HALLIBURTON | Sperry Drilling

PROPRIETARY

ROP Rate of Penetration
DGR Dual Gamma Ray
ADR Azimuthal Deep Resistivity
EWR Electromagnetic Wave Resistivity
ALD Azimuthal Lithodensity
CTN Compensated Thermal Neutron
XCAL Azimuthal Acoustic Caliper
XBAT Azimuthal Bimodal Acoustic Tool

1 : 240

Company : **Shell Gulf of Mexico Inc.**
Rig : **Polar Pioneer**
Well : **OCS-Y-2321 BJ001 ST00BP00**
Field : **Posey 6912**
Country : **USA**
API Number : **55-352-00004-00**

Country : **USA**
Field : **Posey 6912**
Location : **Lat: 71° 10' 24.06" North Long: 163° 28' 18.67" West**
Well : **OCS-Y-2321 BJ001 ST00BP00**
Company : **Shell Gulf of Mexico Inc.**
Rig : **Polar Pioneer**

LOCATION
Latitude : **71° 10' 24.06" North**
Longitude : **163° 28' 18.67" West**
Final UTM Easting = 555,034.550 m
Final UTM Northing = 7,897,425.308 m

Other Services
PWD, DDSr
MRIL-WD

Permanent Datum : **Mean Sea Level** Elevation : **0.00 ft**
Log Measured From : **Drill Floor** **76.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **76.00 ft**
GL **N/A**
WD **146.00 ft**

Depth Logged : **222.00 ft** To **6,795.34 ft**
Date Logged : **30-Jul-15** To **21-Sep-15**
Total Depth MD : **6,800.00 ft** TVD : **6,795.34 ft**
Spud Date : **30-Jul-15**

Unit No. : **1**
Job No. : **AK-XX-0901604700**
Plot Type : **Final**
Plot Date : **01-Nov-15**

Run No.	Borehole Record (TVD) Size	From	To	Casing Record (TVD) Size	Weight	From	To
1	8.500 in	222.00 ft	1,511.97 ft	36.000 in	746.00 lbpf	257.00 ft	375.00 ft
5	17.500 in	1,511.97 ft	2,962.86 ft	22.000 in	224.00 lbpf	257.00 ft	1,474.97 ft
6	12.250 in	2,962.86 ft	5,421.17 ft	14.000 in	114.00 lbpf	257.00 ft	2,932.86 ft
7	8.500 in	5,421.17 ft	6,795.34 ft	9.625 in	53.00 lbpf	2,652.89 ft	5,406.20 ft

WELL INFORMATION

MWD Run Number	100	600	700				
Date run completed	01-Aug-15	14-Sep-15	22-Sep-15				
Rig Bit Number	1	6	7				
Bit Size (in)	8.500	12.250	8.500				
Tool Nominal OD (in)	6.75	8.000	6.750				
Log Start Depth (TVD, ft)	222.00	2,962.86	5,421.17				
Log End Depth (TVD, ft)	1,511.97	5,421.17	6,795.34				
Drill or Wipe	Drill	Drill	Drill				
Drill/Wipe Start Date and Time	30-Jul-15 17:05	12-Sep-15 01:20	20-Sep-15 08:52				
Drill/Wipe End Date and Time	01-Aug-15 11:21	13-Sep-15 16:35	21-Sep-15 23:09				
Min Inc (deg) @ Depth (TVD, ft)	0.00 @ 0.00	0.58 @ 3,074.40	3.42 @ 5,977.80				
Max Inc (deg) @ Depth (TVD, ft)	0.51 @ 320.88	3.70 @ 5,297.46	3.99 @ 6,740.52				
Bit TFA(in2) / Bit Type	0.71 / Tricone	0.99 / PDC	0.55 / PDC				
Flow Rate (gpm)	449.40	828.00	550.00				
Max AV (fpm) / CV (fpm) @ MWD	774.0 / 984.0	239.0 / 357.0	549.0 / 1,000.0				
Fluid Type	Sea Water	Polymer	Polymer				
Density (ppg) / Viscosity (spqt)	8.55 / 27.00	11.40 / 56.00	12.00 / 79.00				
Filtrate CL (ppm)	35,000.00	100,000.00	135,000.00				
pH / Fluid Loss (mptm)	8.50 / 0	9.10 / 4	9.30 / 6				
PV (cP) / YP (lhf2)	17 / 31.00	20 / 27.00	23 / 33.00				
% Solids / % Sand	.01 / .01	16 / 0.5	18 / 0.5				
% Oil / Oil:Water Ratio	0 / 0:100	0 / 0:84	0 / 0:79				
Rm @ Measured Temp (degF)	0.350 @ 35.60	0.080 @ 88.00	0.070 @ 70.00				
Rmf @ Measured Temp (degF)	N/A @ N/A	0.050 @ 88.00	0.060 @ 70.00				
Rmc @ Measured Temp (degF)	N/A @ N/A	0.120 @ 88.00	0.140 @ 70.00				
Max Tool Temp (degF) / Source	42.60 / HCIM	144.94 / HCIM	152.00 / HCIM				

Rm @ Max Tool Temp (degF)	0.3004 @ 42.60	0.0849 @ 144.94	0.0338 @ 152.00		
Lead MWD Engineer	Nick Weeks	Jack Kleinhans	Jack Kleinhans		
Customer Representative	Doug Sloan	Matt Cazalet	Scott Lapiene		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	HCIM	HCIM	HCIM		
Software Version	88.58	88.58	88.58		
Sub Serial Number	12272466	11902800	11320539		
Insert Serial Number	14776659	12136690	11752800		
Date and Time Initialized	30-Jul-15 10:14	11-Sep-15 01:12	19-Sep-15 15:17		
Date and Time Read	01-Aug-15 18:48	18-Sep-15 18:26	25-Sep-15 08:40		
ECMB SW Version	N/A	N/A	generic 1.1.1 Linux 2.6.23.1		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	16.80	56.82	48.80		
Software Version	6.33	6.33	6.33		
Sub Serial Number	12510194	12606713	12460872		
Sonde Serial Number	12059421	12059488	11902192		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	0.00	208.54	301.32		

Gamma Ray Sensor Information

Tool Type	DGR	DGR	DGR		
Distance From Bit (ft)	6.67	37.22	38.40		
Recorded Sample Period (sec)	14	10	10		
Software Version	N/A	N/A	N/A		
Sub Serial Number	12519619	11651705	12519617		
Insert/Sonde Serial Number	12464236	12351708	12041832		

Neutron Sensor Information

Tool Type	CTN	CTN	CTN		
Distance From Bit (ft)	92.13	106.44	126.09		
Recorded Sample Period (sec)	14	10	10		
Sub Serial Number	12473205	12228154	12120657		
Insert Serial Number	12428642	11524484	12034145		
Source Serial Number	23646G	23647G	59459B		
Source Factor	N/A	N/A	N/A		
Pin Orientation	Down	Down	Down		

Density Sensor Information

Tool Type	ALD	ALD	ALD		
Distance From Bit (ft)	79.17	87.77	113.16		
Recorded Sample Period (sec)	14	10	10		
Software Version	3.13	3.12	3.12		
Sub Serial Number	12522518	12279568	10853150		
Insert Serial Number	12541284	10718012	11496392		
Sensor ID Number	32767	32767	2		
Source Serial Number	46836B	39634B	39364b		
Pin Orientation	Down	Down	Down		
Stabilizer Blade O.D. (in)	8.25	11.90	8.20		
DPA Offset	135.00	45.00	135.00		

ADR SENSOR INFORMATION

Tool Type	ADR		ADR		
Tool Orientation	Deep Receiver Down		Deep Receiver Down		
Distance From SWRO to Bit (ft)	59.89		95.88		
Recorded Sample Period (sec)	14		10		
Tool SAP	11747086		12005268		
Receiver Insert SAP	11557203		11724109		
Transmitter Insert SAP	11829390		11292744		
Antenna Collar SAP	11747085		12005268		
App Firmware Version	415		415		
Processor Board FirmWare Version	306		306		
Processor FPGA FirmWare Version	4		4		
Transmitter PIC SW Version	1,025		1,025		
Tool Size	6.75"		6.75"		
Processor SIDS No.	281475276964047		281475276977376		
Processor PCB Rev.	N/A		N/A		
Receiver Board Upper SIDS No.	16607023626362025		16607023626541899		
Receiver Board Upper PCB Rev.	N/A		N/A		
Receiver Board Lower SIDS No.	16607023626361630		16607023626763496		
Receiver Board Lower PCB Rev.	N/A		N/A		
Receiver Board Deep SIDS No.	16607023626341336		16607023626764947		
Receiver Board Deep PCB Rev.	N/A		N/A		
Receiver Insert SIDS No.	11258999109368272		11258999116242384		
Transmitter Insert SIDS No.	4503634027974443		4503634016072279		
Antenna Collar SIDS No.	12666374086518188		12666374059062624		

XBAT Sensor Information

Tool Type	XBAT	XBAT	XBAT		
Dist from Bit	32.85	130.62	64.79		
Recorded Sample Period	20	15	15		
Electronics Insert SN	11215931	12451413	12465296		
Receiver Insert SN	12267657	12405002	12565577		
Transmitter Insert SN	10603805	12277635	12280476		
Collar SN	12323024	12389351	102064794		
CBM SSPROG Version	ssprog 1.0.9-1	ssprog 1.0.9-1	ssprog 1.0.9-1		
CBM Supprt Version	support 1.9.2-1	support 1.9.2-1	support 1.9.2-1		
XBAT Version	xbat 1.2.7-1	xbat 1.2.7-1	xbat 1.2.7-1		
XBAT Caliper ARM Version	122.00	122.00	122.00		
TCM Version	20.08	20.08	20.08		
QXCB DSP Version	52.00	52.00	52.00		
QXDAQ ARM Version	142.00	142.00	121.00		
DAQ DSP Version	53.00	53.00	53.00		
Sequence File Version	120829	131212	131212		
Sequence Selected	13:M9_D5_Q5	8:M9_D9_D4	8:M9_D9_D4		

REMARKS

1. ALL DEPTHS ARE MEASURED DEPTHS (MD), UNLESS OTHERWISE NOTED. THESE DEPTHS ARE BIT DEPTHS AND ARE CALLIBRATED TO THE DRILLERS PIPE TALLY. NO DEPTH CORRECTIONS HAVE BEEN MADE FOR PIPE STRETCH OR COMPRESSION.

2. ALL VERTICAL DEPTHS ARE TRUE VERTICAL DEPTHS (TVD), UNLESS OTHERWISE NOTED. ONLY INVERTED / REVERTED SECTIONS GREATER THAN 30' TVD ARE PRESENTED

3. ALL DATA PRESENTED IS RECORDED DATA UNLESS OTHERWISE STATED.

4. LWD RUN 1 WAS COMPRISED OF DIRECTIONAL, DUAL GAMMA RAY (DGR) UTILIZING GEIGER-MUELLER TUBE TYPE DETECTORS, AZIMUTHAL DEEP ELECTROMAGNETIC WAVE RESISTIVITY (ADR), PRESSURE WHILE DRILLING (PWD) DRILLSTRING DYNAMICS SENSOR (DDSr), AZIMUTHAL LITHODENSITY (ALD), COMPENSATED THERMAL NEUTRON (CTN), MAGNETIC RESONANCE WHILE DRILLING (MRIL-WD), AZIMUTHAL BIMODAL ACOUSTIC TOOL (XBAT), AND THE AZIMUTHAL ACOUSTIC CALIPER TOOL (XCAL)

AZIMUTHAL ACOUSTIC CALIPER TOOL (XCAL).

5. RUN 200 WAS A 36” HOLE OPENING RUN, RUN 300 WAS A 42” HOLE OPENING RUN, RUN 400 WAS A CLEANOUT RUN TO DRILL OUT THE SHOE TRACK AND 30’ OF NEW FORMATION. NO LWD SENSORS WERE UTILIZED. THEREFOR THEY ARE NOT PRESENTED.

6. MWD RUN 500 WAS A 17.5” DRILLING RUN UTILIZING DIRECTIONAL AND PWD. NO LOGGING SENSORS WERE PRESENT, ONLY ROP IS PRESENTED.

7. LWD RUN 6 WAS COMPRISED OF DIRECTIONAL, DUAL GAMMA RAY (DGR) UTILIZING GEIGER-MUELLER TUBE TYPE DETECTORS, ELECTROMAGNETIC WAVE RESISTIVITY PHASE 4 (EWR-P4), PRESSURE WHILE DRILLING (PWD) DRILLSTRING DYNAMICS SENSOR (DDSr), AZIMUTHAL LITHODENSITY (ALD), COMPENSATED THERMAL NEUTRON (CTN), AZIMUTHAL BIMODAL ACOUSTIC TOOL (XBAT), AND THE AZIMUTHAL ACOUSTIC CALIPER TOOL (XCAL).

8. LWD RUN 7 WAS COMPRISED OF DIRECTIONAL, DUAL GAMMA RAY (DGR) UTILIZING GEIGER-MUELLER TUBE TYPE DETECTORS, AZIMUTHAL DEEP ELECTROMAGNETIC WAVE RESISTIVITY (ADR), PRESSURE WHILE DRILLING (PWD) DRILLSTRING DYNAMICS SENSOR (DDSr), AZIMUTHAL LITHODENSITY (ALD), COMPENSATED THERMAL NEUTRON (CTN), MAGNETIC RESONANCE WHILE DRILLING (MRIL-WD), AZIMUTHAL BIMODAL ACOUSTIC TOOL (XBAT), AND THE AZIMUTHAL ACOUSTIC CALIPER TOOL (XCAL).

9. OVER THE COURSE OF THE 12.25” HOLE SECTION THERE ARE SEVERAL INSTANCES WHERE THE BOREHOLE RUGOSITY HAS CREATED “SPIKES” IN THE RESISTIVITY DATA. THIS IS DUE TO ONE RECIEVER READING THE HIGH SALINITY BOREHOLE FLUID (WASHOUT) AND THE OTHER READING THE FORMATION. THERE ARE ALSO AREAS ACROSS THE LOGGED INTERVAL THAT SHOW AN UNDERGAUGE HOLE.

10. LWD RUN 100 XBAT WAS SETUP TO FIRE 3 DIFFERENT ACTIVATIONS. ACTIVATION 1 WAS A 9KHz MONOPOLE FIRING, ACTIVATION 2 WAS A 5KHz DIPOLE FIRING, AND ACTIVATION 3 WAS A 5KHz QUADRAPOLE. COMPRESSIONAL WAS PICKED ONLY FROM THE DIPOLE ACTIVATION - A,C AND A-C ARRAYS. THE DIPOLE A AND C ARRAY'S SEMBLANCE IS PRESENTED ON THIS LOG.

11. REGARDING THE LWD RUN 100 XBAT LOG, THERE ARE SEVERAL INSTANCES ABOVE 530' MD/TVD WHERE THE COMPRESSIONAL ARRIVAL APPEARS TO BE CONTAMINATED/DOMINATED BY THE FLUID ARRIVAL. PICKS WERE NOT MADE WHERE THERE IS LITTLE CONFIDENCE THAT THE PICK IS CORRECT. ADDITIONALLY THERE WAS ONLY A HIGH ENOUGH SIGNAL TO NOISE RATIO IN THE FLEXURAL INTERFACE WAVE TO MAKE RELIABLE PICKS OVER A SMALL SECTION OF THE LOG, FROM 1276'MD TO 1324'MD. THE DIPOLE WAVEFORMS HAVE BEEN PROCESSED USING THE bp3_9 FILTER. THERE WAS NO REFRACTED SHEAR PRESENT OVER THE LOGGED INTERVAL TO CALIBRATE THE MUD VELOCITY FOR THE SLOW SHEAR CORRECTION. SLOW SHEAR CORRECTION PERFORMED USING A DYNAMIC HOLE SIZE FROM THE XCAL, MUD SPEED OF 189µSECS/FT AND A MUD WEIGHT OF 8.6 PPG.

12. LWD RUN 600 XBAT WAS SETUP TO FIRE 3 DIFFERENT ACTIVATIONS. ACTIVATION 1 WAS A 9KHz MONOPOLE FIRING, ACTIVATION 2 WAS A 9KHz DIPOLE FIRING, AND ACTIVATION 3 WAS A 4KHz DIPOLE. COMPRESSIONAL WAS PICKED ONLY FROM THE MONOPOLE ACTIVATION - A,B,C & D ARRAYS. THE MONOPOLE B ARRAY AND THE DIPOLE C ARRAY SEMBLANCE IS PRESENTED ON THIS LOG, PICKS WERE MADE FROM ALL MONOPOLE ACTIVATION ARRAYS, AS WELL AS THE A, C AND A-C ARRAYS FOR THE DIPOLE ACTIVATION. MONOPOLE WAVEFORMS HAVE BEEN PROCESSED USING A bp5_16 FILTER, DIPOLE WAVEFORMS HAVE BEEN PROCESSED WITH A bp3_12 FILTER. SLOW SHEAR CORRECTION PERFORMED USING A DYNAMIC HOLE SIZE FROM THE XCAL, MUD SPEED OF 185µSECS/FT AND A MUD WEIGHT OF 11.1 PPG.

13. LWD RUN 700 XBAT WAS SETUP TO FIRE 3 DIFFERENT ACTIVATIONS. ACTIVATION 1 WAS A 9KHz MONOPOLE FIRING, ACTIVATION 2 WAS A 9KHz DIPOLE FIRING, AND ACTIVATION 3 WAS A 4KHz DIPOLE. COMPRESSIONAL WAS PICKED ONLY FROM THE MONOPOLE ACTIVATION - A,B,C & D ARRAYS. THE MONOPOLE AND DIPOLE A ARRAY’S SEMBLANCE IS PRESENTED ON THIS LOG, PICKS WERE MADE FROM ALL MONOPOLE ACTIVATION ARRAYS, AS WELL AS THE A, C AND A-C ARRAYS FOR THE DIPOLE ACTIVATION. MONOPOLE WAVEFORMS HAVE BEEN PROCESSED USING A hp_13 FILTER, DIPOLE WAVEFORMS HAVE BEEN PROCESSED WITH A bp3_9 FILTER. SLOW SHEAR CORRECTION PERFORMED USING A DYNAMIC HOLE SIZE FROM THE XCAL, MUD SPEED OF 190µSECS/FT AND A MUD WEIGHT OF 12 PPG.

14. ALL XBAT WAVEFORMS WERE SAMPLED AT 10µSECS.

15. RUNS 1- 7 REPRESENT THE OCS-Y-2321 BJ001 ST00BP00 WELL WITH AN API# OF 55-352-00004-00. THIS WELL REACHED A TOTAL DEPTH OF 6,800'MD / 6,795'TVD

MNEMONICS CURVE DESCRIPTION

ROPA	AVERAGE RATE OF PENETRATION
DGRCC	DGR COMBINED GAMMA RAY BC
ARH16PC	ADR AVERAGE 2mhz 16" PHASE RESISTIVITY BC
ARH32PC	ADR AVERAGE 2mhz 32" PHASE RESISTIVITY BC
ARH48PC	ADR AVERAGE 2mhz 48" PHASE RESISTIVITY BC
R09PC	EWR AVERAGE 2mhz 09" PHASE RESISTIVITY BC
R15PC	EWR AVERAGE 2mhz 15" PHASE RESISTIVITY BC
R27PC	EWR AVERAGE 2mhz 27" PHASE RESISTIVITY BC
R39PC	EWR AVERAGE 2mhz 39" PHASE RESISTIVITY BC
ADXT	ADR FORMATION EXPOSURE TIME
EWXT	EWR FORMATION EXPOSURE TIME
TNPS	CTN NEUTRON POROSITY - SANDSTONE
ALCDLC	ALD LOW COUNT RATE BIN DENSITY
ALDCLC	ALD LOW COUNT RATE BIN STAND OFF CORRECTION
ALPELC	ALD LOW COUNT RATE BIN PHOTOELECTRIC FACTOR
XBEDA	XCAL EQUIVALENT HOLE DIAMETER
XBVPVS	XBAT VP/VS RATIO
XBCS	XBAT COMPRESSIONAL SLOWNESS
XBCSS	XBAT COMBINED SHEAR SLOWNESS
XBDFX	XBAT DIPOLE FLEXURAL SLOWNESS
XBSFLAG	XBAT SHEAR FLAG

PARAMETERS USED IN LOG PROCESSING:

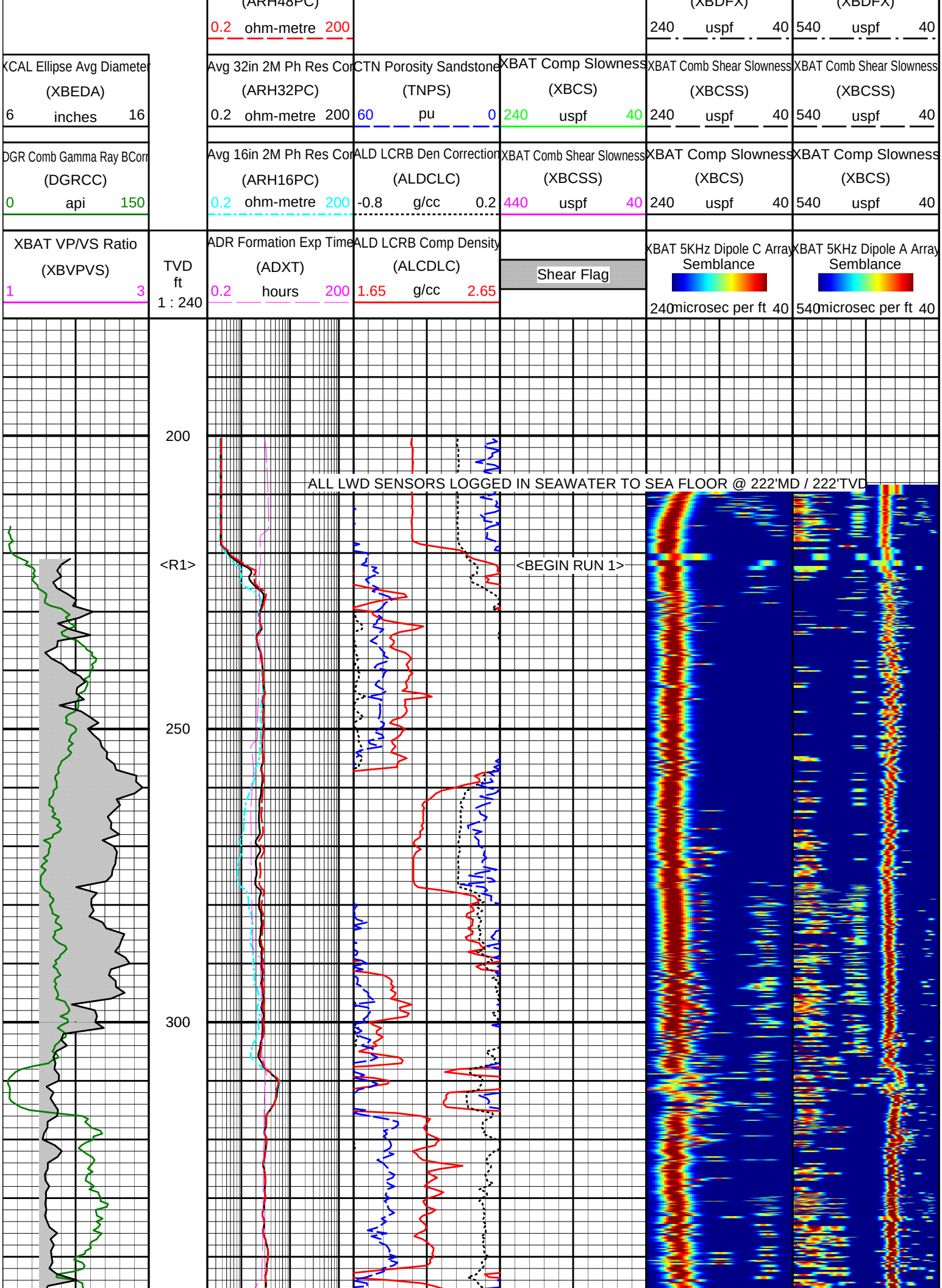
HOLE SIZE:	FIXED @ 8.50” AND 12.25”
MUD WEIGHT:	8.6 – 12.0 PPG
WHOLE MUD CHLORIDES:	18,000 PPM Cl- R100, 100,000-125,000 PPM Cl-
FORMATION WATER SALINITY:	21,200 PPM Cl-
FLUID DENSITY:	1.0 g/cc
MATRIX DENSITY:	2.65 g/cc
LITHOLOGY:	SANDSTONE

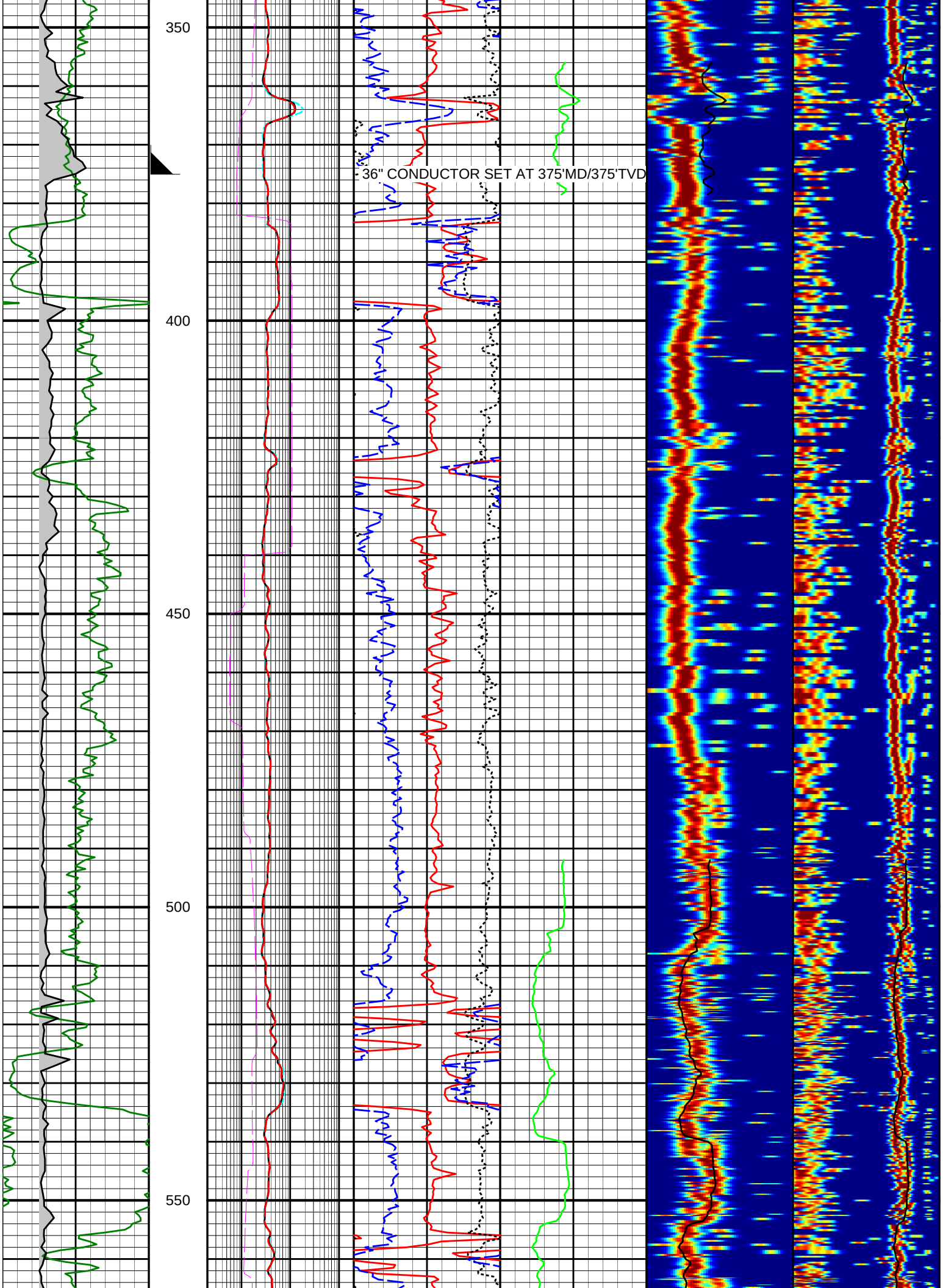
ALL 1:1200 DATA CURVES ARE PRESENTED AT A STEP OF 1.0', AND SMOOTHED OVER A 3.0' WINDOW. GAP FILL IS SET TO 5'. ALL 1:240 DATA CURVES ARE PRESENTED AT A STEP OF 0.5 FT, WITH A WINDOW OF 0.6FT EXCEPT THE ACOUSTIC CURVES, THEY ARE SMOOTHED TO A STEP OF 0.5 WITH A 1.2FT WINDOW. GAP FILL IS SET TO 3FT FOR ALL CURVES.

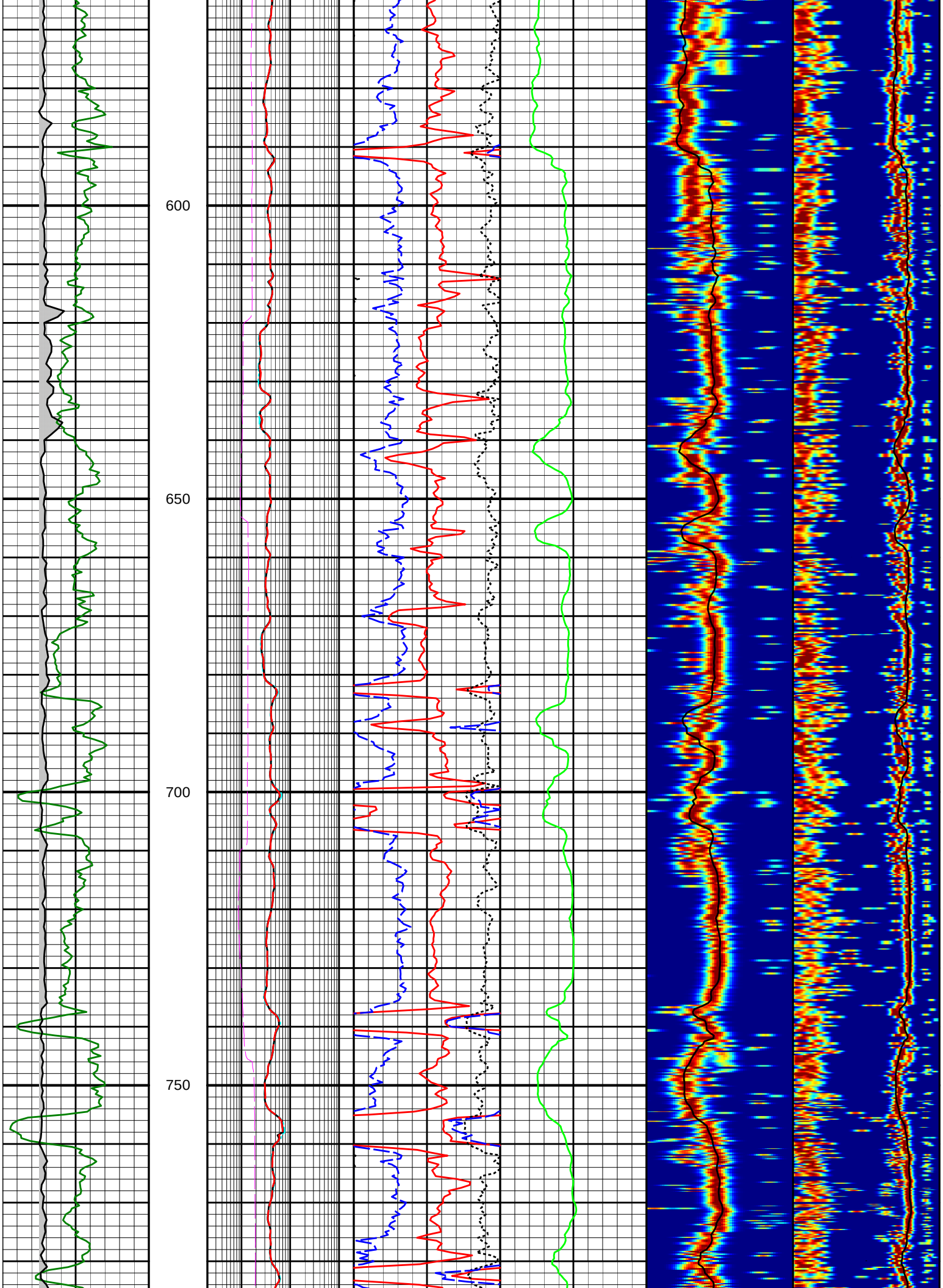
WARRANTY

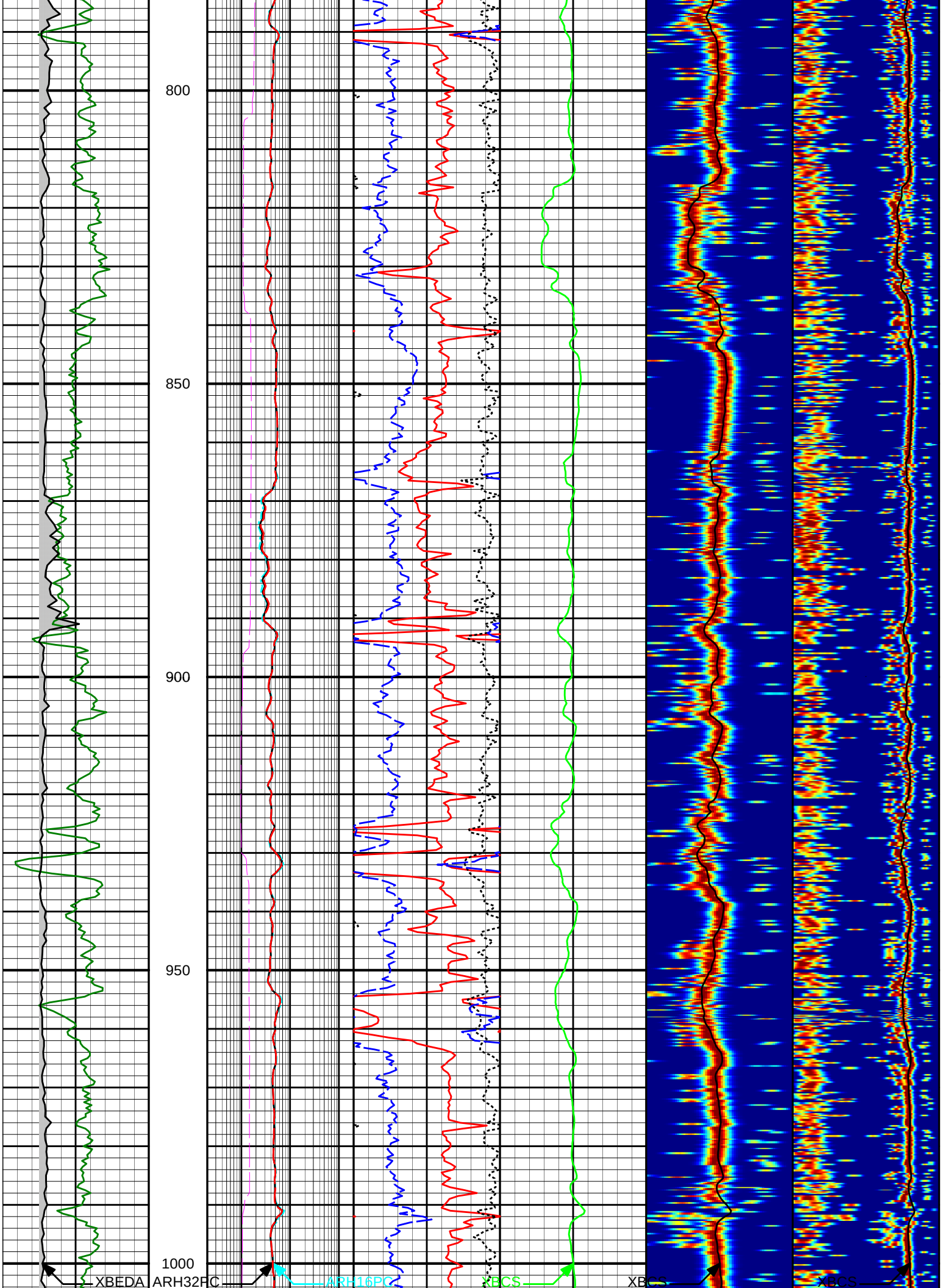
LWD RUN 100 - 8.50" PILOT HOLE

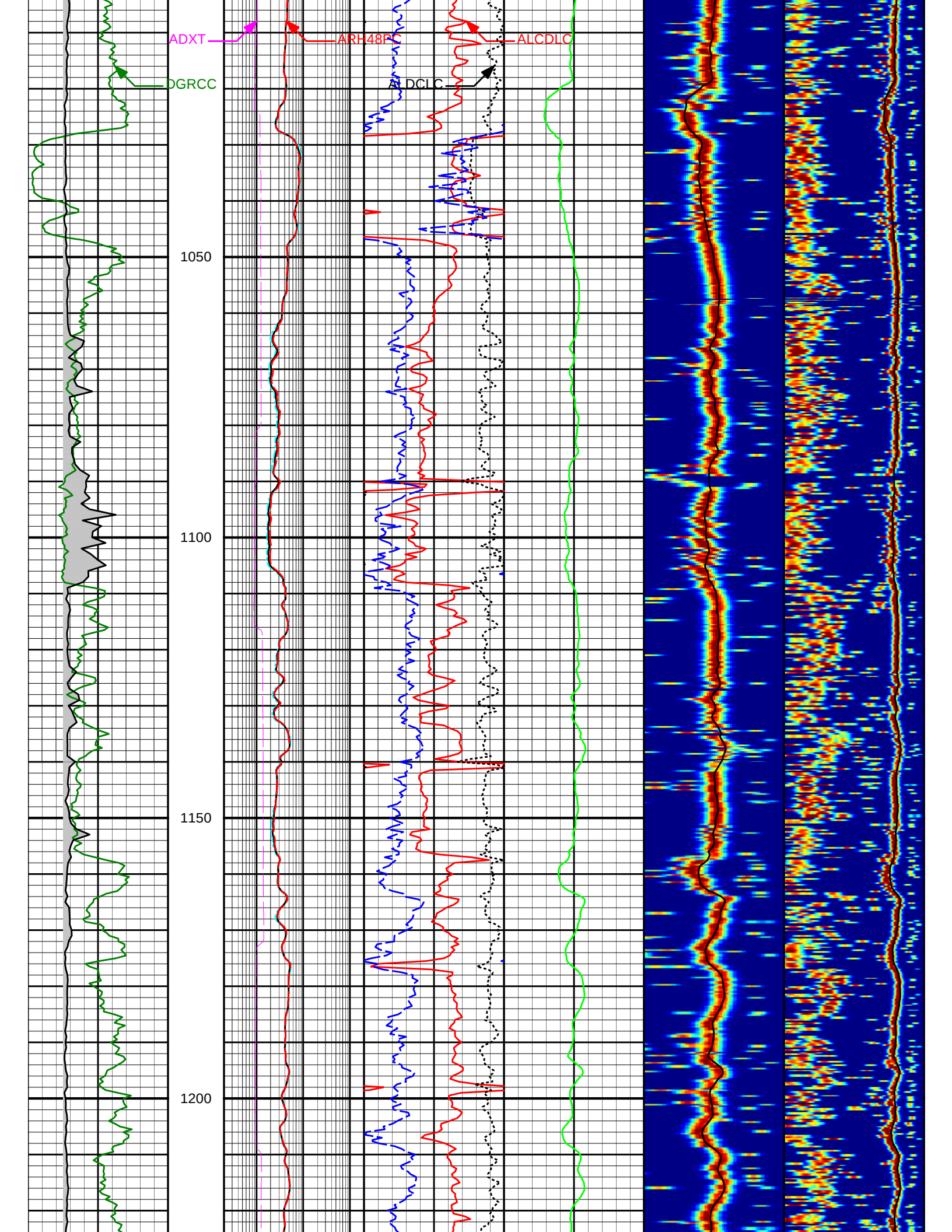
	Avg 48in 2M Ph Res Cor (ARH48PC)		XBAT Dipole Flex Slowness (XBDFX)	XBAT Dipole Flex Slowness (XBDFX)

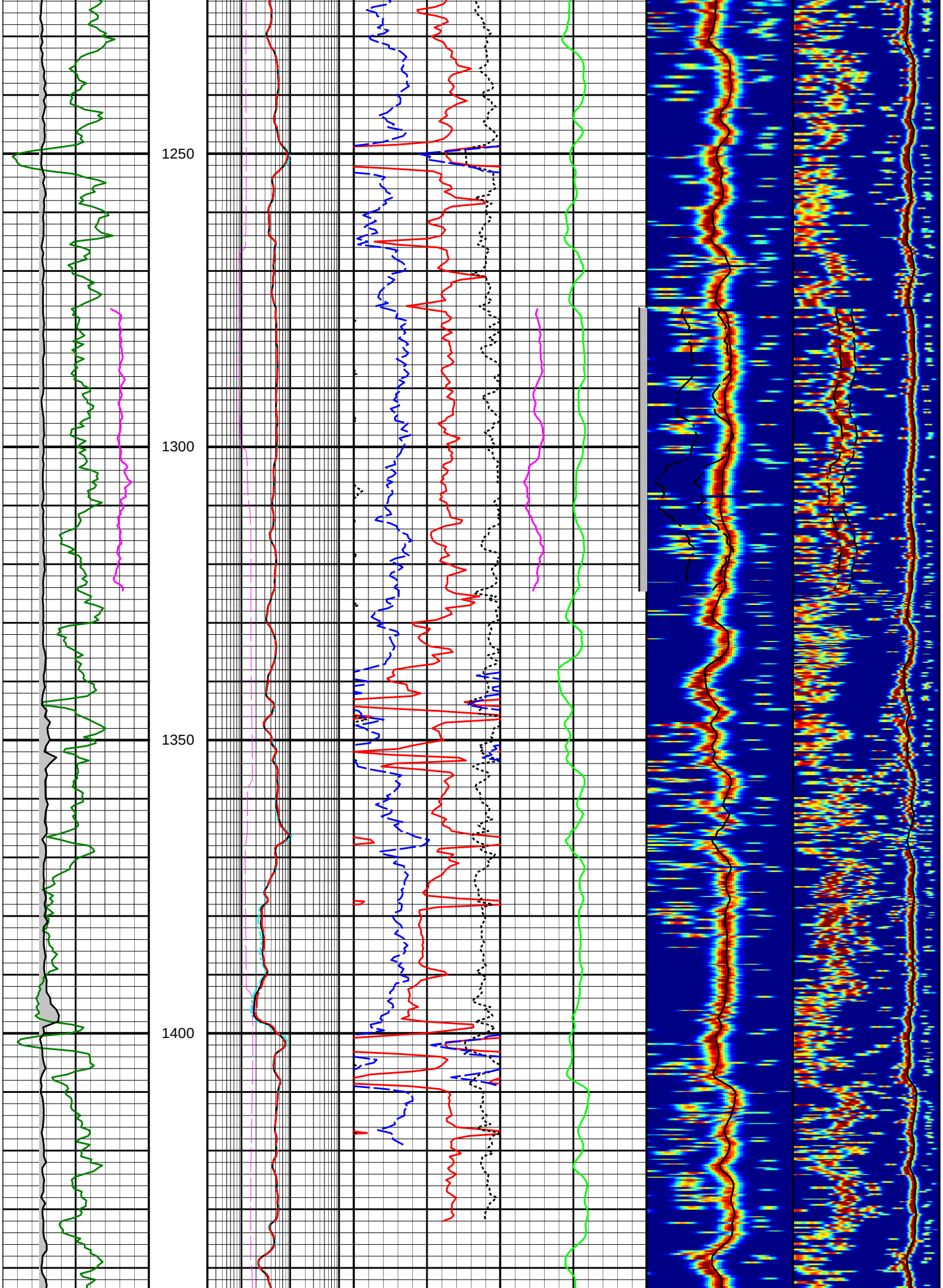

(ARH48PC)
0.2 ohm-metre 200
(XBDFX)
240 uspf 40
(XBDFX)
540 uspf 40
XCAL Ellipse Avg Diameter
(XBEDA)
6 inches 16
Avg 32in 2M Ph Res Cor
(ARH32PC)
0.2 ohm-metre 200
CTN Porosity Sandstone
(TNPS)
60 pu 0
XBAT Comp Slowness
(XBCS)
240 uspf 40
XBAT Comb Shear Slowness
(XBCSS)
240 uspf 40
XBAT Comb Shear Slowness
(XBCSS)
540 uspf 40
DGR Comb Gamma Ray BCorr
(DGRCC)
0 api 150
Avg 16in 2M Ph Res Cor
(ARH16PC)
0.2 ohm-metre 200
ALD LCRB Den Correction
(ALDCLC)
-0.8 g/cc 0.2
XBAT Comb Shear Slowness
(XBCSS)
440 uspf 40
XBAT Comp Slowness
(XBCS)
240 uspf 40
XBAT Comp Slowness
(XBCS)
540 uspf 40
XBAT VP/VS Ratio
(XBVPVS)
1 3
TVD
ft
1 : 240
ADR Formation Exp Time
(ADXT)
0.2 hours 200
ALD LCRB Comp Density
(ALCDLC)
1.65 g/cc 2.65
Shear Flag
XBAT 5KHz Dipole C Array
Semblance
240 microsec per ft 40
XBAT 5KHz Dipole A Array
Semblance
540 microsec per ft 40
200
<R1>
250
300
ALL LWD SENSORS LOGGED IN SEAWATER TO SEA FLOOR @ 222'MD / 222'TVD
<BEGIN RUN 1>

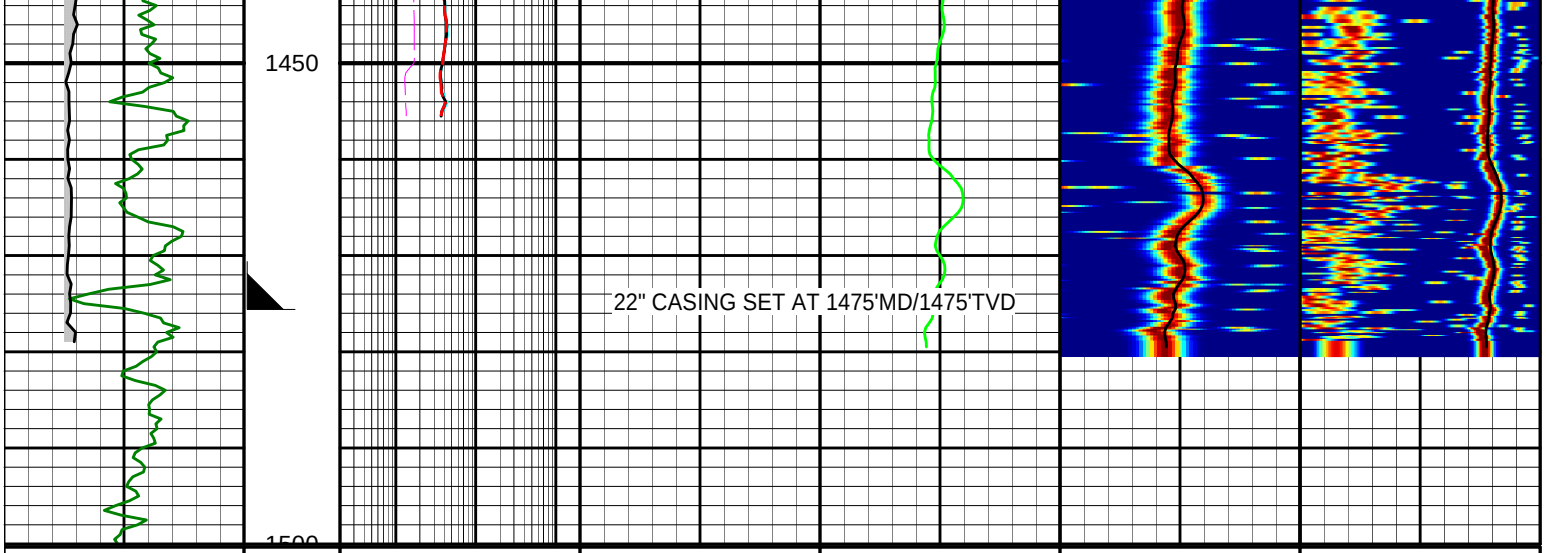

350
400
450
500
550
36" CONDUCTOR SET AT 375'MD/375'TVD


600
650
700
750


800
850
900
950
1000
XBEDA
ARH32RC
ARH16PC
XBCS
XBCS
XBCS


ADXT
ARH48PC
ALCDLC
DGRCC
ALDCLC
1050
1100
1150
1200

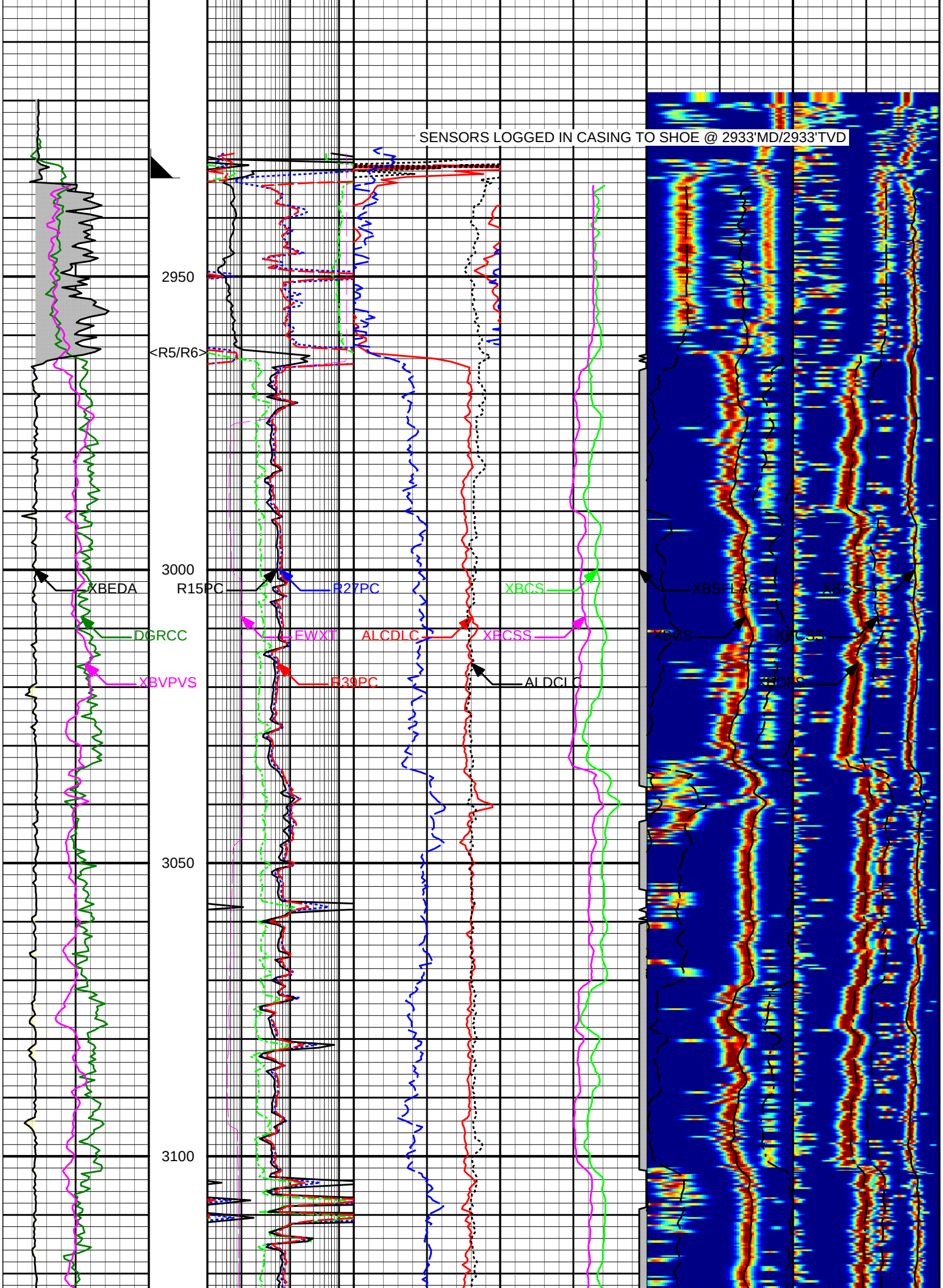

1250
1300
1350
1400

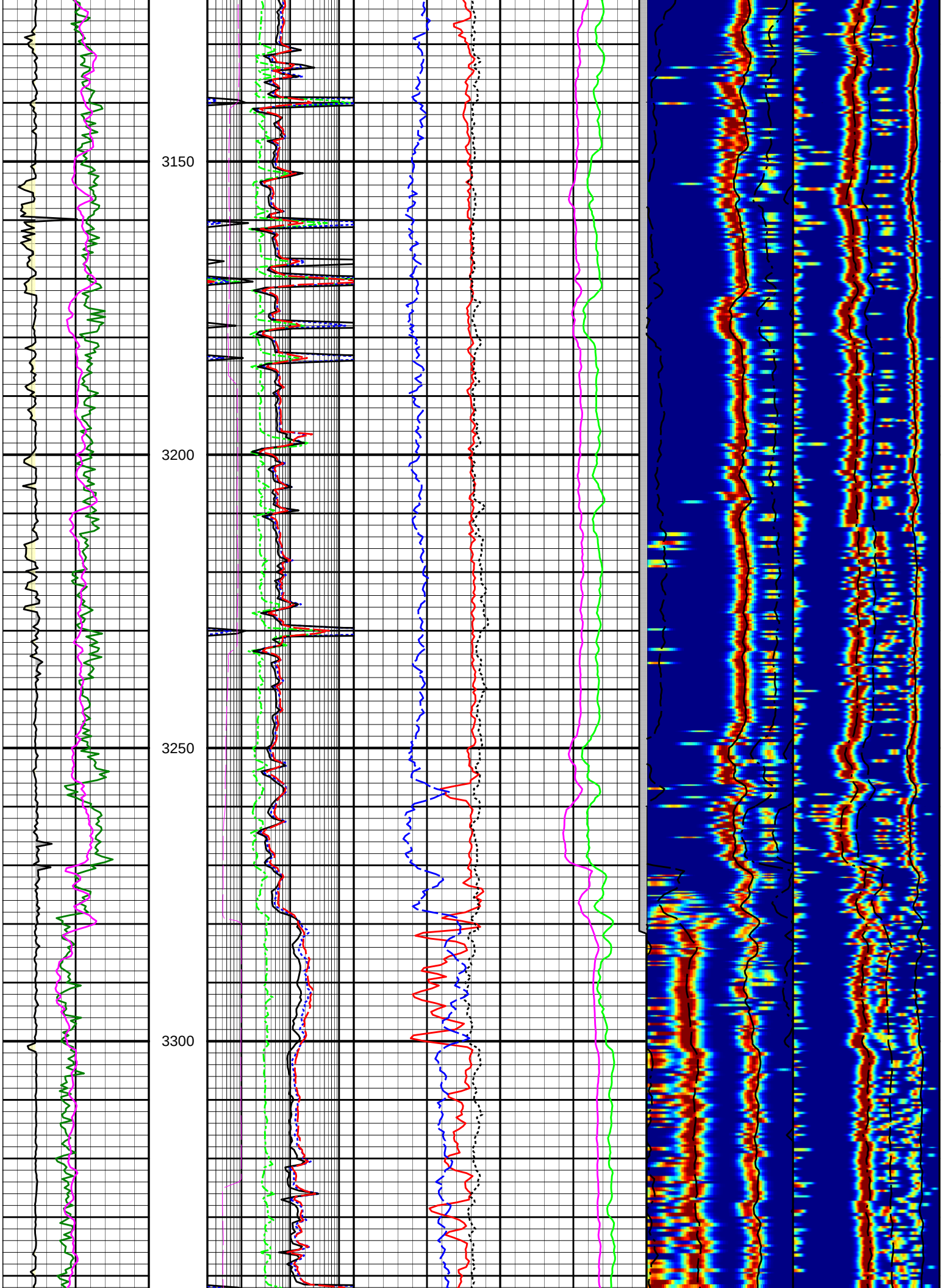


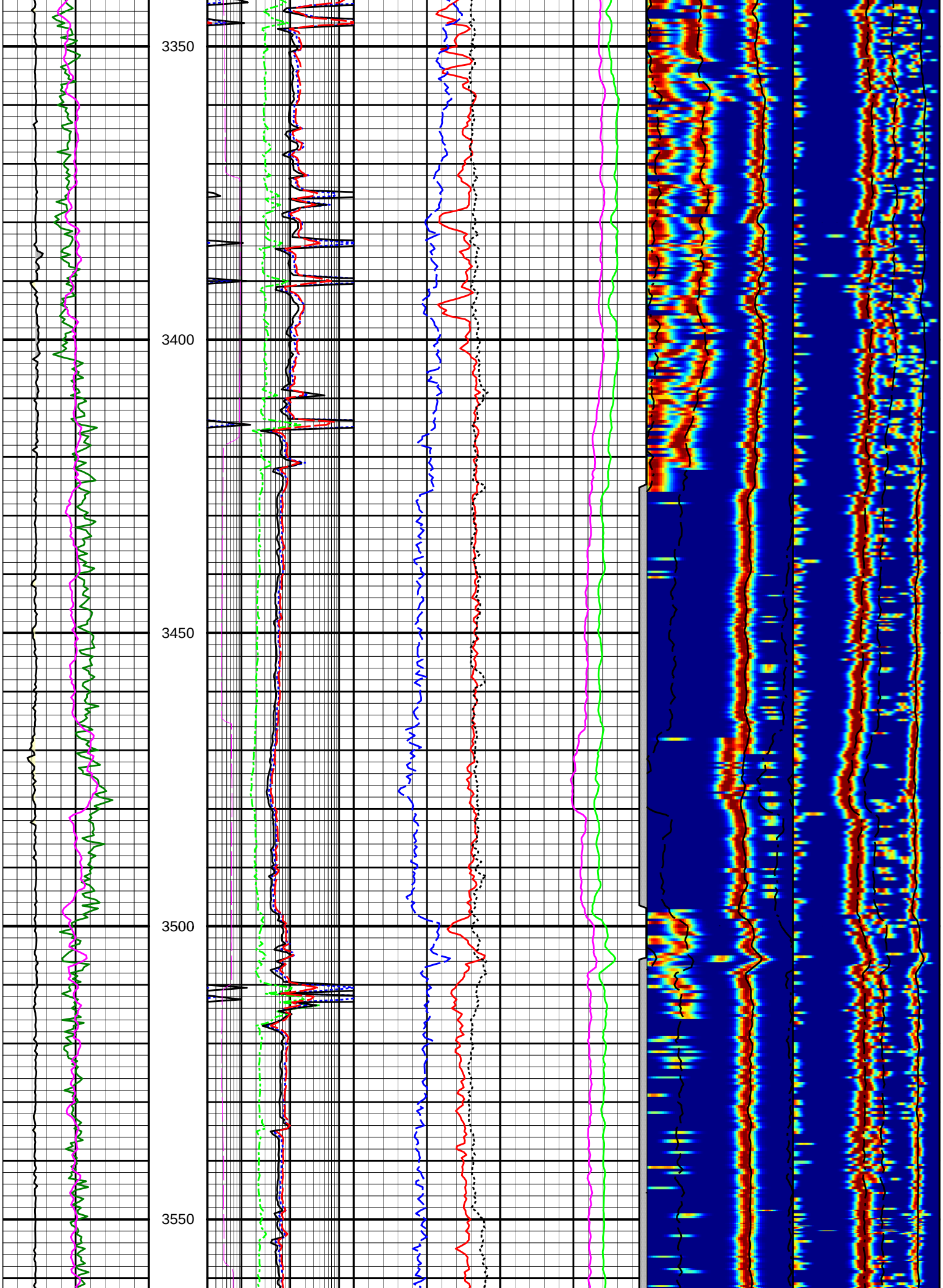
XBAT VP/VS Ratio (XBVPVS) 1 – 3	TVD ft 1 : 240	ADR Formation Exp Time (ADXT) 0.2 – hours – 200	ALD LCRB Comp Density (ALCDLC) 1.65 – g/cc – 2.65	Shear Flag	XBAT 5KHz Dipole C Array Semblance 240 – microsec per ft – 40	XBAT 5KHz Dipole A Array Semblance 540 – microsec per ft – 40
DGR Comb Gamma Ray BCorr (DGRCC) 0 – api – 150		Avg 16in 2M Ph Res Cor (ARH16PC) 0.2 – ohm-metre – 200	ALD LCRB Den Correction (ALDCLC) -0.8 – g/cc – 0.2	XBAT Comb Shear Slowness (XBCSS) 440 – uspf – 40	XBAT Comp Slowness (XBCS) 240 – uspf – 40	XBAT Comp Slowness (XBCS) 540 – uspf – 40
XCAL Ellipse Avg Diameter (XBEDA) 6 – inches – 16		Avg 32in 2M Ph Res Cor (ARH32PC) 0.2 – ohm-metre – 200	CTN Porosity Sandstone (TNPS) 60 – pu – 0	XBAT Comp Slowness (XBCS) 240 – uspf – 40	XBAT Comb Shear Slowness (XBCSS) 240 – uspf – 40	XBAT Comb Shear Slowness (XBCSS) 540 – uspf – 40
		Avg 48in 2M Ph Res Cor (ARH48PC) 0.2 – ohm-metre – 200			XBAT Dipole Flex Slowness (XBDFX) 240 – uspf – 40	XBAT Dipole Flex Slowness (XBDFX) 540 – uspf – 40

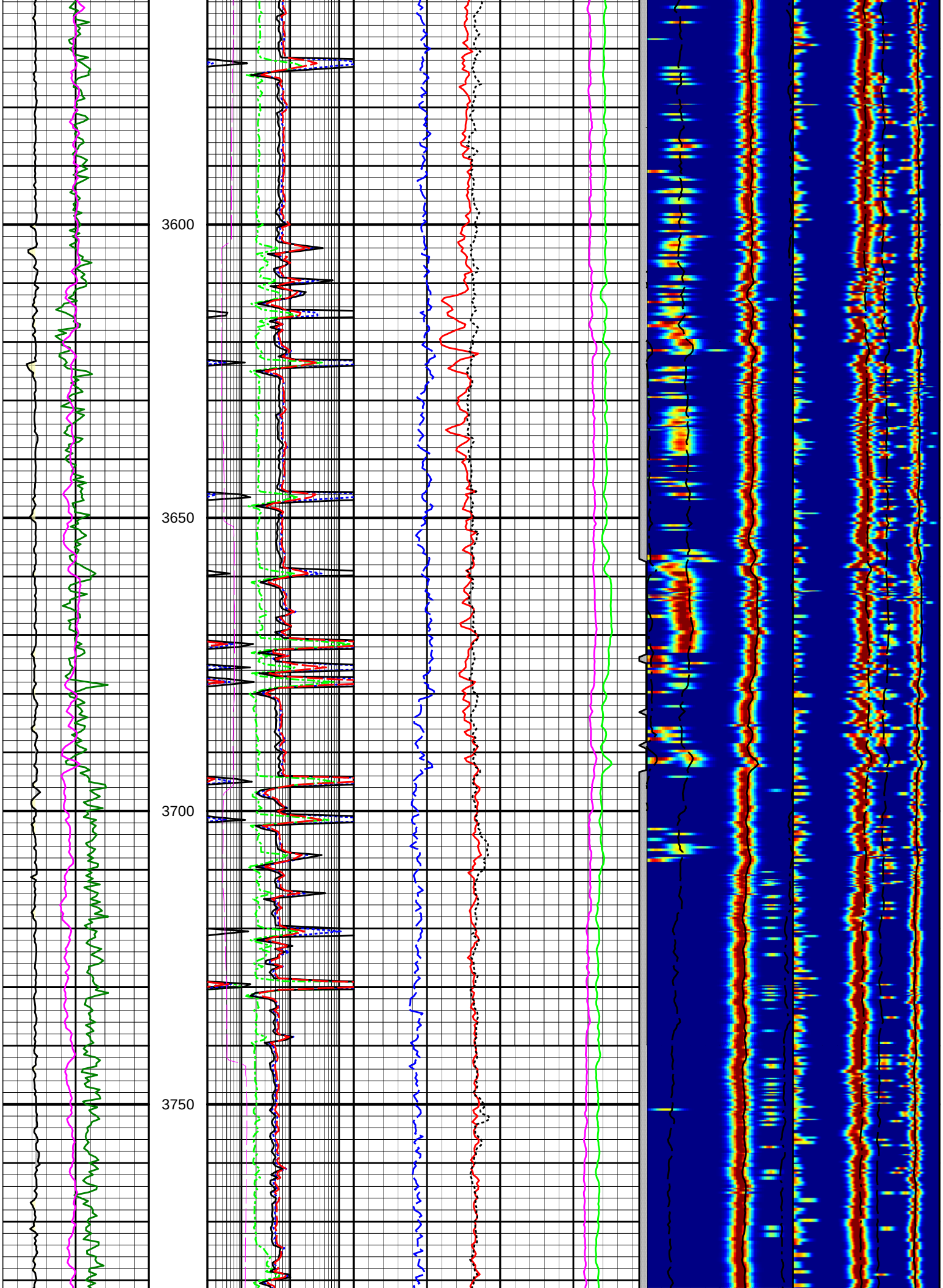
LWD RUN 600 - 12.25" HOLE SECTION

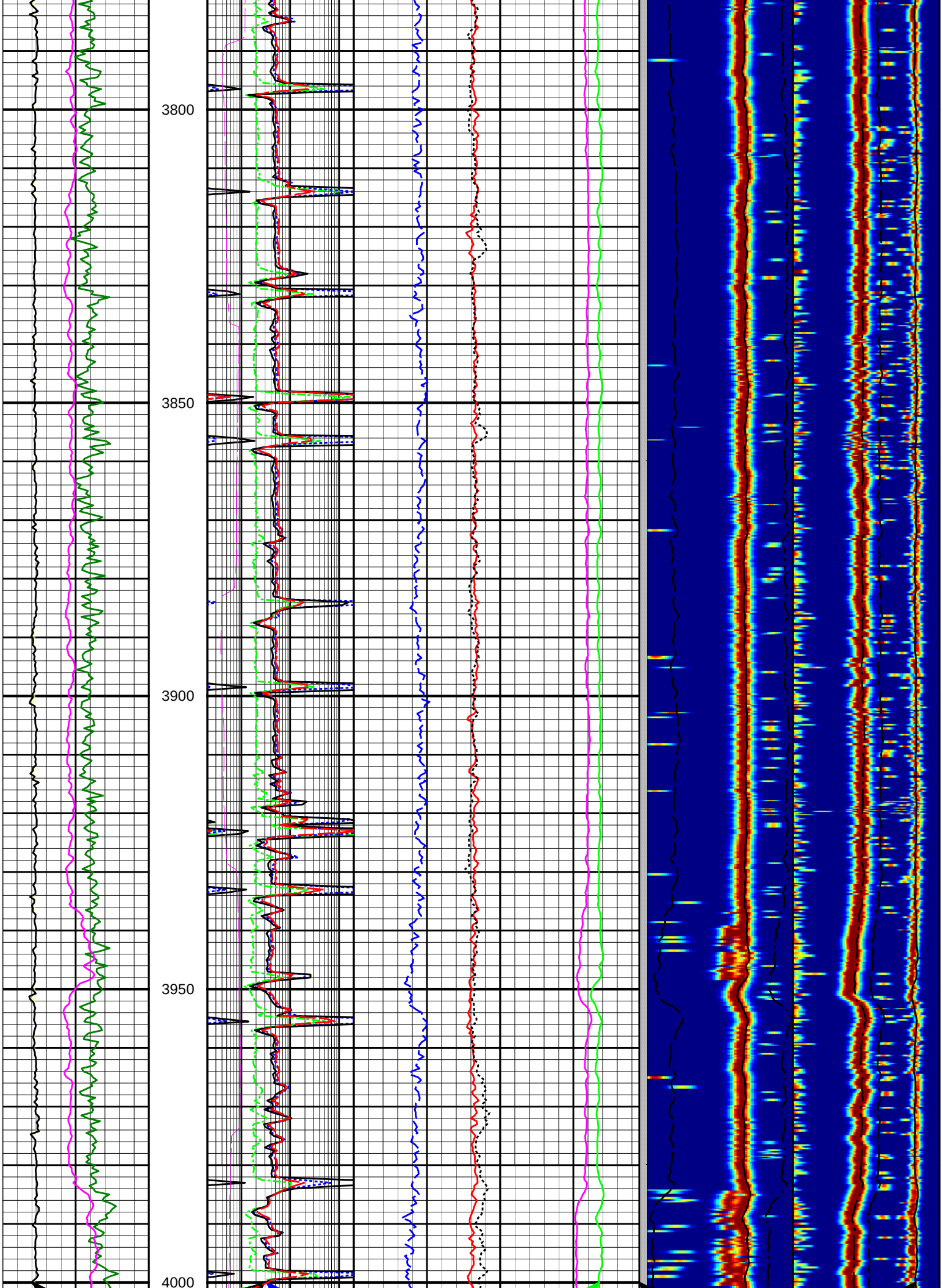
		9in Phase Resistivity BC ohm-metre 0.2 – 200				
		15in Phase Resistivity BC ohm-metre 0.2 – 200			XBAT Dipole Flex Slowness (XBDFX) 240 – uspf – 40	XBAT Dipole Flex Slowness (XBDFX) 440 – uspf – 40
XCAL Ellipse Avg Diameter (XBEDA) 10 – inches – 20		27in Phase Resistivity BC ohm-metre 0.2 – 200	CTN Porosity Sandstone (TNPS) 60 – pu – 0	XBAT Comp Slowness (XBCS) 240 – uspf – 40	XBAT Comb Shear Slowness (XBCSS) 240 – uspf – 40	XBAT Comb Shear Slowness (XBCSS) 440 – uspf – 40
DGR Comb Gamma Ray BCorr (DGRCC) 0 – api – 150		39in Phase Resistivity BC ohm-metre 0.2 – 200	ALD LCRB Den Correction (ALDCLC) -0.8 – g/cc – 0.2	XBAT Comb Shear Slowness (XBCSS) 440 – uspf – 40	XBAT Comp Slowness (XBCS) 240 – uspf – 40	XBAT Comp Slowness (XBCS) 440 – uspf – 40
XBAT VP/VS Ratio (XBVPVS) 1 – 3	TVD ft 1 : 240	EWR Formation Exp Time hours 0.2 – 200	ALD LCRB Comp Density (ALCDLC) 1.65 – g/cc – 2.65	Shear Flag	XBAT 9 KHz Mono B Array Semblance 240 – microsec per ft – 40	XBAT 4 KHz Dipole C Array Semblance 440 – microsec per ft – 40

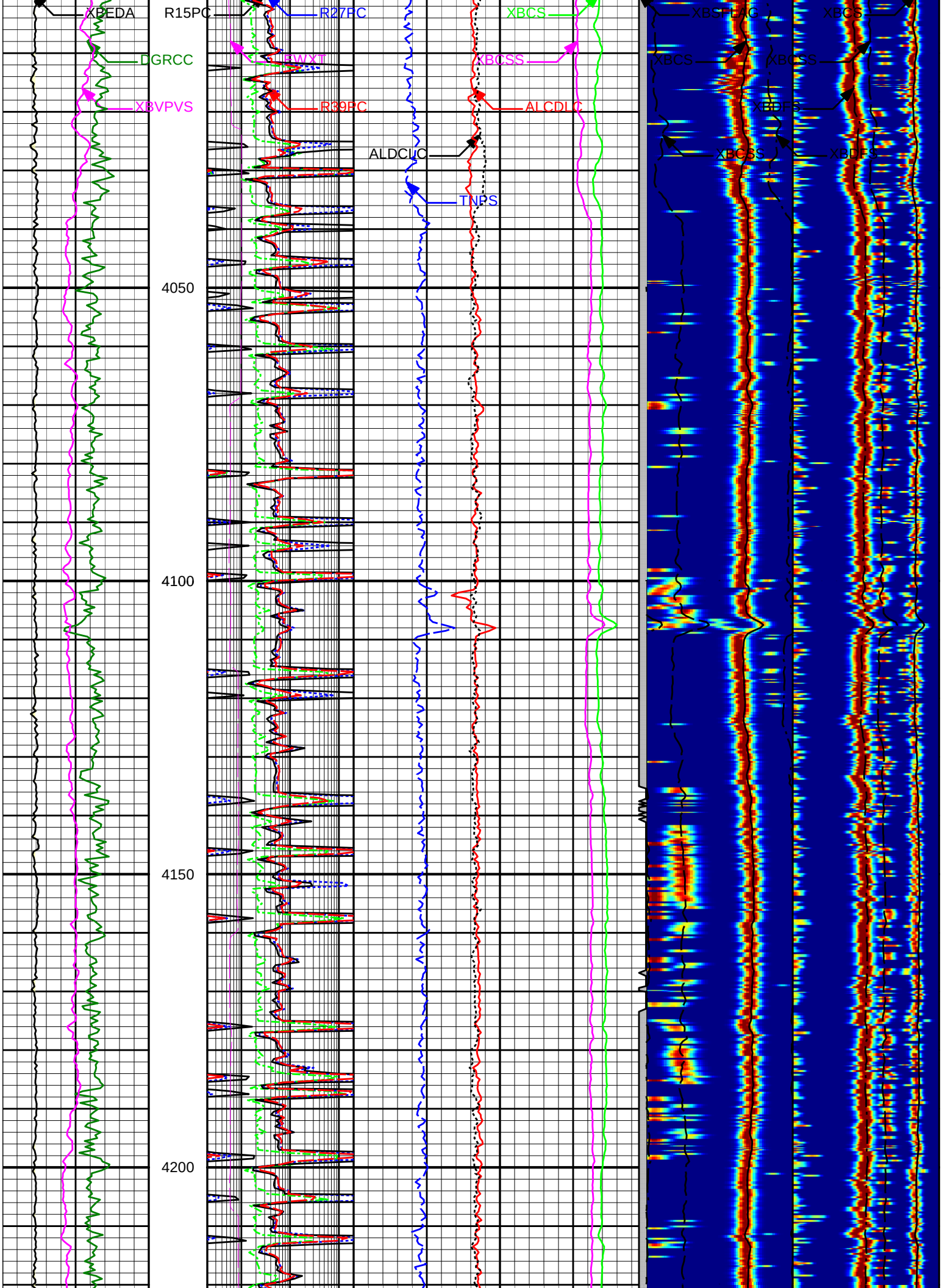

SENSORS LOGGED IN CASING TO SHOE @ 2933'MD/2933'TVD
2950
<R5/R6>
3000
XBEDA
R15PC
R27PC
XBCS
XBSFLAG
XBCS
DGRCC
EWXT
ALCDLC
XBCSS
XBCS
XBCSS
XBVPVS
R39PC
ALDCLC
XBDFS
3050
3100

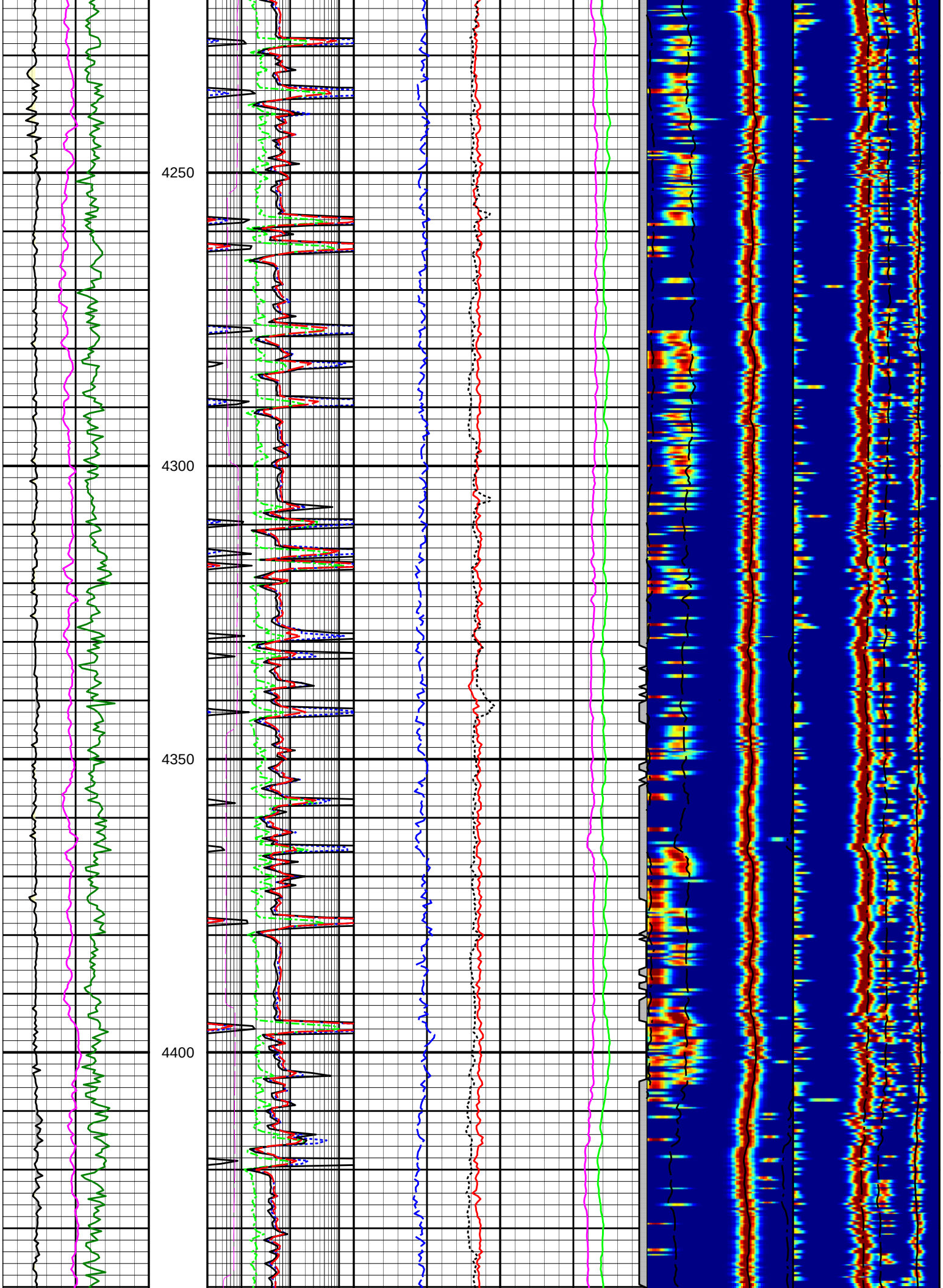

3150
3200
3250
3300

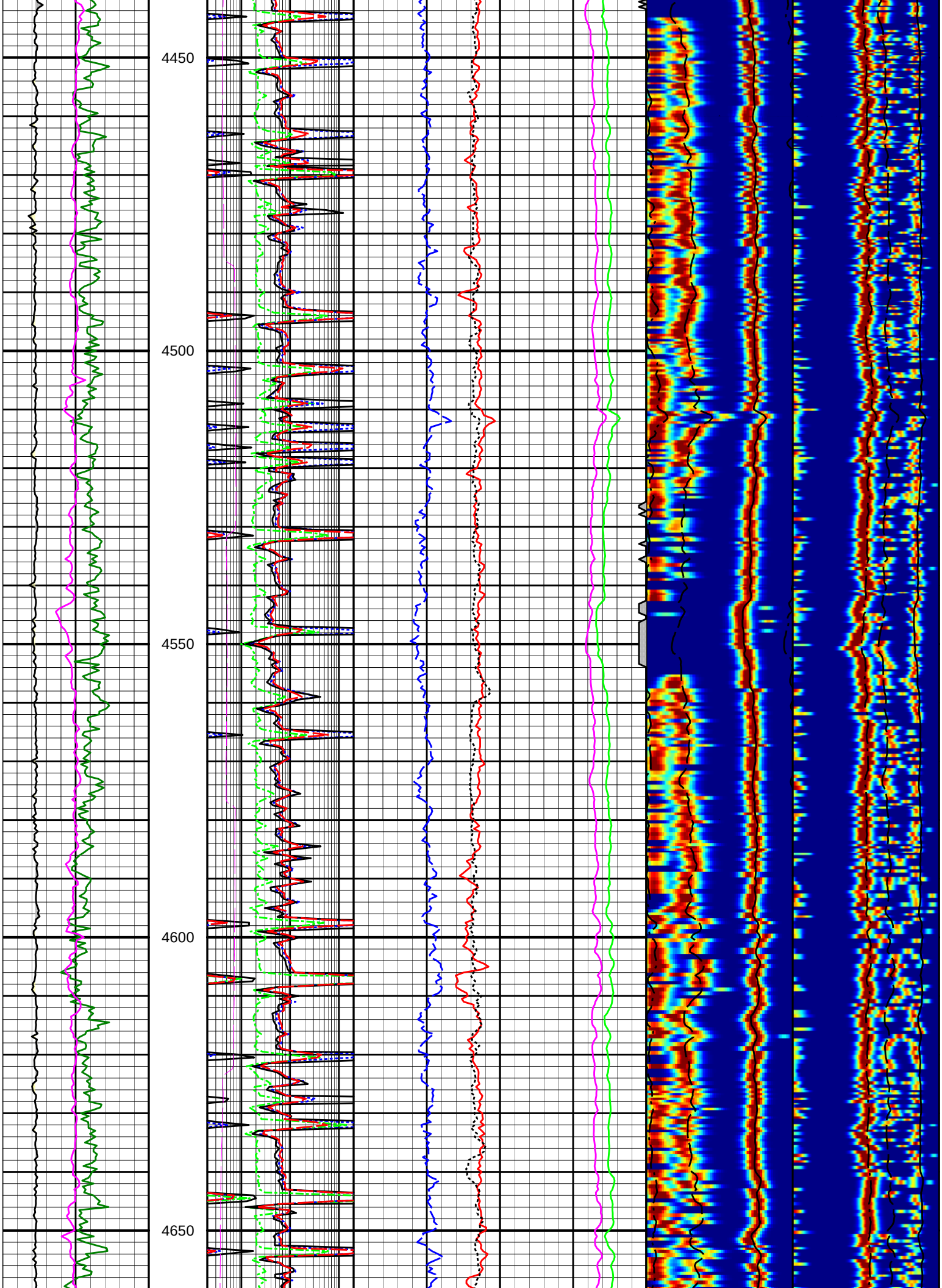

3350
3400
3450
3500
3550

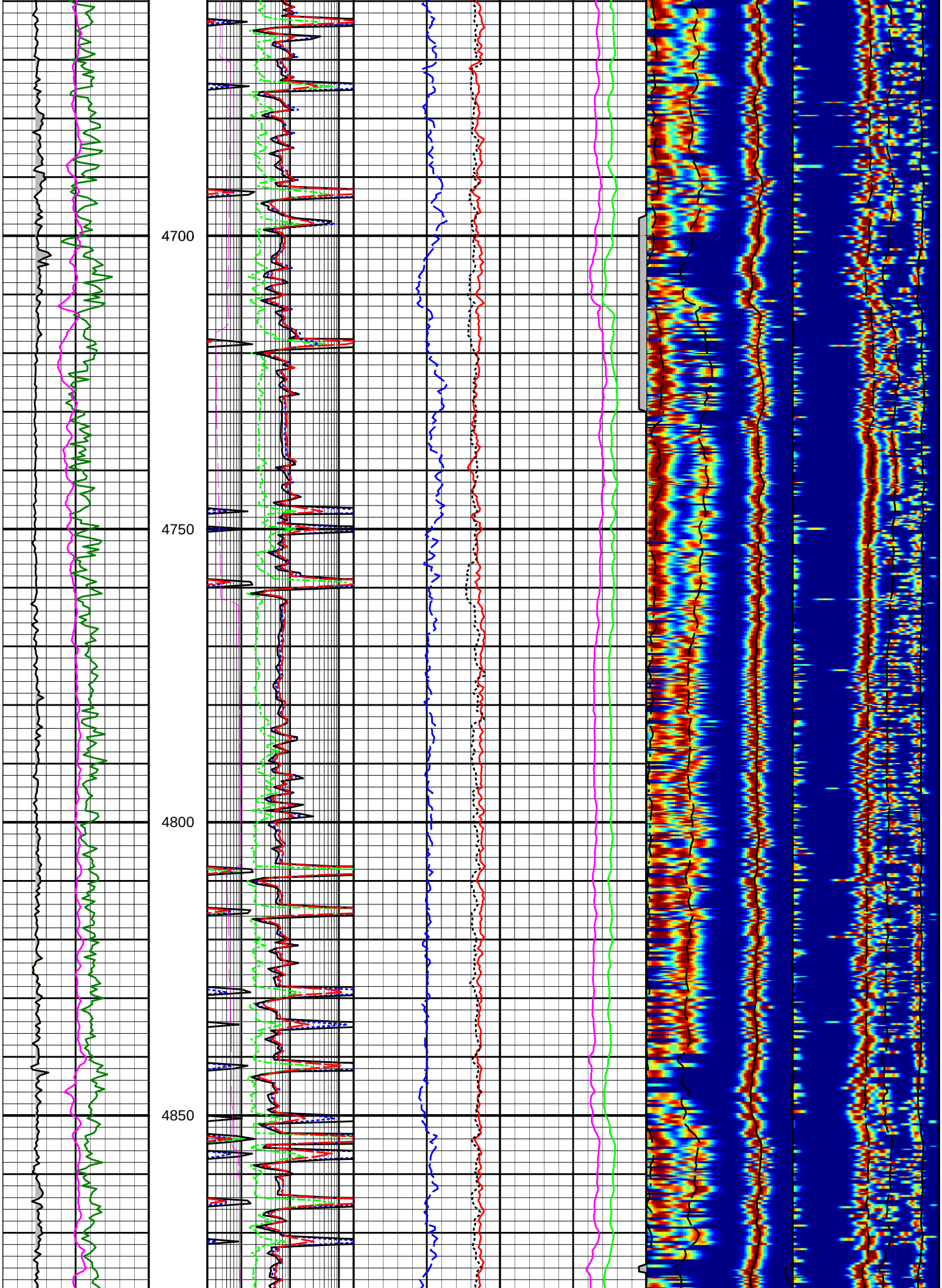

3600
3650
3700
3750

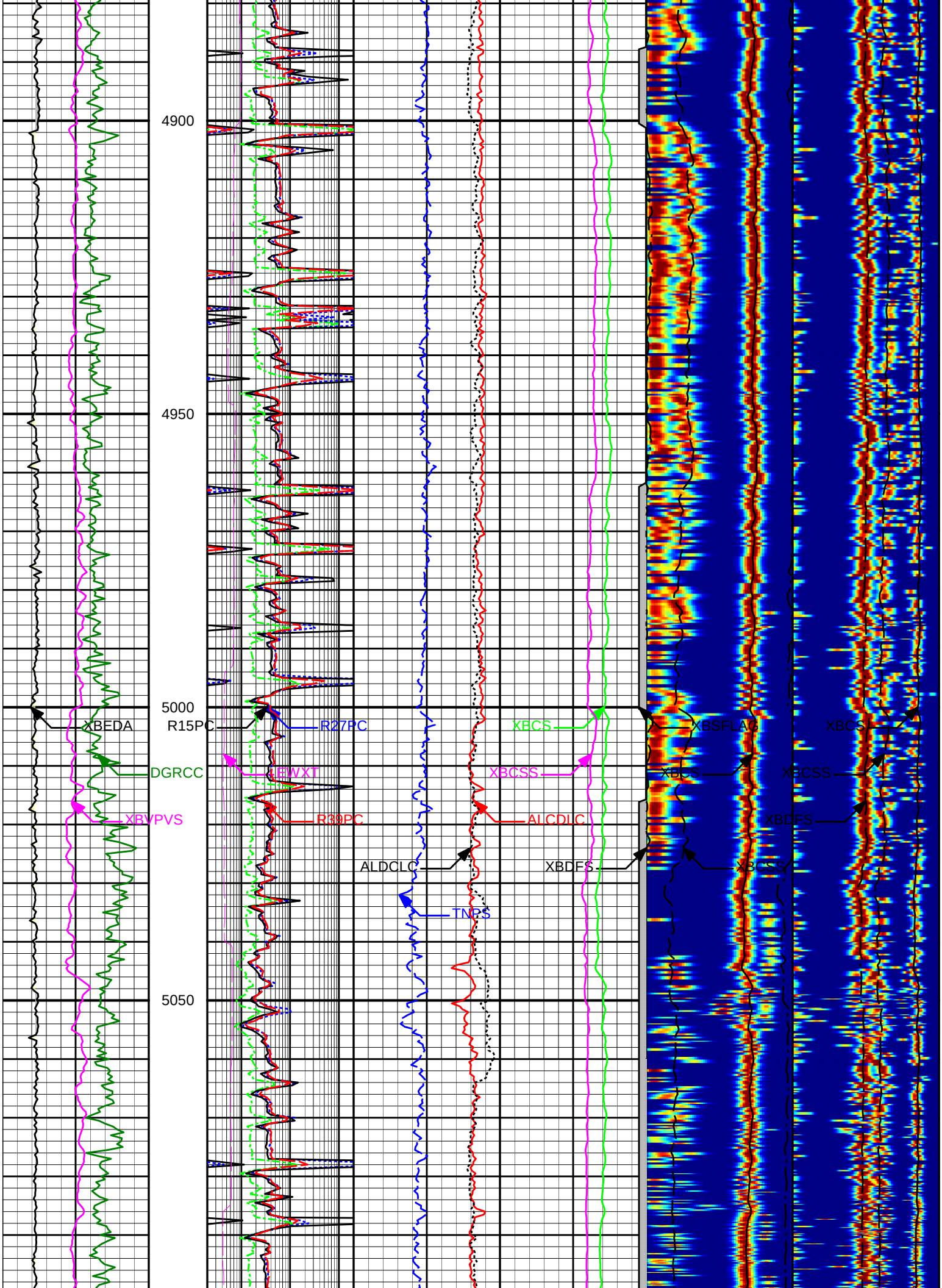

3800
3850
3900
3950
4000

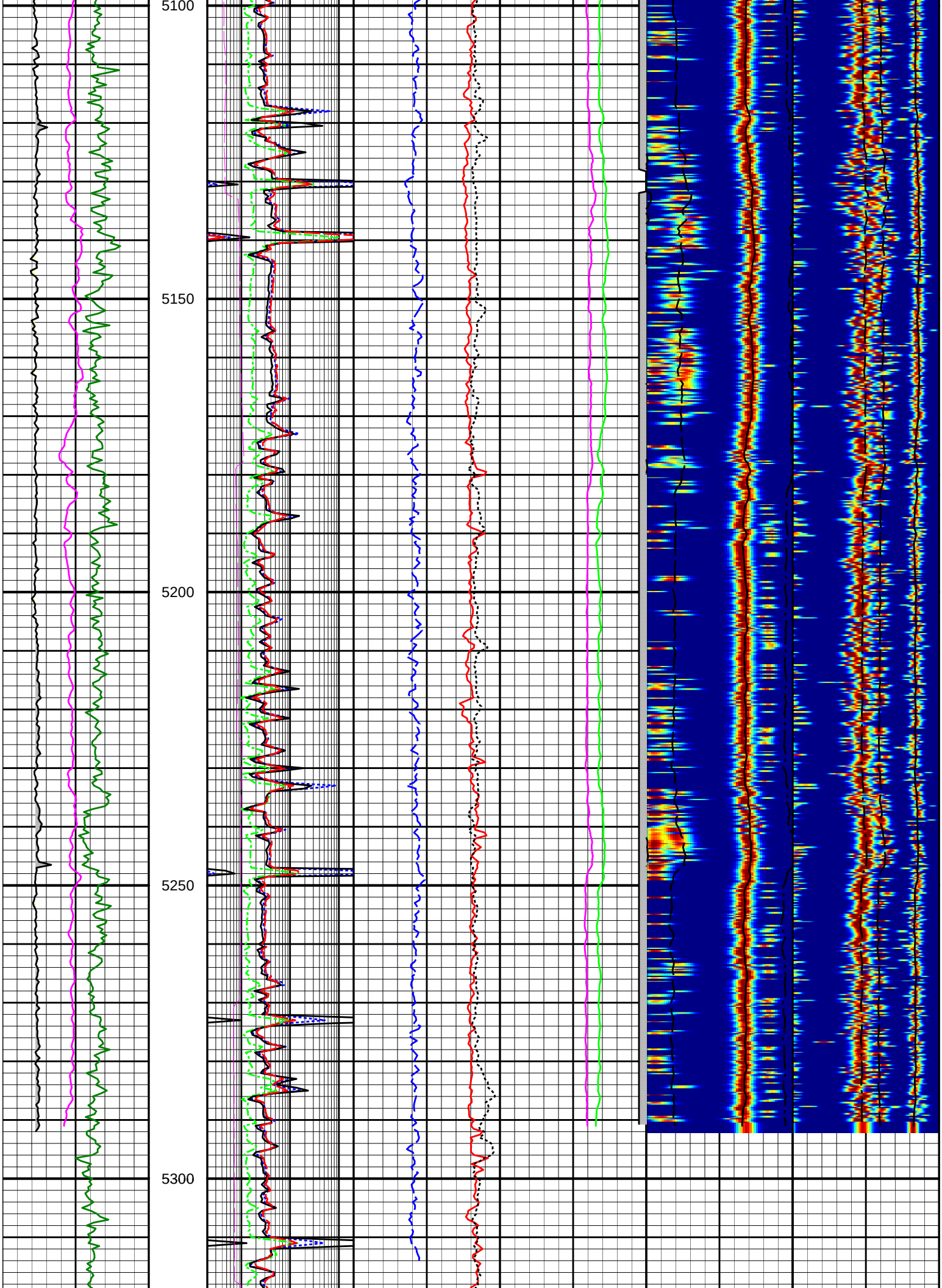

XBEDA
R15PC
R27PC
XBCS
XBSTEAC
XBCS
DGRCC
RWXT
XBCSS
XBCS
XBCSS
XBVPVS
R39PC
ALCDLIC
XBDFS
ALDCLIC
XBCSS
XBDFS
TNPS
4050
4100
4150
4200


4250
4300
4350
4400


4450
4500
4550
4600
4650


4700
4750
4800
4850


4900
4950
5000
5050
XBEDA
R15PC
R27PC
XBCS
XBSFLAG
XBCS
DGRCC
EWXT
XBCSS
XBCS
XBCSS
XBVPVS
R39PC
ALCDLC
XBDFS
ALCDLC
XBDFS
XBCSS
TNPS


5100
5150
5200
5250
5300

XBAT VP/VS Ratio
(XBVPVS)
1 3

TVD
ft
1 : 240

EWR Formation Exp Time
hours
0.2 200

ALD LCRB Comp Density
(ALCDLC)
1.65 g/cc 2.65

Shear Flag

XBAT 9 KHz Mono B Array
Semblance
240 microsec per ft 40

XBAT 4 KHz Dipole C Array
Semblance
440 microsec per ft 40

DGR Comb Gamma Ray BCorr
(DGRCC)
0 api 150

39in Phase Resistivity BC
ohm-metre
0.2 200

ALD LCRB Den Correction
(ALDCLC)
-0.8 g/cc 0.2

XBAT Comb Shear Slowness
(XBCSS)
440 uspf 40

XBAT Comp Slowness
(XBCS)
240 uspf 40

XBAT Comp Slowness
(XBCS)
440 uspf 40

XCAL Ellipse Avg Diameter
(XBEDA)
10 inches 20

27in Phase Resistivity BC
ohm-metre
0.2 200

CTN Porosity Sandstone
(TNPS)
60 pu 0

XBAT Comp Slowness
(XBCS)
240 uspf 40

XBAT Comb Shear Slowness
(XBCSS)
240 uspf 40

XBAT Comb Shear Slowness
(XBCSS)
440 uspf 40

15in Phase Resistivity BC
ohm-metre
0.2 200

XBAT Dipole Flex Slowness
(XBDFX)
240 uspf 40

XBAT Dipole Flex Slowness
(XBDFX)
440 uspf 40

9in Phase Resistivity BC
ohm-metre
0.2 200

LWD RUN 700 - 8.50" ZONE OF INTEREST

Avg 48in 2M Ph Res Cor
(ARH48PC)
0.2 ohm-metre 200

XBAT Dipole Flex Slowness
(XBDFX)
240 uspf 40

XBAT Dipole Flex Slowness
(XBDFX)
340 uspf 40

XCAL Ellipse Avg Diameter
(XBEDA)
6 inches 16

Avg 32in 2M Ph Res Cor
(ARH32PC)
0.2 ohm-metre 200

CTN Porosity Sandstone
(TNPS)
60 pu 0

XBAT Comp Slowness
(XBCS)
240 uspf 40

XBAT Comb Shear Slowness
(XBCSS)
240 uspf 40

XBAT Comb Shear Slowness
(XBCSS)
340 uspf 40

DGR Comb Gamma Ray BCorr
(DGRCC)
0 api 150

Avg 16in 2M Ph Res Cor
(ARH16PC)
0.2 ohm-metre 200

ALD LCRB Den Correction
(ALDCLC)
-0.8 g/cc 0.2

XBAT Comb Shear Slowness
(XBCSS)
440 uspf 40

XBAT Comp Slowness
(XBCS)
240 uspf 40

XBAT Comp Slowness
(XBCS)
340 uspf 40

XBAT VP/VS Ratio
(XBVPVS)
1 3

TVD
ft
1 : 240

ADR Formation Exp Time
(ADXT)
0.2 hours 200

ALD LCRB Comp Density
(ALCDLC)
1.65 g/cc 2.65

Shear Flag

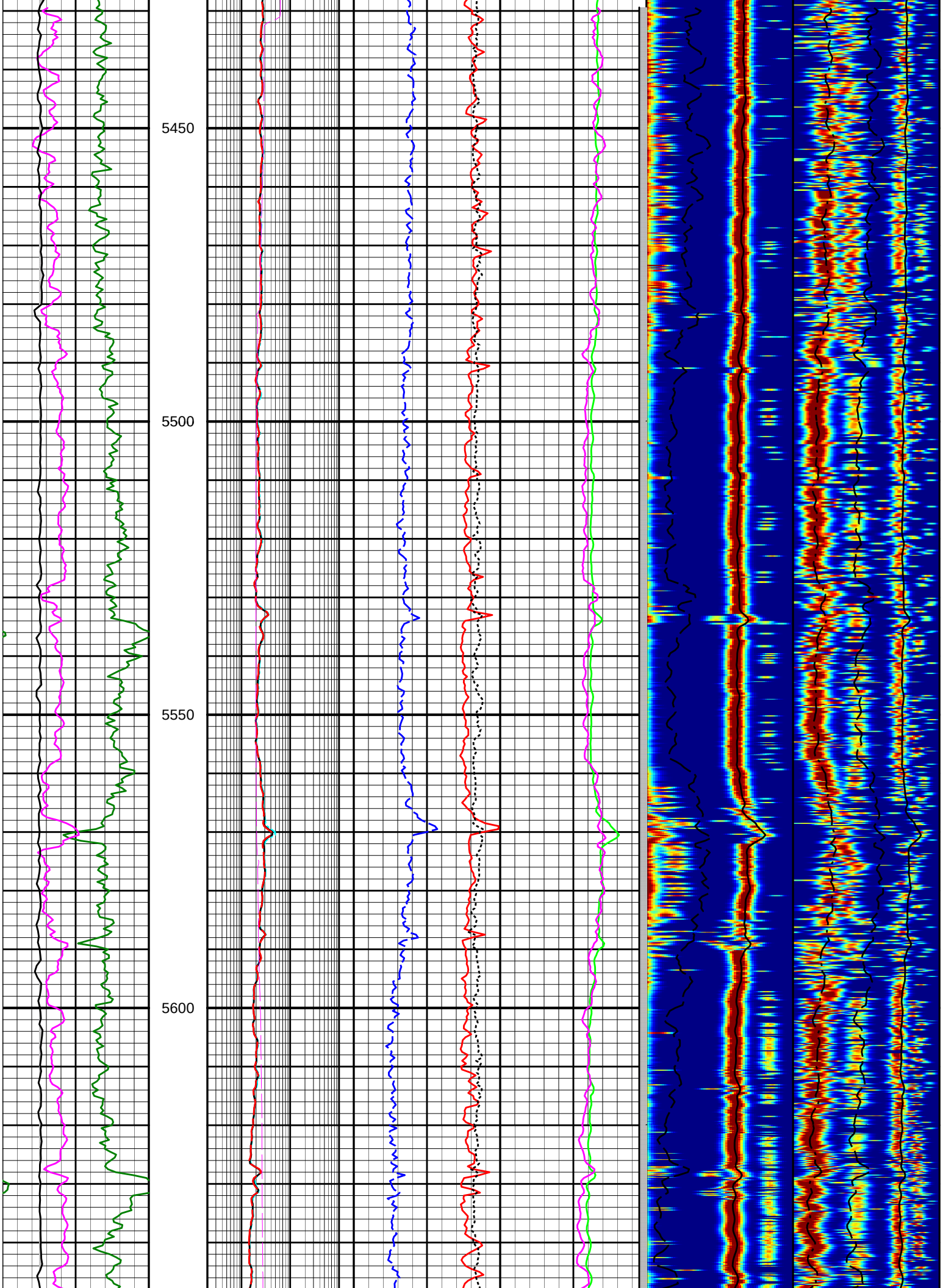
XBAT 9KHz Mono A Array
Semblance
240 microsec per ft 40

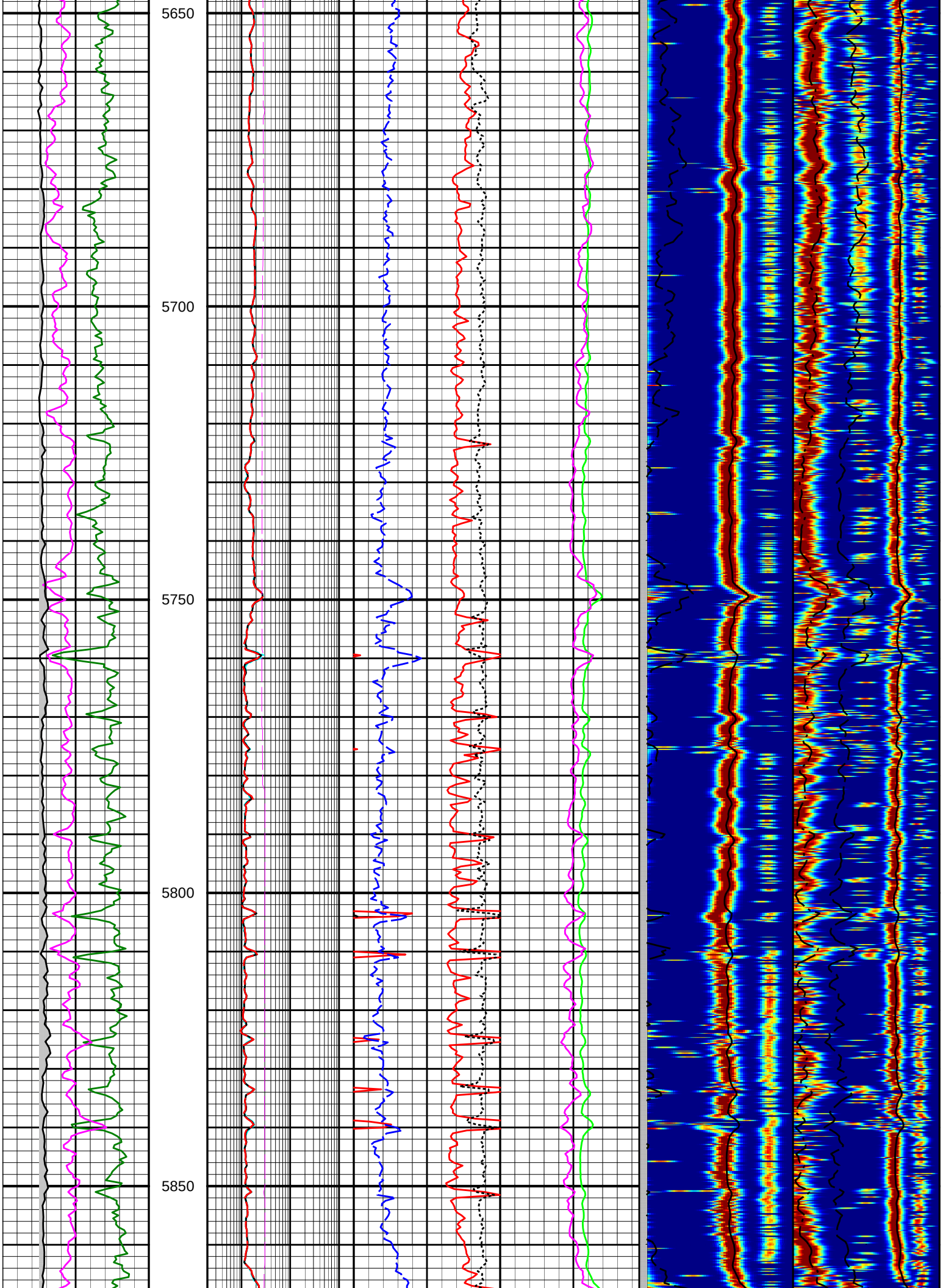
XBAT 4KHz Dipole A Array
Semblance
340 microsec per ft 40

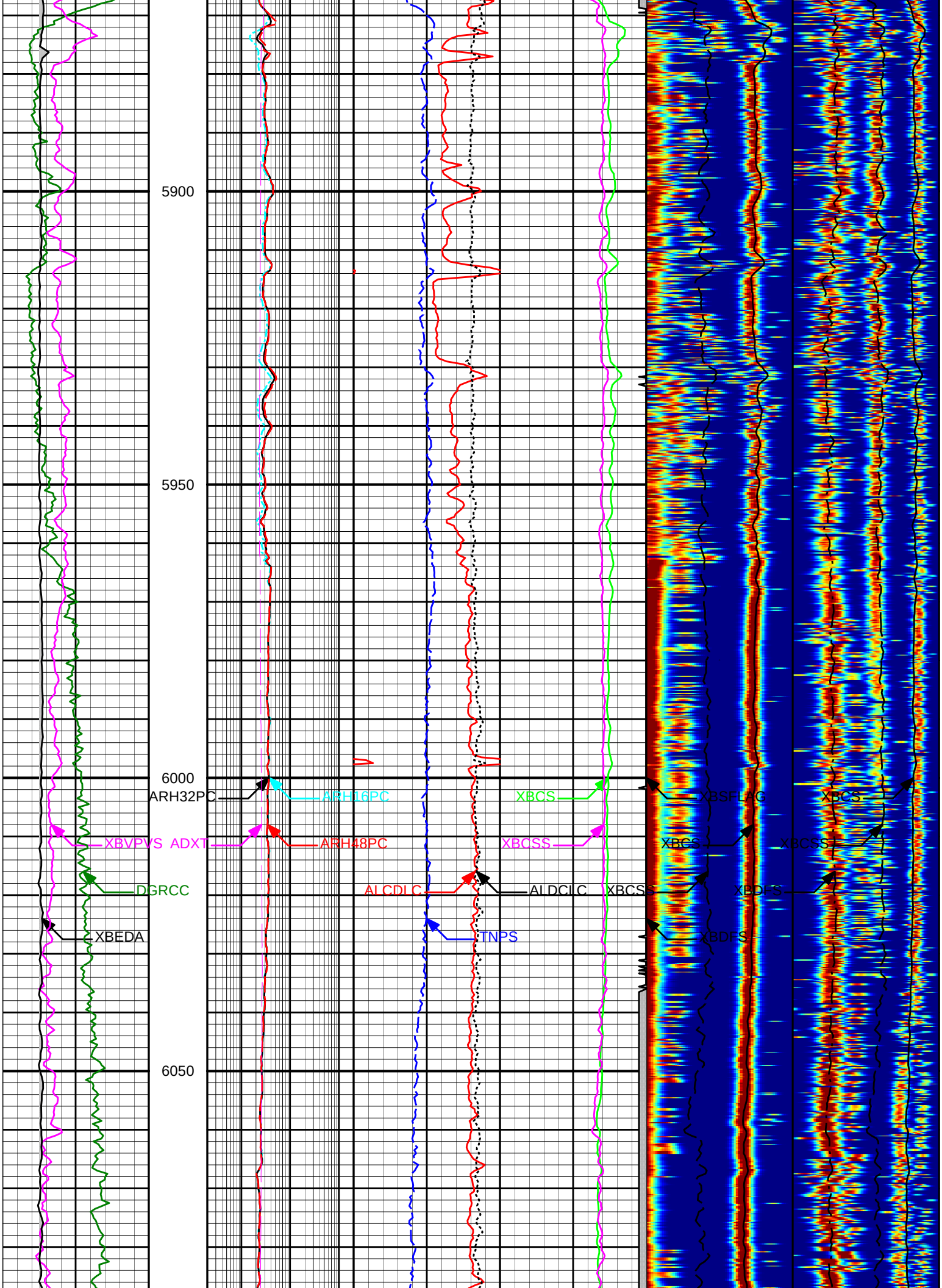
SENSORS LOGGED THROUGH 9-5/8" CASING
TO SHOE AT 5408'MD/5406'TVD

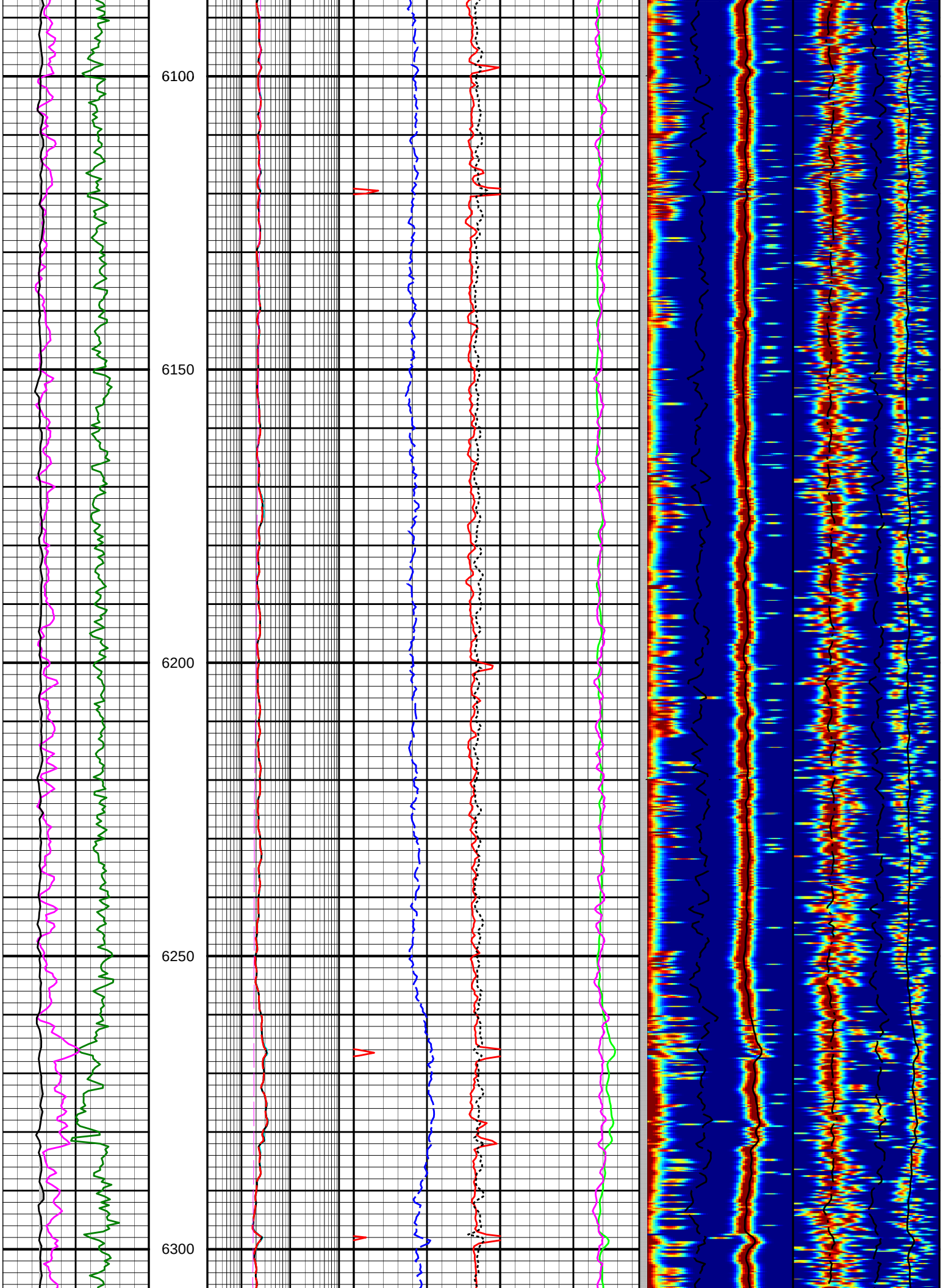
5400

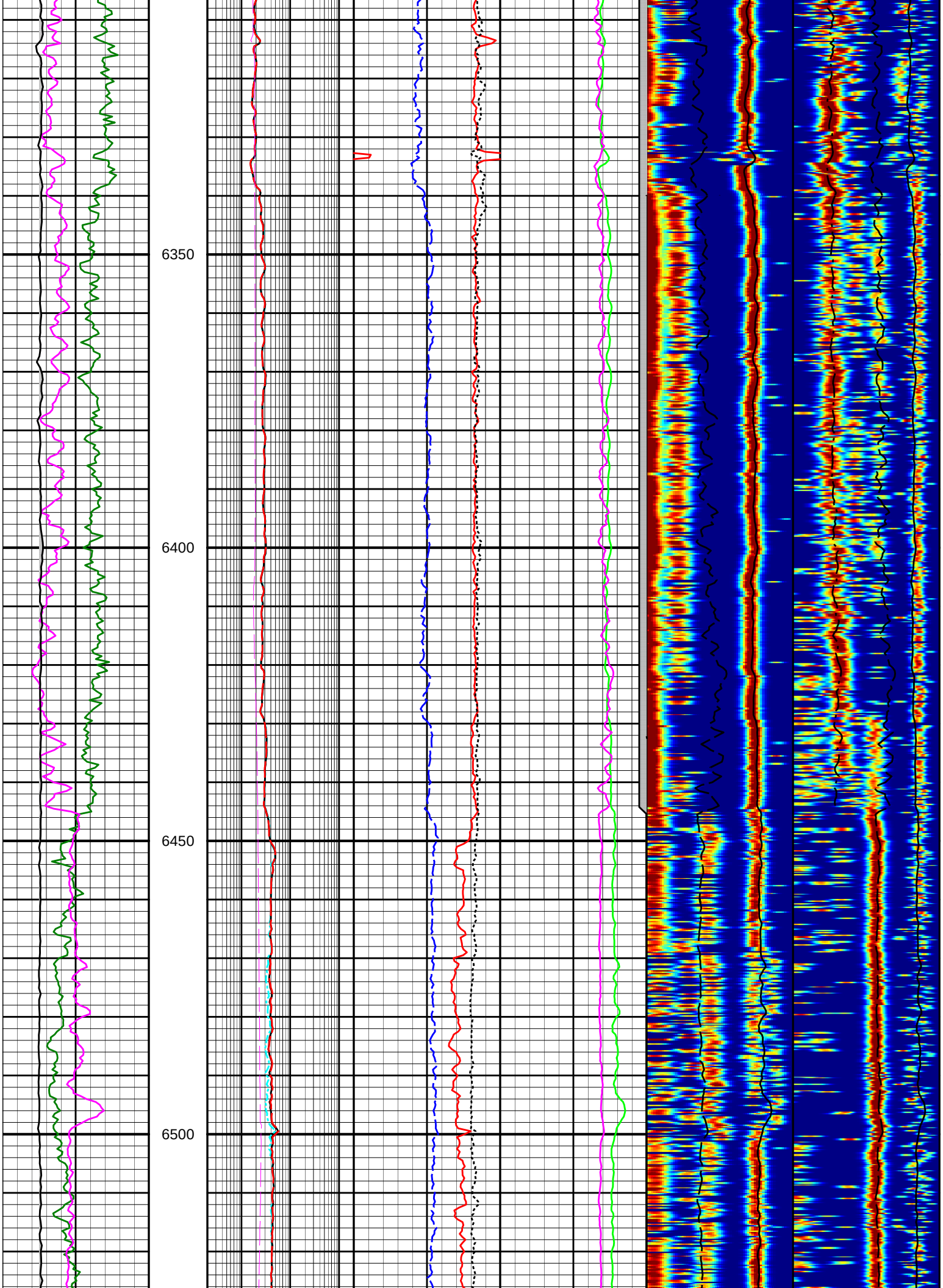
<R6/R7>

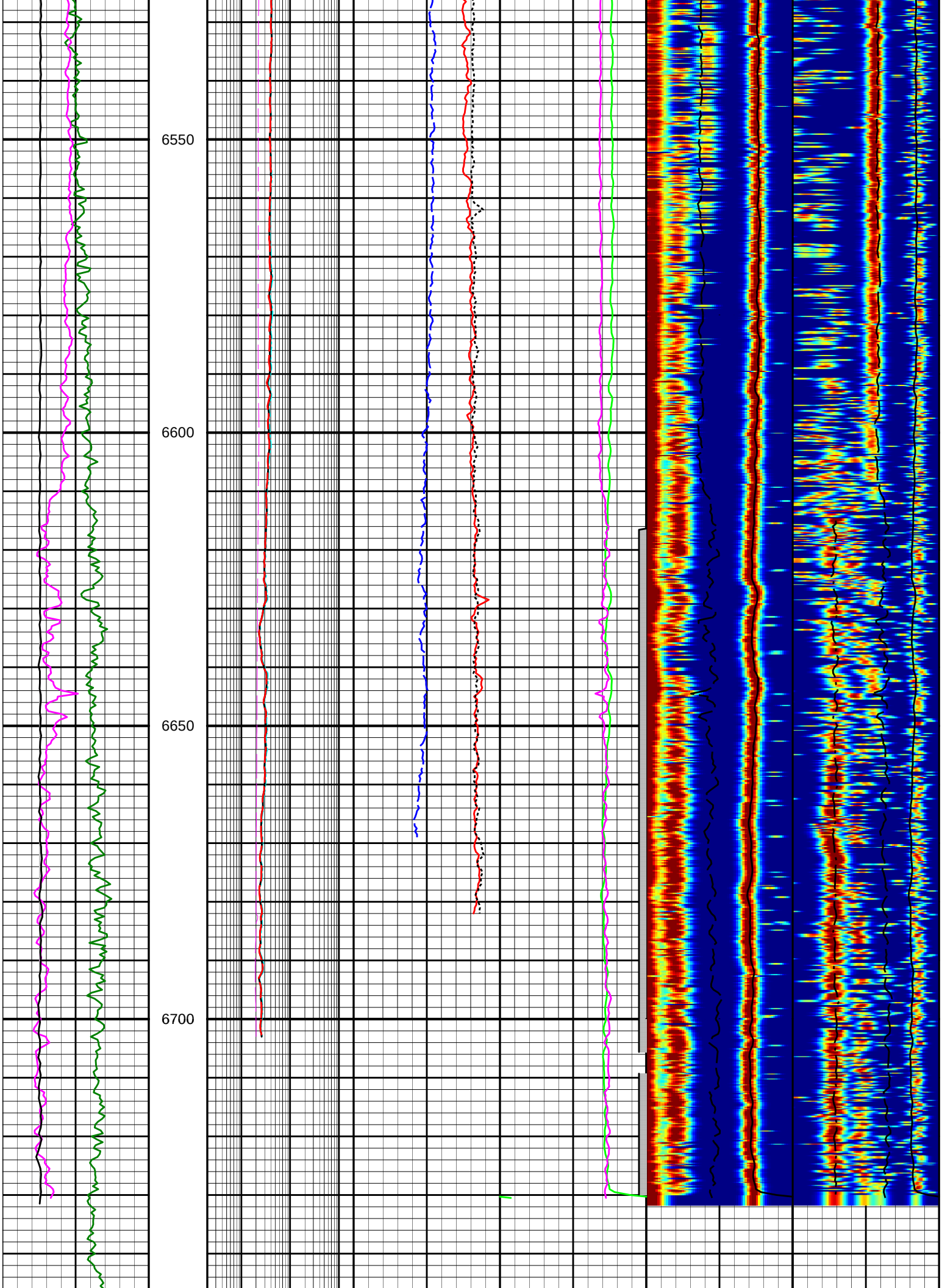

5450
5500
5550
5600

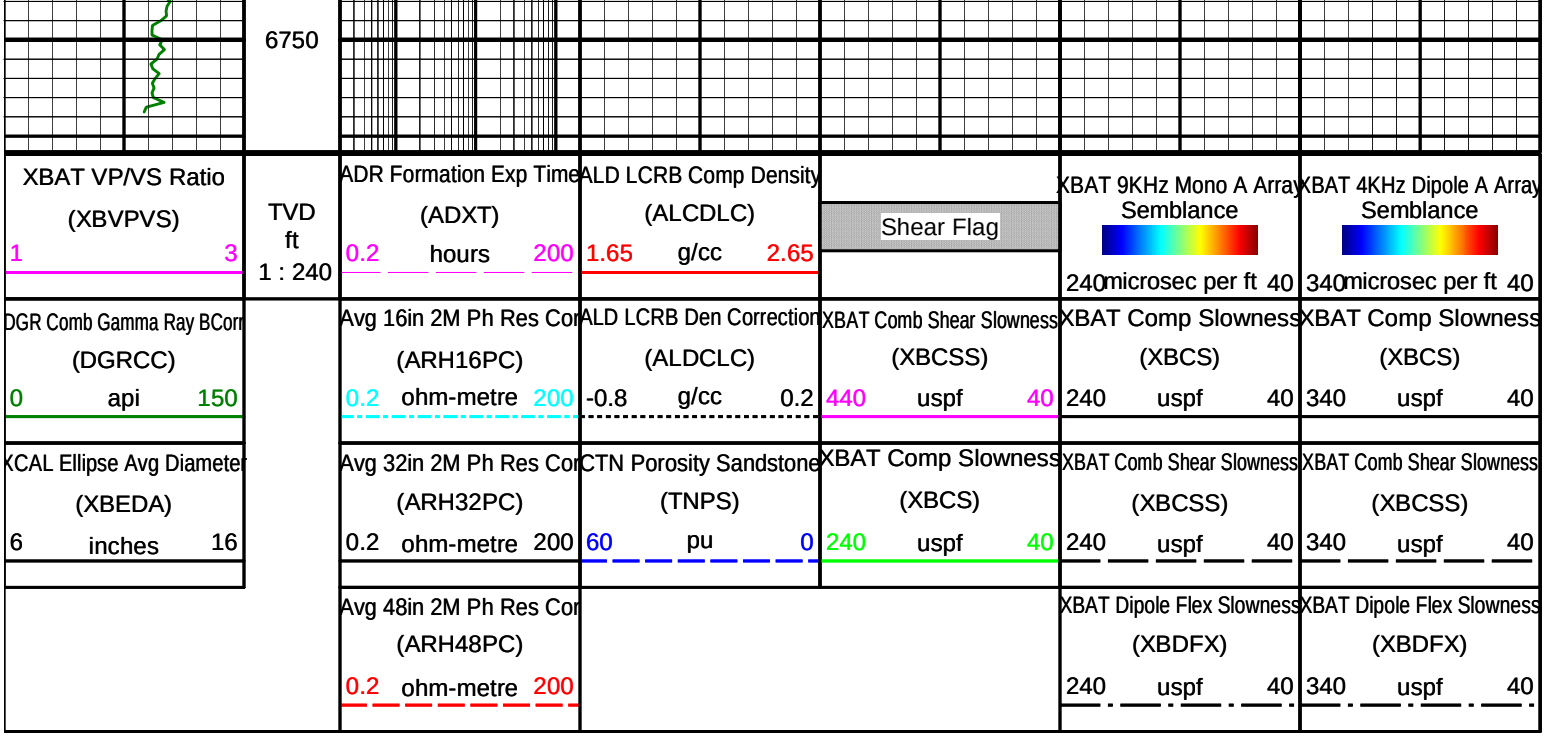

5650
5700
5750
5800
5850


5900
5950
6000
6050
ARH32PC
ARH16PC
ARH48PC
XBVPVS
ADXT
DGRCC
XBEDA
XBCS
XBCSS
ALCDLC
ALDCLC
TNPS
XBSFLAG
XBCS
XBCSS
XBCS
XBCSS
XBDFS
XBDFS


6100
6150
6200
6250
6300


6350
6400
6450
6500


6550
6600
6650
6700



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Shell Gulf of Mexico Inc.
OCS-Y-2321 BJ001 ST00BP00
Posey 6912
Alaska
USA
AK-XX-0901604700
Final Survey is projected to well TD

Measured Depth (feet)	*Inclination (degrees)*	*Direction (degrees)*	*Vertical Depth (feet)*	*Latitude (feet)*	*Departure (feet)*	*Vertical Section (feet)*	*Dogleg (deg/100ft)*
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
220.00	0.00	0.00	220.00	0.00 N	0.00 E	0.00	0.00
320.88	0.51	129.60	320.88	0.29 S	0.35 E	-0.29	0.50
406.77	0.31	89.93	406.76	0.53 S	0.88 E	-0.53	0.39
495.25	0.99	122.22	495.24	0.93 S	1.76 E	-0.93	0.84
590.43	0.31	82.72	590.41	1.34 S	2.71 E	-1.34	0.81
684.05	0.64	327.24	684.03	0.87 S	2.68 E	-0.87	0.88
866.10	0.28	101.20	866.08	0.09 S	2.55 E	-0.09	0.47
957.99	0.00	269.46	957.97	0.13 S	2.77 E	-0.13	0.30
1051.65	0.14	176.72	1051.63	0.24 S	2.78 E	-0.24	0.15
1144.54	0.26	120.65	1144.52	0.46 S	2.97 E	-0.46	0.23
1235.66	0.41	134.11	1235.63	0.80 S	3.38 E	-0.80	0.19
1328.60	0.51	59.75	1328.58	0.83 S	3.98 E	-0.83	0.61
1378.50	0.25	111.62	1378.48	0.76 S	4.27 E	-0.76	0.81
1540.18	0.12	50.83	1540.15	0.78 S	4.74 E	-0.78	0.14
1723.74	0.39	34.99	1723.71	0.14 S	5.26 E	-0.14	0.15
1818.58	0.58	50.01	1818.55	0.43 N	5.81 E	0.43	0.24
2003.18	1.06	39.81	2003.12	2.35 N	7.62 E	2.35	0.27
2095.93	0.87	35.51	2095.87	3.57 N	8.57 E	3.57	0.22
2186.15	0.69	72.12	2186.07	4.30 N	9.49 E	4.30	0.57
2373.34	0.75	76.36	2373.25	4.93 N	11.76 E	4.93	0.04
2463.93	0.78	75.65	2463.83	5.23 N	12.93 E	5.23	0.03
2555.30	0.79	70.25	2555.19	5.59 N	14.13 E	5.59	0.08
2646.22	0.79	76.51	2646.11	5.95 N	15.33 E	5.95	0.10
2743.03	0.70	74.08	2742.91	6.27 N	16.55 E	6.27	0.10
2837.42	0.74	67.59	2837.29	6.66 N	17.68 E	6.66	0.10
2875.38	0.64	69.95	2875.25	6.83 N	18.10 E	6.83	0.27
2978.31	0.74	64.69	2978.17	7.31 N	19.25 E	7.31	0.11

3074.55	0.58	52.33	3074.40	7.88 N	20.20 E	7.88	0.22
3169.04	0.67	47.05	3168.89	8.55 N	20.99 E	8.55	0.11
3258.93	0.77	27.36	3258.77	9.44 N	21.65 E	9.44	0.30
3351.80	0.94	33.05	3351.63	10.64 N	22.35 E	10.64	0.21
3445.40	0.89	33.34	3445.22	11.90 N	23.18 E	11.90	0.06
3537.90	0.88	39.68	3537.71	13.05 N	24.03 E	13.05	0.11
3630.29	0.86	29.57	3630.09	14.20 N	24.82 E	14.20	0.17
3724.13	1.05	46.97	3723.91	15.40 N	25.80 E	15.40	0.37
3815.47	1.16	37.46	3815.23	16.71 N	26.98 E	16.71	0.24
3909.95	1.11	27.77	3909.70	18.28 N	27.99 E	18.28	0.21
4001.96	1.54	18.87	4001.69	20.24 N	28.80 E	20.24	0.52
4095.18	1.55	21.22	4094.87	22.60 N	29.67 E	22.60	0.07
4189.17	1.52	19.27	4188.83	24.97 N	30.54 E	24.97	0.06
4280.67	1.73	13.84	4280.29	27.46 N	31.27 E	27.46	0.28
4373.26	2.11	22.24	4372.83	30.39 N	32.25 E	30.39	0.51
4465.71	1.69	19.56	4465.23	33.26 N	33.35 E	33.26	0.46
4559.04	2.02	19.56	4558.51	36.11 N	34.37 E	36.11	0.35
4651.17	2.19	23.91	4650.58	39.24 N	35.62 E	39.24	0.25
4743.27	2.64	25.07	4742.59	42.77 N	37.23 E	42.77	0.49
4836.87	3.09	32.03	4836.08	46.87 N	39.49 E	46.87	0.61
4929.20	3.15	34.87	4928.26	51.06 N	42.26 E	51.06	0.18
5021.52	3.28	37.85	5020.45	55.22 N	45.33 E	55.22	0.23
5113.59	3.34	39.69	5112.36	59.37 N	48.66 E	59.37	0.13
5206.14	3.59	47.76	5204.74	63.39 N	52.52 E	63.39	0.59
5299.05	3.70	48.27	5297.46	67.34 N	56.92 E	67.34	0.12
5364.19	3.45	52.11	5362.48	69.95 N	60.04 E	69.95	0.54
5429.81	3.65	46.91	5427.97	72.59 N	63.12 E	72.59	0.58
5518.31	3.73	45.18	5516.29	76.55 N	67.22 E	76.55	0.15
5612.70	3.58	42.26	5610.48	80.90 N	71.39 E	80.90	0.25
5704.09	3.56	42.97	5701.70	85.09 N	75.24 E	85.09	0.06
5795.19	3.47	41.51	5792.62	89.22 N	79.00 E	89.22	0.13
5889.32	3.48	42.48	5886.58	93.46 N	82.82 E	93.46	0.06
5980.70	3.42	42.67	5977.80	97.52 N	86.54 E	97.52	0.07
6075.07	3.43	41.69	6072.00	101.69 N	90.33 E	101.69	0.06
6167.81	3.55	39.12	6164.57	105.99 N	93.98 E	105.99	0.21
6259.59	3.53	39.52	6256.17	110.37 N	97.57 E	110.37	0.03
6346.61	3.75	37.26	6343.02	114.70 N	100.99 E	114.70	0.30
6445.34	3.99	34.54	6441.52	120.10 N	104.89 E	120.10	0.31
6536.48	3.96	35.37	6532.44	125.27 N	108.51 E	125.27	0.07
6628.63	3.92	37.01	6624.37	130.38 N	112.25 E	130.38	0.13
6721.62	3.89	35.41	6717.15	135.49 N	115.99 E	135.49	0.12
6745.05	3.99	35.86	6740.52	136.80 N	116.93 E	136.80	0.46
6800.00	3.99	35.86	6795.34	139.90 N	119.17 E	139.90	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 0.00 DEGREES (GRID)
A TOTAL CORRECTION OF 10.95 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6800.00 FEET
IS 183.78 FEET ALONG 40.42 DEGREES (GRID)

Map System: NAD 83 UTM Zones
Geo Datum: North American Datum of 1983
Map Zone: Universal Transverse Mercator Zone 03N

Date Printed:01 November 2015