



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY		GRAND MESA OPERATING COMPANY			
WELL		OBRIEN #1-9			
FIELD		WILDCAT			
PROVINCE/COUNTY LANE					
COUNTRY/STATE		U.S.A. / KANSAS			
LOCATION		2225' FSL & 2305' FEL			
SEC 9	TWP 16S	RGE 29W	Other Services		MSS
Latitude		MAI/MFE			
Longitude					
API Number		15-101-22619			
Permanent Datum GL, Elevation 2656 feet					Elevations: KB 2661.00 DF 2659.00 GL 2656.00
Log Measured From KB, 5.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	12-DEC-2018				
Run Number	ONE				
Service Order	4558-231823318				
Depth Driller	4520.00			feet	
Depth Logger	4521.00			feet	
First Reading	4487.00			feet	
Last Reading	219.00			feet	
Casing Driller	219.00			feet	
Casing Logger	219.00			feet	
Bit Size	7.875			inches	
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.30 lb/USg		52.00 CP		
PH / Fluid Loss	10.00		7.20 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.27 @ 75.0			ohm-m	
Rmf @ Measured Temp	1.02 @ 75.0			ohm-m	
Rmc @ Measured Temp	1.52 @ 75.0			ohm-m	
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.81 @117.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	117.00			deg F	
Equipment / Base	13096		LIB		
Recorded By	ADAM SILL				
Witnessed By	GARET DINKEL				

BOREHOLE RECORD

Last Edited: 12-DEC-2018 16:55

Bit Size inches	Depth From feet	Depth To feet
7.875	219.00	4520.00

CASING RECORD

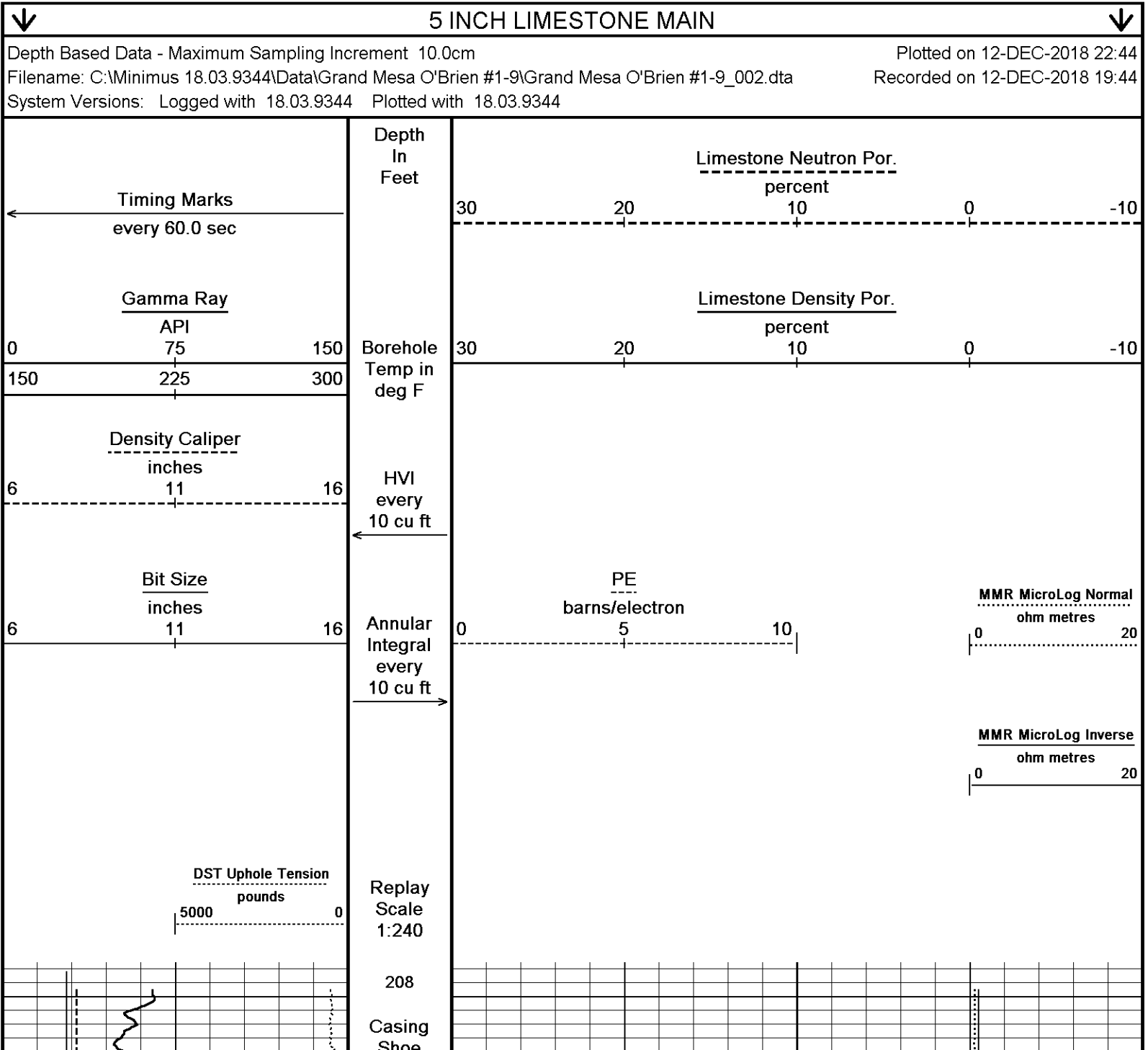
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	219.00	24.00

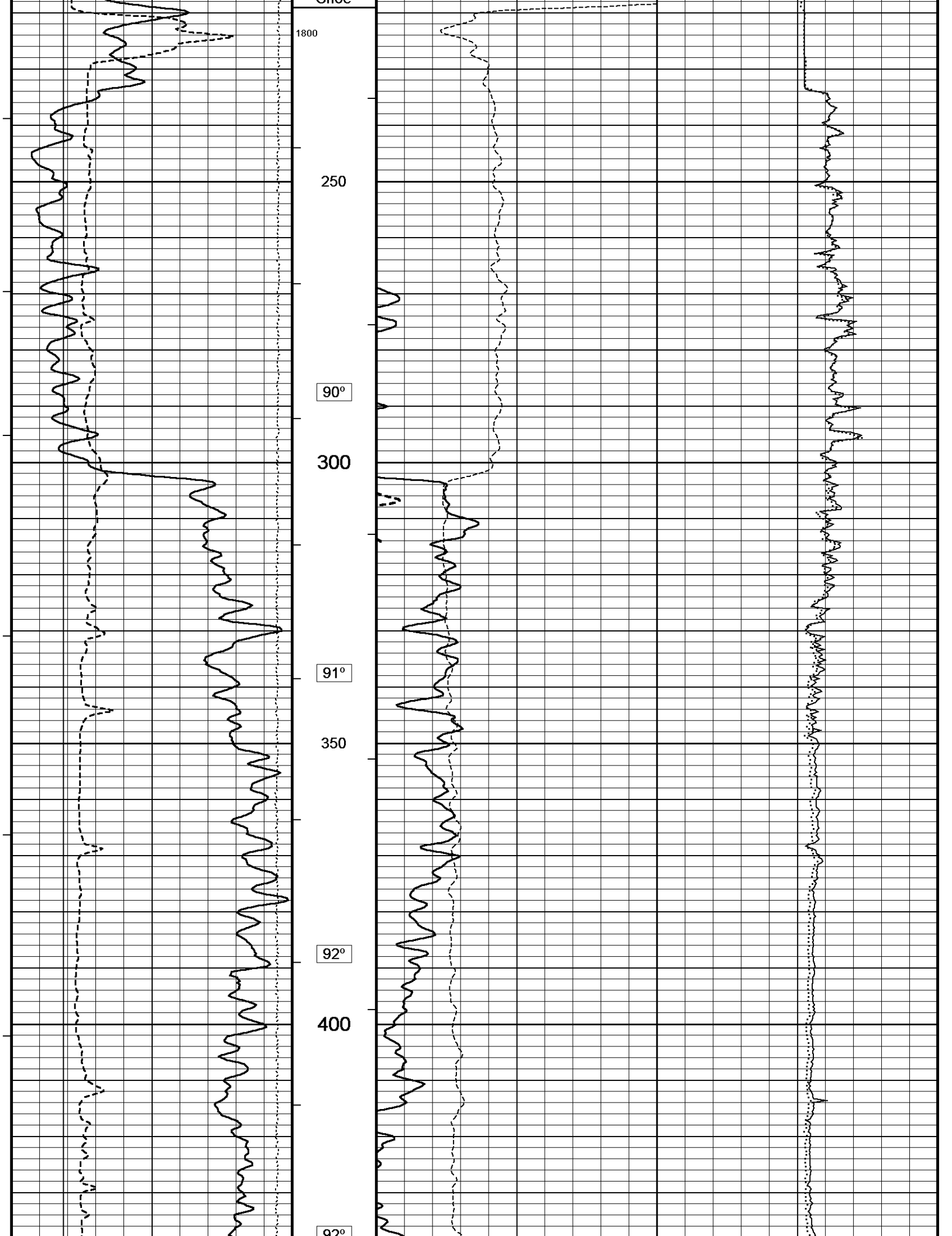
REMARKS

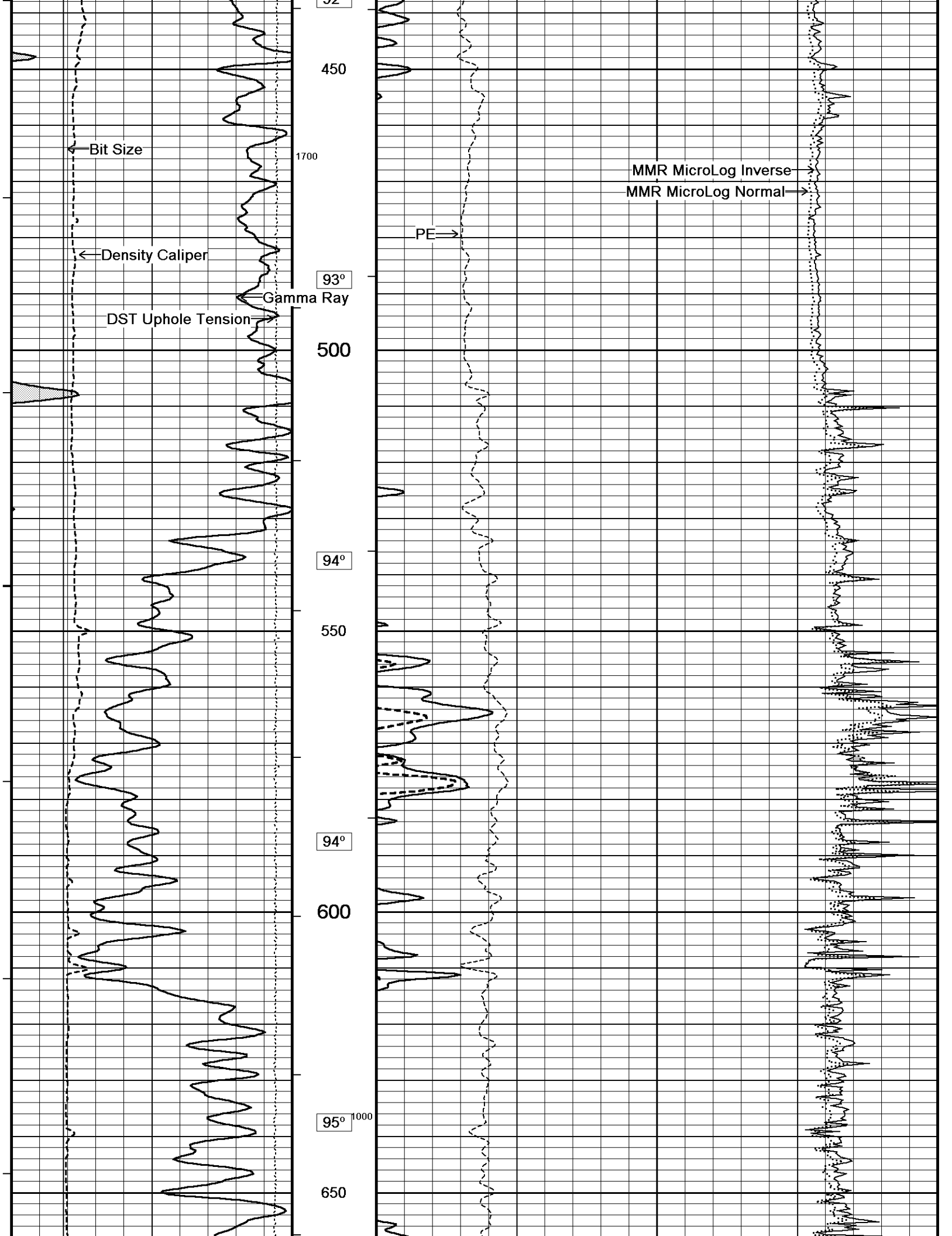
- SOFTWARE ISSUE: WLS 18.03.9344.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE 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: 1802 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1096 CU.FT.

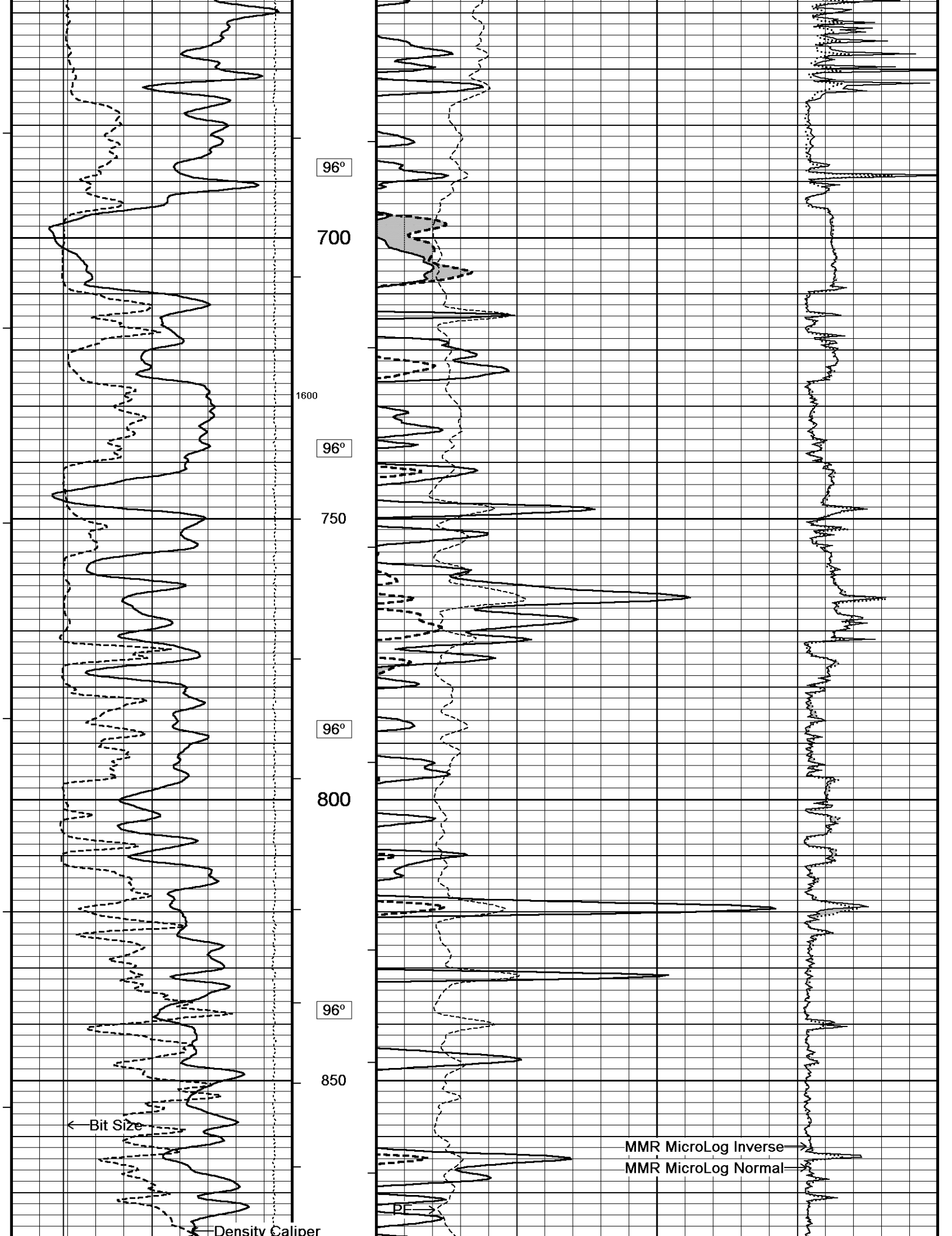
- RIG: WW DRILLING #2.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR, B. COPELAND.

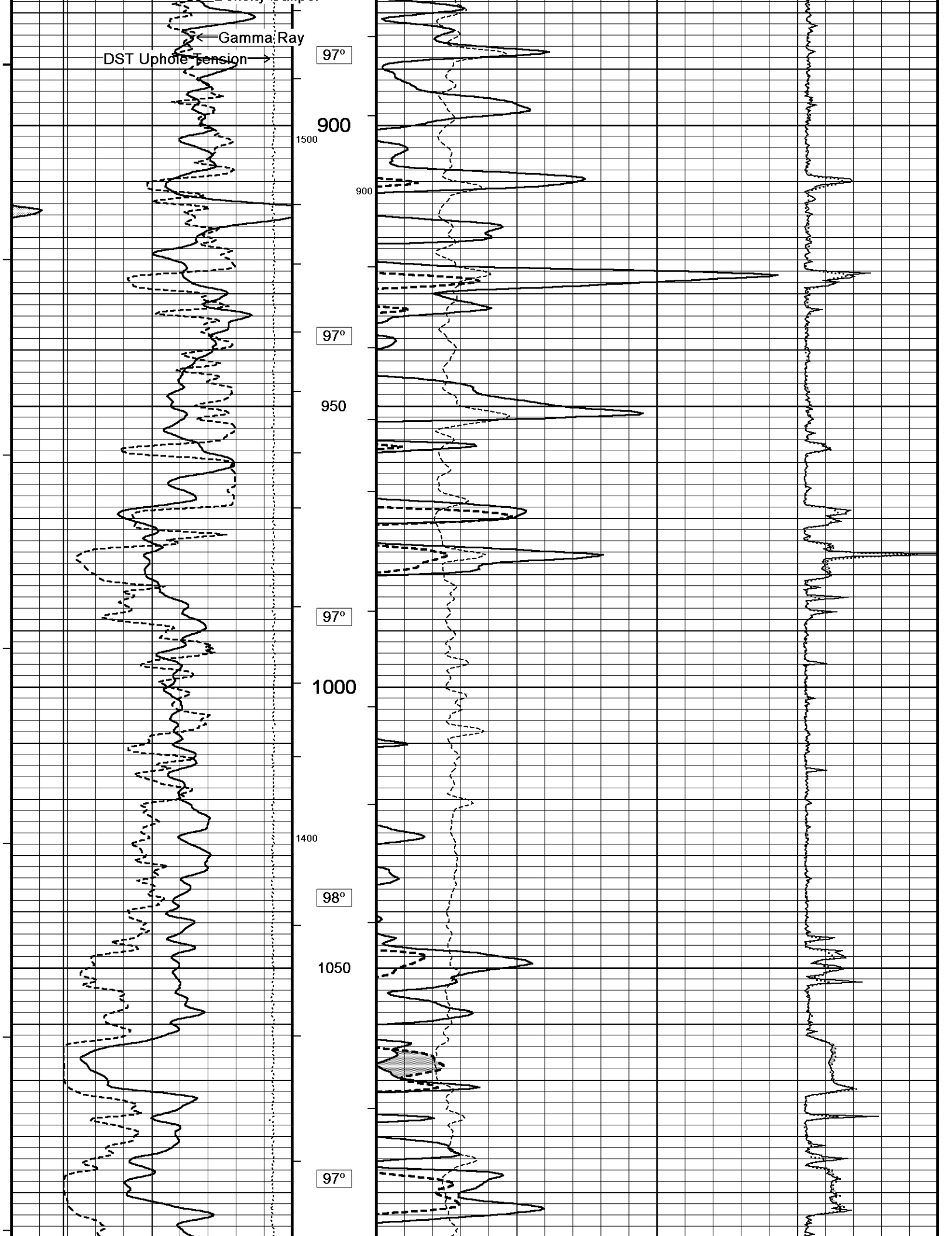
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

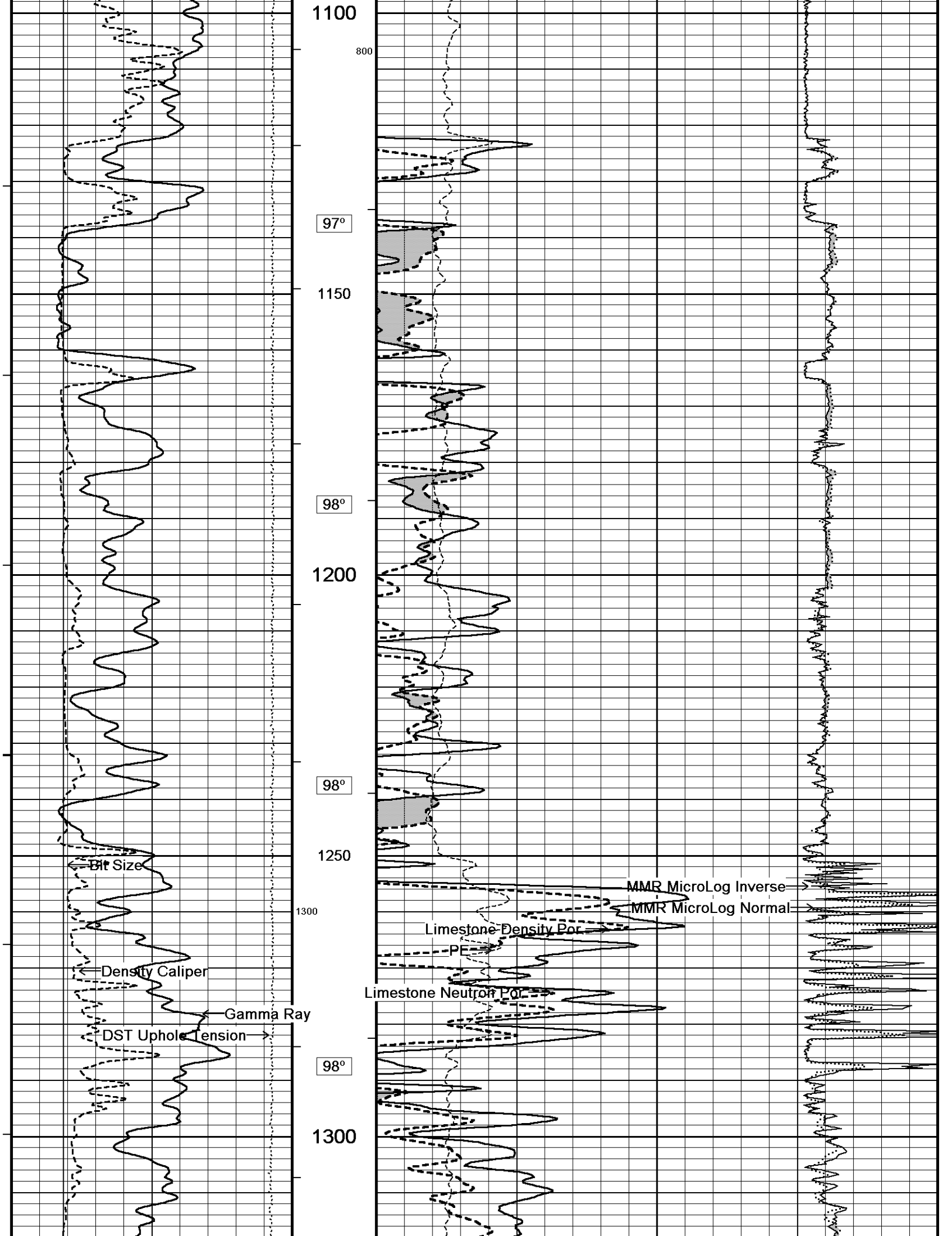


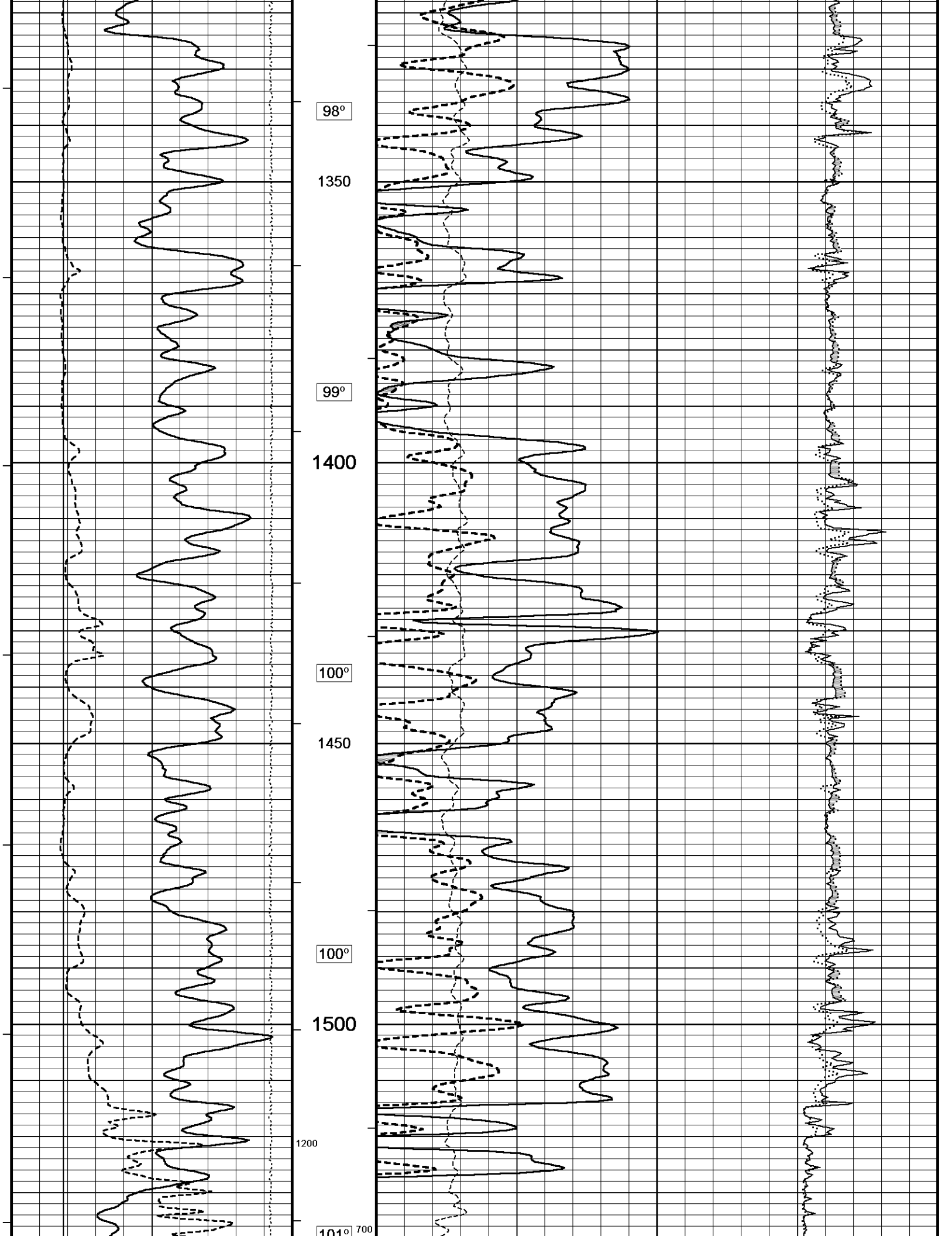


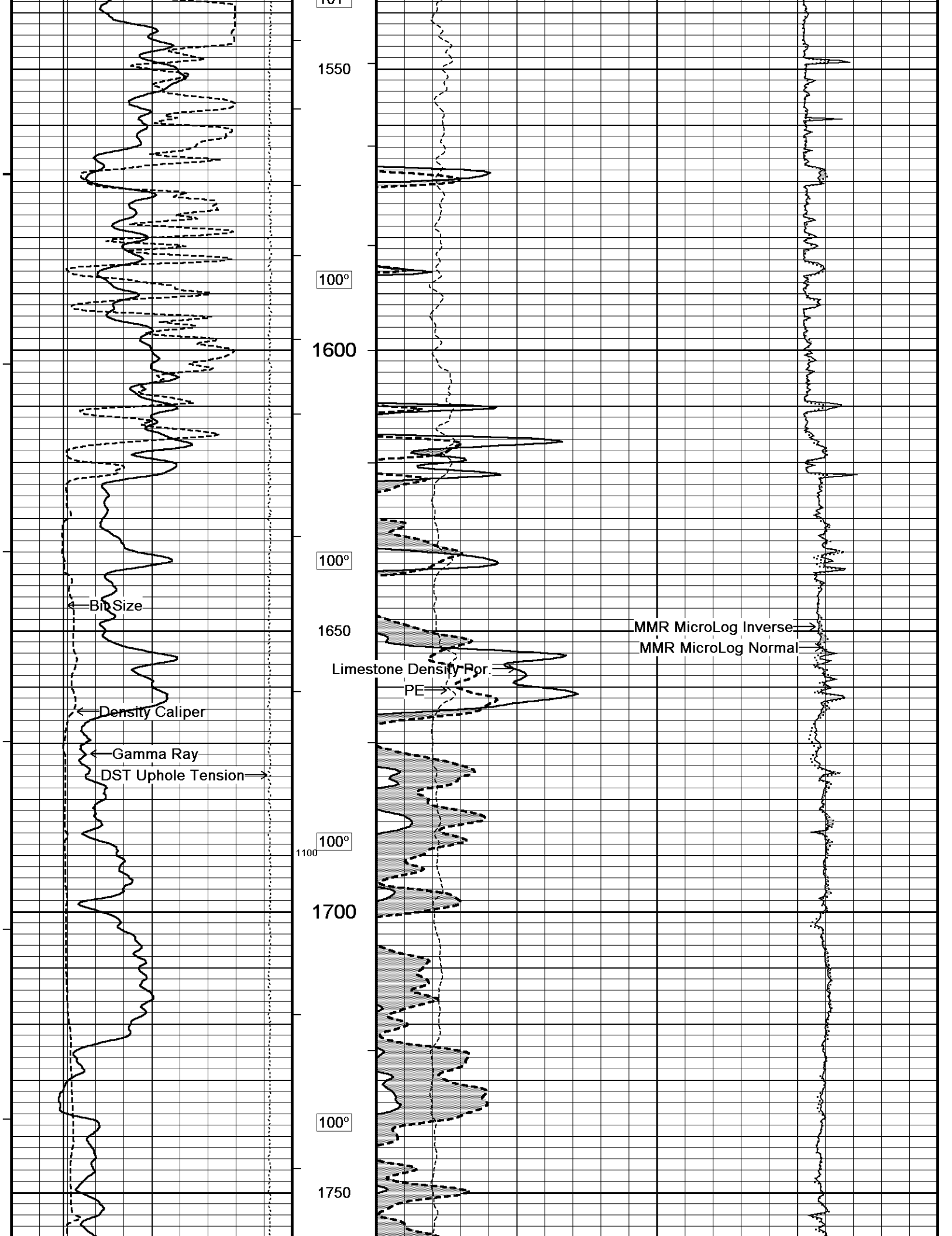


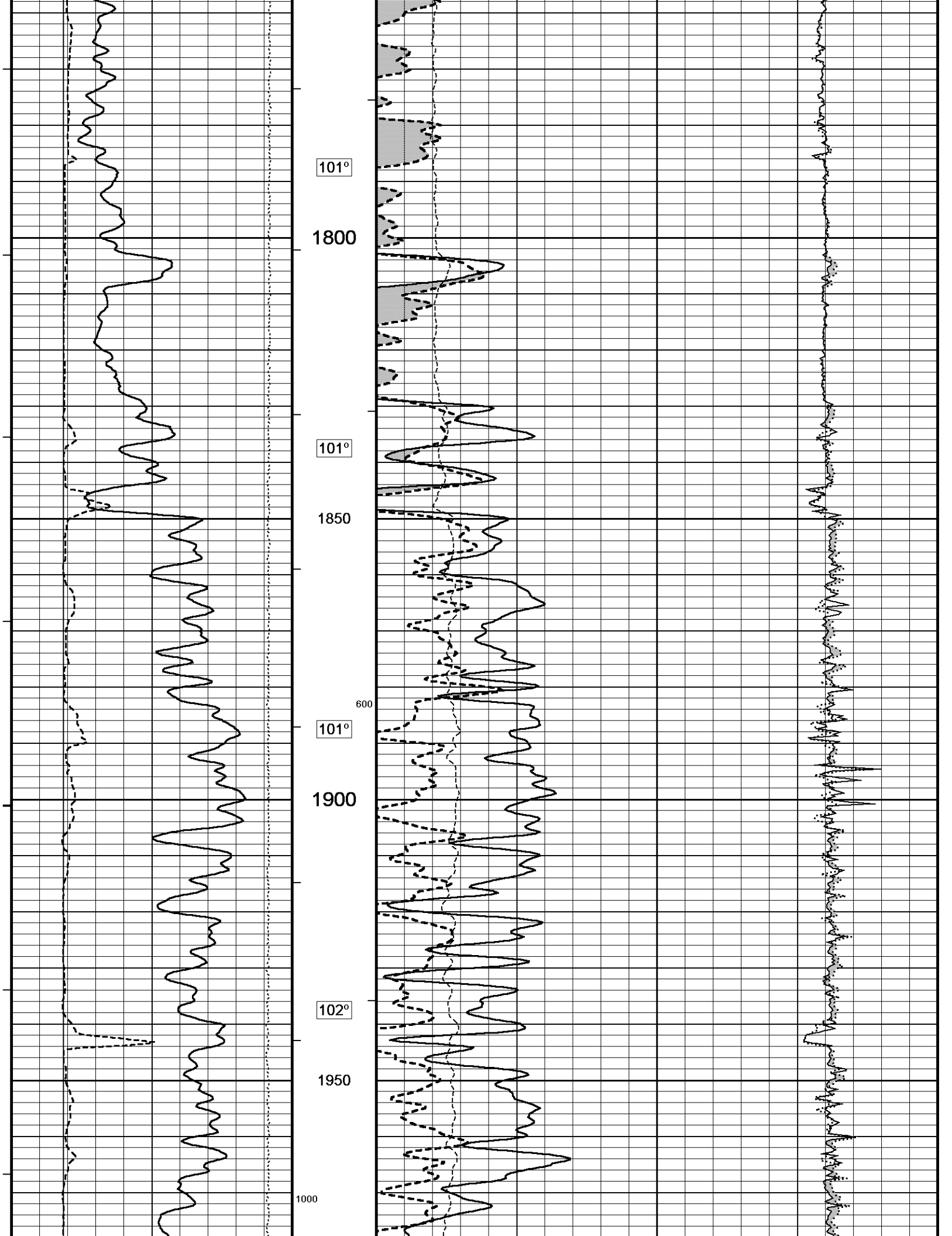


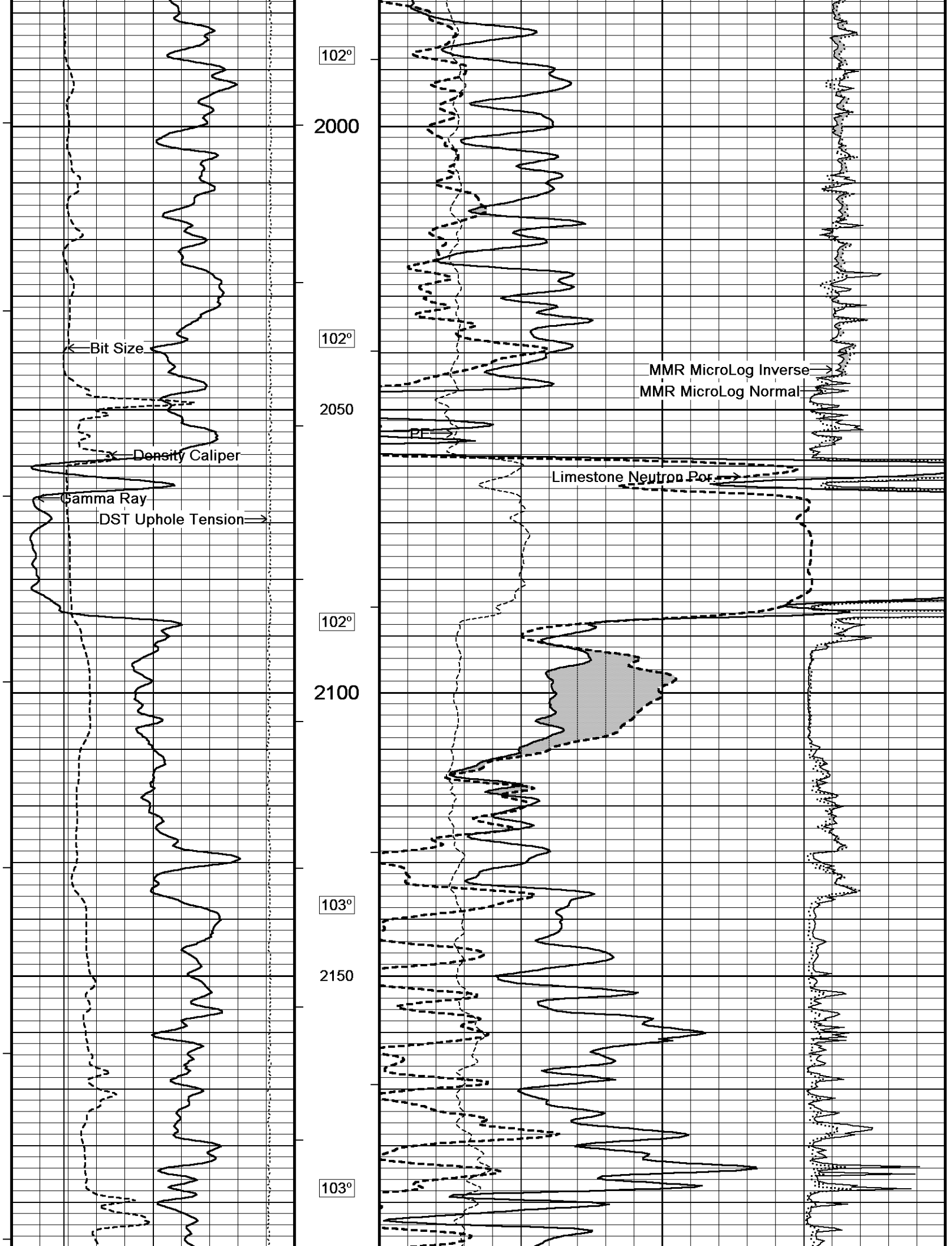


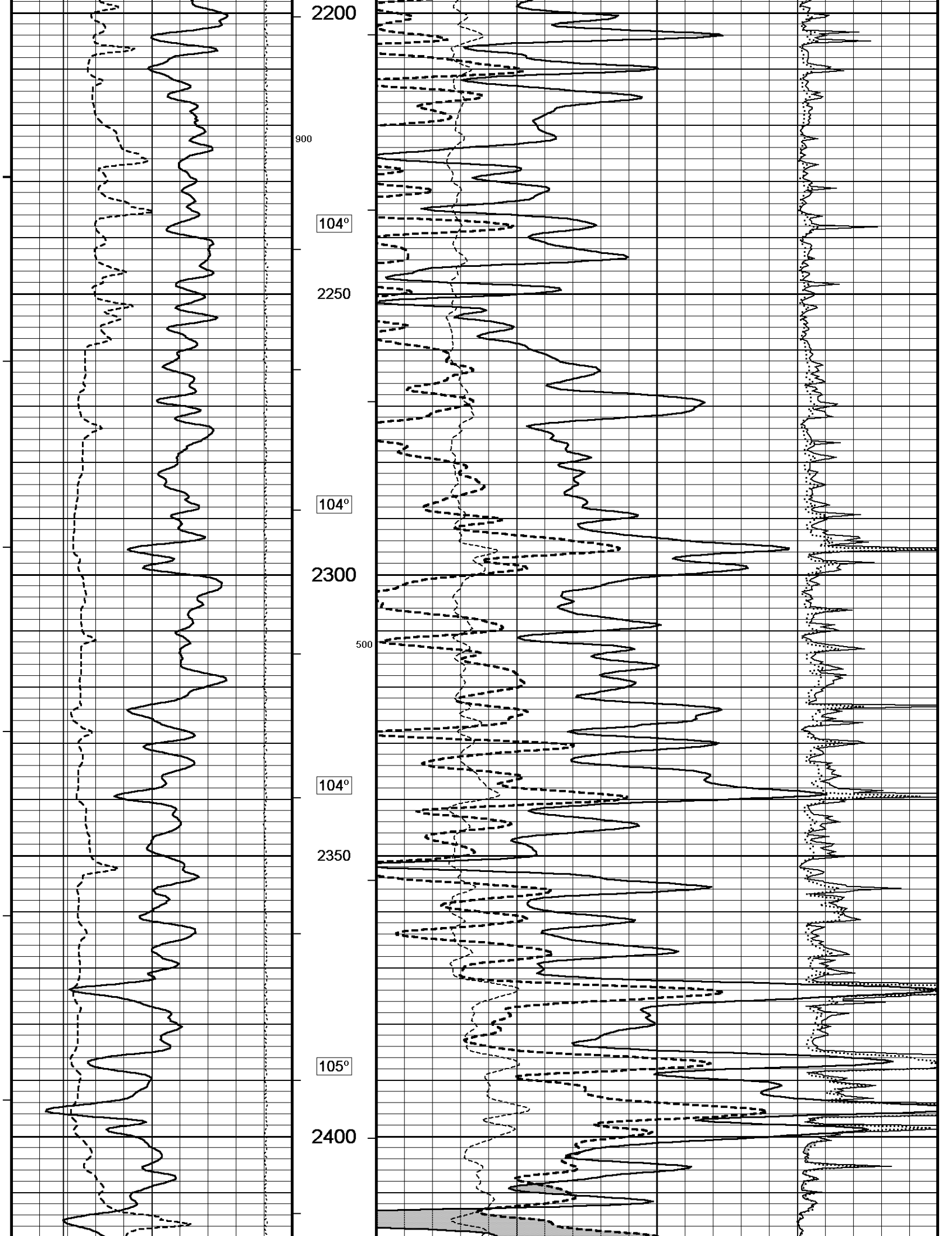


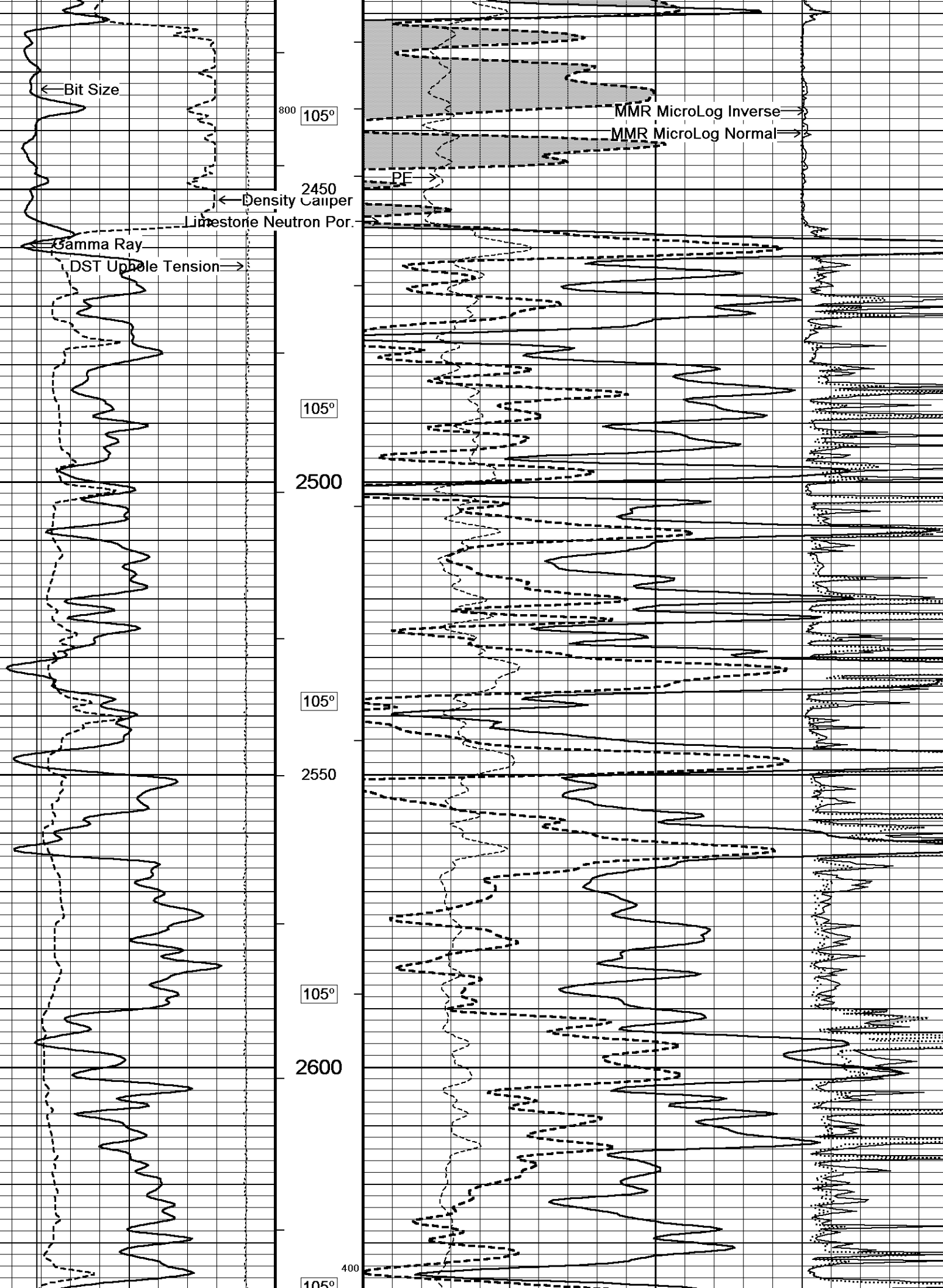


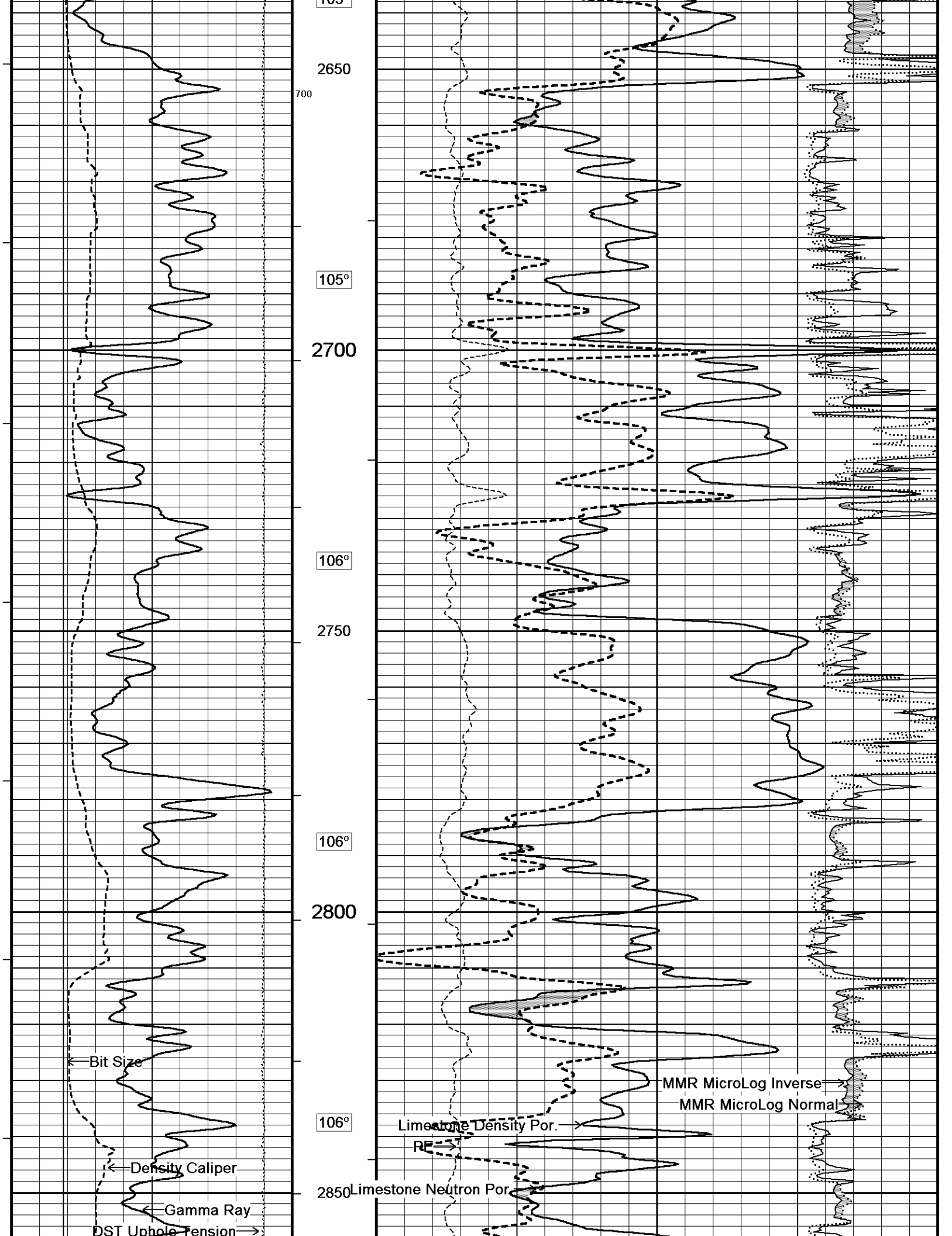


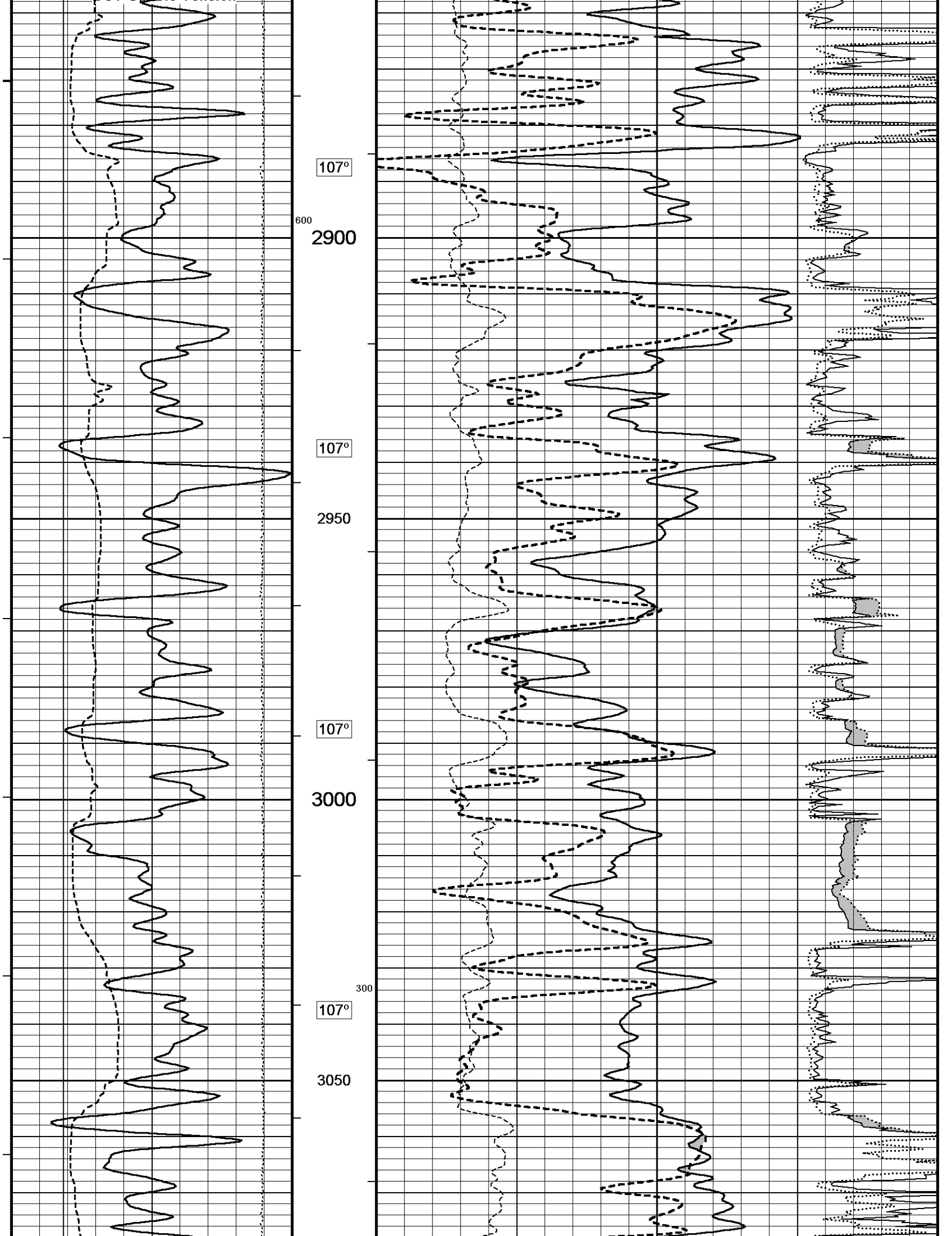


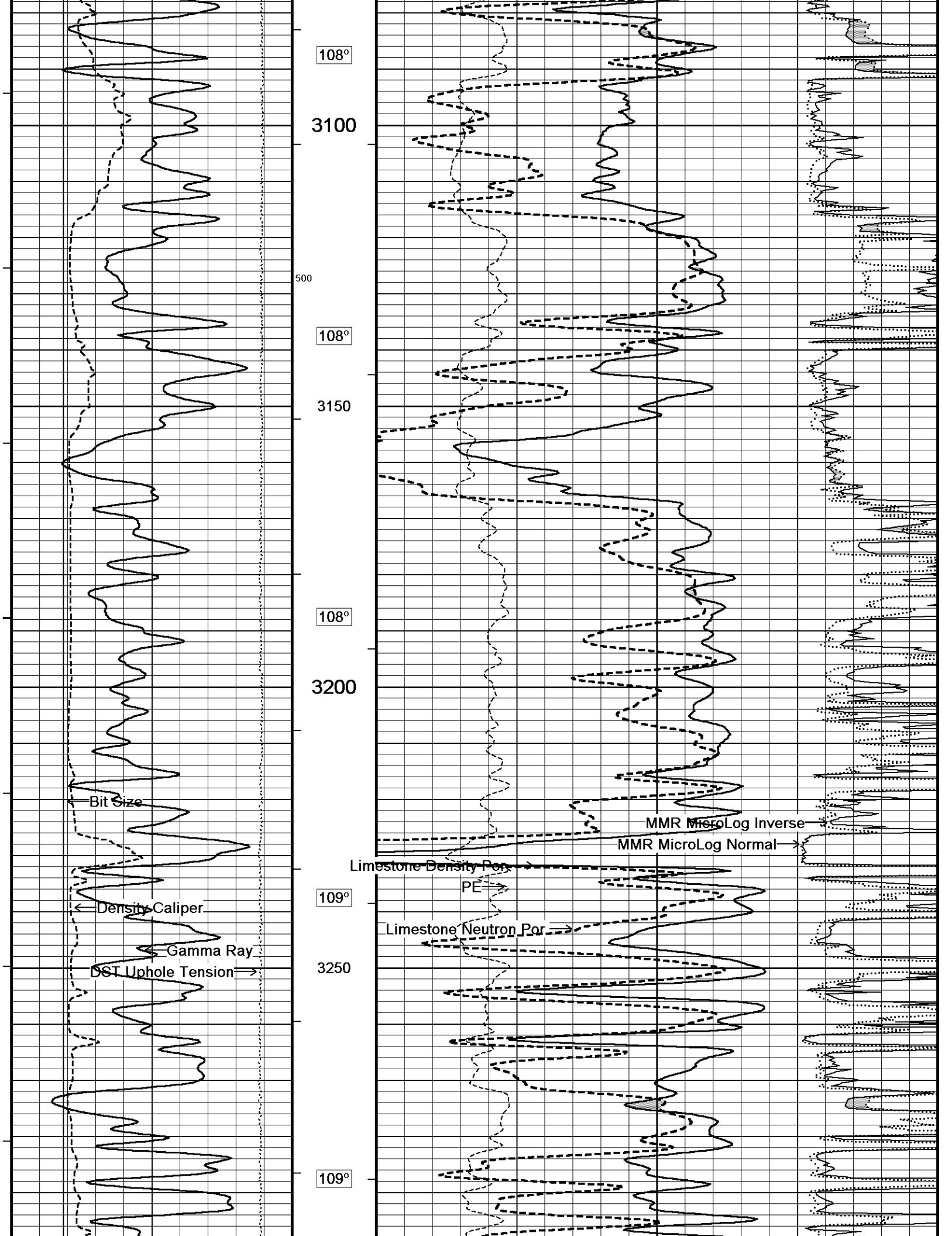


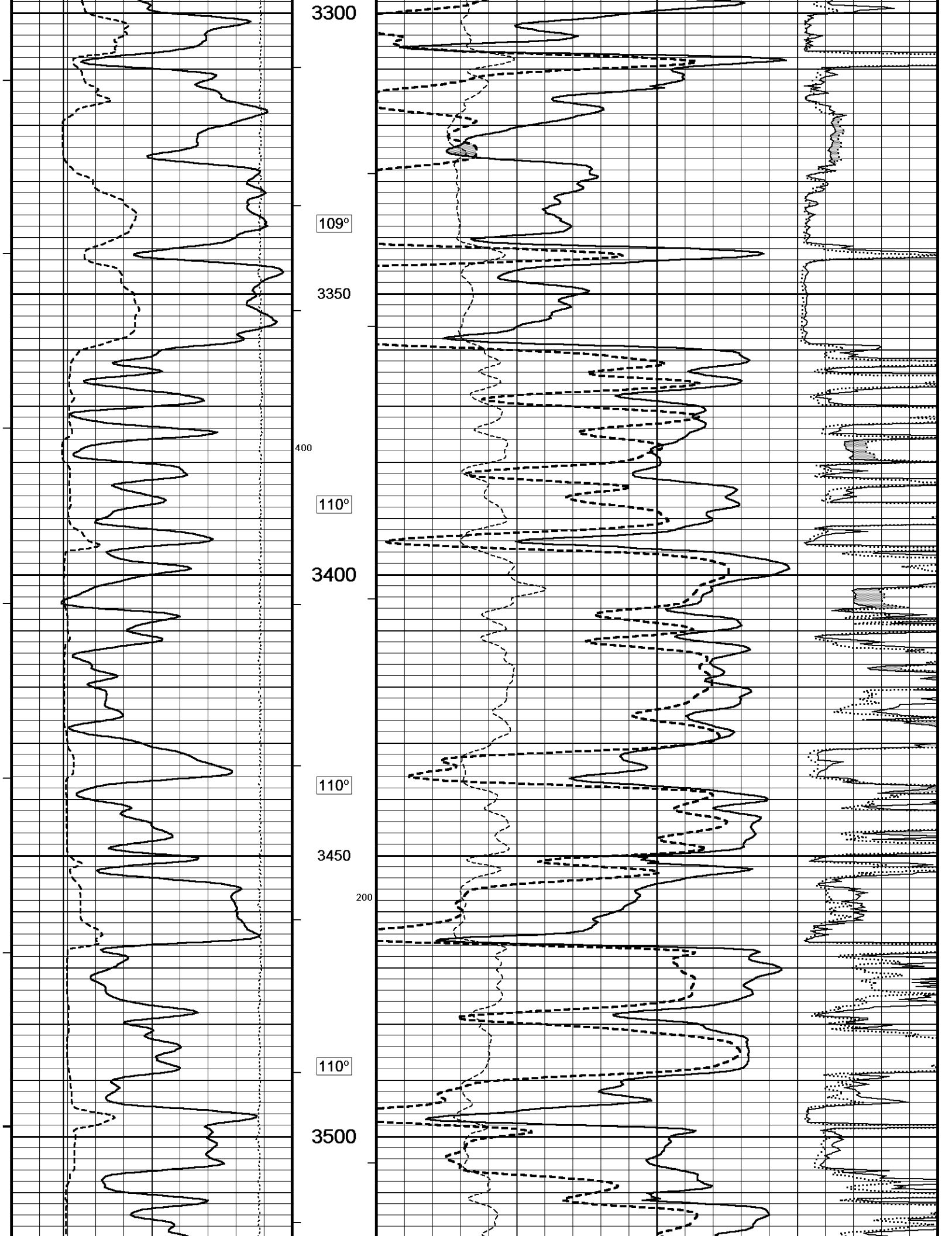


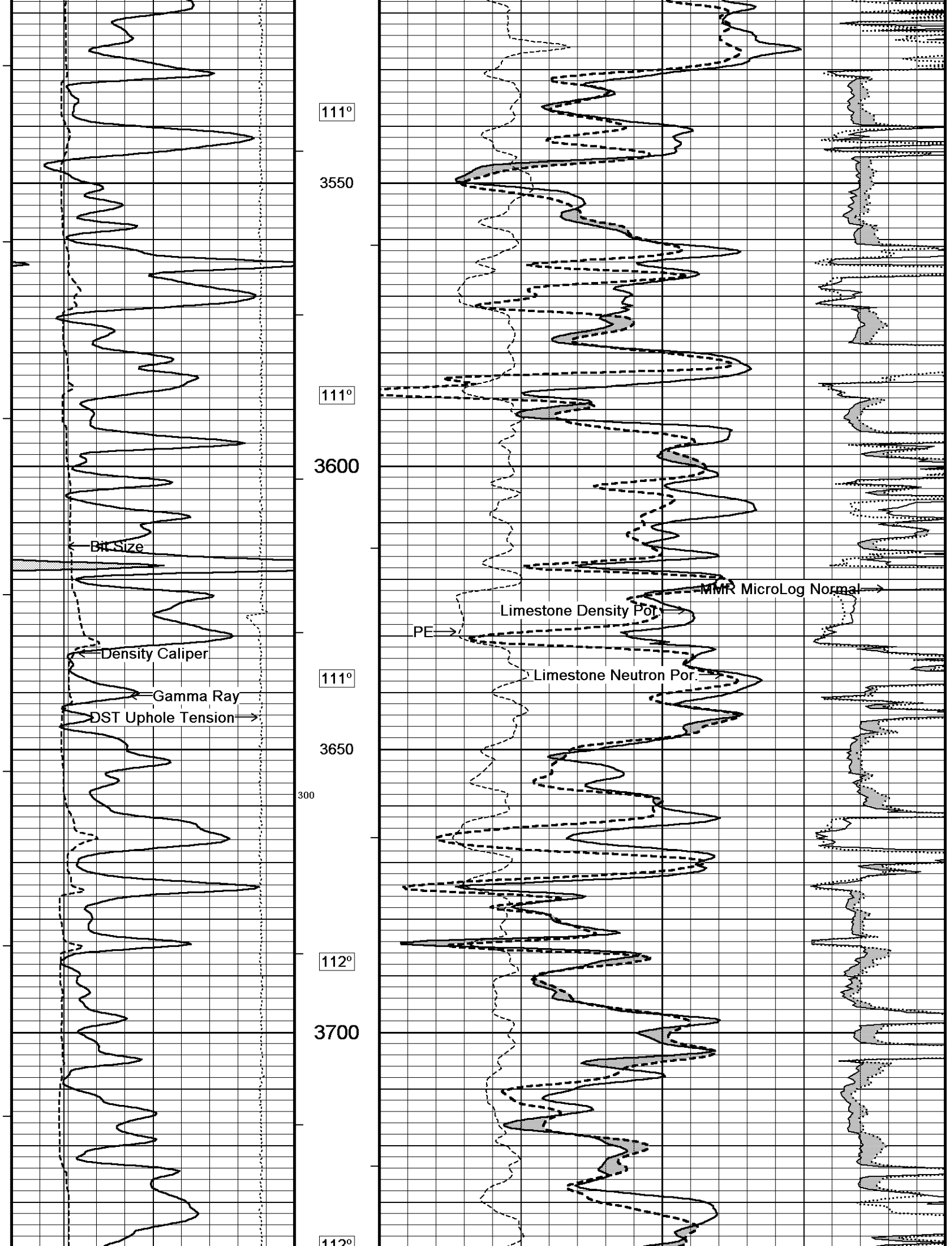


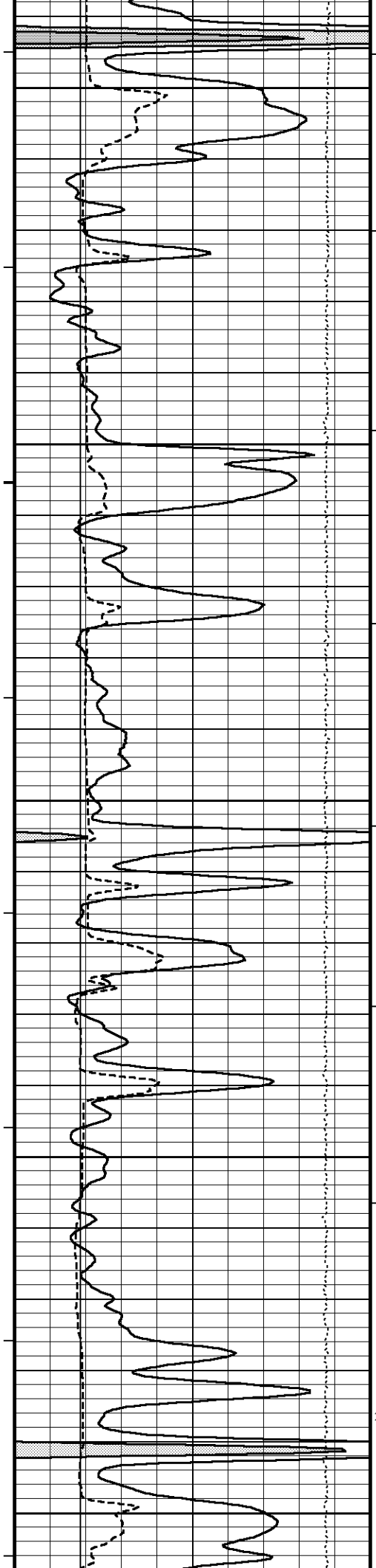




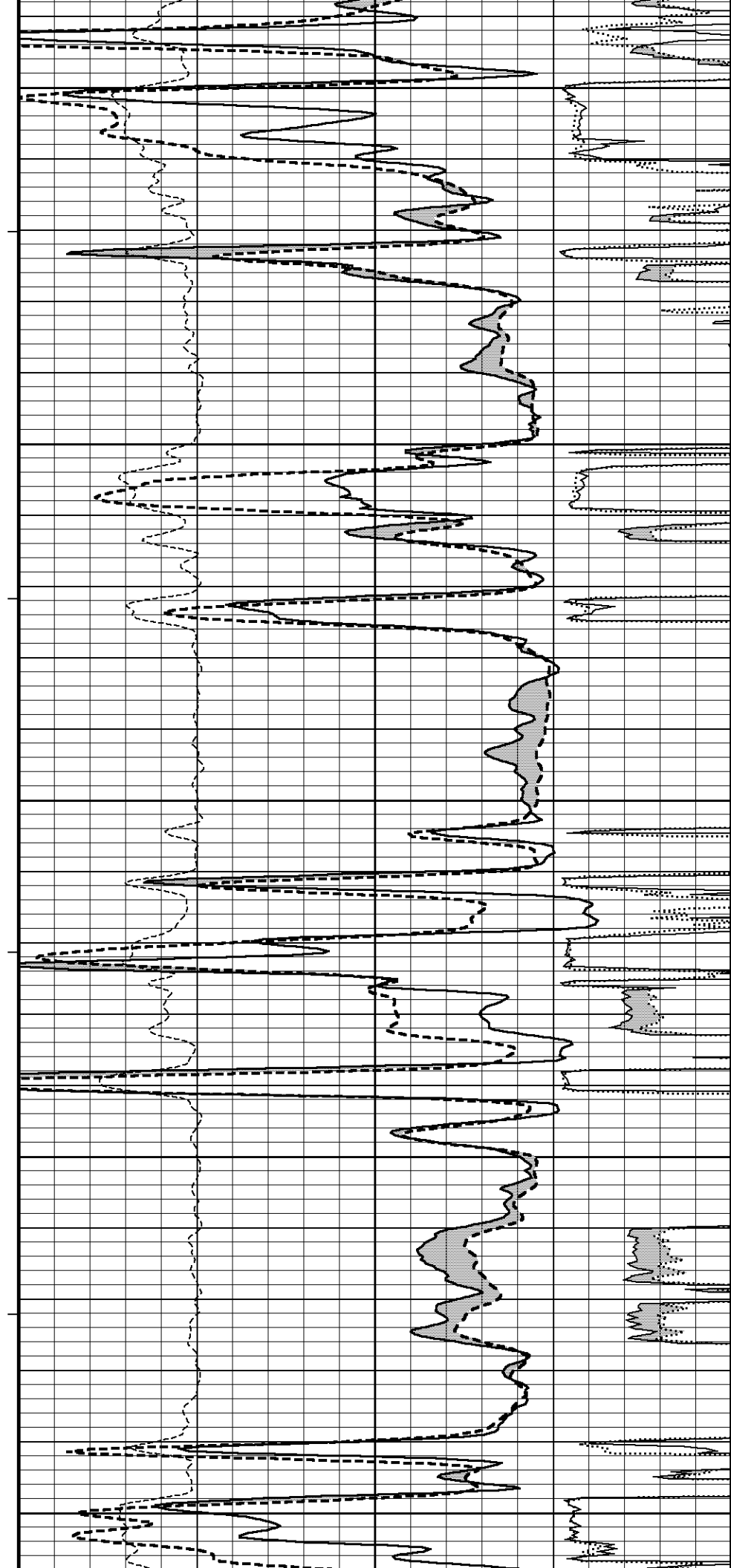


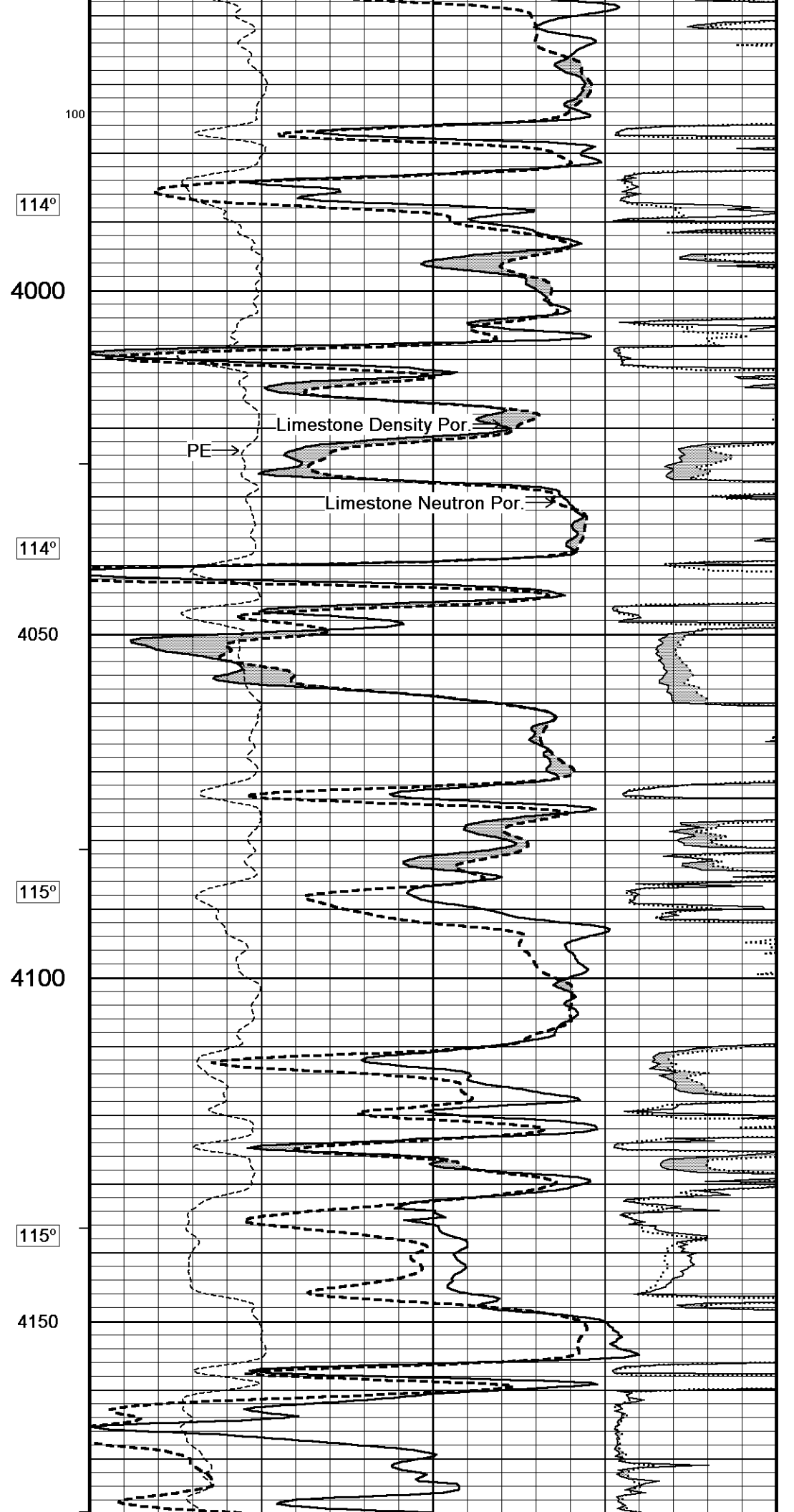
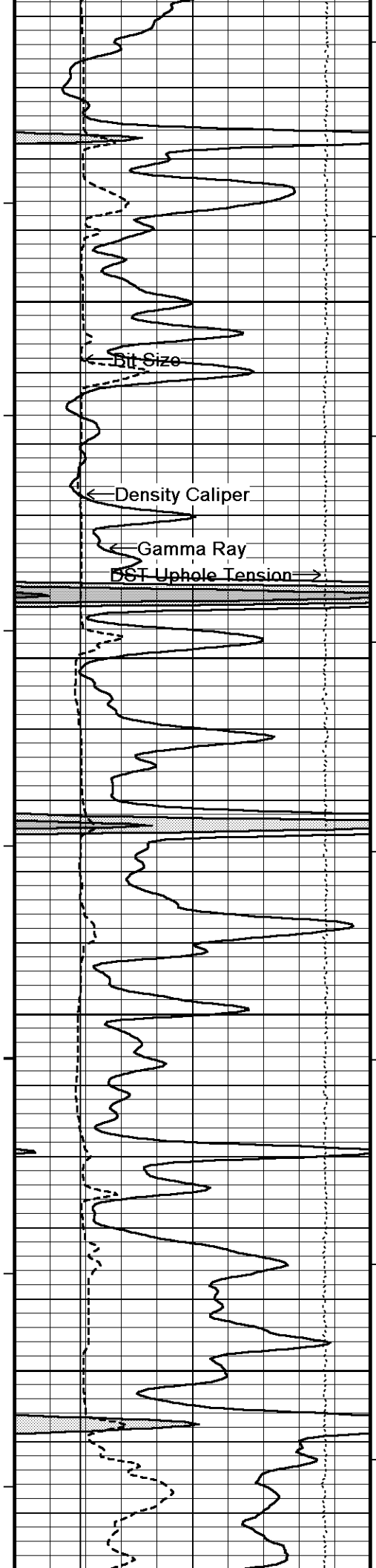


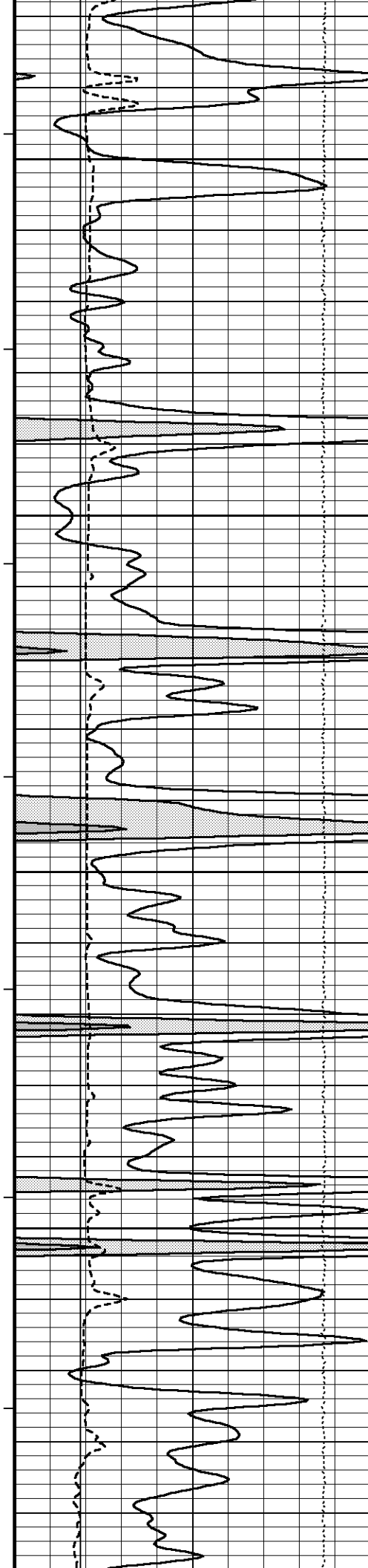




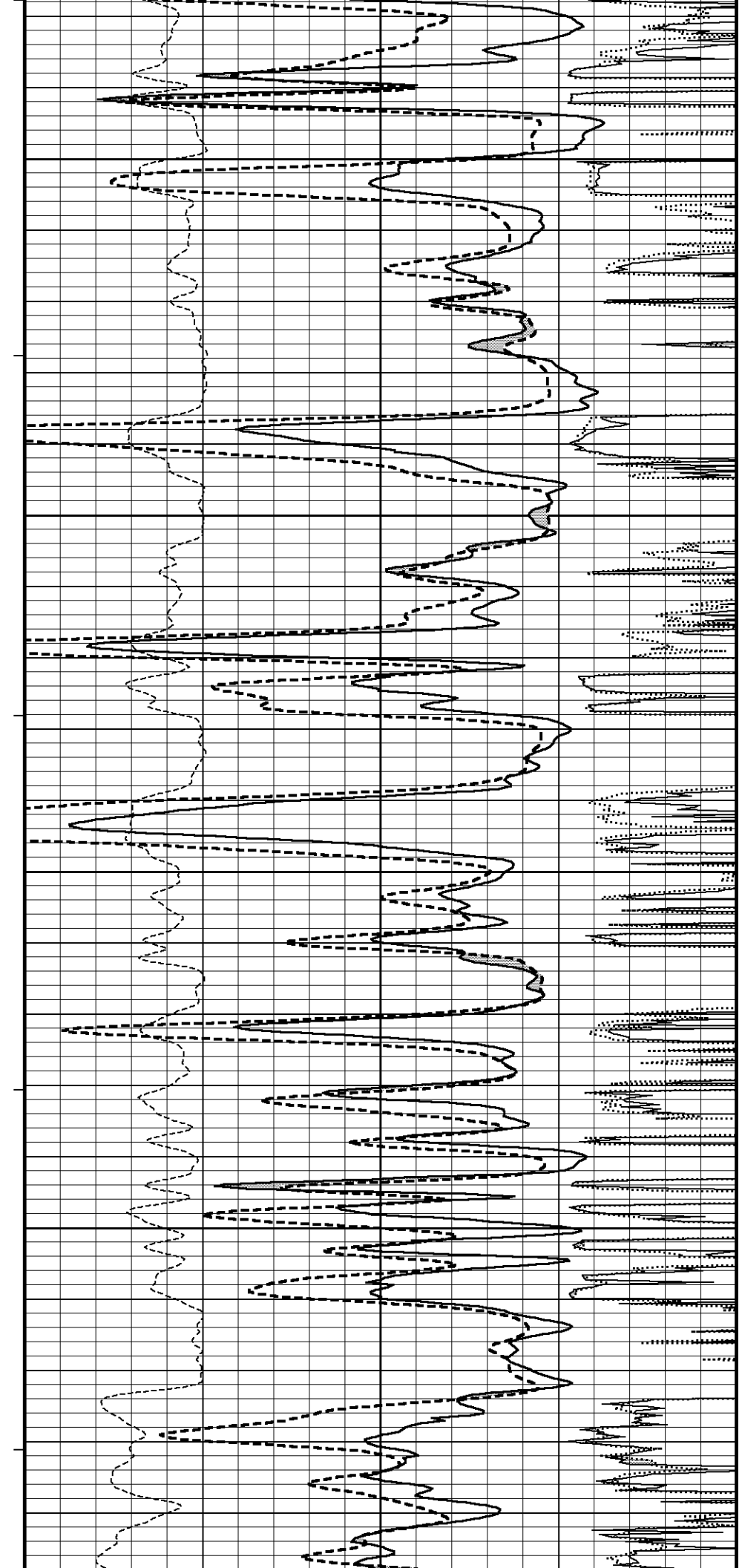
112°
3750
112°
3800
113°
3850
113°
3900
200 113°
3950

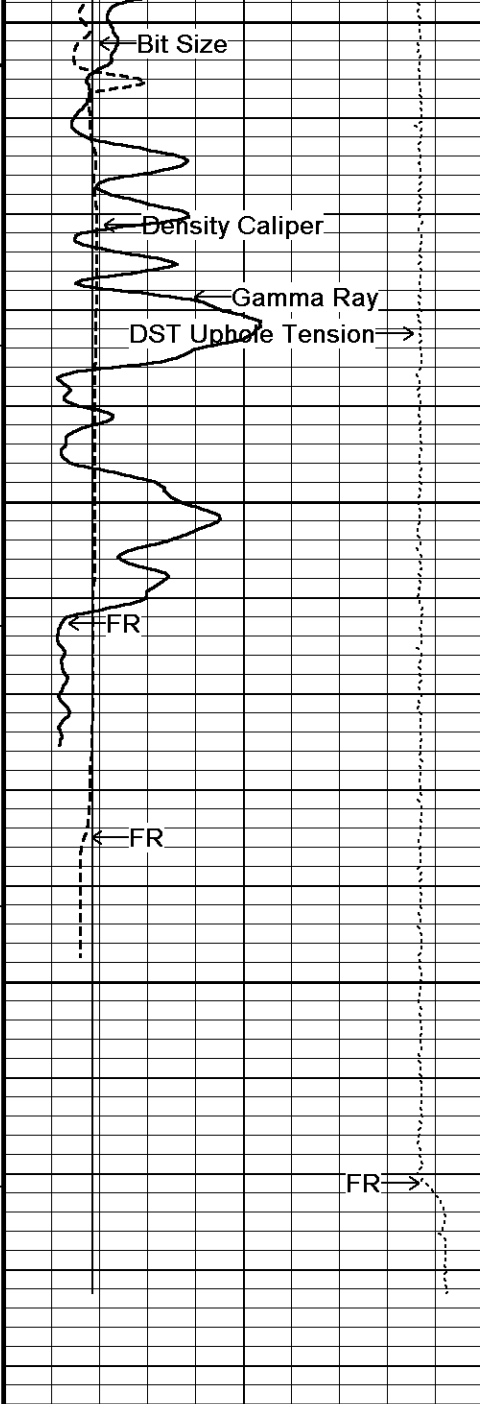




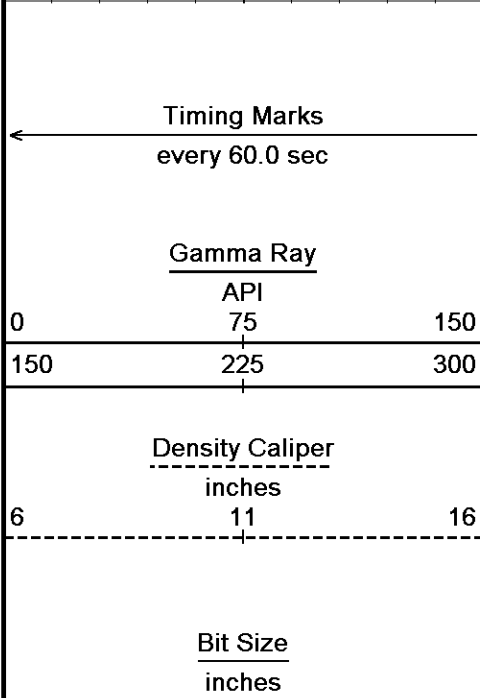
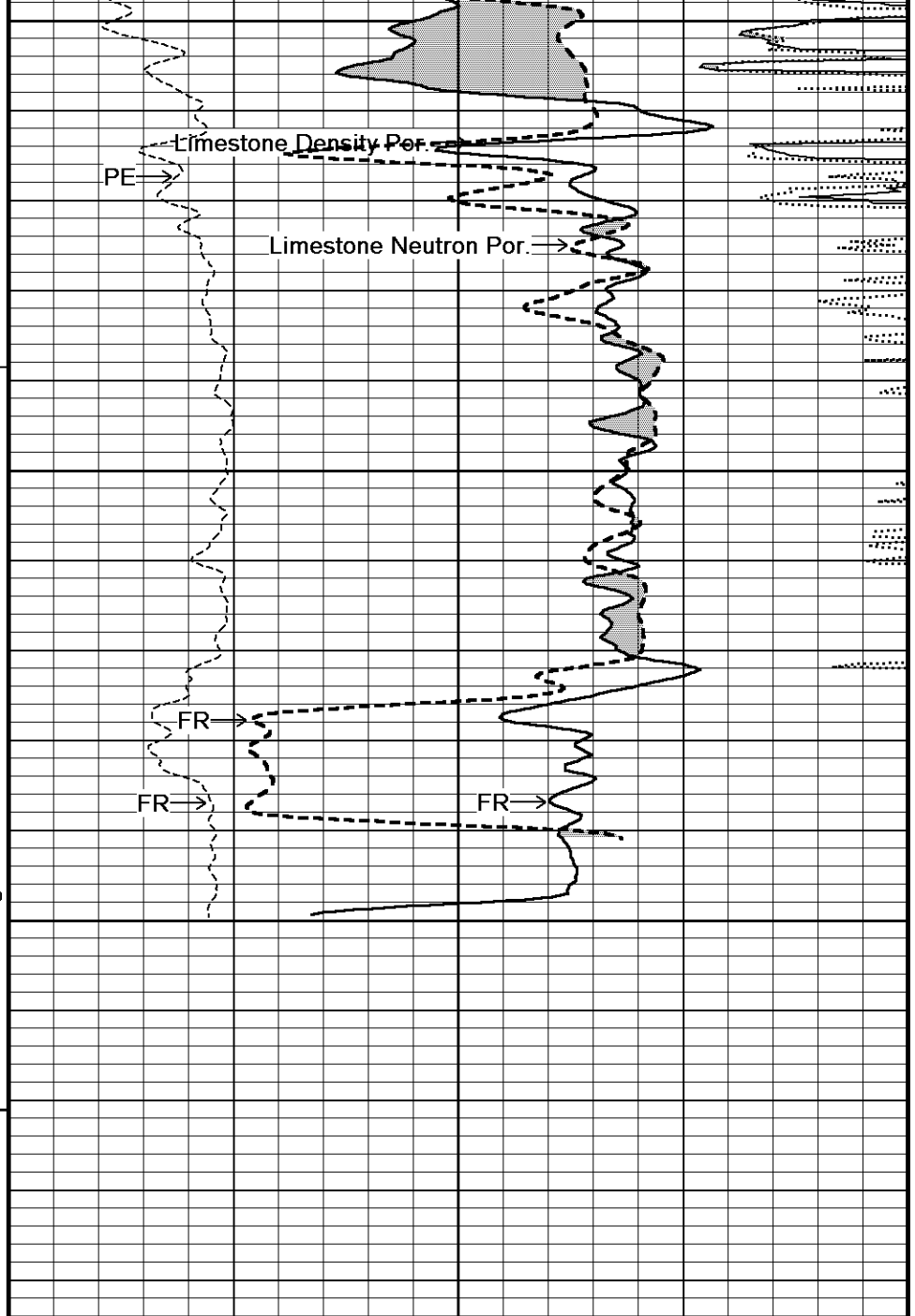


115°
4200
100
115°
4250
116°
4300
117°
4350
117°





4400
117°
4450
0
4500
TD

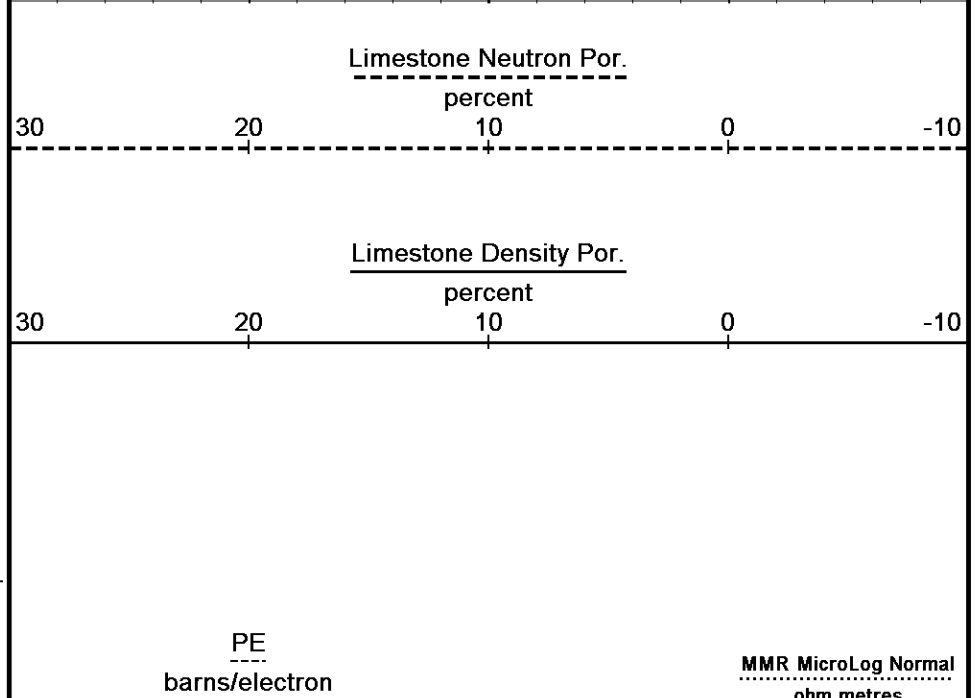


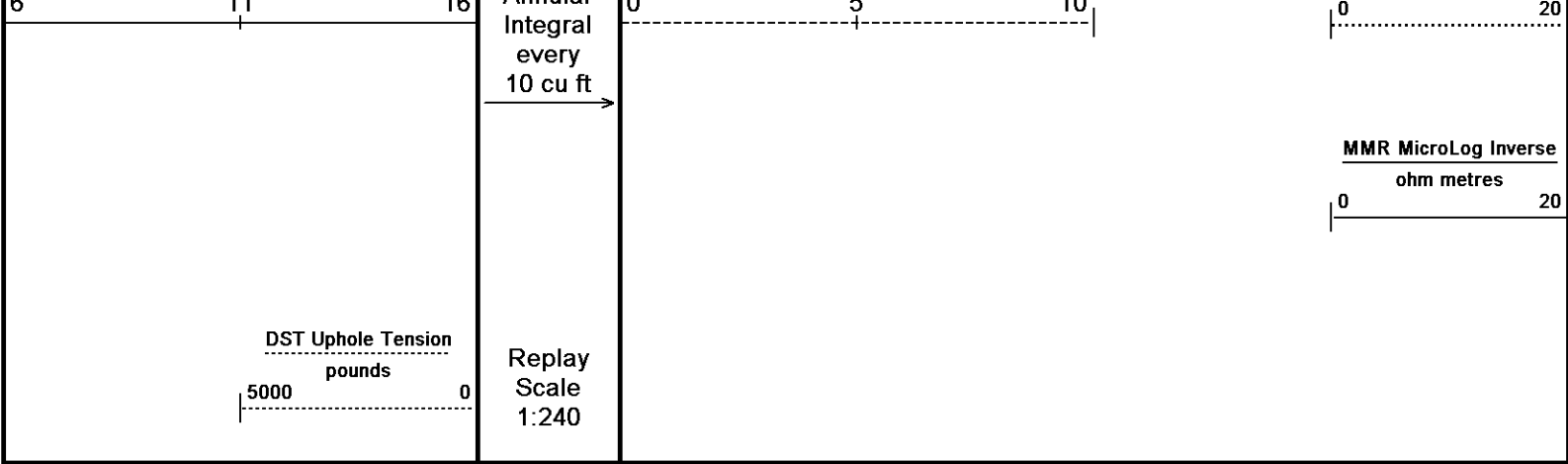
Depth
In
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular





Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 12-DEC-2018 22:44

Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_002.dtaRecorded on 12-DEC-2018 19:44

System Versions: Logged with 18.03.9344Plotted with 18.03.9344

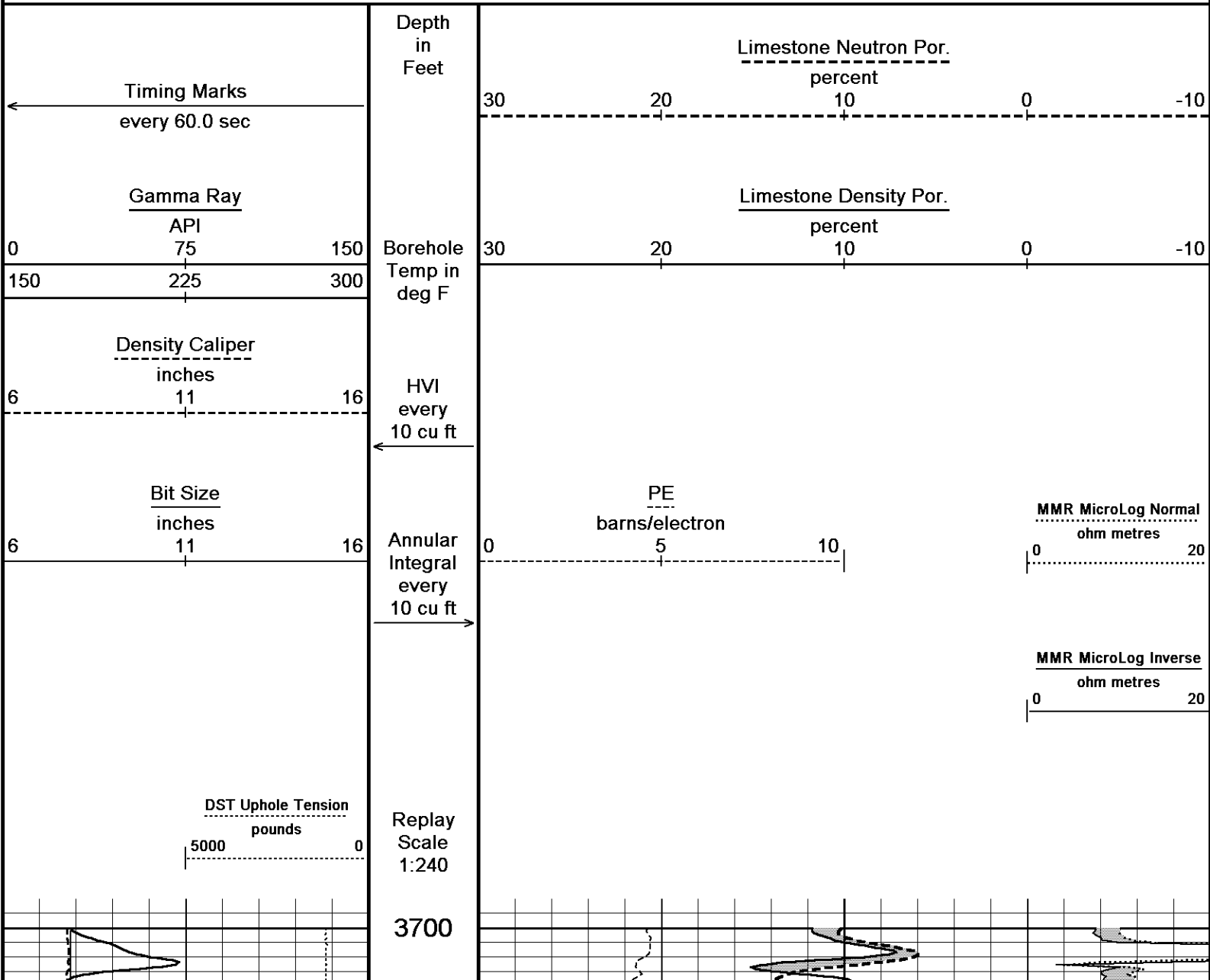
↑5 INCH LIMESTONE MAIN↑

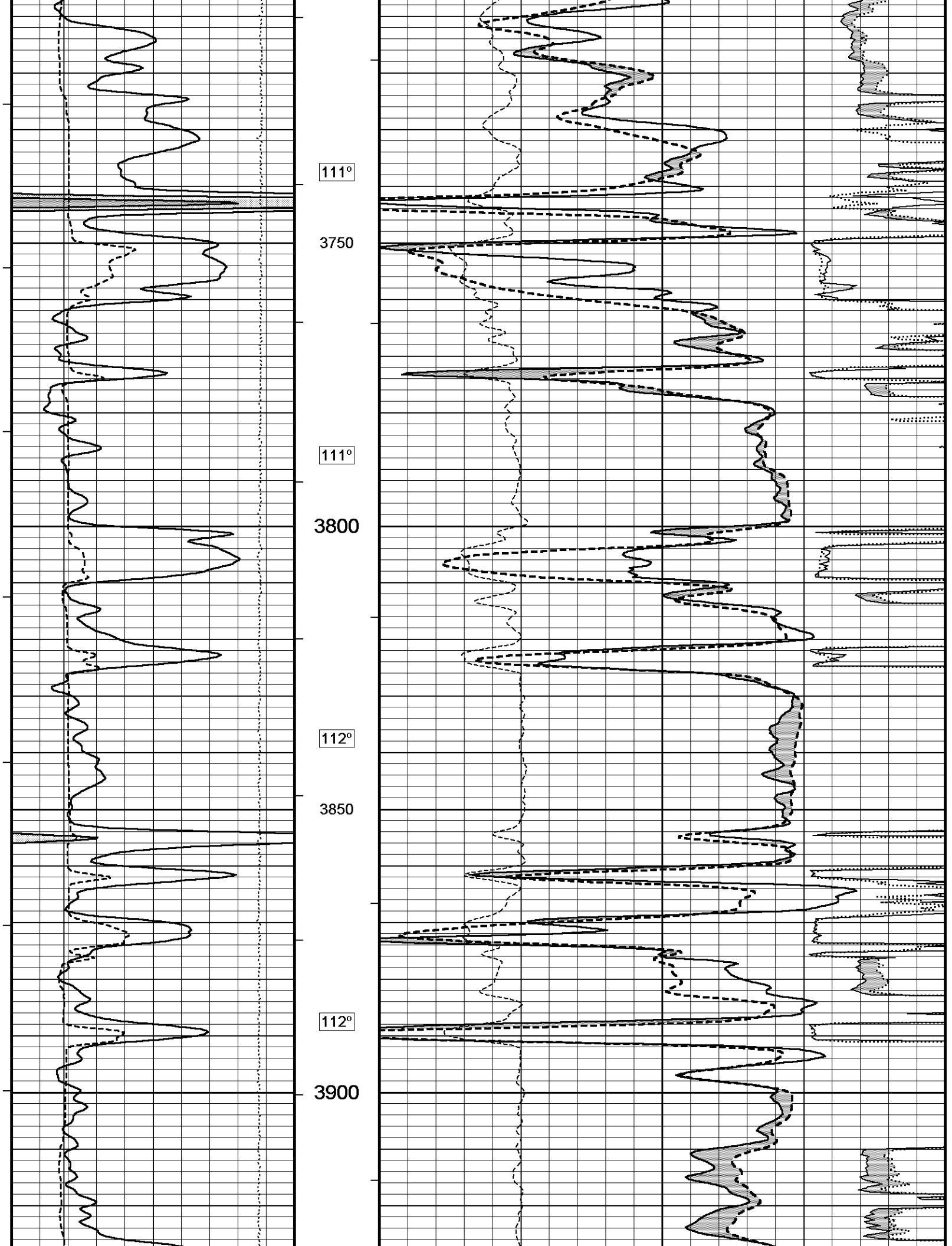
↓REPEAT SECTION↓

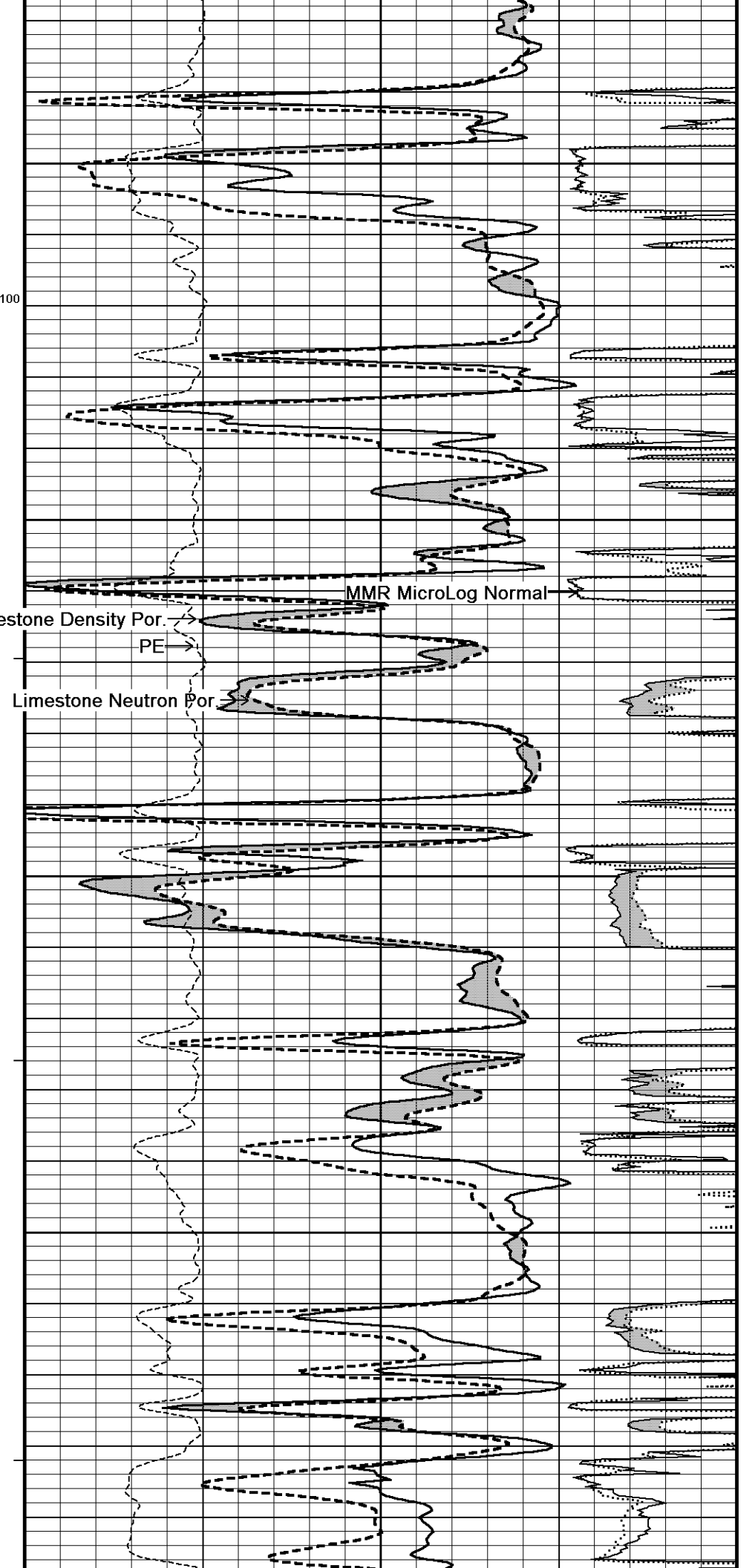
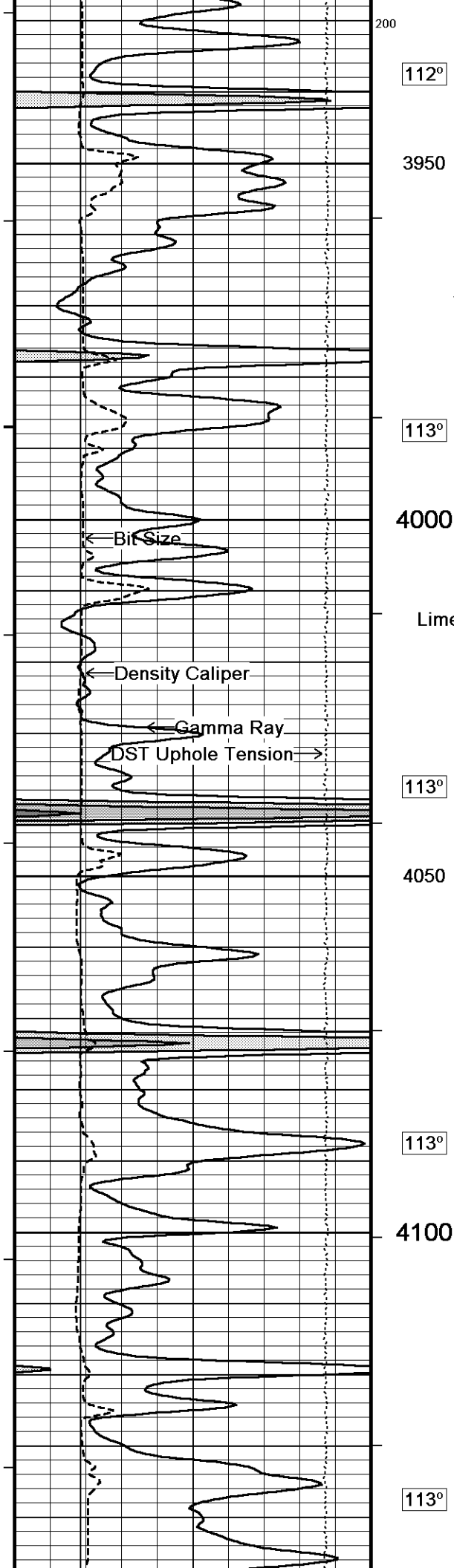
Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 12-DEC-2018 22:44

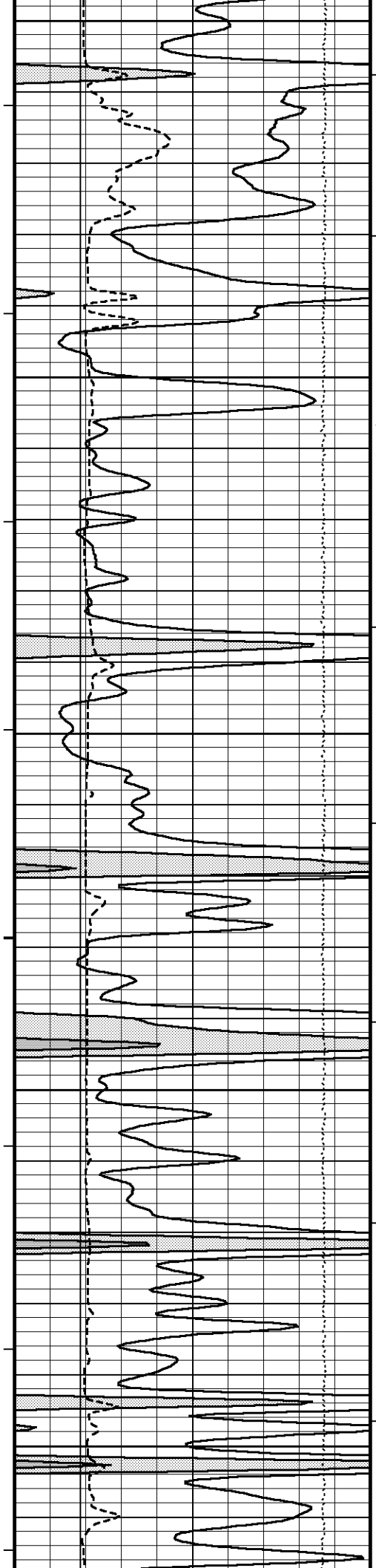
Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dtaRecorded on 12-DEC-2018 18:51

System Versions: Logged with 18.03.9344Plotted with 18.03.9344









4150

114°

4200

100

114°

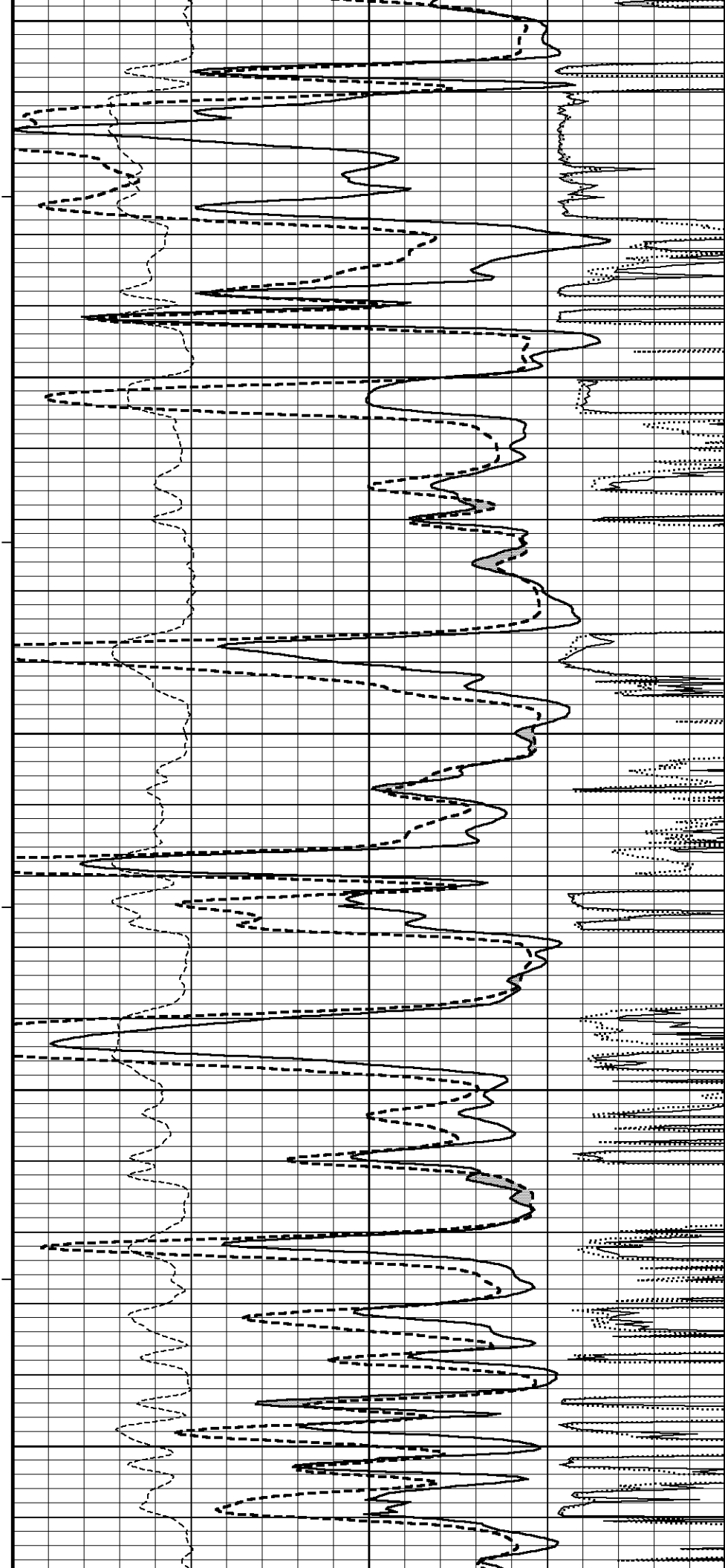
4250

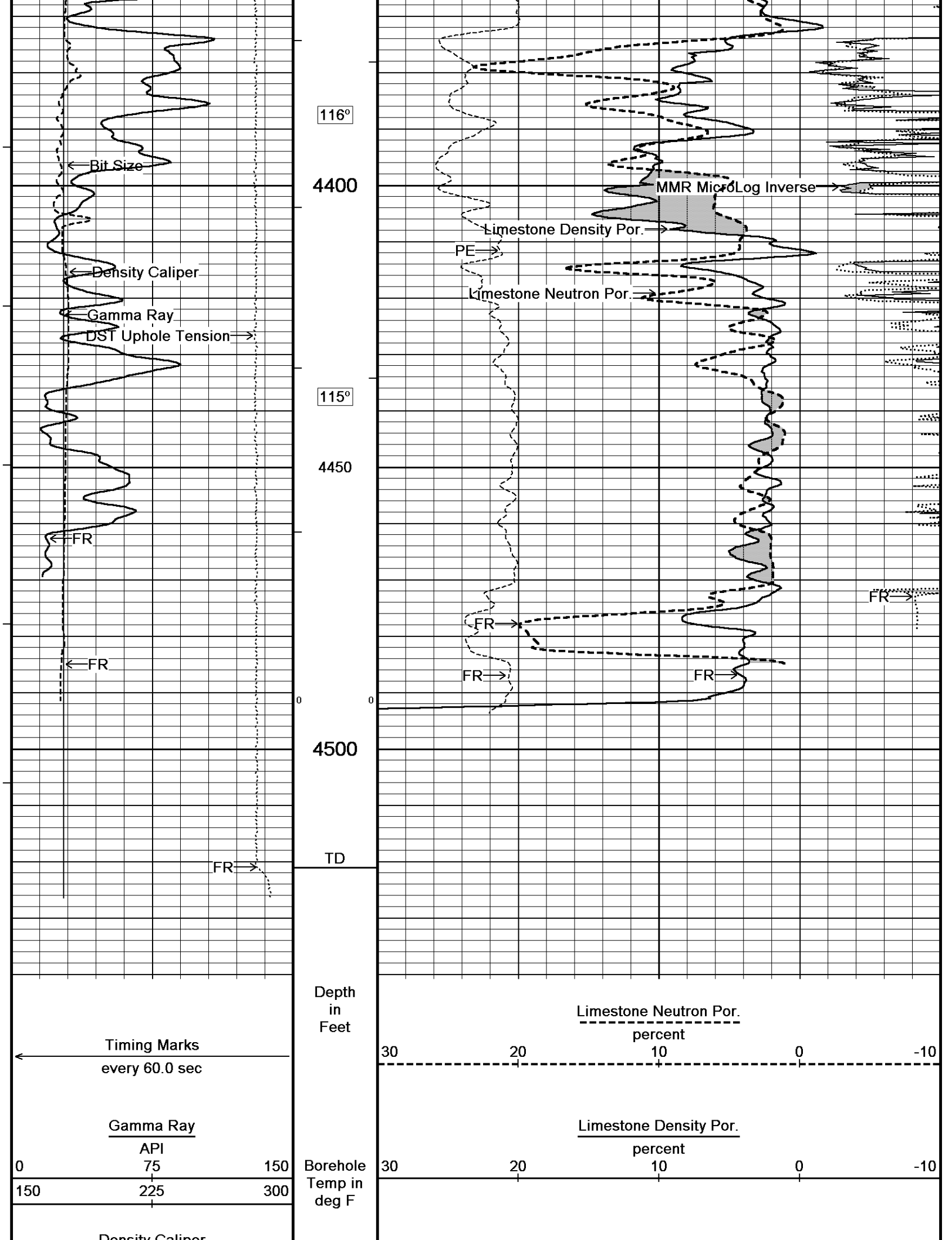
115°

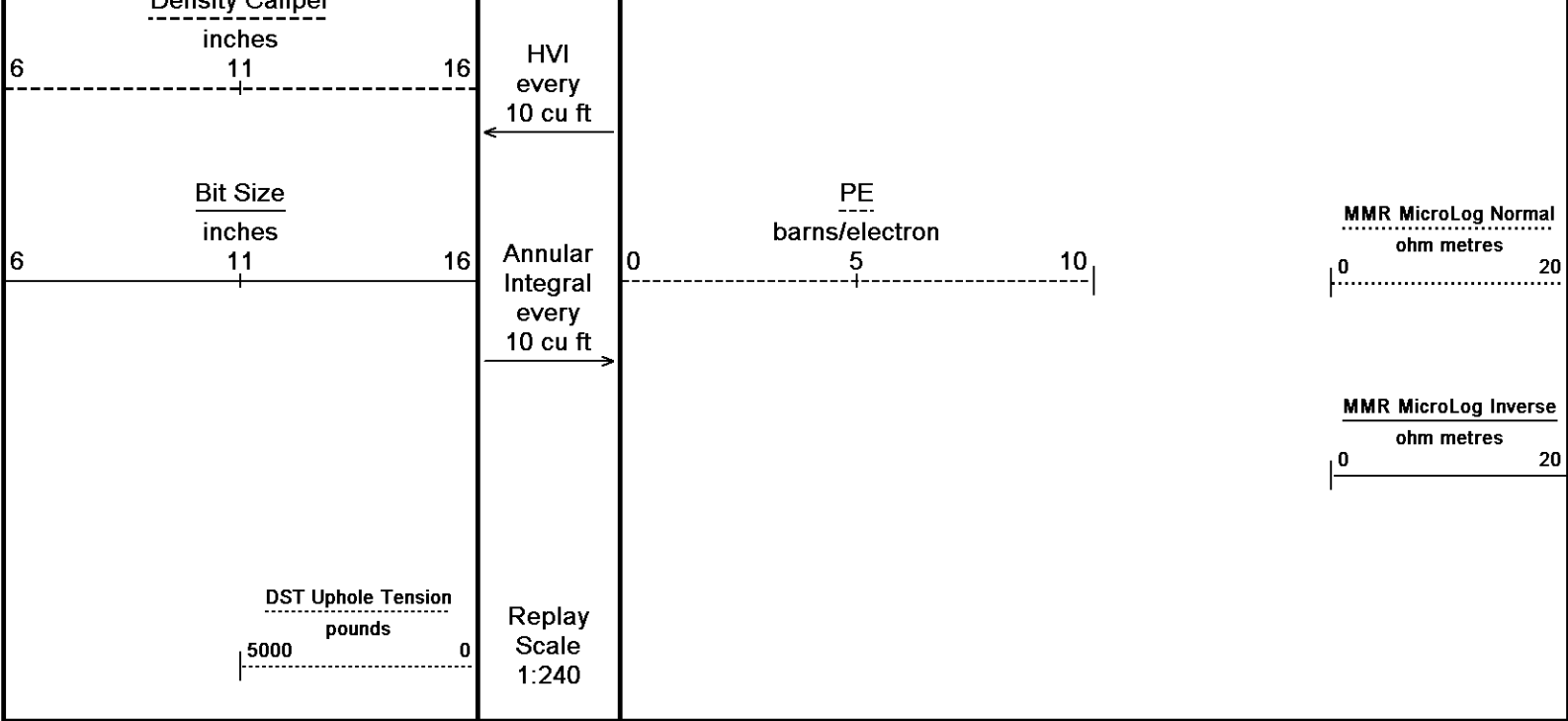
4300

115°

4350







Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 12-DEC-2018 22:44

Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dtaRecorded on 12-DEC-2018 18:51

System Versions: Logged with 18.03.9344Plotted with 18.03.9344

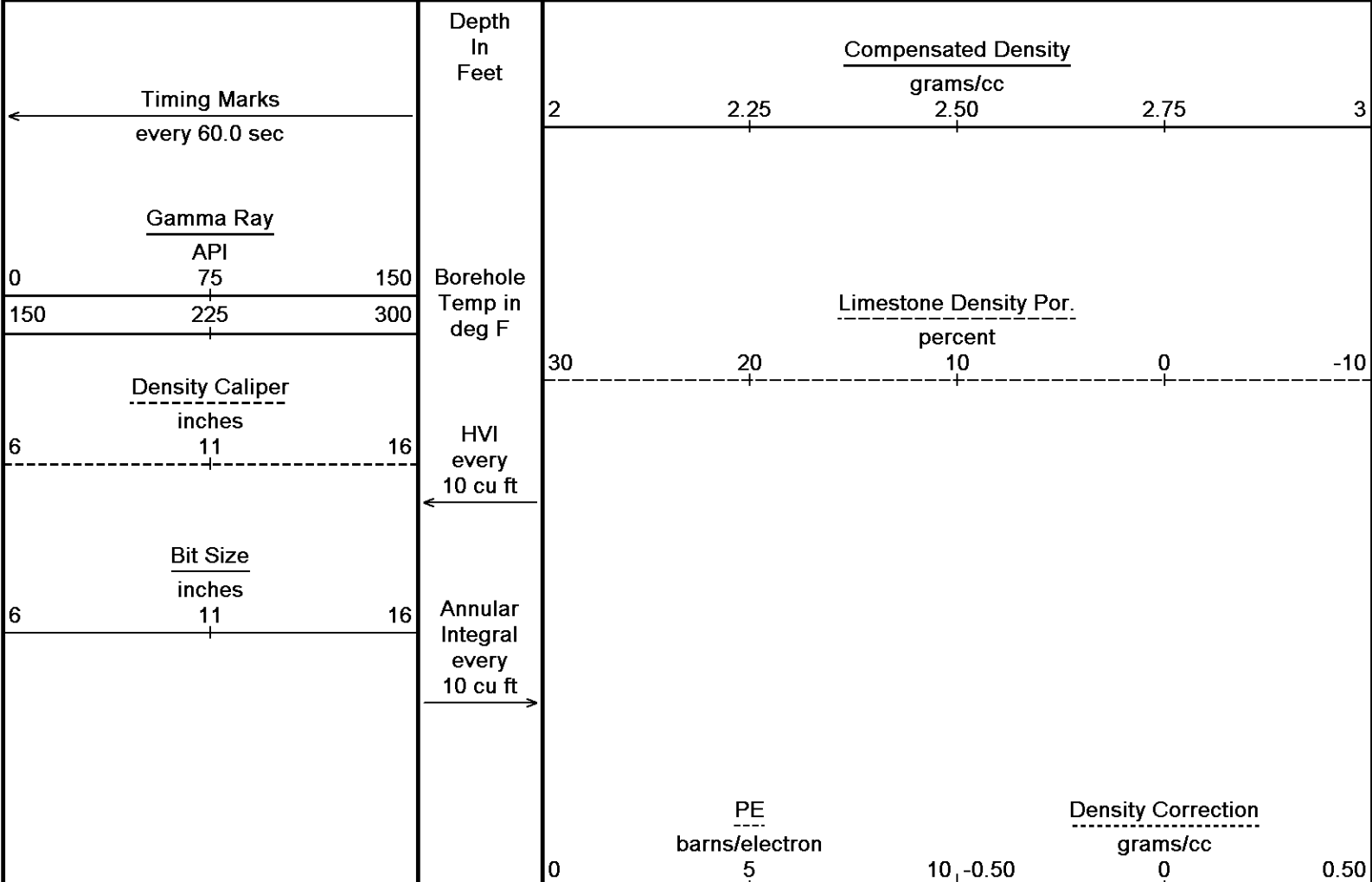
↑REPEAT SECTION↑

↓5 INCH BULK DENSITY MAIN↓

Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 12-DEC-2018 22:44

Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_002.dtaRecorded on 12-DEC-2018 19:44

System Versions: Logged with 18.03.9344Plotted with 18.03.9344



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

208

Casing
Shoe

1800

250

90°

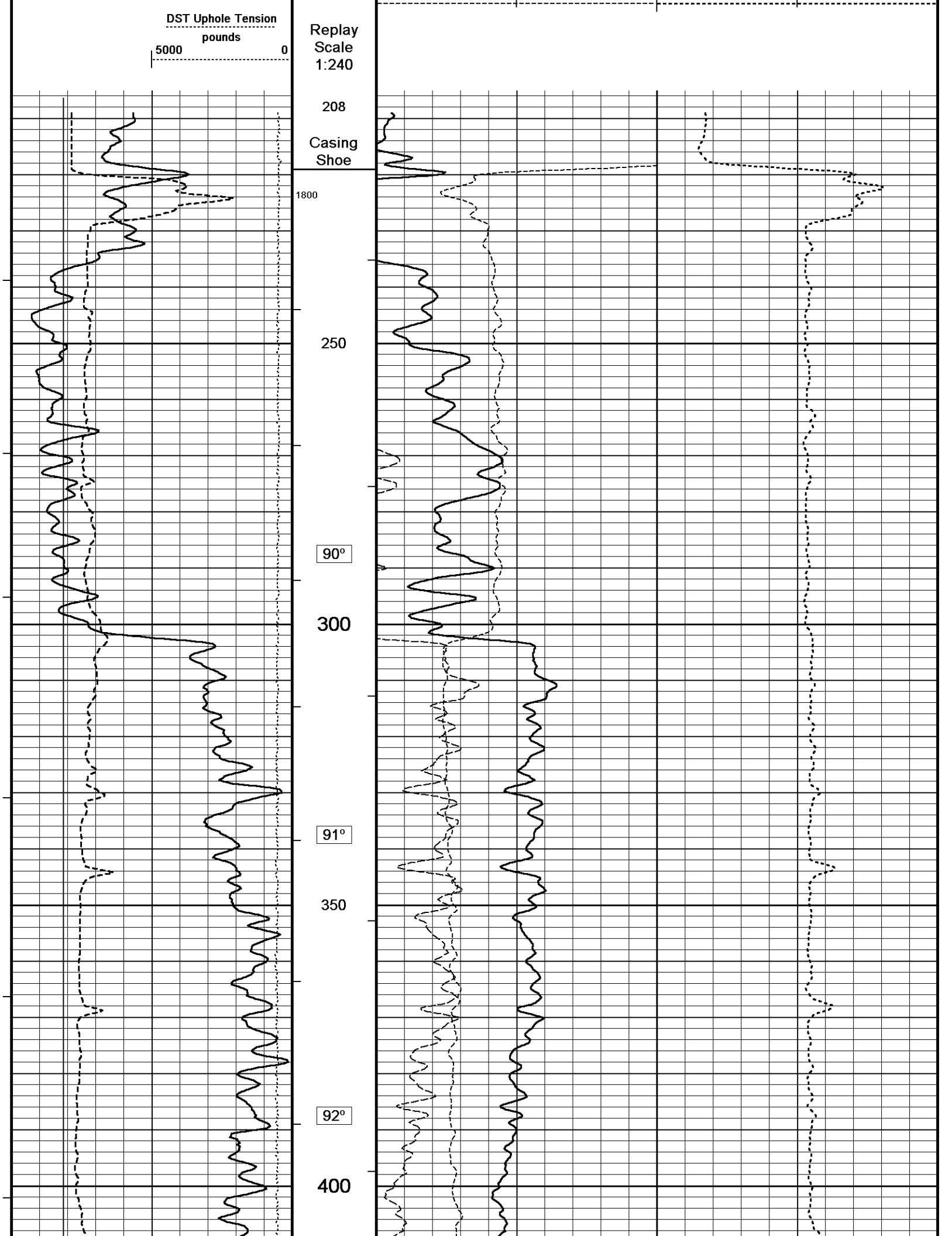
300

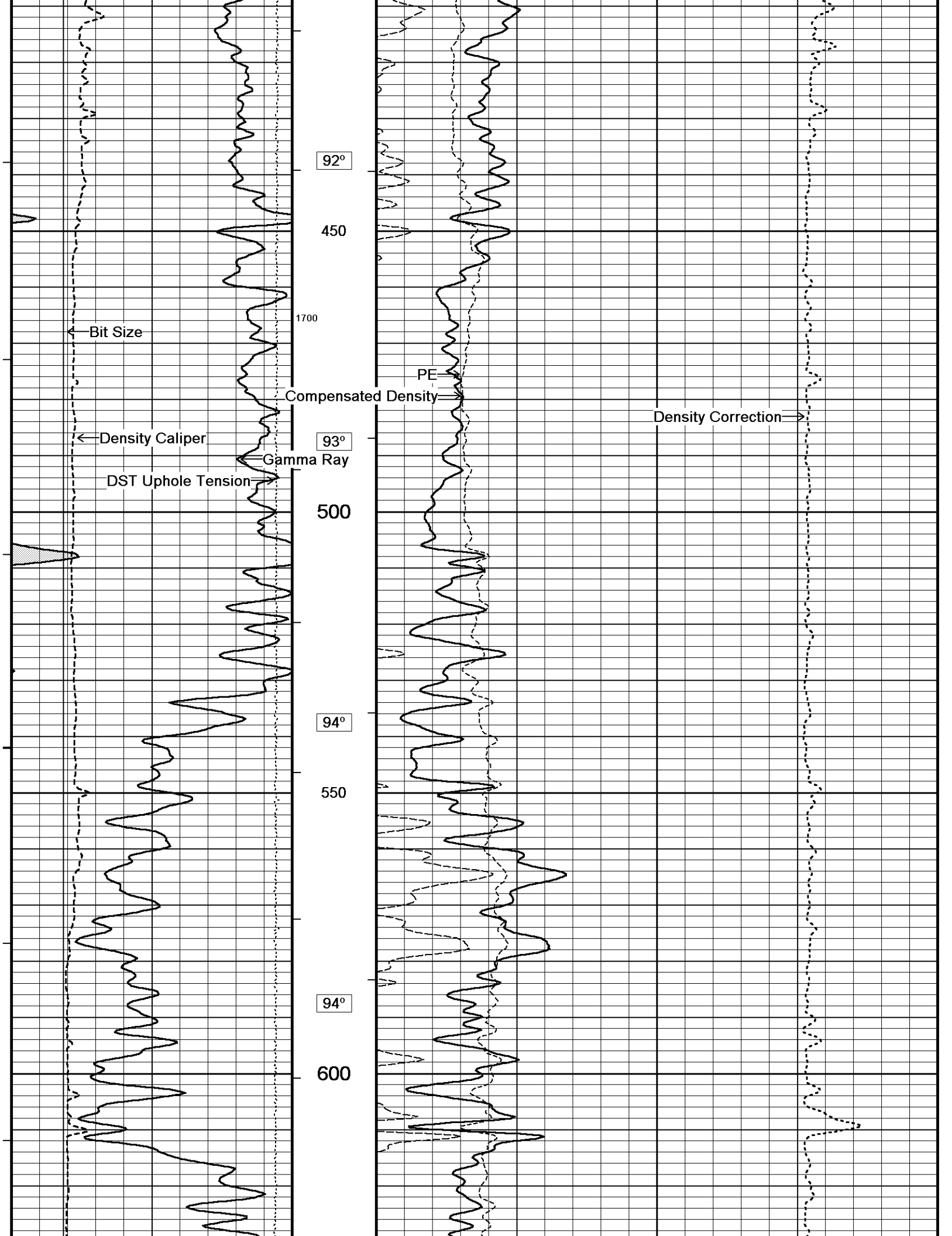
91°

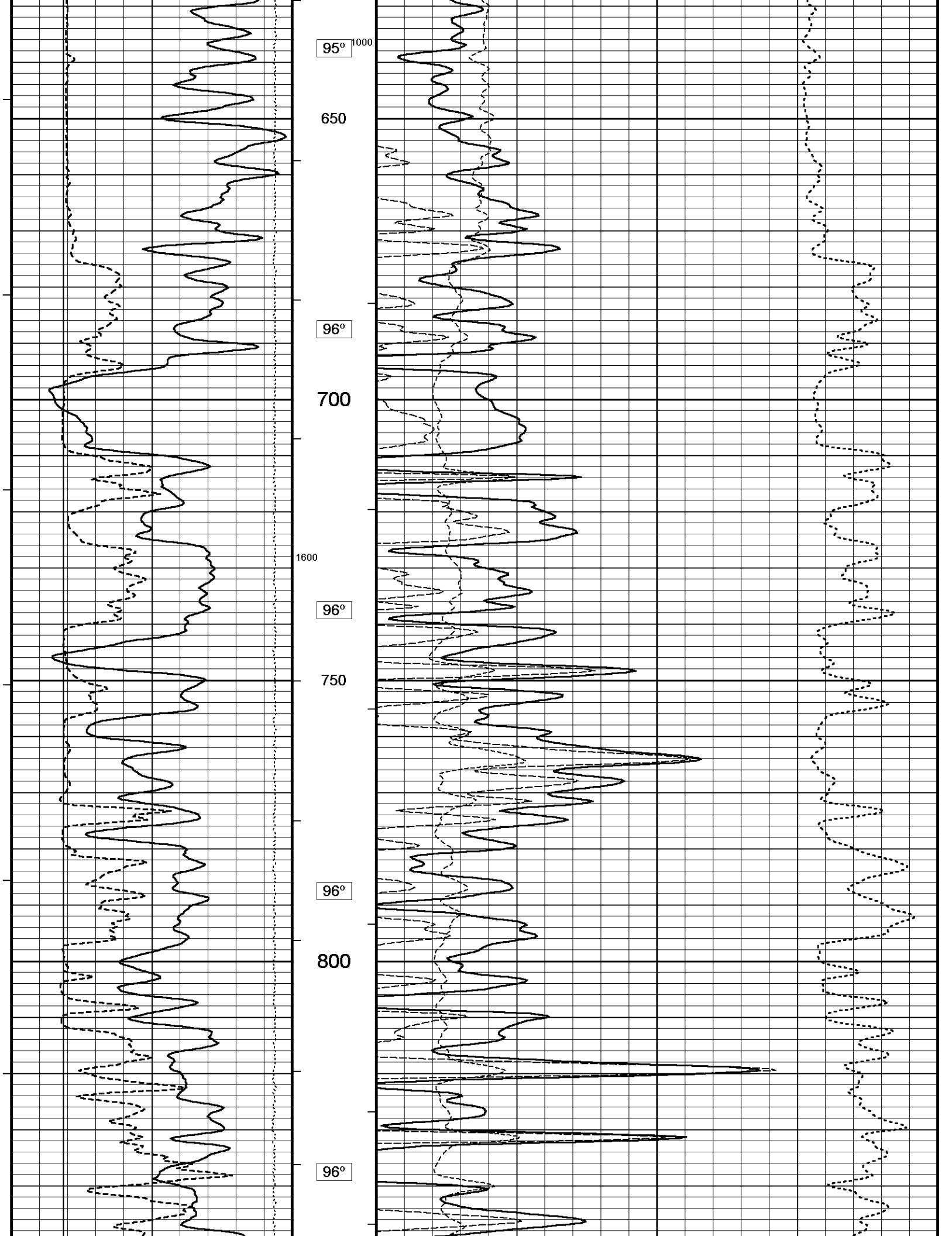
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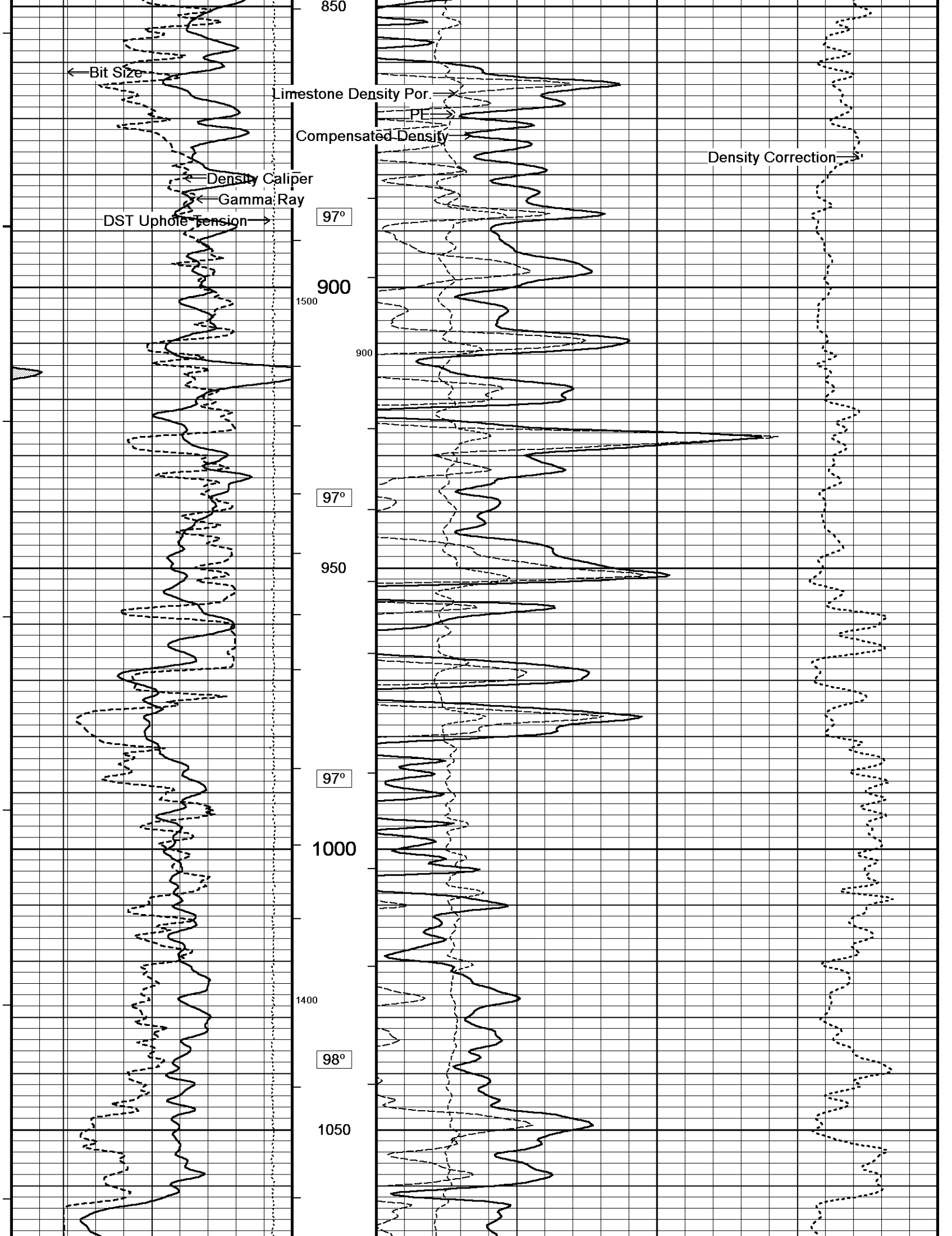
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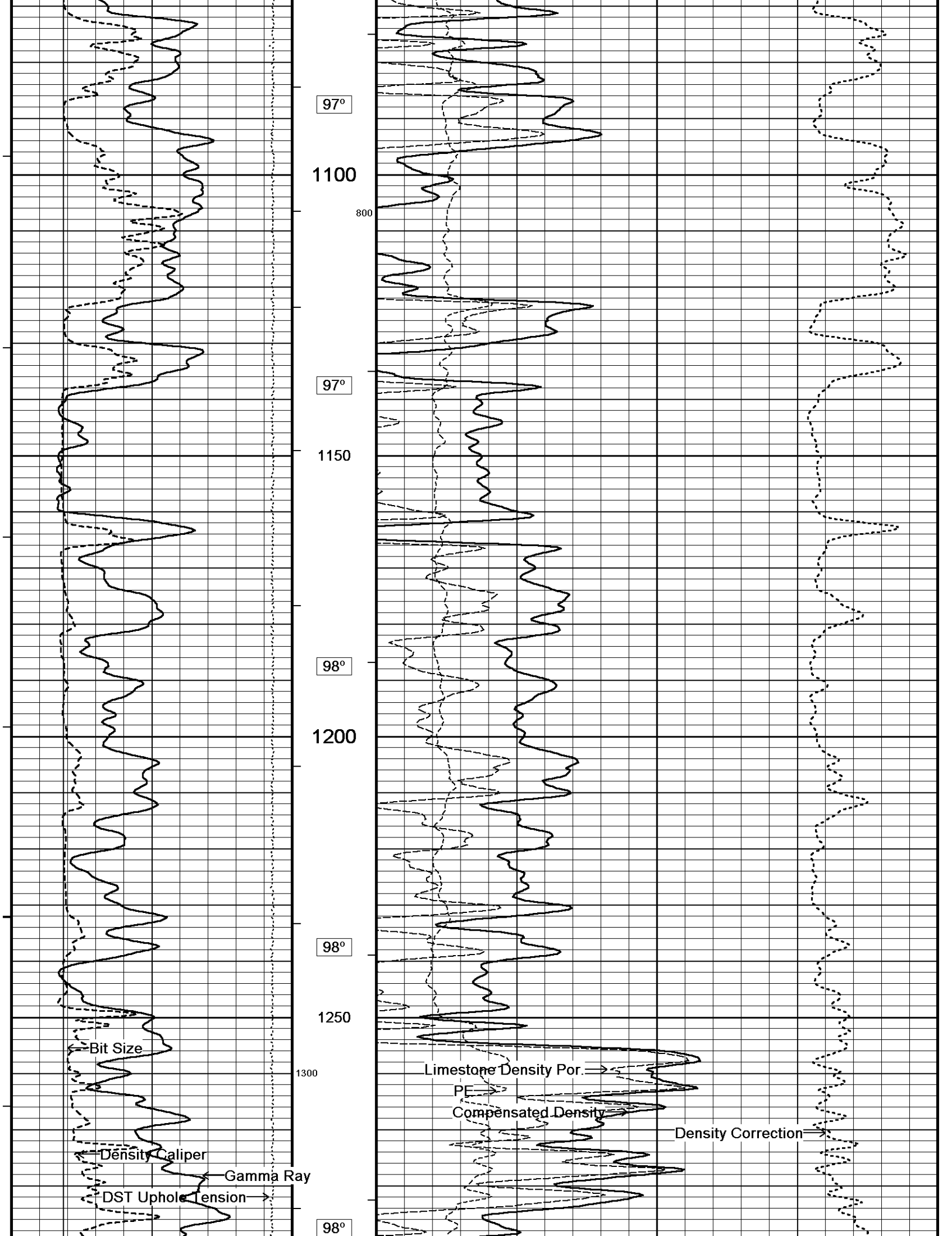
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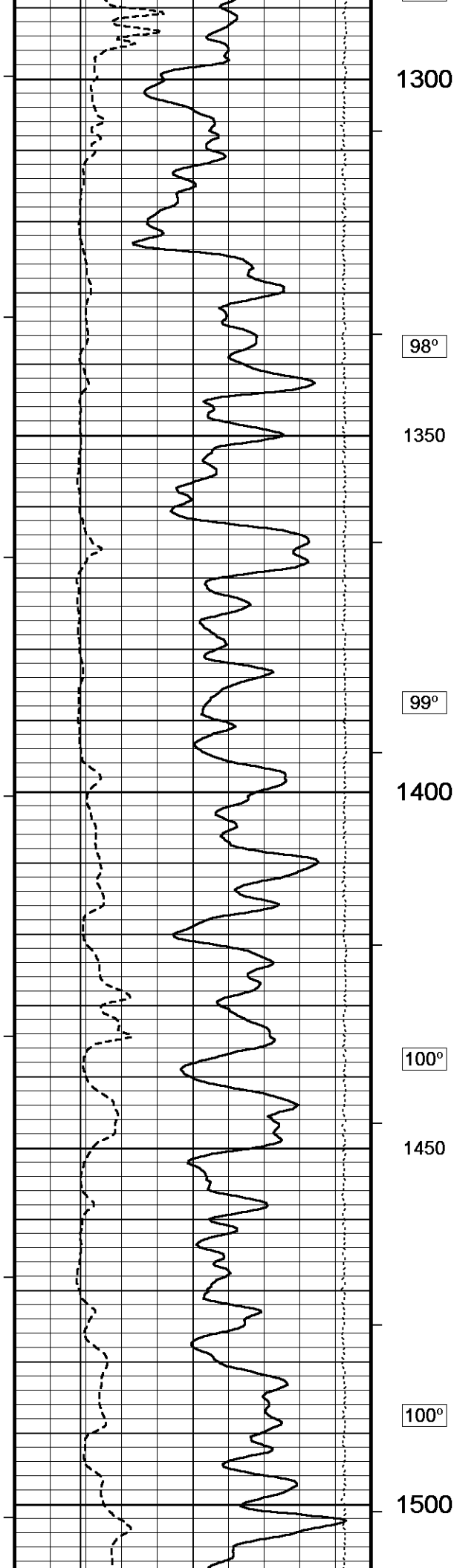












1300

98°

1350

99°

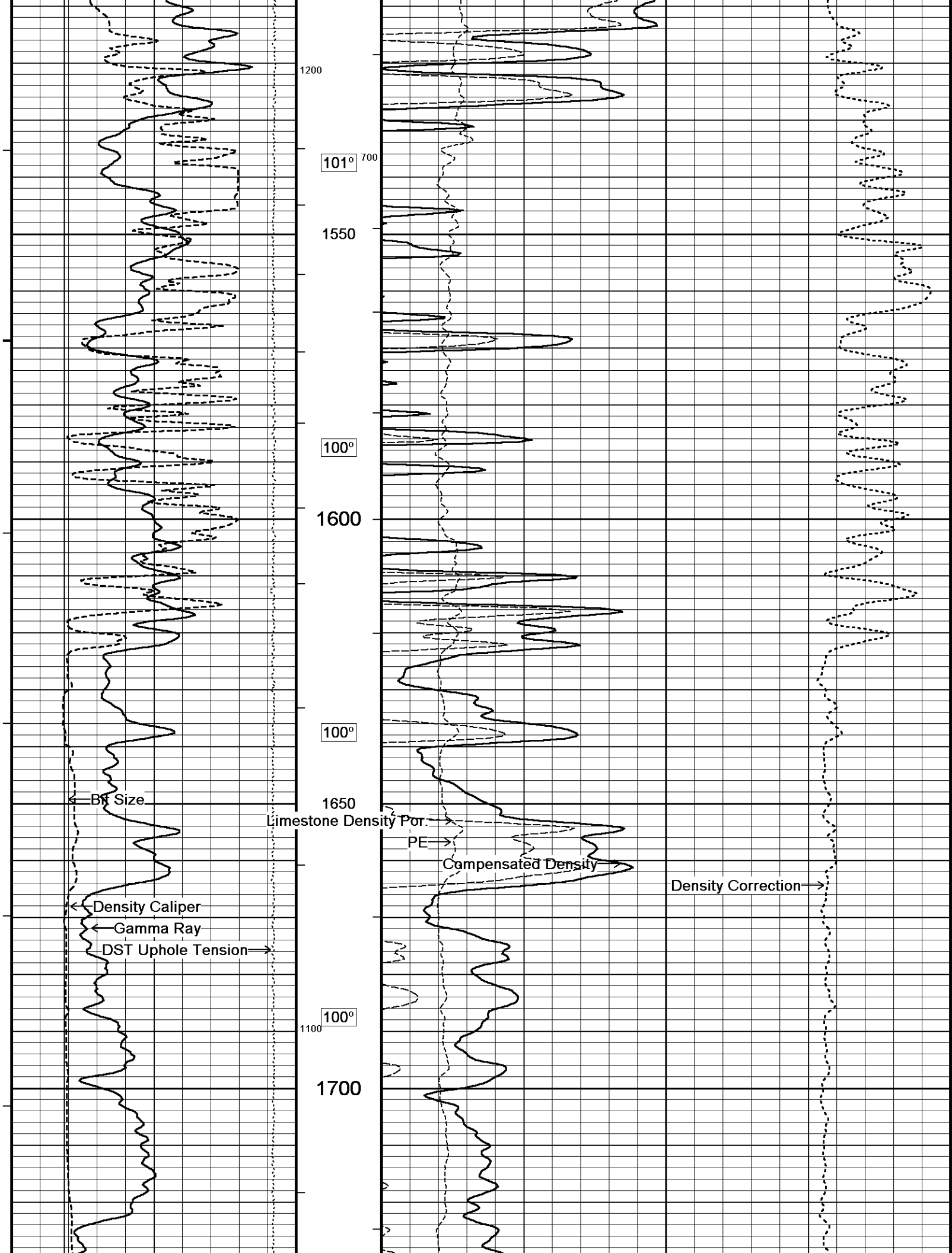
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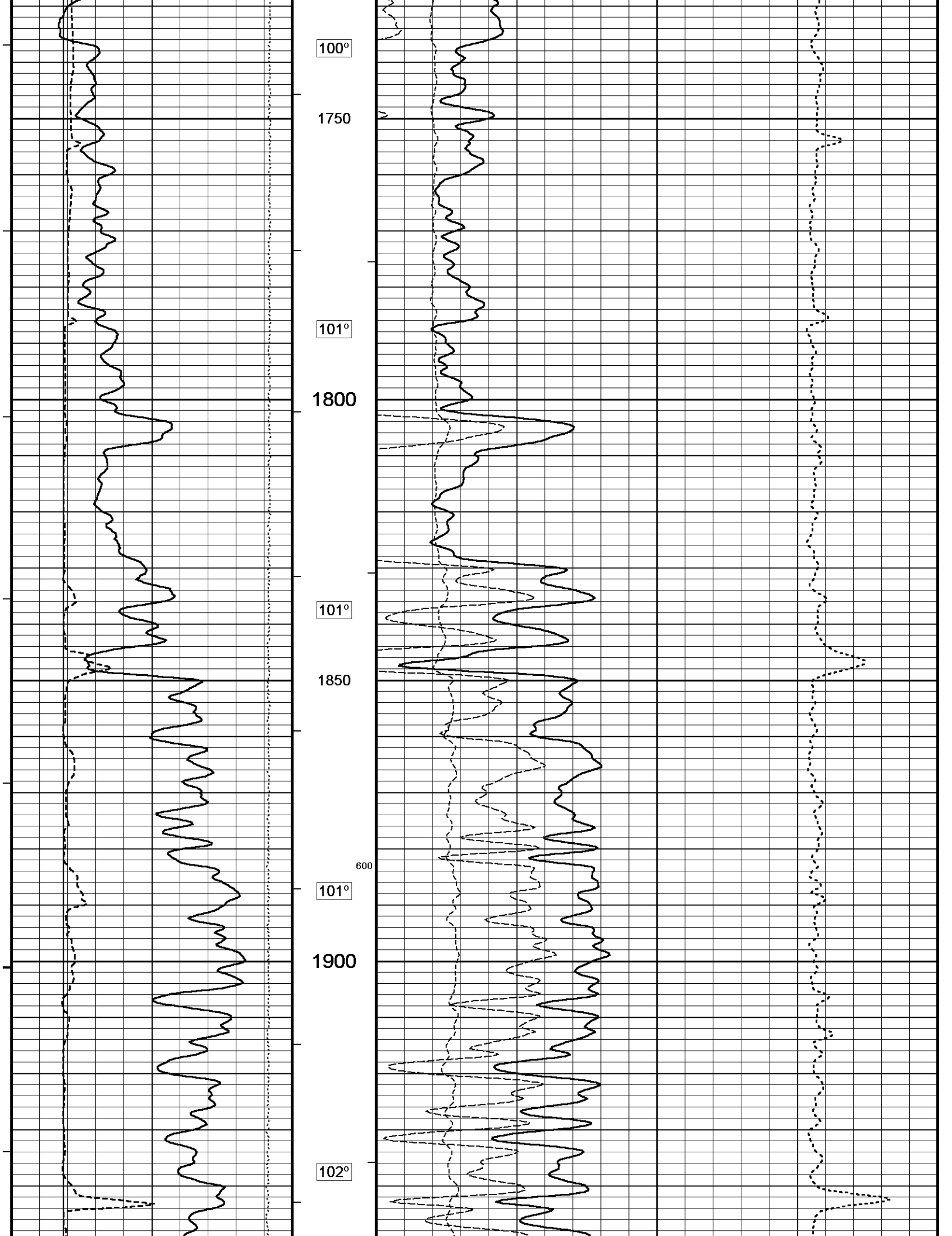
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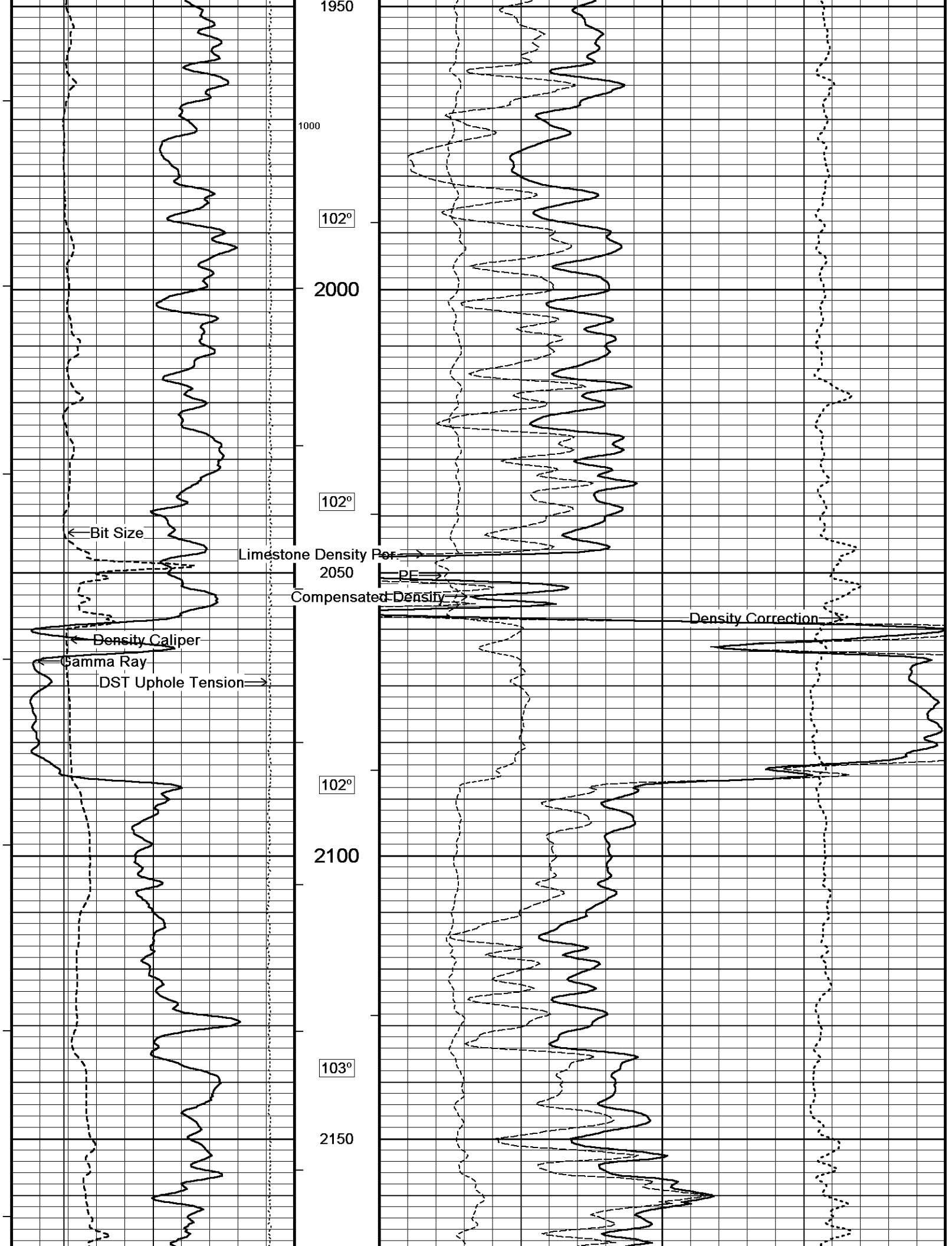
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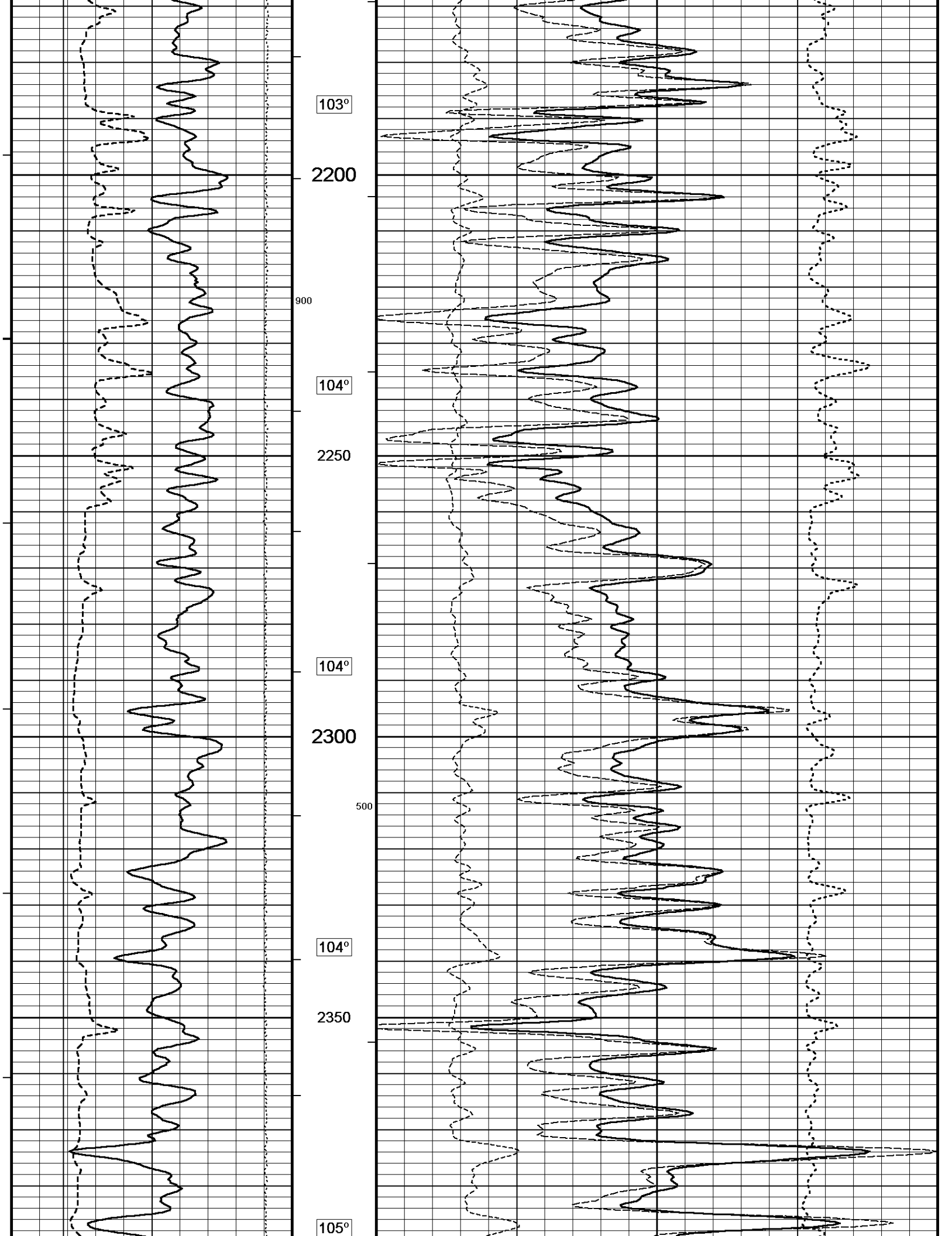
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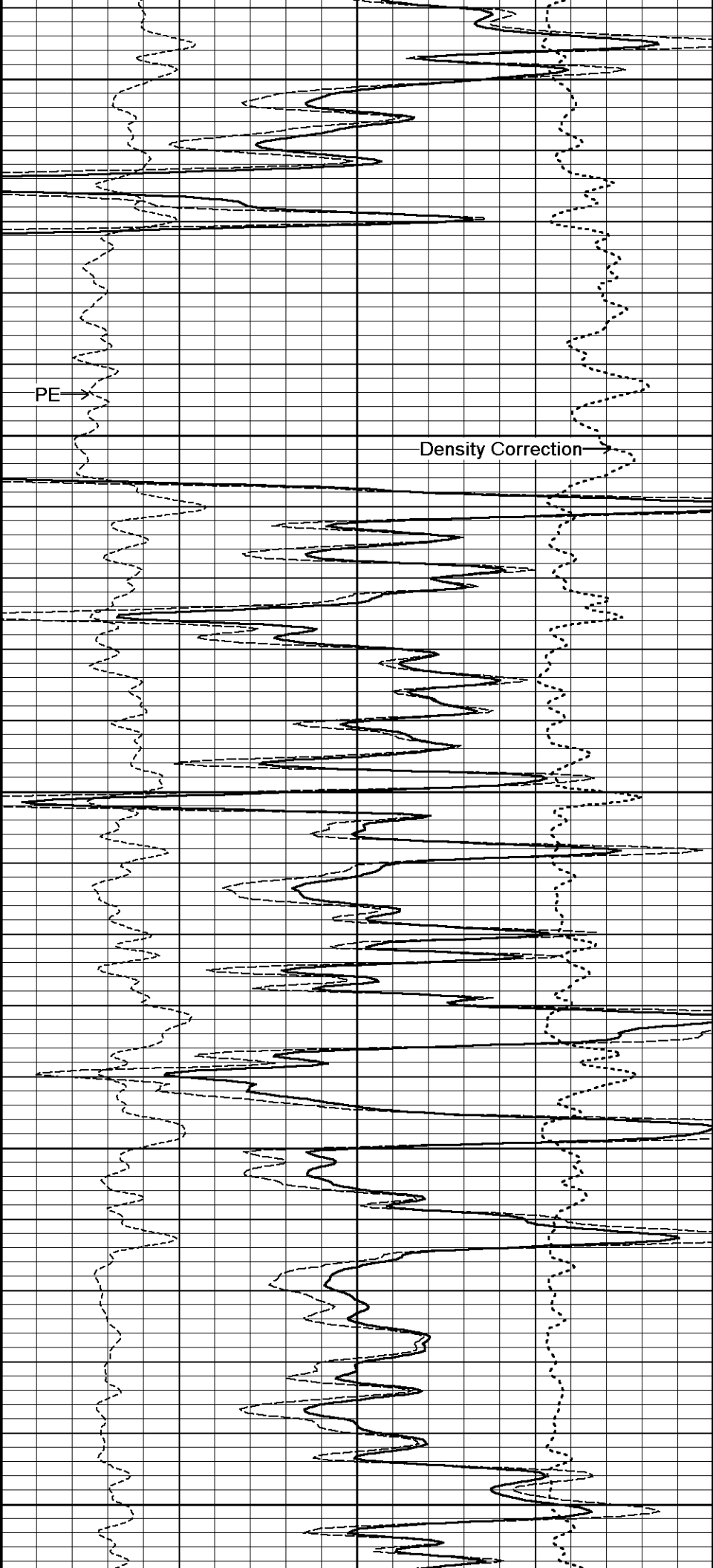
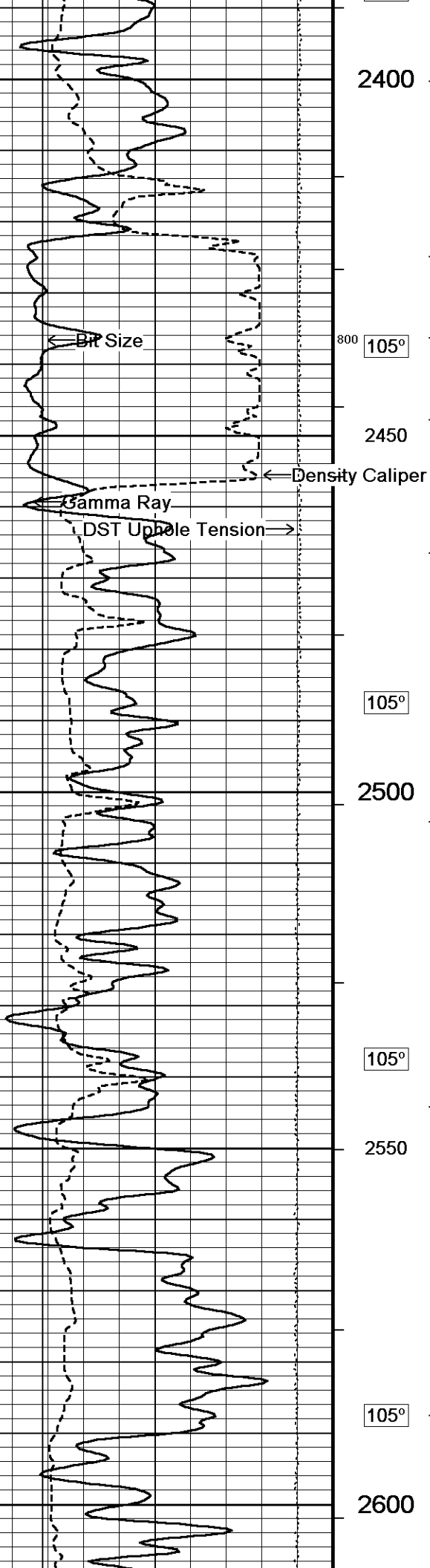
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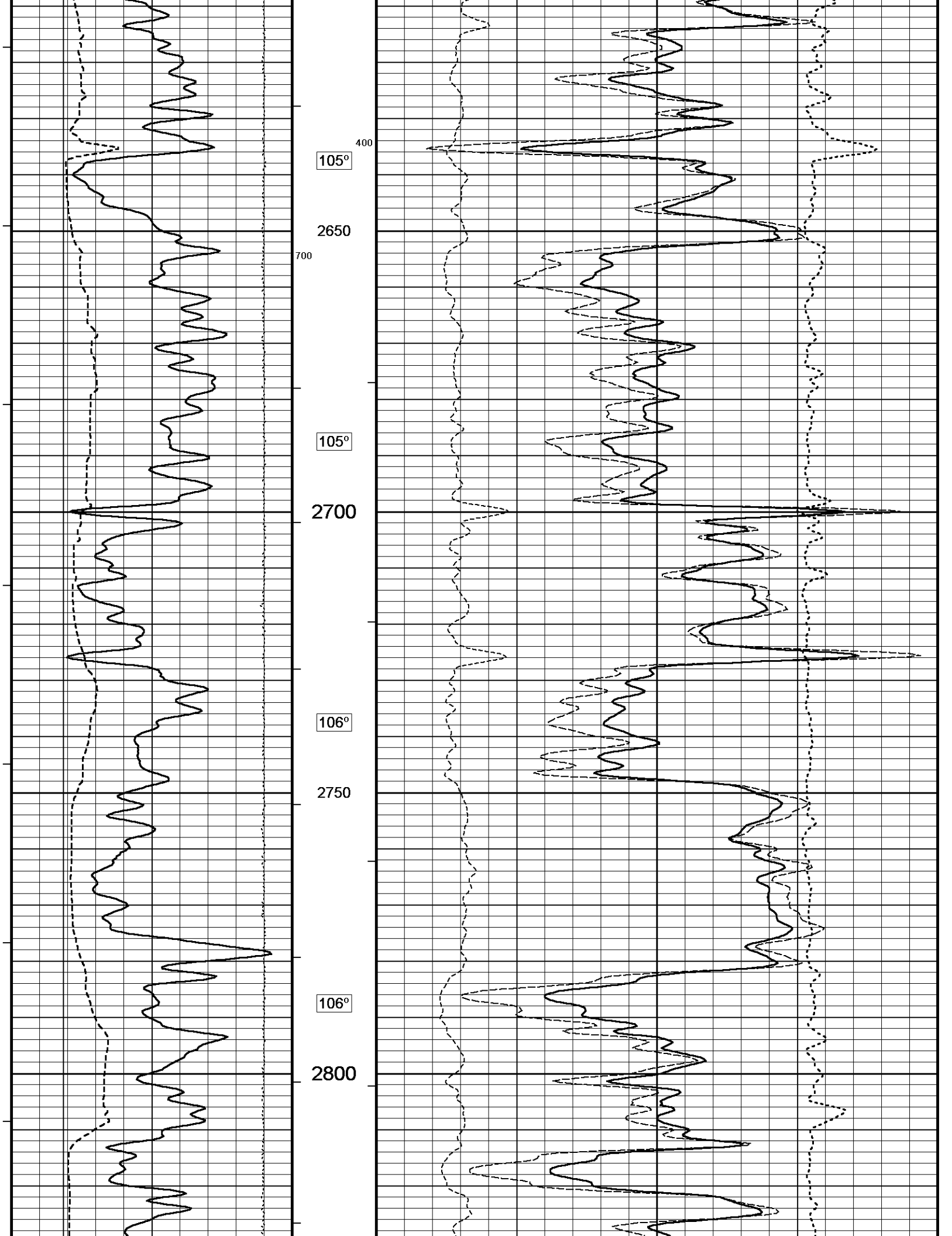


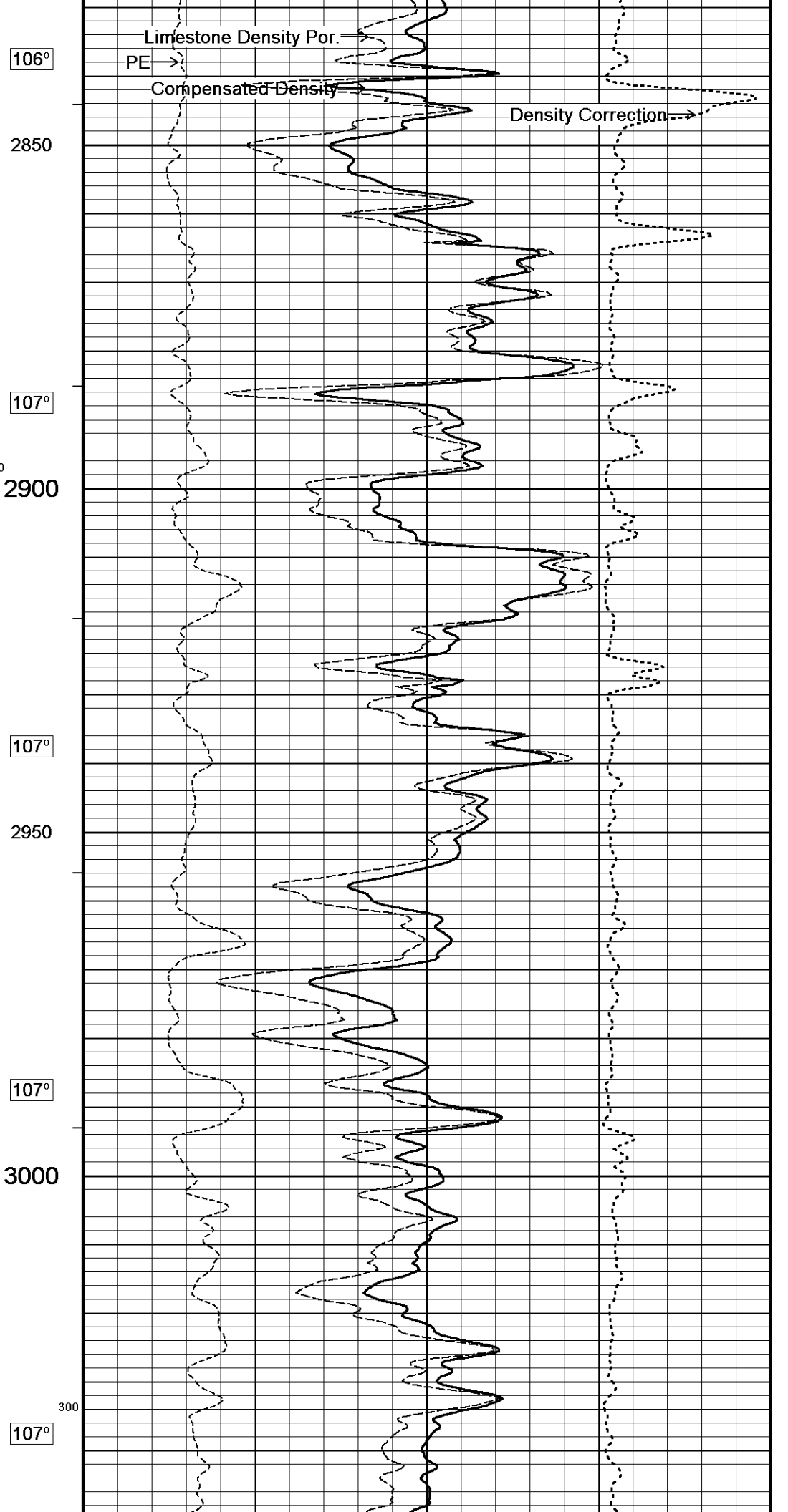
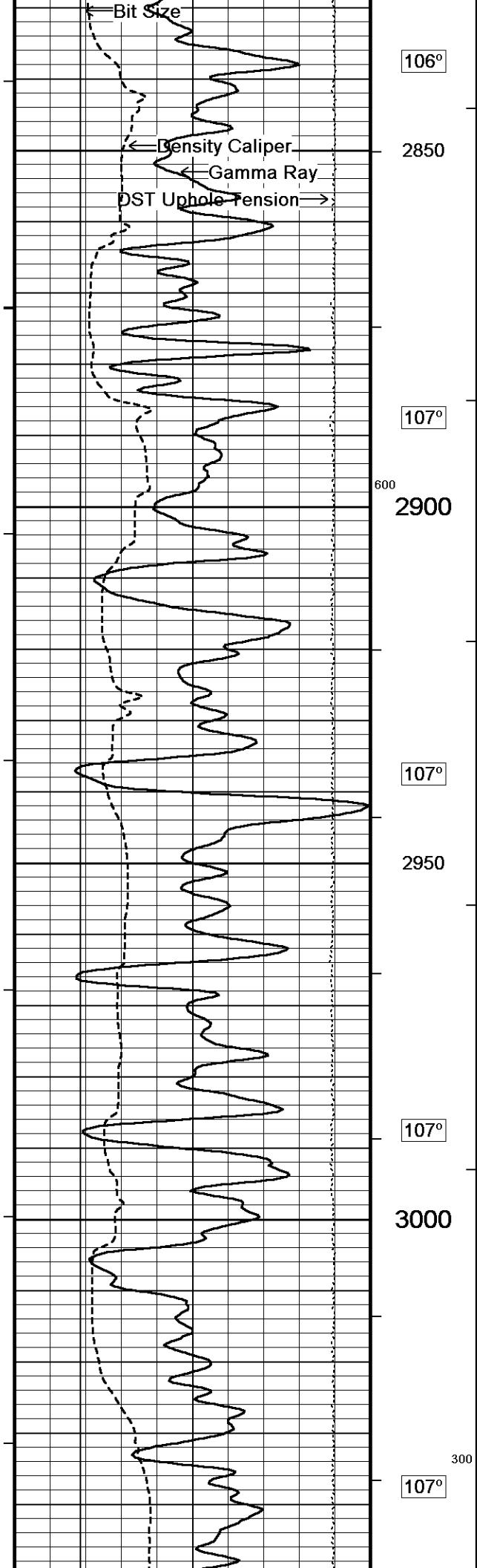


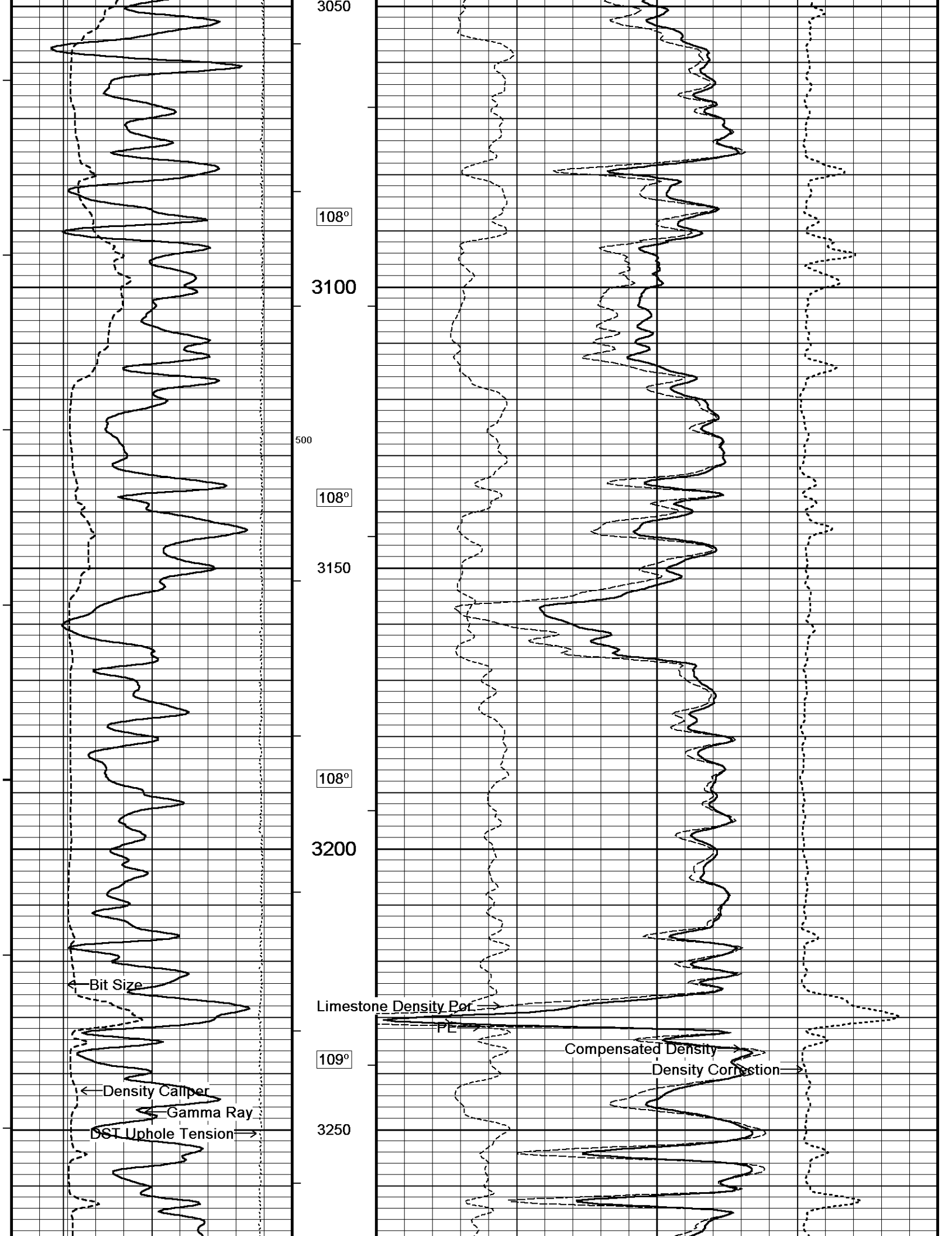


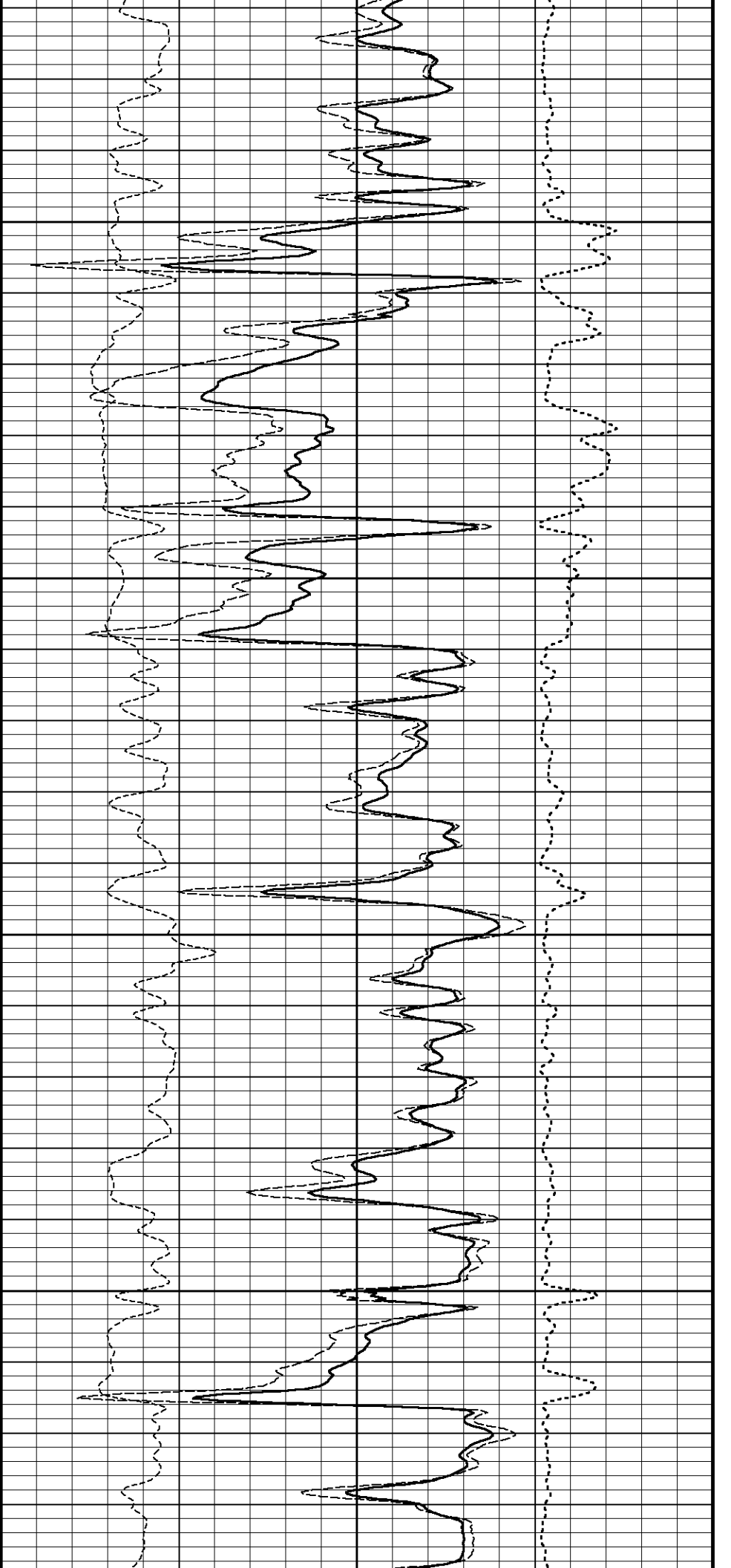
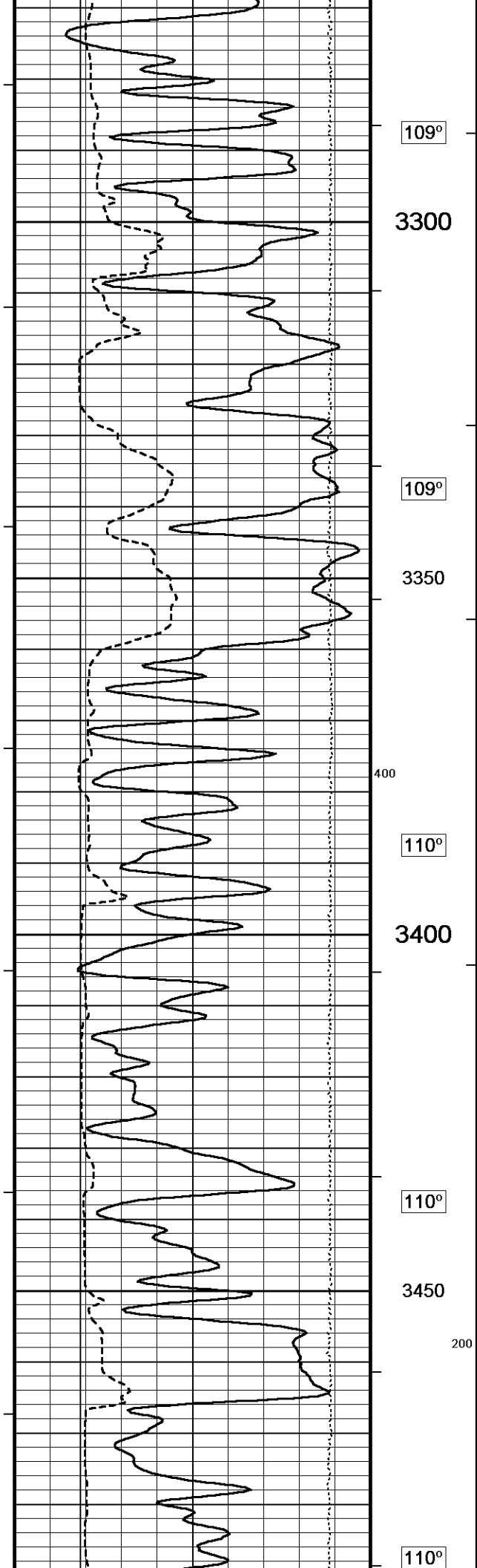


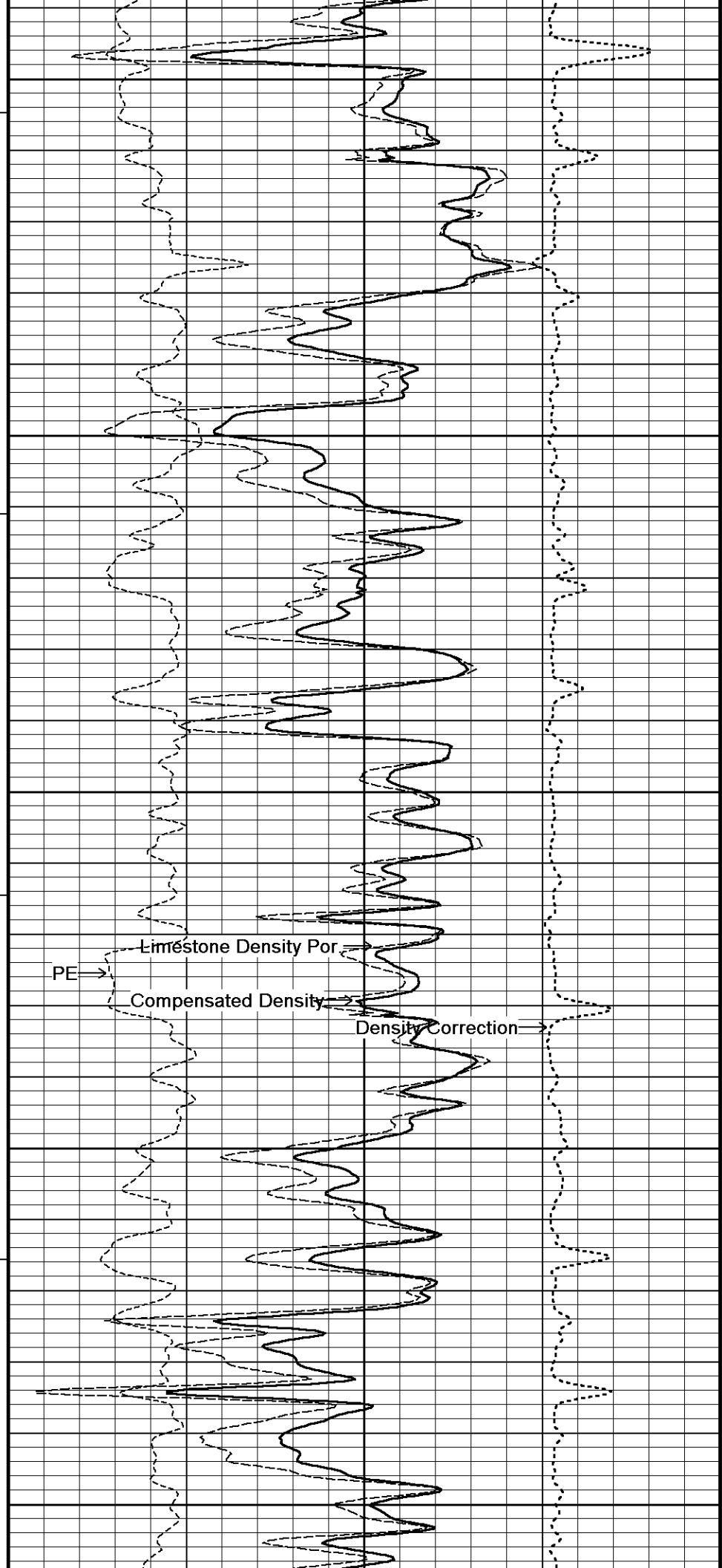
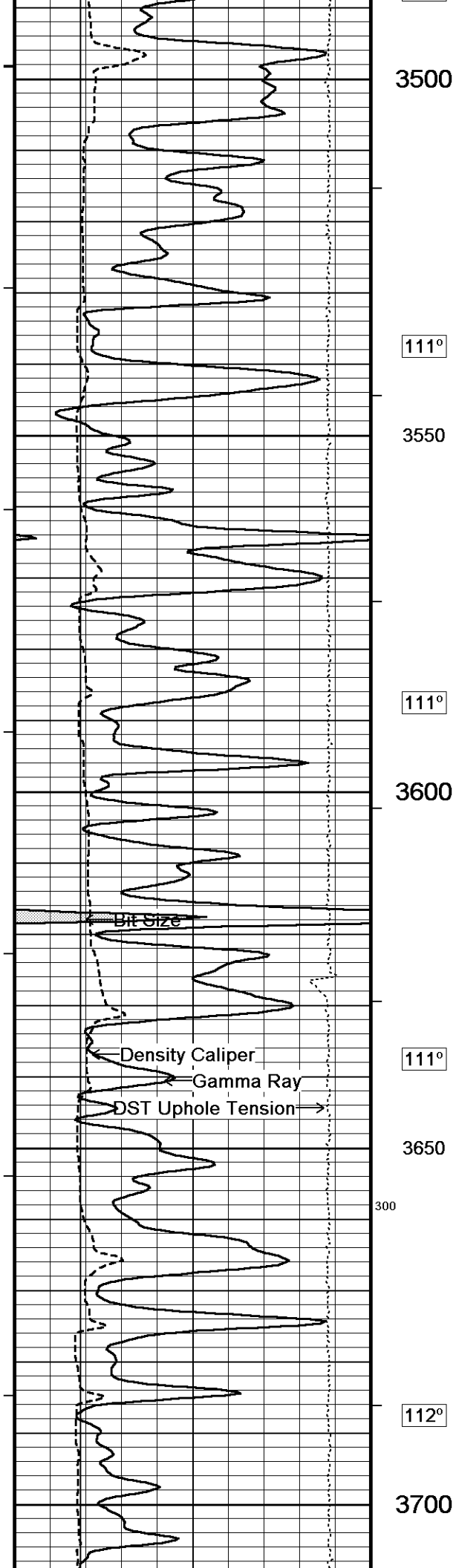


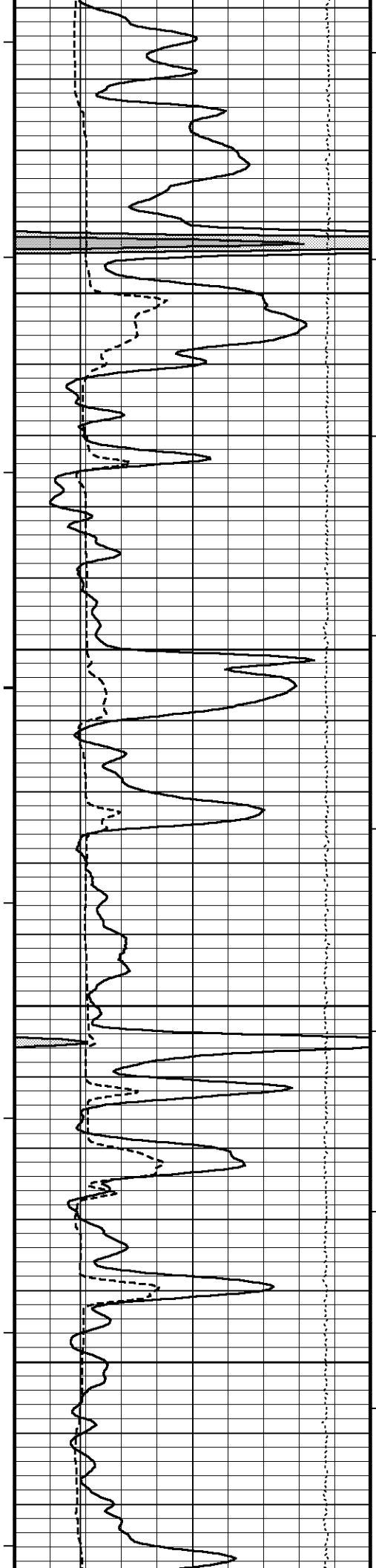












112°

3750

112°

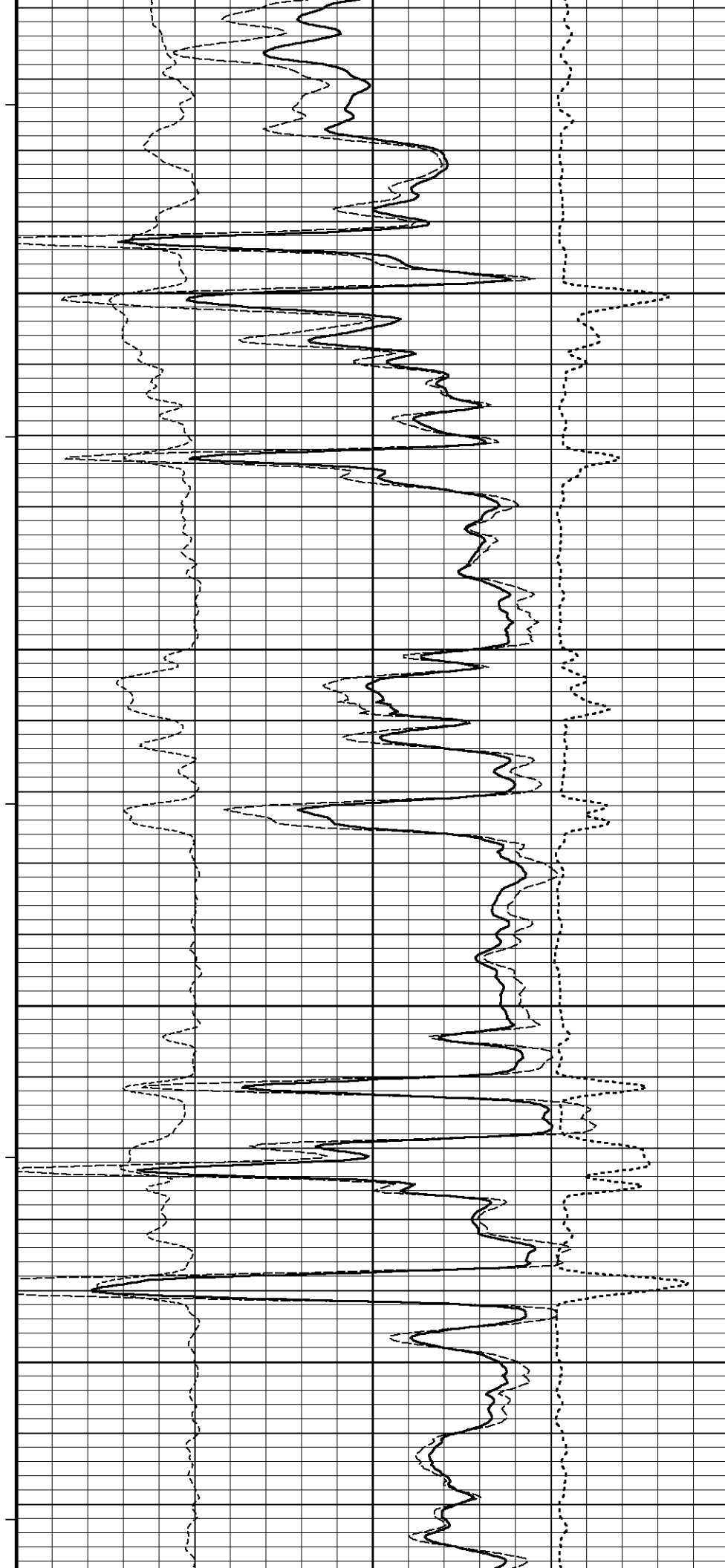
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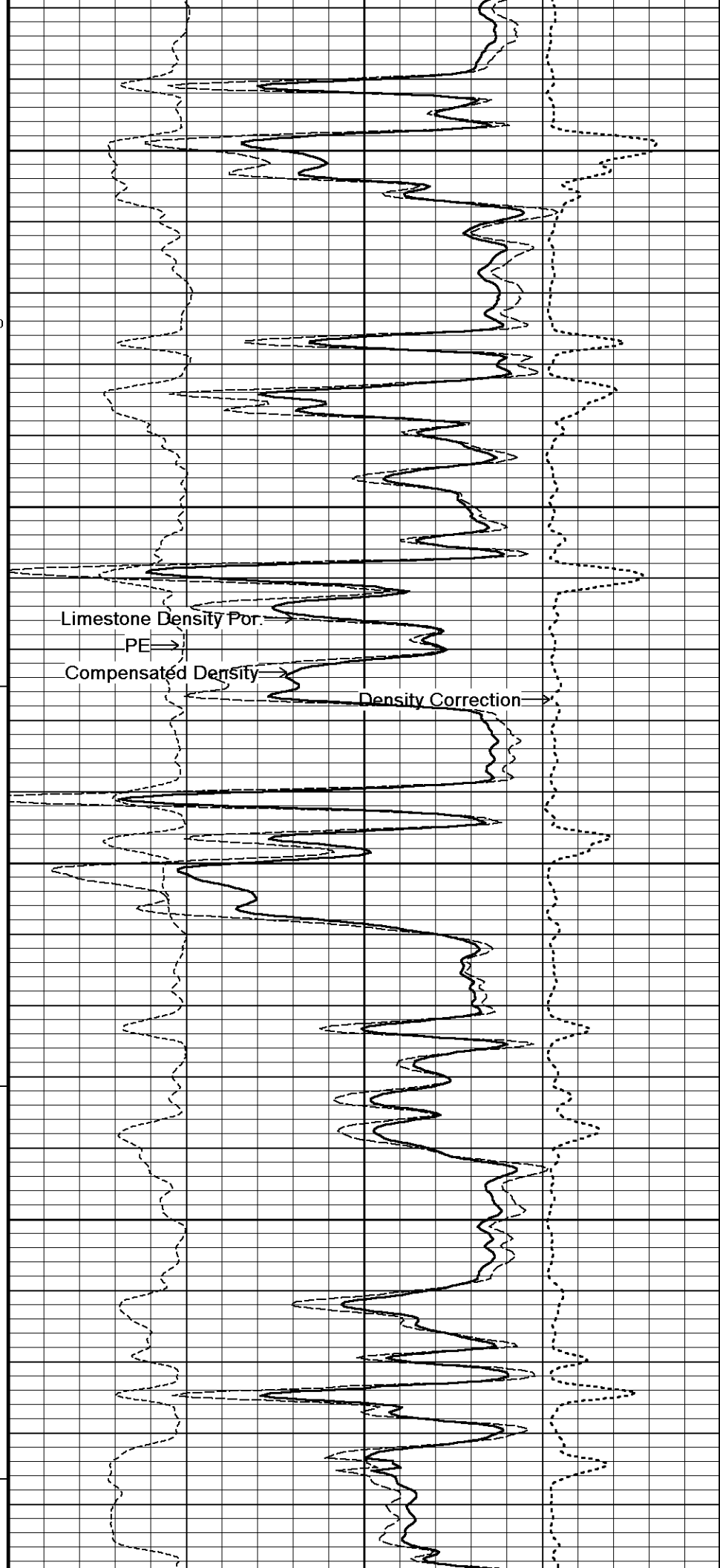
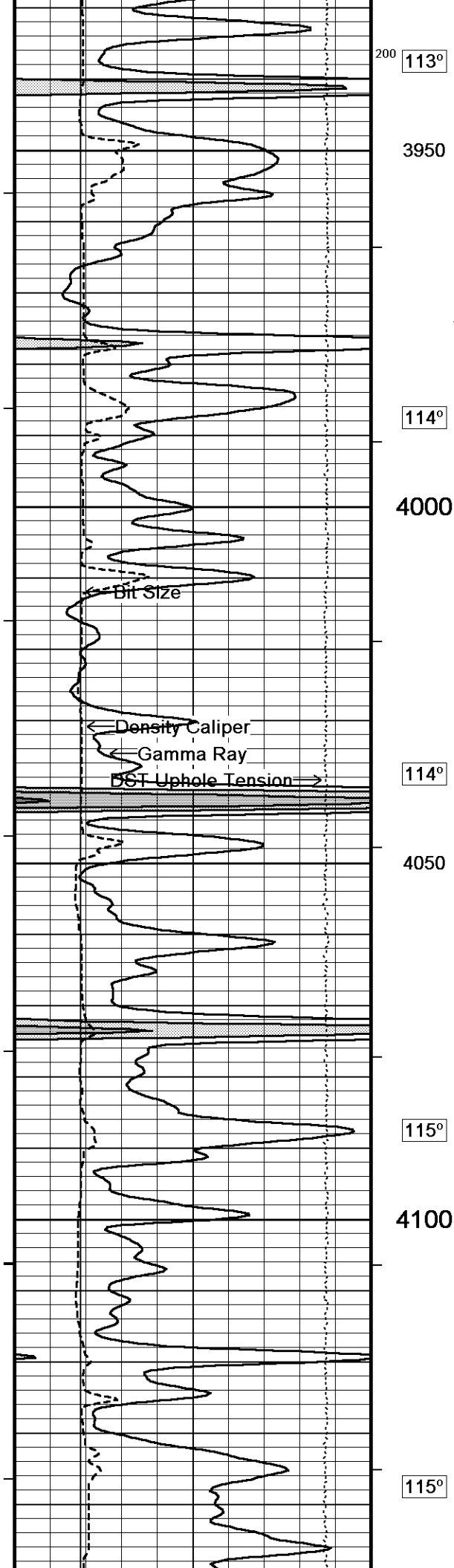
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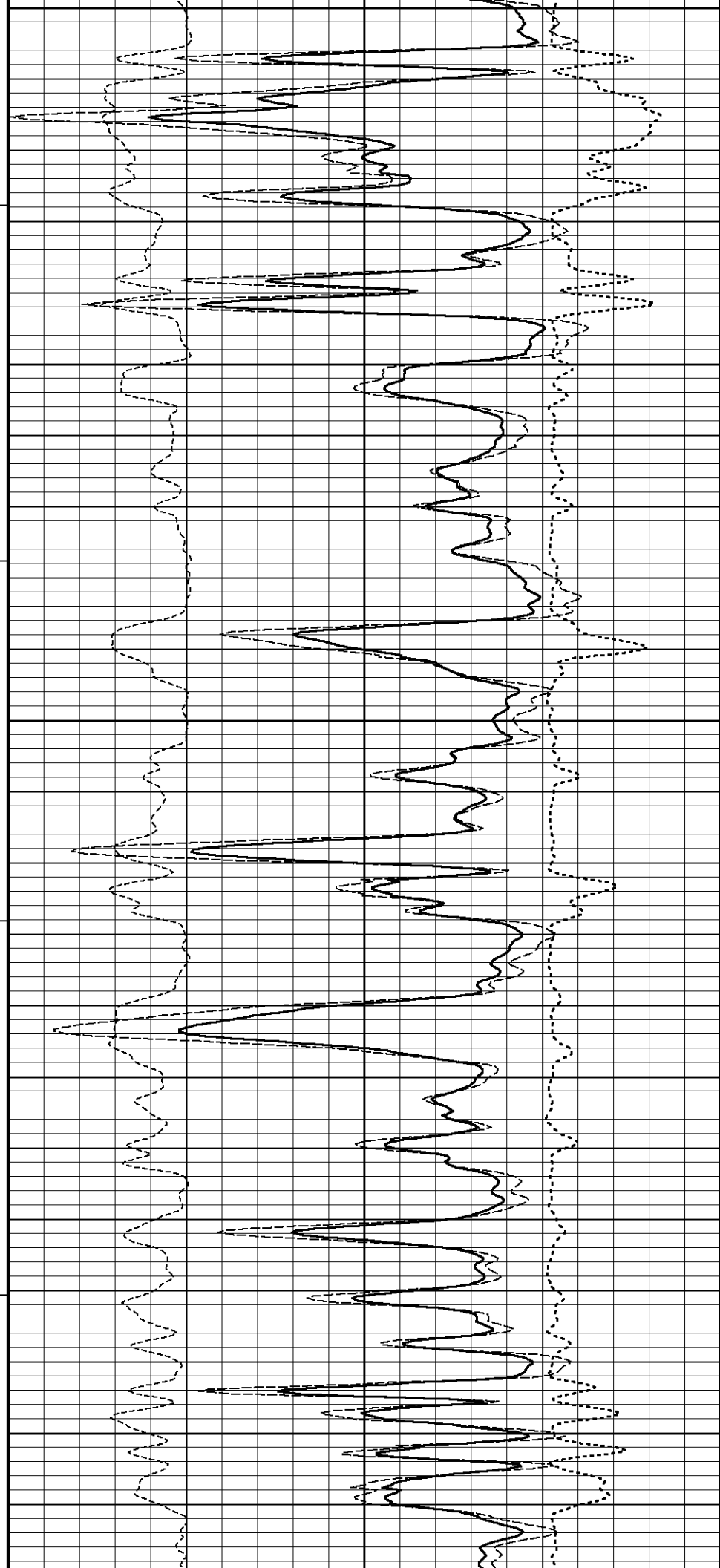
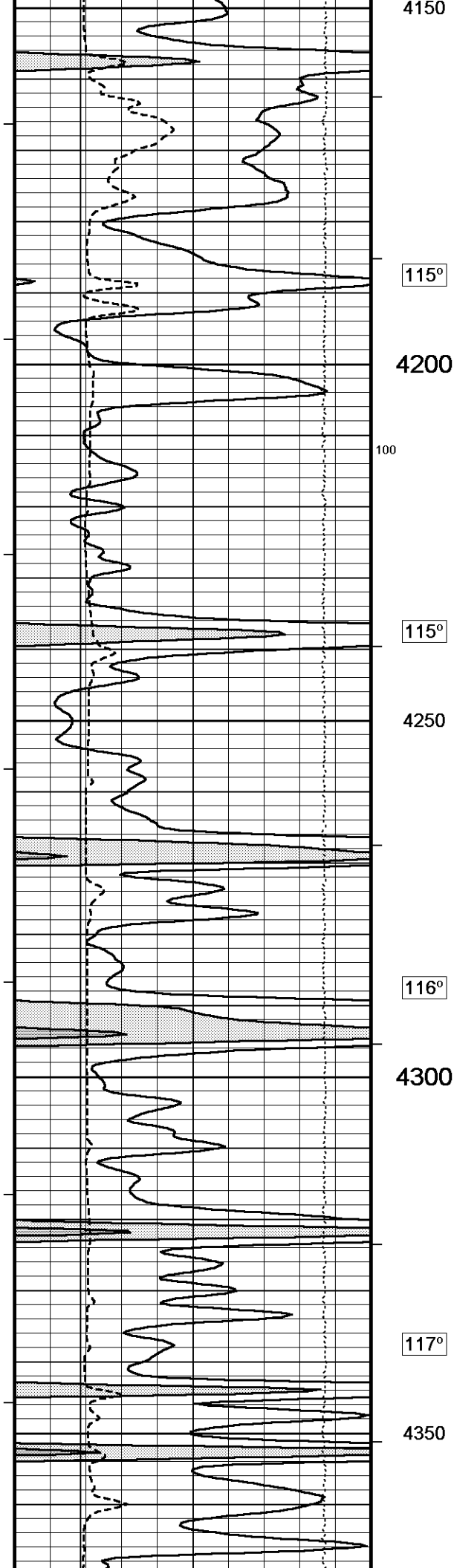
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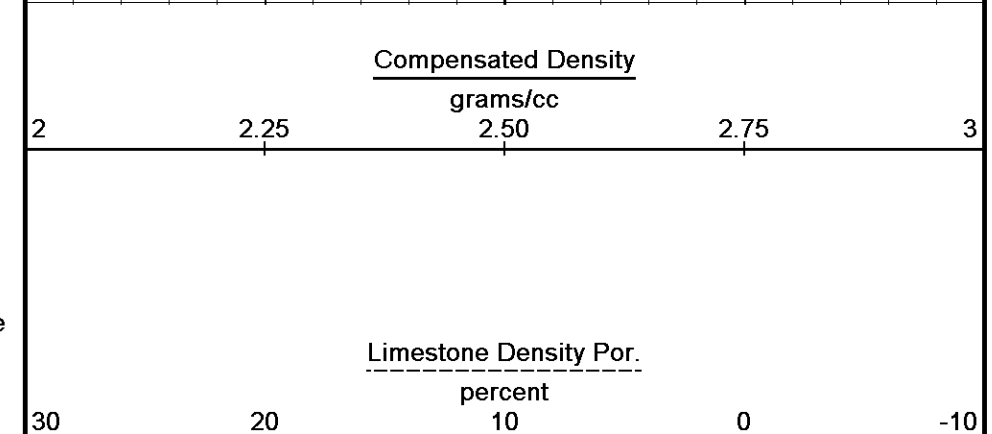
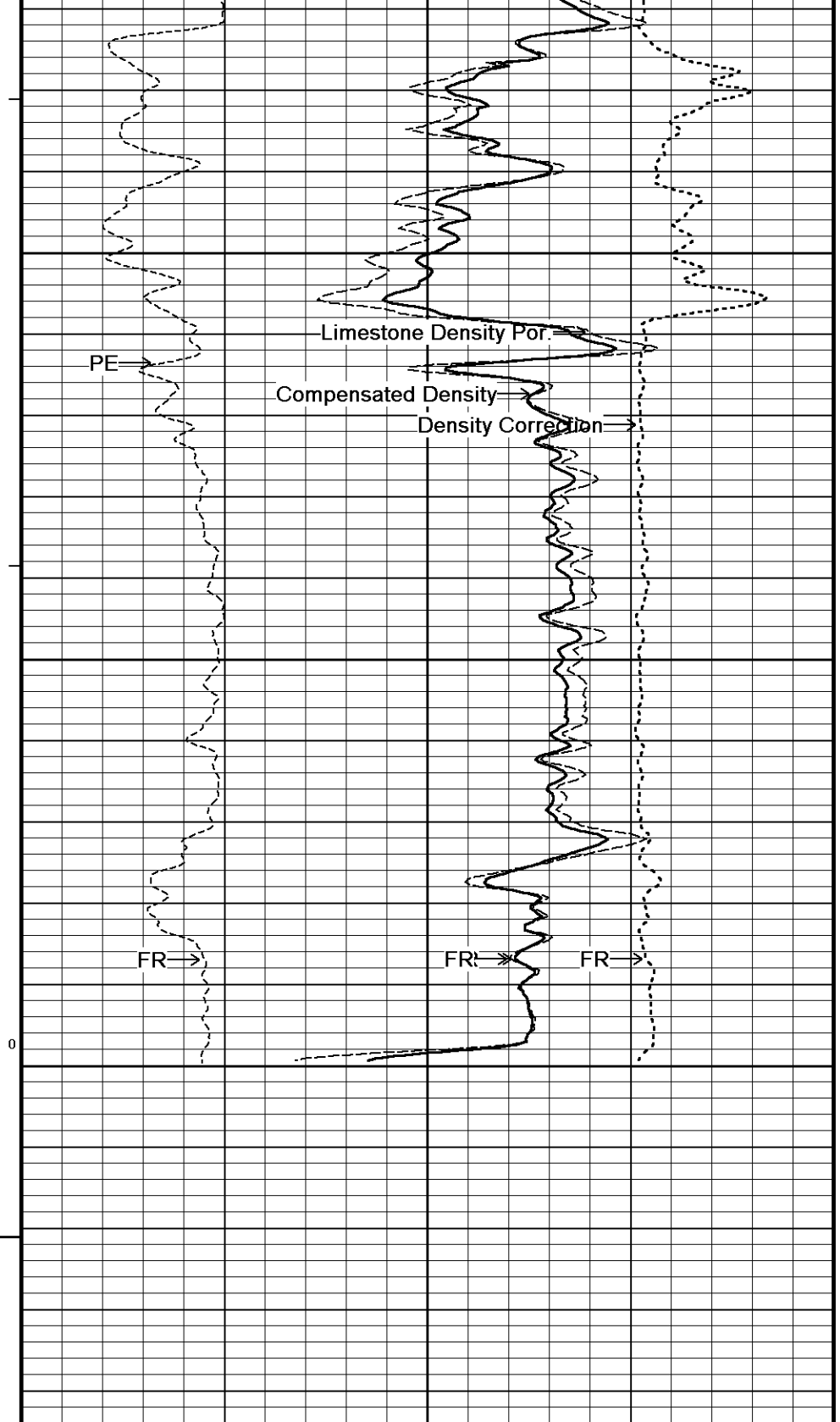
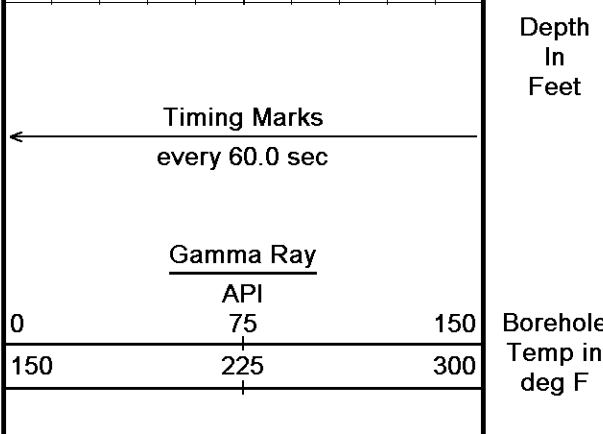
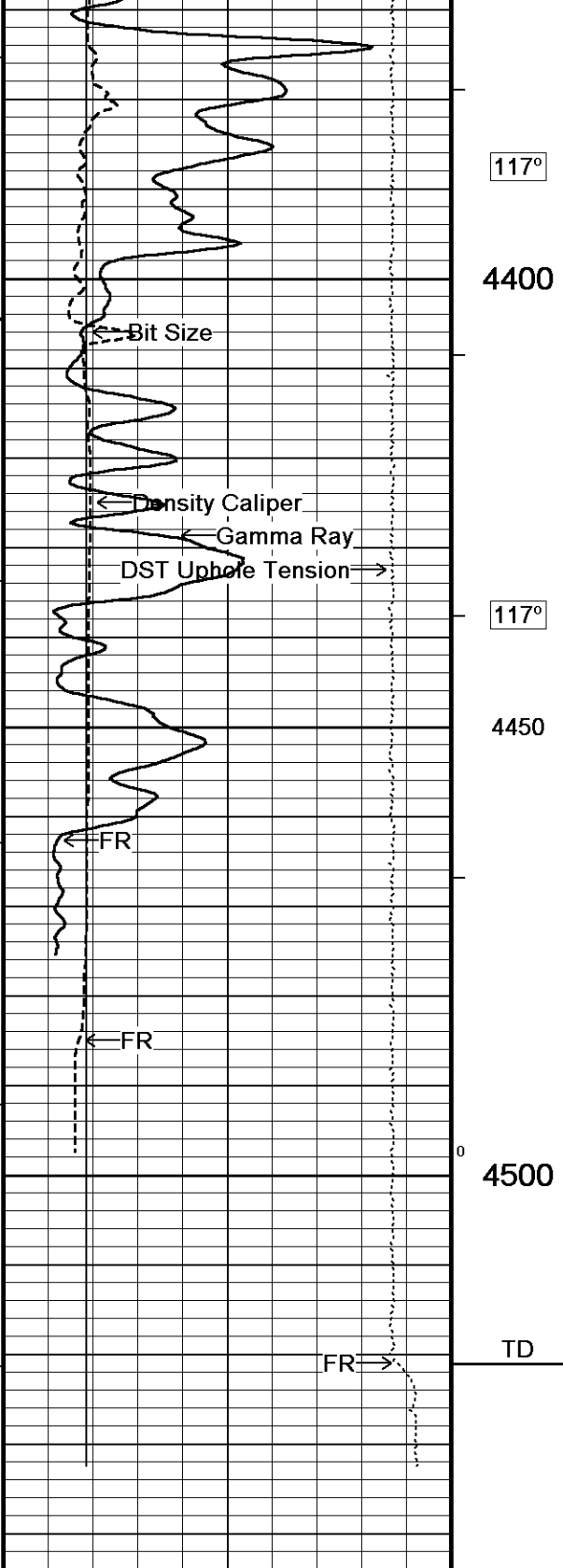
113°

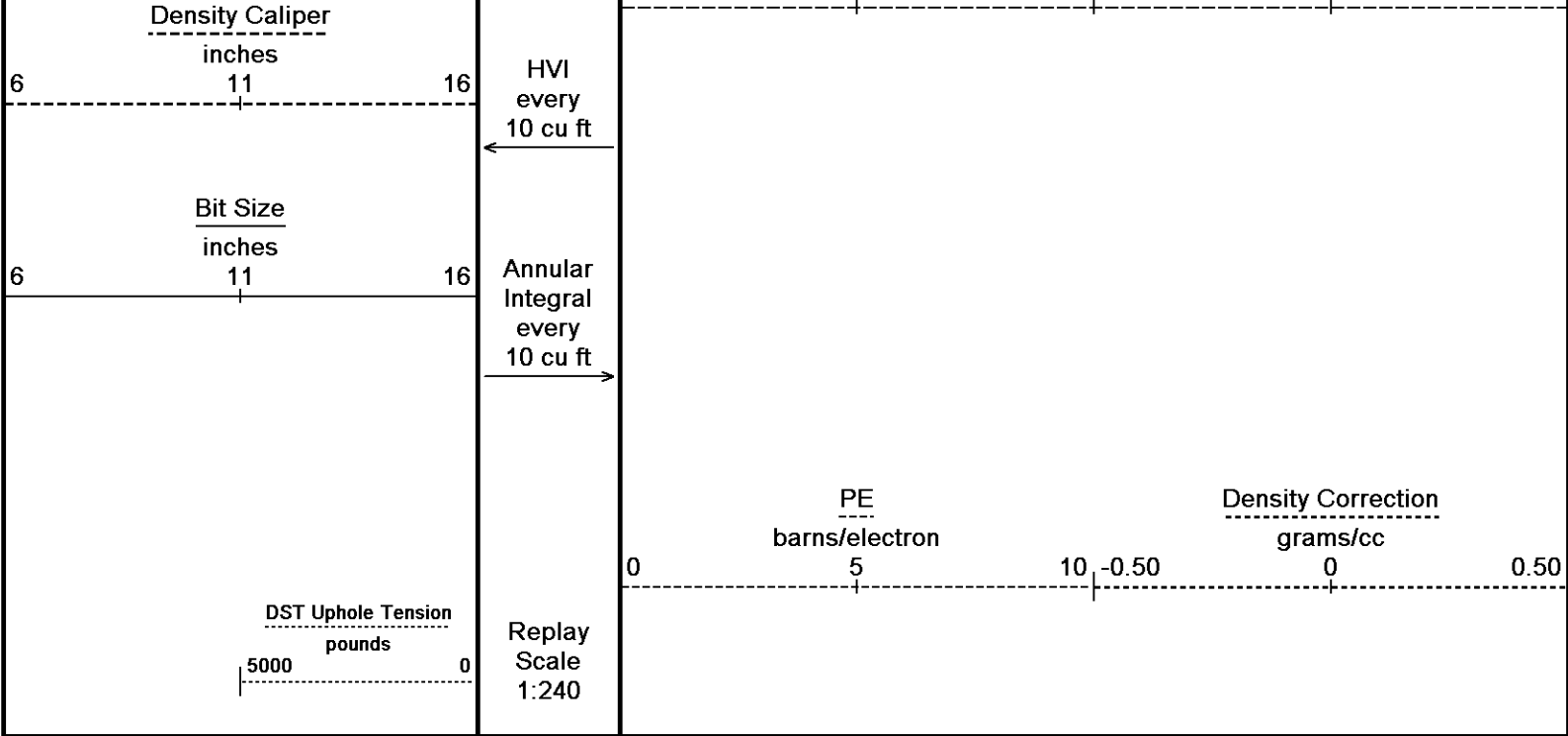
3900











Depth Based Data - Maximum Sampling Increment 10.0cm

Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_002.dta

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 12-DEC-2018 22:44

Recorded on 12-DEC-2018 19:44

↑

5 INCH BULK DENSITY MAIN

↑

↓

REPEAT SECTION

↓

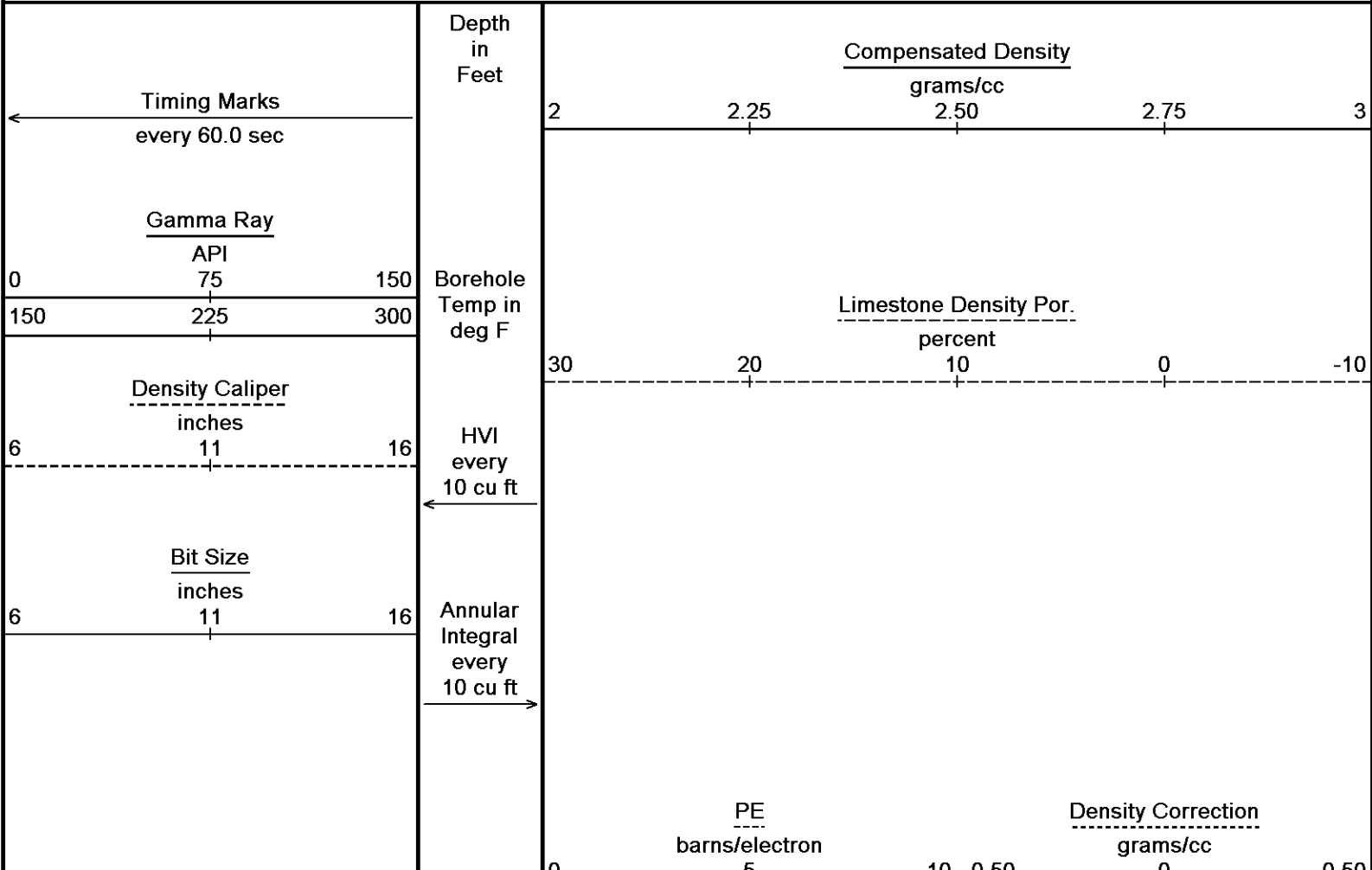
Depth Based Data - Maximum Sampling Increment 10.0cm

Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 12-DEC-2018 22:44

Recorded on 12-DEC-2018 18:51



DST Uphole Tension
pounds

5000

0

Replay
Scale
1:240

3700

111°

3750

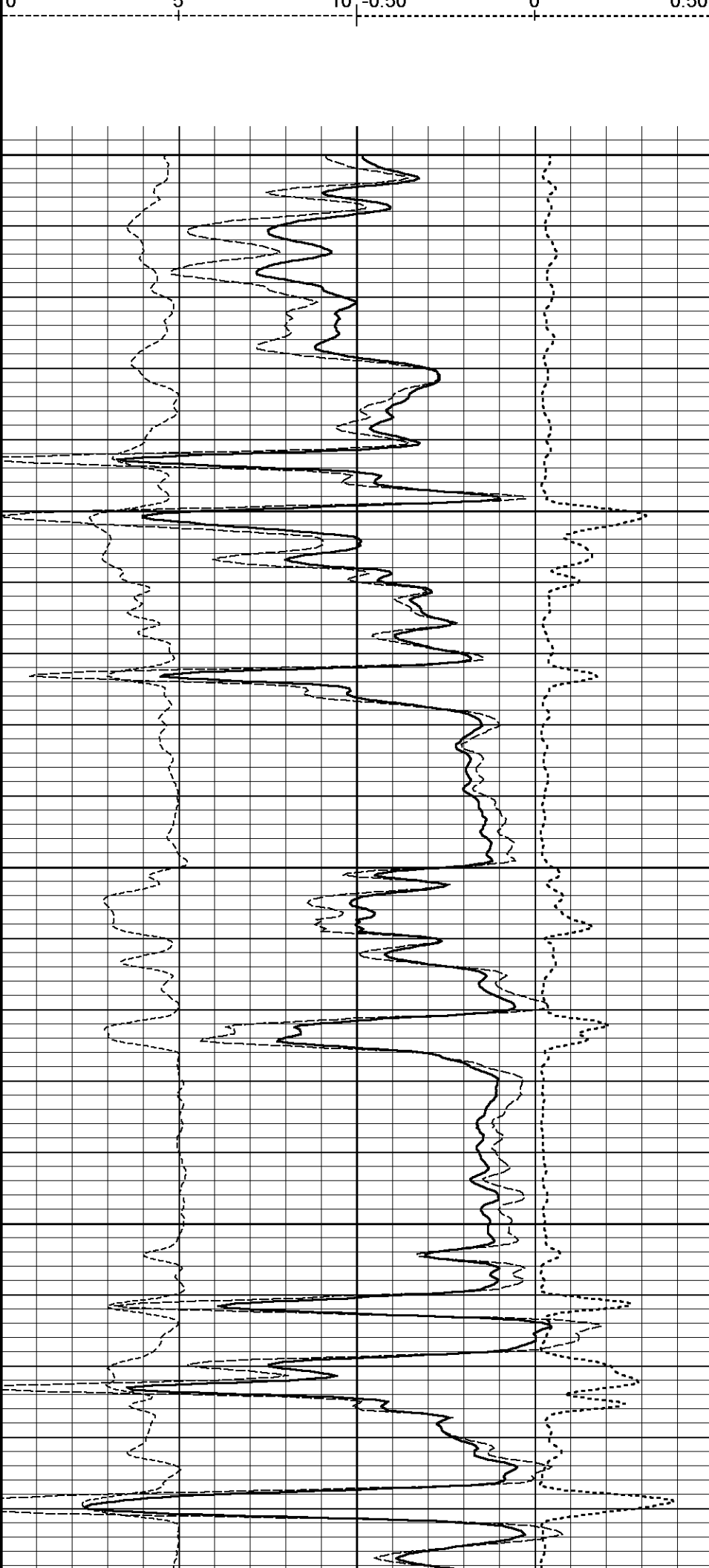
111°

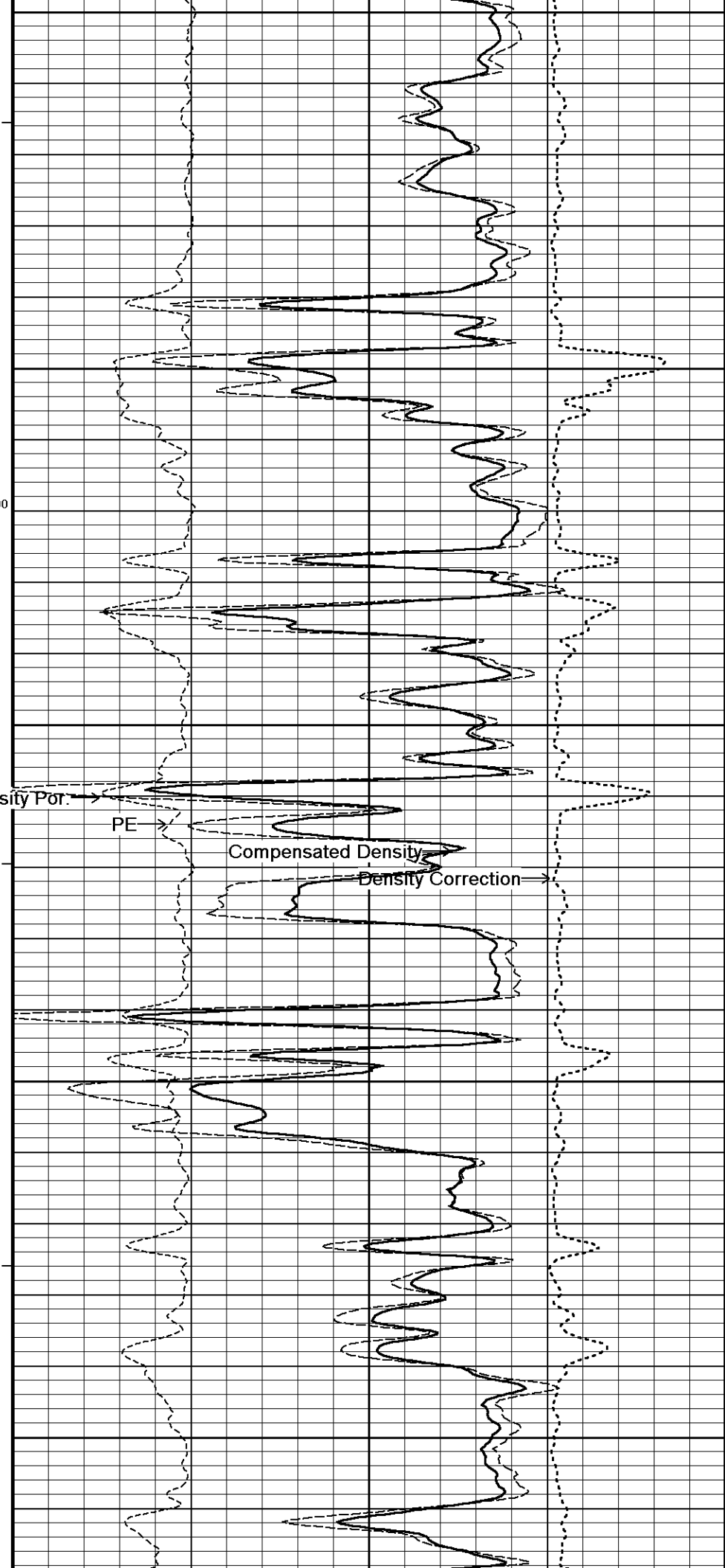
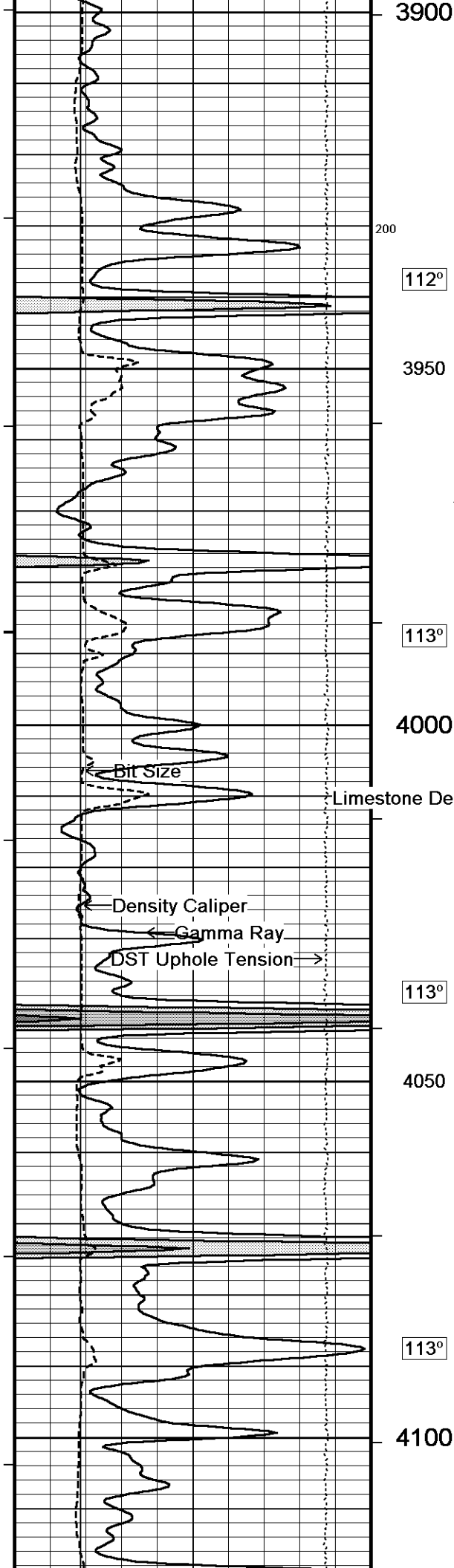
3800

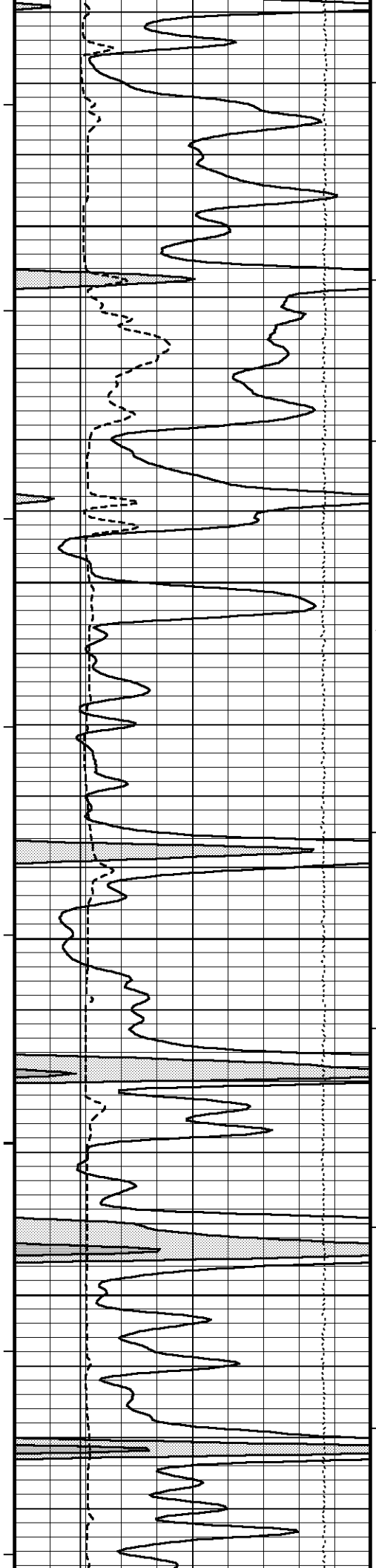
112°

3850

112°







113°

4150

114°

4200

100

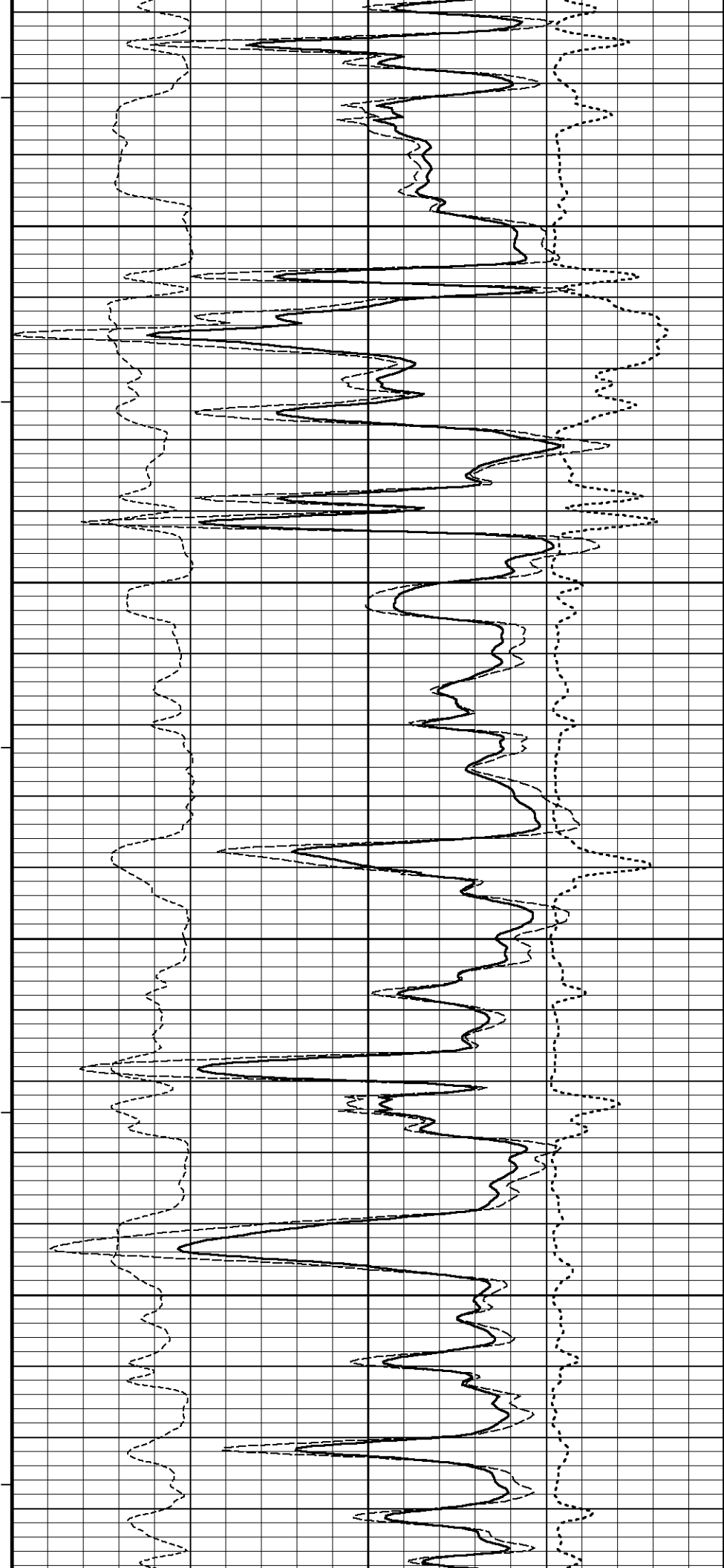
114°

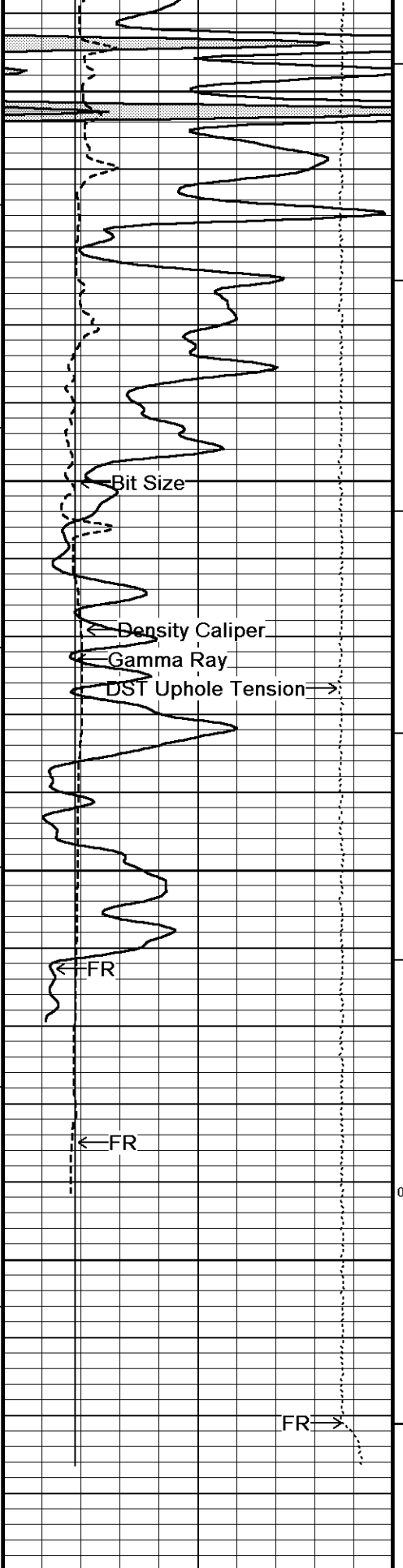
4250

115°

4300

115°





4350

116°

4400

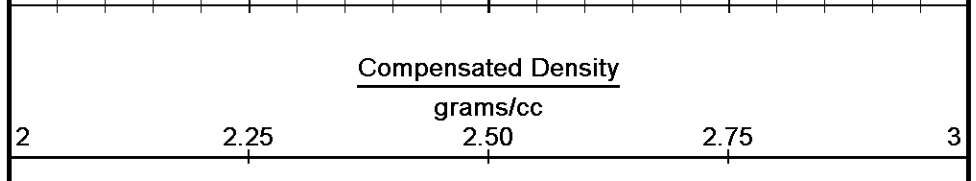
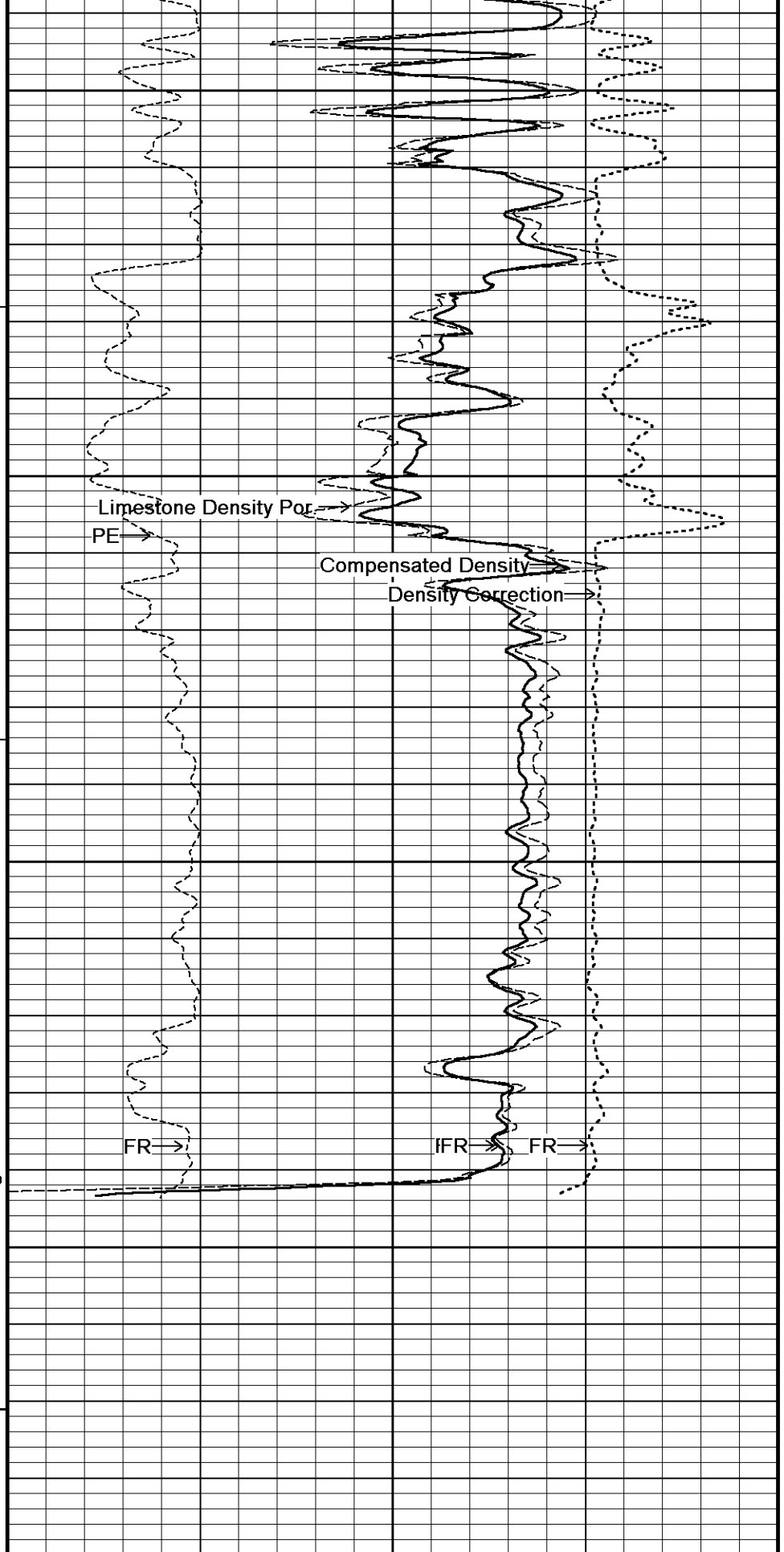
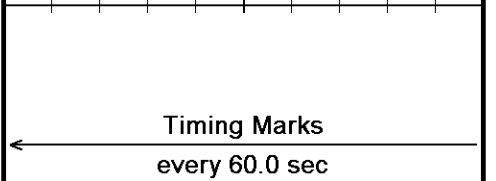
115°

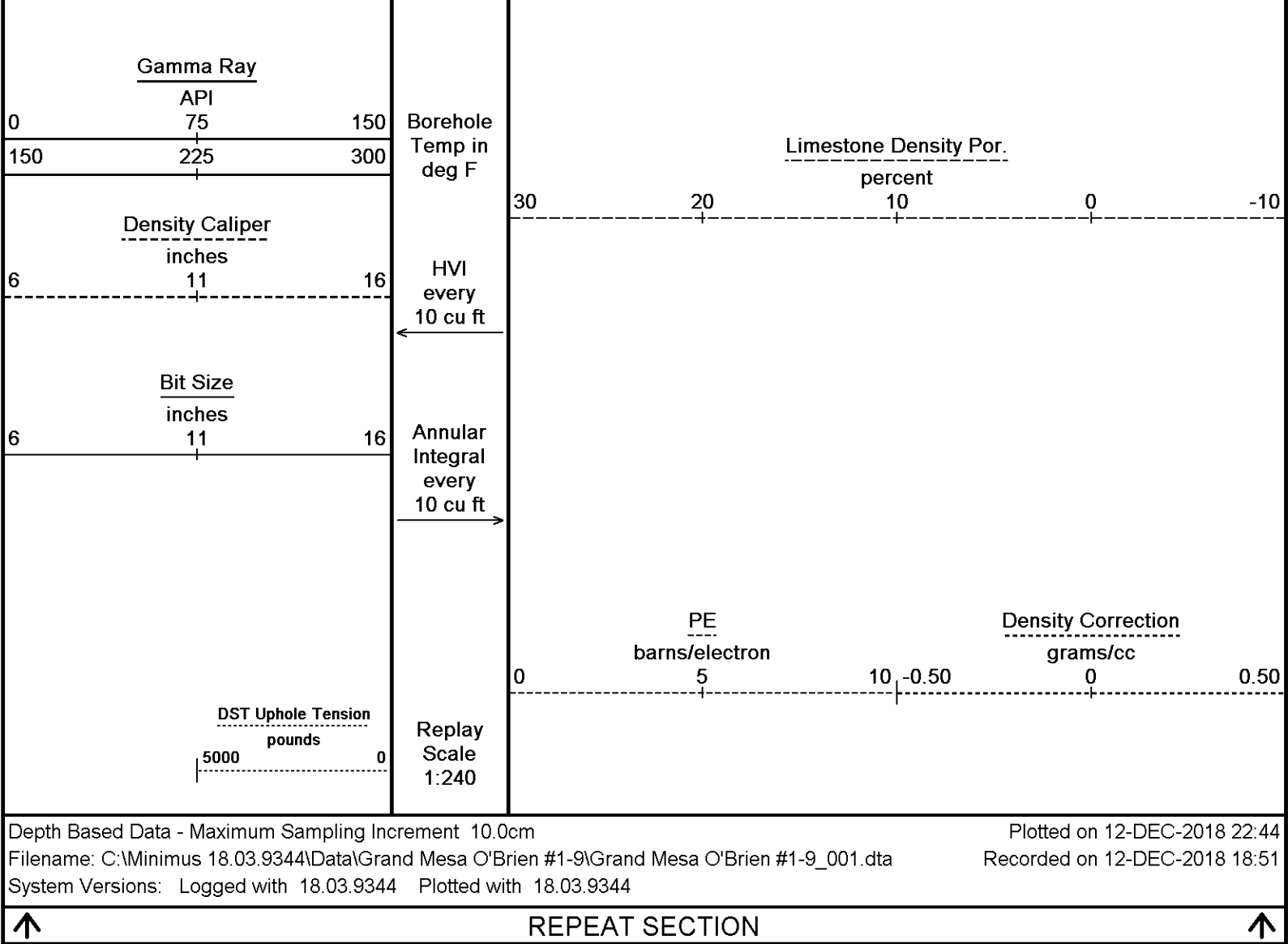
4450

0

4500

Depth in Feet





BEFORE SURVEY CALIBRATION			
C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta			
General Constants All 000			Last Edited on 12-DEC-2018,18:23
General Parameters			
Mud Resistivity	1.270	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	

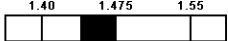
Pre-filter Length 11

Gamma Calibration MCG-D.K 443

Field Calibration on 10-DEC-2018 18:45

	Measured	Calibrated (API)
Background	103	72
Calibrator (Gross)	759	528
Calibrator (Net)	656	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio 1.439  Counts/API

Gamma Constants MCG-D.K 443

Last Edited on 12-DEC-2018,16:59

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.12	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 10-DEC-2018 18:22

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)
	7.99	7.97

Caliper Calibration Tolerances MPD-C.A 216

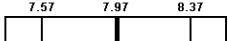
Long Arm Field Cal. 7.99  in

Photo Density Calibration MPD-C.A 216

Base Calibration on 04-DEC-2018 12:43

Field Check on 10-DEC-2018 18:28

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	998.9	1196.1
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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	184.2	897.2
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Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.57	-5%	2.52	+5%
PE Calibration	0.122	0.089	0.110	0.131
Near Den. Field Check	998.9	-3%	996.3	+3%
PE WS Field Check	184.9	-6%	182.6	+6%

Far Density Ratio	21.36	-5%	21.00	+5%
Far Den. Field Check	1196.1	-3%	1187.9	+3%
PE WH Field Check	897.0	-6%	895.4	+6%

Density Constants MPD-C.A 216

Last Edited on 12-DEC-2018,16:59

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	1.12	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	

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.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

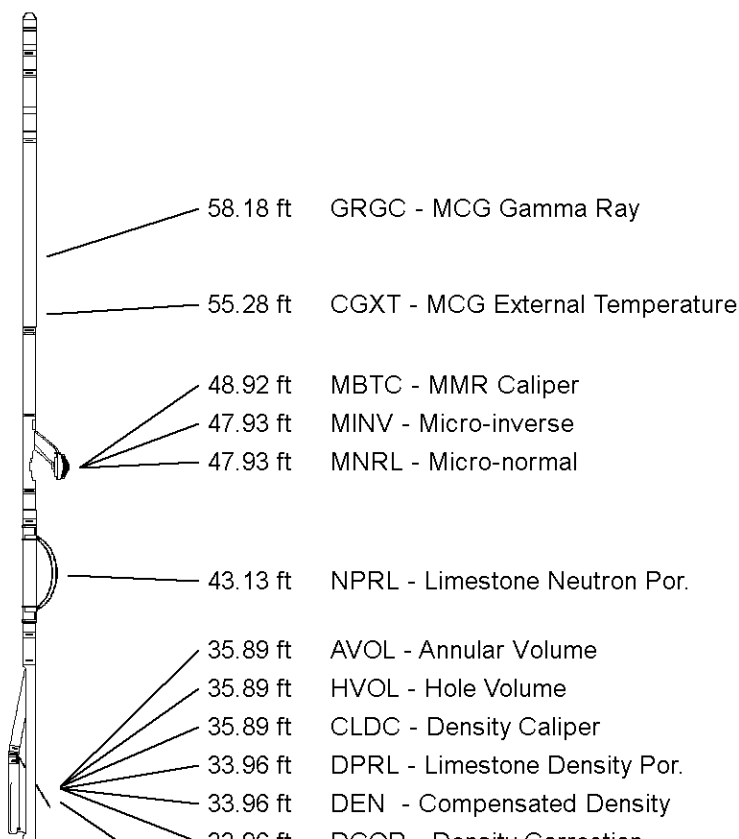
Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

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
SK.I-D A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

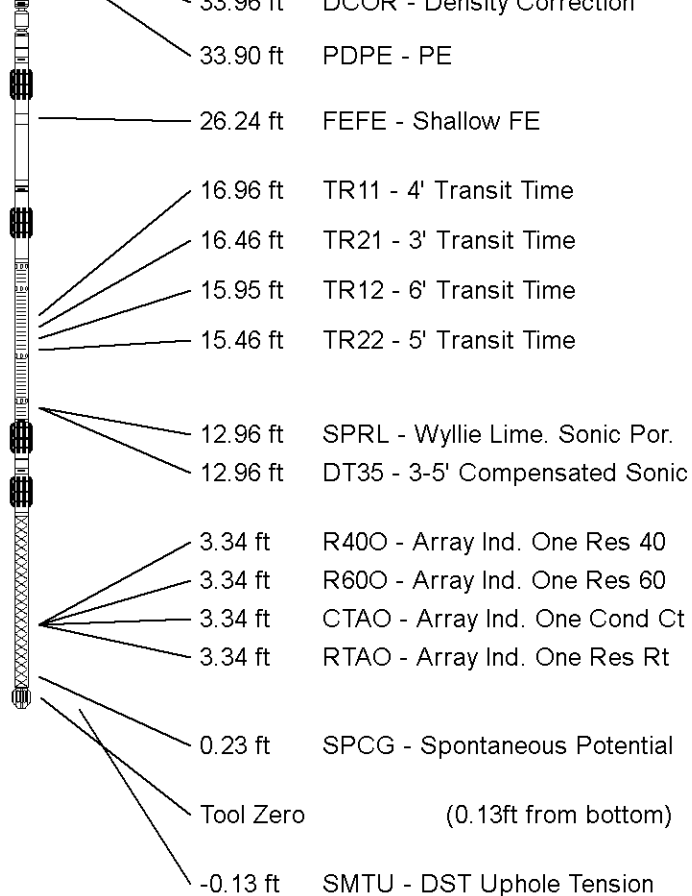


Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

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	GRAND MESA OPERATING COMPANY
WELL	OBRIEN #1-9
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2661	feet	First Reading	4487.00	feet
Elevation Drill Floor	2659	feet	Depth Driller	4520.00	feet
Elevation Ground Level	2656	feet	Depth Logger	4521.00	feet



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COMPENSATED NEUTRON
MICRORESISTIVITY LOG