

Company: NOBLE ENERGY, INC.

Well: TREBOR B11-16

Field: WATTENBERG

County: WELD

State: COLORADO

Ultrasonic Imaging tool
Cement Evaluation Print

County: WELD
Field: WATTENBERG
Location: SE/SE
Well: TREBOR B11-16
Company: NOBLE ENERGY, INC.

LOCATION			
SE/SE		Elev.: K.B. 4706.00 ft G.L. 4696.00 ft D.F. 4705.00 ft	
Permanent Datum:		GROUND LEVEL	
Log Measured From:		KELLY BUSHING	
Drilling Measured From:		KELLY BUSHING	
API Serial No. 05-123-13415		Section 11	Township 5N Range 64W

Logging Date 22-Jan-2014

Run Number 1

Depth Driller 6238 ft

Schlumberger Depth 6200 ft

Bottom Log Interval 6200 ft

Top Log Interval 80 ft

Casing Fluid Type FRESH WATER

Salinity

Density 8.4 lbm/gal

Fluid Level

BIT/CASING/TUBING STRING

Bit Size 7.875 in

From 292 ft

To 6641 ft

Casing/Tubing Size 4.500 in

Weight 15.1 lbm/ft

Grade P110

From 0 ft

To 6641 ft

Maximum Recorded Temperatures

Logger On Bottom 22-Jan-2014 13:45

Unit Number 2276 VERNAL

Recorded By KEVIN CROW

Witnessed By KEVIN MONAGHAN

Run 1

Run 2

Run

Oil Density

Water Salinity

Gas Gravity

Bo

Bw

1/Bg

Bubble Point Pressure

Bubble Point Temperature

Solution GOR

Maximum Deviation 0 deg

CEMENTING DATA

Primary/Squeeze Primary

Casing String No

Lead Cement Type G

Volume 690 ft3

Density 15.8 lbm/gal

Water Loss

Additives

Tail Cement Type

Volume

Density

Water Loss

Additives

Expected Cement Top 5810 ft

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

Unit Number

Recorded By

Witnessed By

DEPTH SUMMARY LISTING

Date Created: 22-JAN-2014 20:29:50

Depth System Equipment

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW-B	Type:	CMTD-B/A	Type:	7-46A-XS
Serial Number:	4967	Serial Number:	8093	Serial Number:	711148
Calibration Date:	08-Aug-2013	Calibration Date:	09-Jan-2014	Length:	24000 FT
Calibrator Serial Number:		Calibrator Serial Number:	100518	Conveyance Method:	Wireline
Calibration Cable Type:	7-46A-XS	Number of Calibration Points:	10	Rig Type:	LAND
Wheel Correction 1:	-1	Calibration RMS:	17		
Wheel Correction 2:	-3	Calibration Peak Error:	30		

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 Z-Chart used as secondary depth control
- 3.
- 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
Thank you for choosing Schlumberger Wireline	
Log Objective: Cement Evaluation	
Toolstring ran as per toolsketch	
No pressure applied for log	
Cement 1000–Surface, 15.8 lb/gal, Type G	
Cement Job completed 21–Jan–2014 at 11:29 am	
Cement density and type unknown from 6200–5810	

Rig: Leed 717	
Crew: Kevin Crow, Thomas Thompkins, Daniil Kholin	

RUN 1 SERVICE ORDER #: CAU6-00076 PROGRAM VERSION: 19C2-270 FLUID LEVEL:			RUN 2 SERVICE ORDER #: PROGRAM VERSION: FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT	DESCRIPTION

SURFACE EQUIPMENT

DOWNHOLE EQUIPMENT

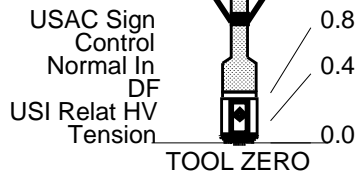


DTC-H
ECH-KC 10354
DTCH0-A 8804
DTCH1-A

TelStatus
ToolStatu

SGT-N
SGH-K 2693
SGC-TB 9841
SGD-TAB

USIT-E
ECH-MFA 1964
USAC-A 992
USIS-A 2797
USSC-B
USRS-A/AB 865



MAXIMUM STRING DIAMETER 3.56 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Schlumberger

MAIN PASS

5" = 100'

MAXIS Field Log

Company: NOBLE ENERGY, INC.

Well: TREBOR B11-16

Input DLIS Files

DEFAULT	Splice_USI_021CUP	FN:1	PRODUCER	22-Jan-2014 11:46	1000.0 FT	66.0 FT
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Output DLIS Files

DEFAULT	USI_052PUP	FN:74	PRODUCER	22-Jan-2014 19:49	1000.0 FT	66.5 FT
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OP System Version: 19C2-270

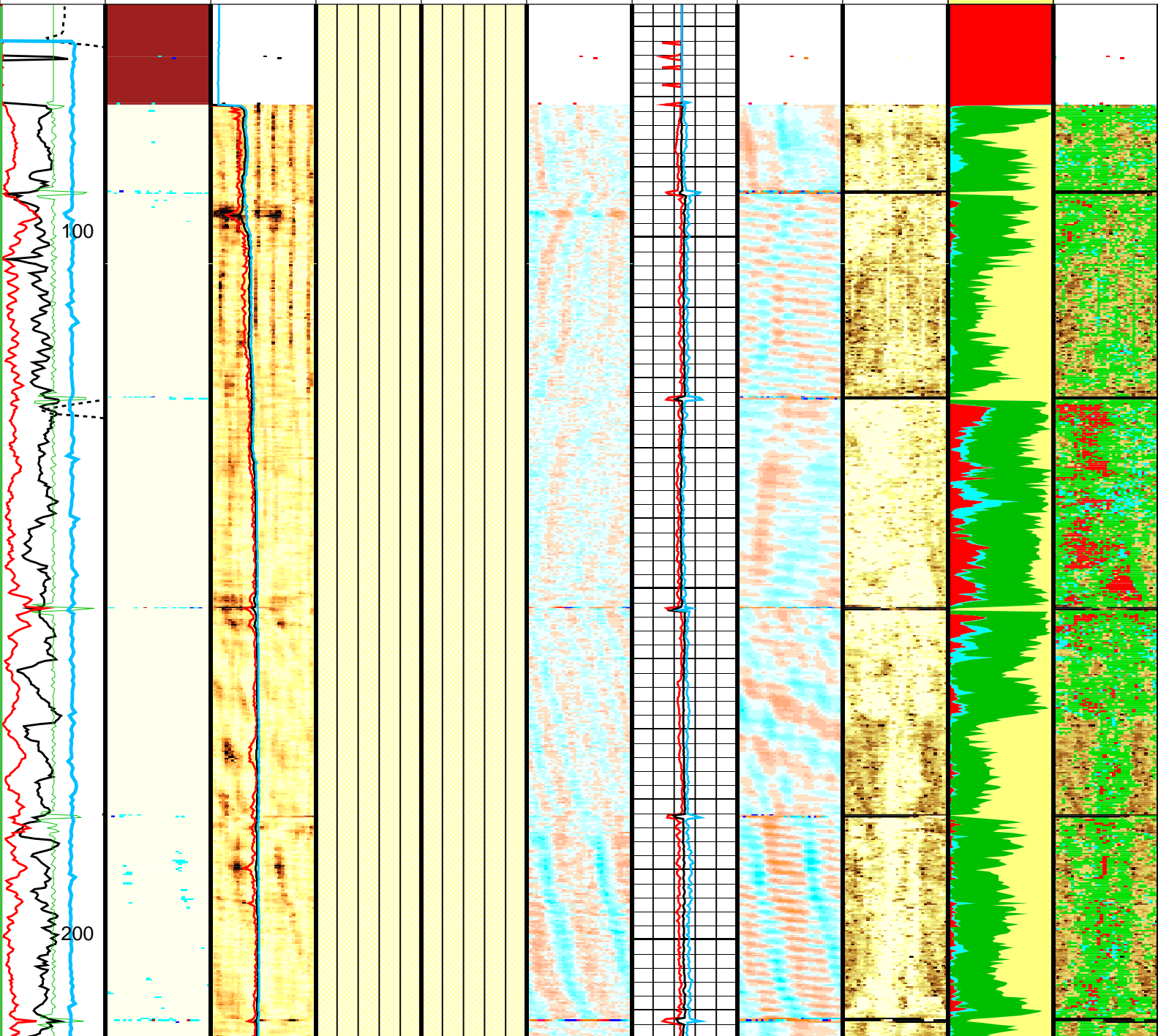
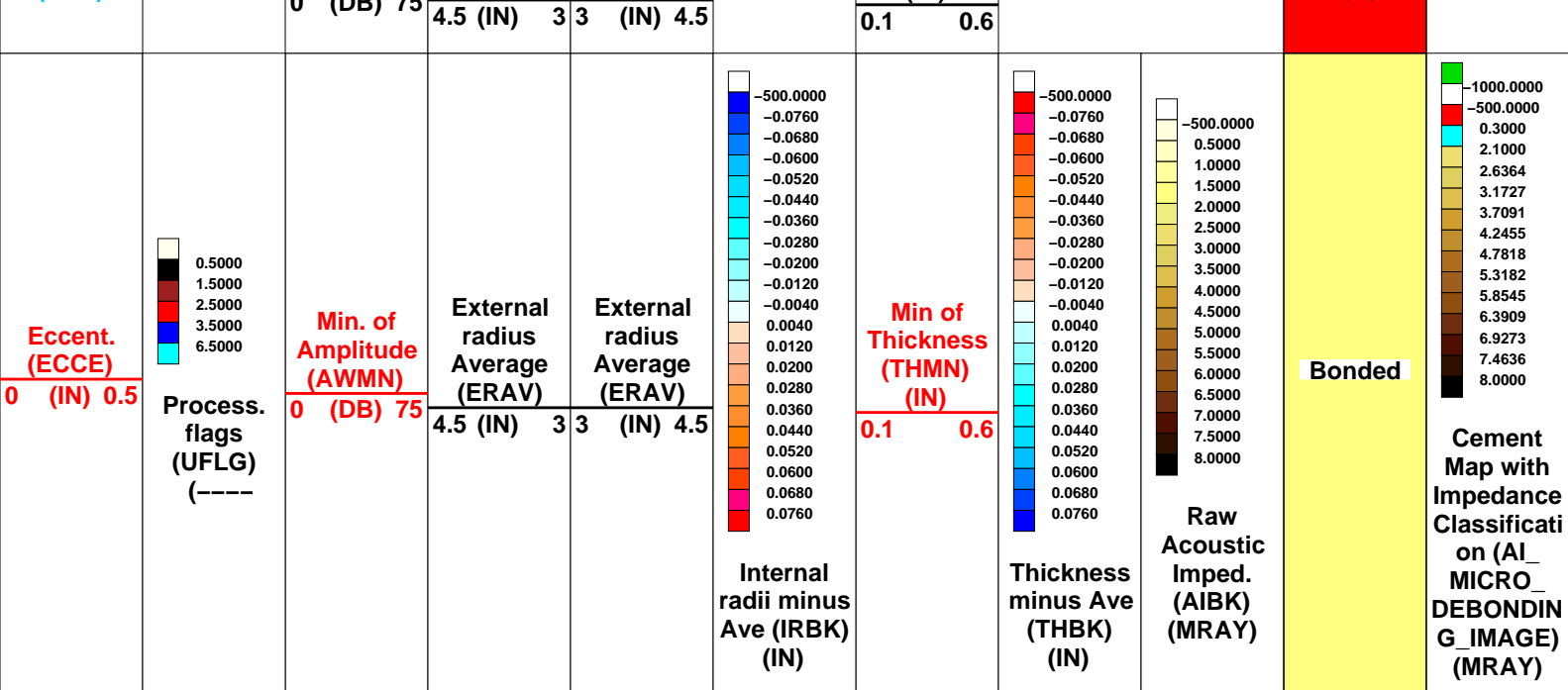
USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	19C2-270		

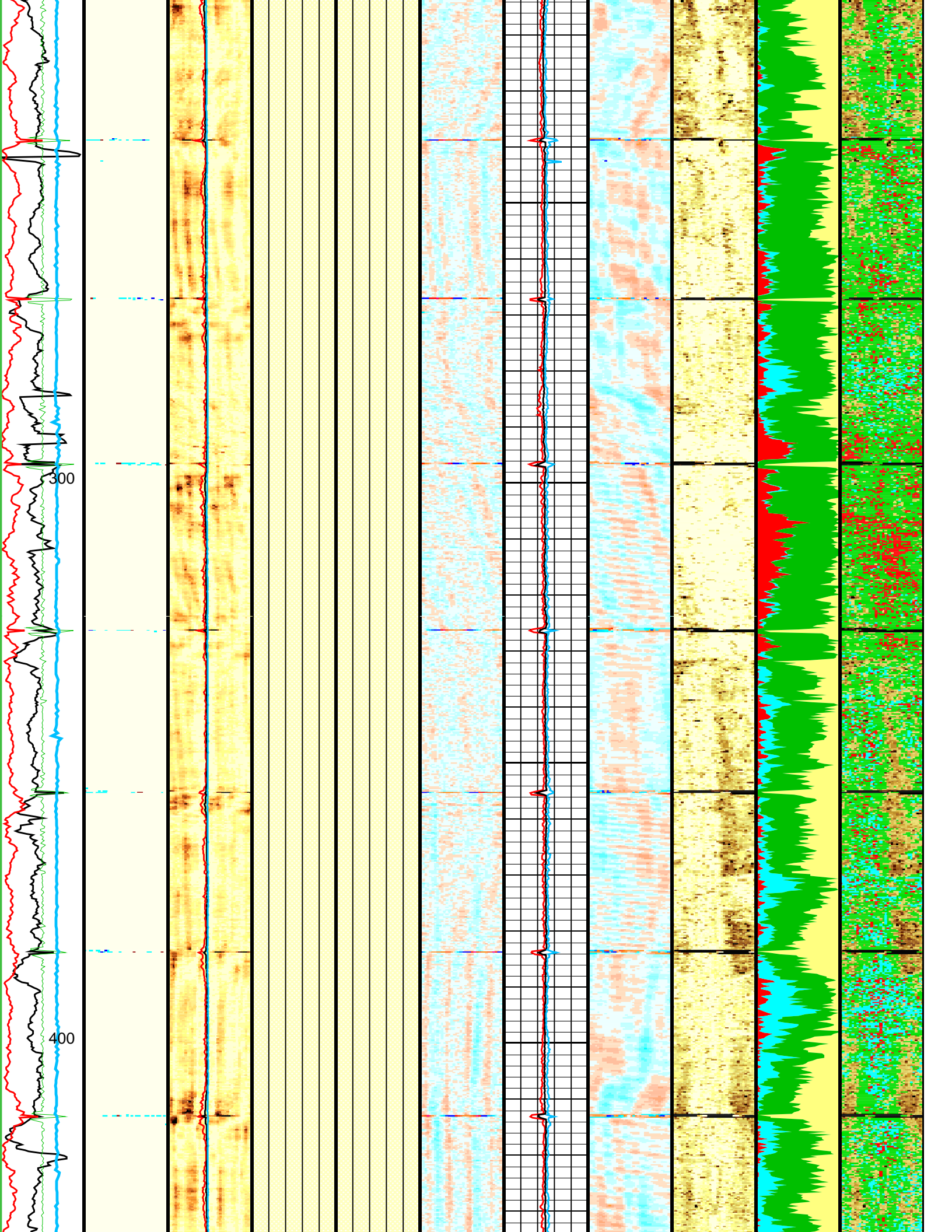
Zoning of Mud Parameters

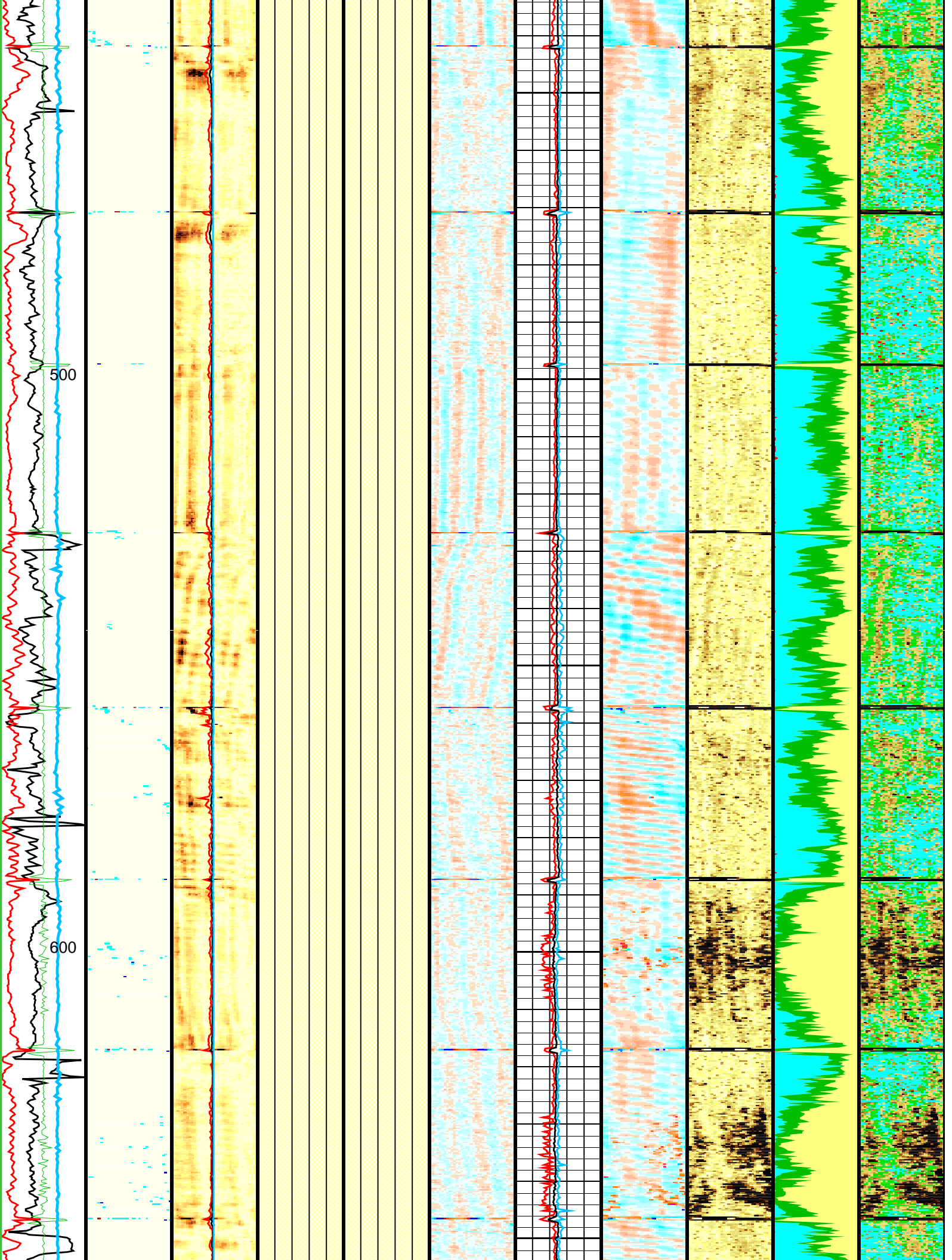
Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
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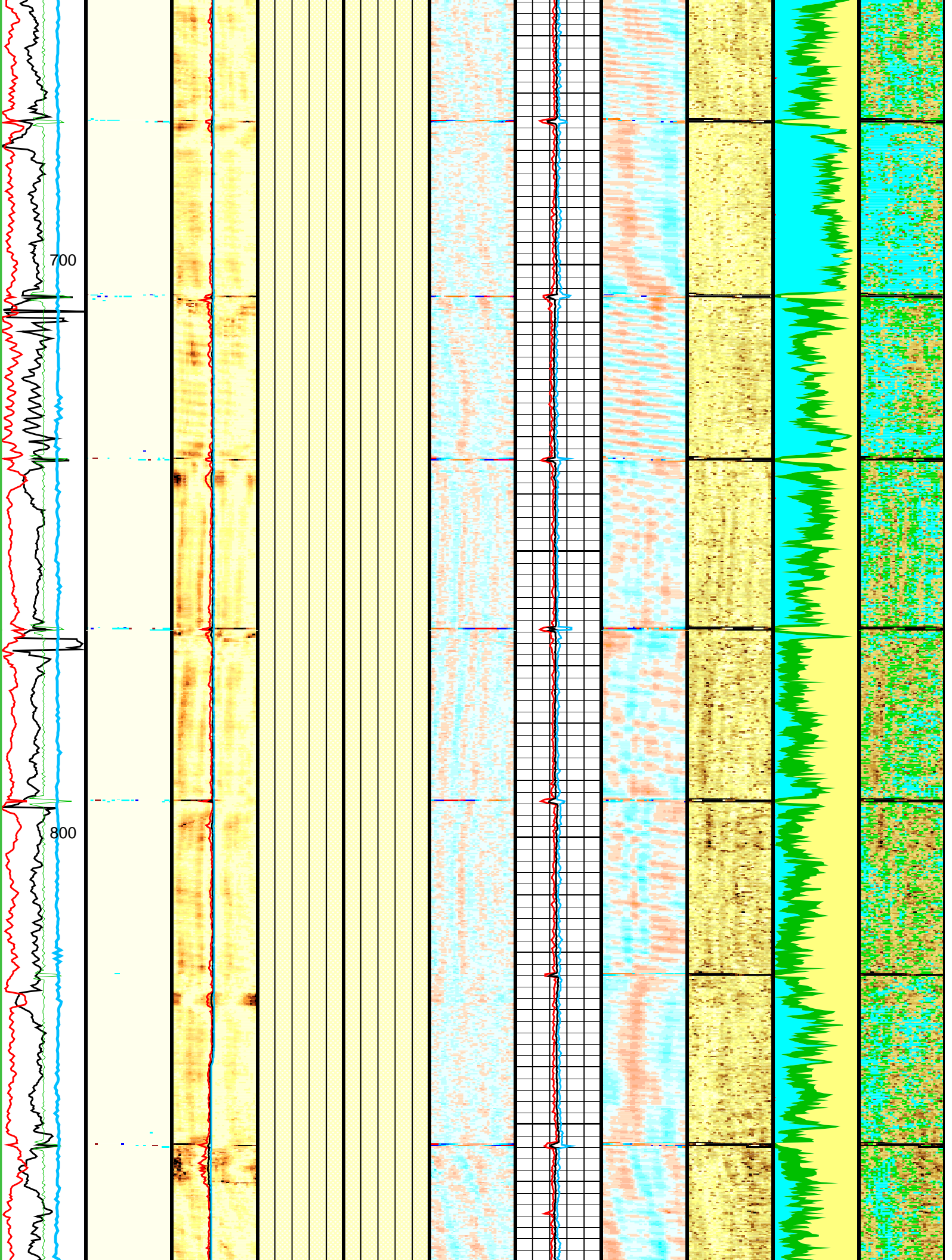
6200.00	198.60	1.70
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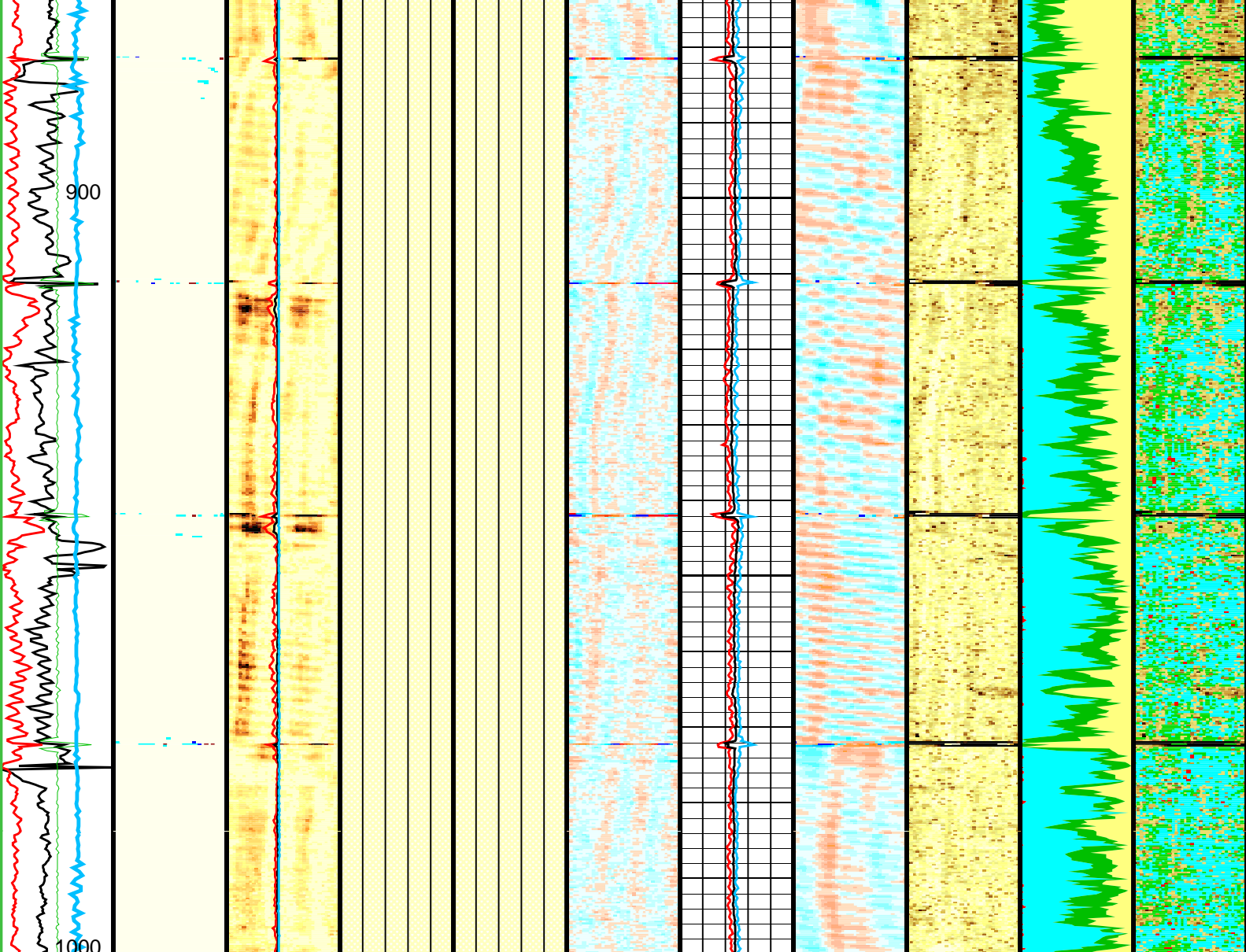
5700.00	198.60	1.70
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<div><div>Eccent. (ECCE)</div><div>0 (IN) 0.5</div></div>	<div><div><div>0.5000</div><div>1.5000</div><div>2.5000</div><div>3.5000</div><div>6.5000</div></div><div>Process. flags (UFLG) (----</div></div>	<div><div>Min. of Amplitude (AWMN)</div><div>0 (DB) 75</div></div>	<div><div>External radius Average (ERAV)</div><div>4.5 (IN) 3 3 (IN) 4.5</div></div>	<div><div>External radius Average (ERAV)</div><div>4.5 (IN) 3 3 (IN) 4.5</div></div>	<div><div><div><div>-500.0000</div><div>-0.0760</div><div>-0.0680</div><div>-0.0600</div><div>-0.0520</div><div>-0.0440</div><div>-0.0360</div><div>-0.0280</div><div>-0.0200</div><div>-0.0120</div><div>-0.0040</div><div>0.0040</div><div>0.0120</div><div>0.0200</div><div>0.0280</div><div>0.0360</div><div>0.0440</div><div>0.0520</div><div>0.0600</div><div>0.0680</div><div>0.0760</div></div><div>Internal radii minus Ave (IRBK) (IN)</div></div></div> <div><div><div><div>-500.0000</div><div>-0.0760</div><div>-0.0680</div><div>-0.0600</div><div>-0.0520</div><div>-0.0440</div><div>-0.0360</div><div>-0.0280</div><div>-0.0200</div><div>-0.0120</div><div>-0.0040</div><div>0.0040</div><div>0.0120</div><div>0.0200</div><div>0.0280</div><div>0.0360</div><div>0.0440</div><div>0.0520</div><div>0.0600</div><div>0.0680</div><div>0.0760</div></div><div>Thickness minus Ave (THBK) (IN)</div></div></div> <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>Bonded</div></div>	<div><div><div><div>-1000.0000</div><div>-500.0000</div><div>0.3000</div><div>2.1000</div><div>2.6364</div><div>3.1727</div><div>3.7091</div><div>4.2455</div><div>4.7818</div><div>5.3182</div><div>5.8545</div><div>6.3909</div><div>6.9273</div><div>7.4636</div><div>8.0000</div></div><div>Cement Map with Impedance Classificati on (AI_ MICRO_ DEBONDIN G_IMAGE) (MRAY)</div></div></div>	
<div><div>Rev. speed (RSAV)</div><div>6 (RPS) 8</div></div>		<div><div>Average of Amplitude (AWAV)</div><div>0 (DB) 75</div></div>	<div><div>Internal radius Average (IRAV)</div><div>4.5 (IN) 3 3 (IN) 4.5</div></div>	<div><div>Internal radius Average (IRAV)</div><div>4.5 (IN) 3 3 (IN) 4.5</div></div>	<div><div>Average of Thickness (THAV) (IN)</div><div>0.1 0.6</div></div>		<div><div>Gas or Dry MicroA</div></div>	
<div><div>CCL (CCL)</div></div>		<div><div>Maximum of</div></div>	<div><div>Internal radius</div></div>	<div><div>Internal radius</div></div>	<div><div>Maximum of Thickness</div></div>			

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	4.5	IN		
CSDE		Casing Density	486.94	LBCF		
CSID		Casing Inner Diameter	3.826	IN		
DFVL		Default Fluid Velocity	201	US/F		
DOT		Diameter of Transducer Sensor	1.756	IN		
EMXV		EMEX Voltage	40	V		
FDII		FPM Data Interpolation Interval	0	FT		
IMAR		Image Rotation	OFF			
MW		Mud Weight	8.4	LB/G		
RCOD		Reference Calibrator Outer Diameter	4.5	IN		
RCSO		Reference Calibrator Standoff	0.8425	IN		
RCTH		Reference Calibrator Thickness	0.2165	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	0.337	IN		
UMAO		USIT Measurement Angular Offset	18	DEG		
USTO		Ultrasonic Time Offset	–2	US		
USUB		Ultrasonic Subassembly Identifier	Sub_5_inch			
UWKM		Ultrasonic Working Mode	10DEG_3IN_60U_LF			
VCAS		Ultrasonic Transversal Velocity in Casing	51.4	US/F		
WLEN		T^3 Processing Length	20.2086	US		
ZCAS		Acoustic Impedance of Casing	46.25	MRAY		
ZINI		Initial Estimate of Cement Impedance	–1	MRAY		
ZMUD		Acoustic Impedance of Mud	1.48	MRAY		
ZTCM		Acoustic Impedance Threshold for Cement	2.1	MRAY		
ZTGS		Acoustic Impedance Threshold for Gas	0.3	MRAY		
System and Miscellaneous						
CWEI		Casing Weight	15.10	LB/F		
DO		Depth Offset for Playback	0.0	FT		
PP		Playback Processing	RECOMPUTE			

Input DLIS Files						
DEFAULT	Splice_USI_021CUP	FN:1	PRODUCER	22–Jan–2014 11:46	1000.0 FT	66.0 FT
Output DLIS Files						
DEFAULT	USI_052PUP	FN:74	PRODUCER	22–Jan–2014 19:49		

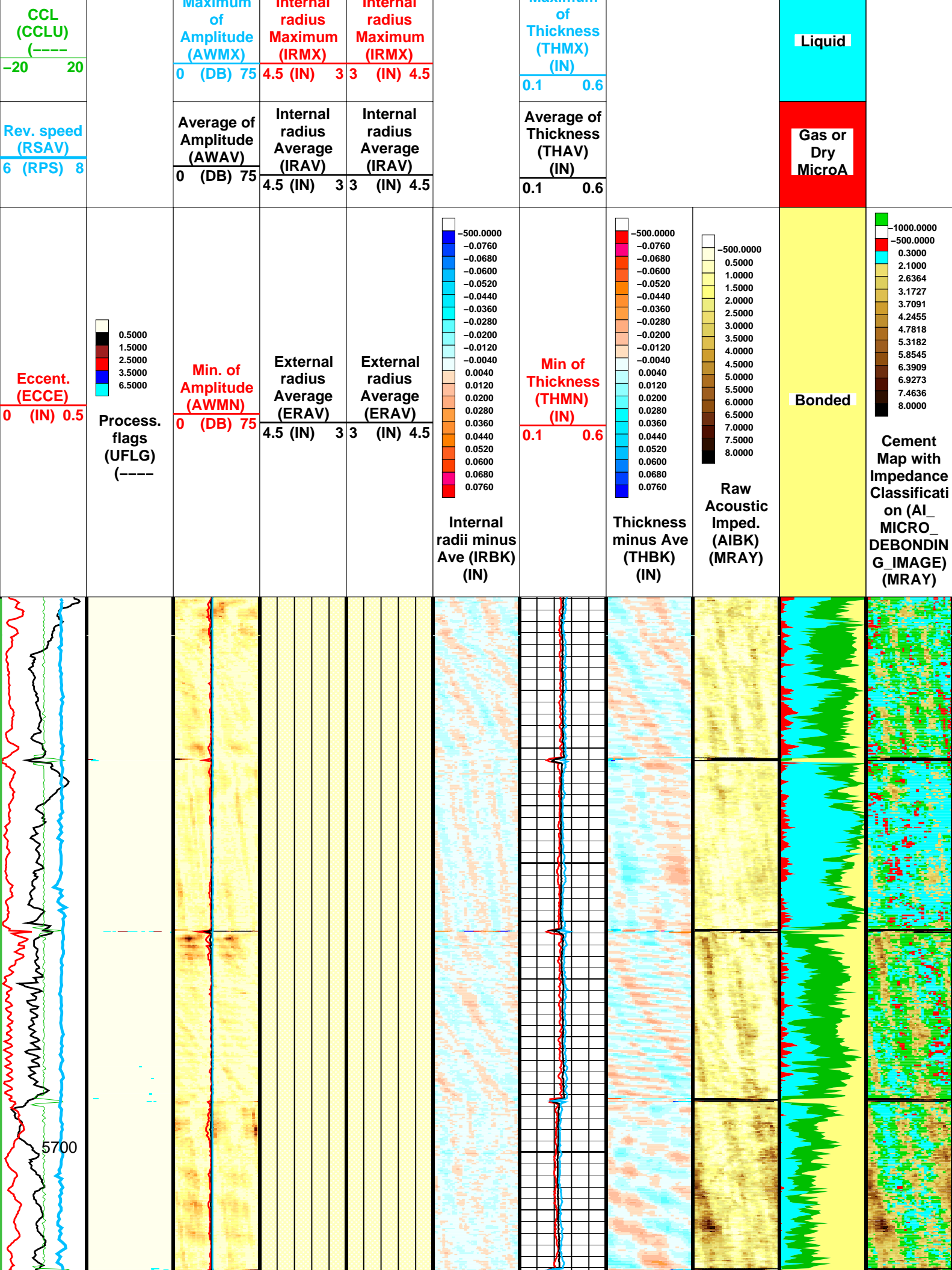
Company: NOBLE ENERGY, INC.				Well: TREBOR B11–16		
Input DLIS Files						
DEFAULT	Splice_USI_SONIC_047CUP	FN:1	PRODUCER	22–Jan–2014 19:23	6185.5 FT	5600.1 FT
Output DLIS Files						
DEFAULT	USI_053PUP	FN:75	PRODUCER	22–Jan–2014 19:59		

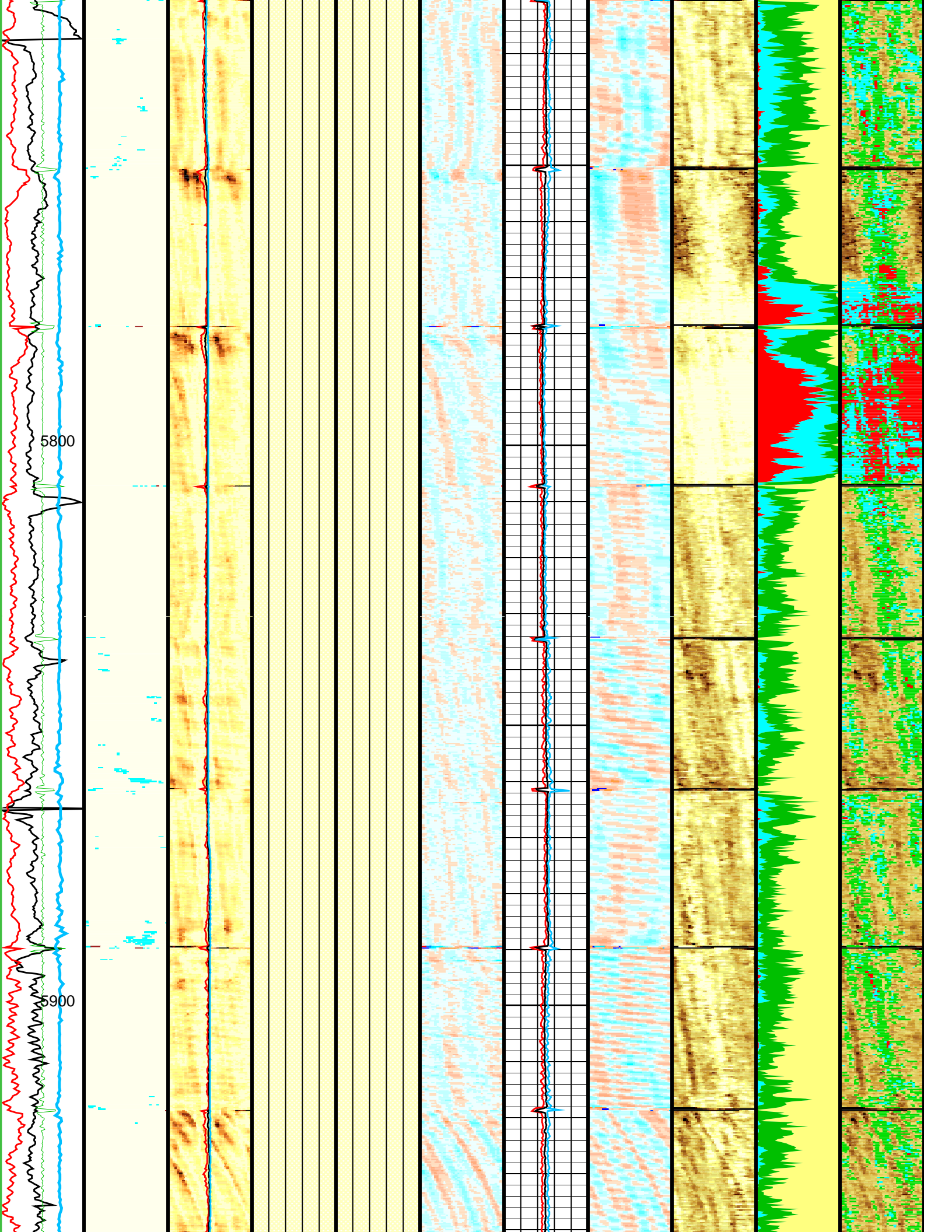
OP System Version: 19C2–270						
USIT–E	19C2–270	SGT–N	19C2–270			
DTC–H	19C2–270					

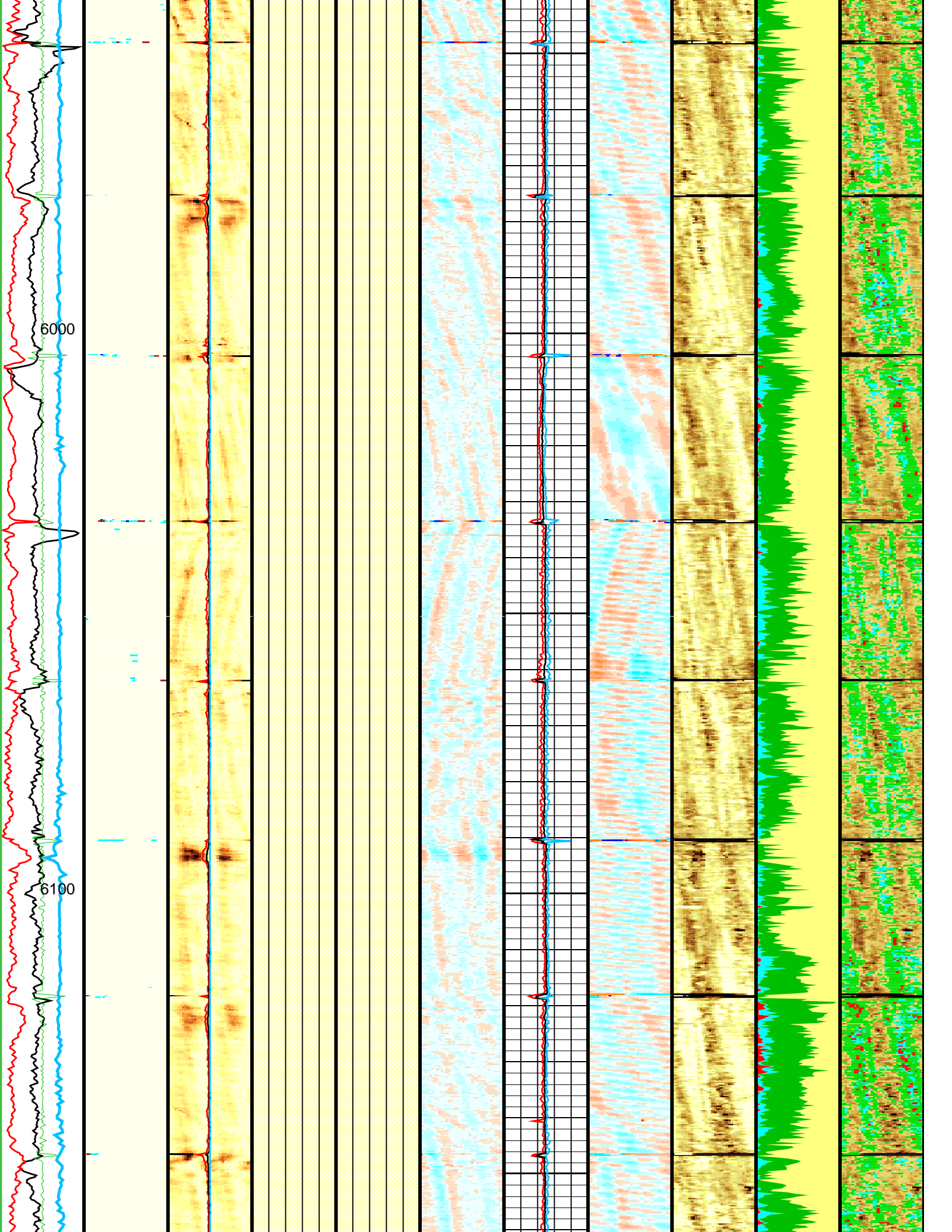
Zoning of Mud Parameters

Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
6200.00	198.60	1.70
5700.00	198.60	1.70
5000.00	198.50	1.70
4400.00	198.20	1.70
3800.00	198.20	1.70
3200.00	198.50	1.70
2600.00	198.10	1.70
2300.00	199.90	1.70
2000.00	201.10	1.72
1700.00	201.90	1.73
1400.00	203.20	1.70
1100.00	204.10	1.73
700.00	206.20	1.71
400.00	204.80	1.71

Image rotation (UCAZ) (DEG)				
0 360				
Azimuth of eccent. (AZEC) (DEG)				
0 360				
Cable Speed (CS) (F/HR)				
0 2000				
Rev. speed (RSAV) (RPS)				
-8 -6				
	<div><div><div><div></div><div>-500.0000</div></div><div><div></div><div>-6.0000</div></div><div><div></div><div>-5.6000</div></div><div><div></div><div>-5.2000</div></div><div><div></div><div>-4.8000</div></div><div><div></div><div>-4.4000</div></div><div><div></div><div>-4.0000</div></div><div><div></div><div>-3.6000</div></div><div><div></div><div>-3.2000</div></div><div><div></div><div>-2.8000</div></div><div><div></div><div>-2.4000</div></div><div><div></div><div>-2.0000</div></div><div><div></div><div>-1.6000</div></div><div><div></div><div>-1.2000</div></div><div><div></div><div>-0.8000</div></div><div><div></div><div>-0.4000</div></div><div><div></div><div>0.5000</div></div></div><div>Amplitude of echo minus Max (AWBK) (DB)</div></div> <div><div>Min of Internal radius (IRMN)</div><div>4.5 (IN)</div><div>3 3</div><div>Min of Internal radius (IRMN)</div><div>(IN) 4.5</div></div> <div>Maximum Internal Internal Maximum</div>			
	Micro-debonding			







Parameters			
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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	4.5	IN
CSDE	Casing Density	486.94	LBCF
CSID	Casing Inner Diameter	3.826	IN
DFVL	Default Fluid Velocity	201	US/F
DOT	Diameter of Transducer Sensor	1.756	IN
EMXV	EMEX Voltage	40	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.4	LB/G
RCOD	Reference Calibrator Outer Diameter	4.5	IN
RCSO	Reference Calibrator Standoff	0.8425	IN
RCTH	Reference Calibrator Thickness	0.2165	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	0.337	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	–2	US

USUB	Ultrasonic Subassembly Identifier	Sub_5_inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	20.2086	US
ZCAS	Acoustic Impedance of Casing	46.25	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.48	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.1	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	15.10	LB/F
DO	Depth Offset for Playback	3.0	FT
PP	Playback Processing	RECOMPUTE	

Input DLIS Files

DEFAULT	Splice_USI_SONIC_047CUP	FN:1	PRODUCER	22-Jan-2014 19:23	6185.5 FT	5600.1 FT
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Output DLIS Files

DEFAULT	USI_053PUP	FN:75	PRODUCER	22-Jan-2014 19:59
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Company: NOBLE ENERGY, INC.

Well: TREBOR B11-16

Input DLIS Files

DEFAULT	Splice_USI_021CUP	FN:1	PRODUCER	22-Jan-2014 11:46	1000.0 FT	66.0 FT
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Output DLIS Files

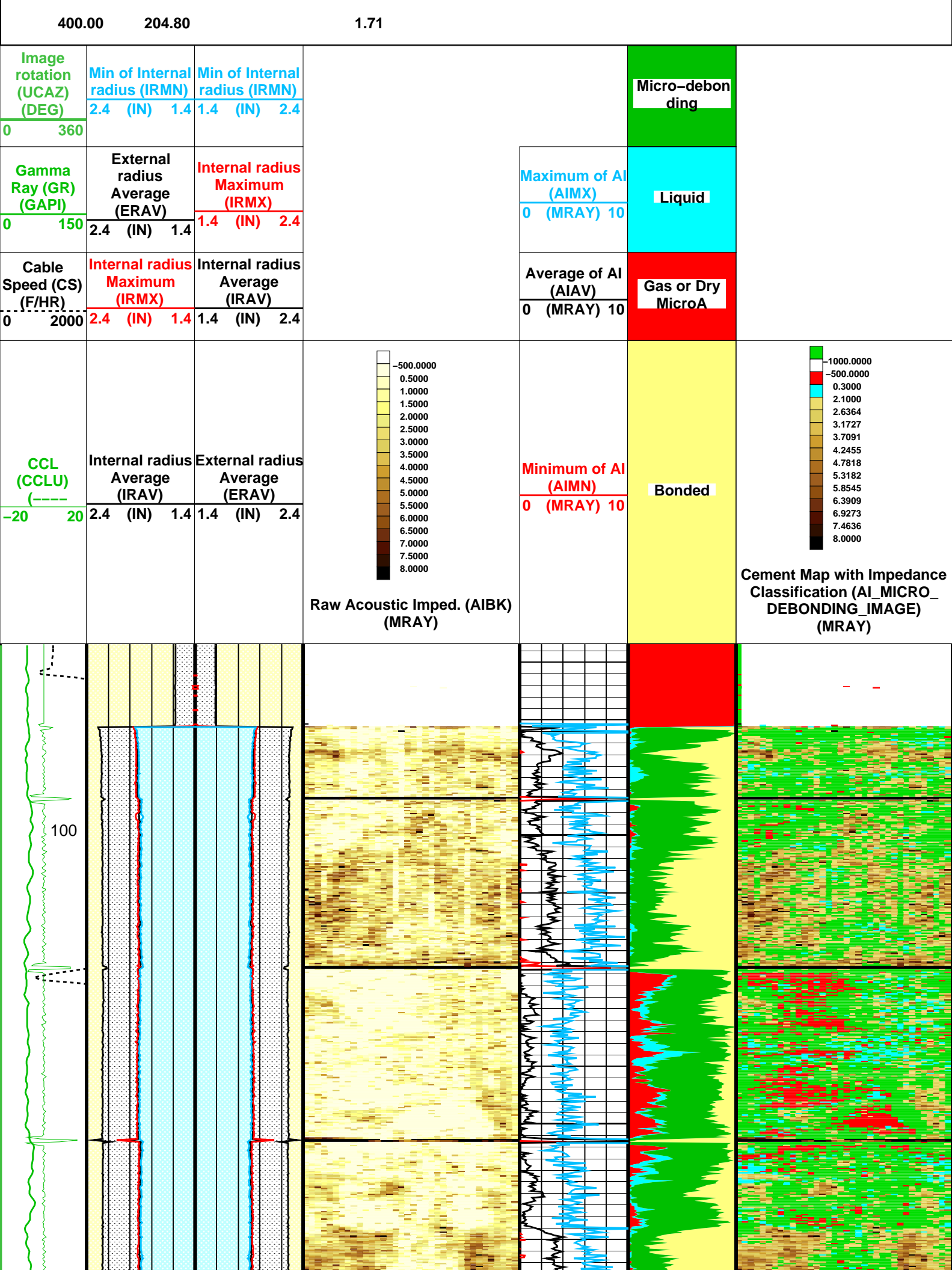
DEFAULT	USI_052PUP	FN:74	PRODUCER	22-Jan-2014 19:49	1000.0 FT	66.5 FT
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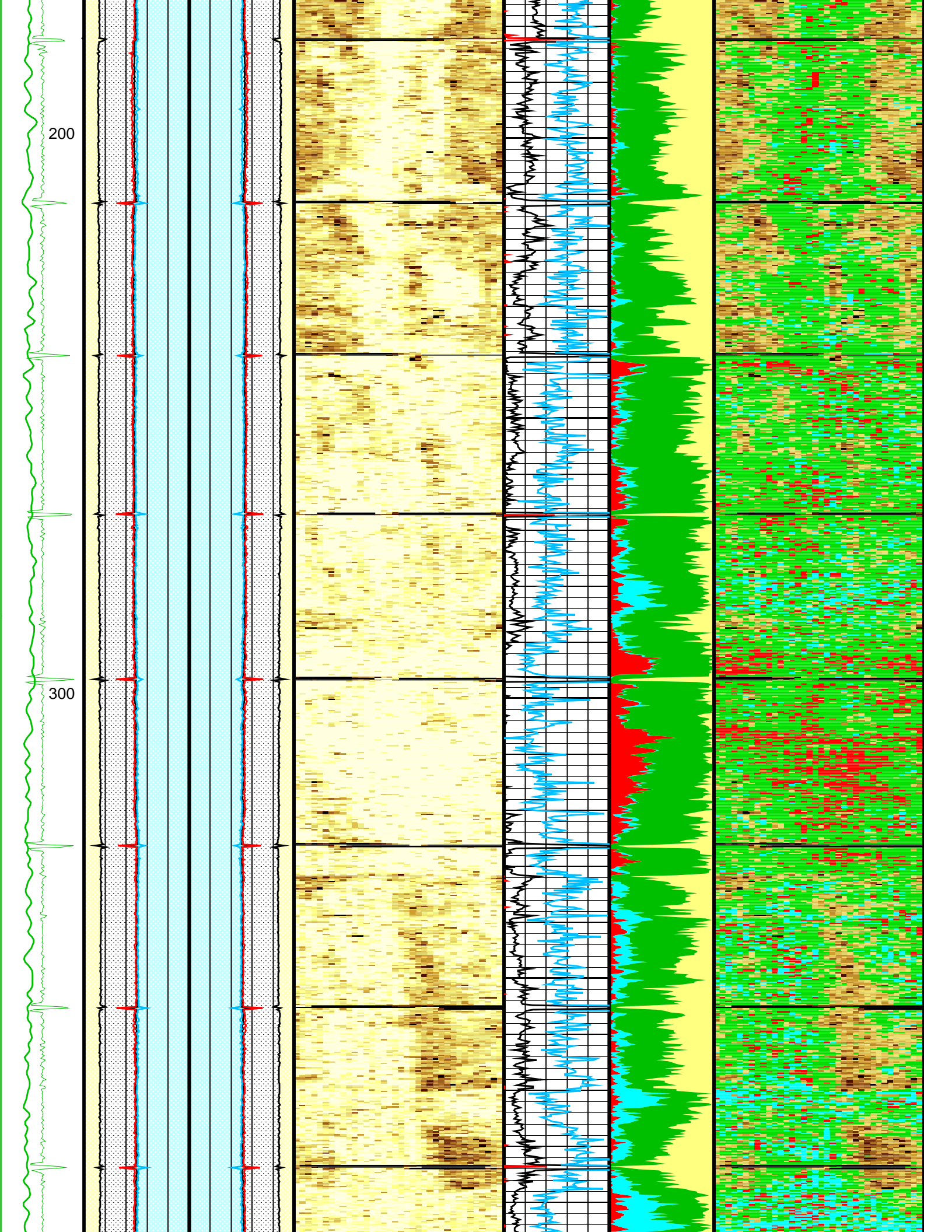
OP System Version: 19C2-270

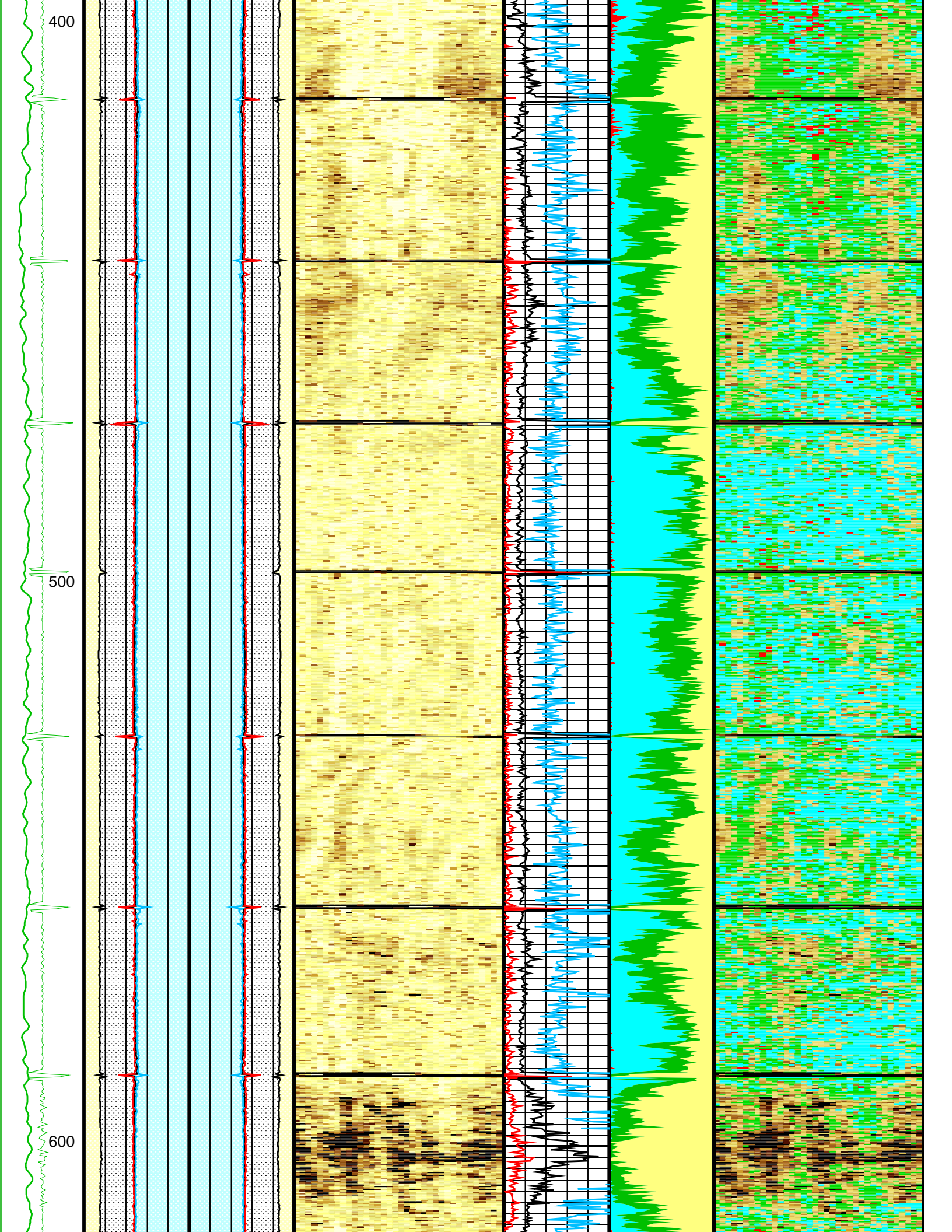
USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	19C2-270		

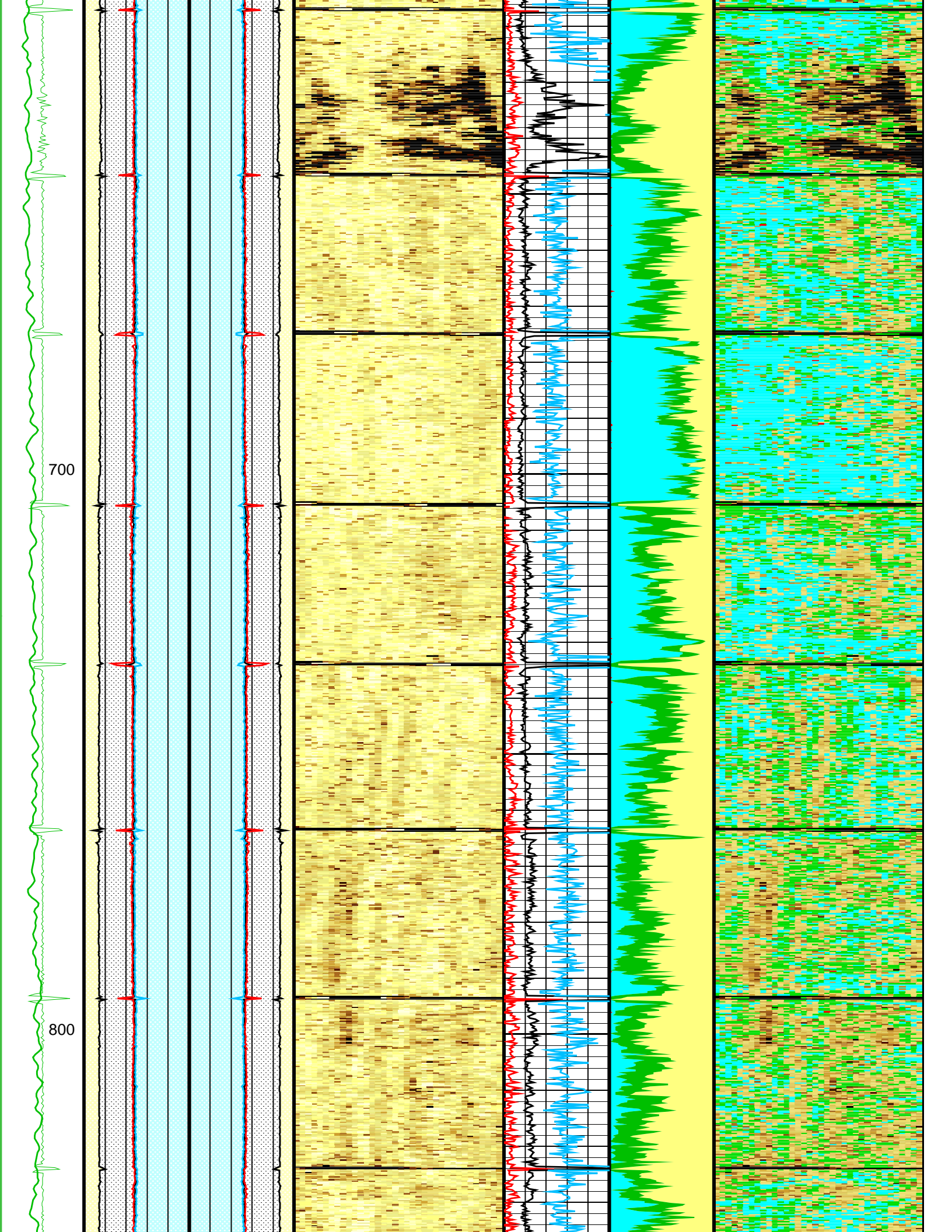
Zoning of Mud Parameters

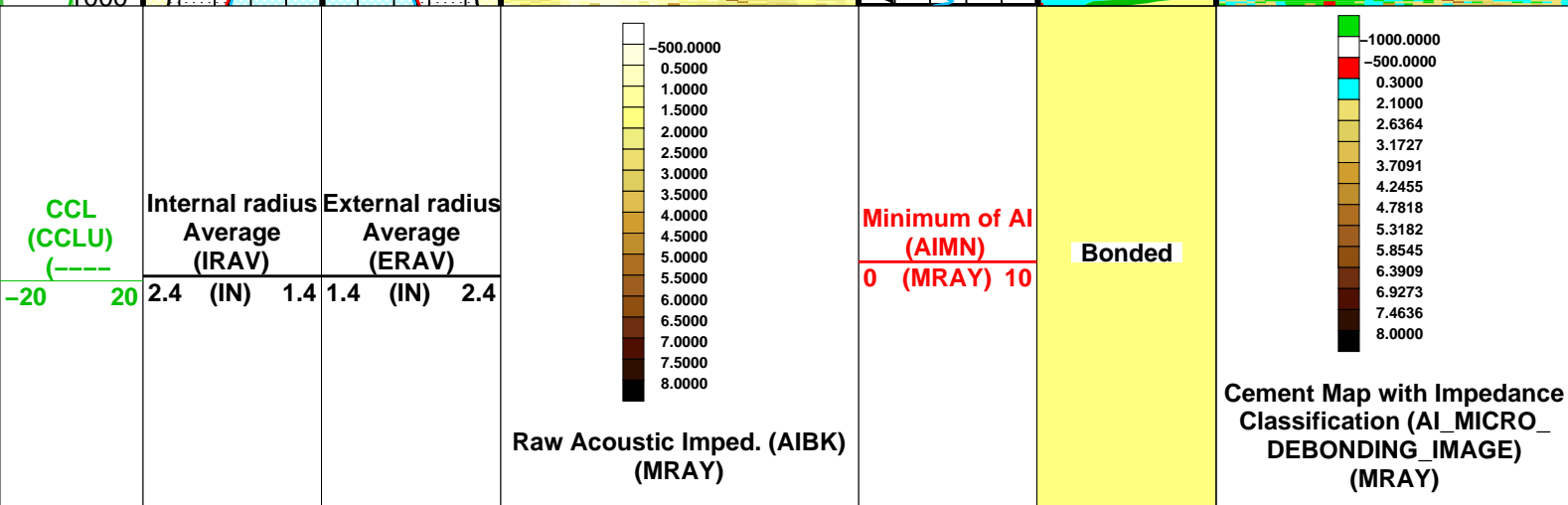
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3200.00	198.50	1.70
2600.00	198.10	1.70
2300.00	199.90	1.70
2000.00	201.10	1.72
1700.00	201.90	1.73
1400.00	203.20	1.70
1100.00	204.10	1.73
700.00	206.20	1.71











Cable Speed (CS) (F/HR)	Internal radius Maximum (IRMX)	Internal radius Average (IRAV)	Average of AI (AIAV)	Gas or Dry MicroA
0 2000	2.4 (IN) 1.4	1.4 (IN) 2.4	0 (MRAY) 10	
Gamma Ray (GR) (GAPI)	External radius Average (ERAV)	Internal radius Maximum (IRMX)	Maximum of AI (AIMX)	Liquid
0 150	2.4 (IN) 1.4	1.4 (IN) 2.4	0 (MRAY) 10	
Image rotation (UCAZ) (DEG)	Min of Internal radius (IRMN)	Min of Internal radius (IRMN)		Micro-debon ding
0 360	2.4 (IN) 1.4	1.4 (IN) 2.4		
Format: USIT CEMENT 5 inch Vertical Scale: 5" per 100' Graphics File Created: 22-Jan-2014 19:49				

OP System Version: 19C2-270

USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	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

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DOT	Diameter of Transducer Sensor	1.756	IN
EMXV	EMEX Voltage	40	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.4	LB/G
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THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.337	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	–2	US
USUB	Ultrasonic Subassembly Identifier	Sub_5_inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	20.2086	US
ZCAS	Acoustic Impedance of Casing	46.25	MRAY
ZINI	Initial Estimate of Cement Impedance	–1	MRAY
ZMUD	Acoustic Impedance of Mud	1.48	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.1	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	15.10	LB/F
DO	Depth Offset for Playback	0.0	FT

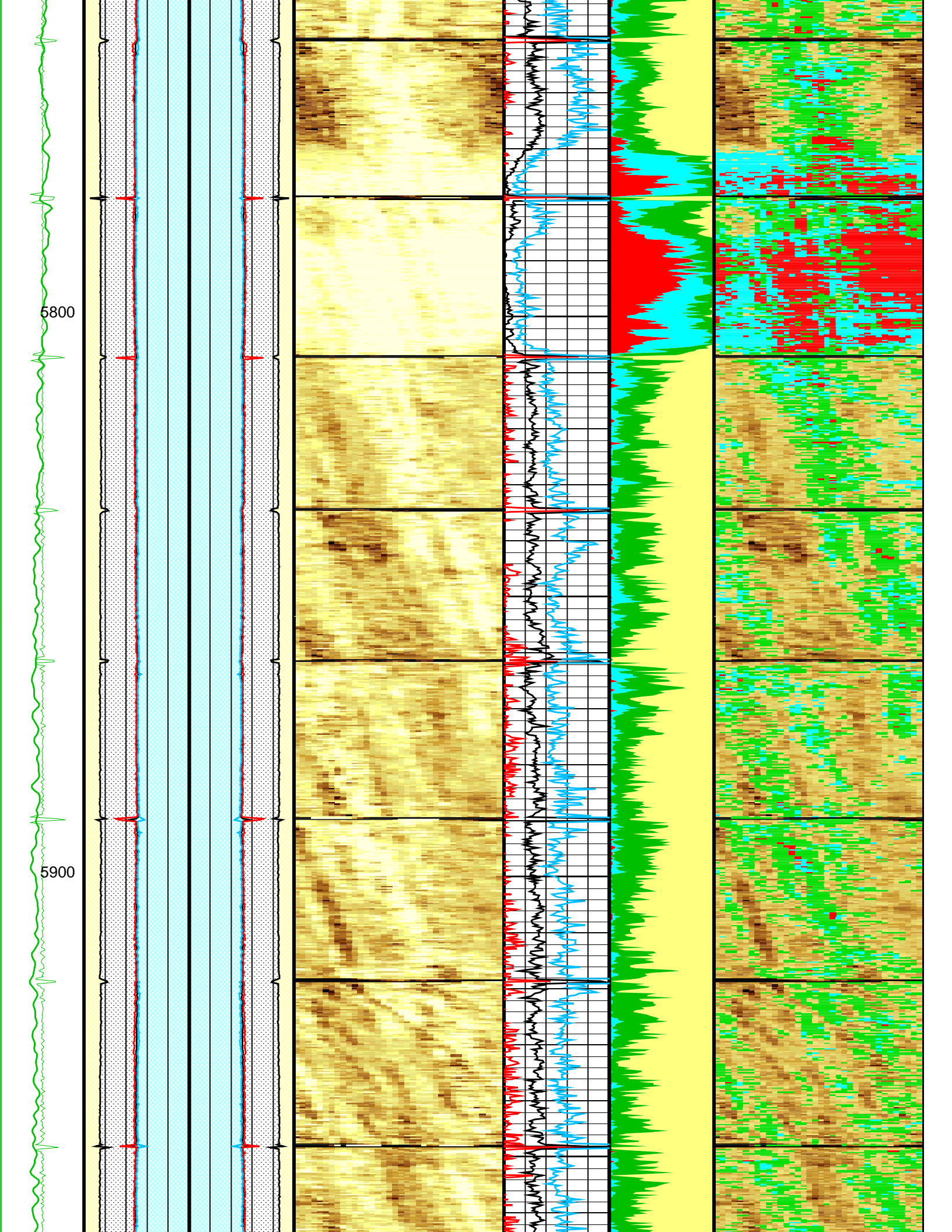
PP	Playback Processing	RECOMPUTE
Input DLIS Files		
DEFAULT	Splice_USI_021CUP	FN:1 PRODUCER 22-Jan-2014 11:46 1000.0 FT 66.0 FT
Output DLIS Files		
DEFAULT	USI_052PUP	FN:74 PRODUCER 22-Jan-2014 19:49

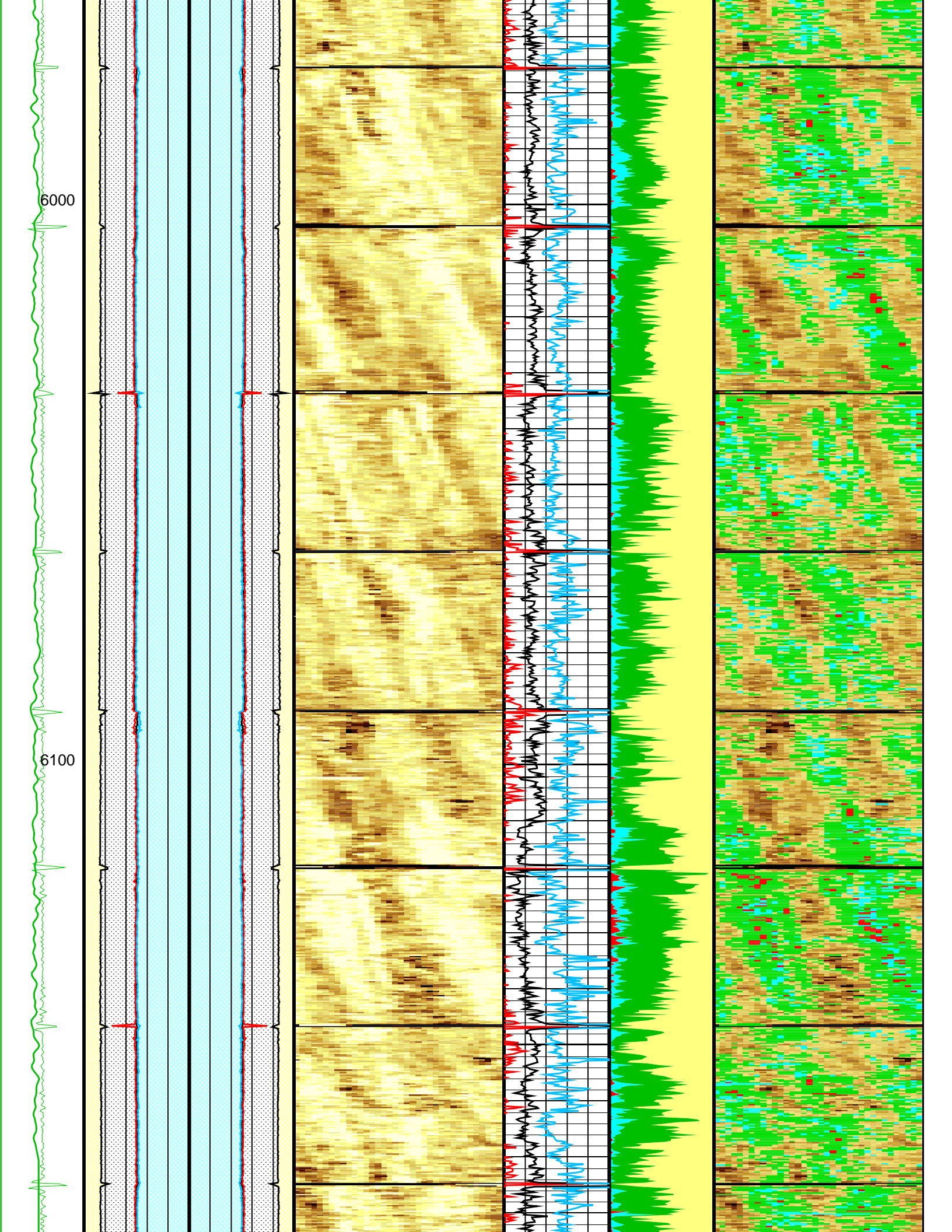
Company: NOBLE ENERGY, INC.					Well: TREBOR B11-16	
Input DLIS Files						
DEFAULT	Splice_USI_SONIC_047CUP	FN:1	PRODUCER	22-Jan-2014 19:23	6185.5 FT	5600.1 FT
Output DLIS Files						
DEFAULT	USI_053PUP	FN:75	PRODUCER	22-Jan-2014 19:59		
OP System Version: 19C2-270						
USIT-E	19C2-270		SGT-N	19C2-270		
DTC-H	19C2-270					

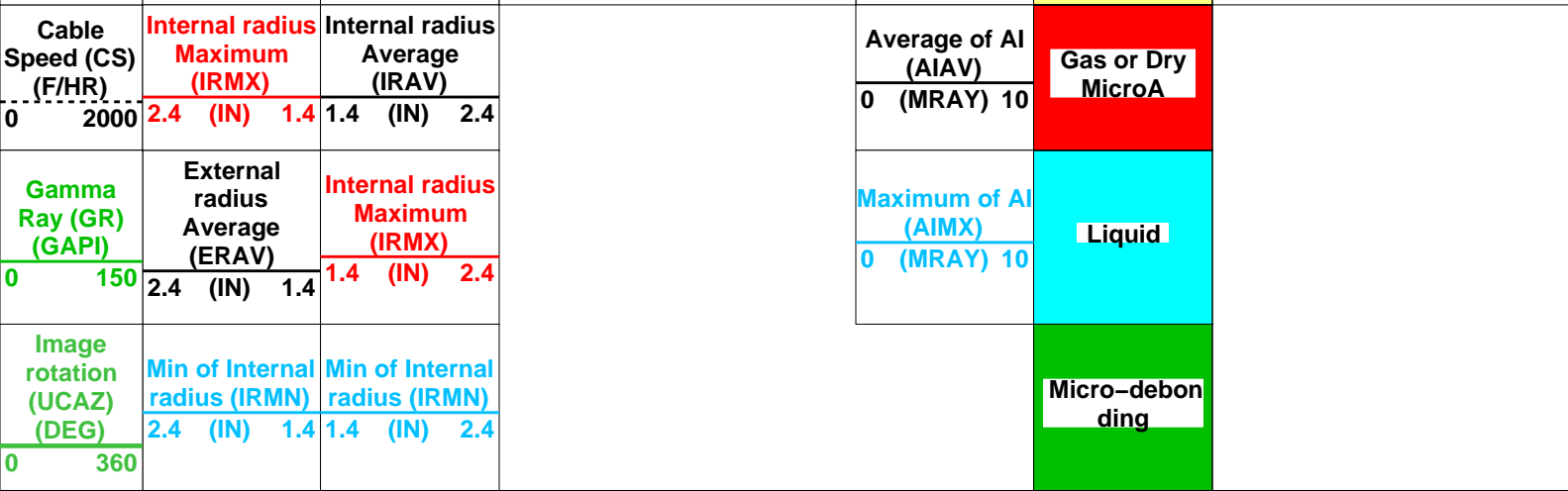
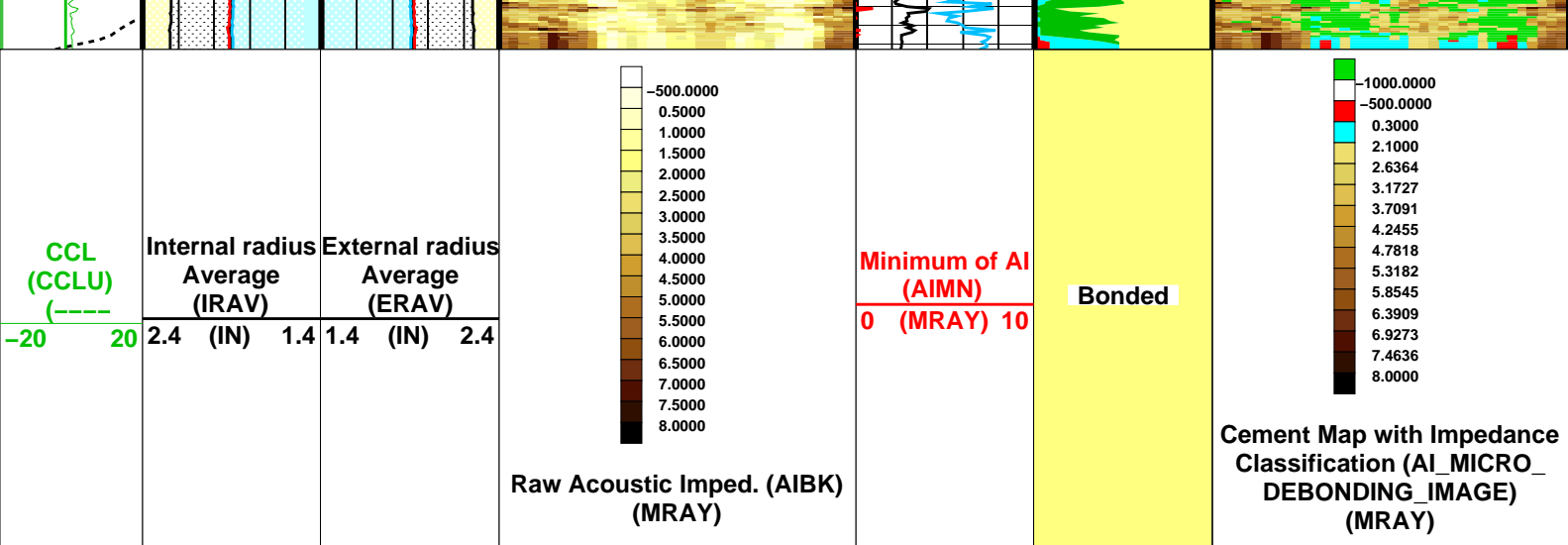
Zoning of Mud Parameters		
Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
6200.00	198.60	1.70
5700.00	198.60	1.70
5000.00	198.50	1.70
4400.00	198.20	1.70
3800.00	198.20	1.70
3200.00	198.50	1.70
2600.00	198.10	1.70
2300.00	199.90	1.70
2000.00	201.10	1.72
1700.00	201.90	1.73
1400.00	203.20	1.70
1100.00	204.10	1.73
700.00	206.20	1.71
400.00	204.80	1.71

Image rotation (UCAZ) (DEG)	Min of Internal radius (IRMN)	Min of Internal radius (IRMN)	Micro-debonding
0 360	2.4 (IN) 1.4	1.4 (IN) 2.4	
Gamma	External radius	Internal radius	Maximum of All

Ray (GR) (GAPI)	Radius Average (ERAV)	Maximum (IRMX)	Minimum of AI (AIMX)	Liquid
Cable Speed (CS) (F/HR)	Internal radius Maximum (IRMX)	Internal radius Average (IRAV)	Average of AI (AIAV)	Gas or Dry MicroA
CCL (CCLU) (-----)	Internal radius Average (IRAV)	External radius Average (ERAV)	Minimum of AI (AIMN)	Bonded
Raw Acoustic Imped. (AIBK) (MRAY)	Cement Map with Impedance Classification (AI_MICRO_ DEBONDING_IMAGE) (MRAY)			
0 150	2.4 (IN) 1.4	1.4 (IN) 2.4	0 (MRAY) 10	
0 2000	2.4 (IN) 1.4	1.4 (IN) 2.4	0 (MRAY) 10	
-20 20	2.4 (IN) 1.4	1.4 (IN) 2.4	0 (MRAY) 10	
5700				







Format: USIT CEMENT 5 inch Vertical Scale: 5" per 100' Graphics File Created: 22-Jan-2014 19:59

OP System Version: 19C2-270

USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	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	4.5	IN
CSDE	Casing Density	486.94	LBCF
CSID	Casing Inner Diameter	3.826	IN
DFVL	Default Fluid Velocity	201	US/F
DOT	Diameter of Transducer Sensor	1.756	IN
EMXV	EMEX Voltage	40	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.4	LB/G
RCOD	Reference Calibrator Outer Diameter	4.5	IN
RCSD	Reference Calibrator Standoff	0.8425	IN

RCSO	Reference Calibrator Standoff	0.8425	IN
RCTH	Reference Calibrator Thickness	0.2165	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	0.337	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub_5_inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	20.2086	US
ZCAS	Acoustic Impedance of Casing	46.25	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.48	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.1	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	15.10	LB/F
DO	Depth Offset for Playback	3.0	FT
PP	Playback Processing	RECOMPUTE	

Input DLIS Files

DEFAULT	Splice_USI_SONIC_047CUP	FN:1	PRODUCER	22-Jan-2014 19:23	6185.5 FT	5600.1 FT
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Output DLIS Files

DEFAULT	USI_053PUP	FN:75	PRODUCER	22-Jan-2014 19:59
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Schlumberger

REPEAT PASS
5" = 100'

MAXIS Field Log

Company: NOBLE ENERGY, INC.

Well: TREBOR B11-16

Input DLIS Files

DEFAULT	USI_SONIC_TLD_MCFL_028LUP	FN:41	PRODUCER	22-Jan-2014 13:32
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Output DLIS Files

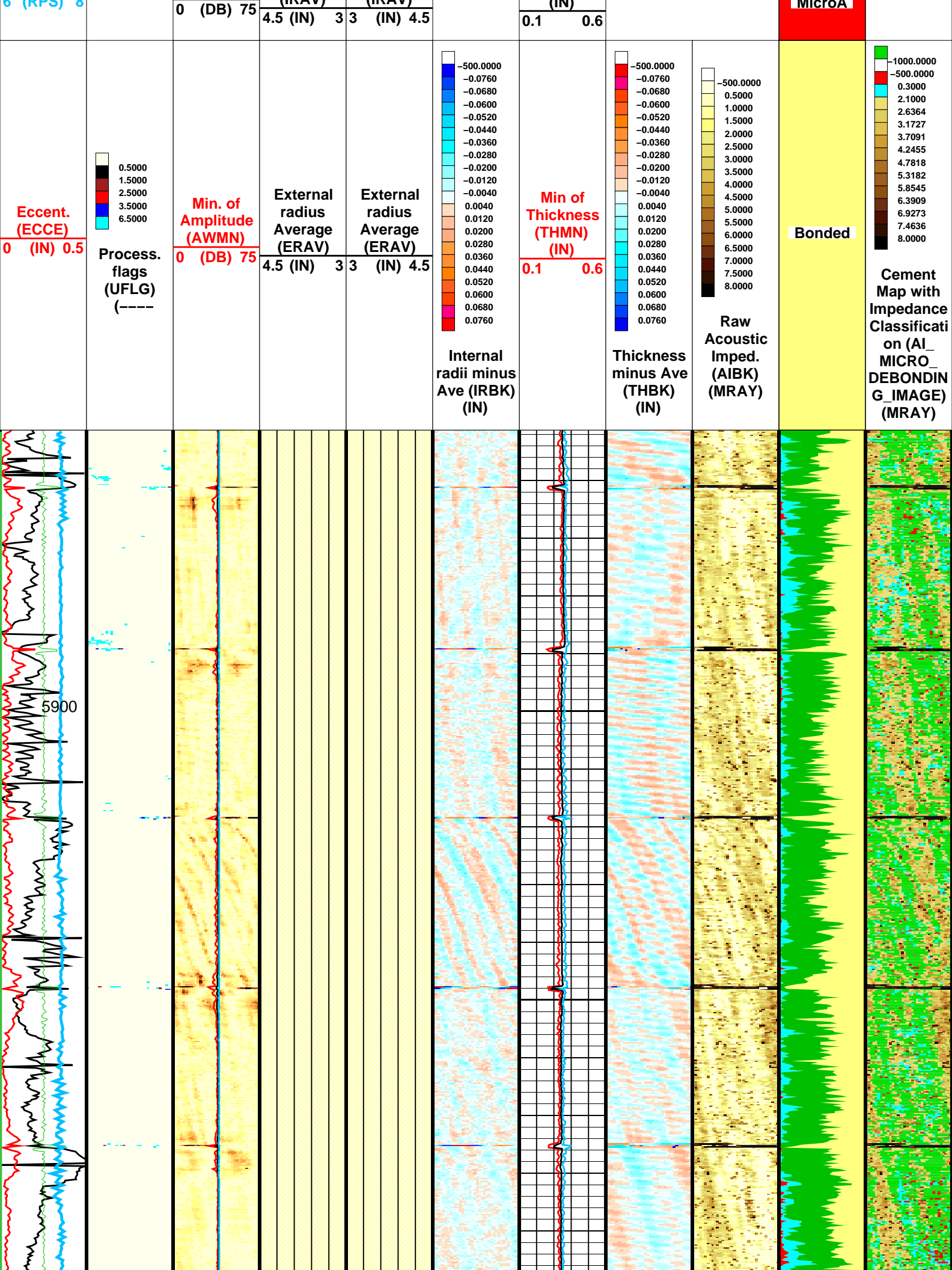
DEFAULT	USI_054PUP	FN:76	PRODUCER	22-Jan-2014 20:02
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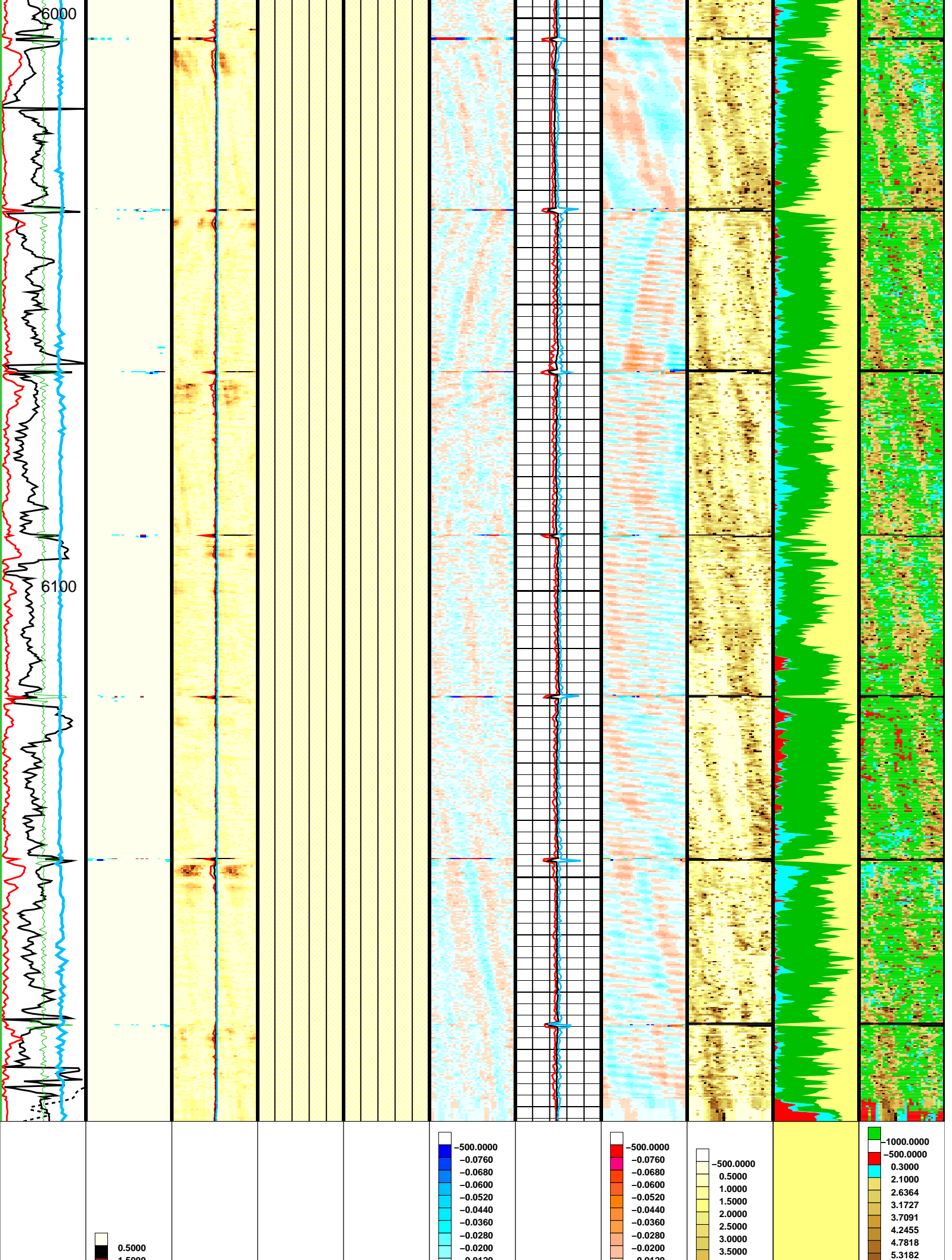
OP System Version: 19C2-270

USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	19C2-270		

Zoning of Mud Parameters

Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
6200.00	198.60	1.70





<div><div><div>1.5000</div><div>2.5000</div><div>3.5000</div><div>6.5000</div></div><div><div>0</div><div>(IN)</div><div>0.5</div></div><div><div>Eccent.</div><div>(ECCE)</div></div></div>	<div><div>Process.</div><div>flags</div><div>(UFLG)</div><div>(----</div></div>	<div><div>0</div><div>(DB)</div><div>75</div></div> <div><div>Min. of</div><div>Amplitude</div><div>(AWMN)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>External</div><div>radius</div><div>Average</div><div>(ERAV)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>External</div><div>radius</div><div>Average</div><div>(ERAV)</div></div>	<div><div>0.0120</div><div>0.0040</div><div>0.0040</div><div>0.0120</div><div>0.0200</div><div>0.0280</div><div>0.0360</div><div>0.0440</div><div>0.0520</div><div>0.0600</div><div>0.0680</div><div>0.0760</div></div> <div><div>Internal</div><div>radii minus</div><div>Ave (IRBK)</div><div>(IN)</div></div>	<div><div>0.1</div><div>0.6</div></div> <div><div>Min of</div><div>Thickness</div><div>(THMN)</div><div>(IN)</div></div>	<div><div>0.0120</div><div>0.0040</div><div>0.0040</div><div>0.0120</div><div>0.0200</div><div>0.0280</div><div>0.0360</div><div>0.0440</div><div>0.0520</div><div>0.0600</div><div>0.0680</div><div>0.0760</div></div> <div><div>Thickness</div><div>minus Ave</div><div>(THBK)</div><div>(IN)</div></div>	<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><div>Raw</div><div>Acoustic</div><div>Imped.</div><div>(AIBK)</div><div>(MRAY)</div></div>	<div><div>Bonded</div></div>	<div><div>5.8545</div><div>6.3909</div><div>6.9273</div><div>7.4636</div><div>8.0000</div></div> <div><div>Cement</div><div>Map with</div><div>Impedance</div><div>Classificati</div><div>on (AI_</div><div>MICRO_</div><div>DEBONDIN</div><div>G_IMAGE)</div><div>(MRAY)</div></div>	
<div><div>6</div><div>(RPS)</div><div>8</div></div> <div><div>Rev. speed</div><div>(RSAV)</div></div>		<div><div>0</div><div>(DB)</div><div>75</div></div> <div><div>Average of</div><div>Amplitude</div><div>(AWAV)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Internal</div><div>radius</div><div>Average</div><div>(IRAV)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Internal</div><div>radius</div><div>Average</div><div>(IRAV)</div></div>		<div><div>0.1</div><div>0.6</div></div> <div><div>Average of</div><div>Thickness</div><div>(THAV)</div><div>(IN)</div></div>			<div><div>Gas or</div><div>Dry</div><div>MicroA</div></div>		
<div><div>-20</div><div>20</div></div> <div><div>CCL</div><div>(CCLU)</div><div>(----</div></div>		<div><div>0</div><div>(DB)</div><div>75</div></div> <div><div>Maximum</div><div>of</div><div>Amplitude</div><div>(AWMX)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Internal</div><div>radius</div><div>Maximum</div><div>(IRMX)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Internal</div><div>radius</div><div>Maximum</div><div>(IRMX)</div></div>		<div><div>0.1</div><div>0.6</div></div> <div><div>Maximum</div><div>of</div><div>Thickness</div><div>(THMX)</div><div>(IN)</div></div>			<div><div>Liquid</div></div>		
<div><div>-8</div><div>-6</div></div> <div><div>Rev. speed</div><div>(RSAV)</div><div>(RPS)</div></div>		<div><div>-500.0000</div><div>-6.0000</div><div>-5.6000</div><div>-5.2000</div><div>-4.8000</div><div>-4.4000</div><div>-4.0000</div><div>-3.6000</div><div>-3.2000</div><div>-2.8000</div><div>-2.4000</div><div>-2.0000</div><div>-1.6000</div><div>-1.2000</div><div>-0.8000</div><div>-0.4000</div><div>0.5000</div></div> <div><div>Amplitude</div><div>of echo</div><div>minus Max</div><div>(AWBK)</div><div>(DB)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Min of</div><div>Internal</div><div>radius</div><div>(IRMN)</div></div>	<div><div>4.5</div><div>(IN)</div><div>3</div><div>3</div><div>(IN)</div><div>4.5</div></div> <div><div>Min of</div><div>Internal</div><div>radius</div><div>(IRMN)</div></div>						<div><div>Micro-deb</div><div>onding</div></div>	
<div><div>0</div><div>2000</div></div> <div><div>Cable</div><div>Speed (CS)</div><div>(F/HR)</div></div>											
<div><div>0</div><div>360</div></div> <div><div>Azimuth of</div><div>eccent.</div><div>(AZEC)</div><div>(DEG)</div></div>											
<div><div>0</div><div>360</div></div> <div><div>Image</div><div>rotation</div><div>(UCAZ)</div><div>(DEG)</div></div>											

COMPUTATION FLAGS LABELLING

(0 – 1.5)	UFLG 1	UTIM error
(1.5 – 2.5)	UFLG 2	Pulse origin not detected
(2.5 – 3.5)	UFLG 3	WINLEN error
<hr/>		
(3.5 – 6.5)	UFLG 4 UFLG 5 UFLG 6	CASING THICKNESS error
<hr/>		
(6.5 – 10)	UFLG 7 UFLG 8 UFLG 9	LOOP PROCESSING error

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	4.5	IN
CSDE	Casing Density	486.94	LBCF
CSID	Casing Inner Diameter	3.826	IN
DFVL	Default Fluid Velocity	201	US/F
DOT	Diameter of Transducer Sensor	1.756	IN
EMXV	EMEX Voltage	40	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.4	LB/G
RCOD	Reference Calibrator Outer Diameter	4.5	IN
RCSO	Reference Calibrator Standoff	0.8425	IN
RCTH	Reference Calibrator Thickness	0.2165	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	0.337	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	–2	US
USUB	Ultrasonic Subassembly Identifier	Sub_5_inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	20.2086	US
ZCAS	Acoustic Impedance of Casing	46.25	MRAY
ZINI	Initial Estimate of Cement Impedance	–1	MRAY
ZMUD	Acoustic Impedance of Mud	1.48	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.1	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	15.10	LB/F
DO	Depth Offset for Playback	3.0	FT
PP	Playback Processing	RECOMPUTE	

Input DLIS Files

DEFAULT USI_SONIC_TLD_MCFL_028LUP FN:41 PRODUCER 22-Jan-2014 13:32

Output DLIS Files

Company: NOBLE ENERGY, INC.

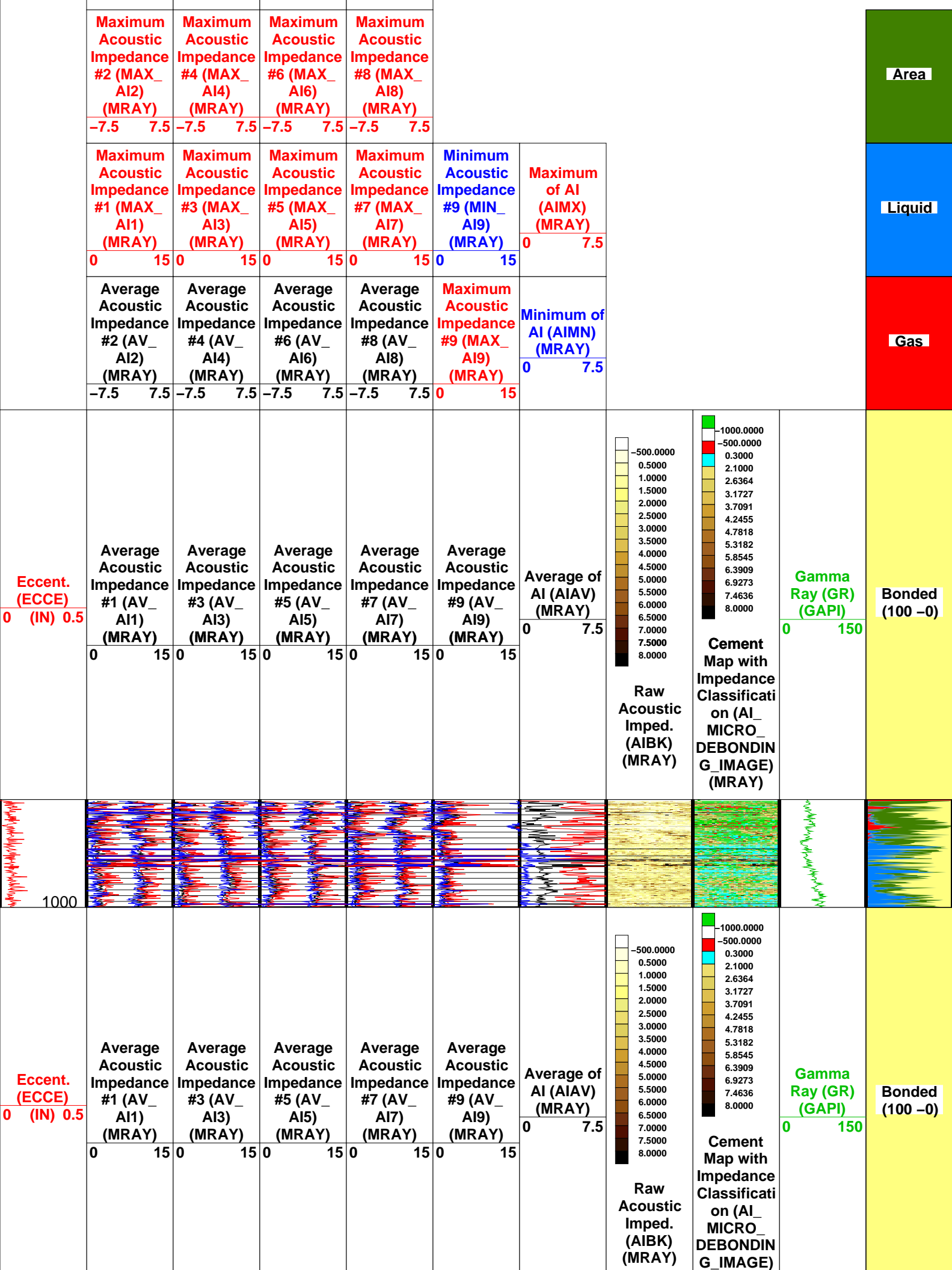
Well: TREBOR B11-16

Input DLIS Files						
DEFAULT	Splice_USI_021CUP	FN:1	PRODUCER	22-Jan-2014 11:46	1000.0 FT	66.0 FT
Output DLIS Files						
DEFAULT	USI_052PUP	FN:74	PRODUCER	22-Jan-2014 19:49	1000.0 FT	66.5 FT

OP System Version: 19C2-270						
USIT-E	19C2-270		SGT-N	19C2-270		
DTC-H	19C2-270					

Zoning of Mud Parameters						
Depth		Fluid Velocity (DFVL)		Acoustic Impedance (ZMUD)		
6200.00	198.60			1.70		
5700.00	198.60			1.70		
5000.00	198.50			1.70		
4400.00	198.20			1.70		
3800.00	198.20			1.70		
3200.00	198.50			1.70		
2600.00	198.10			1.70		
2300.00	199.90			1.70		
2000.00	201.10			1.72		
1700.00	201.90			1.73		
1400.00	203.20			1.70		
1100.00	204.10			1.73		
700.00	206.20			1.71		
400.00	204.80			1.71		

	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 15	0 15	0 15	



						(MRAY)			
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)				
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5	0 15	0 7.5				Gas
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)				
0 15	0 15	0 15	0 15	0 15	0 7.5				Liquid
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)						
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5						Area
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)						
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5						

Format: USIT only Goodwin Compressed Vertical Scale: 0.1" per 100' Graphics File Created: 22-Jan-2014 19:49

OP System Version: 19C2-270

USIT-E 19C2-270 SGT-N 19C2-270
DTC-H 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.

Input DLIS Files

DEFAULT Splice_USI_021CUP FN:1 PRODUCER 22-Jan-2014 11:46 1000.0 FT 66.0 FT

Output DLIS Files

DEFAULT USI_052PUP FN:74 PRODUCER 22-Jan-2014 19:49

Output DLIS Files

OP System Version: 19C2-270

USIT-E

19C2-270

SGT-N

19C2-270

DTC-H

19C2-270

Zoning of Mud Parameters

Depth

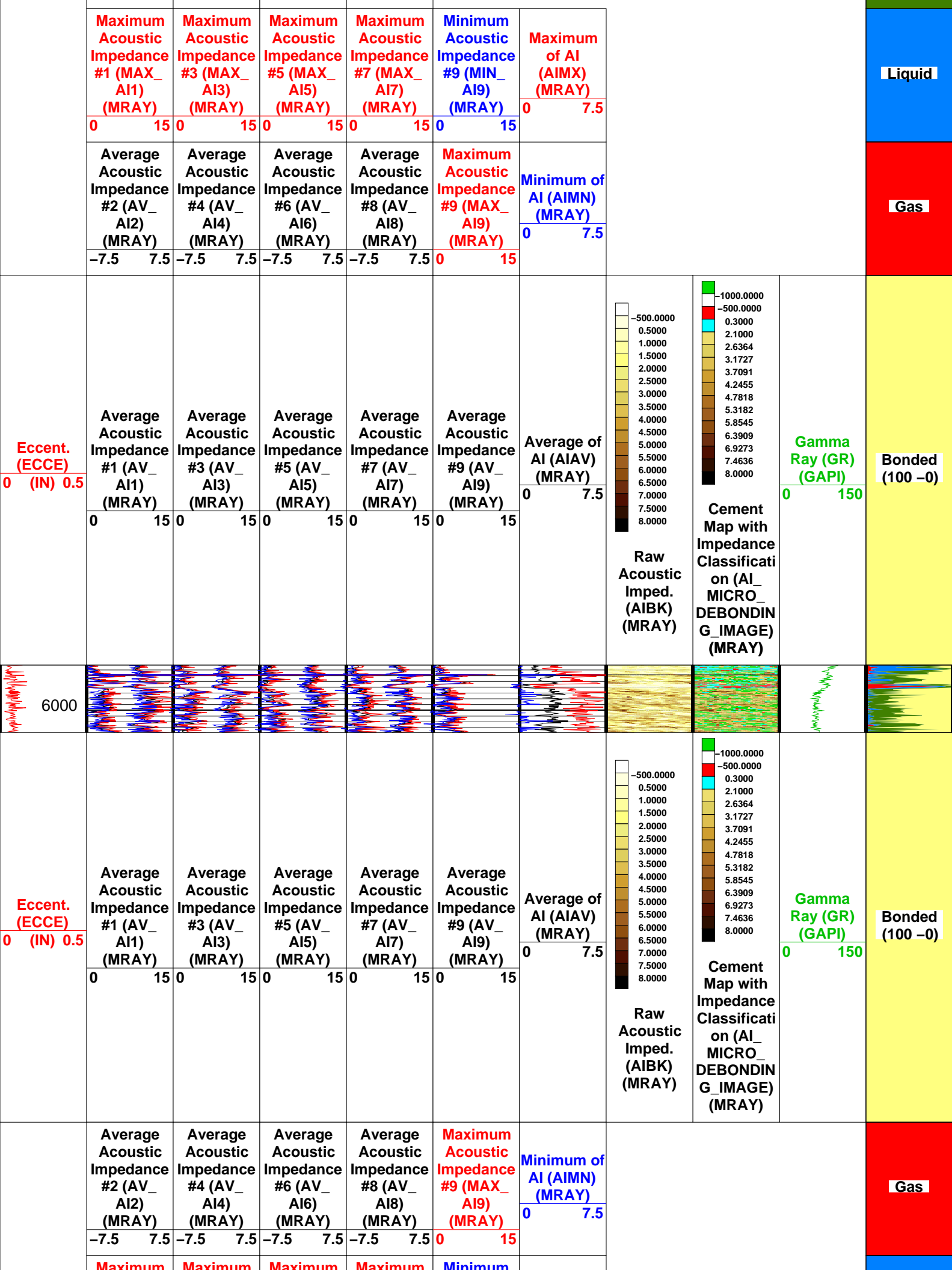
Fluid Velocity (DFVL)

Acoustic Impedance (ZMUD)

6200.00	198.60	1.70
5700.00	198.60	1.70
5000.00	198.50	1.70
4400.00	198.20	1.70
3800.00	198.20	1.70
3200.00	198.50	1.70
2600.00	198.10	1.70
2300.00	199.90	1.70
2000.00	201.10	1.72
1700.00	201.90	1.73
1400.00	203.20	1.70
1100.00	204.10	1.73
700.00	206.20	1.71
400.00	204.80	1.71

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)
-7.57.5	-7.57.5	-7.57.5	-7.57.5
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)
015	015	015	015
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)
-7.57.5	-7.57.5	-7.57.5	-7.57.5

Area



Liquid

Area

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)
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)		
-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)		
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5		

Format: USIT only Goodwin Compressed Vertical Scale: 0.1" per 100' Graphics File Created: 22-Jan-2014 19:59

OP System Version: 19C2-270

USIT-E 19C2-270 SGT-N 19C2-270
DTC-H 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.

Input DLIS Files

DEFAULT Splice_USI_SONIC_047CUP FN:1 PRODUCER 22-Jan-2014 19:23 6185.5 FT 5600.1 FT

Output DLIS Files

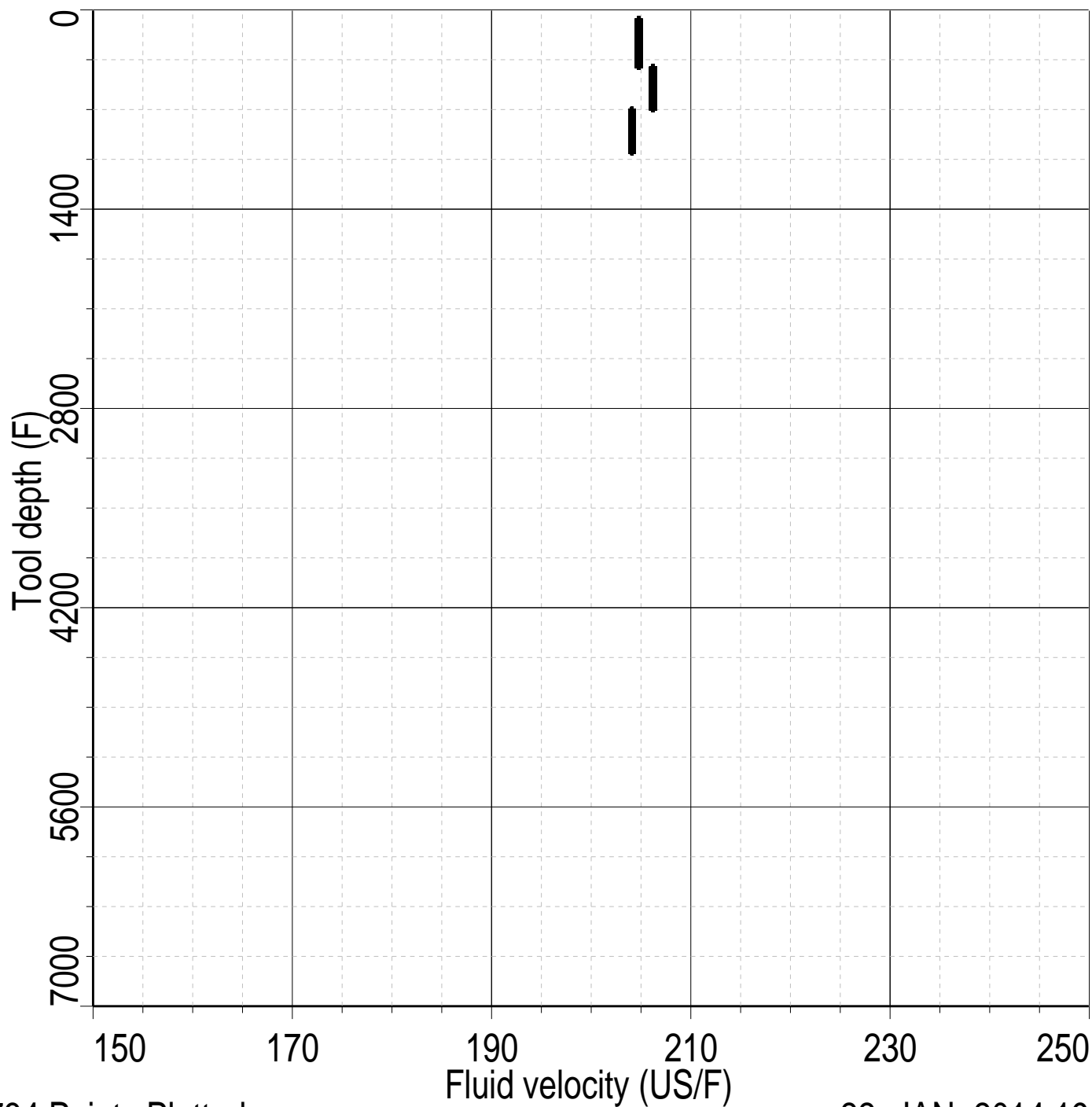
DEFAULT USI_053PUP FN:75 PRODUCER 22-Jan-2014 19:59

Schlumberger

FLUID PROPERTIES

MAXIS Field Log

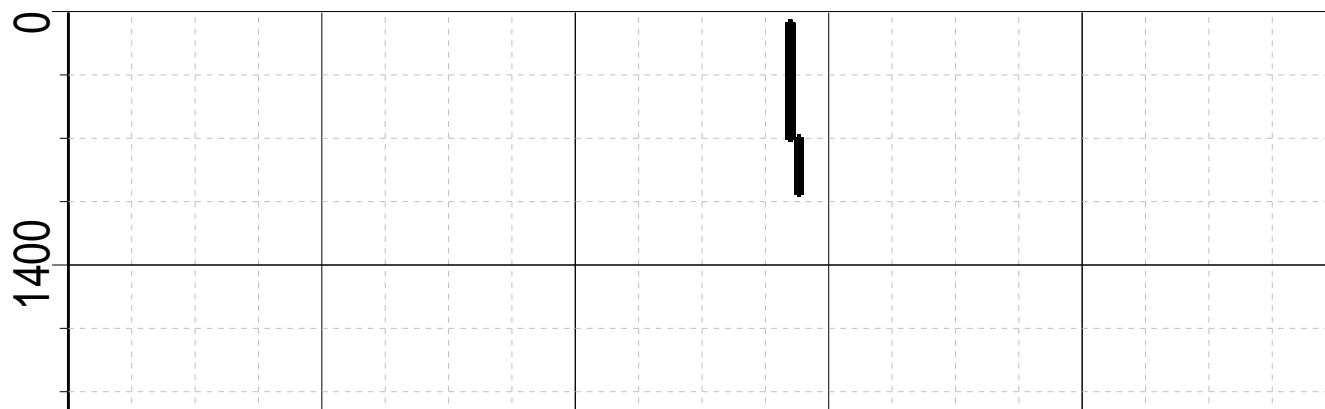
Index: 1000.0 – 66.7 FT

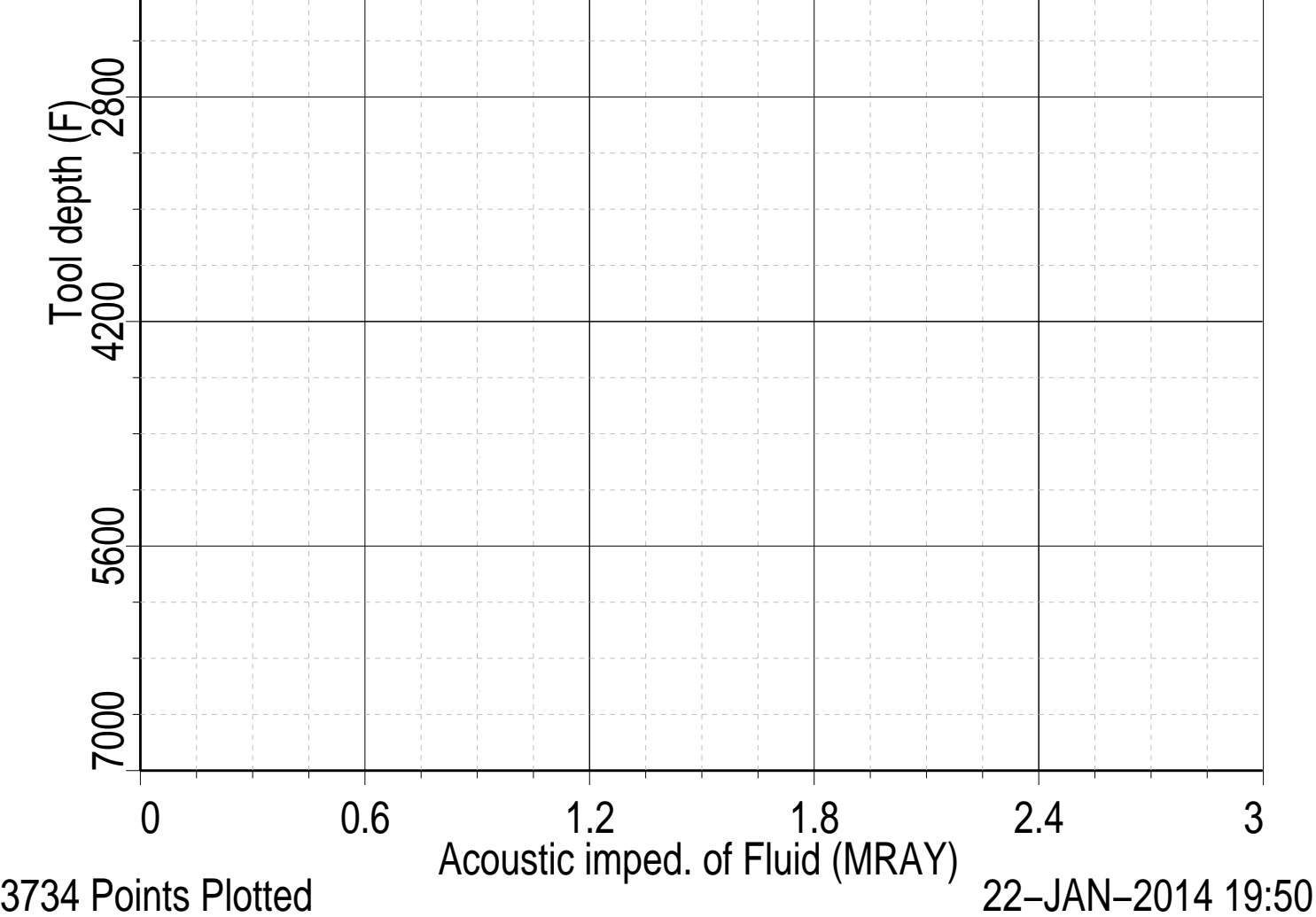


3734 Points Plotted

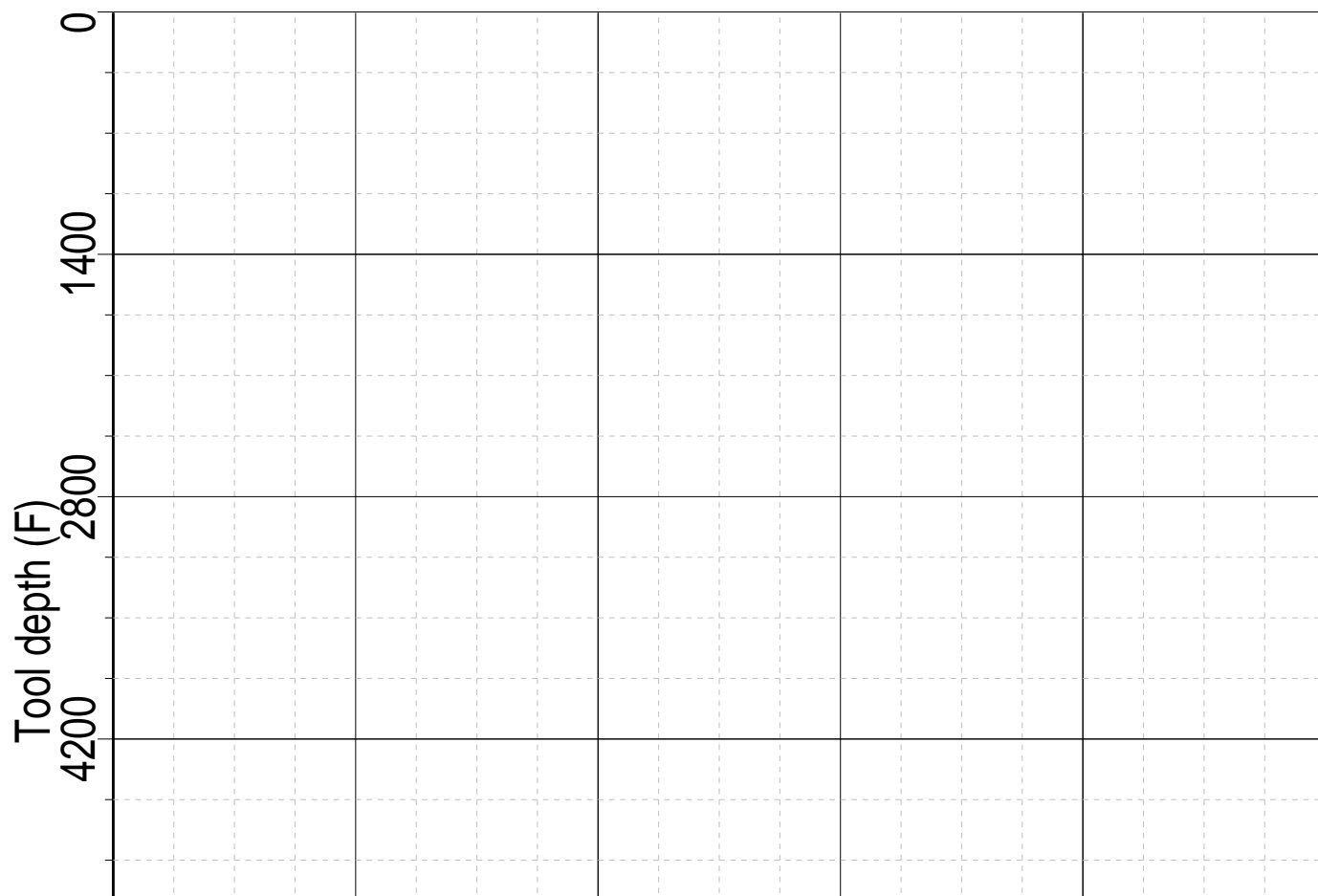
22-JAN-2014 19:50

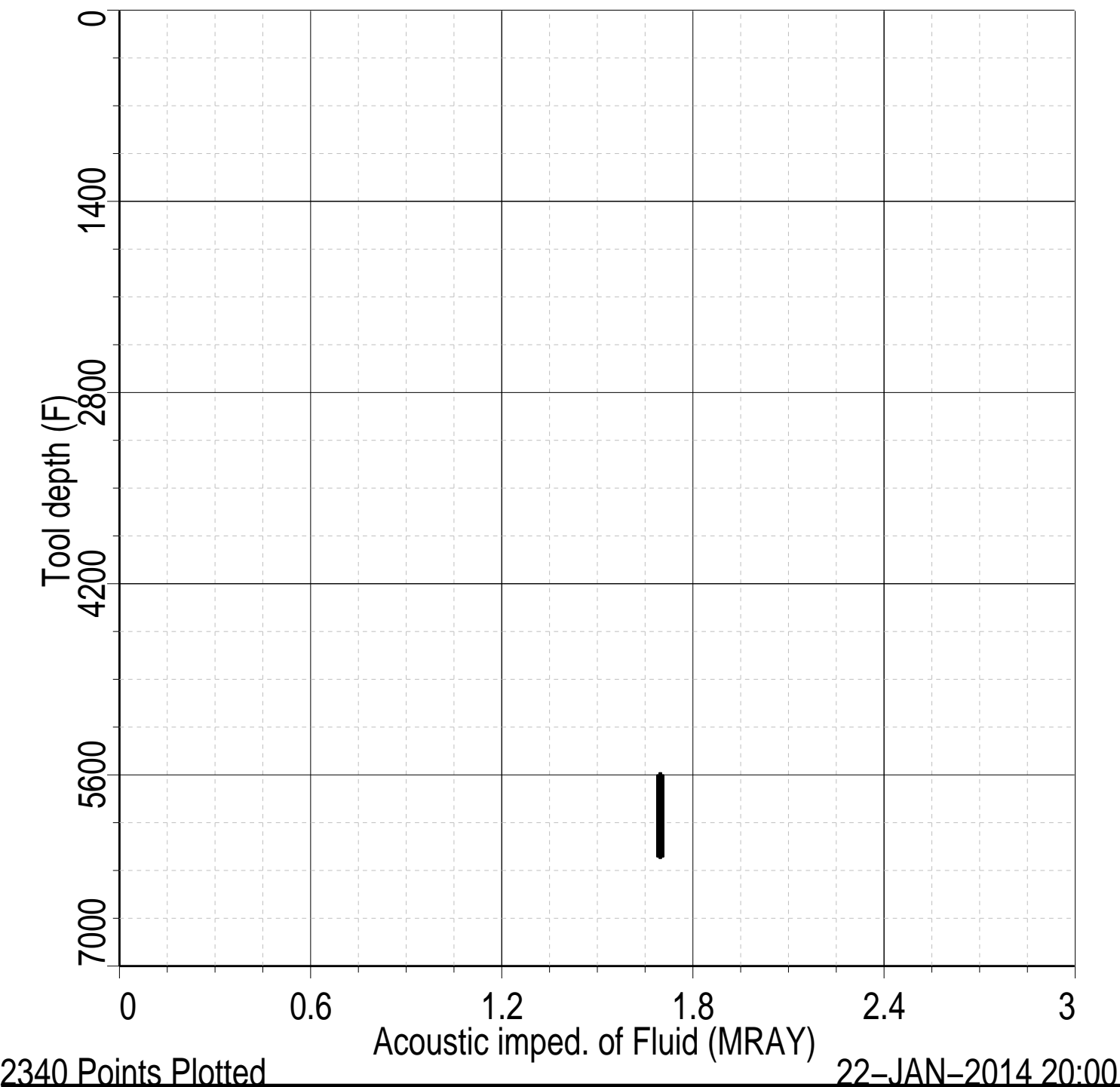
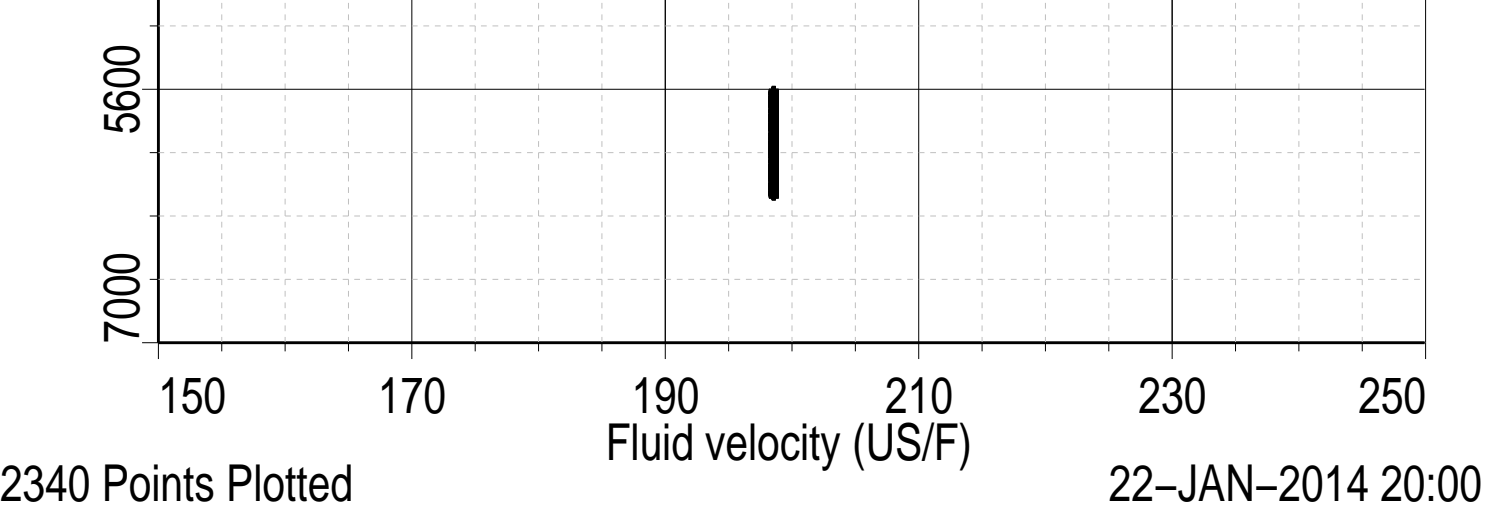
Index: 1000.0 – 66.7 FT





Index: 6188.5 – 5603.7 FT





Company: NOBLE ENERGY, INC.

Schlumberger

Well: **TREBOR B11-16**
Field: **WATTENBERG**
County: **WELD**
State: **COLORADO**

Ultrasonic Imaging tool
Cement Evaluation Print