



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY

MURFIN DRILLING COMPANY, INC.

WELL

RED POLL #8-21

FIELD

WILDCAT

PROVINCE/COUNTY

LINCOLN

COUNTRY/STATE

U.S.A. / COLORADO

LOCATION

1900' FNL & 605' FEL

SEC 21

TWP 10S

RGE 56W

Other Services
MAI/MFE

Latitude

Longitude

API Number

05-073-06754

Permanent Datum GL, Elevation 5489 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

MSS

Date

09-DEC-2018

Run Number

ONE

Service Order

4558-231541832

Depth Driller

8400.00

Depth Logger

8402.00

First Reading

8368.00

Last Reading

4200.00

Casing Driller

432.00

Casing Logger

432.00

Bit Size

7.875

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.40 lb/USg

PH / Fluid Loss

9.00

Sample Source

FLOWLINE

Rm @ Measured Temp

1.15 @ 75.0

Rmf @ Measured Temp

0.92 @ 75.0

Rmc @ Measured Temp

1.38 @ 75.0

Source Rmf / Rmc

CALC

Rm @ BHT

0.47 @182.0

Time Since Circulation

5 HOURS

Max Recorded Temp

182.00

Equipment / Base

13096

Recorded By

ADAM SILL

Witnessed By

GREGG SMITH

Elevations:
KB 5502.00 feet
DF 5500.00
GL 5489.00

BOREHOLE RECORD

Last Edited: 09-DEC-2018 04:36

Bit Size inches	Depth From feet	Depth To feet
7.875	432.00	8400.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	432.00	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: 3751 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 4200 FEET: 732 CU.FT.

- RIG: MURFIN #25.

- ENGINEER: A. SILL.

- OPERATOR: B. TOVAR, B. COPELAND.

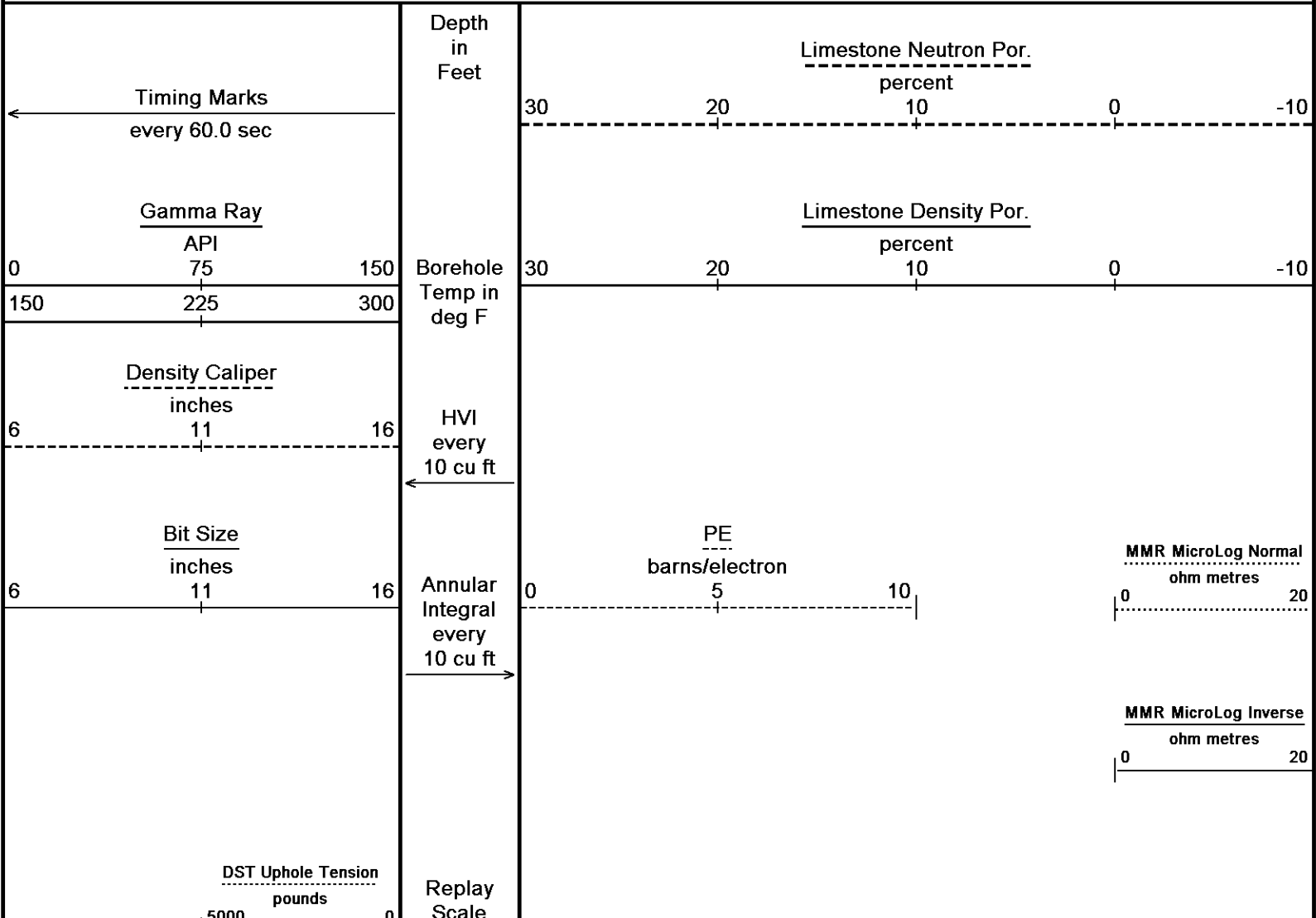
**** CALIPERS WERE CLOSED BETWEEN 5750 FEET AND 5920 FEET AS PER CUSTOMER'S REQUEST, DUE TO HOLE CONDITIONS THROUGH THAT INTERVAL. TOOL READINGS MAY NOT BE ACCURATE THROUGH THIS INTERVAL. ****

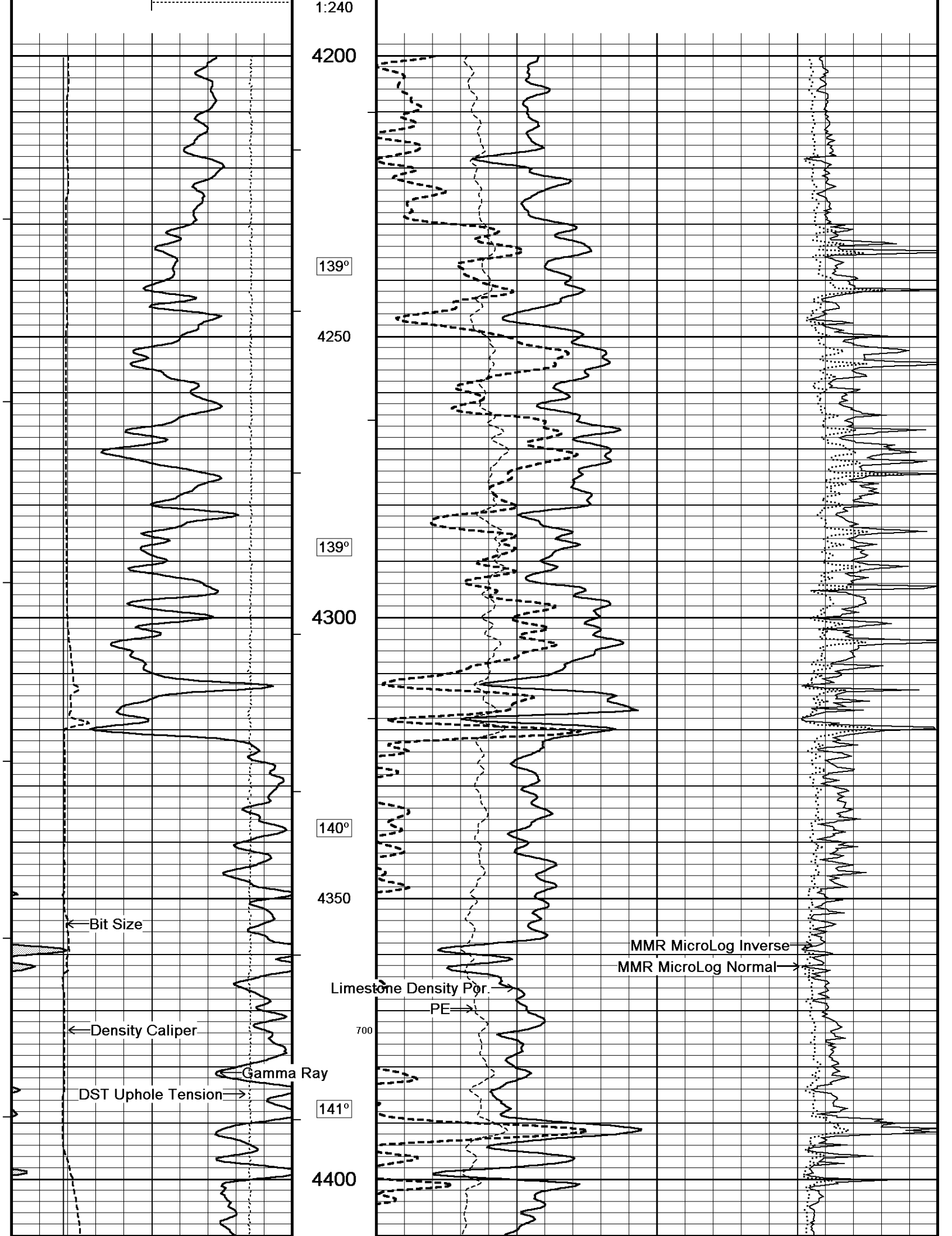
**** SP IS A LITTLE ERRATIC IN PLACES DUE TO AN UNKNOWN CAUSE. CHECKED SP PLACEMENT AND CHECKED FOR SOMETHING THAT MAY BE CAUSING STRAY VOLTAGE AND COULD NOT FIND A CAUSE. ****

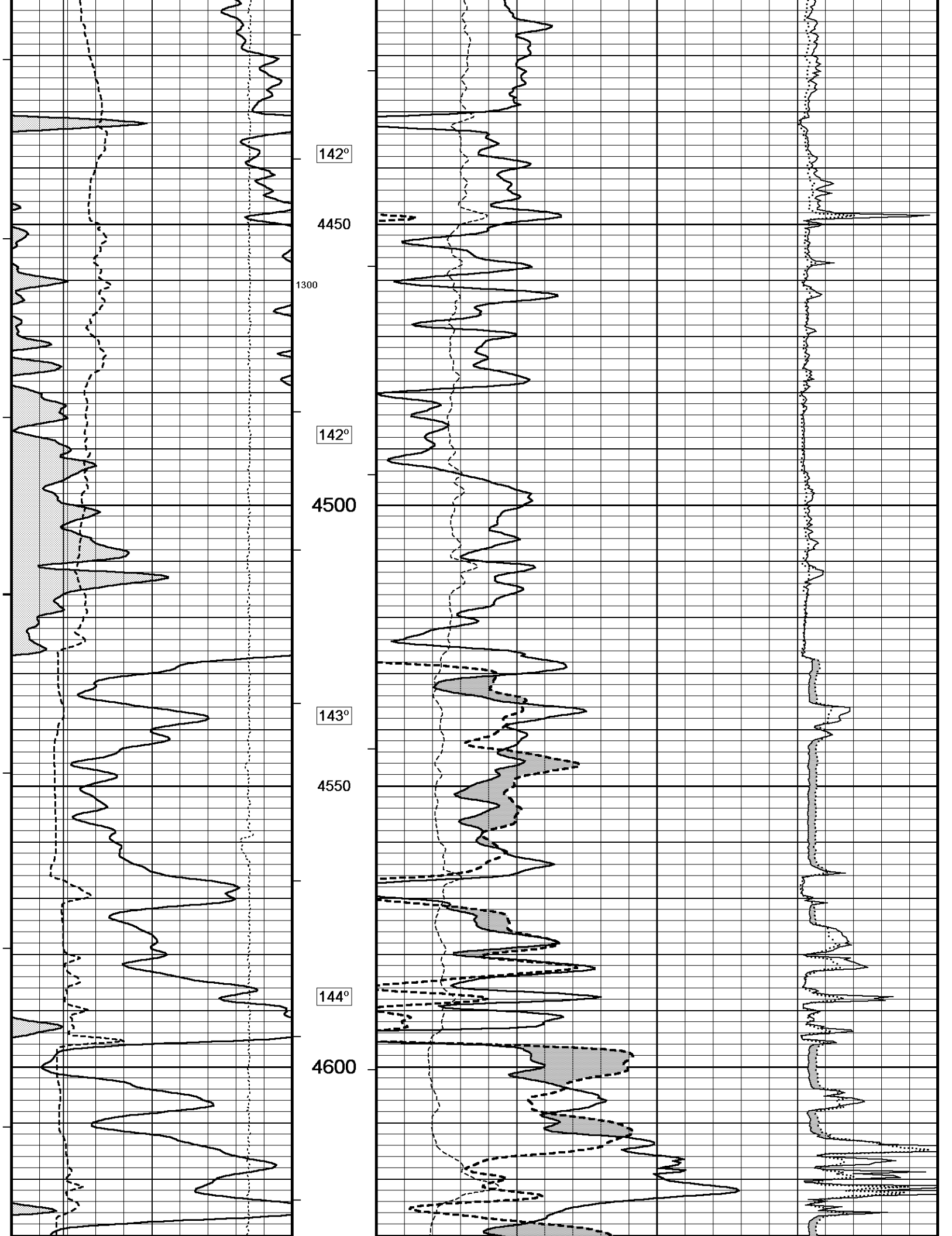
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

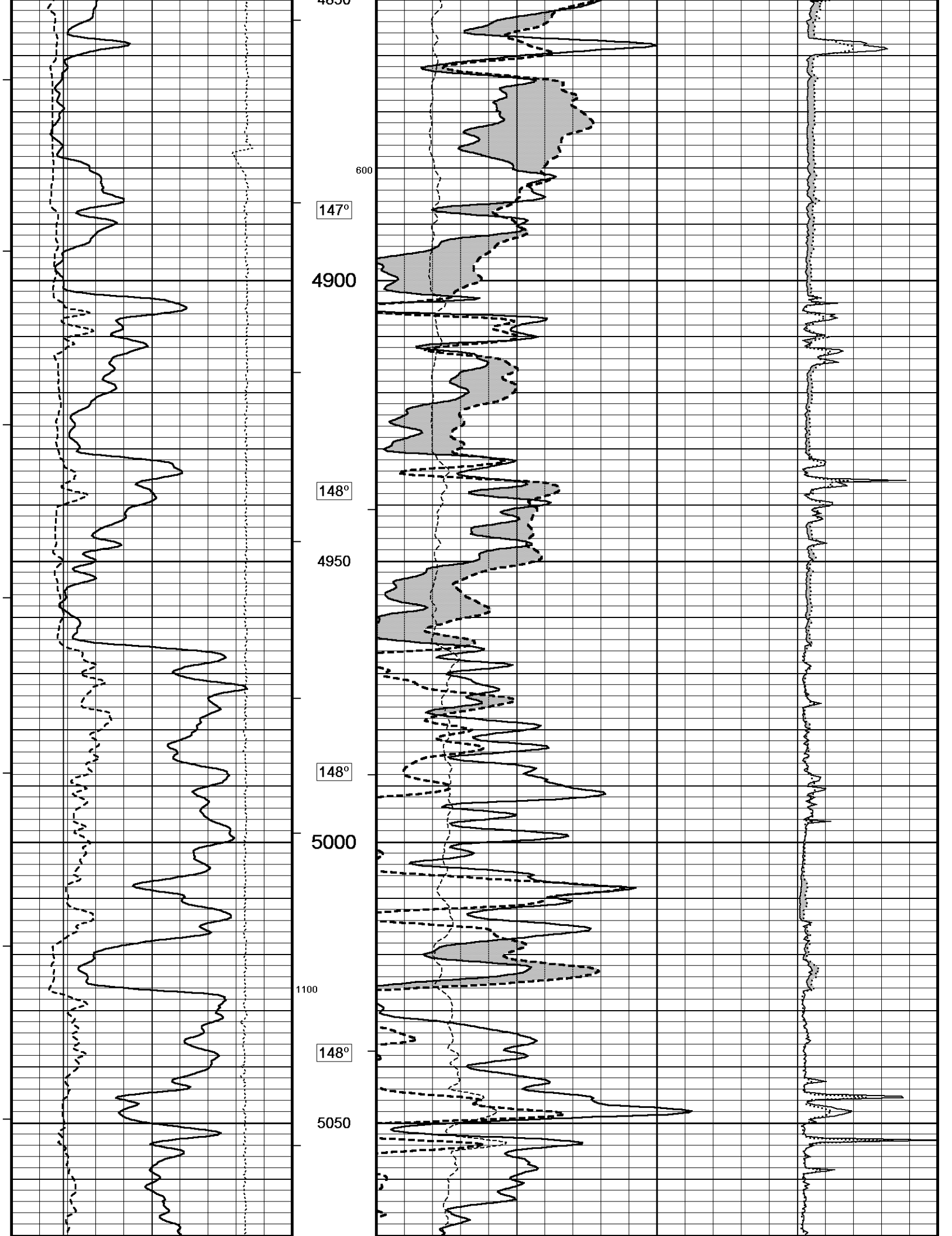
5 INCH LIMESTONE MAIN

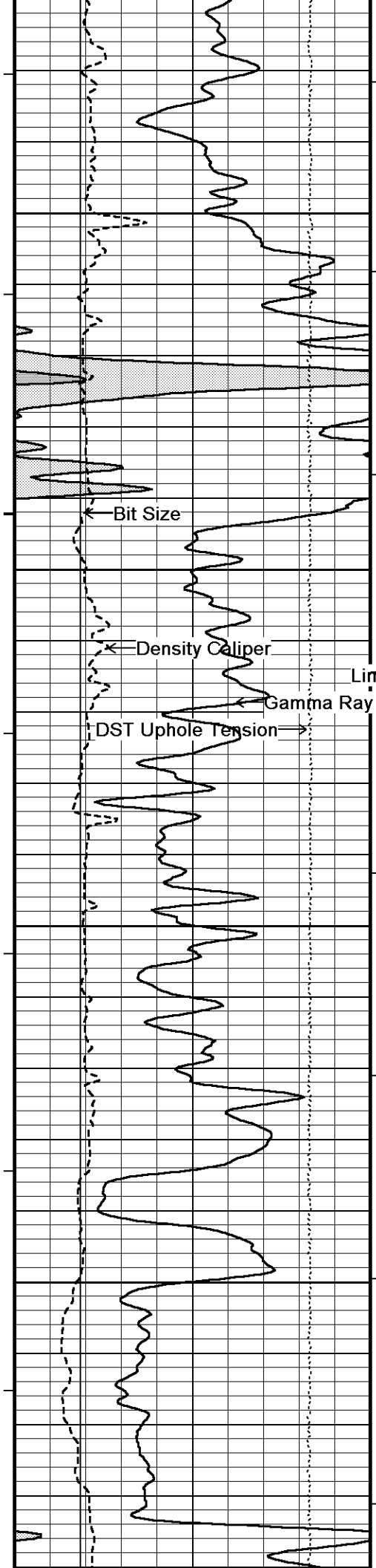
Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 09-DEC-2018 13:03
Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_003.dta Recorded on 09-DEC-2018 07:52
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344











149°

5100

149°

5150

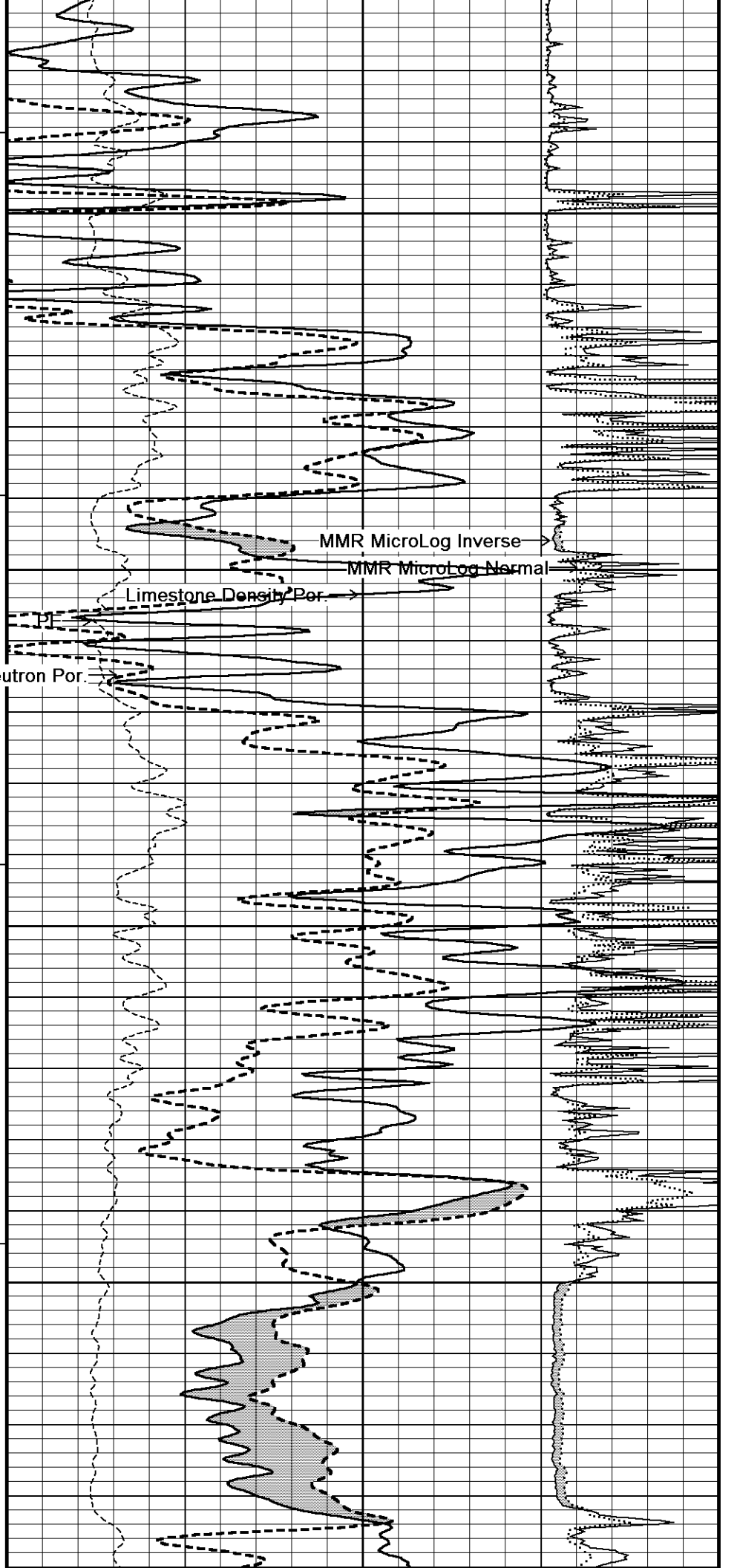
150°

5200

151°

5250

151°

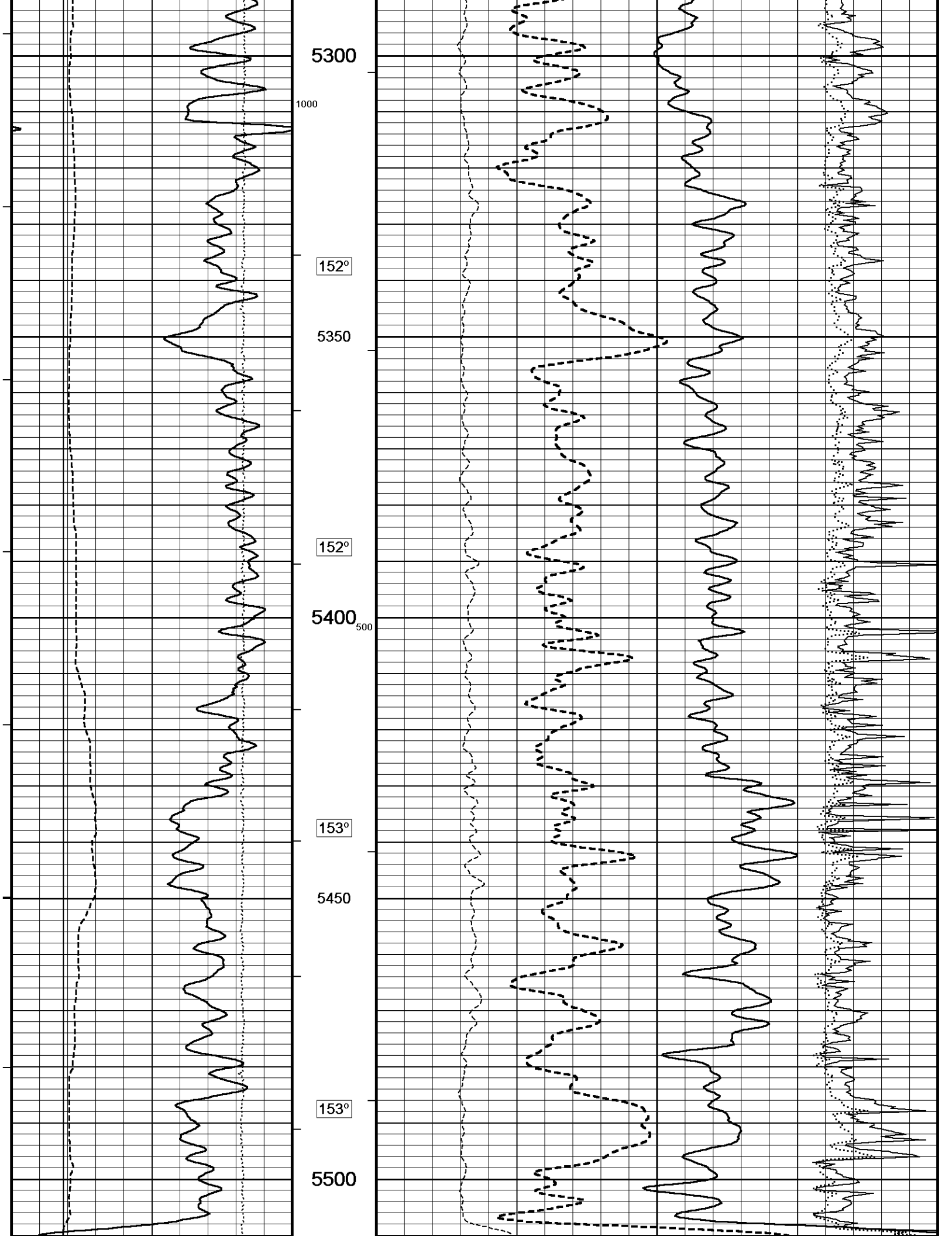


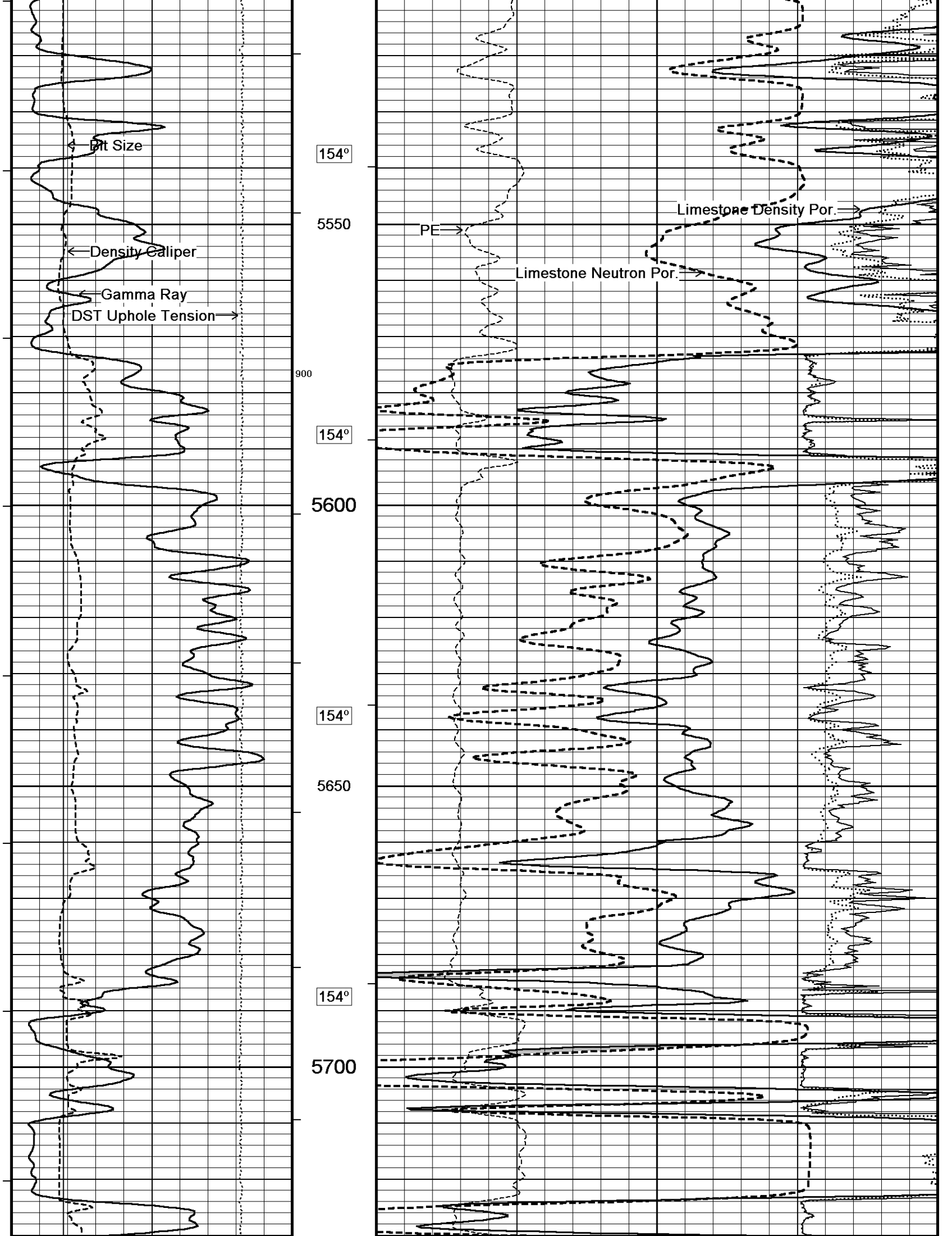
MMR MicroLog Inverse

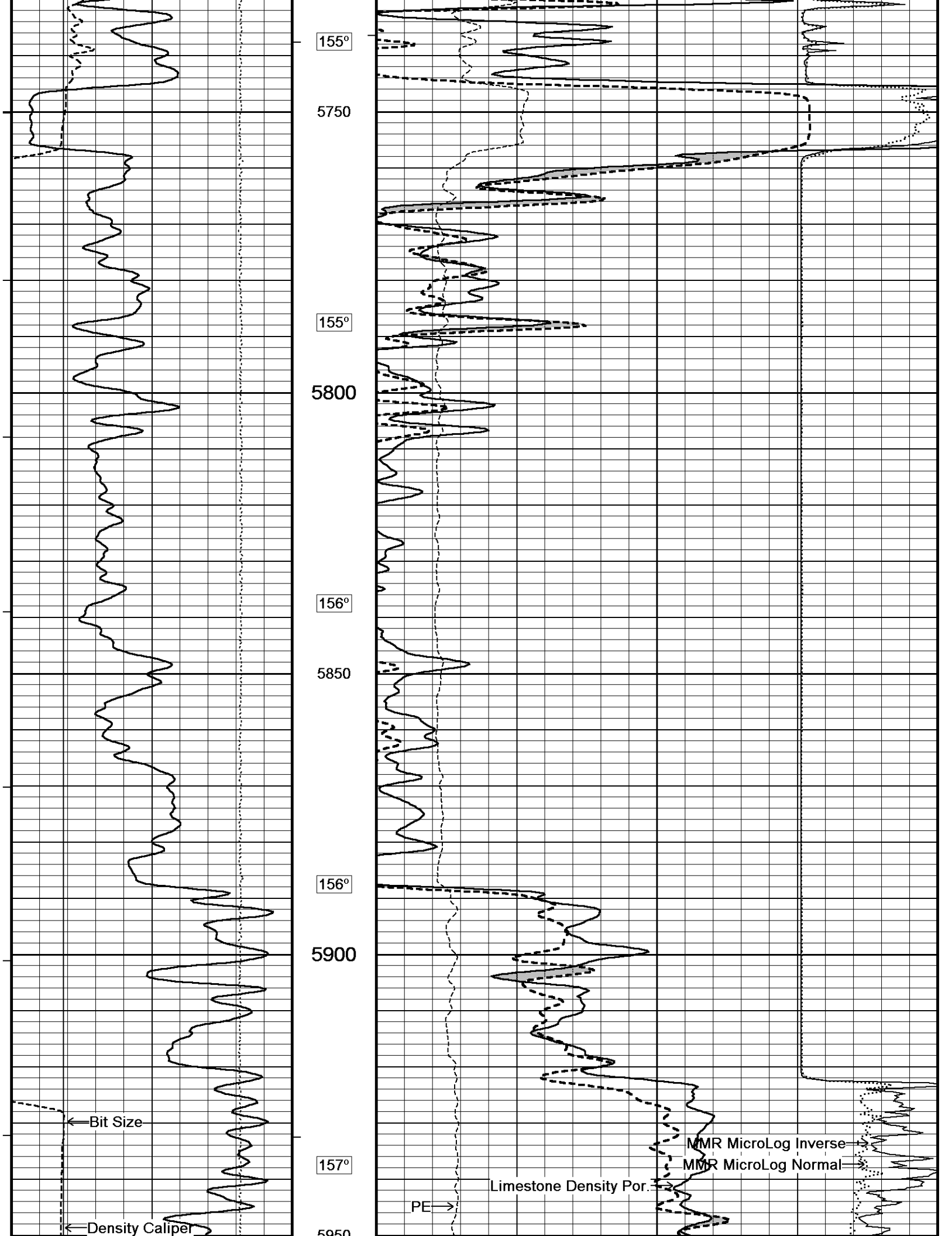
MMR MicroLog Normal

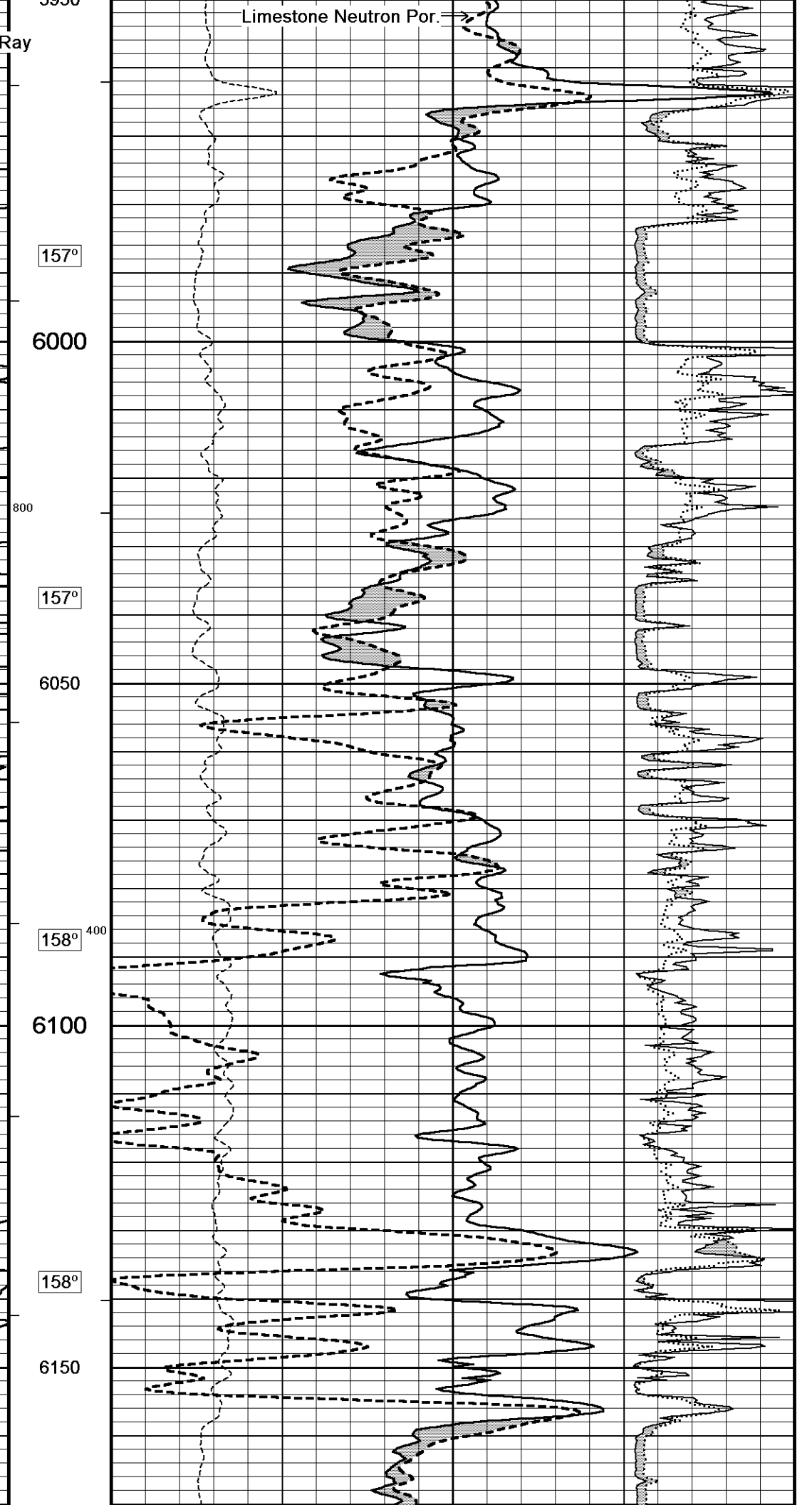
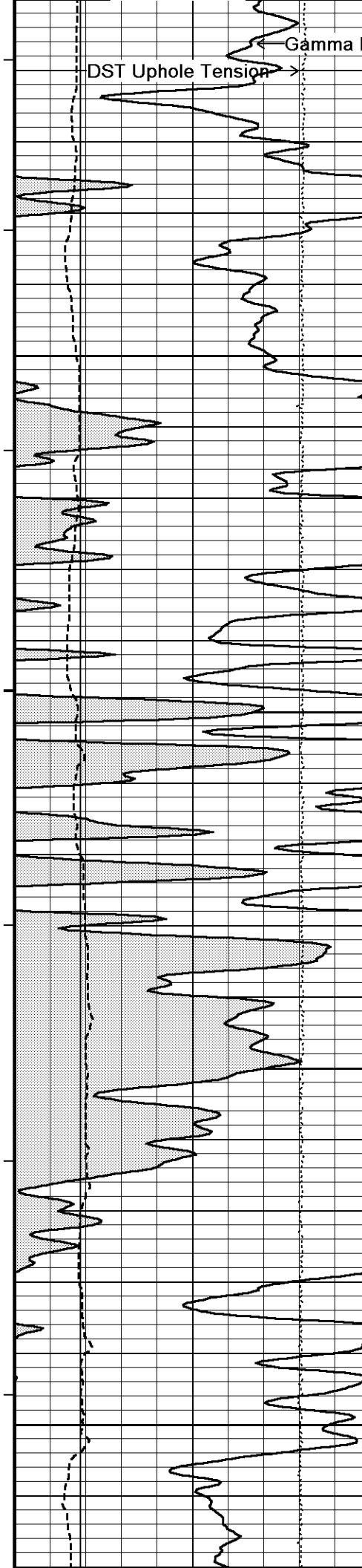
Limestone Density Por.

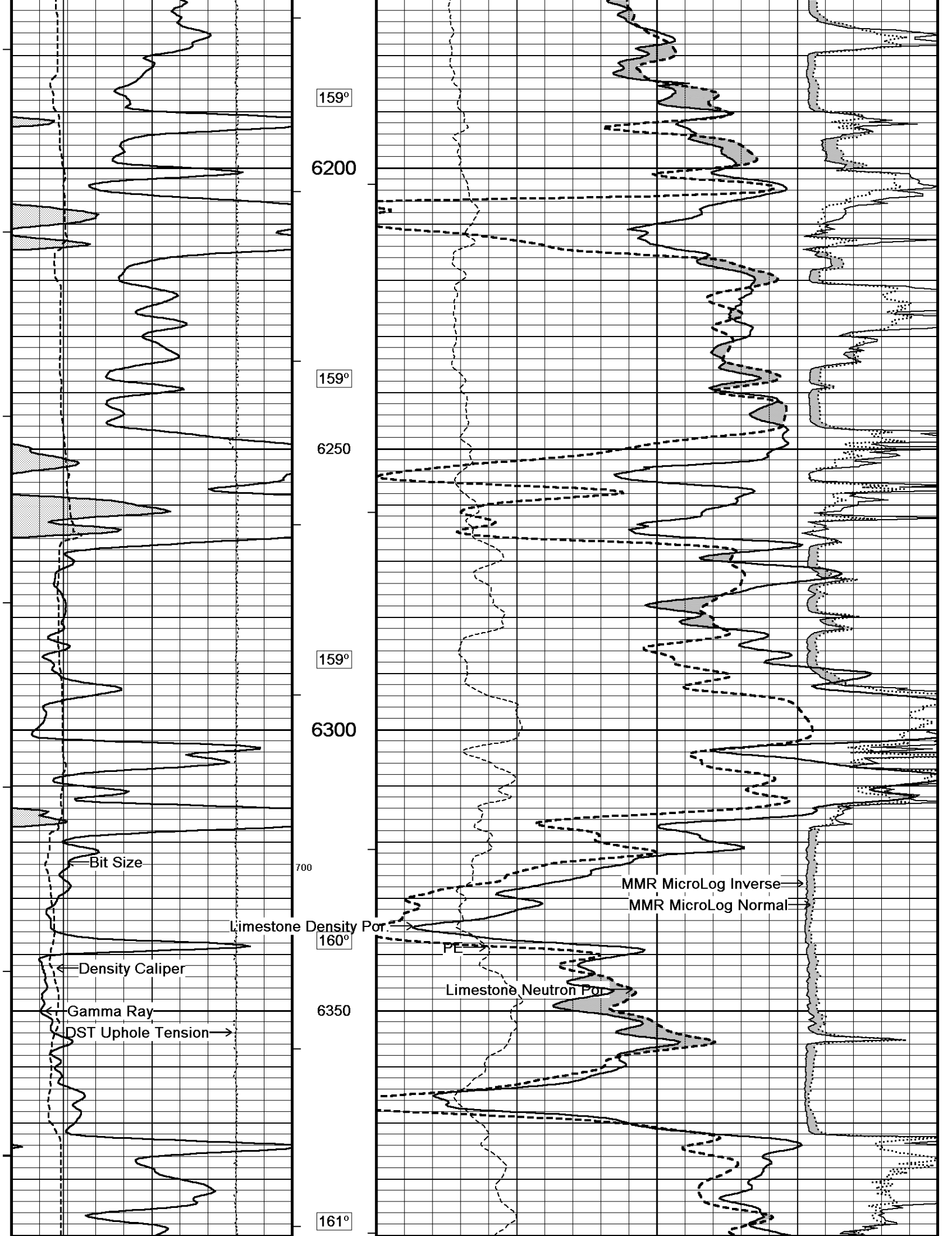
Limestone Neutron Por.

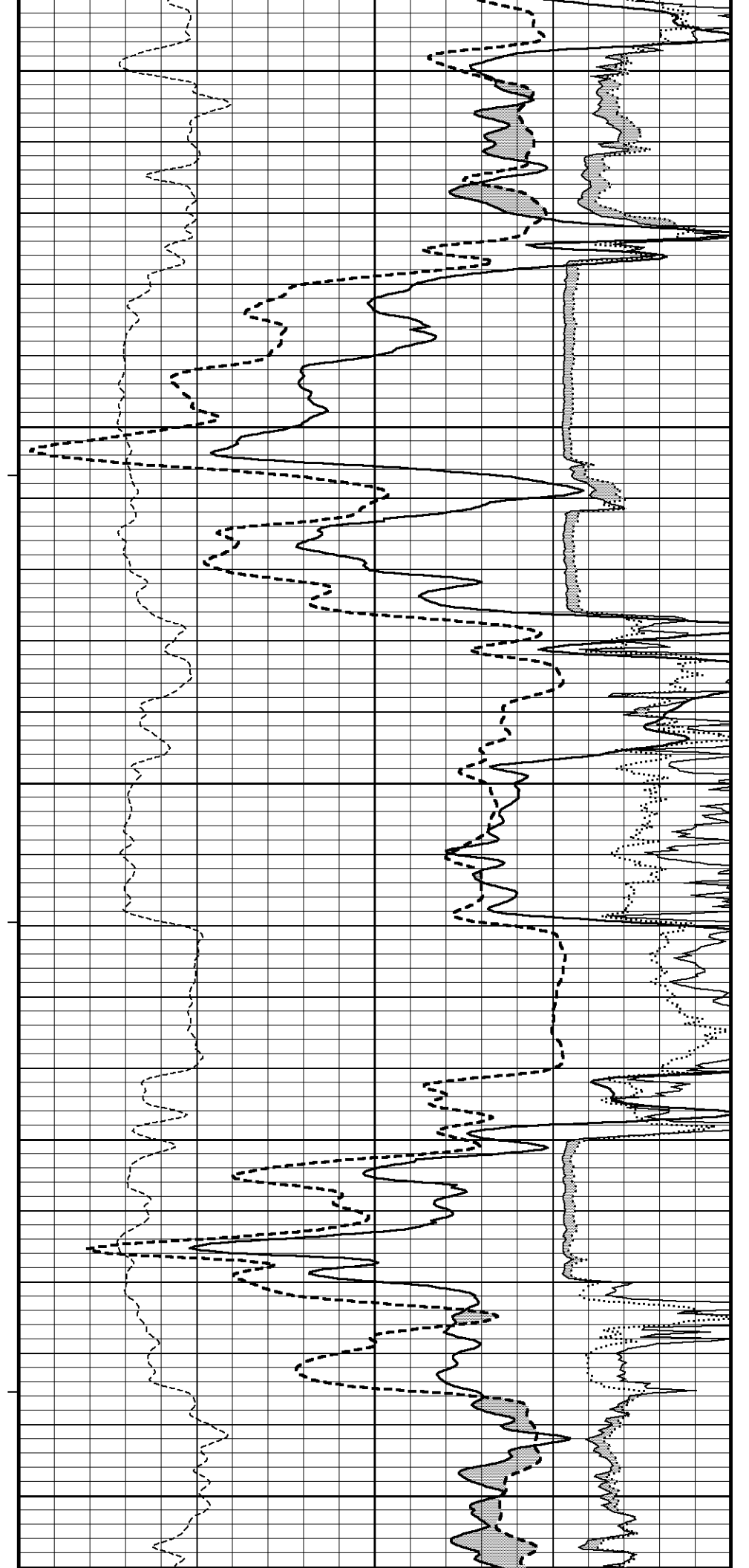
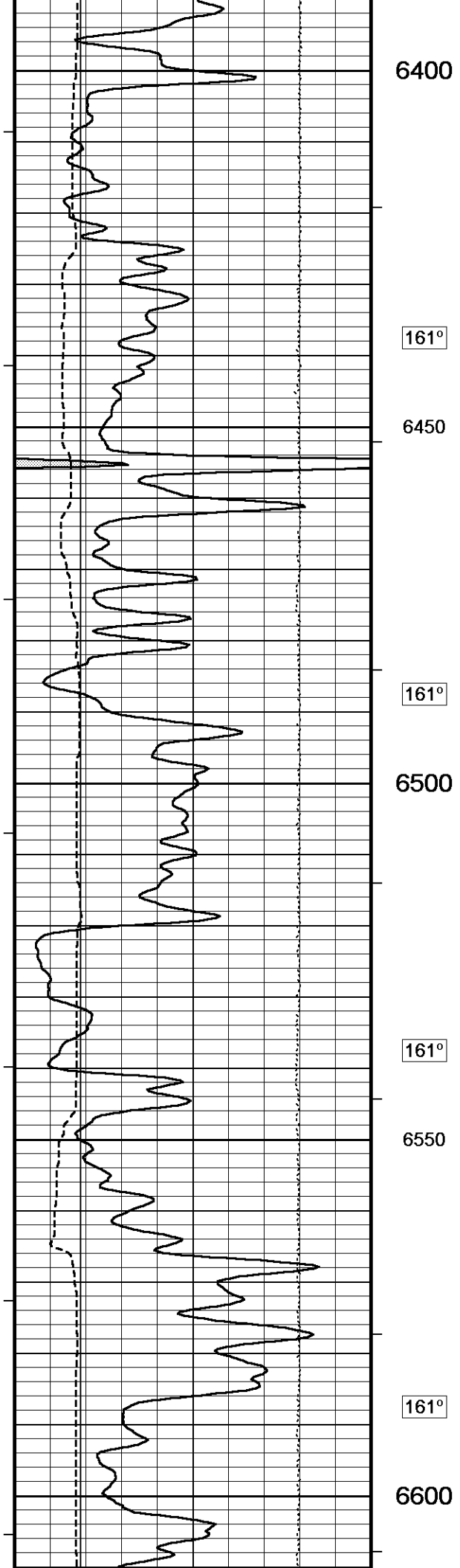


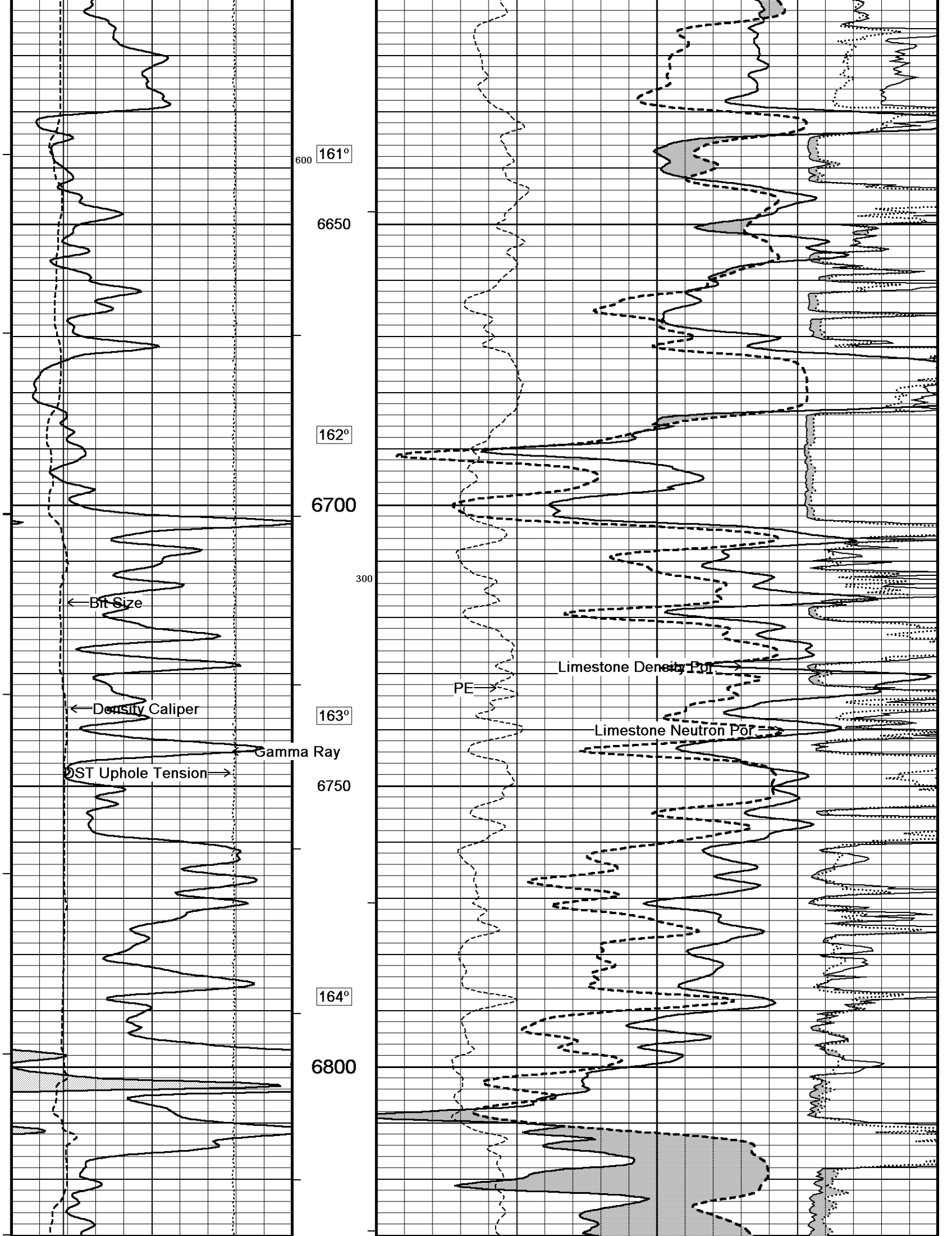


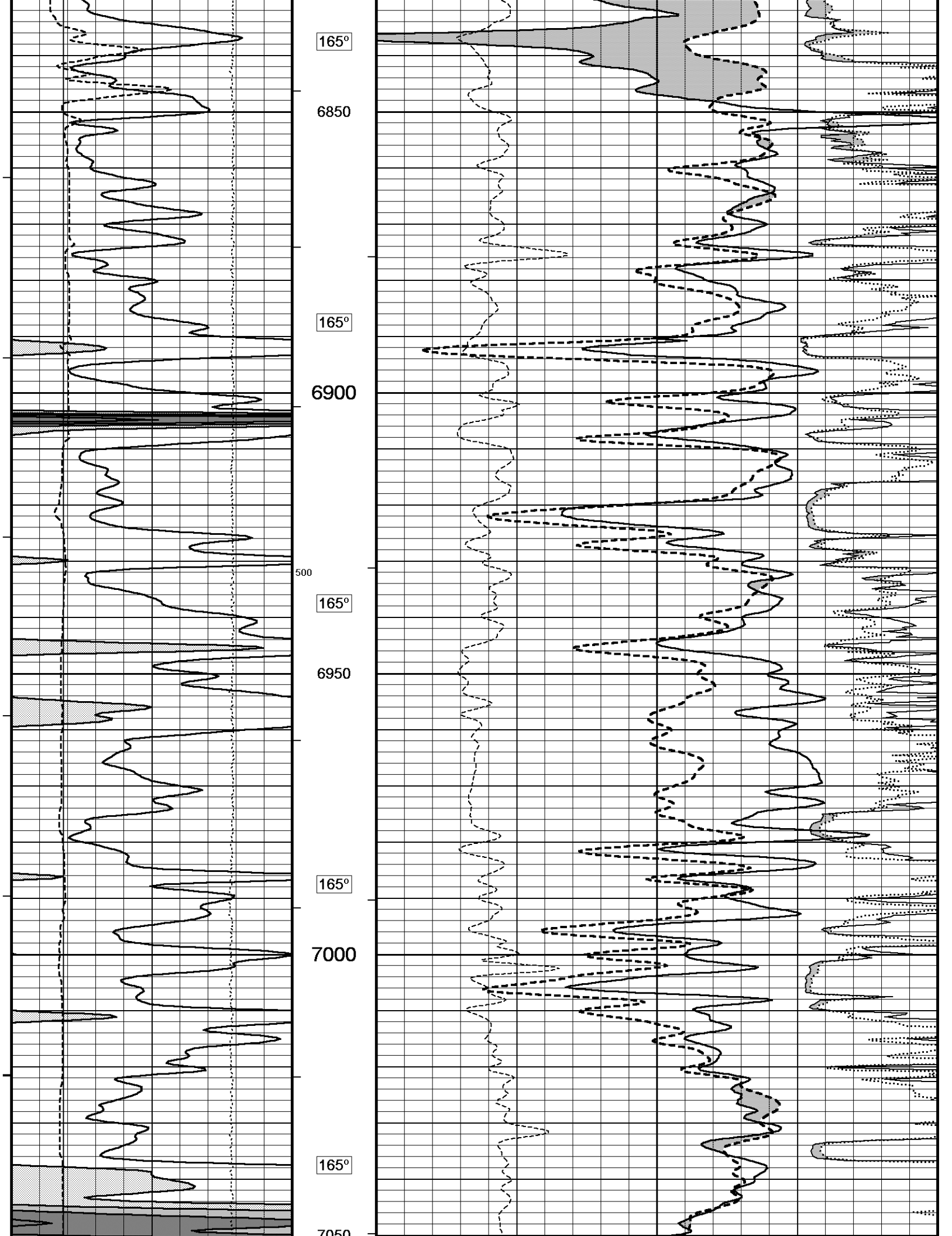


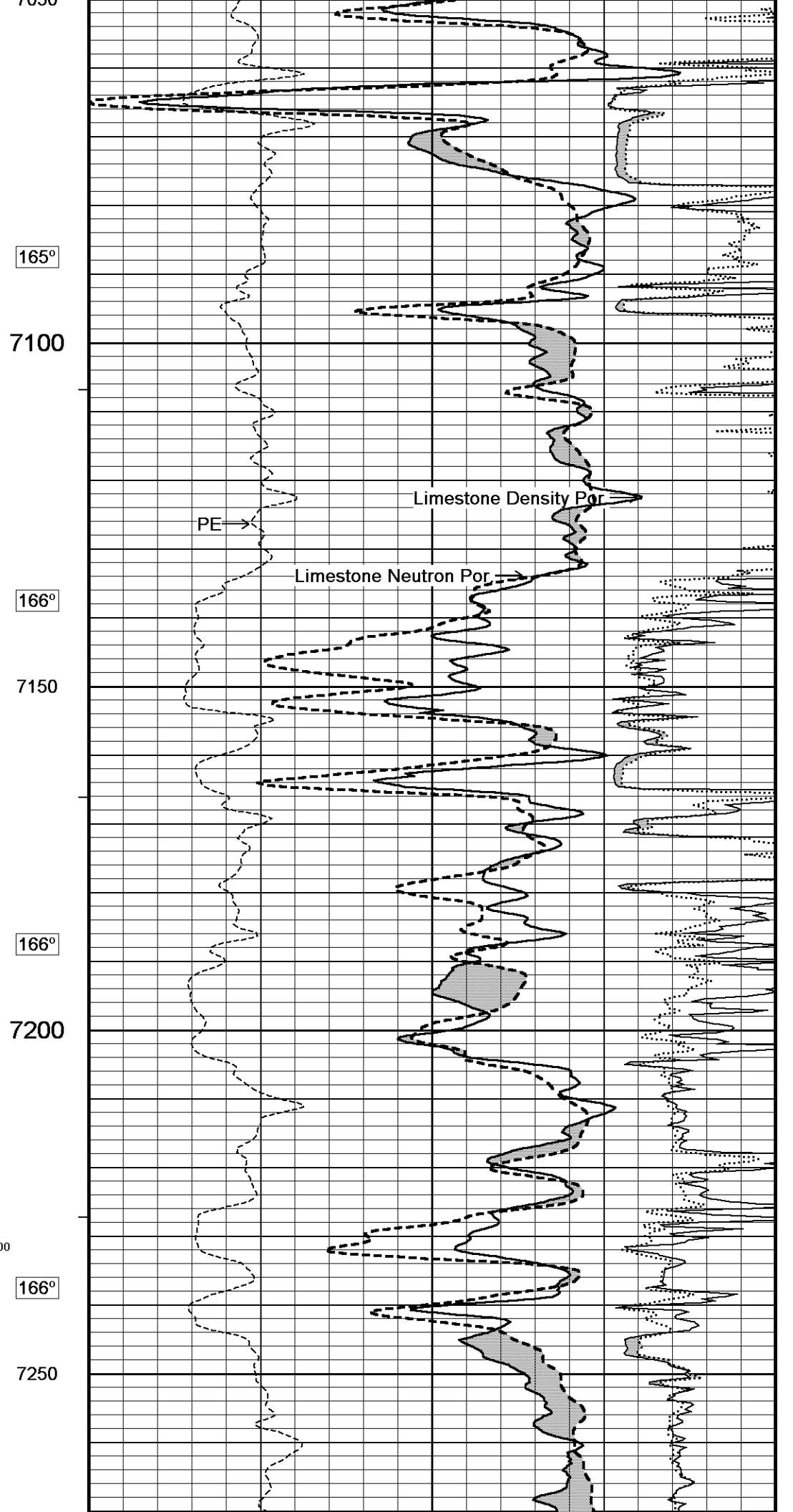
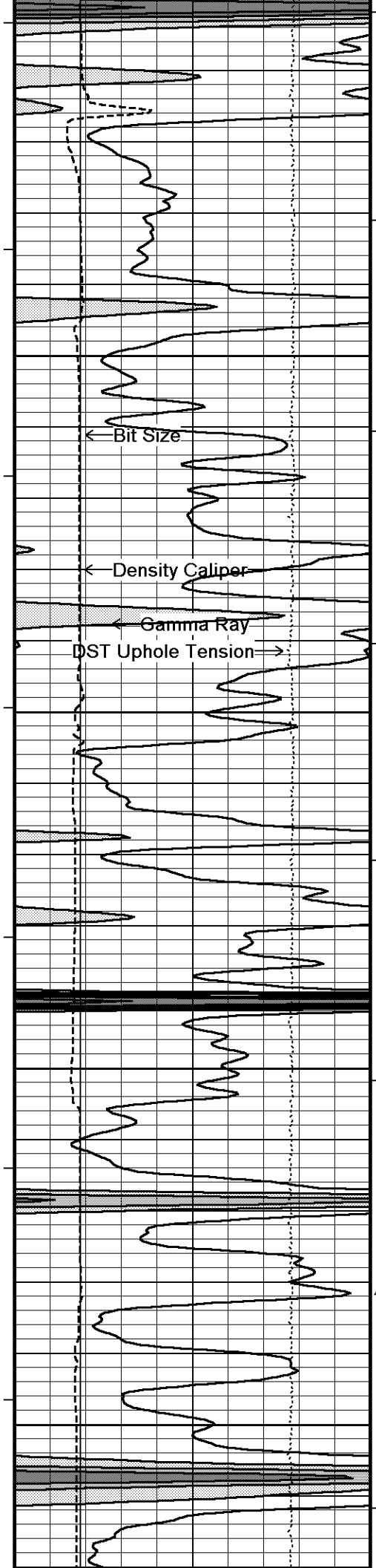












165°

7100

166°

7150

166°

7200

166°

7250

← Bit Size

← Density Caliper

← Gamma Ray

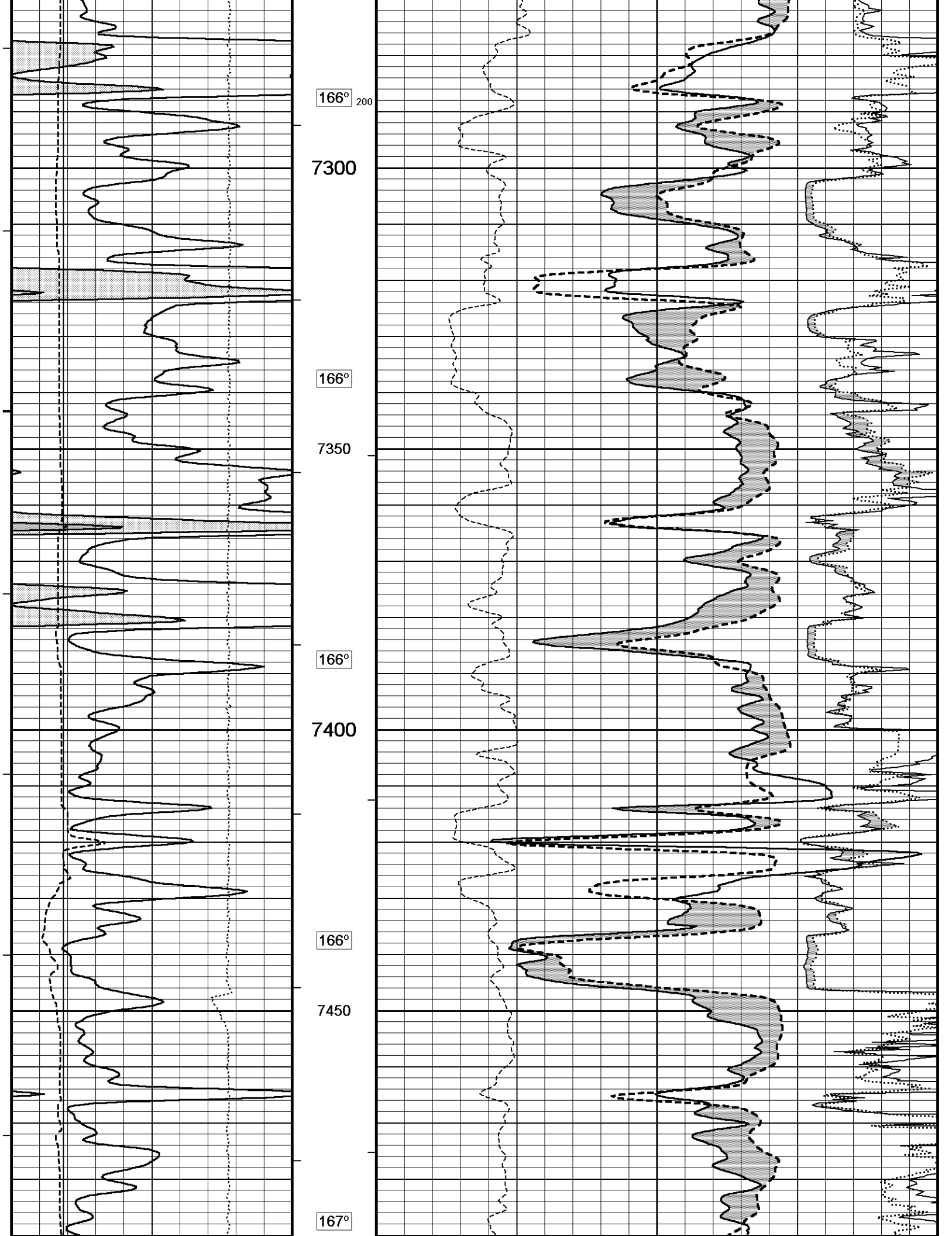
DST Uphole Tension →

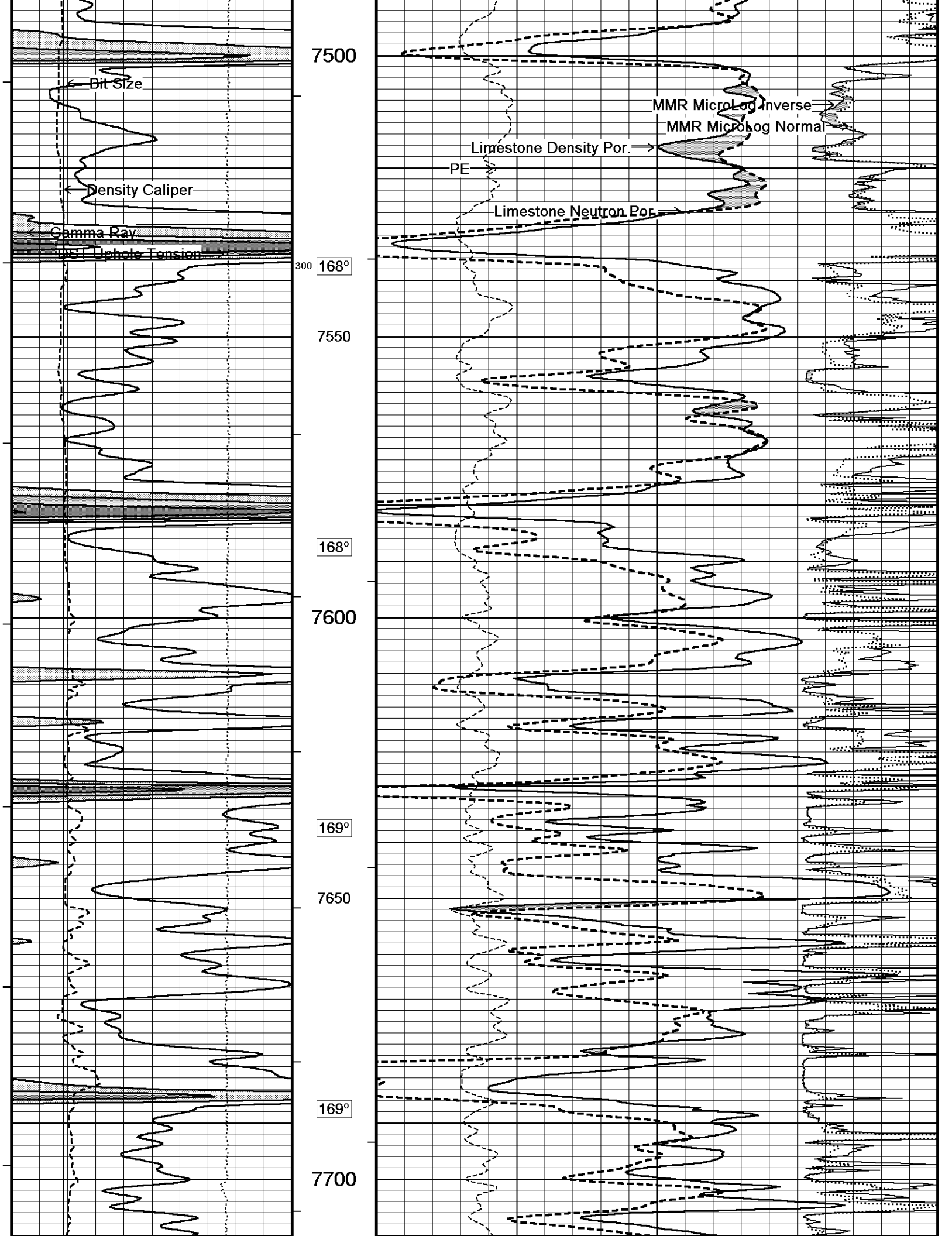
PE →

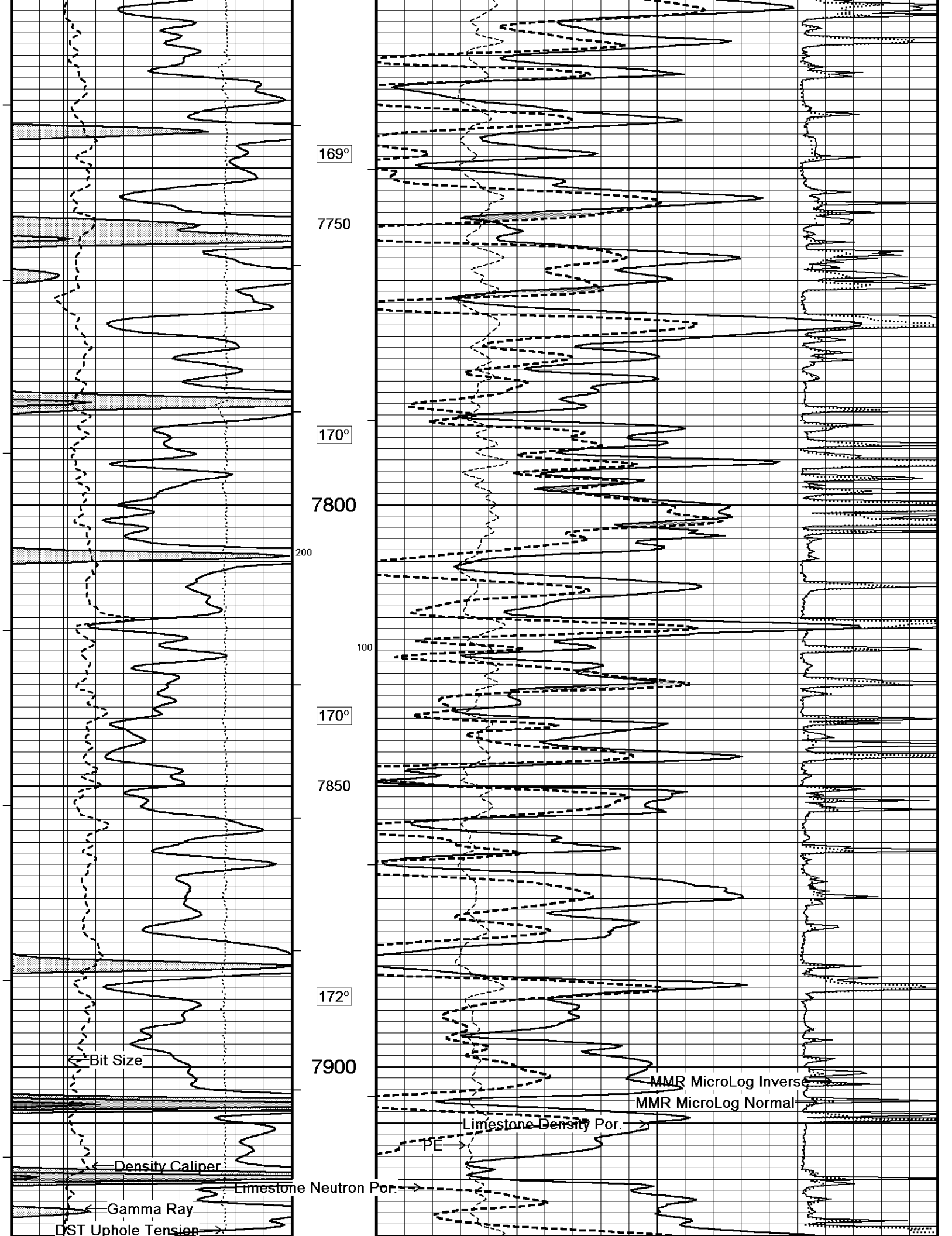
Limestone Density Por →

Limestone Neutron Por →

400







169°

7750

170°

7800

200

100

170°

7850

172°

7900

Bit Size

Density Caliper

Gamma Ray

DST Uphole Tension

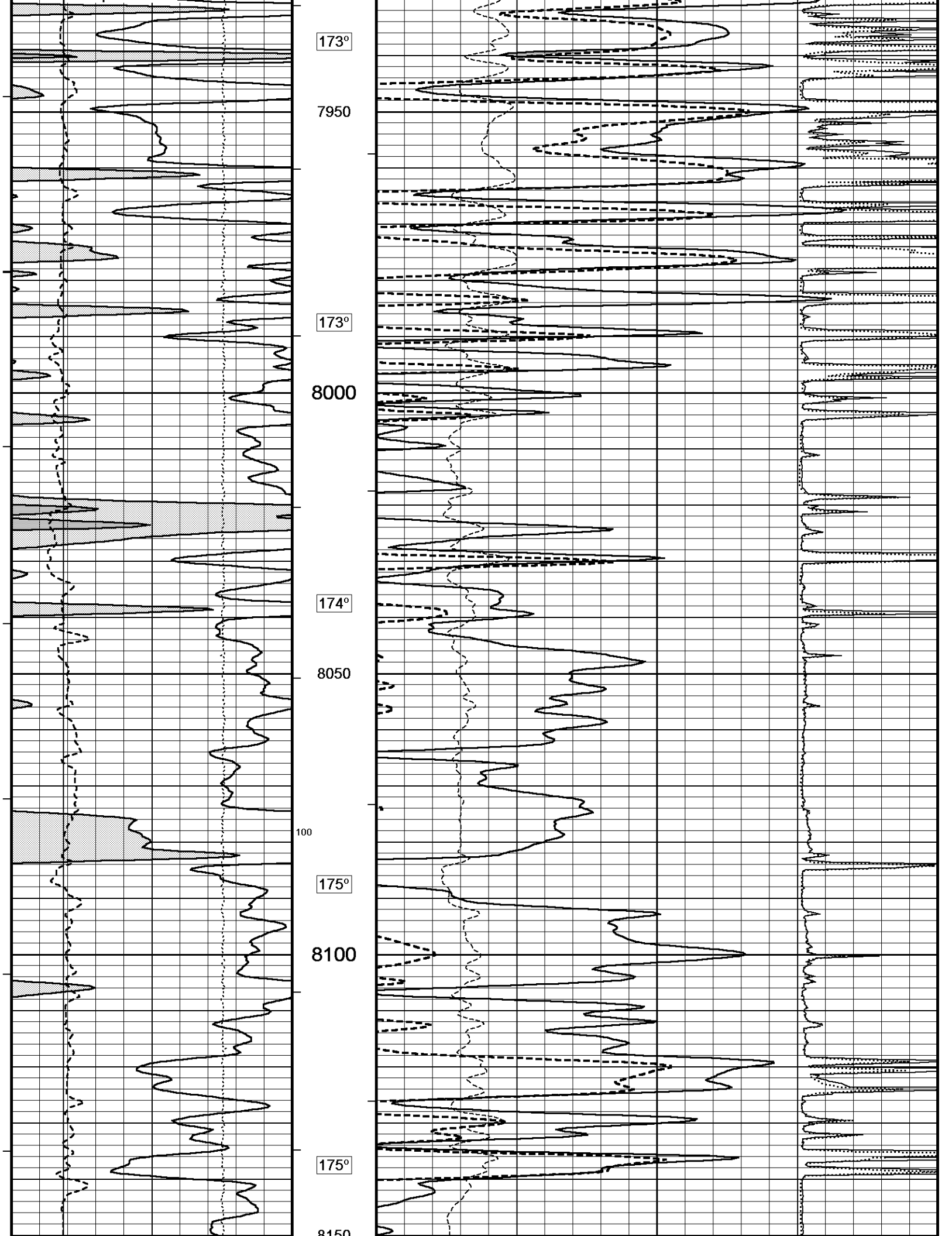
Limestone Neutron Por.

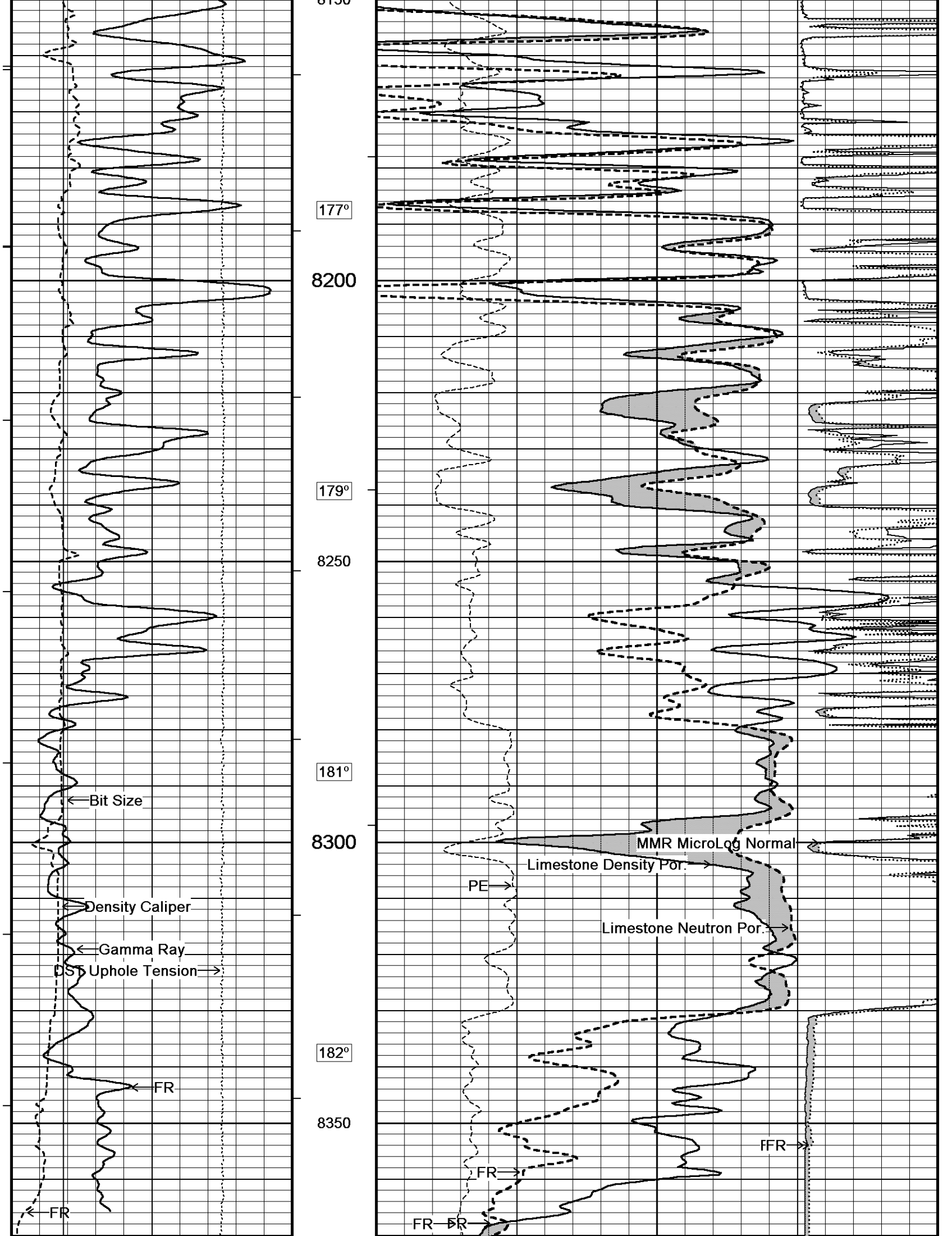
Limestone Density Por.

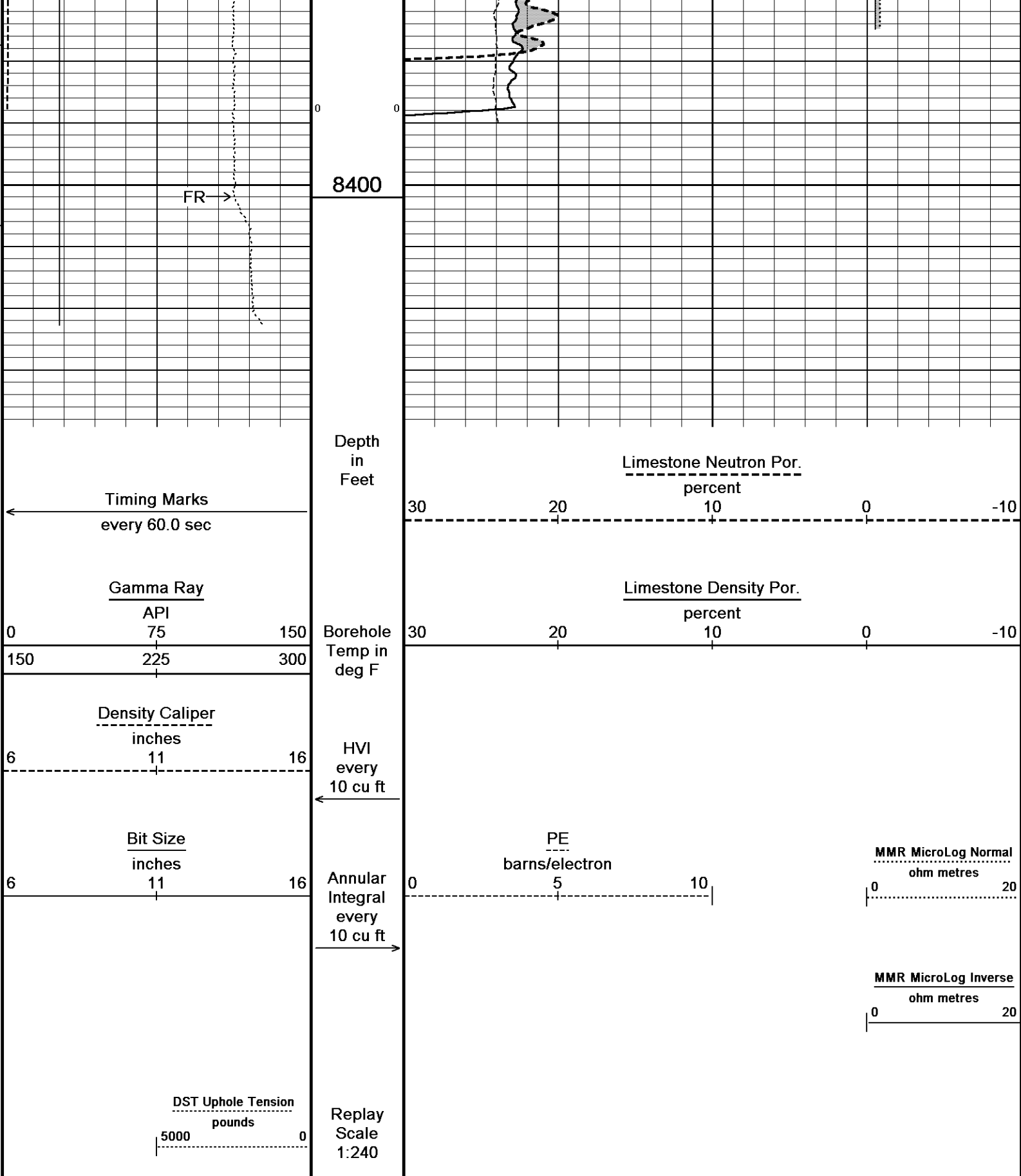
PE

MMR MicroLog Inverse

MMR MicroLog Normal





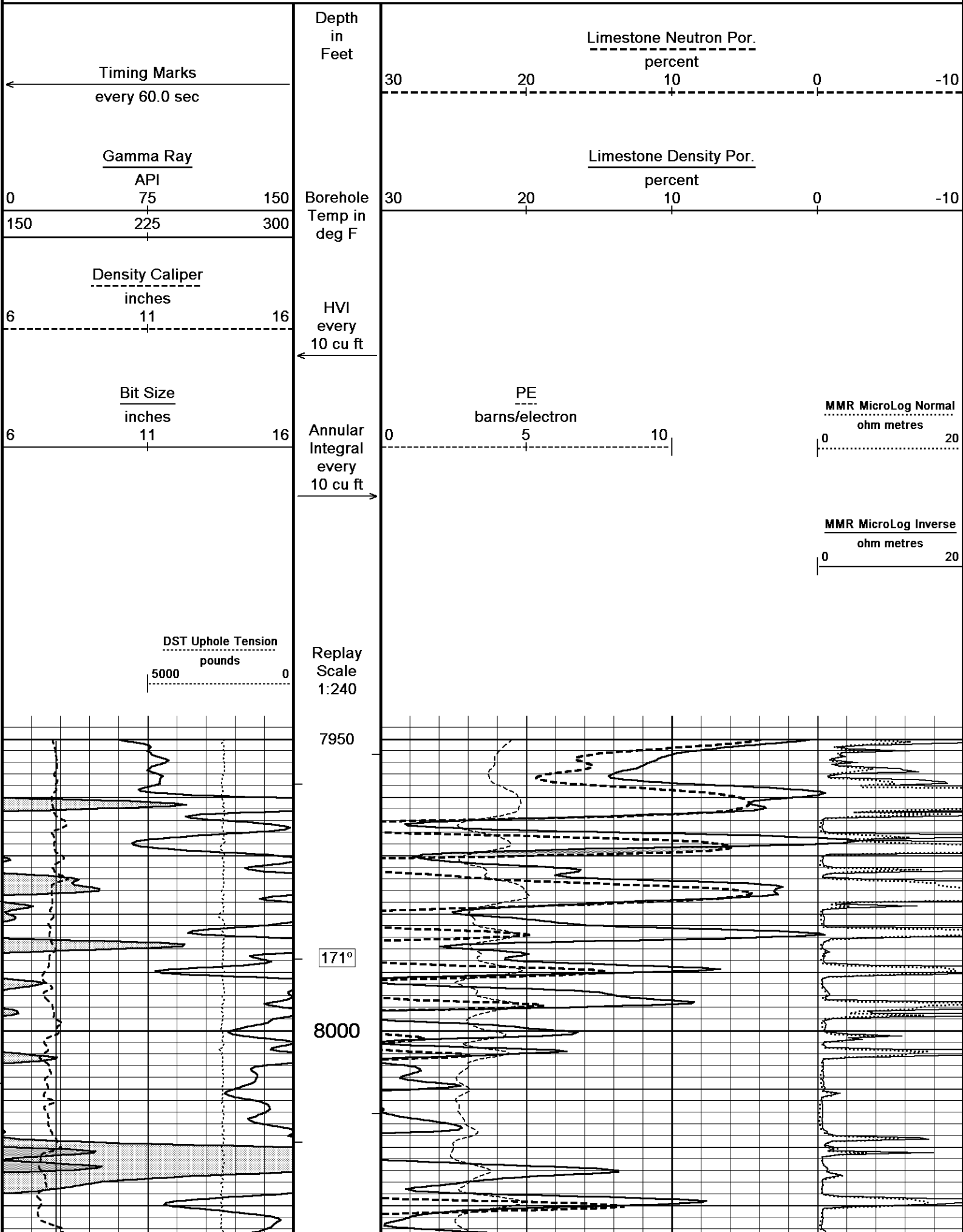


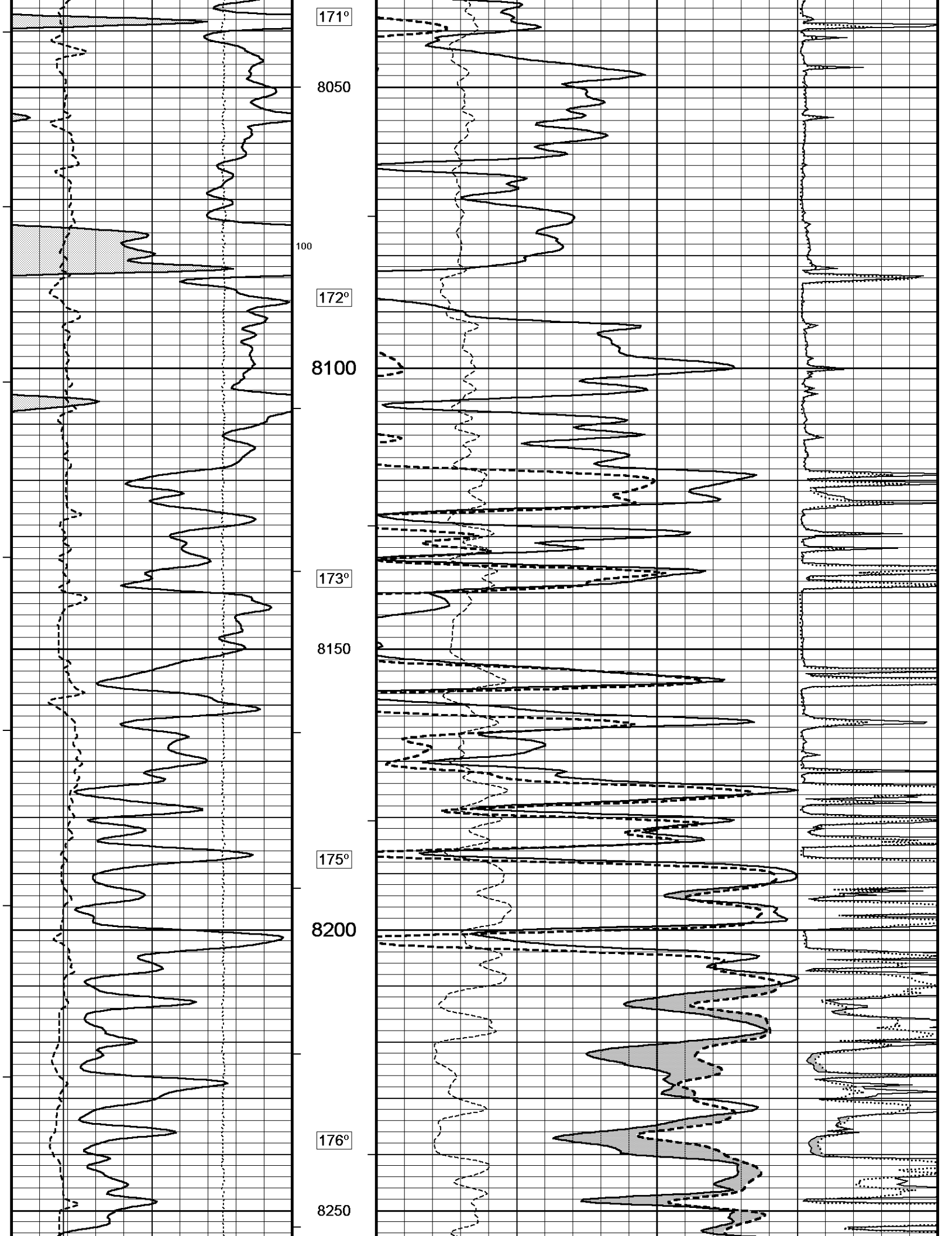
Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_003.dta
 System Versions: Logged with 18.03.9344 Plotted with 18.03.9344
 Plotted on 09-DEC-2018 13:03
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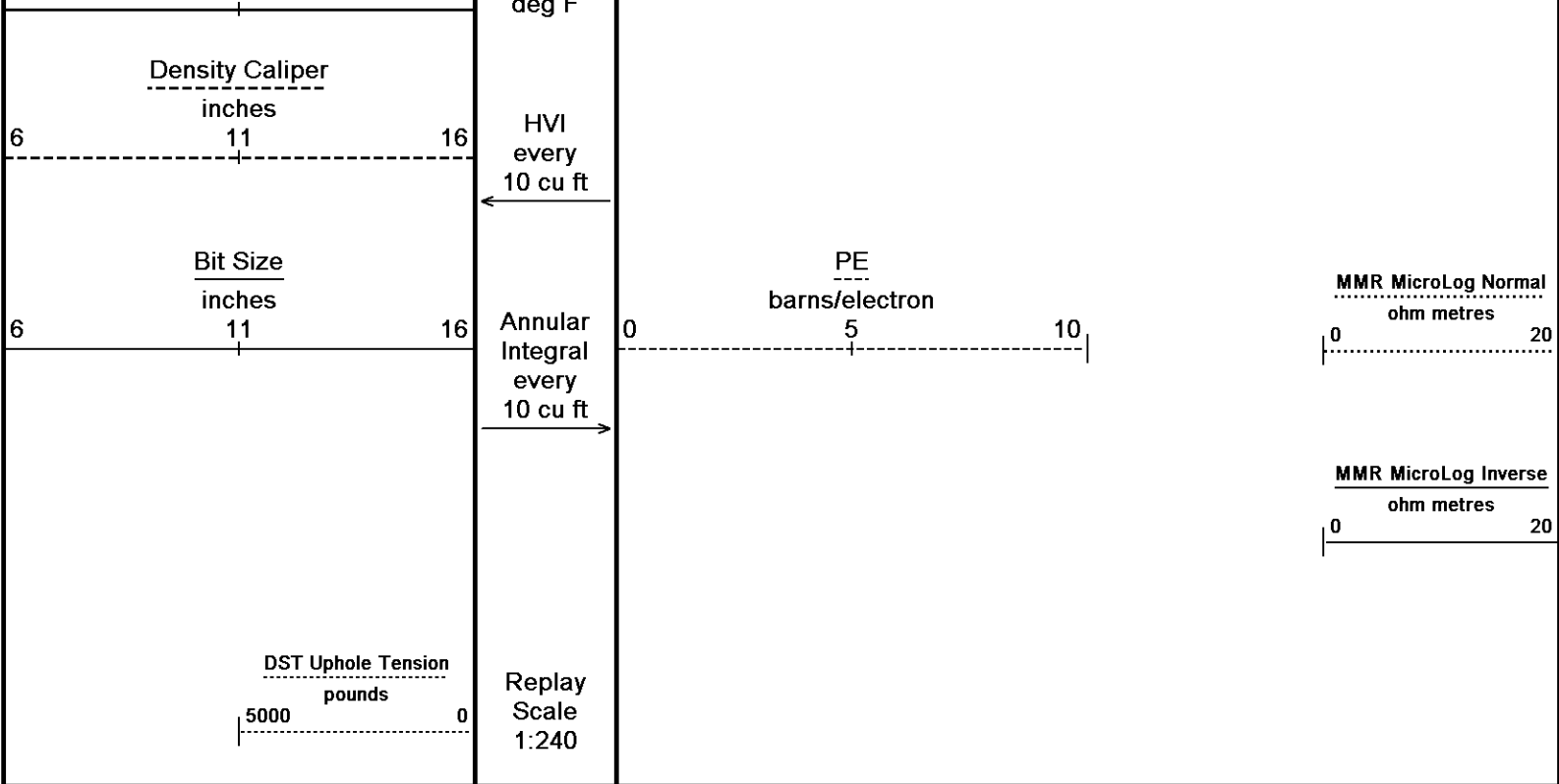
↑ 5 INCH LIMESTONE MAIN ↑

↓ REPEAT SECTION ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 09-DEC-2018 13:03





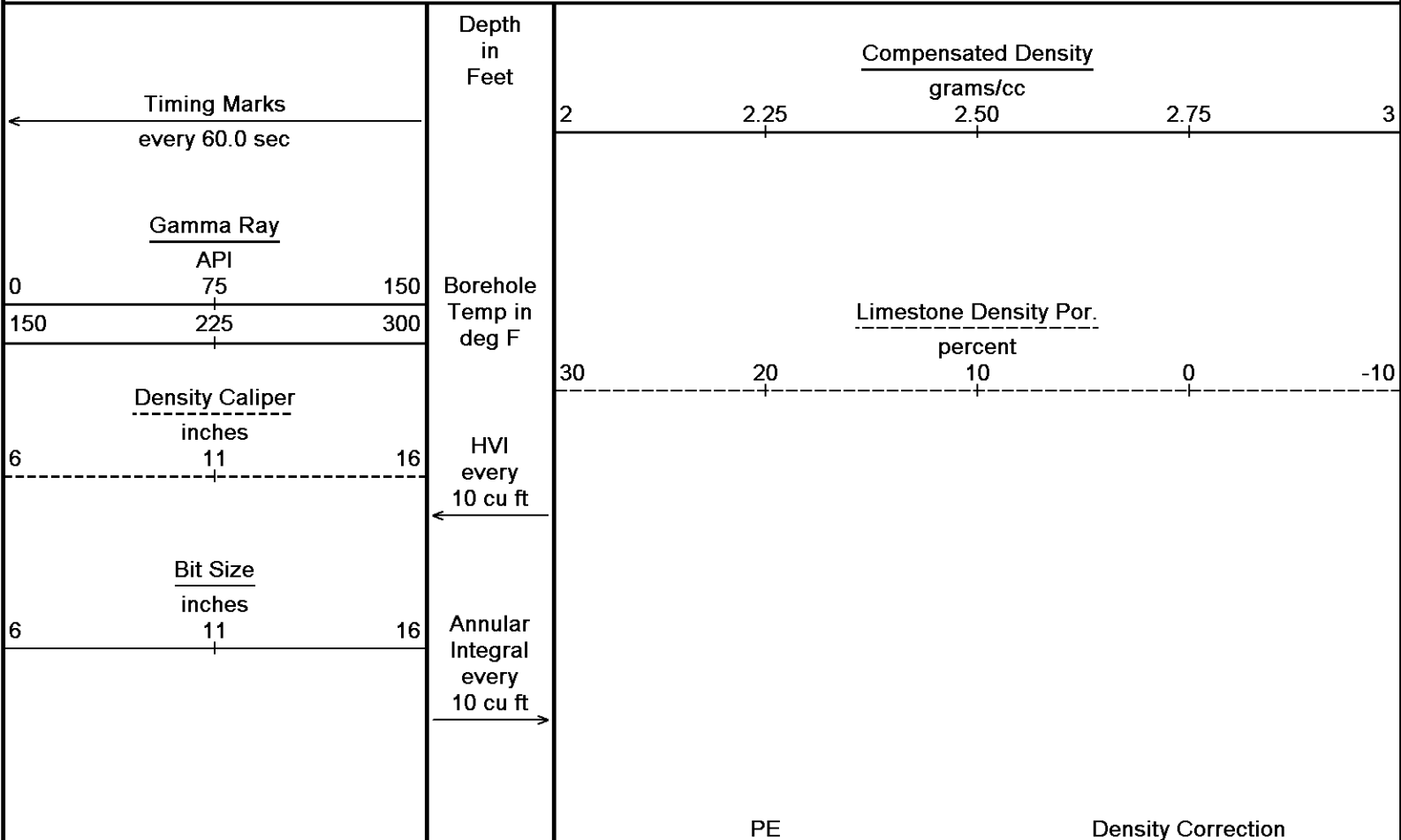


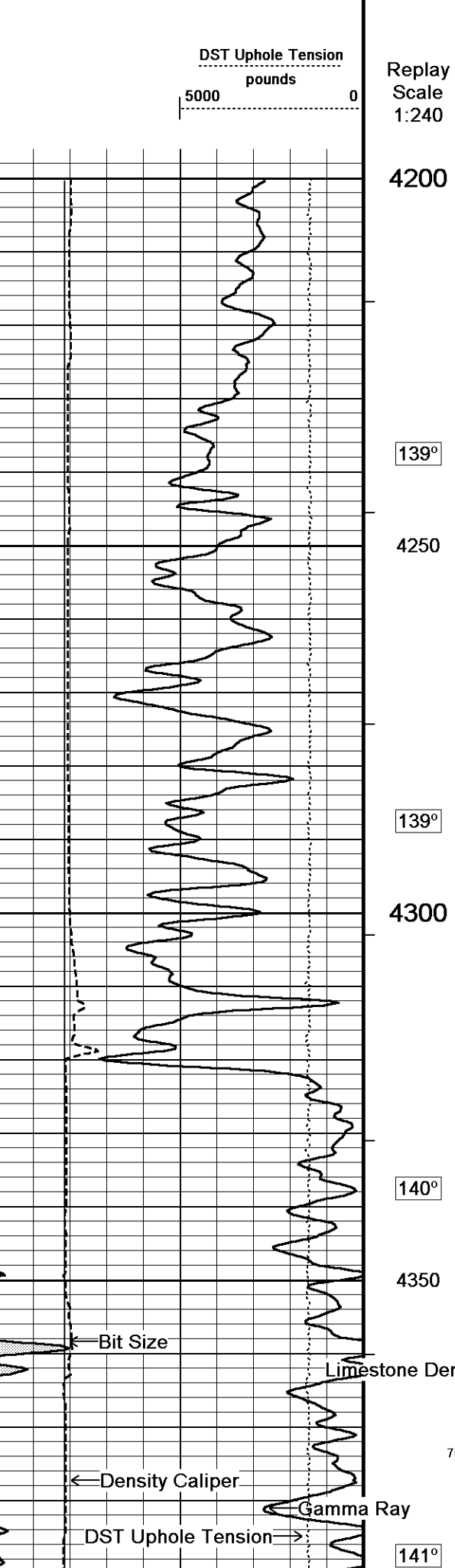
Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 09-DEC-2018 13:03
 Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_002.dta
 Recorded on 09-DEC-2018 07:23
 System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

↑ REPEAT SECTION ↑

↓ 5 INCH BULK DENSITY MAIN ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 09-DEC-2018 13:03
 Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_003.dta
 Recorded on 09-DEC-2018 07:52
 System Versions: Logged with 18.03.9344 Plotted with 18.03.9344





Replay
Scale
1:240

4200

139°

4250

139°

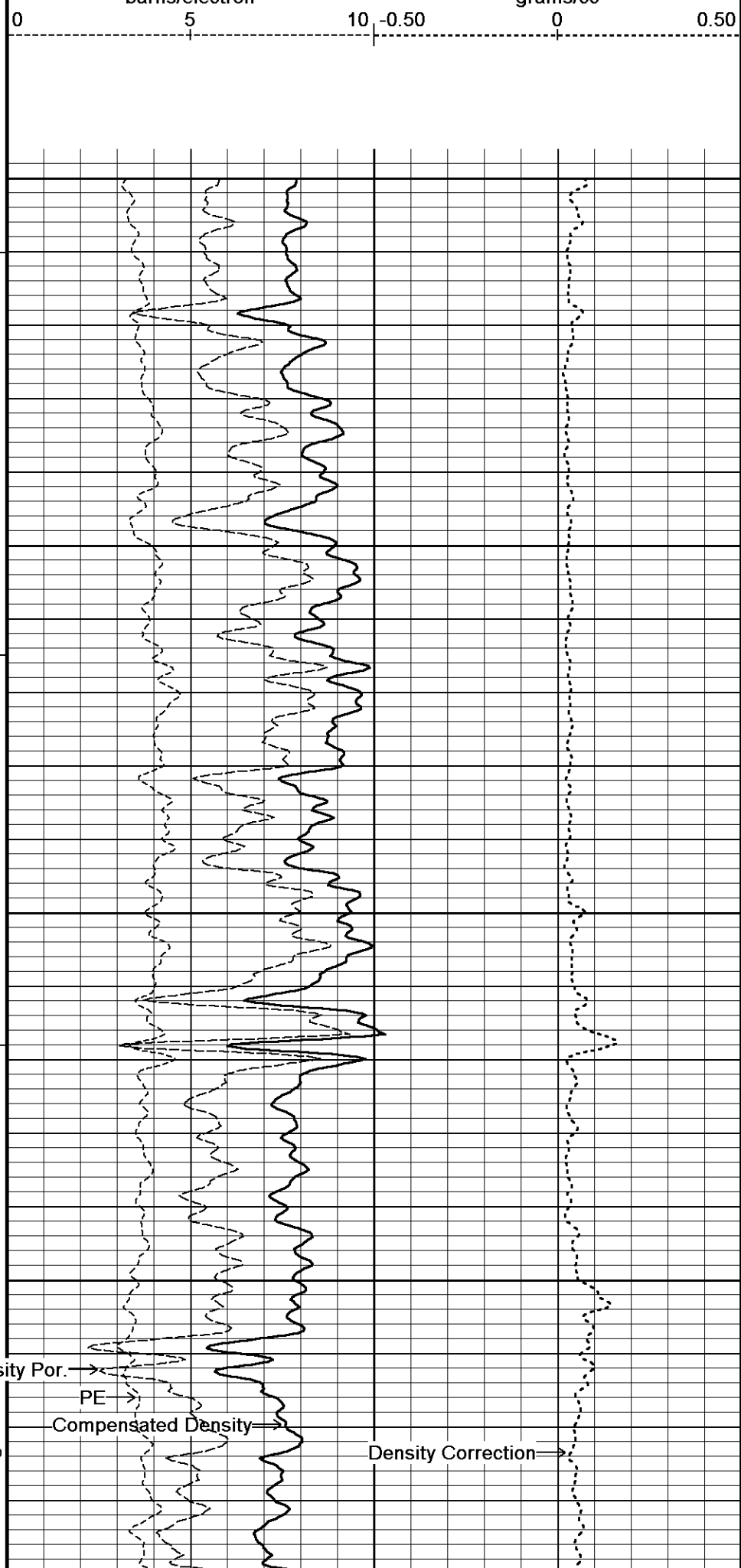
4300

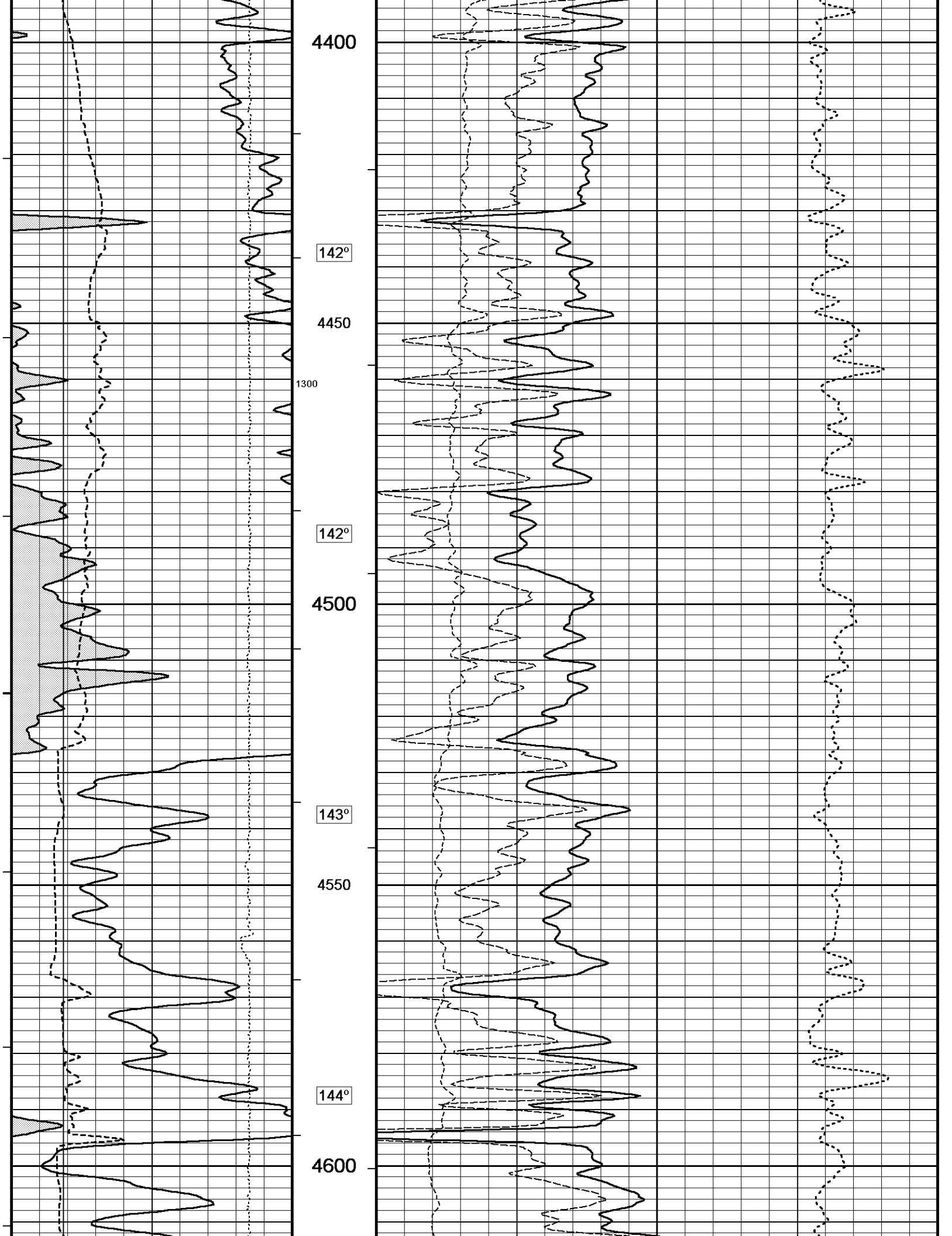
140°

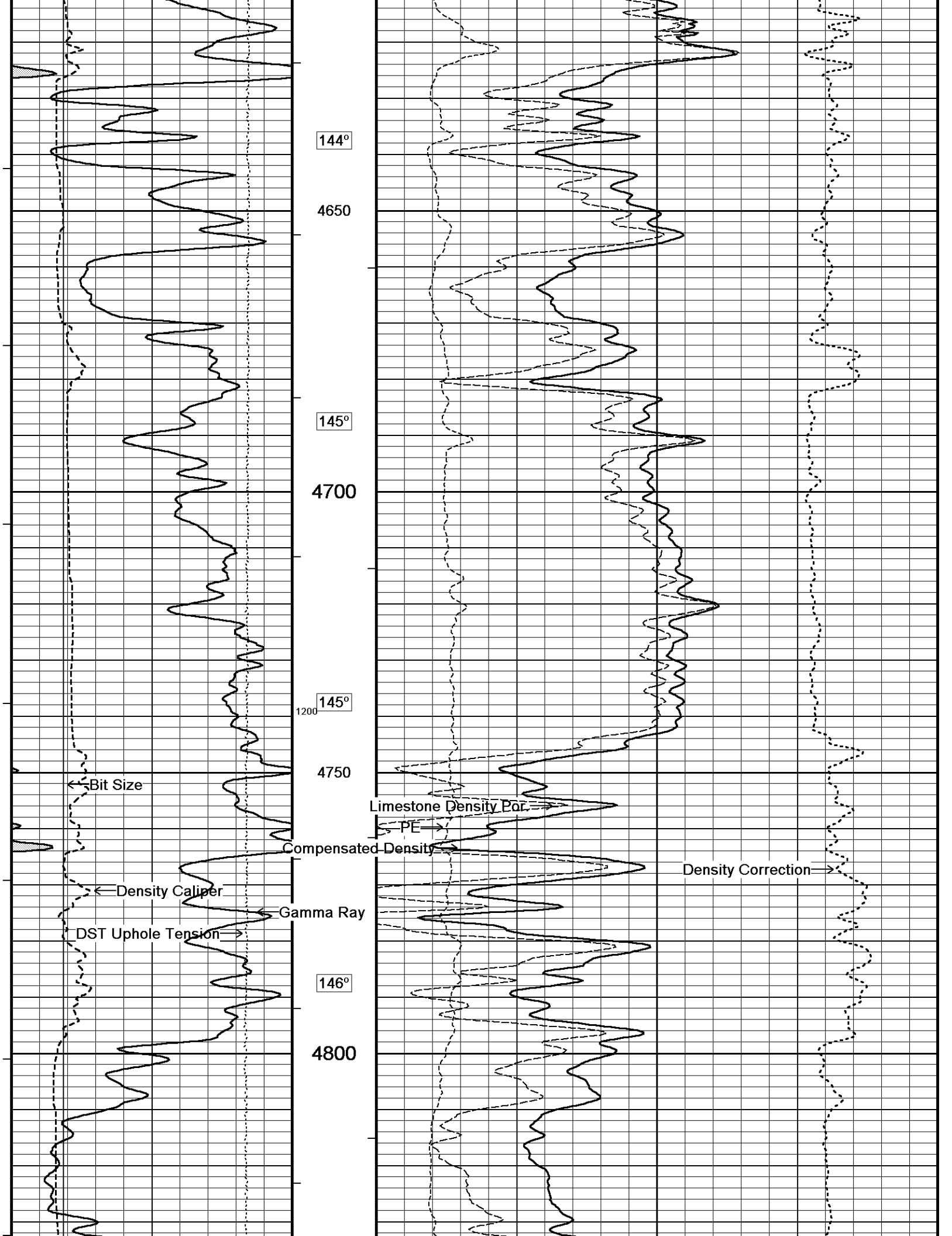
4350

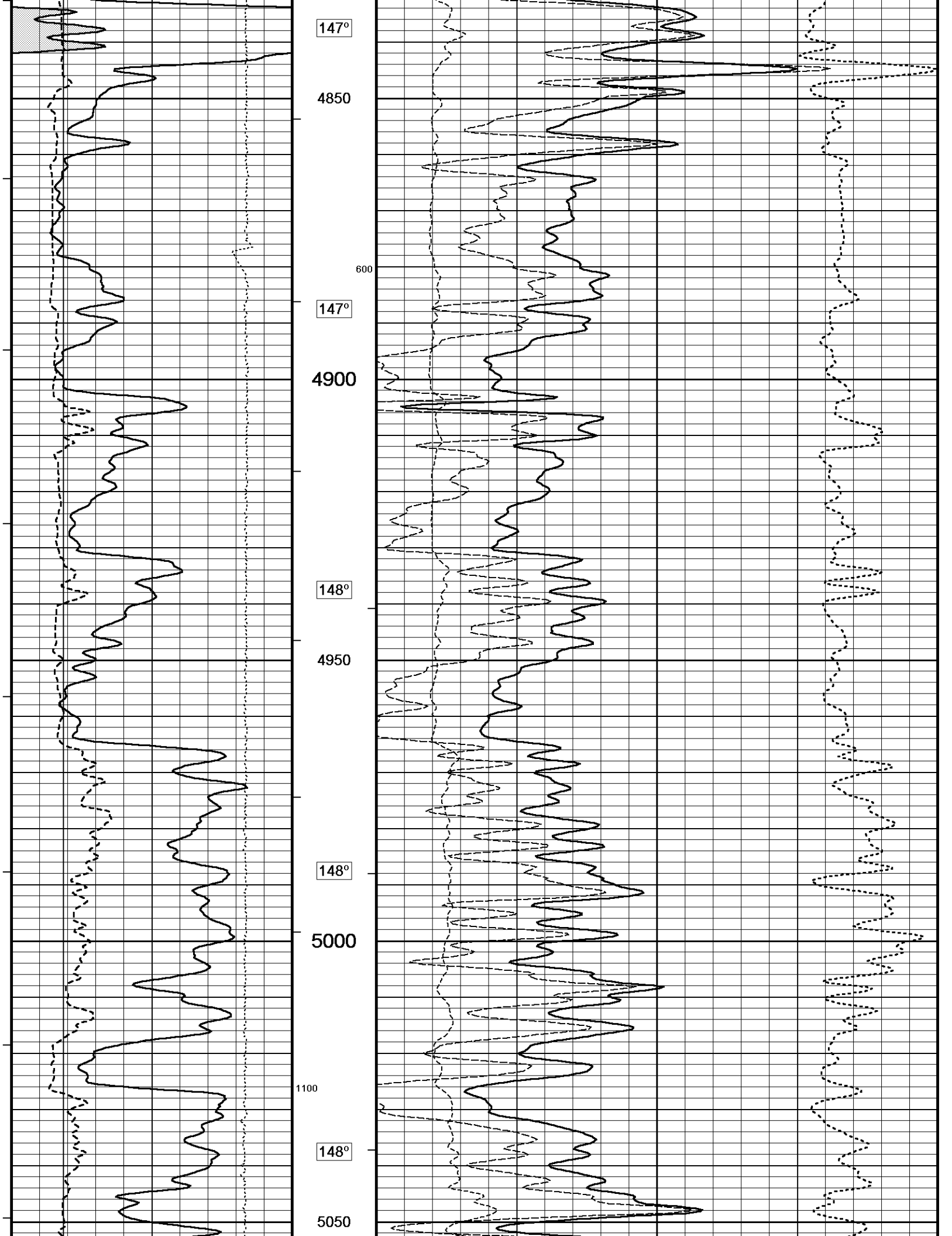
700

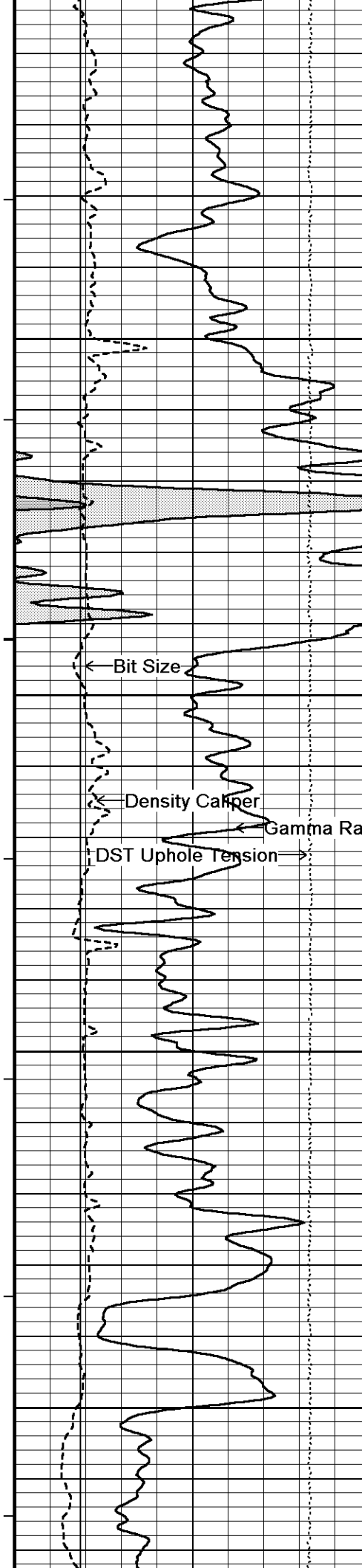
141°



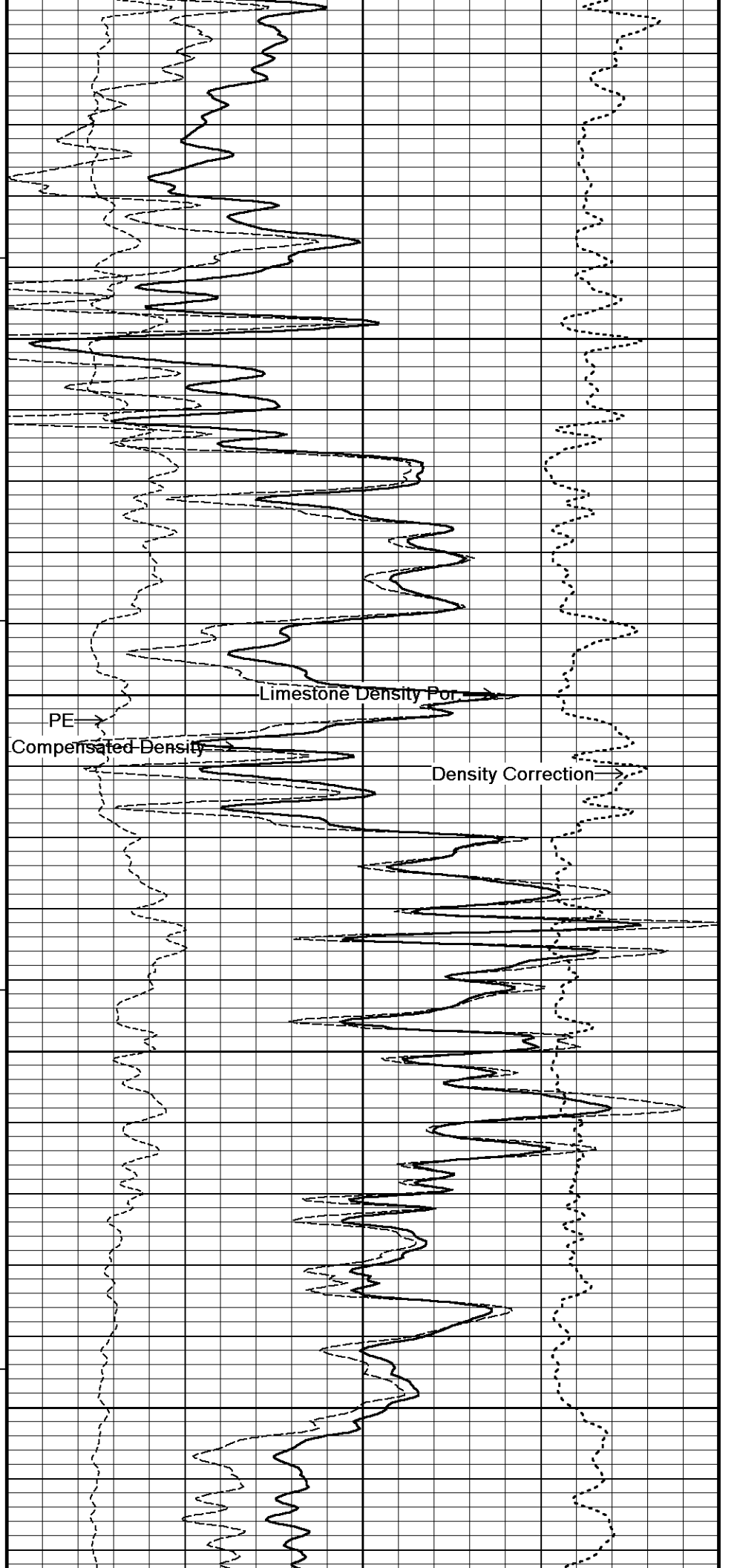






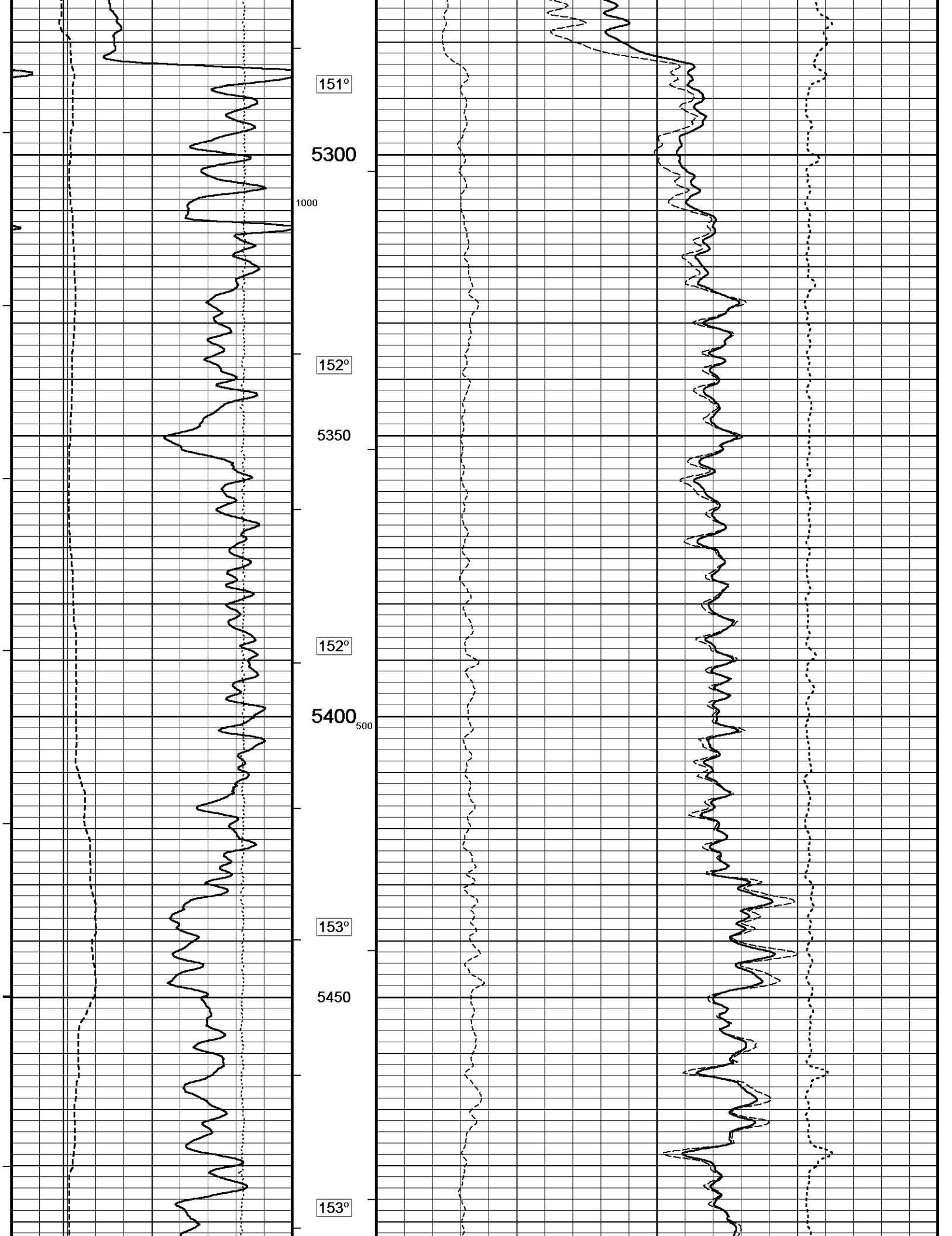


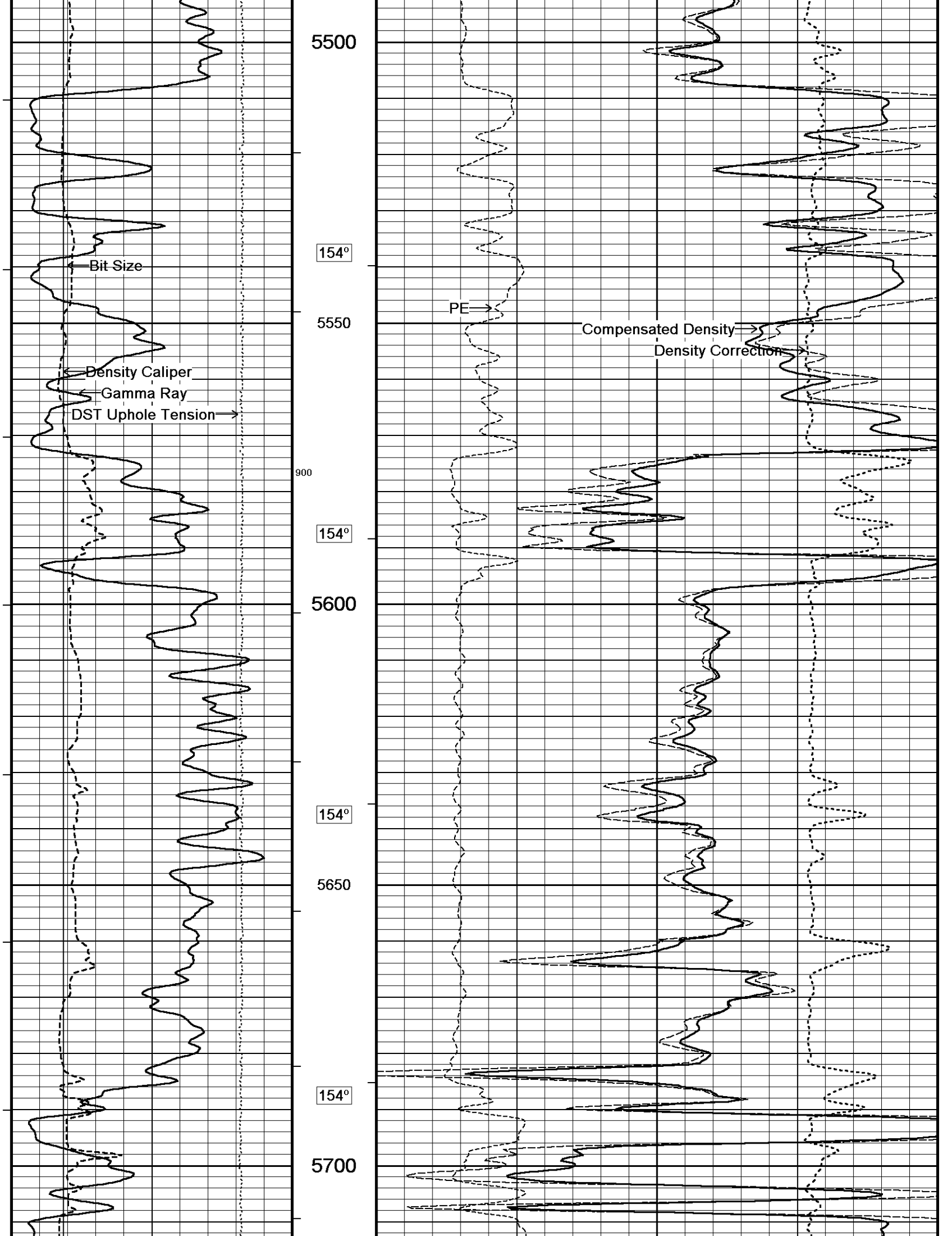
149°
5100
149°
5150
150°
5200
151°
5250

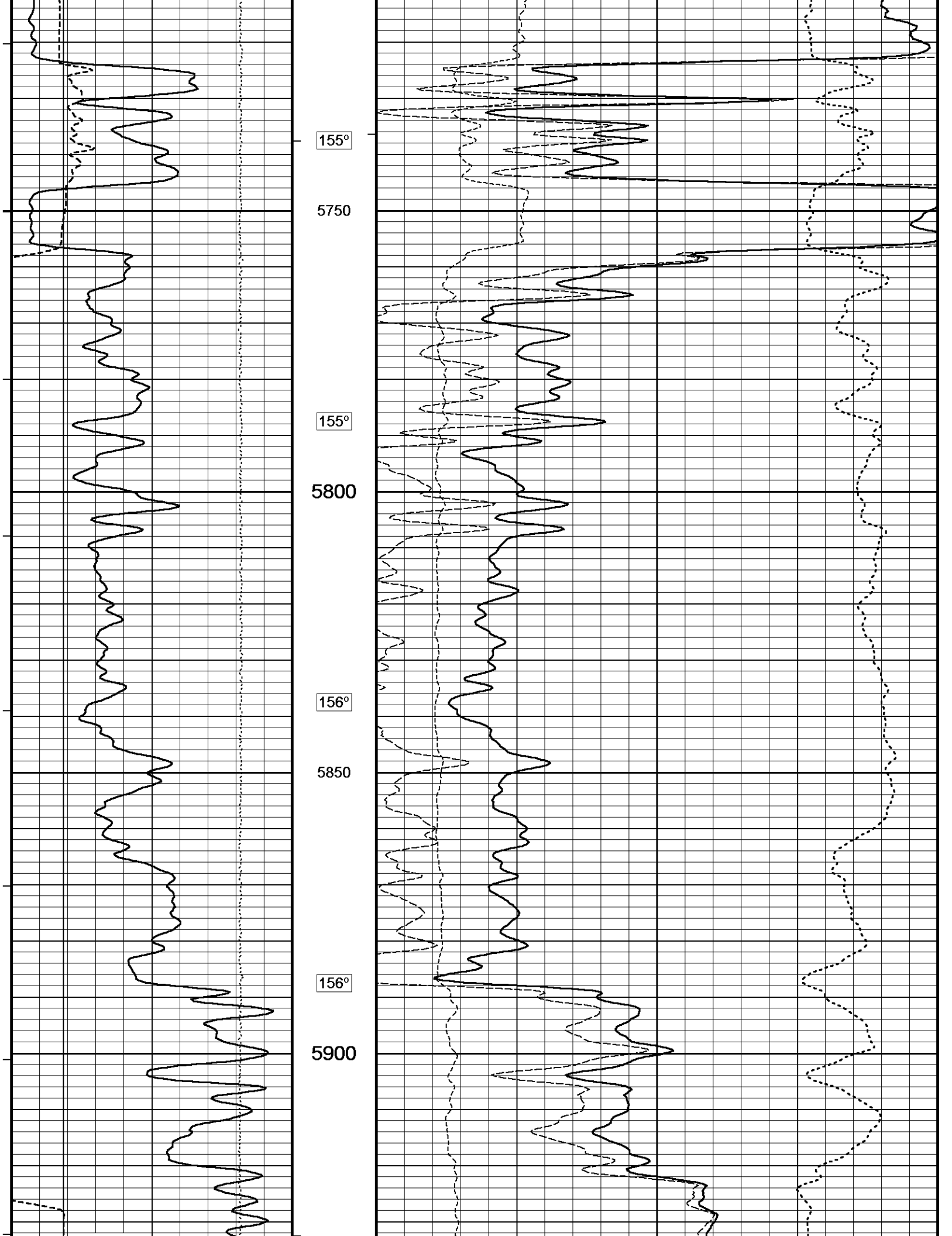


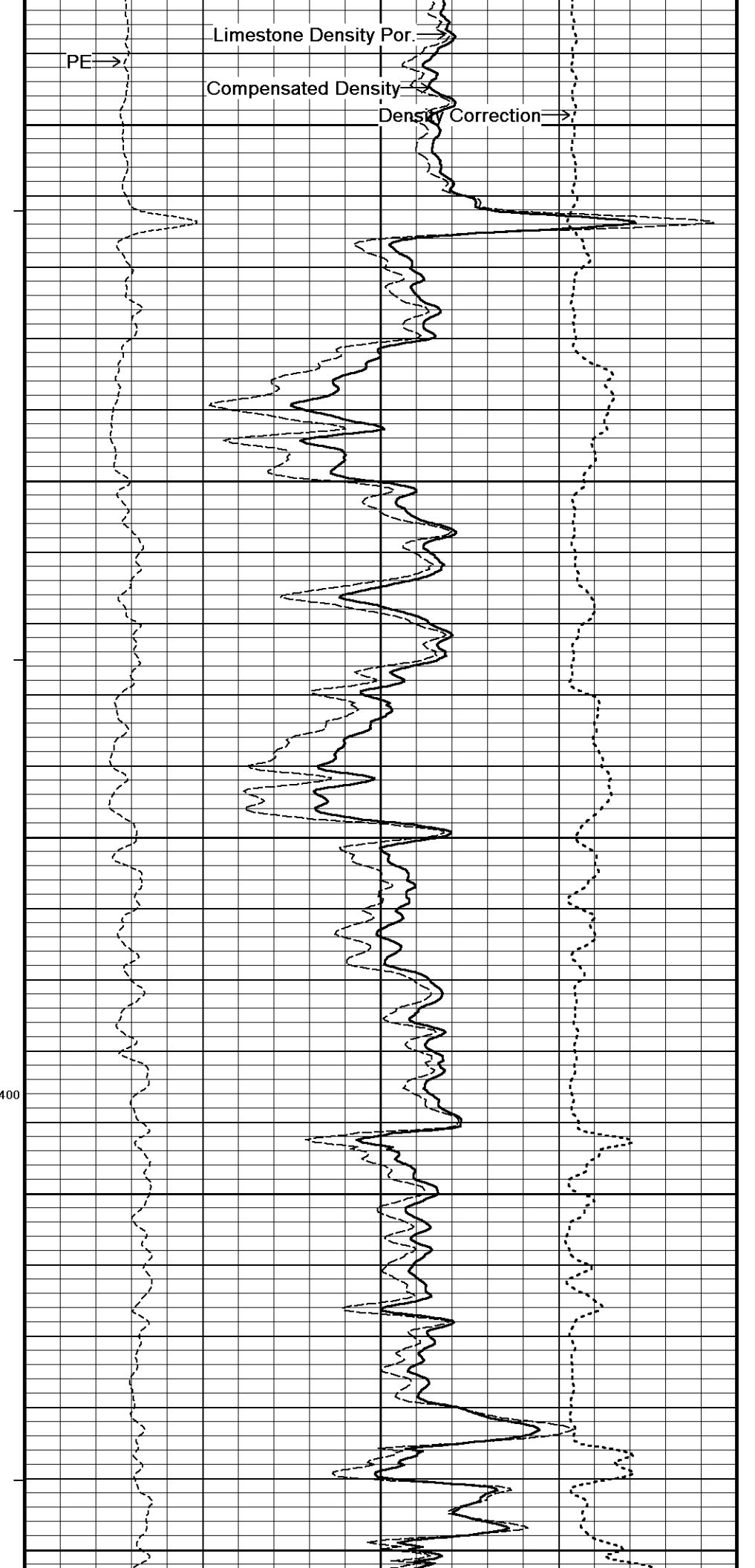
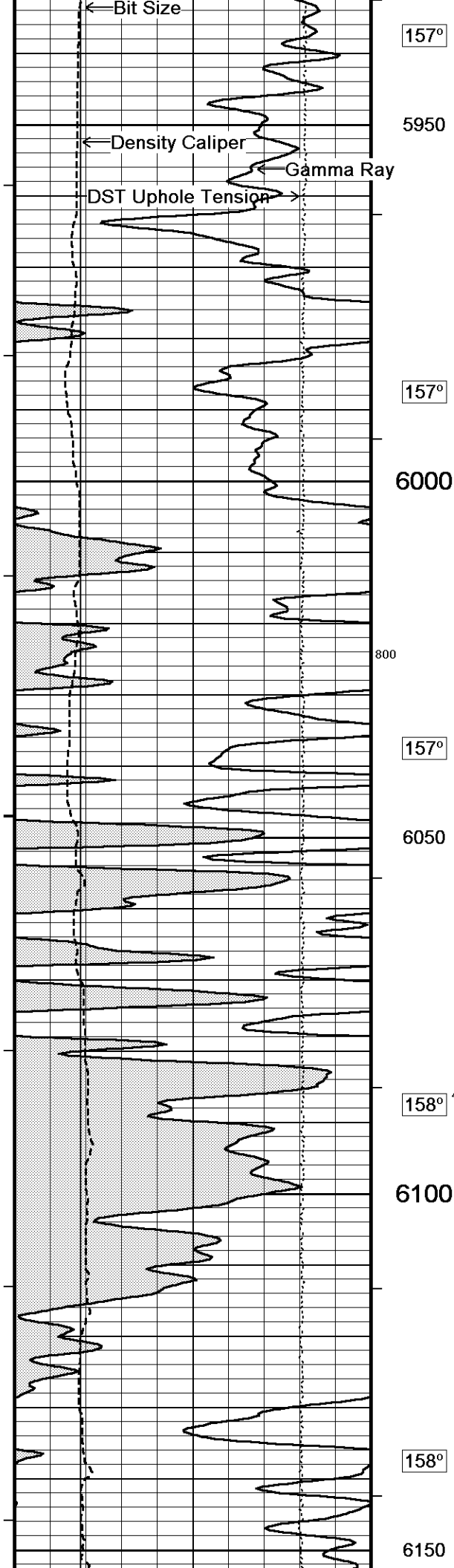
← Bit Size
← Density Caliper
← Gamma Ray
DST Uphole Tension →

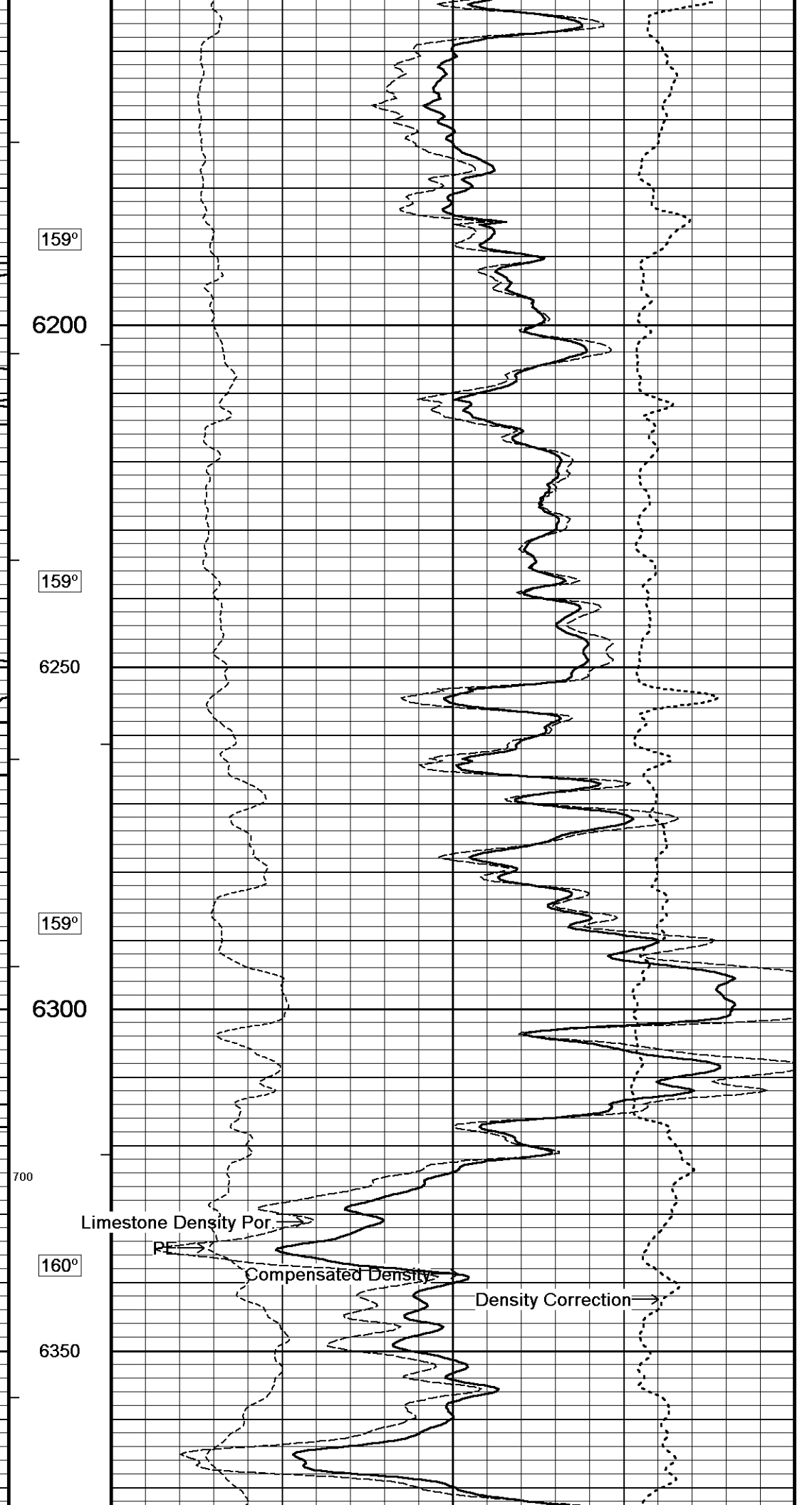
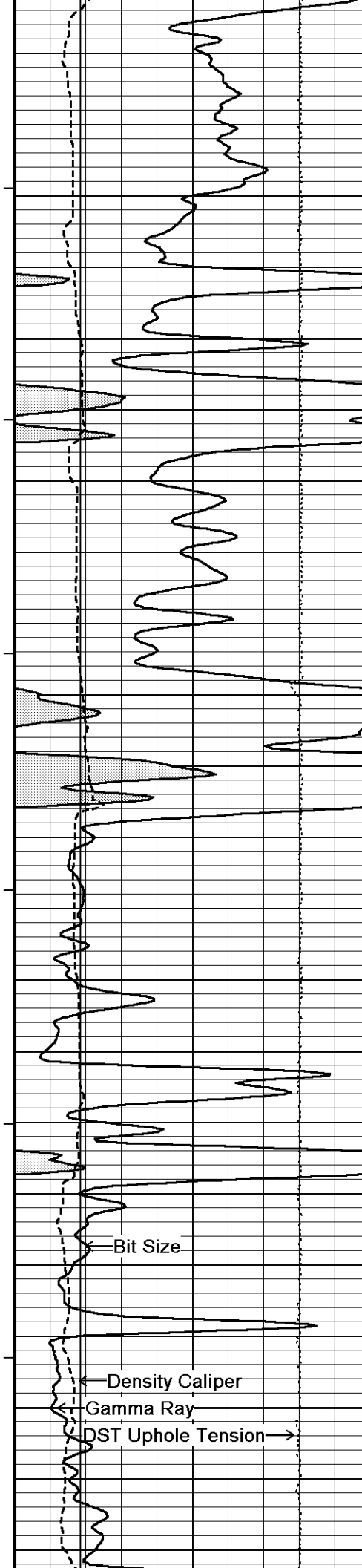
PE →
Compensated Density →
Limestone Density Por →
Density Correction →











159°

6200

159°

6250

159°

6300

700

160°

6350

Bit Size

Density Caliper

Gamma Ray

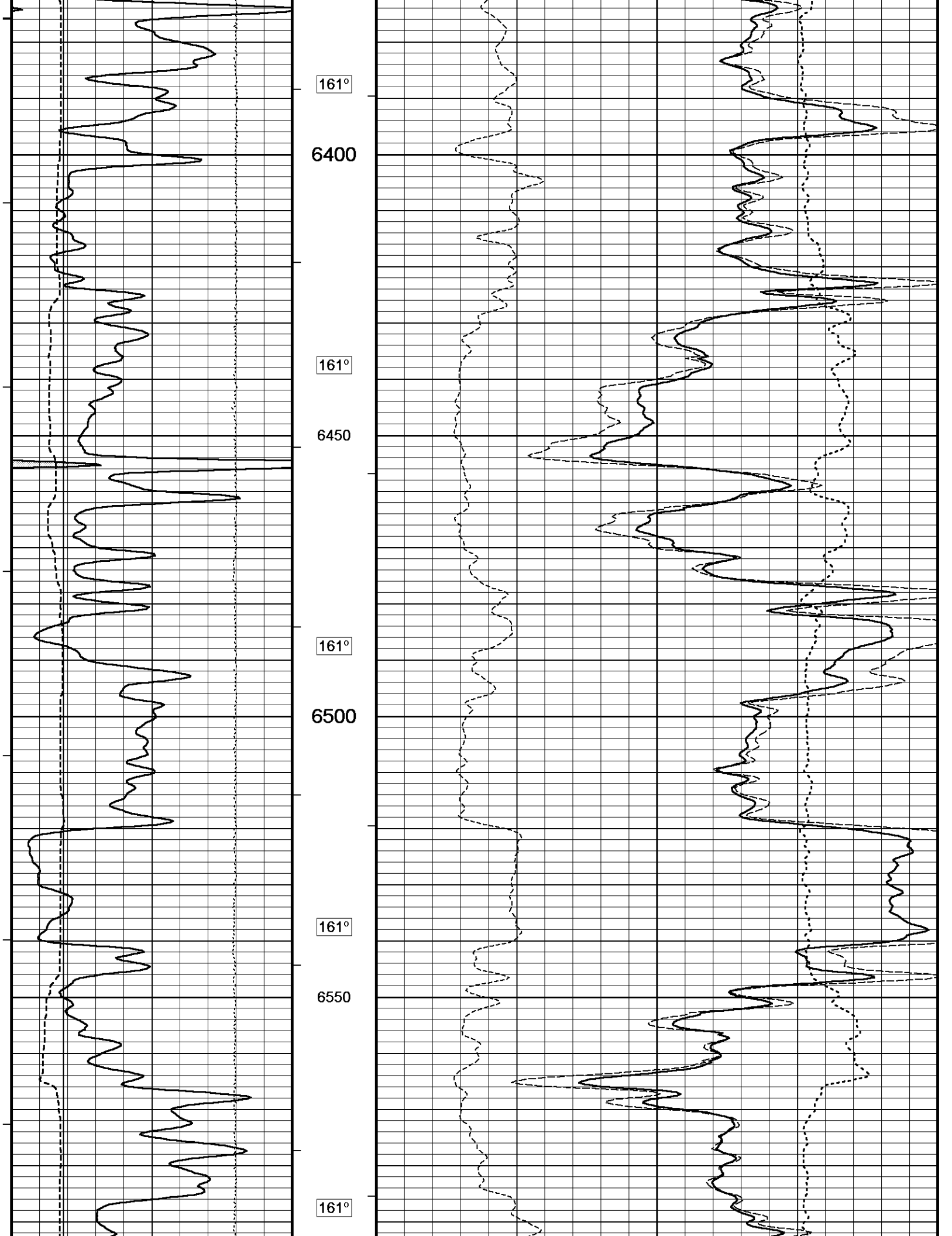
DST Uphole Tension

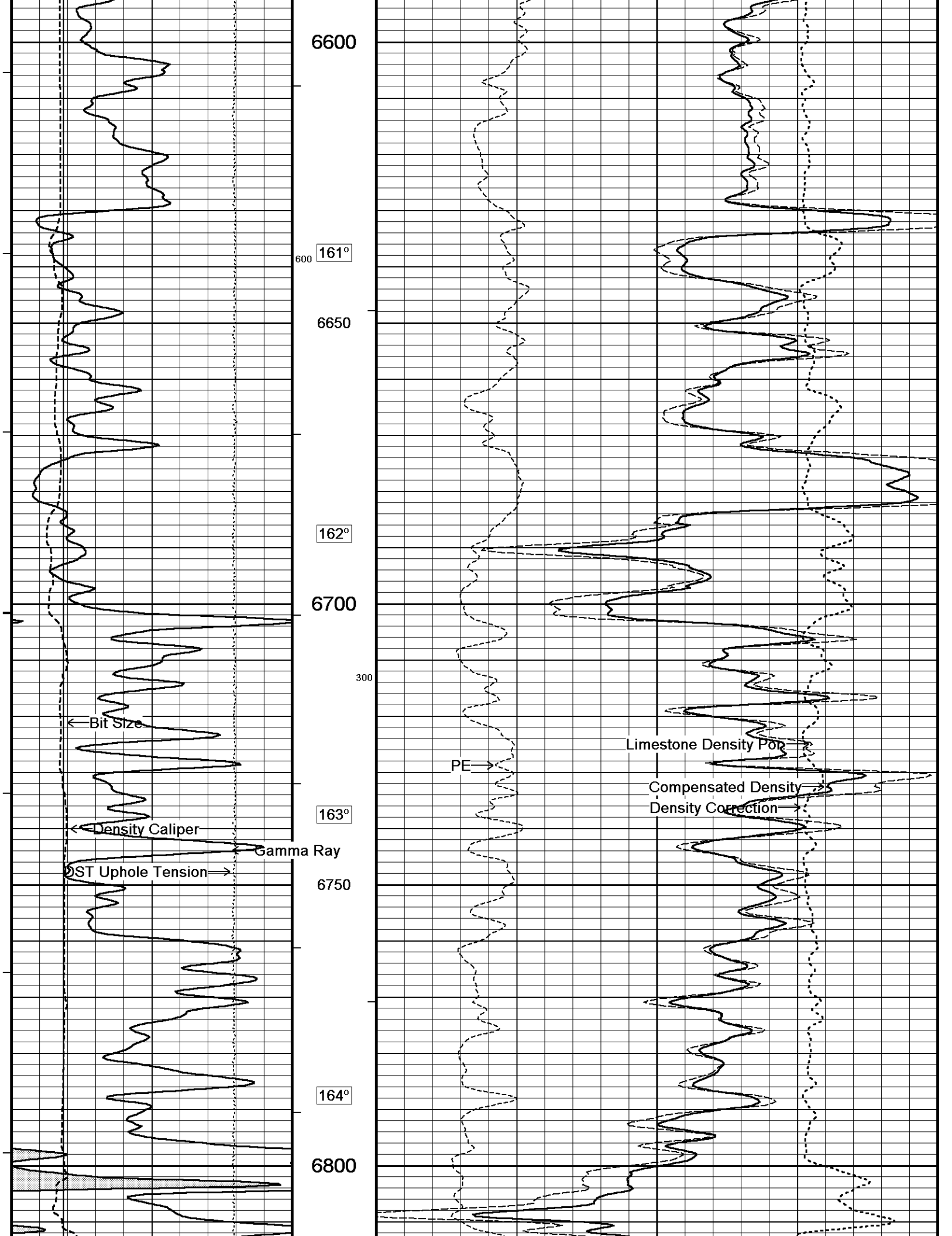
Limestone Density Por

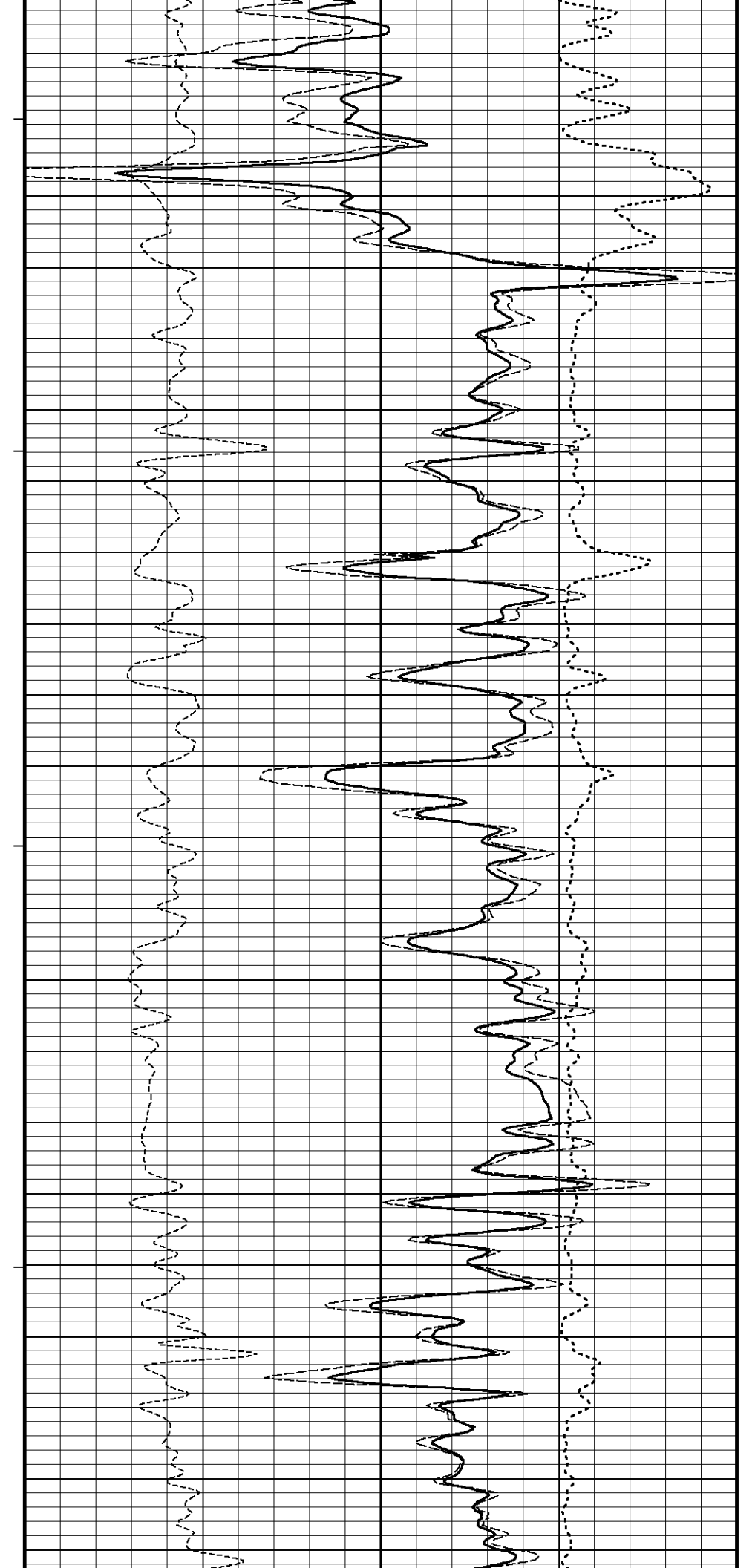
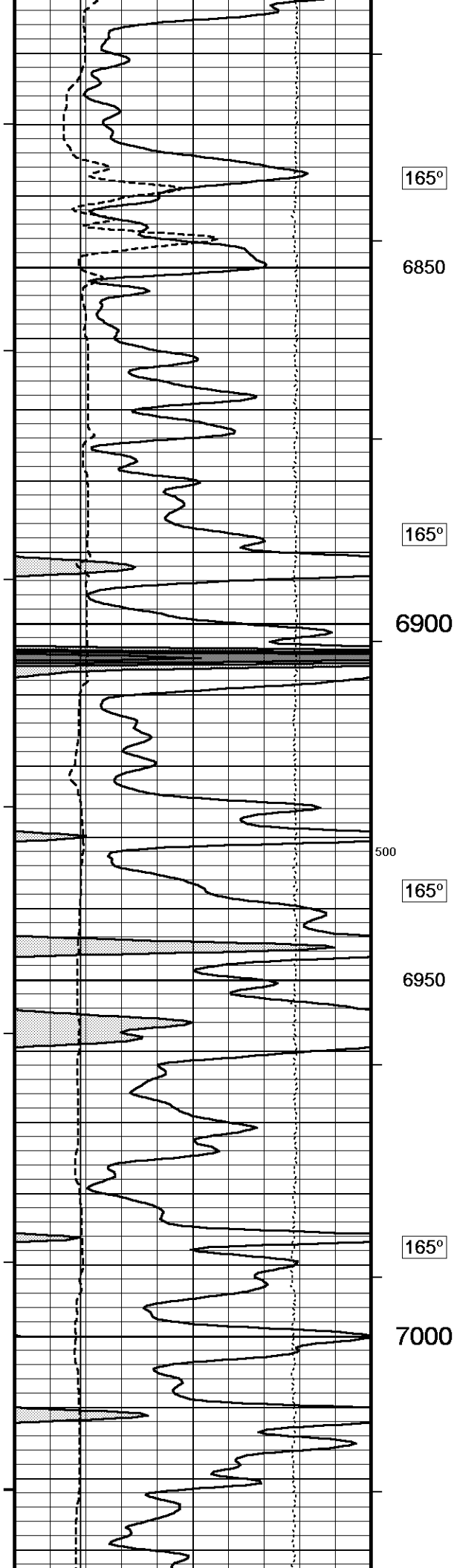
PE

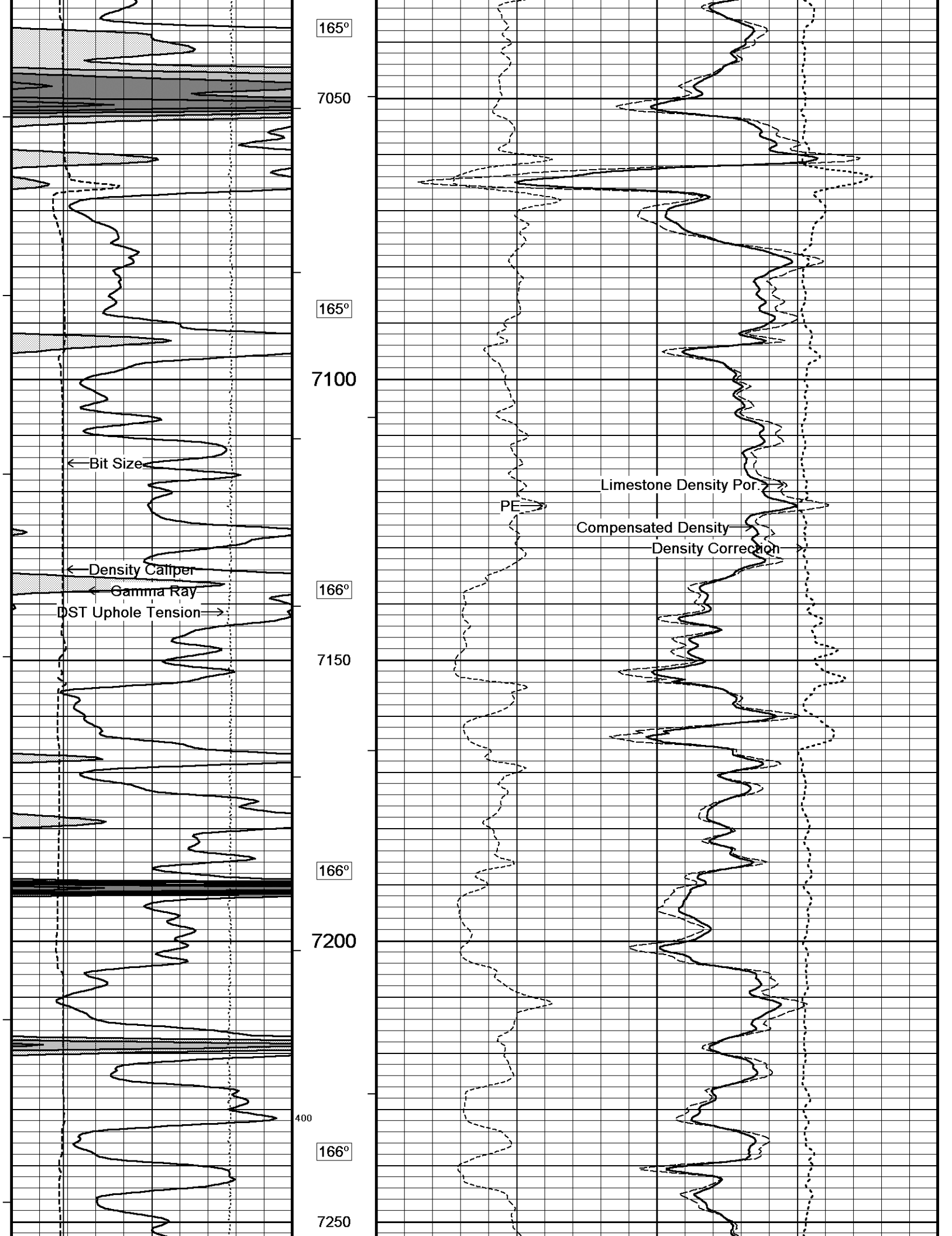
Compensated Density

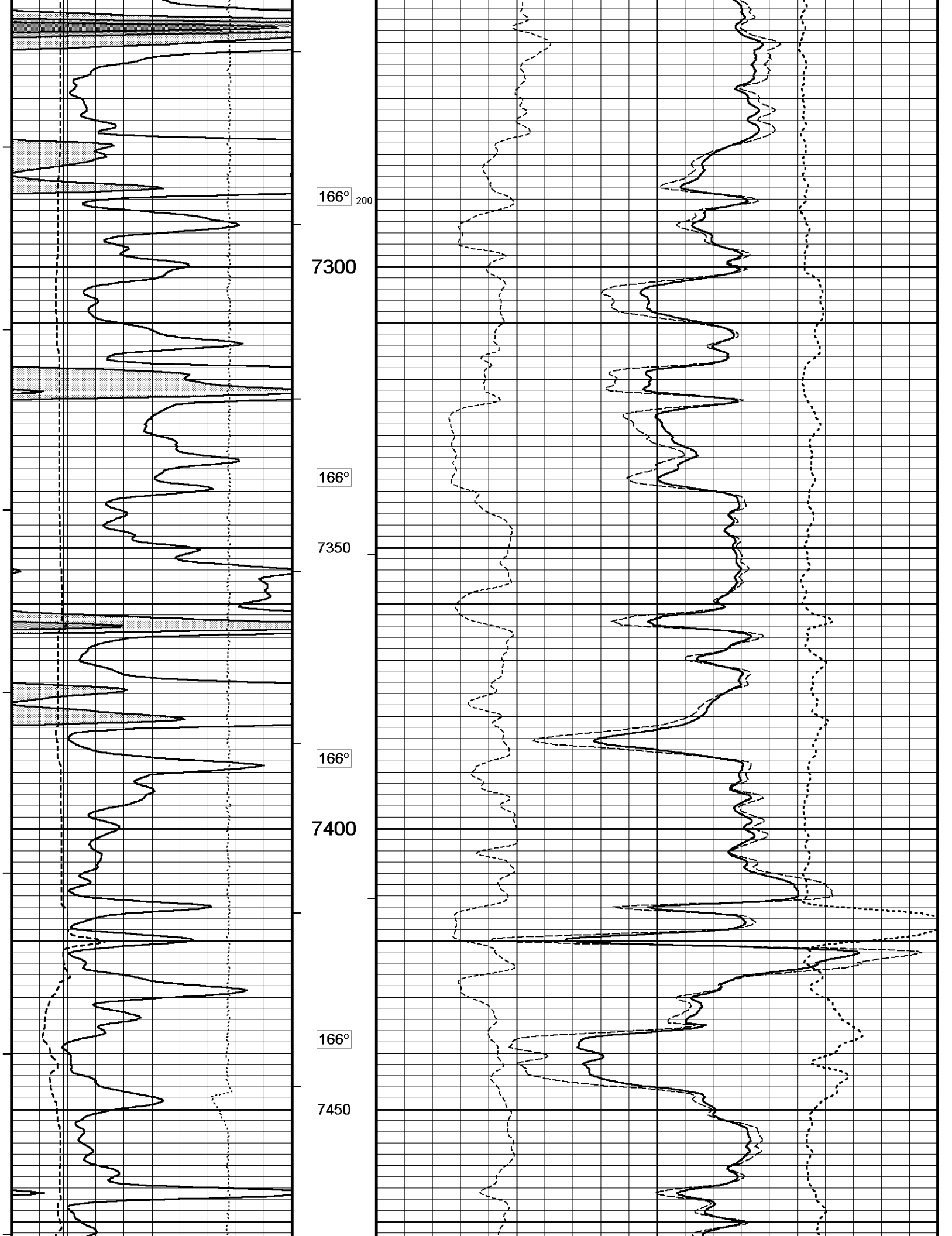
Density Correction

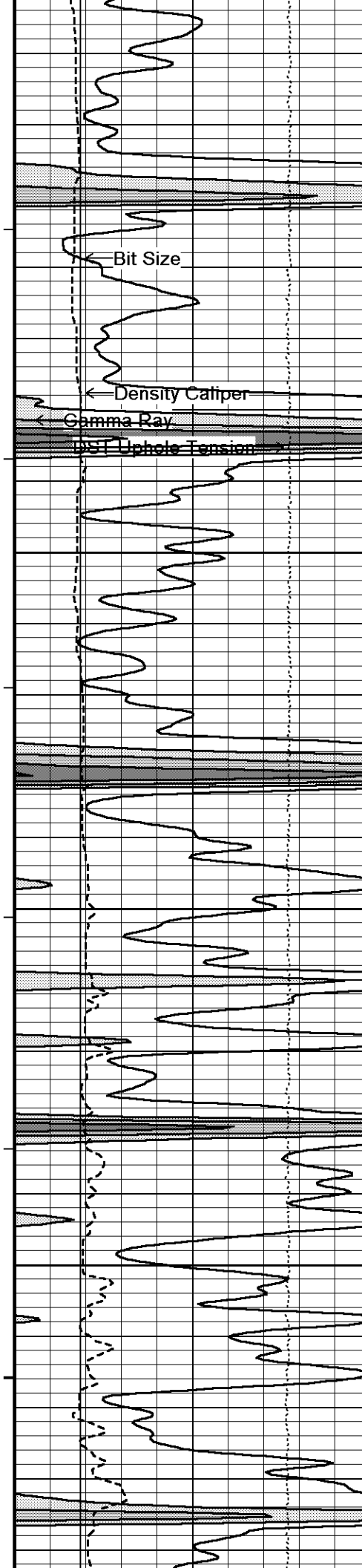




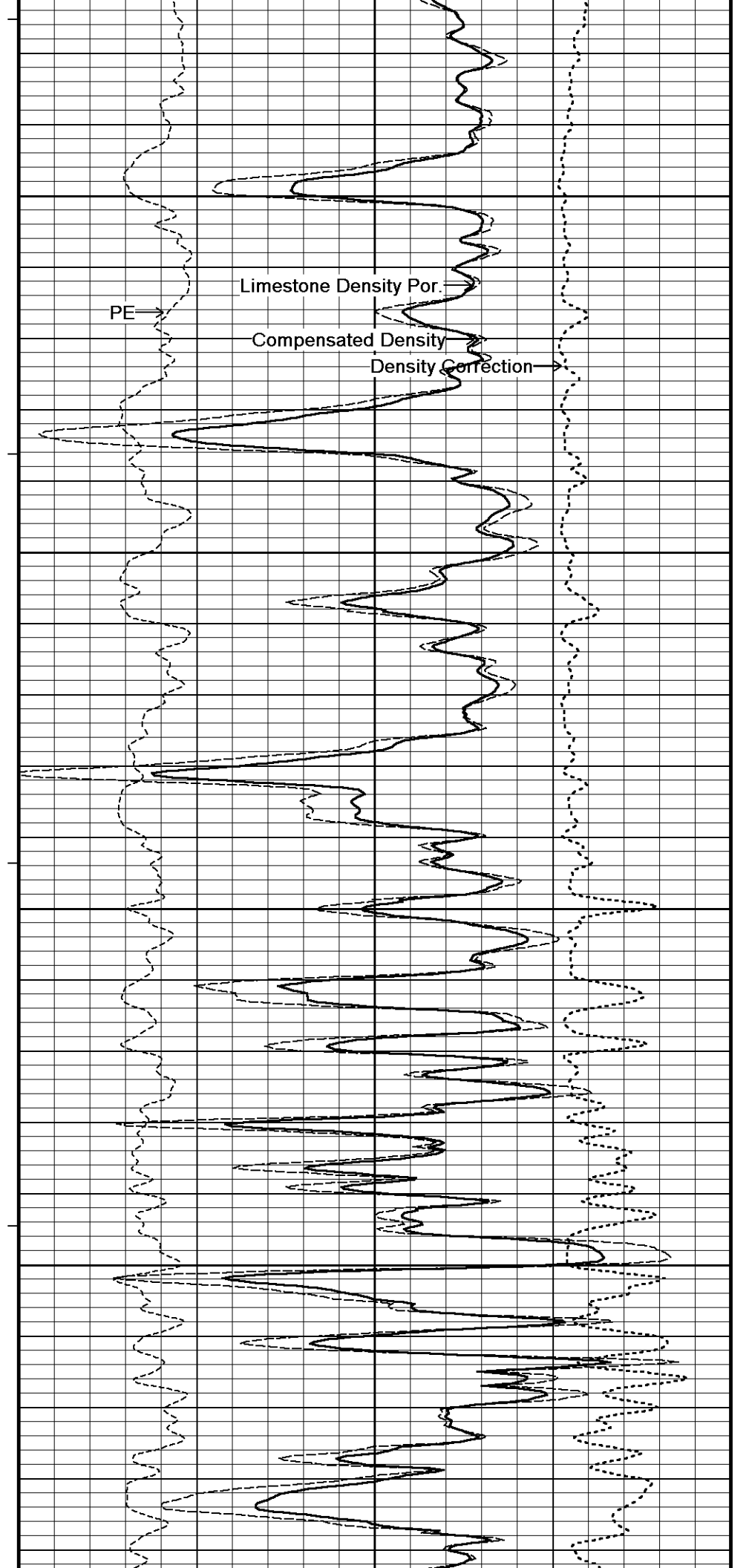


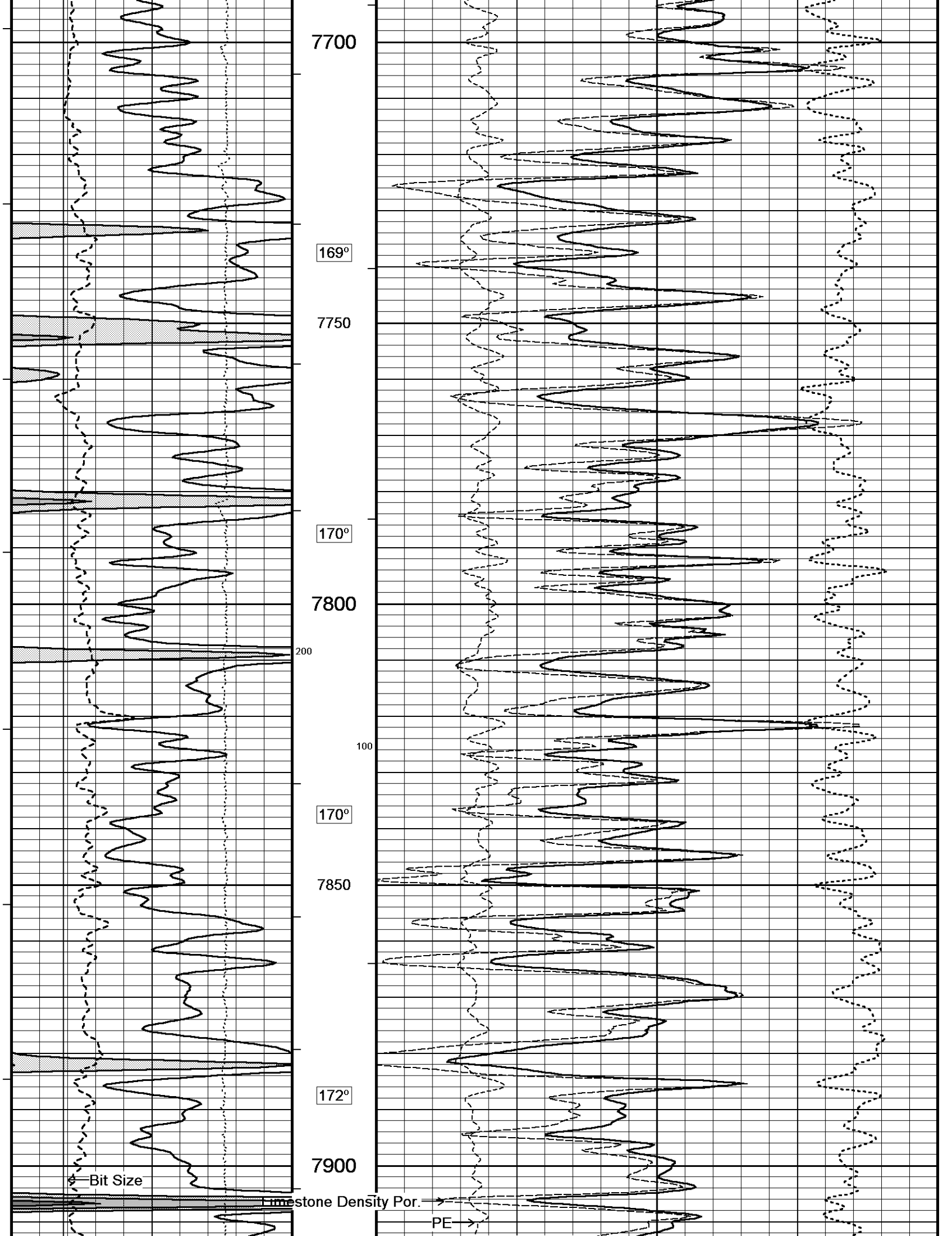






167°
7500
300 168°
7550
168°
7600
169°
7650
169°





7700

169°

7750

170°

7800

200

170°

7850

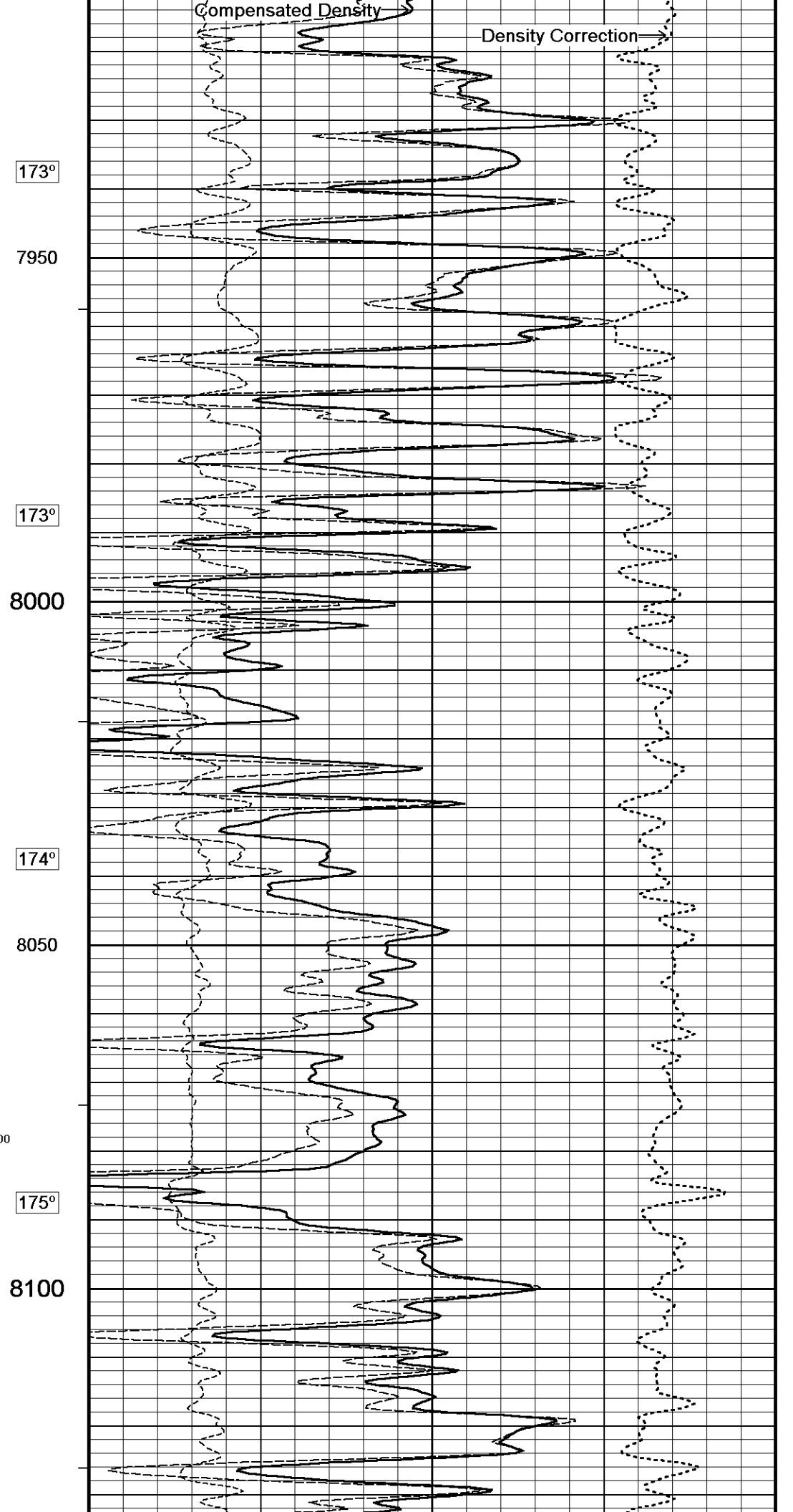
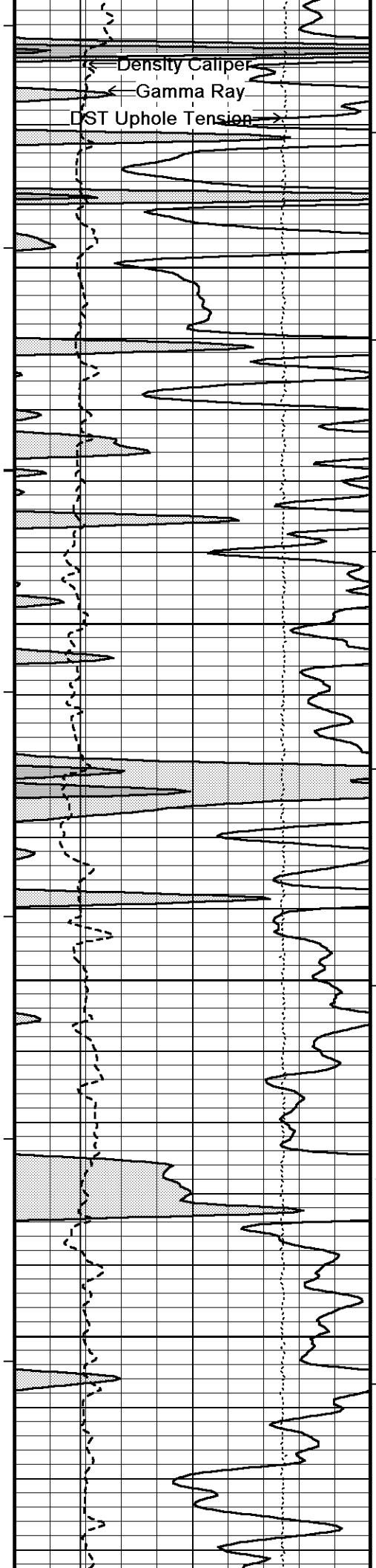
172°

7900

Bit Size

Limestone Density Por.

PE



173°

7950

173°

8000

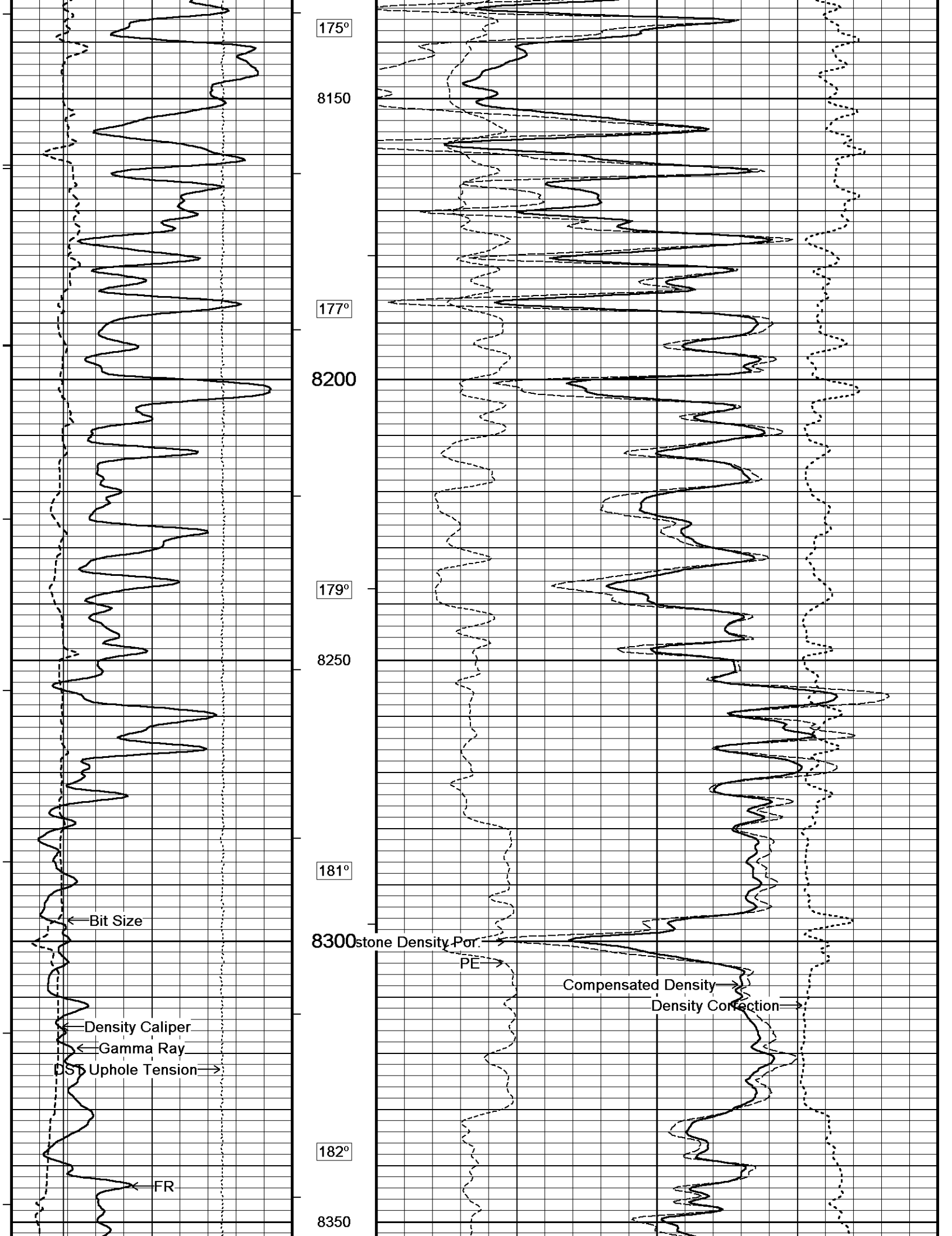
174°

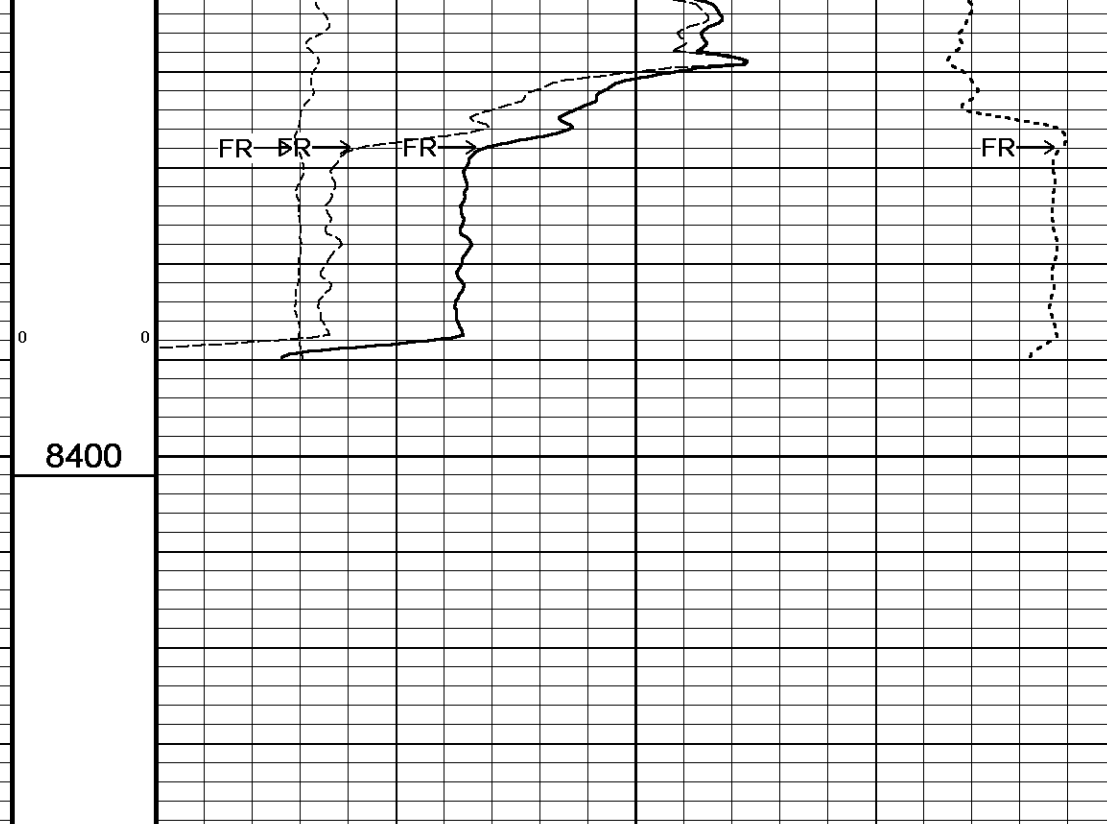
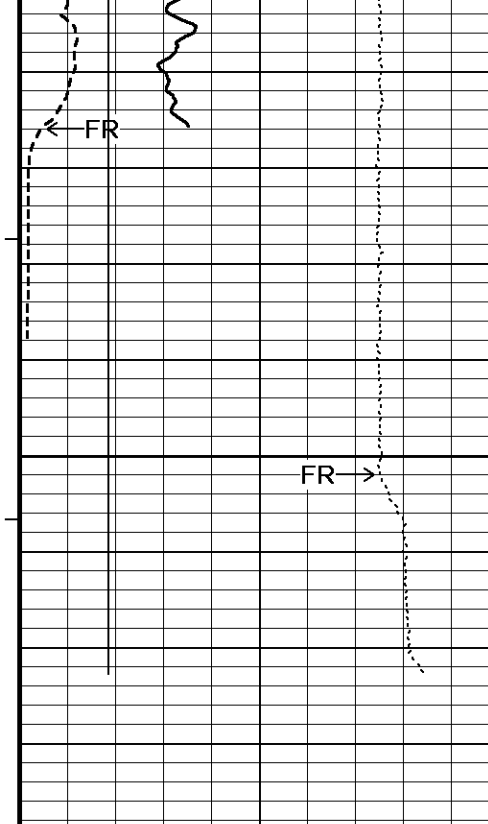
8050

100

175°

8100





Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

8400

Depth
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
2 2.25 2.50 2.75 3

Limestone Density Por.
percent
30 20 10 0 -10

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

REPEAT SECTION

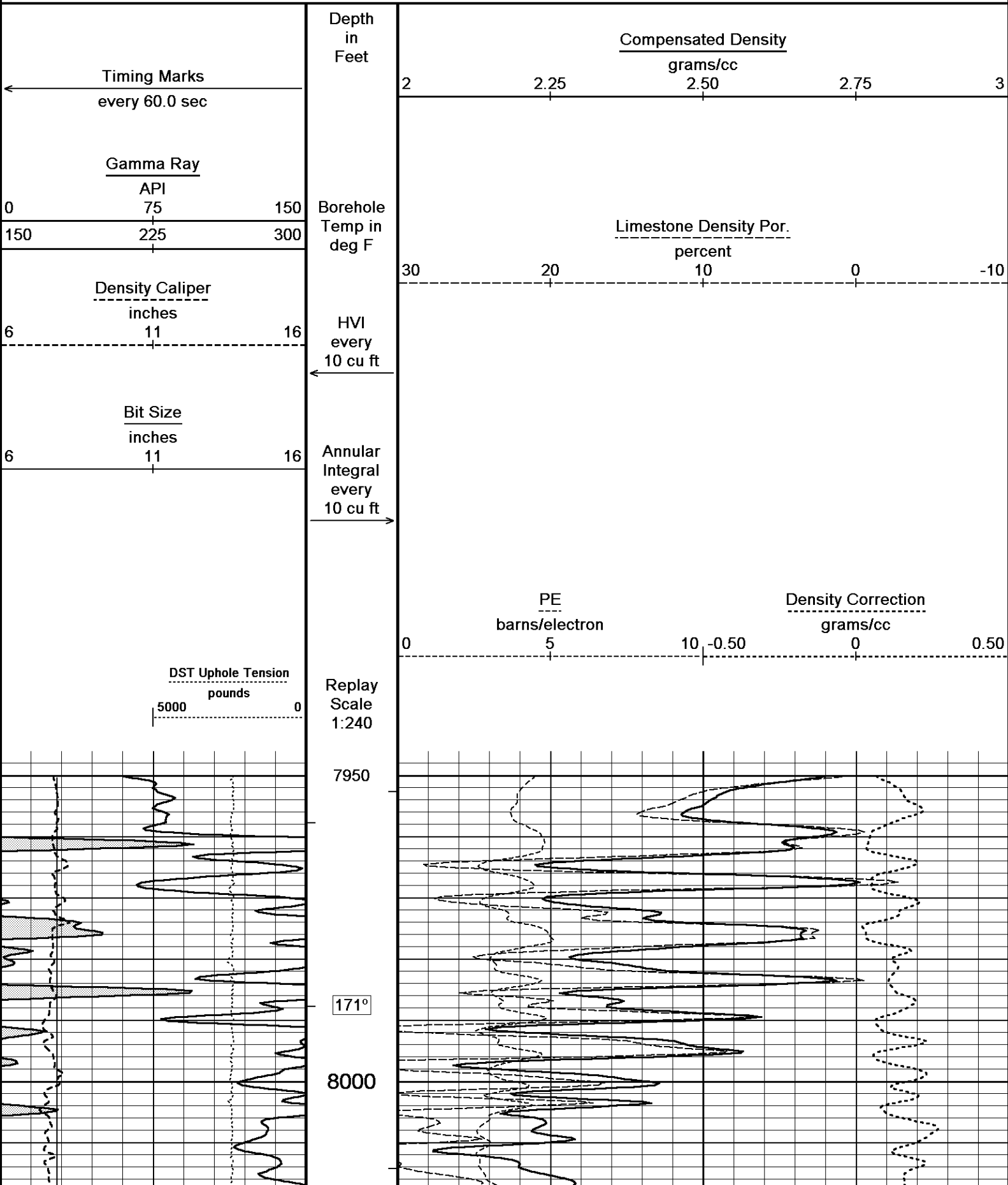
Depth Based Data - Maximum Sampling Increment 10.0cm

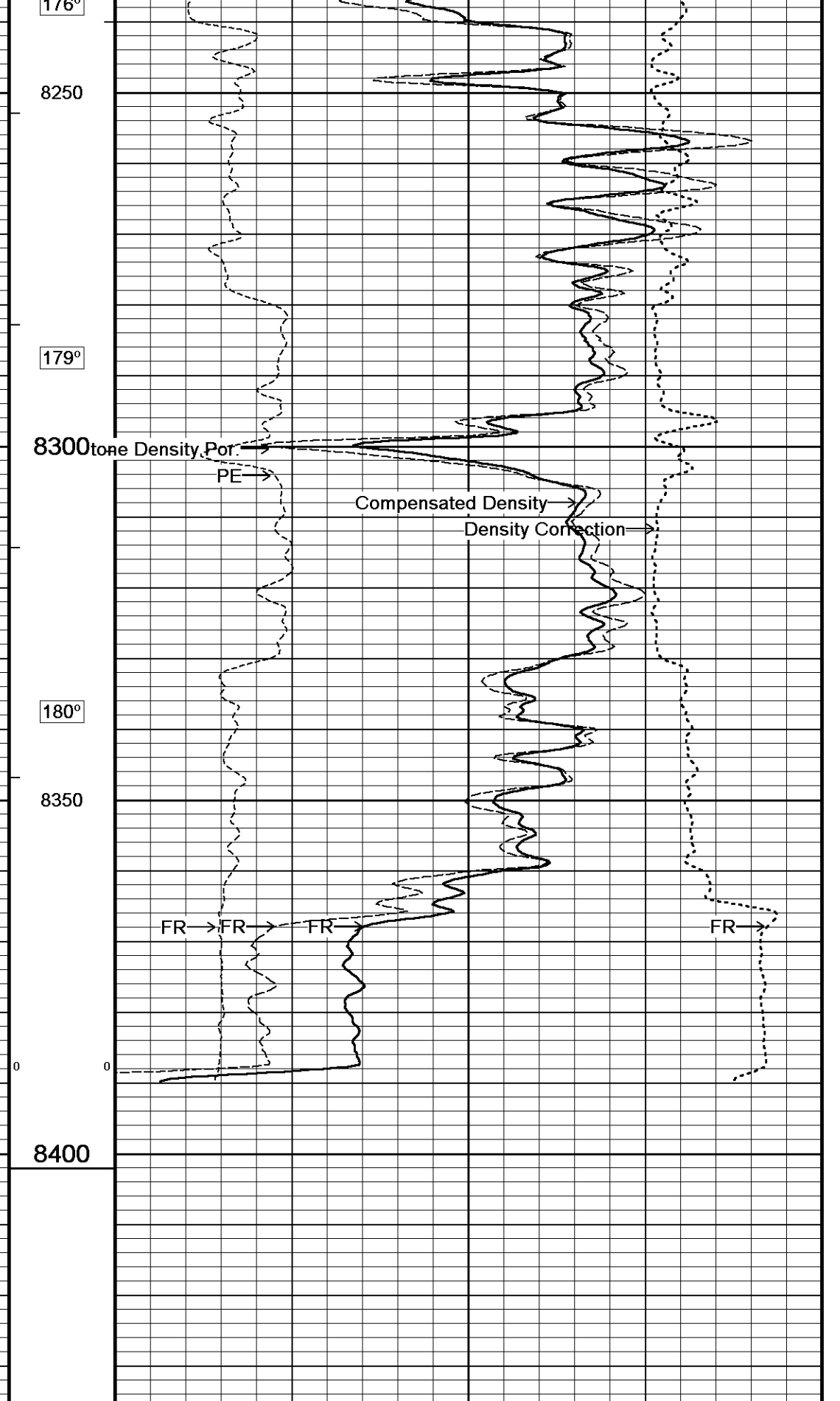
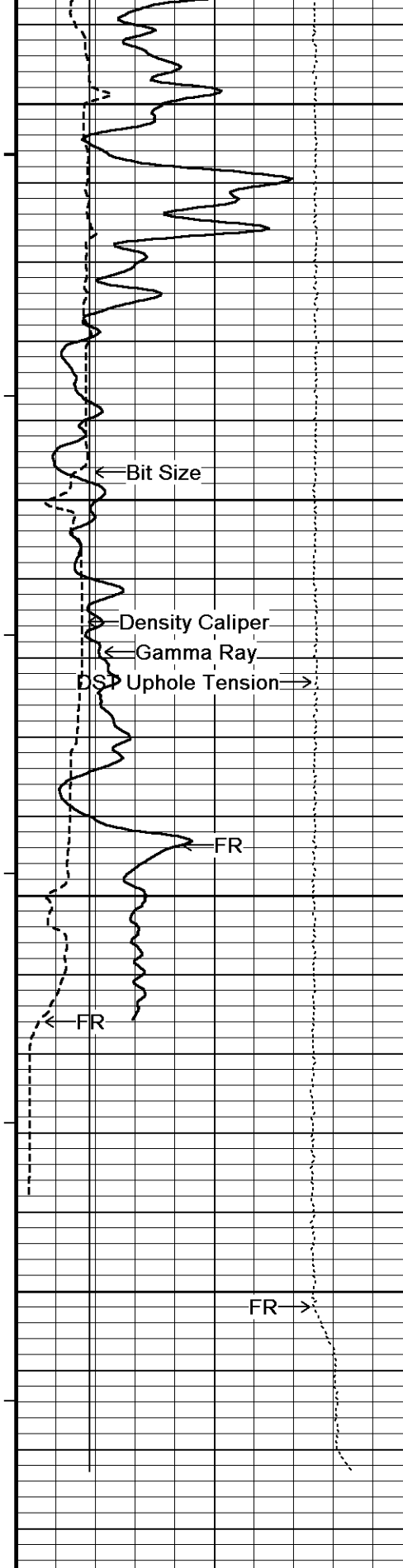
Plotted on 09-DEC-2018 13:03

Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_002.dta

Recorded on 09-DEC-2018 07:23

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344



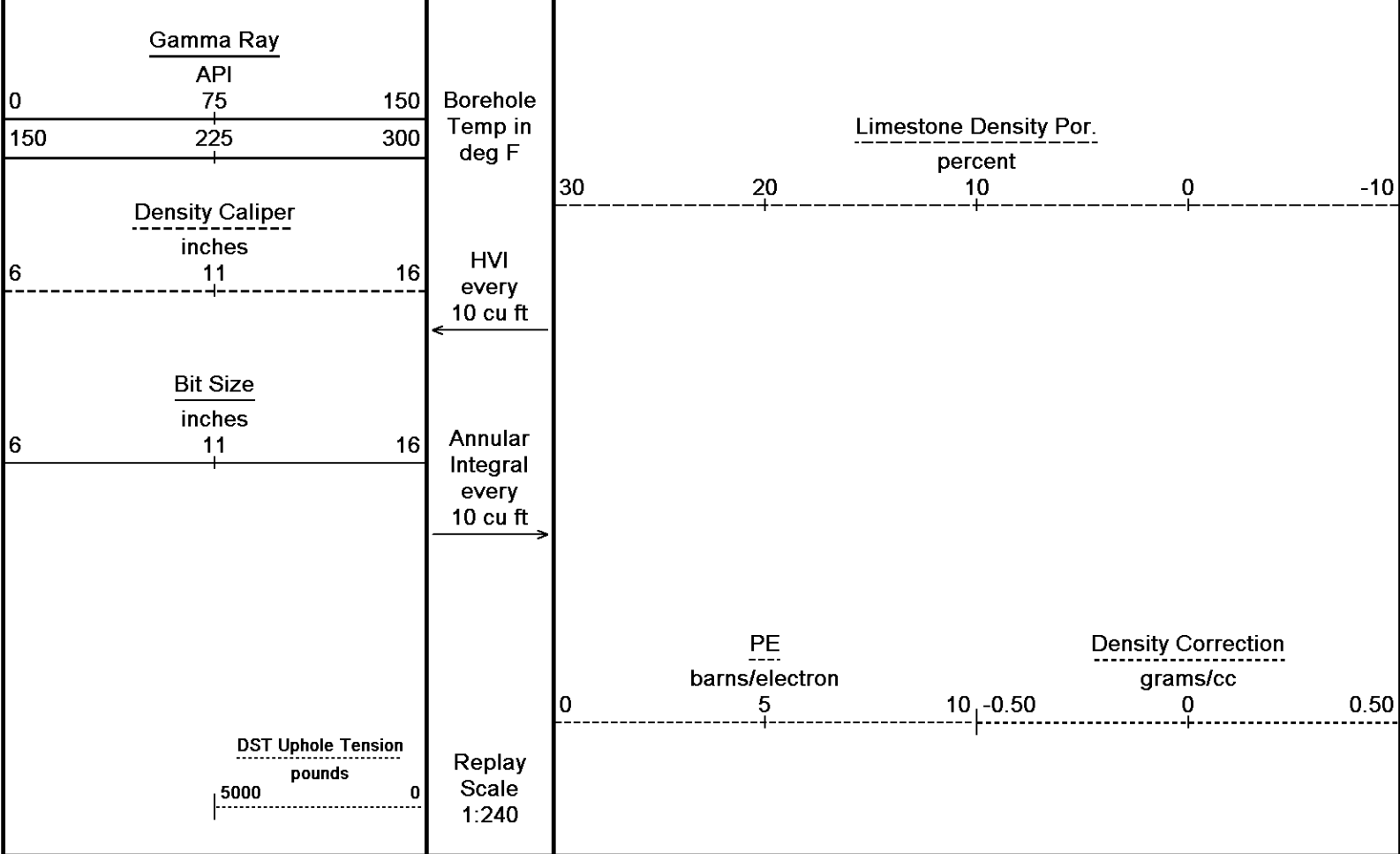


Depth
in
Feet

Compensated Density
grams/cc

Timing Marks
every 60.0 sec

2 2.25 2.50 2.75 3



Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 09-DEC-2018 13:03
 Filename: C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_002.dta
 Recorded on 09-DEC-2018 07:23
 System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 18.03.9344\Data\Murfin Red Poll #8-21\Murfin Red Poll #8-21_002.dta

General Constants All 000 Last Edited on 09-DEC-2018,06:28

General Parameters
 Mud Resistivity 1.150 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

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 07-DEC-2018,13:43

	Measured	Calibrated (API)
Background	106	74
Calibrator (Gross)	758	530
Calibrator (Net)	652	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio	1.40	1.475	1.55	Counts/API
1.430	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Gamma Constants MCG-D.K 443

Last Edited on 08-DEC-2018,00:26

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	
K Mud Concentration	0.00	%

Caliper Calibration MPD-C.A 216

Base Calibration on 04-DEC-2018 12:24

Field Calibration on 07-DEC-2018 12:57

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	15599	3.99
2	24289	5.98
3	32989	7.97
4	41250	9.86
5	50464	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.92	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	7.57	7.97	8.37	in
7.92	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Photo Density Calibration MPD-C.A 216

Base Calibration on 04-DEC-2018 12:43

Field Check on 07-DEC-2018 13:02

Density Calibration				
Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	996	1188		
Reference 1	49174	23910	59556	30836
Reference 2	19716	2252	24941	2541

Field Check at Base	996.3	1187.9
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Field Check	1001.3	1190.0
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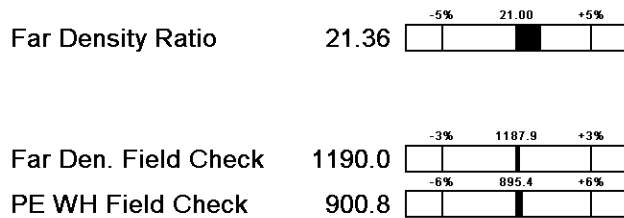
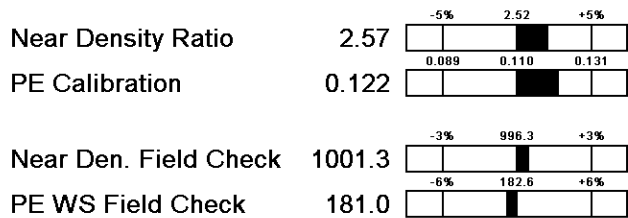
PE Calibration

Base Calibration				
	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	183	895		
Reference 1	20502	49024	0.422	0.371
Reference 2	5636	19607	0.291	0.272

Field Check at Base	182.6	895.4
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Field Check	181.0	900.8
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Photo Density Calibration Tolerances MPD-C.A 216



Density Constants MPD-C.A 216

Last Edited on 08-DEC-2018,00:25

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 Red Poll #8-21\Murfin Red Poll #8-21_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

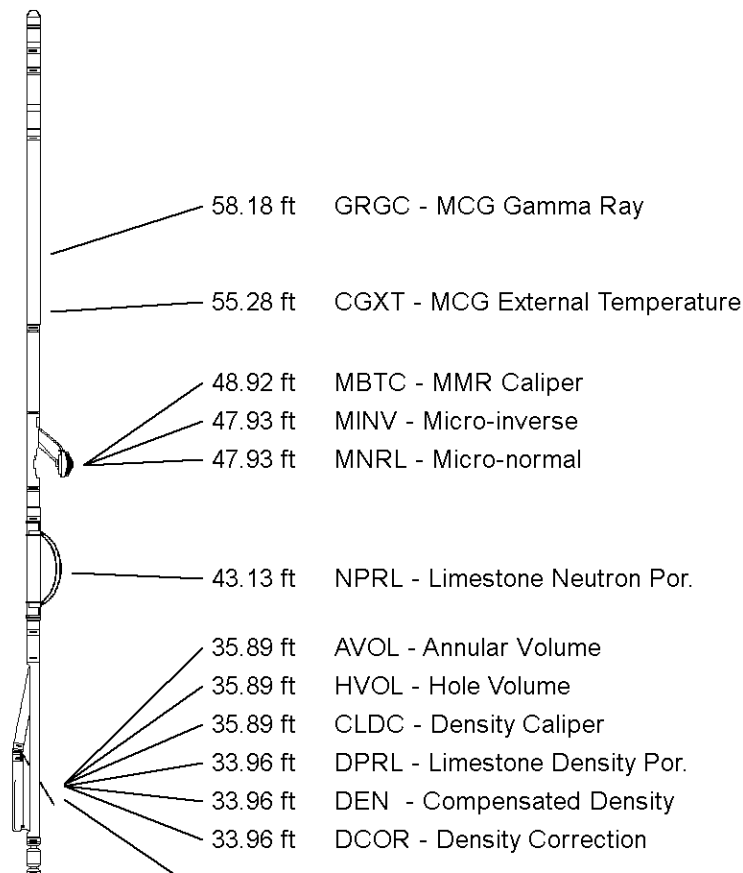
Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

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

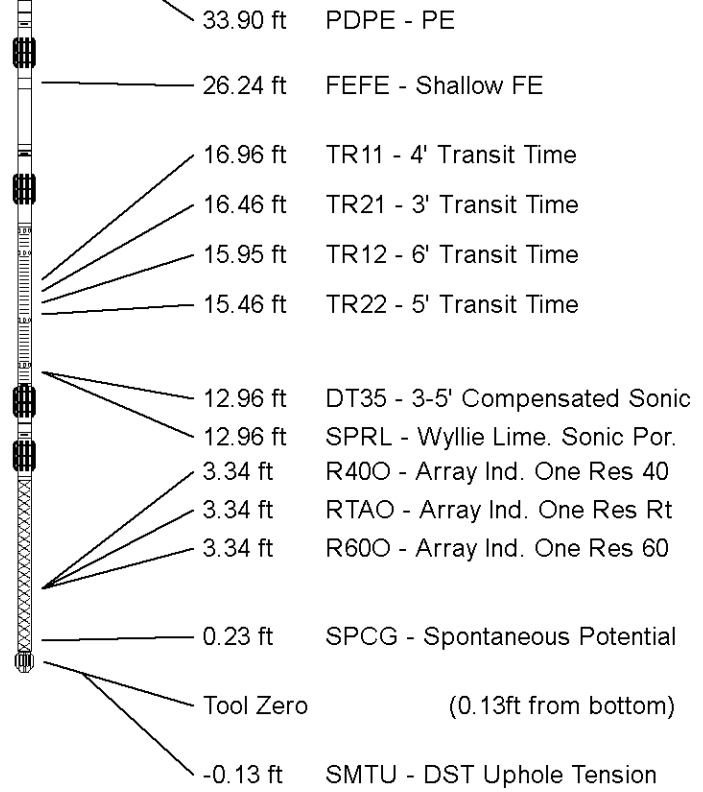


Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

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	RED POLL #8-21
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5502	feet	First Reading	8368.00	feet
Elevation Drill Floor	5500	feet	Depth Driller	8400.00	feet
Elevation Ground Level	5489	feet	Depth Logger	8402.00	feet



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COMPENSATED NEUTRON
MICRORESISTIVITY LOG