Weatherford®

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	BLACK OAK EXPLORATION
WELL	FRISIBIE FAMILY 1-15
FIELD	WILDCAT
PROVINCE/COUNTY	RAWLINS
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	SE NW NW SE 2180' FSL & 2300' FEL
PERMIT NUMBER	SE NE NW SE

SEC 15	TWP 2S	RGE 36W

Other Services
MAI/MFE MSS

Latitude	39.865833
Longitude	-101.360000
API Number	15-153-21221

Permanent Datum GL, Elevation 3330 feet
Log Measured From KB, 5.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	3335.00
DF	3333.00
GL	3330.00

Date	21-MAR-2019		
Run Number	ONE		
Service Order	17937-240384345		
Depth Driller	4860.00	feet	
Depth Logger	4865.00	feet	
First Reading	4831.00	feet	
Last Reading	0.00	feet	
Casing Driller	420.00	feet	
Casing Logger	420.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.00 lb/USg	65.00 sec/qt	
PH / Fluid Loss	10.00	8.80 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	1.04 @103.0	ohm-m	
Rmf @ Measured Temp	0.83 @103.0	ohm-m	
Rmc @ Measured Temp	1.25 @103.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.80 @135.0	ohm-m	
Time Since Circulation	4 HOURS		
Max Recorded Temp	135.00	deg F	
Equipment / Base	13244	LIB	
Recorded By	MATT MCGLOTHLIN		
Witnessed By	CLAYTON CAMOZZI		

BOREHOLE RECORD

Last Edited: 22-MAR-2019 00:06

Bit Size inches	Depth From feet	Depth To feet
7.875	420.00	4860.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	420.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 18.05.4364
- TOOLSTRING: CBH, SHA, MCG, MML, MDN, MPD, SKJ, MFE, MSS, MAI LOGGED IN COMBINATION.
- HARDWARE:
  - MDN: DUAL BOWSPRING FOR DECENTRALIZATION
  - MFE: 1 X 0.5 INCH STANDOFF
  - MSS: 2 X 0.5 INCH STANDOFF
  - MAI: 2 X 0.5 INCH STANDOFF
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST:
  - NEUTRON / DENSITY / MICROLOG / SONIC / INDUCTION: TD - SURFACE CASING.
  - GAMMA RAY: TD - SURFACE.
- CREW: J. JOHNSON, B. COPELAND.

- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.

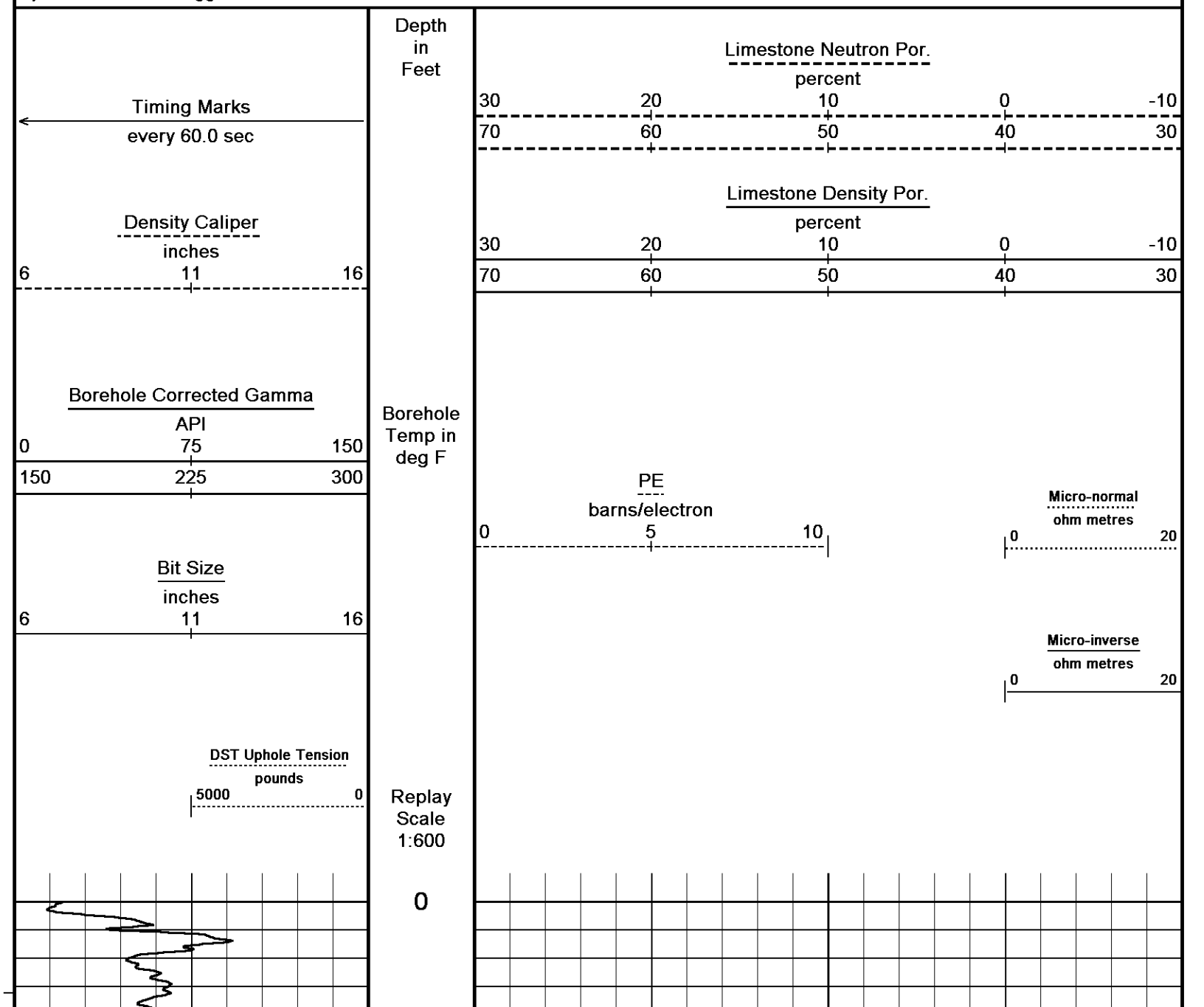
****CLIENT REQUESTE TO PULL REPEAT PASS UP TO 4000 FEET FROM TD.****

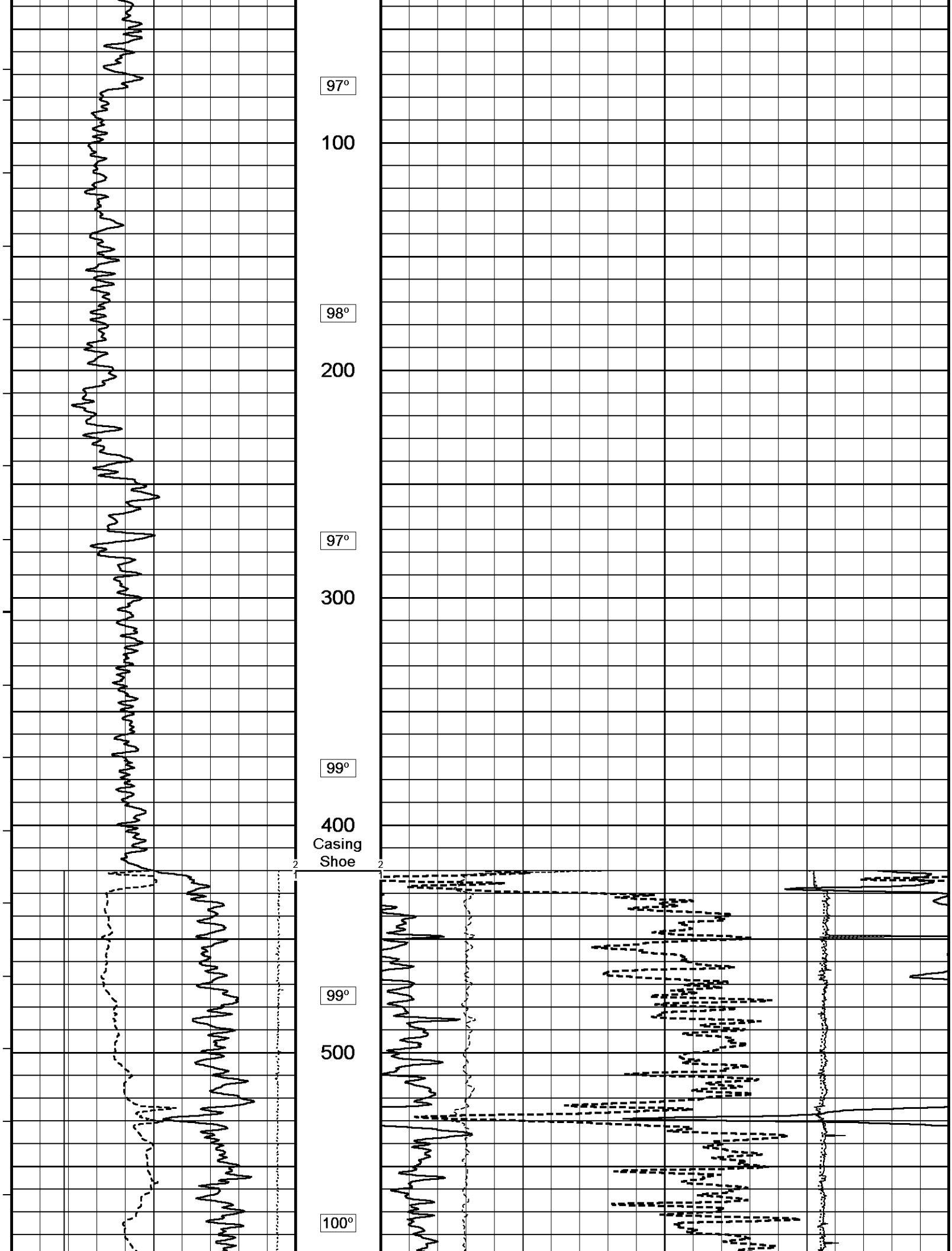
2 INCH LIMESTONE 1:600

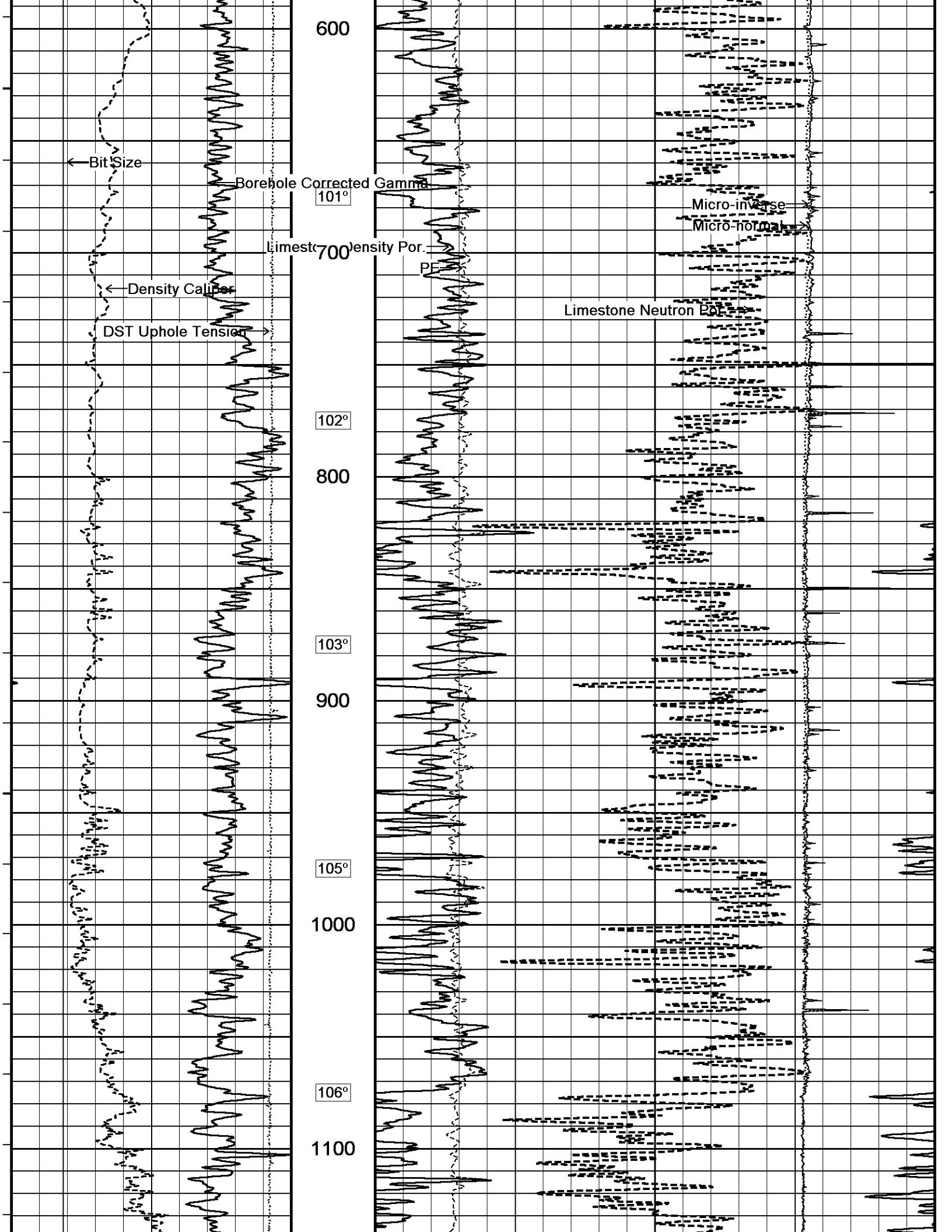
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 22-MAR-2019 08:17

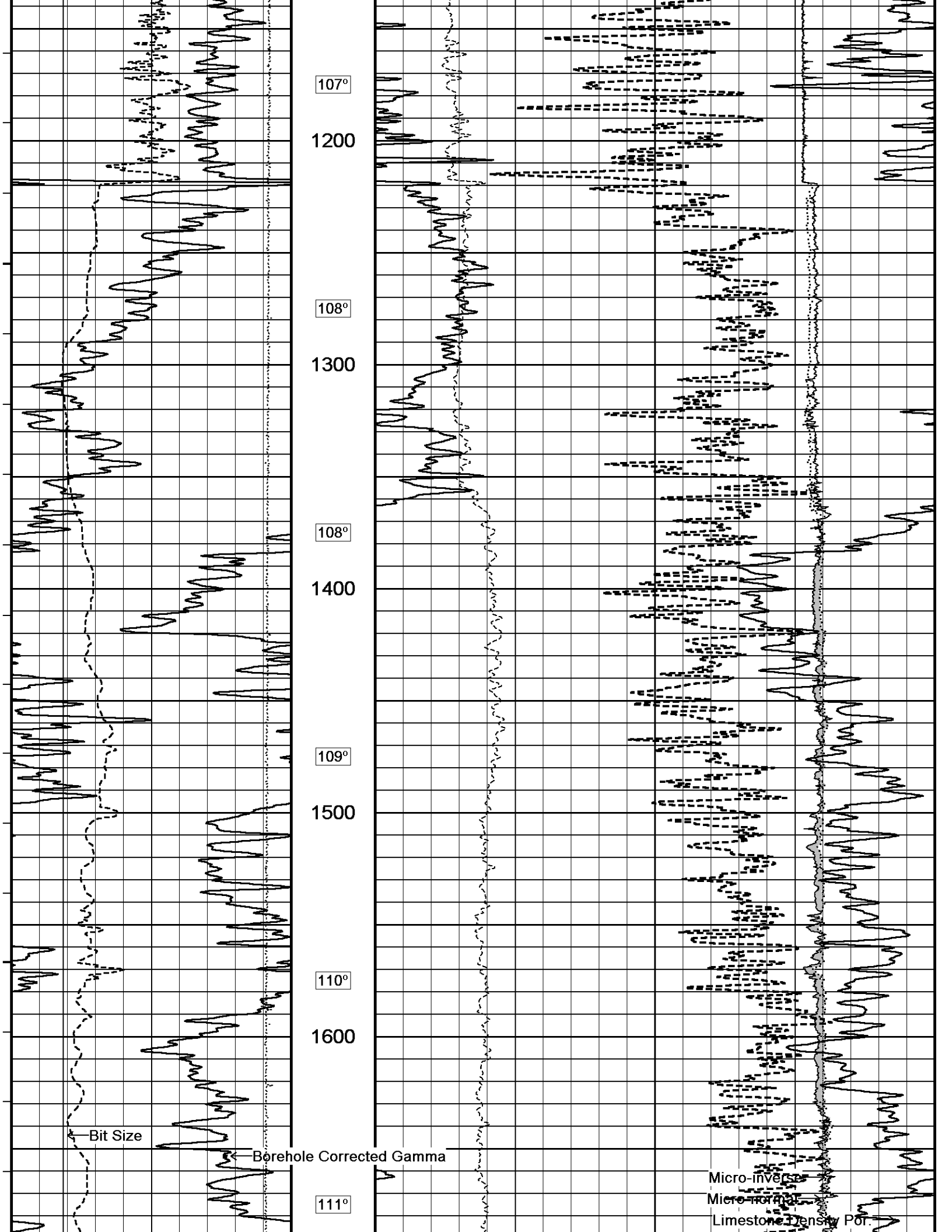
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta — Recorded on 22-MAR-2019 00:23

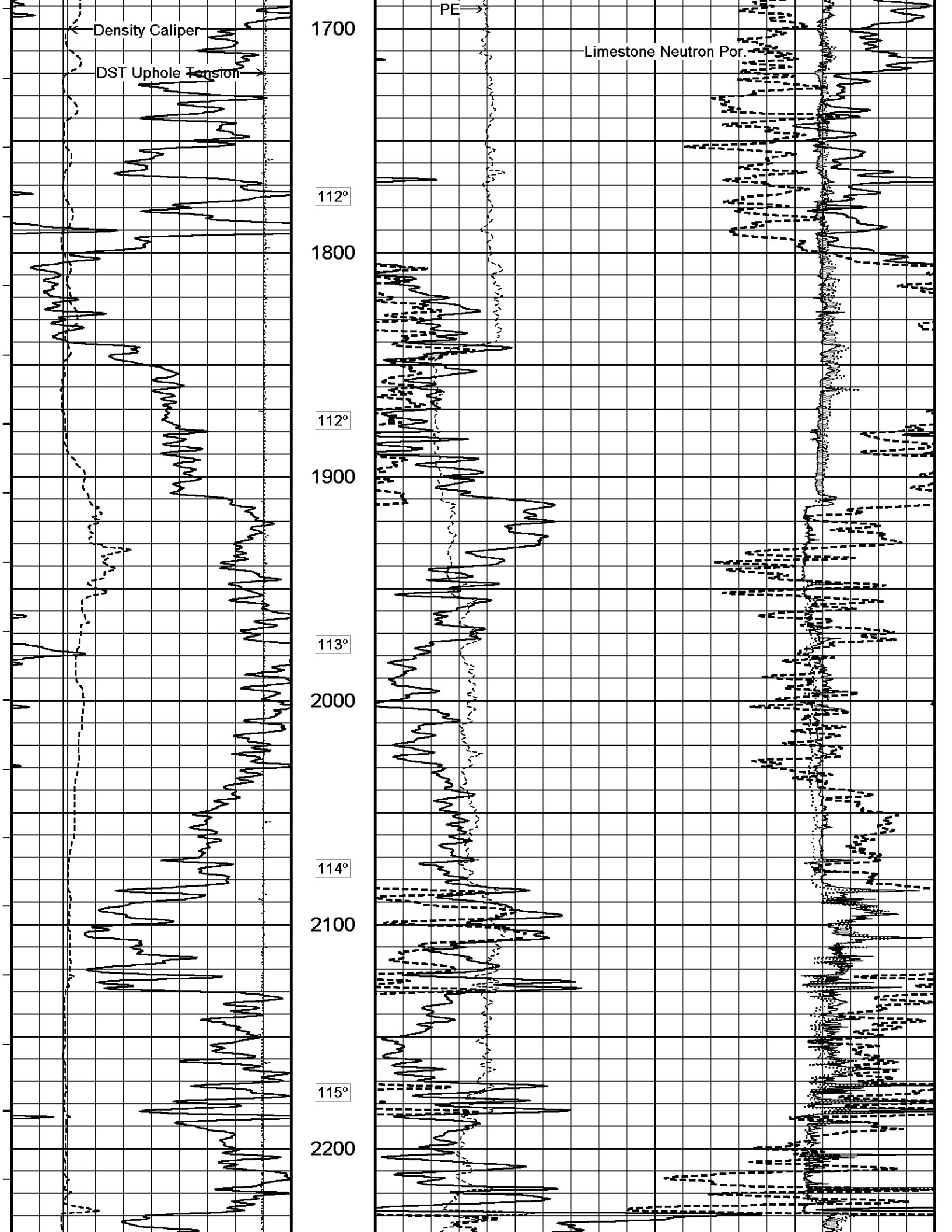
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

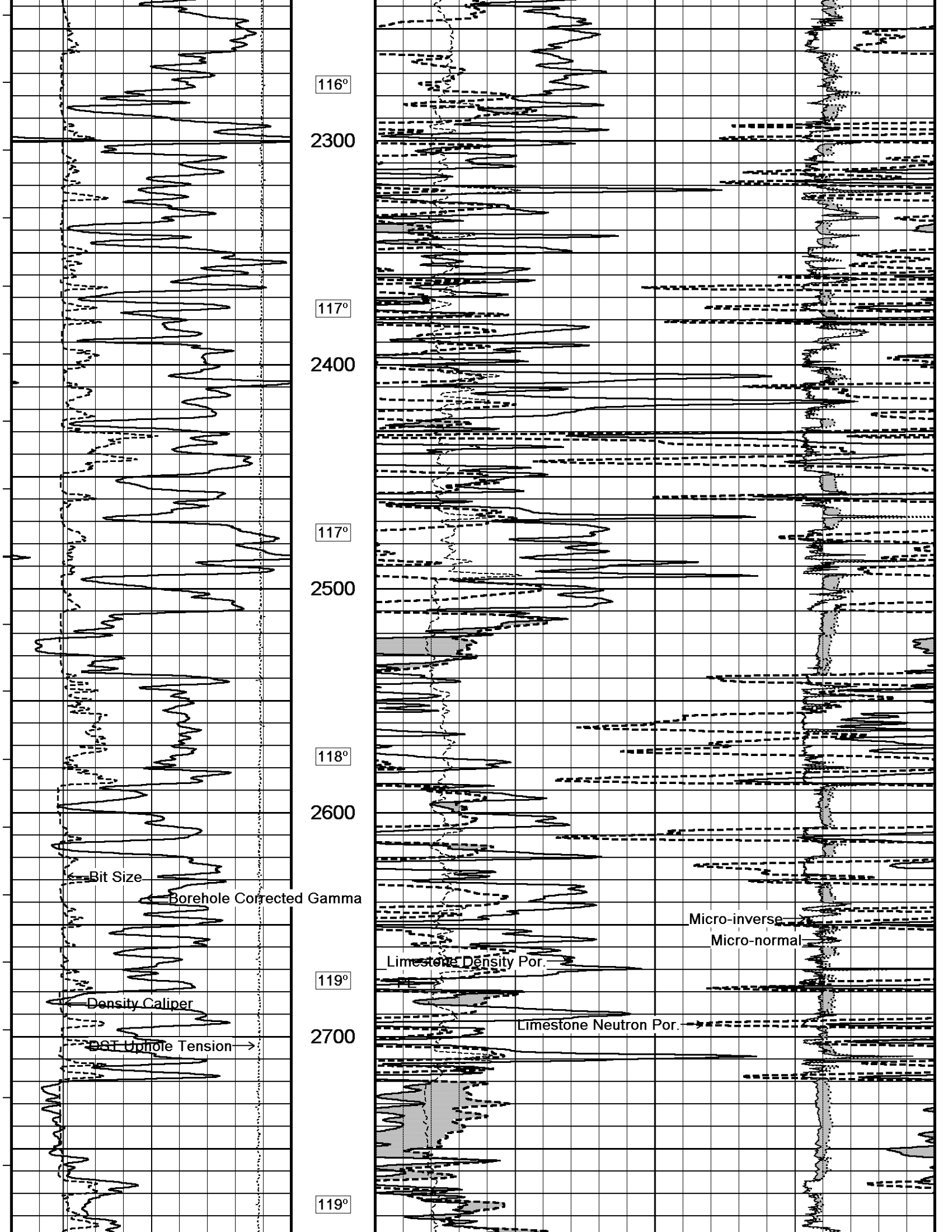


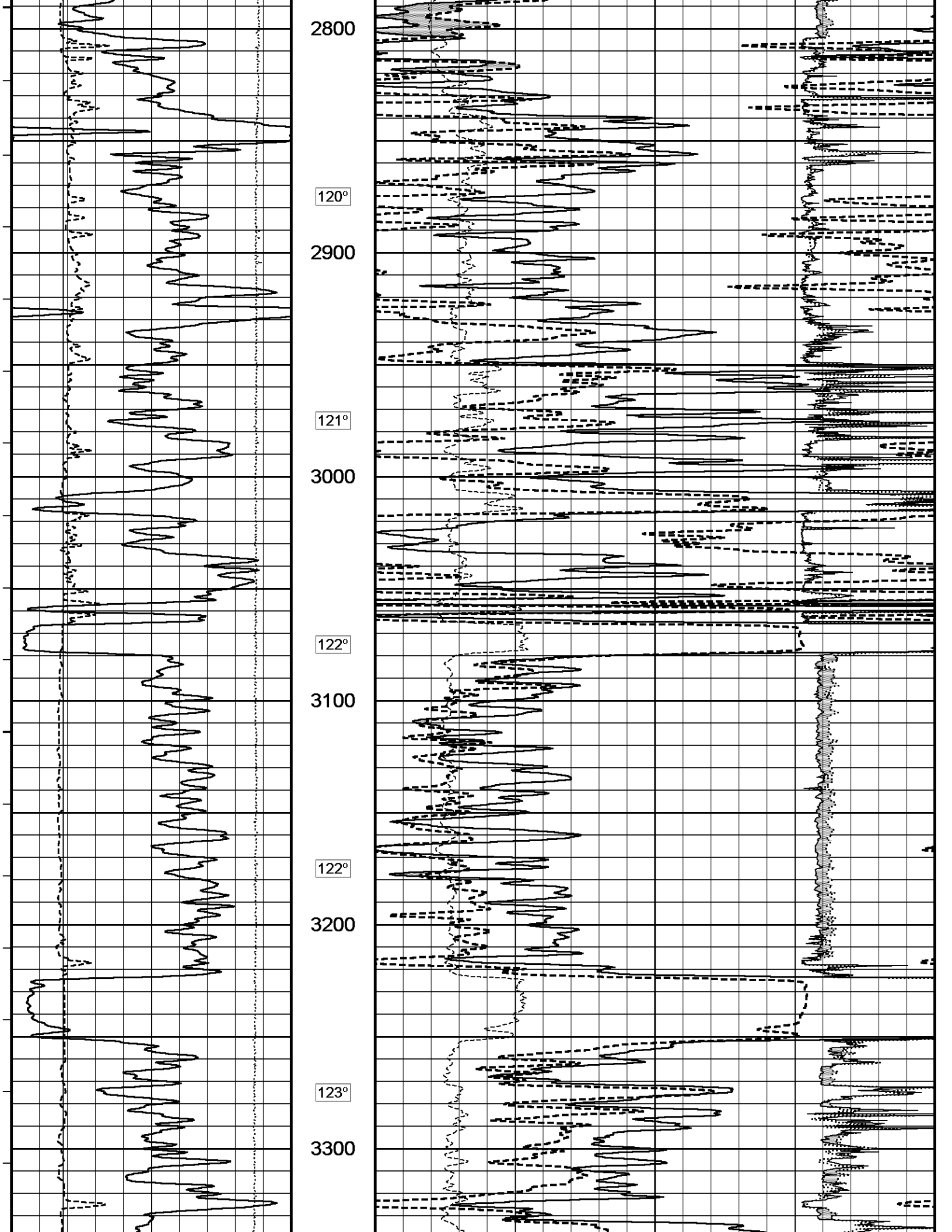

97°
100
98°
200
97°
300
99°
400
Casing
Shoe
99°
500
100°

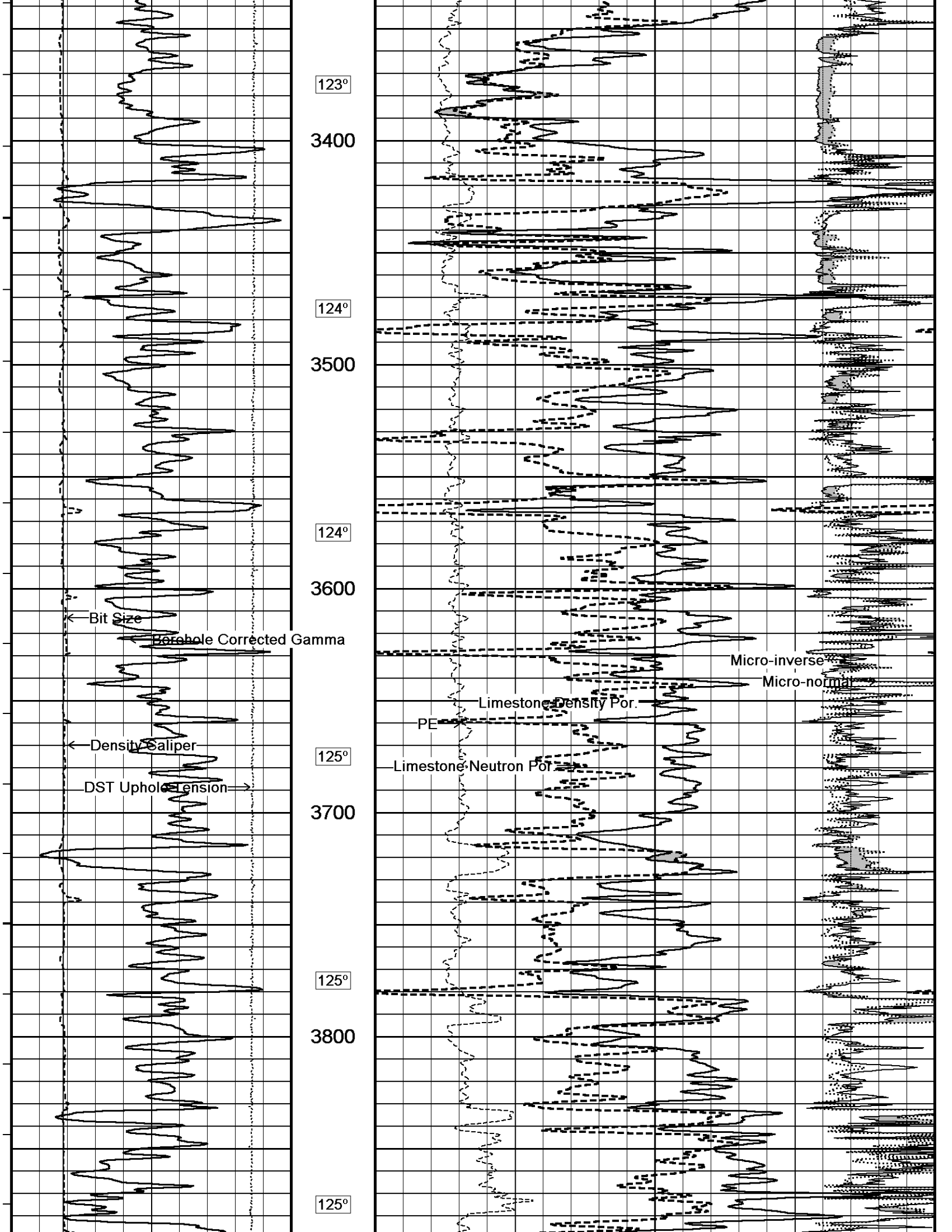

600
Bit Size
Borehole Corrected Gamma
101°
Micro-inverse
Micro-normal
700
Limesto
ensity Por.
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
102°
800
103°
900
105°
1000
106°
1100

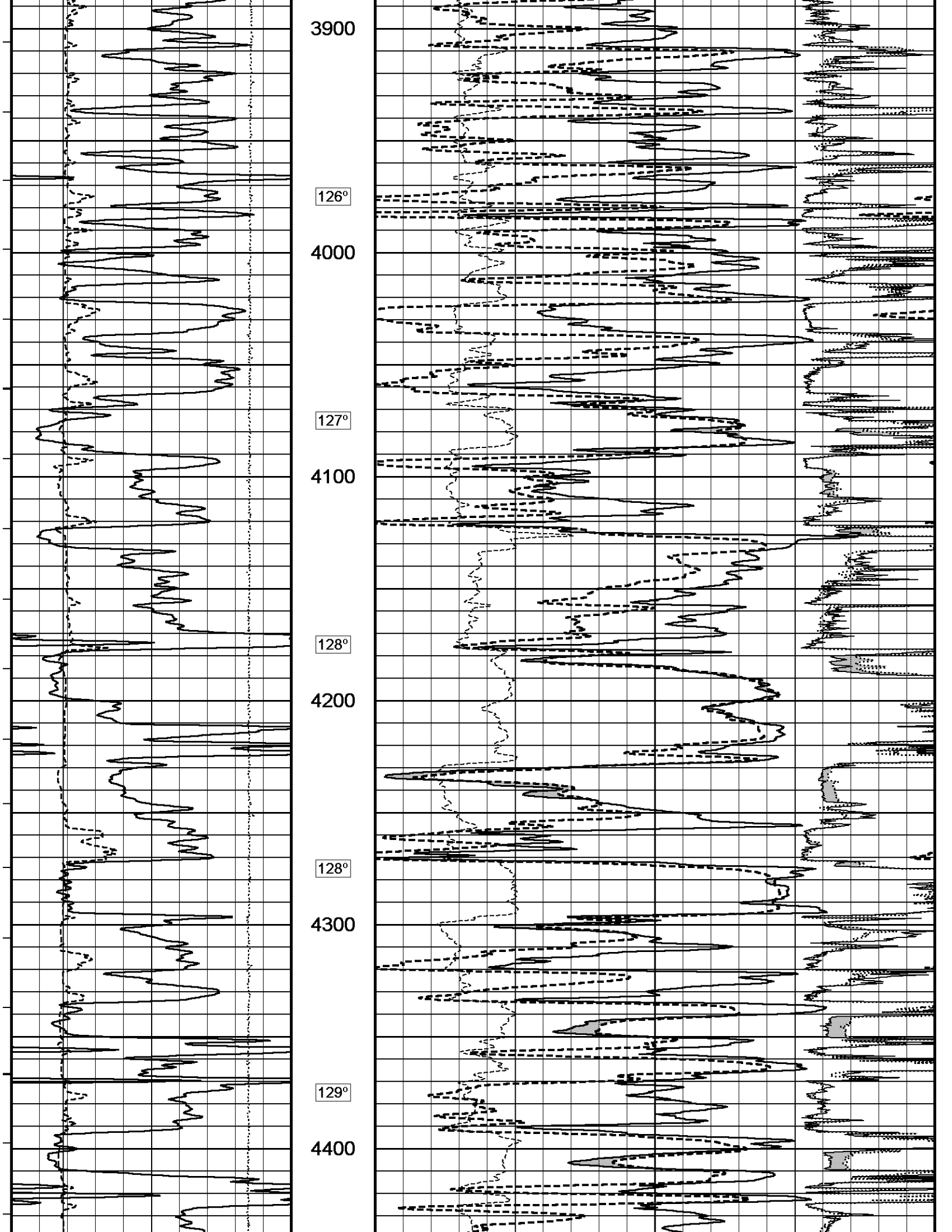

107°
1200
108°
1300
108°
1400
109°
1500
110°
1600
111°
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.

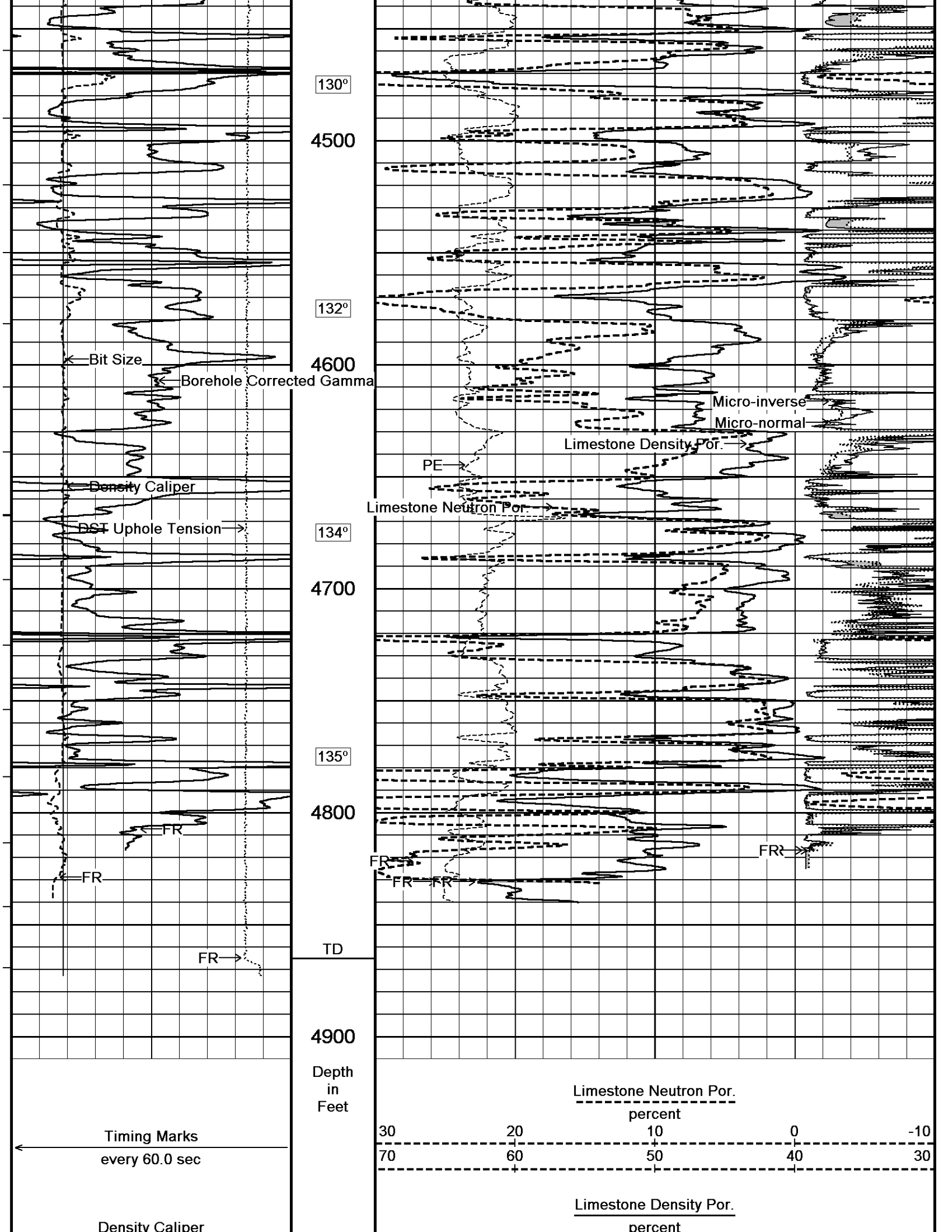

Density Caliper
DST Uphole Tension
PE
Limestone Neutron Por.
1700
112°
1800
112°
1900
113°
2000
114°
2100
115°
2200

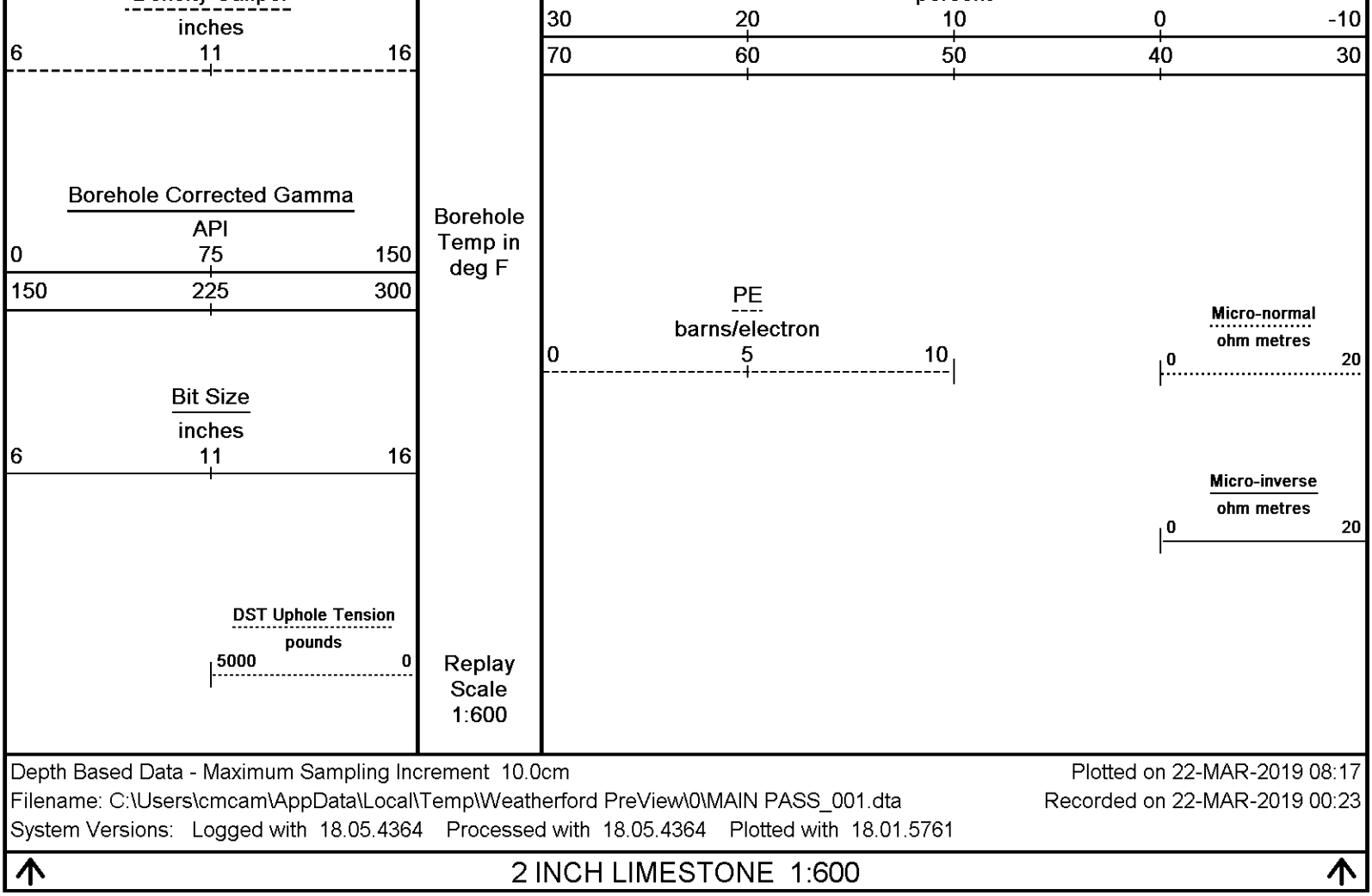

116°
2300
117°
2400
117°
2500
118°
2600
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
119°
Density Caliper
Limestone Neutron Por.
2700
DGT Uphole Tension
119°

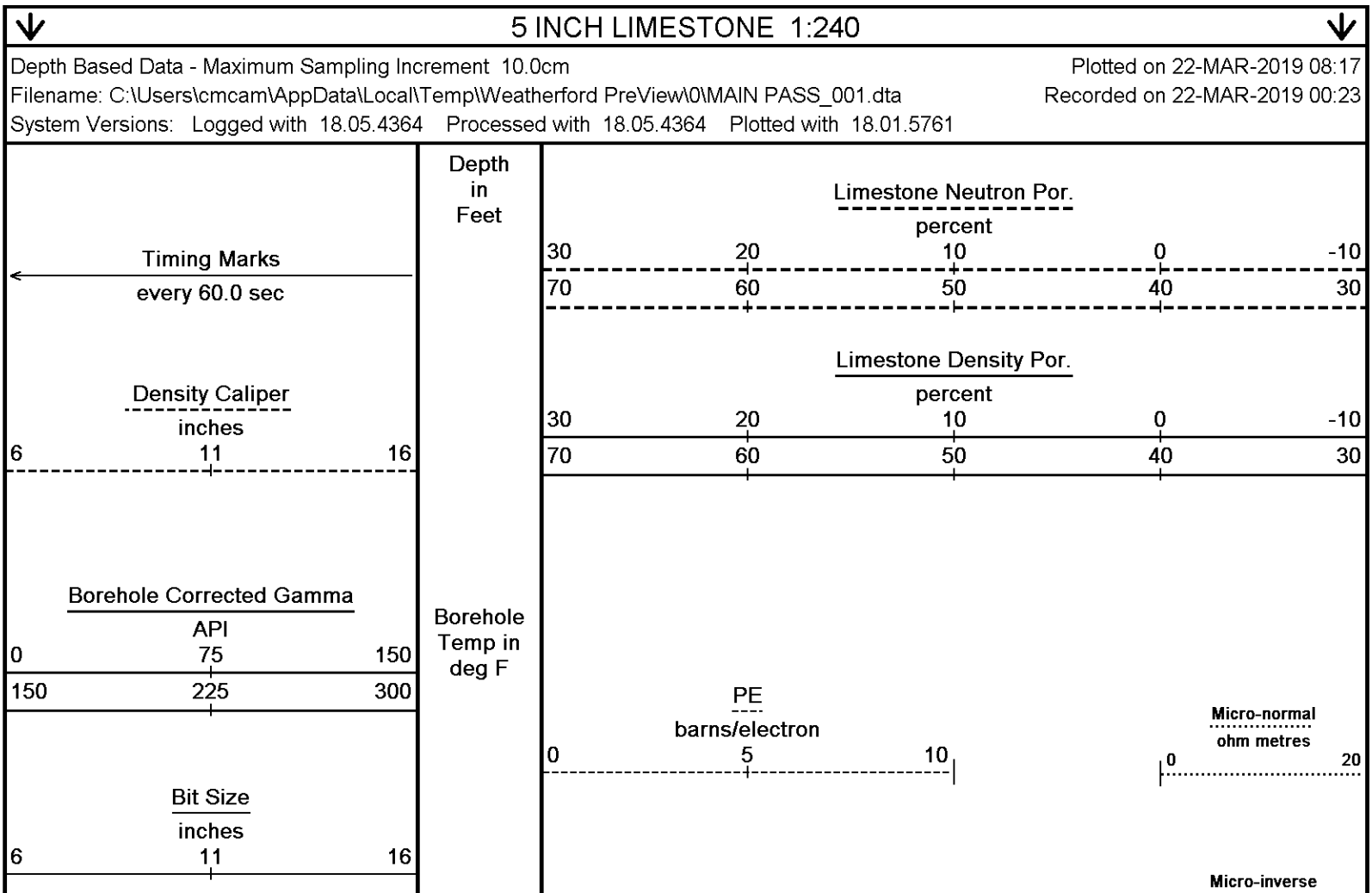

2800
120°
2900
121°
3000
122°
3100
122°
3200
123°
3300

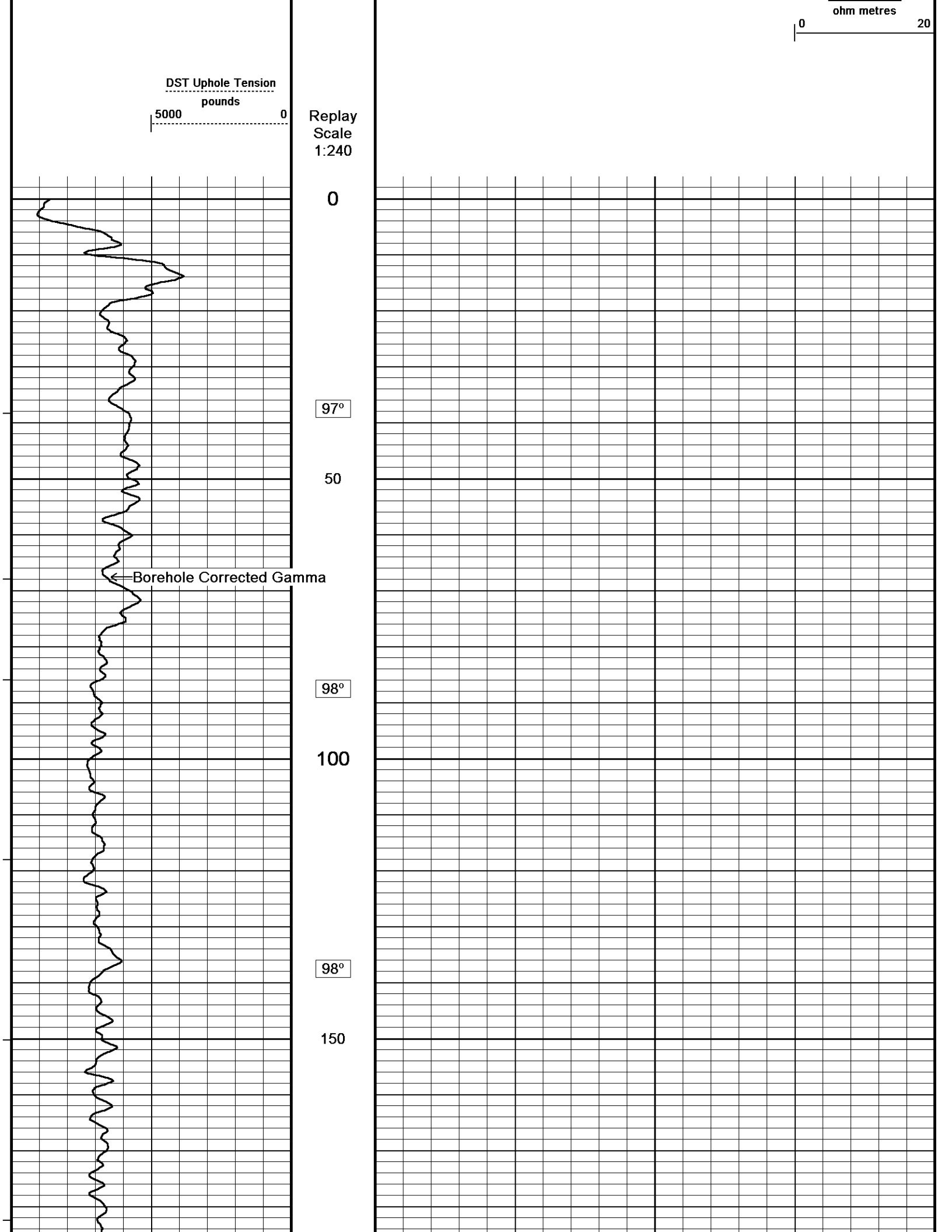

123°
3400
124°
3500
124°
3600
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
125°
Limestone Neutron Por.
DST Uphole Tension
3700
125°
3800
125°

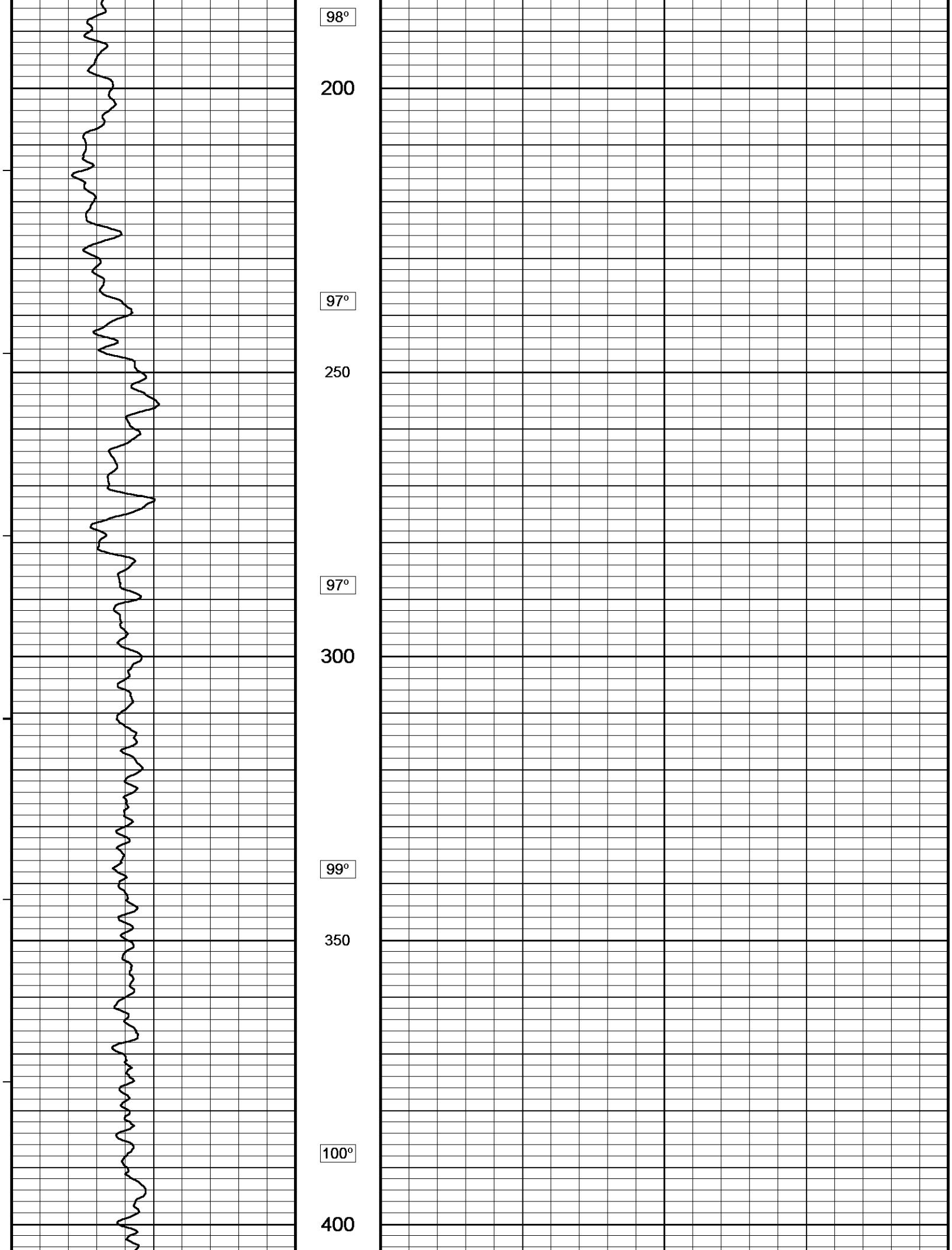

3900
126°
4000
127°
4100
128°
4200
128°
4300
129°
4400

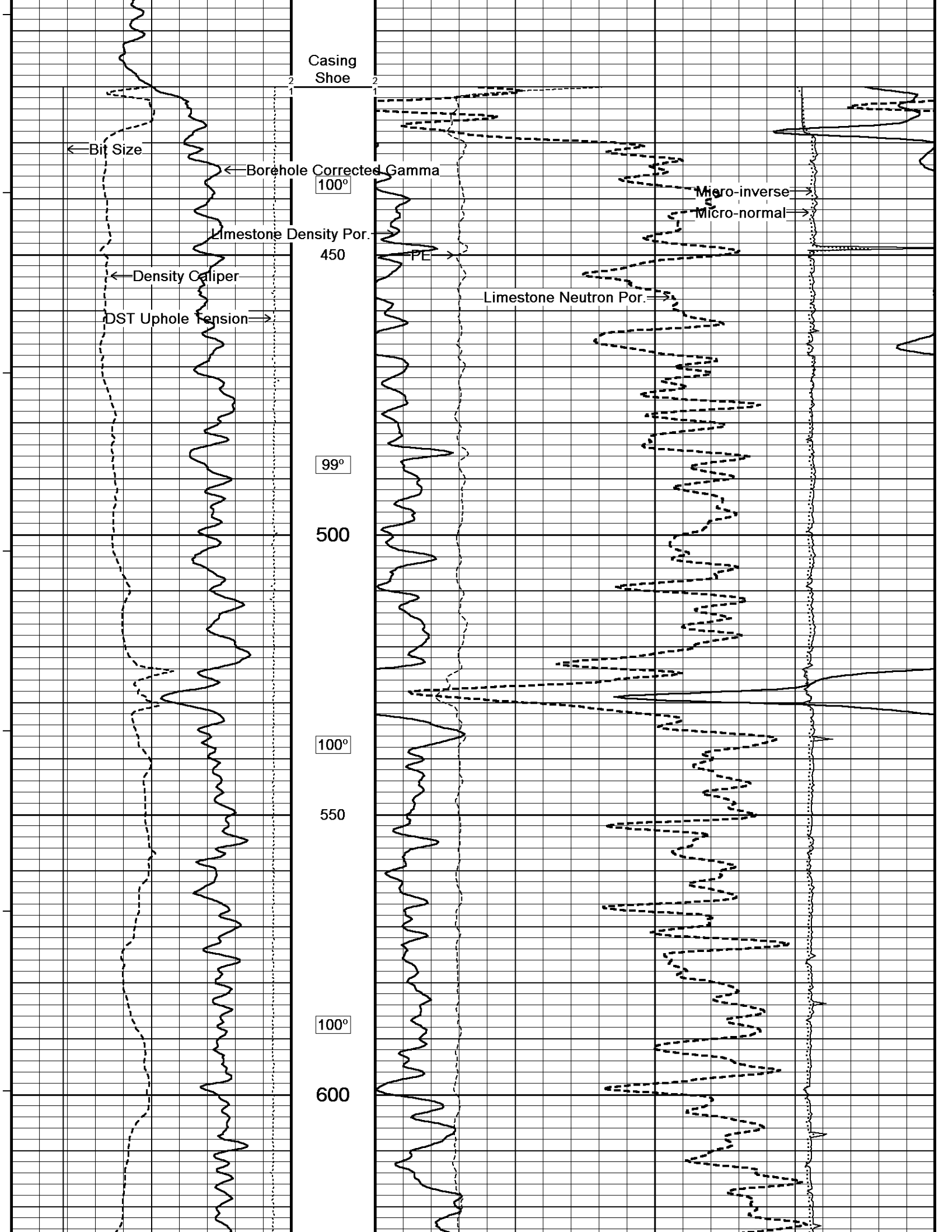

130°
4500
132°
4600
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
134°
4700
135°
4800
FR
FR
FR
FR
FR
FR
TD
4900
Depth
in
Feet
Timing Marks
every 60.0 sec
Density Caliper
Limestone Neutron Por.
percent
30
20
10
0
-10
70
60
50
40
30
Limestone Density Por.
percent

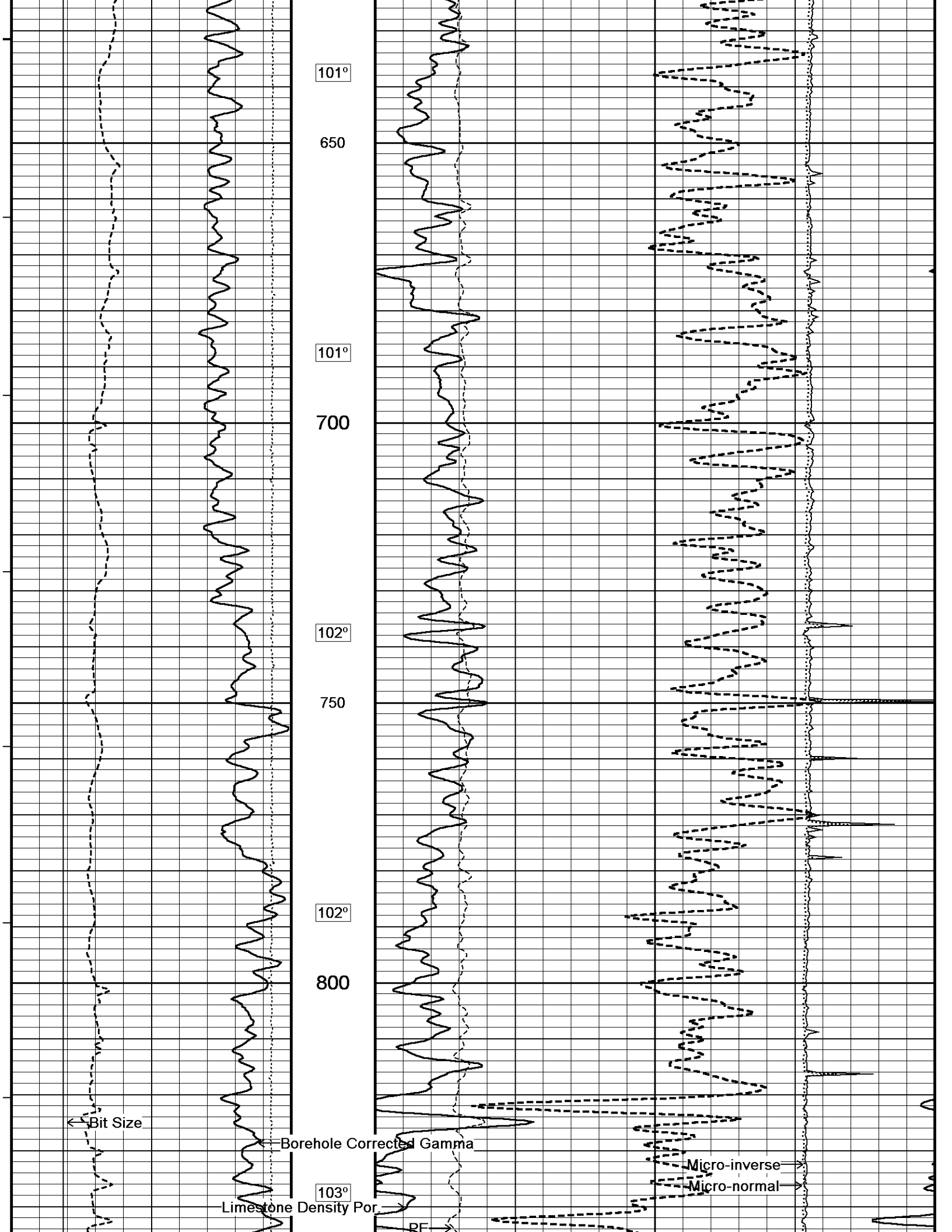

inches
6
11
16
30
20
10
0
-10
70
60
50
40
30
Borehole Corrected Gamma
API
0
75
150
150
225
300
Borehole Temp in deg F
PE
barns/electron
0
5
10
Micro-normal
ohm metres
0
20
Bit Size
inches
6
11
16
Micro-inverse
ohm metres
0
20
DST Uphole Tension
pounds
5000
0
Replay Scale 1:600
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
Recorded on 22-MAR-2019 00:23
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
2 INCH LIMESTONE 1:600

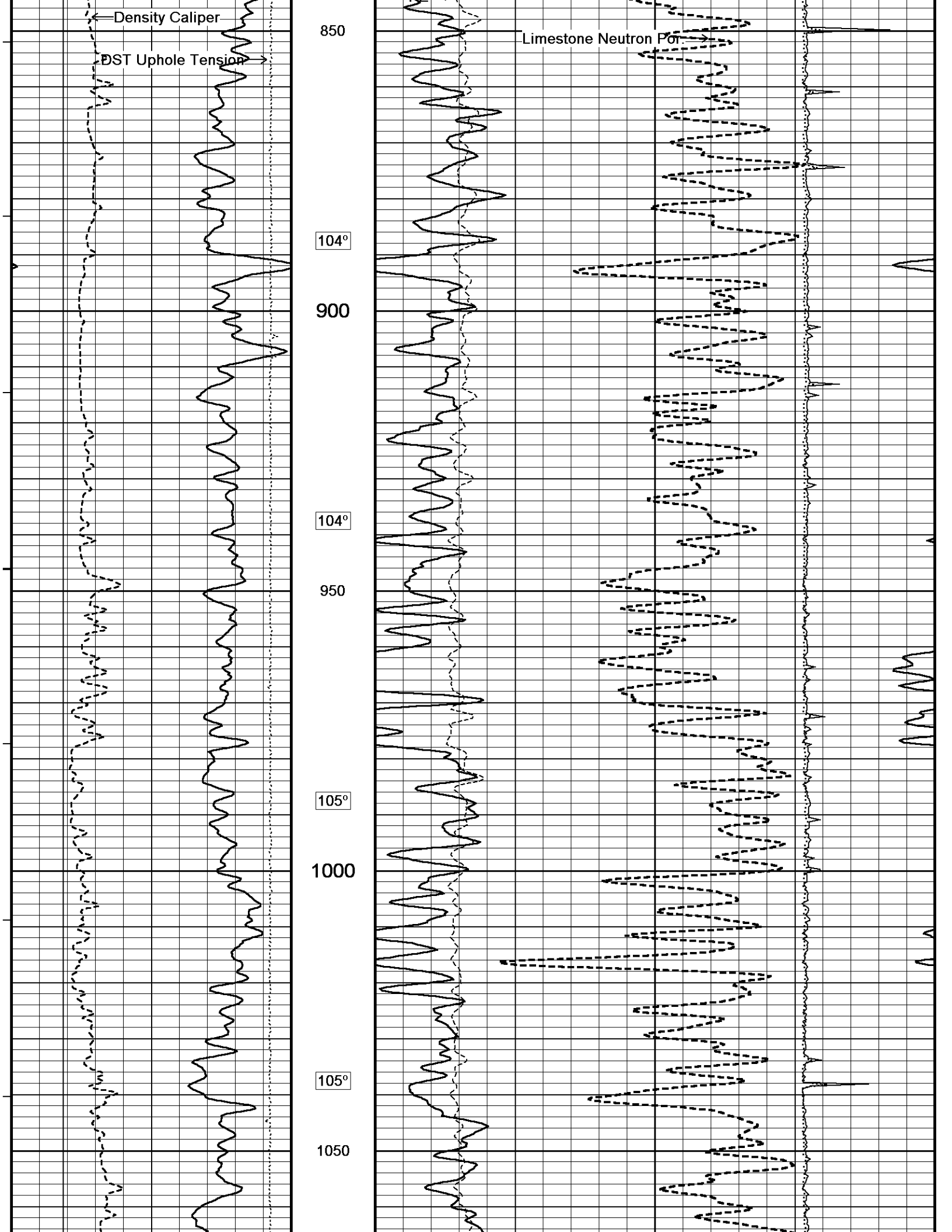

5 INCH LIMESTONE 1:240
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
Recorded on 22-MAR-2019 00:23
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
Depth in Feet
Timing Marks
every 60.0 sec
Limestone Neutron Por.
percent
30
20
10
0
-10
70
60
50
40
30
Limestone Density Por.
percent
Density Caliper
inches
6
11
16
Borehole Corrected Gamma
API
0
75
150
150
225
300
Borehole Temp in deg F
PE
barns/electron
0
5
10
Micro-normal
ohm metres
0
20
Bit Size
inches
6
11
16
Micro-inverse

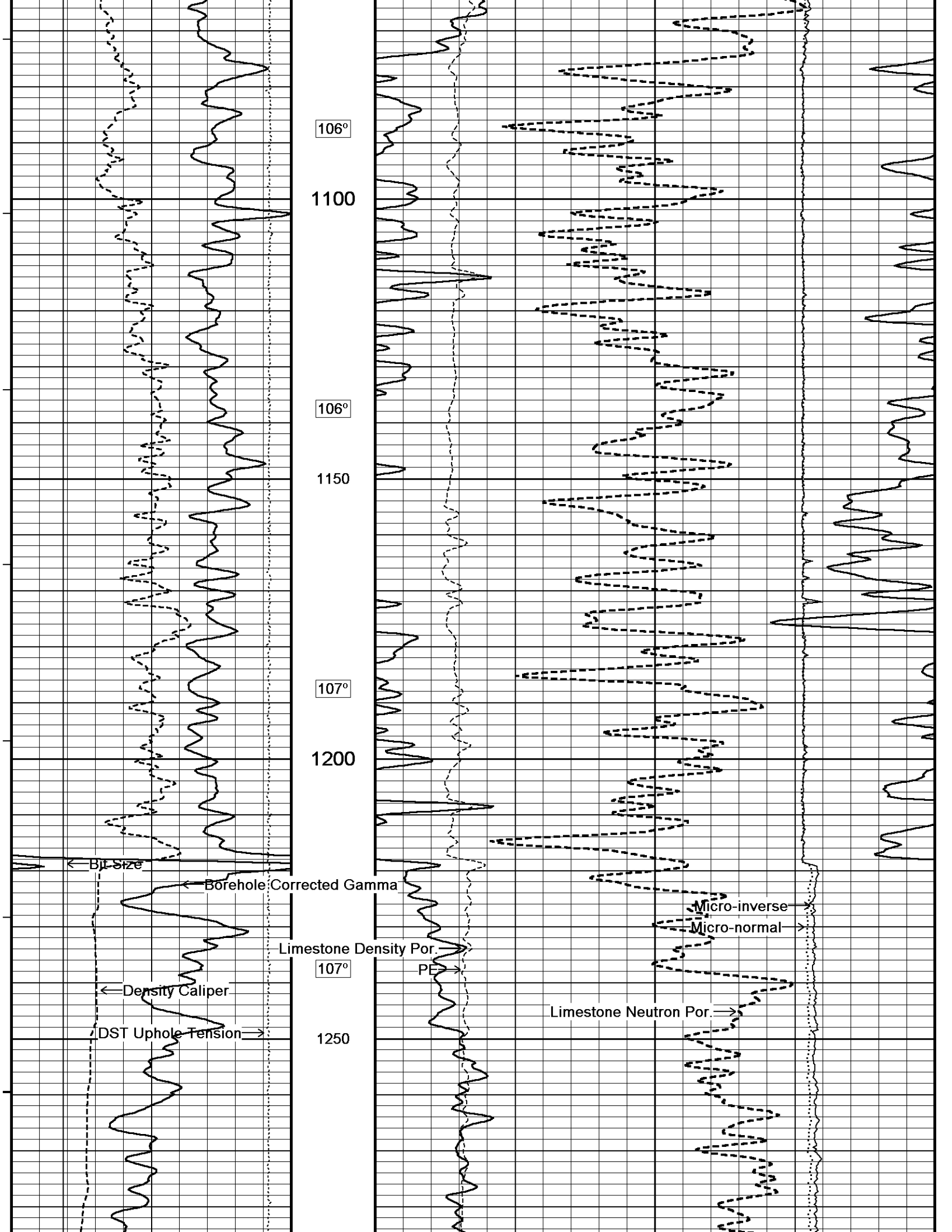

ohm metres
0
20
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
0
97°
50
Borehole Corrected Gamma
98°
100
98°
150

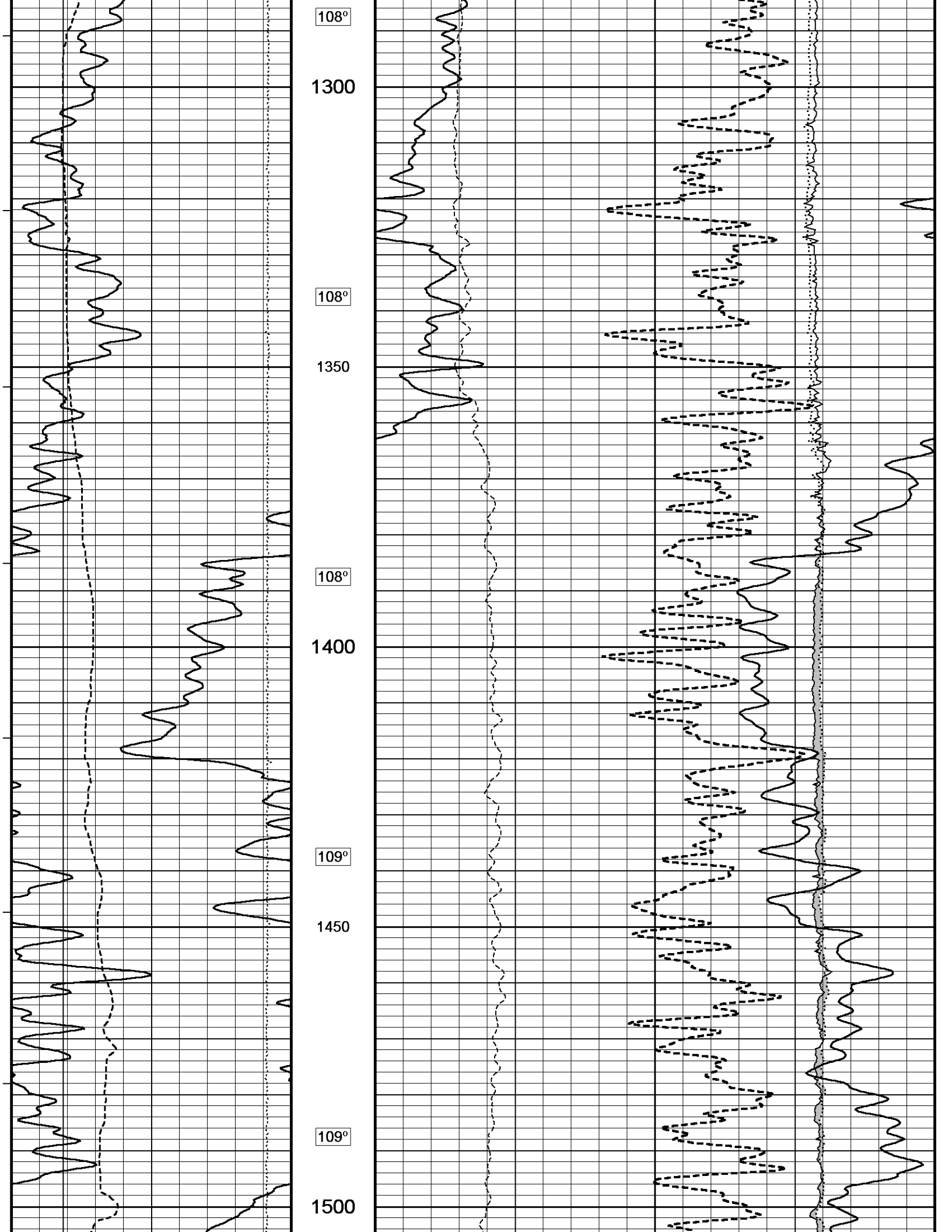

98°
200
97°
250
97°
300
99°
350
100°
400

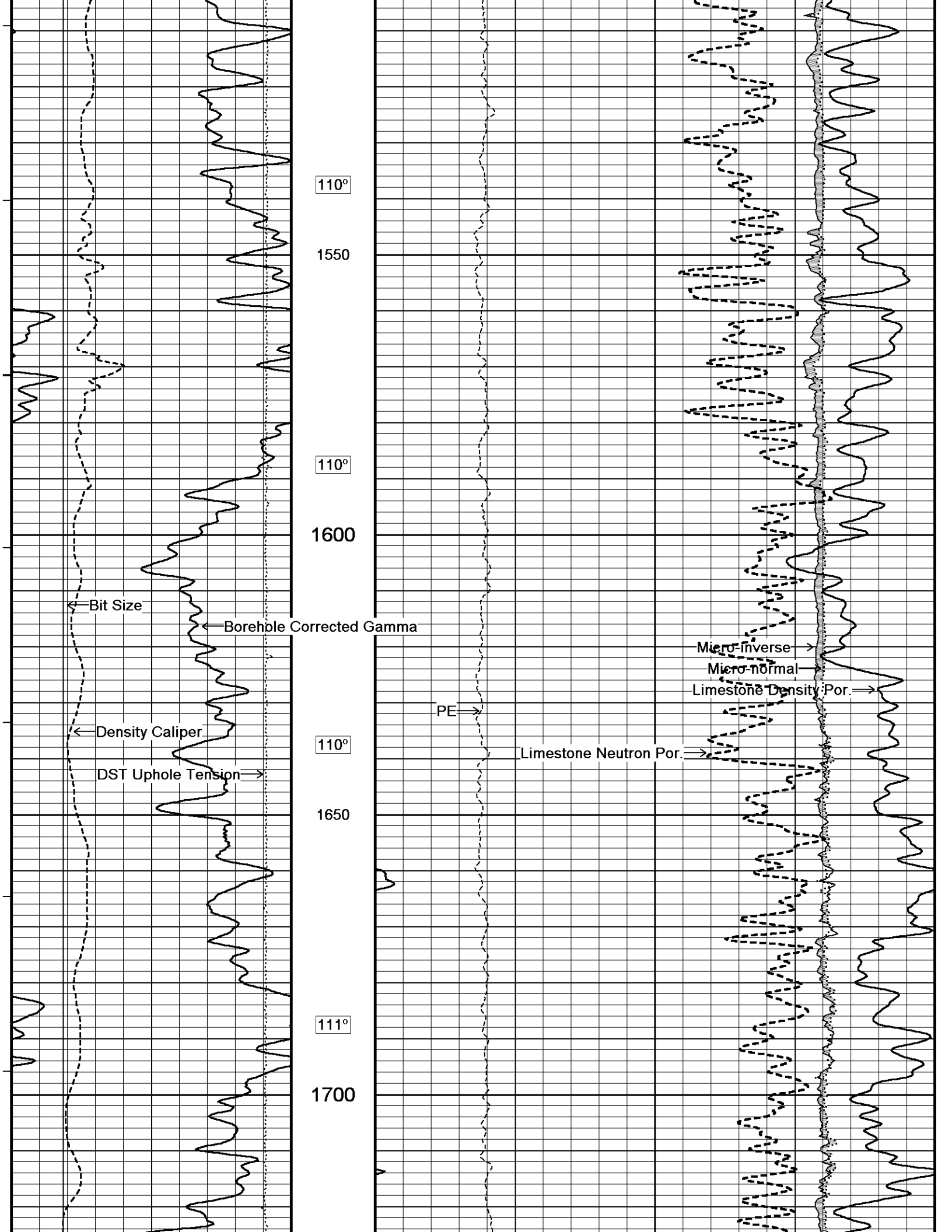

Casing
Shoe
Bit Size
Borehole Corrected Gamma
100°
Micro-inverse
Micro-normal
Limestone Density Por.
450
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
99°
500
100°
550
100°
600

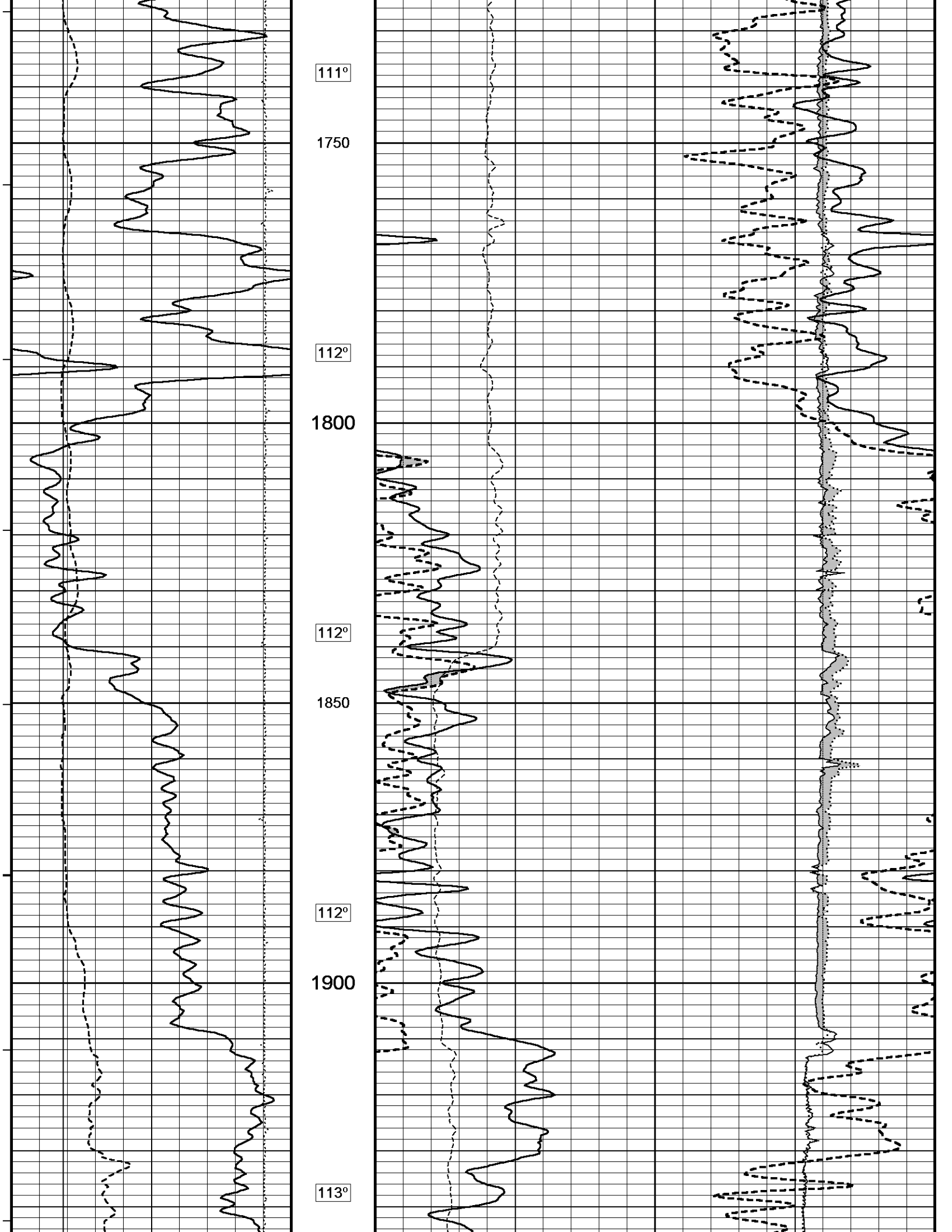

101°
650
101°
700
102°
750
102°
800
103°
Bit Size
Borehole Corrected Gamma
Limestone Density Por
RF
Micro-inverse
Micro-normal

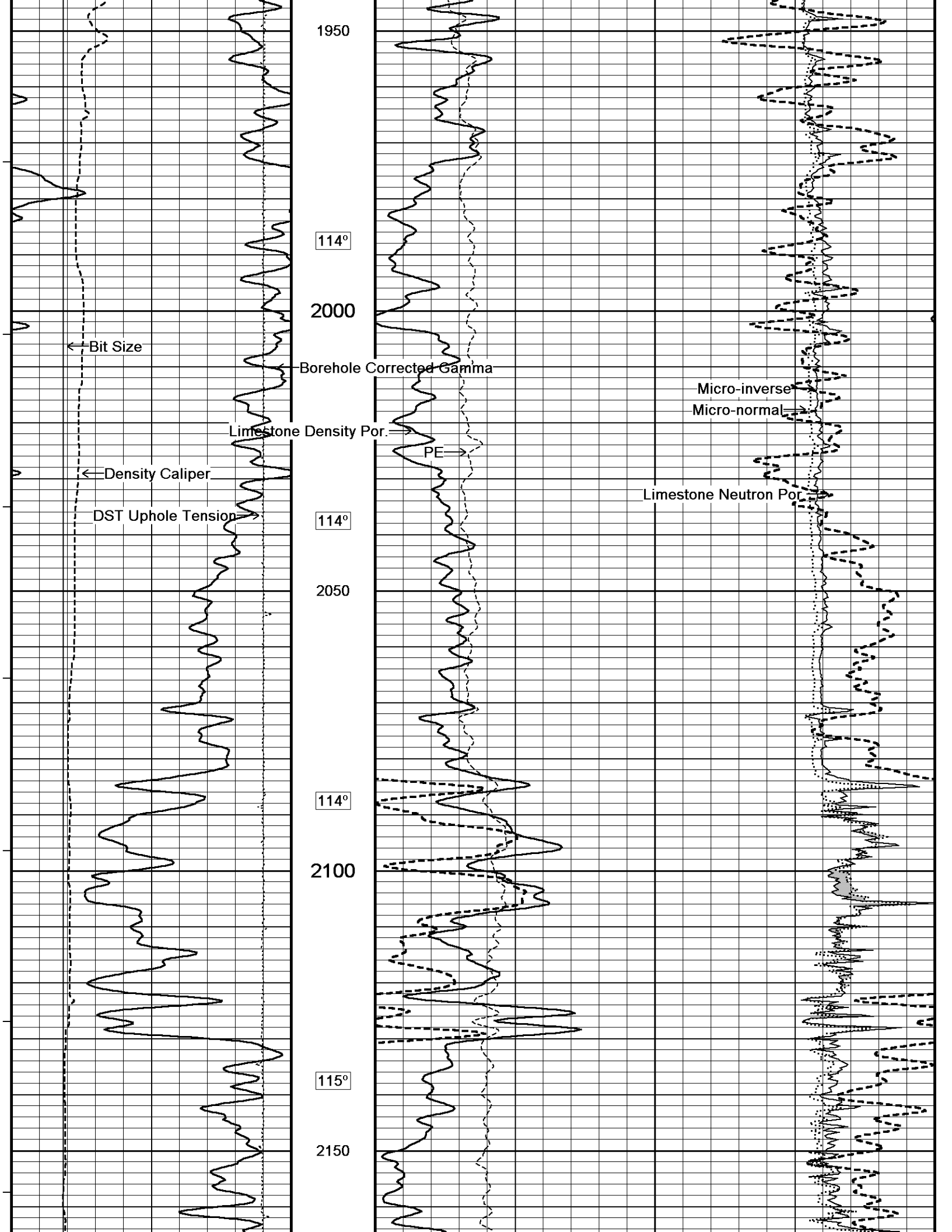

Density Caliper
DST Uphole Tension
Limestone Neutron Por.
850
104°
900
104°
950
105°
1000
105°
1050

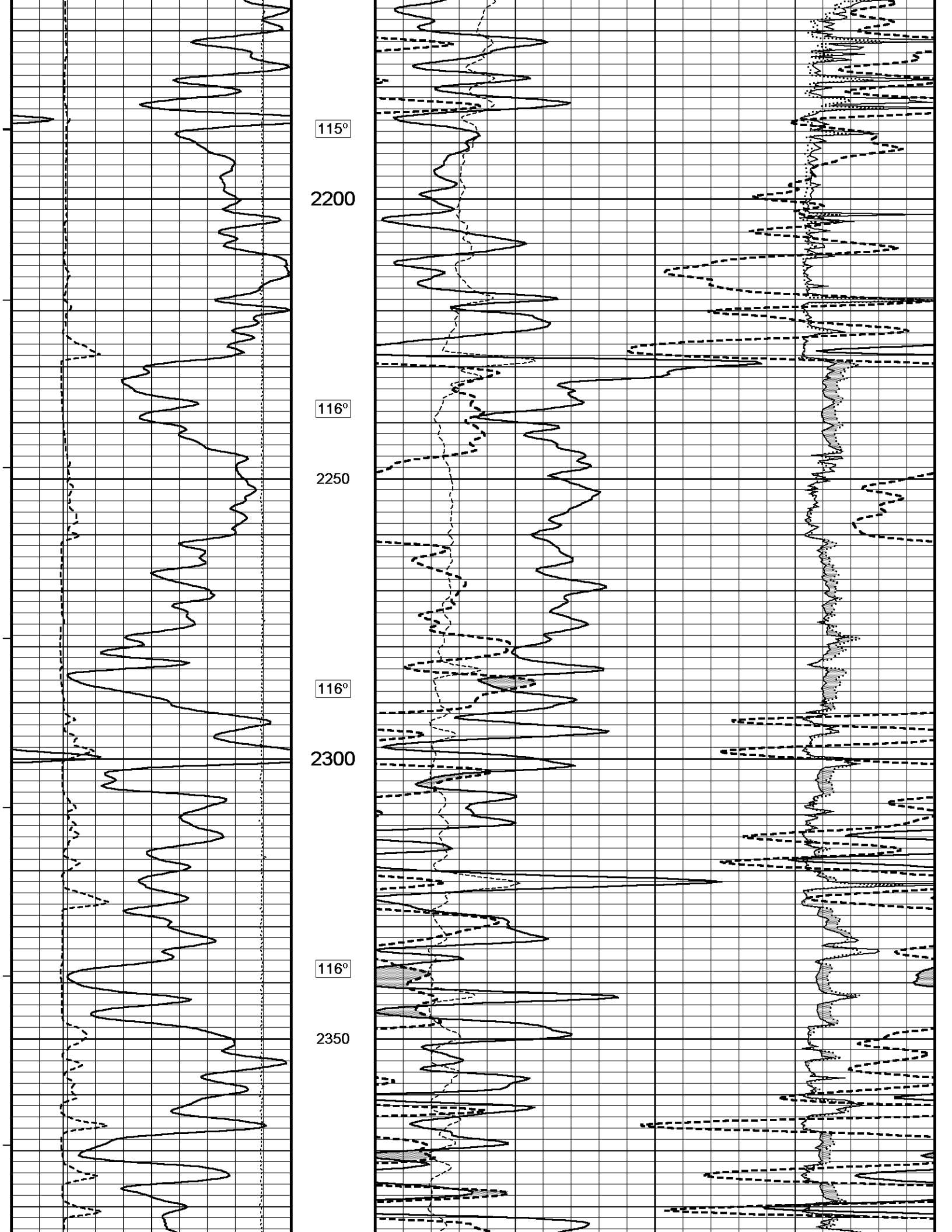

106°
1100
106°
1150
107°
1200
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
107°
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
1250

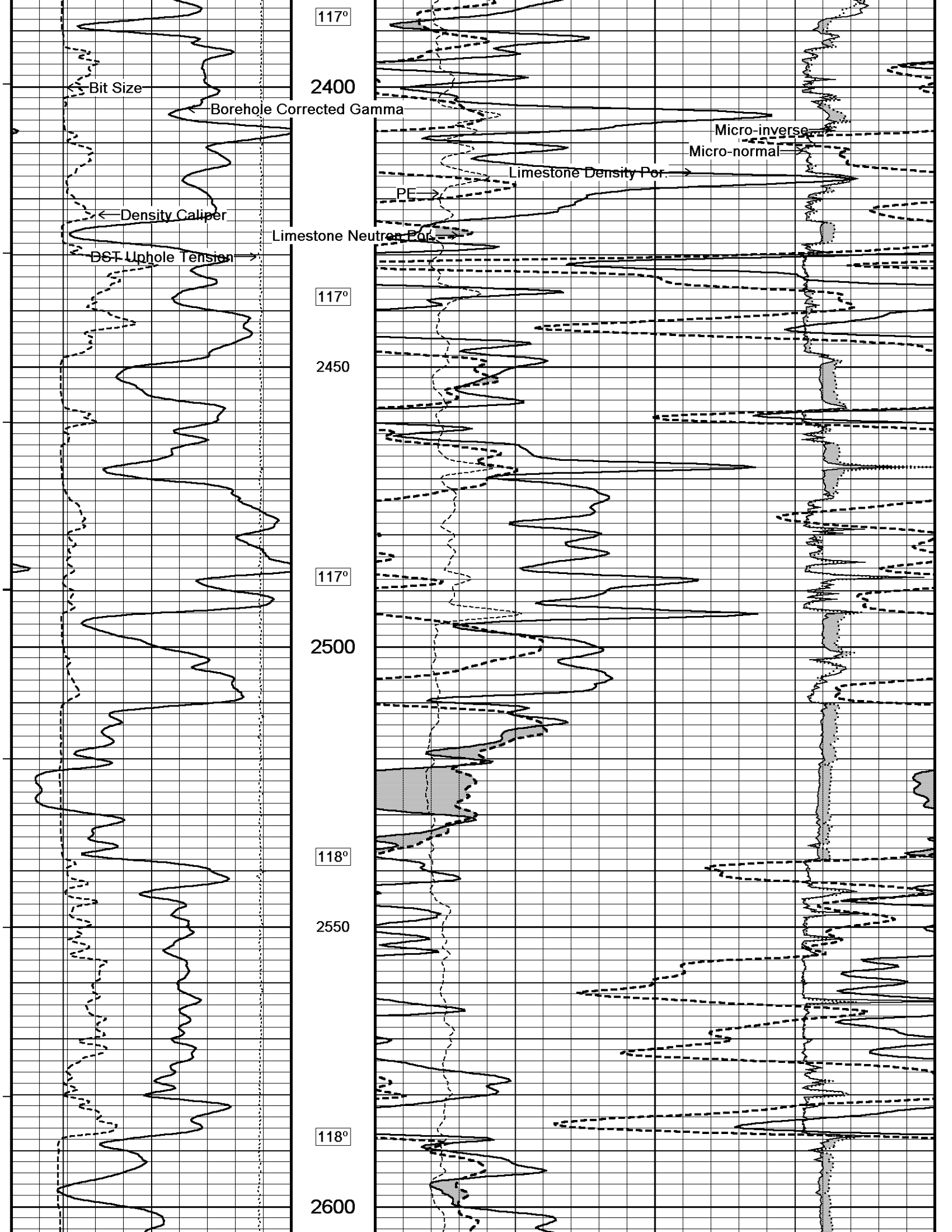

108°
1300
108°
1350
108°
1400
109°
1450
109°
1500

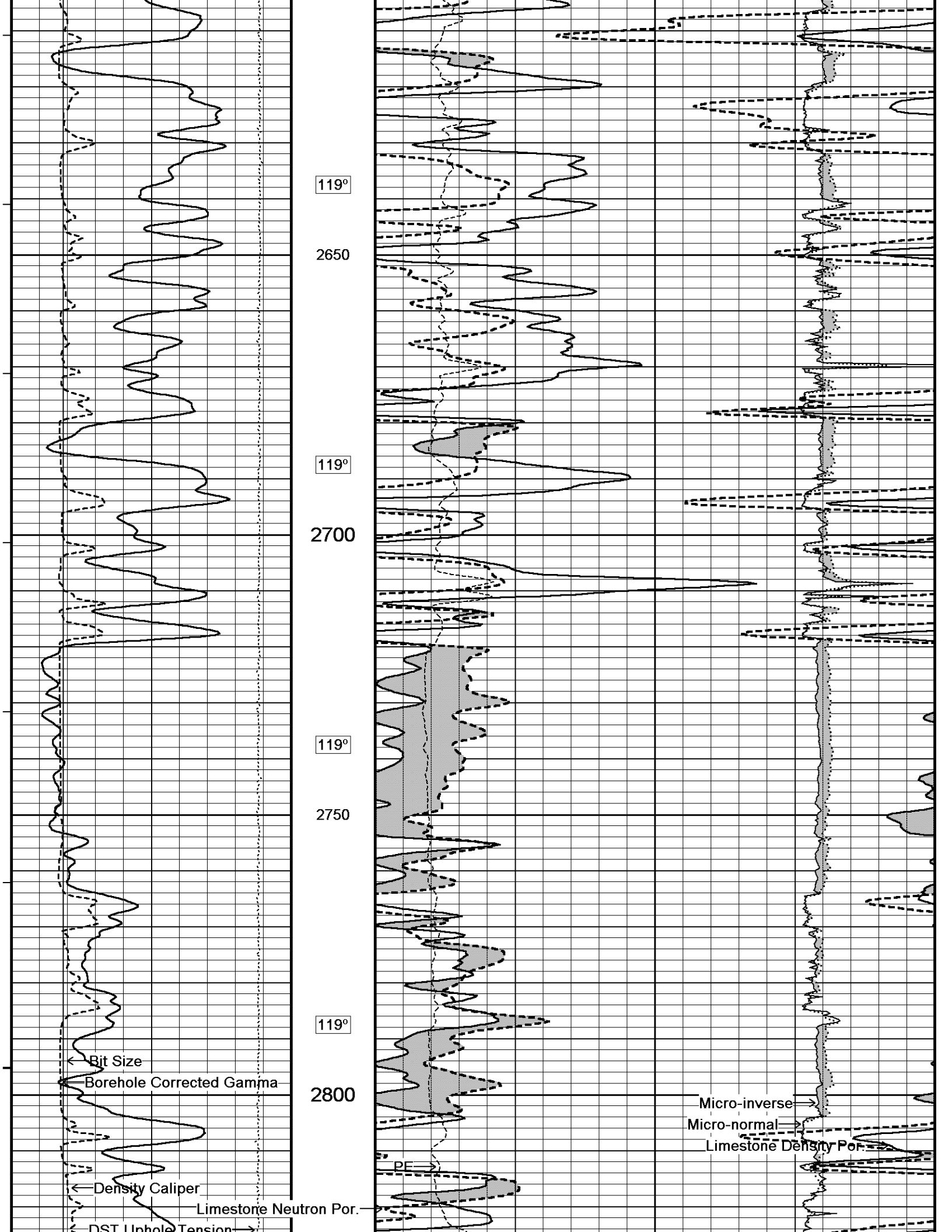

110°
1550
110°
1600
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
110°
Limestone Neutron Por.
DST Uphole Tension
1650
111°
1700

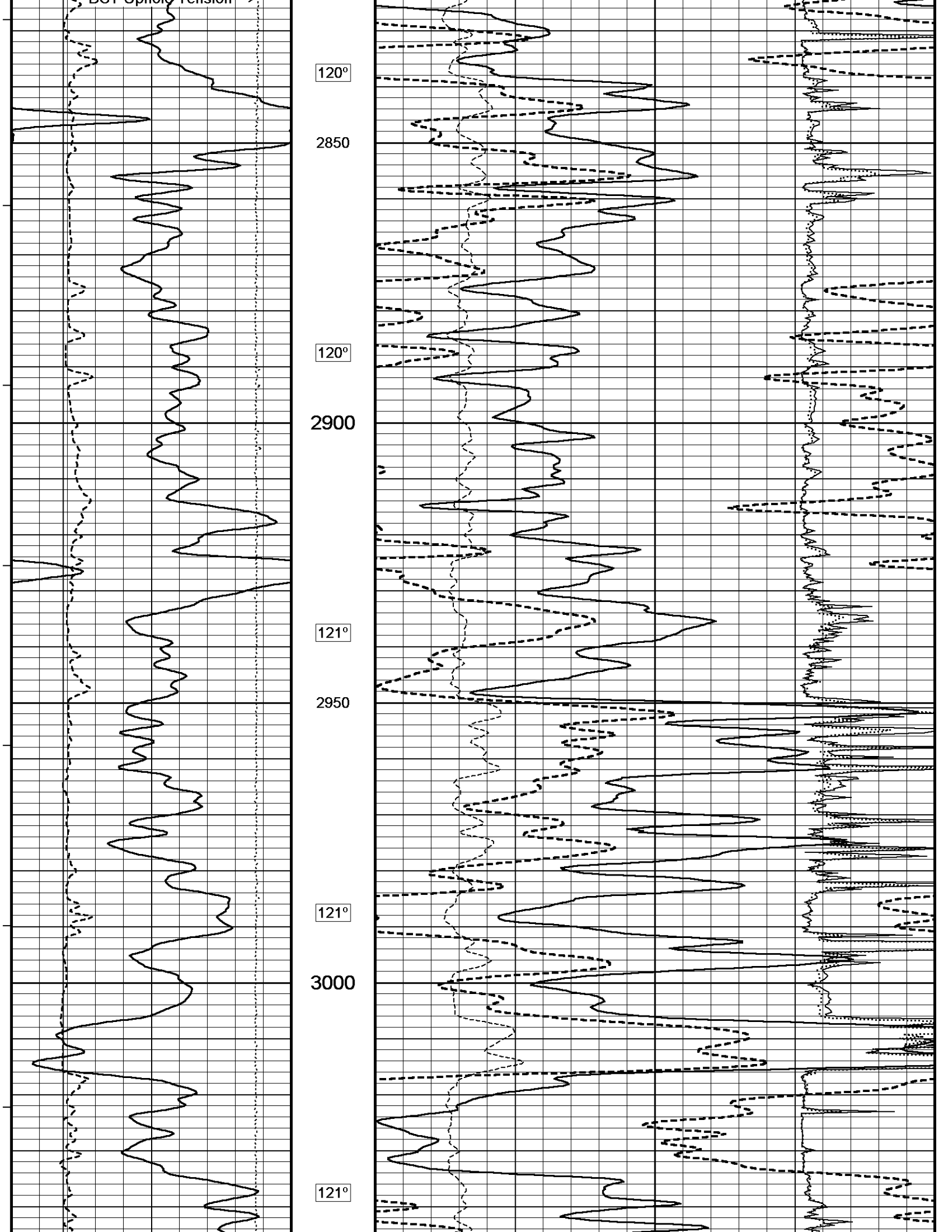

111°
1750
112°
1800
112°
1850
112°
1900
113°

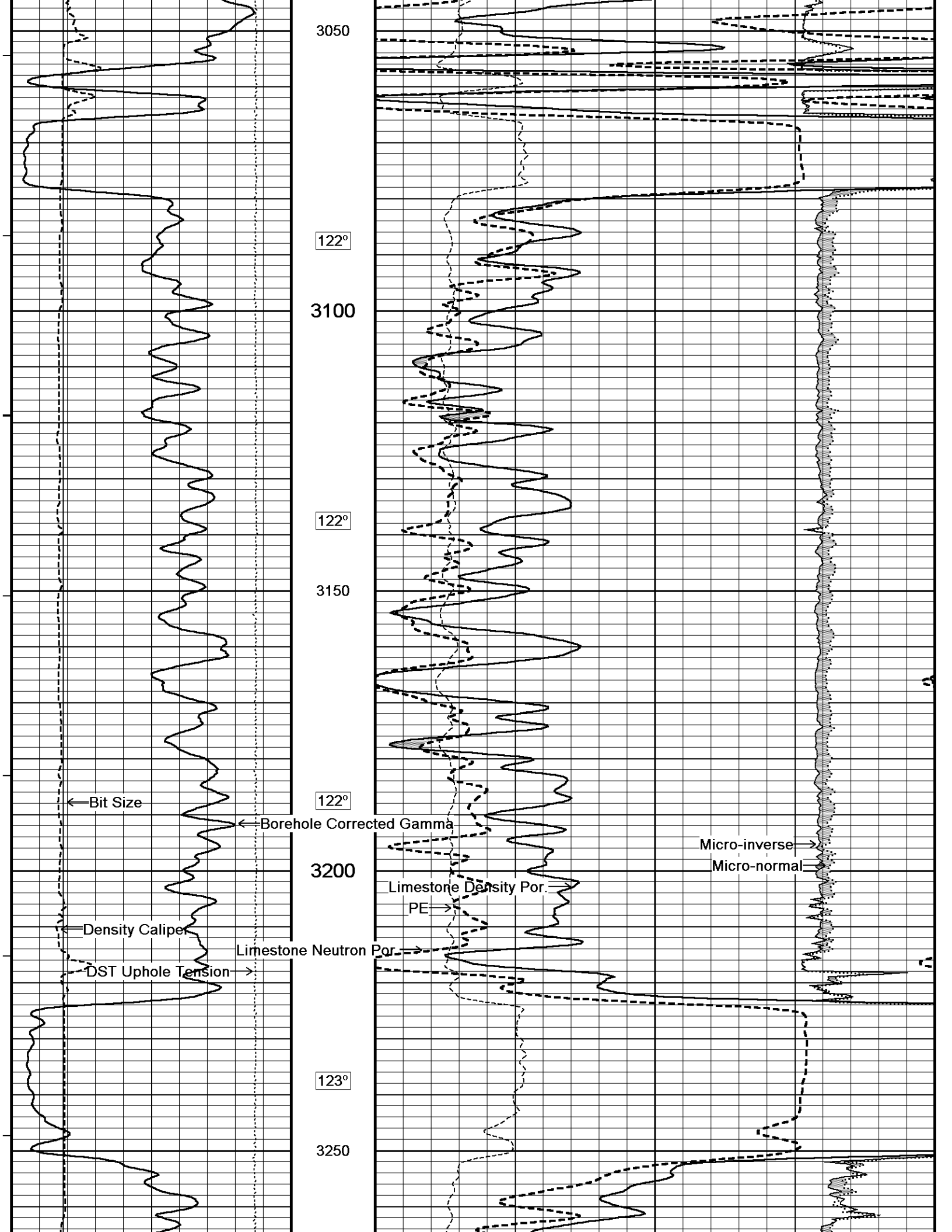

1950
114°
2000
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
114°
2050
114°
2100
115°
2150

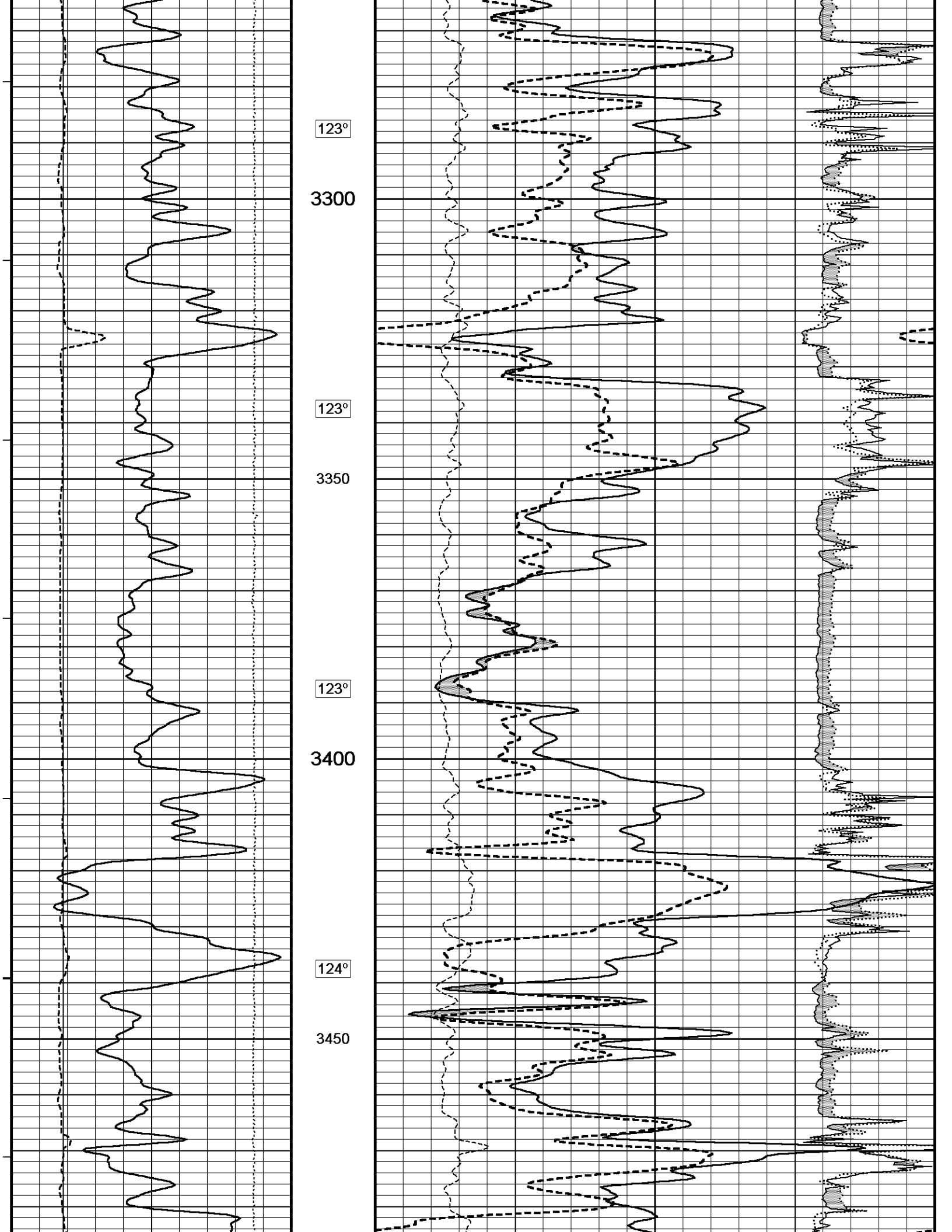

115°
2200
116°
2250
116°
2300
116°
2350

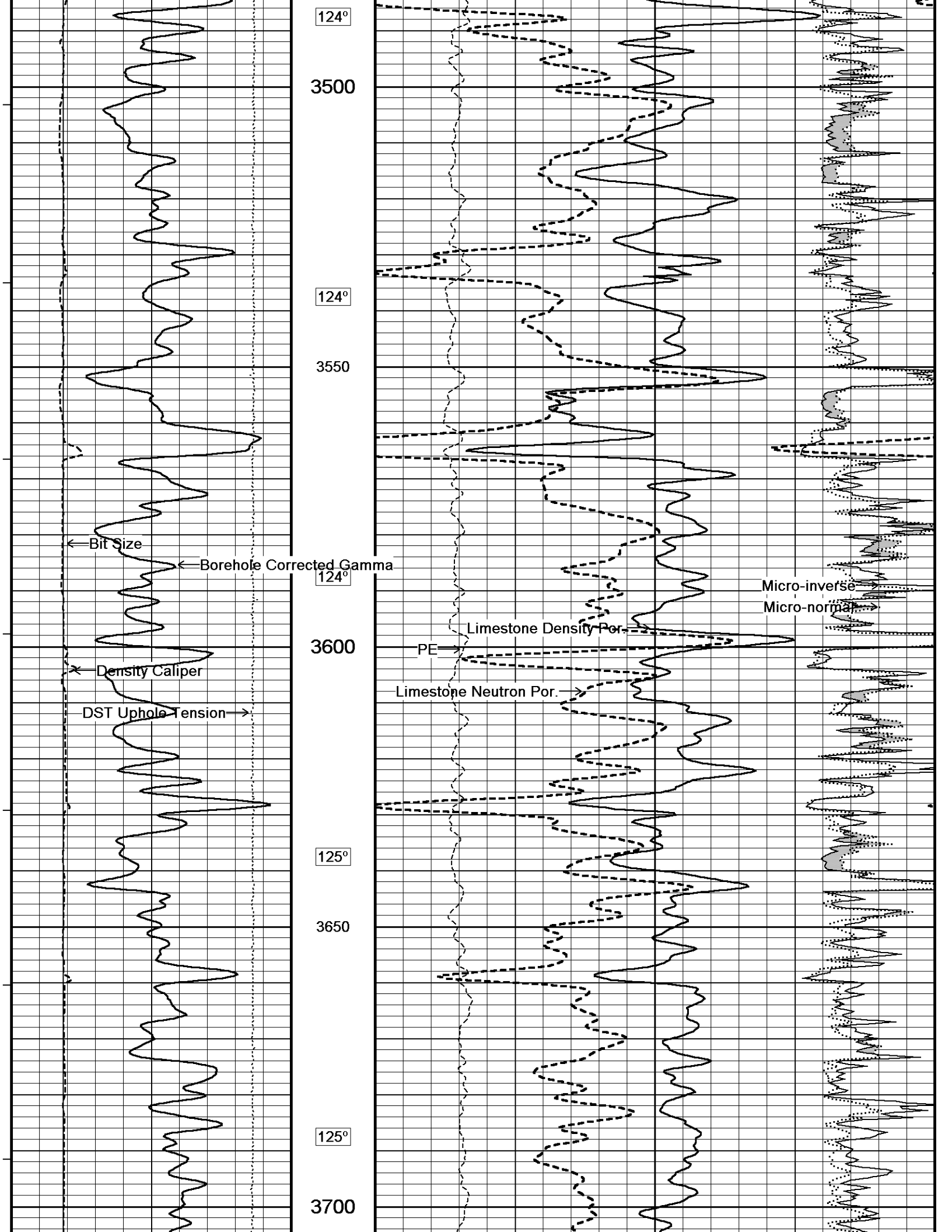

117°
Bit Size
2400
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
117°
2450
117°
2500
118°
2550
118°
2600

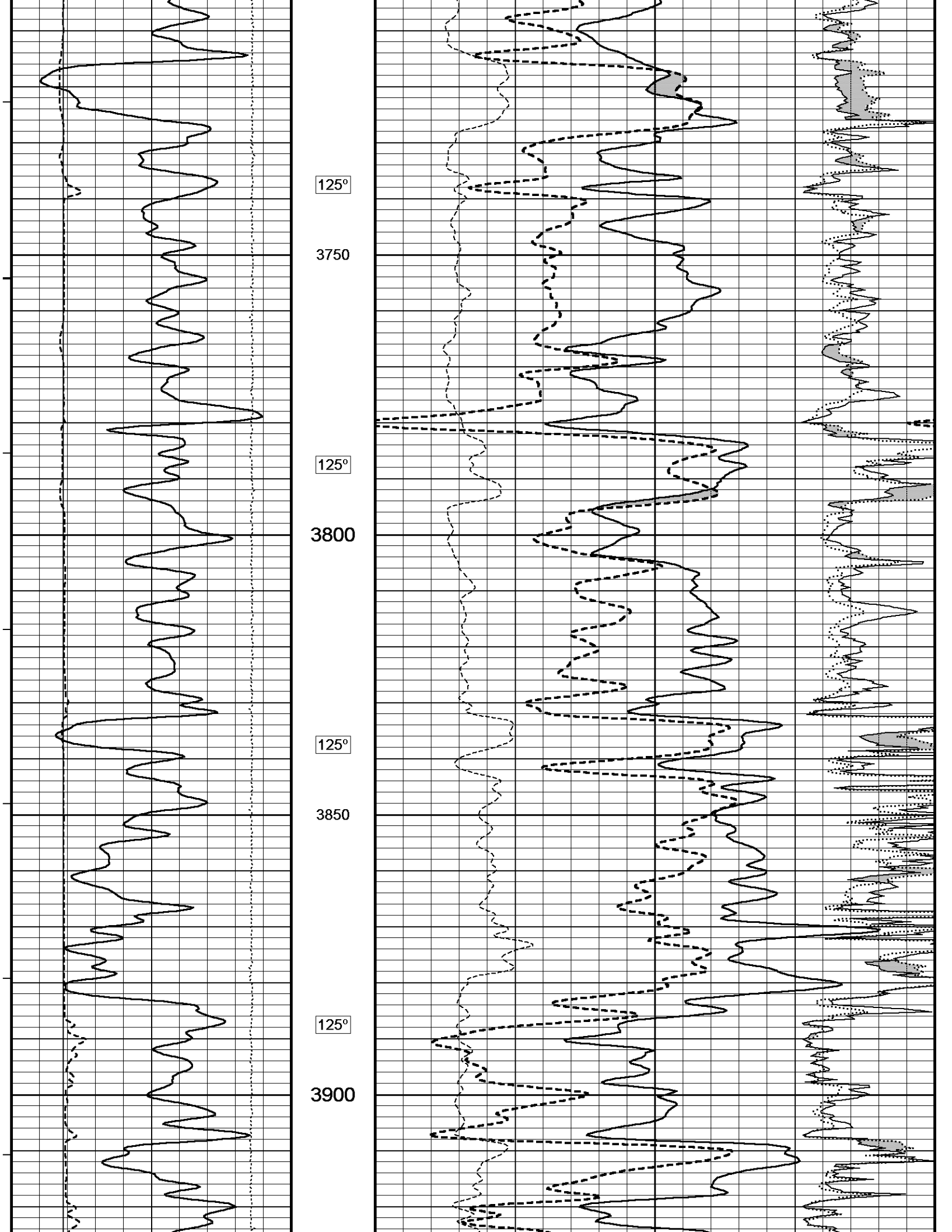

119°
2650
119°
2700
119°
2750
119°
2800
Bit Size
Borehole Corrected Gamma
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
PE
Micro-inverse
Micro-normal
Limestone Density Por.

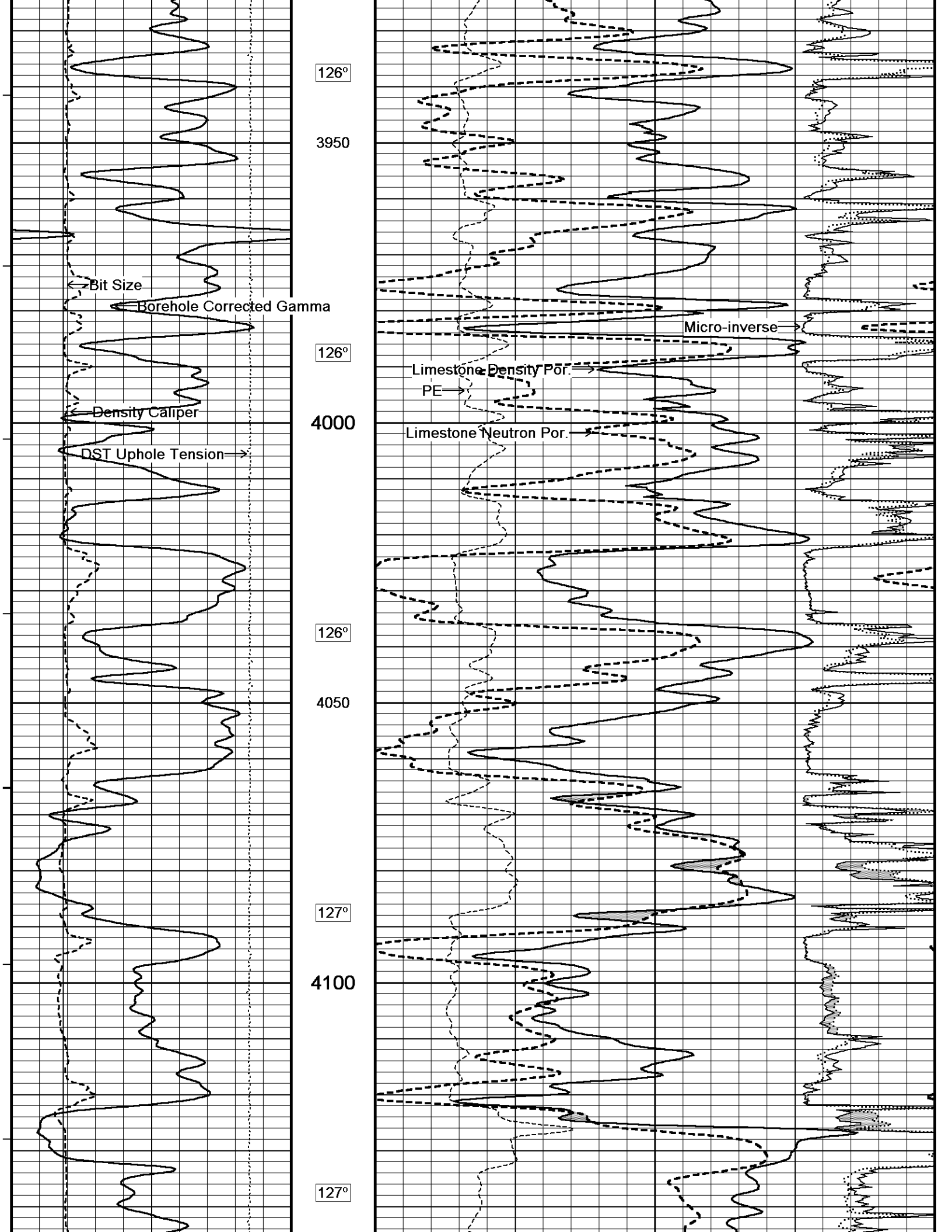

BCT Uphole Tension
120°
2850
120°
2900
121°
2950
121°
3000
121°

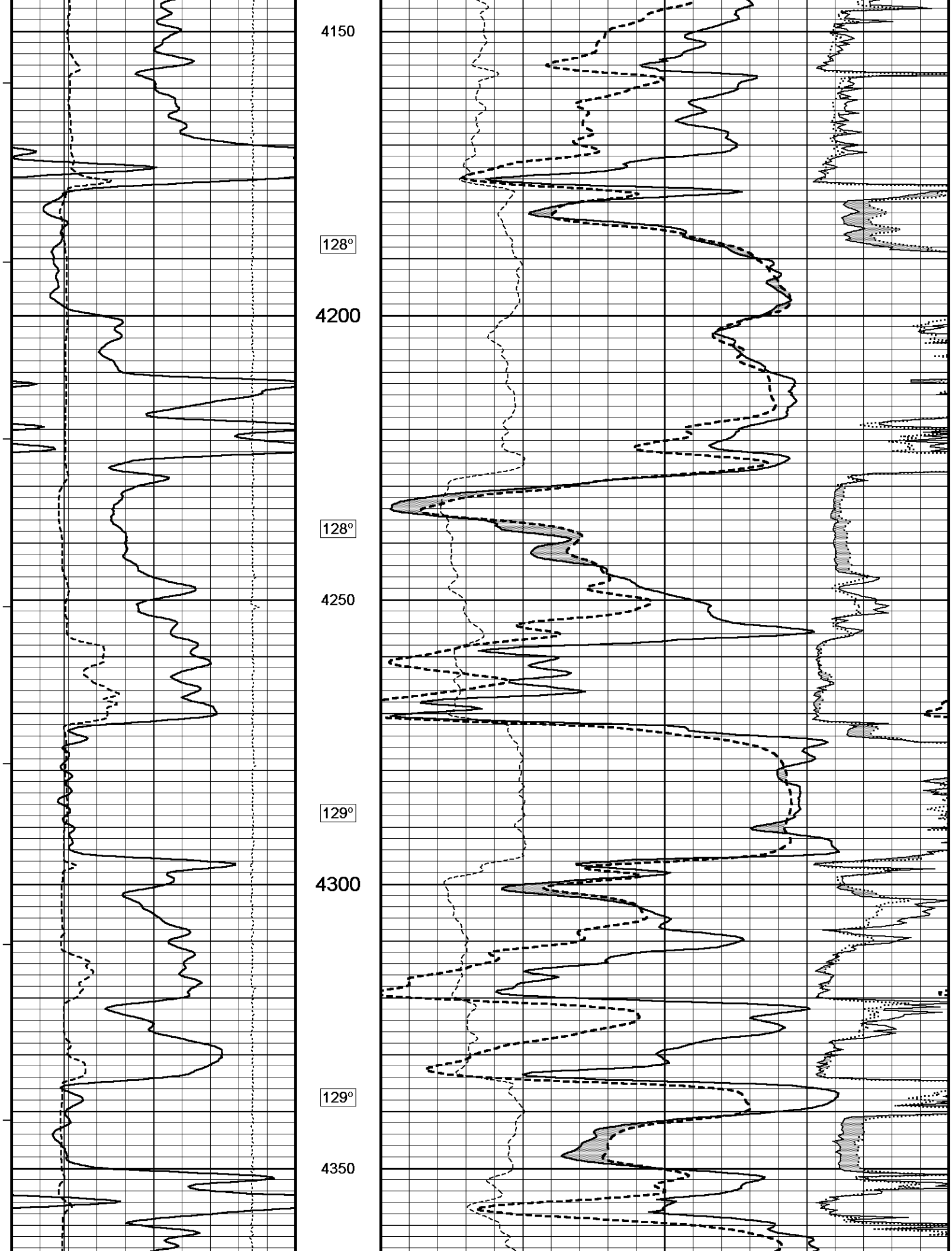

3050
122°
3100
122°
3150
122°
3200
123°
3250
Bit Size
Borehole Corrected Gamma
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
Micro-inverse
Micro-normal
Limestone Density Por.
PE

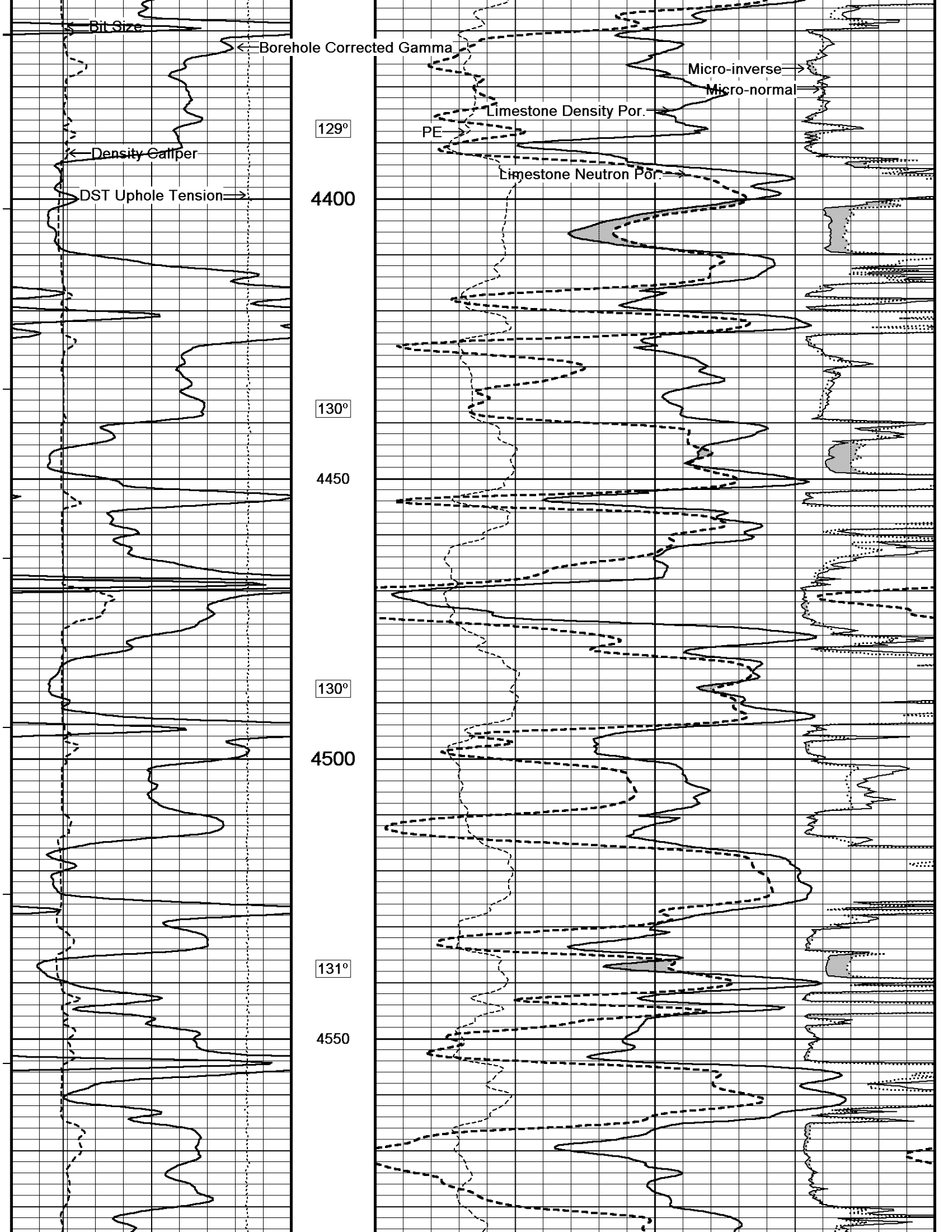

123°
3300
123°
3350
123°
3400
124°
3450

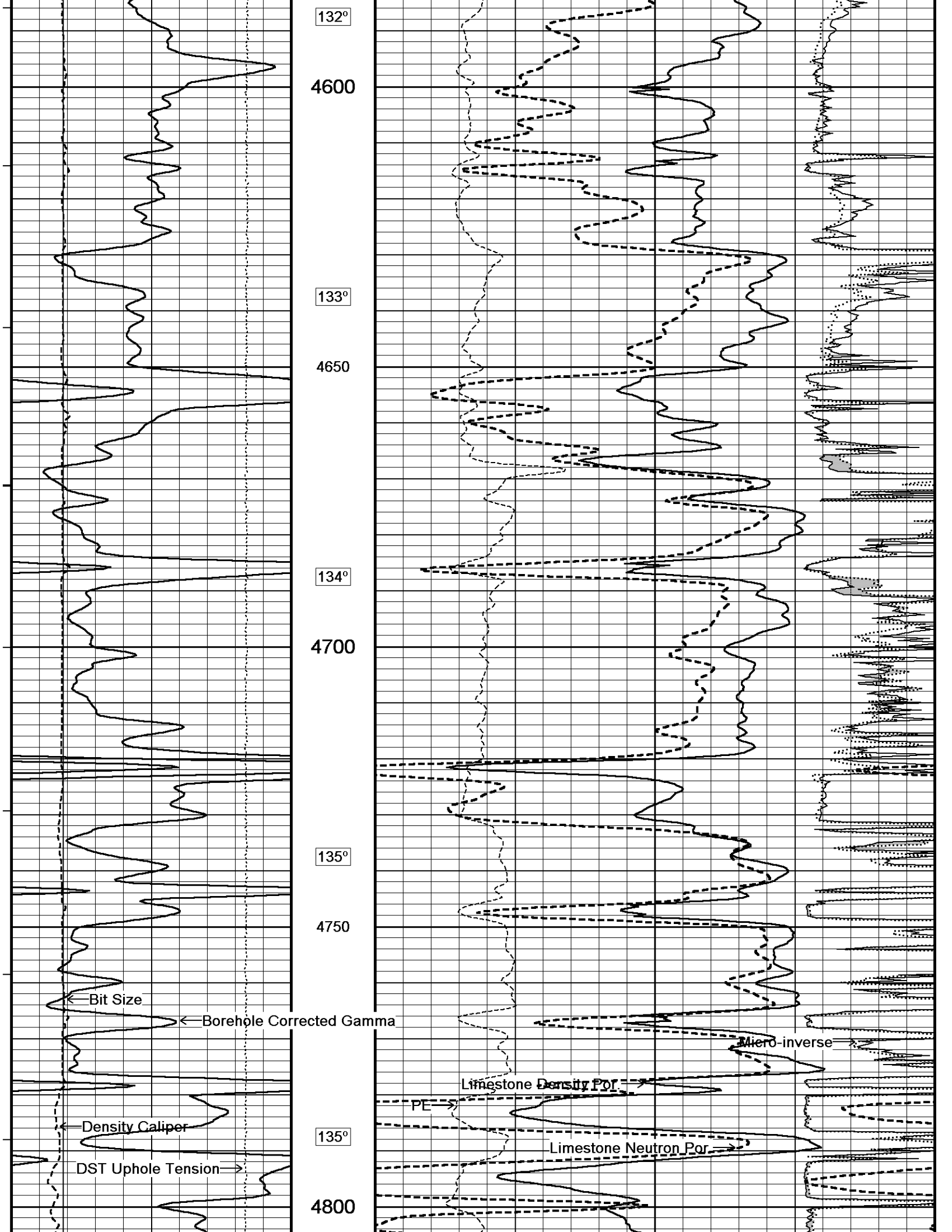

124°
3500
124°
3550
Bit Size
Borehole Corrected Gamma
124°
Micro-inverse
Micro-normal
Limestone Density Por.
3600
PE
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
125°
3650
125°
3700

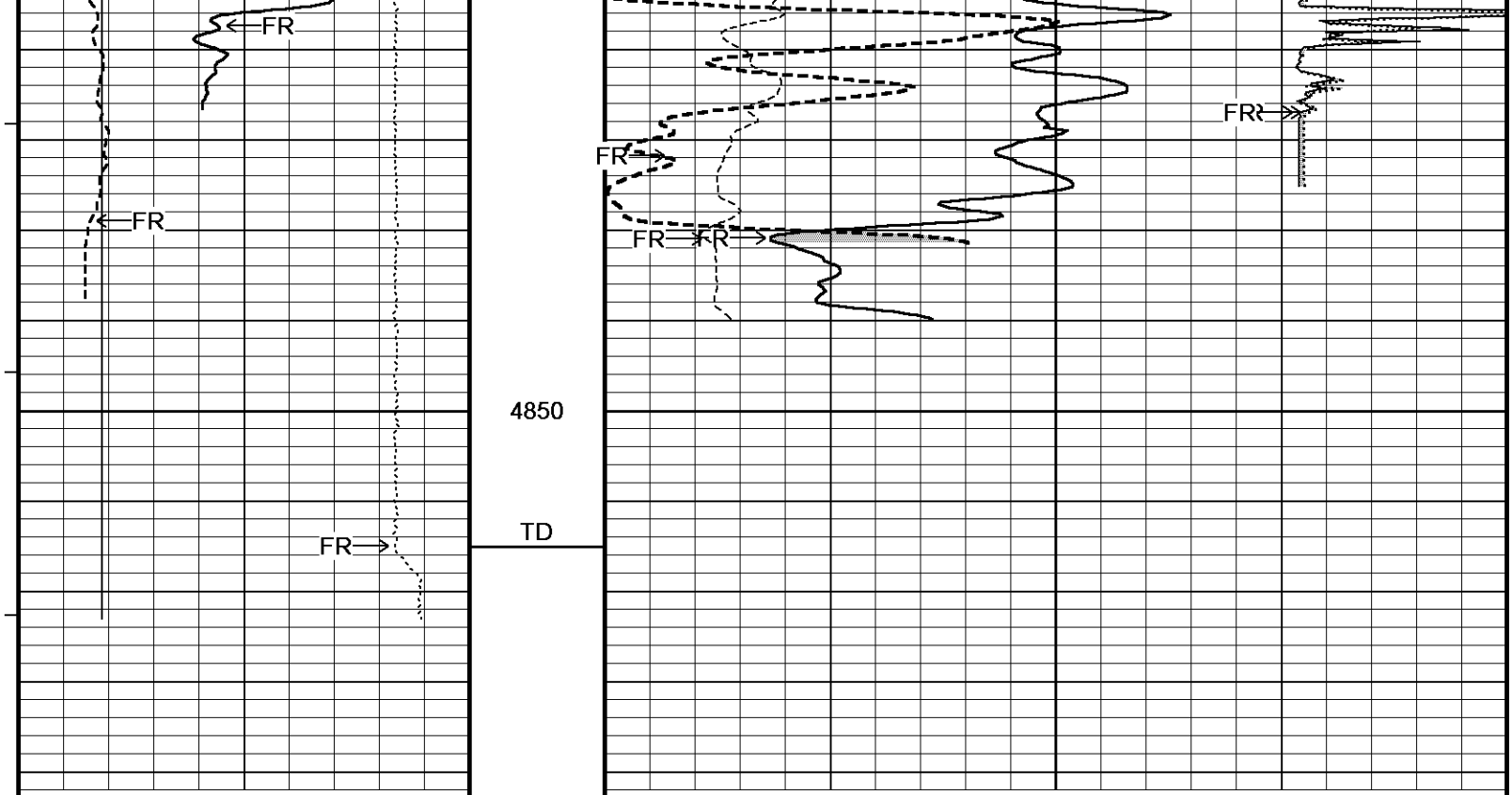

125°
3750
125°
3800
125°
3850
125°
3900


126°
3950
Bit Size
Borehole Corrected Gamma
126°
Micro-inverse
Limestone Density Por.
PE
Density Caliper
4000
Limestone Neutron Por.
DST Uphole Tension
126°
4050
127°
4100
127°


4150
128°
4200
128°
4250
129°
4300
129°
4350


Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
129°
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
4400
130°
4450
130°
4500
131°
4550


132°
4600
133°
4650
134°
4700
135°
4750
135°
4800
Bit Size
Borehole Corrected Gamma
Density Caliper
DST Uphole Tension
Micro-inverse
Limestone Density Por
PE
Limestone Neutron Por



4850

TD

Depth in Feet

Timing Marks
every 60.0 sec

Density Caliper
inches
6 11 16

Borehole Corrected Gamma
API
0 75 150
150 225 300

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

Replay Scale 1:240

Limestone Neutron Por.
percent
30 20 10 0 -10
70 60 50 40 30

Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30

PE
barns/electron
0 5 10

Micro-normal
ohm metres
0 20

Micro-inverse
ohm metres
0 20

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

Plotted on 22-MAR-2019 08:17
Recorded on 22-MAR-2019 00:23

5 INCH LIMESTONE 1:240

REPEAT SECTION 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS_ 001.dta
Recorded on 21-MAR-2019 23:34
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

Timing Marks
every 60.0 sec

Density Caliper
inches
6 11 16

Borehole Corrected Gamma
API
0 75 150
150 225 300

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

Limestone Neutron Por.
percent
30 20 10 0 -10
70 60 50 40 30

Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30

PE
barns/electron
0 5 10

Micro-normal
ohm metres
0 20

Micro-inverse
ohm metres
0 20

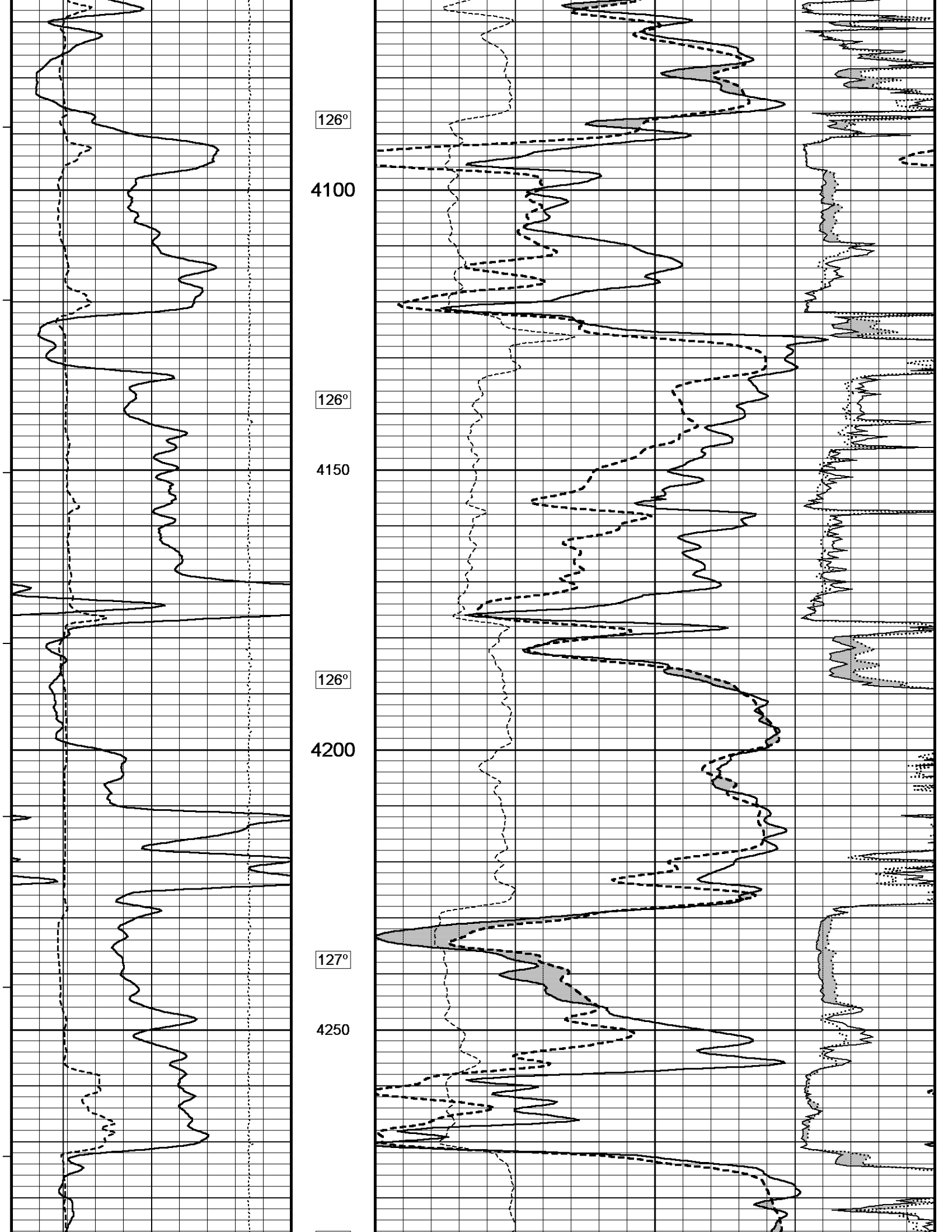
4000

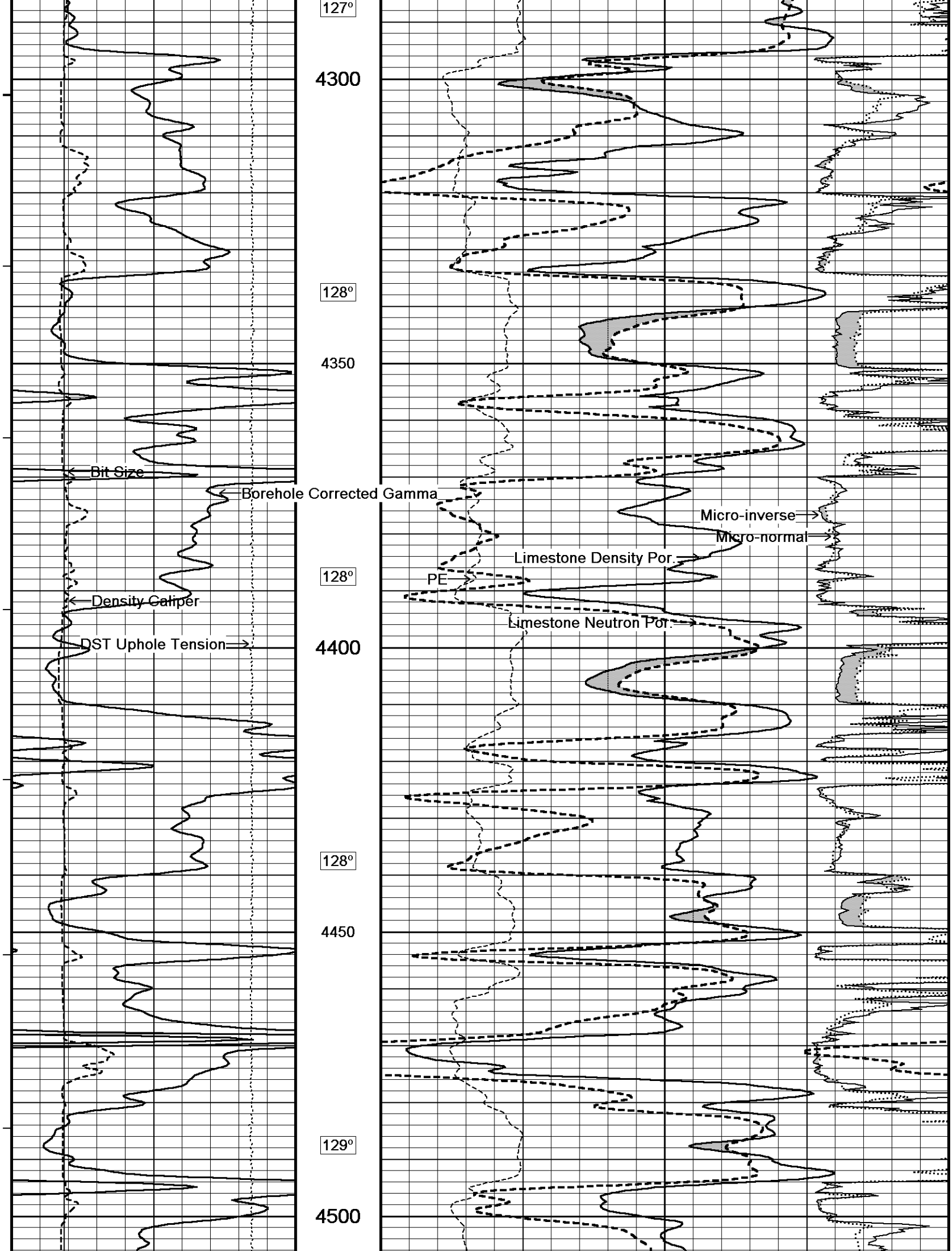
DST Uphole Tension

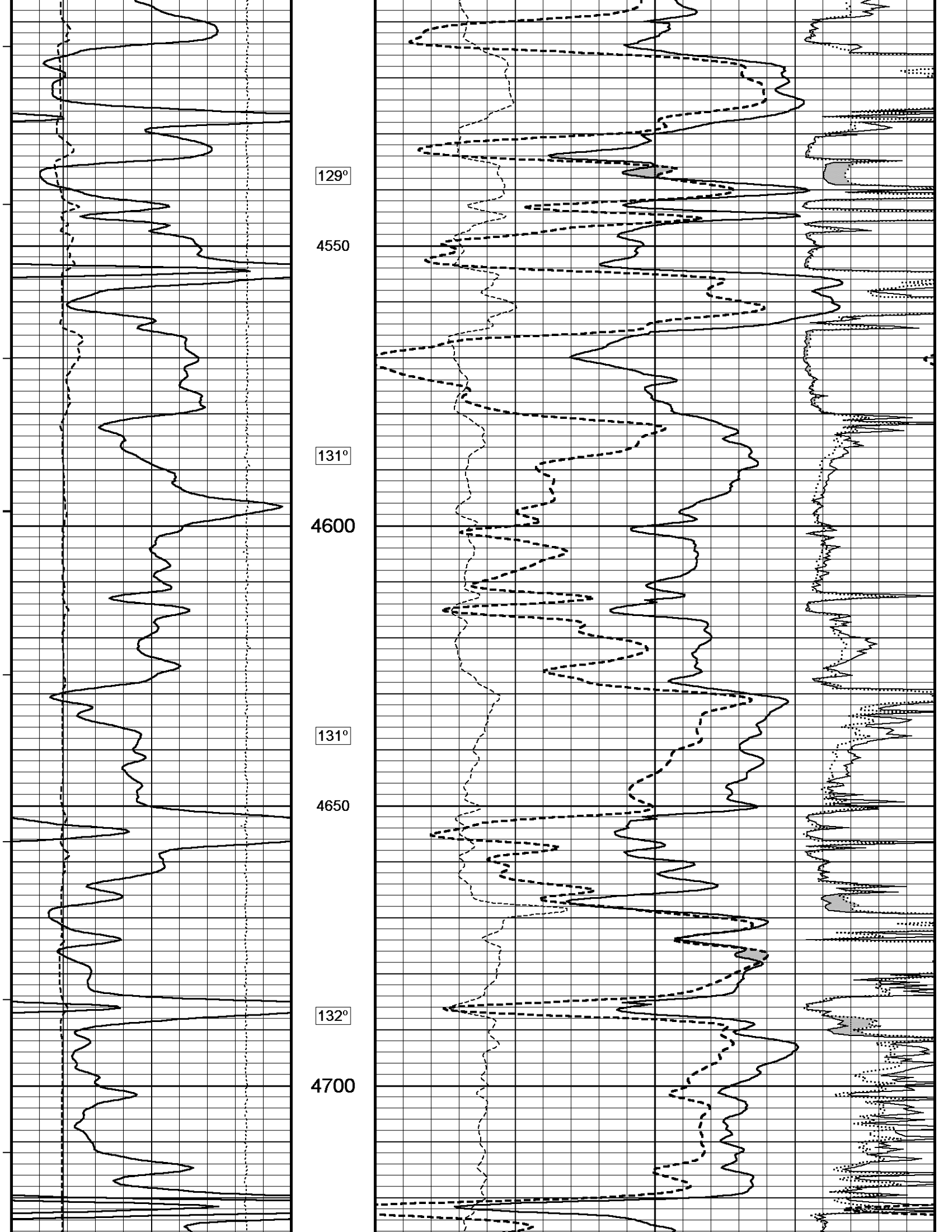
Limestone Neutron Por.

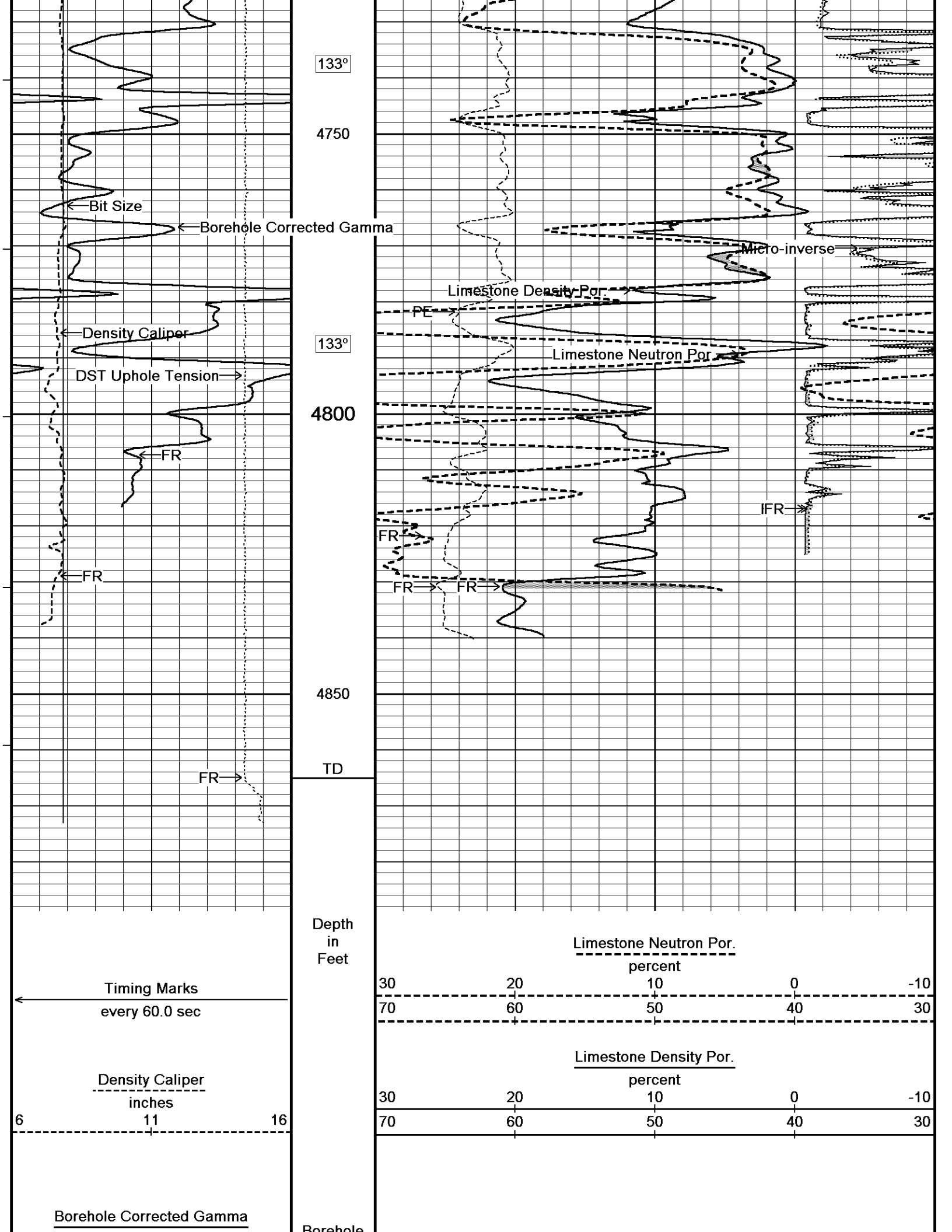
125°

4050


126°
4100
126°
4150
126°
4200
127°
4250


127°
4300
128°
4350
Bit Size
Borehole Corrected Gamma
Micro-inverse
Micro-normal
Limestone Density Por.
PE
128°
Density Caliper
Limestone Neutron Por.
DST Uphole Tension
4400
128°
4450
129°
4500


129°
4550
131°
4600
131°
4650
132°
4700


133°
4750
Bit Size
Borehole Corrected Gamma
Micro-inverse
Limestone Density Por.
PE
Density Caliper
133°
Limestone Neutron Por.
DST Uphole Tension
4800
FR
IFR
FR
FR
FR
FR
4850
TD
FR
Depth
in
Feet
Limestone Neutron Por.
percent
30 20 10 0 -10
70 60 50 40 30
Timing Marks
every 60.0 sec
Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30
Density Caliper
inches
6 11 16
Borehole Corrected Gamma
Borehole

API
0 75 150
150 225 300

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

Replay Scale 1:240

PE
barns/electron
0 5 10

Micro-normal
ohm metres
0 20

Micro-inverse
ohm metres
0 20

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS_ 001.dta
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
Plotted on 22-MAR-2019 08:17
Recorded on 21-MAR-2019 23:34

REPEAT SECTION 1:240

5 INCH BULK DENSITY 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
Plotted on 22-MAR-2019 08:17
Recorded on 22-MAR-2019 00:23

Timing Marks
every 60.0 sec

Depth in Feet

Compensated Density
grams/cc
2 2.25 2.50 2.75 3
1 1.25 1.50 1.75 2

Density Caliper
inches
6 11 16

Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30

Borehole Corrected Gamma
API
0 75 150
150 225 300

Bit Size
inches
6 11 16

Borehole Temp in deg F

PE
barns/electron
0 5 10

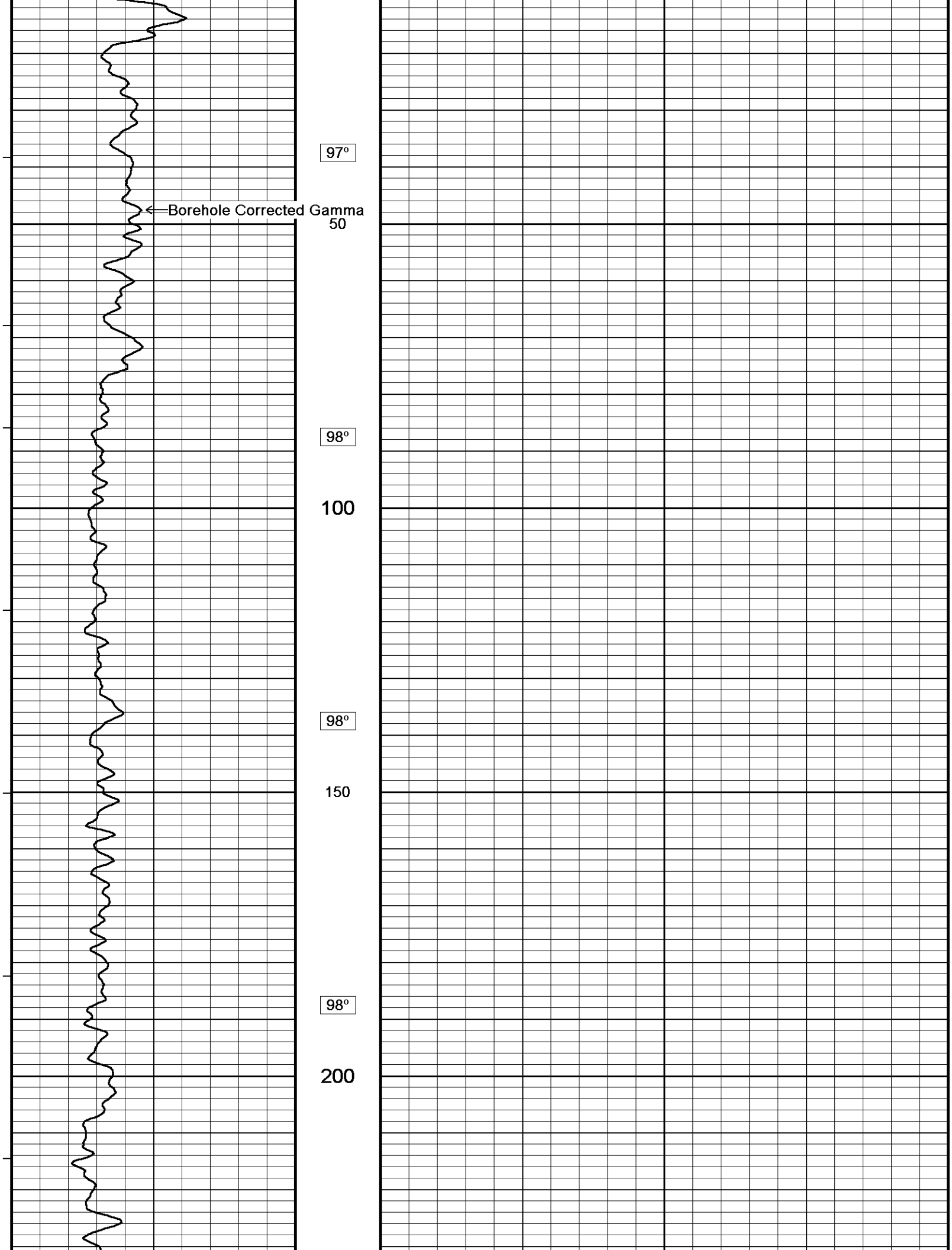
MMR MicroLog Normal
ohm metres
0 20

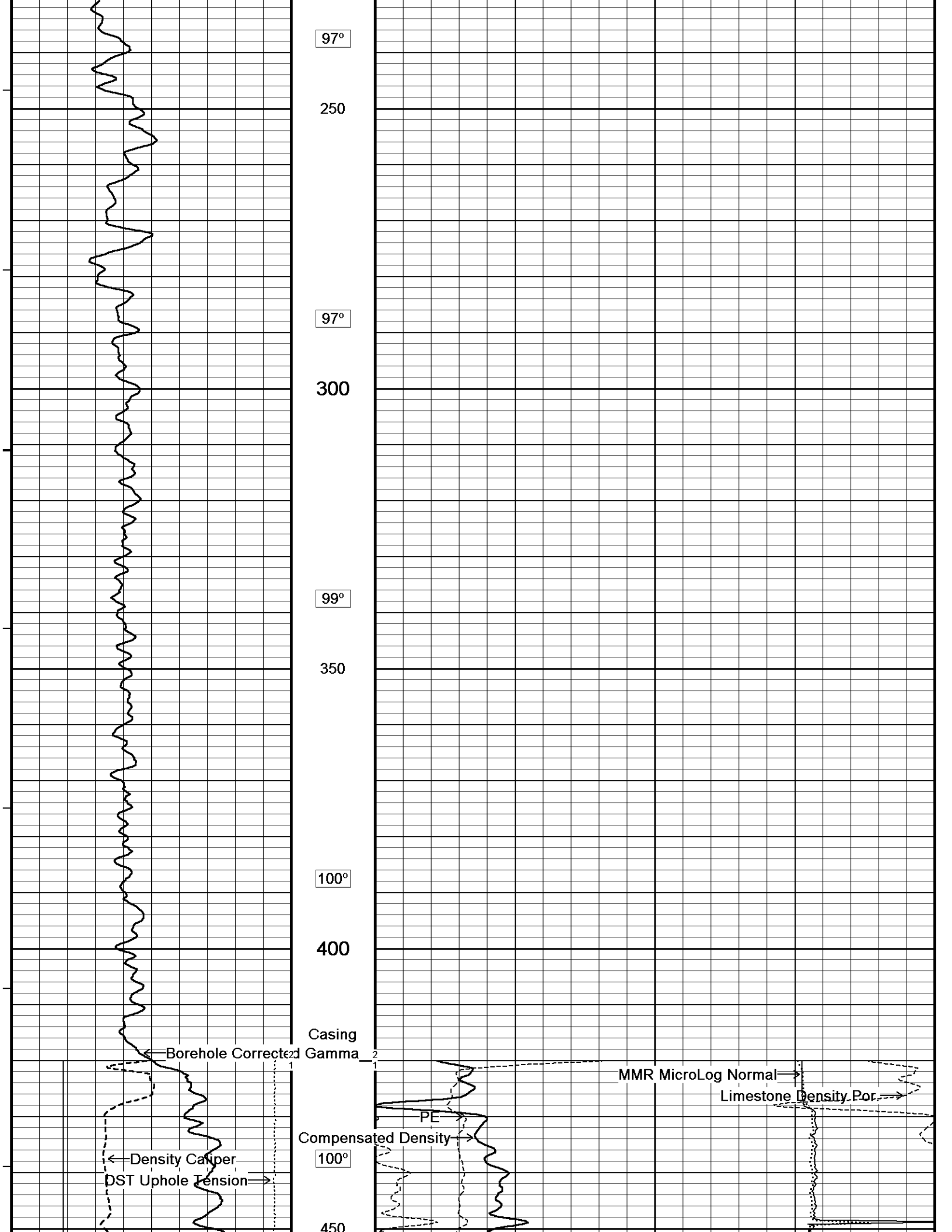
MMR MicroLog Inverse
ohm metres
0 20

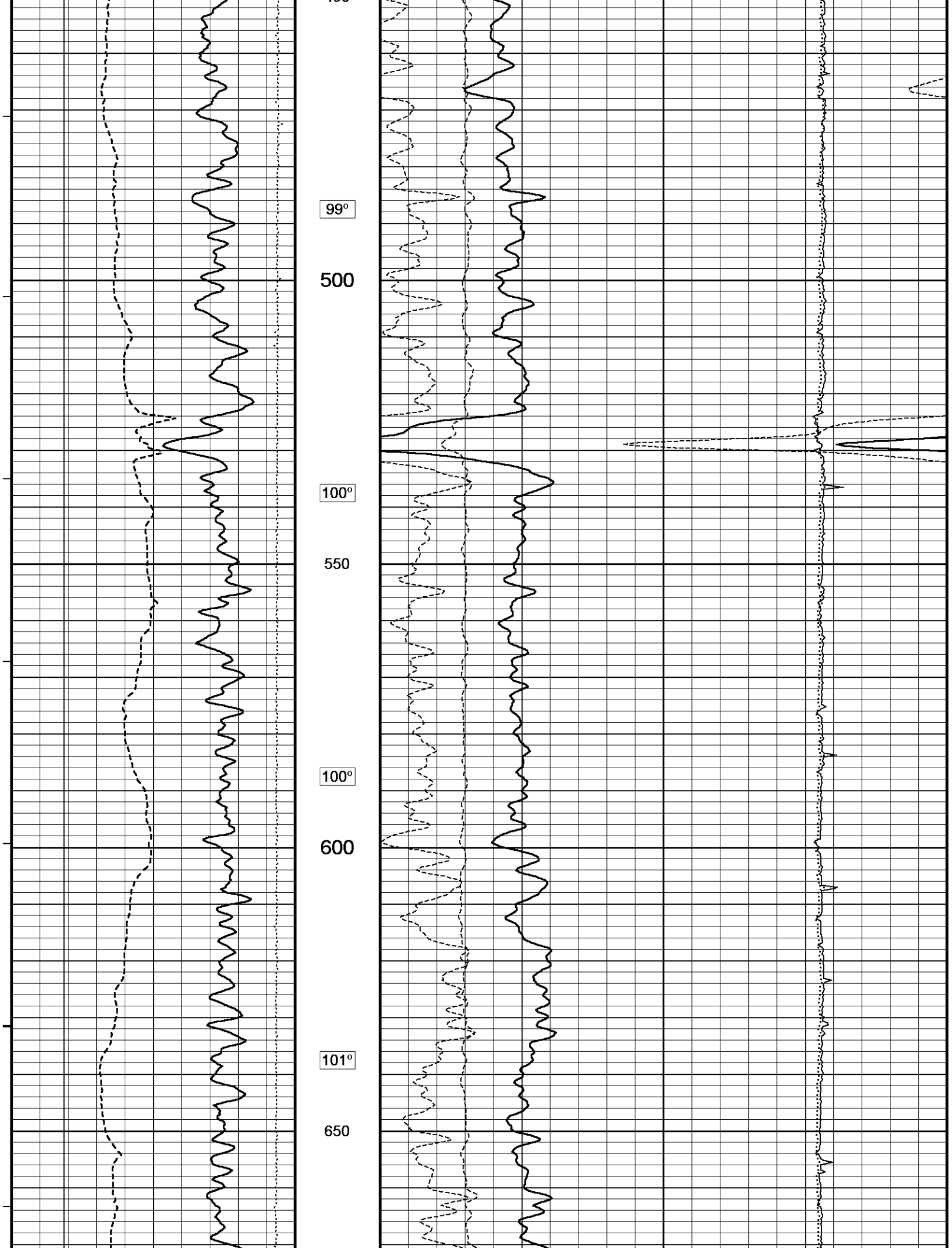
DST Uphole Tension
pounds
5000 0

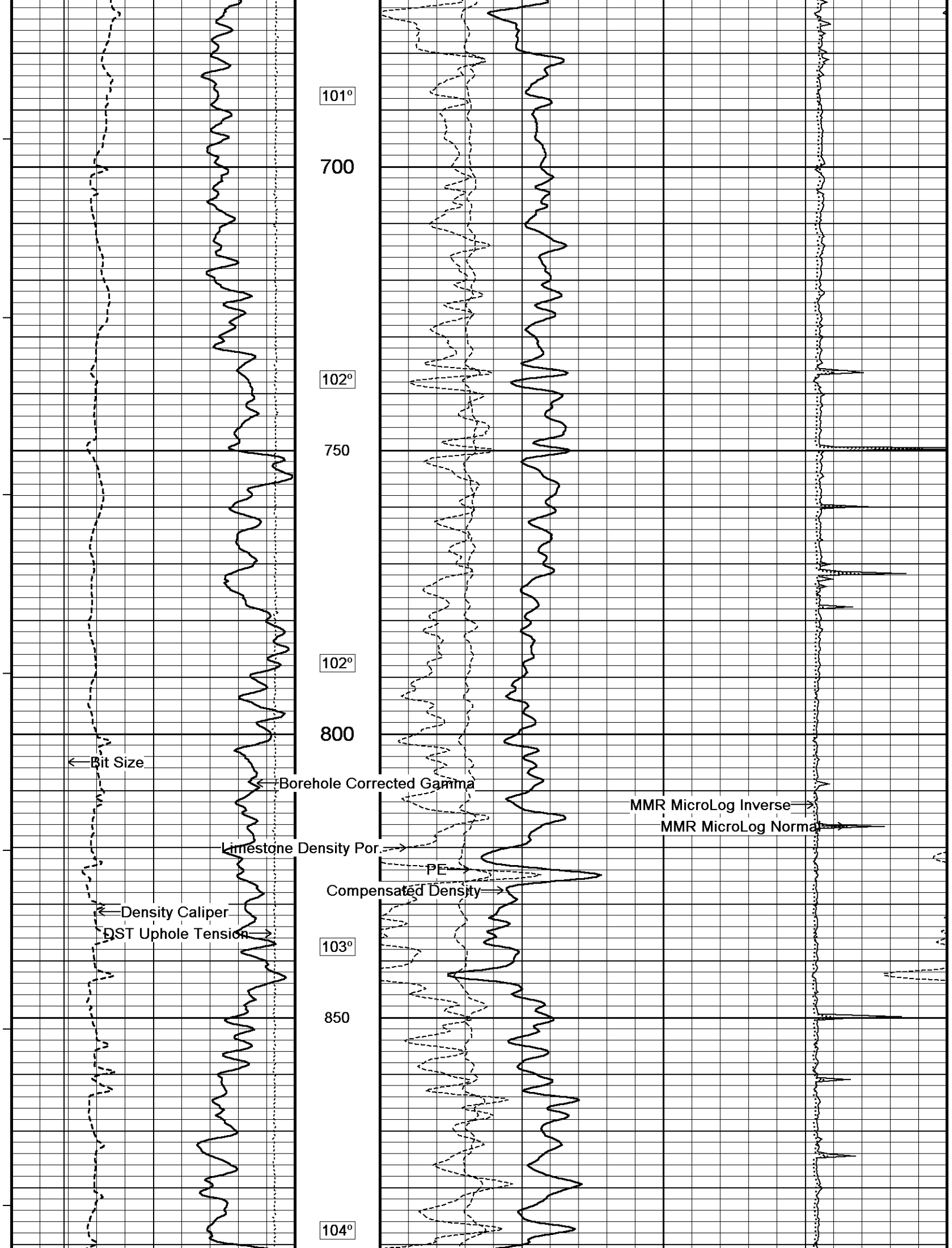
Replay Scale 1:240

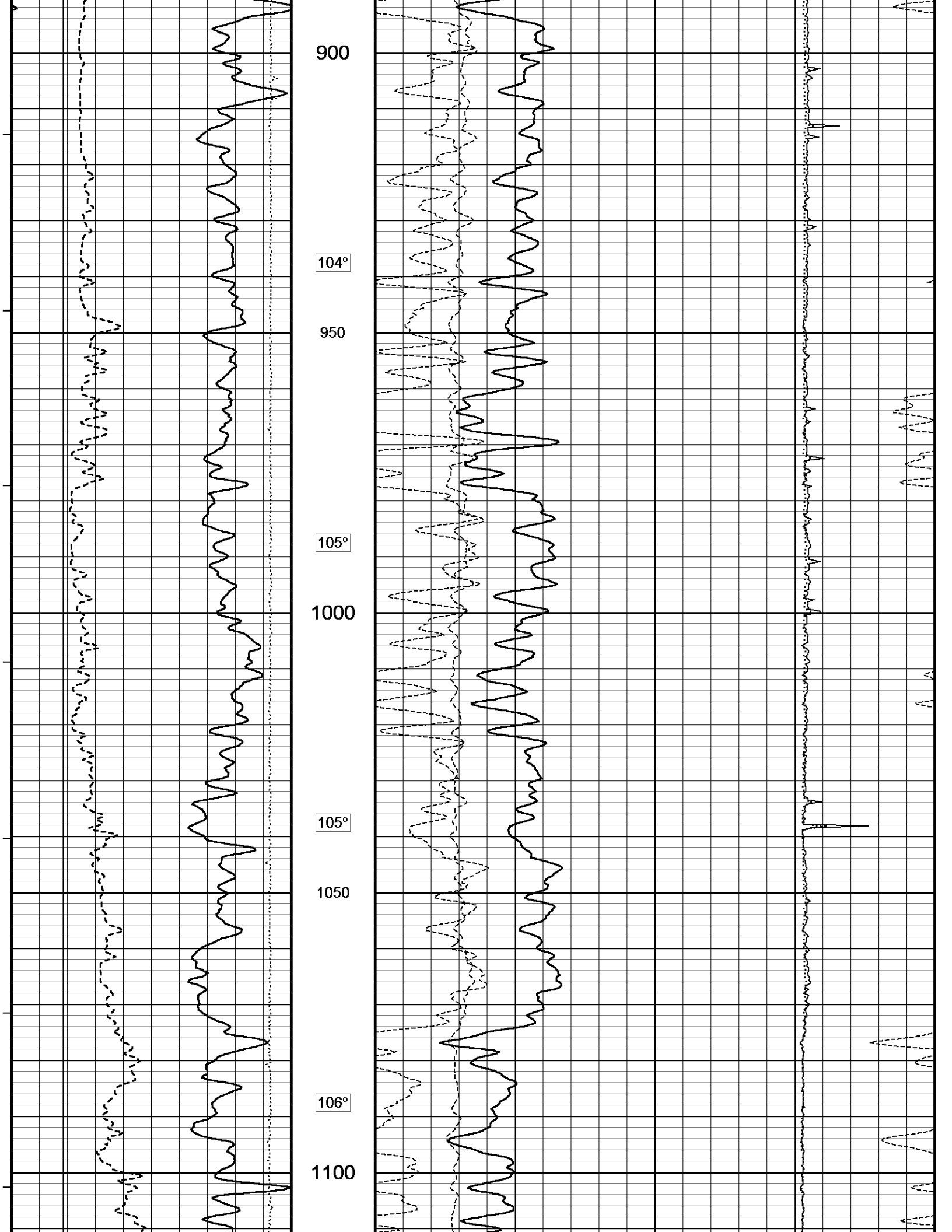
0

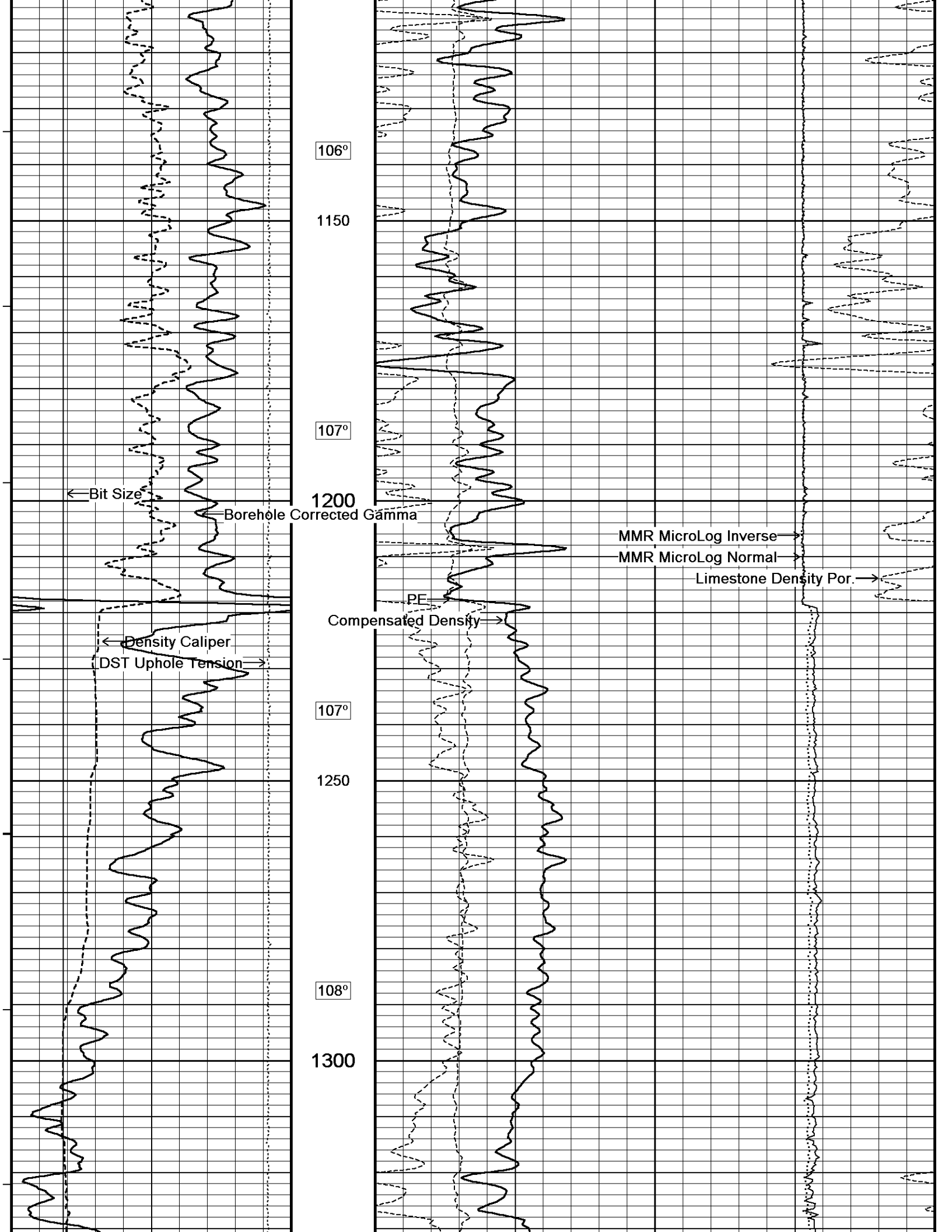

97°
Borehole Corrected Gamma
50
98°
100
98°
150
98°
200

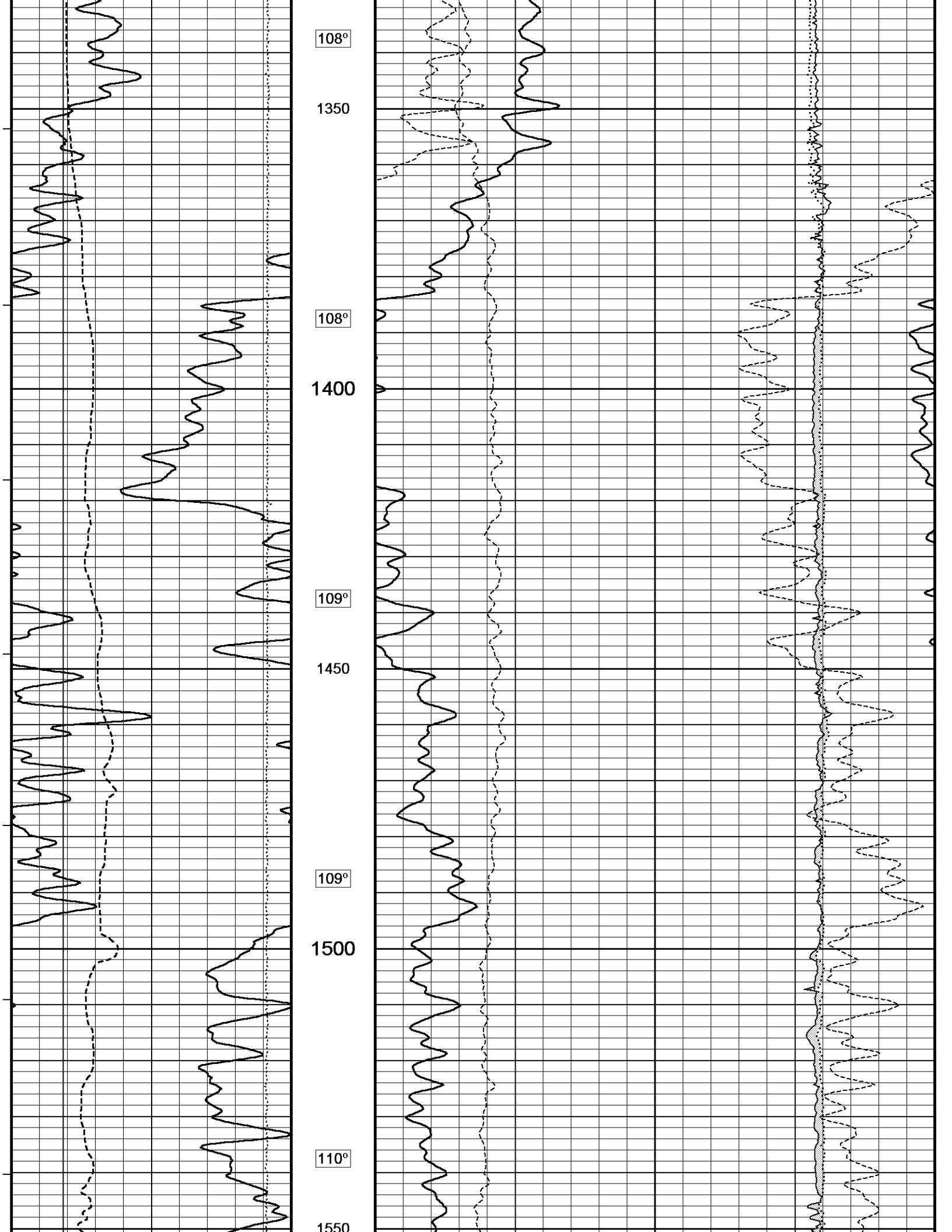

97°
250
97°
300
99°
350
100°
400
Casing
Borehole Corrected Gamma
MMR MicroLog Normal
Limestone Density Por
PE
Compensated Density
100°
Density Caliper
DST Uphole Tension
450

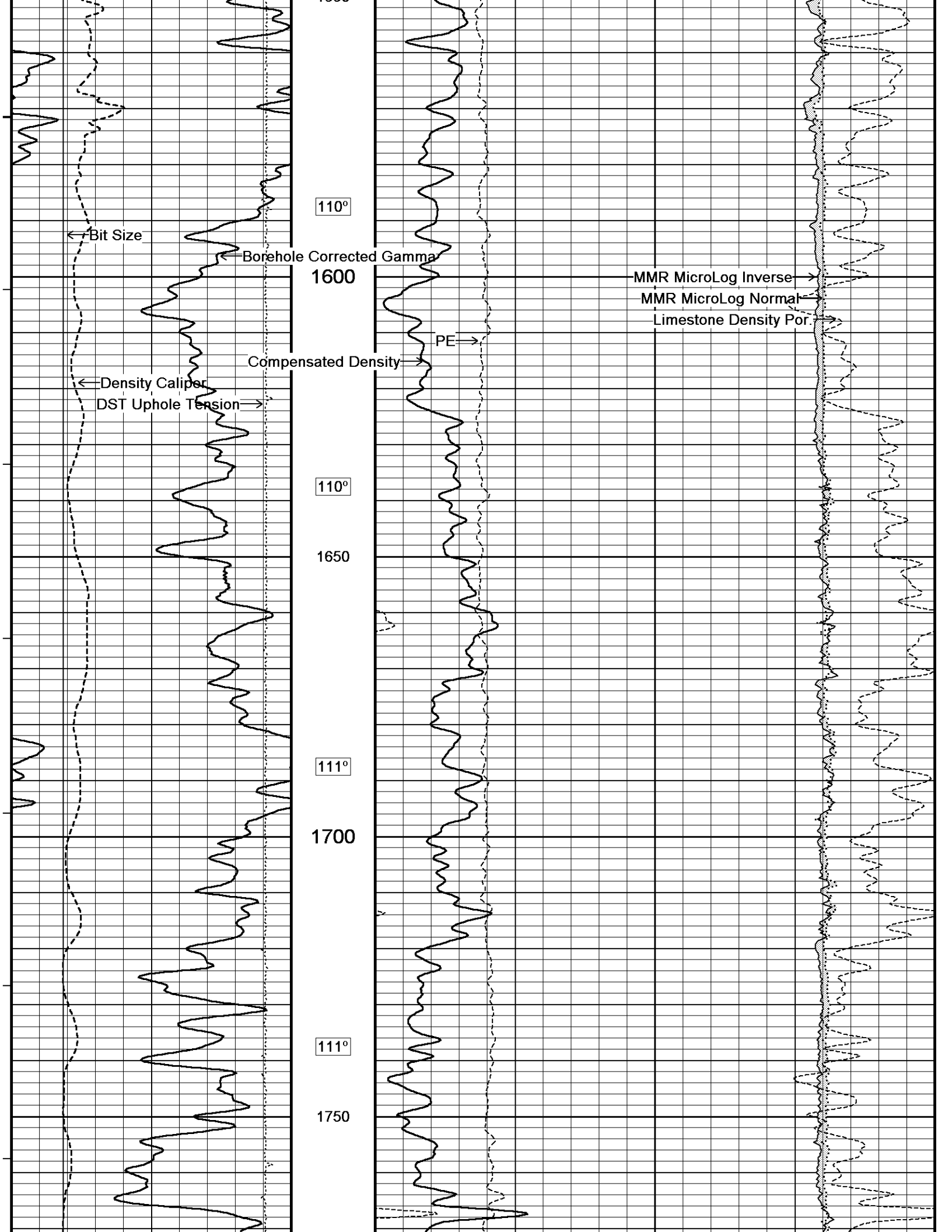

99°
500
100°
550
100°
600
101°
650

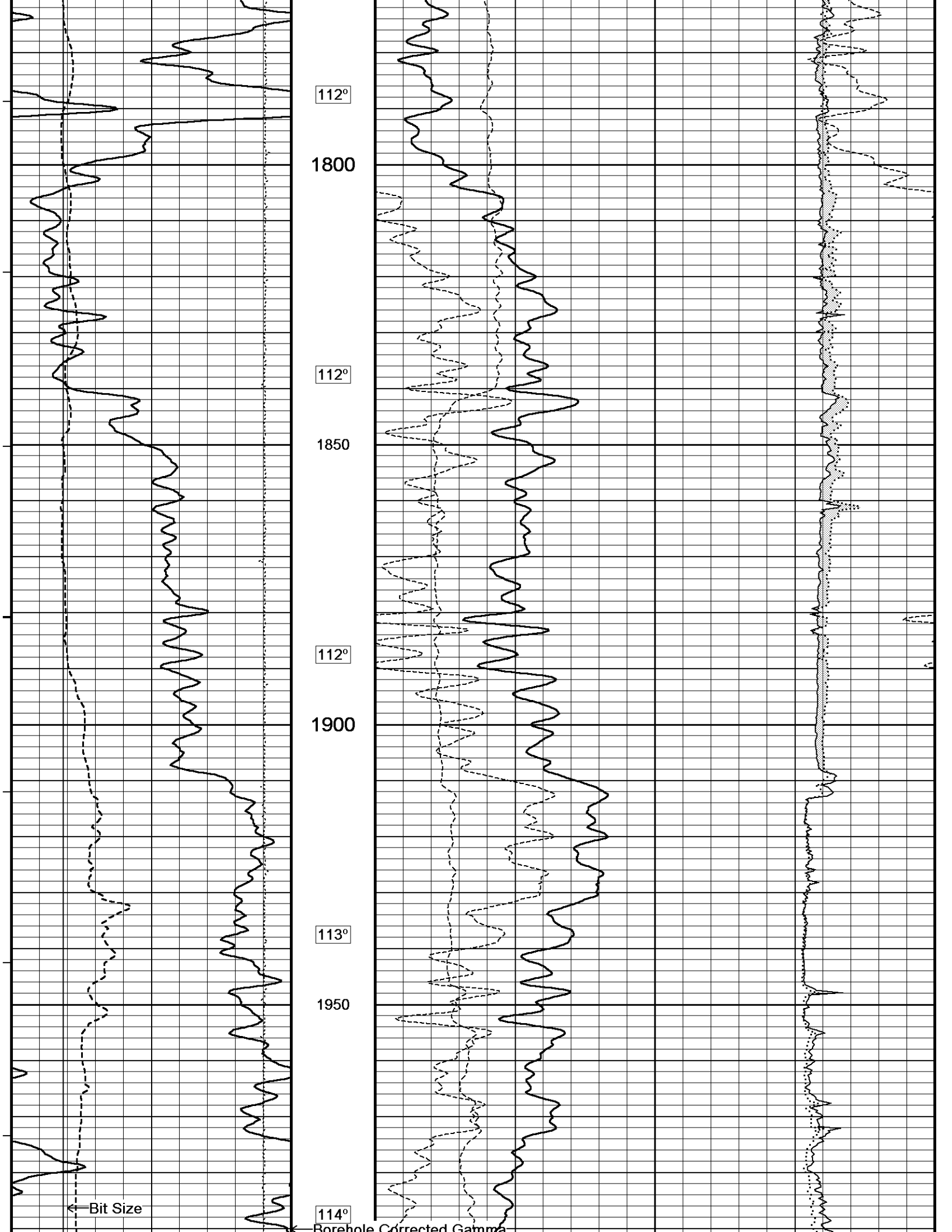

101°
700
102°
750
102°
800
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Compensated Density
Density Caliper
DST Uphole Tension
103°
850
104°

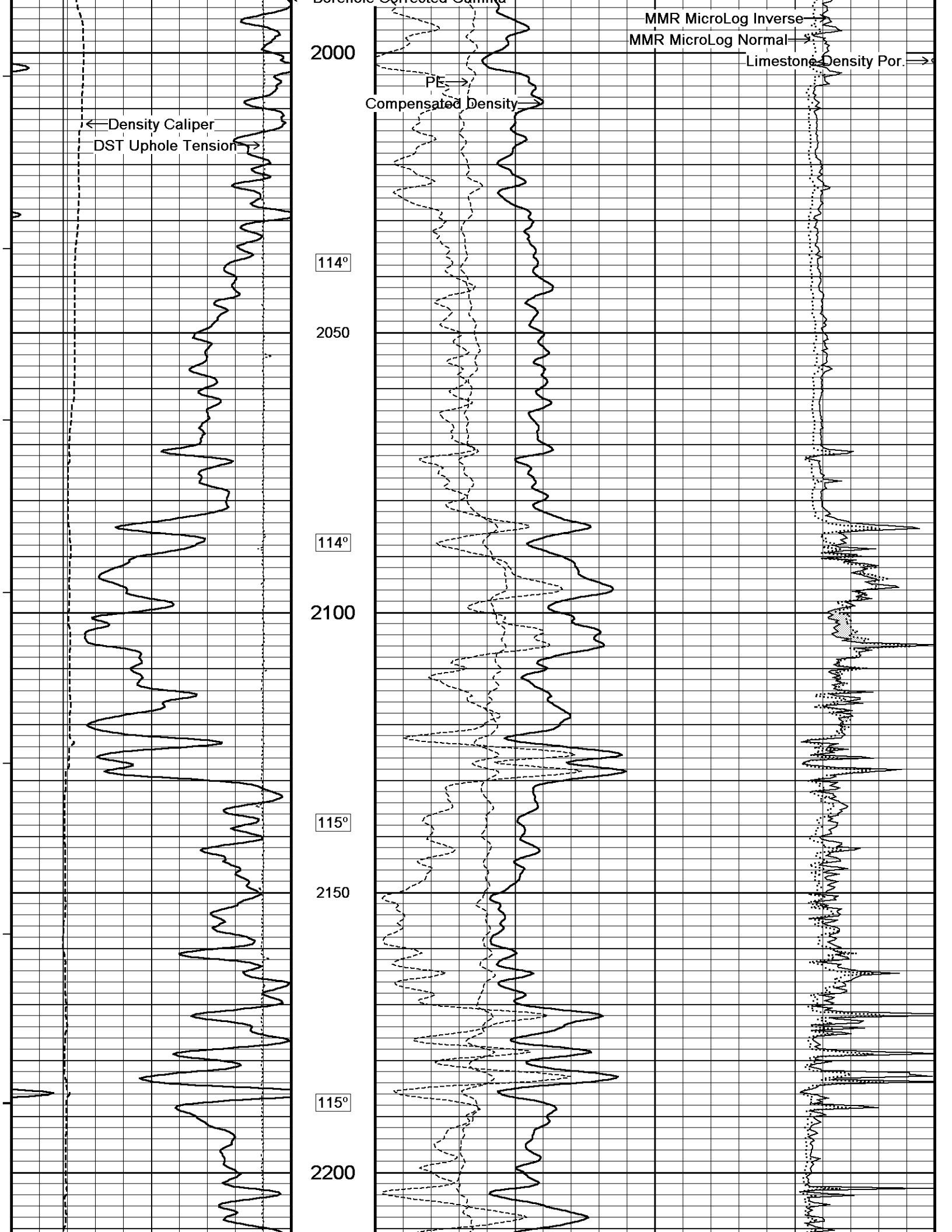

900
104°
950
105°
1000
105°
1050
106°
1100

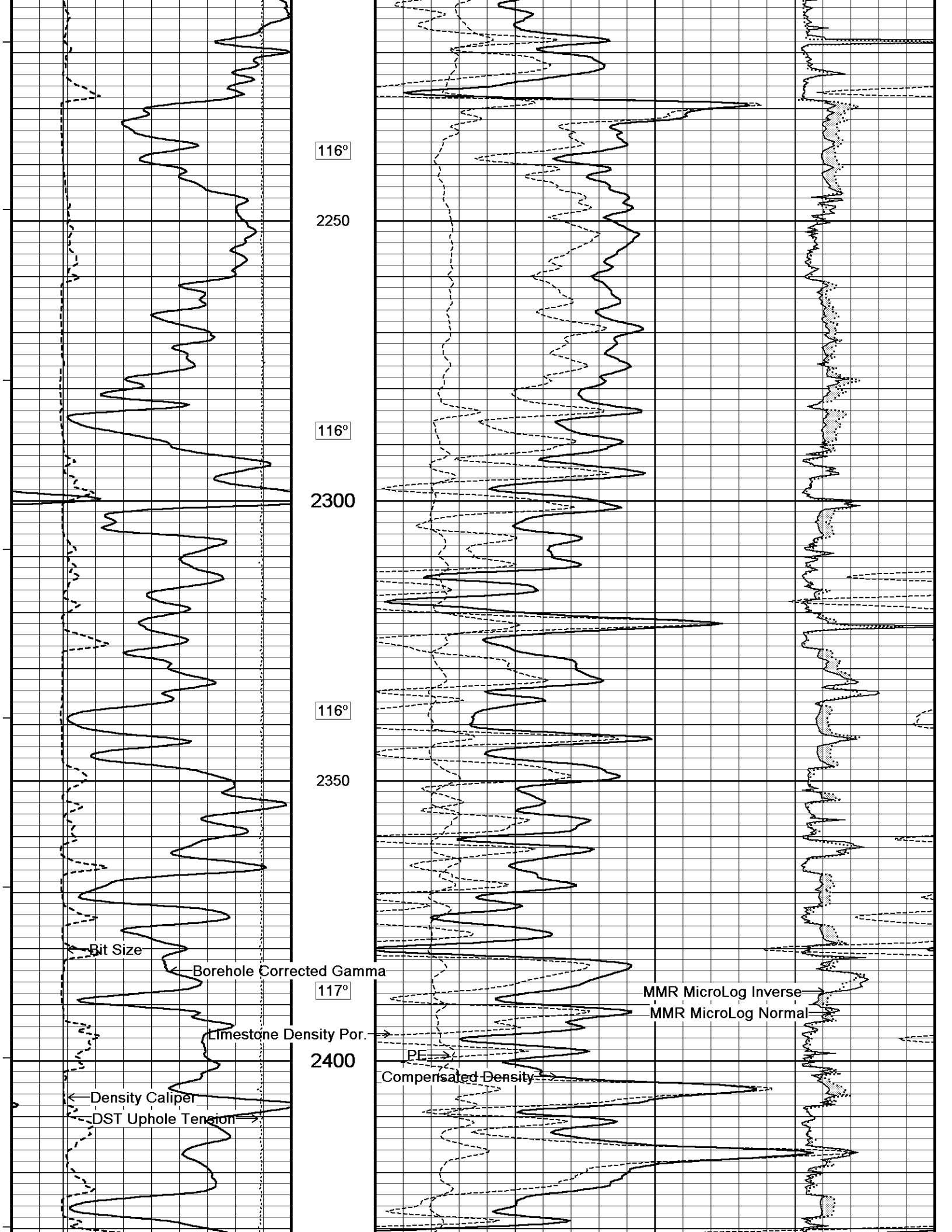

106°
1150
107°
Bit Size
1200
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Compensated Density
Density Caliper
DST Uphole Tension
107°
1250
108°
1300

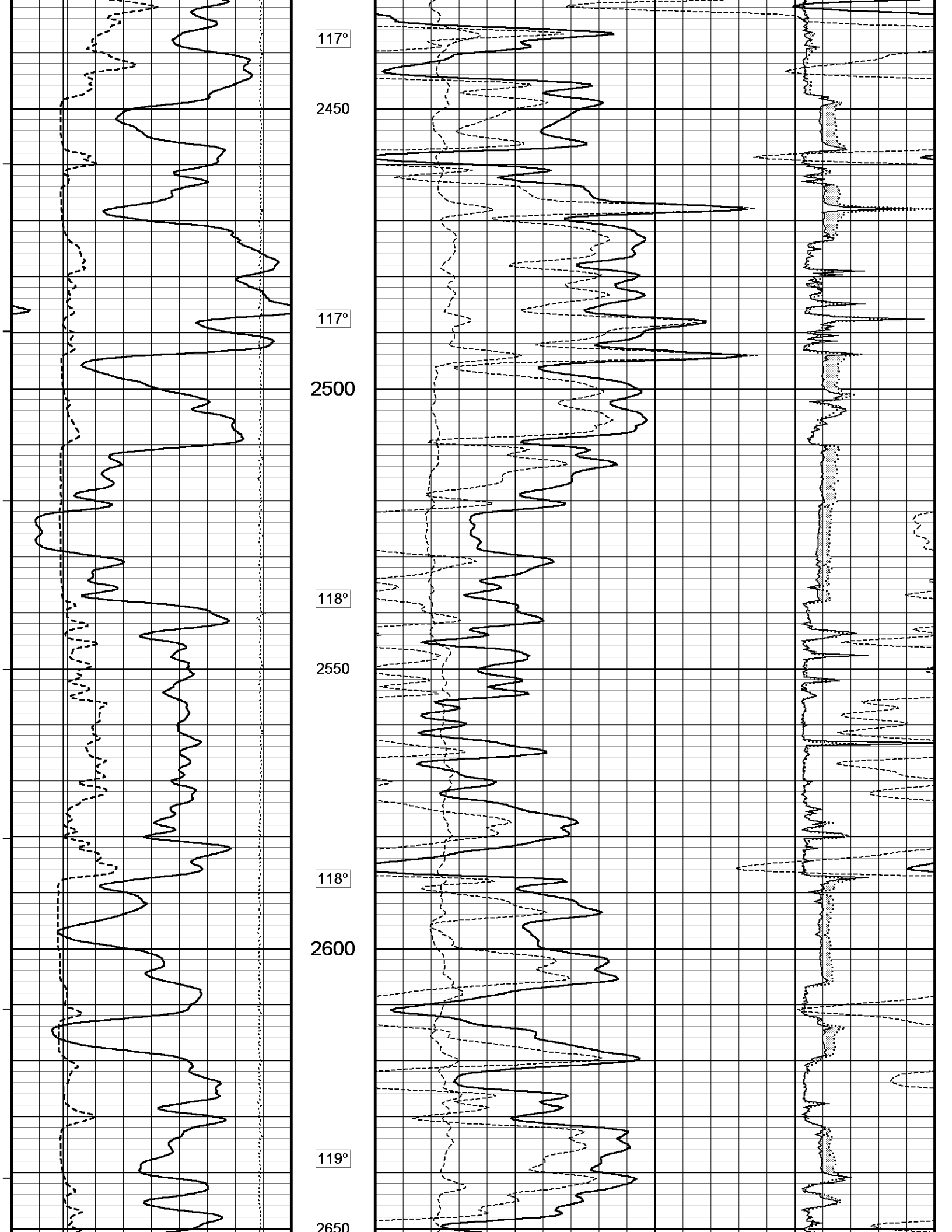

108°
1350
108°
1400
109°
1450
109°
1500
110°
1550

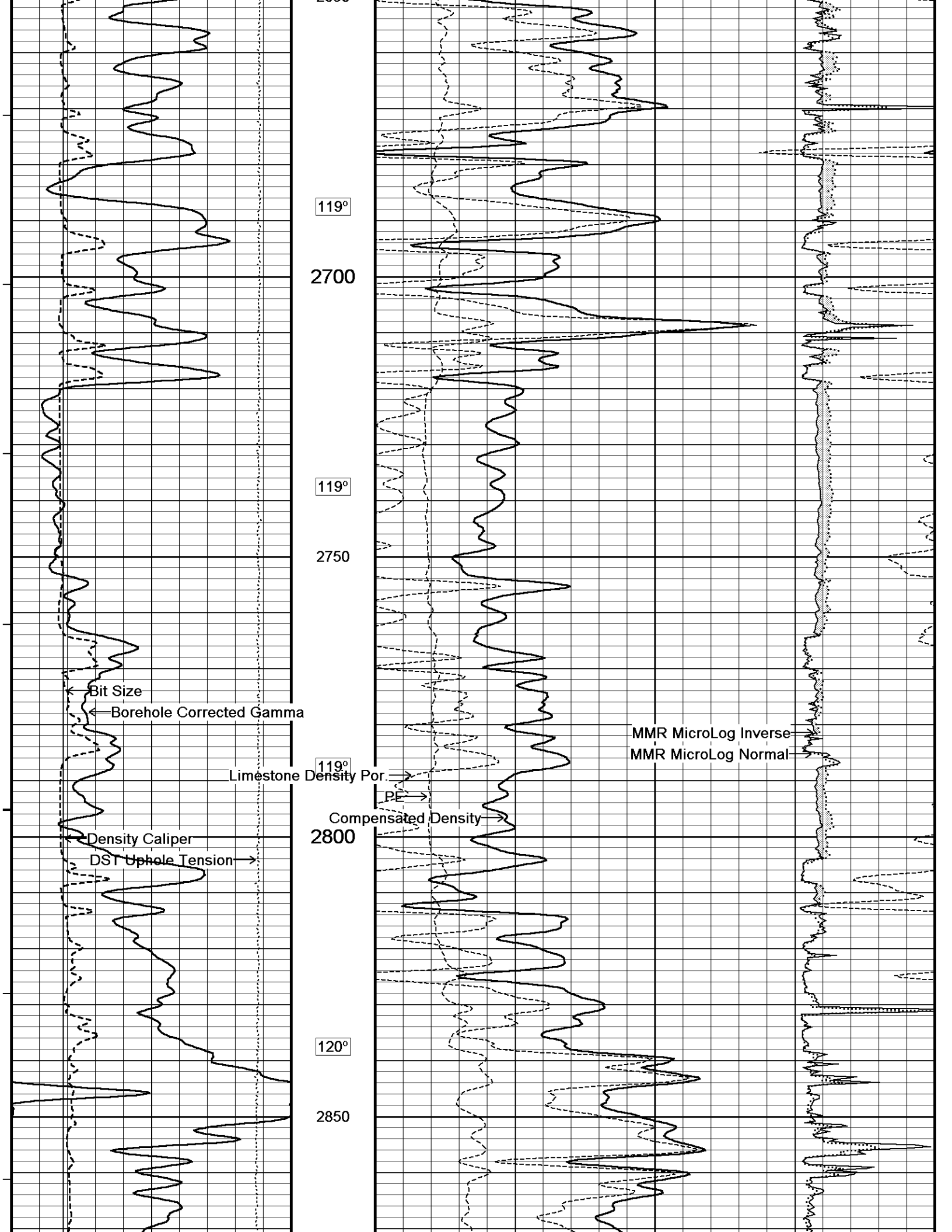

110°
Bit Size
Borehole Corrected Gamma
1600
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE
Compensated Density
Density Caliper
DST Uphole Tension
110°
1650
111°
1700
111°
1750

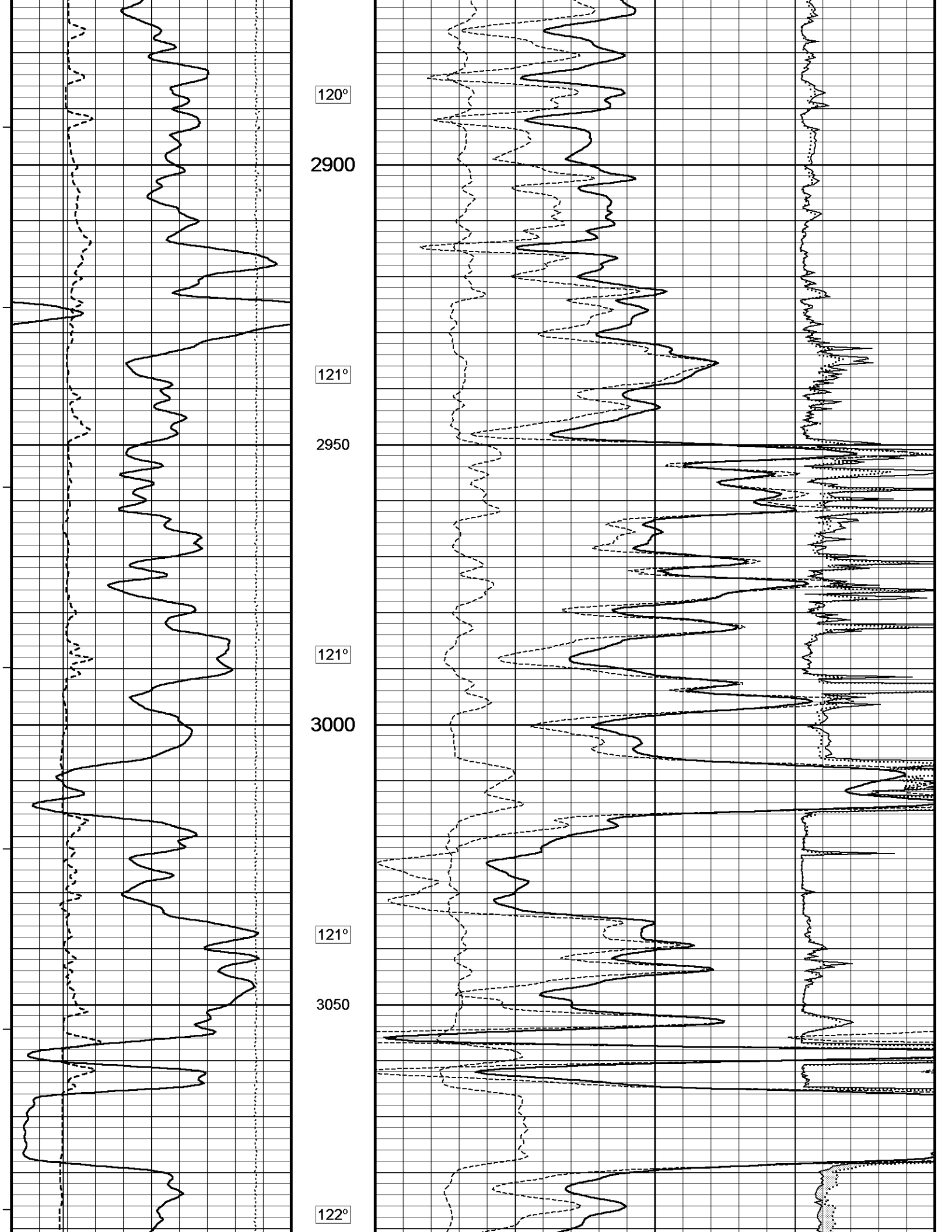

112°
1800
112°
1850
112°
1900
113°
1950
114°
Bit Size
Borehole Corrected Gamma

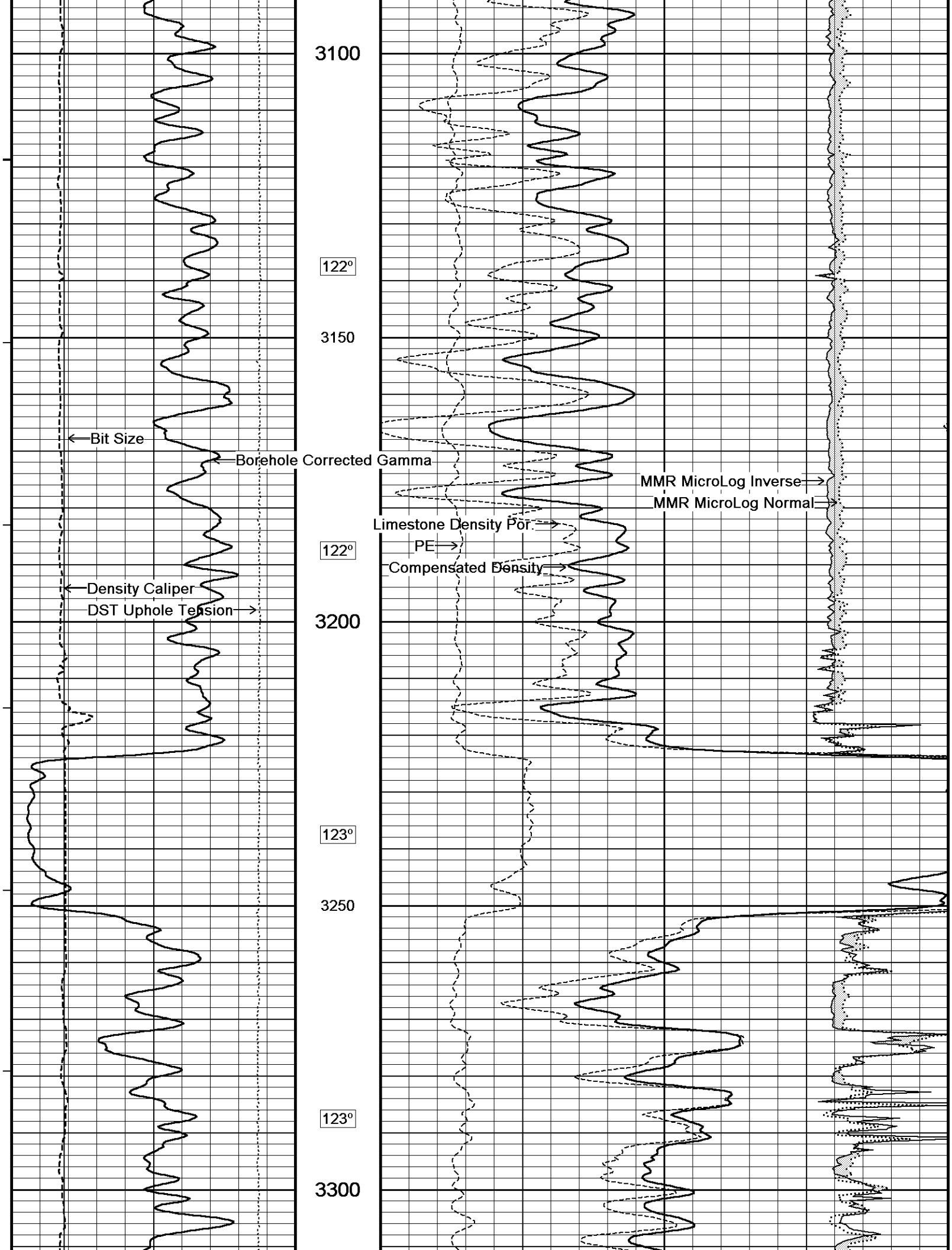

Borehole Corrected Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
2000
PE
Compensated Density
Density Caliper
DST Uphole Tension
114°
2050
114°
2100
115°
2150
115°
2200

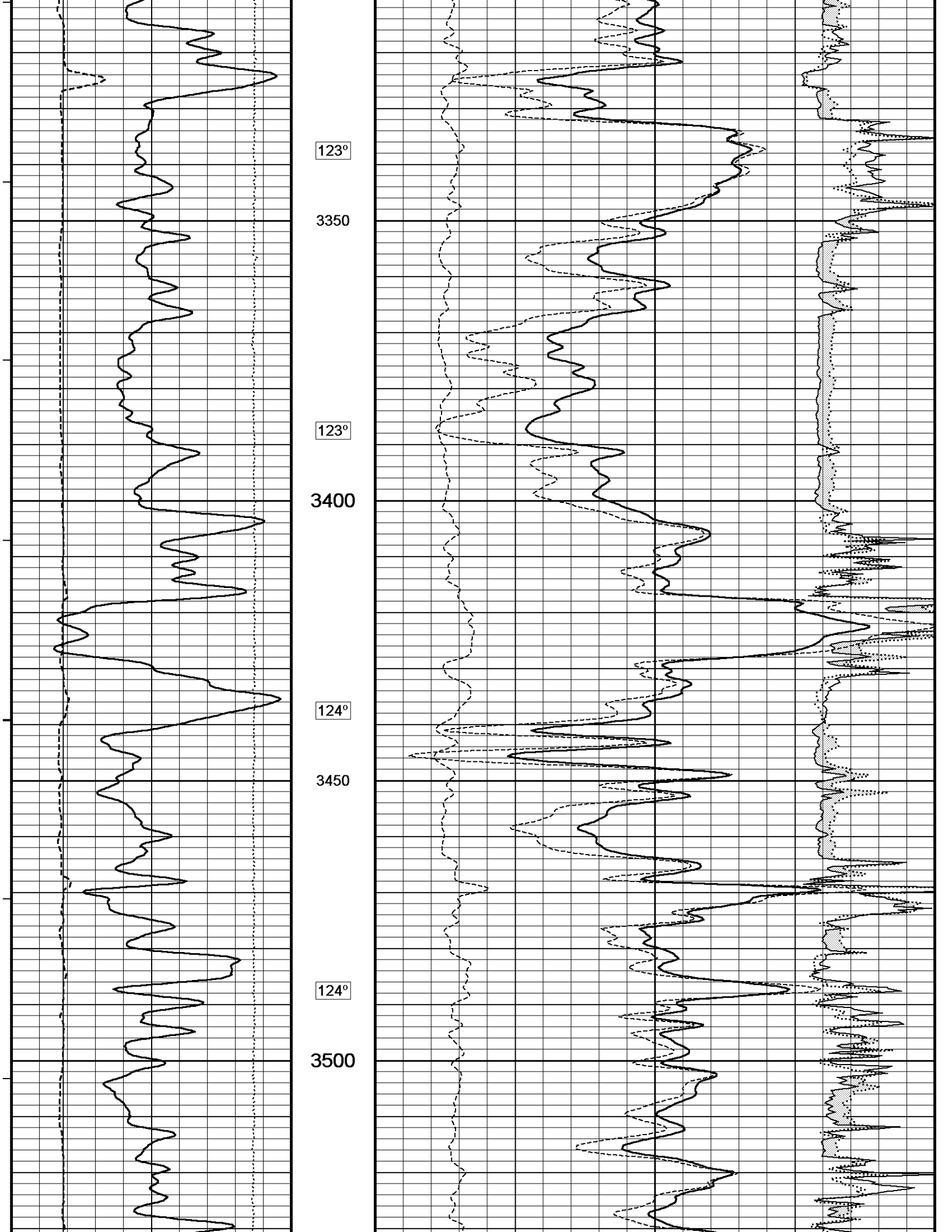

116°
2250
116°
2300
116°
2350
117°
2400
Bit Size
Borehole Corrected Gamma
Limestone Density Por.
Density Caliper
DST Uphole Tension
PE
Compensated Density
MMR MicroLog Inverse
MMR MicroLog Normal

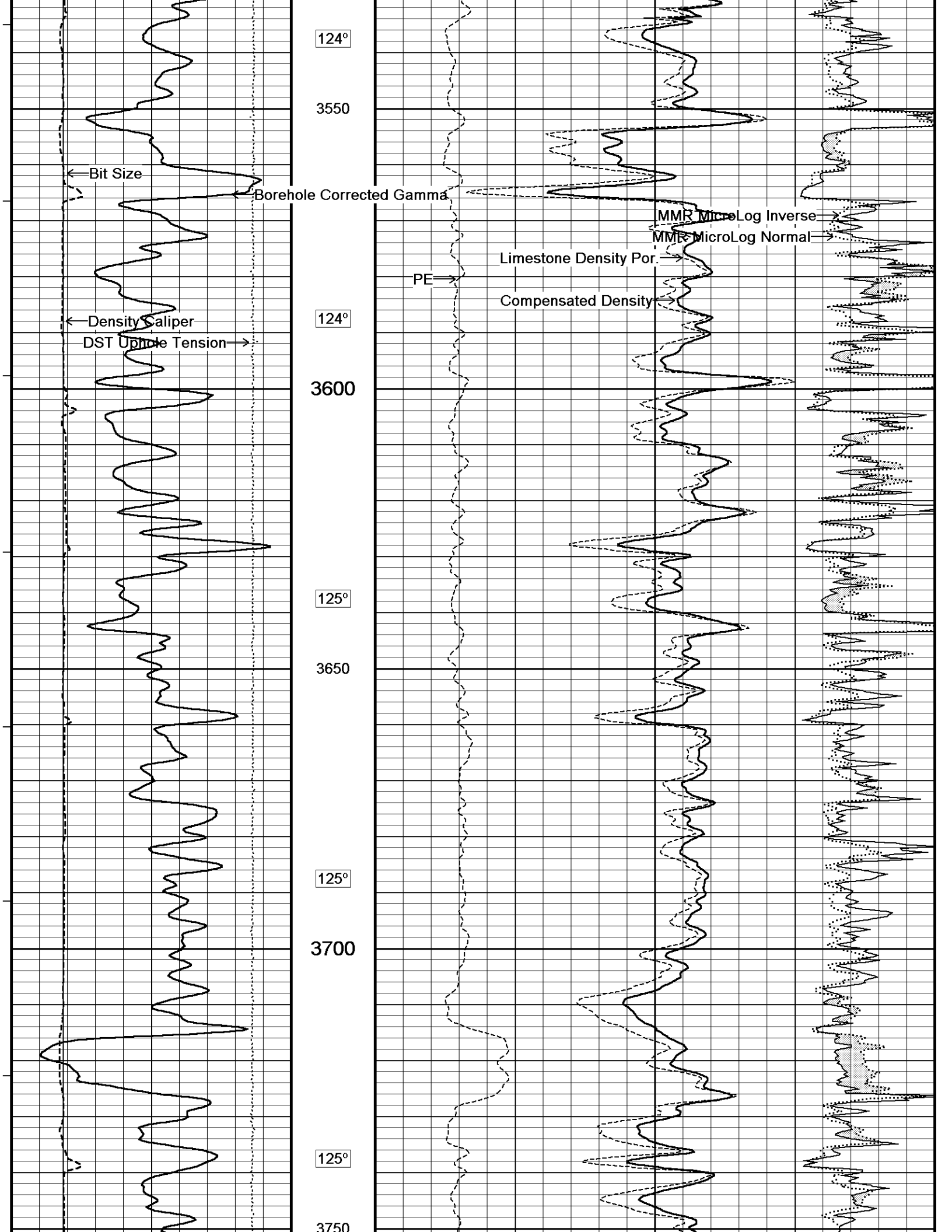

117°
2450
117°
2500
118°
2550
118°
2600
119°
2650

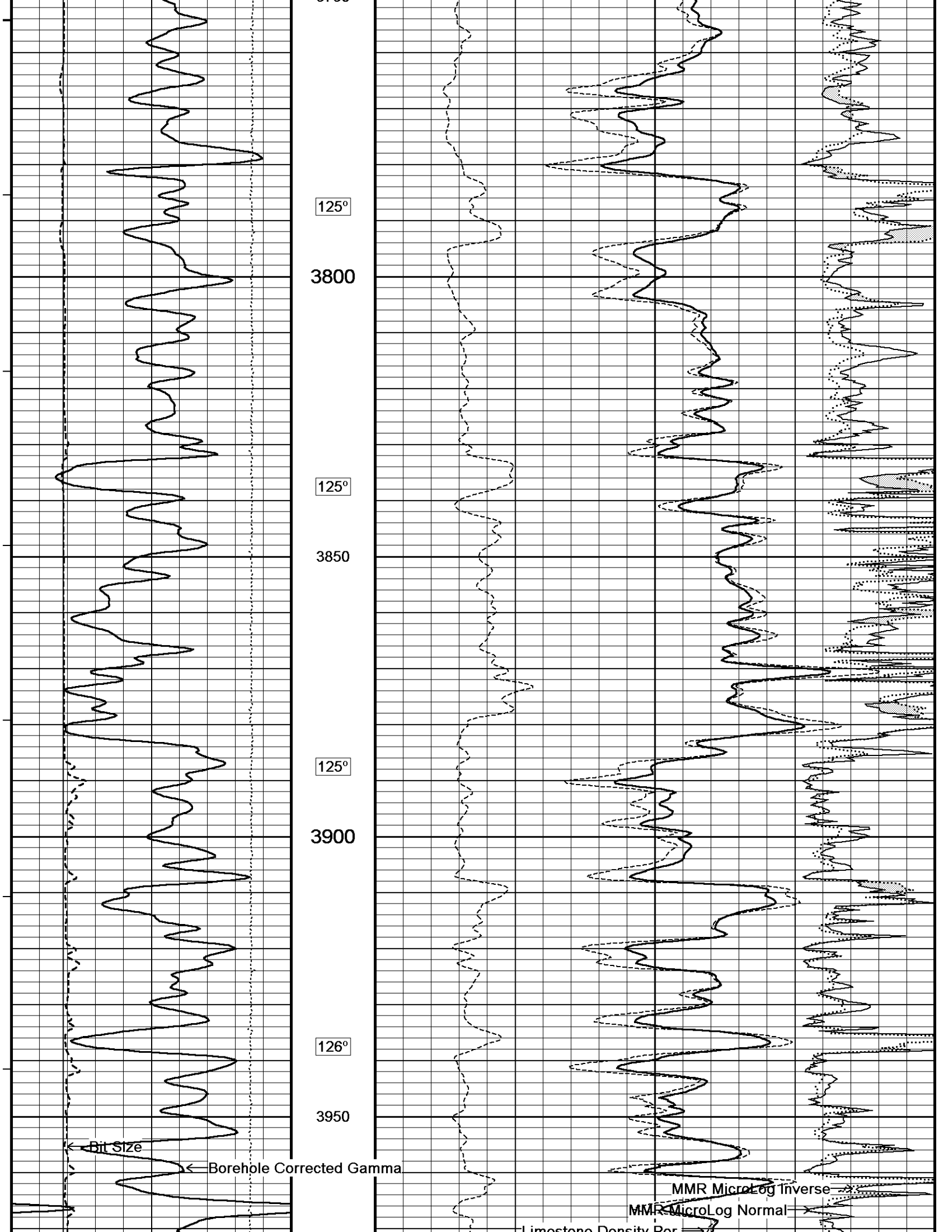

119°
2700
119°
2750
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
119°
Limestone Density Por.
PE
Compensated Density
Density Caliper
2800
DST Uphole Tension
120°
2850

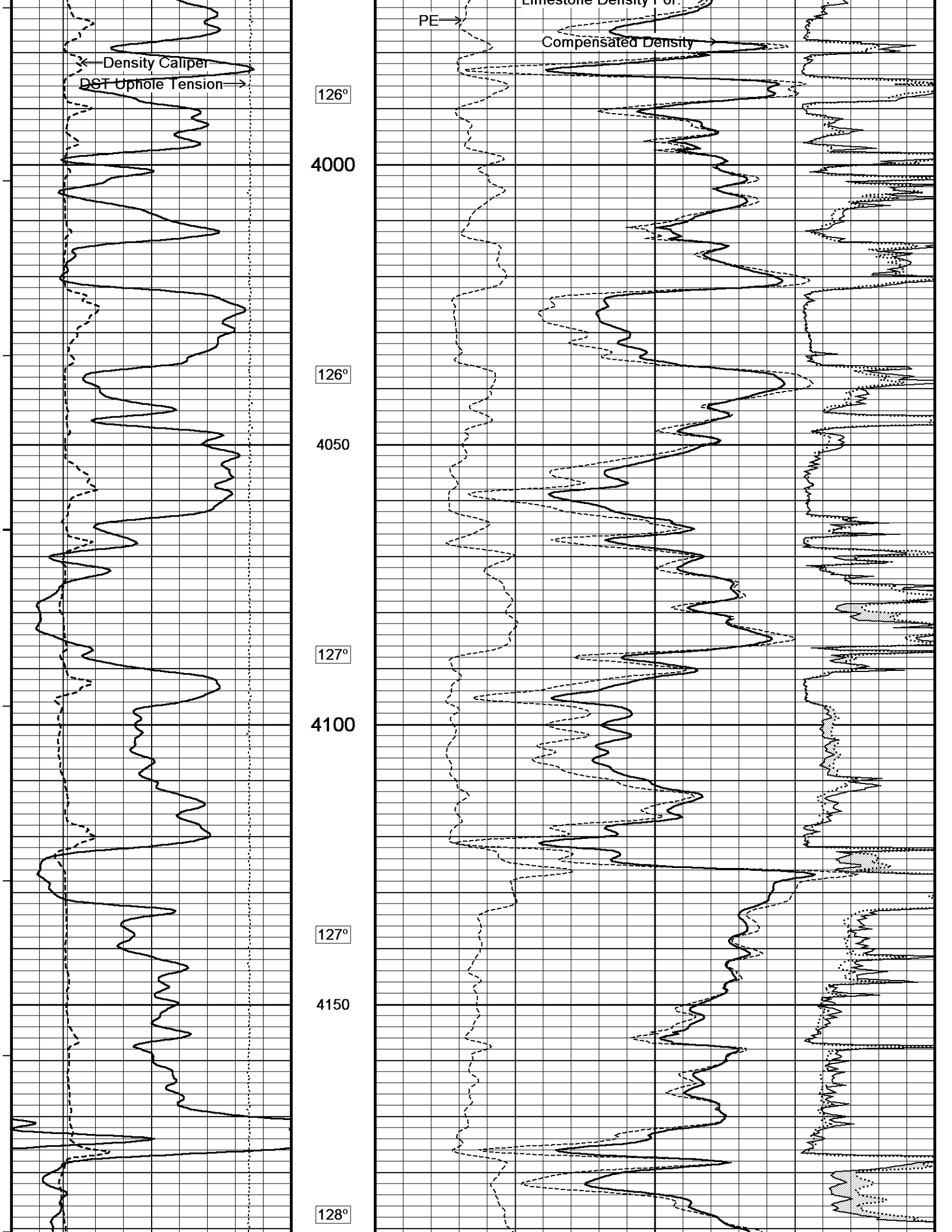

120°
2900
121°
2950
121°
3000
121°
3050
122°

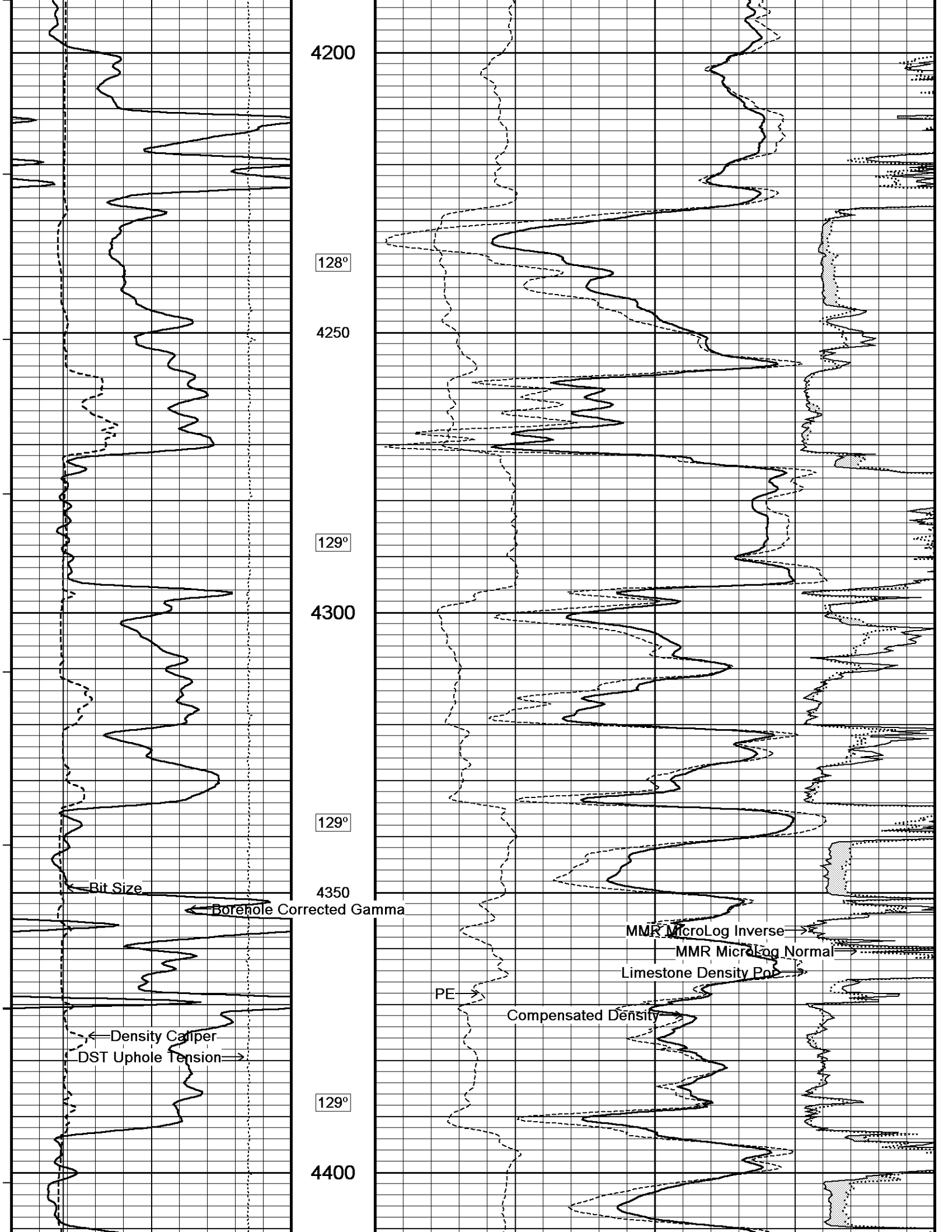

3100
122°
3150
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE
Compensated Density
122°
Density Caliper
DST Uphole Tension
3200
123°
3250
123°
3300

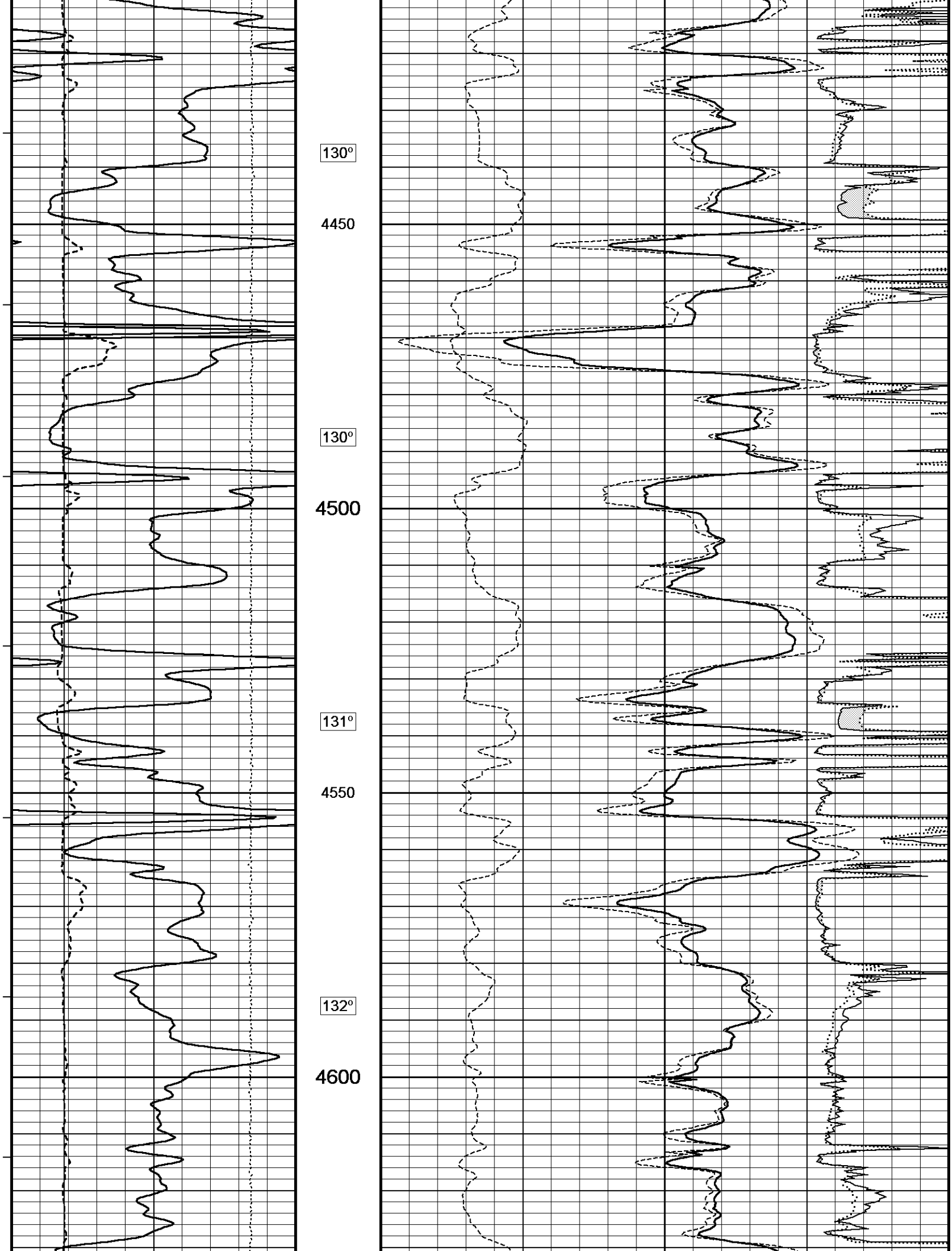

123°
3350
123°
3400
124°
3450
124°
3500

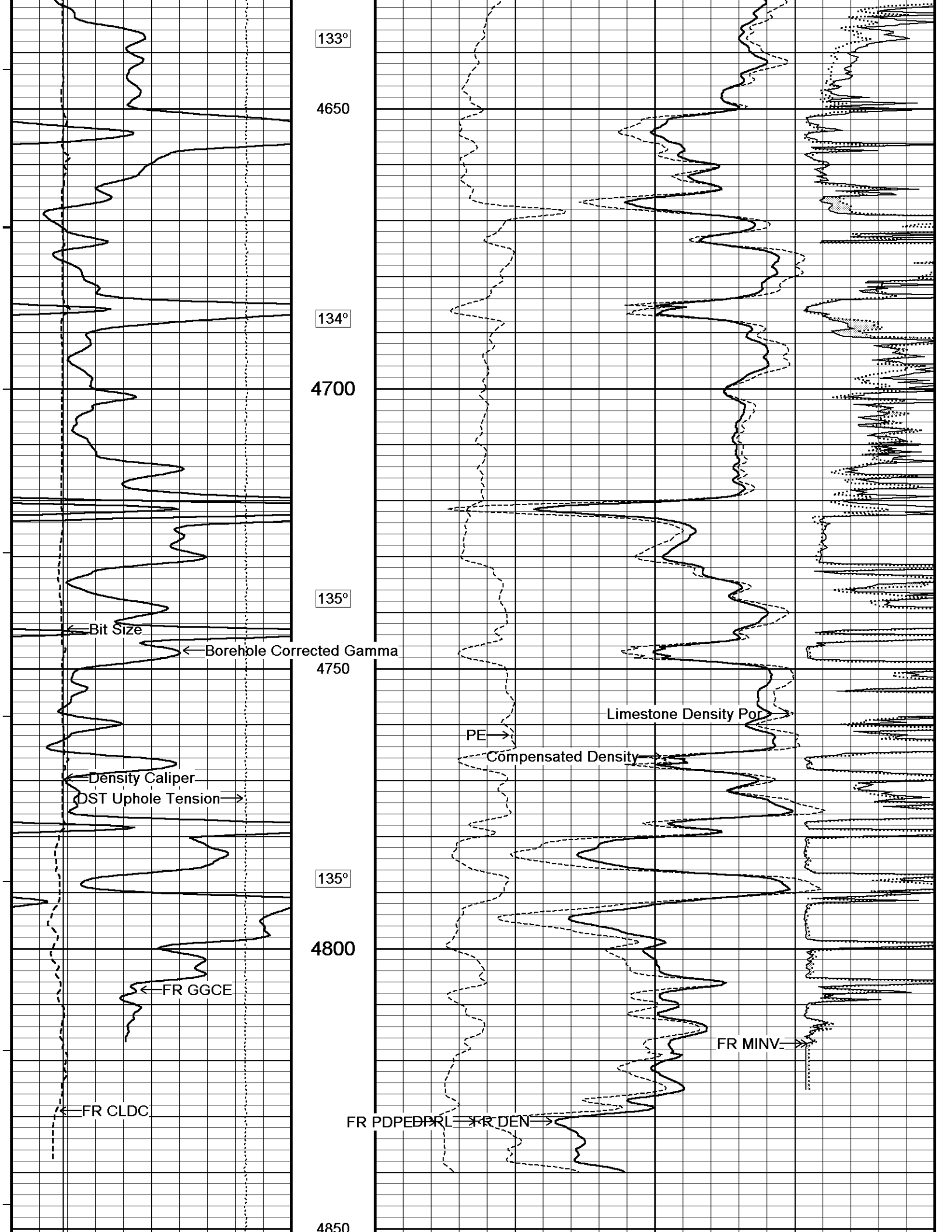

124°
3550
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Compensated Density
Density Caliper
DST Uphole Tension
124°
3600
125°
3650
125°
3700
125°
3750

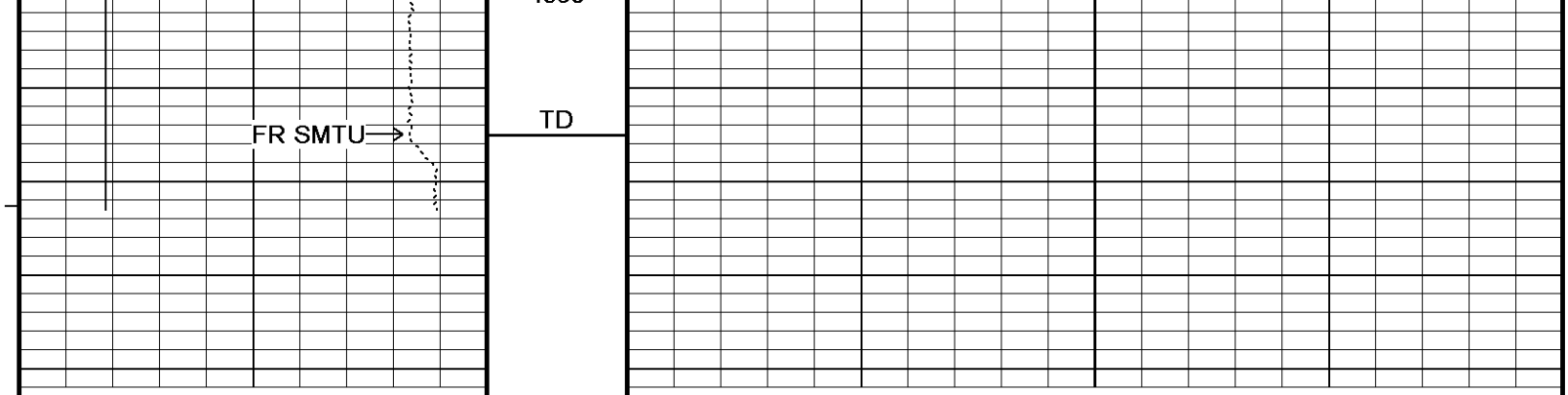

125°
3800
125°
3850
125°
3900
126°
3950
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por


Density Caliper
DST Uphole Tension
126°
4000
126°
4050
127°
4100
127°
4150
128°
PE
Compensated Density


4200
128°
4250
129°
4300
129°
4350
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE
Compensated Density
Density Caliper
DST Uphole Tension
129°
4400


130°
4450
130°
4500
131°
4550
132°
4600


133°
4650
134°
4700
135°
Bit Size
Borehole Corrected Gamma
4750
Limestone Density Por
PE
Compensated Density
Density Caliper
DST Uphole Tension
135°
4800
FR GGCE
FR MINV
FR CLDC
FR PDPE
FR DEN
4850



Depth in Feet

Timing Marks
every 60.0 sec

Compensated Density
grams/cc
2 2.25 2.50 2.75 3
1 1.25 1.50 1.75 2

Density Caliper
inches
6 11 16

Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30

Borehole Corrected Gamma
API
0 75 150
150 225 300

Borehole Temp in deg F

PE
barns/electron
0 5 10

MMR MicroLog Normal
ohm metres
0 20

Bit Size
inches
6 11 16

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 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
Recorded on 22-MAR-2019 00:23
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

5 INCH BULK DENSITY 1:240

REPEAT SECTION 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS_ 001.dta
Recorded on 21-MAR-2019 23:34
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

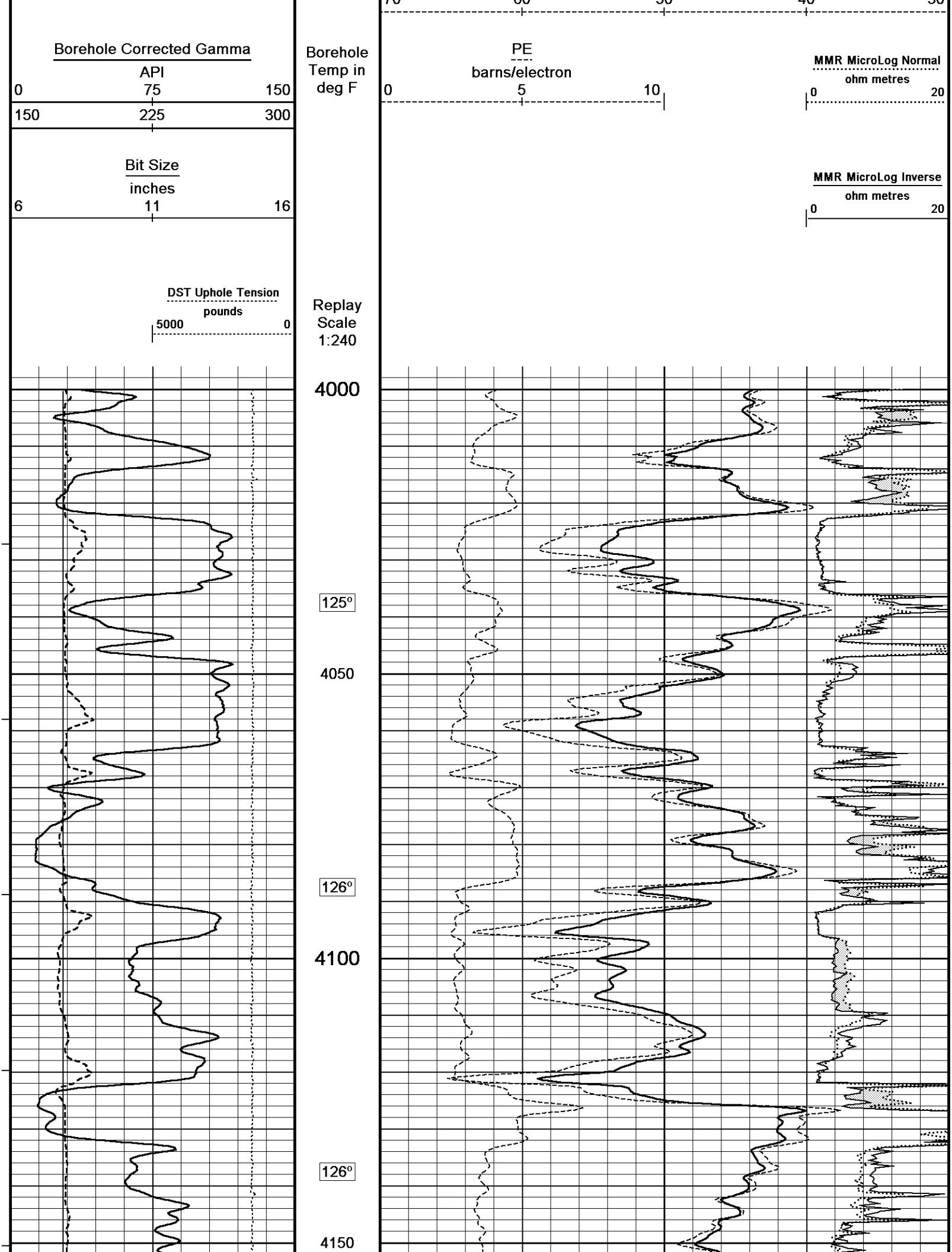
Depth in Feet

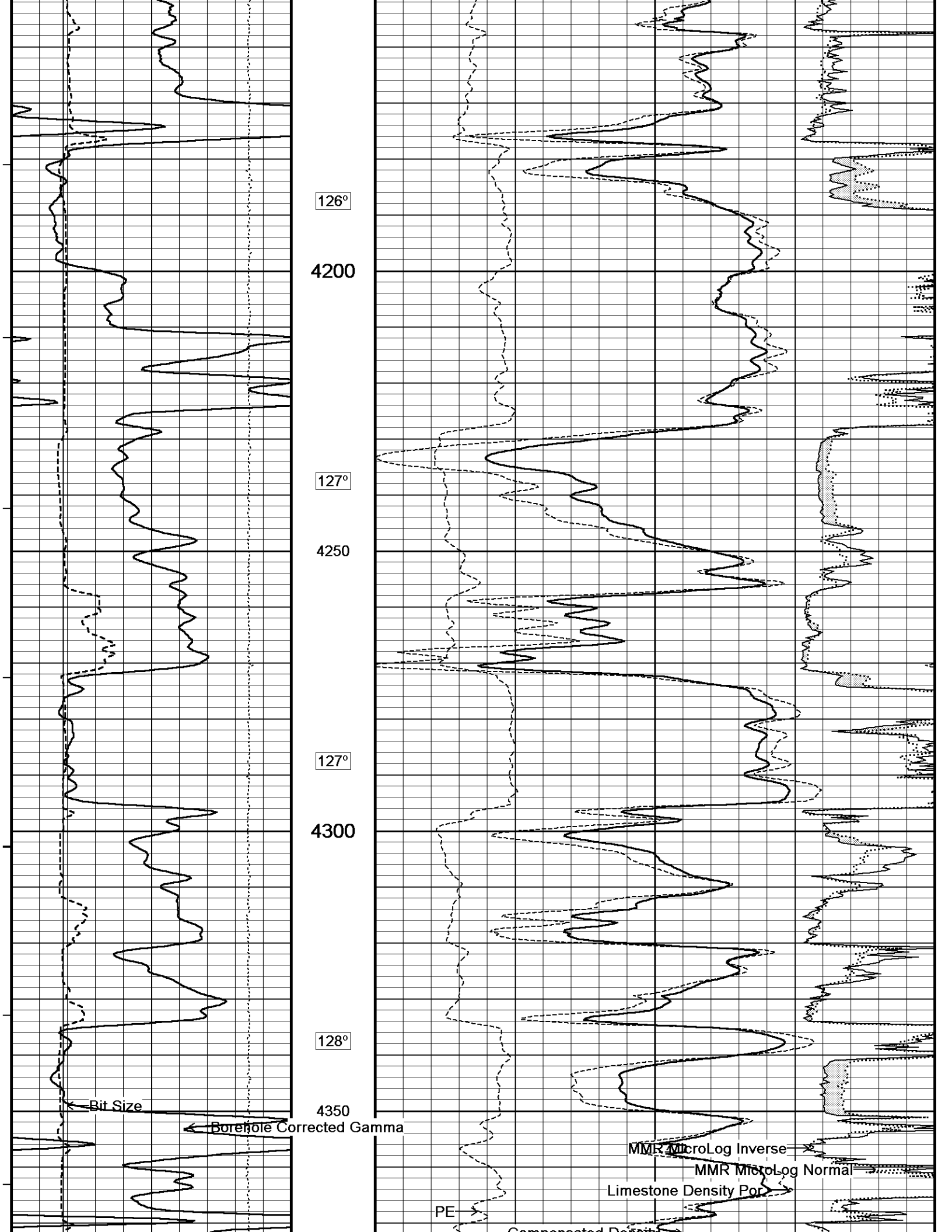
Timing Marks
every 60.0 sec

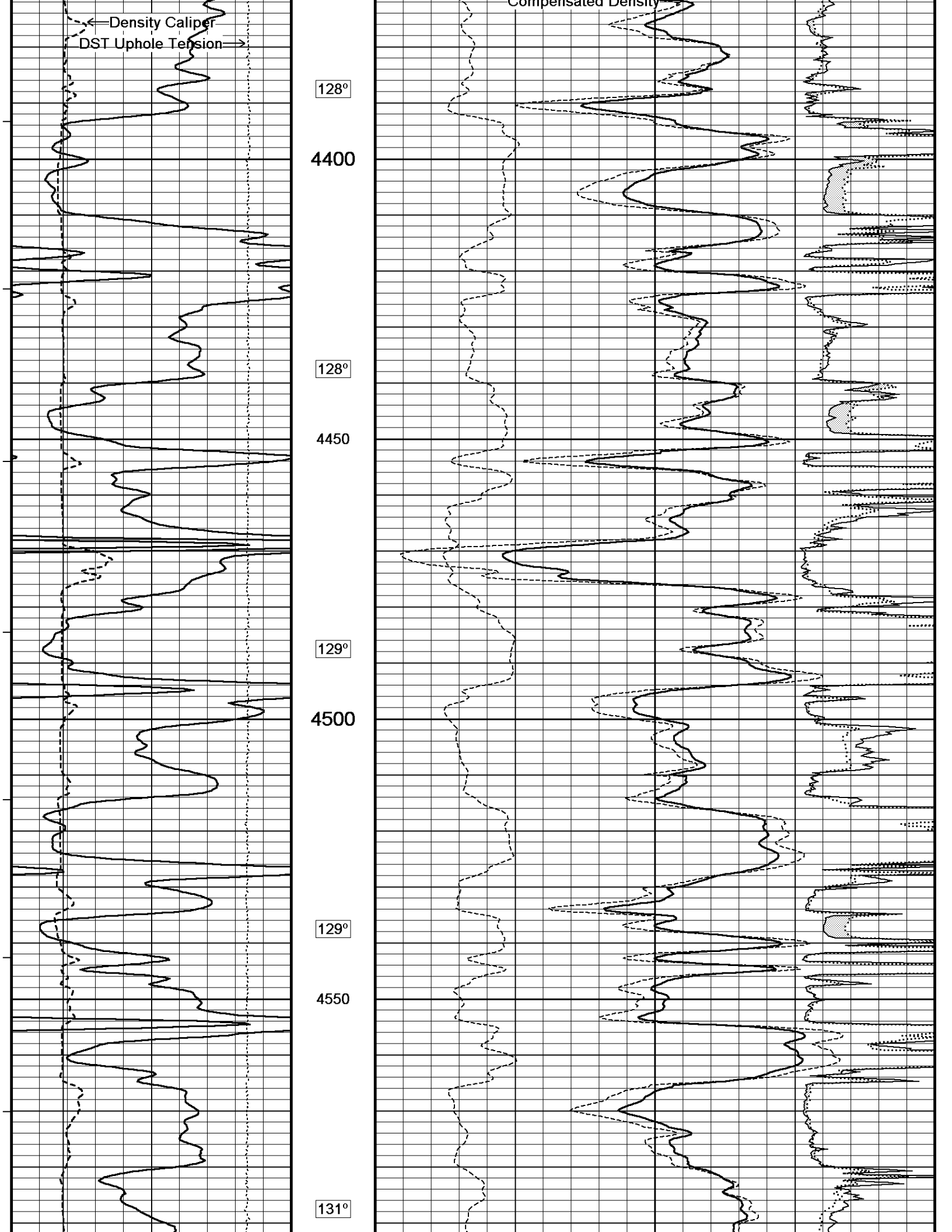
Compensated Density
grams/cc
2 2.25 2.50 2.75 3
1 1.25 1.50 1.75 2

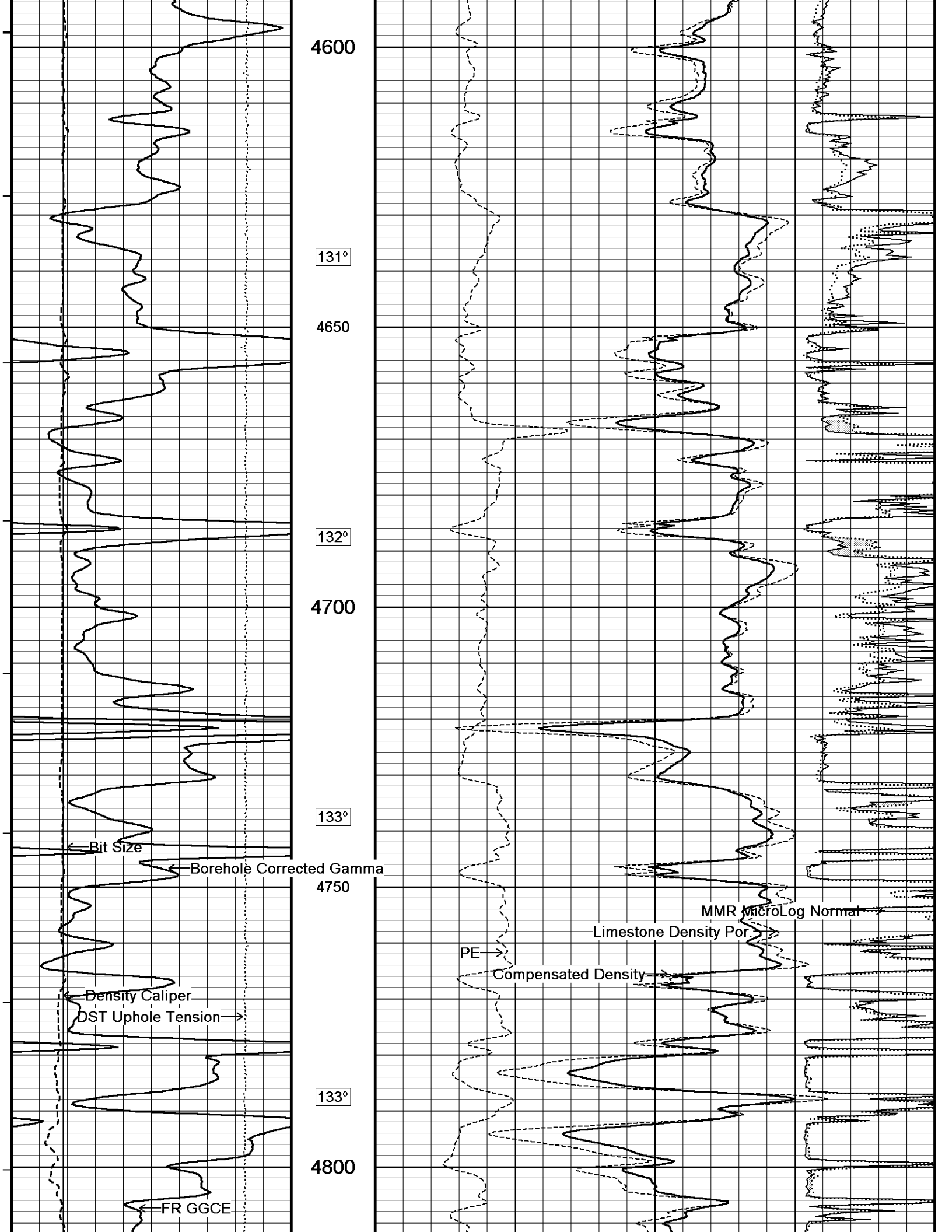
Density Caliper
inches
6 11 16

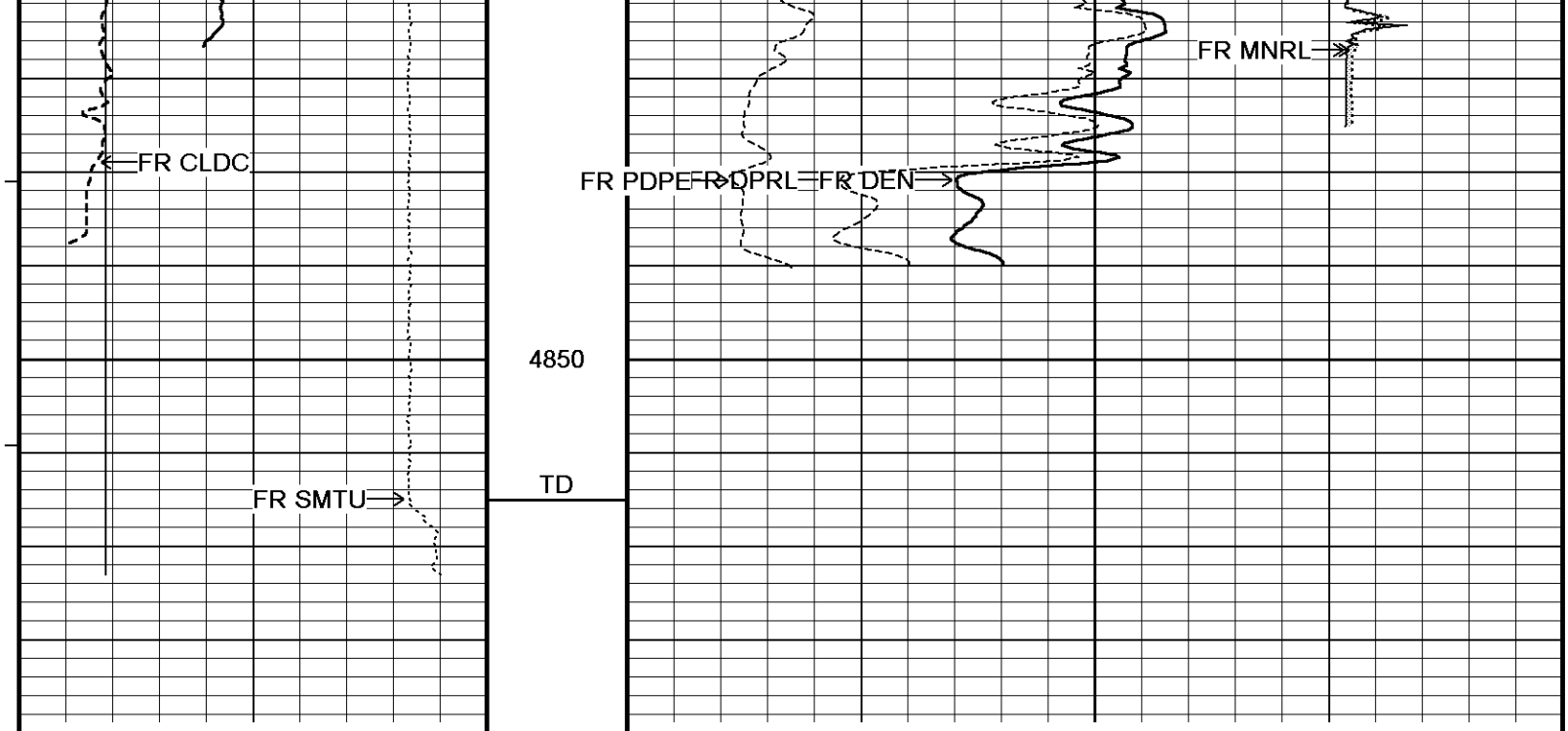
Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30


Borehole Corrected Gamma
API
0
75
150
150
225
300
Bit Size
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Borehole Temp in deg F
Replay Scale 1:240
PE
barns/electron
0
5
10
MMR MicroLog Normal
ohm metres
0
20
MMR MicroLog Inverse
ohm metres
0
20
4000
125°
4050
126°
4100
126°
4150


126°
4200
127°
4250
127°
4300
128°
4350
Bit Size
Borehole Corrected Gamma
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE


Density Caliper
DST Uphole Tension
Compensated Density
128°
4400
128°
4450
129°
4500
129°
4550
131°


4600
131°
4650
132°
4700
133°
Bit Size
Borehole Corrected Gamma
4750
MMR MicroLog Normal
Limestone Density Por
PE
Compensated Density
Density Caliper
DST Uphole Tension
133°
4800
FR GGCE



Depth in Feet

Timing Marks
every 60.0 sec

Compensated Density
grams/cc
2 2.25 2.50 2.75 3
1 1.25 1.50 1.75 2

Density Caliper
inches
6 11 16

Limestone Density Por.
percent
30 20 10 0 -10
70 60 50 40 30

Borehole Corrected Gamma
API
0 75 150
150 225 300

Borehole Temp in deg F

PE
barns/electron
0 5 10

MMR MicroLog Normal
ohm metres
0 20

Bit Size
inches
6 11 16

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 22-MAR-2019 08:17
Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS_ 001.dta
Recorded on 21-MAR-2019 23:34
System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

REPEAT SECTION 1:240

BEFORE SURVEY CALIBRATION
C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta

General Constants All 000
Last Edited on 21-MAR-2019,23:06

General Parameters

Mud Resistivity	1.040	ohm-metres
Mud Resistivity Temperature	103.000	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. One 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 21-MAR-2019 22:36

Reading No	Measured	Calibrated (lbs)
1	17760.84	0.00
2	19449.73	522.50

Gamma Calibration MCG-D.K 443

Field Calibration on 21-MAR-2019 09:55

	Measured	Calibrated (API)
Background	64	45
Calibrator (Gross)	707	501
Calibrator (Net)	644	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio	1.412	1.40 1.475 1.55	Counts/API

Gamma Constants MCG-D.K 443

Last Edited on 21-MAR-2019,22:14

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.08	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-D.K 443

Field Calibration on 21-MAR-2019,09:55

	Measured	Calibrated (mV)
Reference 1	100.8	99.9
Reference 2	-98.4	-99.9

High Resolution Temperature Calibration MCG-D.K 443

Field Calibration on 21-MAR-2019,09:56

	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

Caliper Calibration MML-A 7

Base Calibration on 13-MAR-2019 13:20
Field Calibration on 21-MAR-2019 10:49

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14099	5.98
2	17497	7.97
3	20709	9.86
4	24720	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

	Measured Caliper (in)	Actual Caliper (in)
	8.00	7.97

Caliper Calibration Tolerances MML-A 7

Short Arm Field Cal.	8.00	7.77	7.97	8.17	in

Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 13-MAR-2019 13:20
Field Check on 21-MAR-2019 10:48

	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0

Base Calibration

	Measured		Calibrated (ohm-m)	
Micro Normal	10.2	50.4	5.1	25.6
Micro Inverse	10.0	50.1	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.8	76.8
Micro Inverse	51.0	51.0

Micro Normal & Micro Inverse Calibration Tolerance MML-A 7

Micro Normal Res. 1	10.2	-5%	10.0	+5%	ohm	Micro Normal Res. 2	50.4	-5% 50.0 +5% ohm
Micro Inverse Res. 1	10.0	-5%	10.0	+5%	ohm	Micro Inverse Res. 2	50.1	-5% 50.0 +5% ohm

Micro Normal Base Check	76.8	-2%	76.57	+2%	ohm-m
Micro Inverse Base Check	51.0	-2%	50.97	+2%	ohm-m
Micro Normal Field Check	76.8	-2%	76.8	+2%	ohm-m
Micro Inverse Field Check	51.0	-2%	51.0	+2%	ohm-m

Micro Normal and Micro Inverse Constants MML-A 7

Last Edited on 21-MAR-2019,13:44

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	N/A	inches

Neutron Calibration MDN-B.A 295

Base Calibration on 21-MAR-2019,10:09
Field Calibration on 21-MAR-2019 10:17

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2915	92	3714	110
Ratio	31.740		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	2183	3130
Ratio	0.697	

Field Check

	Calibrated (cps)	
	2224	3184
Ratio	0.699	

Neutron Calibration Tolerances MDN-B.A 295

Ratio	31.740	-5%	33	+5%	
Base Check	0.697	0.65	0.7	0.75	
Field Check	0.699	0.677	0.697	0.717	

Neutron Constants MDN-B.A 295

Last Edited on 21-MAR-2019,13:45

Neutron Source Id	P0204NN
Neutron Jig Number	NJ5736
Air Hole Processing	Legacy

All Hole Processing	Legacy	
Caliper Source for Processing	Bit Size	
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 13-MAR-2019 13:31
Field Check on 21-MAR-2019 09:40

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

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	960.2	126.8
Base Check		281.8
Field Check		282.3

FE Calibration Tolerances MFE-B.J 352

Reference 2	960.2	-3% 980.0 +3%	ohm
Base Check	281.8	-2% 277.0 +2%	ohm-m
Field Check	282.3	-2% 281.8 +2%	ohm-m

FE Constants MFE-B.J 352

Last Edited on 21-MAR-2019,13:45

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 308

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'					
4'					
5'					
6'					

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (m)
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	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-A.A 111

Factory Loop Calibration 17-MAR-2019 17:11
Field Check on 21-MAR-2019 09:38

Factory Loop Calibration

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

	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
Array	Low	High	Low	High	Gain	Offset
1 (near)	17.6	473.6	9.3	966.2	2.099	-27.8
2	6.4	385.9	7.6	821.4	2.144	-6.1
3	3.2	264.0	5.2	566.0	2.150	-1.6
4 (far)	2.1	135.5	2.6	279.2	2.074	-1.8
Array Temperature		23.0	Deg F			

Tool Checks

	Factory Reference (mmho/m)		Before Survey (mmho/m)	
Array	Low	High	Low	High
1 (near)	8.9	3838.6	9.7	3837.6
2	27.2	3497.1	27.8	3497.5
3	26.8	2994.8	27.4	2995.9
4 (far)	17.6	2040.6	18.0	2040.9
Array Temperature		70.6	62.2	Deg F

Induction Check Tolerances MAI-A.A 111

Low Array 1	9.7	7.4 / 8.9 / 10.4	mmho/m	High Array 1	3837.6	-0.5% / 3838.6 / +0.5%	mmho/m
Low Array 2	27.8	25.7 / 27.2 / 28.7	mmho/m	High Array 2	3497.5	-0.5% / 3497.1 / +0.5%	mmho/m
Low Array 3	27.4	25.3 / 26.8 / 28.3	mmho/m	High Array 3	2995.9	-0.5% / 2994.8 / +0.5%	mmho/m
Low Array 4	18.0	16.1 / 17.6 / 19.1	mmho/m	High Array 4	2040.9	-0.5% / 2040.6 / +0.5%	mmho/m

Induction Constants MAI-A.A 111

Last Edited on 21-MAR-2019,22:56

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	Pineapple	
Stand-off	0.49	inches
Number of Fins on Stand-off	5.0000	
Stand-off Fin Angle	72.00	degrees
Stand-off Fin Width	1.3878	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	
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-A.A 111

Field Calibration on 21-MAR-2019,09:38

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length	11

Caliper Calibration MPD-C.A 216

Base Calibration on 21-MAR-2019 10:44
Field Calibration on 21-MAR-2019 10:45

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16416	3.99
2	24992	5.98
3	33618	7.97
4	41920	9.86
5	51021	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	7.96	7.57 7.97 8.37	in

Photo Density Calibration MPD-C.A 216

Base Calibration on 13-MAR-2019 13:15
Field Check on 21-MAR-2019 10:28

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	993	1178		
Reference 1	49484	24265	59556	30836
Reference 2	19819	2323	24941	2541
Field Check at Base	992.5	1177.7		
Field Check	988.7	1170.7		

PE Calibration

Base Calibration	WS	Measured WH	Ratio	Calibrated Ratio
Background	179	888		
Reference 1	20495	49325	0.419	0.371
Reference 2	5677	19711	0.292	0.272
Field Check at Base	179.0	888.4		
Field Check	180.5	888.3		

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.58	-5% 2.52 +5%	Far Density Ratio	20.15	-5% 21.00 +5%
PE Calibration	0.119	0.089 0.110 0.131			
Near Den. Field Check	988.7	-3% 992.5 +3%	Far Den. Field Check	1170.7	-3% 1177.7 +3%
PE WS Field Check	180.5	-6% 179.0 +6%	PE WH Field Check	888.3	-6% 888.4 +6%

Density Constants MPD-C.A 216

Last Edited on 21-MAR-2019,22:15

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.08	gm/cc
Mud Density 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

DOWNHOLE EQUIPMENT

C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta

Cablehead, 11 pin
CBH-CB 267 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor
SHA-J.B 722 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-log
MML-A 7 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

Compact Neutron
MDN-B.A 295 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: 2.449 in

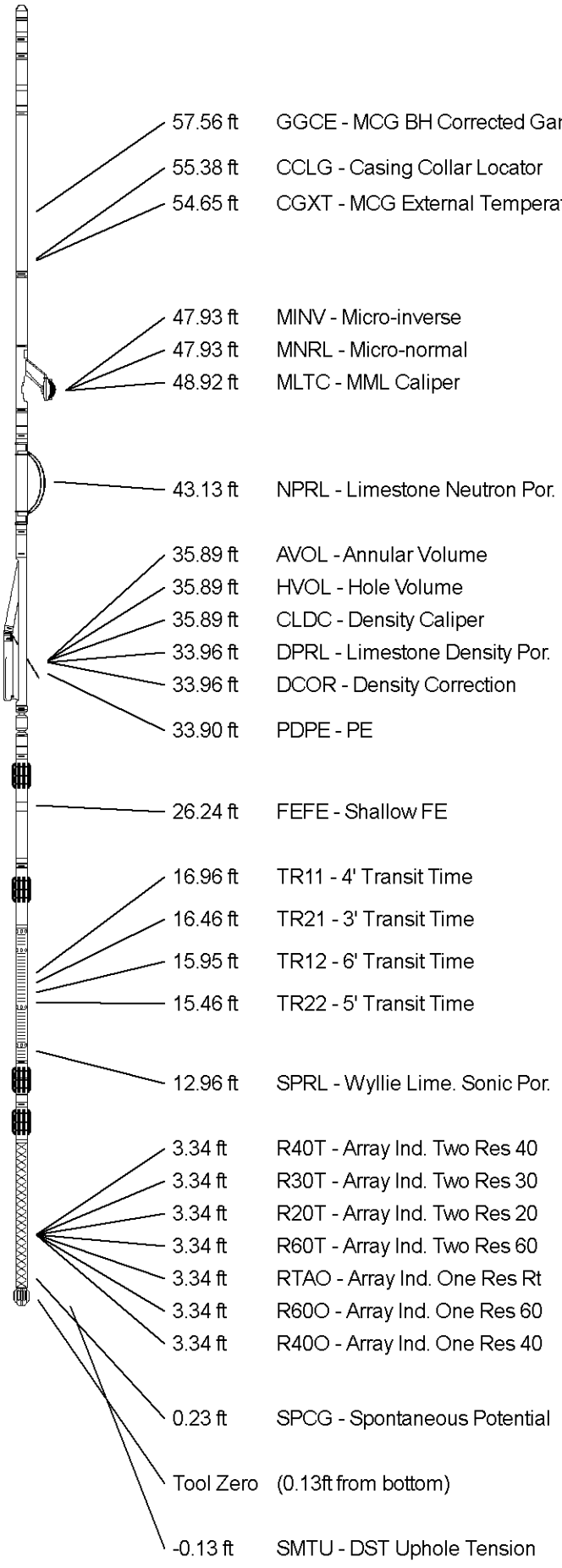
Compact Knuckle Joint
SKJ-E.B 733 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

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

Compact Sonic
MSS-C.K 308 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: 2.240 in

Total Length: 67.54 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY	BLACK OAK EXPLORATION
WELL	ERISIBIE FAMILY 1-15

WELL	PRICIDIL FAMILY 1-16
FIELD	WILDCAT
PROVINCE/COUNTY	RAWLINS
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3335	feet	First Reading	4831.00	feet
Elevation Drill Floor	3333	feet	Depth Driller	4860.00	feet
Elevation Ground Level	3330	feet	Depth Logger	4865.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG