

**Weatherford****COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY

M & M EXPLORATION, INC.

WELL

Z-BAR 21-8

FIELD

AETNA GAS AREA

PROVINCE/COUNTY

BARBER

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

**1975' FNL & 380' FEL
NE/4**

SEC

TWP

RGE

Other Services

21

34S

15W

MA/ MFE

API Number

15-007-24066

MML

MSS

Permit Number

Permanent Datum GL, Elevation 1557 feet

Log Measured From KB

Drilling Measured From KB @ 10 FEET

Date

24-OCT-2013

Elevations:

feet

Run Number

ONE

Service Order

3541145

Depth Driller

5050.00 feet

Depth Logger

5053.00 feet

First Reading

5021.00 feet

Last Reading

3900.00 feet

Casing Driller

930.00 feet

Casing Logger

939.00 feet

Bit Size

7.875

inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.20 lb/USg

52.00 CP

PH / Fluid Loss

10.30

8.00 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

0.80 @ 72.0 ohm-m

Rmf @ Measured Temp

0.64 @ 72.0 ohm-m

Rmc @ Measured Temp

0.96 @ 72.0 ohm-m

Source Rmf / Rmc

CALC

CALC

Rm @ BHT

0.49 @ 117.0

ohm-m

Time Since Circulation

4 HOURS

Max Recorded Temp

117.00

deg F

Equipment / Base

13057

KANSAS

Recorded By

JIM SCHULER

Witnessed By

BILL BUSCH

JOB #

LB13-301

BOREHOLE RECORD

Last Edited: 24-OCT-2013 06:17

Bit Size
inches

7.875

Depth From
feet

939.00

Depth To
feet

5053.00

CASING RECORD

Type

Size
inches

8.625

Depth From
feet

0.00

Shoe Depth
feet

939.00

Weight
pounds/ft

24.00

REMARKS

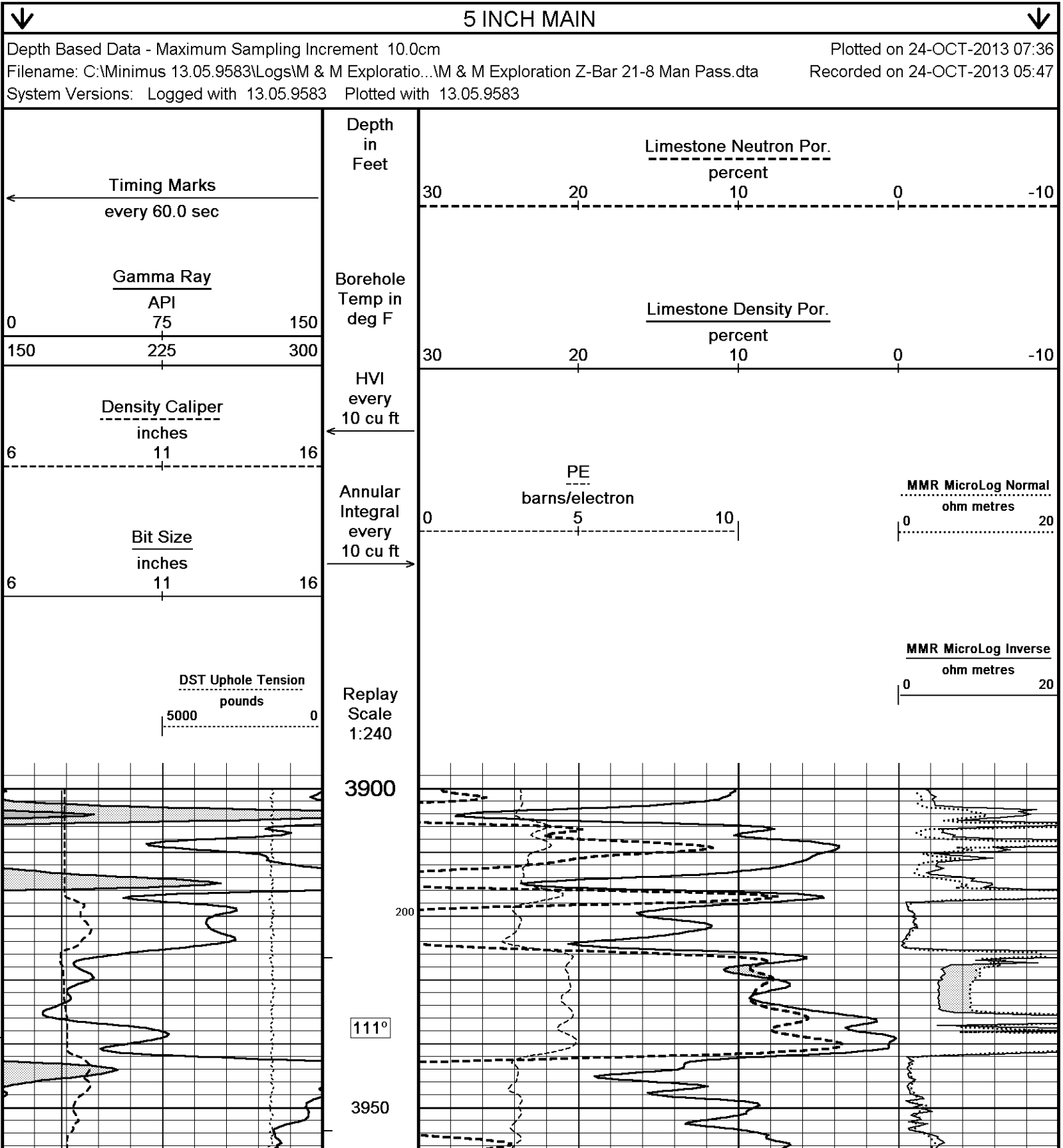
- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, MML, MDN, MPD, MFE, MSS, MAI RAN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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 3900 FEET: 390 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3900 FEET: 205 CU. FT.

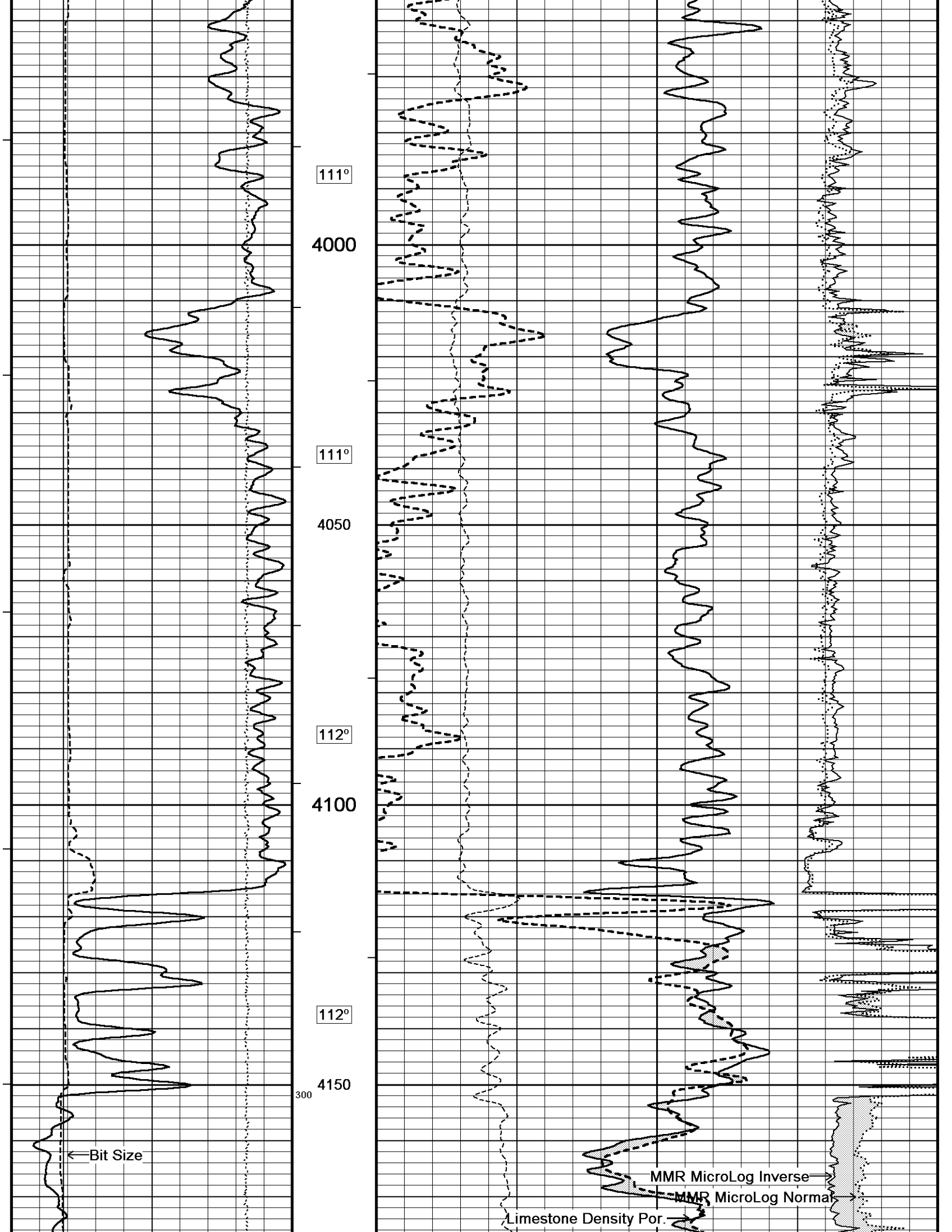
- RIG: HARDT DRILLING 1

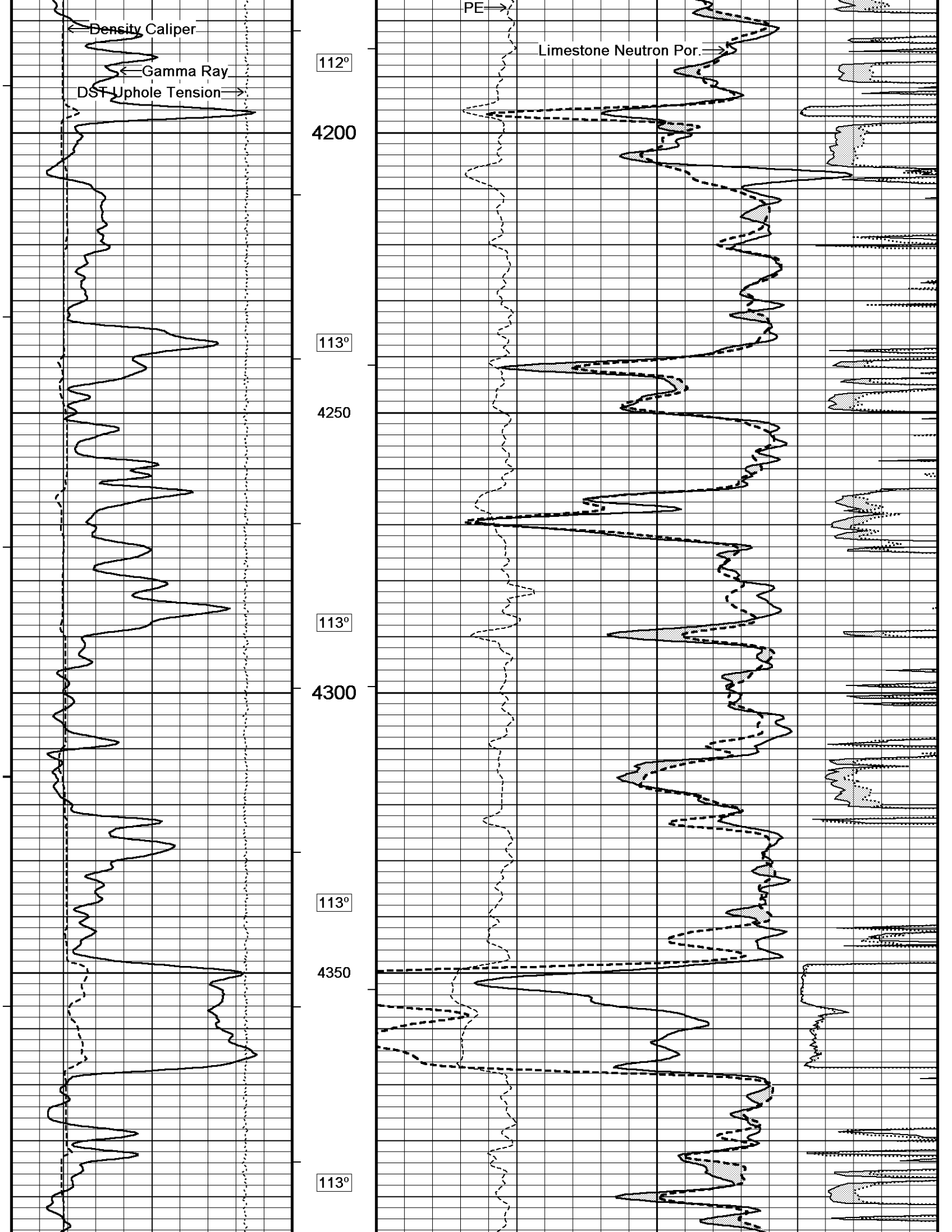
- ENGINEER: J. SCHULER AND J. LAPOINT

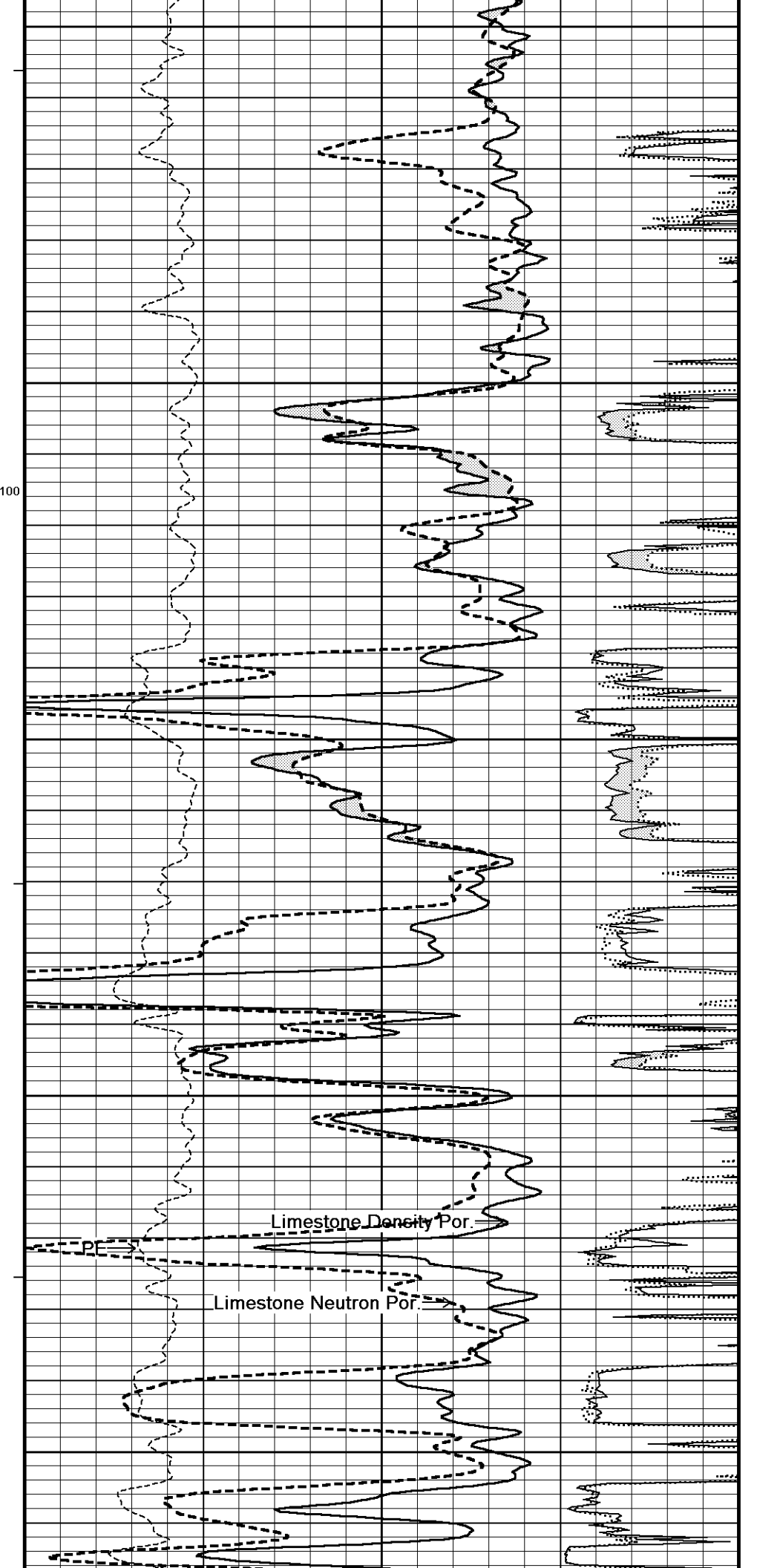
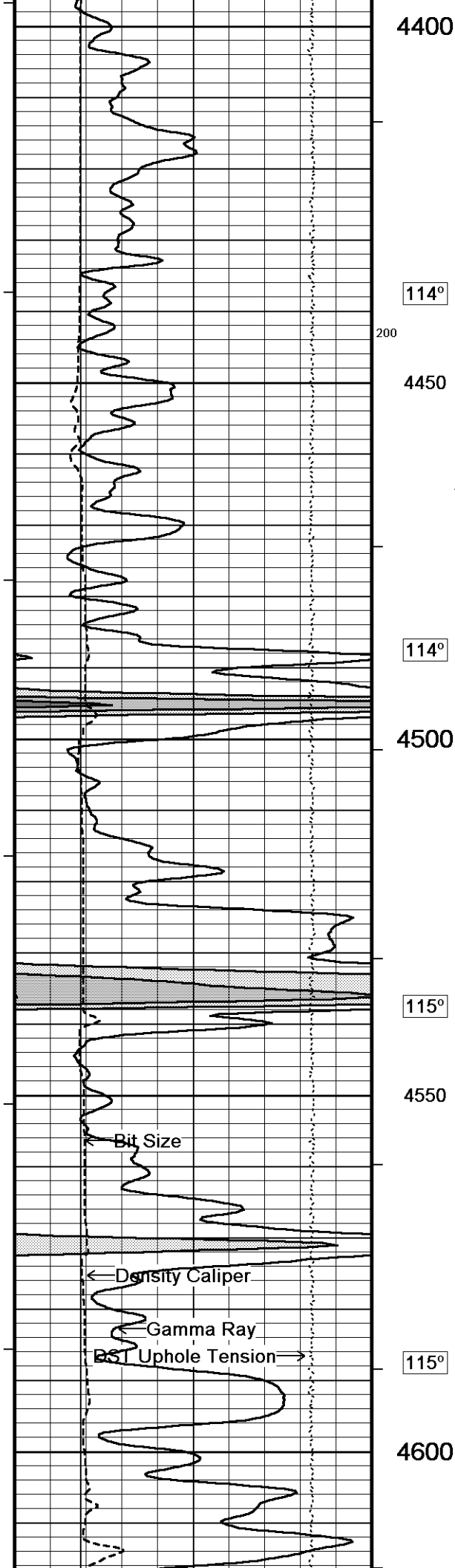
- OPERATOR(S): C. RAMIREZ

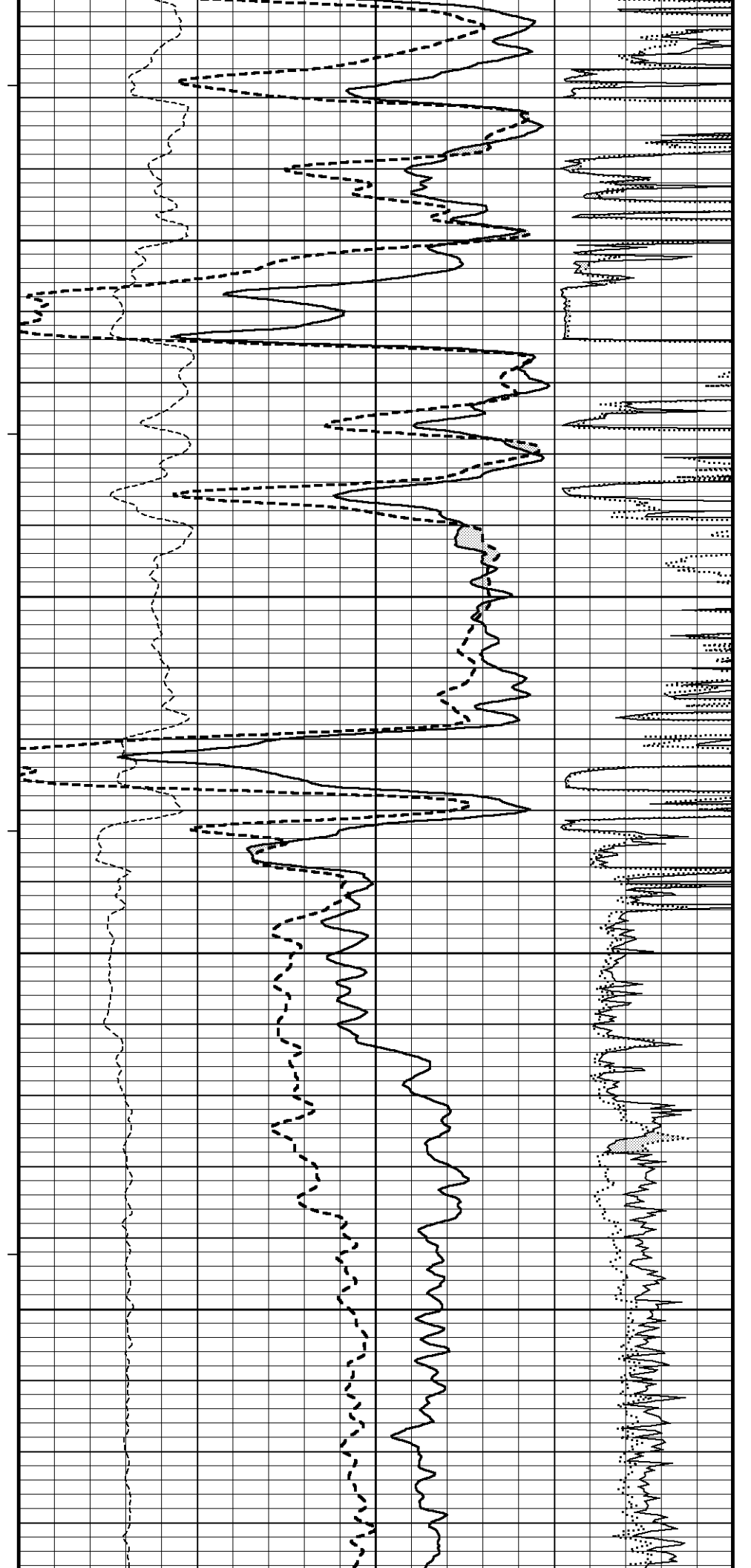
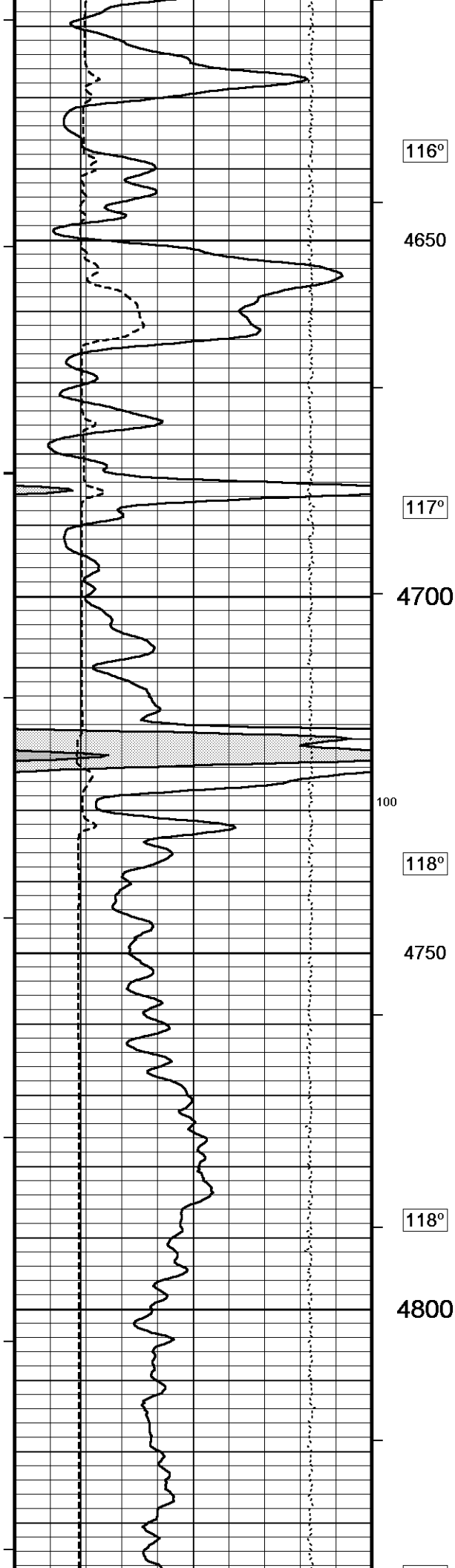
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

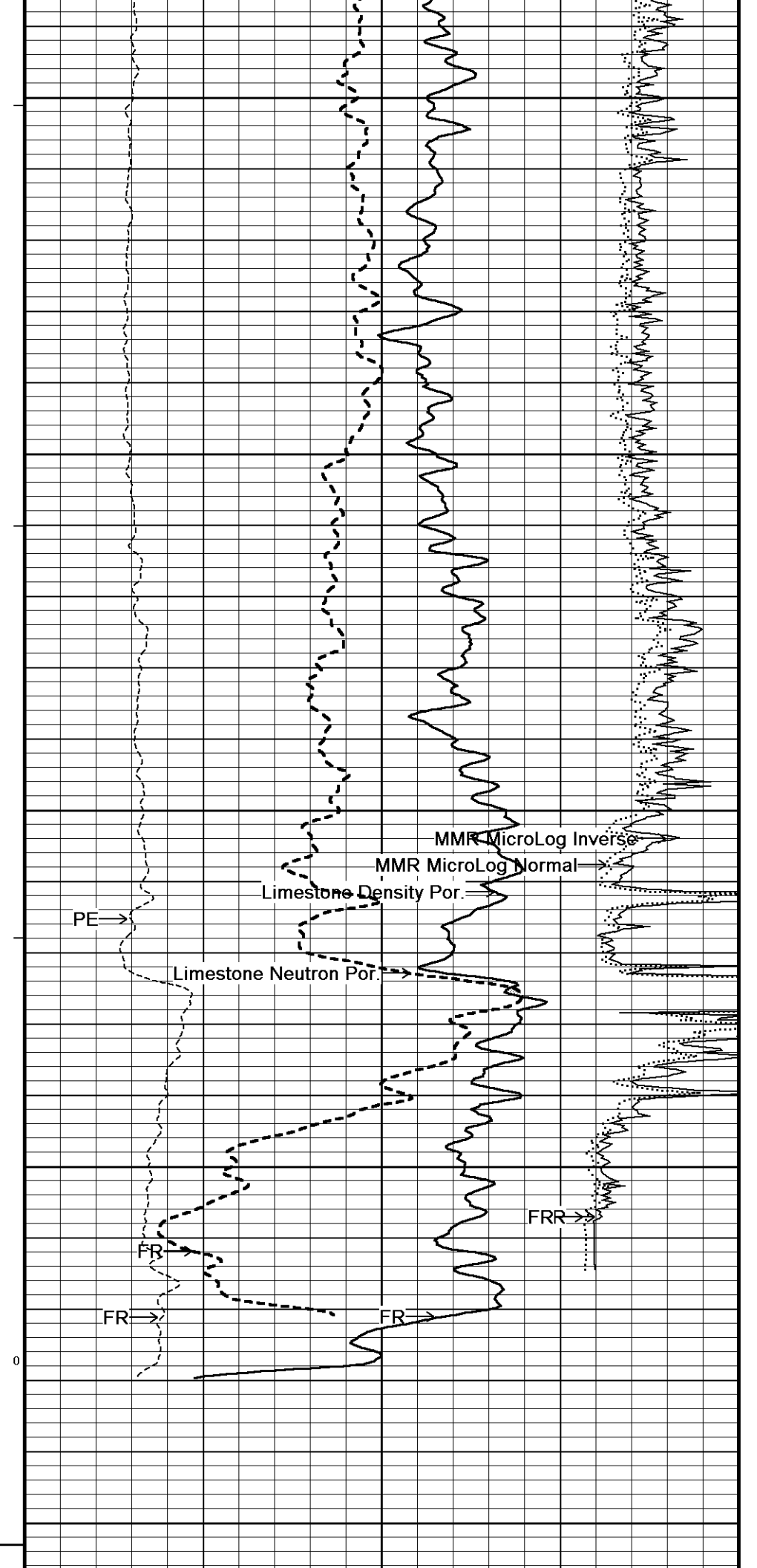
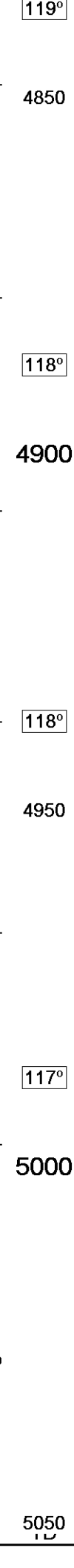
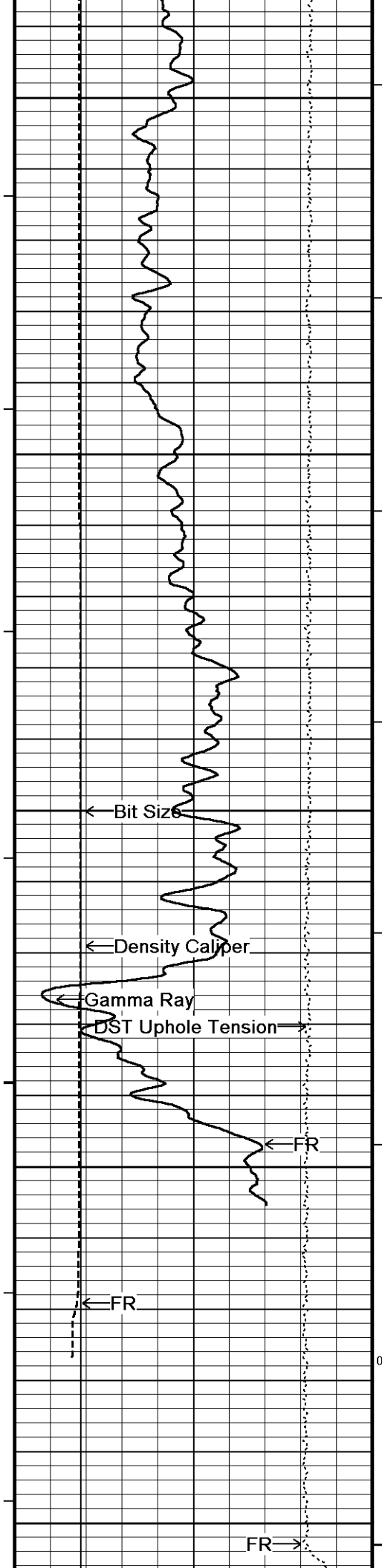


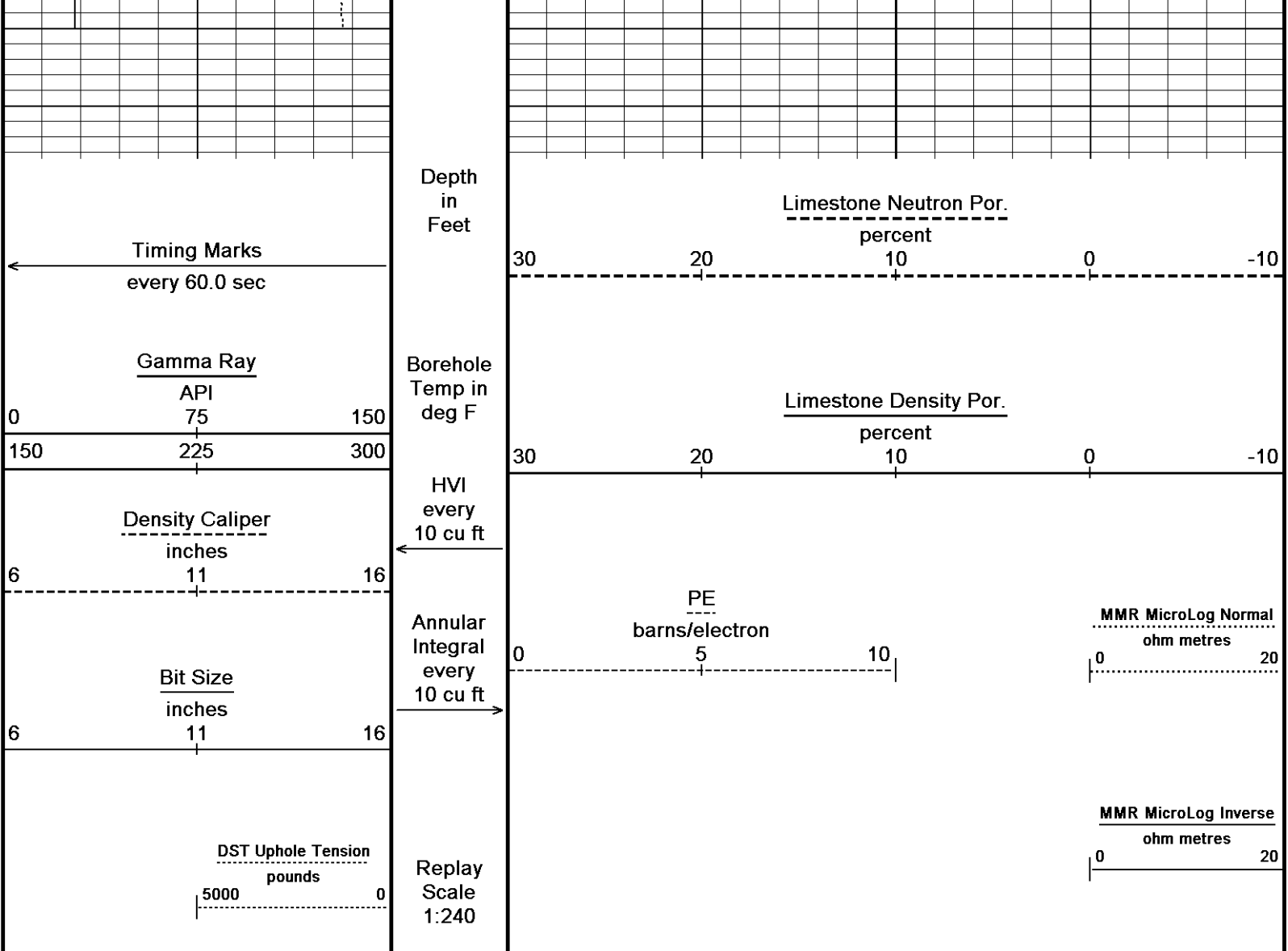










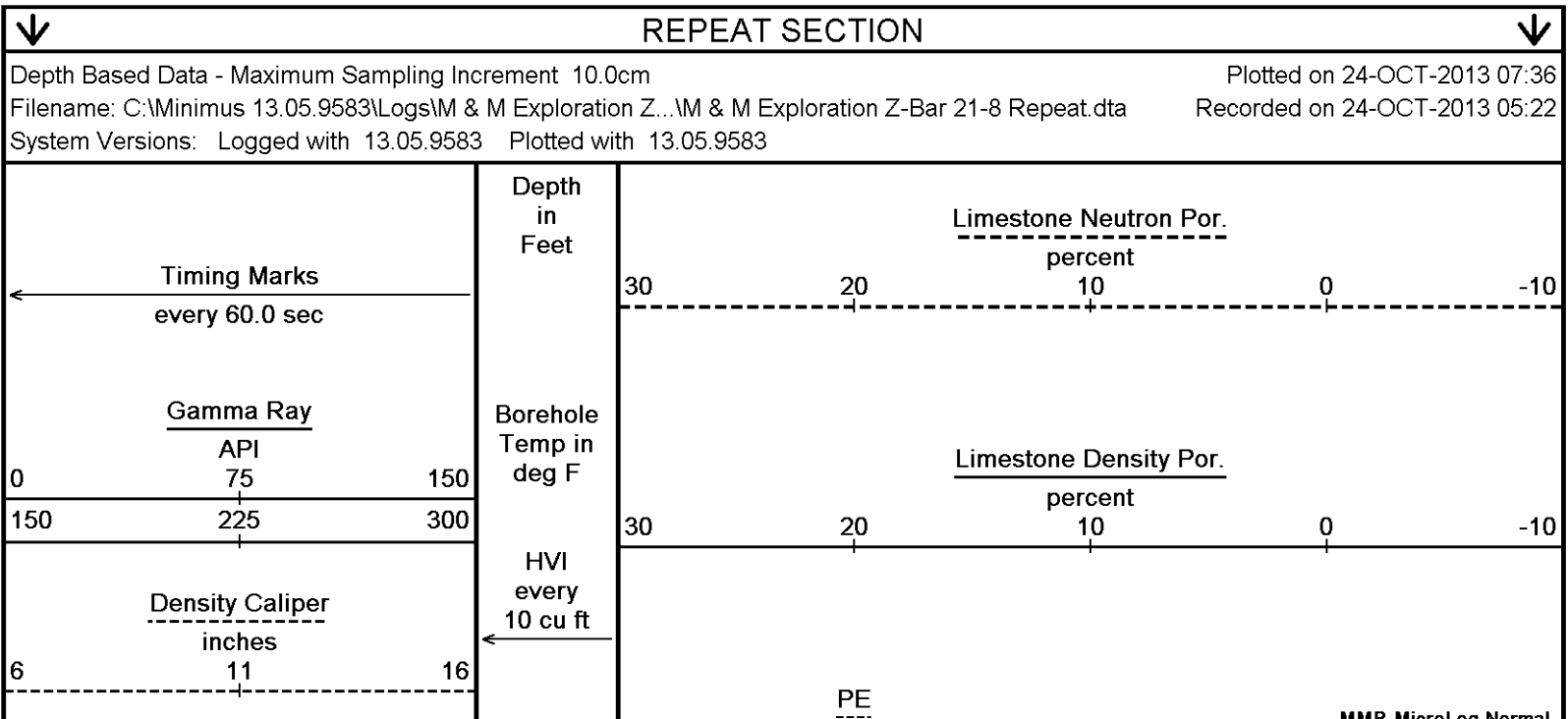


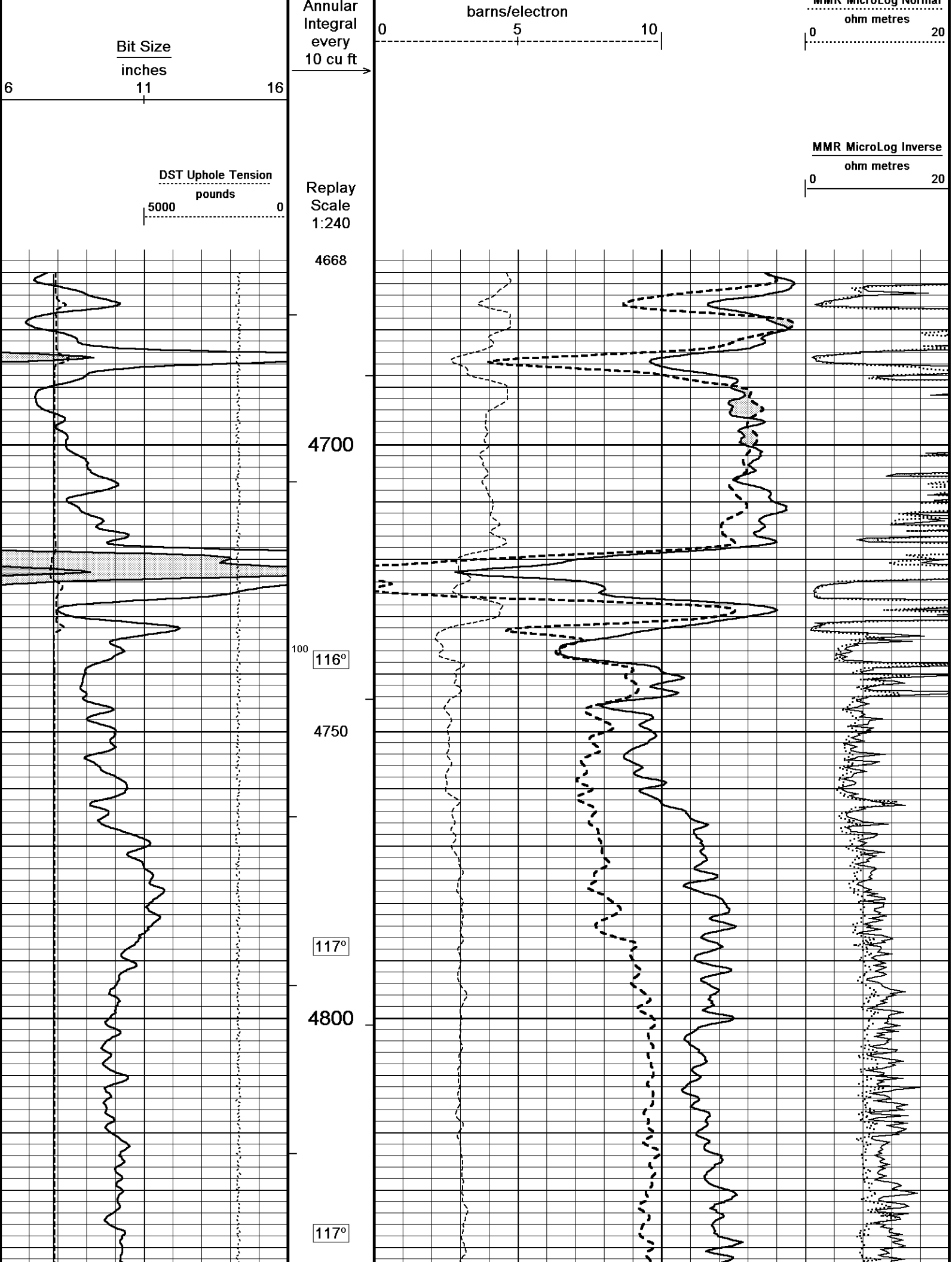
Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 24-OCT-2013 07:36

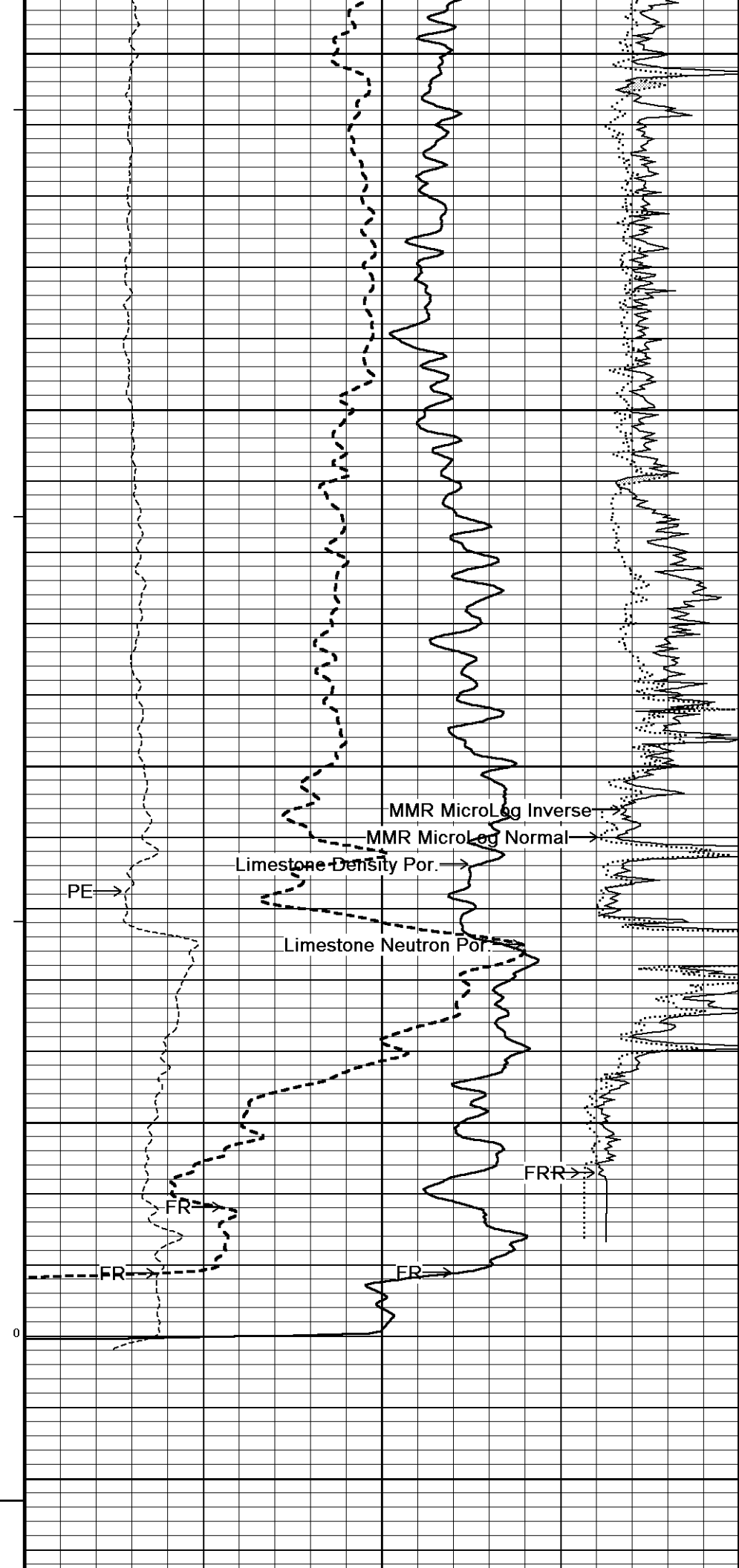
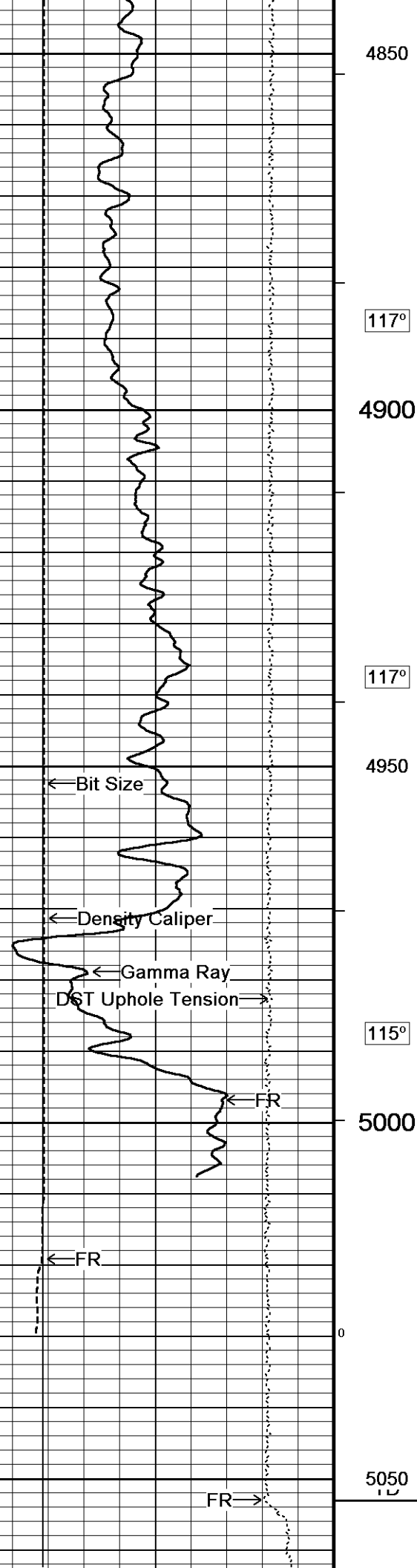
Filename: C:\Minimus 13.05.9583\Logs\M & M Exploration Z-Bar 21-8 Man Pass.dtaRecorded on 24-OCT-2013 05:47

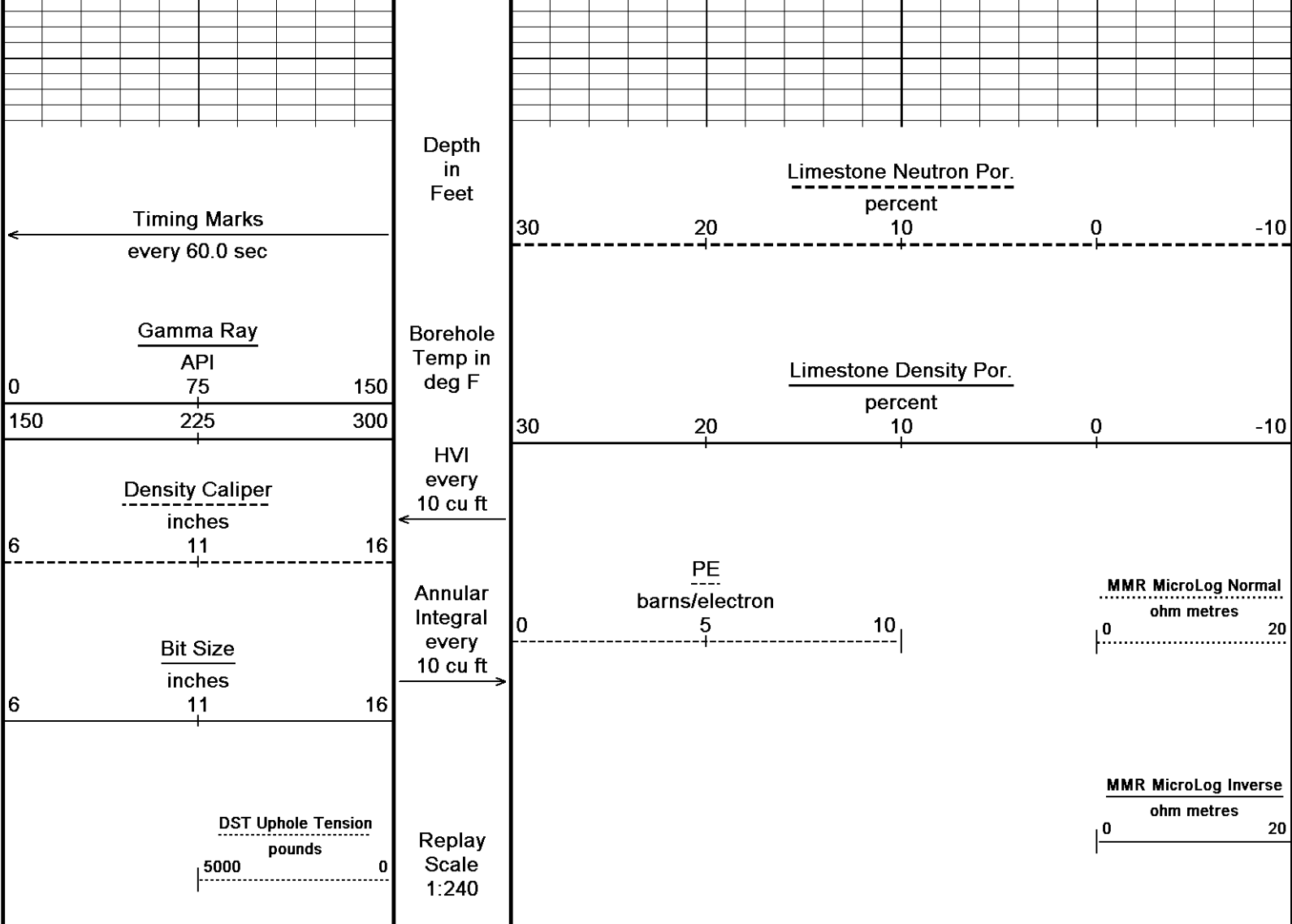
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

↑5 INCH MAIN↑









Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 24-OCT-2013 07:36

Filename: C:\Minimus 13.05.9583\Logs\M & M Exploration Z...M & M Exploration Z-Bar 21-8 Repeat.dtaRecorded on 24-OCT-2013 05:22

System Versions: Logged with 13.05.9583Plotted with 13.05.9583

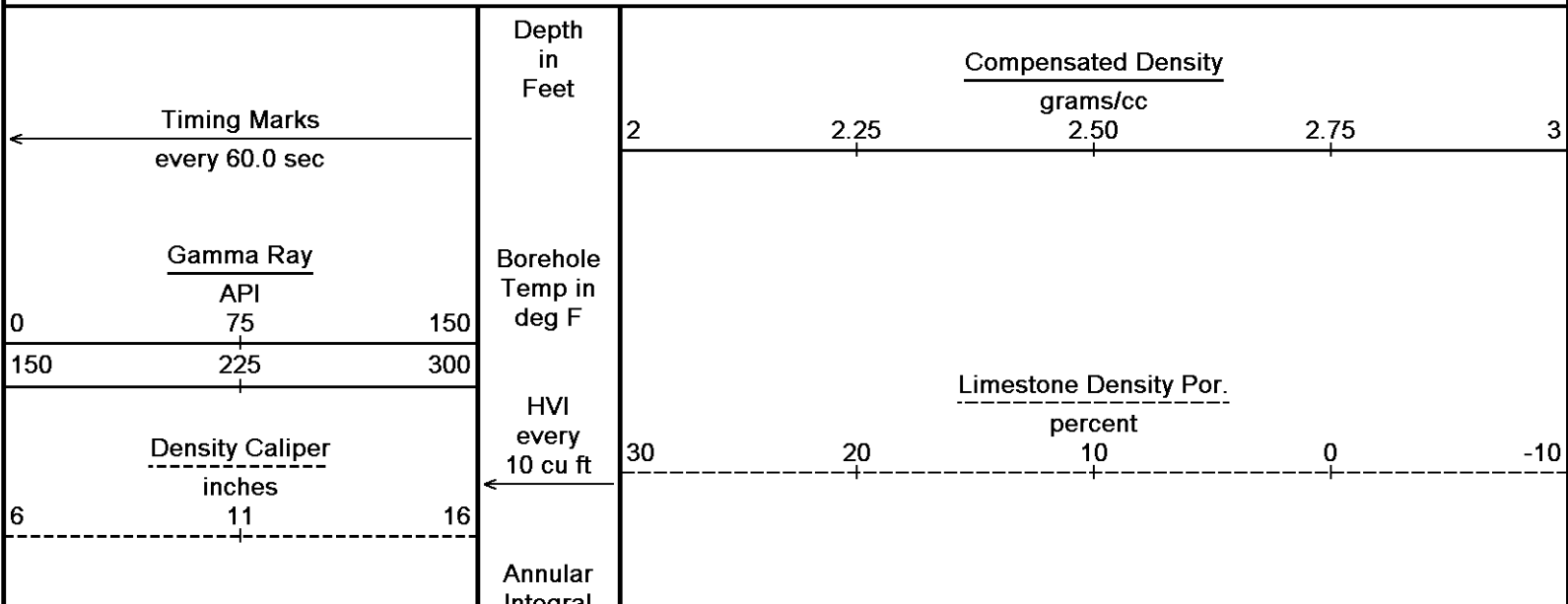
↑REPEAT SECTION↑

↓5 INCH MAIN↓

Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 24-OCT-2013 07:36

Filename: C:\Minimus 13.05.9583\Logs\M & M Exploratio...M & M Exploration Z-Bar 21-8 Man Pass.dtaRecorded on 24-OCT-2013 05:47

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Bit Size
inches

6 11 16

DST Uphole Tension
pounds

5000 0

Integral
every
10 cu ft

Replay
Scale
1:240

3900

200

111°

3950

111°

4000

111°

4050

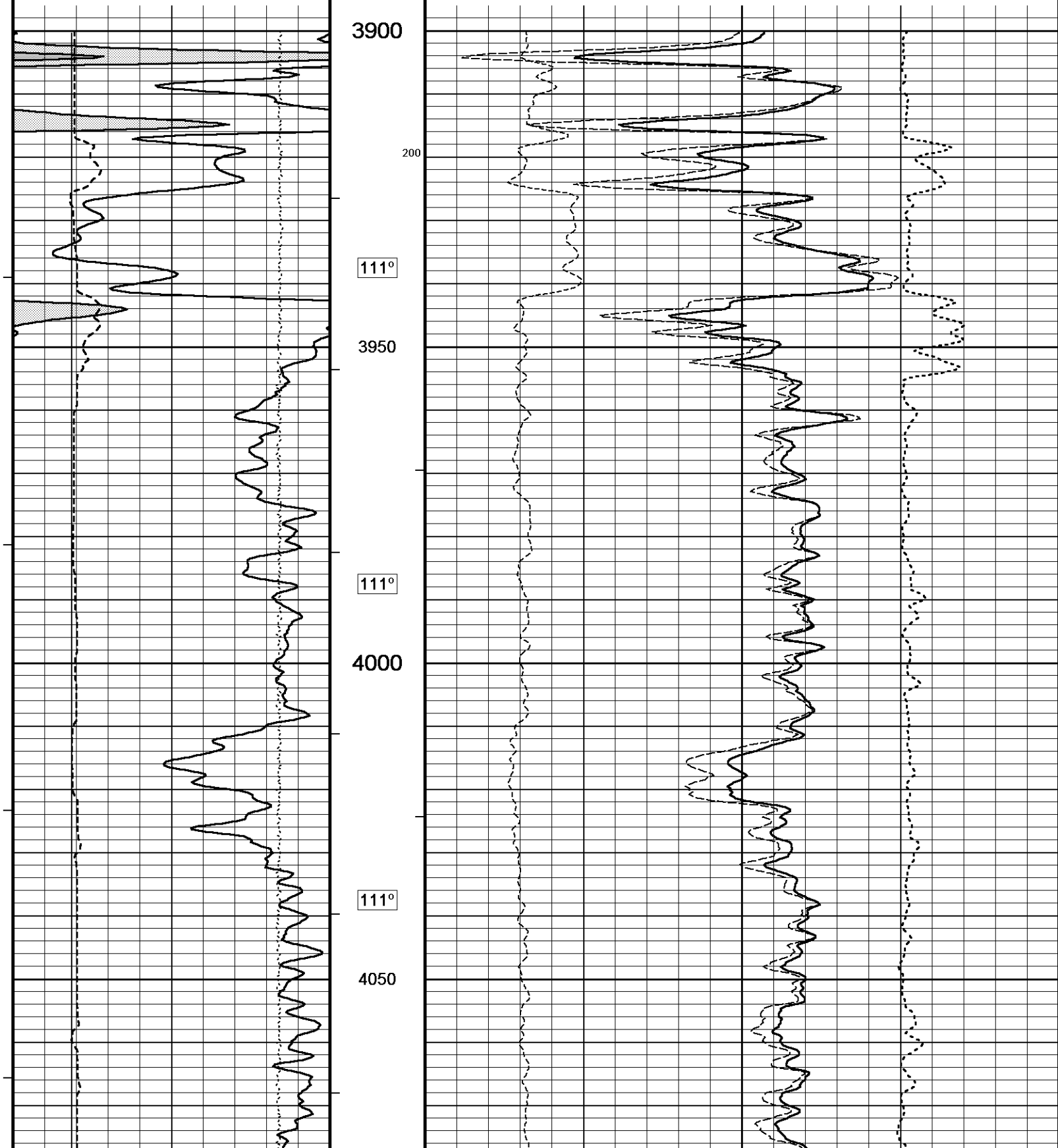
PE

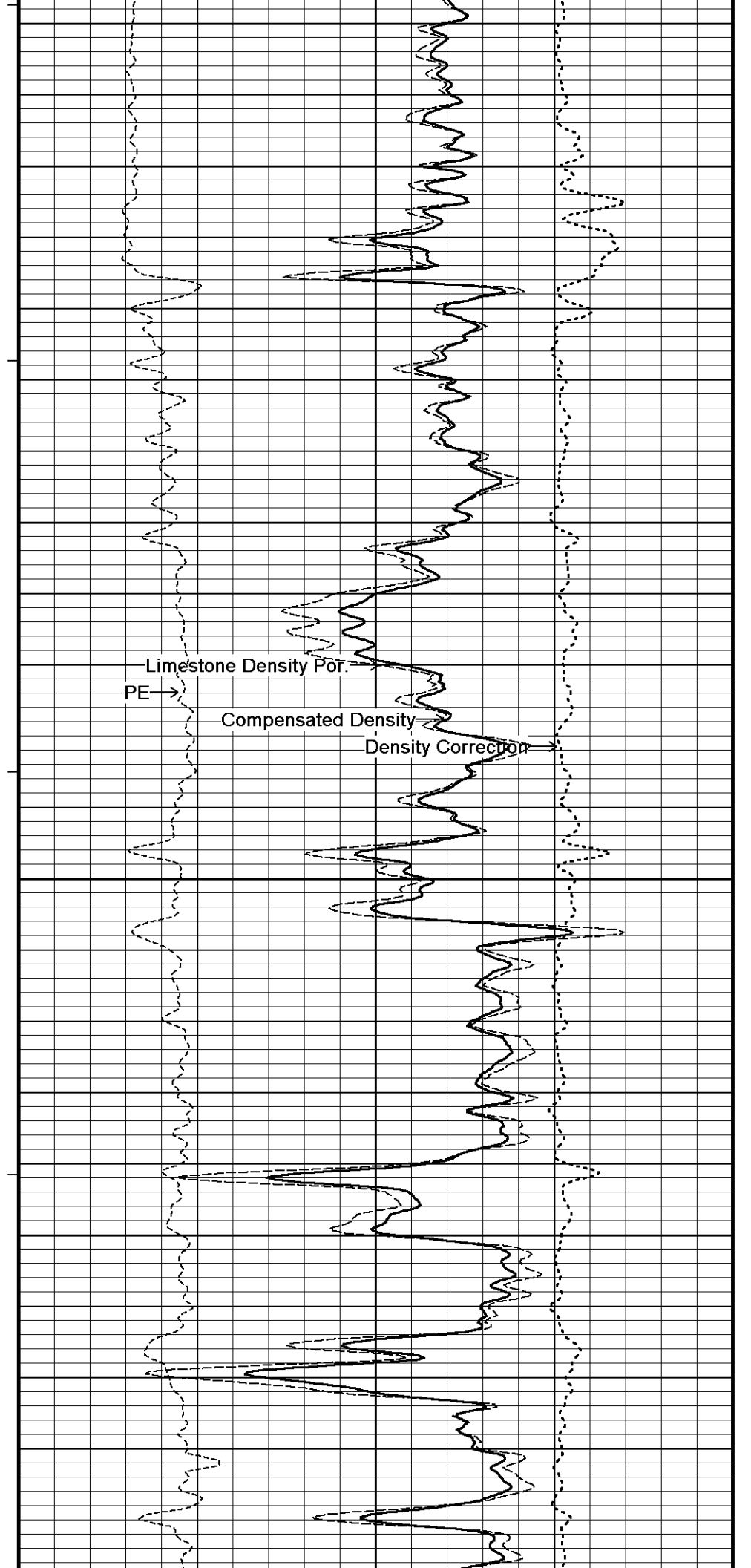
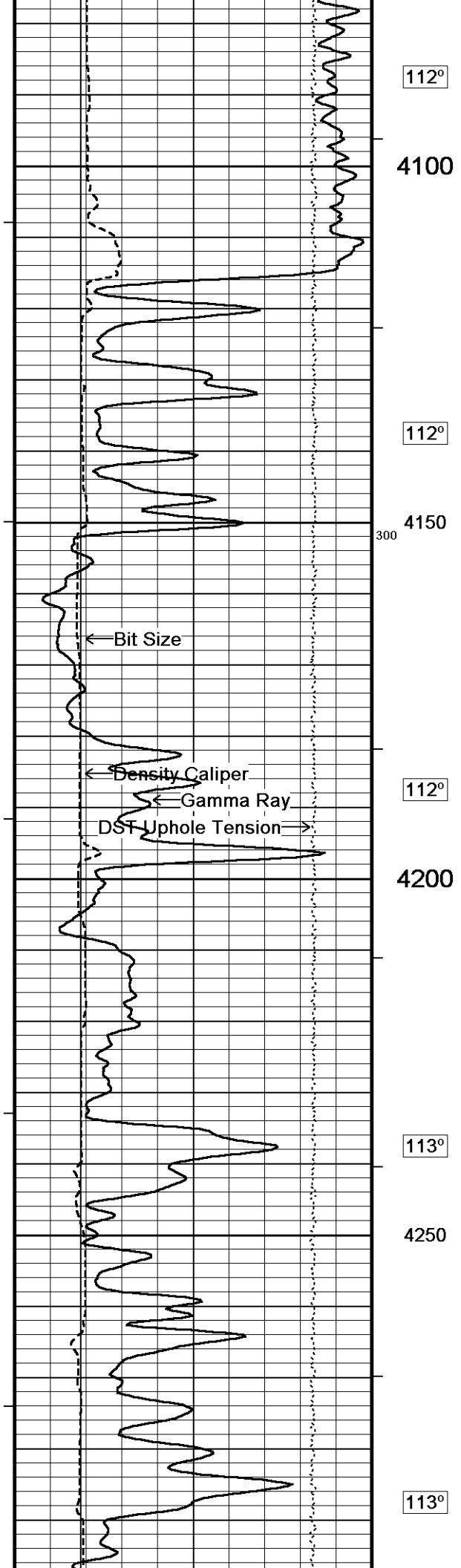
barns/electron

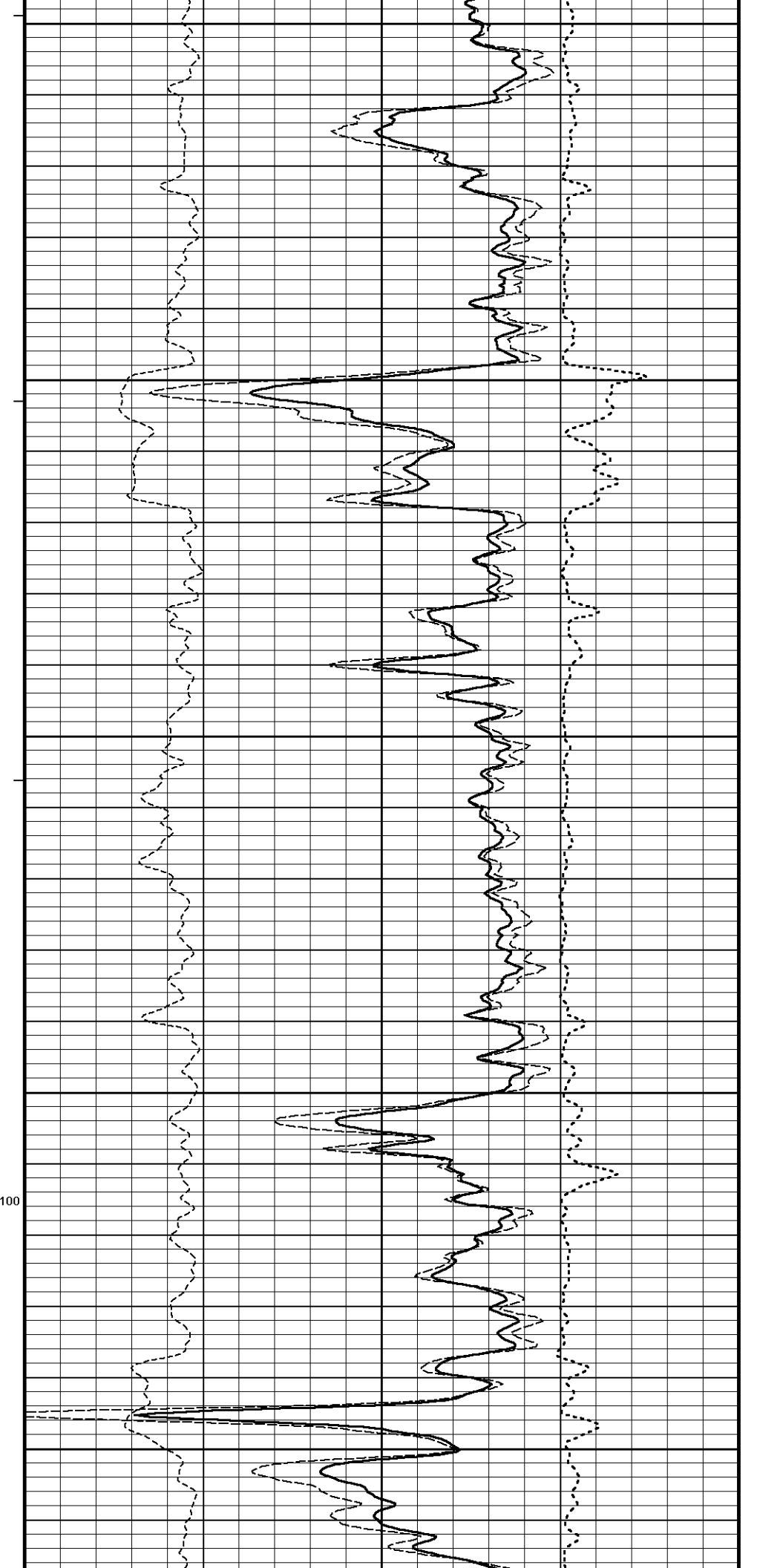
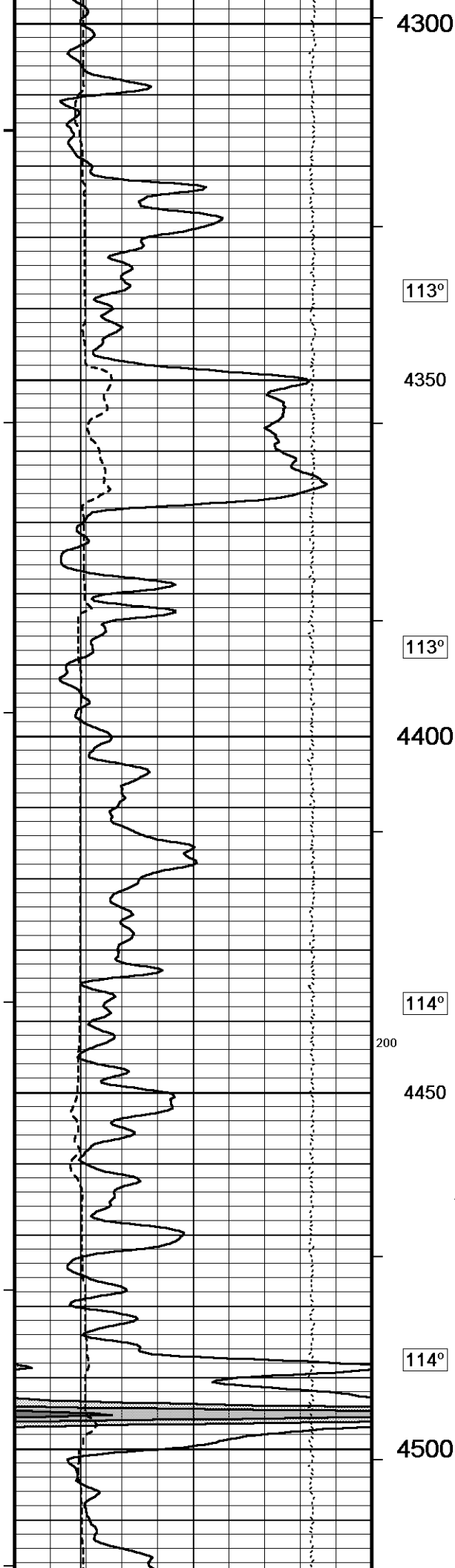
0 5 10 -0.50

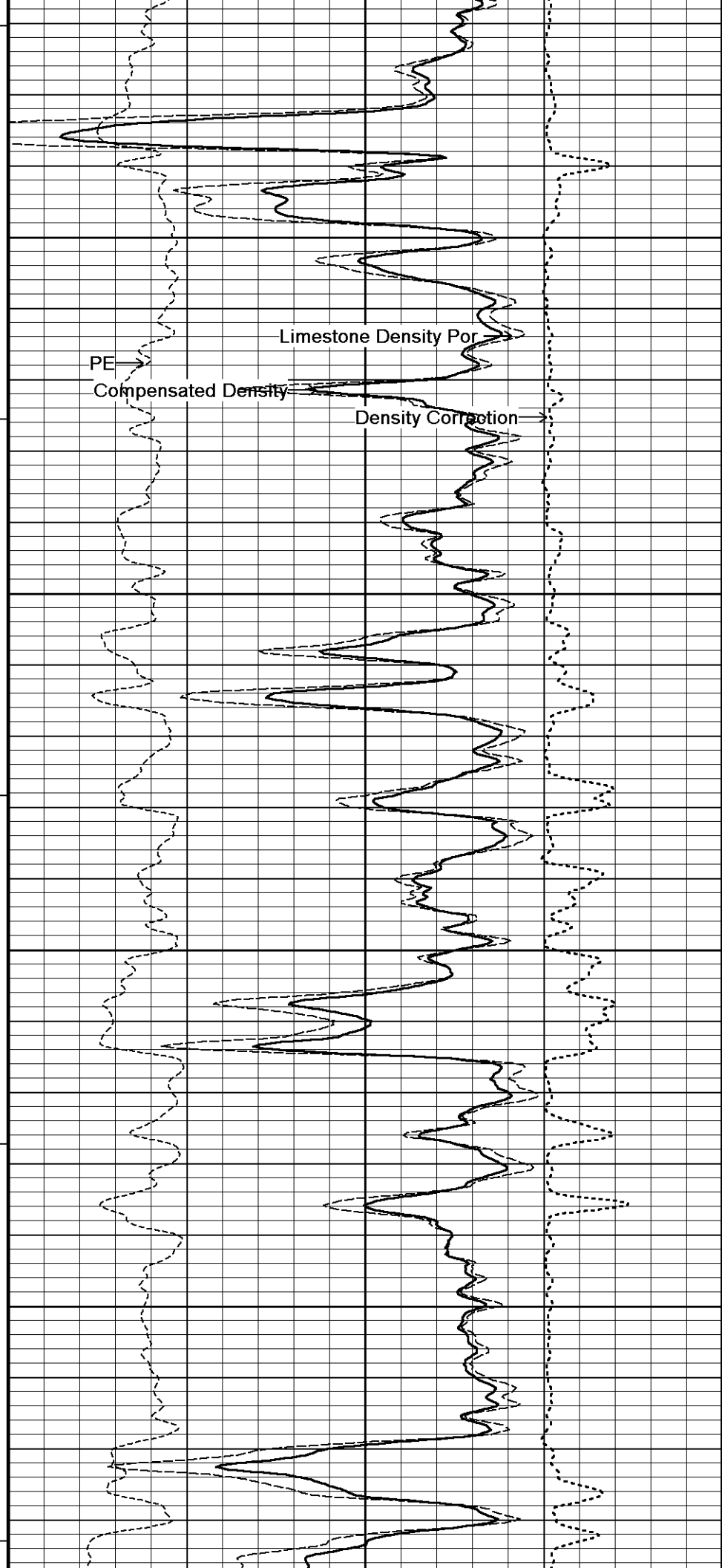
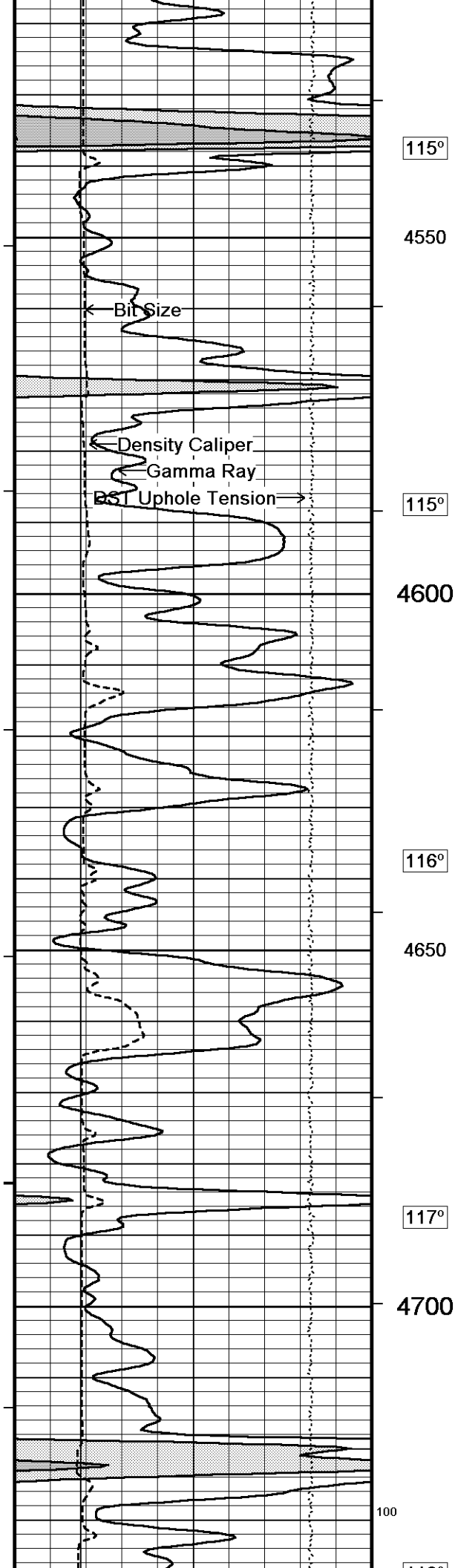
Density Correction
grams/cc

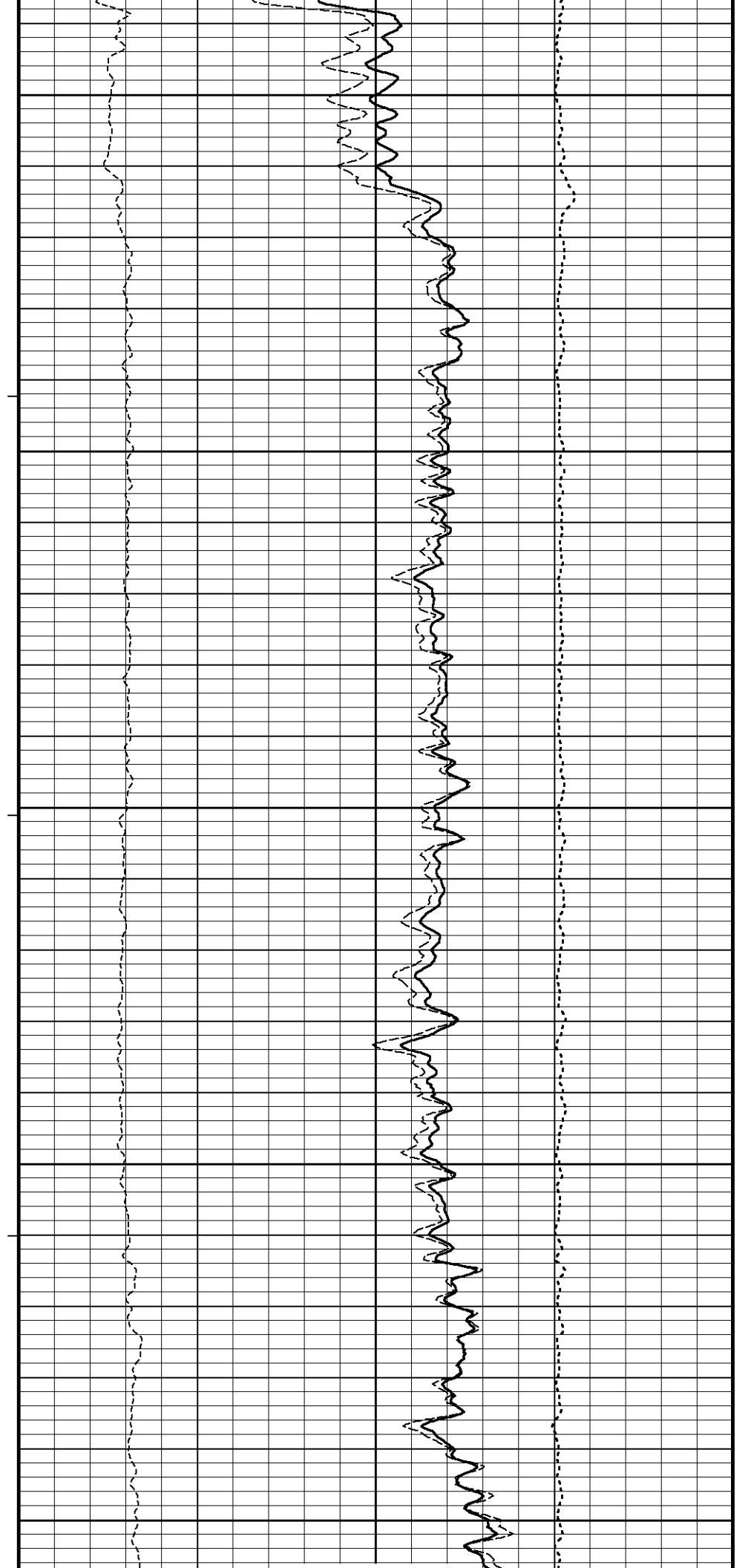
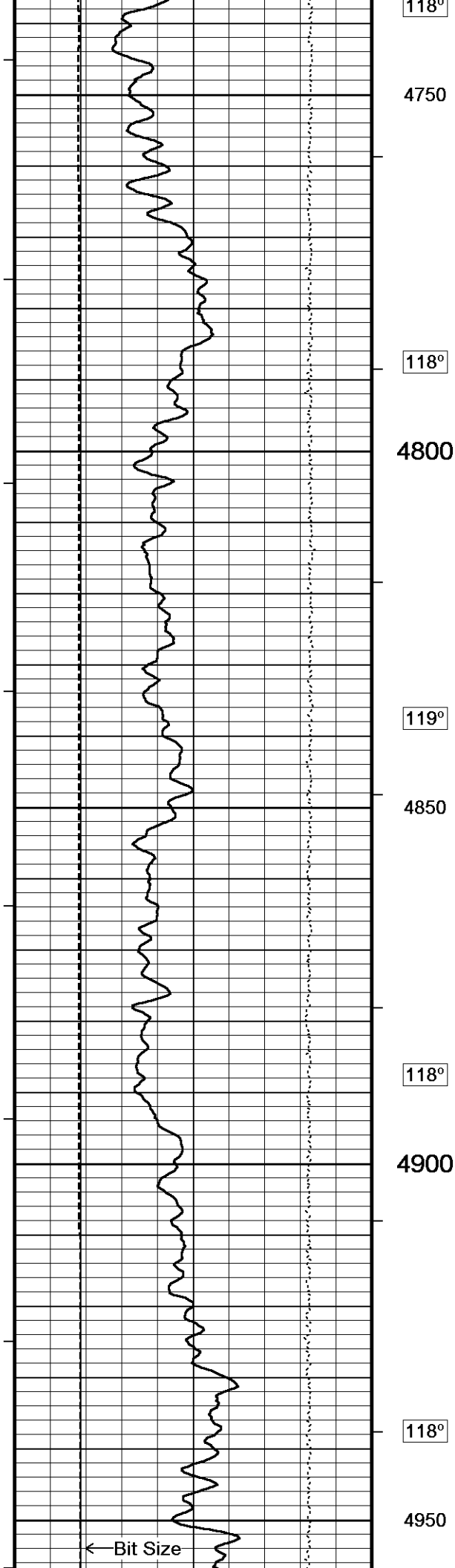
0 0.50

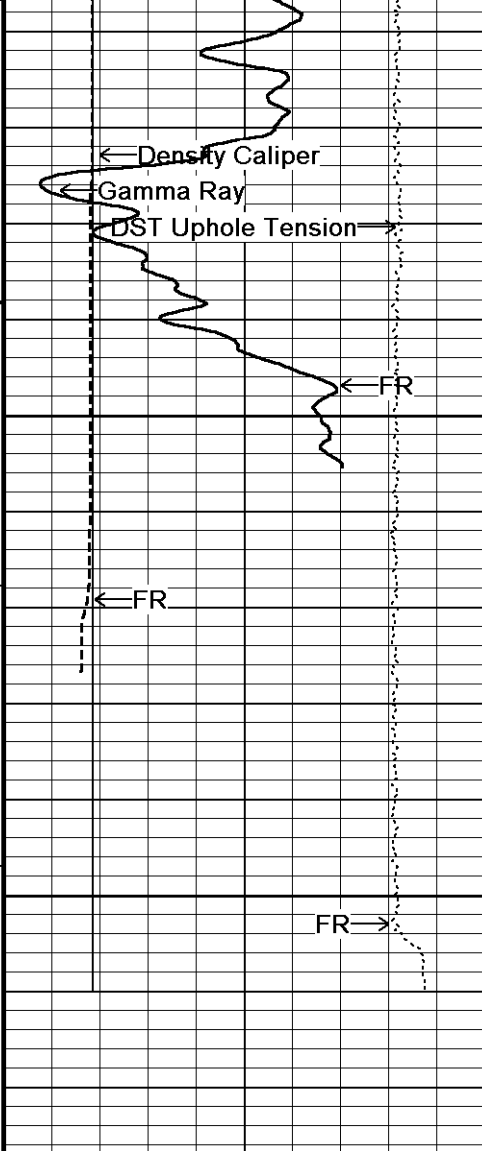








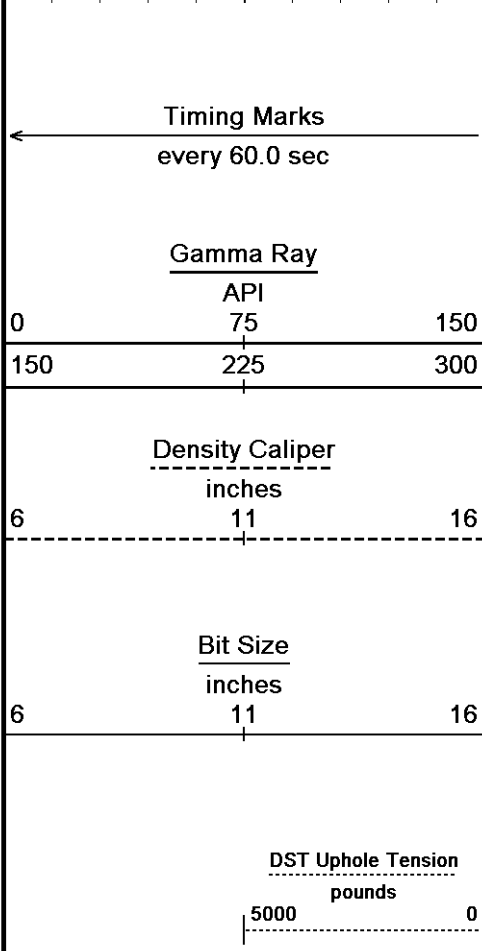




117°

5000

5050



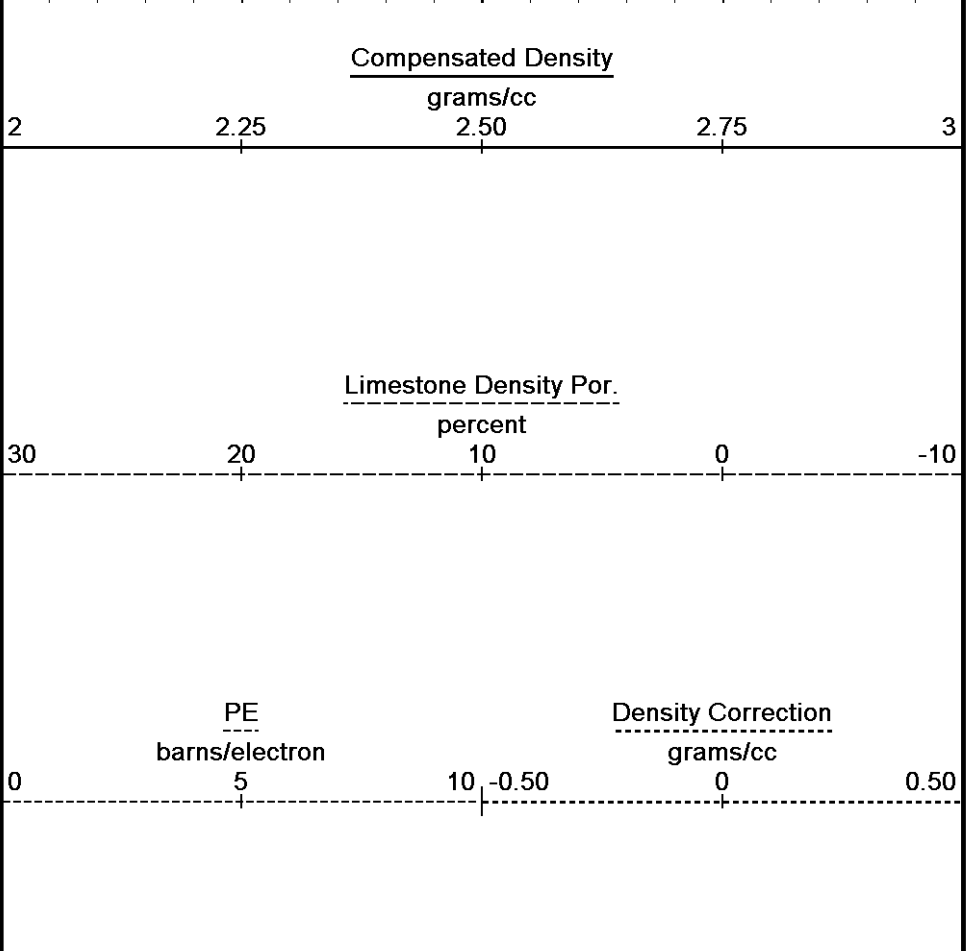
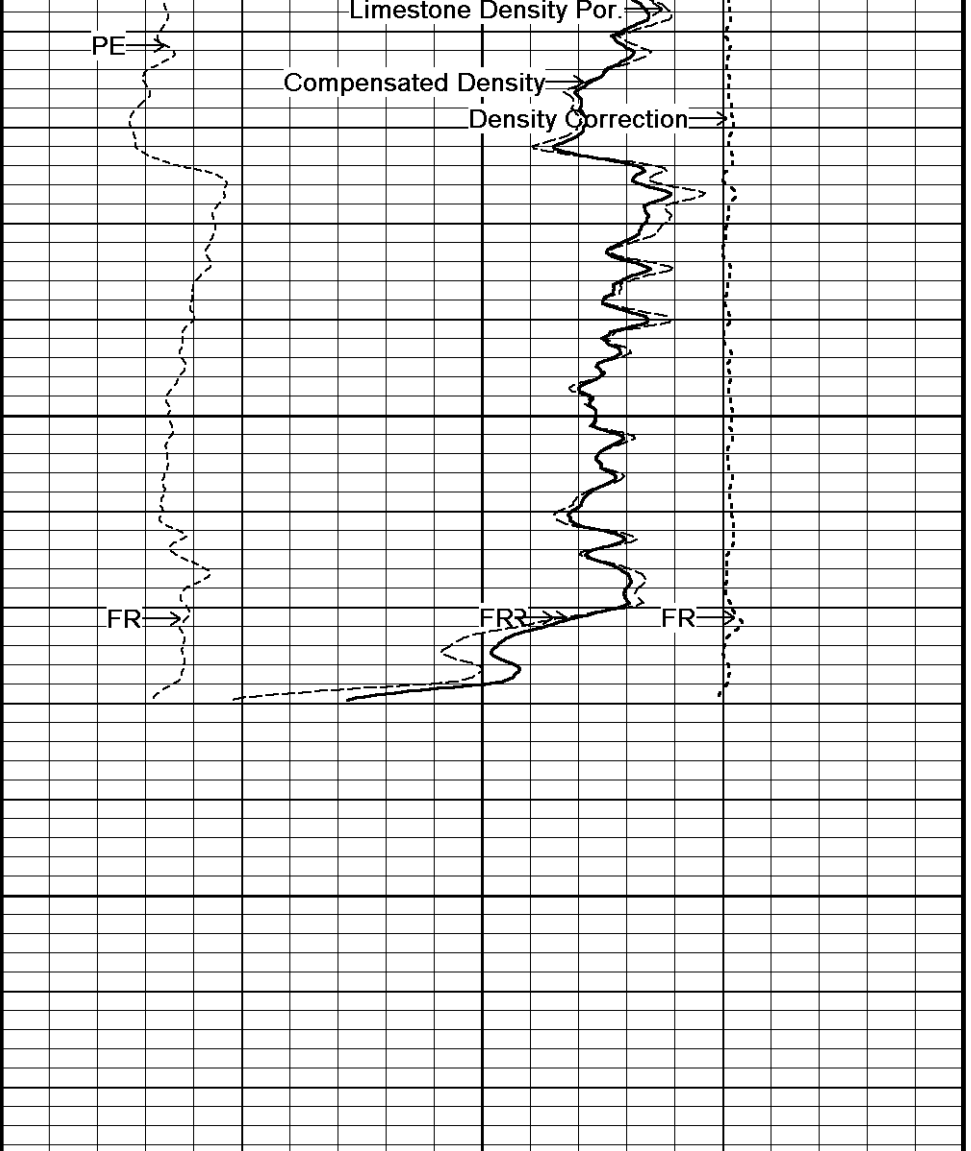
Depth
in
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240



↑

5 INCH MAIN

↑

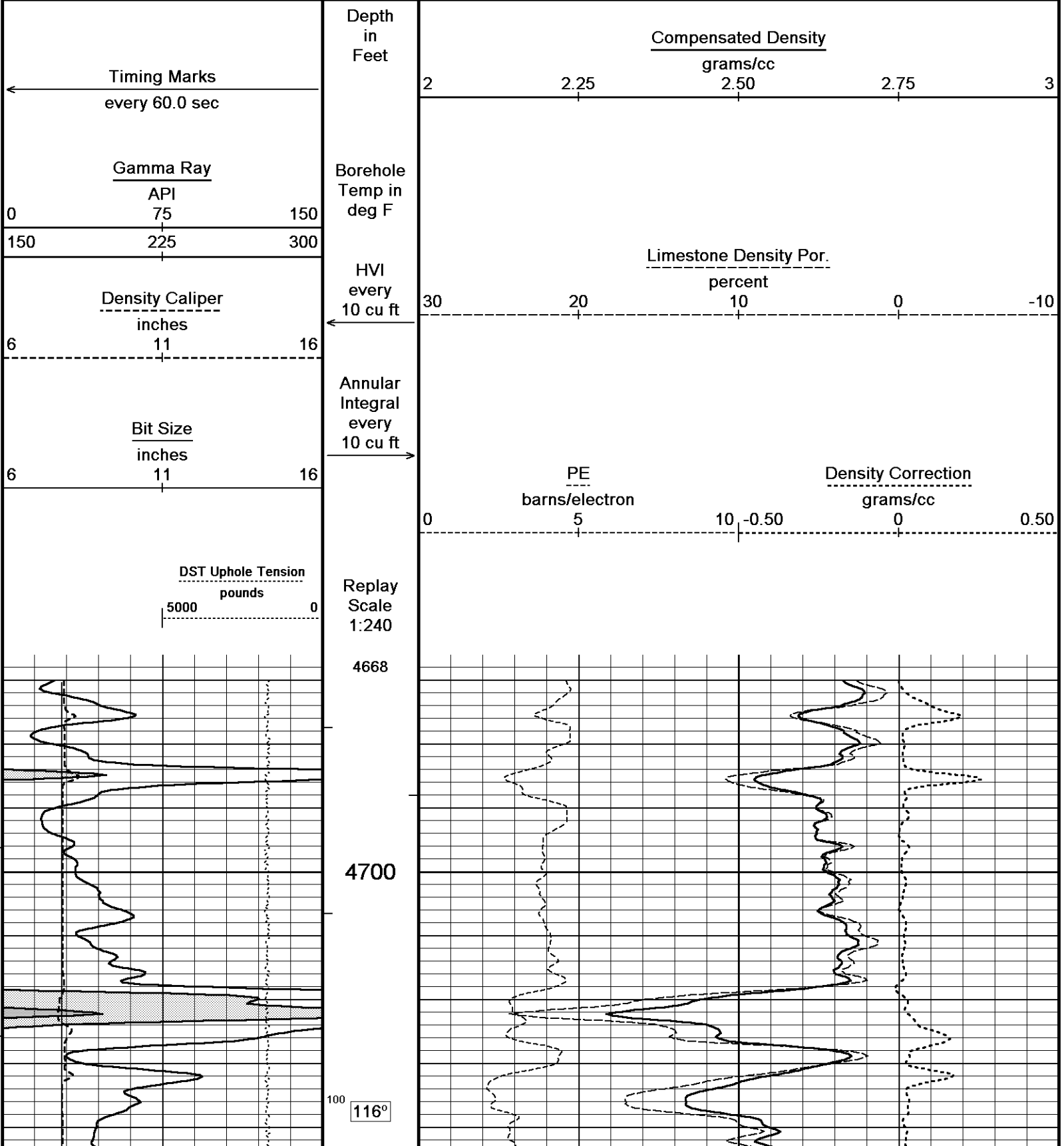
↓

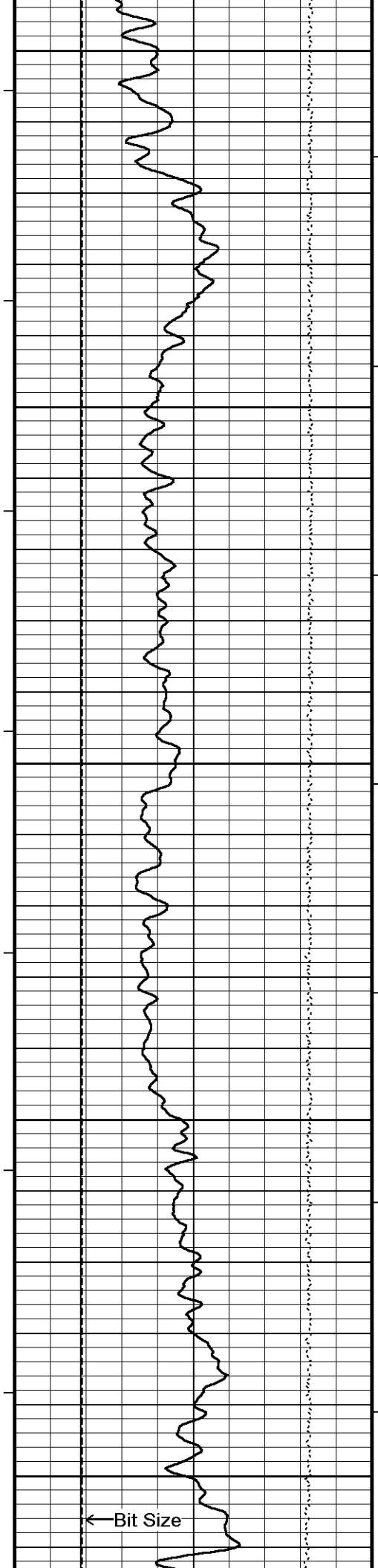
REPEAT SECTION

↓

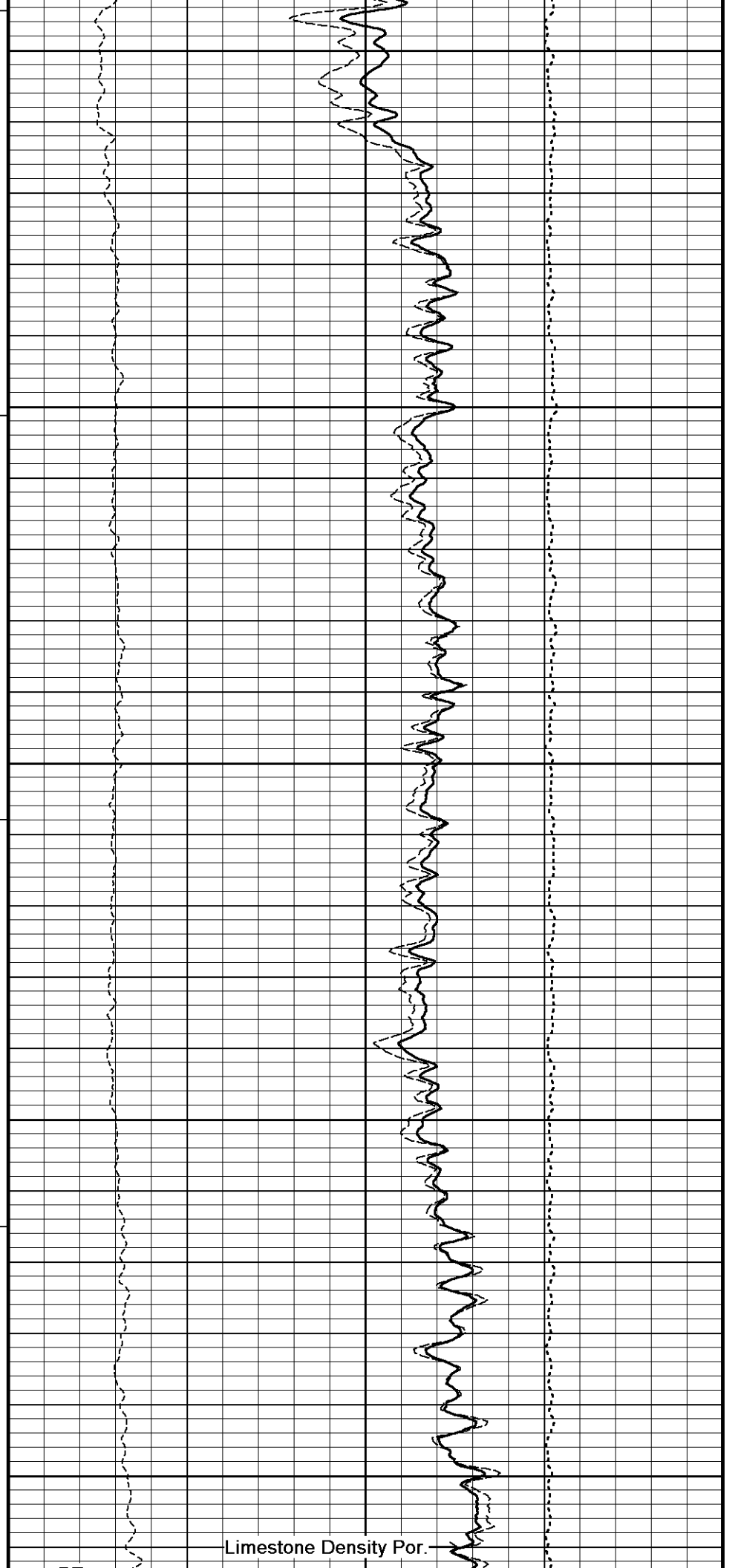
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Logs\M & M Exploration Z...M & M Exploration Z-Bar 21-8 Repeat.dta
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Plotted on 24-OCT-2013 07:36
Recorded on 24-OCT-2013 05:22

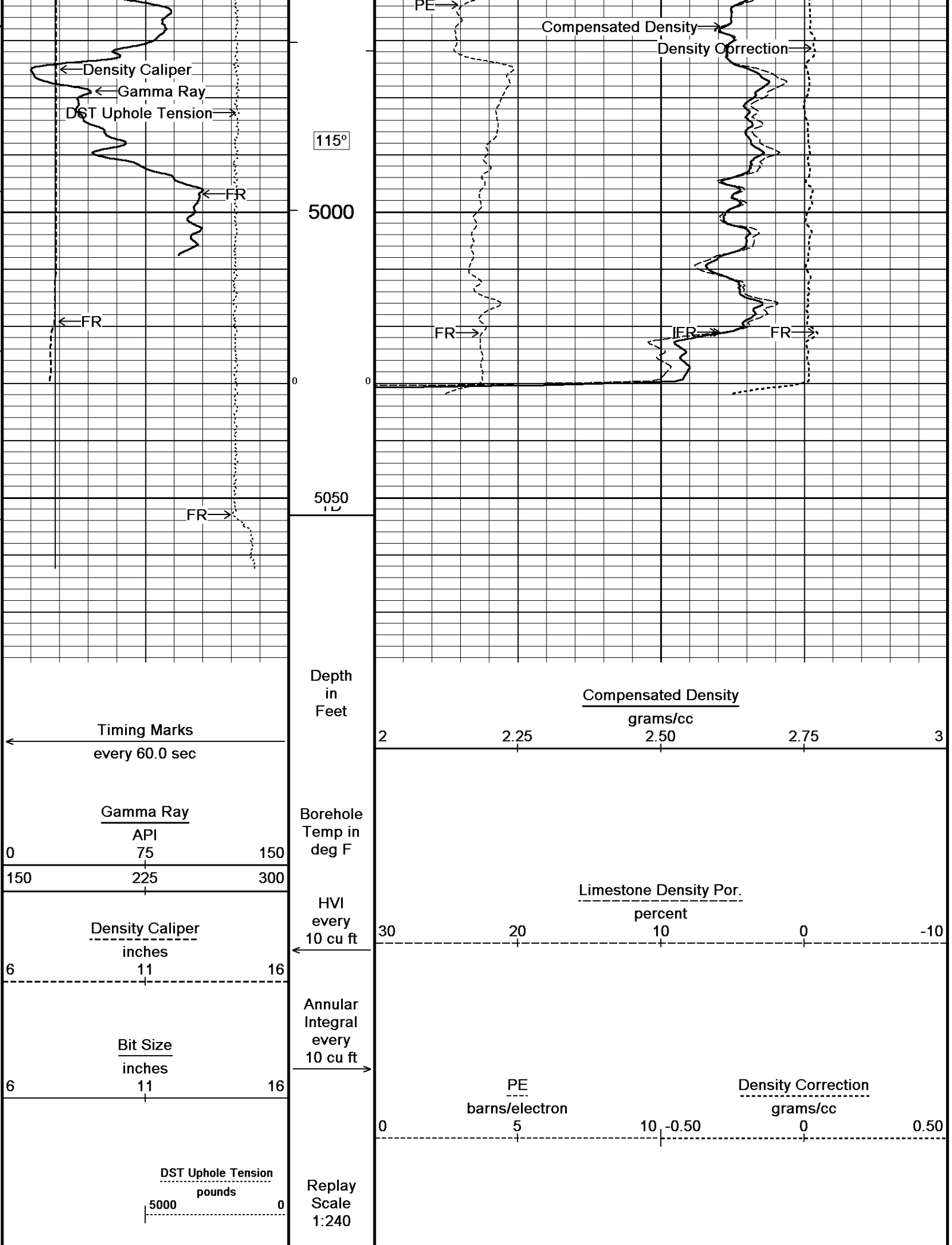




4750
117°
4800
117°
4850
117°
4900
117°
4950



Limestone Density Por.



↑

REPEAT SECTION

↑

BEFORE SURVEY CALIBRATION				
C:\Minimus 13.05.9583\Logs\M & M Exploration Z-Bar 21-8\M & M Exploration Z-Bar 21-8 Repeat.dta				
General Constants All 000			Last Edited on 24-OCT-2013,02:56	
General Parameters				
Mud Resistivity	0.900	ohm-metres		
Mud Resistivity Temperature	72.000	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	5.500	inches		
Caliper for Differential Caliper	MMR Caliper			
Rwa Parameters				
Porosity used	Crossplot Porosity			
Resistivity used	Array Ind. One Res Rt			
RWA Constant A	1.000			
RWA Constant M	2.000			
SW/APOR Tool Source	0.000			
High Resolution Temperature Calibration MCG-D.K 442			Field Calibration on 20-OCT-2013,18:27	
	Measured	Calibrated(Deg F)		
Lower	50.00	50.00		
Upper	75.00	75.00		
High Resolution Temperature Constants MCG-D.K 442			Last Edited on 20-OCT-2013,18:27	
Pre-filter Length	11			
Gamma Calibration MCG-D.K 442			Field Calibration on 23-OCT-2013 01:26	
	Measured	Calibrated (API)		
Background	74	50		
Calibrator (Gross)	1157	775		
Calibrator (Net)	1083	725		
Gamma Constants MCG-D.K 442			Last Edited on 24-OCT-2013,02:55	
Gamma Calibrator Number	GRC38			
Mud Density	1.10	gm/cc		
Caliper Source for Processing	Density Caliper			
Tool Position	Eccentred			
Concentration of KCl		kppm		
K Mud Type	Chloride			
K Mud Concentration	0.00	%		
Photo Density Calibration MPD-B 31			Base Calibration on 11-OCT-2013 13:32	
			Field Check on 23-OCT-2013 01:18	
Density Calibration				
Base Calibration				
		Measured	Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	44679	22866	59556	30836
Reference 2	18345	1888	24941	2541
Field Check at Base				
	669.8	824.9		
Field Check				
	667.4	826.5		

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	125	594		
Reference 1	18704	44569	0.422	0.371
Reference 2	5436	18261	0.301	0.272

Field Check at Base

124.9 594.3

Field Check

124.0 593.3

Density Constants MPD-B 31

Last Edited on 24-OCT-2013,02:54

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	1.10 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

Caliper Calibration MPD-B 31

Base Calibration on 11-OCT-2013 13:50
Field Calibration on 23-OCT-2013 01:14

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18160	3.99
2	27038	5.98
3	35584	7.97
4	43976	9.86
5	53328	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.94	7.97

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Logs\M & M Exploration Z-Bar 21-8\M & M Exploration Z-Bar 21-8 Repeat.dta

CBH-C, Cablehead, 11 pin
CBH-CA 170 LG: 2.40 ft WT: 24.3 lb OD: 2.24 in

Compact Comms Gamma
MCG-D.K 442 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.88 in



56.02 ft GRGC - Gamma Ray
53.11 ft CGXT - MCG External Temperature

45.76 ft MBTC - MMR Caliper
45.76 ft MINV - MMR MicroLog Inverse
45.76 ft MNRL - MMR MicroLog Normal

Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

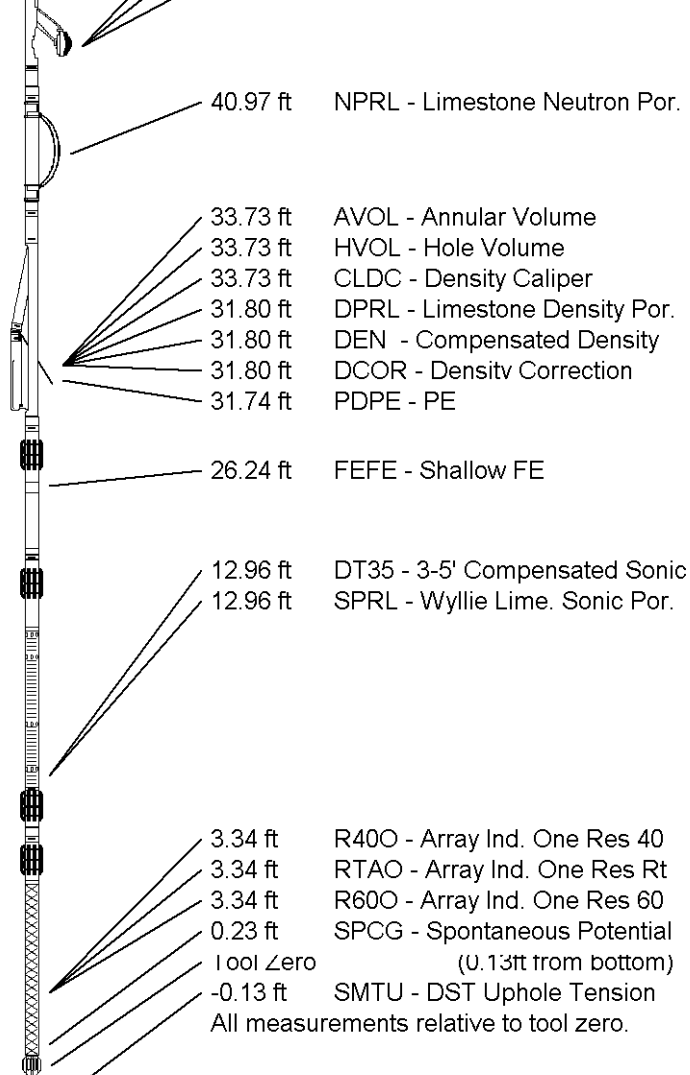
Compact Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focused Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Sonic
MSS-A.A 126 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 63.70 ft Weight: 480.6 lb



COMPANY	M & M EXPLORATION, INC.
WELL	Z-BAR 21-8
FIELD	AETNA GAS AREA
PROVINCE/COUNTY	BARBER
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1567.00	feet	First Reading	5021.00	feet
Elevation Drill Floor	1565.00	feet	Depth Driller	5050.00	feet
Elevation Ground Level	1557.00	feet	Depth Logger	5053.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG