



Weatherford[®]

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY

M&M EXPLORATION, INC.

WELL

Z-BAR 26-15

FIELD

AETNA GAS AREA

PROVINCE/COUNTY

BARBER

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

560' FSL & 2100' FEL SE/4

SEC

TWP

33S

15W

Other Services
MAI/MFE

API Number

15-007-24069

Permit Number

Permanent Datum G.L., Elevation 1809 feet

Log Measured From KB

Drilling Measured From K.B. @ 10 FEET

Date

13-SEP-2013

Run Number

ONE

Service Order

3541081

Depth Driller

5150.00

Depth Logger

5149.00

First Reading

5130.00

Last Reading

3900.00

Casing Driller

324.00

Casing Logger

323.00

Bit Size

7.875

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.20 lb/USg

PH / Fluid Loss

10.00

Sample Source

FLOWLINE

Rm @ Measured Temp

1.13 @ 95.0

Rmf @ Measured Temp

0.90 @ 95.0

Source Rmf / Rmc

1.36 @ 95.0

Rm @ BHT

0.93 @ 116.0

Time Since Circulation

5 HOURS

Max Recorded Temp

116.00

Equipment / Base

13096

Recorded By

ROB HOFFMAN

Witnessed By

BILL BUSCH

JOB#

LB13-256

Elevations:
KB 1819.00
DF 1817.00
GL 1809.00

BOREHOLE RECORD

Last Edited: 13-SEP-2013 07:27

Bit Size inches	Depth From feet	Depth To feet
7.875	324.00	5150.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	13.375	0.00	324.00	48.00

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583.
- 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: 1998 CU. FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH CASING FROM TD TO 3900: 298 CU. FT.
- SERVICE ORDER # 3541081

- RIG: HARDT RIG #1

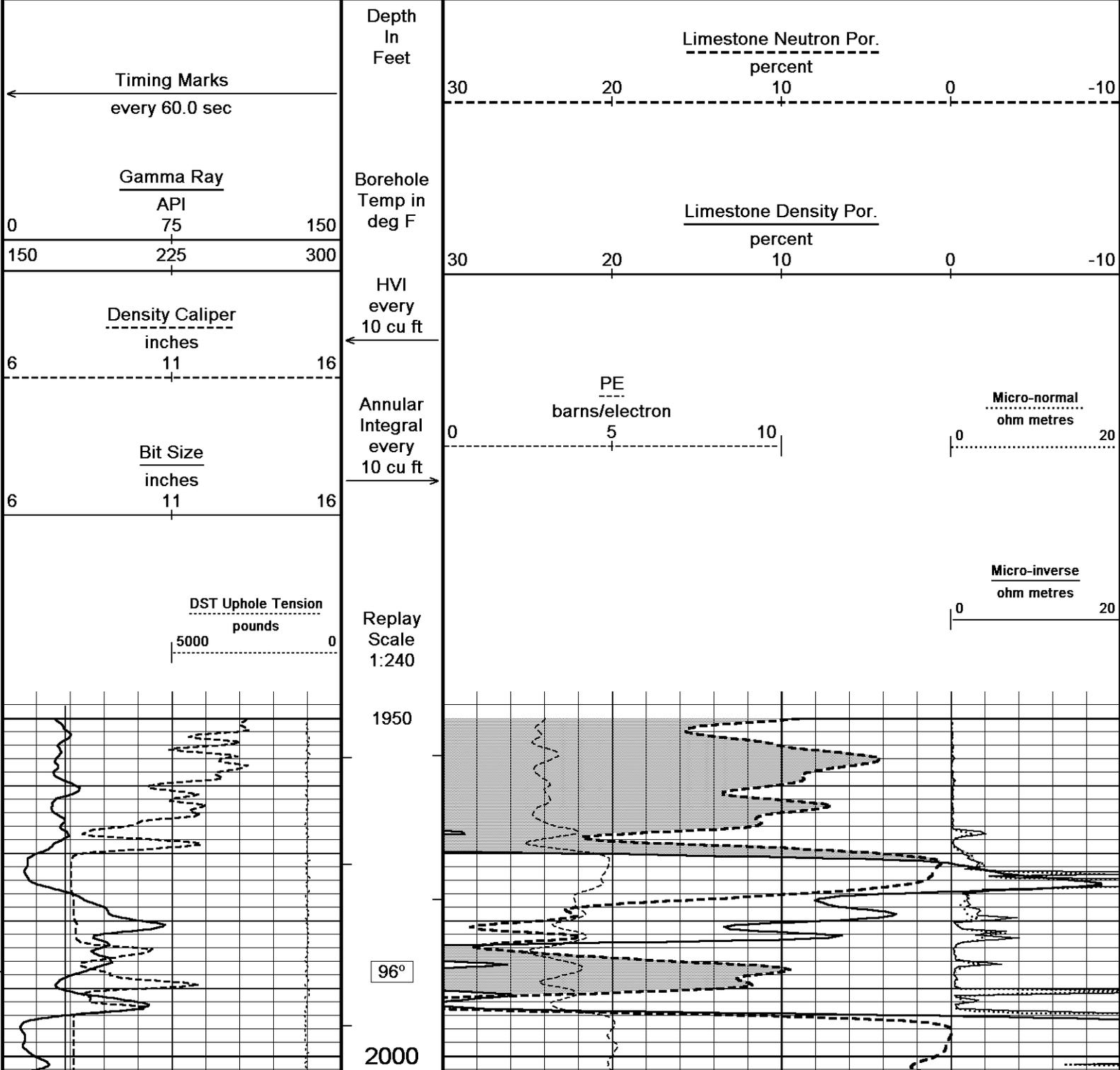
- ENGINEER: ROB HOFFMAN

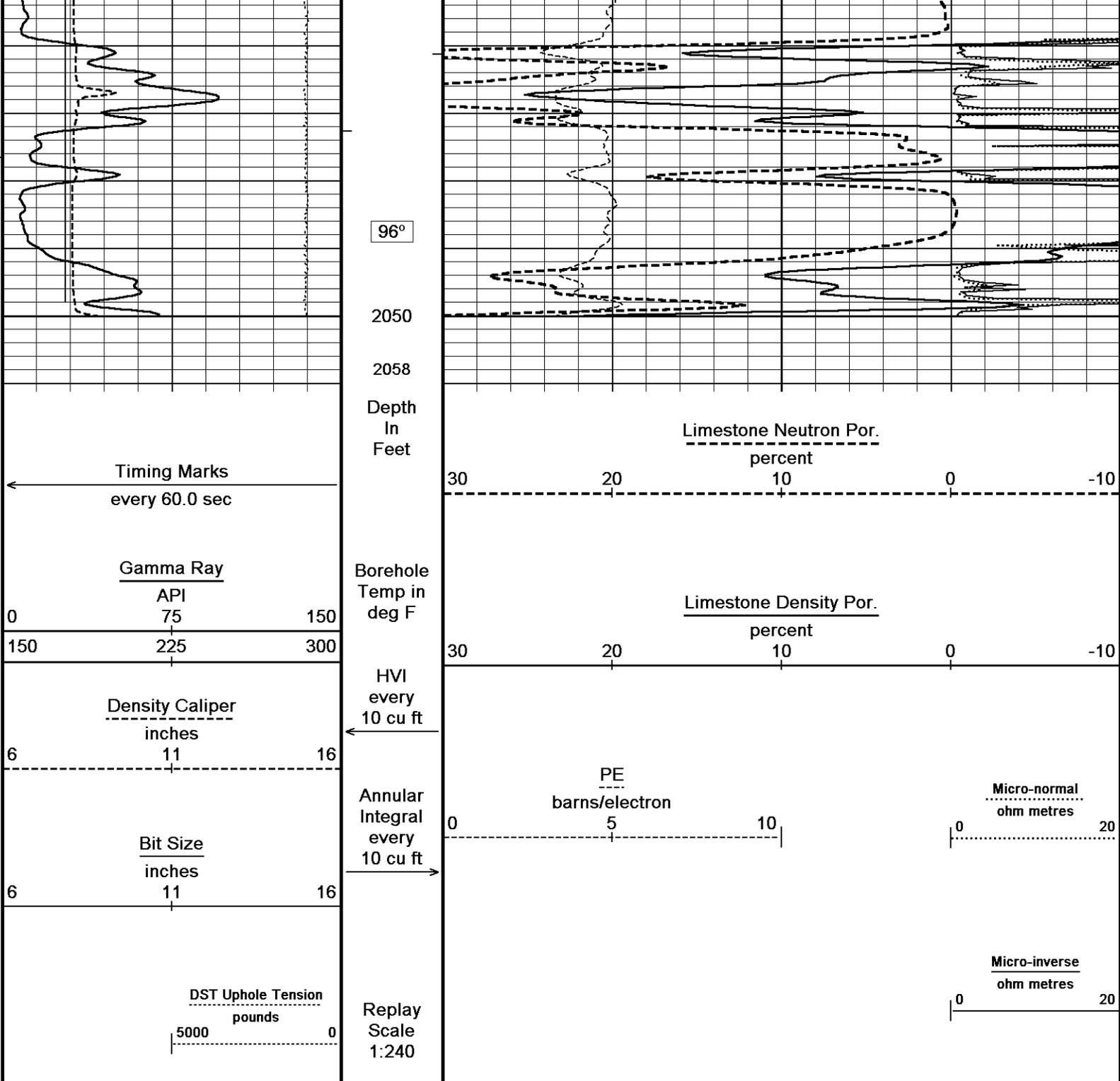
- OPERATOR(S): K. RINEHART, J. DUNLAP

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.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 14-SEP-2013 09:58
 Filename: C:\Minimus 13.05.9583\Logs\M&M Exploration Z-Ba...M&M Exploration Z-Bar 26-15_002.dta Recorded on 13-SEP-2013 12:34
 System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583



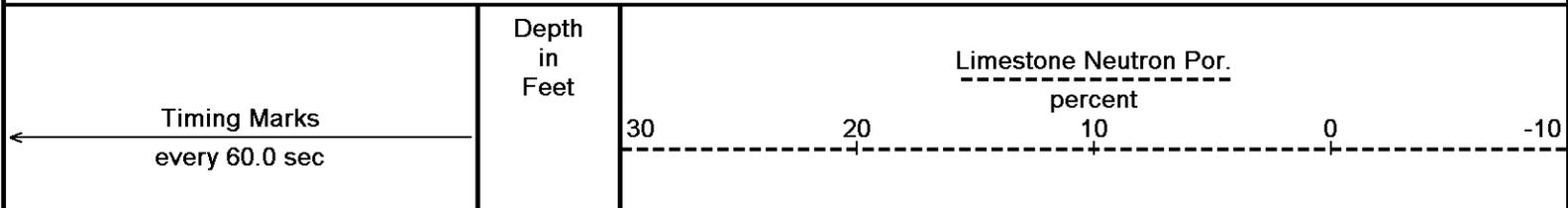


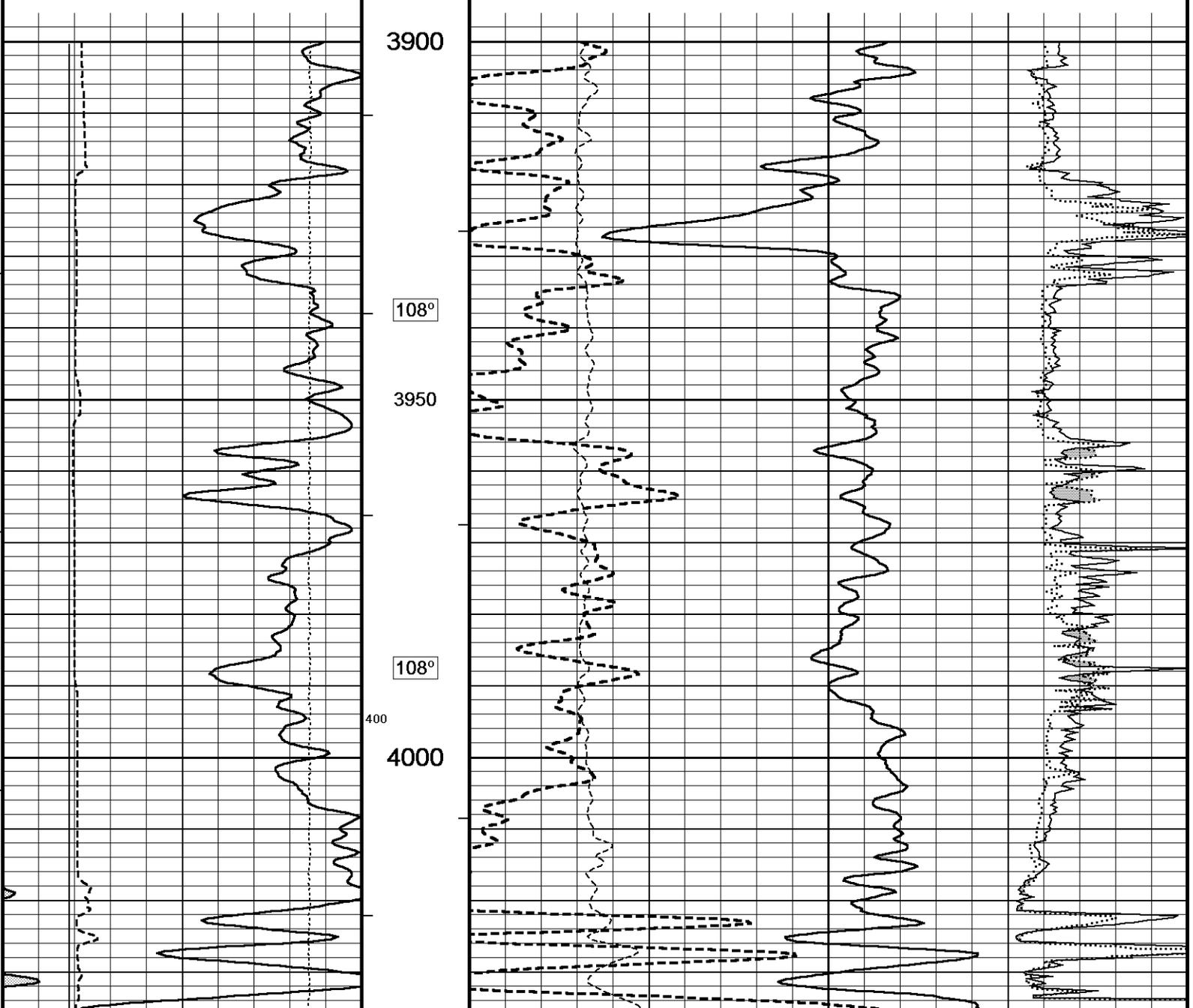
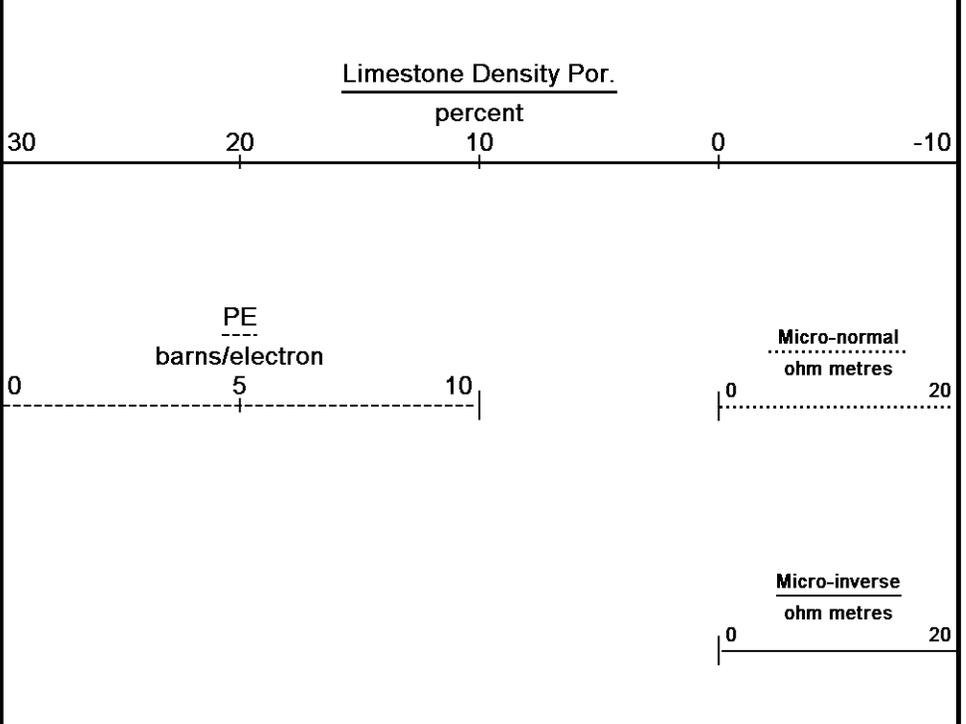
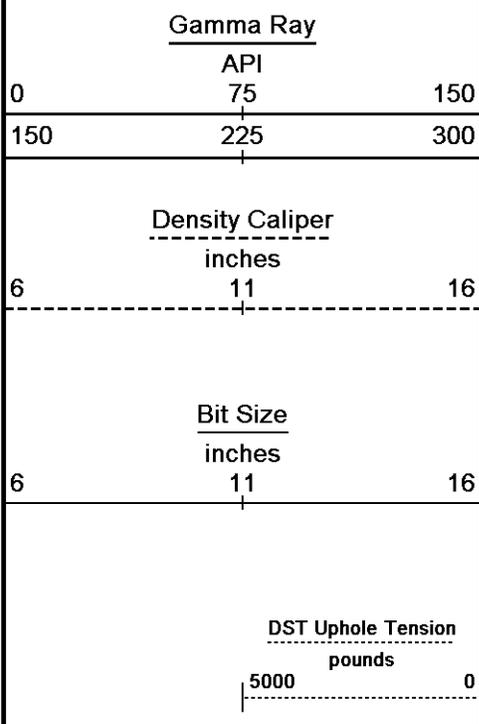
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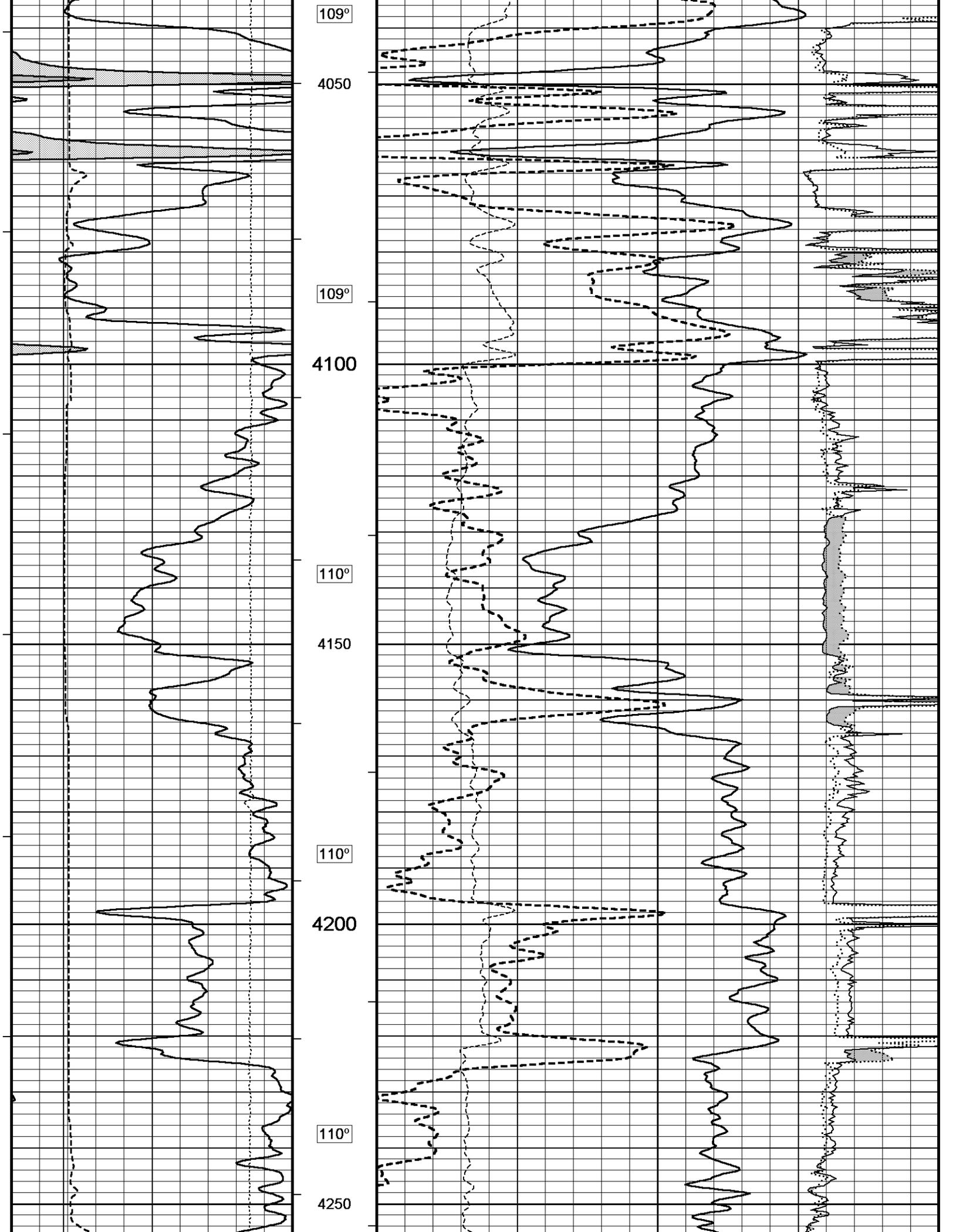
5 INCH MAIN

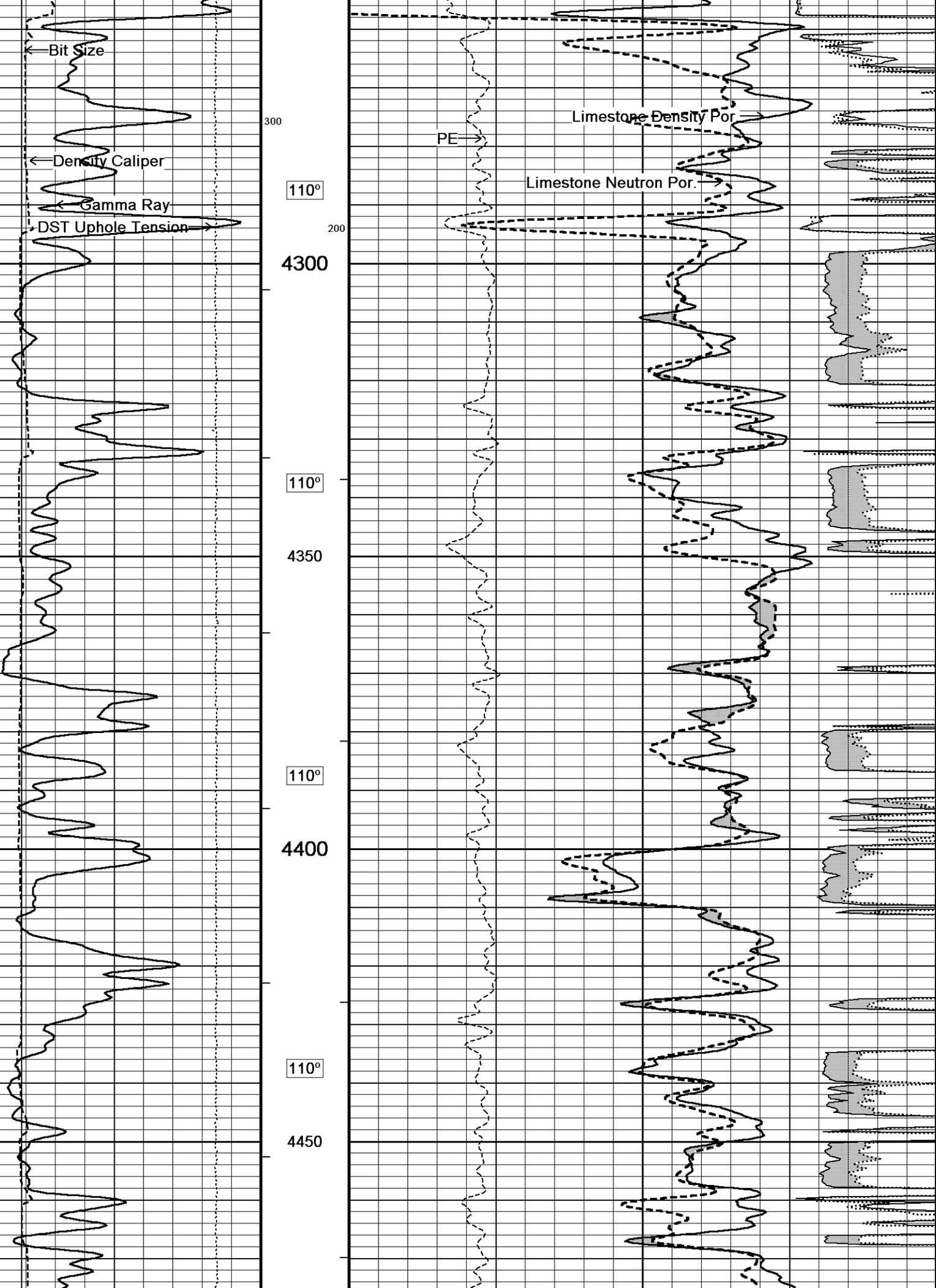
5 INCH MAIN

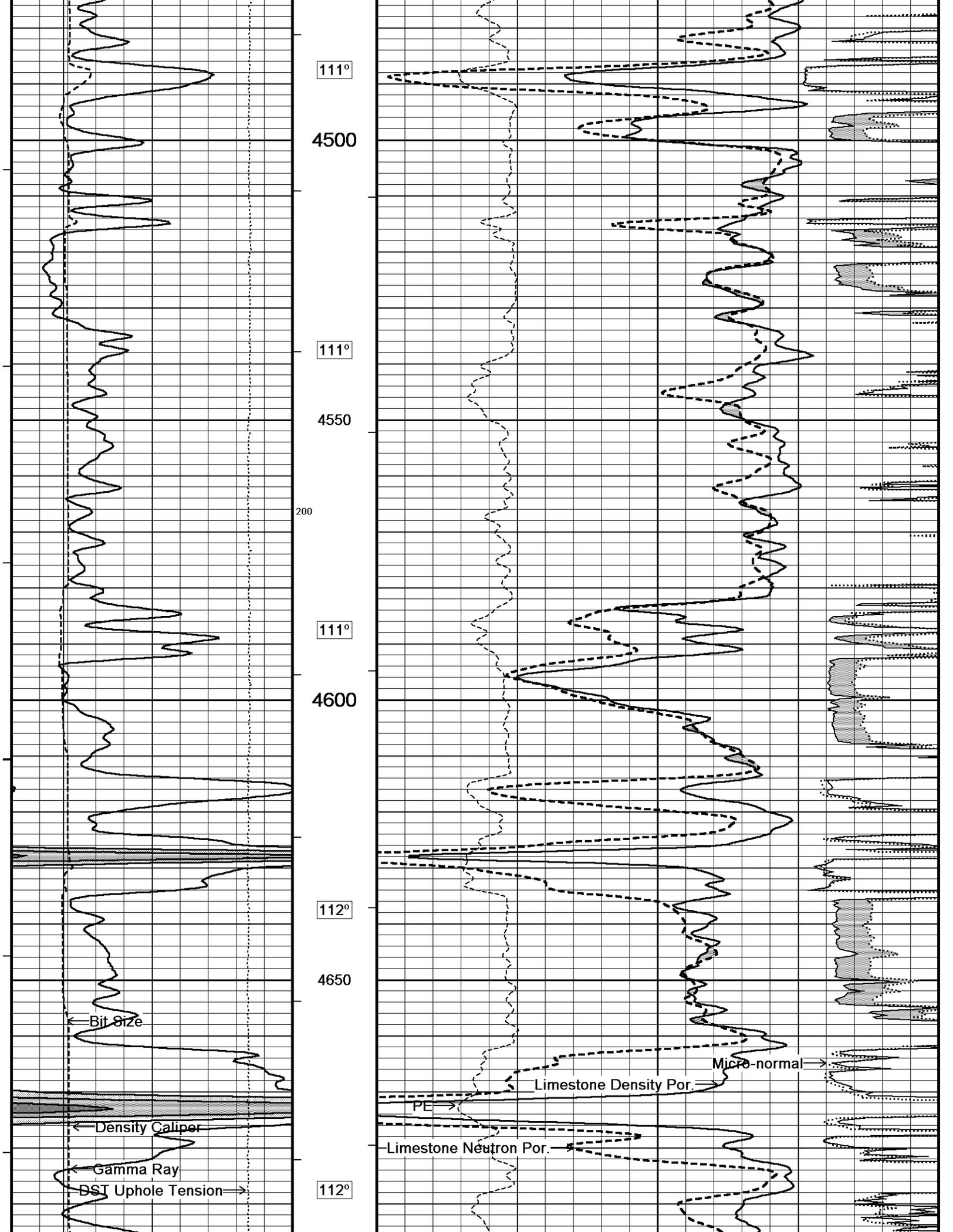
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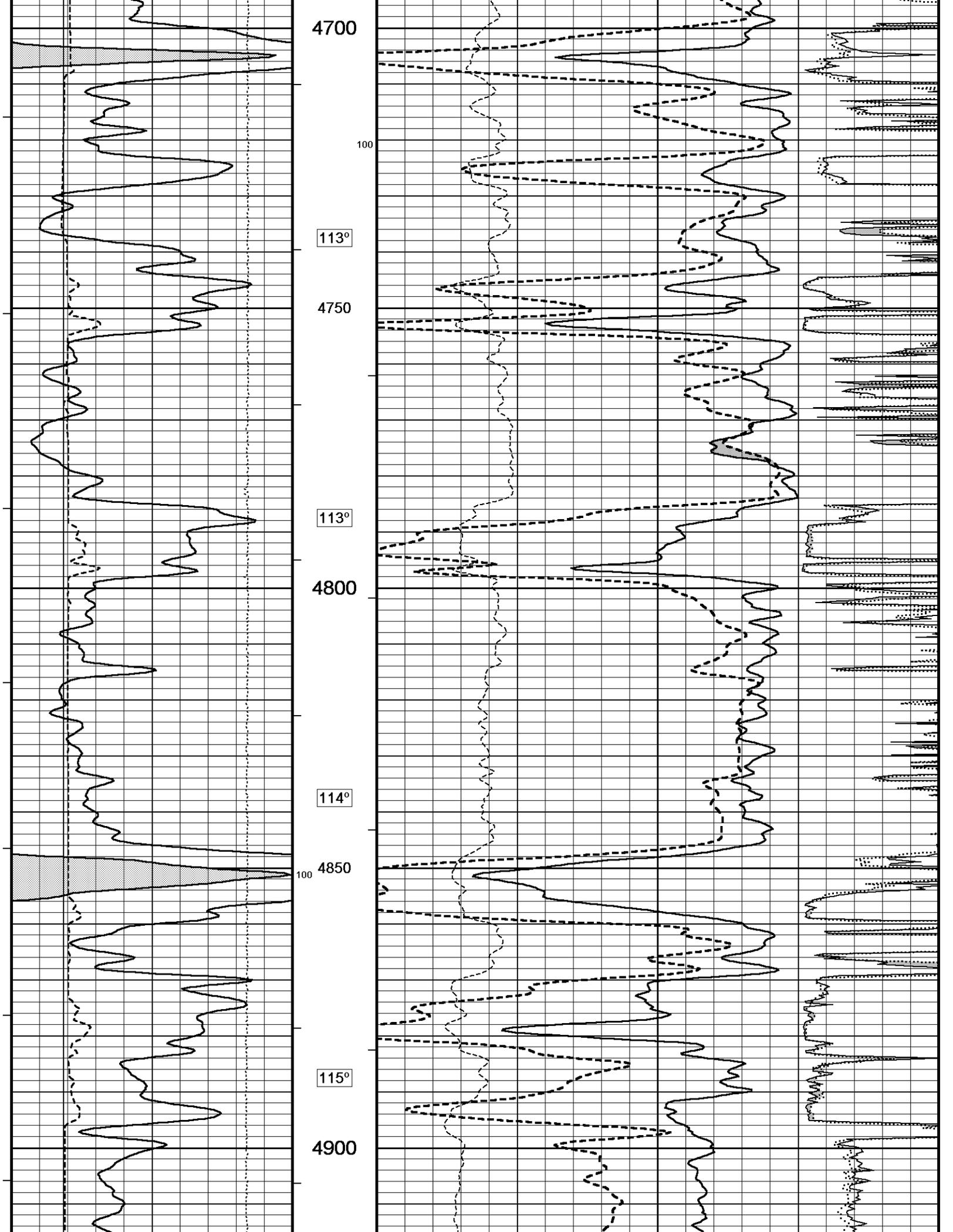


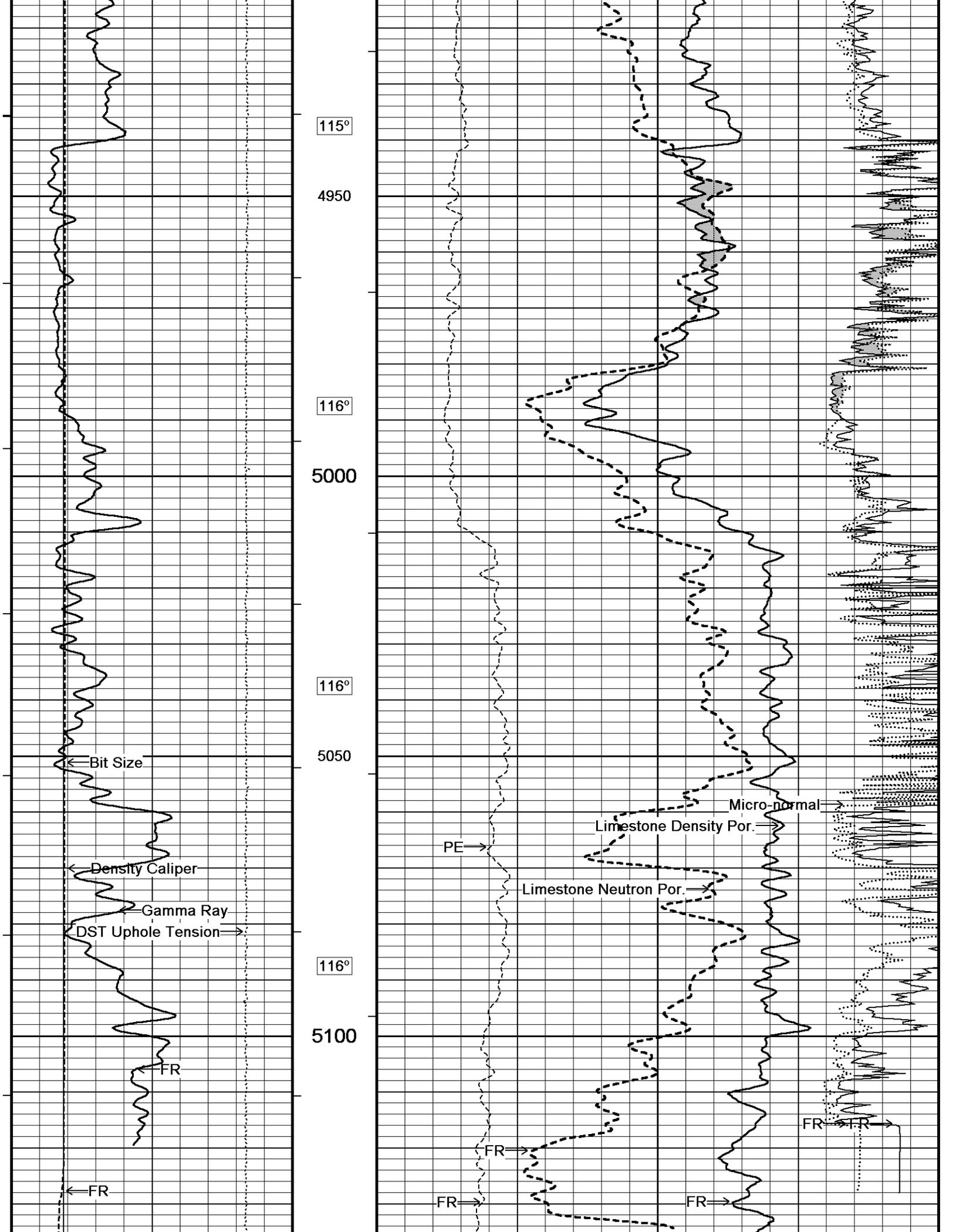


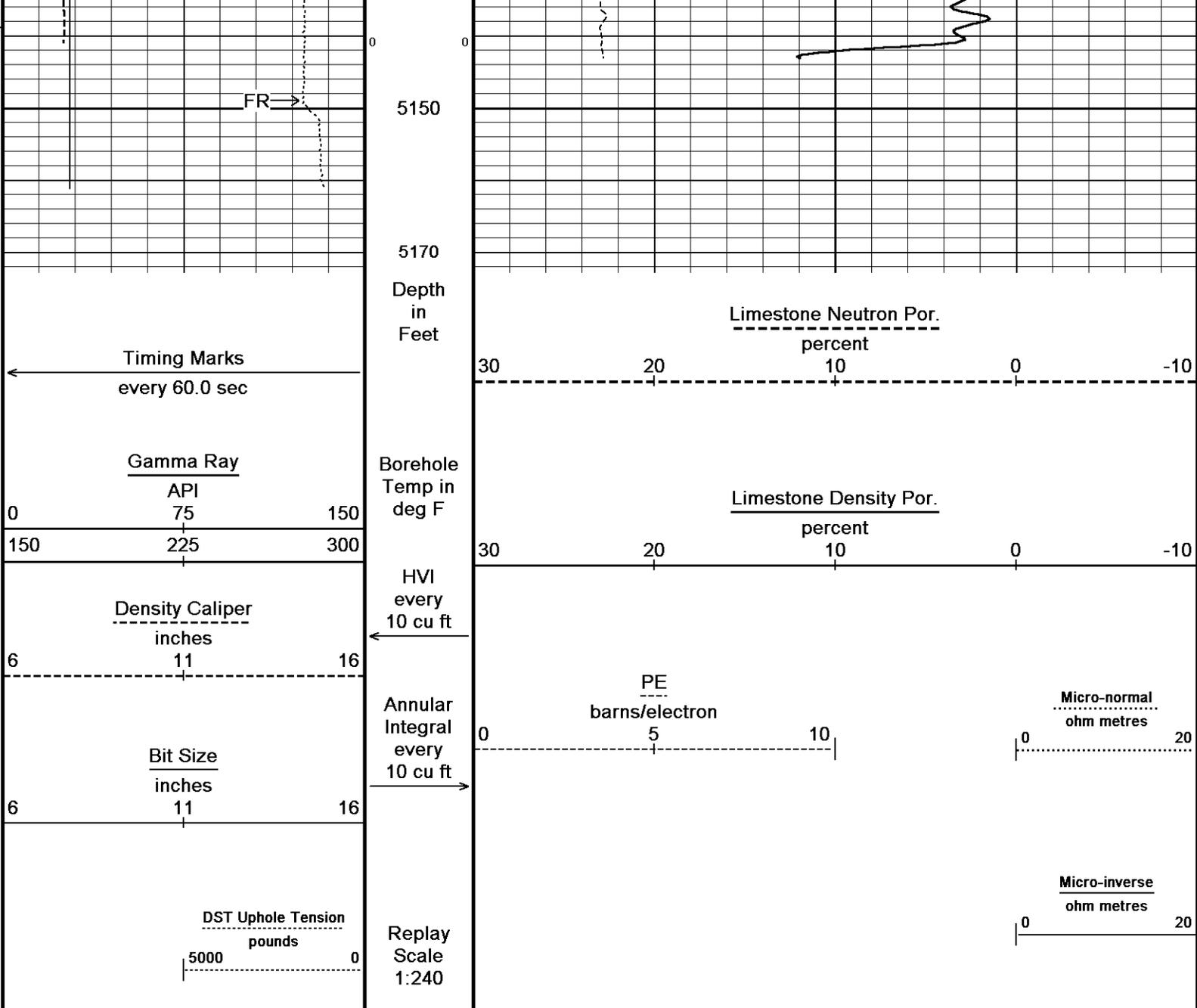










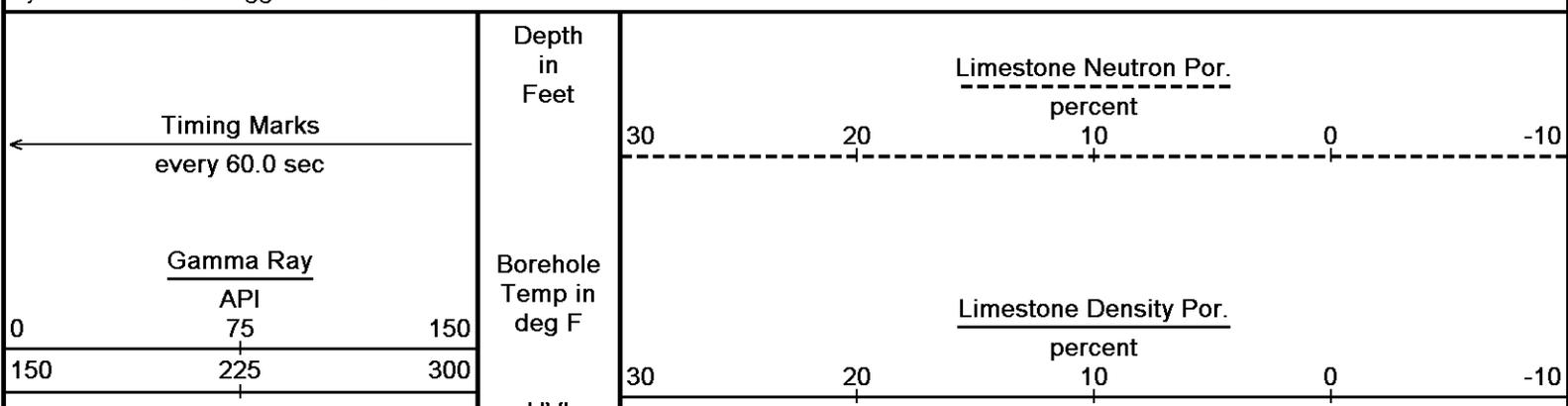


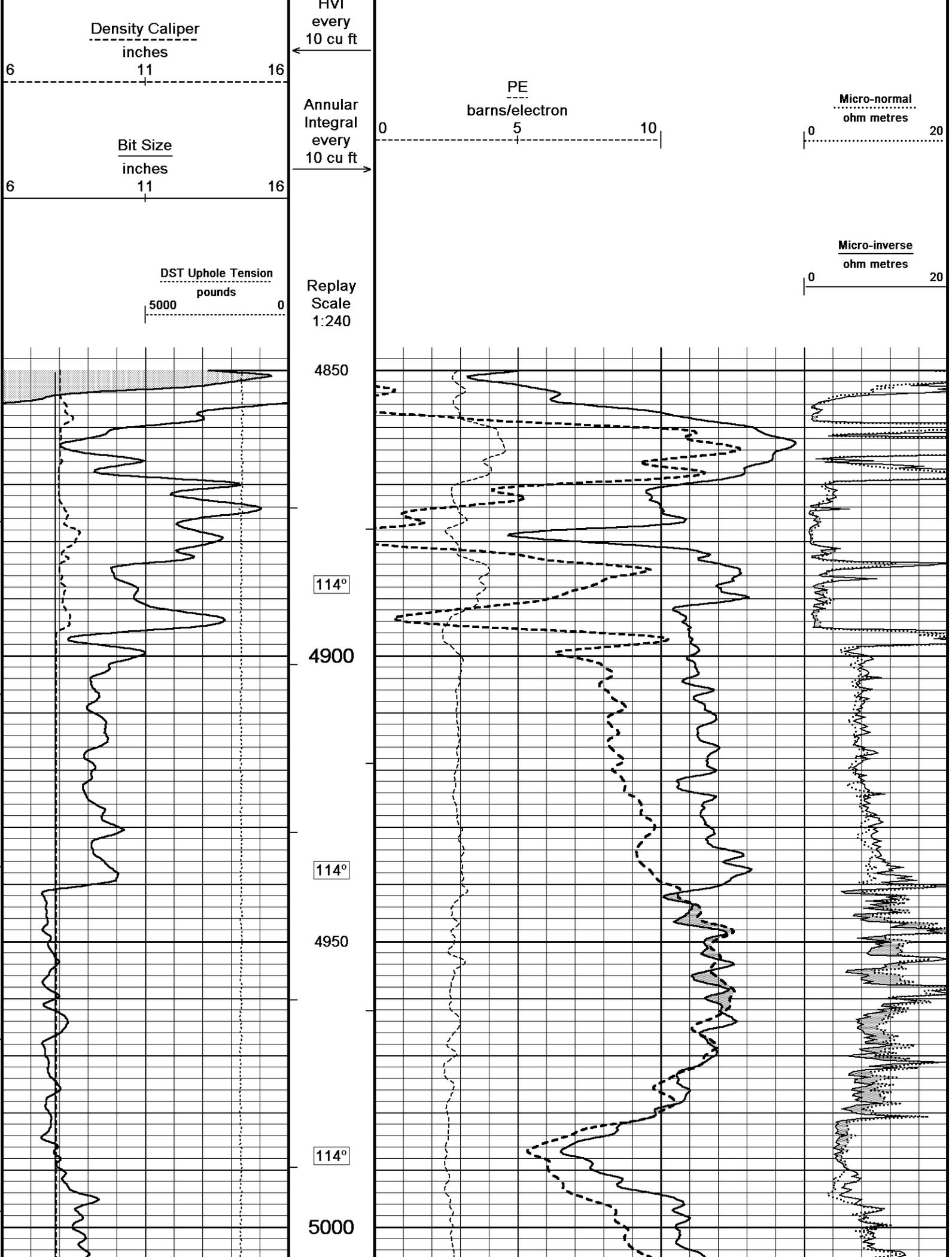
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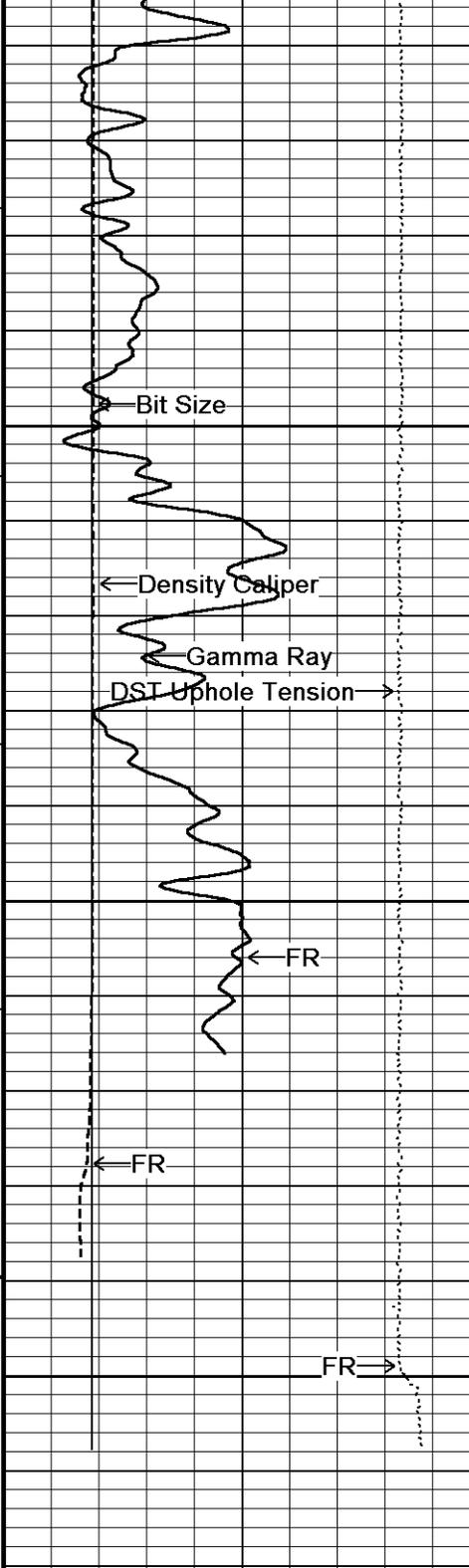
↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

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115°

5050

115°

5100

0

5150

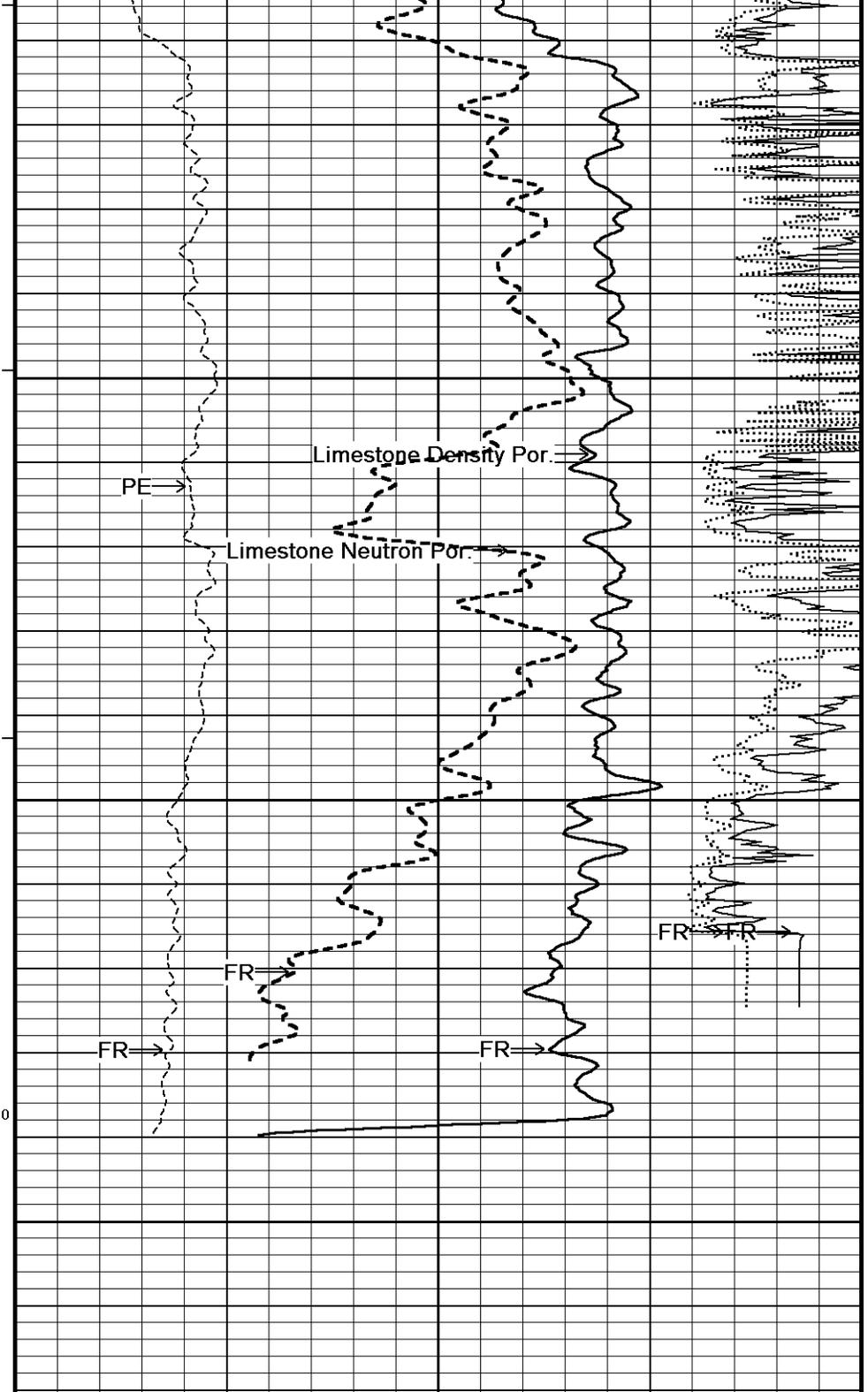
5170
Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

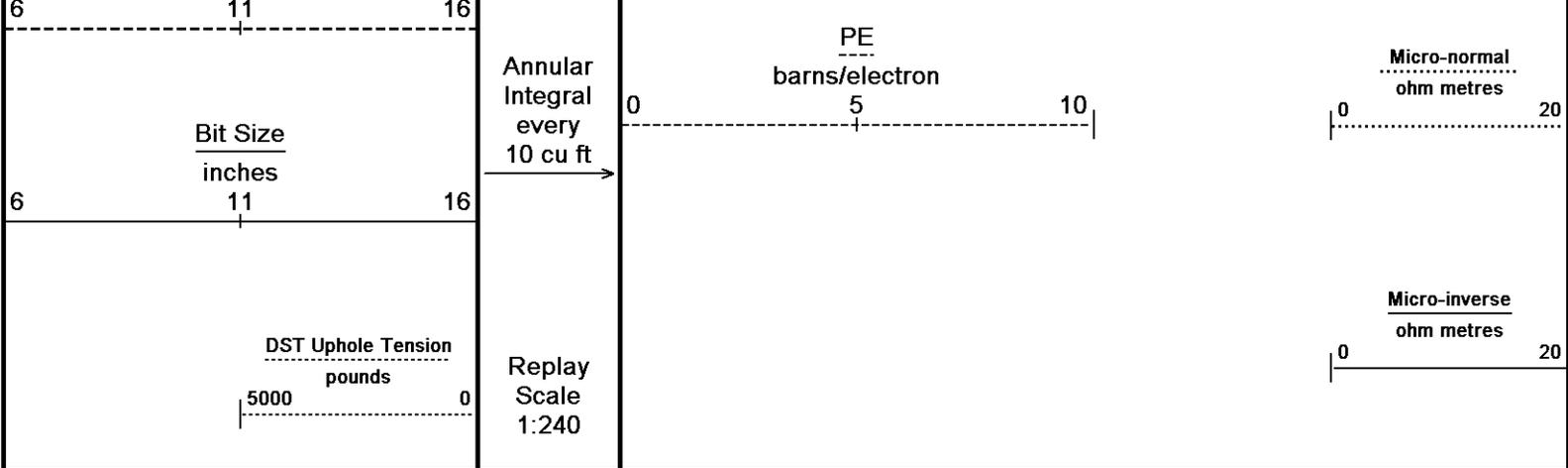
Density Caliper
inches

Borehole
Temp in
deg F
HVI
every
10 cu ft



Limestone Neutron Por.
percent
30 20 10 0 -10

Limestone Density Por.
percent
30 20 10 0 -10

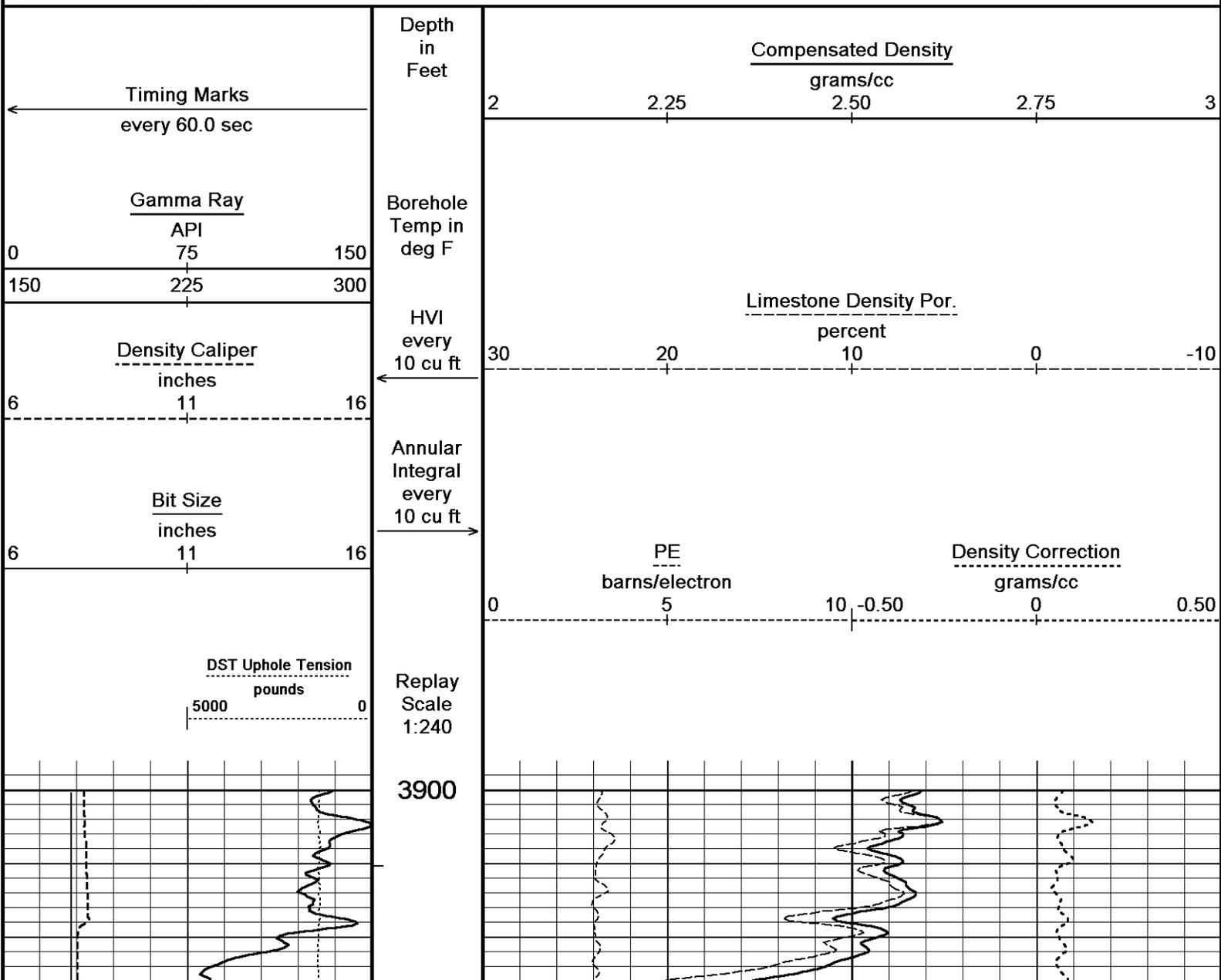


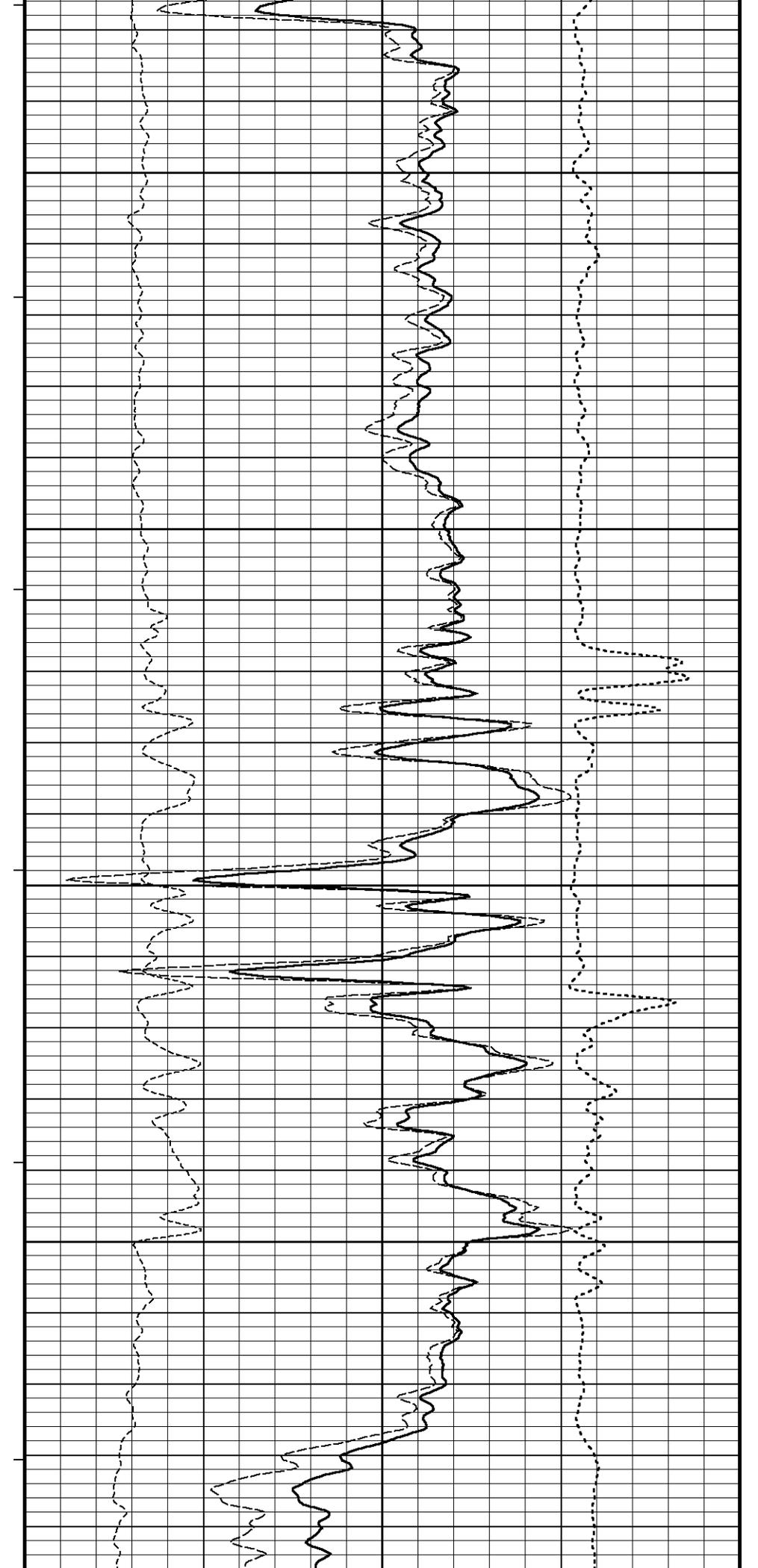
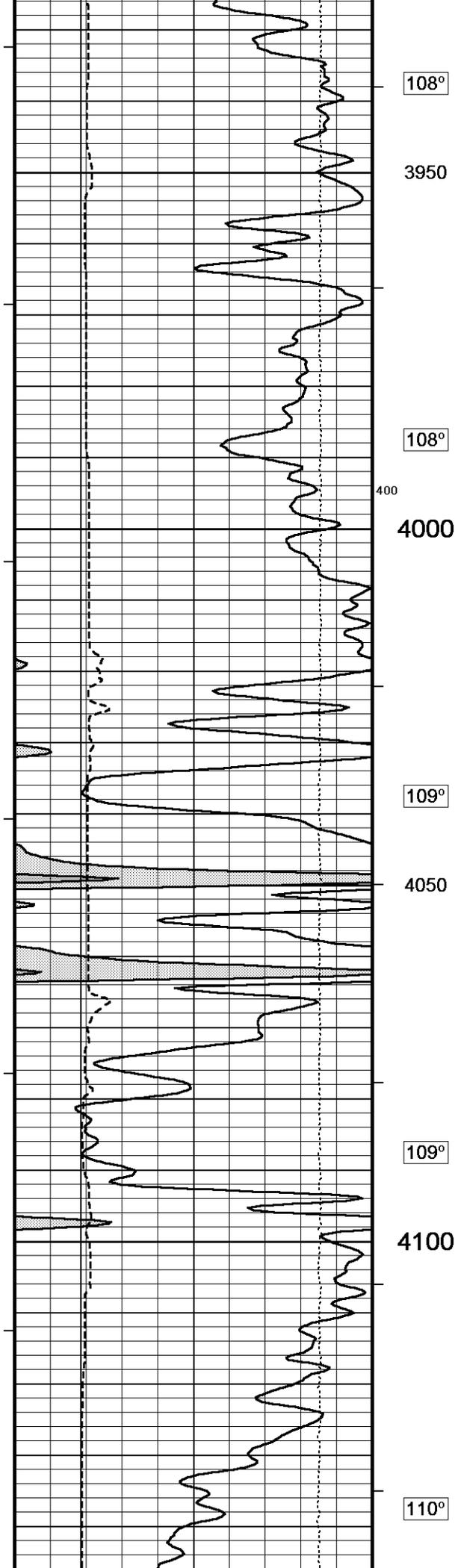
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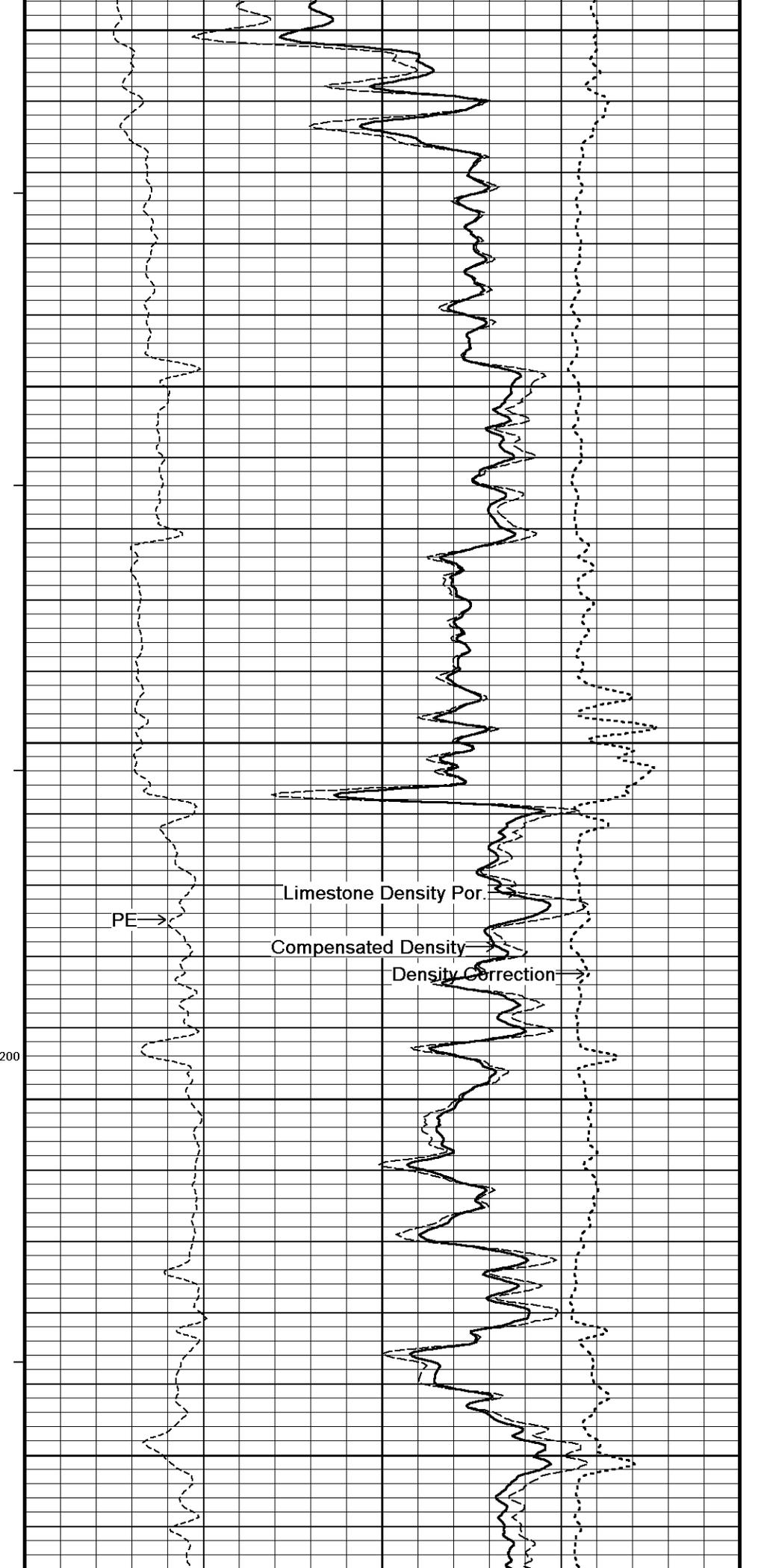
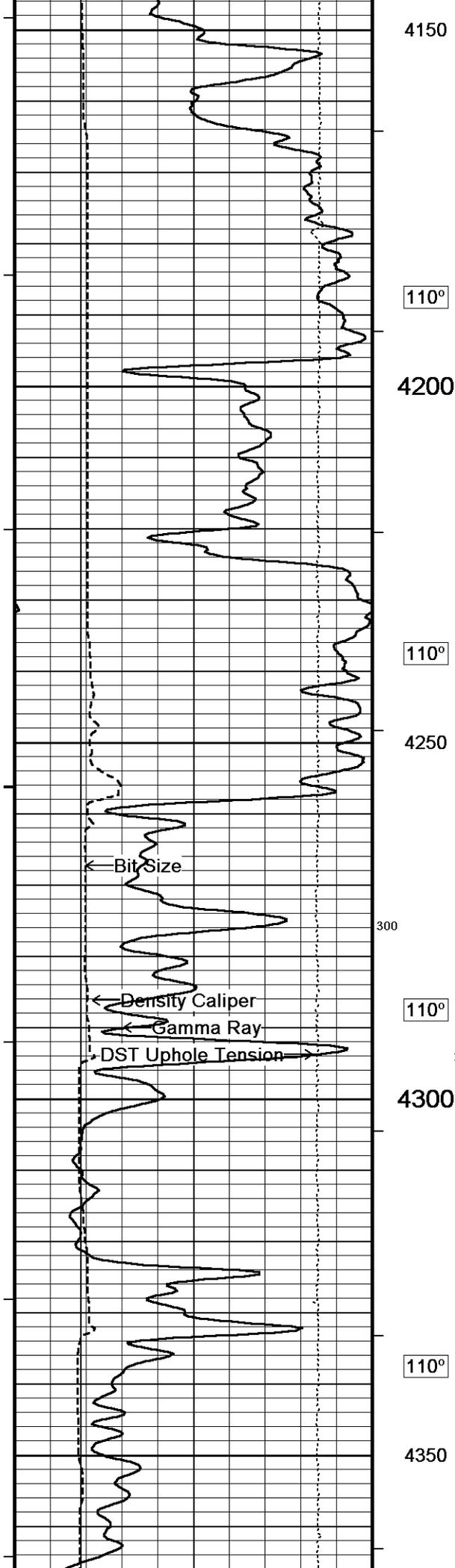
↑
↑
REPEAT SECTION

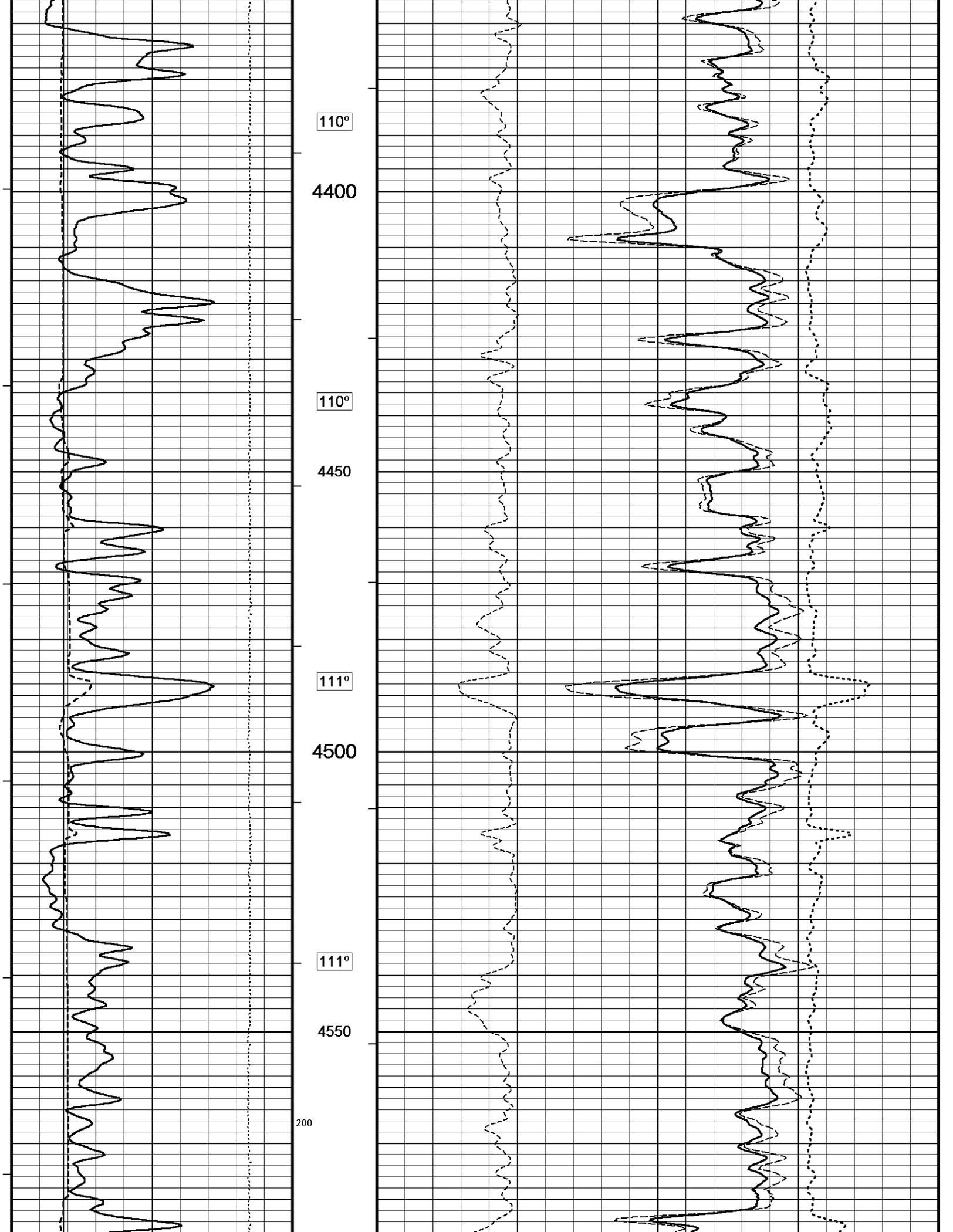
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↓
5 INCH MAIN

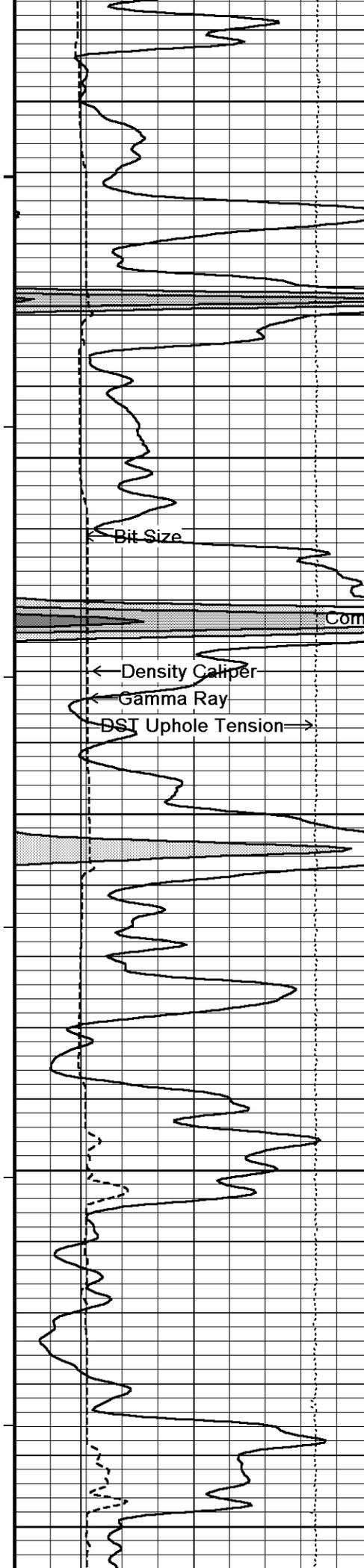
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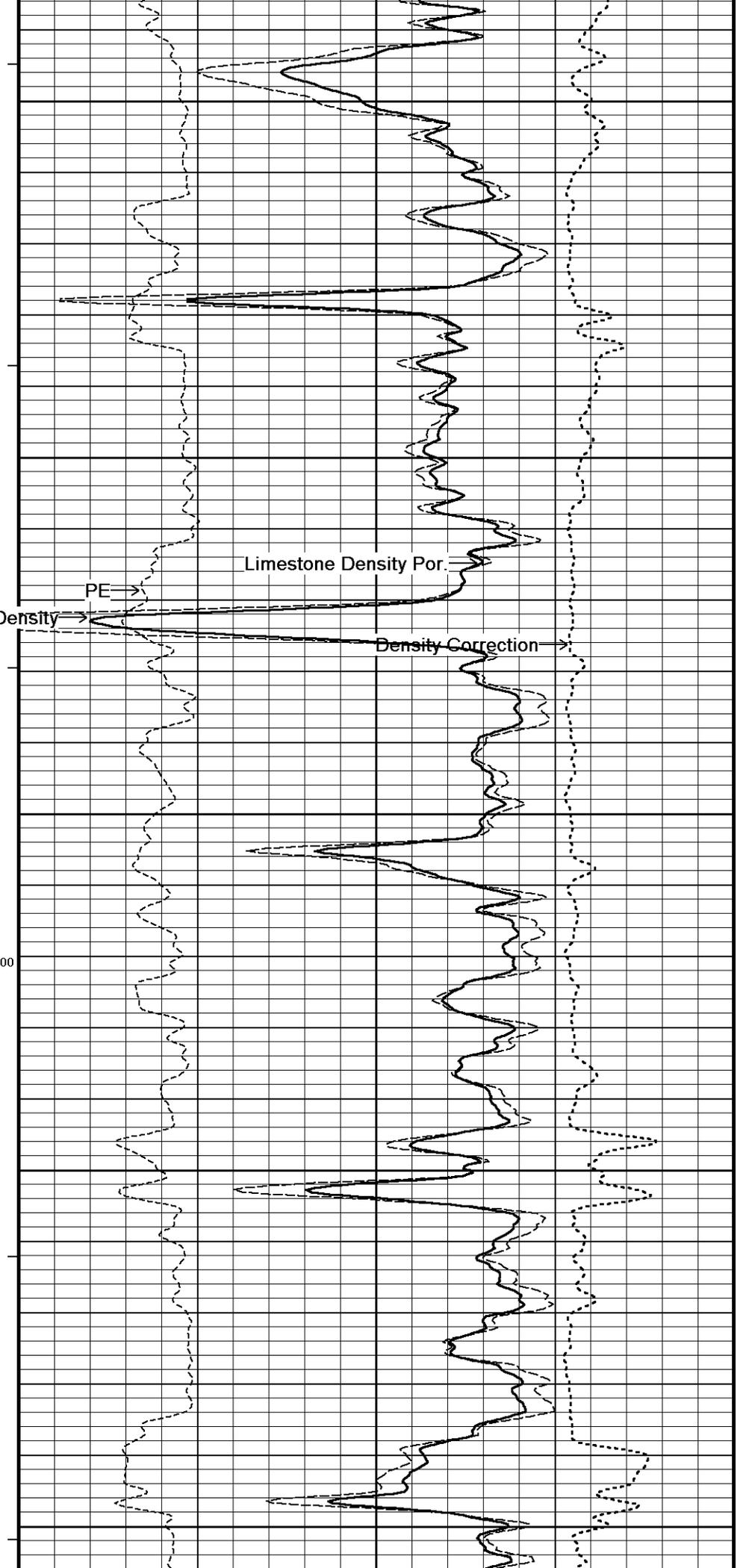






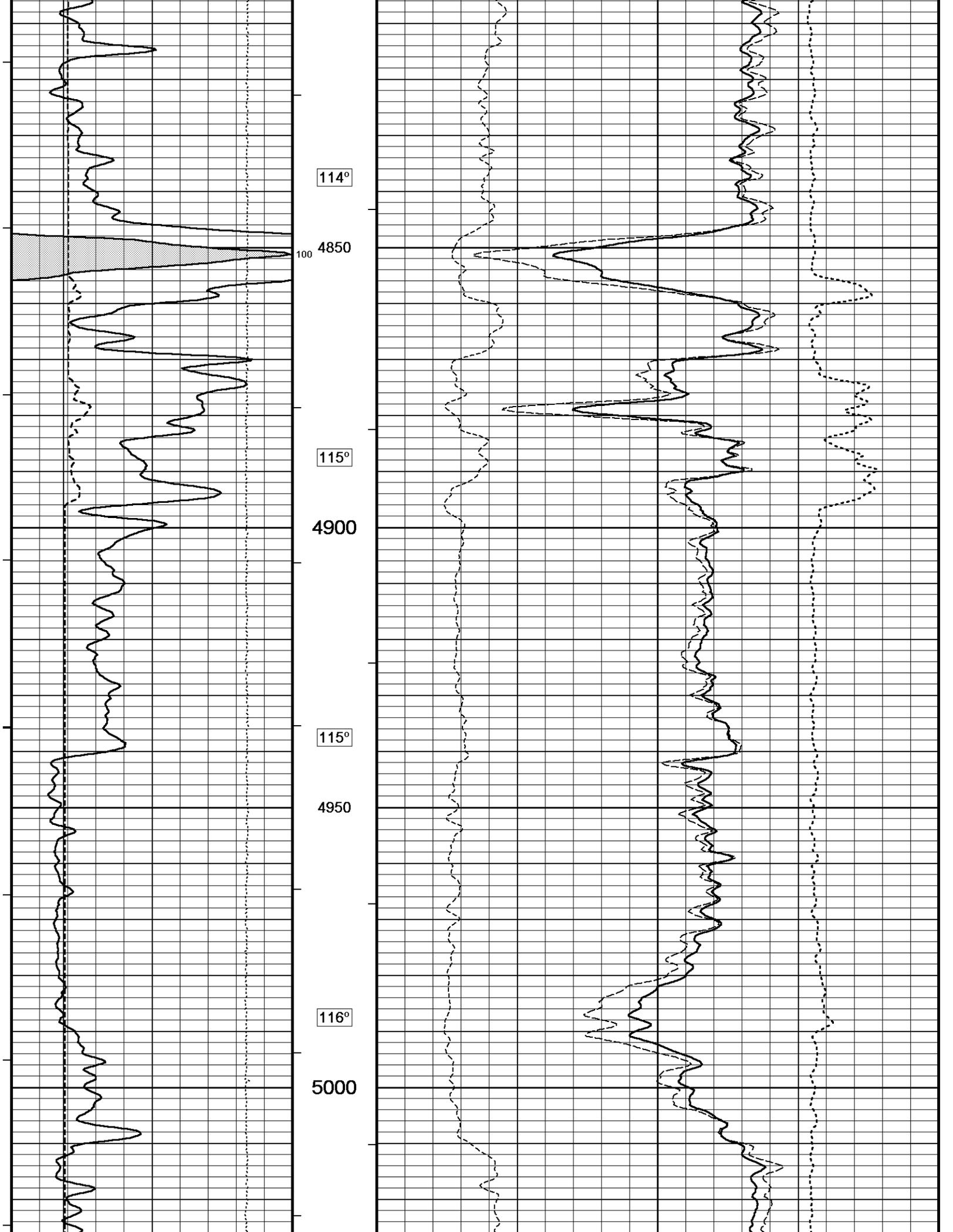


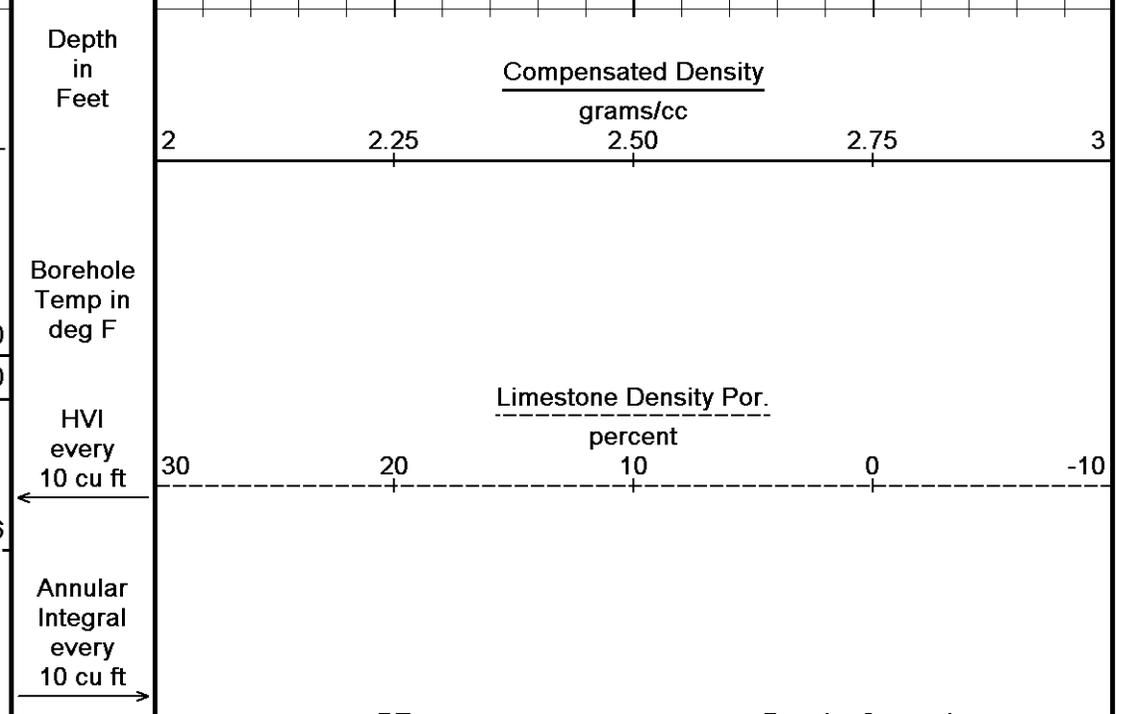
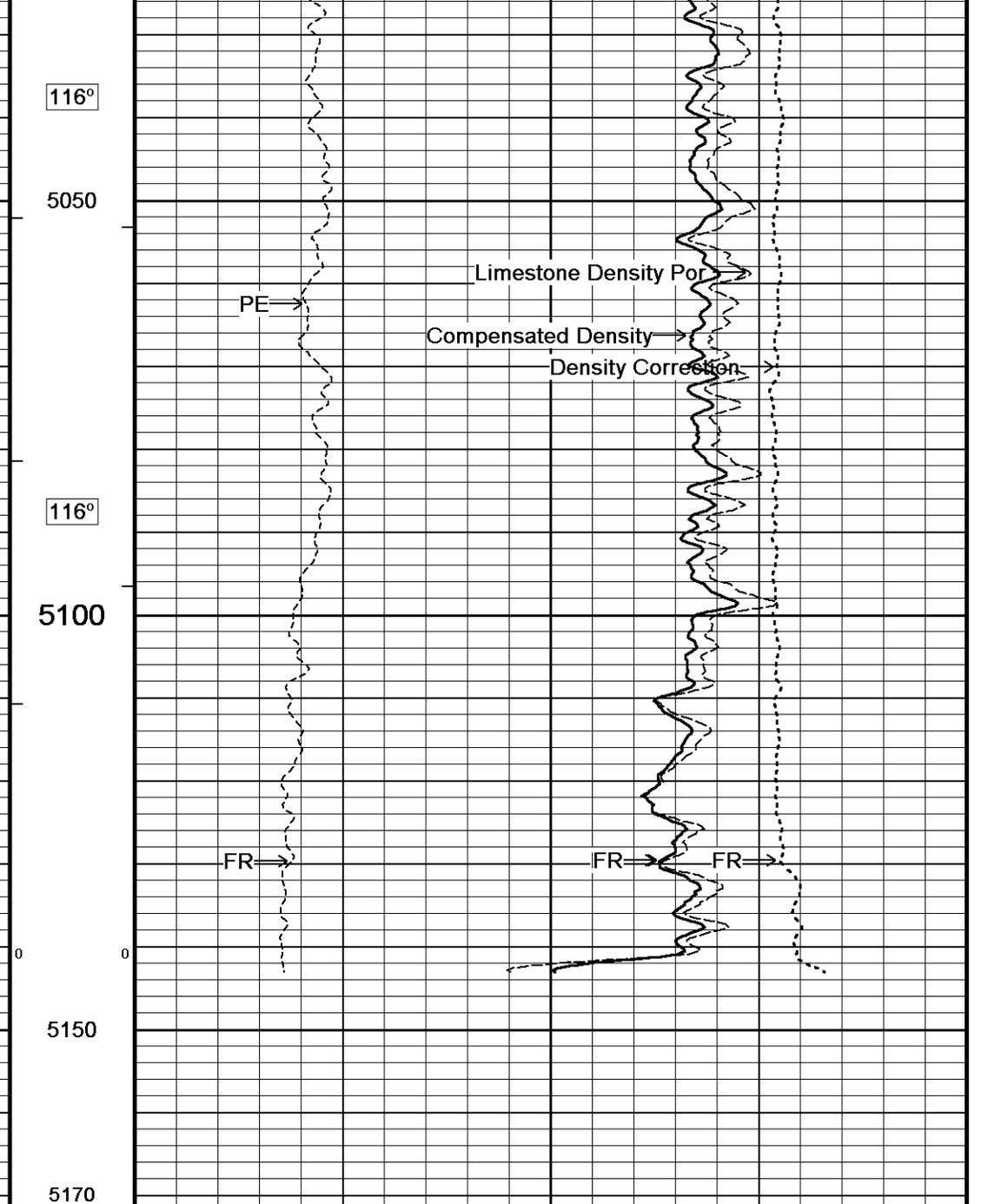
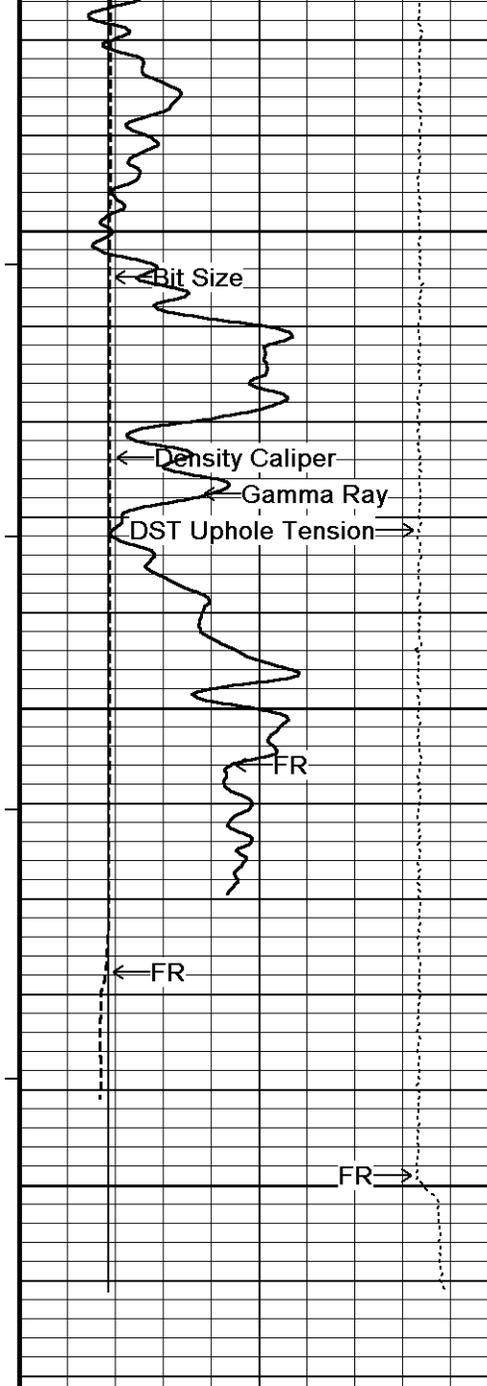
111°
4600
112°
4650
112°
4700
100
113°
4750
113°
4800



Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension

PE
Limestone Density Por.
Density Correction
Compensated Density





Timing Marks
every 60.0 sec

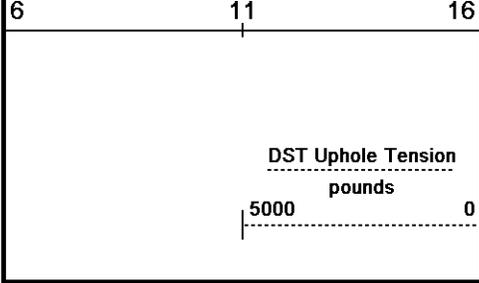
Gamma Ray API			
0	75	150	
150	225	300	

Density Caliper inches		
6	11	16

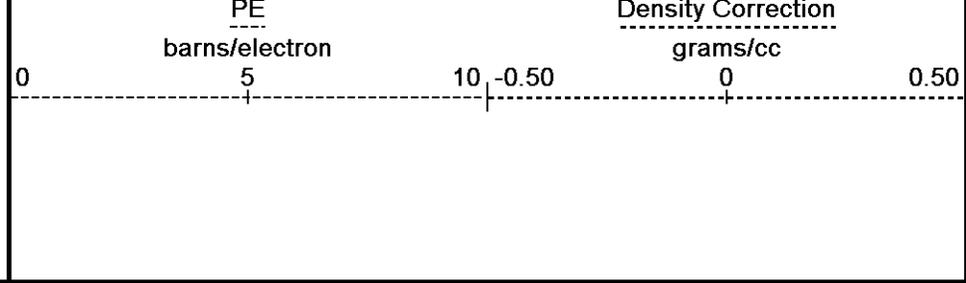
Bit Size inches	

Borehole
Temp in
deg F

HVI
every
10 cu ft



Replay
Scale
1:240

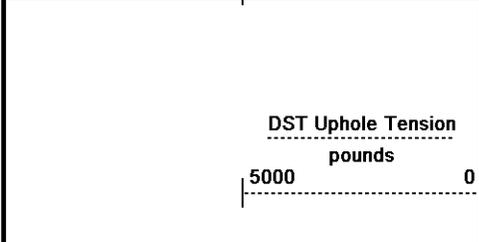
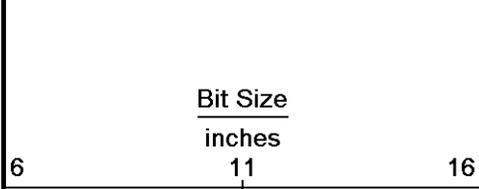
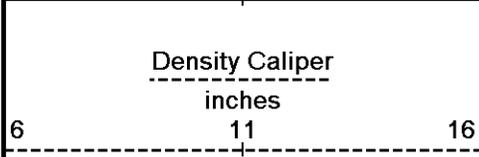
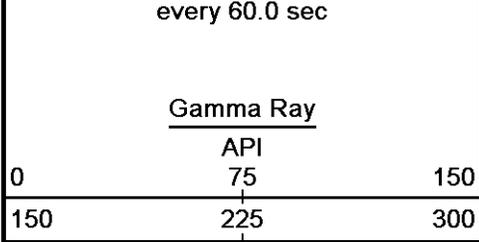


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↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

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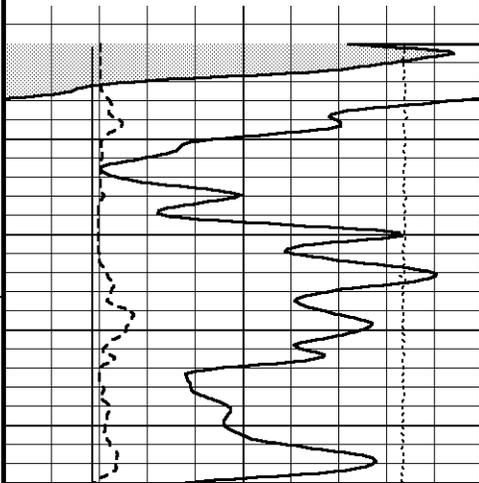
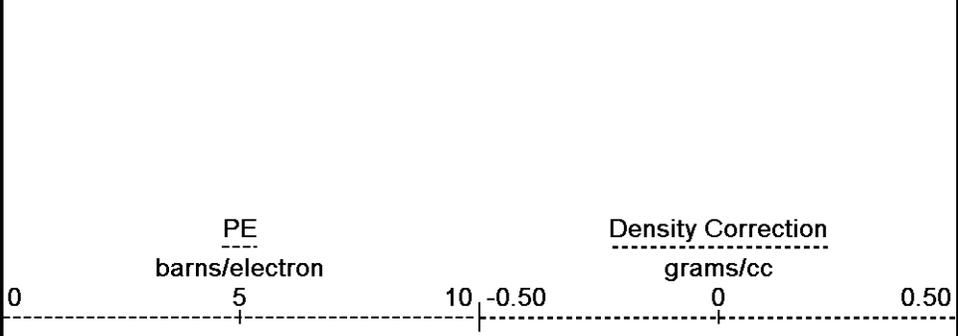
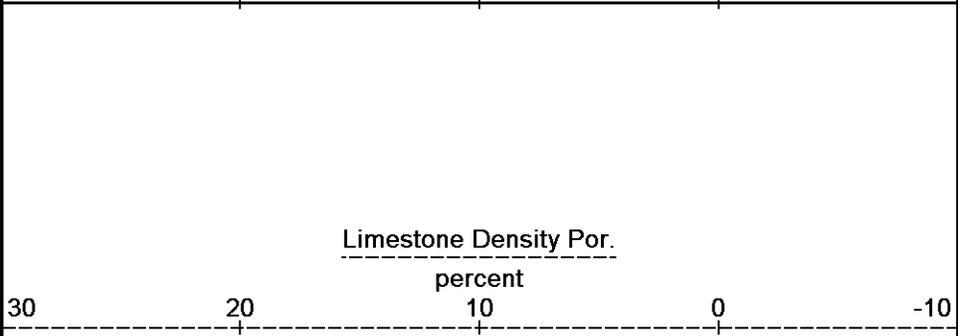
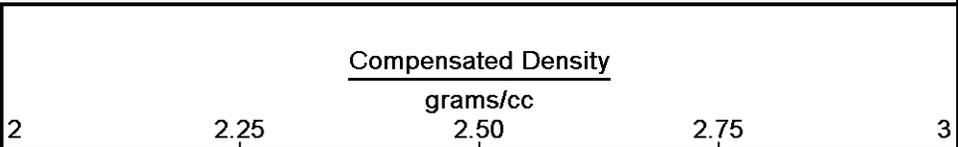
Depth
in
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

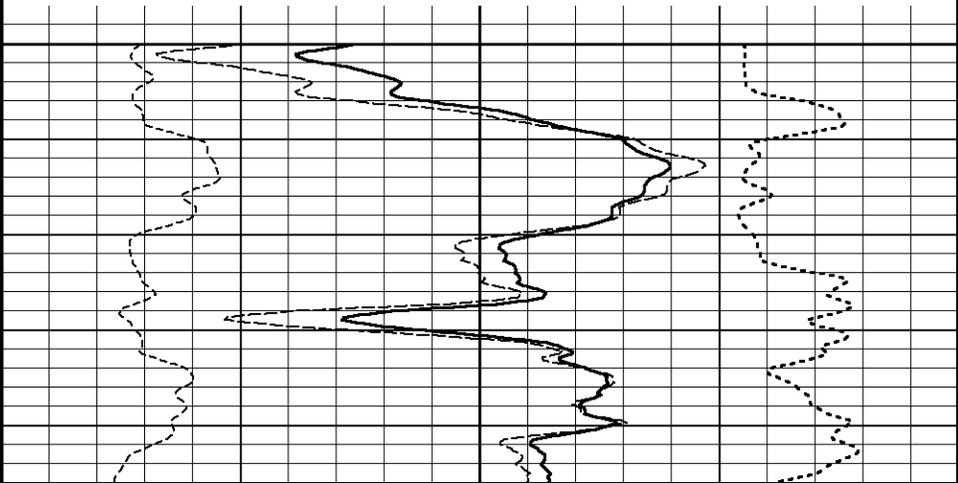
Annular
Integral
every
10 cu ft

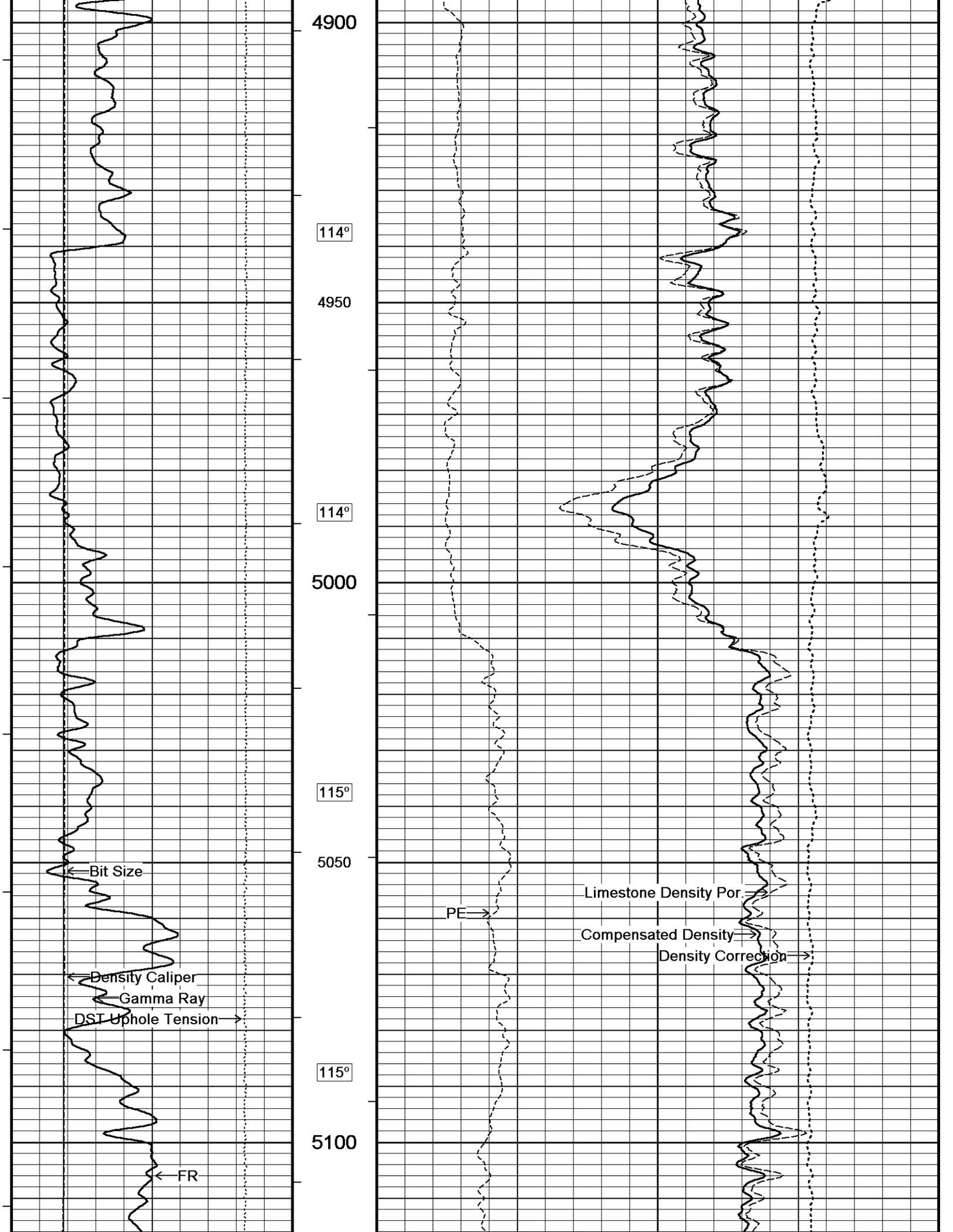
Replay
Scale
1:240

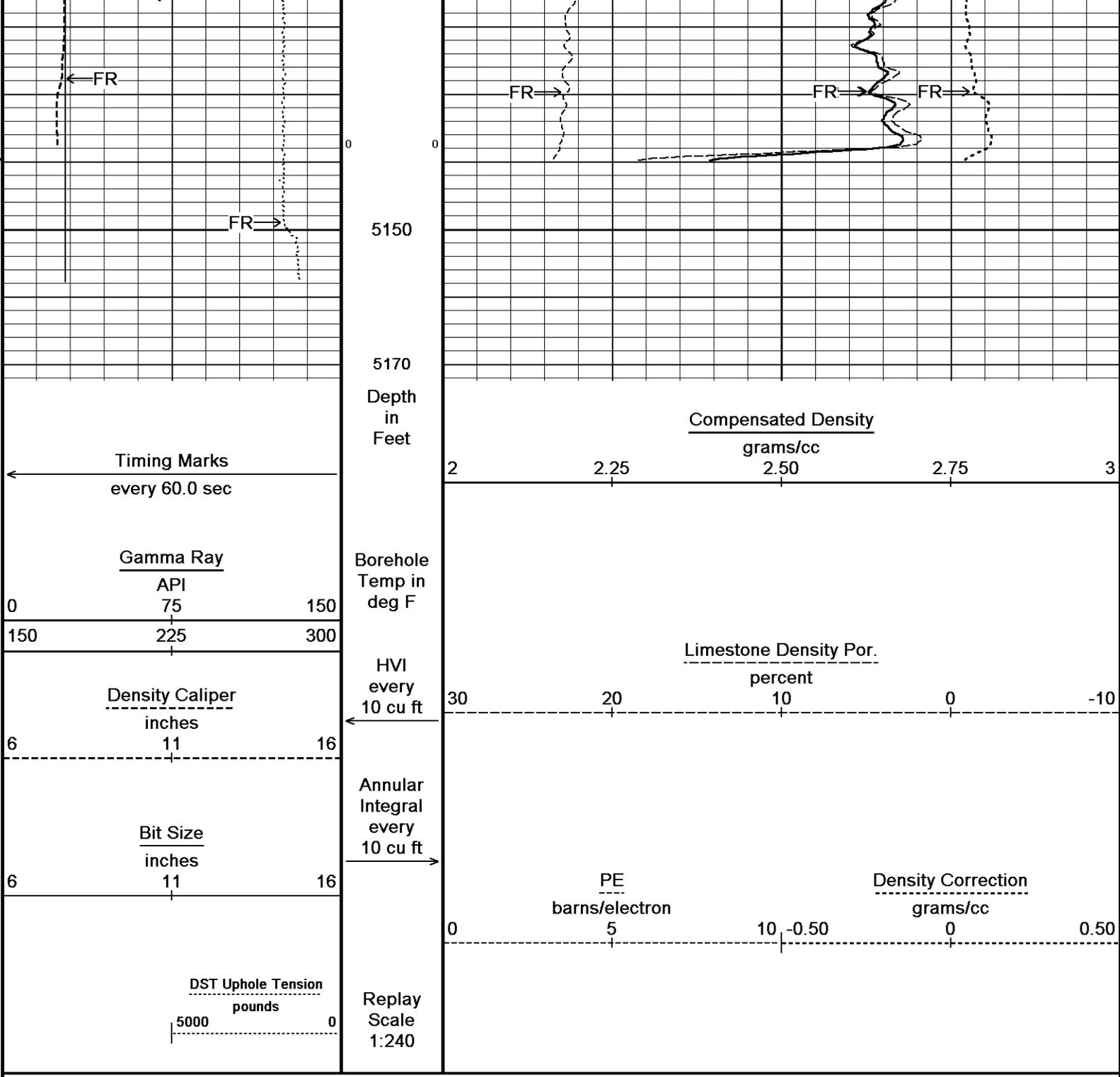


4850

114°







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↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 13.05.9583\Logs\M&M Exploration Z-Bar 26-15\M&M Exploration Z-Bar 26-15_001.dta

General Constants All 000 Last Edited on 13-SEP-2013,07:33

General Parameters

Mud Resistivity	1.130	ohm-metres
Mud Resistivity Temperature	95.000	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	Density Caliper	

Rwa Parameters	
Porosity used	Base Density Porosity
Resistivity used	Array Ind. Six Res Rt
RWA Constant A	1.000
RWA Constant M	2.000
SW/APOR Tool Source	0.000

Down-hole Tension Calibration SMS 0

Field Calibration on 13-SEP-2013 11:30

Reading No	Measured	Calibrated (lbs)
1	13577.56	0.00
2	14008.29	395.00

Gamma Calibration MCG-D.K 469

Field Calibration on 11-SEP-2013 14:30

	Measured	Calibrated (API)
Background	68	47
Calibrator (Gross)	1124	772
Calibrator (Net)	1055	725

Gamma Constants MCG-D.K 469

Last Edited on 13-SEP-2013,07:33

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	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 18-AUG-2013,02:35

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 18-AUG-2013,02:35

Pre-filter Length	11
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SP Calibration MCG-D.K 469

Field Calibration on 12-SEP-2013 15:11

	Measured	Calibrated (mV)
Reference 1	100.2	100.0
Reference 2	-99.2	-100.1

Caliper Calibration MML-A 3

Base Calibration on 15-AUG-2013 08:50

Field Calibration on 11-SEP-2013 14:21

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14887	5.98
2	18120	7.97
3	21042	9.86
4	25322	11.92
5	0	0.00
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	5.99	5.98

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 15-AUG-2013 09:16

Field Check on 11-SEP-2013 14:19

Base Calibration					
Channel	Measured		Calibrated (ohm-m)		
	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.3	60.3	5.0	25.0	
Micro Inverse	15.7	78.4	5.0	25.0	

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	62.9	62.9
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 3		Last Edited on 11-SEP-2013,14:18
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	1.0000	
Micro Inverse K Factor	1.0000	
Standoff Offset	N/A	inches

Neutron Calibration MDN-A.B 66		Base Calibration on 31-JUL-2013 10:25	
		Field Check on 11-SEP-2013 14:35	
Base Calibration			
	Measured	Calibrated (cps)	
	Near Far	Near	Far
	3180 99	3714	110
Ratio	32.180	33.764	
Field Calibrator at Base			
		Calibrated (cps)	
		1617	2323
Ratio		0.696	
Field Check			
		Calibrated (cps)	
		1626	2326
Ratio		0.693	

Neutron Constants MDN-A.B 66		Last Edited on 11-SEP-2013,14:31	
Neutron Source Id	P0204NN		
Neutron Jig Number	5824NE		
Epithermal Neutron	No		
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 353		Base Calibration on 15-AUG-2013 09:33	
		Field Check on 11-SEP-2013 11:33	
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	964.1	126.8	
Base Check		280.9	
Field Check		281.0	

FE Constants MFE-B.J 353		Last Edited on 11-SEP-2013,11:32	
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 167		Base Calibration on 19-APR-2013,13:41	
		Field Check on 11-SEP-2013 11:22	
Base Calibration			

Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.3	474.2	9.3	966.2	
2	6.3	388.4	7.6	821.4	
3	3.3	259.4	5.2	566.0	
4	1.9	133.0	2.6	279.2	
Array Temperature		76.8		Deg F	
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	0.0	0.0	13.4	3837.8	
2	0.0	0.0	29.7	3475.3	
3	0.0	0.0	29.1	3051.7	
4	0.0	0.0	19.8	2080.7	
Deep			18.6	2048.1	
Medium			42.2	3989.4	
Shallow			43.1	5051.7	
Array Temperature		0.0		80.9 Deg F	

Induction Constants MAI-A.A 167				Last Edited on 11-SEP-2013,11:20	
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	60.00		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 167				Field Calibration on 18-AUG-2013,02:21	
		Measured	Calibrated(Deg F)		
Lower		50.00	50.00		
Upper		75.00	75.00		

High Resolution Temperature Constants MAI-A.A 167				Last Edited on 18-AUG-2013,02:21	
Pre-filter Length	11				

Caliper Calibration MPD-B 64				Base Calibration on 15-AUG-2013 14:54	
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Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	16560	3.99
2	24992	5.98
3	32880	7.97
4	41184	9.86
5	50688	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	5.89	5.98

Photo Density Calibration MPD-B 64

Base Calibration on 15-AUG-2013 14:37
Field Check on 11-SEP-2013 14:18

Density Calibration					
Base Calibration		Measured		Calibrated (sdu)	
	Near	Far	Near	Far	
Reference 1	60206	33560	59556	30836	
Reference 2	25378	2915	24941	2541	

Field Check at Base		
	Near	Far
	1155.1	1345.7

Field Check		
	Near	Far
	1161.0	1348.7

PE Calibration				
Base Calibration		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background	211	1029		
Reference 1	22957	60005	0.386	0.371
Reference 2	6904	25238	0.276	0.272

Field Check at Base		
	WS	WH
	211.2	1028.9

Field Check		
	WS	WH
	208.9	1032.5

Density Constants MPD-B 64

Last Edited on 13-SEP-2013,07:33

Density Source Id	18235B	
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 (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
0.00	0.00

DOWNHOLE EQUIPMENT

3/8" Triple Cone Cable Head (MCB C A)
 MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

Compact Comms Gamma
 MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
 MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

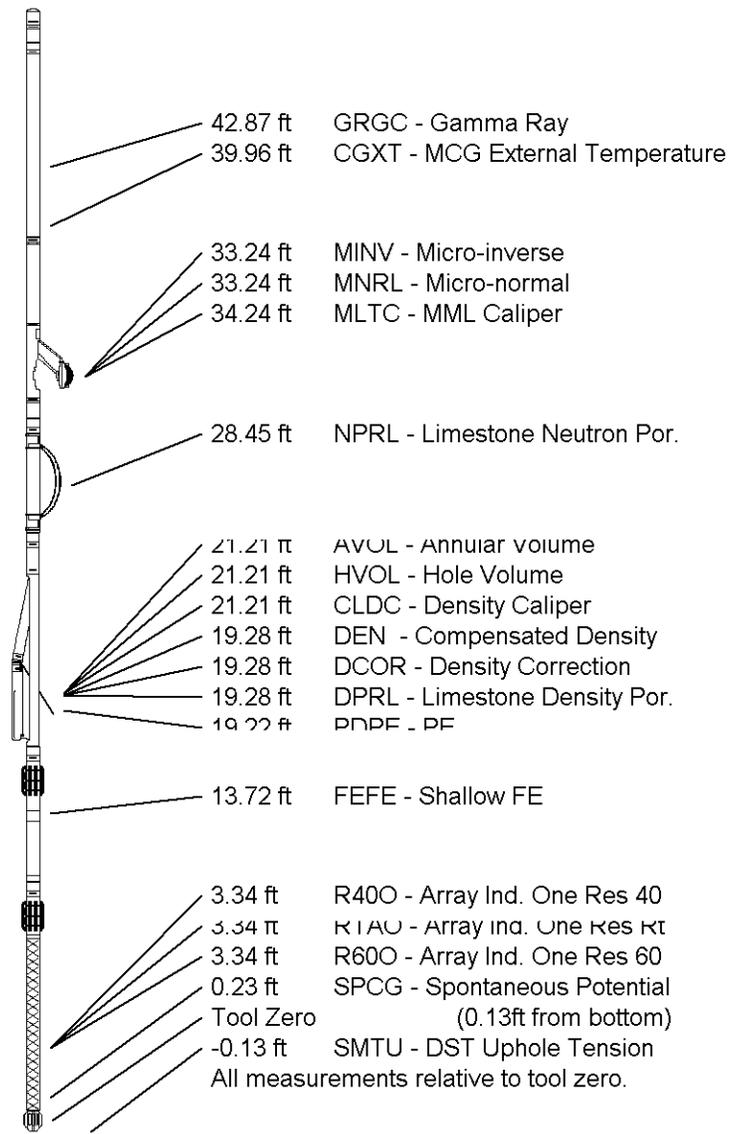
Compact Neutron
 MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
 MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
 MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
 MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 49.73 ft Weight: 399.0 lb



COMPANY M&M EXPLORATION, INC.
 WELL Z-BAR 26-15
 FIELD AETNA GAS AREA
 PROVINCE/COUNTY BARBER
 COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	1819.00	feet	First Reading	5130.00	feet
Elevation Drill Floor	1817.00	feet	Depth Driller	5150.00	feet
Elevation Ground Level	1809.00	feet	Depth Logger	5149.00	feet



Weatherford®

COMPACT PHOTO DENSITY
 COMPENSATED NEUTRON
 MICRORESISTIVITY LOG