

Company: Noble Energy Inc

Well: Wells Ranch AE30-67-1BHNA

Field: Wattenberg

County: Weld

State: Colorado

Ultrasonic Imager

ND State

Gamma Ray - CCL Log

County: Weld

Field: Wattenberg

Location: SWNW Sec. 29, T6N, R62W

Well: Wells Ranch AE30-67-1BHNA

Company: Noble Energy Inc

Location: SWNW Sec. 29, T6N, R62W
SHL: 1959' FNL X 65' FWL

Elev.: K.B. 4788.00 ft
G.L. 4764.00 ft
D.F. 4787.00 ft

Permanent Datum: Ground Level Elev.: 4764.00 f

Log Measured From: Kelly Bushing 24.00 ft above Perm.Datum

Drilling Measured From: Kelly Bushing

API Serial No. Section: 29 Township: 6N Range: 62W

05-123-38650-0000

Logging Date 30-Apr-2014

Run Number	Run 1: USIT	
Depth Driller	11885.00 ft	
Schlumberger Depth	11885.00 ft	
Bottom Log Interval	6673.00 ft	
Top Log Interval		
Casing Fluid Type	Brine	
Salinity		
Density	8.4 lbm/gal	
Fluid Level	0.00 ft	
BIT/CASING/TUBING STRING		
Bit Size	8.75 in	
From	0.00 ft	
To	11885.00 ft	
Casing/Tubing Size	7 in	
Weight	26 lbm/ft	
Grade	P110	
From	0.00 ft	
To	6770.00 ft	
Max Recorded Temperatures		
Logger on Bottom	Time	
Unit Number	Location:	Ft. Morgan, CO
Recorded By	Tim Hoffman	
Witnessed By		

Disclaimer

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Contents

1. Header
2. Disclaimer
3. Contents
4. Well Sketch
5. Borehole Size/Casing/Tubing Record
6. Operational Run Summary
7. Remarks and Equipment Summary
8. Depth Summary
9. Run1: USIT ND State Log

9.1 Integration Summary

9.2 Software Version

9.3 Composite Summary

9.4 Log (ND State Only)

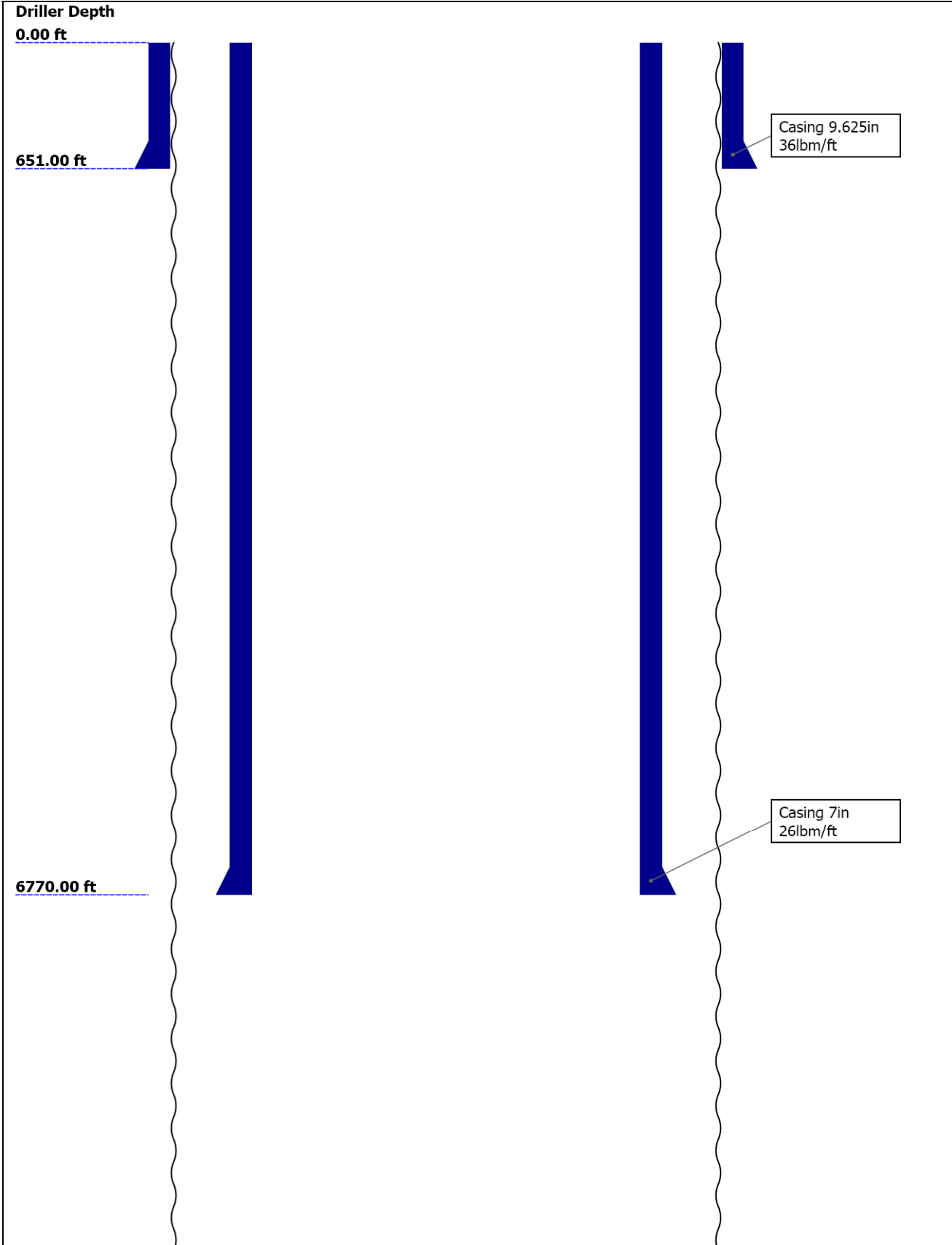
9.5 Parameter Listing
10. USI Goodwin

10.1 USI Fluid Properties Measurement

10.2 USI Goodwin

- 11. Run1: USIT Correlation Log
 - 11.1 Integration Summary
 - 11.2 Log (Correlation 5 Inch)
- 12. XYZ (USI Fluid Acoustic Slowness vs Depth 3.0 in)
- 13. XYZ (USI Acoustic Impedance of Mud vs Depth 3.0 in)
- 14. Tail

Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	8.75					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	11885					
Bottom Logger (ft)	11885					
Casing						
Size (in)	9.625	7				
Weight (lbm/ft)	36	26				
Inner Diameter (in)	8.921	6.276				
Grade	J55	P110				
Top Driller (ft)	0	0				
Top Logger (ft)	0	0				
Bottom Driller (ft)	651	6770				
Bottom Logger (ft)	651	6770				

Operational Run Summary

Parameter (unit)	Run1: USIT					
Date Log Started	30-Apr-2014					
Time Log Started	08:33:35					
Date Log Finished	30-Apr-2014					
Time Log Finished	12:05:05					
Top Log Interval (ft)	NaN					
Bottom Log Interval (ft)	6673.00					
Total Depth (ft)	11885.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	8.750					
Logging Unit Number	3022					
Logging Unit Location	Ft. Morgan, CO					
Recorded By	Tim Hoffman					
Witnessed By						
Service Order Number	CX03-00025					

Remarks and Equipment Summary

Run1: USIT: Toolstring			Run1: USIT: Remarks	
Equip name	Length	MP name	Offset	<div> <div>This is the first run in hole</div> <div>Toolstring run as per tool sketch</div> <div>12.5 ppg lead cement</div> <div>13.8 ppg tail cement</div> <div>0 PSI repeat pass</div> <div>3000 PSI main pass</div> <div>500 PSI High resolution pass from 500' to surface</div> <div>Crew: Jay Musgrave, Troy Ocanas</div> </div>
LEH-QT	32.75			
LEH-QT				
DTC-H:880	29.84			
3		CTEM	28.94	
ECH-KC:1035		HV	0.00	
4		ToolStat	26.84	
DTC-H:8803		us		
		TelStatus	26.84	
SGT-N:984	26.84			
1		GR	25.92	
SGH-K:2693				
SGD-TAA:213				
65				
SGC-TB:9841				
CME-AF	21.34			
AH-184:39	17.54			
06				
USIT-E:977	15.54			
ECH-MFA:19				
69				
USAC-A:977				
USIS-A:2797				
USSC-B:1738				
USRS-B:938				
USI-SENSOR				
		USI Sens	0.38	
		or		
		TOOL_ZERO		
		Head Ten		
		sion		
<div> <div>Lengths are in ft</div> <div>Maximum Outer Diameter = 4.645 in</div> <div>Line: Sensor Location, Value: Gating Offset</div> <div>All measurements are relative to TOOL_ZERO</div> </div>				

Depth Summary

Run1: USIT			
Depth Measuring Device			
Type	IDW-B		
Serial Number	6239		
Calibration Date	10-Jan-2014		
Calibrator Serial Number			
Calibration Cable Type	7-396P LXS		

Wheel Correction 1	-4		
Wheel Correction 2	-2		

Tension Device			
Type	CMTD-B/A		
Serial Number	1109		
Calibration Date	29-Apr-2014		
Calibrator Serial Number	78135		
Number of Calibration Points	10		
Calibration Root Mean Square Error	10		
Calibration Peak Error	20		

Logging Cable			
Type	7-39P-LXS		
Serial Number			
Length	11800.00 ft		
Conveyance Type	Wireline		
Rig Type			

Run1: USIT:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth policies followed
Rig Up Length At Surface		IDW used as primary depth reference. Z-chart used as secondary
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

Run1: USIT

ND State Log

Software Version

Acquisition System		Version	
MaxWell		4.0.9163.3000	
Application Patch		Patch-SP-10767_13393-4.0.9163.3001	
Computation	Description	Version	
Cementation	Cementation Computation Application	4.0.9167.3000	
Tool Elements	Description	Software Version	Firmware Version
USI-SENSOR	USIT Transducer Element	4.0.9265.3000	DSP: v01.82
SGC-TB	Scintillation Gamma Cartridge	4.0.9033.3000	

Pass Summary

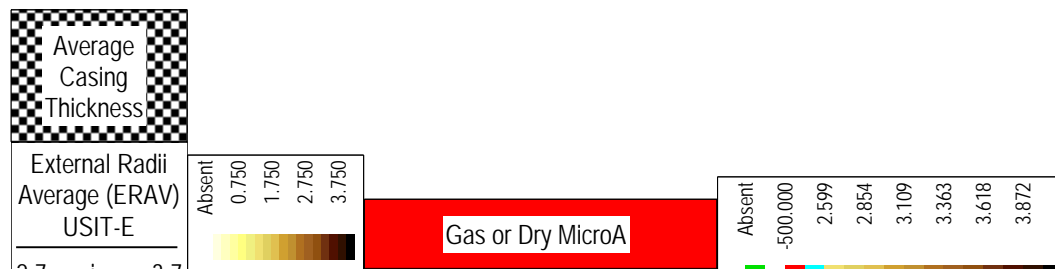
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run1: USIT	Log[3]:Up	Up	22.63 ft	6678.83 ft	30-Apr-2014 10:14:23 AM	30-Apr-2014 11:19:33 AM	ON	4.95 ft	No

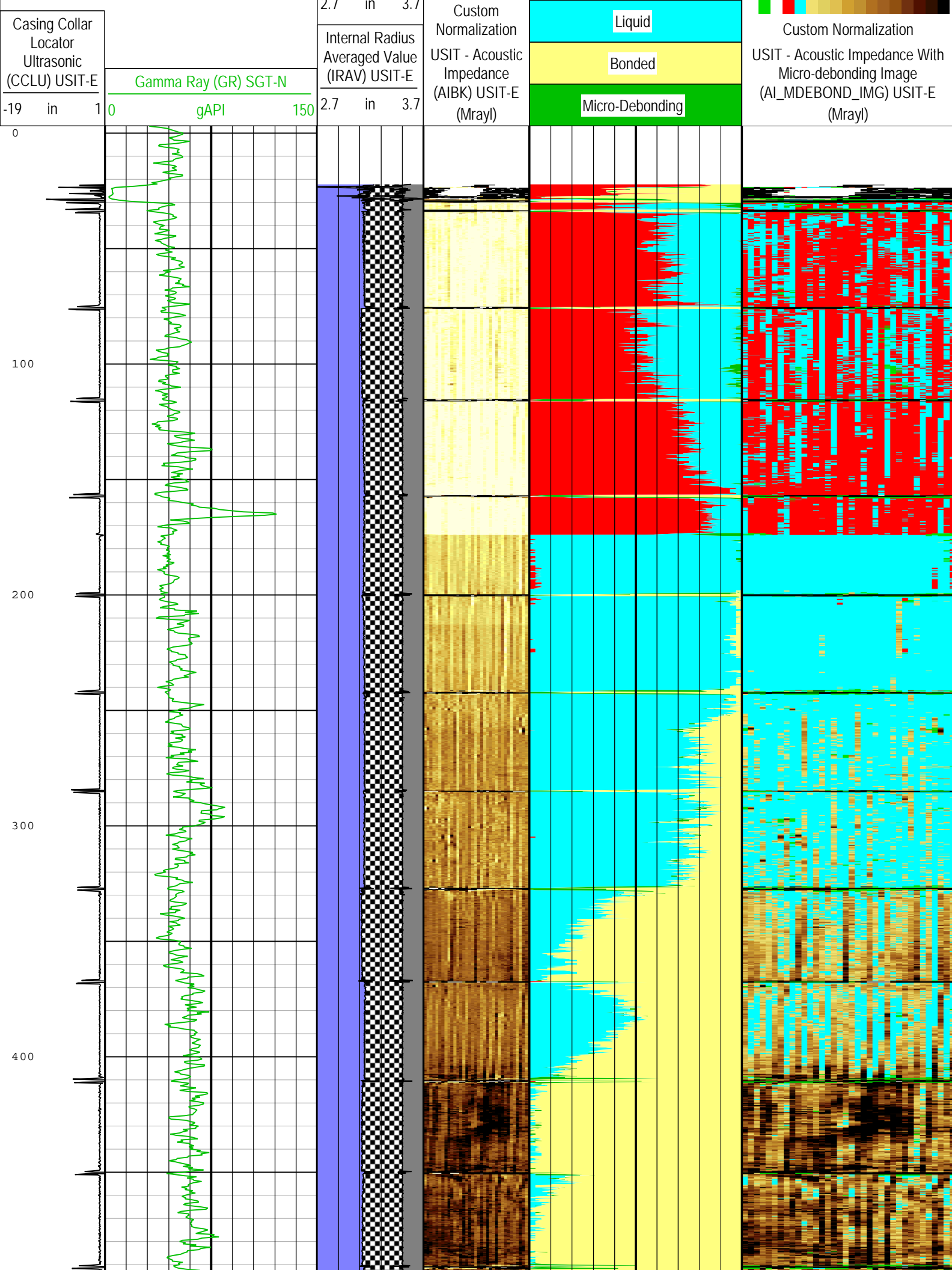
All depths are referenced to toolstring zero

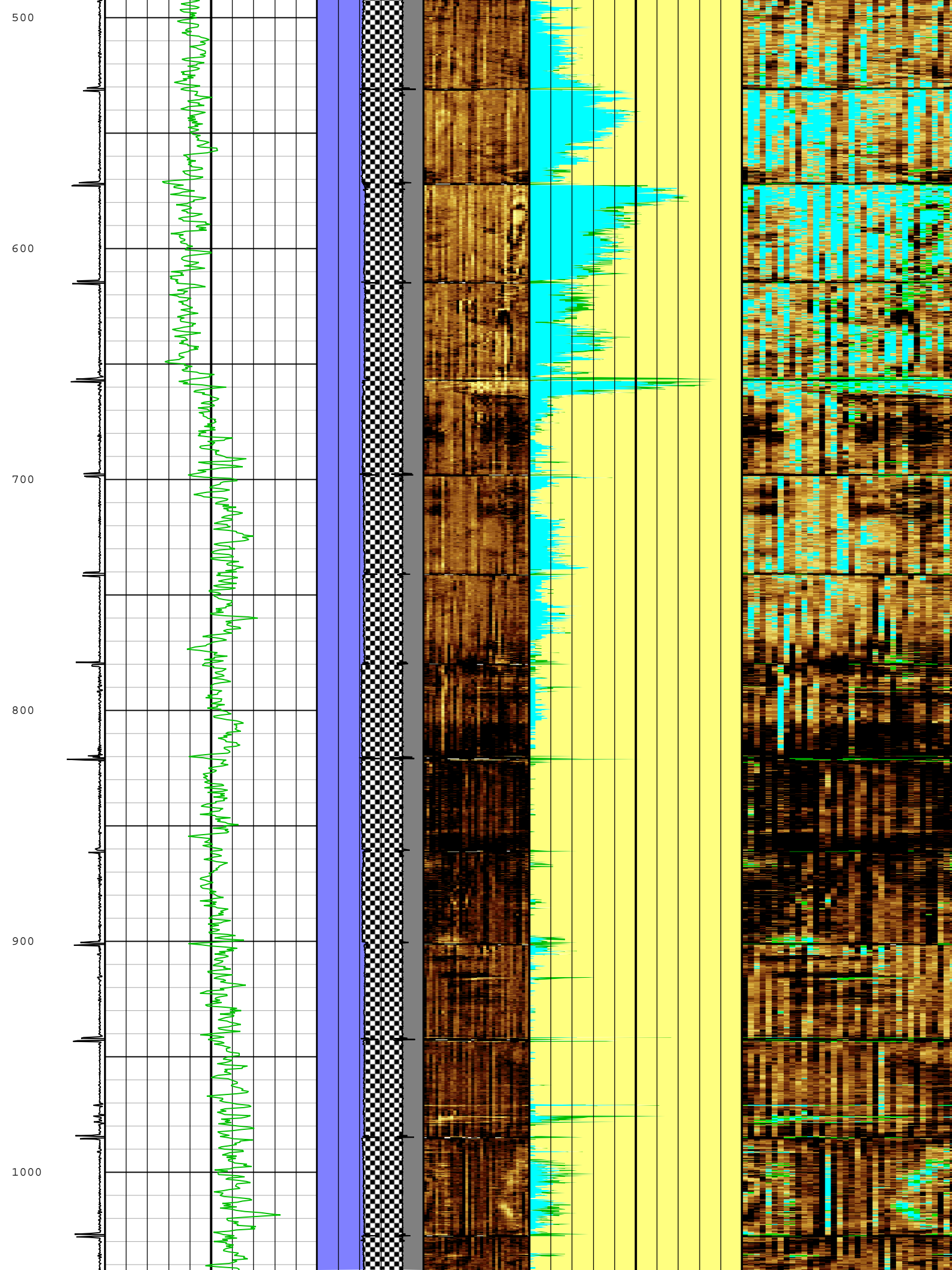
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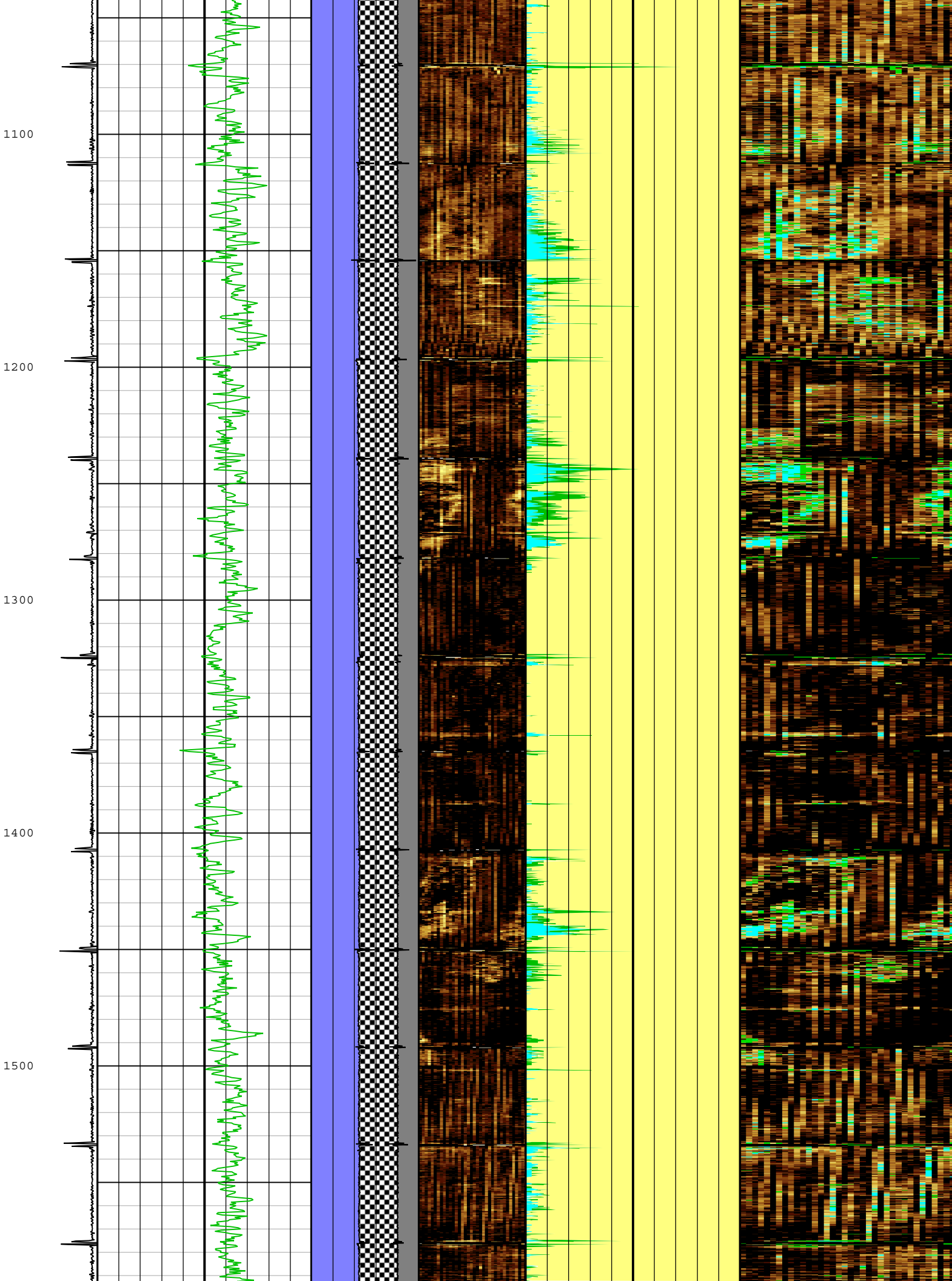
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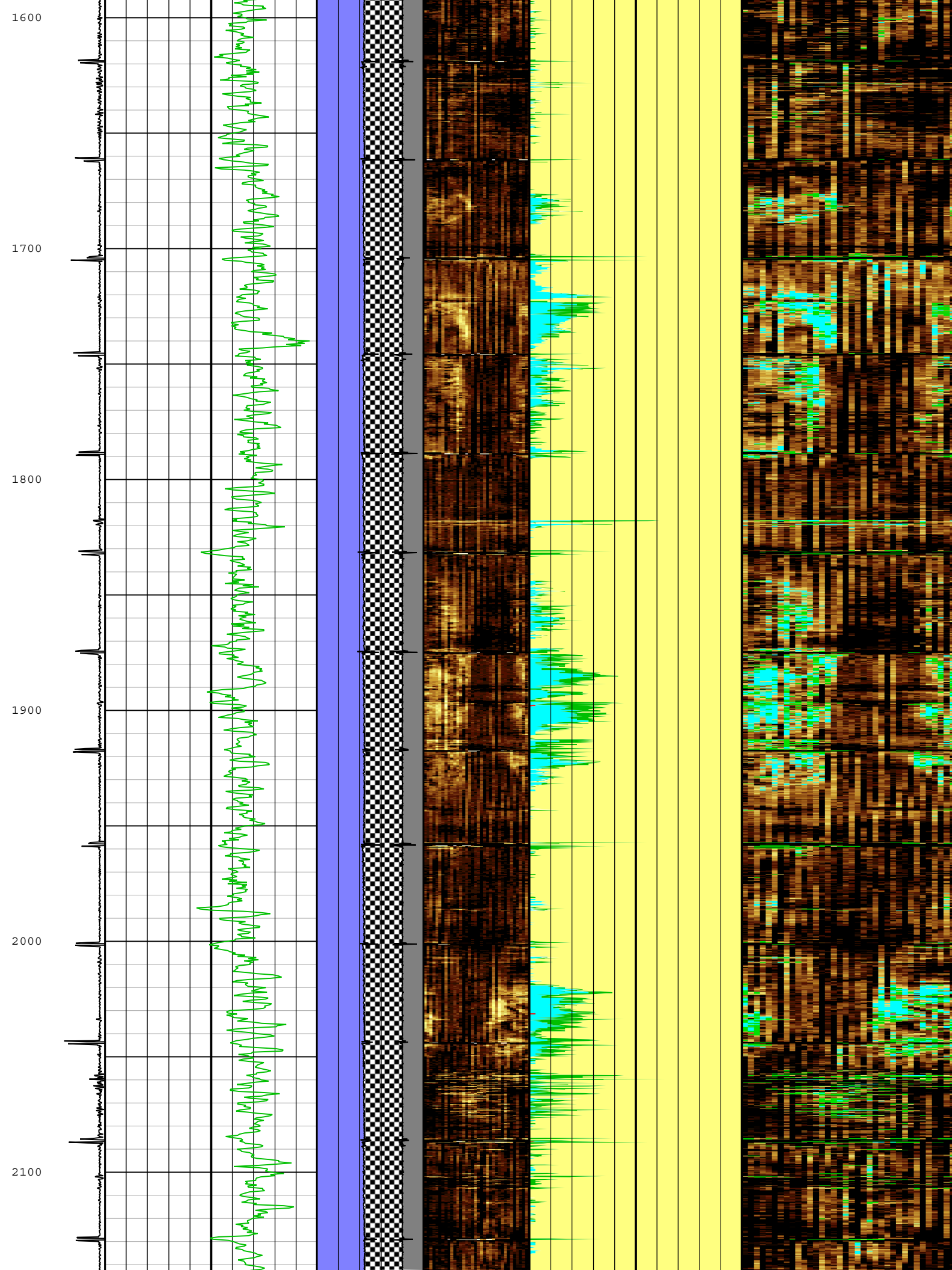
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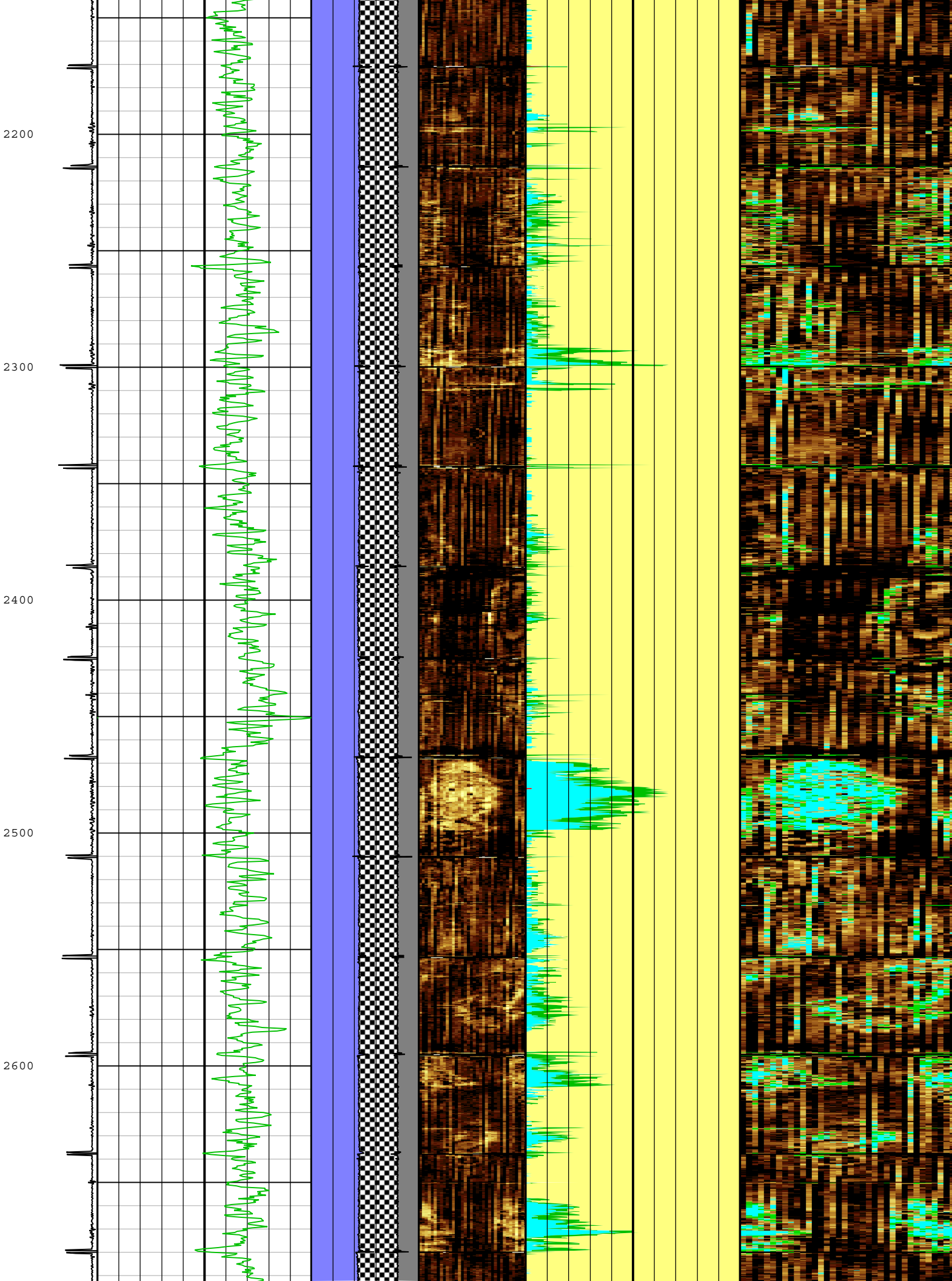


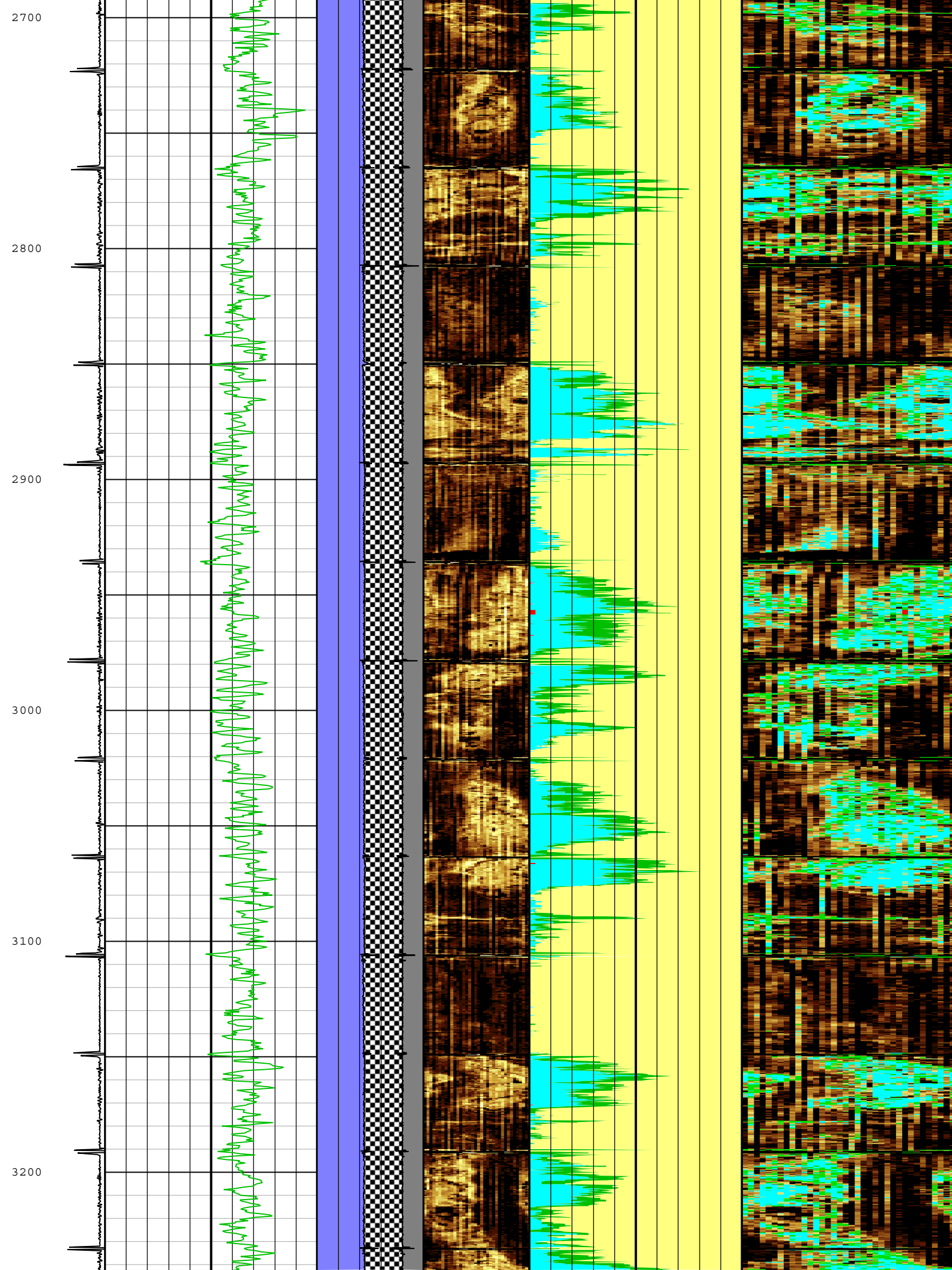


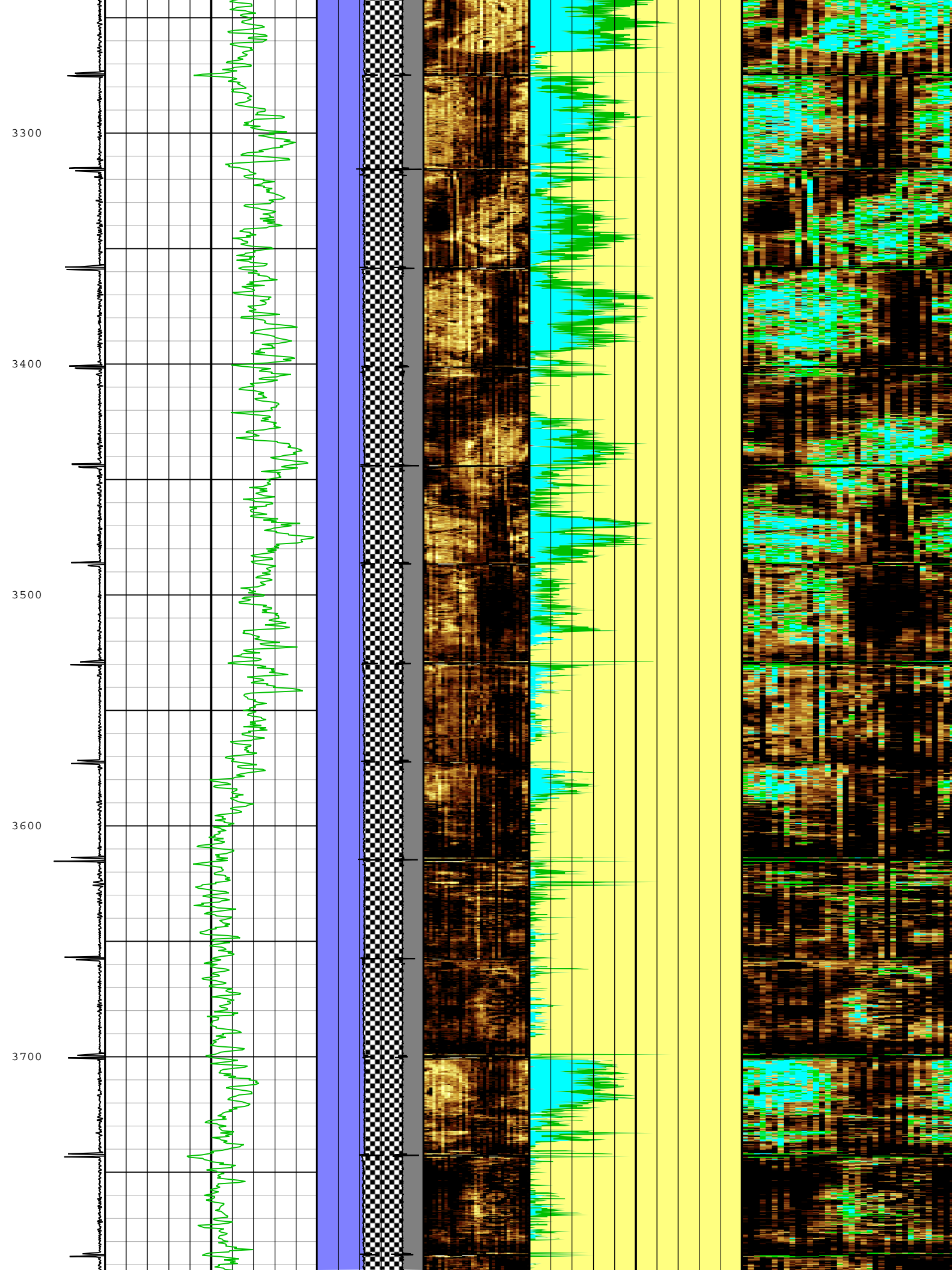


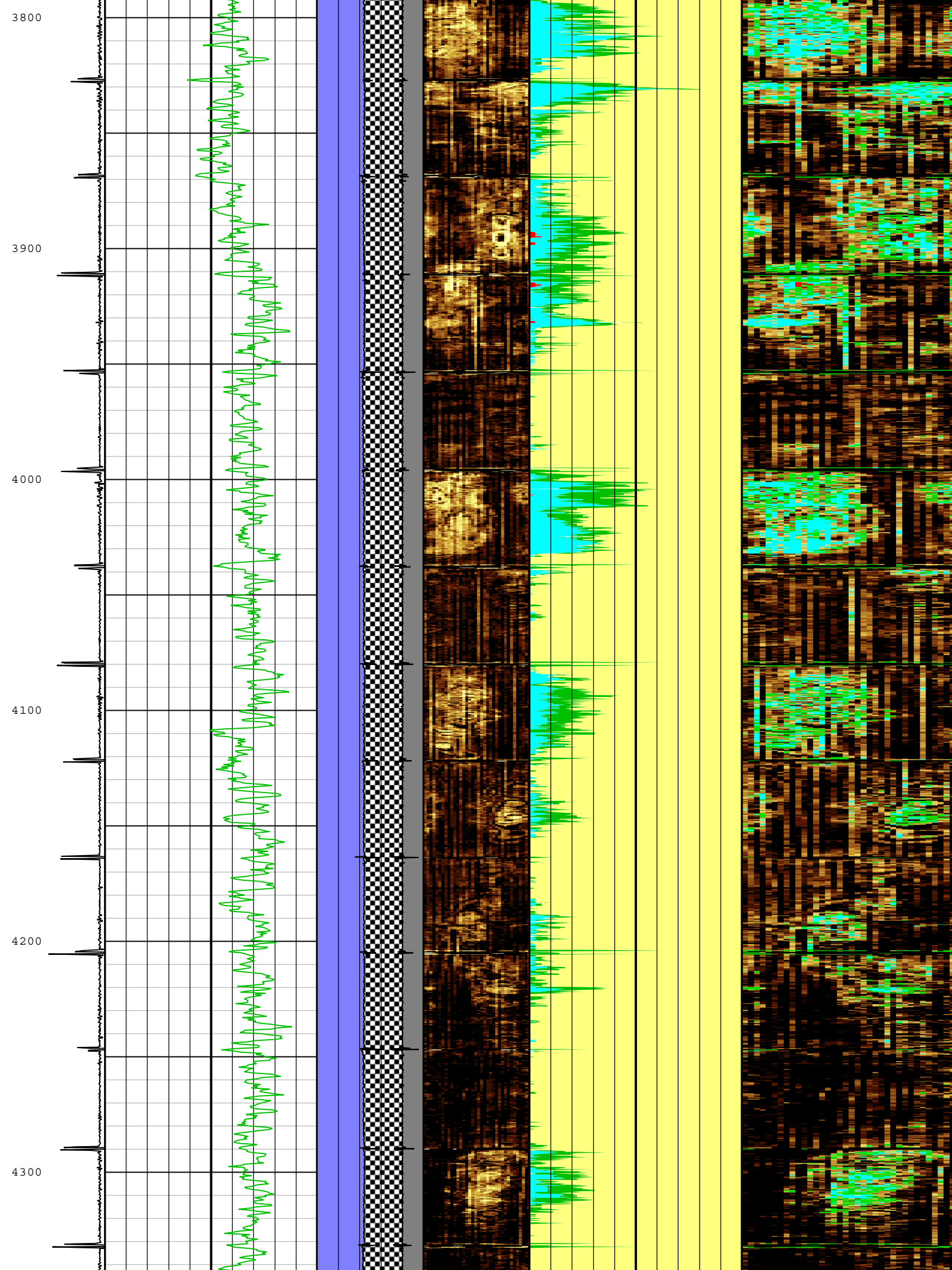


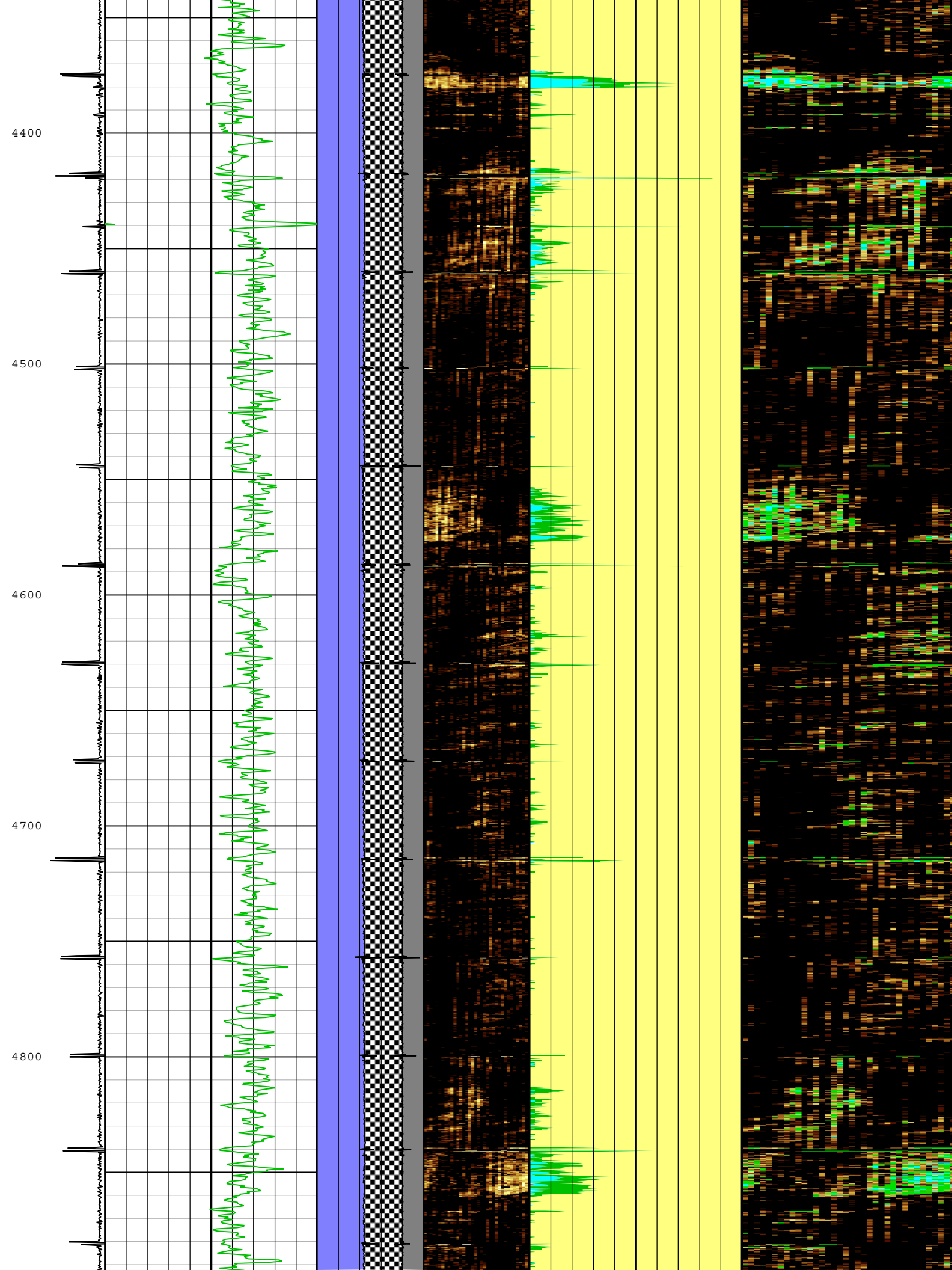


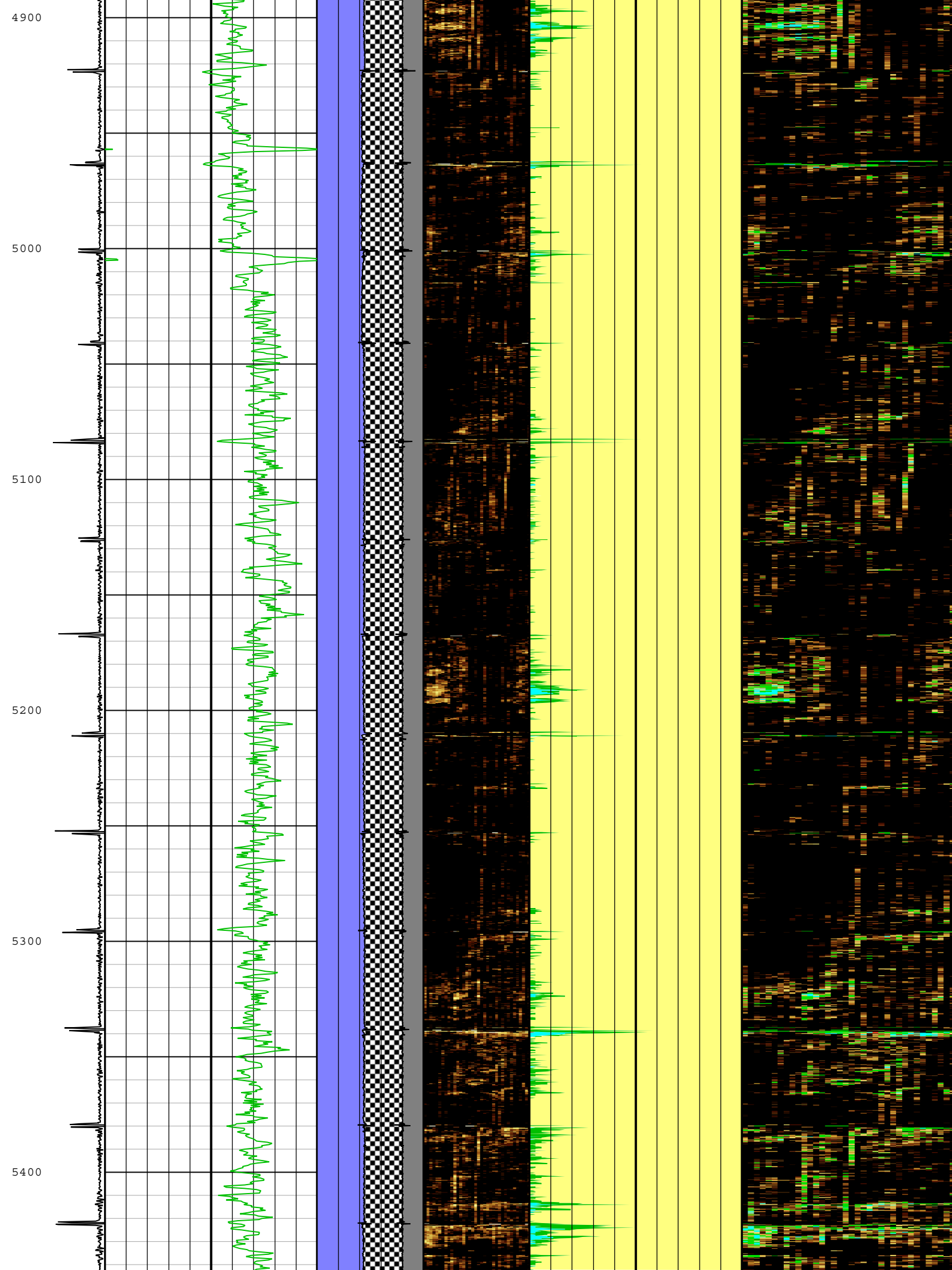












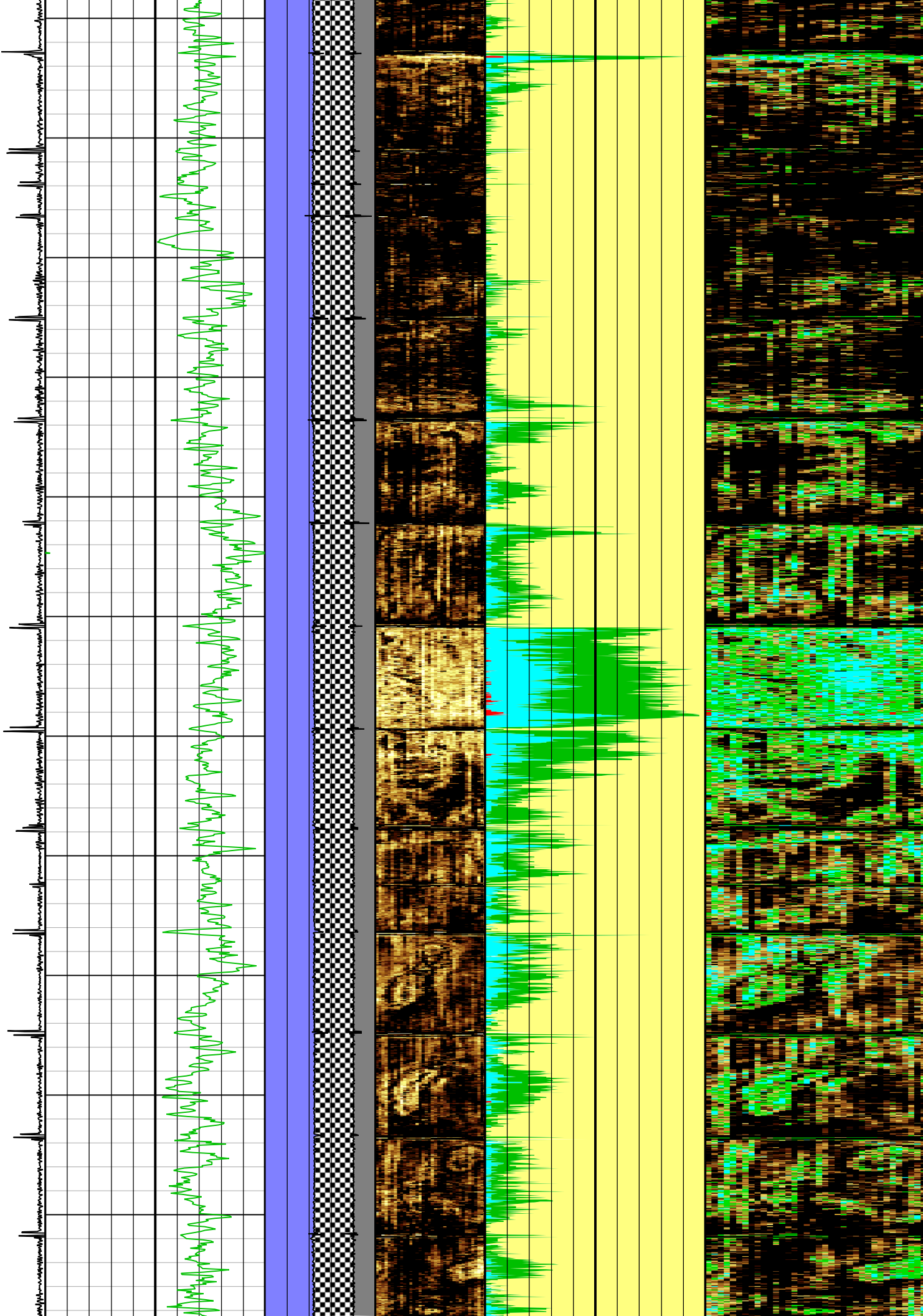
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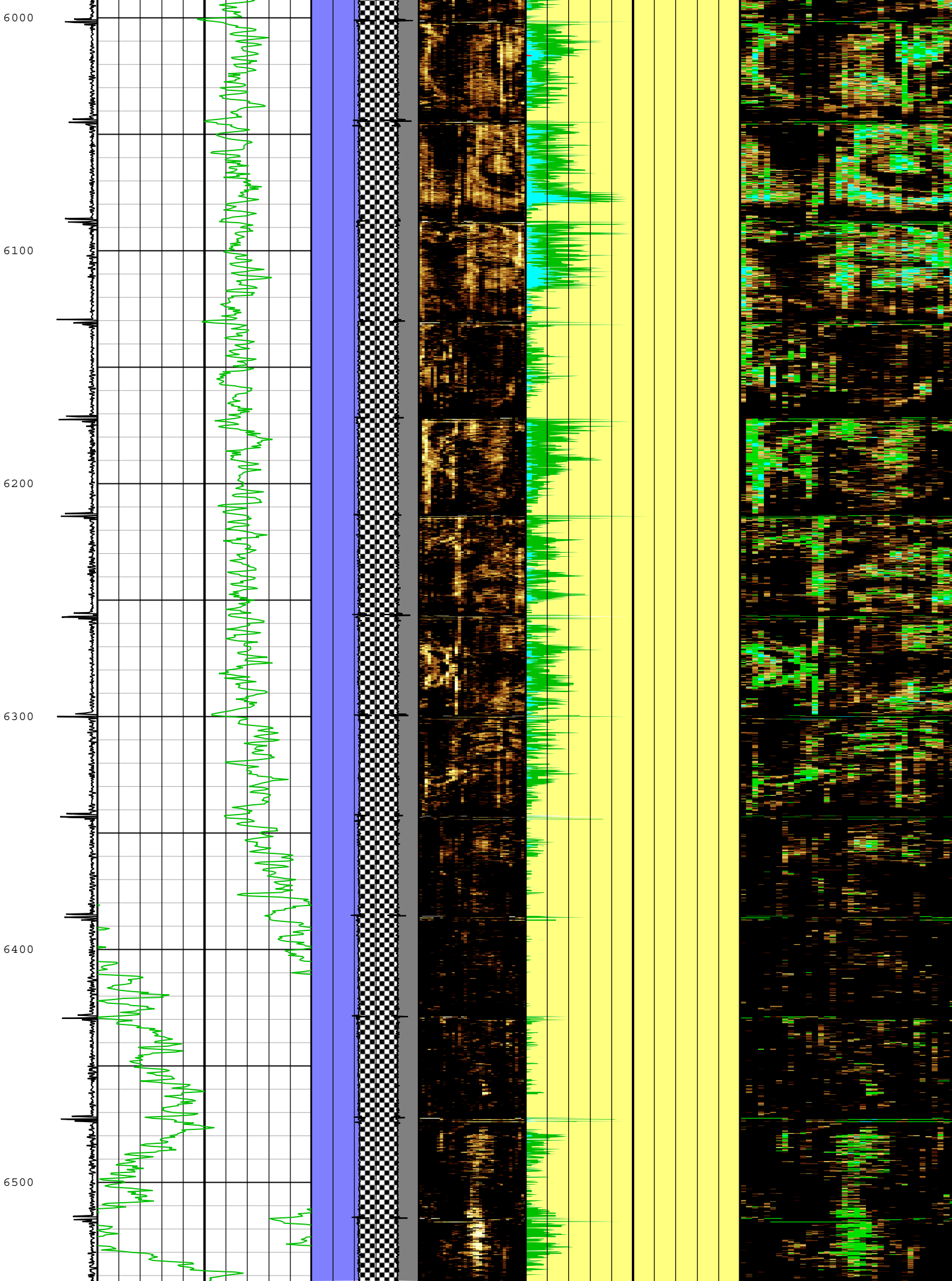
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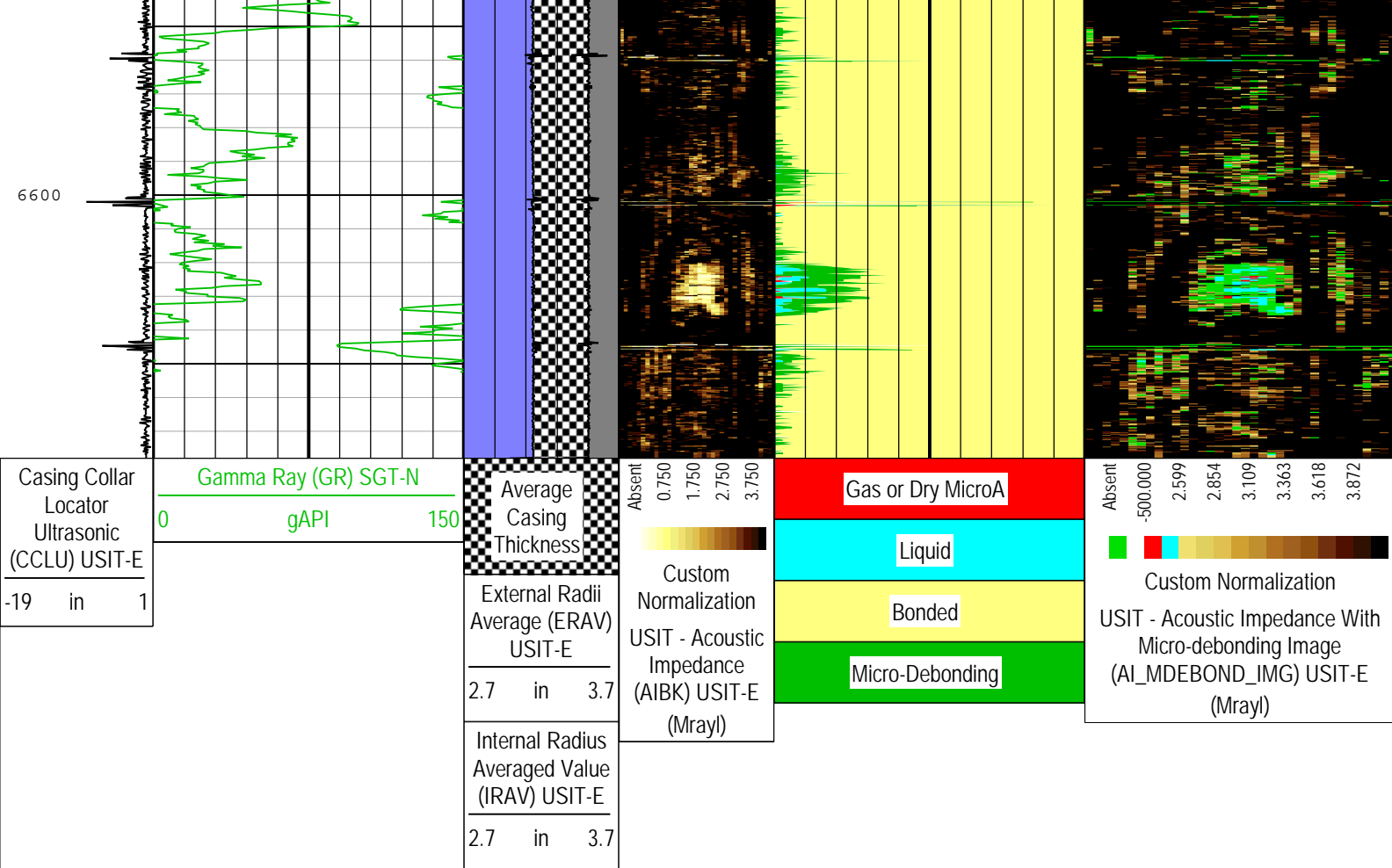
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5800

5900







TIME_1900 - Time Marked every 60.00 (s)

Description: USI Corrosion Format: Log (ND State Only) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 30-Apr-2014 12:43:35

Channel Processing Parameters				
Parameter	Description	Tool	Value	Unit
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	8.75	in
CBLO	Casing Bottom (Logger)	WLSESSION	6770	ft
CDEN	Cement Density	SGT-N	16.69	lbm/gal
CMTY	Cement Type	USIT-E	Light Cement	
CTHILGR	Nominal Casing Thickness - Zoned along logger depths	WLSESSION	0.352	in
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	190	us/ft
FDII	FPM Data Interpolation Interval	USIT-E	0	ft
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS	
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	Depth Zoned	us
RCTH	Reference Calibrator Thickness	USIT-E	0.295	in
TCUB	T^3 Processing Level	USIT-E	Loop	
THDH	Maximum Search Thickness (percentage of nominal)	USIT-E	130	%
THDL	Minimum Search Thickness (percentage of nominal)	USIT-E	70	%
TPOS	Tool Position: Centered or Eccentered	SGT-N	Centered	

UDFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	Manual	
UTHDP	Thickness Detection Policy	USIT-E	Fundamental	
VCAS	Ultrasonic Transversal Velocity in Casing	USIT-E	51.4	us/ft
ZCAS	Acoustic Impedance of Casing	USIT-E	46.25	Mrayl
ZMUD	Acoustic Impedance of Mud	Borehole	Depth Zoned	Mrayl

Depth Zone Parameters			
Parameter	Value	Start (ft)	Stop (ft)
MEAS_WLEN	22.5	0	6678
ZMUD	1.64	0	200
ZMUD	1.66	200	400
ZMUD	1.67	400	600
ZMUD	1.68	600	900
ZMUD	1.7	900	1200
ZMUD	1.71	1200	1500
ZMUD	1.73	1500	2000
ZMUD	1.75	2000	2500
ZMUD	1.77	2500	3000
ZMUD	1.78	3000	3500
ZMUD	1.79	3500	4000
ZMUD	1.8	4000	6678

All depth are actual.

Tool Control Parameters				
Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
DDT5	USIC Downhole Decimation for T5 only	USIT-E	0_NONE	
EMXV	EMEX Voltage	USIT-E	50	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
USFR	Ultrasonic Sampling Frequency	USIT-E	500000	Hz
USI_UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
USI_UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 3.0 in LF	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	6673	ft
VRES	Vertical Resolution	USIT-E	3.0 in	
WINB	Window Begin Time	USIT-E	33.87	us
WINE	Window End Time	USIT-E	73.87	us

USI Goodwin			
USIT - Fluid Properties Measurement			
Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[3]:Up	6678.83	22.63

Fluid Velocity = "Automatic"

CFVL equals DFSL channel			
Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)
Mud Impedance = "Manual". CZMD uses ZMUD parameter zoned table below			
Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
0	200	1.64	1.64
200	400	1.66	1.66
400	600	1.67	1.67
600	900	1.68	1.68
900	1200	1.7	1.7
1200	1500	1.71	1.71
1500	2000	1.73	1.73
2000	2500	1.75	1.75
2500	3000	1.77	1.77
3000	3500	1.78	1.78
3500	4000	1.79	1.79
4000		1.8	1.8

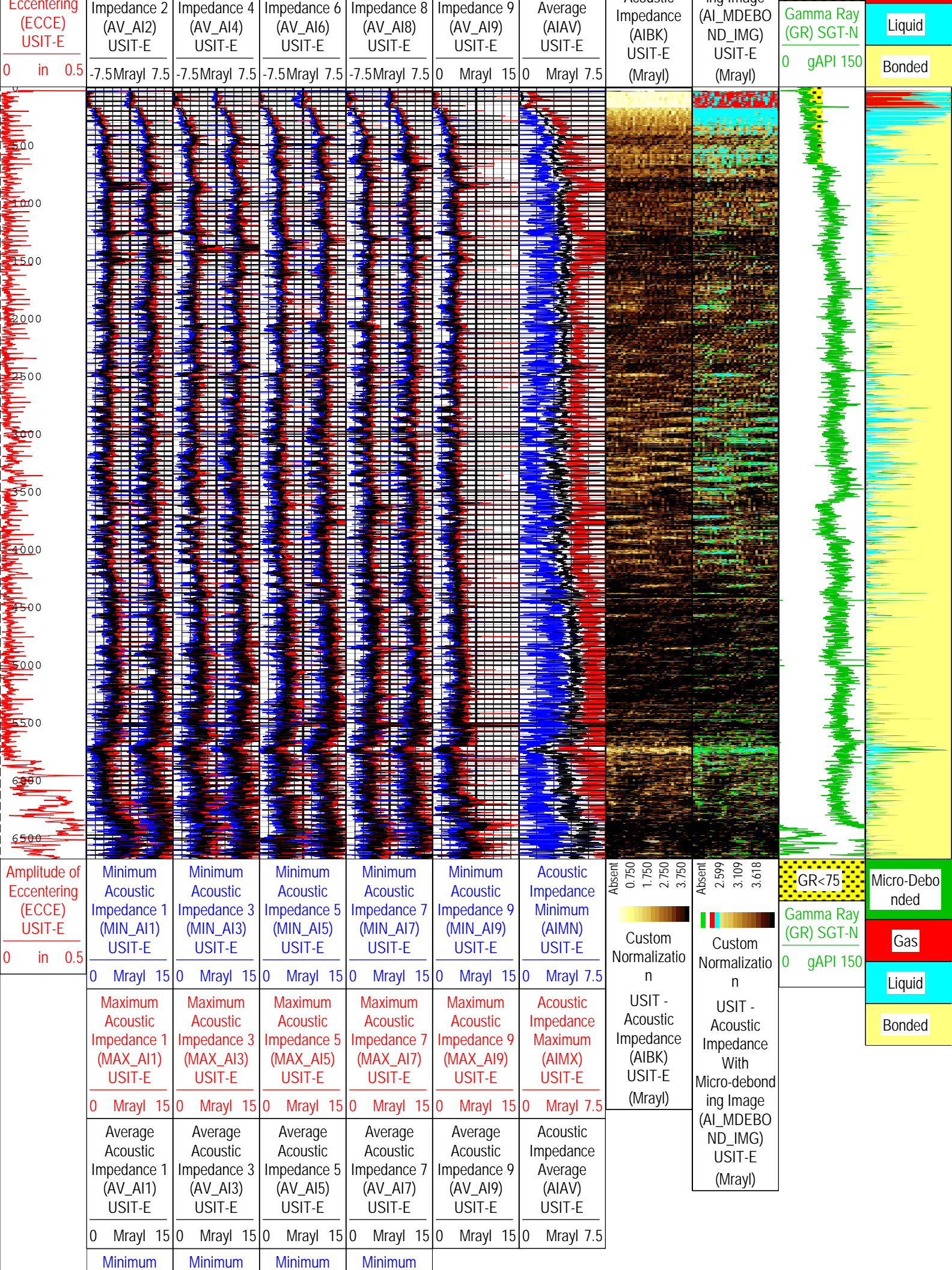
Run1: USIT			
USI Goodwin Compressed			

Log	Company:Noble Energy Inc Well:Wells Ranch AE30-67-1BHNA		
	Run1: USIT: Log[3]:Up:S002		

Description: USI Goodwin Format: USI Goodwin Index Scale: 0.1 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 30-Apr-2014 12:43:44

TIME_1900 - Time Marked every 60.00 (s)

Amplitude of	<div> <div>Minimum Acoustic Impedance 1 (MIN_AI1) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Minimum Acoustic Impedance 3 (MIN_AI3) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Minimum Acoustic Impedance 5 (MIN_AI5) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Minimum Acoustic Impedance 7 (MIN_AI7) USIT-E</div> <div>0 Mrayl 15</div> </div>		
	<div> <div>Maximum Acoustic Impedance 1 (MAX_AI1) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Maximum Acoustic Impedance 3 (MAX_AI3) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Maximum Acoustic Impedance 5 (MAX_AI5) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Maximum Acoustic Impedance 7 (MAX_AI7) USIT-E</div> <div>0 Mrayl 15</div> </div>		
	<div> <div>Average Acoustic Impedance 1 (AV_AI1) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Average Acoustic Impedance 3 (AV_AI3) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Average Acoustic Impedance 5 (AV_AI5) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Average Acoustic Impedance 7 (AV_AI7) USIT-E</div> <div>0 Mrayl 15</div> </div>		
	<div> <div>Minimum Acoustic Impedance 2 (MIN_AI2) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Minimum Acoustic Impedance 4 (MIN_AI4) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Minimum Acoustic Impedance 6 (MIN_AI6) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Minimum Acoustic Impedance 8 (MIN_AI8) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Minimum Acoustic Impedance 9 (MIN_AI9) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Acoustic Impedance Minimum (AIMN) USIT-E</div> <div>0 Mrayl 7.5</div> </div>
	<div> <div>Maximum Acoustic Impedance 2 (MAX_AI2) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Maximum Acoustic Impedance 4 (MAX_AI4) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Maximum Acoustic Impedance 6 (MAX_AI6) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Maximum Acoustic Impedance 8 (MAX_AI8) USIT-E</div> <div>-7.5Mrayl 7.5</div> </div>	<div> <div>Maximum Acoustic Impedance 9 (MAX_AI9) USIT-E</div> <div>0 Mrayl 15</div> </div>	<div> <div>Acoustic Impedance Maximum (AIMX) USIT-E</div> <div>0 Mrayl 7.5</div> </div>
	<div> <div>Average Acoustic</div> </div>	<div> <div>Average Acoustic</div> </div>	<div> <div>Average Acoustic</div> </div>	<div> <div>Average Acoustic</div> </div>	<div> <div>Average Acoustic</div> </div>	<div> <div>Acoustic Impedance</div> </div>
	<div> <div>Custom Normalization</div> <div>USIT - Acoustic Impedance With Micro-debonding Image</div> </div>					
	<div> <div>GR<75</div> </div>					
	<div> <div>Micro-Debonded</div> <div>Gas</div> </div>					



Acoustic Impedance 2 (MIN_AI2) USIT-E	Acoustic Impedance 4 (MIN_AI4) USIT-E	Acoustic Impedance 6 (MIN_AI6) USIT-E	Acoustic Impedance 8 (MIN_AI8) USIT-E
-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5
Maximum Acoustic Impedance 2 (MAX_AI2) USIT-E	Maximum Acoustic Impedance 4 (MAX_AI4) USIT-E	Maximum Acoustic Impedance 6 (MAX_AI6) USIT-E	Maximum Acoustic Impedance 8 (MAX_AI8) USIT-E
-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5
Average Acoustic Impedance 2 (AV_AI2) USIT-E	Average Acoustic Impedance 4 (AV_AI4) USIT-E	Average Acoustic Impedance 6 (AV_AI6) USIT-E	Average Acoustic Impedance 8 (AV_AI8) USIT-E
-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5	-7.5Mrayl 7.5

TIME_1900 - Time Marked every 60.00 (s)

Description: USI Goodwin Format: USI Goodwin Index Scale: 0.1 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 30-Apr-2014 12:43:44

Run1: USIT

Correlation Log

Log

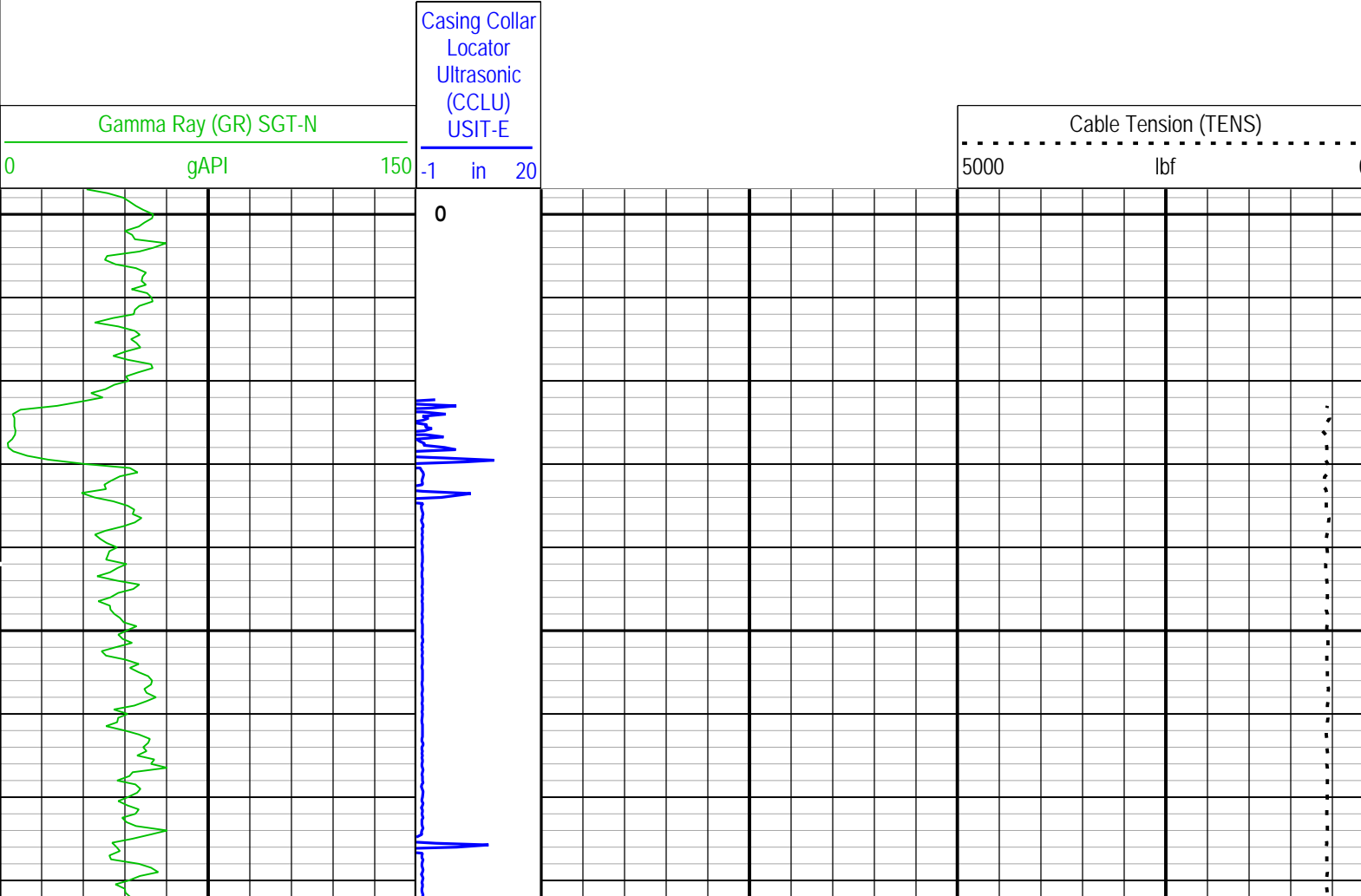
Company:Noble Energy Inc

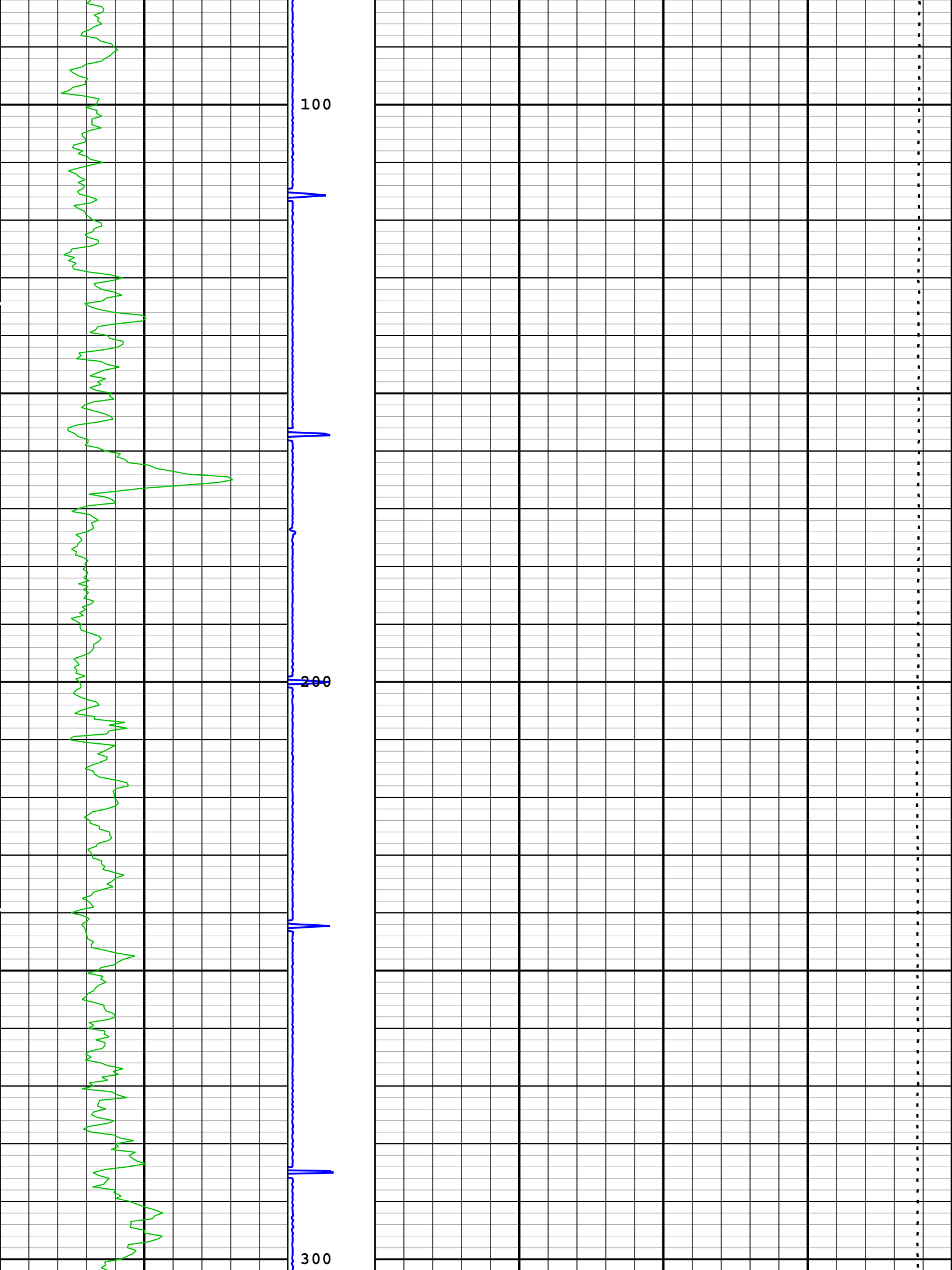
Well:Wells Ranch AE30-67-1BHNA

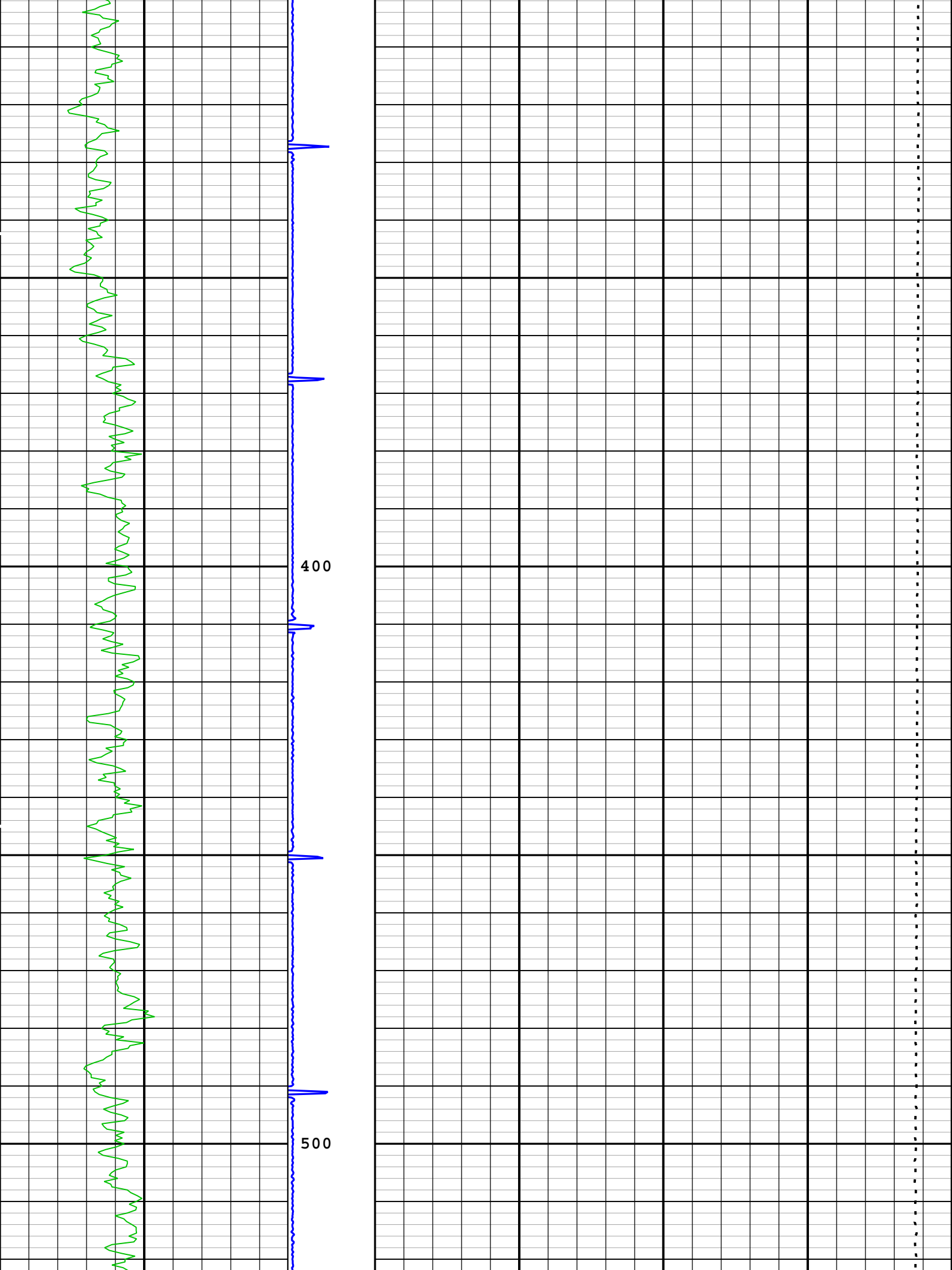
Run1: USIT: Log[3]:Up:S002

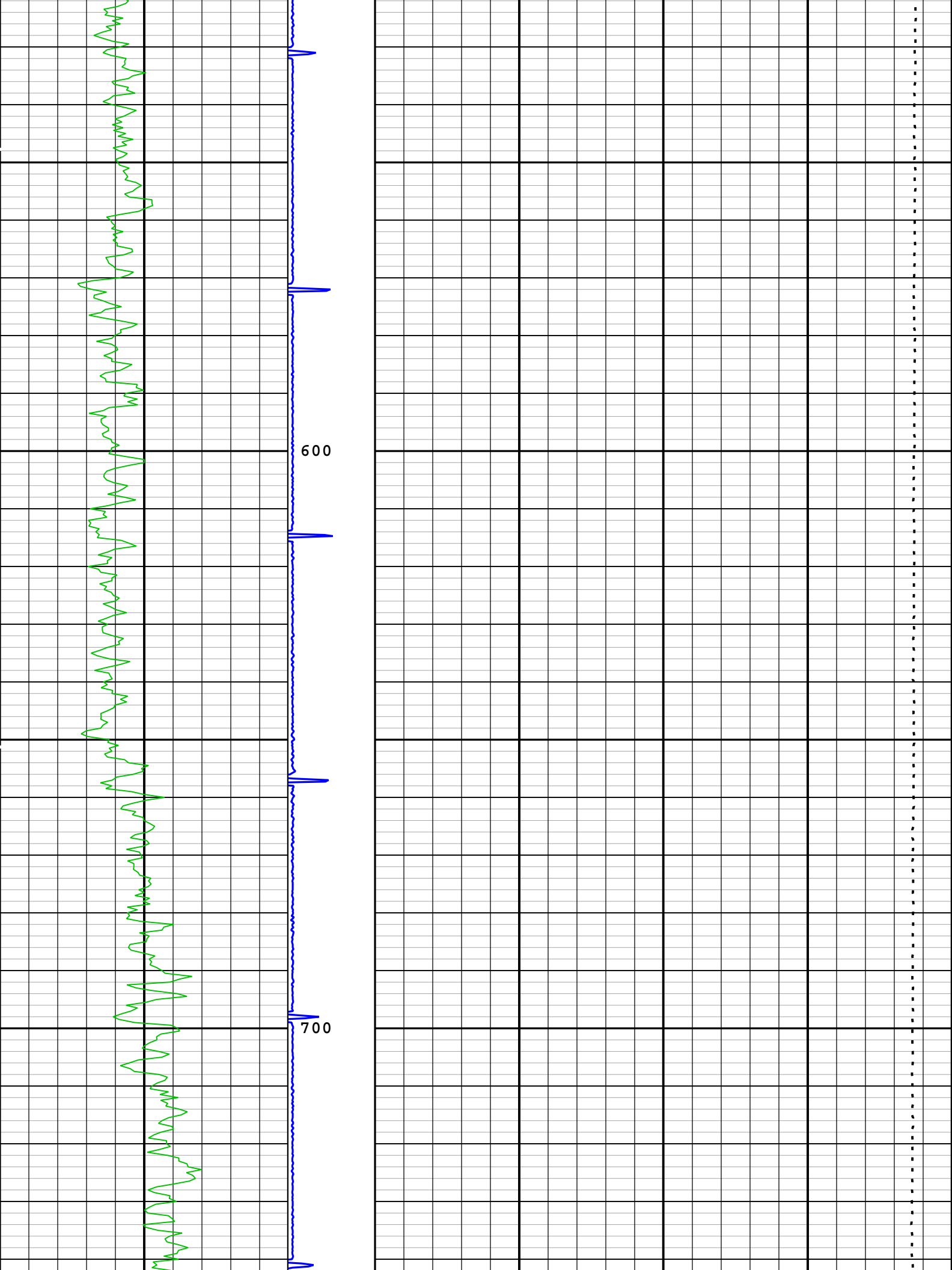
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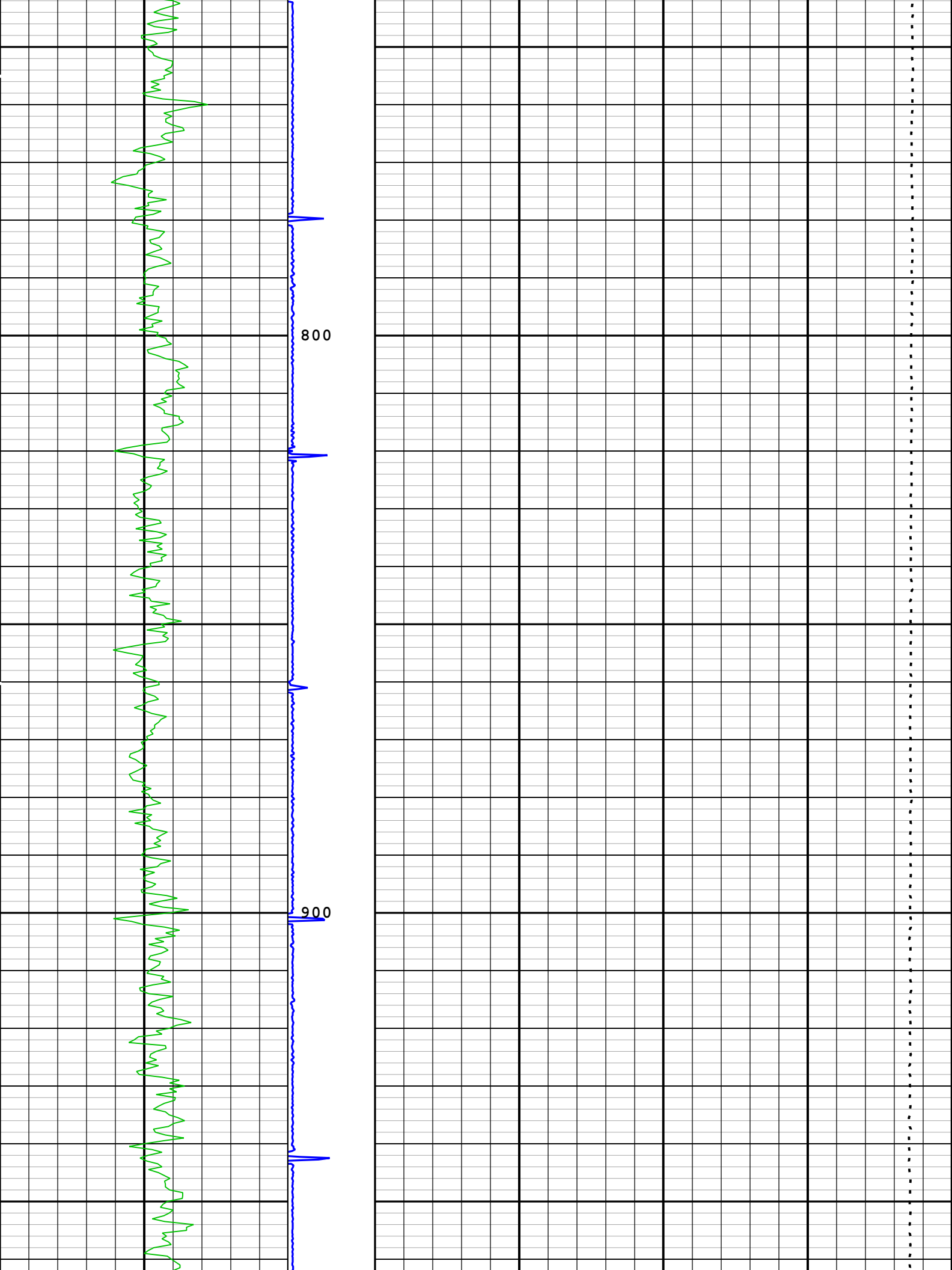
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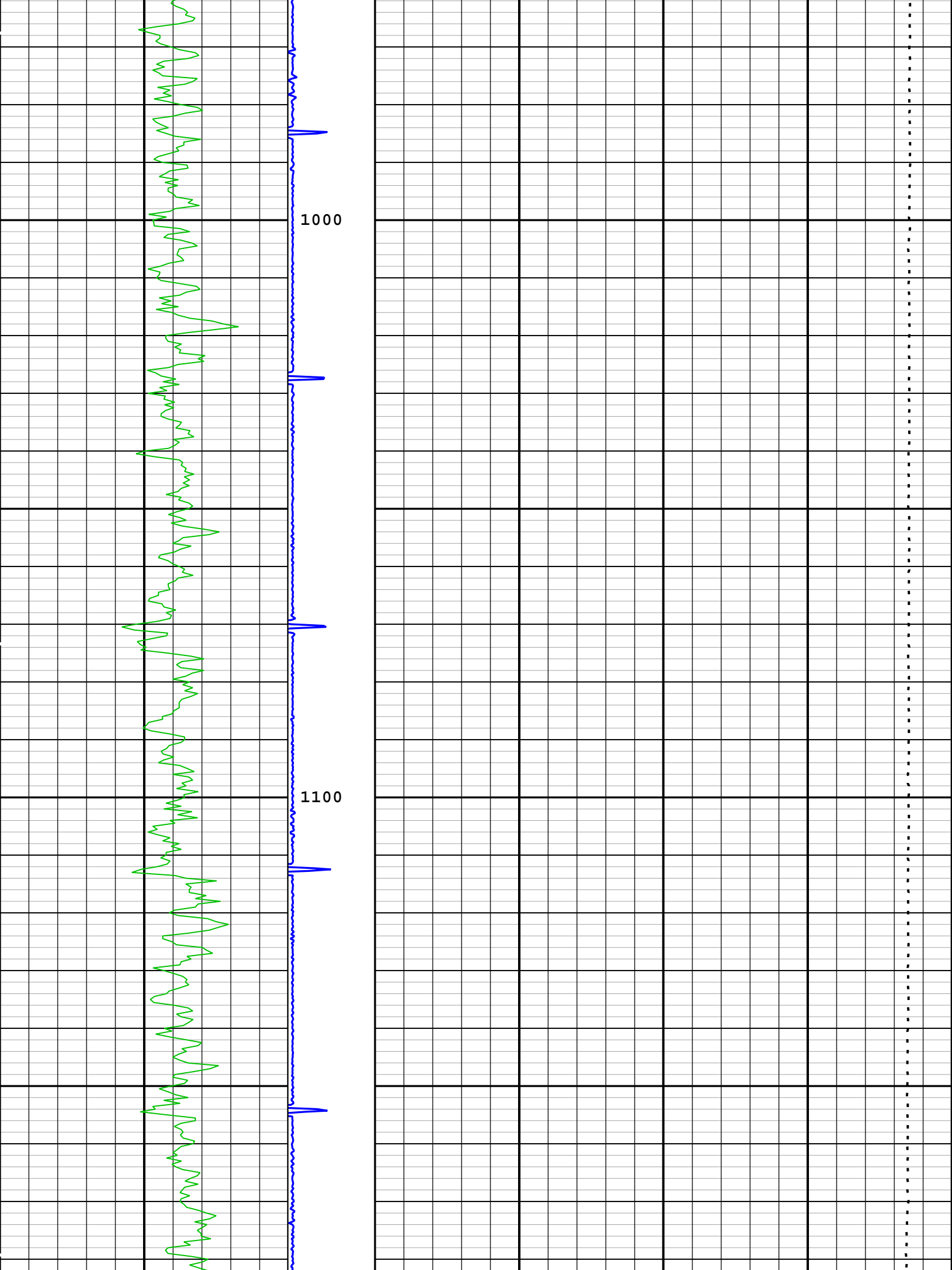


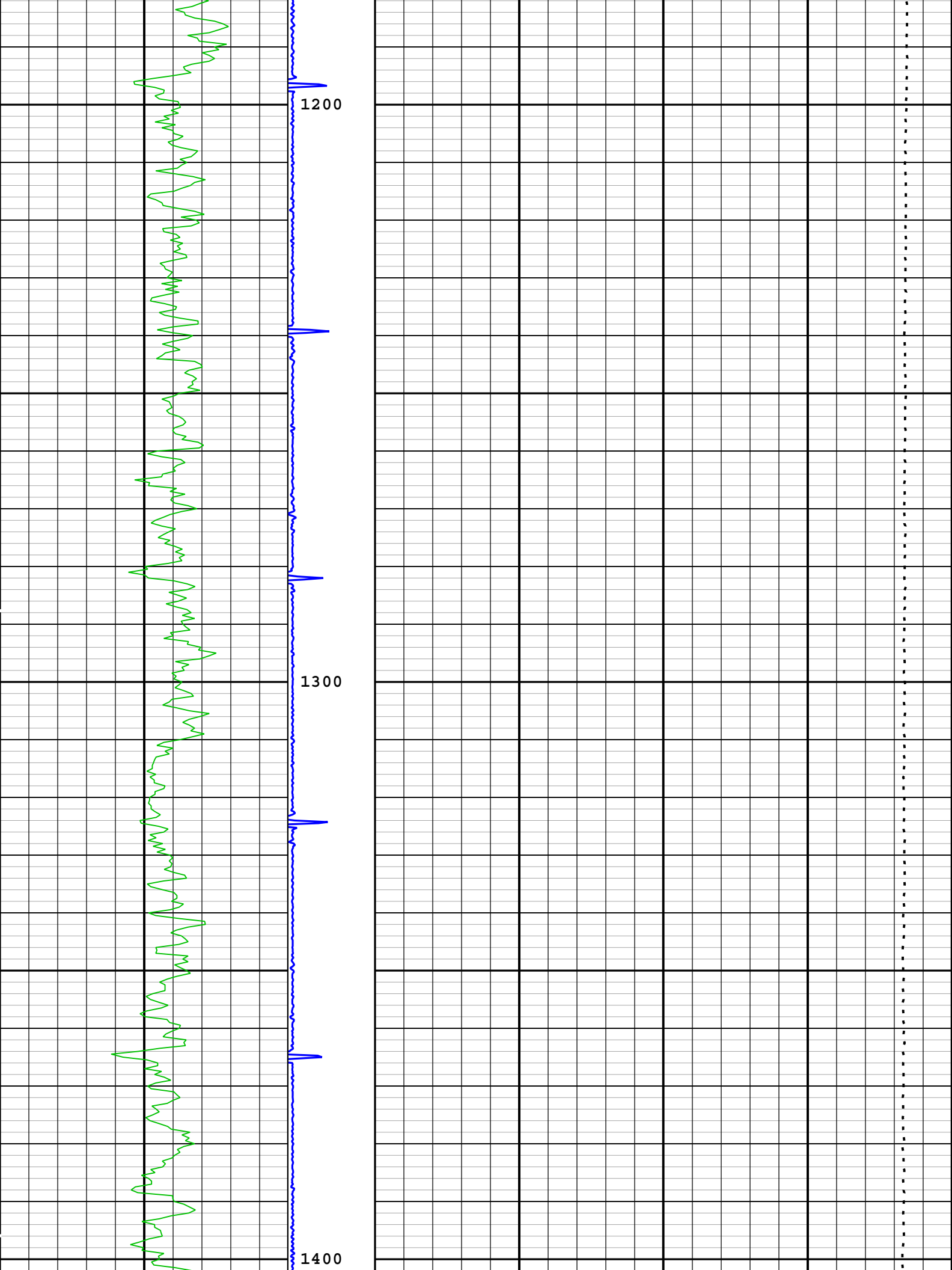


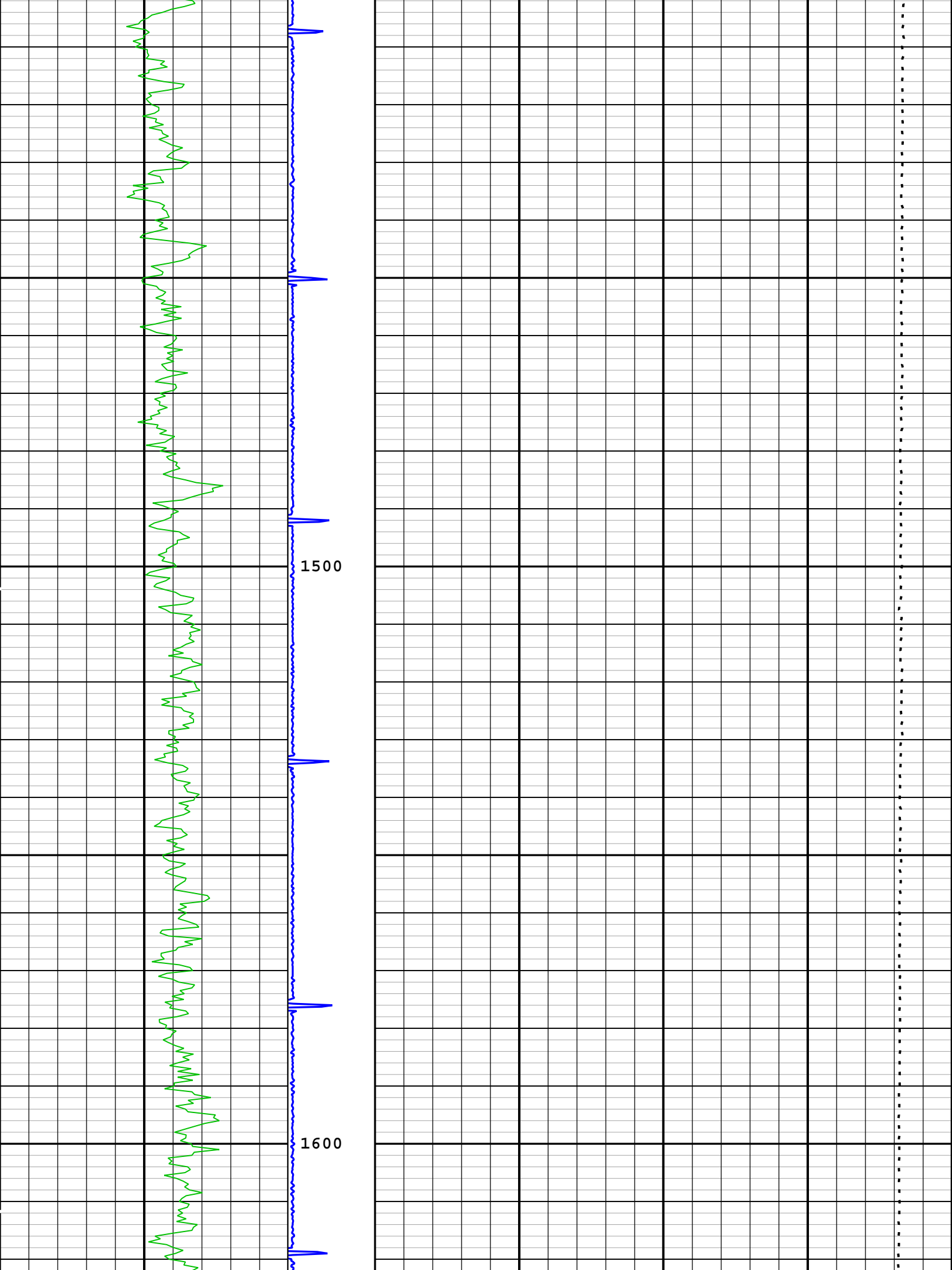


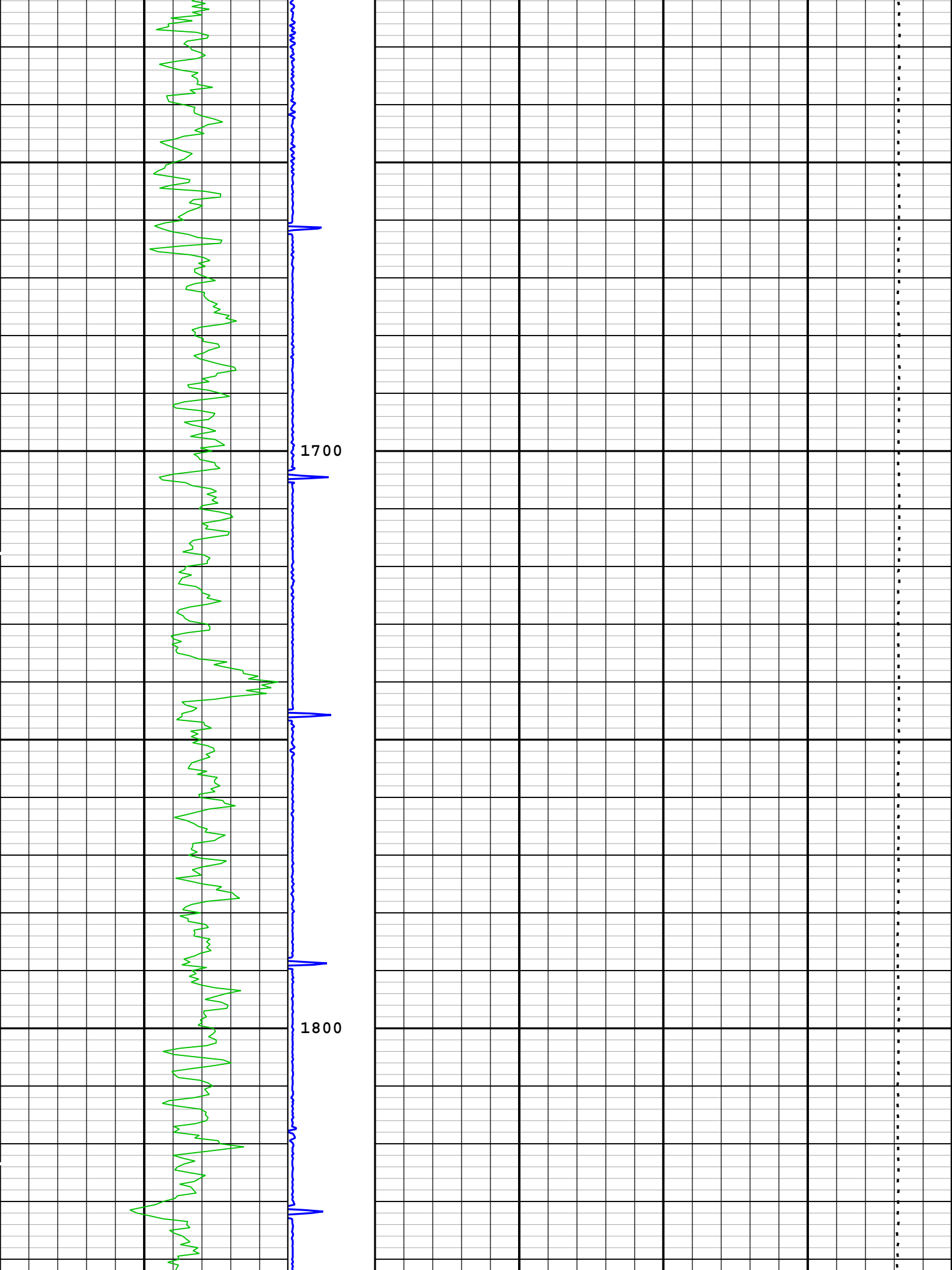


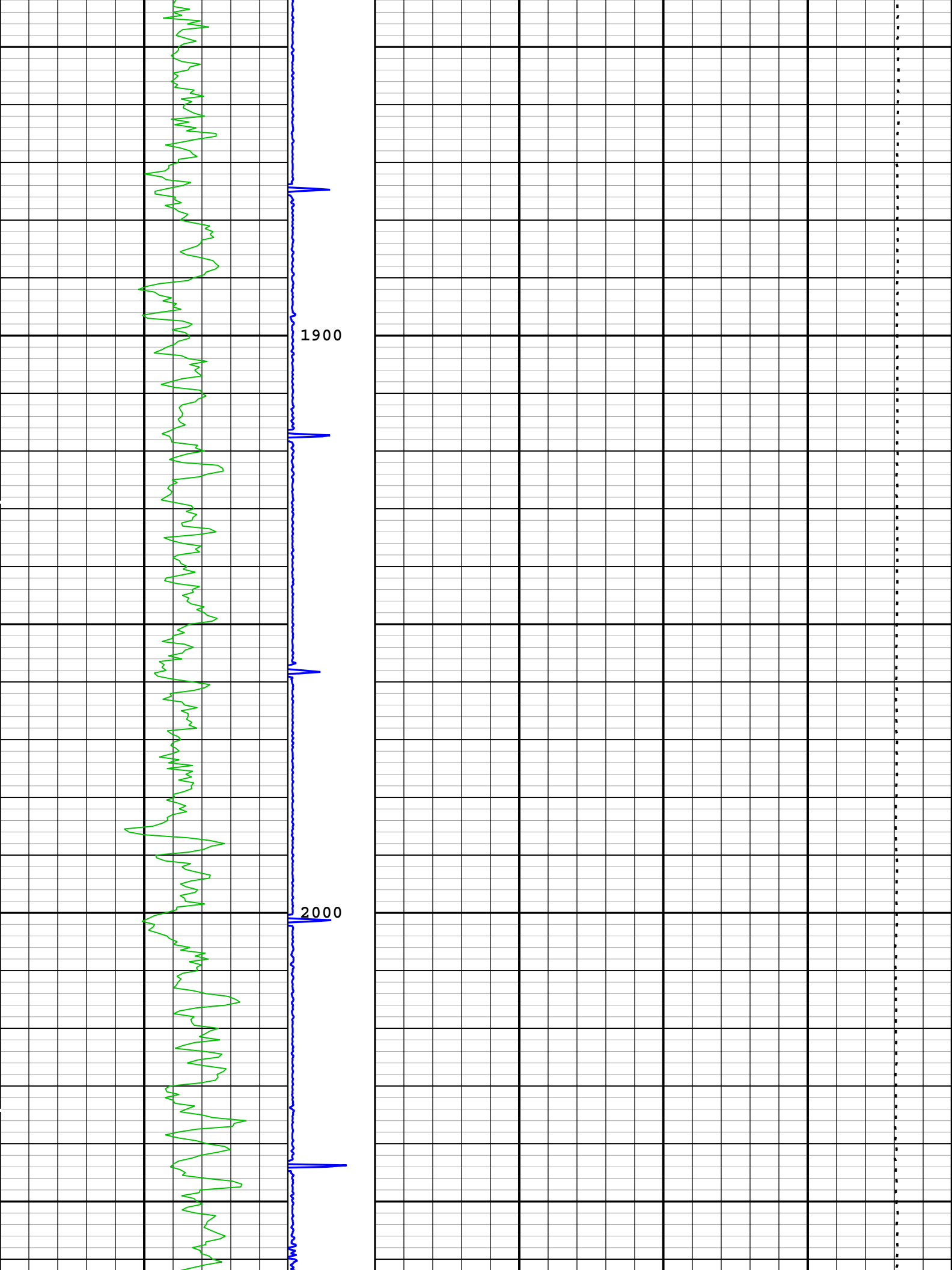


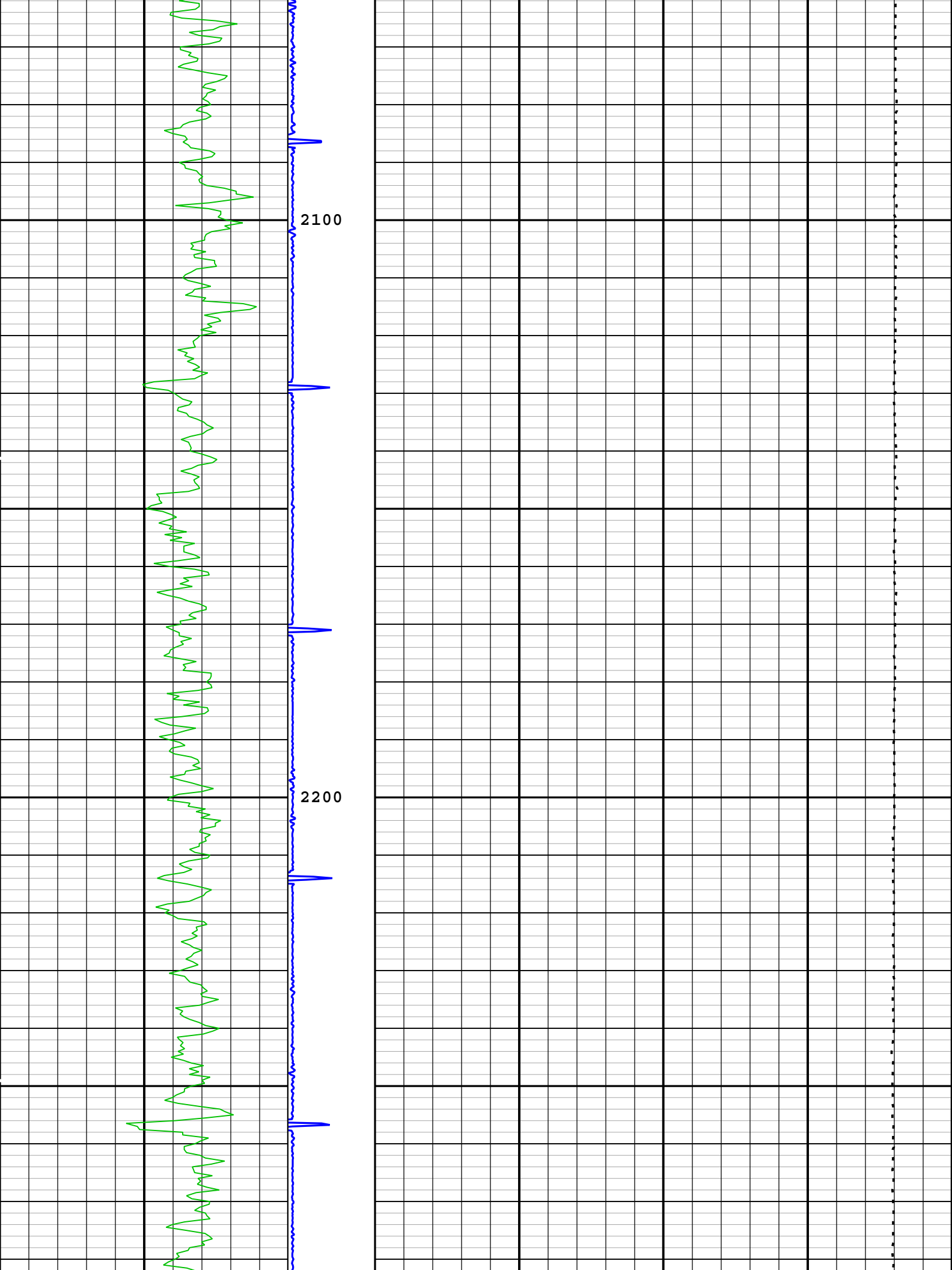


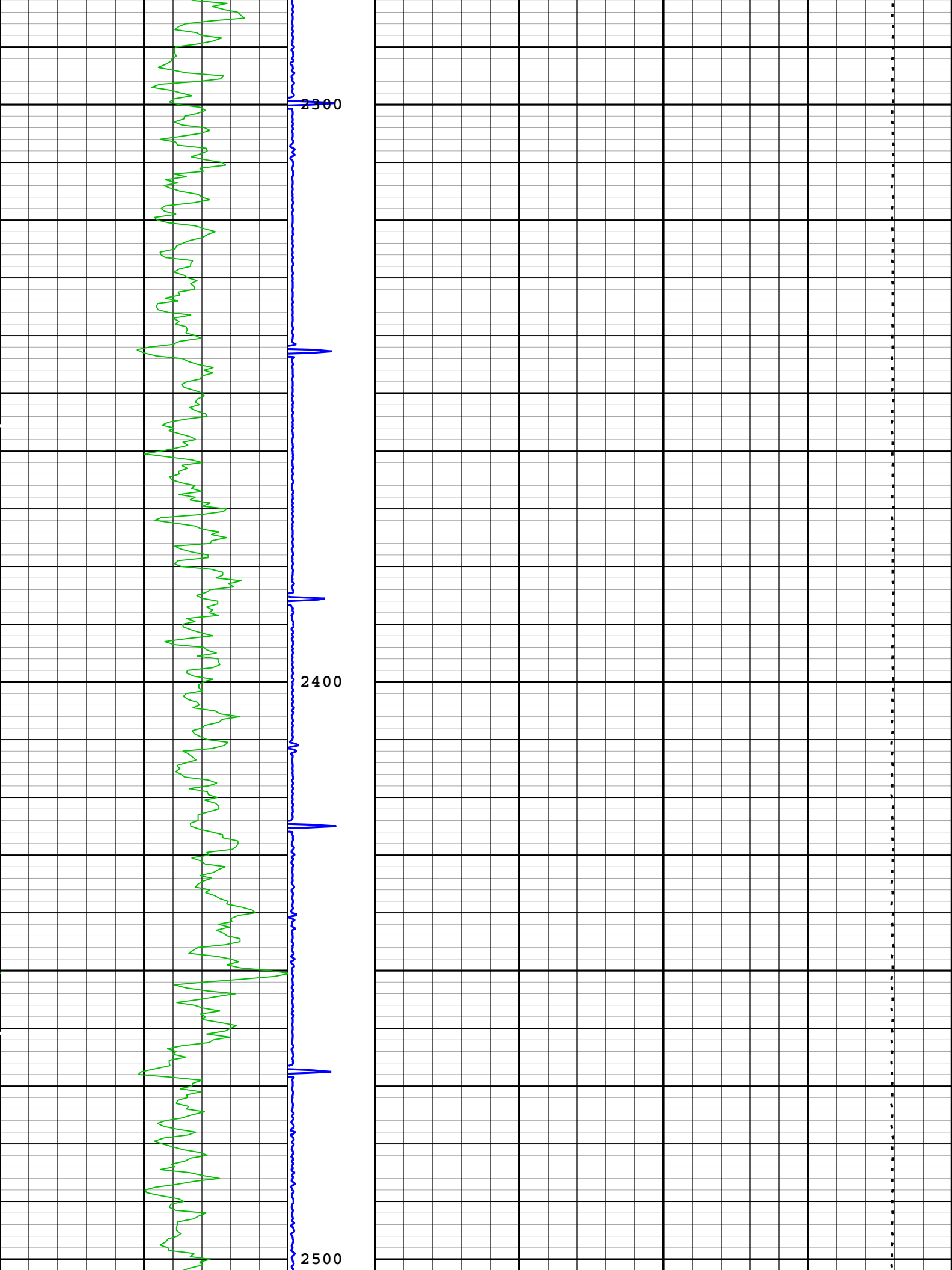


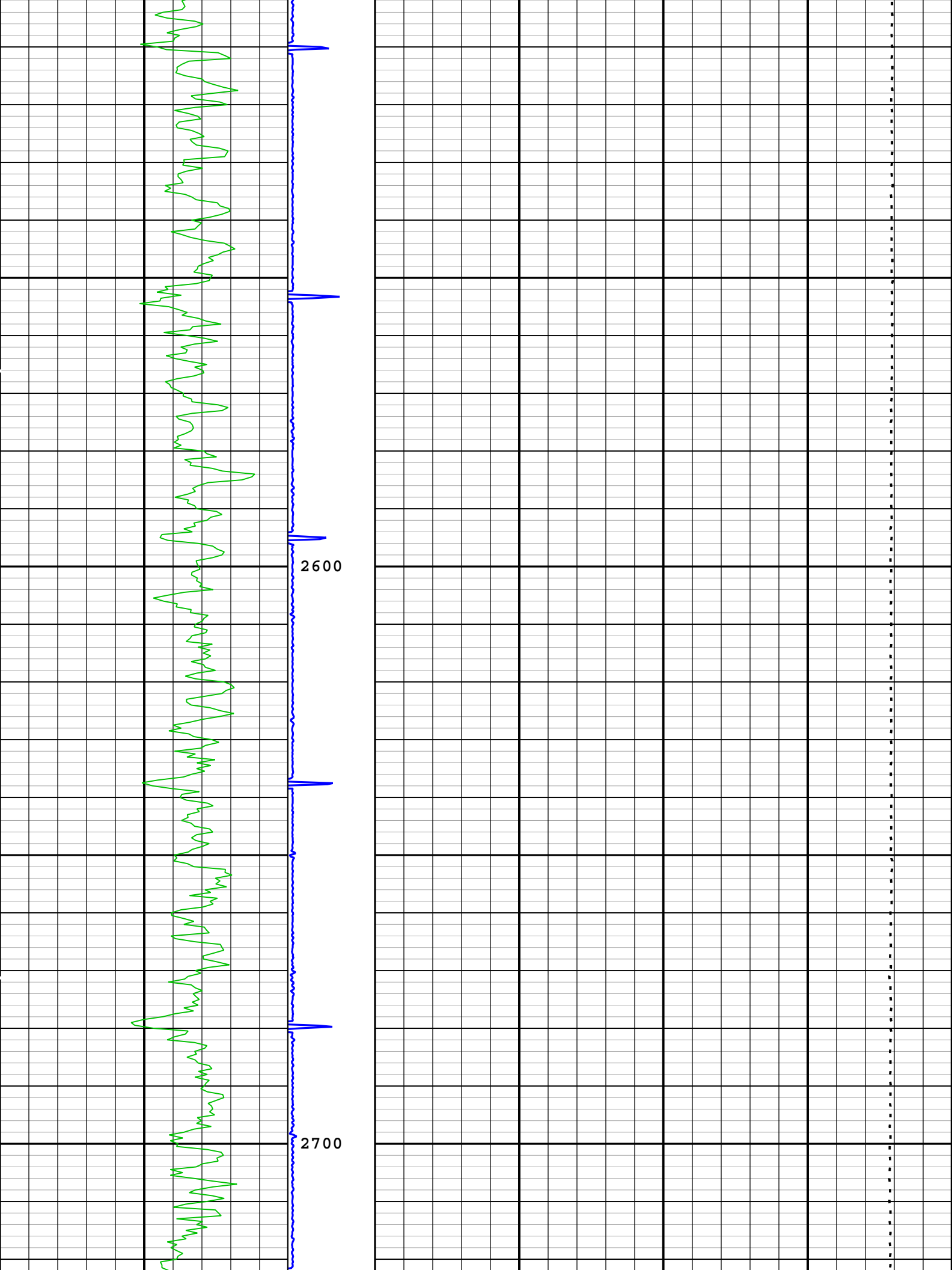


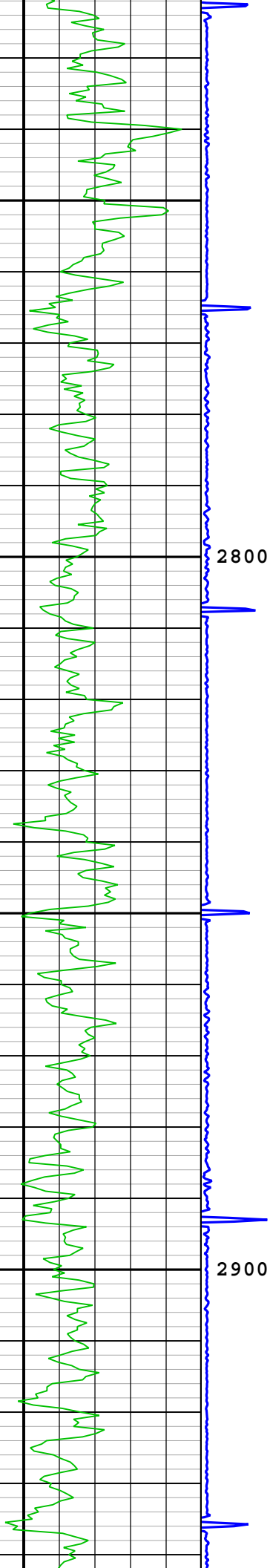


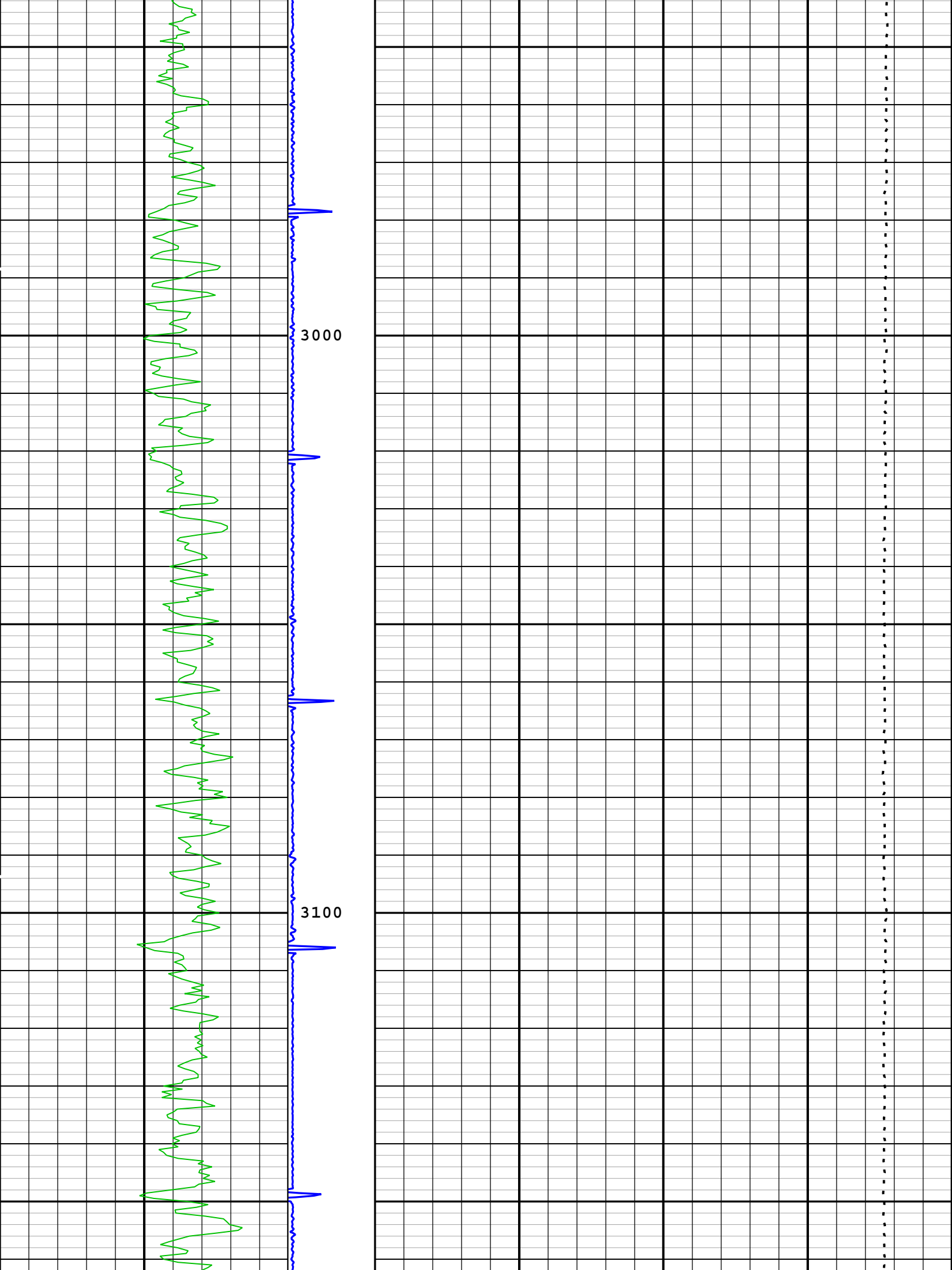


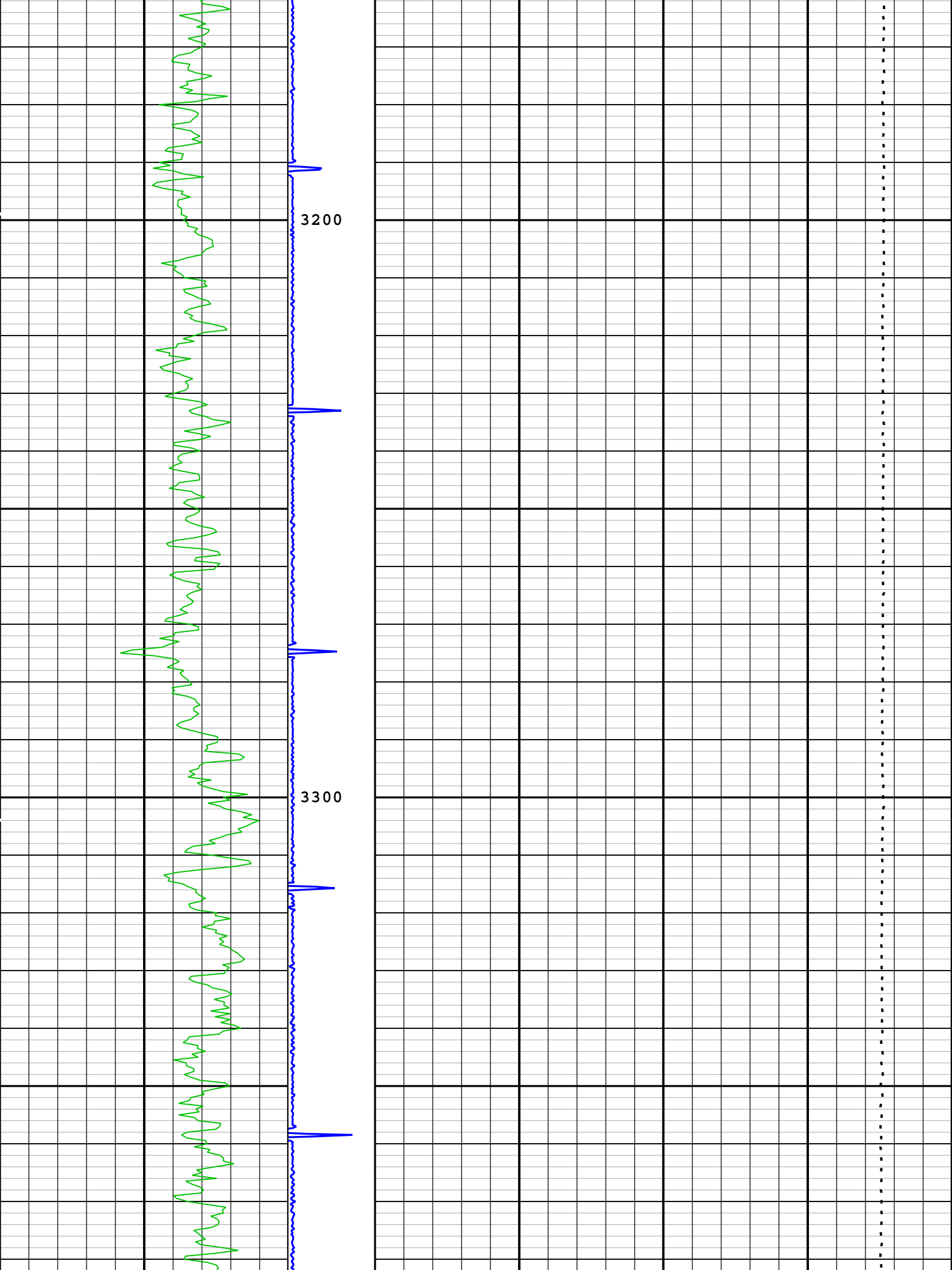


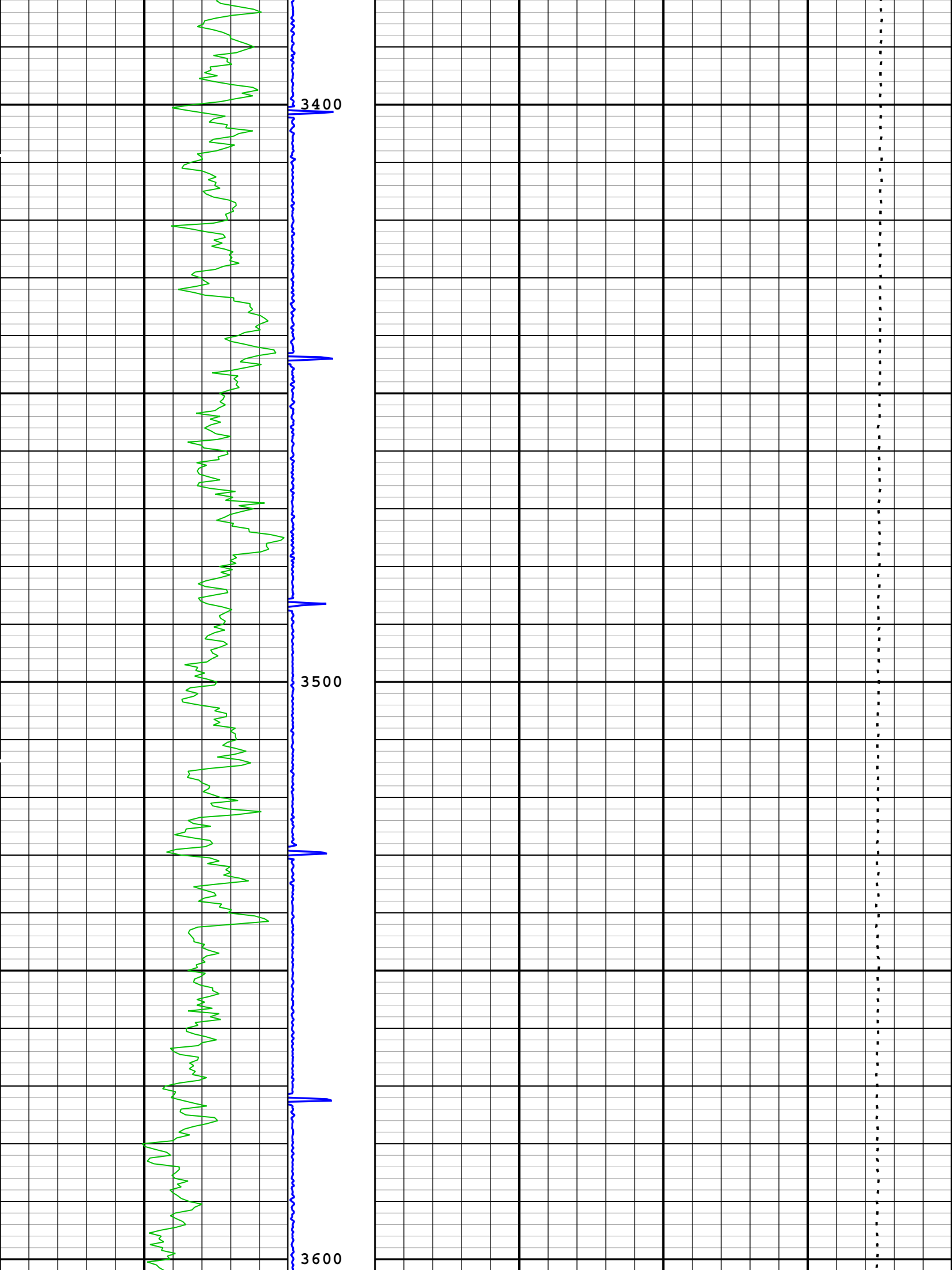


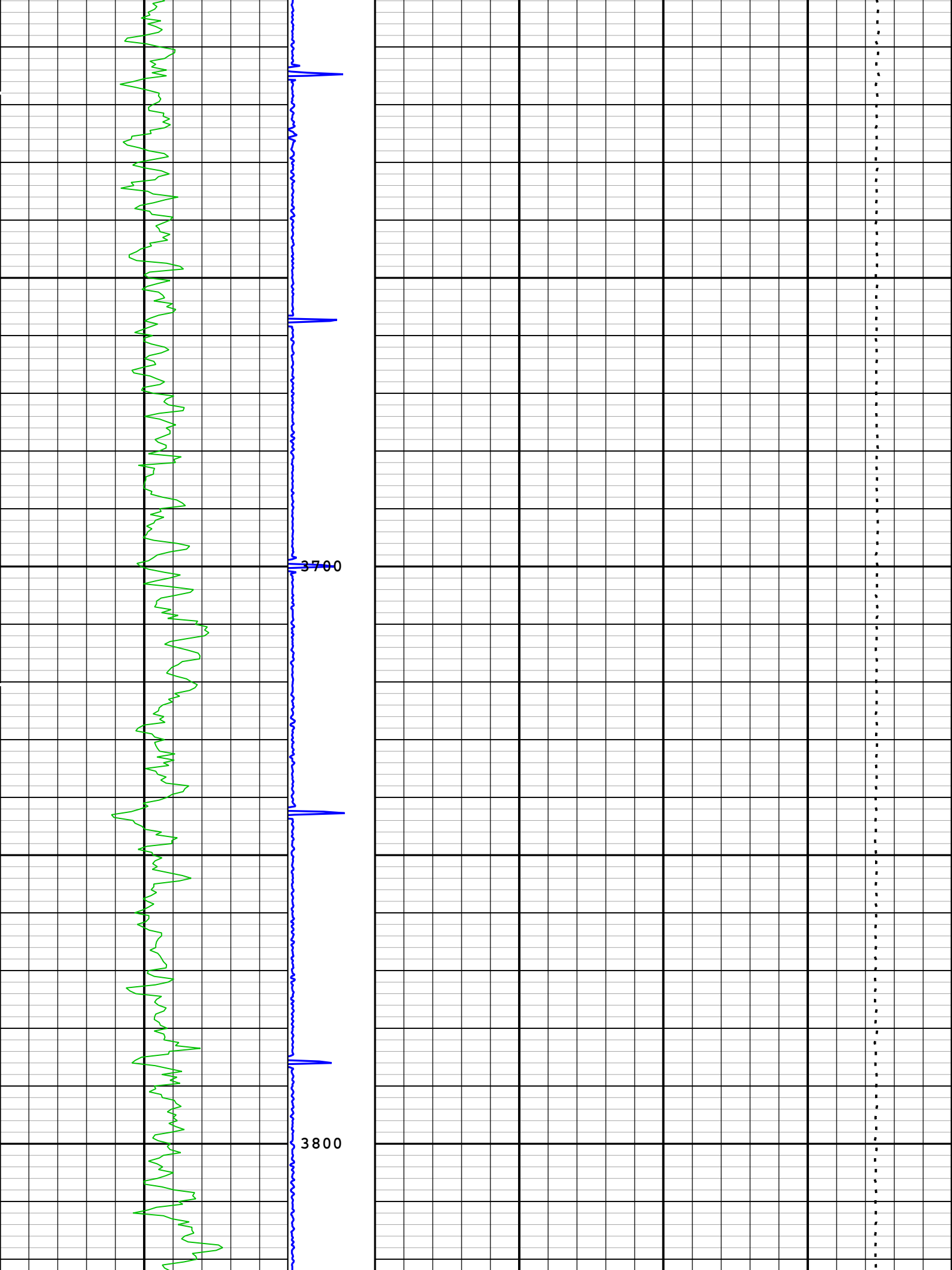


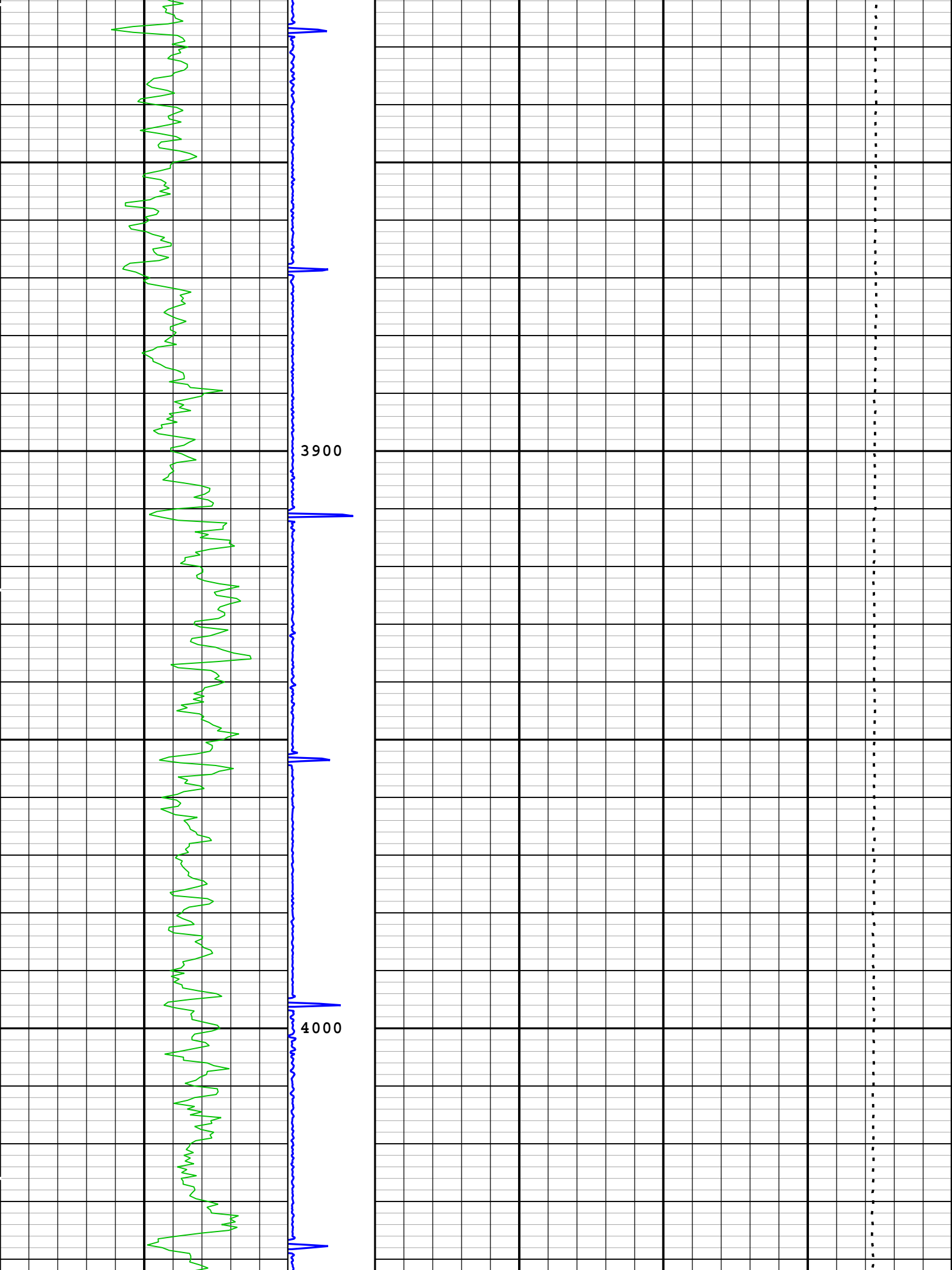


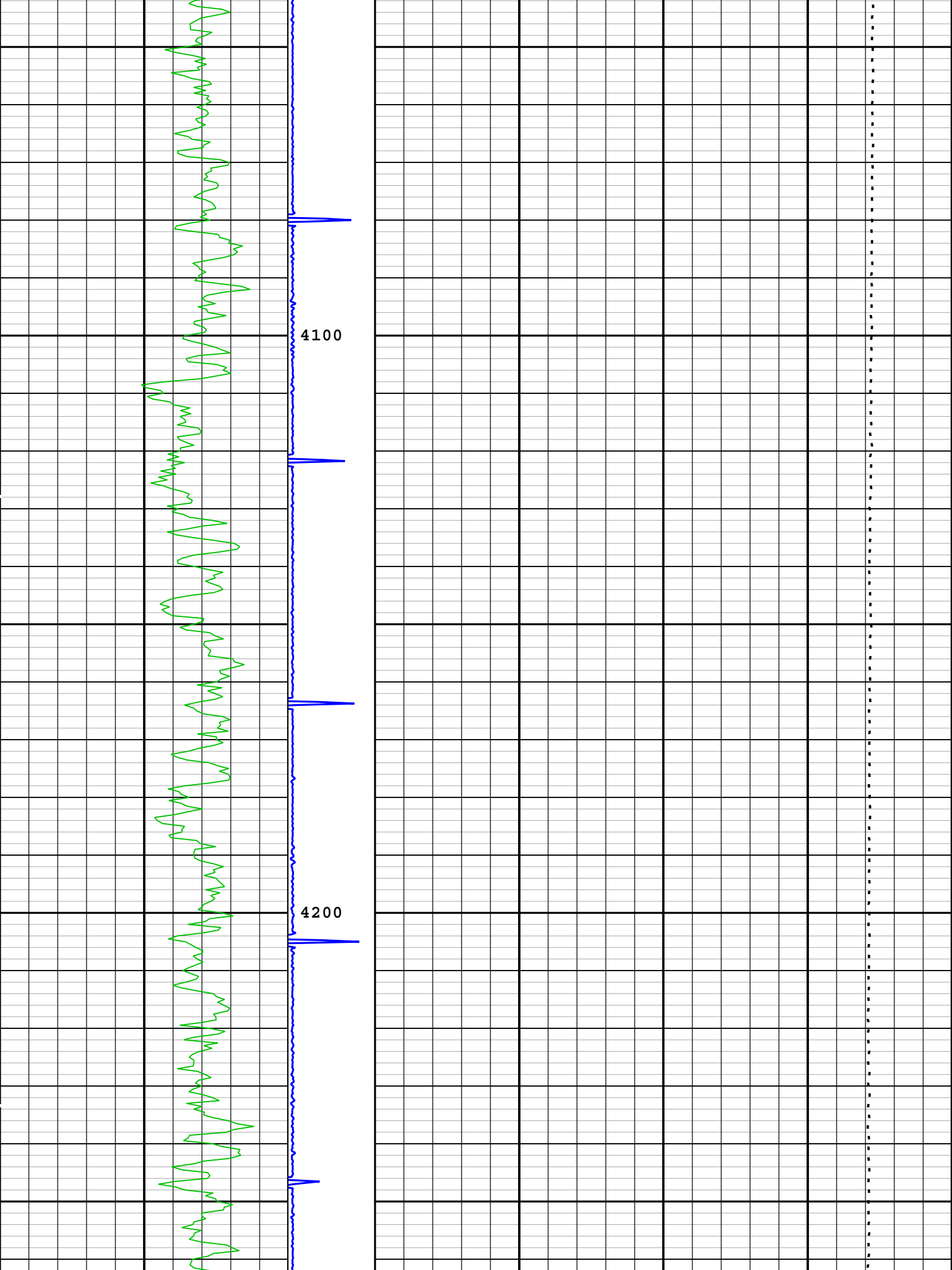


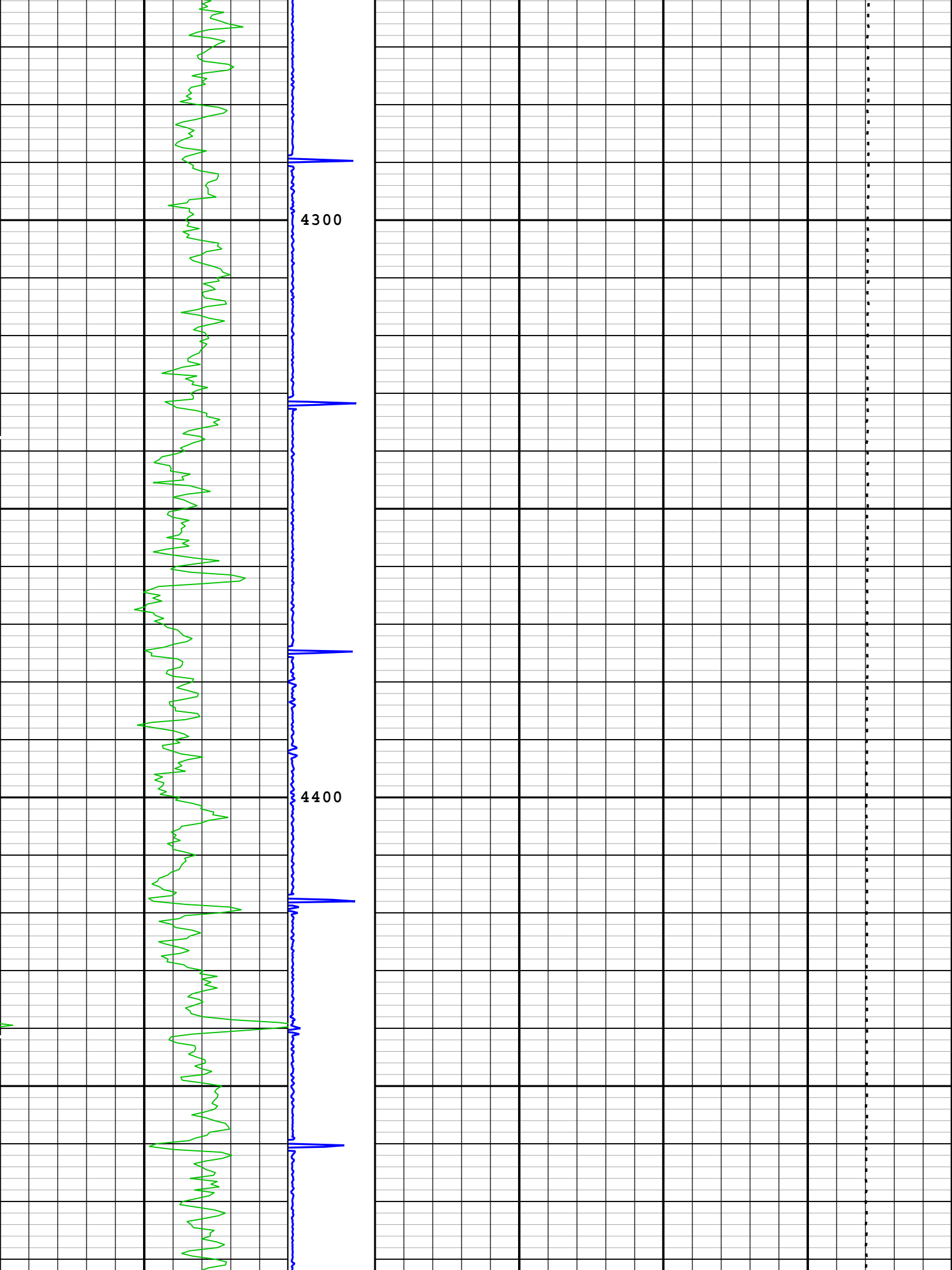


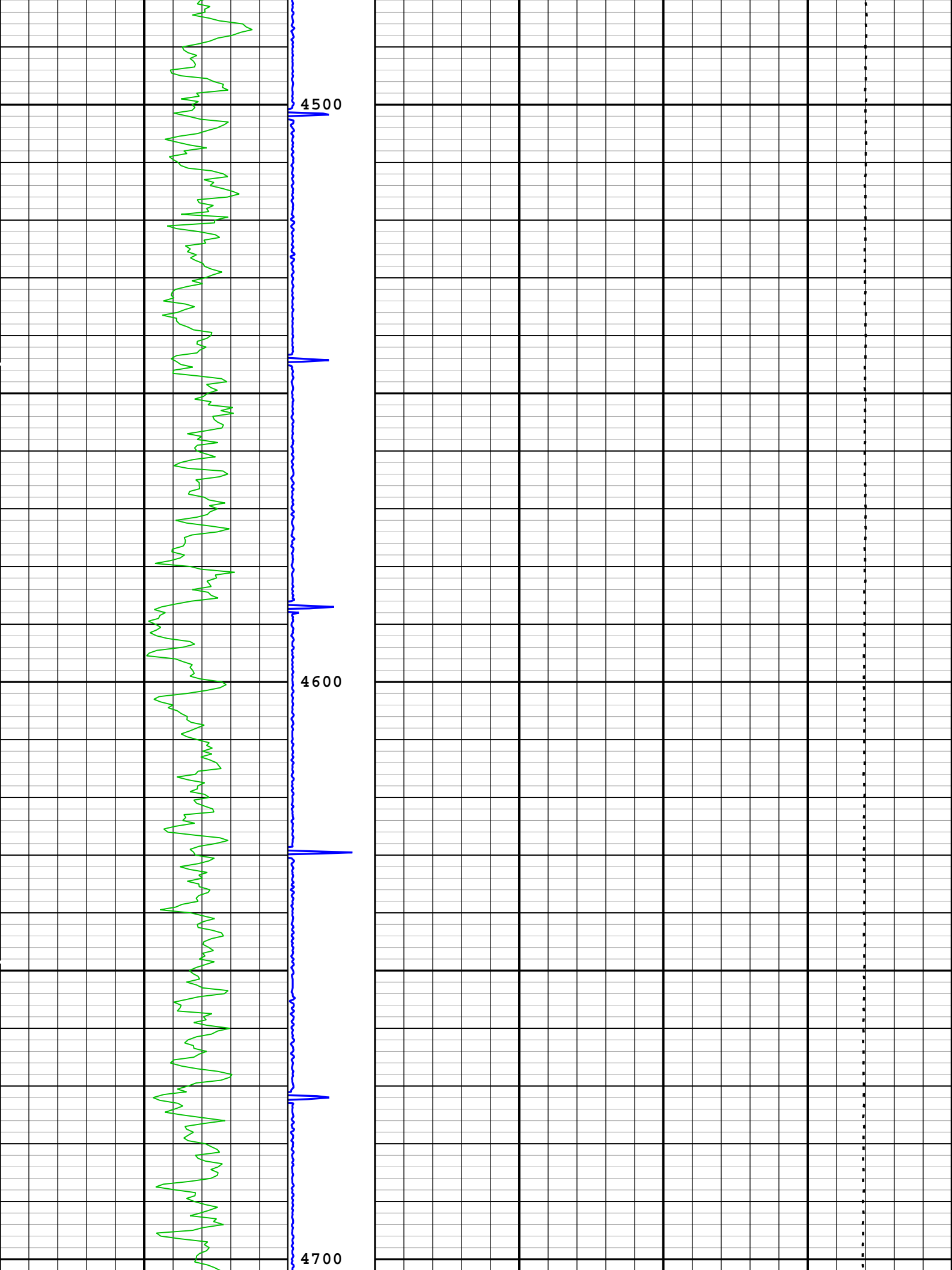


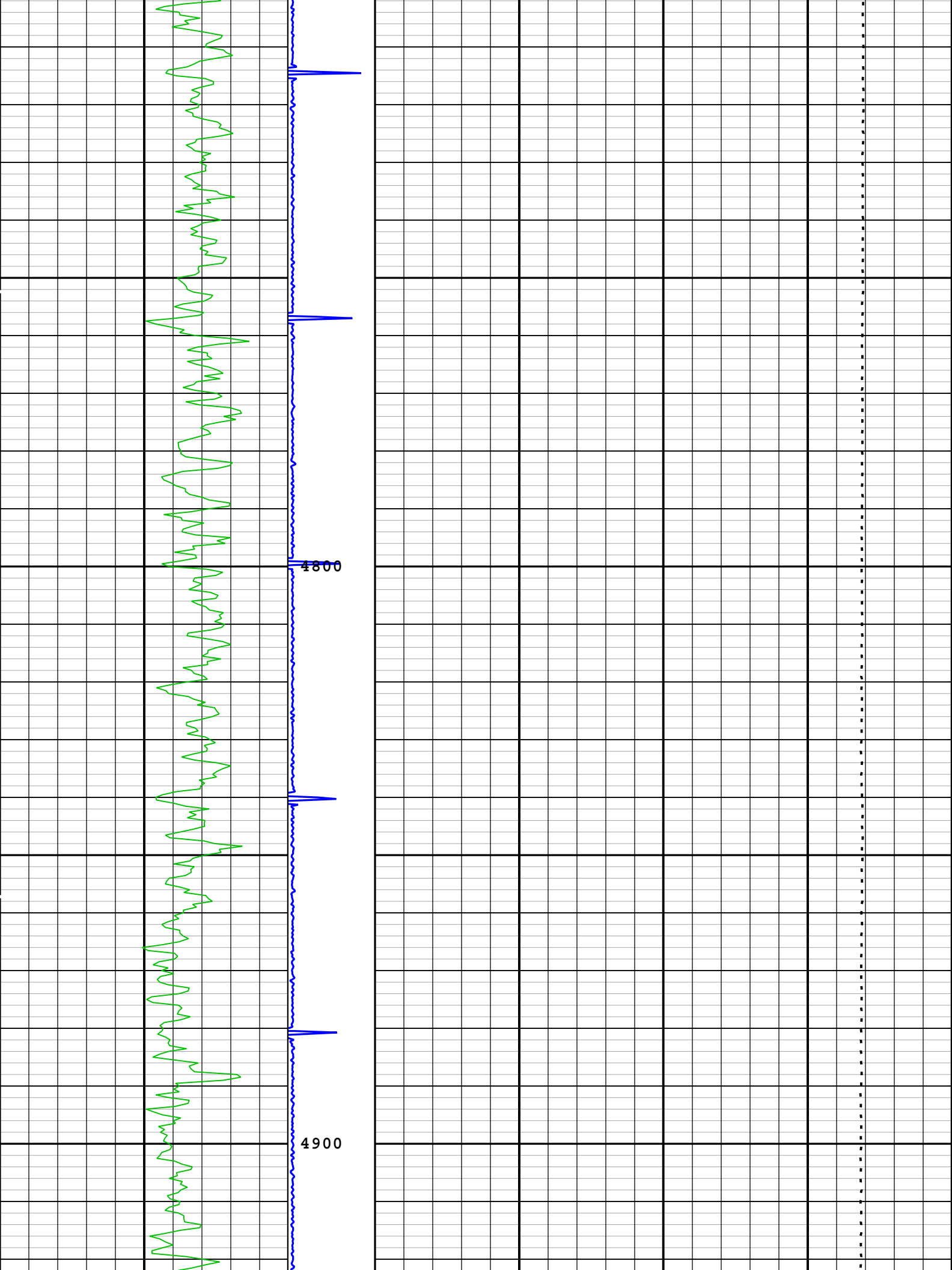


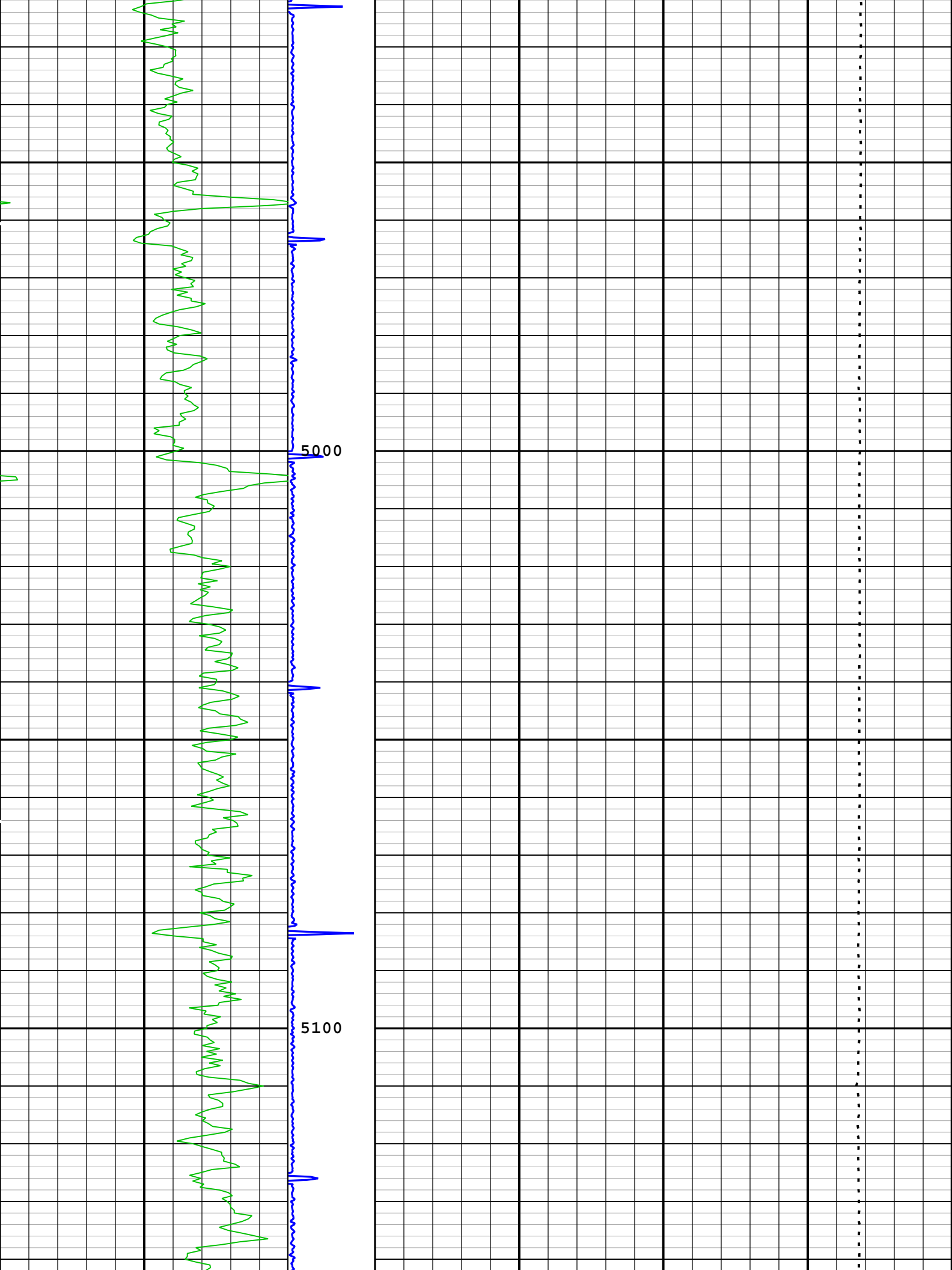


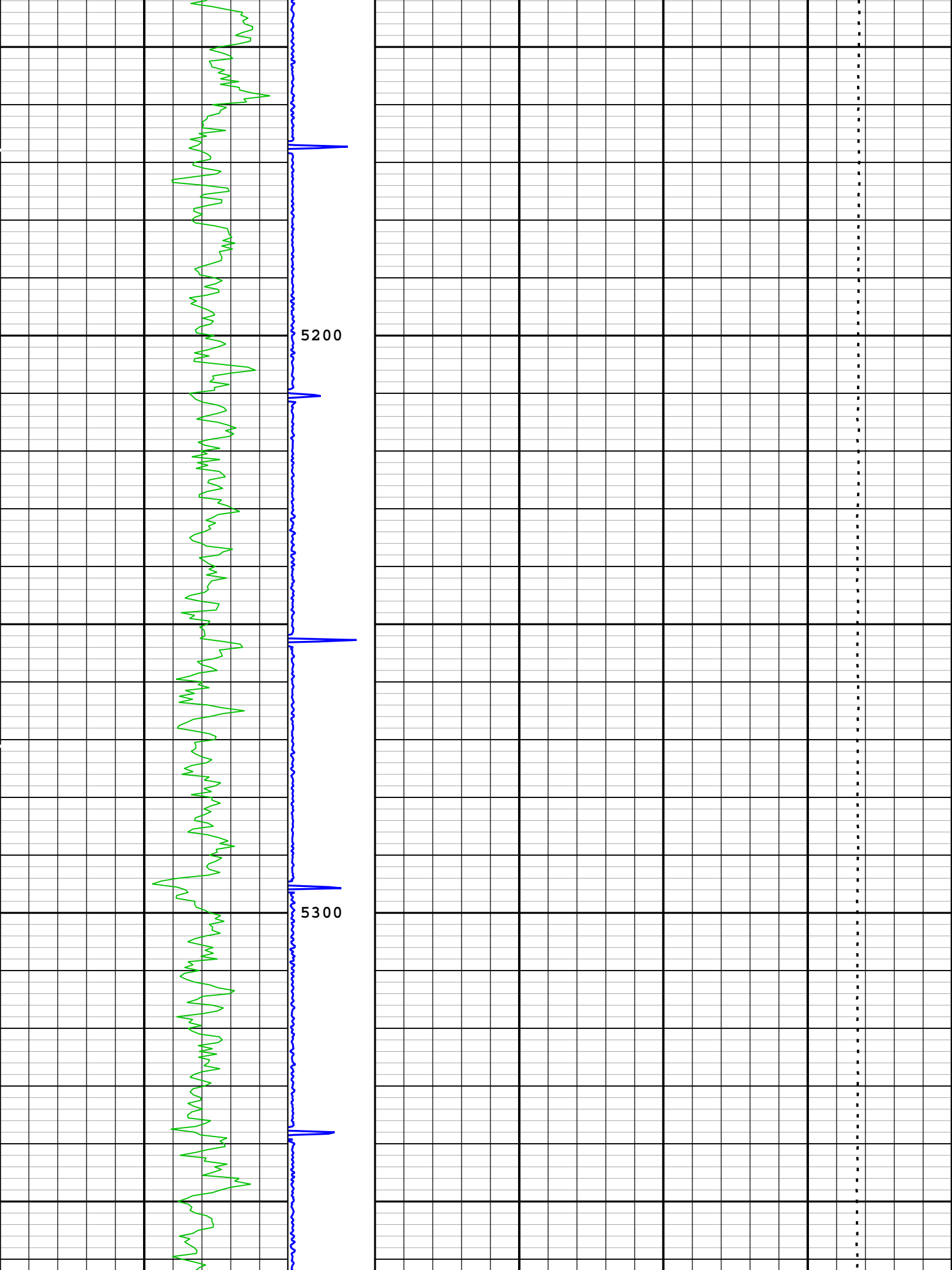


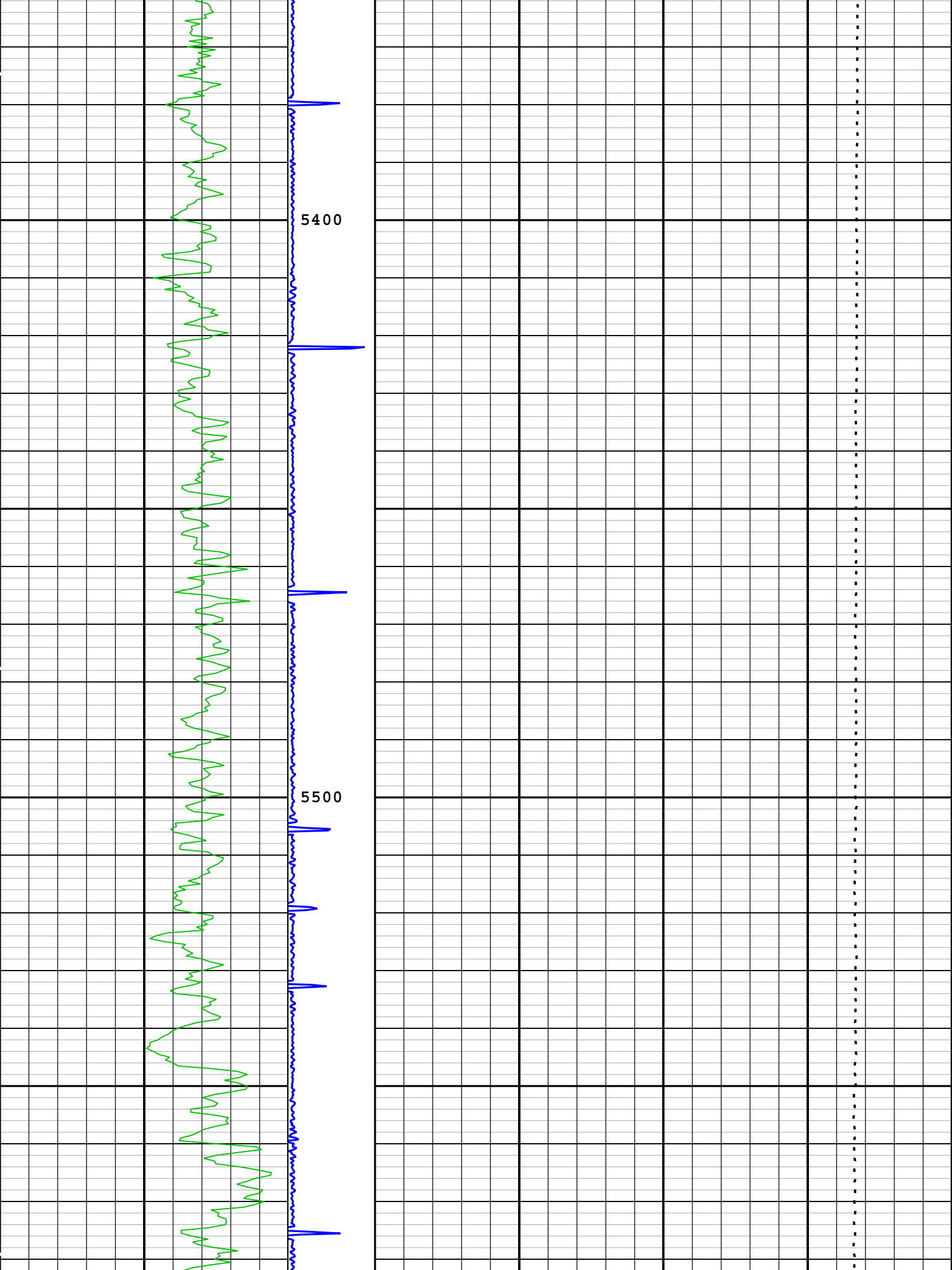


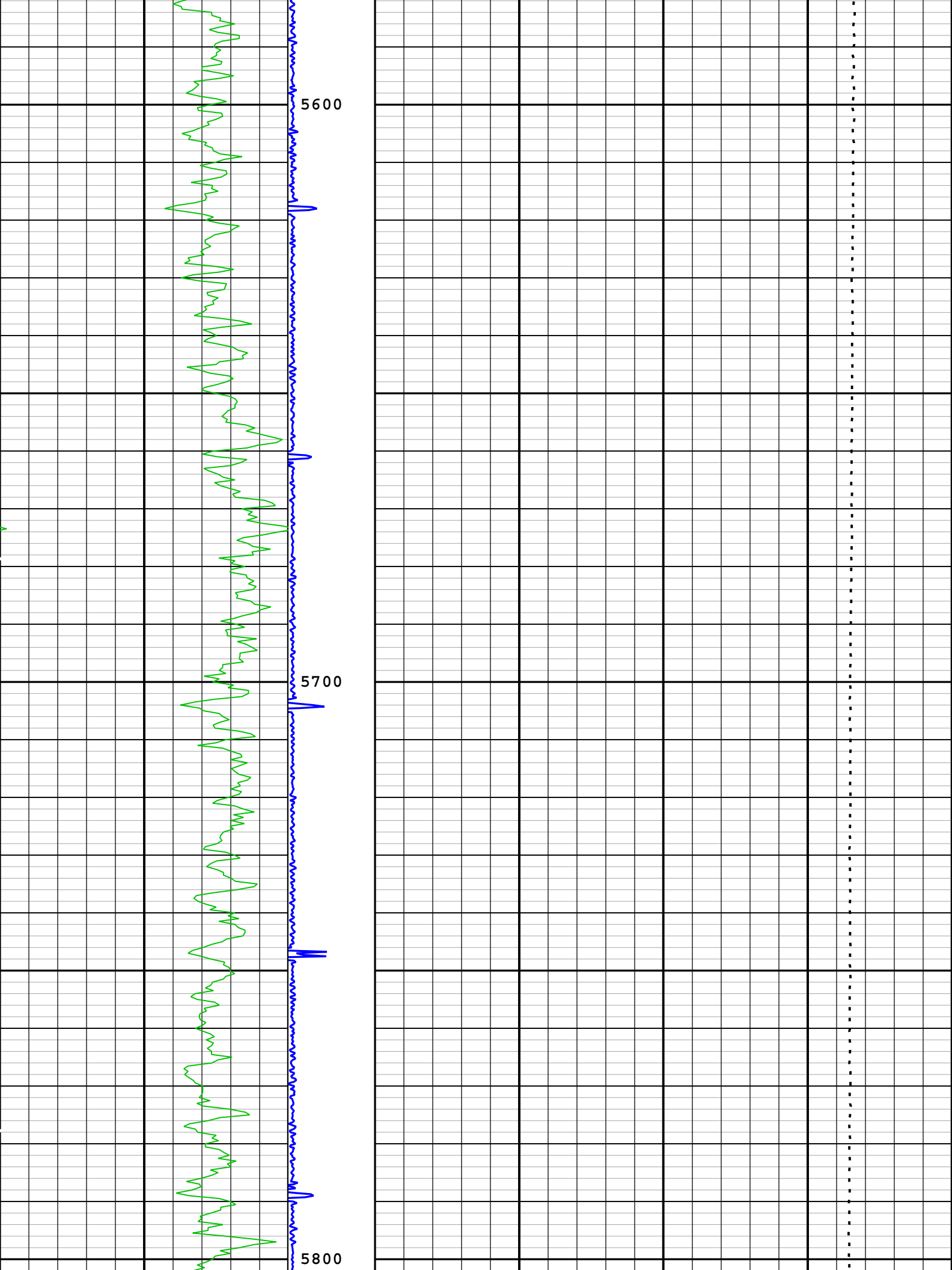


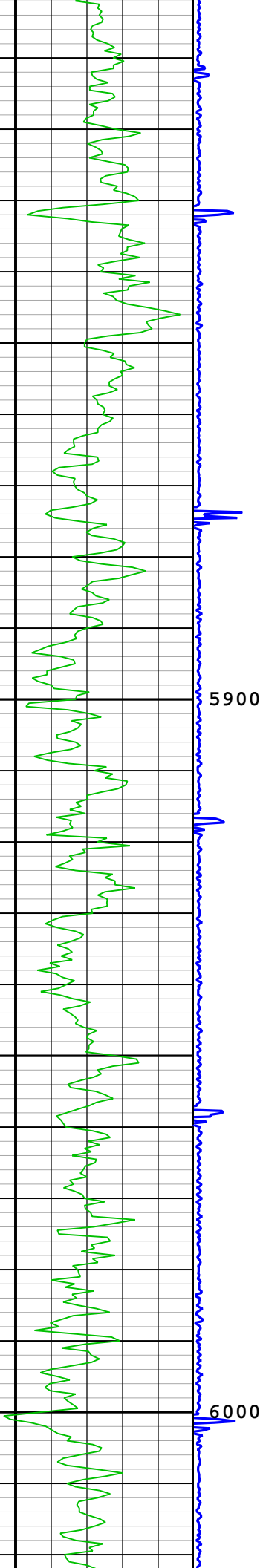


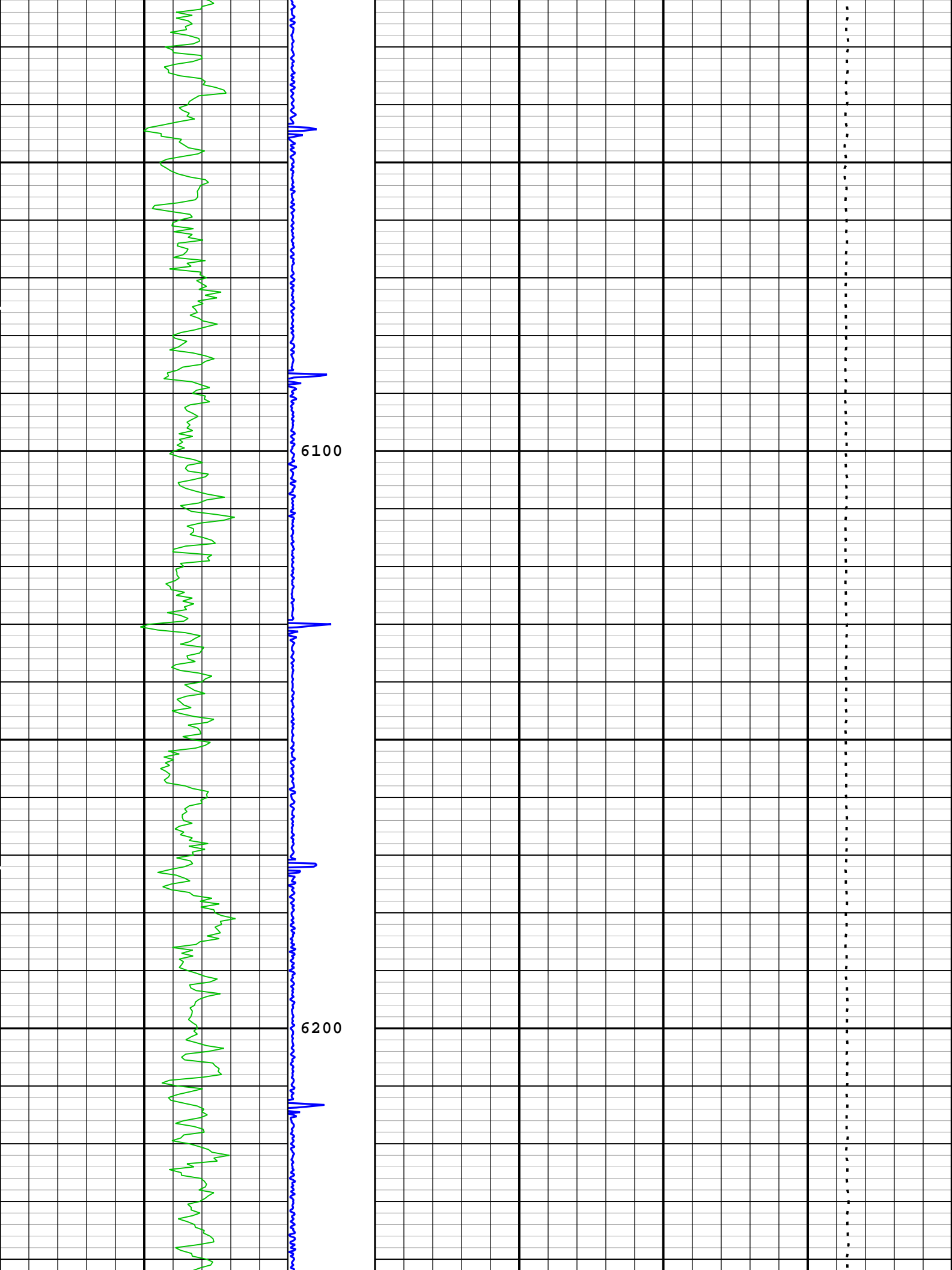


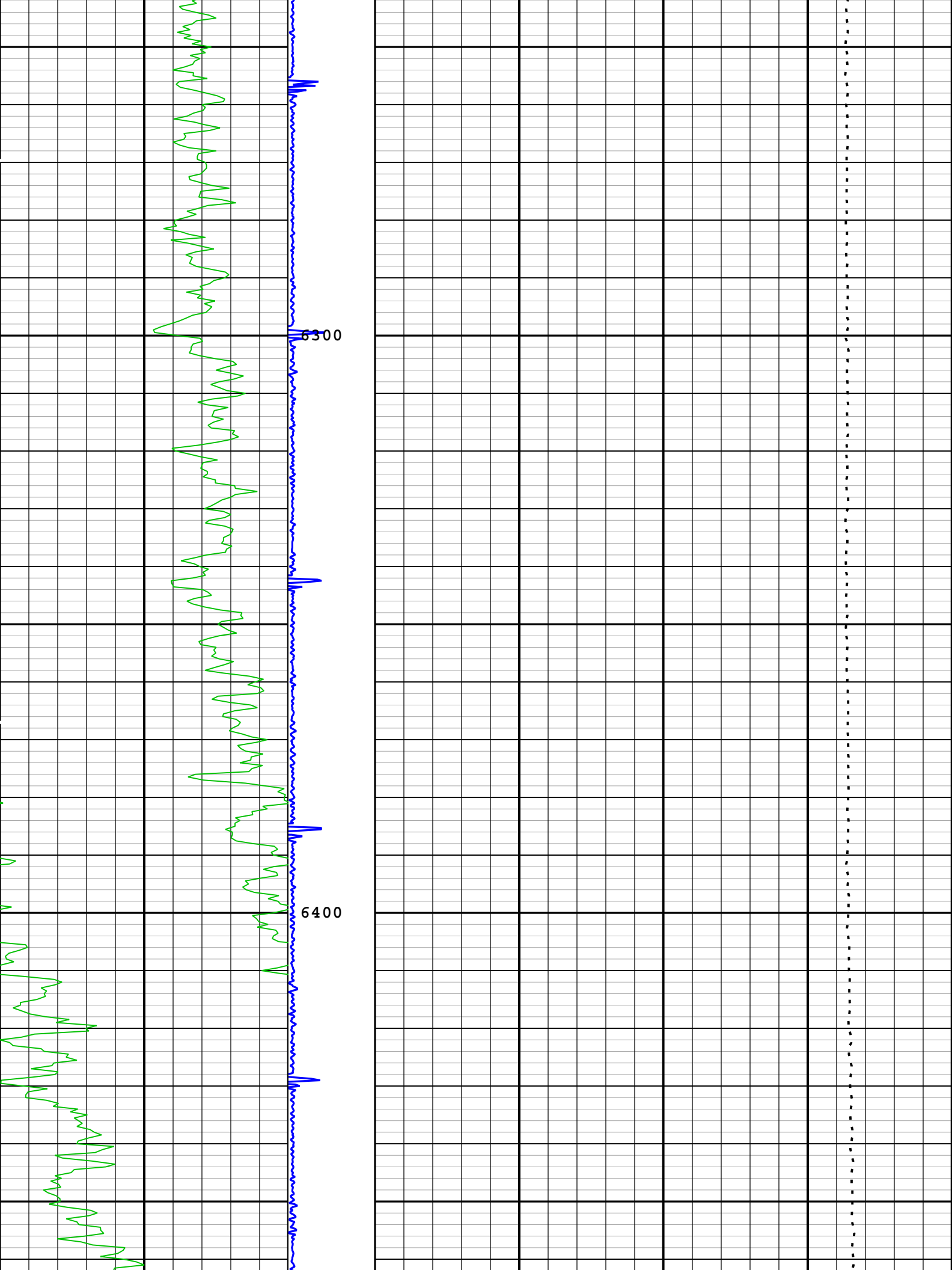


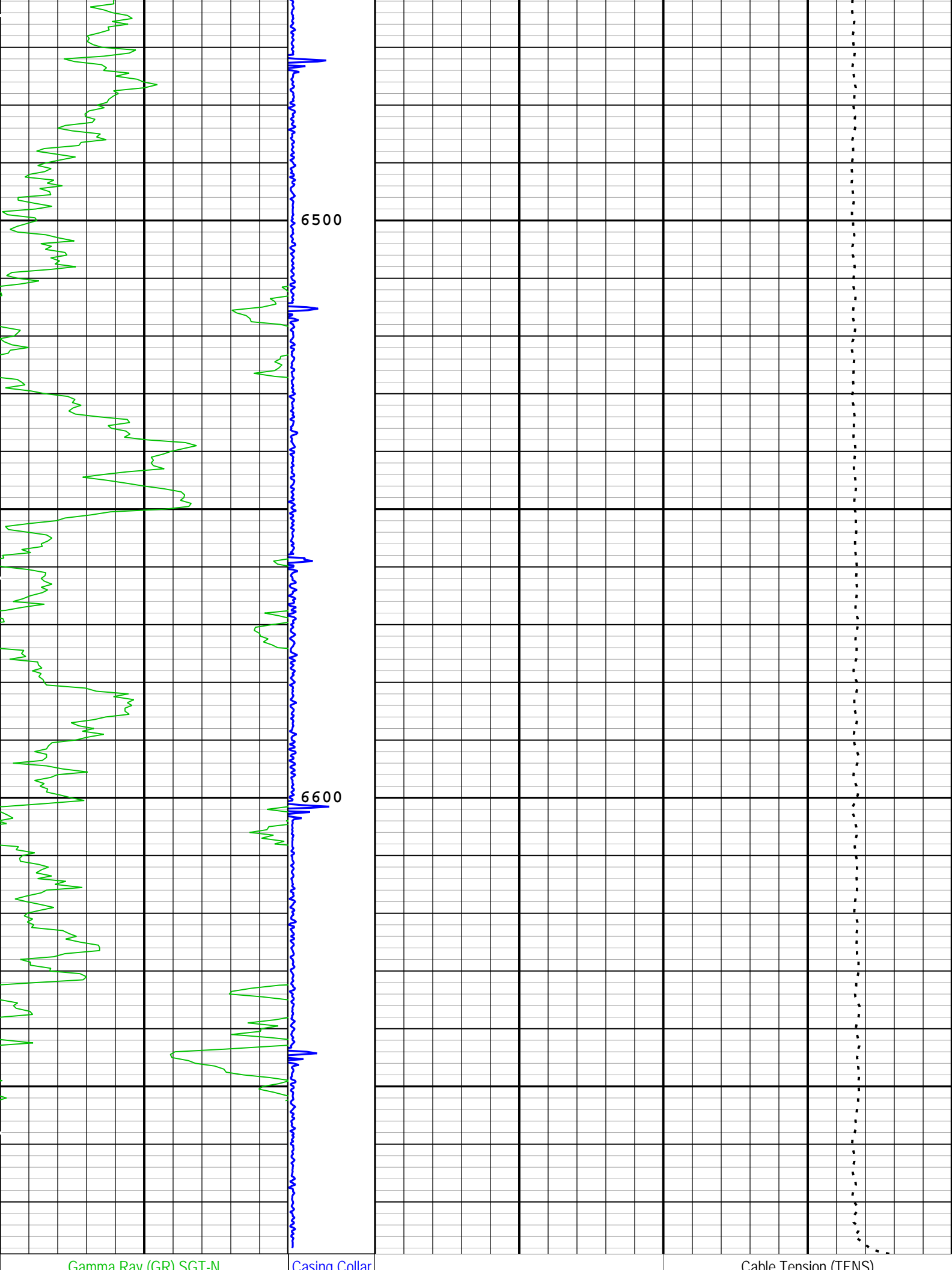












Gamma Ray (GR) SEC-W
0 gAPI 150

Casing Collar
Locator
Ultrasonic
(CCLU)
USIT-E
-1 in 20

Cable Tension (FLEW)
5000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

Description: DEPTH Domain Log for EDTCB GR channels Format: Log (Correlation 5 Inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type:
Measured Depth Creation Date: 30-Apr-2014 12:43:45

XYZ

Company:Noble Energy Inc

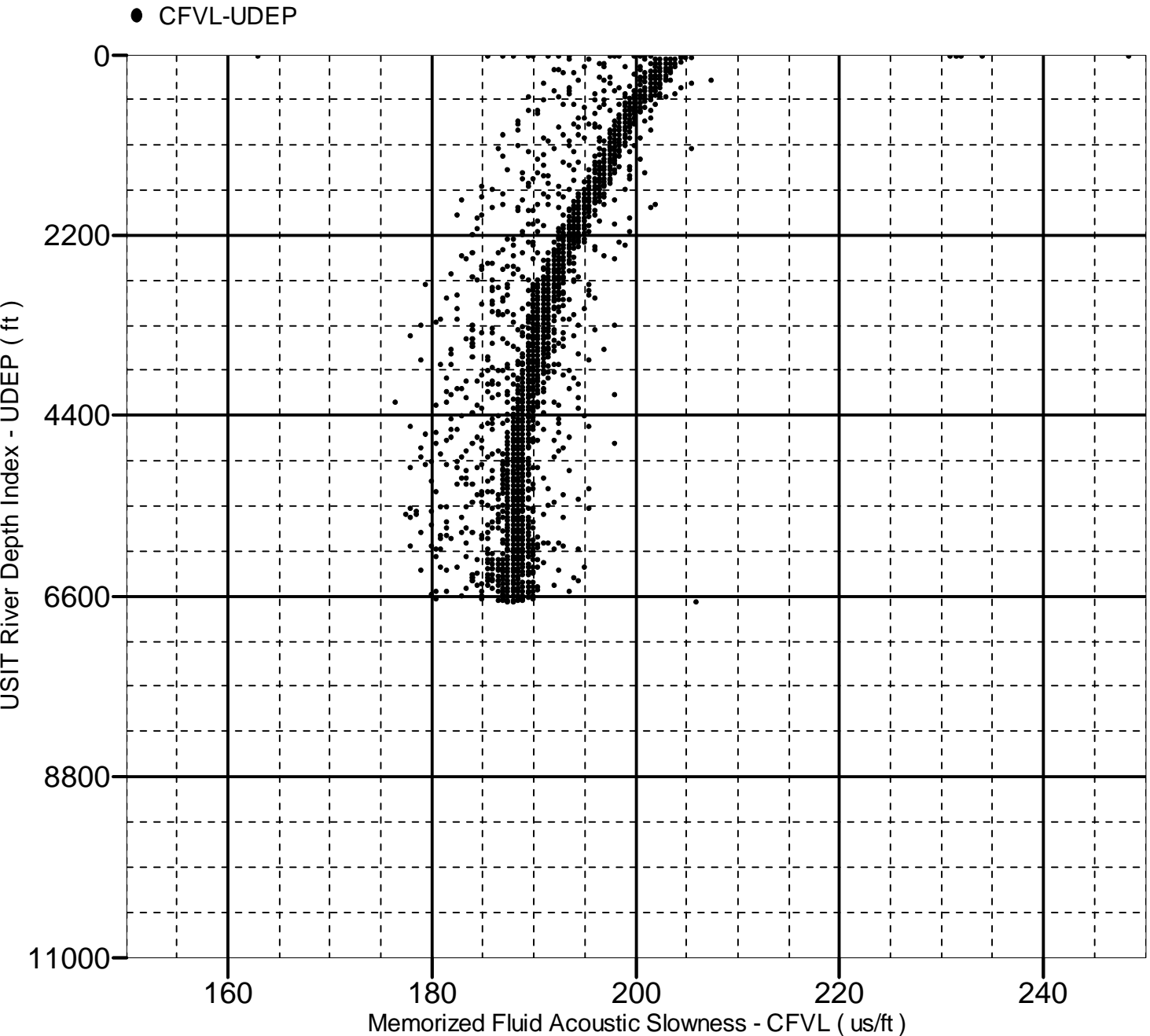
Well:Wells Ranch AE30-67-1BHNA

Run1: USIT: Log[3]:Up:S002

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6678.50 to 22.25 ft



XYZ

Company:Noble Energy Inc

Well:Wells Ranch AE30-67-1BHNA

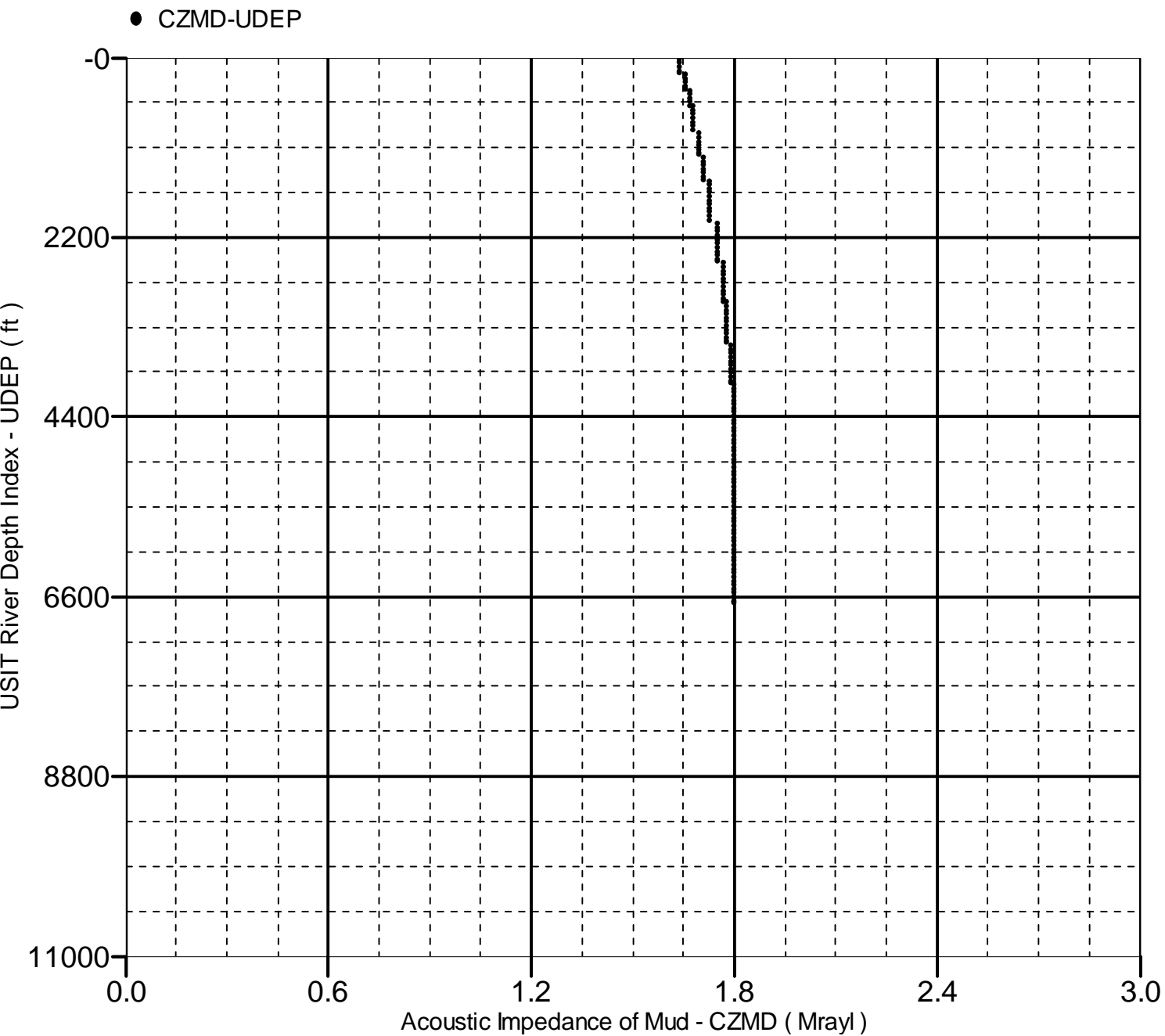
Run1: USIT: Log[3]:Up:S002

Acoustic Impedance of Mud vs Depth

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6678.50 to 22.25 ft



Company:	Noble Energy Inc	Schlumberger
Well:	Wells Ranch AE30-67-1BHNA	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	
Ultrasonic Imager		
ND State		
Gamma Ray - CCL Log		