COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

Weatherford®

COMPANY	CMX, INC.
WELL	KOZISEK #1-8
FIELD	STOLTENBERG
PROVINCE/COUNTY	ELLSWORTH
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	990' FSL & 1980' FEL

SEC 8	TWP 16S	RGE 10W	Other Services
Latitude			MAI/MFE
Longitude			
API Number	15-053-21344		

Permanent Datum GL, Elevation 1838 feet
Log Measured From KB
Drilling Measured From KB @ 8 FEET

Elevations:	feet
KB	1846.00
DF	1844.00
GL	1838.00

Date	11-JAN-2016						
Run Number	ONE						
Service Order	4558-139737246						
Depth Driller	3400.00	feet					
Depth Logger	3396.00	feet					
First Reading	3377.00	feet					
Last Reading	2300.00	feet					
Casing Driller	347.00	feet					
Casing Logger	348.00	feet					
Bit Size	7.875	inches					
Hole Fluid Type	CHEMICAL						
Density / Viscosity	9.00	lb/USg	43.00	CP			
PH / Fluid Loss	9.00		9.80	ml/30Min			
Sample Source	FLOWLINE						
Rm @ Measured Temp	0.83 @ 75.0	ohm-m					
Rmf @ Measured Temp	0.66 @ 75.0	ohm-m					
Rmc @ Measured Temp	1.0 @ 75.0	ohm-m					
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	0.69 @ 90.0	ohm-m					
Time Since Circulation	4 HOURS						
Max Recorded Temp	90.00	deg F					
Equipment / Base	13096		OKC				
Recorded By	ADAM SILL						
Witnessed By	KEN LeBLANC						

Last Edited: 11-JAN-2016 22:43

BOREHOLE RECORD

Bit Size inches	Depth From feet	Depth To feet
7.875	347.00	3400.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	347.00	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: 1332 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 2300 FEET: 207 CU.FT.
- RIG: DUKE #2

- RIG: DURE #2.

- ENGINEER: A. SILL.

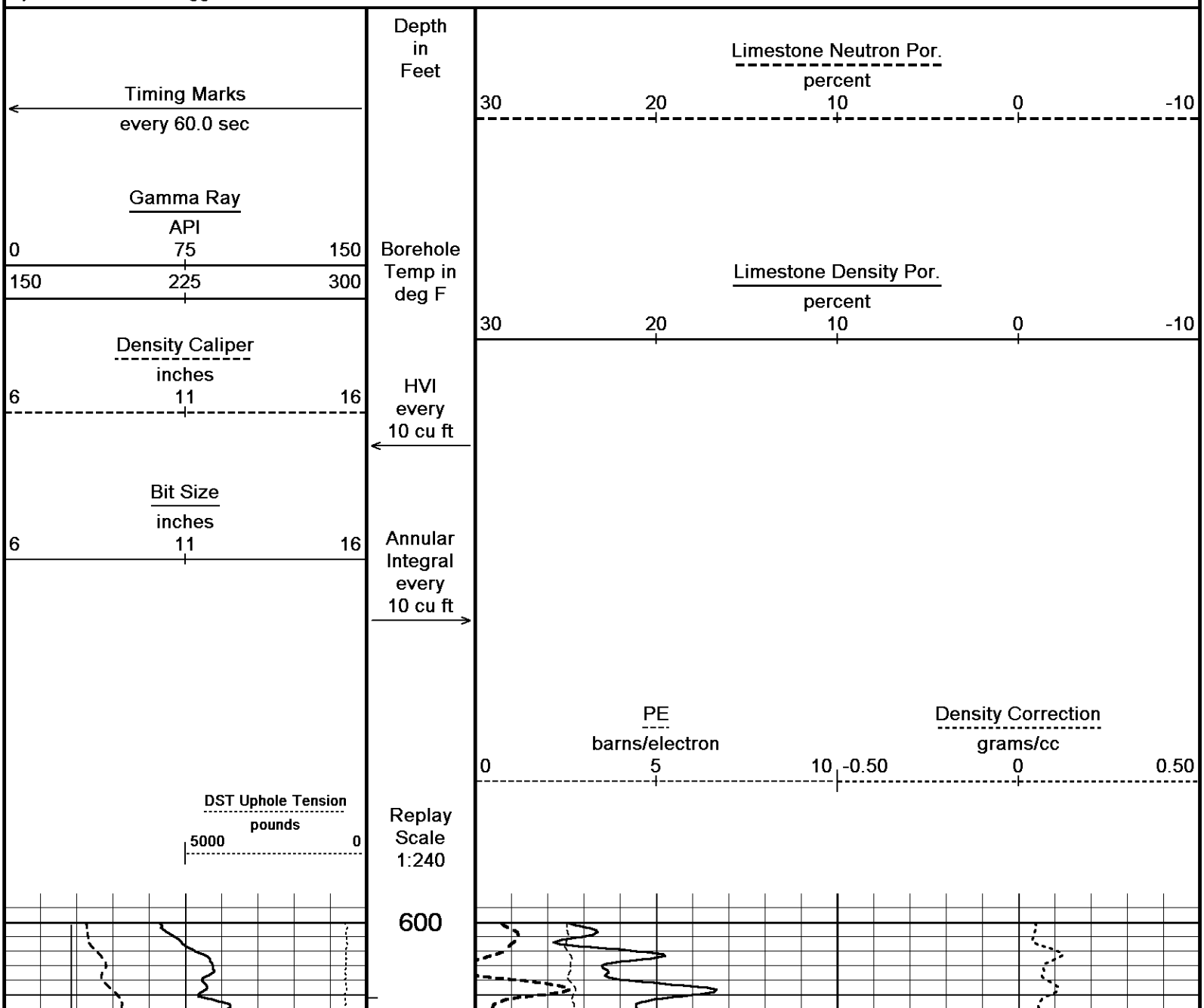
- OPERATOR: J. LaPOINT.

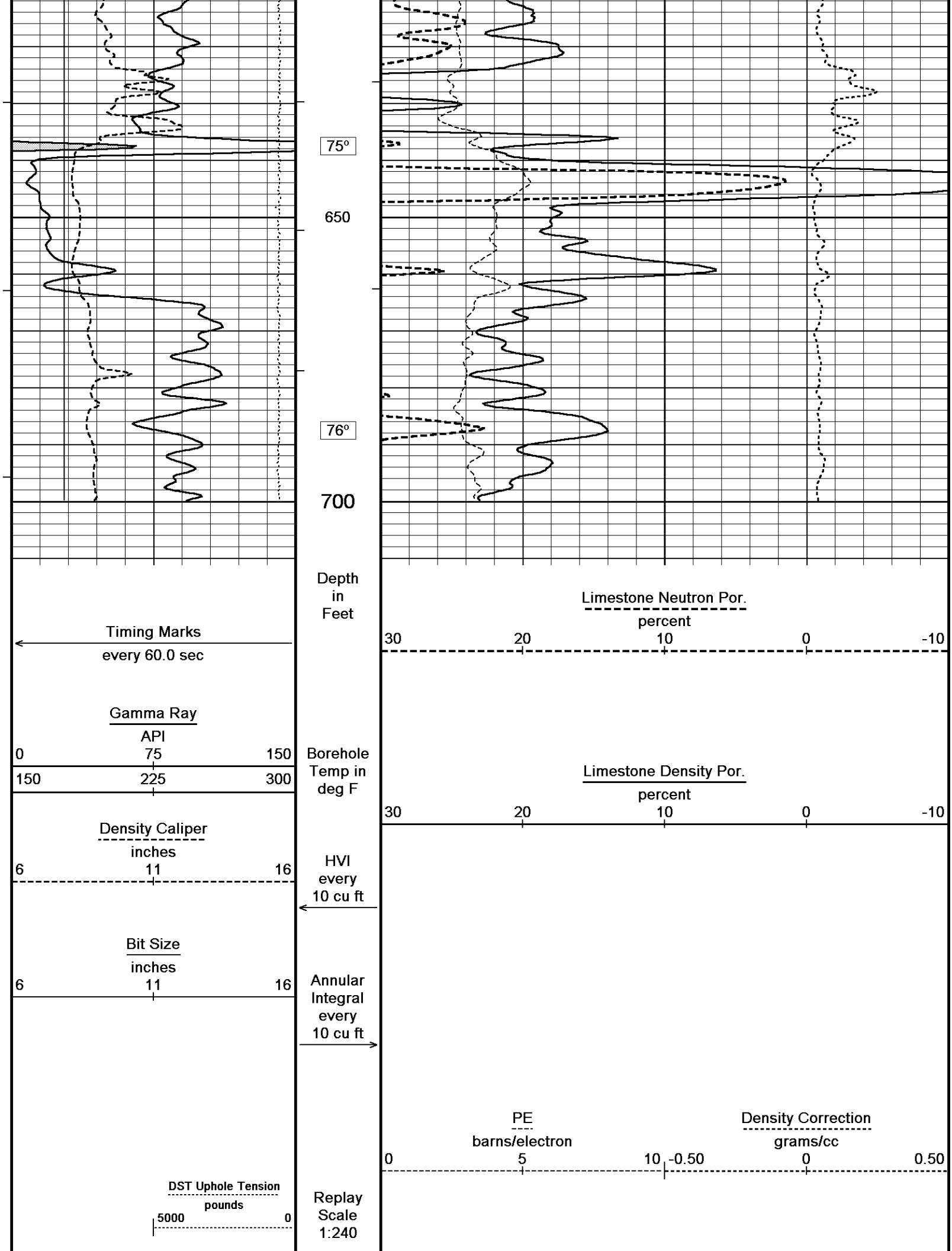
5 INCH LIMESTONE MAIN - ANHYDRITE SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 12-JAN-2016 02:50

Filename: C:\Minimus 15.03.5939\Logs\CMX Kozisek #1-8\CMX Kozisek #1-8_002.dta — Recorded on 12-JAN-2016 00:56

System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




75°
650
76°
700
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
1:240
Limestone Neutron Por.
percent
30
20
10
0
-10
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 10.0cm
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Plotted on 12-JAN-2016 02:50
Recorded on 12-JAN-2016 00:56

