



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY	M&M EXPLORATION, INC.			
WELL	Z-BAR 27-9			
FIELD	AETNA			
PROVINCE/COUNTY	BARBER			
COUNTRY/STATE	U.S.A. / KANSAS			
LOCATION	2000' FSL & 600' FEL SE/4			
SEC 27	TWP 33S	RGE 15W	Other Services	
Latitude				MAI/MFE
Longitude				
API Number	15-007-24149			
Permanent Datum GL, Elevation	1798 feet			Elevations: feet
Log Measured From KB				KB 1808.00
Drilling Measured From KB				DF 1806.00
				GL 1798.00
Date	19-APR-2014			
Run Number	ONE			
Service Order	4558-85106879			
Depth Driller	5150.00			feet
Depth Logger	5154.00			feet
First Reading	5135.00			feet
Last Reading	4020.00			feet
Casing Driller	294.00			feet
Casing Logger	294.00			feet
Bit Size	7.875			inches
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.00 lb/USg		40.00 CP	
PH / Fluid Loss	10.00		9.80 cc/30min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.67 @ 89.0		ohm-m	
Rmf @ Measured Temp	0.54 @ 89.0		ohm-m	
Rmc @ Measured Temp	0.80 @ 89.0		ohm-m	
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.52 @115.0		ohm-m	
Time Since Circulation	5 HOURS			
Max Recorded Temp	115.00		deg F	
Equipment / Base	13057	LIB		
Recorded By	ADAM SILL			
Witnessed By	BILL BUSCH			
JOB#	LB14-120			

BOREHOLE RECORD					Last Edited: 19-APR-2014 08:19
Bit Size inches		Depth From feet		Depth To feet	
7.875		294.00		5150.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	294.00	24.00	

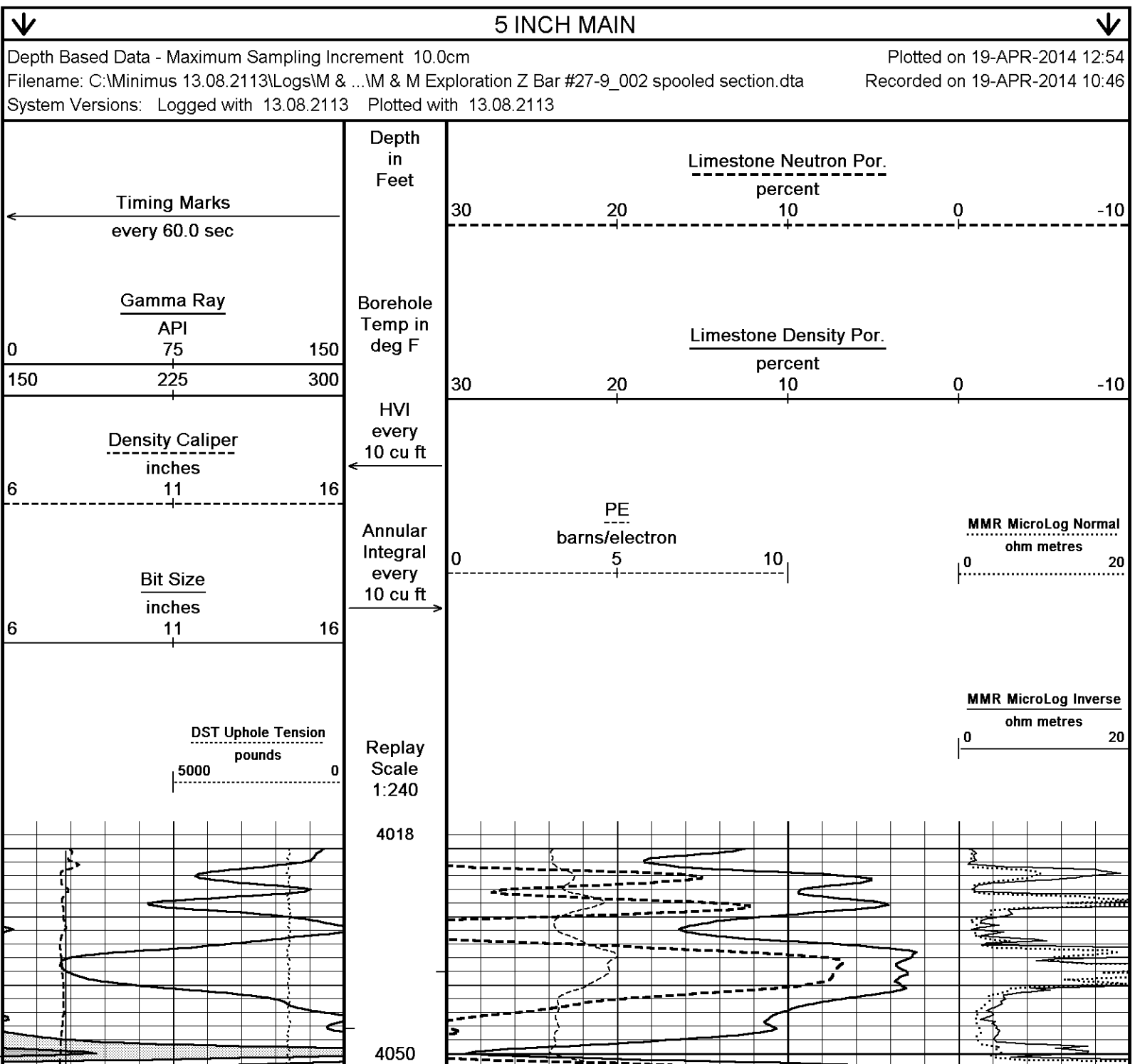
REMARKS
- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1868 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 4020 FEET: 245 CU.FT.
- RIG: HARDT #1

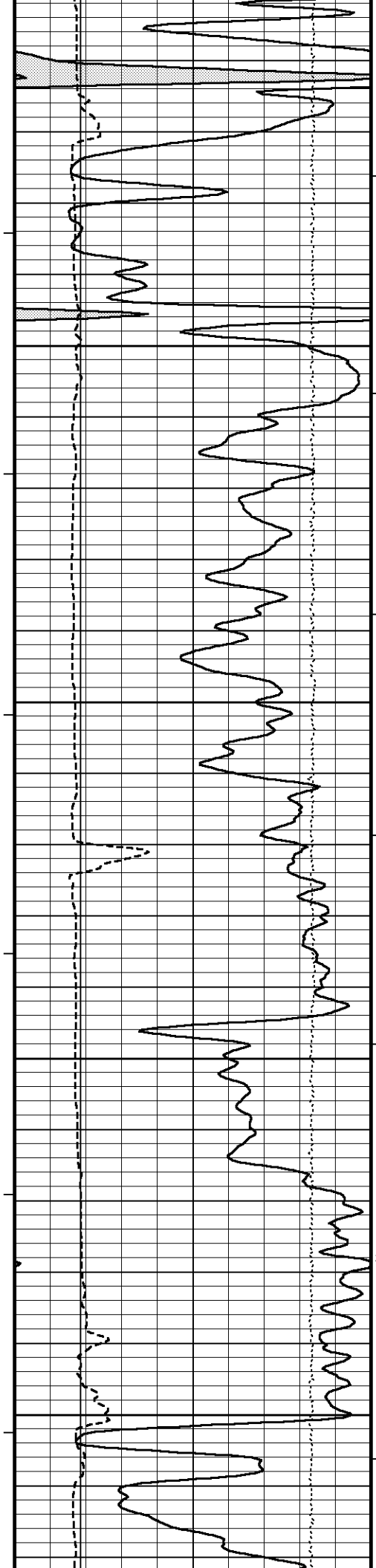
LOG: HAWD 771

- ENGINEER: A. SILL.

- OPERATOR(S): J. LaPOINT, N. ADAME.

In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.





107°

4100

108°

4150

108°

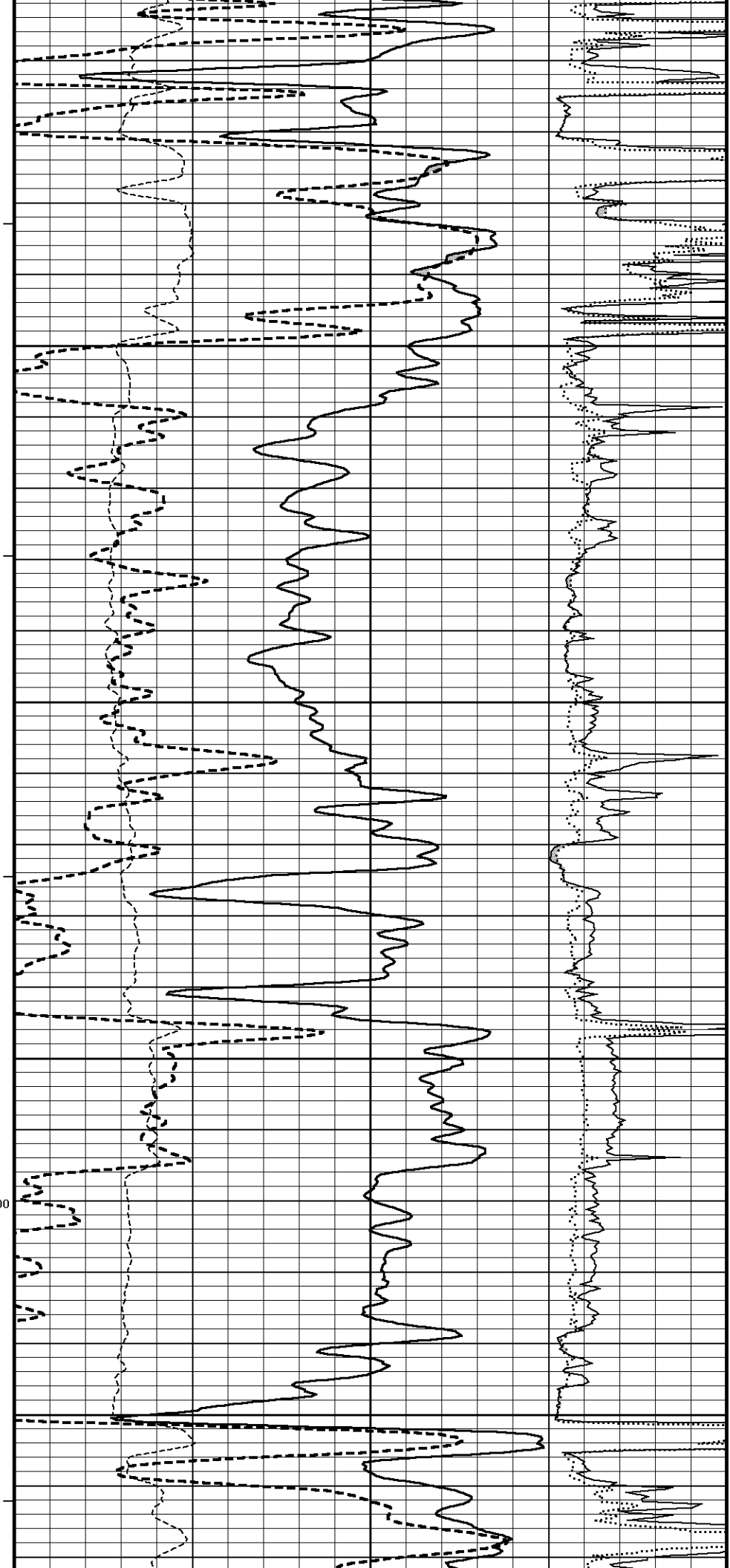
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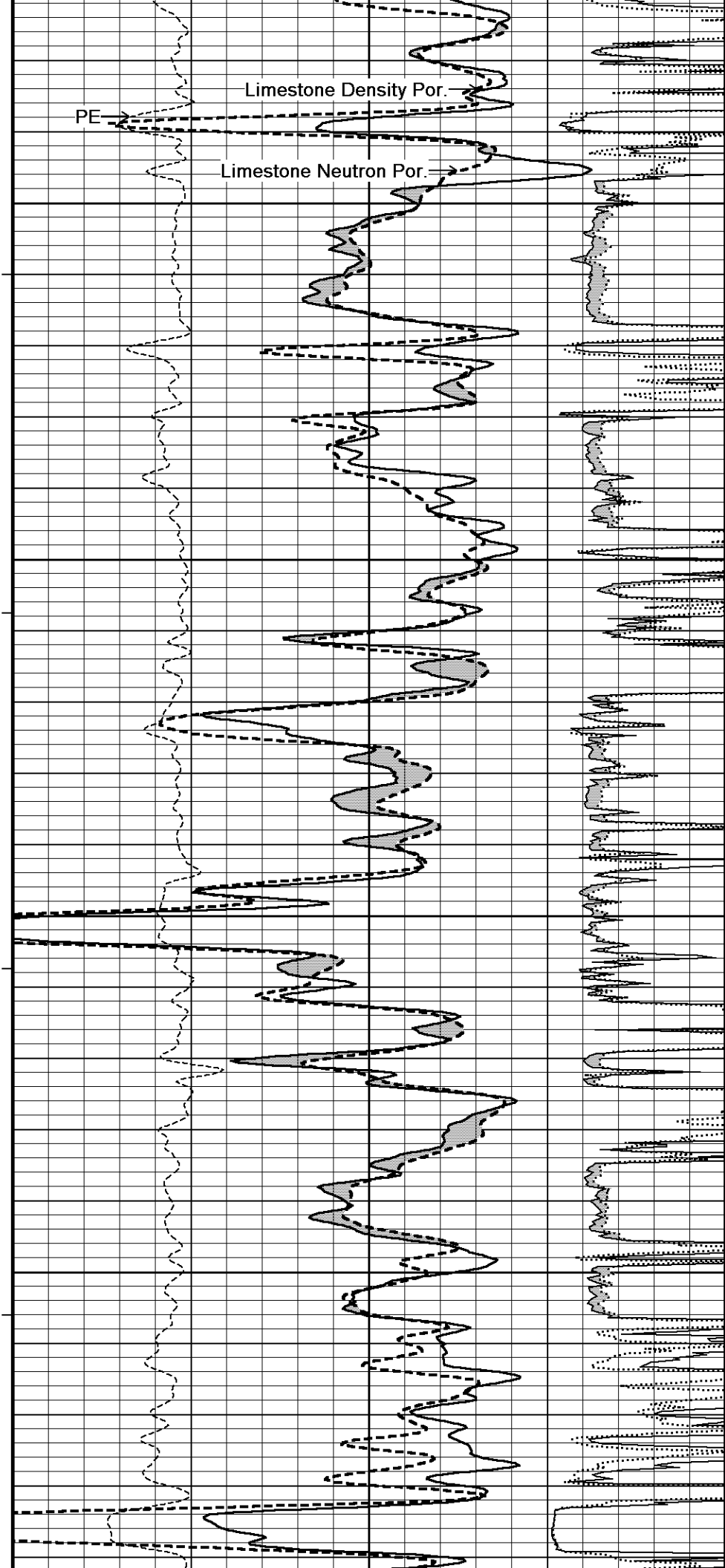
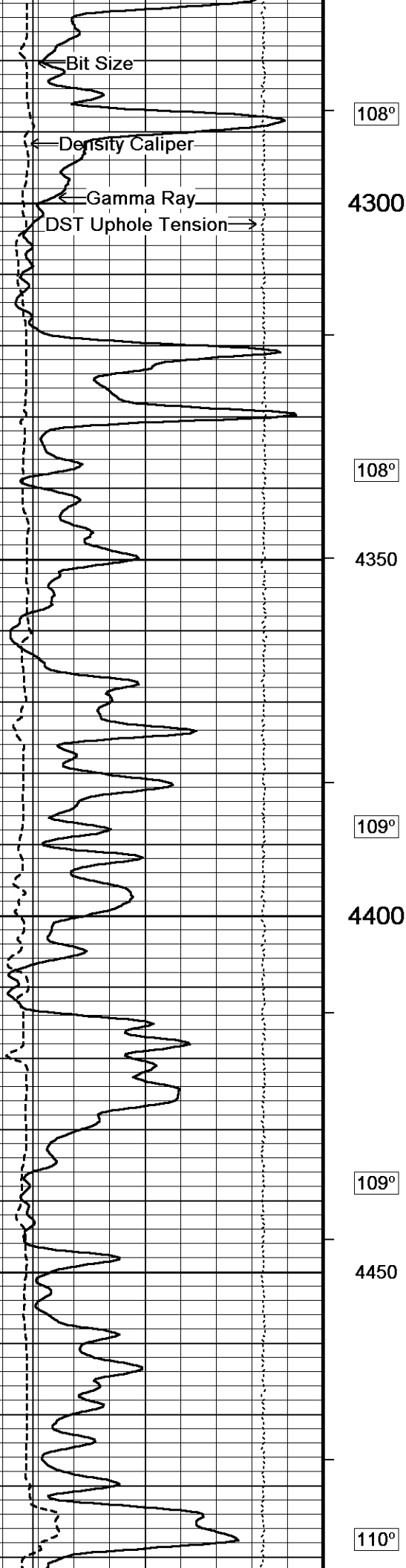
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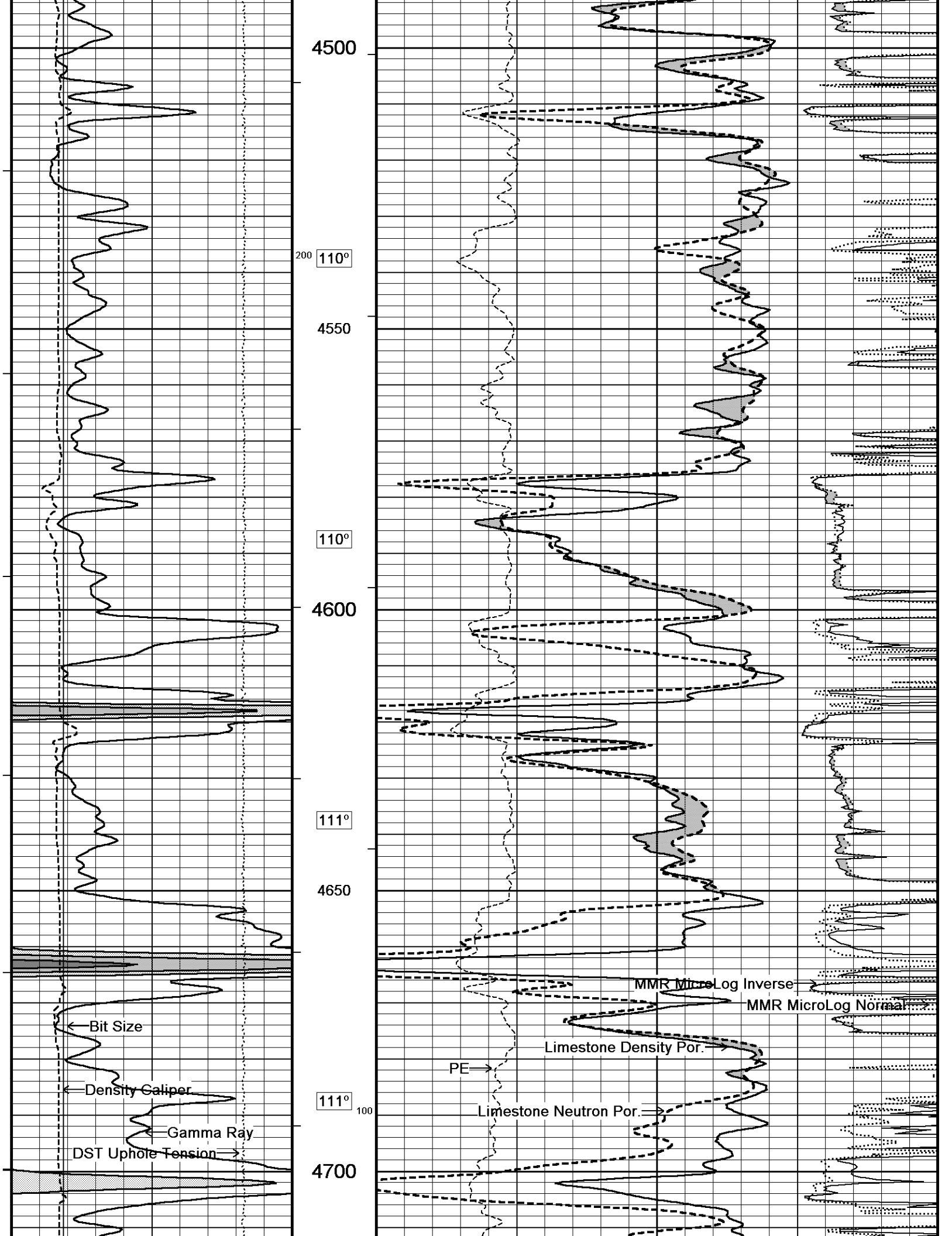
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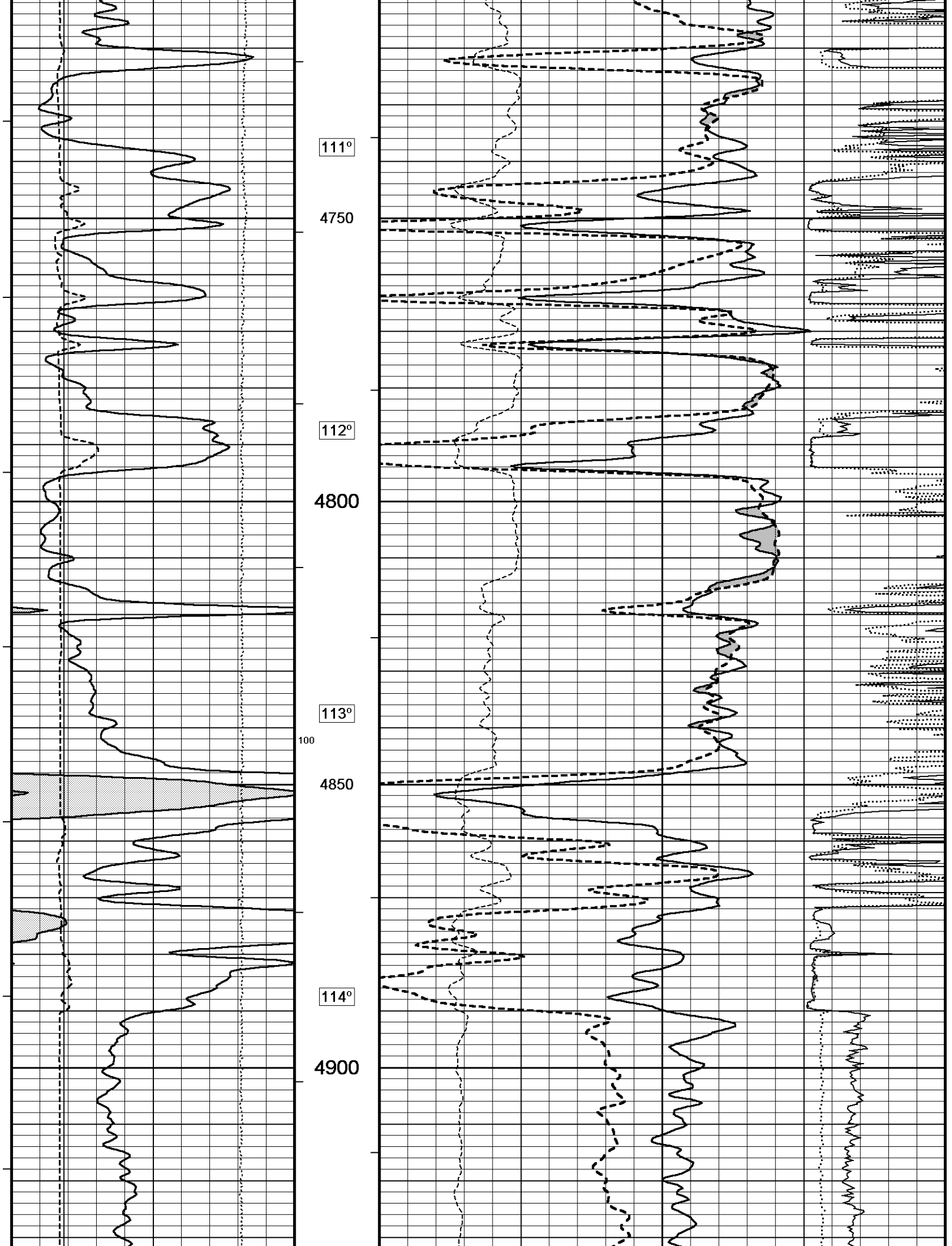
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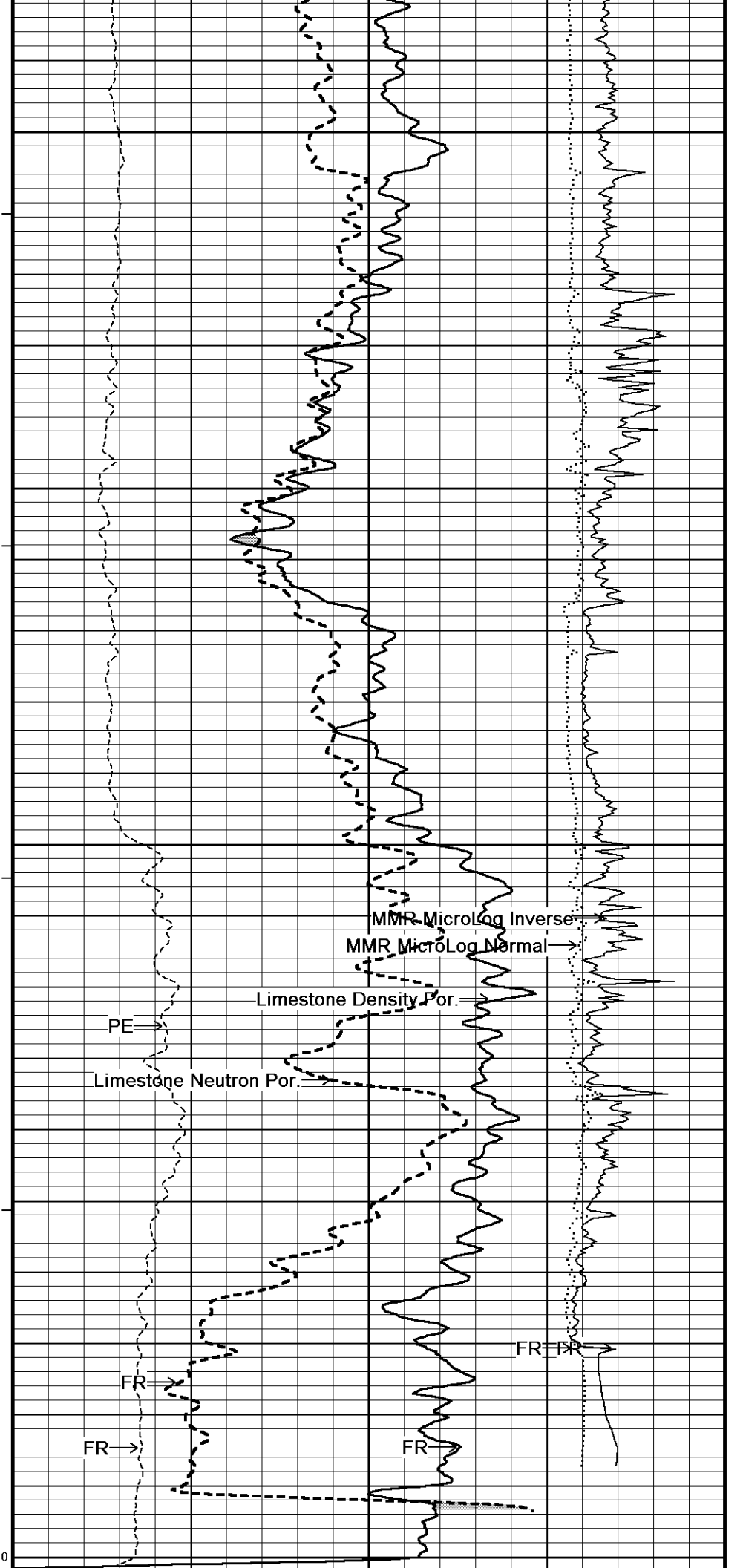
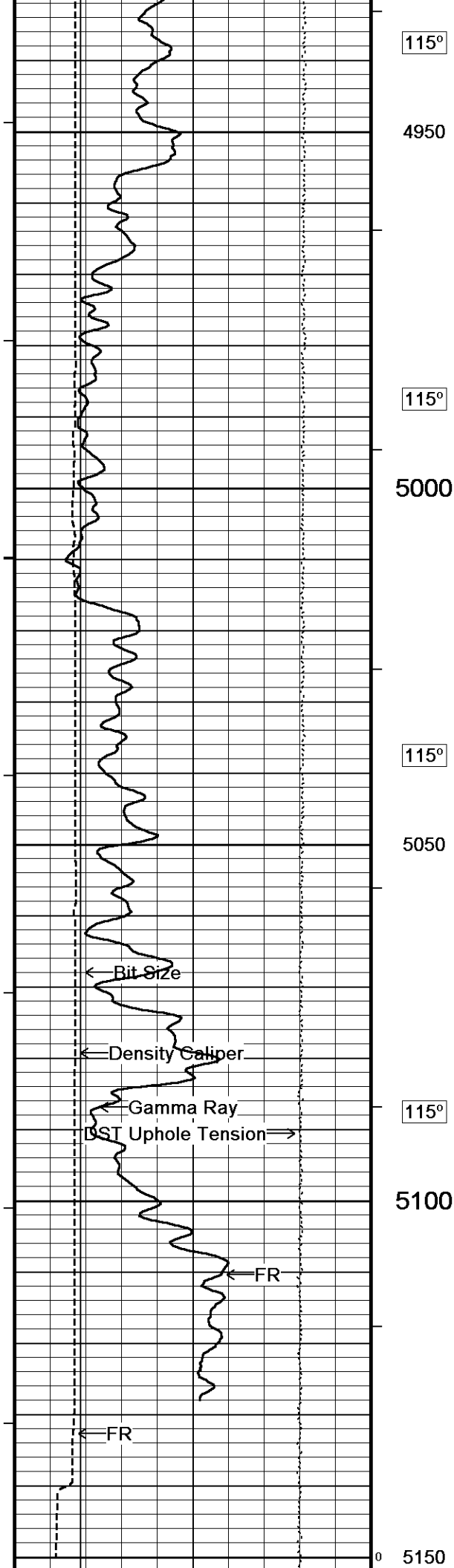
4250











FR →

5184

Depth
in
FeetTiming Marks
every 60.0 sec

Gamma Ray

API

75

0 150

150 225 300

Density Caliper
inches

11

6 16

Bit Size
inches

11

6 16

DST Uphole Tension
pounds

5000

0

Borehole
Temp in
deg FHVI
every
10 cu ftAnnular
Integral
every
10 cu ftReplay
Scale
1:240Limestone Neutron Por.
percent

30 20 10 0 -10

Limestone Density Por.
percent

30 20 10 0 -10

PE
barns/electron

0 5 10

MMR MicroLog Normal
ohm metres

0 20

MMR MicroLog Inverse
ohm metres

0 20

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 19-APR-2014 12:54

Filename: C:\Minimus 13.08.2113\Logs\M & ...M & M Exploration Z Bar #27-9_002 spooled section.dta

Recorded on 19-APR-2014 10:46

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113



5 INCH MAIN



REPEAT SECTION



Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 19-APR-2014 12:54

Filename: C:\Minimus 13.08.2113\Logs\M & M Exploration Z ...M & M Exploration Z Bar #27-9_001.dta

Recorded on 19-APR-2014 09:34

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Timing Marks
every 60.0 sec

Gamma Ray

API

75

0 150

150 225 300

Depth
in
FeetBorehole
Temp in
deg F

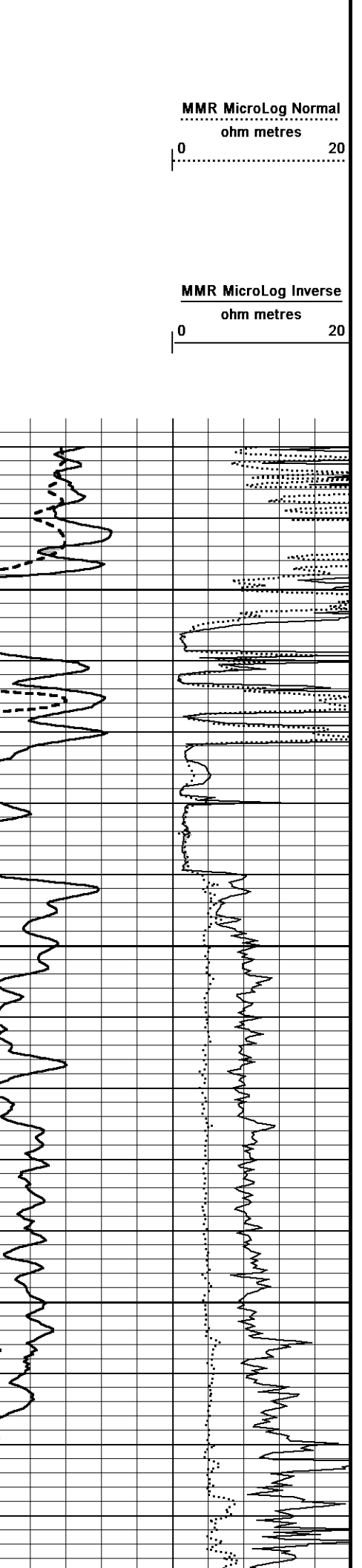
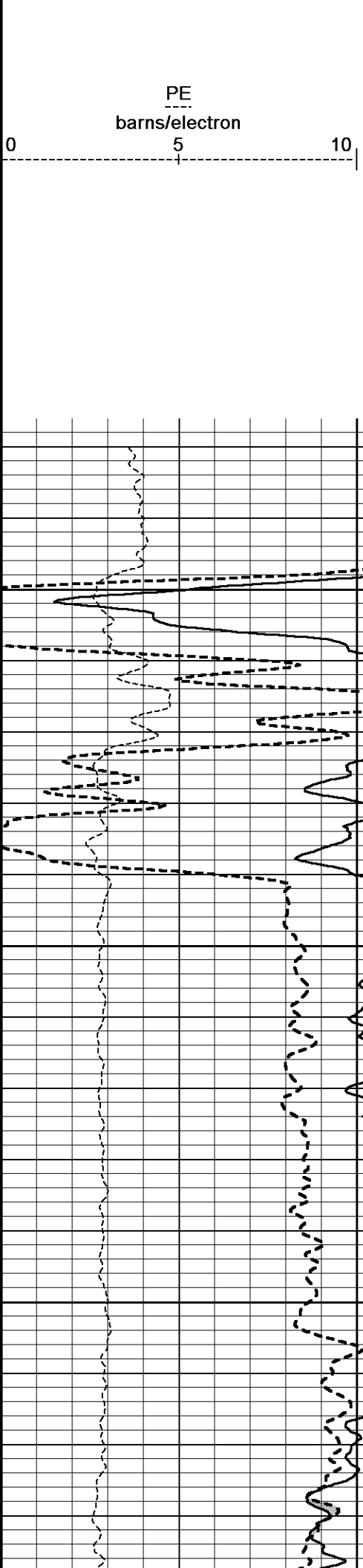
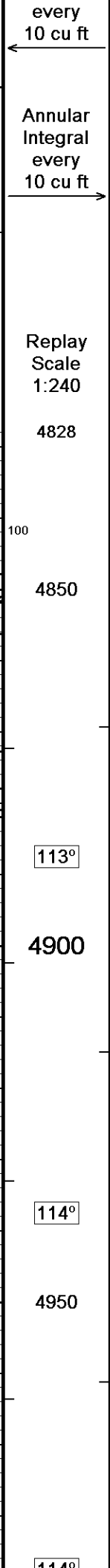
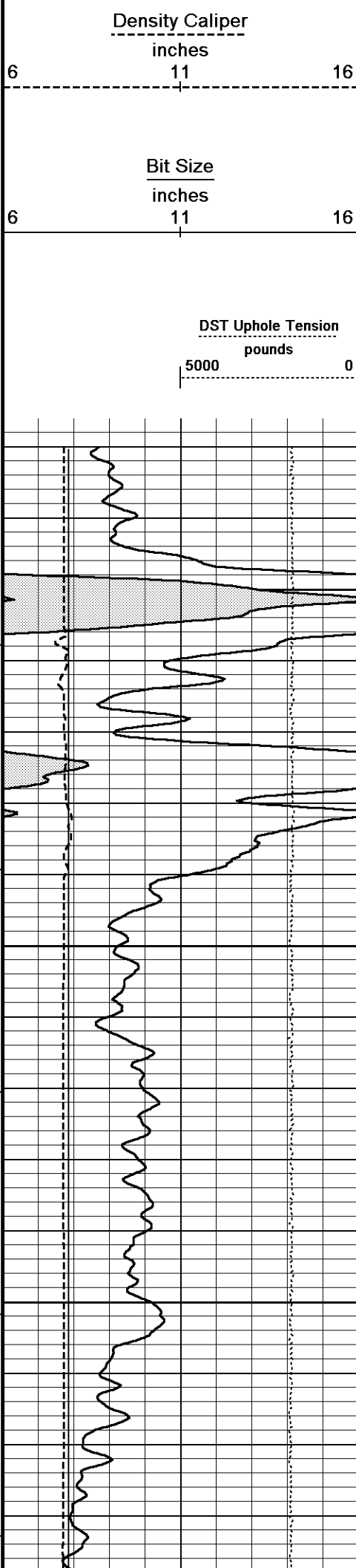
HVI

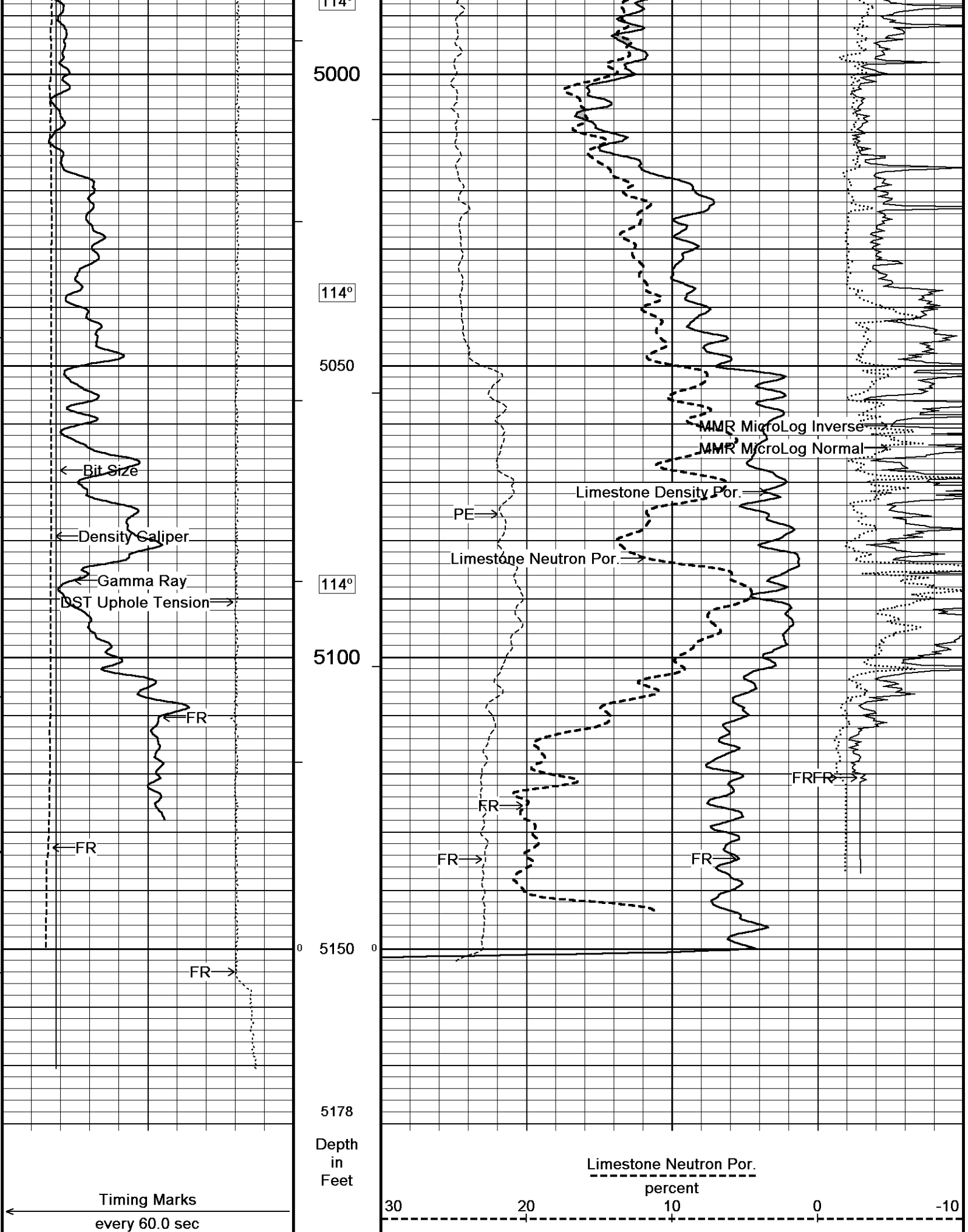
Limestone Neutron Por.
percent

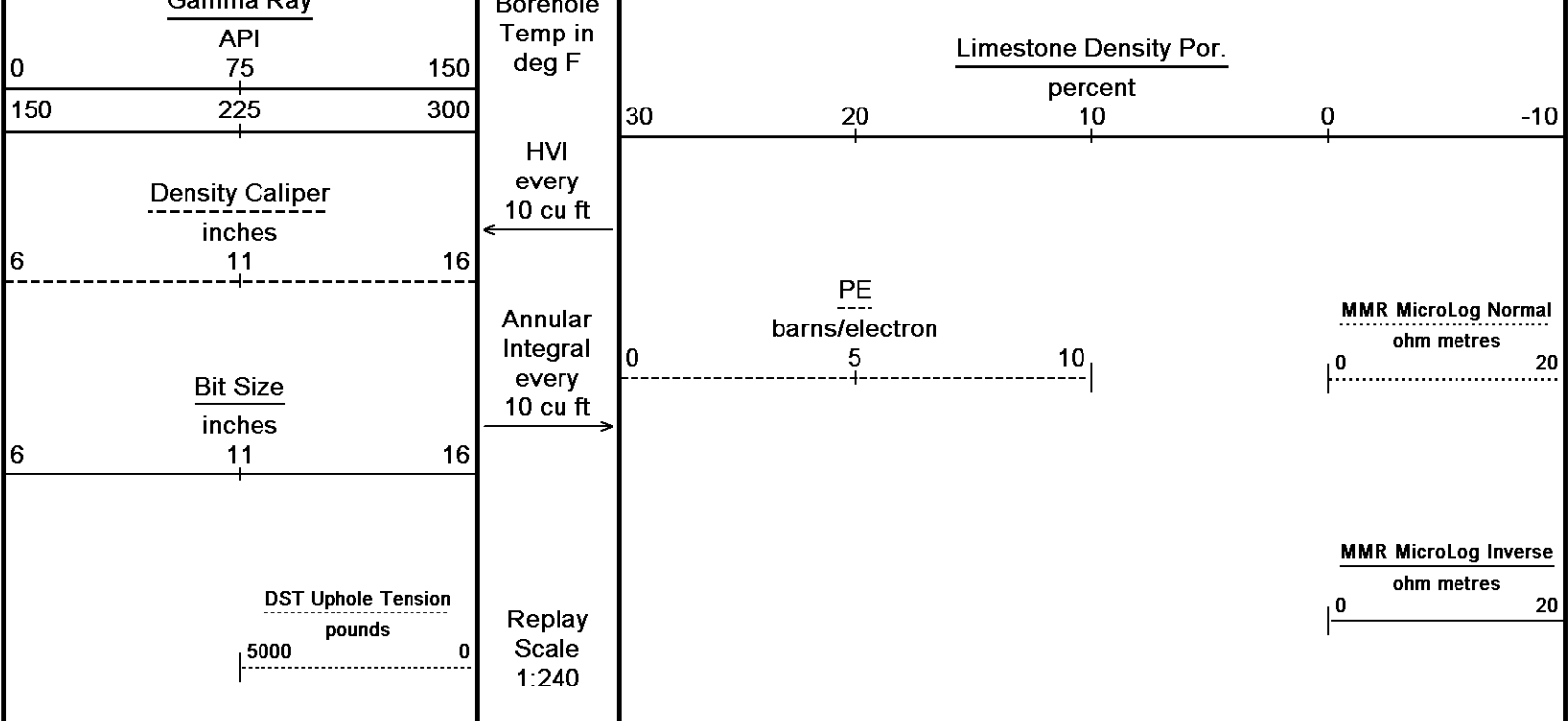
30 20 10 0 -10

Limestone Density Por.
percent

30 20 10 0 -10





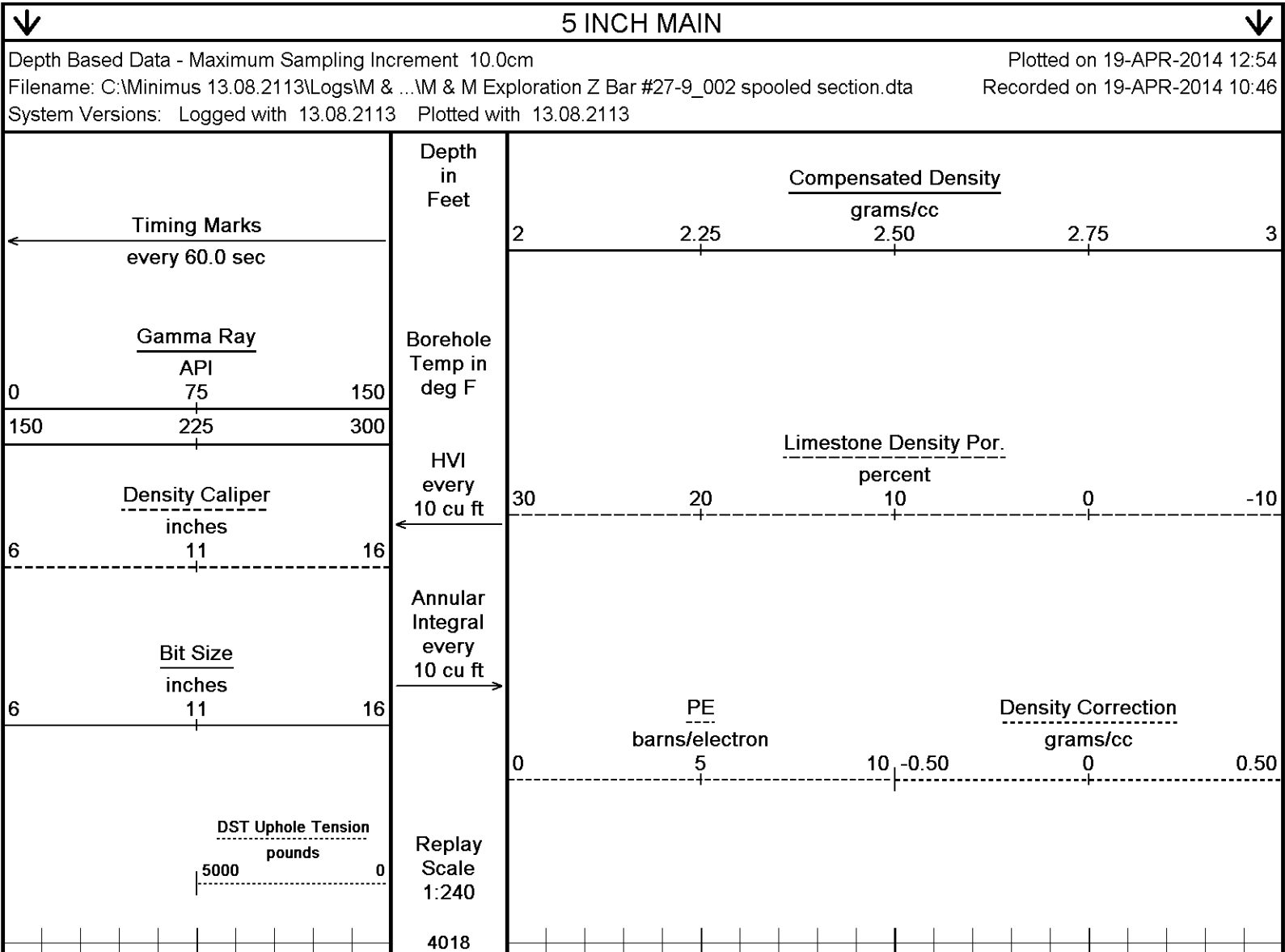


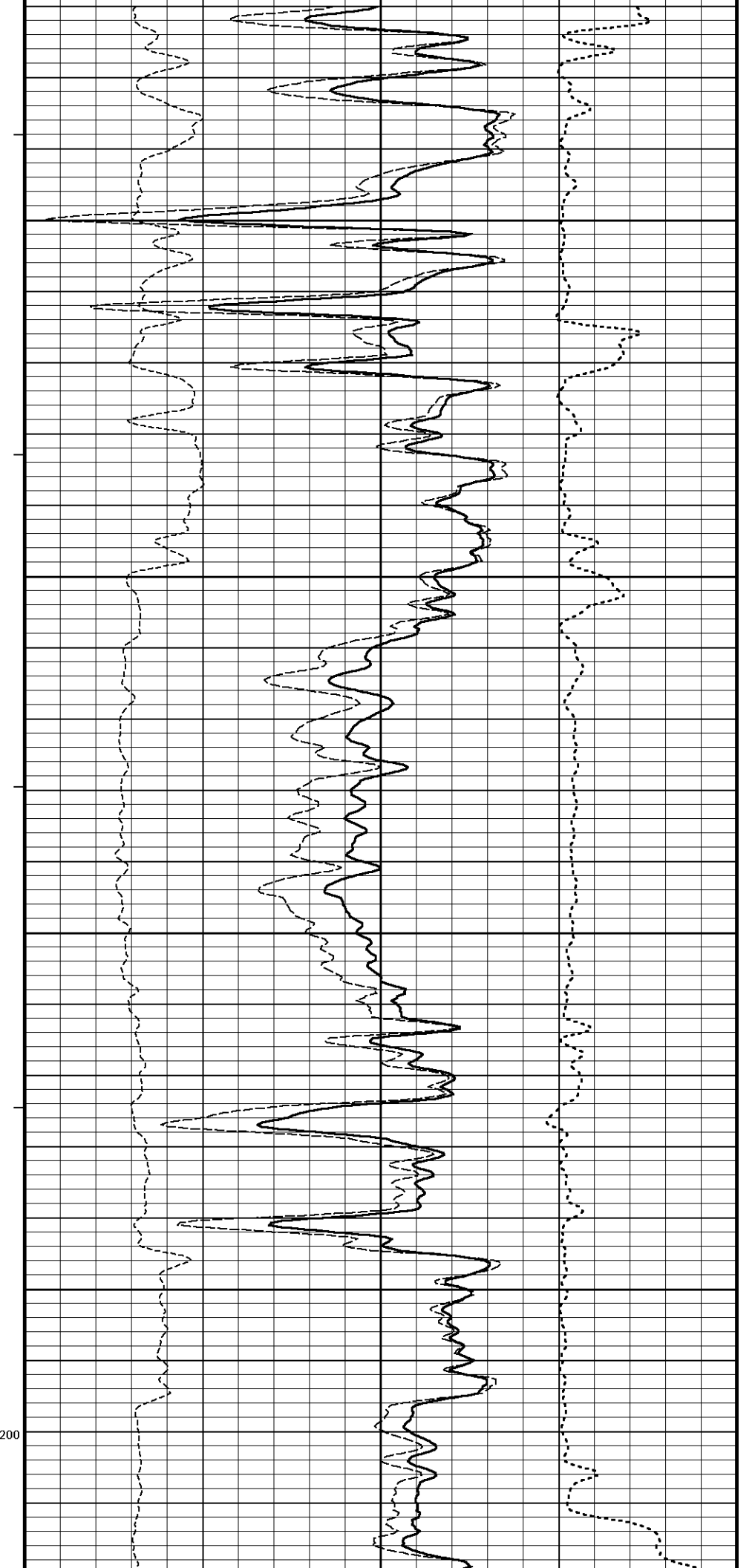
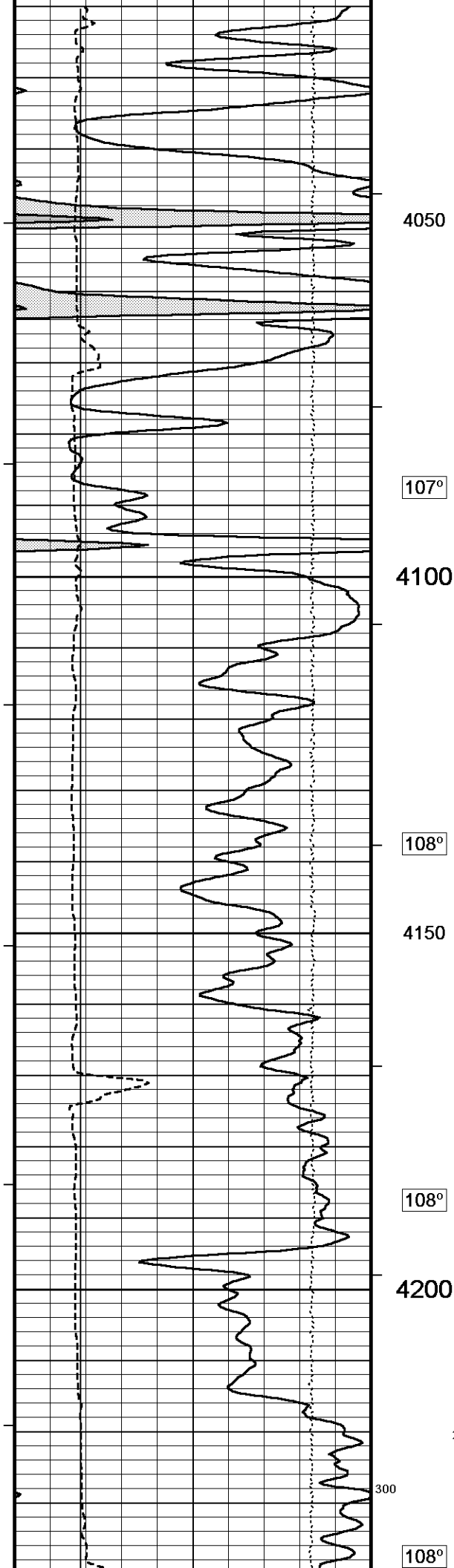
Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 19-APR-2014 12:54

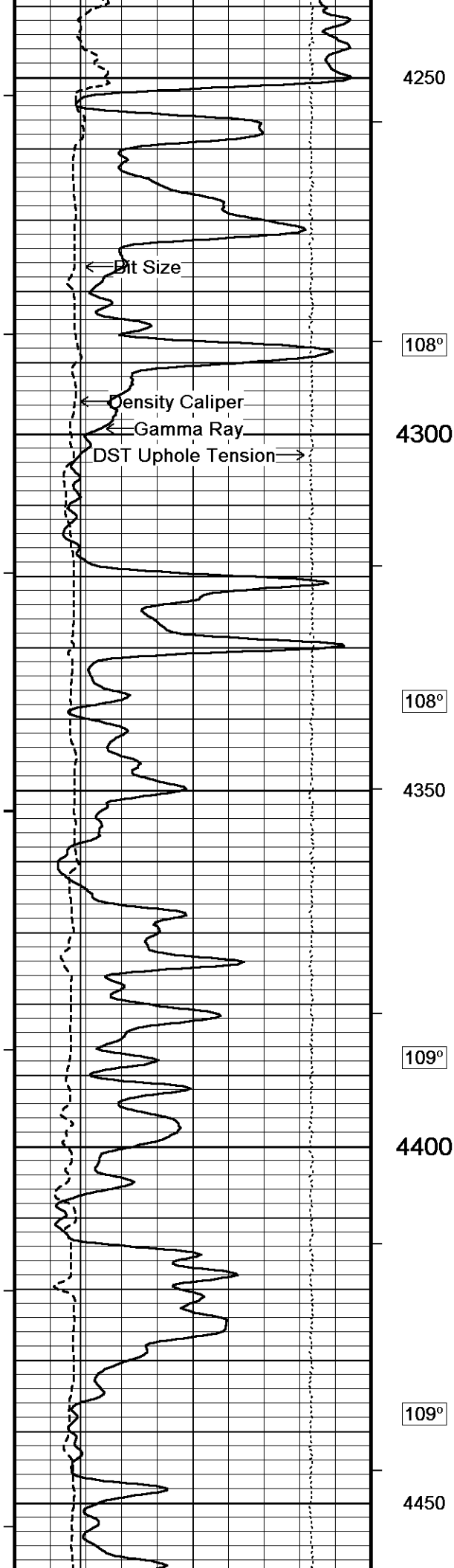
Filename: C:\Minimus 13.08.2113\Logs\M & M Exploration Z ...M & M Exploration Z Bar #27-9_001.dtaRecorded on 19-APR-2014 09:34

System Versions: Logged with 13.08.2113Plotted with 13.08.2113

↑REPEAT SECTION↑







4250

108°

4300

108°

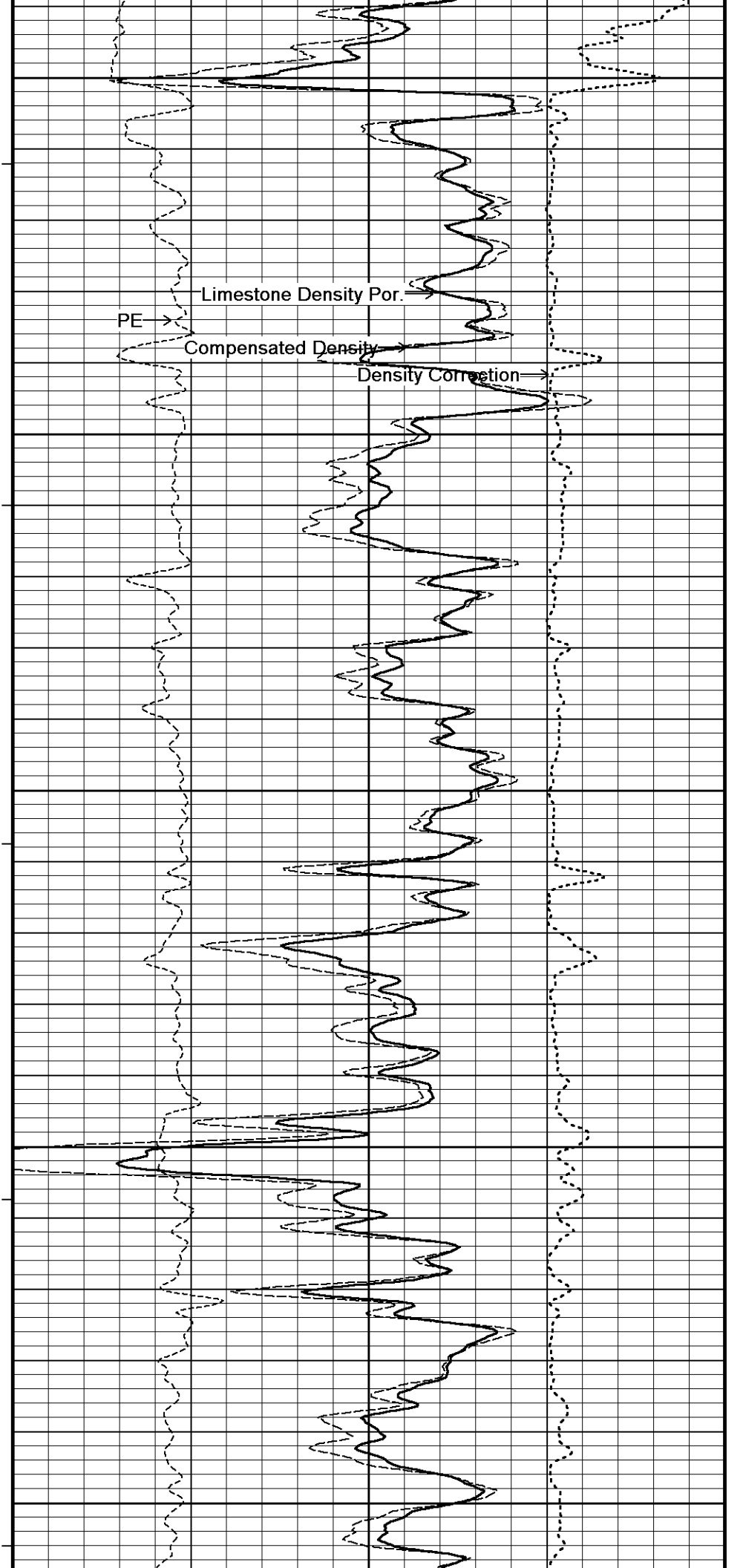
4350

109°

4400

109°

4450

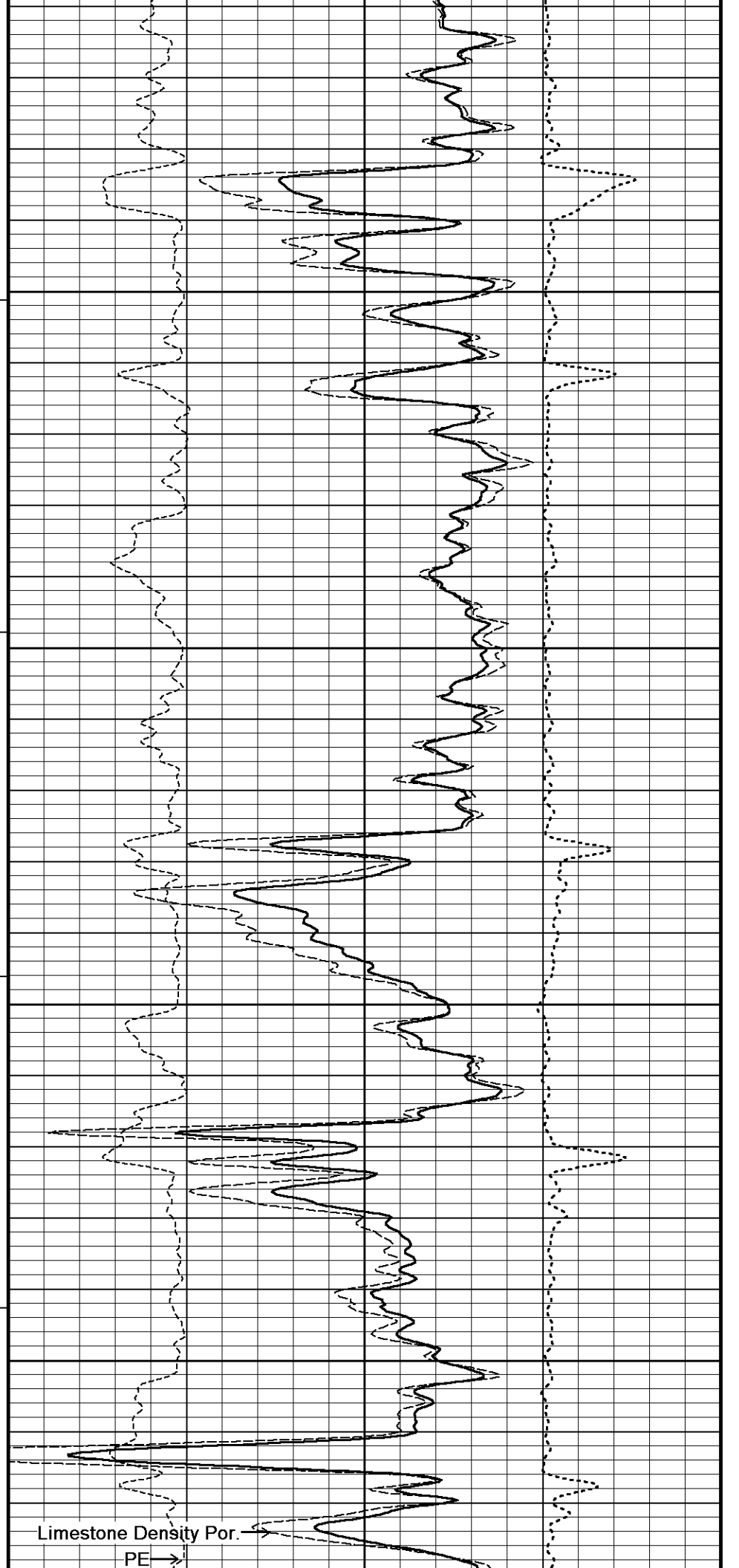
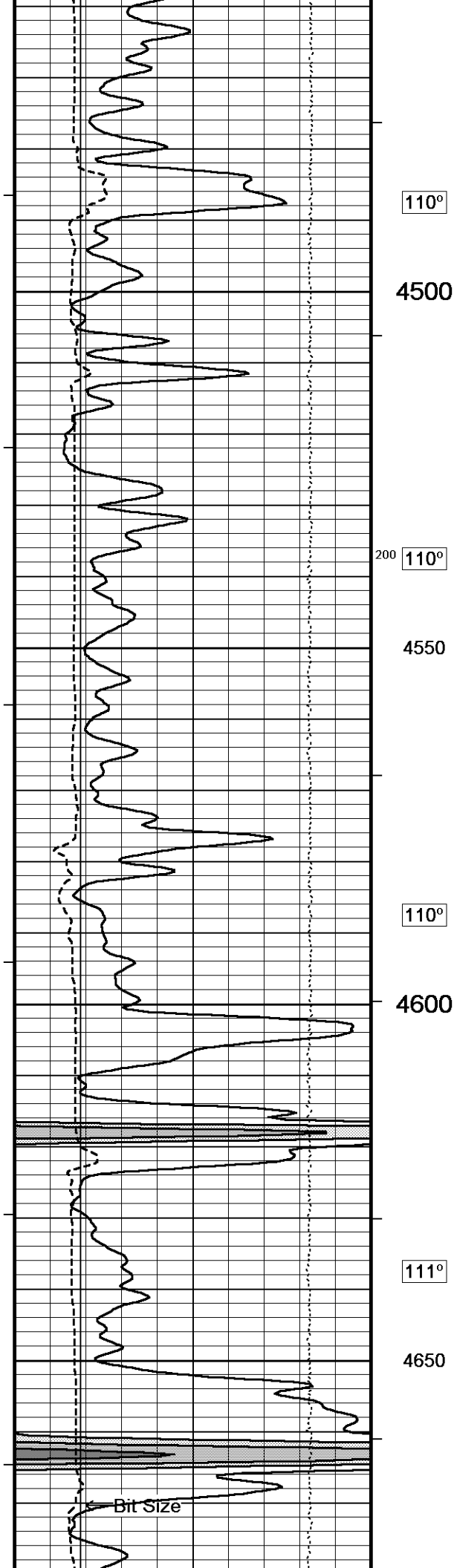


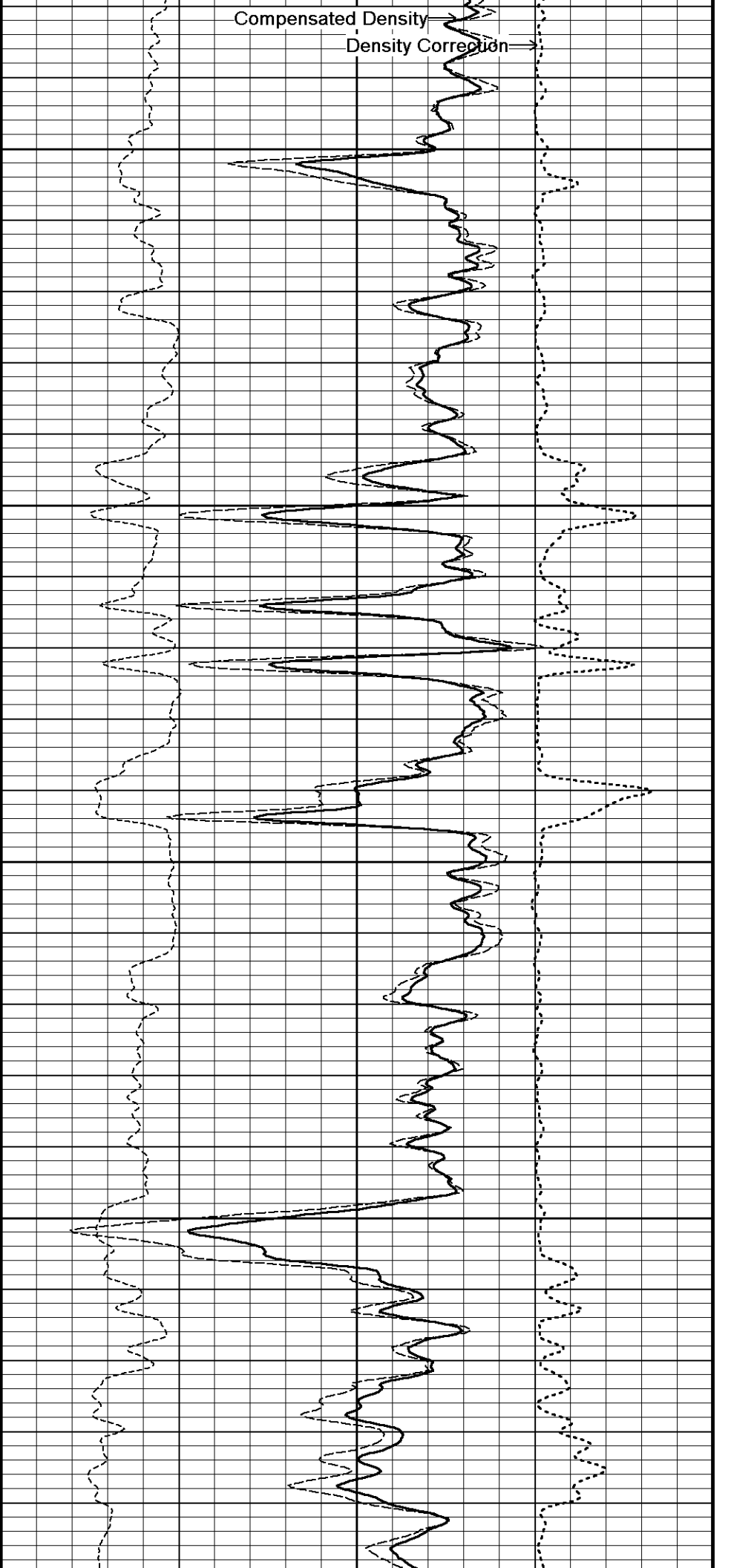
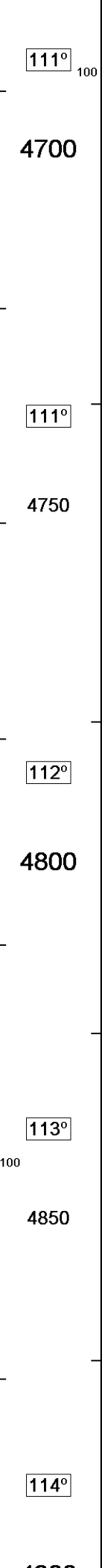
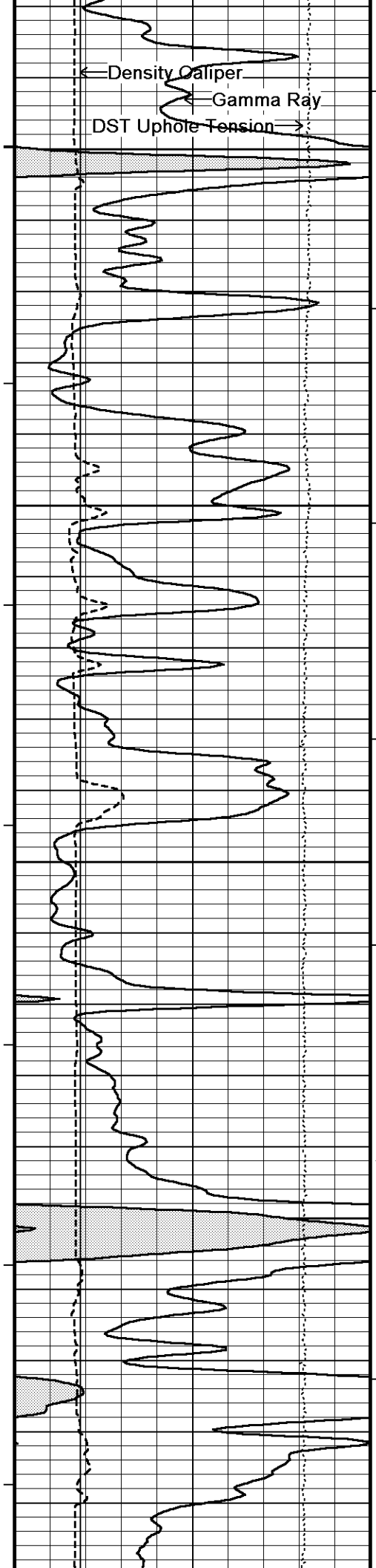
PE

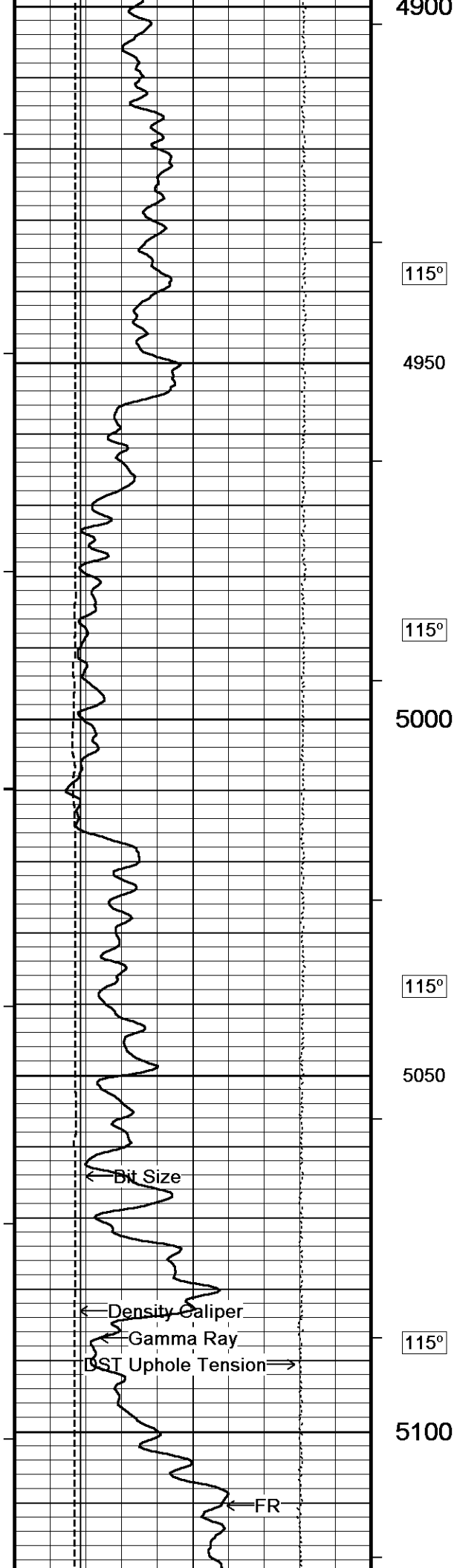
Limestone Density Por.

Compensated Density

Density Correction







4900

115°

4950

115°

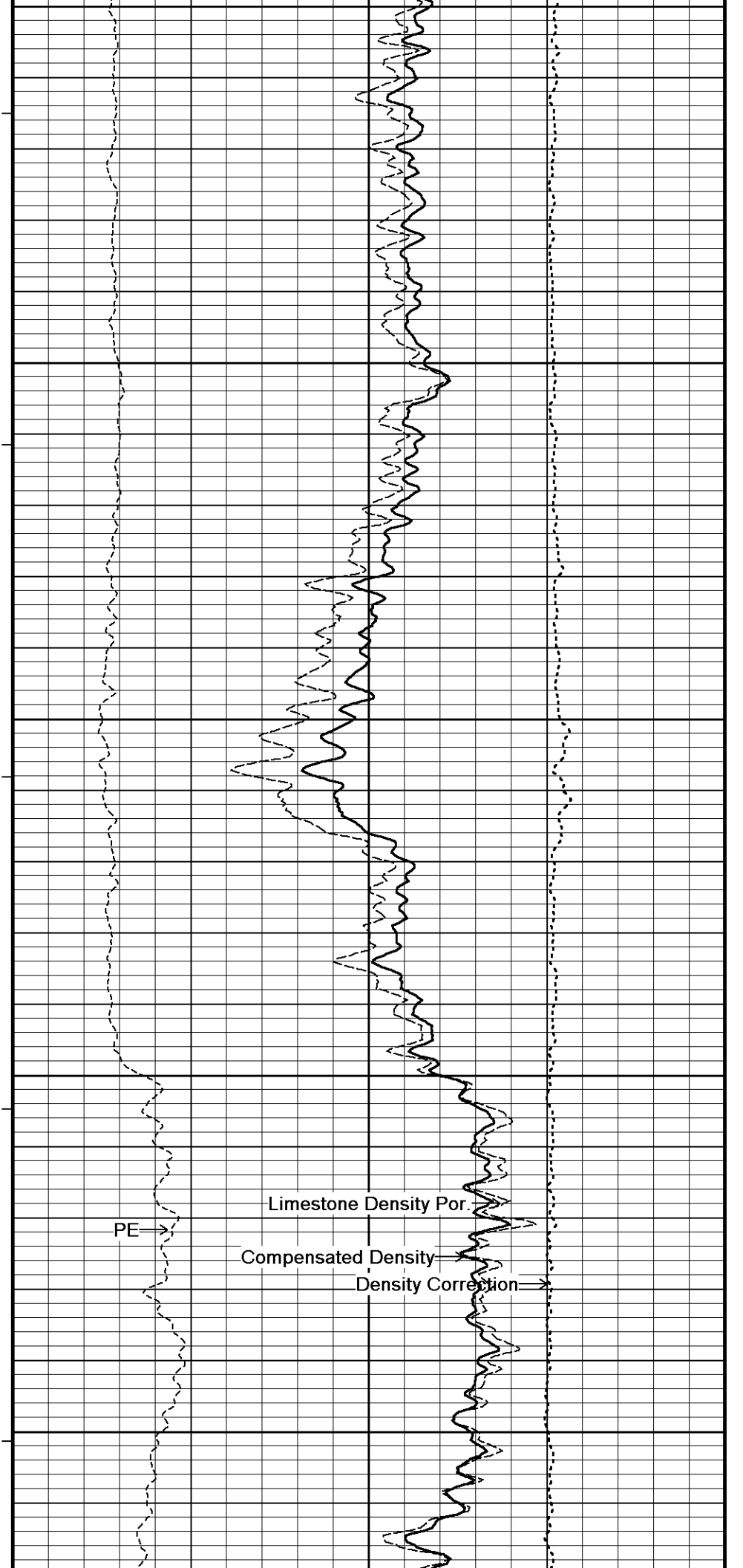
5000

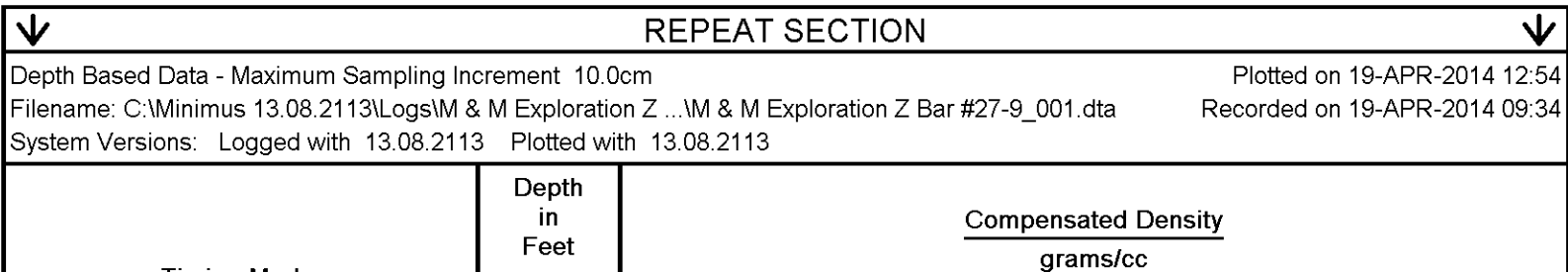
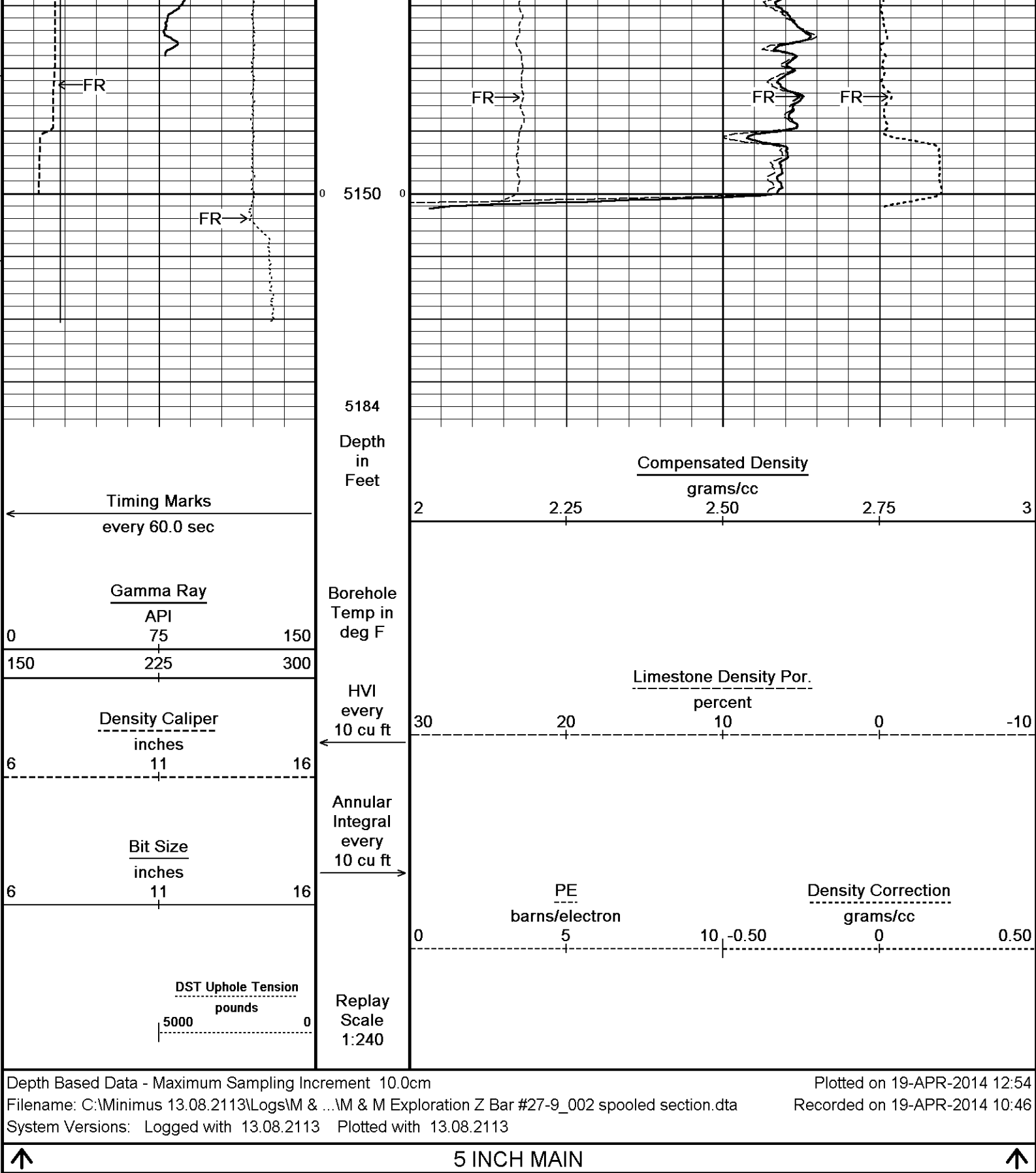
115°

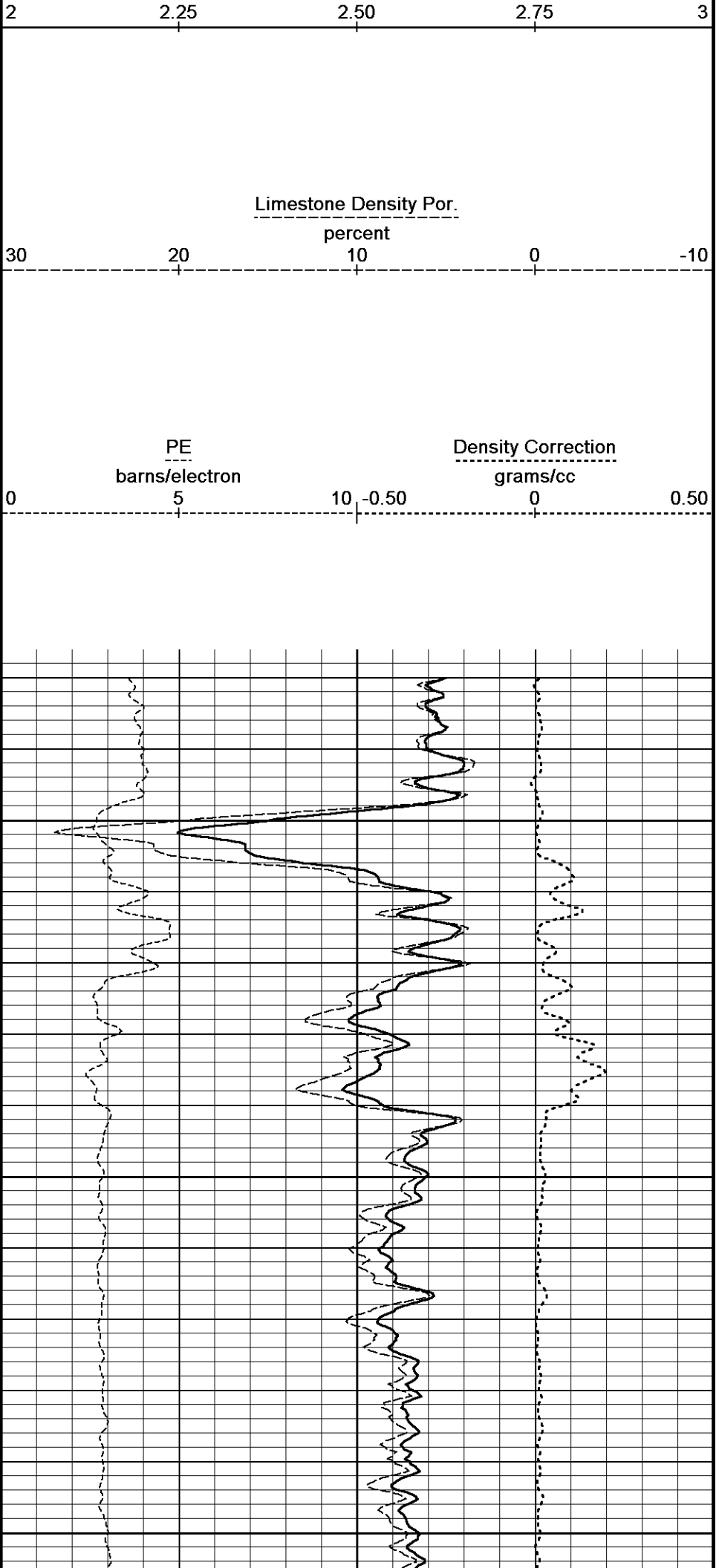
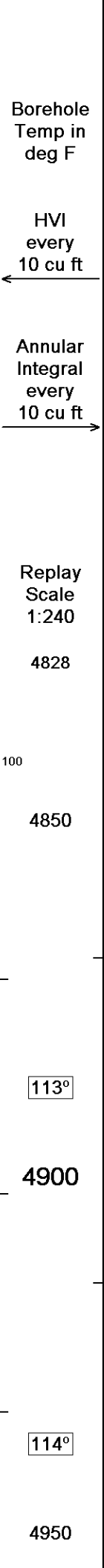
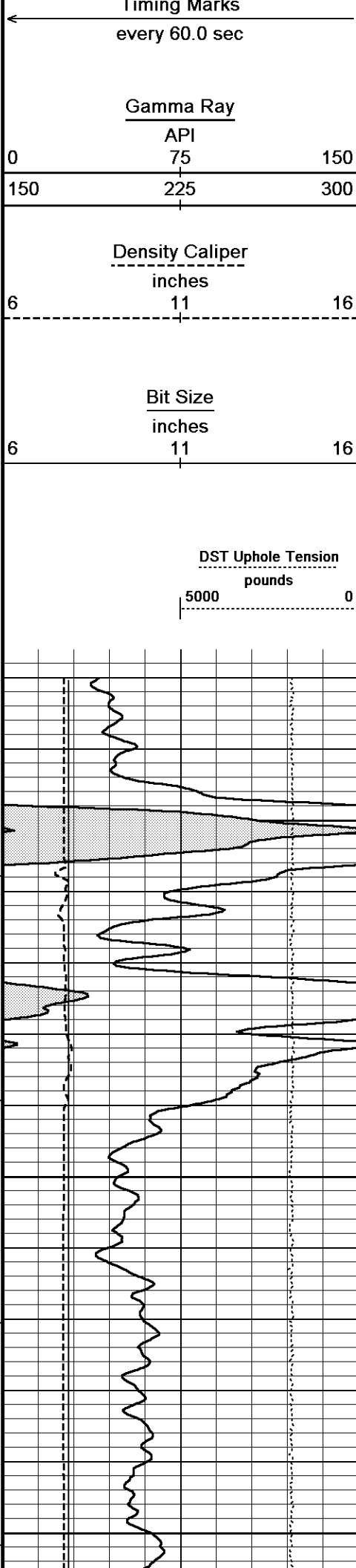
5050

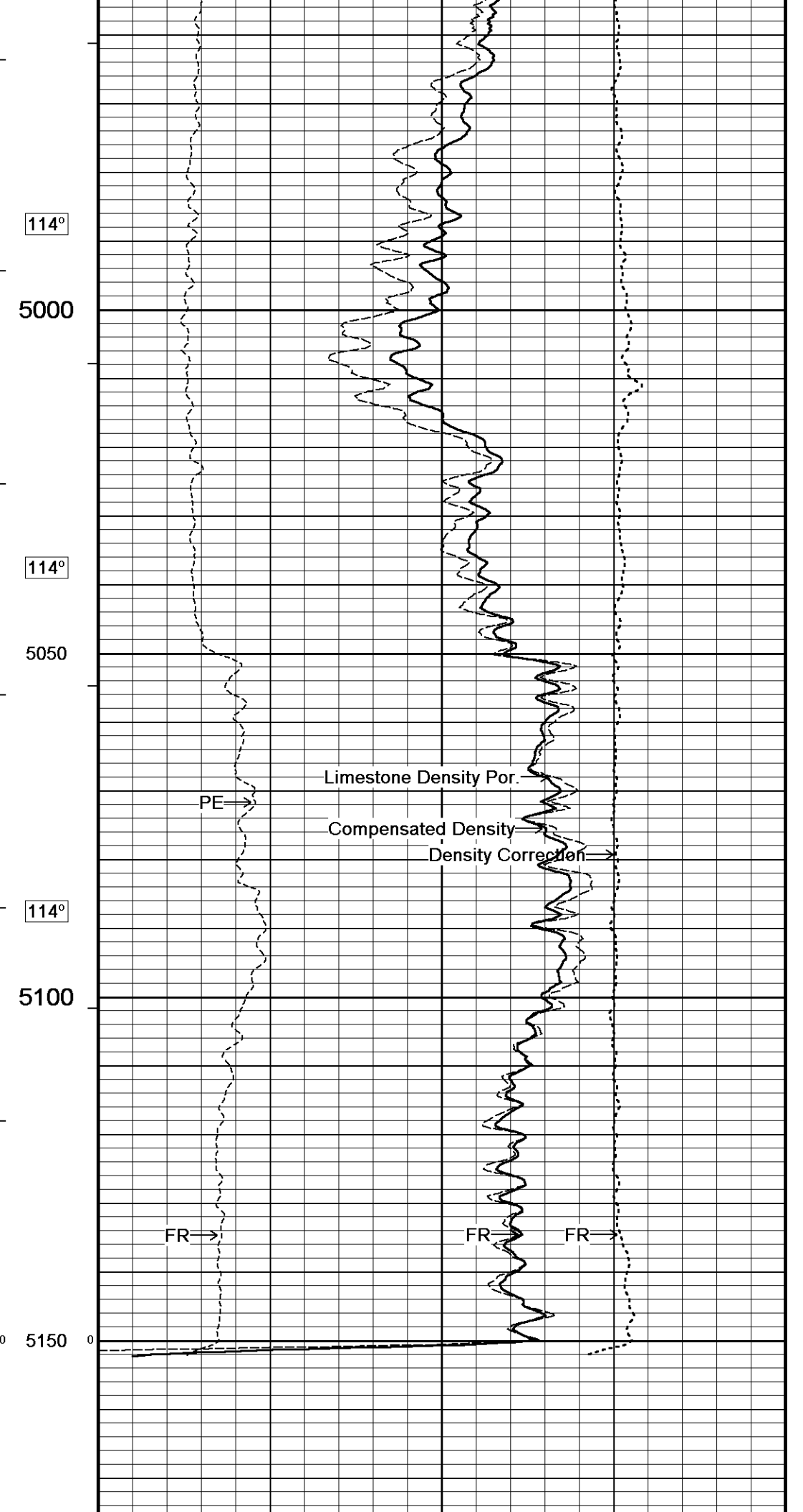
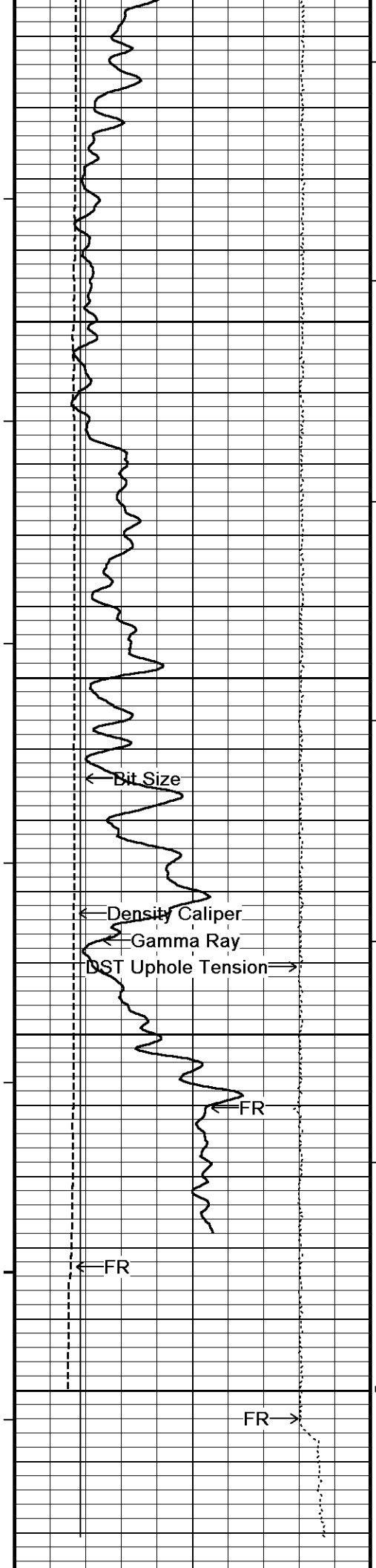
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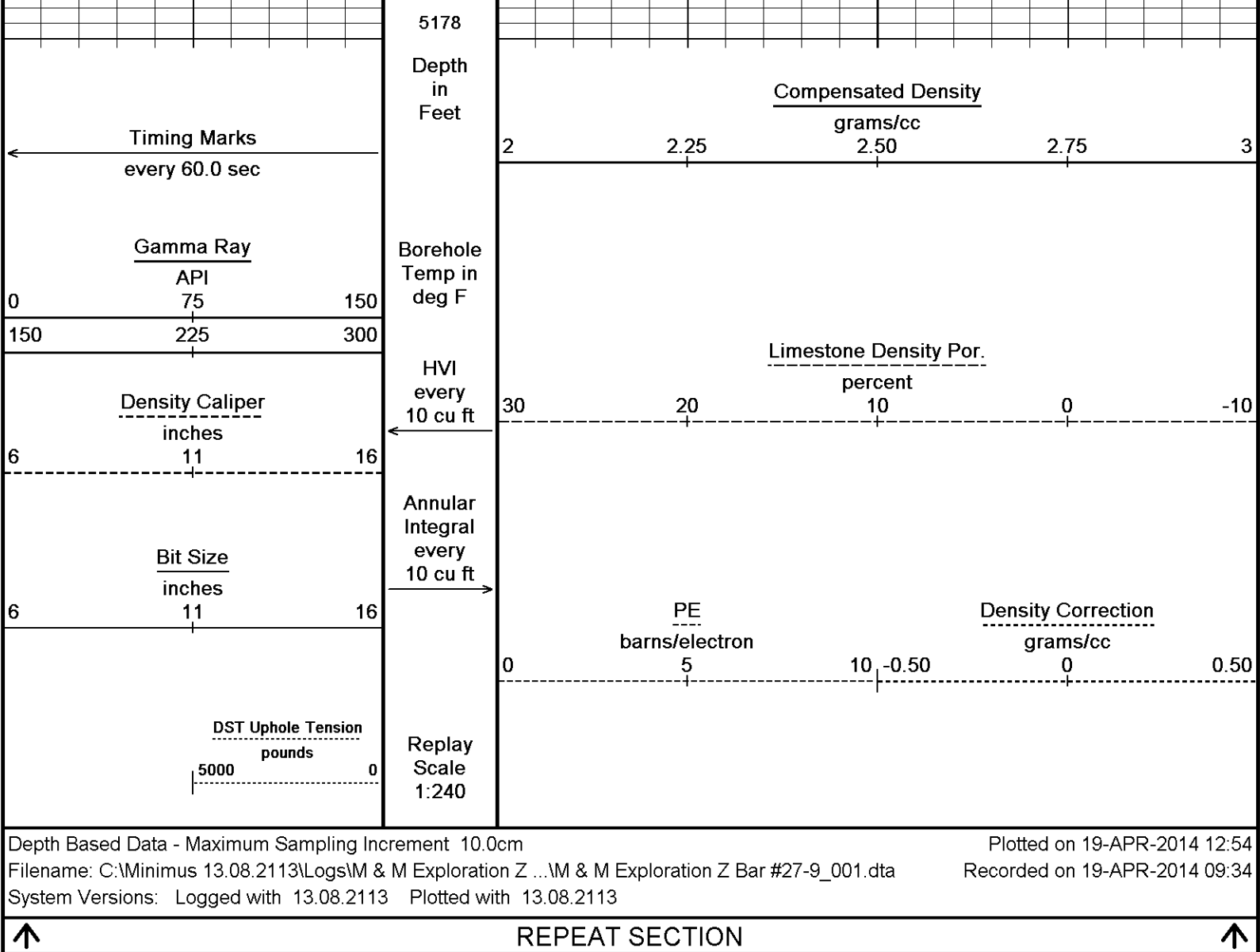
5100











BEFORE SURVEY CALIBRATION		
C:\Minimus 13.08.2113\Logs\M & M Exploration Z Bar #27-9\M & M Exploration Z Bar #27-9_001.dta		
General Constants All 000		Last Edited on 19-APR-2014,09:14
General Parameters		
Mud Resistivity	0.670	ohm-metres
Mud Resistivity Temperature	89.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	MMR Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. Four Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0			Field Calibration on 12-APR-2014 13:09
Reading No	Measured	Calibrated (lbs)	
1	15639.80	0.00	

1	15035.80	0.00
2	16323.32	476.00
Gamma Calibration MCG-D.K 443		
		Field Calibration on 18-APR-2014 03:58
	Measured	Calibrated (API)
Background	71	47
Calibrator (Gross)	1166	772
Calibrator (Net)	1096	725
Gamma Constants MCG-D.K 443		
		Last Edited on 19-APR-2014,08:21
Gamma Calibrator Number	GRC38	
Mud Density	1.08	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%
SP Calibration MCG-D.K 443		
		Field Calibration on 10-APR-2014 11:40
	Measured	Calibrated (mV)
Reference 1	102.2	100.0
Reference 2	-99.0	-100.0
High Resolution Temperature Calibration MCG-D.K 443		
		Field Calibration on 05-MAR-2014,20:50
	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00
High Resolution Temperature Constants MCG-D.K 443		
		Last Edited on 05-MAR-2014,20:50
Pre-filter Length	11	
Caliper Calibration MMR-C.A 248		
		Base Calibration on 24-MAR-2014 11:12 Field Calibration on 18-APR-2014 04:19
Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	13253	5.96
2	16528	7.97
3	19726	9.95
4	23473	11.91
5	0	0.00
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.96	7.97
Micro Normal and Micro Inverse Calibration MMR-C.A 248		
		Base Calibration on 24-MAR-2014 11:03 Field Check on 18-APR-2014 04:21
Base Calibration		
	Measured	Calibrated (ohm-m)
Channel	Resistor 1 Resistor 2	Resistor 1 Resistor 2
Micro Normal	10.1 49.8	5.1 25.6
Micro Inverse	9.9 49.5	3.4 16.9
Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	93.6	93.6
Micro Inverse	62.2	62.2
Micro Normal and Micro Inverse Constants MMR-C.A 248		
		Last Edited on 23-JAN-2014,17:04
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	0.0000	inches
Neutron Calibration MDN-A.B 65		
		Base Calibration on 02-APR-2014 11:47 Field Check on 18-APR-2014 04:03
Base Calibration		
	Measured	Calibrated (cps)
	Near Far	Near Far

Ratio	2916	94	3714	110
	30.984		33.764	
Field Calibrator at Base			Calibrated (cps)	
			1762	2457
Ratio			0.717	
Field Check			Calibrated (cps)	
			1753	2453
Ratio			0.710	

Neutron Constants MDN-A.B 65			Last Edited on 18-APR-2014,17:54	
Neutron Source Id	PN-521			
Neutron Jig Number	5824NE			
Epithermal Neutron				
Caliper Source for Processing	Density Caliper			
Stand-off	0.00	inches		
Mud Density	1.00	gm/cc		
Limestone Sigma	7.10	cu		
Sandstone Sigma	4.26	cu		
Dolomite Sigma	4.70	cu		
Formation Pressure Source	None			
Formation Pressure	N/A	kpsi		
Temperature Source	Constant Value			
Temperature	68.00	degrees F		
Mud Salinity	0.00	kppm		
Salinity Correction	Not Applied			
Formation Fluid Salinity Source	None			
Formation Fluid Salinity	N/A	kppm		
Barite Mud Correction	Not Applied			

FE Calibration MFE-B.J 352			Base Calibration on 02-APR-2014 09:18
			Field Check on 18-APR-2014 03:18
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	963.7	126.8	
Base Check			281.5
Field Check			281.6

FE Constants MFE-B.J 352			Last Edited on 18-APR-2014,17:53	
Running Mode	No Sleeve			
MFE K Factor	0.1268			
Caliper Source for FE correction	Density Caliper			
Caliper Value for FE correction	N/A		inches	
Rm Source for FE correction	Temperature Corr			
Temp. for Rm Corr.	MCG External Temperature			
Stand-off	0.5		inches	

Induction Calibration MAI-A.A 158				Base Calibration on 03-APR-2014,15:01	
				Field Check on 18-APR-2014 03:17	
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.2	475.3	9.3	966.2	
2	6.1	381.2	7.6	821.4	
3	3.8	265.2	5.2	566.0	
4	2.7	132.2	2.6	279.2	
Array Temperature		22.3	Deg F		
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1			11.9	3814.3	
2			29.9	3530.4	
3			27.1	2981.2	
4			18.0	2097.4	
Deep			14.8	1943.5	

Deep	14.8	1943.3
Medium	40.8	3887.2
Shallow	47.1	5236.2

Array Temperature	58.7	Deg F
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Induction Constants MAI-A.A 158

Last Edited on 19-APR-2014,08:21

Induction Model	RtAP-WBM		
Caliper for Borehole Corr.	Density Caliper		
Hole Size for Borehole Correction	N/A	inches	
Tool Centred	No		
Stand-off Type	Fins		
Stand-off	0.50	inches	
Number of Fins on Stand-off	8.0000		
Stand-off Fin Angle	45.00	degrees	
Stand-off Fin Width	0.5000	inches	
Borehole Corr. Rm Source	Temperature Corr		
Temp. for Rm Corr.	MCG External Temperature		
Squasher Start	0.0020	mhos/metre	
Squasher Offset	N/A	mhos/metre	
Borehole Normalisation			
DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000
Calibration Site Corrections			
Channel 1	0.00	mmhos/metre	
Channel 2	0.00	mmhos/metre	
Channel 3	0.00	mmhos/metre	
Channel 4	0.00	mmhos/metre	
Apparent Porosity and Water Saturation Constants			
Archie Constant (A)	1.00		
Cementation Exponent (M)	2.00		
Saturation Exponent (N)	2.00		
Saturation of Water for Apor	100.00	percent	
Resistivity of Water for Apor and Sw	0.05	ohm-m	
Resistivity of Mud Filtrate for Sw	0.00	ohm-m	
Source for Rt	0.00		
Source for Rxo	0.00		

High Resolution Temperature Calibration MAI-A.A 158

Field Calibration on 03-APR-2014,15:43

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MAI-A.A 158

Last Edited on 03-APR-2014,15:43

Pre-filter Length	11
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Photo Density Calibration MPD-D.A 481

Base Calibration on 02-APR-2014 11:04

Field Check on 18-APR-2014 04:18

Density Calibration				
Base Calibration				
	Near	Far	Near	Far
Background	1226	1442		
Reference 1	46921	22694	59556	30836
Reference 2	19336	2468	24941	2541
Field Check at Base				
	1225.8	1442.4		
Field Check				
	1228.1	1443.9		

PE Calibration		
Base Calibration	Measured	Calibrated

	WS	WH	Ratio	Ratio
Background	233	1097		
Reference 1	20771	46744	0.450	0.371
Reference 2	5890	19202	0.312	0.272

Field Check at Base
233.0 1096.7

Field Check
232.9 1098.5

Density Constants MPD-D.A 481

Last Edited on 19-APR-2014,08:21

Density Source Id	254	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.08	gm/cc
Mud Density Z/A Multiplier	1.11	
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Matrix Density (gm/cc)	Depth (ft)	
2.71		
0.00	0.00	
0.00	0.00	
0.00	0.00	
0.00	0.00	
0.00	0.00	
0.00	0.00	
0.00	0.00	
0.00	0.00	

Caliper Calibration MPD-D.A 481

Base Calibration on 02-APR-2014 11:11
Field Calibration on 18-APR-2014 04:14

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	18335	3.99
2	28333	5.98
3	38337	7.97
4	48197	9.86
5	59281	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.98	7.97

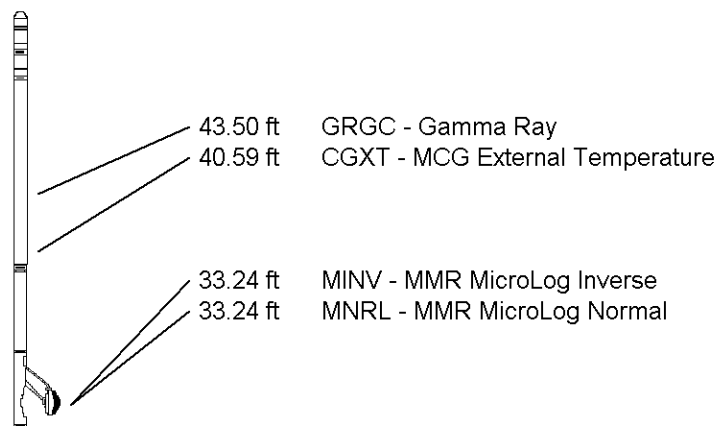
DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\M & M Exploration Z Bar #27-9\M & M Exploration Z Bar #27-9_001.dta

CBH-C, Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-C.A 248 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in



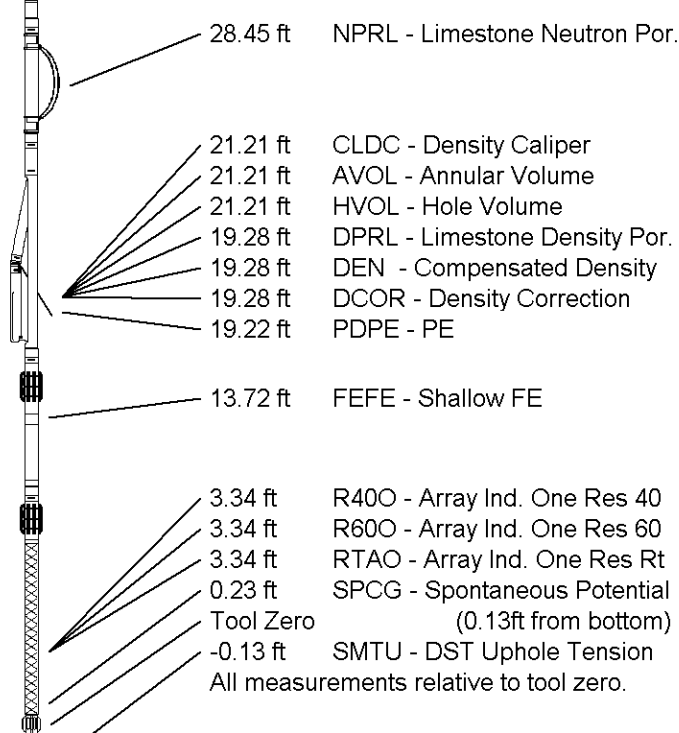
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-D.A 481 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 158 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 51.18 ft Weight: 407.9 lb



COMPANY M&M EXPLORATION, INC.
WELL Z-BAR 27-9
FIELD AETNA
PROVINCE/COUNTY BARBER
COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	1808.00	feet	First Reading	5135.00	feet
Elevation Drill Floor	1806.00	feet	Depth Driller	5150.00	feet
Elevation Ground Level	1798.00	feet	Depth Logger	5154.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG