Weatherford

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	GRAND MESA OPERATING COMPANY
WELL	RINGER #1-24
FIELD	WILDCAT
PROVINCE/COUNTY	BARBER
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1792' FNL & 1266' FEL

SEC 24	TWP 30S	RGE 12W	Other Services
Latitude			MAI/MFE MSS
Longitude			
API Number	15-007-24329		

Permanent Datum GL, Elevation 1791 feet
Log Measured From KB, 5.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	1796.00
DF	1794.00
GL	1791.00

Date	24-JUN-2018			
Run Number	ONE			
Service Order	4558-217017166			
Depth Driller	4920.00	feet		
Depth Logger	4914.00	feet		
First Reading	4880.00	feet		
Last Reading	2500.00	feet		
Casing Driller	217.00	feet		
Casing Logger	218.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg		45.00 CP	
PH / Fluid Loss	9.00		11.00 ml/30Min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.42 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.34 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.50 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.25 @126.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	126.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	ADAM SILL			
Witnessed By	DAVE BARKER			

BOREHOLE RECORD

Last Edited: 24-JUN-2018 08:52

Bit Size inches	Depth From feet	Depth To feet
7.875	217.00	4920.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	217.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 18.01.6830.
- 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: 2550 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 2500 FEET: 625 CU.FT.

- RIG: WW DRILLING #4.

- ENGINEER: A. SILL.

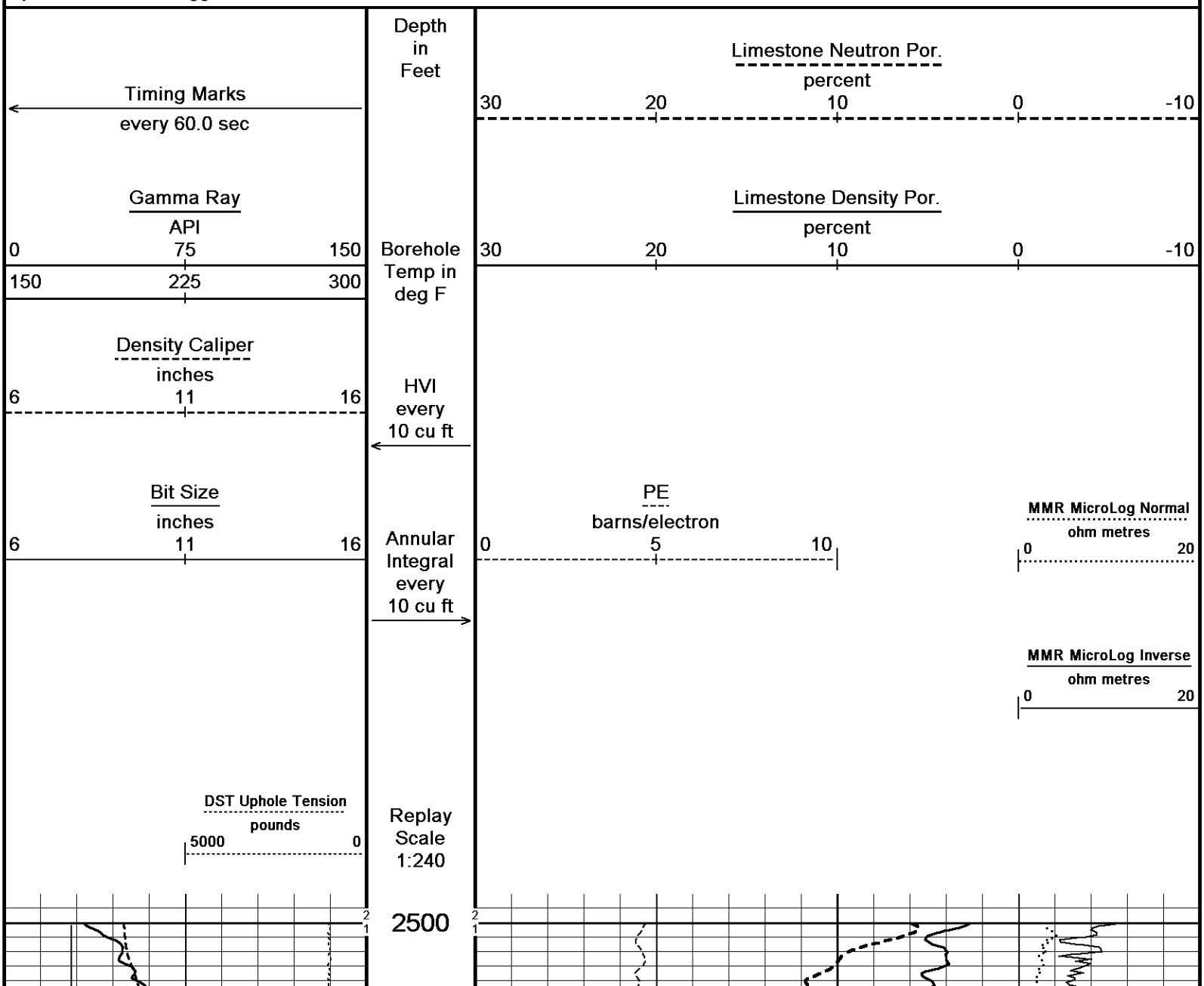
- OPERATOR: J. KLINE.

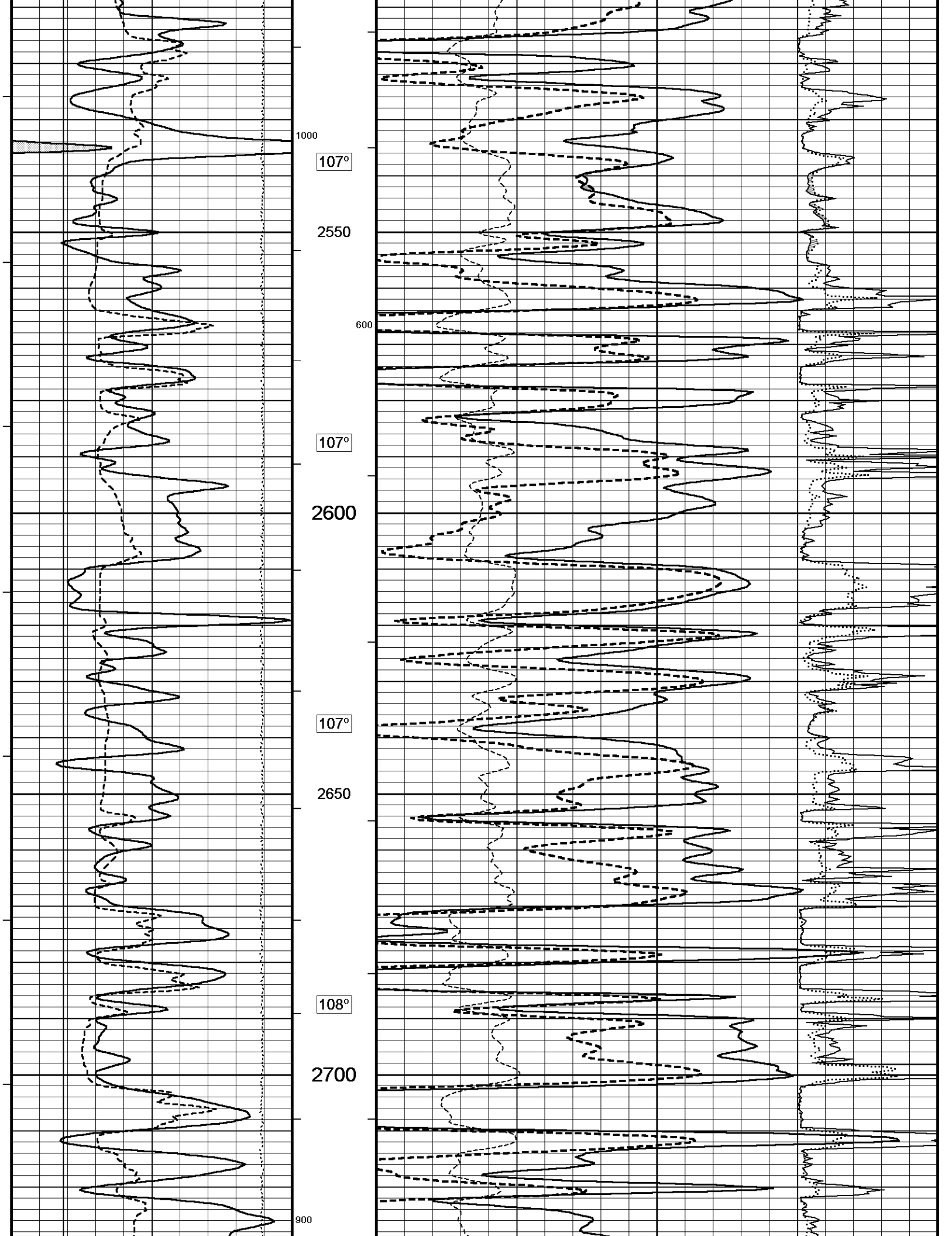
5 INCH LIMESTONE MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 24-JUN-2018 16:32

Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_003.dta — Recorded on 24-JUN-2018 13:00

System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

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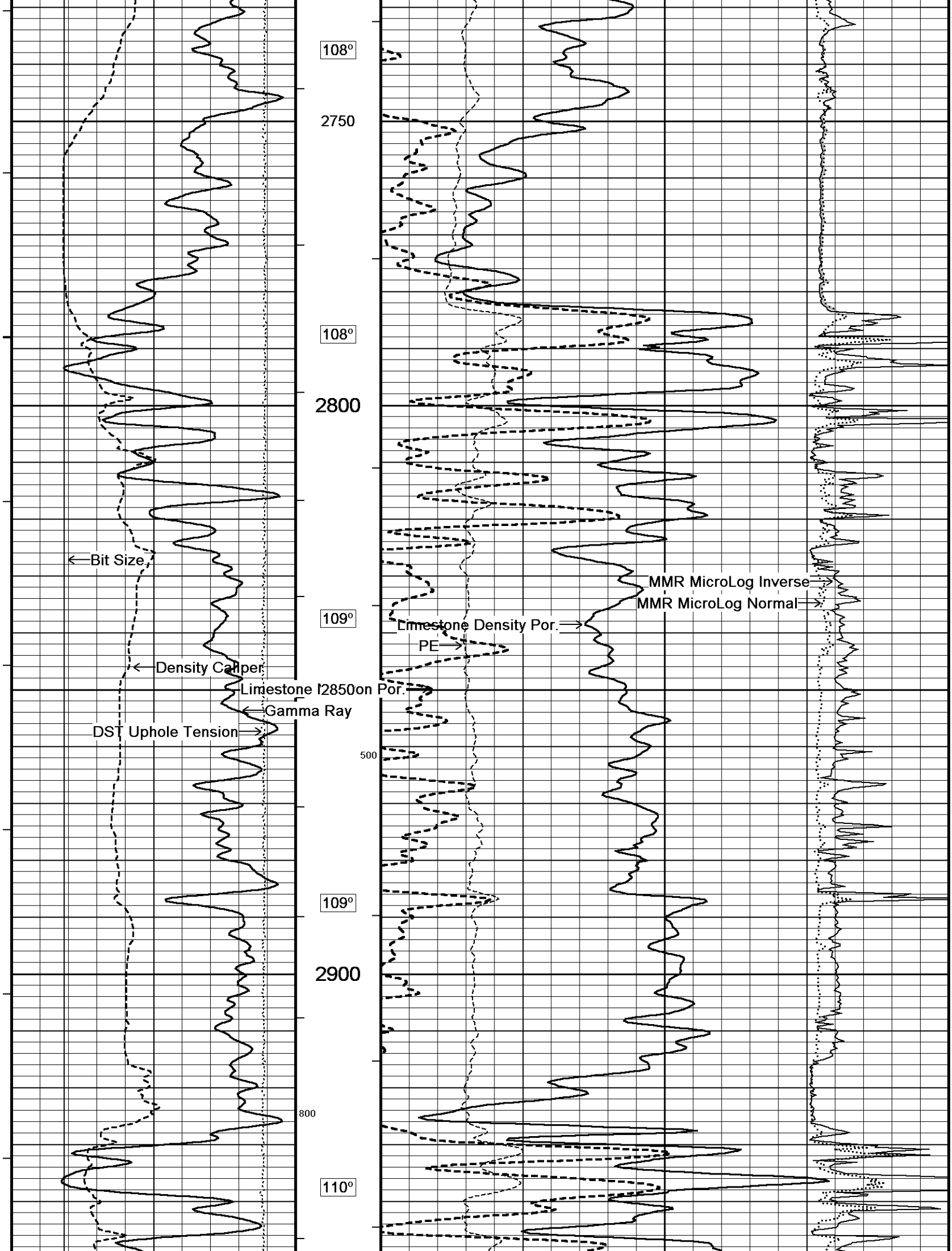
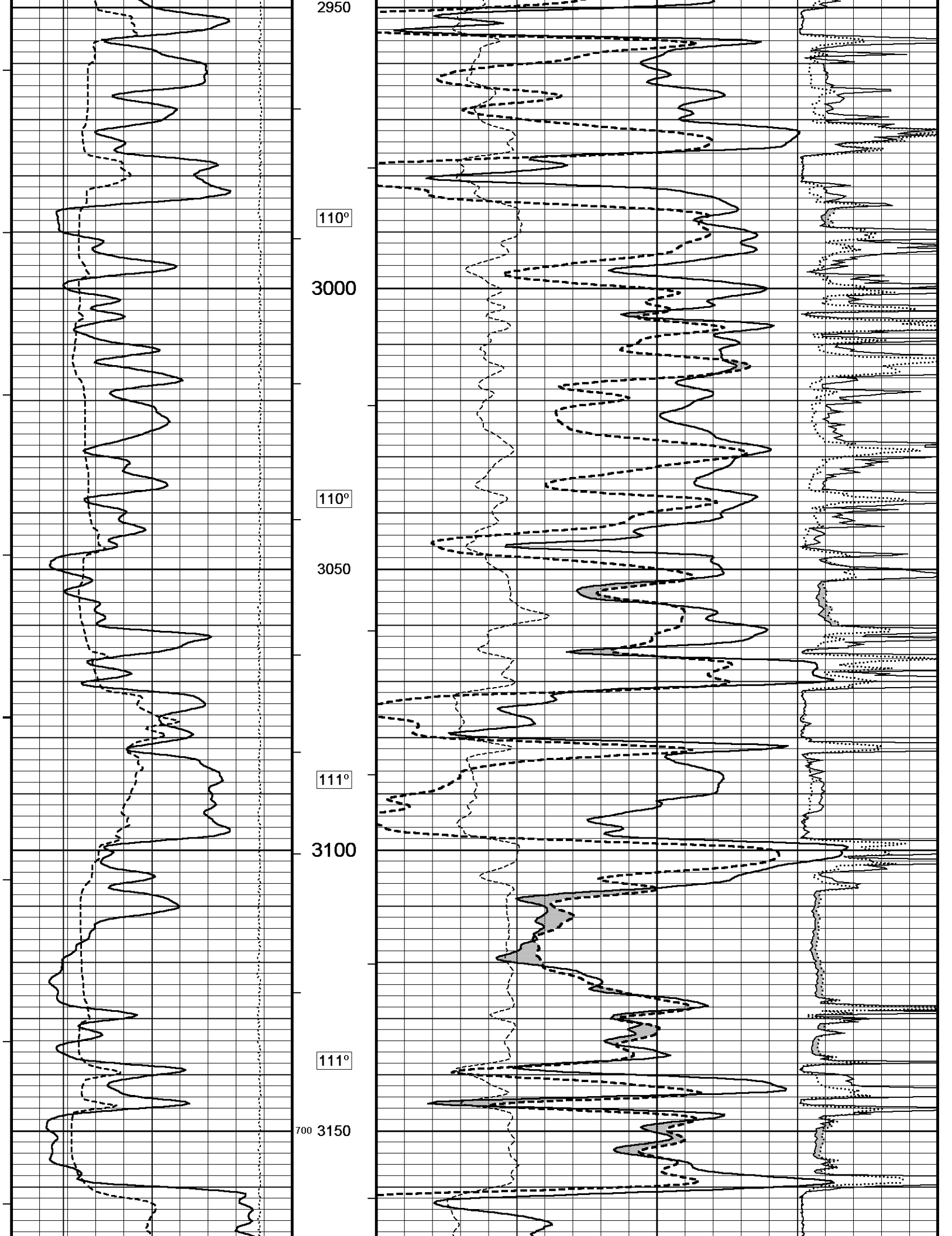
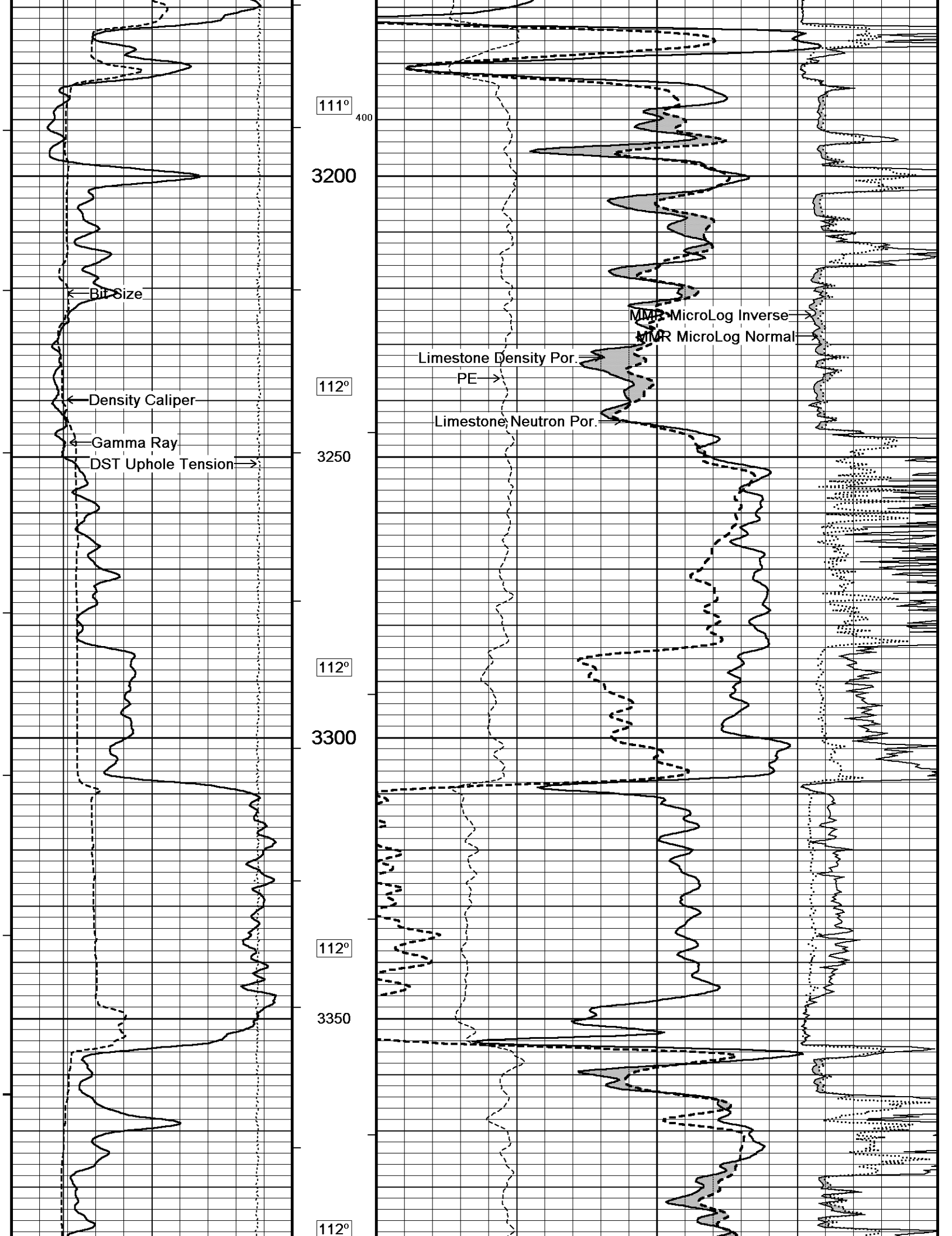
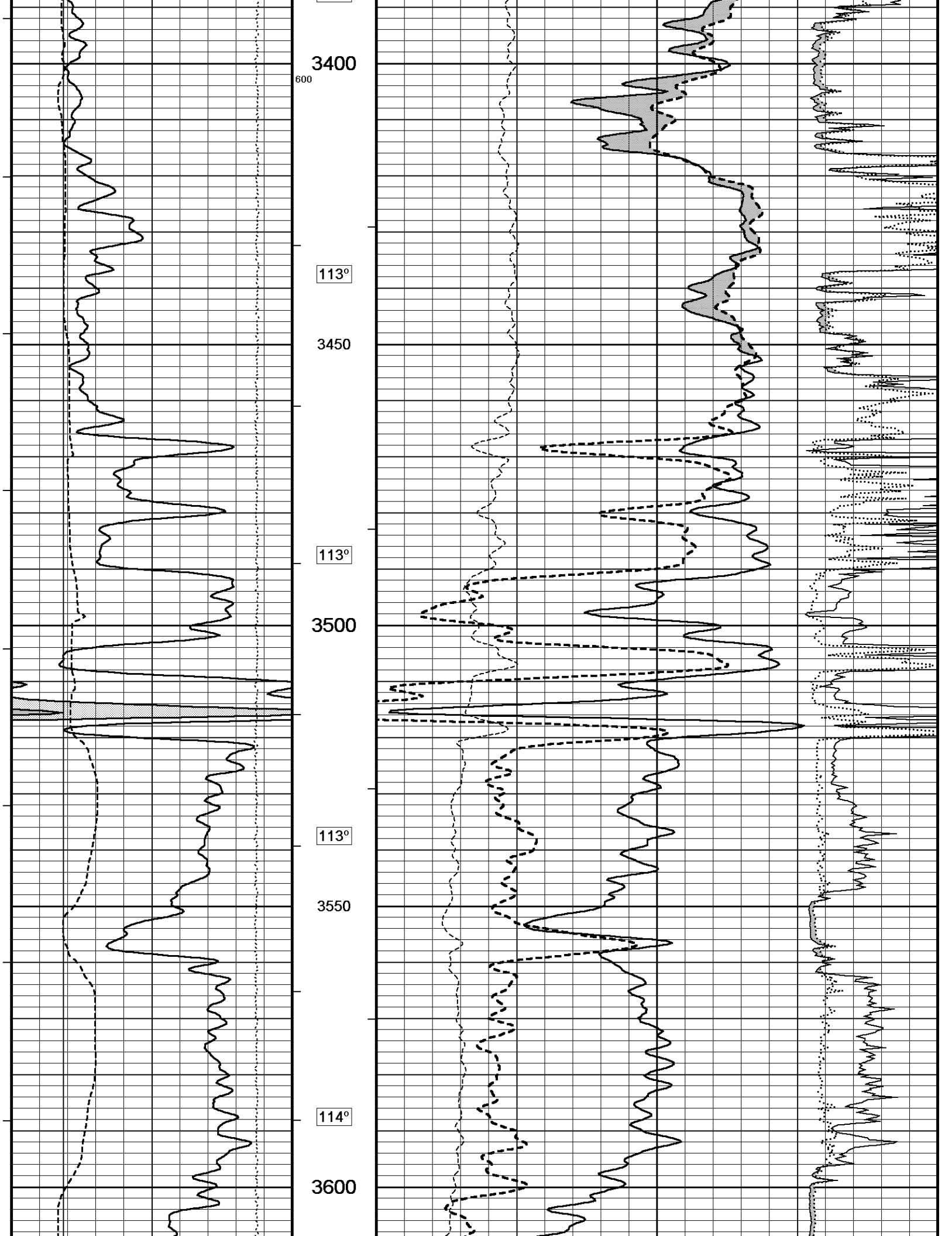
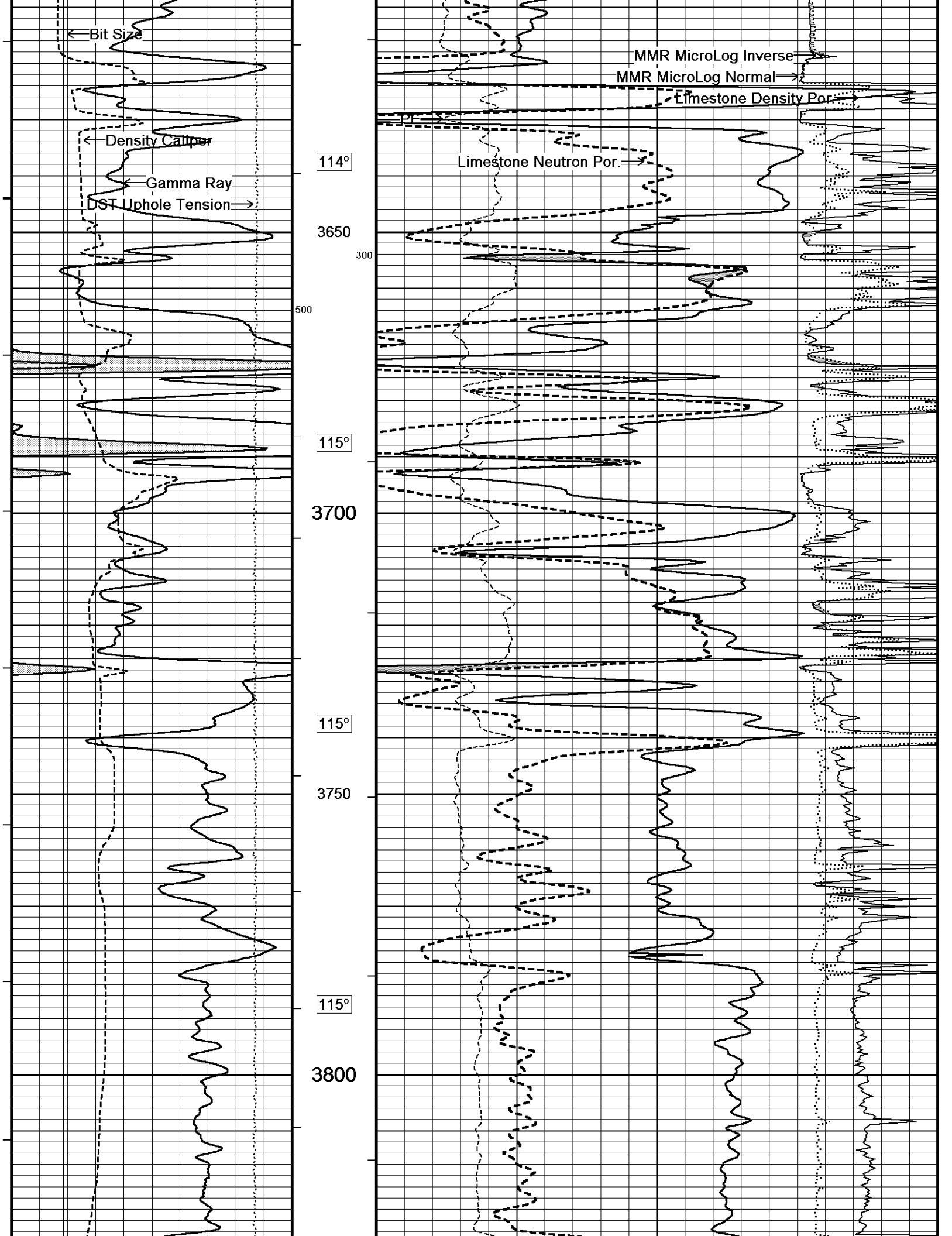
107°
2550
600
107°
2600
107°
2650
108°
2700
900

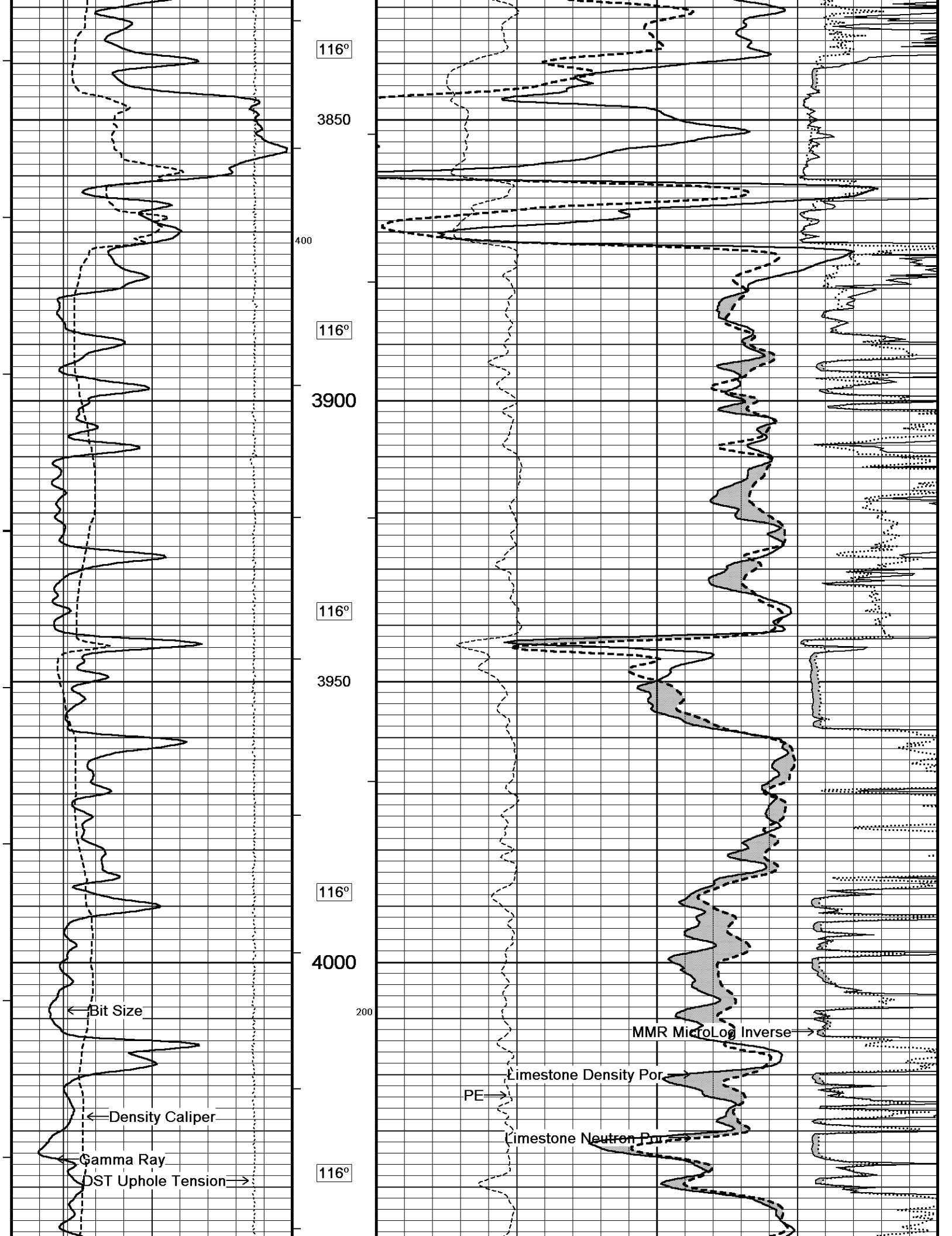

108°
2750
108°
2800
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
109°
Limestone Density Por.
PE
Density Caliper
Limestone 2850on Por.
Gamma Ray
DST Uphole Tension
500
109°
2900
800
110°

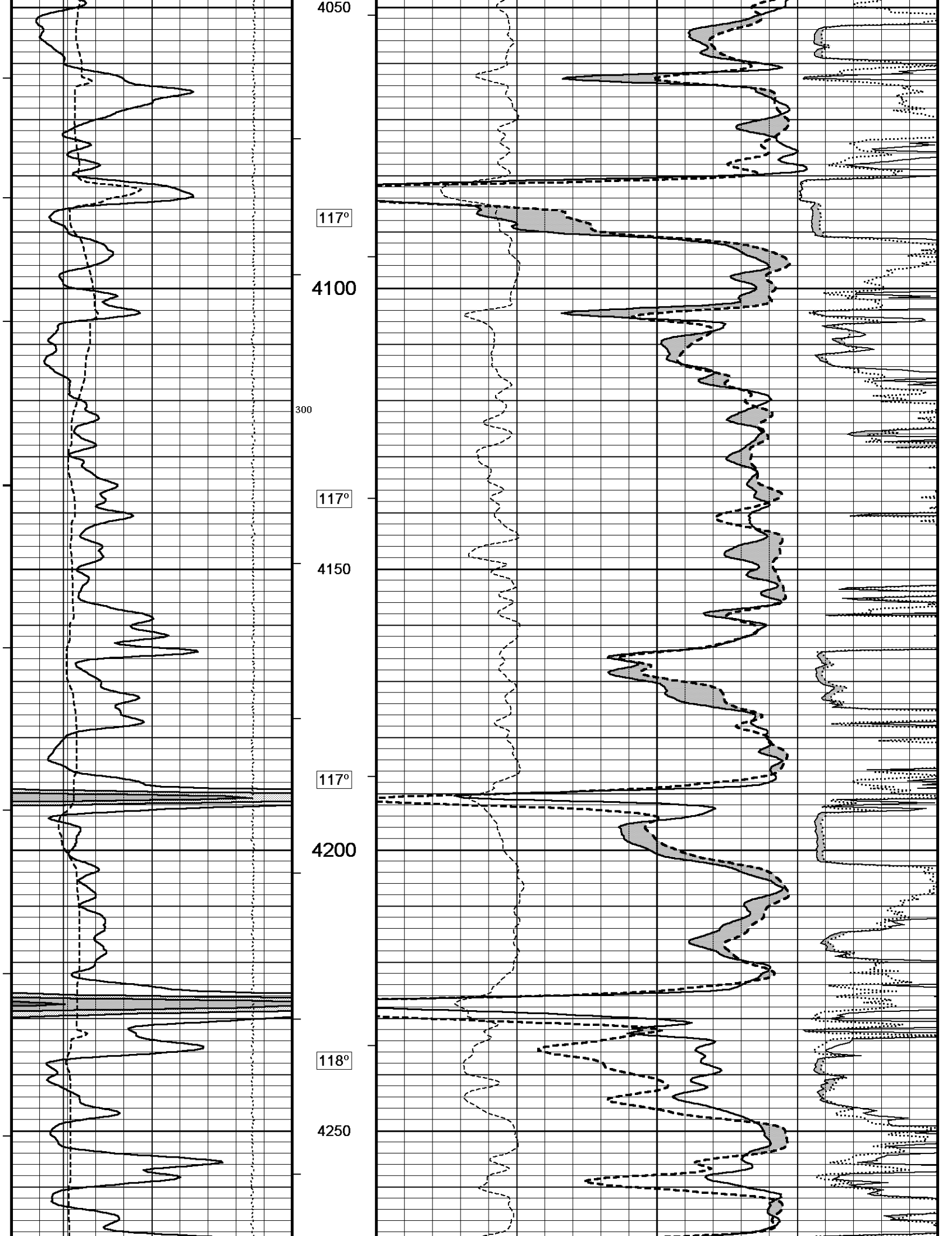

2950
110°
3000
110°
3050
111°
3100
111°
700 3150

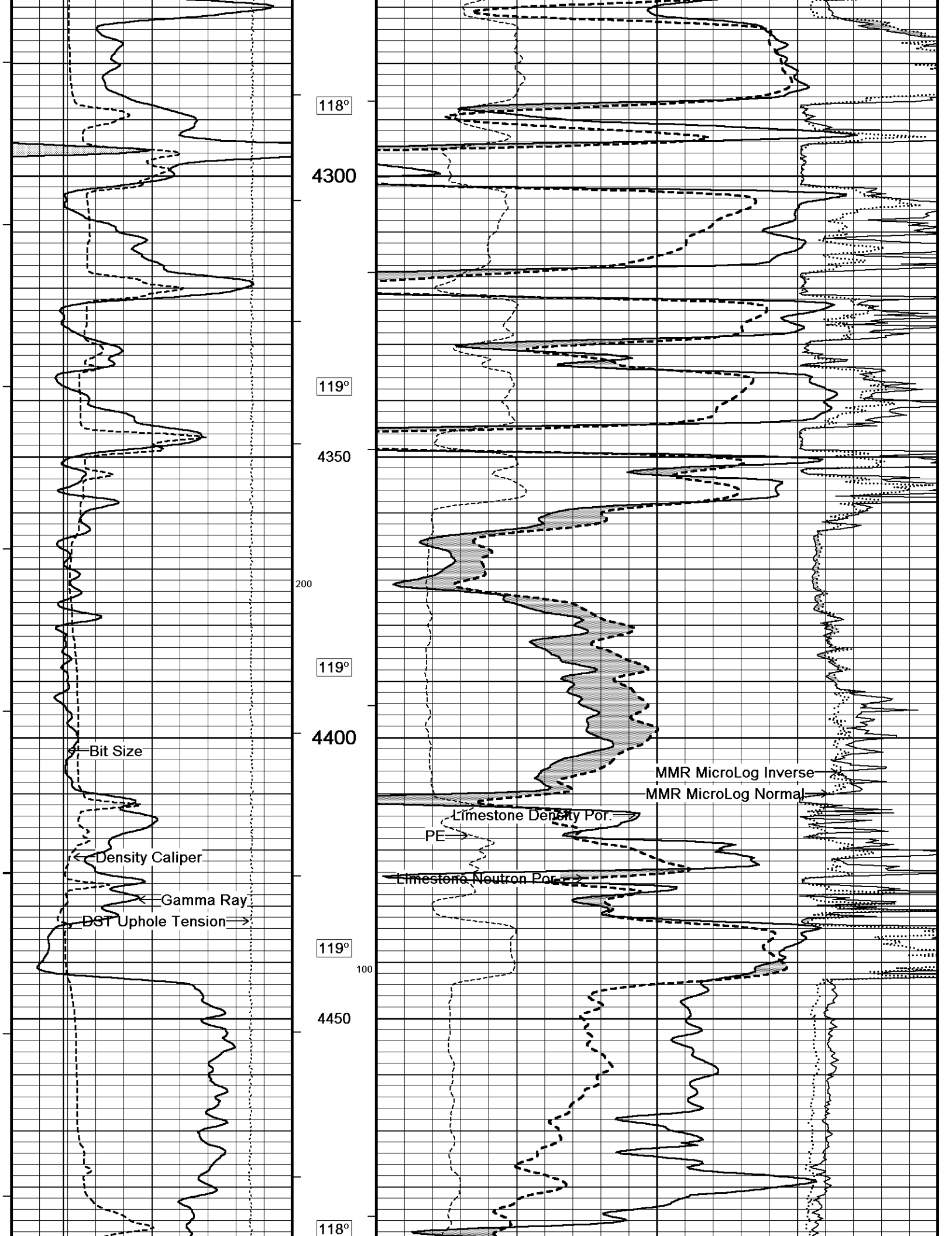

111°
400
3200
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
112°
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Neutron Por.
3250
112°
3300
112°
3350
112°

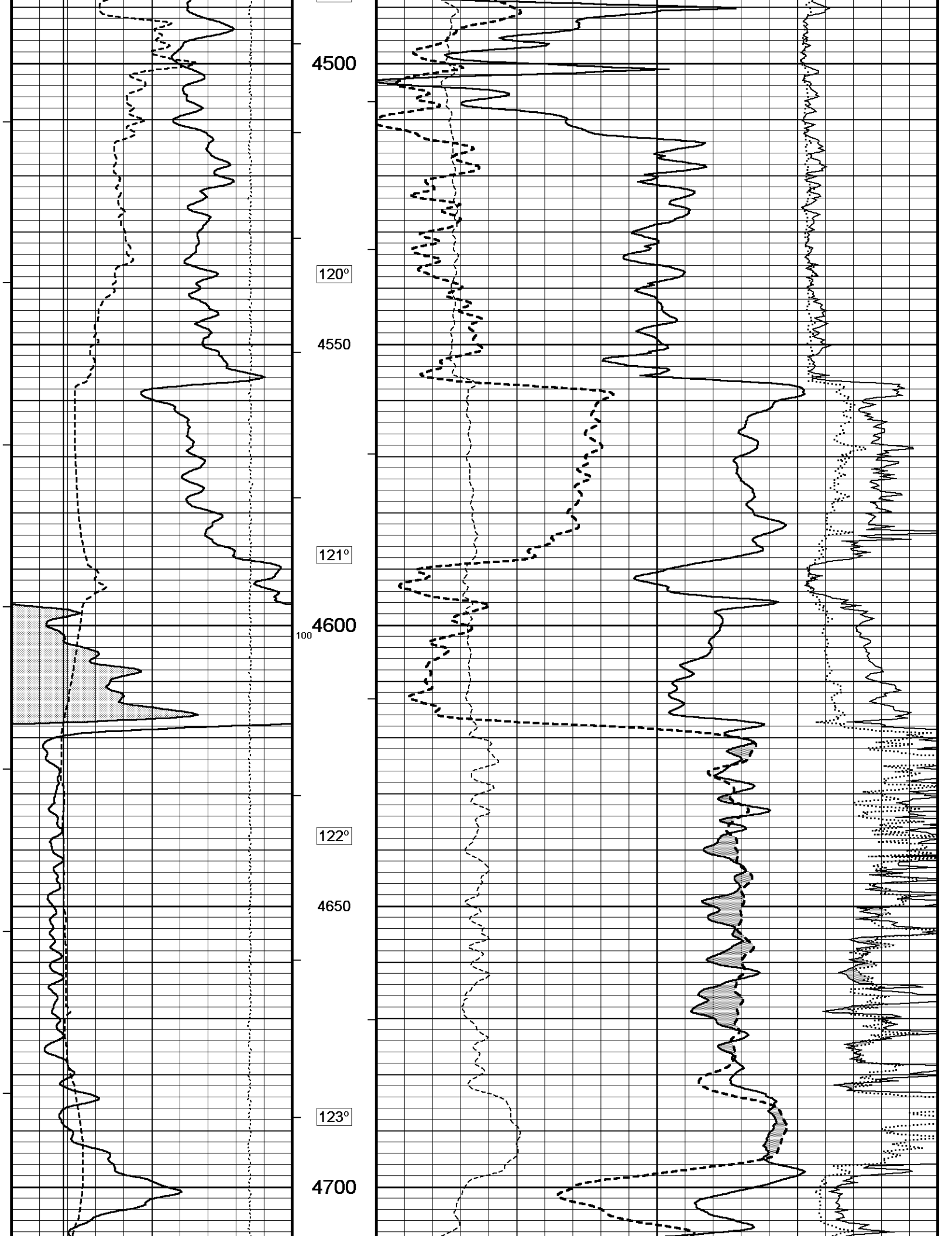

3400
600
113°
3450
113°
3500
113°
3550
114°
3600

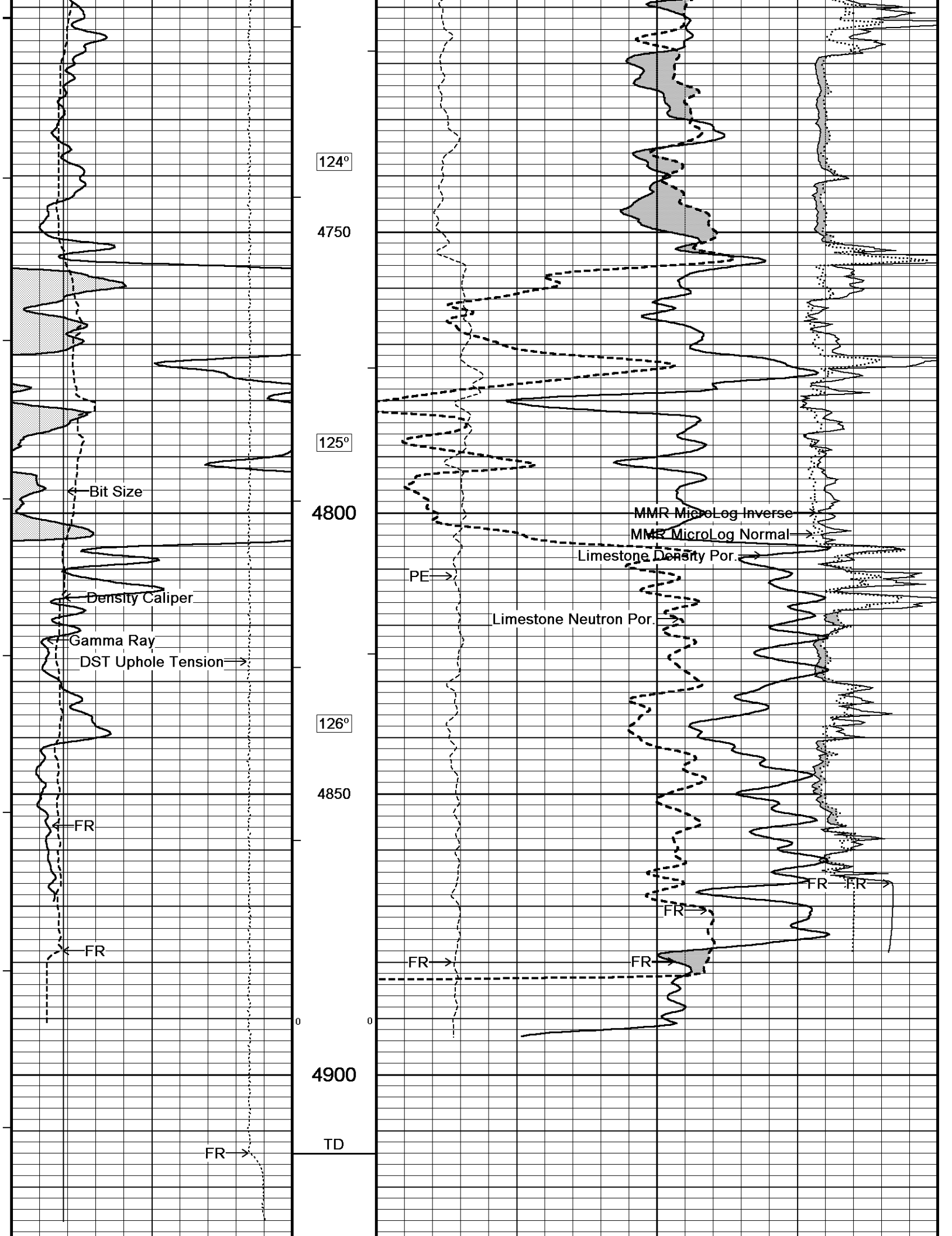

Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
114°
3650
300
500
115°
3700
115°
3750
115°
3800

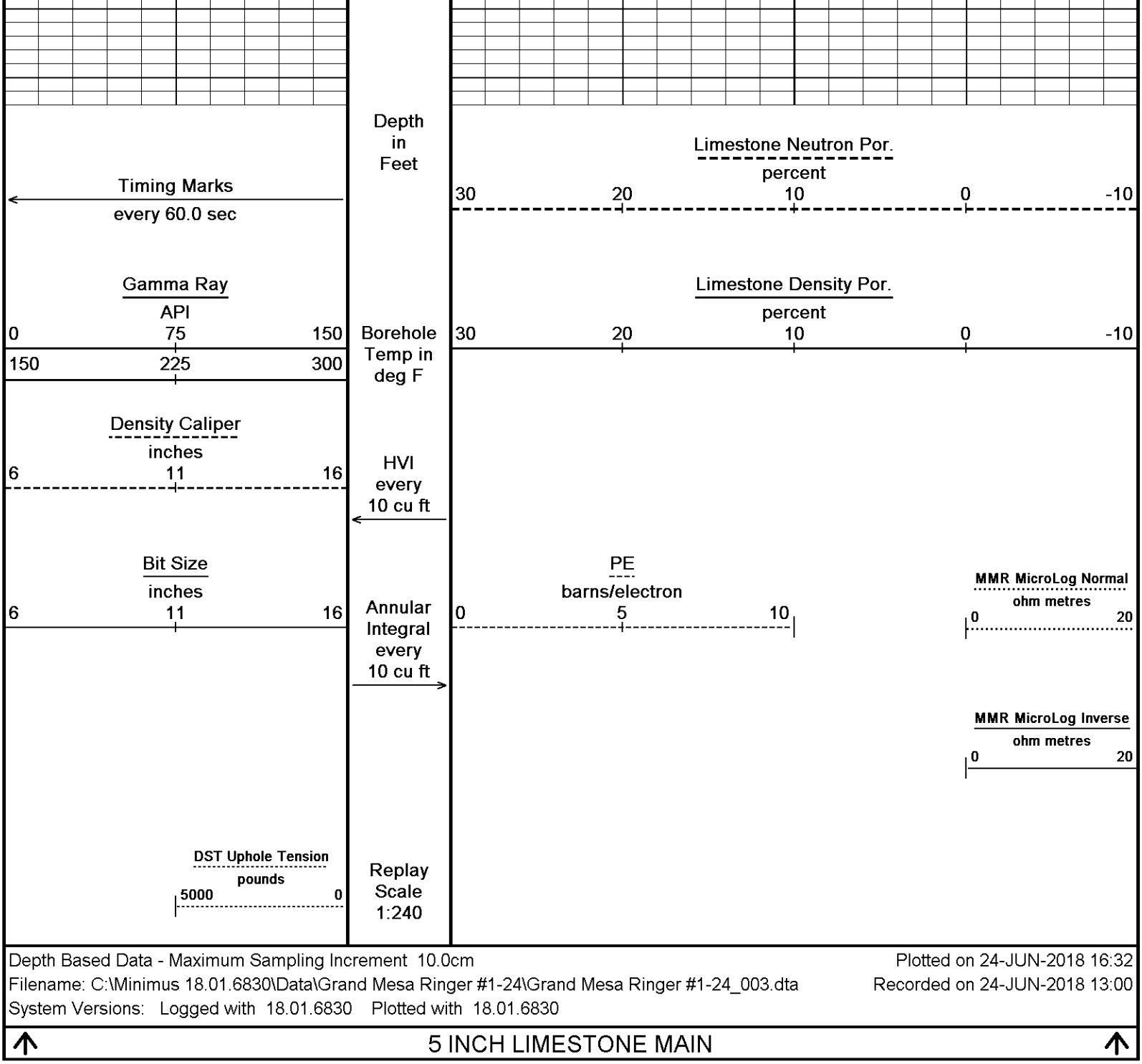

116°
3850
400
116°
3900
116°
3950
116°
4000
200
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
Limestone Density Por
PE
Limestone Neutron Por
116°


4050
117°
4100
300
117°
4150
117°
4200
118°
4250


118°
4300
119°
4350
200
119°
4400
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE
Limestone Neutron Por
119°
100
4450
118°


4500
120°
4550
121°
100
4600
122°
4650
123°
4700


124°
4750
125°
4800
126°
4850
4900
TD
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
FR
FR
FR
FR
FR
0
0

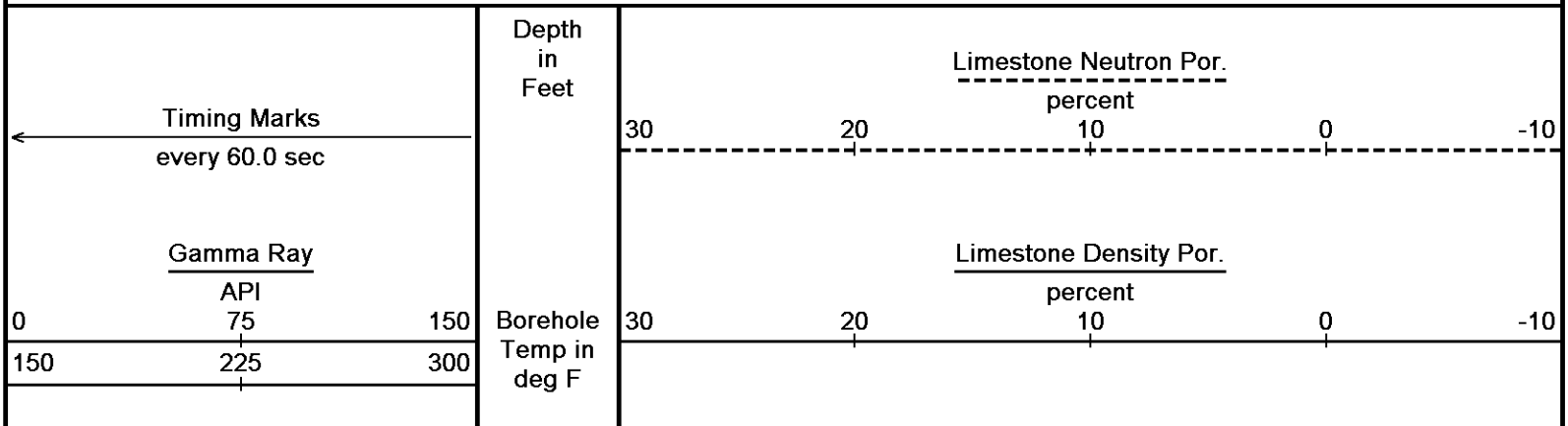


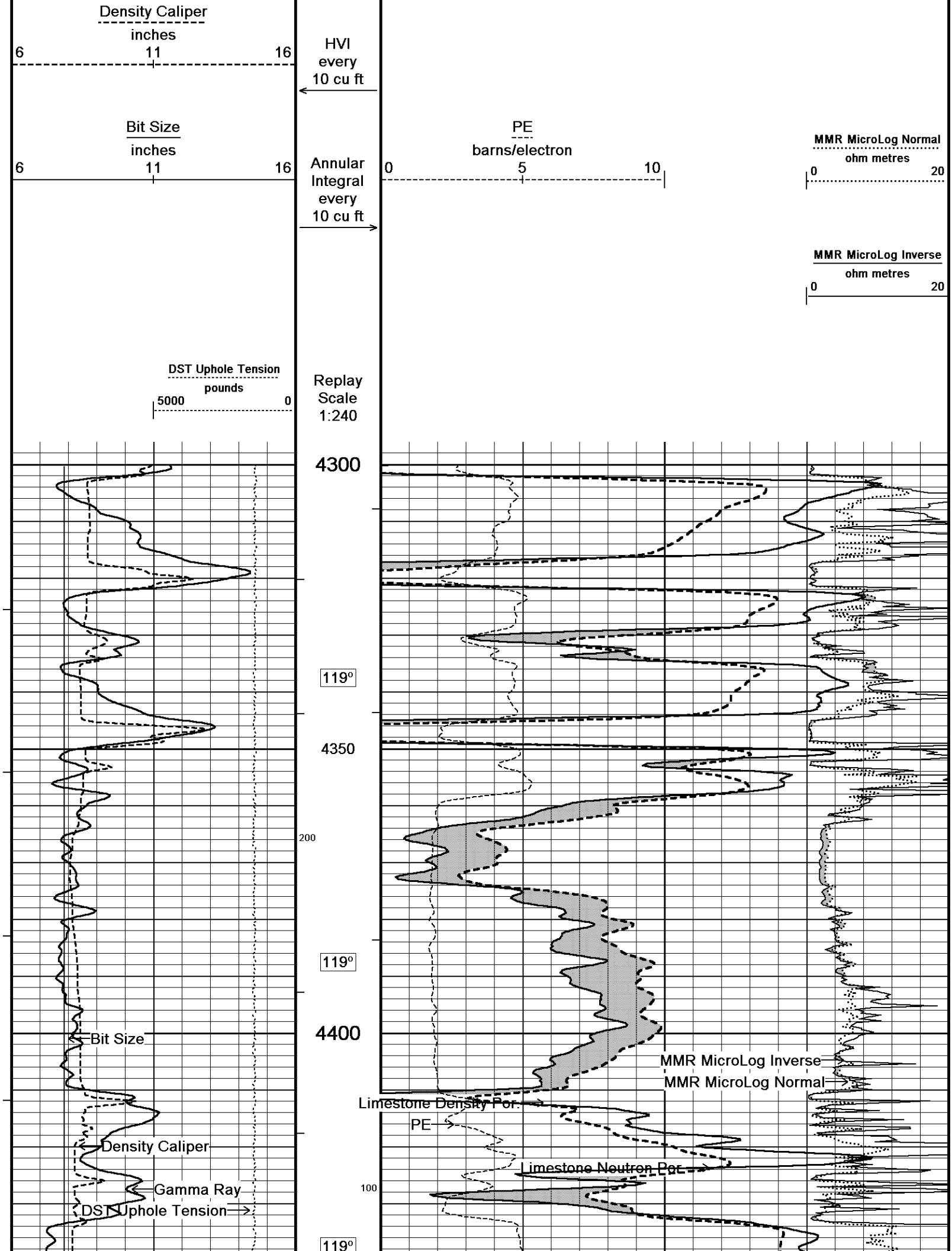
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 24-JUN-2018 16:32
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_003.dta — Recorded on 24-JUN-2018 13:00
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

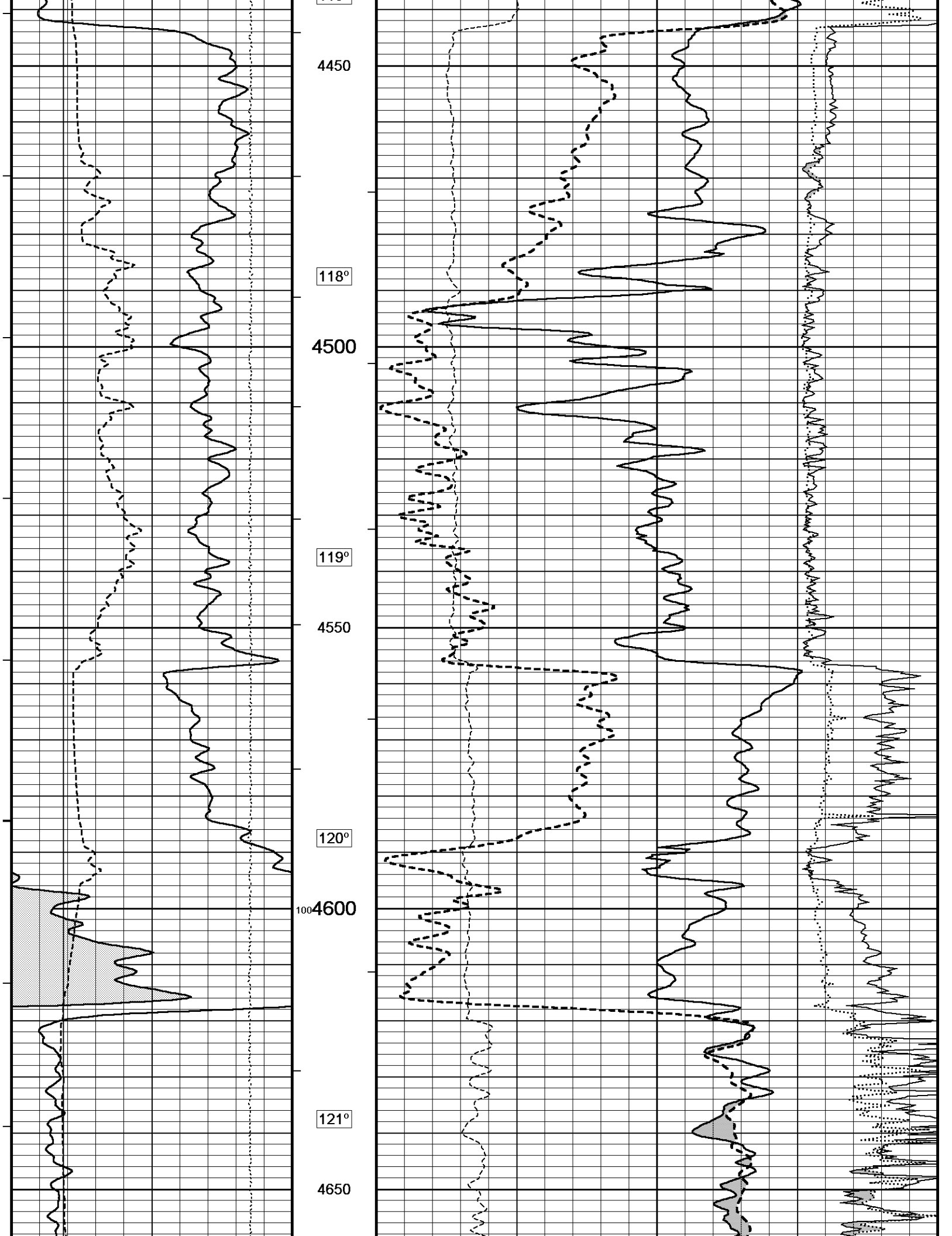
5 INCH LIMESTONE MAIN

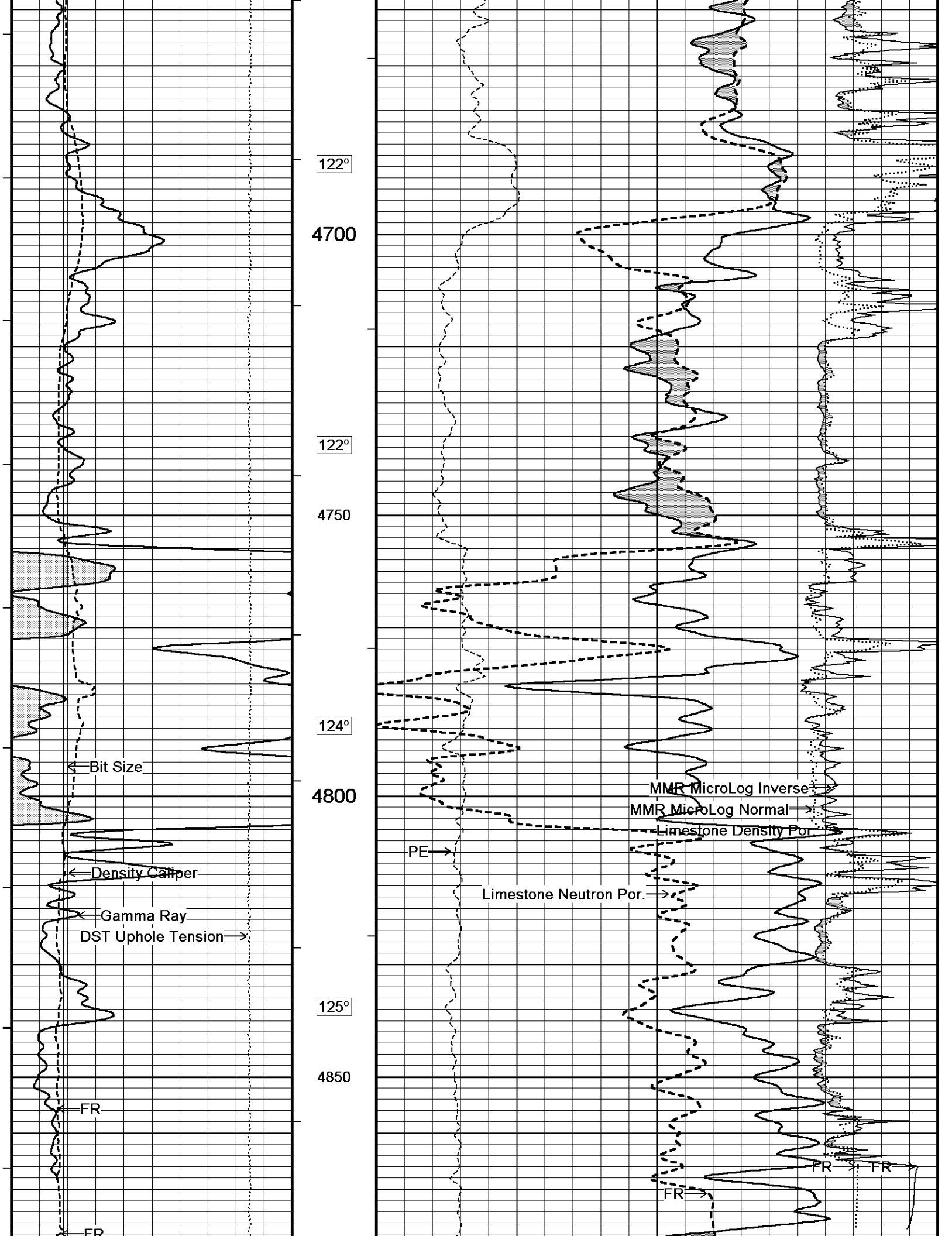
REPEAT SECTION

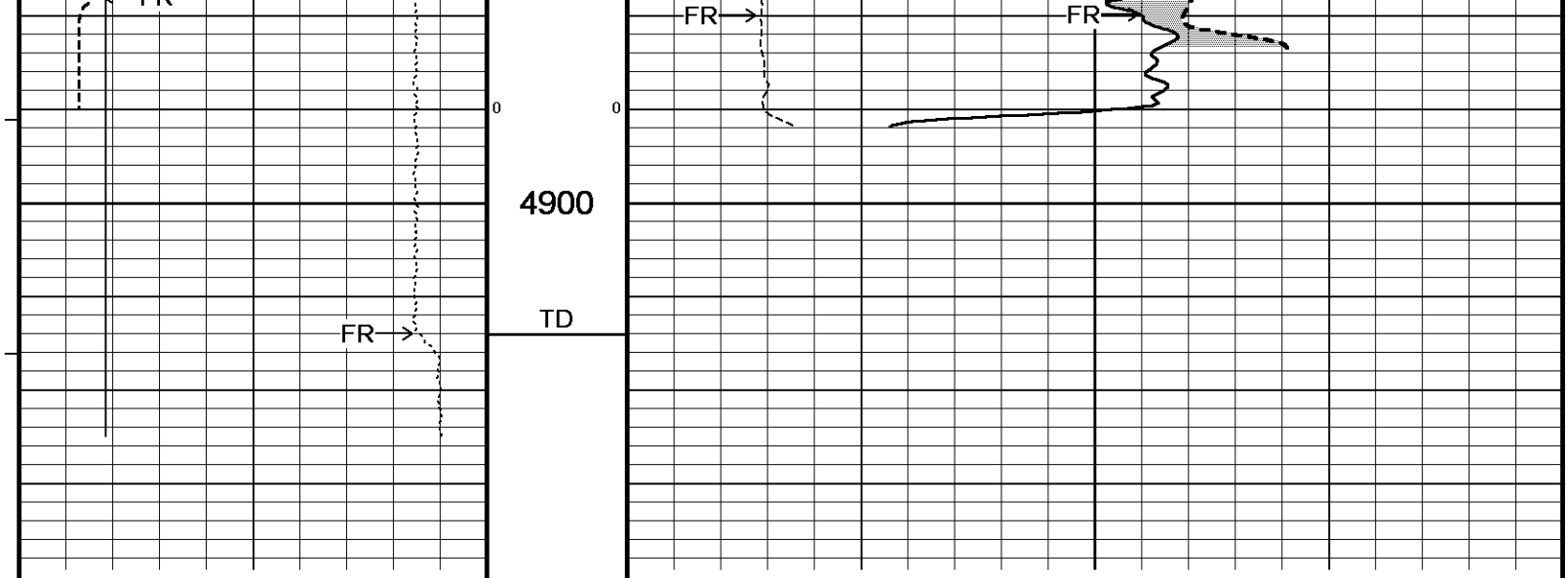
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 24-JUN-2018 16:32
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_002.dta — Recorded on 24-JUN-2018 12:12
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830




Density Caliper
inches
6
11
16
HVI
every
10 cu ft
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
4300
119°
4350
200
119°
4400
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
100
119°


4450
118°
4500
119°
4550
120°
100
4600
121°
4650


122°
4700
122°
4750
124°
4800
125°
4850
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
PE
Limestone Neutron Por.
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
FR
FR
FR



4900

TD

Depth in Feet

Timing Marks
every 60.0 sec

Limestone Neutron Por.
percent
30 20 10 0 -10

Gamma Ray
API
0 75 150

Limestone Density Por.
percent
30 20 10 0 -10

Borehole Temp in deg F
150 225 300

Density Caliper
inches
6 11 16

HVI every 10 cu ft

Bit Size
inches
6 11 16

PE
barns/electron
0 5 10

Annular Integral every 10 cu ft

MMR MicroLog Normal
ohm metres
0 20

MMR MicroLog Inverse
ohm metres
0 20

DST Uphole Tension
pounds
5000 0

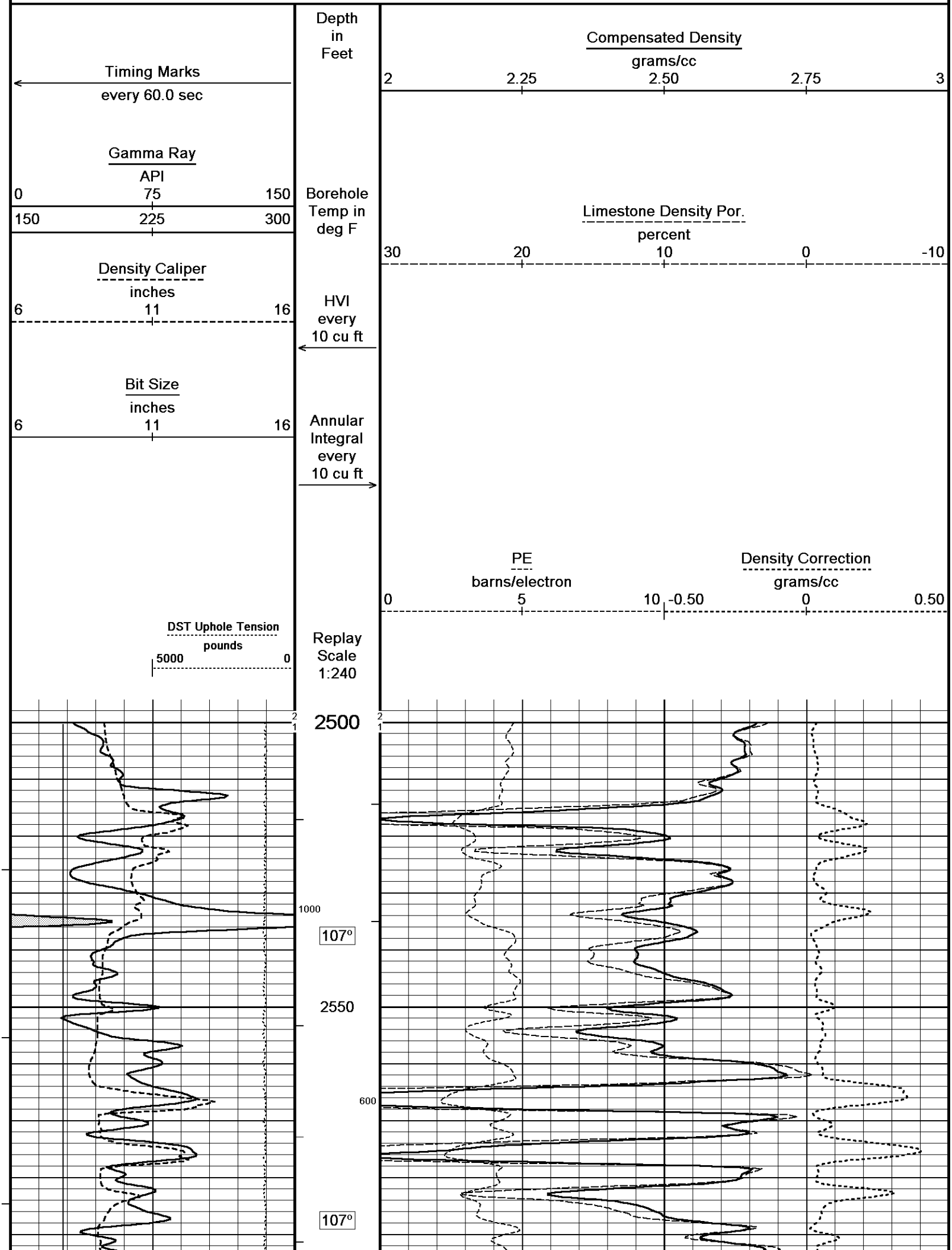
Replay Scale 1:240

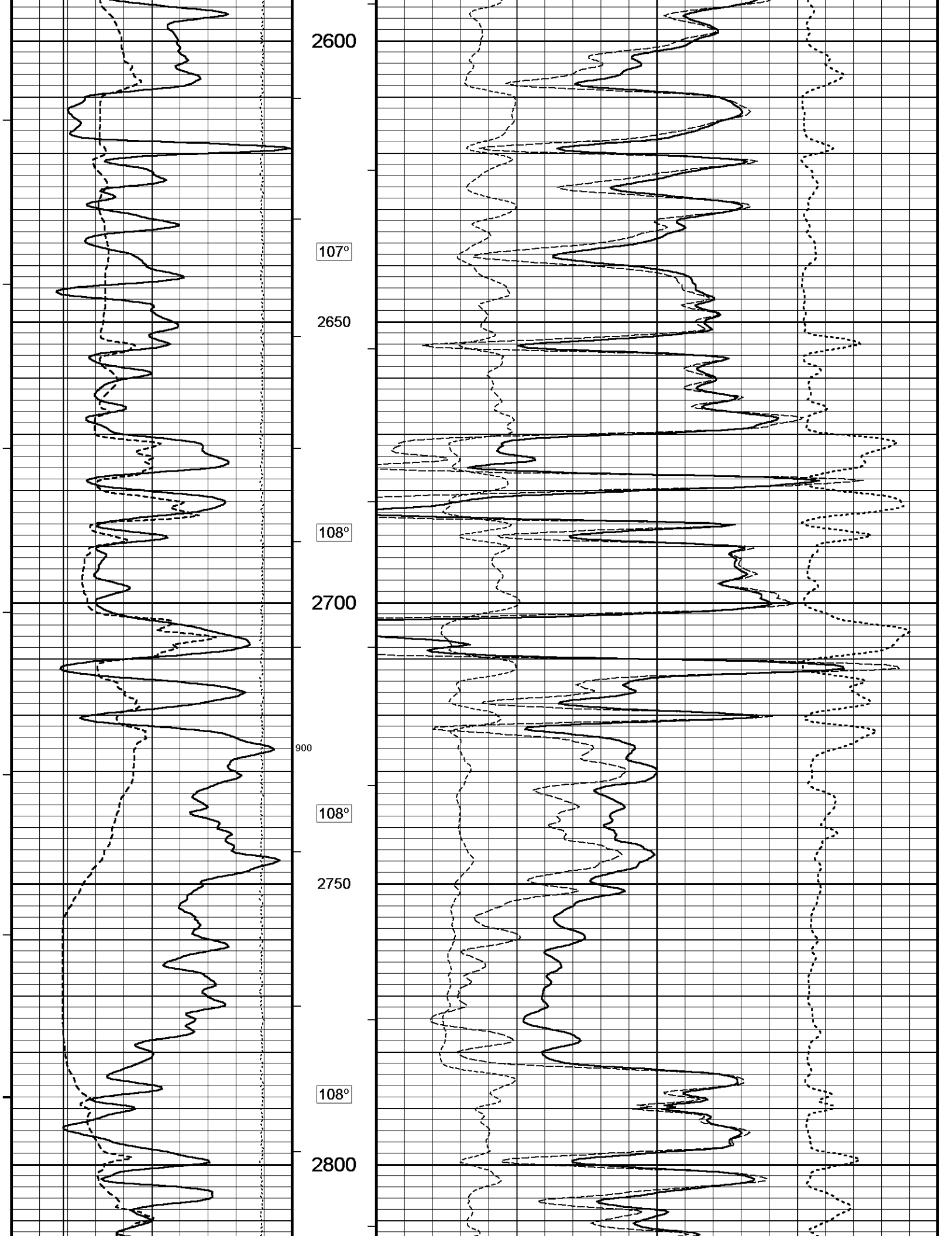
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 24-JUN-2018 16:32
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_002.dta
Recorded on 24-JUN-2018 12:12
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

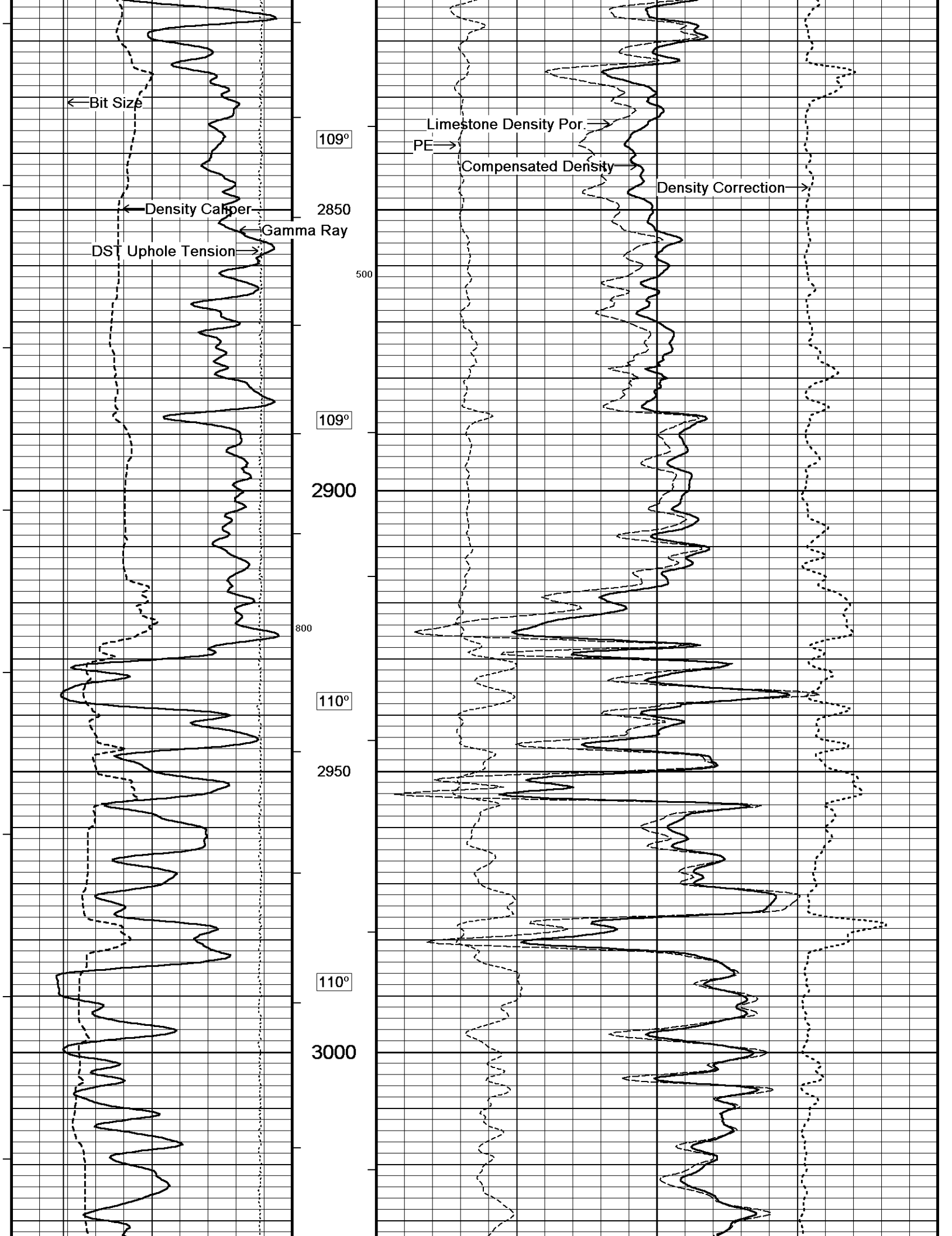
REPEAT SECTION

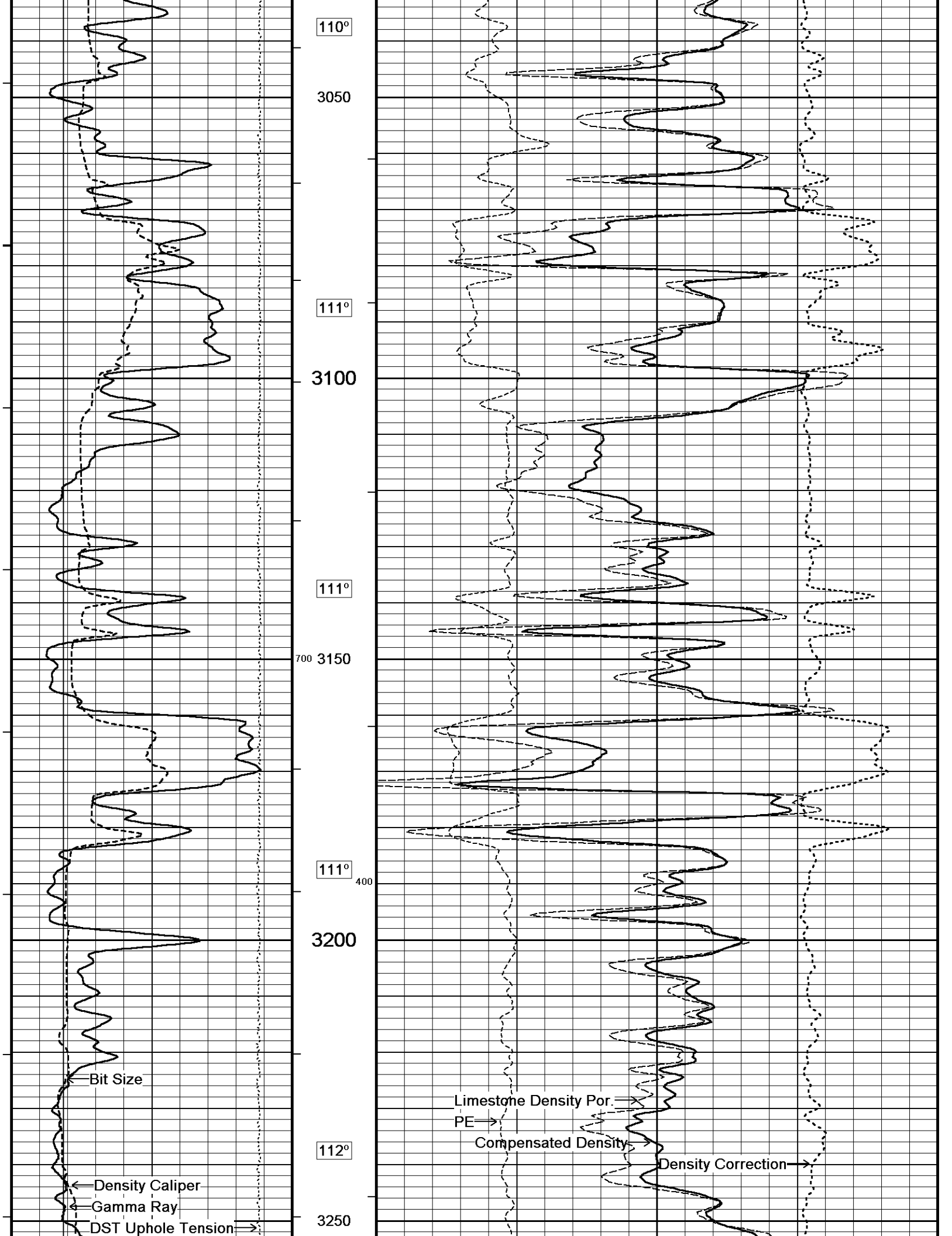
5 INCH BULK DENSITY MAIN

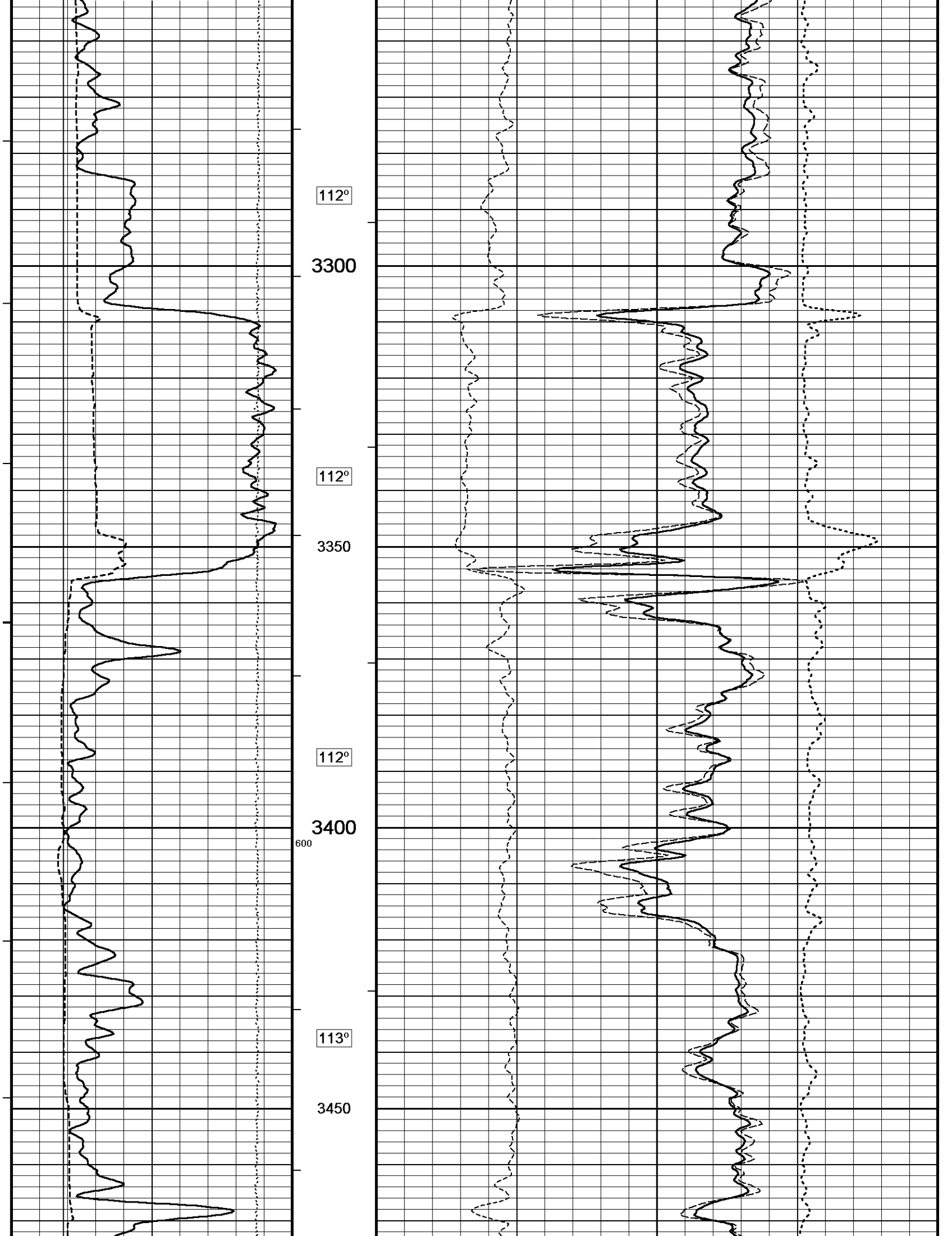
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 24-JUN-2018 16:32
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_003.dta
Recorded on 24-JUN-2018 13:00
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

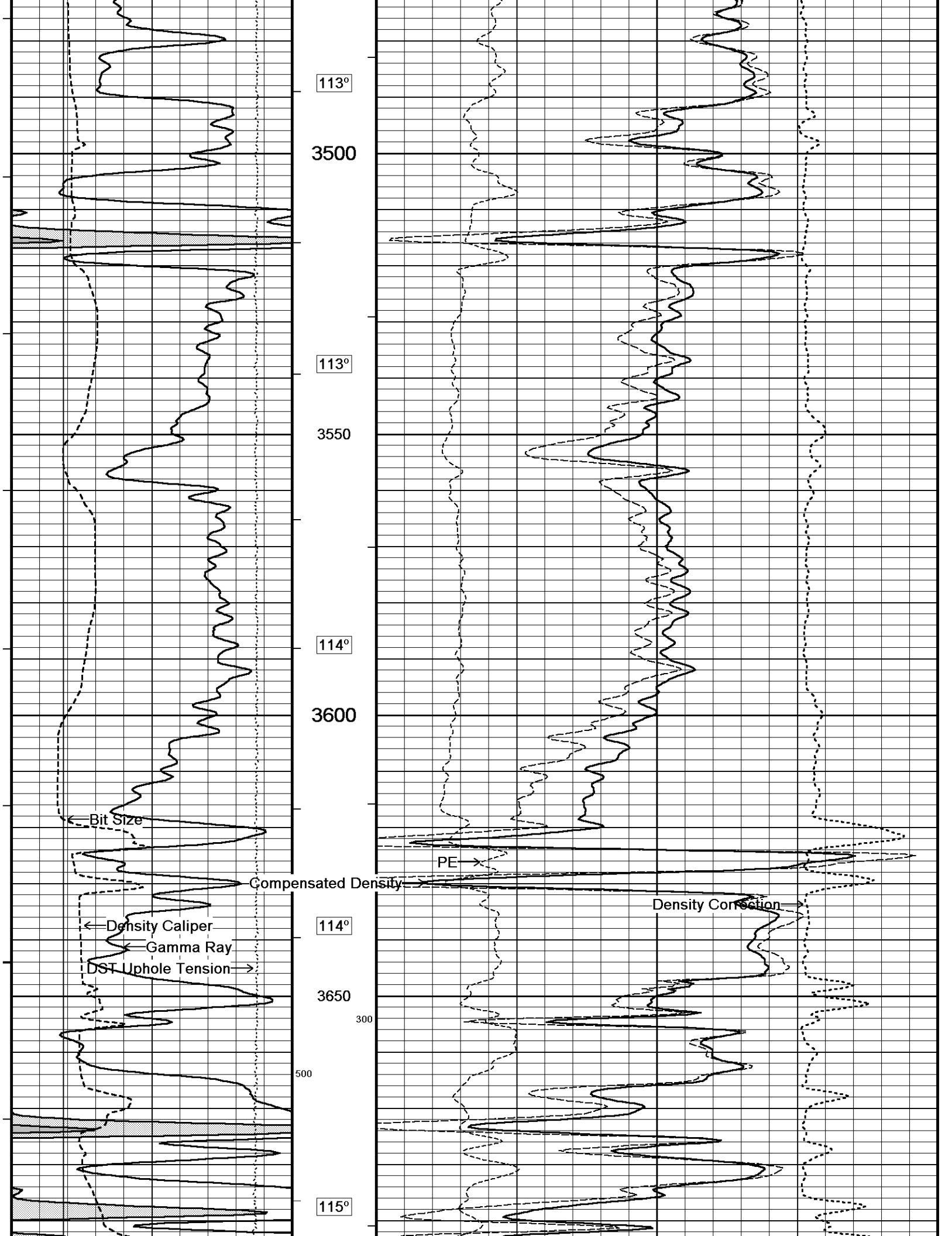

Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Density Caliper
inches
6
11
16
Bit Size
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Depth
in
Feet
Borehole
Temp in
deg F
HVI
every
10 cu ft
Annular
Integral
every
10 cu ft
Replay
Scale
1:240
Compensated Density
grams/cc
2
2.25
2.50
2.75
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
2500
1000
107°
2550
600
107°

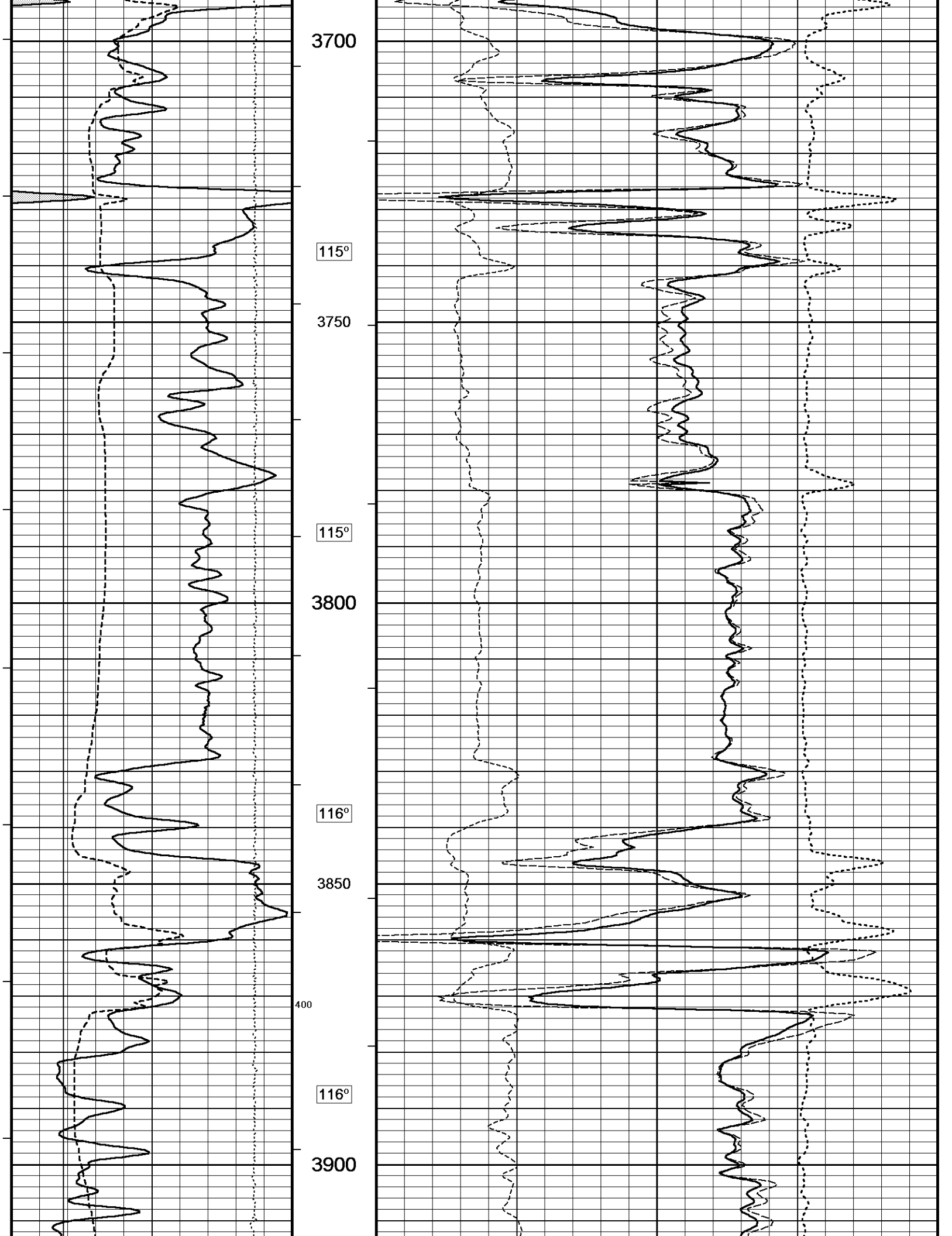

2600
107°
2650
108°
2700
900
108°
2750
108°
2800

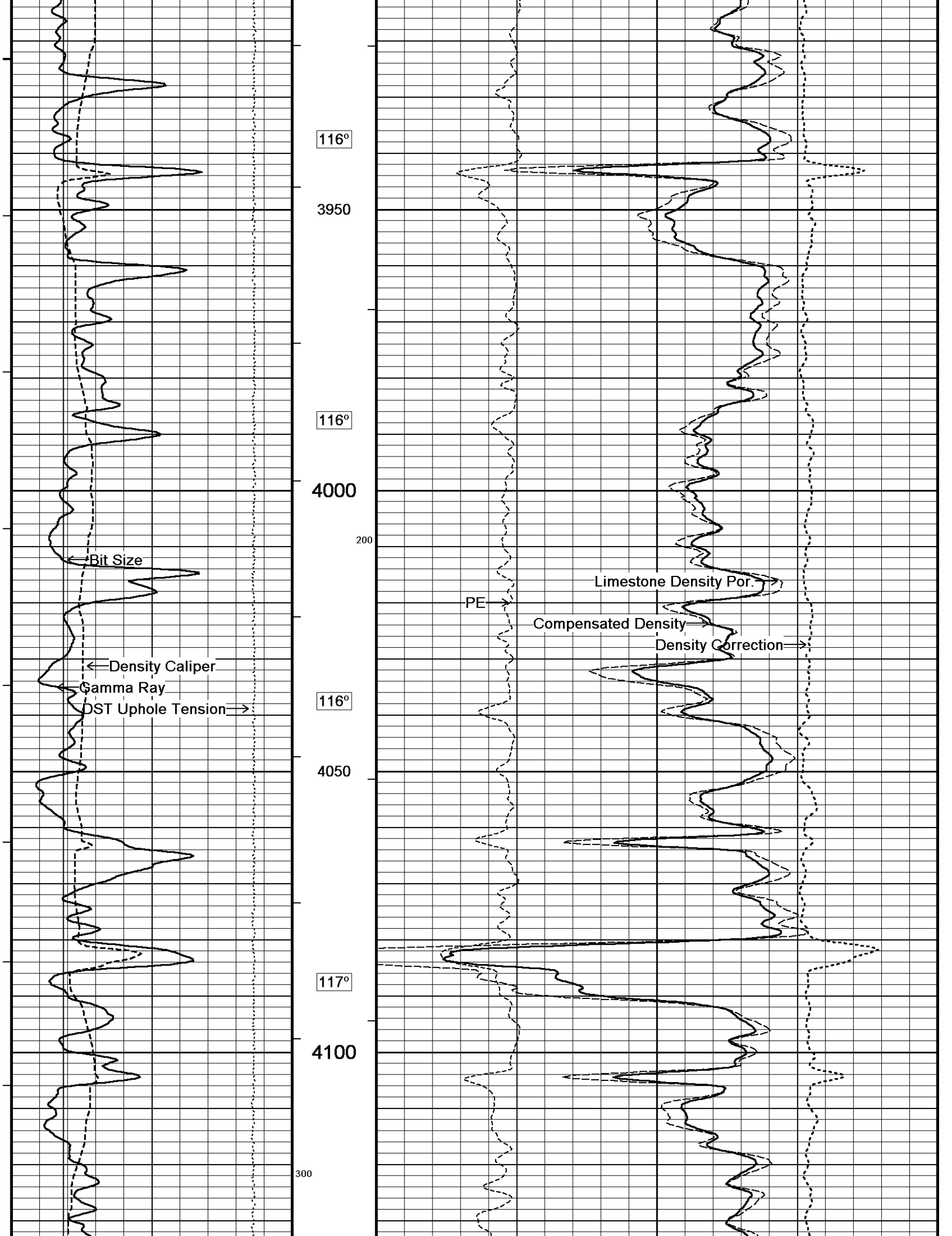

Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
109°
2850
109°
2900
800
110°
2950
110°
3000
Limestone Density Por.
PE
Compensated Density
Density Correction
500

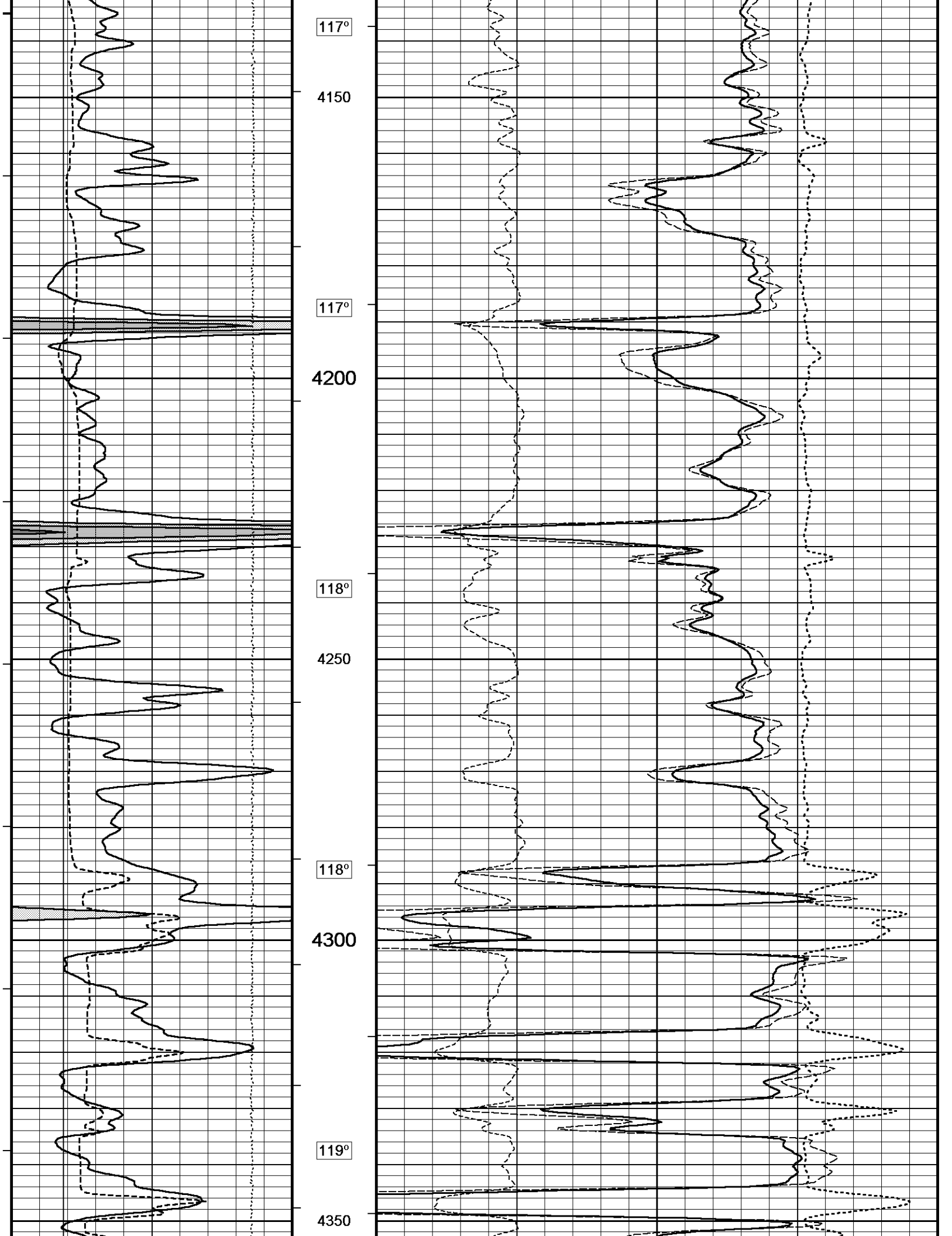

110°
3050
111°
3100
111°
700 3150
111°
400
3200
112°
3250
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por.
PE
Compensated Density
Density Correction

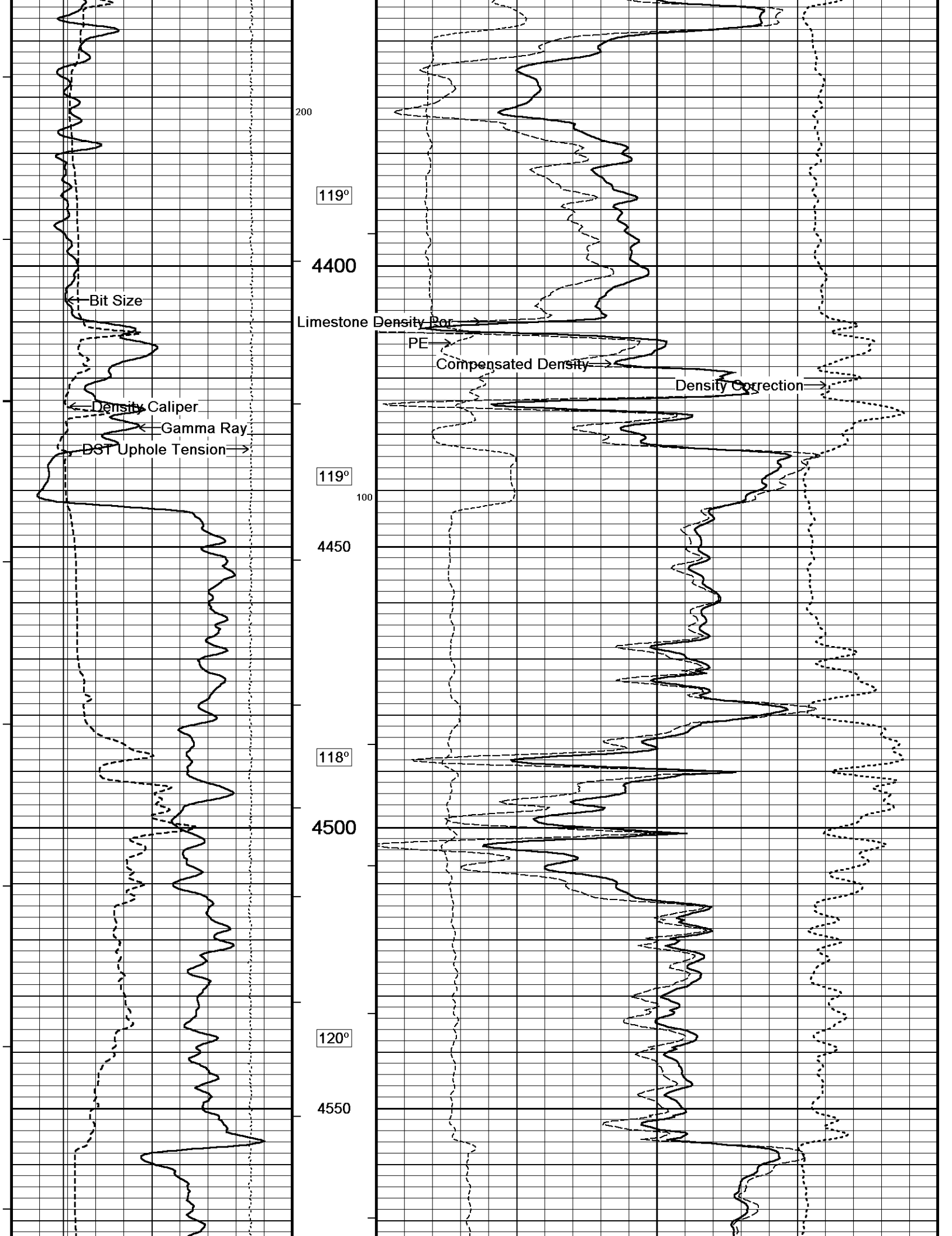

112°
3300
112°
3350
112°
3400
600
113°
3450

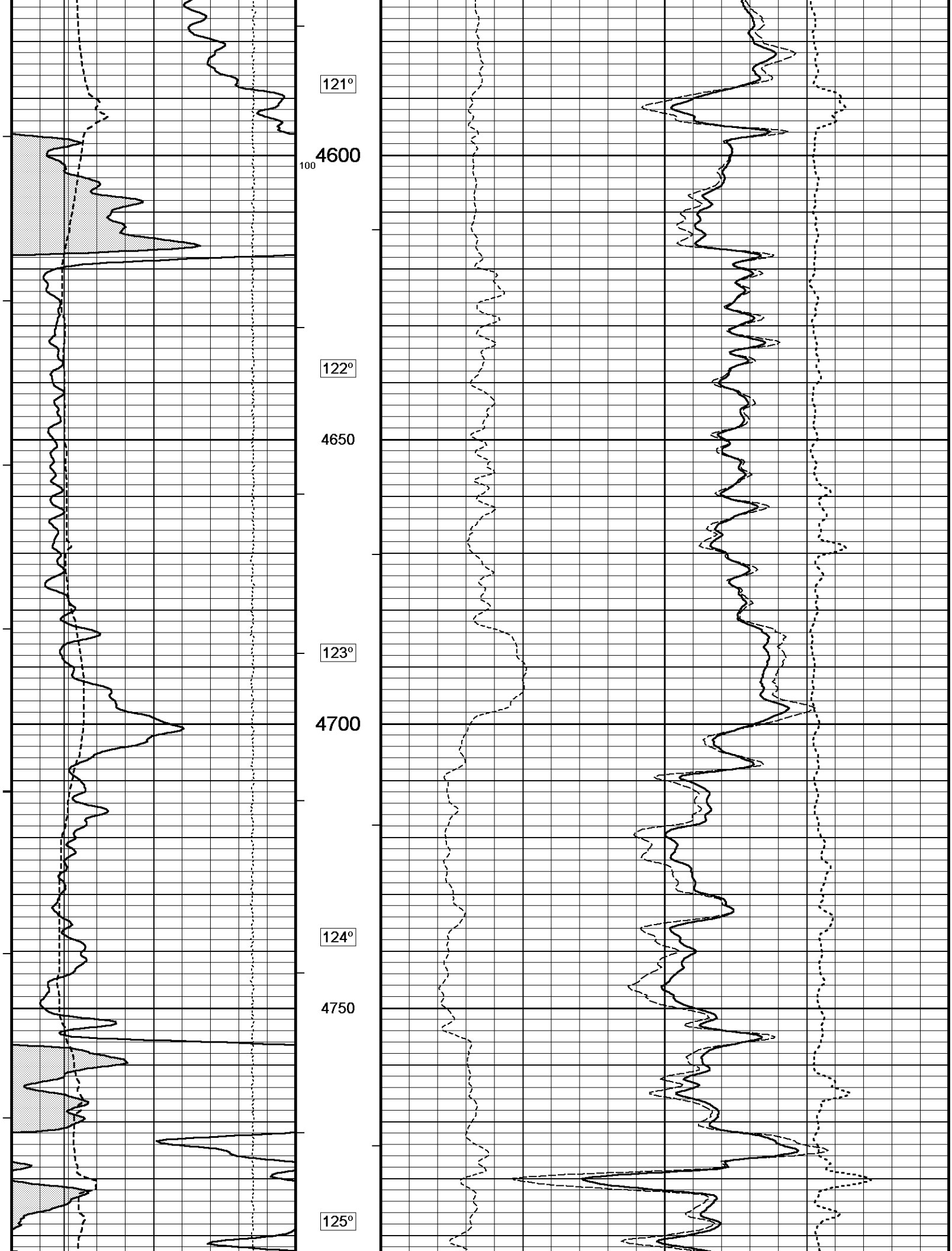

113°
3500
113°
3550
114°
3600
Bit Size
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
114°
3650
300
500
115°

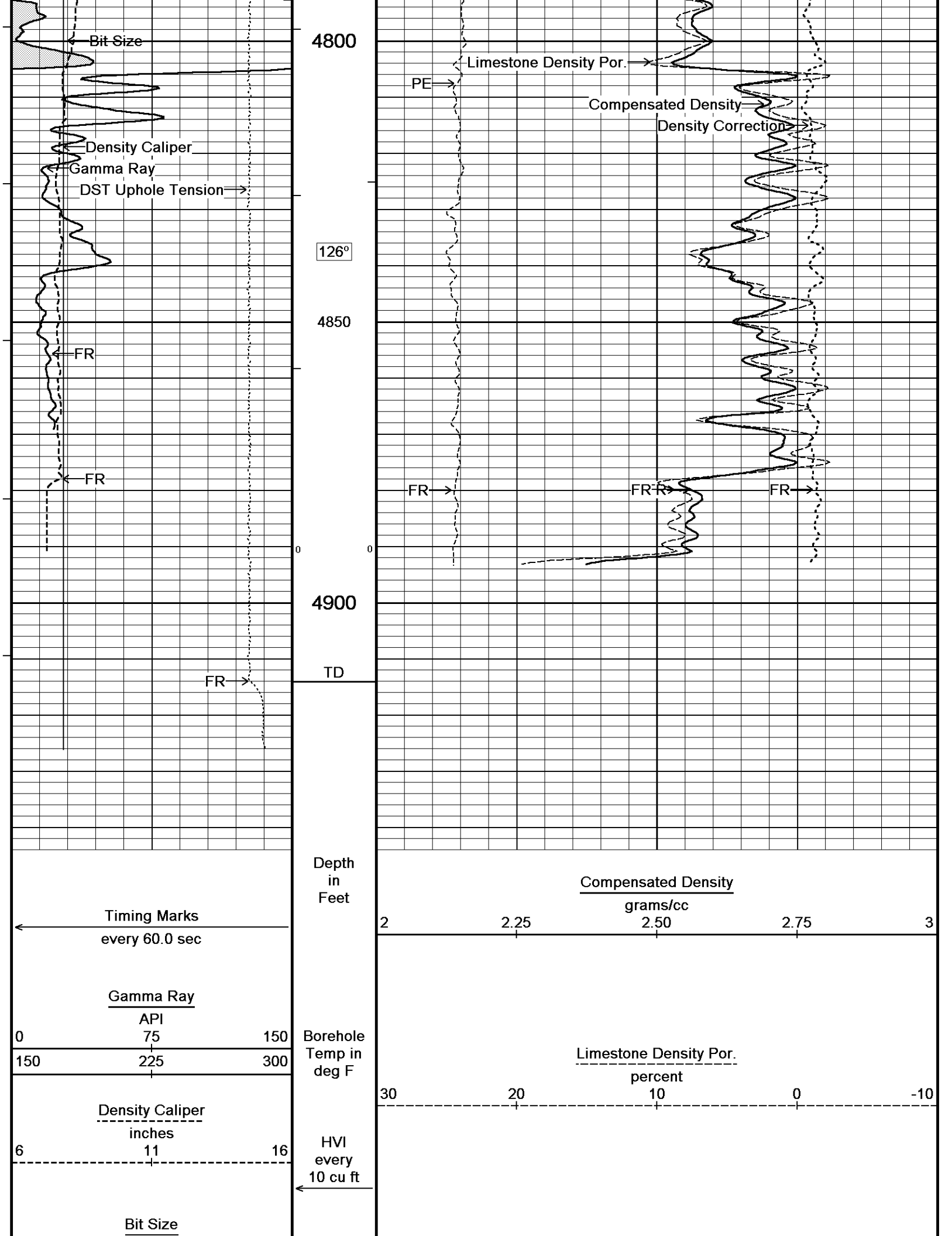

3700
115°
3750
115°
3800
116°
3850
400
116°
3900


116°
3950
116°
4000
200
Bit Size
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
116°
4050
117°
4100
300


117°
4150
117°
4200
118°
4250
118°
4300
119°
4350


200
119°
4400
Bit Size
Limestone Density Por
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
119°
100
4450
118°
4500
120°
4550


121°
100
4600
122°
4650
123°
4700
124°
4750
125°


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
4800
126°
4850
0
0
4900
TD
Limestone Density Por.
PE
Compensated Density
Density Correction
FR
FR
FR
Depth in Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Borehole Temp in deg F
Density Caliper
inches
6
11
16
HVI every 10 cu ft
Bit Size
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Limestone Density Por.
percent
30
20
10
0
-10

inches
6 11 16

Annular Integral every 10 cu ft

PE
barns/electron
0 5 10

Density Correction
grams/cc
-0.50 0 0.50

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
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5 INCH BULK DENSITY MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 24-JUN-2018 16:32
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Recorded on 24-JUN-2018 12:12
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

Depth in Feet

Timing Marks
every 60.0 sec

Compensated Density
grams/cc
2 2.25 2.50 2.75 3

Gamma Ray
API
0 75 150
150 225 300

Borehole Temp in deg F

Limestone Density Por.
percent
30 20 10 0 -10

Density Caliper
inches
6 11 16

HVI every 10 cu ft

Bit Size
inches
6 11 16

Annular Integral every 10 cu ft

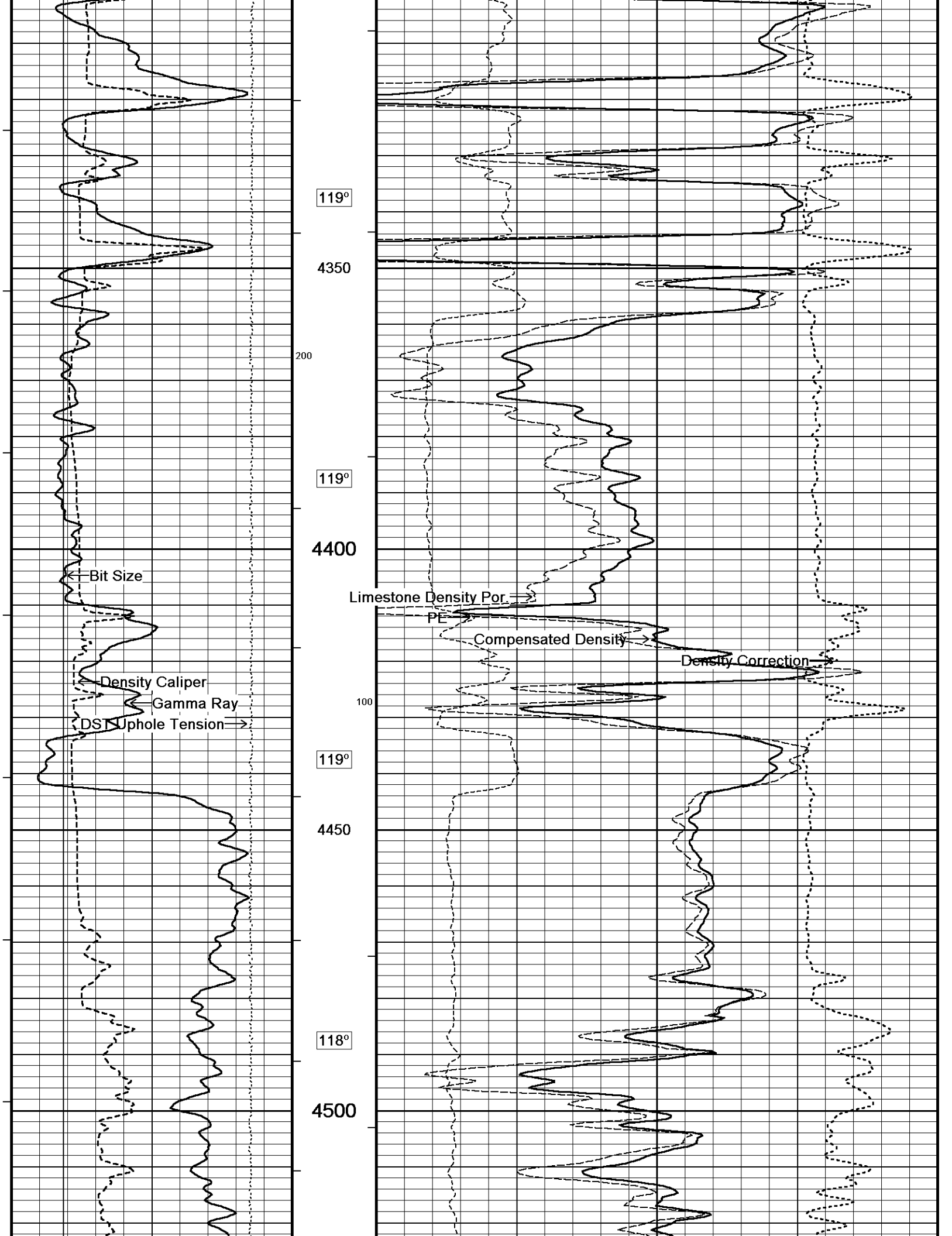
PE
barns/electron
0 5 10

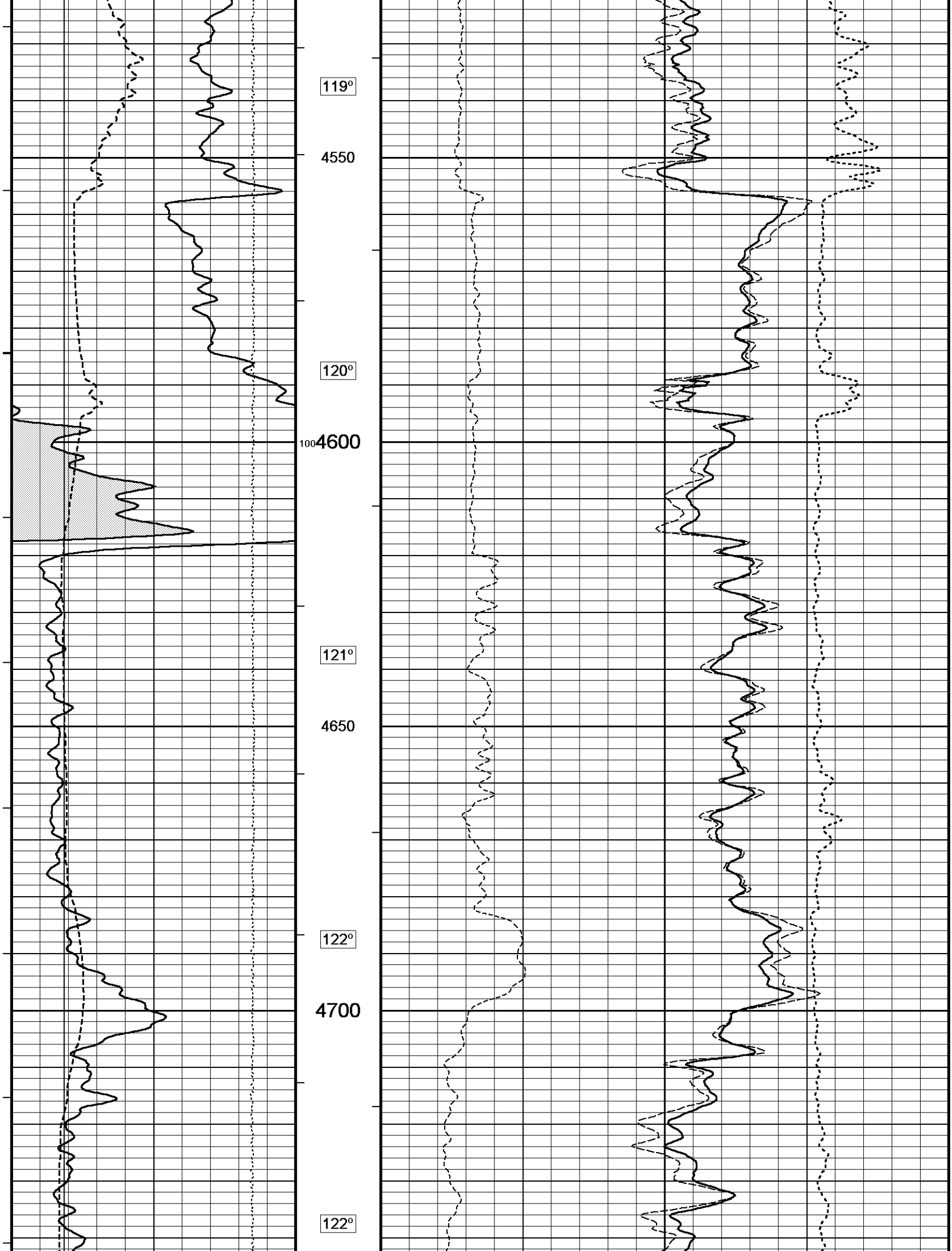
Density Correction
grams/cc
-0.50 0 0.50

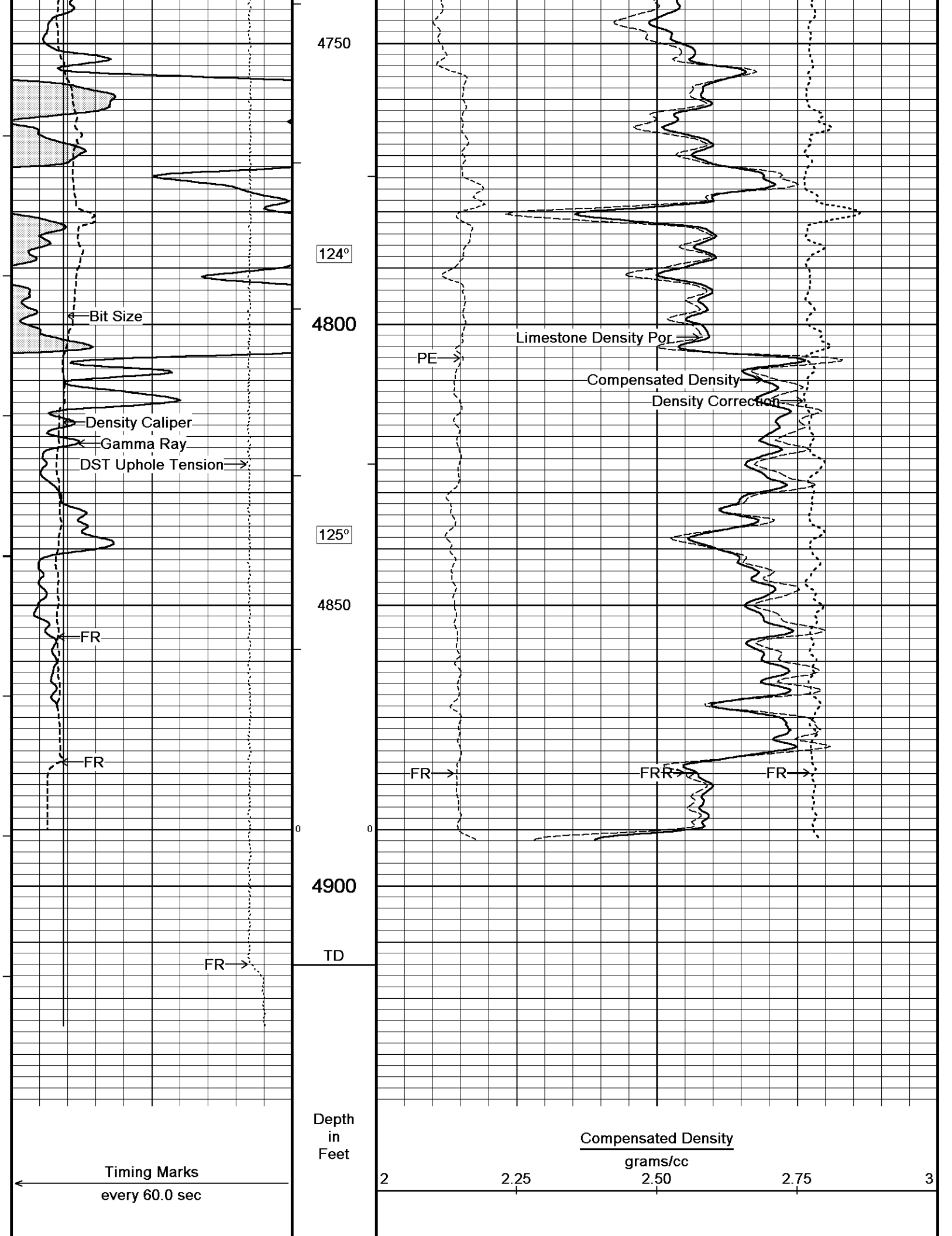
DST Uphole Tension
pounds
5000 0

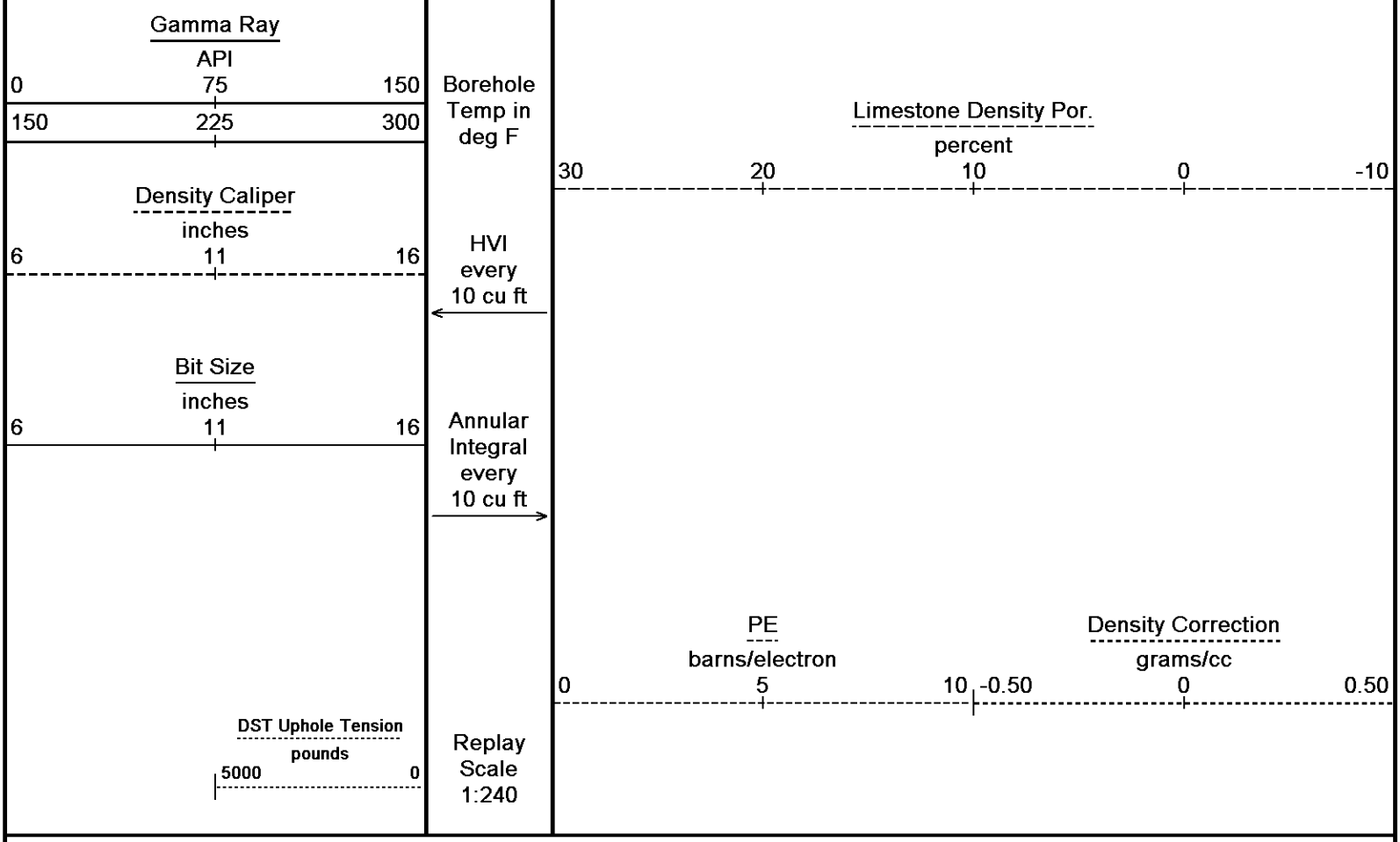
Replay Scale 1:240

4300


119°
4350
200
119°
4400
Bit Size
Limestone Density Por
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
100
119°
4450
118°
4500


119°
4550
120°
100 4600
121°
4650
122°
4700
122°


4750
124°
4800
125°
4850
4900
TD
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
Limestone Density Por
PE
Compensated Density
Density Correction
FR
FR
FR
Depth
in
Feet
Timing Marks
every 60.0 sec
Compensated Density
grams/cc
2
2.25
2.50
2.75
3



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 24-JUN-2018 16:32

Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_002.dta — Recorded on 24-JUN-2018 12:12

System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_002.dta

General Constants All 000

Last Edited on 24-JUN-2018,11:52

General Parameters		
Mud Resistivity	0.420	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	Deep Induction	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.A 246

Field Calibration on 24-JUN-2018,09:00

	Measured	Calibrated (API)
Background	57	39
Calibrator (Gross)	734	495
Calibrator (Net)	676	456

Gamma Calibration Tolerances MCG-D.A 246

Ratio	1.483	1.40 1.475 1.55	Counts/API

Gamma Constants MCG-D.A 246

Last Edited on 24-JUN-2018,09:01

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	%

High Resolution Temperature Calibration MCG-D.A 246

Field Calibration on 22-JUN-2018,16:25

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

High Resolution Temperature Constants MCG-D.A 246

Last Edited on 07-JUN-2018,10:42

Pre-filter Length	11

Caliper Calibration MPD-C.A 216

Base Calibration on 07-JUN-2018 14:09
Field Calibration on 24-JUN-2018,08:58

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14245	3.99
2	22960	5.98
3	31650	7.97
4	39952	9.86
5	49231	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.98	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	7.98	7.57 7.97 8.37	in

Photo Density Calibration MPD-C.A 216

Base Calibration on 07-JUN-2018 14:35
Field Check on 24-JUN-2018,08:58

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1007	1198		
Reference 1	50088	24364	59556	30836
Reference 2	19851	2273	24941	2541

Field Check at Base

1006.9	1197.8

Field Check

999.4	1191.4

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	184	903		
Reference 1	21030	49928	0.425	0.371
Reference 2	5765	19740	0.296	0.272

Field Check at Base

184.4	903.5

Field Check

184.2	900.5

Photo Density Calibration Tolerances MPD-C.A 216

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.60	-5% 2.52 +5%	Far Density Ratio	21.54	-5% 21.00 +5%
PE Calibration	0.120	0.089 0.110 0.131			
Near Den. Field Check	999.4	-3% 1006.9 +3%	Far Den. Field Check	1191.4	-3% 1197.8 +3%
PE WS Field Check	184.2	-6% 184.4 +6%	PE WH Field Check	900.5	-6% 903.5 +6%

Density Constants MPD-C.A 216

Last Edited on 24-JUN-2018,09:01

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)
2.68	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 18.01.6830\Data\Grand Mesa Ringer #1-24\Grand Mesa Ringer #1-24_002.dta

Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor
SHA-J.B 724 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

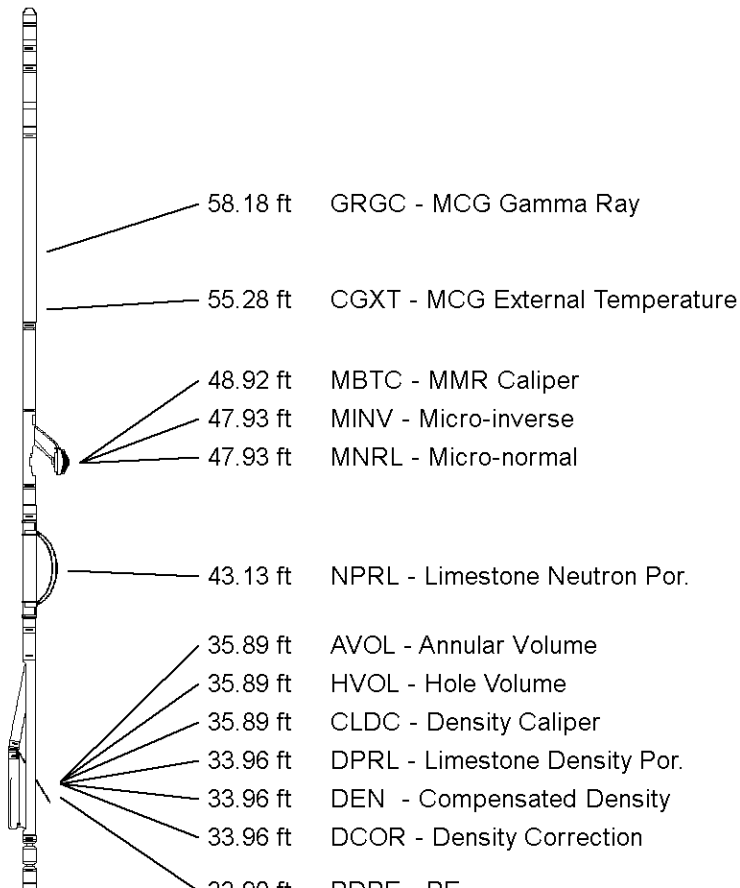
Compact Comms Gamma
MCG-D.A 246 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

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

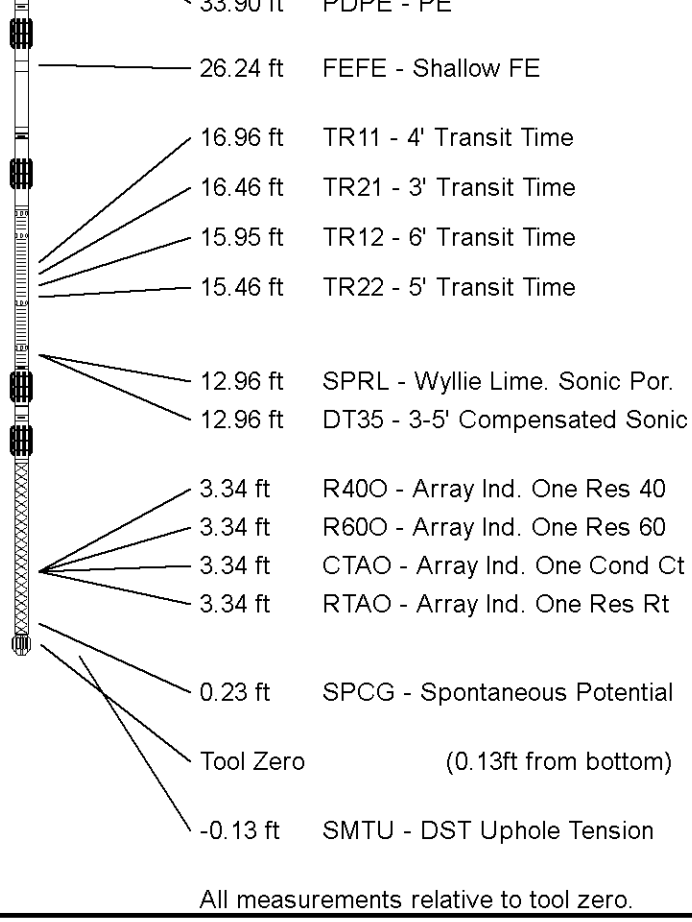


Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

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

Compact Induction
MAI-A.A 111 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	RINGER #1-24
FIELD	WILDCAT
PROVINCE/COUNTY	BARBER
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1796	feet	First Reading	4880.00	feet
Elevation Drill Floor	1794	feet	Depth Driller	4920.00	feet
Elevation Ground Level	1791	feet	Depth Logger	4914.00	feet

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COMPENSATED NEUTRON
MICRORESISTIVITY LOG