COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG

Weatherford®

COMPANY	CMX, INC.
WELL	#1 KREHBIEL
FIELD	WELCH-BORNHOLDT
PROVINCE/COUNTY	RICE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1270' FSL & 330' FEL

SEC	TWP	RGE	Other Services
1	21S	6w	MAI/MFE

Latitude
Longitude
API Number 15-159-22774

Permanent Datum GL, Elevation 1529 feet
Log Measured From KB
Drilling Measured From KB @ 13 FEET

Elevations:	feet
KB	1542.00
DF	1540.00
GL	1529.00

Date	30-APR-2014			
Run Number	ONE			
Service Order	7036-86005377			
Depth Driller	3500.00	feet		
Depth Logger	3500.00	feet		
First Reading	3480.78	feet		
Last Reading	2400.00	feet		
Casing Driller	265.00	feet		
Casing Logger	267.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg		53.00 CP	
PH / Fluid Loss	9.50		14.00 ml/30Min	
Sample Source	MUDPIT			
Rm @ Measured Temp	0.50 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.40 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.60 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.37 @103.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	103.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	DEREK CARTER			
Witnessed By	LEAH KASTENS			
JOB #	LB14-132			

BOREHOLE RECORD

Last Edited: 30-APR-2014 02:20

Bit Size inches	Depth From feet	Depth To feet
7.875	265.00	3500.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	265.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113.
- TOOLS: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - MFE: 1 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 SURFACE CASING: 1340 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 2400 FT : 190 CU. FT

- ANNULAR HOLE VOLUME WITH 5.0 INCH CASING FROM TD TO 2100 FT.: 100 CU. FT.

- RIG: DUKE DRILLING #7

- SERVICE ORDER: 7036-86005377

- ENGINEER: DEREK CARTER

- OPERATOR: CARLOS RAMIREZ

- HIT LEDGE AT 672 FT. WHILE RIH; PULLED TOOLS OFF LEDGE AND RAN PAST WITH NO FURTHER PROBLEMS

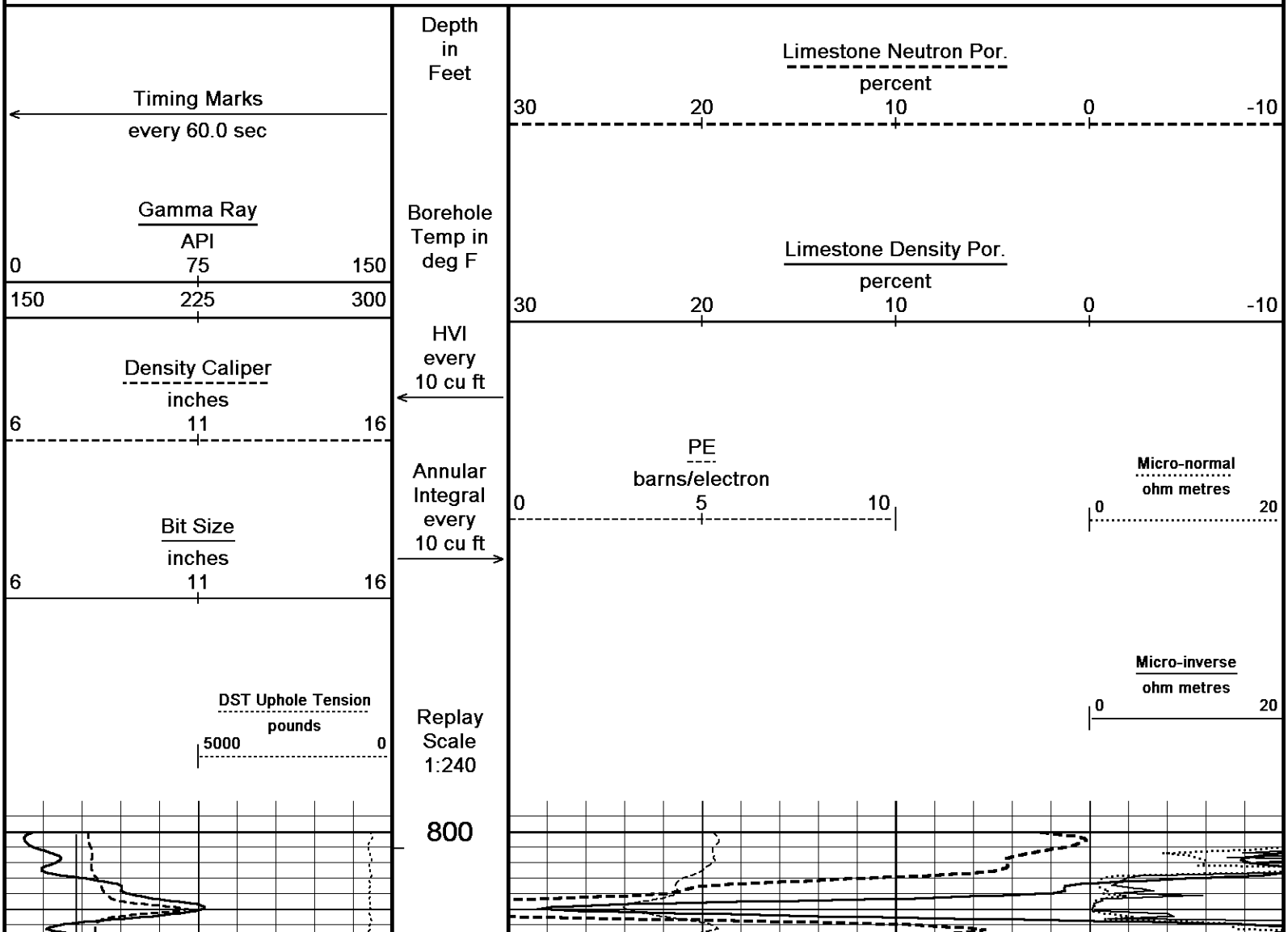
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

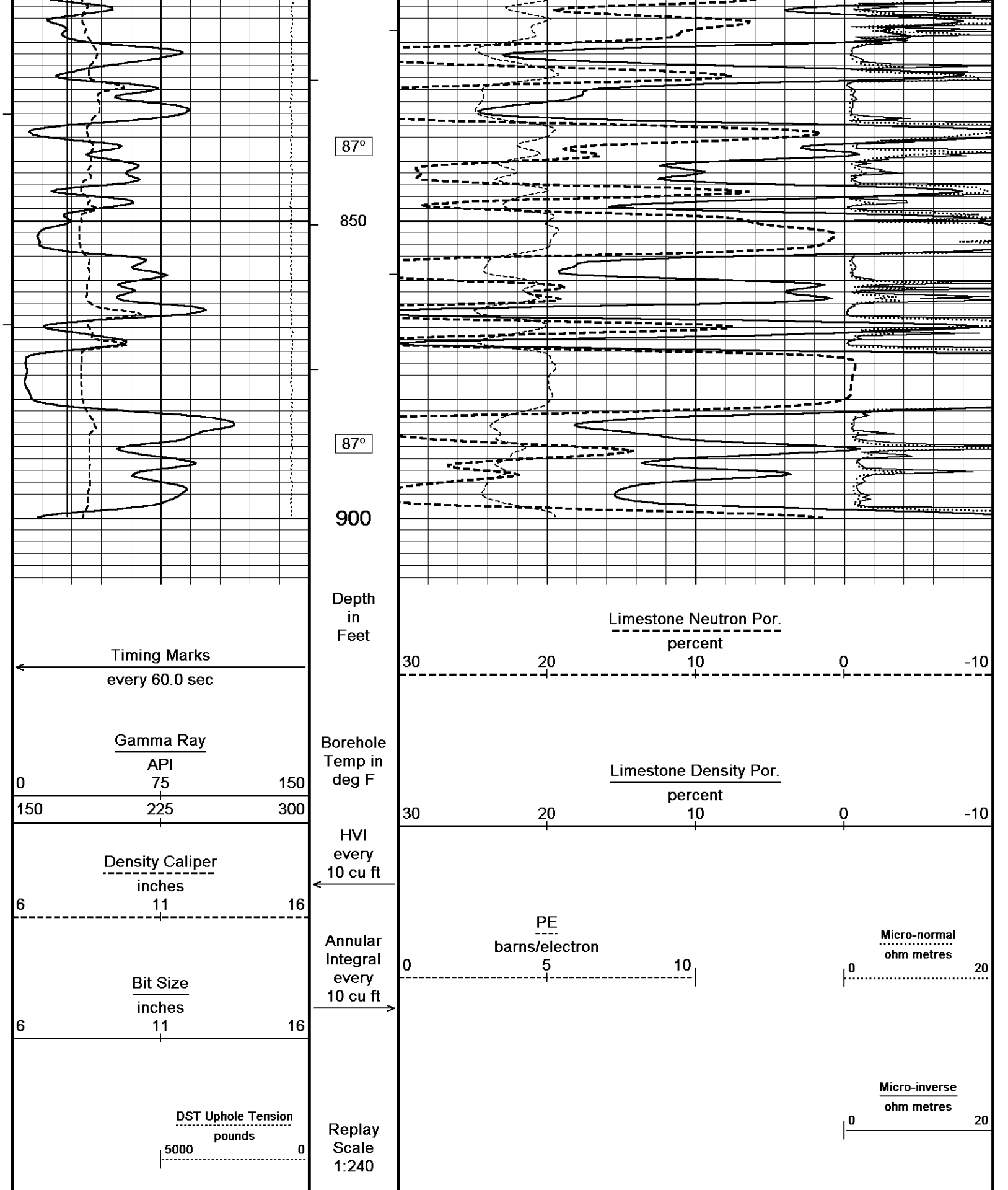
5 INCH LIMESTONE MAIN ANHYDRITE SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-APR-2014 10:28

Filename: C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Main.dta — Recorded on 30-APR-2014 08:14

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113





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5 INCH LIMESTONE MAIN ANHYDRITE SECTION

5 INCH LIMESTONE MAIN

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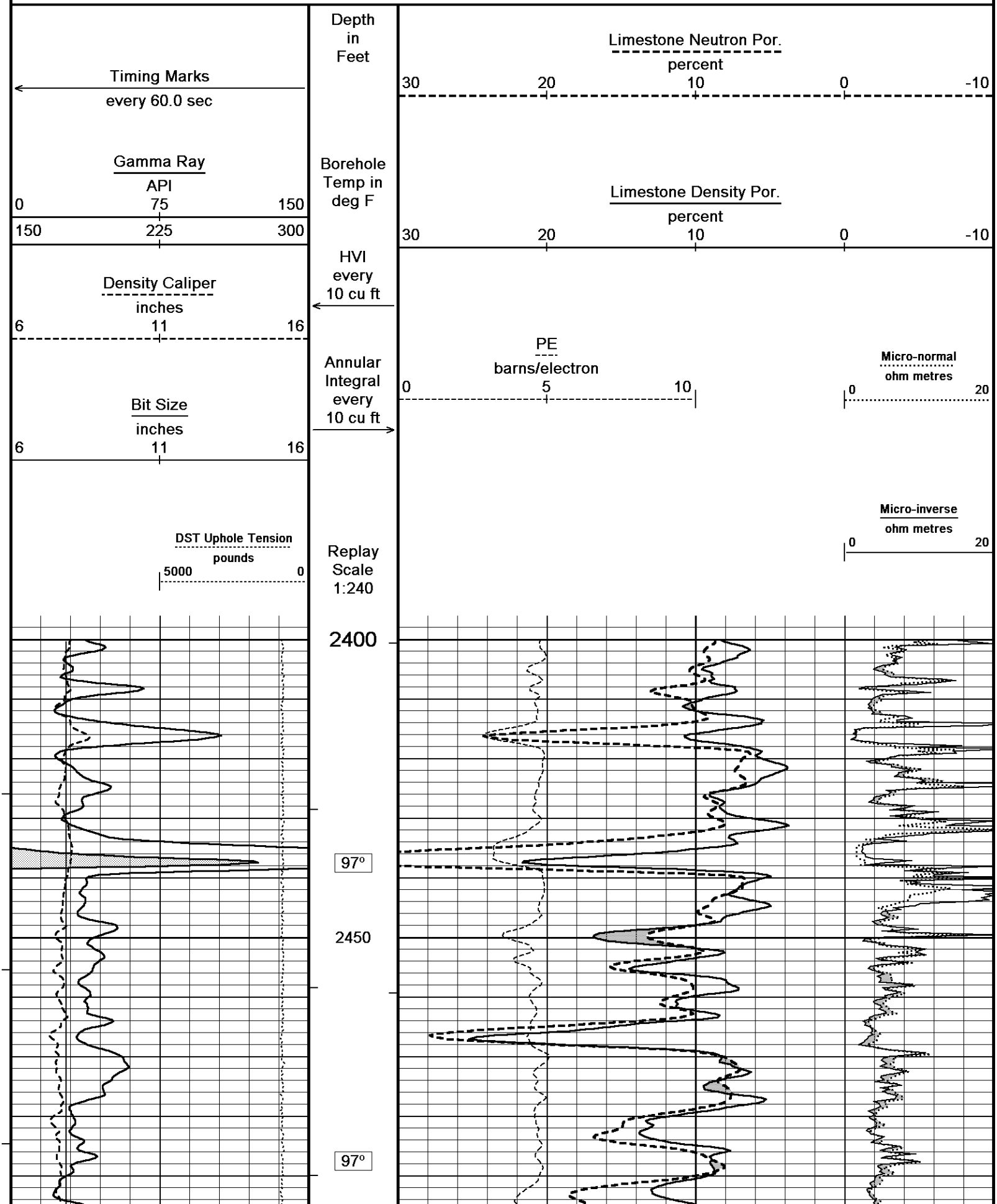
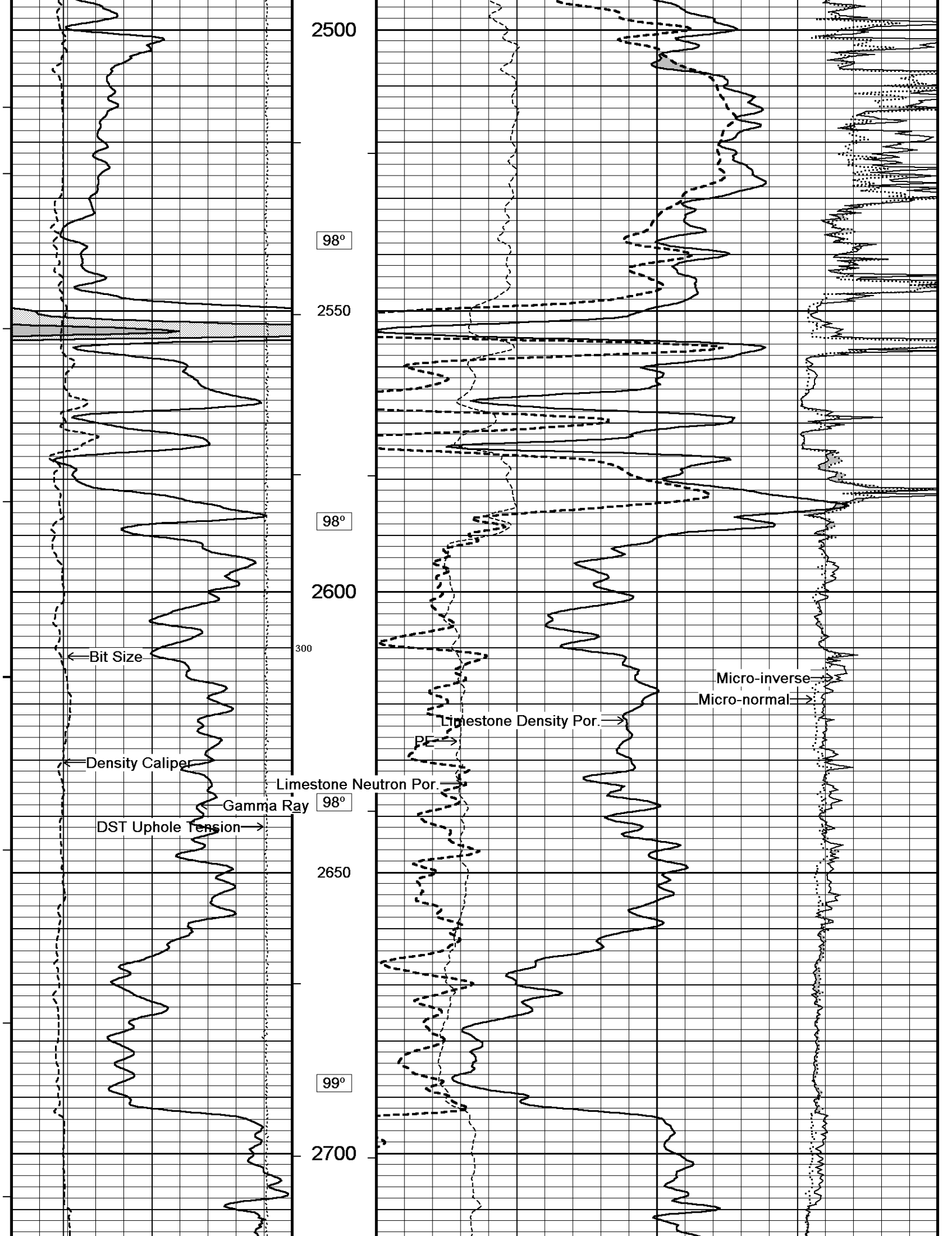
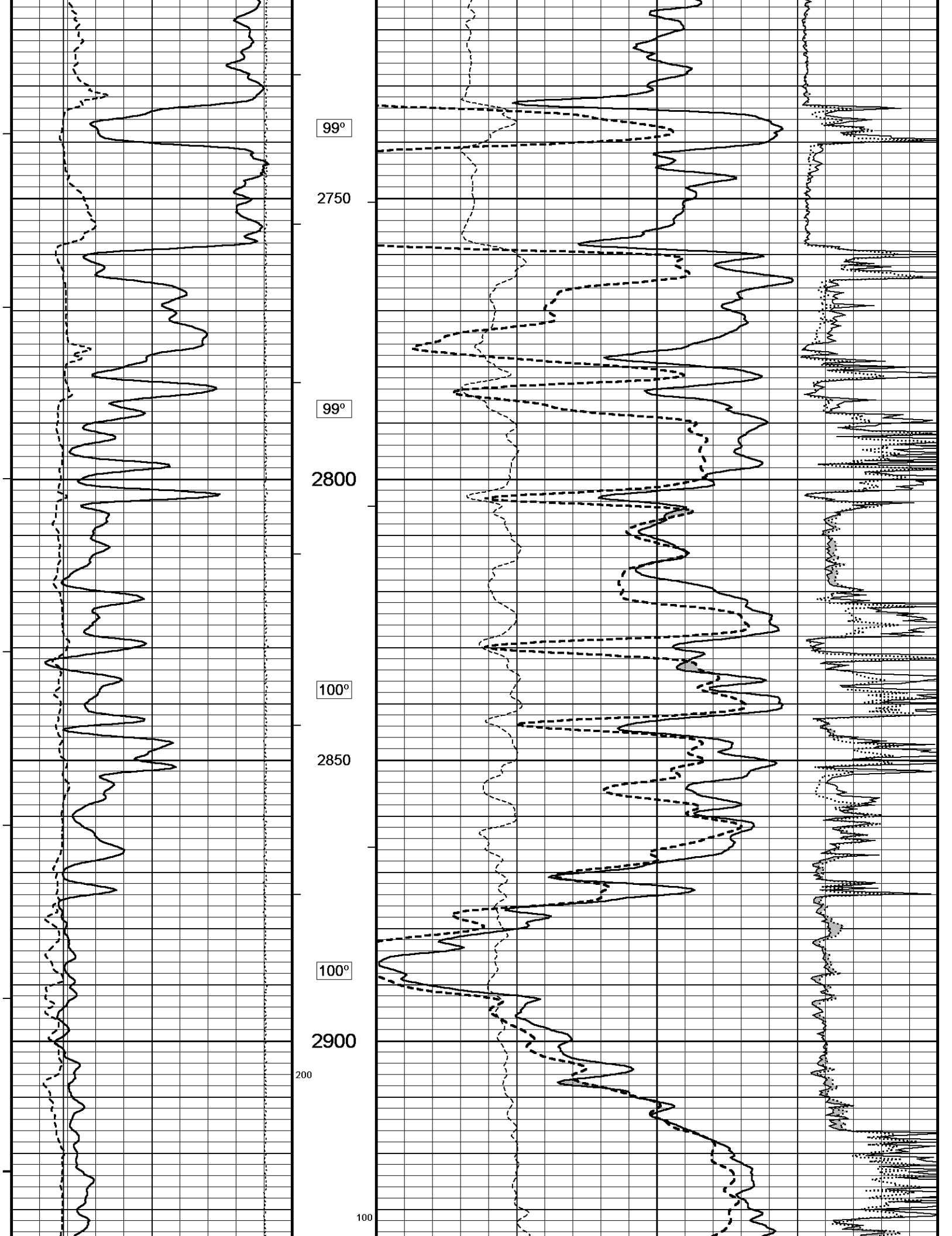
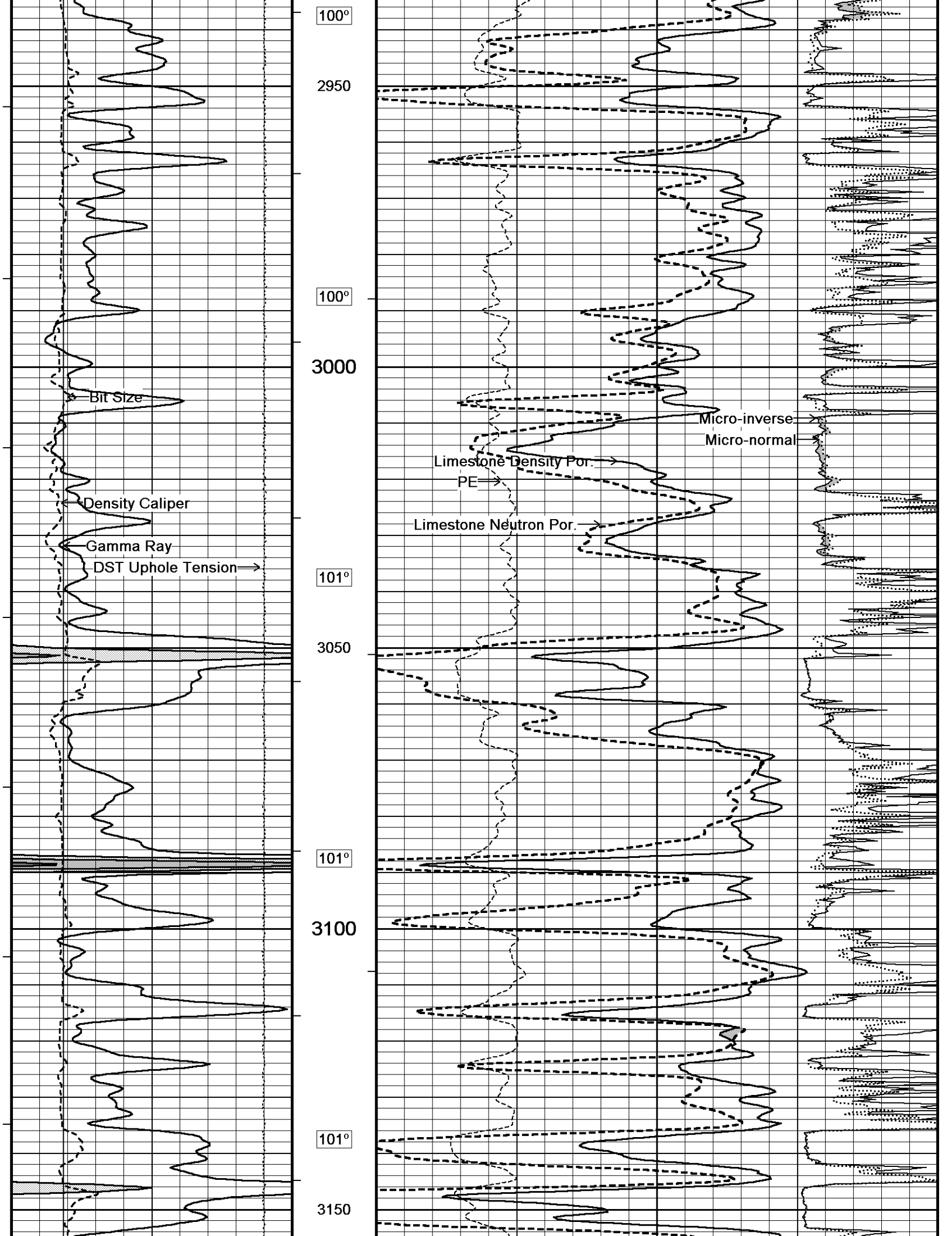
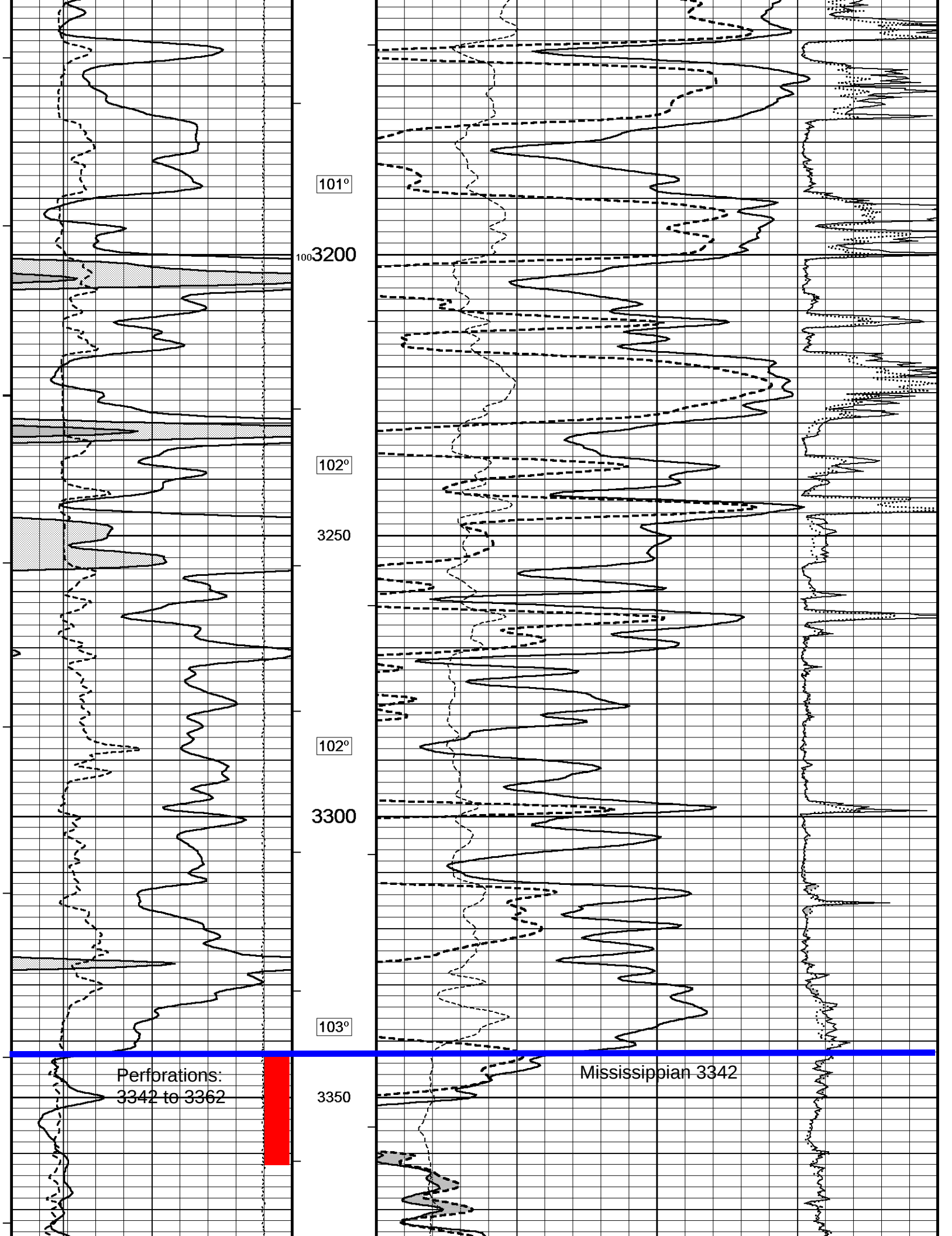
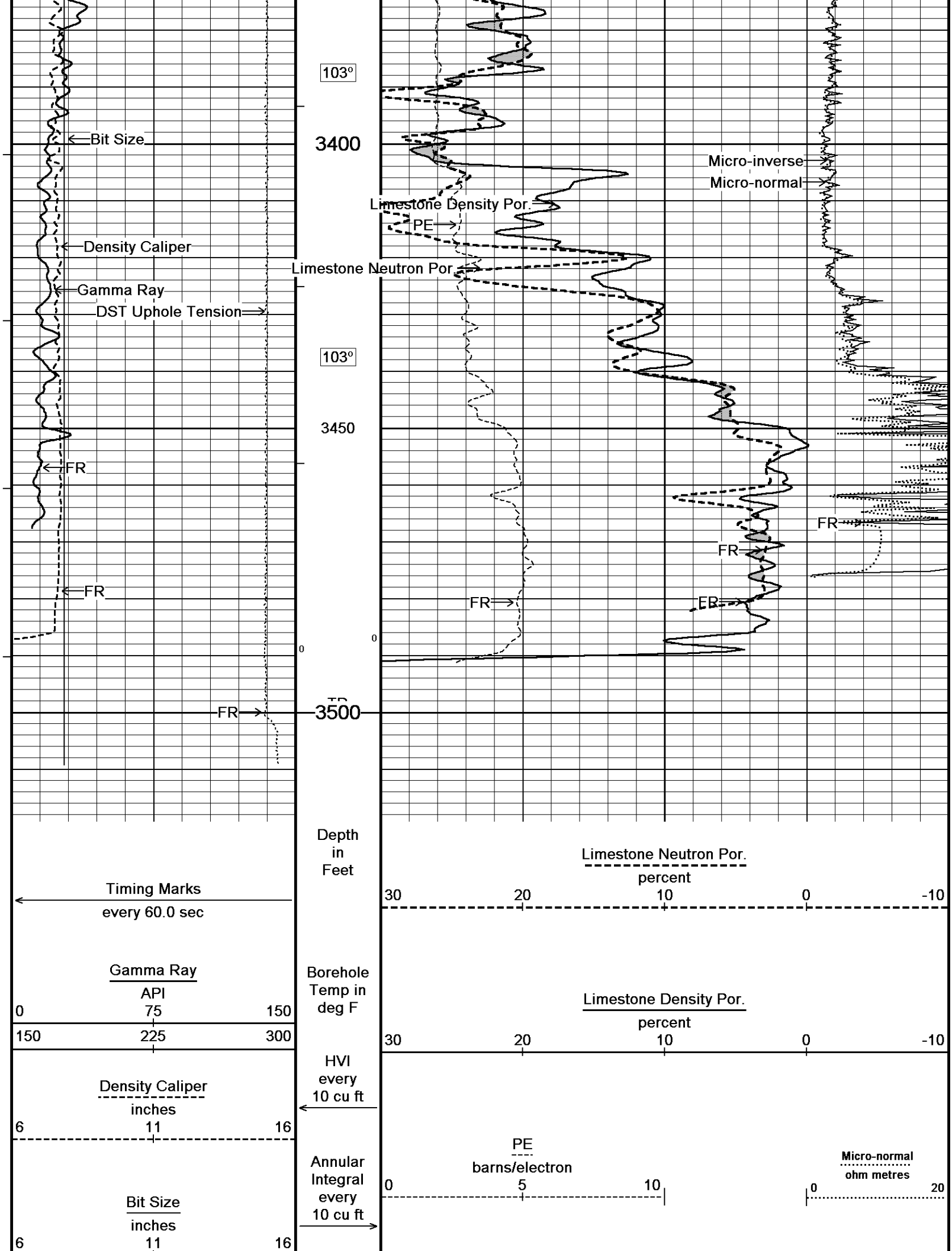



2500
98°
2550
98°
2600
300
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Neutron Por.
98°
2650
99°
2700
Micro-inverse
Micro-normal
Limestone Density Por.
PE


99°
2750
99°
2800
100°
2850
100°
2900
200
100


100°
2950
100°
3000
Bit Size
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
101°
3050
101°
3100
101°
3150


101°
100
3200
102°
3250
102°
3300
103°
3350
Perforations:
3342 to 3362
Mississippian 3342


103°
3400
Bit Size
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
103°
3450
FR
FR
FR
FR
FR
FR
0
0
3500
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
Micro-normal
ohm metres
0 20
Annular
Integral
every
10 cu ft
Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Micro-inverse
ohm metres
0 20

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Plotted on 30-APR-2014 10:28
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5 INCH LIMESTONE MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
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Plotted on 30-APR-2014 10:28
Recorded on 30-APR-2014 07:55

Timing Marks
every 60.0 sec

Depth
in
Feet

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

Micro-normal
ohm metres
0 20

Annular
Integral
every
10 cu ft

Bit Size
inches
6 11 16

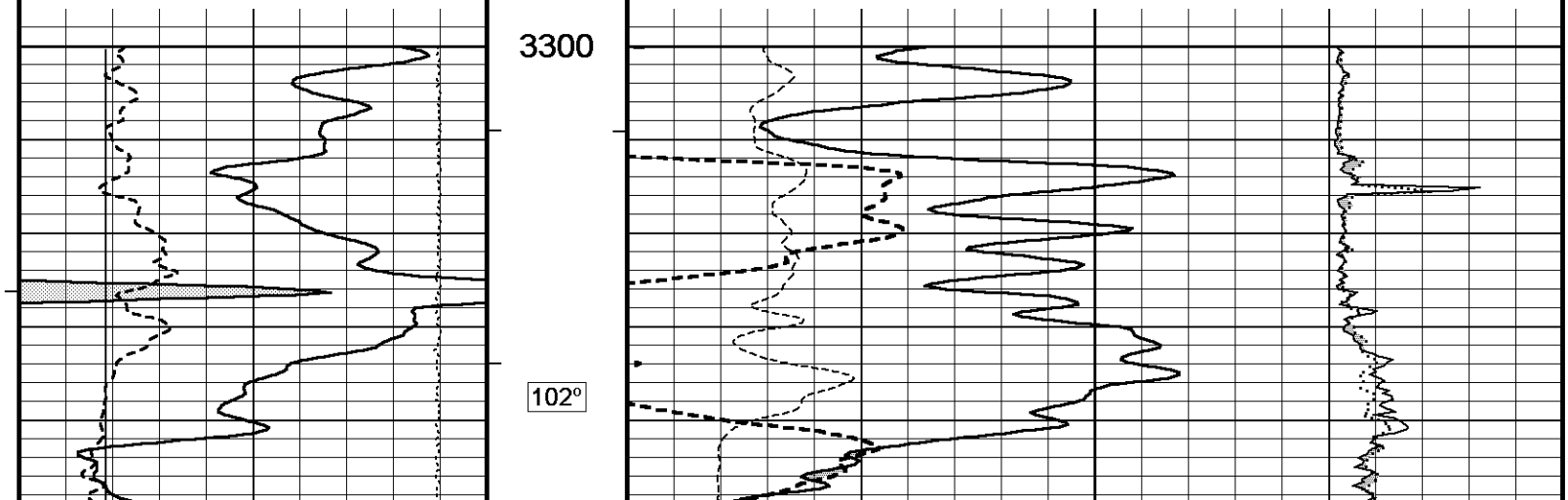
Micro-inverse
ohm metres
0 20

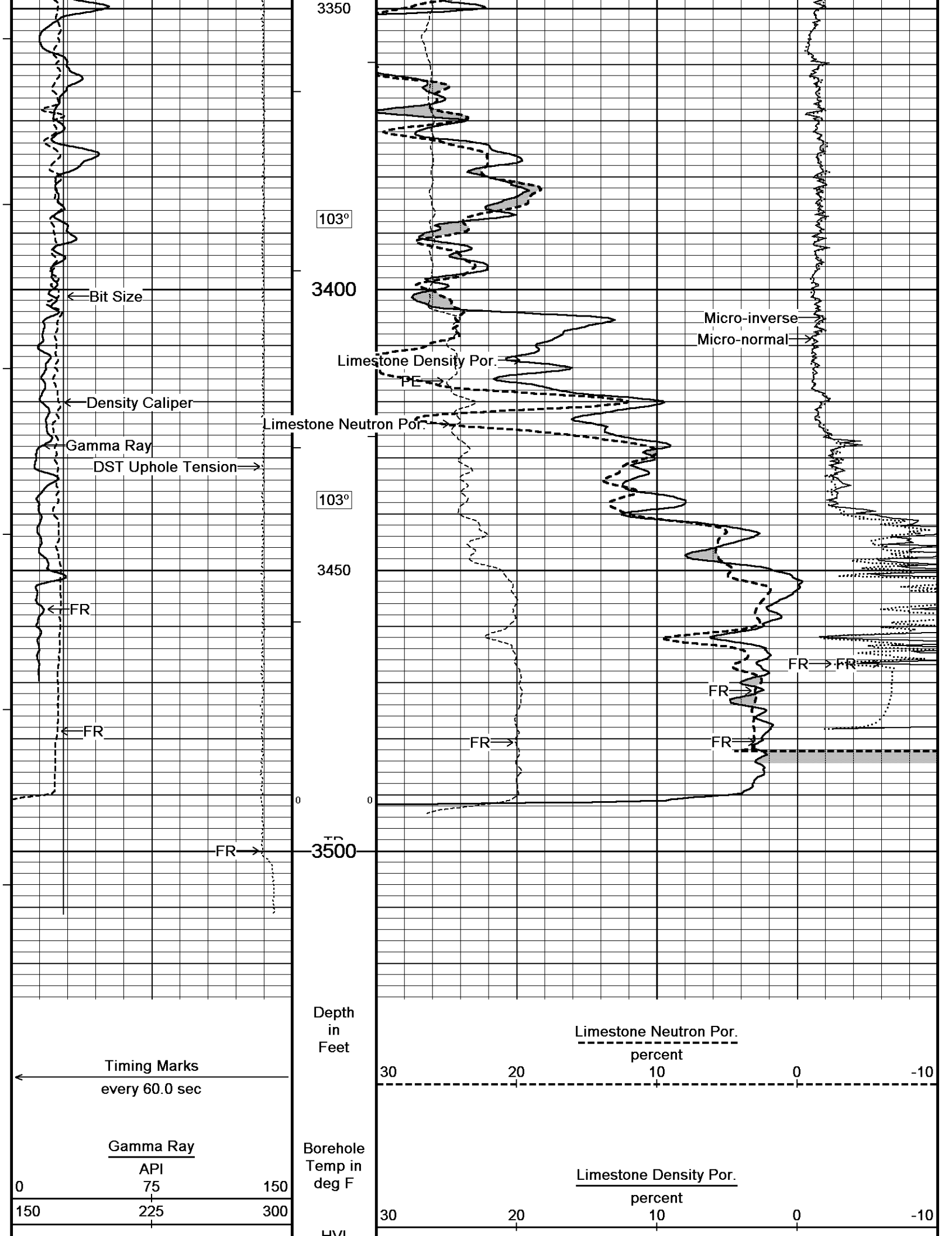
DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

3300

102°




3350
103°
3400
Bit Size
Micro-inverse
Micro-normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
103°
3450
FR
FR
FR
FR
FR
FR
FR
0
0
FR
3500
Depth
in
Feet
Timing Marks
every 60.0 sec
Limestone Neutron Por.
percent
30
20
10
0
-10
Gamma Ray
API
0
75
150
Borehole
Temp in
deg F
Limestone Density Por.
percent
150
225
300
30
20
10
0
-10

HVI every 10 cu ft

Density Caliper
inches
6 11 16

Annular Integral every 10 cu ft

PE
barns/electron
0 5 10

Micro-normal
ohm metres
0 20

Bit Size
inches
6 11 16

Micro-inverse
ohm metres
0 20

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-APR-2014 10:28
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REPEAT SECTION

5 INCH BULK DENSITY MAIN

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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

HVI every 10 cu ft

Density Caliper
inches
6 11 16

Annular Integral every 10 cu ft

PE
barns/electron
0 5 10

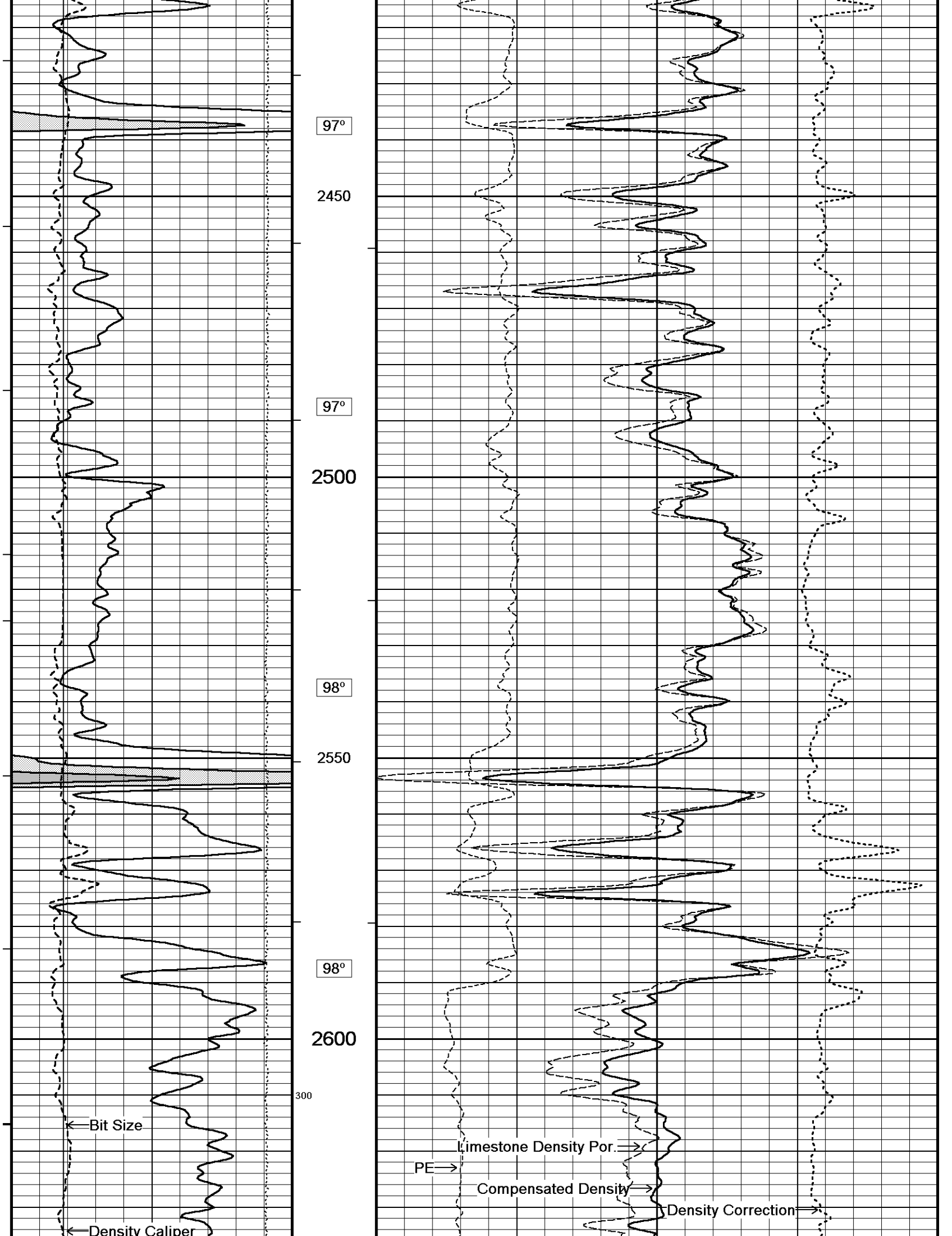
Density Correction
grams/cc
-0.50 0 0.50

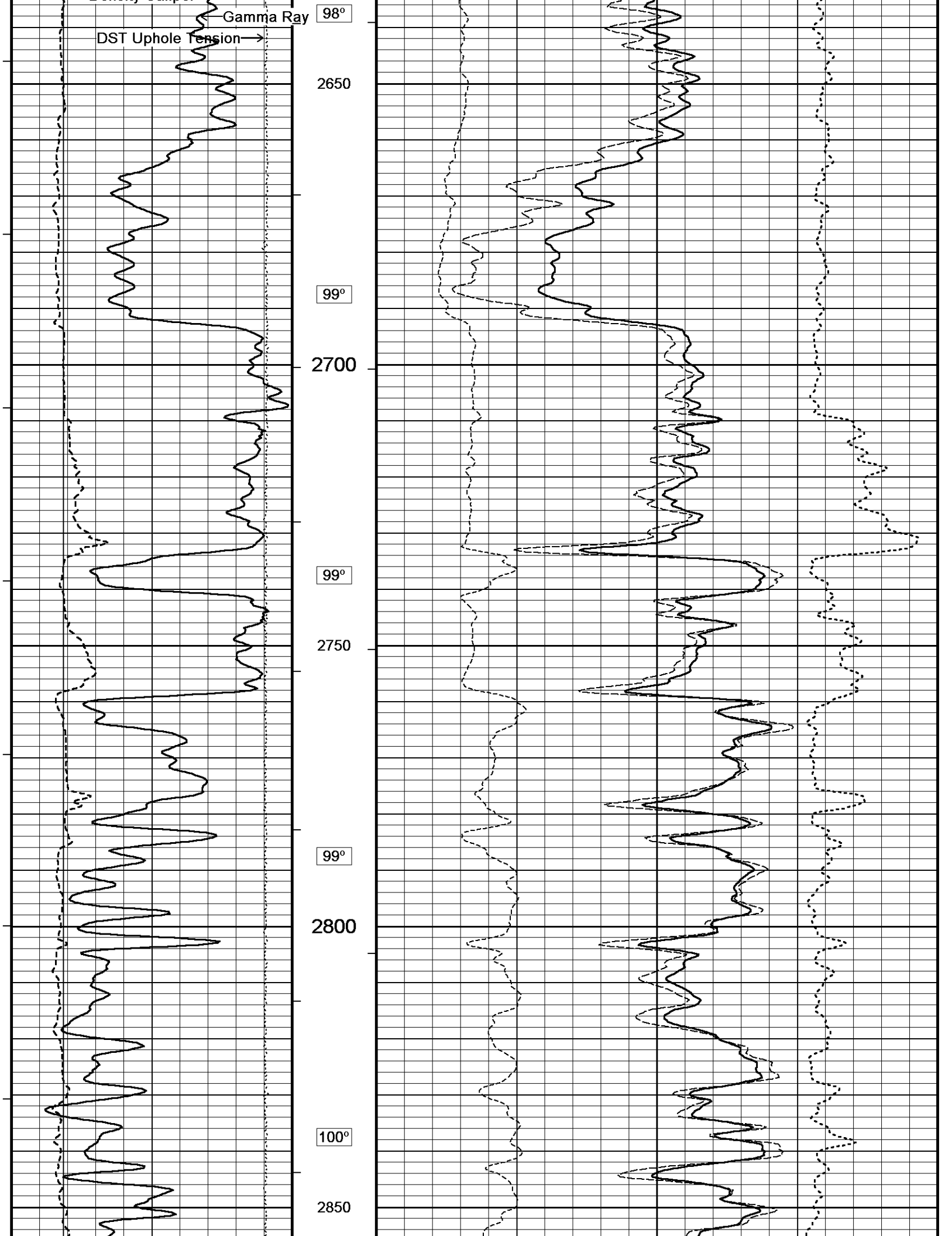
Bit Size
inches
6 11 16

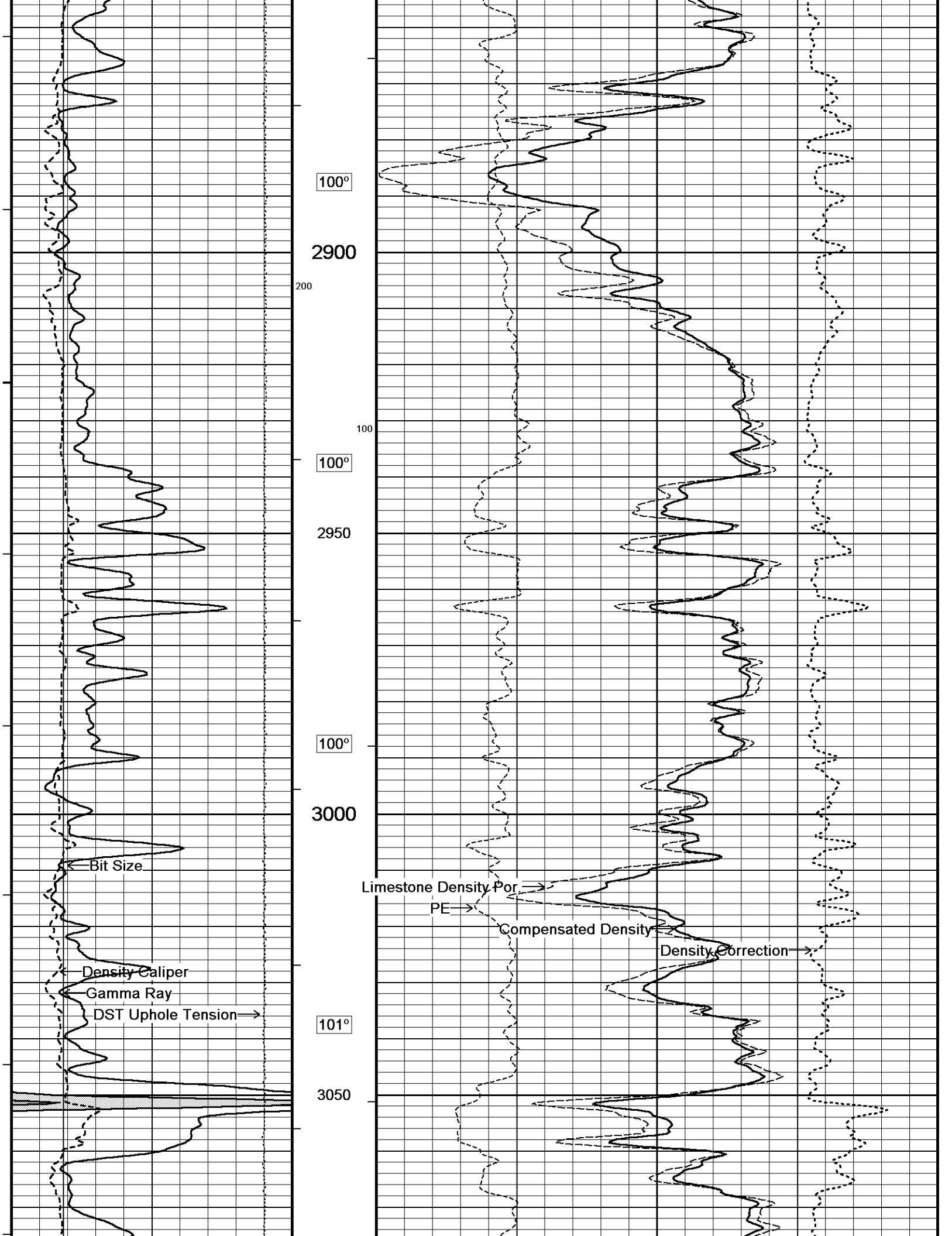
DST Uphole Tension
pounds
5000 0

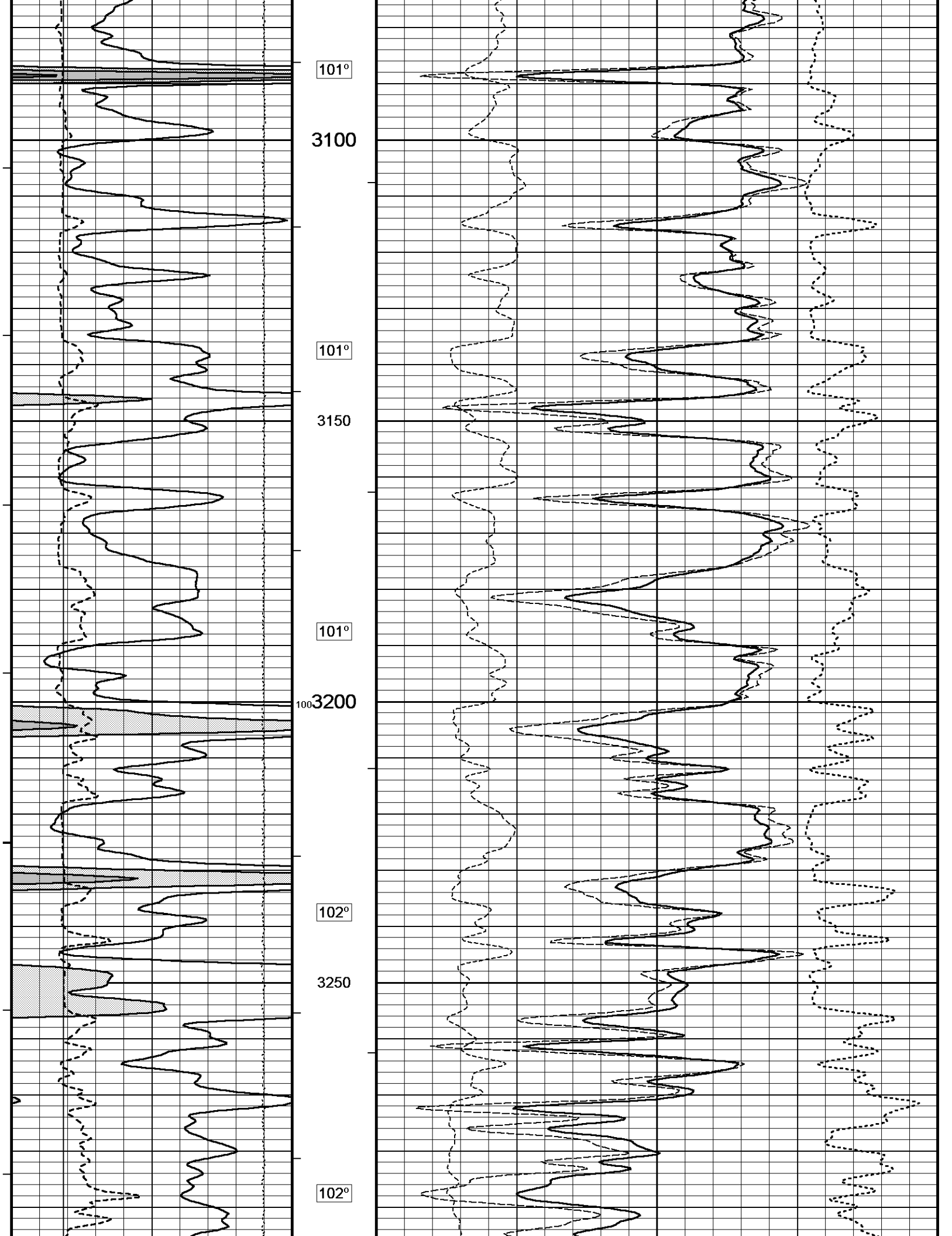
Replay Scale 1:240

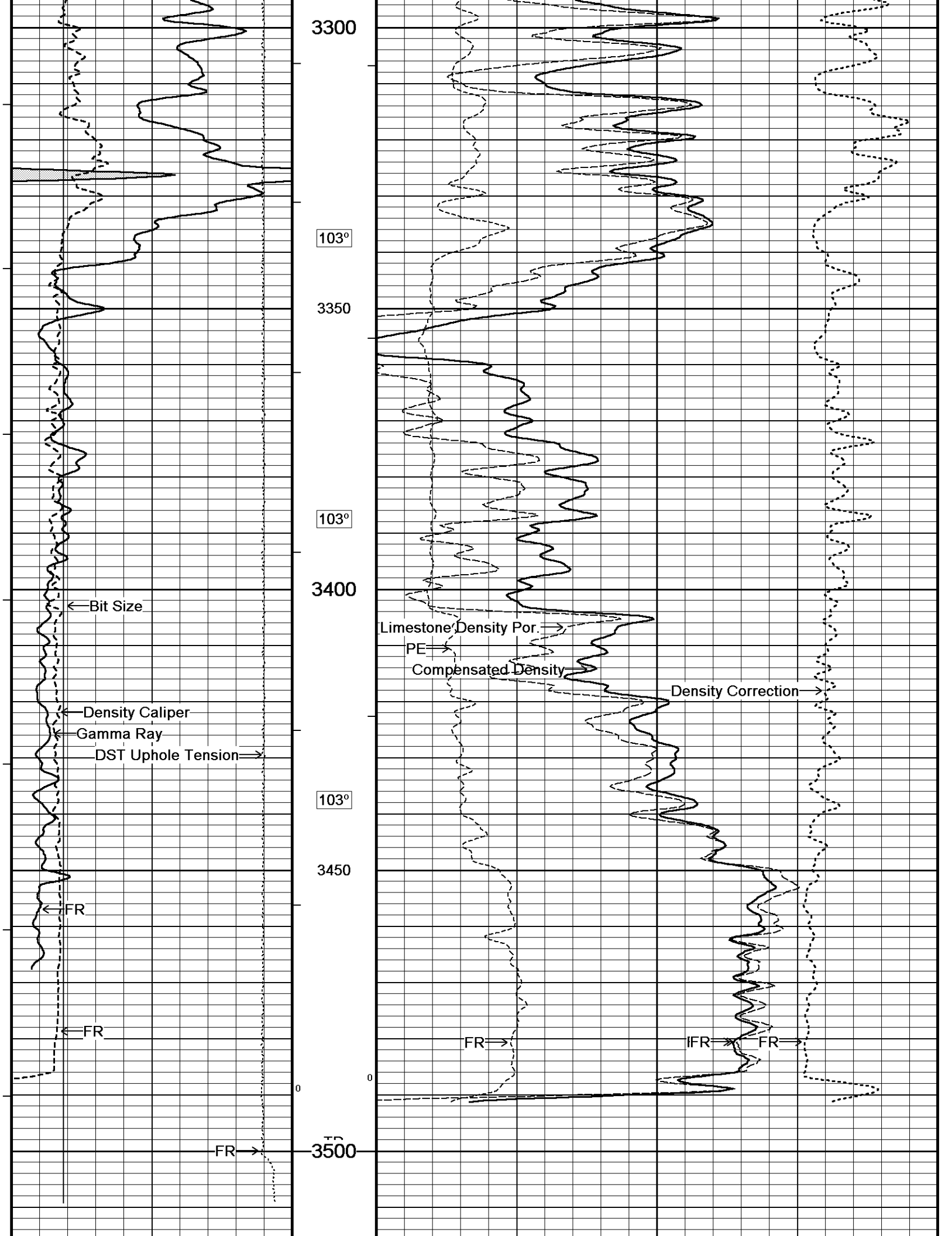
2400

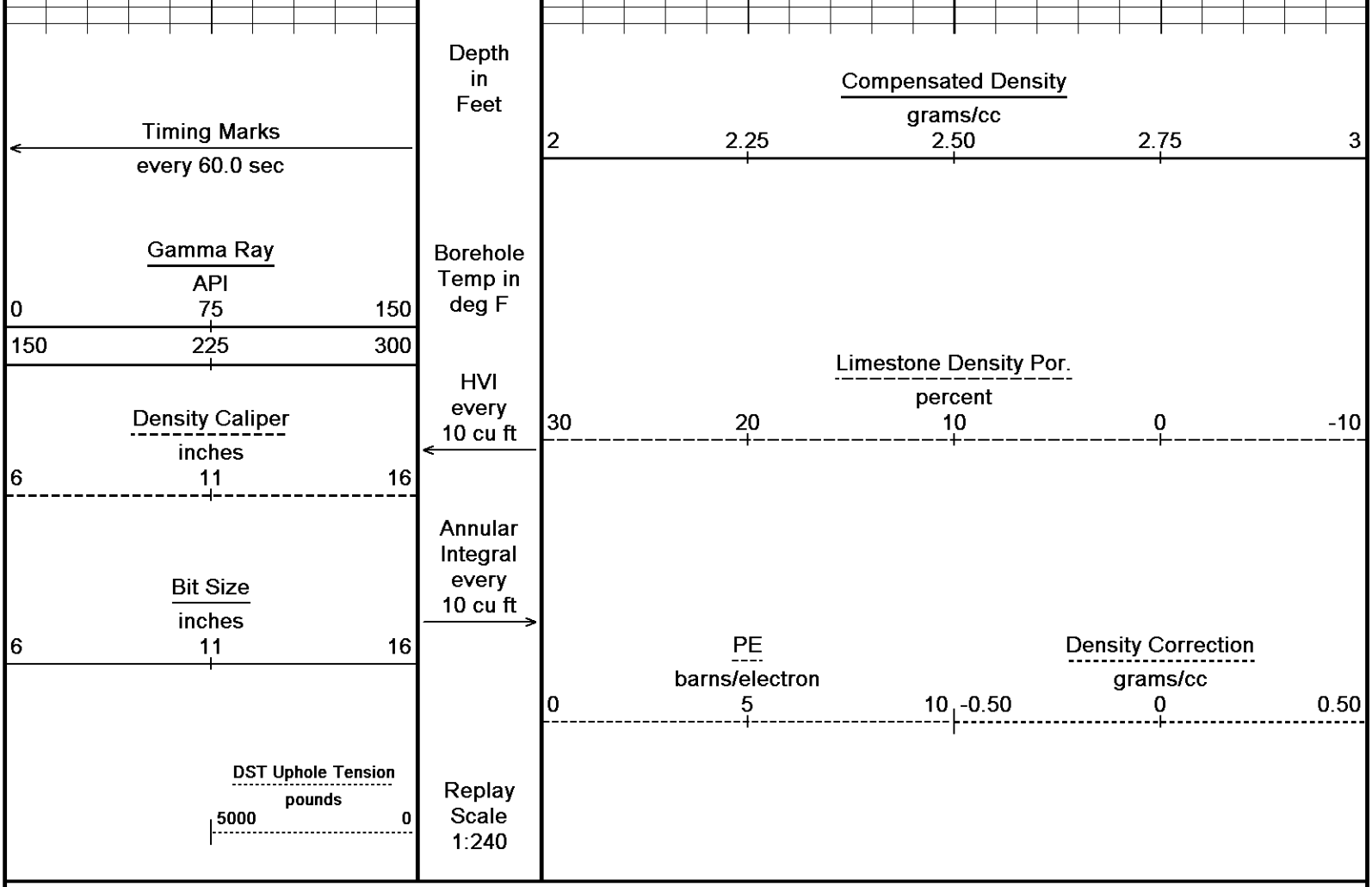

97°
2450
97°
2500
98°
2550
98°
2600
300
Bit Size
Density Caliper
Limestone Density Por
PE
Compensated Density
Density Correction


Gamma Ray
DST Uphole Tension
98°
2650
99°
2700
99°
2750
99°
2800
100°
2850


100°
2900
200
100
100°
2950
100°
3000
Bit Size
Limestone Density Por
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
101°
3050


101°
3100
101°
3150
101°
100
3200
102°
3250
102°


3300
103°
3350
103°
3400
Bit Size
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
103°
3450
FR
FR
FR
IFR
FR
0
FR
3500



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5 INCH BULK DENSITY MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 30-APR-2014 10:28
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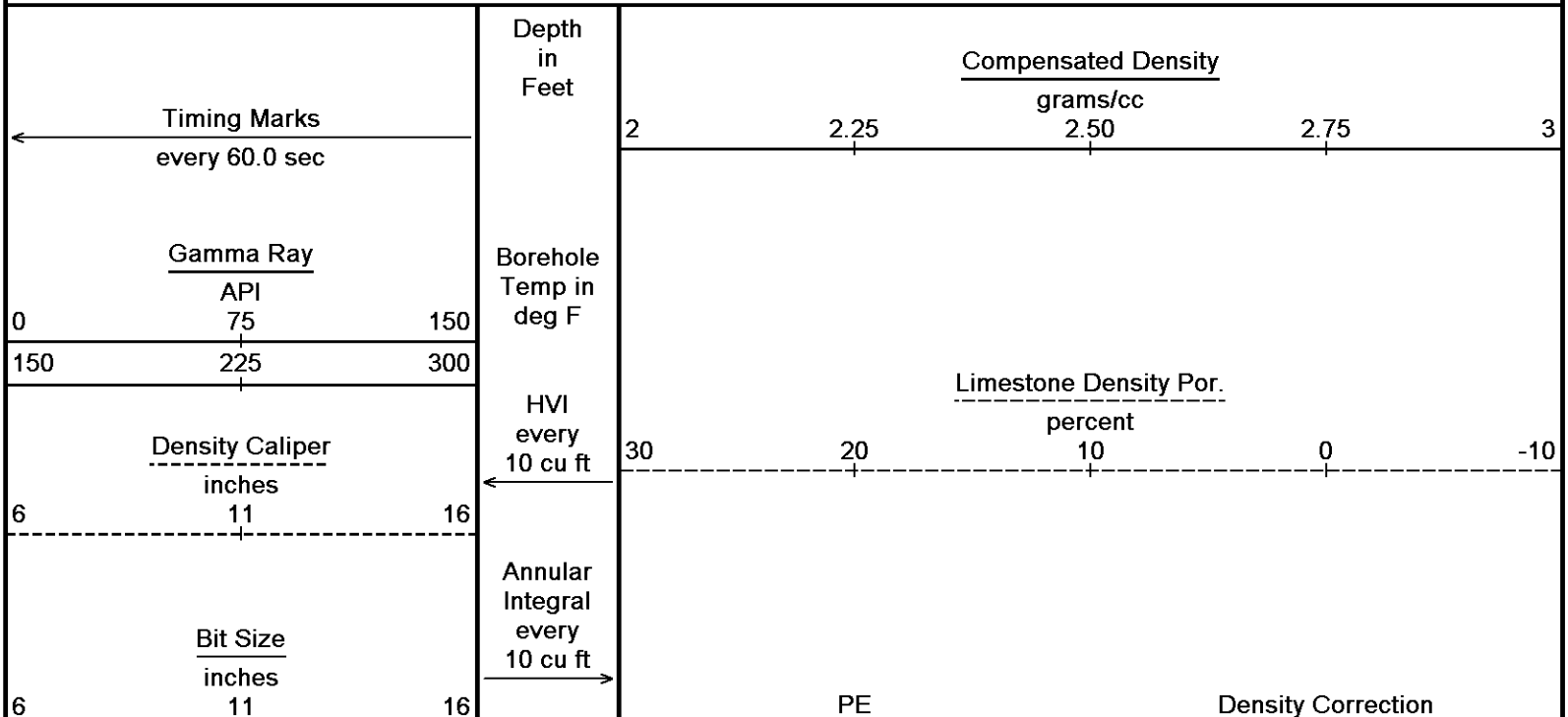
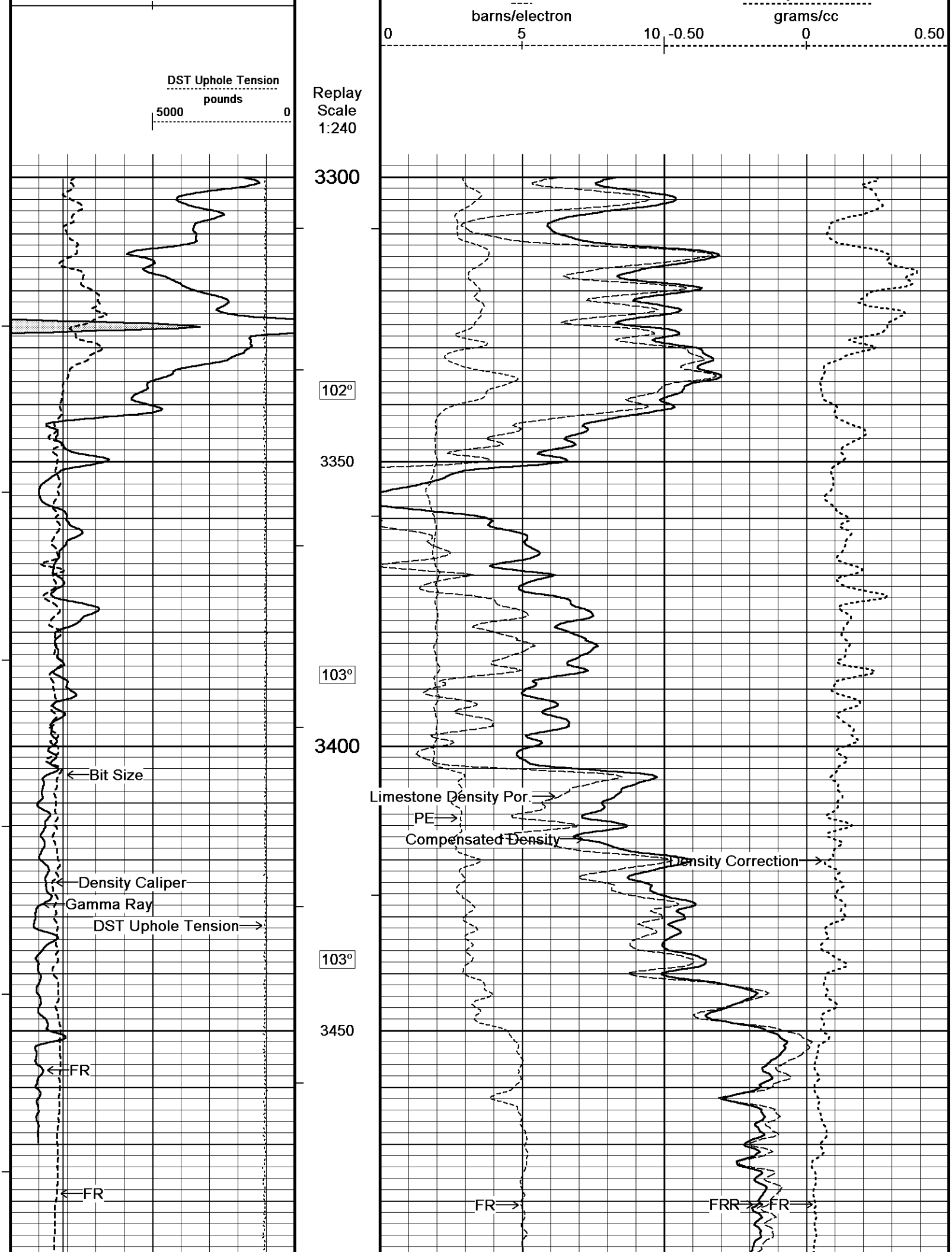
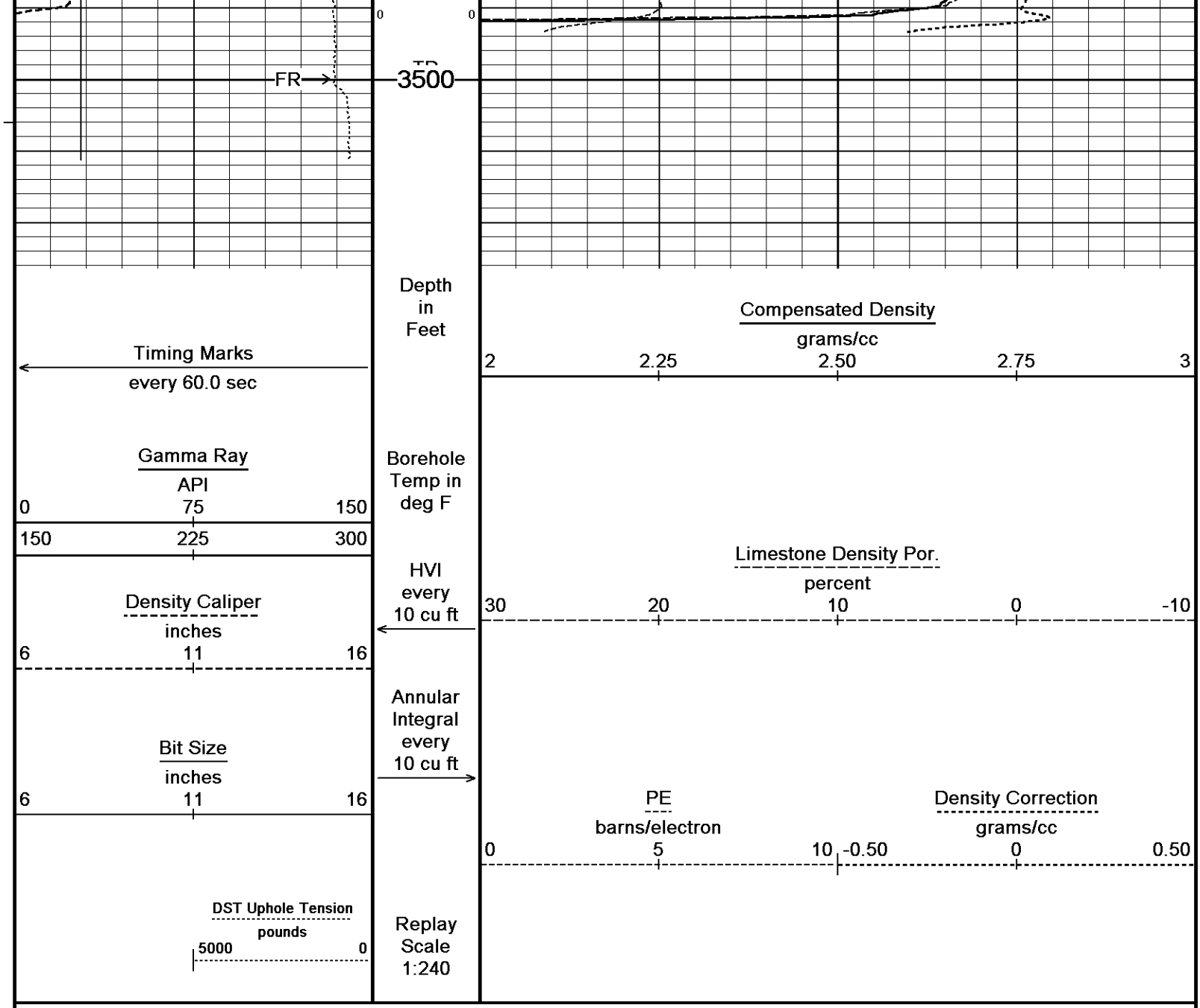



DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
barns/electron
0
5
10
-0.50
grams/cc
0
0.50
3300
102°
3350
103°
3400
103°
3450
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
Limestone Density Por.
PE
Compensated Density
Density Correction
FR
FRR
FR



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REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Main Detail.dta

General Constants All 000

Last Edited on 30-APR-2014,07:32

General Parameters		
Mud Resistivity	0.500	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	MML Caliper	

Rwa Parameters

Porosity used	Crossplot Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	1.000
RWA Constant M	2.000
SW/APOR Tool Source	0.000

Gamma Calibration MCG-B 39

Field Calibration on 29-APR-2014 13:04

	Measured	Calibrated (API)
Background	70	47
Calibrator (Gross)	1149	772
Calibrator (Net)	1080	725

Gamma Constants MCG-B 39

Last Edited on 30-APR-2014,02:27

Gamma Calibrator Number	GRC038	
Mud Density	1.13	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-B 39

Field Calibration on 17-APR-2014,10:21

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

High Resolution Temperature Constants MCG-B 39

Last Edited on 17-APR-2014,10:21

Pre-filter Length	11

Caliper Calibration MPD-C.A 216

Base Calibration on 24-APR-2014 15:34
Field Calibration on 29-APR-2014 13:15

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16880	3.99
2	26832	5.98
3	36848	7.97
4	46696	9.86
5	57888	11.92
6	N/A	N/A

Field Calibration

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

Photo Density Calibration MPD-C.A 216

Base Calibration on 24-APR-2014 16:06
Field Check on 29-APR-2014 13:11

Density Calibration

Base Calibration

	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1106	1309		
Reference 1	60877	31827	59556	30836
Reference 2	25213	2782	24941	2541

Field Check at Base

1106.2	1308.9

Field Check

1106.1	1311.8

PE Calibration

Base Calibration

		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background	202	984		
Reference 1	24835	60672	0.413	0.371
Reference 2	7214	25081	0.291	0.272

Field Check at Base

202.3	984.1

Field Check
202.1 987.5

Density Constants MPD-C.A 216

Last Edited on 30-APR-2014,02:27

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	1.13	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	0.00
0.00	

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Main Detail.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.244 in

Compact Comms Gamma
MCG-B 39 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

Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

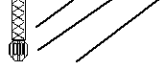
Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

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

Compact Induction
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 49.73 ft Weight: 399.0 lb

42.87 ft	GRGC - Gamma Ray
39.96 ft	CGXT - MCG External Temperature
33.24 ft	MINV - Micro-inverse
33.24 ft	MNRL - Micro-normal
34.24 ft	MLTC - MML Caliper
28.45 ft	NPRL - Limestone Neutron Por.
21.21 ft	CLDC - Density Caliper
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
19.28 ft	DEN - Compensated Density
19.28 ft	DCOR - Density Correction
19.28 ft	DPRL - Limestone Density Por.
19.22 ft	PDPE - PE
13.72 ft	FEFE - Shallow FE
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R1AO - Array Ind. One Res R1
3.34 ft	R60O - Array Ind. One Res 60
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension



All measurements relative to tool zero.

COMPANY	CMX, INC.
WELL	#1 KREHBIEL
FIELD	WELCH-BORNHOLDT
PROVINCE/COUNTY	RICE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1542.00	feet	First Reading	3480.78	feet
Elevation Drill Floor	1540.00	feet	Depth Driller	3500.00	feet
Elevation Ground Level	1529.00	feet	Depth Logger	3500.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG