COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

Weatherford®

COMPANY	RED OAK ENERGY, INC.
WELL	GTD LAND #1-30
FIELD	WILDCAT
PROVINCE/COUNTY	GREELEY
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2310' FSL & 330' FEL NE NE SE

SEC 30	TWP 18S	RGE 42W	Other Services MAI/MFE MSS
Latitude			
Longitude			
API Number	15-071-20888		

Permanent Datum GL, Elevation 3842 feet
Log Measured From KB, 9.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	3851.00
DF	3849.00
GL	3842.00

Date	09-OCT-2018			
Run Number	ONE			
Service Order	4558-226284064			
Depth Driller	5056.00	feet		
Depth Logger	5059.00	feet		
First Reading	5025.00	feet		
Last Reading	3500.00	feet		
Casing Driller	352.00	feet		
Casing Logger	351.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg	52.00 CP		
PH / Fluid Loss	11.00	8.00 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.75 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.60 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.90 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.45 @125.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	125.00	deg F		
Equipment / Base	13096	LIB		
Recorded By	ADAM SILL			
Witnessed By	RYAN DAVIS			

Last Edited: 09-OCT-2018 14:22

BOREHOLE RECORD

Bit Size inches	Depth From feet	Depth To feet
7.875	352.00	5056.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	352.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 18.03.9344.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
  - HARDWARE: DUAL BOWSPRING USED ON MDN.
    0.5 INCH STANDOFF USED ON MFE.
    TWO 0.5 INCH STANDOFFS USED ON MSS.
    0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1951 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1178 CU.FT.

- RIG: MURFIN #21.

- ENGINEER: A. SILL.

- OPERATOR: B. TOVAR.

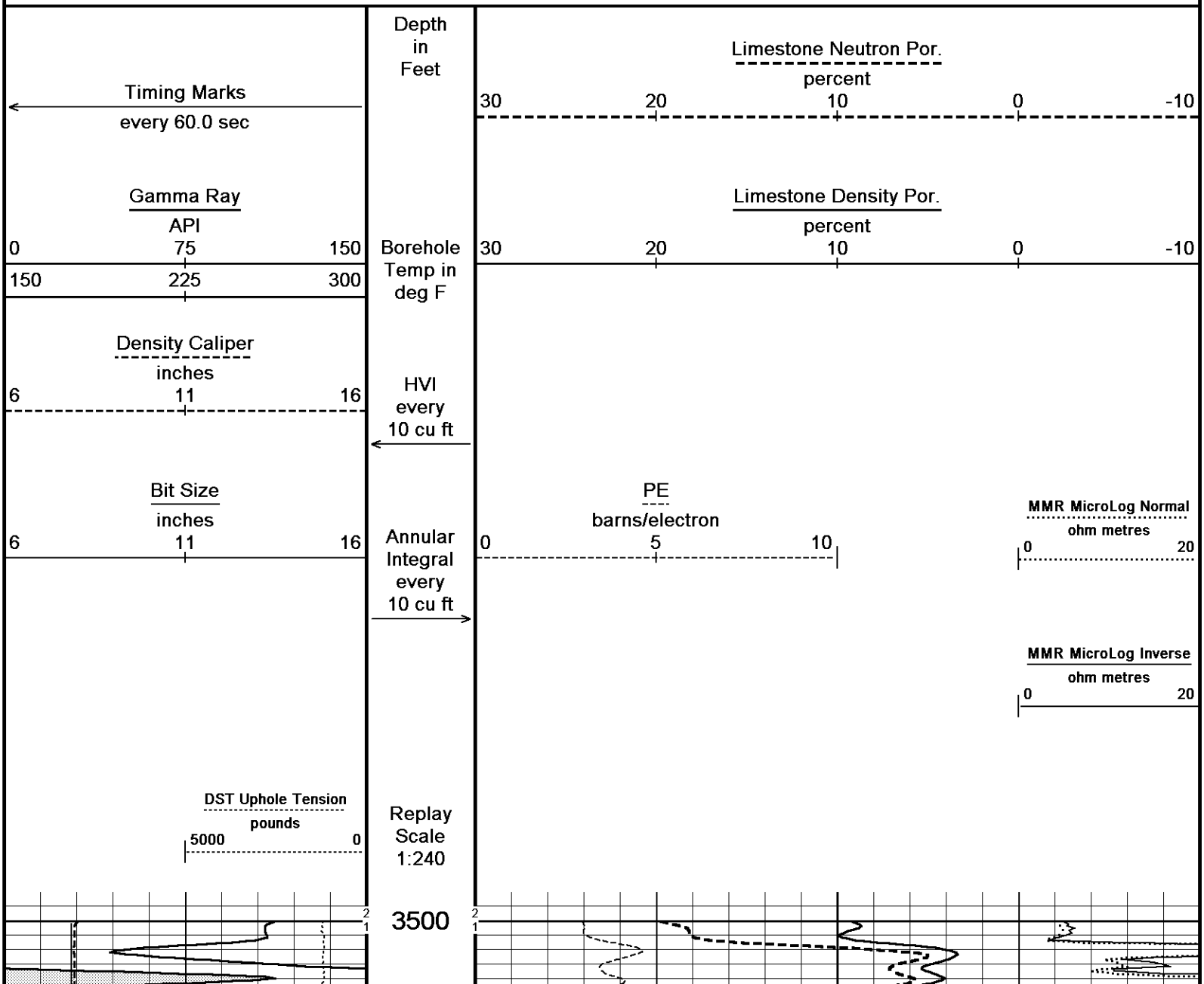
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

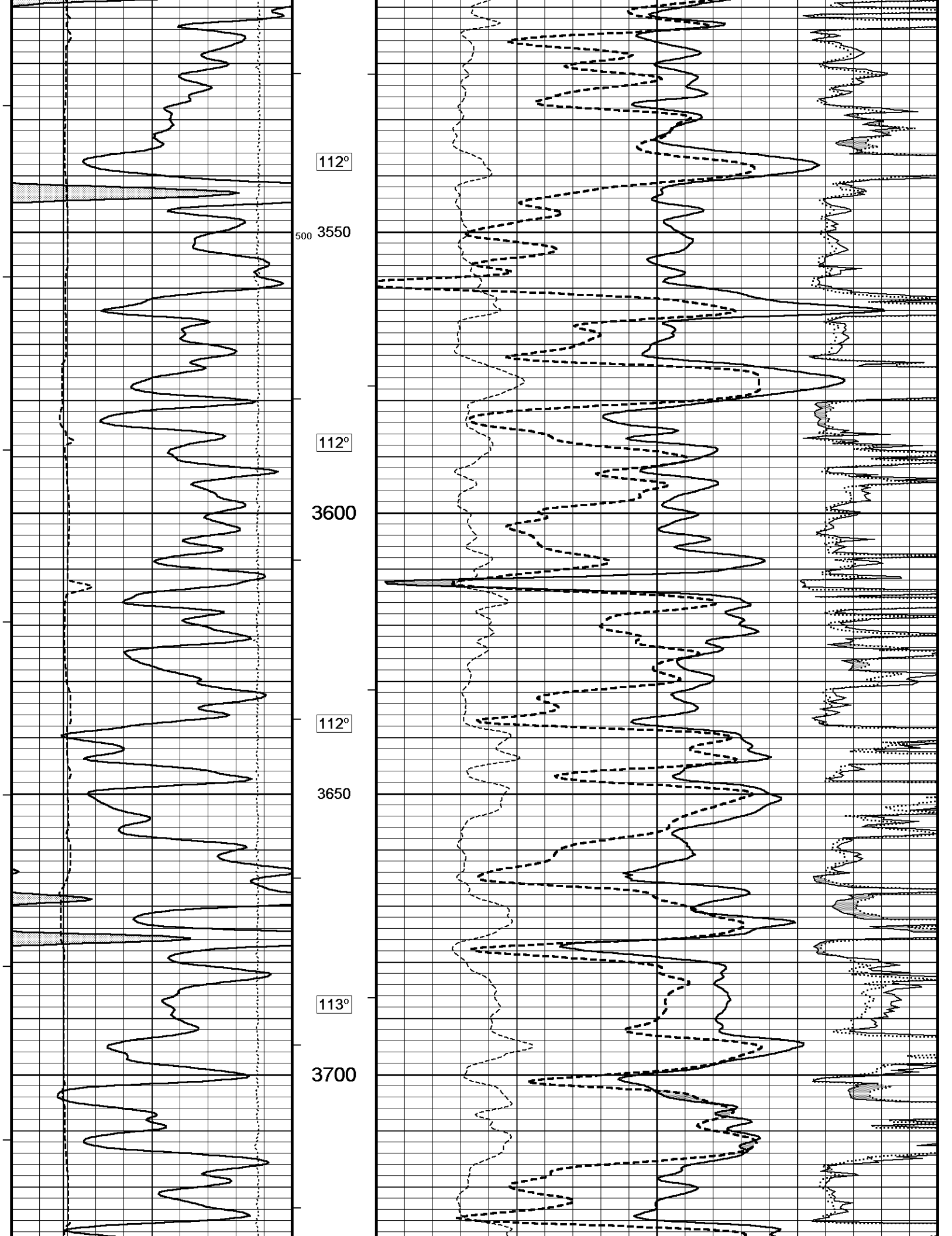
5 INCH LIMESTONE MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19

Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_003.dta — Recorded on 09-OCT-2018 17:22

System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

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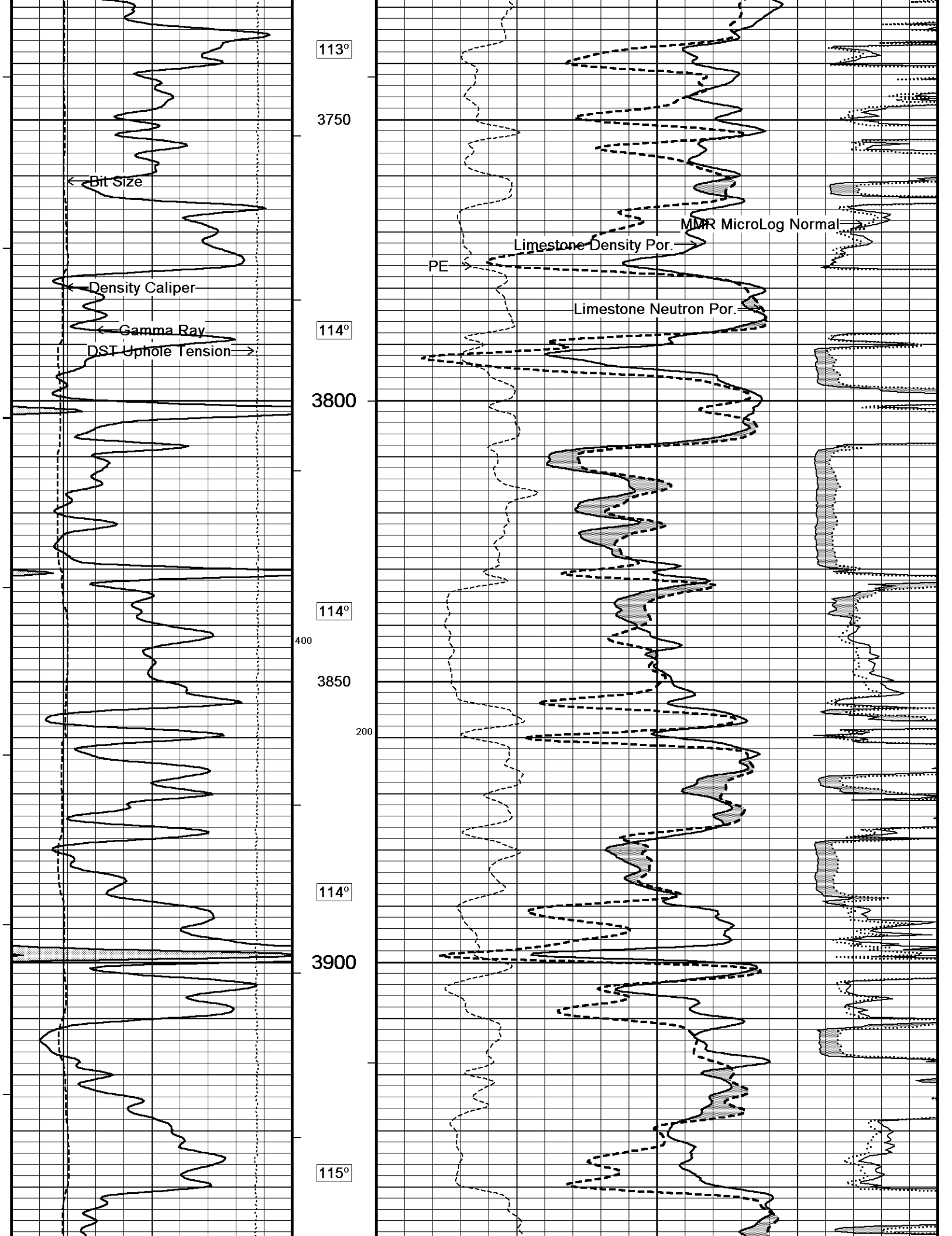
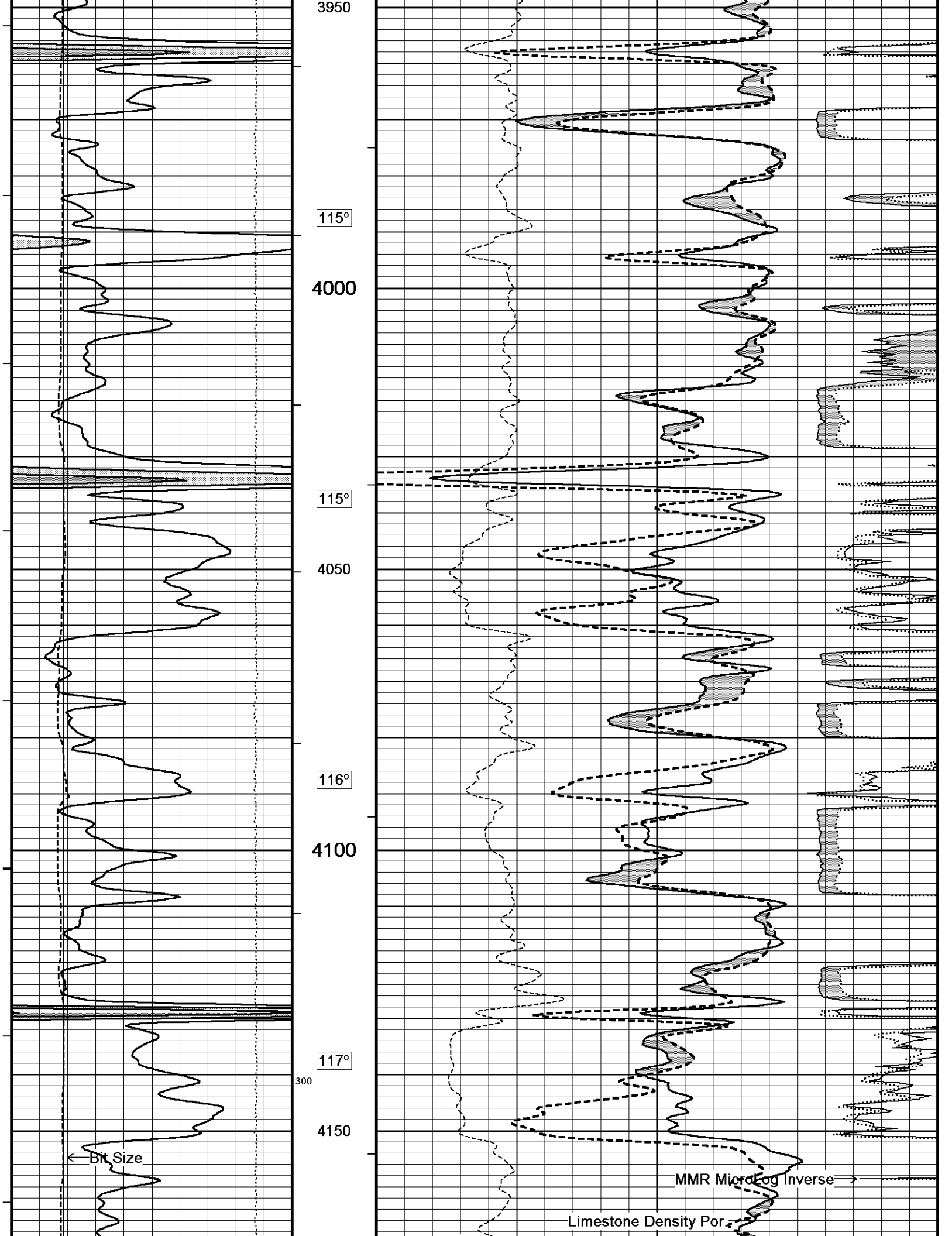
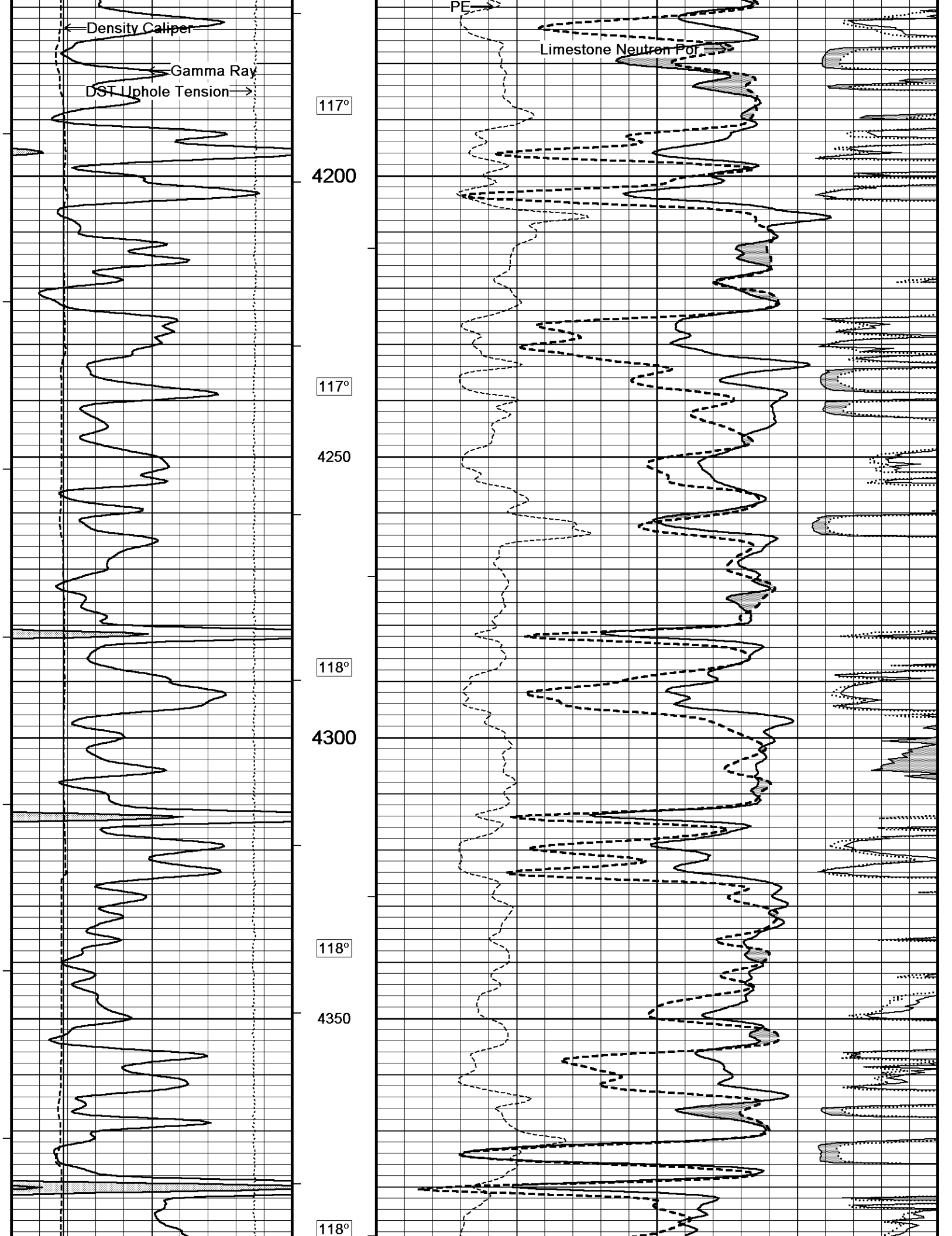
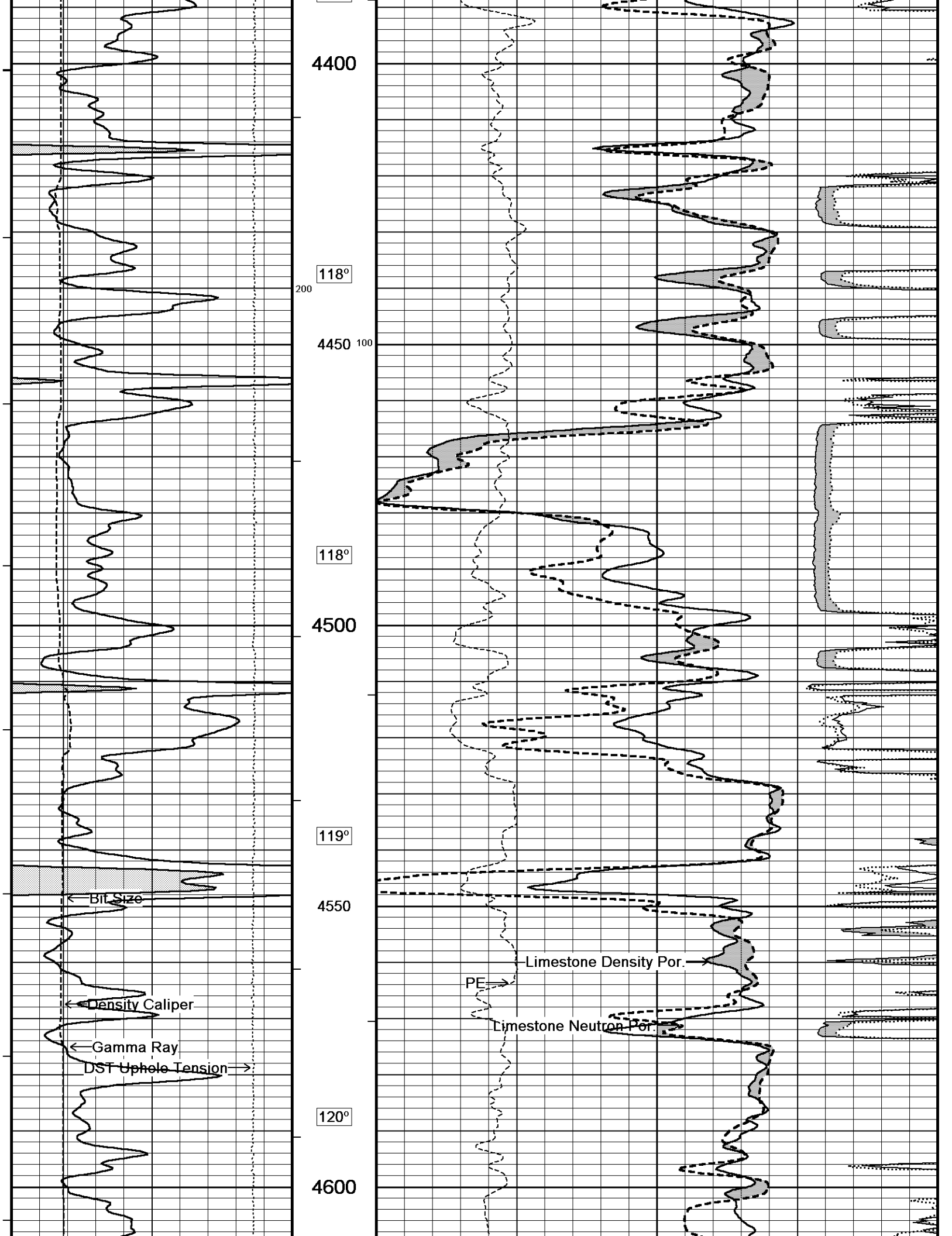
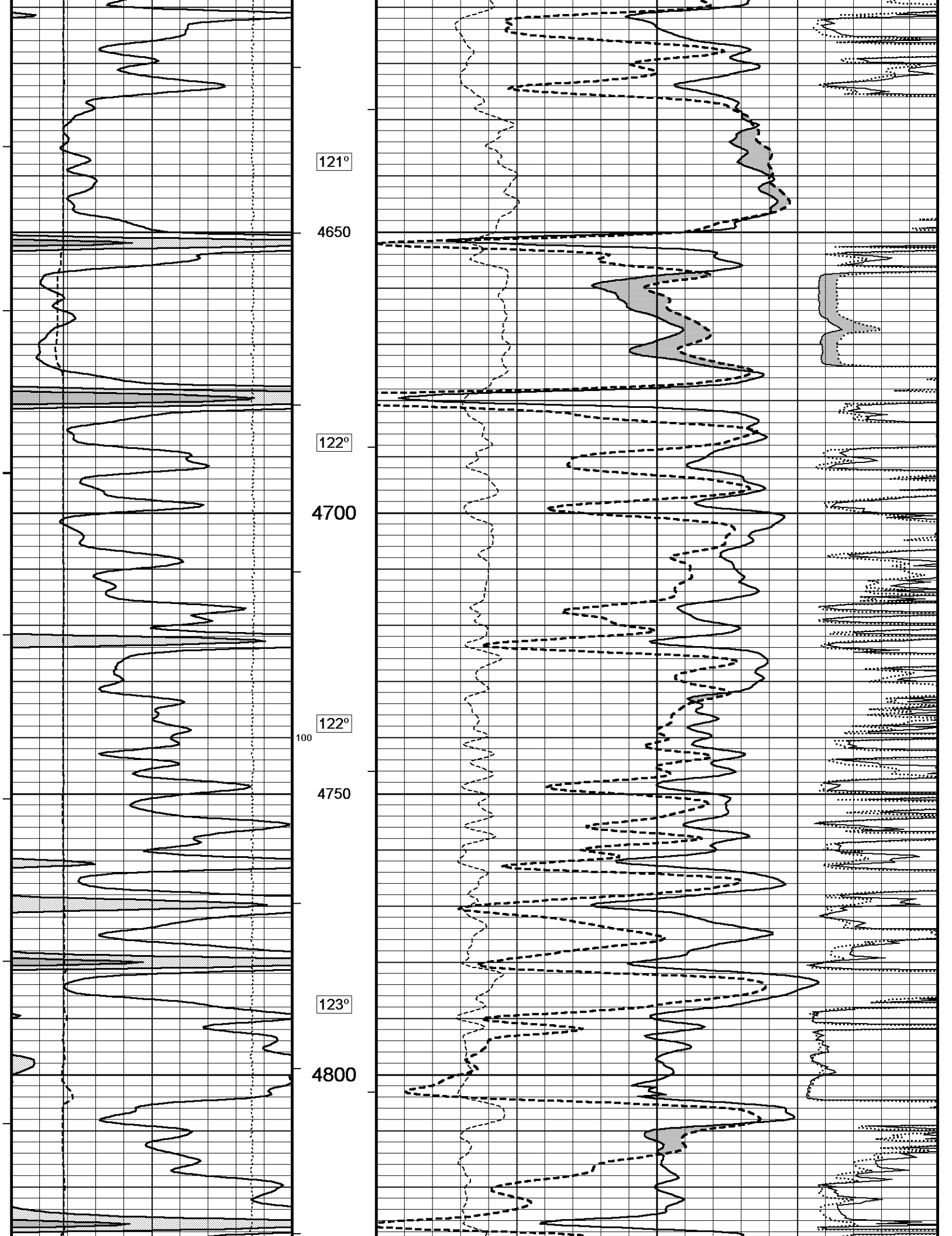
500
3550
112°
3600
112°
3650
113°
3700


113°
3750
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
114°
3800
114°
400
3850
200
114°
3900
115°
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.


3950
115°
4000
115°
4050
116°
4100
117°
300
4150
Bit Size
MMR MicroLog Inverse
Limestone Density Por.


Density Caliper
Gamma Ray
DST Uphole Tension
PE
Limestone Neutron Por
117°
4200
117°
4250
118°
4300
118°
4350
118°


4400
118°
200
4450
100
118°
4500
119°
Bit Size
4550
Density Caliper
Gamma Ray
DST Uphole Tension
120°
4600
Limestone Density Por.
PE
Limestone Neutron Por.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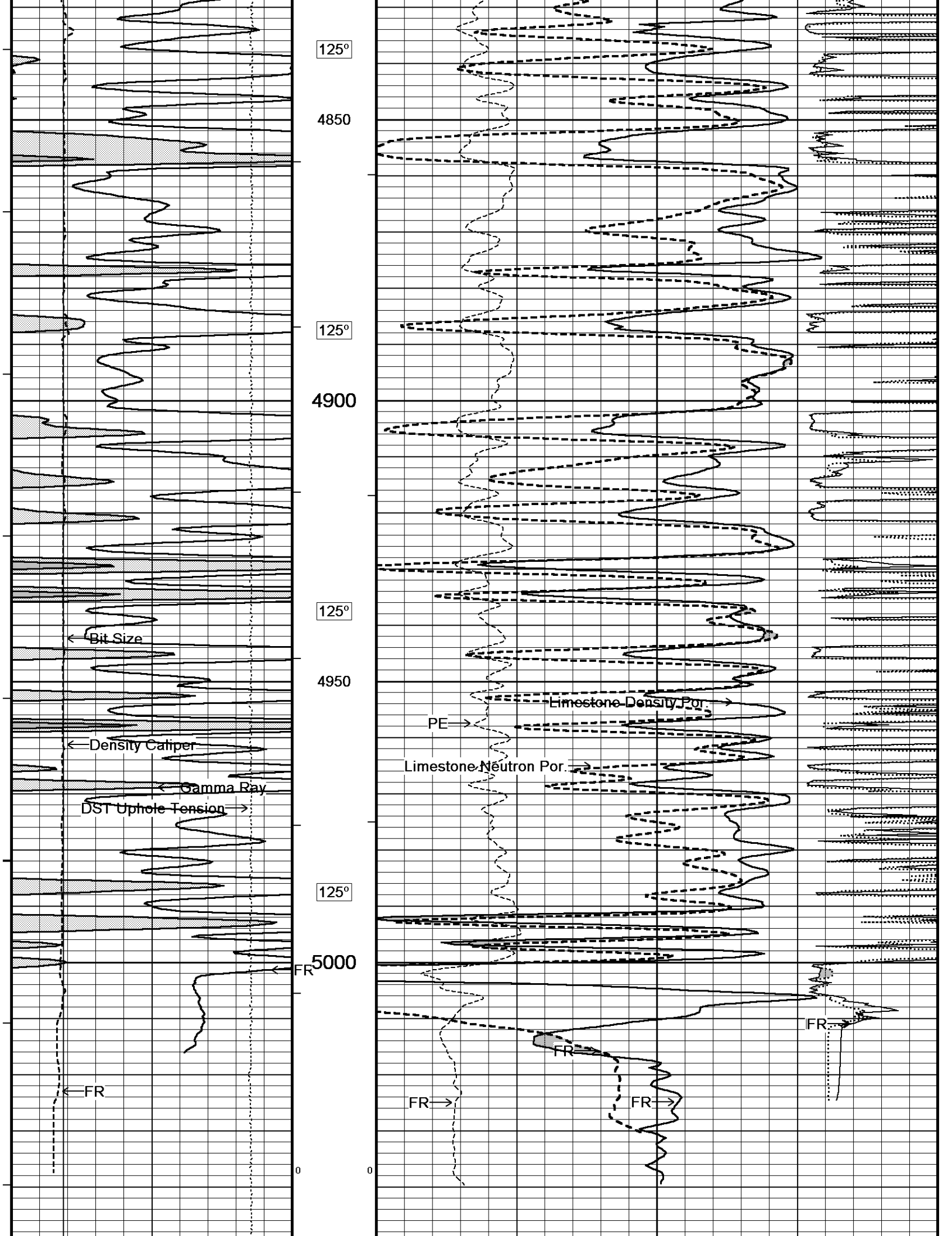
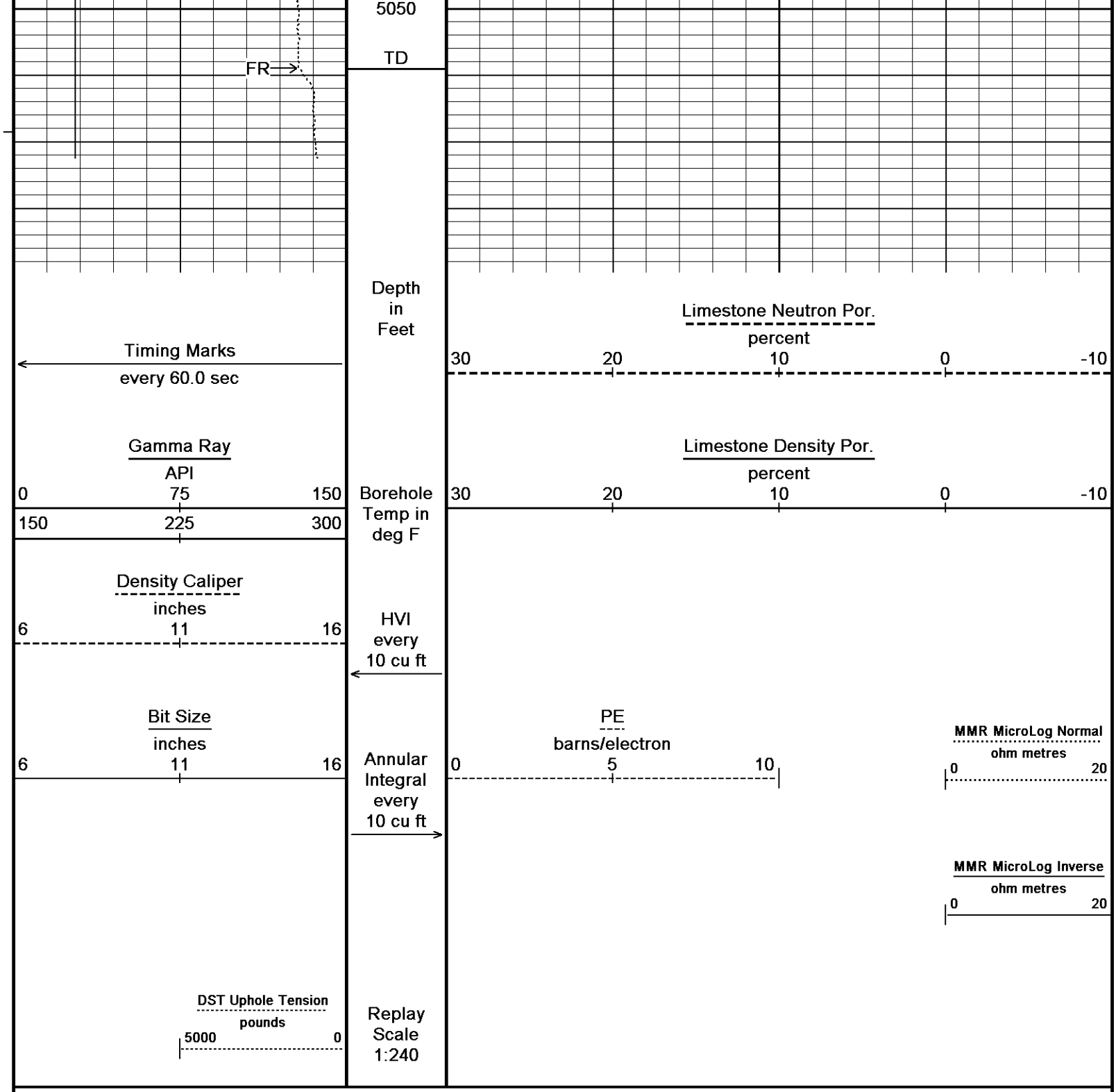
4650
122°
4700
122°
100
4750
123°
4800


125°
4850
125°
4900
125°
Bit Size
4950
Density Caliper
Gamma Ray
DST Uphole Tension
125°
5000
FR
FR
0
Limestone Density Por.
PE
Limestone Neutron Por.
FR
FR
FR
FR
0



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19

Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_003.dta — Recorded on 09-OCT-2018 17:22

System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

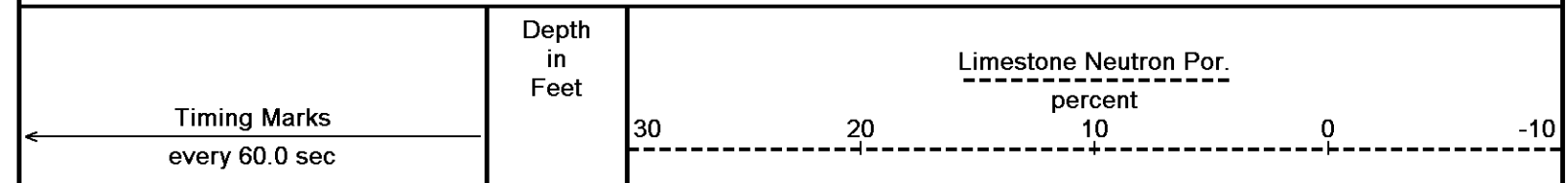
5 INCH LIMESTONE MAIN

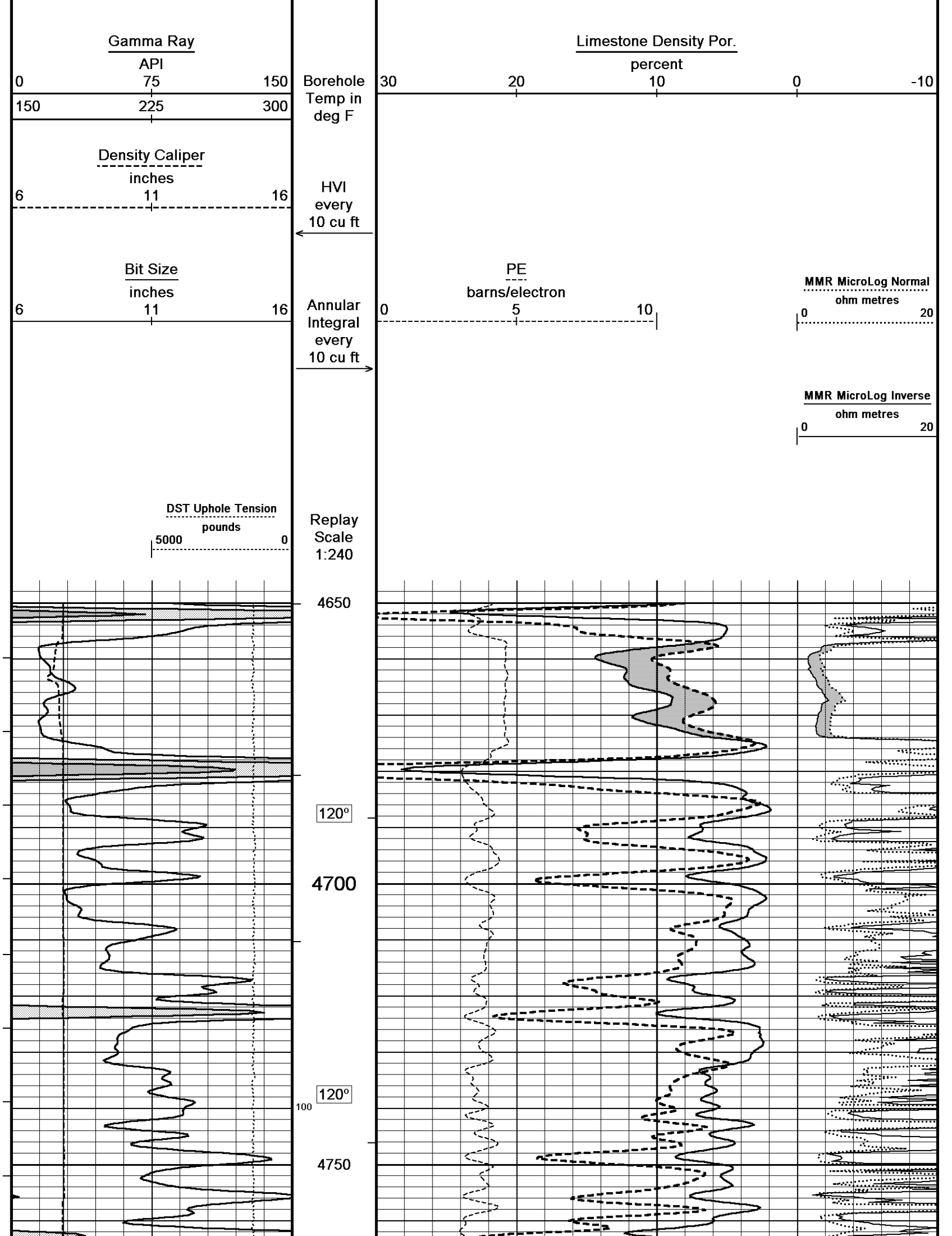
REPEAT SECTION

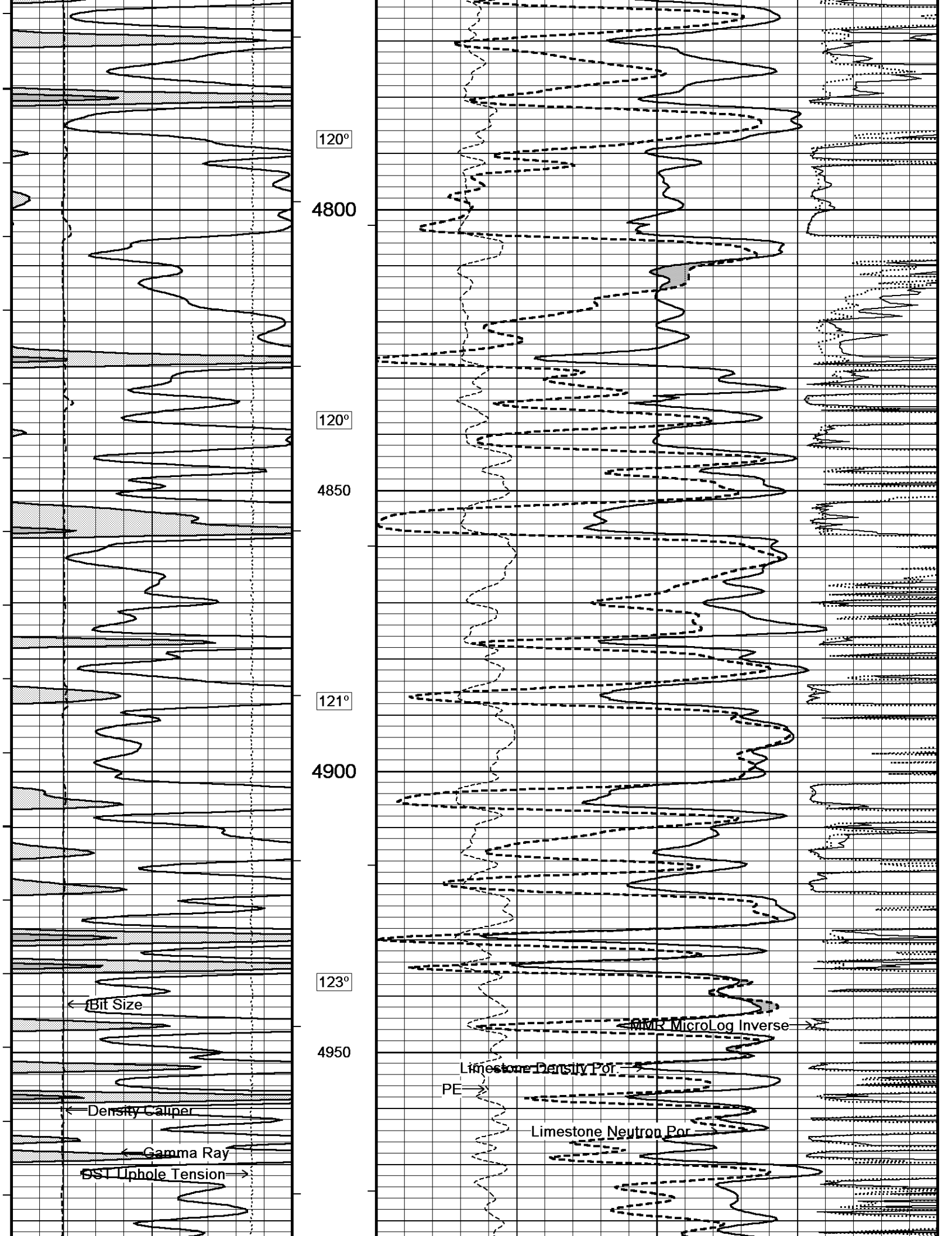
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19

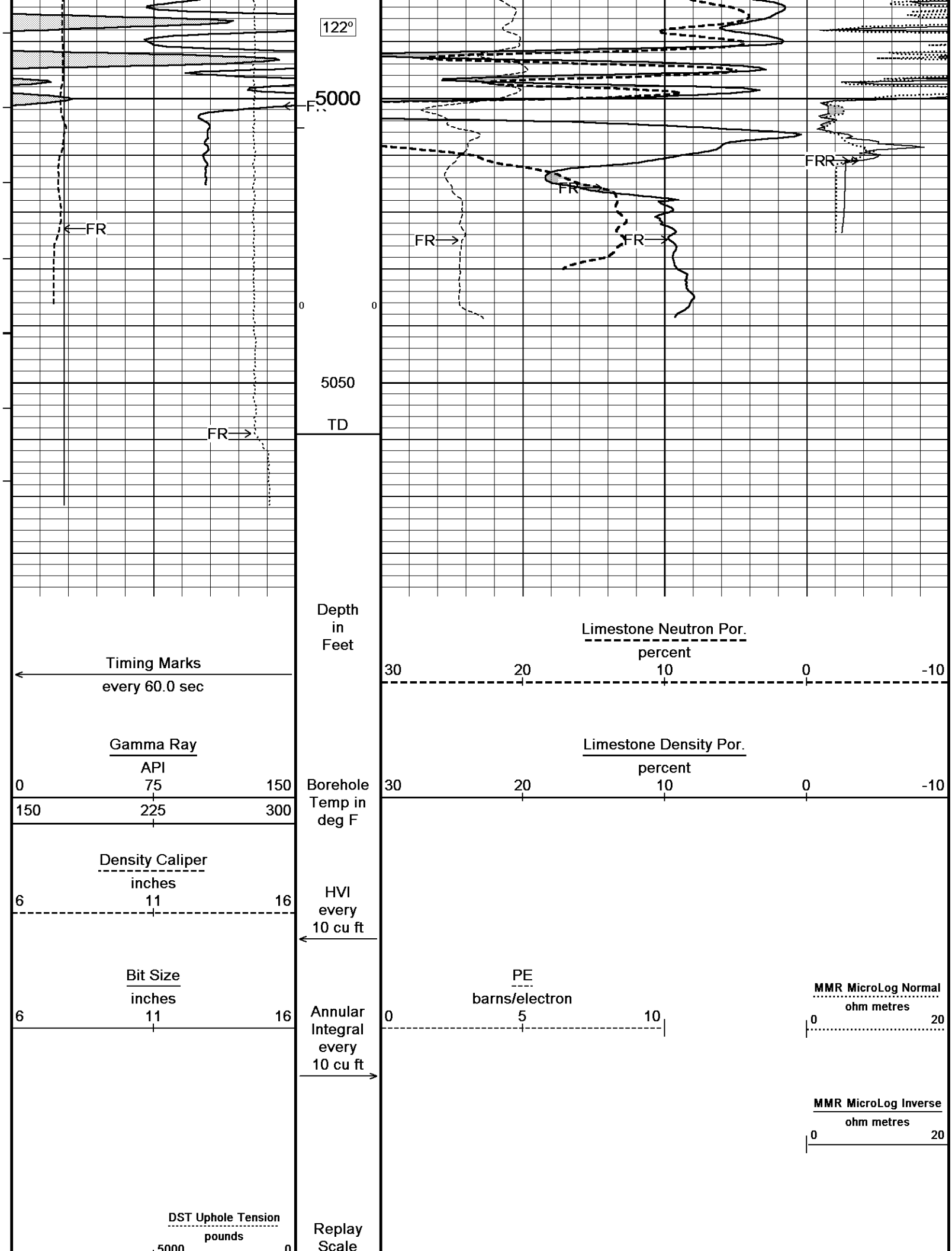
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_002.dta — Recorded on 09-OCT-2018 16:19

System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344




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
inches
6
11
16
Annular Integral every 10 cu ft
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 1:240
4650
120°
4700
120°
100
4750


120°
4800
120°
4850
121°
4900
123°
4950
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
Limestone Density Por
PE
Limestone Neutron Por


122°
5000
FR
FR
FR
FR
FR
FRR
0
0
5050
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
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
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
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_002.dta
System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

Plotted on 10-OCT-2018 03:19
Recorded on 09-OCT-2018 16:19

REPEAT SECTION

10 INCH HIGH RESOLUTION

Depth Based Data - Maximum Sampling Increment 2.5cm
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_001.dta
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 10-OCT-2018 03:19
Recorded on 09-OCT-2018 16:19

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
inches
6 11 16

Annular Integral every 10 cu ft

DST Uphole Tension
pounds
5000 0

Replay Scale 1:120

4650

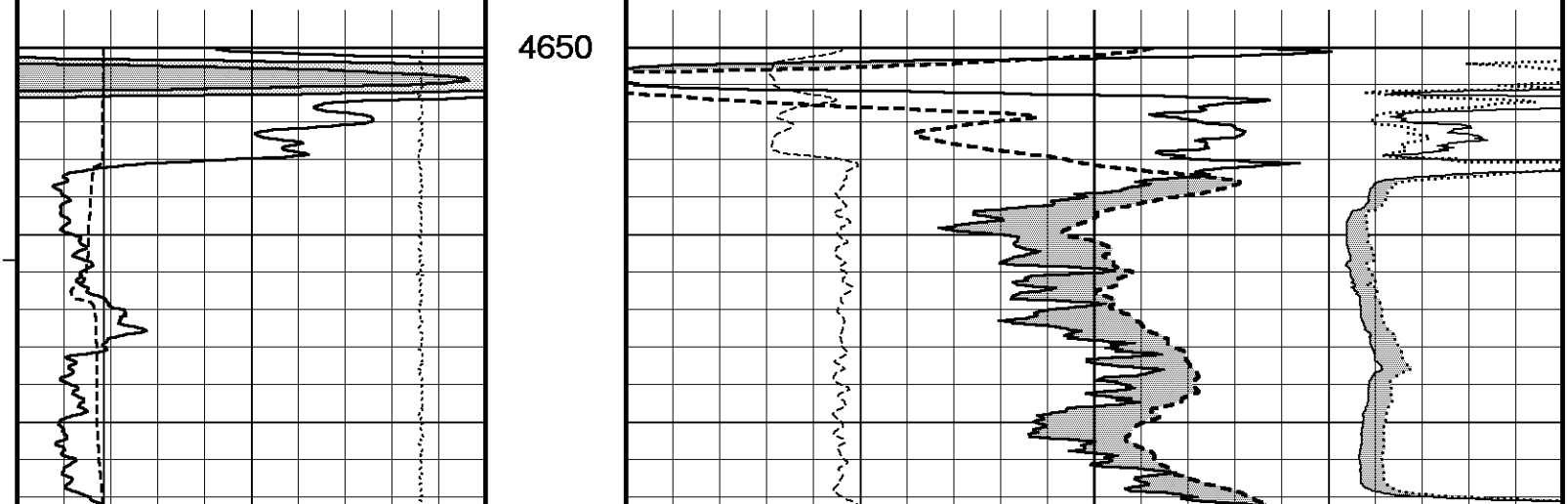
Limestone Neutron Por.
percent
30 20 10 0 -10

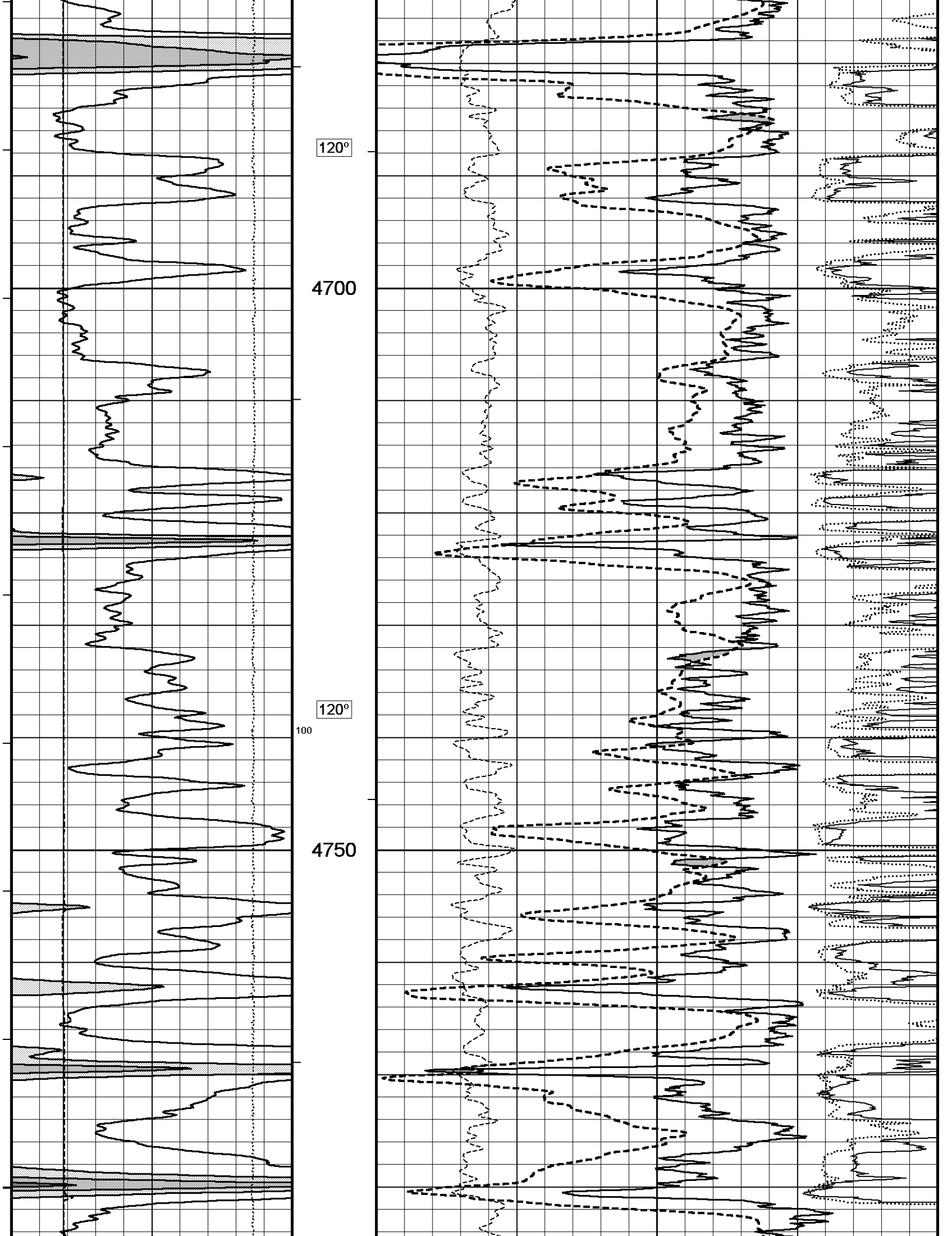
Limestone Density Por.
percent
30 20 10 0 -10

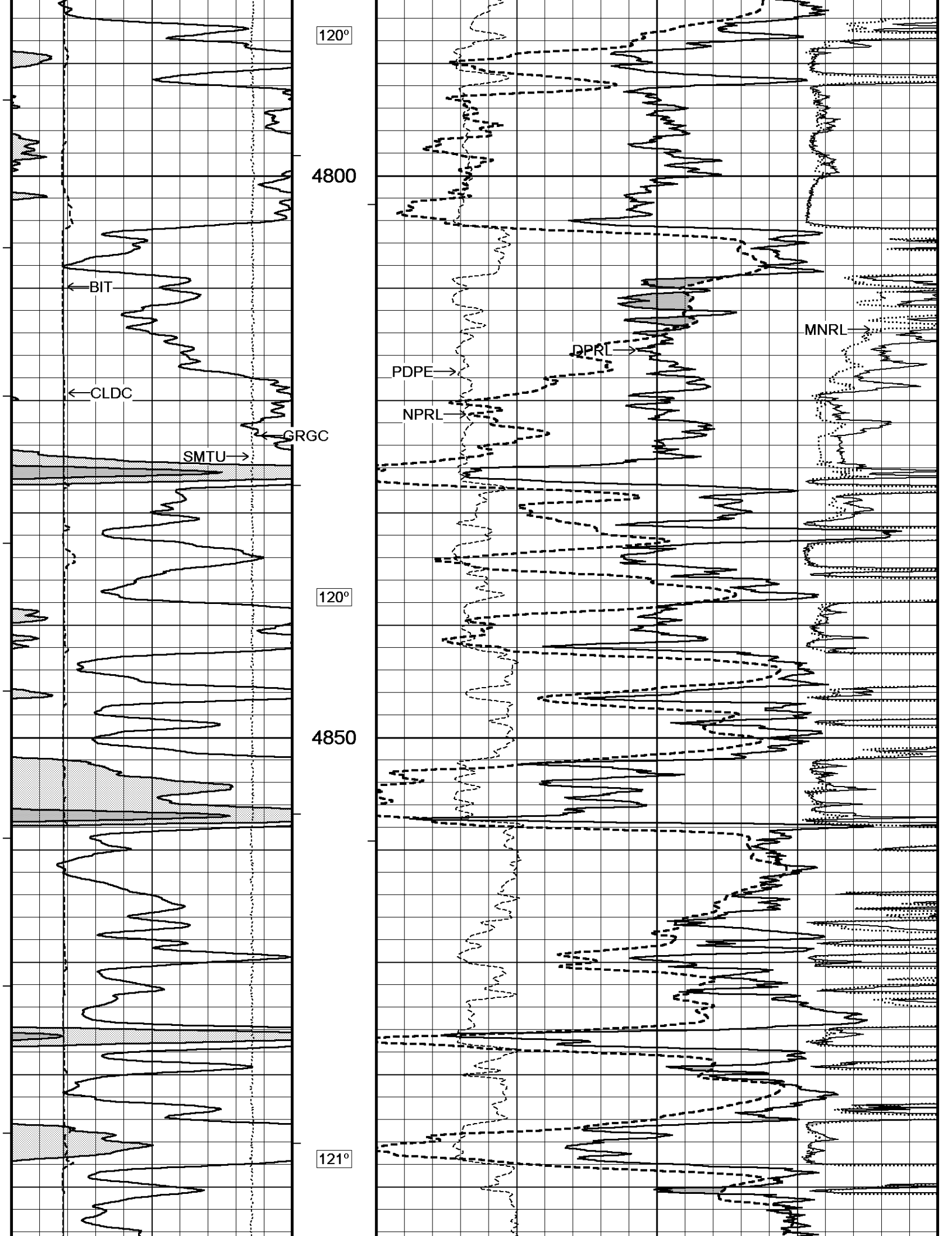
PE
barns/electron
0 5 10

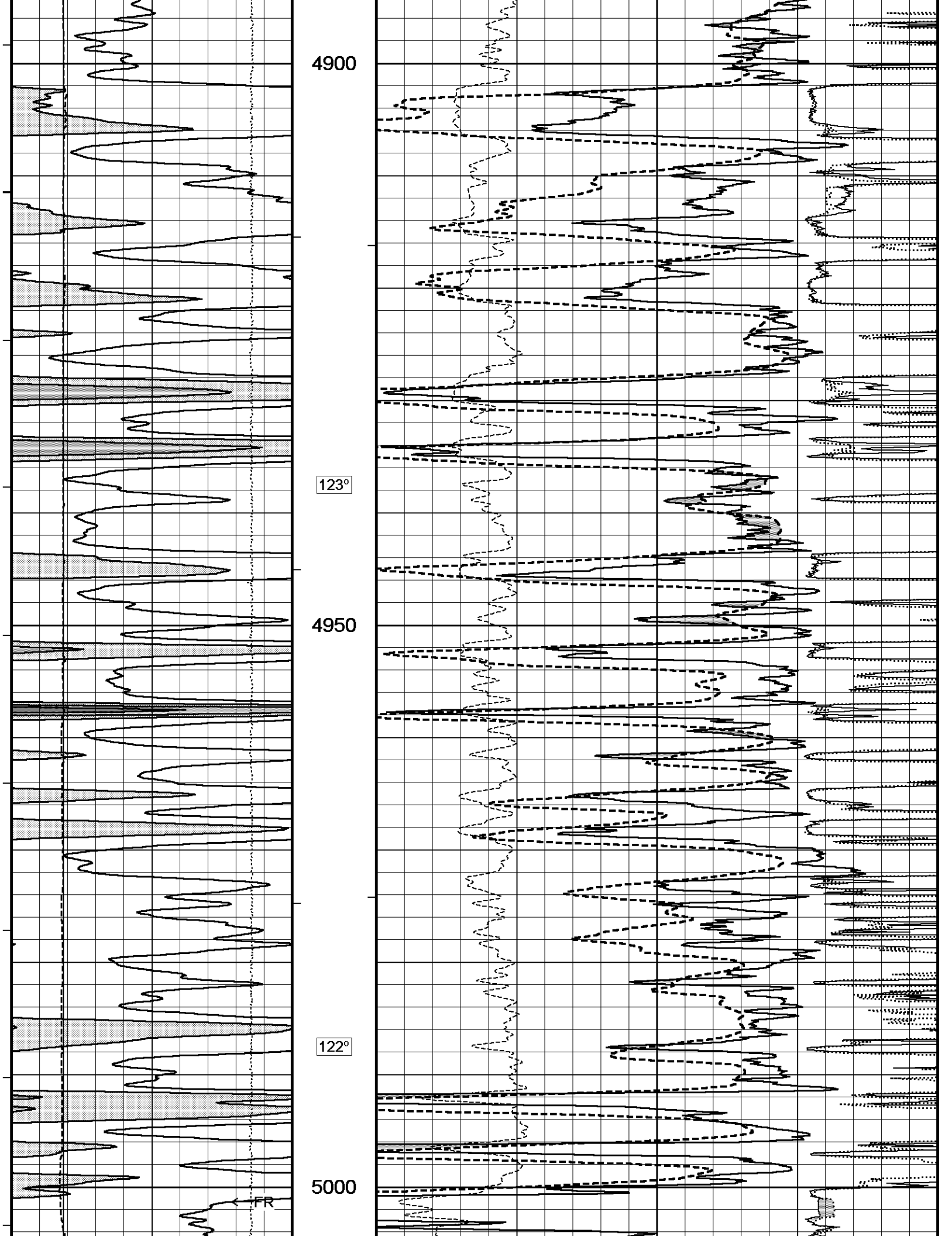
MMR MicroLog Normal
ohm metres
0 20

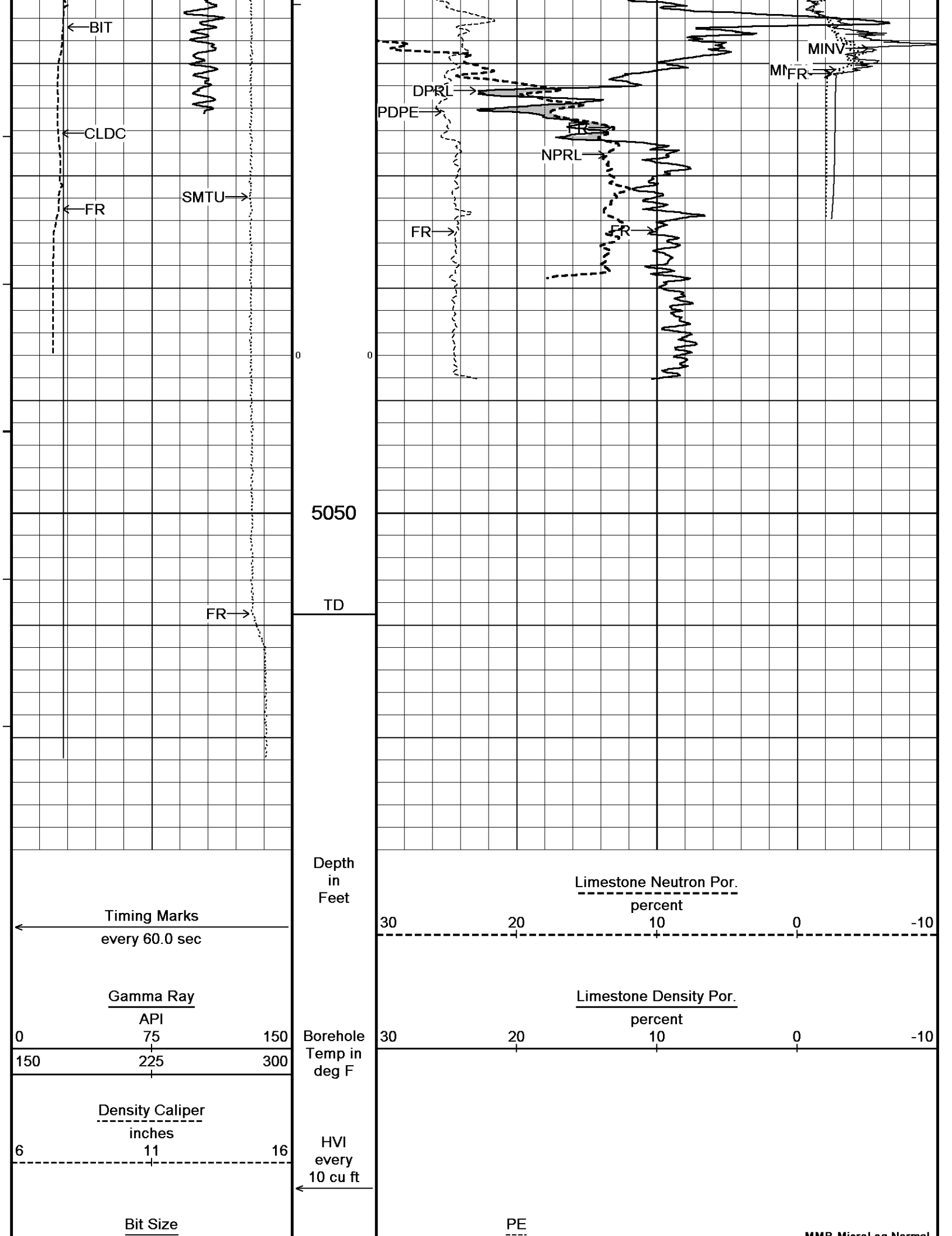
MMR MicroLog Inverse
ohm metres
0 20




120º
4700
120º
100
4750


120º
4800
BIT
CLDC
GRGC
SMTU
120º
4850
121º
MNRL
DPRL
PDPE
NPRL


4900
123°
4950
122°
5000
FR


BIT
CLDC
FR
SMTU
FR
0
0
5050
TD
DPRL
PDPE
FR
NPRL
FR
FR
MINV
MI
FR
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
PE

inches
6 11 16

Annular Integral every 10 cu ft

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

Depth Based Data - Maximum Sampling Increment 2.5cm — Plotted on 10-OCT-2018 03:19
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_001.dta — Recorded on 09-OCT-2018 16:19
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

10 INCH HIGH RESOLUTION

5 INCH BULK DENSITY MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_003.dta — Recorded on 09-OCT-2018 17:22
System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

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

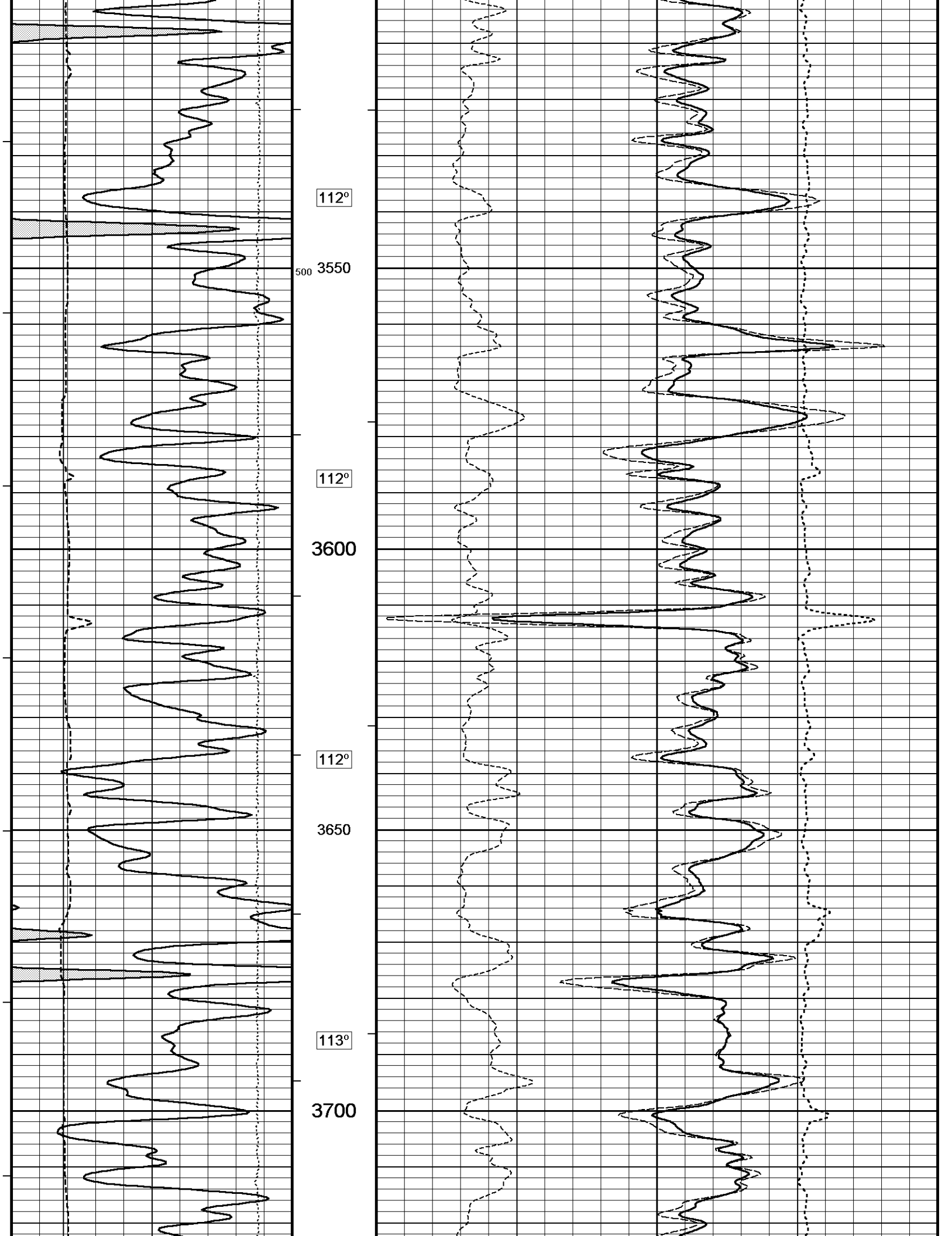
PE
barns/electron
0 5 10

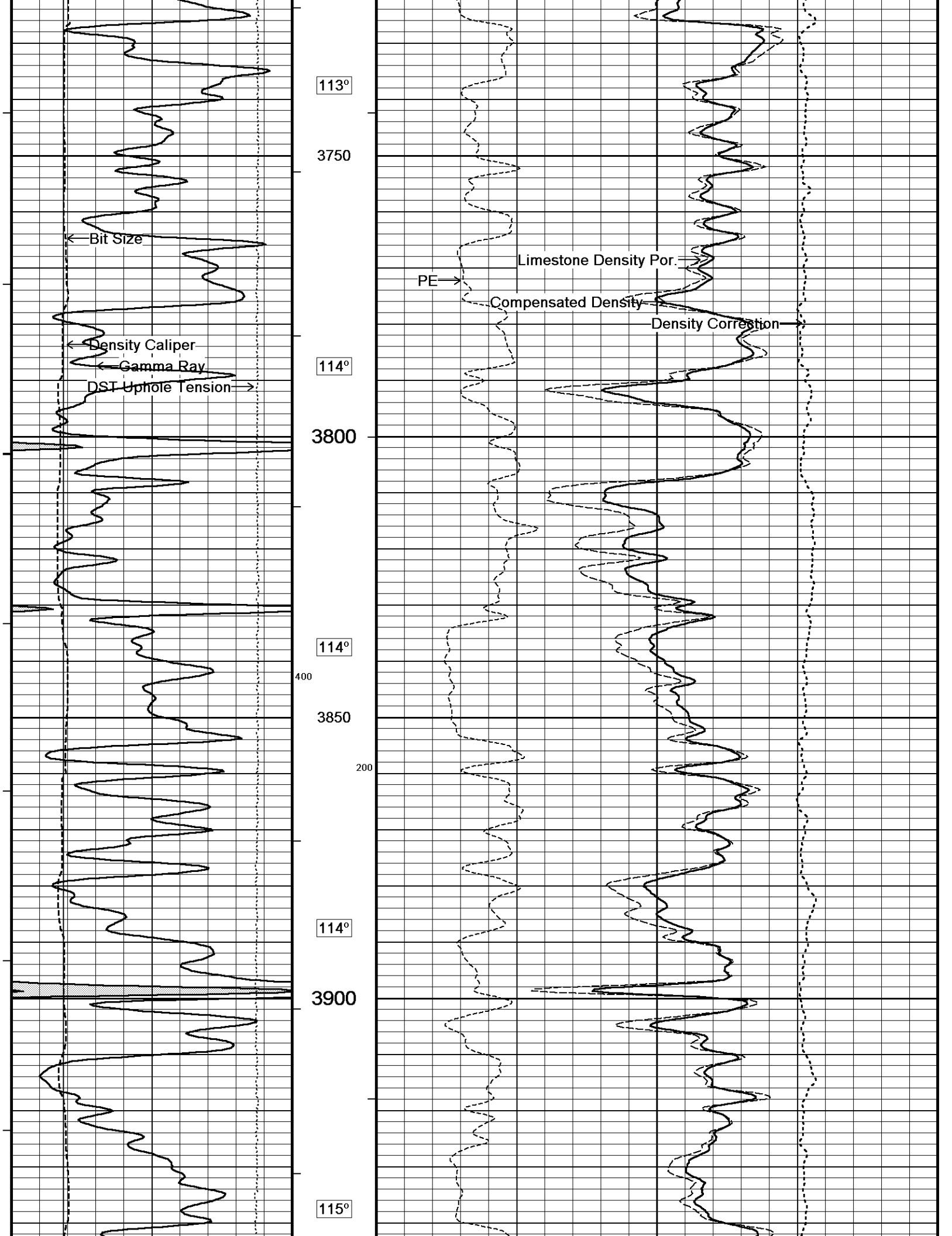
Density Correction
grams/cc
-0.50 0 0.50

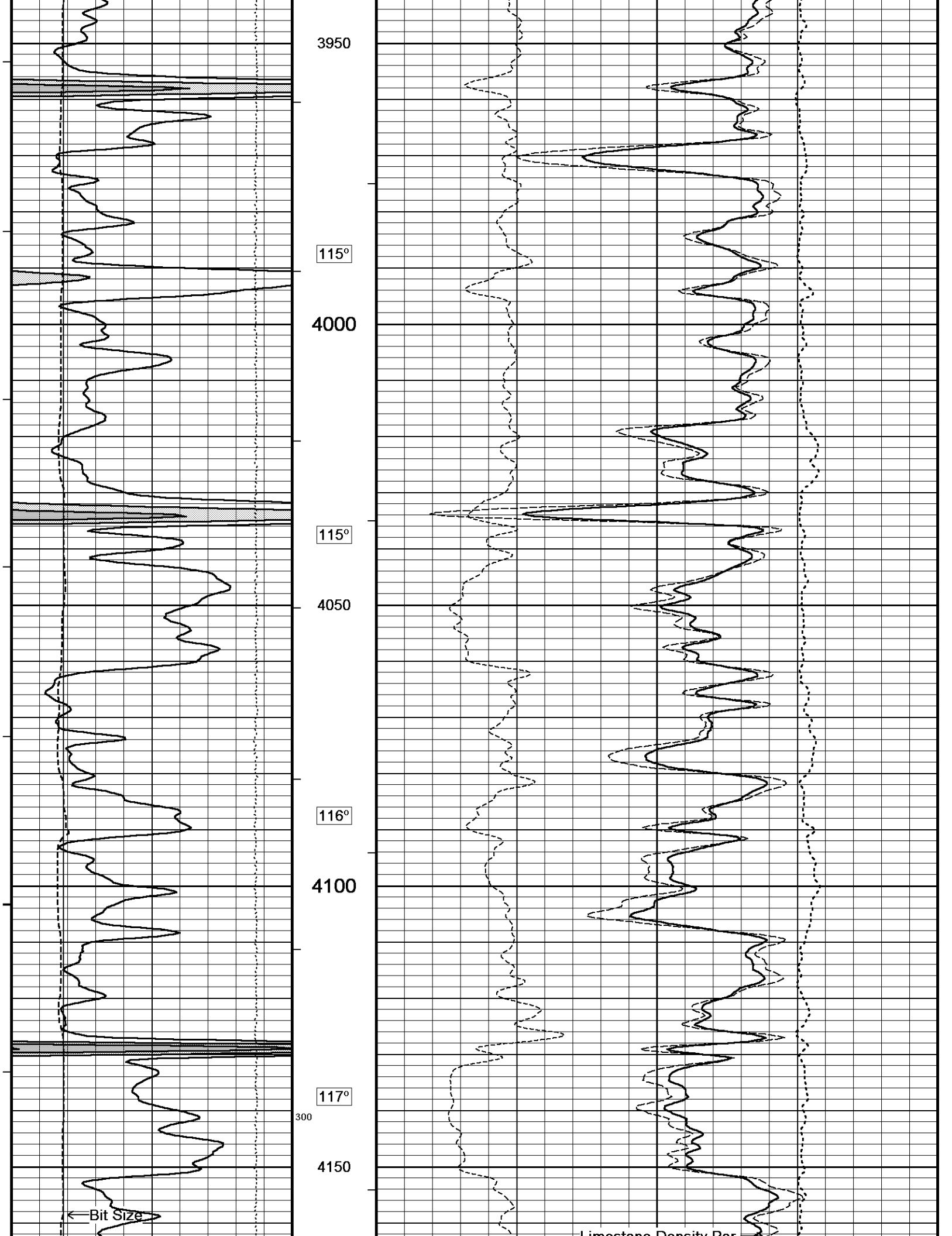
DST Uphole Tension
pounds
5000 0

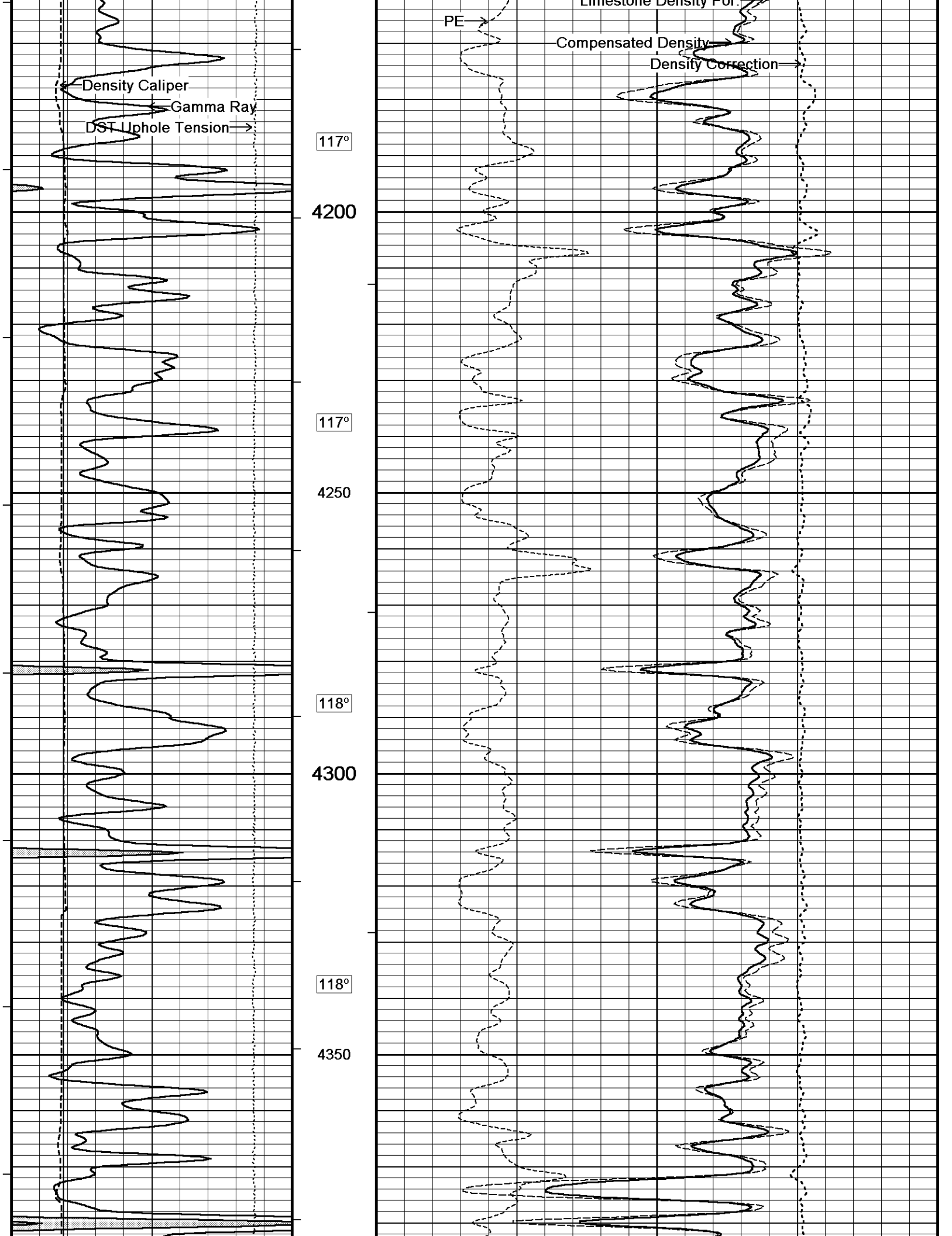
Replay Scale 1:240

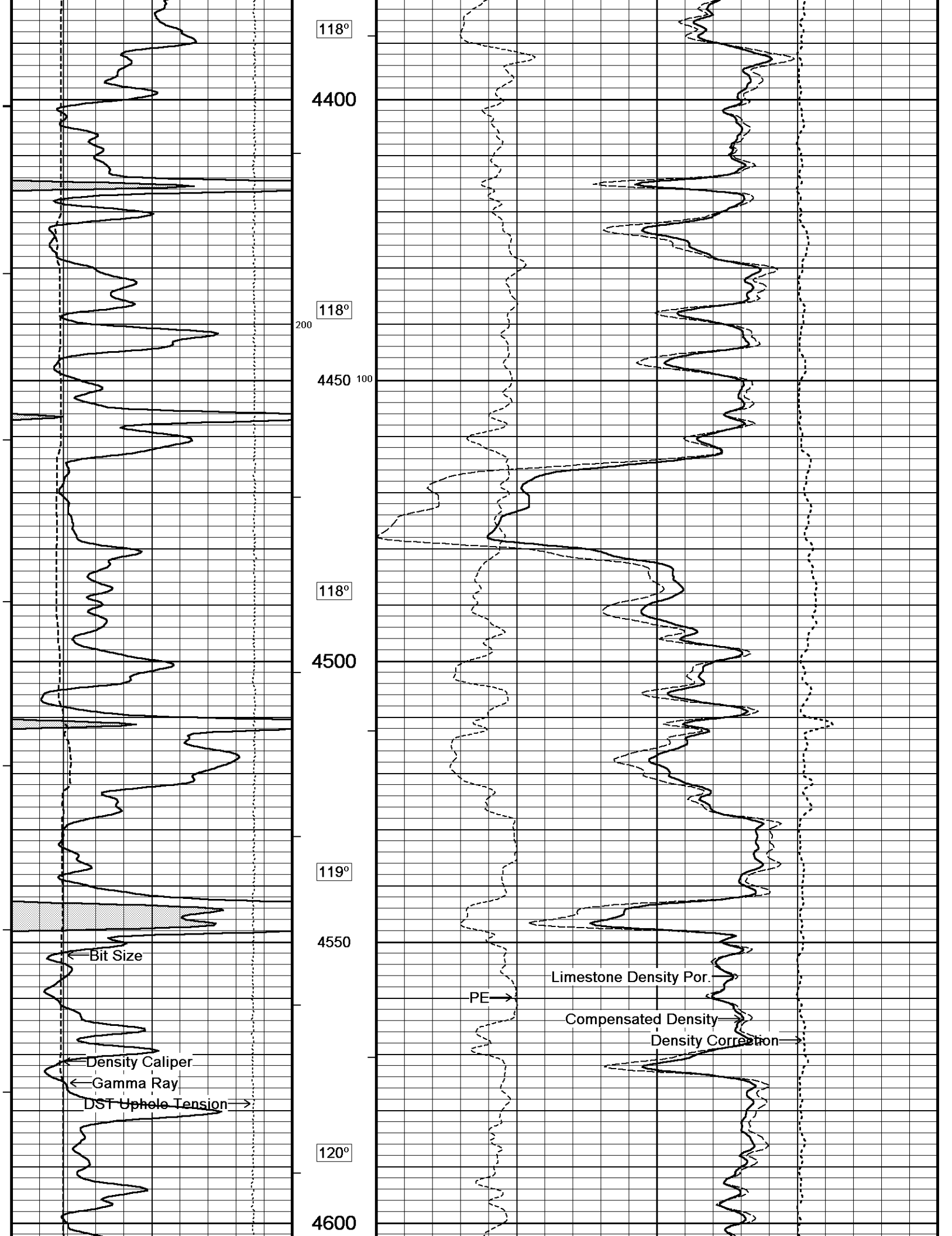
3500

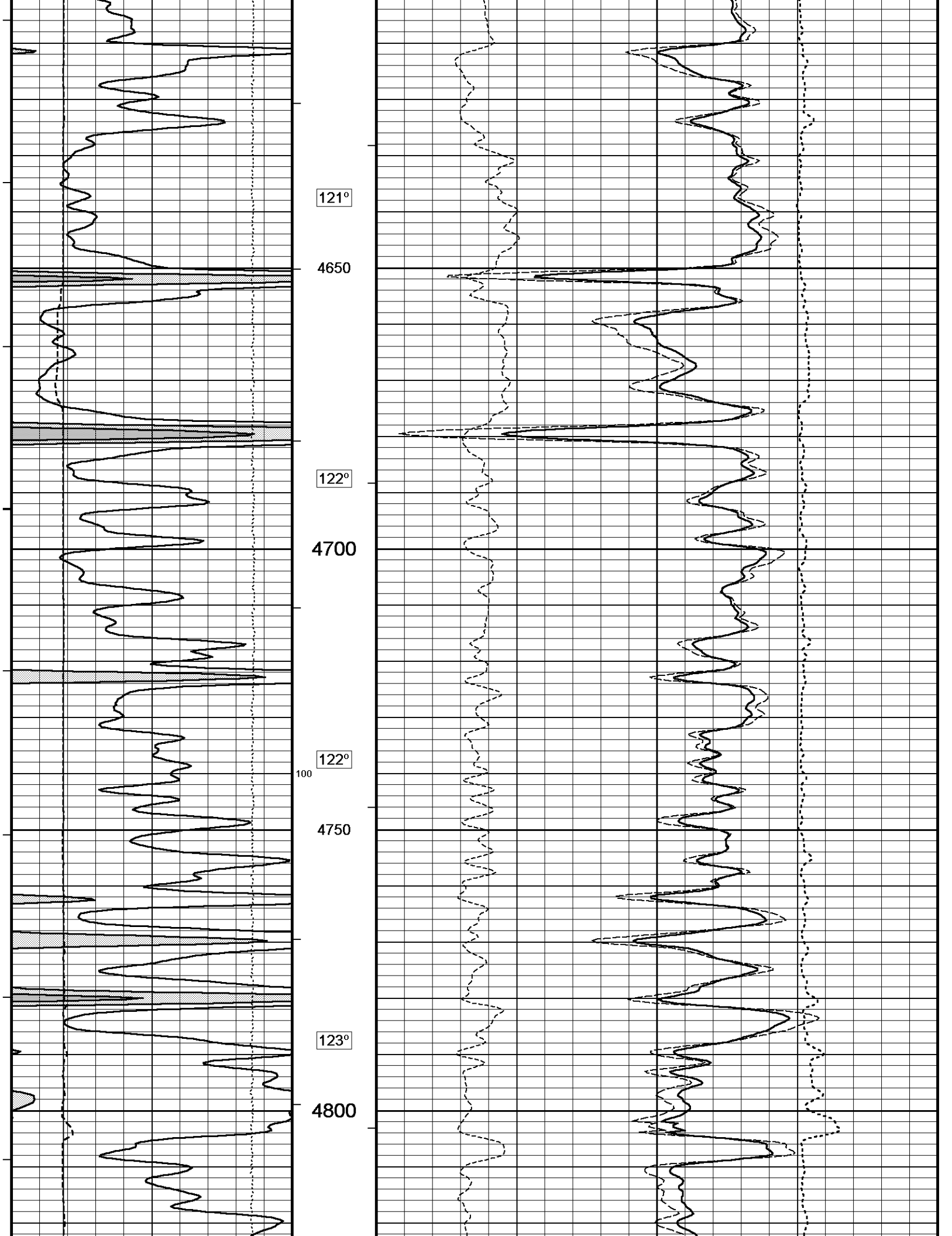

112°
500
3550
112°
3600
112°
3650
113°
3700

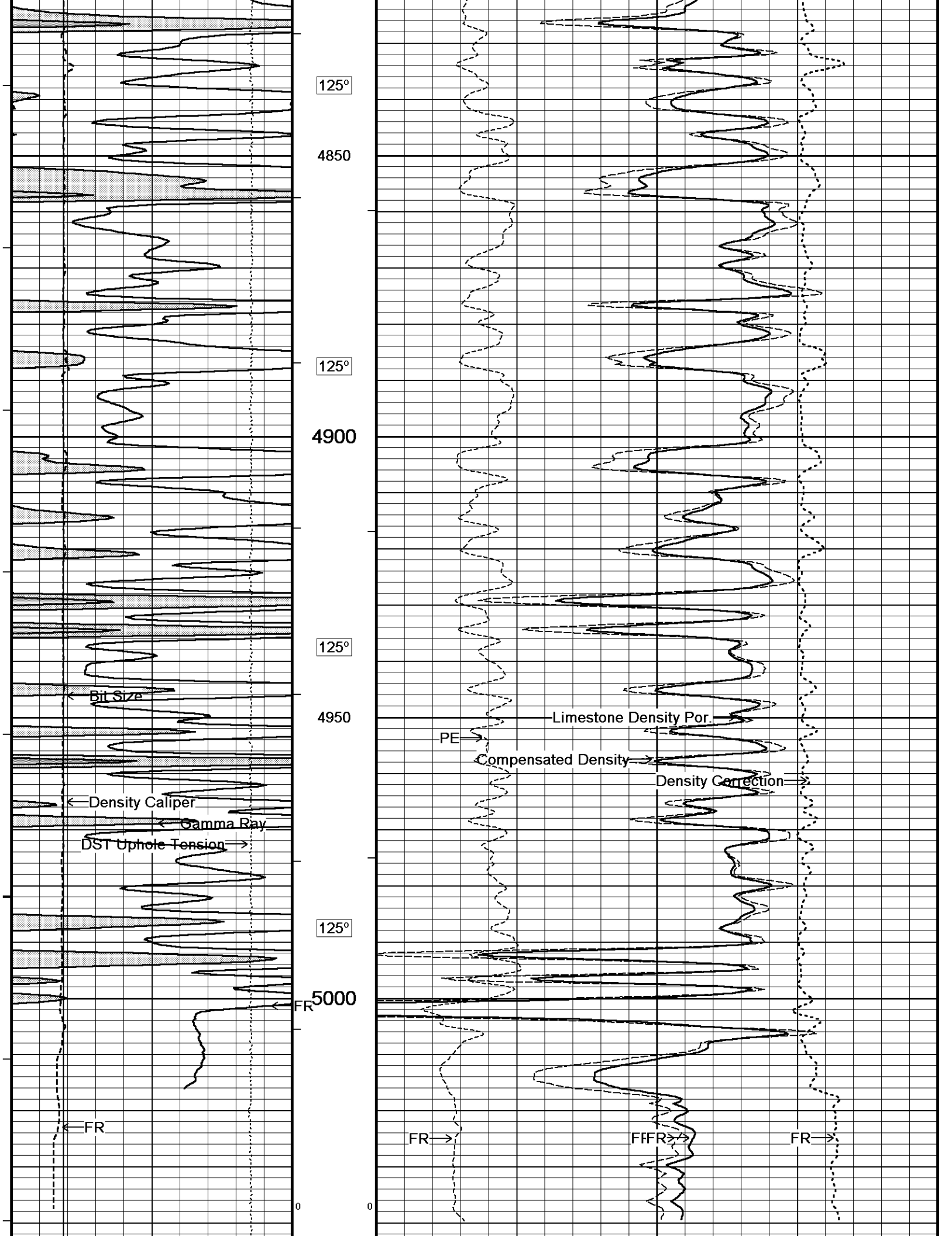

113°
3750
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
114°
3800
114°
400
3850
200
114°
3900
115°
Limestone Density Por.
PE
Compensated Density
Density Correction

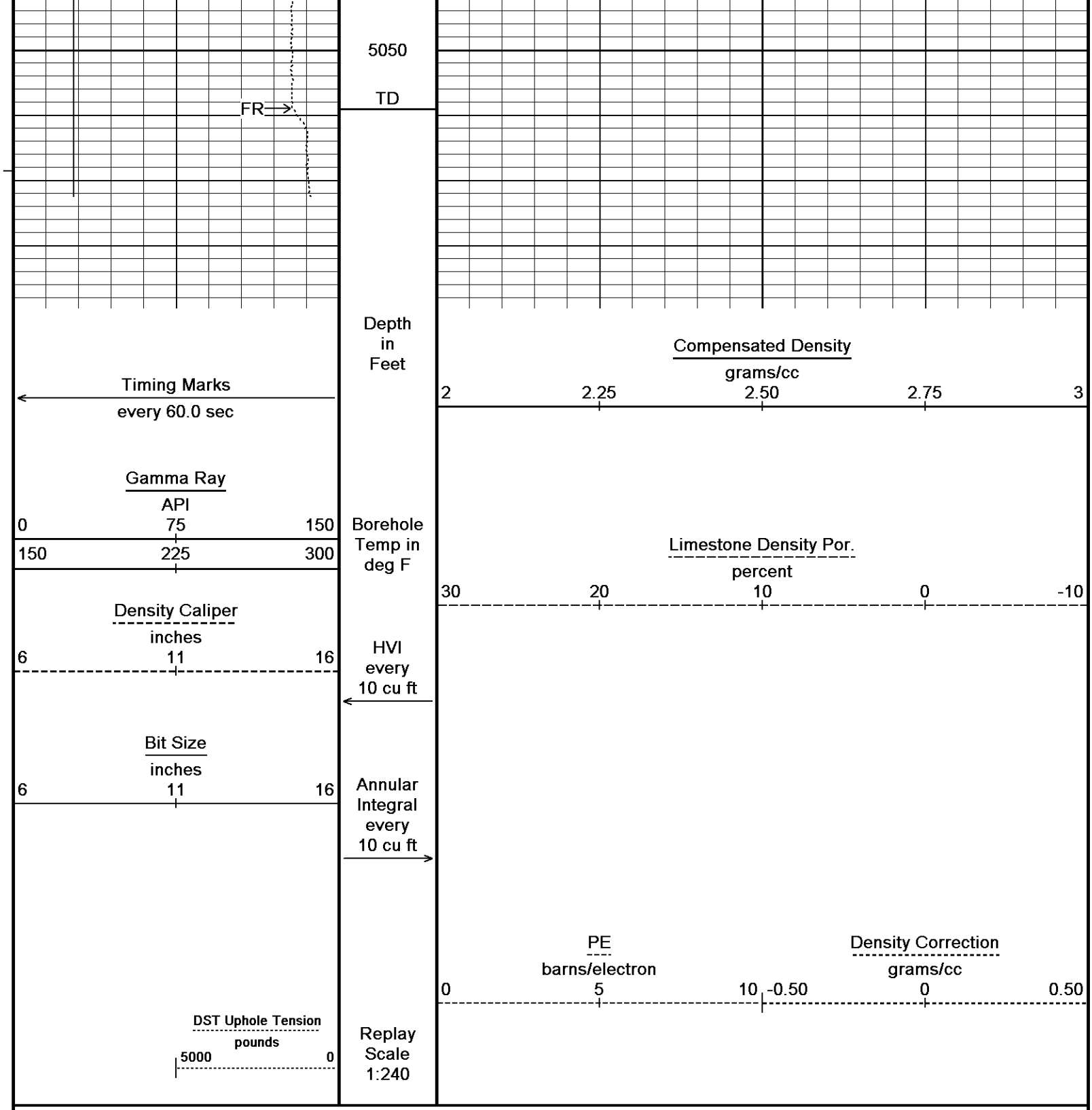

3950
115°
4000
115°
4050
116°
4100
117°
300
4150
Bit Size
Limestone Density Por


Density Caliper
Gamma Ray
DST Uphole Tension
117°
4200
117°
4250
118°
4300
118°
4350
PE
Limestone Density Por.
Compensated Density
Density Correction


118°
4400
118°
200
4450
100
118°
4500
119°
4550
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
120°
4600
PE
Limestone Density Por.
Compensated Density
Density Correction


121°
4650
122°
4700
122°
100
4750
123°
4800


125°
4850
125°
4900
125°
Bit Size
4950
Density Caliper
Gamma Ray
DST Uphole Tension
125°
5000
FR
FR
0
0
Limestone Density Por.
PE
Compensated Density
Density Correction
FR
FFFR
FR



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19

Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_003.dta — Recorded on 09-OCT-2018 17:22

System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

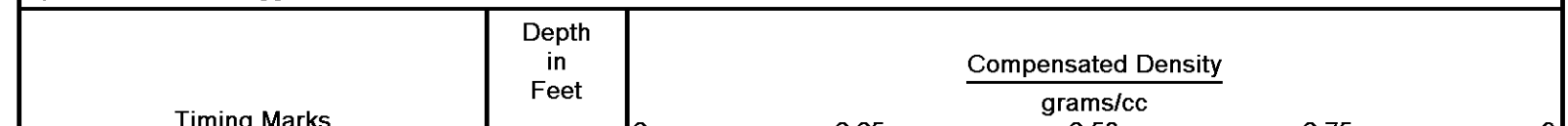
5 INCH BULK DENSITY MAIN

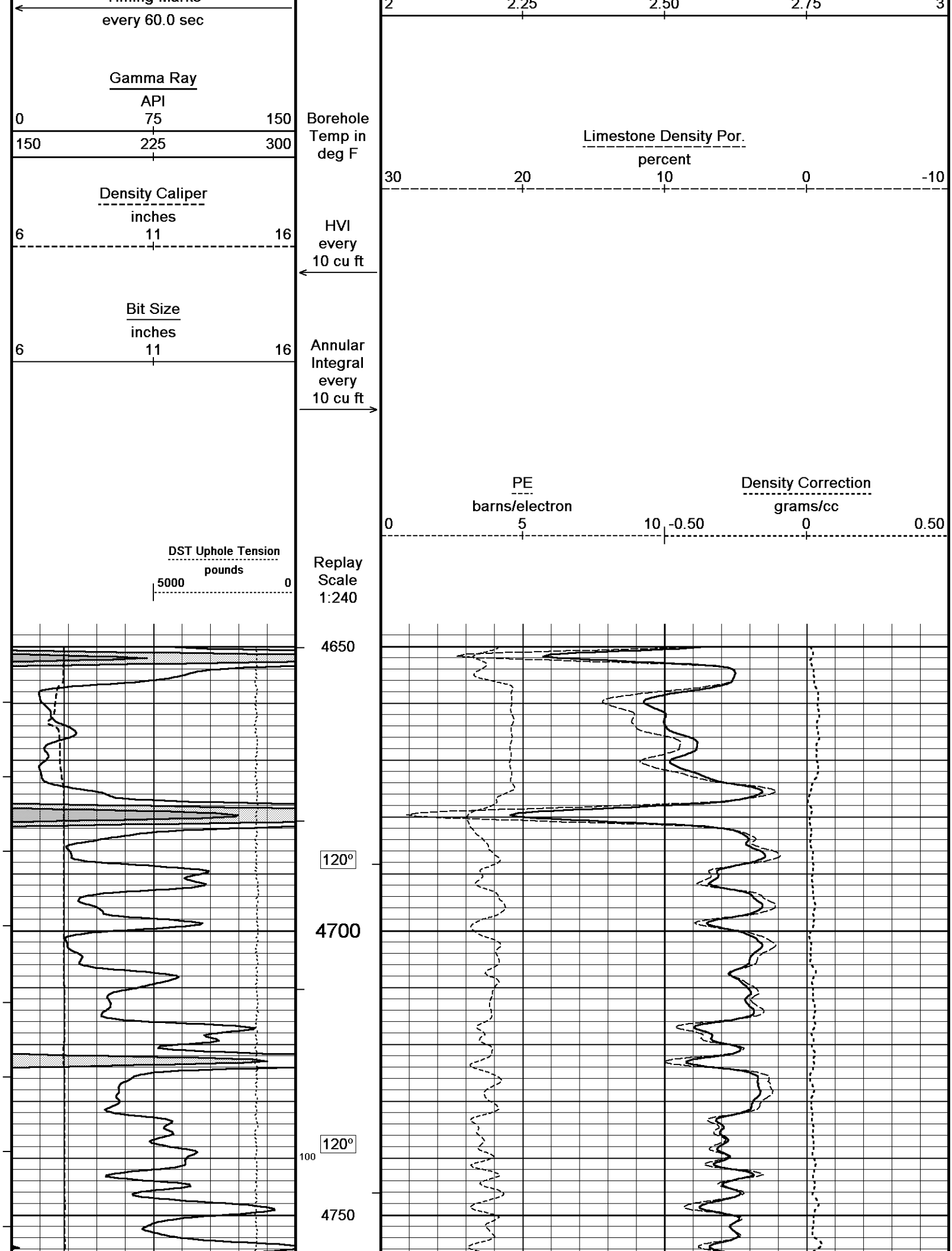
REPEAT SECTION

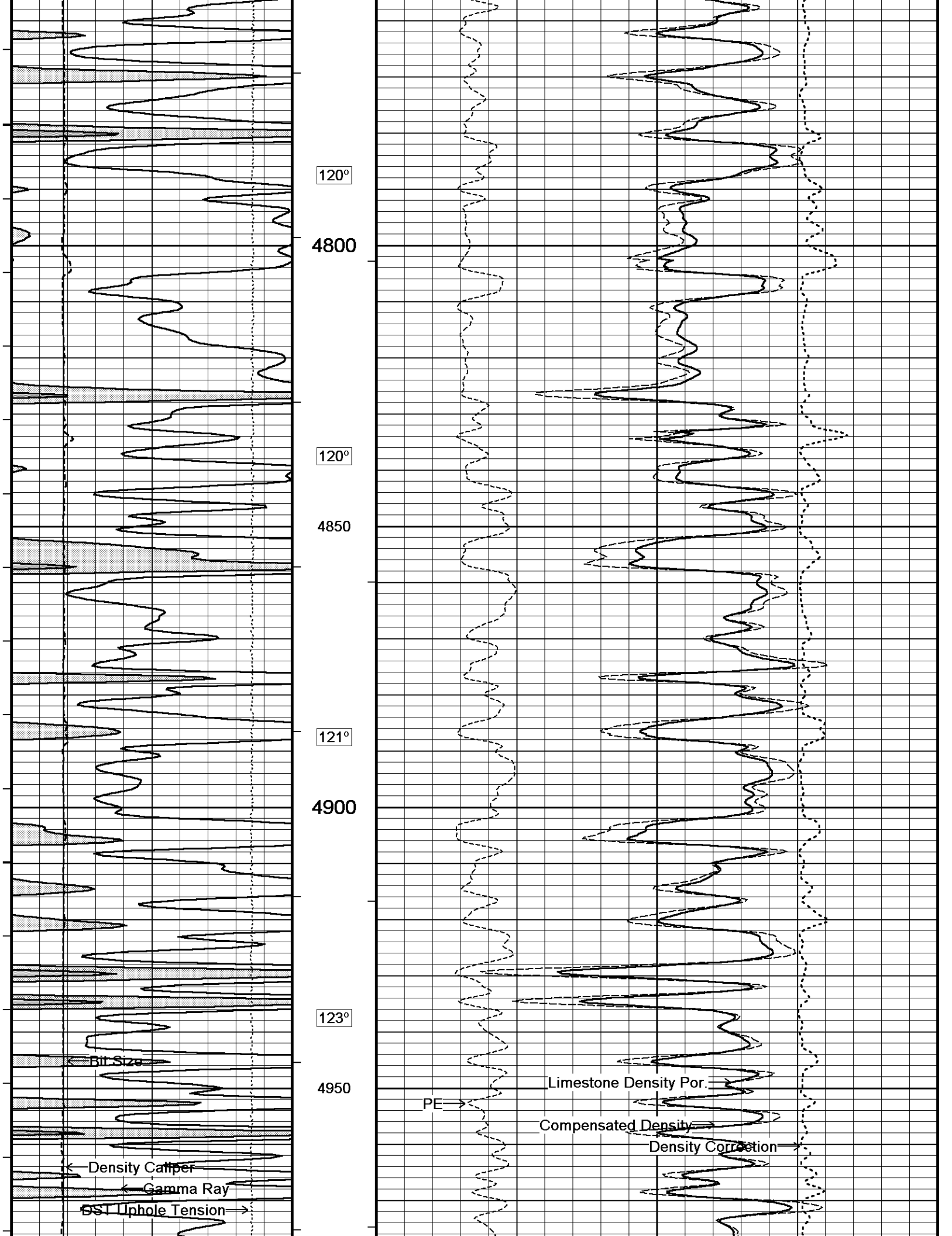
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19

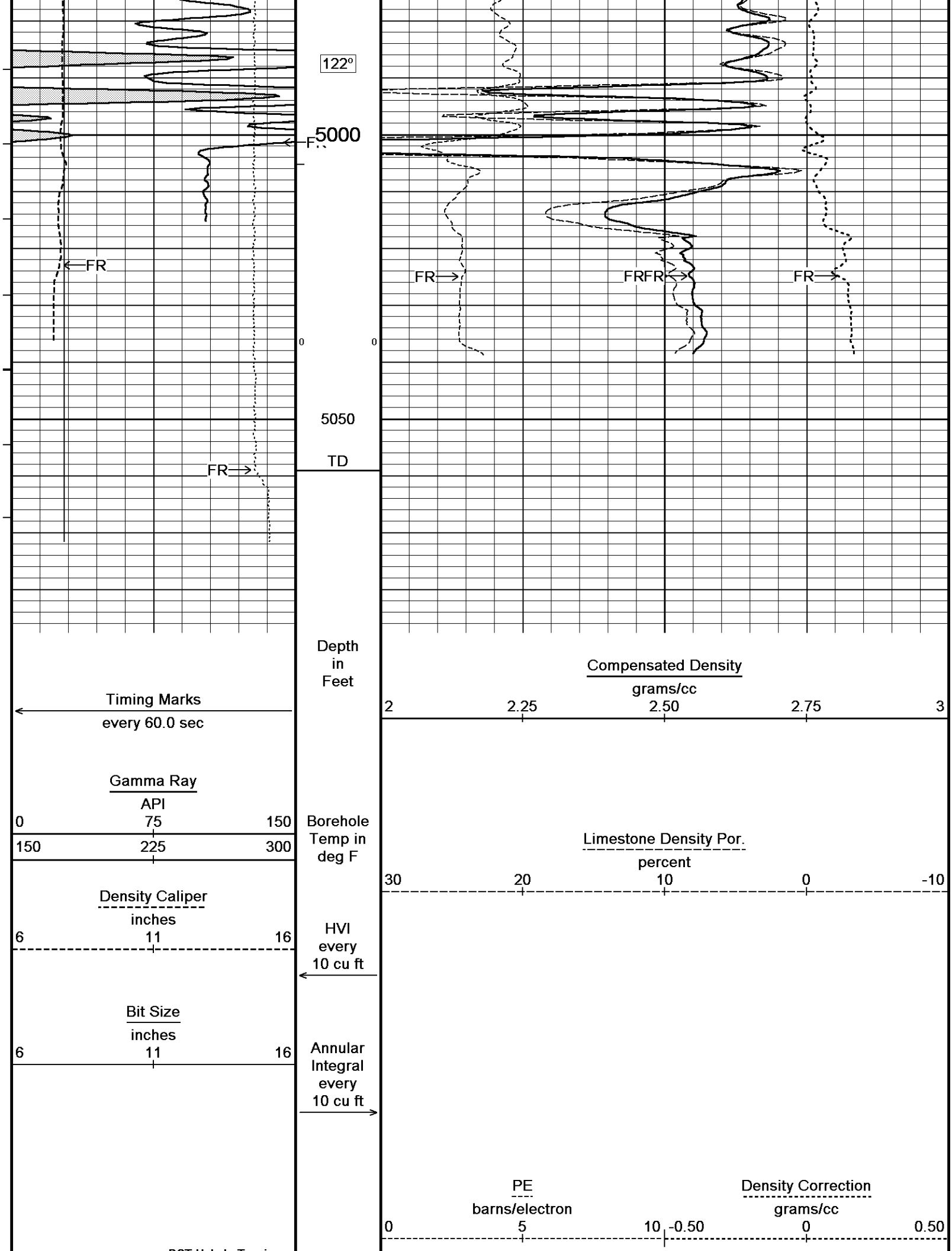
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_002.dta — Recorded on 09-OCT-2018 16:19

System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344




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
inches
6
11
16
Annular Integral every 10 cu ft
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
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
4650
120°
4700
120°
100
4750


120°
4800
120°
4850
121°
4900
123°
4950
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
PE
Limestone Density Por.
Compensated Density
Density Correction


122°
5000
FR
FR
FR
FRFR
FR
FR
0
0
5050
TD
Depth in Feet
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Timing Marks
every 60.0 sec
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

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 10-OCT-2018 03:19
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_002.dta — Recorded on 09-OCT-2018 16:19
System Versions: Logged with 18.03.9344 Processed with 18.03.9344 Plotted with 18.03.9344

REPEAT SECTION

10 INCH HIGH RESOLUTION

Depth Based Data - Maximum Sampling Increment 2.5cm — Plotted on 10-OCT-2018 03:19
Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_001.dta — Recorded on 09-OCT-2018 16:19
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

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
inches
6 11 16

Annular Integral every 10 cu ft

Vectar Processed Density
grams/cc
2 2.25 2.50 2.75 3

Limestone Density Por.
percent
30 20 10 0 -10

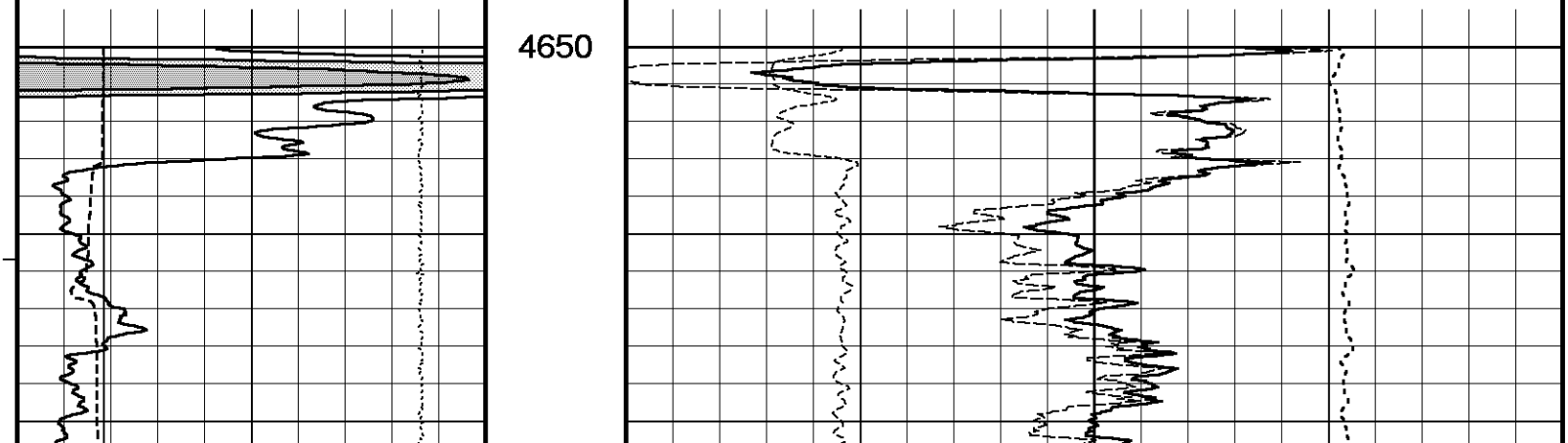
PE
barns/electron
0 5 10

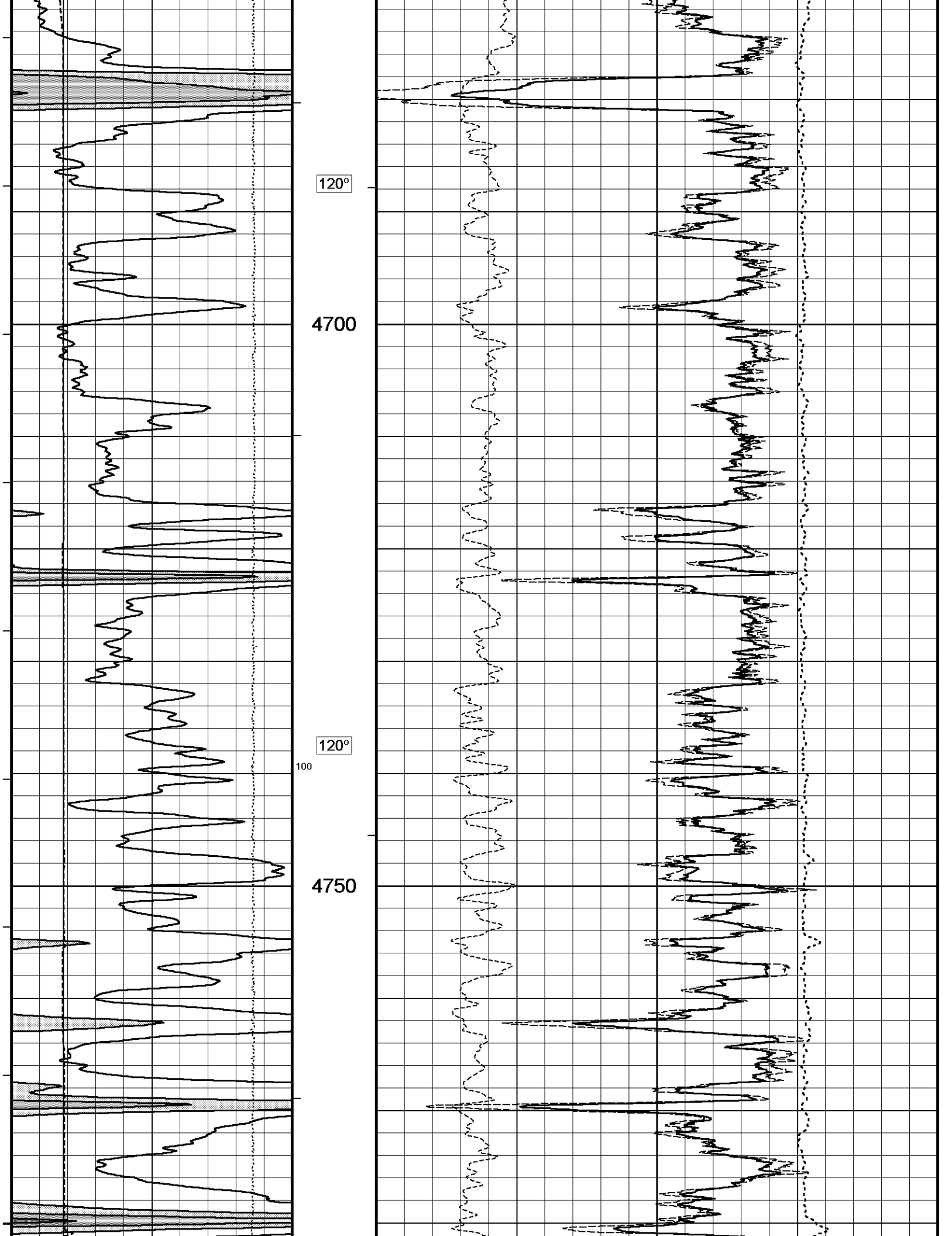
Density Correction
grams/cc
-0.50 0 0.50

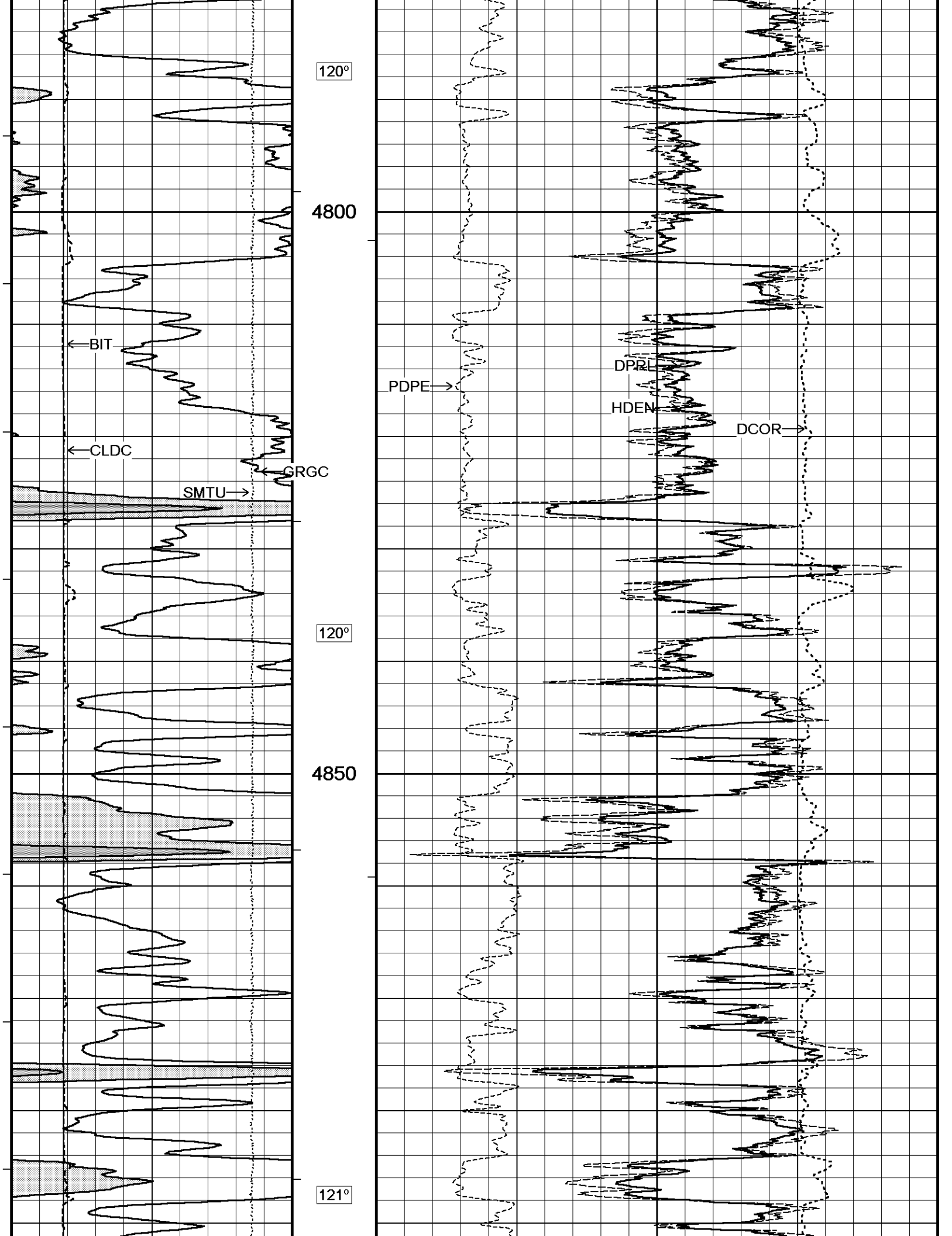
DST Uphole Tension
pounds
5000 0

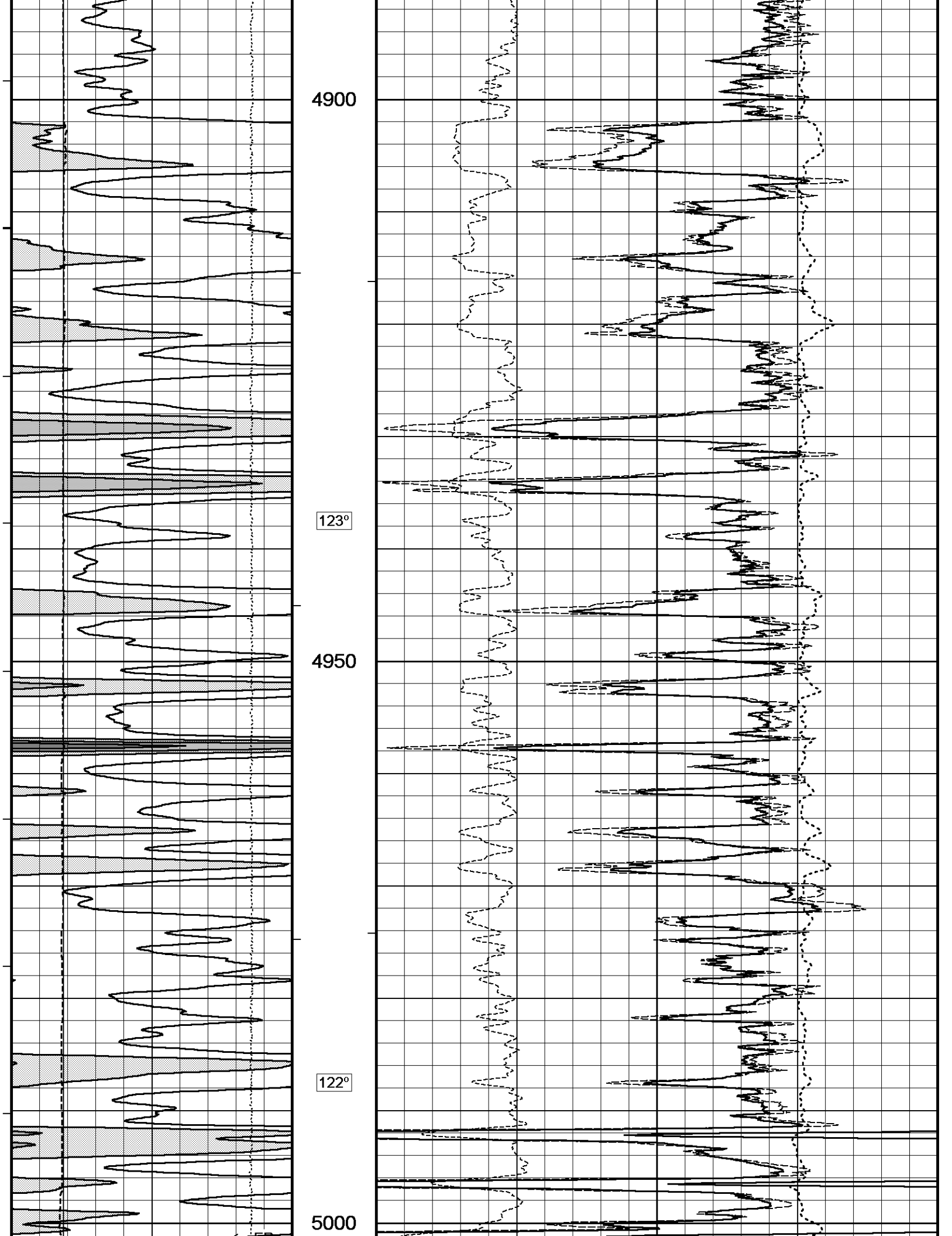
Replay Scale 1:120

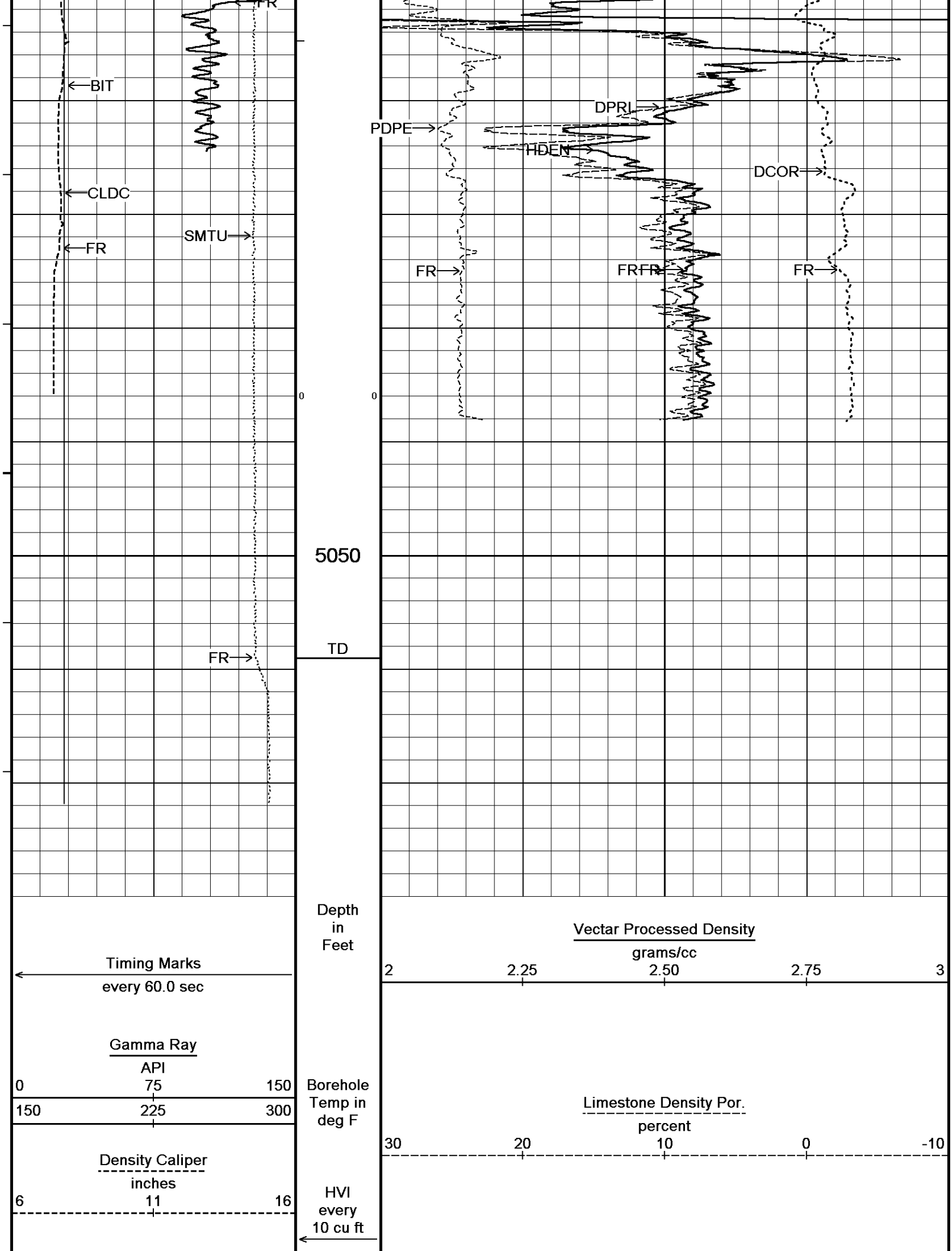
4650

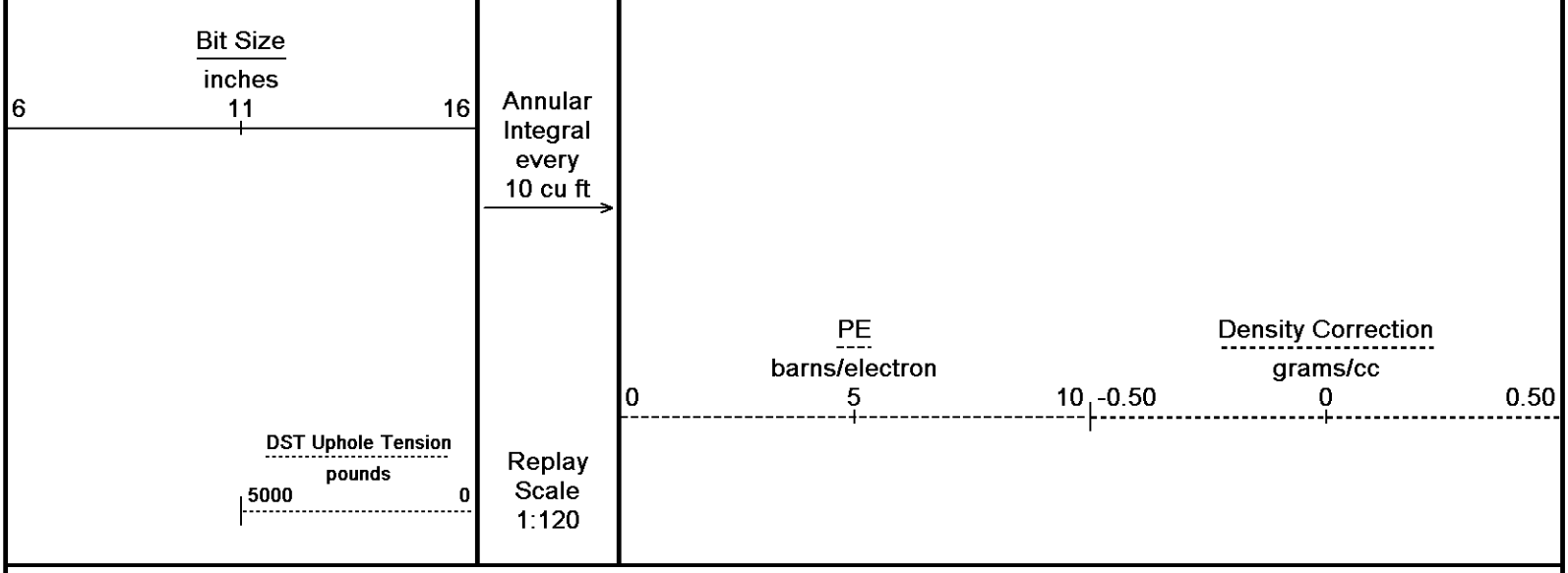



120°
4700
120°
100
4750


120°
4800
BIT
CLDC
GRGC
SMTU
120°
4850
121°
PDPE
DPRL
HDEN
DCOR


4900
123°
4950
122°
5000


FR
BIT
CLDC
FR
SMTU
FR
0
0
PDPE
DPRI
HDEN
DCOR
FR
FRFR
FR
5050
TD
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
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 10-OCT-2018 03:19

Filename: C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_001.dta — Recorded on 09-OCT-2018 16:19

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

10 INCH HIGH RESOLUTION

BEFORE SURVEY CALIBRATION

C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_002.dta

General Constants All 000

Last Edited on 09-OCT-2018,15:57

General Parameters		
Mud Resistivity	0.750	ohm-metres
Mud Resistivity Temperature	75.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. Two Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 09-OCT-2018 15:20

Reading No	Measured	Calibrated (lbs)
1	16224.87	0.00
2	17442.12	527.00

Gamma Calibration MCG-D.A 246

Field Calibration on 02-OCT-2018 10:56

	Measured	Calibrated (API)
Background	72	49
Calibrator (Gross)	741	505
Calibrator (Net)	669	456

Gamma Calibration Tolerances MCG-D.A 246

Ratio 1.467 (1.40 – 1.475 – 1.55) Counts/API

Gamma Constants MCG-D.A 246

Last Edited on 09-OCT-2018,14:24

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 01-AUG-2018,13:29

	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

SP Calibration MCG-D.A 246

Field Calibration on 01-AUG-2018,13:35

	Measured	Calibrated (mV)
Reference 1	103.5	100.0
Reference 2	-96.9	-100.1

Caliper Calibration MML-A 7

Base Calibration on 27-SEP-2018 11:32
Field Calibration on 02-OCT-2018 10:28

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14280	5.98
2	17812	7.97
3	21097	9.86
4	25122	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

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

Caliper Calibration Tolerances MML-A 7

Short Arm Field Cal.	7.98	7.77	7.97	8.17	in

Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 27-SEP-2018 11:41
Field Check on 02-OCT-2018 10:29

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

Base Calibration

	Measured		Calibrated (ohm-m)	
Micro Normal	10.1	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	76.7	76.7
Micro Inverse	51.0	51.0

Micro Normal & Micro Inverse Calibration Tolerance MML-A 7

Micro Normal Res. 1	10.1	-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	76.7	-2%	76.57	+2%	ohm-m
Micro Inverse Base Check	51.0	-2%	50.95	+2%	ohm-m
Micro Normal Field Check	76.7	-2%	76.7	+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 08-OCT-2018,00:09

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159
Micro Normal K Factor	0.5110

Micro Normal K Factor	0.3110	
Micro Inverse K Factor	0.3380	
Standoff Offset	N/A	inches

Neutron Calibration MDN-B.A 292

Base Calibration on 27-SEP-2018 14:58
Field Check on 02-OCT-2018 11:00

Base Calibration

	Measured Near	Measured Far	Calibrated (cps) Near	Calibrated (cps) Far
	2910	91	3714	110
Ratio	31.871		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	2207	3209
Ratio	0.688	

Field Check

	Calibrated (cps)	
	2195	3179
Ratio	0.690	

Neutron Calibration Tolerances MDN-B.A 292

Ratio	31.871	-5%	33	+5%
Base Check	0.688	0.65	0.7	0.75
Field Check	0.690	0.668	0.688	0.708

Neutron Constants MDN-B.A 292

Last Edited on 08-OCT-2018,00:09

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 27-SEP-2018 11:01
Field Check on 02-OCT-2018 10:24

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

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	972.4	126.8
Base Check		278.4
Field Check		278.5

FE Calibration Tolerances MFE-A.A 135

Reference 2	972.4	-3%	980.0	+3%	ohm
Base Check	278.4	-2%	277.0	+2%	ohm-m
Field Check	278.5	-2%	278.4	+2%	ohm-m

FE Constants MFE-A.A 135

Last Edited on 08-OCT-2018,00:09

FE Constants MFE-A.A 135

Last Edited on 08-OCT-2018,00:09

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 319

Last Edited on 08-JUL-2018,09:57

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'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)
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	

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 01-AUG-2018,13:29

	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

Induction Calibration MAI-A.A 111

Factory Loop Calibration 27-SEP-2018 16:38
Field Check on 02-OCT-2018 10:23

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	0.000	0.0
2	6.4	385.9	7.6	821.4	0.000	0.0
3	3.2	264.0	5.2	566.0	0.000	0.0
4 (far)	2.1	135.5	2.6	279.2	0.000	0.0

Array Temperature 23.0 Deg F

Tool Checks

	Factory Reference (mmho/m)		Before Survey (mmho/m)	
Array	Low	High	Low	High
1 (near)	11.4	3842.2	11.5	3841.2
2	29.4	3500.1	29.4	3499.5
3	28.7	2997.4	28.8	2996.9
4 (far)	18.9	2042.0	18.9	2041.7
Array Temperature		93.7		70.7 Deg F

Induction Check Tolerances MAI-A.A 111

Low Array 1	11.5	9.9 / 11.4 / 12.9	mmho/m	High Array 1	3841.2	-0.5% / 3842.2 / +0.5%	mmho/m
Low Array 2	29.4	27.9 / 29.4 / 30.9	mmho/m	High Array 2	3499.5	-0.5% / 3500.1 / +0.5%	mmho/m
Low Array 3	28.8	27.2 / 28.7 / 30.2	mmho/m	High Array 3	2996.9	-0.5% / 2997.4 / +0.5%	mmho/m
Low Array 4	18.9	17.4 / 18.9 / 20.4	mmho/m	High Array 4	2041.7	-0.5% / 2042.0 / +0.5%	mmho/m

Induction Constants MAI-A.A 111

Last Edited on 09-OCT-2018,14:23

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.	Borehole Temp. Unfilt.	
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	

Caliper Calibration MPD-C.A 216

Base Calibration on 27-SEP-2018 13:19
Field Calibration on 02-OCT-2018 10:35

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15233	3.99
2	24000	5.98
3	32704	7.97
4	40935	9.86
5	50176	11.92
6	N/A	N/A

Field Calibration

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

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.92 in

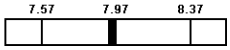


Photo Density Calibration MPD-C.A 216

Base Calibration on 27-SEP-2018 13:54
Field Check on 02-OCT-2018 10:42

Density Calibration

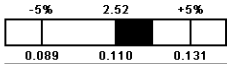
Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	999	1185		
Reference 1	49691	24217	59556	30836
Reference 2	19847	2262	24941	2541
Field Check at Base	999.2	1184.9		
Field Check	993.7	1186.5		

PE Calibration

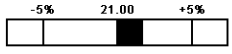
Base Calibration	WS	WH	Ratio	Calibrated Ratio
Background	183	898		
Reference 1	20466	49533	0.417	0.371
Reference 2	5695	19740	0.293	0.272
Field Check at Base	182.6	898.2		
Field Check	182.3	891.5		

Photo Density Calibration Tolerances MPD-C.A 216

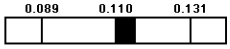
Near Density Ratio 2.58



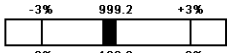
Far Density Ratio 21.37



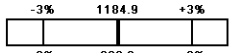
PE Calibration 0.116



Near Den. Field Check 993.7



Far Den. Field Check 1186.5



PE WS Field Check 182.3 -6% 182.6 +6% PE WH Field Check 891.5 -6% 898.2 +6%

Density Constants MPD-C.A 216

Last Edited on 09-OCT-2018,14:24

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.13	gm/cc
Mud Density Type		
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Precision Enhanced Density Processing	Applied	

Matrix Density (gm/cc)	Depth (ft)
2.71	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Red Oak GTD Land #1-30\Red Oak GTD Land #1-30_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 595 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-log
MML-A 7 LG: 7.97 ft WT: 81.6 lb OD: 2.244 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

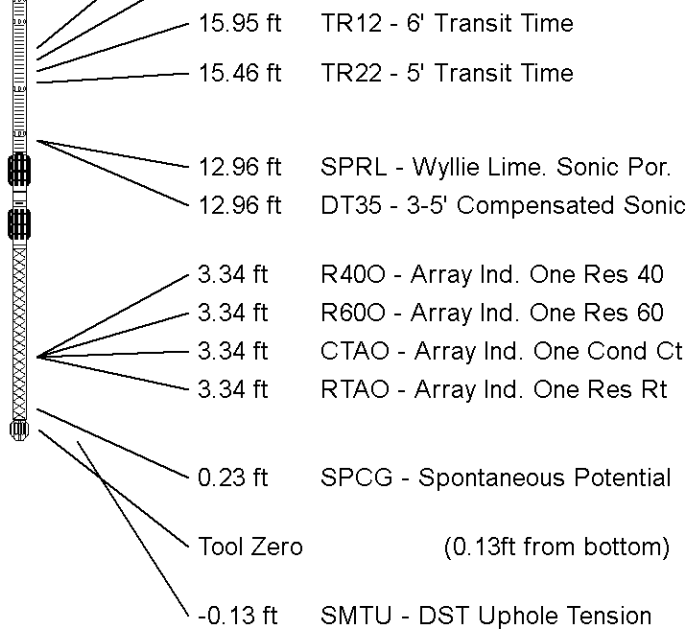
Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

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

57.56 ft GRGC - MCG Gamma Ray
54.65 ft CGXT - MCG External Temperature
48.92 ft MLTC - MML Caliper
47.93 ft MINV - Micro-inverse
47.93 ft MNRL - Micro-normal
43.13 ft NPRL - Limestone Neutron Por.
35.89 ft AVOL - Annular Volume
35.89 ft HVOL - Hole Volume
35.89 ft CLDC - Density Caliper
33.96 ft DPRL - Limestone Density Por.
33.96 ft DEN - Compensated Density
33.96 ft DCOR - Density Correction
33.90 ft PDPE - PE
26.24 ft FEFE - Shallow FE
16.96 ft TR11 - 4' Transit Time
16.46 ft TR21 - 3' Transit Time

Compact Induction
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 67.54 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY	RED OAK ENERGY, INC.
WELL	GTD LAND #1-30
FIELD	WILDCAT
PROVINCE/COUNTY	GREELEY
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3851	feet	First Reading	5025.00	feet
Elevation Drill Floor	3849	feet	Depth Driller	5056.00	feet
Elevation Ground Level	3842	feet	Depth Logger	5059.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG