



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY

MURFIN DRILLING COMPANY, INC.

WELL

COLUMBINE #8-24

FIELD

WILDCAT

PROVINCE/COUNTY LINCOLN

COUNTRY/STATE

U.S.A. / COLORADO

LOCATION

2040' FNL & 600' FEL

SEC 24

TWP 9S

RGE 56W

Latitude

Other Services

MAI/MFE

MSS

API Number

05-073-06753

Permanent Datum GL, Elevation 5380 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

Date 15-NOV-2018

Run Number

ONE

Service Order

4558-229462509

Depth Driller

8574.00 feet

Depth Logger

8566.00 feet

First Reading

8532.00 feet

Last Reading

4200.00 feet

Casing Driller

455.00 feet

Casing Logger

456.00 feet

Bit Size

7.875

inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.40 lb/USg 70.00 CP

PH / Fluid Loss

10.50 6.40 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

0.85 @ 75.0 ohm-m

Rmf @ Measured Temp

0.68 @ 75.0 ohm-m

Rmc @ Measured Temp

1.02 @ 75.0 ohm-m

Source Rmf / Rmc

CALC CALC

Rm @ BHT

0.35 @180.0 ohm-m

Time Since Circulation

5 HOURS

Max Recorded Temp

180.00 deg F

Equipment / Base

13096 LIB

Recorded By

ADAM SILL

Witnessed By

GREGG SMITH

Elevations:
KB 5393.00 feet
DF 5391.00
GL 5380.00

BOREHOLE RECORD

Last Edited: 15-NOV-2018 20:38

Bit Size
inches

7.875

Depth From
feet

455.00

Depth To
feet

8574.00

CASING RECORD

Type

Size
inches

8.625

Depth From
feet

0.00

Shoe Depth
feet

455.00

Weight
pounds/ft

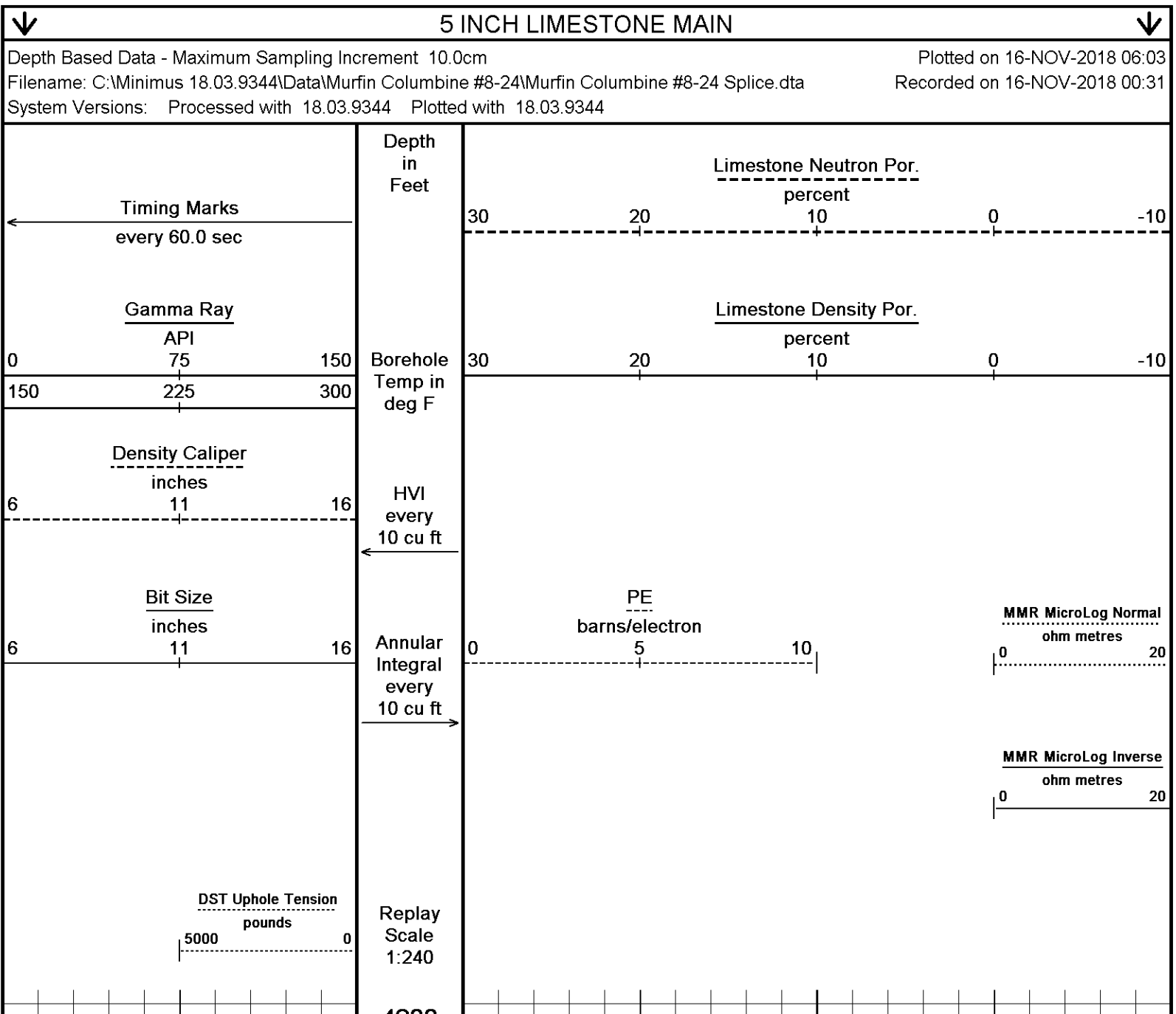
24.00

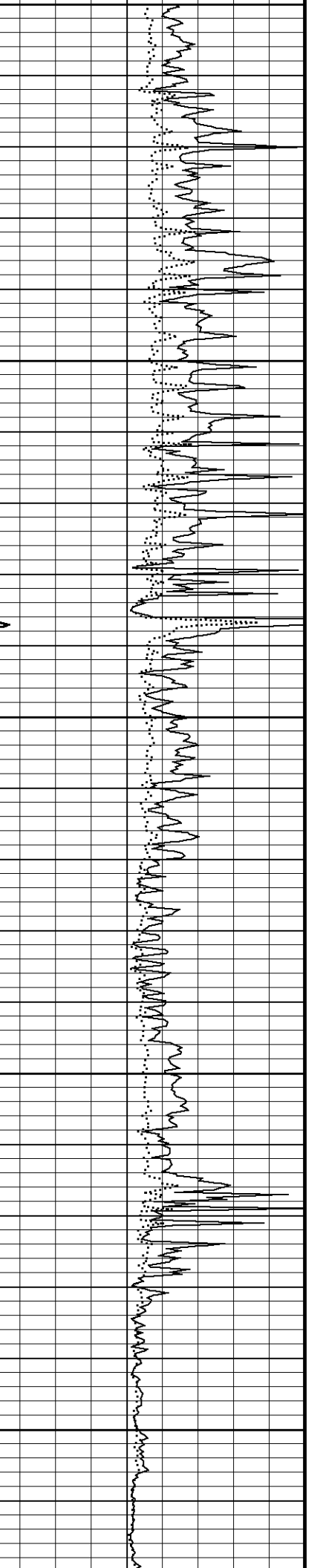
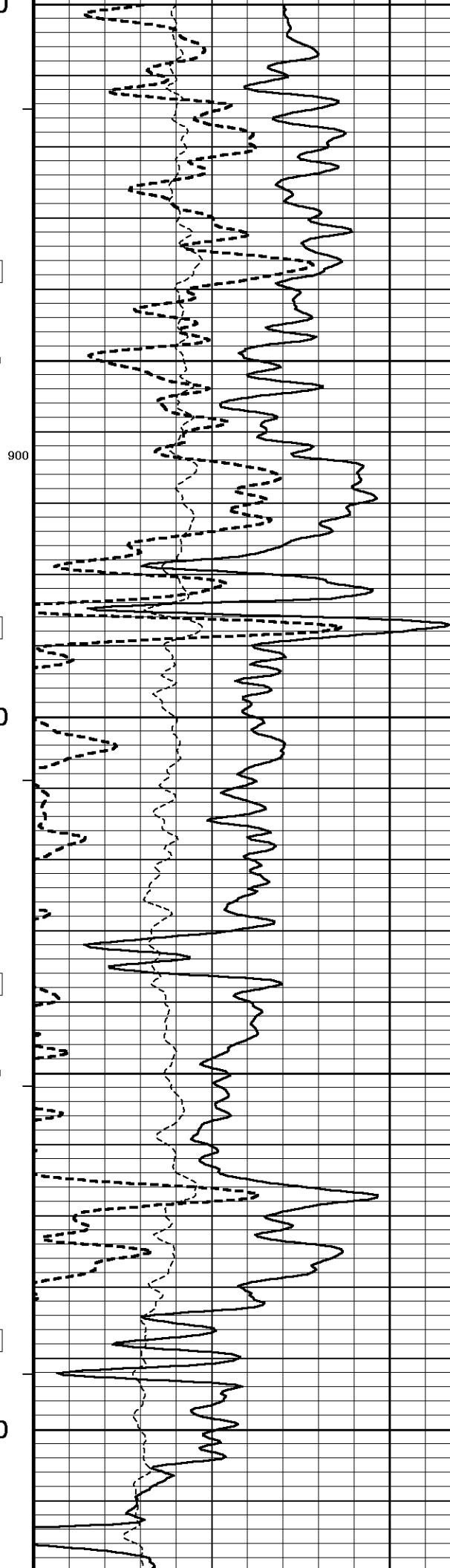
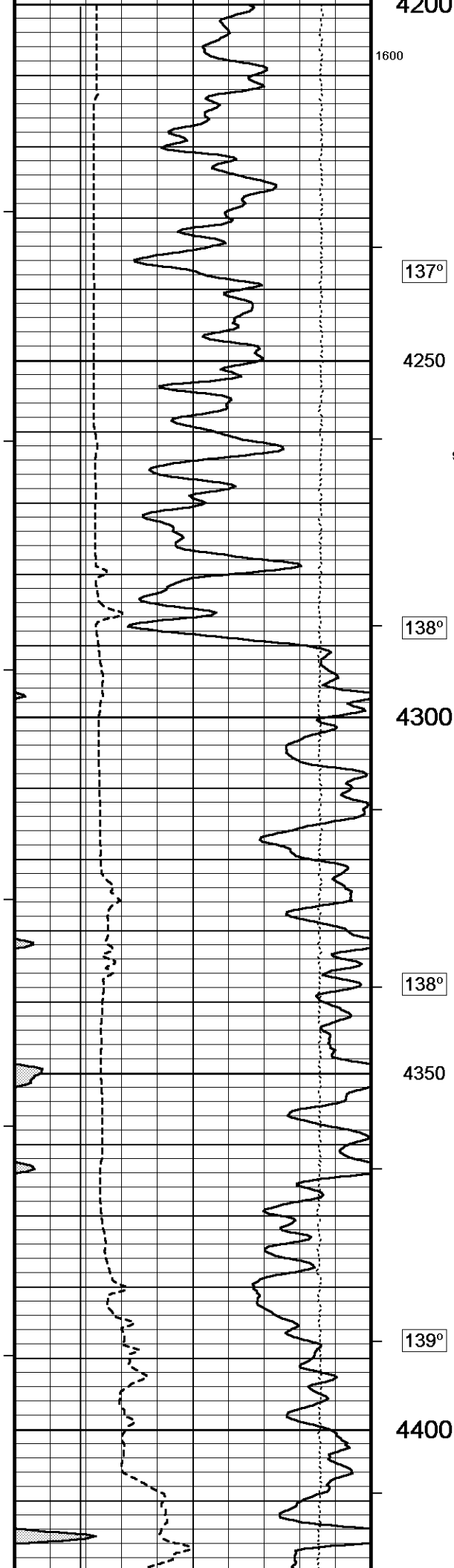
REMARKS

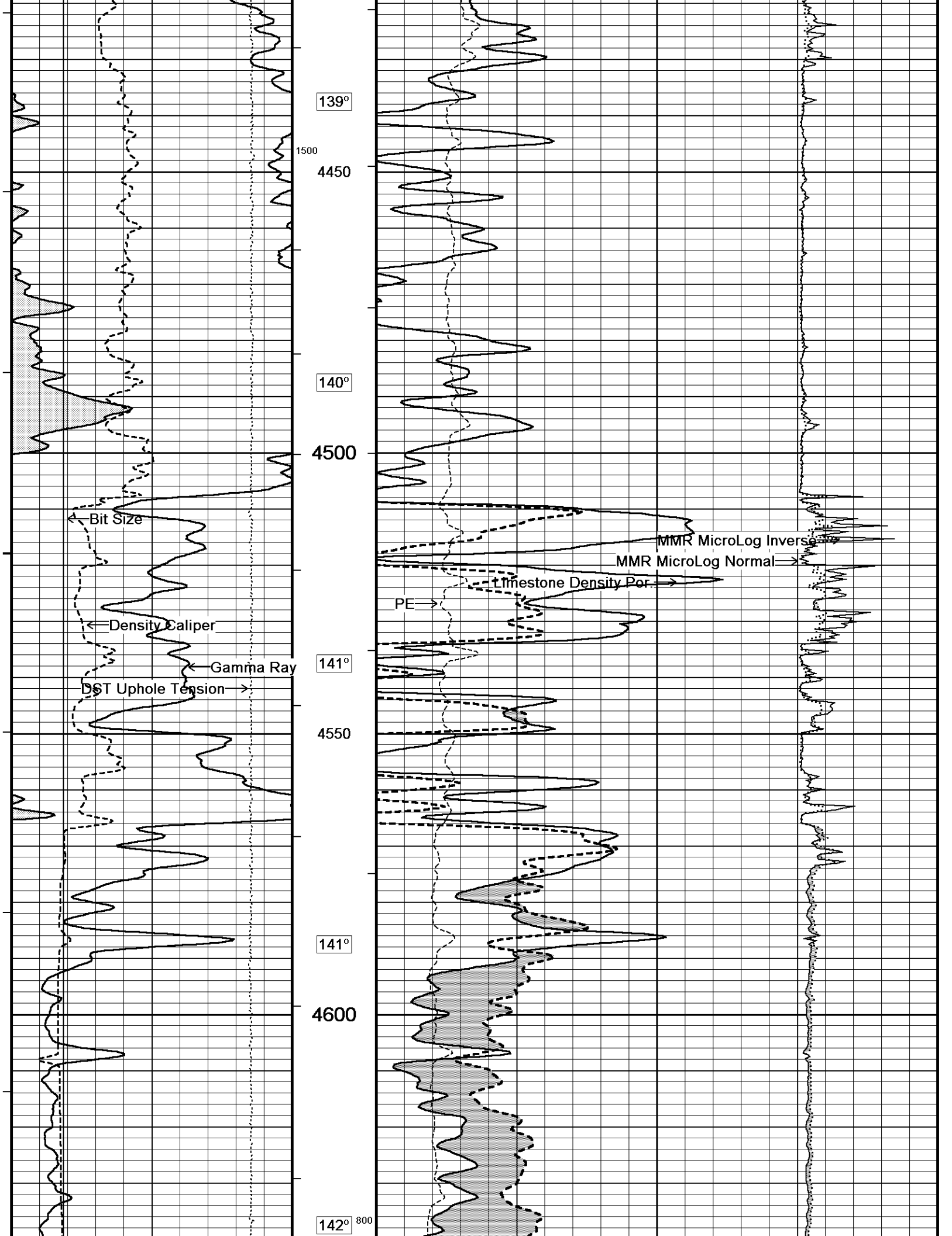
- SOFTWARE ISSUE: WLS 18.03.9344.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE 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: 4041 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 4200 FEET: 913 CU.FT.

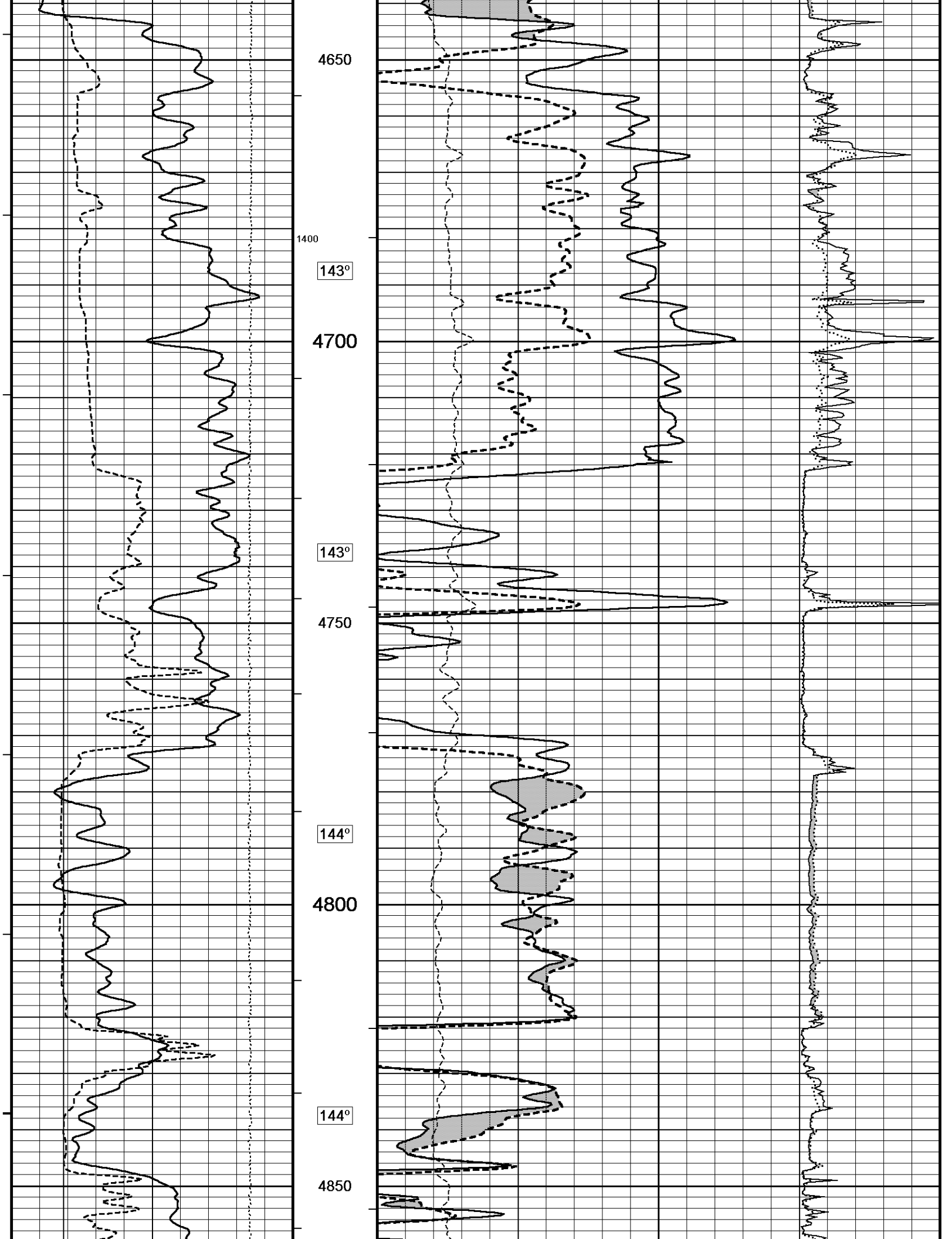
**** CALIPERS WERE CLOSED BETWEEN 5725 FEET AND 5900 FEET AS PER CUSTOMER'S REQUEST, DUE TO HOLE CONDITIONS THROUGH THAT INTERVAL. TOOL READINGS MAY NOT BE ACCURATE THROUGH THIS INTERVAL. ****

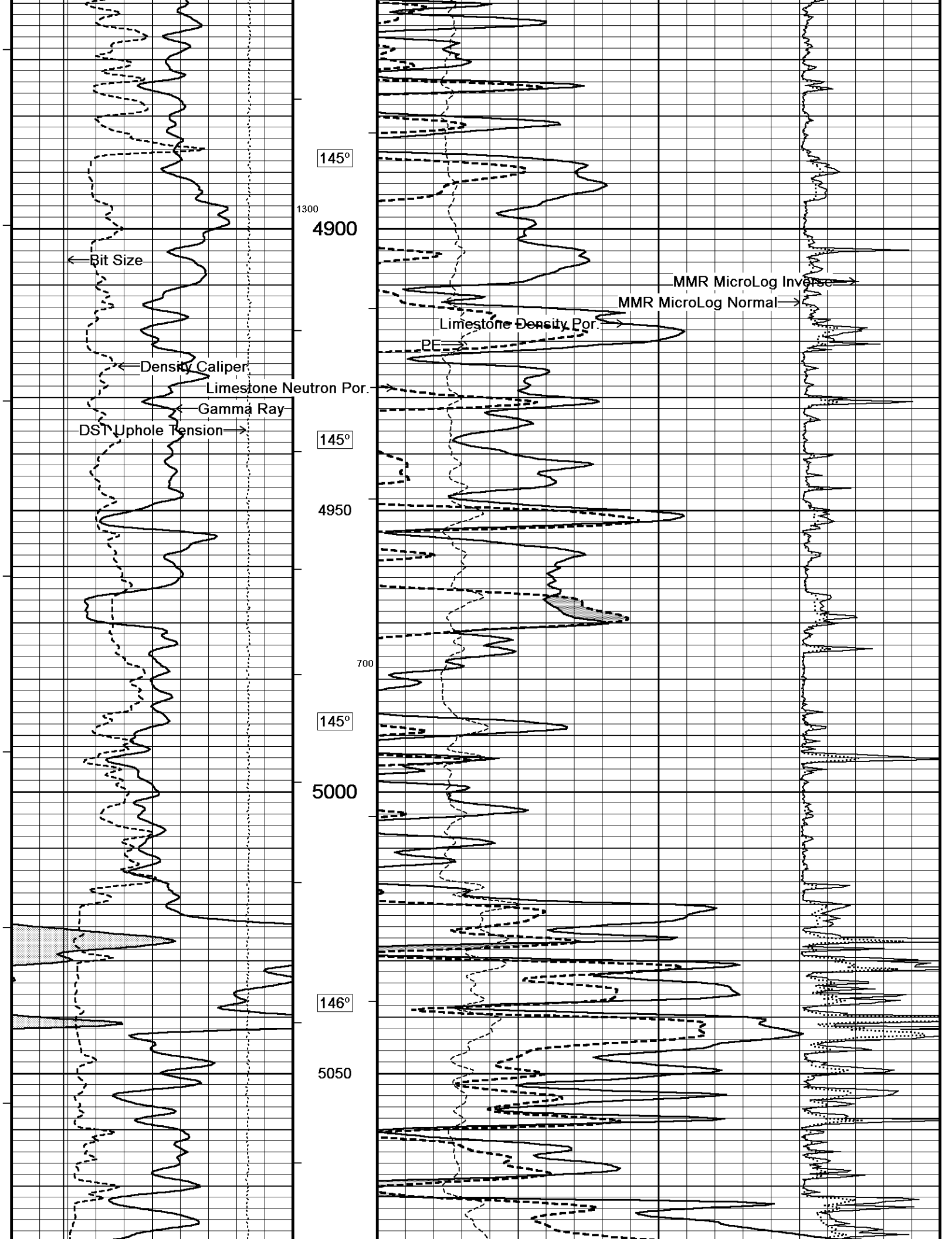
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

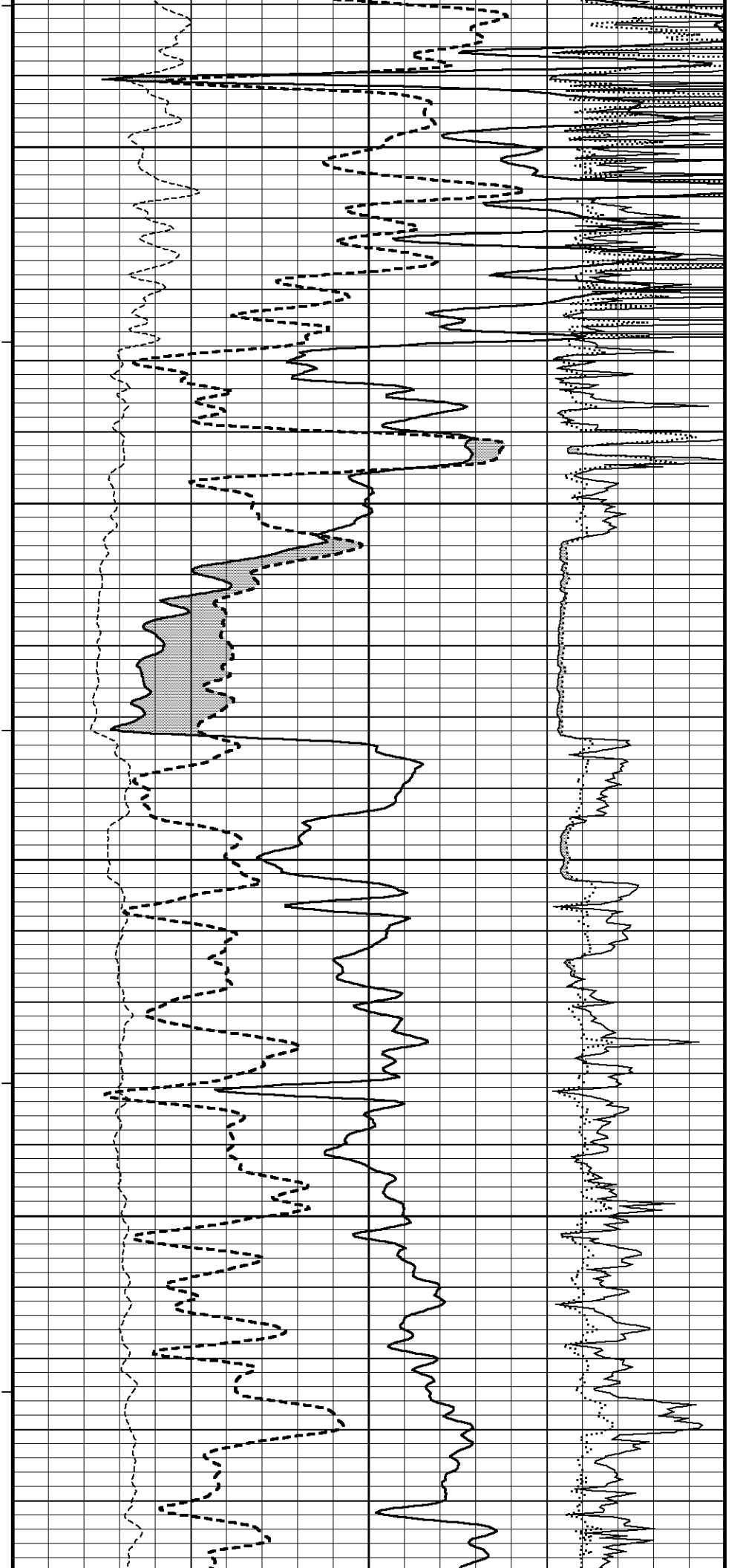
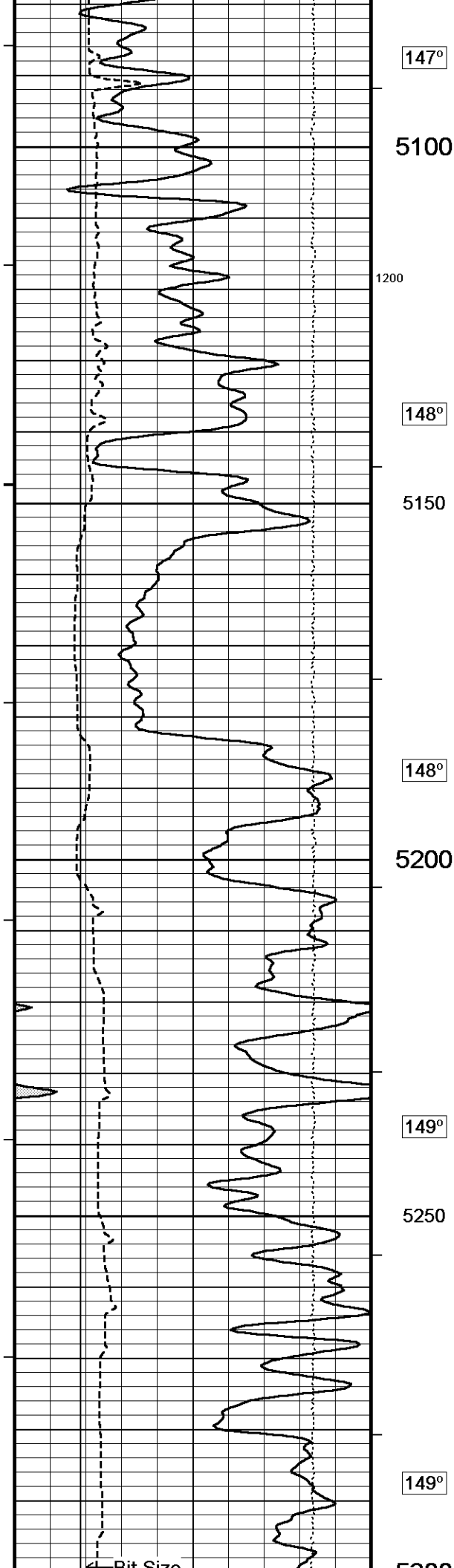


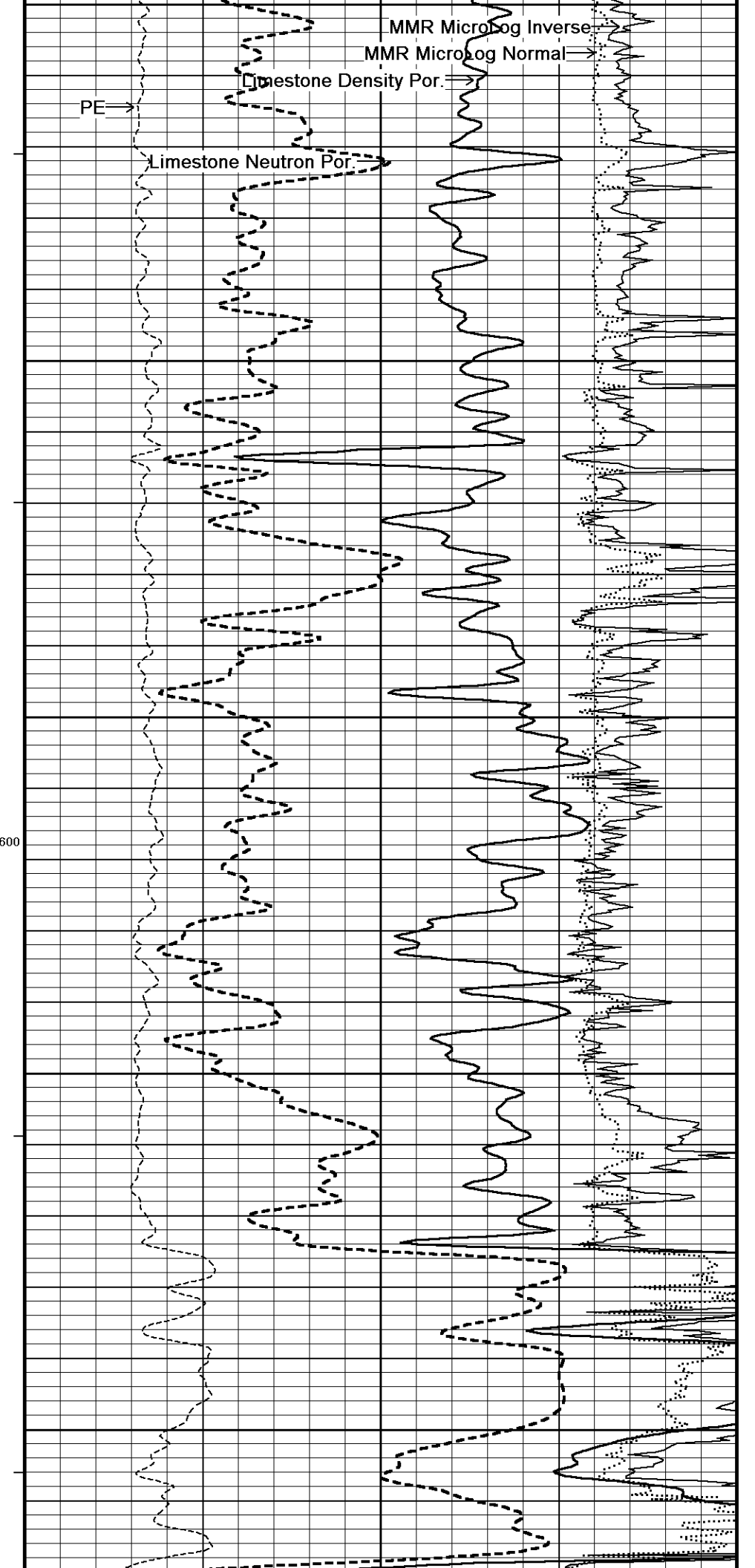
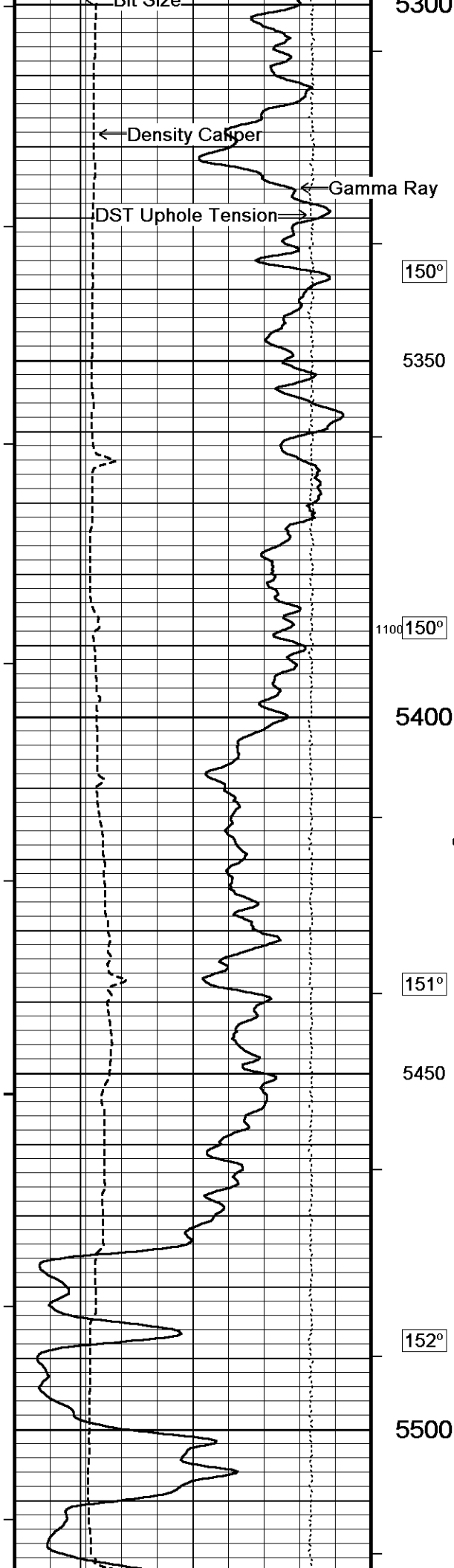


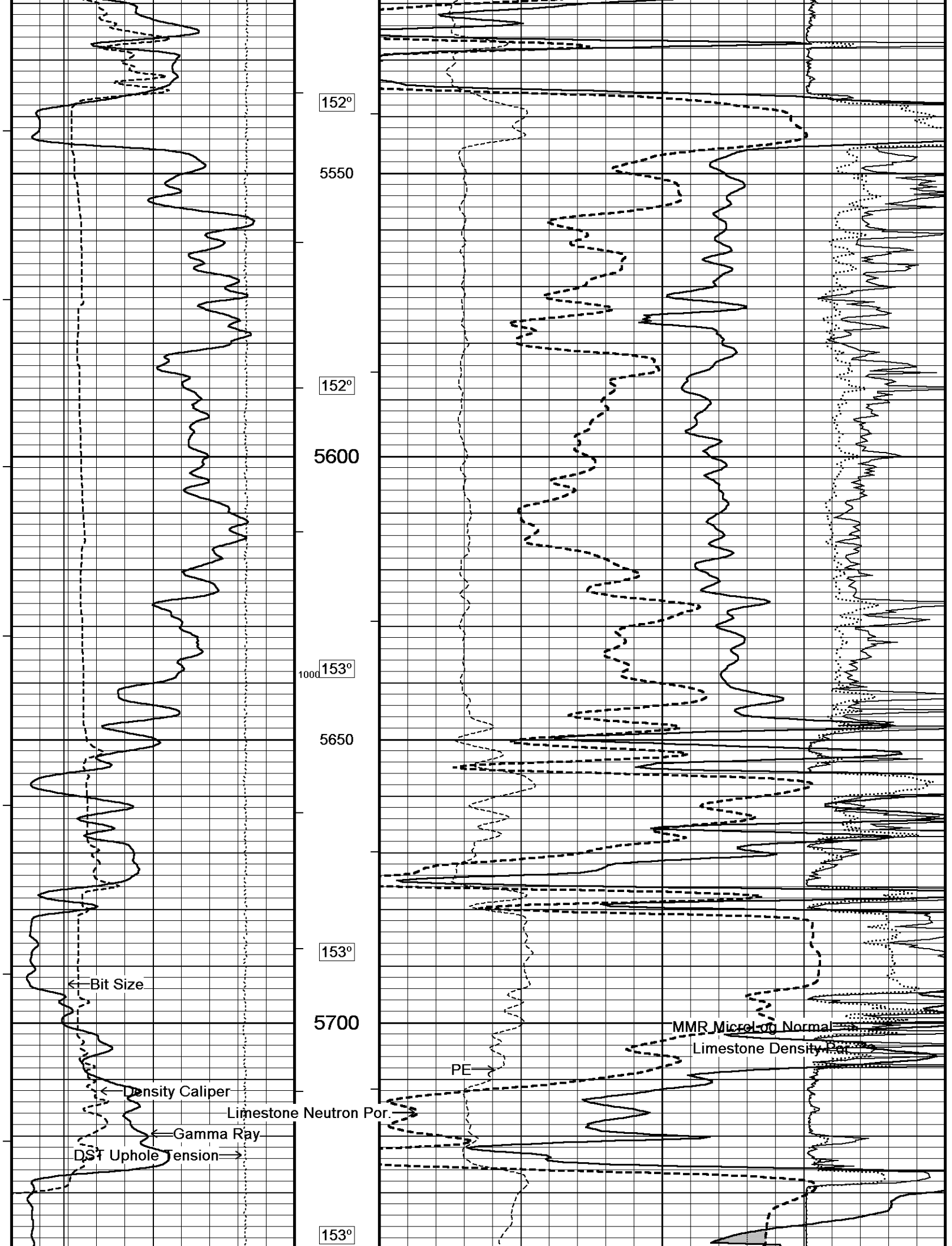


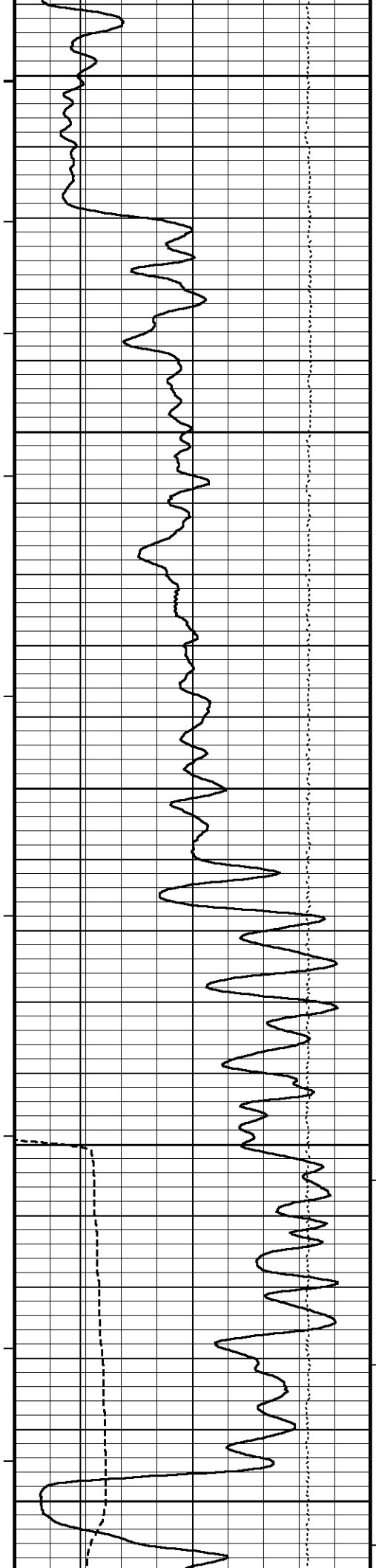












5750

154°

5800

154°

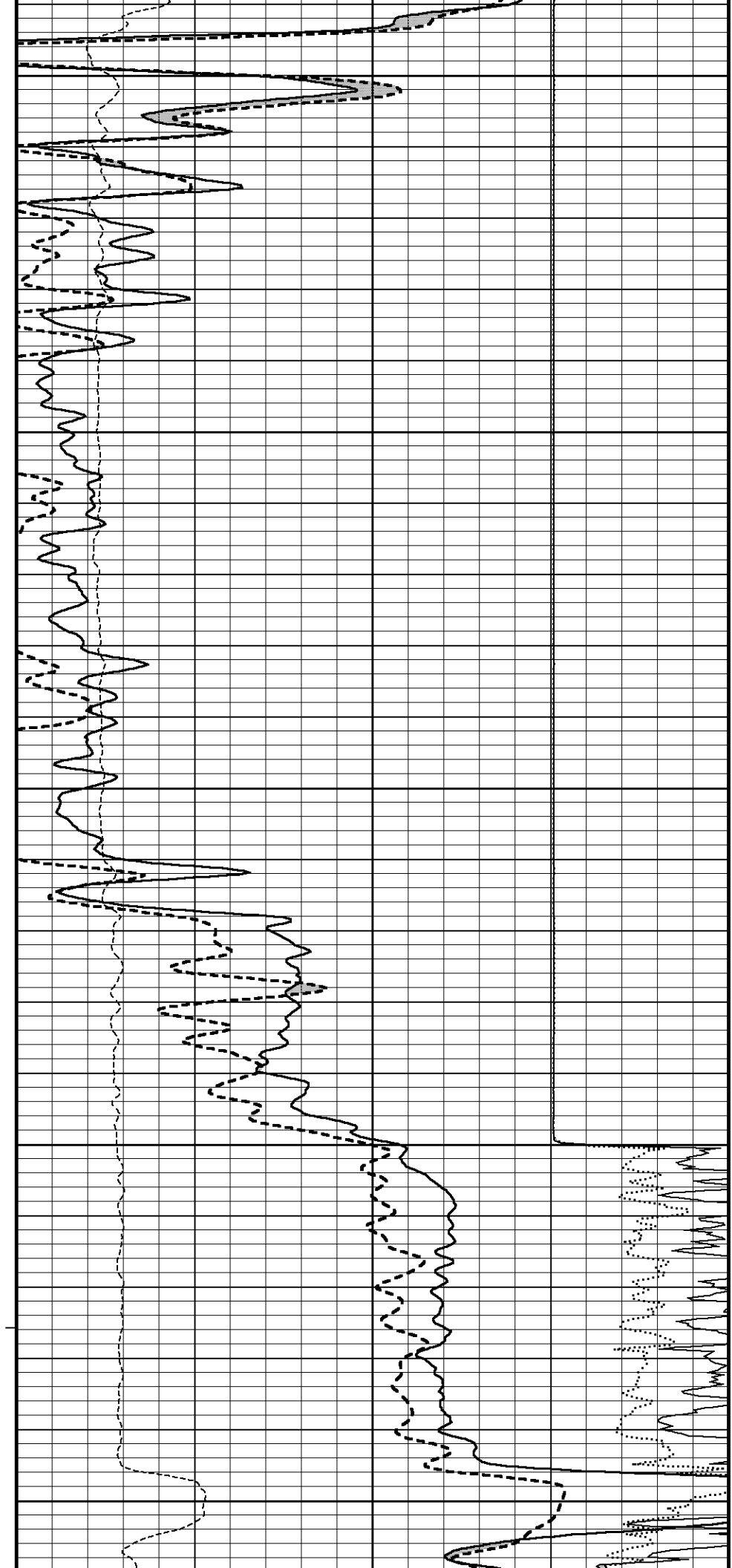
5850

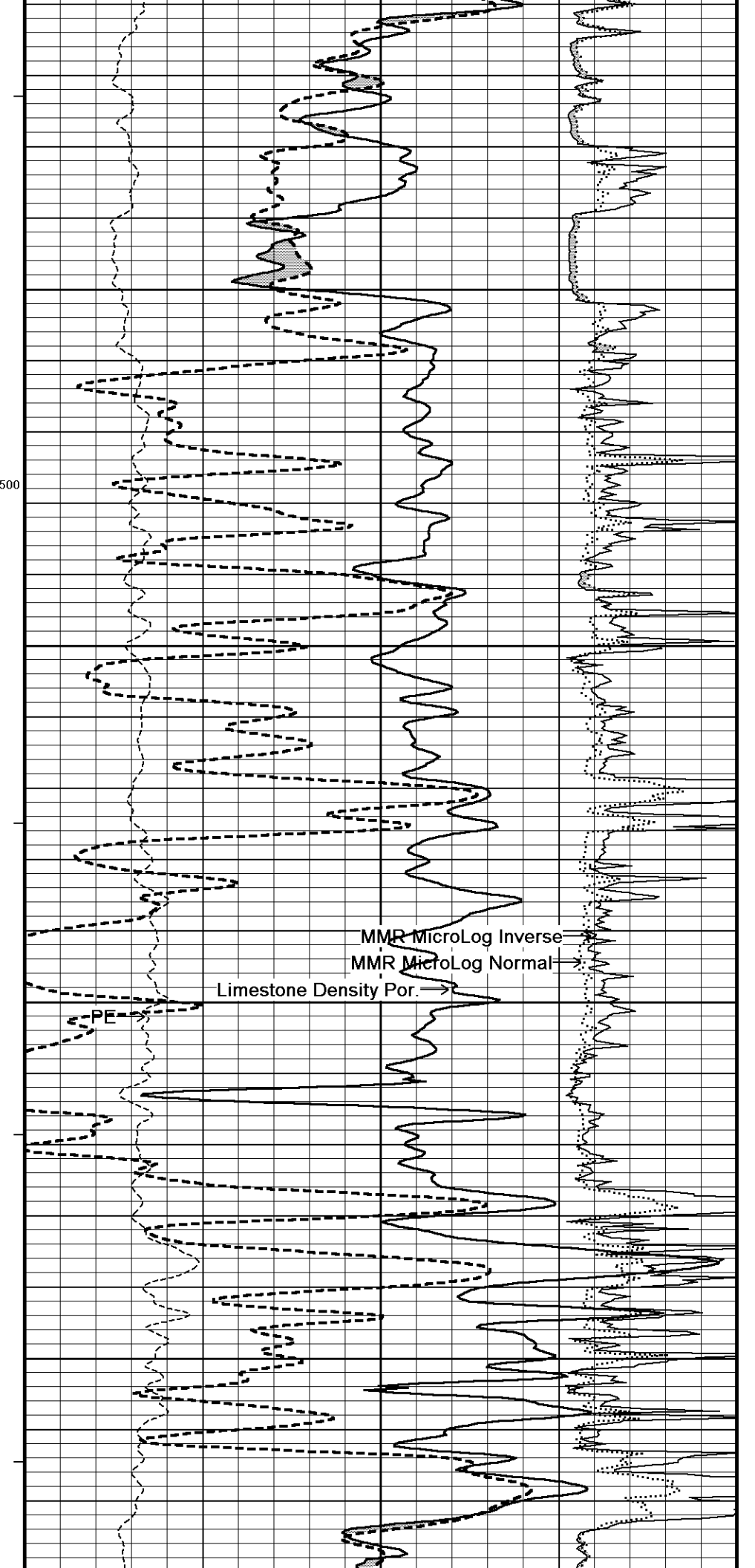
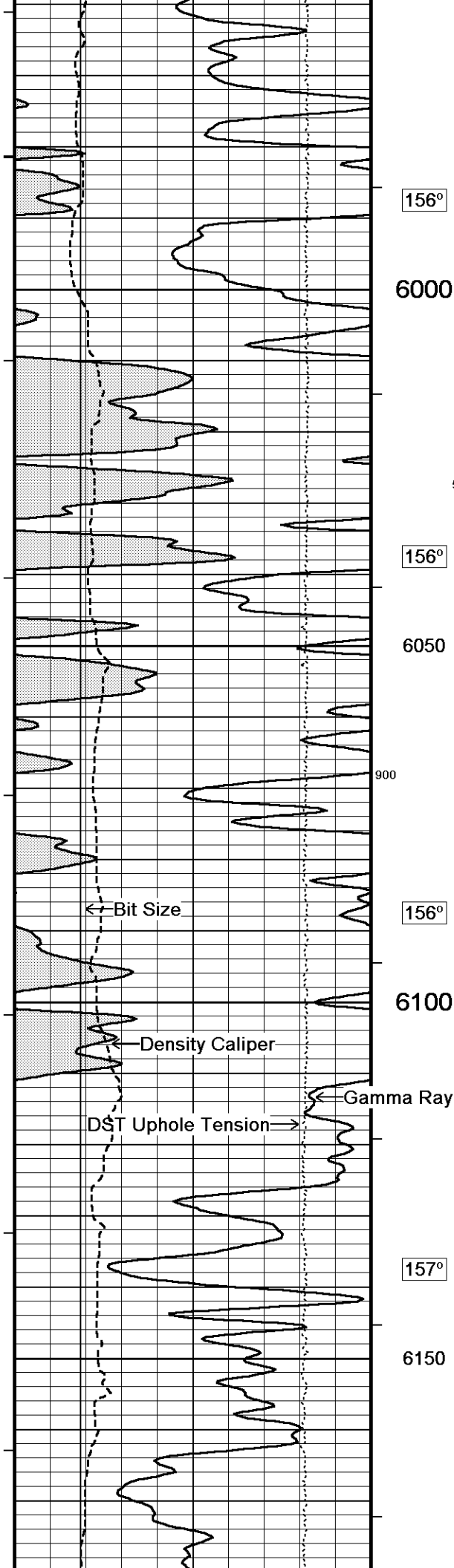
156°

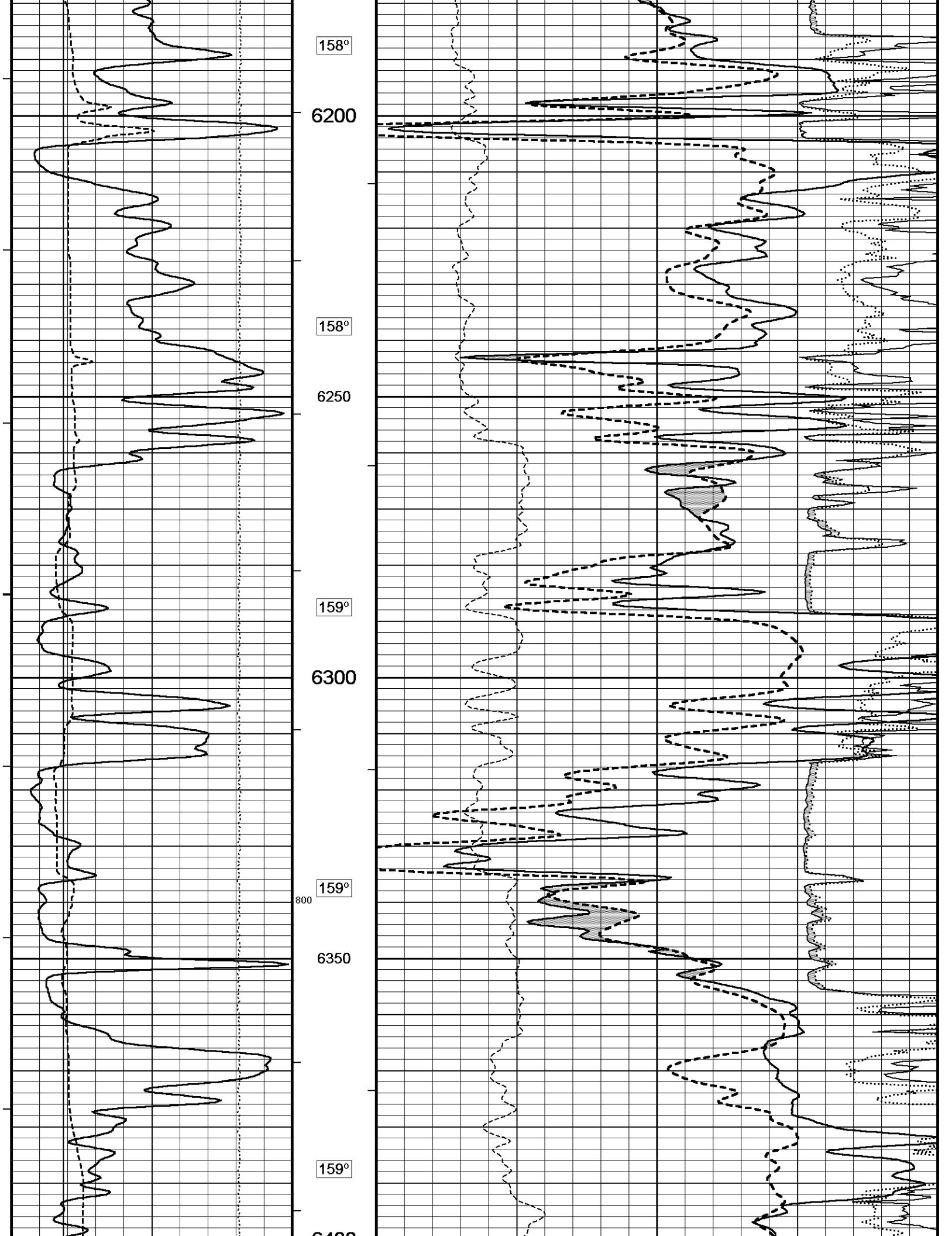
5900

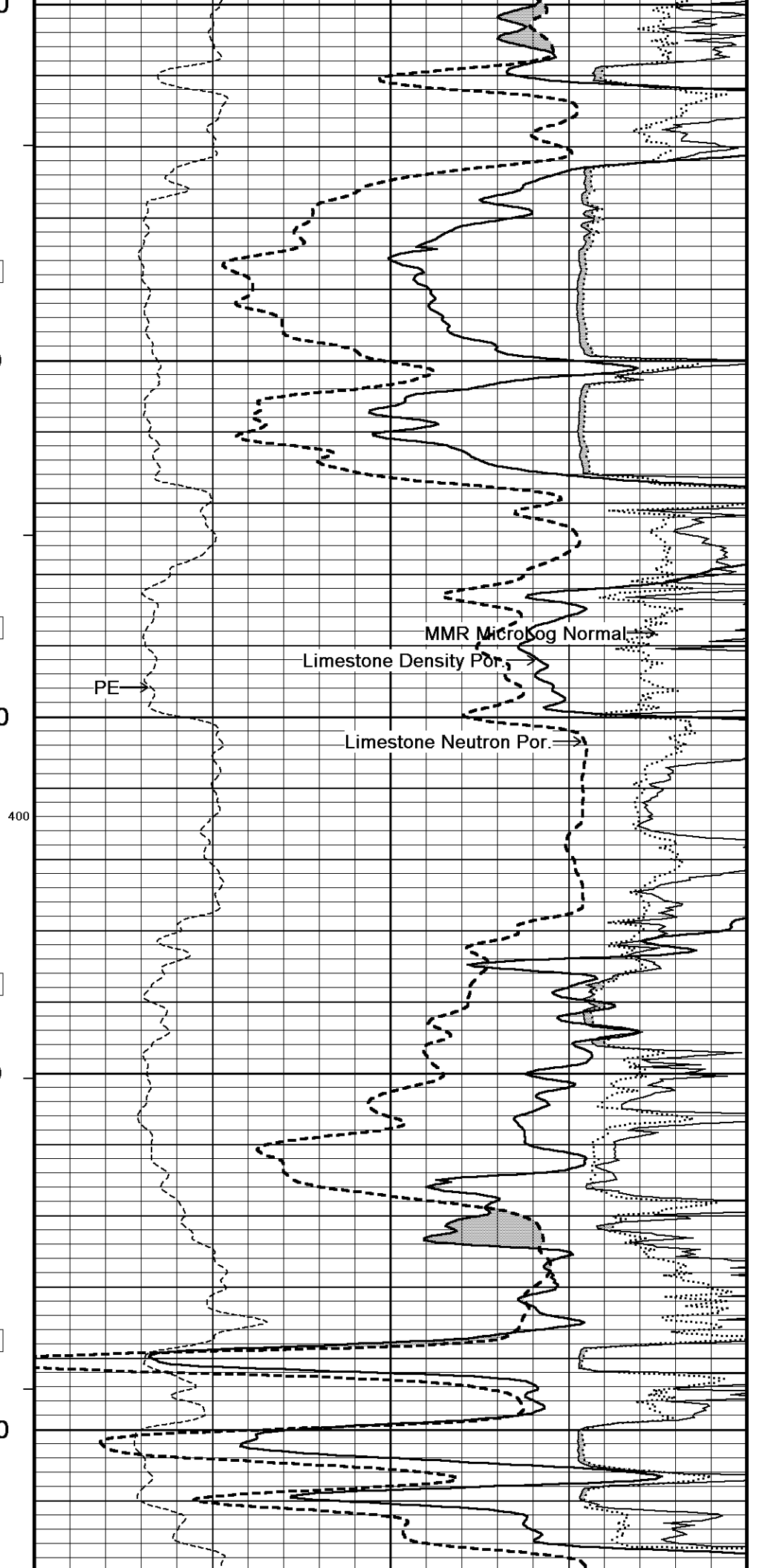
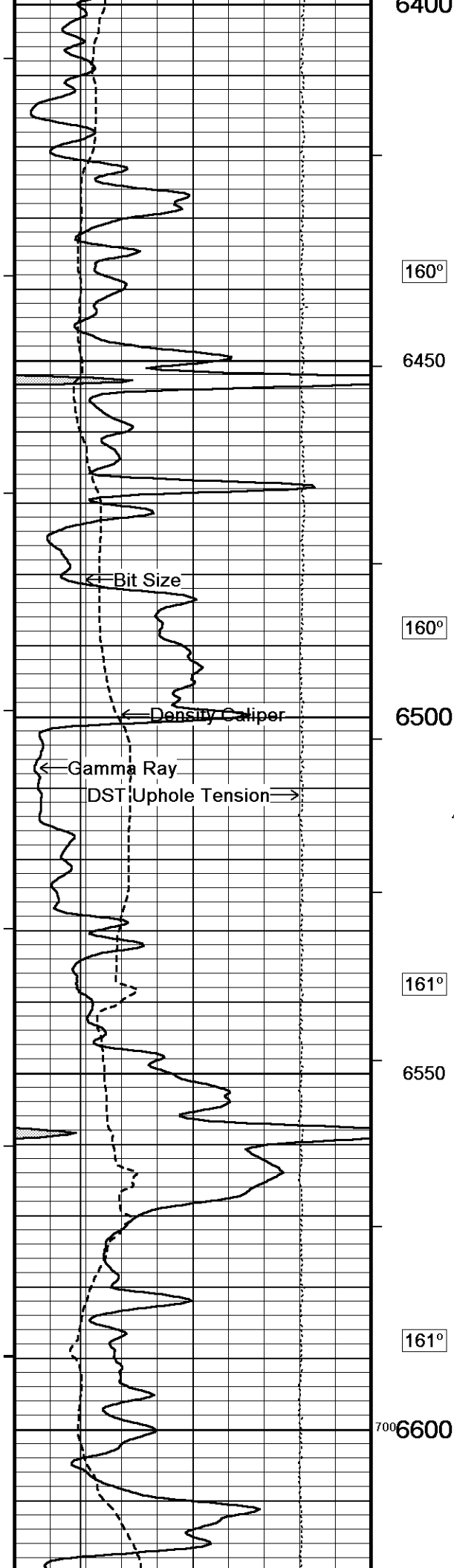
156°

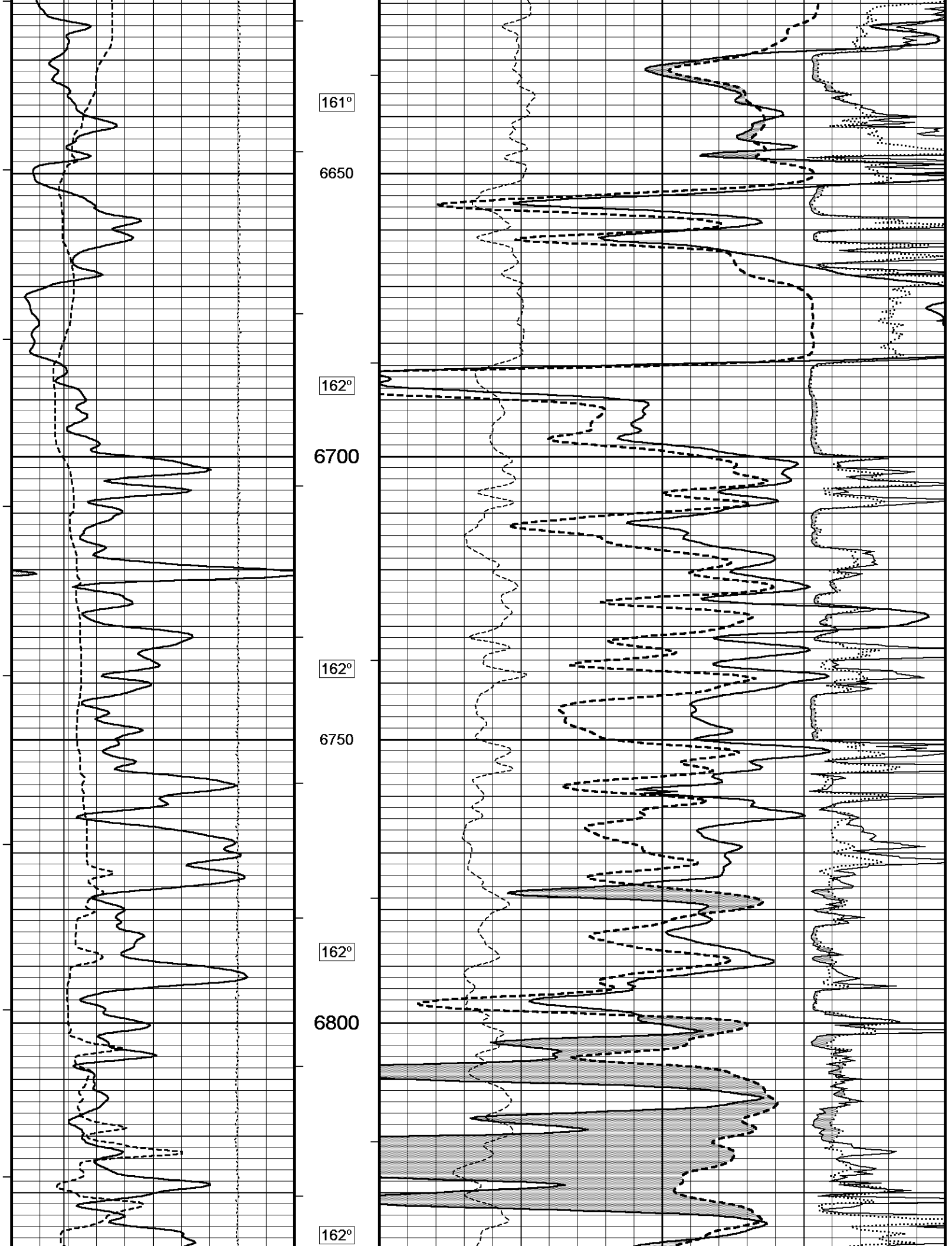
5950

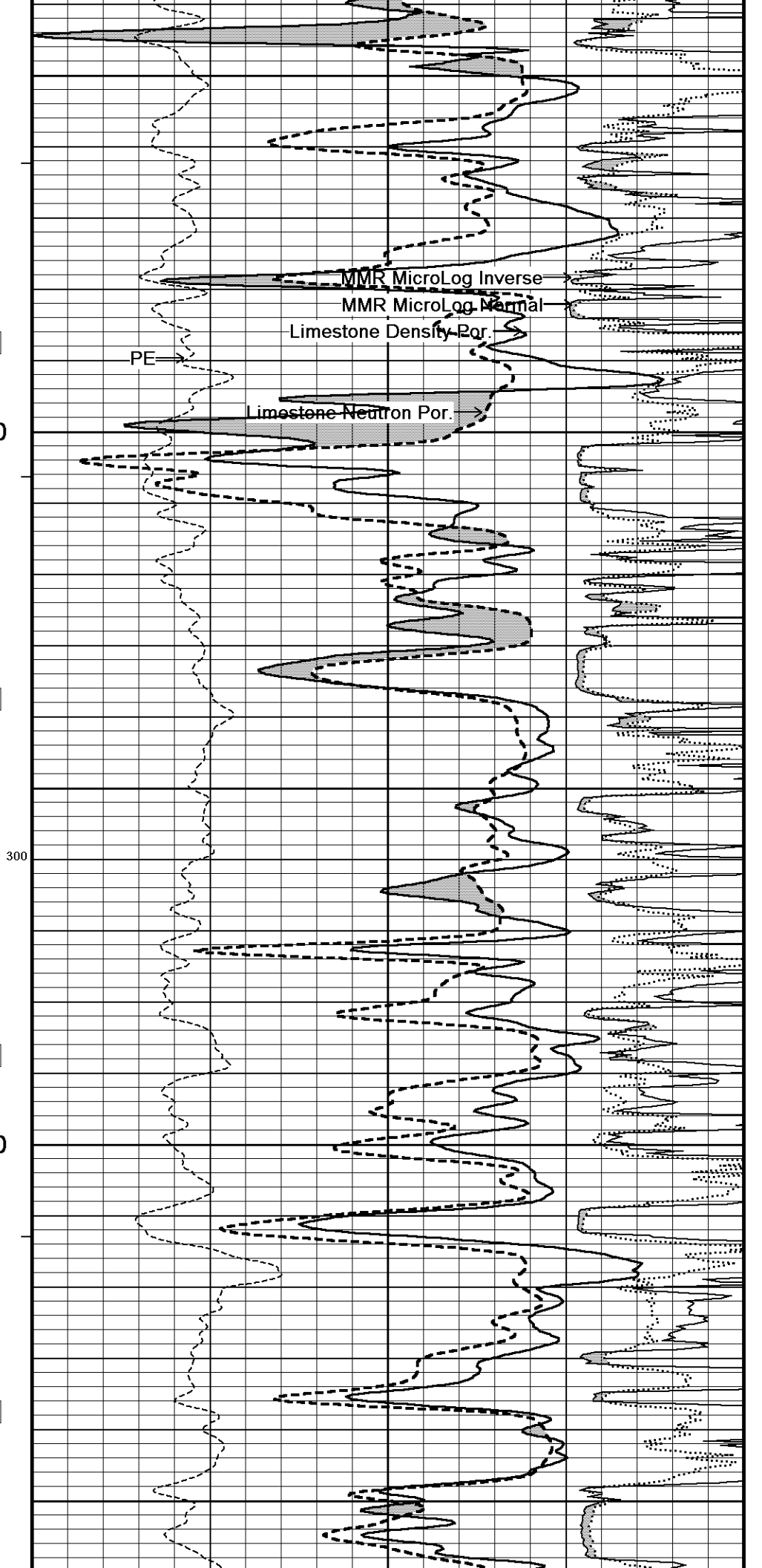
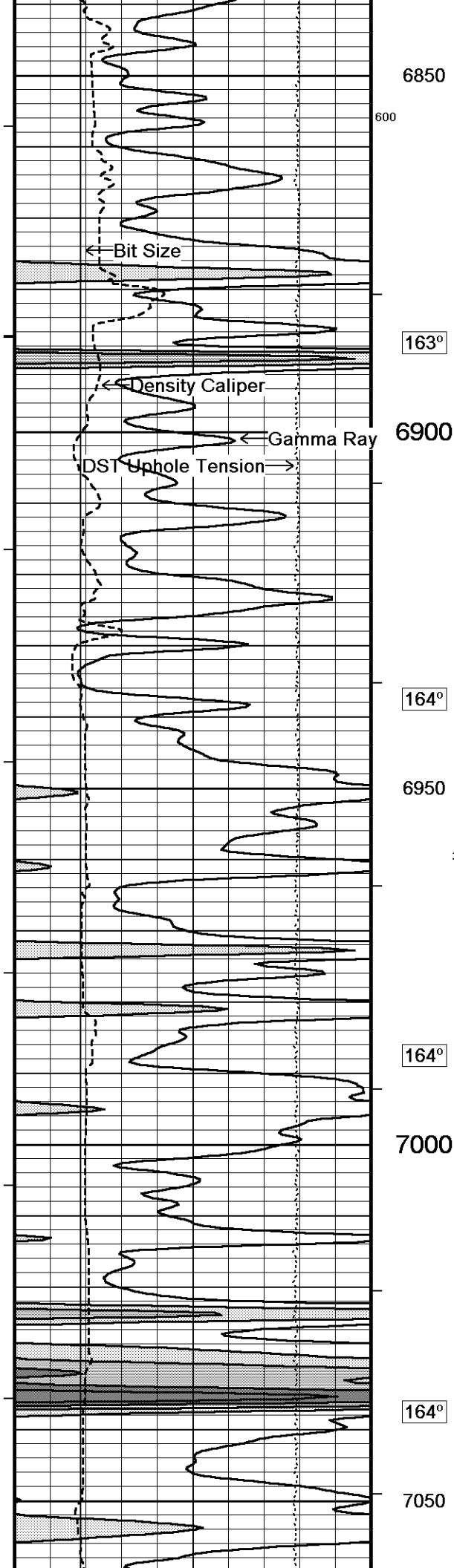


