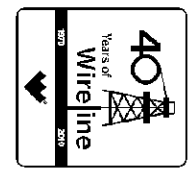




**Weatherford**

**COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG**

COMPANY APACHE CORP.  
WELL HAGER 1-12  
FIELD UNNAMED  
PROVINCE/COUNTY MEADE  
COUNTRY/STATE U.S.A. / KANSAS  
LOCATION 1320' FSL & 1320' FWL



SEC 12 TWP 34S RGE 28W Other Services MAI/MFE  
API Number 15-119-21263  
Permit Number  
Permanent Datum G.L., Elevation 2359 feet  
Log Measured From K.B. @ 12 FEET above Permanent Datum  
Drilling Measured From K.B.

Elevations: KB 2371.00  
DF 2369.00  
GL 2359.00

Date	02-APR-2011
Run Number	ONE
Depth Driller	6260.00 feet
Depth Logger	6265.00 feet
First Reading	6243.00 feet
Last Reading	2000.00 feet
Casing Driller	1630.00 feet
Casing Logger	1631.00 feet
Bit Size	7.875 inches
Hole Fluid Type	CHEMICAL
Density / Viscosity	9.00 lb/USg 56.00 CP
PH / Fluid Loss	10.00 7.20 ml/30Min
Sample Source	FLOWLINE
Rm @ Measured Temp	0.87 @ 78.0 ohm-m
Rmf @ Measured Temp	0.70 @ 78.0 ohm-m
Rmc @ Measured Temp	1.04 @ 78.0 ohm-m
Source Rmf / Rmc	CALC CALC
Rm @ BHT	0.58 @ 118.0 ohm-m
Time Since Circulation	6 HOURS
Max Recorded Temp	118.00 deg F
Equipment Name	COMPACT
Equipment / Base	13025 LIB
Recorded By	L. SCOTT
Witnessed By	KARL GRAHAM
S.O.# / JOB#	3529171 LB11-065

BOREHOLE RECORD			Last Edited: 03-APR-2011 04:15	
Bit Size inches	Depth From feet	Depth To feet		
7.875	1631.00	6265.00		
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1631.00	24.00

**REMARKS**

ols Used: MAI, MPD, MCG, MDN, MML, MFE, SKJ  
 Hardware: MPD: 8 inch profile plate. MAI and MFE: 0.5 Inch standoffs used. MDN: Dual Bowspring used.  
 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.  
 Annular volume with 5.5 inch production casing = 907 cu. ft.  
 Service order #3529171  
 Rig: Duke Rig #6  
 Engineer: L. Scott  
 Operator(s): N. Adame, J. LaPoint

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

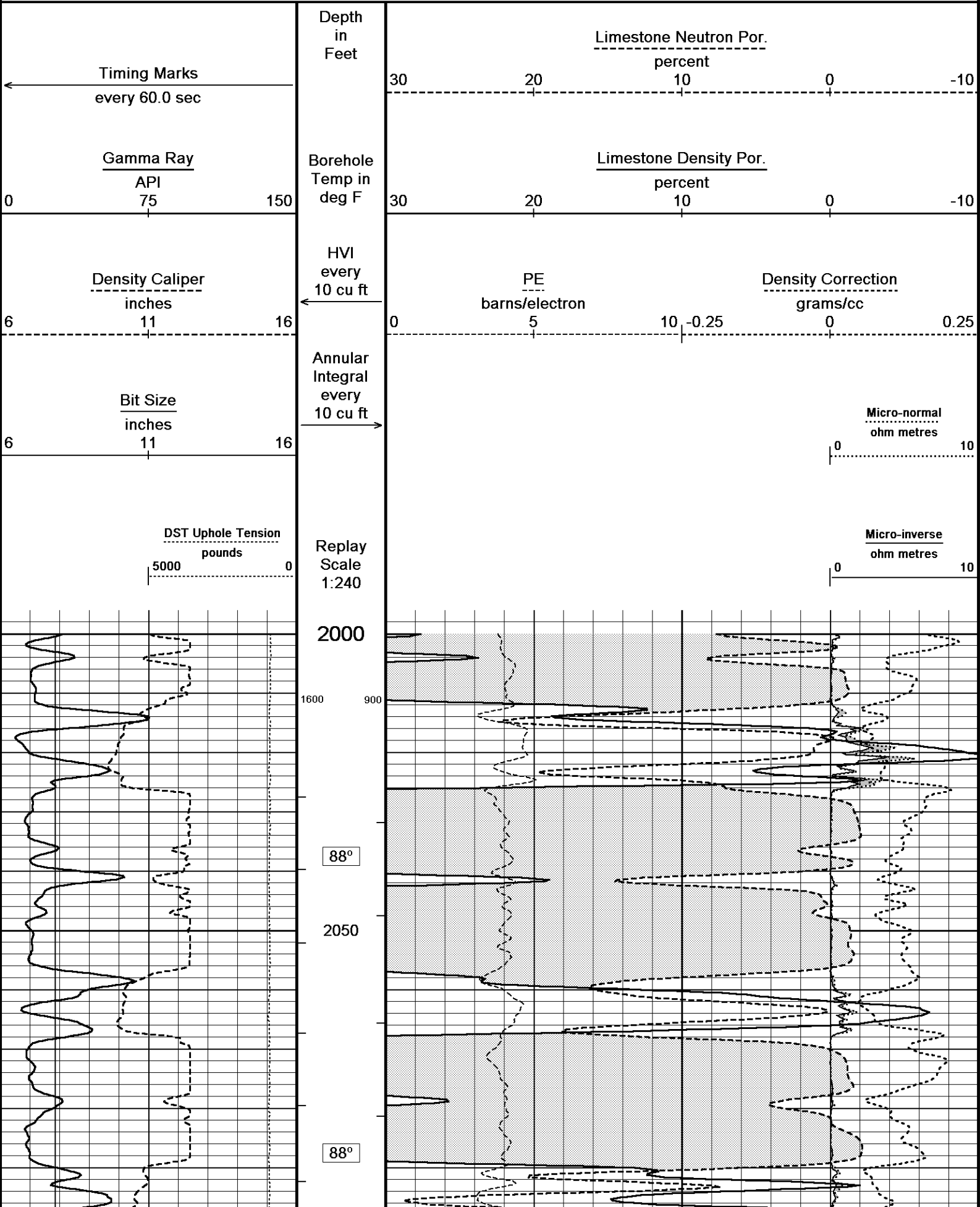
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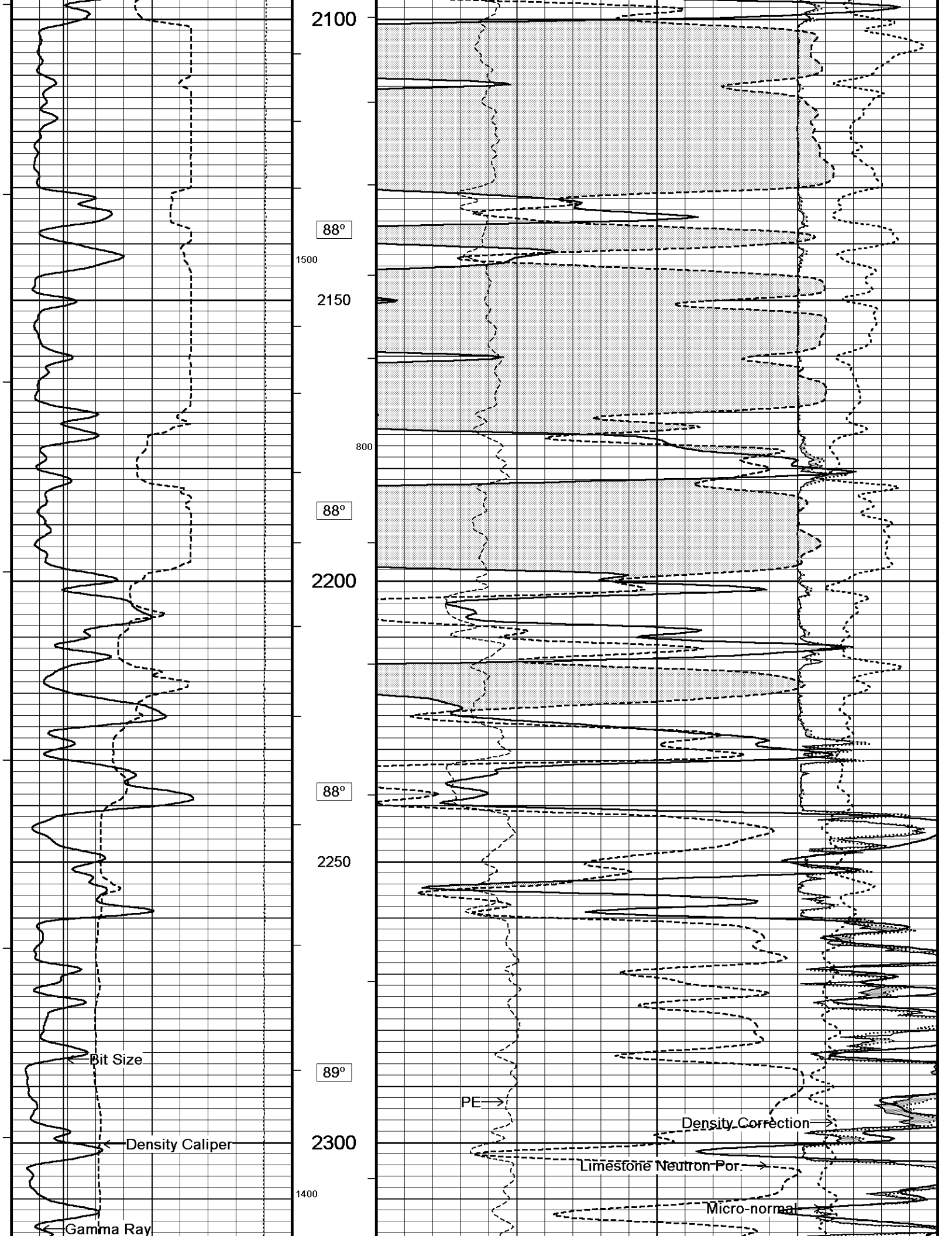
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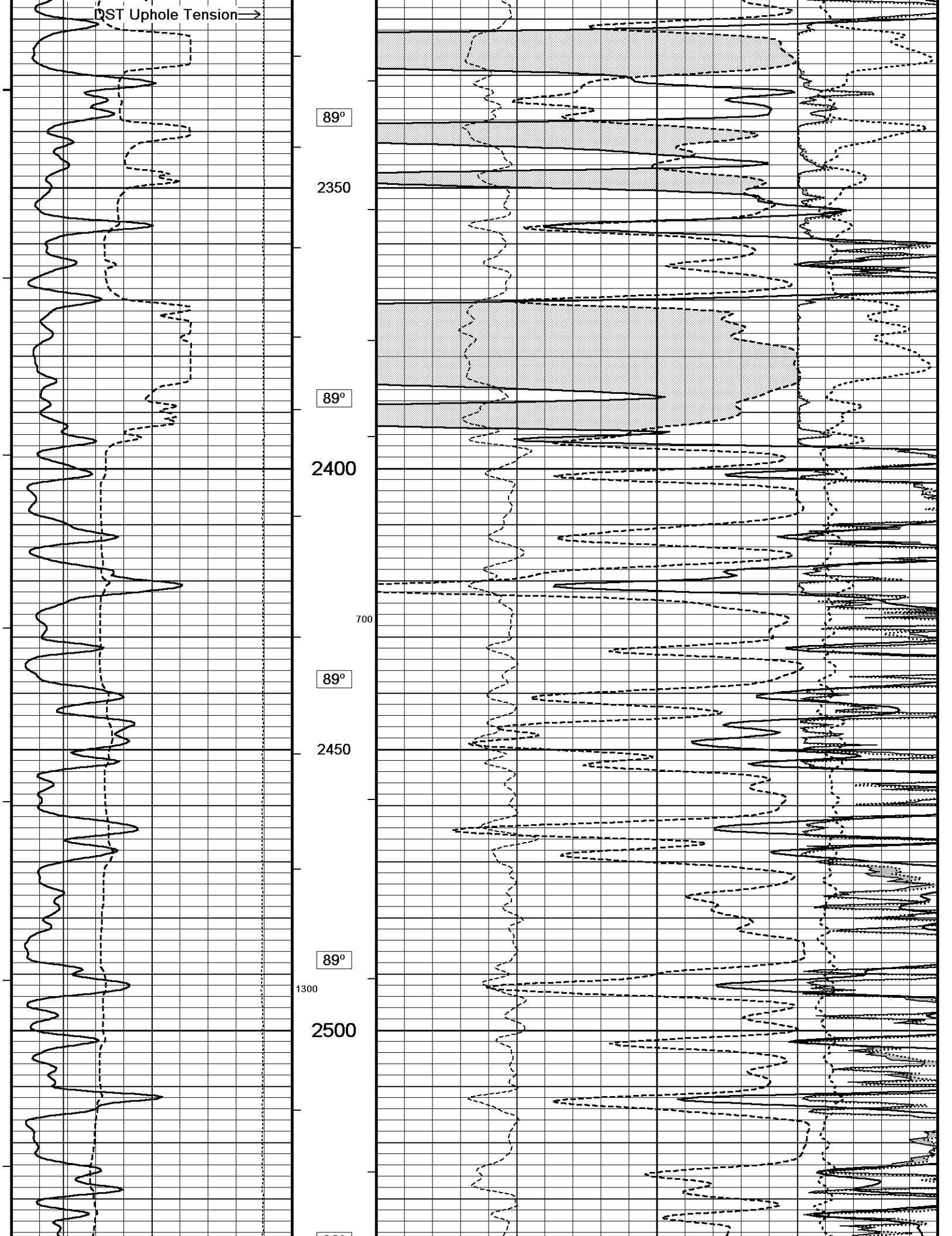
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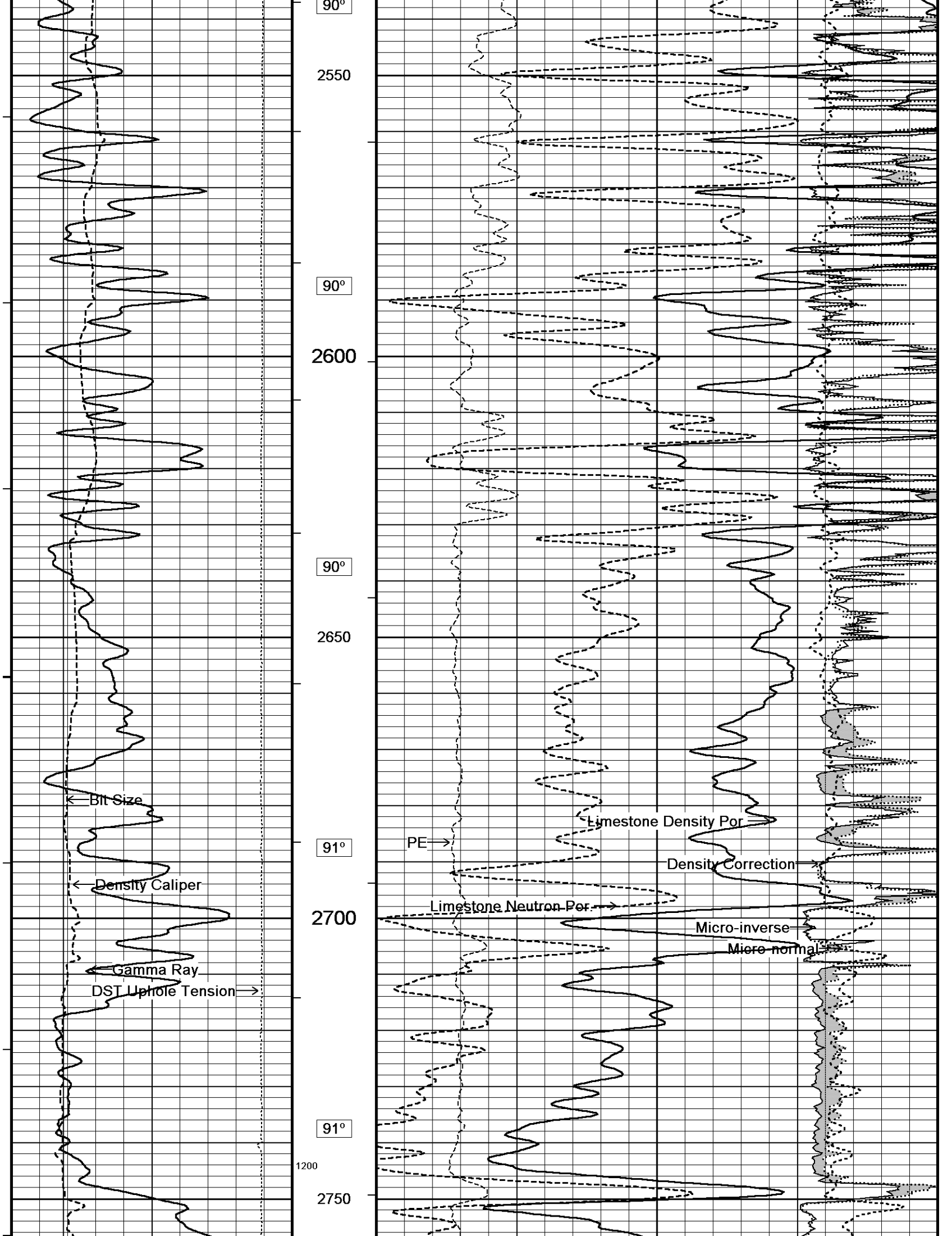
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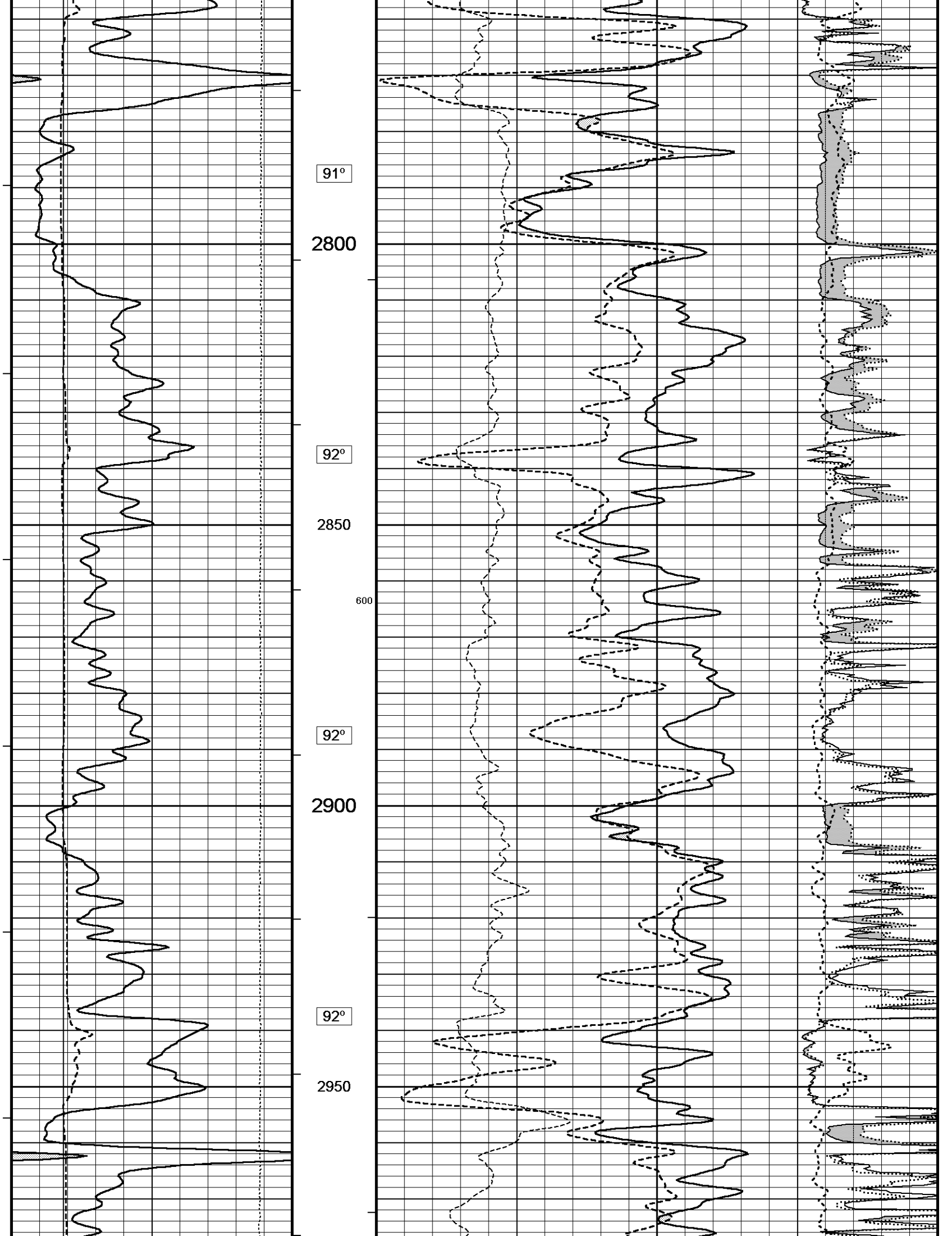
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

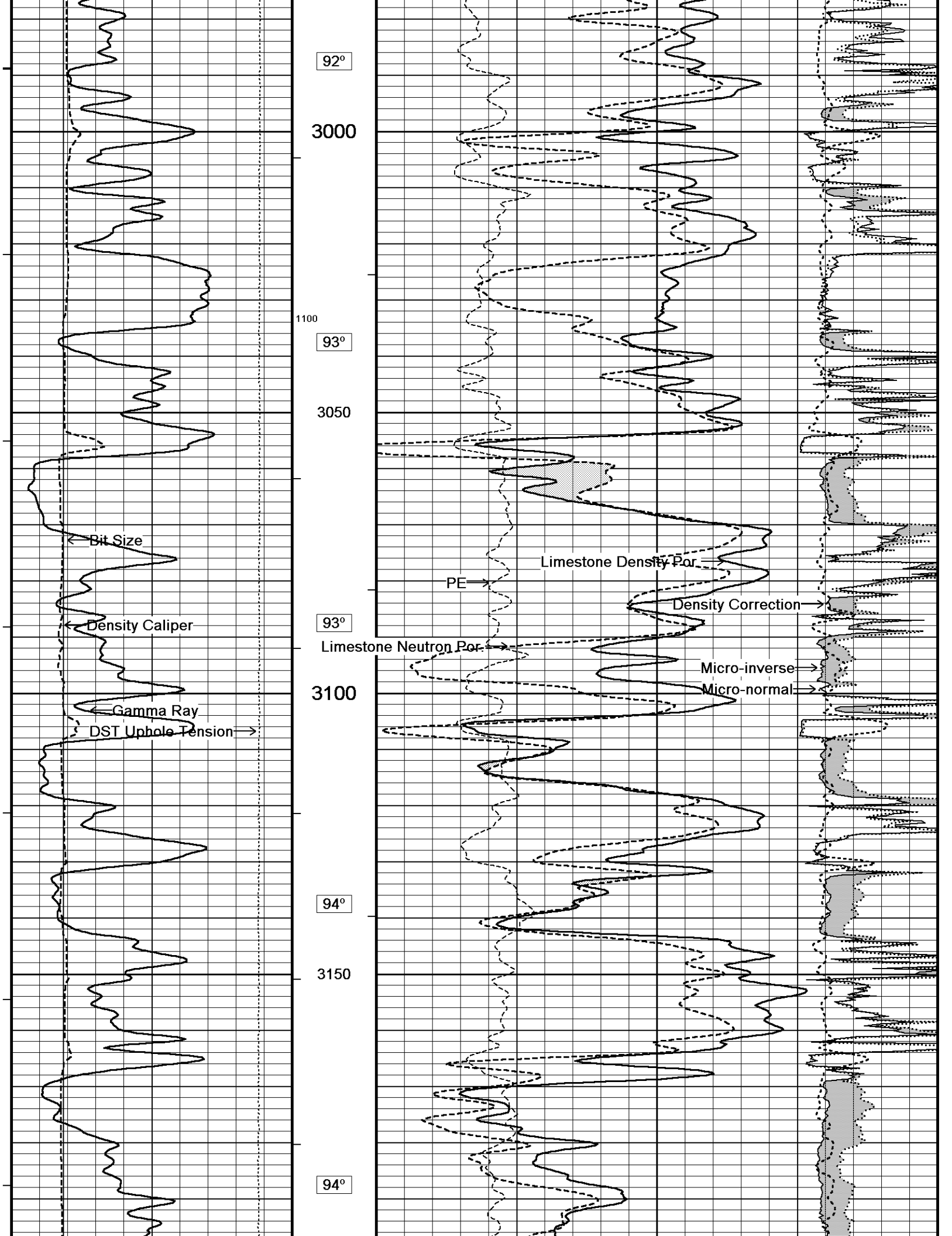


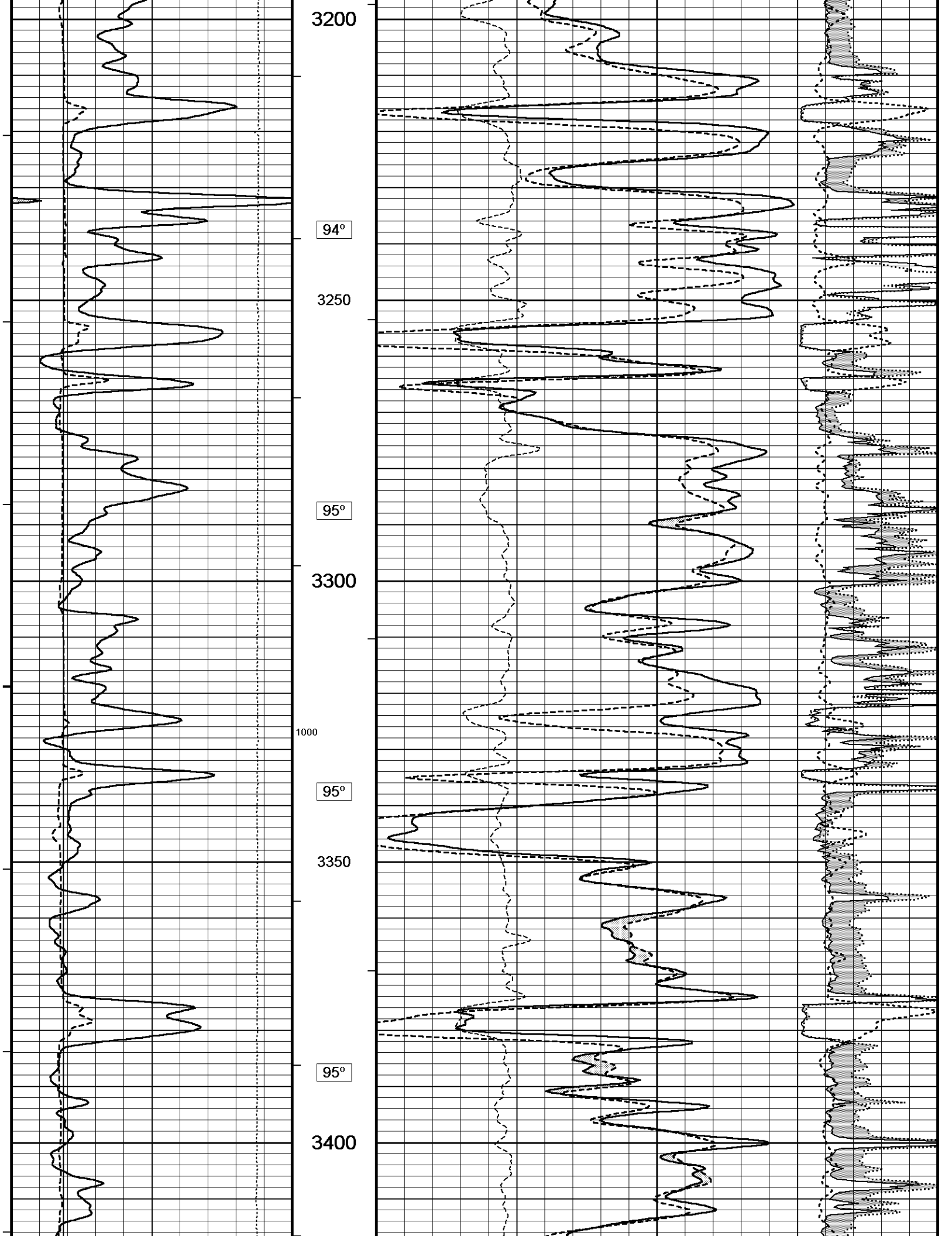


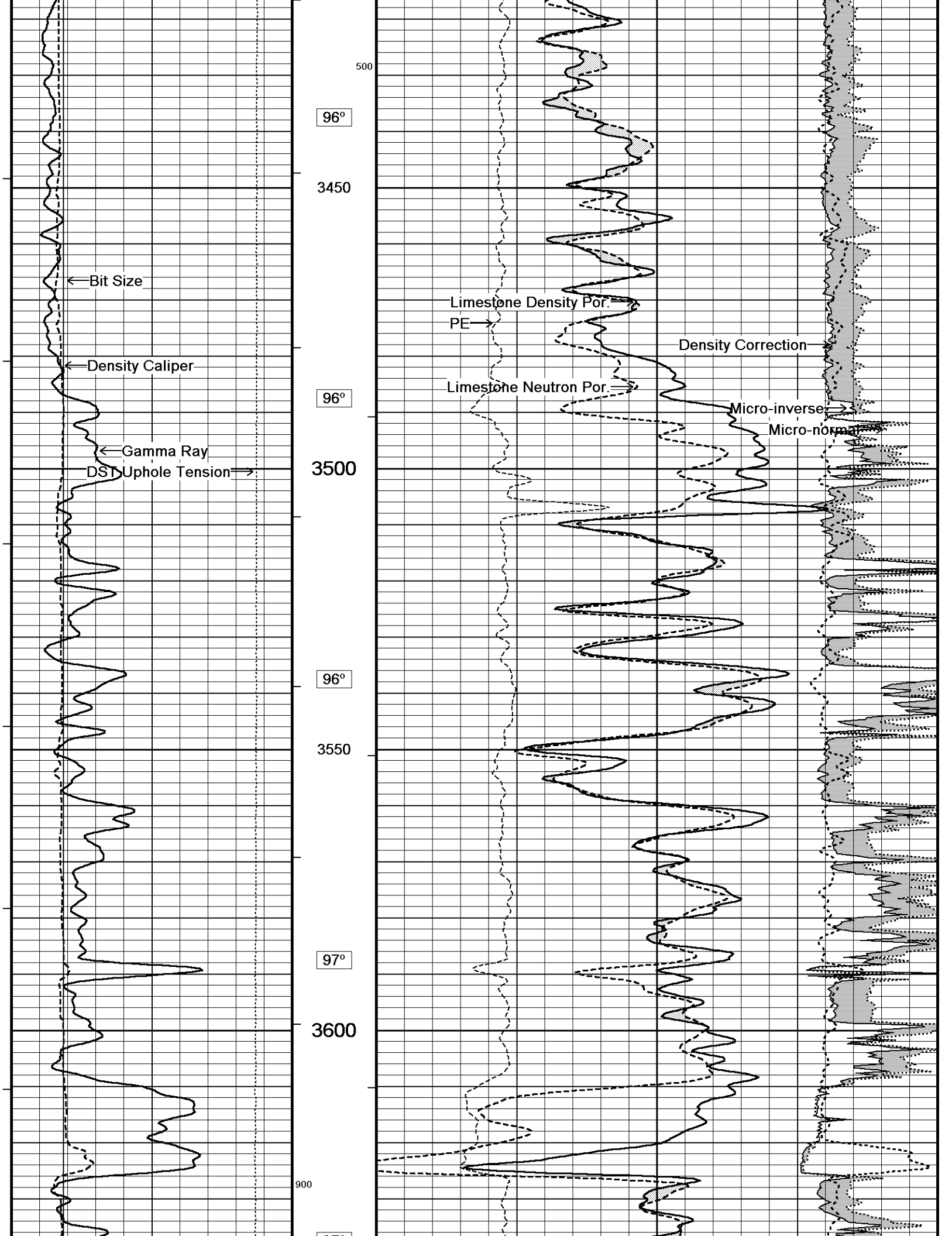


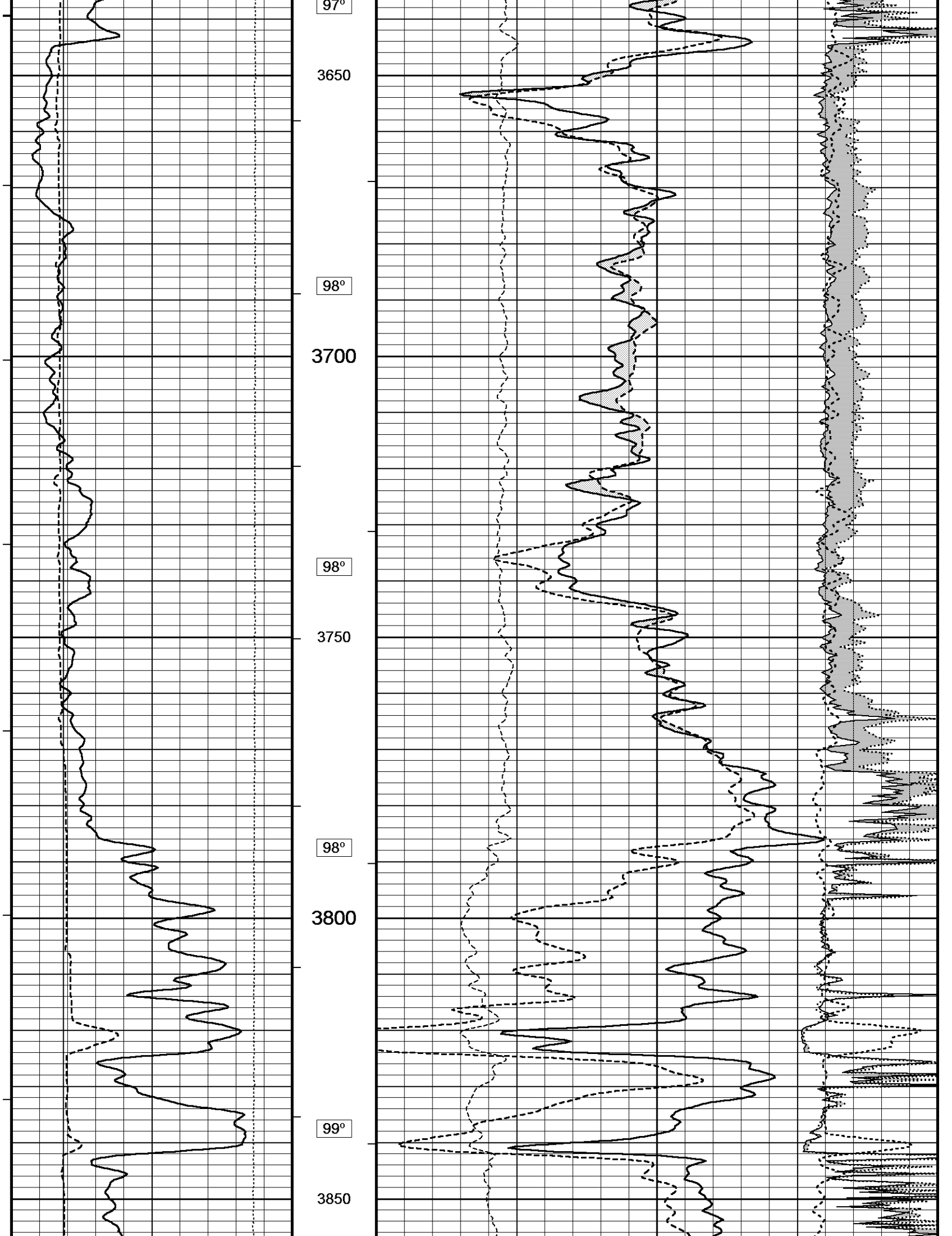


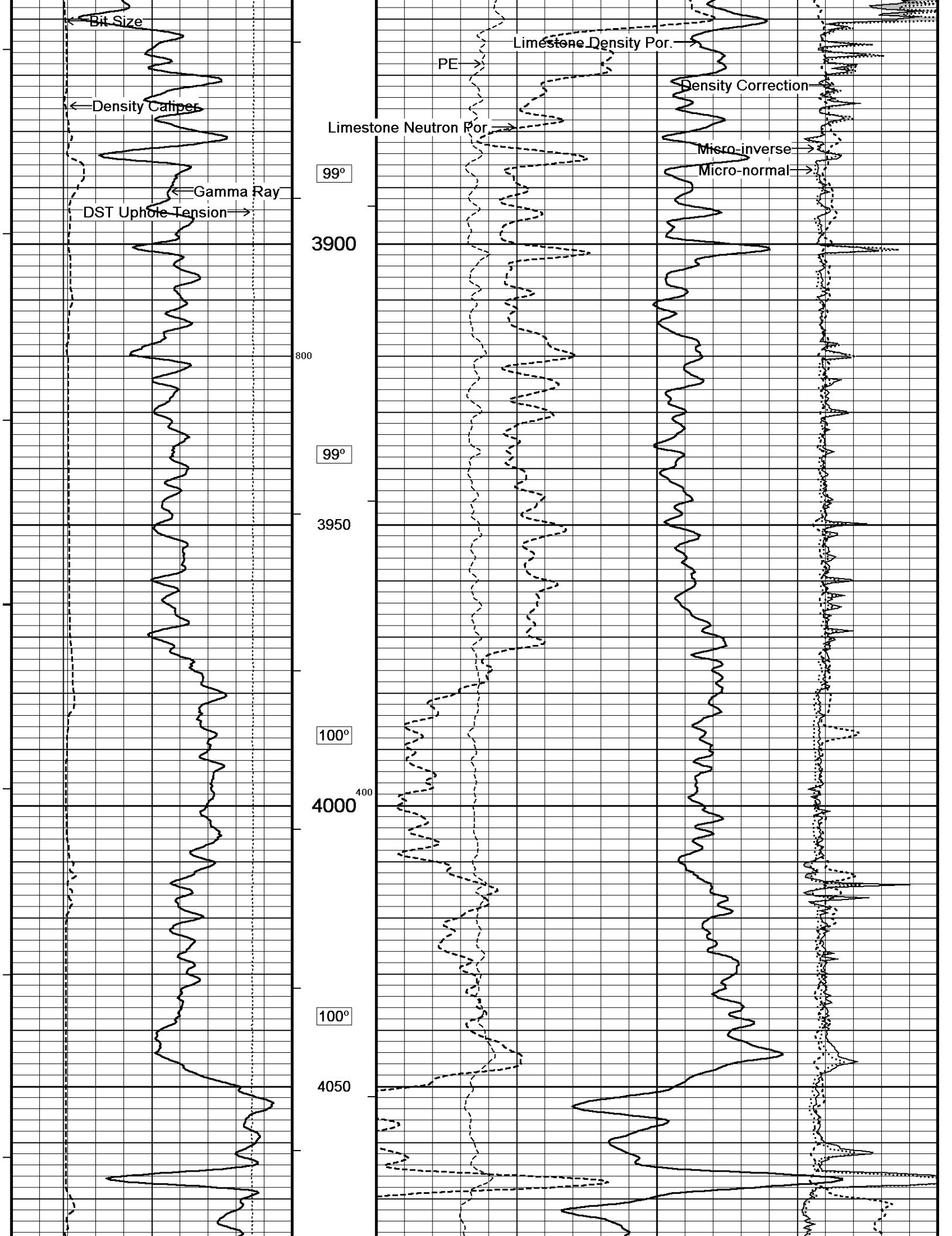


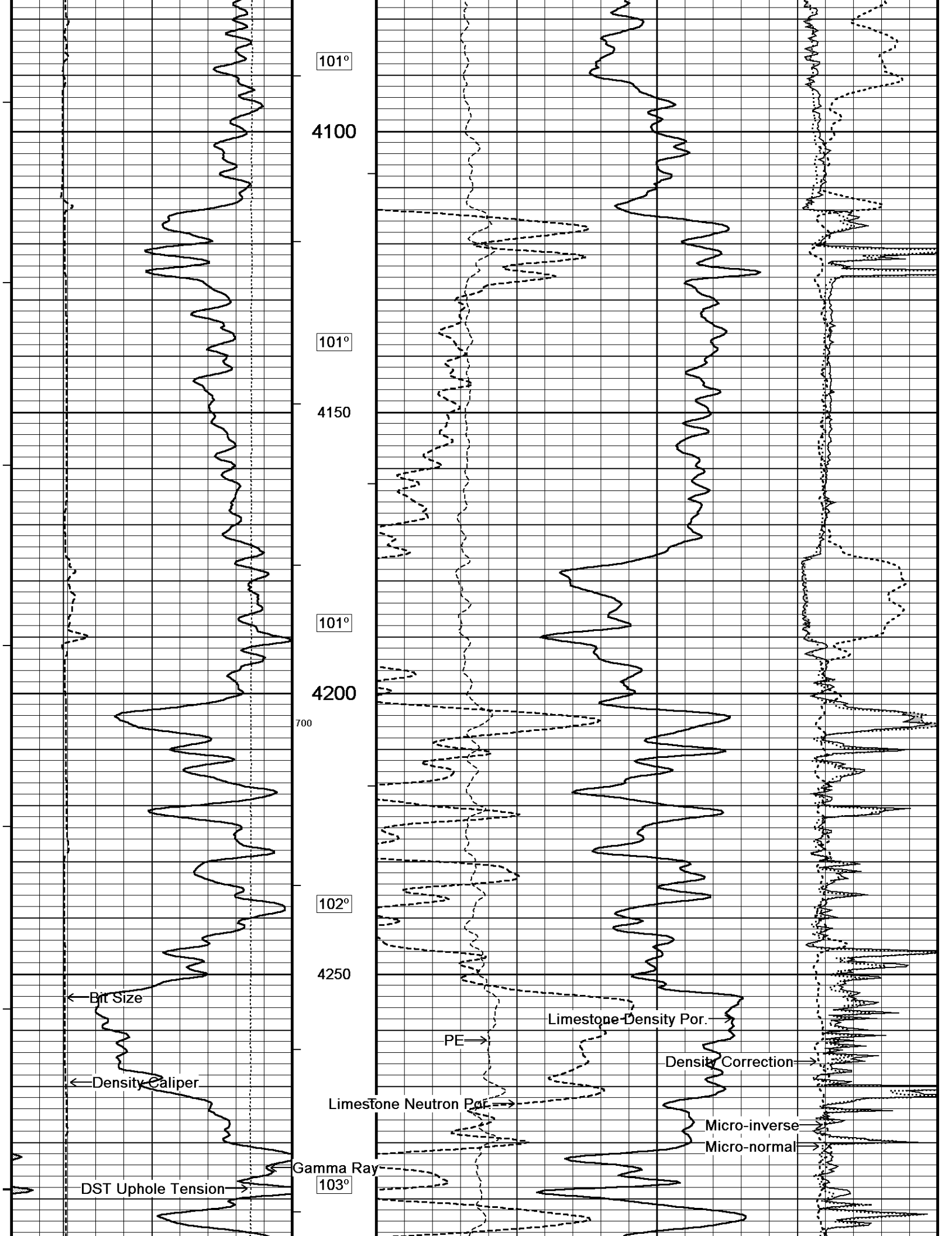


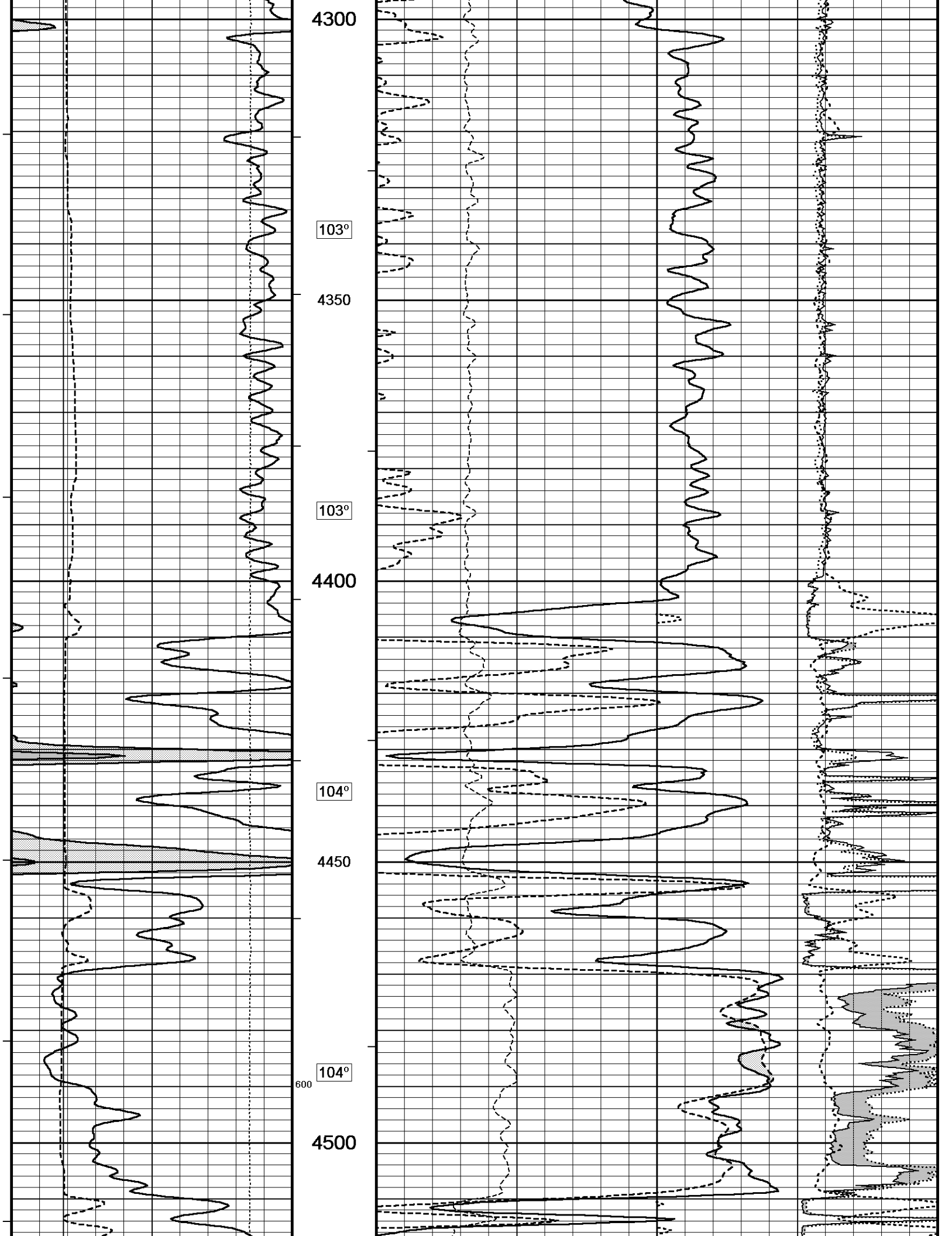


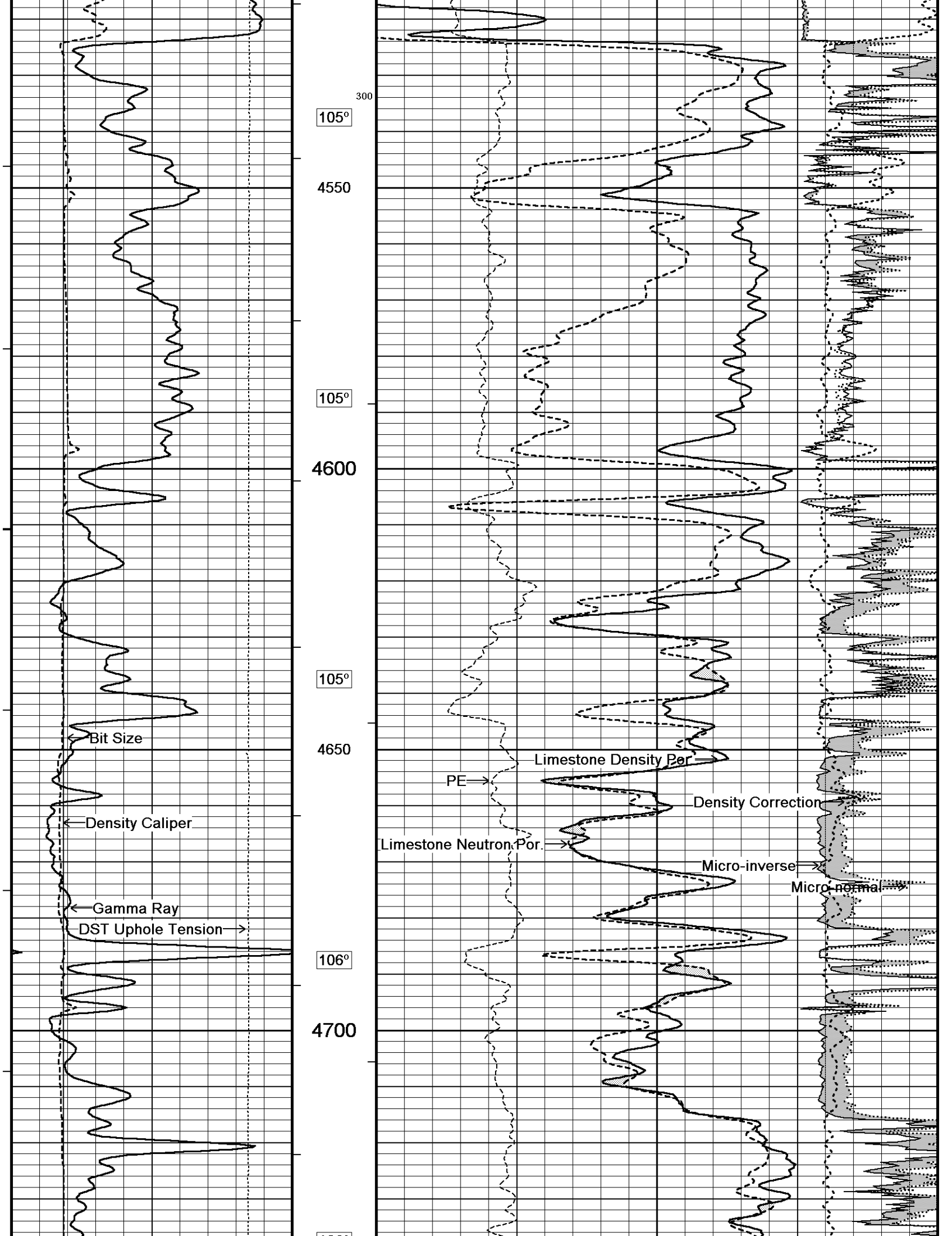


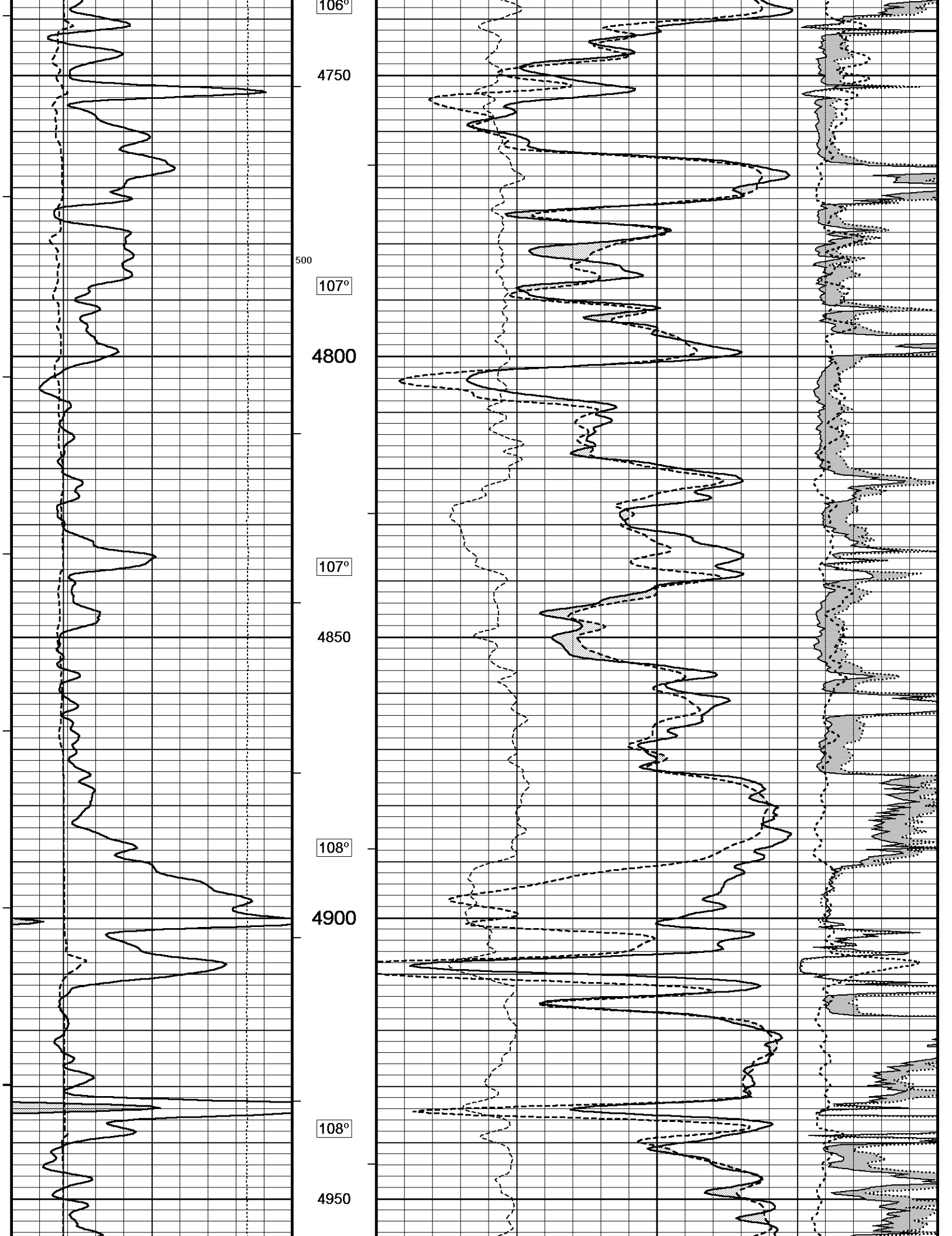


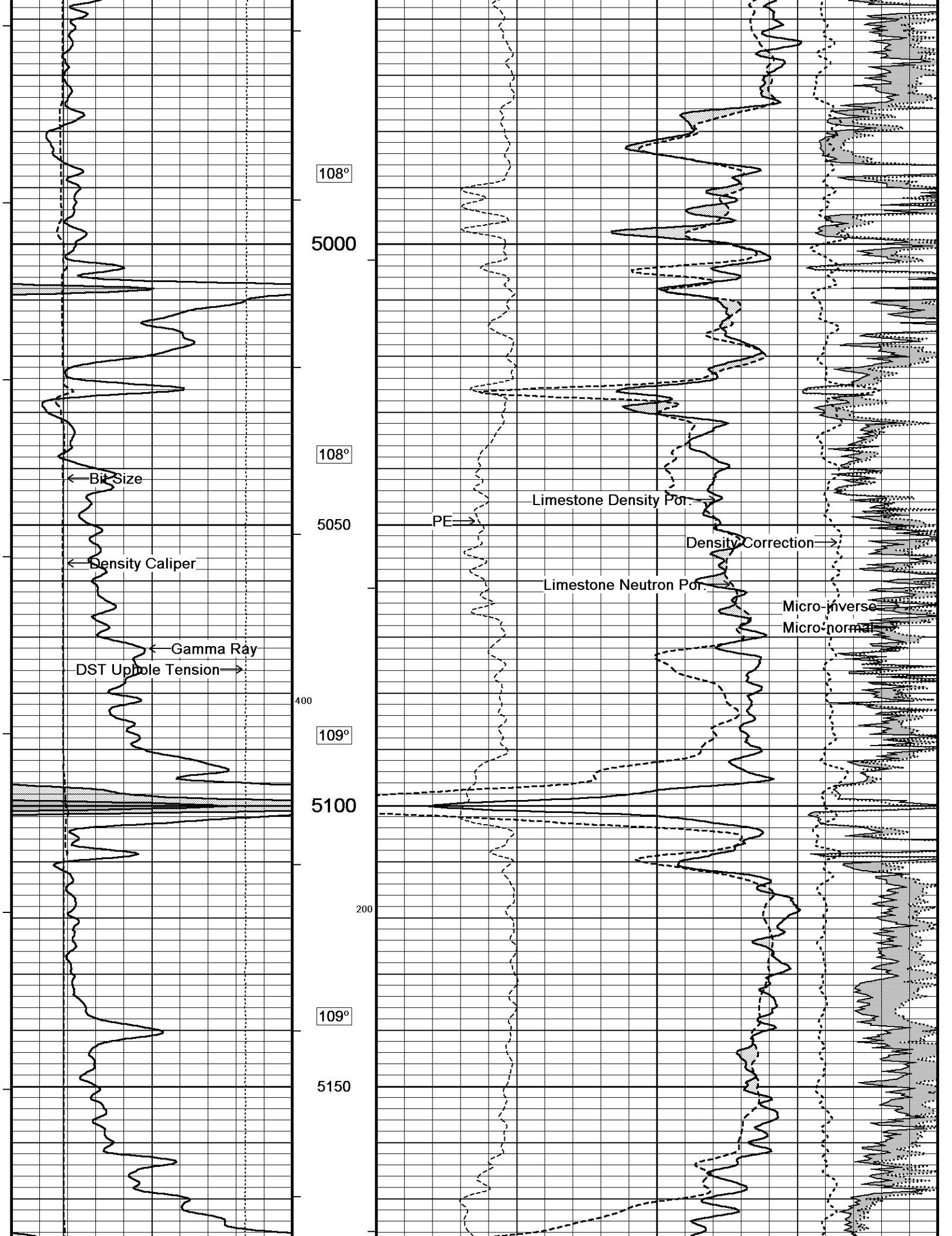


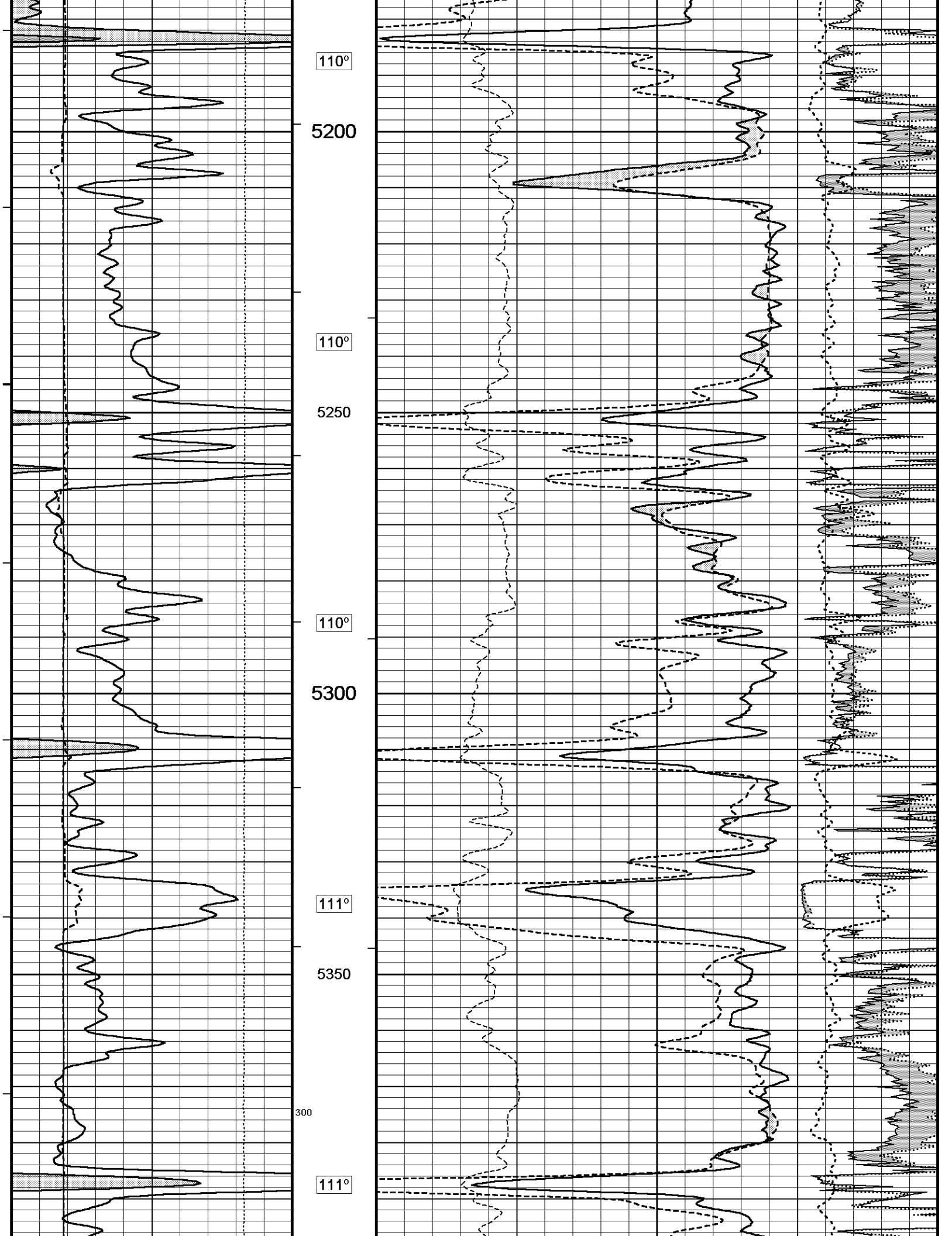


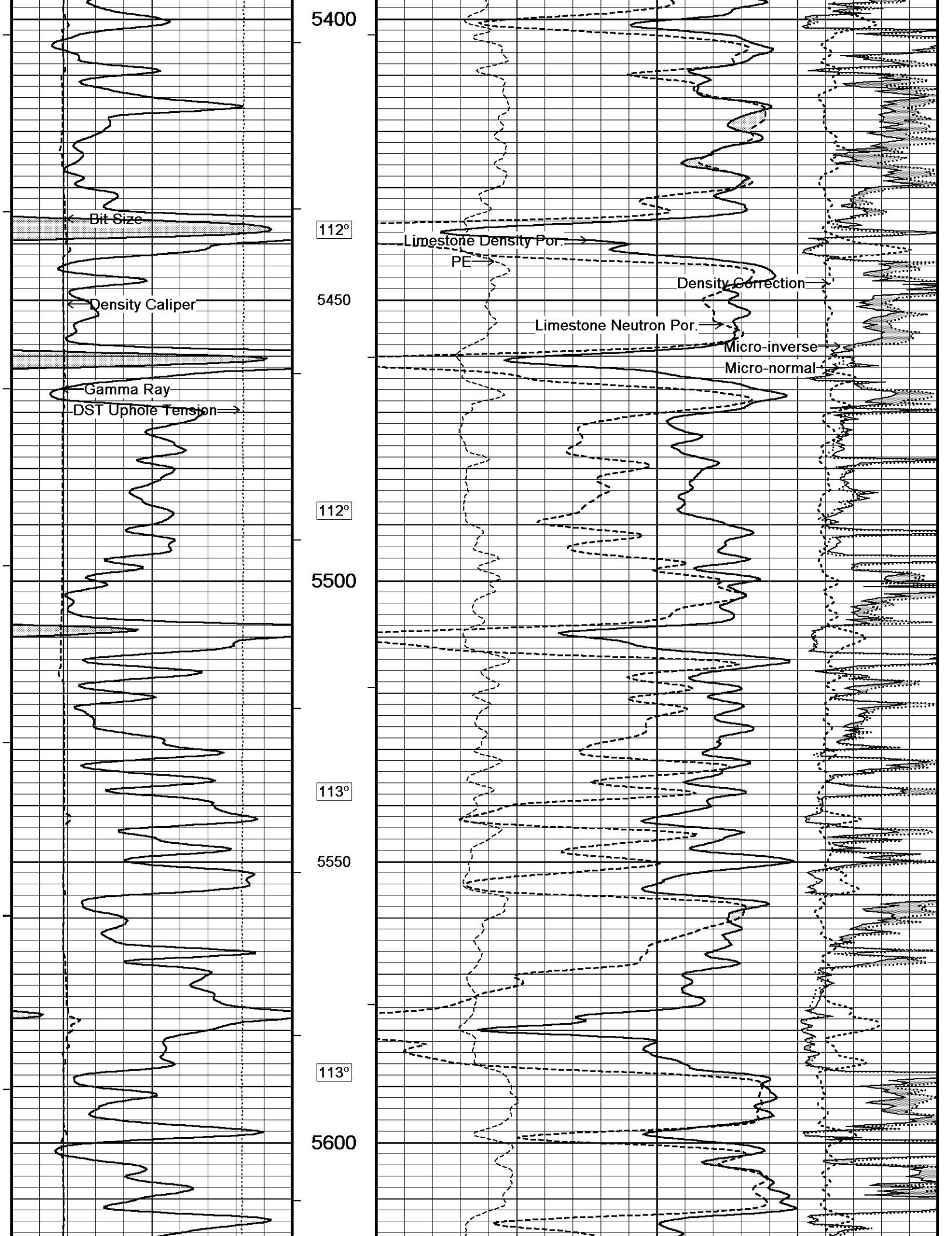


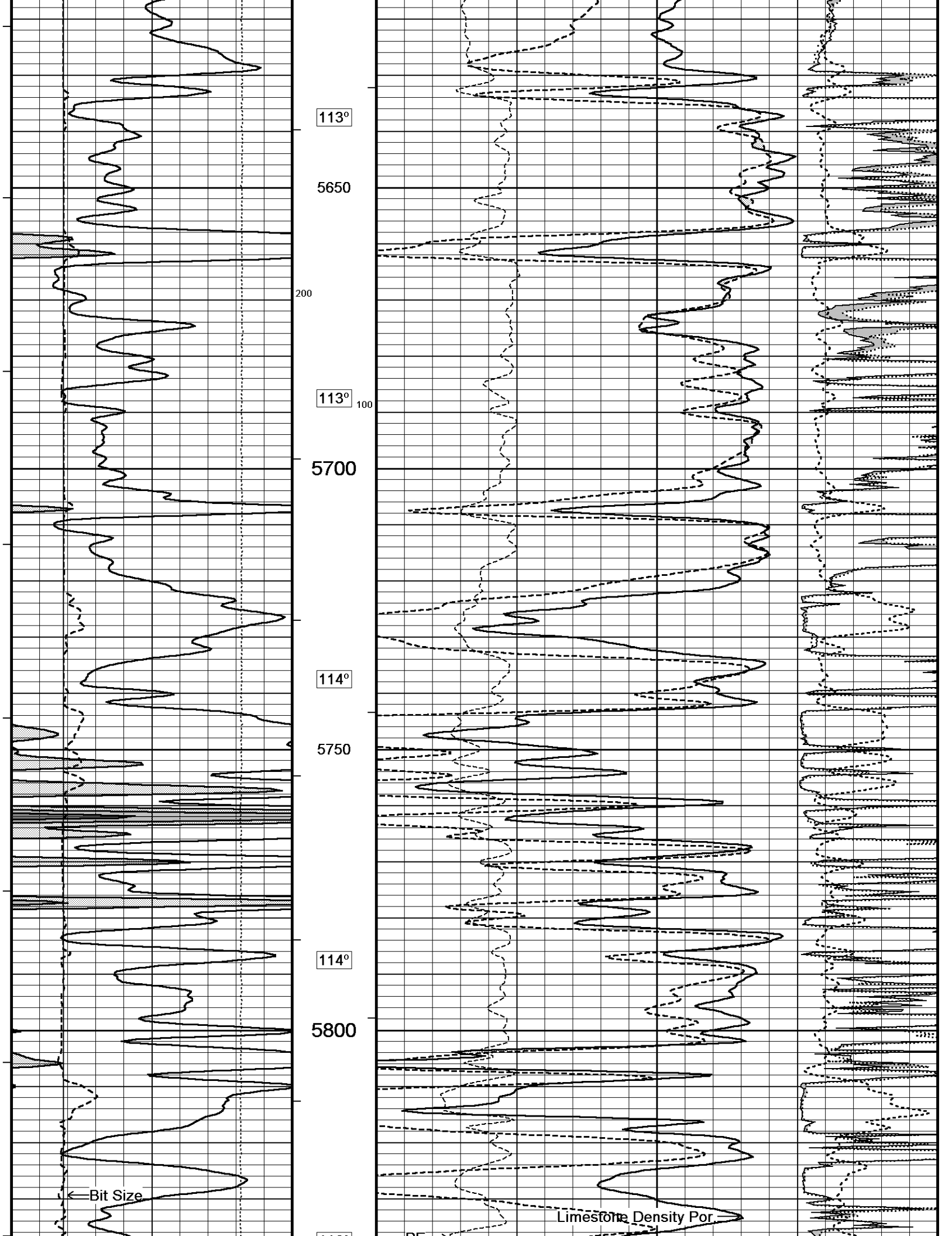


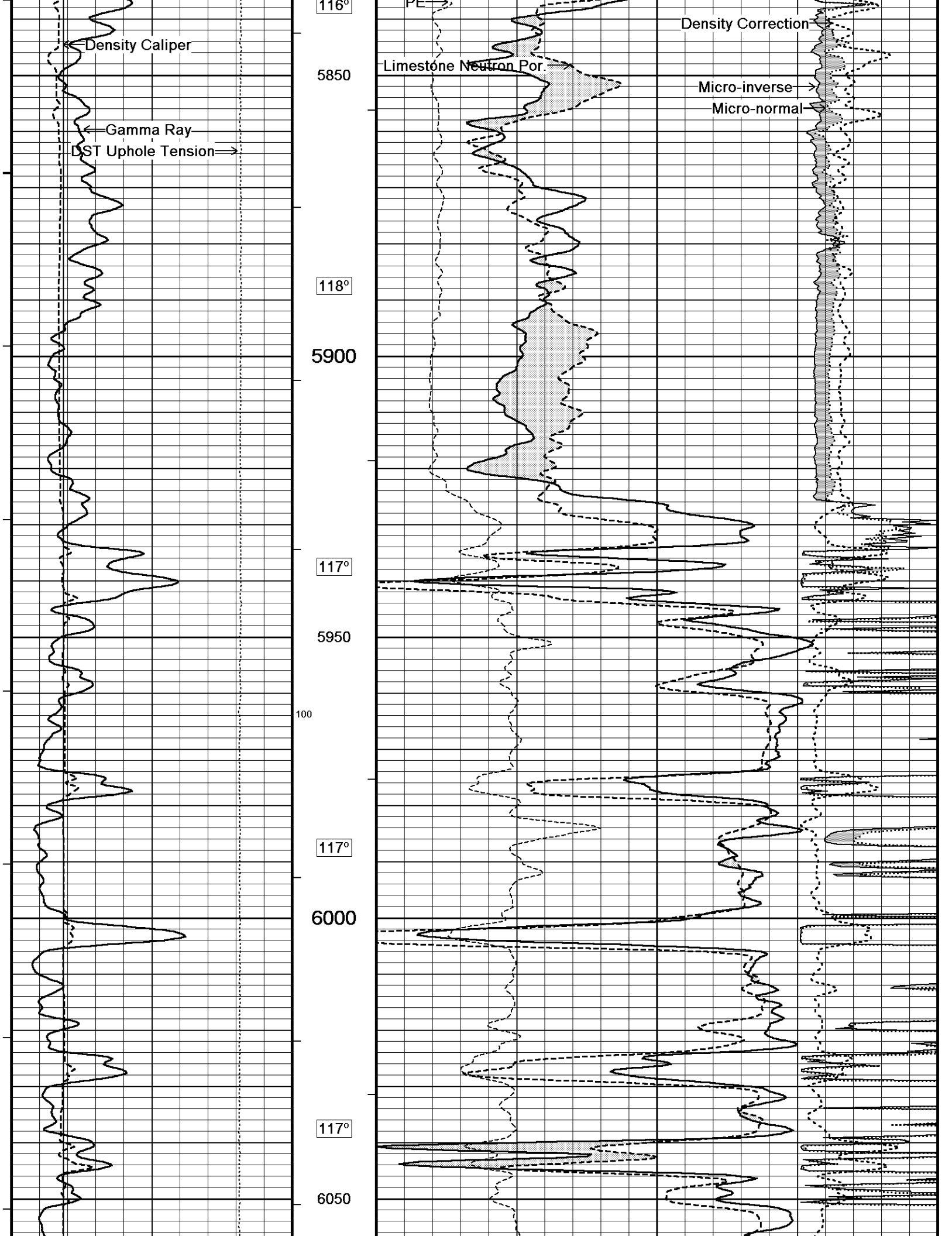


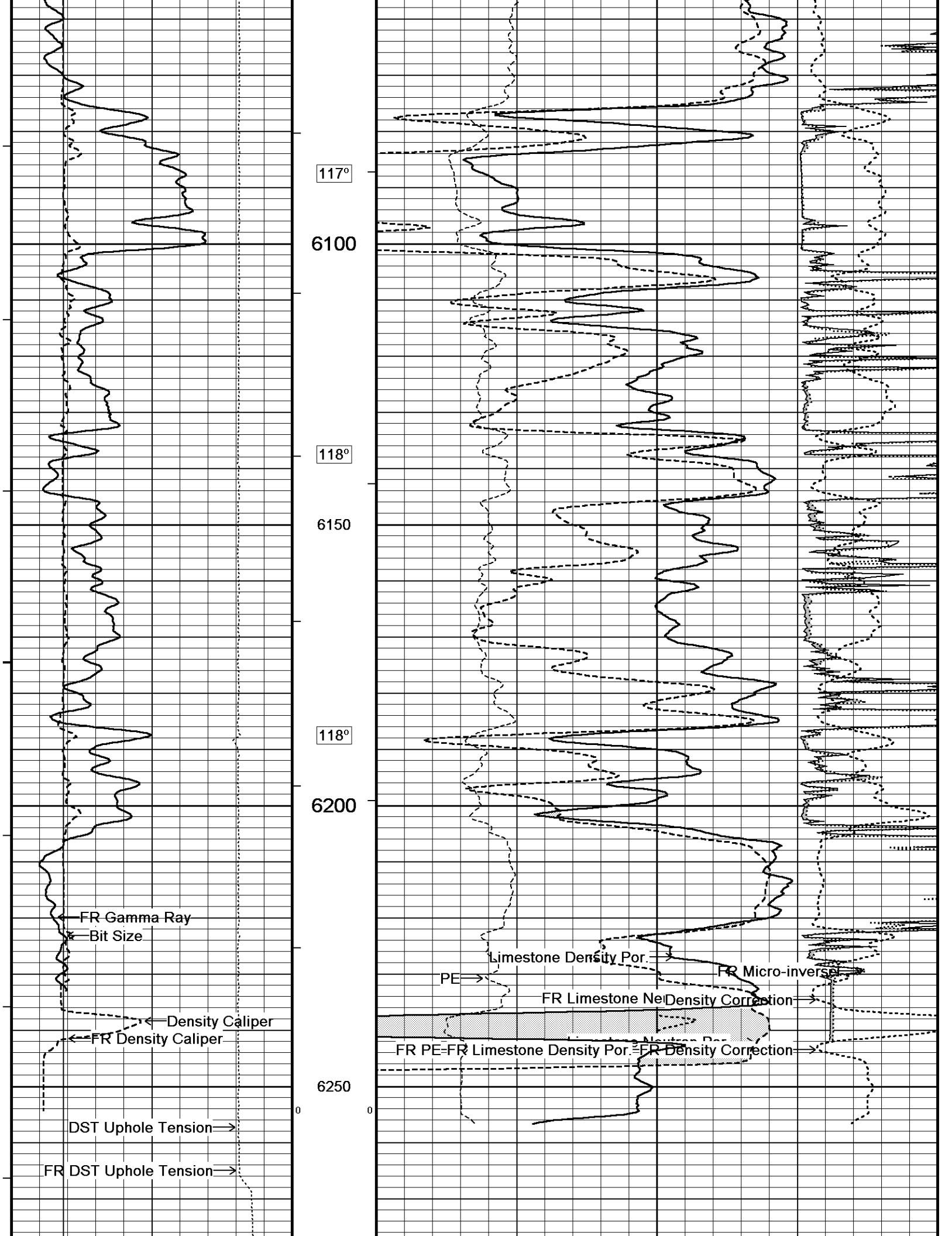


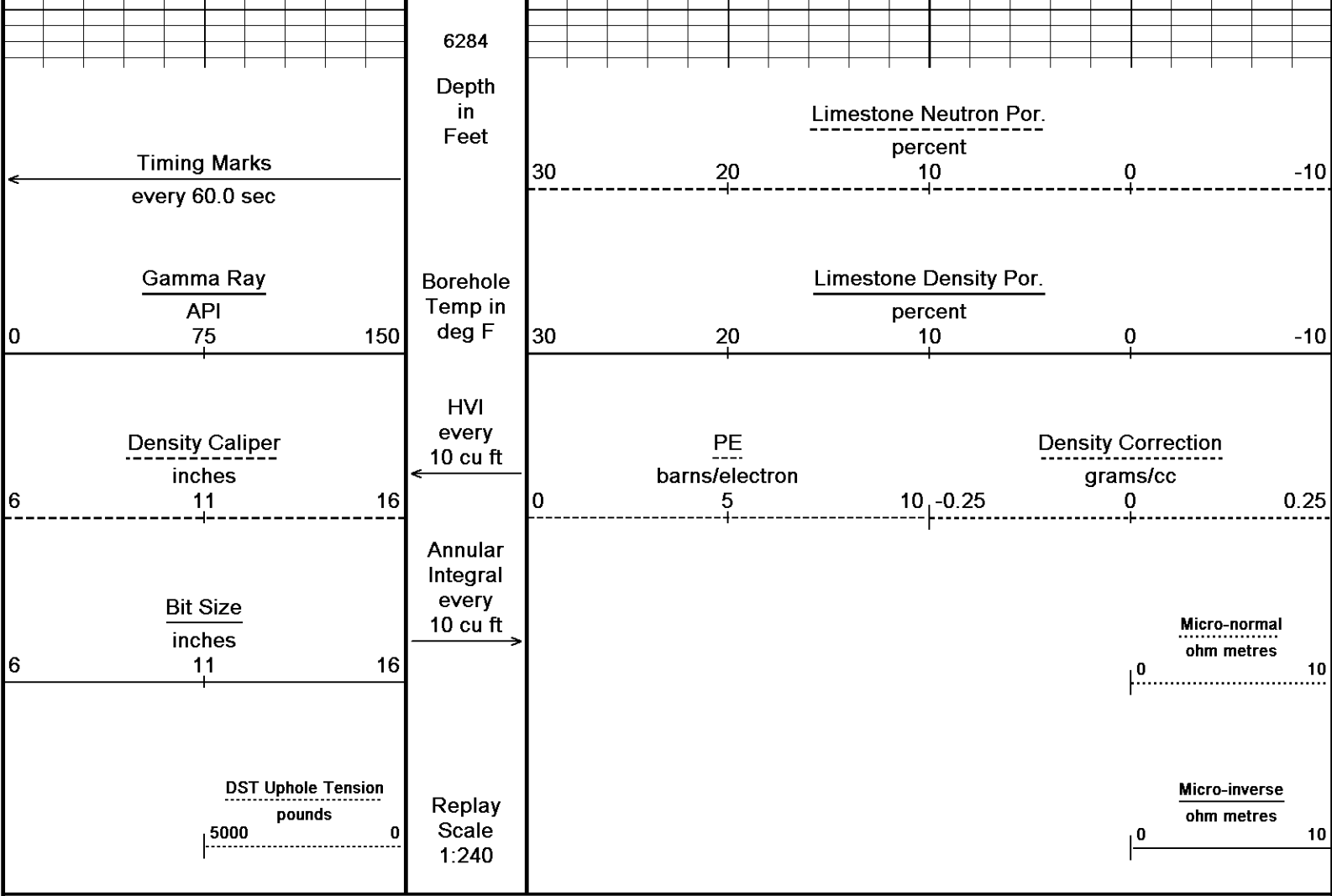










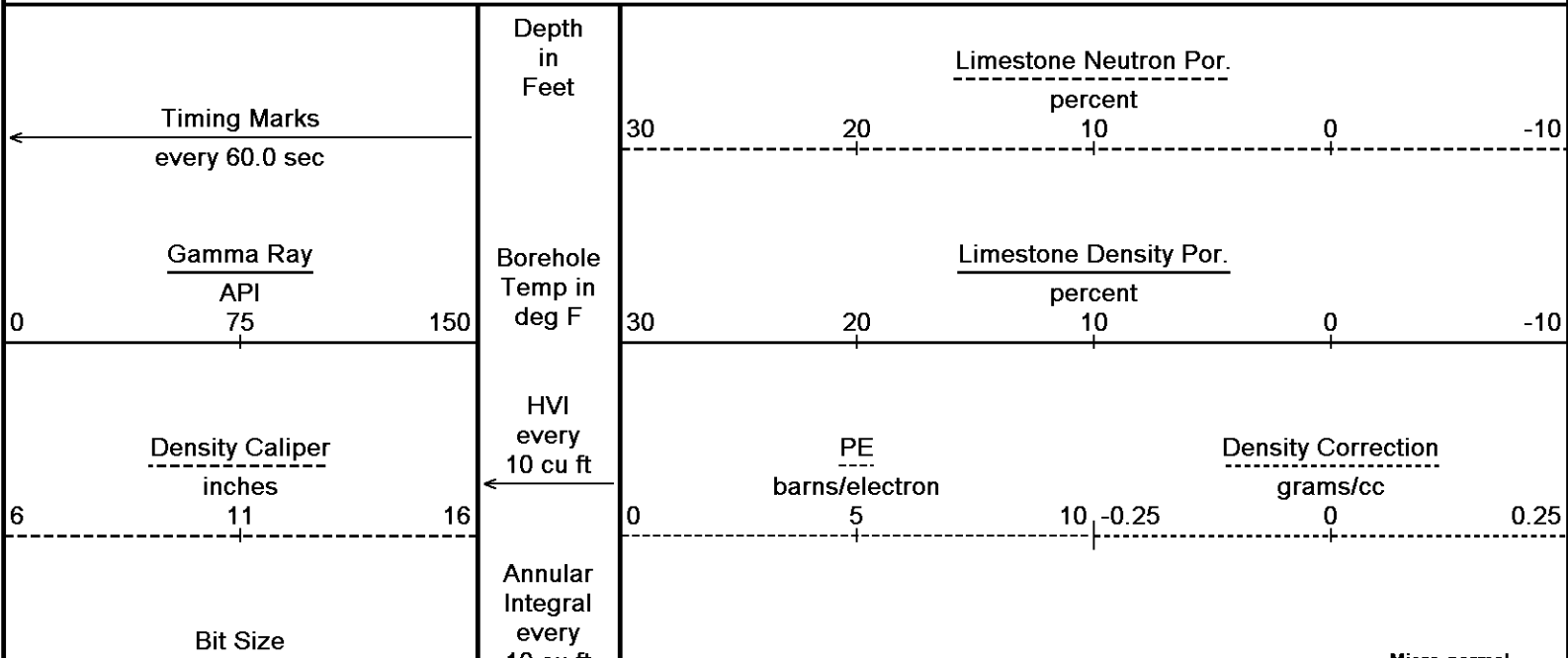


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 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164  
 Plotted on 03-APR-2011 13:05  
 Recorded on 03-APR-2011 01:40

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm  
 Filename: C:\DOCUME~1\garciar\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12\_001.dta  
 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164  
 Plotted on 03-APR-2011 13:05  
 Recorded on 03-APR-2011 00:59



6 inches 11 16

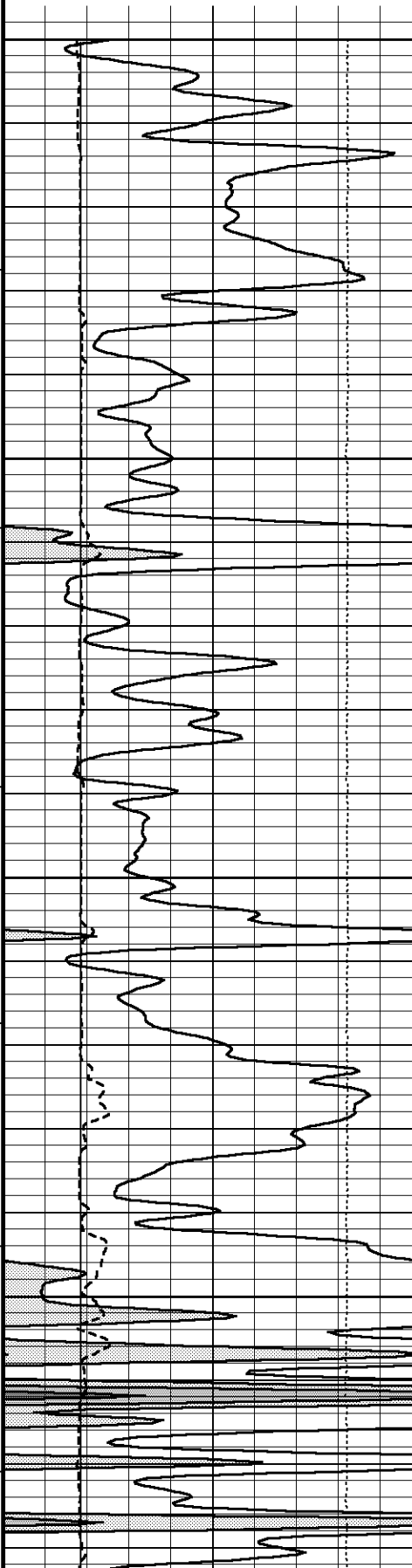
DST Uphole Tension  
pounds  
5000 0

10 cu ft

Replay  
Scale  
1:240

0 10  
Micro-normal  
ohm metres

0 10  
Micro-inverse  
ohm metres



5600

111°

5650

200

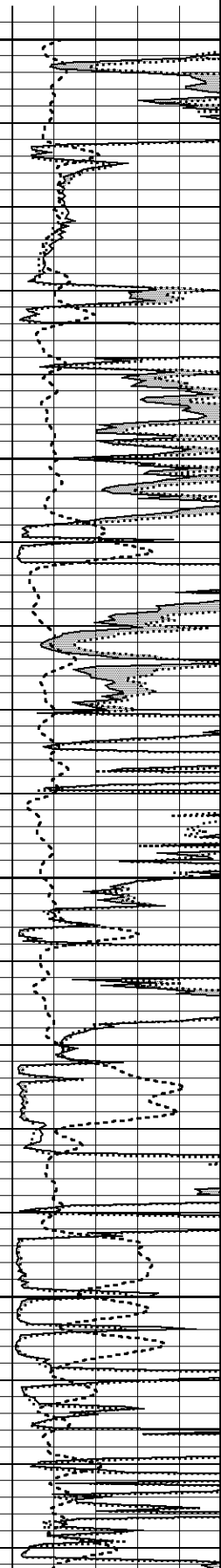
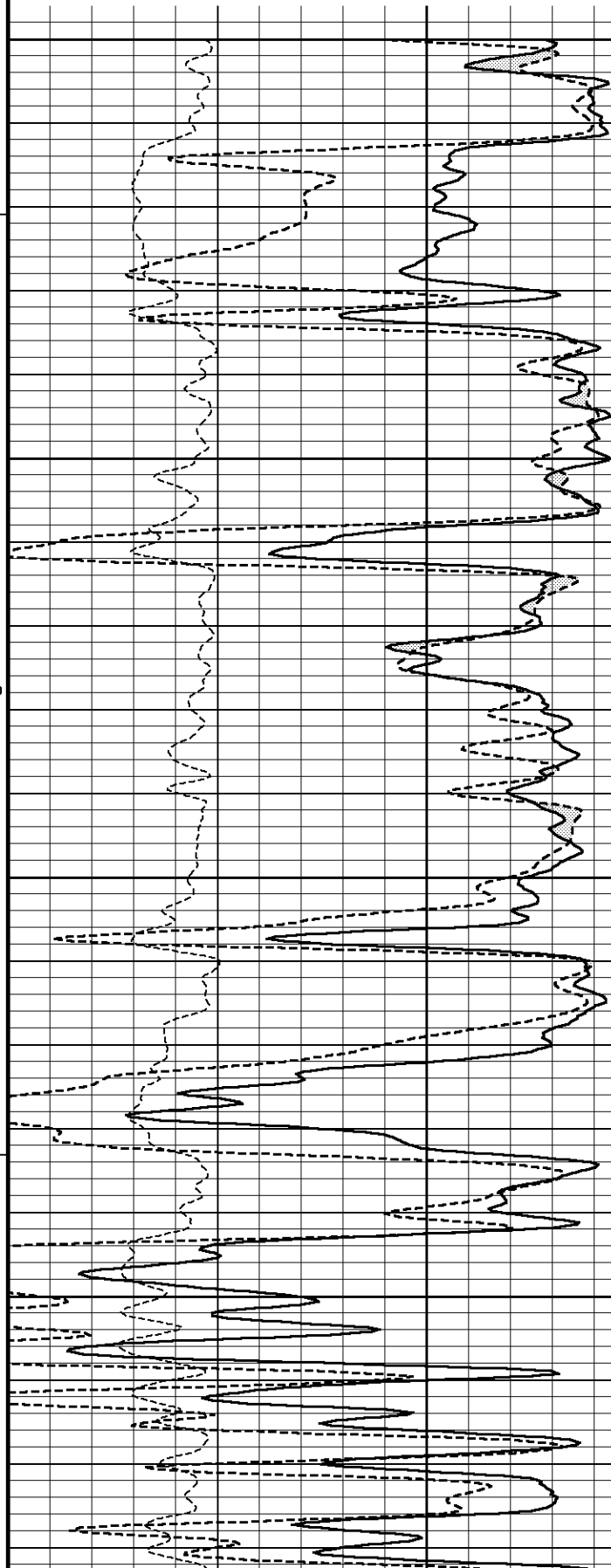
100

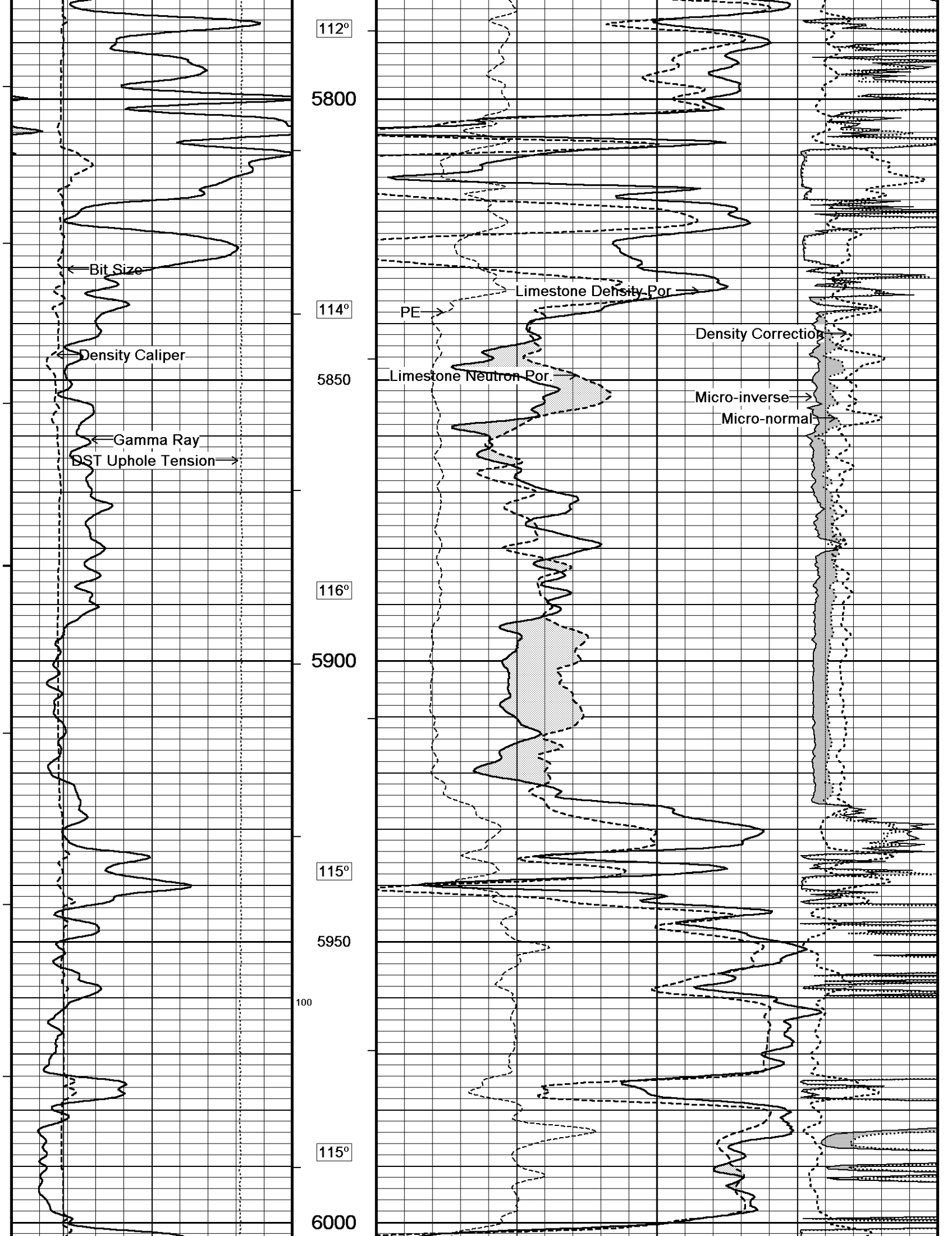
112°

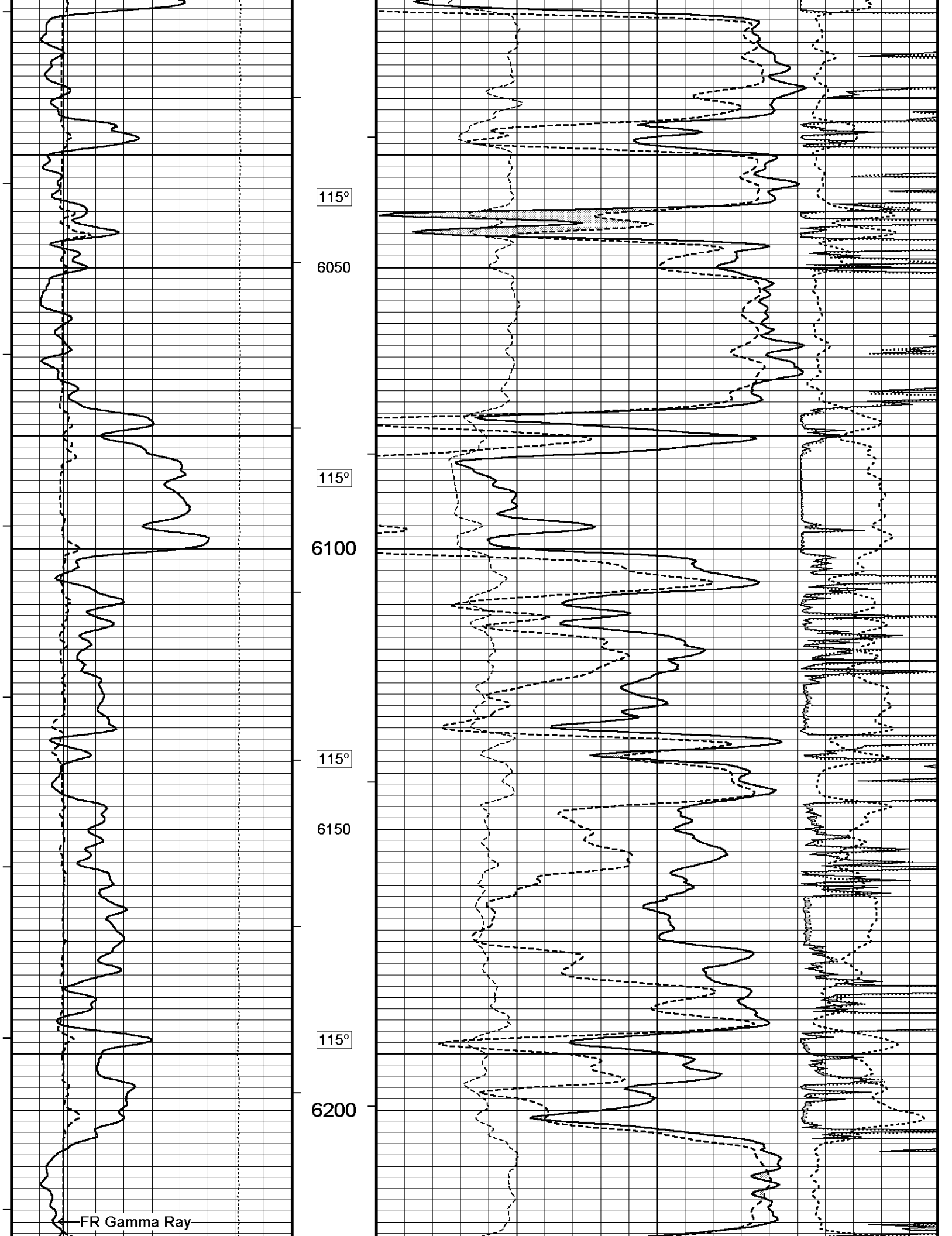
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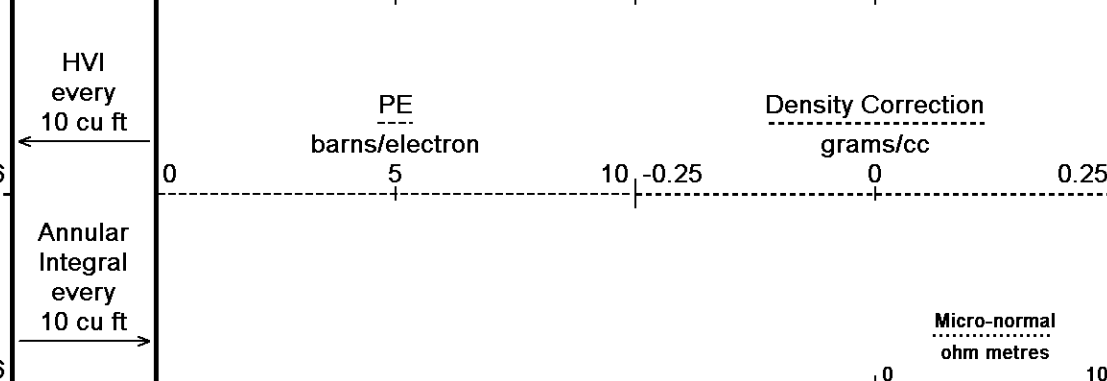
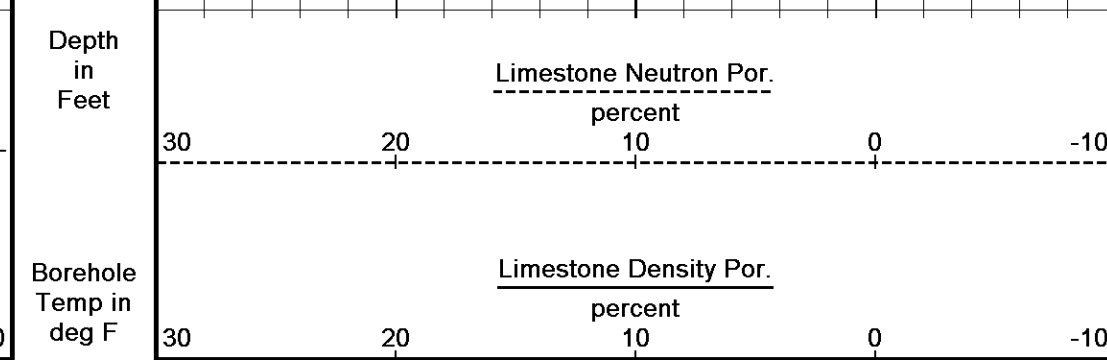
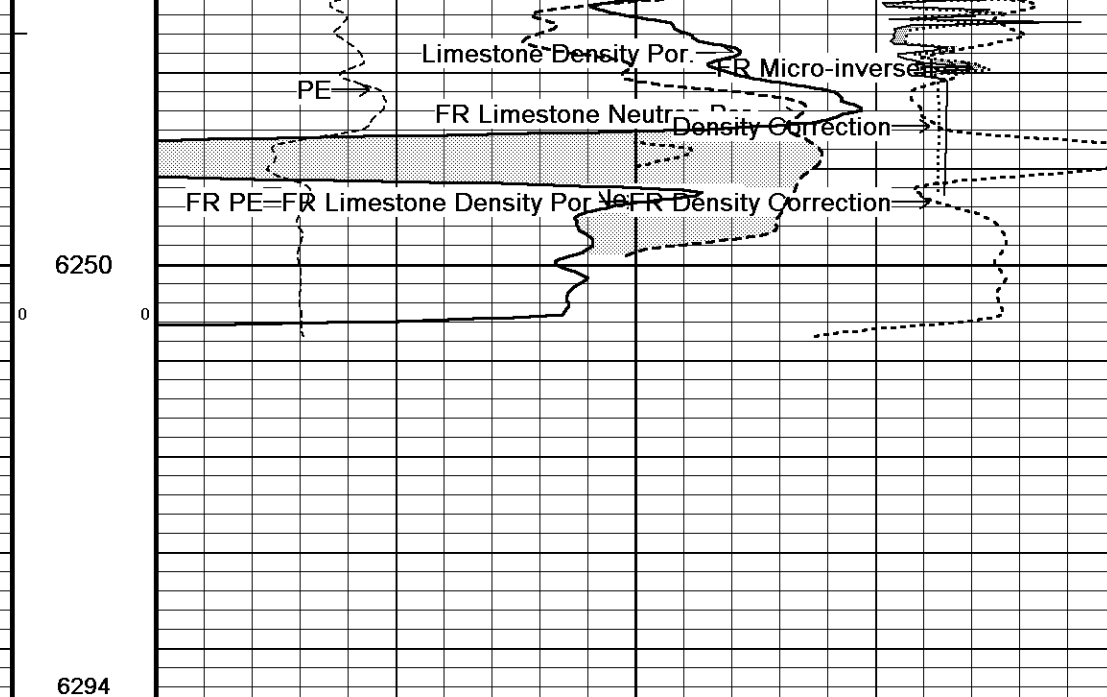
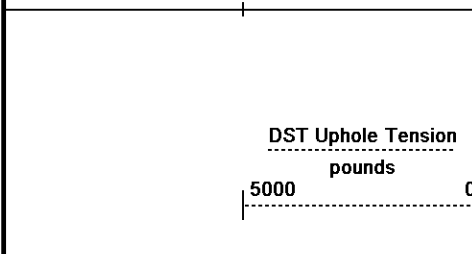
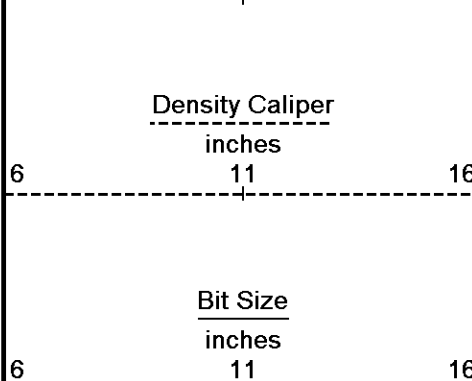
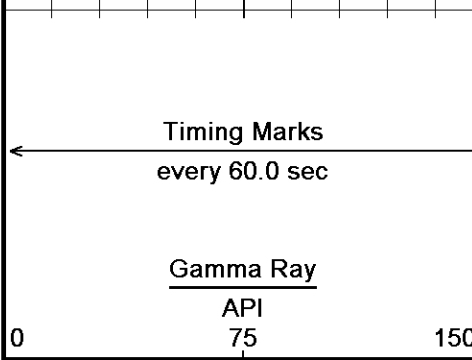
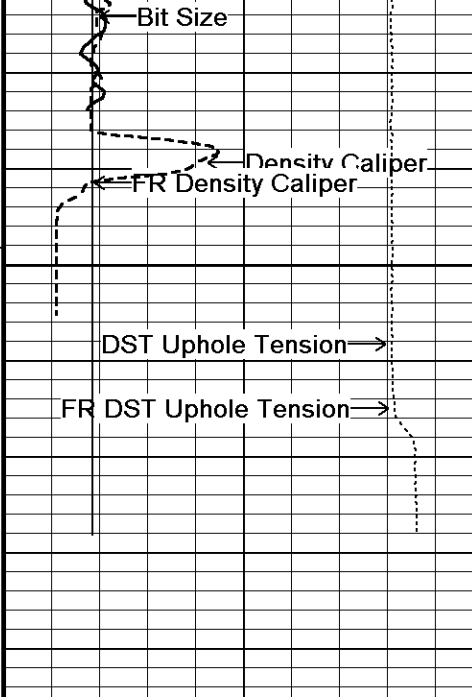
112°

5750









Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 03-APR-2011 13:05  
 Filename: C:\DOCUME~1\garciar\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12\_001.dta  
 Recorded on 03-APR-2011 00:59  
 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

REPEAT SECTION

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm  
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 Recorded on 03-APR-2011 01:40  
 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

	Depth	
--	-------	--

Timing Marks  
every 60.0 sec

Gamma Ray  
API  
75

Density Caliper  
inches  
11

Bit Size  
inches  
11

DST Uphole Tension  
pounds  
5000

In  
Feet

Borehole  
Temp in  
deg F

HVI  
every  
10 cu ft

Annular  
Integral  
every  
10 cu ft

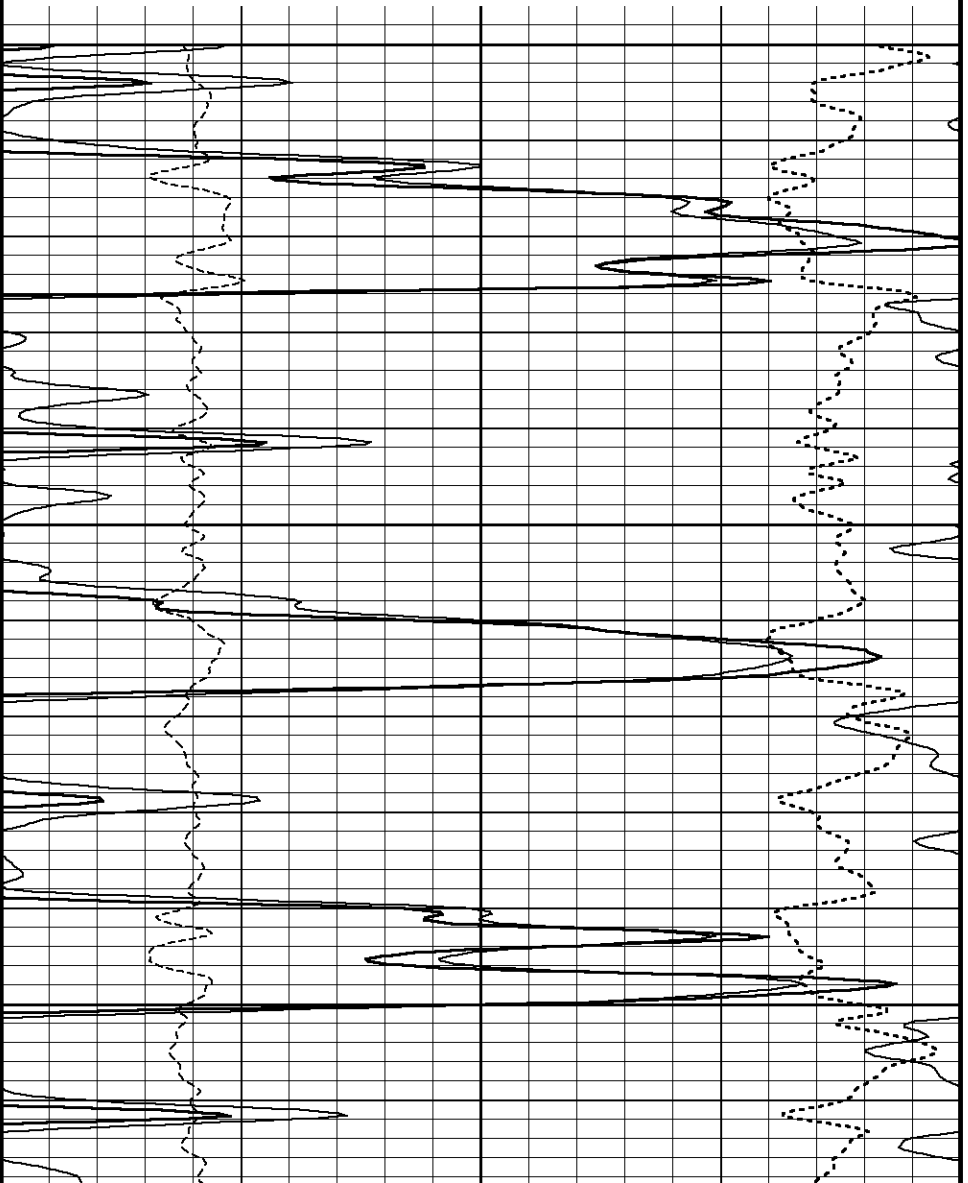
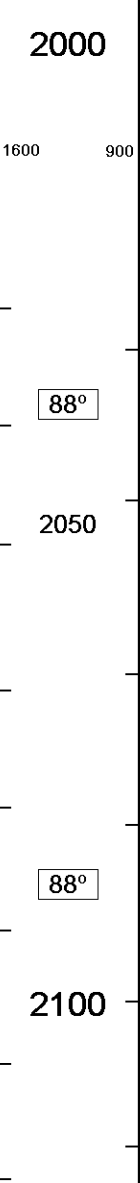
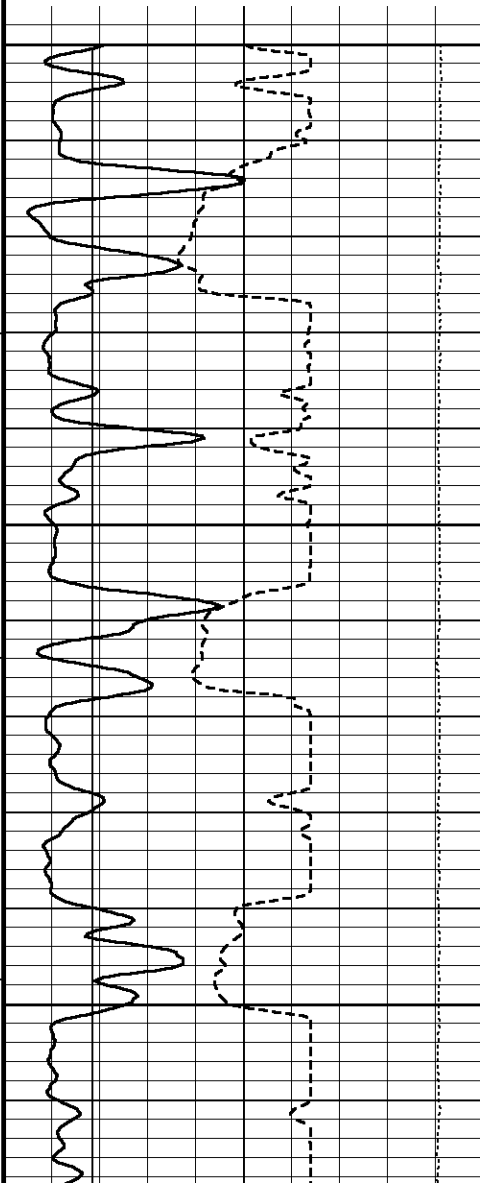
Replay  
Scale  
1:240

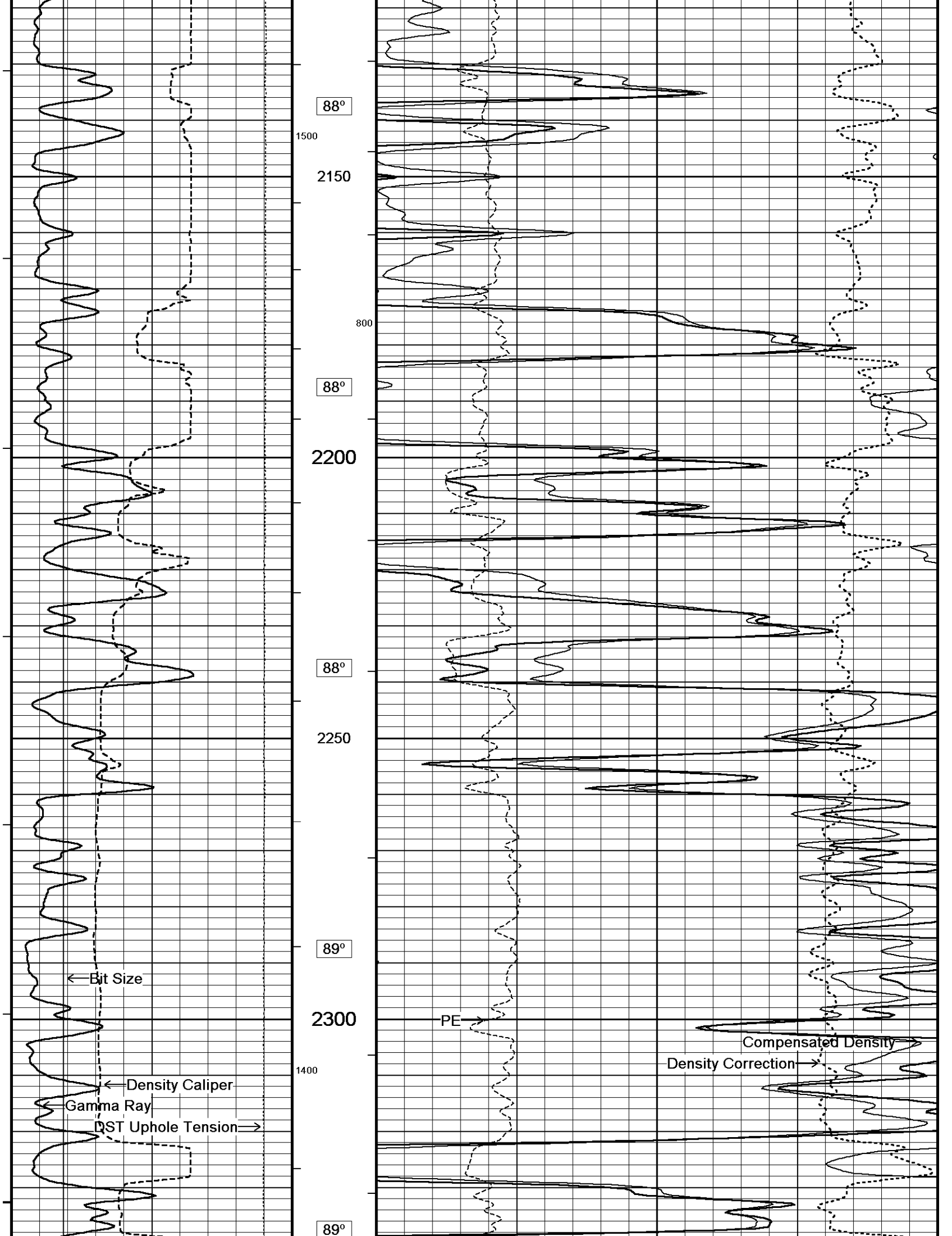
Compensated Density  
grams/cc

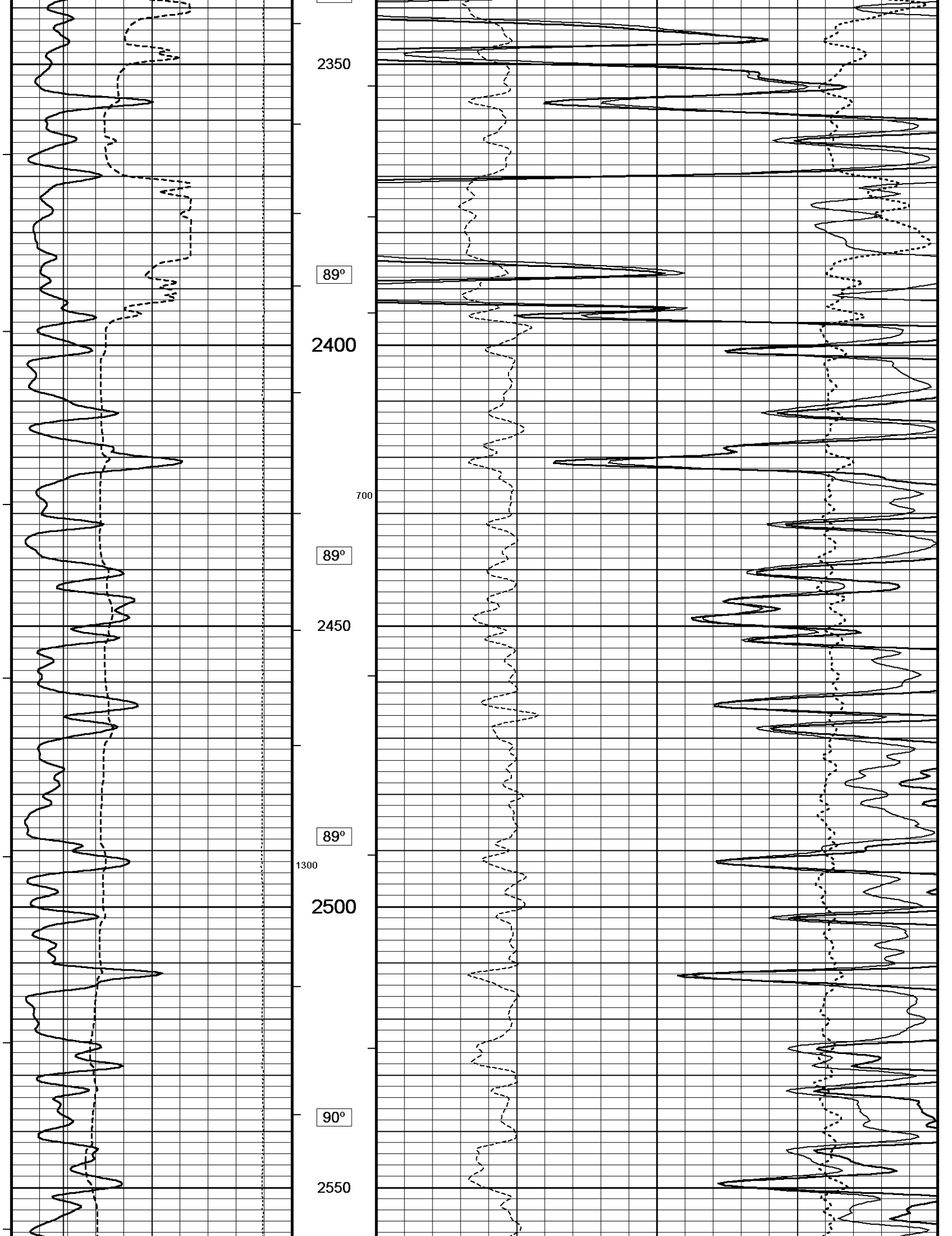
Limestone Density Por.  
percent

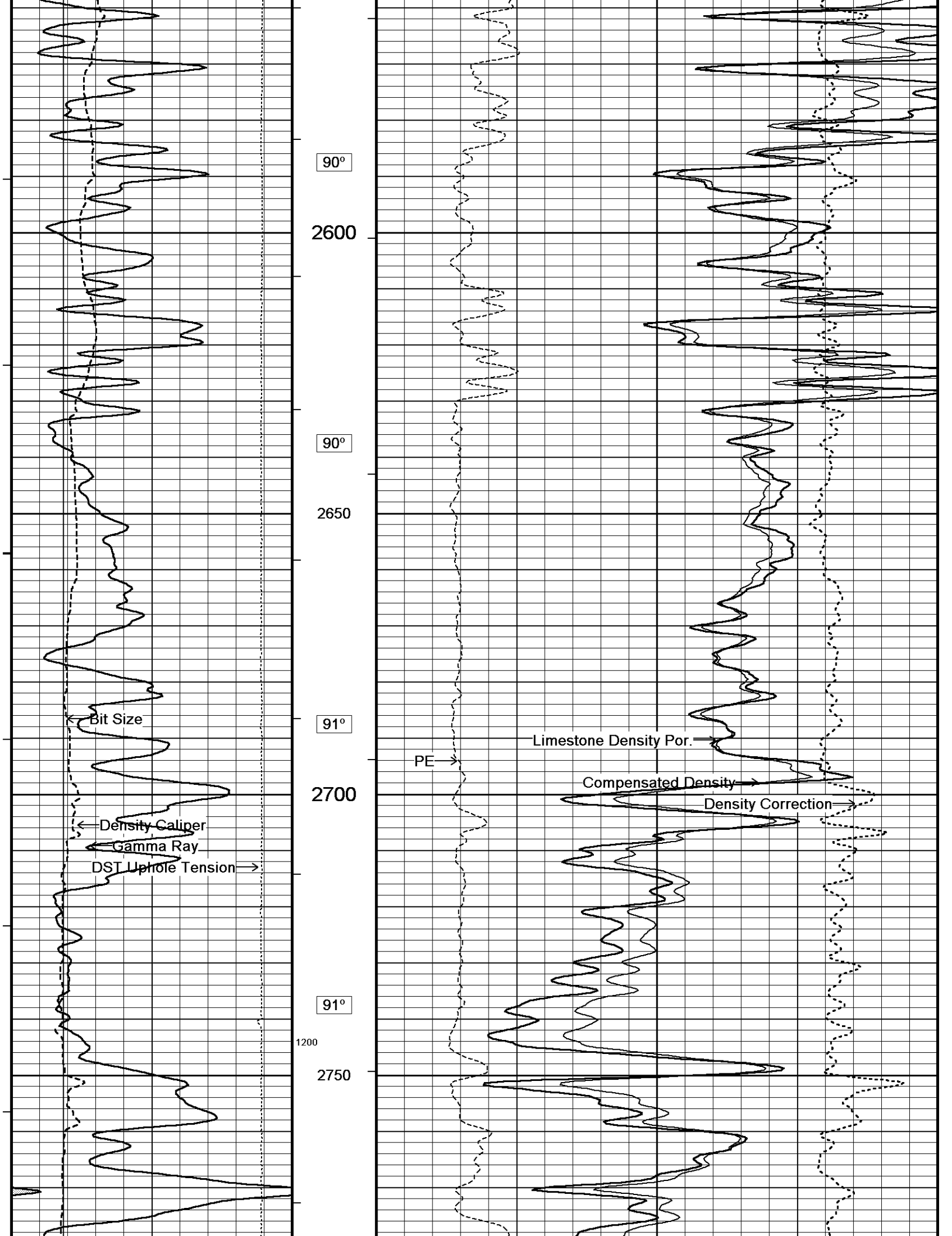
PE  
barns/electron

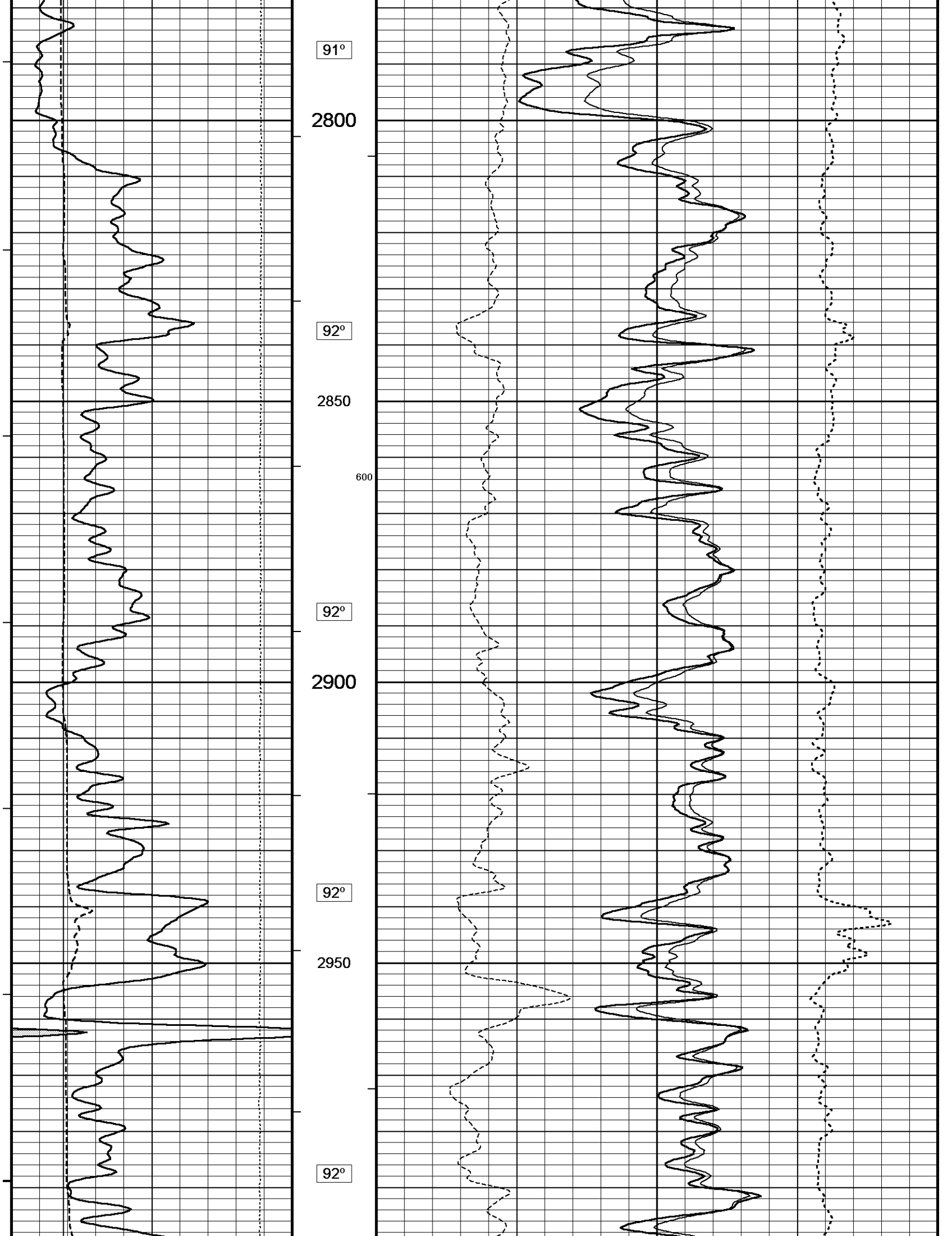
Density Correction  
grams/cc

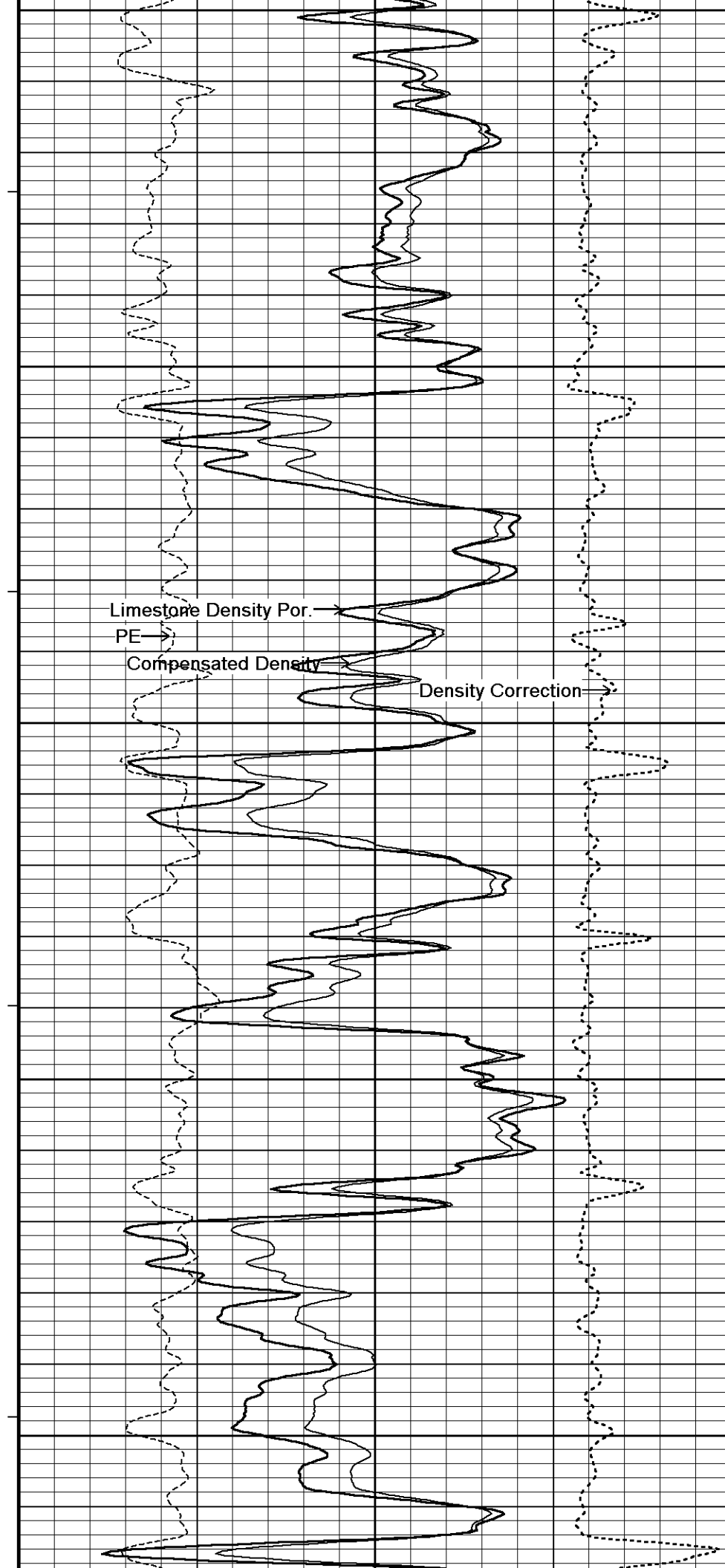
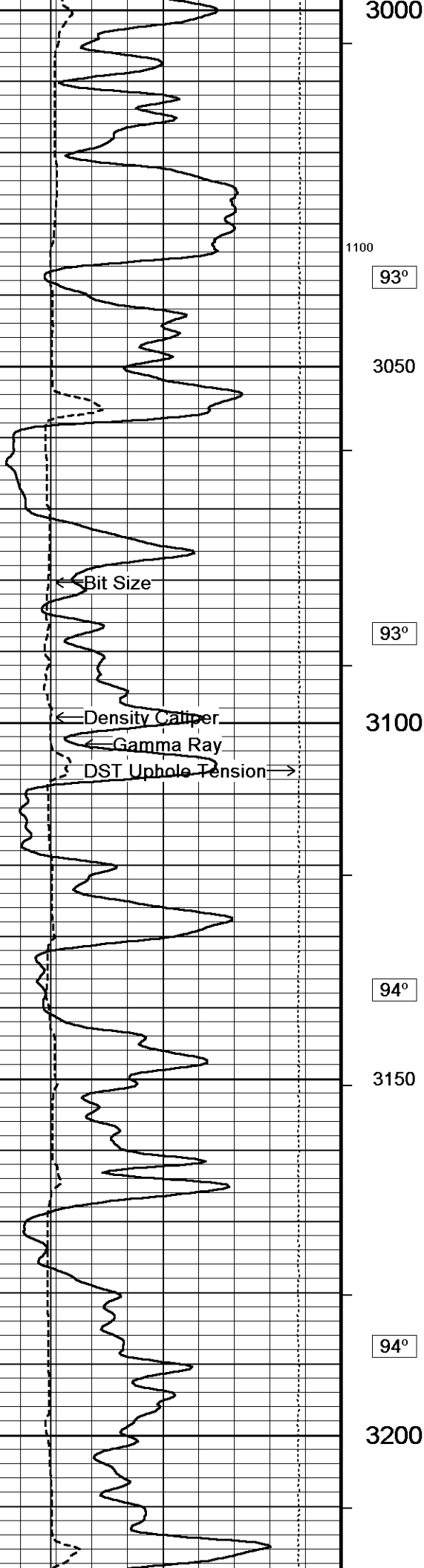


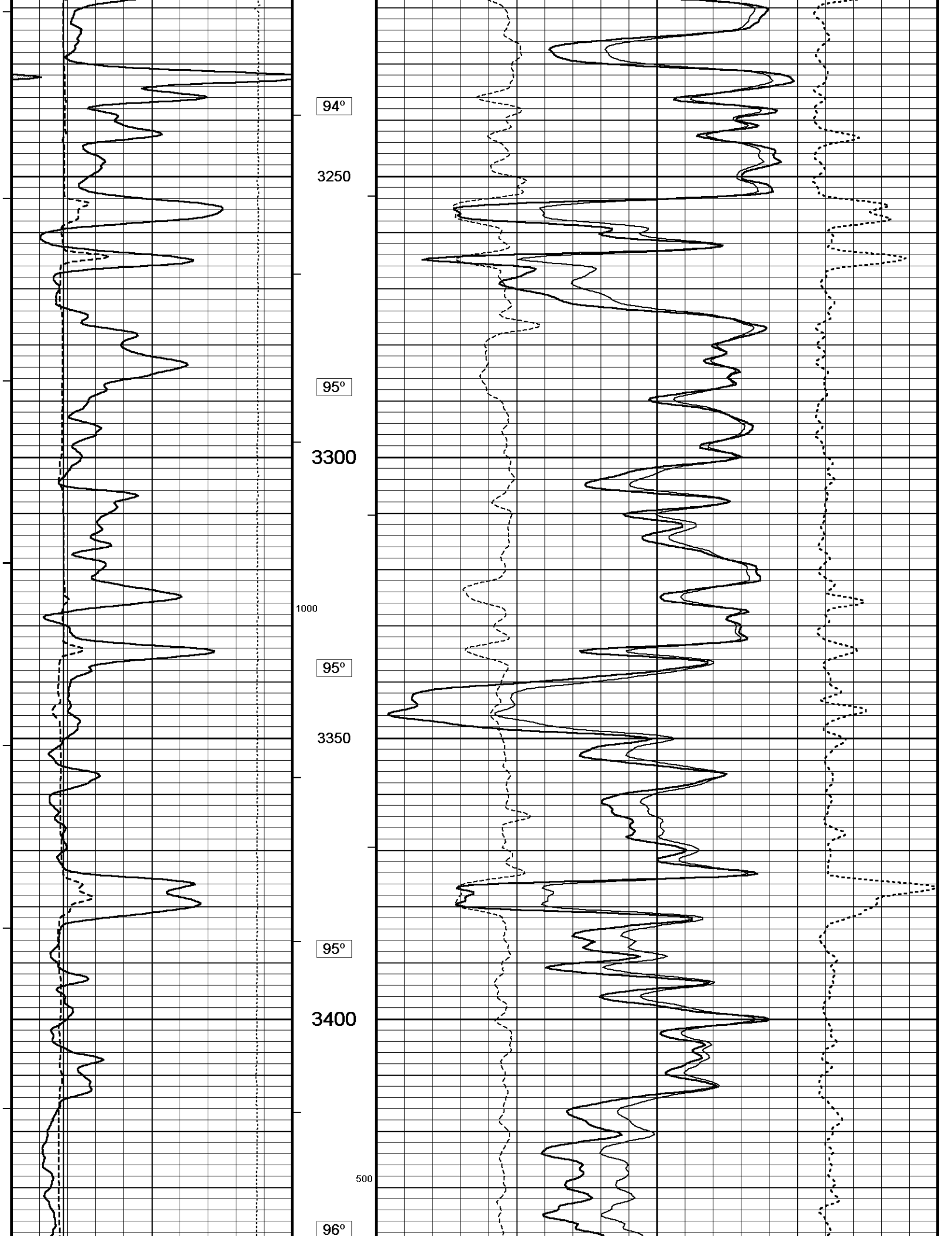


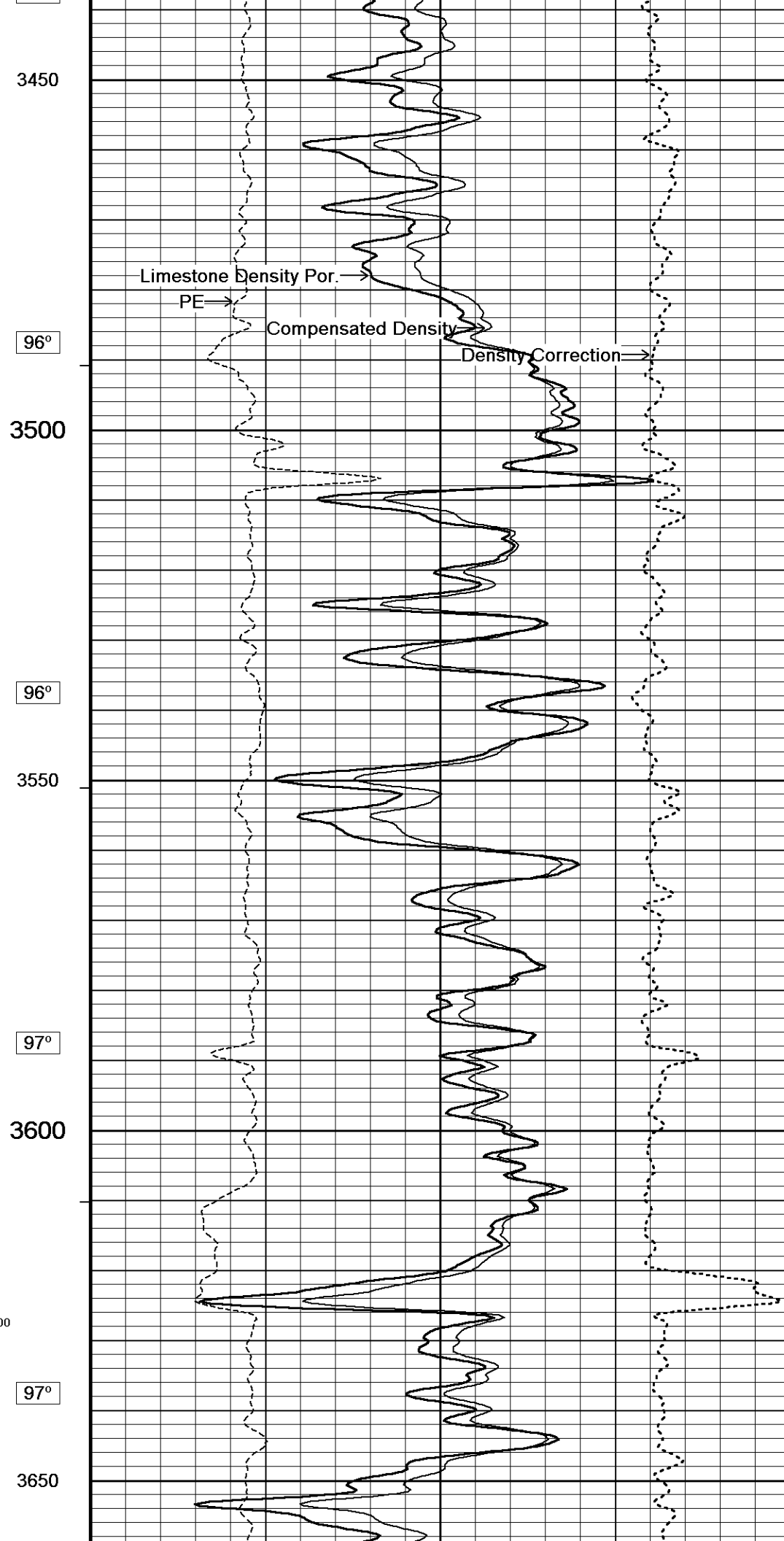
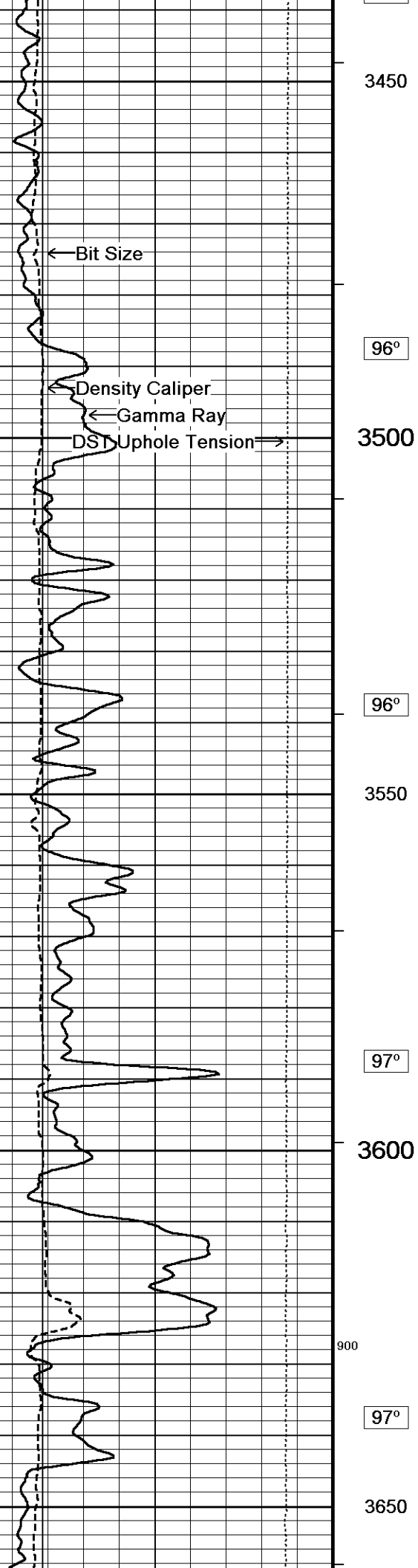










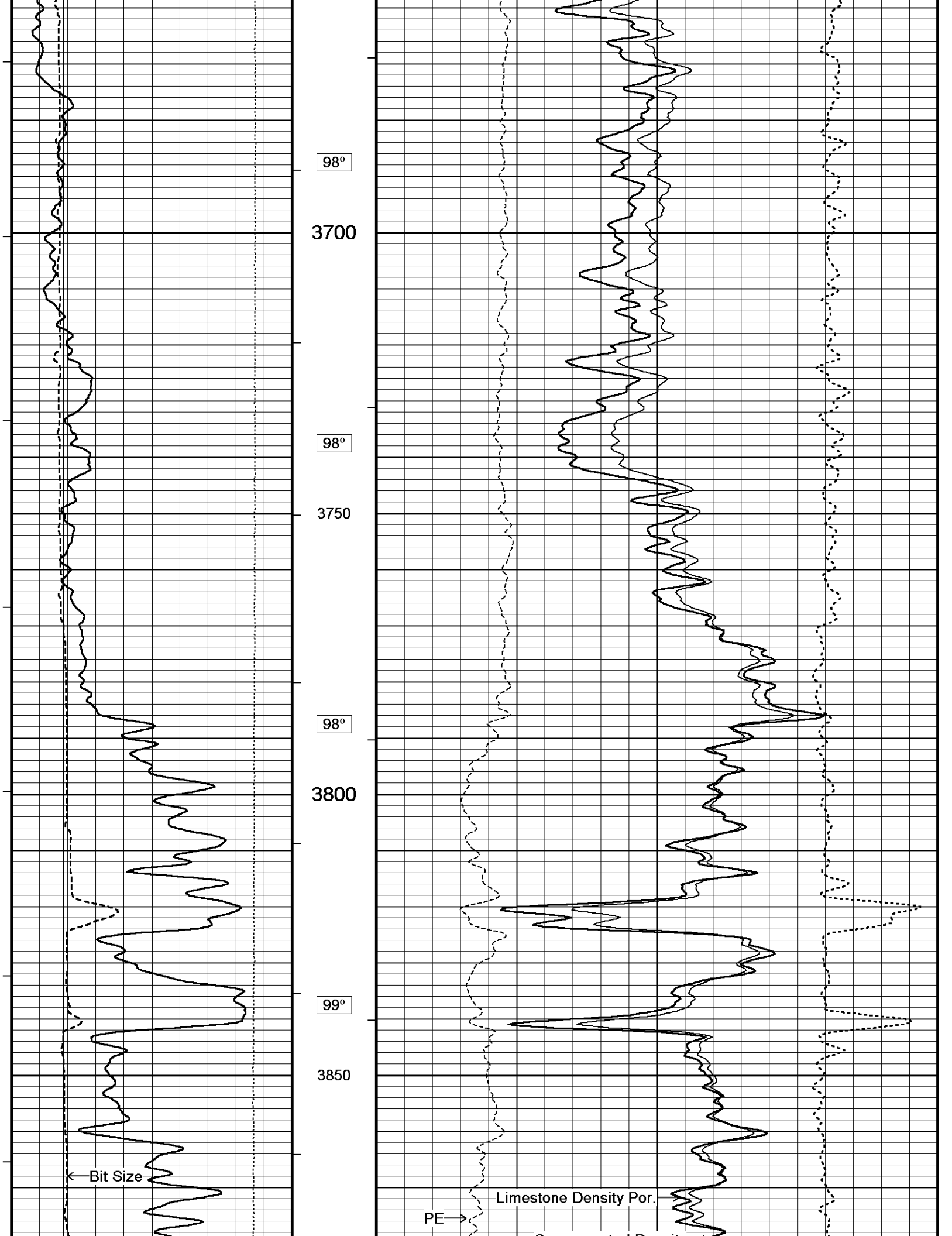


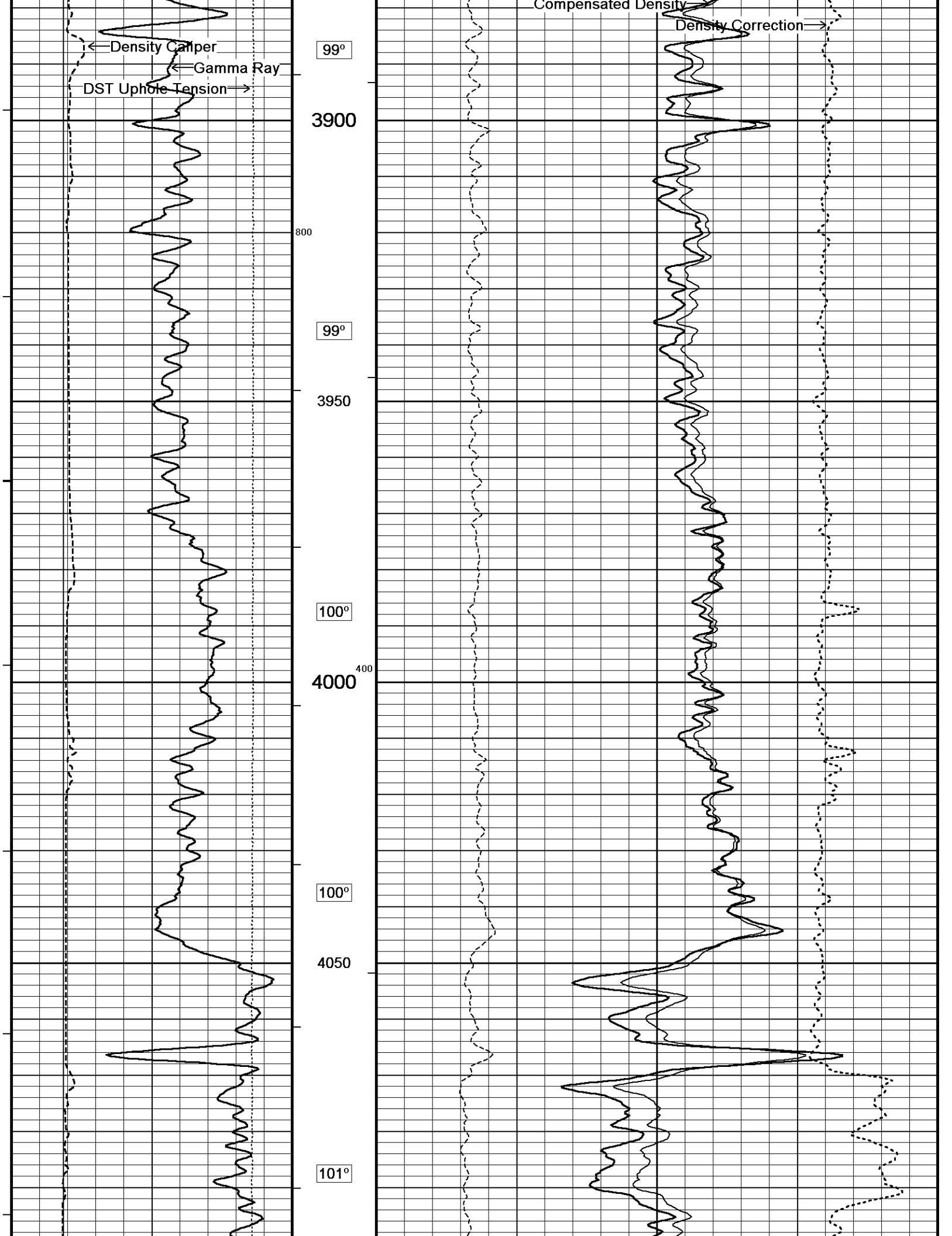
96°

96°

97°

97°





Density Caliper

Gamma Ray

DST Uphole Tension

99°

3900

800

99°

3950

100°

4000<sup>400</sup>

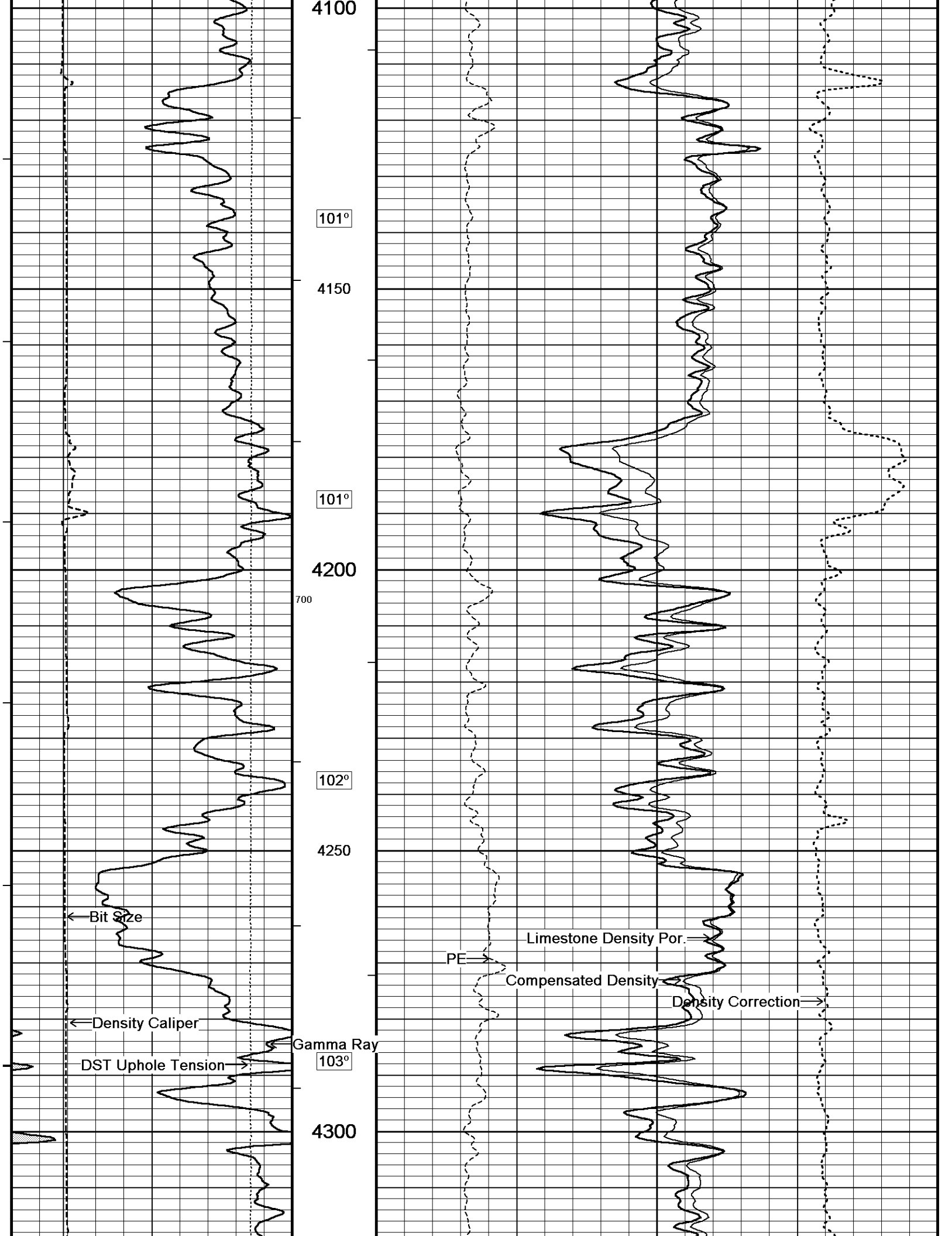
100°

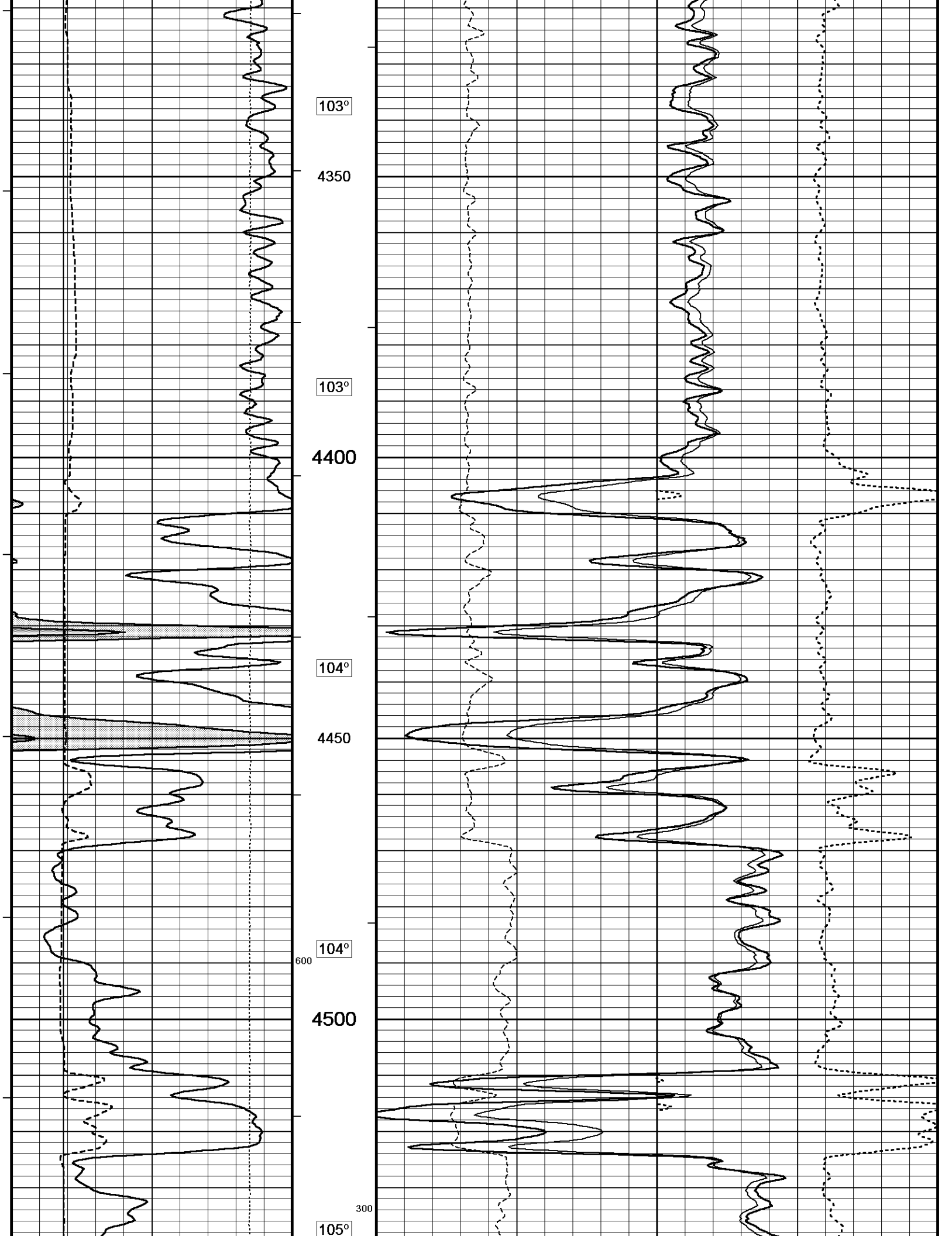
4050

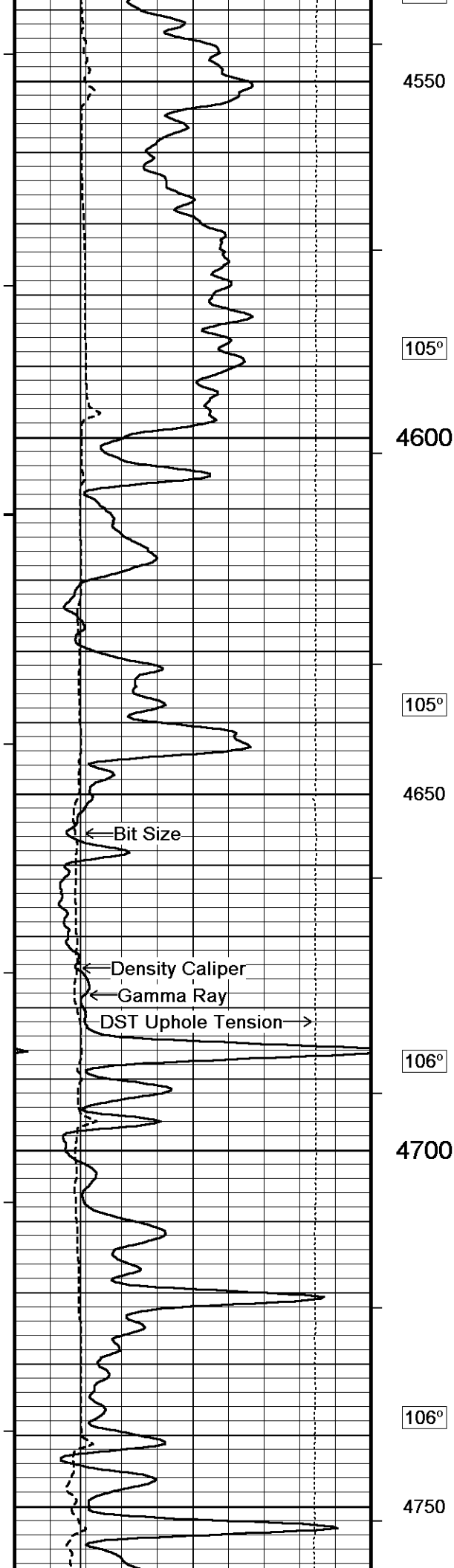
101°

Compensated Density

Density Correction







4550

105°

4600

105°

4650

← Bit Size

← Density Caliper

← Gamma Ray

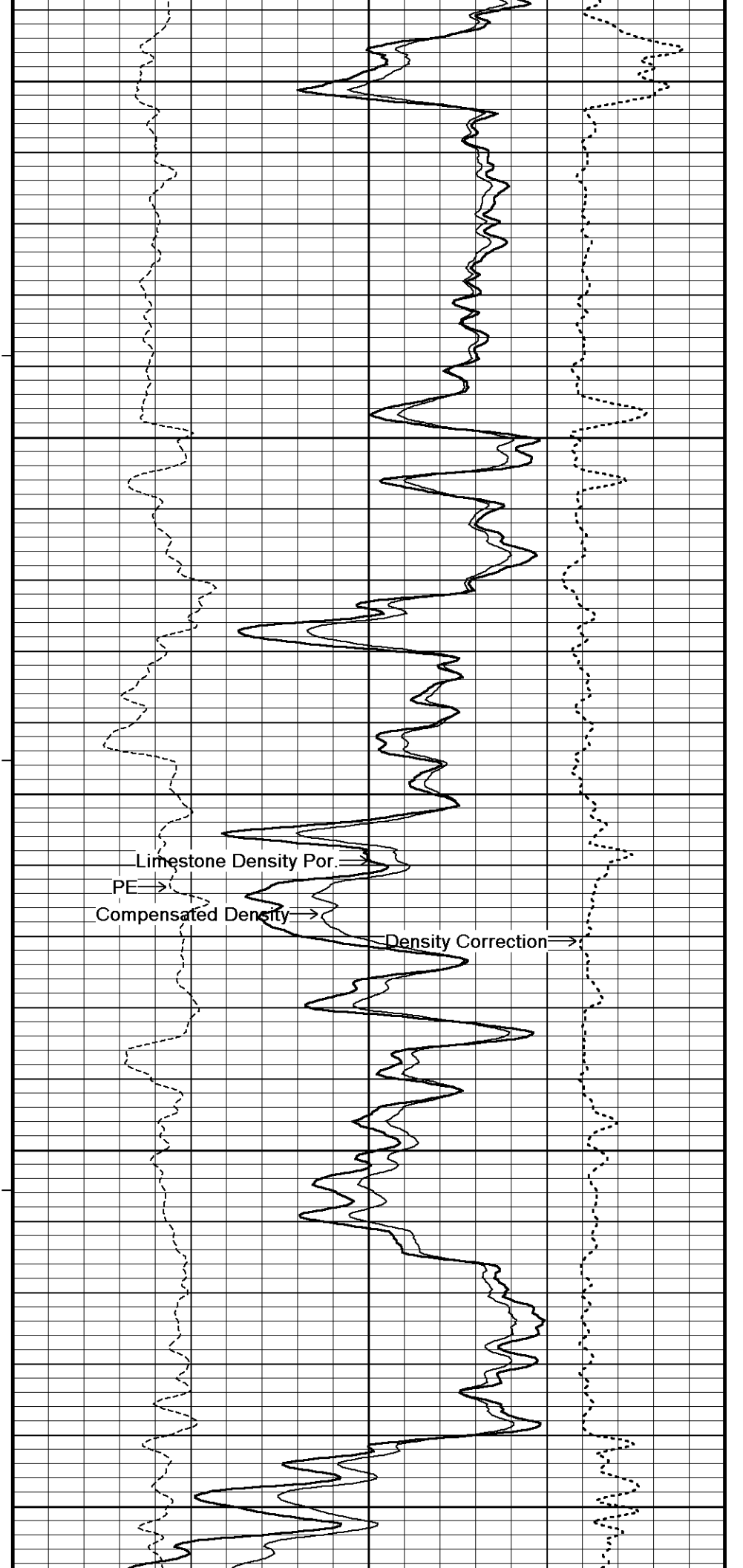
→ DST Uphole Tension

106°

4700

106°

4750

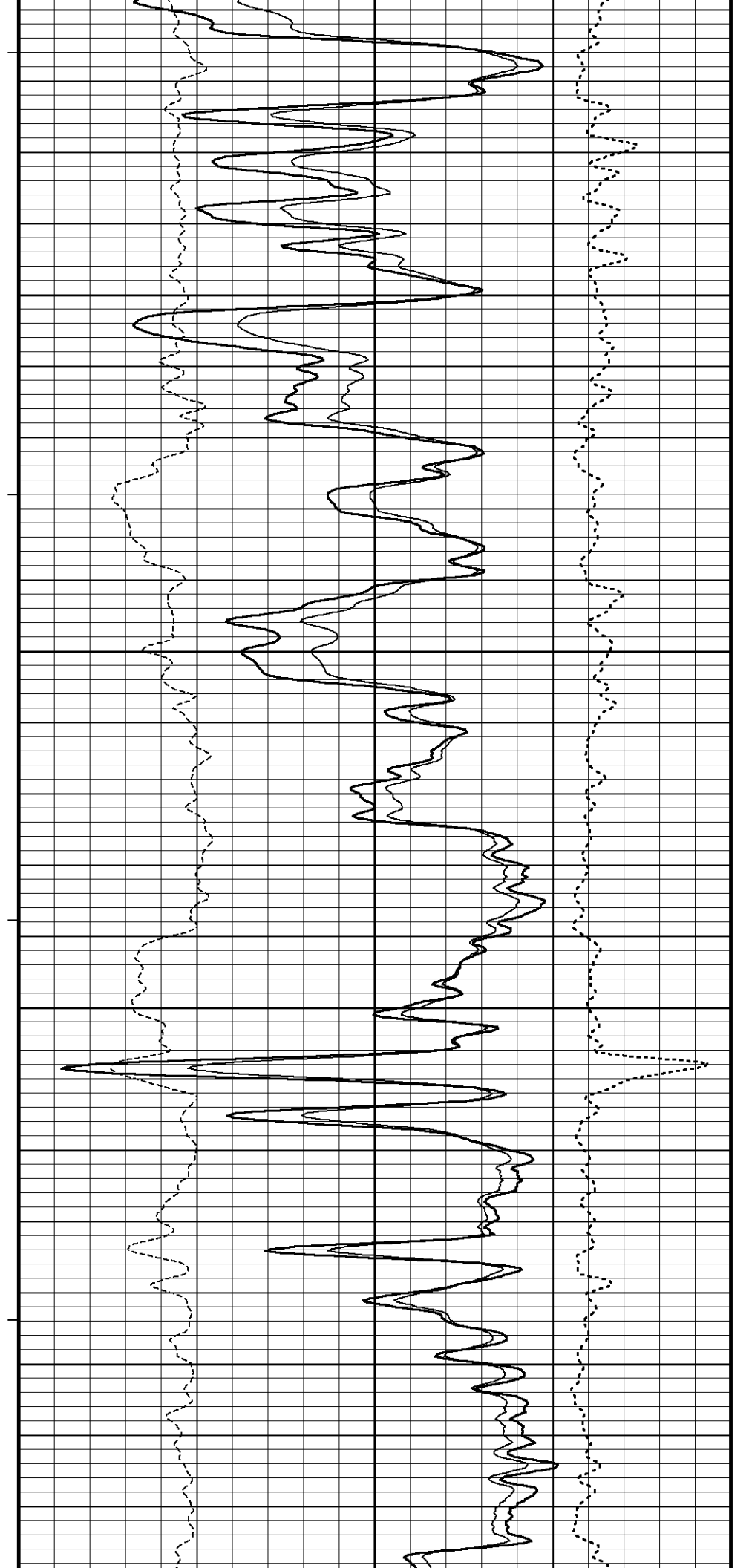
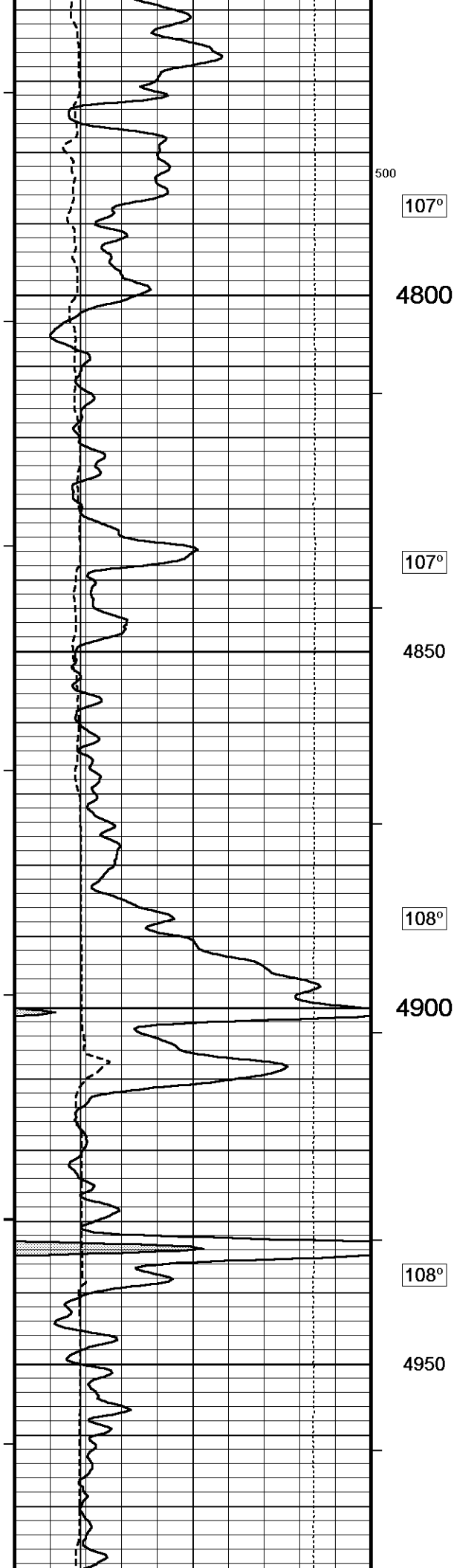


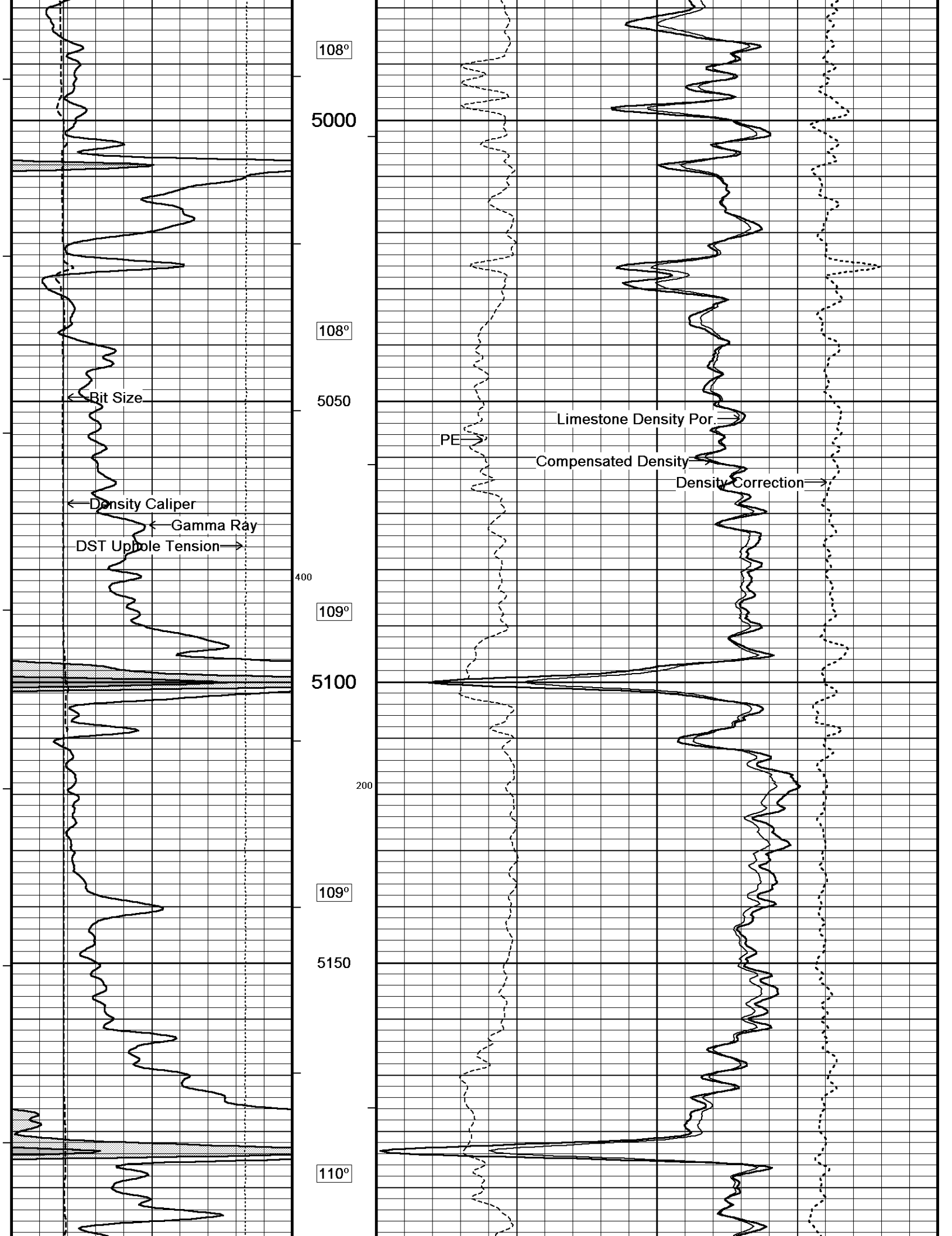
→ Limestone Density Por.

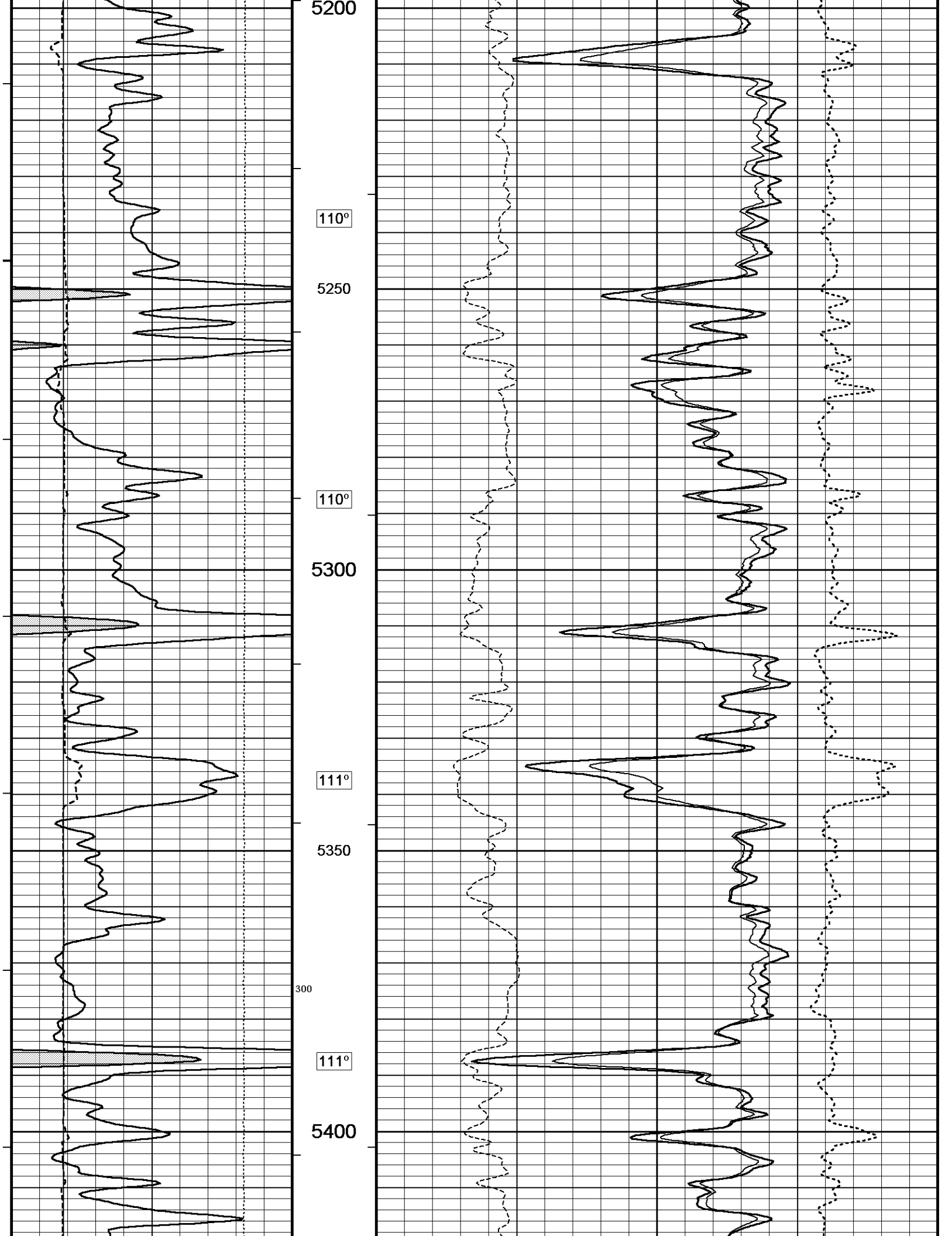
→ PE

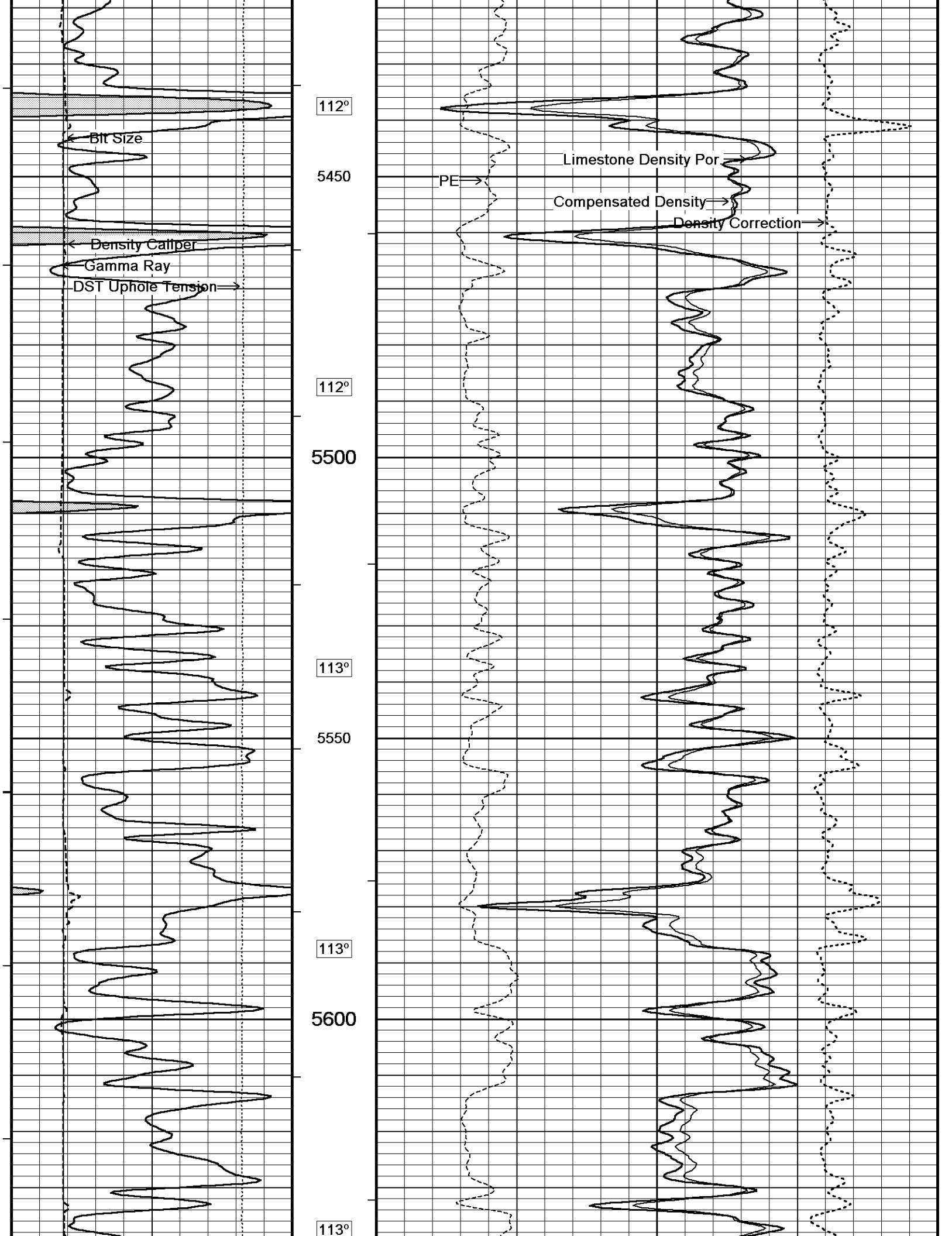
→ Compensated Density

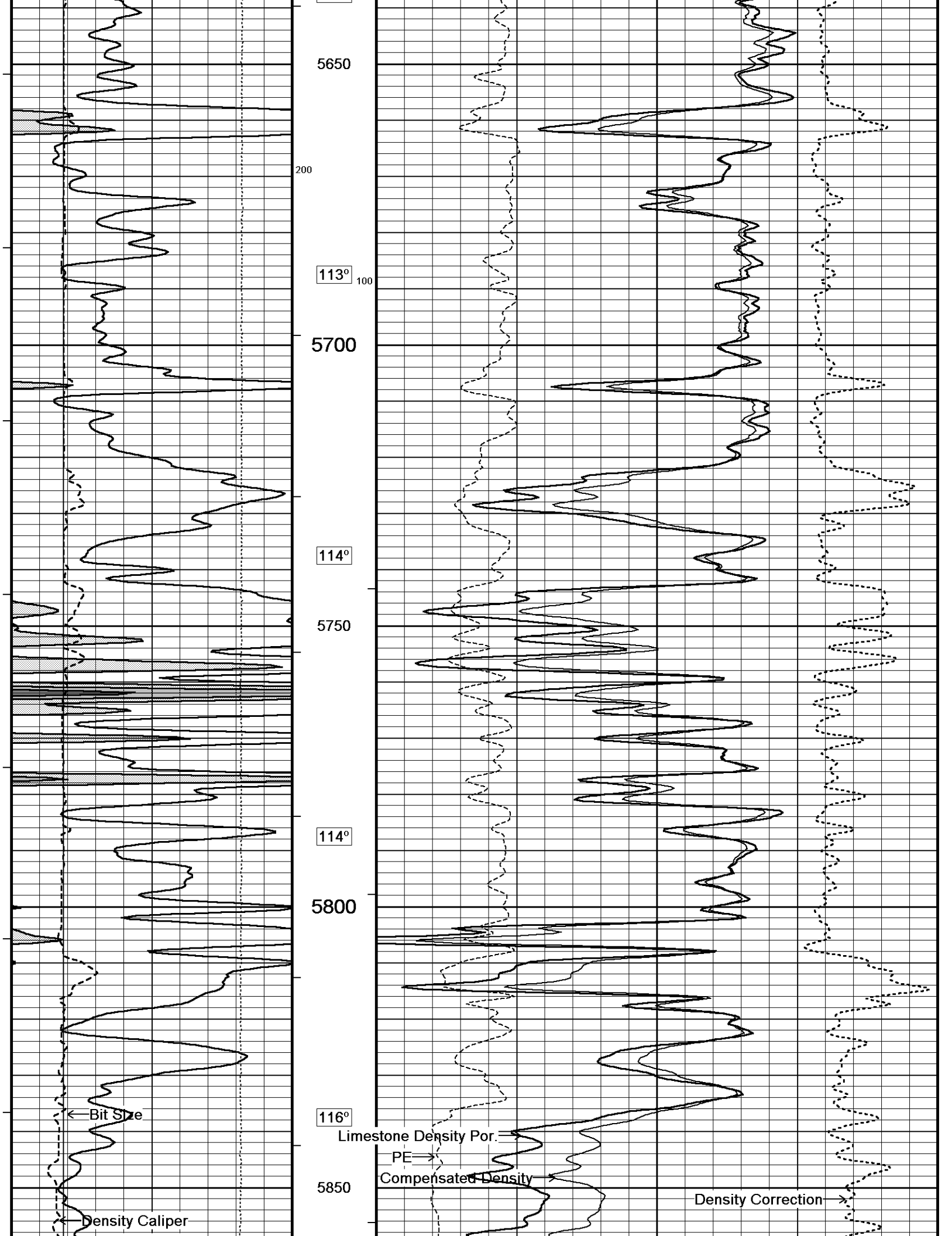
→ Density Correction

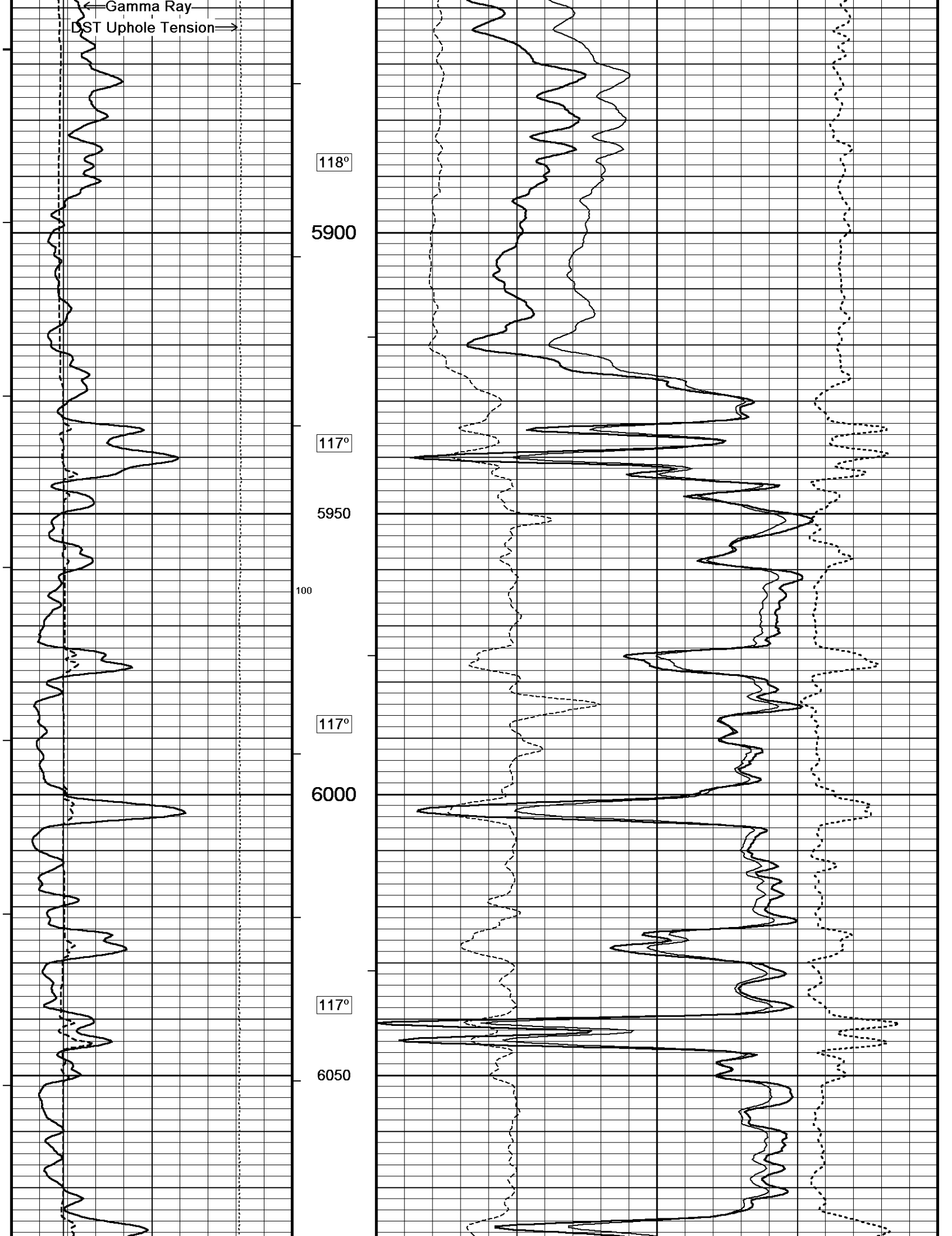


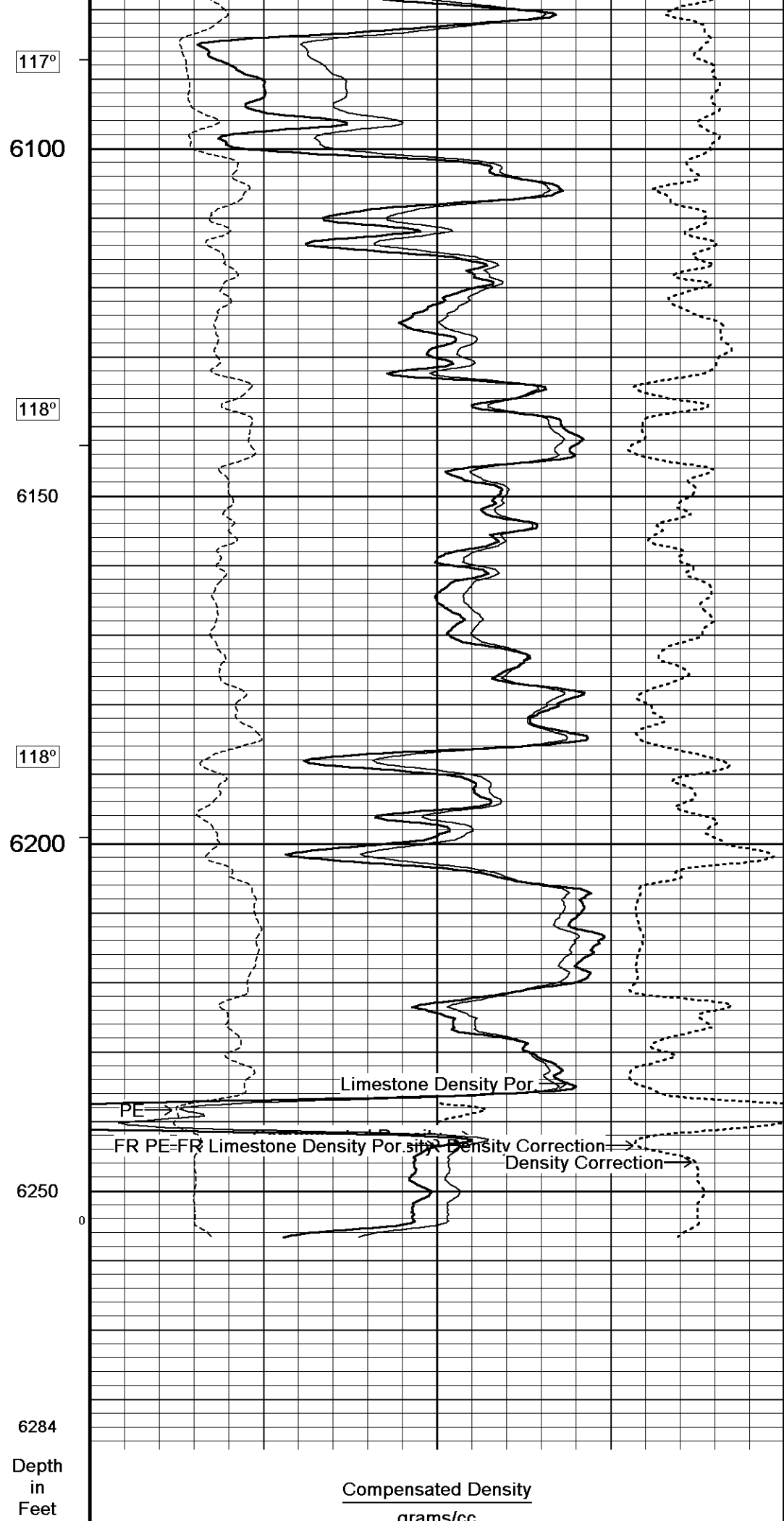
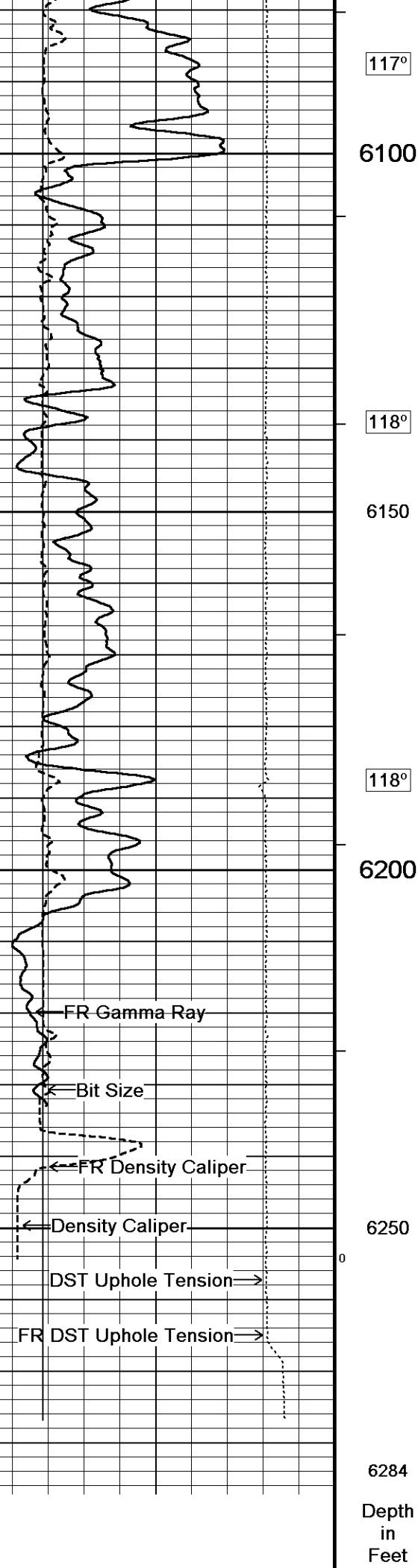


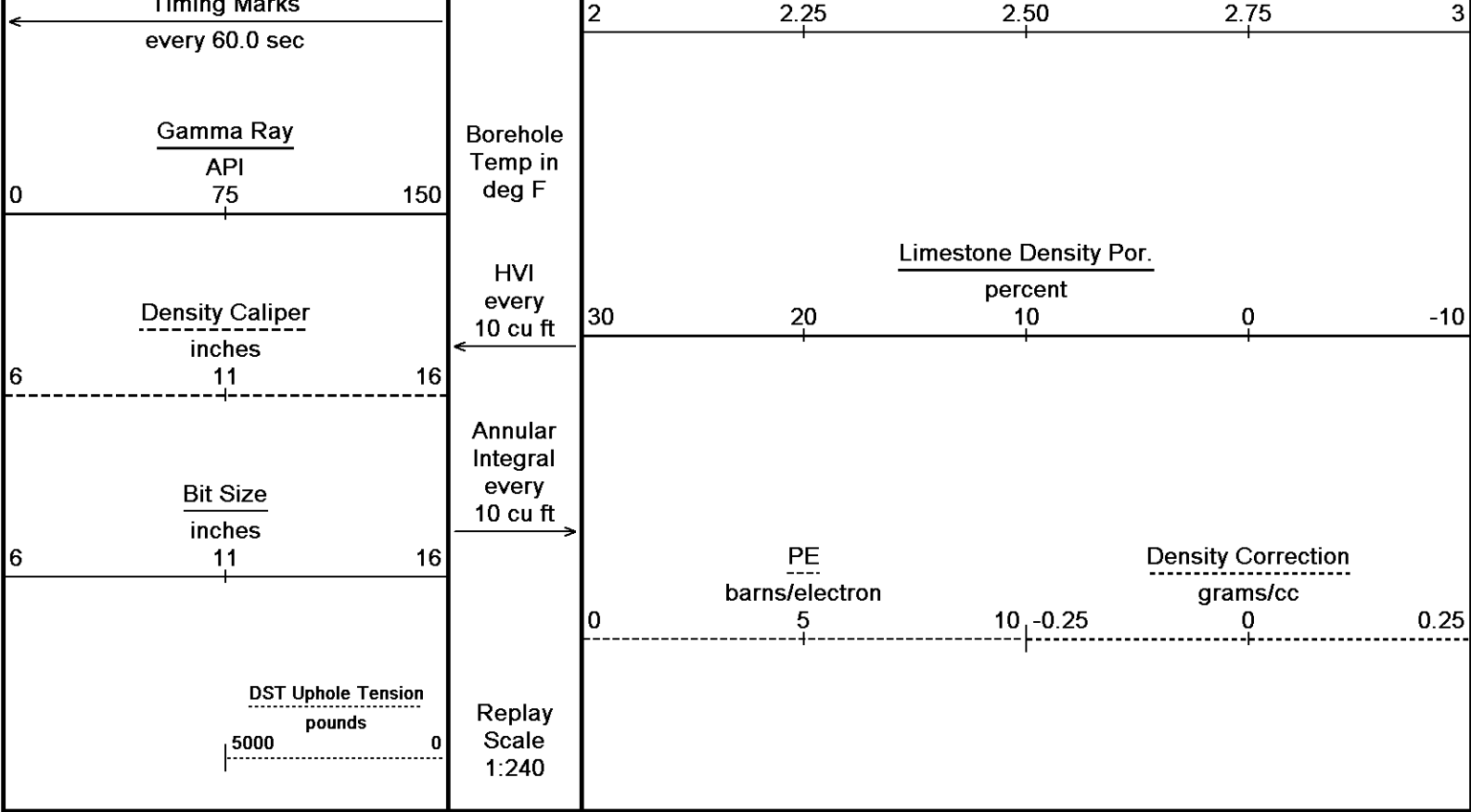










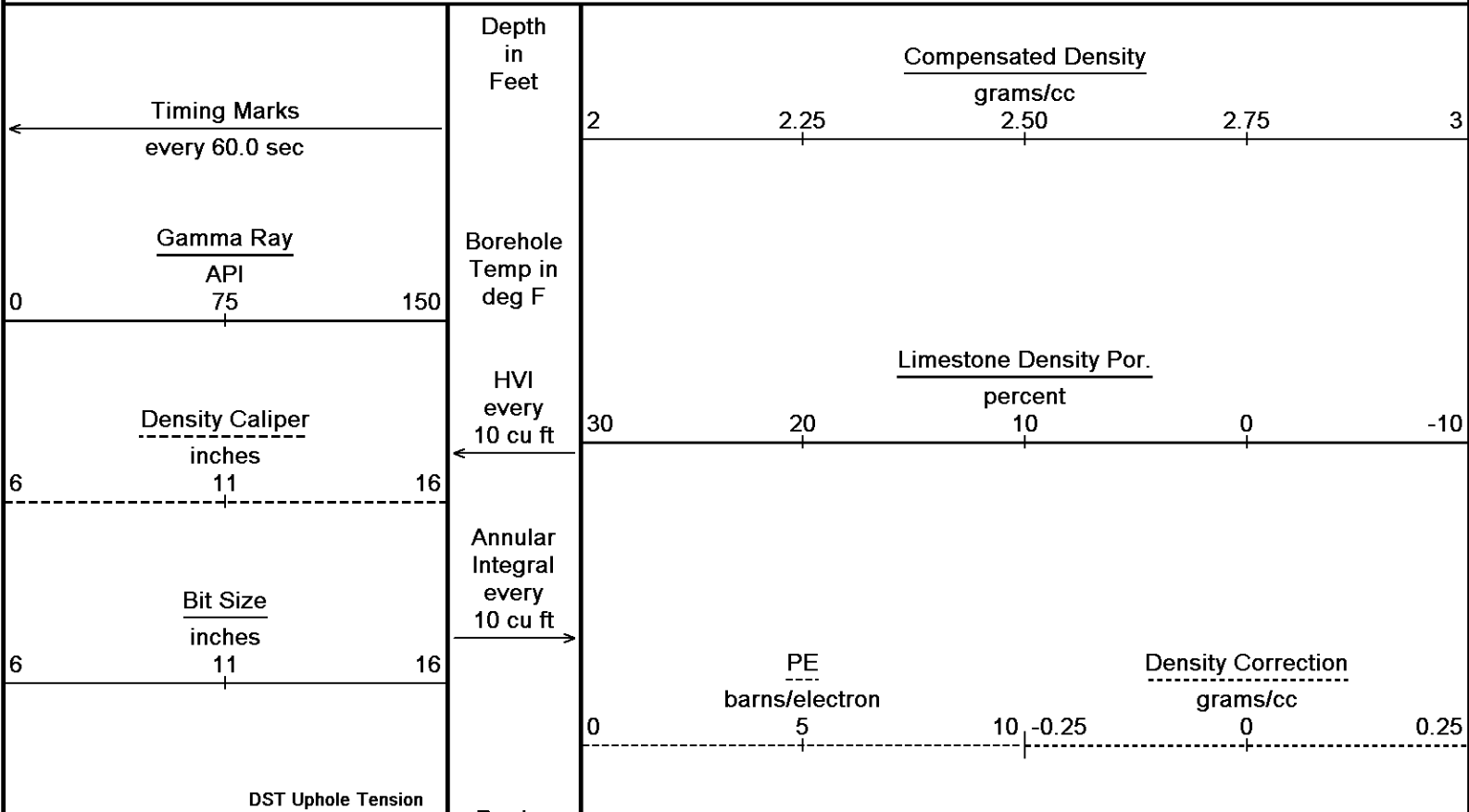


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 03-APR-2011 13:05  
 Filename: C:\DOCUME~1\garciar\LOCALS~1\Temp\Weatherford Pr... \APACHE HAGER 1-12\_002.dta Recorded on 03-APR-2011 01:40  
 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

5 INCH MAIN

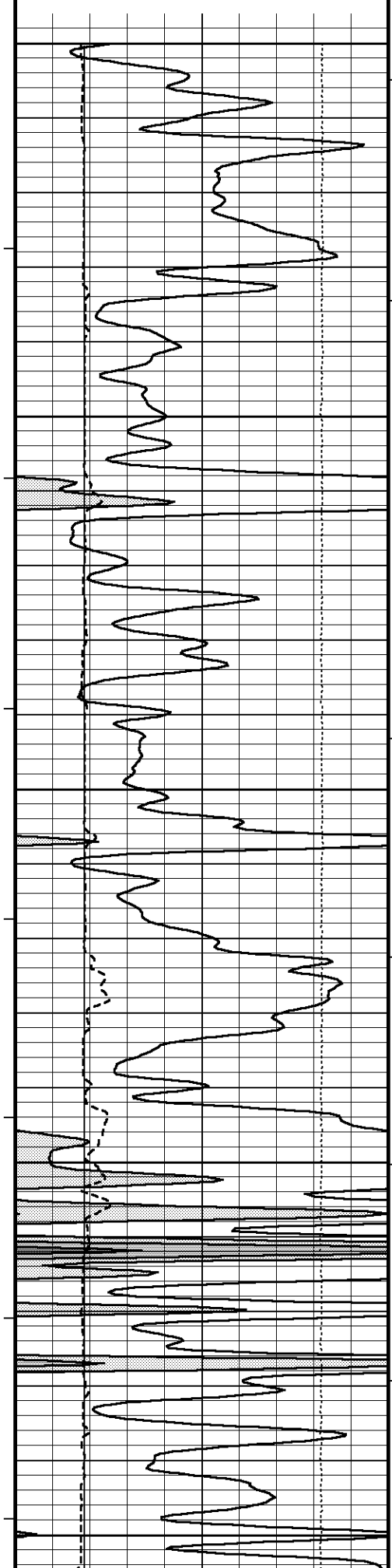
REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 03-APR-2011 13:05  
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 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164



5000 pounds 0

Replay  
Scale  
1:240



5600

111°

5650

200

100

112°

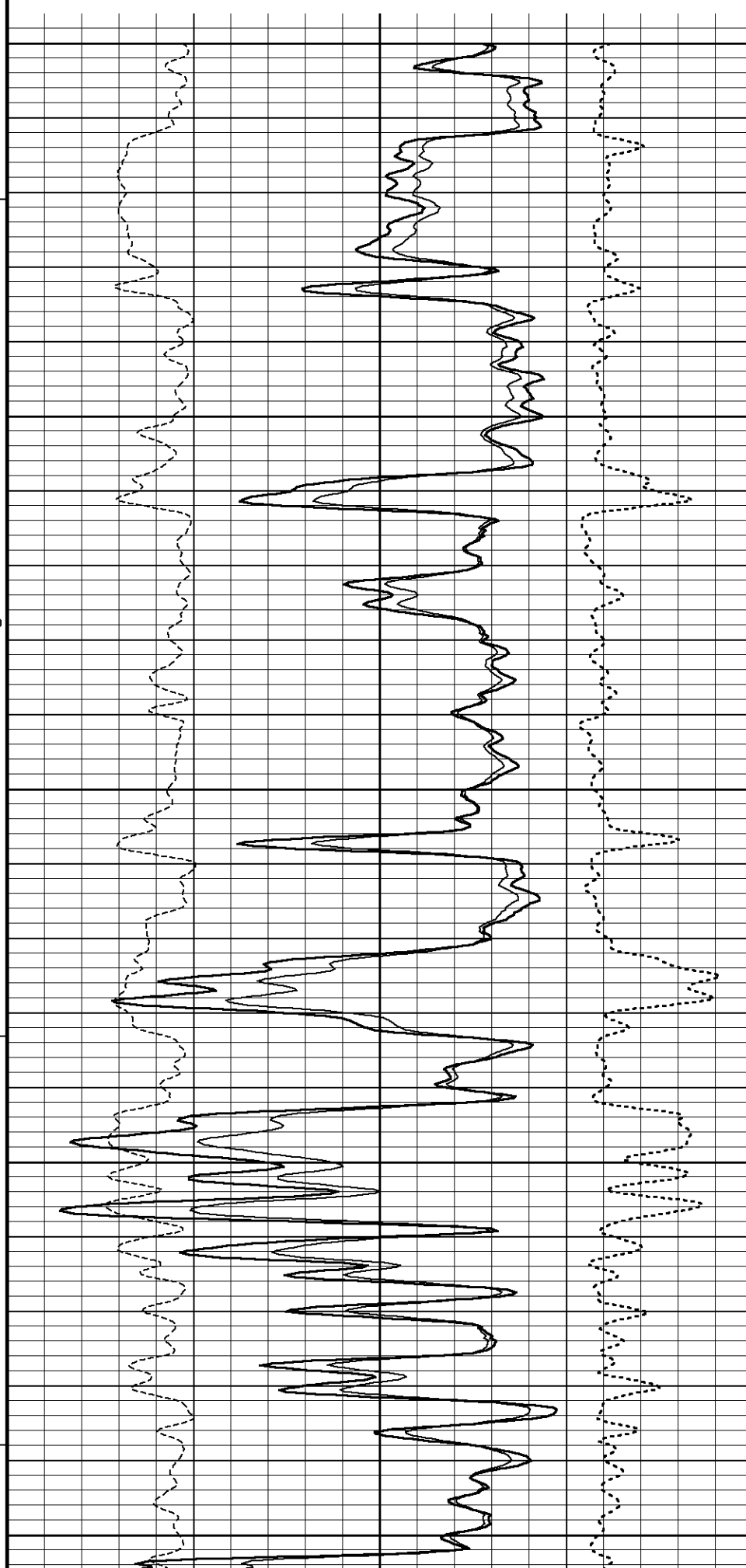
5700

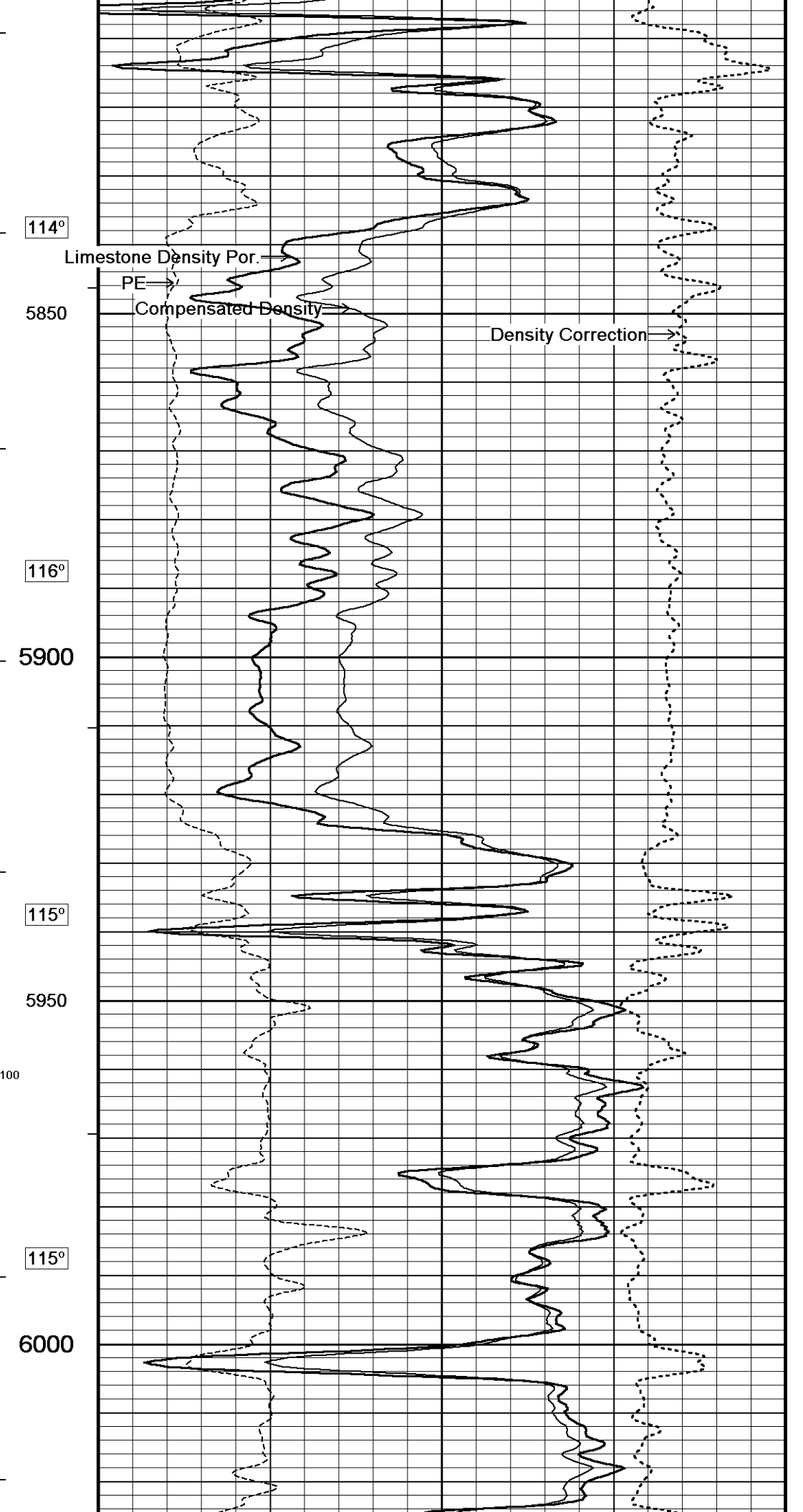
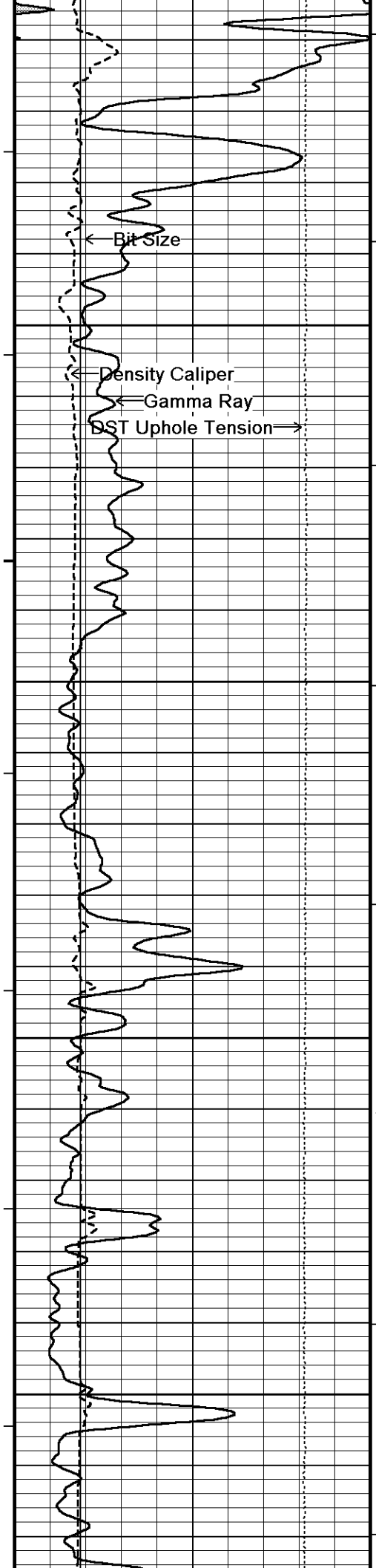
112°

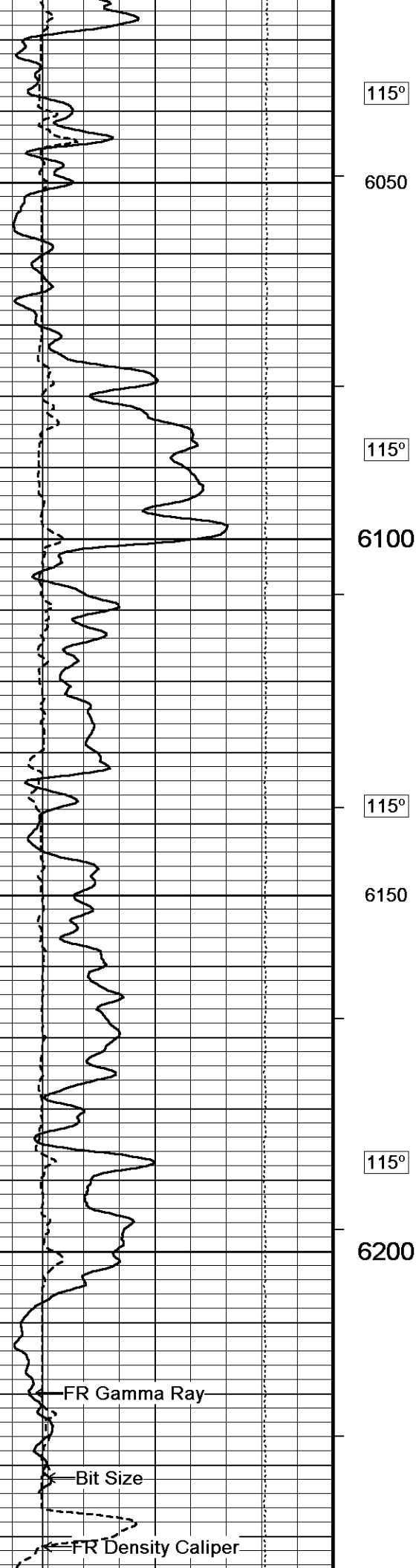
5750

112°

5800







115°

6050

115°

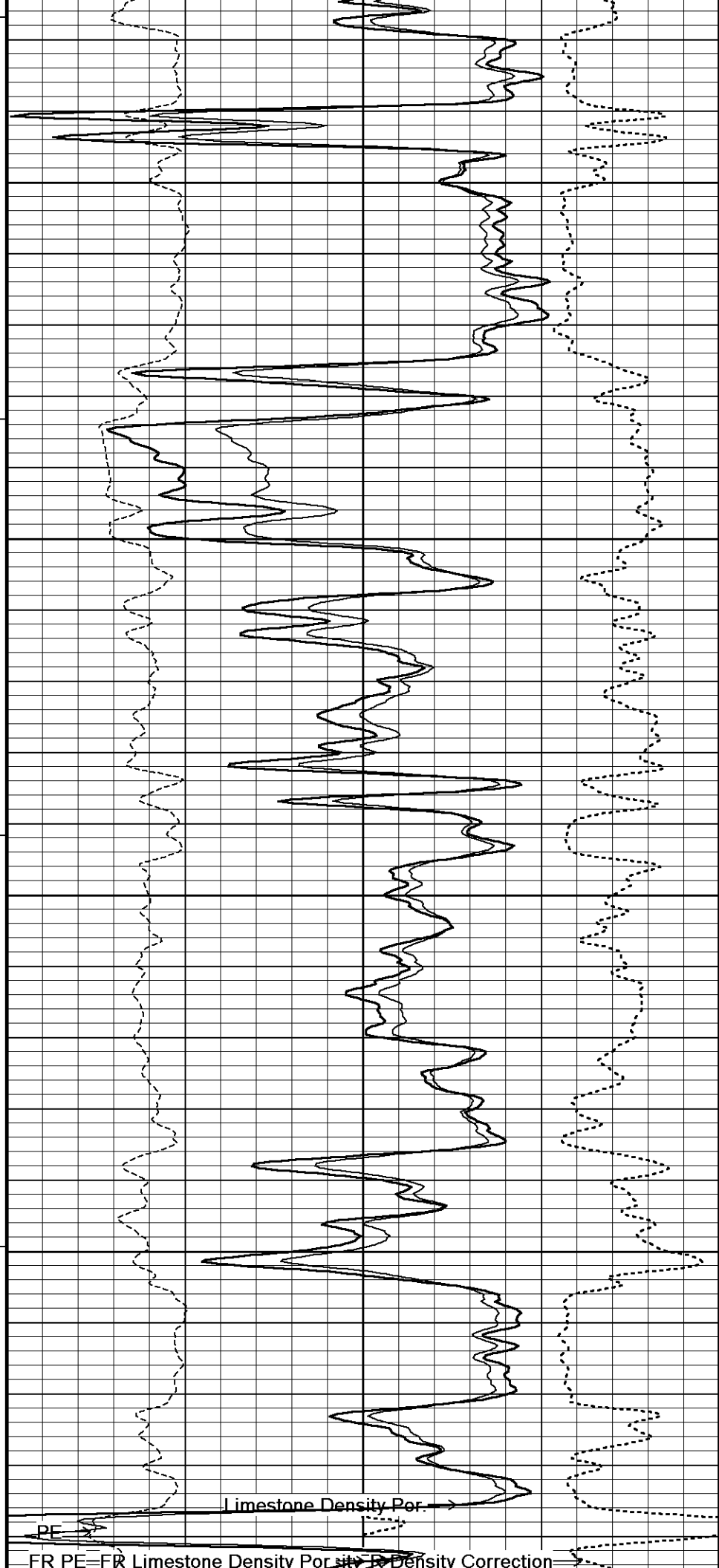
6100

115°

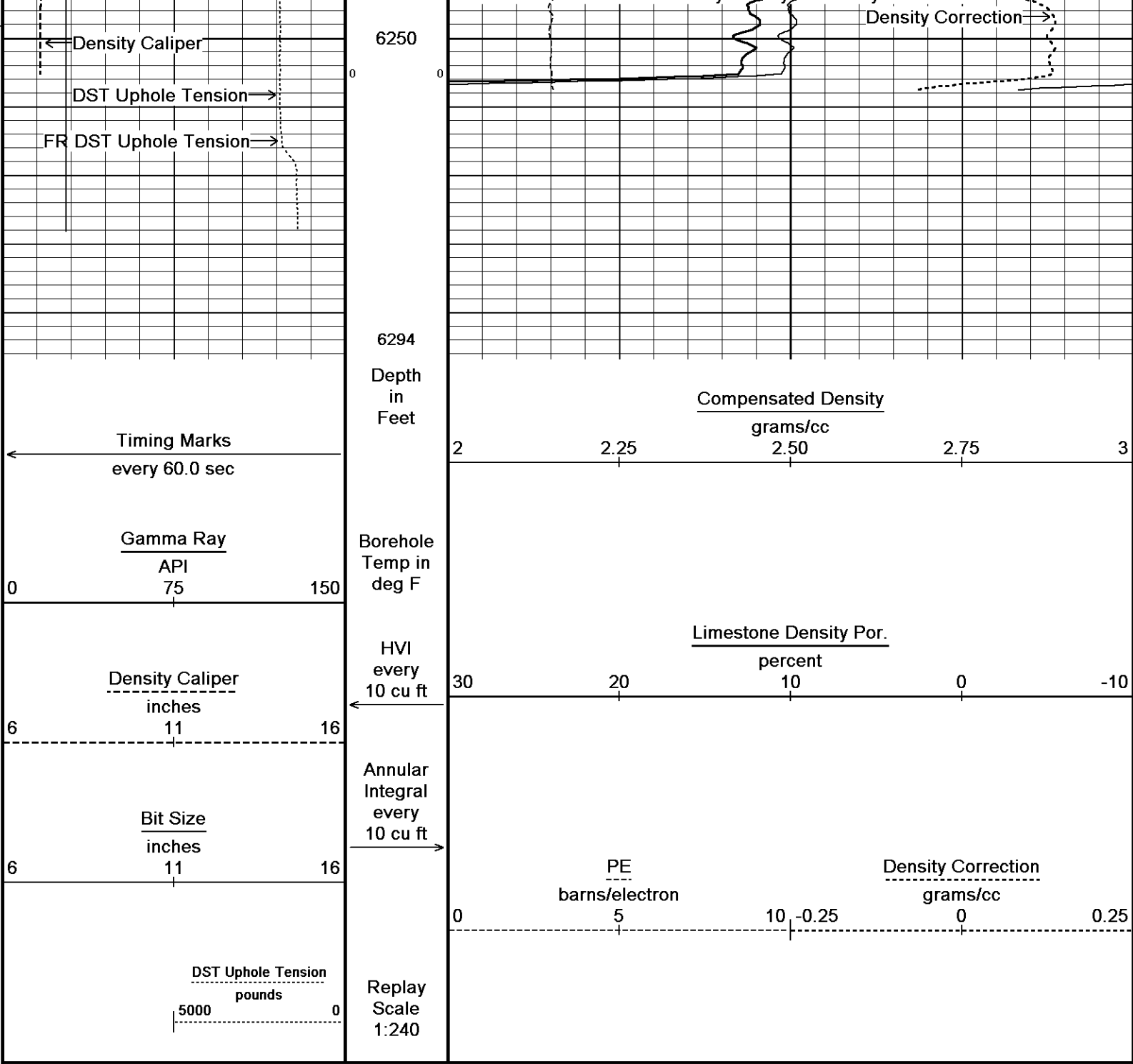
6150

115°

6200



FR PE = FR Limestone Density Porosity + Density Correction



Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 03-APR-2011 13:06  
 Filename: C:\DOCUME~1\garciar\LOCALS~1\Temp\Weatherford Pr... \APACHE HAGER 1-12\_001.dta  
 Recorded on 03-APR-2011 00:59  
 System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

↑ REPEAT SECTION ↑

**BEFORE SURVEY CALIBRATION**  
 C:\DOCUME~1\garciar\LOCALS~1\Temp\Weatherford PreView\0\APACHE HAGER 1-12.dta

General Constants All 000 Last Edited on 02-APR-2011,20:45

General Parameters		
Mud Resistivity	0.870	ohm-metres
Mud Resistivity Temperature	78.000	degrees F
Water Level	0.000	feet
Density/Neutron Processing	Wet Hole	

Hole/Annular Volume and Differential Caliper Parameters  
 HVOL Method Single Caliper  
 HVOL Caliper 1 Density Caliper

HVOL Caliper 1	Density Caliper	N/A	
HVOL Caliper 2		5.500	inches
Annular Volume Diameter			
Caliper for Differential Caliper	Density Caliper		
Rwa Parameters			
Porosity used	Base Density Porosity		
Resistivity used	Array Ind. One Res Rt		
RWA Constant A		1.000	
RWA Constant M		2.000	

Down-hole Tension Calibration All 000			Field Calibration on 30-JUN-2010
Reading No	Measured	Calibrated (lbs)	
1	14112.01	10.00	
2	15164.79	427.00	

Down-hole Tension Calibration SMS 0			Field Calibration on 30-JUN-2010
Reading No	Measured	Calibrated (lbs)	
1	14112.01	10.00	
2	15164.79	427.00	

High Resolution Temperature Calibration MCG-C 139			Field Calibration on 03-SEP-2010,11:23
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-C 139			Last Edited on
Pre-filter Length		11	

SP Calibration MCG-C 139			Field Calibration on 04-MAR-2011 06:37
	Measured	Calibrated (mV)	
Reference 1	103.7	100.0	
Reference 2	-96.9	-100.0	

Gamma Calibration MCG-C 139			Field Calibration on 02-APR-2011 19:01
	Measured	Calibrated (API)	
Background	68	46	
Calibrator (Gross)	1138	771	
Calibrator (Net)	1071	725	

Gamma Constants MCG-C 139			Last Edited on 02-APR-2011,20:45
Gamma Calibrator Number	grc38		
Mud Density	1.08	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Concentration of KCl	0.00	kppm	

Micro Normal and Micro Inverse Calibration MML-A 16					Base Calibration on 11-MAR-2011 11:10
					Field Check on 02-APR-2011 18:47
Base Calibration					
Channel		Measured	Calibrated (ohm-m)		
	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.2	60.2	2.6	12.8	
Micro Inverse	15.6	78.3	1.7	8.4	
Channel		Base Check (ohm-m)	Field Check (ohm-m)		
Micro Normal		32.1	32.1		
Micro Inverse		16.3	16.3		

Micro Normal and Micro Inverse Constants MML-A 16			Last Edited on 02-APR-2011,18:46
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		N/A	inches

Caliper Calibration MML-A 16			Base Calibration on 11-MAR-2011 11:20
			Field Calibration on 02-APR-2011 18:51

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13875	5.98
2	17350	7.97
3	20581	9.86
4	24656	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.01	5.98

Neutron Calibration MDN-A.B 66

Base Calibration on 11-MAR-2011 13:54  
Field Check on 02-APR-2011 18:55

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3091	97	3714	110
Ratio	31.957		33.764	

Field Calibrator at Base

Calibrated (cps)
1660
2371
Ratio
0.700

Field Check

Calibrated (cps)
1663
2382
Ratio
0.698

Neutron Constants MDN-A.B 66

Last Edited on 02-APR-2011,20:46

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.08	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	Constant Value	
Formation Pressure	0.00	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-A.A 52

Base Calibration on 11-MAR-2011 10:55  
Field Check on 02-APR-2011 18:41

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	965.7	126.8

Base Check 279.9

Field Check 279.9

FE Constants MFE-A.A 52

Last Edited on 02-APR-2011,18:40

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

High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 17-JAN-2011,18:32

Lower	Measured	1.00	Calibrated(Deg F)	33.80
Upper		11.00		51.80

High Resolution Temperature Constants MAI-A.A 167

Last Edited on

Pre-filter Length 11

Induction Calibration MAI-A.A 167

Base Calibration on 11-MAR-2011,09:58  
Field Check on 02-APR-2011 18:40

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	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	13.0	3839.1
2	0.0	0.0	29.5	3476.9
3	0.0	0.0	29.0	3053.1
4	0.0	0.0	19.7	2081.9
Deep	0.0	0.0	18.5	2049.2
Medium	0.0	0.0	42.1	3991.2
Shallow	0.0	0.0	42.9	5053.8

Array Temperature 0.0 74.7 Deg F

Induction Constants MAI-A.A 167

Last Edited on 02-APR-2011,18:37

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	

## Base Calibration

Reading No	Measured	Calibrator Size (in)
1	17936	3.99
2	28079	5.98
3	38384	7.97
4	48048	9.86
5	59047	11.92
6	N/A	N/A

## Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.98	5.98

## Photo Density Calibration MPD-B 35

Base Calibration on 11-MAR-2011 11:54

Field Check on 02-APR-2011 18:46

## Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	57876	27553	59556	30836
Reference 2	23524	2615	24941	2541

## Field Check at Base

1175.2 1398.5

## Field Check

1173.8 1392.5

## PE Calibration

Base Calibration	WS	Measured		Calibrated Ratio
		WH	Ratio	
Background	211	1039		
Reference 1	21426	57673	0.375	0.371
Reference 2	6234	23377	0.270	0.272

## Field Check at Base

211.2 1039.0

## Field Check

209.4 1039.0

## Density Constants MPD-B 35

Last Edited on 02-APR-2011,20:46

Density Source Id	p50557b
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

## DOWNHOLE EQUIPMENT

Compact Comms Gamma  
MCG-C 139 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log  
MML-A 16 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

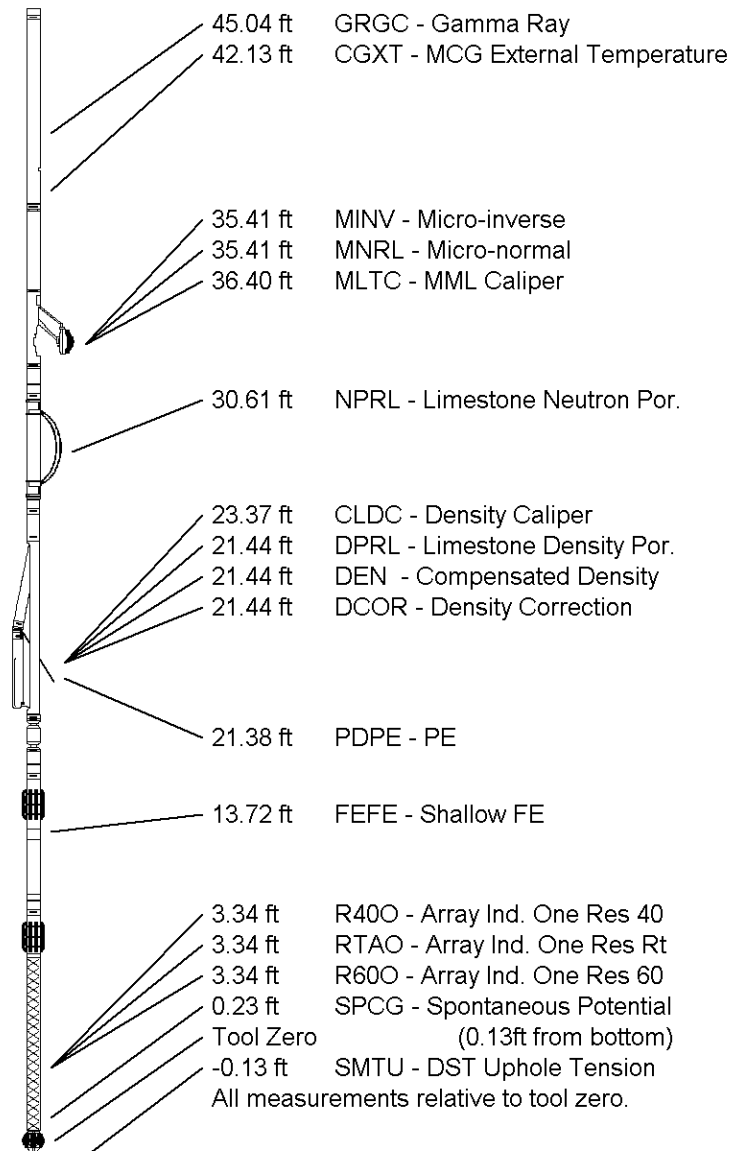
Compact Density/Caliper  
MPD-B 35 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

SKJ-D.A Compact Knuckle Joint  
SKJ-D.A 36 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

Compact Focused Electric  
MFE-A.A 52 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: 50.32 ft Weight: 407.9 lb



COMPANY	APACHE CORP.
WELL	HAGER 1-12
FIELD	UNNAMED
PROVINCE/COUNTY	MEADE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2371.00	feet	First Reading	6243.00	feet
Elevation Drill Floor	2369.00	feet	Depth Driller	6260.00	feet
Elevation Ground Level	2359.00	feet	Depth Logger	6265.00	feet



COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG

