Weatherford

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL CO., INC.
WELL	BAHM 2-21
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	335' FNL & 2120' FEL
PERMIT NUMBER	SE NW NW NE

SEC 21	TWP 16S	RGE 34W	Other Services

Latitude	38.655160581
Longitude	-101.080919172
API Number	15-171-21101

Permanent Datum GL, Elevation 3135 feet
Log Measured From KB
Drilling Measured From KB @ 10 FEET

Elevations:	feet
KB	3145.00
DF	3143.00
GL	3135.00

Date	02-NOV-2014			
Run Number	ONE			
Service Order	7036-102129390			
Depth Driller	4890.00	feet		
Depth Logger	4890.00	feet		
First Reading	4858.24	feet		
Last Reading	3800.00	feet		
Casing Driller	267.00	feet		
Casing Logger	266.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	WBM			
Density / Viscosity	9.20 lb/USg		53.00 CP	
PH / Fluid Loss	10.00		8.90 ml/30Min	
Sample Source	MUDPIT			
Rm @ Measured Temp	0.425 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.34 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.51 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.297 @110.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	111.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	DEREK CARTER			
Witnessed By	TIM PRIEST			
JOB #	LB14-343			

BOREHOLE RECORD

Last Edited: 02-NOV-2014 12:41

Bit Size inches	Depth From feet	Depth To feet
7.875	267.00	4890.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	267.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 14.03.4558
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - 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
- 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 3800 FT.: 360 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 3800 FT.: 280 CU. FT.

- SERVICE ORDER # 7036-102129390

- RIG: H.D. DRILLING #2

- ENGINEER: DEREK CARTER

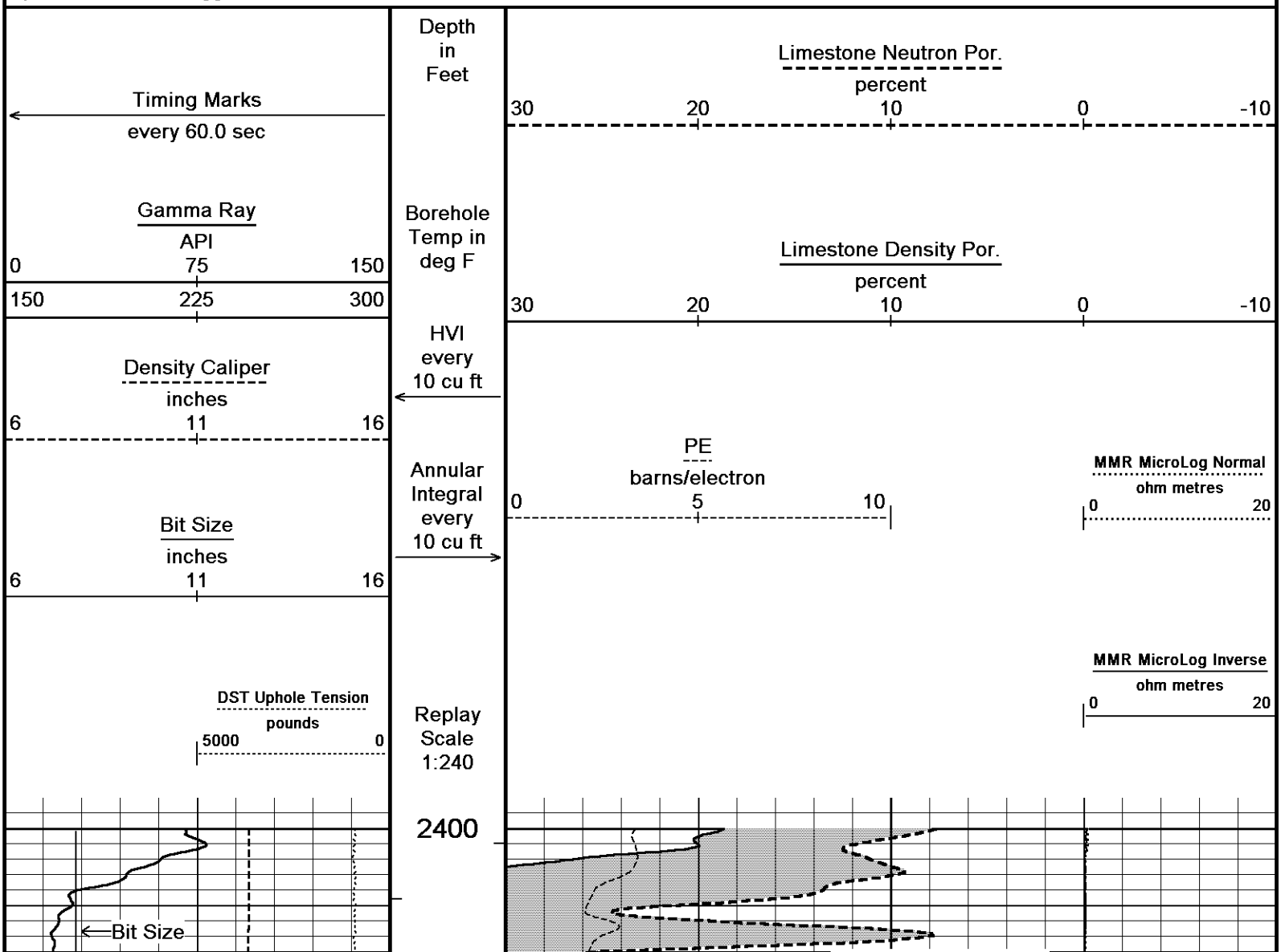
- OPERATORS: CARLOS RAMIREZ

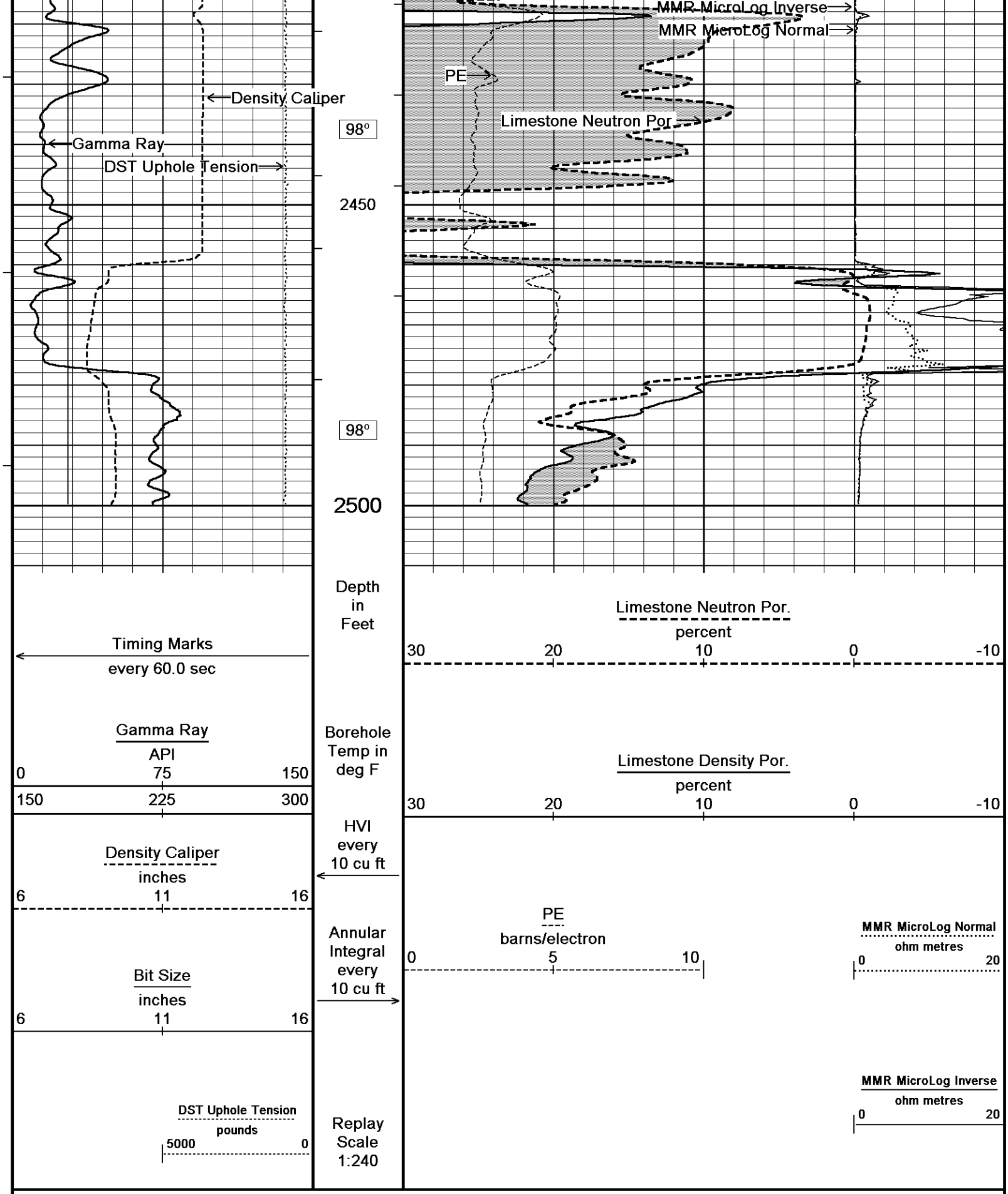
5 INCH LIMESTONE MAIN - ANHYDRITE SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 16:27

Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare...\Shakespeare Bahm 2-21 Main Anhydrite.dta — Recorded on 02-NOV-2014 15:48

System Versions: Logged with 14.03.4558 Plotted with 14.03.4558





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Plotted on 02-NOV-2014 16:27
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5 INCH LIMESTONE MAIN - ANHYDRITE SECTION

5 INCH LIMESTONE MAIN

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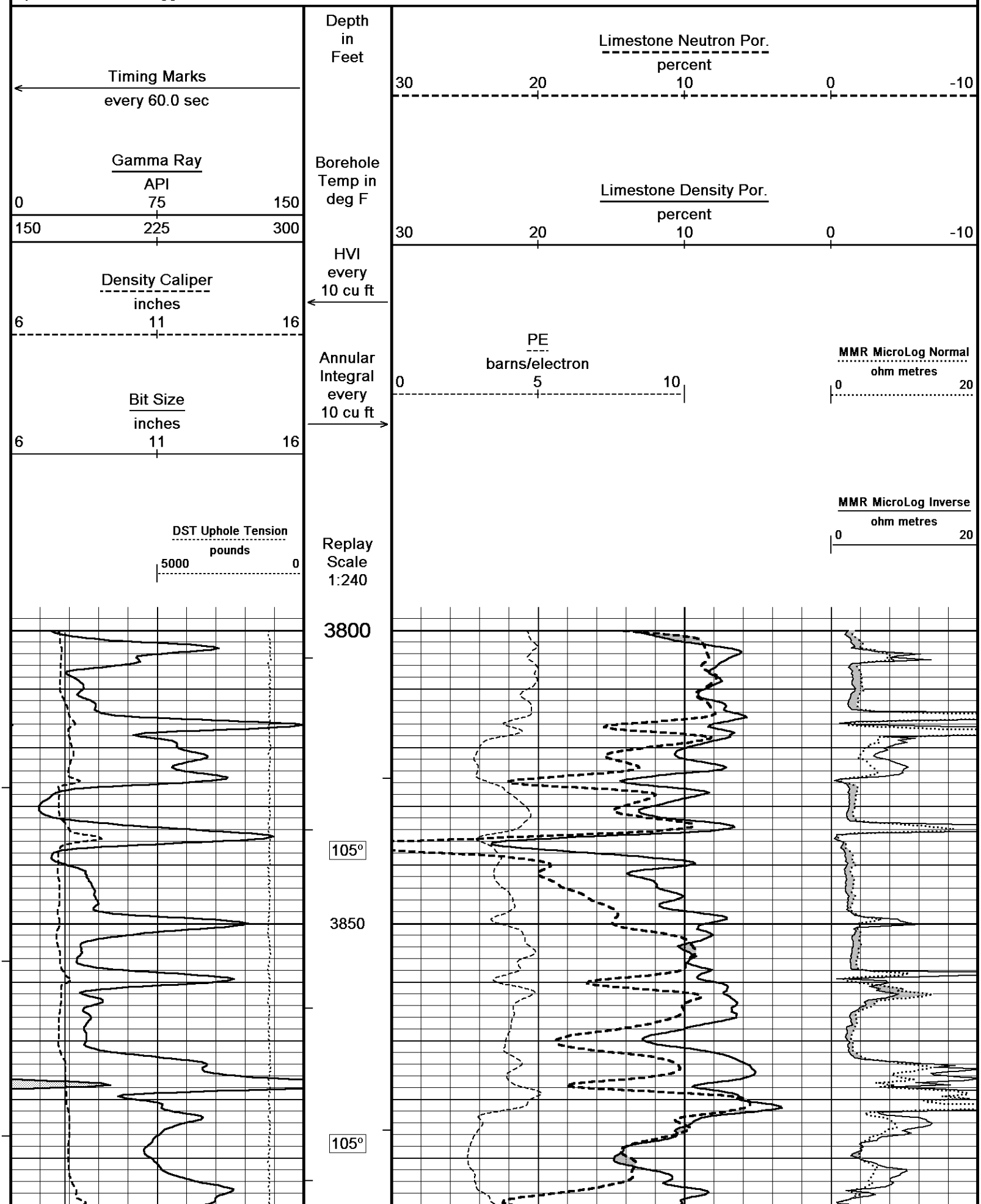
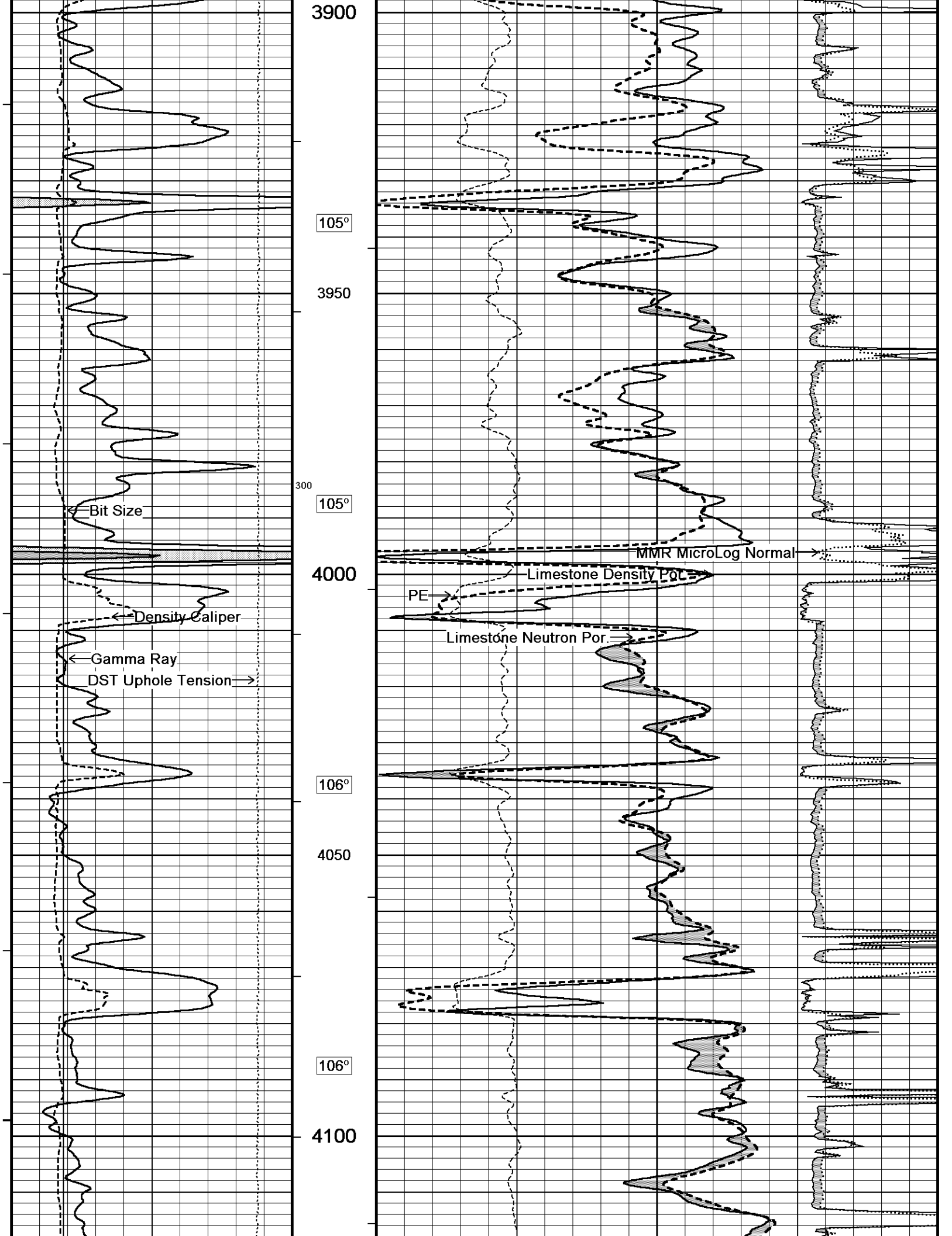
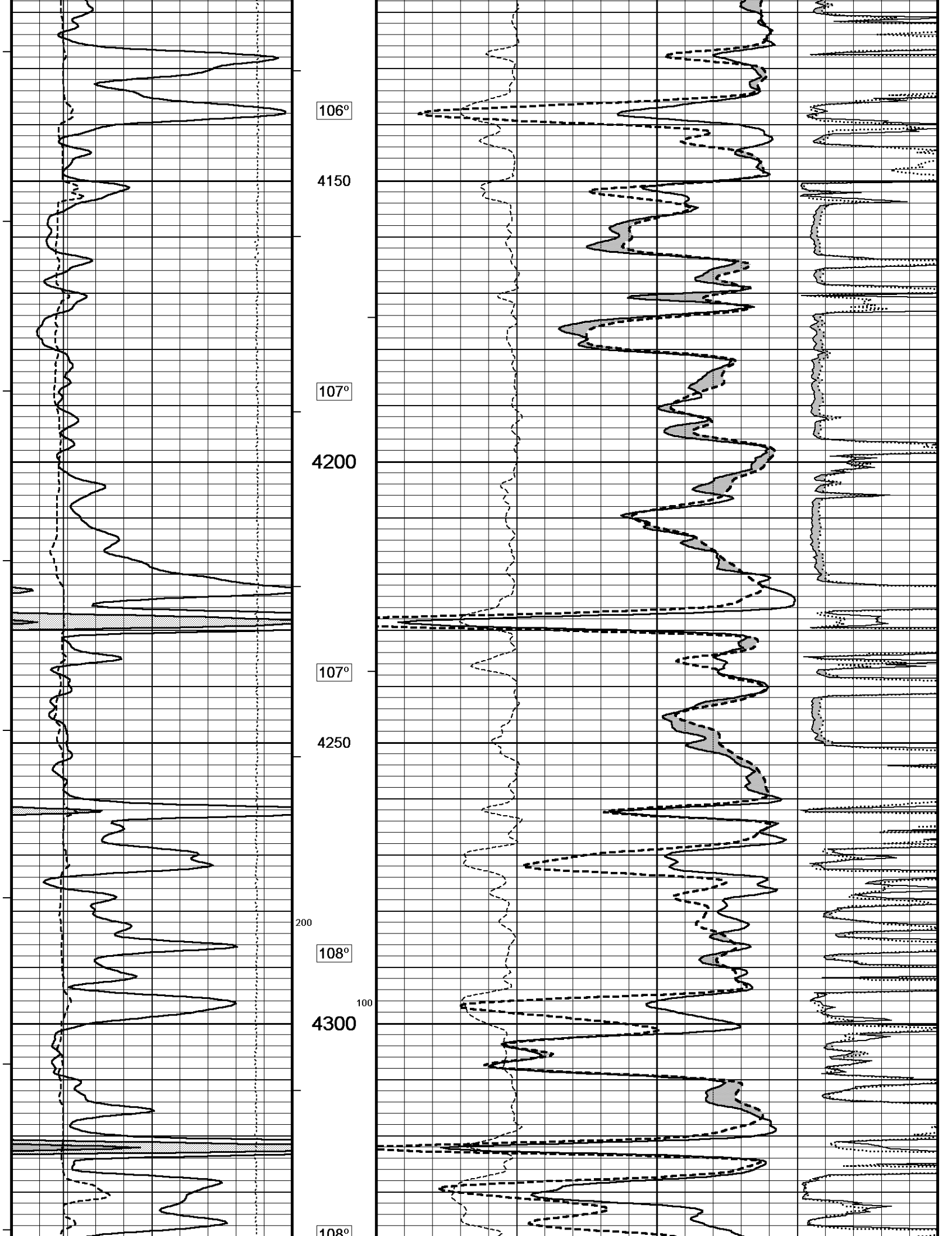
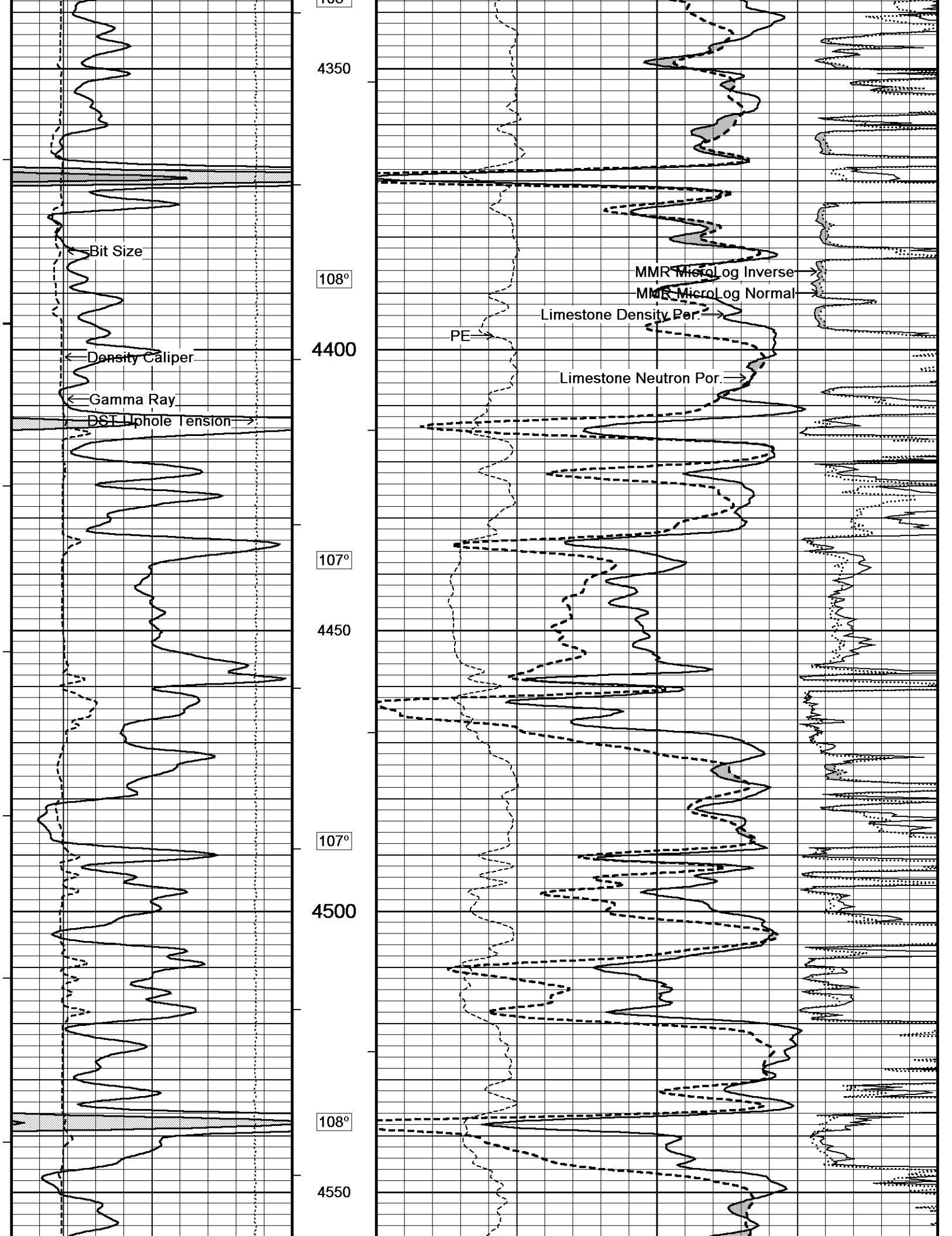
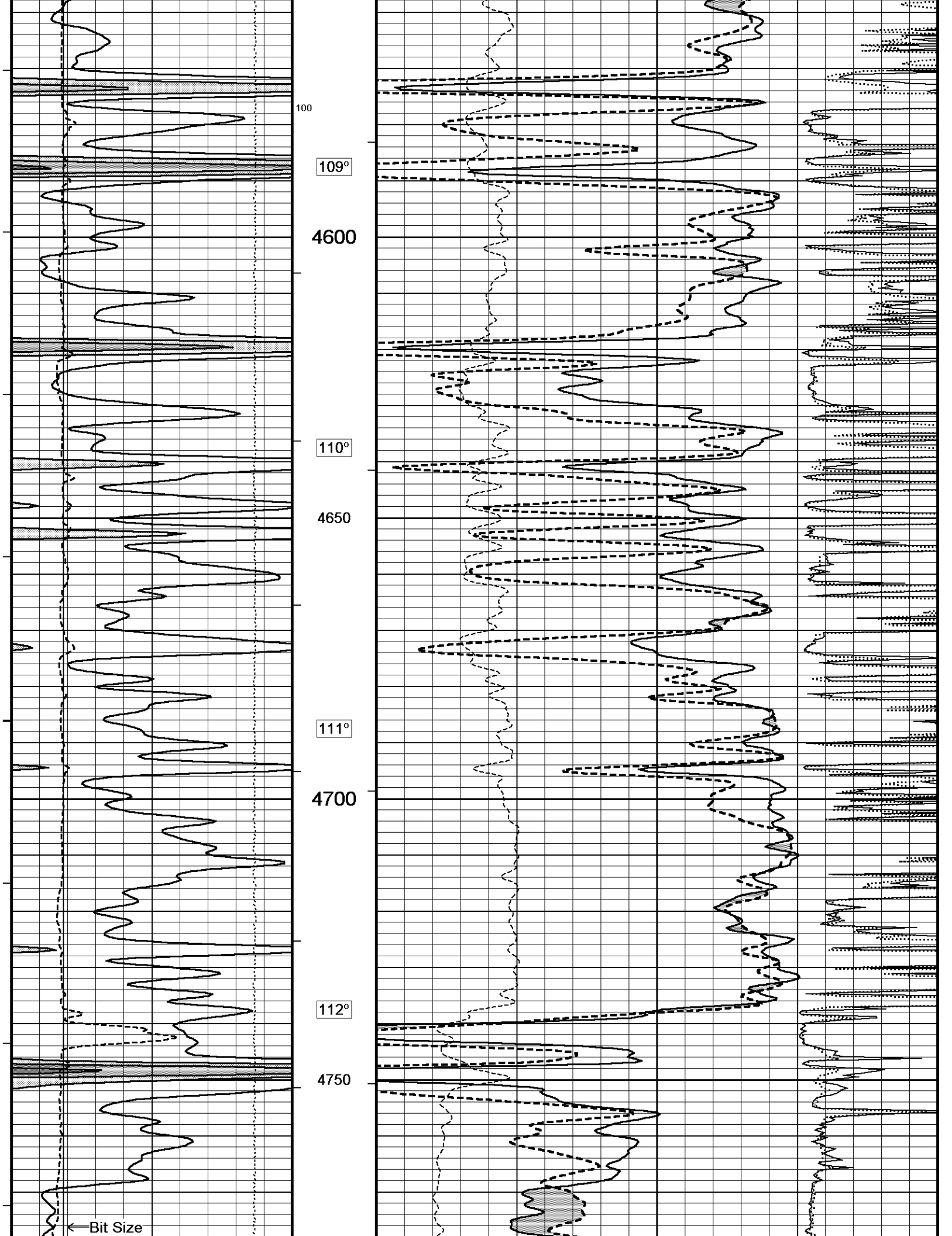
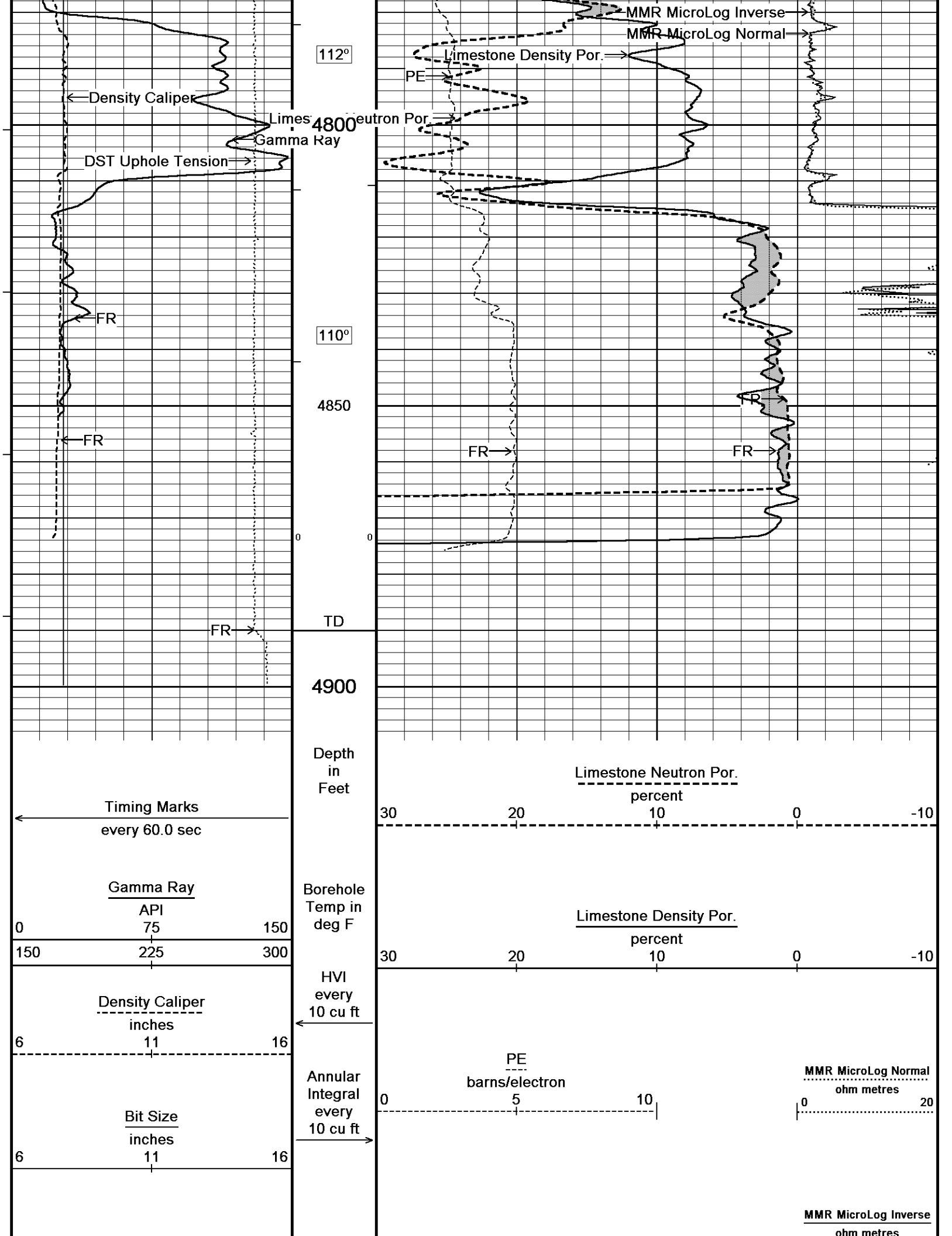



3900
105°
3950
300
105°
Bit Size
MMR MicroLog Normal
4000
Limestone Density Por
PE
Density Caliper
Limestone Neutron Por
Gamma Ray
DST Uphole Tension
106°
4050
106°
4100


106°
4150
107°
4200
107°
4250
200
108°
100
4300
108°


4350
Bit Size
108°
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
4400
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
107°
4450
107°
4500
108°
4550


100
109°
4600
110°
4650
111°
4700
112°
4750
←Bit Size


MMR MicroLog Inverse
MMR MicroLog Normal
112°
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
4800
Gamma Ray
DST Uphole Tension
FR
110°
4850
FR
FR
FR
FR
0
0
TD
FR
4900
Depth in Feet
Limestone Neutron Por.
percent
30 20 10 0 -10
Timing Marks
every 60.0 sec
Gamma Ray
API
0 75 150
Borehole Temp in deg F
Limestone Density Por.
percent
30 20 10 0 -10
150 225 300
HVI every 10 cu ft
Density Caliper
inches
6 11 16
PE
barns/electron
0 5 10
MMR MicroLog Normal
ohm metres
0 20
Annular Integral every 10 cu ft
Bit Size
inches
6 11 16
MMR MicroLog Inverse
ohm metres

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

0 20

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

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
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Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm ...\Shakespeare Bahm 2-21 Repeat.dta
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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

HVI
every
10 cu ft

Density Caliper
inches
6 11 16

PE
barns/electron
0 5 10

Annular
Integral
every
10 cu ft

MMR MicroLog Normal
ohm metres
0 20

Bit Size
inches
6 11 16

MMR MicroLog Inverse
ohm metres
0 20

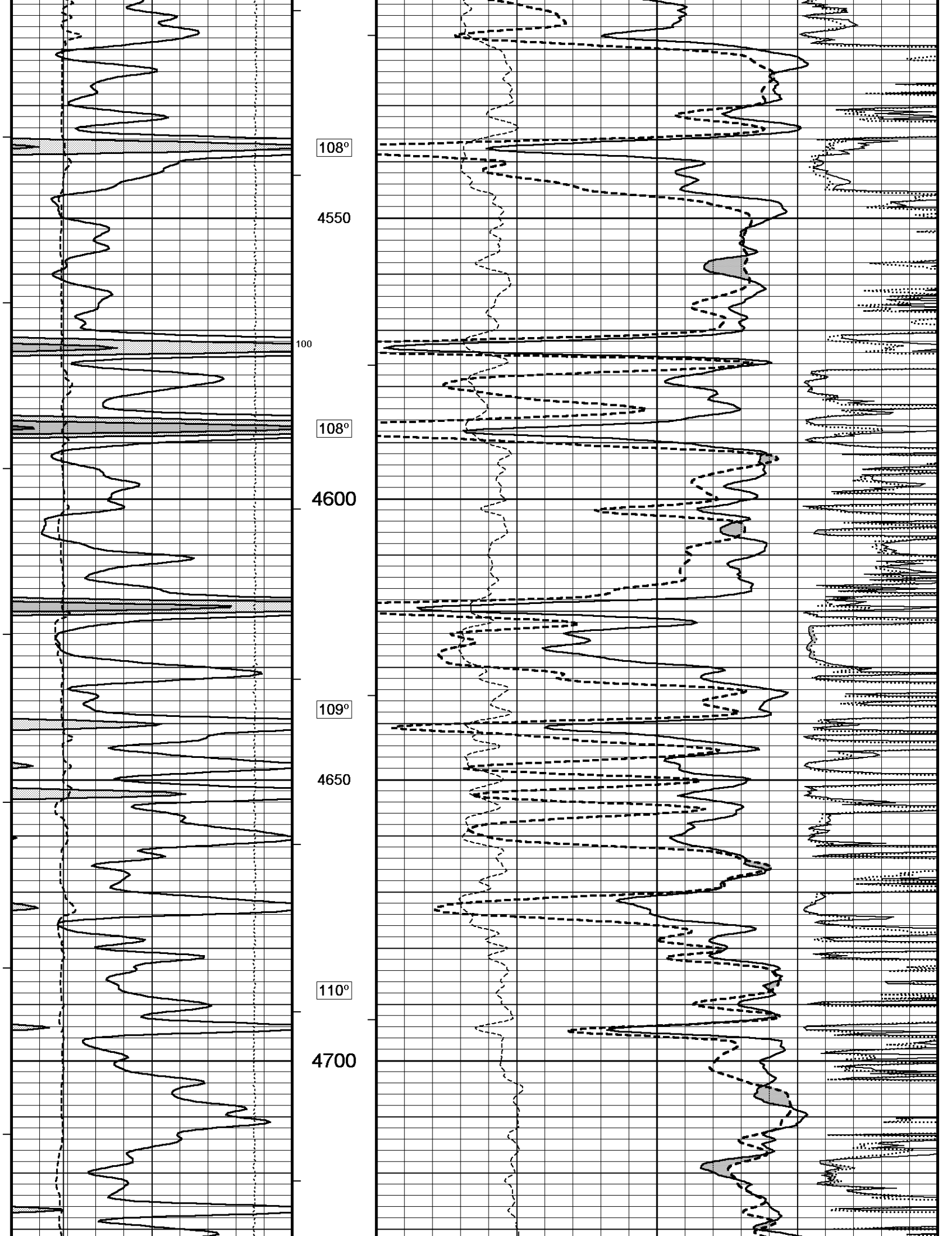
DST Uphole Tension
pounds
5000 0

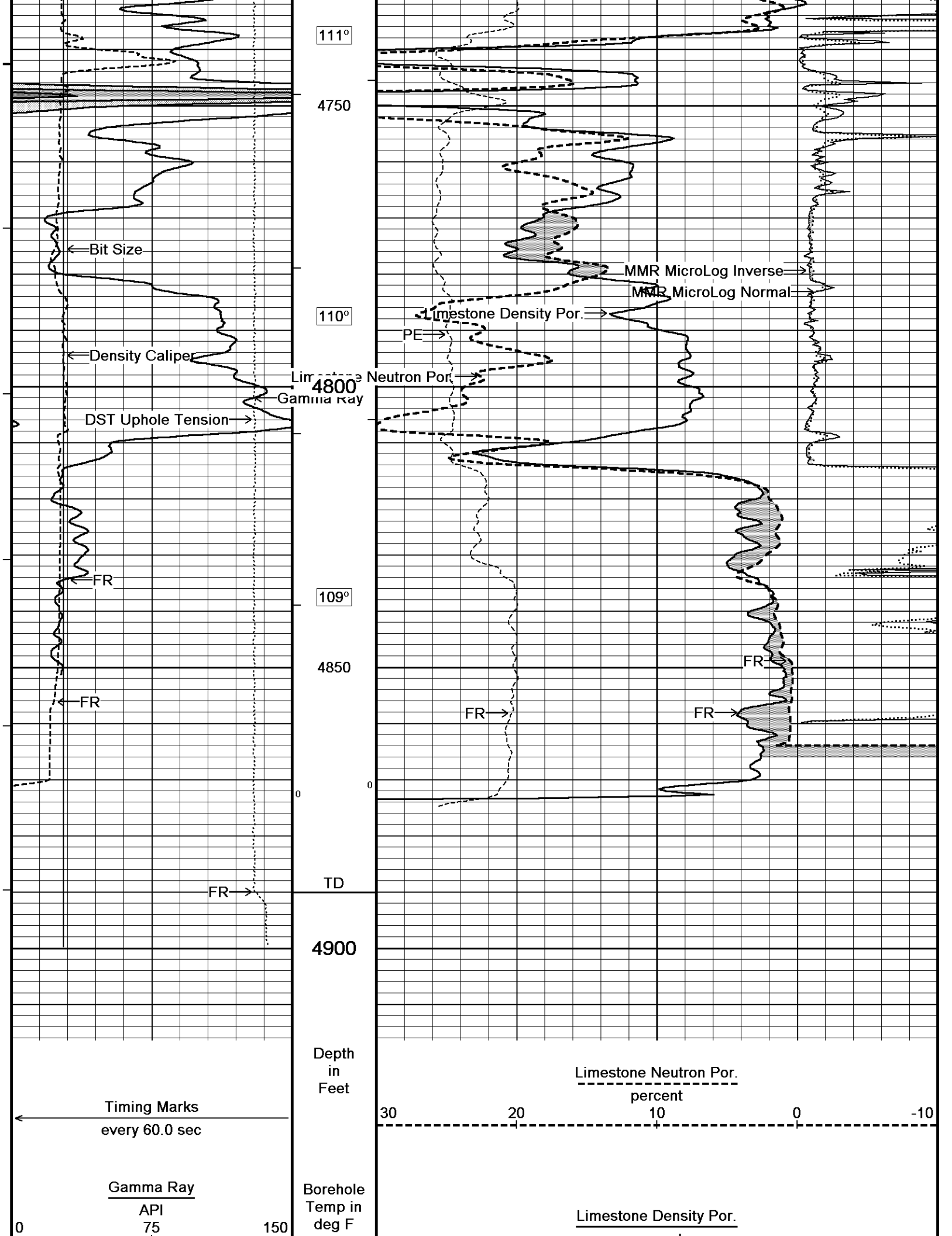
Replay
Scale
1:240

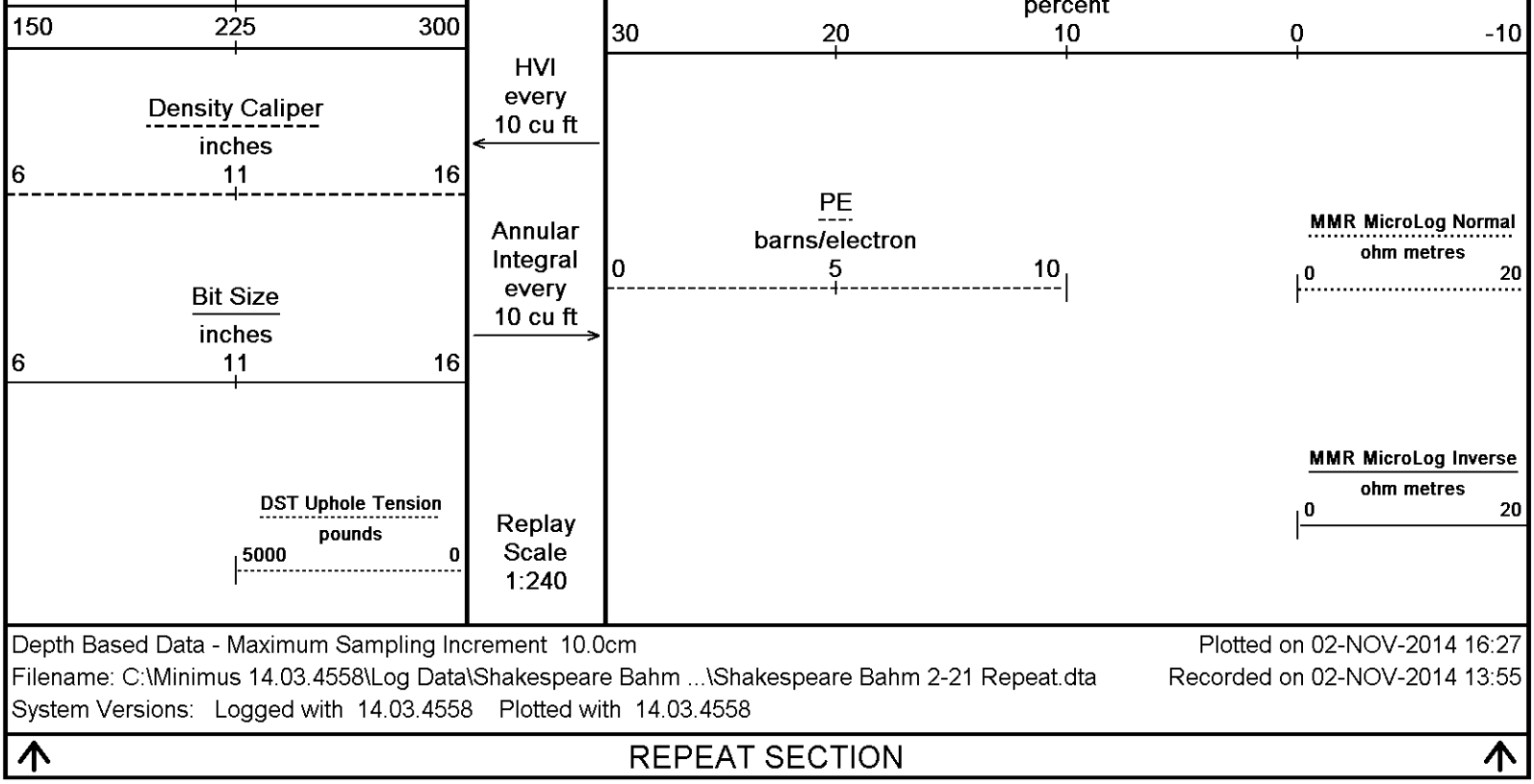
4450

107°

4500


108°
4550
100
108°
4600
109°
4650
110°
4700


111°
4750
110°
4800
109°
4850
TD
4900
Bit Size
Density Caliper
DST Uphole Tension
FR
FR
FR
FR
FR
FR
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
Gamma Ray
0
0
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
Depth
in
Feet
Borehole
Temp in
deg F
Limestone Neutron Por.
percent
30
20
10
0
-10
Limestone Density Por.



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 16:27
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REPEAT SECTION

5 INCH BUK DENSITY MAIN

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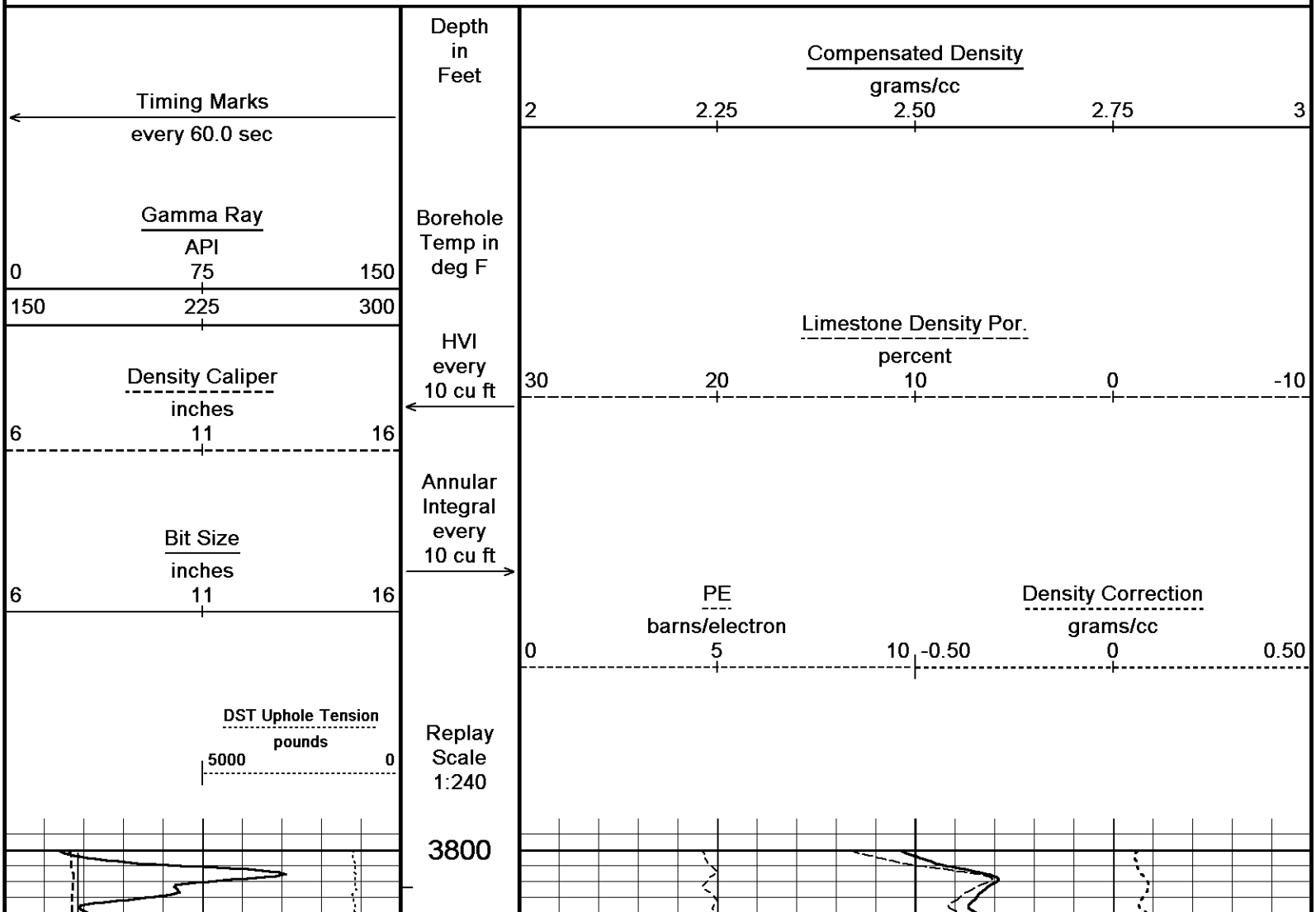
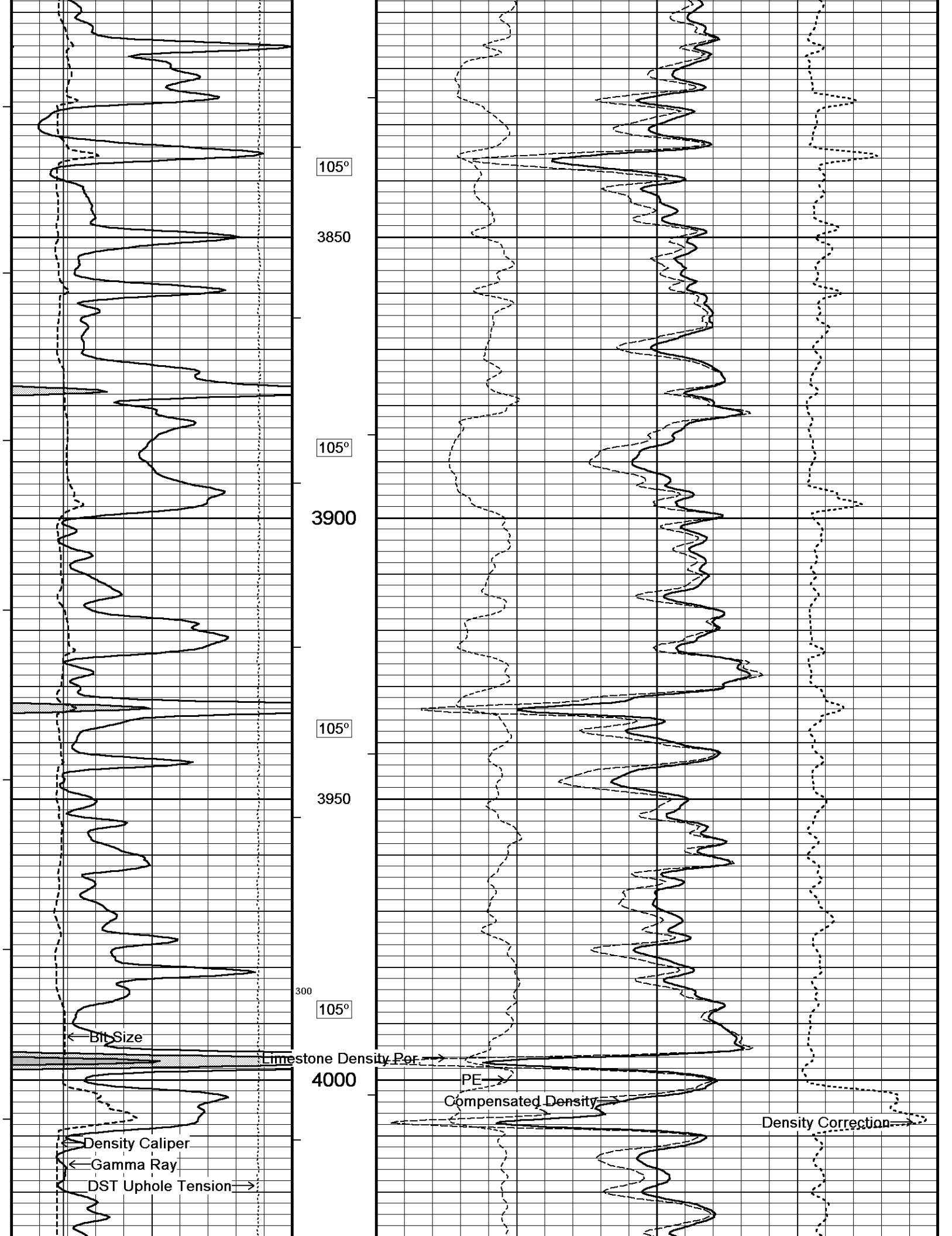
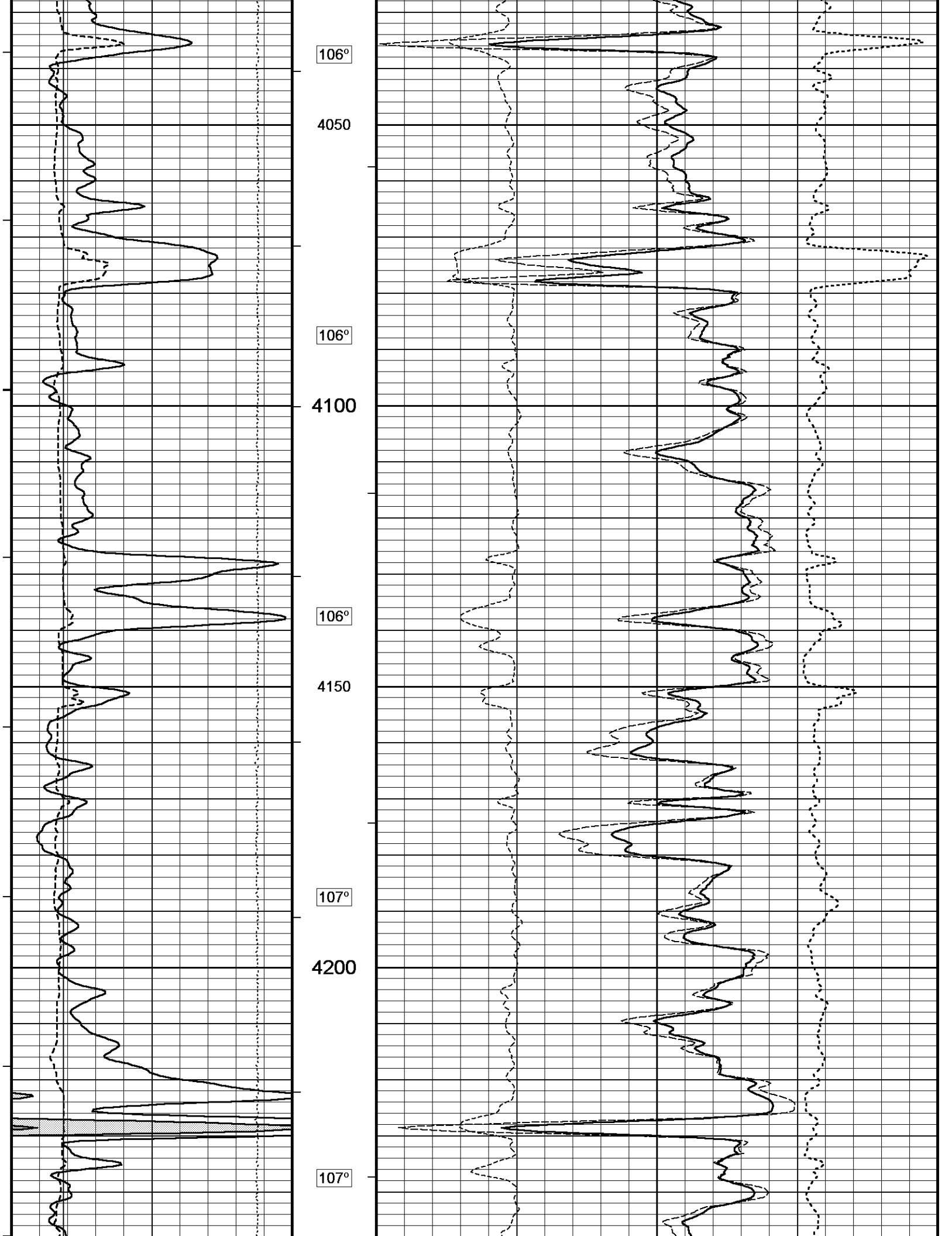
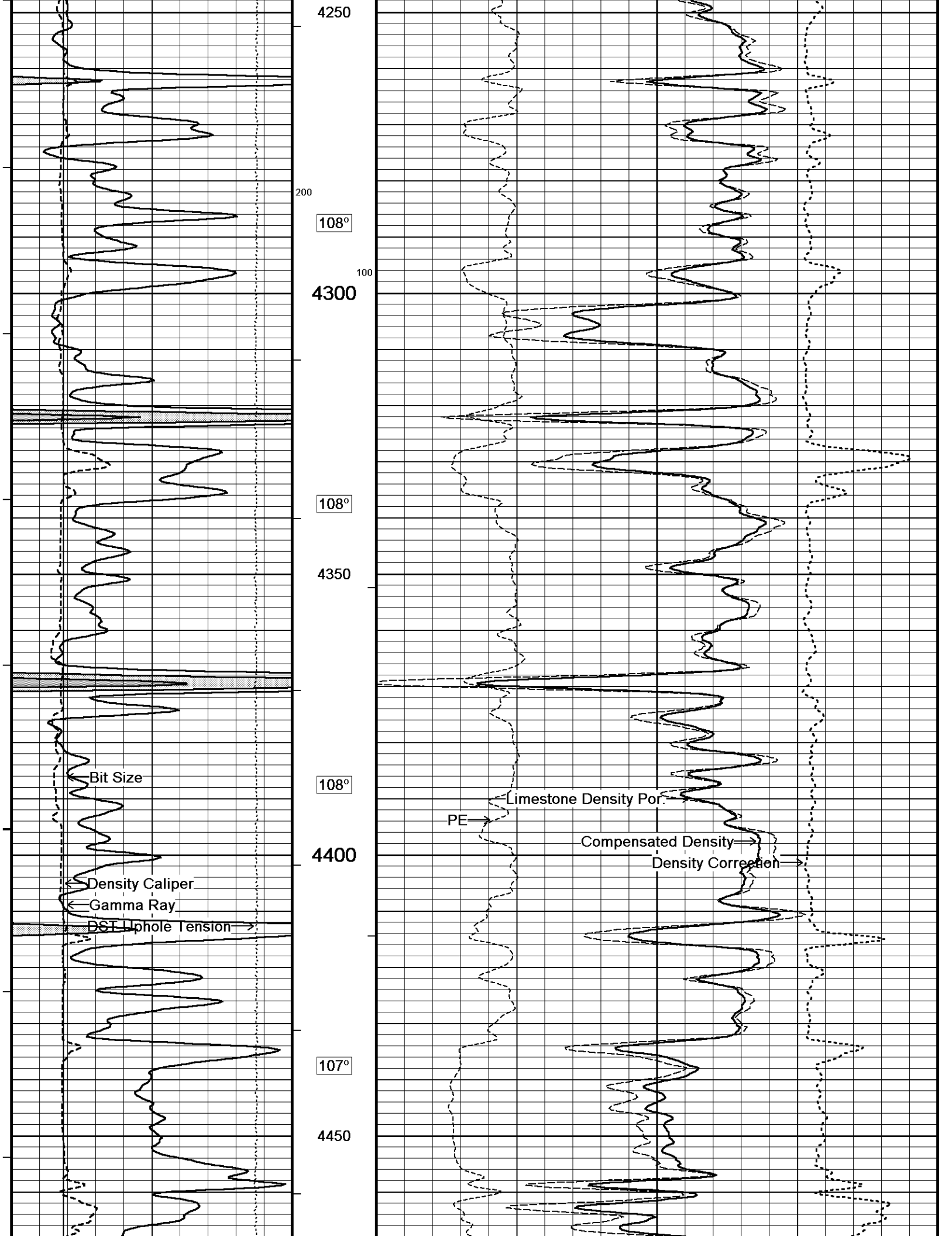
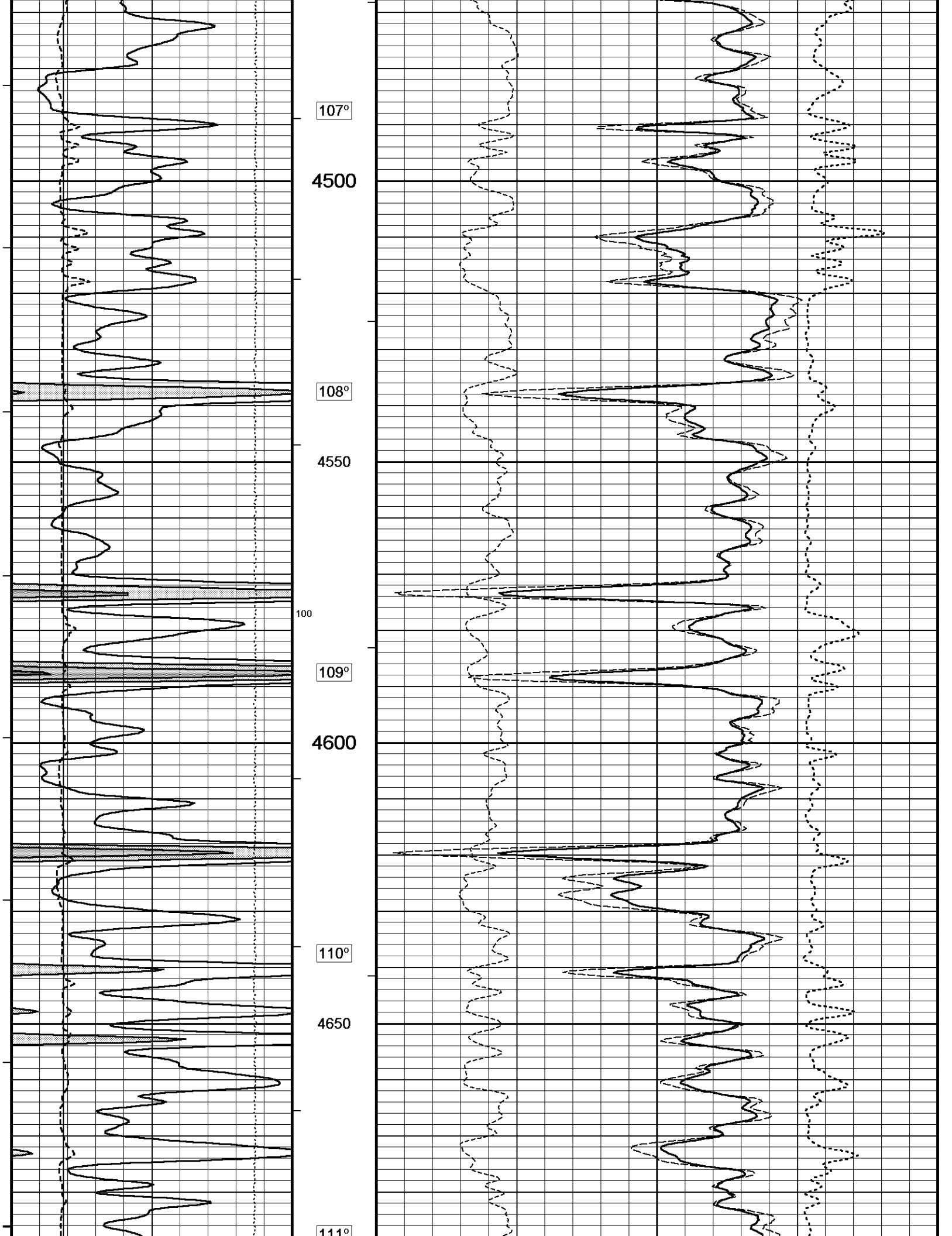
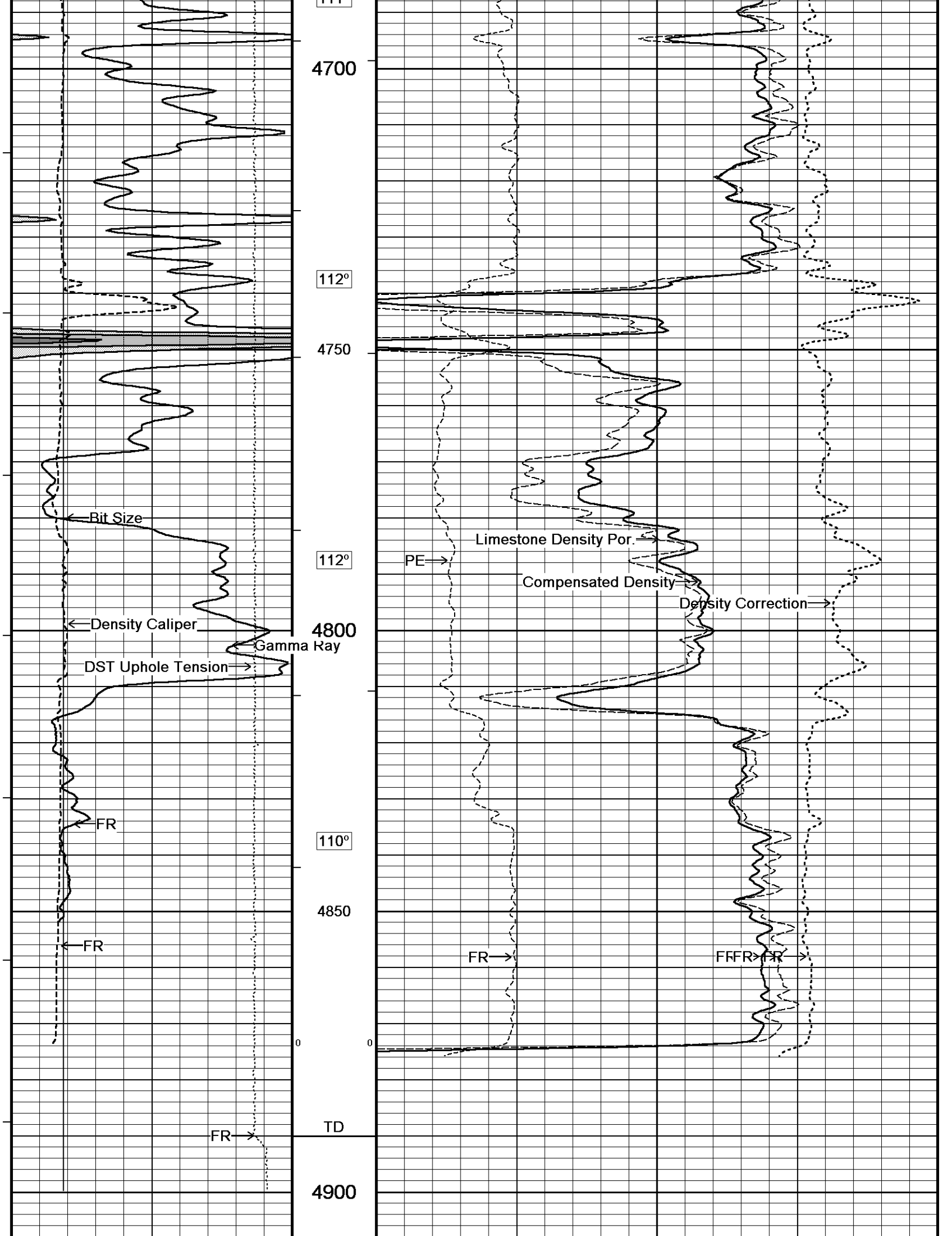


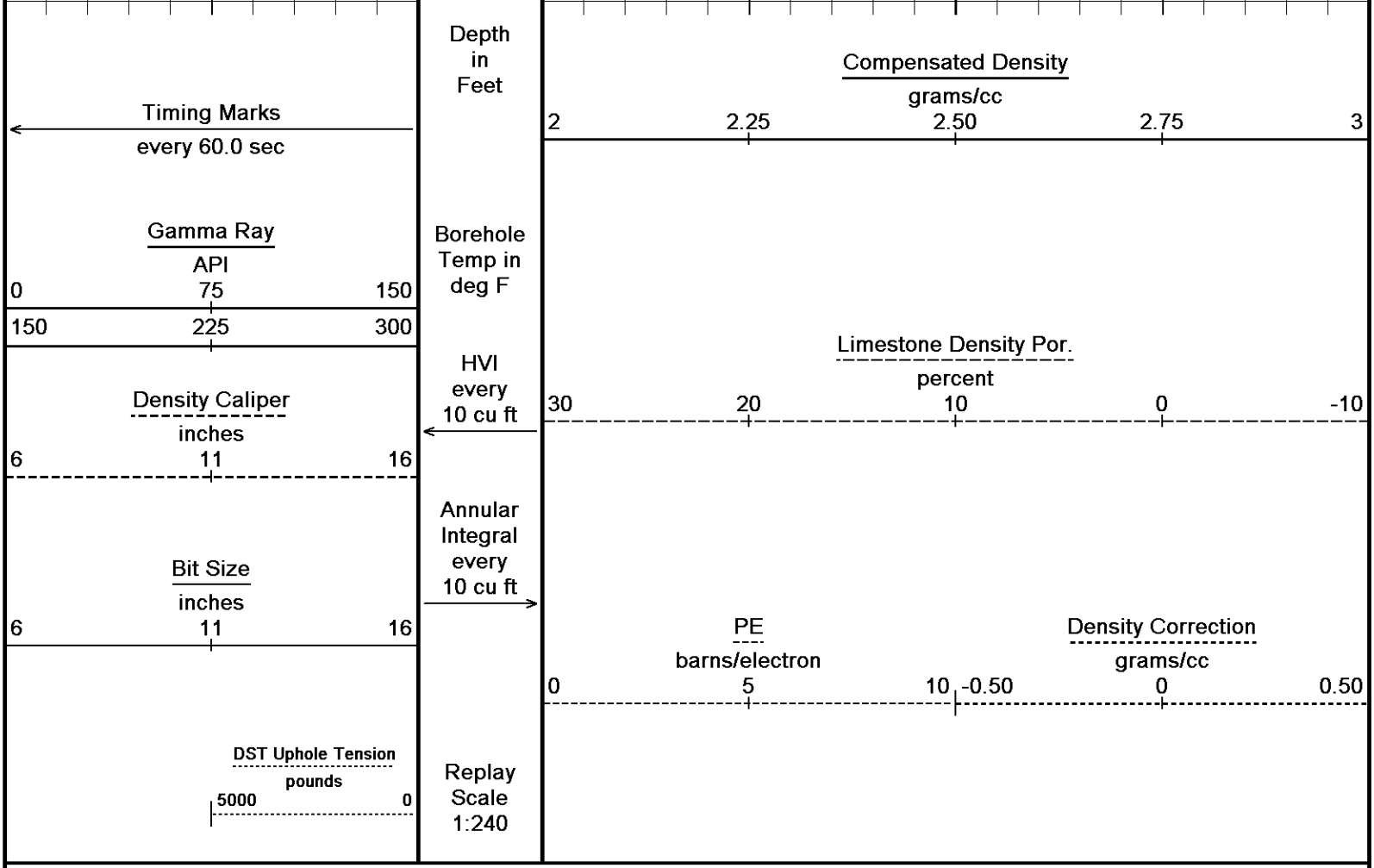

105°
3850
105°
3900
105°
3950
300
105°
Bit Size
Limestone Density Por
4000
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension


106°
4050
106°
4100
106°
4150
107°
4200
107°


4250
200
108°
100
4300
108°
4350
108°
4400
107°
4450
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por
PE
Compensated Density
Density Correction


107°
4500
108°
4550
100
109°
4600
110°
4650
111°


4700
112°
4750
112°
4800
110°
4850
TD
4900
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
PE
Limestone Density Por.
Compensated Density
Density Correction
FR
FR
0
0



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 16:27
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5 INCH BUK DENSITY MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 16:27
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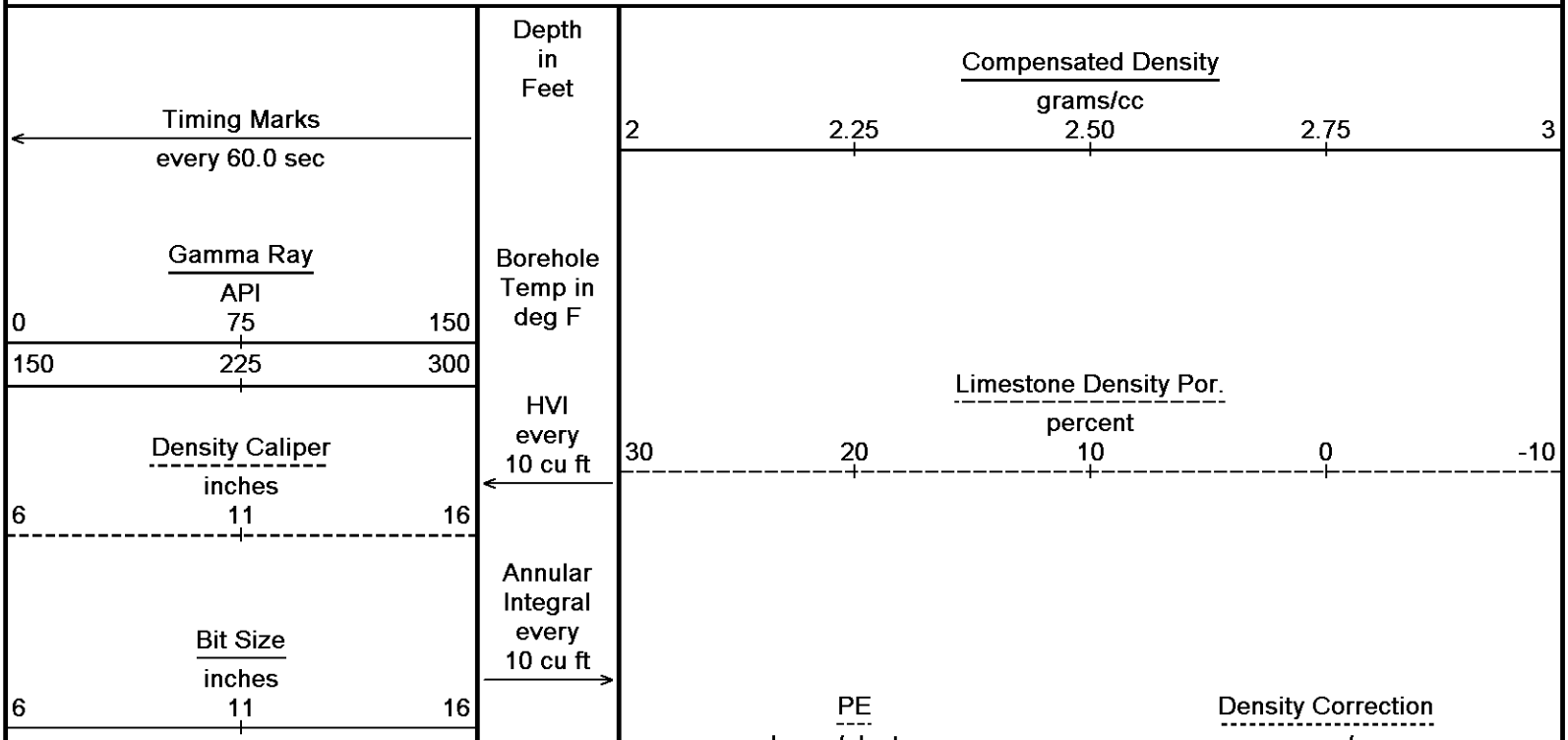
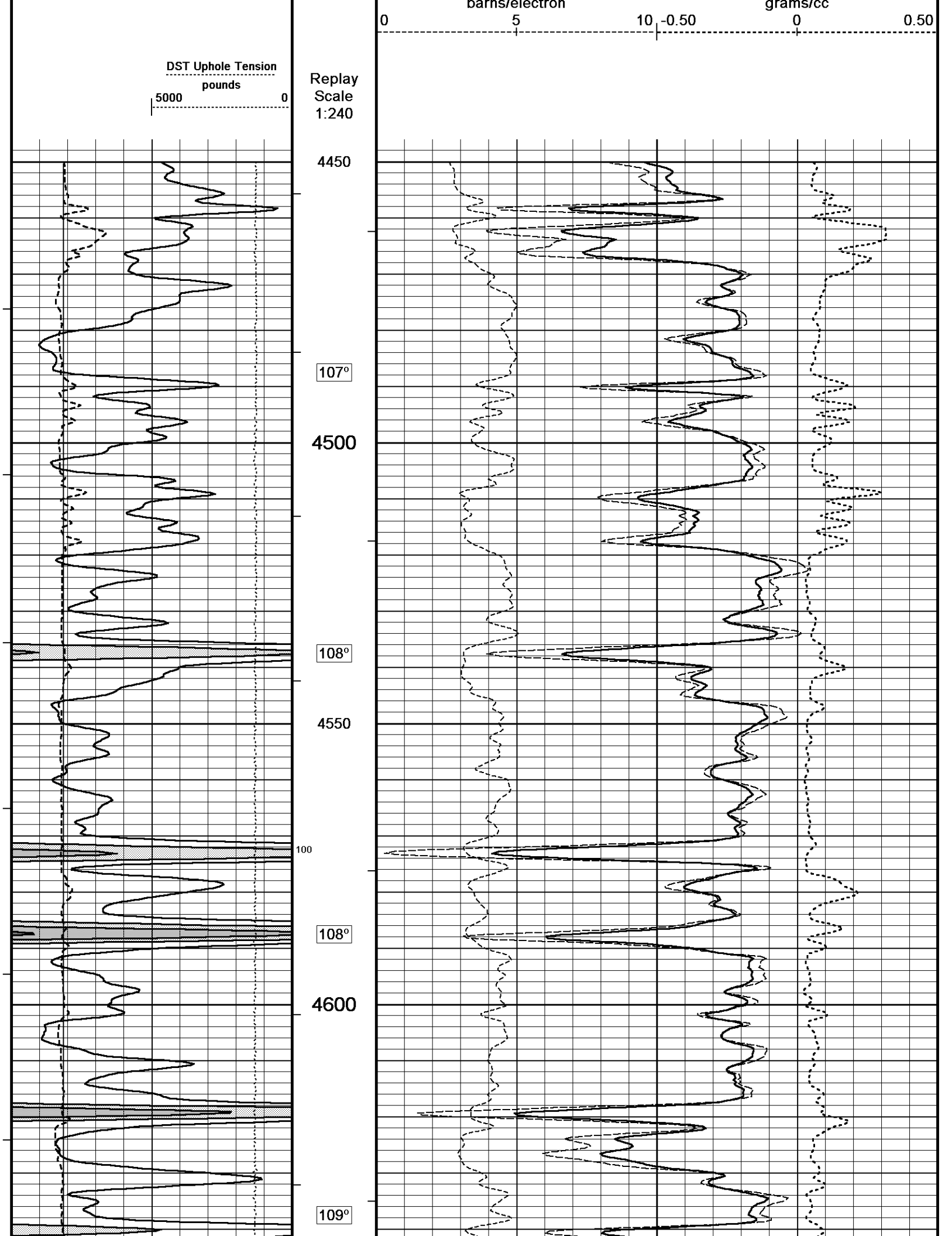
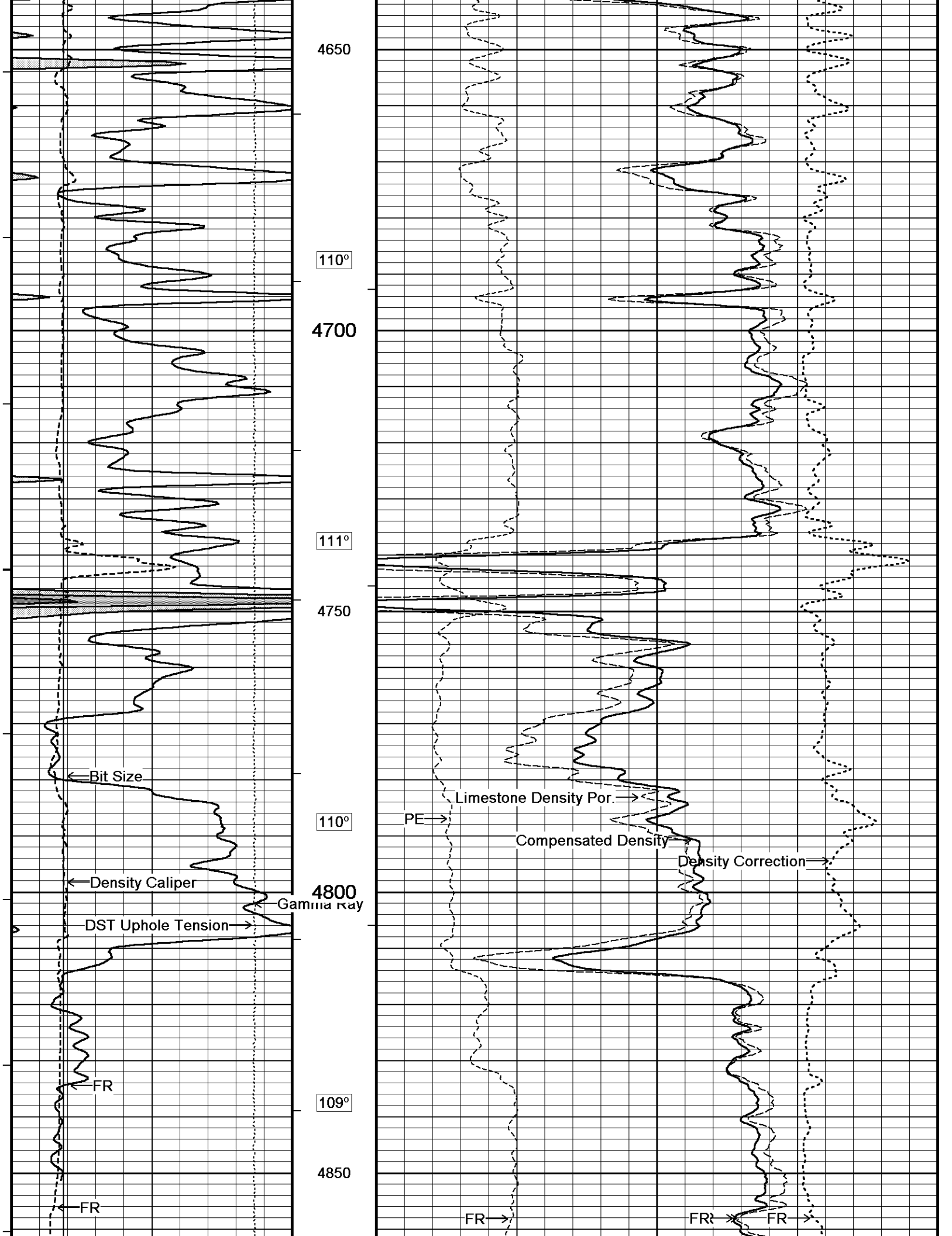
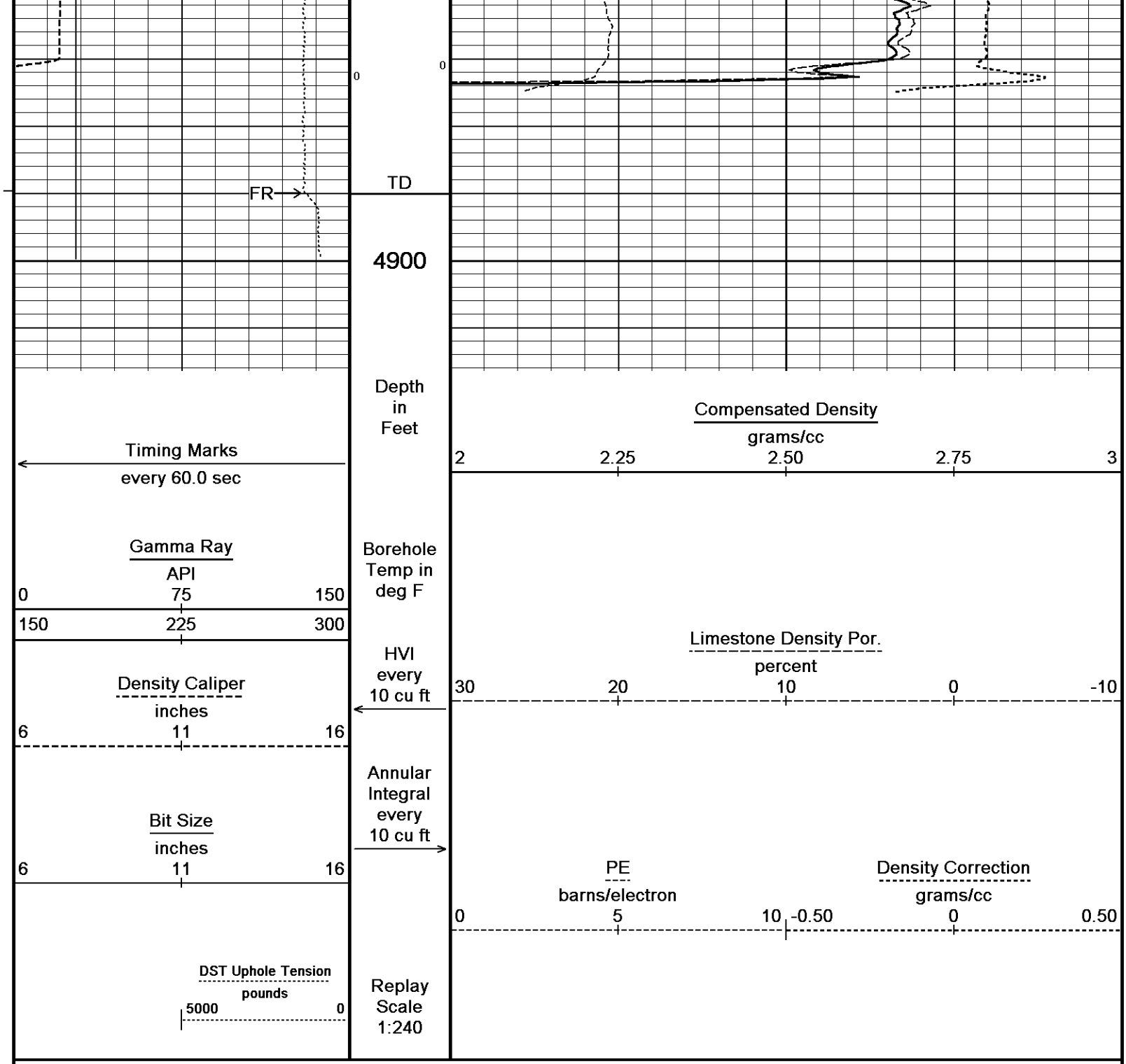



DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
4450
107°
4500
108°
4550
100
108°
4600
109°
barns/electron
0
5
10
-0.50
grams/cc
0
0.50


4650
110°
4700
111°
4750
110°
4800
109°
4850
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
Limestone Density Por.
PE
Compensated Density
Density Correction
FR
FR
FR



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REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm 2-21\Shakespeare Bahm 2-21 Main.dta

General Constants All 000 — Last Edited on 02-NOV-2014,13:30

General Parameters		
Mud Resistivity	0.425	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 Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	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

Gamma Calibration MCG-D.K 469

Field Calibration on 28-OCT-2014 13:39

	Measured	Calibrated (API)
Background	68	45
Calibrator (Gross)	1149	770
Calibrator (Net)	1082	725

Gamma Calibration Tolerances MCG-D.K 469

		1.40	1.475	1.55	
Ratio	1.492				Counts/API

Gamma Constants MCG-D.K 469

Last Edited on 02-NOV-2014,12:42

Gamma Calibrator Number	GRC038	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 12-MAY-2014,02:16

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

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 13-JUL-2014,14:53

Pre-filter Length	11

Caliper Calibration MPD-C.A 216

Base Calibration on 24-OCT-2014 11:23
Field Calibration on 02-NOV-2014 09:42

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18960	3.99
2	28807	5.98
3	38852	7.97
4	48518	9.86
5	59792	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.95	7.97

Caliper Calibration Tolerances MPD-C.A 216

		7.77	7.97	8.17	
Short Arm Field Cal.	7.95				in

Photo Density Calibration MPD-C.A 216

Base Calibration on 24-OCT-2014 11:46
Field Check on 02-NOV-2014 09:40

Density Calibration

Base Calibration

	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1094	1297		
Reference 1	59838	31173	59556	30836
Reference 2	24858	2730	24941	2541

Field Check at Base

	1094.4	1296.6

Field Check

	1094.8	1289.1

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	201	974		
Reference 1	25019	59646	0.423	0.371
Reference 2	7097	24723	0.290	0.272

Field Check at Base

	201.2	973.6

Field Check

	198.8	975.3

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.47	-5% 2.52 +5%	Far Density Ratio	20.84	-5% 21.00 +5%
PE Calibration	0.124	0.089 0.110 0.131			
Near Den. Field Check	1094.8	-3% 1094.4 +3%	Far Den. Field Check	1289.1	-3% 1296.6 +3%
PE WS Field Check	198.8	-6% 201.2 +6%	PE WH Field Check	975.3	-6% 973.6 +6%

Density Constants MPD-C.A 216

Last Edited on 02-NOV-2014,12:41

Density Source Id	18235B	
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	1.10	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 (m)
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

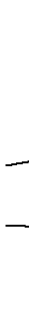
DOWNHOLE EQUIPMENT

C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm 2-21\Shakespeare Bahm 2-21 Main.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 234 LG: 1.58 ft WT: 15.4 lb OD: 2.240 in

Compact Comms Gamma
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in



55.39 ft GRGC - Gamma Ray

52.48 ft CGXT - MCG External Temperature

Compact Neutron
MDN-A.B 152 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

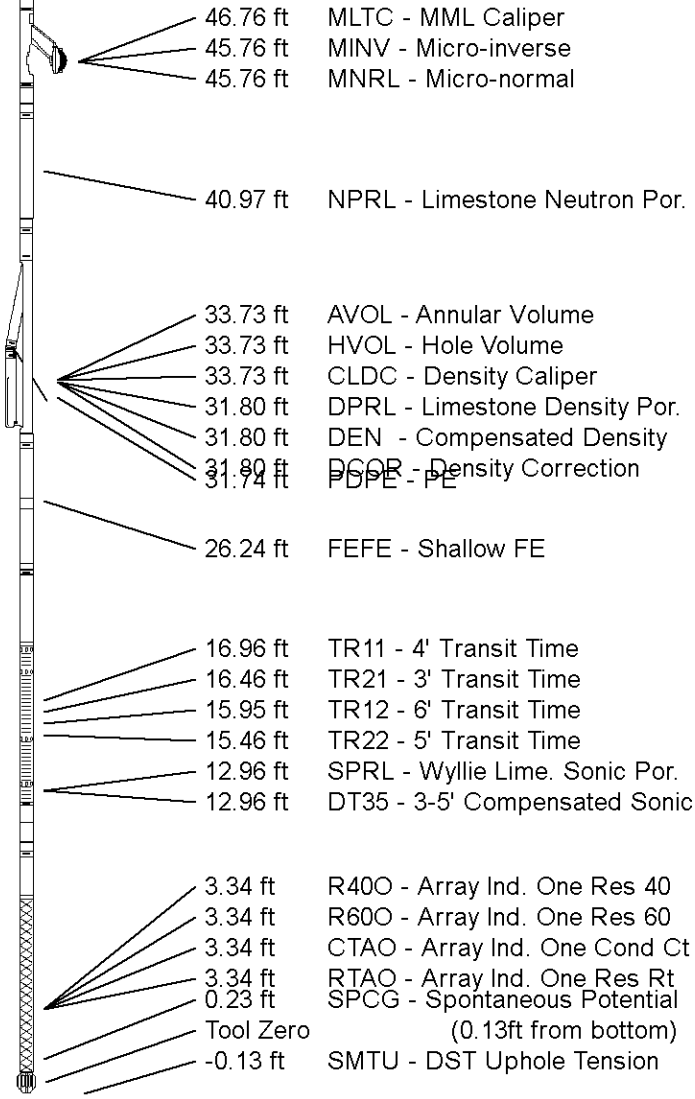
Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic
MSS-A.A 126 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

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

Total Length: 62.25 ft Weight: 471.8 lb



COMPANY	SHAKESPEARE OIL CO., INC.
WELL	BAHM 2-21
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3145.00	feet	First Reading	4858.24	feet
Elevation Drill Floor	3143.00	feet	Depth Driller	4890.00	feet
Elevation Ground Level	3135.00	feet	Depth Logger	4890.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG