

Schlumberger

Company: Noble Energy

Well: Wells Ranch AA21-67HN

Field: Wattenberg

County: Weld

State: Colorado

County: Weld

Field: Wattenberg

Location: SE NE Sec 21, T6N, R63W

Well: Wells Ranch AA21-67HN

Company: Noble Energy

LOCATION

SE NE Sec 21, T6N, R63W

SHL: 1599' FNL & 419' FEL

Lat/Long: 40.47495000/-104.43402000

Elev.: K.B. 4749.00 ft

G.L. 4725.00 ft

D.F. 4748.00 ft

Permanent Datum: Ground Level

Log Measured From: Kelly Bushing

Drilling Measured From: Kelly Bushing

Elev.: 4725.00 ft

24.00 ft above Perm. Datum

API Serial No. 05-123-37741-0000

Section 21

Township 6N

Range 63W

PVT DATA			
Oil Density	Run 1	Run 2	Run 3
Water Salinity			
Gas Gravity			
Bo			
Bw			
1/Bg			
Bubble Point Pressure			
Bubble Point Temperature			
Solution GOR			
Maximum Deviation			
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 16-Feb-2014

Run Number Run 2

Depth Driller 7076 ft

Schlumberger Depth 6820 ft

Bottom Log Interval 6820 ft

Top Log Interval 50 ft

Casing Fluid Type Water Based Mud

Salinity

Density 9.2 lbm/gal

Fluid Level 0 ft

BIT/CASING/TUBING STRING

Bit Size 8.750 in

From 0 ft

To 7096 ft

Casing/Tubing Size 7.000 in

Weight 23 lbm/ft

Grade L80IC

From 0 ft

To 7076 ft

Maximum Recorded Temperatures

Logger On Bottom 16-Feb-2014 Time 14:45

Unit Number 9108 Location Fort Morgan, CO

Recorded By Keri Ondrus

Witnessed By Clifford Kester

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	

DEPTH SUMMARY LISTING	
-----------------------	--

Date Created: 16-FEB-2014 15:29:04

Depth System Equipment

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW-B	Type:	CMTD-B/A	Type:	7-46A-XS
Serial Number:	1734	Serial Number:	147	Serial Number:	711080
Calibration Date:	22-Oct-2013	Calibration Date:	23-Jan-2014	Length:	21000 FT
Calibrator Serial Number:		Calibrator Serial Number:	78135		
Calibration Cable Type:	7-46A-XS	Number of Calibration Points:	10	Conveyance Method:	Wireline
Wheel Correction 1:	-3	Calibration RMS:	17	Rig Type:	LAND
Wheel Correction 2:	-5	Calibration Peak Error:	28		

Depth Control Parameters	
--------------------------	--

Log Sequence:	First Log In the Well
Rig Up Length At Surface:	0.00 FT
Rig Up Length At Bottom:	0.00 FT
Rig Up Length Correction:	0.00 FT
Stretch Correction:	3.00 FT
Tool Zero Check At Surface:	

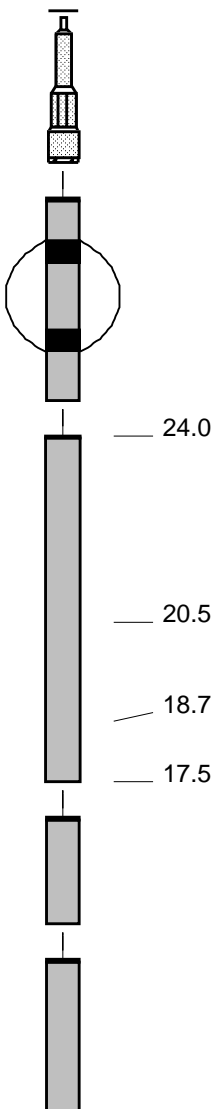
Depth Control Remarks	
-----------------------	--

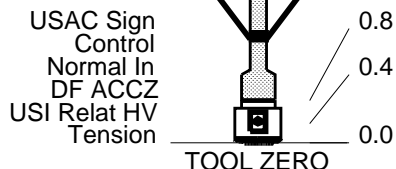
1. All Schlumberger depth control procedures followed.
2. IDW used as primary depth control device.
3. Z-chart used as secondary depth control device.
- 4.
- 5.
- 6.

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:	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
Toolstring run as per toolsketch.	
Lubricator used for well control, no surface pressure applied during logs.	

Thank you for choosing Schlumberger Wireline.					
Schlumberger crew: Tyler Riter, Gary Lapp					
RUN 1			RUN 2		
SERVICE ORDER #:		BX19-00116	SERVICE ORDER #:		
PROGRAM VERSION:		19C2-270	PROGRAM VERSION:		
FLUID LEVEL:		0 ft	FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP
EQUIPMENT DESCRIPTION					
RUN 1			RUN 2		
SURFACE EQUIPMENT					
WITM (EDTS)-A					
DOWNHOLE EQUIPMENT					
LEH-QT		30.8			
LEH-QT					
AH-CEN		27.8			
AH-CEN					
EDTC-B	MDSB_EDTC	24.0			
EDTH-B 8625	Mud Tempe	24.0			
EDTC-B 8593					
EDTG-A/B					
	CTEM	20.5			
	Gamma Ray	18.7			
	EFTB DIAG				
	TelStatus	17.5			
	EDTCB Ele				
AH-107		17.5			
AH-107					
USIT-E		15.5			
ECH-MFA 1964					
USAC-A 992					
USIS-A 1804					
USSC-A 745					
USRS-B 1983					



MAXIMUM STRING DIAMETER 7.50 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Company: Noble Energy

Well: Wells Ranch AA21-67HN

Input DLIS Files

DEFAULT	USI_007LUP	FN:6	PRODUCER	16-Feb-2014 12:05	6826.0 FT	50.5 FT
---------	------------	------	----------	-------------------	-----------	---------

Output DLIS Files

DEFAULT	USI_008PUP	FN:7	PRODUCER	16-Feb-2014 13:43	6829.0 FT	53.5 FT
---------	------------	------	----------	-------------------	-----------	---------

OP System Version: 19C2-270

eWAFE Version: 1.191

USIT-E	19C2-270	EDTC-B	19C2-270
--------	----------	--------	----------

Changed Parameter Summary

DLIS Name	New Value		Previous Value		Depth & Time
DFVL	200	US/F	212	US/F	6829.0 13:43:09
	200	US/F	200	US/F	6823.0 13:43:10
	201	US/F	200	US/F	6149.0 13:43:31
	202	US/F	201	US/F	5025.0 13:44:06
	203	US/F	202	US/F	3887.0 13:44:42
	204	US/F	203	US/F	2647.0 13:45:21
	205	US/F	204	US/F	2315.0 13:45:31
	206	US/F	205	US/F	1607.0 13:45:53
	207	US/F	206	US/F	1403.0 13:45:59
	208	US/F	207	US/F	1361.0 13:46:01
	209	US/F	208	US/F	1113.0 13:46:08
	210	US/F	209	US/F	865.0 13:46:16
ZMUD	211	US/F	210	US/F	493.0 13:46:28
	212	US/F	211	US/F	155.0 13:46:38
	1.68	MRAY	1.68	MRAY	6829.0 13:43:09
	1.67	MRAY	1.68	MRAY	6823.0 13:43:10
	1.66	MRAY	1.67	MRAY	6149.0 13:43:31
	1.65	MRAY	1.66	MRAY	5025.0 13:44:06
	1.64	MRAY	1.65	MRAY	3887.0 13:44:42
	1.63	MRAY	1.64	MRAY	2647.0 13:45:21
	1.62	MRAY	1.63	MRAY	2315.0 13:45:31
	1.61	MRAY	1.62	MRAY	1607.0 13:45:53
	1.6	MRAY	1.61	MRAY	1403.0 13:45:59
	1.59	MRAY	1.6	MRAY	1361.0 13:46:01
	1.58	MRAY	1.59	MRAY	1113.0 13:46:08

865.0 13:46:16
493.0 13:46:28
155.0 13:46:38

0 360

Cable Drag From D4T to STIT

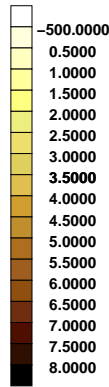
Min of Internal radius (IRMN)	2.7	(IN)	3.7
-------------------------------	-----	------	-----

Internal radius Maximum (IRMX)	2.7 (IN)	3.7
--------------------------------------	----------	-----

Internal radius Average (IRAV)		
2.7	(IN)	3.7

-20 20

External radius		
Average (ERAV)		
2.7	(IN)	3.7



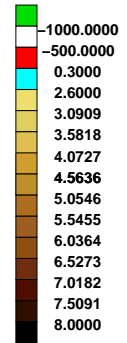
Raw Acoustic Imped. (AIBK)
(MRAY)

100

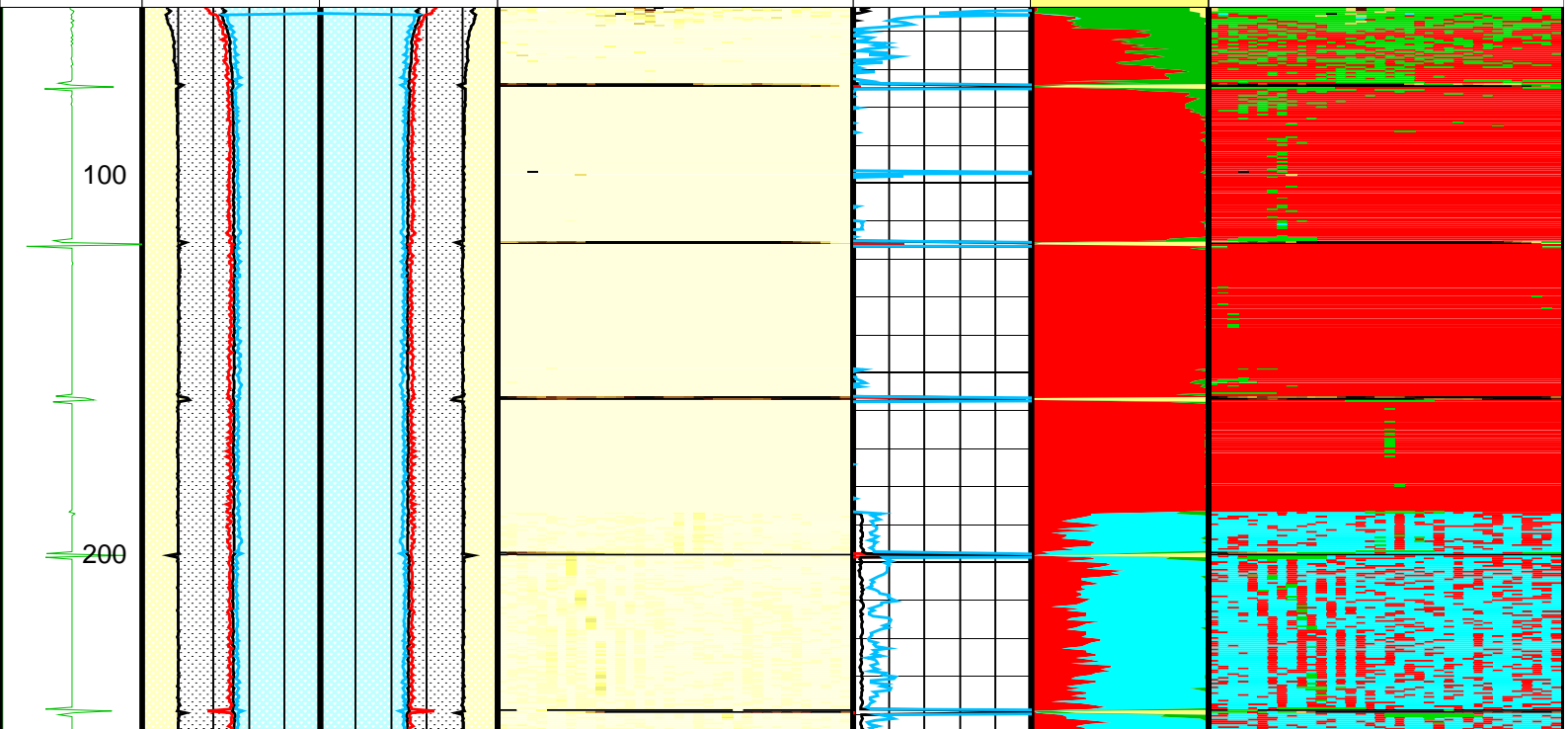
Liquid

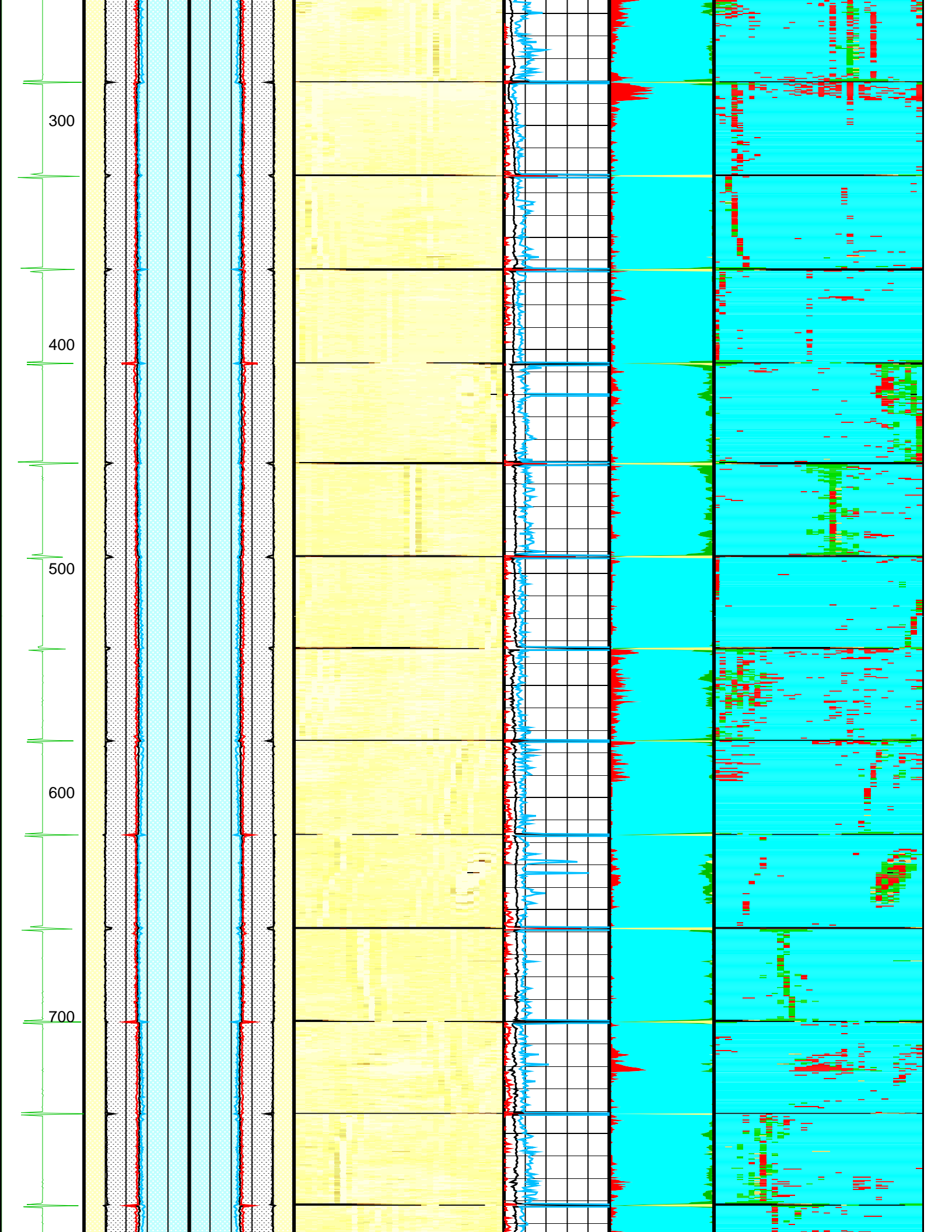
**Gas or Dry
MicroA**

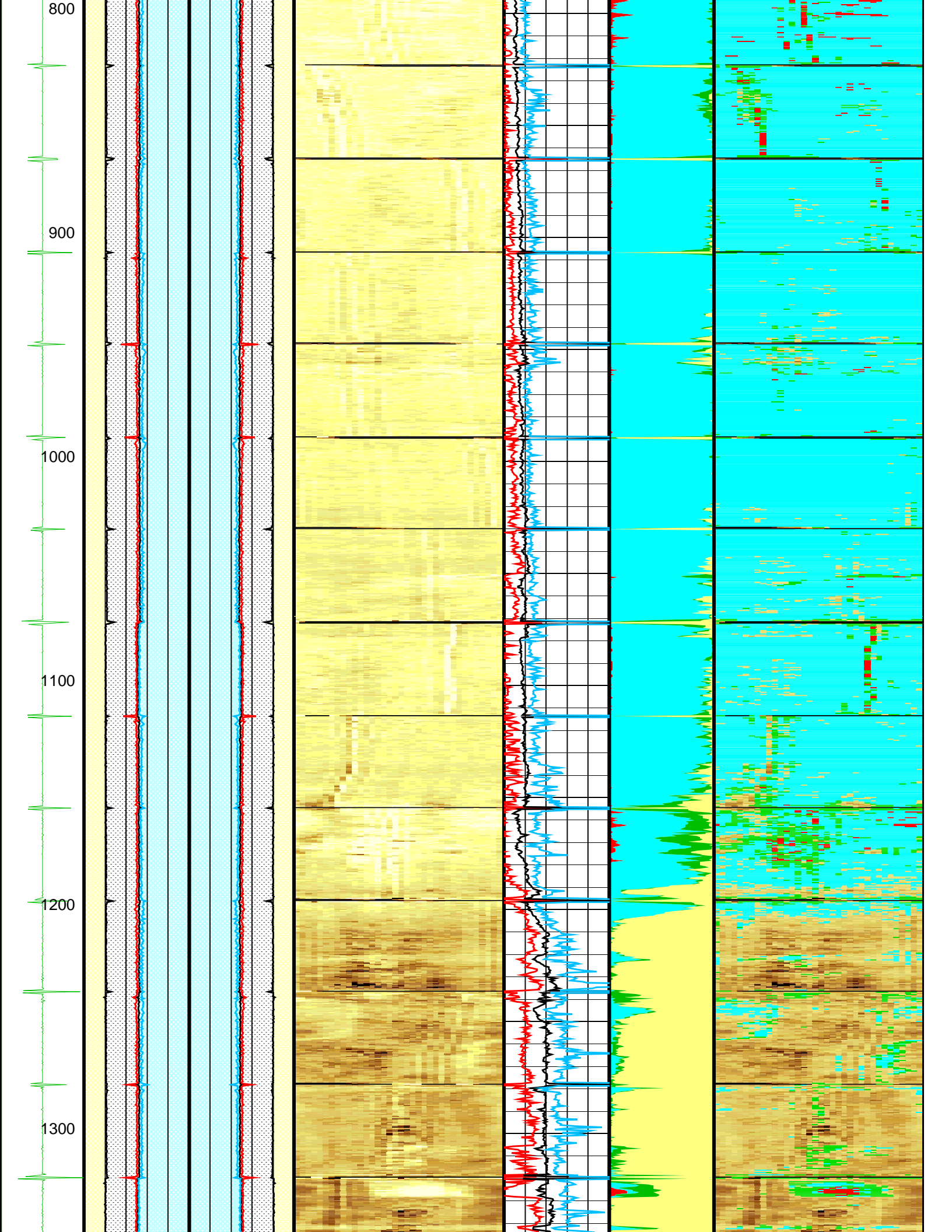
Bonded

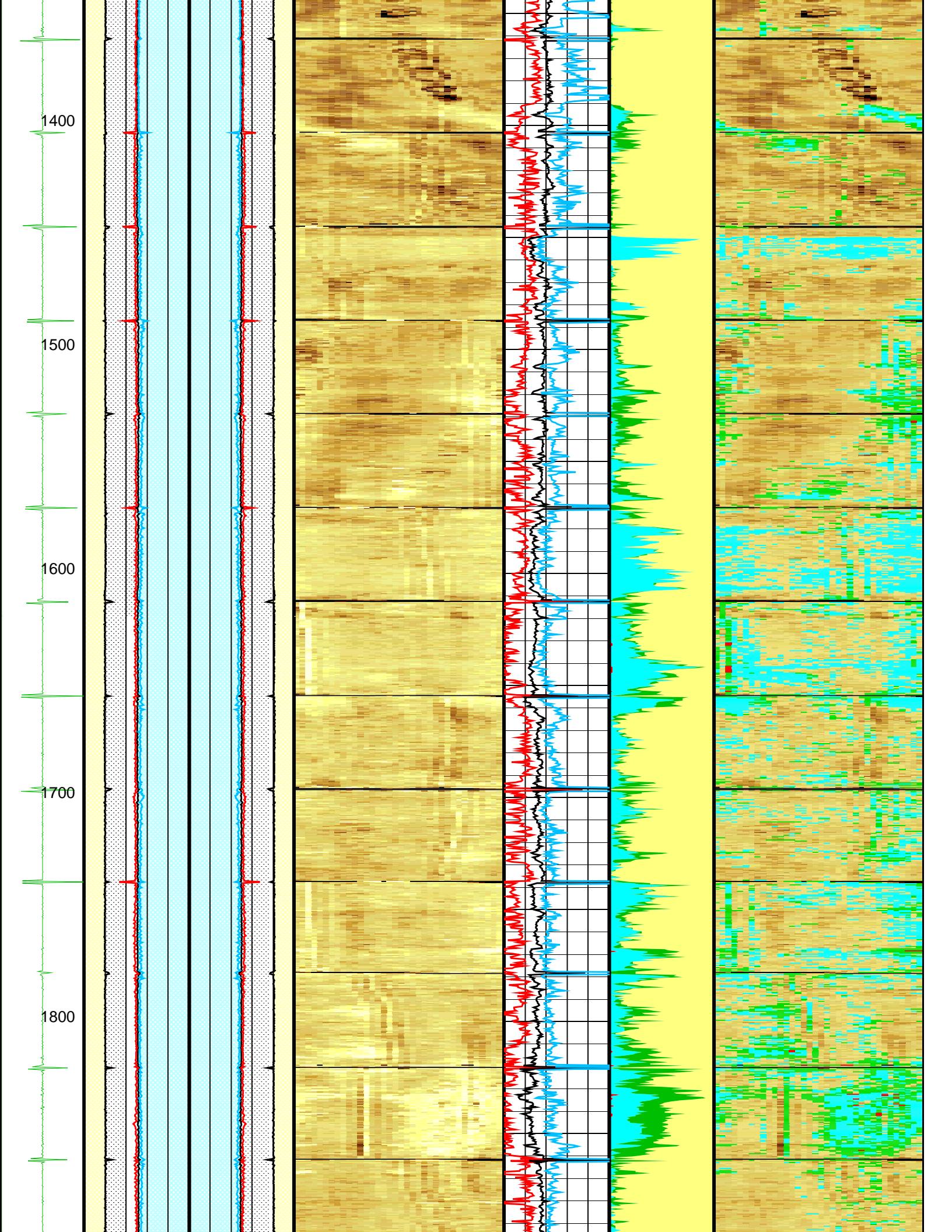


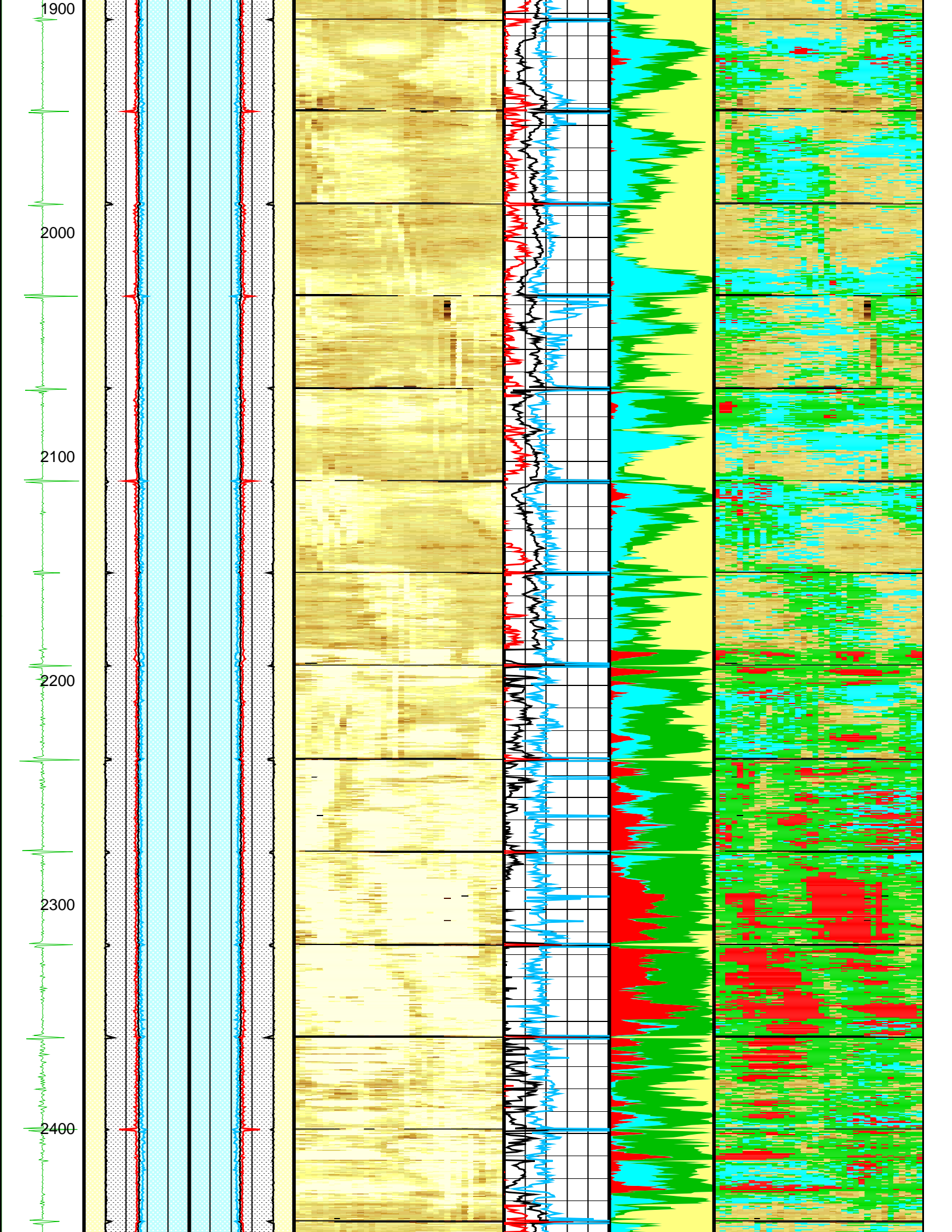
Cement Map with Impedance Classification (AI_MICRO_DEBONDING_IMAGE) (MRAY)

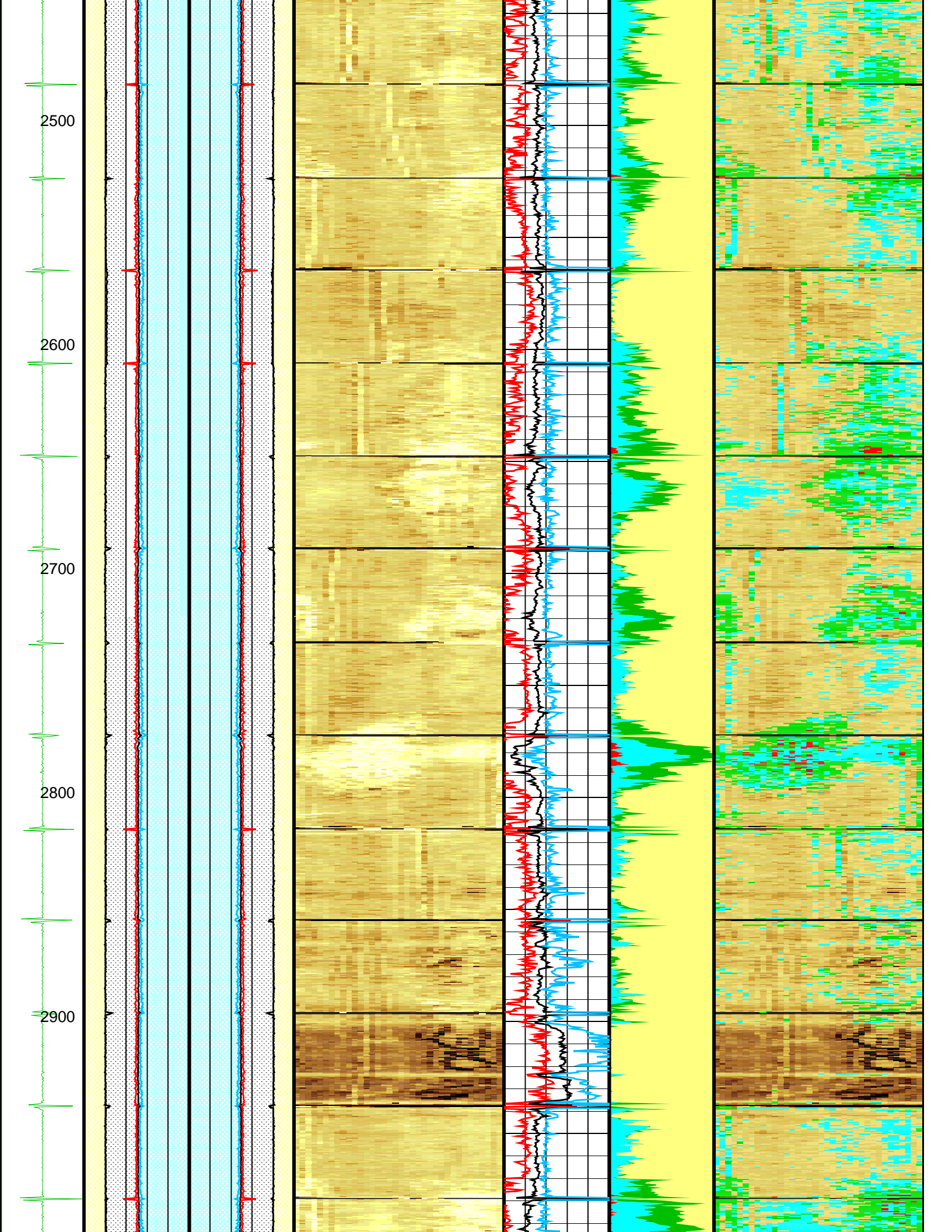


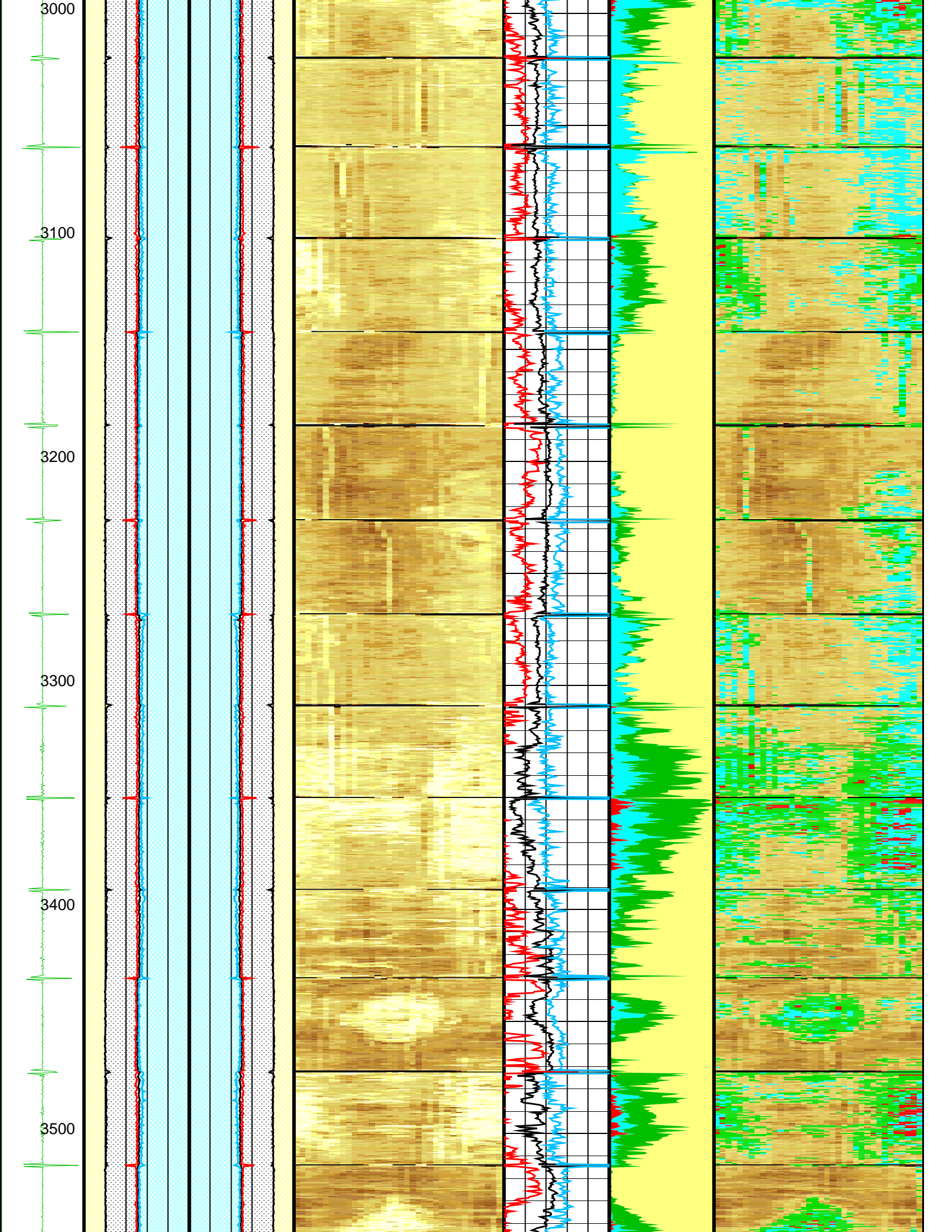


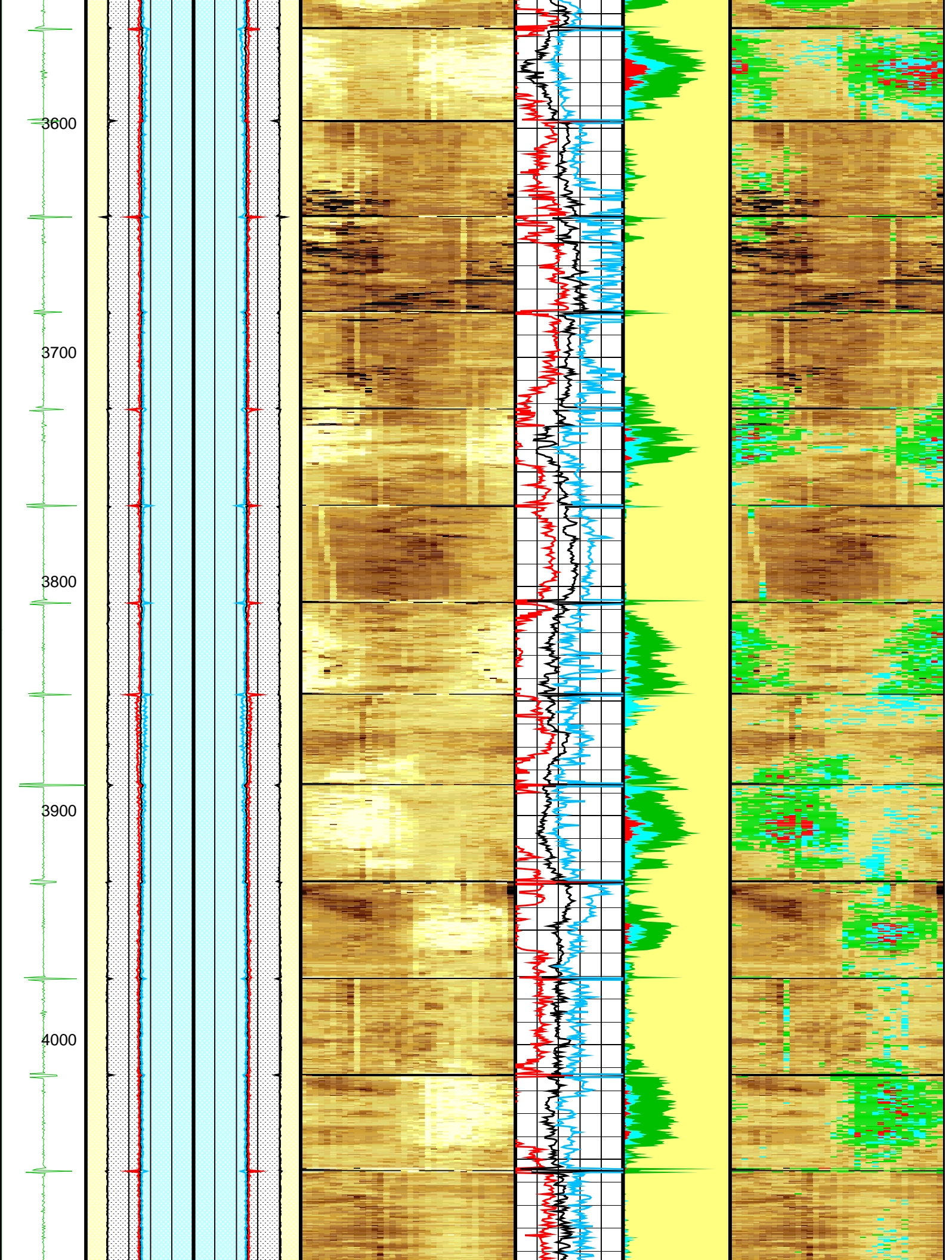


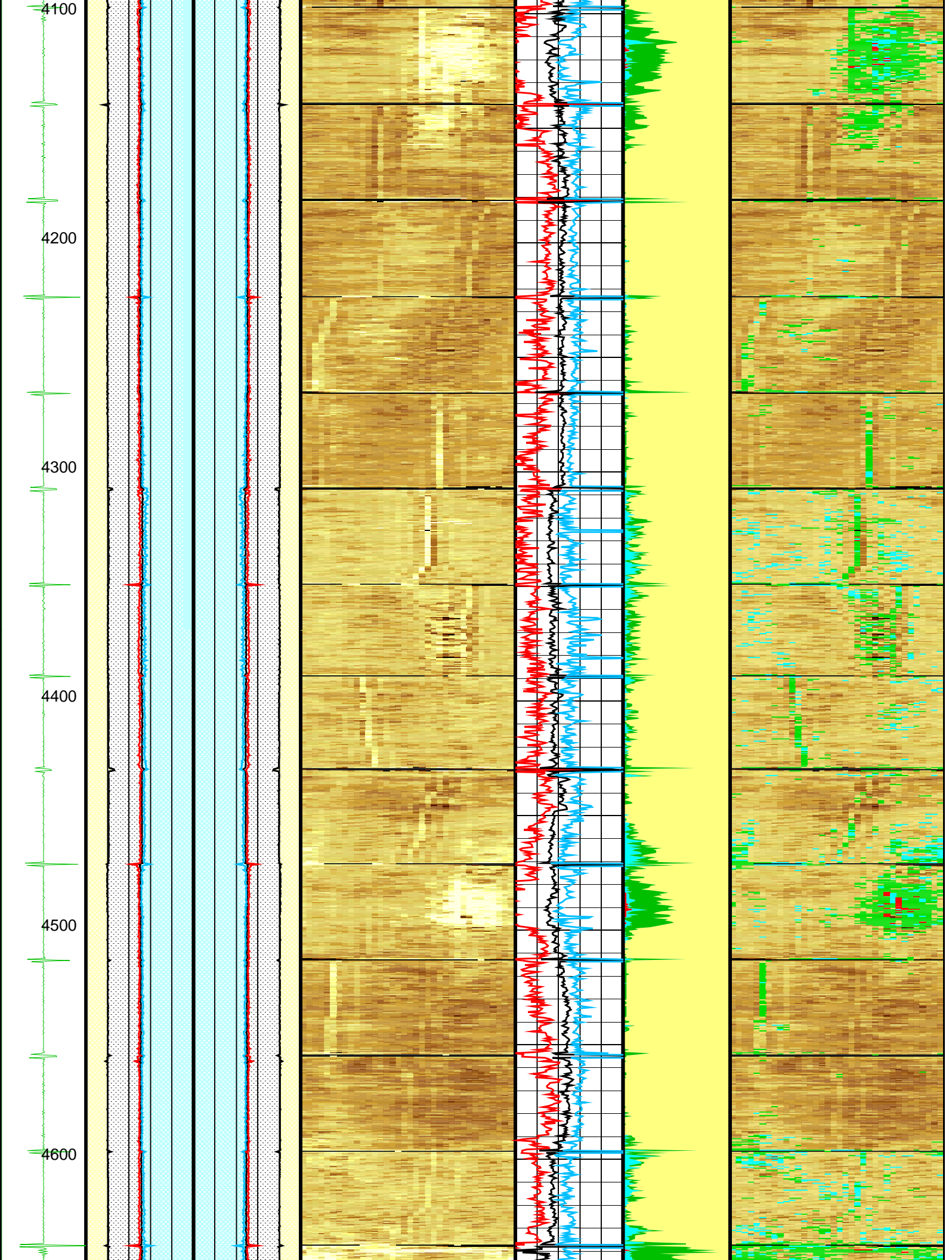


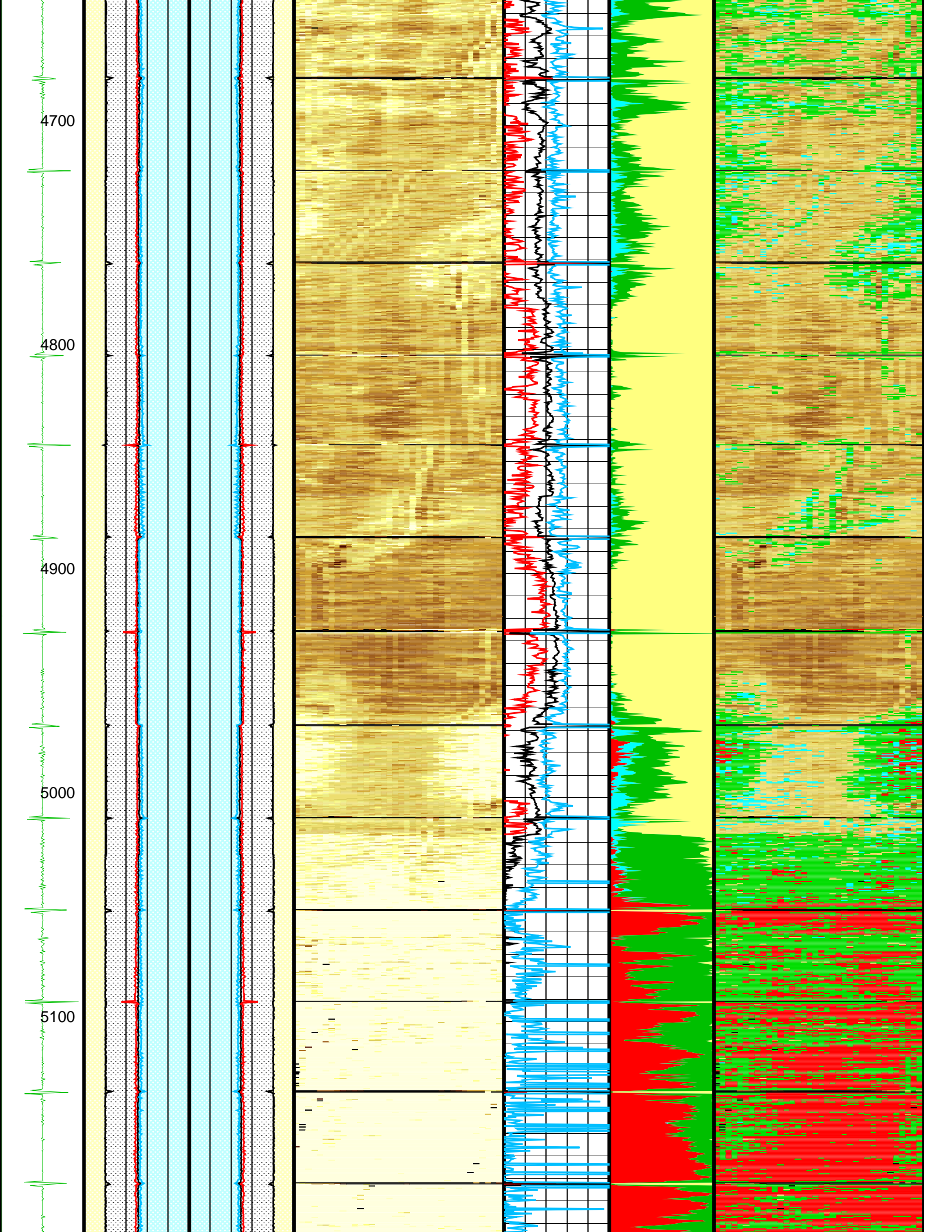


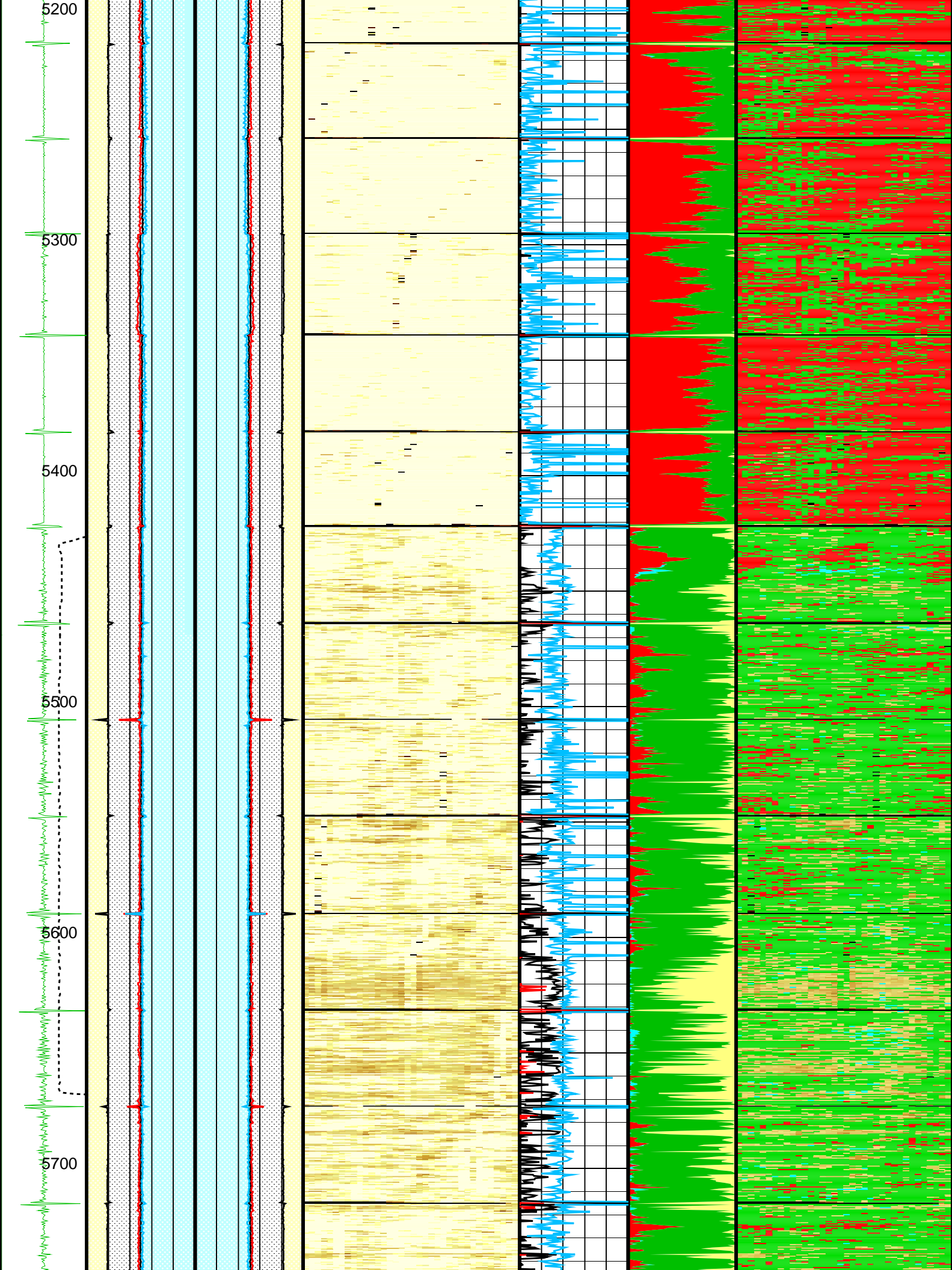


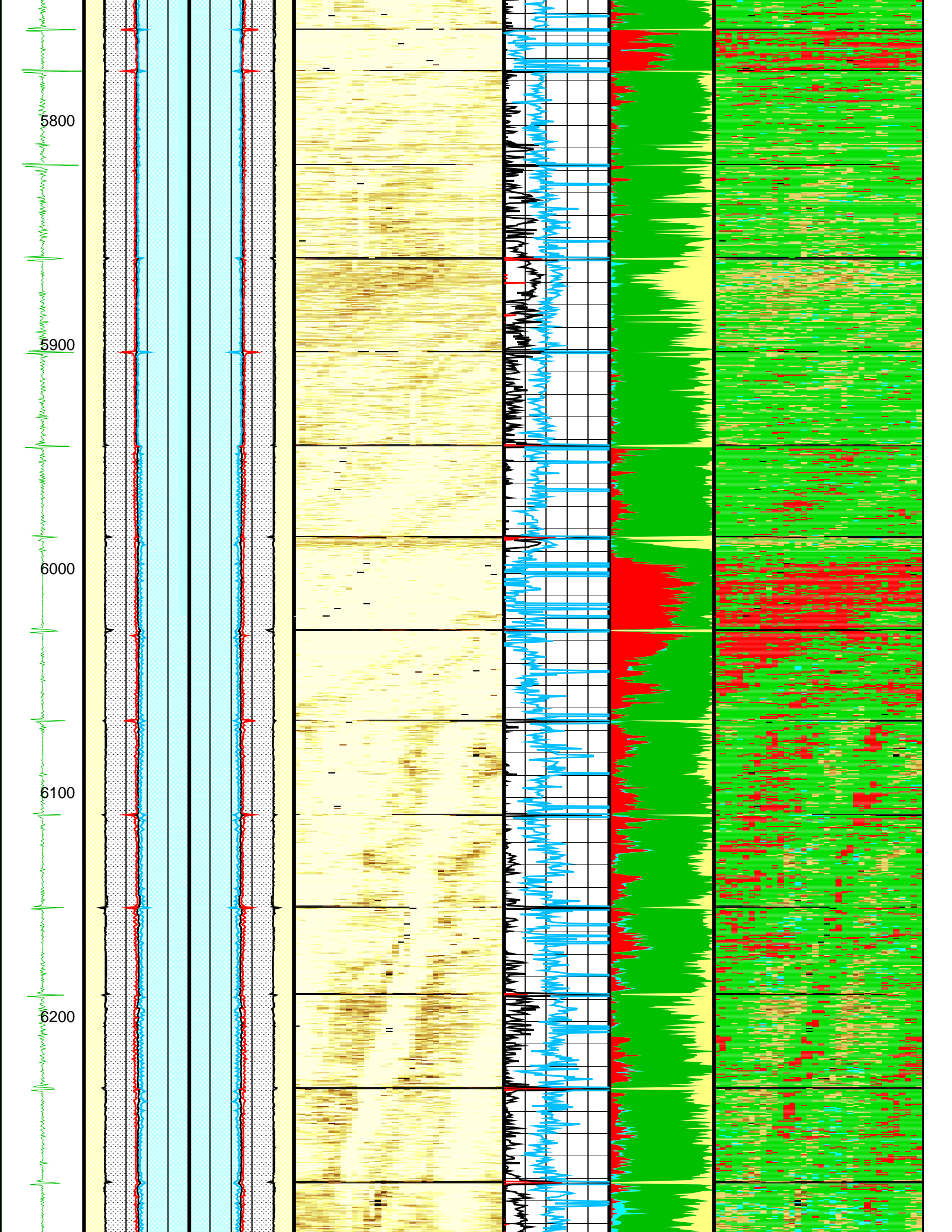


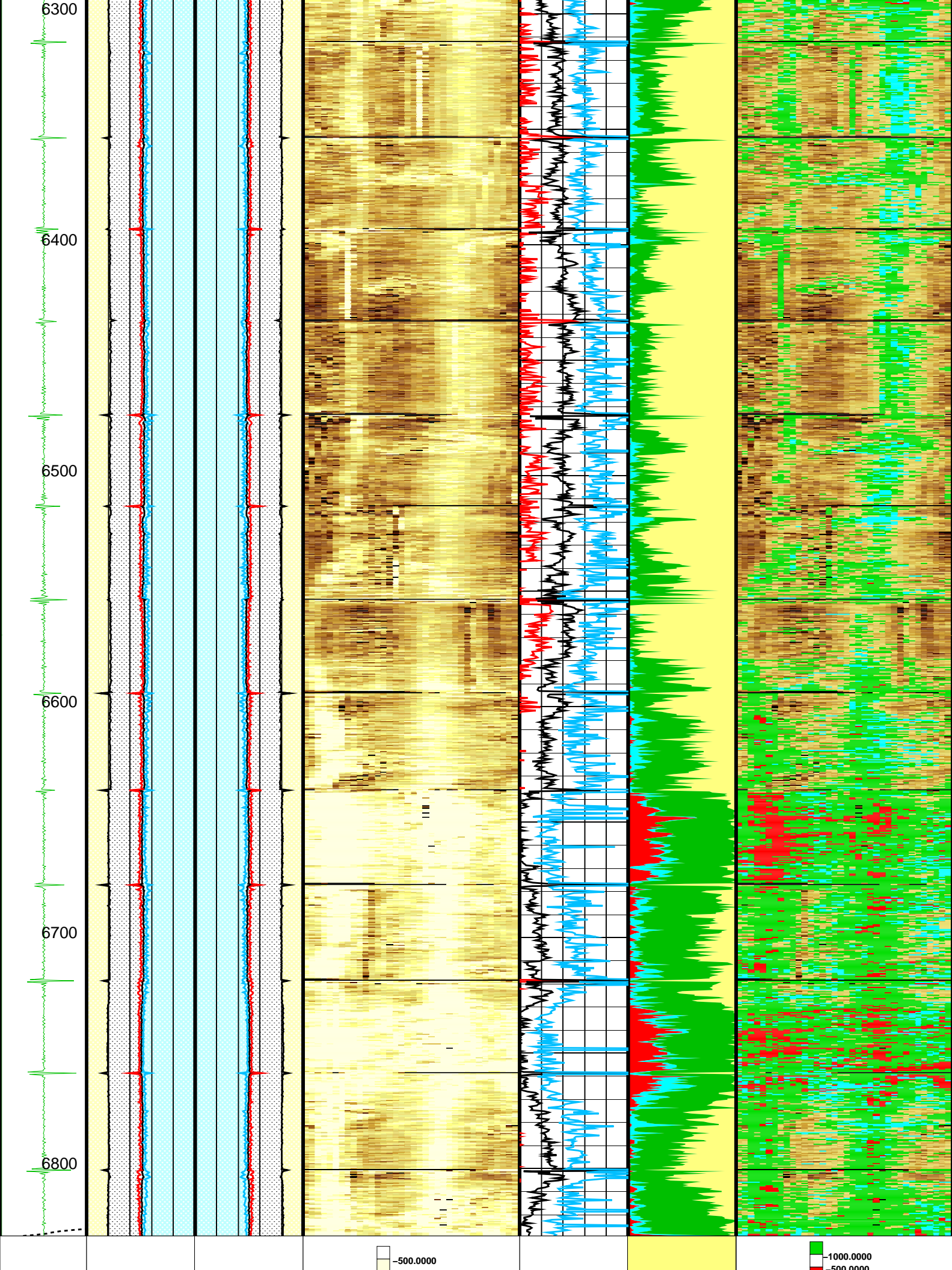


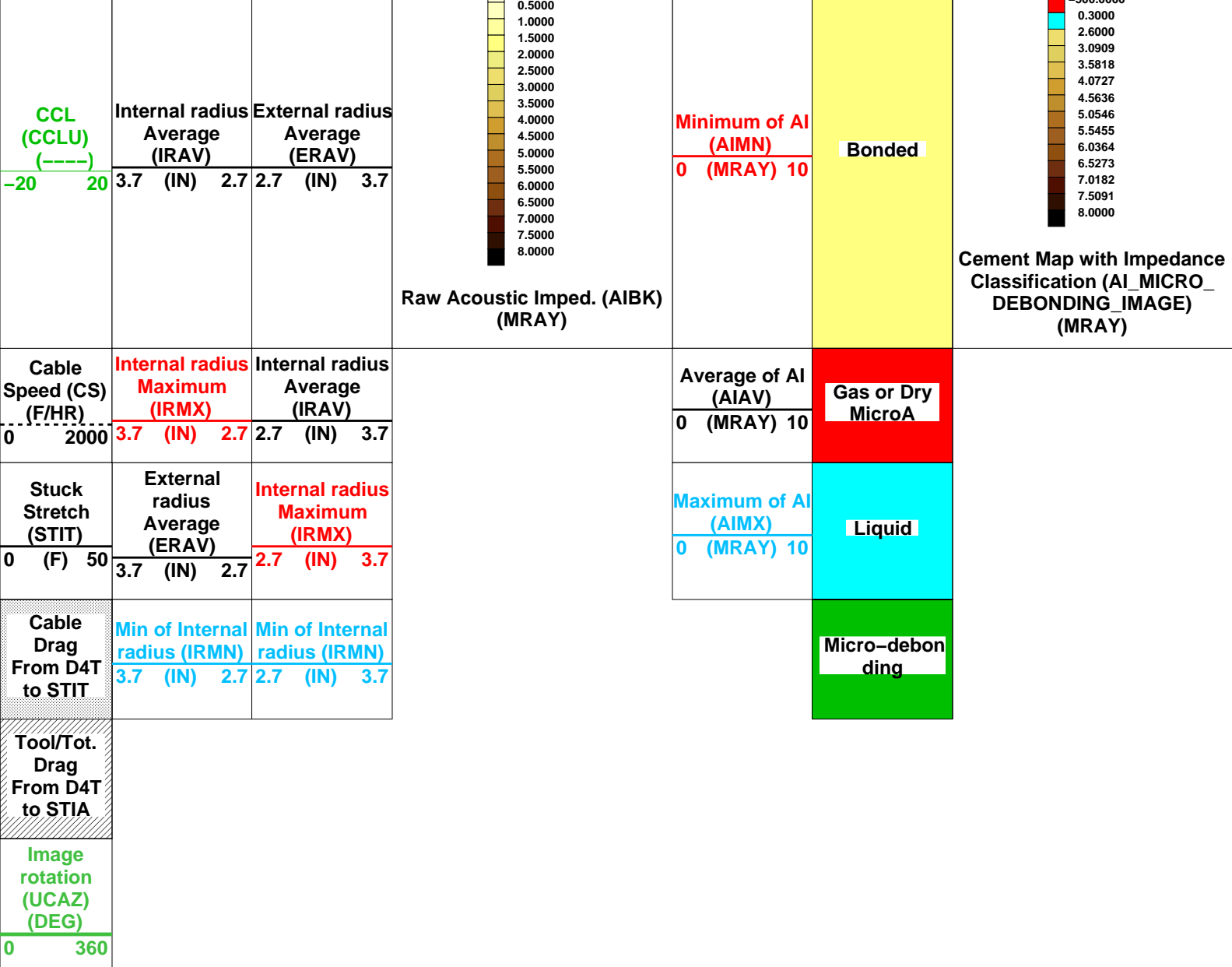












Format: USIT CEMENT 2 inch Vertical Scale: 2" per 100' Graphics File Created: 16-Feb-2014 13:43

OP System Version: 19C2-270
eWAFE Version: 1.191

USIT-E	19C2-270	EDTC-B
		19C2-270

All USI Images are outside views

USI : LOW Frequency Compression Mode Used For Logging.

Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.

Parameters		
DLIS Name	Description	Value
USIT-E: Ultrasonic Imaging – E		
AGMN	Minimum Gain of Cartridge	–4 DB
AGMX	Maximum Gain of Cartridge	20 DB
BERJ	Bad Echo Rejection	ON
CDIA	Casing Outer Diameter	7 IN
CSDE	Casing Density	486.94 LBCF
CSID	Casing Inner Diameter	6.366 IN

DFVL	Default Fluid Velocity	212	US/F
DOT	Diameter of Transducer Sensor	2.874	IN
EMXV	EMEX Voltage	95	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	9.2	LB/G
RCOD	Reference Calibrator Outer Diameter	7	IN
RCSO	Reference Calibrator Standoff	1.1811	IN
RCTH	Reference Calibrator Thickness	0.2952	IN
SDNV	Number of Vertical Samples used for Micro-debonding Computation	5	
SDTHOR	Acoustic Impedance STD Horizontal Threshold for Micro-debonding	0.5	
SDTVER	Acoustic Impedance STD Vertical Threshold for Micro-debonding	0.3	
TCUB	T^3 Processing Level	Vax_Loop	
THDH	Maximum Search Thickness (percentage of nominal)	130	
THDL	Minimum Search Thickness (percentage of nominal)	70	
THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.317	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub_7_inch	
UWKM	Ultrasonic Working Mode	10DEG_6IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	19.0093	US
ZCAS	Acoustic Impedance of Casing	46.2537	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.68	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.6	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
STI: Stuck Tool Indicator			
LBFR	Trigger for MAXIS First Reading Label	STI	
STKT	STI Stuck Threshold	2.5	FT
TDD	Total Depth - Driller	7076.00	FT
TDL	Total Depth - Logger	-50000.00	FT
System and Miscellaneous			
CWEI	Casing Weight	23.00	LB/F
DO	Depth Offset for Playback	3.0	FT
PP	Playback Processing	RECOMPUTE	

Input DLIS Files

DEFAULT	USI_007LUP	FN:6	PRODUCER	16-Feb-2014 12:05	6826.0 FT	50.5 FT
---------	------------	------	----------	-------------------	-----------	---------

Output DLIS Files

DEFAULT	USI_008PUP	FN:7	PRODUCER	16-Feb-2014 13:43
---------	------------	------	----------	-------------------

Company: Noble Energy	Well: Wells Ranch AA21-67HN
-----------------------	-----------------------------

Input DLIS Files

DEFAULT	USI_007LUP	FN:6	PRODUCER	16-Feb-2014 12:05	6826.0 FT	50.5 FT
---------	------------	------	----------	-------------------	-----------	---------

Output DLIS Files

DEFAULT	USI_008PUP	FN:7	PRODUCER	16-Feb-2014 13:43	6829.0 FT	53.5 FT
---------	------------	------	----------	-------------------	-----------	---------

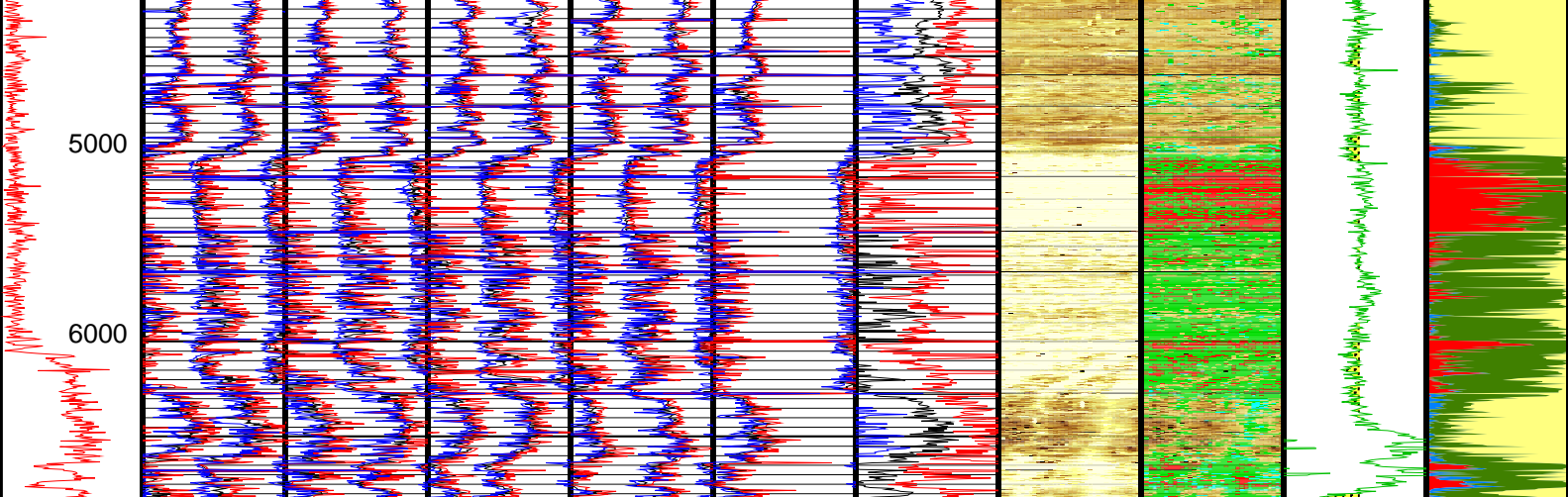
OP System Version: 19C2-270

eWAFE Version: 1.191

USIT-E	19C2-270	EDTC-B	19C2-270
--------	----------	--------	----------

Minimum Acoustic Impedance #2 (MIN_ AI2) (MRAY)	Minimum Acoustic Impedance #4 (MIN_ AI4) (MRAY)	Minimum Acoustic Impedance #6 (MIN_ AI6) (MRAY)	Minimum Acoustic Impedance #8 (MIN_ AI8) (MRAY)
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5
Minimum Acoustic Impedance #1 (MIN_ AI1) (MRAY)	Minimum Acoustic Impedance #3 (MIN_ AI3) (MRAY)	Minimum Acoustic Impedance #5 (MIN_ AI5) (MRAY)	Minimum Acoustic Impedance #7 (MIN_ AI7) (MRAY)
0 15 0	0 15 0	0 15 0	0 15 0

[illegible]



<div>Eccent. (ECCE)</div> <div>0 (IN) 0.5</div>	Average Acoustic Impedance #1 (AV_ AI1) (MRAY)		Average Acoustic Impedance #3 (AV_ AI3) (MRAY)		Average Acoustic Impedance #5 (AV_ AI5) (MRAY)		Average Acoustic Impedance #7 (AV_ AI7) (MRAY)		Average Acoustic Impedance #9 (AV_ AI9) (MRAY)		Average of AI (AIAV) (MRAY)		<div><div></div><div>-500.0000</div><div>0.5000</div><div>1.0000</div><div>1.5000</div><div>2.0000</div><div>2.5000</div><div>3.0000</div><div>3.5000</div><div>4.0000</div><div>4.5000</div><div>5.0000</div><div>5.5000</div><div>6.0000</div><div>6.5000</div><div>7.0000</div><div>7.5000</div><div>8.0000</div></div> <div>Raw Acoustic Imped. (AIBK) (MRAY)</div>	<div><div></div><div>-1000.0000</div><div>-500.0000</div><div>0.3000</div><div>2.6000</div><div>3.0909</div><div>3.5818</div><div>4.0727</div><div>4.5636</div><div>5.0546</div><div>5.5455</div><div>6.0364</div><div>6.5273</div><div>7.0182</div><div>7.5091</div><div>8.0000</div></div> <div>Cement Map with Impedance Classification on (AI_MICRO_DEBONDING_IMAGE) (MRAY)</div>	<div>Gamma Ray (GR_EDTC) (GAPI)</div> <div>0 150</div>	<div>Bonded (100 -0)</div>
	<div>0 15</div>	<div>0 15</div>	<div>0 15</div>	<div>0 15</div>	<div>0 15</div>	<div>0 7.5</div>										

Average Acoustic Impedance #2 (AV_ AI2) (MRAY)		Average Acoustic Impedance #4 (AV_ AI4) (MRAY)		Average Acoustic Impedance #6 (AV_ AI6) (MRAY)		Average Acoustic Impedance #8 (AV_ AI8) (MRAY)		Maximum Acoustic Impedance #9 (MAX_ AI9) (MRAY)		Minimum of AI (AIMN) (MRAY)		<div>GR<75</div>	<div>Gas</div>
-7.5	7.5	-7.5	7.5	-7.5	7.5	-7.5	7.5	0	15	0	7.5		
Maximum Acoustic Impedance #1 (MAX_ AI1) (MRAY)		Maximum Acoustic Impedance #3 (MAX_ AI3) (MRAY)		Maximum Acoustic Impedance #5 (MAX_ AI5) (MRAY)		Maximum Acoustic Impedance #7 (MAX_ AI7) (MRAY)		Minimum Acoustic Impedance #9 (MIN_ AI9) (MRAY)		Maximum of AI (AIMX) (MRAY)			<div>Liquid</div>
0	15	0	15	0	15	0	15	0	15	0	7.5		
Maximum Acoustic Impedance #2 (MAX_ AI2) (MRAY)		Maximum Acoustic Impedance #4 (MAX_ AI4) (MRAY)		Maximum Acoustic Impedance #6 (MAX_ AI6) (MRAY)		Maximum Acoustic Impedance #8 (MAX_ AI8) (MRAY)							<div>Area</div>
-7.5	7.5	-7.5	7.5	-7.5	7.5	-7.5	7.5						
Minimum Acoustic Impedance #1 (MIN_ AI1) (MRAY)		Minimum Acoustic Impedance #3 (MIN_ AI3) (MRAY)		Minimum Acoustic Impedance #5 (MIN_ AI5) (MRAY)		Minimum Acoustic Impedance #7 (MIN_ AI7) (MRAY)							
0	15	0	15	0	15	0	15						
Minimum Acoustic Impedance #2 (MIN_ AI2) (MRAY)		Minimum Acoustic Impedance #4 (MIN_ AI4) (MRAY)		Minimum Acoustic Impedance #6 (MIN_ AI6) (MRAY)		Minimum Acoustic Impedance #8 (MIN_ AI8) (MRAY)							
0	15	0	15	0	15	0	15						

	Impedance #2 (MIN_ AI2) (MRAY) -7.5 7.5	Impedance #4 (MIN_ AI4) (MRAY) -7.5 7.5	Impedance #6 (MIN_ AI6) (MRAY) -7.5 7.5	Impedance #8 (MIN_ AI8) (MRAY) -7.5 7.5	
Format: USIT only Goodwin Compressed Vertical Scale: 0.1" per 100' Graphics File Created: 16-Feb-2014 13:43					
<div>OP System Version: 19C2-270</div> <div>eWAFE Version: 1.191</div> <div> <div>USIT-E</div> <div>19C2-270</div> <div>EDTC-B</div> <div>19C2-270</div> </div>					
All USI Images are outside views					
USI : LOW Frequency Compression Mode Used For Logging. Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.					
<div>Input DLIS Files</div> <div> <div>DEFAULT</div> <div>USI_007LUP</div> <div>FN:6</div> <div>PRODUCER</div> <div>16-Feb-2014 12:05</div> <div>6826.0 FT</div> <div>50.5 FT</div> </div> <div>Output DLIS Files</div> <div> <div>DEFAULT</div> <div>USI_008PUP</div> <div>FN:7</div> <div>PRODUCER</div> <div>16-Feb-2014 13:43</div> </div>					
<div> <div>Company:</div> <div>Noble Energy</div> <div>Schlumberger</div> </div> <div> <div>Well:</div> <div>Wells Ranch AA21-67HN</div> </div> <div> <div>Field:</div> <div>Wattenberg</div> </div> <div> <div>County:</div> <div>Weld</div> </div> <div> <div>State:</div> <div>Colorado</div> </div> <div> Ultrasonic Imager USIT LITE Cement Report </div>					