COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG

Weatherford®

COMPANY	GRAND MESA OPERATING
WELL	P-D #1-27
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	674' FNL & 196' FEL
	NE SE NE NE

SEC	TWP	RGE	Other Services
27	13S	31W	MAI/MFE

API Number 15-063-22029
Permit Number

Permanent Datum G.L., Elevation 2870 feet
Log Measured From KB
Drilling Measured From K.B. @ 5 FEET

Elevations:	feet
KB	2875.00
DF	2873.00
GL	2870.00

Date	23-SEP-2012			
Run Number	ONE			
Depth Driller	4662.00	feet		
Depth Logger	4663.00	feet		
First Reading	4644.00	feet		
Last Reading	3600.00	feet		
Casing Driller	219.00	feet		
Casing Logger	218.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.10 lb/USg	67.00 CP		
PH / Fluid Loss	10.50	7.20 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	1.24 @ 94.0	ohm-m		
Rmf @ Measured Temp	0.99 @ 94.0	ohm-m		
Rmc @ Measured Temp	1.49 @ 94.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.97 @120.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	120.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13057	LIB		
Recorded By	R.HOFFMAN			
Witnessed By	BOB SHREIBER			
S.O. # / JOB #	3538924		LB12-256	

BOREHOLE RECORD

Last Edited: 23-SEP-2012 11:39

Bit Size inches	Depth From feet	Depth To feet
7.875	218.00	4663.00

CASING RECORD

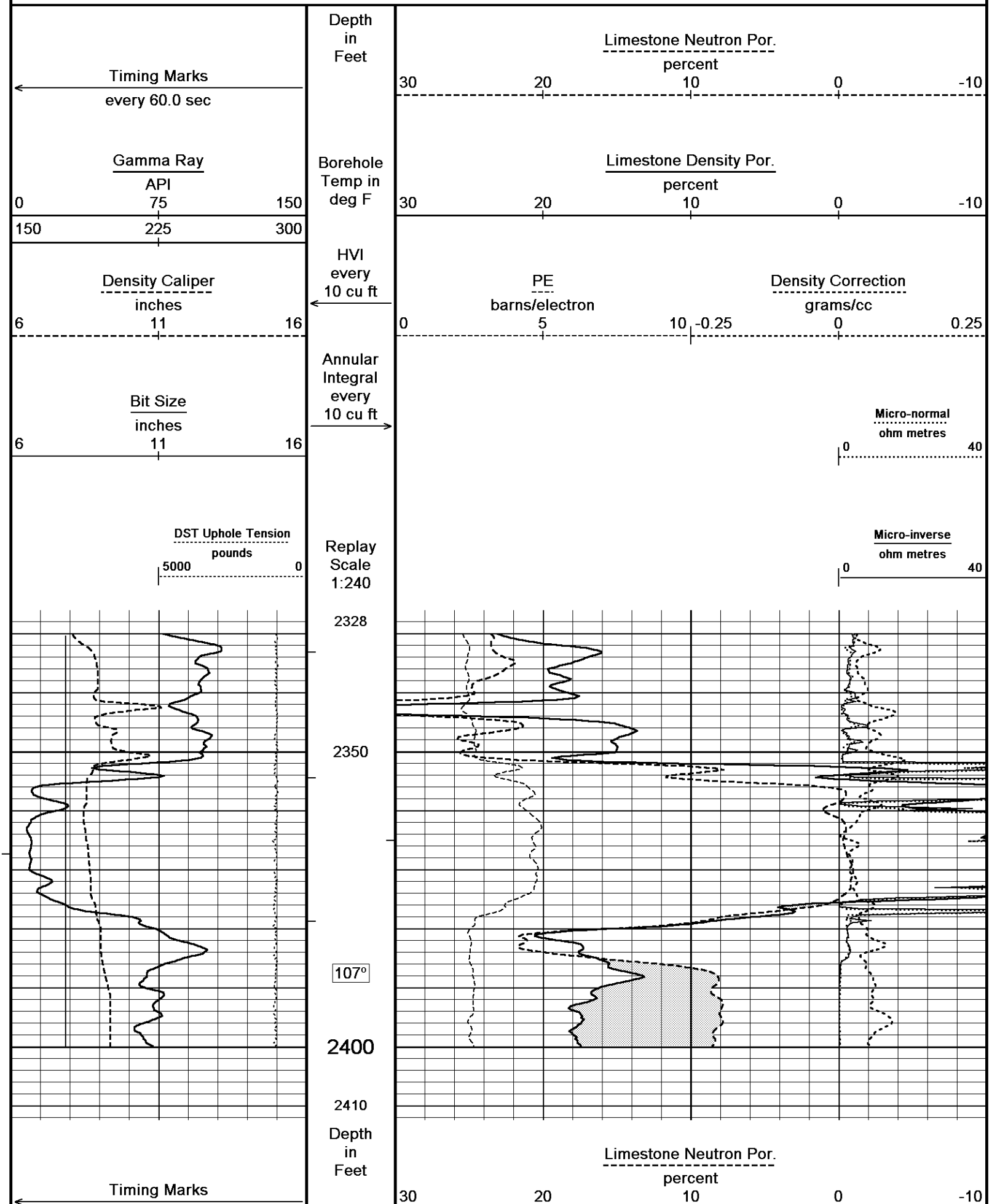
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	218.00	24.00

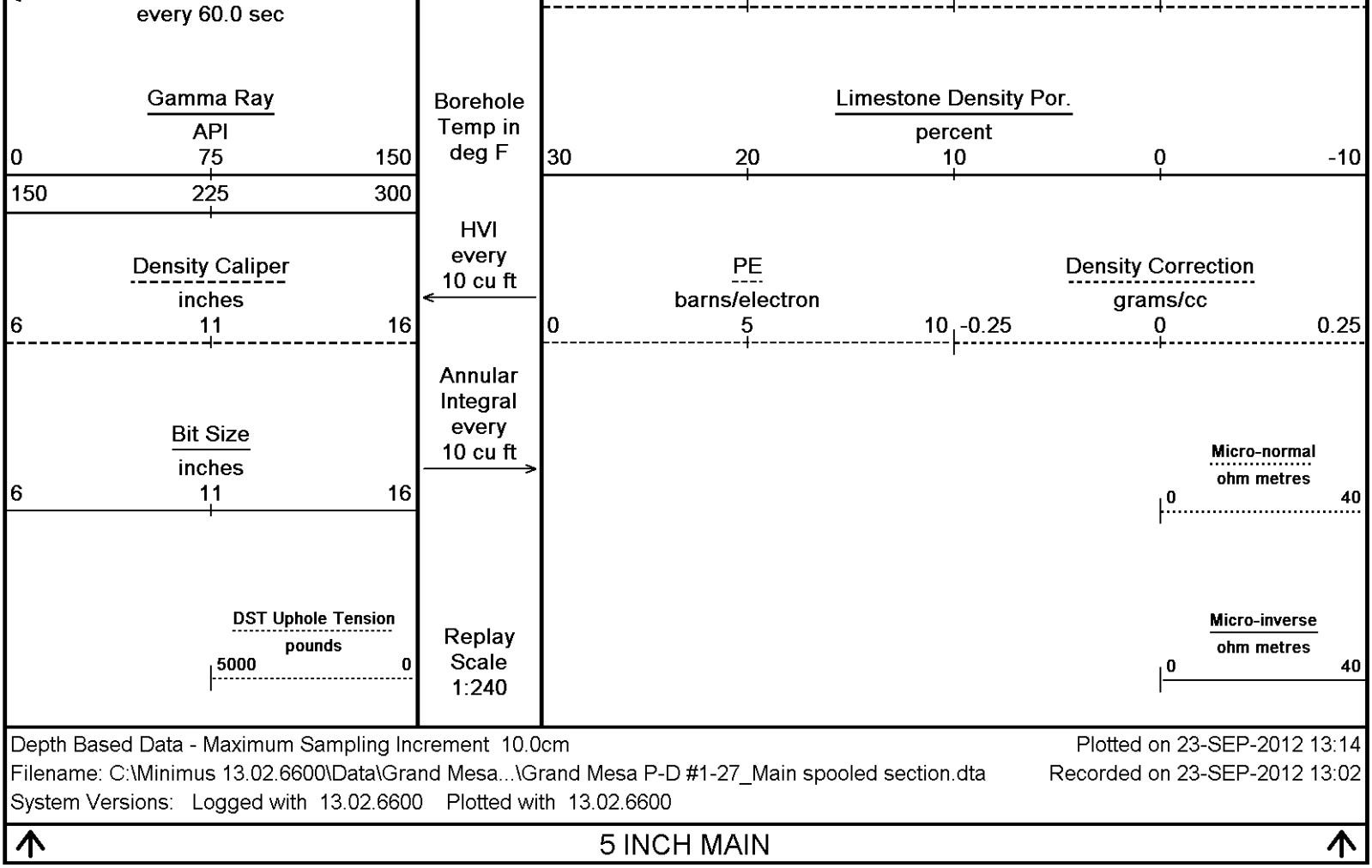
REMARKS

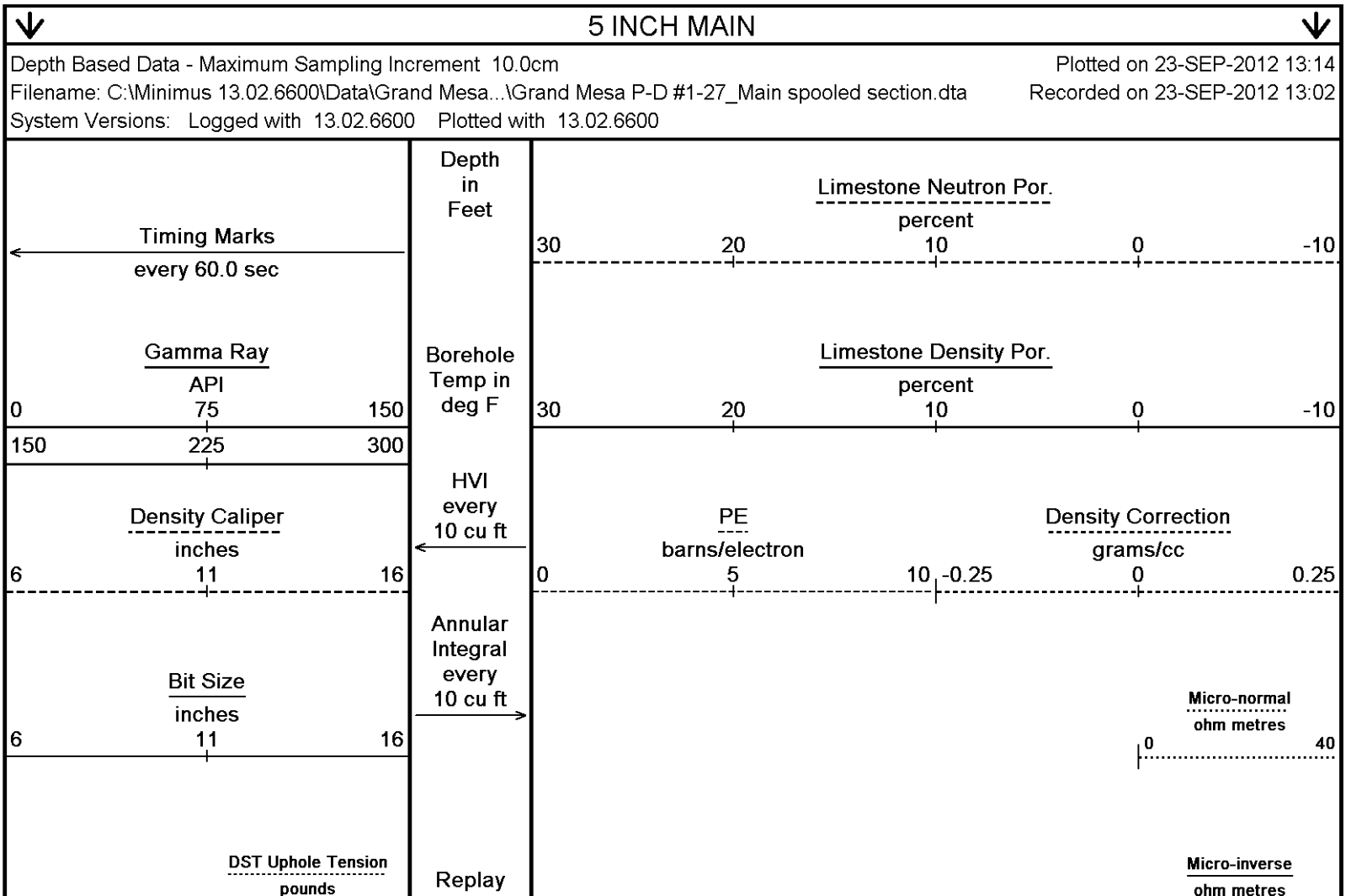
Tools Ran: MCG, MML, MDN, MPD, MFE, MAI.
Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used. MFE, and MAI 0.5 inch standoffs used.
2.71 g/cc Limestone Density Matrix used to calculate porosity.
All intervals logged and scaled per customer's request.
Tight pulls, washouts and borehole rugosity will affect data quality.
Annular volume with 5.5 inch production casing= 205 cu. ft.
Service order: #3538924
Rig: Murfin #24
Engineer: R. Hoffman
Operator(s): K. Rinehart

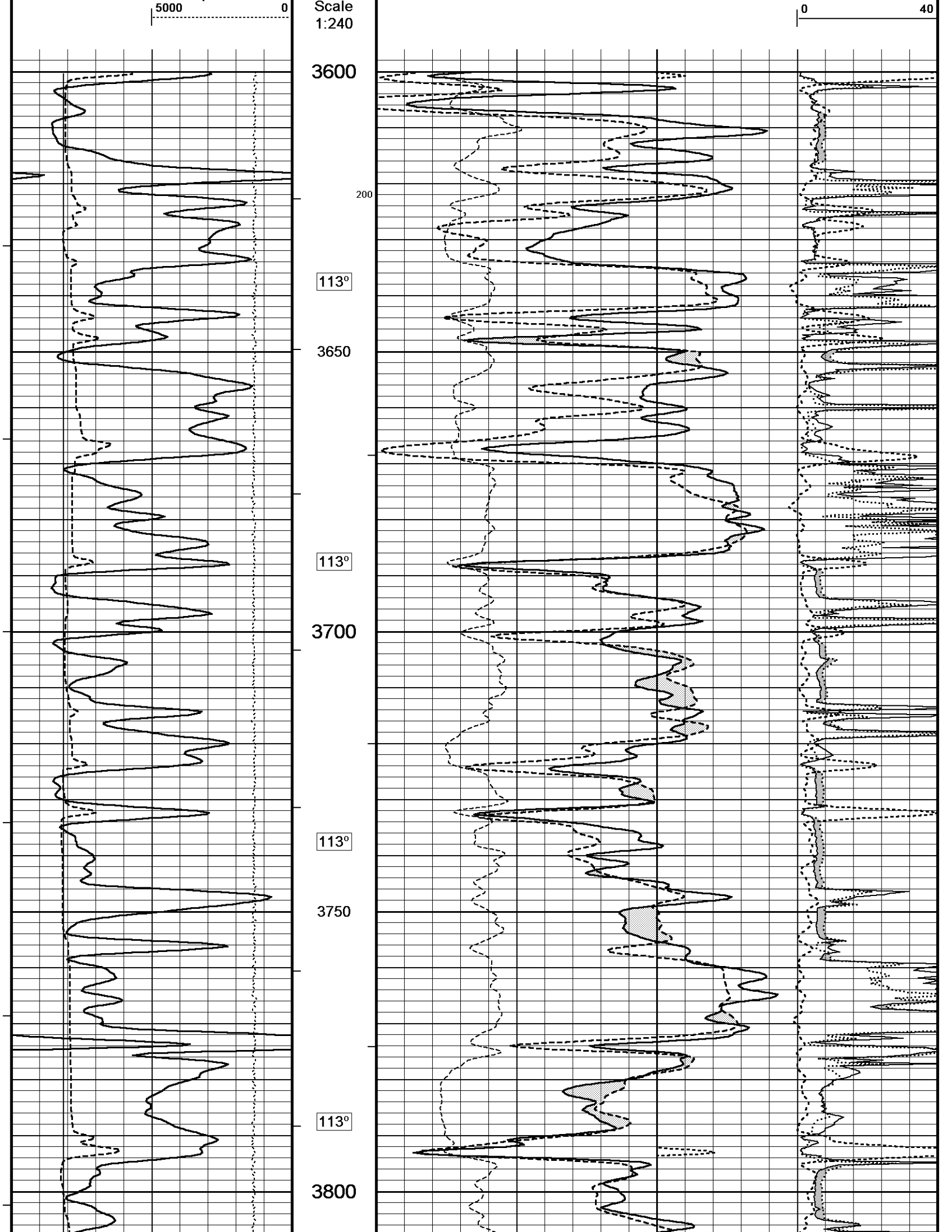
5 INCH MAIN

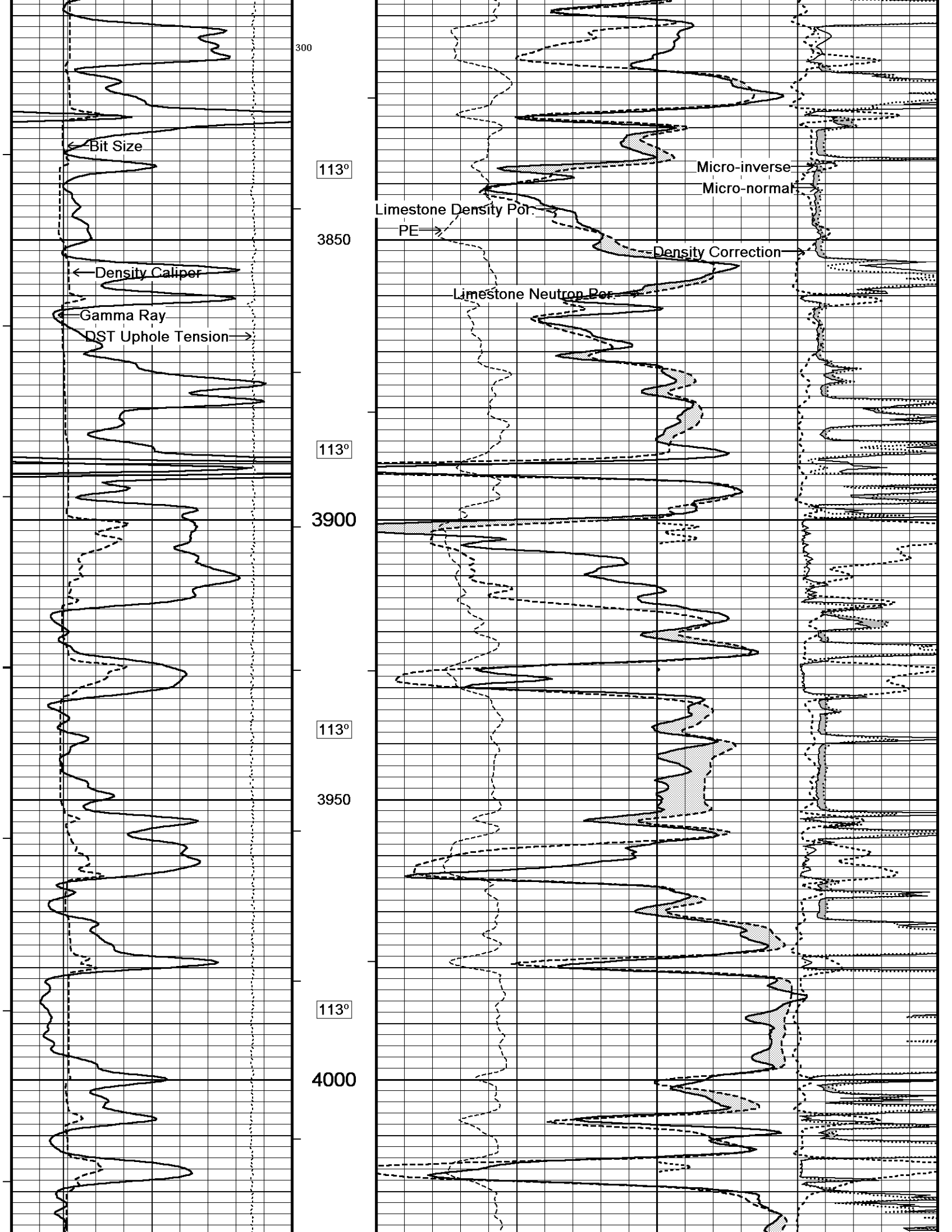
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-SEP-2012 13:14
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa...\Grand Mesa P-D #1-27_Main spooled section.dta
Recorded on 23-SEP-2012 13:02
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

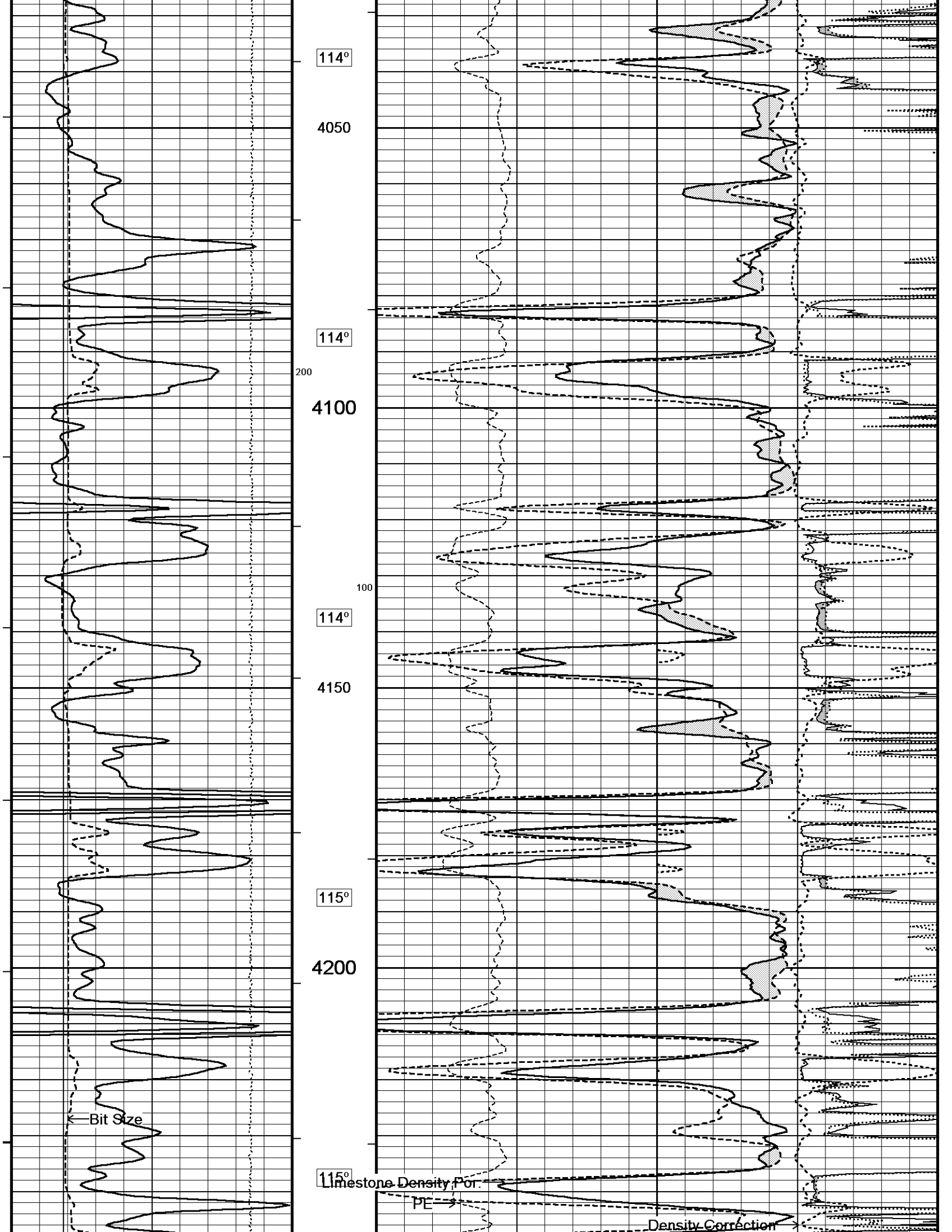


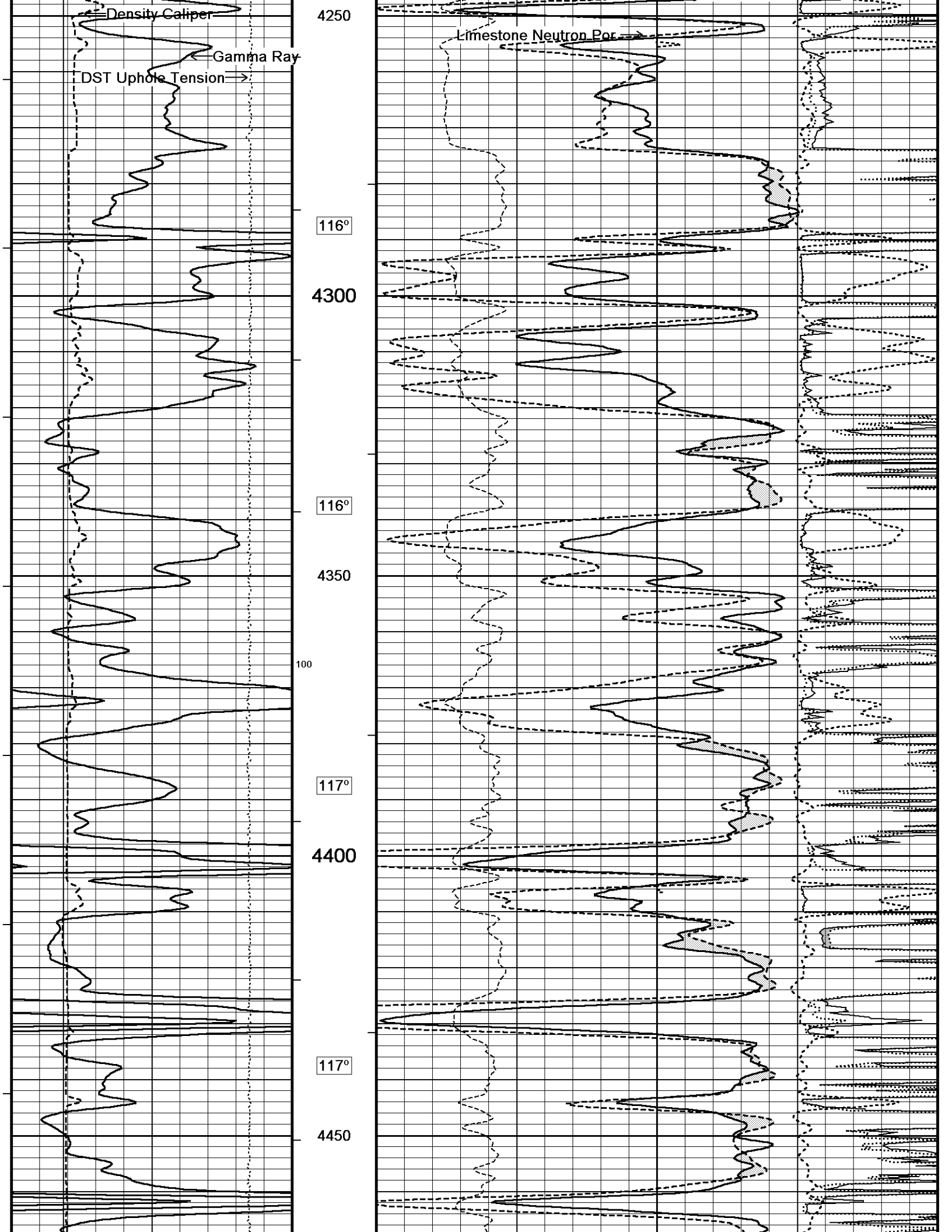

every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Density Caliper
inches
6
11
16
Bit Size
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Borehole Temp in deg F
HVI every 10 cu ft
Annular Integral every 10 cu ft
Replay Scale 1:240
Limestone Density Por.
percent
30
20
10
0
-10
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.25
0
0.25
Micro-normal
ohm metres
0
40
Micro-inverse
ohm metres
0
40
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-SEP-2012 13:14
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa...\Grand Mesa P-D #1-27_Main spooled section.dta
Recorded on 23-SEP-2012 13:02
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600
5 INCH MAIN

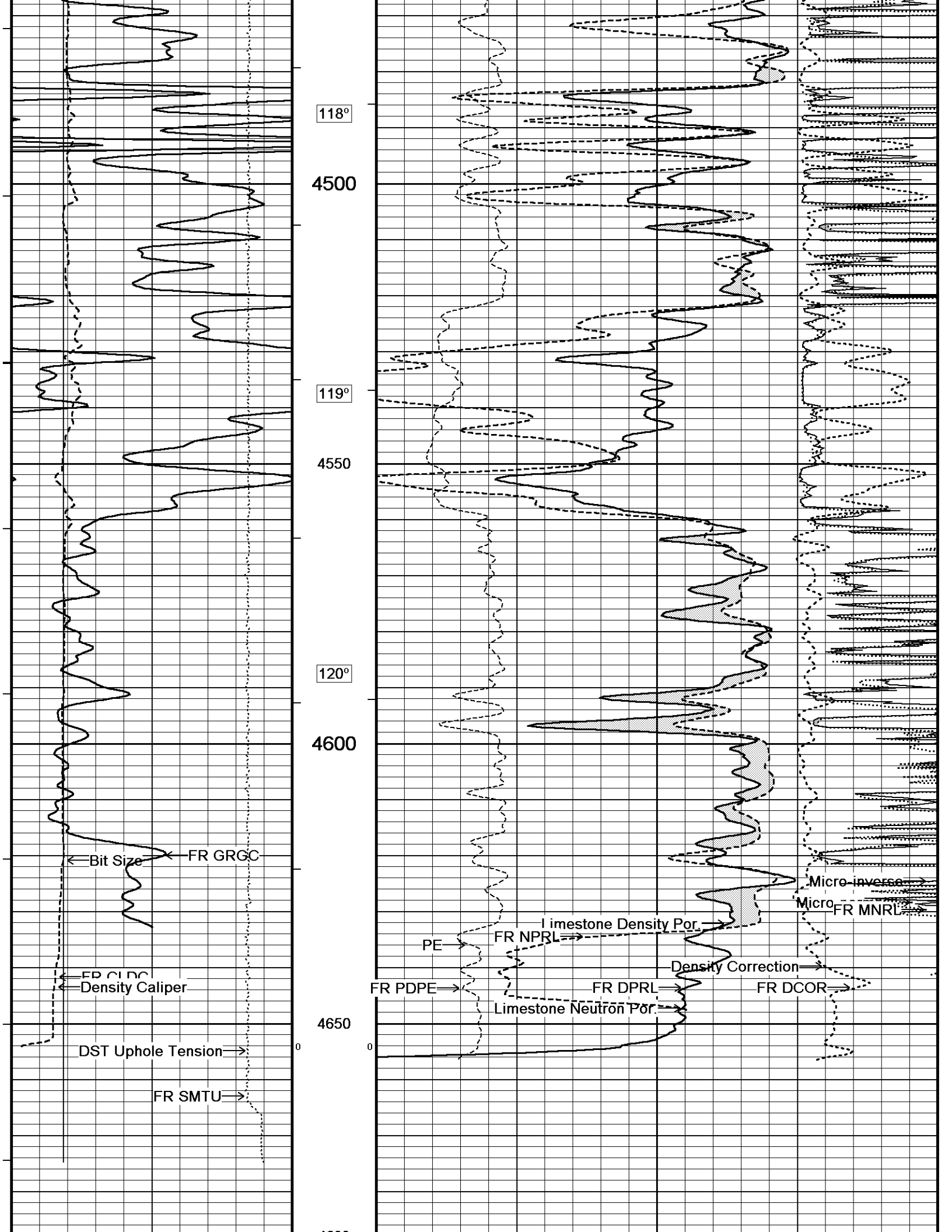

5 INCH MAIN
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-SEP-2012 13:14
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa...\Grand Mesa P-D #1-27_Main spooled section.dta
Recorded on 23-SEP-2012 13:02
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600
Timing Marks
every 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
Depth in Feet
Borehole Temp in deg F
HVI every 10 cu ft
Annular Integral every 10 cu ft
Replay
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
-0.25
0
0.25
Micro-normal
ohm metres
0
40
Micro-inverse
ohm metres

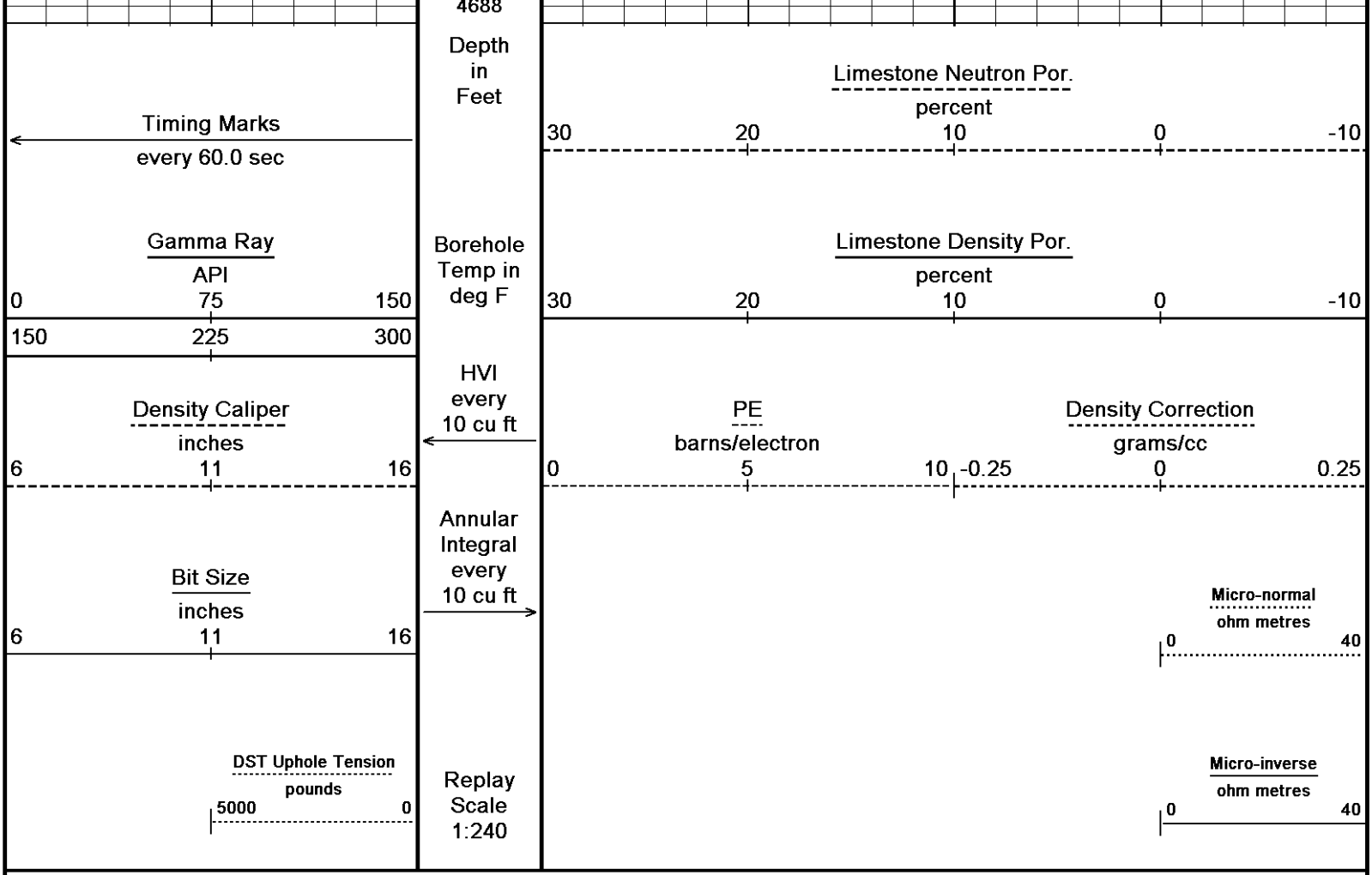

5000
0
Scale
1:240
0
40
3600
200
113°
3650
113°
3700
113°
3750
113°
3800


300
Bit Size
113°
Micro-inverse
Micro-normal
Limestone Density Por.
PE
3850
Density Correction
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
113°
3900
113°
3950
113°
4000


114°
4050
114°
200
4100
100
114°
4150
115°
4200
115°
Bit Size
Limestone Density Por.
PE
Density Correction


Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Neutron Por
4250
116°
4300
116°
4350
100
117°
4400
117°
4450


118°
4500
119°
4550
120°
4600
4650
Bit Size
FR GRGC
FR CLDC
Density Caliper
DST Uphole Tension
FR SMTU
0
PE
FR PDPE
FR NPRL
Limestone Density Por.
Limestone Neutron Por.
FR DPRL
Density Correction
FR DCOR
Micro-inverse
Micro
FR MNRL
0



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-SEP-2012 13:14
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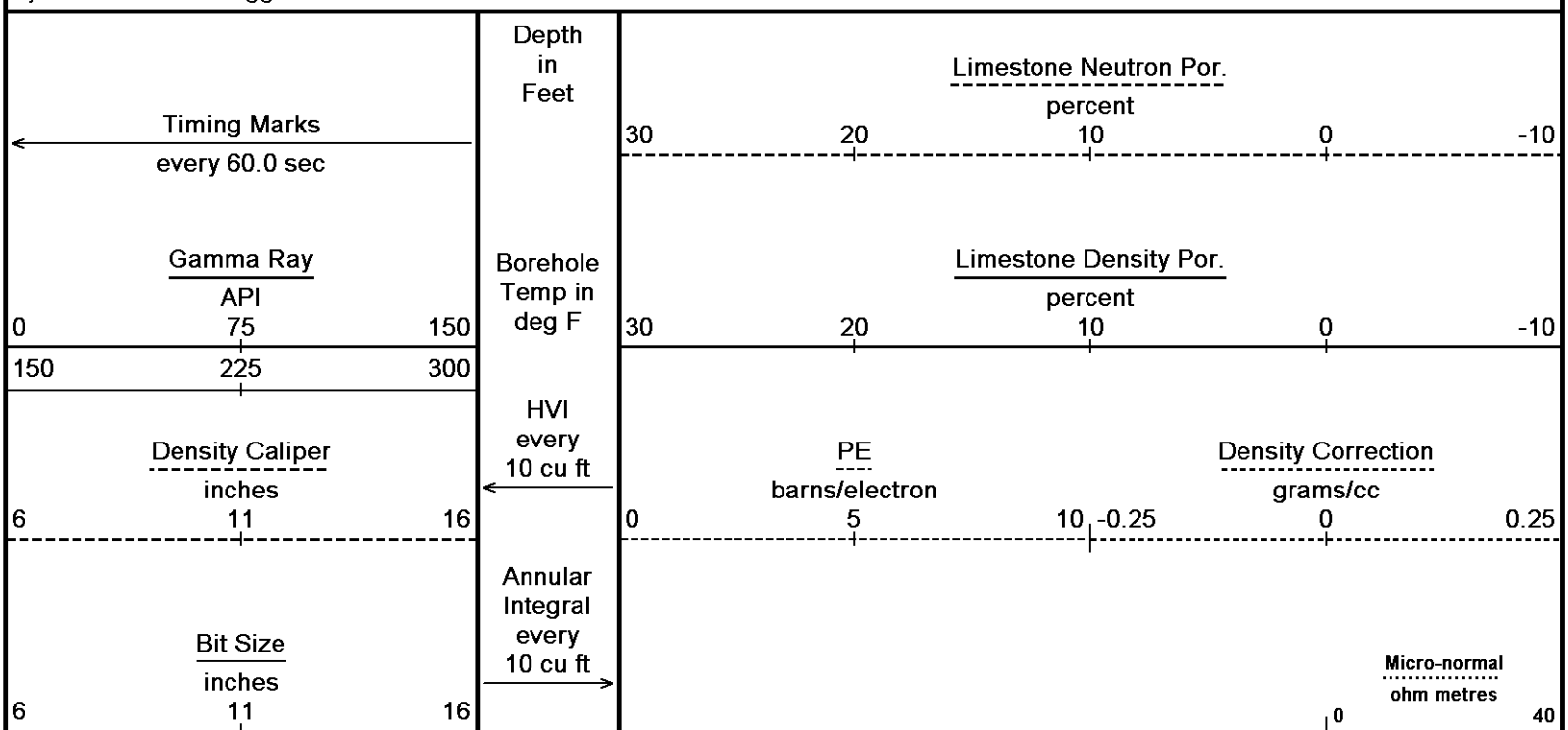
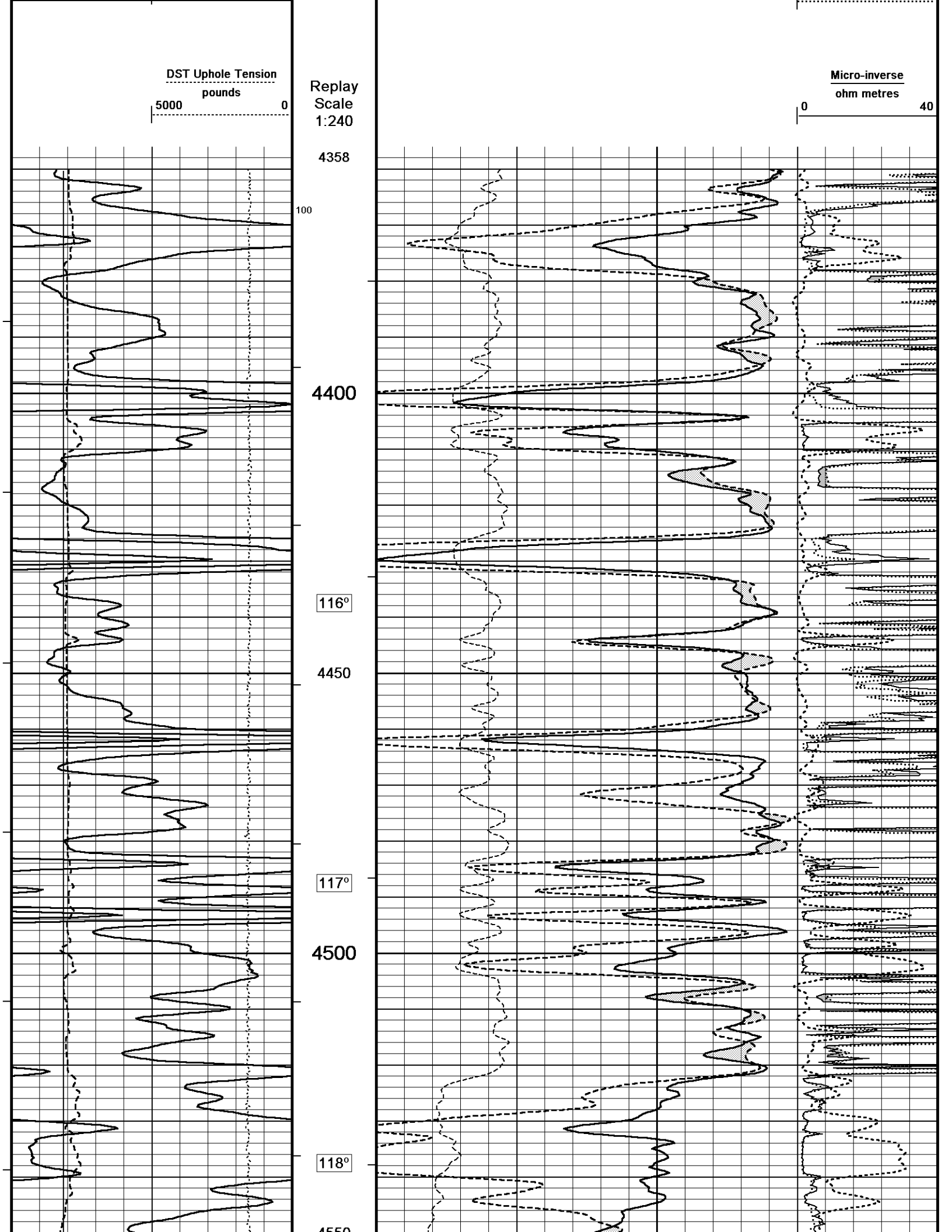
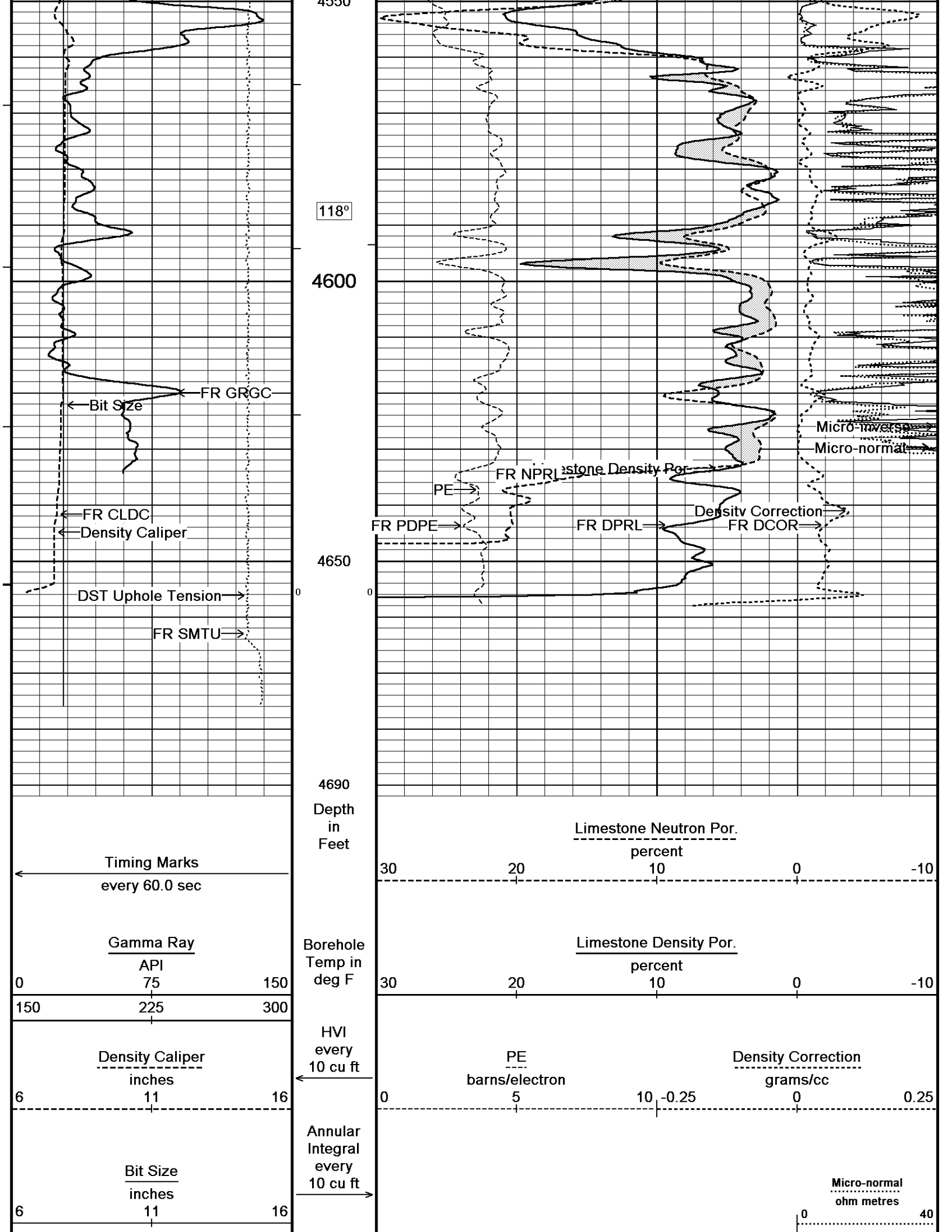
5 INCH MAIN

5 INCH REPEAT

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-SEP-2012 13:14
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa P-D #1-27\Grand Mesa P-D #1-27_001.dta — Recorded on 23-SEP-2012 11:22
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600




DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
Micro-inverse
ohm metres
0
40
4358
100
4400
116°
4450
117°
4500
118°


4550
118°
4600
4650
4690
FR GRGC
Bit Size
FR CLDC
Density Caliper
DST Uphole Tension
FR SMTU
0
0
Micro-inverse
Micro-normal
FR NPRL
PE
FR PDPE
FR DPRL
Density Correction
FR DCOR
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
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
Density Correction
grams/cc
-0.25 0 0.25
Annular Integral every 10 cu ft
Bit Size
inches
6 11 16
Micro-normal
ohm metres
0 40

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Micro-inverse
ohm metres
0 40

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa P-D #1-27\Grand Mesa P-D #1-27_001.dta
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Plotted on 23-SEP-2012 13:14
Recorded on 23-SEP-2012 11:22

5 INCH REPEAT

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
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Plotted on 23-SEP-2012 13:14
Recorded on 23-SEP-2012 13:02

Timing Marks
every 60.0 sec

Depth
in
Feet

Compensated Density
grams/cc
2 2.25 2.50 2.75 3

Gamma Ray
API
0 75 150
150 225 300

Borehole
Temp in
deg F

Limestone Density Por.
percent
30 20 10 0 -10

HVI
every
10 cu ft

Density Caliper
inches
6 11 16

Annular
Integral
every
10 cu ft

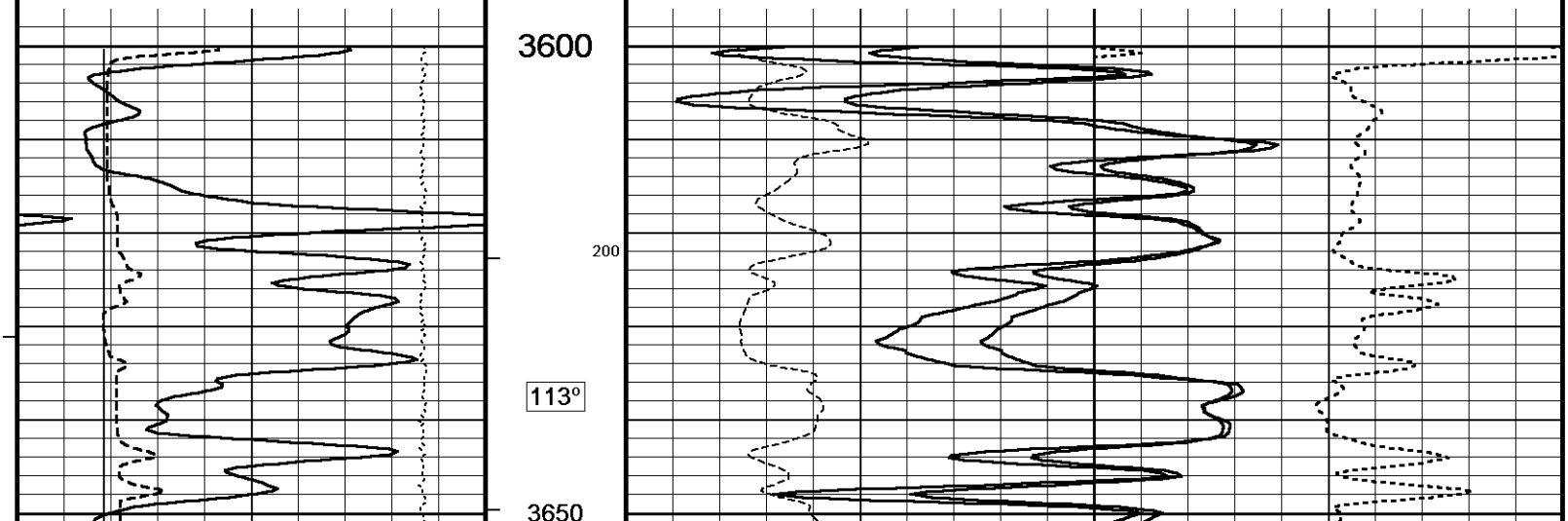
Bit Size
inches
6 11 16

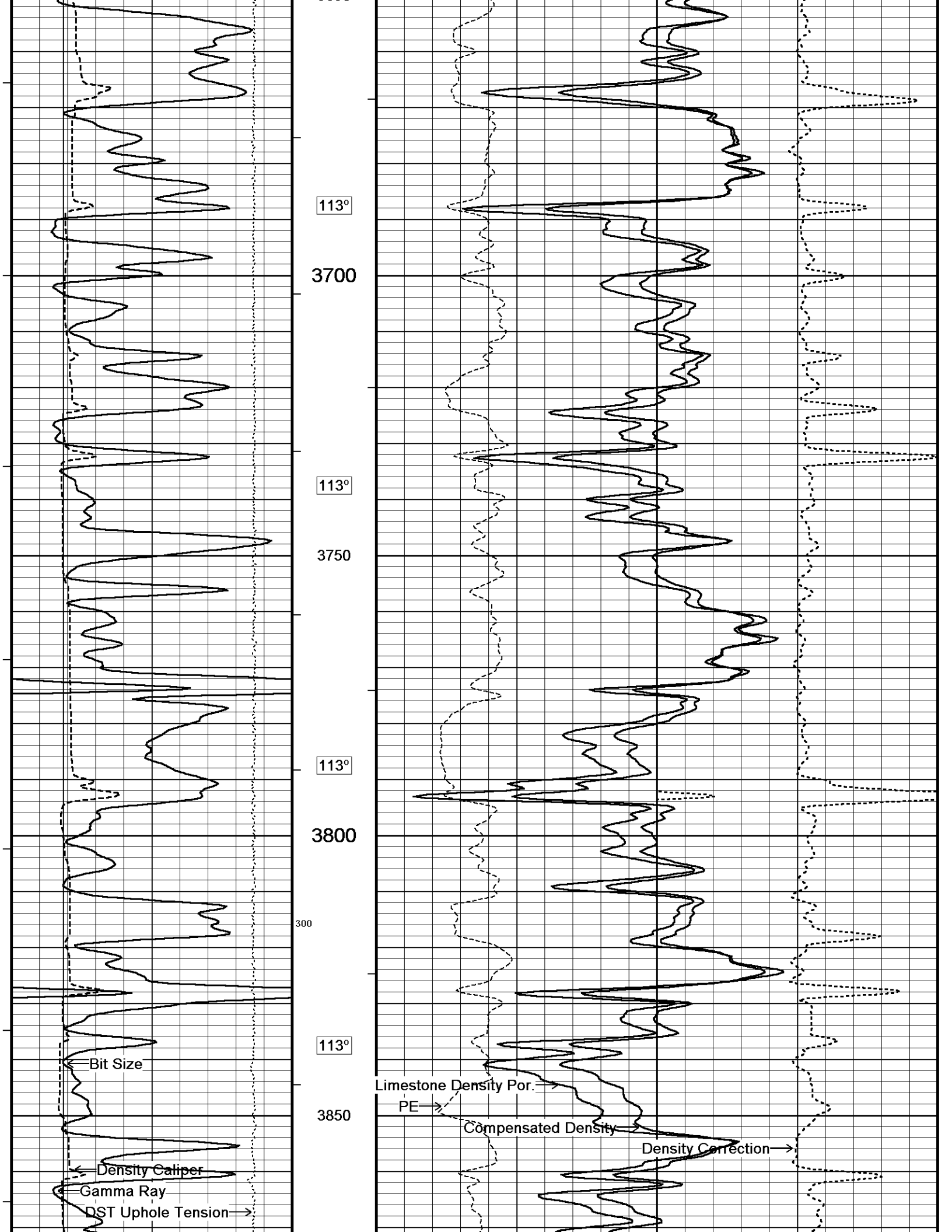
PE
barns/electron
0 5 10

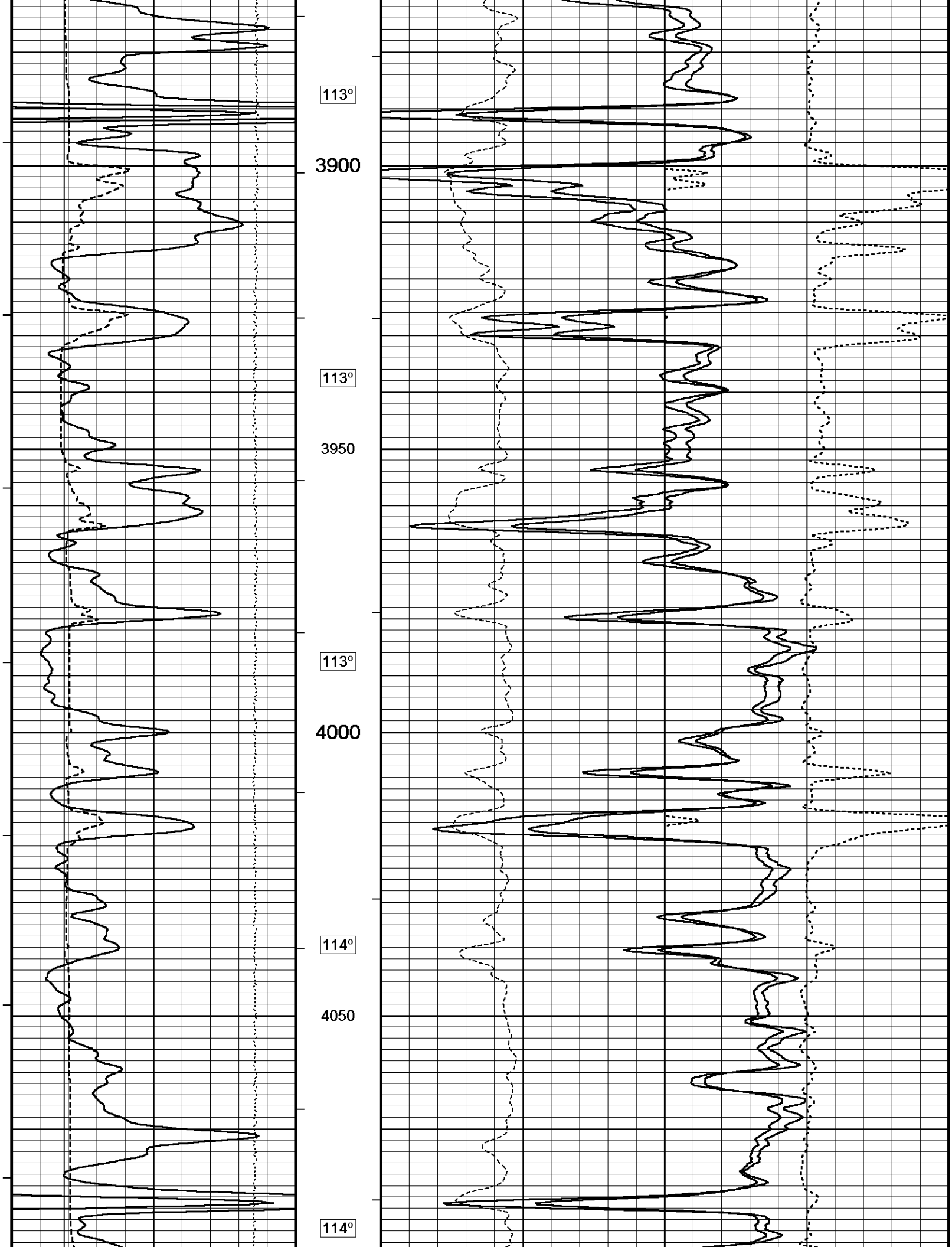
Density Correction
grams/cc
-0.25 0 0.25

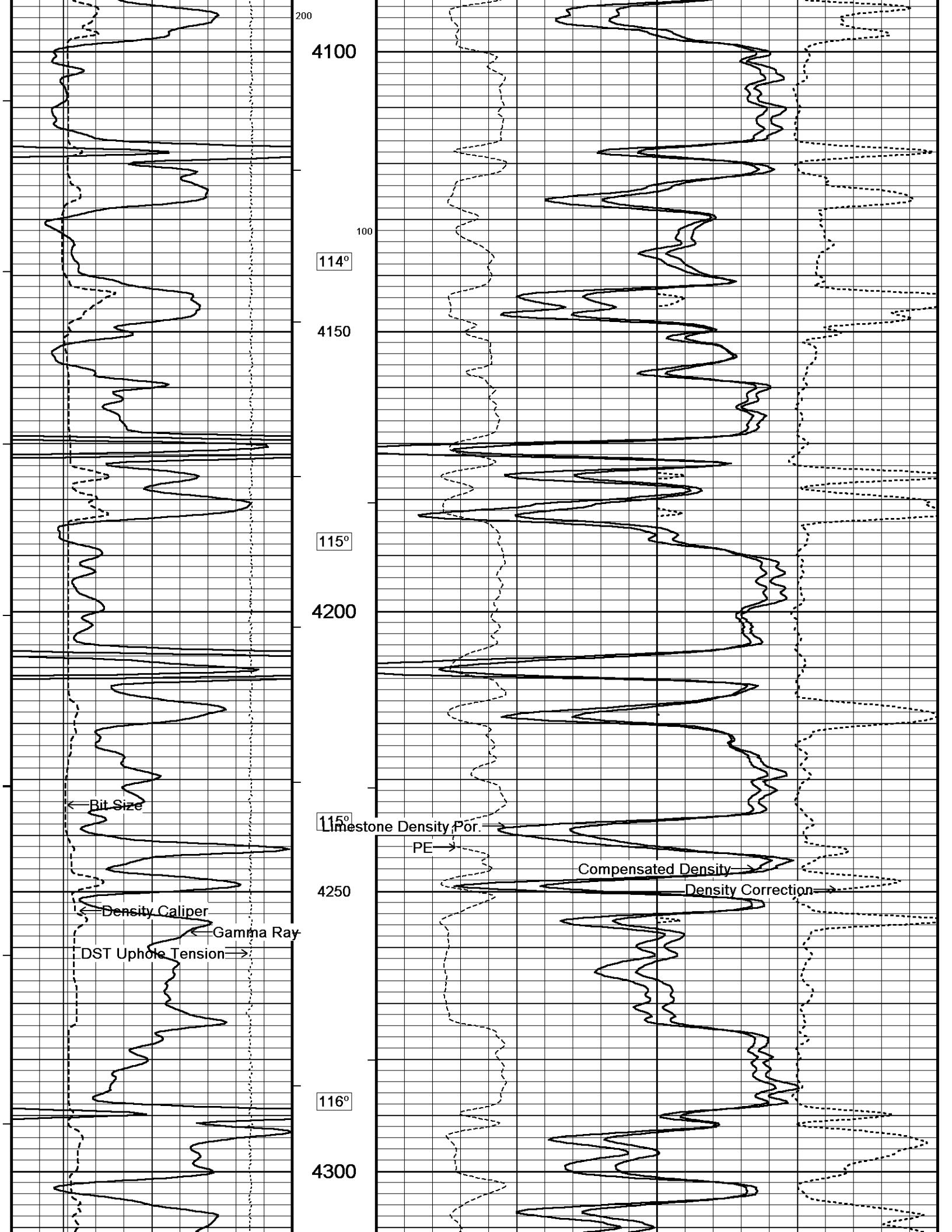
DST Uphole Tension
pounds
5000 0

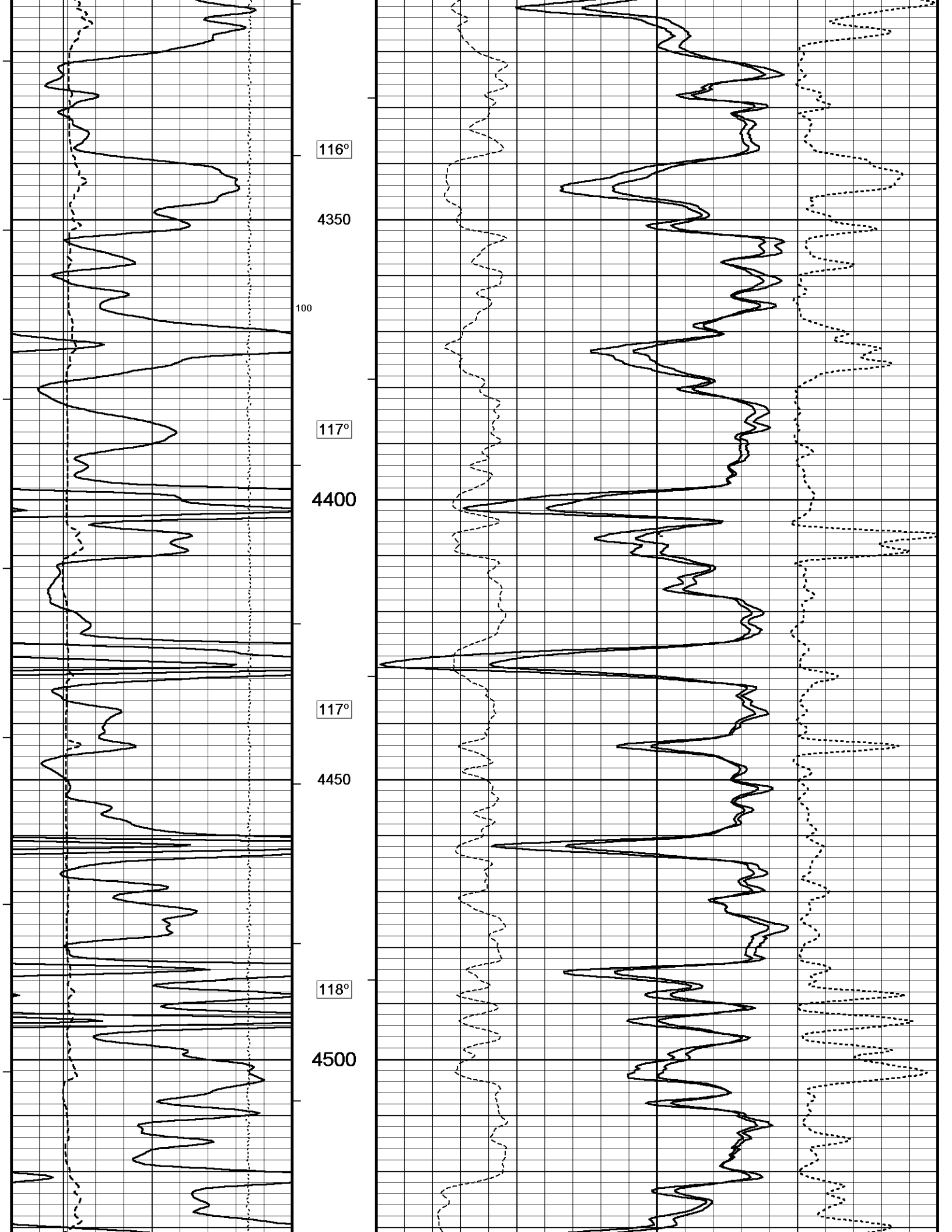
Replay
Scale
1:240

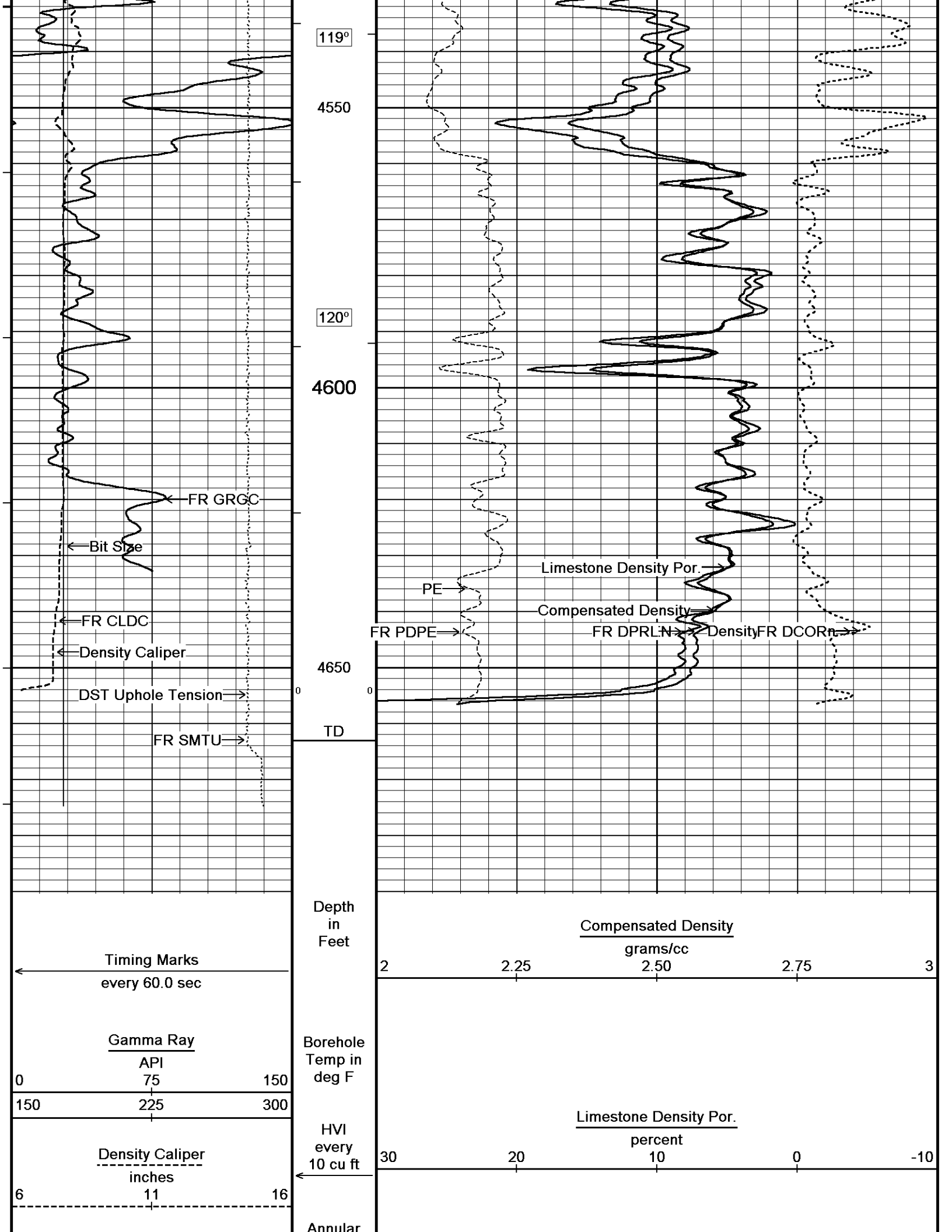



113°
3700
113°
3750
113°
3800
300
113°
3850
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por.
PE
Compensated Density
Density Correction


113°
3900
113°
3950
113°
4000
114°
4050
114°


200
4100
100
114°
4150
115°
4200
115°
4250
116°
4300
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por.
PE
Compensated Density
Density Correction


116°
4350
100
117°
4400
117°
4450
118°
4500


119°
4550
120°
4600
4650
TD
FR GRGC
Bit Size
FR CLDC
Density Caliper
DST Uphole Tension
FR SMTU
PE
FR PDPE
Limestone Density Por.
Compensated Density
FR DPRL-N
Density
FR DCORn
0
0
Depth in Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Density Caliper
inches
6
11
16
Borehole Temp in deg F
HVI every 10 cu ft
Annular
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Limestone Density Por.
percent
30
20
10
0
-10

Bit Size
inches
6 11 16

Annular Integral every 10 cu ft

PE
barns/electron
0 5 10

Density Correction
grams/cc
-0.25 0 0.25

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-SEP-2012 13:14
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5 INCH MAIN

5 INCH REPEAT

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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

Bit Size
inches
6 11 16

PE
barns/electron
0 5 10

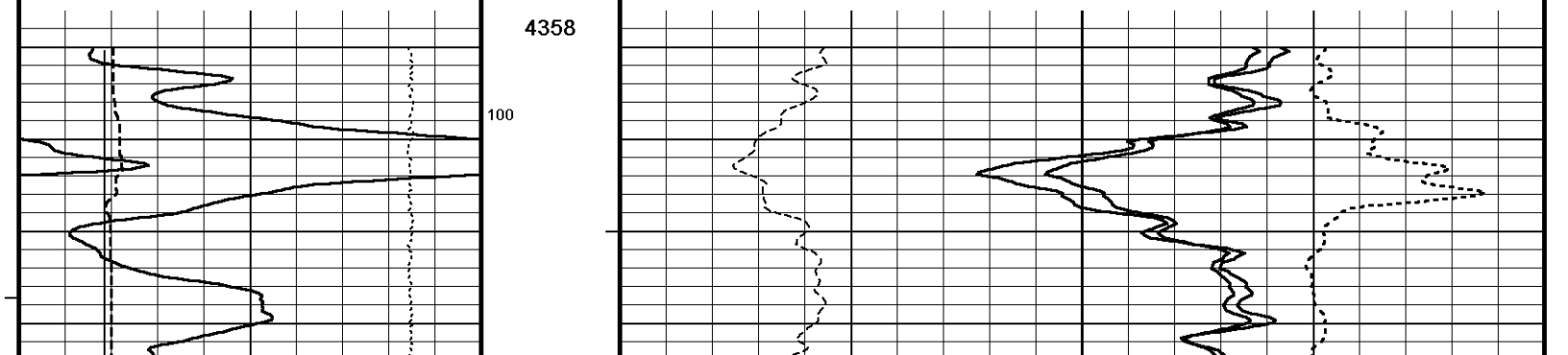
Density Correction
grams/cc
-0.25 0 0.25

DST Uphole Tension
pounds
5000 0

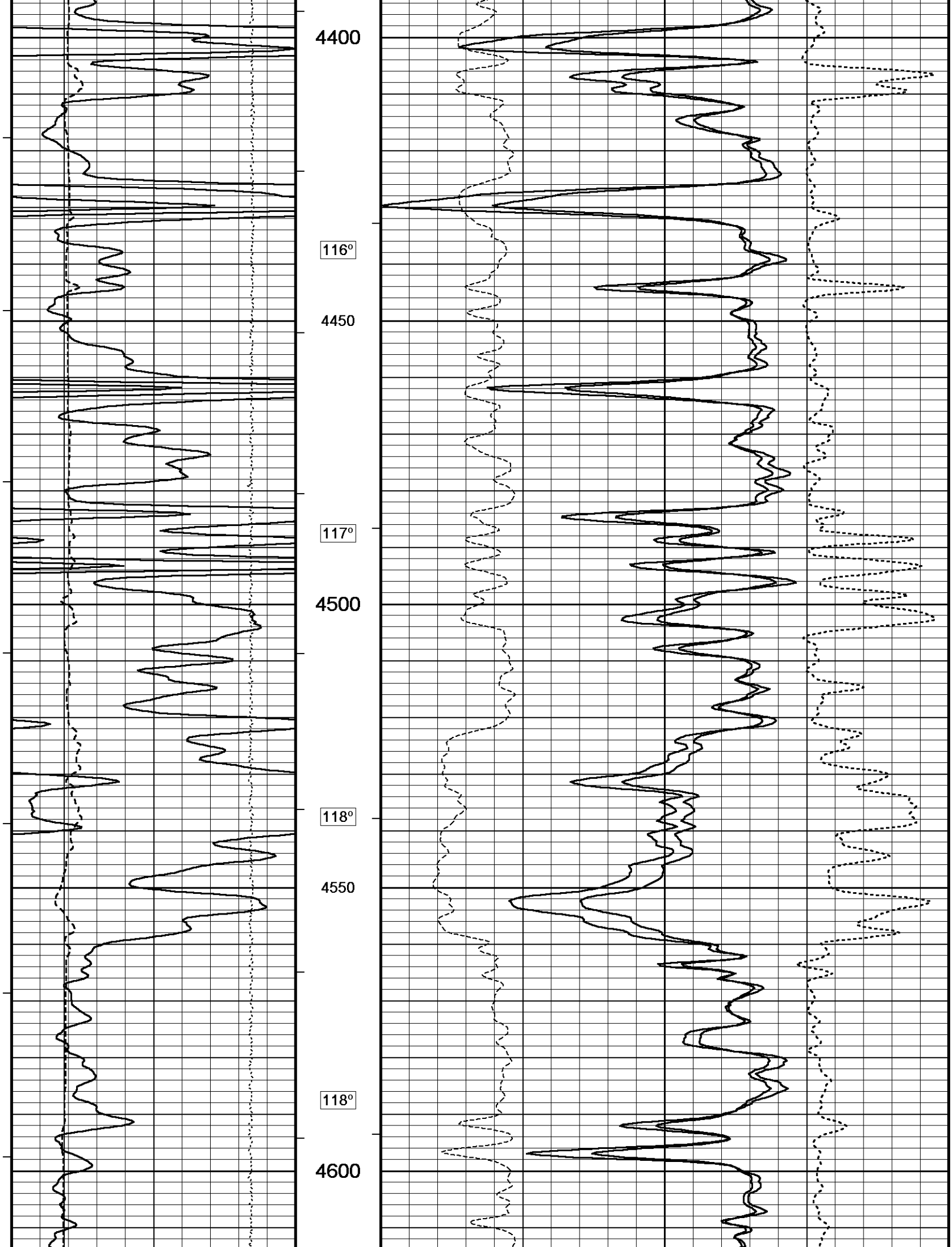
Replay Scale 1:240

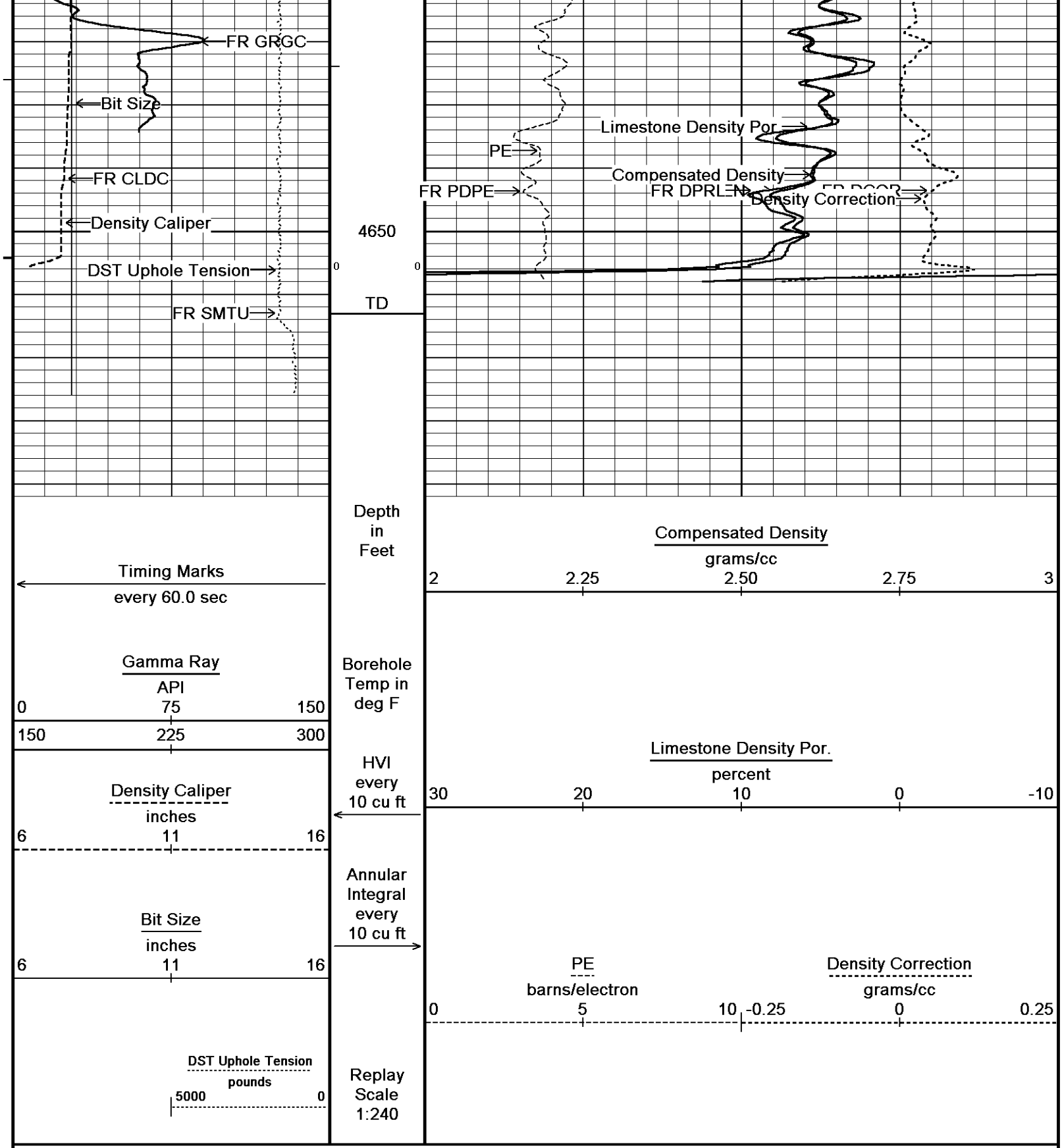
4358

100



5 INCH REPEAT


4400
116°
4450
117°
4500
118°
4550
118°
4600



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-SEP-2012 13:14
Filename: C:\Minimus 13.02.6600\Data\Grand Mesa P-D #1-27\Grand Mesa P-D #1-27_001.dta
Recorded on 23-SEP-2012 11:22
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

5 INCH REPEAT

BEFORE SURVEY CALIBRATION

C:\Minimus 13.02.6600\Data\Grand Mesa P-D #1-27\Grand Mesa P-D #1-27_Main spooled section.dta

General Constants All 000
Last Edited on 23-SEP-2012,10:02

General Parameters

Mud Resistivity	1.240	ohm-metres
Mud Resistivity Temperature	94.000	degrees F
Water Level	0.000	feet
Density/Neutron 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	Base Density Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	0.610
RWA Constant M	2.150

Down-hole Tension Calibration SMS 0

Field Calibration on 23-SEP-2012 10:43

Reading No	Measured	Calibrated (lbs)
1	13629.25	0.00
2	13666.72	400.00

Gamma Calibration MCG-C 208

Field Calibration on 23-SEP-2012 00:17

	Measured	Calibrated (API)
Background	67	46
Calibrator (Gross)	1106	771
Calibrator (Net)	1039	725

Gamma Constants MCG-C 208

Last Edited on 23-SEP-2012,10:02

Gamma Calibrator Number	GR38	
Mud Density	1.09	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG-C 208

Field Calibration on 03-AUG-2012 22:37

	Measured	Calibrated (mV)
Reference 1	100.2	101.0
Reference 2	-101.3	-101.0

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 03-AUG-2012,16:18

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-C 208

Last Edited on

Pre-filter Length	11

Caliper Calibration MML-A 4

Base Calibration on 27-AUG-2012 09:13
Field Calibration on 23-SEP-2012 00:13

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15511	5.98
2	18793	7.97
3	22115	9.86
4	26057	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.94	5.98

Micro Normal and Micro Inverse Calibration MML-A 4

Base Calibration on 27-AUG-2012 09:21
Field Check on 23-SEP-2012 00:11

Base Calibration

Channel	Measured Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1	Calibrated (ohm-m) Resistor 2
Micro Normal	12.2	60.2	5.0	25.0
Micro Inverse	15.7	78.5	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	62.9	62.8
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 4

Last Edited on 15-SEP-2012,14:38

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	1.0000	
Micro Inverse K Factor	1.0000	
Standoff Offset	N/A	inches

Neutron Calibration MDN-A.B 65

Base Calibration on 28-AUG-2012 10:35
Field Check on 23-SEP-2012 00:21

Base Calibration

	Measured Near	Measured Far	Calibrated (cps) Near	Calibrated (cps) Far
	3134	97	3714	110
Ratio	32.240		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1654	2401
Ratio	0.689	

Field Check

	Calibrated (cps)	
	1650	2376
Ratio	0.695	

Neutron Constants MDN-A.B 65

Last Edited on 23-SEP-2012,00:17

Neutron Source Id	PN-521	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
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	Constant Value	
Formation Pressure	0.00	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-B.J 352

Base Calibration on 27-AUG-2012 14:50
Field Check on 23-SEP-2012 00:03

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.9	126.8
Base Check		281.2
Field Check		281.5

FE Constants MFE-B.J 352

Last Edited on 23-SEP-2012,05:15

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Caliper Source for FE correction	Density Caliper	
Caliper Value for FE correction	N/A	inches
Rm Source for FE correction	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	

Stand-off	0.5	inches

Induction Calibration MAI-A.A 45

Base Calibration on 26-JUL-2012,09:22
Field Check on 23-SEP-2012 00:02

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	14.4	472.6	9.3	966.2
2	5.7	374.0	7.6	821.4
3	3.4	261.2	5.2	566.0
4	2.5	133.9	2.6	279.2
Array Temperature		78.4	Deg F	

Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	0.0	0.0	19.0	3851.7	
2	0.0	0.0	31.8	3629.6	
3	0.0	0.0	28.7	3049.8	
4	0.0	0.0	18.3	2079.4	
Deep	0.0	0.0	16.1	1911.6	
Medium	0.0	0.0	42.5	4061.2	
Shallow	0.0	0.0	49.7	5483.3	
Array Temperature		0.0		70.6	Deg F

Induction Constants MAI-A.A 45

Last Edited on 22-SEP-2012,23:59

Induction Model	RtAP-WBM	
Caliper for Borehole Corr.	Density Caliper	
Hole Size for Borehole Correction	2.500	inches
Tool Centred	No	
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
Borehole Corr. Rm Source	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	
Squasher Start	0.0020	mhos/metre
Squasher Offset	N/A	mhos/metre

Borehole Normalisation

DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000

Calibration Site Corrections

Channel 1	0.00	mmhos/metre
Channel 2	0.00	mmhos/metre
Channel 3	0.00	mmhos/metre
Channel 4	0.00	mmhos/metre

Apparent Porosity and Water Saturation Constants

Archie Constant (A)	1.00	
Cementation Exponent (M)	2.00	
Saturation Exponent (N)	2.00	
Saturation of Water for Apor	100.00	percent
Resistivity of Water for Apor and Sw	0.05	ohm-m
Resistivity of Mud Filtrate for Sw	0.00	ohm-m
Source for Rt	0.00	
Source for Rxo	0.00	

High Resolution Temperature Calibration MAI-A.A 45

Field Calibration on 26-JUL-2012,09:09

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MAI-A.A 45

Last Edited on

Pre-filter Length	11

Caliper Calibration MPD-B 31

Base Calibration on 28-AUG-2012 11:03
Field Calibration on 23-SEP-2012 00:05

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18576	3.99
2	27056	5.98
3	35613	7.97
4	44032	9.86
5	53360	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.96	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 28-AUG-2012 11:22
Field Check on 23-SEP-2012 00:10

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	46103	23728	59556	30836
Reference 2	19270	1960	24941	2541

Field Check at Base

688.3	844.7

Field Check

687.8	848.7

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	127	604		
Reference 1	18457	45978	0.404	0.371
Reference 2	5504	19174	0.290	0.272

Field Check at Base

127.0	604.2

Field Check

127.2	602.6

Density Constants MPD-B 31

Last Edited on 23-SEP-2012,10:02

Density Source Id	254	
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	1.09	gm/cc
Mud Density Z/A Multiplier	1.13	
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 13.02.6600\Data\Grand Mesa P-D #1-27\Grand Mesa P-D #1-27_Main spooled section.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

Compact Comms Gamma
MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
MML-A 4 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

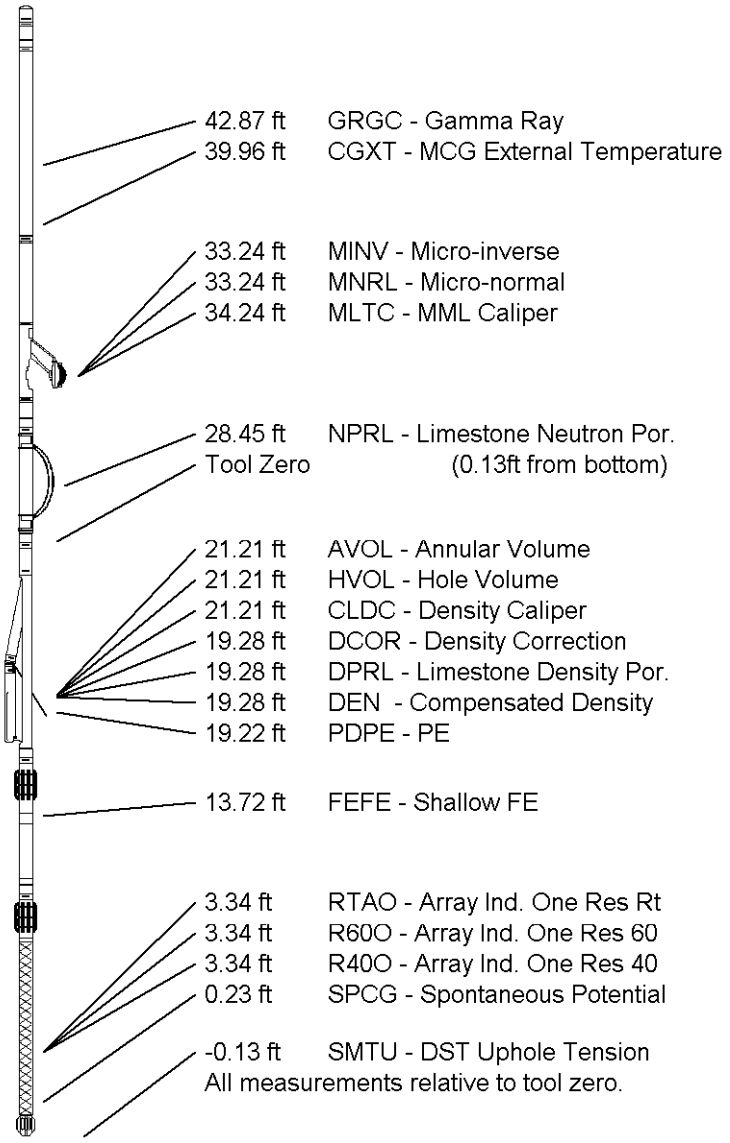
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 49.73 ft Weight: 399.0 lb



COMPANY	GRAND MESA OPERATING
WELL	P-D #1-27
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2875.00	feet	First Reading	4644.00	feet
Elevation Drill Floor	2873.00	feet	Depth Driller	4662.00	feet
Elevation Ground Level	2870.00	feet	Depth Logger	4663.00	feet

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COMPENSATED NEUTRON
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