5 INCH LIMESTONE MAIN - ANHYDRITE SECTION

5 INCH LIMESTONE MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
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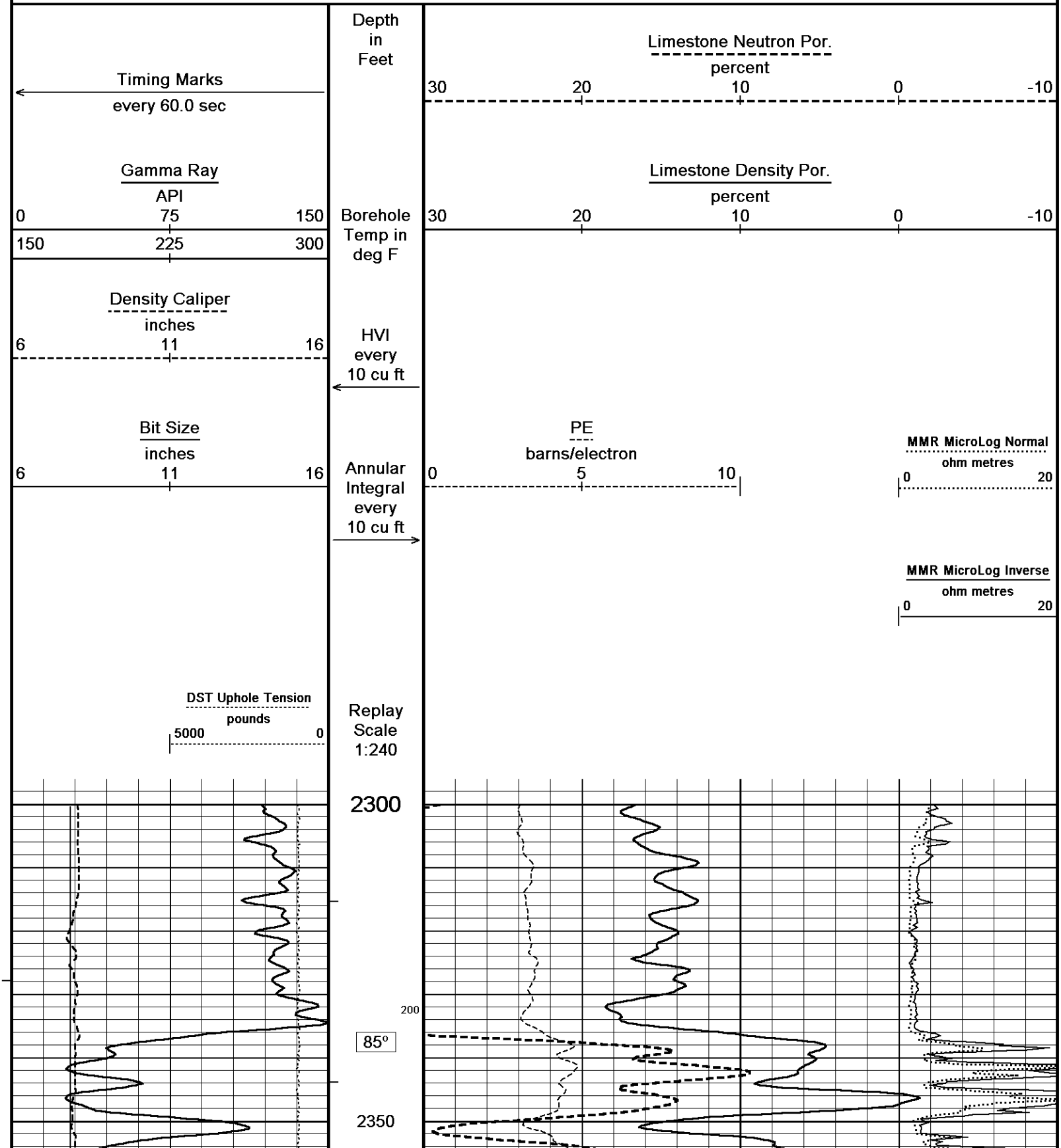
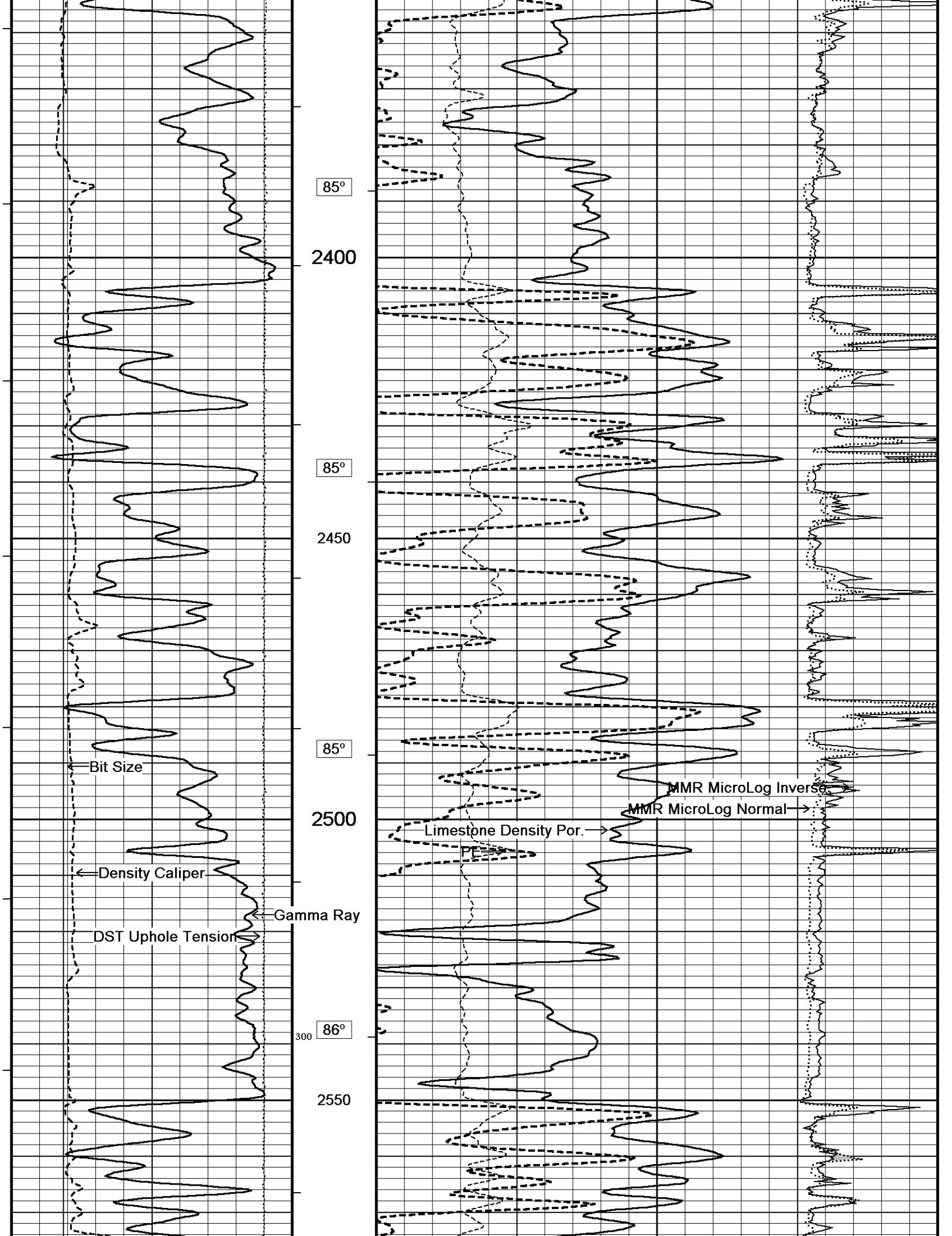
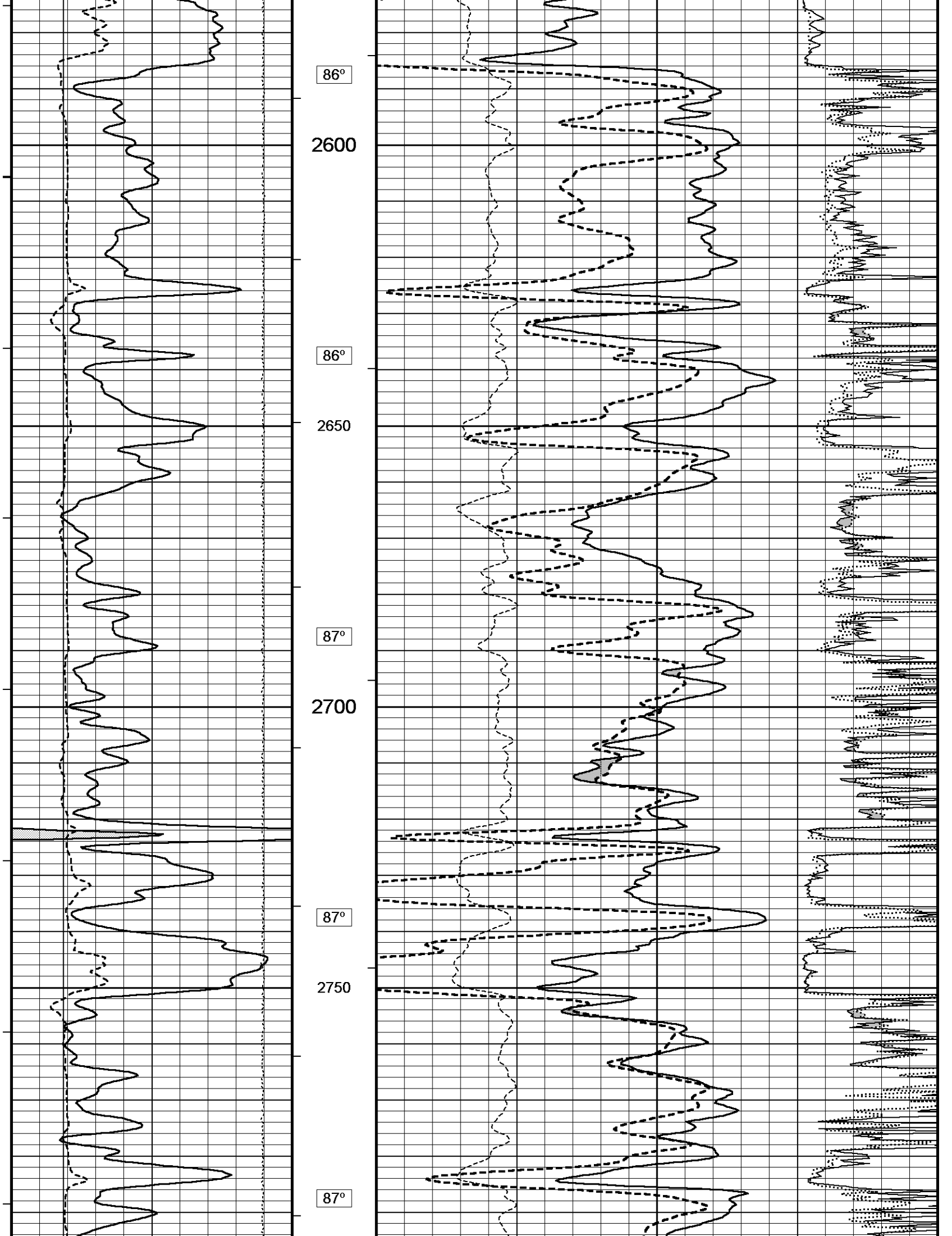
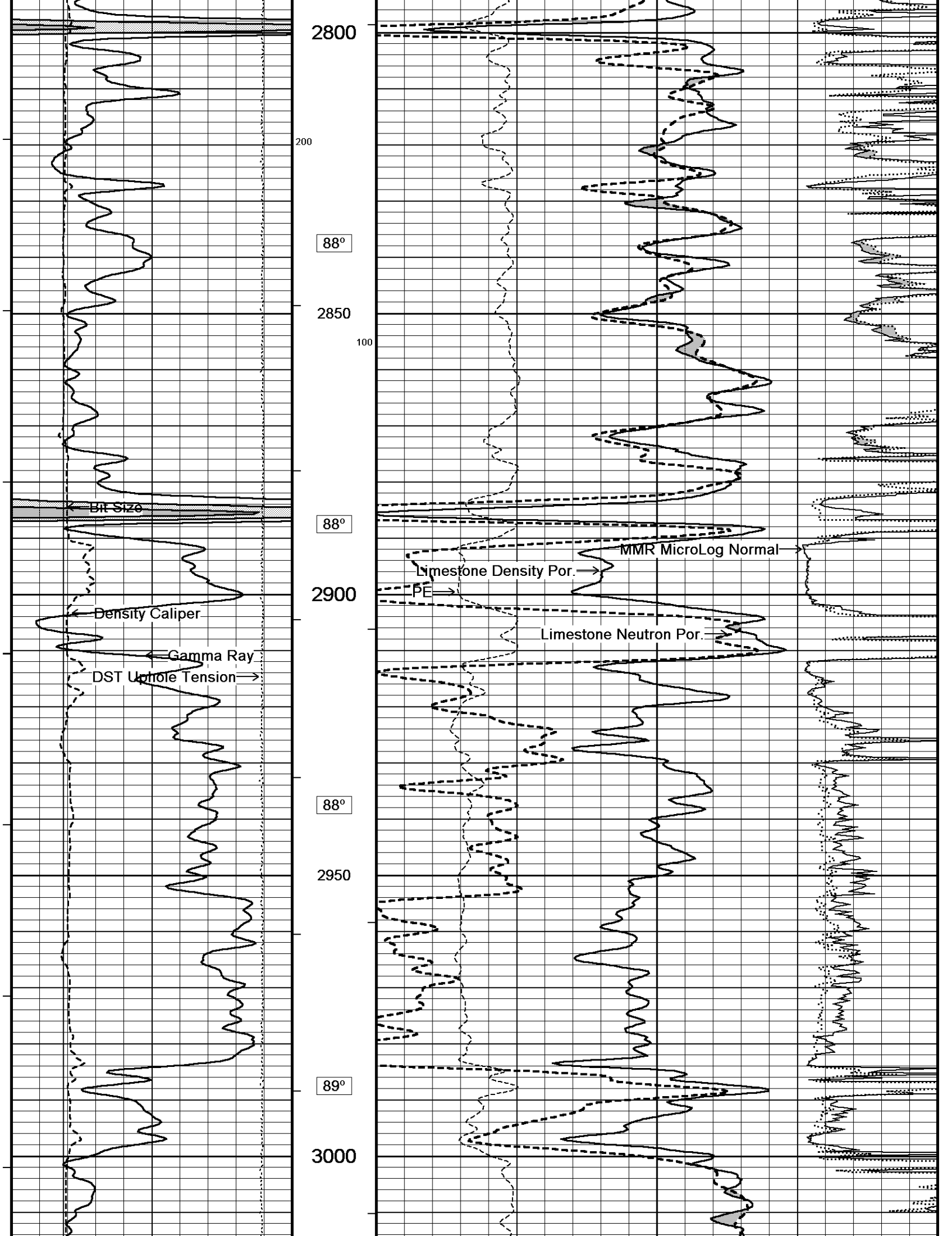
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939

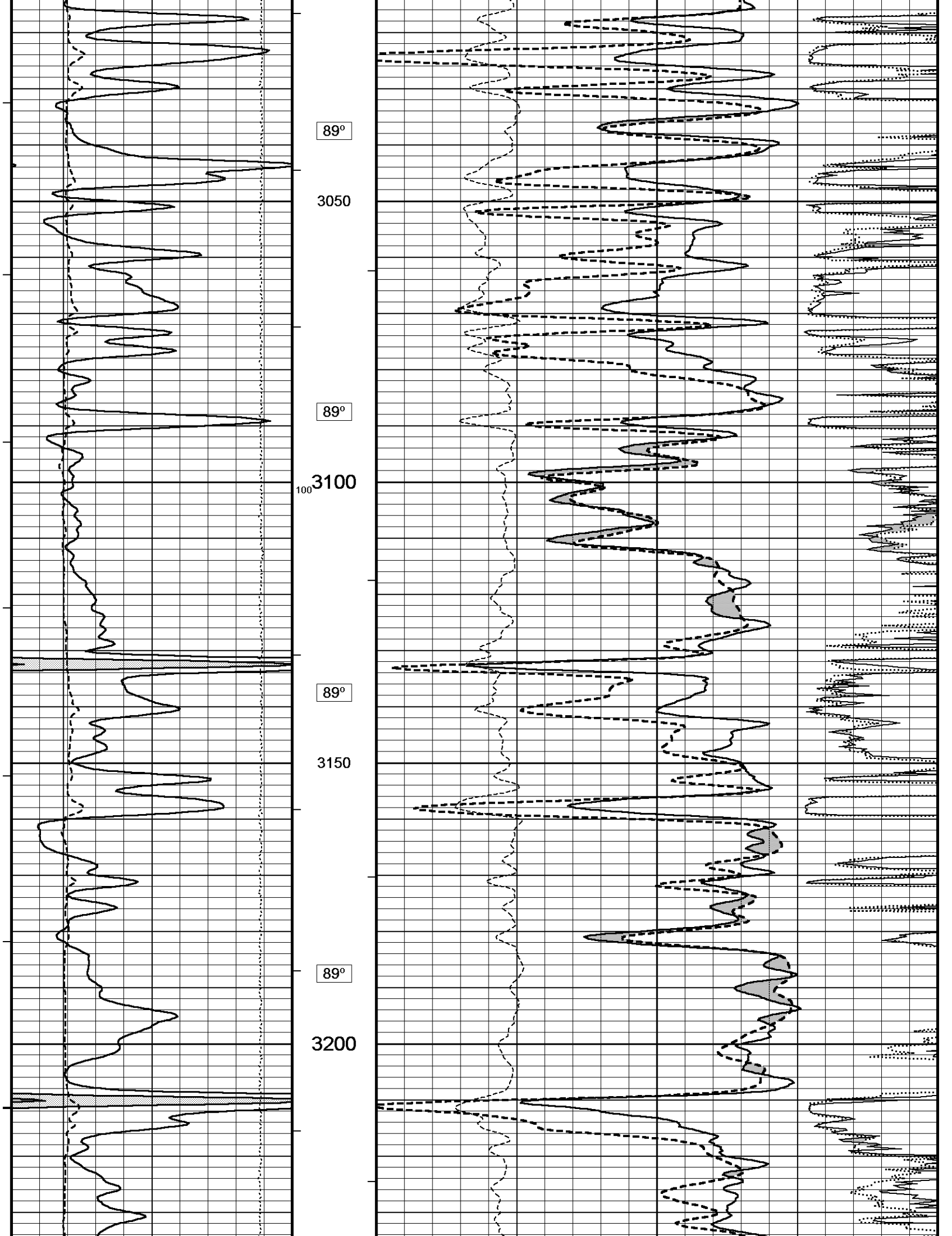
Plotted on 12-JAN-2016 02:50
Recorded on 12-JAN-2016 00:56

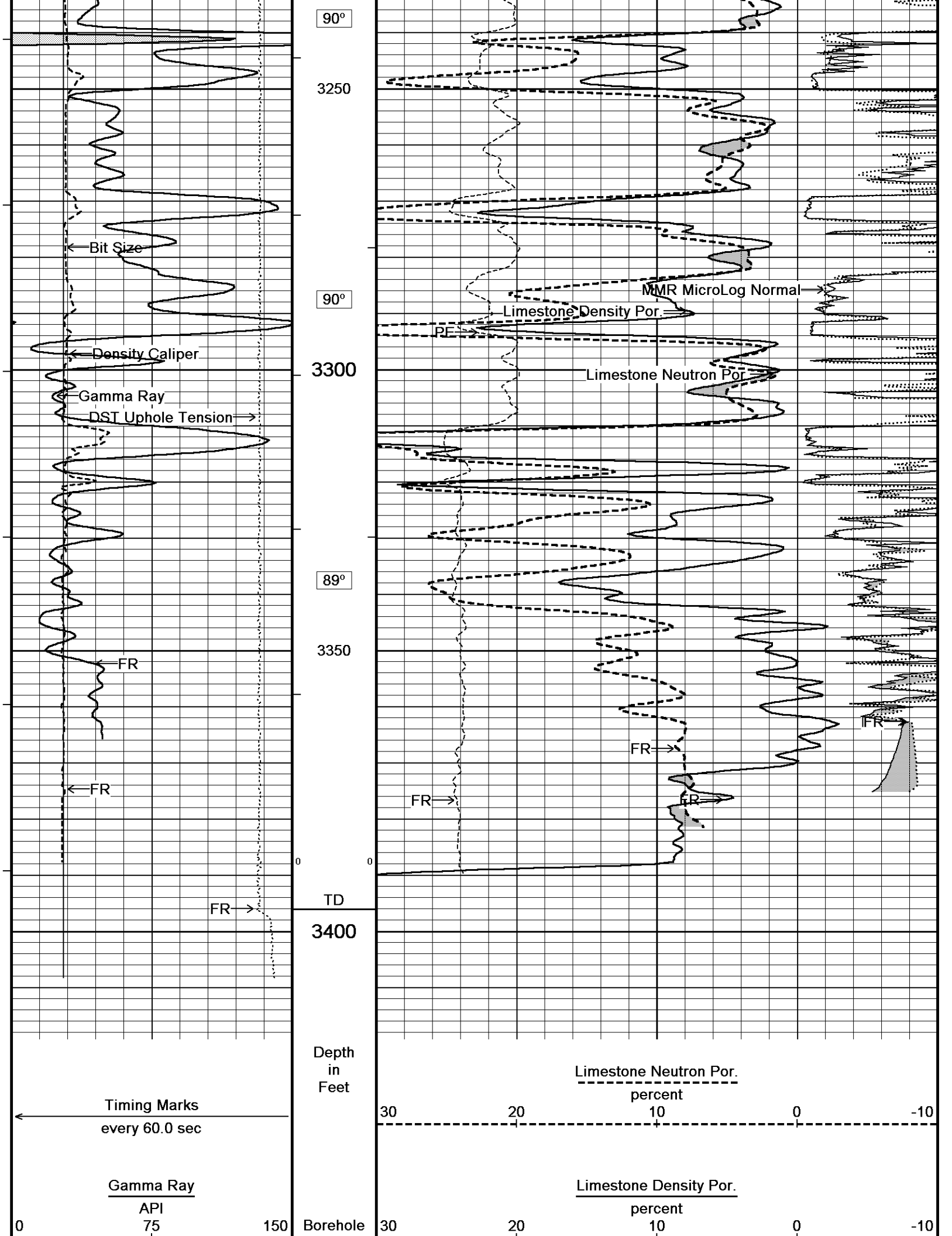


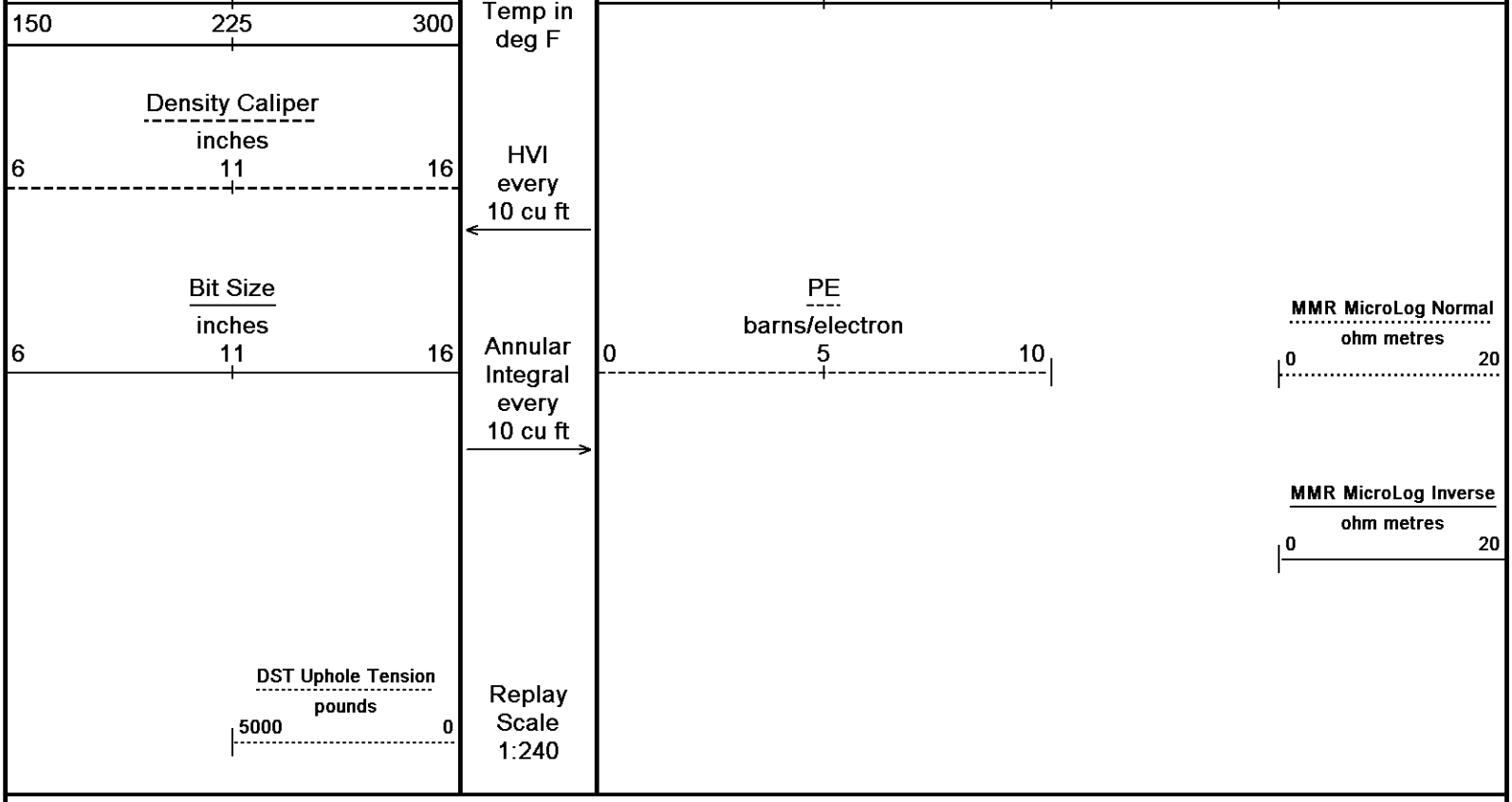

85°
2400
85°
2450
85°
Bit Size
2500
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por.
PE
Density Caliper
Gamma Ray
DST Uphole Tension
300
86°
2550


86°
2600
86°
2650
87°
2700
87°
2750
87°


2800
200
88°
2850
100
Bit Size
88°
MMR MicroLog Normal
Limestone Density Por.
PE
2900
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
88°
2950
89°
3000


89°
3050
89°
100
3100
89°
3150
89°
3200


90°
3250
90°
3300
89°
3350
TD
3400
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
FR
FR
FR
FR
Depth
in
Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
Borehole
Limestone Neutron Por.
percent
30
20
10
0
-10
Limestone Density Por.
percent
30
20
10
0
-10



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 12-JAN-2016 02:50
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5 INCH LIMESTONE MAIN

REPEAT SECTION

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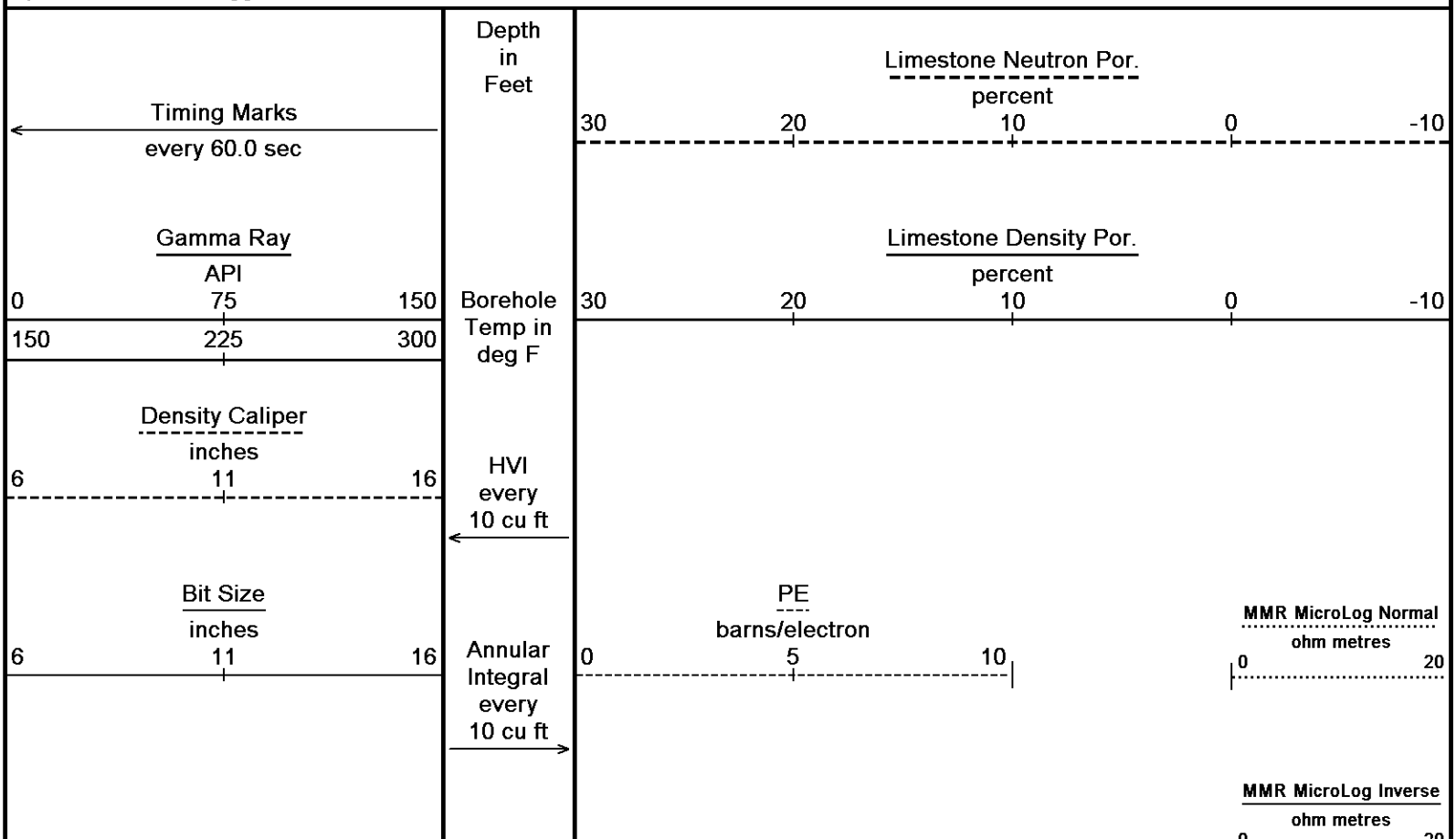
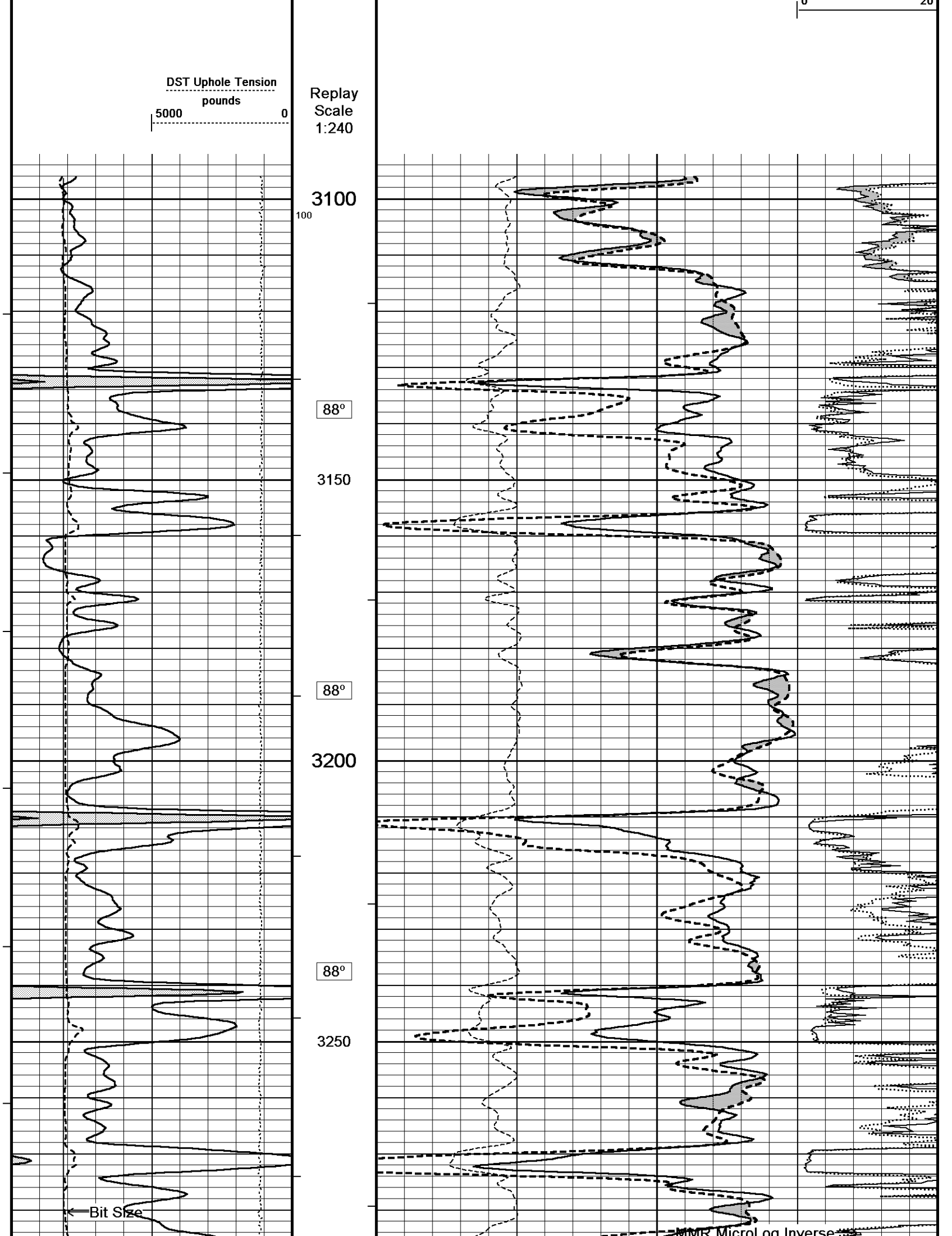
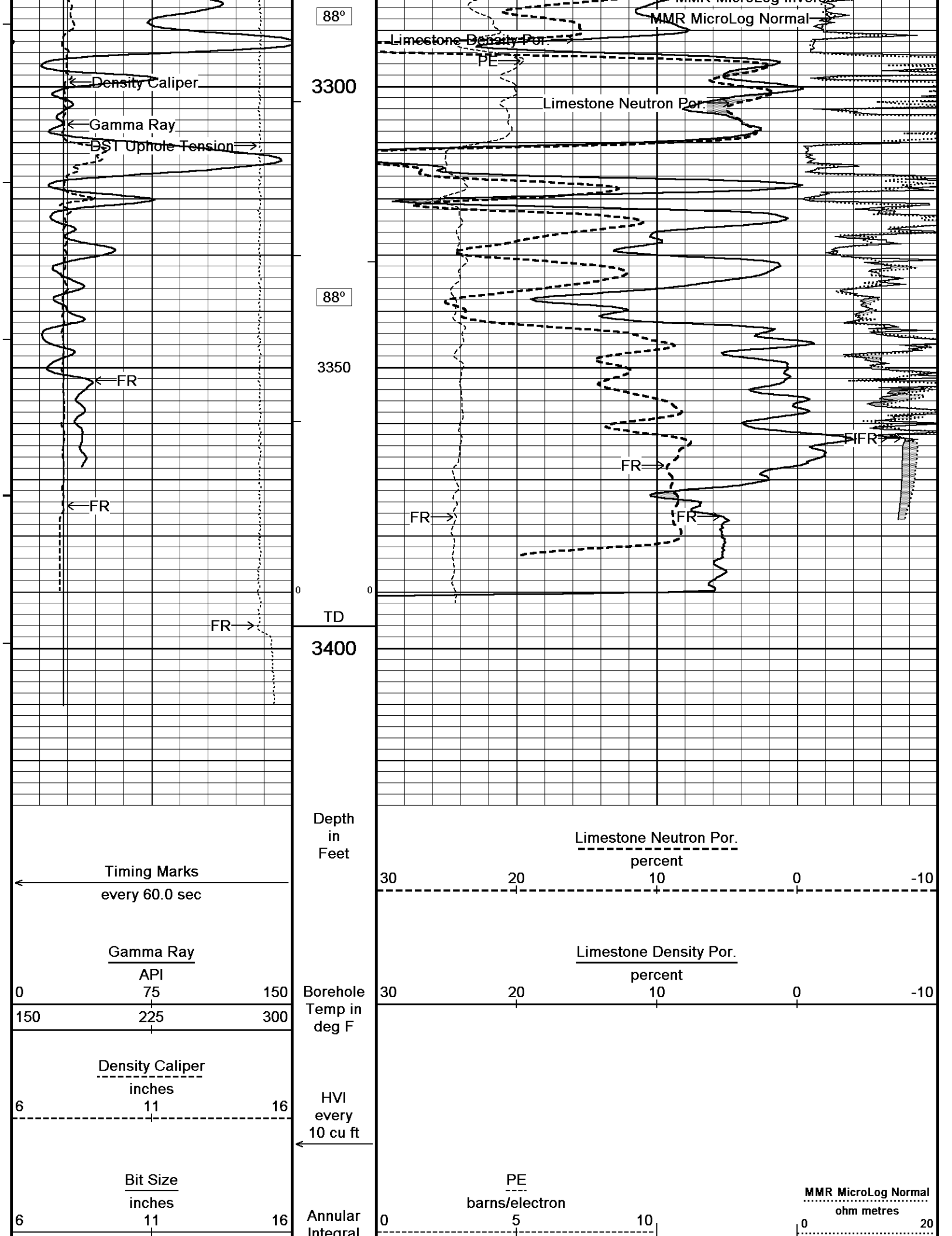
System Versions: Logged with 15.03.5939 Plotted with 15.03.5939




DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
3100
100
88°
3150
88°
3200
88°
3250
Bit Size
0
20
MMR MicroLog Inverse


88°
3300
Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
MMR MicroLog Normal
Limestone Density Por.
PE
Limestone Neutron Por.
88°
3350
FR
FR
FR
IFR
0
0
TD
3400
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
Annular Integral
PE
barns/electron
0 5 10
MMR MicroLog Normal
ohm metres
0 20

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
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Plotted on 12-JAN-2016 02:50
Recorded on 12-JAN-2016 00:24

REPEAT SECTION

5 INCH BULK DENSITY MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
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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

Density Caliper
inches
6 11 16

HVI
every
10 cu ft

Bit Size
inches
6 11 16

Annular
Integral
every
10 cu ft

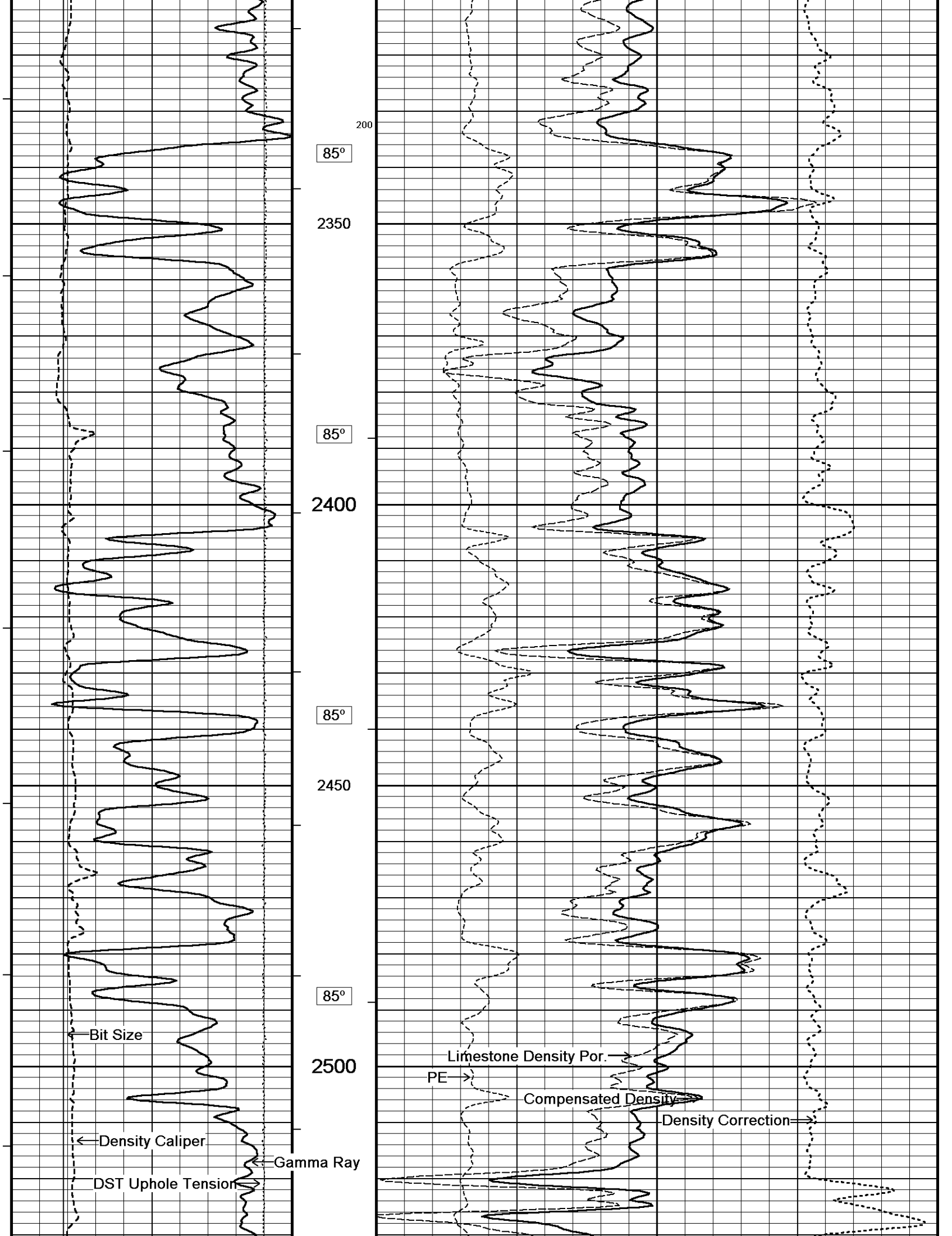
PE
barns/electron
0 5 10

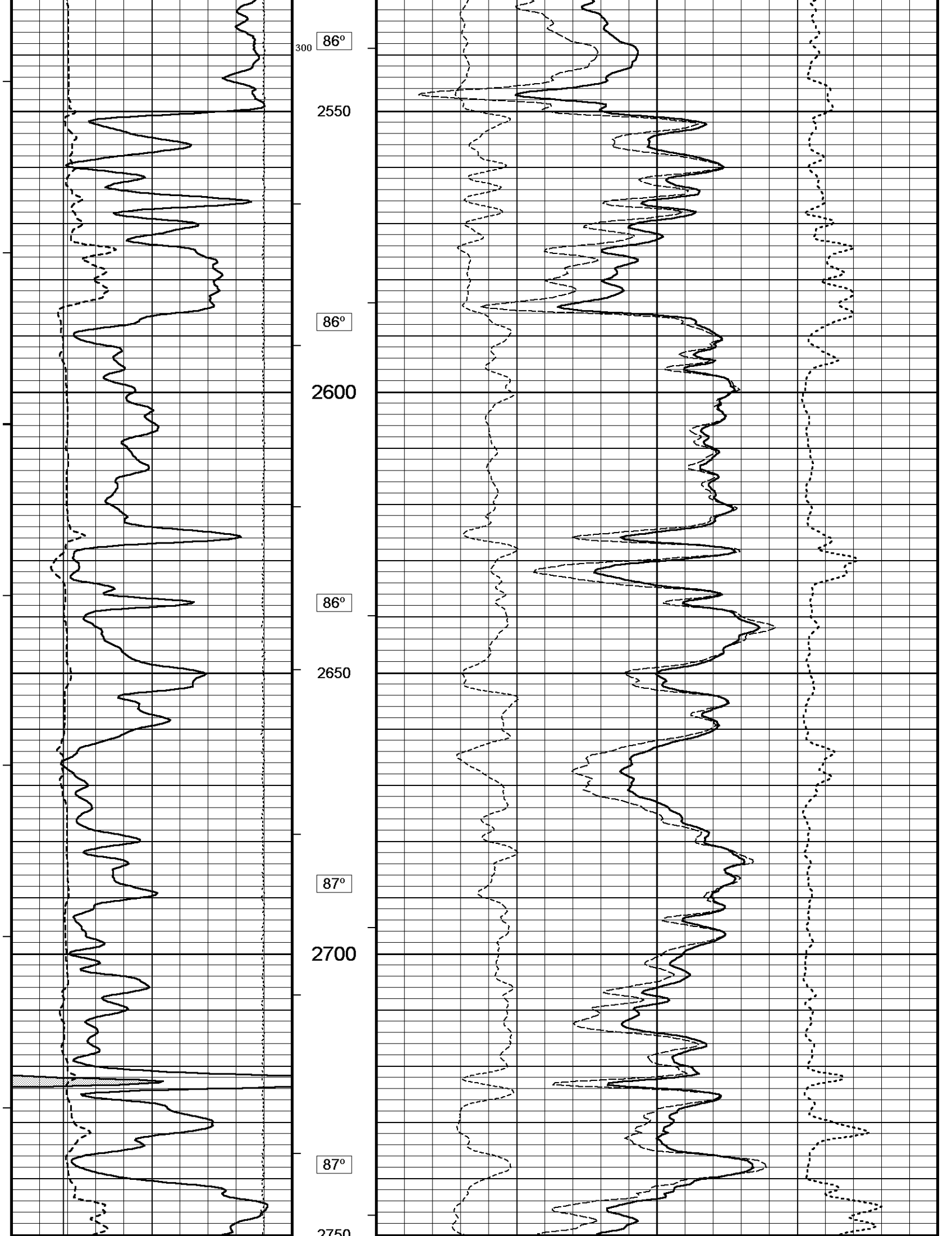
Density Correction
grams/cc
-0.50 0 0.50

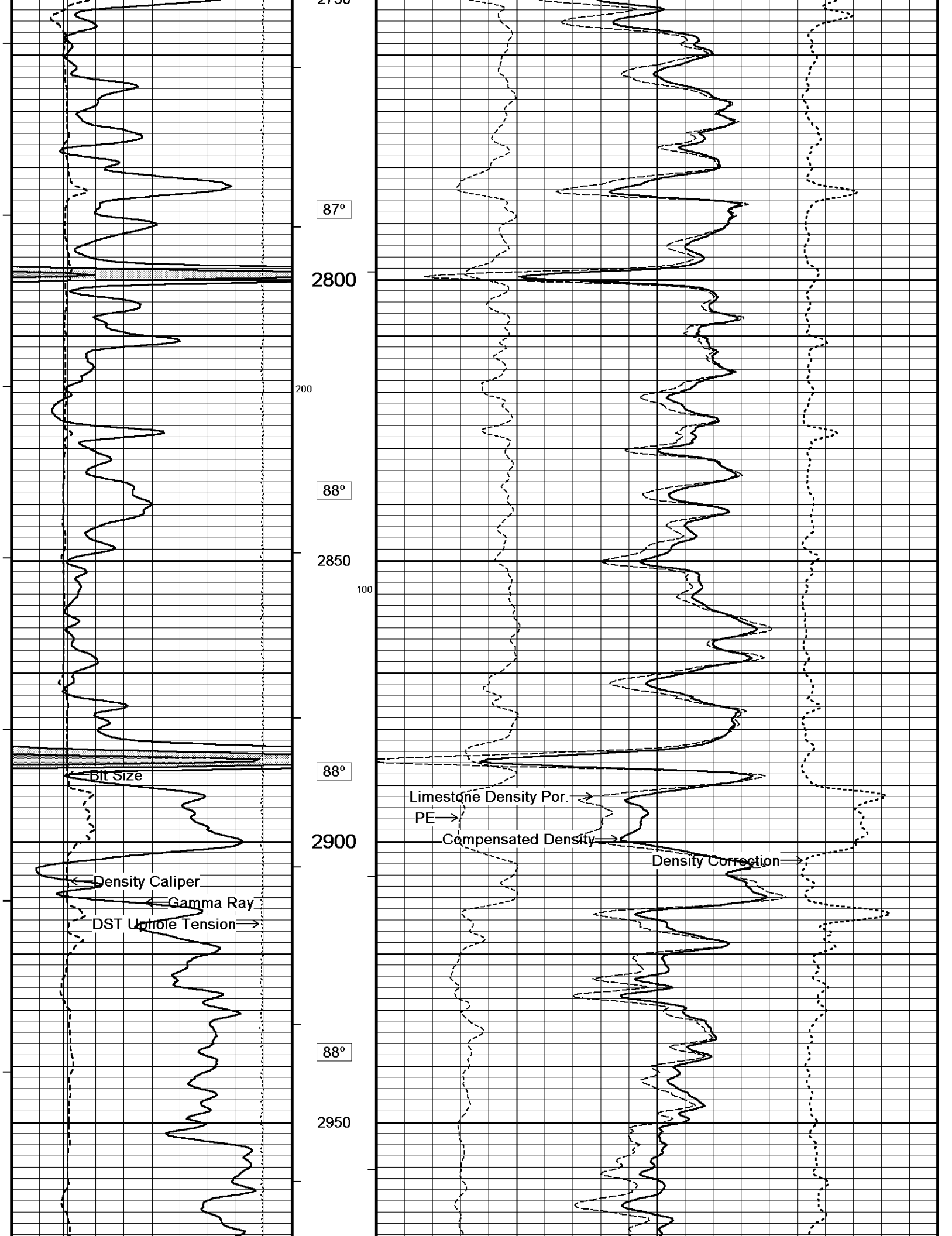
DST Uphole Tension
pounds
5000 0

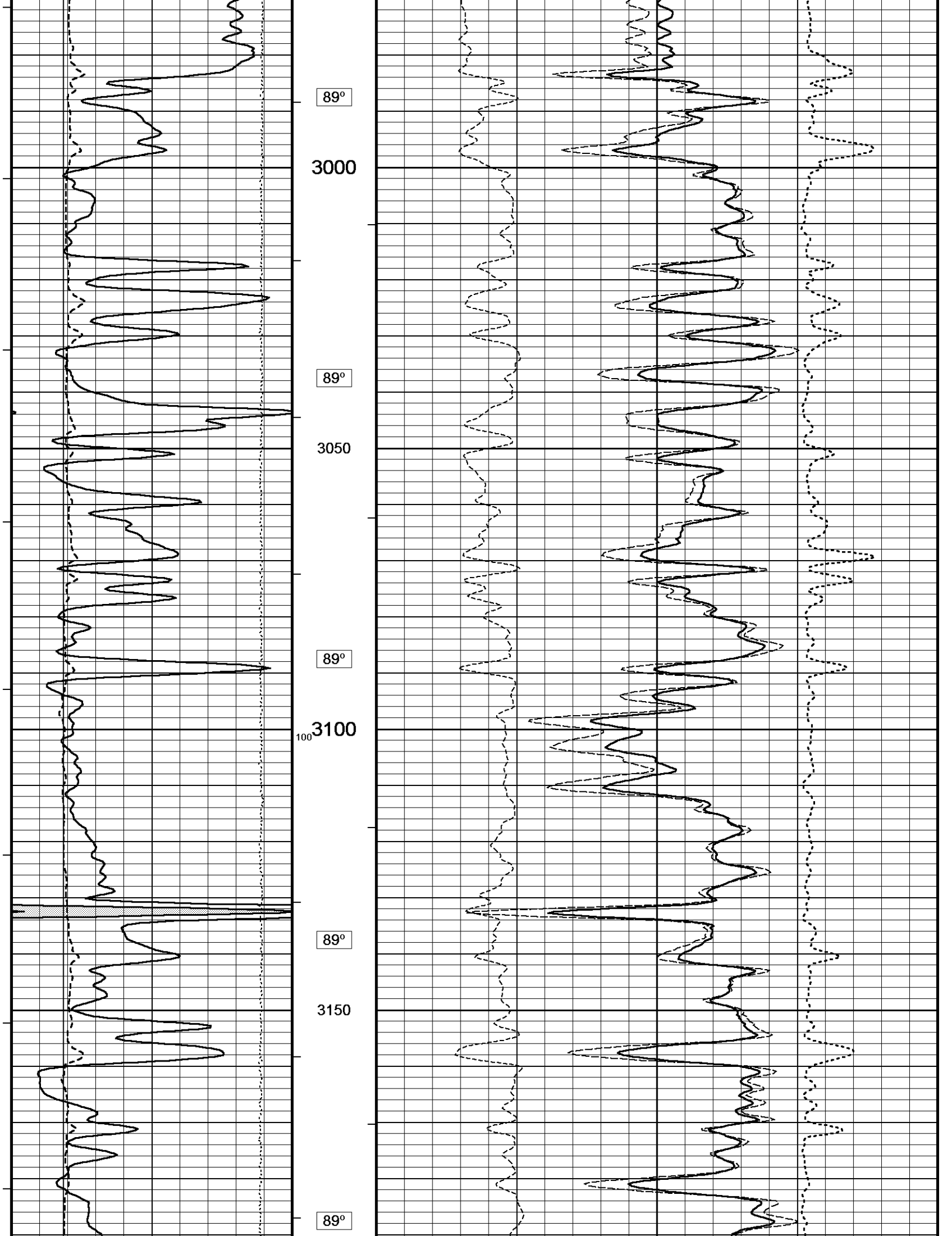
Replay
Scale
1:240

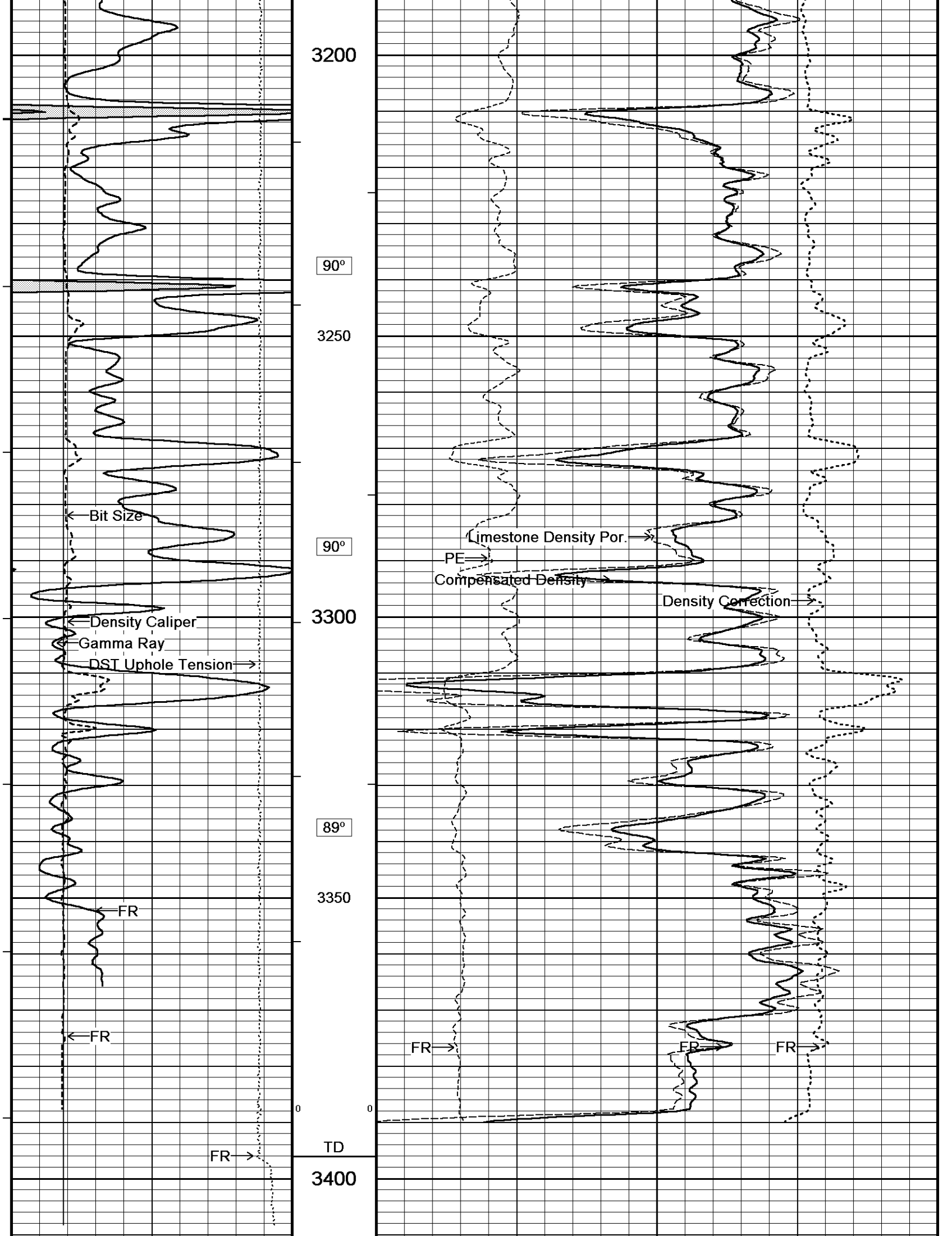
2300

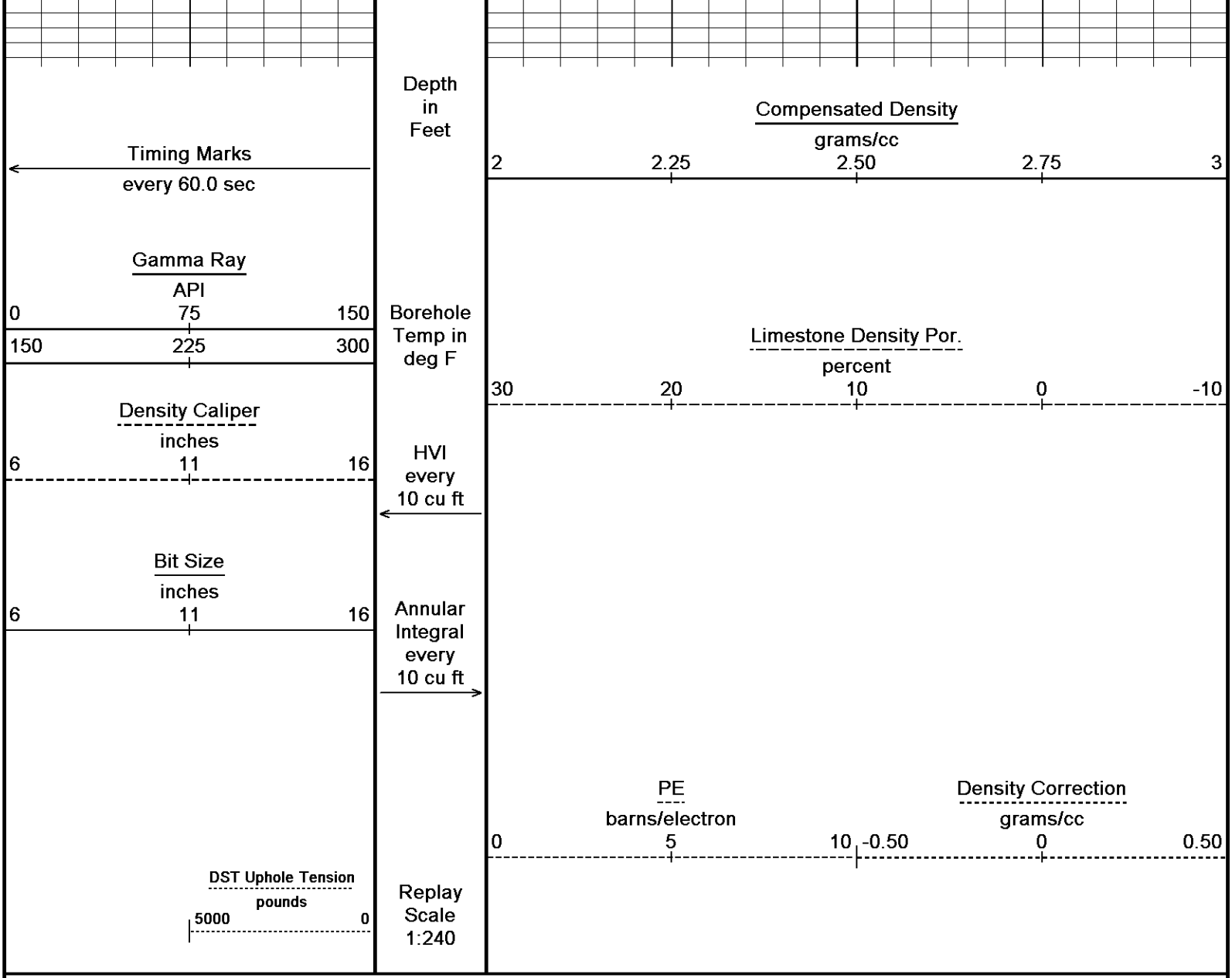

200
85°
2350
85°
2400
85°
2450
85°
2500
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por.
PE
Compensated Density
Density Correction


300
86°
2550
86°
2600
86°
2650
87°
2700
87°
2750


87°
2800
200
88°
2850
100
88°
Bit Size
Limestone Density Por.
PE
Compensated Density
2900
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
88°
2950


89°
3000
89°
3050
89°
100
3100
89°
3150
89°


3200
90°
3250
Bit Size
90°
Limestone Density Por.
PE
Compensated Density
Density Correction
3300
Density Caliper
Gamma Ray
DST Uphole Tension
89°
3350
FR
FR
FR
FR
FR
0
0
TD
FR
3400



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5 INCH BULK DENSITY MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
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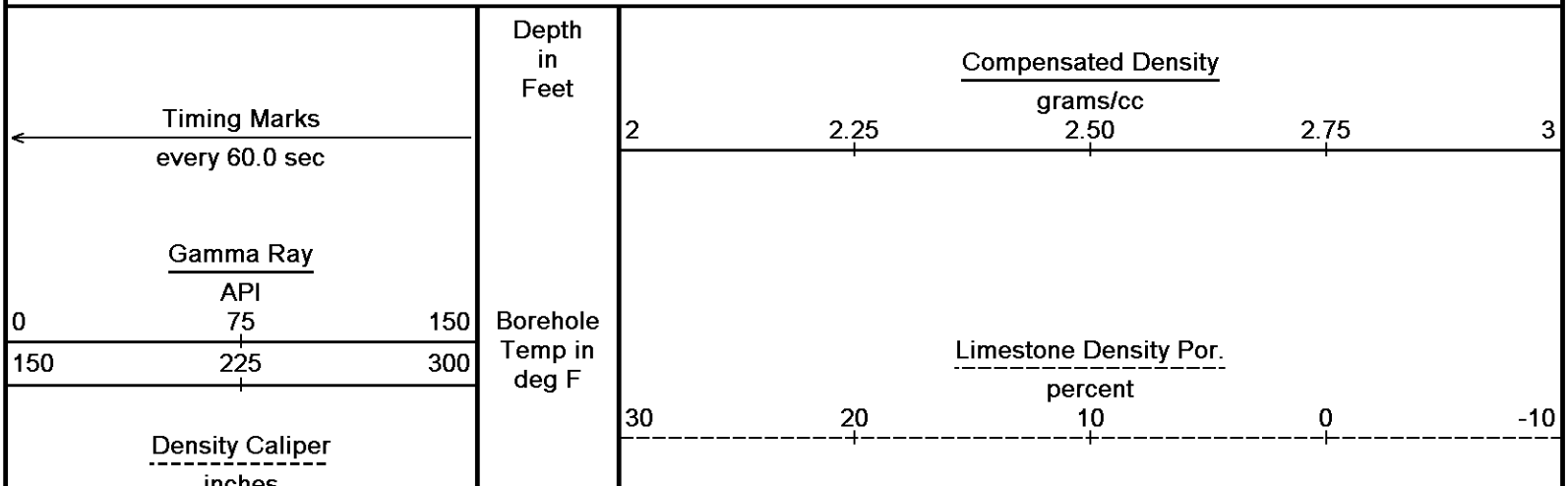
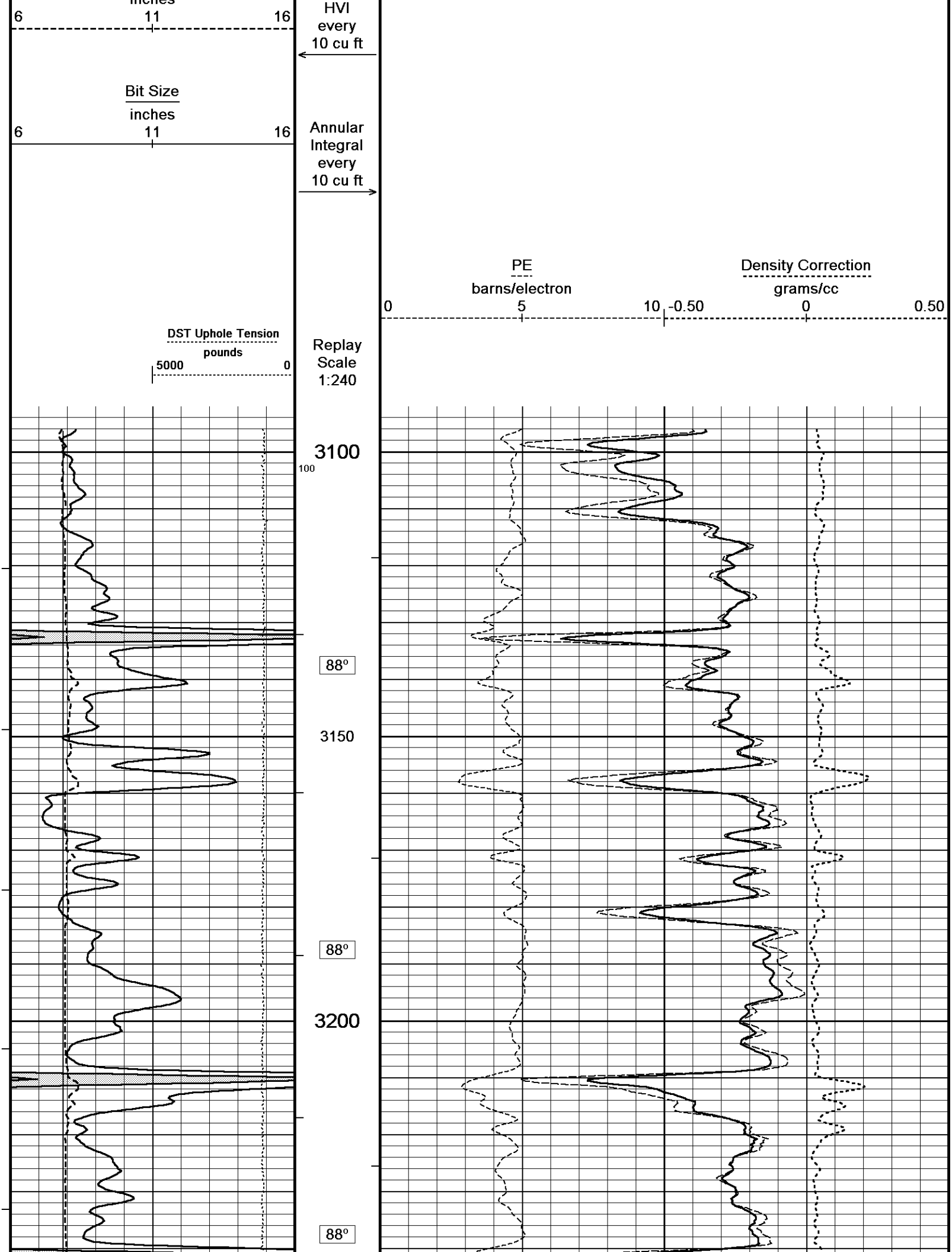
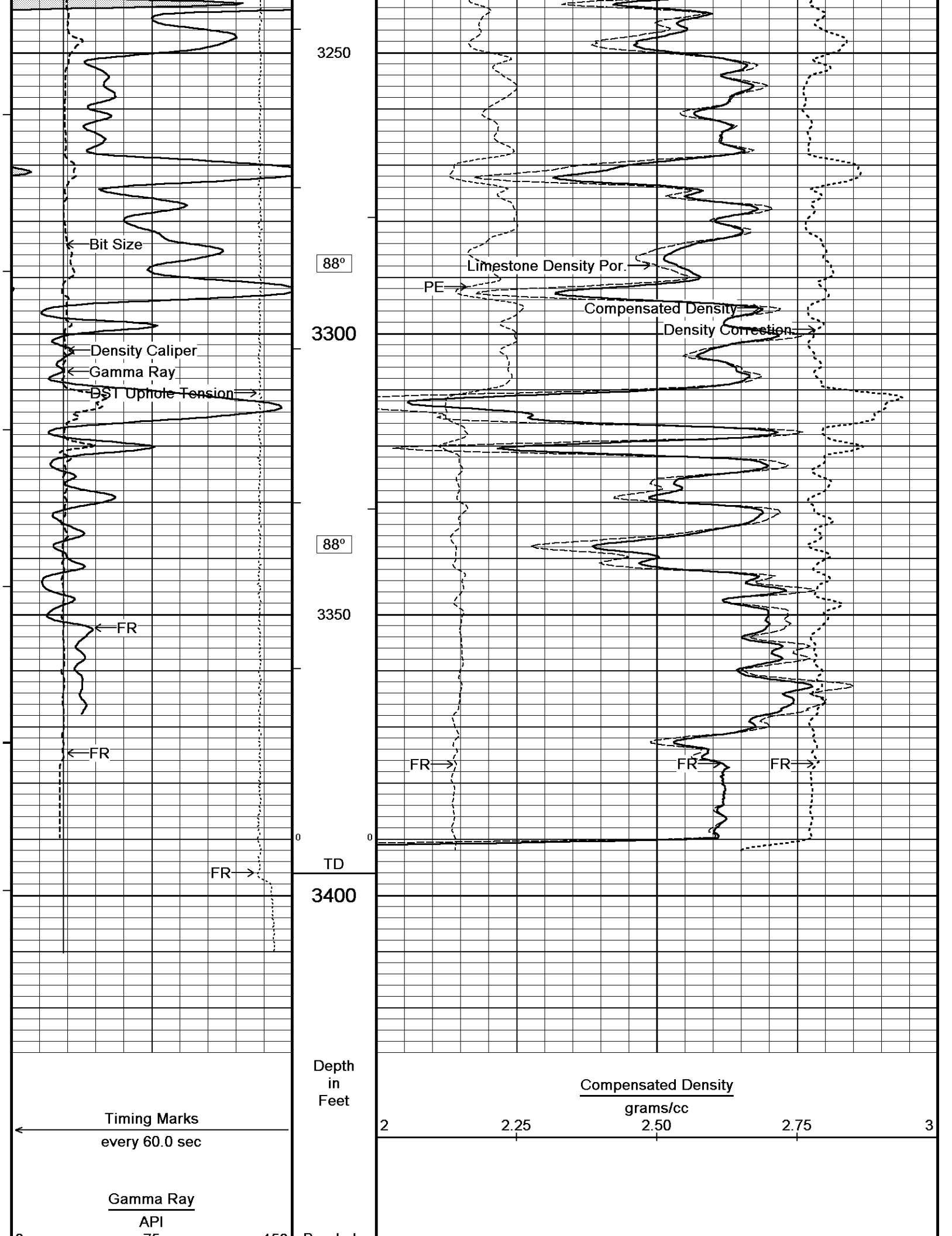
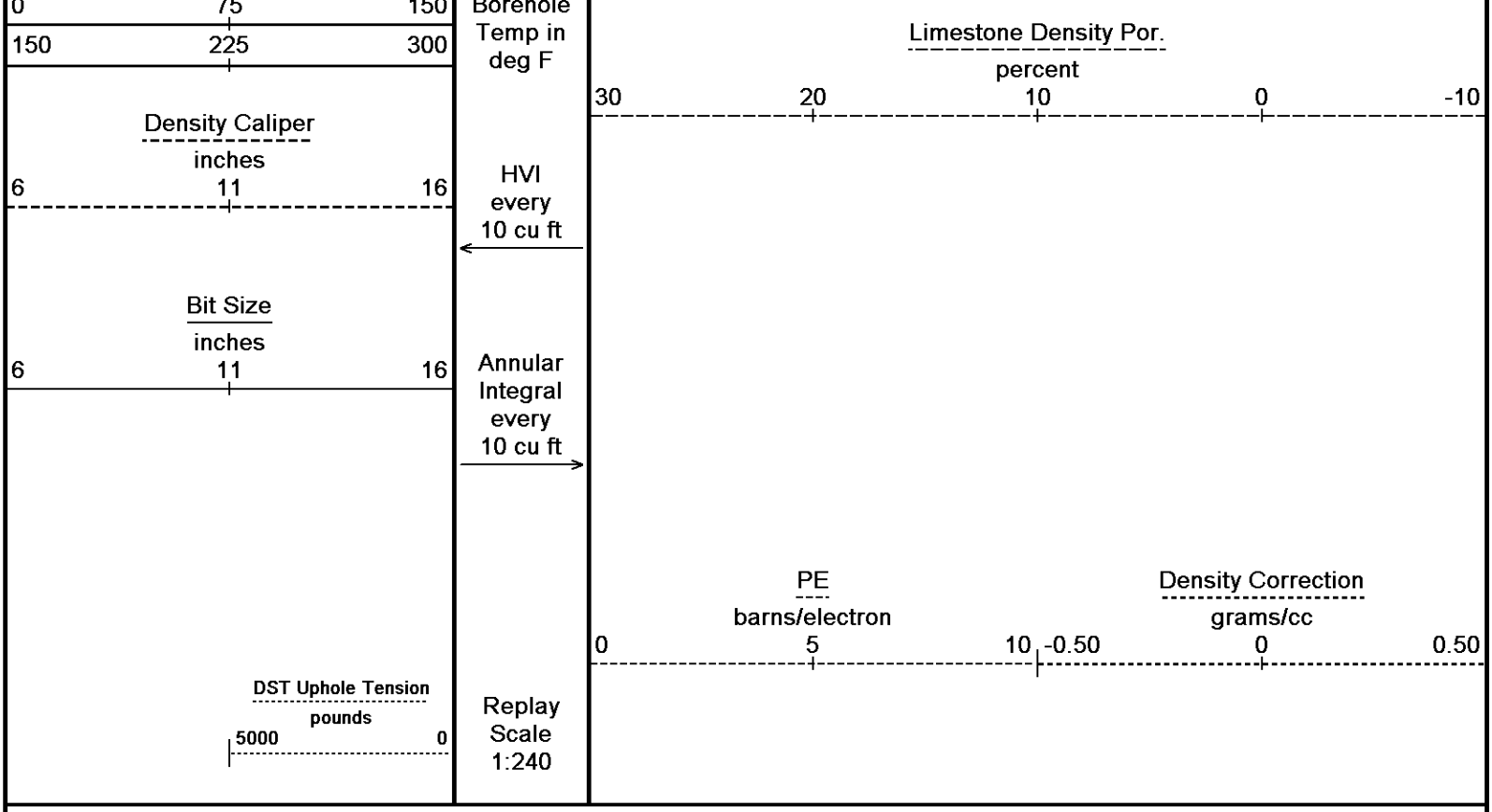



6
11
16
HVI
every
10 cu ft
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
3100
100
88°
3150
88°
3200
88°


3250
Bit Size
88°
Limestone Density Por.
PE
Compensated Density
Density Correction
3300
Density Caliper
Gamma Ray
DST Uphole Tension
88°
3350
FR
FR
FR
FR
FR
FR
0
0
TD
3400
Depth
in
Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
Compensated Density
grams/cc
2
2.25
2.50
2.75
3



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REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 15.03.5939\Logs\CMX Kozisek #1-8\CMX Kozisek #1-8_001.dta

General Constants All 000

Last Edited on 12-JAN-2016,00:01

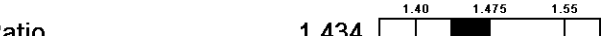
General Parameters		
Mud Resistivity	0.830	ohm-metres
Mud Resistivity Temperature	75.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	None	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Deep Induction	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-C 123

Field Calibration on 10-JAN-2016 07:56

	Measured	Calibrated (API)
Background	74	51
Calibrator (Gross)	728	507
Calibrator (Net)	654	456

Gamma Calibration Tolerances MCG-C 123



Ratio 1.464 Counts/API

Gamma Constants MCG-C 123

Last Edited on 11-JAN-2016,22:45

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

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

Caliper Calibration MPD-C.A 216

Base Calibration on 08-DEC-2015 13:20
Field Calibration on 10-JAN-2016 07:32

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)
7.93	7.97

Caliper Calibration Tolerances MPD-C.A 216

		7.77	7.97	8.17	
Short Arm Field Cal.	7.93				in

Photo Density Calibration MPD-C.A 216

Base Calibration on 08-DEC-2015 13:38
Field Check on 10-JAN-2016 07:36

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

Near	Far
1066.1	1261.6

Field Check

Near	Far
1066.2	1264.4

PE Calibration

Base Calibration	Measured 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

WS	WH
194.5	945.4

Field Check

WS	WH
195.7	947.4

Photo Density Calibration Tolerances MPD-C.A 216

		-5%	2.52	+5%			-5%	21.00	+5%	
Near Density Ratio	2.58					Far Density Ratio	20.82			

PE Calibration	0.119	0.089 / 0.110 / 0.131			
Near Den. Field Check	1066.2	-3% / 1066.1 / +3%	Far Den. Field Check	1264.4	-3% / 1261.6 / +3%
PE WS Field Check	195.7	-6% / 194.5 / +6%	PE WH Field Check	947.4	-6% / 945.4 / +6%

Density Constants MPD-C.A 216

Last Edited on 11-JAN-2016,22:45

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.08	gm/cc
Mud Density 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 15.03.5939\Logs\CMX Kozisek #1-8\CMX Kozisek #1-8_001.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

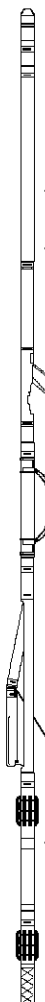
Compact Micro-Resistivity
MMR-C.A 247 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

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



43.50 ft	GRGC - MCG Gamma Ray
40.59 ft	CGXT - MCG External Temperature
34.24 ft	MBTC - MMR Caliper
33.24 ft	MINV - MMR MicroLog Inverse
33.24 ft	MNRL - MMR MicroLog Normal
28.45 ft	NPRL - Limestone Neutron Por.
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
21.21 ft	CLDC - Density Caliper
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	RTAO - Array Ind. One Res Rt

Total Length: 51.18 ft Weight: 407.9 lb

All measurements relative to tool zero.

COMPANY	CMX, INC.
WELL	KOZISEK #1-8
FIELD	STOLTENBERG
PROVINCE/COUNTY	ELLSWORTH
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1846.00	feet	First Reading	3377.00	feet
Elevation Drill Floor	1844.00	feet	Depth Driller	3400.00	feet
Elevation Ground Level	1838.00	feet	Depth Logger	3396.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG