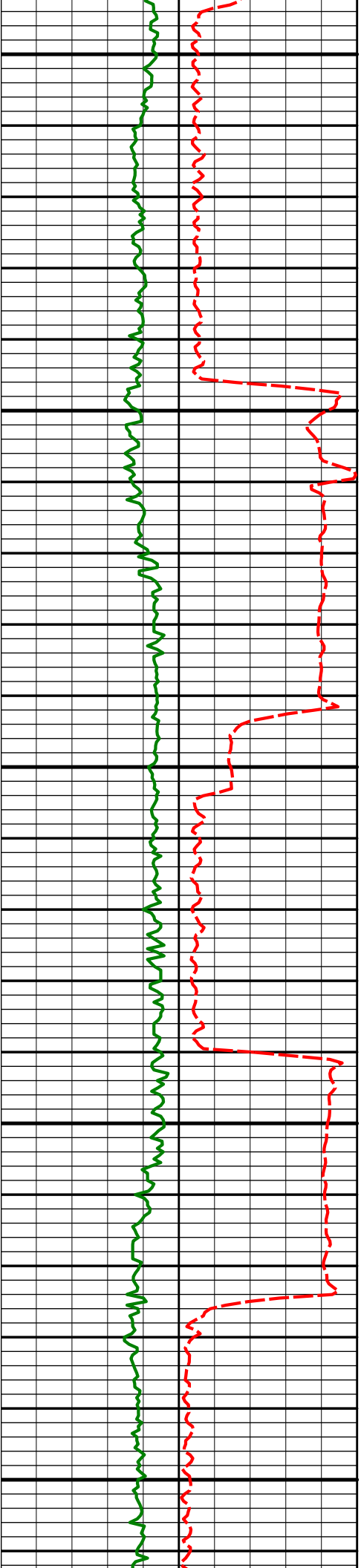
8564'	89.07°	268.57°	6666.40'	2313.55'
8659'	88.74°	266.99°	6668.21'	2408.44'



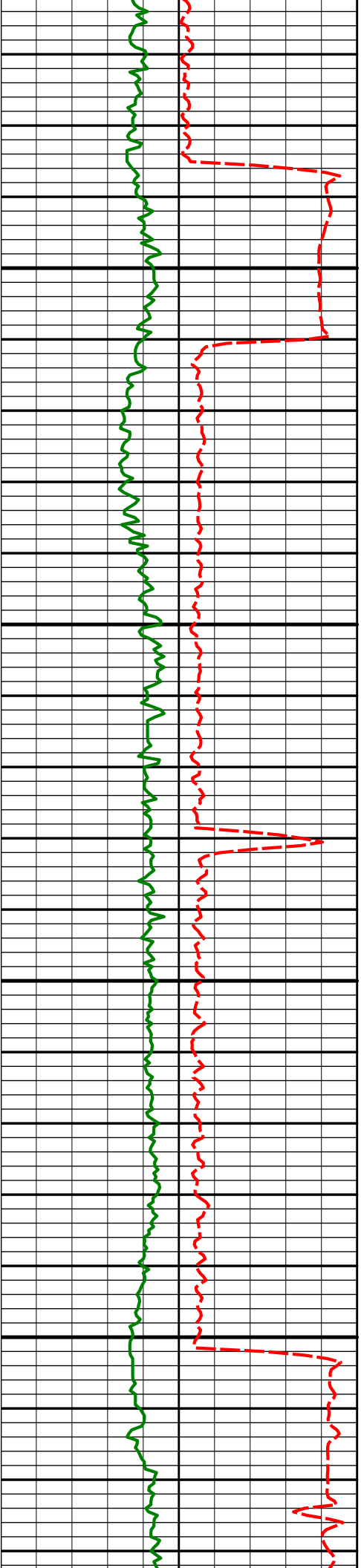
8754'	90.74°	268.31°	6668.64'	2503.36'
8849'	92.13°	268.36°	6666.26'	2598.21'



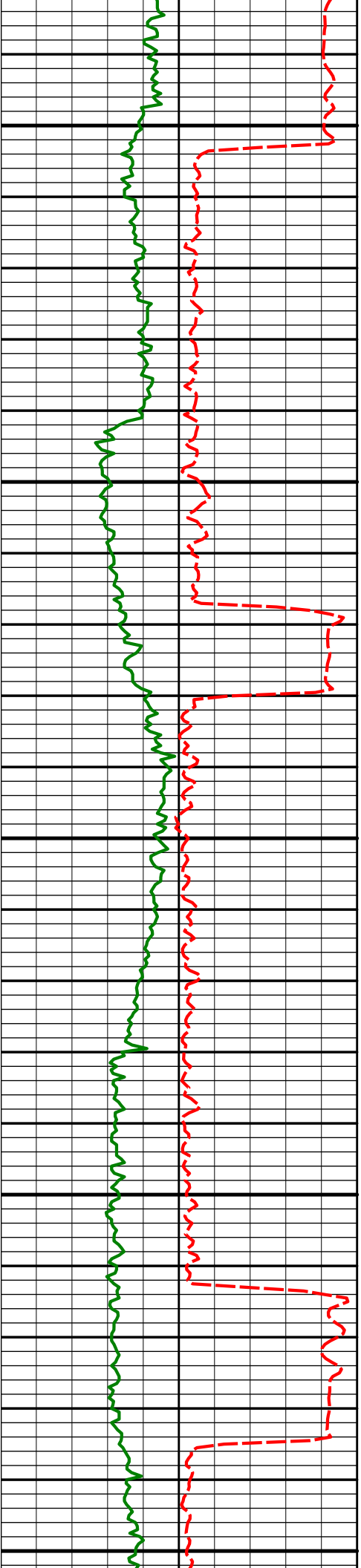
8944'	91.29°	268.06°	6663.43'	2693.05'
9039'	90.77°	268.44°	6661.72'	2787.91'
9134'	90.59°	270.61°	6660.59'	2882.66'



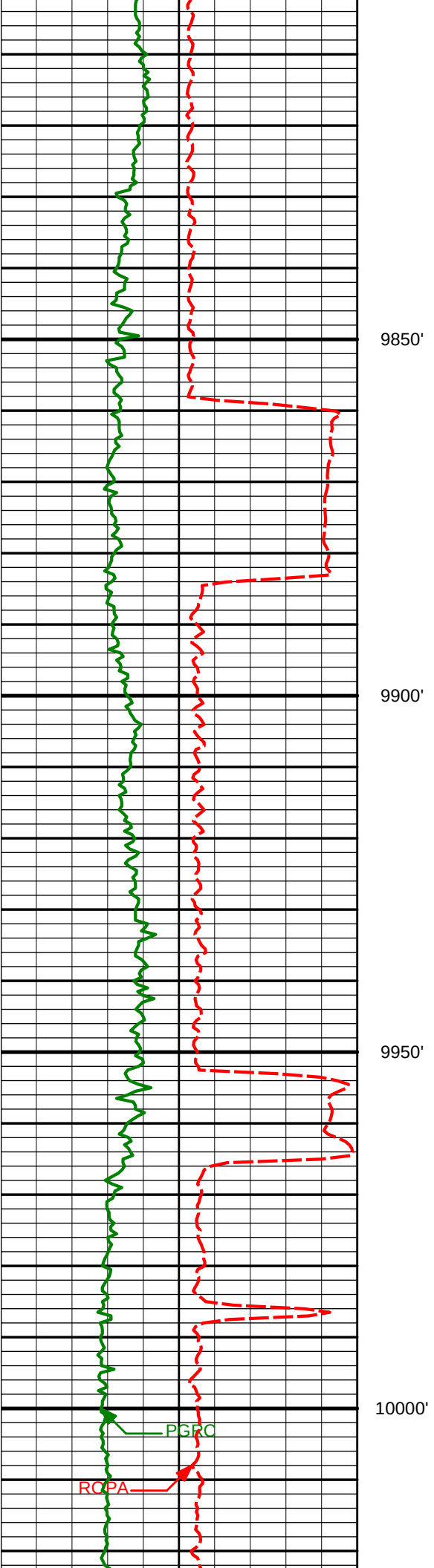
9229'	89.51°	270.68°	6660.51'	2977.26'
9324'	87.25°	271.19°	6663.20'	3071.77'



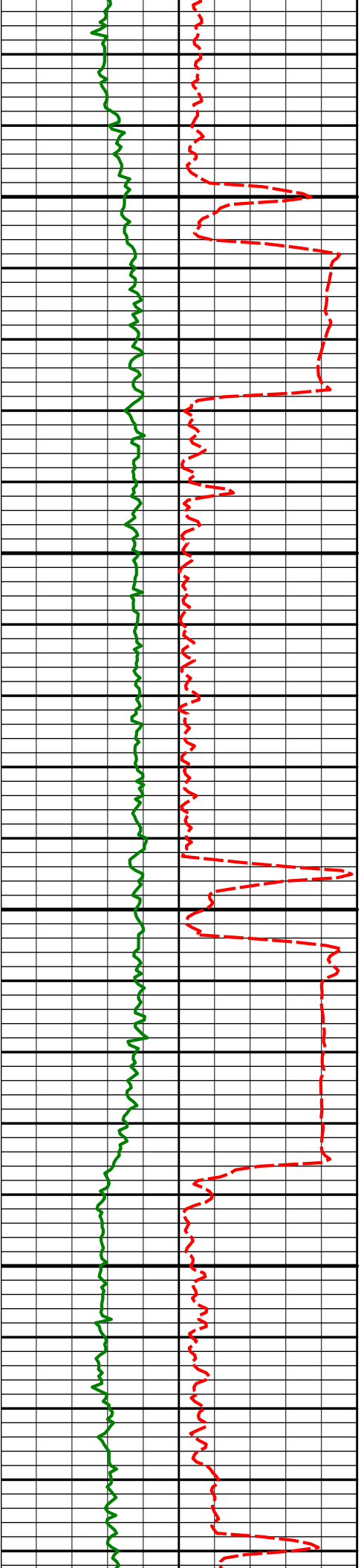
9419'	87.07°	269.37°	6667.90'	3166.30'
9513'	90.34°	269.81°	6670.03'	3260.02'



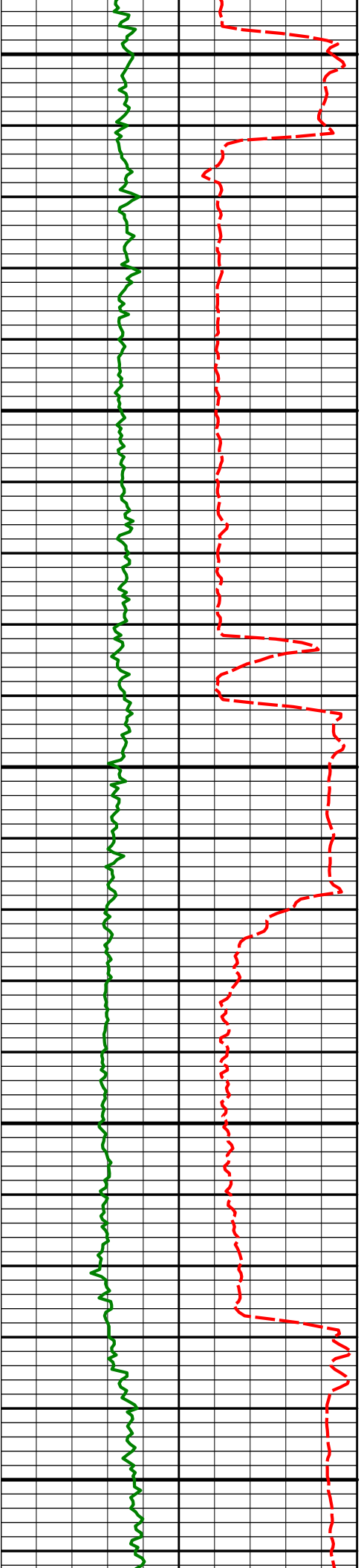
9609'	86.52°	269.37°	6672.66'	3355.71'
9704'	87.44°	269.81°	6677.66'	3450.32'
9798'	87.94°	270.56°	6681.45'	3543.91'



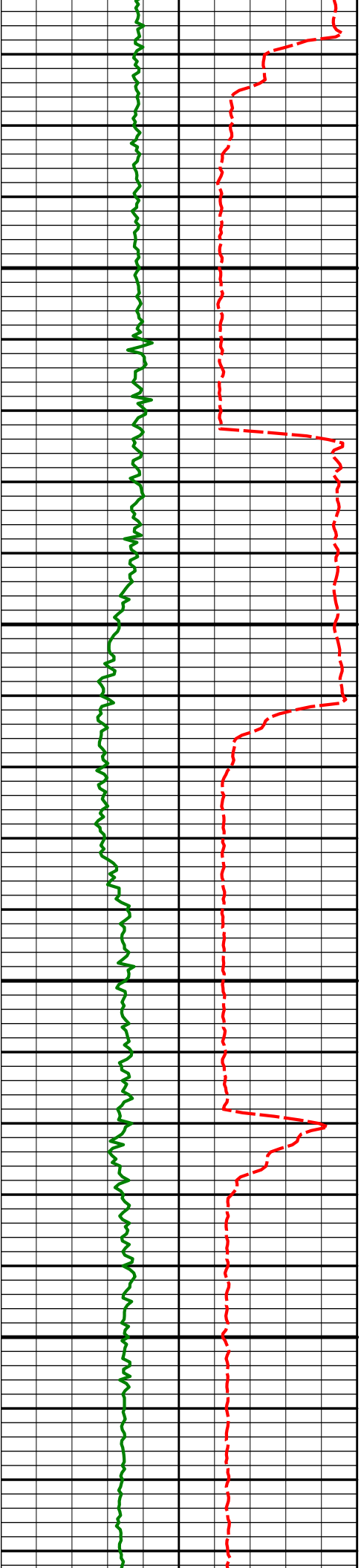
9893'	87.75°	270.59°	6685.02'	3638.46'
9988'	88.64°	269.88°	6688.02'	3733.07'



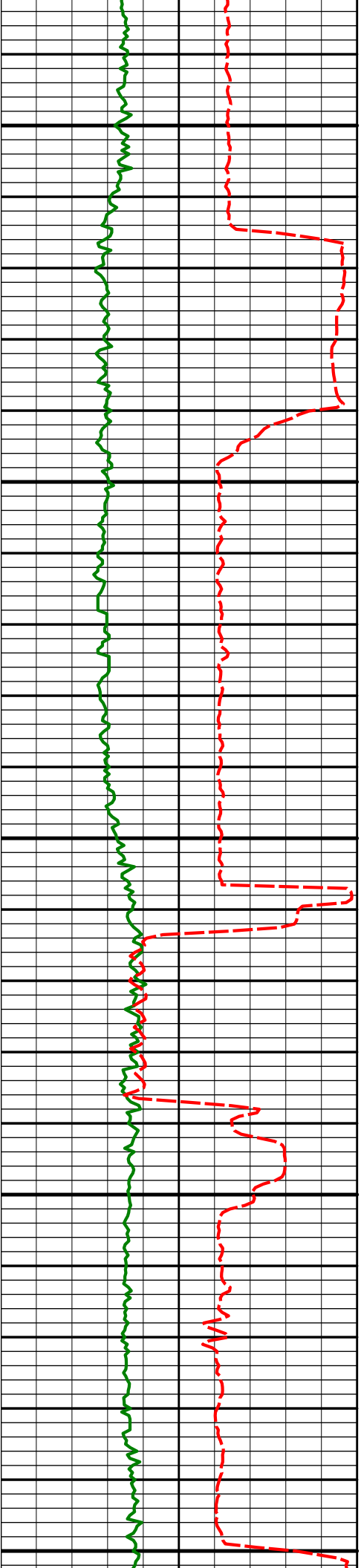
10083'	89.72°	270.43°	6689.38'	3827.74'
10177'	87.93°	269.85°	6691.30'	3921.39'



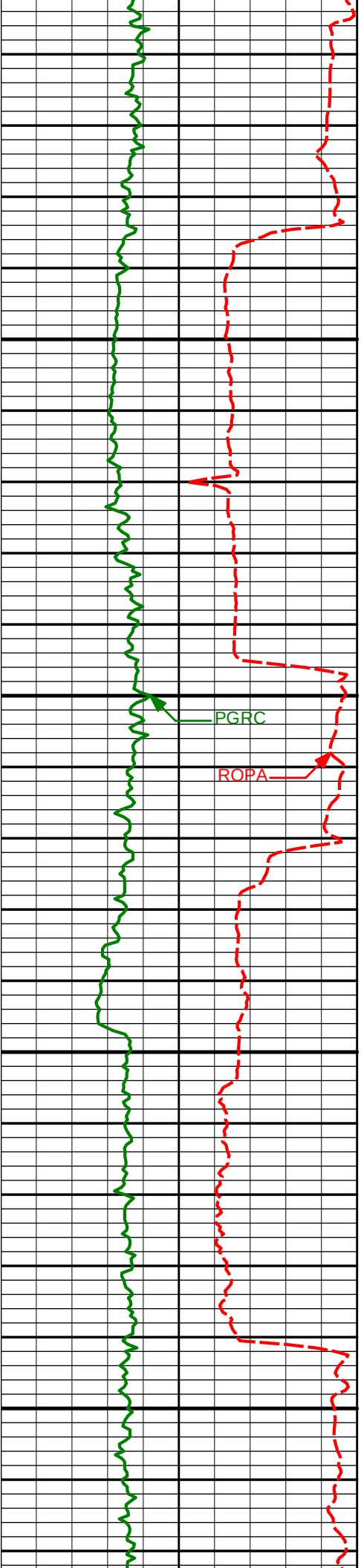
10272'	89.04°	269.66°	6693.81'	4016.08'
10367'	90.09°	269.34°	6694.54'	4110.83'
10462'	90.09°	271.36°	6694.39'	4205.47'



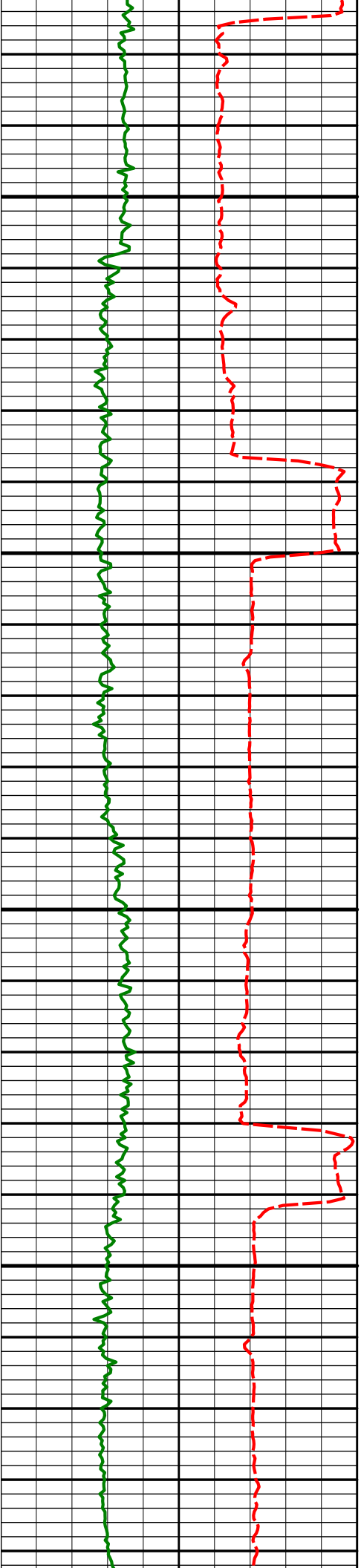
10557'	87.50°	271.08°	6696.38'	4299.96'
10652'	89.85°	271.31°	6698.58'	4394.44'



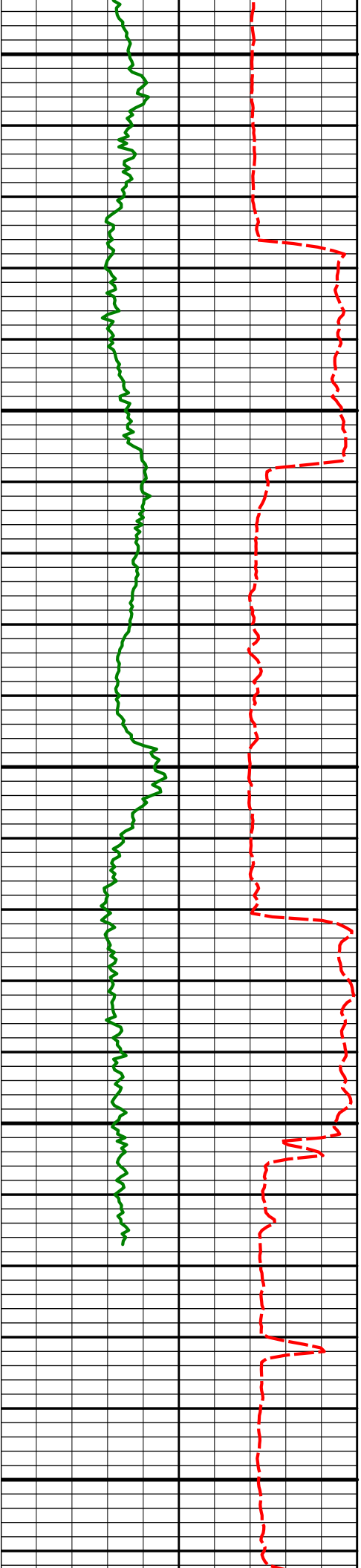
10747'	90.00°	269.81°	6698.71'	4489.05'
10841'	89.01°	269.33°	6699.52'	4582.80'



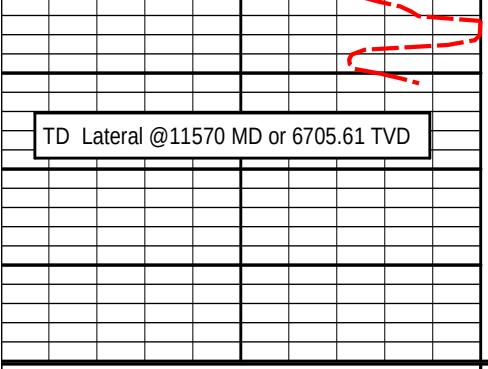
10936'	88.37°	269.19°	6701.69'	4677.56'
11032'	89.54°	269.89°	6703.44'	4773.29'



11126'	87.90°	268.68°	6705.54'	4867.04'
11221'	87.84°	267.68°	6709.07'	4961.86'
11316'	90.80°	267.89°	6710.20'	5056.76'



11411'	90.99°	269.86°	6708.71'	5151.57'
11509'	90.68°	270.47°	6707.29'	5249.22'



	11570'	90.68°	270.47°	6706.56'	5309.98'

Avg Rate of Penetration feet per hr 600 0	Feet	Depth	Inc	Azm	TVD Vsec
Gamma Ray Cor (PGRC) (Api) 0 300					

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA26-63HN
Wattenberg
Weld Colorado
USA
CA-XX-0900808839

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
286.00	0.30	36.20	286.00	0.60 N	0.44 E	-0.49	0.10
488.00	0.80	10.70	487.99	2.42 N	1.02 E	-1.21	0.27
742.00	0.60	349.90	741.97	5.47 N	1.11 E	-1.55	0.13
930.00	0.20	286.60	929.97	6.53 N	0.63 E	-1.15	0.29
1011.00	0.55	348.80	1010.96	6.95 N	0.41 E	-0.97	0.60
1104.00	0.18	332.81	1103.96	7.52 N	0.26 E	-0.86	0.41
1197.00	0.24	340.32	1196.96	7.83 N	0.13 E	-0.76	0.07
1290.00	0.44	353.59	1289.96	8.37 N	0.02 E	-0.69	0.23
1383.00	0.68	144.13	1382.96	8.28 N	0.31 E	-0.97	1.17
1476.00	0.91	142.97	1475.95	7.24 N	1.07 E	-1.65	0.25
1571.00	1.01	142.22	1570.94	5.98 N	2.04 E	-2.51	0.11
1666.00	1.12	146.45	1665.92	4.54 N	3.07 E	-3.42	0.14
1761.00	1.20	160.62	1760.90	2.83 N	3.91 E	-4.13	0.31
1855.00	0.65	152.94	1854.89	1.43 N	4.48 E	-4.58	0.60
1950.00	3.16	193.41	1949.83	1.60 S	4.12 E	-3.98	2.84
2045.00	5.07	181.12	2044.58	8.34 S	3.43 E	-2.75	2.20
2140.00	7.21	184.71	2139.03	18.48 S	2.86 E	-1.37	2.29
2235.00	8.81	193.70	2233.11	31.49 S	0.64 E	1.88	2.13
2330.00	9.33	202.39	2326.92	45.68 S	4.01 W	7.66	1.54
2425.00	9.51	205.26	2420.64	59.90 S	10.29 W	15.07	0.53
2520.00	9.02	200.22	2514.40	73.99 S	16.22 W	22.10	1.00
2614.00	10.66	200.09	2607.02	89.07 S	21.75 W	28.82	1.74
2709.00	12.33	203.36	2700.11	106.63 S	28.79 W	37.25	1.89
2804.00	12.10	201.66	2792.96	125.20 S	36.49 W	46.41	0.45
2899.00	12.14	201.58	2885.84	143.74 S	43.84 W	55.22	0.05
2994.00	12.82	201.92	2978.60	162.81 S	51.45 W	64.34	0.72
3089.00	10.90	203.22	3071.56	180.84 S	58.92 W	73.24	2.04
3184.00	11.39	193.71	3164.78	198.21 S	64.69 W	80.38	2.00
3278.00	12.09	197.48	3256.81	216.62 S	69.84 W	86.99	1.10
3373.00	10.12	201.69	3350.03	233.87 S	75.92 W	94.43	2.24
3468.00	12.03	205.58	3443.26	250.55 S	83.28 W	103.10	2.16

3468.00	12.03	205.58	3443.26	250.55 S	83.28 W	103.10	2.16
3563.00	12.29	202.35	3536.13	268.83 S	91.40 W	112.66	0.77
3658.00	12.78	201.10	3628.87	287.99 S	99.03 W	121.80	0.59
3753.00	14.19	199.75	3721.24	308.75 S	106.74 W	131.16	1.52
3848.00	13.50	202.33	3813.48	329.97 S	114.89 W	140.98	0.97
3942.00	12.93	205.64	3905.00	349.60 S	123.61 W	151.25	1.01
4037.00	10.79	206.05	3997.96	367.17 S	132.12 W	161.14	2.25
4132.00	9.53	205.80	4091.47	382.24 S	139.44 W	169.65	1.33
4226.00	8.24	202.64	4184.34	395.47 S	145.42 W	176.67	1.47
4321.00	6.68	199.18	4278.54	406.97 S	149.86 W	182.02	1.71
4416.00	5.30	194.24	4373.02	416.44 S	152.76 W	185.66	1.55
4511.00	5.53	198.23	4467.59	425.04 S	155.27 W	188.85	0.46
4606.00	3.43	197.60	4562.30	432.10 S	157.56 W	191.70	2.21
4701.00	1.37	175.80	4657.21	435.94 S	158.33 W	192.79	2.33
4796.00	1.37	152.92	4752.18	438.08 S	157.73 W	192.36	0.57
4890.00	1.49	144.32	4846.15	440.08 S	156.51 W	191.30	0.26
4986.00	0.30	103.95	4942.14	441.15 S	155.54 W	190.42	1.33
5081.00	0.26	113.49	5037.14	441.30 S	155.10 W	189.99	0.06
5176.00	0.75	105.38	5132.14	441.55 S	154.30 W	189.22	0.52
5271.00	1.12	90.63	5227.12	441.72 S	152.77 W	187.71	0.46
5366.00	1.12	92.40	5322.10	441.77 S	150.92 W	185.86	0.04
5460.00	1.57	92.64	5416.08	441.87 S	148.71 W	183.67	0.48
5555.00	1.43	70.99	5511.05	441.54 S	146.29 W	181.23	0.61
5650.00	1.17	66.24	5606.02	440.77 S	144.28 W	179.17	0.30
5745.00	1.38	79.30	5701.00	440.16 S	142.27 W	177.11	0.38
5840.00	1.15	68.68	5795.98	439.61 S	140.26 W	175.06	0.34
5935.00	1.20	58.06	5890.96	438.73 S	138.53 W	173.27	0.23
6023.00	1.11	53.55	5978.94	437.74 S	137.06 W	171.73	0.15
6070.00	2.58	258.59	6025.93	437.68 S	137.73 W	172.39	7.69
6118.00	8.04	259.46	6073.70	438.51 S	142.09 W	176.80	11.38
6165.00	11.87	259.39	6119.99	440.00 S	150.08 W	184.88	8.15
6213.00	15.40	259.79	6166.63	442.04 S	161.21 W	196.14	7.36
6260.00	18.33	264.39	6211.60	443.87 S	174.71 W	209.74	6.85
6308.00	20.91	274.01	6256.82	444.00 S	190.77 W	225.77	8.60
6355.00	24.03	275.68	6300.25	442.47 S	208.66 W	243.48	6.78
6403.00	28.99	272.83	6343.19	440.93 S	230.02 W	264.64	10.67
6450.00	34.70	270.45	6383.10	440.26 S	254.80 W	289.28	12.44
6498.00	42.21	268.96	6420.66	440.45 S	284.62 W	319.03	15.76
6545.00	47.85	269.69	6453.87	440.83 S	317.86 W	352.19	12.05
6593.00	52.38	270.53	6484.64	440.75 S	354.68 W	388.89	9.53
6640.00	55.01	271.02	6512.46	440.23 S	392.55 W	426.59	5.66
6688.00	58.05	270.59	6538.93	439.67 S	432.58 W	466.45	6.38
6735.00	61.34	269.85	6562.65	439.52 S	473.15 W	506.88	7.13
6783.00	65.36	268.59	6584.17	440.11 S	516.04 W	549.67	8.70
6830.00	71.00	268.12	6601.64	441.37 S	559.64 W	593.23	12.04
6878.00	75.93	267.95	6615.29	442.95 S	605.61 W	639.18	10.28
6925.00	79.31	268.03	6625.37	444.56 S	651.48 W	685.04	7.19
6961.00	81.24	268.48	6631.45	445.64 S	686.95 W	720.47	5.50
7047.00	85.49	271.77	6641.39	445.44 S	772.34 W	805.57	6.23
7142.00	88.83	271.08	6646.09	443.08 S	867.18 W	899.92	3.59
7237.00	90.59	271.44	6646.57	440.99 S	962.15 W	994.42	1.89
7332.00	91.33	271.48	6644.98	438.57 S	1057.11 W	1088.87	0.78
7427.00	90.89	272.22	6643.14	435.51 S	1152.04 W	1183.25	0.91
7521.00	88.67	273.16	6643.50	431.10 S	1245.93 W	1276.49	2.56
7616.00	88.95	272.93	6645.47	426.05 S	1340.77 W	1370.62	0.38
7711.00	88.46	272.74	6647.62	421.35 S	1435.63 W	1464.80	0.55
7806.00	88.80	272.13	6649.89	417.32 S	1530.52 W	1559.06	0.73
7901.00	87.26	271.73	6653.16	414.12 S	1625.40 W	1653.38	1.67
7996.00	86.67	271.92	6658.19	411.10 S	1720.22 W	1747.65	0.65
8091.00	87.96	270.44	6662.64	409.15 S	1815.09 W	1842.06	2.07
8185.00	89.63	269.72	6664.62	409.01 S	1909.07 W	1935.72	1.93
8280.00	90.37	271.12	6664.62	408.32 S	2004.06 W	2030.35	1.67
8375.00	89.54	269.47	6664.69	407.83 S	2099.06 W	2125.00	1.94
8470.00	89.66	269.66	6665.35	408.55 S	2194.05 W	2219.75	0.24
8564.00	89.07	268.57	6666.40	410.00 S	2288.03 W	2313.55	1.32
8659.00	88.74	266.99	6668.21	413.68 S	2382.94 W	2408.44	1.70
8754.00	90.74	268.31	6668.64	417.58 S	2477.85 W	2503.36	2.52
8849.00	92.13	268.36	6666.26	420.34 S	2572.78 W	2598.21	1.46
8944.00	91.29	268.06	6663.43	423.30 S	2667.69 W	2693.05	0.94
9039.00	90.77	268.44	6661.72	426.20 S	2762.63 W	2787.91	0.68
9134.00	90.59	270.61	6660.59	426.99 S	2857.62 W	2882.66	2.29
9229.00	89.51	270.68	6660.51	425.92 S	2952.61 W	2977.26	1.14

9324.00	87.25	271.19	6663.20	424.37 S	3047.55 W	3071.77	2.44
9419.00	87.07	269.37	6667.90	423.91 S	3142.43 W	3166.30	1.92
9513.00	90.34	269.81	6670.03	424.58 S	3236.39 W	3260.02	3.51
9609.00	86.52	269.37	6672.66	425.27 S	3332.33 W	3355.71	4.01
9704.00	87.44	269.81	6677.66	425.95 S	3427.20 W	3450.32	1.07
9798.00	87.94	270.56	6681.45	425.64 S	3521.12 W	3543.91	0.96
9893.00	87.75	270.59	6685.02	424.69 S	3616.05 W	3638.46	0.20
9988.00	88.64	269.88	6688.02	424.30 S	3711.00 W	3733.07	1.20
10083.00	89.72	270.43	6689.38	424.04 S	3805.99 W	3827.74	1.28
10177.00	87.93	269.85	6691.30	423.81 S	3899.96 W	3921.39	2.00
10272.00	89.04	269.66	6693.81	424.22 S	3994.93 W	4016.08	1.19
10367.00	90.09	269.34	6694.54	425.05 S	4089.92 W	4110.83	1.16
10462.00	90.09	271.36	6694.39	424.47 S	4184.91 W	4205.47	2.13
10557.00	87.50	271.08	6696.38	422.45 S	4279.86 W	4299.96	2.74
10652.00	89.85	271.31	6698.58	420.47 S	4374.81 W	4394.44	2.49

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 265.40 DEGREES (GRID)
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10652.00 FEET
IS 4394.97 FEET ALONG 264.51 DEGREES (GRID)

Tie-In @ Surface

Surveys at 286 ft, 488 ft, 742 ft and 930 ft were taken and provided by HP 322 while they were drilling the surface hole.

Survey @ 11570 is a projection to the bit.

Date Printed:23 October 2013