



**Weatherford**<sup>®</sup>

## CEMENT BOND LOG

COMPANY

VANGUARD OPERATING LLC.

WELL

CSF 41B-4-791

FIELD

MAMM CREEK

PROVINCE/COUNTY

GARFIELD

COUNTRY/STATE

U.S.A./COLORADO

LOCATION

SEC

4

TWP

7S

RGE

91W

Other Services

RAPTOR N-VISION

Latitude

39.479308

Longitude

-107.559985

API Number

05-045-23497

Permanent Datum :Ground Level, Elevation 6540.4 feet

Log Measured From KB, 17.00 feet above Permanent Datum

Drilling Measured From KB

Elevations:  
KB 6557.40  
DF  
GL 6540.40

Date

26-FEB-2018

### PERFORATION RECORD

Run Number

ONE

Service Order

5133-206669803

Shot

Density

Number  
of Shots

feet

Depth To  
feet

Type Log

SBT

Depth Driller

8500.00

feet

Depth Logger

8411.25

feet

Top Log Interval

5035.00

feet

Bottom Log Interval

8411.25

feet

Hole Fluid Type

WATER

Hole Fluid Level

Restriction ID

4.000

inches

Gun Type

Max Recorded Temp

216.00

deg F

Gun Size

Well Head Pressure

0.00

CASING / TUBING RECORD

Well Head Equipment

N/A

Size

Weight

Depth From

Depth To

Time Well Ready

ROA

inches

pounds/ft

feet

feet

Time Logger Bottom

SEE LOG

8.625

32.00

0.00

912.00

Unit

14115/15108

4.500

11.60

0.00

8477.00

Equipment Name

WSS-E

Base

CASPER, WY

Recorded By

P. MAZUR/A. TAYLOR

Witnessed By

M. SNOW

## BOREHOLE RECORD

Last Edited: 24-FEB-2018 06:50

Bit Size  
inches

7.875

Depth From  
feet

912.00

Depth To  
feet

8500.00

## CASING / TUBING RECORD

Type

Grade

TypeJoint

Size  
inches

Depth From  
feet

Shoe Depth  
feet

Weight  
pounds/ft

Surface

J-55

LTC

8.625

0.00

912.00

32.00

Production

P-110

LTC

4.500

0.00

8477.00

11.60

## REMARKS

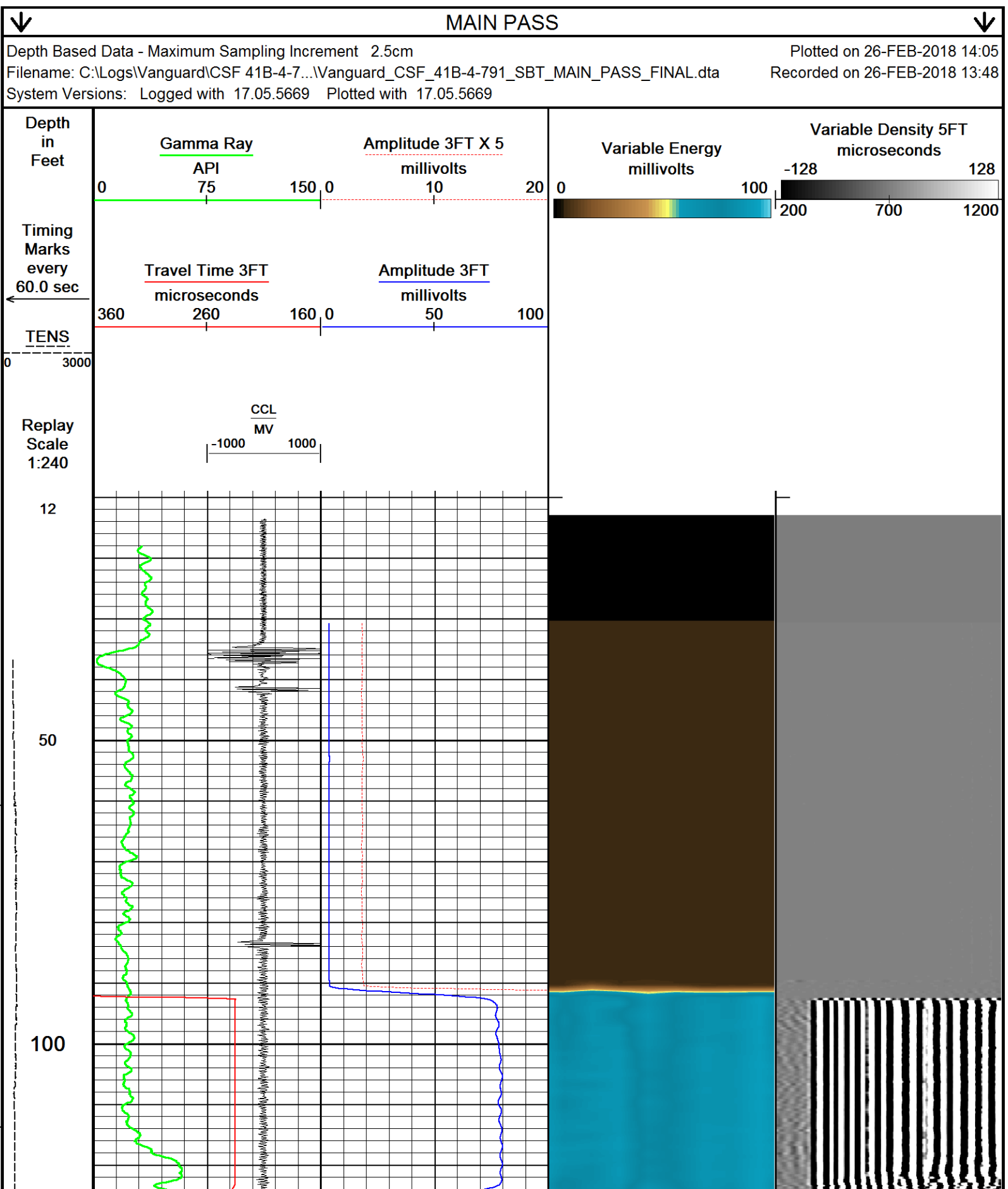
Logged with WLS v 17.05.6573 via WSS-E

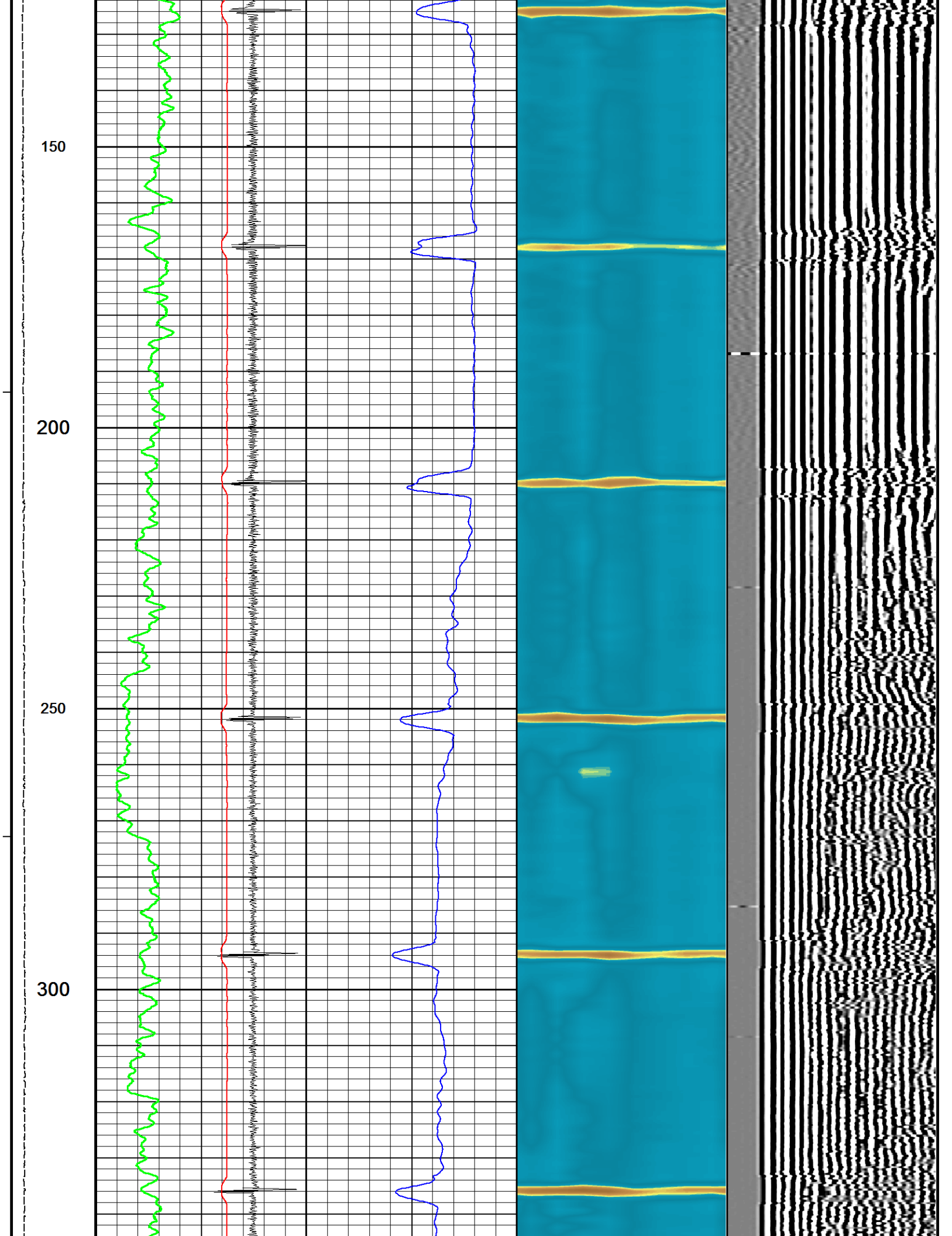
Intervals logged and presented at clients request.

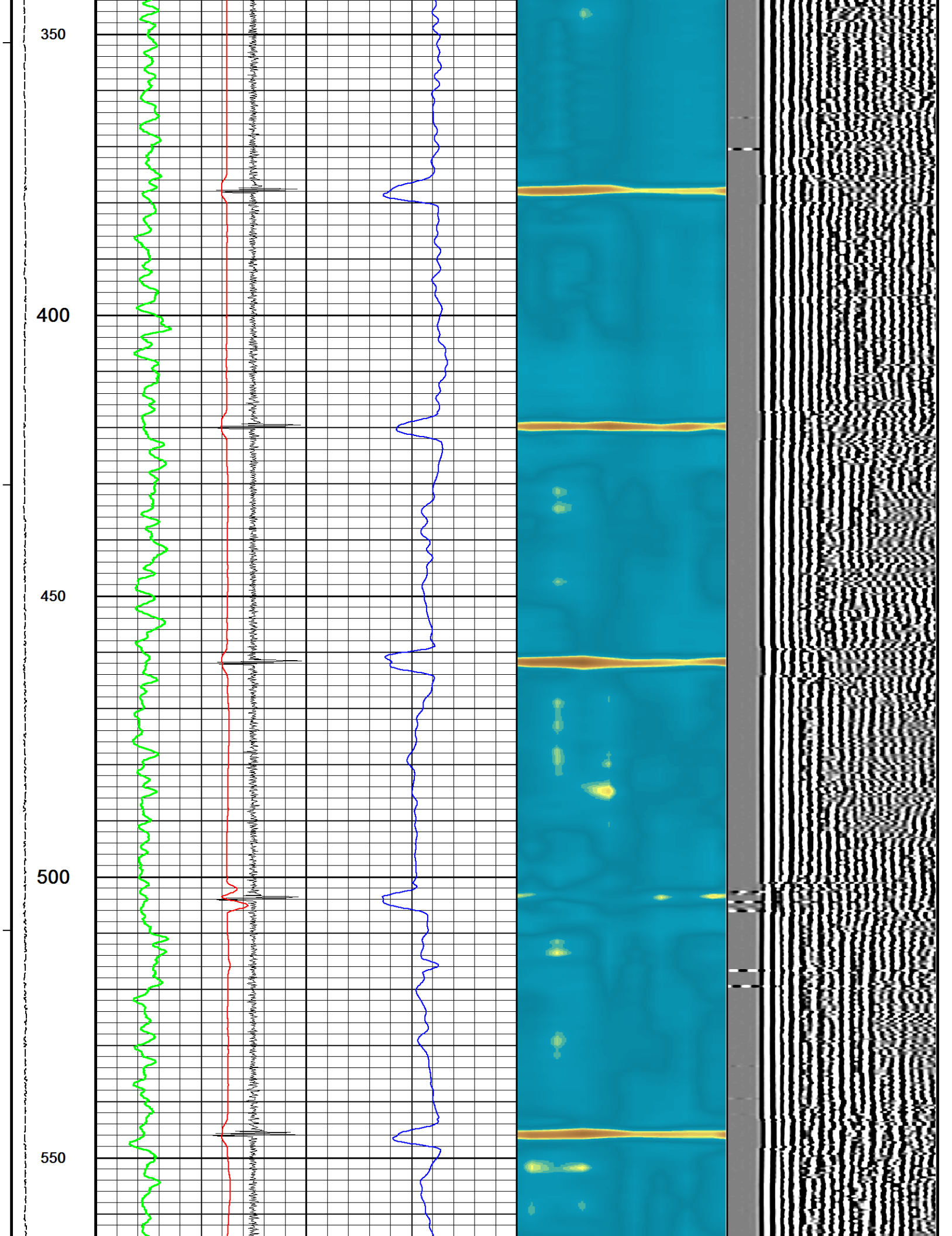
Depth correlated to marker joint at 6038.5' from Temperature GR/CCL log (RMWS; 02-01-2018) supplied on site by client representative; 18.1' added to correlate.

In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY. AND

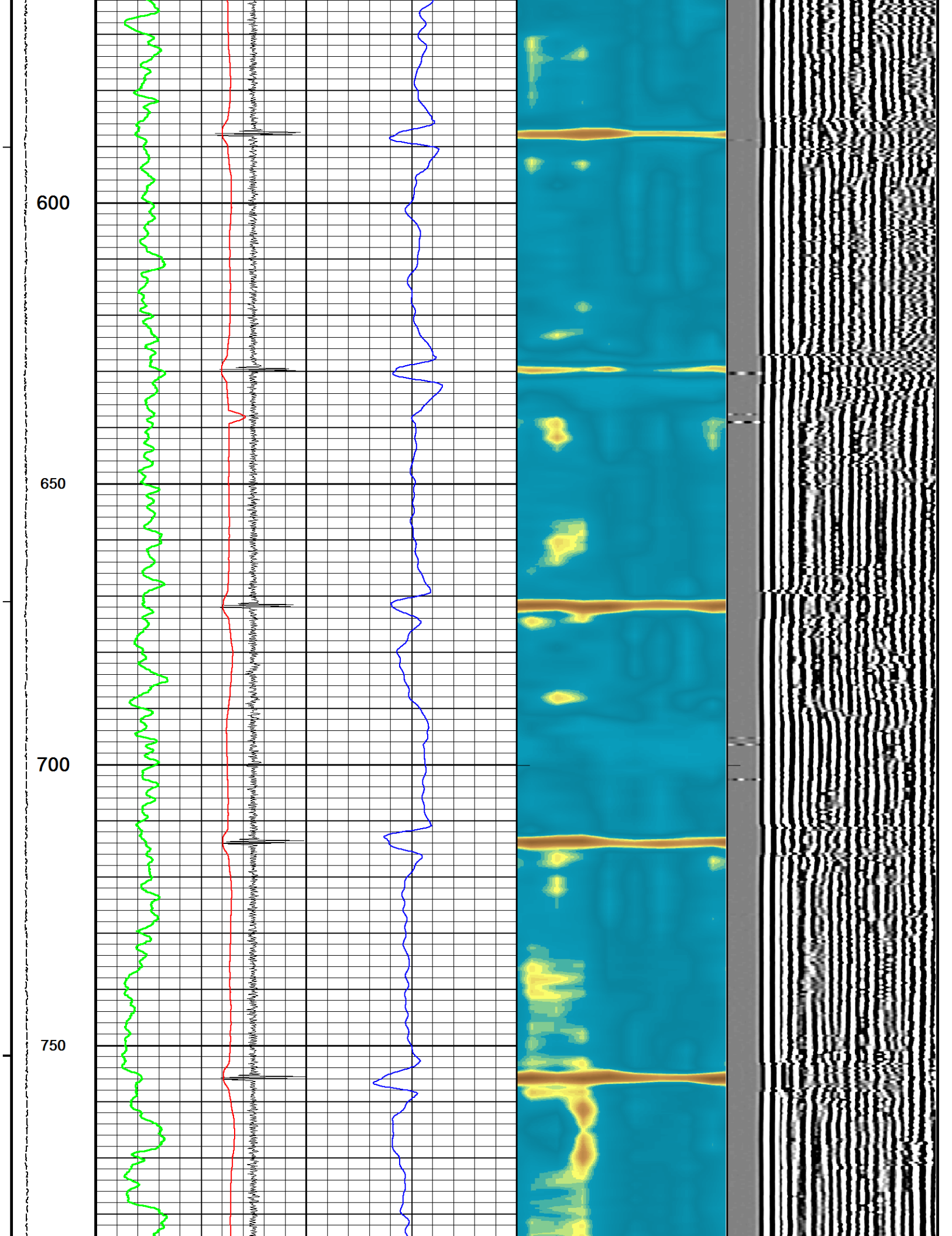
THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

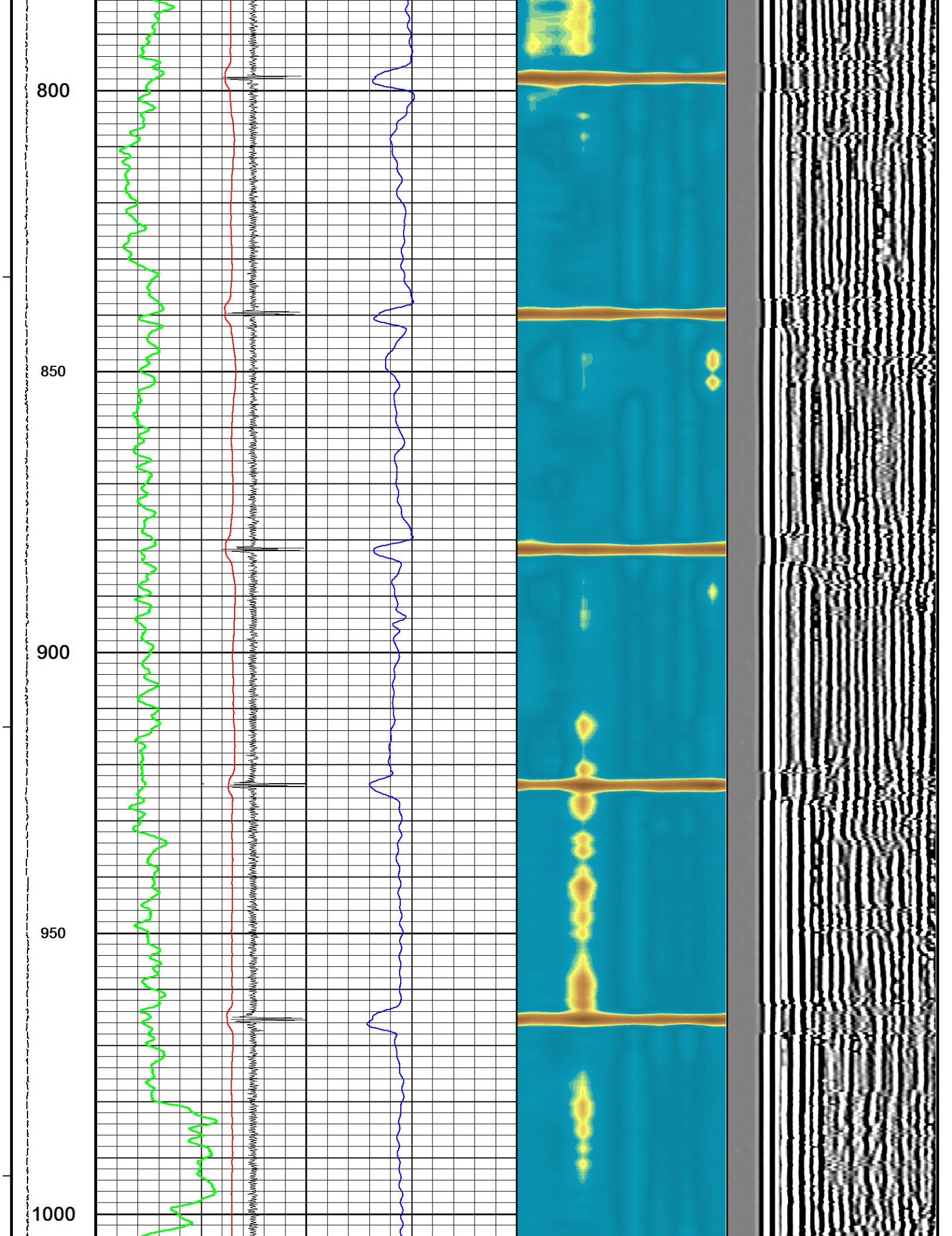


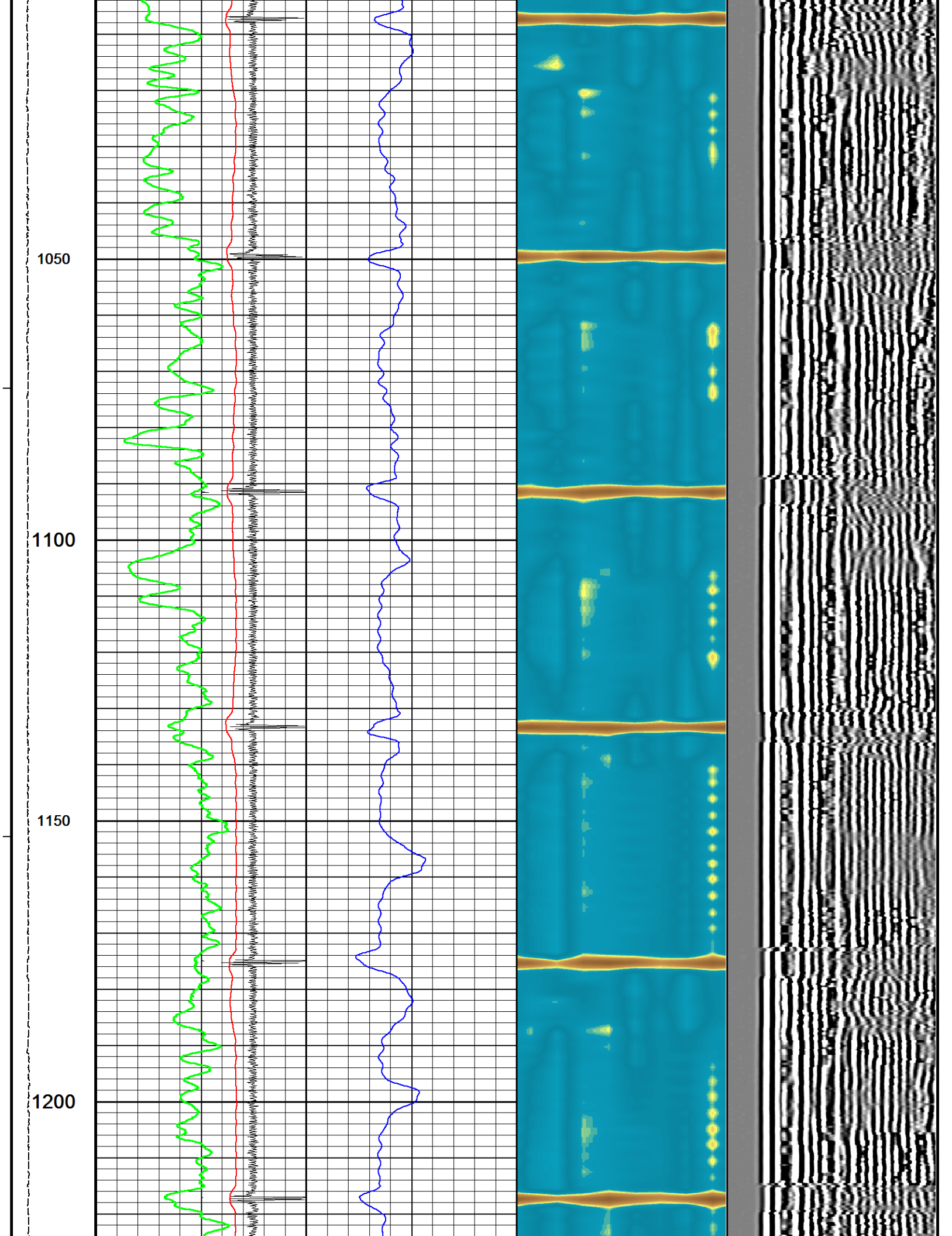




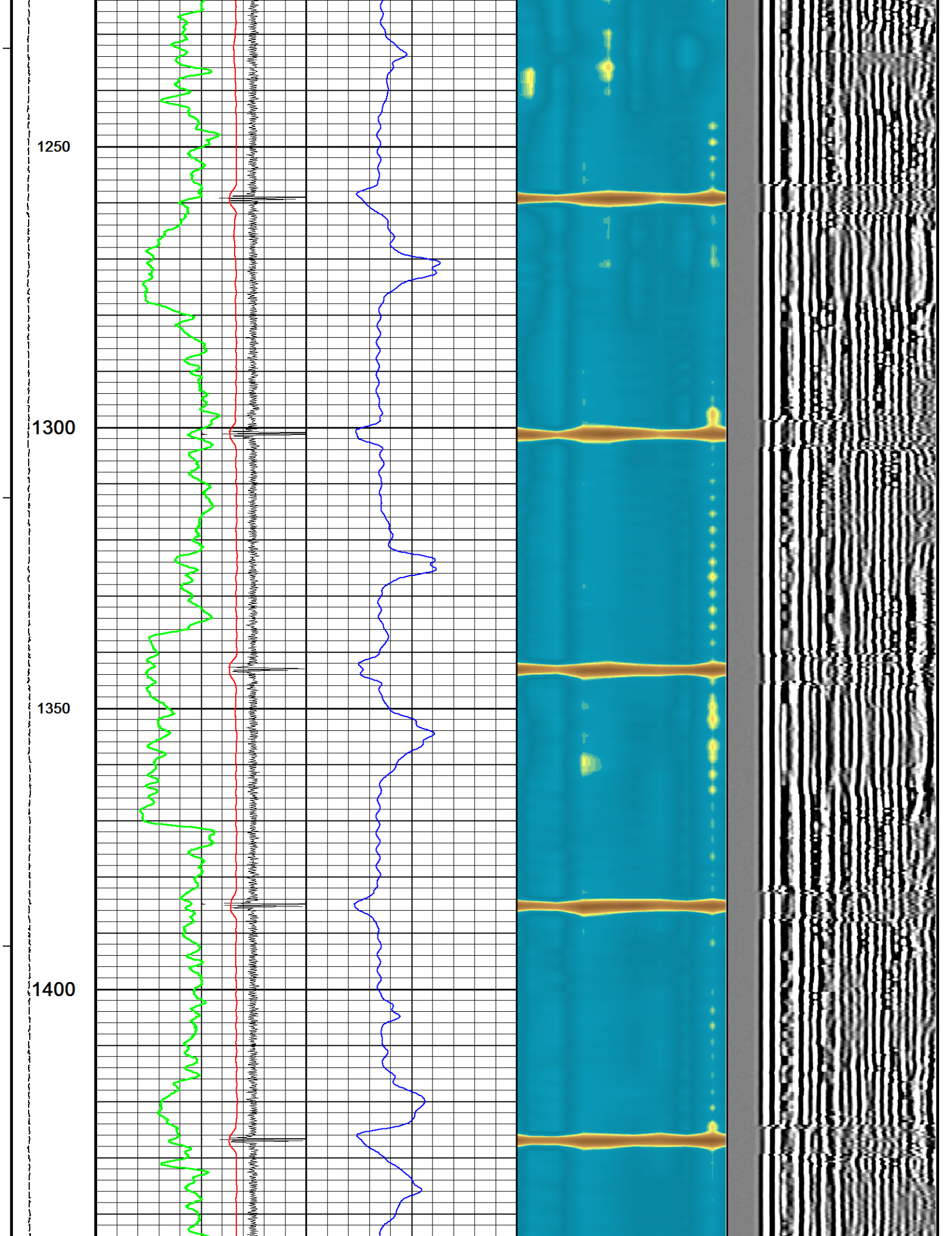




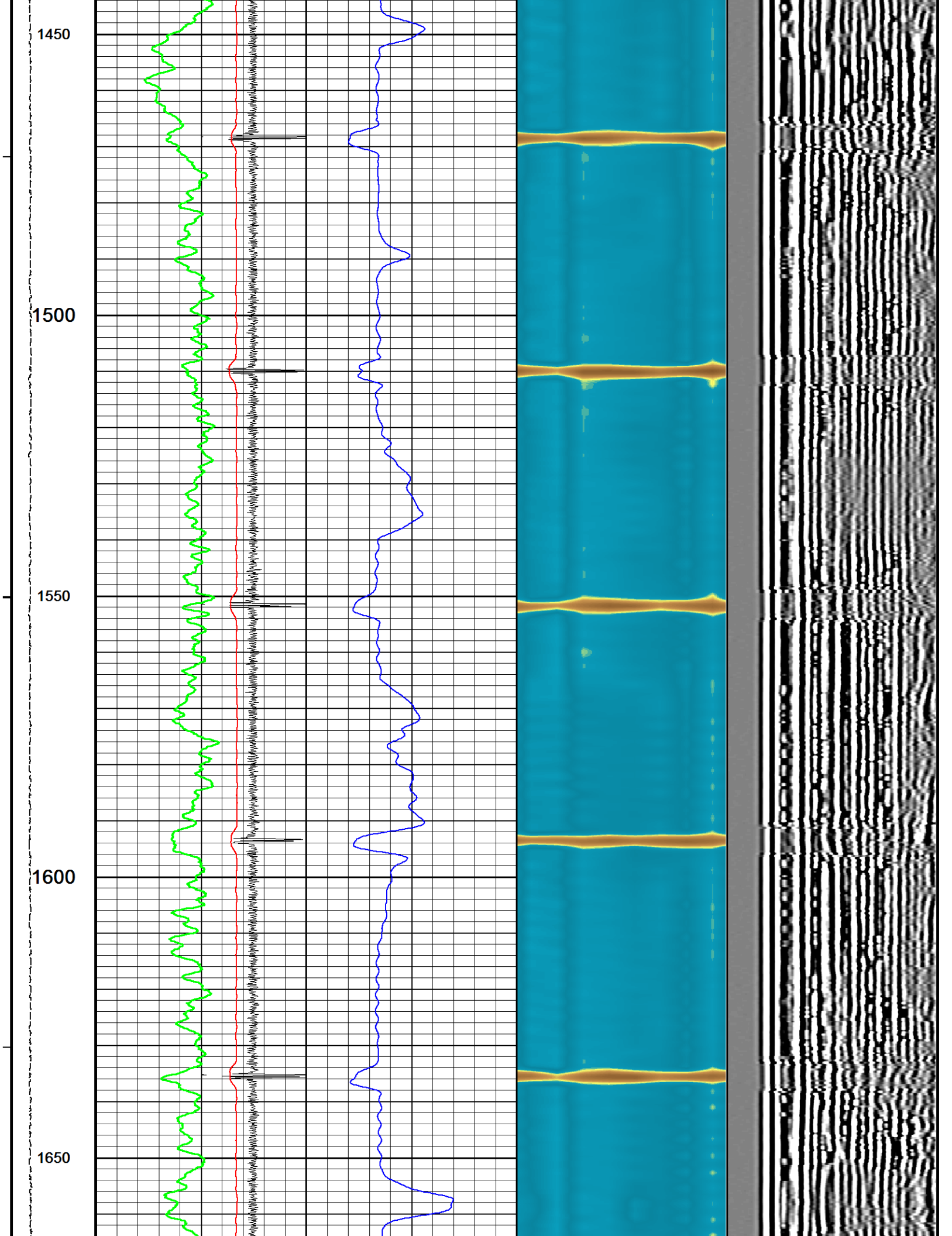


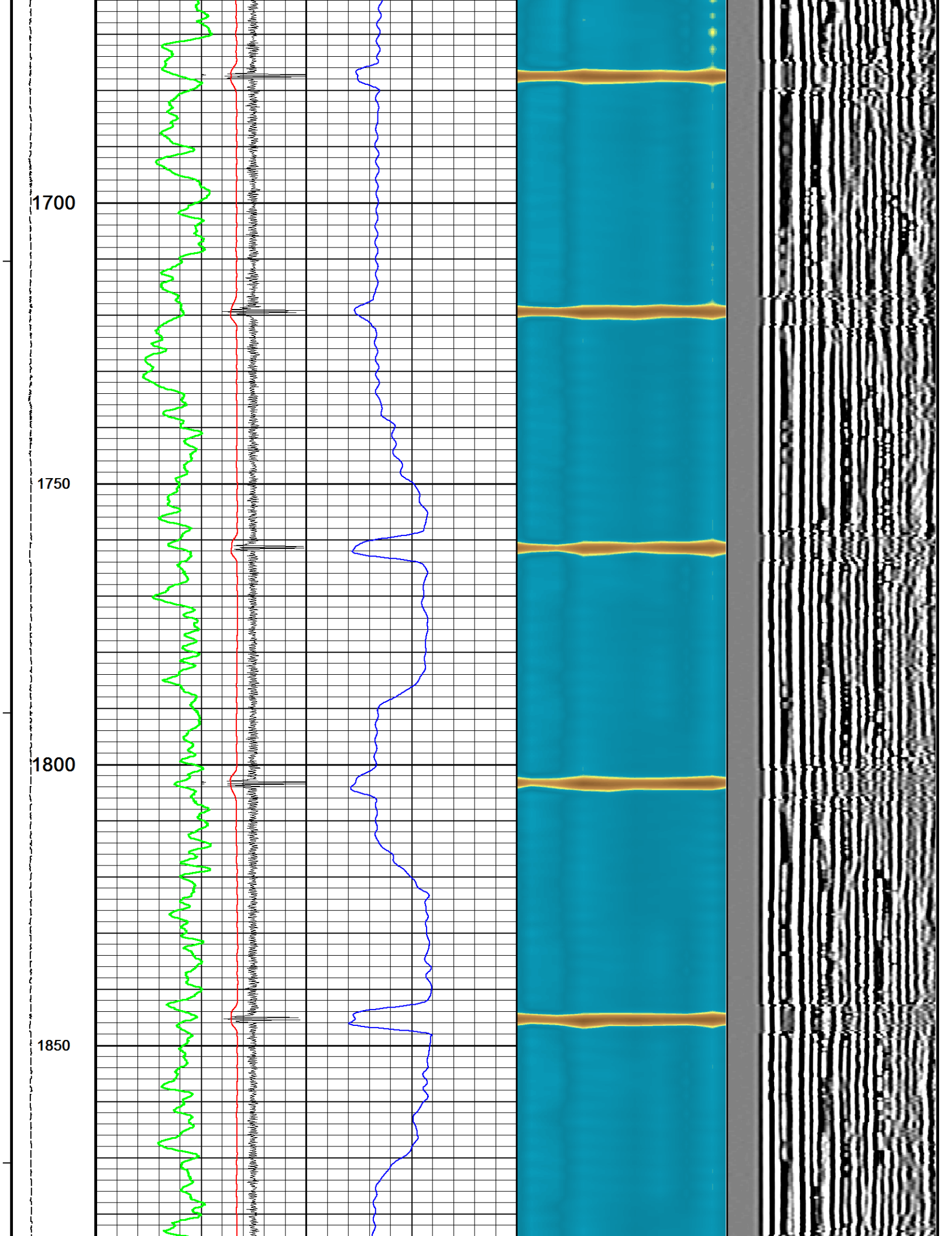


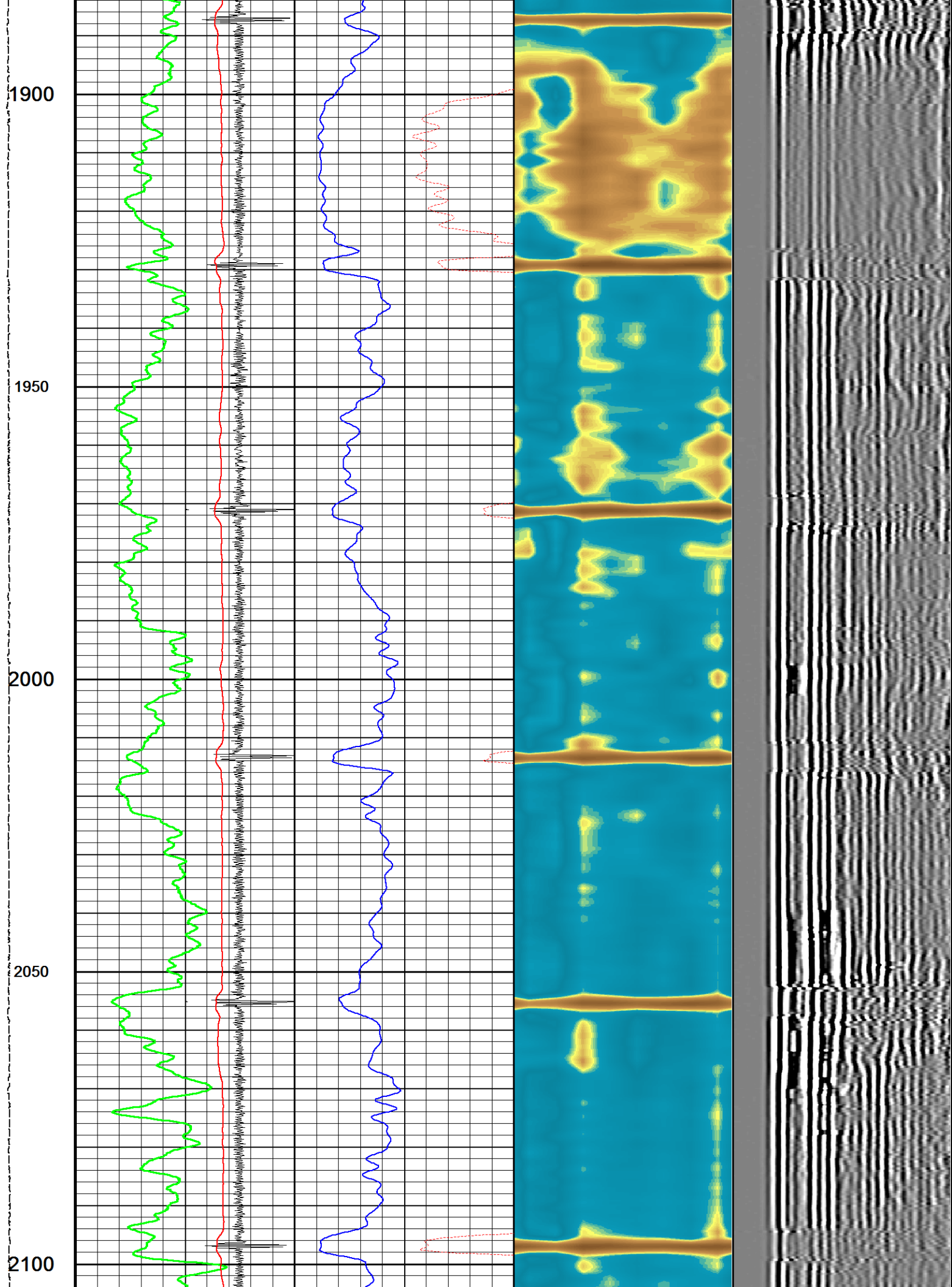




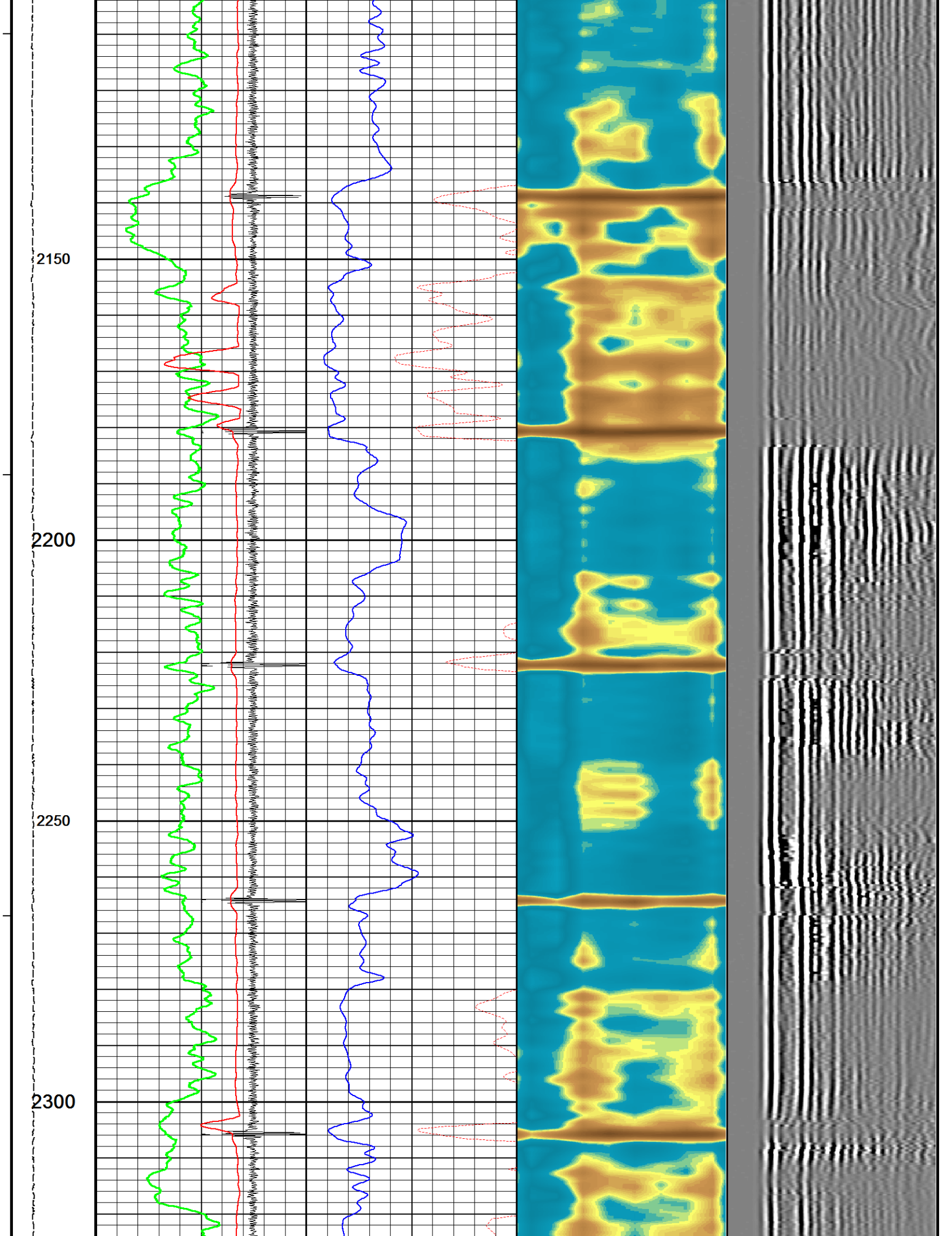




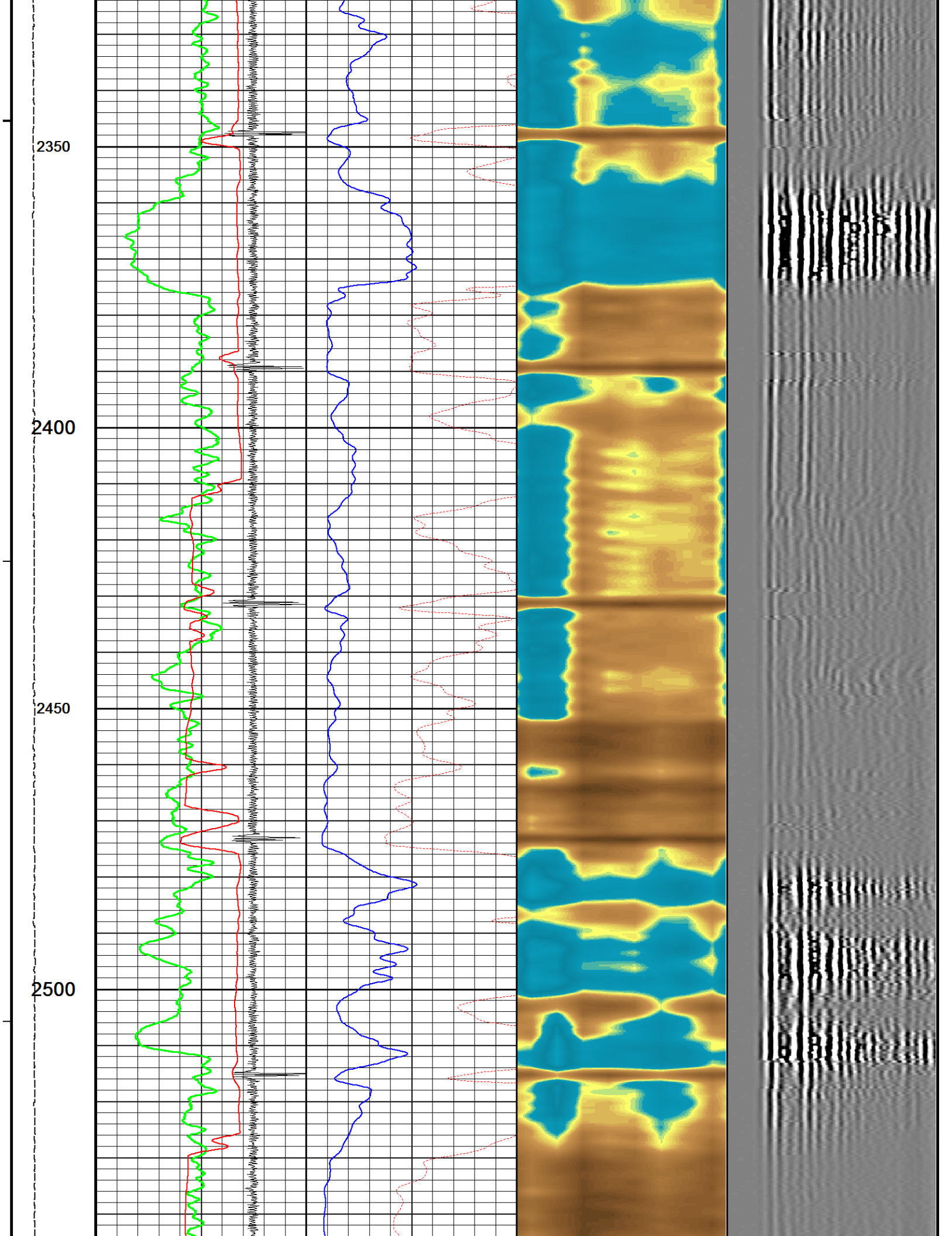












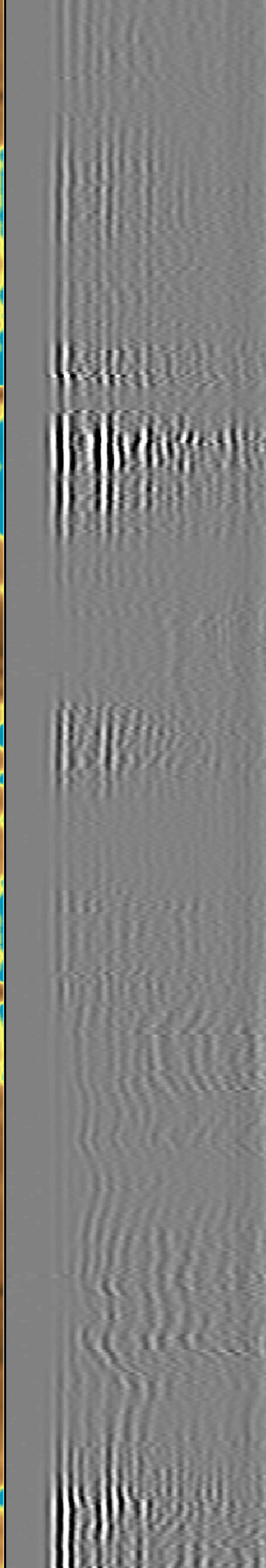
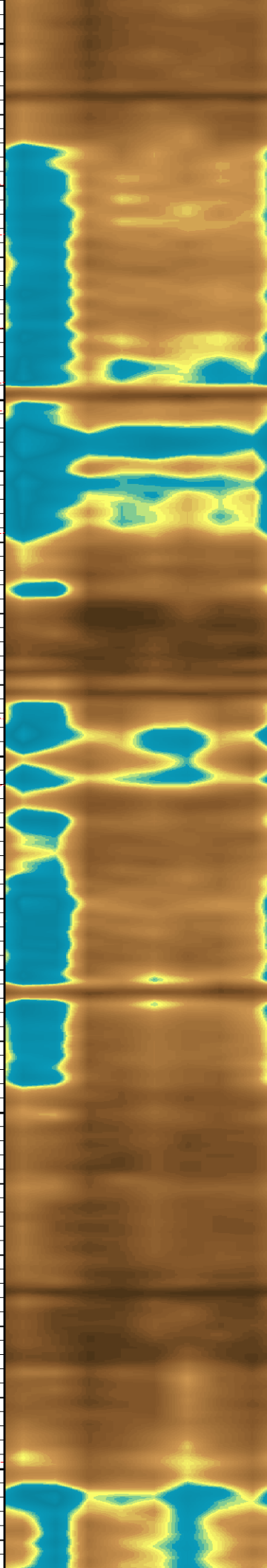
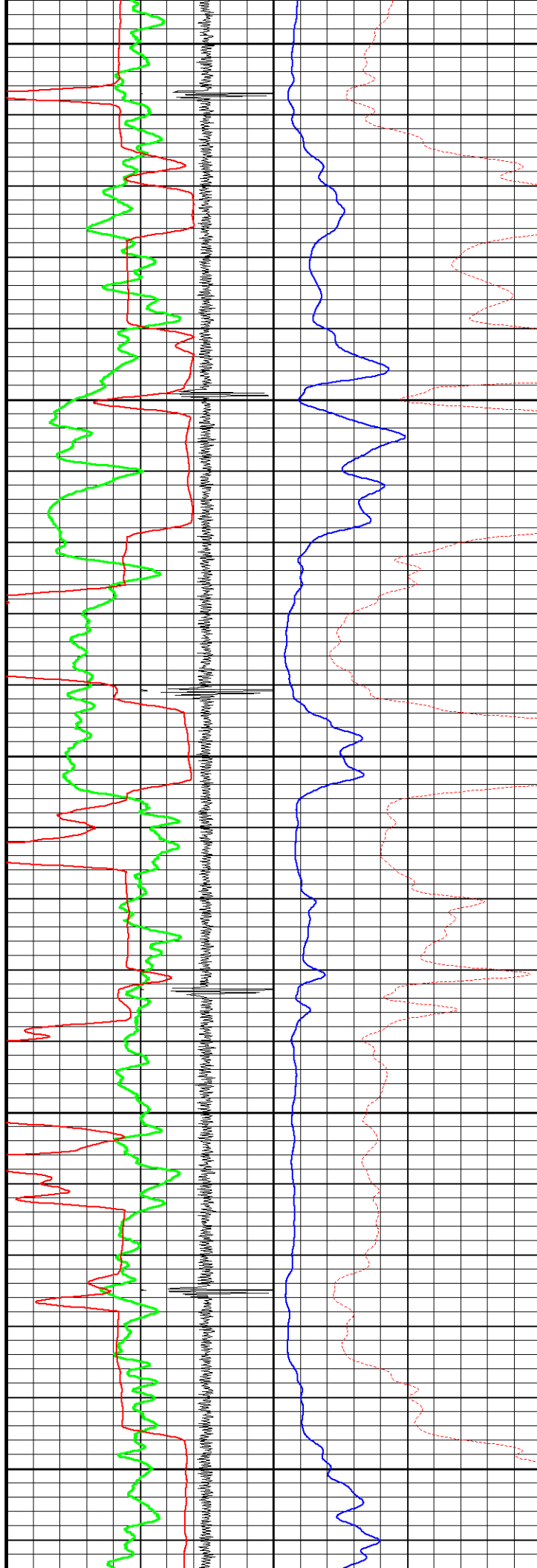
2550

2600

2650

2700

2750

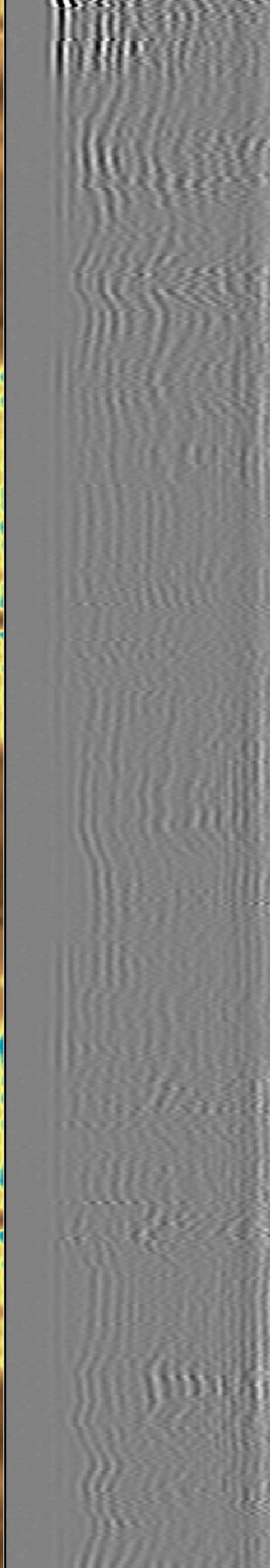
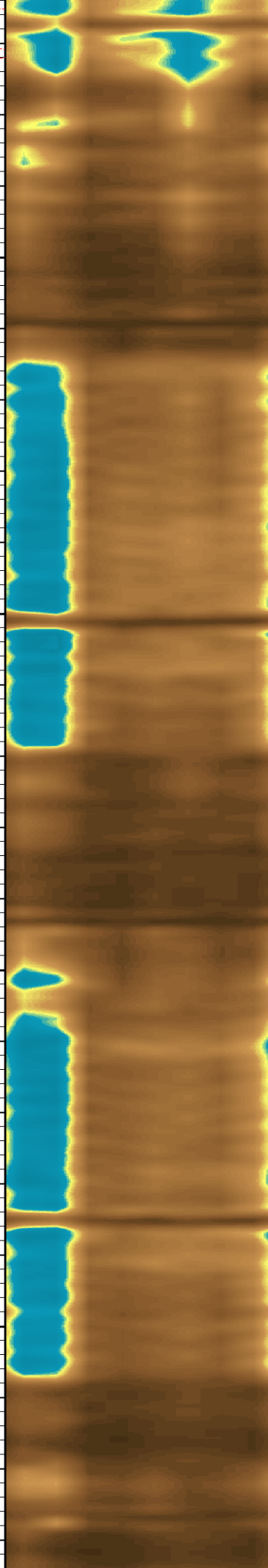
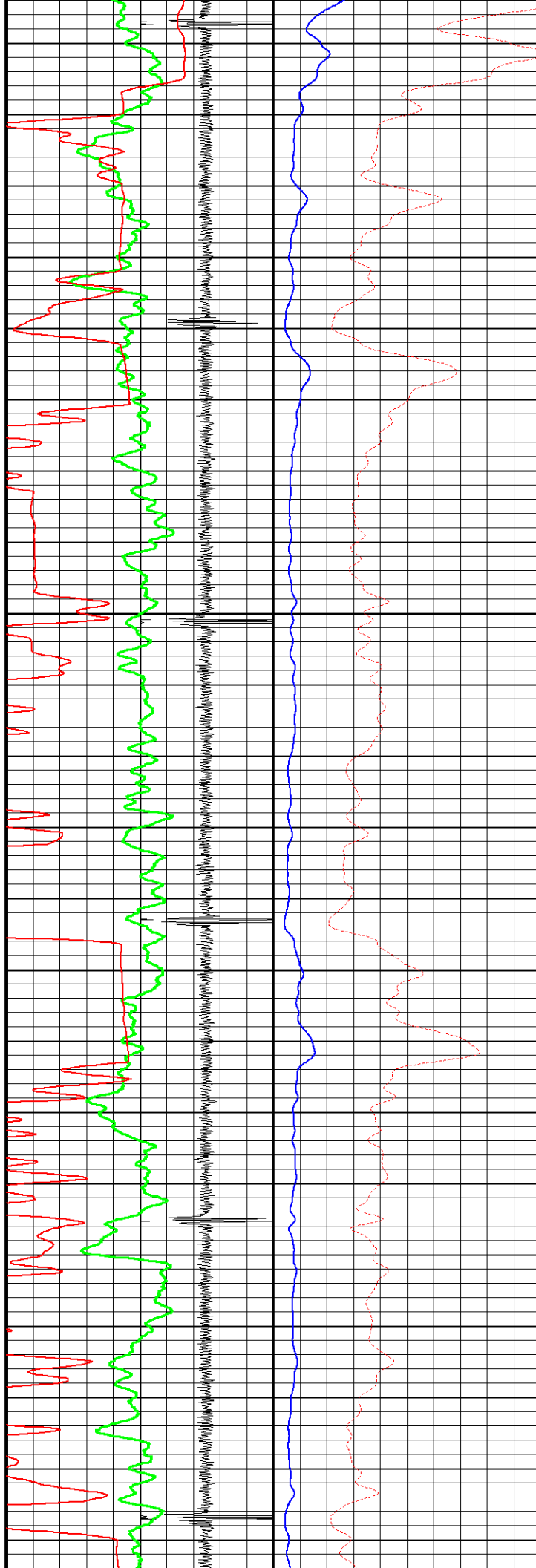


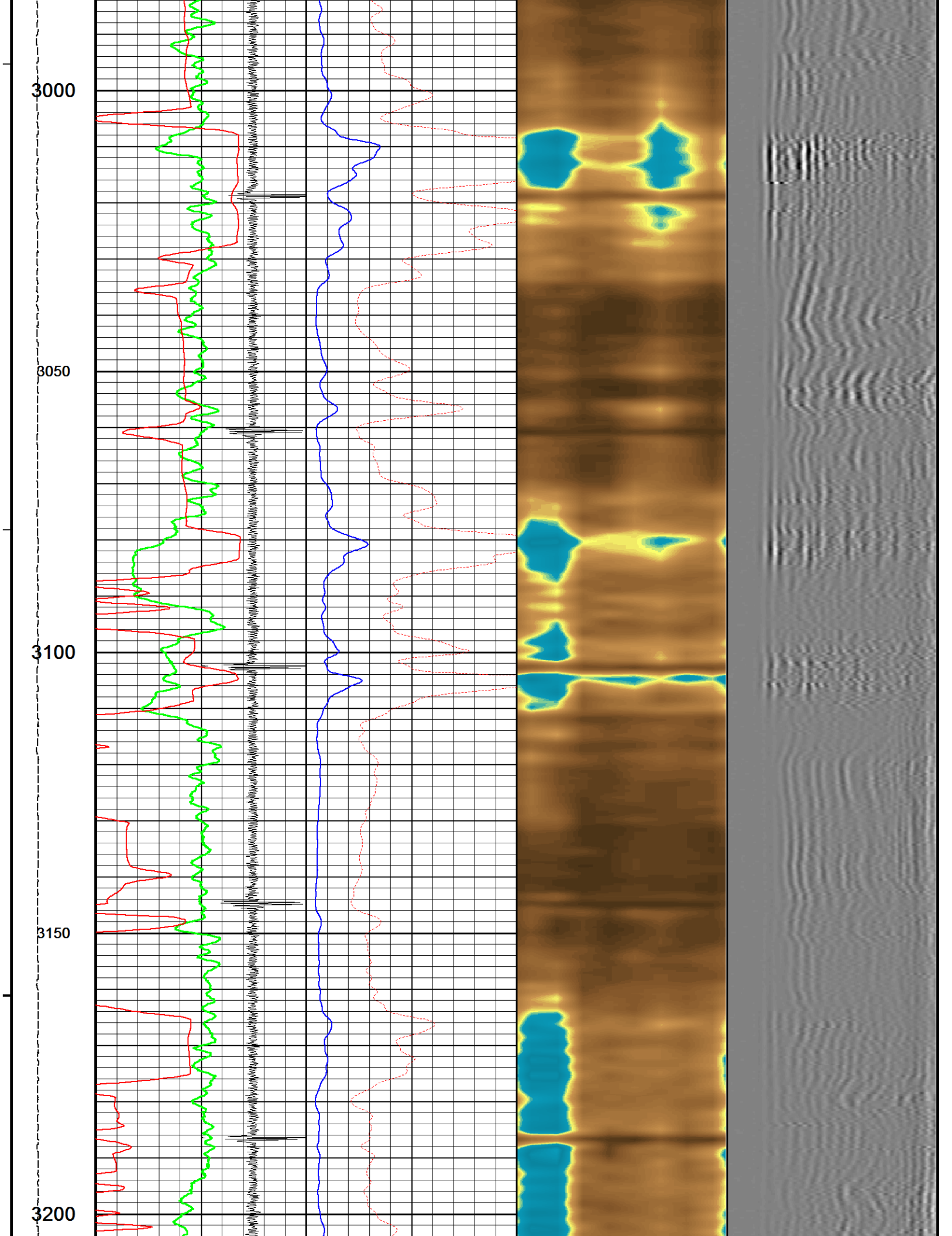
2800

2850

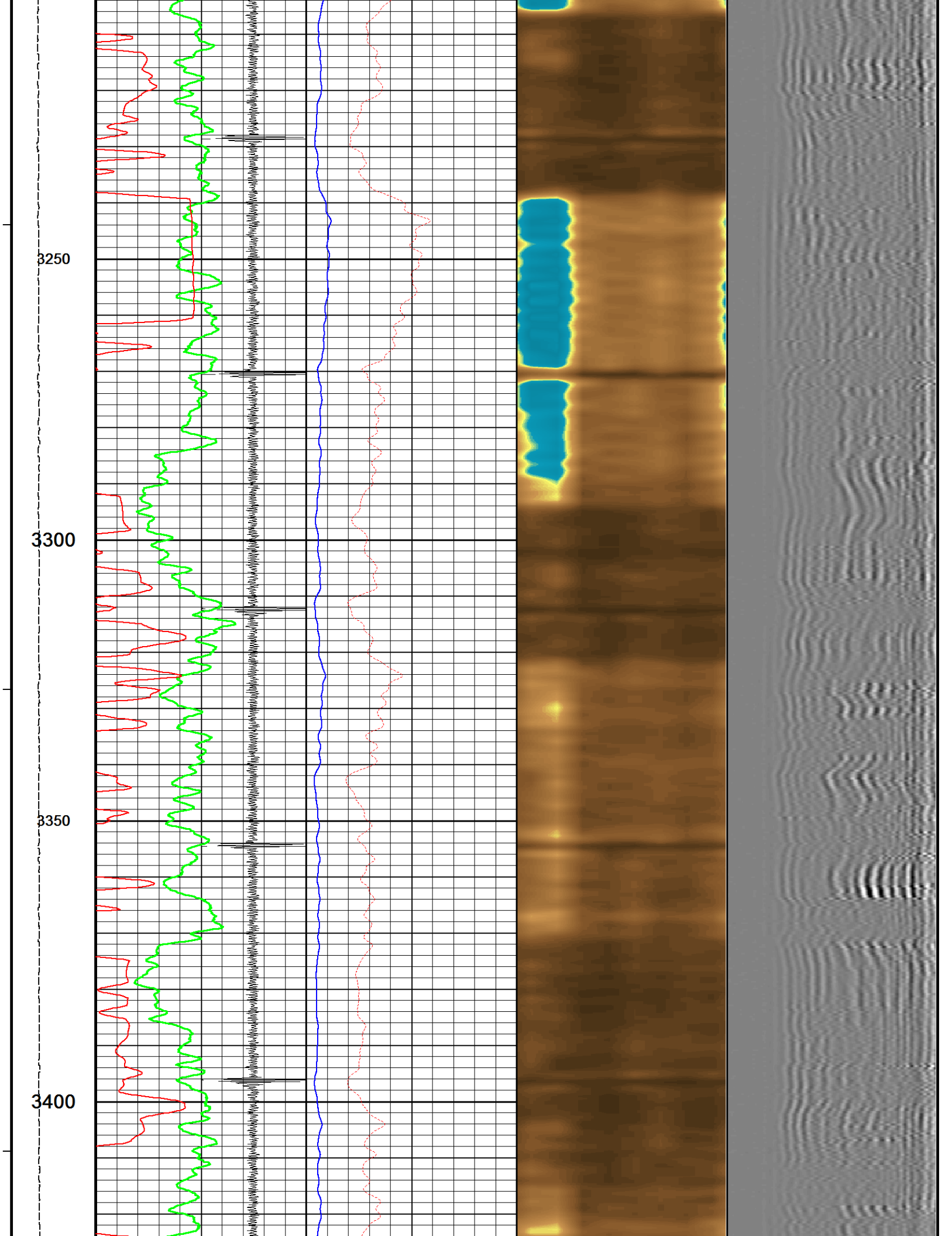
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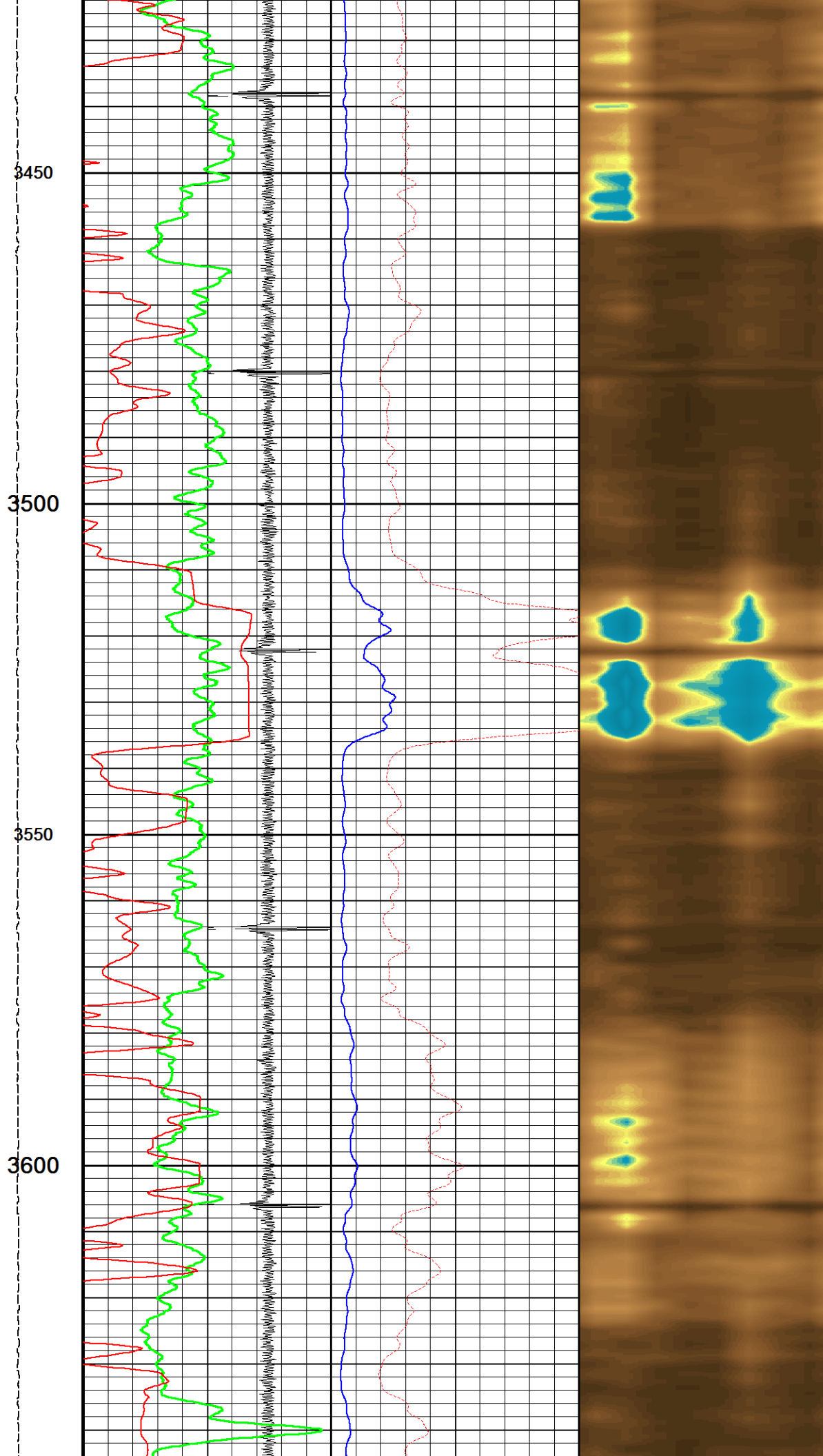
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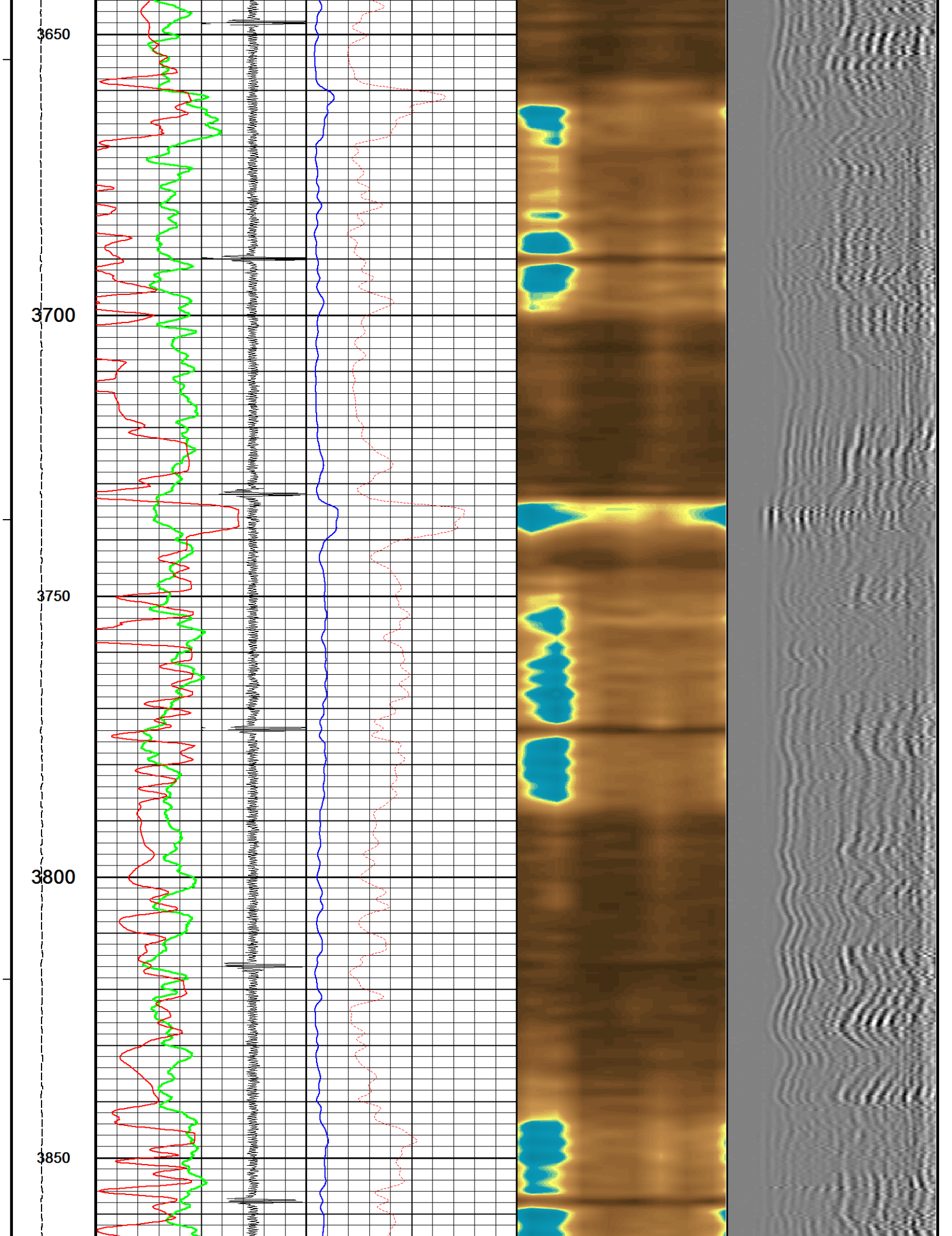


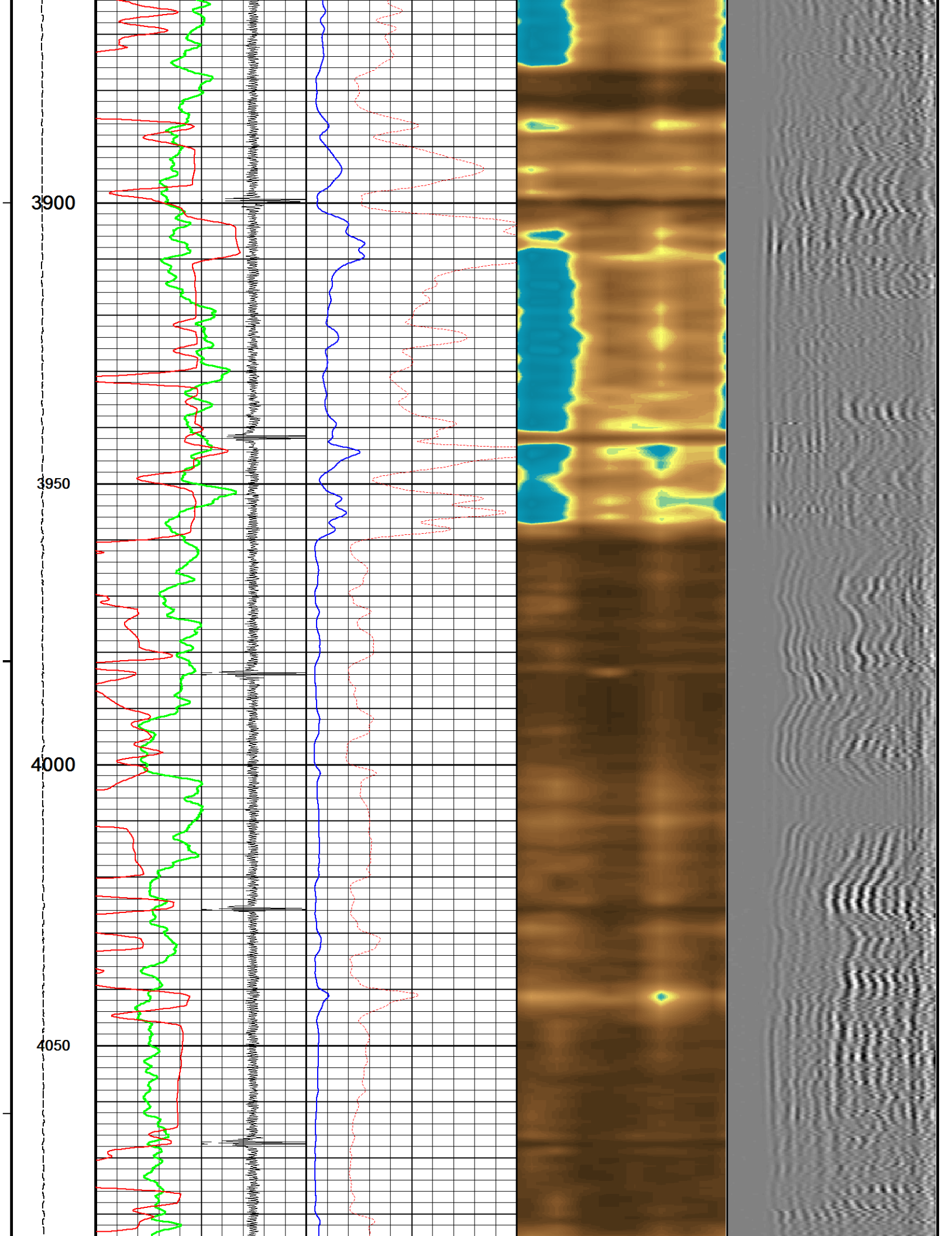




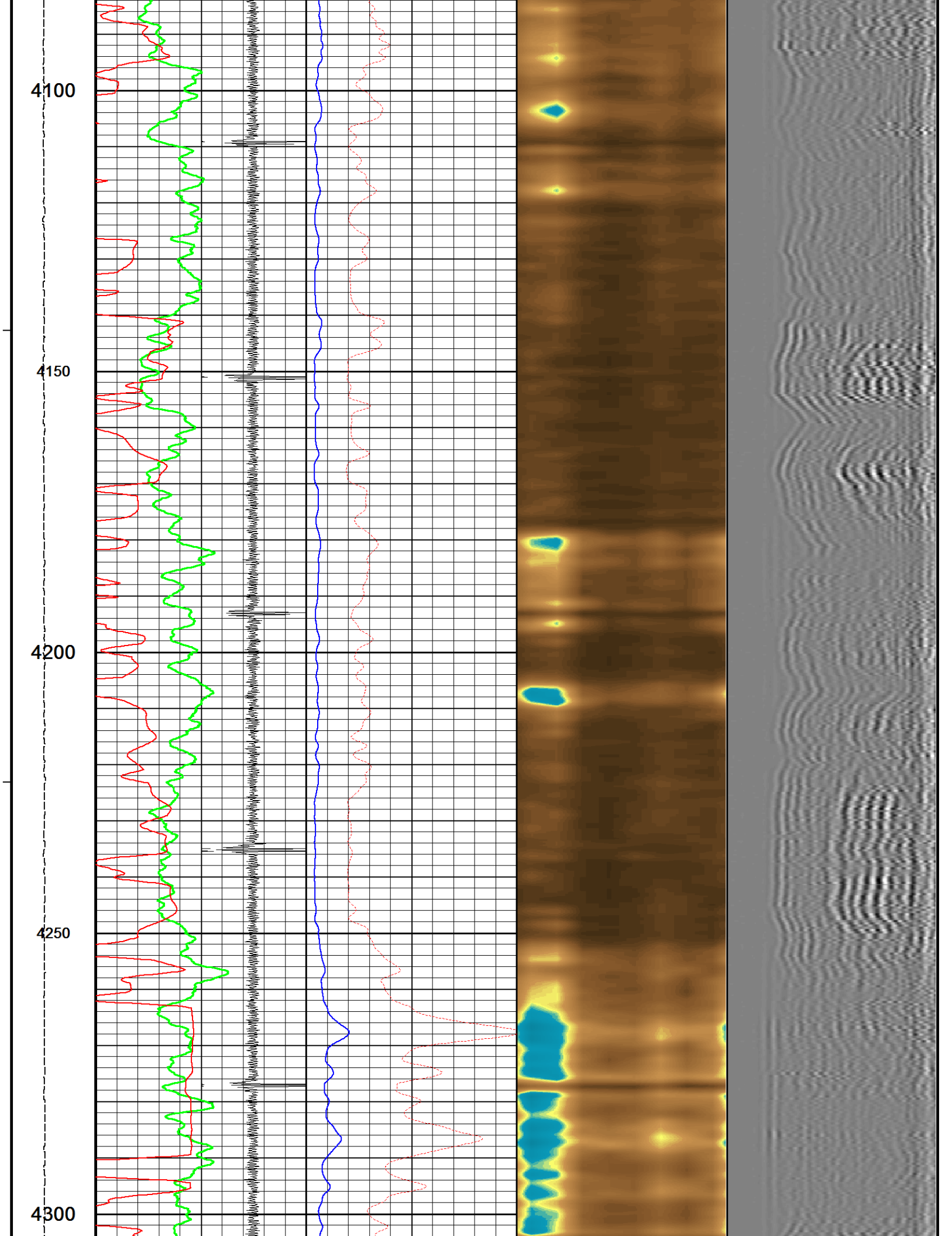


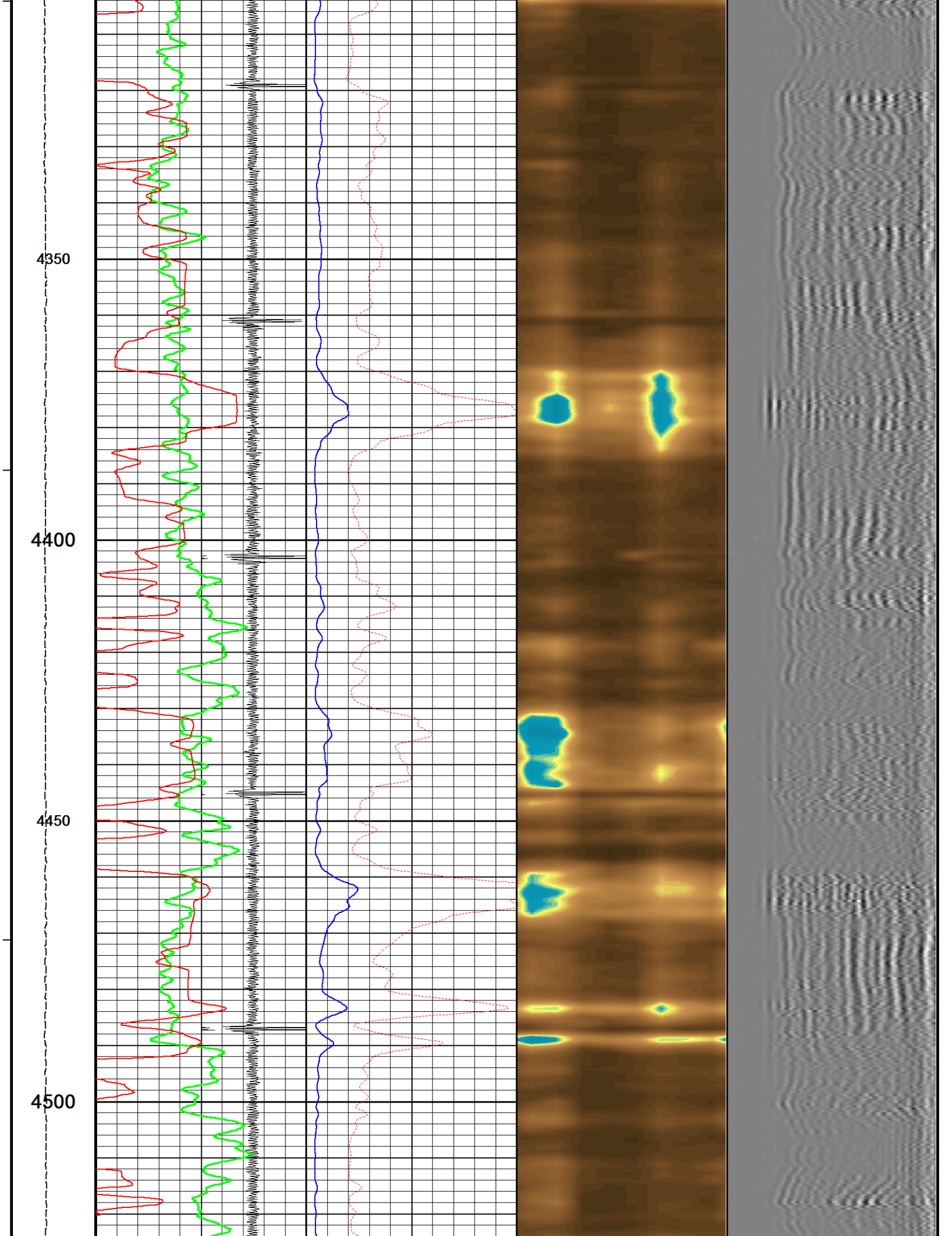


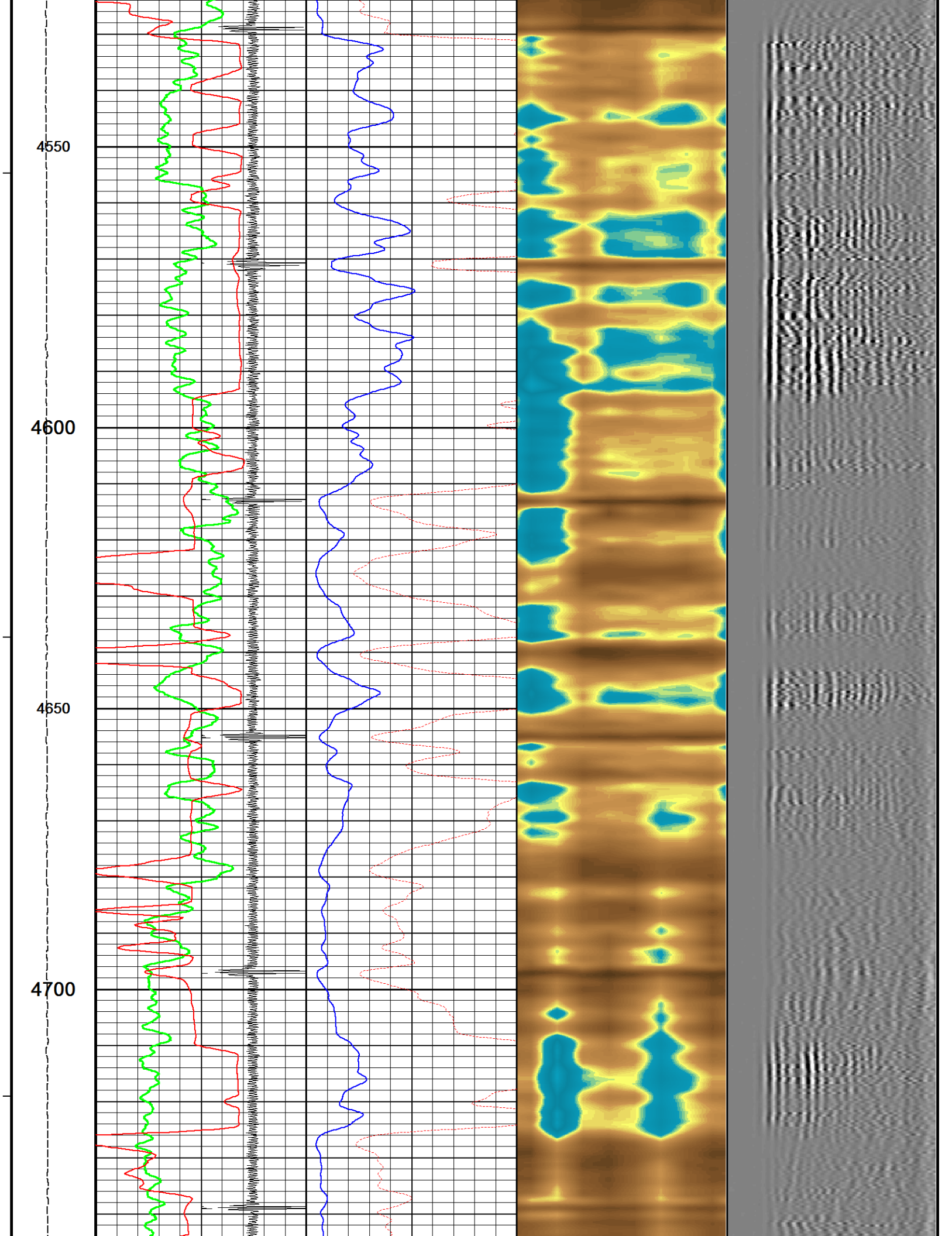




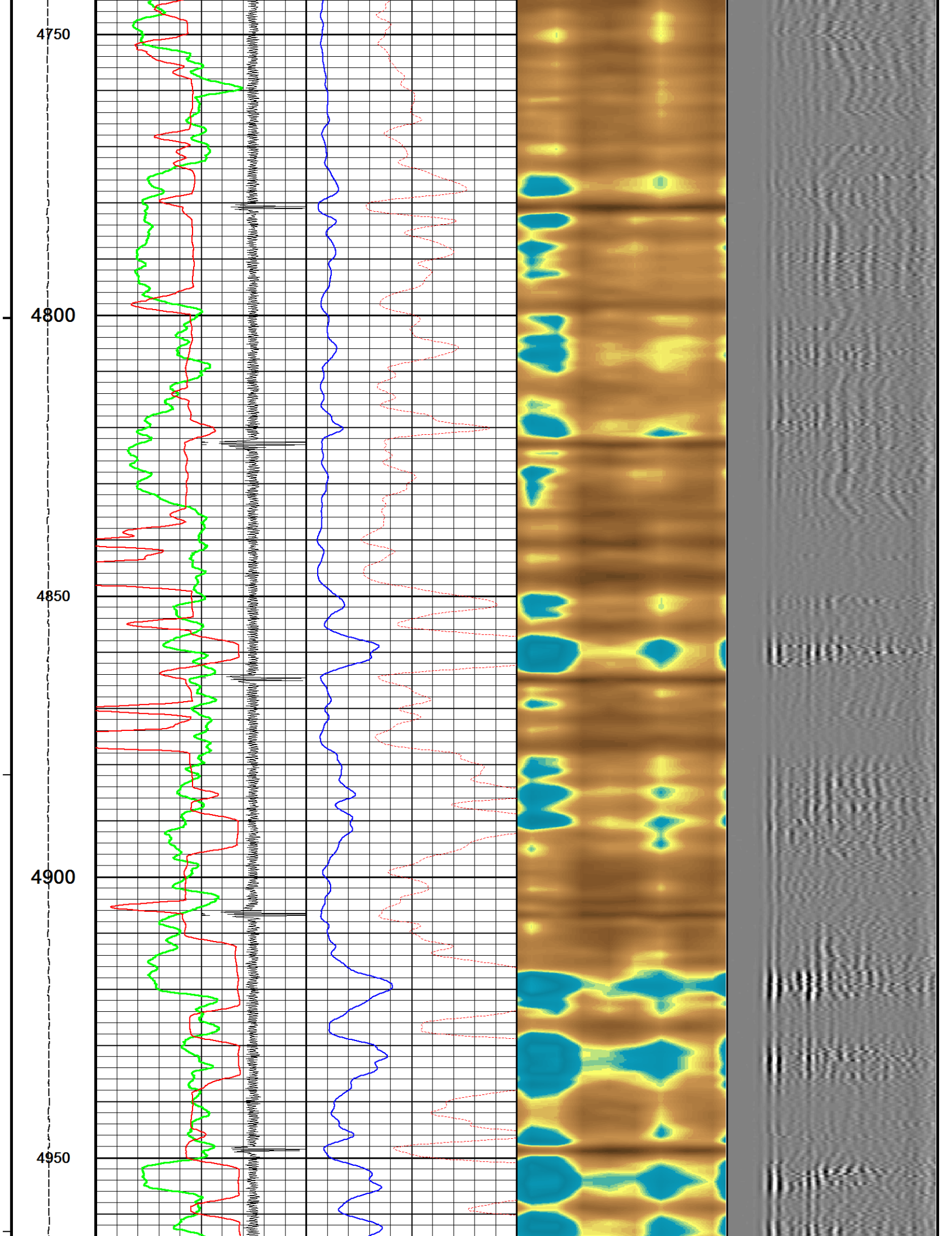




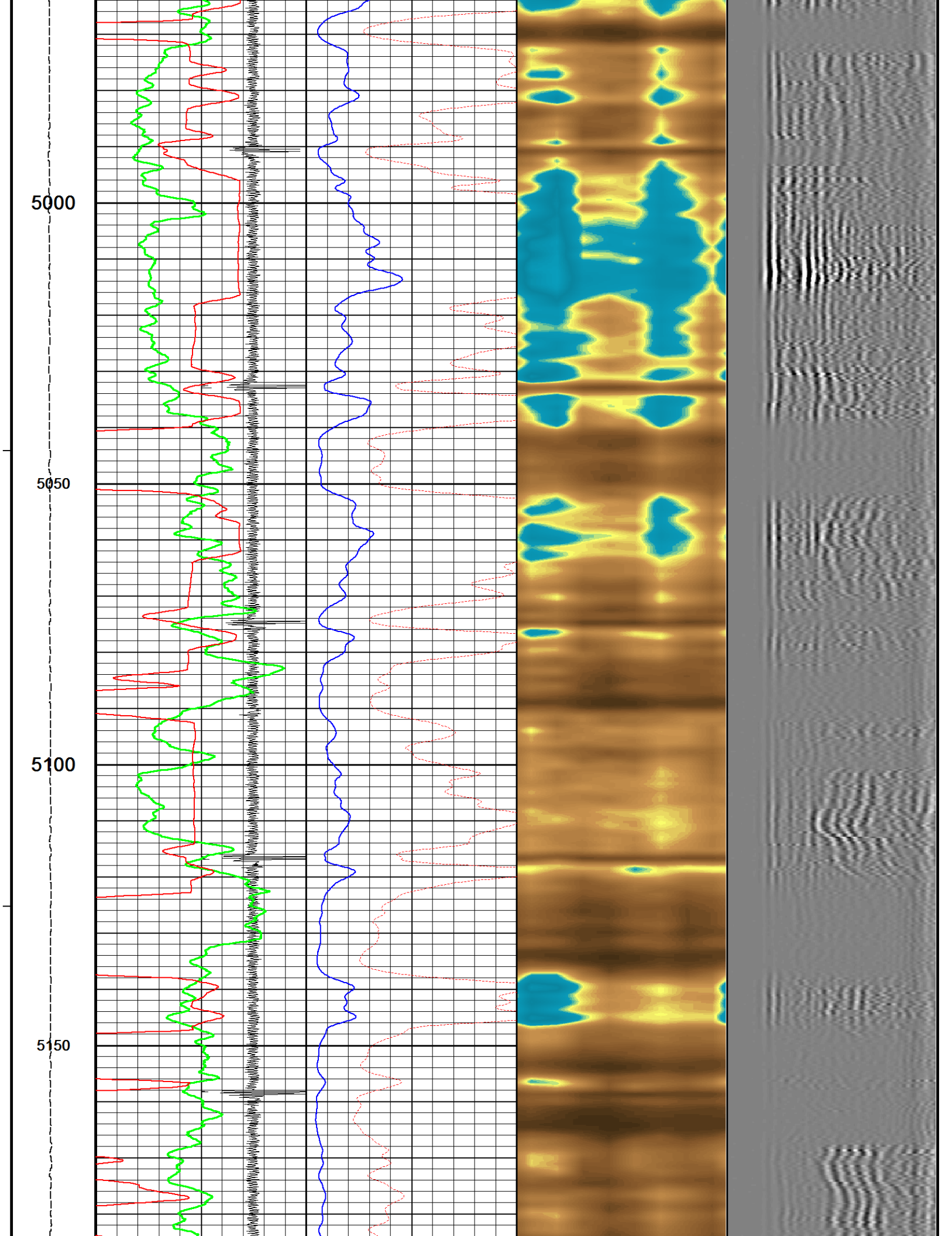


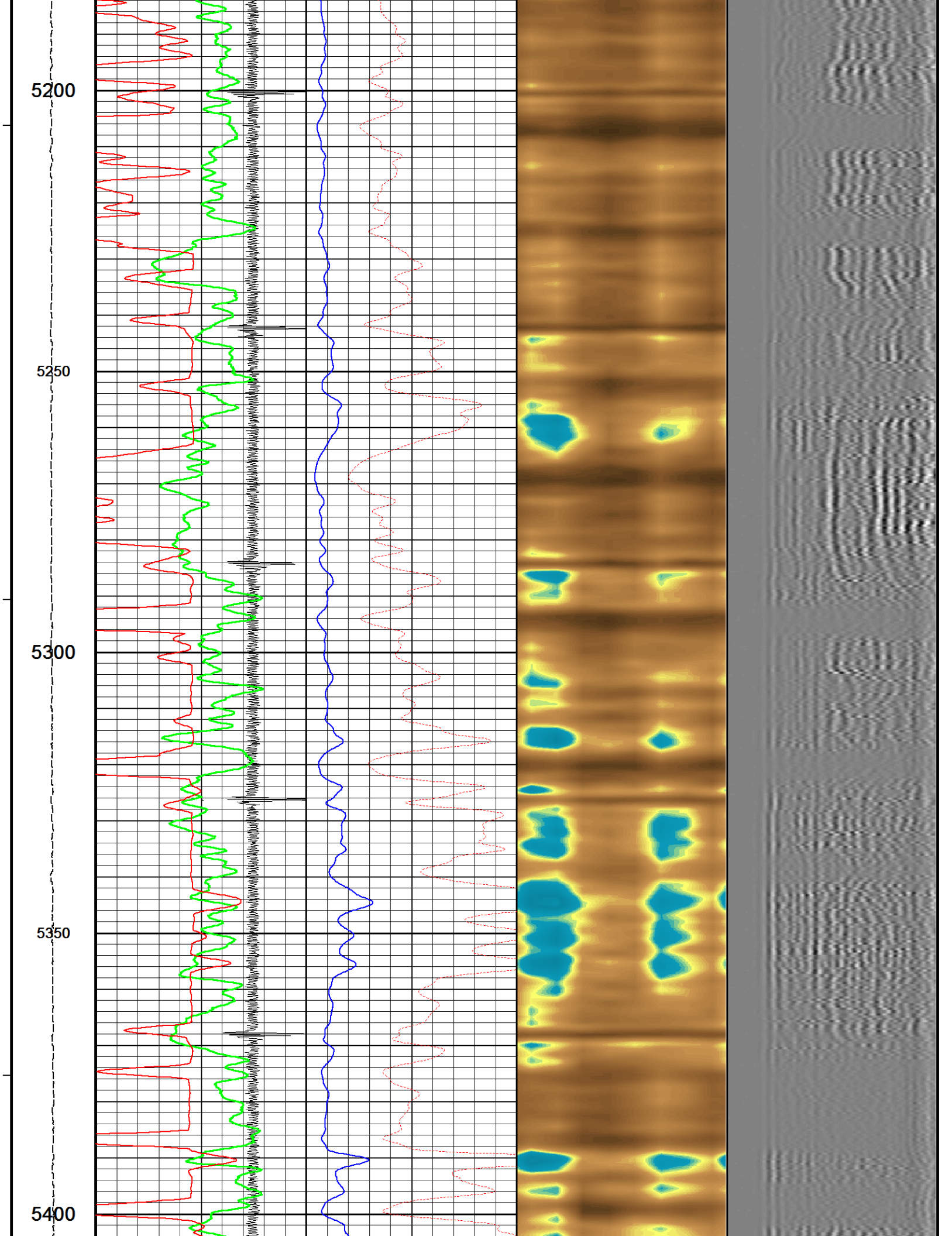


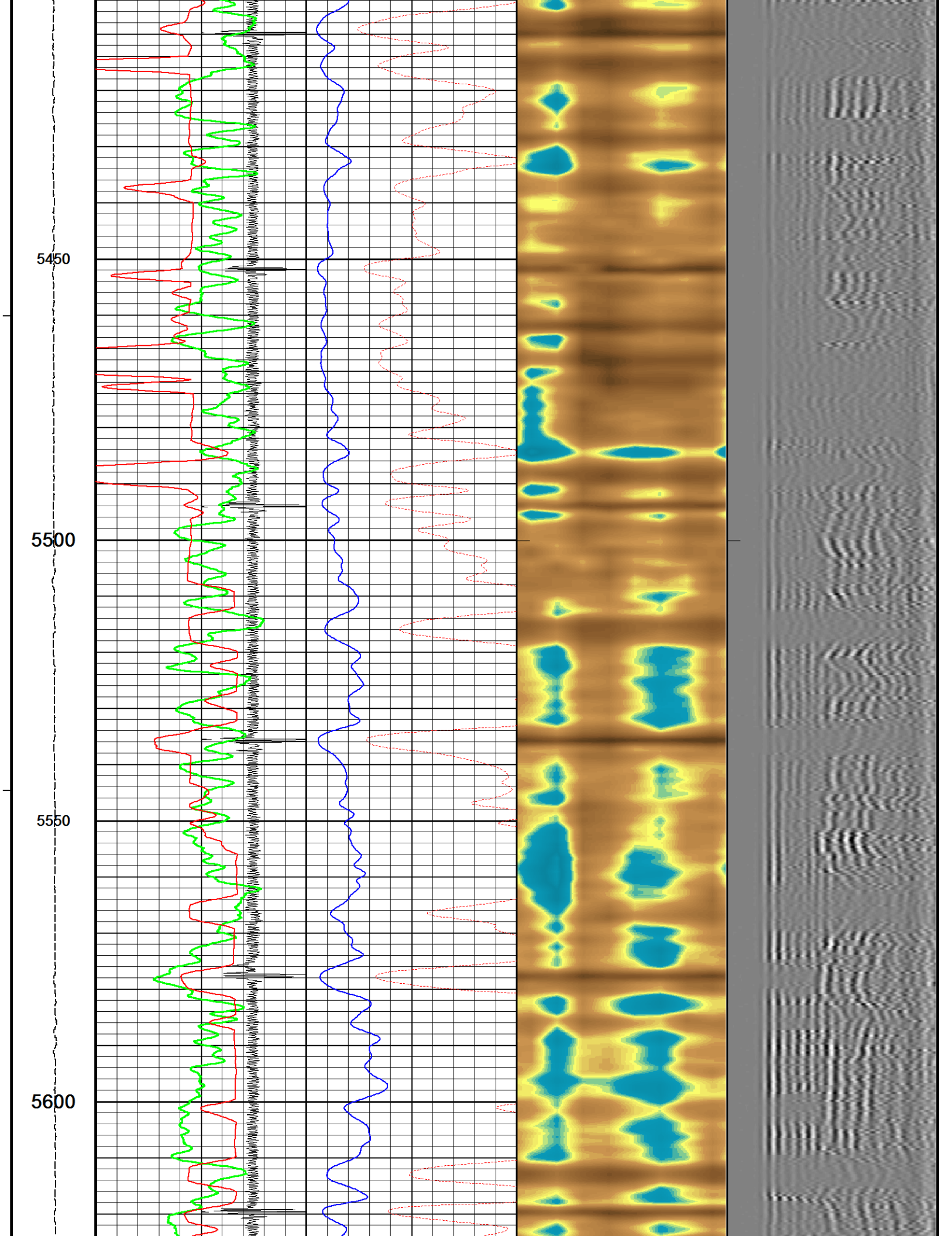




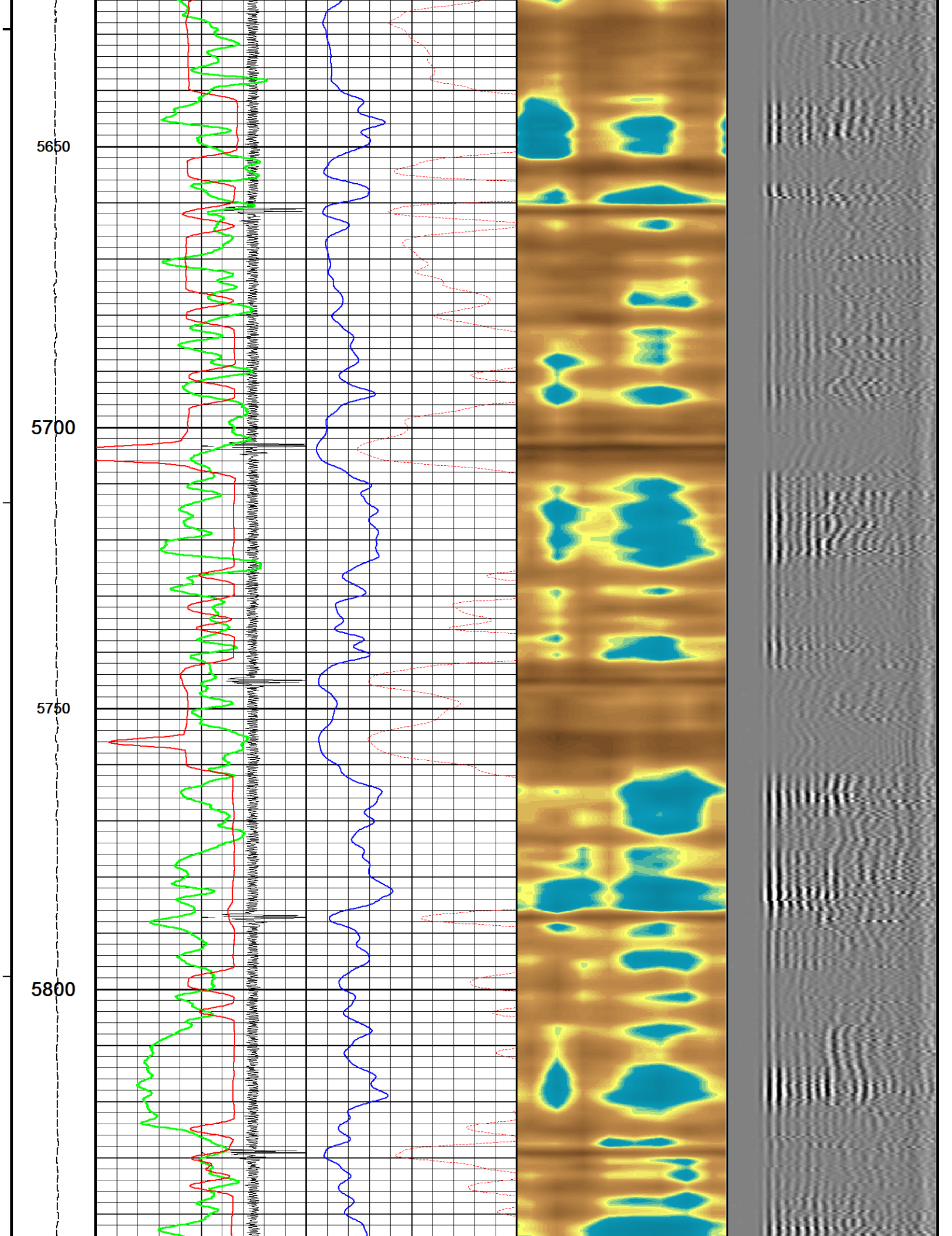




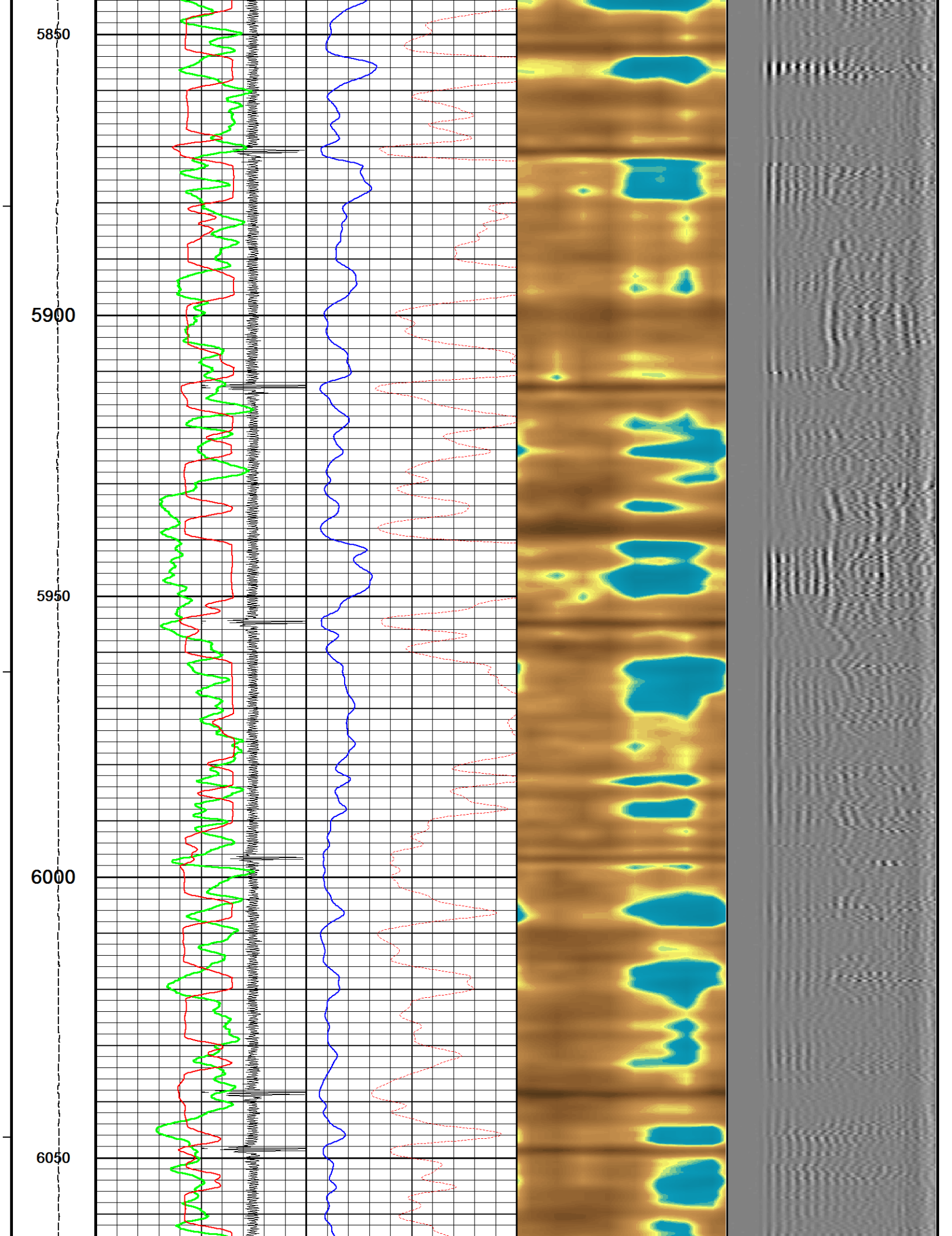


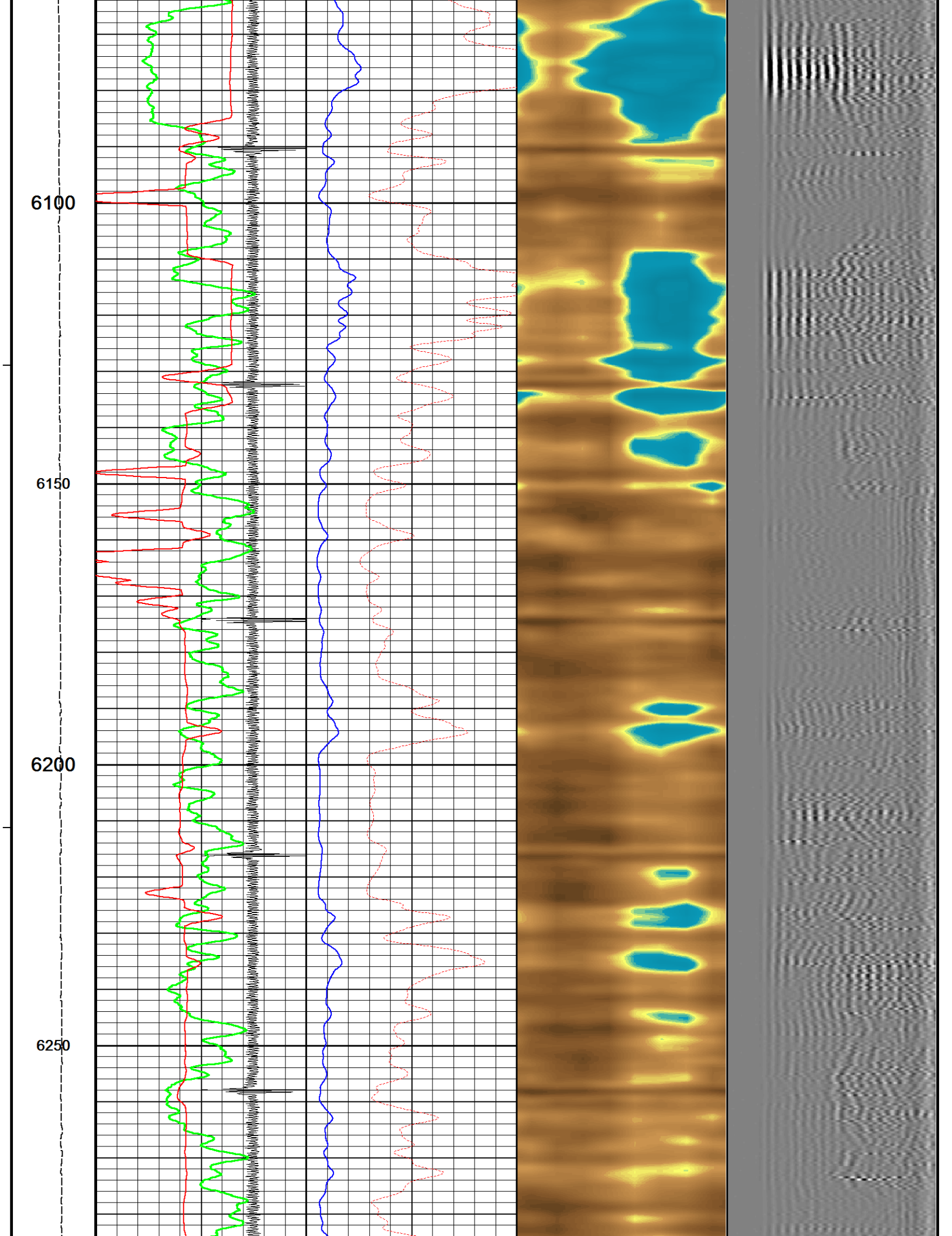


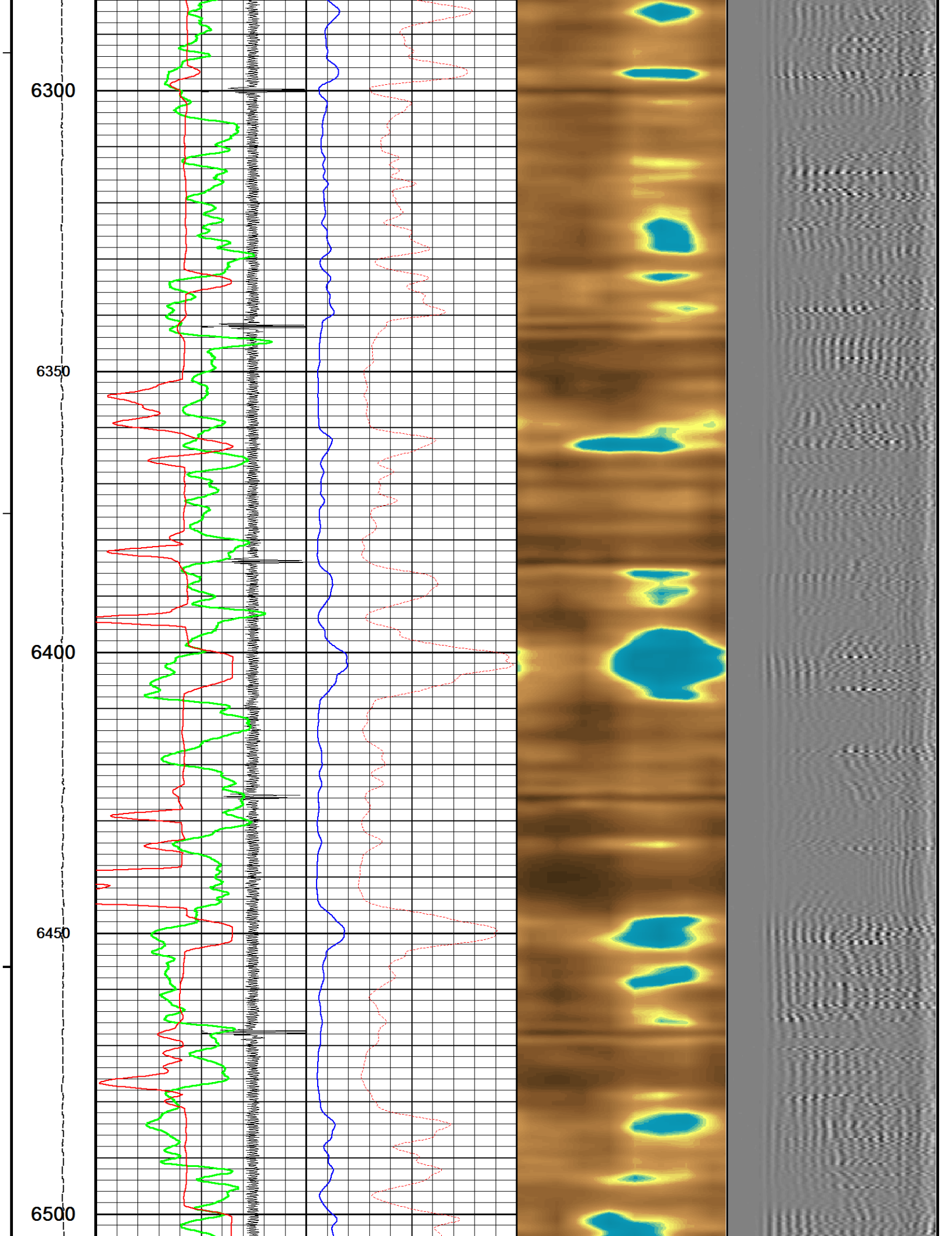




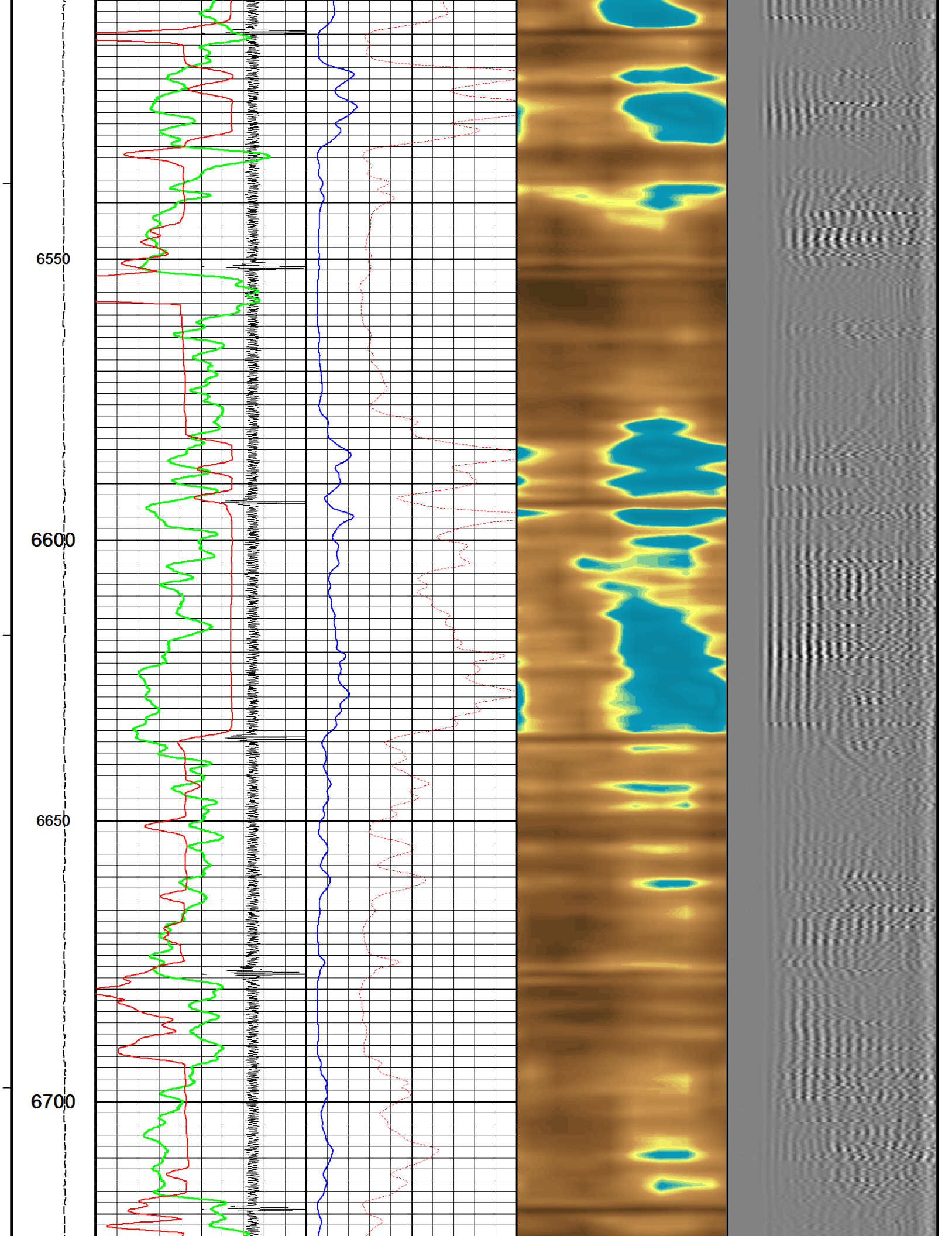




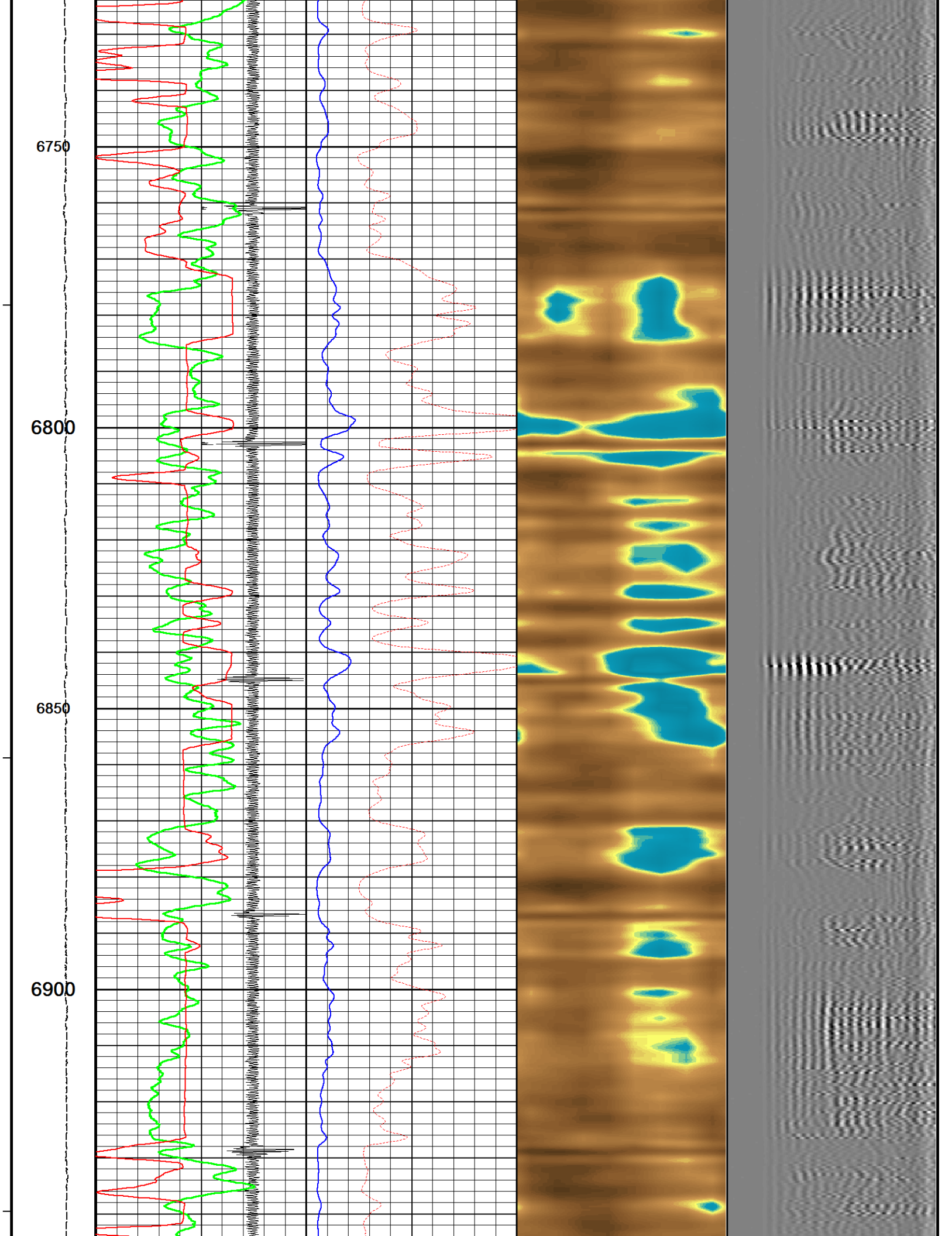


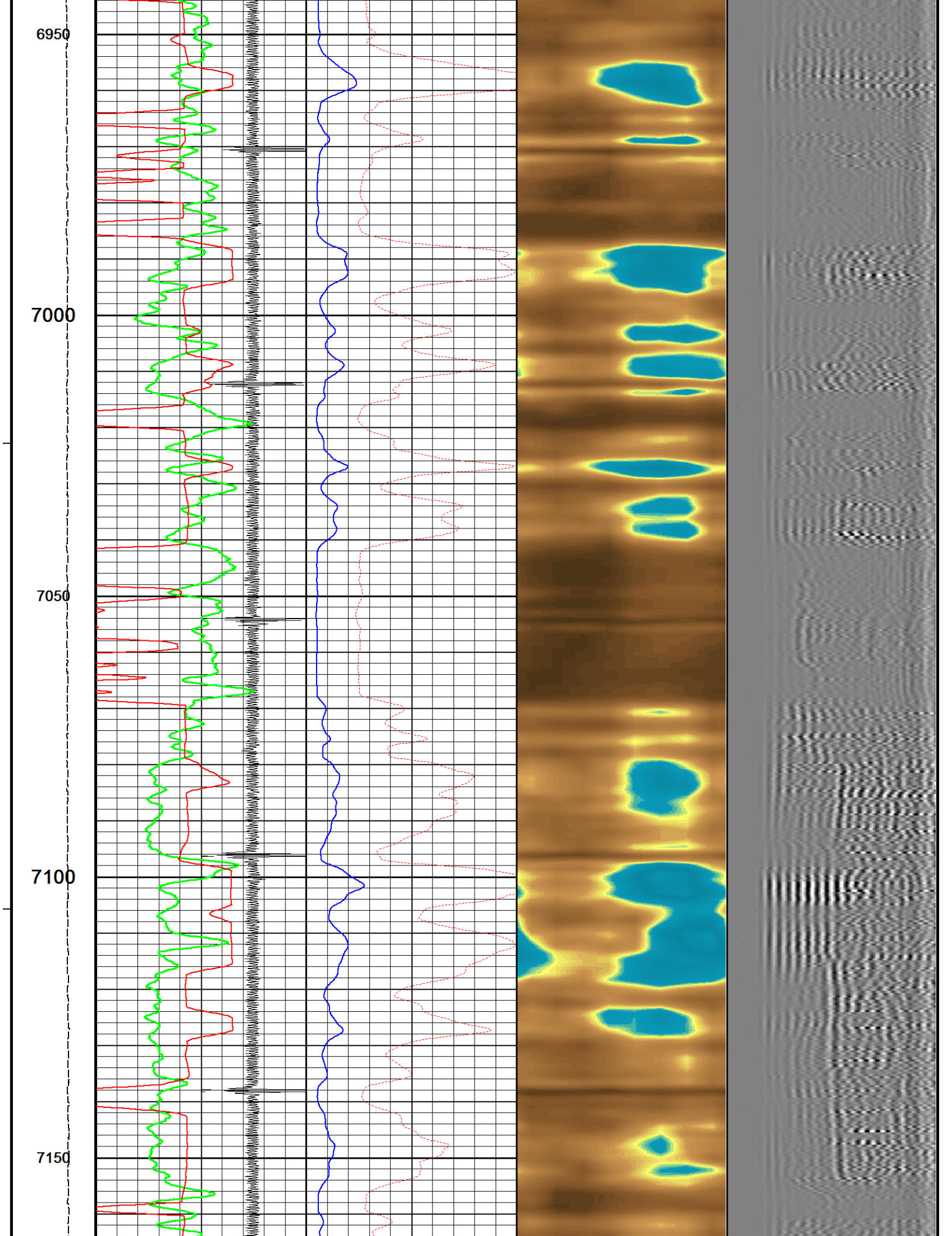


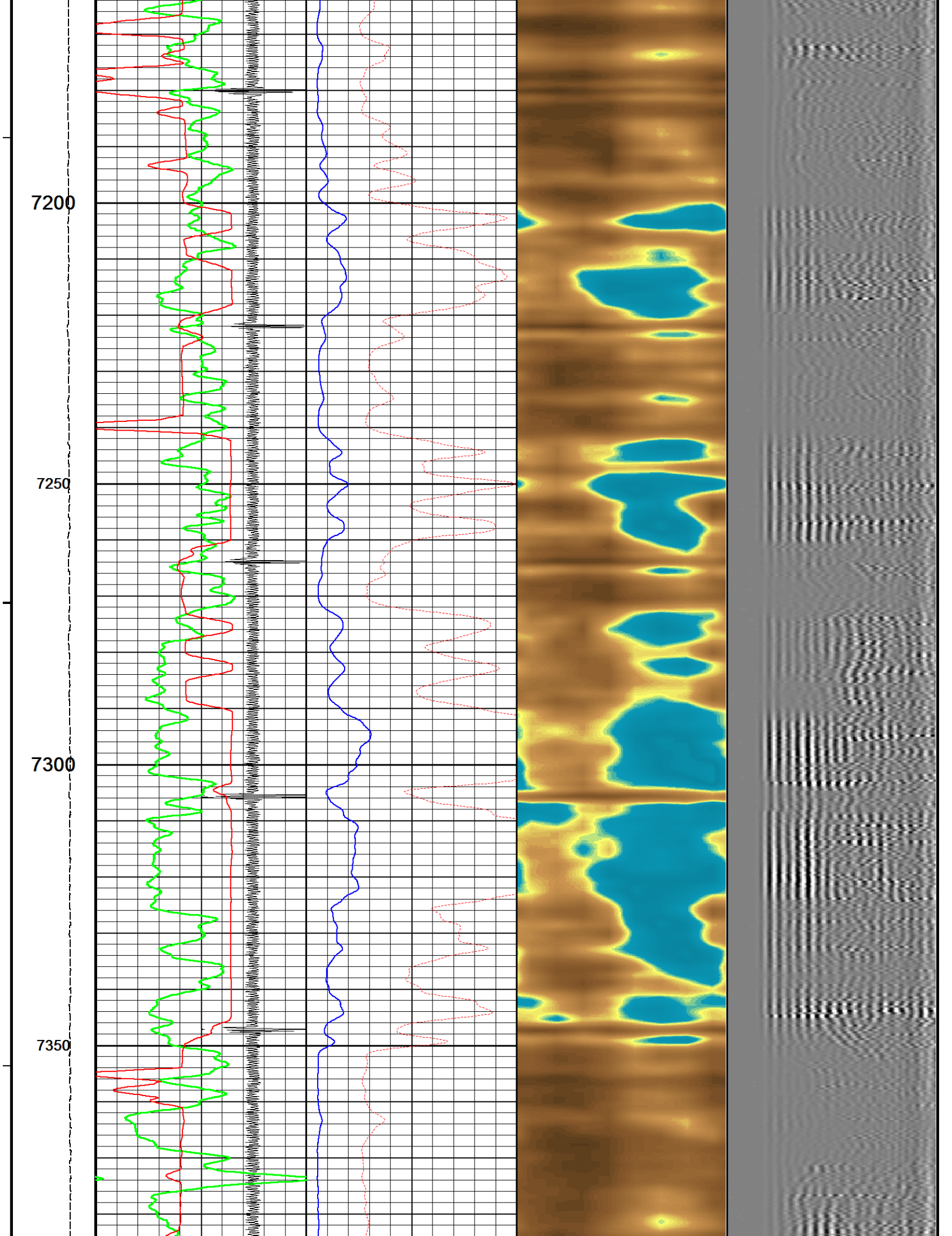




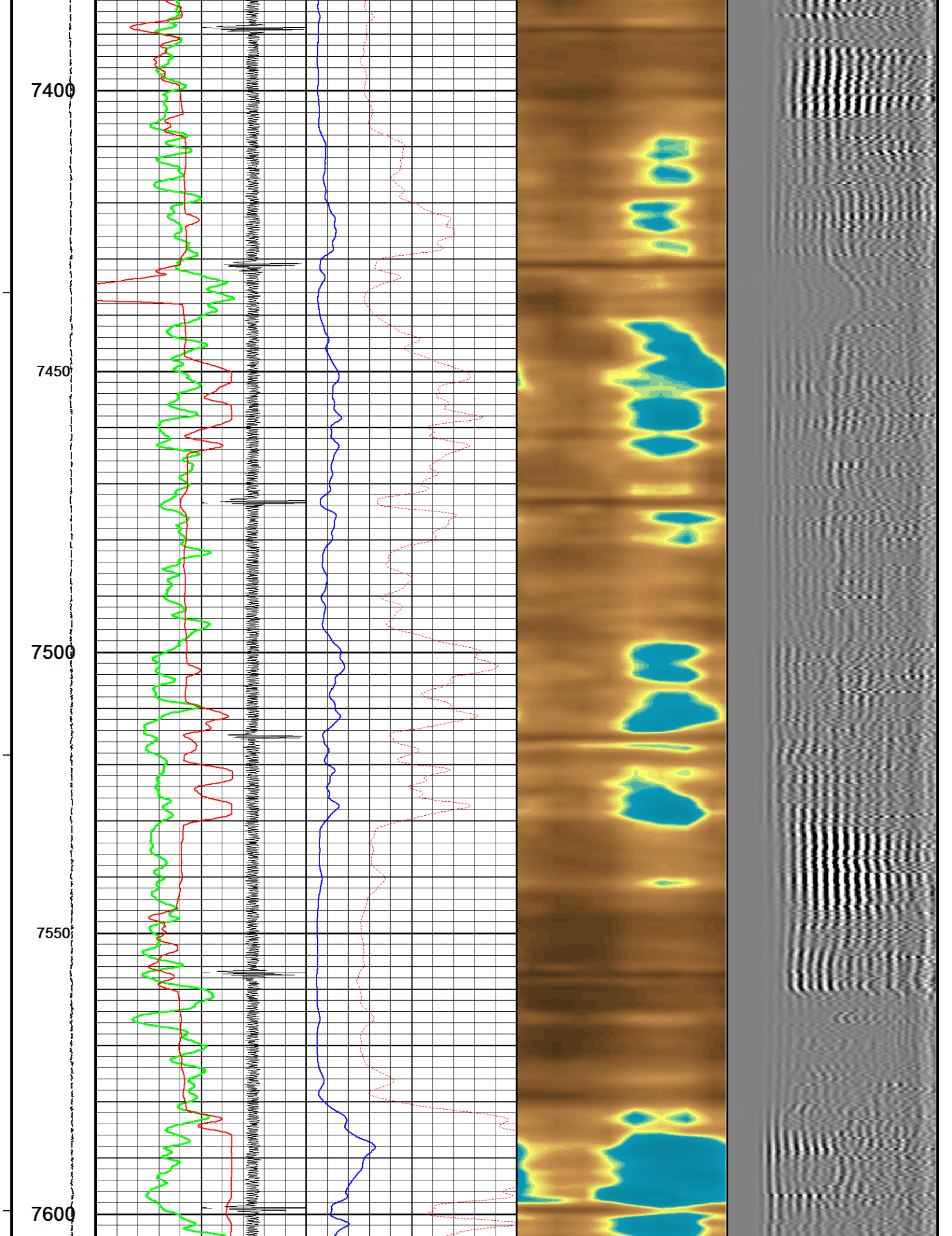




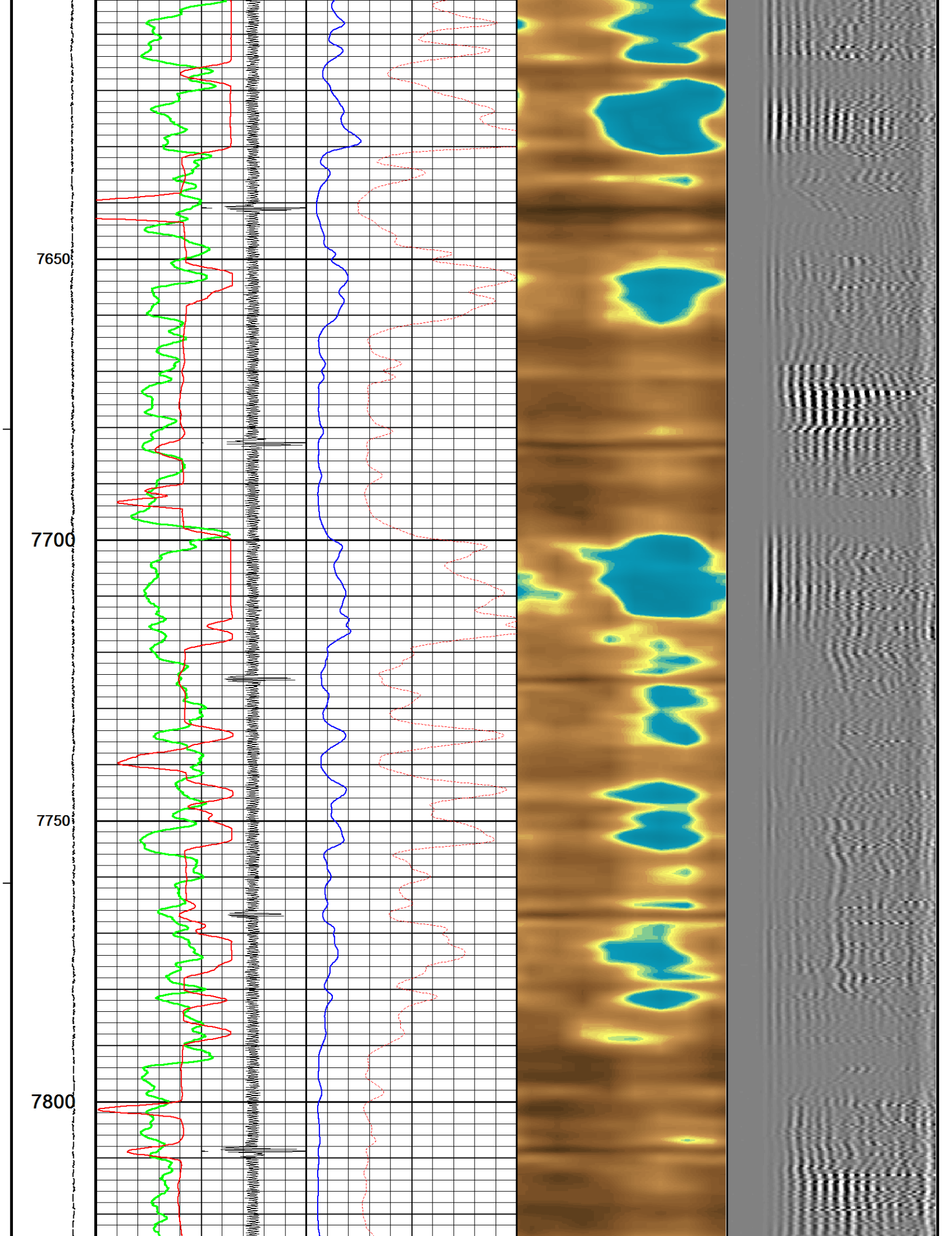


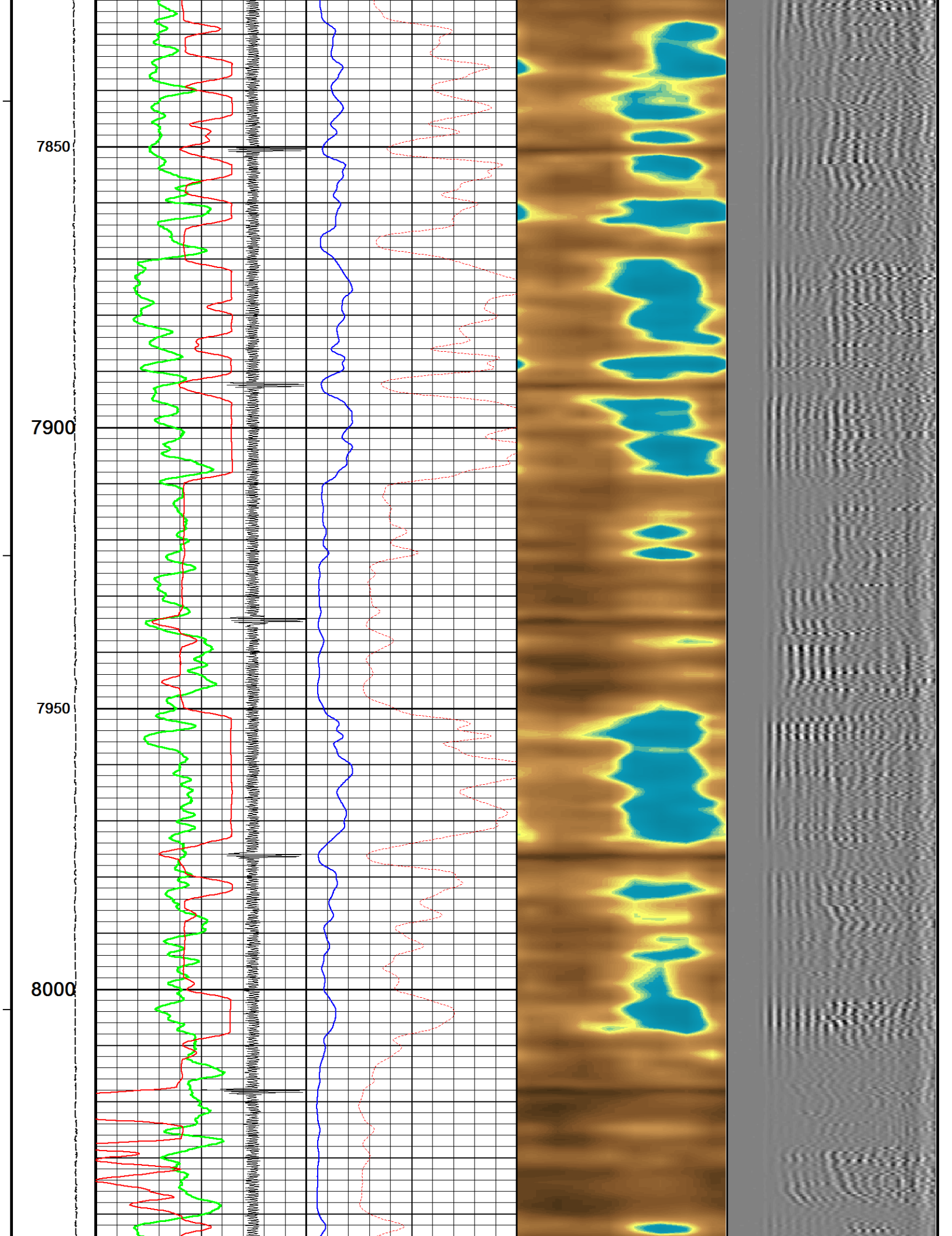


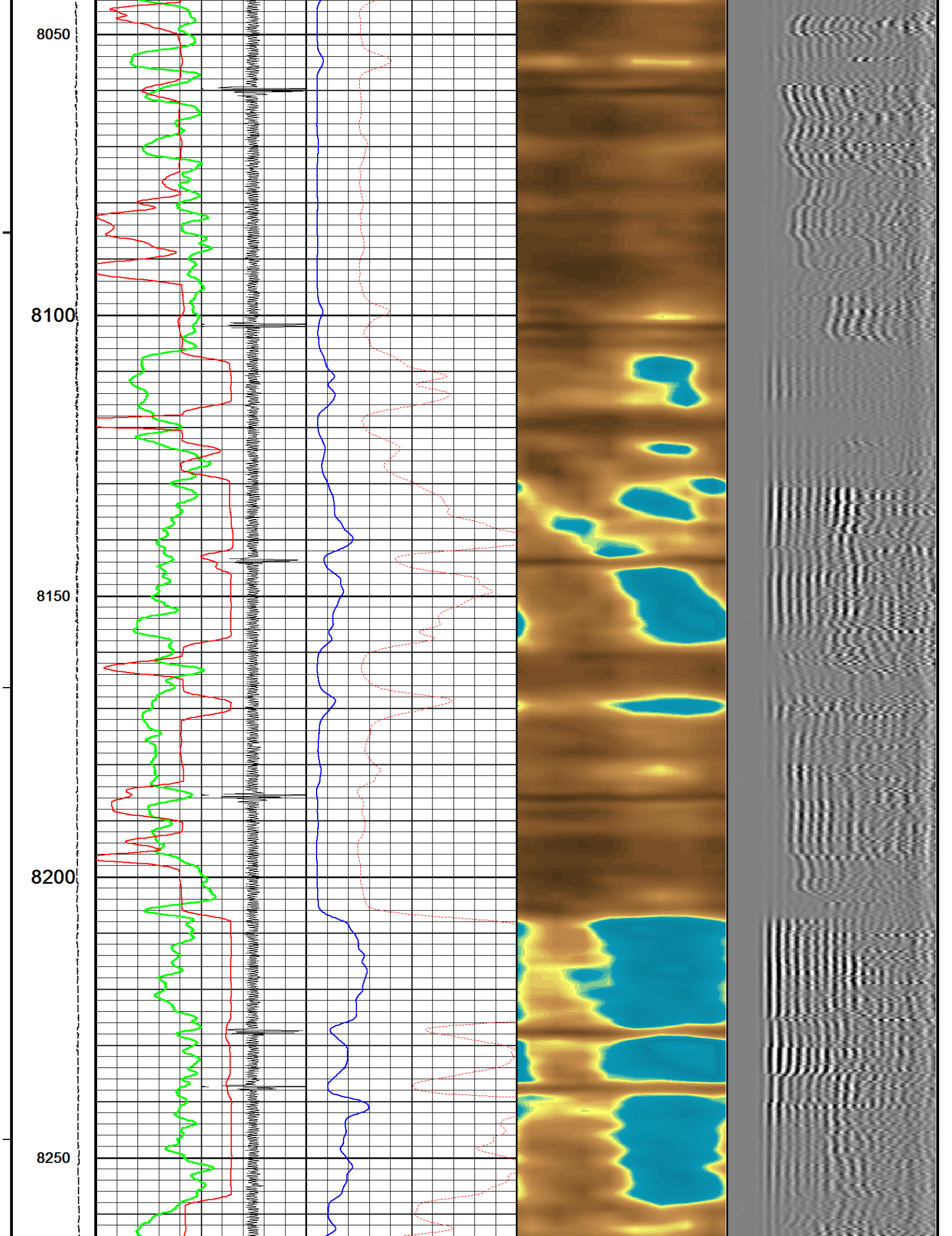














8300

8350

8400

8426

Depth  
in  
Feet

Timing  
Marks  
every  
60.0 sec

TENS

Replay  
Scale

Gamma Ray

API

Amplitude 3FT X 5

millivolts

Variable Energy  
millivolts

Variable Density 5FT  
microseconds

Travel Time 3FT  
microseconds

Amplitude 3FT  
millivolts

CCL  
MV

-1000 1000

0 75 150 0 10 20

0 100 -128 128

360 260 160 0 50 100

200 700 1200

0

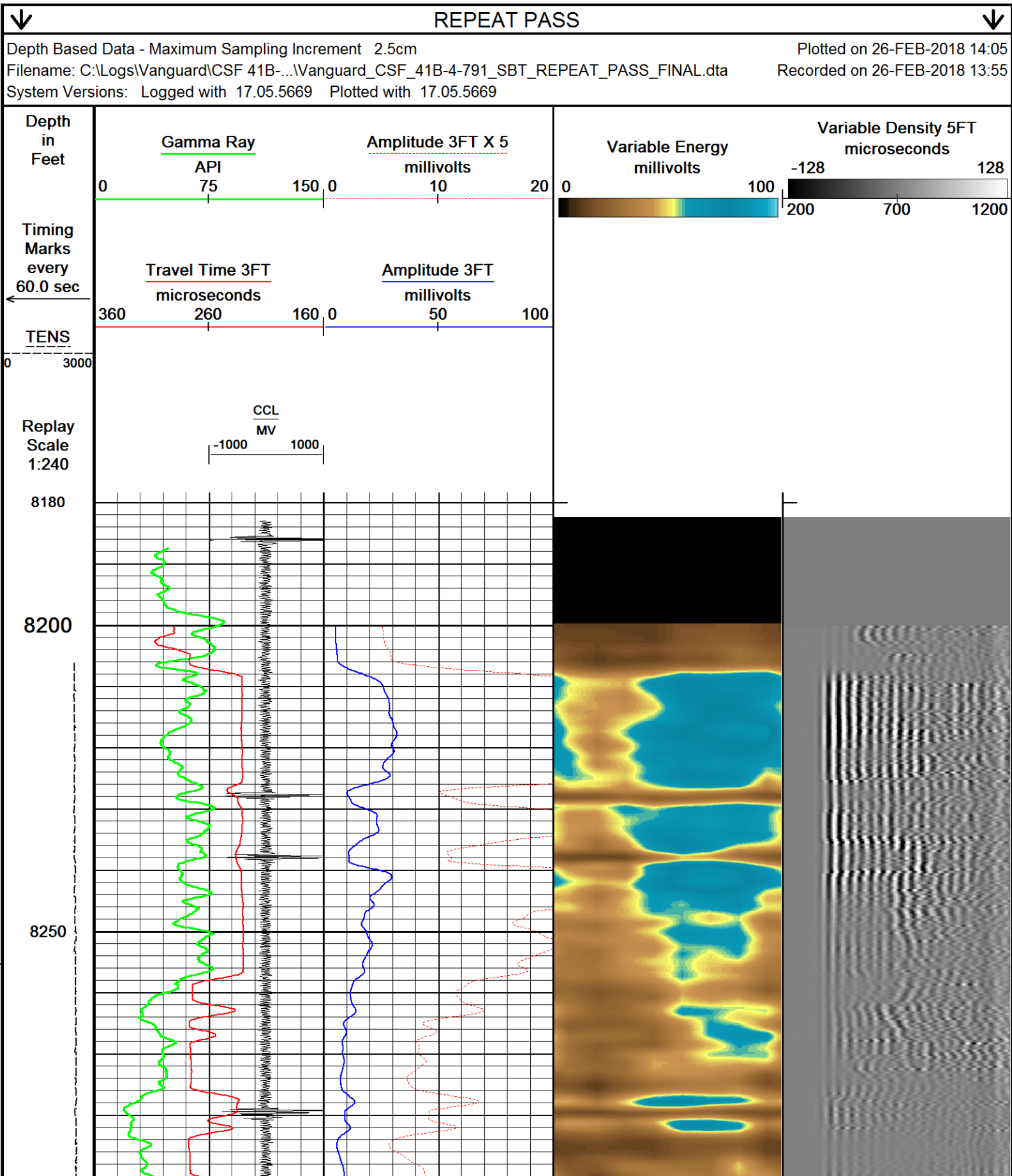
3000

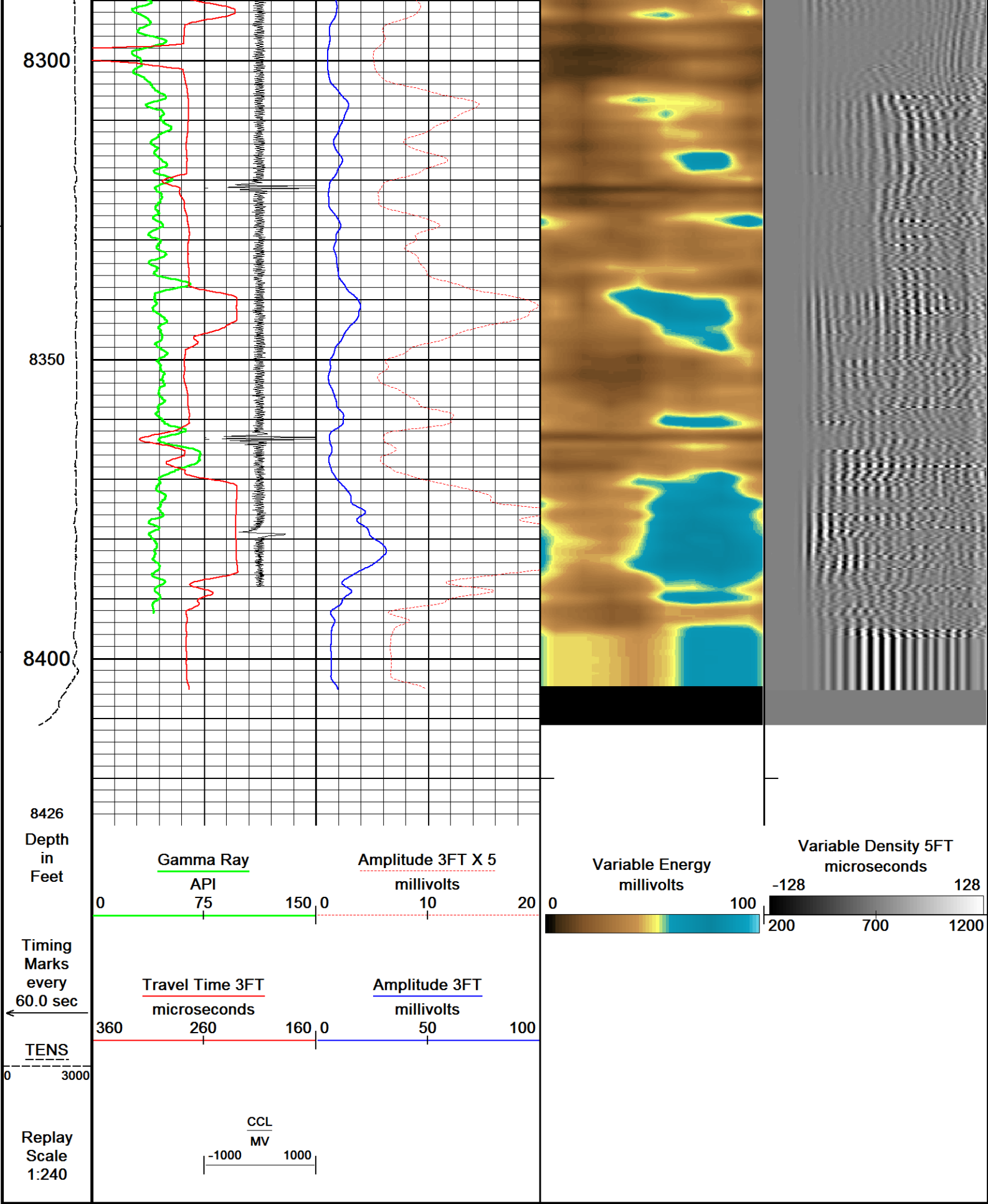
Scale  
1:240

Depth Based Data - Maximum Sampling Increment 2.5cm  
Filename: C:\Logs\Vanguard\CSF 41B-4-7...\Vanguard\_CSF\_41B-4-791\_SBT\_MAIN\_PASS\_FINAL.dta  
System Versions: Logged with 17.05.5669 Plotted with 17.05.5669

Plotted on 26-FEB-2018 14:05  
Recorded on 26-FEB-2018 13:48

↑MAIN PASS↑





Depth Based Data - Maximum Sampling Increment 2.5cm  
Filename: C:\Logs\Vanguard\CSF 41B-...\Vanguard\_CSF\_41B-4-791\_SBT\_REPEAT\_PASS\_FINAL.dta  
System Versions: Logged with 17.05.5669 Plotted with 17.05.5669  
Plotted on 26-FEB-2018 14:05  
Recorded on 26-FEB-2018 13:55



# DOWNHOLE EQUIPMENT

C:\Logs\Vanguard\CSF 41B-4-791\Vanguard\_CSF\_41B-4-791\_SBT\_MAIN\_PASS\_FINAL.dta

## Mono-Cablehead

MCH-AA 0 LG: 1.03 ft WT: 2.2 lb OD: 1.457 in

## 2.75in Bond Cent

CEN-AA 219 LG: 2.49 ft WT: 11.0 lb OD: 2.717 in

## 2.75" CCL/Telemetry Sub

CTB-AB 211 LG: 3.40 ft WT: 39.7 lb OD: 2.756 in

## 2.75" Gamma Ray Tool

GRB-AB 228 LG: 4.71 ft WT: 59.5 lb OD: 2.756 in

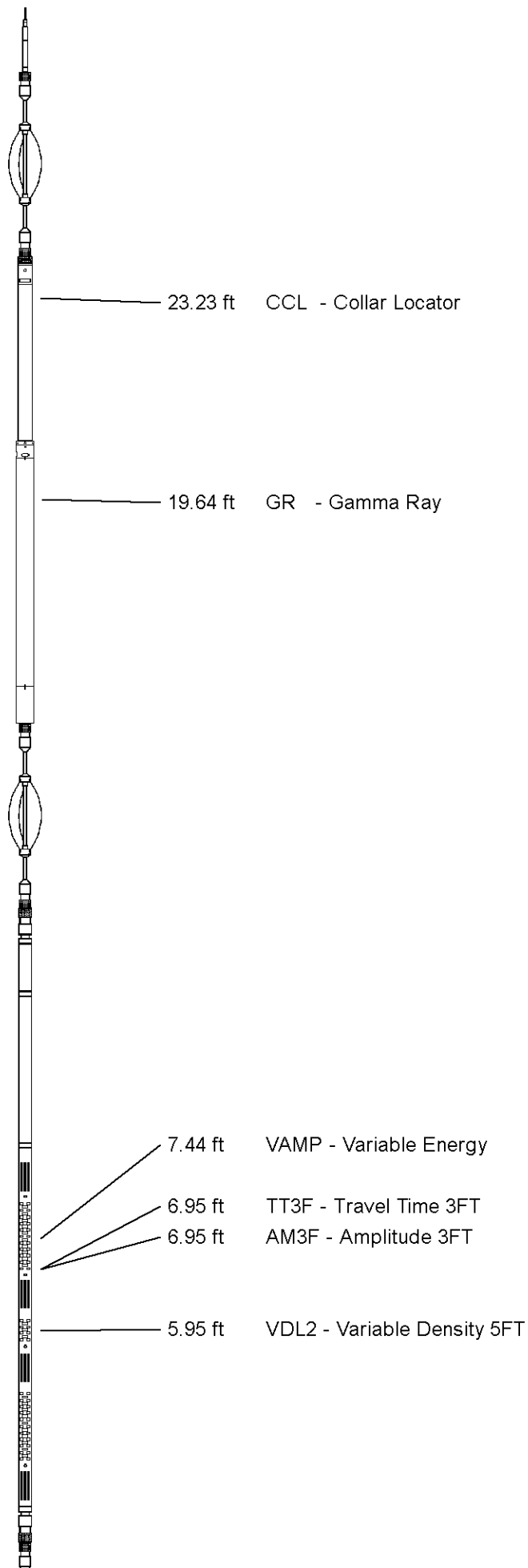
## 2.75in SBT Middle

CEN-BA 155 LG: 3.08 ft WT: 22.0 lb OD: 2.717 in

## Sector Bond Tool

SBT-AA 316 LG: 10.32 ft WT: 90.4 lb OD: 2.717 in

## 2.75in Bond Cent



CEN-AA 116 LG: 2.49 ft WT: 11.0 lb OD: 2.717 in

Total Length: 27.53 ft Weight: 235.9 lb



0.00 ft TENS - Tension  
Tool Zero (0.00ft from bottom)

All measurements relative to tool zero.

## SHOP AND FIELD CALIBRATIONS

C:\Logs\Vanguard\CSF 41B-4-791\Vanguard\_CSF\_41B-4-791\_SBT\_MAIN\_PASS\_FINAL.dta

UGR Field Survey Cal GRB-AB 228

Field calibration on 00-JAN-1988 00:00

### Gamma Ray Field Survey Calibration

Tool Type: GRB-AB  
Calibrator No:

Serial No: 228

Background	Calibrator	Standard	Units
102.2	492.8	140.0	CPS

Delta Counts Per Sec: 390.6

CPS/API = 2.790

SBT Field calibration SBT-AA 316


Field calibration on 00-JAN-1988 00:00

### Sector Bond Field Calibration

Tool Type	SBT-AA	Serial No	316
T0 Gain	3dB	Free Pipe Depth	

Sensor	Description	Standard(mV)	Measured(mV)
AMP 3FT	100% Bond	3.60	0.30
	Free Pipe	81.00	712.10
AMP 5FT	100% Bond	0.40	0.80
	Free Pipe	54.00	2141.10
1 SECTOR AMP	100% Bond	5.00	0.30
	Free Pipe	95.00	856.80
2 SECTOR AMP	100% Bond	5.00	12.20
	Free Pipe	95.00	865.00
3 SECTOR AMP	100% Bond	5.00	0.10
	Free Pipe	95.00	883.50
4 SECTOR AMP	100% Bond	5.00	1.90
	Free Pipe	95.00	902.40
5 SECTOR AMP	100% Bond	5.00	0.30
	Free Pipe	95.00	905.60
6 SECTOR AMP	100% Bond	5.00	9.60
	Free Pipe	95.00	906.30
7 SECTOR AMP	100% Bond	5.00	0.30
	Free Pipe	95.00	913.80
8 SECTOR AMP	100% Bond	5.00	3.30
	Free Pipe	95.00	

8 SECTOR AMPL	100% Bond	95.00	884.50
Free Pipe			
SBT Constants    SBT-AA 316			
Last Edited on 26-FEB-2018 08:38			
Min Ampl 100% Bond	3.63	MV	
Max Ampl 0% Bond	81.03	MV	
Casing Size	4.50	IN	
Casing Weight	11.6	LB/F	
3' TT Correction	-999.0	US	
DT Fluid	200.0	US/F	
Fast Formation TT	38.5	US/F	
Cement Cmpr Strength	580	PSI	
Casing Velocity	57.00	US/F	
Maximum Attenuation	12.00	DB/F	
Cement Weight	0.00	LB/G	

COMPANY	VANGUARD OPERATING LLC.				
WELL	CSF 41B-4-791				
FIELD	MAMM CREEK				
PROVINCE/COUNTY	GARFIELD				
COUNTRY/STATE	U.S.A./COLORADO				
Elevation Kelly Bushing	6557.4	feet	Bottom Log Interval	8411.25	feet
Elevation Drill Floor		feet	Depth Driller	8500.00	feet
Elevation Ground Level	6540.4	feet	Depth Logger	8411.25	feet
<div><div>Weatherford®</div></div> <div>CEMENT BOND LOG</div>					