HALLIBURTON | Sperry Drilling

PCG Pressure Case Gamma
PCD Pressure Case Directional

Company	: **Noble Energy**
Rig	: **H&P 343**
Well	: **Wells Ranch State USX AA16-64-1**
Field	: **Wattenberg**
Country	: **USA**
API Number	: **05-123-36043**

Country	: **USA**
Field	: **Wattenberg**
Location	: **Lat: 40° 29' 4.63" North** **Long: 104° 24' 45.29" West**
Well	: **Wells Ranch State USX AA16-64-1**
Company	: **Noble Energy**
Rig	: **H&P 343**

LOCATION

Latitude : **40° 29' 4.63" North**
Longitude : **104° 24' 45.29" West**
UTM Easting = **3,302,472.12 ft**
UTM Northing = **1,421,242.12 ft**

Other Services
Directional Drilling

Elev. KB **NA**
DF **4780.00 ft**
GL **4756.00 ft**
WD **NA**

Job No. :**CA-XX-0900145813**

Permanent Datum : **Ground Level** Elevation : **4756.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Depth Logged : **667.00 ft** To **6,681.15 ft**
Date Logged : **06-Feb-13** To **16-Feb-13**
Total Depth MD : **16,319.00 ft** TVD: **6,681.15 ft**
Spud Date : **07-Feb-13**

Unit No. : **11610115**
Plot Type : **Final**
Plot Date : **15-Feb-13**

Borehole Record (TVD)

Run No.	Size	From	To
2	8.750 in	667.00 ft	5,849.48 ft
3	8.750 in	5,849.48 ft	6,616.80 ft

Casing Record (TVD)

Run No.	Size	Weight	From	To
	9.625 in	36.00 lbpf	SURFACE	656.00 ft
	7.000 in	26.00 lbpf	SURFACE	6,616.66 ft

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	08-Feb-13	09-Feb-13			
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)	667.00	5,849.48			
Log End Depth (TVD, ft)	5,849.48	6,616.80			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	08-Feb-13 00:45	09-Feb-13 01:30			
Drill/Wipe End Date and Time	08-Feb-13 16:00	09-Feb-13 17:15			
Min Inc (deg) @ Depth (TVD, ft)	.22 @ 811.00	1.28 @ 5,886.47			
Max Inc (deg) @ Depth (TVD, ft)	14.89 @ 2,953.01	87.81 @ 6,615.45			
Bit TFA(in2) / Bit Type	.86 / PDC	.98 / PDC			
Flow Rate (gpm)	594.93	558.18			
Max AV (fpm) / CV (fpm) @ MWD	395.3 / NA	401.0 / NA			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.90 / 30.00	9.68 / 37.00			
Filtrate CL (ppm)	2,200.00	2,300.00			
pH / Fluid Loss (mptm)	9.00 / NA	8.30 / NA			
PV (cP) / YP (lhf2)	6 / 6.00	13 / 13.00			
% Solids / % Sand	3.9 / .6	10.5 / 0.30			
% Oil / Oil:Water Ratio	0.5 / 0.5:96.2	0 / 0:93.2			
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) / Source	141.70 / PCM	134.00 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 141.70	NA @ 134.00			
Lead MWD Engineer	Ryan Brunkhorst	Ryan Brunkhorst			
Customer Representative	Matt Settles	Matt Settles			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	11567858	11567858			
Insert Serial Number	11680772	11680772			
Date and Time Initialized	07-Feb-13 11:56	07-Feb-13 11:56			
Date and Time Read	10-Feb-13 00:17	10-Feb-13 00:43			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	55.00	54.00			
Software Version	6.21	6.21			
Sub Serial Number	11567858	11567858			
Sonde Serial Number	11833026	11833026			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	234.16	245.36			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.50	47.22			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11567858	11567858			
Insert/Sonde Serial Number	11293431	11293431			

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
6. INSITE version 7.4.01

WARRANTY

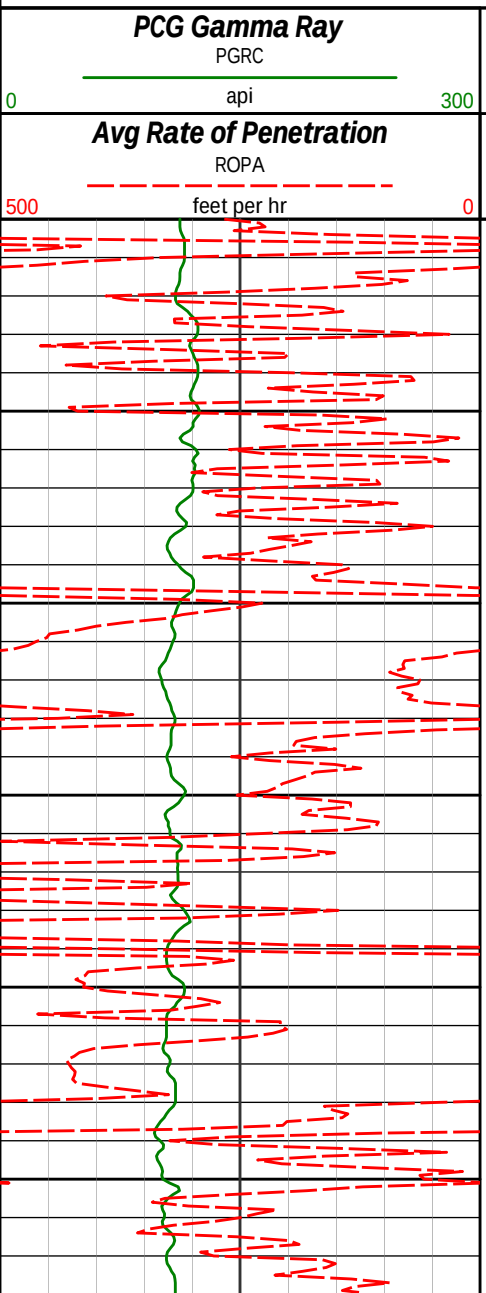
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES 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

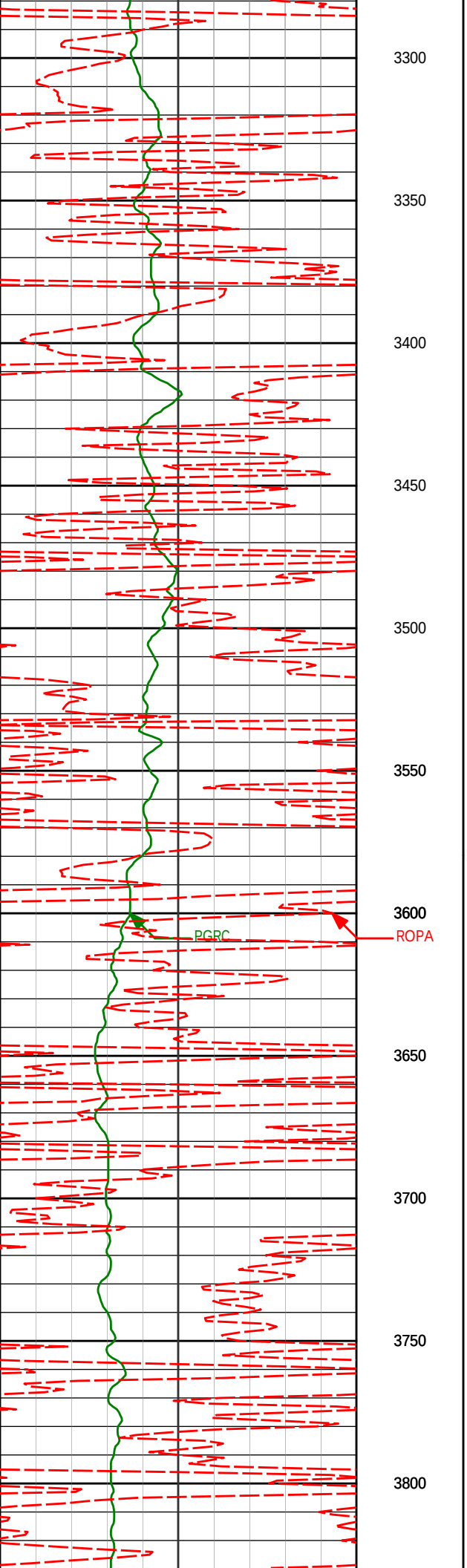
Sperry Drilling Services

TVD Main Log 1:600

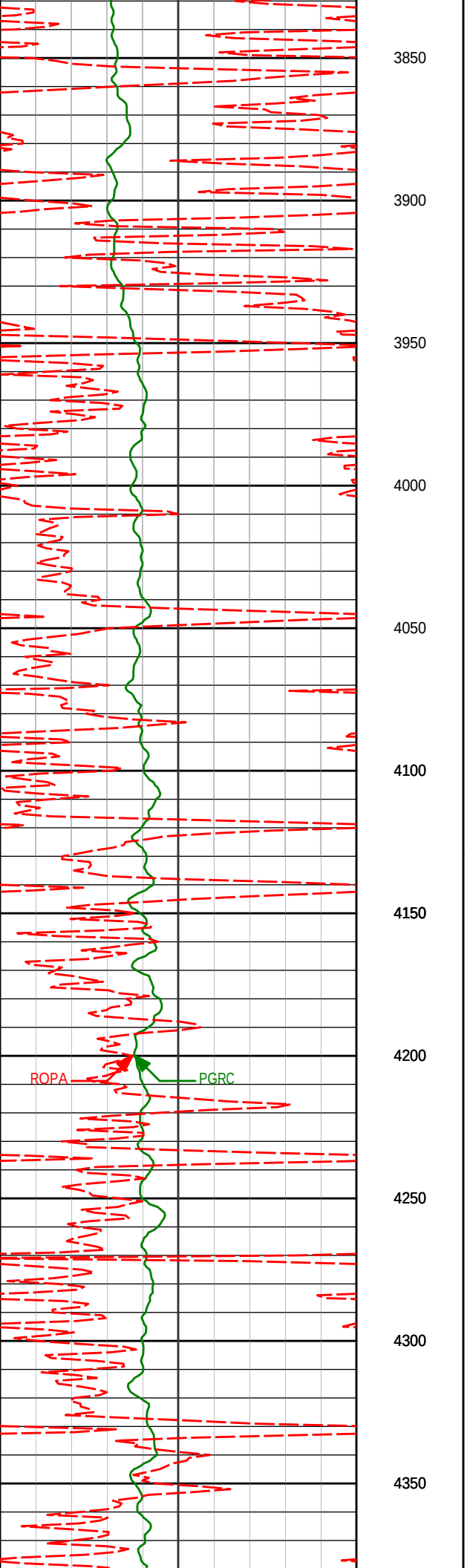
Noble Energy
Wells Ranch State USX AA16-64-1HNL
H&P 343
T6N-R63W



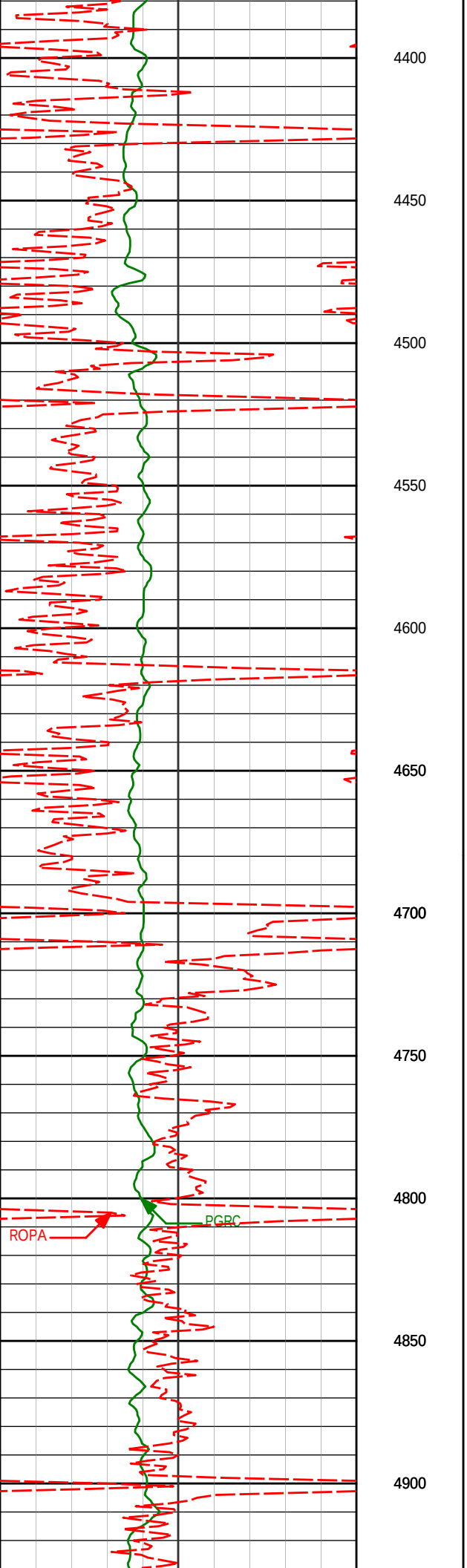
Depth ft	Depth	Inc.	Azi.	TVD	V.S.
	3081'	14.85°	226.50°	3044.83'	237.51'
	3176'	11.68°	221.33°	3137.29'	253.24'
	3271'	9.39°	226.99°	3230.68'	265.70'



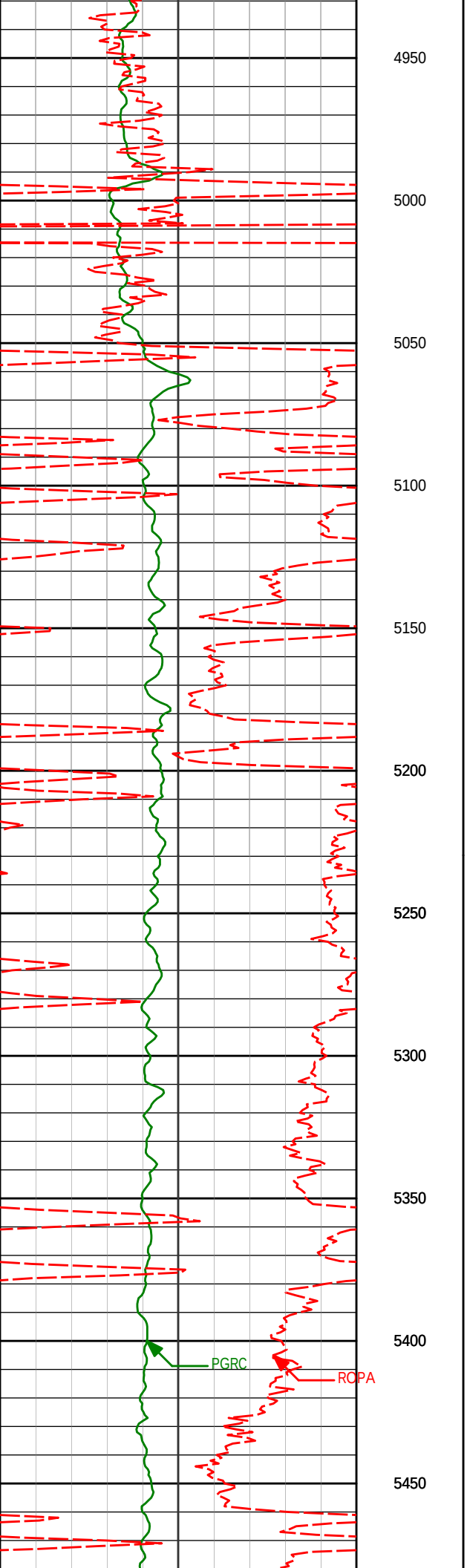
3366'	4.79°	237.50°	3324.93'	274.98'
3461'	1.70°	239.20°	3419.77'	279.64'
3556'	1.74°	228.78°	3514.73'	281.99'
3651'	0.68°	90.38°	3609.72'	282.55'
3746'	0.93°	109.87°	3704.71'	281.27'
3841'	0.70°	80.99°	3799.70'	279.98'



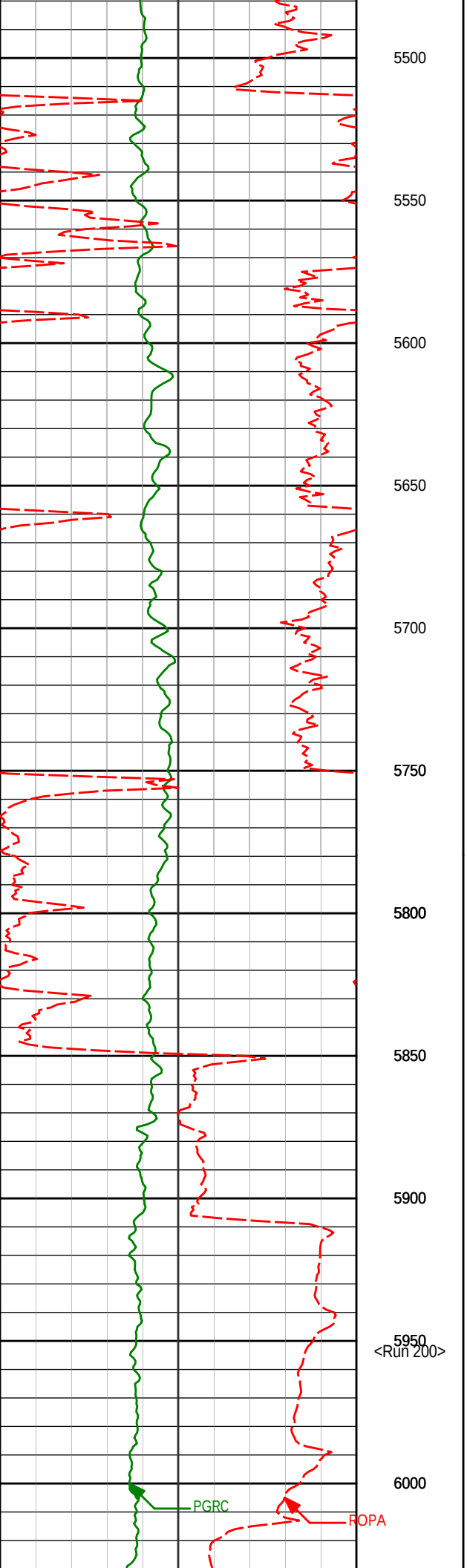
3936'	1.23°	93.87°	3894.68'	278.39'
4031'	1.31°	92.72°	3989.66'	276.29'
4126'	0.53°	118.49°	4084.65'	274.83'
4221'	0.26°	98.90°	4179.64'	274.24'
4316'	0.60°	179.78°	4274.64'	274.05'
4411'	0.48°	200.91°	4369.64'	274.22'



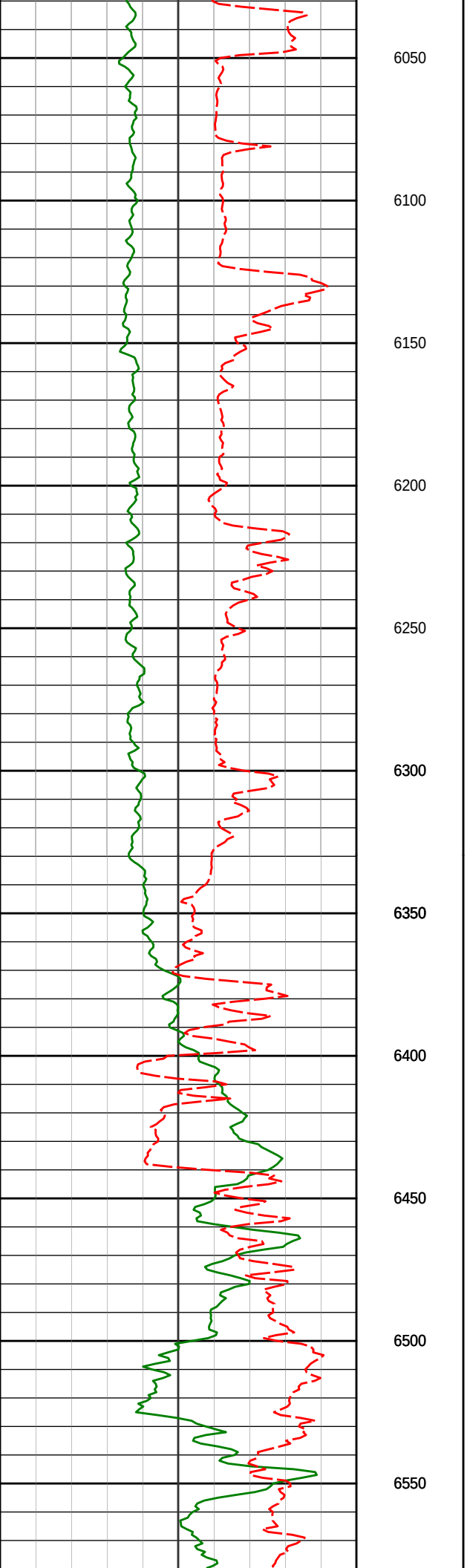
4506'	0.94°	189.70°	4464.63'	274.53'
4601'	0.96°	195.79°	4559.62'	274.93'
4696'	0.28°	206.56°	4654.61'	275.29'
4791'	0.38°	218.34°	4749.61'	275.60'
4886'	0.31°	128.80°	4844.61'	275.61'



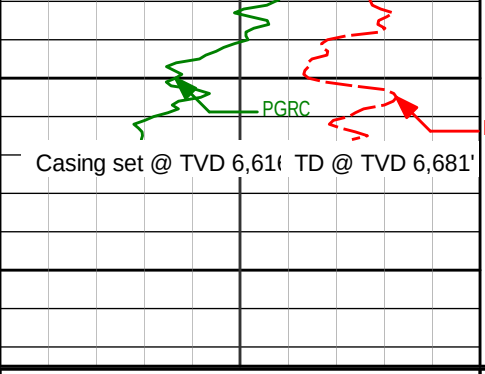
4981'	0.54°	196.65°	4939.61'	275.56'
5076'	1.24°	210.92°	5034.59'	276.27'
5171'	1.22°	212.49°	5129.57'	277.40'
5266'	0.84°	202.04°	5224.56'	278.26'
5361'	0.86°	203.65°	5319.55'	278.85'
5456'	0.86°	238.35°	5414.54'	279.78'



5551'	1.20°	235.51°	5509.52'	281.24'
5646'	0.96°	246.94°	5604.50'	282.82'
5741'	0.71°	234.43°	5699.49'	284.06'
5836'	0.88°	232.35°	5794.49'	285.14'
5928'	1.28°	249.30°	5886.47'	286.69'
5976'	4.61°	257.83°	5934.40'	289.10'
6023'	9.63°	263.11°	5981.02'	294.88'
6071'	13.42°	265.36°	6028.05'	304.45'



6118'	14.06°	266.96°	6073.70'	315.60'
6213'	17.10°	267.09°	6165.20'	341.11'
6308'	26.42°	261.99°	6253.34'	376.18'
6403'	37.62°	267.44°	6333.78'	426.36'
6451'	44.03°	270.83°	6370.08'	457.71'
6498'	45.70°	269.38°	6403.40'	490.84'
6546'	46.41°	268.81°	6436.71'	525.39'
6593'	49.61°	267.11°	6468.15'	560.32'
6641'	55.13°	265.20°	6497.44'	598.30'
6688'	58.94°	264.97°	6523.01'	637.67'
6736'	63.06°	264.82°	6546.28'	679.59'
6783'	68.51°	265.72°	6565.55'	722.39'



Depth	Inc.	Azi.	TVD	V.S.
6831'	74.65°	268.17°	6580.71'	767.90'
6878'	77.61°	268.58°	6591.98'	813.52'
6926'	79.27°	268.18°	6601.60'	860.54'
6973'	82.43°	268.18°	6609.07'	906.94'
7048'	87.81°	269.24°	6615.45'	981.63'

6600

6650

Avg Rate of Penetration
ROPA
500 feet per hr 0

Depth ft

PCG Gamma Ray
PGRC
0 api 300

HALLIBURTON

Sperry Drilling Services

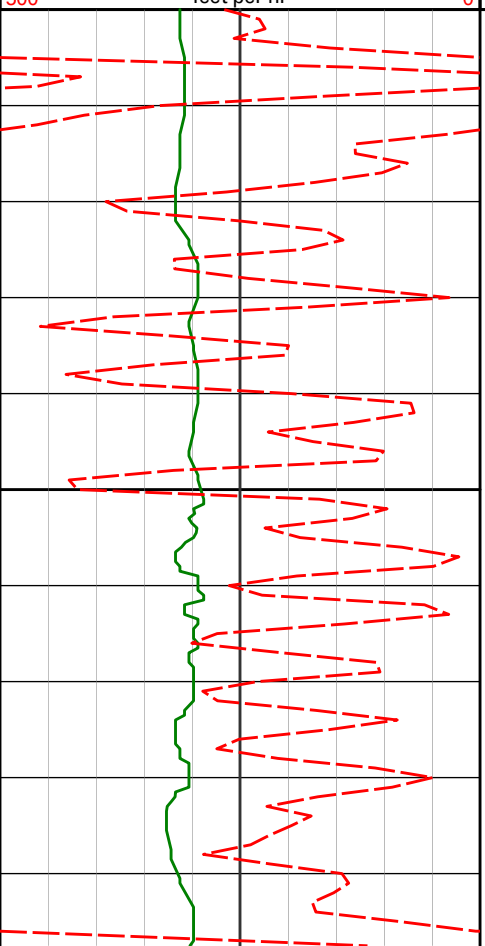
TVD Detail Log 1:240

Noble Energy
Wells Ranch State USX AA16-64-1HNL
H&P 343
T6N-R63W

PCG Gamma Ray
PGRC
0 api 300

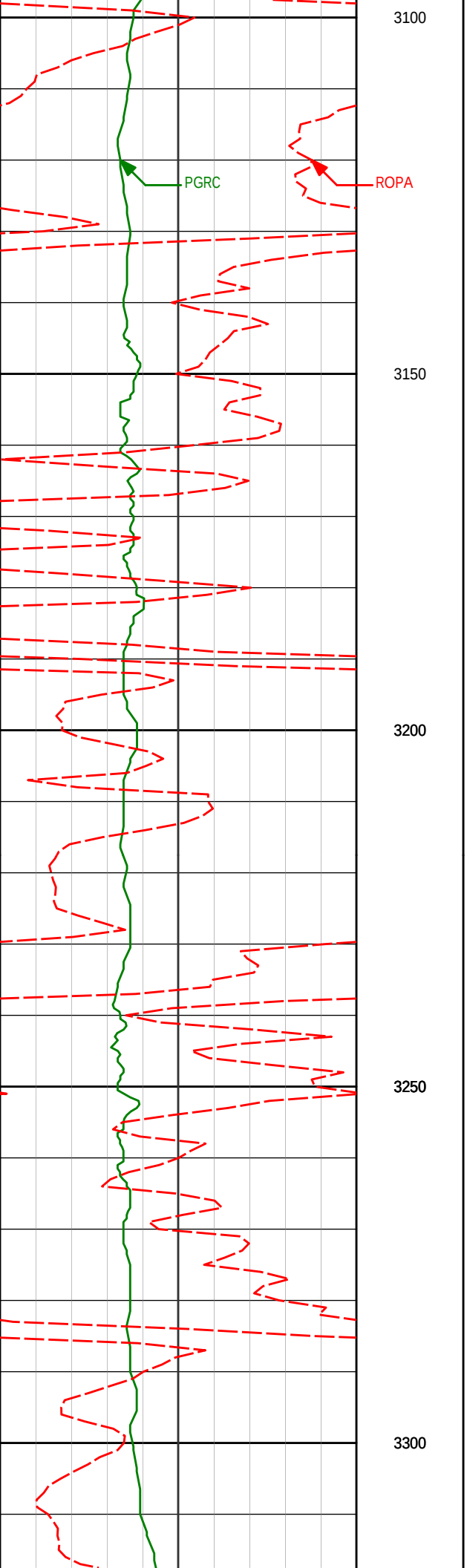
Avg Rate of Penetration
ROPA
500 feet per hr 0

Depth ft



Depth	Inc.	Azi.	TVD	V.S.
3081'	14.85°	226.50°	3044.83'	237.51'

3050



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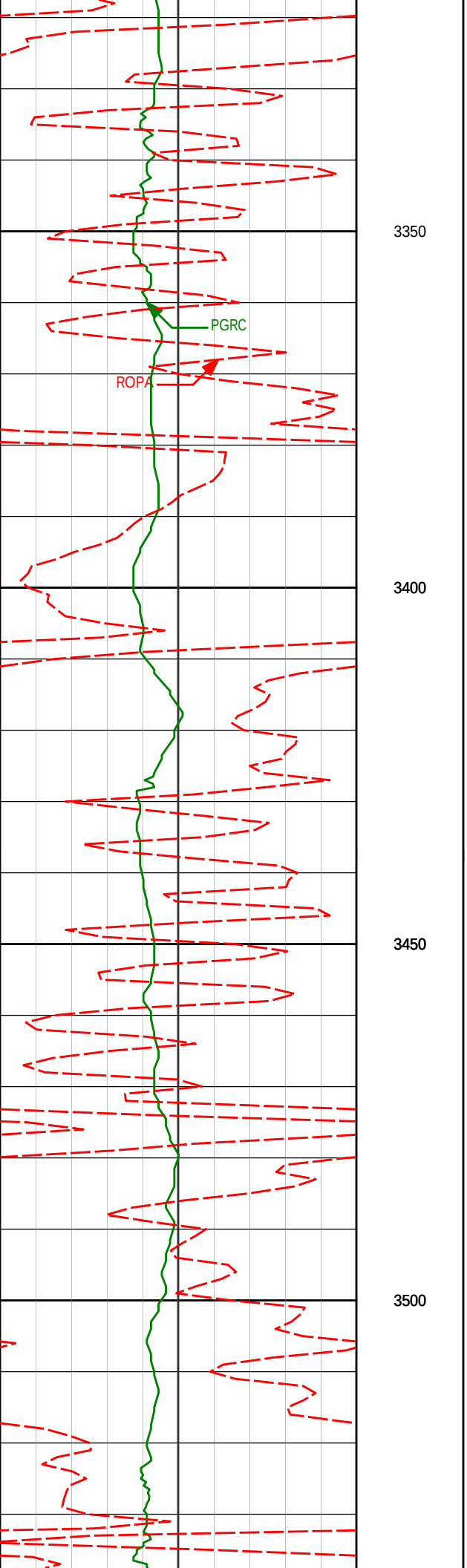

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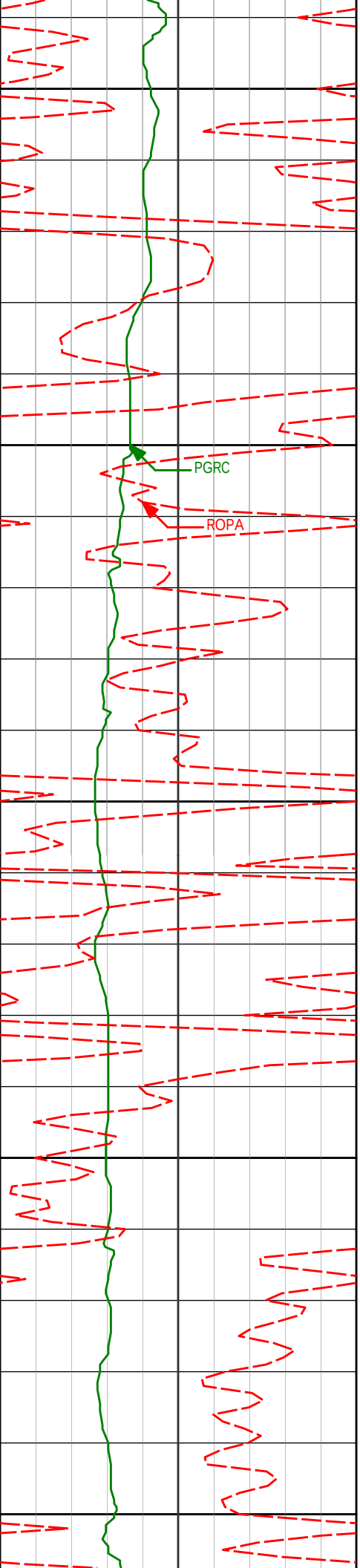

3651'	0.68°	90.38°	3609.72'	282.55'
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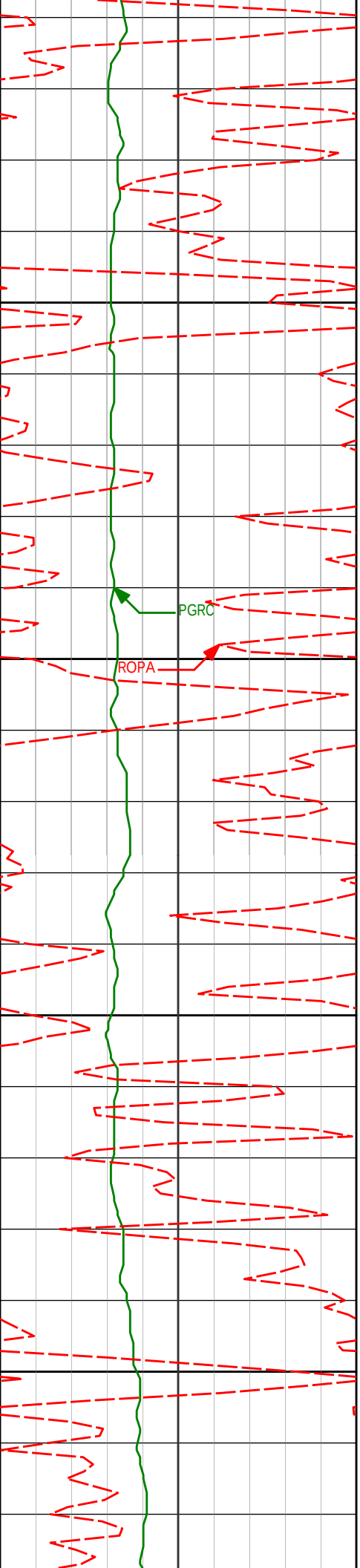
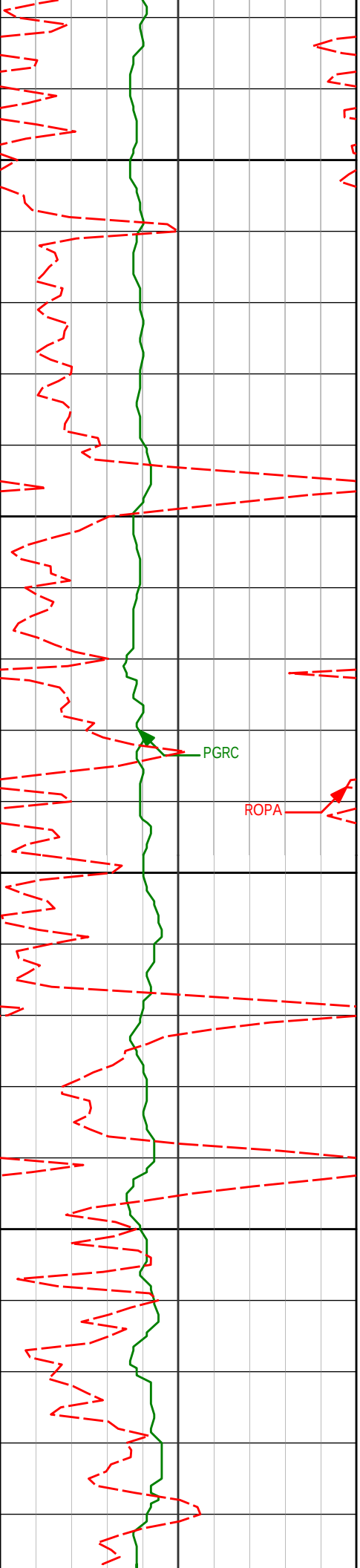


3841'	0.70°	80.99°	3799.70'	279.98'	
3936'	1.23°	93.87°	3894.68'	278.39'	



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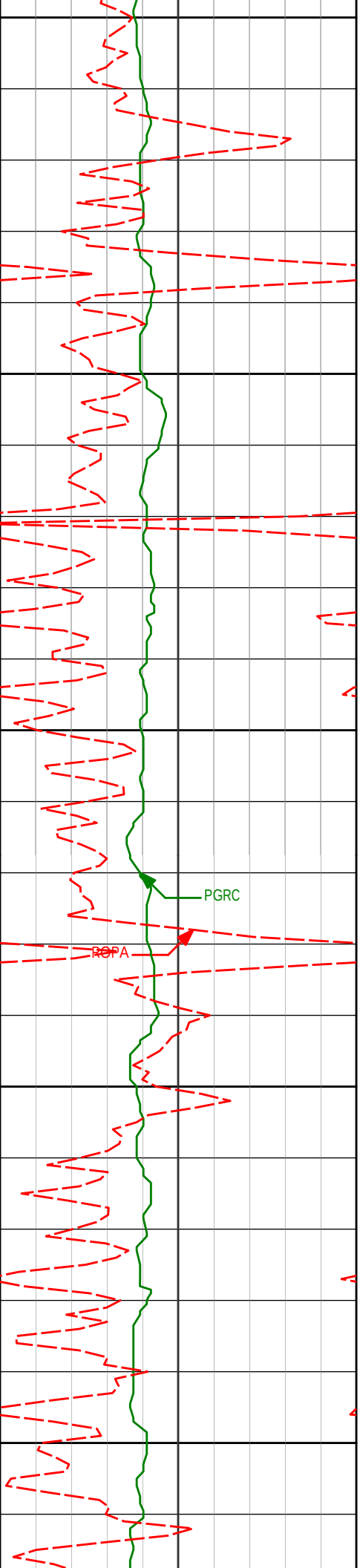
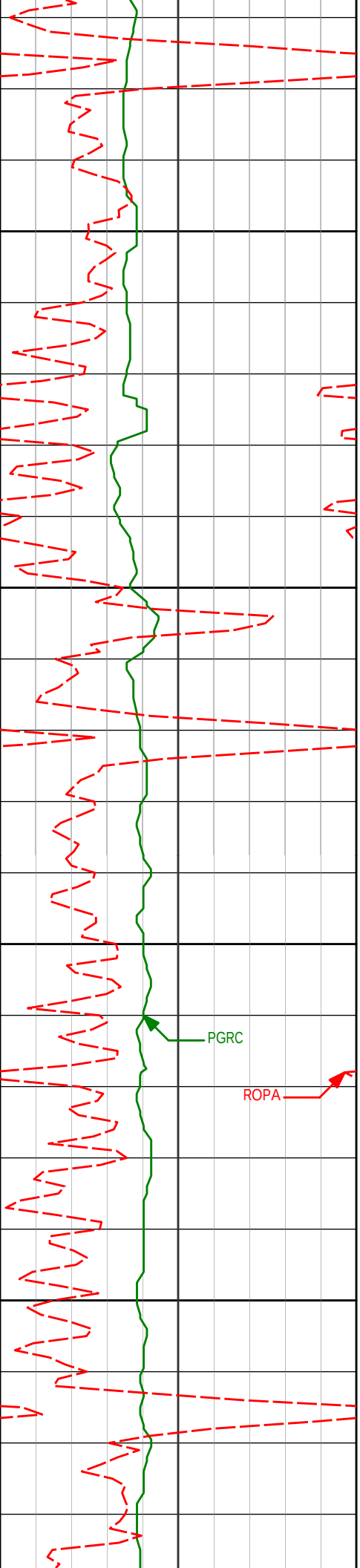


4316'	0.60°	179.78°	4274.64'	274.05'
4411'	0.48°	200.91°	4369.64'	274.22'



4506'	0.94°	189.70°	4464.63'	274.53'
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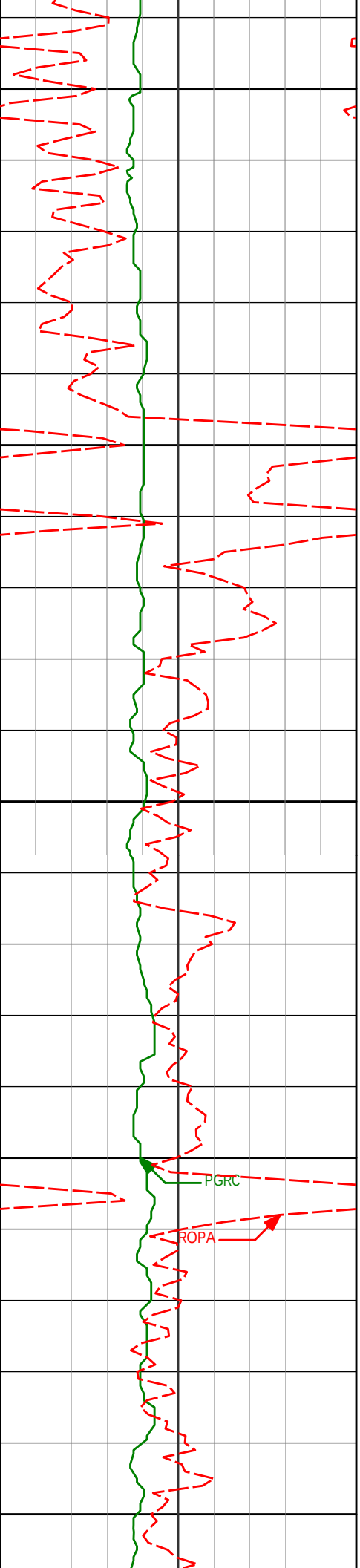

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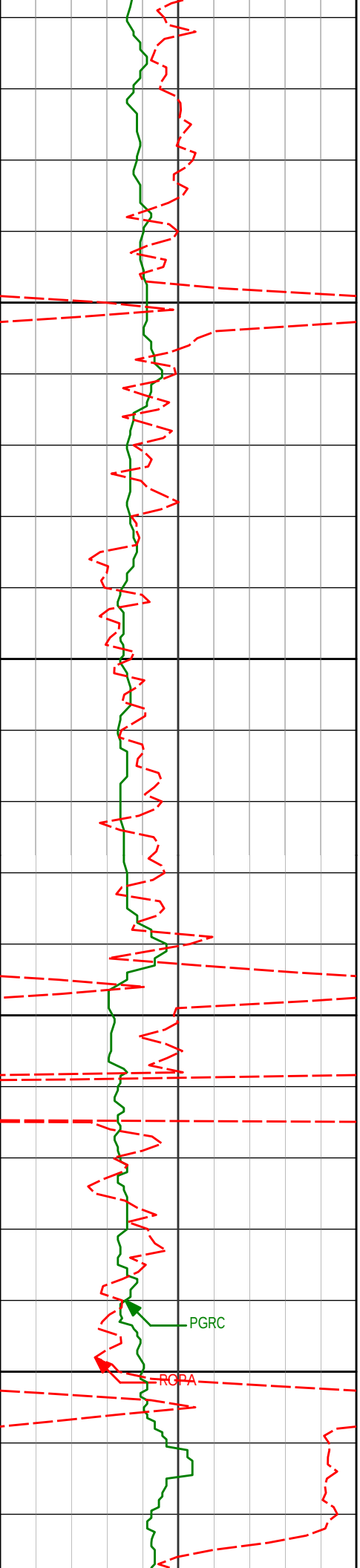

4981'	0.54°	196.65°	4939.61'	275.56'
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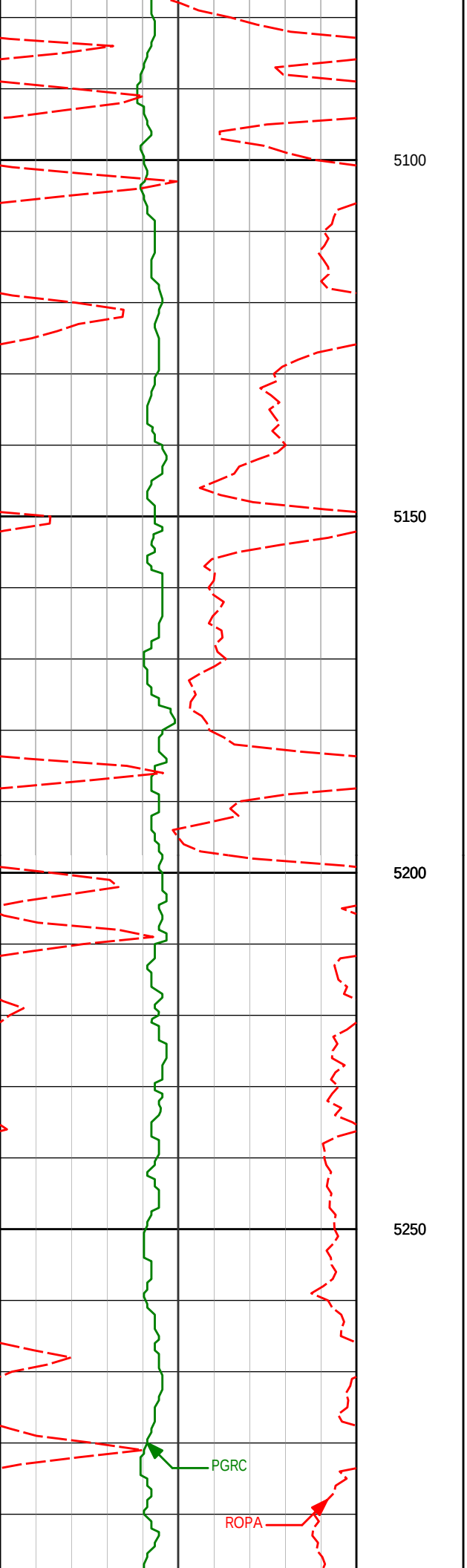

5171'	1.22°	212.49°	5129.57'	277.40'
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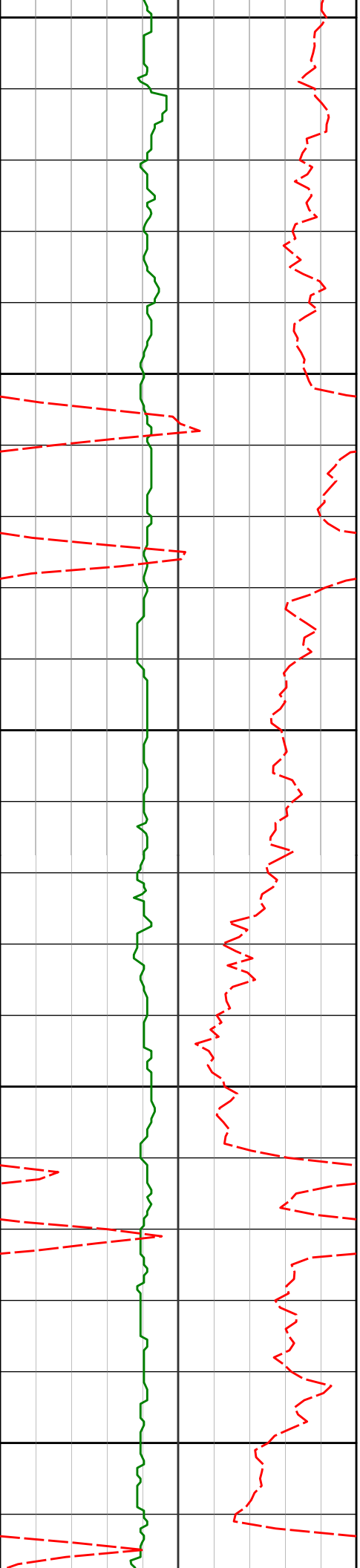

5361'	0.86°	203.65°	5319.55'	278.85'
5456'	0.86°	238.35°	5414.54'	279.78'
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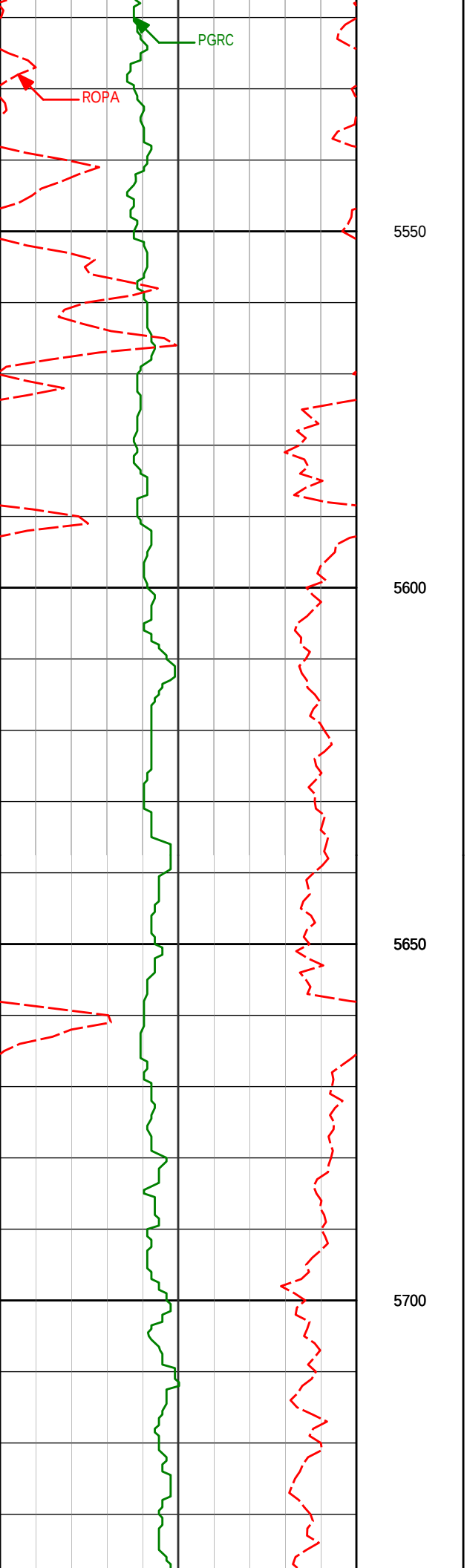

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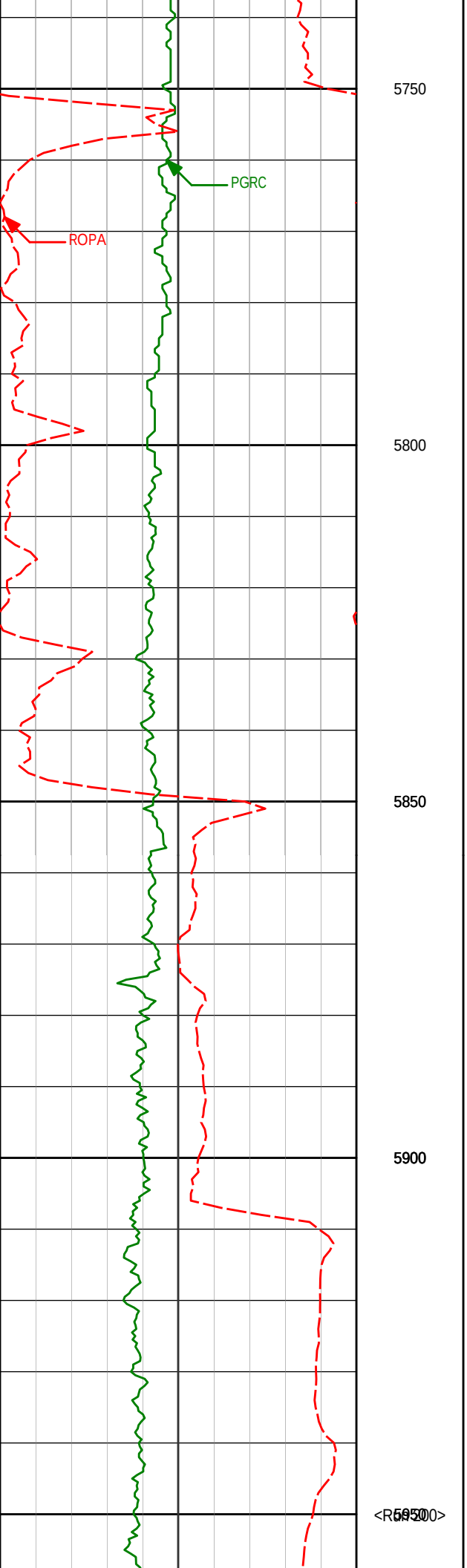
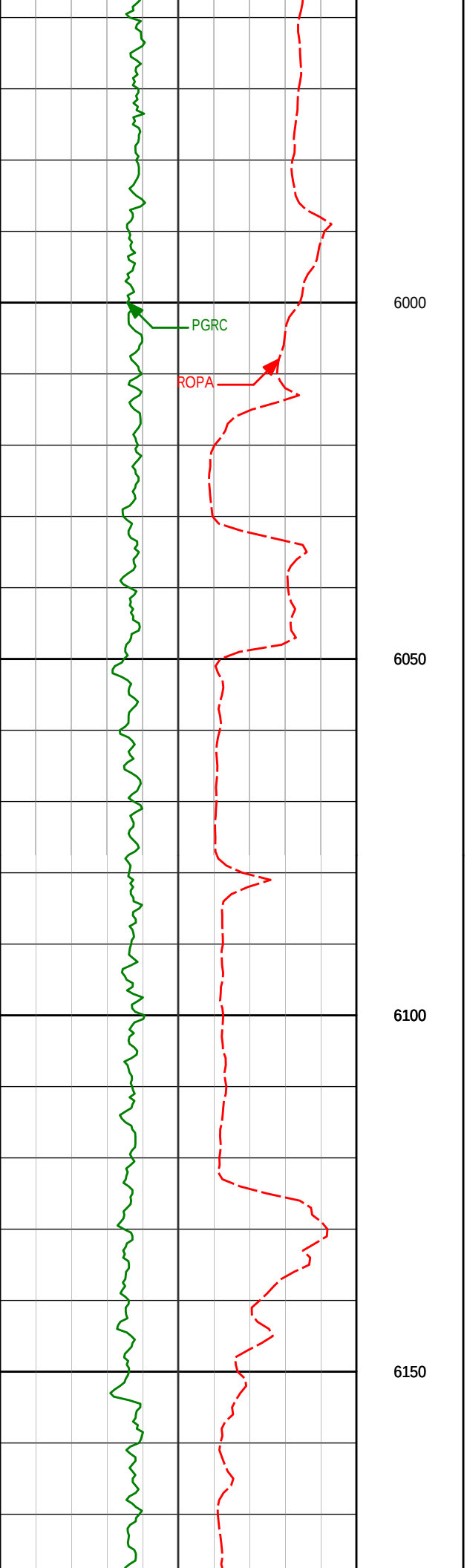
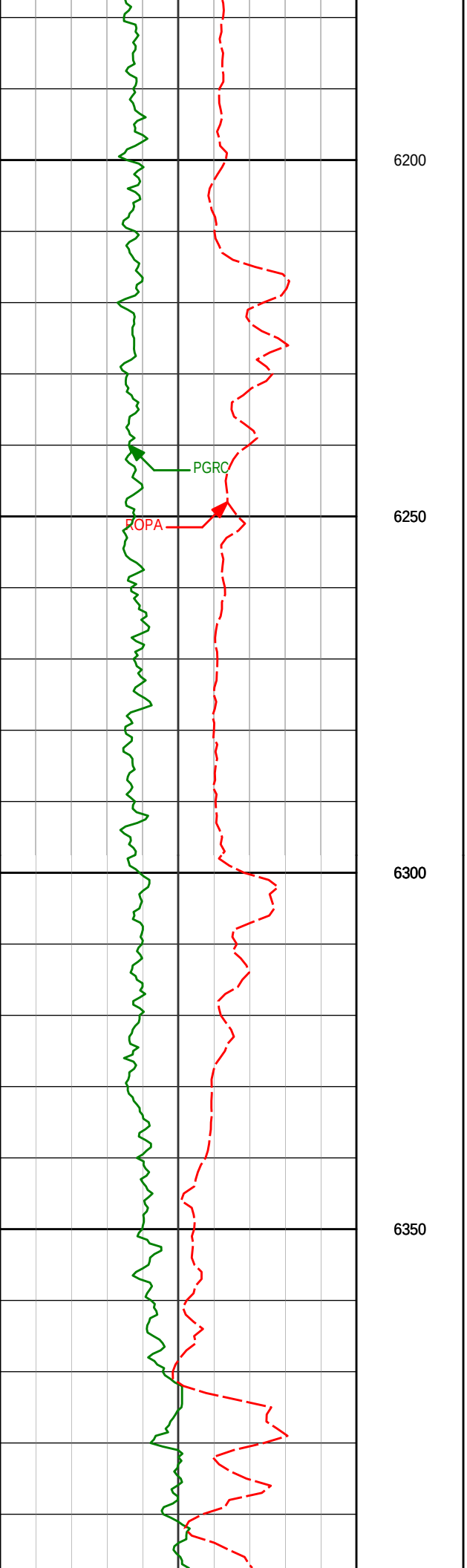
5741'	0.71°	234.43°	5699.49'	284.06'



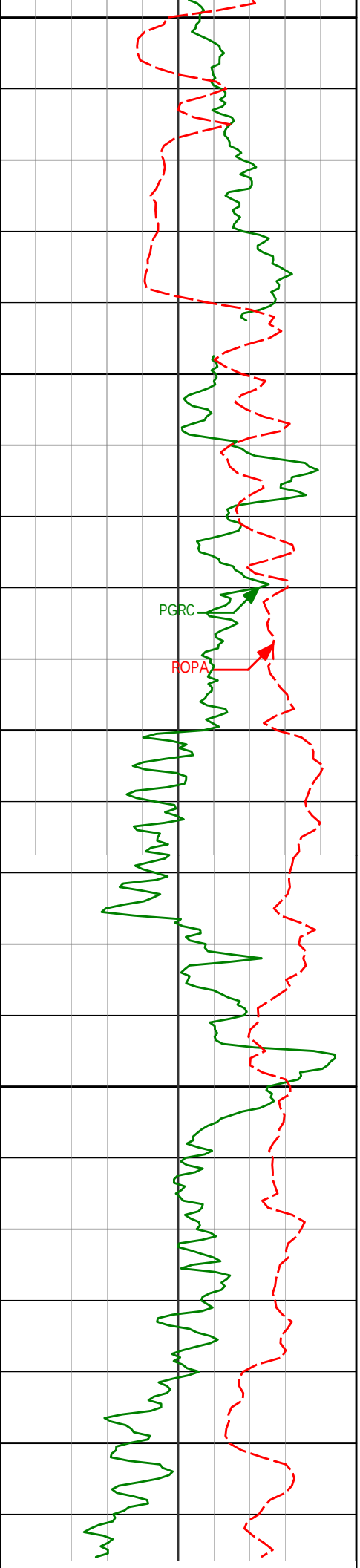
5836'	0.88°	232.35°	5794.49'	285.14'
5928'	1.28°	249.30°	5886.47'	286.69'
5976'	4.61°	257.83°	5934.40'	289.10'



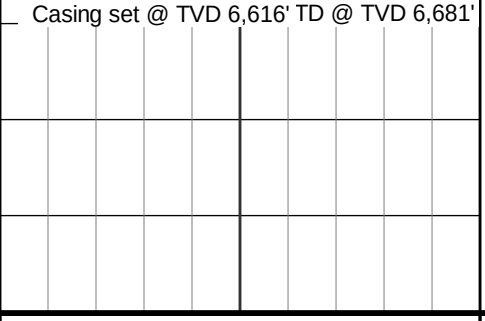
6023'	9.63°	263.11°	5981.02'	294.88'
6071'	13.42°	265.36°	6028.05'	304.45'
6118'	14.06°	266.96°	6073.70'	315.60'
6213'	17.10°	267.09°	6165.20'	341.11'



6308'	26.42°	261.99°	6253.34'	376.18'
6403'	37.62°	267.44°	6333.78'	426.36'
6451'	44.03°	270.83°	6370.08'	457.71'



6498'	45.70°	269.38°	6403.40'	490.84'
6546'	46.41°	268.81°	6436.71'	525.39'
6593'	49.61°	267.11°	6468.15'	560.32'
6641'	55.13°	265.20°	6497.44'	598.30'
6688'	58.94°	264.97°	6523.01'	637.67'
6736'	63.06°	264.82°	6546.28'	679.59'
6783'	68.51°	265.72°	6565.55'	722.39'
6831'	74.65°	268.17°	6580.71'	767.90'
6878'	77.61°	268.58°	6591.98'	813.52'
6926'	79.27°	268.18°	6601.60'	860.54'
6973'	82.43°	268.18°	6609.07'	906.94'
7048'	87.81°	269.24°	6615.45'	981.63'



Avg Rate of Penetration
ROPA
500 feet per hr 0

Depth
ft

Depth	Inc.	Azi.	TVD	V.S.

PCG Gamma Ray
PGRC
0 api 300

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch State USX AA16-64-1
Wattenberg
Weld Colorado
USA
CA-XX-0900145813
Tie-on survey is tied on to surface casing.

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
656.00	0.00	0.00	656.00	0.00 N	0.00 E	0.00	0.00
718.00	0.37	265.72	718.00	0.01 S	0.20 W	0.20	0.60
811.00	0.22	248.25	811.00	0.10 S	0.66 W	0.67	0.19
904.00	0.80	205.47	903.99	0.76 S	1.11 W	1.14	0.71
998.00	0.73	247.68	997.99	1.58 S	1.95 W	2.00	0.59
1092.00	0.51	239.01	1091.98	2.02 S	2.86 W	2.93	0.25
1185.00	0.57	221.93	1184.98	2.58 S	3.52 W	3.61	0.18
1279.00	0.40	223.01	1278.97	3.16 S	4.06 W	4.17	0.18
1372.00	0.48	176.76	1371.97	3.79 S	4.26 W	4.39	0.38
1466.00	0.64	220.87	1465.97	4.58 S	4.58 W	4.74	0.47
1561.00	4.97	233.08	1560.83	7.45 S	8.22 W	8.48	4.58
1656.00	7.42	242.28	1655.27	12.78 S	16.94 W	17.39	2.77
1751.00	7.33	243.05	1749.49	18.38 S	27.77 W	28.42	0.14
1846.00	7.57	231.70	1843.69	25.01 S	38.09 W	38.96	1.57
1941.00	9.56	231.66	1937.62	33.78 S	49.19 W	50.37	2.09
2036.00	11.51	225.87	2031.02	45.27 S	62.18 W	63.76	2.33
2131.00	13.59	217.28	2123.75	60.76 S	75.74 W	77.88	2.94
2226.00	14.62	216.78	2215.89	79.24 S	89.68 W	92.47	1.09
2321.00	14.04	214.81	2307.93	98.31 S	103.44 W	106.91	0.80
2416.00	14.72	216.64	2399.96	117.45 S	117.22 W	121.37	0.86
2511.00	13.88	222.10	2492.02	135.59 S	132.06 W	136.85	1.67
2606.00	13.71	220.81	2584.28	152.57 S	147.06 W	152.45	0.37
2701.00	13.14	222.97	2676.68	168.99 S	161.78 W	167.75	0.80
2796.00	14.51	226.74	2768.93	185.05 S	177.81 W	184.34	1.73
2891.00	13.97	225.26	2861.01	201.28 S	194.62 W	201.73	0.69
2986.00	14.89	226.22	2953.01	217.79 S	211.58 W	219.27	1.00
3081.00	14.85	226.50	3044.83	234.62 S	229.22 W	237.51	0.09
3176.00	11.68	221.33	3137.29	250.22 S	244.41 W	253.24	3.56
3271.00	9.39	226.99	3230.68	262.73 S	256.43 W	265.70	2.64
3366.00	4.79	237.50	3324.93	270.15 S	265.44 W	274.98	5.01
3461.00	1.70	239.20	3419.77	273.01 S	270.00 W	279.64	3.25
3556.00	1.74	228.78	3514.73	274.68 S	272.30 W	281.99	0.33
3651.00	0.68	90.38	3609.72	275.63 S	272.82 W	282.55	2.41
3746.00	0.93	109.87	3704.71	275.90 S	271.53 W	281.27	0.39
3841.00	0.70	80.99	3799.70	276.07 S	270.23 W	279.98	0.49

3936.00	1.23	93.87	3894.68	276.05 S	268.64 W	278.39	0.60
4031.00	1.31	92.72	3989.66	276.17 S	266.54 W	276.29	0.09
4126.00	0.53	118.49	4084.65	276.43 S	265.07 W	274.83	0.91
4221.00	0.26	98.90	4179.64	276.67 S	264.47 W	274.24	0.31
4316.00	0.60	179.78	4274.64	277.20 S	264.25 W	274.05	0.65
4411.00	0.48	200.91	4369.64	278.07 S	264.39 W	274.22	0.24
4506.00	0.94	189.70	4464.63	279.21 S	264.67 W	274.53	0.50
4601.00	0.96	195.79	4559.62	280.75 S	265.01 W	274.93	0.11
4696.00	0.28	206.56	4654.61	281.72 S	265.33 W	275.29	0.72
4791.00	0.38	218.34	4749.61	282.17 S	265.63 W	275.60	0.13
4886.00	0.31	128.80	4844.61	282.58 S	265.63 W	275.61	0.51
4981.00	0.54	196.65	4939.61	283.17 S	265.56 W	275.56	0.54
5076.00	1.24	210.92	5034.59	284.48 S	266.21 W	276.27	0.77
5171.00	1.22	212.49	5129.57	286.22 S	267.28 W	277.40	0.04
5266.00	0.84	202.04	5224.56	287.72 S	268.09 W	278.26	0.44
5361.00	0.86	203.65	5319.55	289.02 S	268.64 W	278.85	0.03
5456.00	0.86	238.35	5414.54	290.04 S	269.53 W	279.78	0.54
5551.00	1.20	235.51	5509.52	290.98 S	270.96 W	281.24	0.36
5646.00	0.96	246.94	5604.50	291.86 S	272.51 W	282.82	0.34
5741.00	0.71	234.43	5699.49	292.51 S	273.72 W	284.06	0.32
5836.00	0.88	232.35	5794.49	293.30 S	274.78 W	285.14	0.18
5928.00	1.28	249.30	5886.47	294.09 S	276.30 W	286.69	0.55
5976.00	4.61	257.83	5934.40	294.69 S	278.68 W	289.10	6.98
6023.00	9.63	263.11	5981.02	295.56 S	284.44 W	294.88	10.76
6071.00	13.42	265.36	6028.05	296.49 S	293.98 W	304.45	7.95
6118.00	14.06	266.96	6073.70	297.24 S	305.12 W	315.60	1.58
6213.00	17.10	267.09	6165.20	298.56 S	330.59 W	341.11	3.20
6308.00	26.42	261.99	6253.34	302.22 S	365.55 W	376.18	10.00
6403.00	37.62	267.44	6333.78	306.47 S	415.62 W	426.36	12.16
6451.00	44.03	270.83	6370.08	306.89 S	446.97 W	457.71	14.13
6498.00	45.70	269.38	6403.40	306.83 S	480.12 W	490.84	4.17
6546.00	46.41	268.81	6436.71	307.38 S	514.68 W	525.39	1.71
6593.00	49.61	267.11	6468.15	308.64 S	549.58 W	560.32	7.32
6641.00	55.13	265.20	6497.44	311.21 S	587.49 W	598.30	11.92
6688.00	58.94	264.97	6523.01	314.59 S	626.77 W	637.67	8.12
6736.00	63.06	264.82	6546.28	318.32 S	668.58 W	679.59	8.59
6783.00	68.51	265.72	6565.55	321.85 S	711.28 W	722.39	11.73
6831.00	74.65	268.17	6580.71	324.26 S	756.73 W	767.90	13.68
6878.00	77.61	268.58	6591.98	325.55 S	802.34 W	813.52	6.35
6926.00	79.27	268.18	6601.60	326.88 S	849.34 W	860.54	3.55
6973.00	82.43	268.18	6609.07	328.35 S	895.71 W	906.94	6.72
7048.00	87.81	269.24	6615.45	330.03 S	970.39 W	981.63	7.31

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A CLOSURE OF 251.22 DEGREES (GRID)
A TOTAL CORRECTION OF 7.81 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7048.00 FEET
IS 1024.98 FEET ALONG 251.22 DEGREES (GRID)

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