



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY				M & M EXPLORATION, INC.			
WELL				Z BAR 5-9			
FIELD				AETNA GAS AREA			
PROVINCE/COUNTY				BARBER			
COUNTRY/STATE				U.S.A. / KANSAS			
LOCATION				1515' FSL & 735' FEL SE SW NE SE			
SEC 5	TWP 34S	RGE 14W	Other Services				
Latitude				MPD/MDN			
Longitude				MAI/MFE			
API Number		15-007-24150		MML			
Permanent Datum GL, Elevation 1651 feet							
Log Measured From KB				Elevations: KB 1661.00			
Drilling Measured From KB @ 10 FEET				DF 1659.00			
				GL 1651.00			
Date	30-MAR-2014						
Run Number	ONE						
Service Order	5872-83329134						
Depth Driller	5200.00			feet			
Depth Logger	5203.00			feet			
First Reading	5184.00			feet			
Last Reading	3870.00			feet			
Casing Driller	301.00			feet			
Casing Logger	301.00			feet			
Bit Size	7.875			inches			
Hole Fluid Type	CHEM						
Density / Viscosity	9.10 lb/USg		49.00 CP				
PH / Fluid Loss	9.50		8.20 ml/30Min				
Sample Source	PIT						
Rm @ Measured Temp	1.50 @ 86.0			ohm-m			
Rmf @ Measured Temp	1.20 @ 86.0			ohm-m			
Rmc @ Measured Temp	1.80 @ 86.0			ohm-m			
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	1.07 @120.0		ohm-m				
Time Since Circulation	4 HRS						
Max Recorded Temp	120.00			deg F			
Equipment / Base	13057		LIB				
Recorded By	D. COLE						
Witnessed By	B. BUSCH						
JOB #	LB 14-096						

BOREHOLE RECORD			Last Edited: 30-MAR-2014 05:57	
Bit Size inches	Depth From feet		Depth To feet	
7.875	301.00		5200.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
CASING	13.375	0.00	301.00	48.00

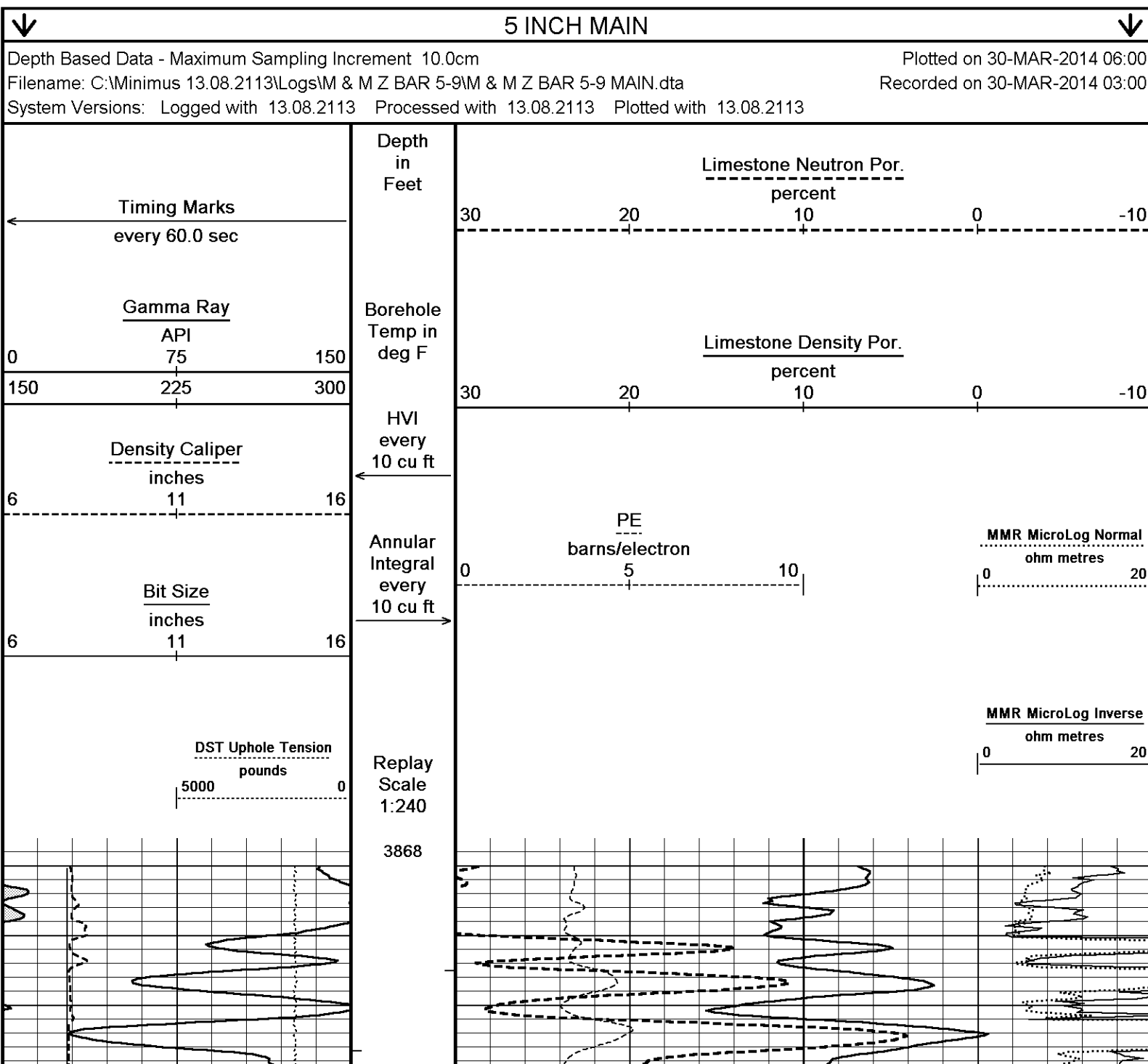
REMARKS
- SOFTWARE ISSUE: WLS 13.08.211.
- RUN ONE: MCG, MML, MDN, MPD, MFE, AND MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 430 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 290 CU.FT.

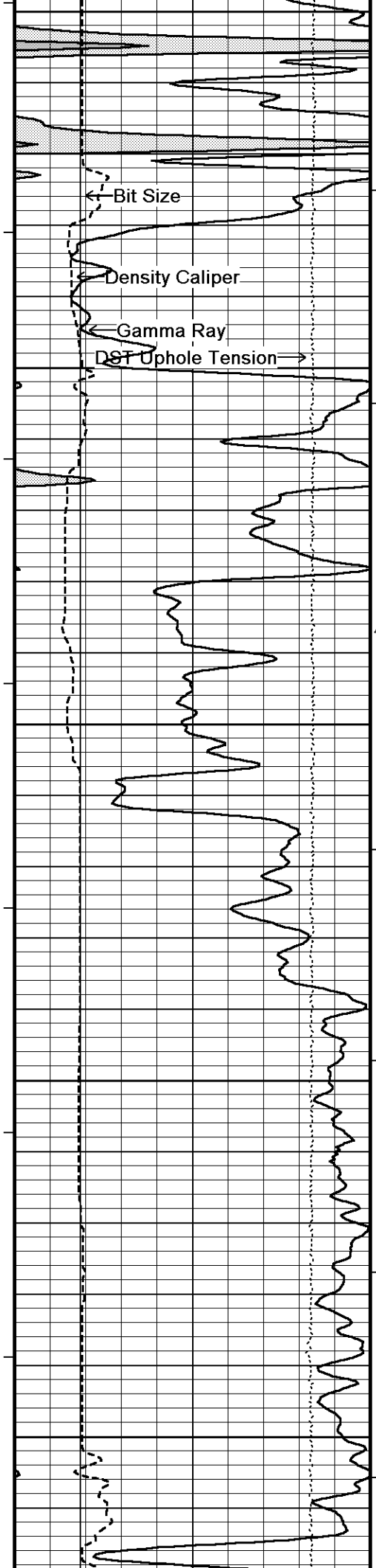
- RIG: HARDT

- ENGINEER: D. COLE.

- OPERATOR: J. DUNLAP.

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.





3900

Limestone Density Por.

107°

PE

Limestone Neutron Por.

3950

400 108°

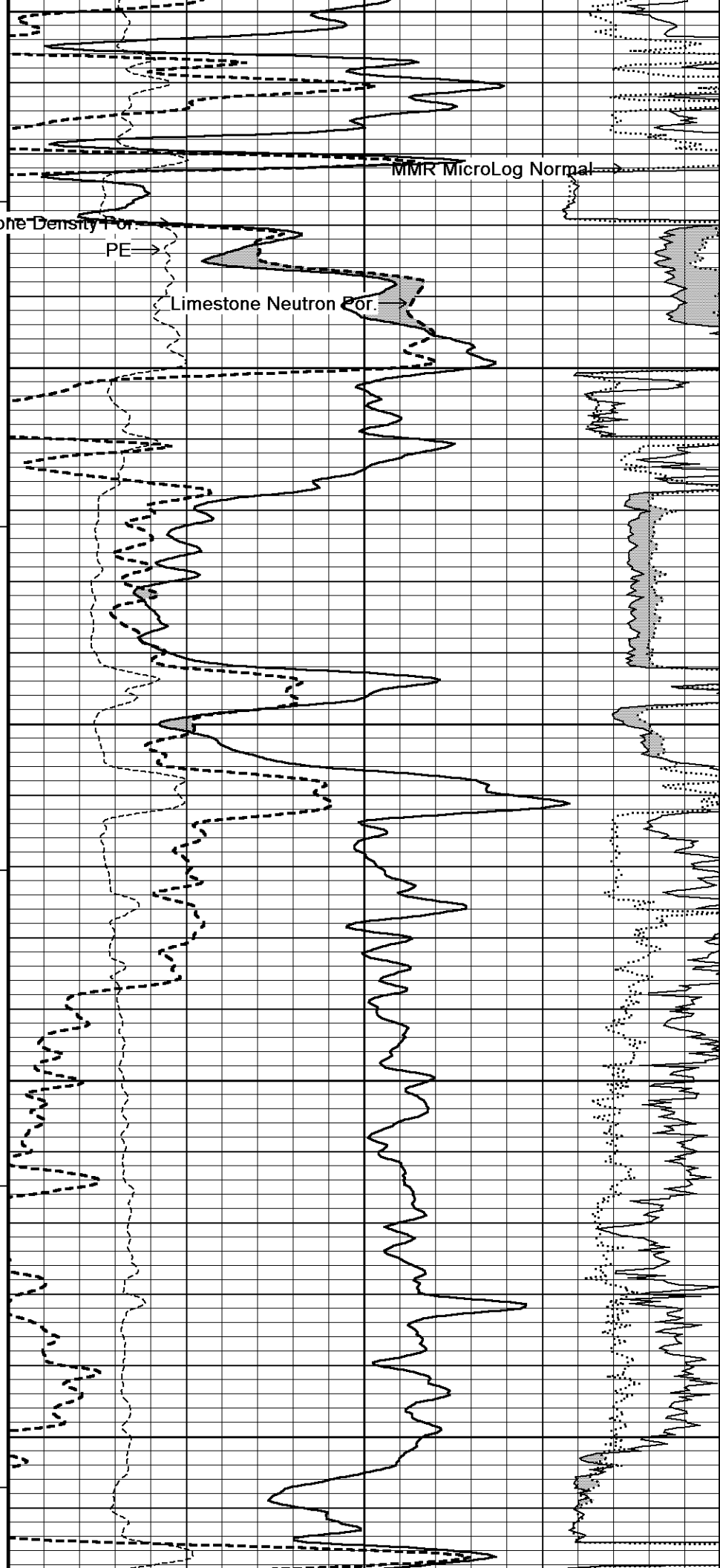
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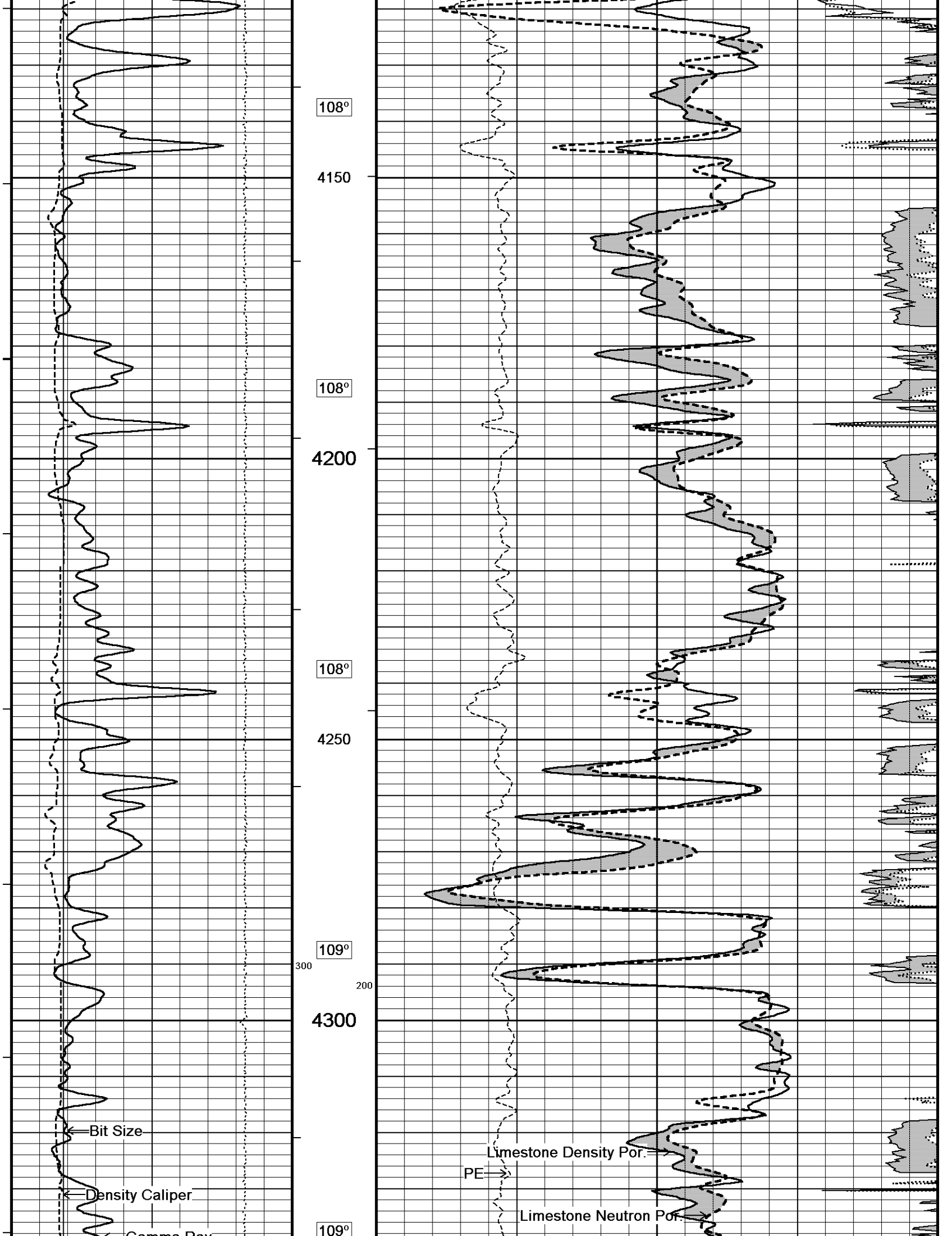
108°

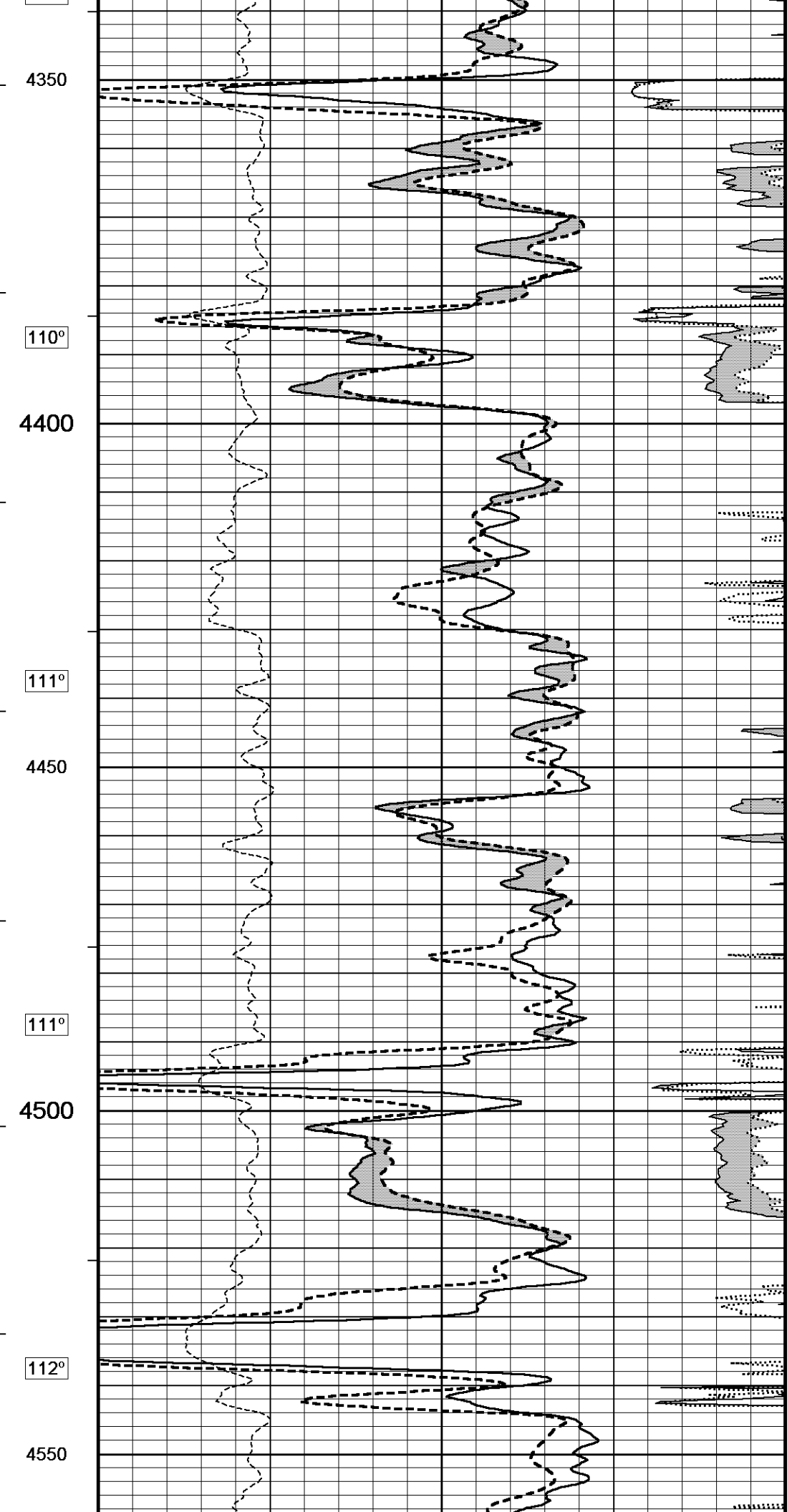
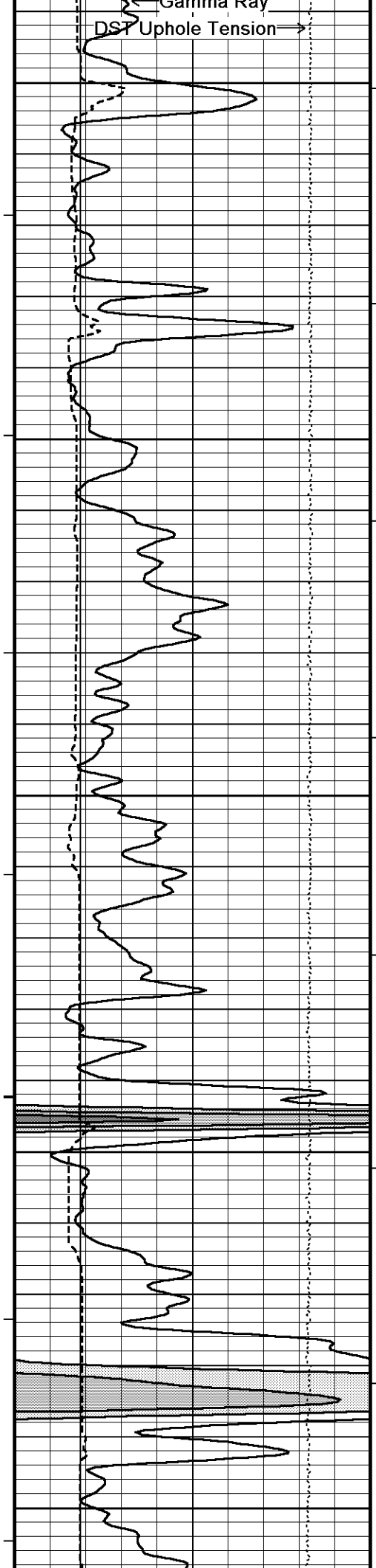
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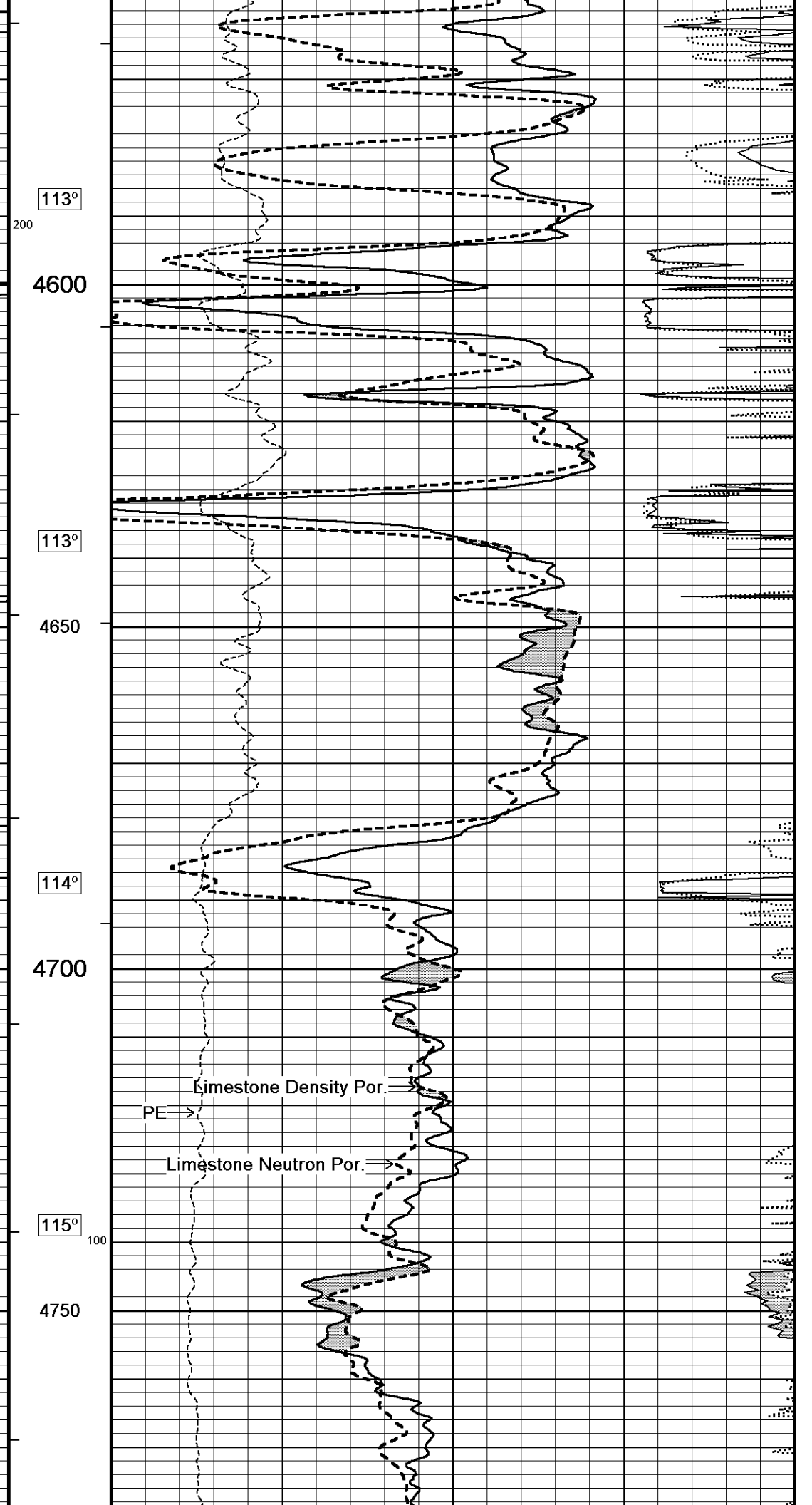
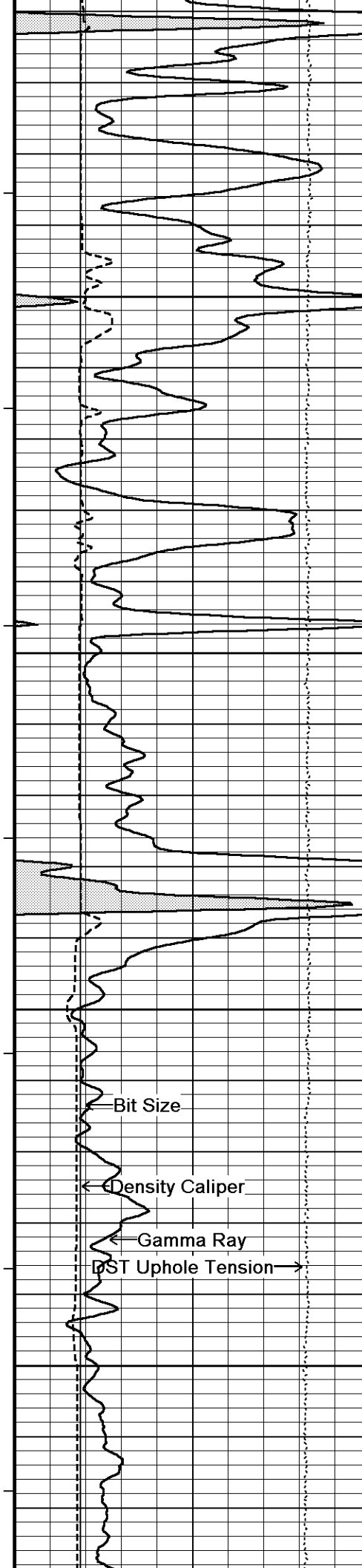
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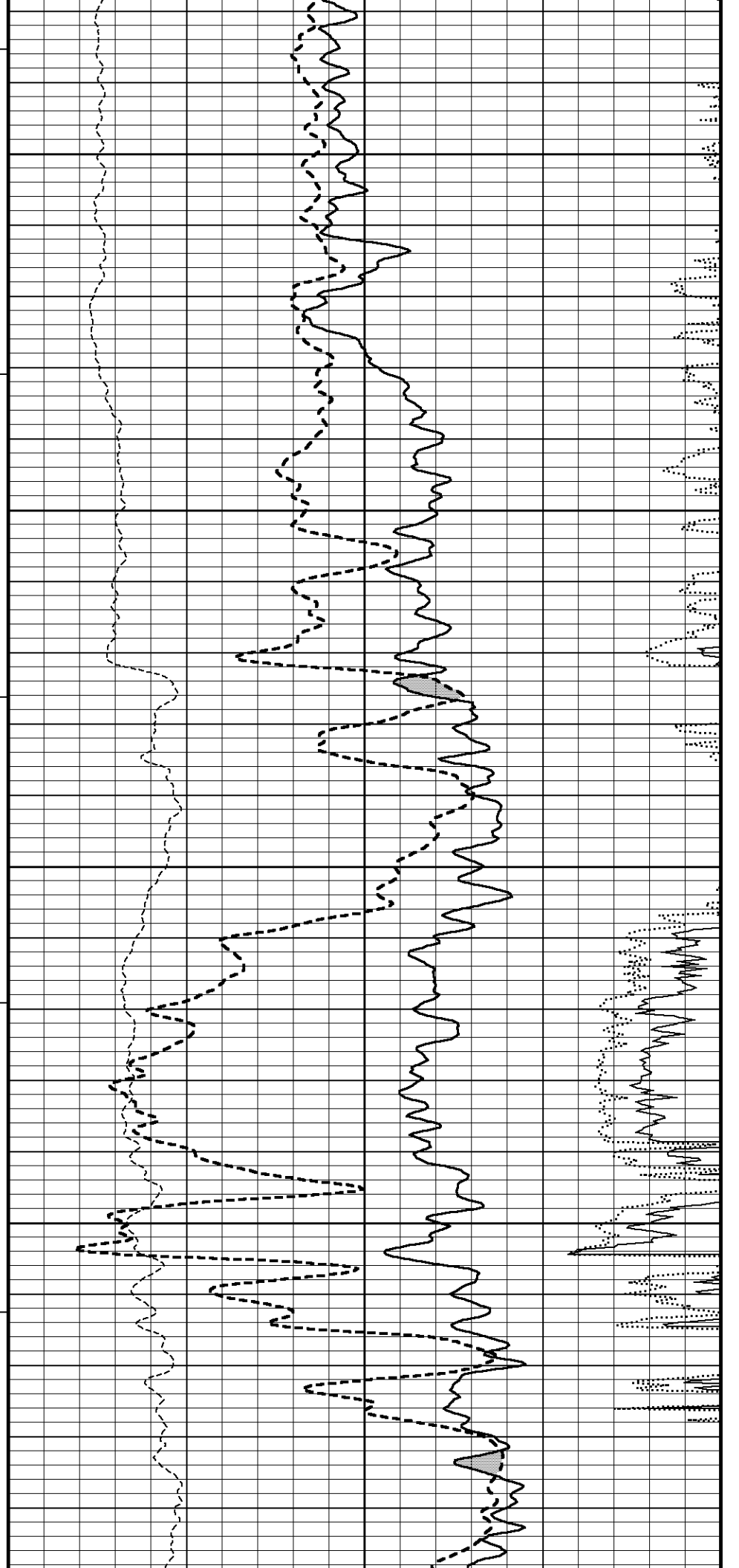
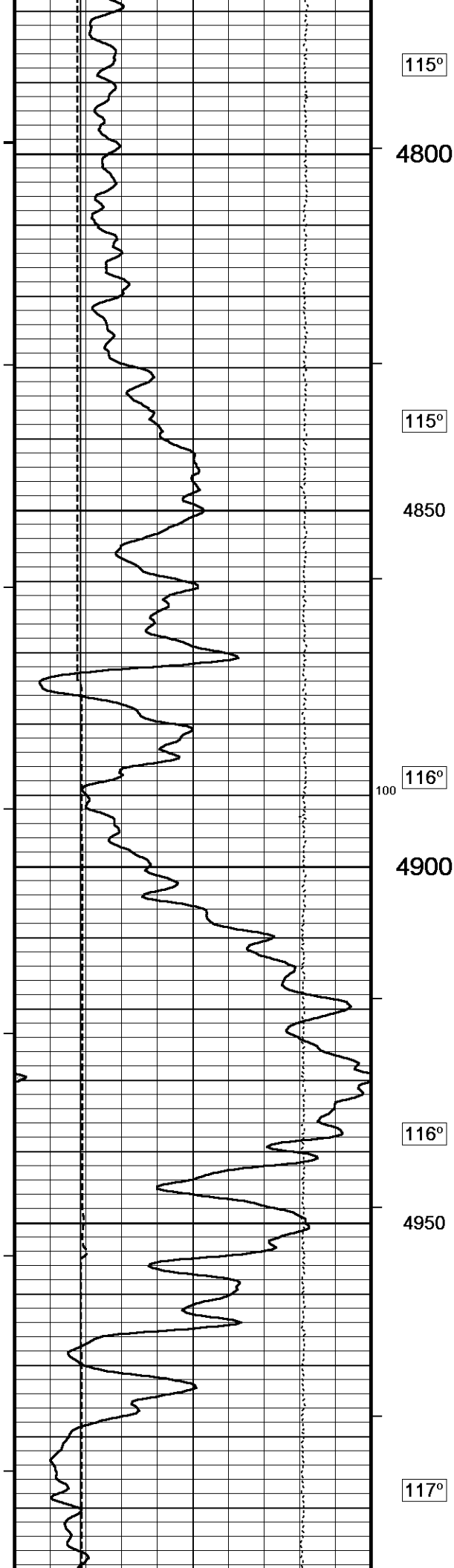
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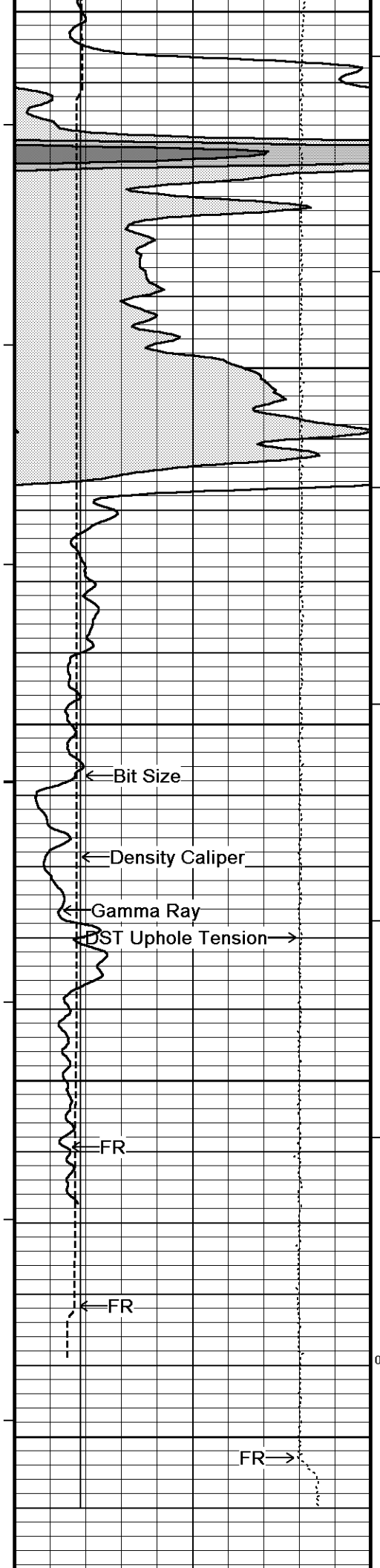




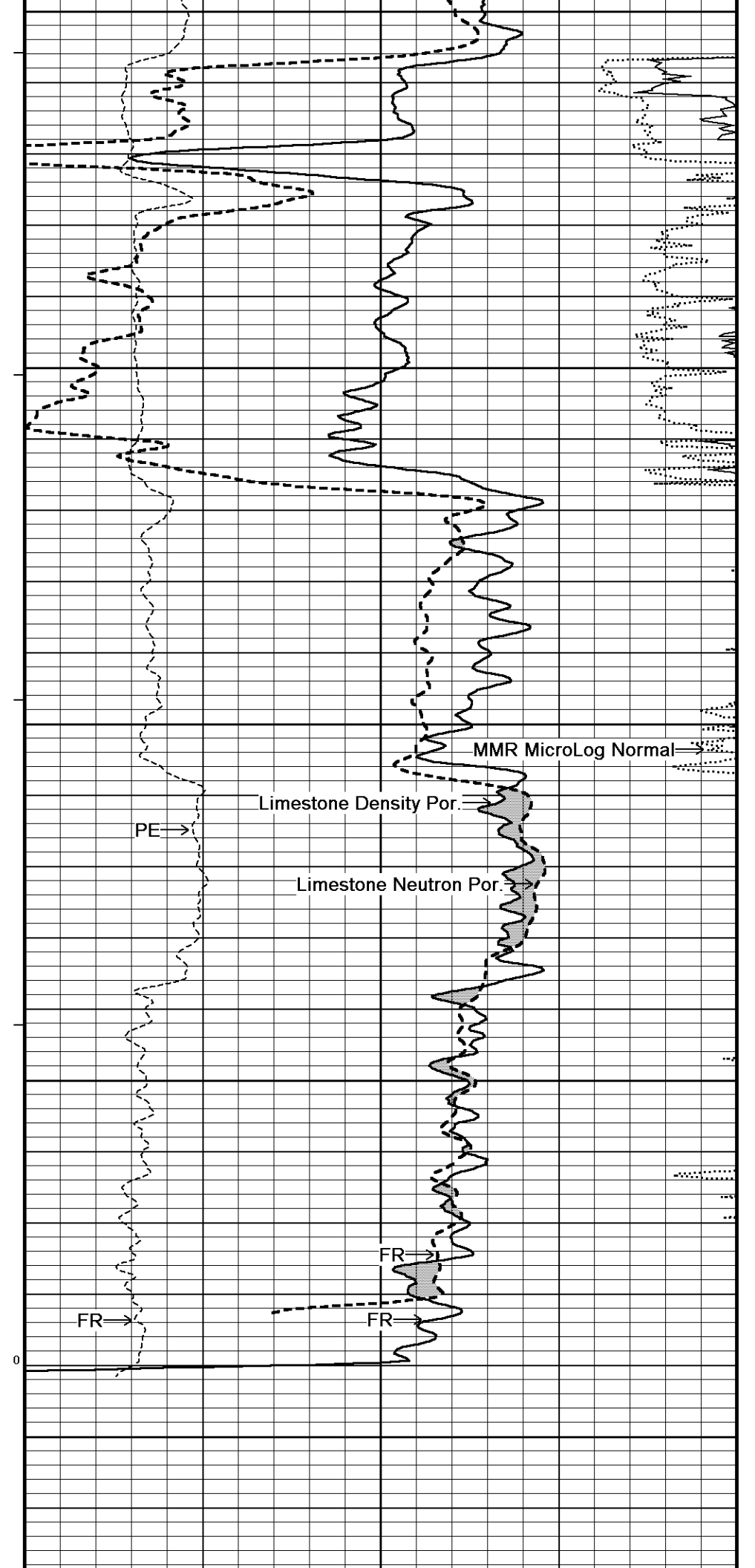


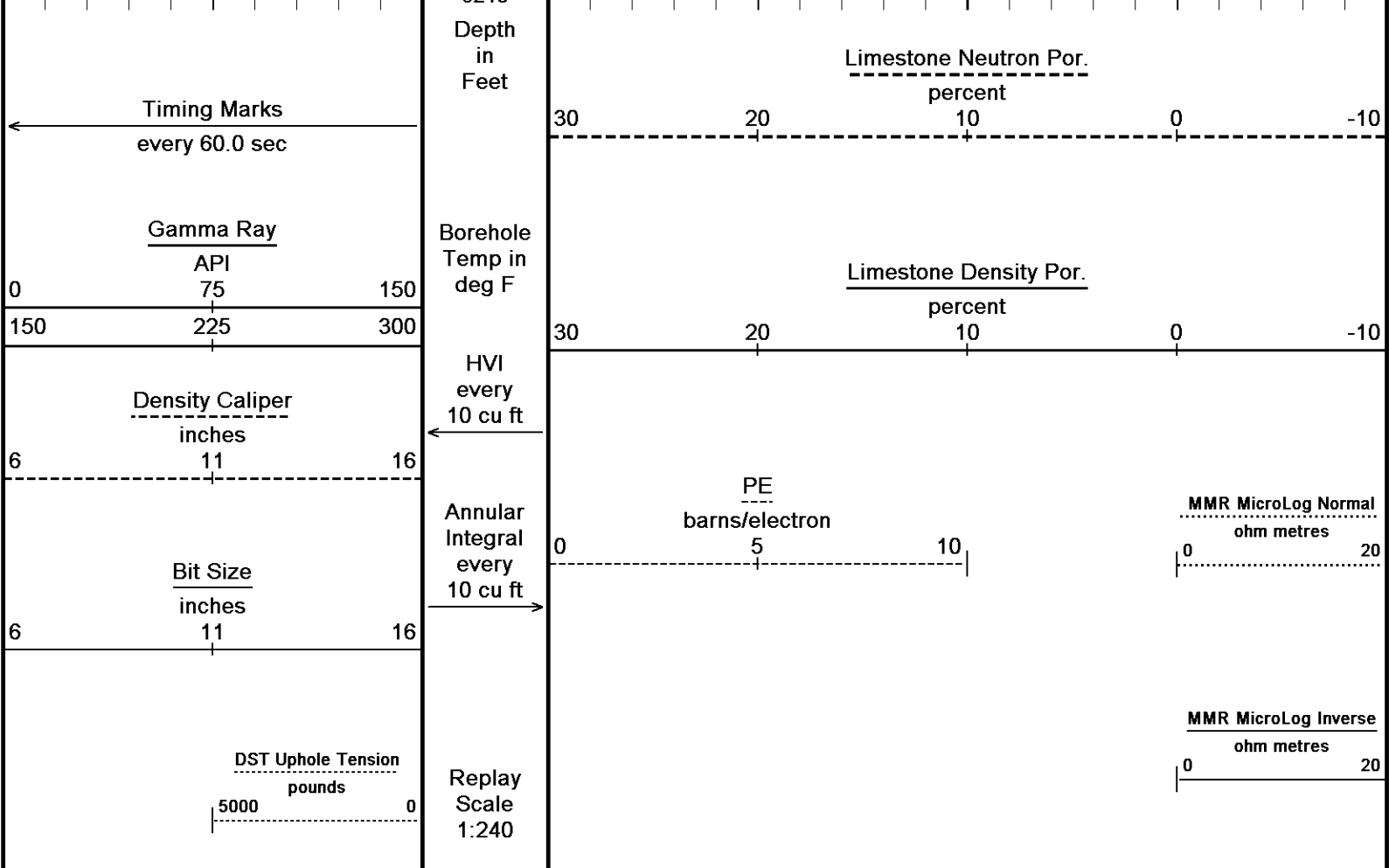






5000
118°
5050
119°
5100
120°
5150
0
5200
5218



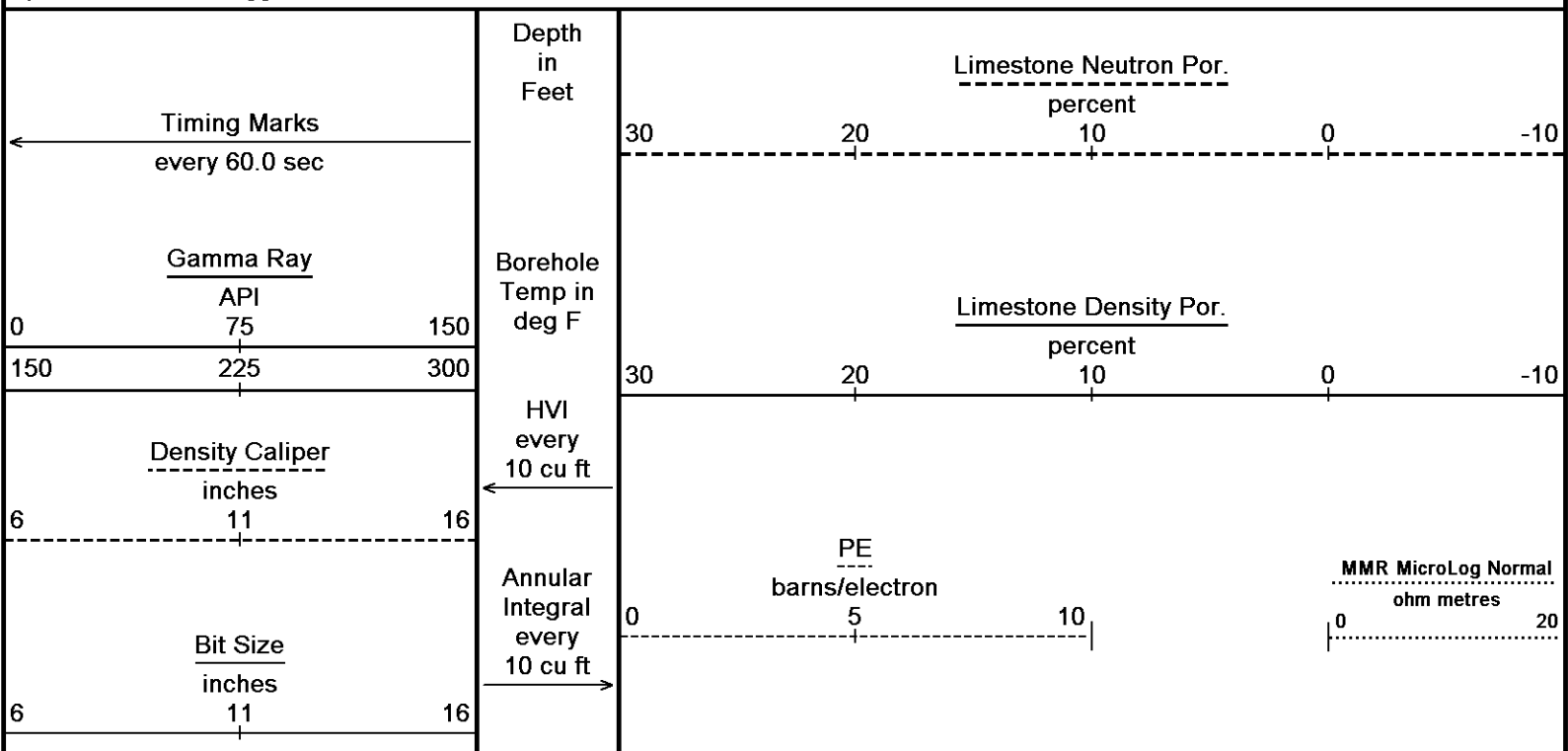


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 30-MAR-2014 06:00
 Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 MAIN.dta Recorded on 30-MAR-2014 03:00
 System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113

↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 30-MAR-2014 06:00
 Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 REPEAT.dta Recorded on 30-MAR-2014 02:28
 System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113



DST Uphole Tension
pounds

5000

0

Replay
Scale
1:240

4668

4700

114°

100

4750

114°

4800

115°

4850

Bit Size

Density Caliper

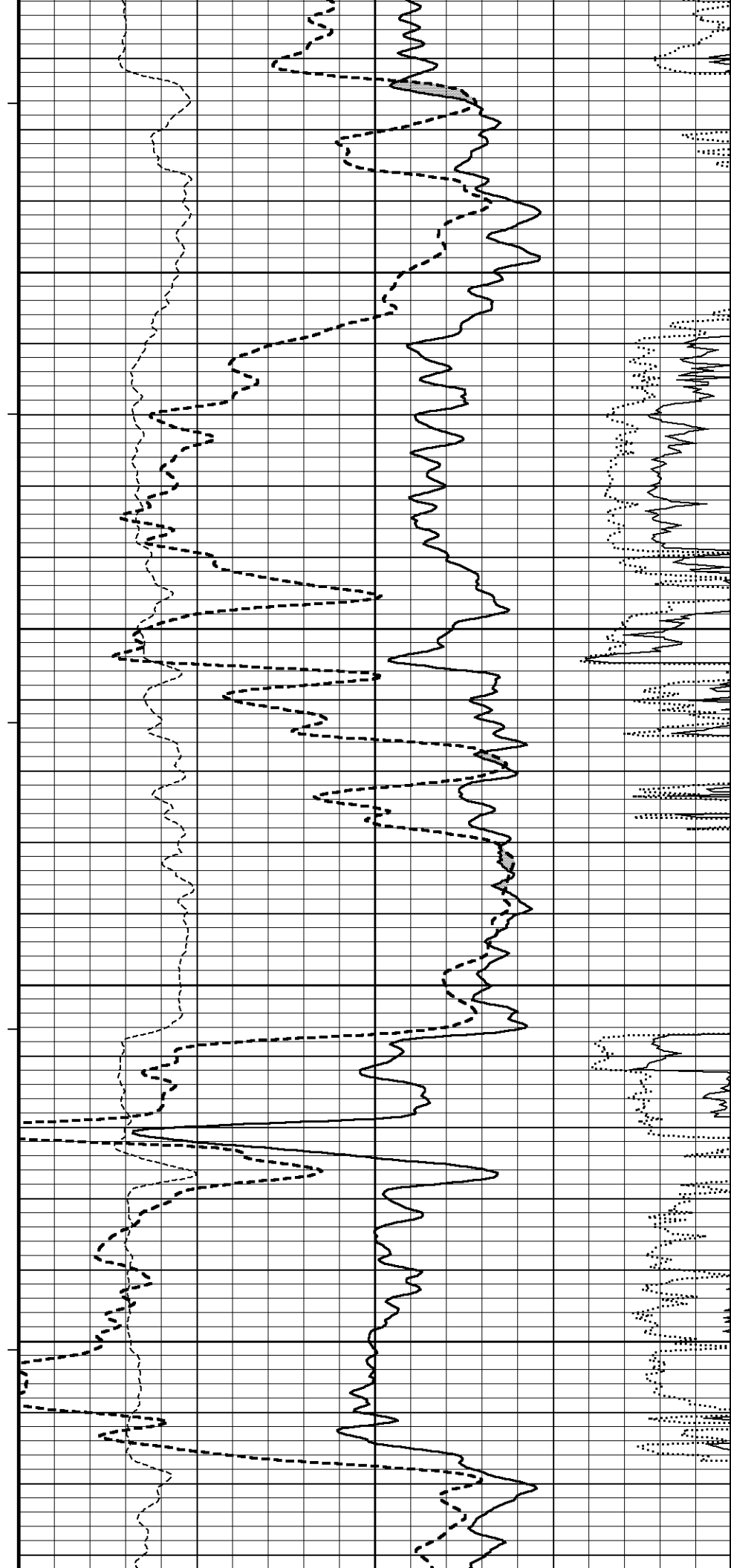
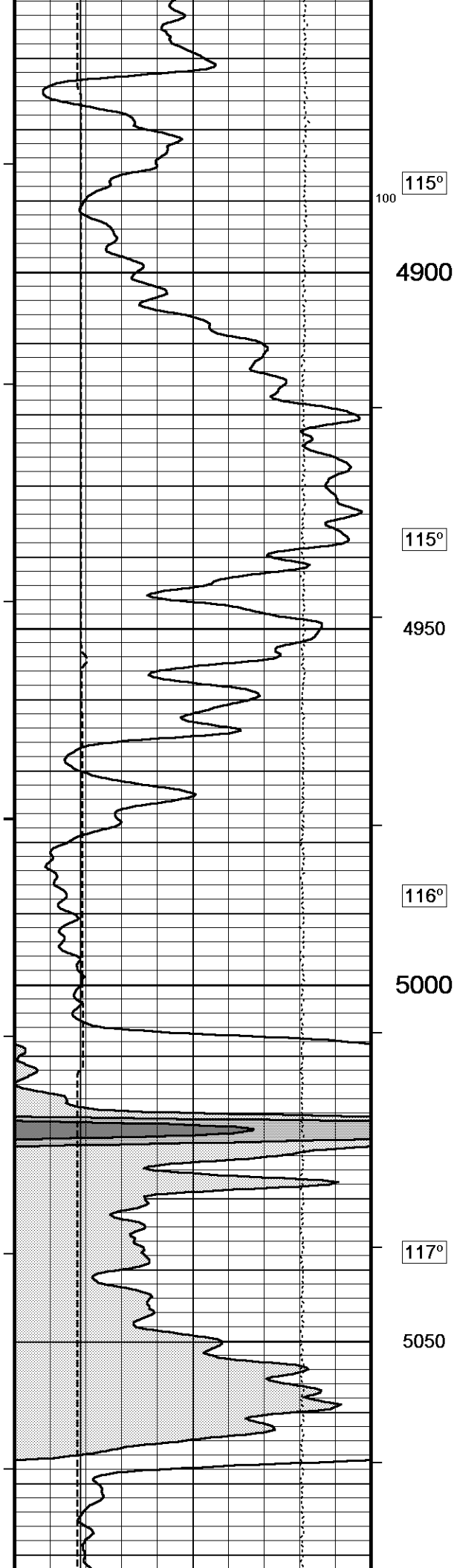
Gamma Ray

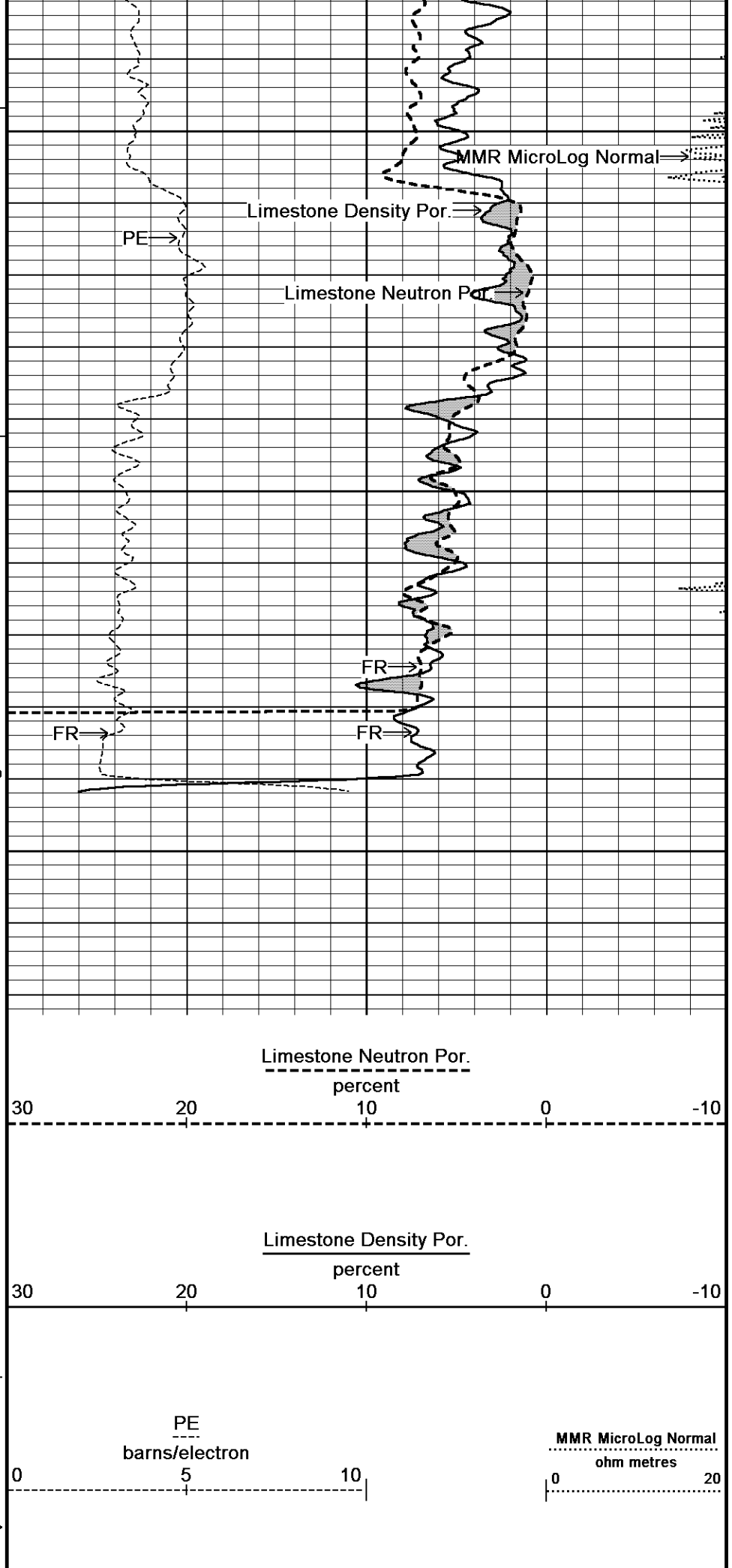
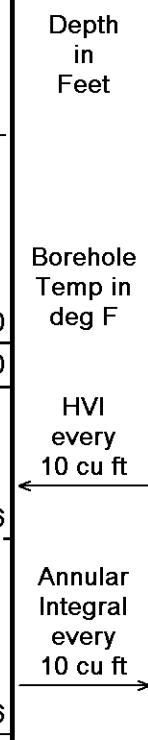
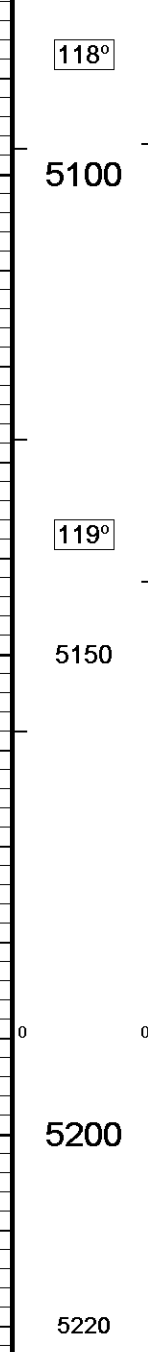
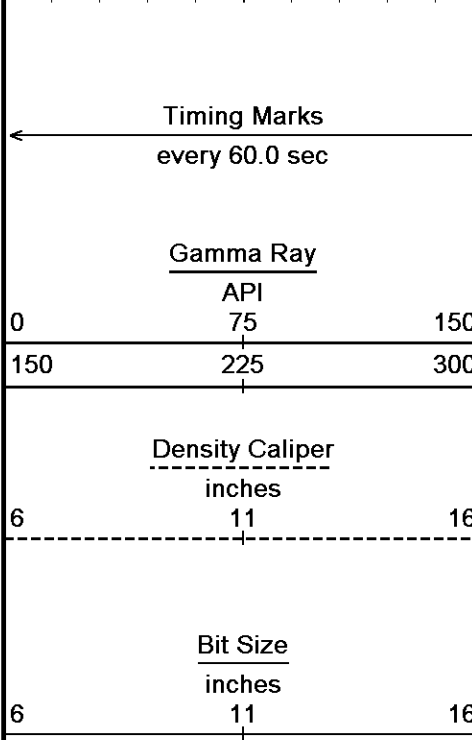
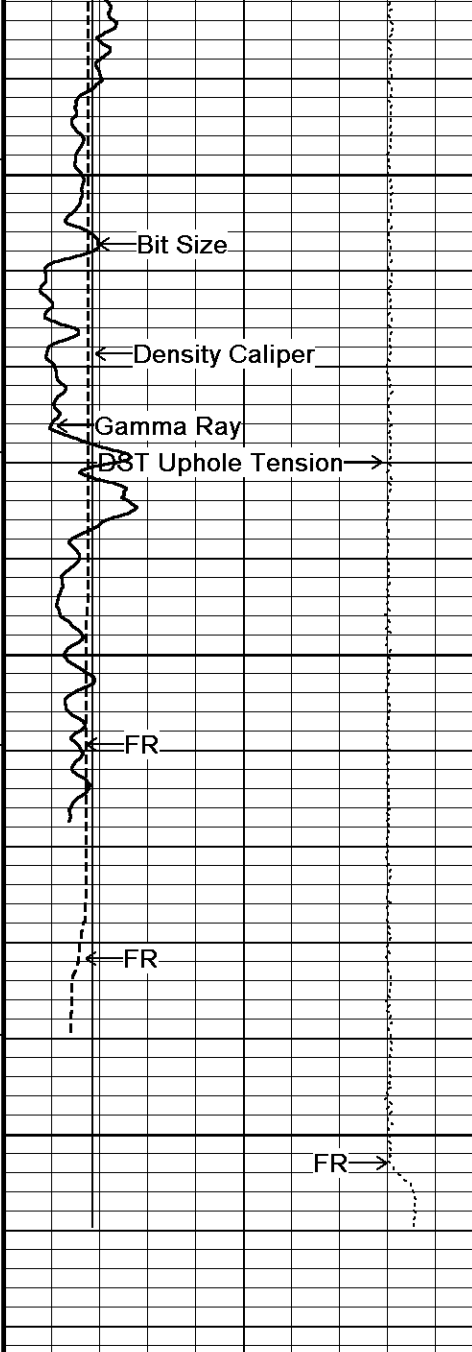
DST Uphole Tension

Limestone Density Por.

PE

Limestone Neutron Por.





<u>DST Uphole Tension</u> pounds 5000 0	Replay Scale 1:240	<u>MMR MicroLog Inverse</u> ohm metres 0 20
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Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 REPEAT.dta
 System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113

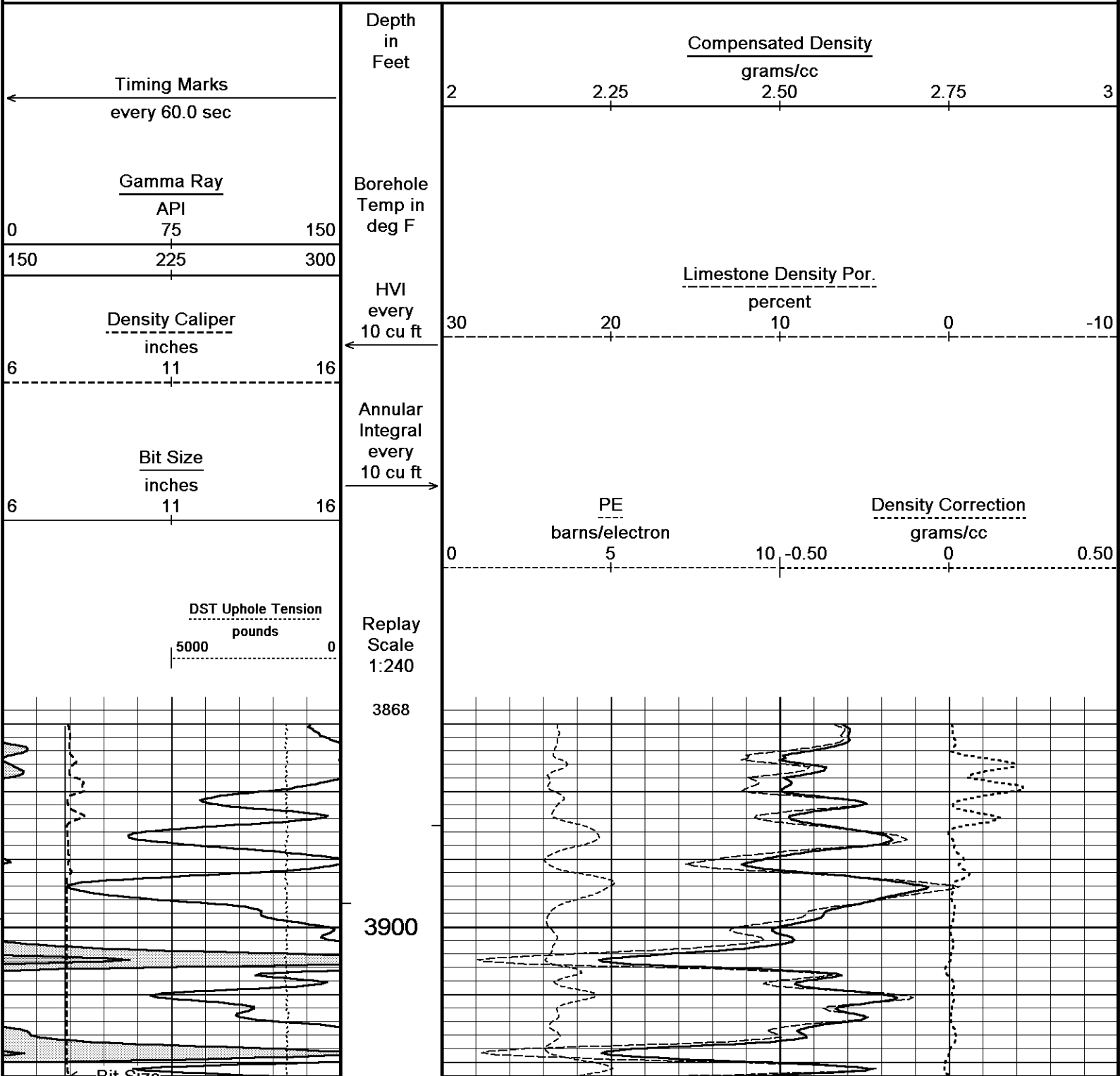
Plotted on 30-MAR-2014 06:00
 Recorded on 30-MAR-2014 02:28

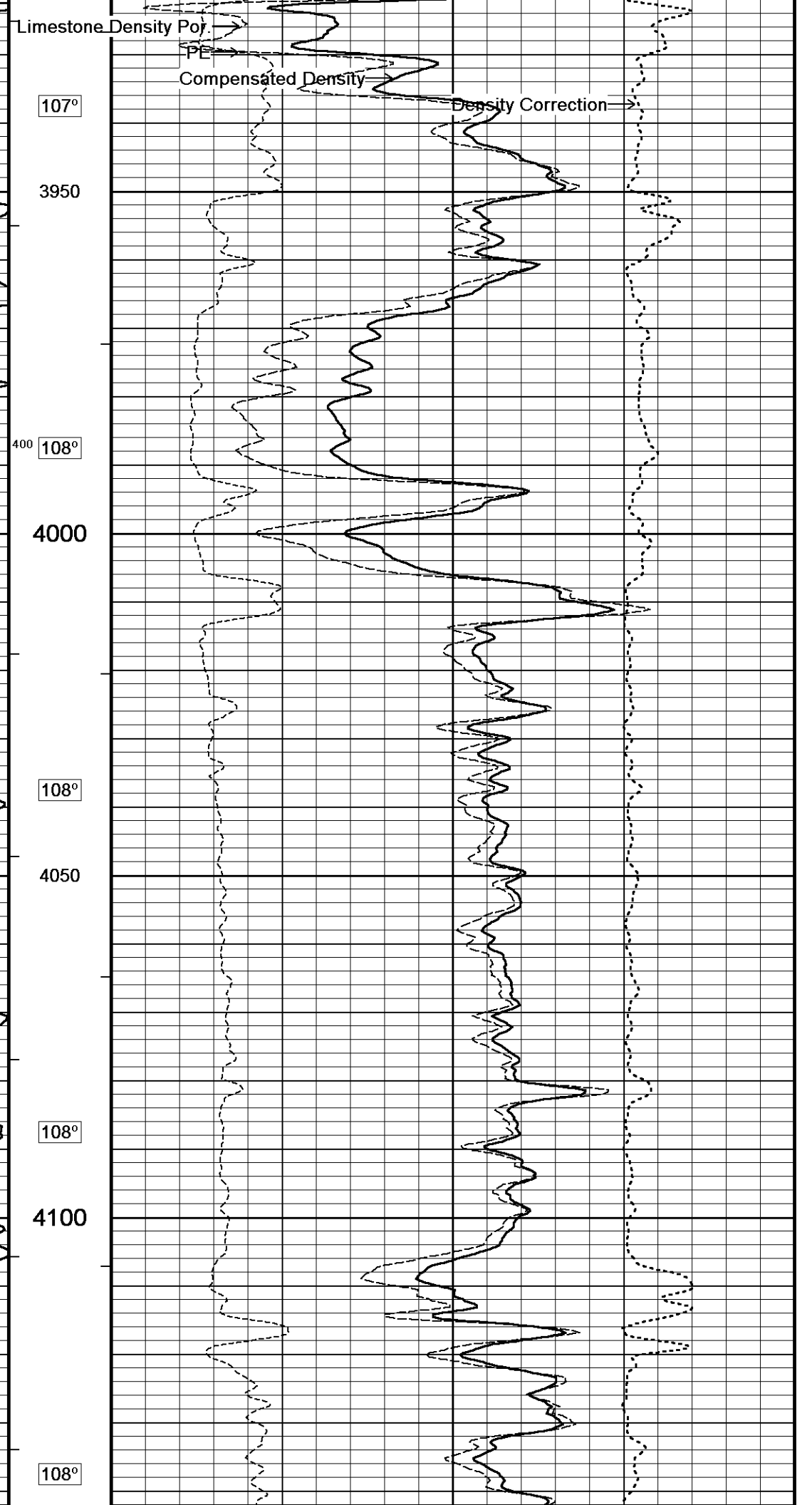
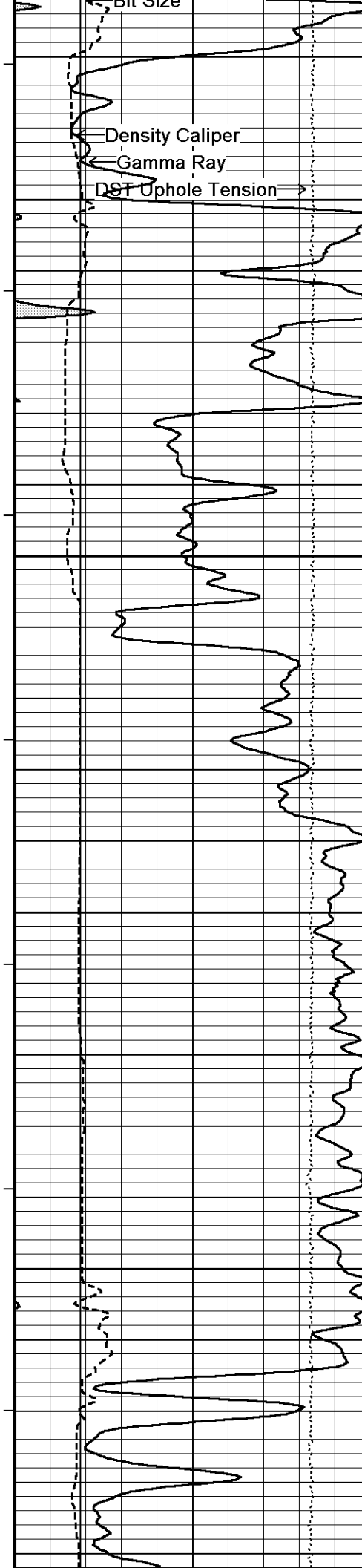
↑
REPEAT SECTION
↑

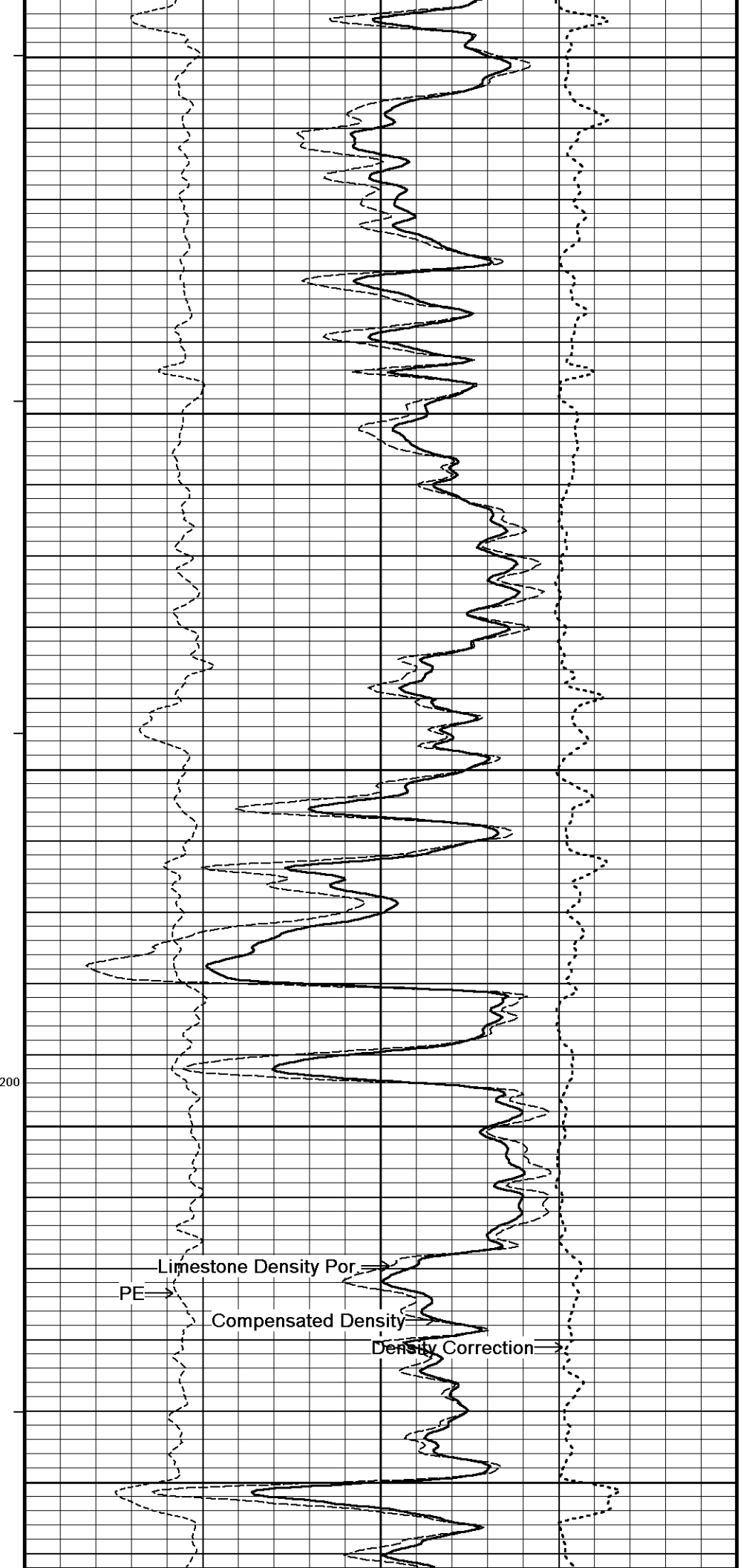
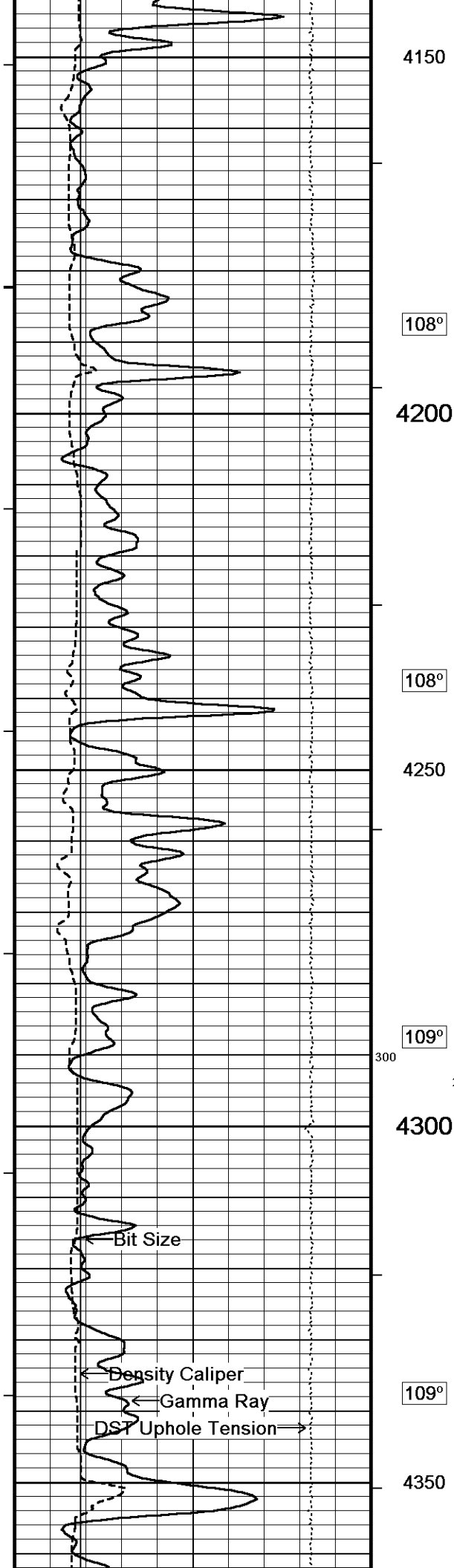
<u>DST Uphole Tension</u> pounds 5000 0	Replay Scale 1:240	<u>MMR MicroLog Inverse</u> ohm metres 0 20
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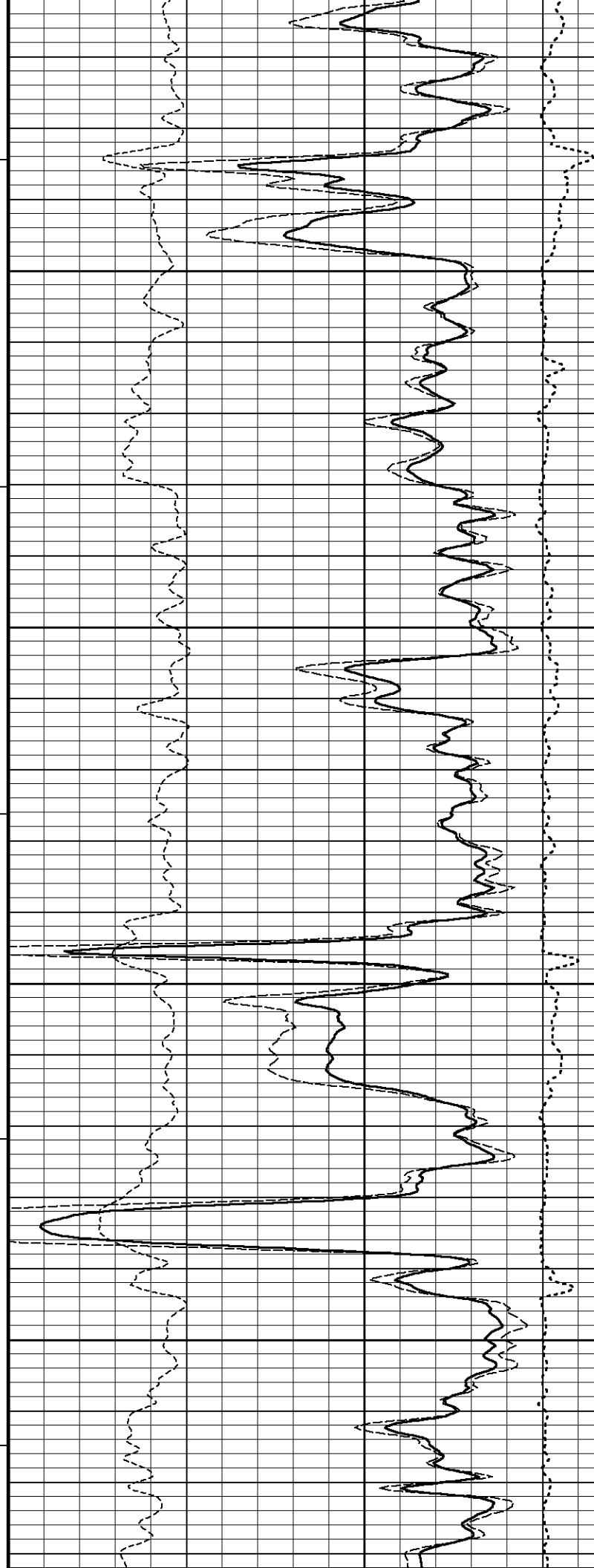
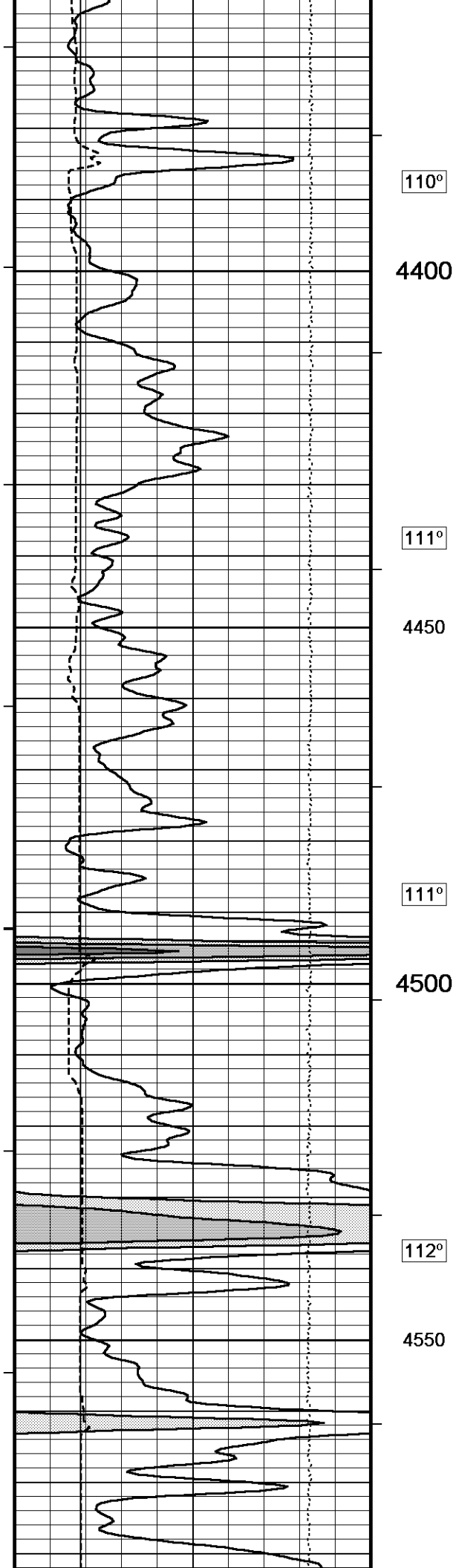
Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 MAIN.dta
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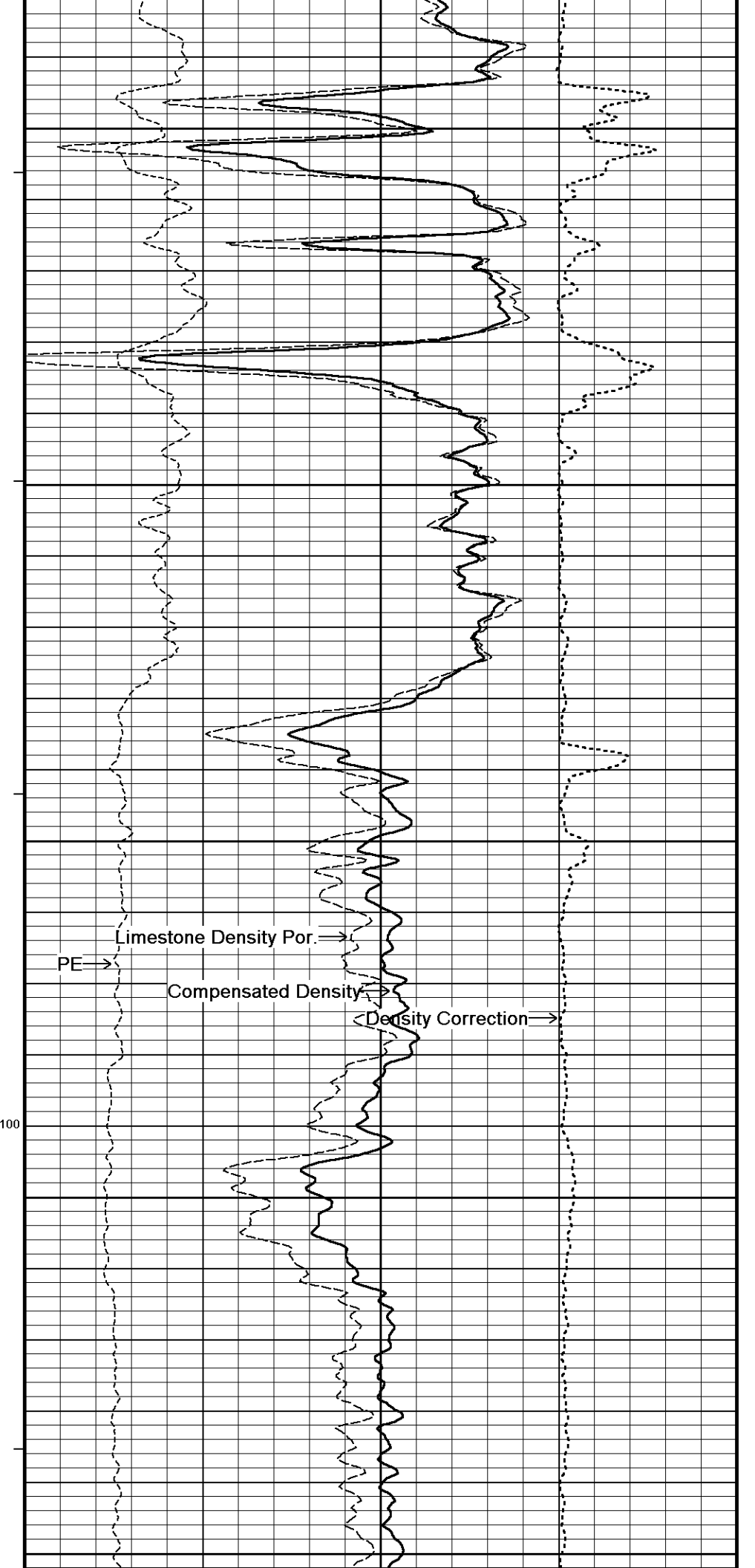
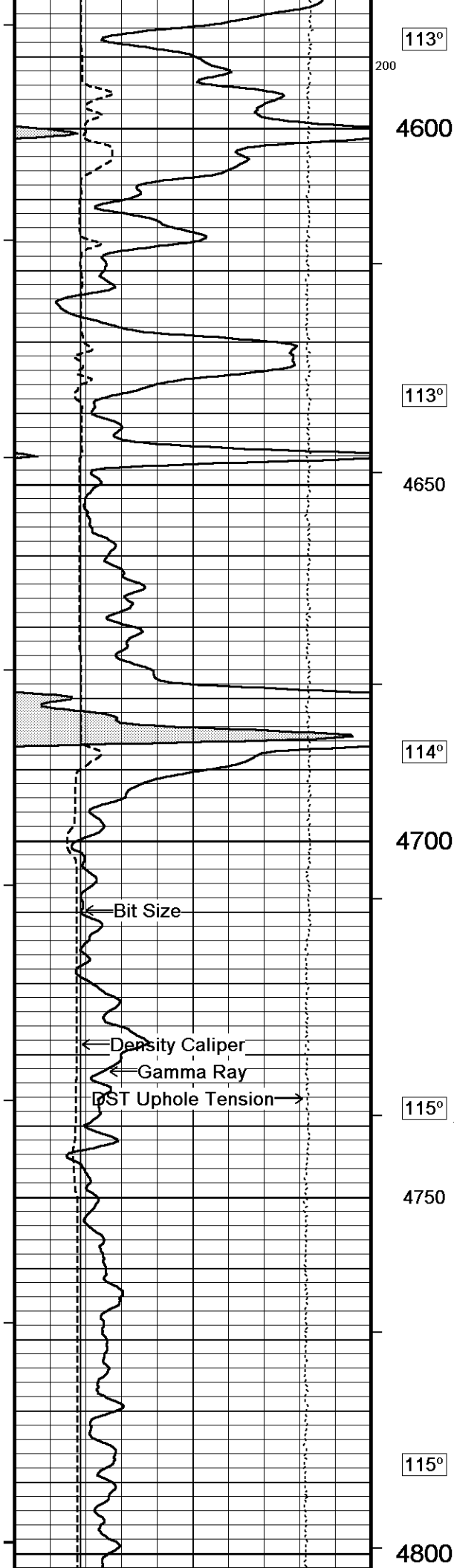
Plotted on 30-MAR-2014 06:00
 Recorded on 30-MAR-2014 03:00

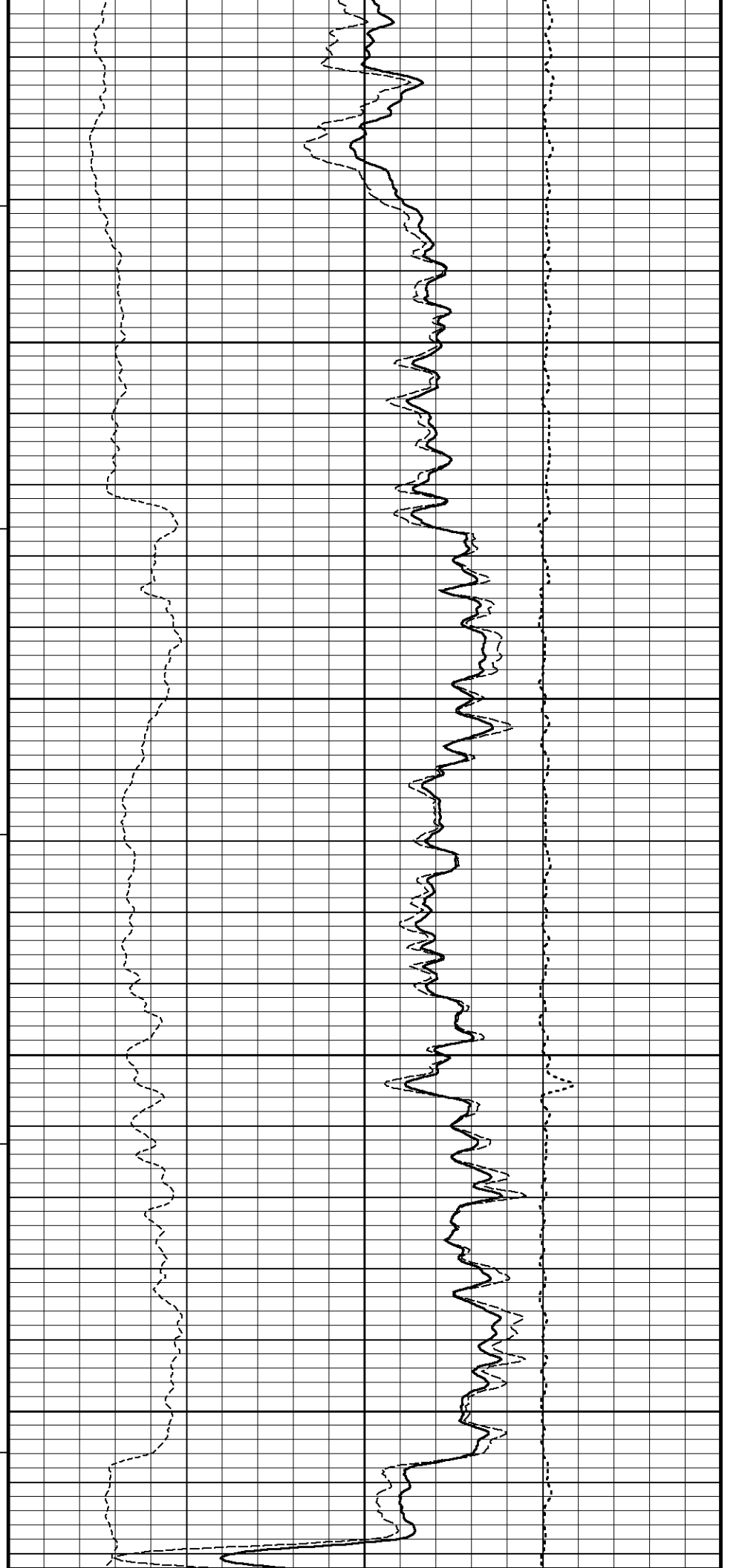
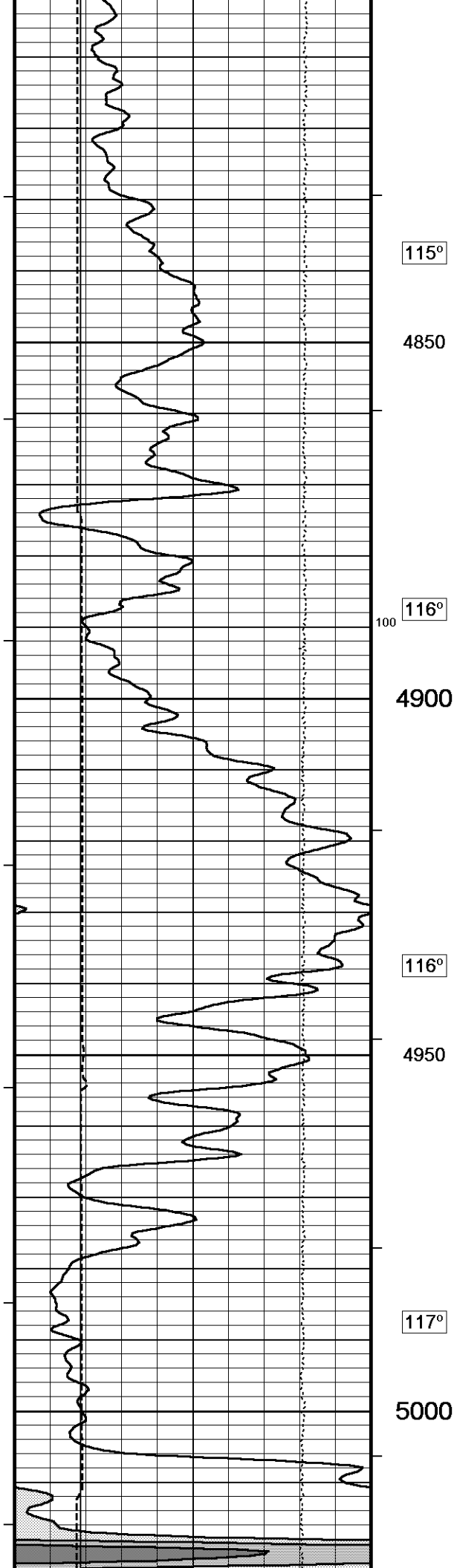


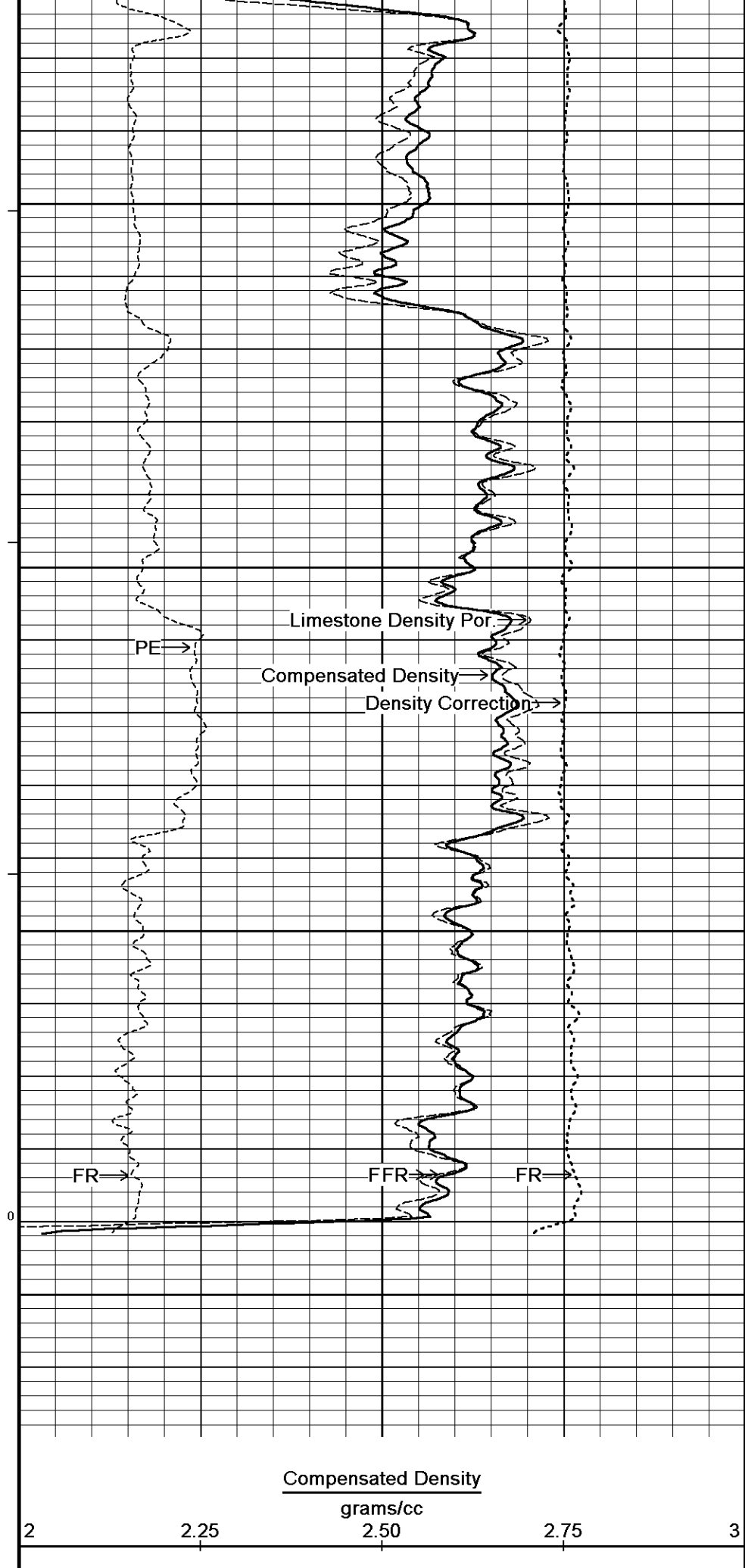
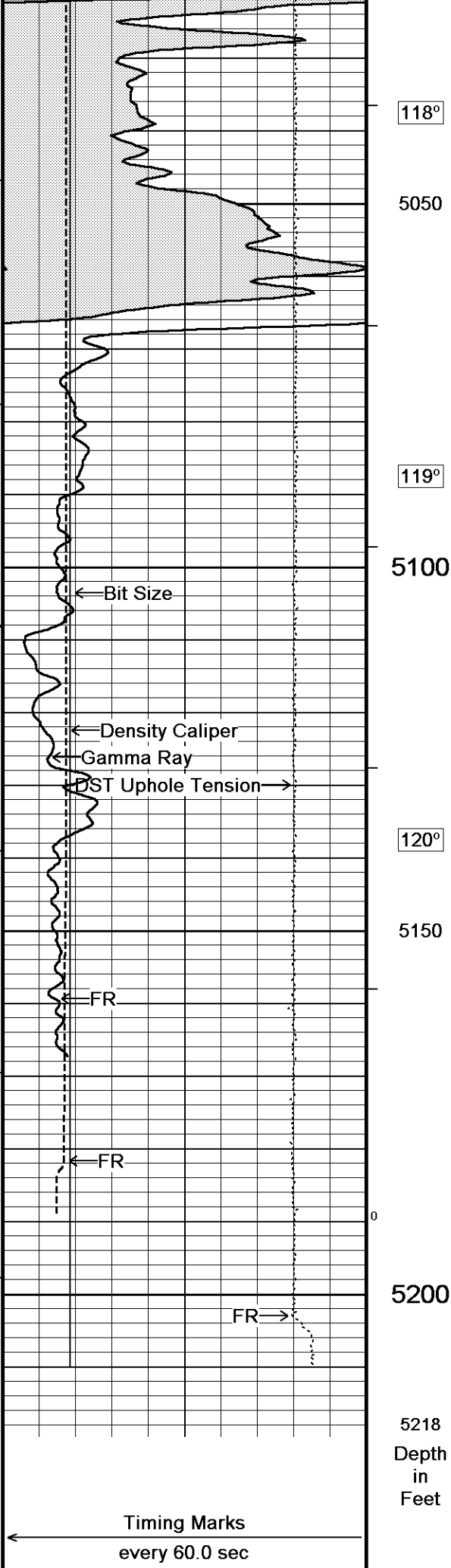


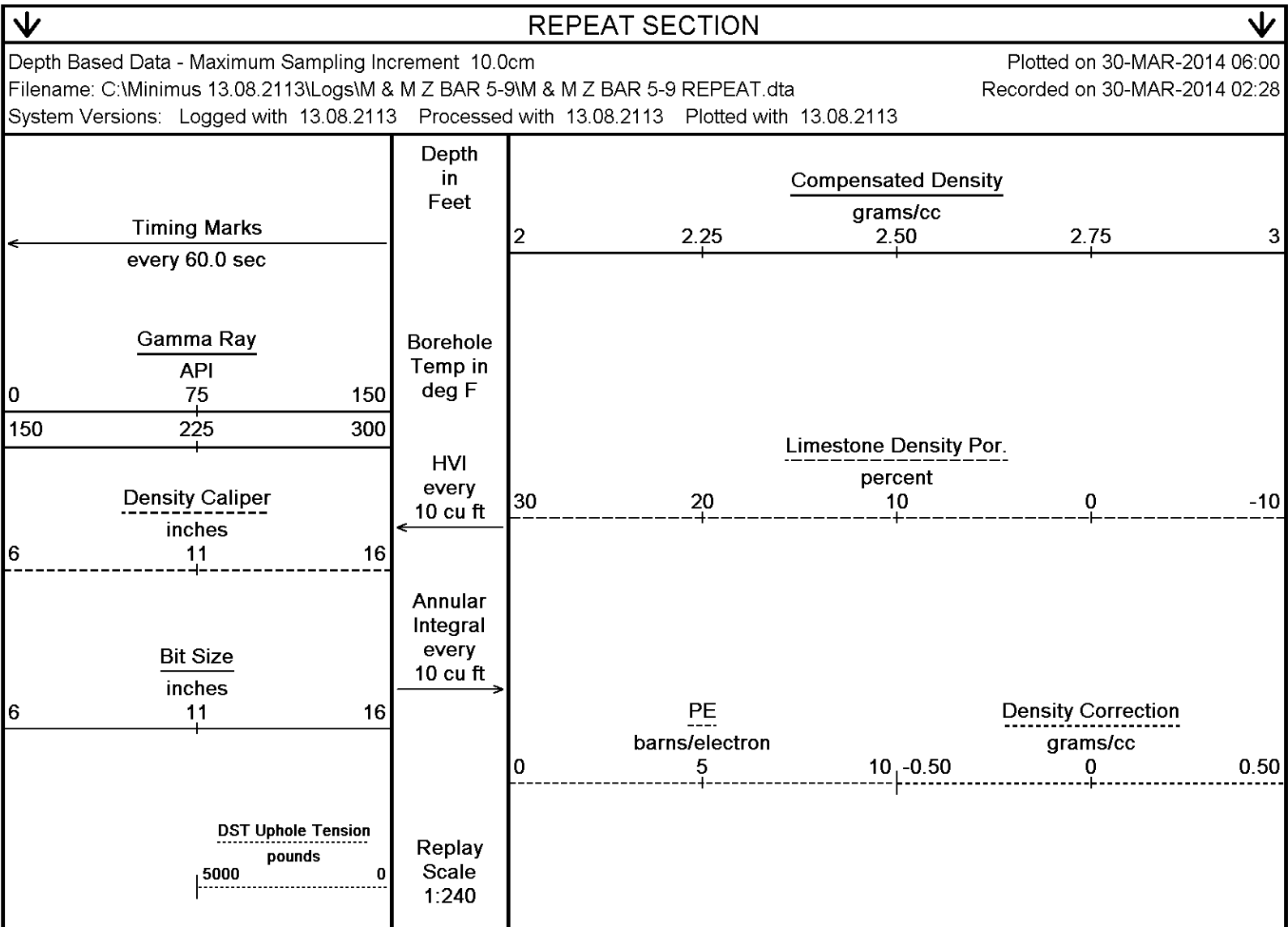
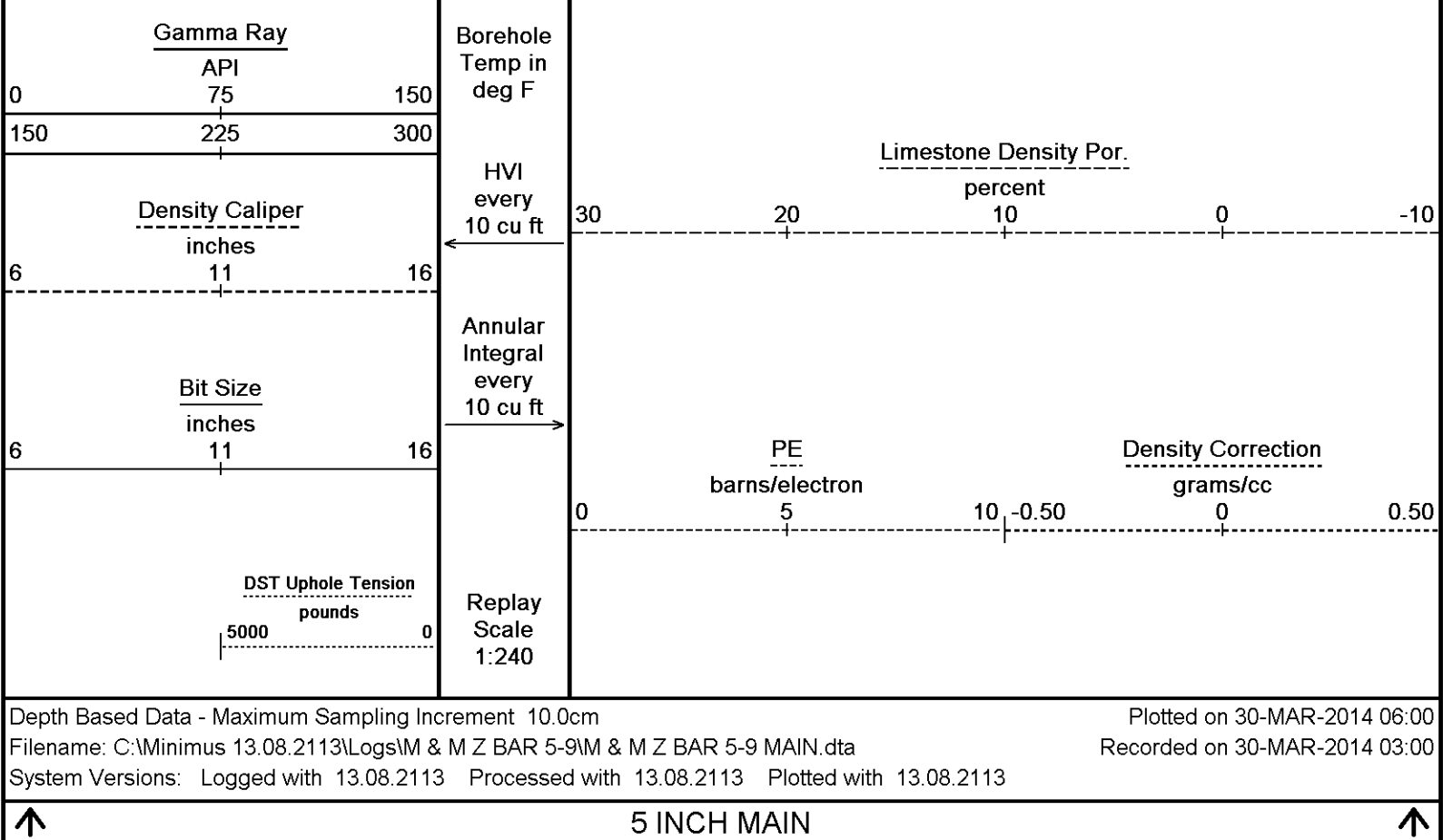


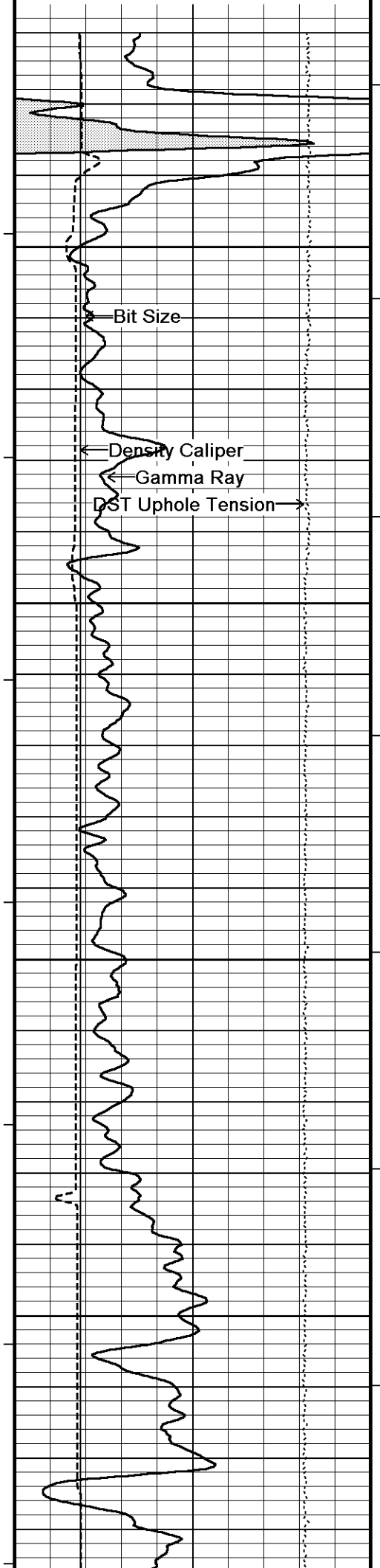












4668

4700

114°

100

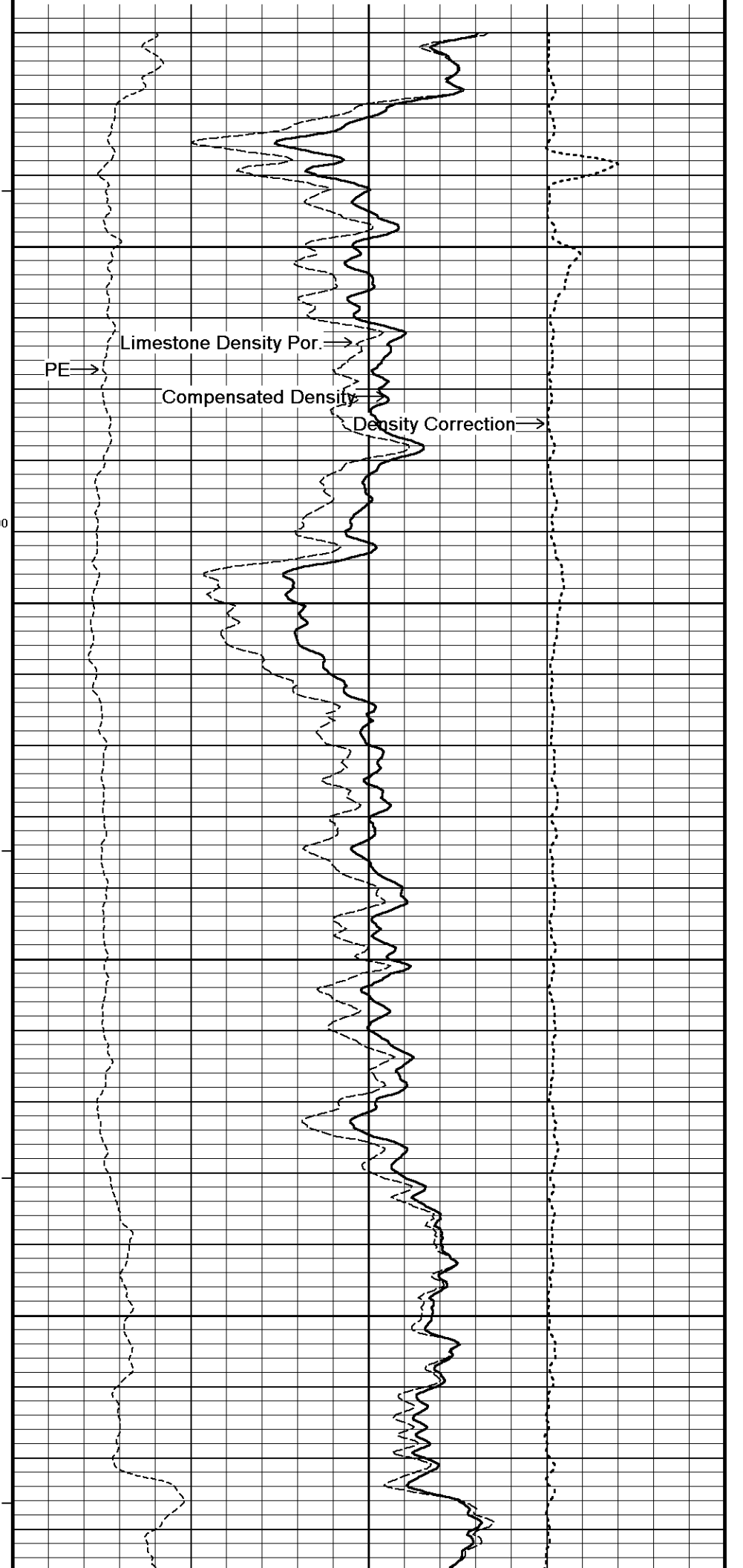
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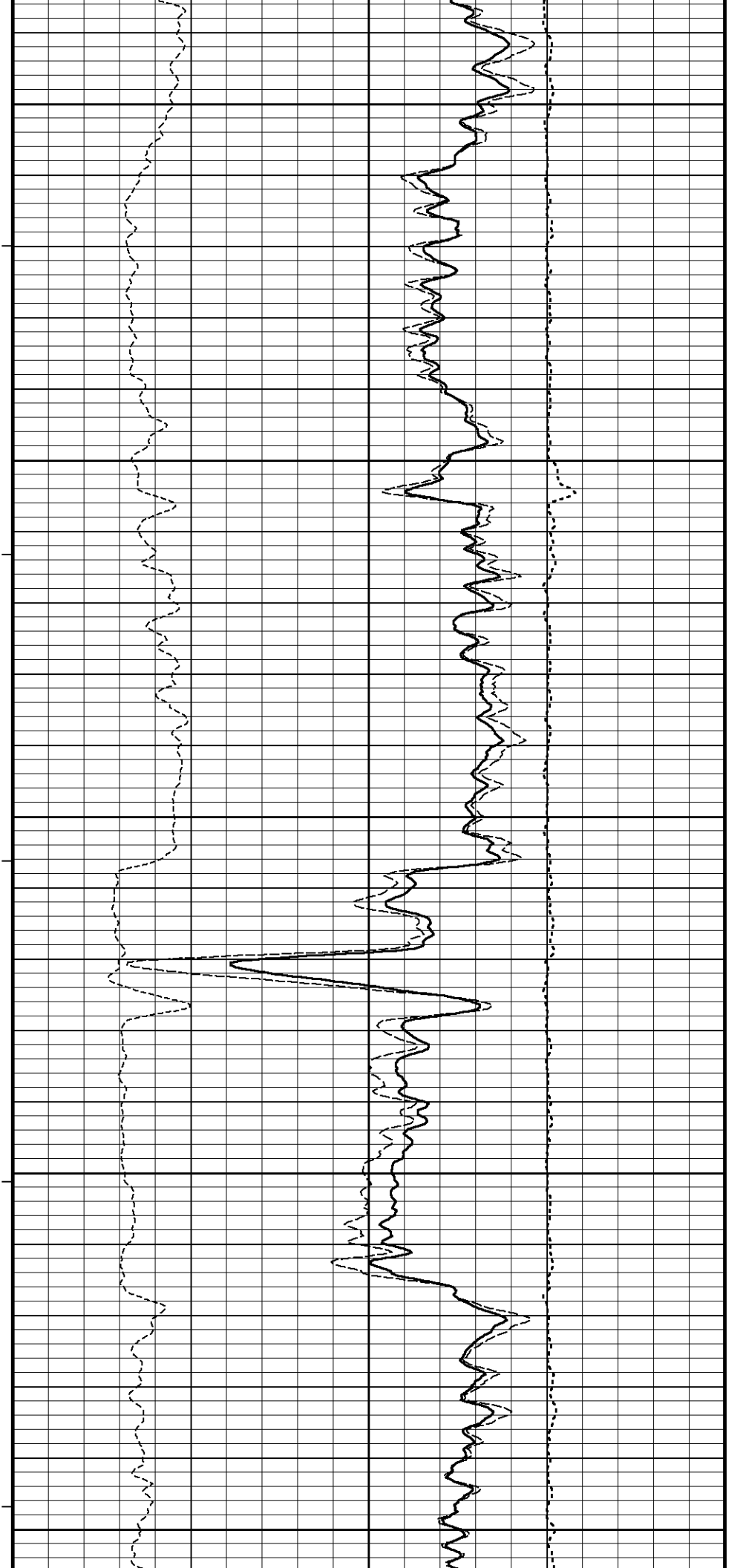
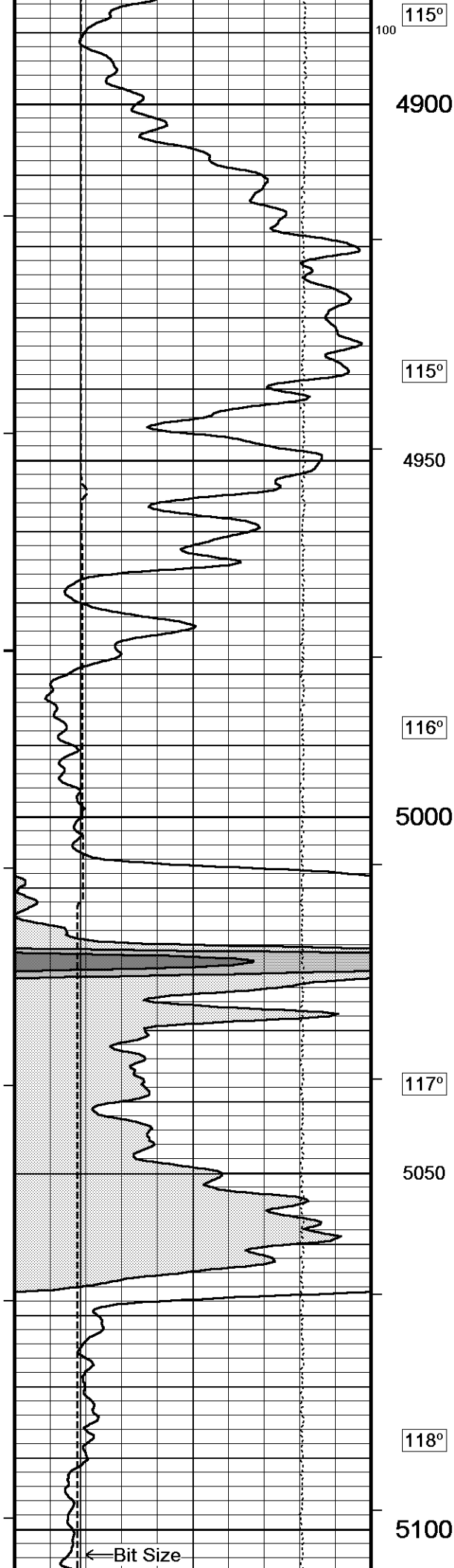
114°

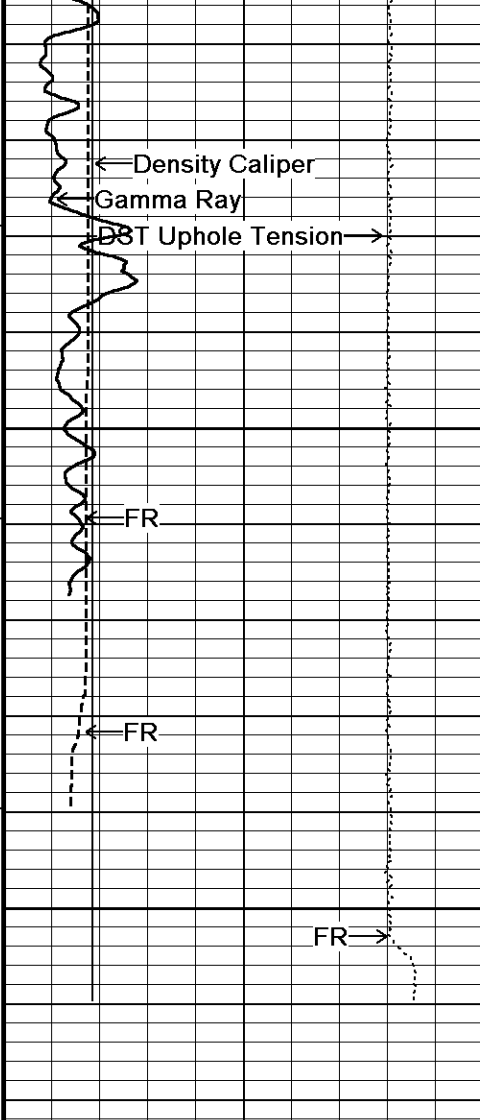
4800

115°

4850







119°

5150

5200

5220

Depth
in
Feet

← Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

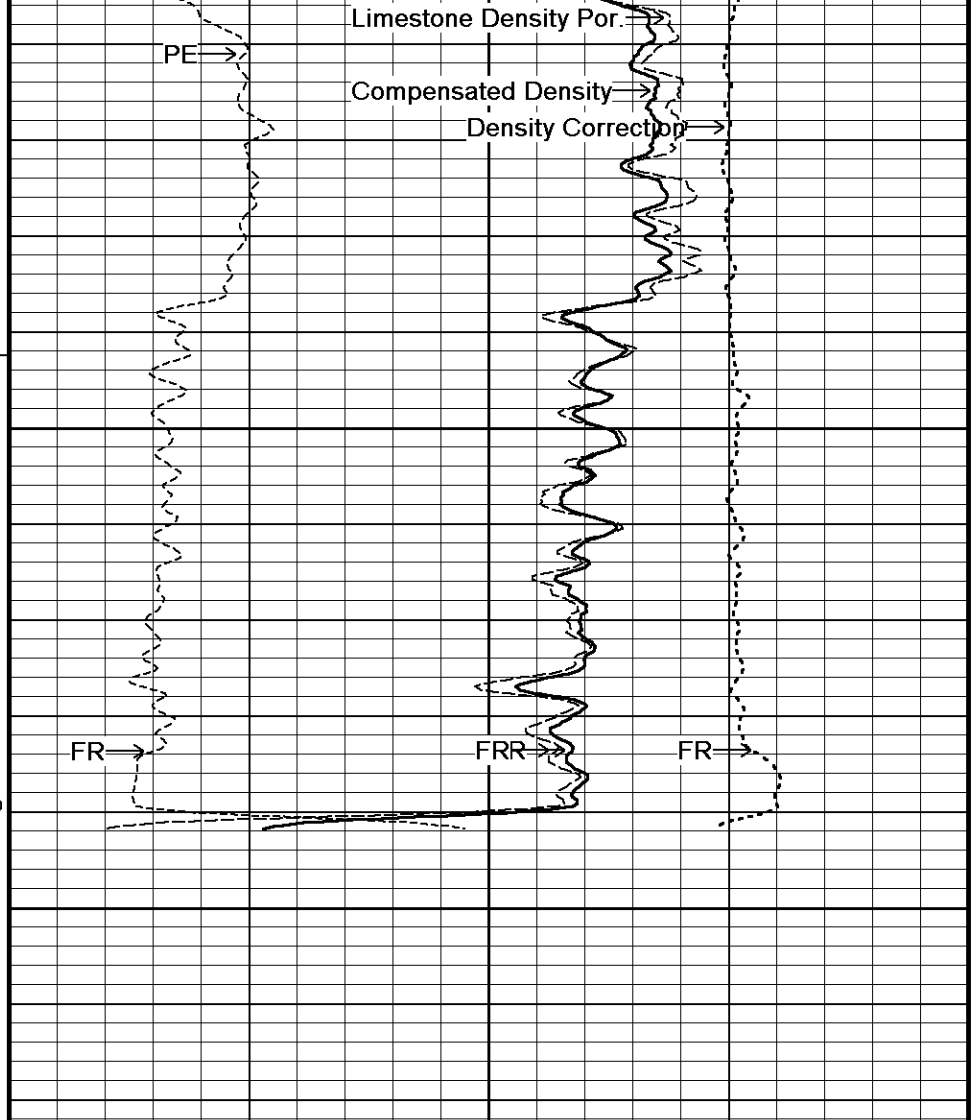
DST Uphole Tension
pounds
5000 0

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240



Compensated Density
grams/cc
2 2.25 2.50 2.75 3

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10 -0.50
Density Correction
grams/cc
0 0.50

↑

REPEAT SECTION

↑

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 REPEAT.dta

General Constants All 000			Last Edited on 30-MAR-2014,01:52		
General Parameters					
Mud Resistivity	1.500		ohm-metres		
Mud Resistivity Temperature	86.000		degrees F		
Water Level	0.000		feet		
Borehole Fluid Processing	Water Level Switch				
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				

Gamma Calibration MCG-D.K 443			Field Calibration on 19-MAR-2014 12:14		
	Measured		Calibrated (API)		
Background	68		46		
Calibrator (Gross)	1142		771		
Calibrator (Net)	1074		725		

Gamma Constants MCG-D.K 443			Last Edited on 30-MAR-2014,01:41		
Gamma Calibrator Number	GRC38				
Mud Density	1.09		gm/cc		
Caliper Source for Processing	Density Caliper				
Tool Position	Centred				
Concentration of KCl			kppm		
K Mud Type	Chloride				
K Mud Concentration	0.00		%		

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				

Photo Density Calibration MPD-B 31			Base Calibration on 05-MAR-2014 10:34	
			Field Check on 19-MAR-2014 12:01	
Density Calibration				
Base Calibration		Measured	Calibrated (sdu)	
	Near	Far	Near	Far
Background	659	817		
Reference 1	44468	22312	59556	30836
Reference 2	18182	1869	24941	2541
Field Check at Base				
	658.5	816.6		
Field Check				

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	124	586		
Reference 1	18196	44354	0.413	0.371
Reference 2	5335	18101	0.298	0.272

Field Check at Base

124.4 586.4

Field Check

122.0 586.8

Density Constants MPD-B 31

Last Edited on 22-MAR-2014,21:42

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	1.09 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 (m)
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-B 31

Base Calibration on 05-MAR-2014 10:47
Field Calibration on 20-MAR-2014,07:24

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18528	3.99
2	26688	5.98
3	34842	7.97
4	43098	9.86
5	52480	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.06	7.88

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9\M & M Z BAR 5-9 REPEAT.dta

MCB-A 11B Tension Cablehead
MCB-A 170 LG: 2.18 ft WT: 19.8 lb OD: 2.240 inCompact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 inCompact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

43.50 ft

40.59 ft

33.24 ft

33.24 ft

GRGC - Gamma Ray
CGXT - MCG External TemperatureMINV - MMR MicroLog Inverse
MNRL - MMR MicroLog Normal

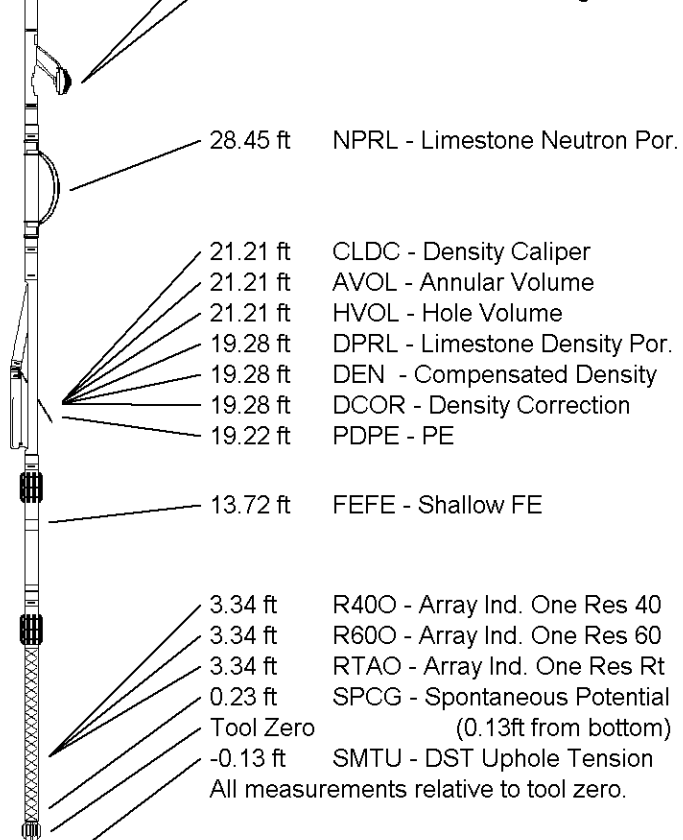
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-B 31 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 45 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 50.96 ft Weight: 403.4 lb



COMPANY	M & M EXPLORATION, INC.
WELL	Z BAR 5-9
FIELD	AETNA GAS AREA
PROVINCE/COUNTY	BARBER
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1661.00	feet	First Reading	5184.00	feet
Elevation Drill Floor	1659.00	feet	Depth Driller	5200.00	feet
Elevation Ground Level	1651.00	feet	Depth Logger	5203.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG