COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

Weatherford

COMPANY	O'BRIEN ENERGY RESOURCES CORP.
WELL	MARY #1-1
FIELD	GRANGER CREEK
PROVINCE/COUNTY	CLARK
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2277' FNL & 2262' FEL

SEC 1	TWP 31S	RGE 22W	Other Services
Latitude			MAI/MFE
Longitude			
API Number	15-025-21588		

Permanent Datum GL, Elevation 2252 feet
Log Measured From KB
Drilling Measured From KB @ 13 FEET

Elevations:	feet
KB	2265.00
DF	2263.00
GL	2252.00

Date	19-DEC-2015			
Run Number	ONE			
Service Order	4558-137748401			
Depth Driller	6500.00	feet		
Depth Logger	6502.00	feet		
First Reading	6483.00	feet		
Last Reading	4000.00	feet		
Casing Driller	644.00	feet		
Casing Logger	647.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.45 lb/USg	48.00 CP		
PH / Fluid Loss	9.50	9.20 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.70 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.56 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.84 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.44 @119.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	119.00	deg F		
Equipment / Base	13096	OKC		
Recorded By	ADAM SILL			
Witnessed By	ROGER PEARSON		PETE DEBENHAM	

BOREHOLE RECORD

Last Edited: 19-DEC-2015 18:42

Bit Size inches	Depth From feet	Depth To feet
7.875	644.00	6500.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	644.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 15.03.5939.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
  - HARDWARE: DUAL BOWSPRING USED ON MDN.
  0.5 INCH STANDOFF USED ON MFE.
  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: 2352 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 4000 FEET: 563 CU.FT.
- RIG: DUKE #9

- RIG: DURE #6.

- ENGINEER: A. SILL.

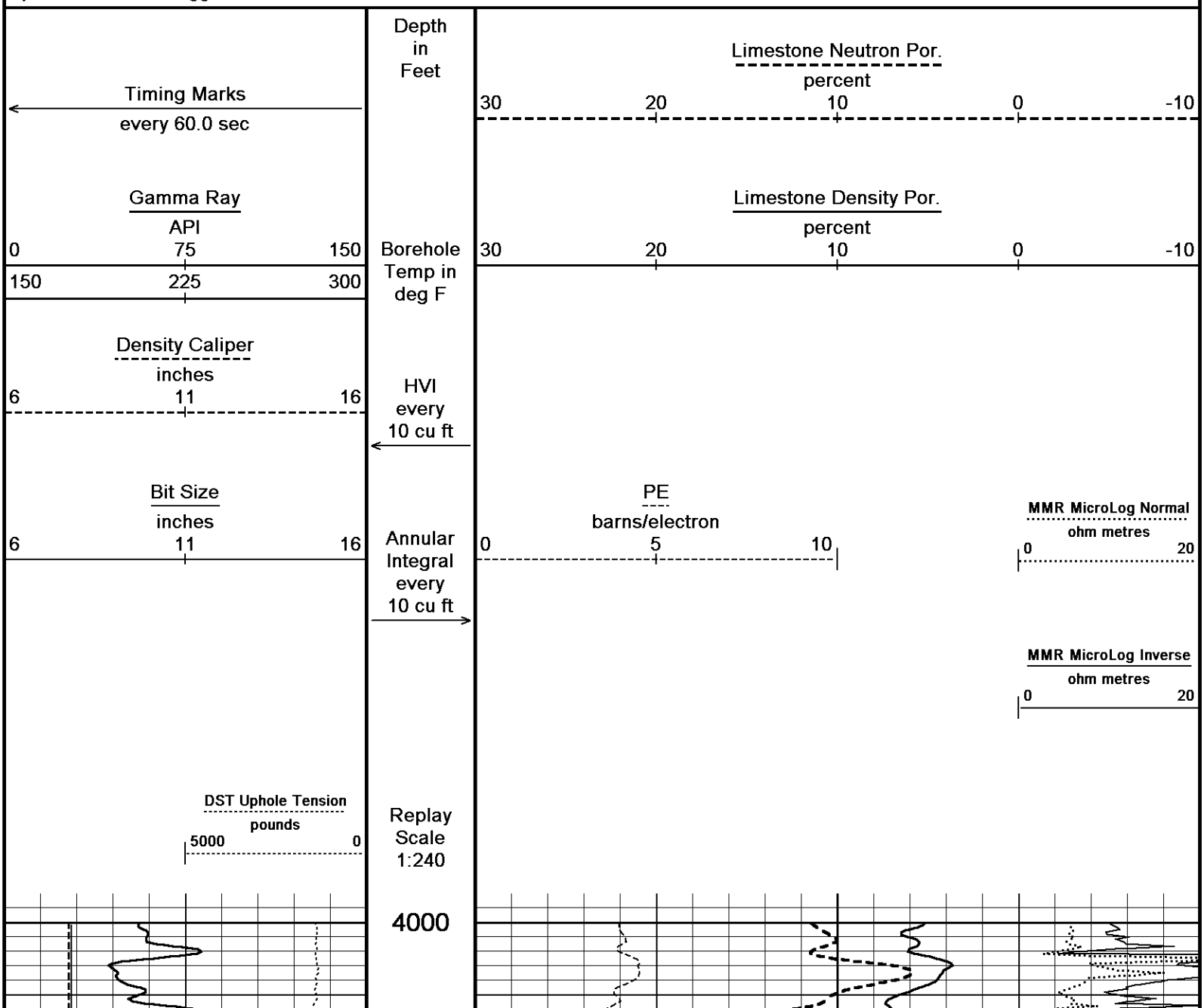
- OPERATOR: S. MENDEZ.

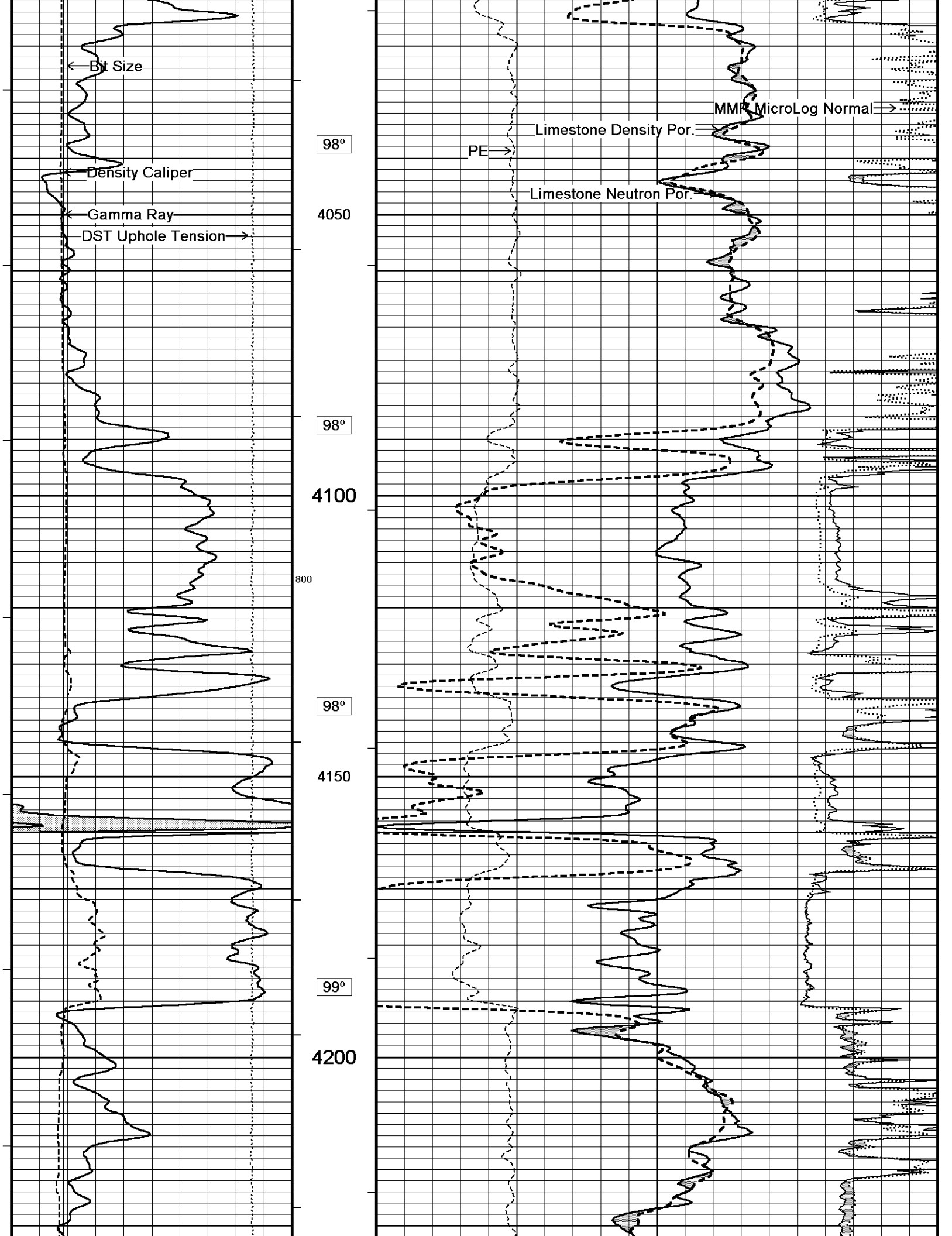
5 INCH MAIN

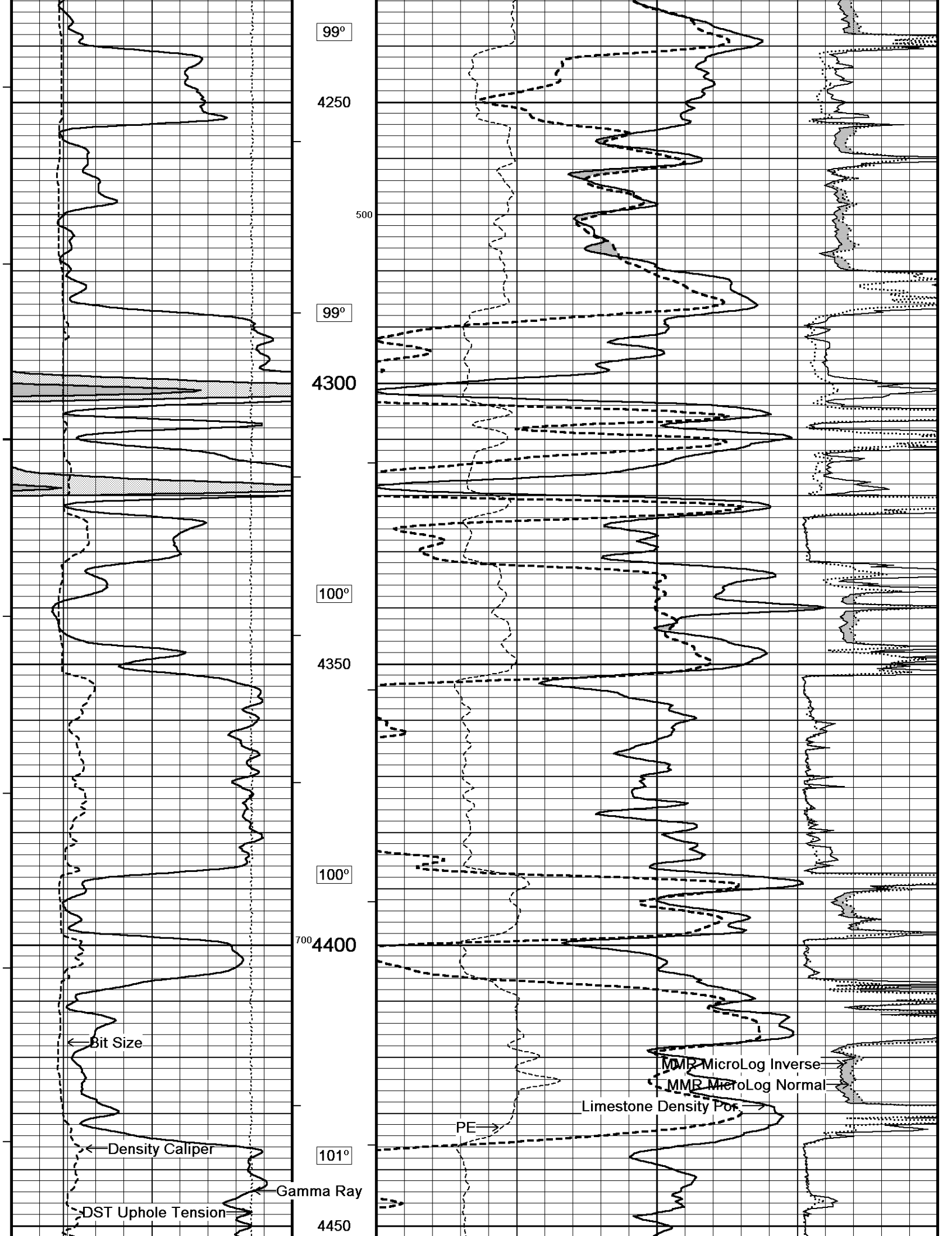
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 20-DEC-2015 03:05

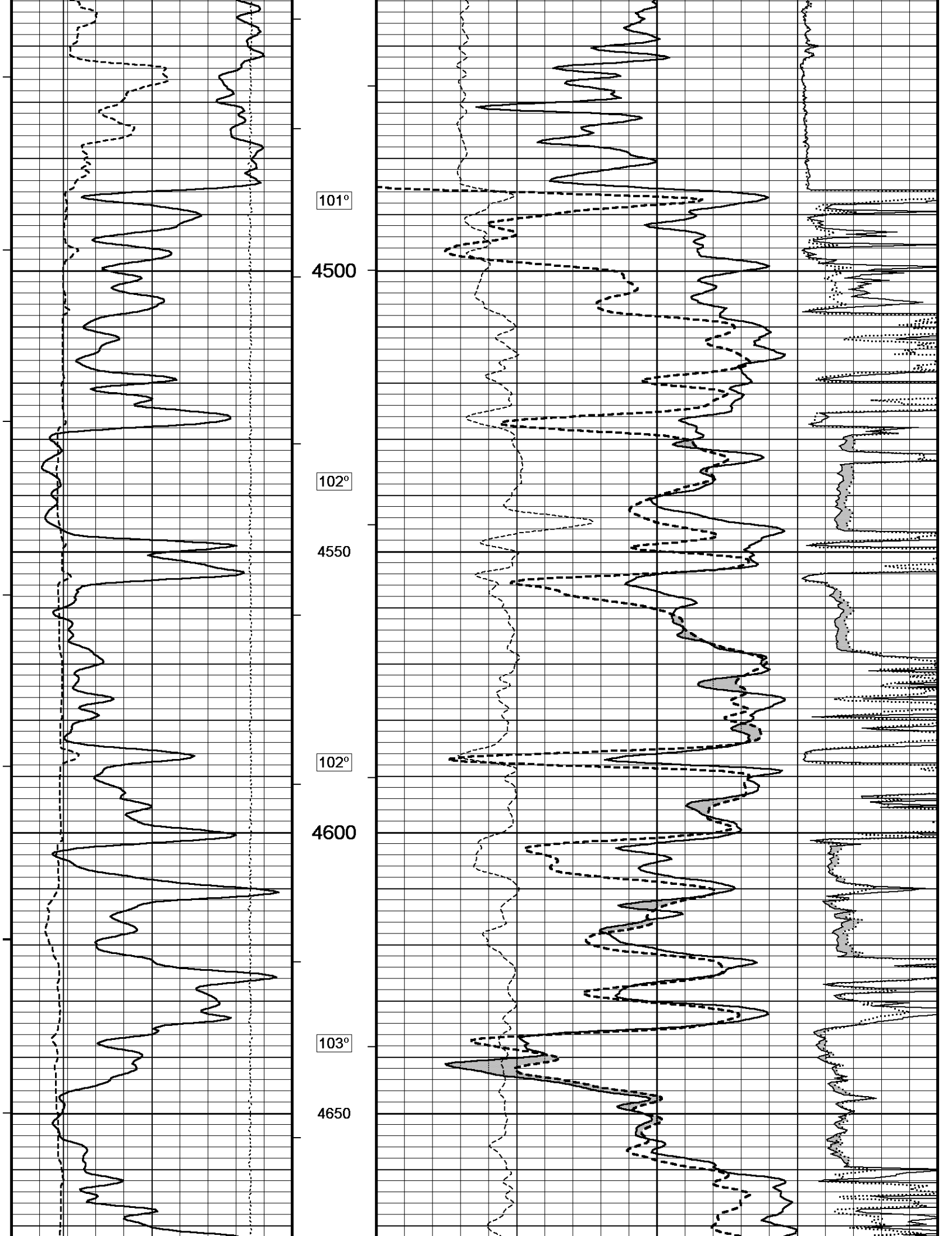
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Main.dta — Recorded on 19-DEC-2015 22:36

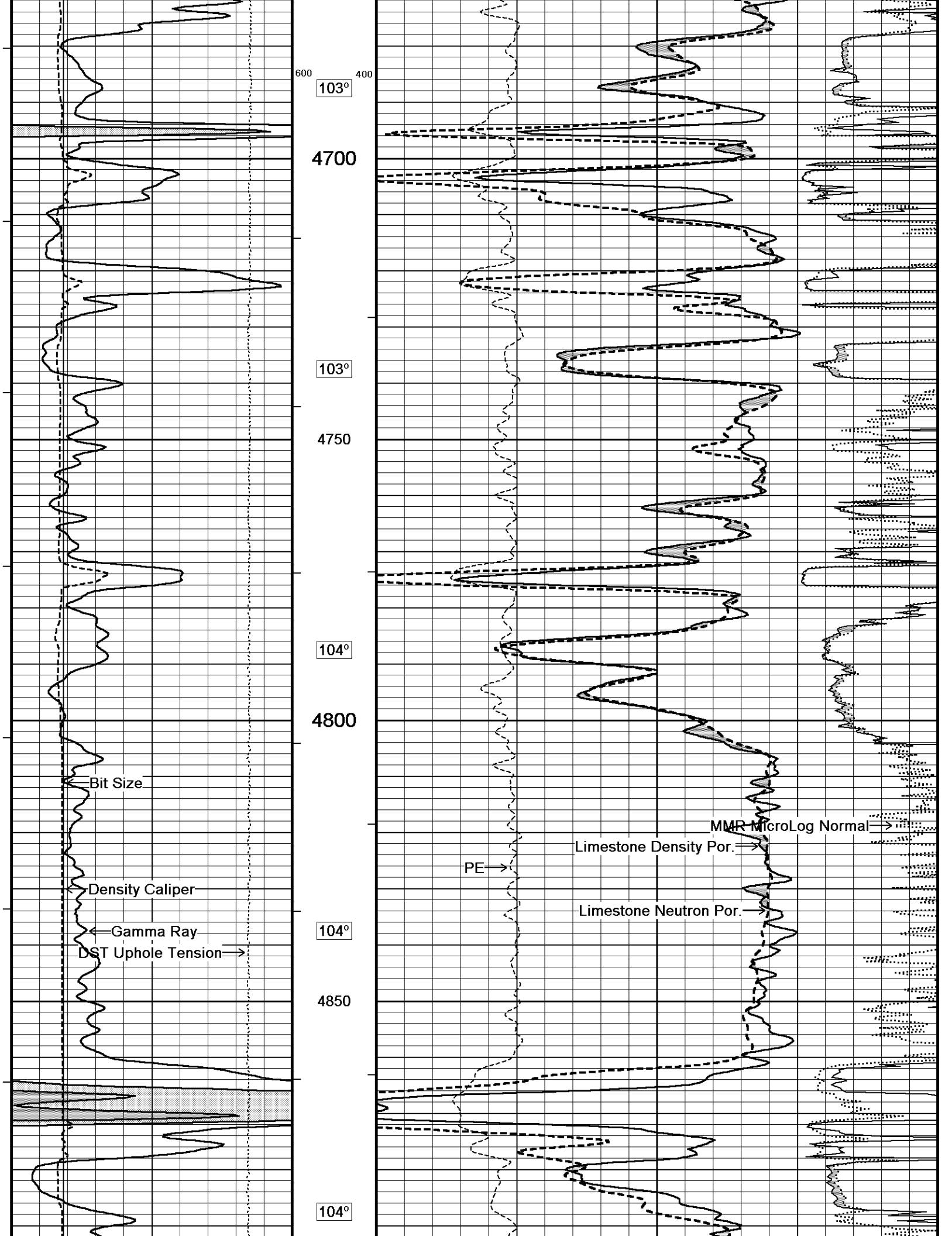
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

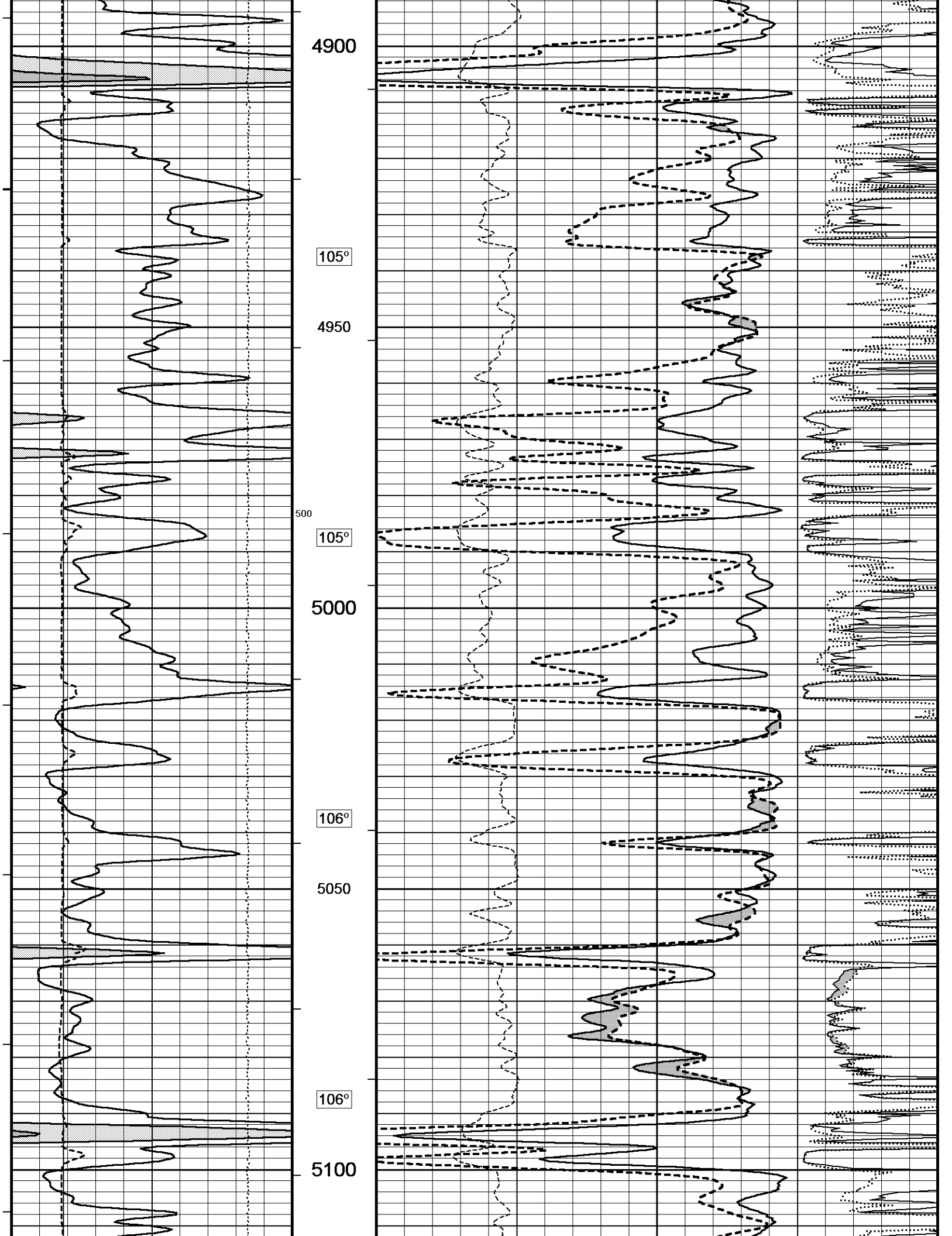


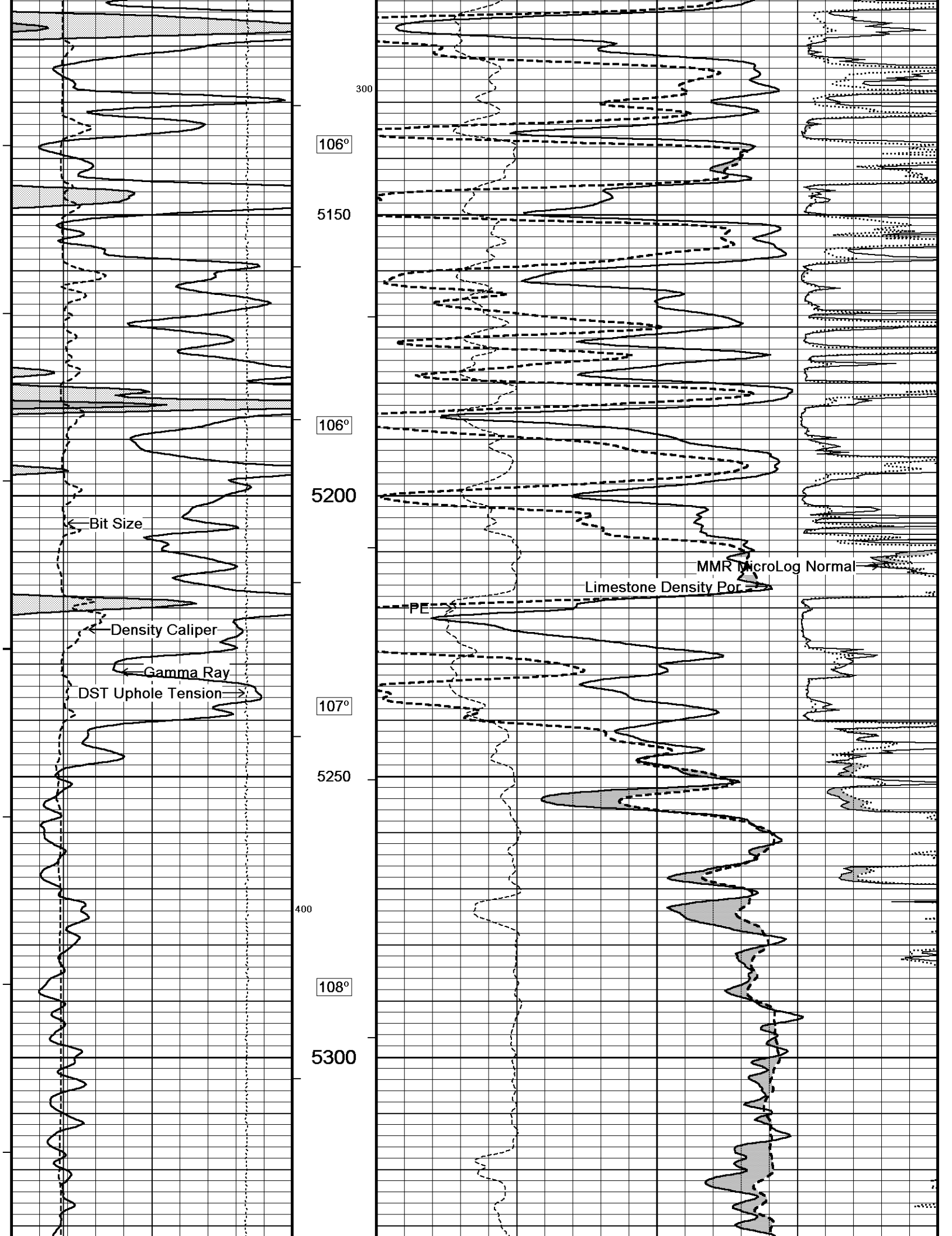

Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
98°
4050
98°
4100
800
98°
4150
99°
4200
PE
Limestone Density Por.
Limestone Neutron Por.
MMP MicroLog Normal

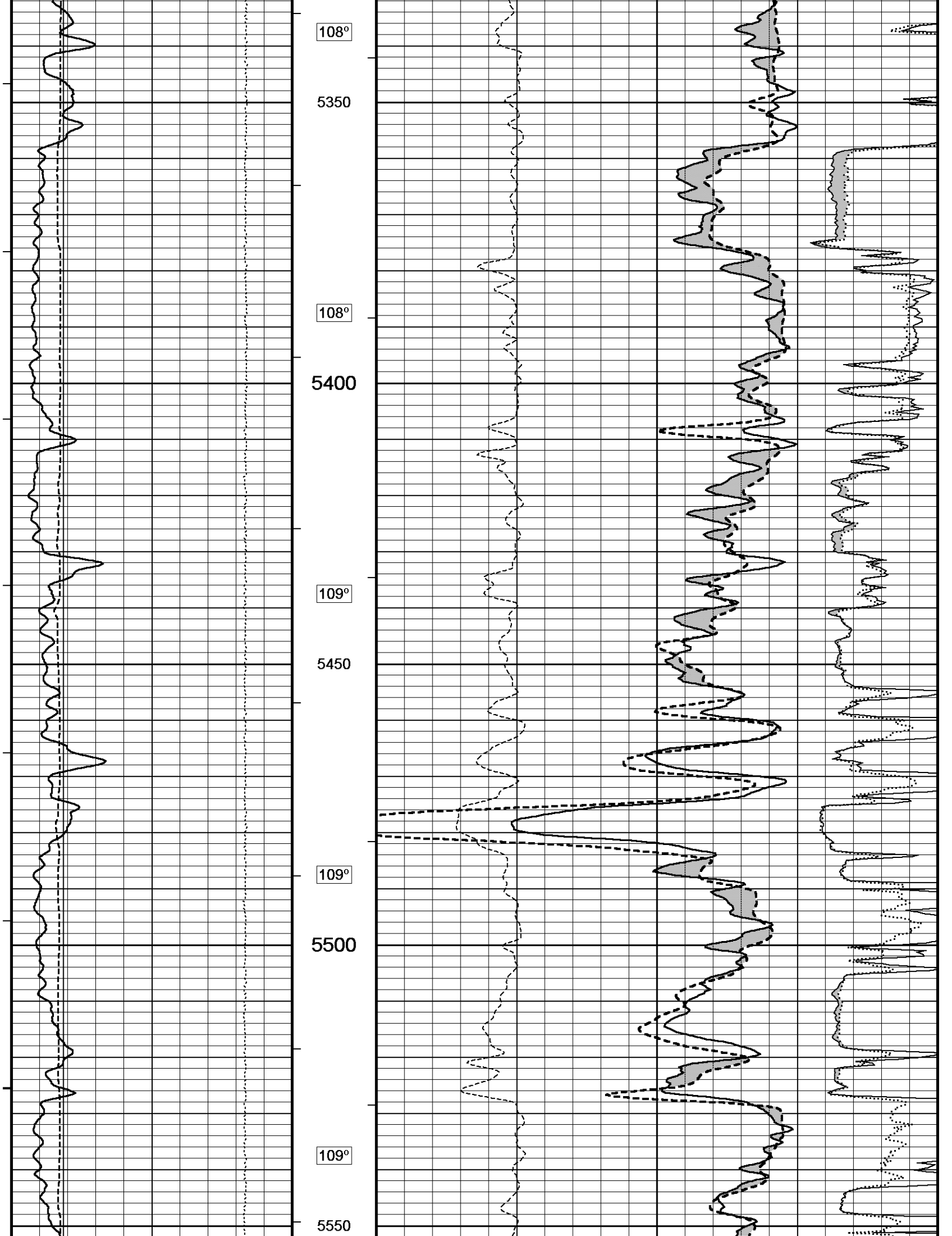

99°
4250
500
99°
4300
100°
4350
100°
700
4400
101°
4450
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE

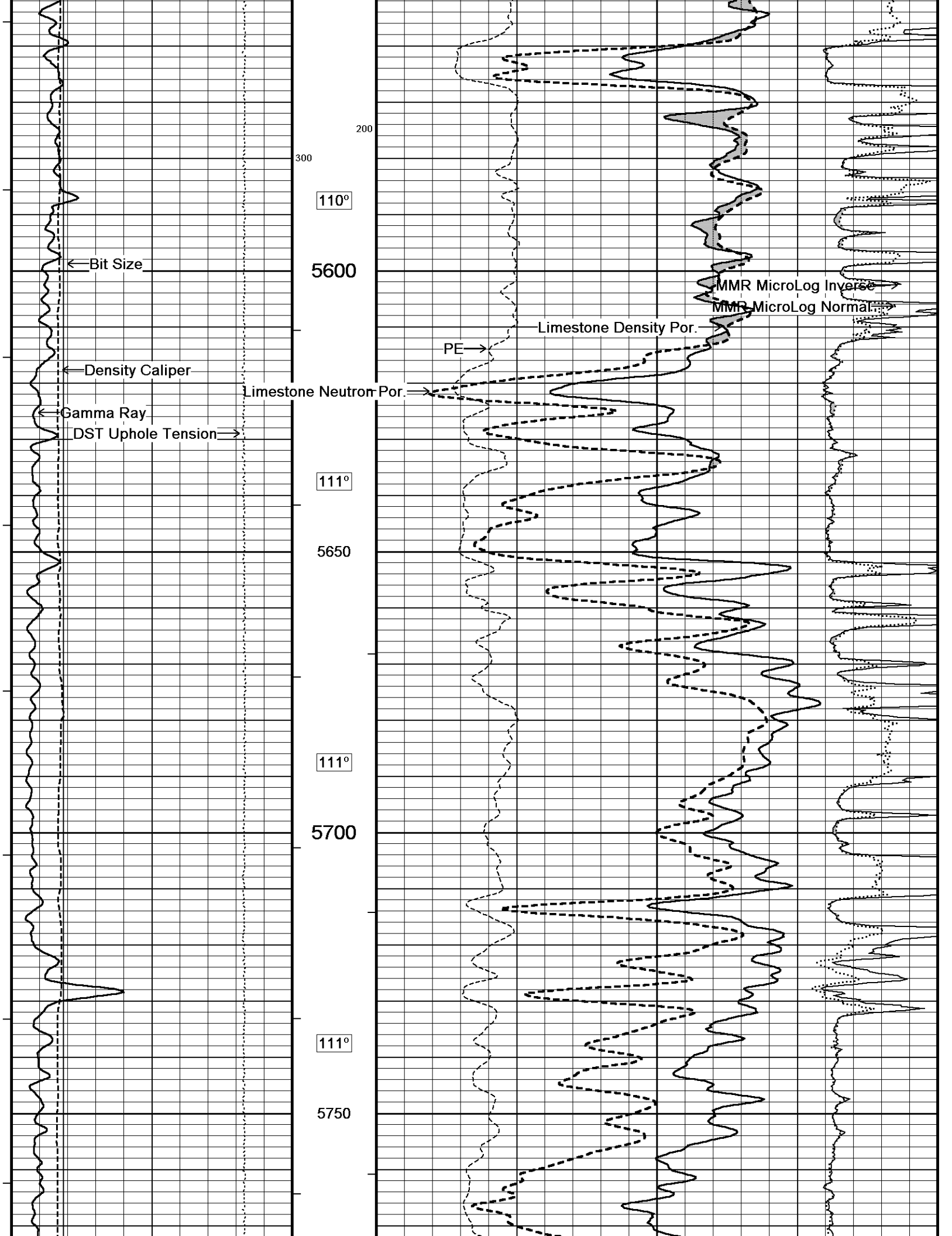

101°
4500
102°
4550
102°
4600
103°
4650

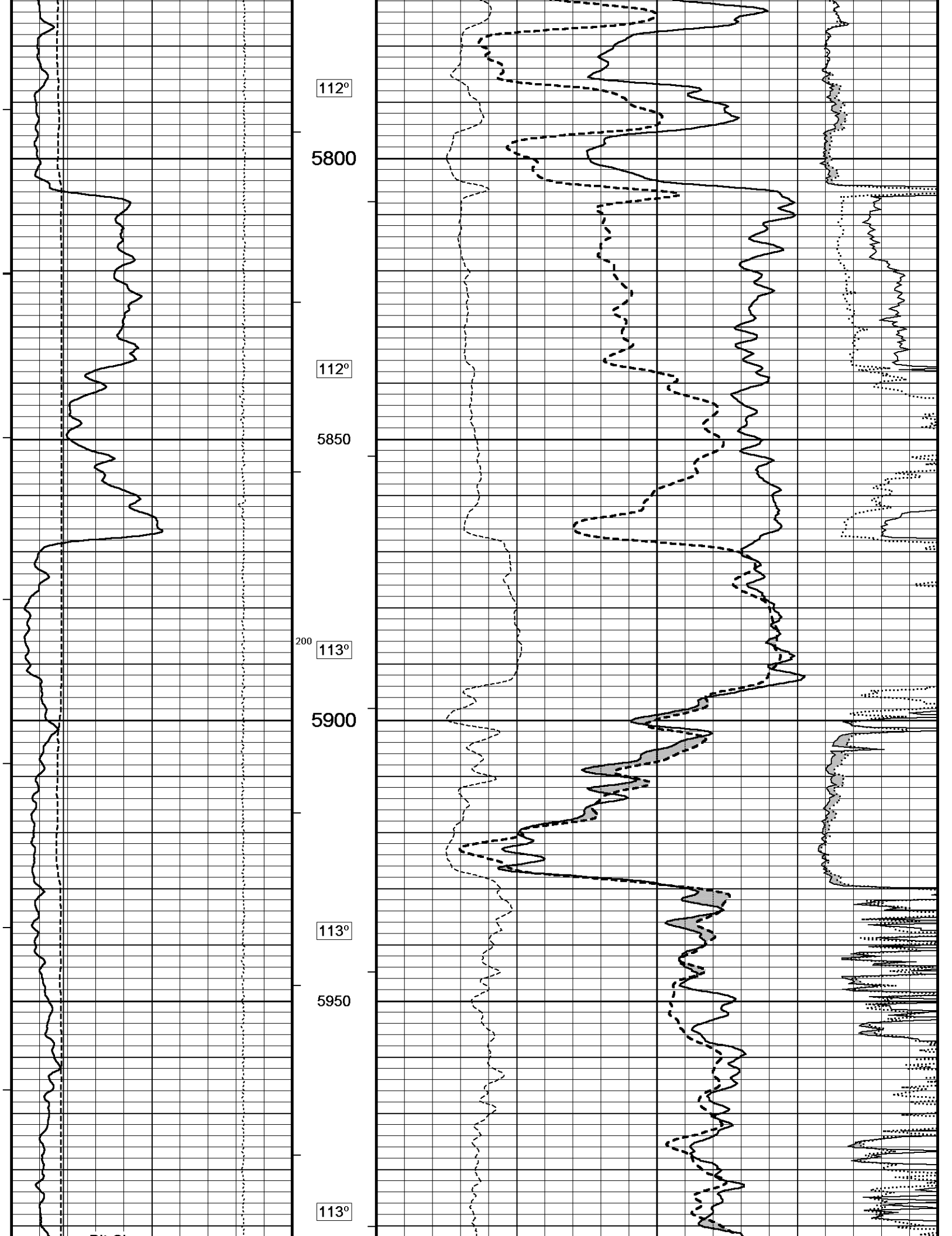

600
400
103°
4700
103°
4750
104°
4800
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
PE
Limestone Density Por.
MMR MicroLog Normal
Limestone Neutron Por.
104°
4850
104°

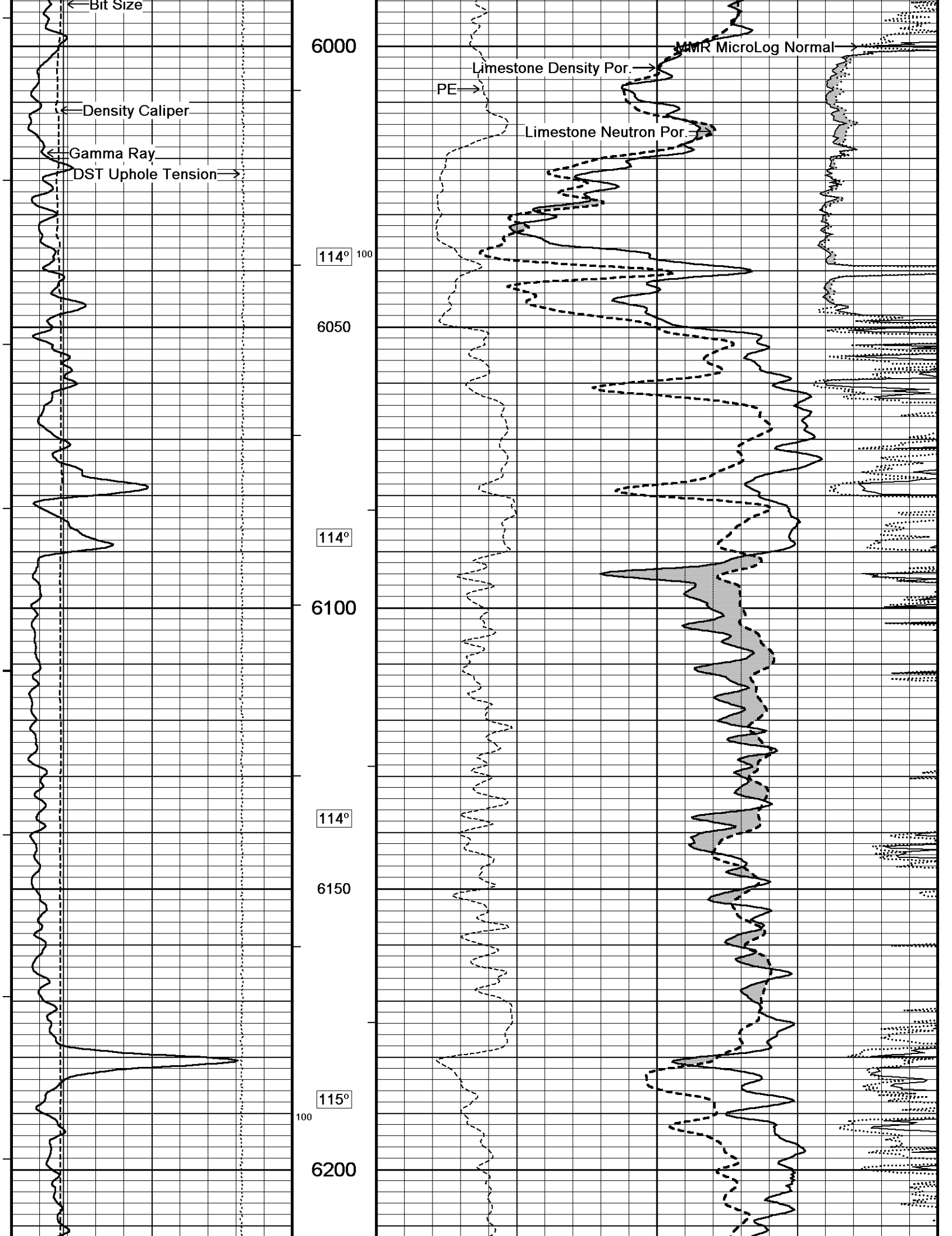

4900
105°
4950
500
105°
5000
106°
5050
106°
5100

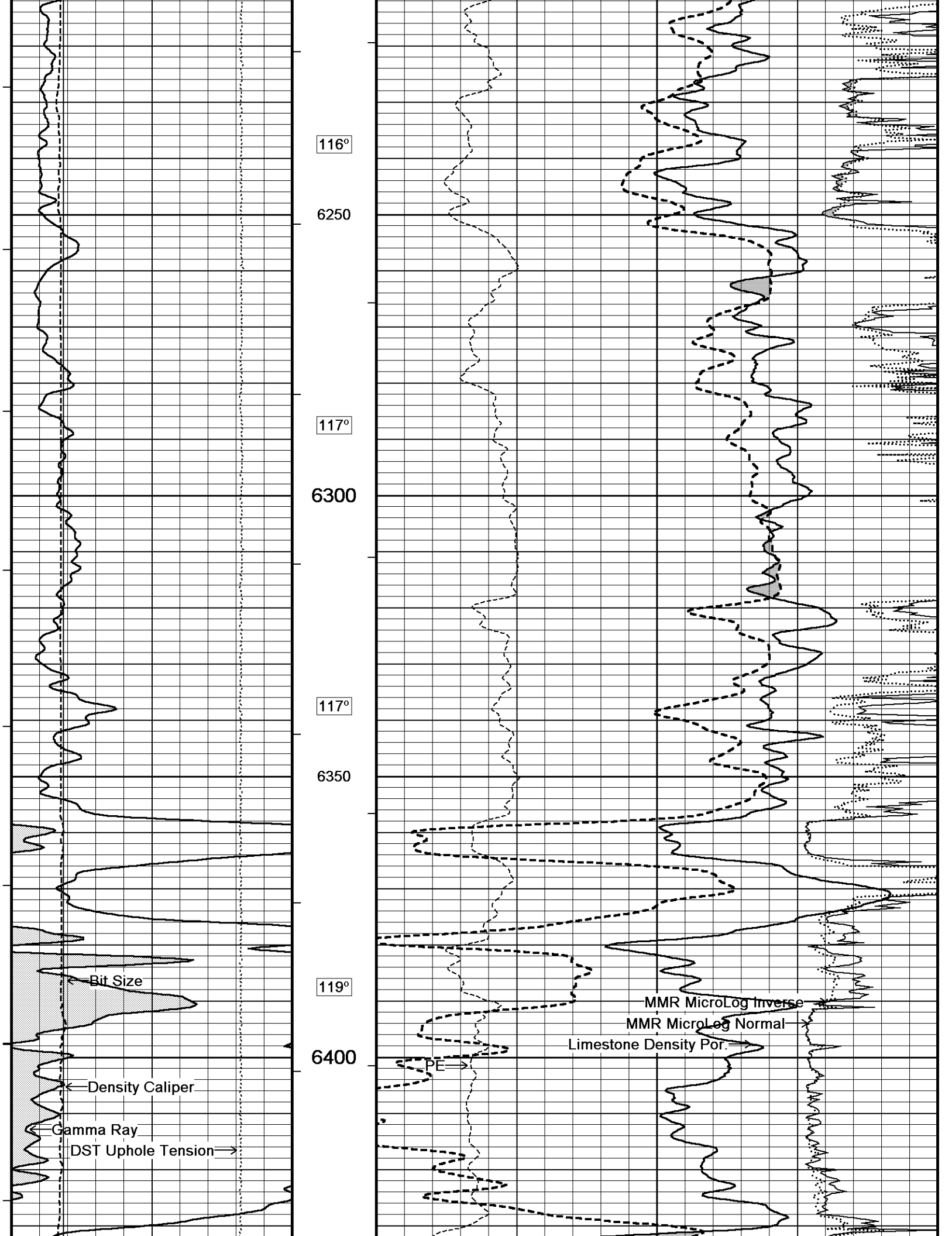

300
106°
5150
106°
5200
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Normal
Limestone Density Por
PE
107°
5250
400
108°
5300

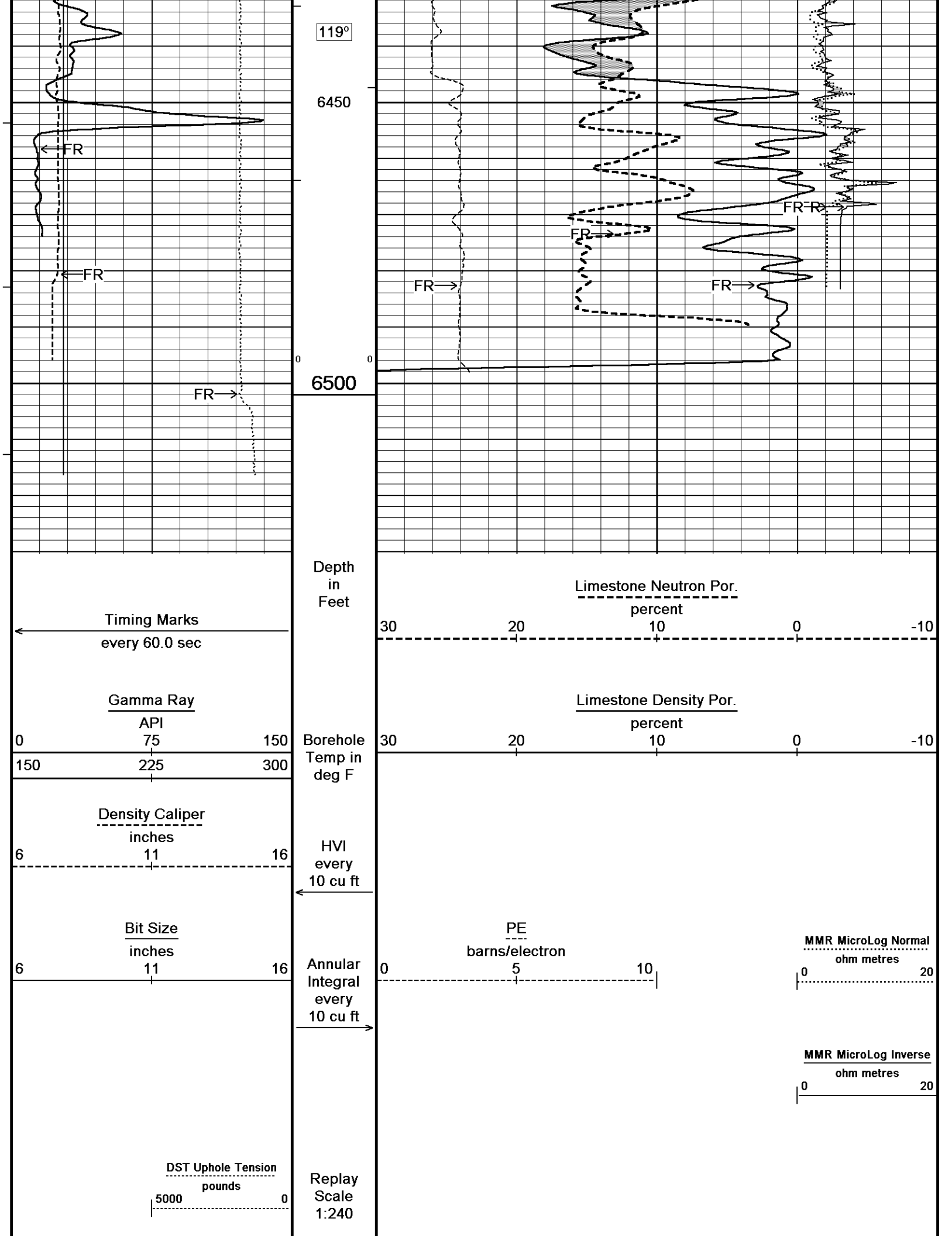

108°
5350
108°
5400
109°
5450
109°
5500
109°
5550


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
300
110°
5600
111°
5650
111°
5700
111°
5750
200
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.


112°
5800
112°
5850
200
113°
5900
113°
5950
113°


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
6000
114°
100
6050
114°
6100
114°
6150
115°
100
6200
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.


116°
6250
117°
6300
117°
6350
119°
6400
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
PE
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.

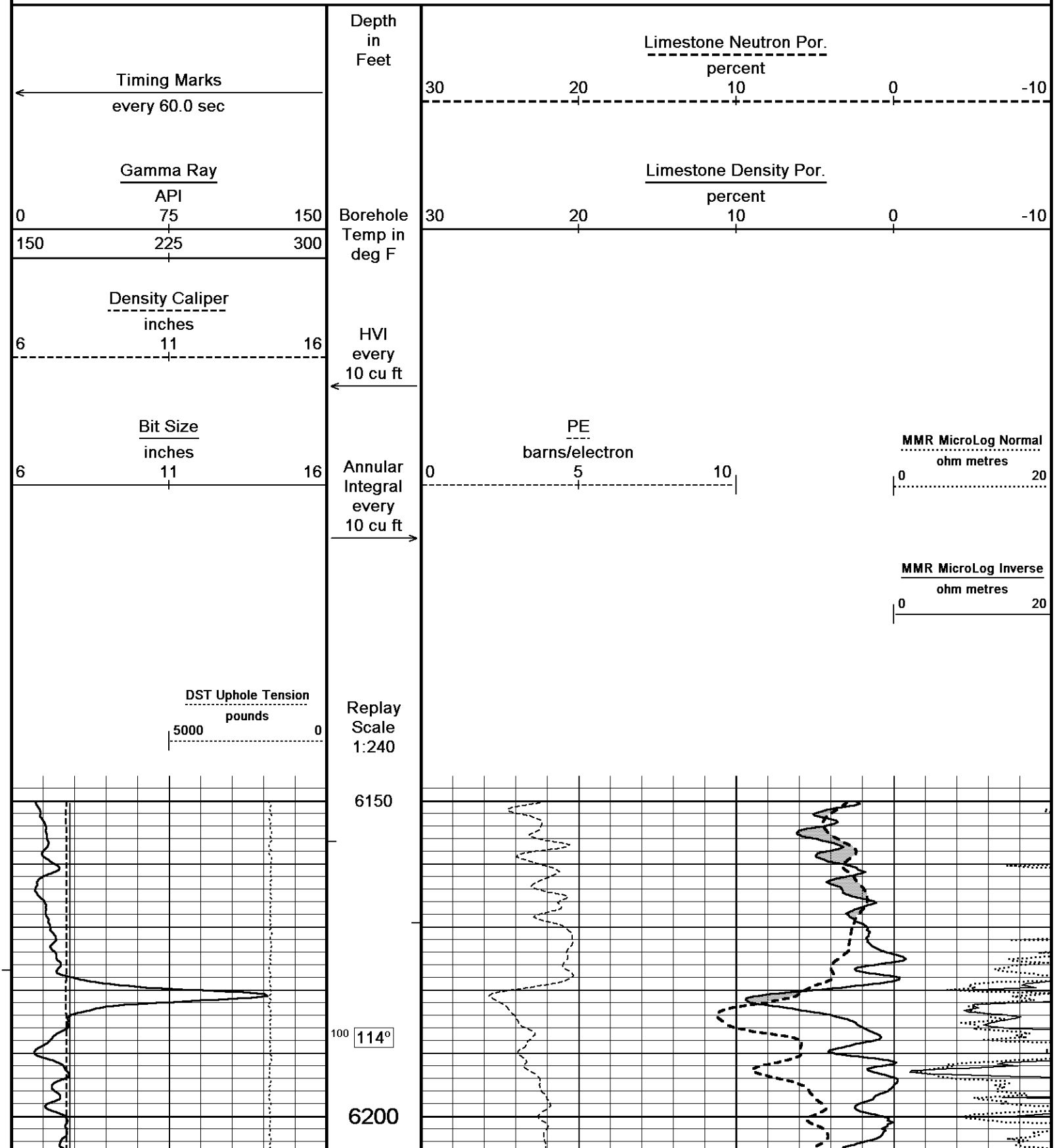

119°
6450
6500
FR
FR
FR
FR
FR
FR
FR
0
0
Depth
in
Feet
Timing Marks
every 60.0 sec
Limestone Neutron Por.
percent
30
20
10
0
-10
Gamma Ray
API
0
75
150
Limestone Density Por.
percent
30
20
10
0
-10
Borehole
Temp in
deg F
150
225
300
Density Caliper
inches
6
11
16
HVI
every
10 cu ft
Bit Size
inches
6
11
16
PE
barns/electron
0
5
10
MMR MicroLog Normal
ohm metres
0
20
Annular
Integral
every
10 cu ft
MMR MicroLog Inverse
ohm metres
0
20
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240

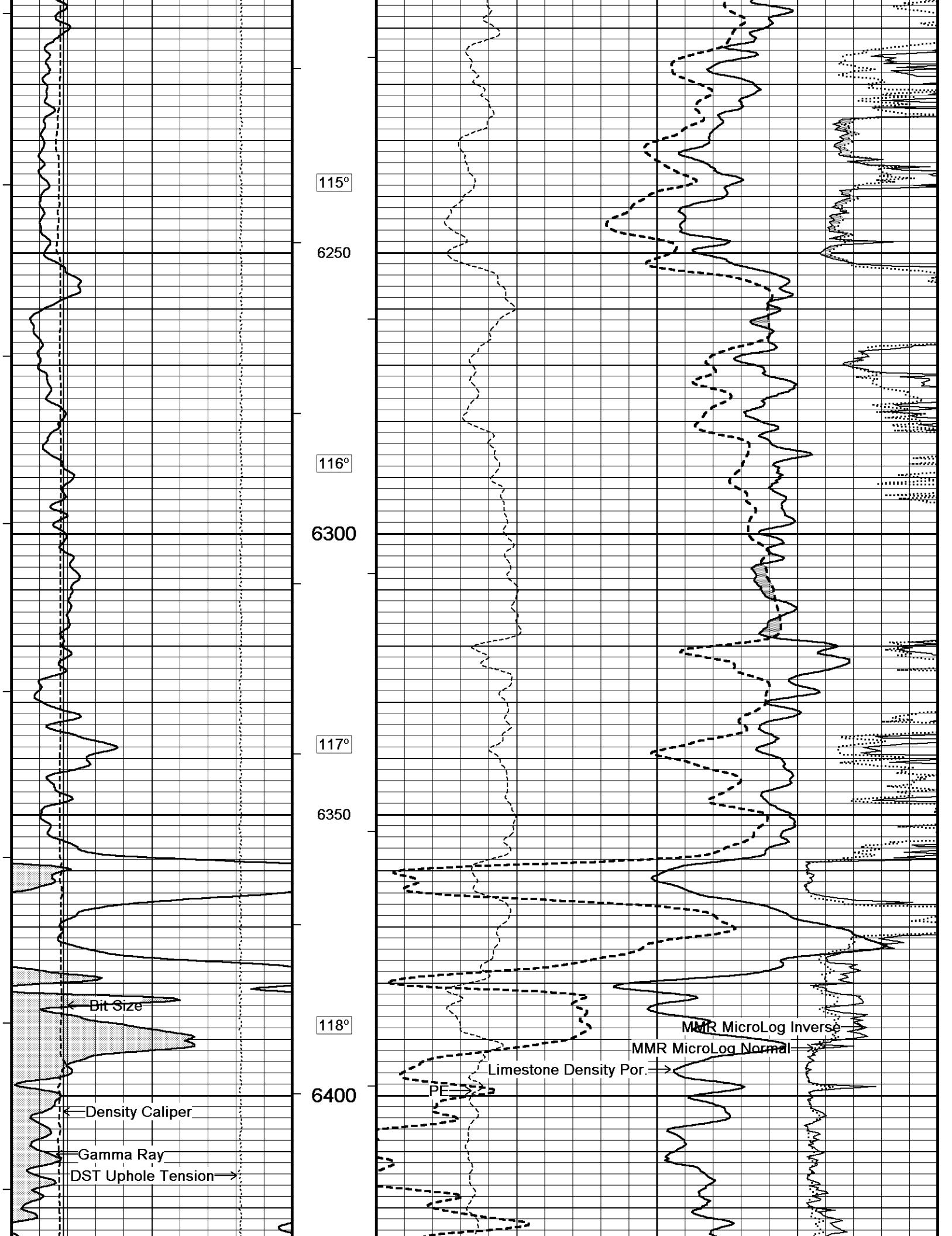
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Main.dta
Recorded on 19-DEC-2015 22:36
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

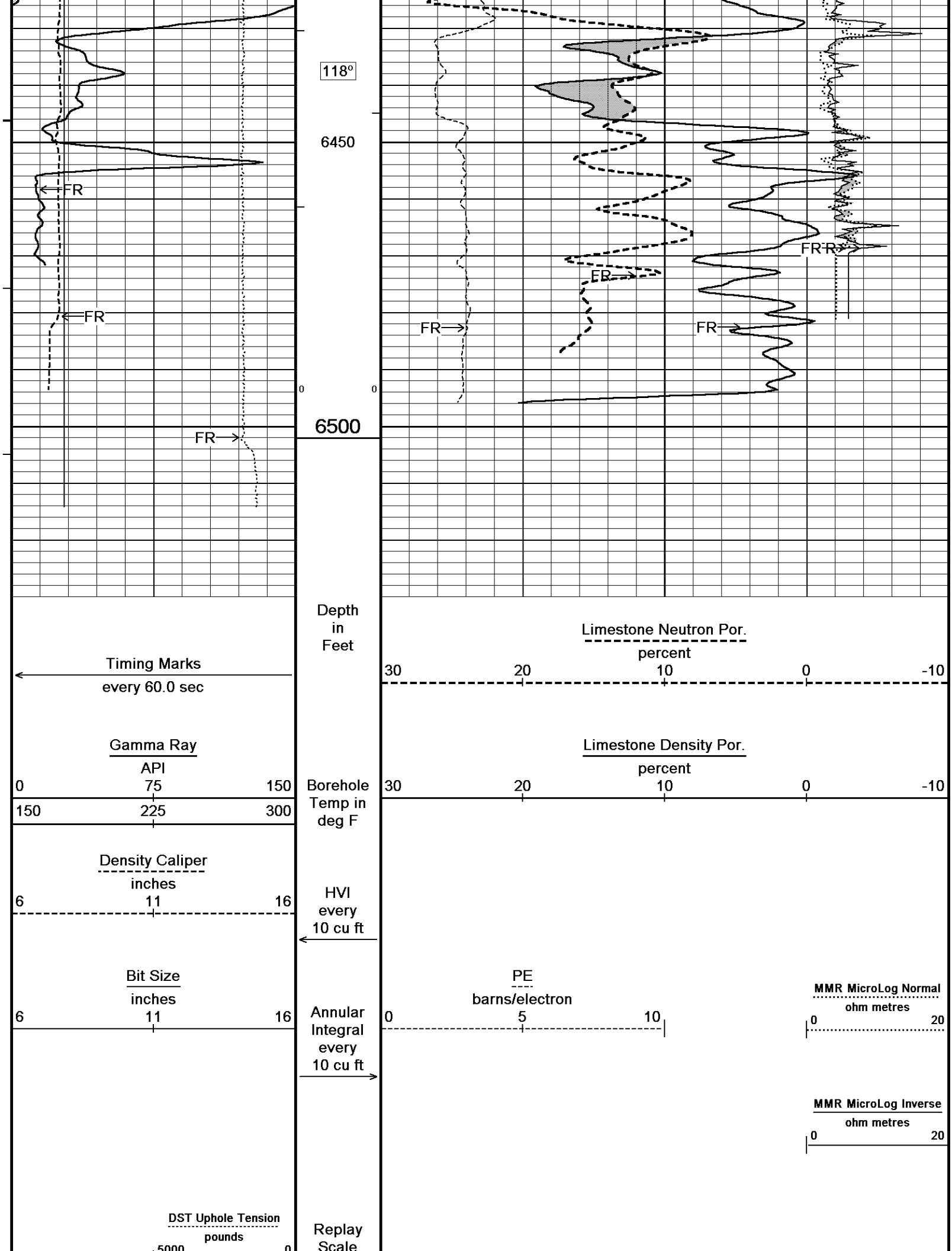
5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta
Recorded on 19-DEC-2015 22:13
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




115°
6250
116°
6300
117°
6350
118°
6400
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE


118°
6450
6500
FR
FR
FR
FR
FR
FR
FR
0
0
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
150
225
300
Borehole
Temp in
deg F
Density Caliper
inches
6
11
16
HVI
every
10 cu ft
Bit Size
inches
6
11
16
PE
barns/electron
0
5
10
MMR MicroLog Normal
ohm metres
0
20
Annular
Integral
every
10 cu ft
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
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

Plotted on 20-DEC-2015 03:05
Recorded on 19-DEC-2015 22:13

REPEAT SECTION

10 INCH HIGH RESOLUTION UPPER SECTION

Depth Based Data - Maximum Sampling Increment 2.5cm
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Upper.dta
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

Plotted on 20-DEC-2015 03:05
Recorded on 19-DEC-2015 21:11

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

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Limestone Neutron Por.
percent
30 20 10 0 -10

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

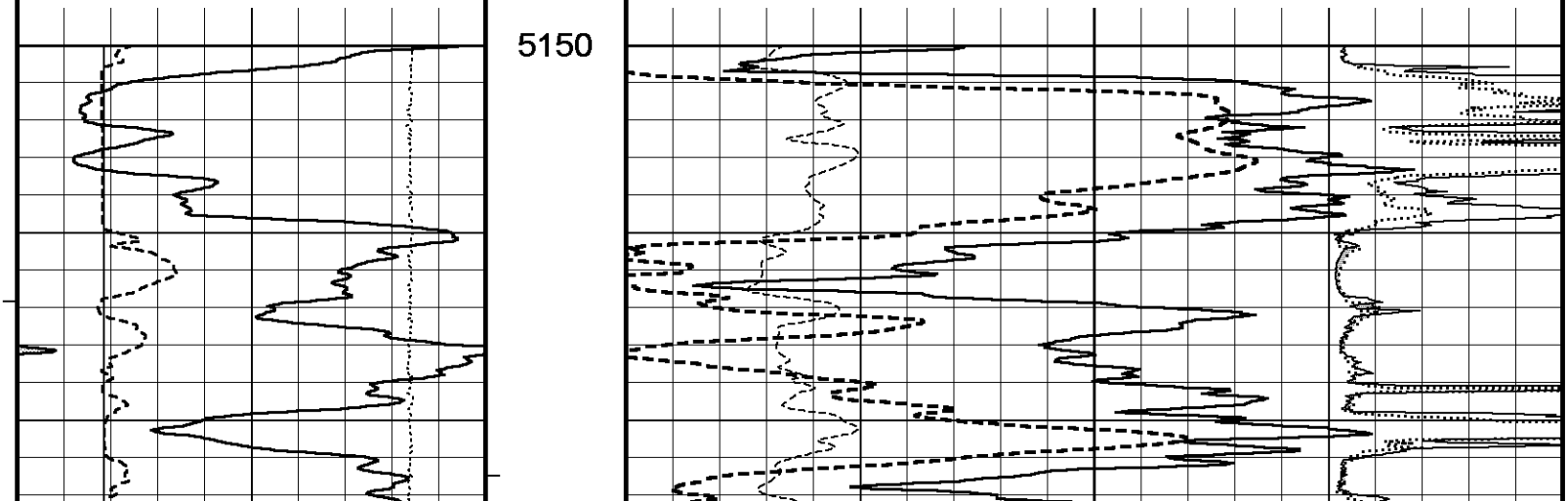
MMR MicroLog Normal
ohm metres
0 20

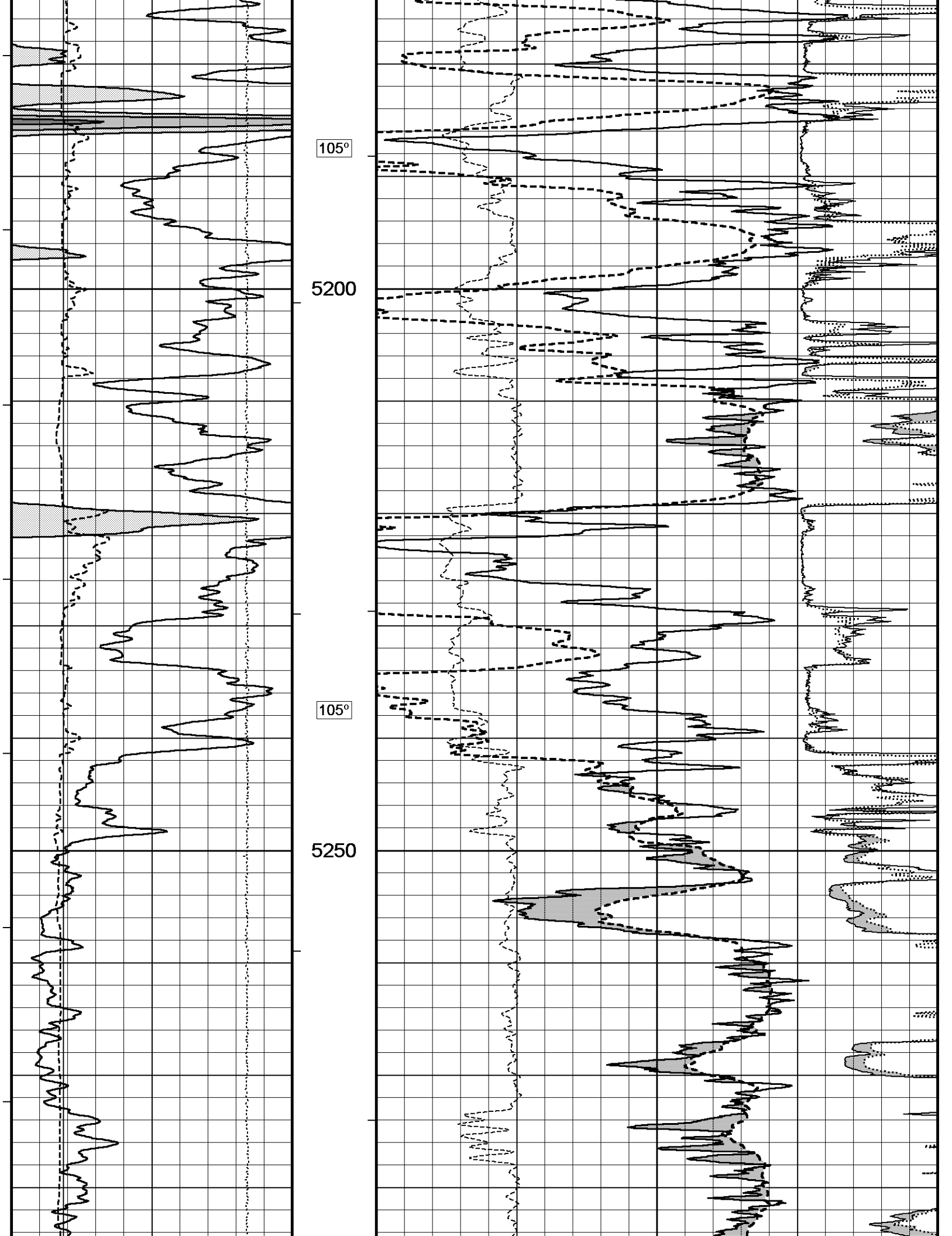
MMR MicroLog Inverse
ohm metres
0 20

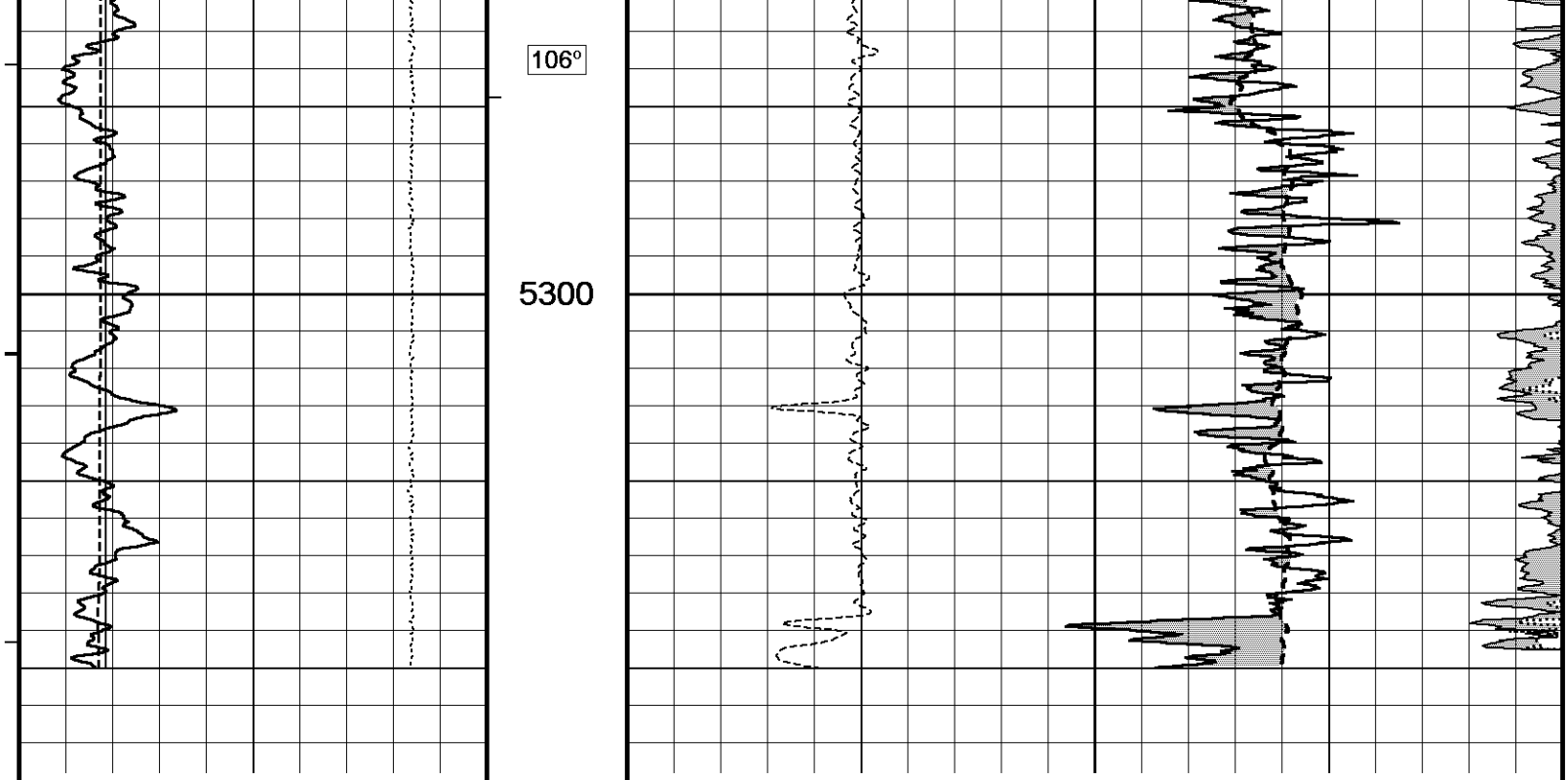
DST Uphole Tension
pounds
5000 0

Replay Scale 1:120

5150




105°
5200
105°
5250



Depth in Feet

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

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:120

Limestone Neutron Por.
percent
30 20 10 0 -10

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

MMR MicroLog Normal
ohm metres
0 20

MMR MicroLog Inverse
ohm metres
0 20

Depth Based Data - Maximum Sampling Increment 2.5cm
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Upper.dta
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

Plotted on 20-DEC-2015 03:05
Recorded on 19-DEC-2015 21:11

10 INCH HIGH RESOLUTION UPPER SECTION

10 INCH HIGH RESOLUTION LOWER SECTION

Depth Based Data - Maximum Sampling Increment 2.5cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Lower.dta
Recorded on 19-DEC-2015 21:43
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

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

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Limestone Neutron Por.
percent
30 20 10 0 -10

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

MMR MicroLog Normal
ohm metres
0 20

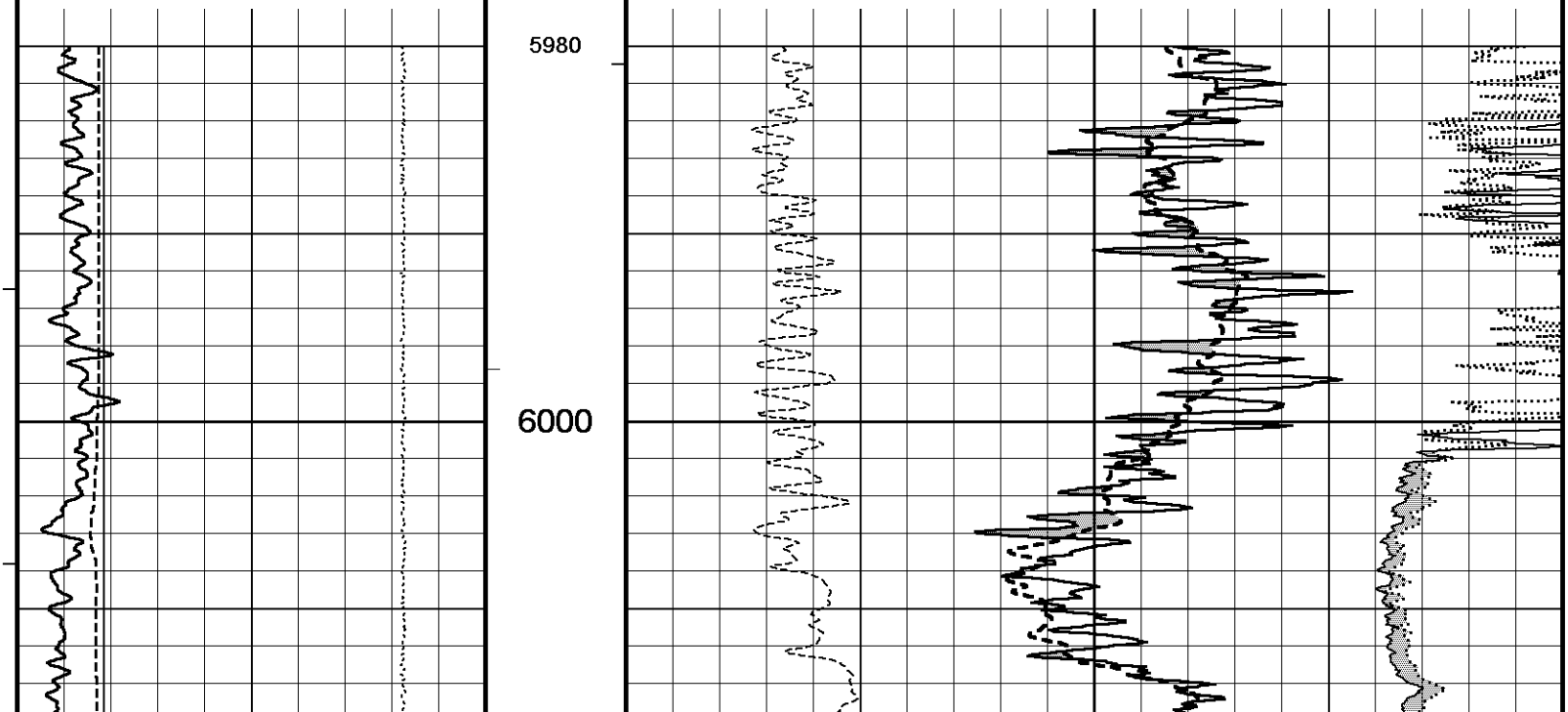
MMR MicroLog Inverse
ohm metres
0 20

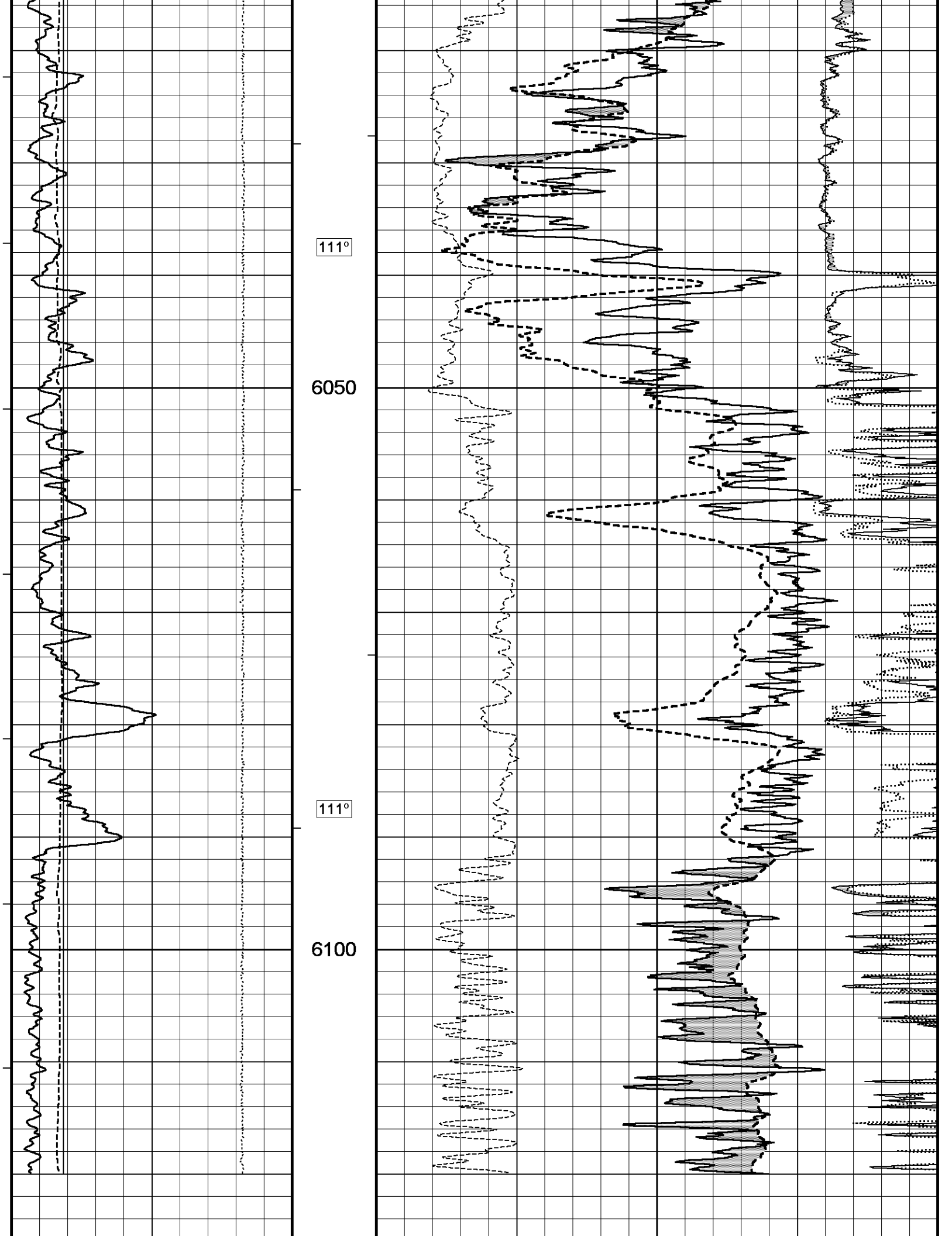
DST Uphole Tension
pounds
5000 0

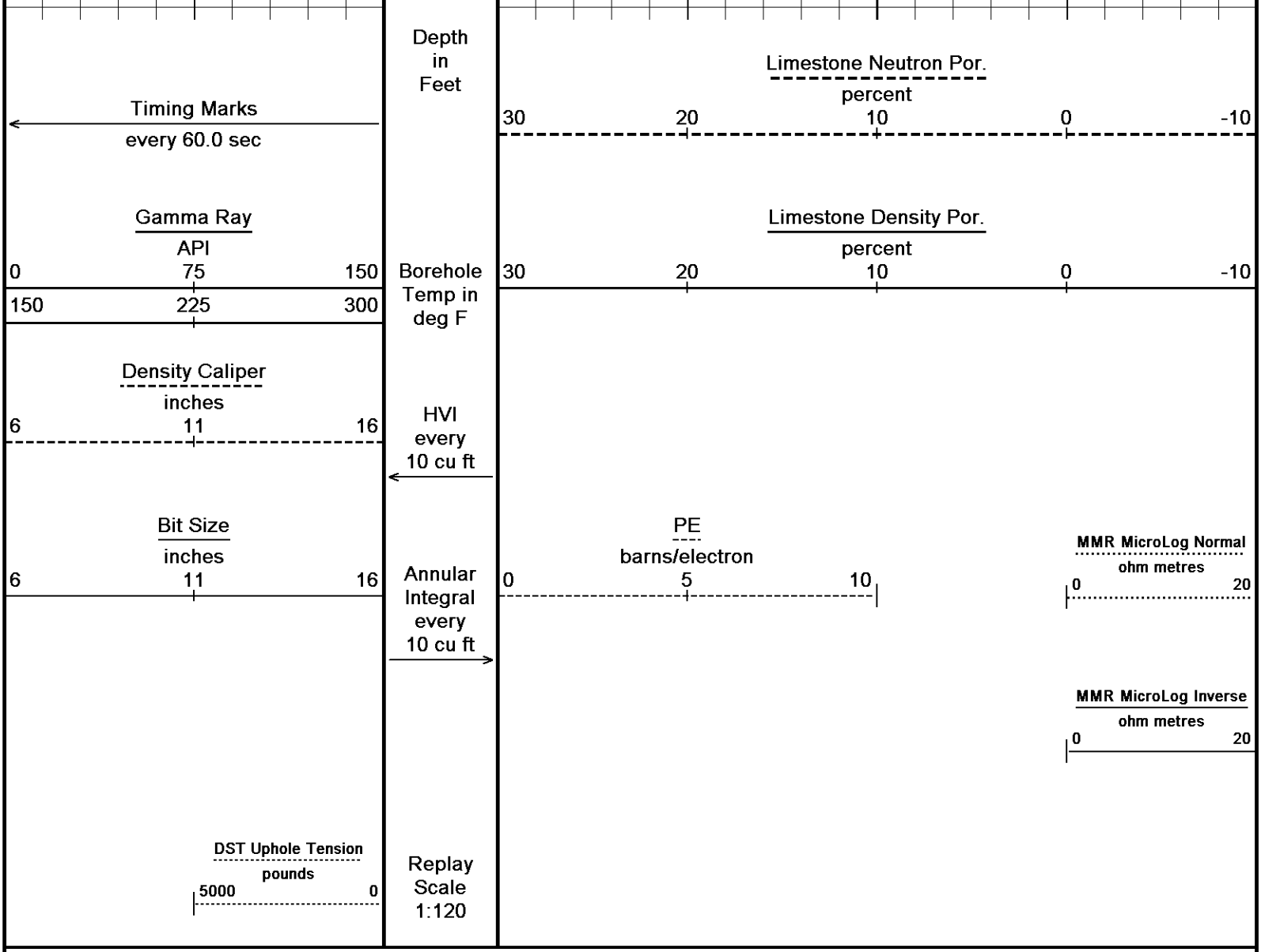
Replay Scale 1:120

5980

6000




111°
6050
111°
6100

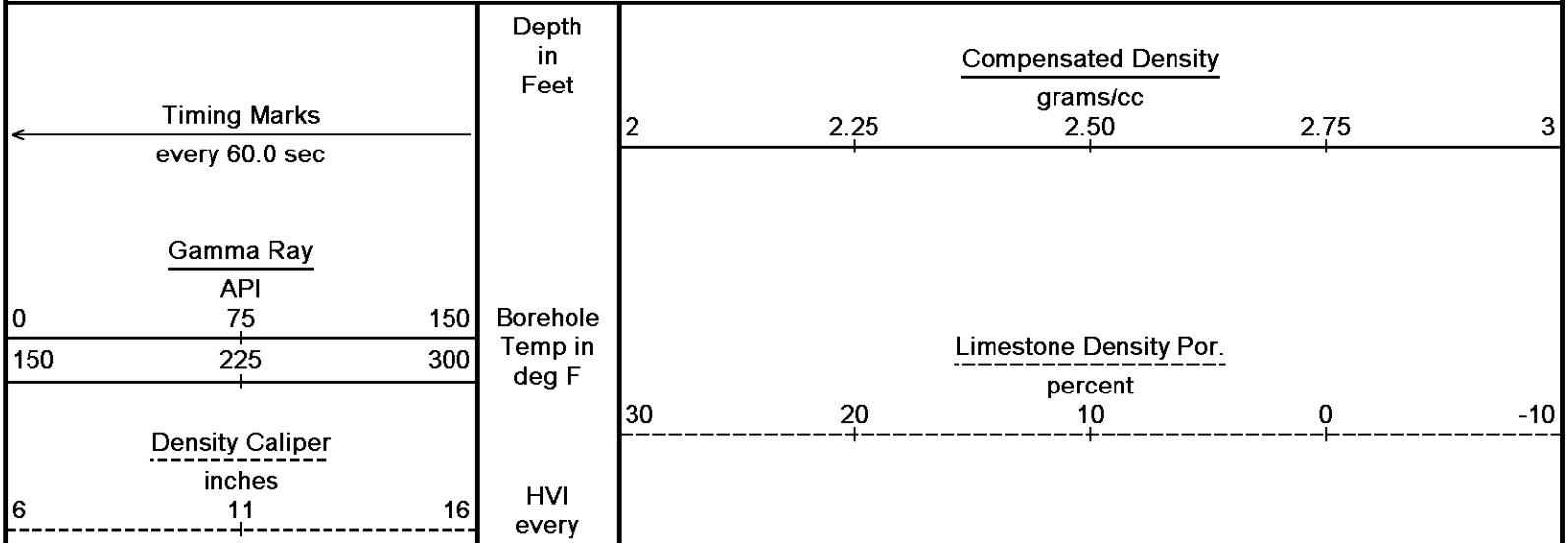


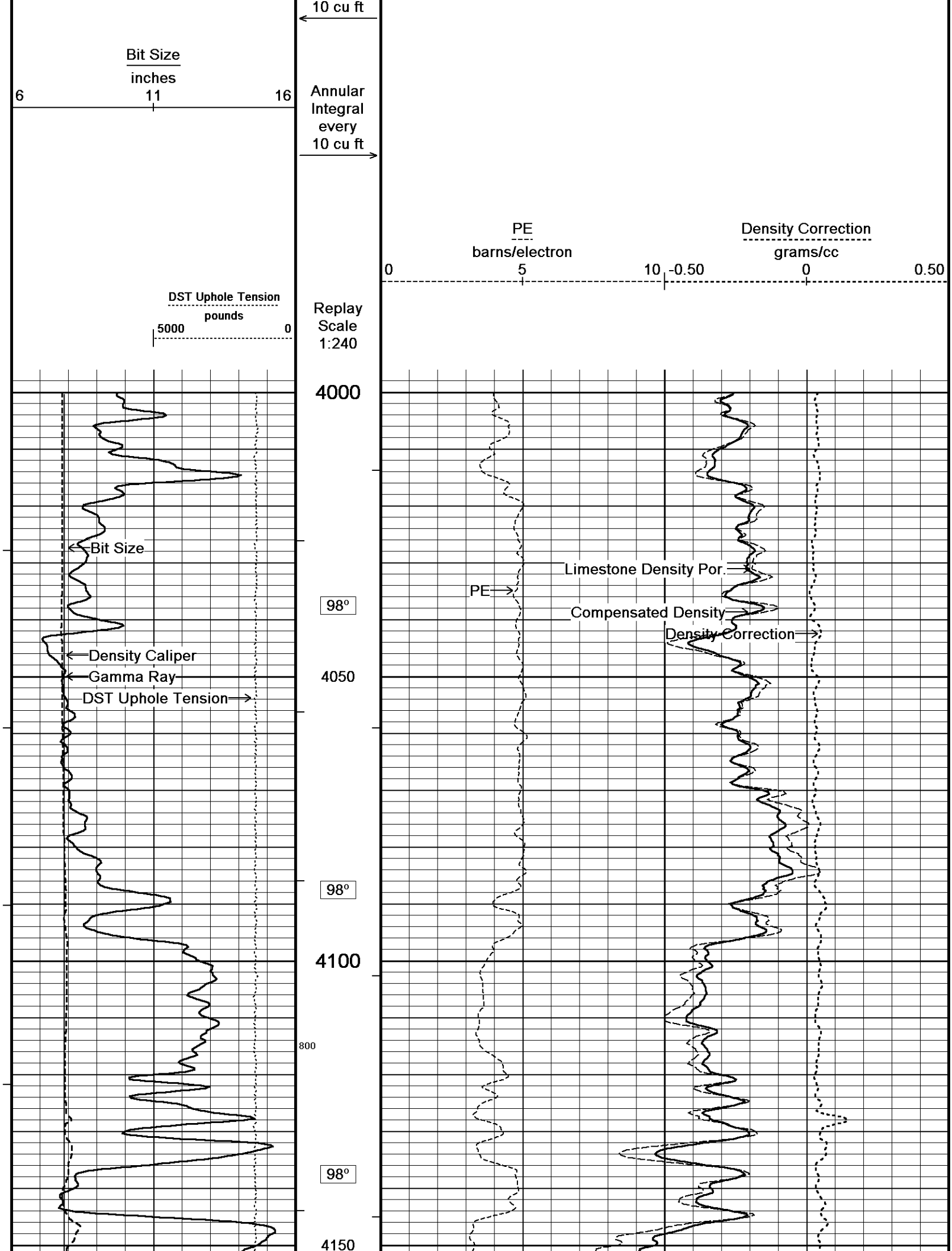
Depth Based Data - Maximum Sampling Increment 2.5cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Lower.dta
Recorded on 19-DEC-2015 21:43
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

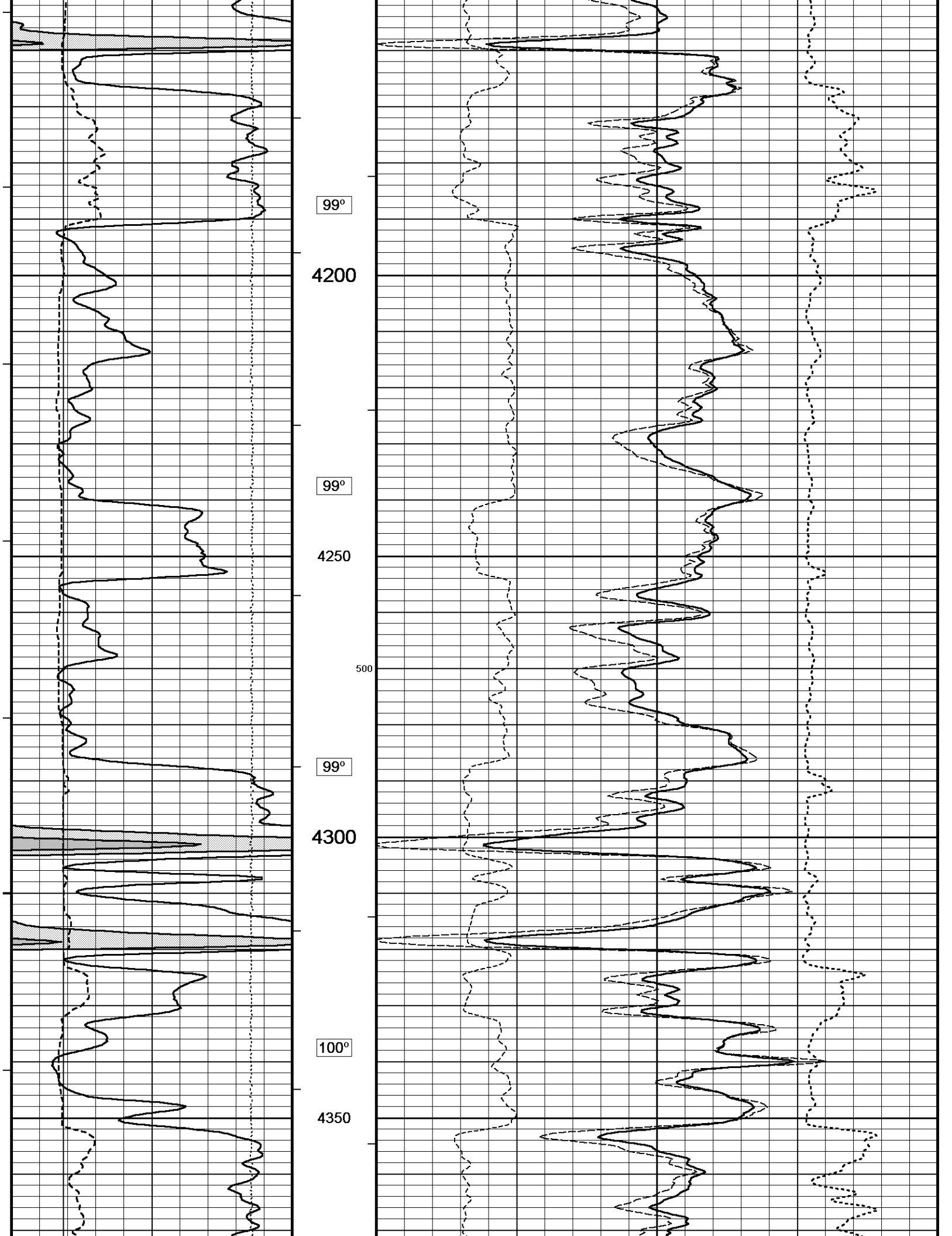
10 INCH HIGH RESOLUTION LOWER SECTION

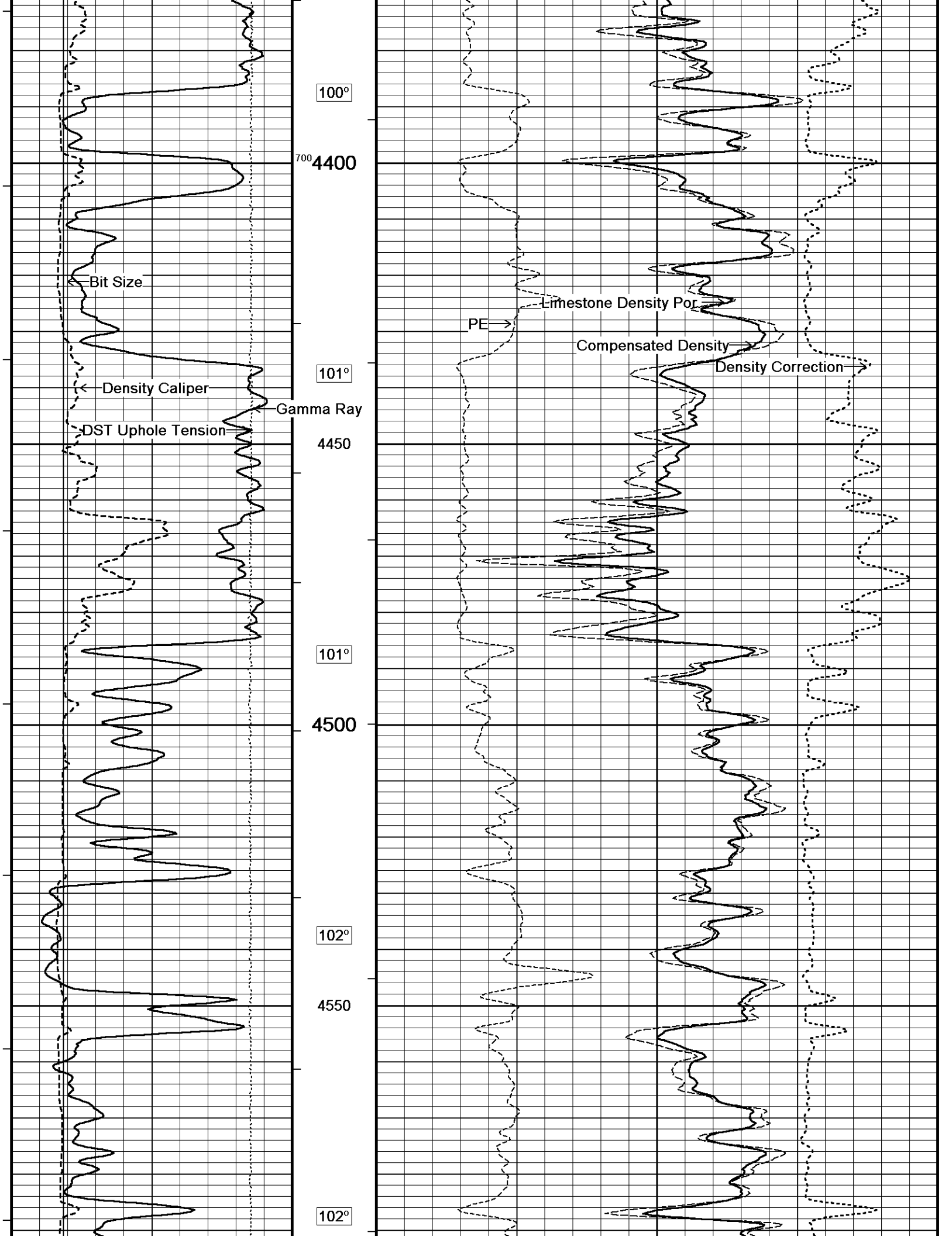
5 INCH MAIN

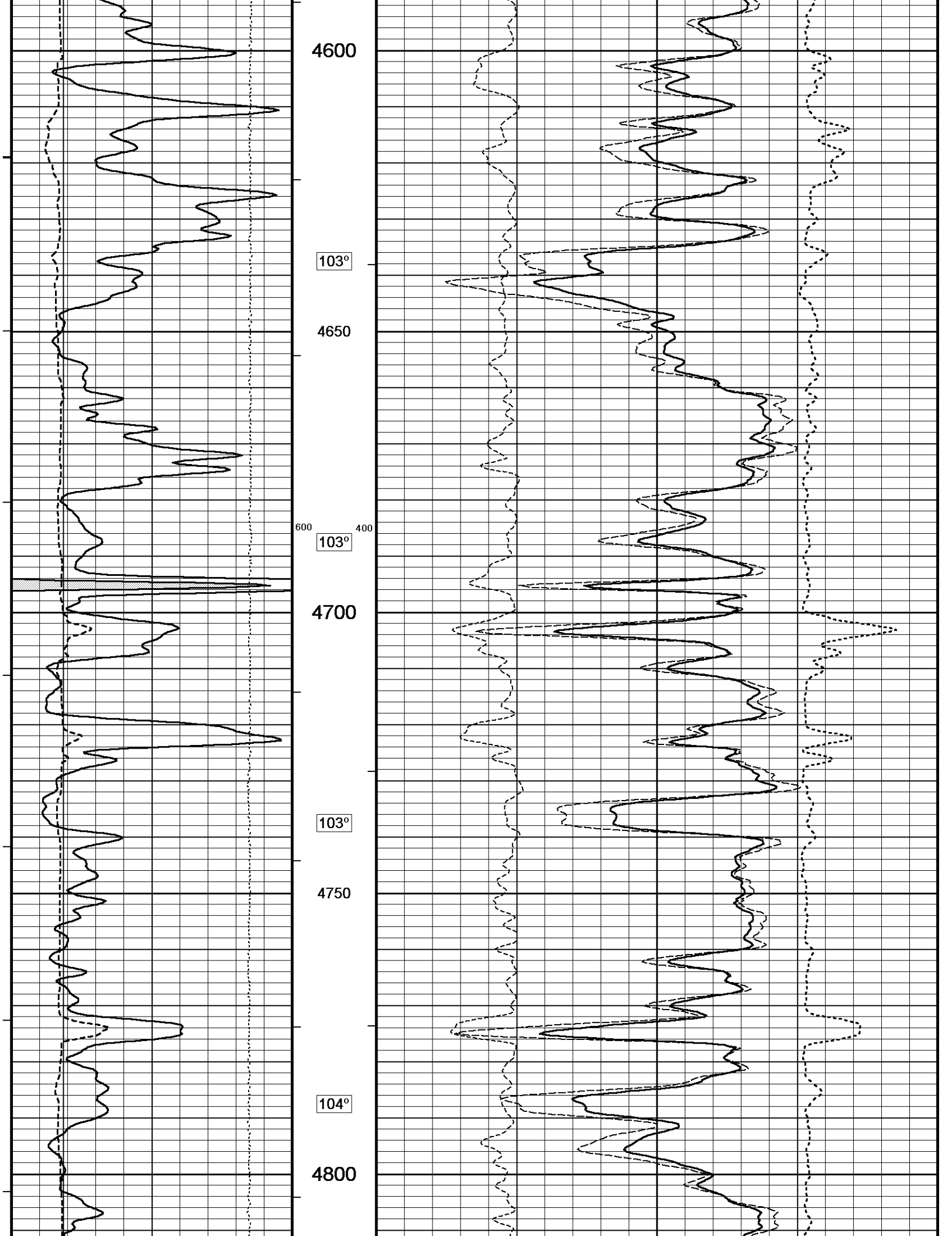
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Main.dta
Recorded on 19-DEC-2015 22:36
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

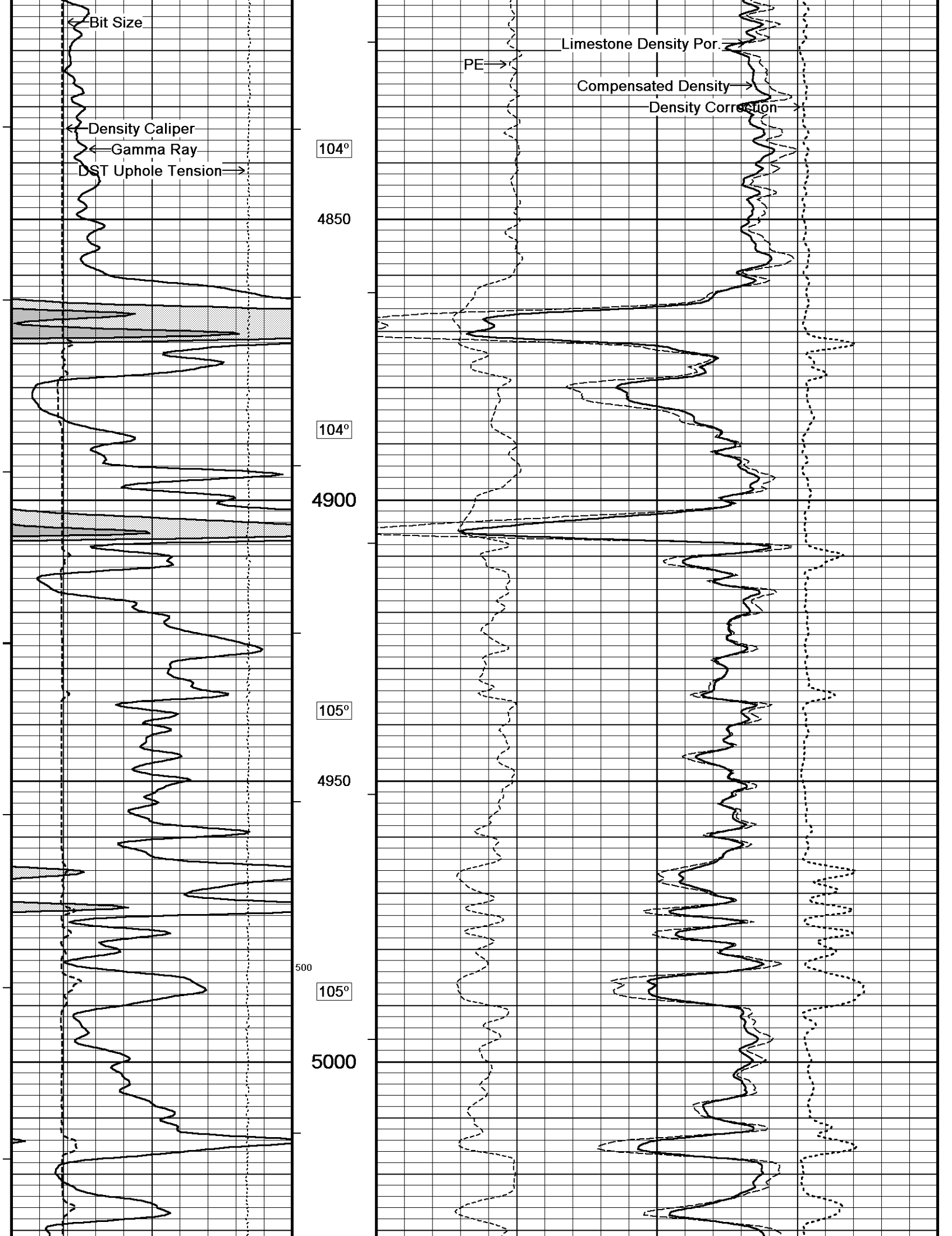


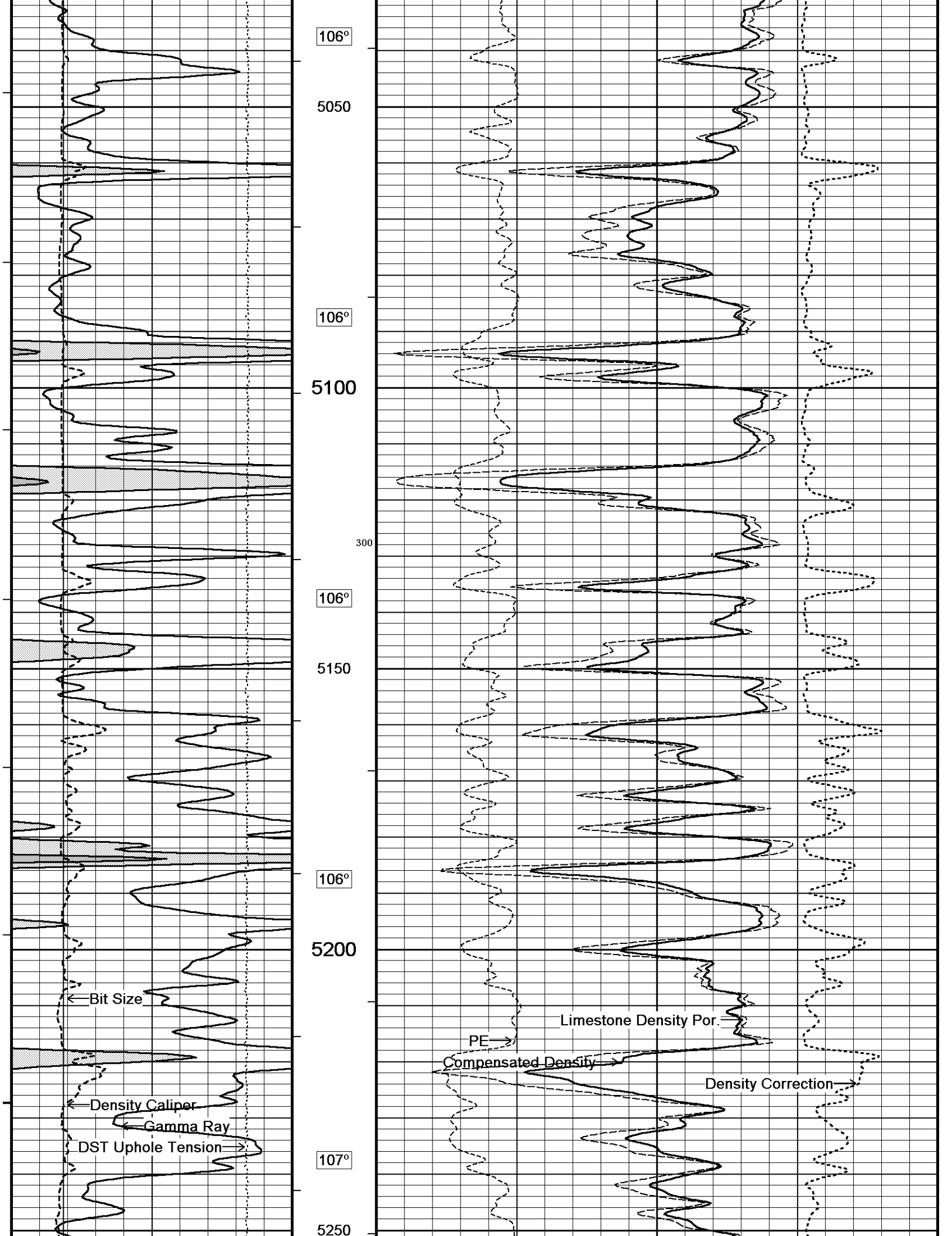

10 cu ft
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
4000
Bit Size
98°
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
4050
98°
4100
800
98°
4150

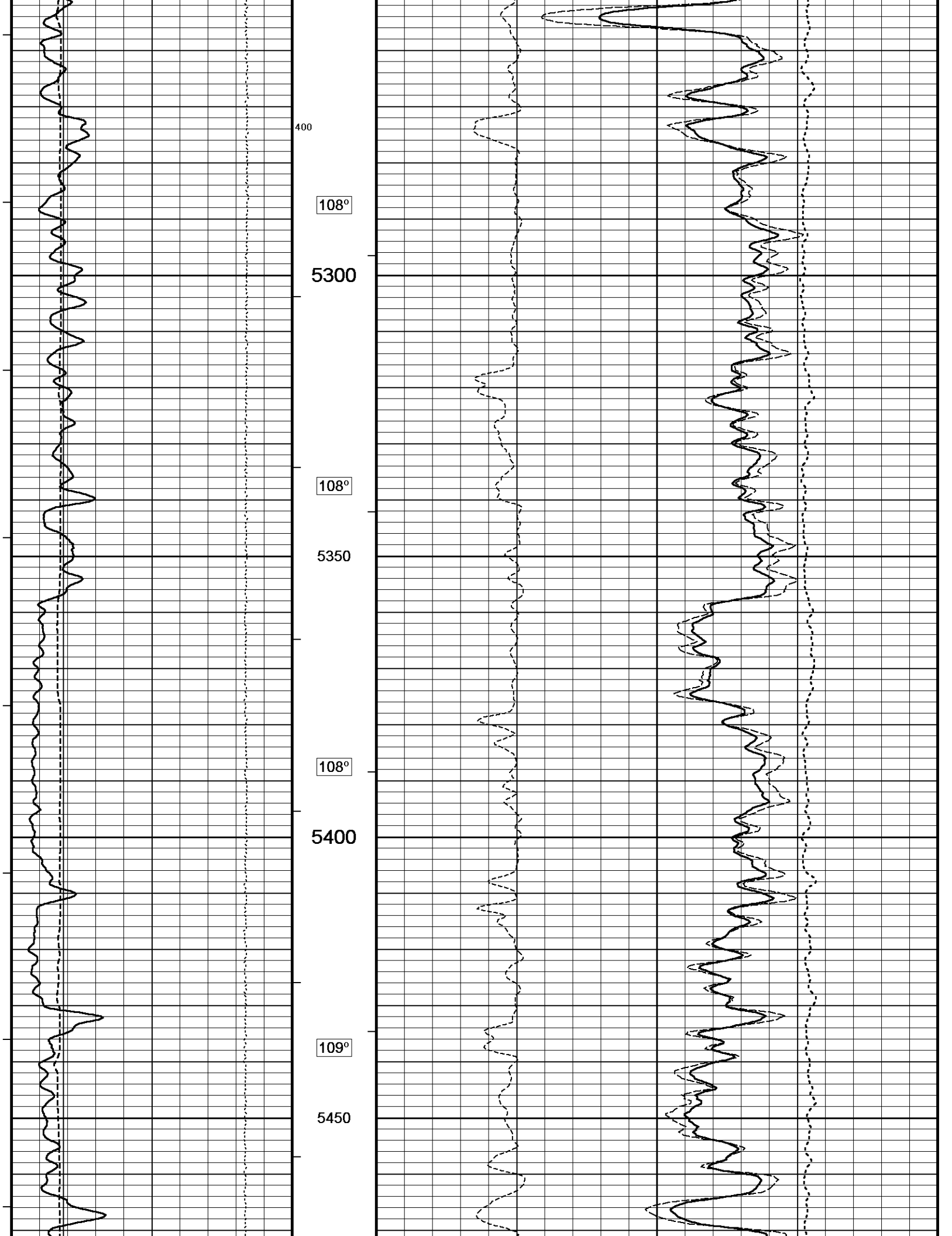

99°
4200
99°
4250
500
99°
4300
100°
4350

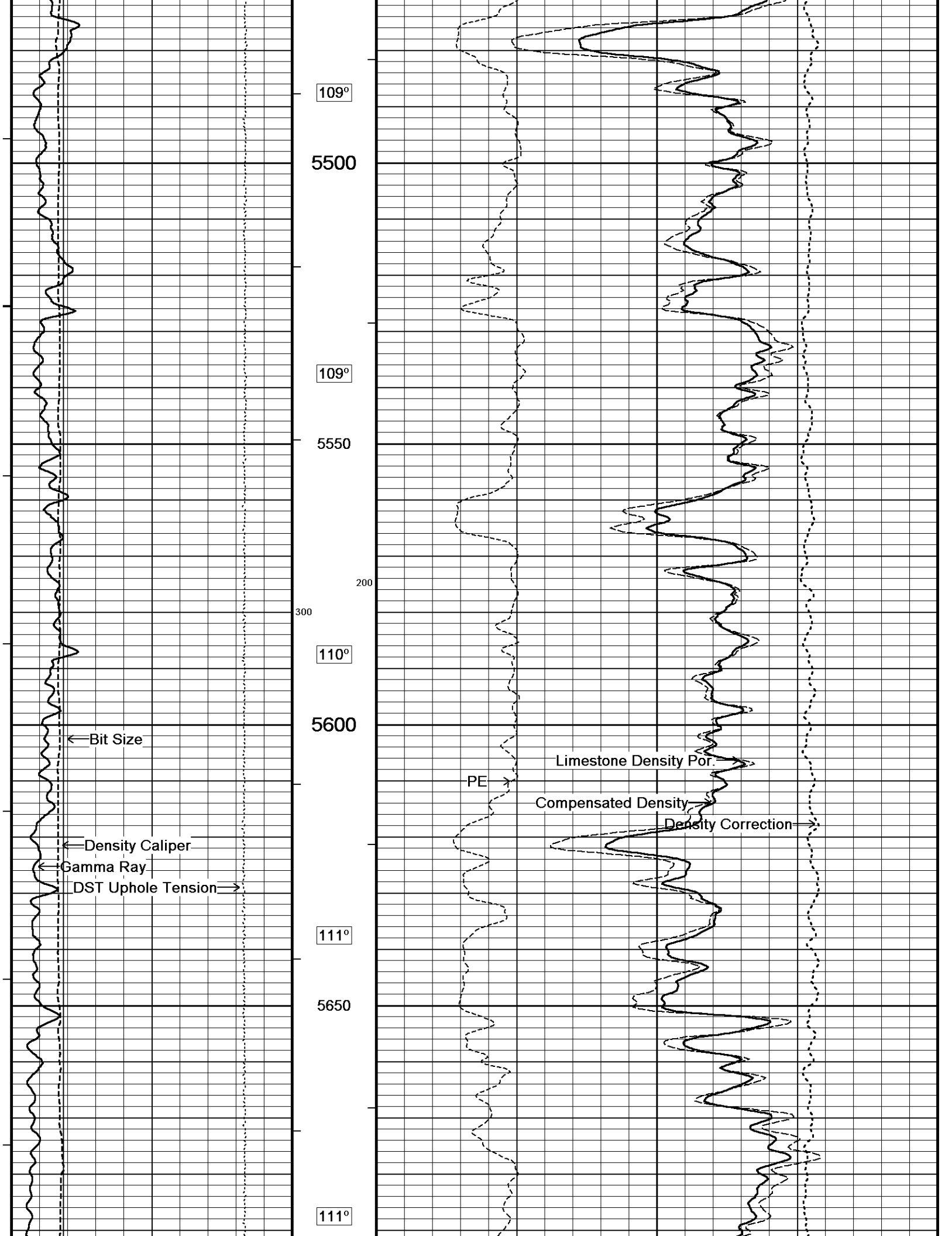

100°
700
4400
Bit Size
Limestone Density Por
PE
Compensated Density
Density Correction
101°
Density Caliper
Gamma Ray
DST Uphole Tension
4450
101°
4500
102°
4550
102°

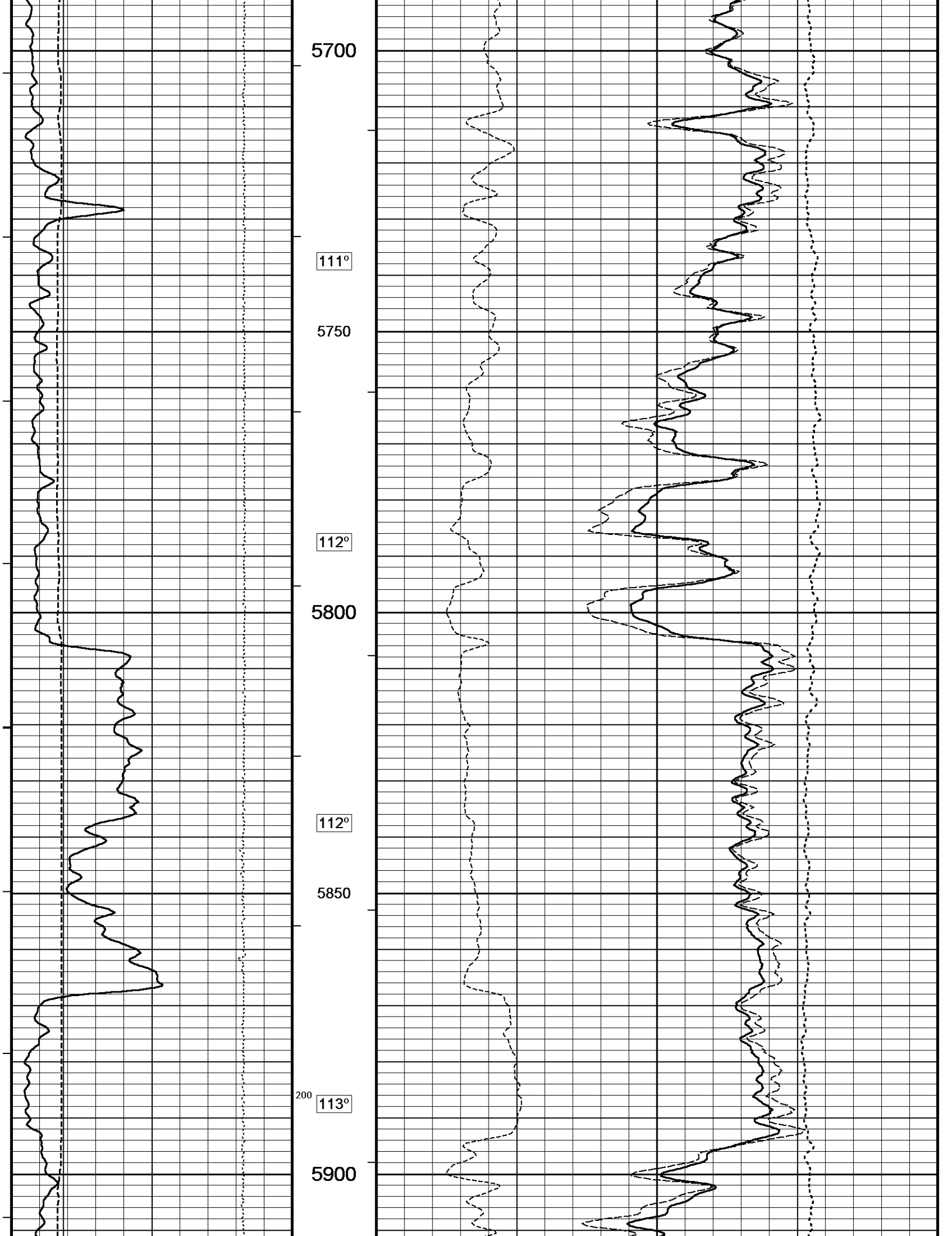

4600
103°
4650
600
400
103°
4700
103°
4750
104°
4800

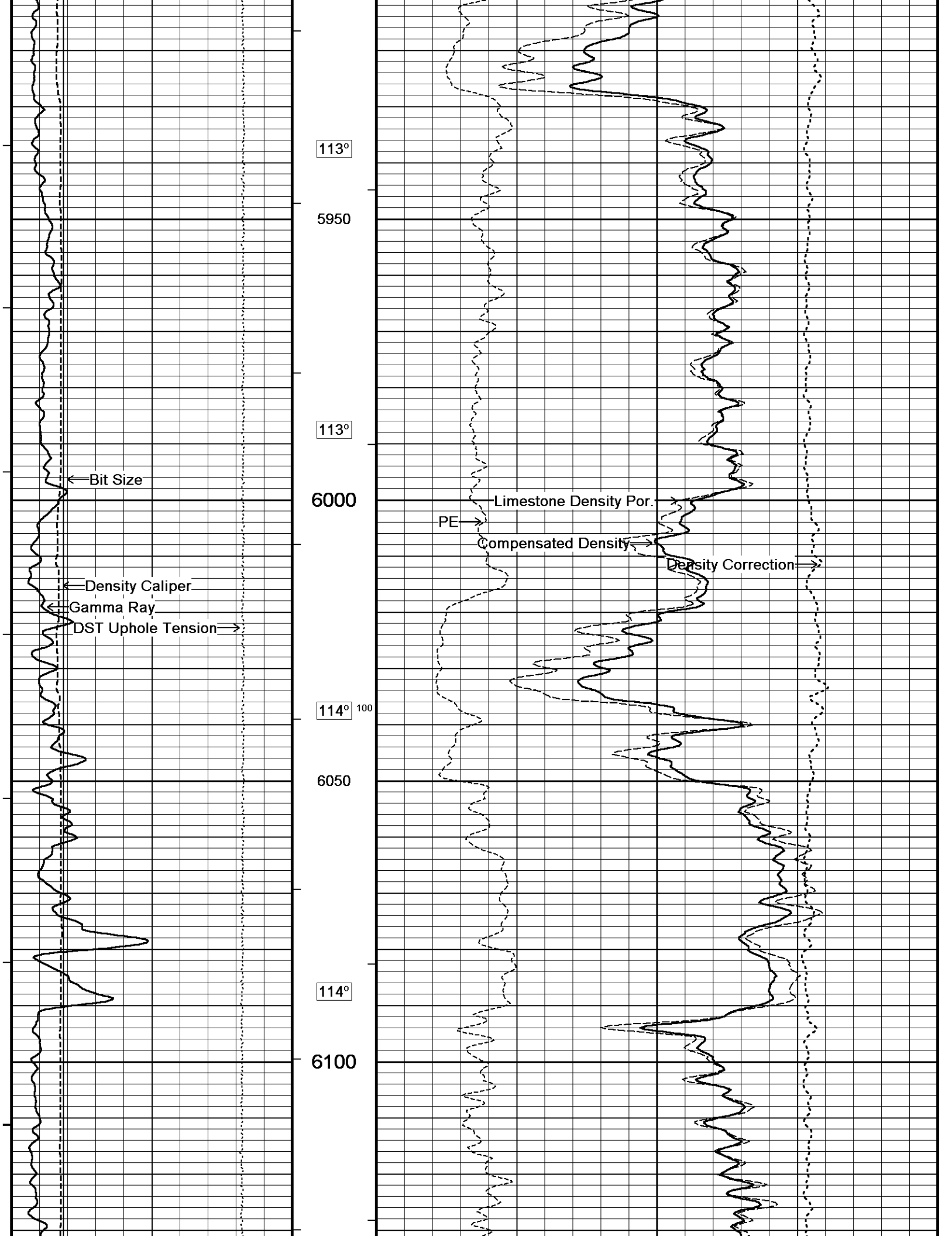

Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
PE
Limestone Density Por.
Compensated Density
Density Correction
104°
4850
104°
4900
105°
4950
500
105°
5000

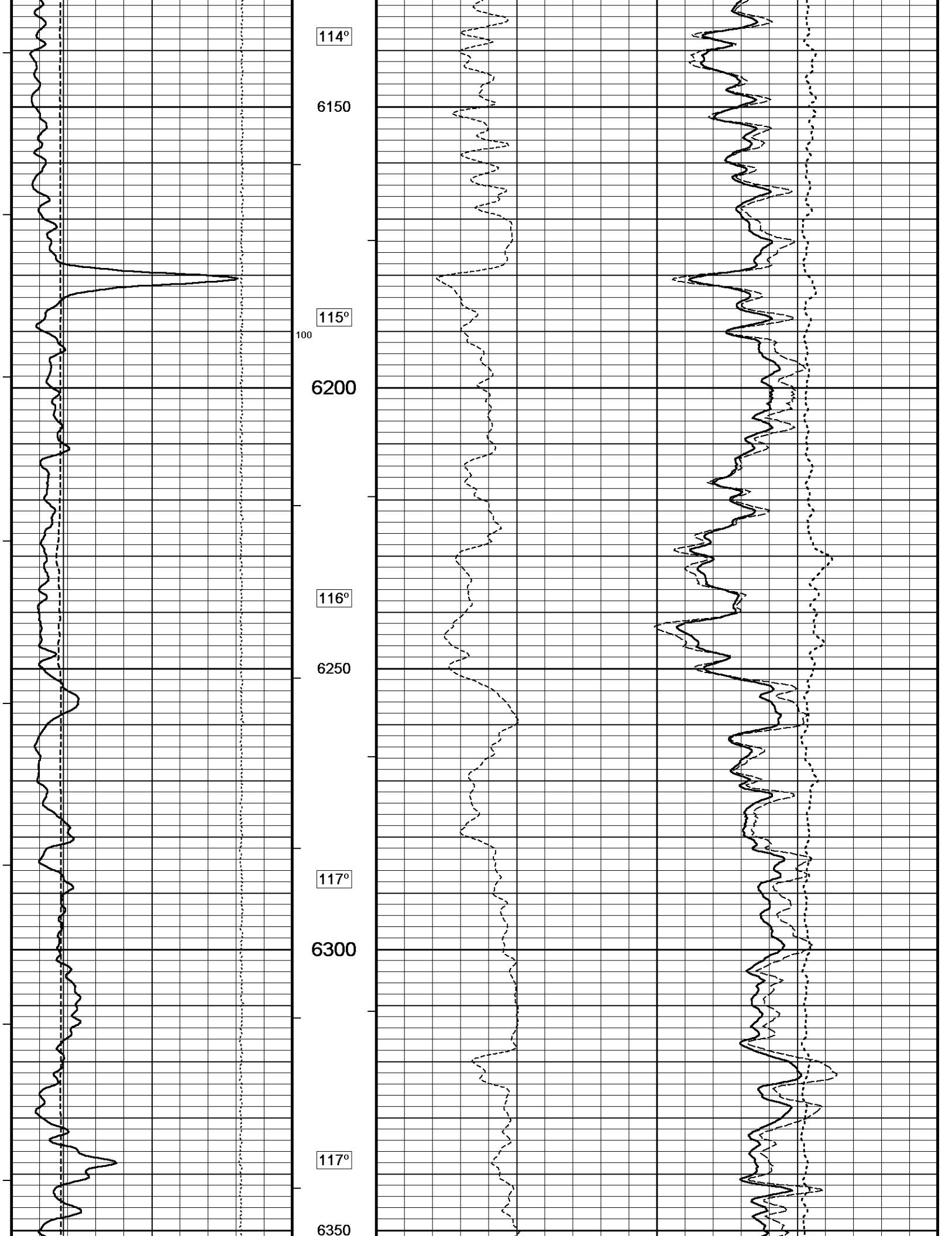

106°
5050
106°
5100
300
106°
5150
106°
5200
107°
5250
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
PE
Limestone Density Por.
Compensated Density
Density Correction

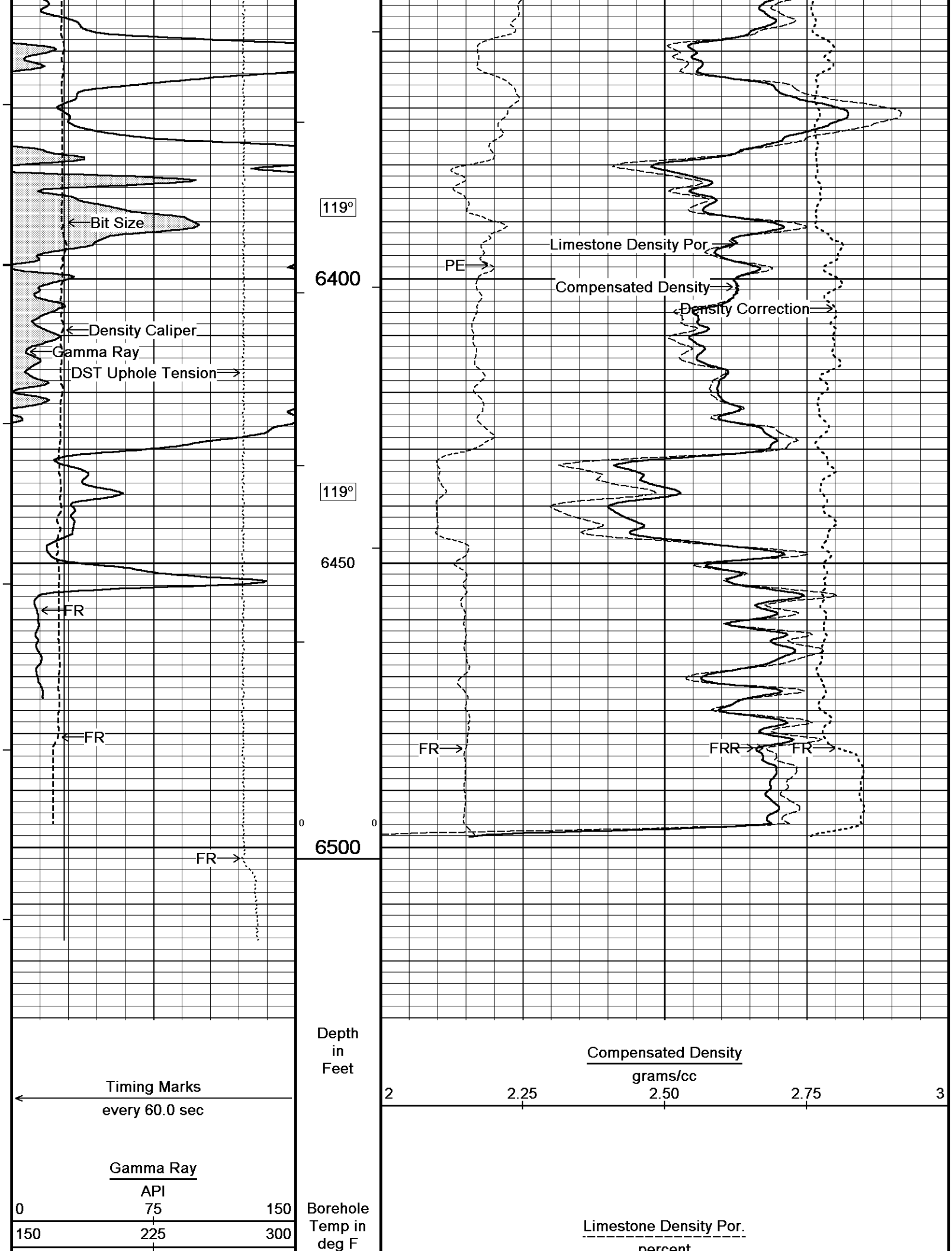

400
108°
5300
108°
5350
108°
5400
109°
5450

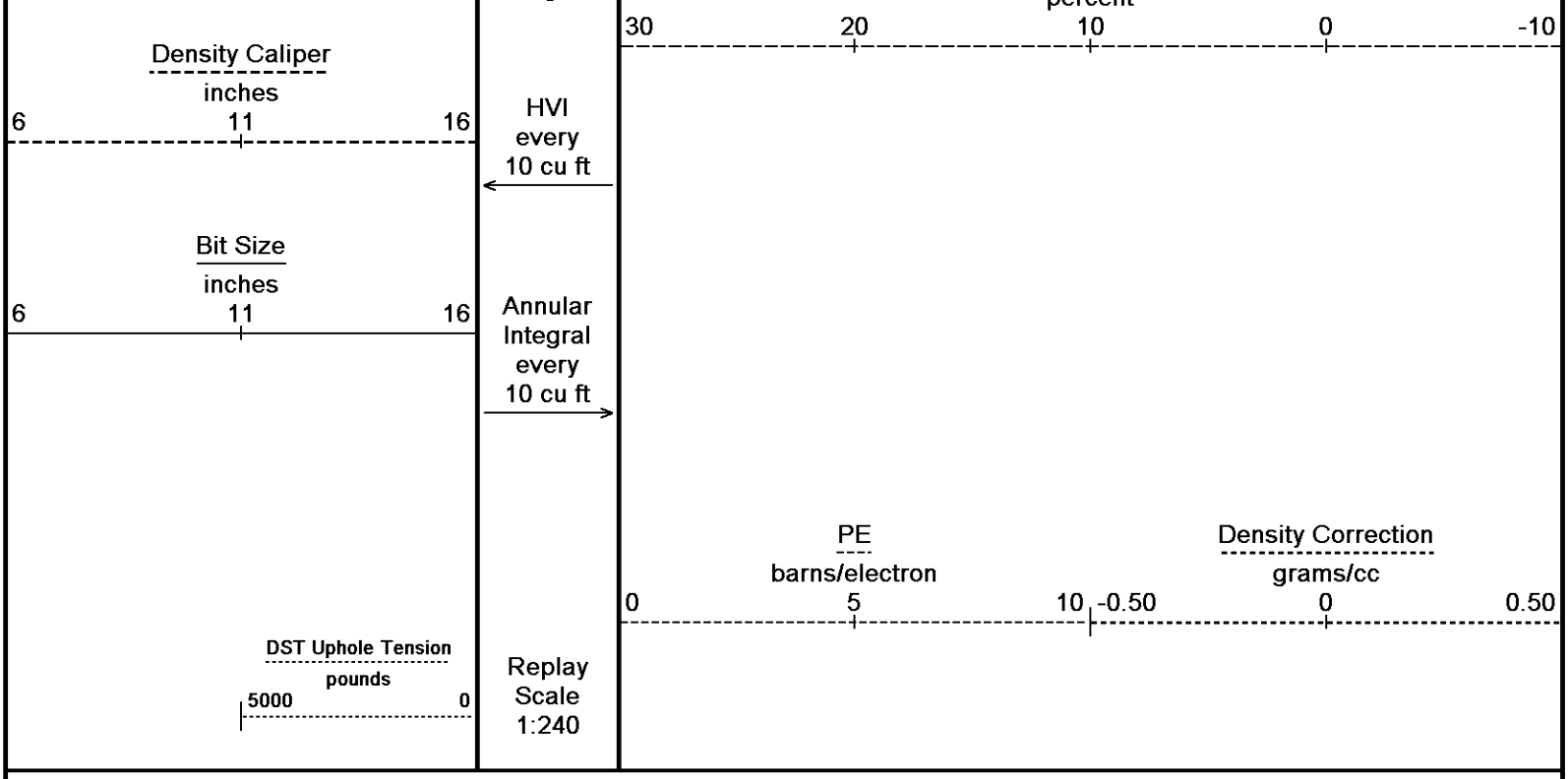

109°
5500
109°
5550
200
300
110°
5600
Bit Size
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
111°
5650
111°


5700
111°
5750
112°
5800
112°
5850
200
113°
5900


113°
5950
113°
Bit Size
6000
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
114°
100
6050
114°
6100


114°
6150
115°
100
6200
116°
6250
117°
6300
117°
6350


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
119°
6400
119°
6450
6500
PE
Limestone Density Por
Compensated Density
Density Correction
FR
FRR
FR
Timing Marks
every 60.0 sec
Depth
in
Feet
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

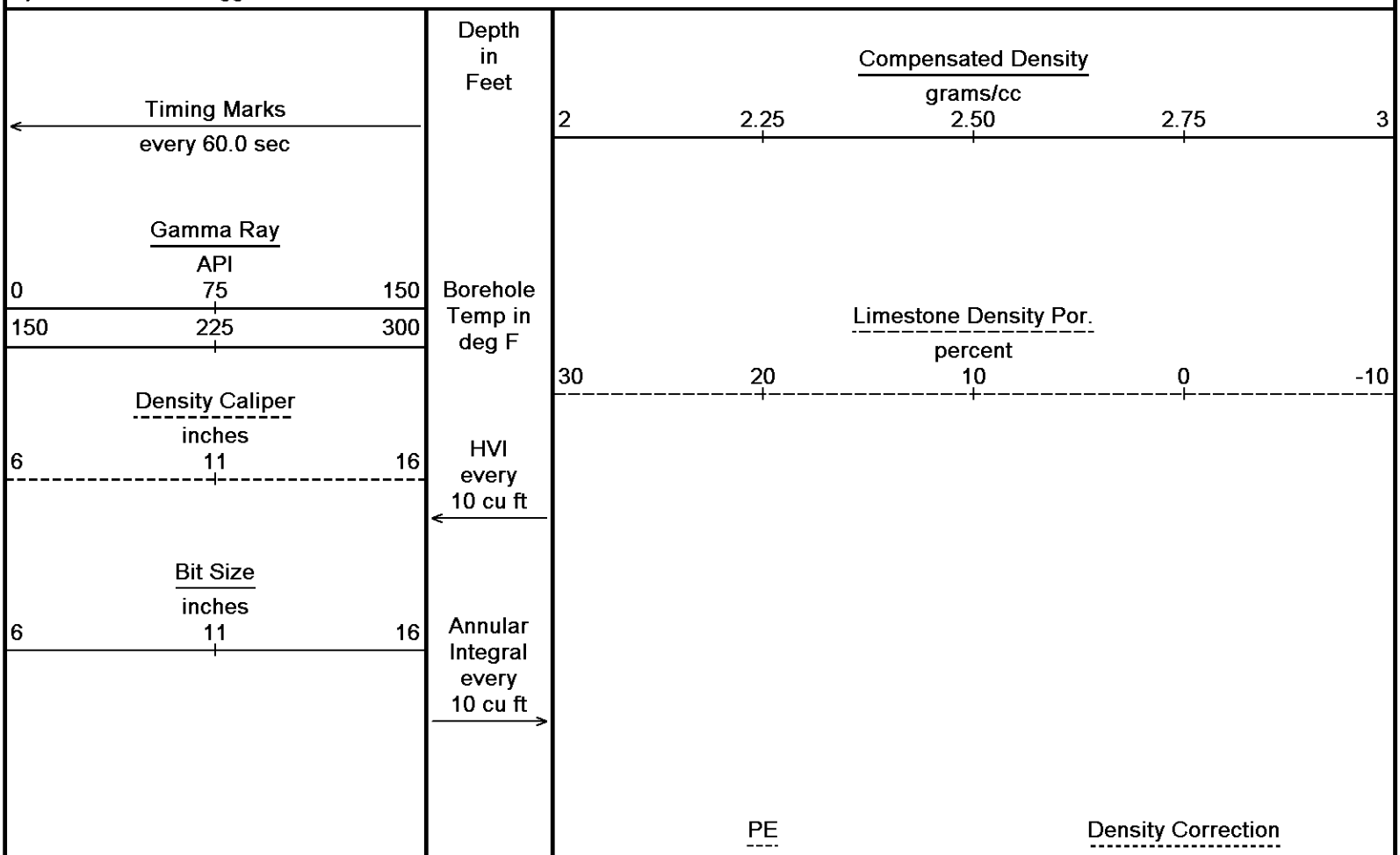


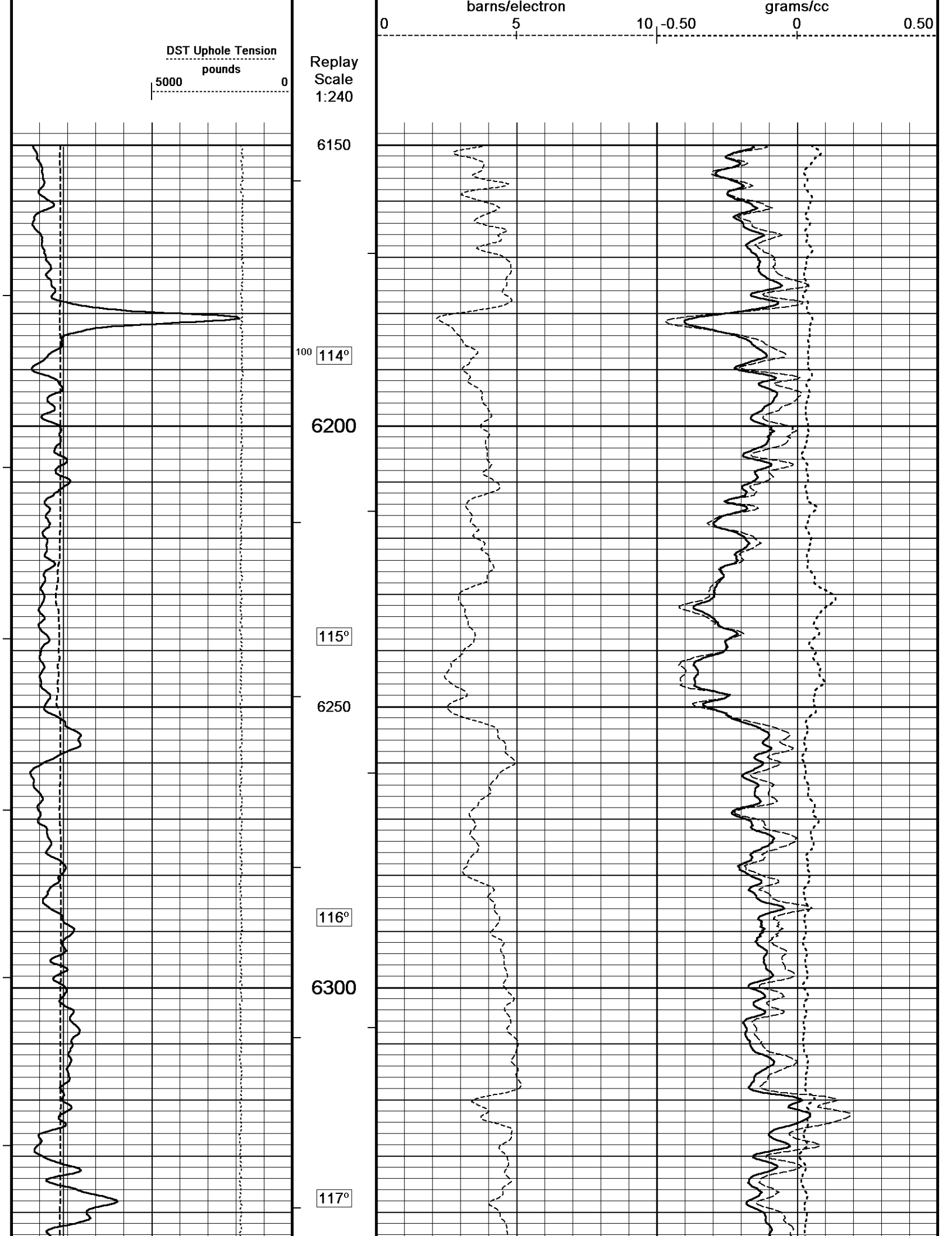
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Main.dta
Recorded on 19-DEC-2015 22:36
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

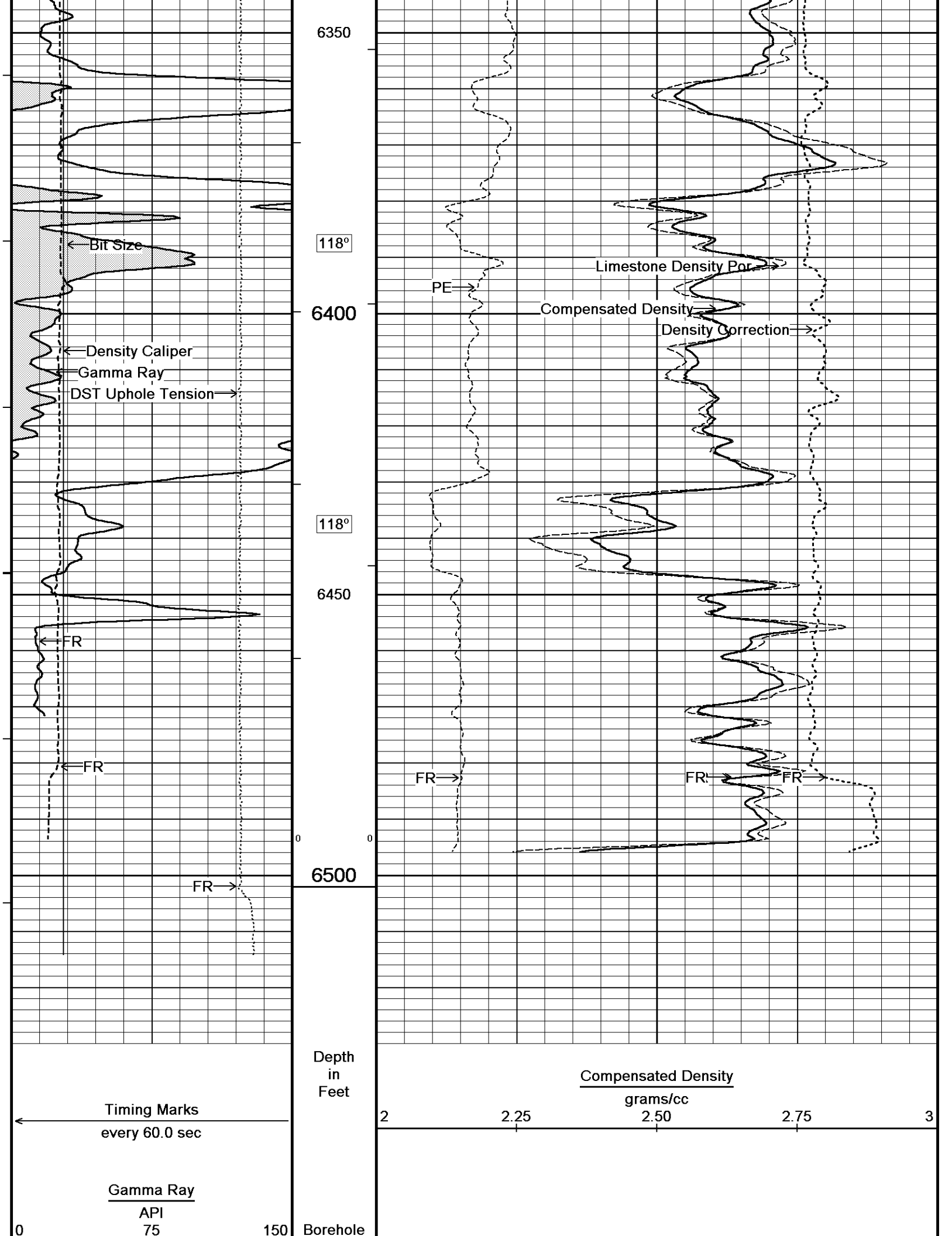
5 INCH MAIN

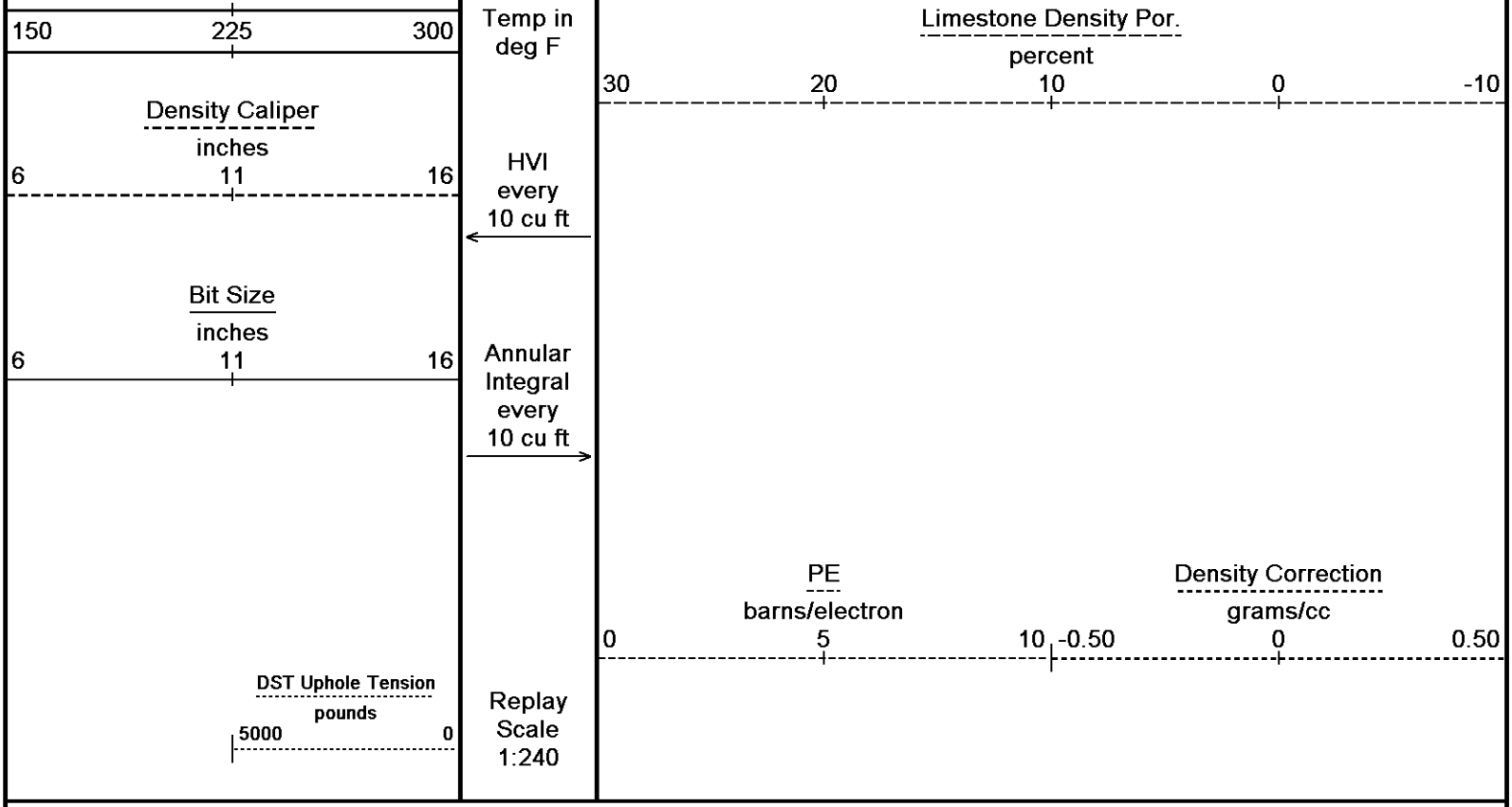
REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta
Recorded on 19-DEC-2015 22:13
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
6150
100
114°
6200
115°
6250
116°
6300
117°
barns/electron
0
5
10
grams/cc
-0.50
0
0.50


6350
118°
Bit Size
6400
Density Caliper
Gamma Ray
DST Uphole Tension
118°
6450
FR
FR
FR
0
0
6500
PE
Limestone Density Por
Compensated Density
Density Correction
FR
FR
FR
Timing Marks
every 60.0 sec
Depth
in
Feet
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Gamma Ray
API
0
75
150
Borehole

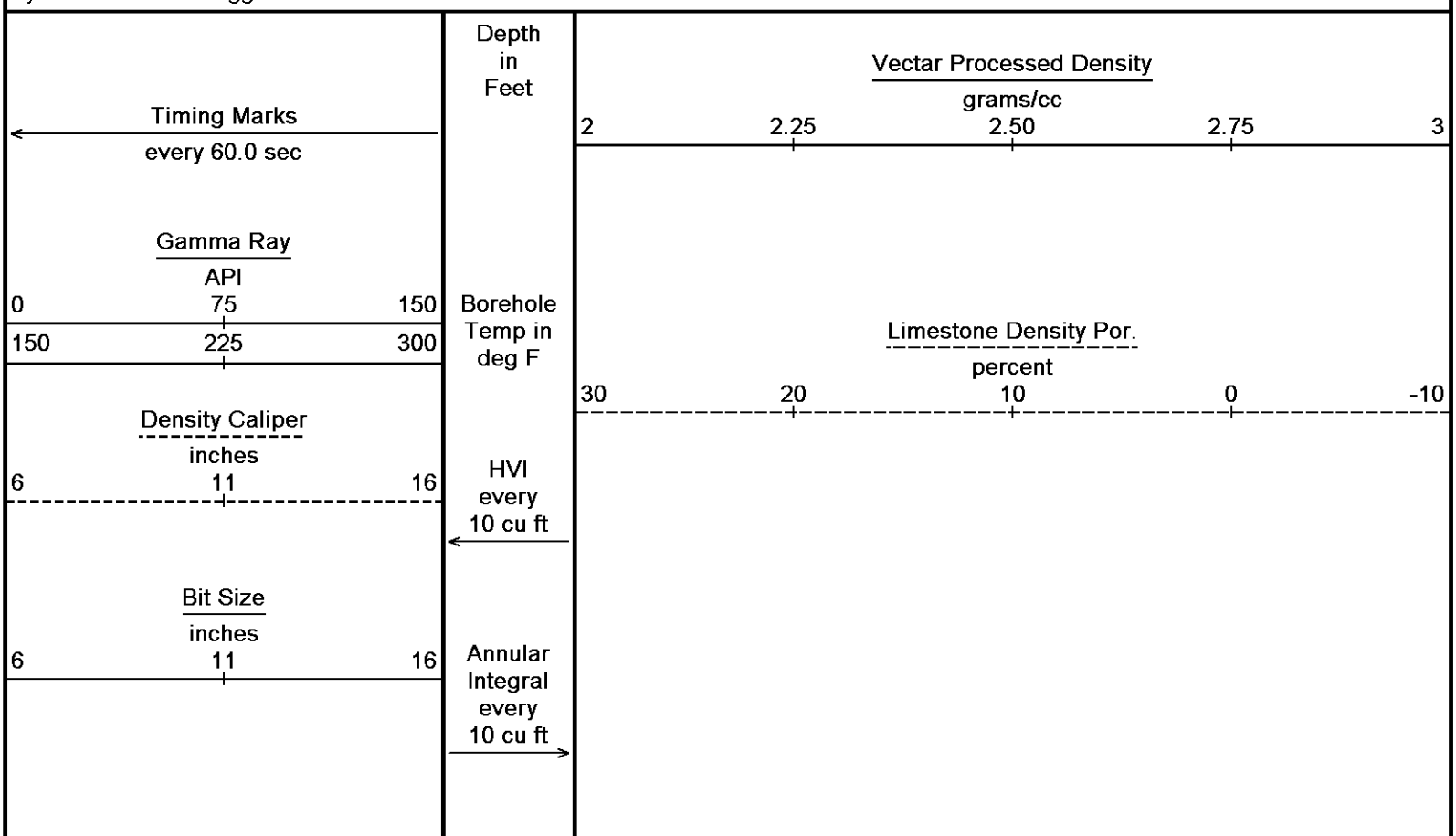


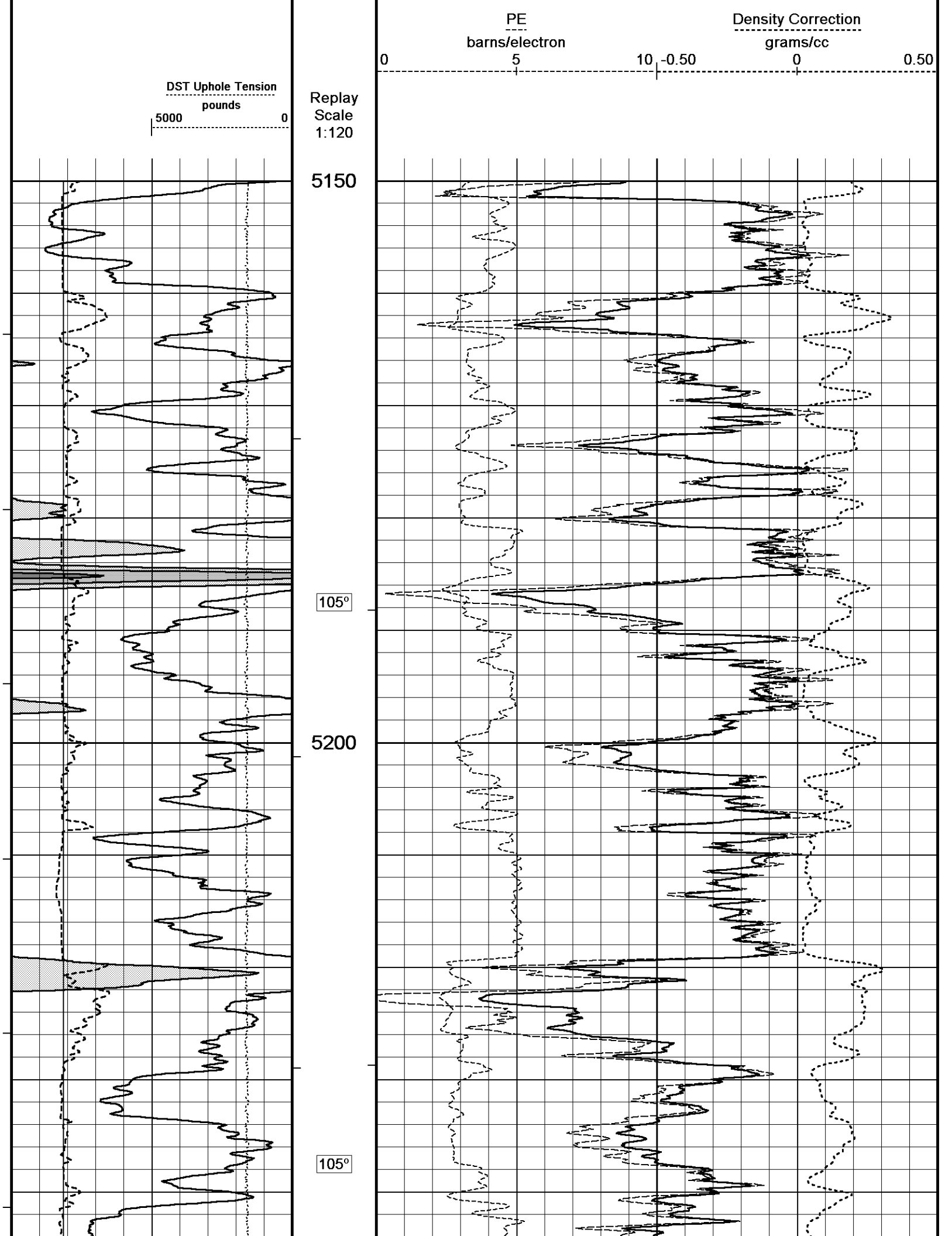
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta — Recorded on 19-DEC-2015 22:13
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

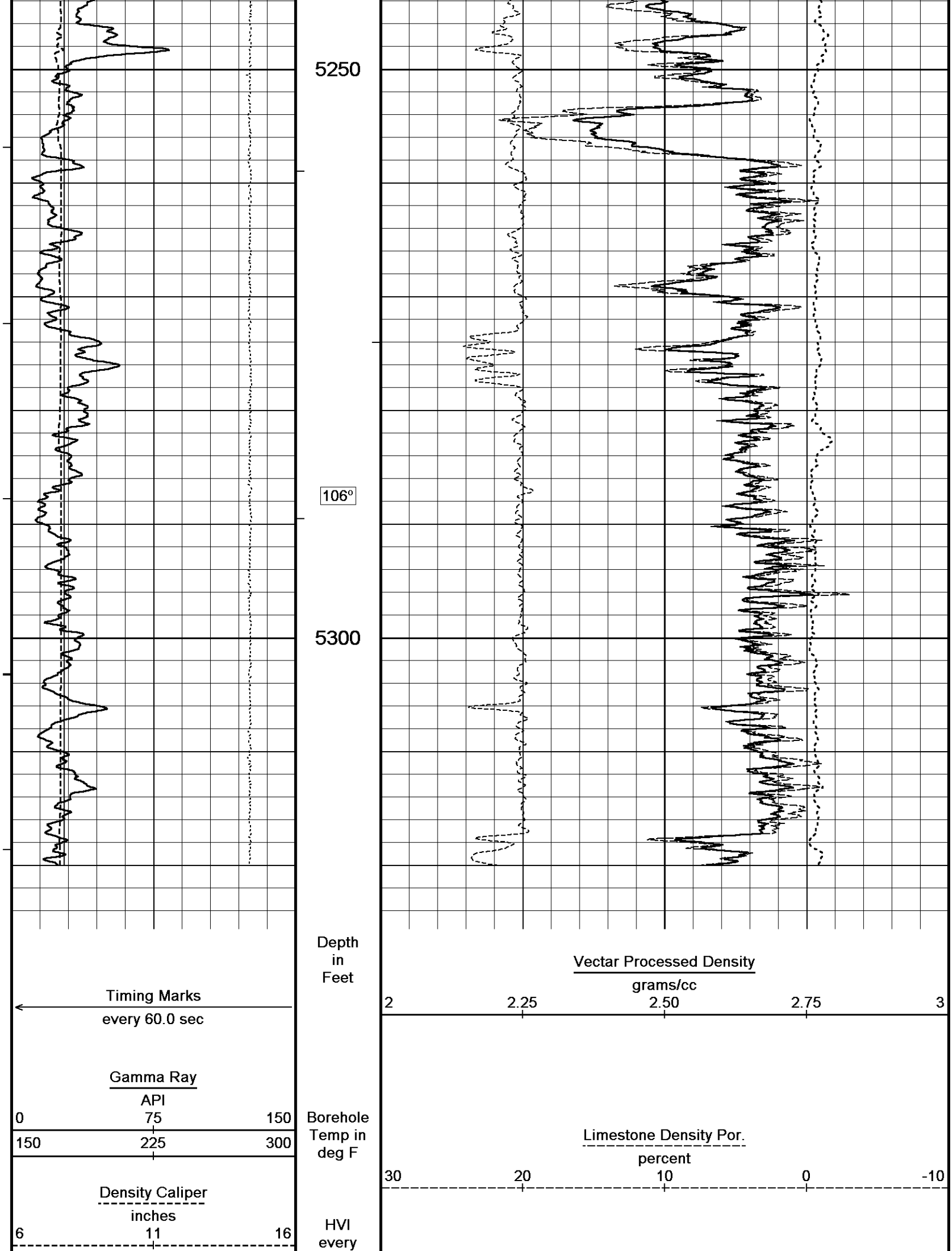
REPEAT SECTION

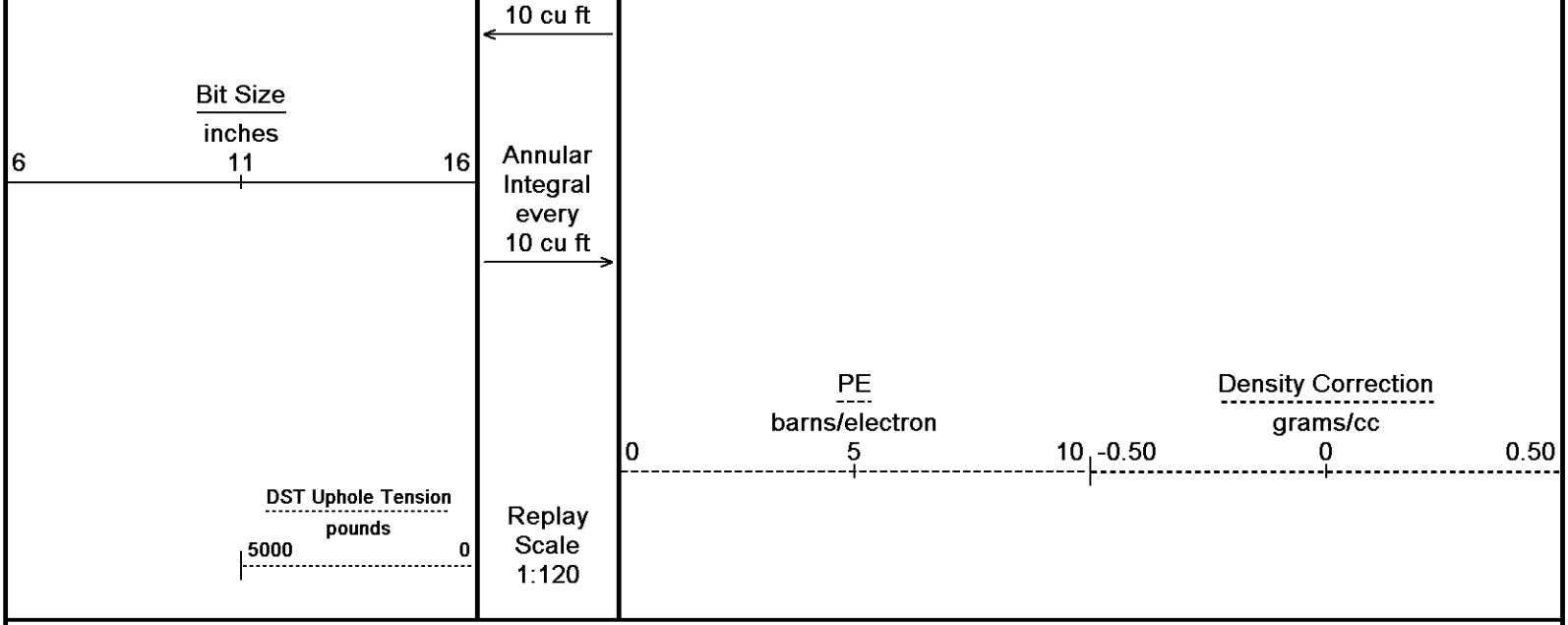
10 INCH HIGH RESOLUTION UPPER SECTION

Depth Based Data - Maximum Sampling Increment 2.5cm — Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Upper.dta — Recorded on 19-DEC-2015 21:11
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




DST Uphole Tension
pounds
5000
0
Replay
Scale
1:120
5150
105°
5200
105°
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50


5250
106°
5300
Depth
in
Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Density Caliper
inches
6
11
16
Borehole
Temp in
deg F
HVI
every
Vectar Processed Density
grams/cc
2
2.25
2.50
2.75
3
Limestone Density Por.
percent
30
20
10
0
-10

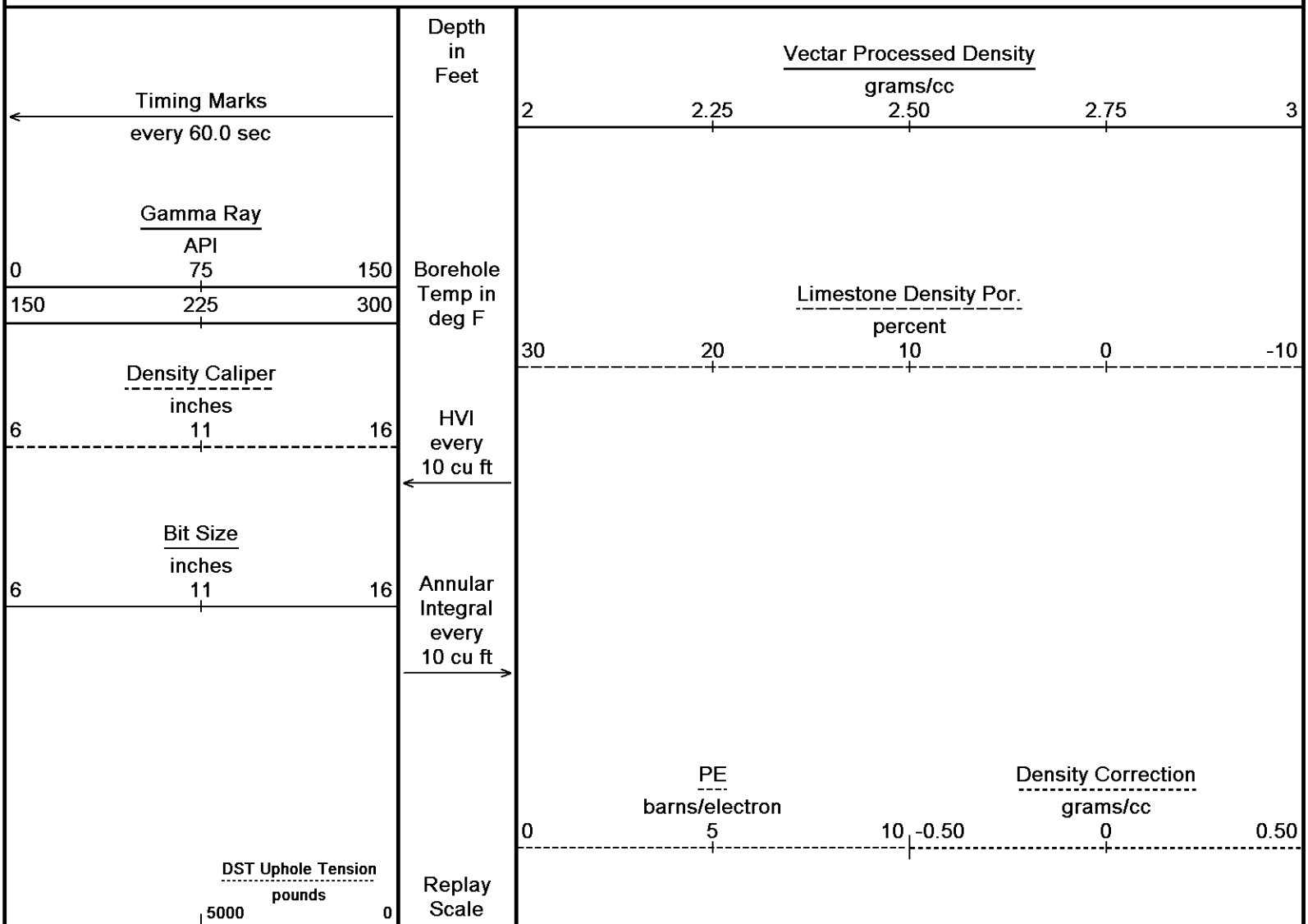


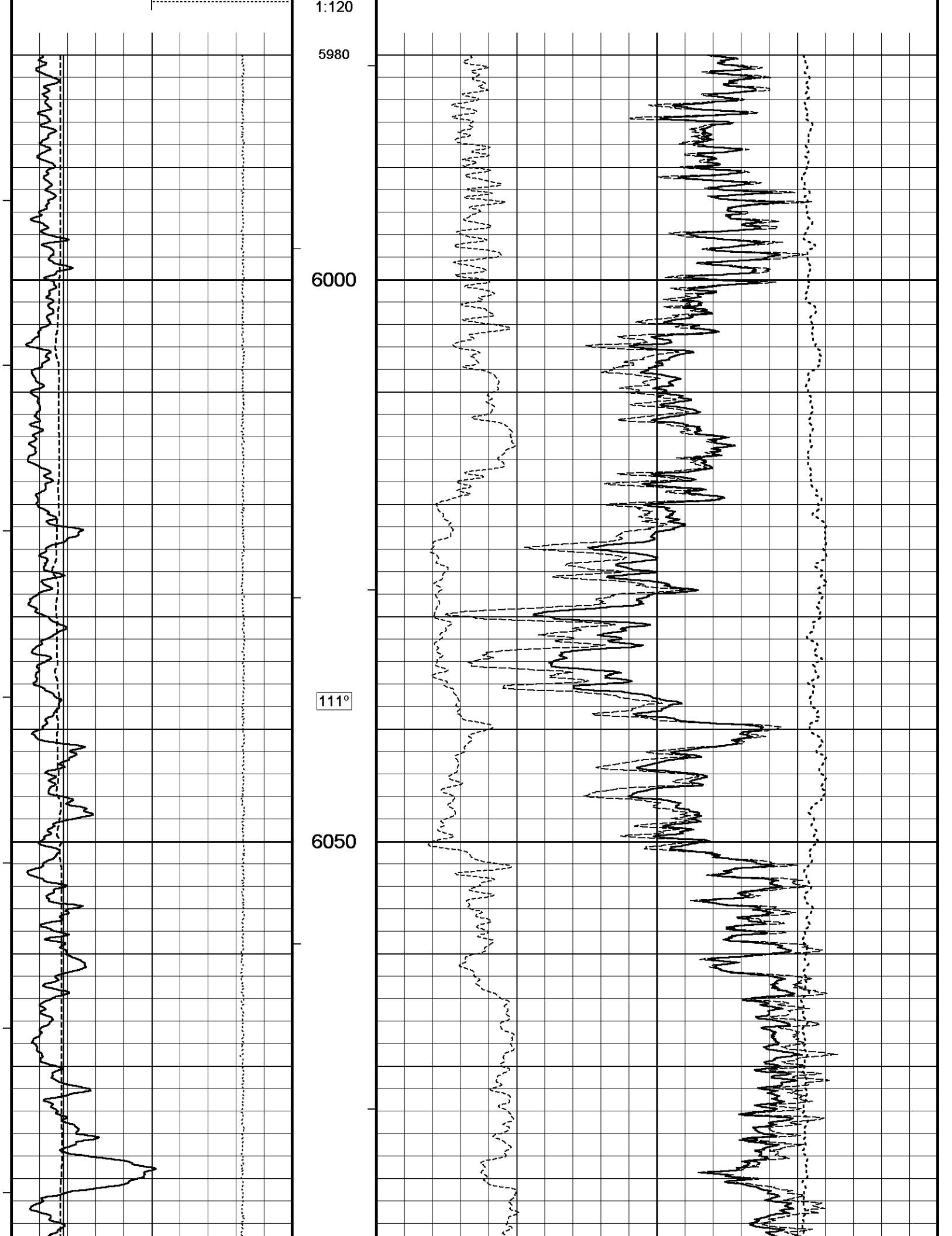
Depth Based Data - Maximum Sampling Increment 2.5cm — Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Upper.dta — Recorded on 19-DEC-2015 21:11
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

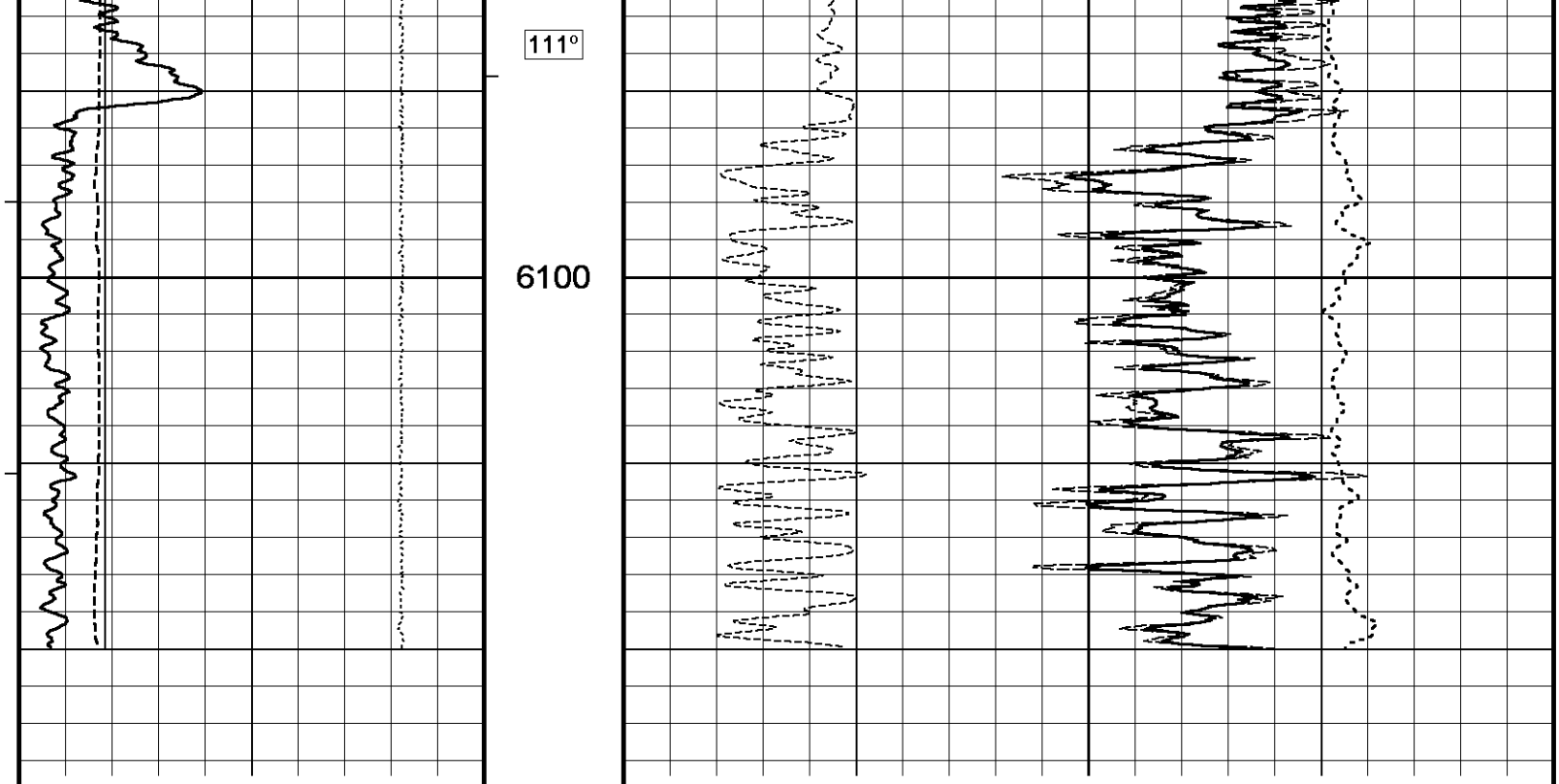
10 INCH HIGH RESOLUTION UPPER SECTION

10 INCH HIGH RESOLUTION LOWER SECTION

Depth Based Data - Maximum Sampling Increment 2.5cm — Plotted on 20-DEC-2015 03:05
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Lower.dta — Recorded on 19-DEC-2015 21:43
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




1:120
5980
6000
111°
6050



Depth in Feet

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

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:120

Vectar Processed 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

Depth Based Data - Maximum Sampling Increment 2.5cm
Filename: C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Hi-Res Lower.dta
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

Plotted on 20-DEC-2015 03:05
Recorded on 19-DEC-2015 21:43

10 INCH HIGH RESOLUTION LOWER SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta

General Constants All 000

Last Edited on 19-DEC-2015,20:31

General Parameters		
Mud Resistivity	0.700	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	4.500	inches
Caliper for Differential Caliper	None	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 15-DEC-2015 07:54

Reading No	Measured	Calibrated (lbs)
1	15210.27	0.00
2	16310.99	481.00

Gamma Calibration MCG-C 123

Field Calibration on 19-DEC-2015 14:25

	Measured	Calibrated (API)
Background	71	49
Calibrator (Gross)	729	505
Calibrator (Net)	658	456

Gamma Calibration Tolerances MCG-C 123

Ratio 1.443 (1.40 | 1.475 | 1.55) Counts/API

Gamma Constants MCG-C 123

Last Edited on 19-DEC-2015,18:43

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-C 123

Field Calibration on 31-OCT-2015,17:05

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-C 123

Last Edited on 22-SEP-2015,11:43

Pre-filter Length	11

SP Calibration MCG-C 123

Field Calibration on 02-NOV-2015 16:50

	Measured	Calibrated (mV)
Reference 1	100.3	100.0
Reference 2	-100.1	-99.9

Micro Normal and Micro Inverse Calibration MMR-C.A 247

Base Calibration on 08-DEC-2015 14:10

Base Calibration

Channel	Measured Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1	Calibrated (ohm-m) Resistor 2
Micro Normal	10.2	50.0	5.1	25.6
Micro Inverse	10.0	49.5	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	93.5	93.5
Micro Inverse	62.2	62.2

Micro Normal & Micro Inverse Calibration Tolerance MMR-C.A 247

Micro Normal Res. 1 10.2 ohm (-5% 10.0 +5%)
Micro Normal Res. 2 50.0 ohm (-5% 50.0 +5%)
Micro Inverse Res. 1 10.0 ohm (-5% 10.0 +5%)
Micro Inverse Res. 2 49.5 ohm (-5% 50.0 +5%)

Micro Normal Base Check 93.5 ohm-m (-2% 93.09 +2%)
Micro Inverse Base Check 62.2 ohm-m (-2% 62.10 +2%)

Micro Normal Field Check 93.5 ohm-m (-2% 93.5 +2%)
Micro Inverse Field Check 62.2 ohm-m (-2% 62.2 +2%)

Micro Normal and Micro Inverse Constants MMR-C.A 247

Last Edited on 20-OCT-2015,12:33

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	0.0000	inches

Caliper Calibration MMR-C.A 247

Base Calibration on 08-DEC-2015 14:01
Field Calibration on 19-DEC-2015 14:11

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14497	5.98
2	17836	7.97
3	21070	9.86
4	24988	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

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

Caliper Calibration Tolerances MMR-C.A 247

Short Arm Field Cal. 7.96 in (7.77 7.97 8.17)

Micro-Resistivity Caliper Constants MMR-C.A 247

Last Edited on

Sonde Configuration	Resistivity Mode

Neutron Calibration MDN-A.B 114

Base Calibration on 08-DEC-2015 14:59
Field Check on 19-DEC-2015 14:30

Base Calibration

	Measured Near	Measured Far	Calibrated (cps) Near	Calibrated (cps) Far
	3047	94	3714	110
Ratio	32.339		33.764	

Field Calibrator at Base

	Calibrated (cps) Near	Calibrated (cps) Far
	2143	3132
Ratio	0.684	

Field Check

	Calibrated (cps) Near	Calibrated (cps) Far
	2126	3071
Ratio	0.692	

Neutron Calibration Tolerances MDN-A.B 114

Ratio	32.339	
Base Check	0.684	0.65 0.7 0.75
Field Check	0.692	0.664 0.684 0.704

Neutron Constants MDN-A.B 114

Last Edited on 19-DEC-2015,18:43

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Legacy	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-A.A 135

Base Calibration on 08-DEC-2015 14:21
Field Check on 19-DEC-2015 14:04

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.1	126.8
Base Check		281.2
Field Check		281.5

FE Calibration Tolerances MFE-A.A 135

Reference 2	963.1	-3% 980.0 +3%	ohm
Base Check	281.2	-2% 277.0 +2%	ohm-m
Field Check	281.5	-2% 281.2 +2%	ohm-m

FE Constants MFE-A.A 135

Last Edited on 19-DEC-2015,18:42

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	

Induction Calibration MAI-A.A 111

Base Calibration on 05-AUG-2014,09:34
Field Check on 19-DEC-2015 14:03

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	17.6	473.6	9.3	966.2
2	6.4	385.9	7.6	821.4
3	3.2	264.0	5.2	566.0
4	2.1	135.5	2.6	279.2

Array Temperature	23.0	Deg F

Test Loop Calibration Verified 09-DEC-2015 11:03

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High	
1	12.1	3873.0	11.2	3872.7	
2	29.8	3528.1	29.4	3528.3	
3	29.1	3021.3	28.8	3021.7	
4	19.1	2058.5	19.0	2058.8	
Deep	17.7	1962.1	17.6	1962.4	
Medium	43.1	3976.4	42.9	3977.0	
Shallow	44.4	5232.7	43.8	5232.9	
Array Temperature		65.8		54.4	Deg F

Induction Calibration Tolerances MAI-A.A 111

Low Conductivity 1	17.6	13.0 / 17.0 / 21.0	mmho/m	High Conductivity 1	473.6	430.0 / 475.0 / 520.0	mmho/m
Low Conductivity 2	6.4	4.5 / 6.0 / 7.5	mmho/m	High Conductivity 2	385.9	345.0 / 385.0 / 425.0	mmho/m
Low Conductivity 3	3.2	1.0 / 3.5 / 6.0	mmho/m	High Conductivity 3	264.0	240.0 / 260.0 / 280.0	mmho/m
Low Conductivity 4	2.1	0.0 / 2.0 / 4.0	mmho/m	High Conductivity 4	135.5	120.0 / 135.0 / 150.0	mmho/m
Background Vx 1	0.0	-110.0 / -32.5 / 45.0	mmho/m	Phase Check Loop 1	0.0	-2.0 / 0.0 / 2.0	%
Background Vx 2	0.0	-35.0 / 20.0 / 75.0	mmho/m	Phase Check Loop 2	0.0	-2.0 / 0.0 / 2.0	%
Background Vx 3	0.0	-60.0 / 2.5 / 65.0	mmho/m	Phase Check Loop 3	0.0	-2.0 / 0.0 / 2.0	%
Background Vx 4	0.0	-50.0 / -17.5 / 15.0	mmho/m	Phase Check Loop 4	0.0	-2.0 / 0.0 / 2.0	%

Induction Constants MAI-A.A 111

Last Edited on 19-DEC-2015,18:42

Induction Model	RtAP-WBM	
Borehole Correction Constants		
Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Stand-off Type	Fins	
Stand-off	0.50	inches
Number of Fins on Stand-off	8.0000	
Stand-off Fin Angle	45.00	degrees
Stand-off Fin Width	0.5000	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	
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 24-NOV-2014,10:23

	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 08-DEC-2015 13:20
Field Calibration on 19-DEC-2015 14:06

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	20896	3.99
2	31104	5.98
3	41152	7.97
4	51010	9.86
5	61632	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

Short Arm Field Cal. 7.98 in

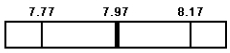


Photo Density Calibration MPD-C.A 216

Base Calibration on 08-DEC-2015 13:38
Field Check on 19-DEC-2015 14:10

Density Calibration

Base Calibration

	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	1066	1262		
Reference 1	52985	25543	59556	30836
Reference 2	21151	2428	24941	2541

Field Check at Base

1066.1	1261.6

Field Check

1070.1	1262.5

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	194	945		
Reference 1	21734	52806	0.415	0.371
Reference 2	5972	21023	0.288	0.272

Field Check at Base

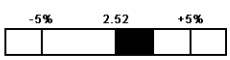
194.5	945.4

Field Check

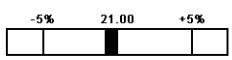
194.1	950.3

Photo Density Calibration Tolerances MPD-C.A 216

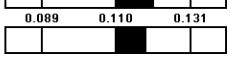
Near Density Ratio 2.58



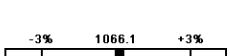
Far Density Ratio 20.82



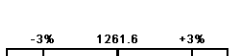
PE Calibration 0.119

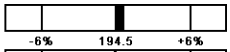


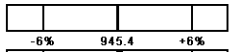
Near Den. Field Check 1070.1



Far Den. Field Check 1262.5







PE WS Field Check	194.1	PE WH Field Check	950.3

Density Constants MPD-C.A 216

Last Edited on 19-DEC-2015,18:43

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 Z/A Multiplier	1.11	
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	

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	

DOWNHOLE EQUIPMENT

C:\Minimus 15.03.5939\Logs\O'Brien Mary #1-1\O'Brien Mary #1-1 Repeat.dta

Cablehead, 11 pin
CBH-CA 155 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 123 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-C.A 247 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

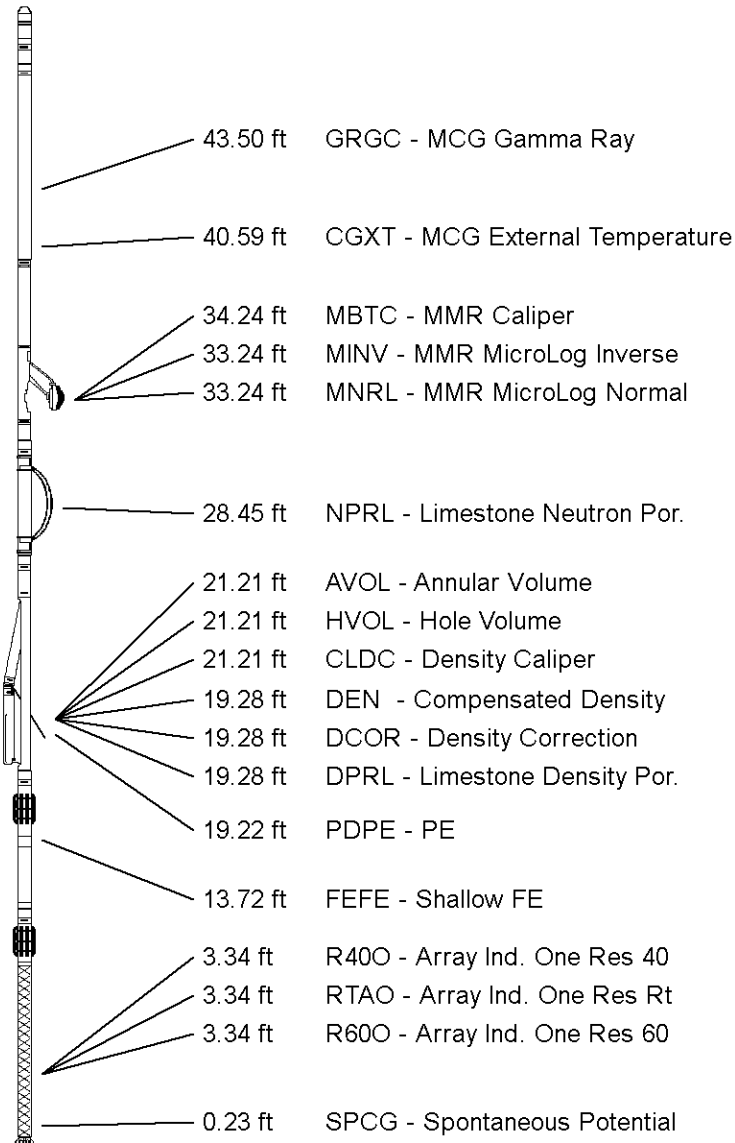
Compact Neutron
MDN-A.B 114 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

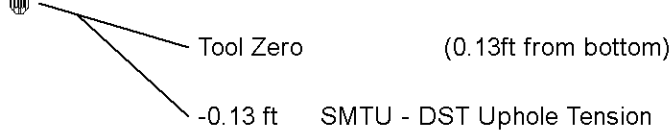
Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 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: 51.18 ft Weight: 407.9 lb





All measurements relative to tool zero.

COMPANY	O'BRIEN ENERGY RESOURCES CORP.
WELL	MARY #1-1
FIELD	GRANGER CREEK
PROVINCE/COUNTY	CLARK
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2265.00	feet	First Reading	6483.00	feet
Elevation Drill Floor	2263.00	feet	Depth Driller	6500.00	feet
Elevation Ground Level	2252.00	feet	Depth Logger	6502.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG