HALLIBURTON | **Sperry Drilling**

PCG Pressure Case Gamma
PCG Pressure Case Directional

Powered by INSITE™

1 : 600 / 1 : 240

Company	: **Noble Engery**
Rig	: **H&P 343**
Well	: **70 Ranch State BB18-622**
Field	: **Wattenburg**
Country	: **USA**
API Number	: **05-123-41539**

Country	: **USA**
Field	: **Wattenburg**
Location	: **Lat: 40° 23' 37.50" North** **Long: 104° 27' 13.10" West**
Well	: **70 Ranch State BB18-622**
Company	: **Noble Engery**
Rig	: **H&P 343**

LOCATION

Latitude : **40° 23' 37.50" North**
Longitude : **104° 27' 13.10" West**
UTM Easting = **3,291,442.509 ft**
UTM Northing = **1,388,003.064 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **4647.00 ft**
Log Measured From : **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

Elev. KB **N/A**
DF **4671.00 ft**
GL **4647.00 ft**
WD **N/A**

TVD LOG

Depth Logged : **757.99 ft** To **6,519.35 ft**
Date Logged : **10-Jul-15** To **10-Jul-15**
Total Depth MD : **16,491.00 ft** TVD : **6,519.35 ft**
Spud Date : **17-Jul-15**

Unit No. : **11610115** Job No. : **CA-XX-0902500206**
Plot Type : **Final**
Plot Date : **17-Jul-15**

Run No.	Borehole Record (TVD)			Casing Record (TVD)			
	Size	From	To	Size	Weight	From	To
0100	8.750 in	757.99 ft	6,491.96 ft	9.625 in	36.60 lbpf	SURFACE	746.99 ft
				7.000 in	34.70 lbpf	SURFACE	6,491.72 ft

WELL INFORMATION

MWD Run Number	100				
Date run completed	13-Jul-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)					
Log Start Depth (MD, ft)	758.00				
Log End Depth (MD, ft)	6,870.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	11-Jul-15 17:50				
Drill/Wipe End Date and Time	12-Jul-15 21:30				
Min Inc (deg) @ Depth (MD, ft)	0.52 @ 845.00				
Max Inc (deg) @ Depth (MD, ft)	85.84 @ 6,804.00				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	595.24				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	11.10 / 37.00				
Filtrate CL (ppm)	1,700.00				
pH / Fluid Loss (mptm)	9.70 / 5				
PV (cP) / YP (lhf2)	13 / 12.00				
% Solids / % Sand	12.60 / 0.35				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				

Max Tool Temp (degF) / Source	182.55 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Brian Neu				
Customer Representative	Jim Boyd				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11342292				
Insert Serial Number	11680771				
Date and Time Initialized	10-Jul-15 18:43				
Date and Time Read	12-Jul-15 06:38				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	65.00				
Software Version	6.33				
Sub Serial Number	11342292				
Sonde Serial Number	11477975				
Sensor ID Number	N/A				
Toolface Offset (deg)	143.20				

Gamma Ray Sensor Information

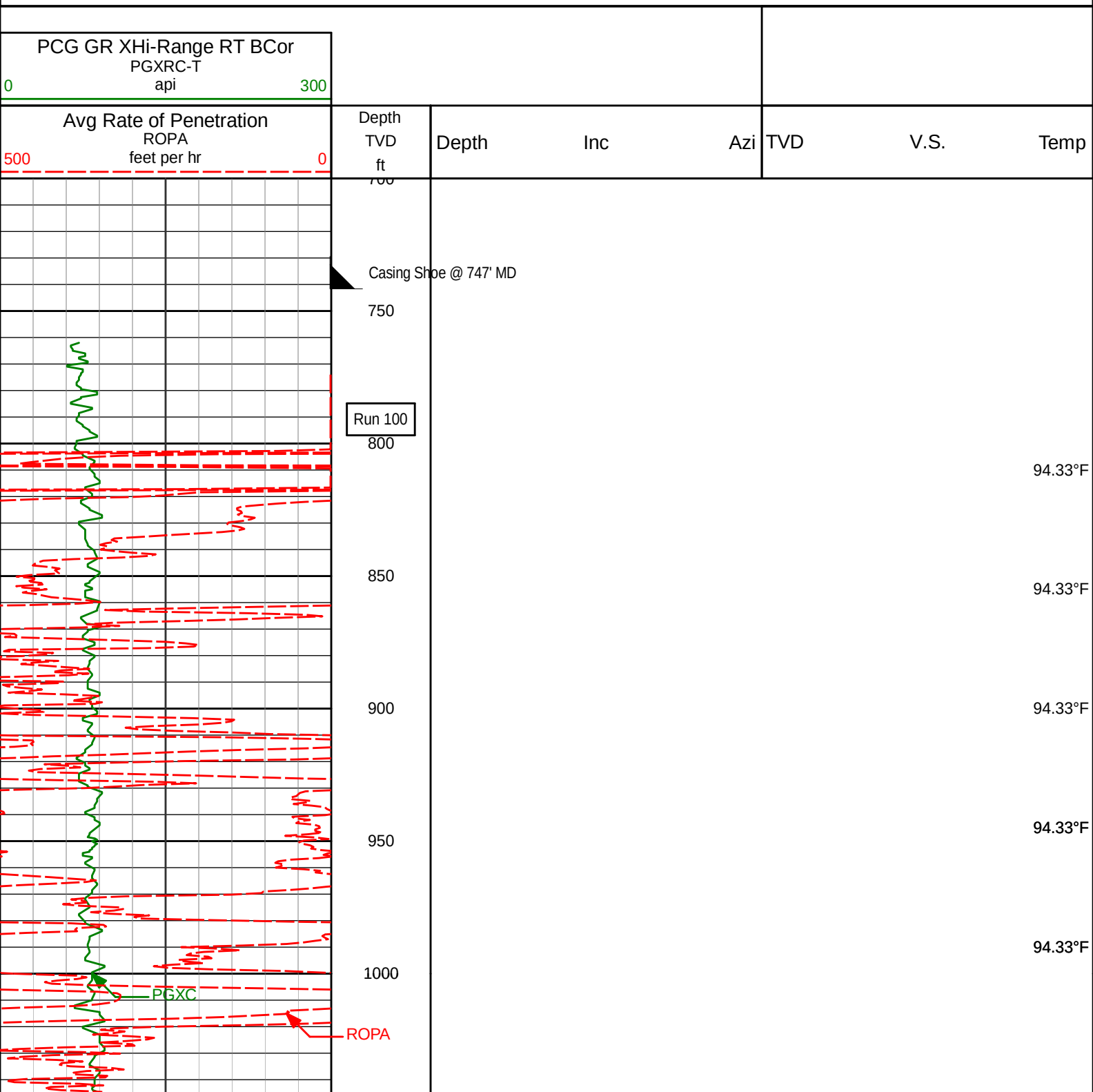
Tool Type	PCG				
Distance From Bit (ft)	58.19				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11342292				
Insert/Sonde Serial Number	11120592				

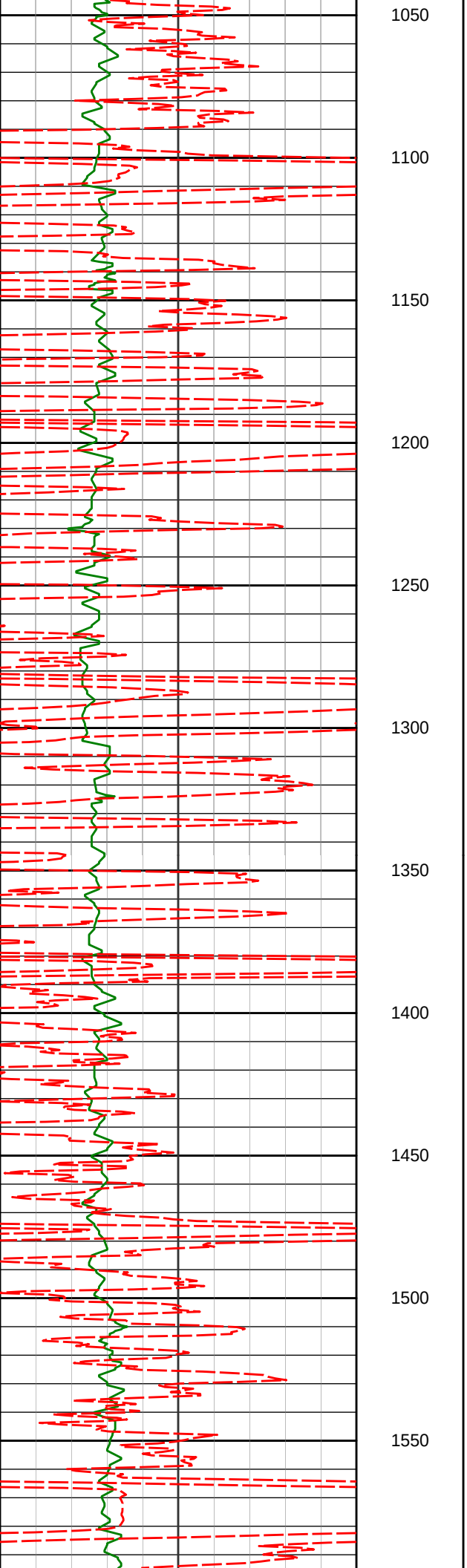
REMARKS

1. All depths are calibrated to driller's pipe tally and are total vertical depth 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. Environmental parameters used in gamma and resistance processing:
Hole Size: 8.75"
Mud Density: 9.9-11.0
5. The following smoothing parameters have been applied to the data:
Interval: 0.5 ft
Coercion Distance: 1.2 ft (ROPA)
Interval: 0.5 ft
Coercion Distance: 0.6 ft (Gamma Ray)

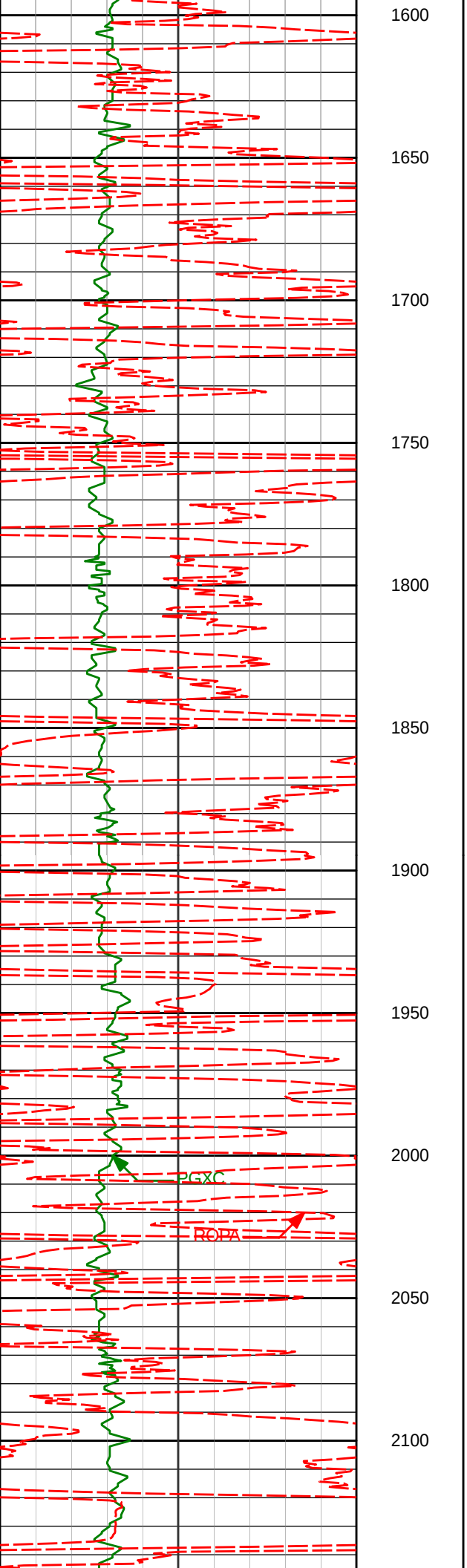
WARRANTY

TVD Detail 1:600 Scale





96.42°F
96.42°F
96.42°F
96.42°F
98.51°F
98.51°F
98.51°F
98.51°F
98.51°F
98.51°F
100.62°F
100.62°F



100.62°F
100.62°F
102.72°F
102.72°F
102.72°F
102.99°F
104.56°F
104.83°F
104.83°F
106.97°F
106.97°F
106.97°F


2150
2200
2250
2300
2350
2400
2450
2500
2550
2600
2650
109.09°F
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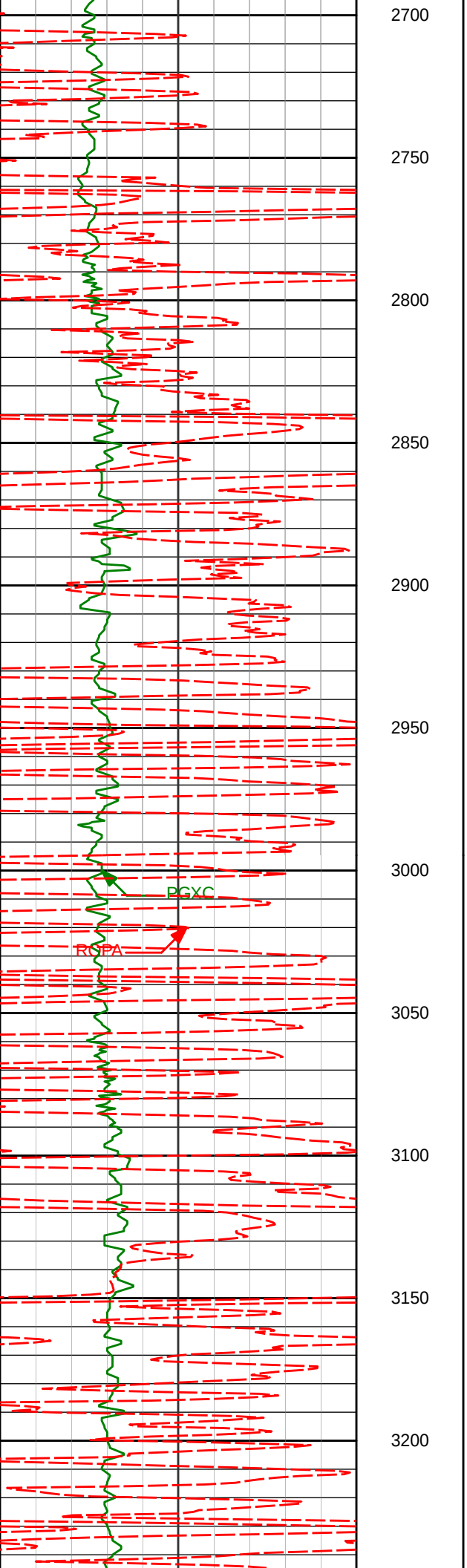
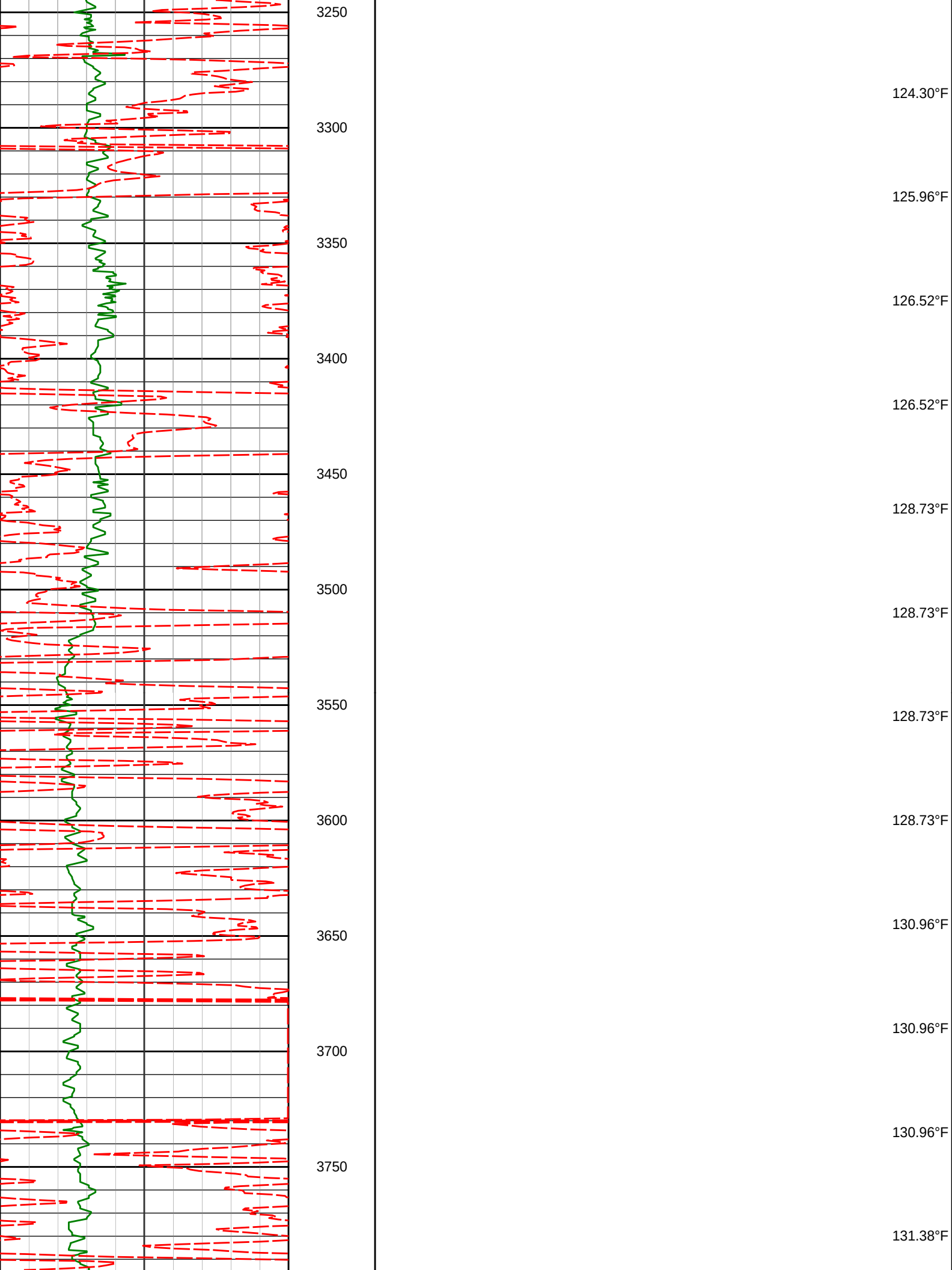
113.40°F
113.40°F
113.40°F
115.56°F



115.56°F
117.73°F
117.73°F
117.73°F
117.73°F
119.91°F
119.91°F
122.11°F
122.11°F
122.11°F
124.30°F
124.30°F


3250
3300
3350
3400
3450
3500
3550
3600
3650
3700
3750
124.30°F
125.96°F
126.52°F
126.52°F
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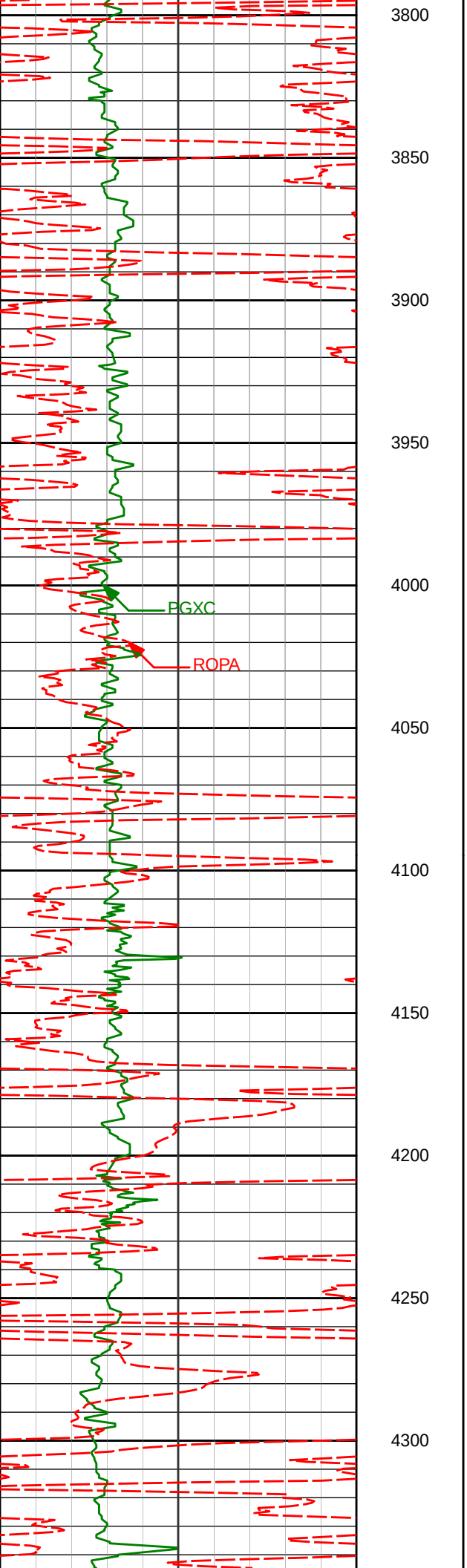
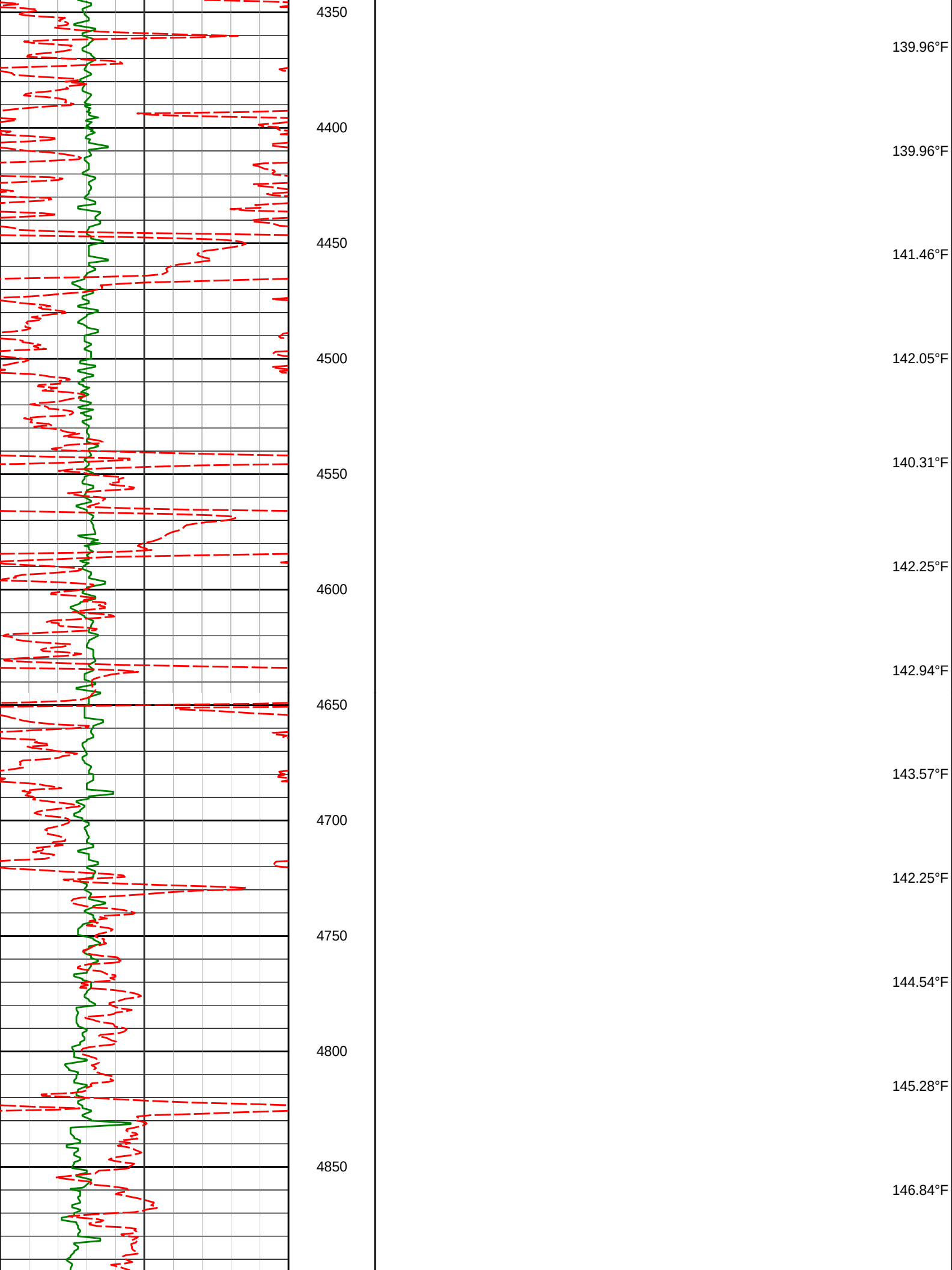
130.96°F
130.96°F
130.96°F
131.38°F



133.20°F
133.20°F
135.45°F
135.45°F
135.45°F
135.45°F
136.76°F
137.03°F
137.70°F
137.70°F
137.70°F


4350
4400
4450
4500
4550
4600
4650
4700
4750
4800
4850
139.96°F
139.96°F
141.46°F
142.05°F
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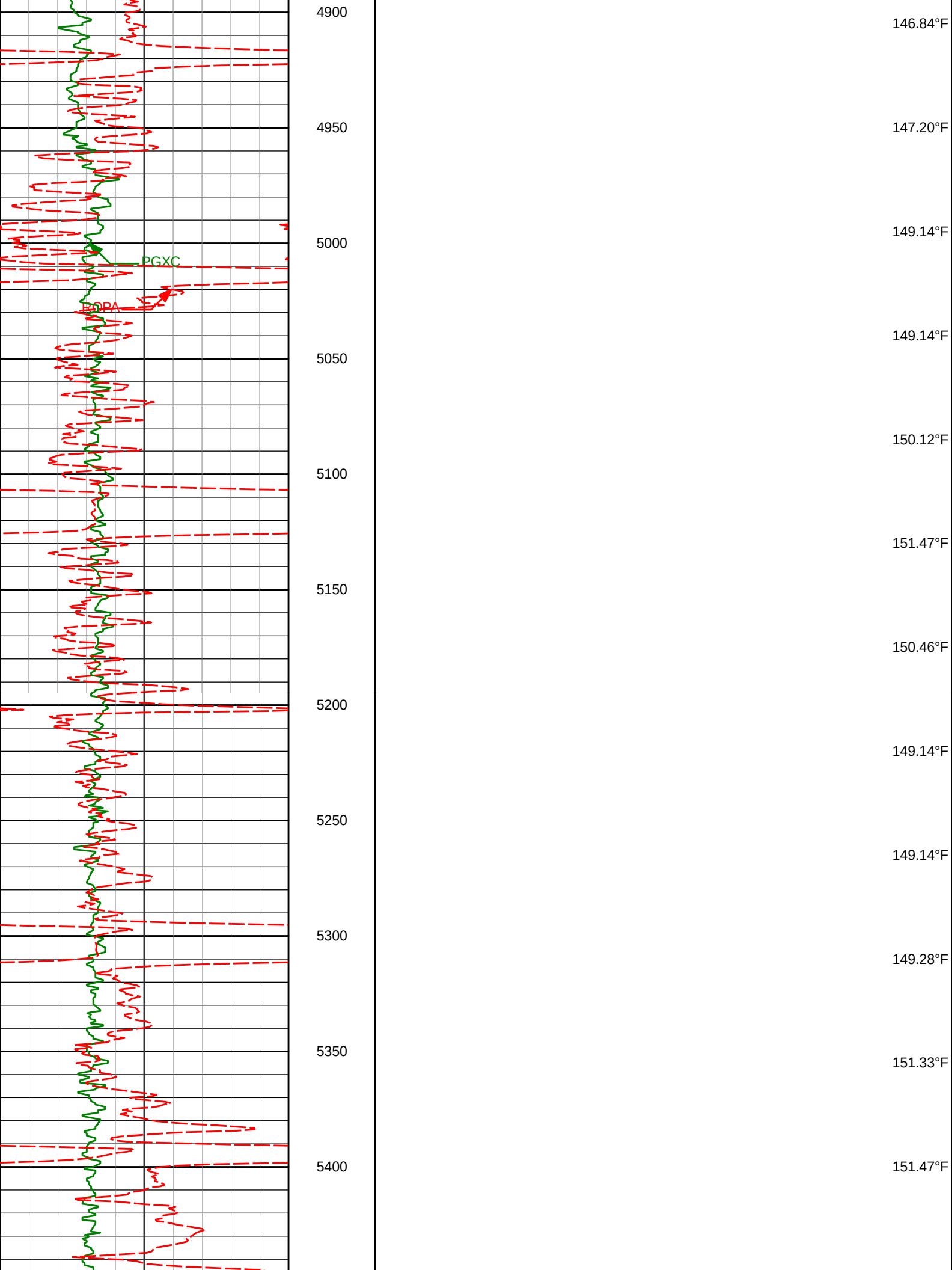
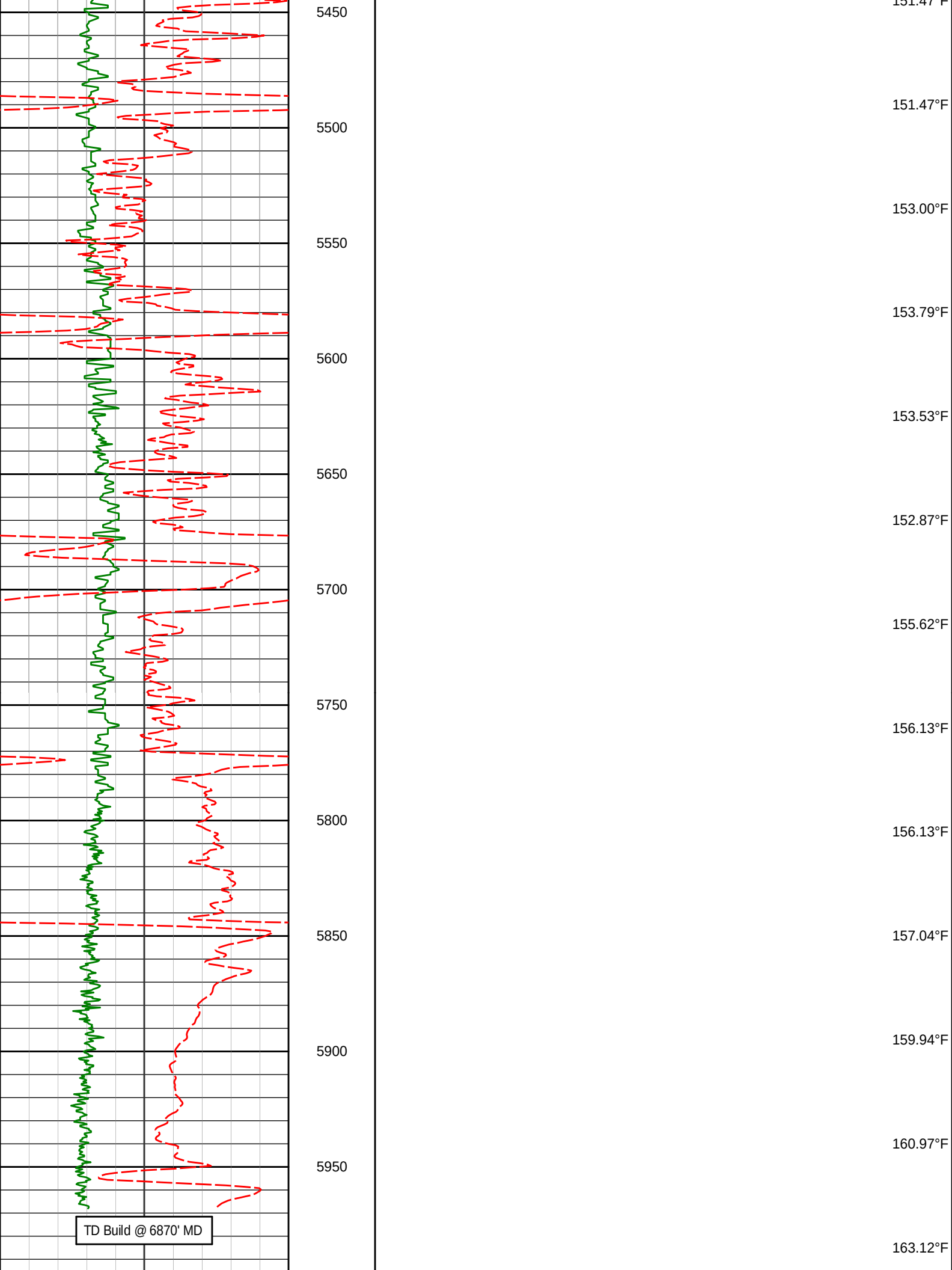
142.25°F
144.54°F
145.28°F
146.84°F


4900
4950
5000
5050
5100
5150
5200
5250
5300
5350
5400
PGXC
RODA
146.84°F
147.20°F
149.14°F
149.14°F
150.12°F
151.47°F
150.46°F
149.14°F
149.14°F
149.28°F
151.33°F
151.47°F

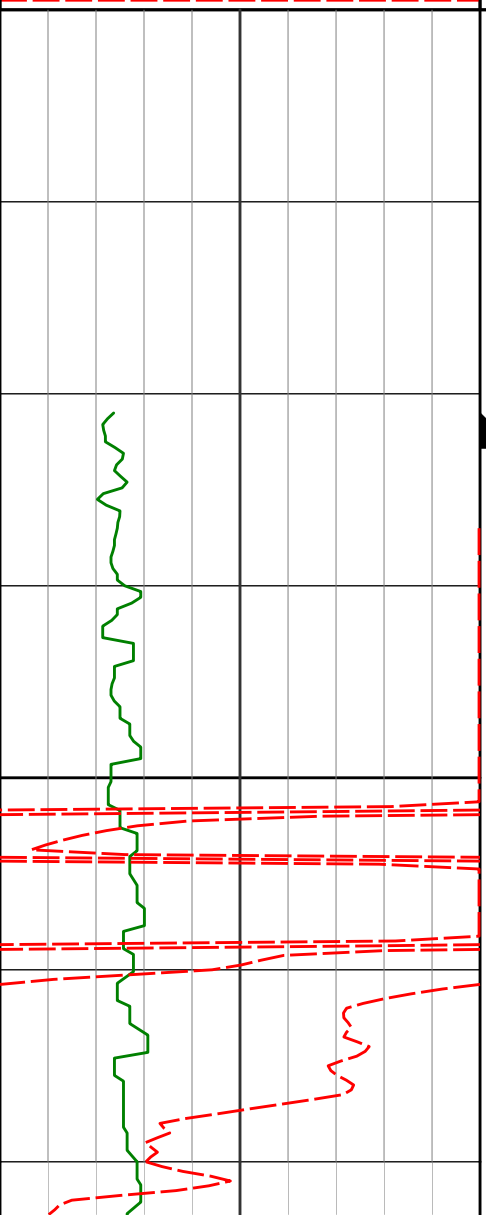

5450
5500
5550
5600
5650
5700
5750
5800
5850
5900
5950
TD Build @ 6870' MD
151.47°F
151.47°F
153.00°F
153.79°F
153.53°F
152.87°F
155.62°F
156.13°F
156.13°F
157.04°F
159.94°F
160.97°F
163.12°F

6000

Avg Rate of Penetration ROPA 500 feet per hr 0	Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
PCG GR XHi-Range RT BCor PGXRC-T 0 api 300							

TVD Detail 1:240 Scale

PCG GR XHi-Range RT PGRC 0 api 300							
Avg Rate of Penetration ROPA 500 feet per hr 0	Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp



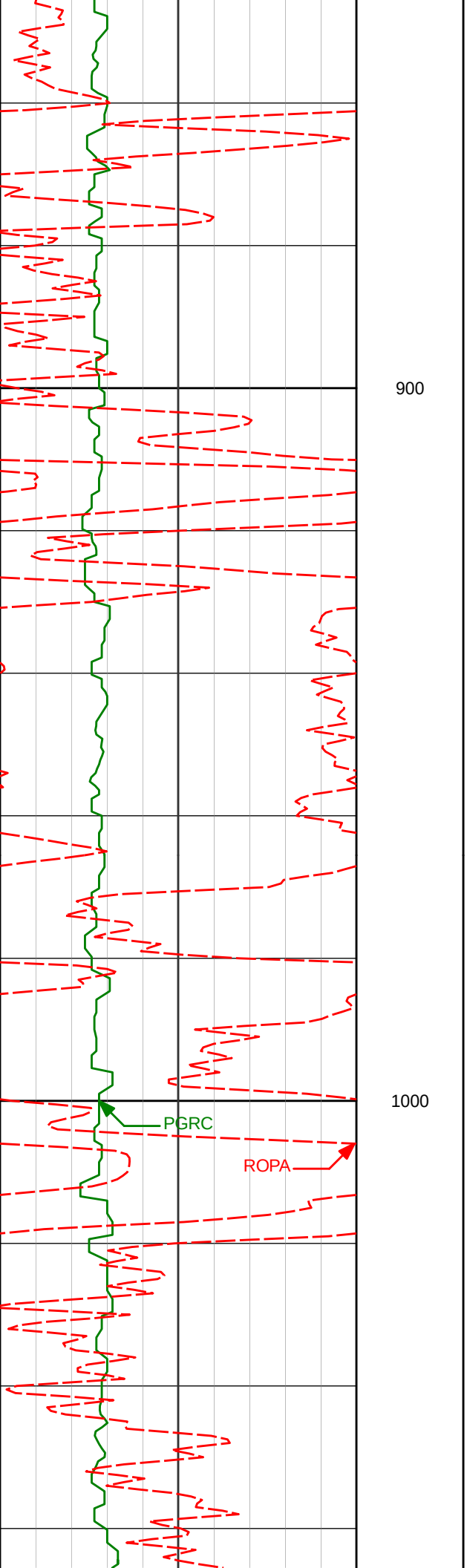
Casing Shoe @ 747' MD

800

Run 100

94.33°F

845' 0.52° 7.50° 844.99' -0.48'



94.33°F

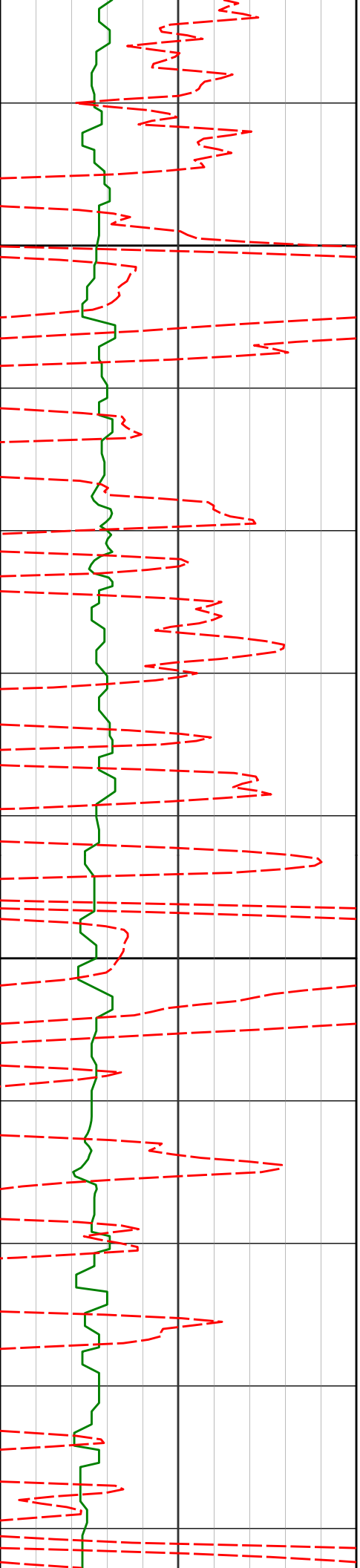
94.33°F

940'	0.52°	11.07°	939.98'	-0.62'

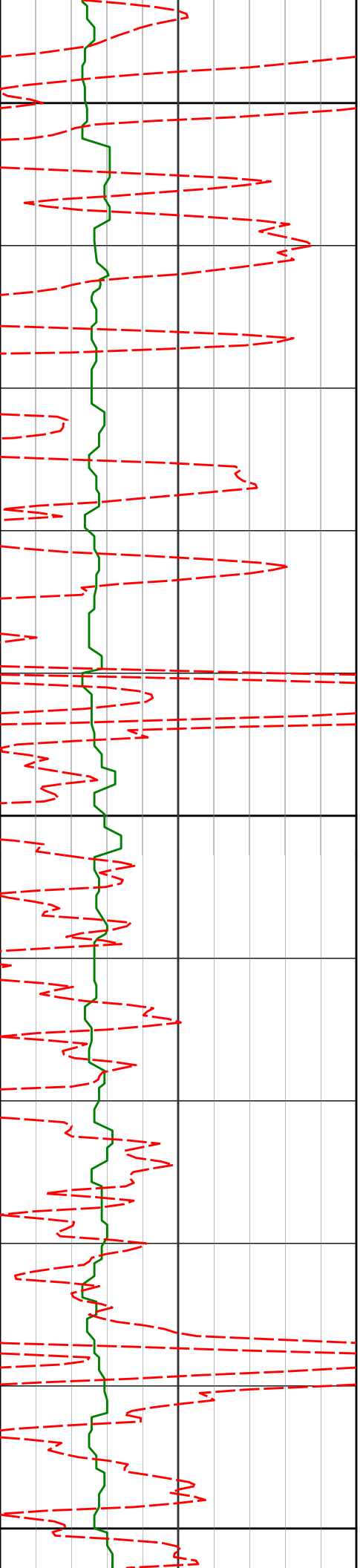
94.33°F

94.33°F

1034'	0.65°	14.50°	1033.98'	-0.83'



					96.42°F
1127'	0.71°	16.00°	1126.97'	-1.12'	96.42°F
					96.42°F
1220'	0.81°	25.88°	1219.96'	-1.56'	96.42°F
					98.51°F



	1313'	0.89°	22.29°	1312.95'	-2.12'
	1406'	0.86°	17.51°	1405.94'	-2.60'
	1499'	0.91°	18.05°	1498.93'	-3.04'

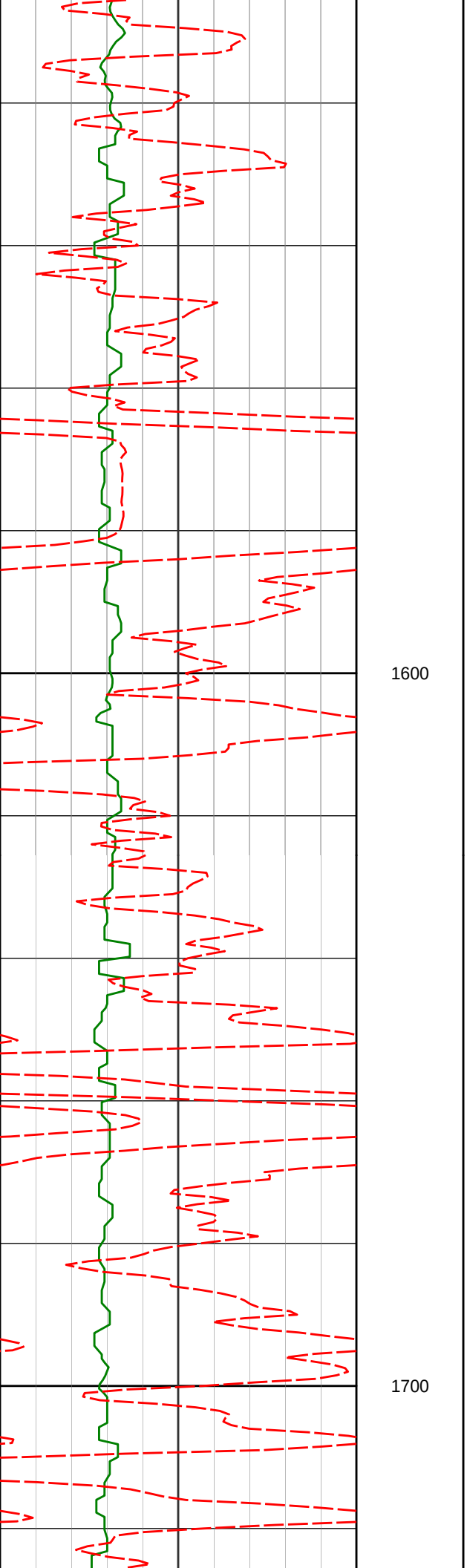
98.51°F

98.51°F

98.51°F

98.51°F

98.51°F



100.62°F

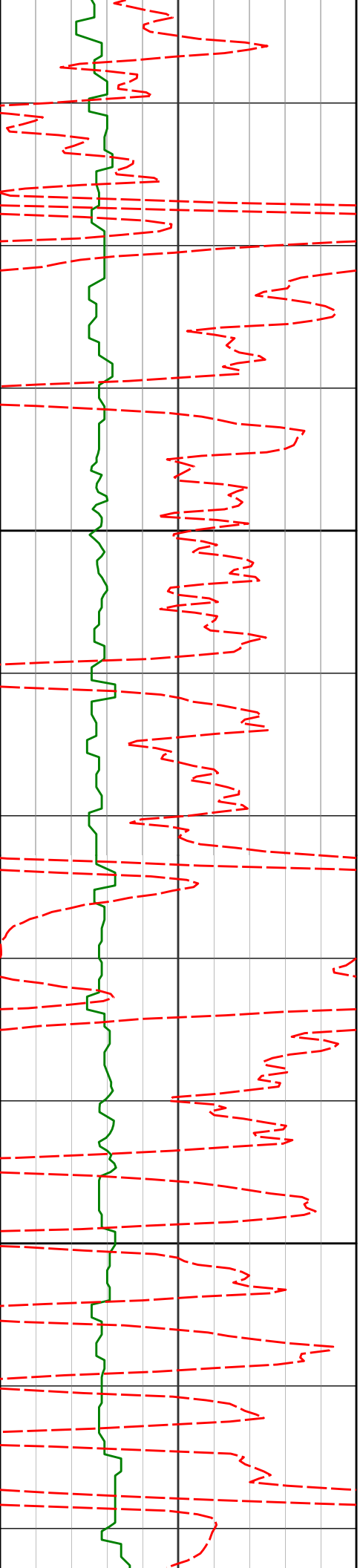
100.62°F

100.62°F

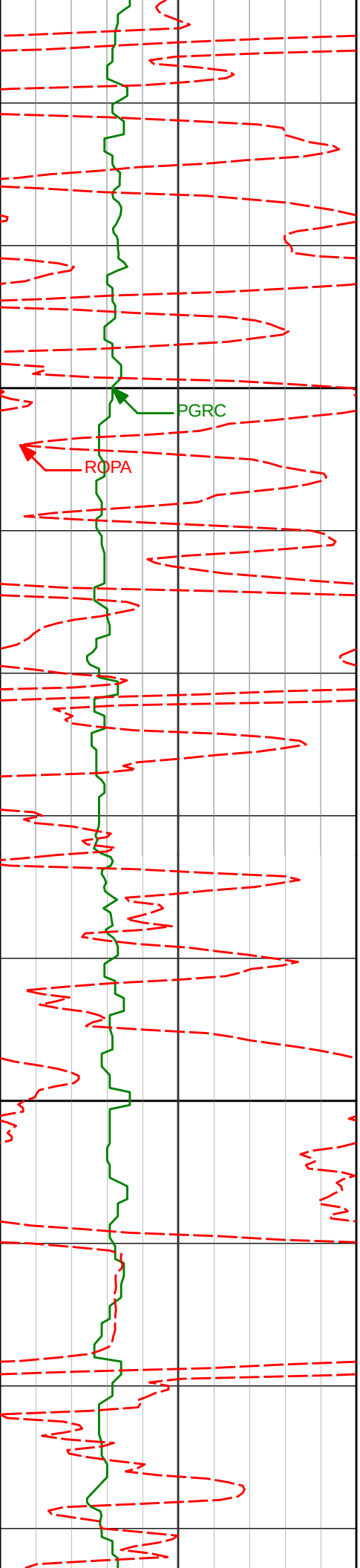
100.62°F

1683' 0.79° 21.48° 1682.91' -3.94'

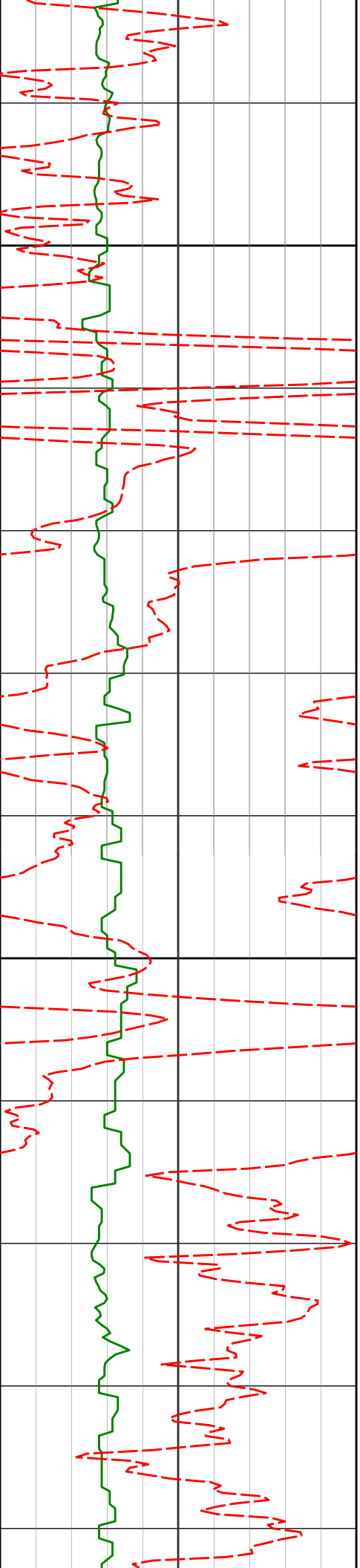
102.72°F



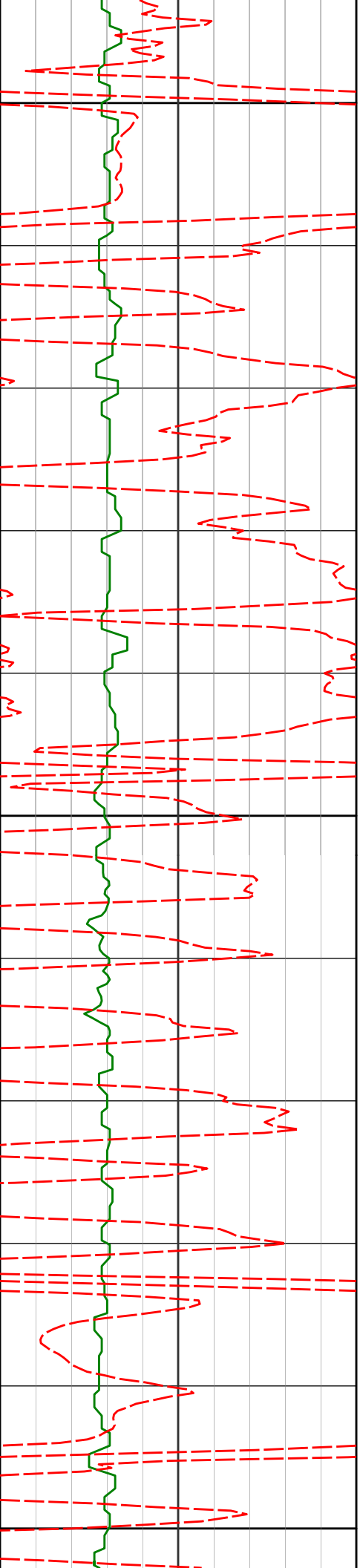
					102.72°F
1776'	0.66°	30.68°	1775.91'	-4.45'	
1800					102.72°F
					102.99°F
1869'	4.42°	71.27°	1868.80'	-8.11'	
					104.56°F
1900					
					104.83°F



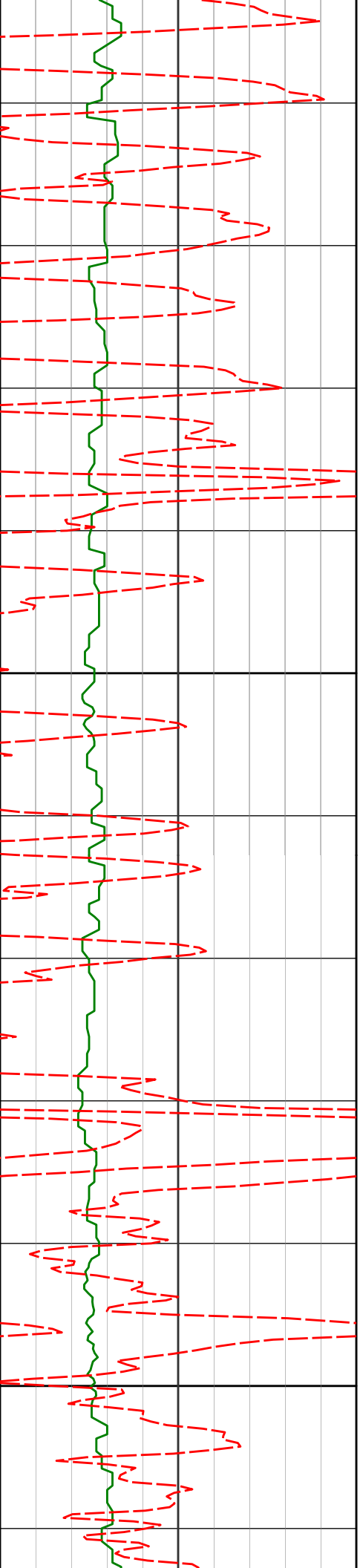
1962'	6.51°	71.26°	1961.37'	-16.48'	
					104.83°F
2000					
					106.97°F
					106.97°F
2100					
					106.97°F
2146'	6.88°	79.08°	2144.12'	-37.16'	
					109.09°F



					109.09°F
2240'	8.60°	75.30°	2237.26'	-49.48'	
					109.09°F
					109.09°F
2333'	8.27°	75.61°	2329.26'	-62.67'	
					111.24°F
					111.24°F



	2425'	8.06°	74.05°	2420.32'	-75.27'
113.40°F					
	2517'	7.28°	69.43°	2511.50'	-86.92'
113.40°F					
113.40°F					
	2610'	8.53°	58.38°	2603.62'	-98.29'



115.56°F

2700

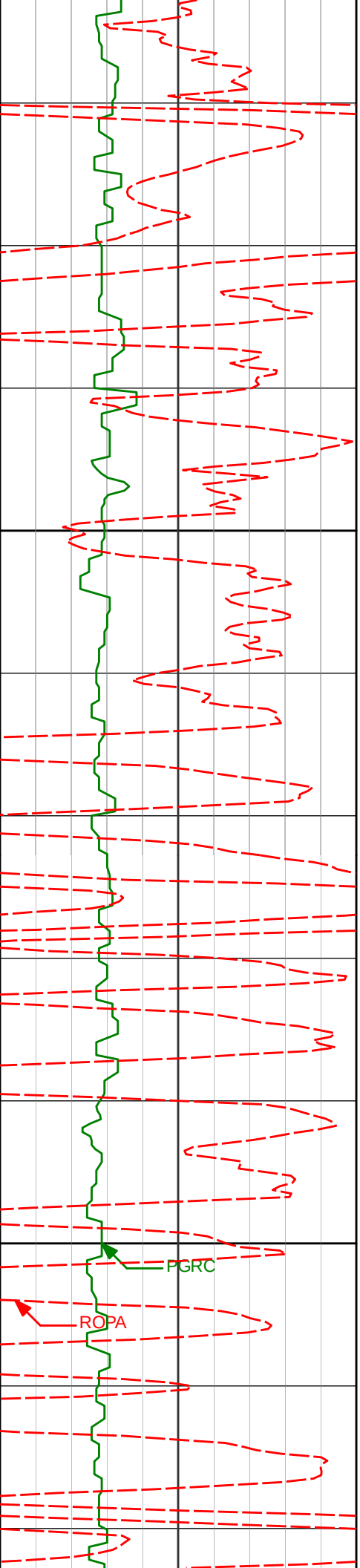
115.56°F

117.73°F

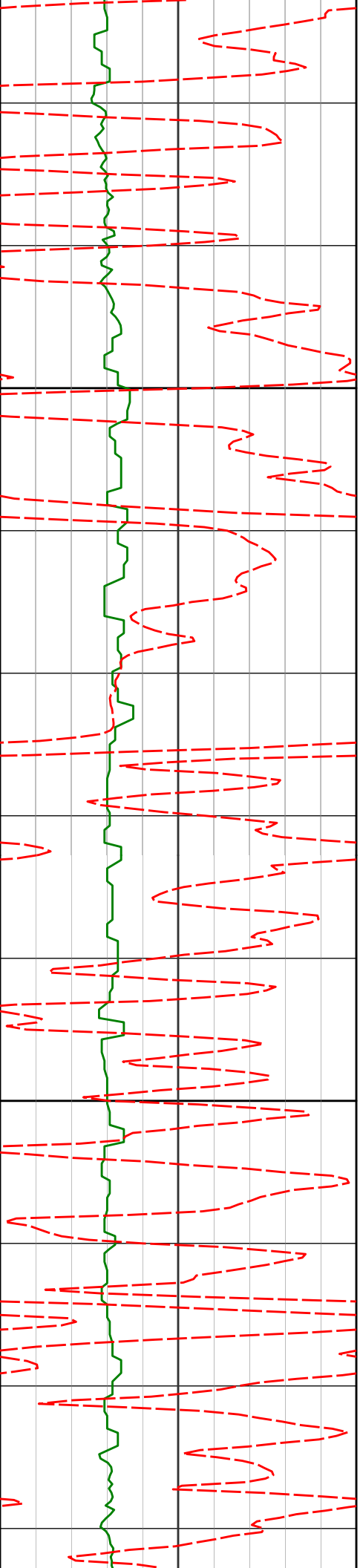
2796' 8.31° 55.42° 2787.62' -121.05'

117.73°F

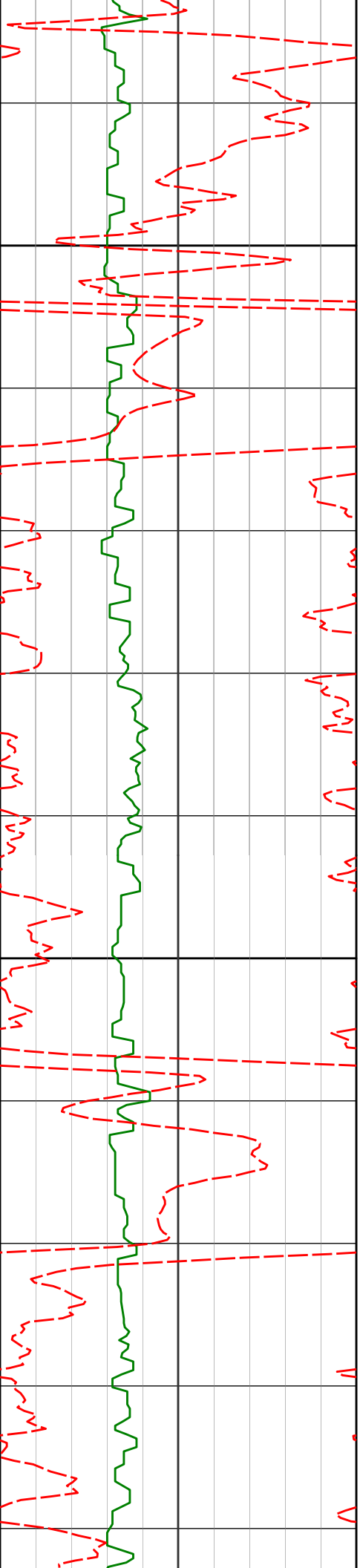
2800



					117.73°F
2890'	8.58°	61.09°	2880.60'	-132.75'	117.73°F
					119.91°F
2984'	7.91°	58.60°	2973.63'	-144.38'	119.91°F
					122.11°F



					122.11°F
3079'	7.08°	57.75°	3067.82'	-154.89'	
3100					
					122.11°F
3174'	7.67°	58.43°	3162.03'	-165.22'	
					124.30°F
3200					
					124.30°F
3268'	5.97°	58.28°	3255.36'	-174.70'	



3300

3400

3363'	6.13°	66.14°	3349.83'	-183.52'	

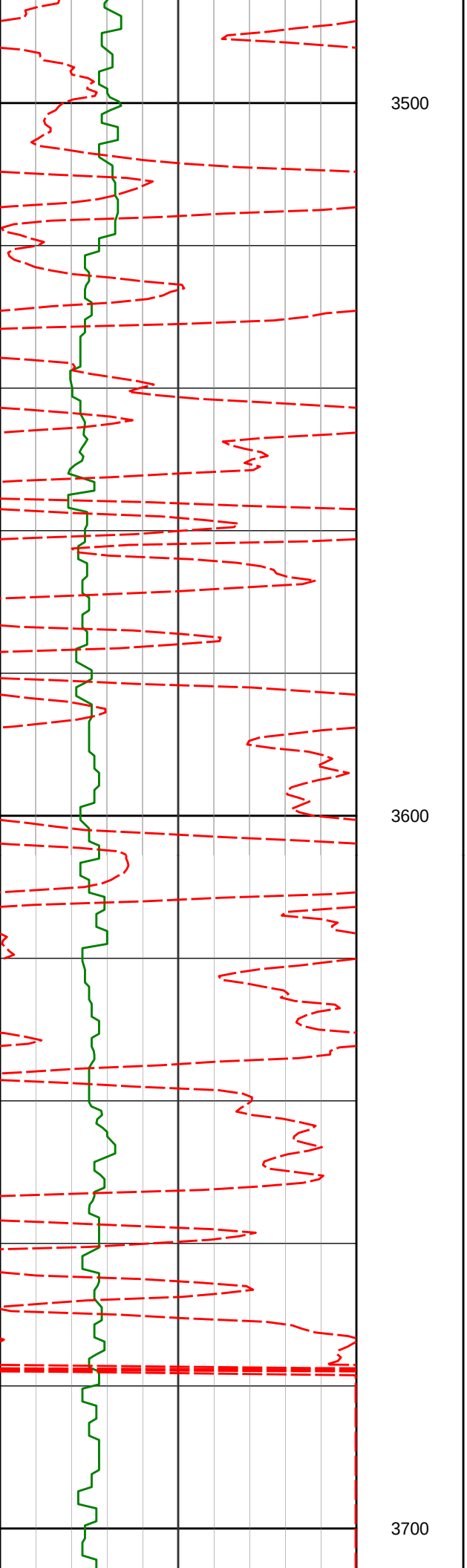
124.30°F

125.96°F

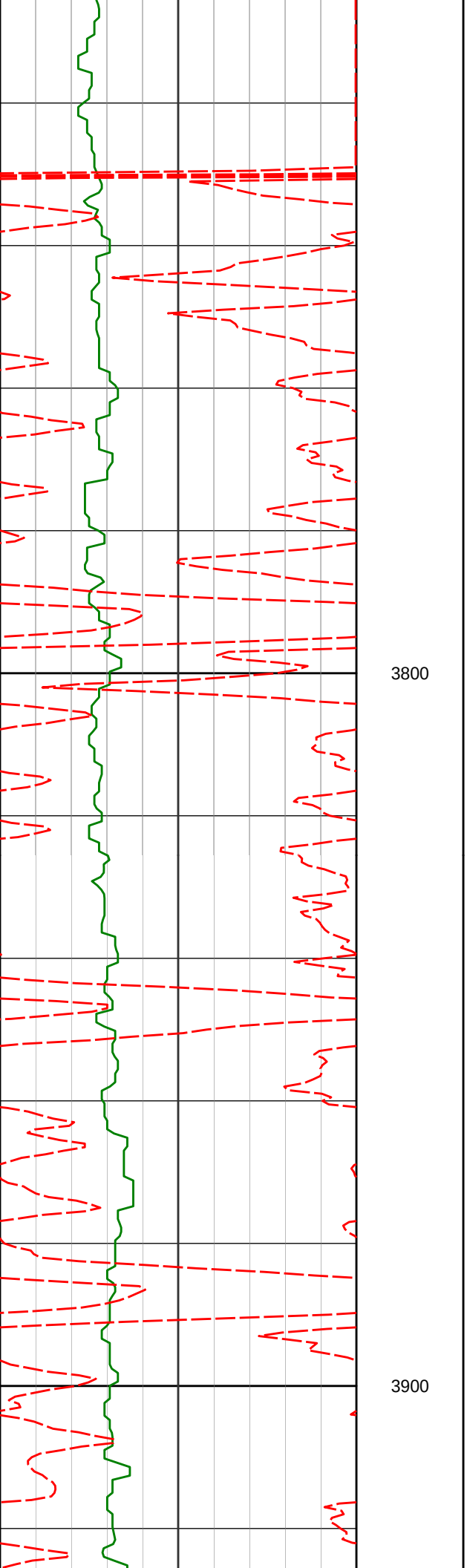
126.52°F

126.52°F

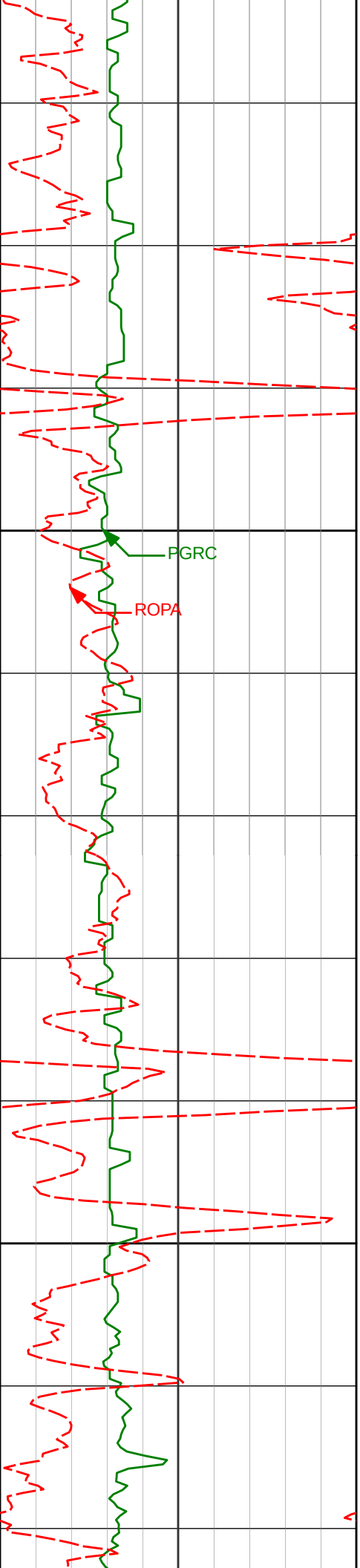
128.73°F



					128.73°F
3552'	7.41°	71.43°	3537.52'	-204.27'	
					128.73°F
					128.73°F
3646'	7.82°	69.85°	3630.69'	-216.00'	
					130.96°F
					130.96°F



3741'	8.33°	67.82°	3724.75'	-228.42'	130.96°F
					131.38°F
3836'	8.49°	66.85°	3818.72'	-241.22'	133.20°F
					133.20°F
3930'	7.52°	66.24°	3911.81'	-253.22'	135.45°F



135.45°F

4000

135.45°F

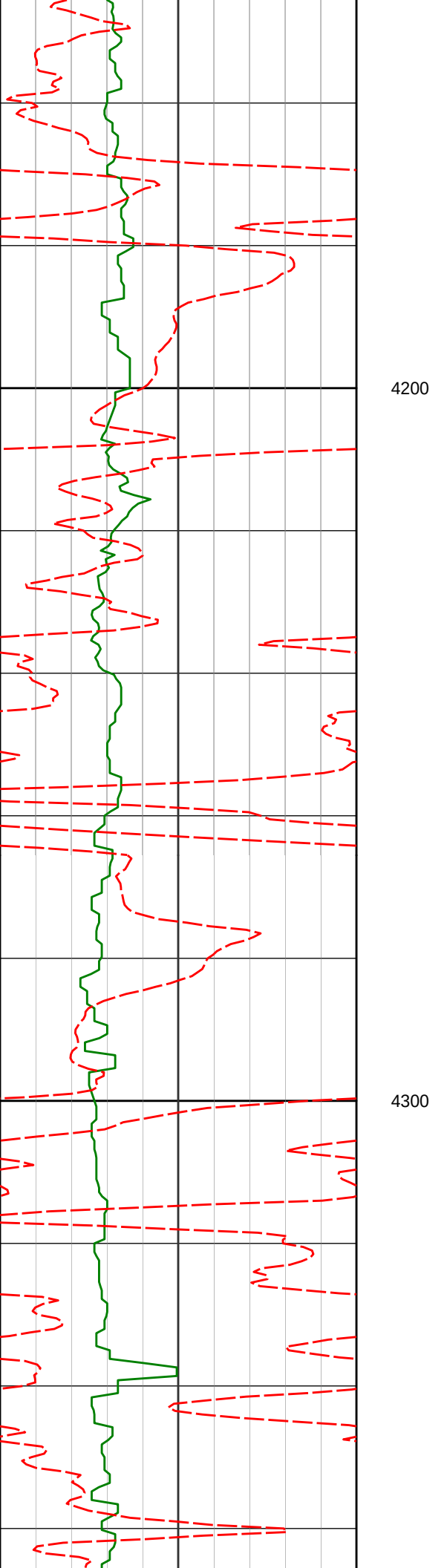
135.45°F

137.70°F

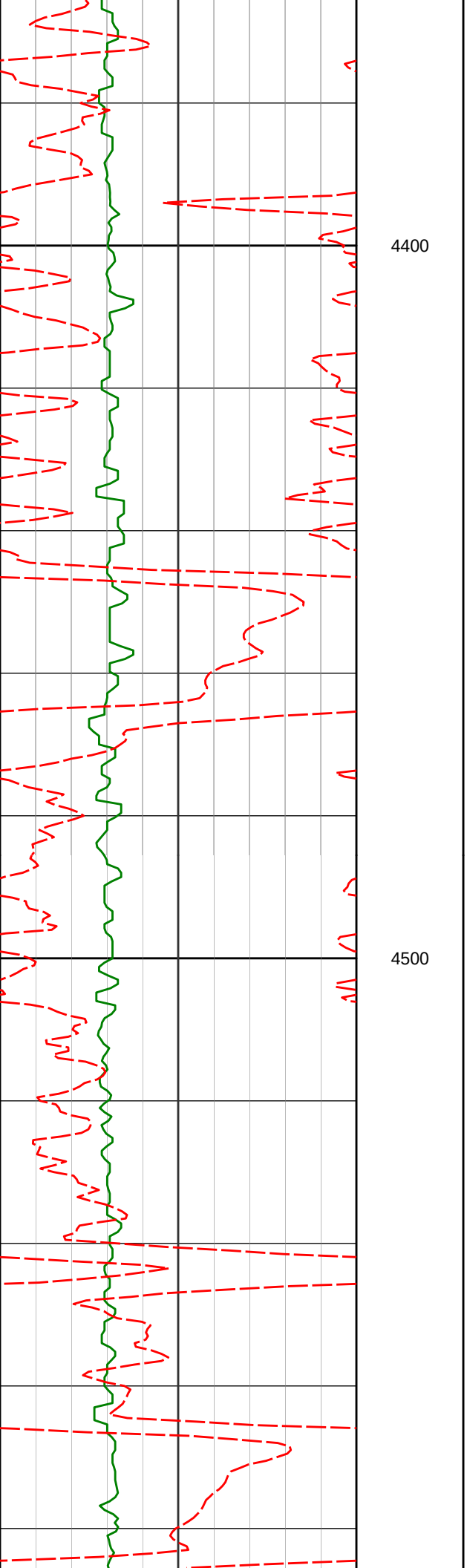
4100

4120' 5.36° 63.62° 4100.60' -272.52'

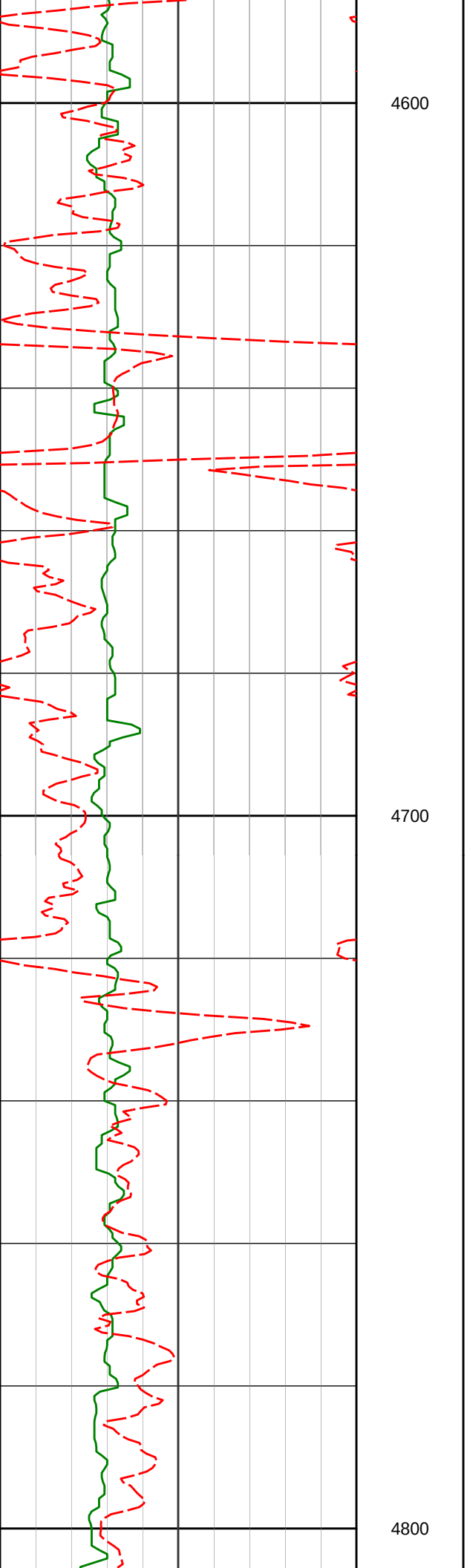
136.76°F



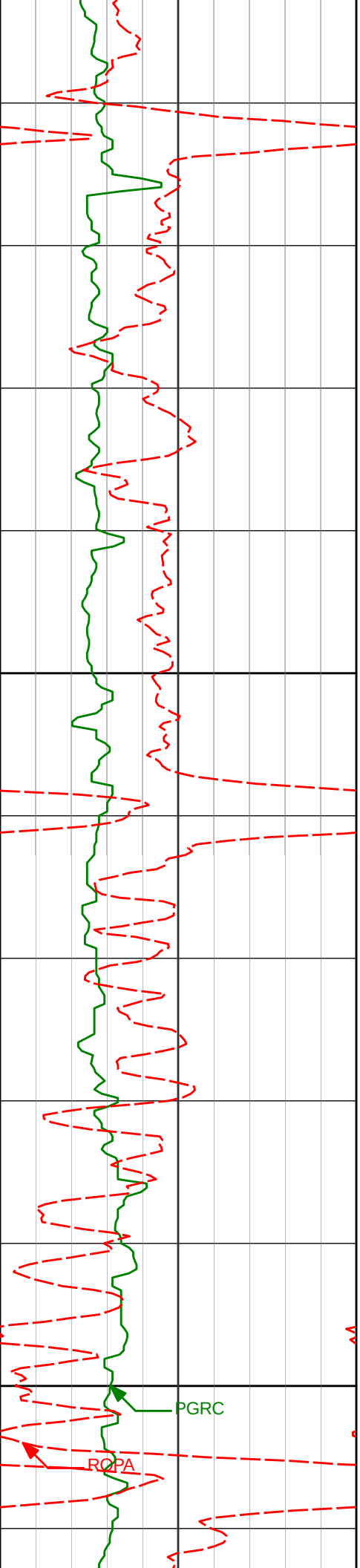
					137.03°F
4214'	6.57°	87.00°	4194.10'	-281.82'	
					137.70°F
					137.70°F
4309'	8.95°	89.40°	4288.22'	-294.64'	
					137.70°F
					139.96°F



4404'	9.02°	86.53°	4382.06'	-309.47'	
					139.96°F
					141.46°F
4498'	7.78°	77.02°	4475.05'	-323.02'	
					142.05°F
					140.31°F



					142.25°F
					142.94°F
4688'	8.31°	69.74°	4663.18'	-348.41'	
					143.57°F
					142.25°F
4783'	7.02°	65.11°	4757.33'	-360.10'	
					144.54°F



4877'	6.67°	62.53°	4850.66'	-370.14'

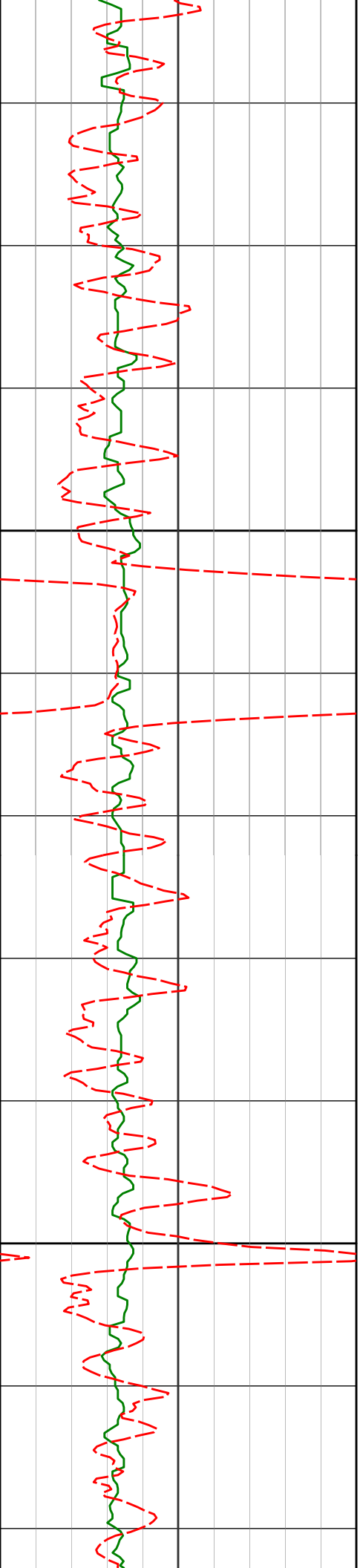
145.28°F

146.84°F

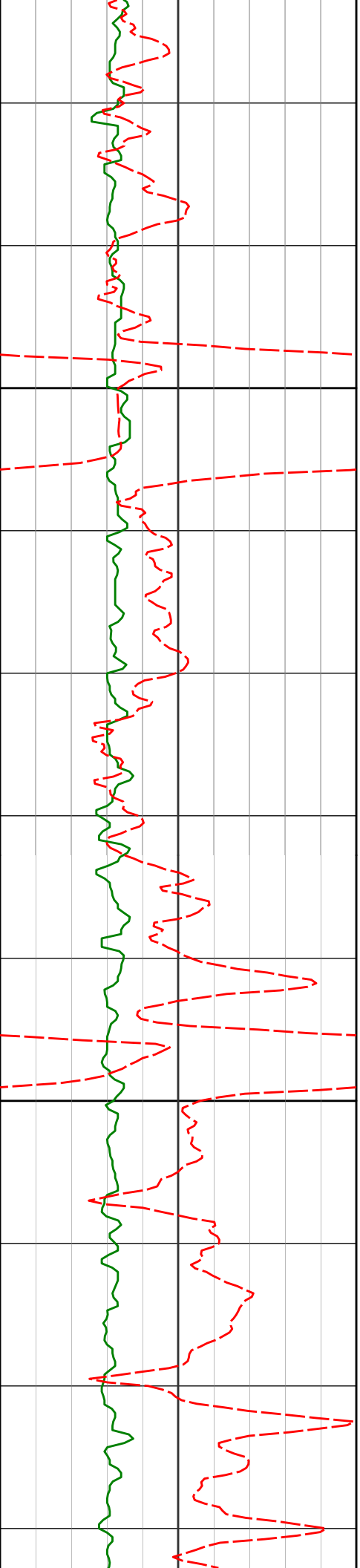
146.84°F

147.20°F

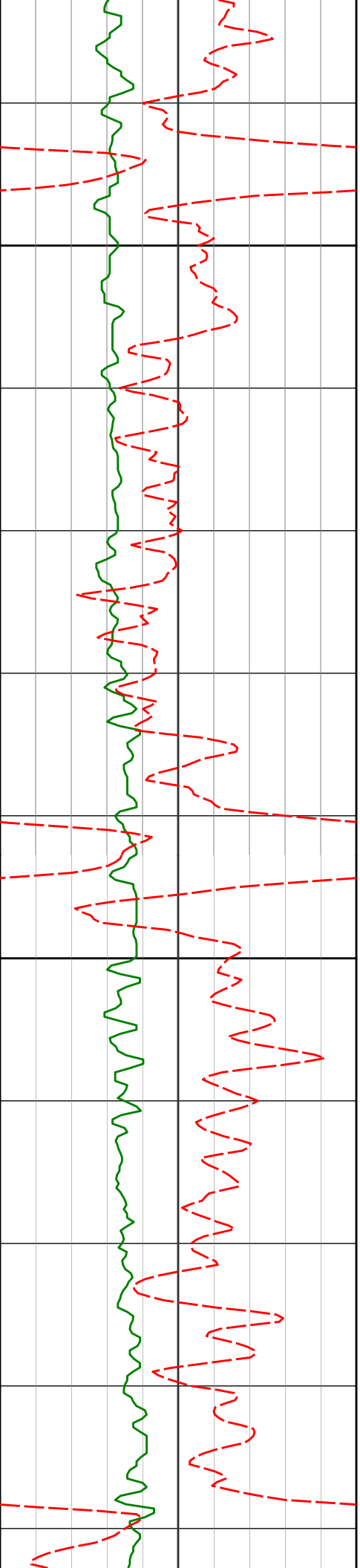
149.14°F



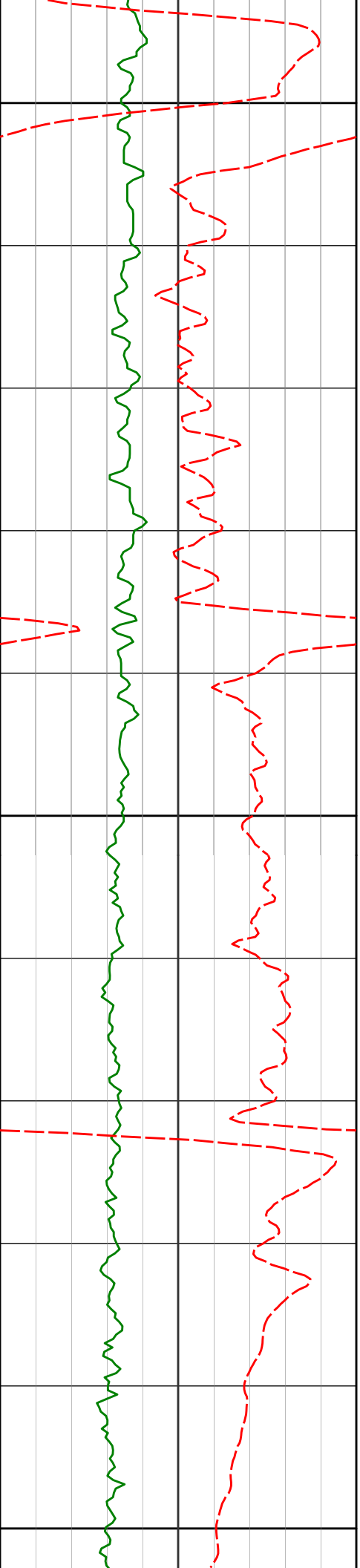
5067'	4.78°	56.29°	5039.71'	-386.48'	149.14°F
					150.12°F
5161'	3.96°	53.89°	5133.44'	-392.35'	151.47°F
					150.46°F
					149.14°F



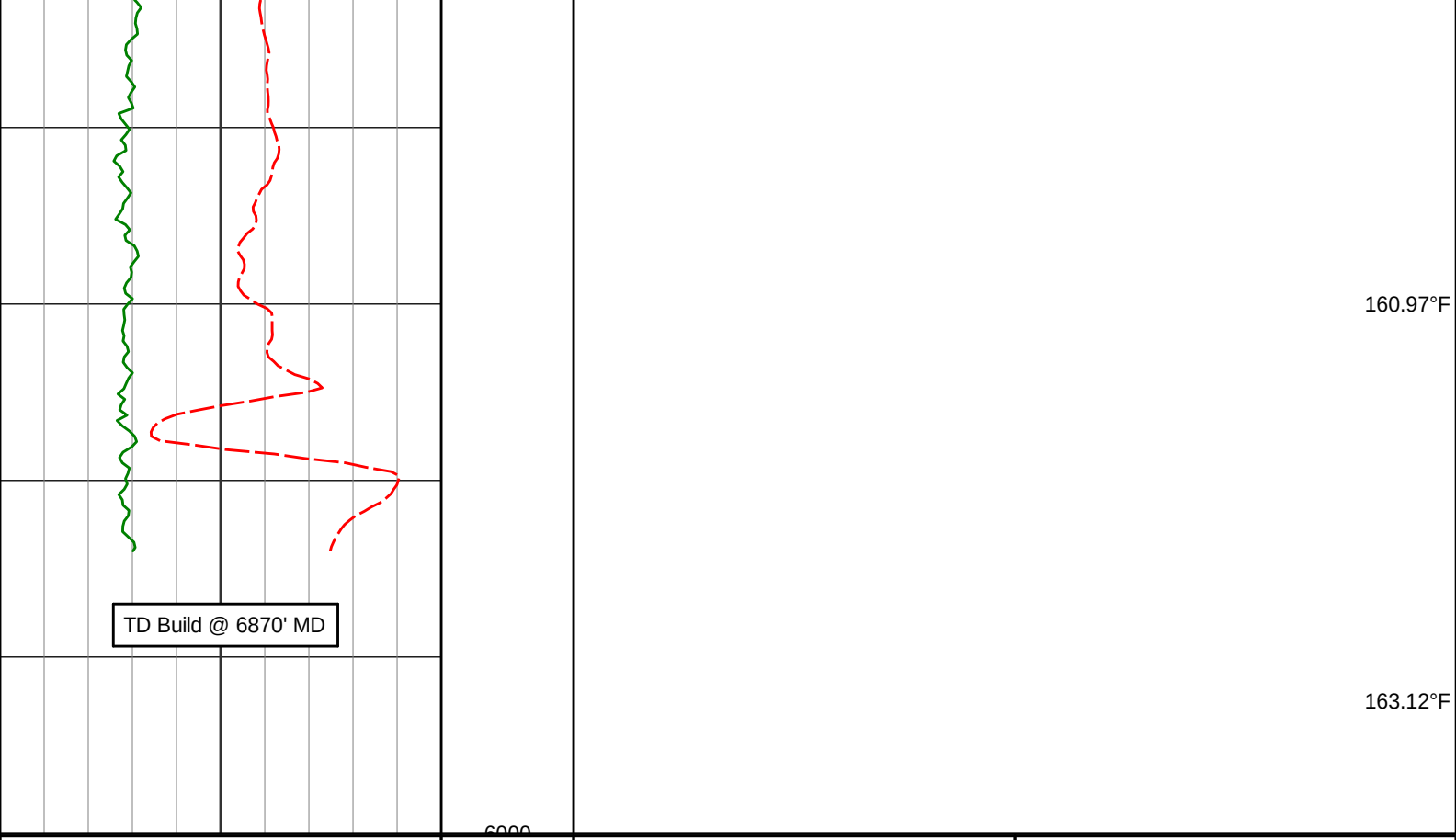
5300					149.14°F
					149.28°F
	5351'	1.97°	50.96°	5323.17'	-400.17'
					151.33°F
5400					151.47°F
	5445'	2.27°	25.49°	5417.11'	-402.22'
					151.47°F



					151.47°F
5540'	1.89°	12.49°	5512.05'	-403.35'	
					153.00°F
					153.79°F
5634'	2.10°	12.02°	5605.99'	-404.04'	
					153.53°F
					152.87°F



5729'	1.64°	346.96°	5700.94'	-404.08'	155.62°F
					156.13°F
5824'	2.43°	27.27°	5795.88'	-404.68'	156.13°F
					157.04°F
5918'	6.35°	285.15°	5889.68'	-400.56'	159.94°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Engery
70 Ranch State BB18-622
Wattenburg
Weld Colorado
USA
CA-XX-0902500206

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
845.00	0.52	7.50	844.99	3.77 N	0.50 E	-0.48	0.06
940.00	0.52	11.07	939.98	4.63 N	0.64 E	-0.62	0.03
1034.00	0.65	14.50	1033.98	5.57 N	0.85 E	-0.83	0.14
1127.00	0.71	16.00	1126.97	6.63 N	1.14 E	-1.12	0.06
1220.00	0.81	25.88	1219.96	7.78 N	1.59 E	-1.56	0.18
1313.00	0.89	22.29	1312.95	9.04 N	2.15 E	-2.12	0.10
1406.00	0.86	17.51	1405.94	10.38 N	2.64 E	-2.60	0.08
1499.00	0.91	18.05	1498.93	11.75 N	3.08 E	-3.04	0.05
1683.00	0.79	21.48	1682.91	14.31 N	3.99 E	-3.94	0.07
1776.00	0.66	30.68	1775.91	15.37 N	4.50 E	-4.45	0.18
1869.00	4.42	71.27	1868.80	16.98 N	8.17 E	-8.11	4.23
1962.00	6.51	71.26	1961.37	19.83 N	16.55 E	-16.48	2.25
2146.00	6.88	79.08	2144.12	25.26 N	37.25 E	-37.16	0.53
2240.00	8.60	75.30	2237.26	28.11 N	49.58 E	-49.48	1.91

2333.00	8.27	75.61	2329.26	31.54 N	62.78 E	-62.67	0.36
2425.00	8.06	74.05	2420.32	34.96 N	75.40 E	-75.27	0.33
2517.00	7.28	69.43	2511.50	38.78 N	87.06 E	-86.92	1.09
2610.00	8.53	58.38	2603.62	44.47 N	98.45 E	-98.29	2.11
2796.00	8.31	55.42	2787.62	59.32 N	121.26 E	-121.05	0.26
2890.00	8.58	61.09	2880.60	66.57 N	132.99 E	-132.75	0.93
2984.00	7.91	58.60	2973.63	73.33 N	144.64 E	-144.38	0.81
3079.00	7.08	57.75	3067.82	79.85 N	155.17 E	-154.89	0.88
3174.00	7.67	58.43	3162.03	86.30 N	165.52 E	-165.22	0.62
3268.00	5.97	58.28	3255.36	92.15 N	175.02 E	-174.70	1.81
3363.00	6.13	66.14	3349.83	96.80 N	183.86 E	-183.52	0.89
3552.00	7.41	71.43	3537.52	104.76 N	204.64 E	-204.27	0.75
3646.00	7.82	69.85	3630.69	108.89 N	216.38 E	-216.00	0.49
3741.00	8.33	67.82	3724.75	113.71 N	228.82 E	-228.42	0.61
3836.00	8.49	66.85	3818.72	119.07 N	241.64 E	-241.22	0.23
3930.00	7.52	66.24	3911.81	124.28 N	253.65 E	-253.22	1.04
4120.00	5.36	63.62	4100.60	133.23 N	272.99 E	-272.52	1.15
4214.00	6.57	87.00	4194.10	135.46 N	282.30 E	-281.82	2.86
4309.00	8.95	89.40	4288.22	135.82 N	295.12 E	-294.64	2.53
4404.00	9.02	86.53	4382.06	136.35 N	309.95 E	-309.47	0.48
4498.00	7.78	77.02	4475.05	138.23 N	323.50 E	-323.02	1.98
4688.00	8.31	69.74	4663.18	145.87 N	348.92 E	-348.41	0.60
4783.00	7.02	65.11	4757.33	150.69 N	360.62 E	-360.10	1.50
4877.00	6.67	62.53	4850.66	155.63 N	370.68 E	-370.14	0.49
5067.00	4.78	56.29	5039.71	165.12 N	387.06 E	-386.48	1.05
5161.00	3.96	53.89	5133.44	169.20 N	392.94 E	-392.35	0.89
5351.00	1.97	50.96	5323.17	175.13 N	400.78 E	-400.17	1.05
5445.00	2.27	25.49	5417.11	177.83 N	402.84 E	-402.22	1.04
5540.00	1.89	12.49	5512.05	181.06 N	403.99 E	-403.35	0.64
5634.00	2.10	12.02	5605.99	184.25 N	404.68 E	-404.04	0.22
5729.00	1.64	346.96	5700.94	187.27 N	404.74 E	-404.08	0.97
5824.00	2.43	27.27	5795.88	190.39 N	405.35 E	-404.68	1.67
5918.00	6.35	285.15	5889.68	193.52 N	401.24 E	-400.56	7.72
6013.00	19.33	277.95	5982.11	197.08 N	380.51 E	-379.82	13.74
6107.00	23.06	269.19	6069.76	198.97 N	346.67 E	-345.97	5.20
6202.00	26.83	267.82	6155.88	197.89 N	306.63 E	-305.94	4.00
6296.00	36.08	268.38	6235.98	196.30 N	257.66 E	-256.97	9.85
6391.00	44.93	272.03	6308.15	196.70 N	196.04 E	-195.35	9.63
6485.00	54.16	273.82	6369.08	200.42 N	124.70 E	-123.99	9.93
6580.00	59.00	271.70	6421.39	204.20 N	45.52 E	-44.81	5.42
6627.00	63.94	270.60	6443.83	205.01 N	4.25 E	-3.53	10.72
6674.00	69.64	269.79	6462.34	205.15 N	38.93 W	39.65	12.22
6721.00	76.07	271.25	6476.19	205.57 N	83.81 W	84.53	13.99
6769.00	82.05	270.23	6485.30	206.18 N	130.91 W	131.63	12.64
6804.00	85.84	268.33	6489.00	205.74 N	165.71 W	166.43	12.11

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 270.20 DEGREES (GRID)
A TOTAL CORRECTION OF 7.58 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6804.00 FEET
IS 264.17 FEET ALONG 321.15 DEGREES (GRID)

Final survey is a straight line projection to TD.

Date Printed:17 July 2015