Schlumberger

Company: **BLACK HILLS ENERGY**

Well: **HORSESHOE CANYON 4−28**
Field: **SHIRE GULCH**
County: **MESA** State: **COLORADO**

County: MESA
Field: SHIRE GULCH
Location: LAT N 39.244 deg , LONG W 108
Well: HORSESHOE CANYON 4−28
Company: BLACK HILLS ENERGY

CEMENT BOND LOG
CBL / VDL / RADIAL IMAGE
GAMMA RAY / CCL

LOCATION

LAT N 39.244 deg , LONG W 108.23 deg

Elev.: K.B. 5765.00 ft
G.L. 5747.00 ft
D.F. 5764.00 ft

Permanent Datum: GROUND LEVEL Elev.: 5747.00 ft
Log Measured From: KELLY BUSHING 18.00 ft above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Range
05−077−09401−0000			

	Run 1	Run 2	Run
PVT DATA			
Oil Density			
Water Salinity			
Gas Gravity			
Bo			
Bw			
1/Bg			
Bubble Point Pressure			
Bubble Point Temperature			
Solution GOR			
Maximum Deviation	91 deg		
CEMENTING DATA			
Primary/Squeeze	Primary		
Casing String No			
Lead Cement Type			
Volume			
Density			
Water Loss			
Additives			
Tail Cement Type			
Volume			
Density			
Water Loss			
Additives			
Expected Cement Top			
Logging Date			
Run Number			
Depth Driller			
Schlumberger Depth			
Bottom Log Interval			
Top Log Interval			
Casing Fluid Type			
Salinity			
Density			
Fluid Level			
BIT/CASING/TUBING STRING			
Bit Size			
From			
To			
Casing/Tubing Size			
Weight			
Grade			
From			
To			
Maximum Recorded Temperatures			
Logger On Bottom / Time			
Unit Number / Location			
Recorded By			
Witnessed By			

Logging Date	6−Sep−2011		
Run Number	SUBSEQUENT		
Depth Driller	11220 ft		
Schlumberger Depth	11116 ft		
Bottom Log Interval	11092 ft		
Top Log Interval	4815 ft		
Casing Fluid Type	FRESH WATER		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	18 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.000 in		
From			
To			
Casing/Tubing Size	4.500 in		
Weight	11.6 lbm/ft		
Grade	P−110		
From	18 ft		
To	11220 ft		
Maximum Recorded Temperatures			
Logger On Bottom / Time	6−Sep−2011 11:12		
Unit Number / Location	3017 GRAND JUNCTION		
Recorded By	M. THOMLINSON		
Witnessed By	MIKE DURHAM		

Run 3

Run 4

DISCLAIMER

THE USE OF AND RELIANCE UPON THIS RECORDED−DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED−DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE OF AND RELIANCE UPON THE RECORDED−DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED−DATA.

OTHER SERVICES1	OTHER SERVICES2
OS1: TEMP	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:

REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
This log is correlated to Platform Express	
ran on 17−Jun−2011	
This log is the downlog recorded running in hole	

log ran while pumping tool downhole

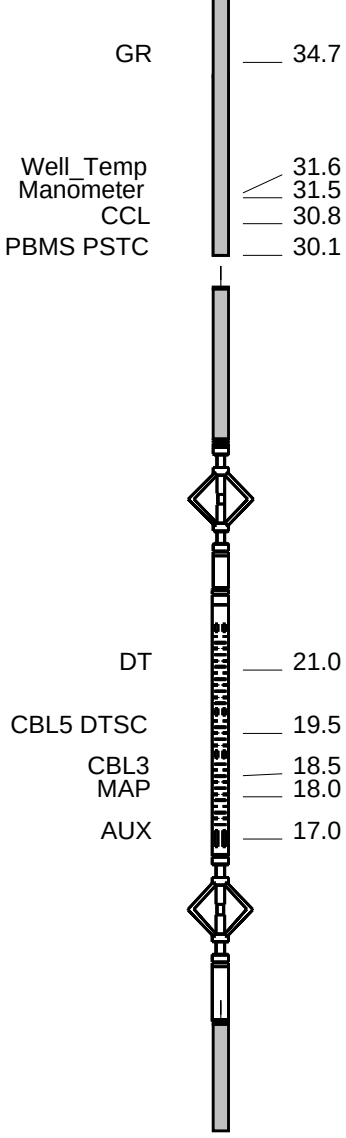
depth will shift with tension and pump speed

RUN 1			RUN 2		
SERVICE ORDER #:			SERVICE ORDER #:		
PROGRAM VERSION:		18C0−147	PROGRAM VERSION:		
FLUID LEVEL:		18 ft	FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1	RUN 2
SURFACE EQUIPMENT	
WITM−A PSC_16MHZ	
DOWNHOLE EQUIPMENT	
MH−22 MH−22	39.9
Detail MT TelStatus CTEM	38.4
PSPT PSC−A PSPT−A 1772 PSTC−A	38.4

PBMS−A
10k_Sapphire_Mano
RTD_Thermometer
GR
CCL
PBMS



SCMT−CB 30.1
SCMC−CA
SECH−CA
CMIR−AG
SCMS−CB 8186
SCMX−CA

AH−PDS 10.1
AH−PDS

MAXIMUM STRING DIAMETER 1.69 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Schlumberger

MAIN PASS

MAXIS Field Log

Company: BLACK HILLS ENERGY **Well: HORSESHOE CANYON 4−28**

Input DLIS Files

DEFAULT	Flip_SCMT_PSP_007LUP		PRODUCER	06−Sep−2011 11:05	11130.8 FT	4791.5 FT

Output DLIS Files

DEFAULT	SCMT_PSP_008PUP	FN:6	PRODUCER	06−Sep−2011 11:10	11130.5 FT	4791.5 FT

OP System Version: 18C0−147

SCMT−CB	18C0−147	PSPT	18C0−147

PIP SUMMARY

Time Mark Every 60 S

	Well Pressure (WPRE) 0 (PSIA) 3000 Well Temperature (WTEP) 0 (DEGF) 300	
Discriminated CCL (CCLD) 5 (V) −1	Cbl 3.ft Transit Time (TT) 270 (US) 0	CBL Amplitude (CBL) 0 (MV) 10

Tension (TENS) (LBF)
0 2000

Gamma Ray (GR)
0 (GAPI) 150

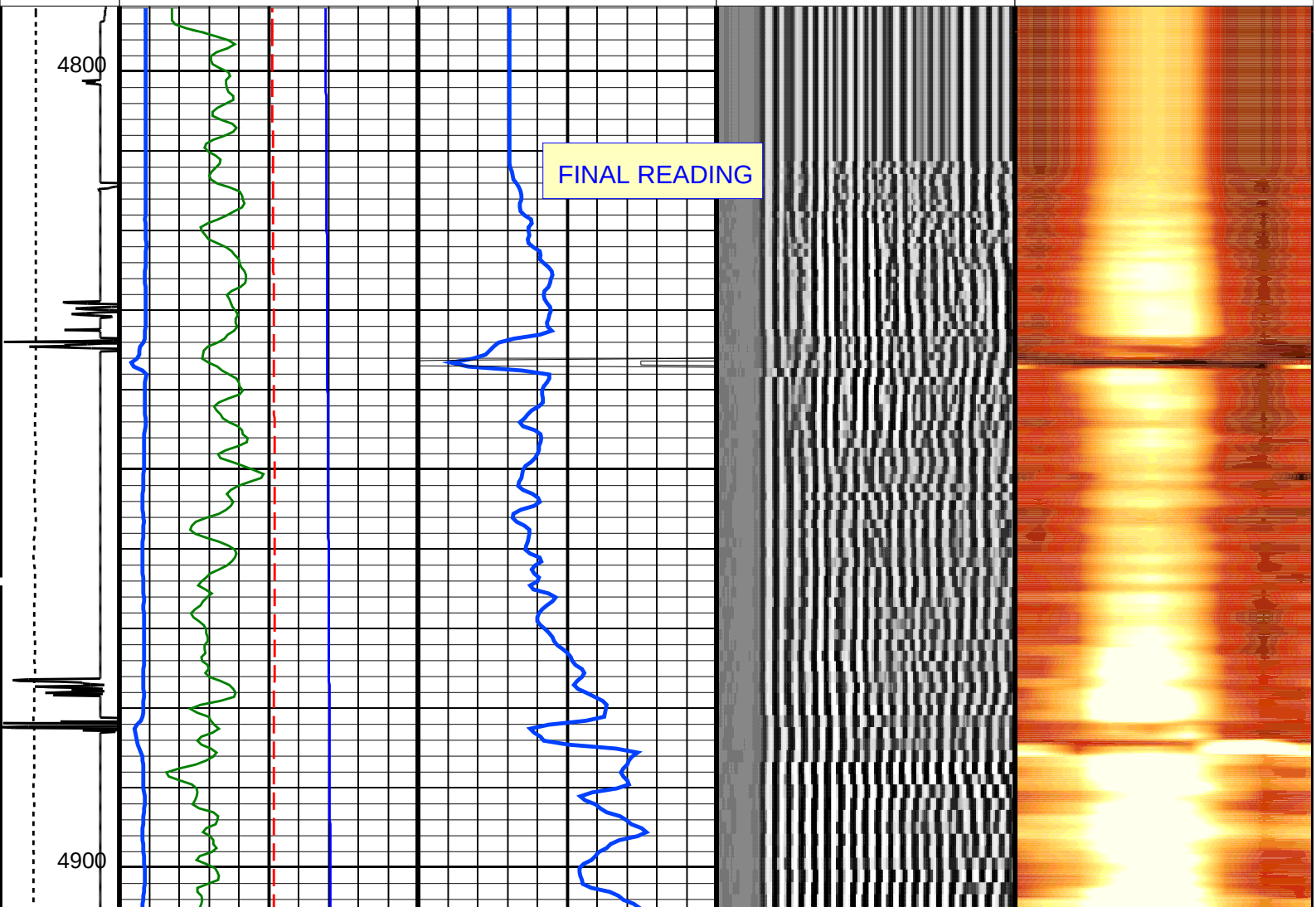
CBL Amplitude (CBL)
0 (MV) 100

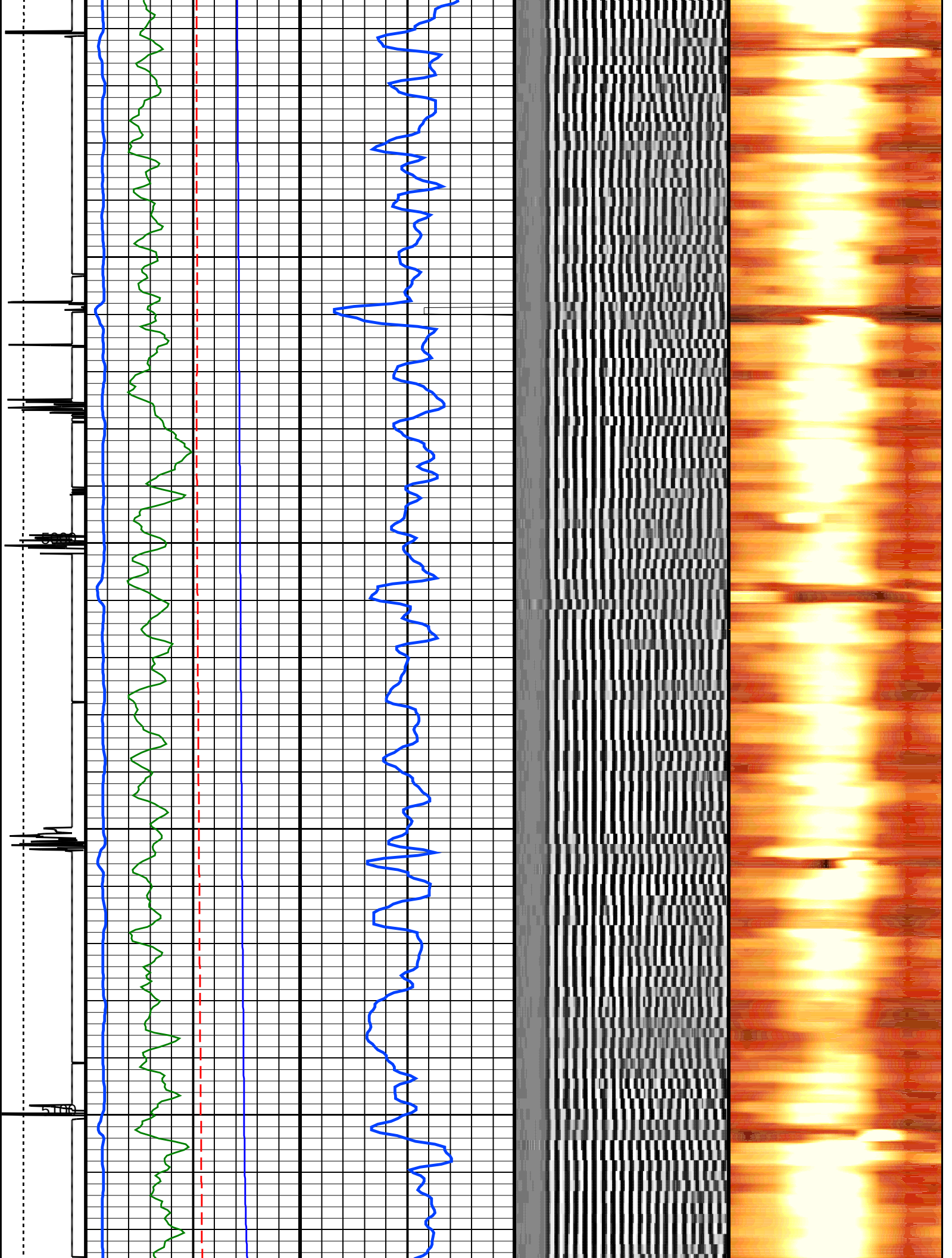
Min Amplitude Max

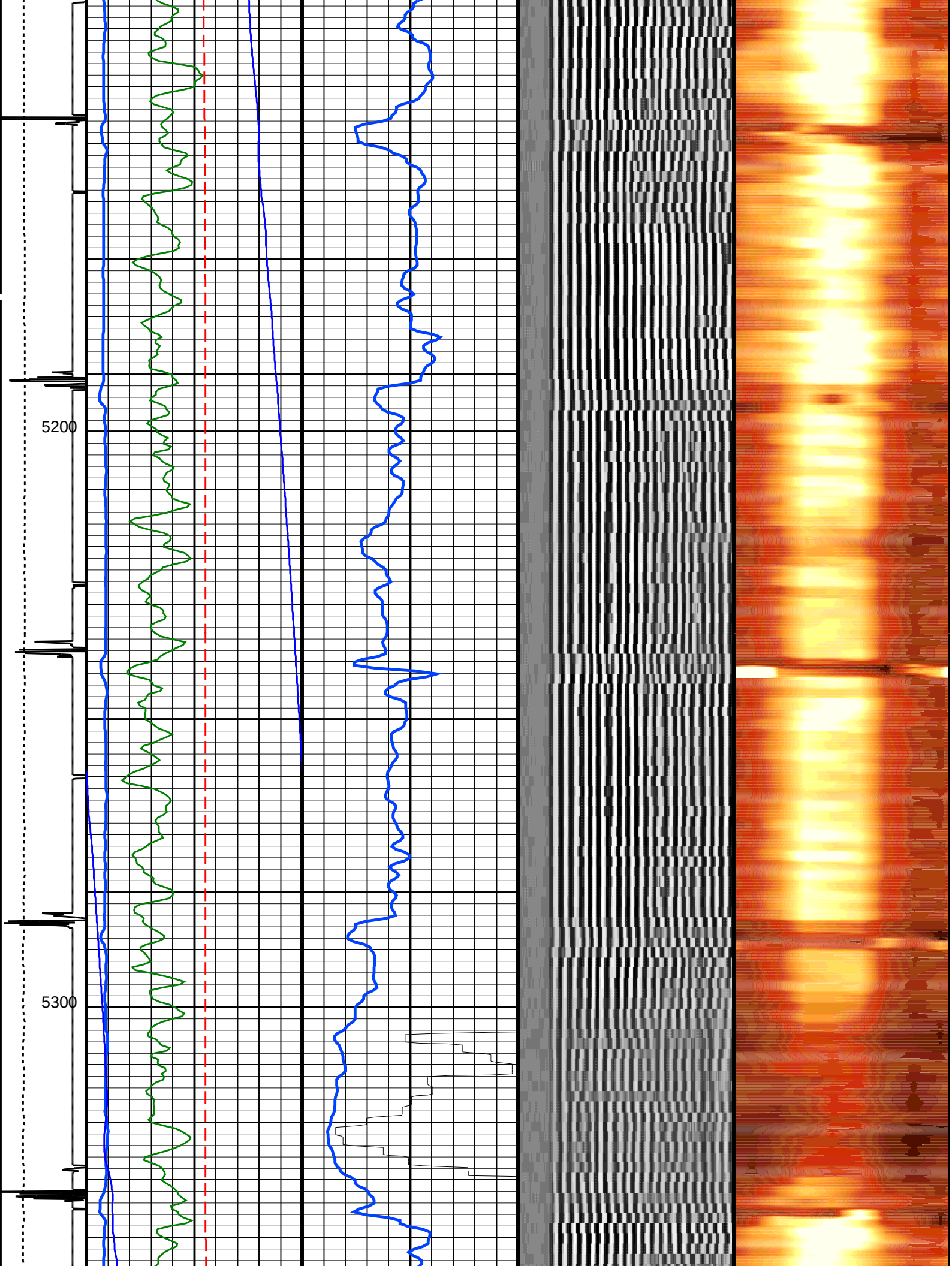
VDL VariableDensity (VDL)
200 (US) 1200

2.5000
5.0000
7.5000
10.0000
12.5000
15.0000
17.5000
20.0000
22.5000
25.0000
27.5000
30.0000
32.5000
35.0000
37.5000
40.0000
42.5000
45.0000
47.5000
50.0000
52.5000
55.0000
57.5000
60.0000
62.5000
65.0000
67.5000
70.0000
72.5000
75.0000
77.5000
80.0000
82.5000
85.0000
87.5000
90.0000
92.5000
95.0000
97.5000
100.0000

CBL Amplitude Mapping Image (0 – 100) (MPWF) (MV)



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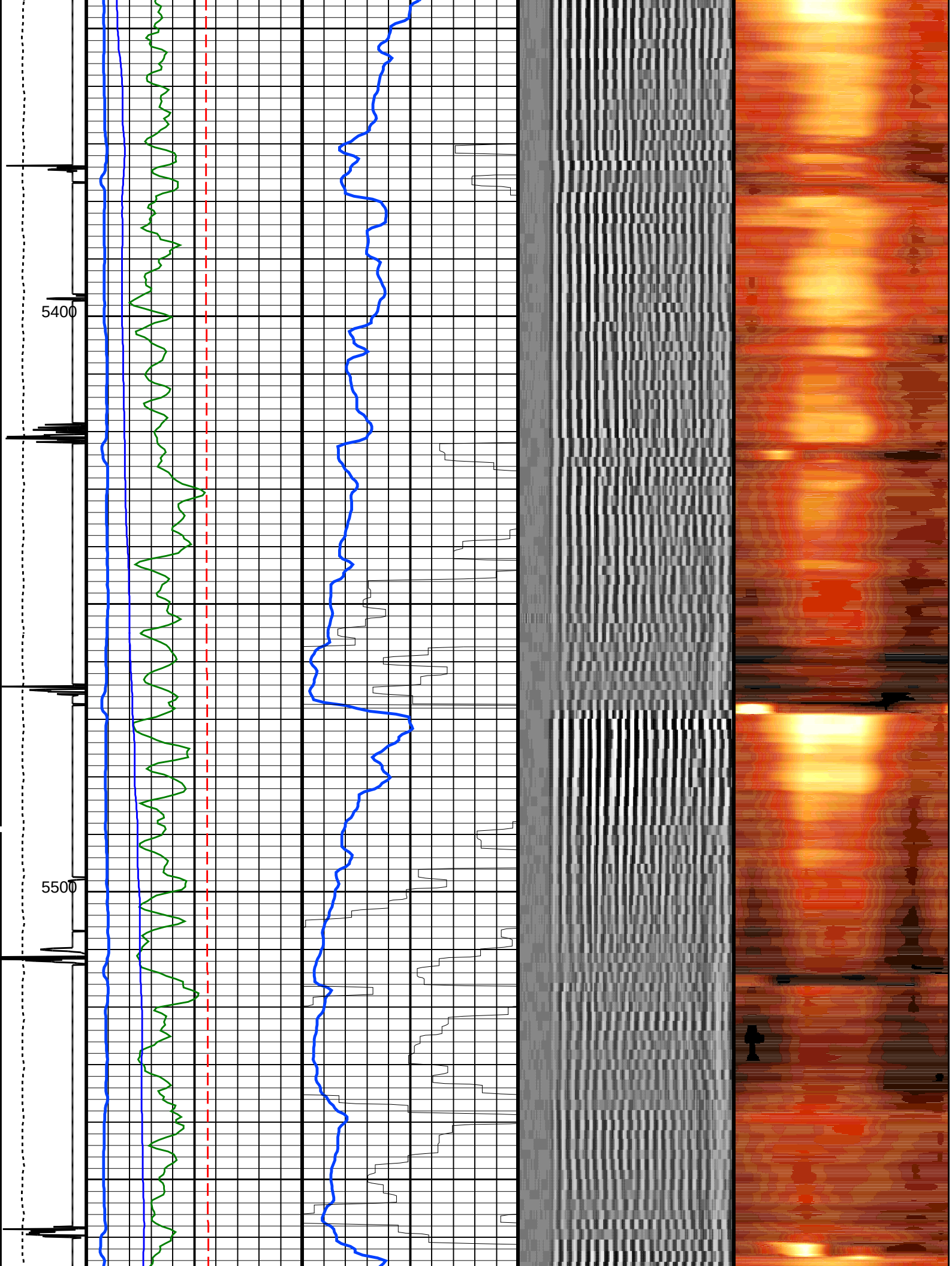
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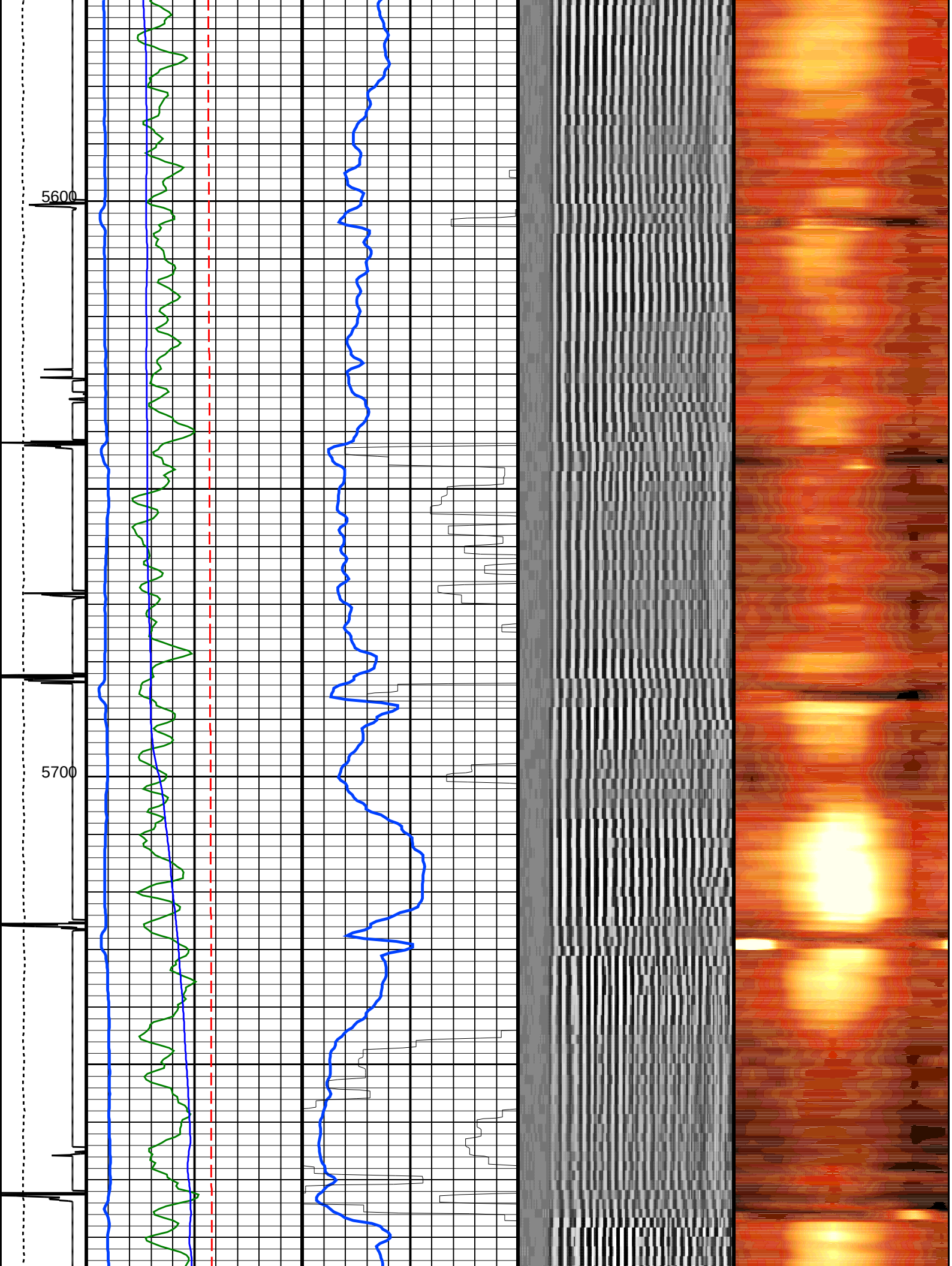
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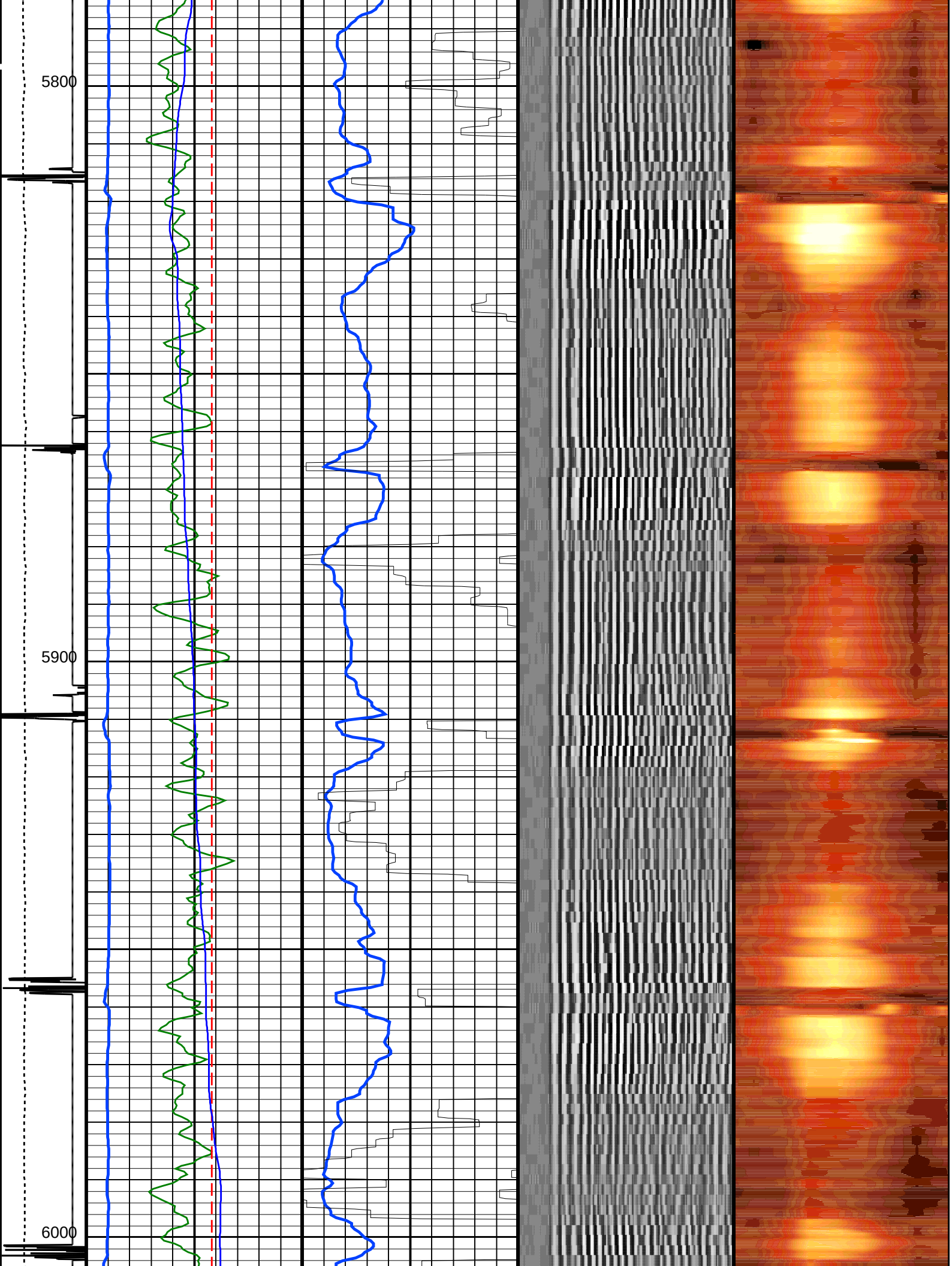
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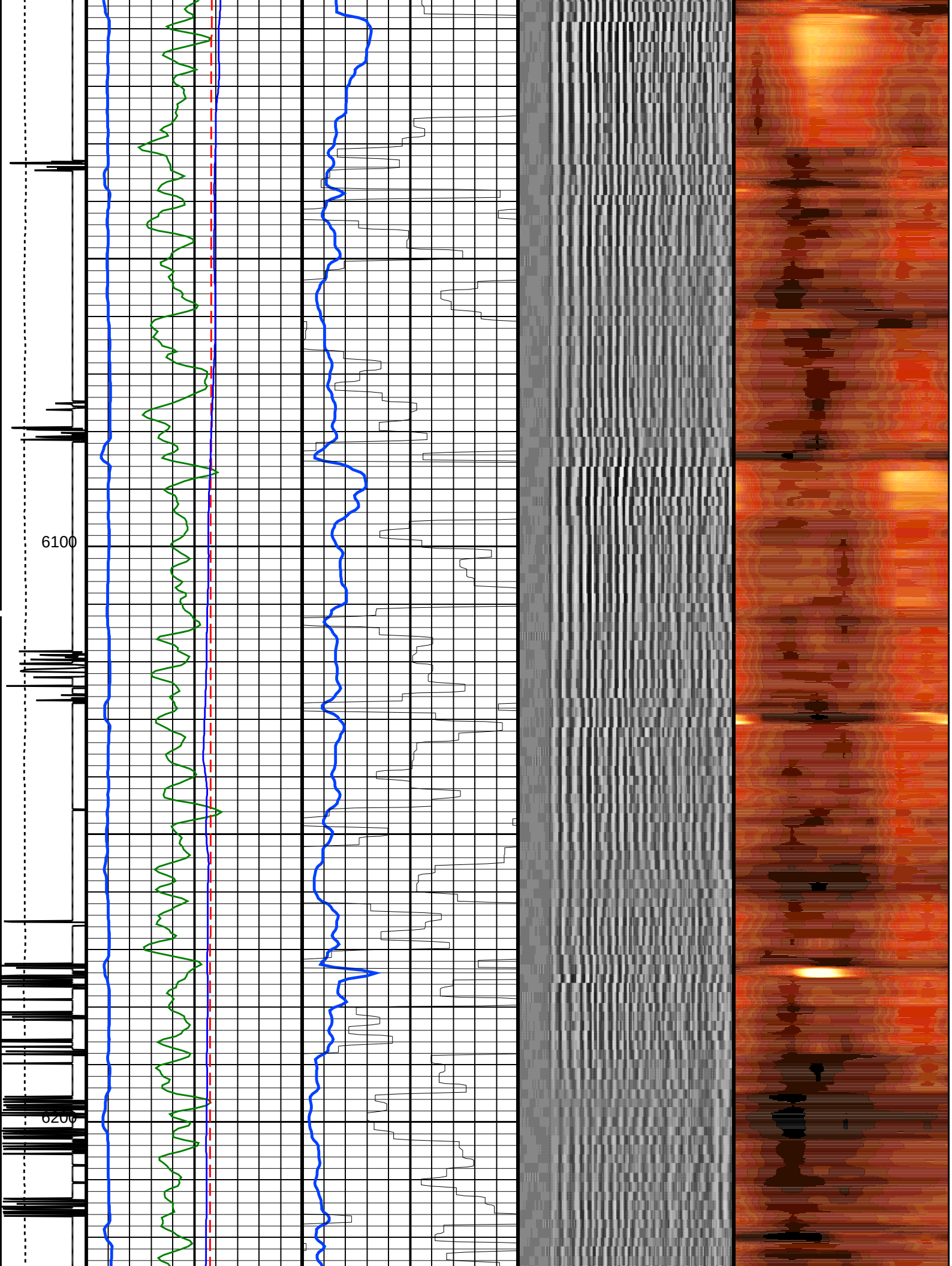
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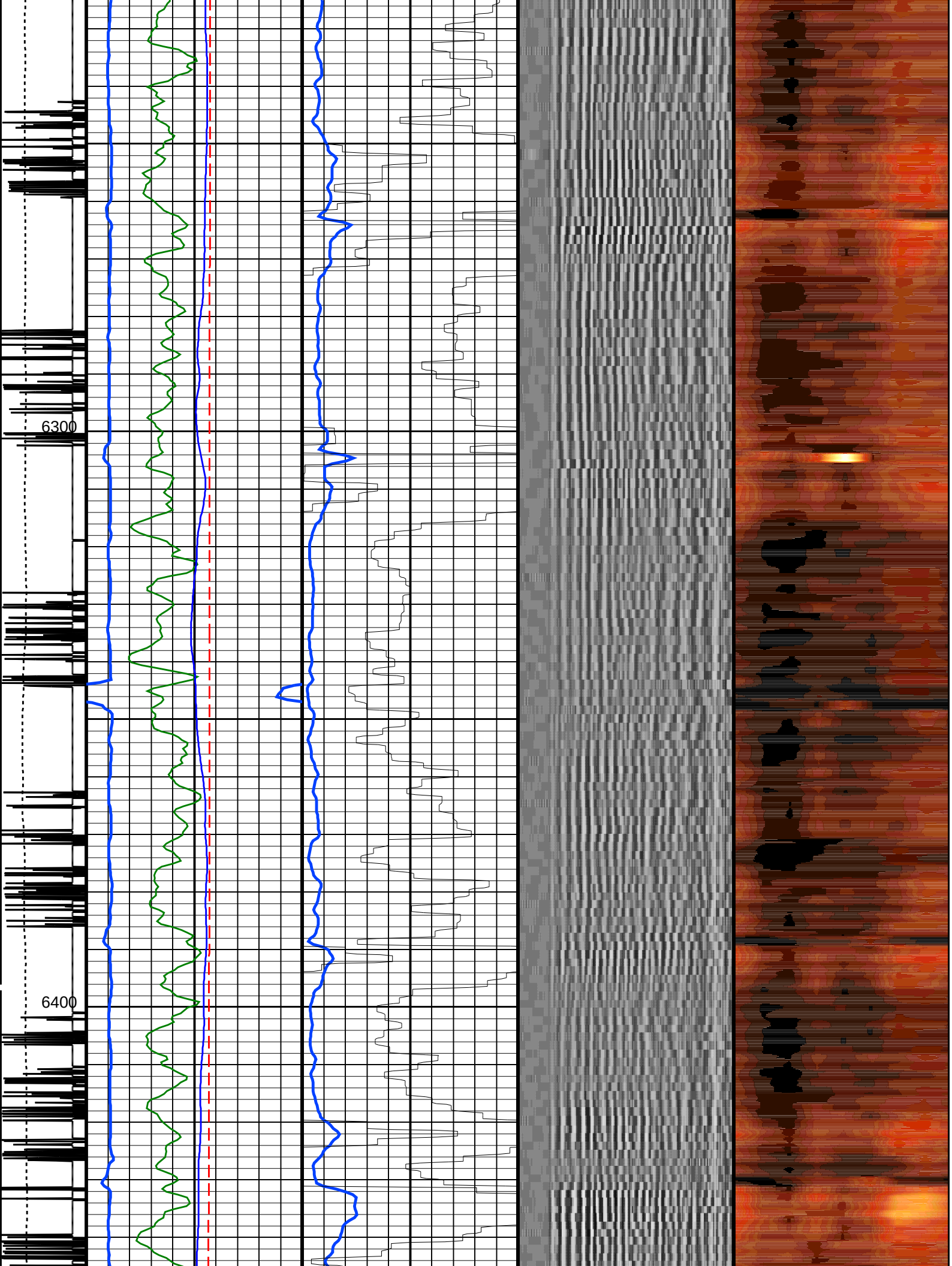
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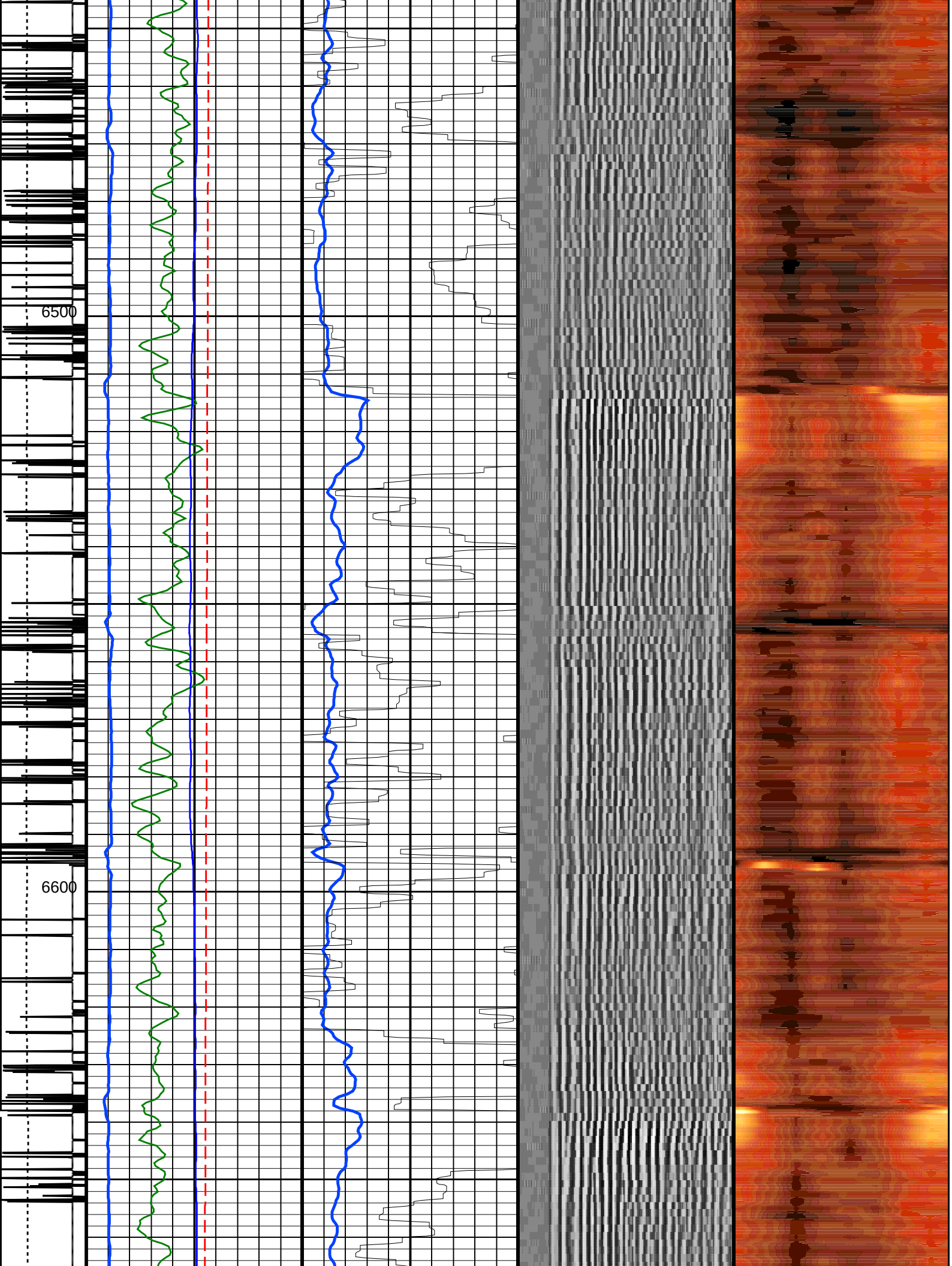
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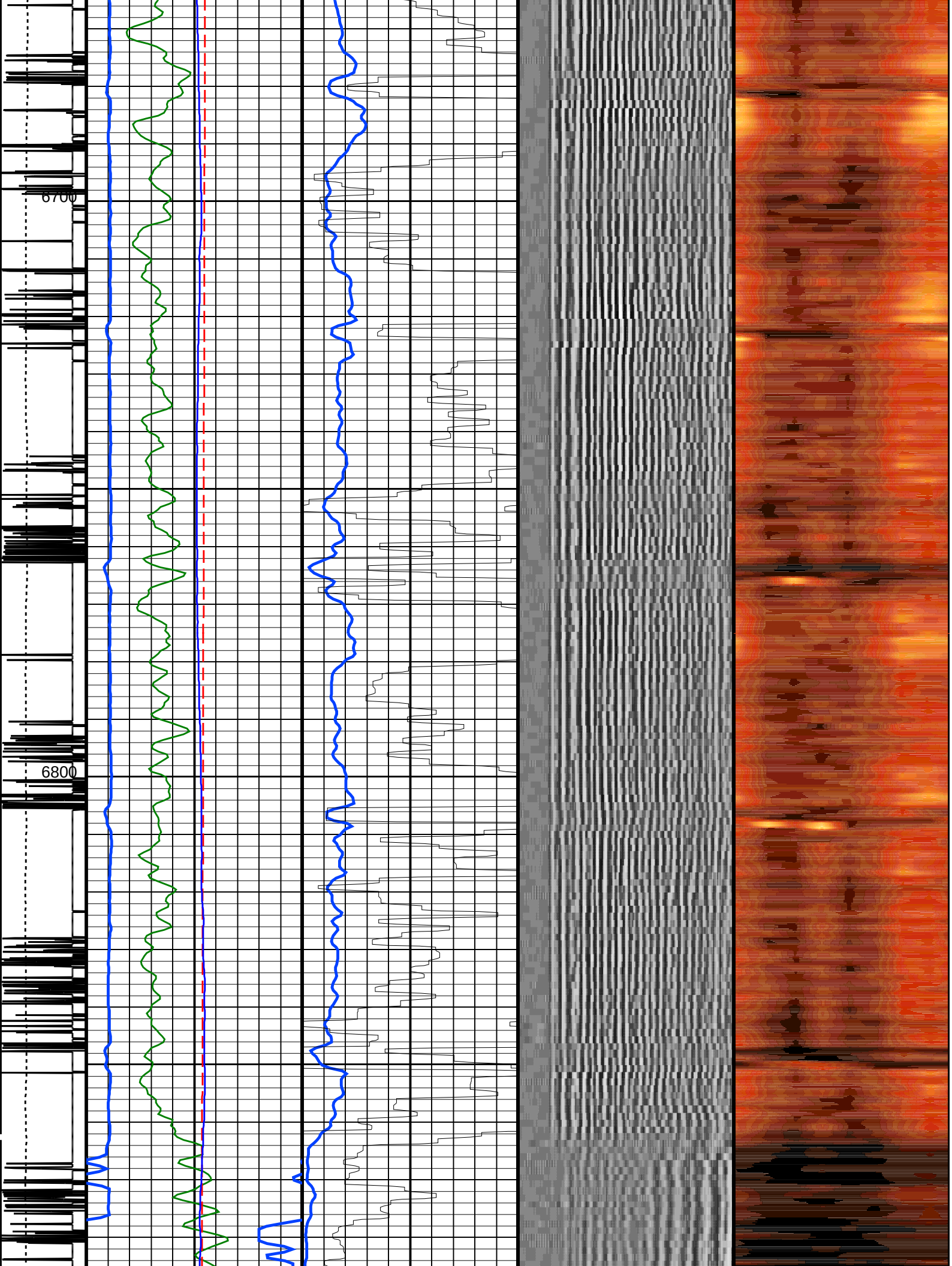
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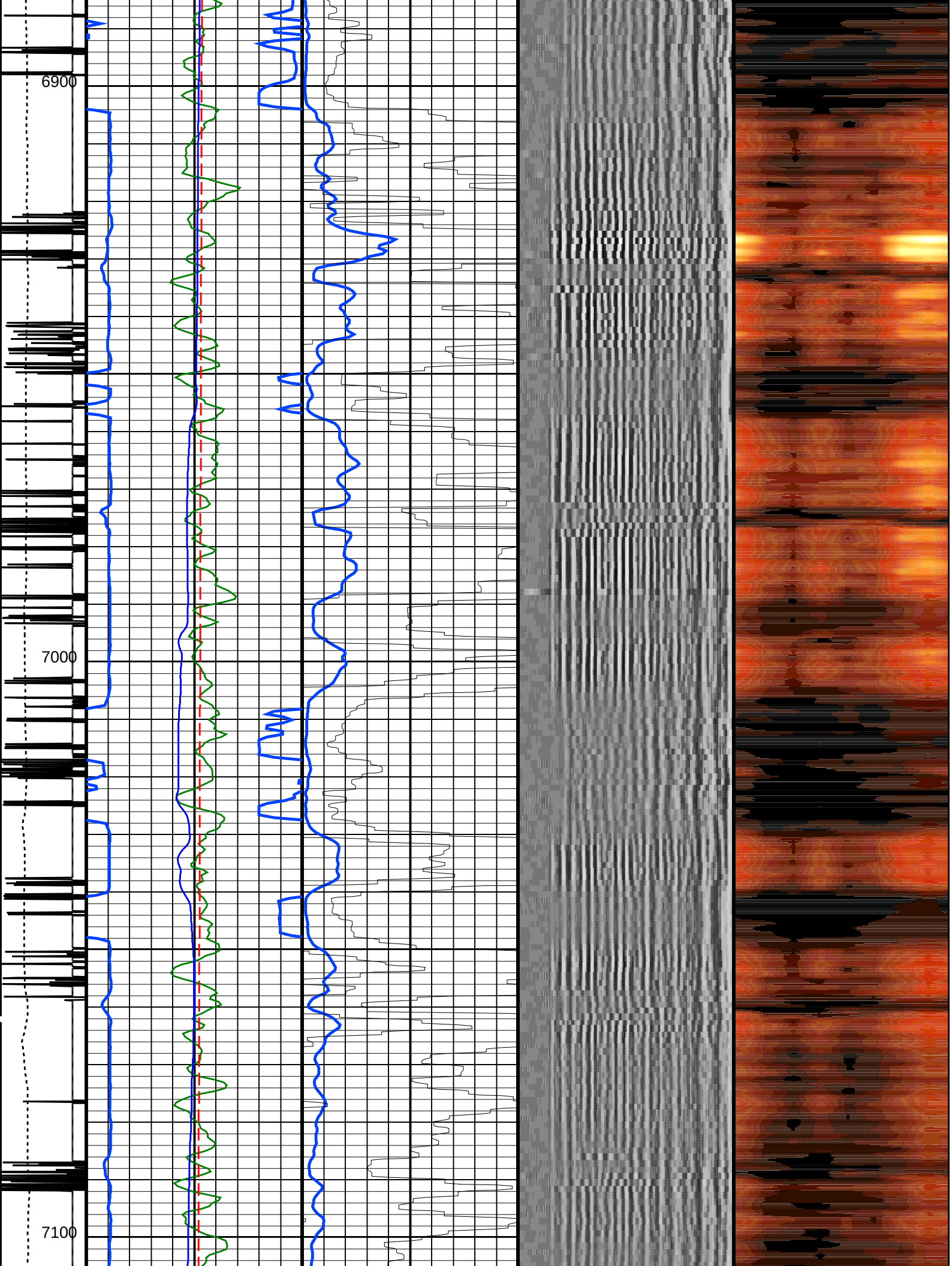
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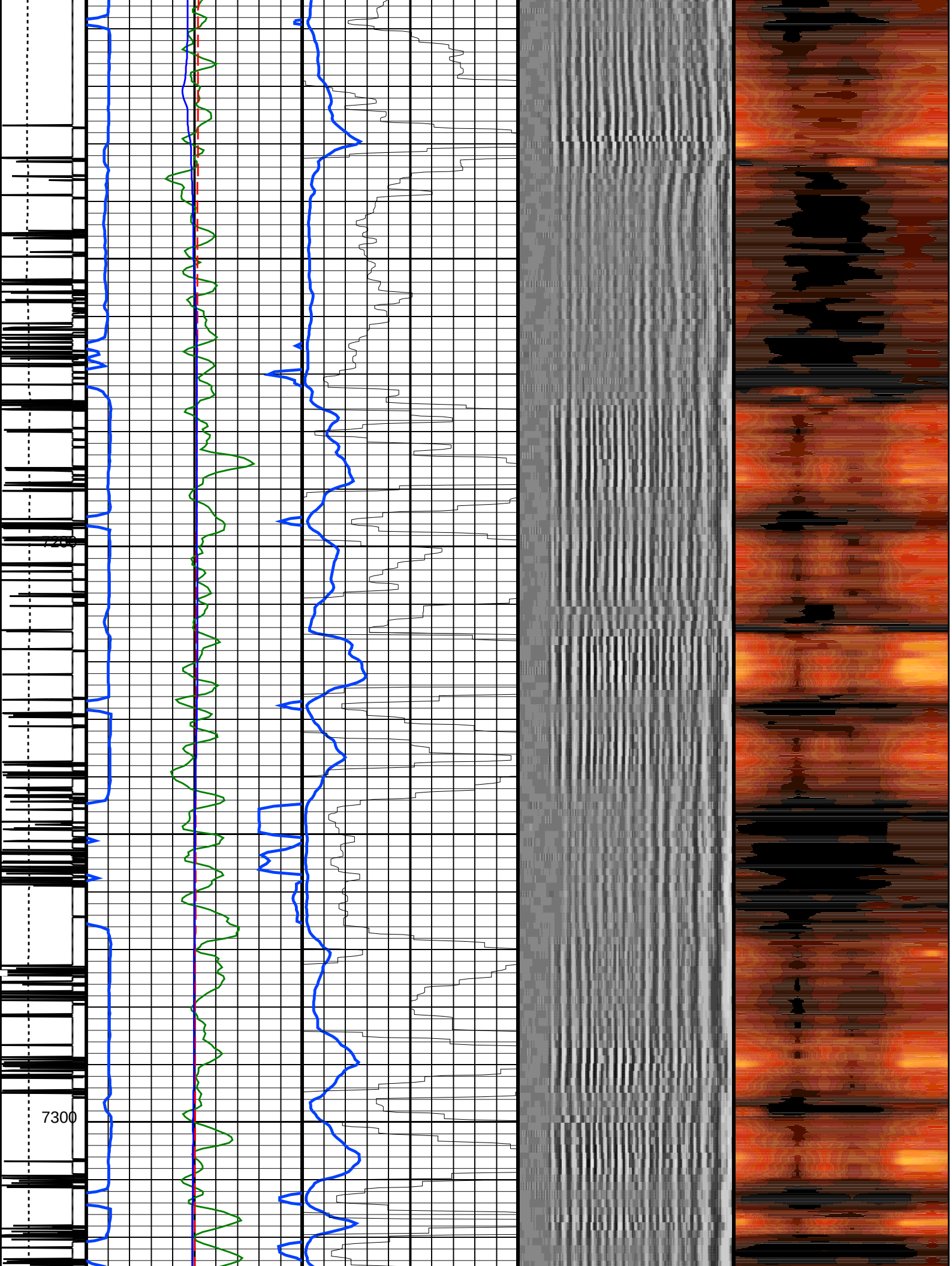
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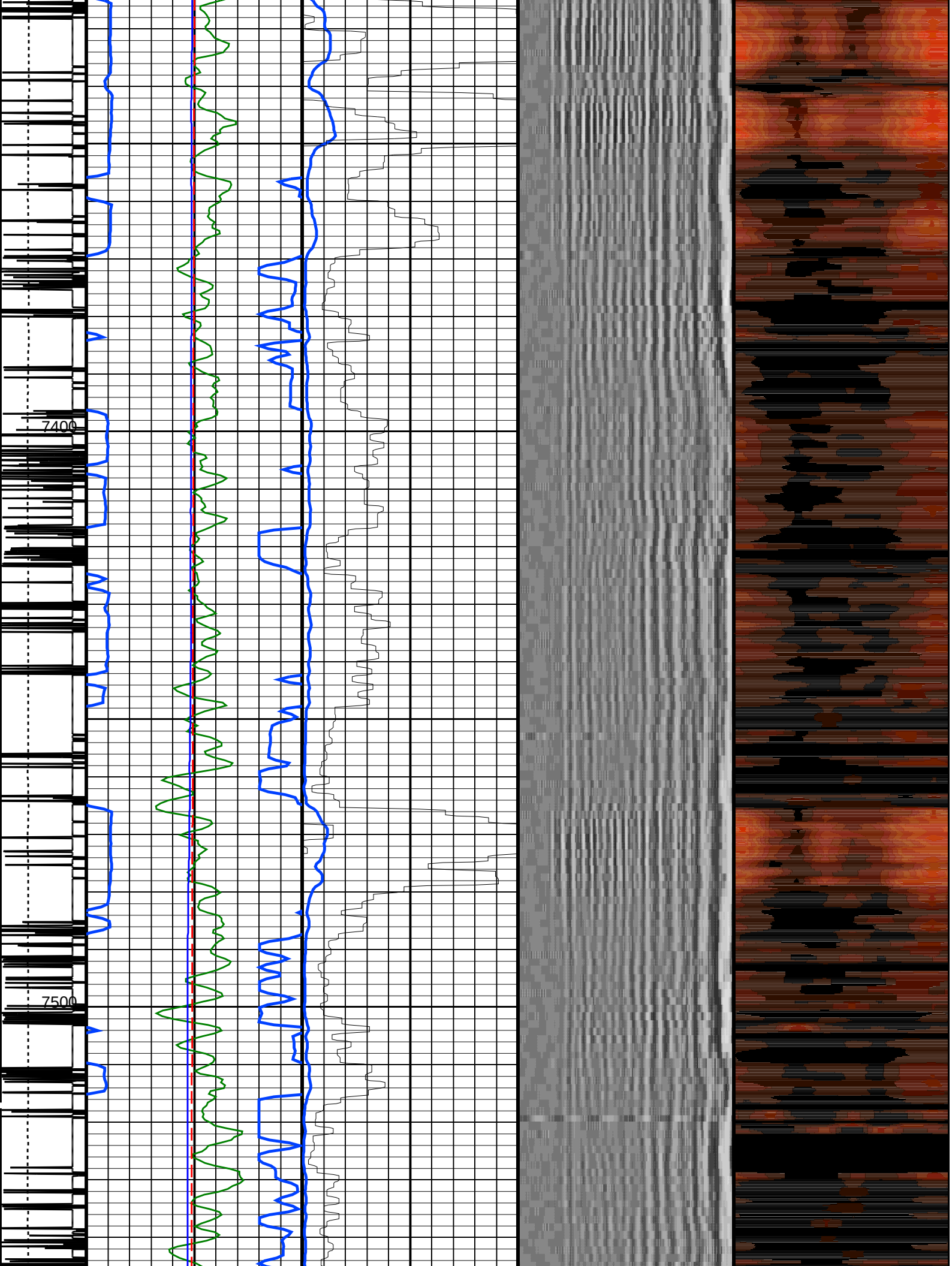
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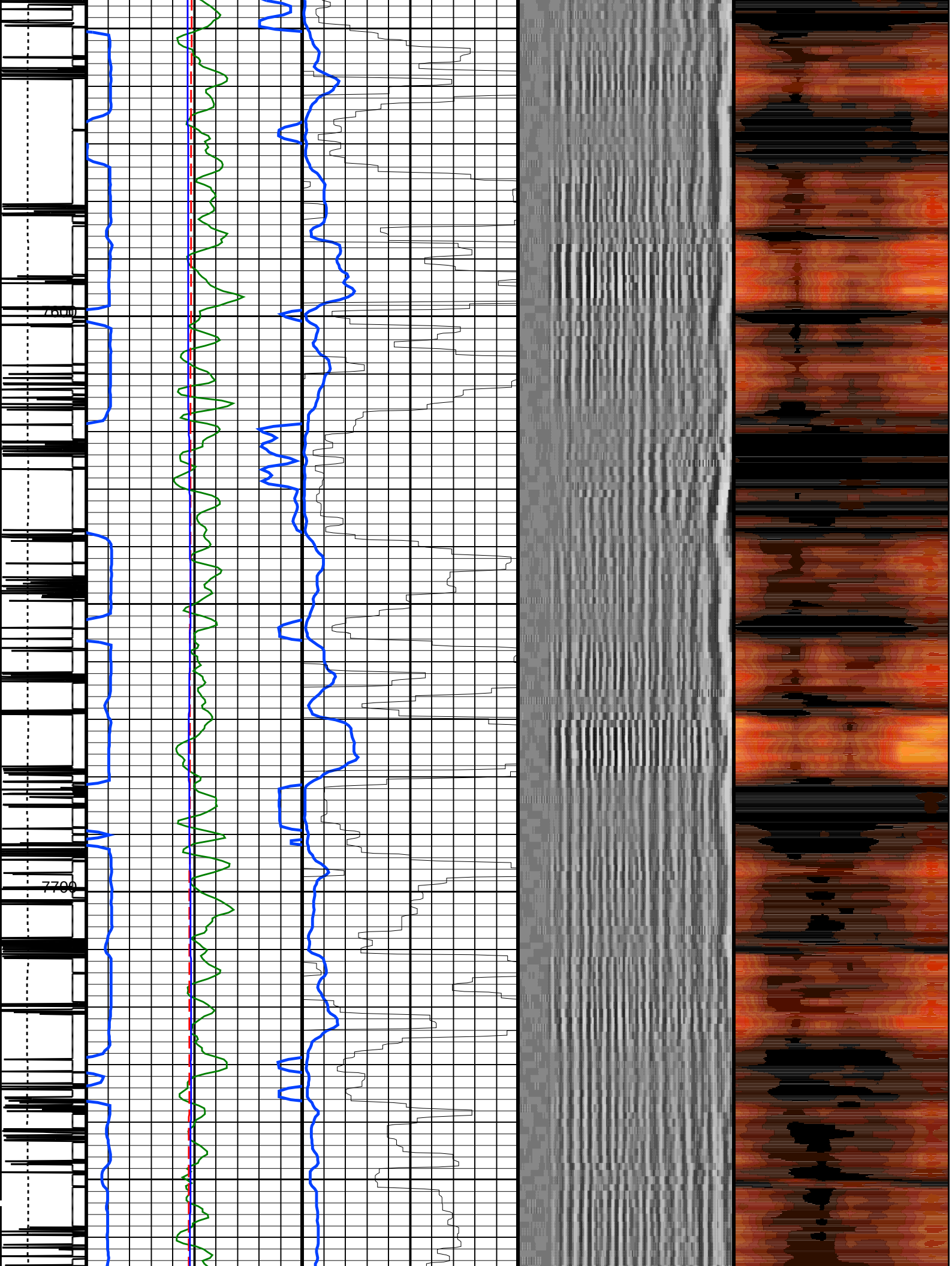
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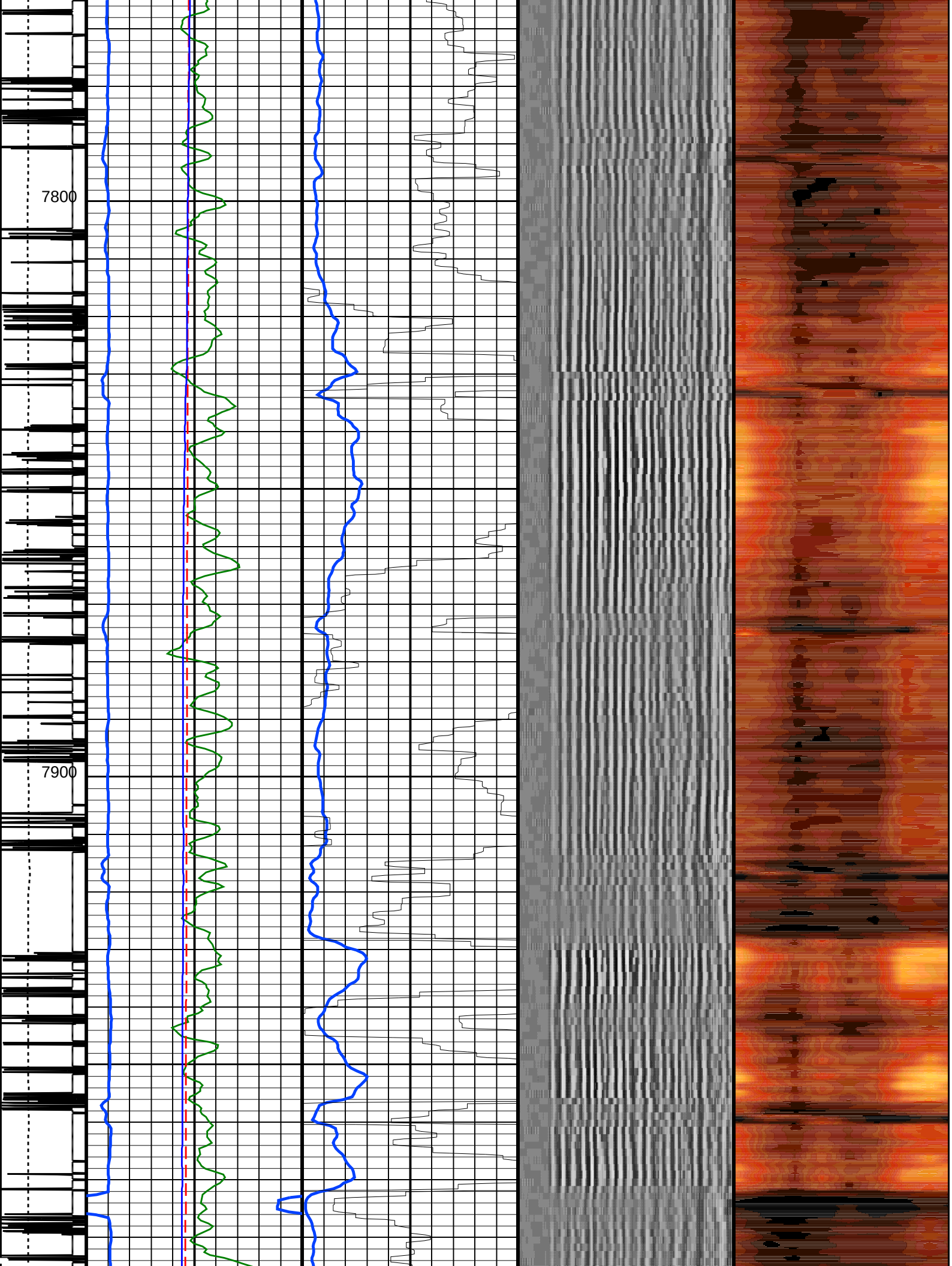
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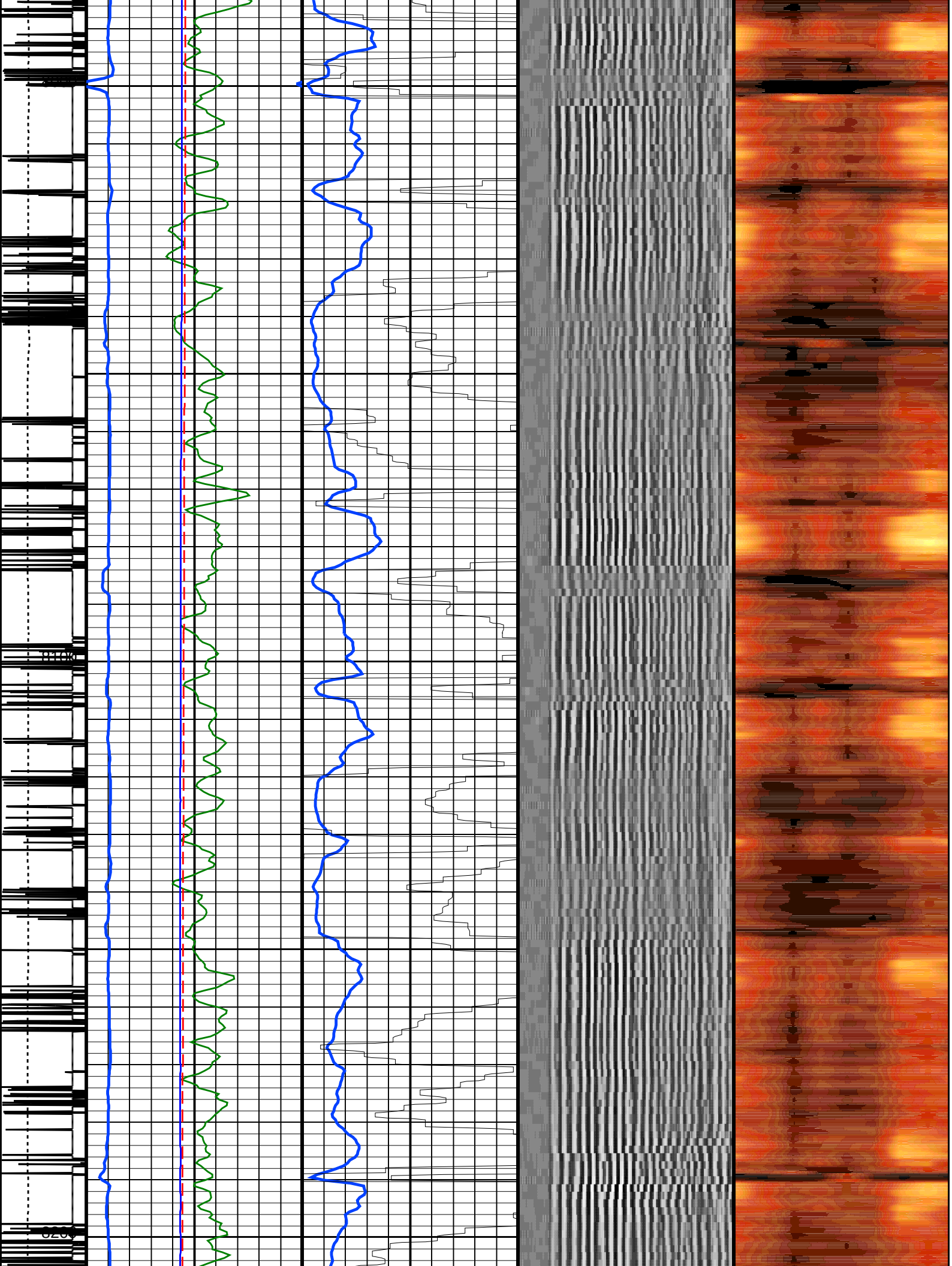

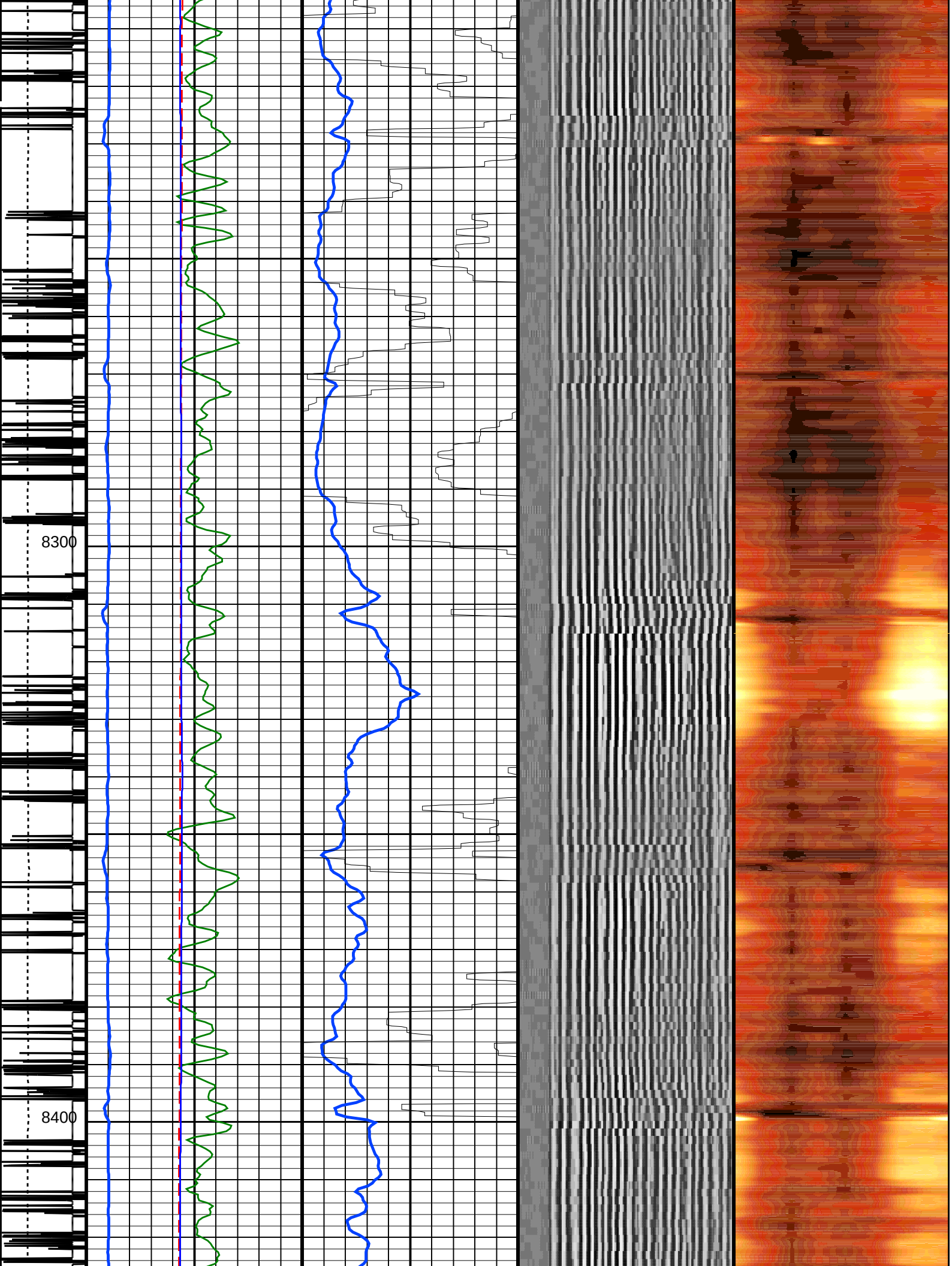
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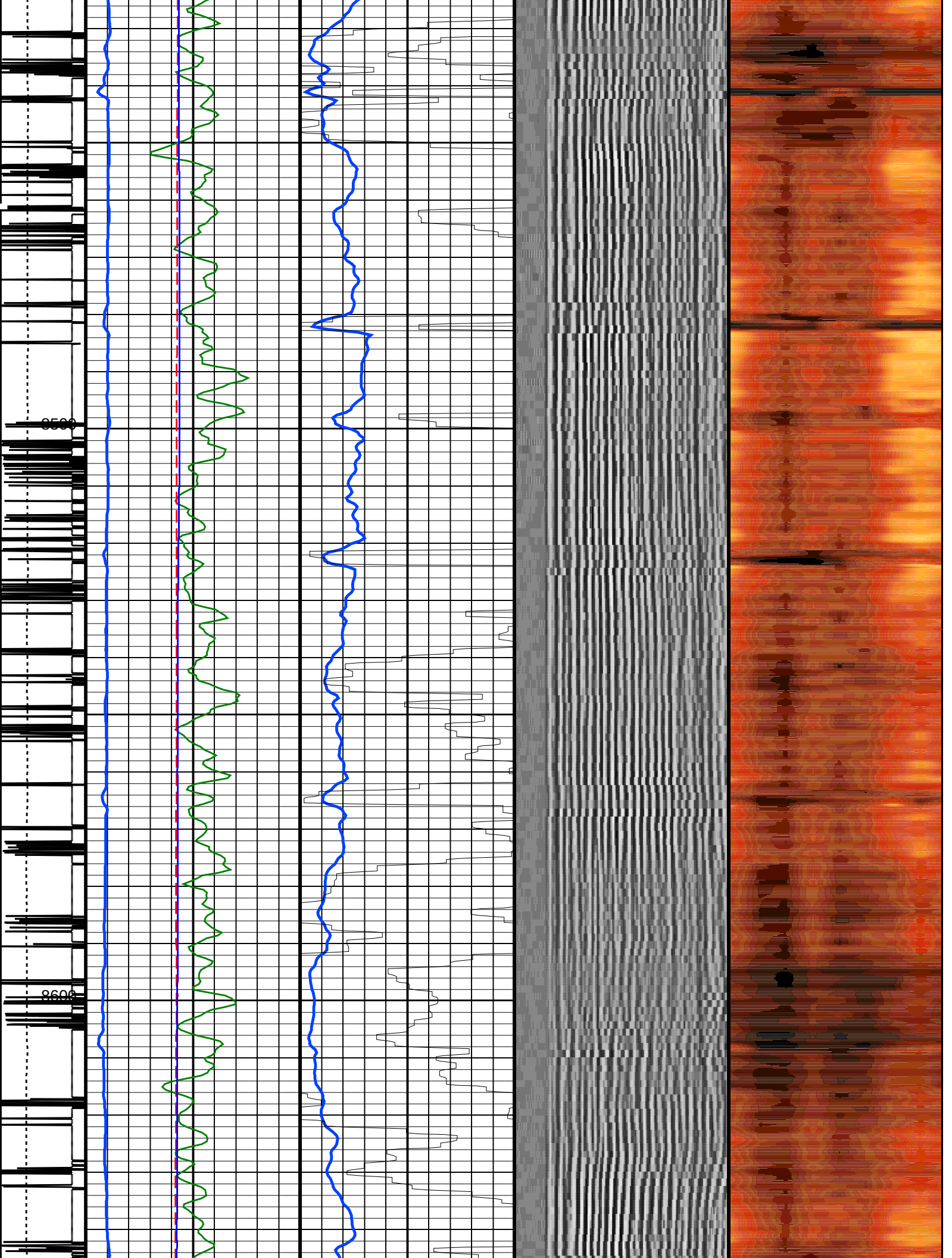
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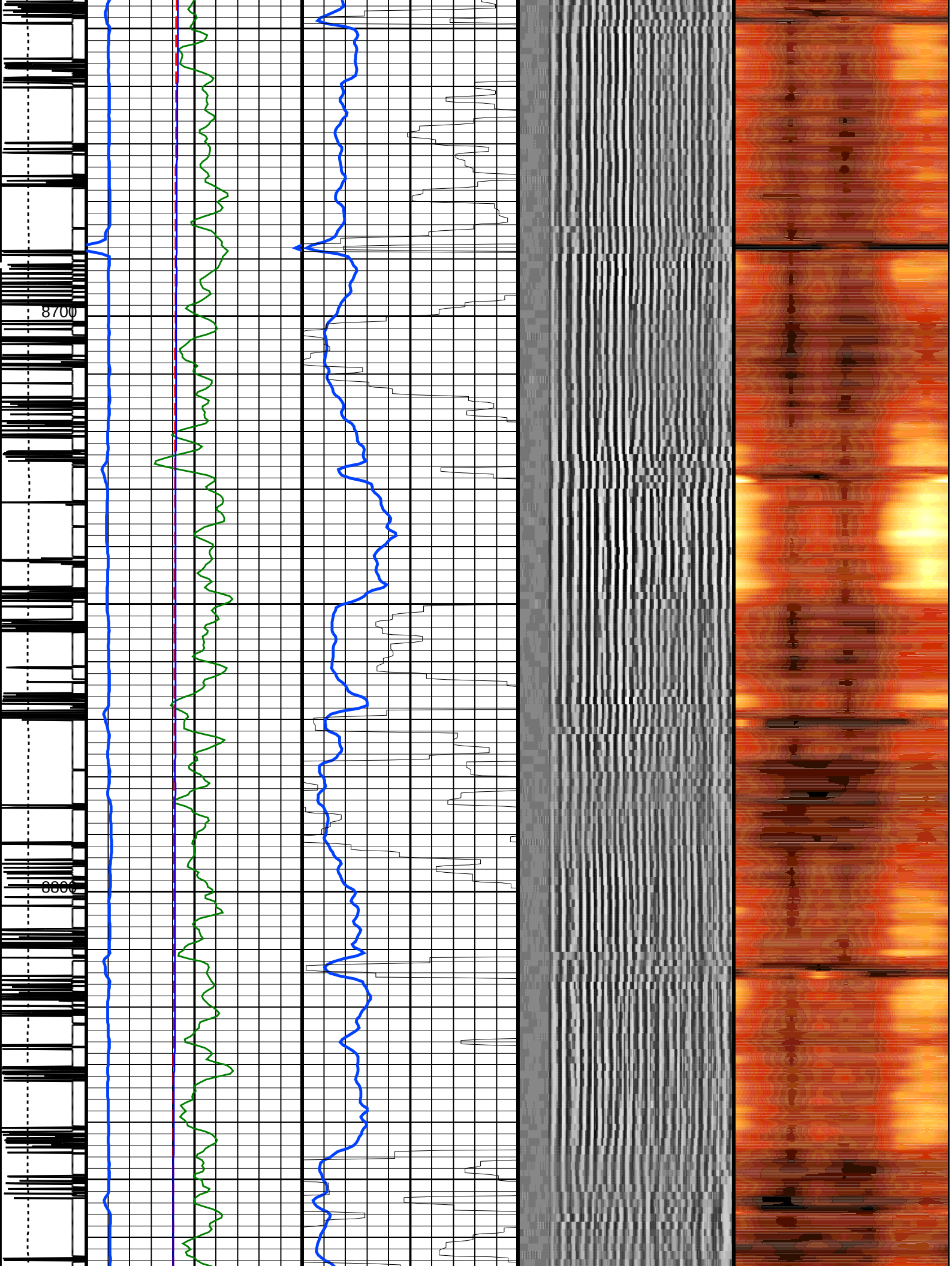
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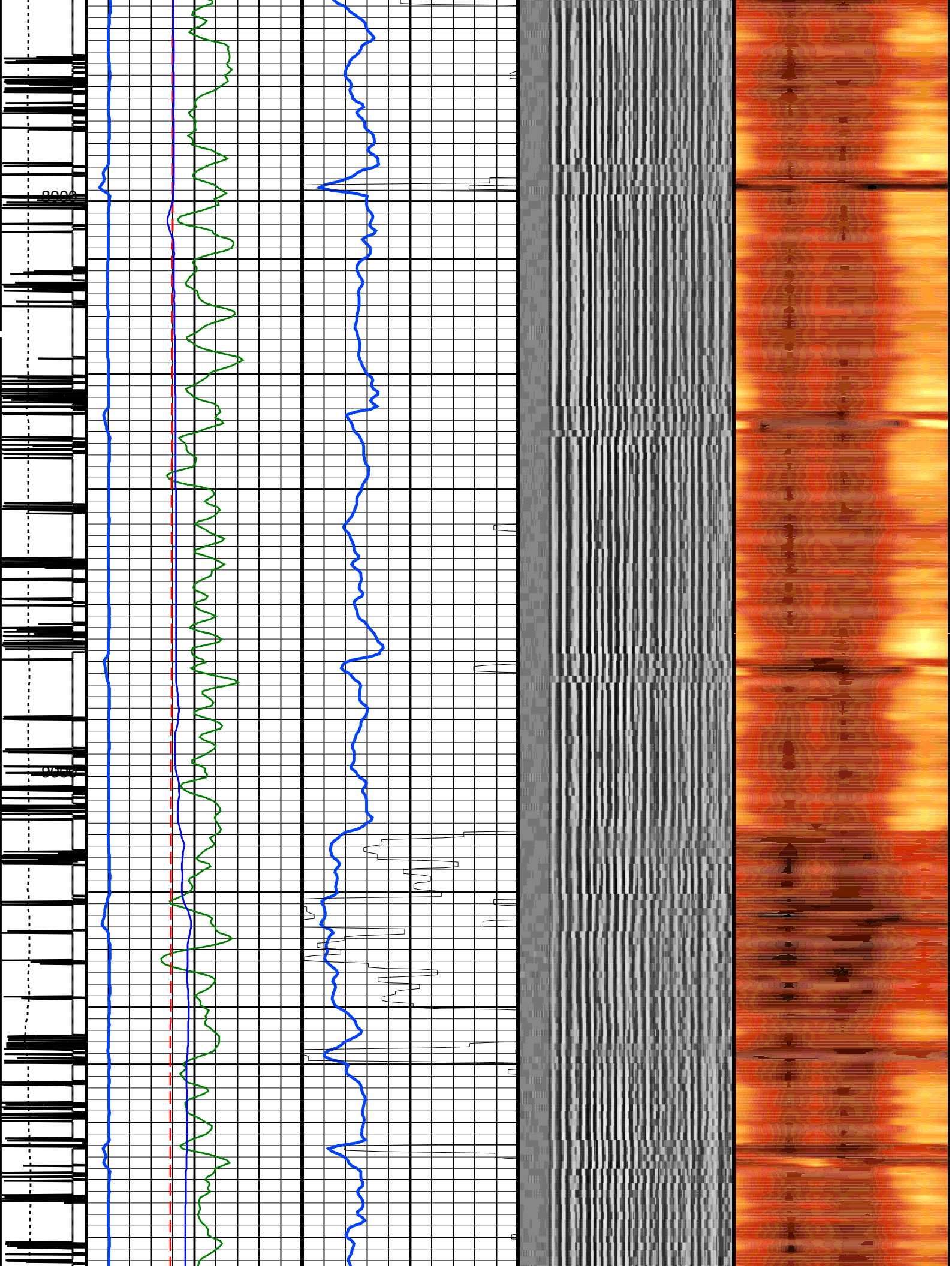

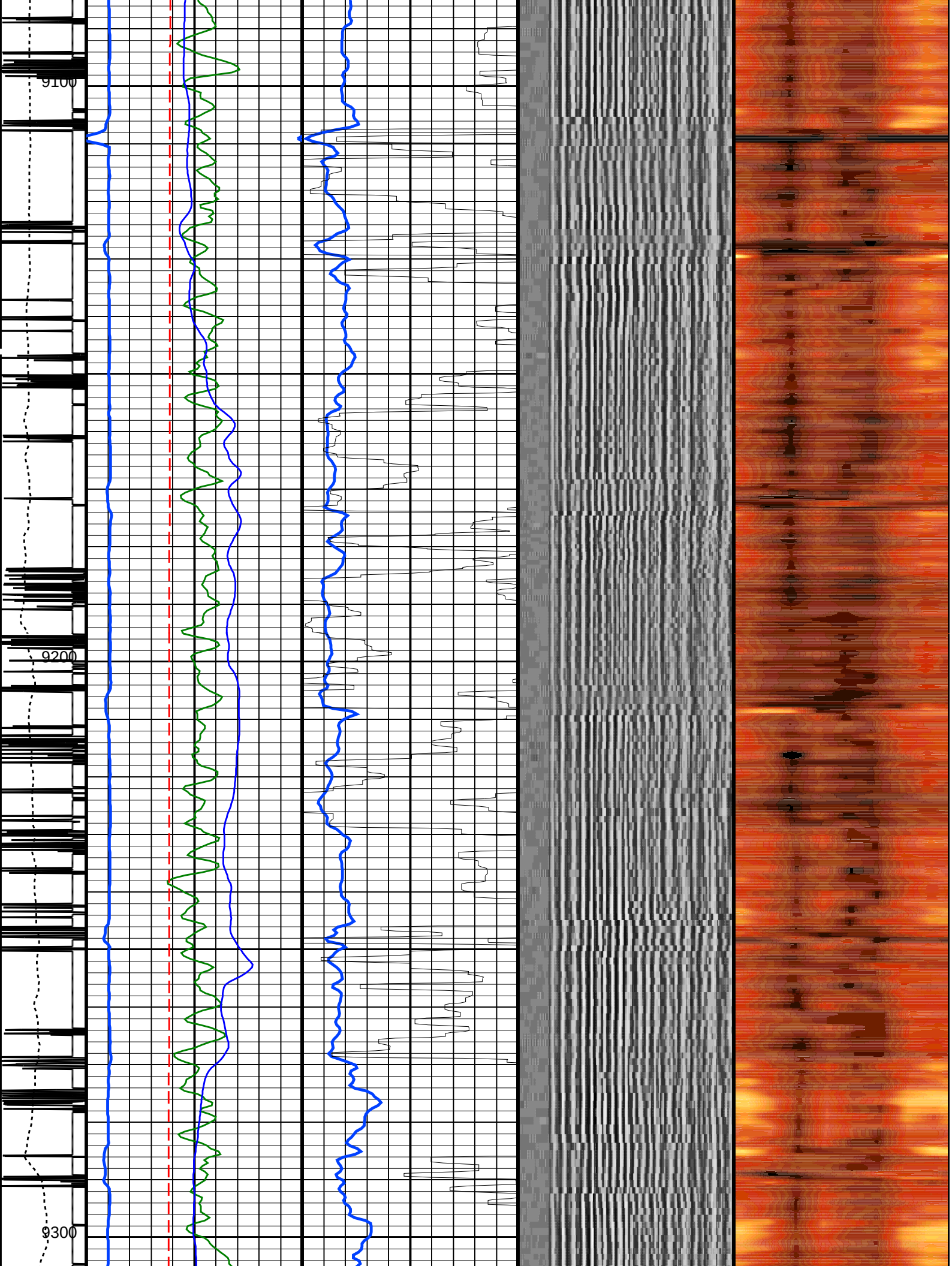
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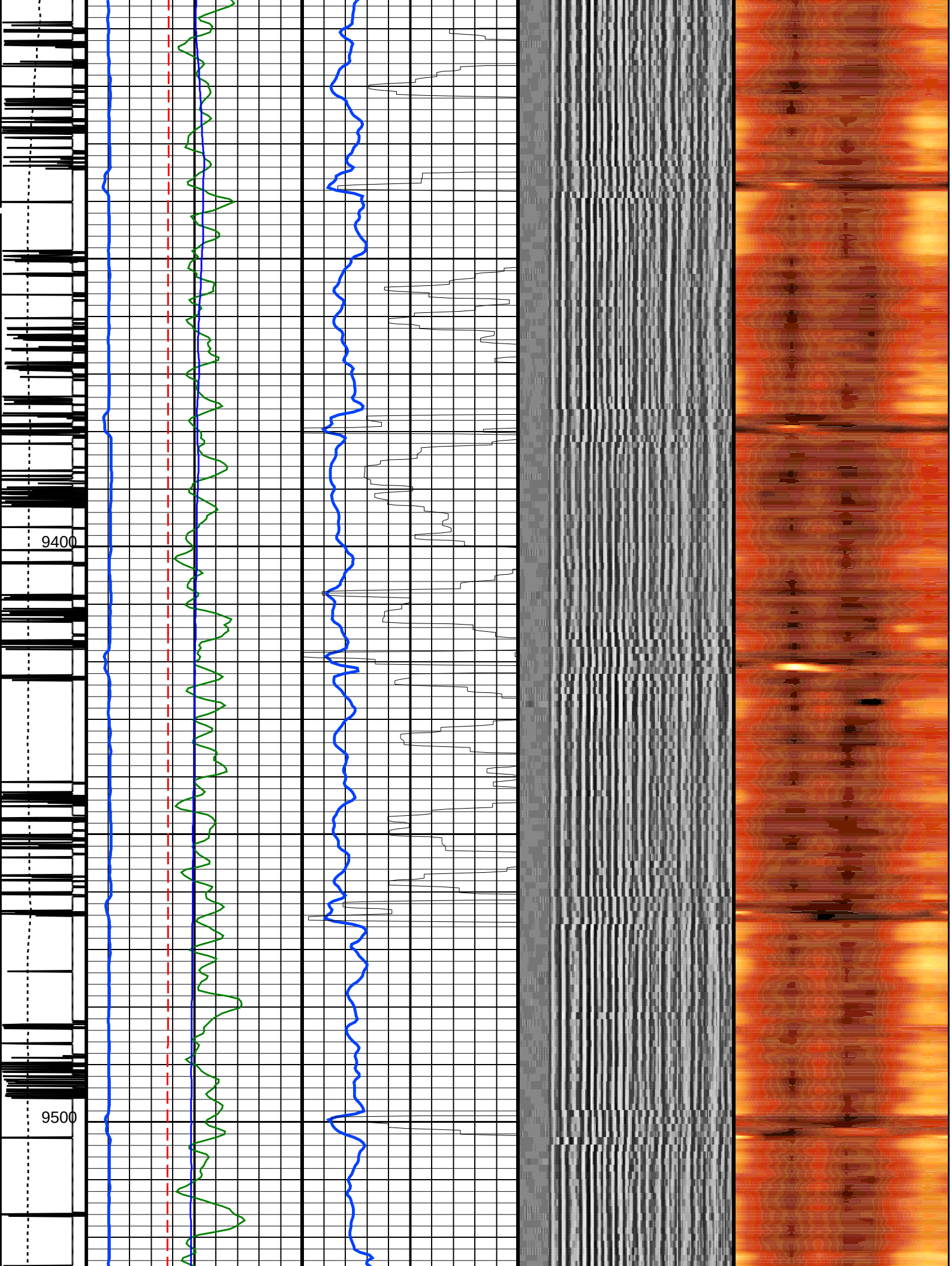
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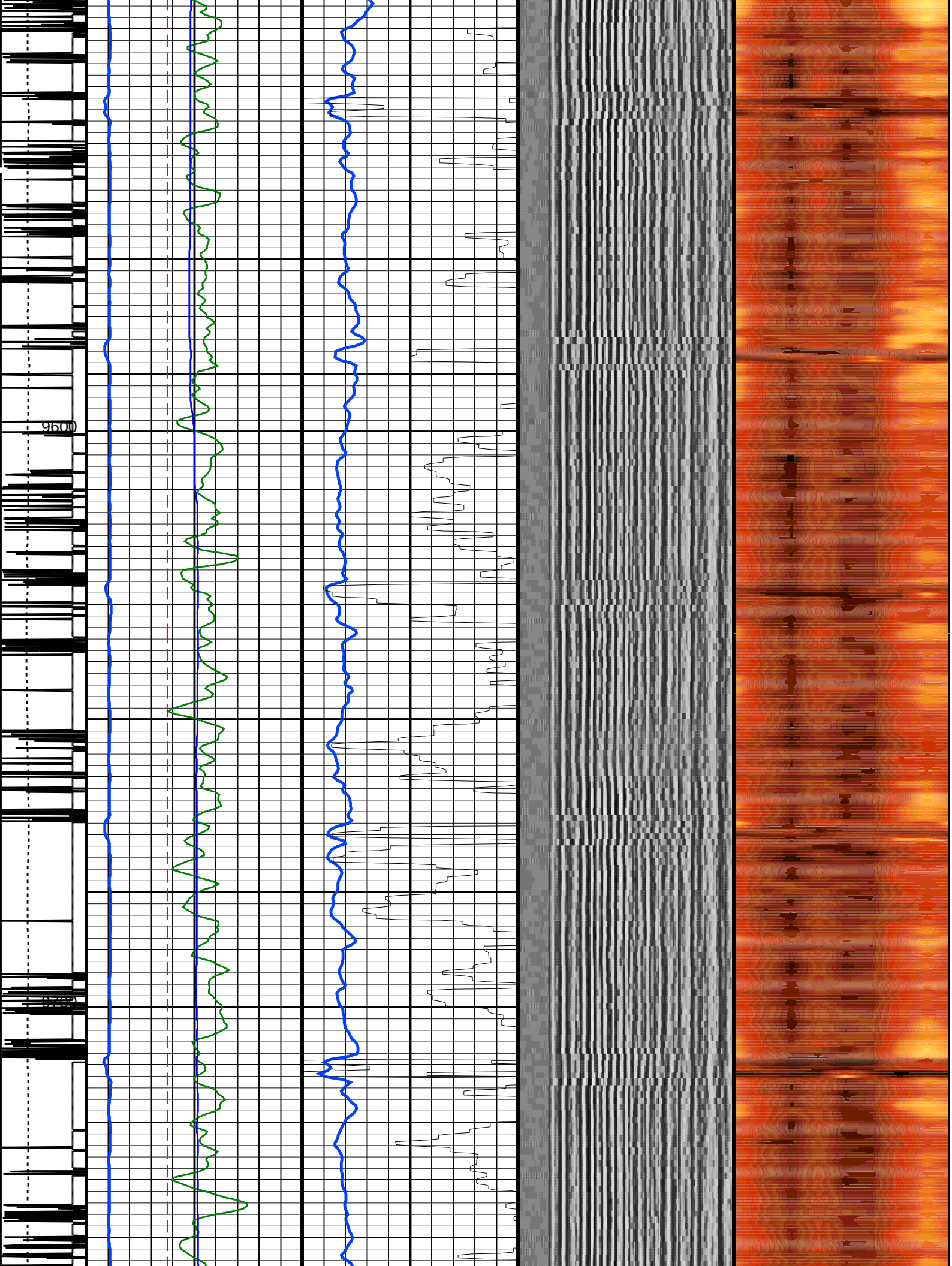
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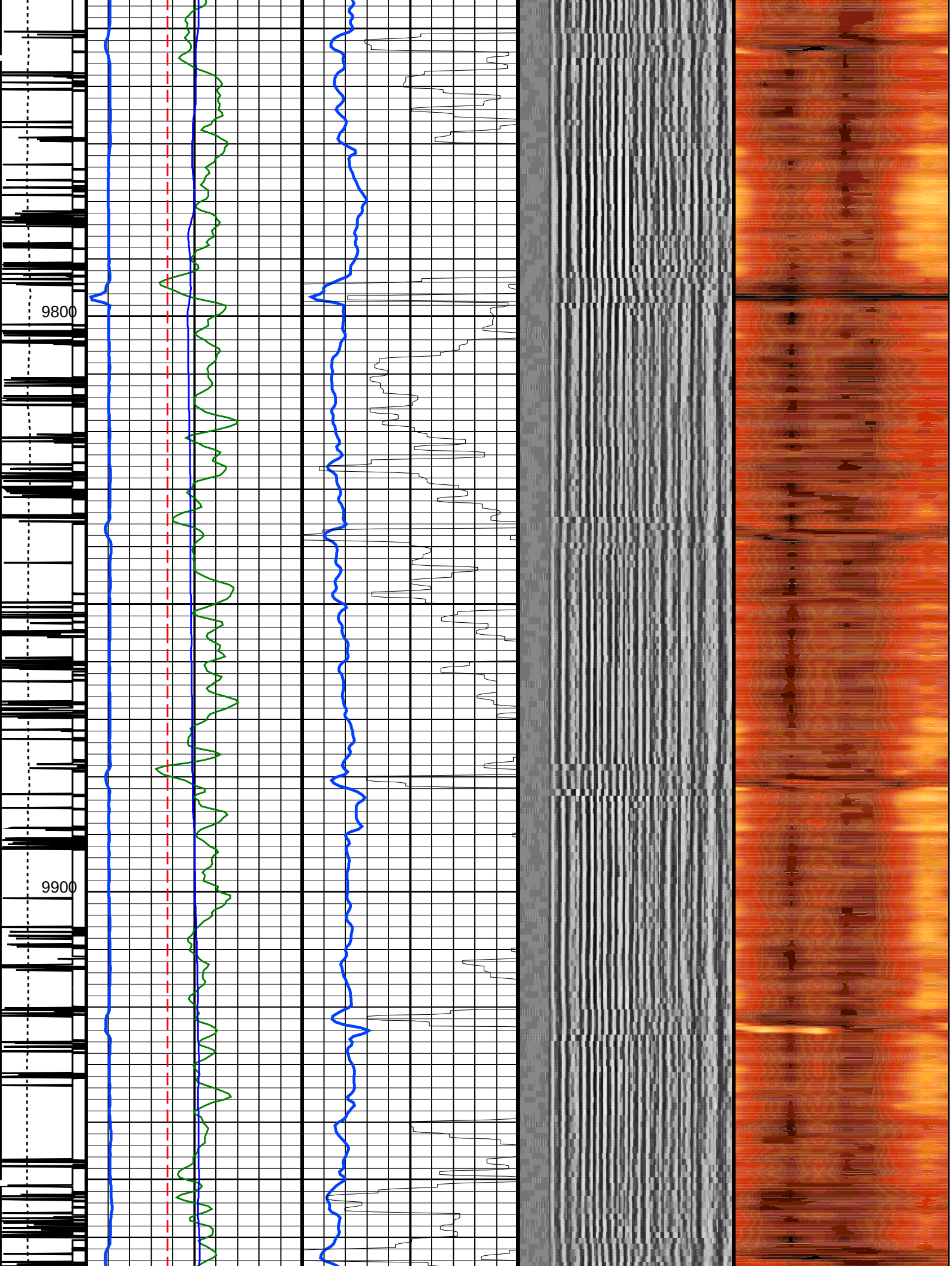
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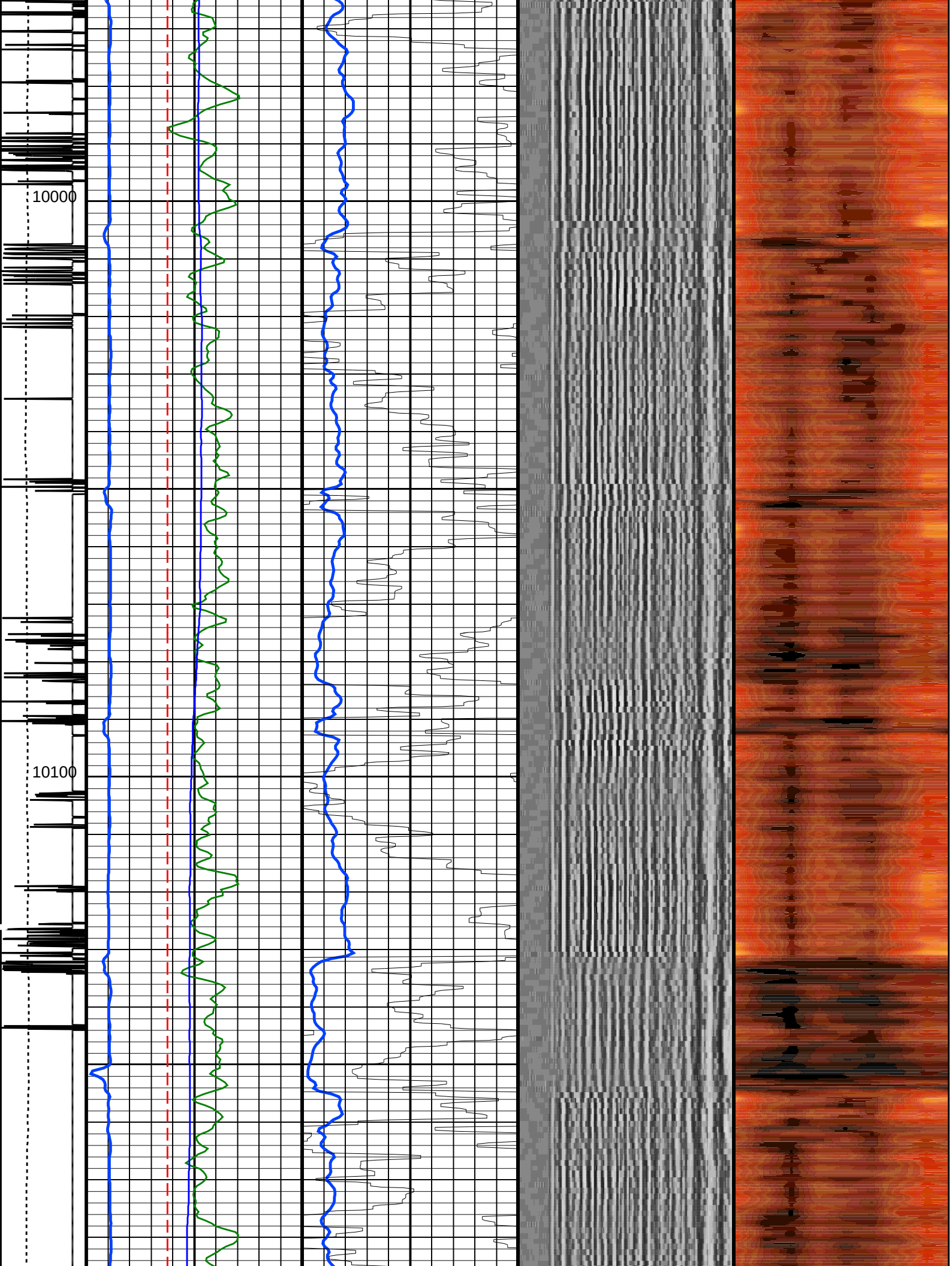
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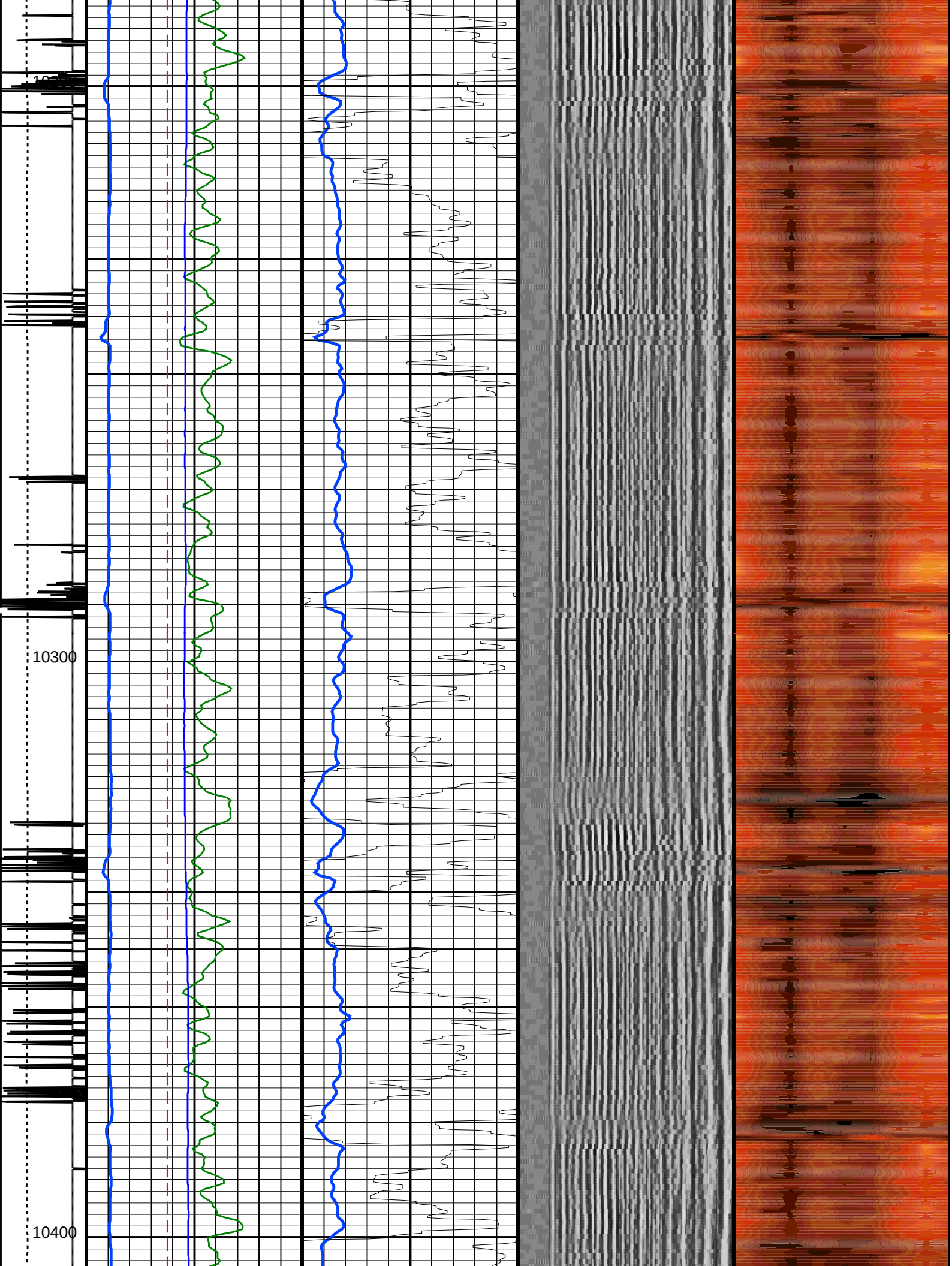
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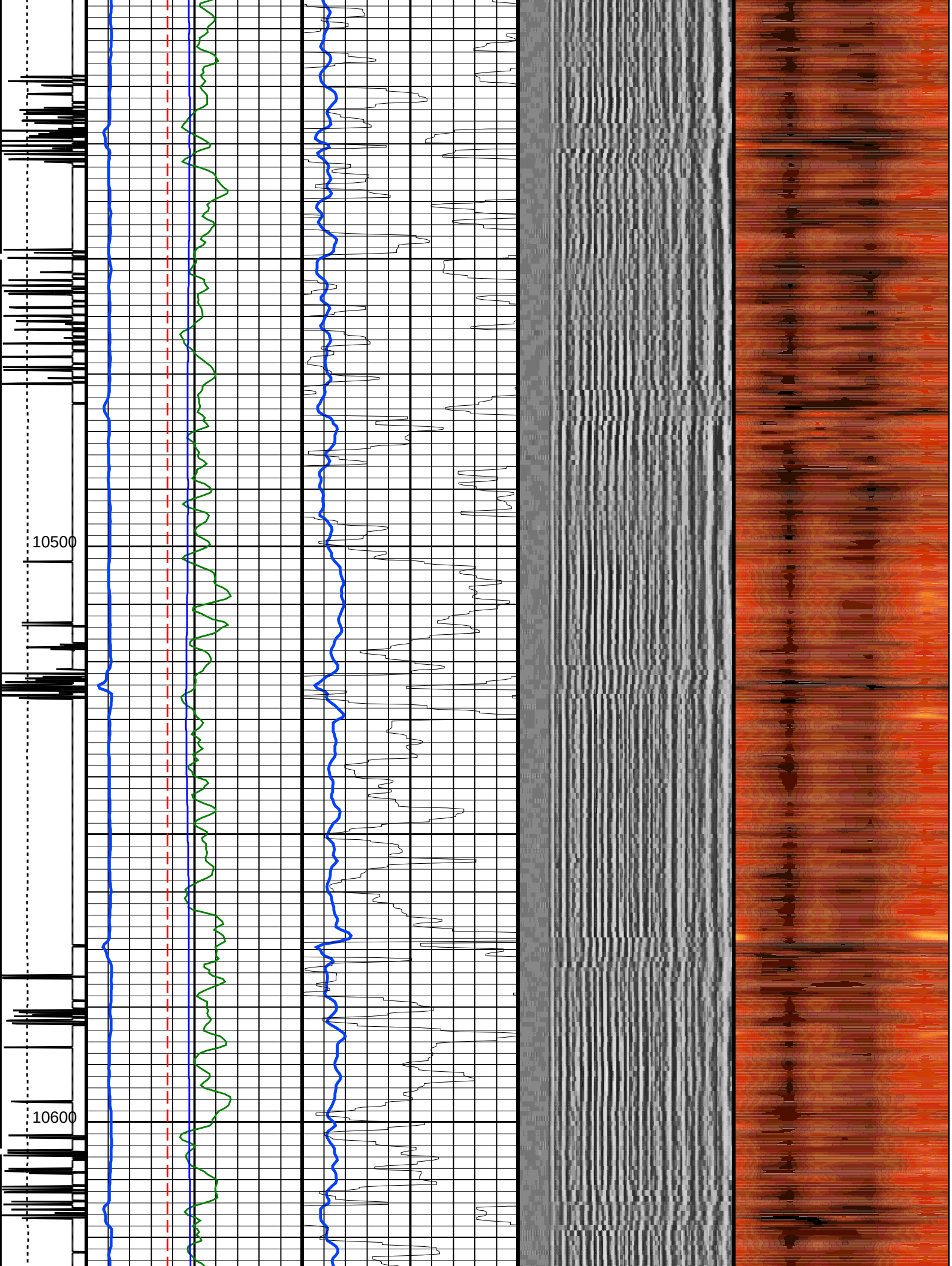
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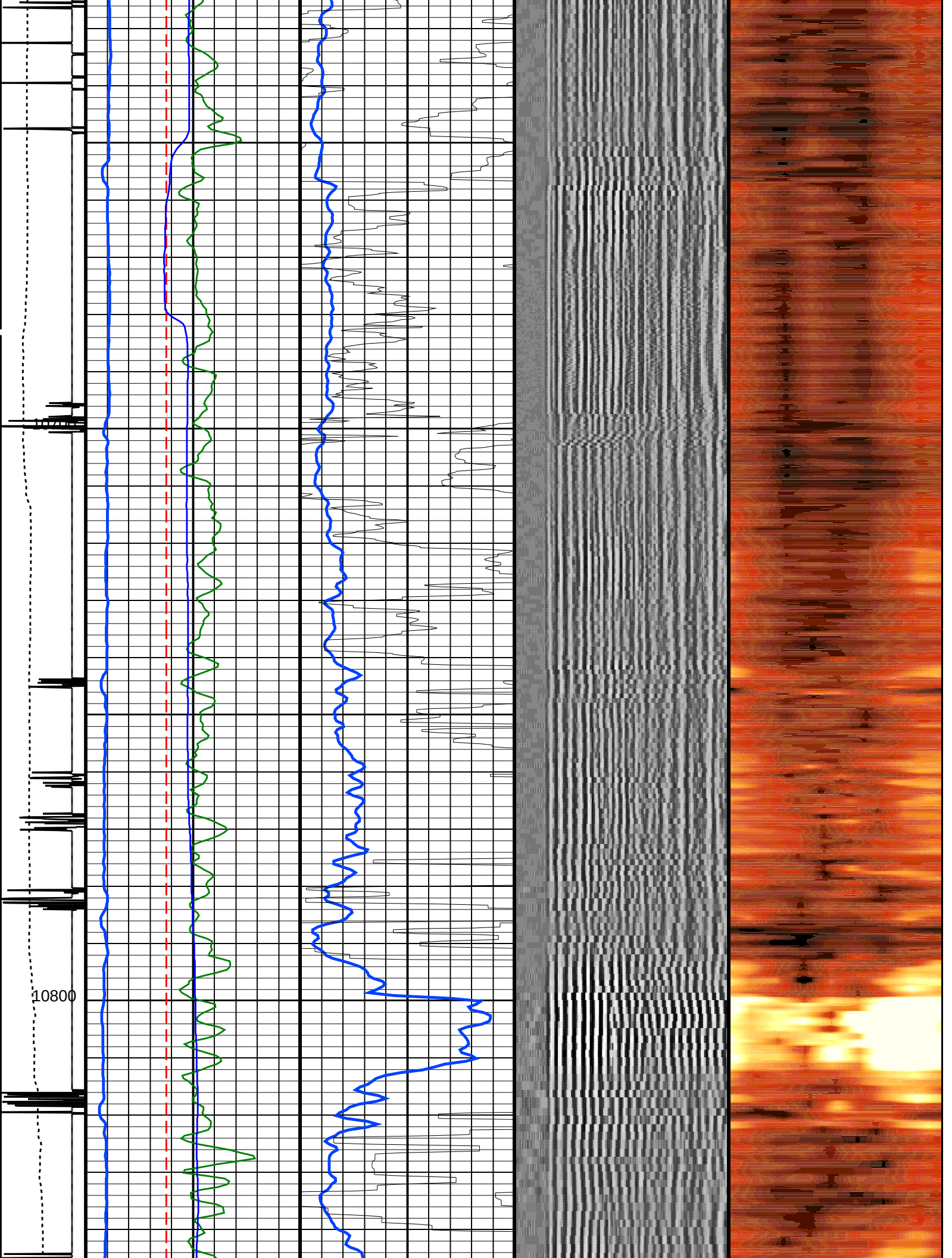
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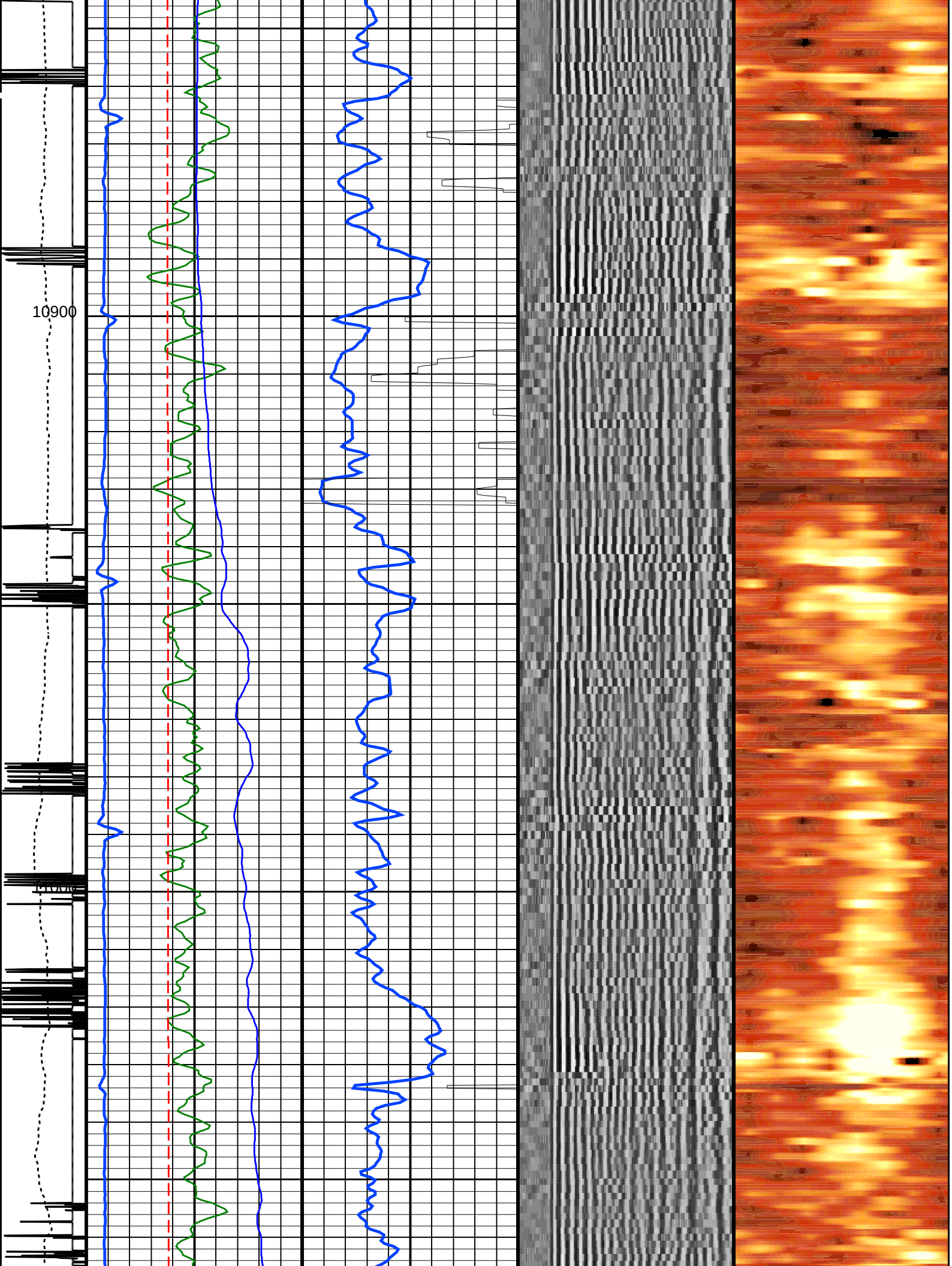
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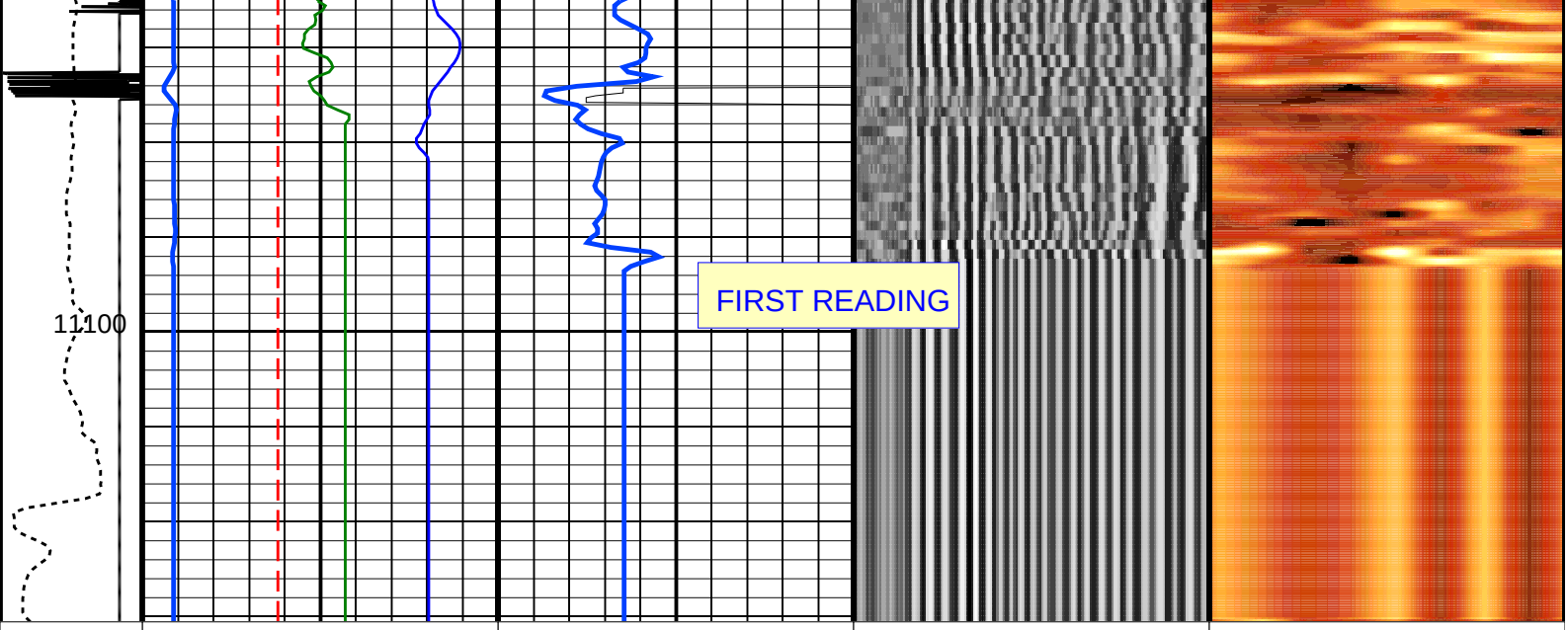

Tension (TENS) (LBF)
0 2000

Gamma Ray (GR)
0 (GAPI) 150

CBL Amplitude (CBL)
0 (MV) 100

Min Amplitude Max
VDL VariableDensity (VDL)
200 (US) 1200

2.5000
5.0000
7.5000
10.0000
12.5000
15.0000
17.5000
20.0000
22.5000
25.0000
27.5000
30.0000
32.5000
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37.5000
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67.5000
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72.5000
75.0000
77.5000
80.0000
82.5000
85.0000
87.5000
90.0000
92.5000
95.0000
97.5000
100.0000

CBL Amplitude Mapping Image (0 − 100) (MPWF) (MV)

Discriminated CCL (CCLD)
5 (V) −1

Cbl 3.ft Transit Time (TT)
270 (US) 0

CBL Amplitude (CBL)
0 (MV) 10

Well Temperature (WTEP)
0 (DEGF) 300

Well Pressure (WPRE)
0 (PSIA) 3000

PIP SUMMARY

Time Mark Every 60 S

Format: Scmt_VDL_Image **Vertical Scale: 5" per 100'** **Graphics File Created: 06−Sep−2011 11:10**

QP System Version 12C0-147

<<<SCMT Cement Evaluation Information Summary>>>

Sonde Serial Number	SCMS−CB 8186		
Current Casing Size	4.50000 IN		
Casing Weight	11.6000 LB/F		
Expected CBL Amplitude in Free Pipe Section	80 MV	Minimum Sonic Amplitude	0.579149 MV (100% Cement) 1.55185 MV (80% Cement)
		MAP Minimum Sonic Amplitude	4.32284 MV (100% Cement) 8.10244 MV (80% Cement)
Master Calibration (Normalization)		Before Calibration (Adjustment)	
Date of Master Calibration	23−FEB−2011		
CBL Correction Factor	0.0700110	CBL Adjustment Factor (CBAF)	1.30000
MAP 1 Correction Factor	0.0960446	MAP Adjustment Factor (MPAF)	1.0
MAP 2 Correction Factor	0.103019		
MAP 3 Correction Factor	0.112474		
MAP 4 Correction Factor	0.170246		
MAP 5 Correction Factor	0.138168		
MAP 6 Correction Factor	0.126543		
MAP 7 Correction Factor	0.0891491		
MAP 8 Correction Factor	0.107987		

Parameters

DLIS Name	Description	Value	
	SCMT−CB: Slim Cement Mapping Tool, 1−11/16 OD		
BILI	Bond Index Level for Zone Isolation	0.8	
BISS	Bond Index Source Selection for BIQL	BI	
CB3D	SCMT CBL 3 ft Peak Detection Mode	PEAK	
CB3G	SCMT CBL 3 ft Peak Detection T0_Delay and Noise Gate	224.559	US
CB3T	SCMT CBL 3 ft Fixed Threshold Level	20	MV
CB5D	SCMT CBL 5 ft Peak Detection Mode	PEAK	
CB5G	SCMT CBL 5 ft Peak Detection T0_Delay and Noise Gate	338.559	US
CB5T	SCMT CBL 5 ft Fixed Threshold Level	20	MV
CBLG	CBL Gate Width	40	US
CBRA	CBL LQC Reference Amplitude in Free Pipe	80	MV
CMCF	CBL Cement Type Compensation Factor	1	
CMTC	SCMT Slow Channel Multiplexer Mode	SCAN	
CMTM	SCMT Operating Mode	LOG	
CMTP	SCMT Tool position on CAN	3	
CSCS	SCMT Slow Channel Index	VCC	
CTHI	Casing Thickness	0.255617	IN
DTF	Delta−T Fluid	189	US/F
FATT	Acoustic Attenuation due to Fluid	0	DB/F
FCF	CBL Fluid Compensation Factor	0.924277	
GOBO	Good Bond	1.55185	MV
MAPD	SCMT MAP Peak Detection Mode	PEAK	
MAPG	SCMT MAP Peak Detection T0_Delay and Noise Gate	167.559	US
MAPT	SCMT MAP Fixed Threshold Level	30	MV
MATT	Maximum Attenuation	16.5449	DB/F
MCCF	MAP Cement Type Compensation Factor	1	
MCI	Minimum Cemented Interval for Isolation	1.25	FT
MMSA	MAP Minimum Sonic Amplitude	4.32284	MV
MSA	Minimum Sonic Amplitude	0.579149	MV
PEDE	Peak Detection On/Off Switch in Playback	OFF	
RBC	Relative Bearing Correction Allow/Disallow	ALLOW	
VDLG	VDL Manual Gain	5	
ZCMT	Acoustic Impedance of Cement	6.8	MRAY
	PSPT: Production Services Logging Platform		
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
CSID	Casing Size I.D.	6.5	IN
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F

GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
PBPO	PBMS Tool position on CAN	2	
PCCG	PBMS CCL Gain	DB36	
PSTP	PSTC Tool Position on CAN Bus	1	
SHT	Surface Hole Temperature	68	DEGF
System and Miscellaneous			
ALTDPCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	8.000	IN
BSAL	Borehole Salinity	−50000.00	PPM
CSIZ	Current Casing Size	4.500	IN
CWEI	Casing Weight	11.60	LB/F
DFD	Drilling Fluid Density	8.40	LB/G
DO	Depth Offset for Playback	0.0	FT
FLEV	Fluid Level	18.00	FT
MST	Mud Sample Temperature	−50000.00	DEGF
PBVSADP	Use alternate depth channel for playback	NO	
PP	Playback Processing	NORMAL	
RMFS	Resistivity of Mud Filtrate Sample	−50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	11252	FT
TDD	Total Depth − Driller	11220.00	FT
TDL	Total Depth − Logger	−50000.00	FT
TWS	Temperature of Connate Water Sample	100.00	DEGF

Input DLIS Files

DEFAULT	Flip_SCMT_PSP_007LUP		PRODUCER	06−Sep−2011 11:05	11130.8 FT	4791.5 FT

Output DLIS Files

DEFAULT	SCMT_PSP_008PUP	FN:6	PRODUCER	06−Sep−2011 11:10

Company: **BLACK HILLS ENERGY**

Schlumberger

Well: **HORSESHOE CANYON 4−28**
Field: **SHIRE GULCH**
County: **MESA**
State: **COLORADO**

CEMENT BOND LOG
CBL / VDL / RADIAL IMAGE
GAMMA RAY / CCL