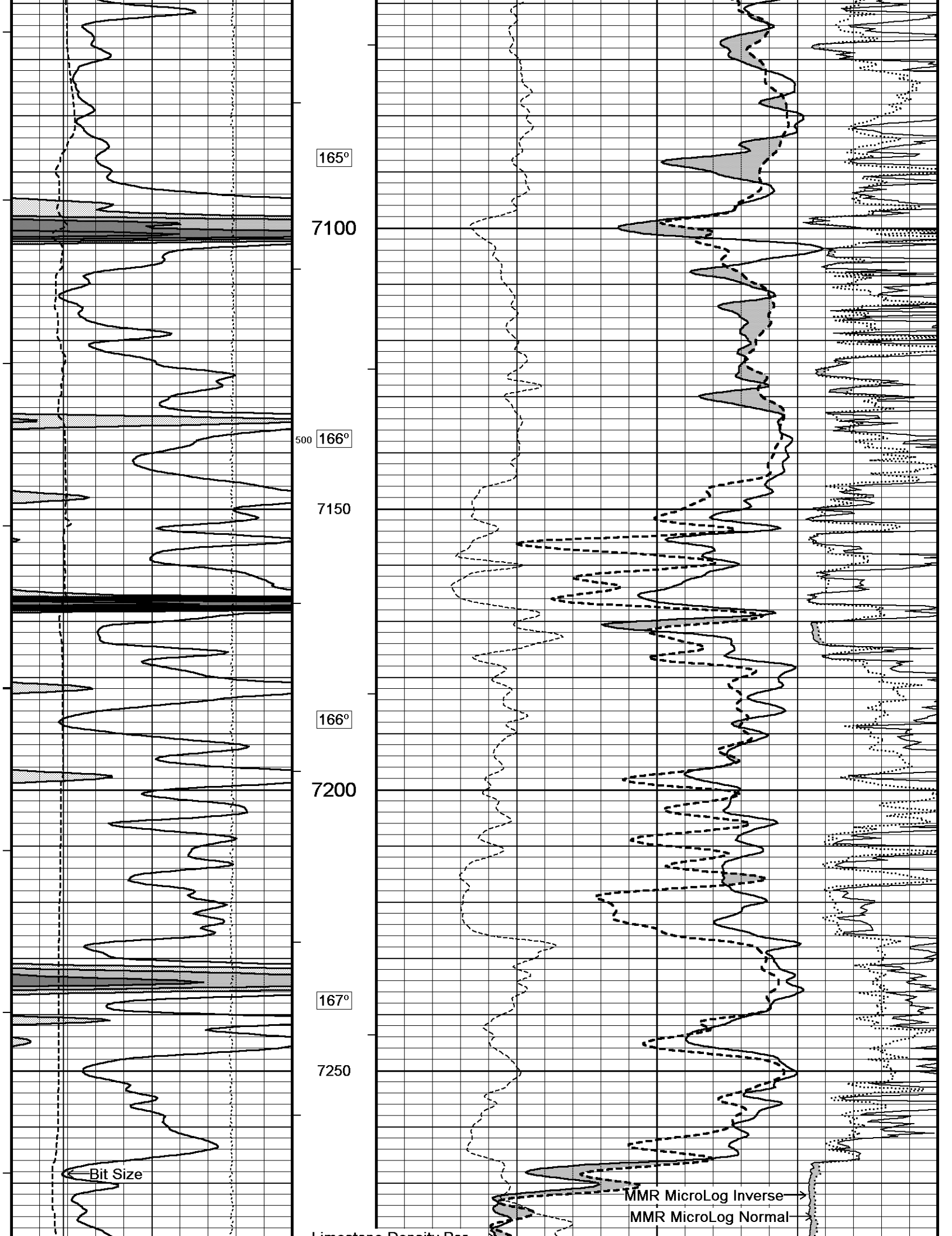


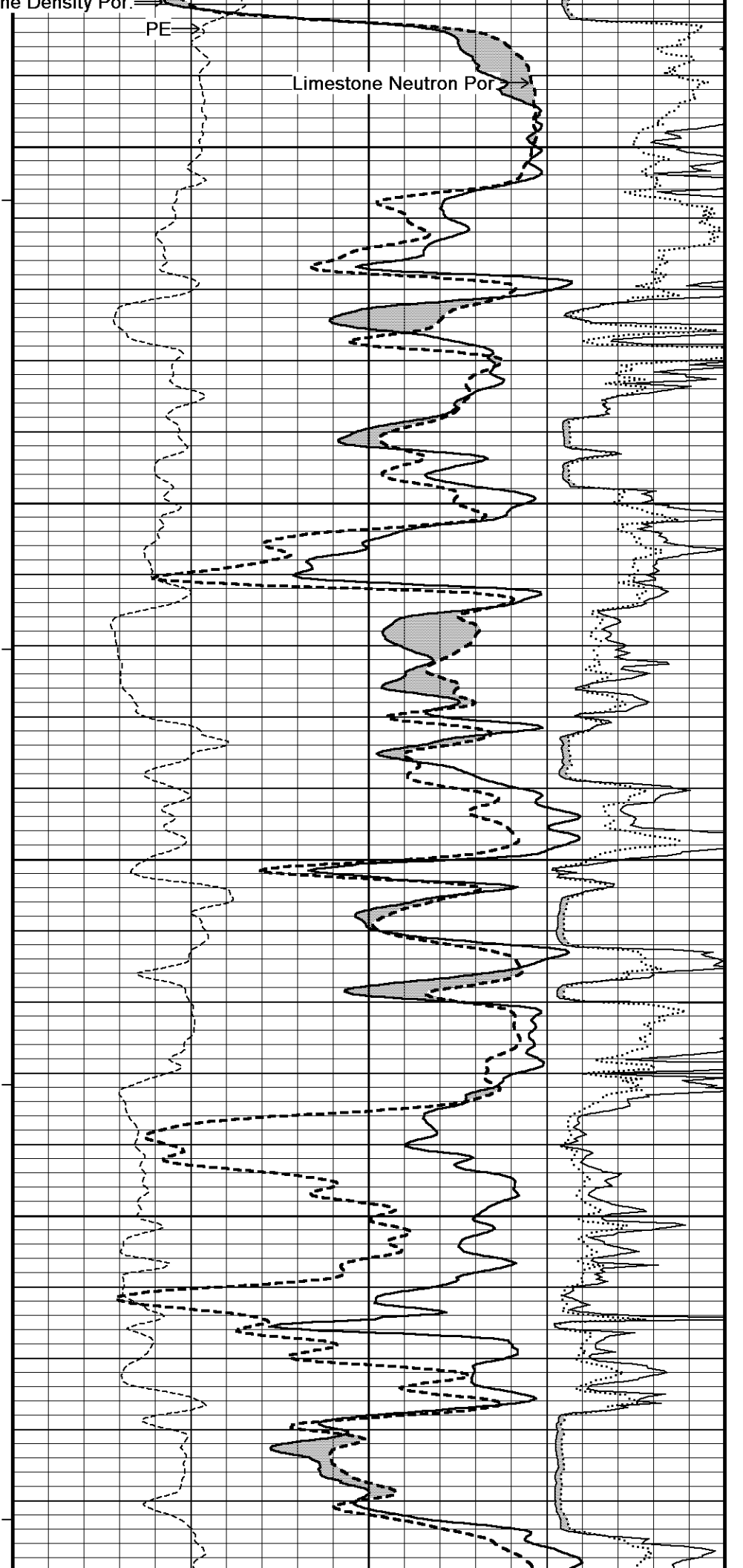
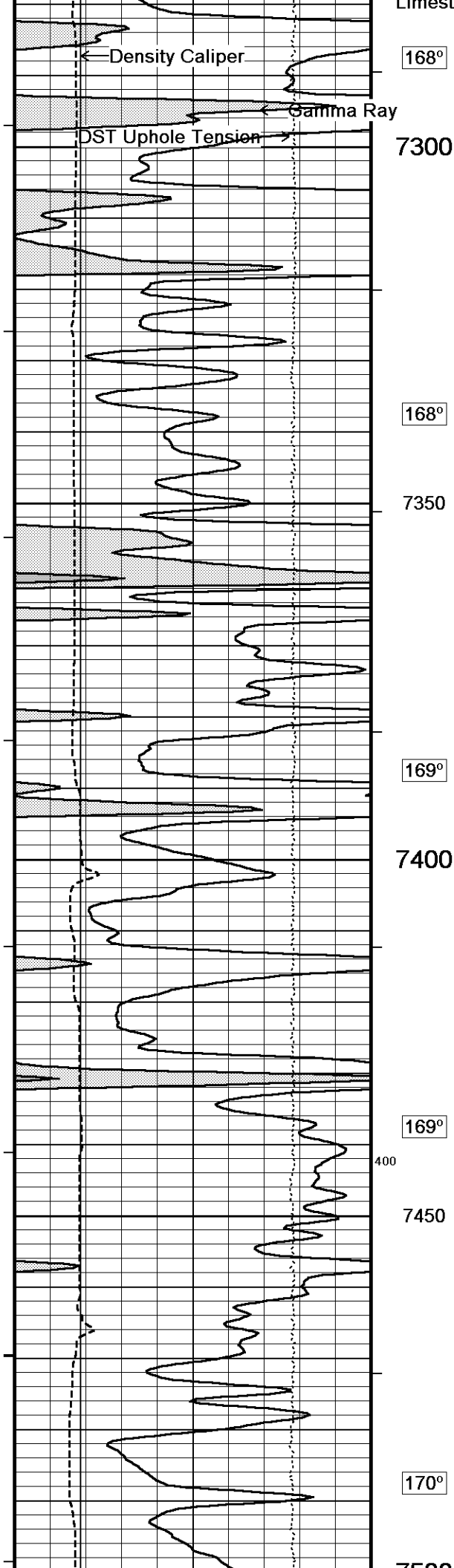


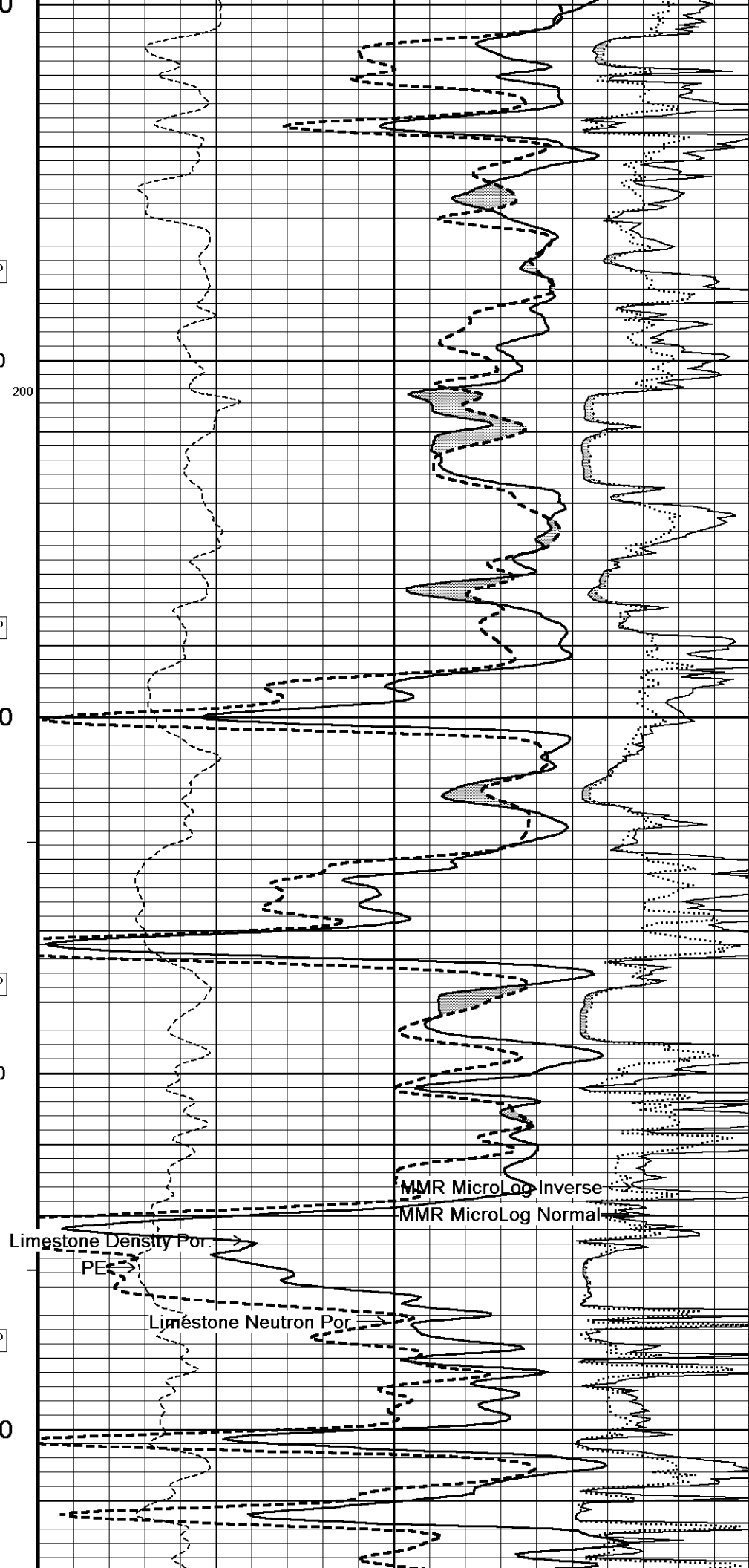
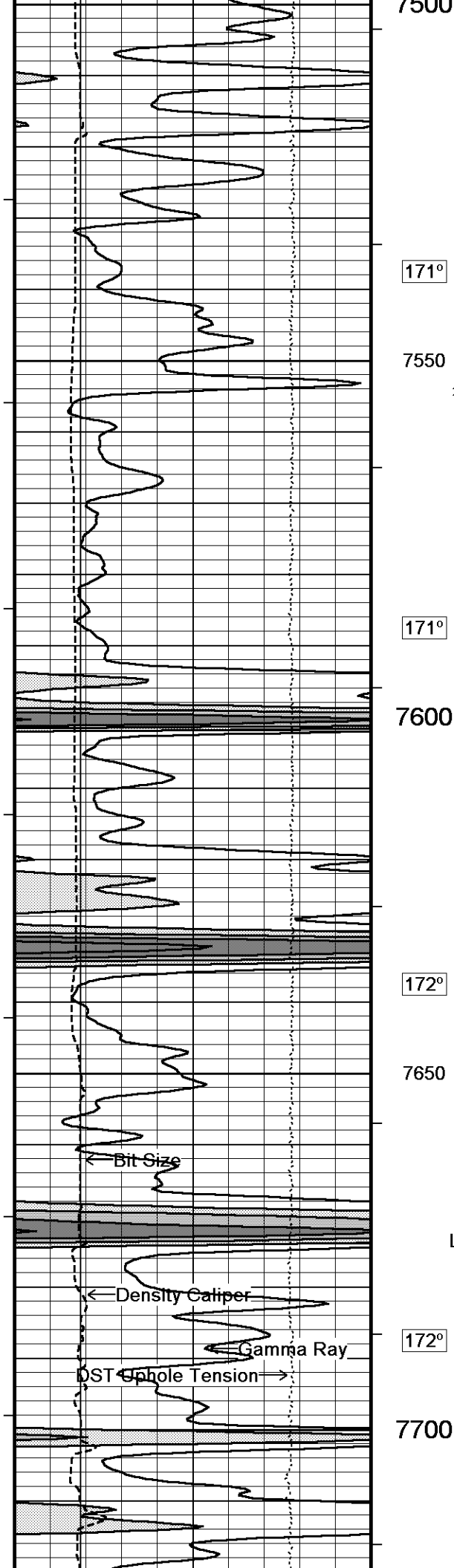


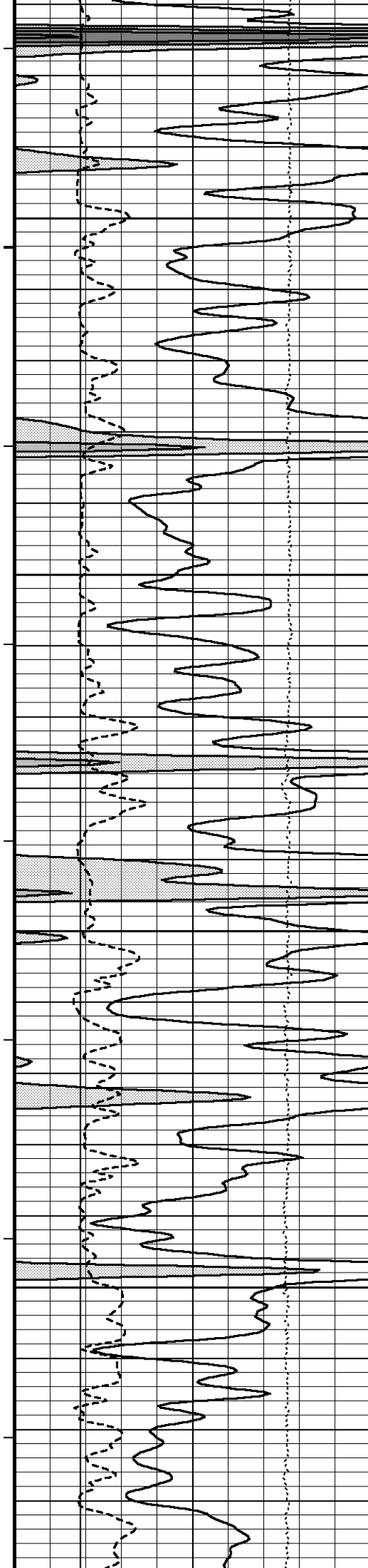




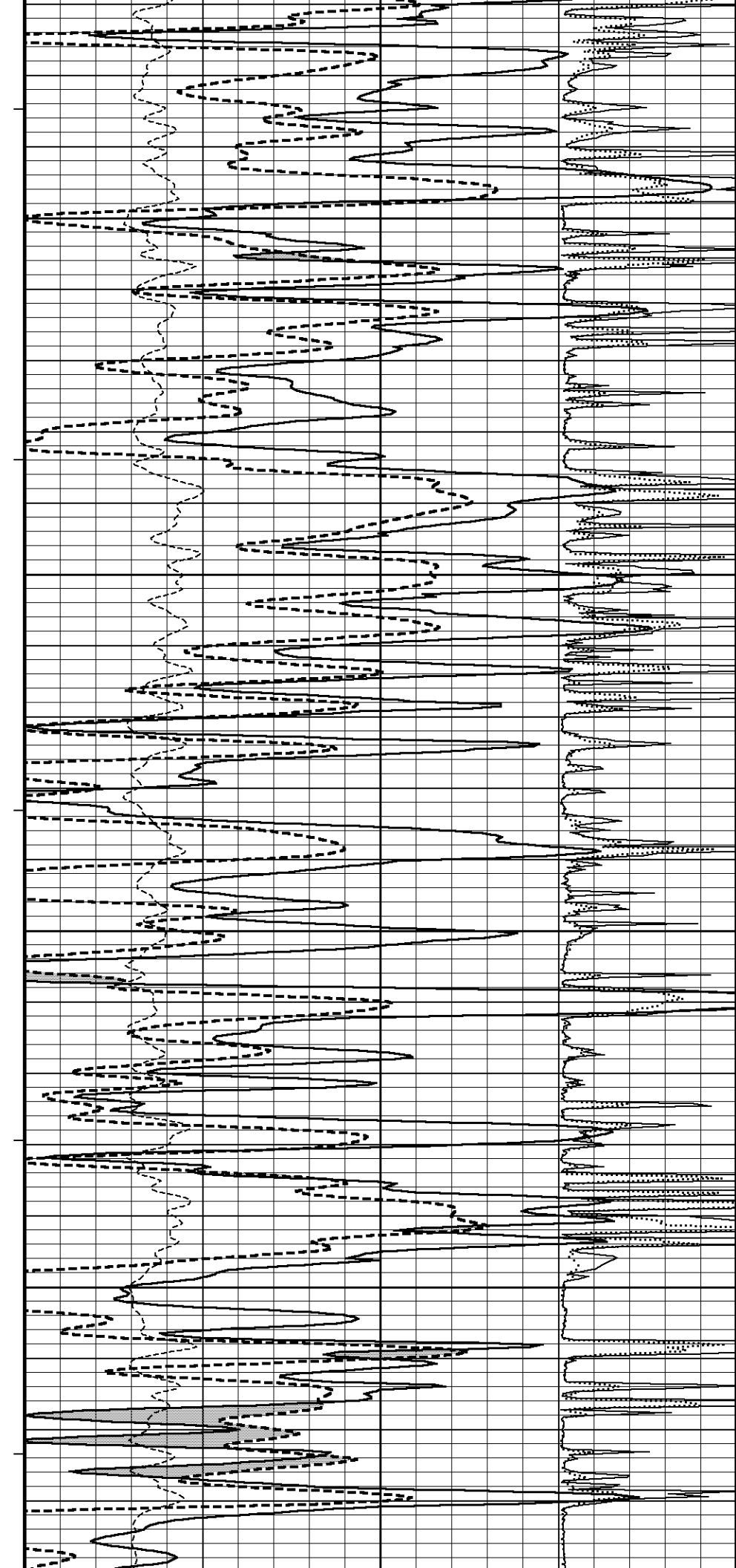


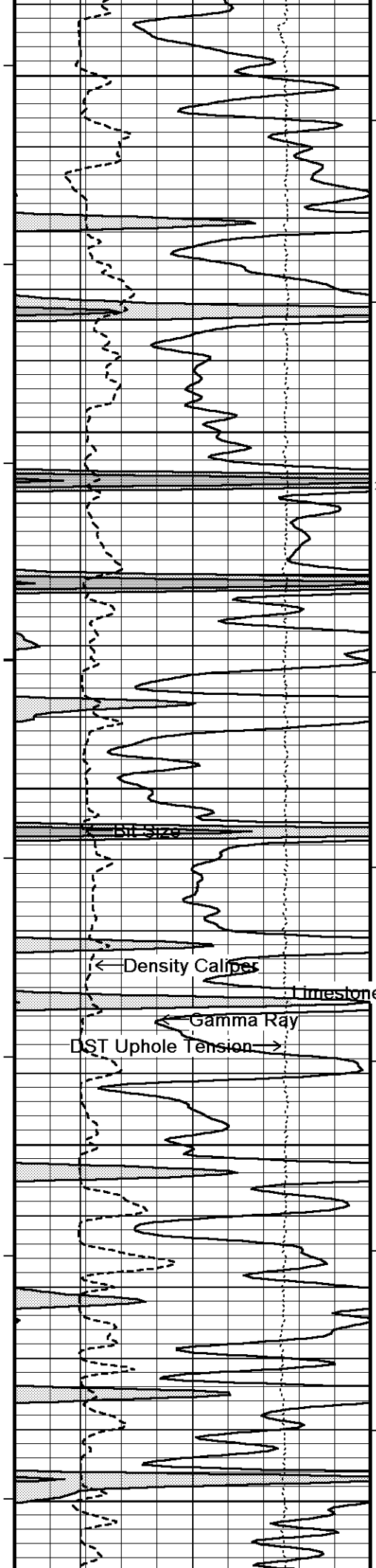




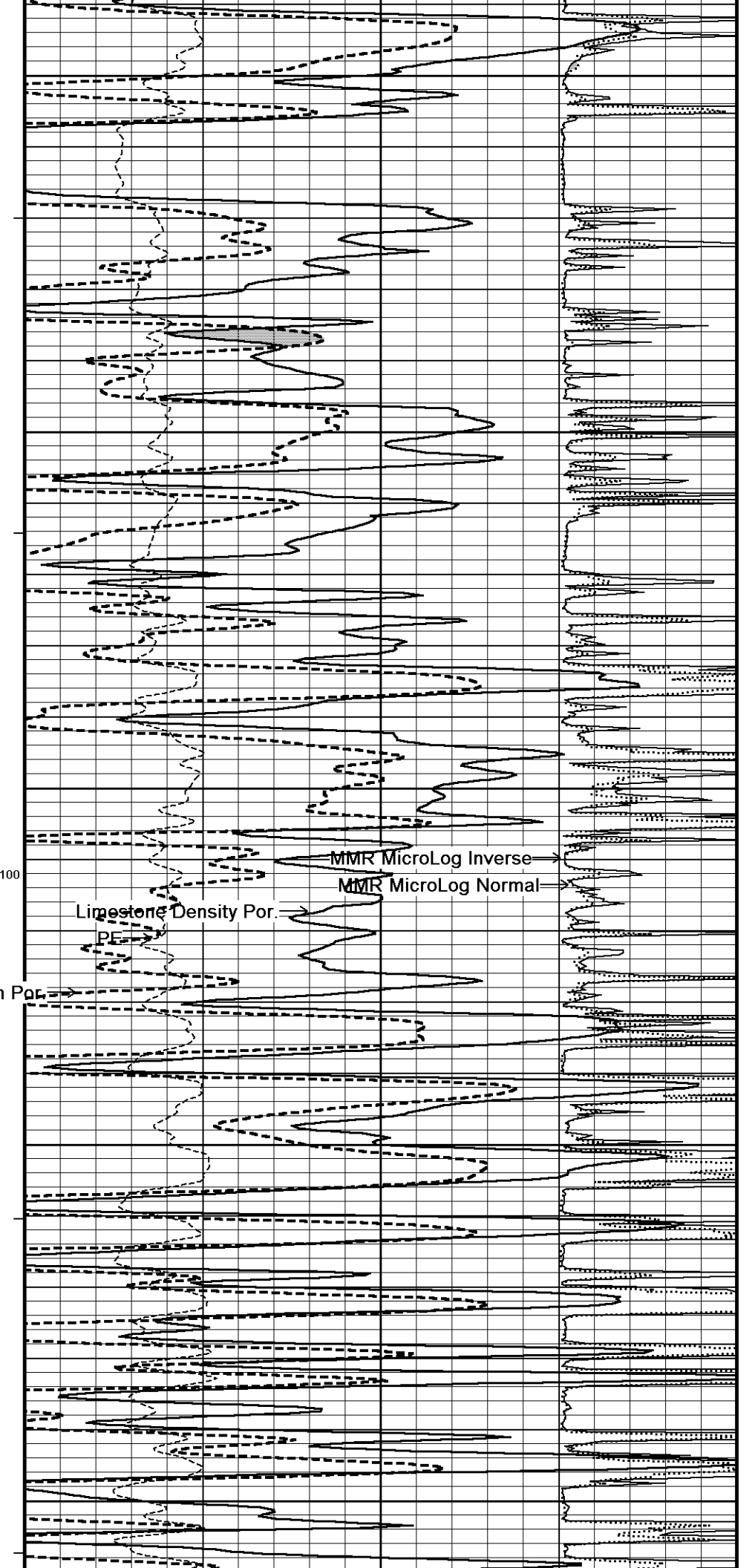


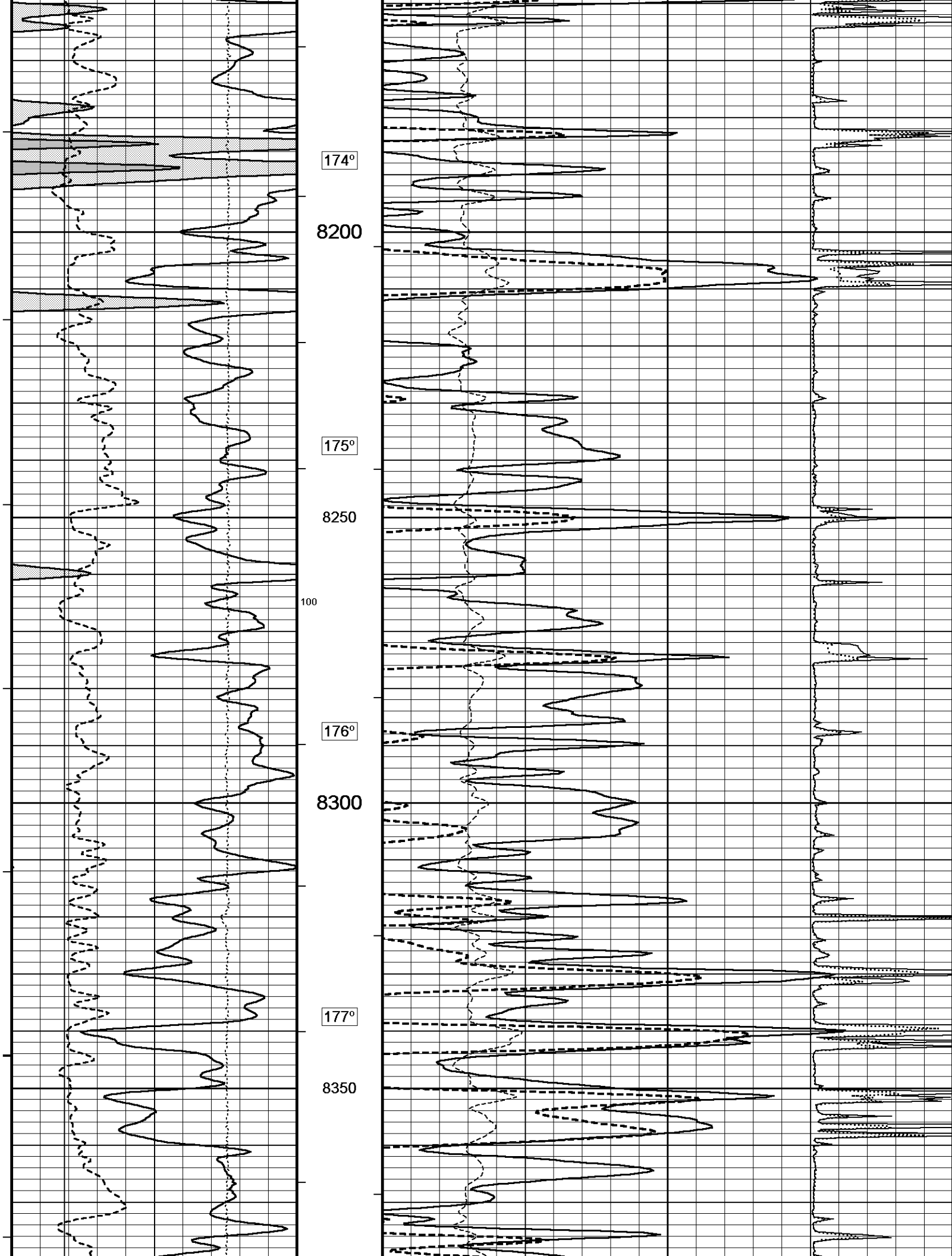
300
7750
172°
7800
172°
7850
173°
7900
173°
173°

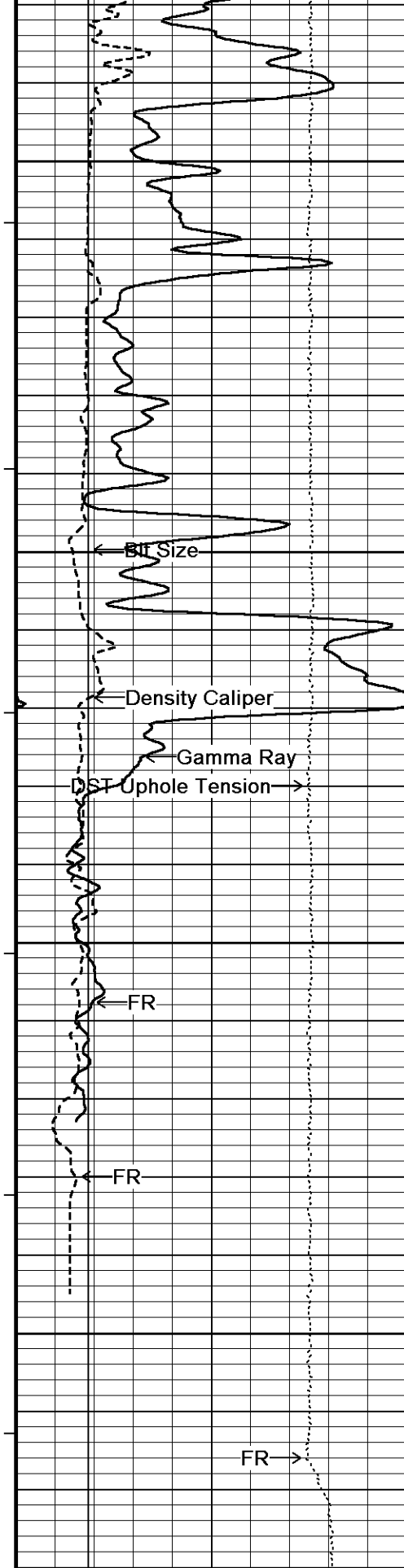




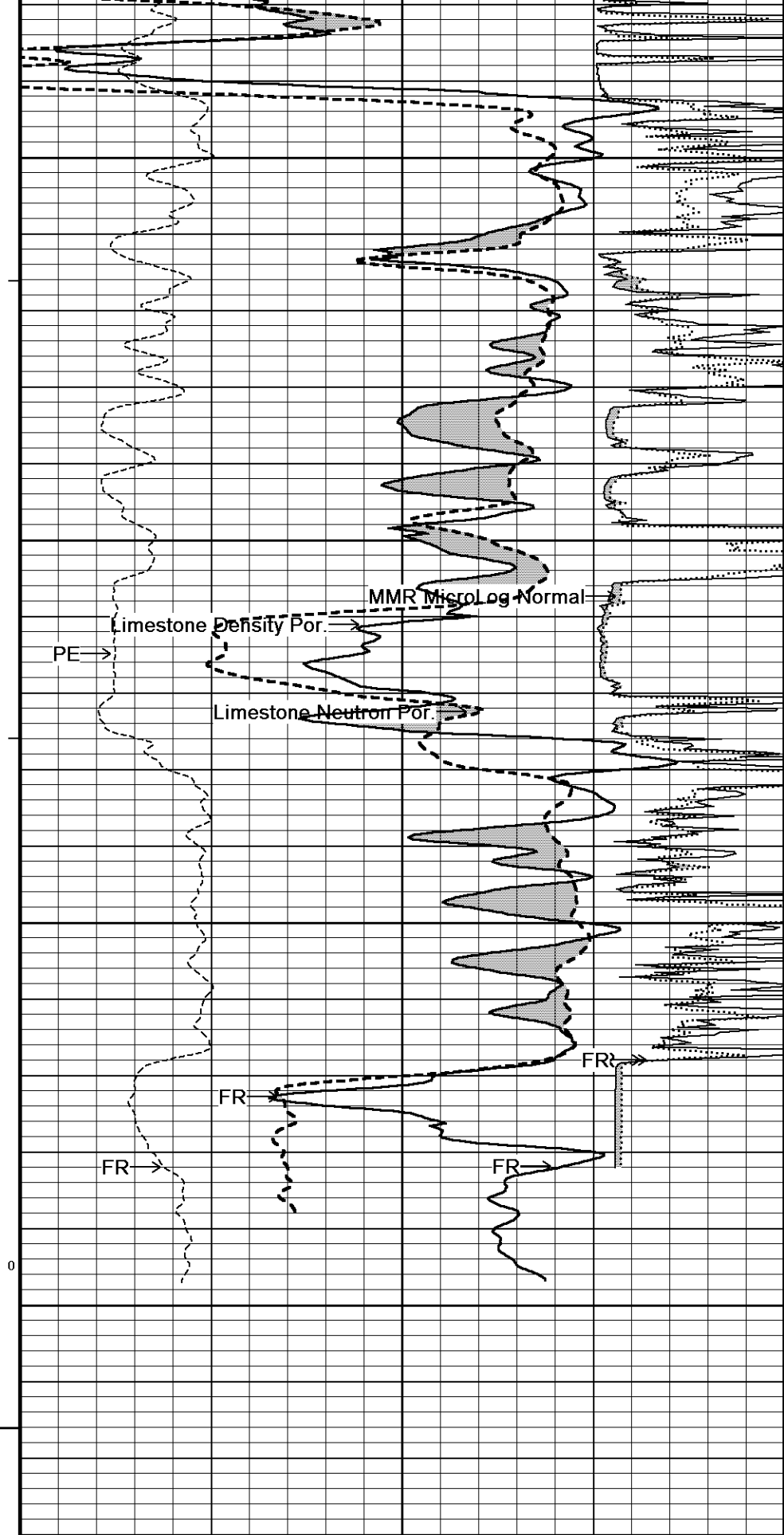
7950
173°
8000
200
173°
8050
100
173°
8100
174°
8150



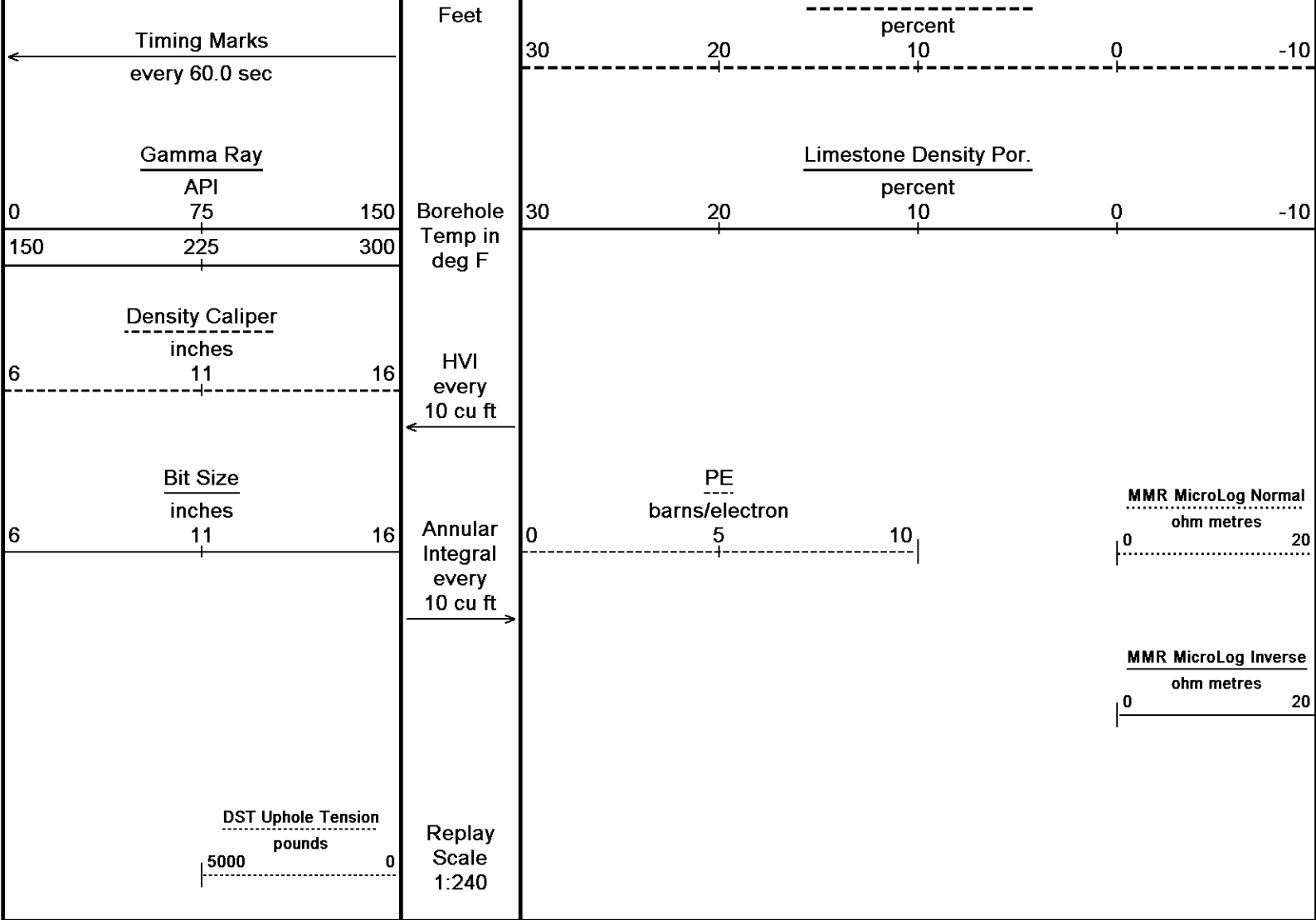




178°
8400
180°
8450
180°
8500
0
8550
TD
Depth in



Limestone Neutron Por.



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24 Splice.dta
System Versions: Processed with 18.03.9344 Plotted with 18.03.9344

Plotted on 16-NOV-2018 06:03
Recorded on 16-NOV-2018 00:31

↑

5 INCH LIMESTONE MAIN

↑

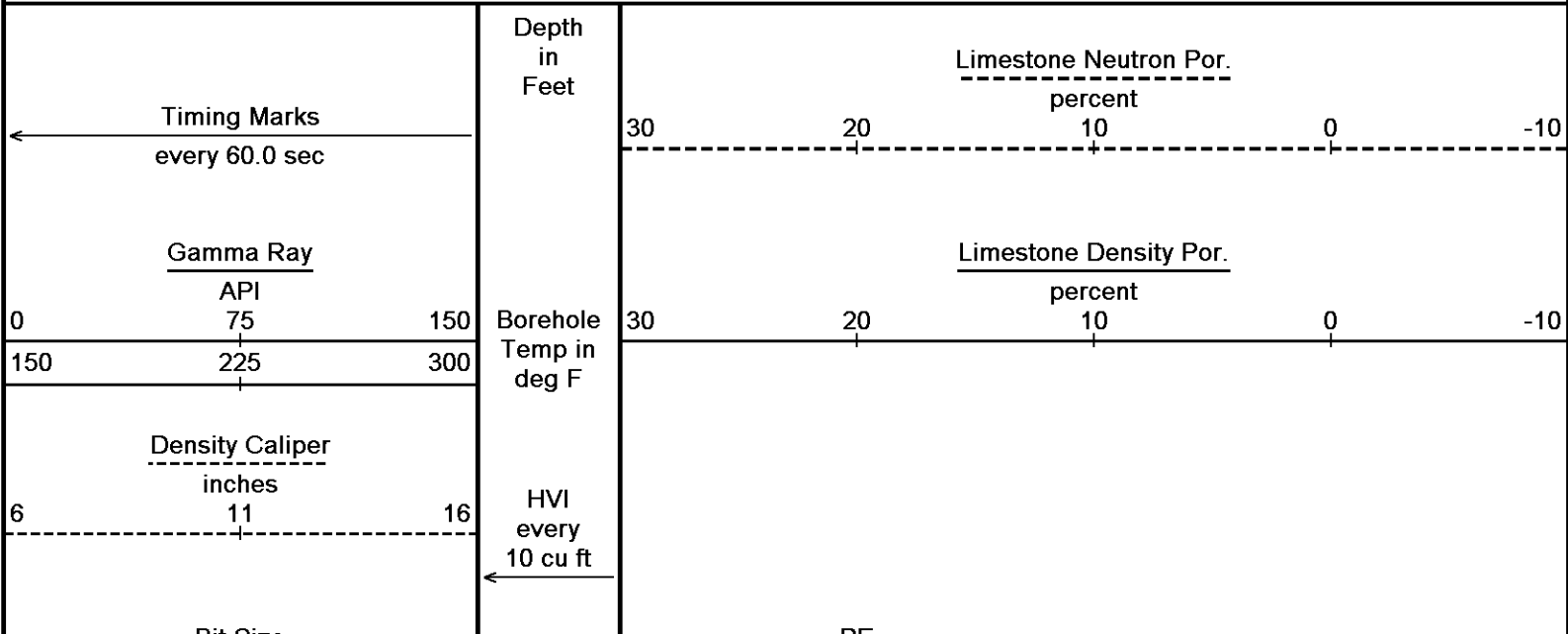
↓

REPEAT SECTION

↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24_002.dta
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 16-NOV-2018 06:03
Recorded on 16-NOV-2018 00:04



Bit Size

inches

6 11 16

Annular
Integral
every
10 cu ft

PE
barns/electron

0 5 10

MMR MicroLog Normal

ohm metres

0 20

MMR MicroLog Inverse

ohm metres

0 20

DST Uphole Tension

pounds

5000 0

Replay
Scale
1:240

8100

172°

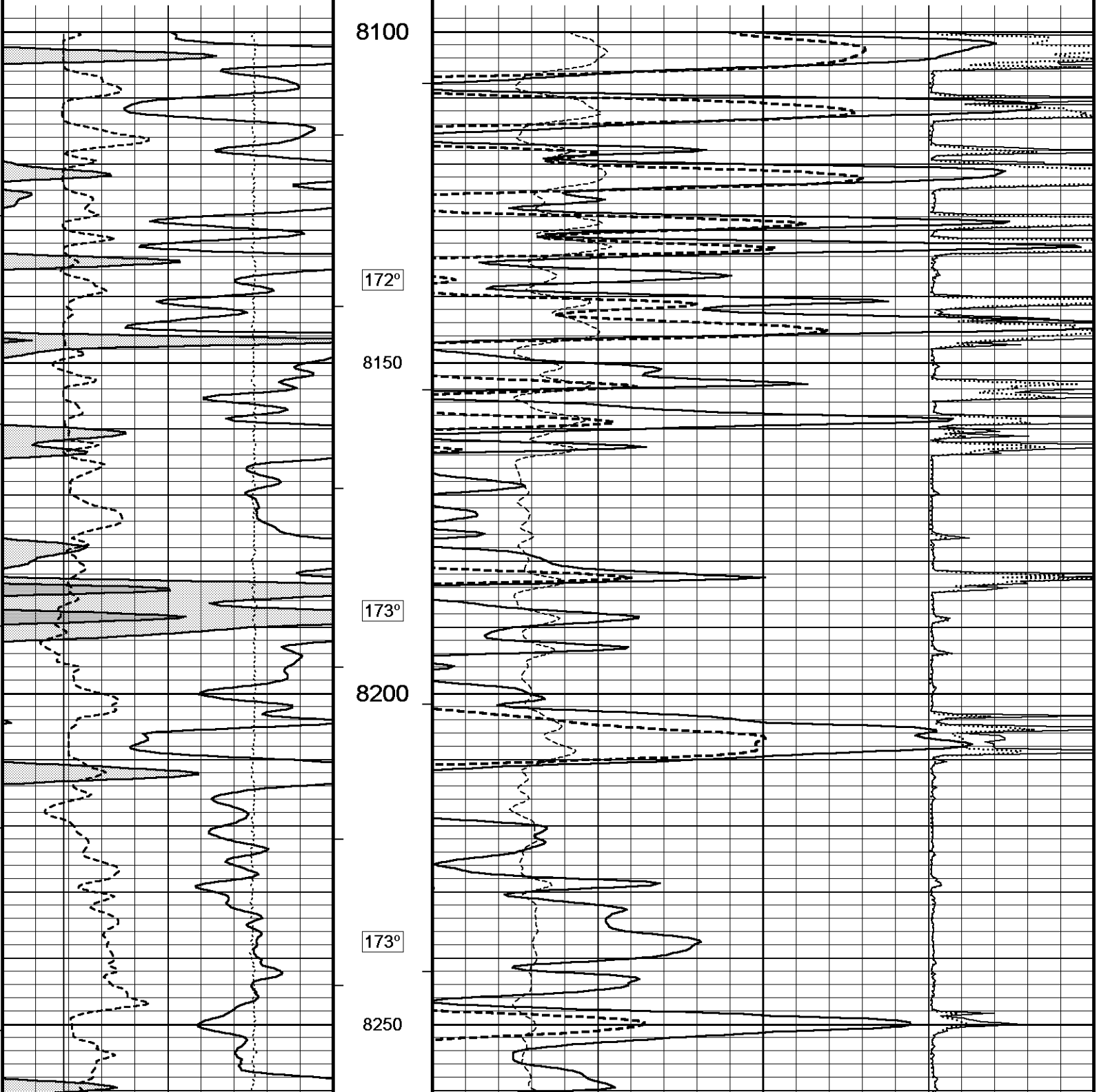
8150

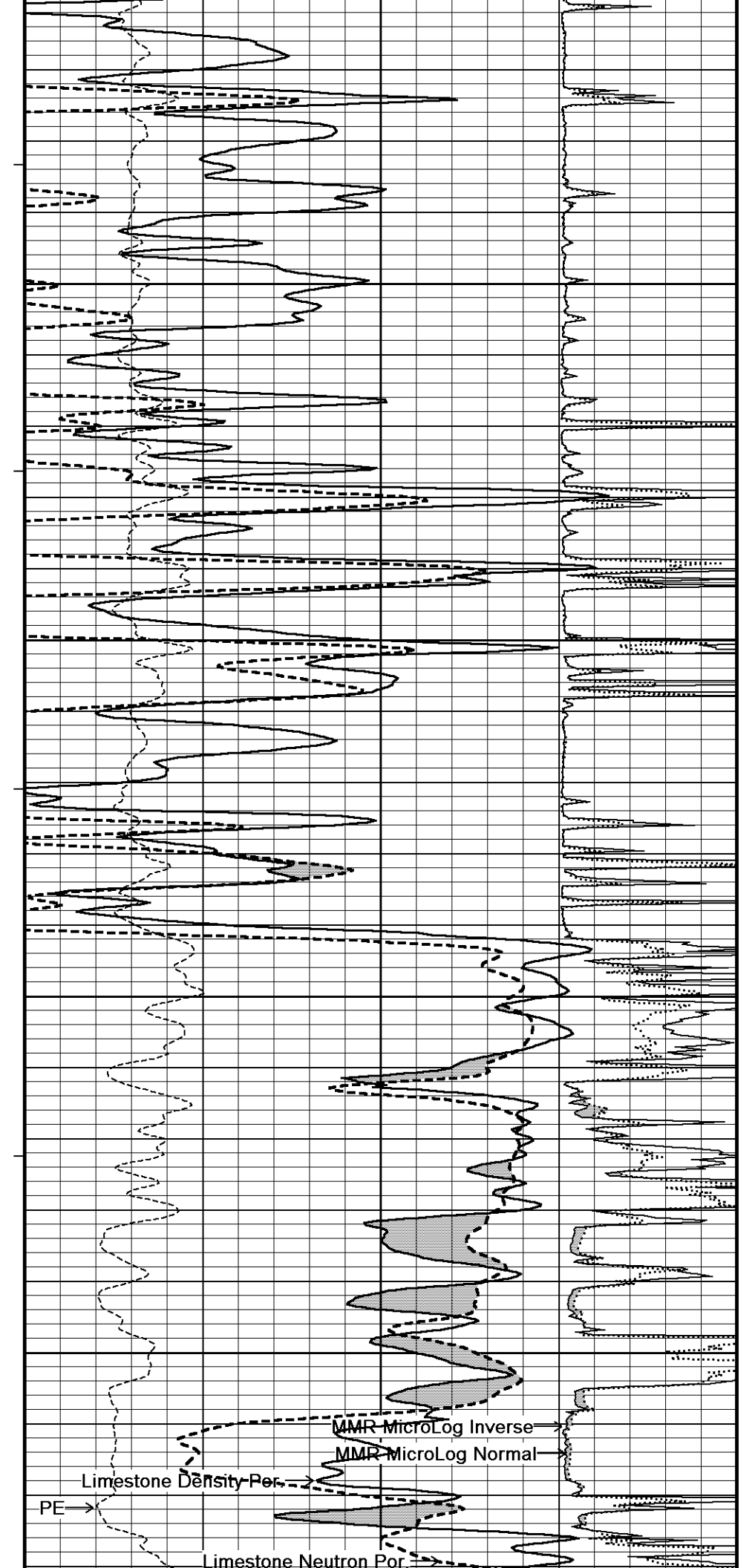
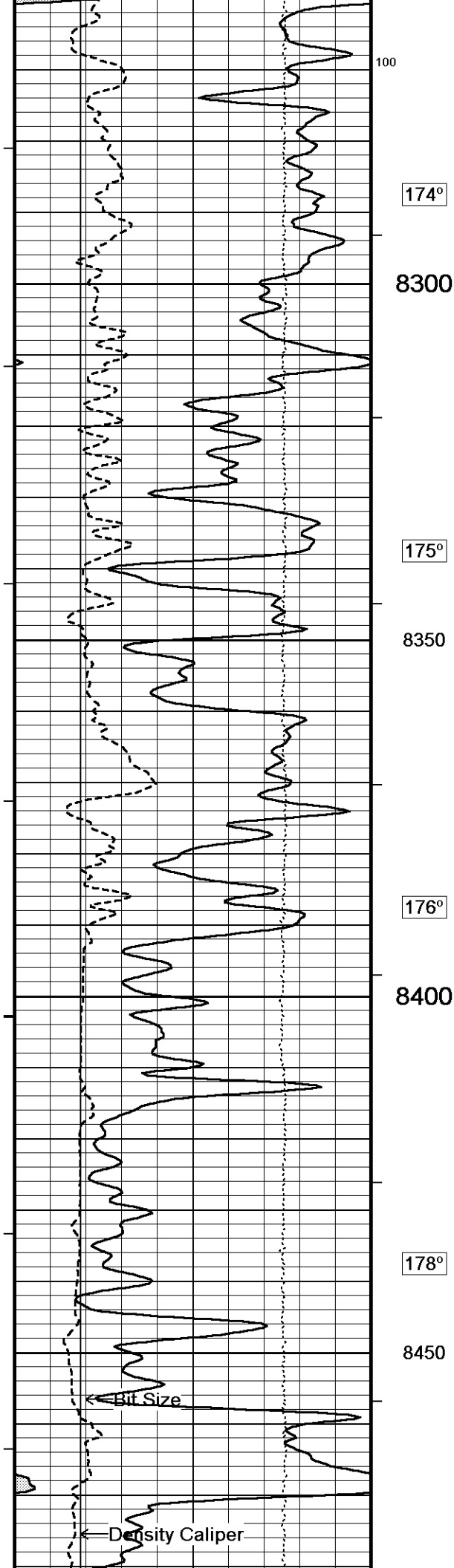
173°

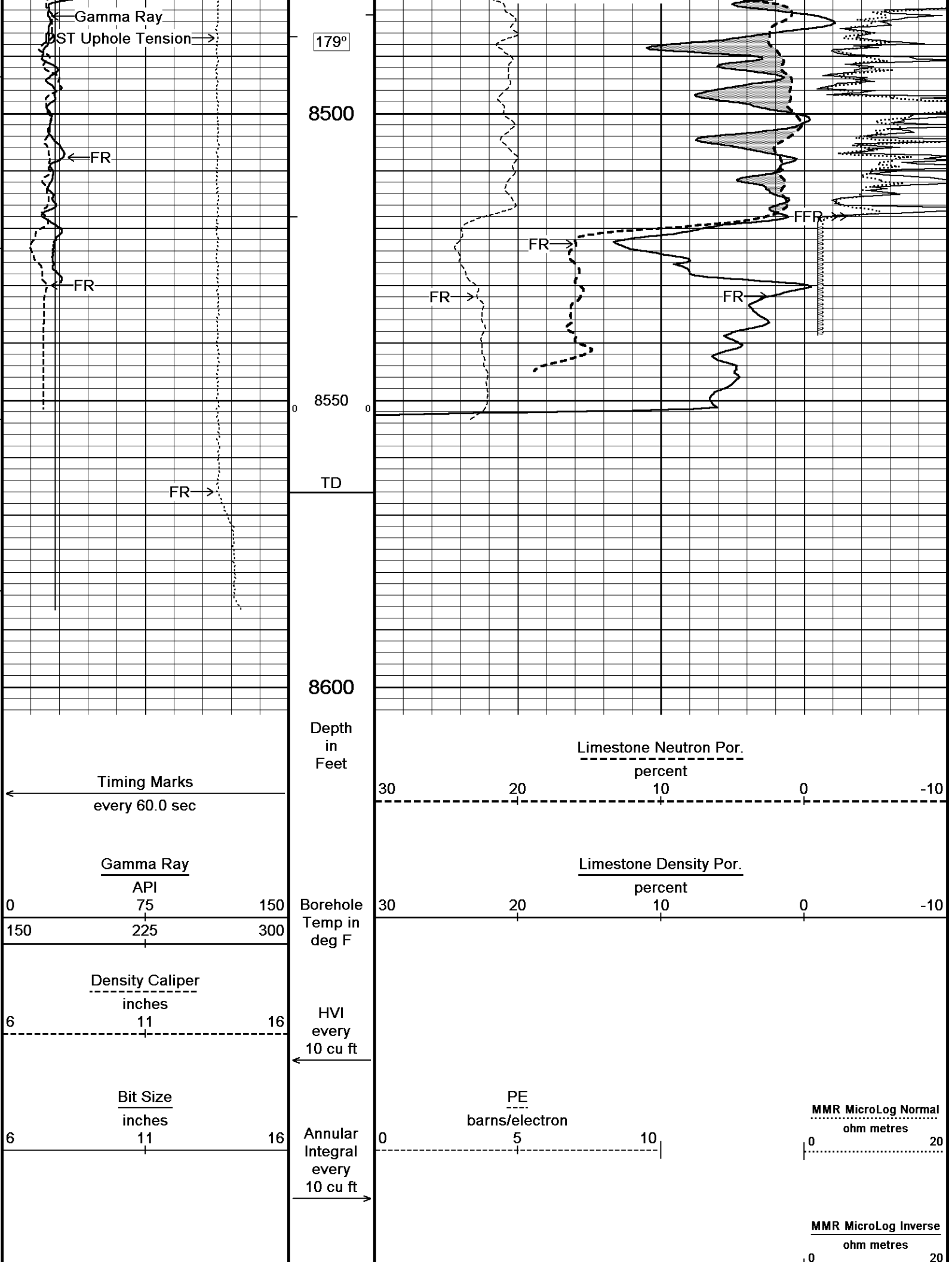
8200

173°

8250







DST Uphole Tension
pounds

50000

Replay
Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 16-NOV-2018 06:03

Filename: C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24_002.dtaRecorded on 16-NOV-2018 00:04

System Versions: Logged with 18.03.9344Plotted with 18.03.9344

↑REPEAT SECTION↑

↓

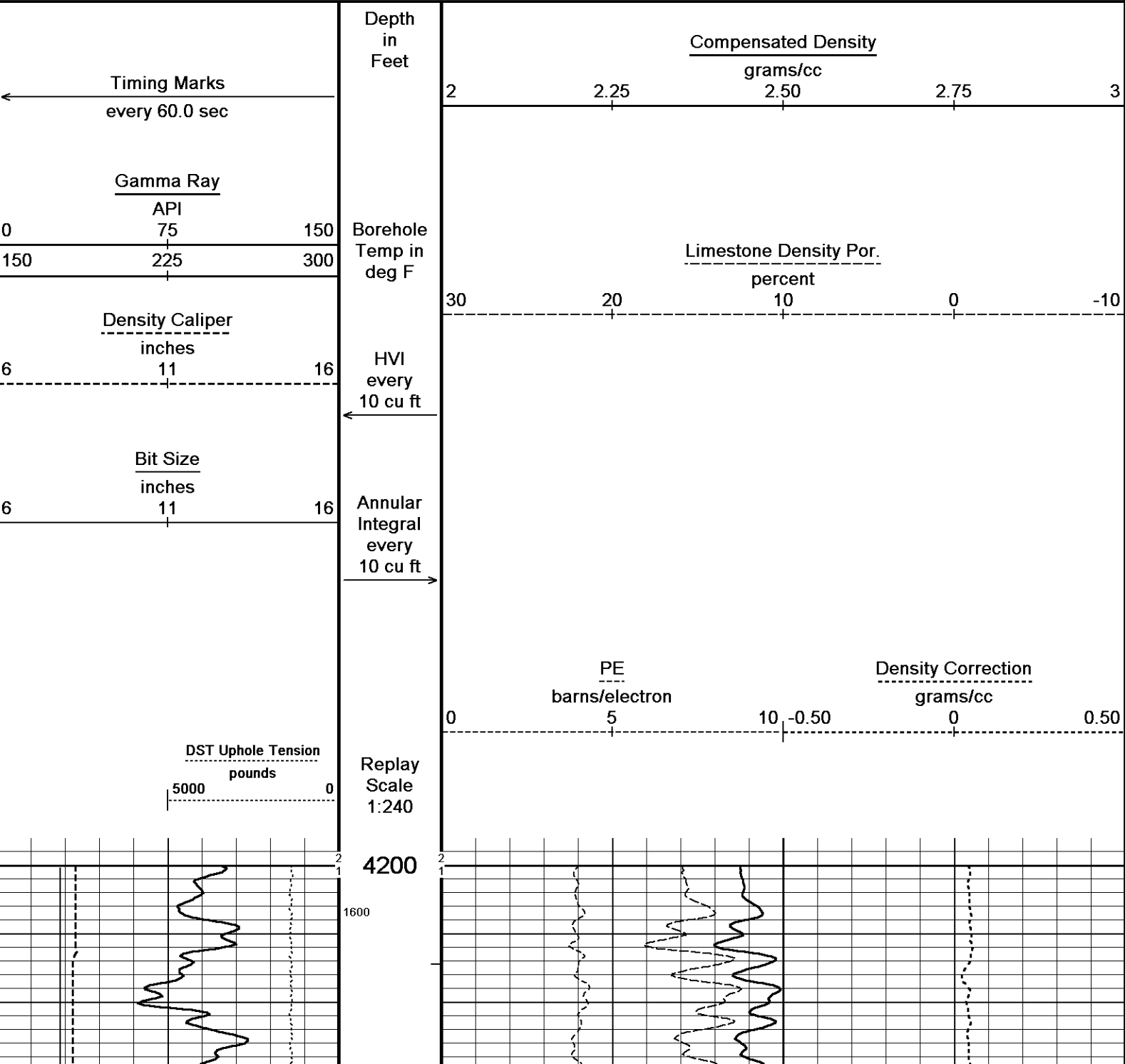
5 INCH BULK DENSITY MAIN

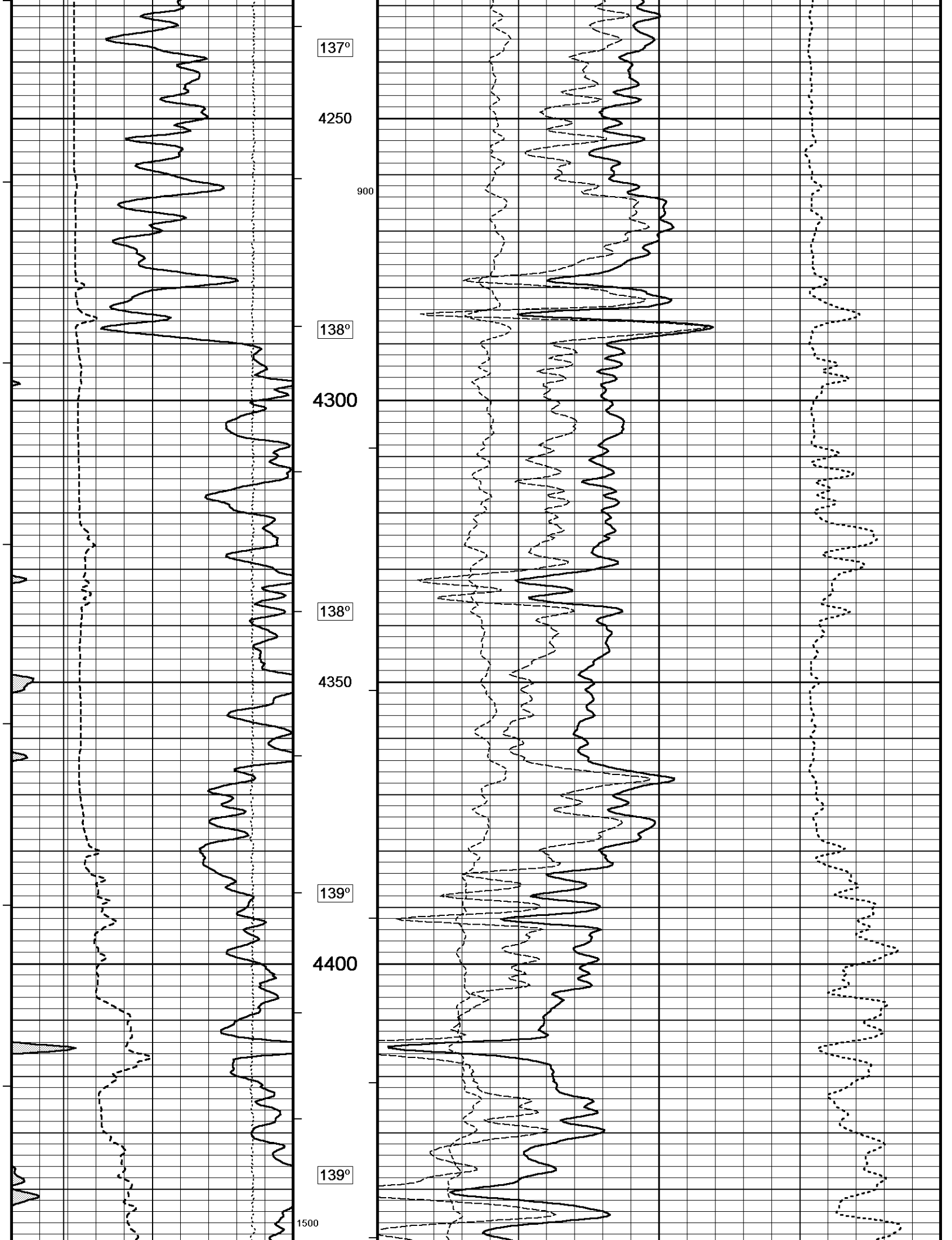
↓

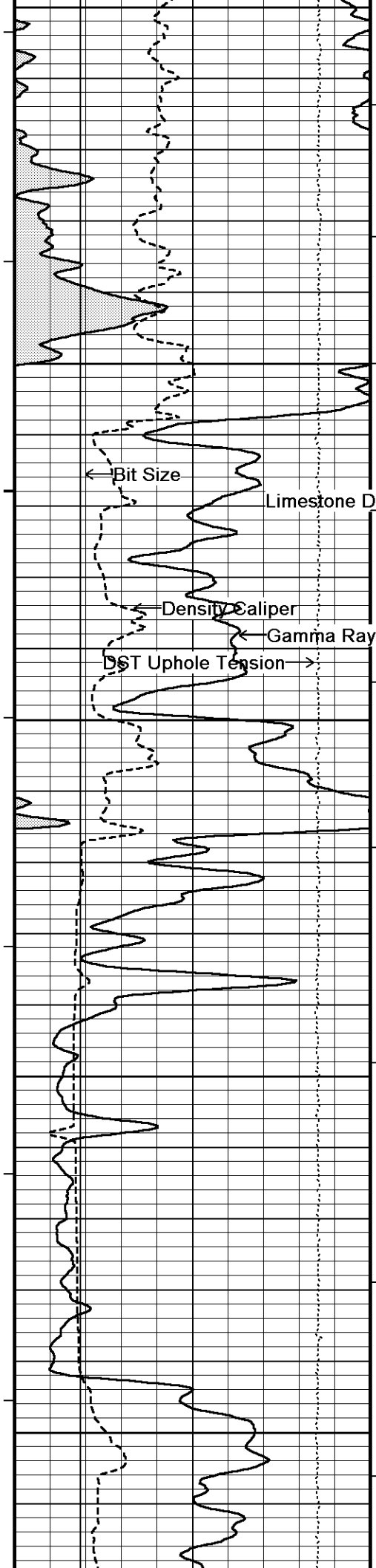
Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 16-NOV-2018 06:03

Filename: C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24 Splice.dtaRecorded on 16-NOV-2018 00:31

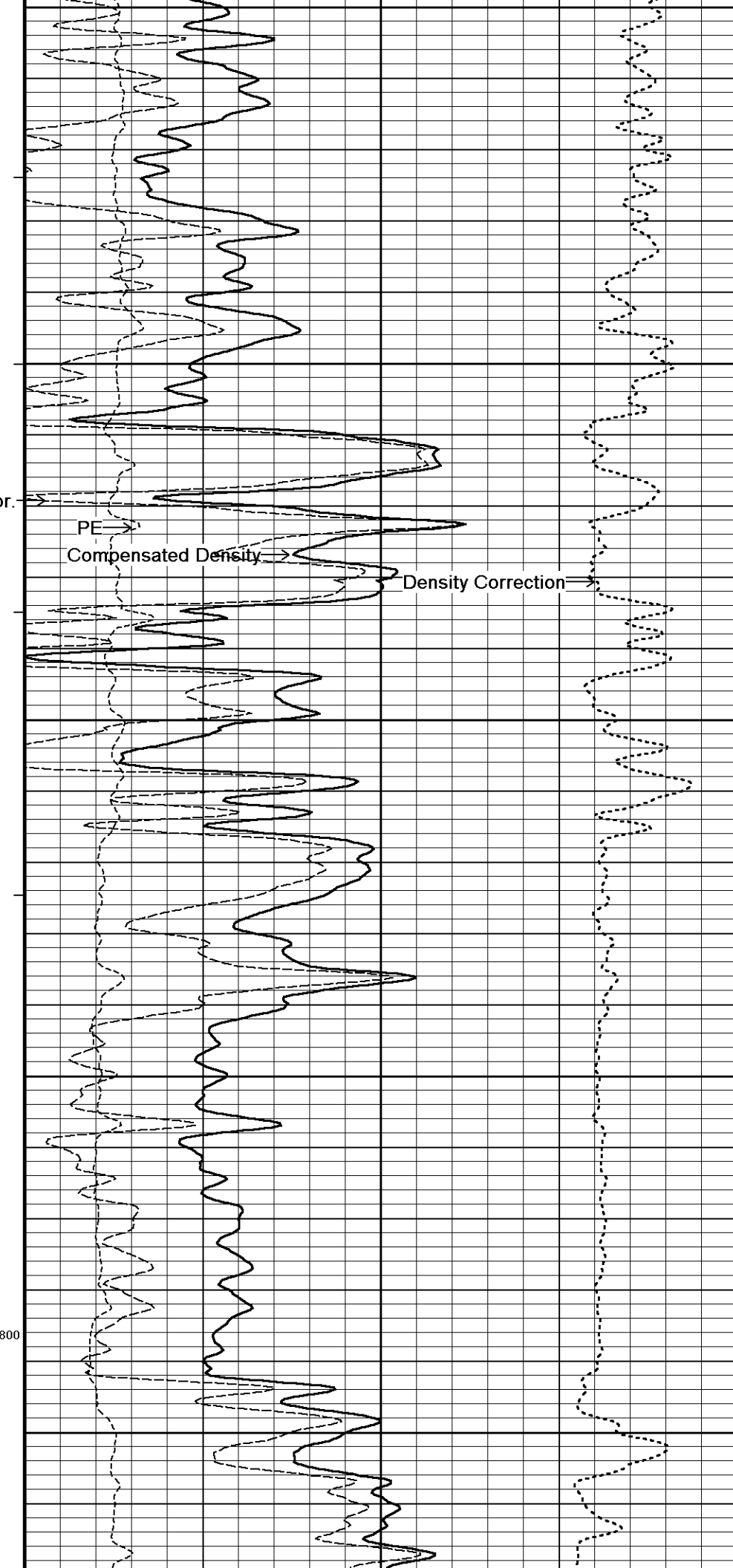
System Versions: Processed with 18.03.9344Plotted with 18.03.9344

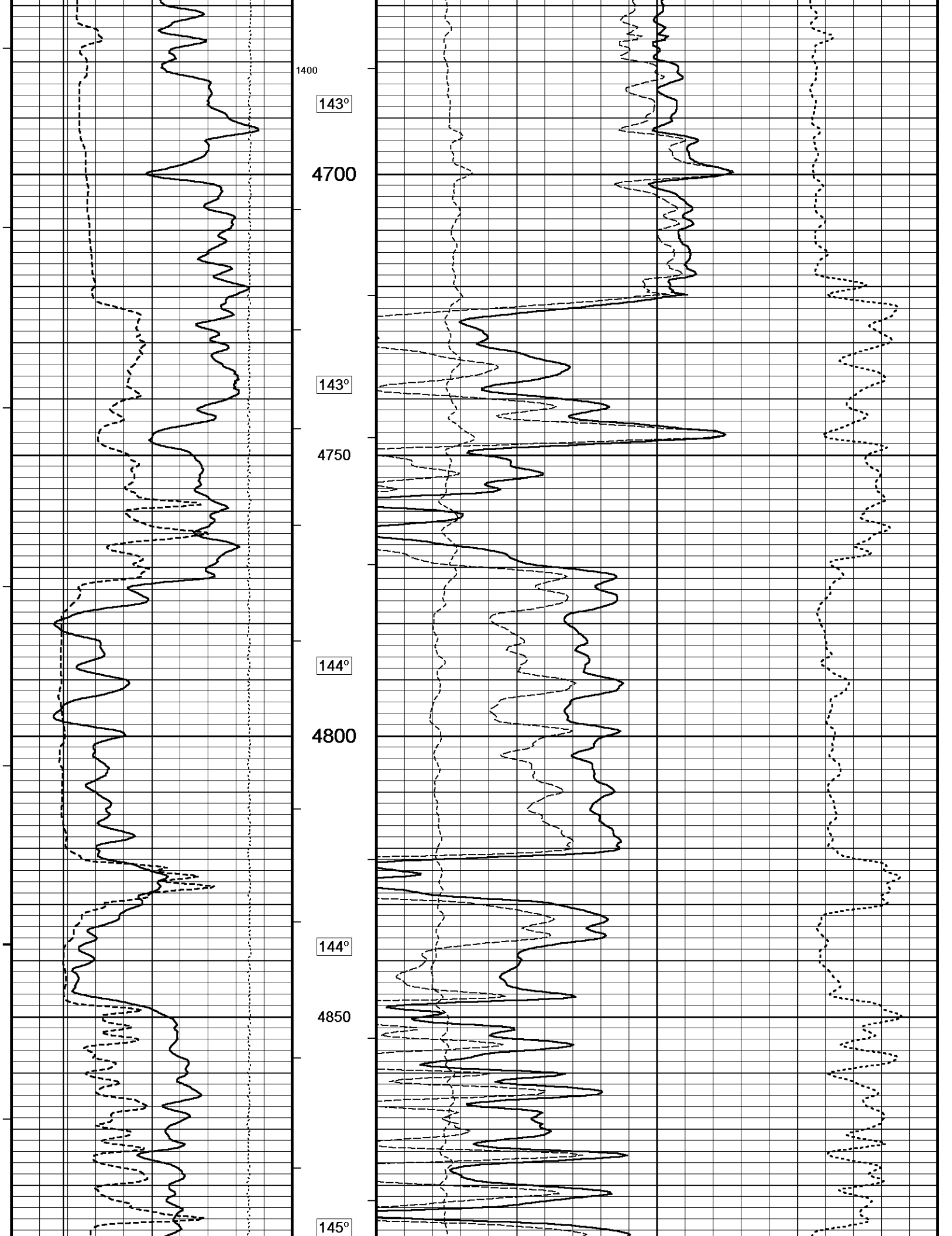


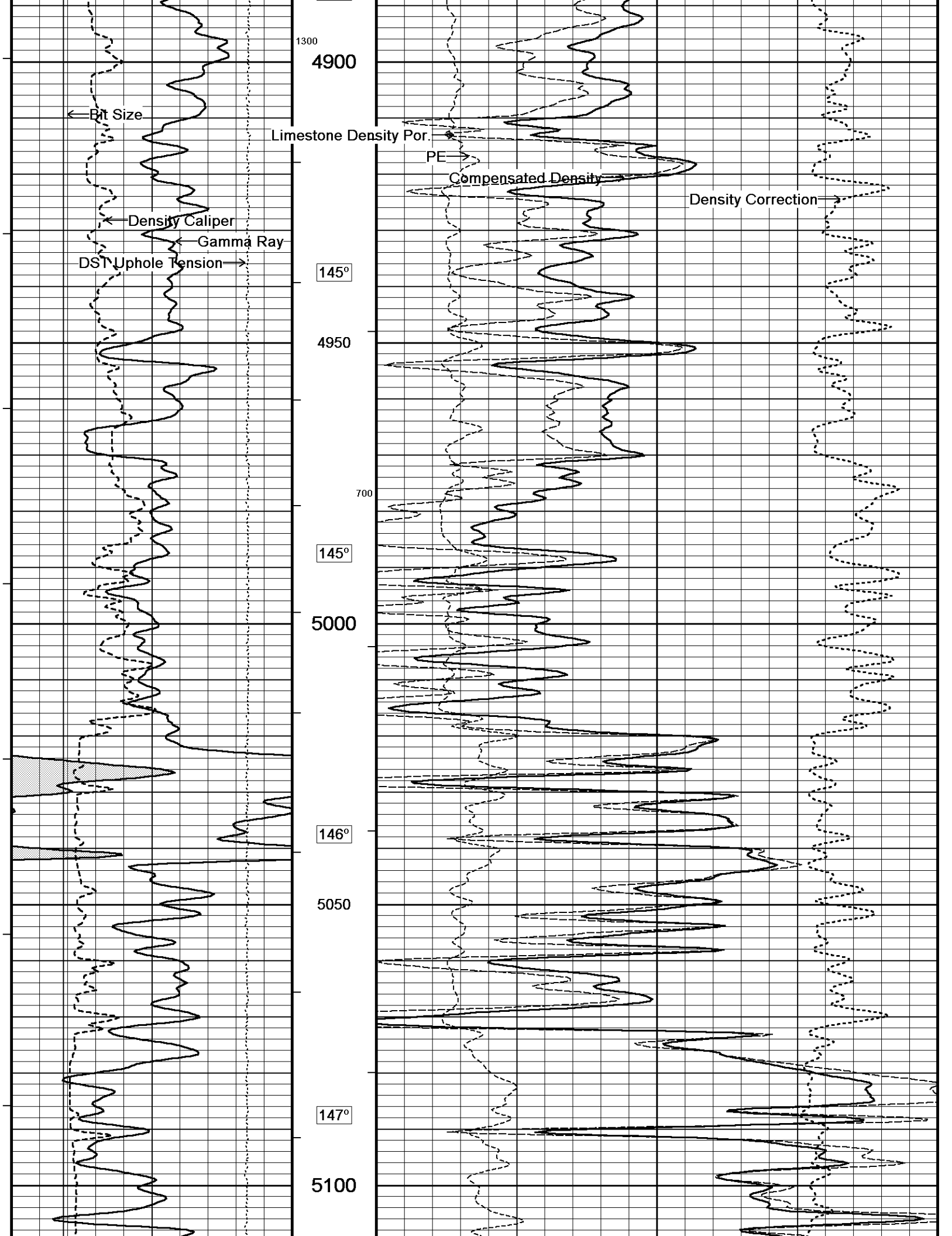


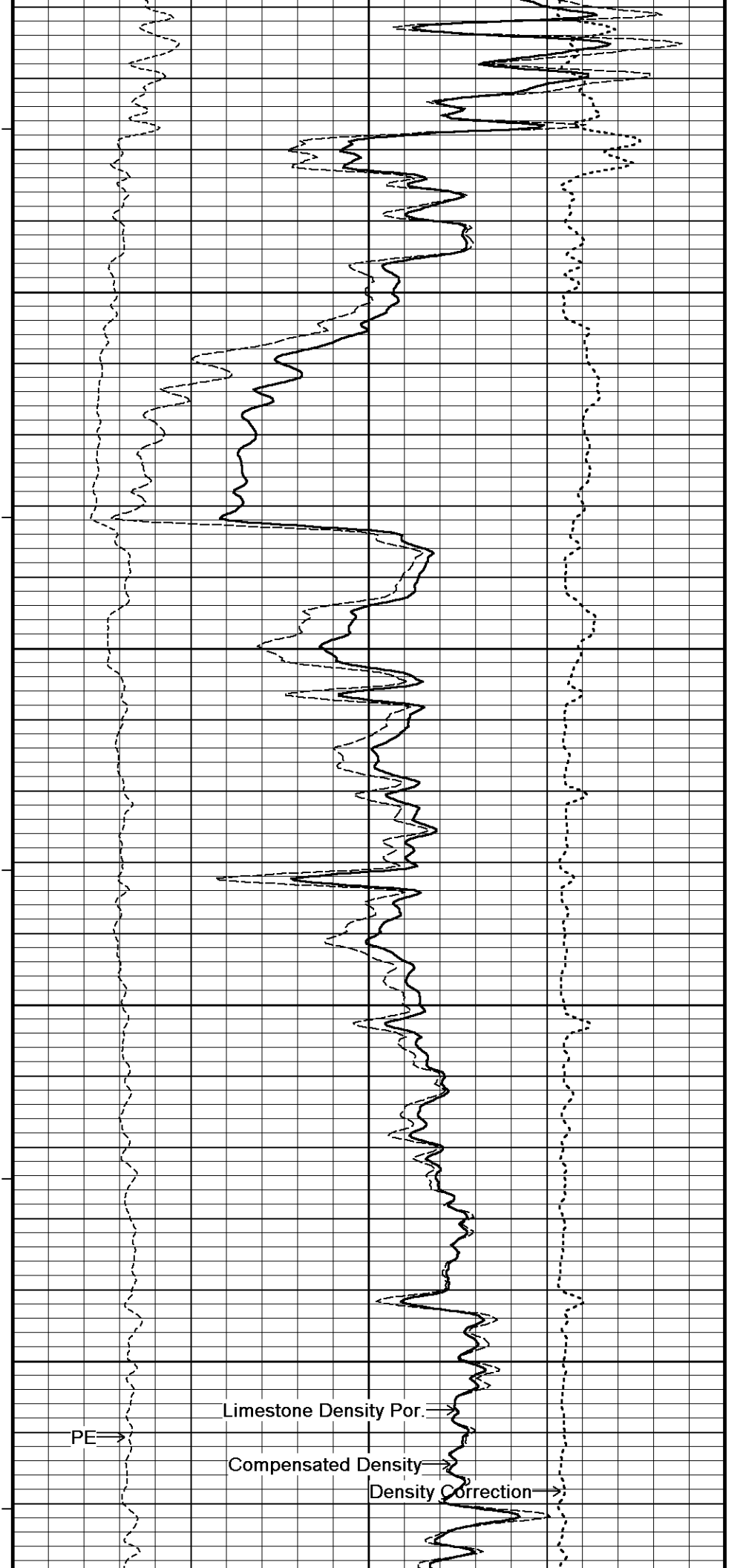
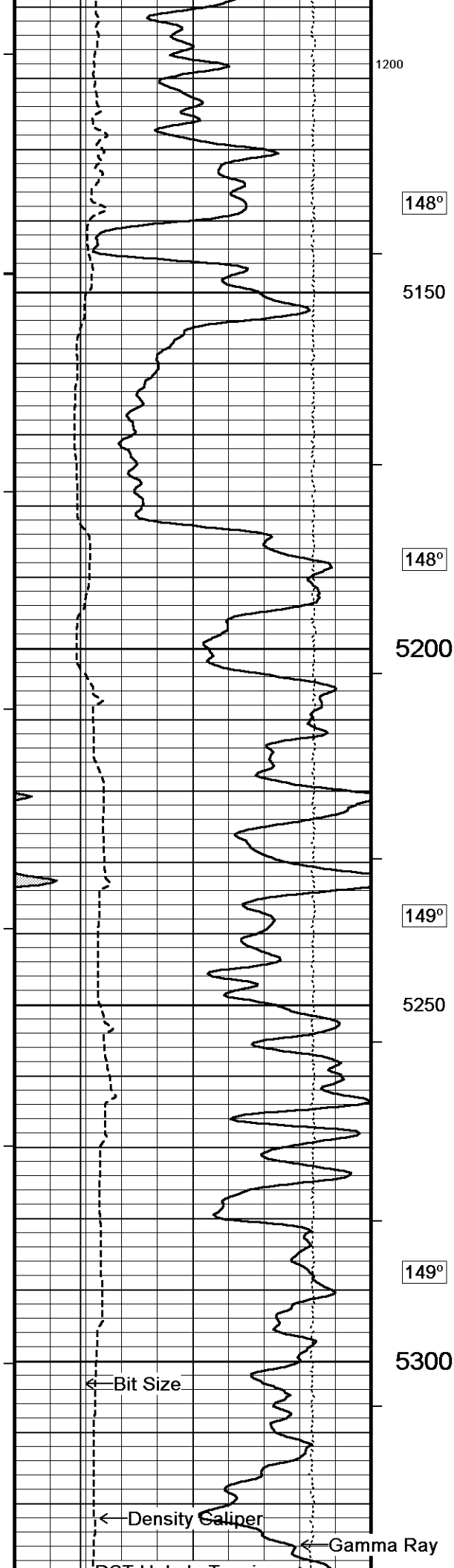


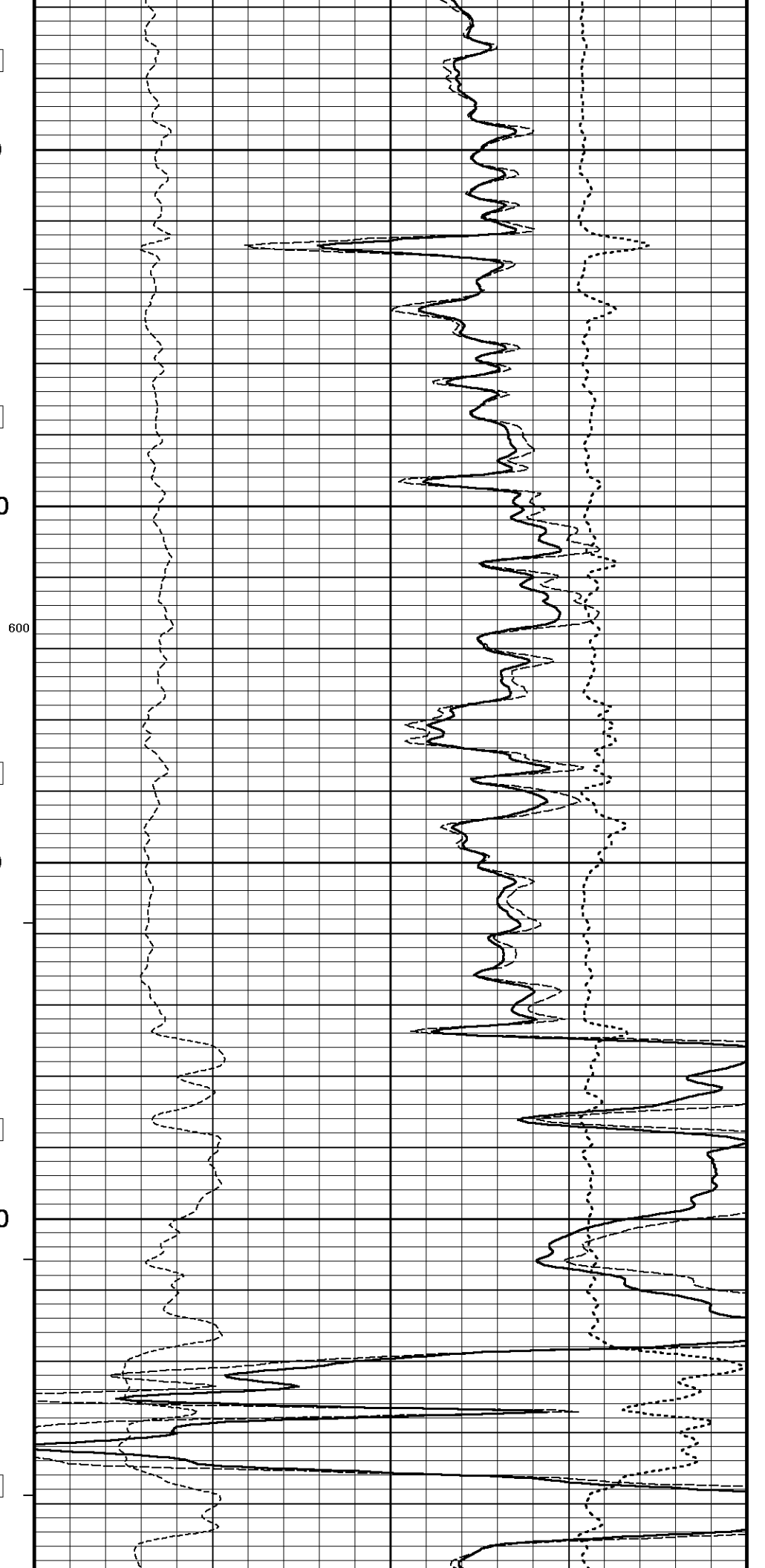
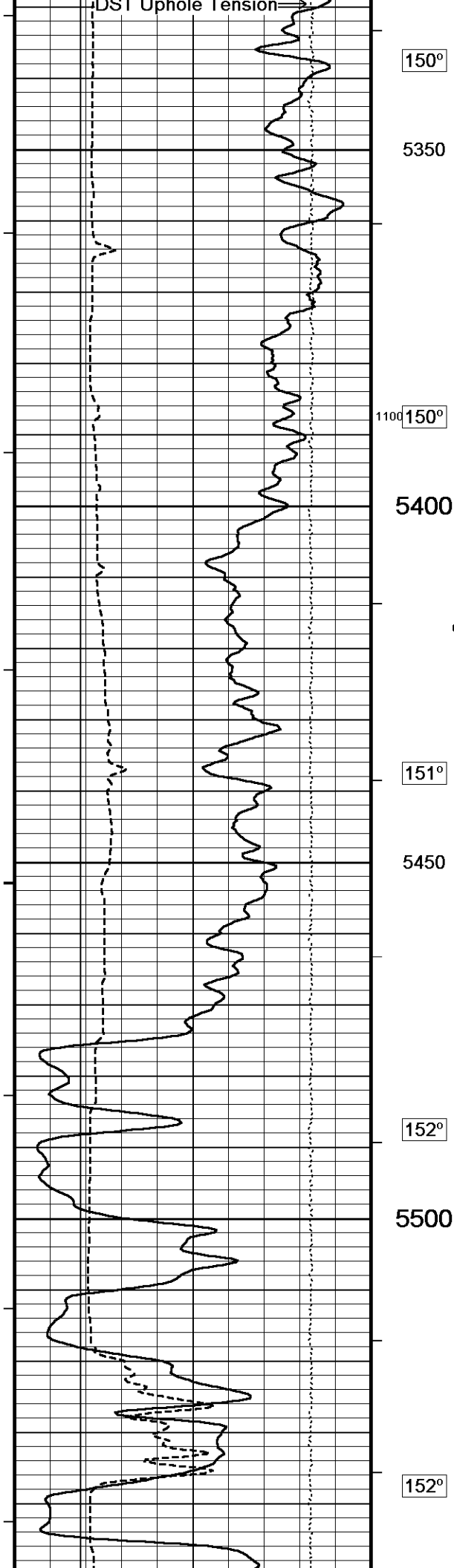
4450
140°
4500
141°
4550
141°
4600
142° 800
4650

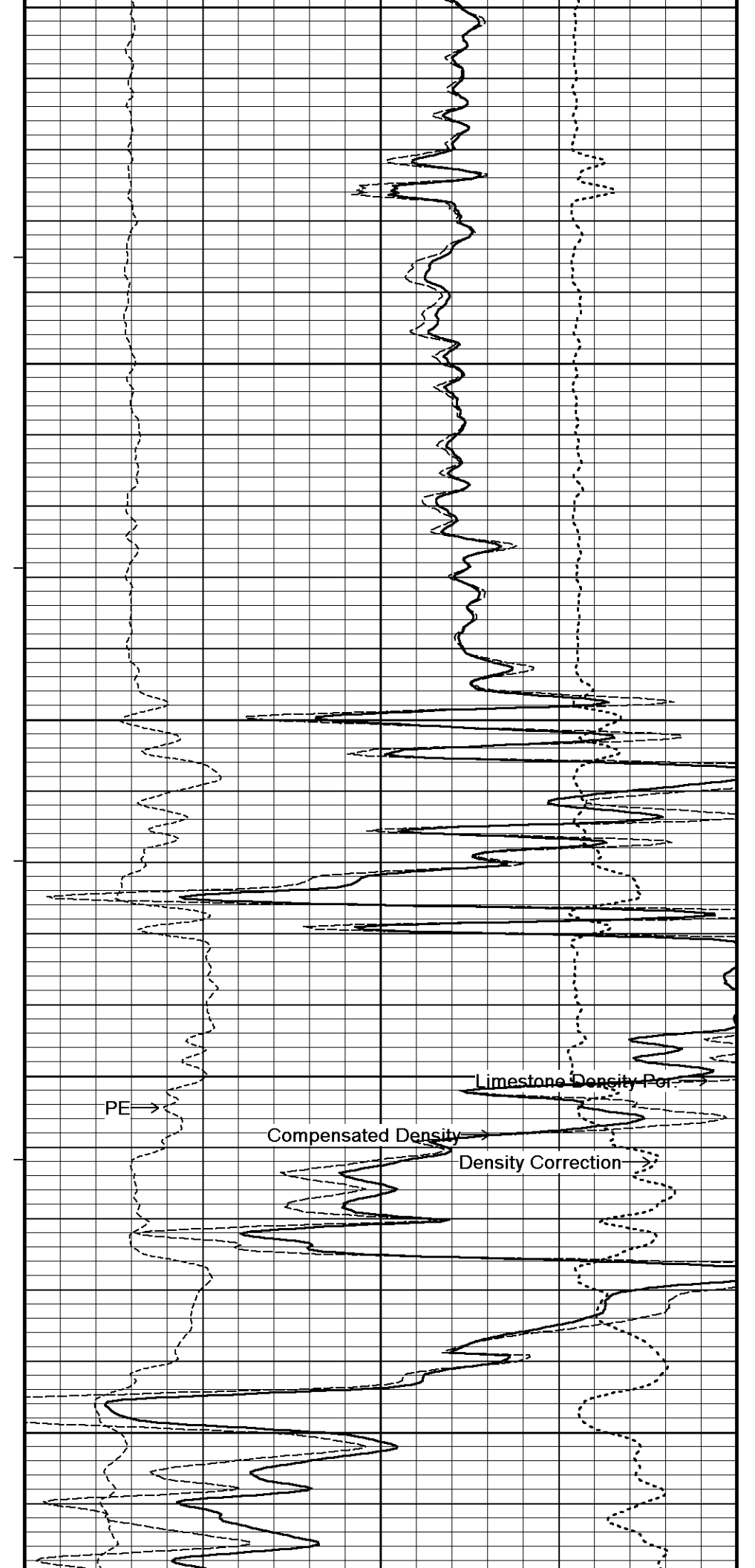
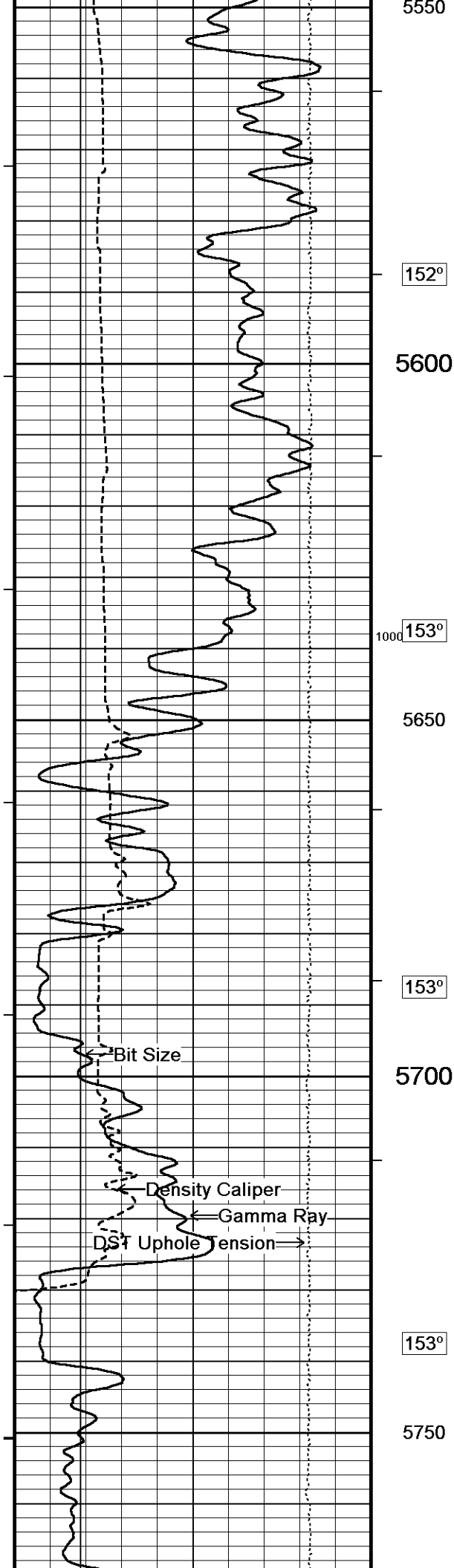


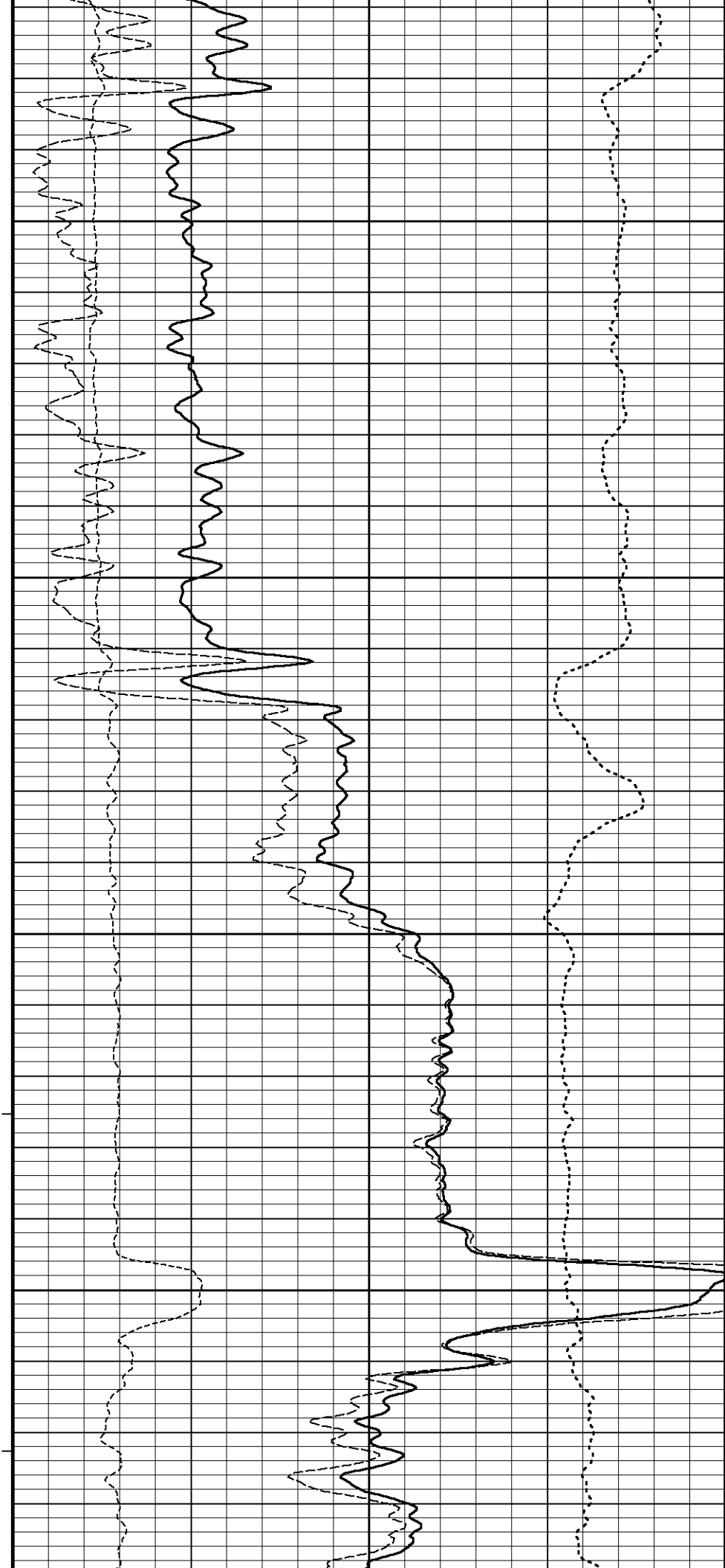
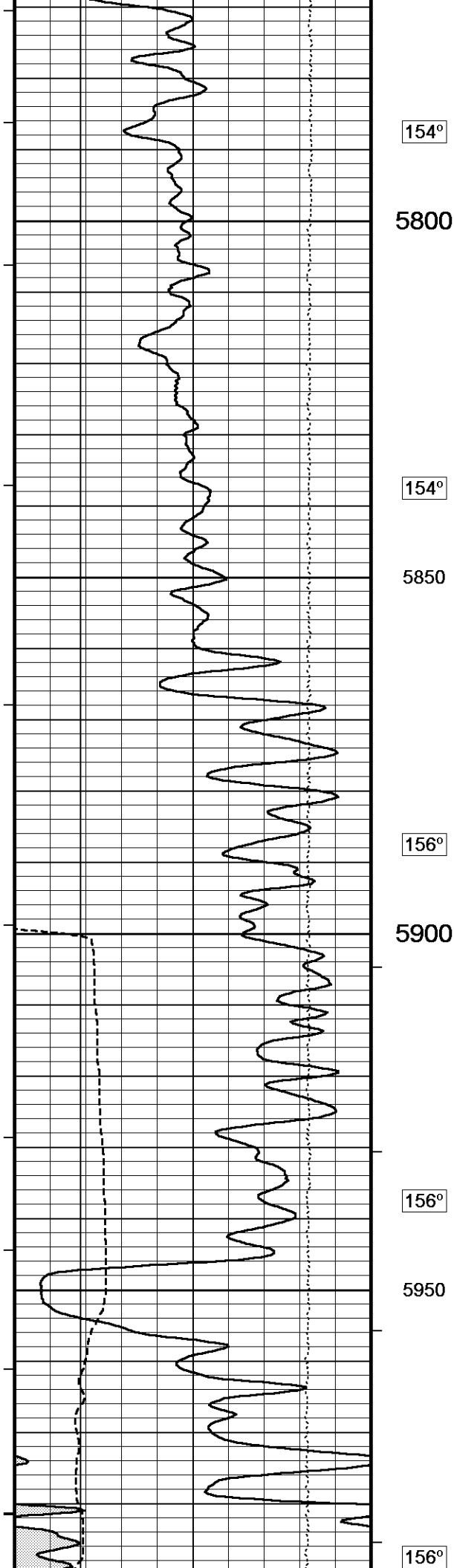


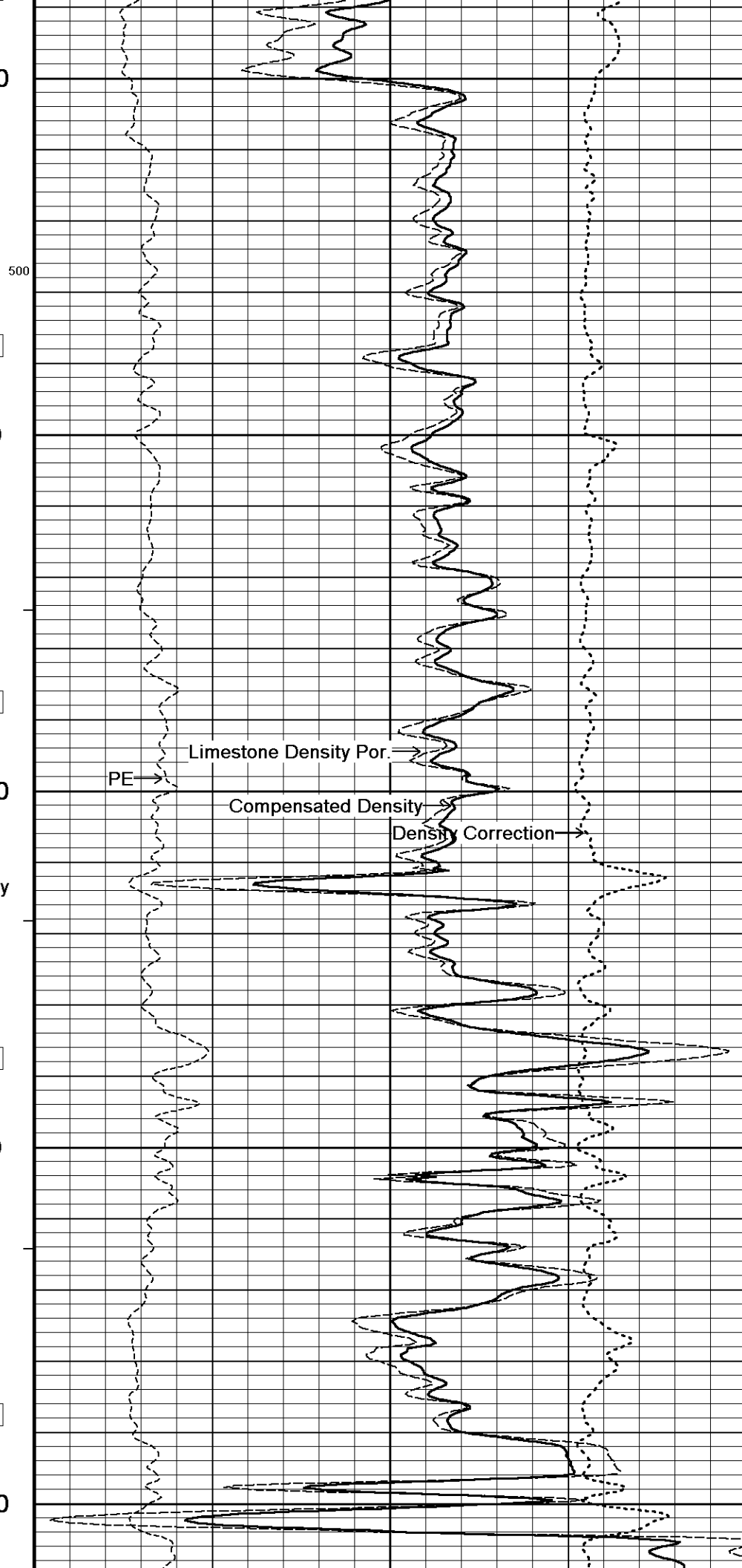
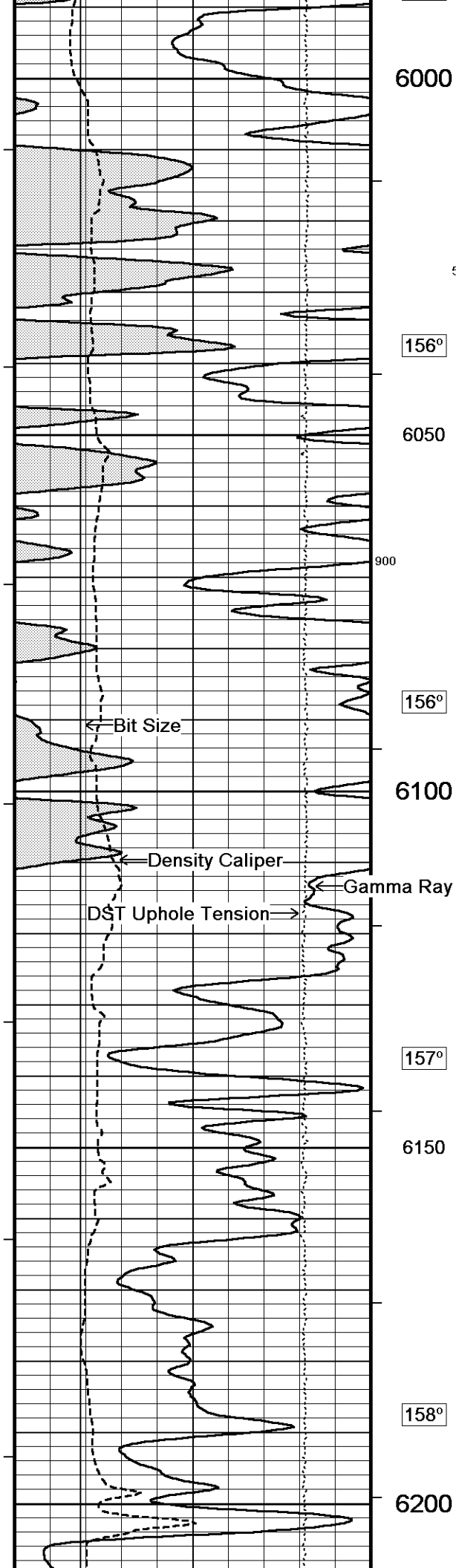


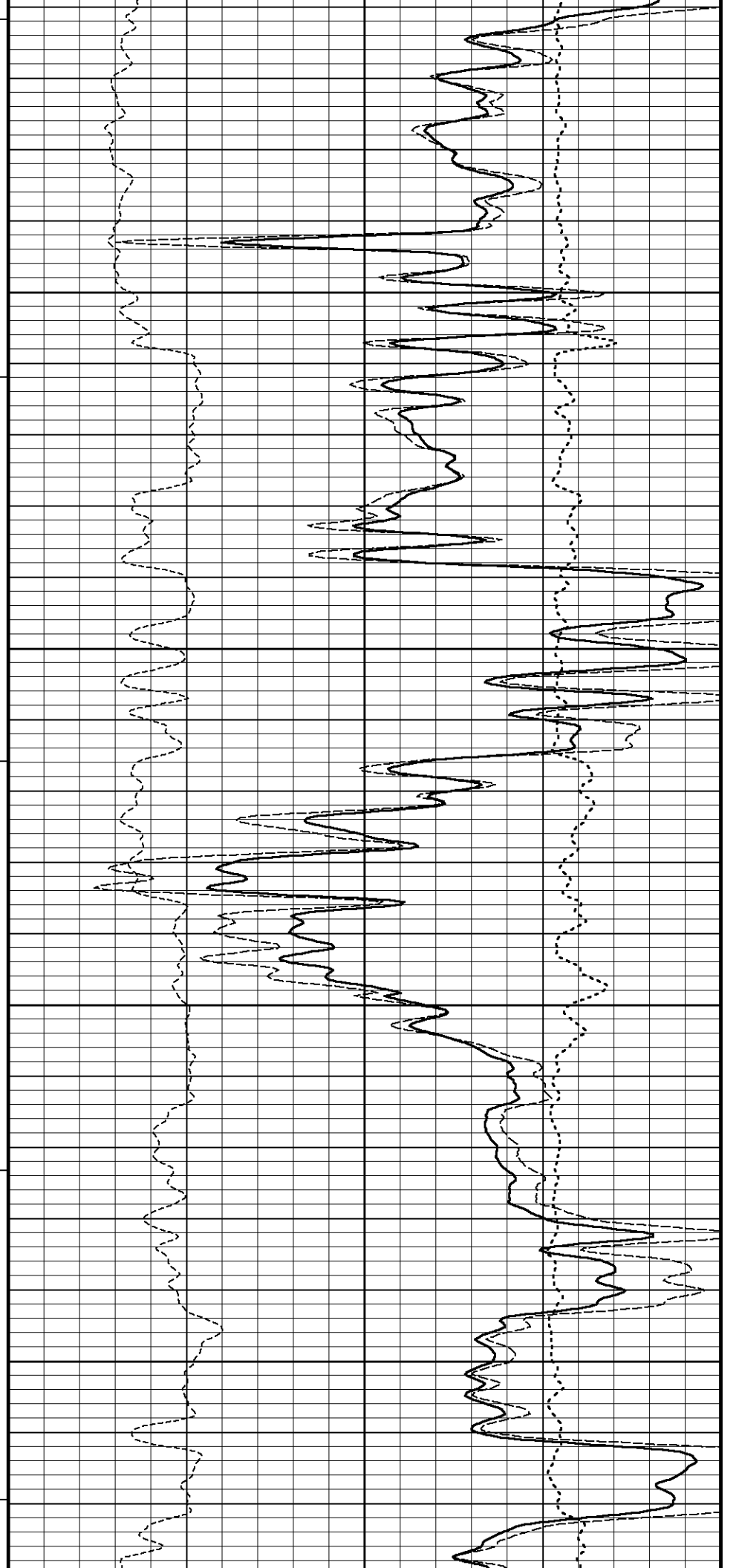
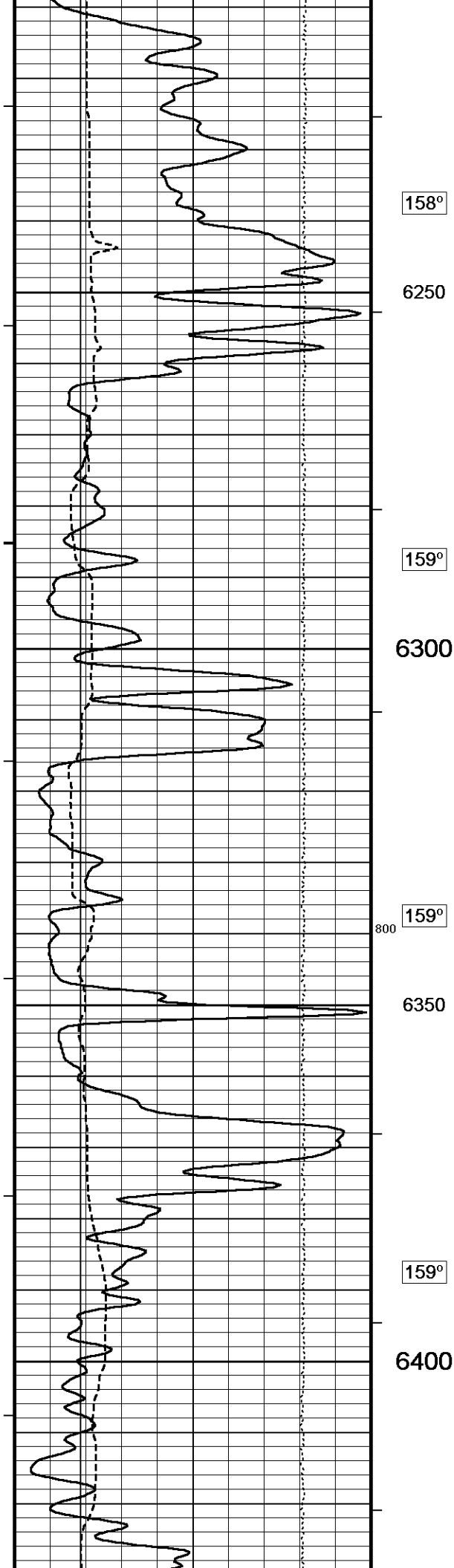


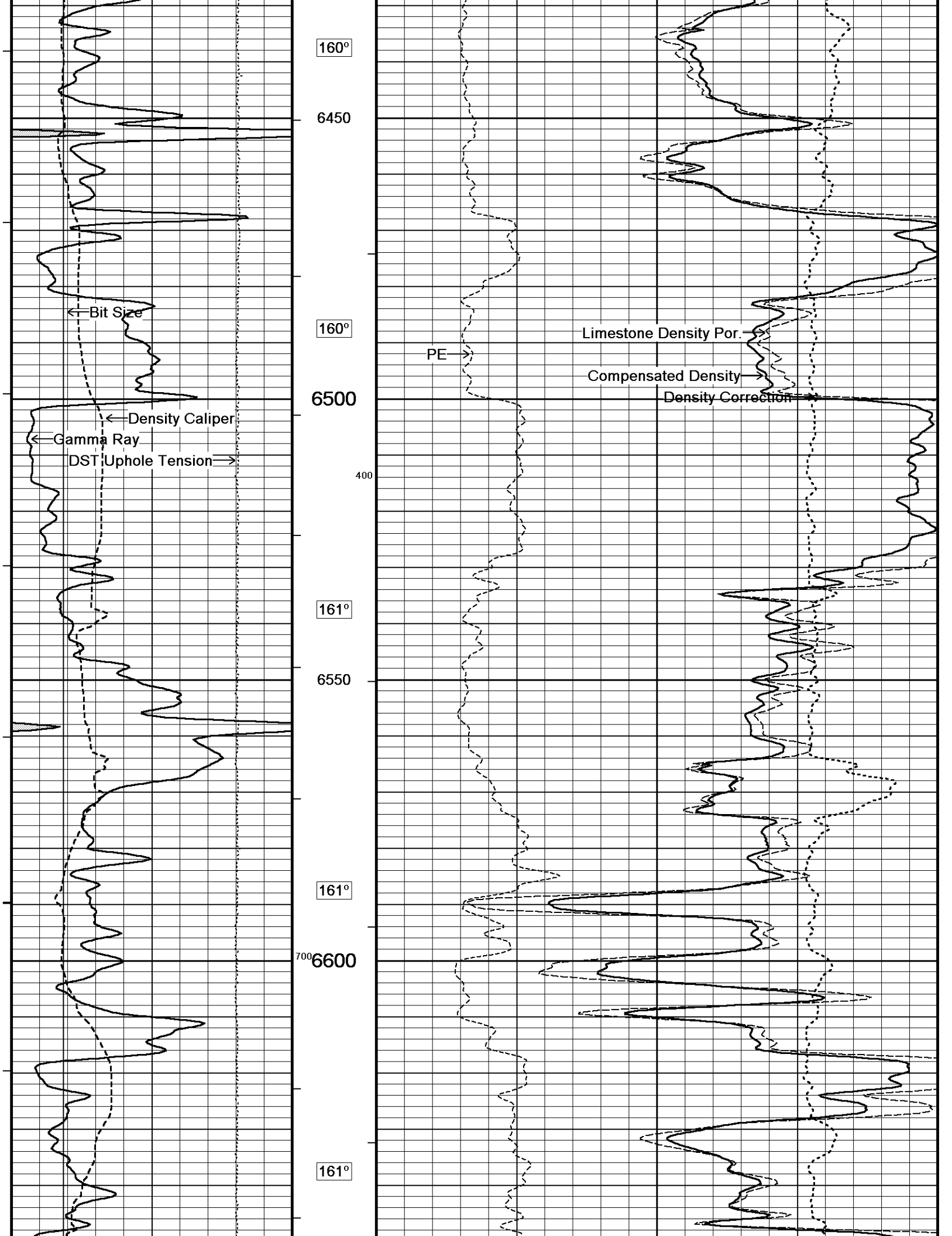


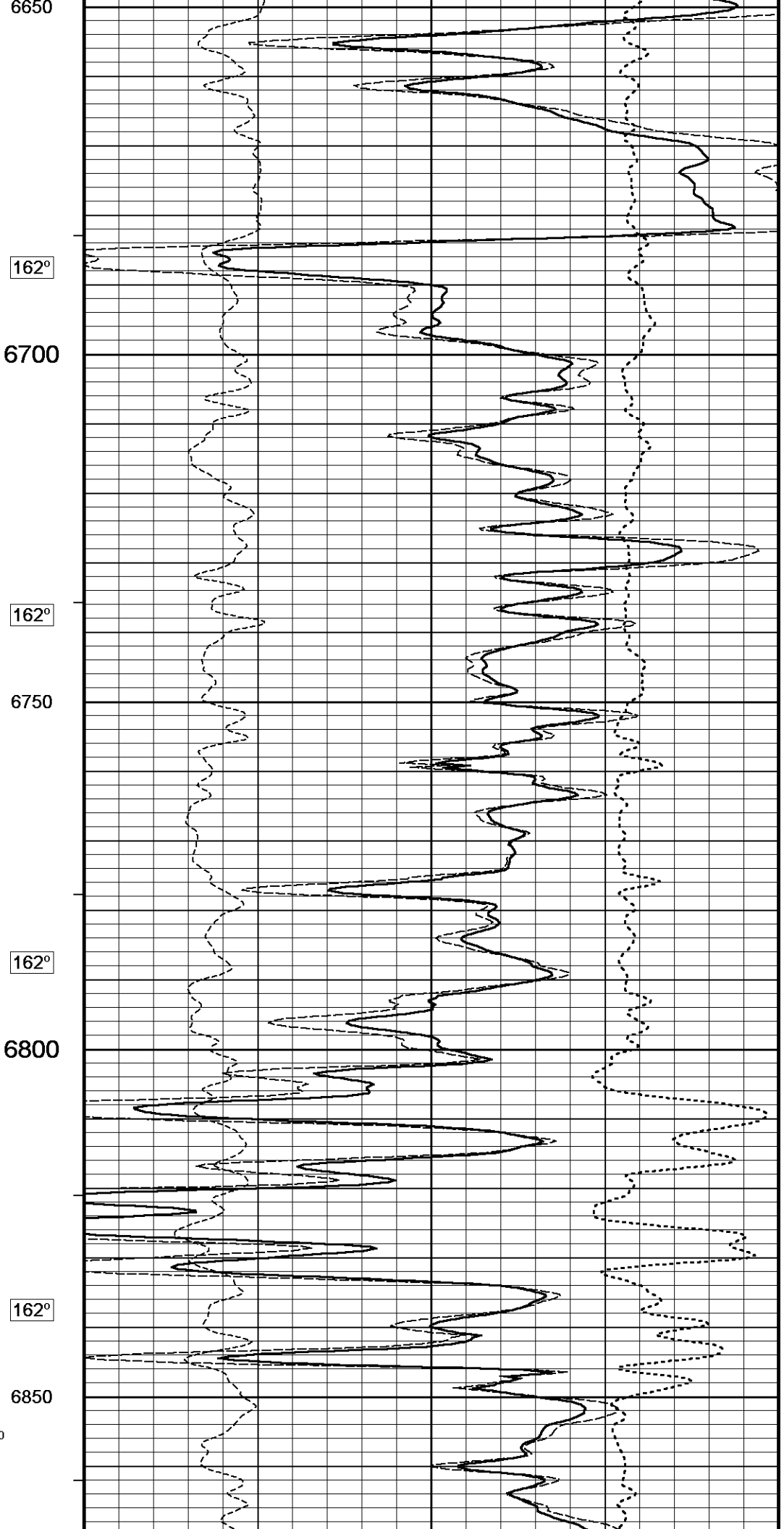
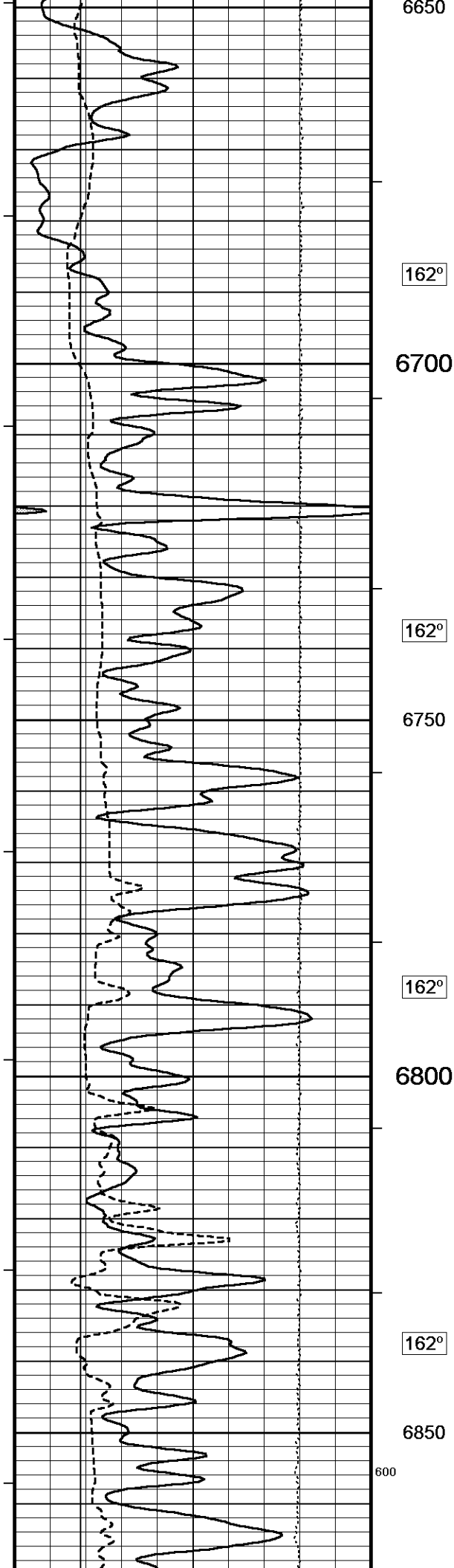


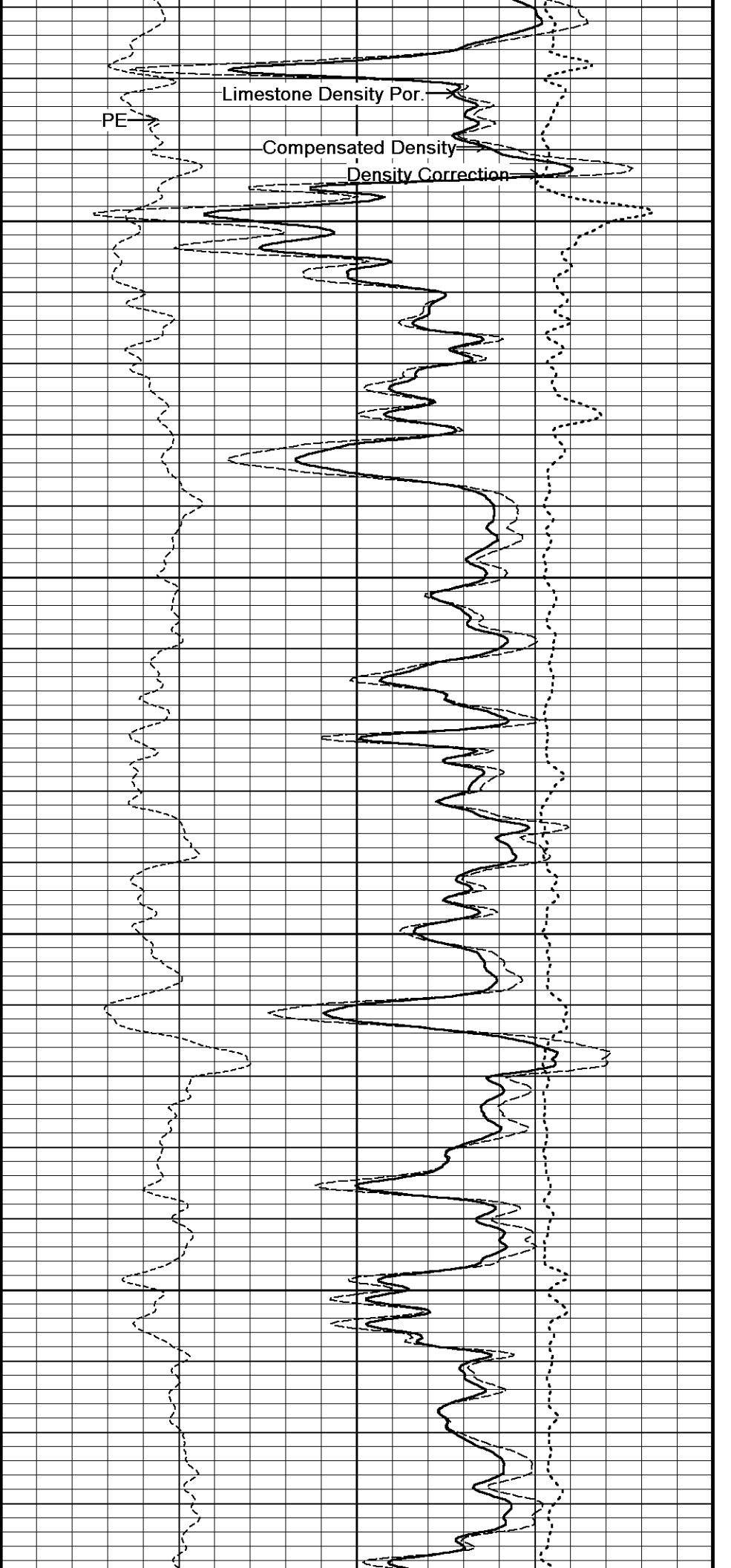
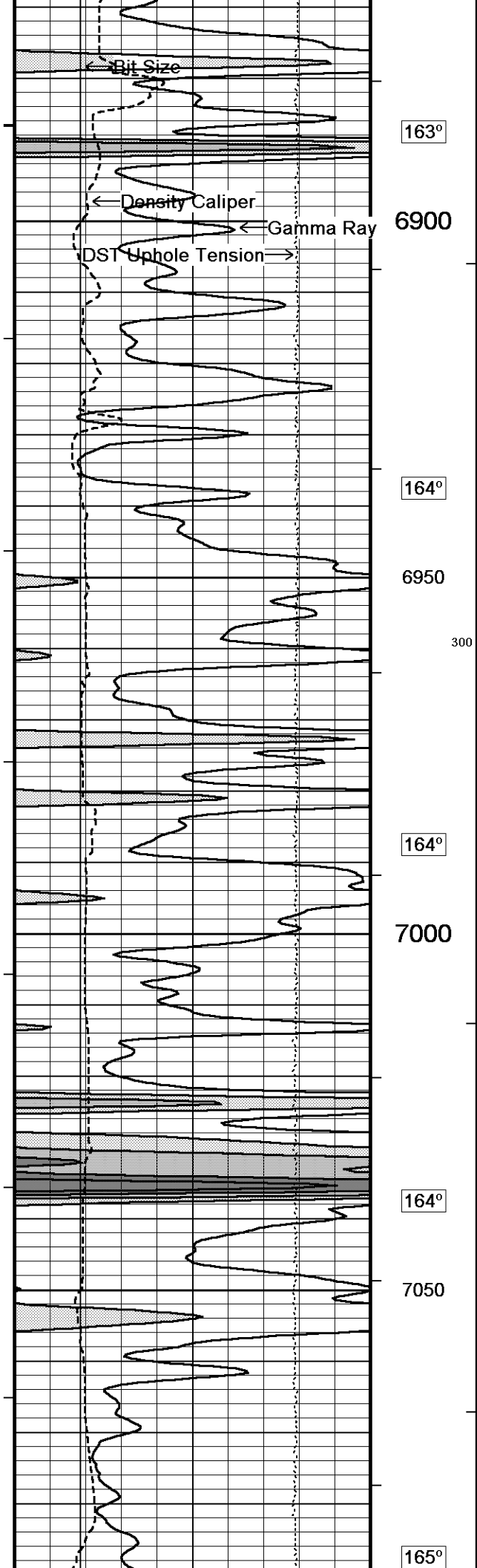


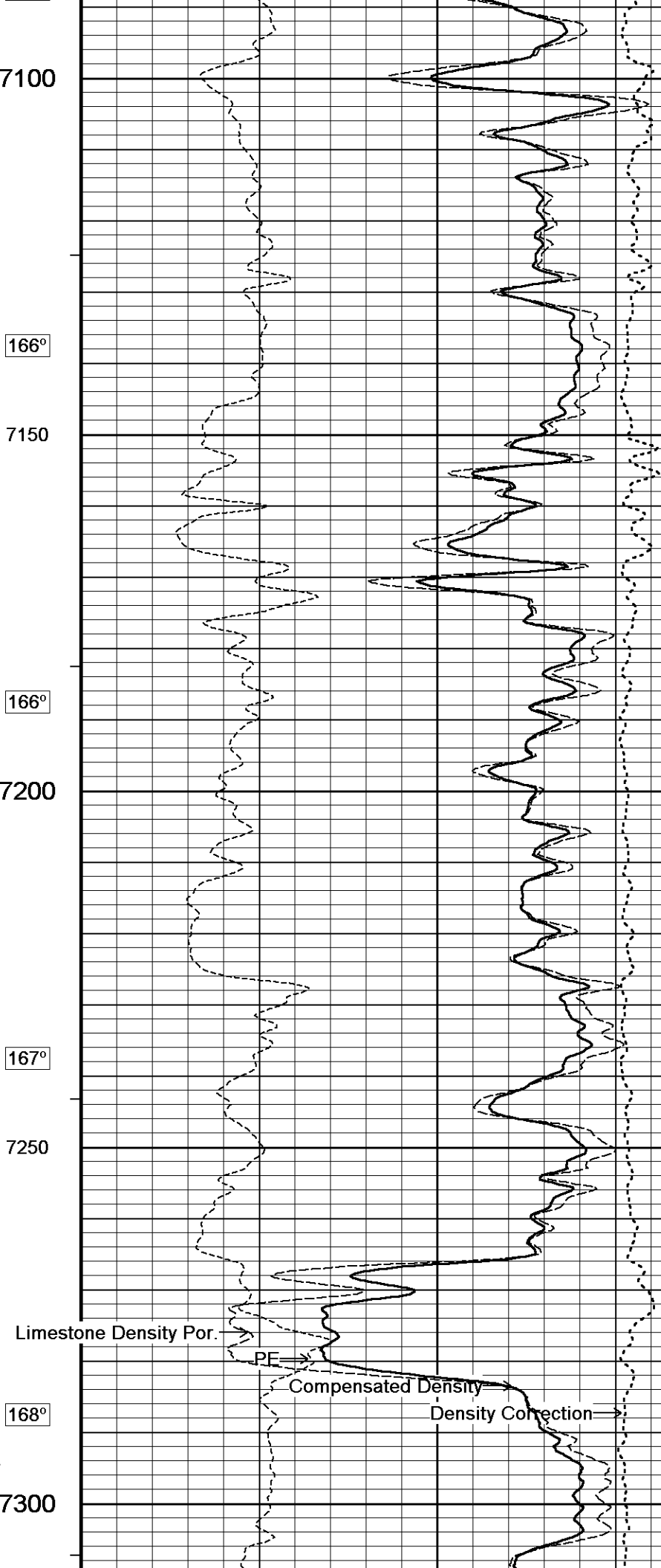
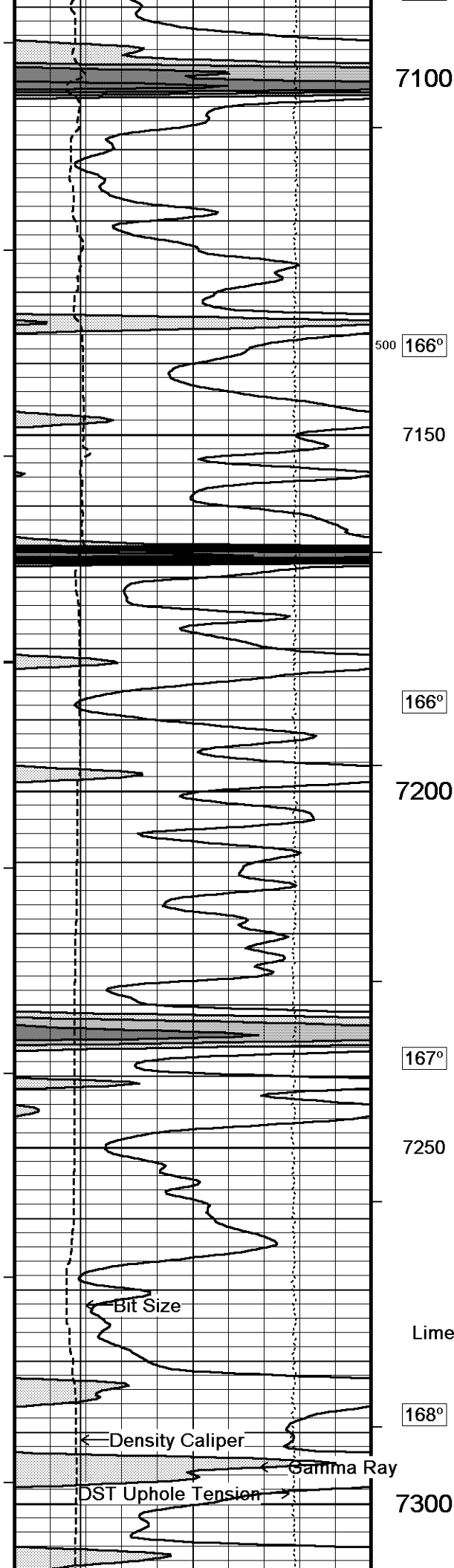


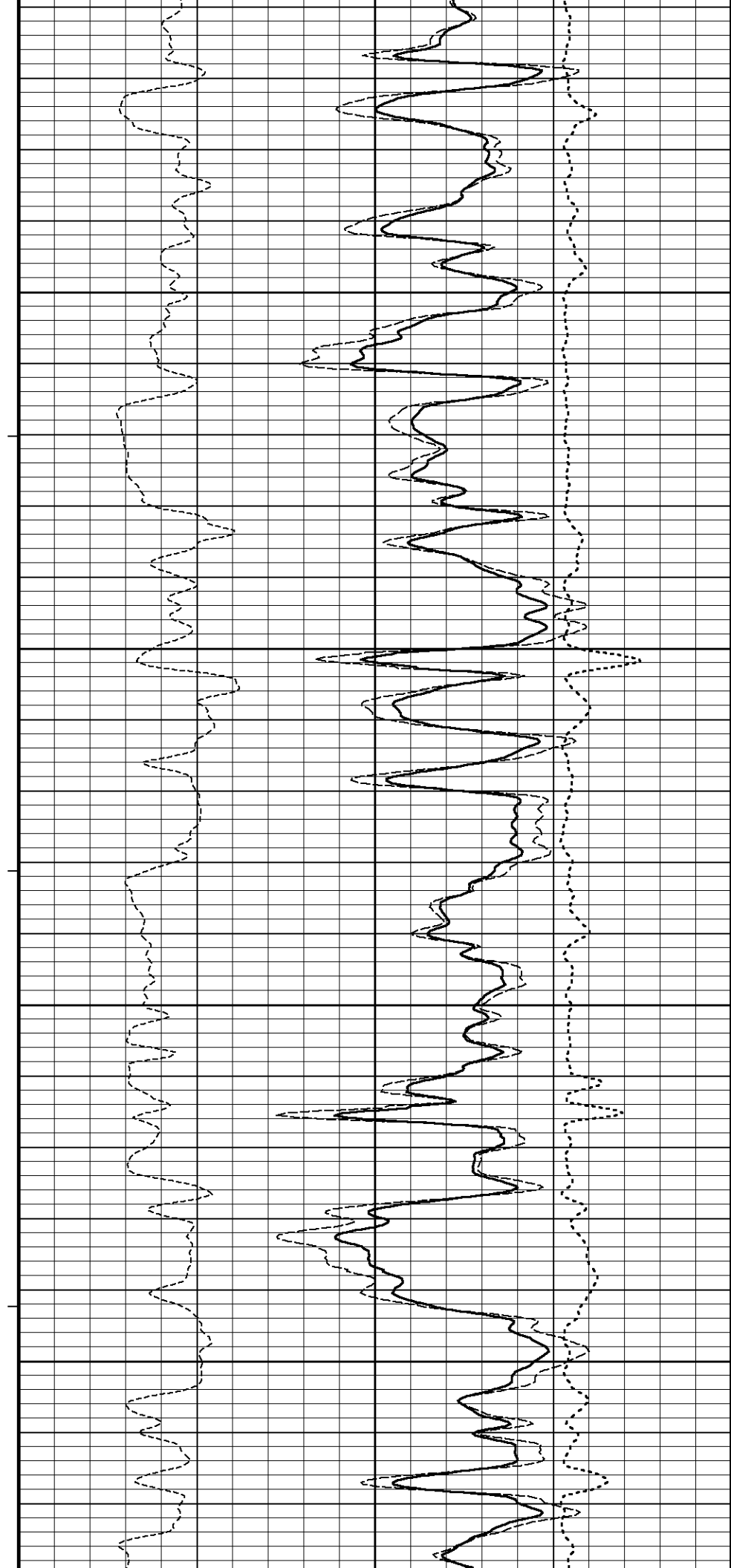
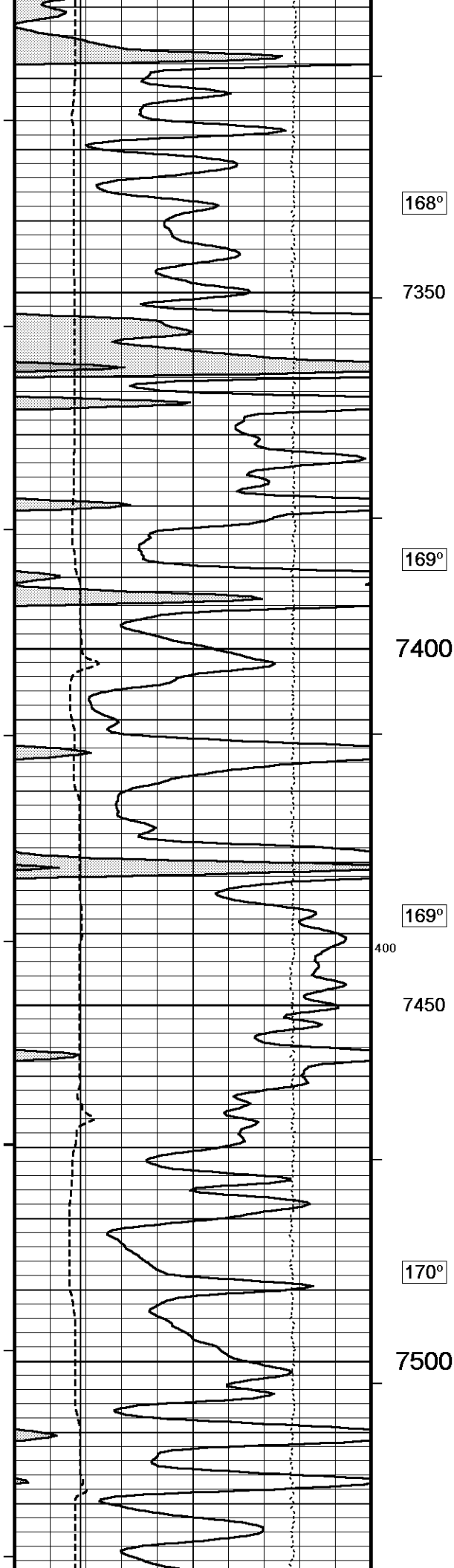


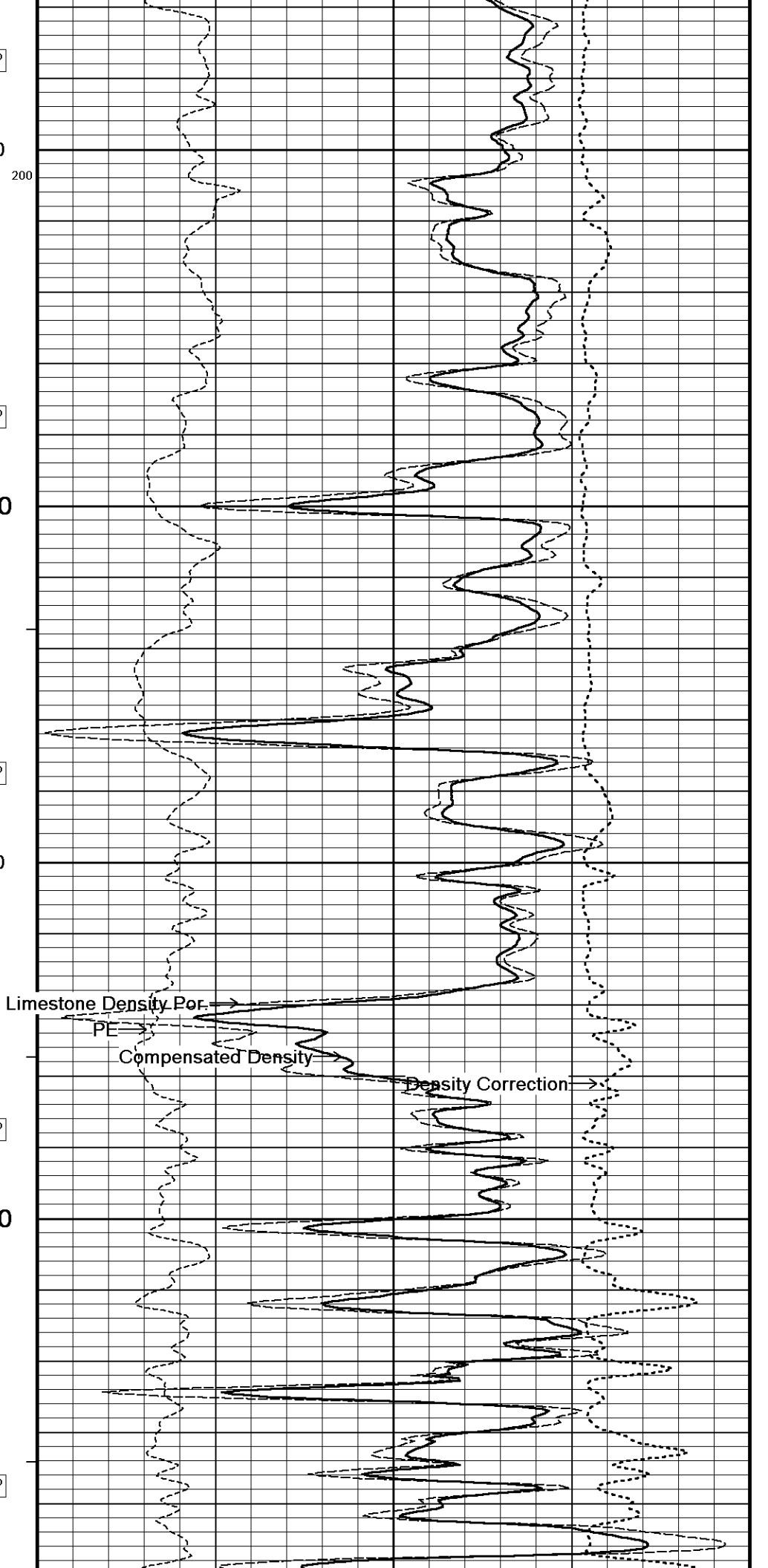
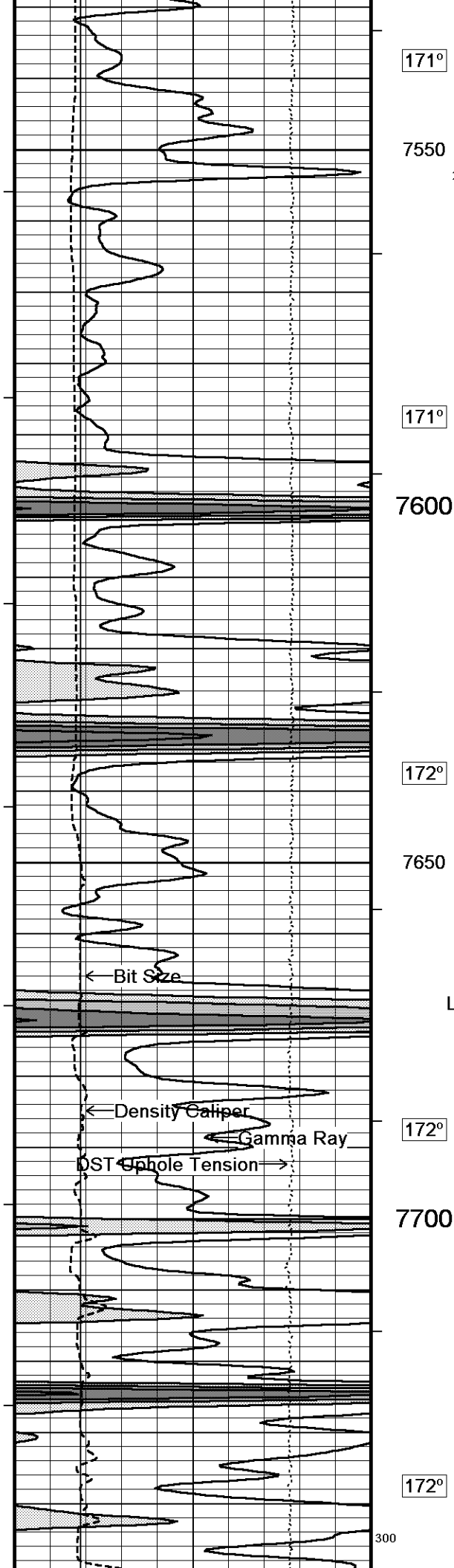


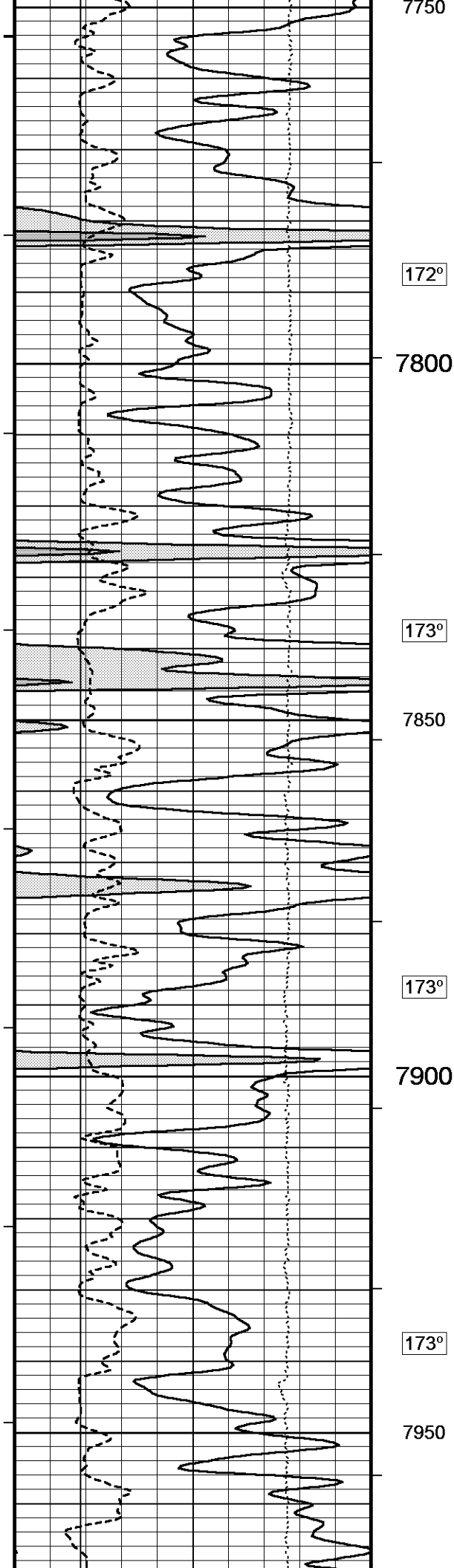












7750

172°

7800

173°

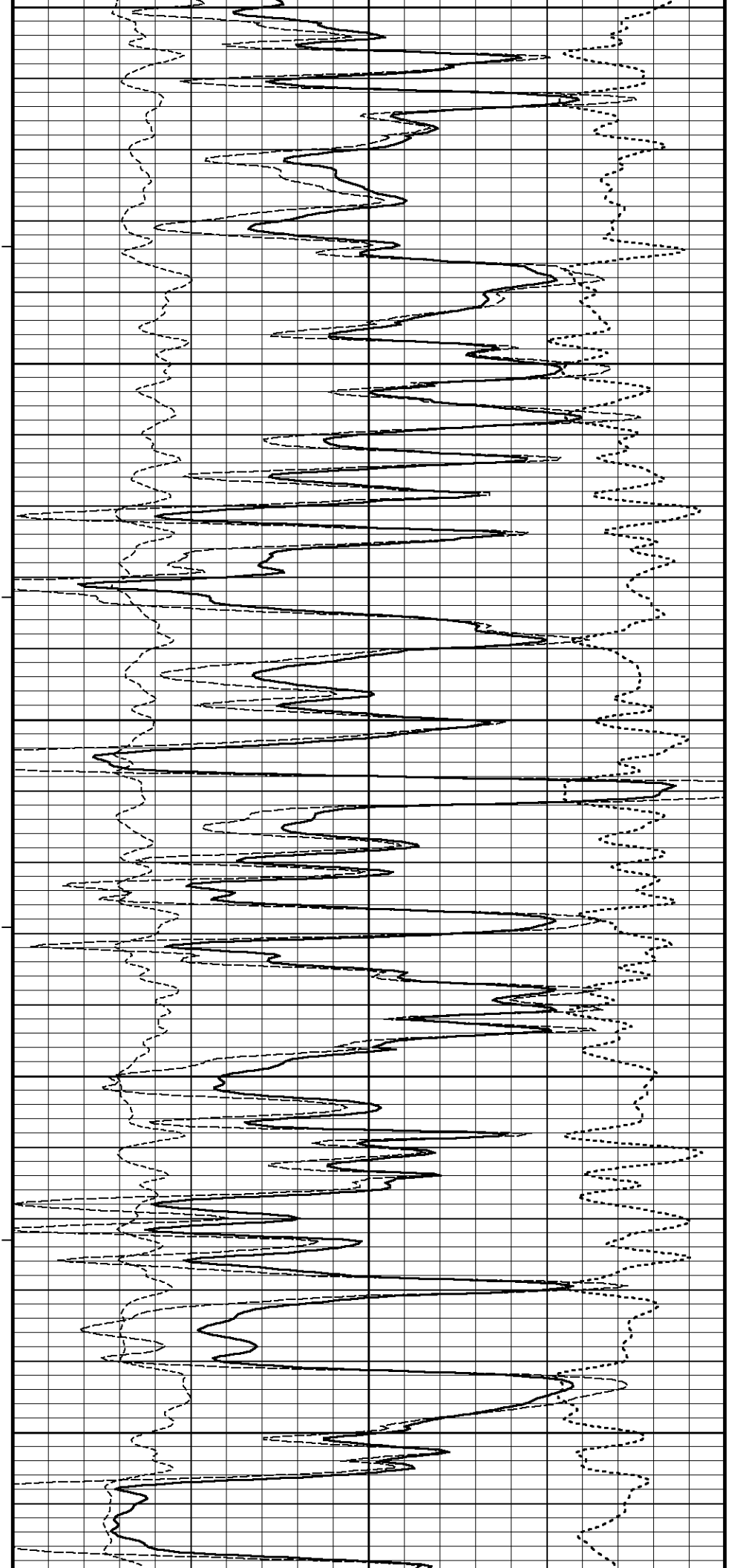
850

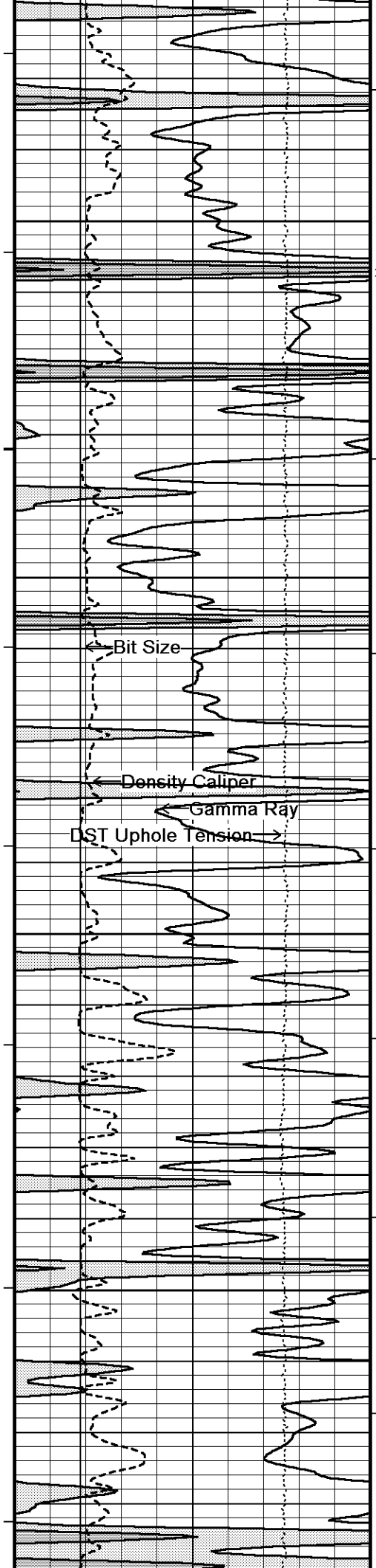
173°

900

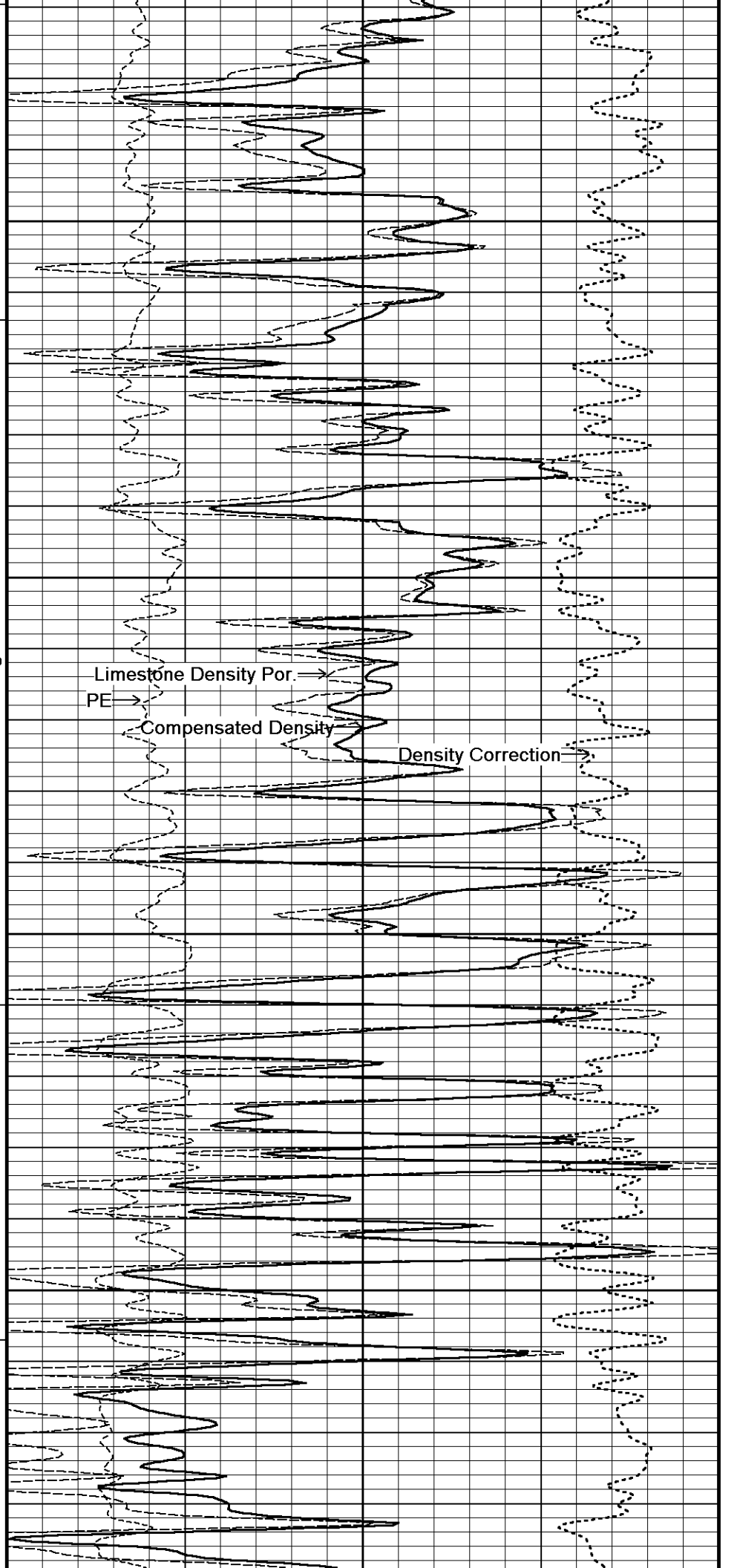
173°

950



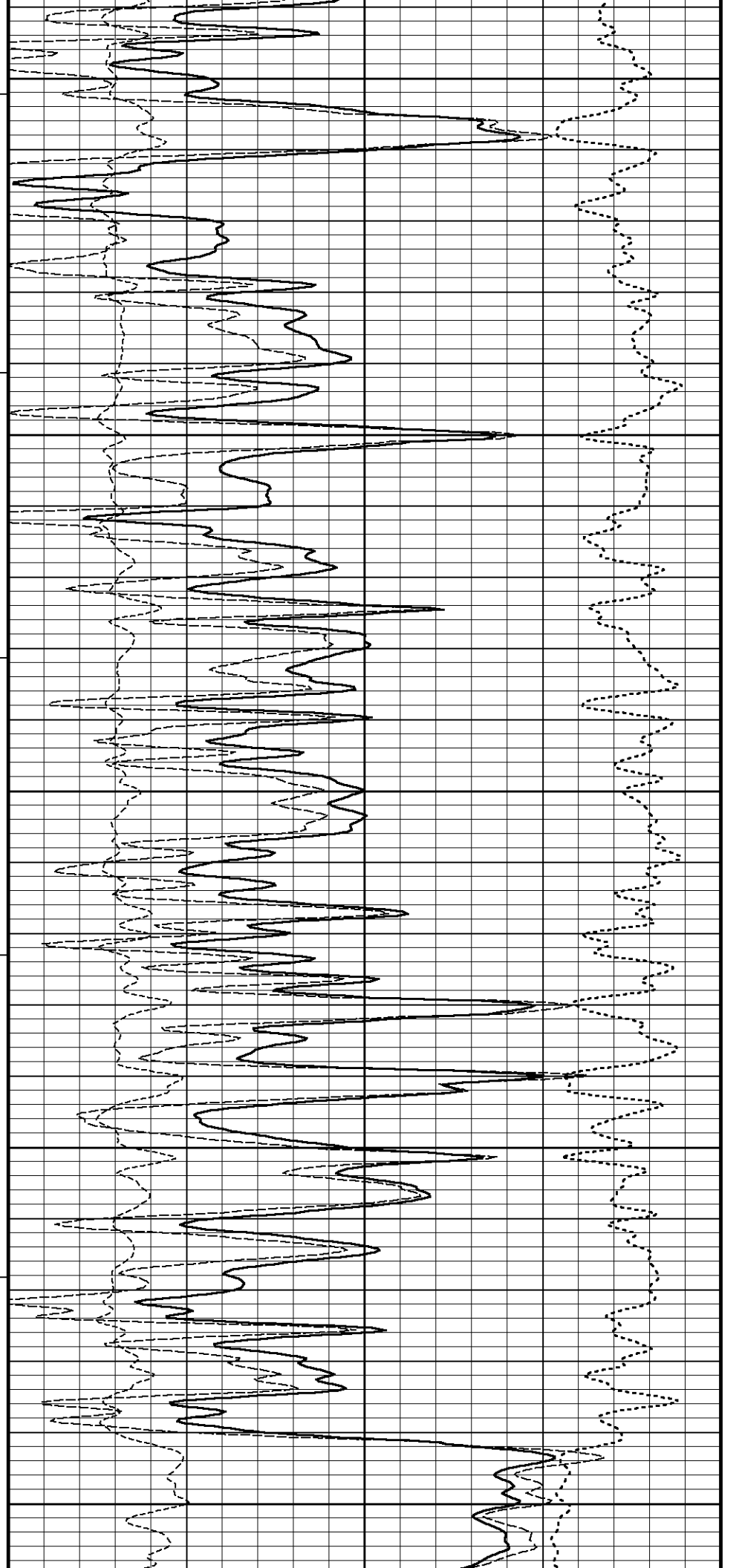
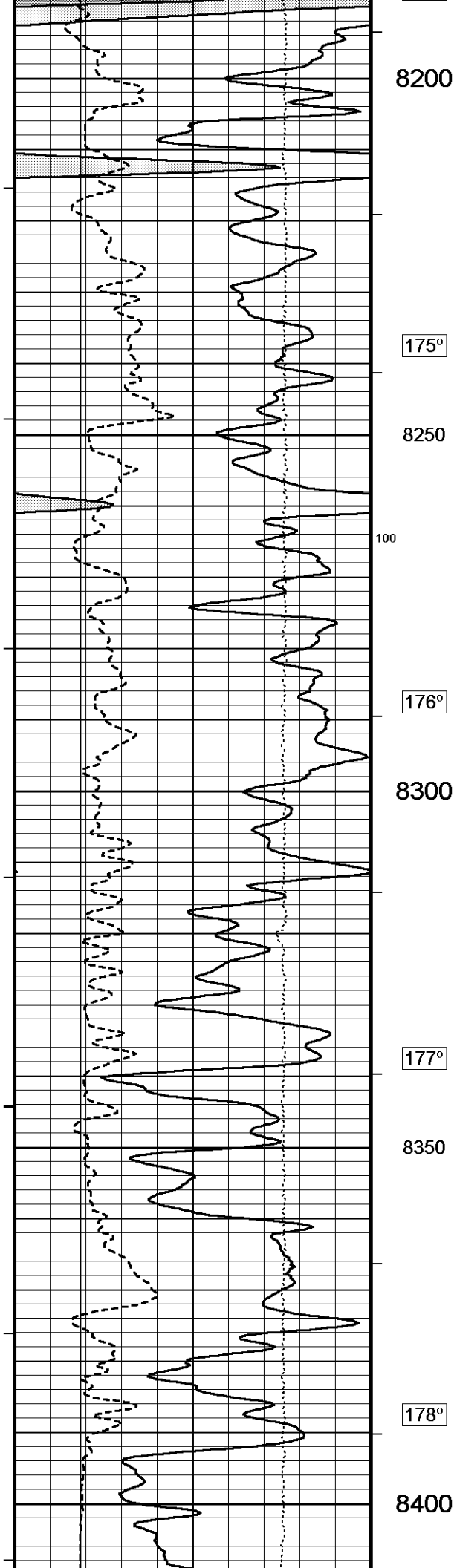


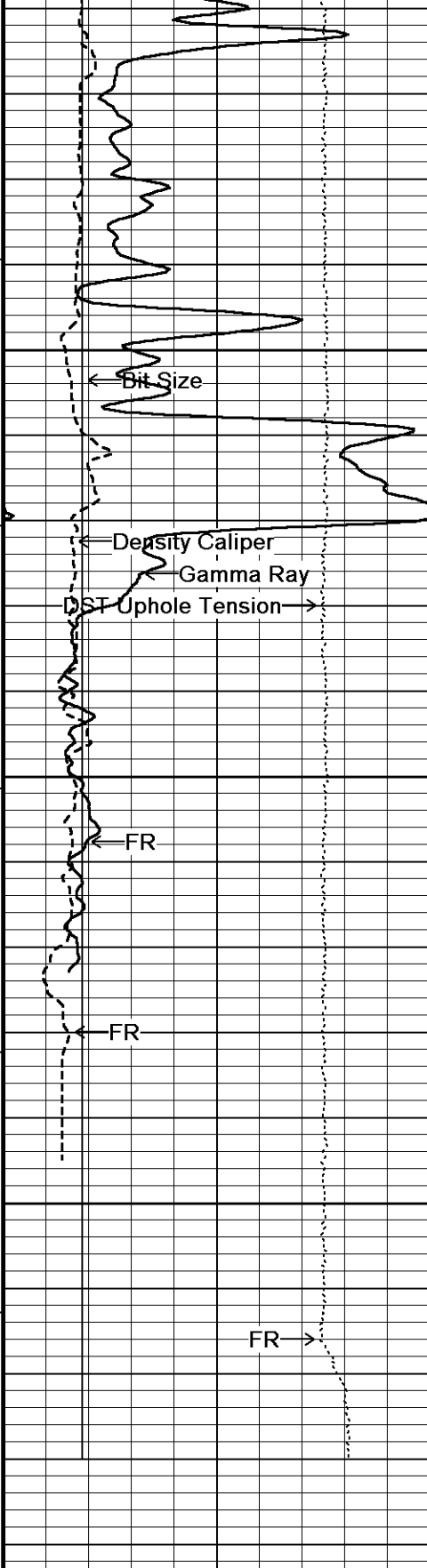
173°
8000
200
173°
8050
100
173°
8100
174°
8150
174°



Limestone Density Por. →
PE →
Compensated Density →
Density Correction →

← Bit Size
← Density Caliper
← Gamma Ray
DST Uphole Tension →





180°

8450

180°

8500

8550

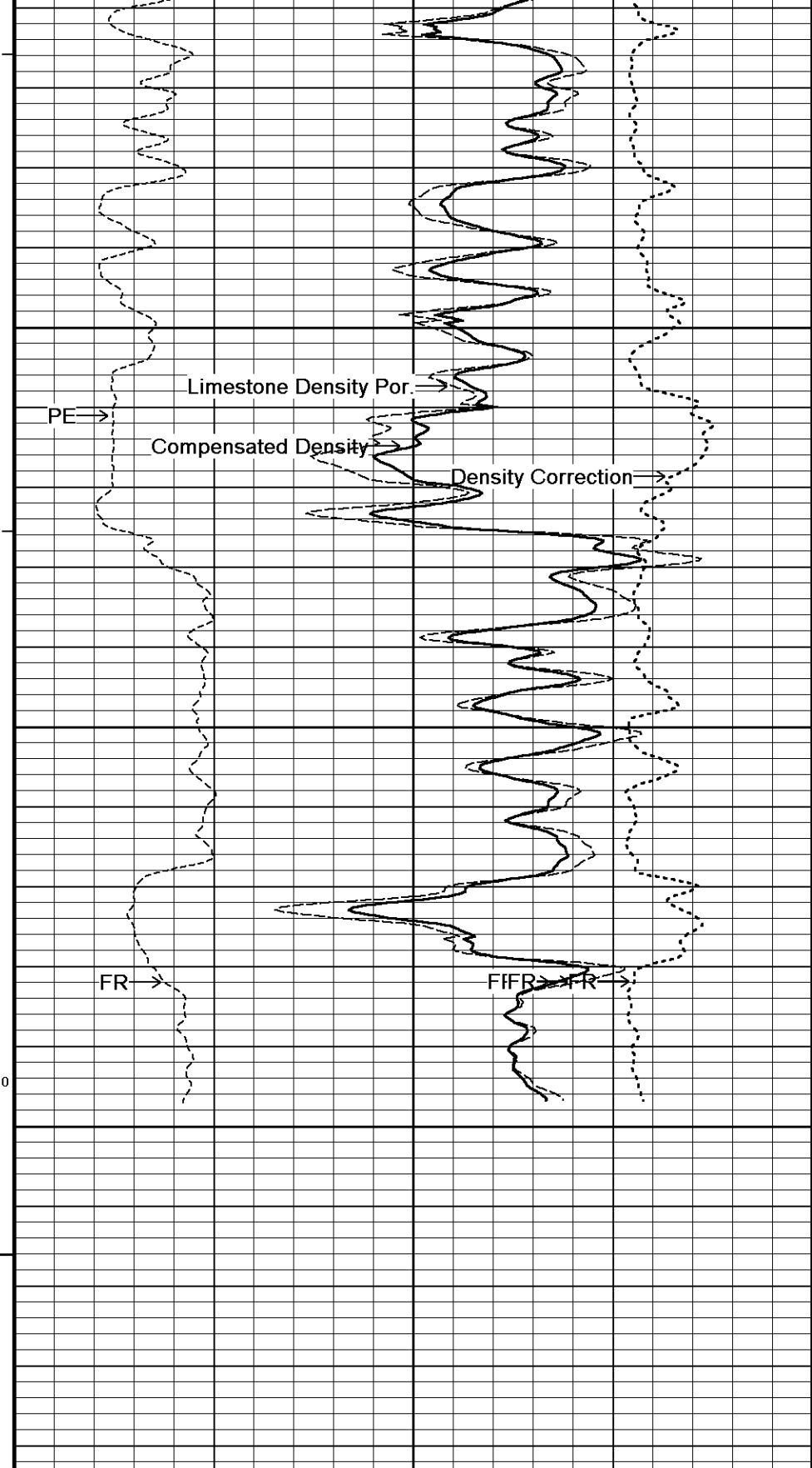
TD

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150

Borehole
Temp in



2

2.25

grams/cc

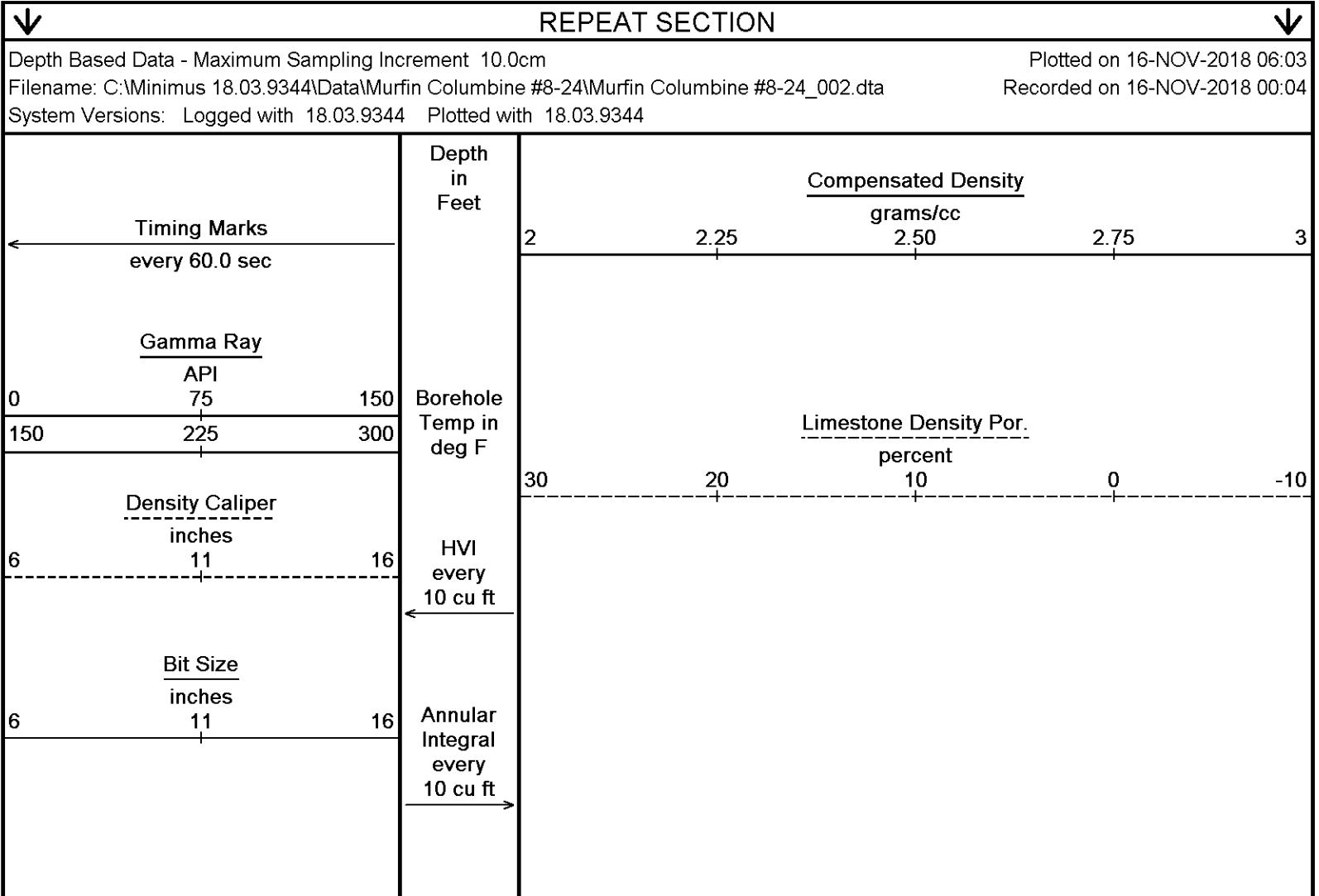
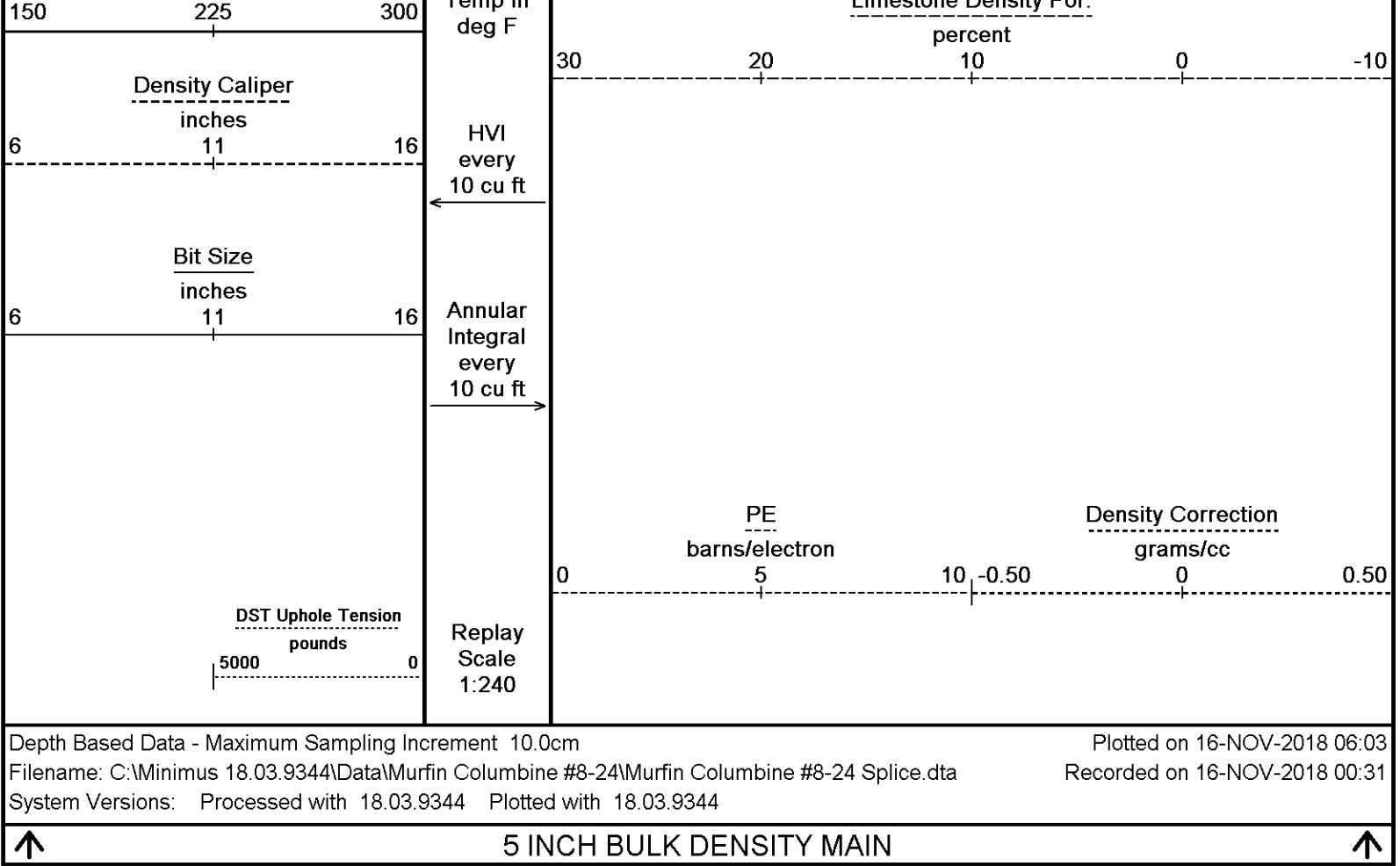
2.50

2.75

3

Compensated Density

Limestone Density Por



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

8100

172°

8150

173°

8200

173°

8250

100

174°

PE
barns/electron

Density Correction
grams/cc

0

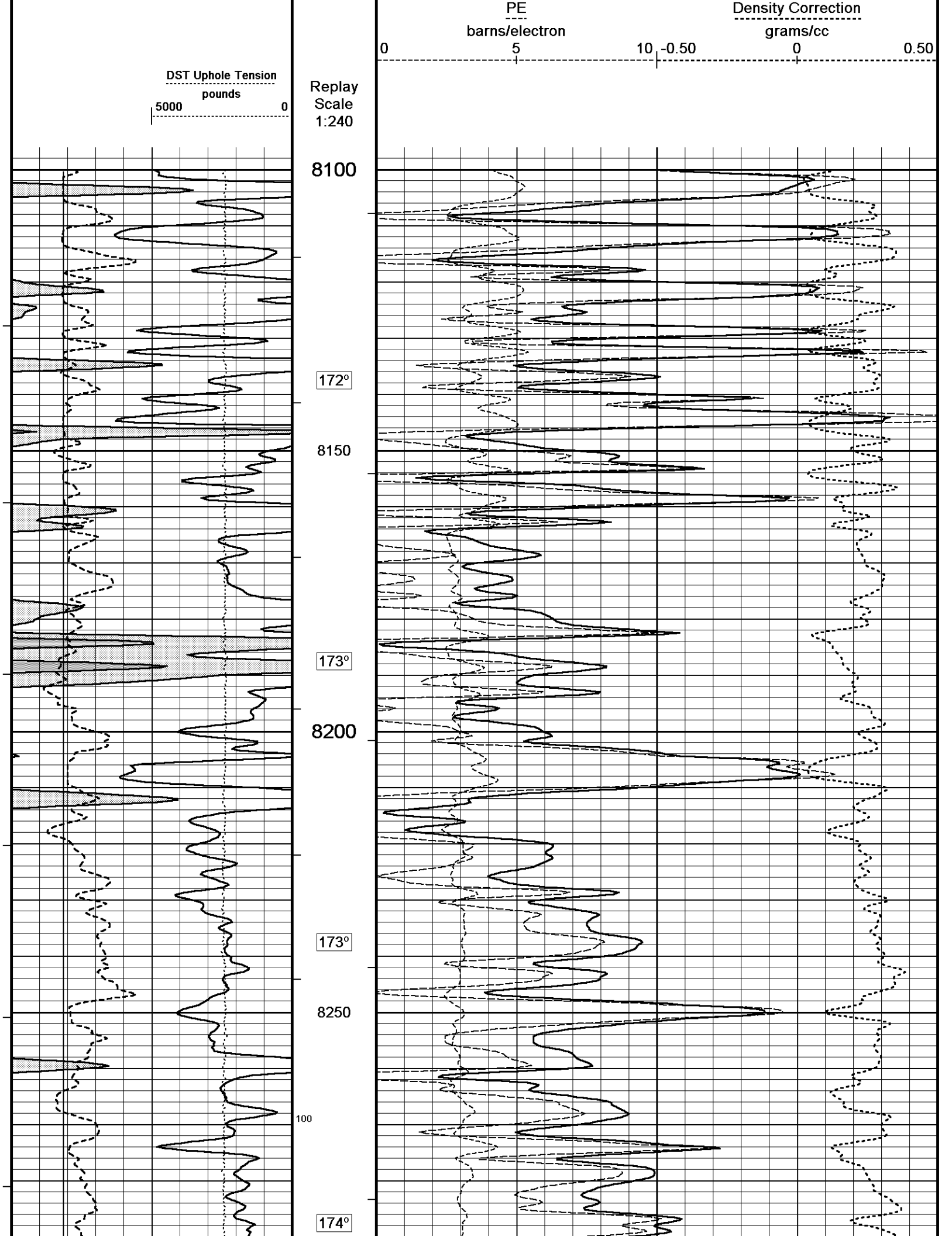
5

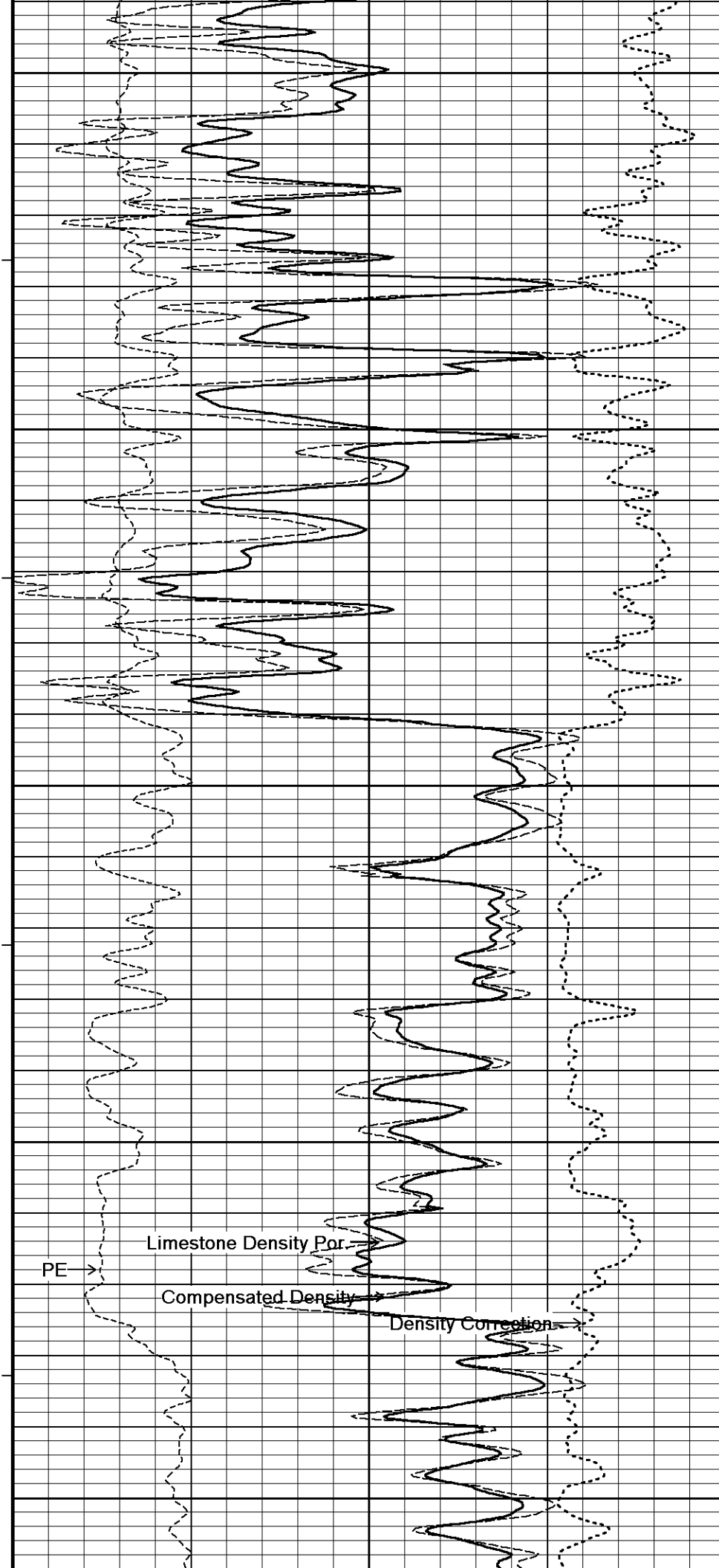
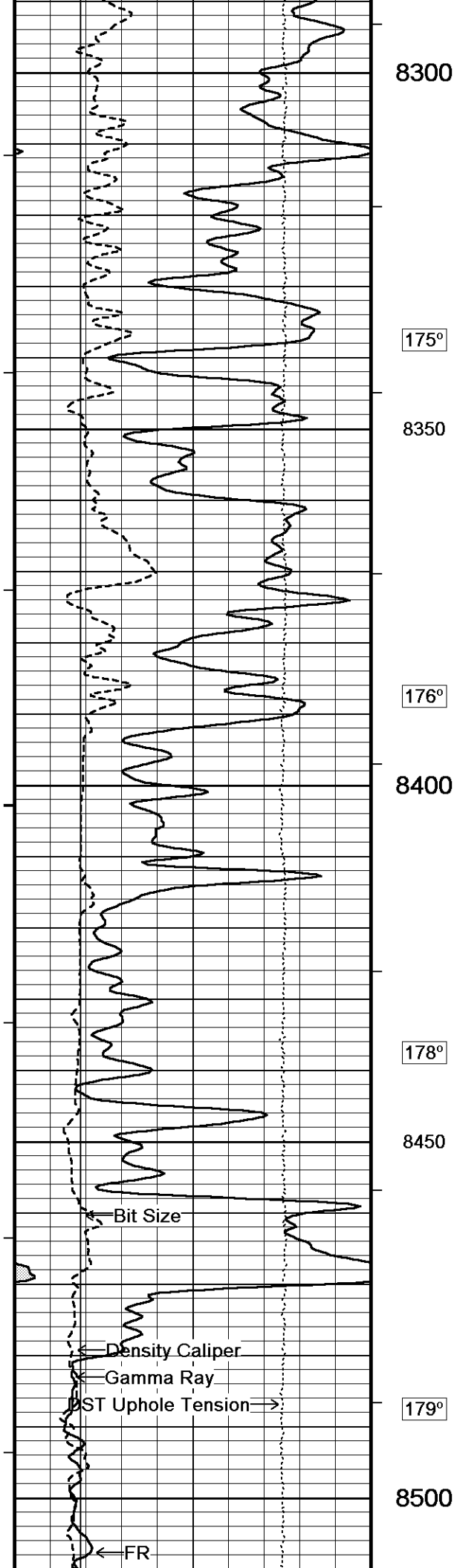
10

-0.50

0

0.50







REPEAT SECTION



BEFORE SURVEY CALIBRATION

C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24_002.dta

General Constants All 000

Last Edited on 15-NOV-2018,23:03

General Parameters

Mud Resistivity	0.850	ohm-metres
Mud Resistivity Temperature	75.000	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	Density Caliper	

Rwa Parameters

Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. Two Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 15-NOV-2018 22:34

Reading No	Measured	Calibrated (lbs)
1	15808.85	0.00
2	17295.28	527.00

SP Calibration MCG-D.K 443

Field Calibration on 12-OCT-2018,05:20

	Measured	Calibrated (mV)
Reference 1	103.5	100.0
Reference 2	-96.9	-100.1

High Resolution Temperature Calibration MCG-D.K 443

Field Calibration on 12-OCT-2018,05:20

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	212.00	212.00

High Resolution Temperature Constants MCG-D.K 443

Last Edited on 12-OCT-2018,05:20

Pre-filter Length	11
-------------------	----

Gamma Calibration MCG-D.K 443

Field Calibration on 14-NOV-2018 17:02

	Measured	Calibrated (API)
Background	73	51
Calibrator (Gross)	728	507
Calibrator (Net)	655	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio	1.436	<div> <div>1.40</div> <div>1.475</div> <div>1.55</div> </div>	Counts/API
-------	-------	---	------------

Gamma Constants MCG-D.K 443

Last Edited on 15-NOV-2018,20:40

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	

Potassium Equivalence	0.00	%
K Mud Concentration		

Micro Normal and Micro Inverse Calibration MMR-B.A 91					Base Calibration on 14-NOV-2018 16:15	
					Field Check on 14-NOV-2018 16:19	
		Resistor 1 (ohm)		Resistor 2 (ohm)		
		10.0		50.0		
Base Calibration						
		Measured		Calibrated (ohm-m)		
Micro Normal	10.3	49.8	5.1	25.6		
Micro Inverse	9.9	49.4	3.4	16.9		
Channel		Base Check (ohm-m)		Field Check (ohm-m)		
Micro Normal		93.9		93.9		
Micro Inverse		62.3		62.3		

Micro Normal & Micro Inverse Calibration Tolerance MMR-B.A 91					
Micro Normal Res. 1	10.3	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm	Micro Normal Res. 2	49.8 <div><div></div><div></div><div></div><div></div><div></div></div> ohm
Micro Inverse Res. 1	9.9	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm	Micro Inverse Res. 2	49.4 <div><div></div><div></div><div></div><div></div><div></div></div> ohm
Micro Normal Base Check	93.9	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m		
Micro Inverse Base Check	62.3	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m		
Micro Normal Field Check	93.9	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m		
Micro Inverse Field Check	62.3	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m		

Micro Normal and Micro Inverse Constants MMR-B.A 91				Last Edited on 13-APR-2018,05:04	
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	

Caliper Calibration MMR-B.A 91				Base Calibration on 14-NOV-2018 16:08	
				Field Calibration on 14-NOV-2018 16:09	
Base Calibration		Measured	Calibrator Size (in)		
Reading No					
1		14000	5.98		
2		17358	7.97		
3		20707	9.86		
4		24750	11.92		
5		0	0.00		
6		N/A	N/A		
Field Calibration		Measured Caliper (in)	Actual Caliper (in)		
		7.97	7.97		

Caliper Calibration Tolerances MMR-B.A 91			
Short Arm Field Cal.	7.97	<div><div></div><div></div><div></div><div></div><div></div></div>	in

Micro-Resistivity Caliper Constants MMR-B.A 91			
Sonde Configuration	Resistivity Mode		

Micro Laterolog Calibration MMR-B.A 91				Base Calibration on 31-DEC-1999 00:00			
				Field Check on 31-DEC-1999 00:00			
		Resistor 1 (ohm)	Resistor 2 (ohm)				
		0.0	0.0				
Base Calibration							
		Measured	Calibrated (ohm-m)				
Ref 1	Ref 2	Ref 1	Ref 2				
0.0	0.0	0.0	0.0				
Base Check (ohm-m)		Field Check (ohm-m)					
0.0		0.0					

Micro Laterolog Constants MMR-B.A 91			
--------------------------------------	--	--	--

Pad Type	6 in Solid Nylon B23059	
Standoff Offset	0.0000	inches
Micro Laterolog K Factor	0.0128	
Micro Laterolog Rm K Factor	N/A	
Mudcake Thickness Correction Constants		
Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper		
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	20.00	Degrees C
Mud Cake Resistivity Source	Constant Value	
Temp. for Rmc Corr.	MCG External Temperature	

Neutron Calibration MDN-B.A 292

Base Calibration on 25-OCT-2018,14:15

Field Check on 14-NOV-2018 17:08

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2910	91	3714	110
Ratio	31.871		33.764	

Field Calibrator at Base

	Calibrated (cps)
	2207 3209
Ratio	0.688

Field Check

	Calibrated (cps)
	2170 3165
Ratio	0.686

Neutron Calibration Tolerances MDN-B.A 292

Ratio	31.871	<div> <div>-5%</div> <div>33</div> <div>+5%</div> </div>
-------	--------	--

Base Check	0.688	<div> <div>0.65</div> <div>0.7</div> <div>0.75</div> </div>
------------	-------	---

Field Check	0.686	<div> <div>0.668</div> <div>0.688</div> <div>0.708</div> </div>
-------------	-------	---

Neutron Constants MDN-B.A 292

Last Edited on 15-NOV-2018,20:40

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Legacy	
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 25-OCT-2018 13:00

Field Check on 14-NOV-2018 16:37

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.2	126.8

Base Check	281.4
------------	-------

Field Check	281.4
-------------	-------

FE Calibration Tolerances MFE-B.J 352

Reference 2	963.2	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm
Base Check	281.4	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m
Field Check	281.4	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m

FE Constants MFE-B.J 352

Last Edited on 15-NOV-2018,20:39

Running Mode	No Sleeve
MFE K Factor	0.1268
Borehole Correction Constants	
Sonde Position	0.5 inches
Hole Size Source	Density Caliper
Hole Size Constant Value	N/A inches
Rm Source	Global Value: Temperature Corrected
Temp. for Rm Corr.	MCG External Temperature

Sonic Constants MSS-C.K 319

Last Edited on 08-JUL-2018,09:57

Maximum Boundary Contrast	70.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	0.00	micro-sec
MX3FT	1500.00	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft

Sonde Mode	Compensated
Hole Type	Open Hole

Sonde Parameters

	Measured	Calibrated
Offset		0.0000
Free Pipe	0.0000	

Peak Amplitude Source

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing	N/A			
Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)	
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	0.00	0.00	

Full Waveform Parameters

Use 3' Waveform to derive TR	No	
Use 4' Waveform to derive TR	No	
Use 5' Waveform to derive TR	No	
Use 6' Waveform to derive TR	No	
3' Waveform Discriminator Level	0.30	mV
4' Waveform Discriminator Level	0.30	mV
5' Waveform Discriminator Level	0.15	mV
6' Waveform Discriminator Level	0.15	mV

Waveform Discriminator Filter	Not Applied	
Semblance Window Width	150.00	micro-sec
Semblance Processing Enabled	Yes	
Tracking Boxes Enabled In Processing	Yes	

Induction Calibration MAI-B.J 390

Factory Loop Calibration 25-OCT-2018 13:24

Field Check on 14-NOV-2018 16:35

Factory Loop Calibration


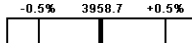
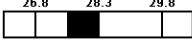
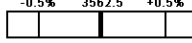
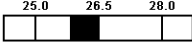
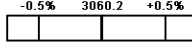
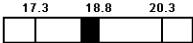
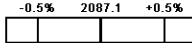
High Conductivity Reference Resistor	3.3	ohm
Low Conductivity Reference Resistor	333.3	ohm

Array	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
	Low	High	Low	High	Gain	Offset
1 (near)	16.8	458.6	9.3	966.2	2.166	-27.2
2	6.3	377.7	7.6	821.4	2.191	-6.2
3	3.8	258.6	5.2	566.0	2.200	-3.0
4 (far)	1.9	132.3	2.6	279.2	2.121	-1.4
Array Temperature	77.9		Deg F			

Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)		Deg F
	Low	High	Low	High	
1 (near)	11.3	3958.7	10.4	3957.3	
2	28.3	3562.5	27.6	3561.2	
3	26.5	3060.2	25.8	3059.6	
4 (far)	18.8	2087.1	18.3	2086.7	
Array Temperature	61.2		65.5		

Induction Check Tolerances MAI-B.J 390

Low Array 1	10.4		mmho/m	High Array 1	3957.3		mmho/m
Low Array 2	27.6		mmho/m	High Array 2	3561.2		mmho/m
Low Array 3	25.8		mmho/m	High Array 3	3059.6		mmho/m
Low Array 4	18.3		mmho/m	High Array 4	2086.7		mmho/m

Induction Constants MAI-B.J 390

Last Edited on 15-NOV-2018,20:39

Induction Model RtAP-WBM

Borehole Correction Constants

Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
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
Rm Source	Global Value: Constant Temperature	
Temp. for Rm Corr.	N/A	
Borehole Correction Method	Default	

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
Symmetrised Receiver Gains		
Receiver 1	1.00	
Receiver 2	1.00	
Receiver 3	1.00	
Receiver 4	1.00	
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-B.J 390			Field Calibration on 15-MAY-2018,12:48
	Measured	Calibrated(Deg F)	
Lower	10.00	10.00	
Upper	100.00	100.00	

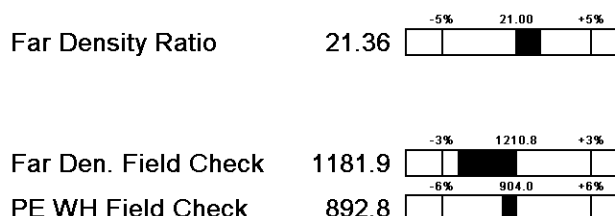
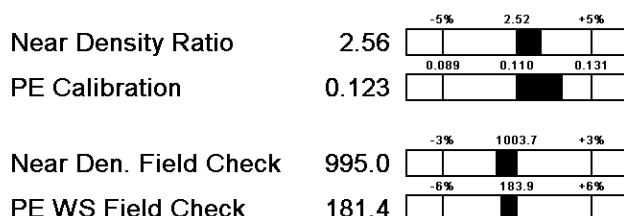
High Resolution Temperature Constants MAI-B.J 390		Last Edited on 06-MAR-2018,13:01
Pre-filter Length	11	

Caliper Calibration MPD-C.A 216			Base Calibration on 25-OCT-2018 13:33	Field Calibration on 14-NOV-2018 16:41
Base Calibration				
Reading No	Measured	Calibrator Size (in)		
1	15197	3.99		
2	23984	5.98		
3	32561	7.97		
4	40928	9.86		
5	50160	11.92		
6	N/A	N/A		
Field Calibration				
	Measured Caliper (in)	Actual Caliper (in)		
	7.97	7.97		

Caliper Calibration Tolerances MPD-C.A 216				
Long Arm Field Cal.	7.97	<div> <div>7.57</div> <div>7.97</div> <div>8.37</div> </div>		in

Photo Density Calibration MPD-C.A 216			Base Calibration on 25-OCT-2018 13:50	Field Check on 14-NOV-2018 16:47
Density Calibration				
Base Calibration		Measured	Calibrated (sdu)	
	Near	Far	Near	Far
Background	1004	1211		
Reference 1	49178	24022	59556	30836
Reference 2	19804	2279	24941	2541
Field Check at Base				
	1003.7	1210.8		
Field Check				
	995.0	1181.9		
PE Calibration				
Base Calibration		Measured	Calibrated	
	WS	WH	Ratio	Ratio
Background	184	904		
Reference 1	20688	49027	0.426	0.371
Reference 2	5715	19697	0.294	0.272
Field Check at Base				
	183.9	904.0		

Photo Density Calibration Tolerances MPD-C.A 216



Density Constants MPD-C.A 216

Last Edited on 15-NOV-2018,20:40

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	1.13	gm/cc
Mud Density Type		
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	
Precision Enhanced Density Processing	Applied	
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	0.00	

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Murfin Columbine #8-24\Murfin Columbine #8-24_002.dta

Cablehead, 11 pin
CBH-CB 264 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

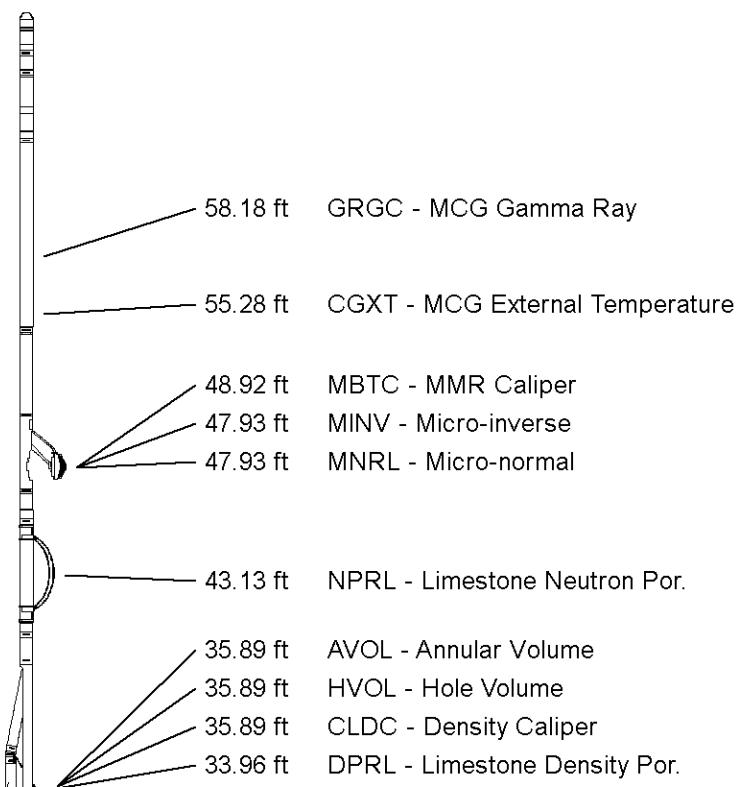
Compact Swivel Head Adaptor
SHA-J.B 595 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

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

Compact Micro-Resistivity
MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron
MDN-B.A 292 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in



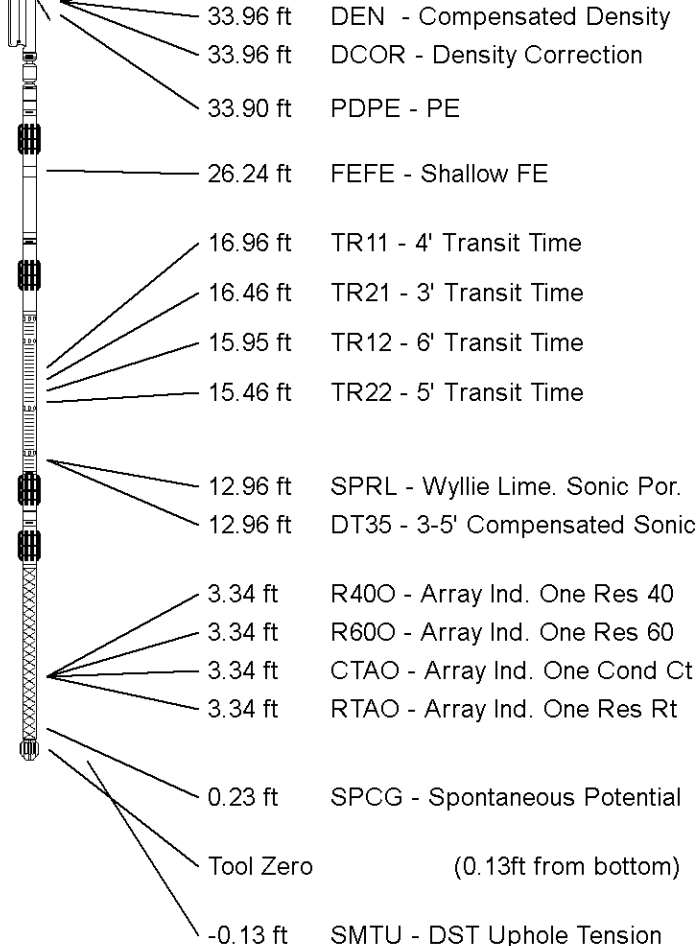
Compact Knuckle Joint
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

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

Compact Sonic
MSS-C.K 319 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction
MAI-B.J 390 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 68.16 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY	MURFIN DRILLING COMPANY, INC.
WELL	COLUMBINE #8-24
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5393	feet	First Reading	8532.00	feet
Elevation Drill Floor	5391	feet	Depth Driller	8574.00	feet
Elevation Ground Level	5380	feet	Depth Logger	8566.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG