Weatherford®

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	Grand Mesa Operating Co.
WELL	S & L #1-14
FIELD	Maurice Prospect
PROVINCE/COUNTY	Gove
COUNTRY/STATE	U.S.A. / Kansas
LOCATION	0330' FSL X 0553' FEL

40 Years of Wireline 1970 2010

SEC	TWP	RGE	Other Services
14	13S	31W	MAI/MFE
			MML

API Number 15-063-22003
Permit Number

Permanent Datum G.L., Elevation 2904 feet
Log Measured From KB
Drilling Measured From KB @ 5 FEET

Elevations:	feet
KB	2909.00
DF	2911.00
GL	2904.00

Date	29-JUN-2012			
Run Number	One			
Depth Driller	4700.00	feet		
Depth Logger	4700.00	feet		
First Reading	4681.00	feet		
Last Reading	3600.00	feet		
Casing Driller	212.00	feet		
Casing Logger	212.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	Chem			
Density / Viscosity	9.30 lb/USg	54.00 CP		
PH / Fluid Loss	11.50	6.40 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.57 @ 99.0	ohm-m		
Rmf @ Measured Temp	0.46 @ 99.0	ohm-m		
Rmc @ Measured Temp	0.68 @ 99.0	ohm-m		
Source Rmf / Rmc	CALC			
Rm @ BHT	0.45 @125.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	125.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13025	LIB		
Recorded By	R. BURNS		J. LAPOINT	
Witnessed By	BOB SCHRIVER			
S.O./JOB#	3529328		LB12-169	

BOREHOLE RECORD

Last Edited: 29-JUN-2012 20:07

Bit Size inches	Depth From feet	Depth To feet
7.875	212.00	4700.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	212.00	24.00

REMARKS

Tools Used: MPD, MCG, MDN, MML, MFE, MAI.
Hardware: MPD: 8 inch profile plate used. MDN: Dual Bowspring used.
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.
Annular volume with 5.5 inch production casing = 225 cu. ft.
Service order #3529328
Rig: Murfin # 24
Engineer: R. Burns, J. LaPoint
Operator(s):

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_003.dta
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

Plotted on 29-JUN-2012 21:01
Recorded on 29-JUN-2012 18:53

Timing Marks
every 60.0 sec

Depth in Feet

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

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 10

DST Uphole Tension
pounds
5000 0

Micro-inverse
ohm metres
0 10

Replay Scale 1:240

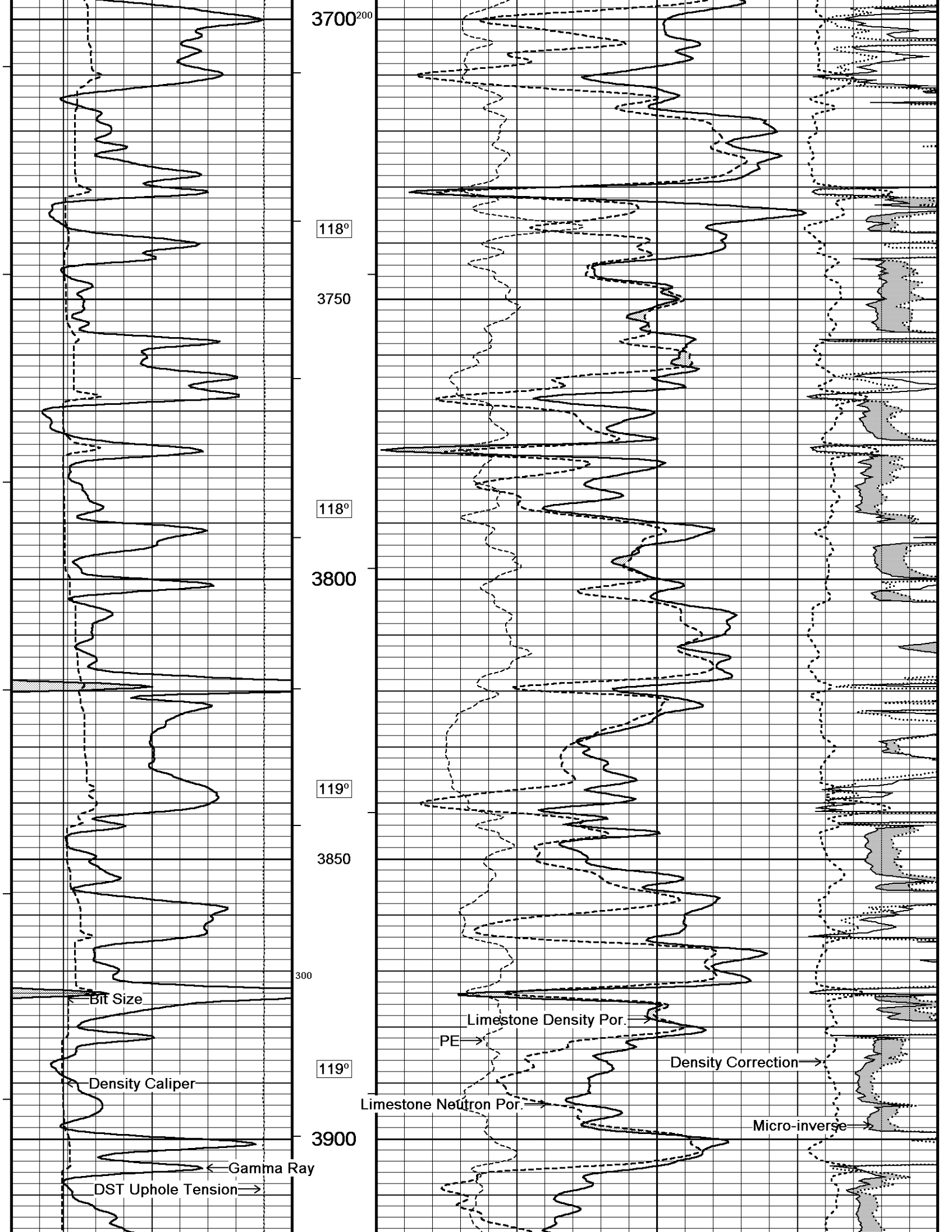
3600

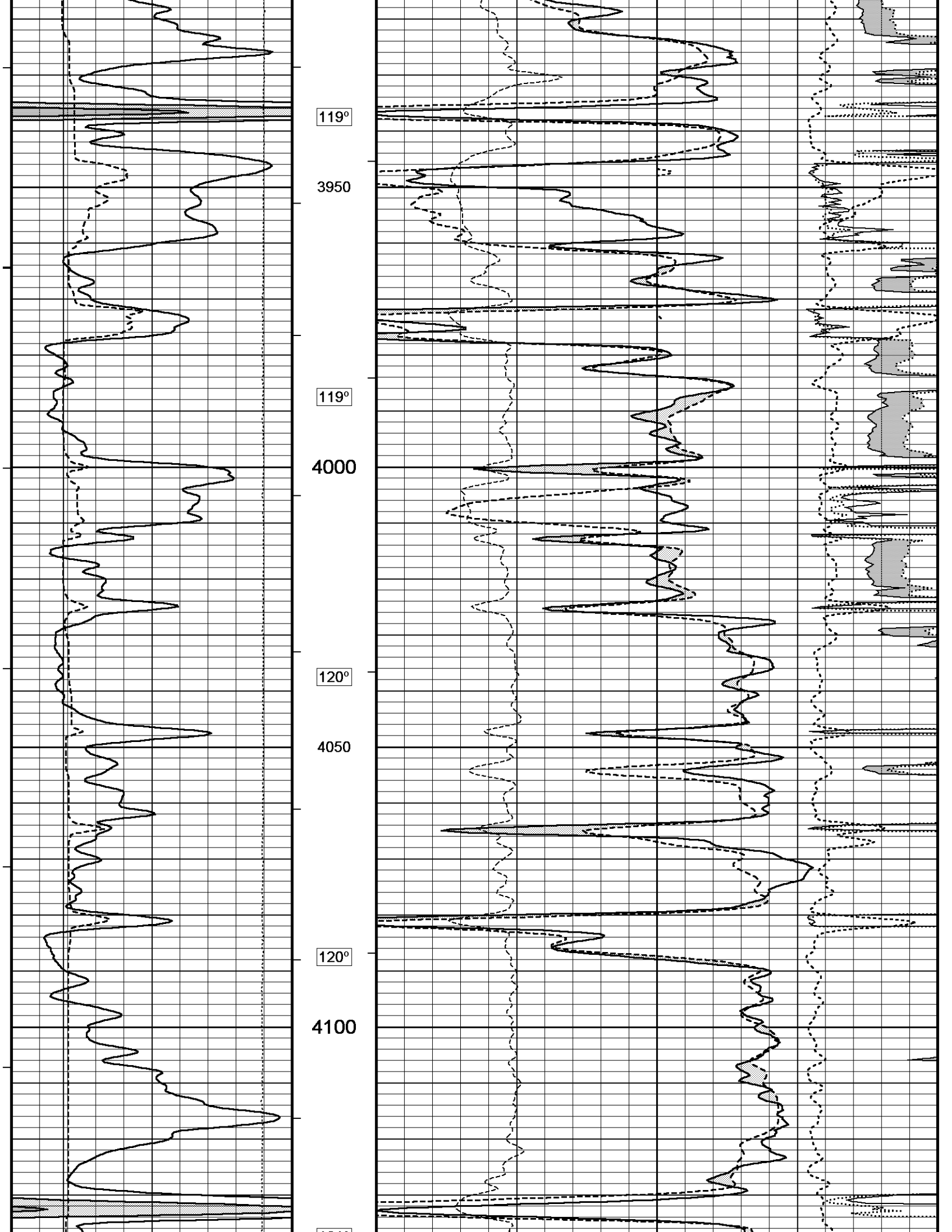
400

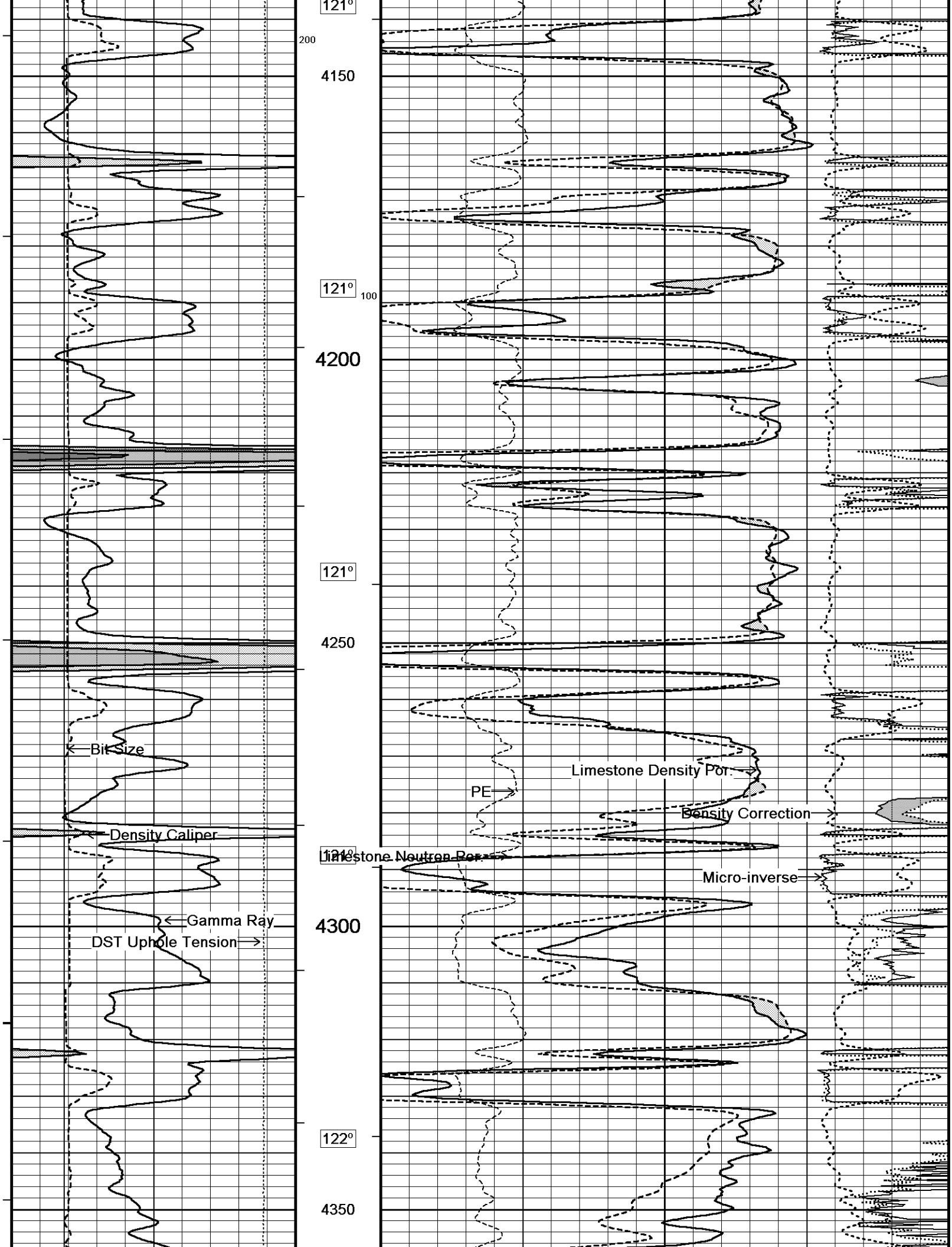
118°

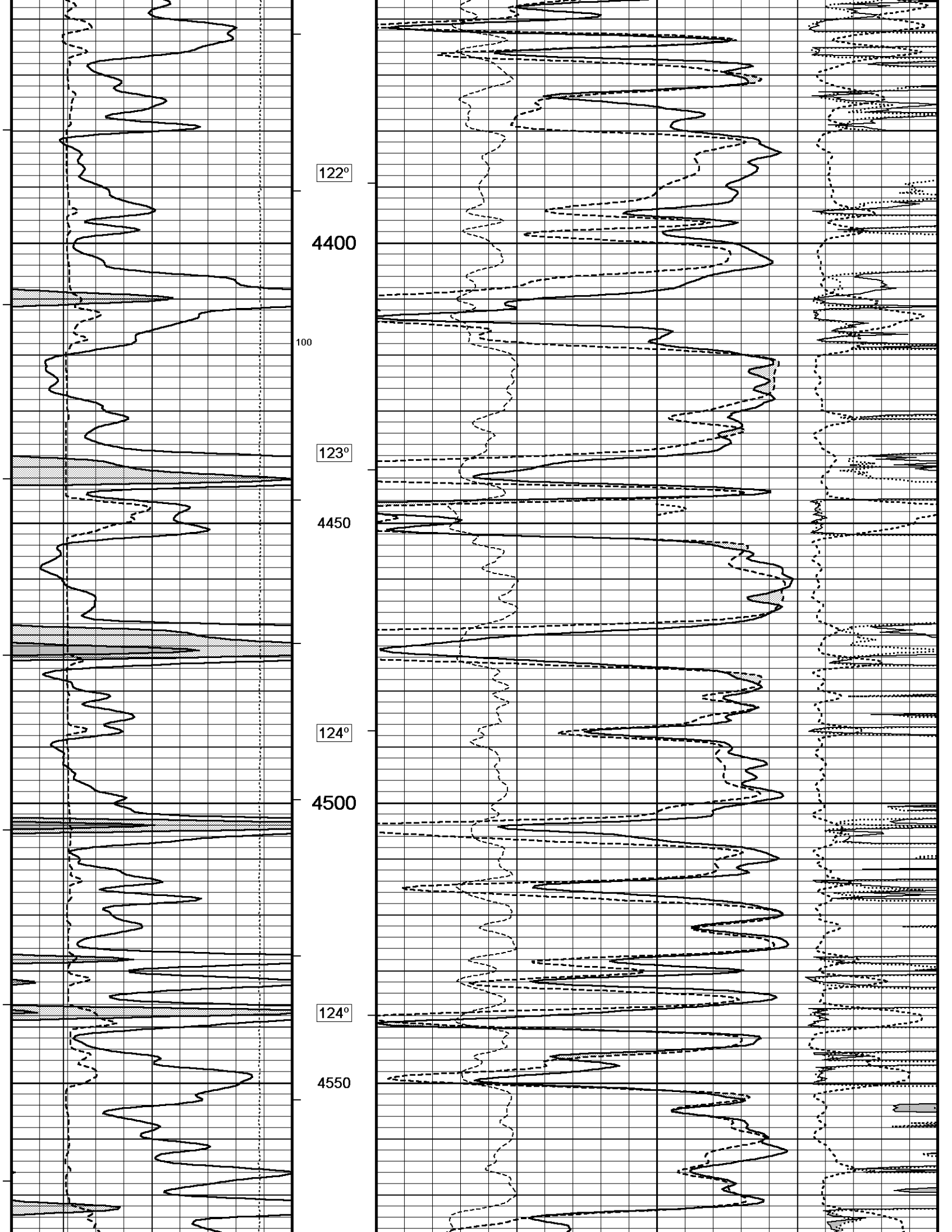
3650

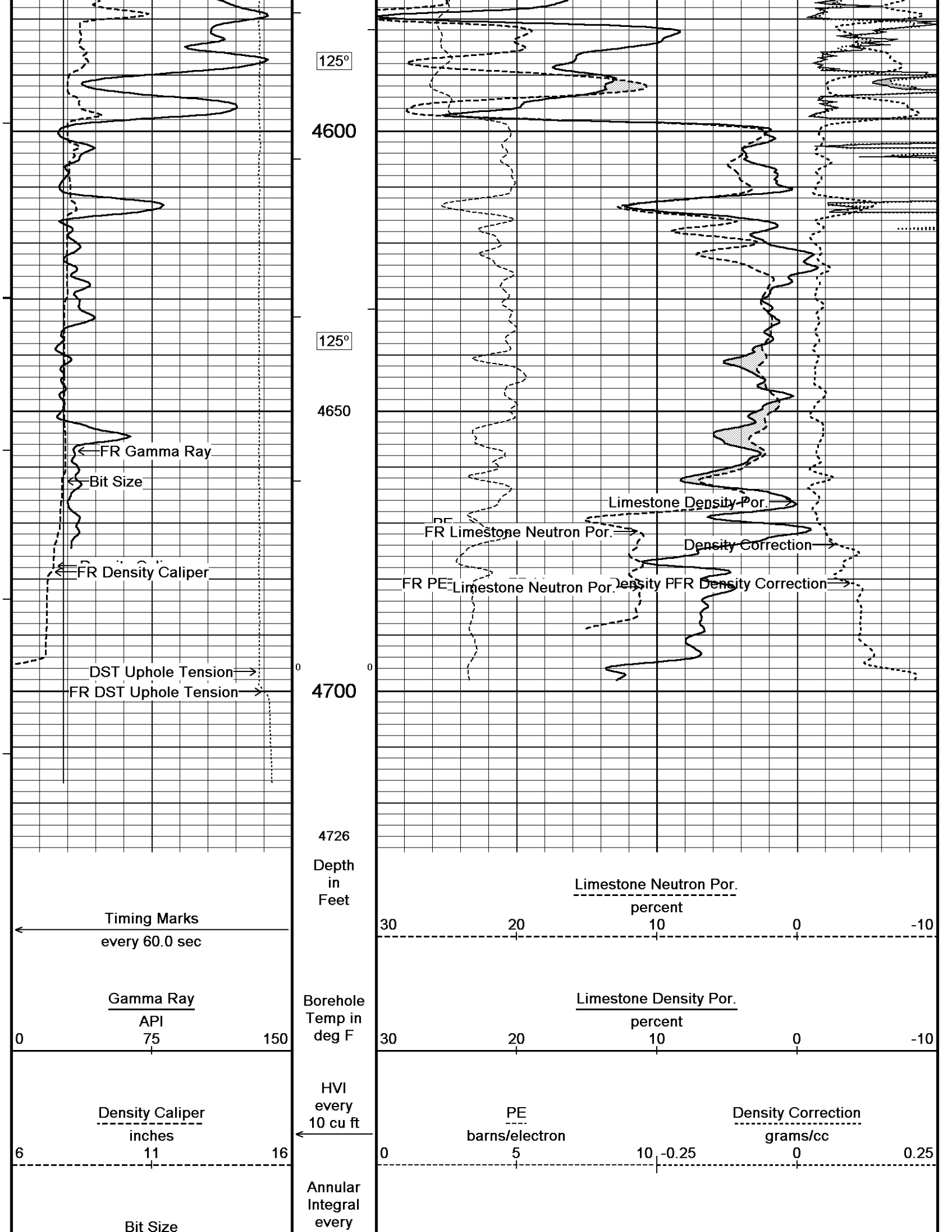
118°


3700
200
118°
3750
118°
3800
119°
3850
300
119°
3900
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Limestone Density Por.
PE
Limestone Neutron Por.
Density Correction
Micro-inverse


119°
3950
119°
4000
120°
4050
120°
4100


121°
200
4150
121°
100
4200
121°
4250
Bit Size
Density Caliper
Limestone Neutron Por.
PE
Limestone Density Por.
Density Correction
Micro-inverse
Gamma Ray
DST Uphole Tension
4300
122°
4350


122°
4400
100
123°
4450
124°
4500
124°
4550


125°
4600
125°
4650
FR Gamma Ray
Bit Size
FR Density Caliper
DST Uphole Tension
FR DST Uphole Tension
0
0
4700
4726
Limestone Density Por.
FR Limestone Neutron Por.
Density Correction
FR PE
Limestone Neutron Por.
FR Density Correction
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
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
Bit Size

inches
6 11 16

10 cu ft

Micro-normal
ohm metres
0 10

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Micro-inverse
ohm metres
0 10

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_003.dta
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

Plotted on 29-JUN-2012 21:01
Recorded on 29-JUN-2012 18:53

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_002.dta
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

Plotted on 29-JUN-2012 21:01
Recorded on 29-JUN-2012 18:29

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

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

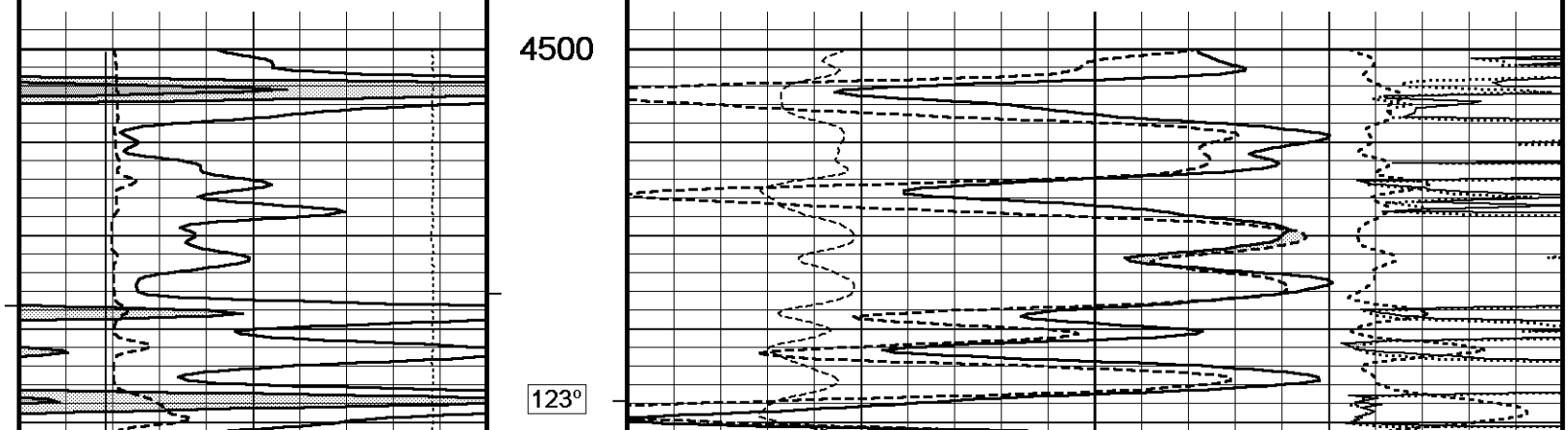
Micro-normal
ohm metres
0 10

DST Uphole Tension
pounds
5000 0

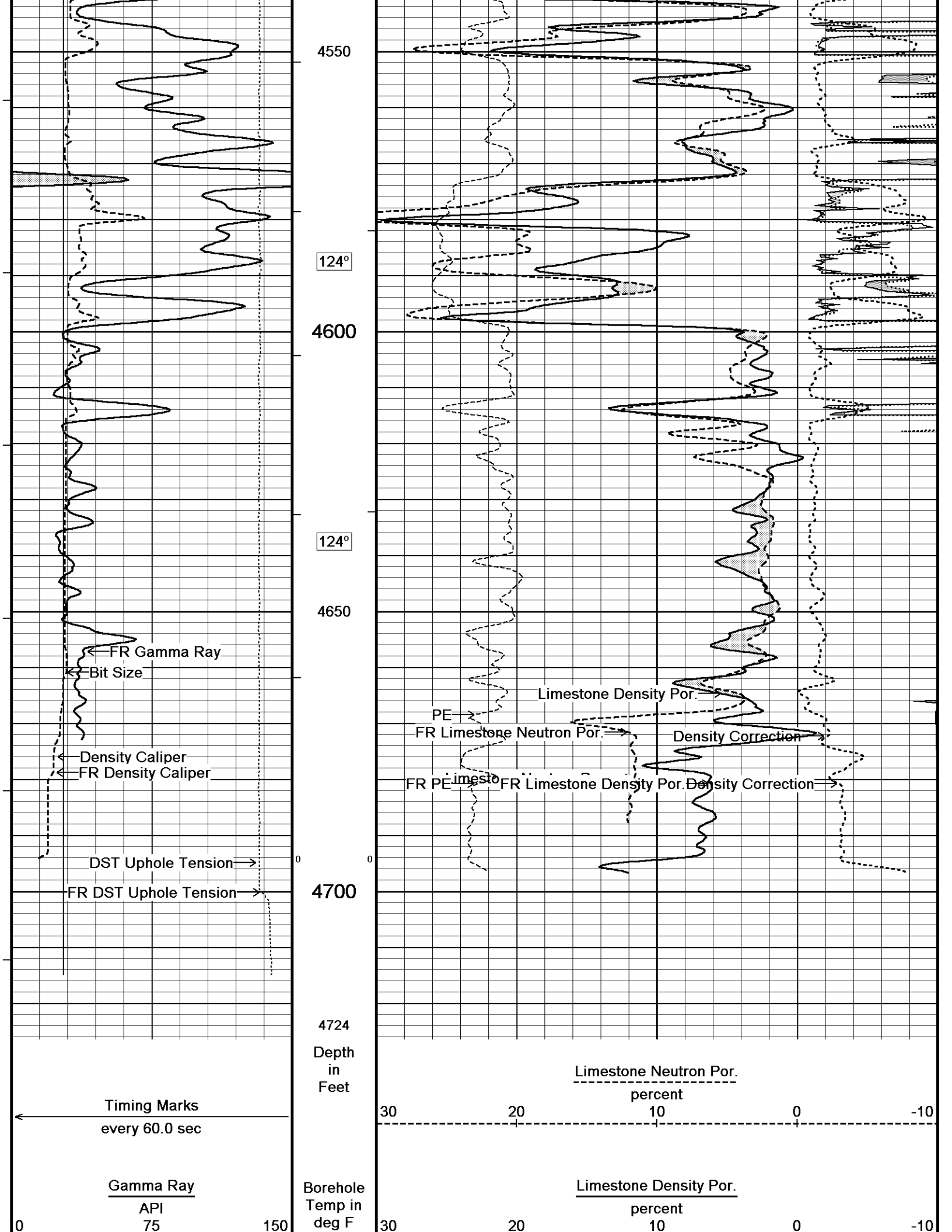
Replay
Scale
1:240

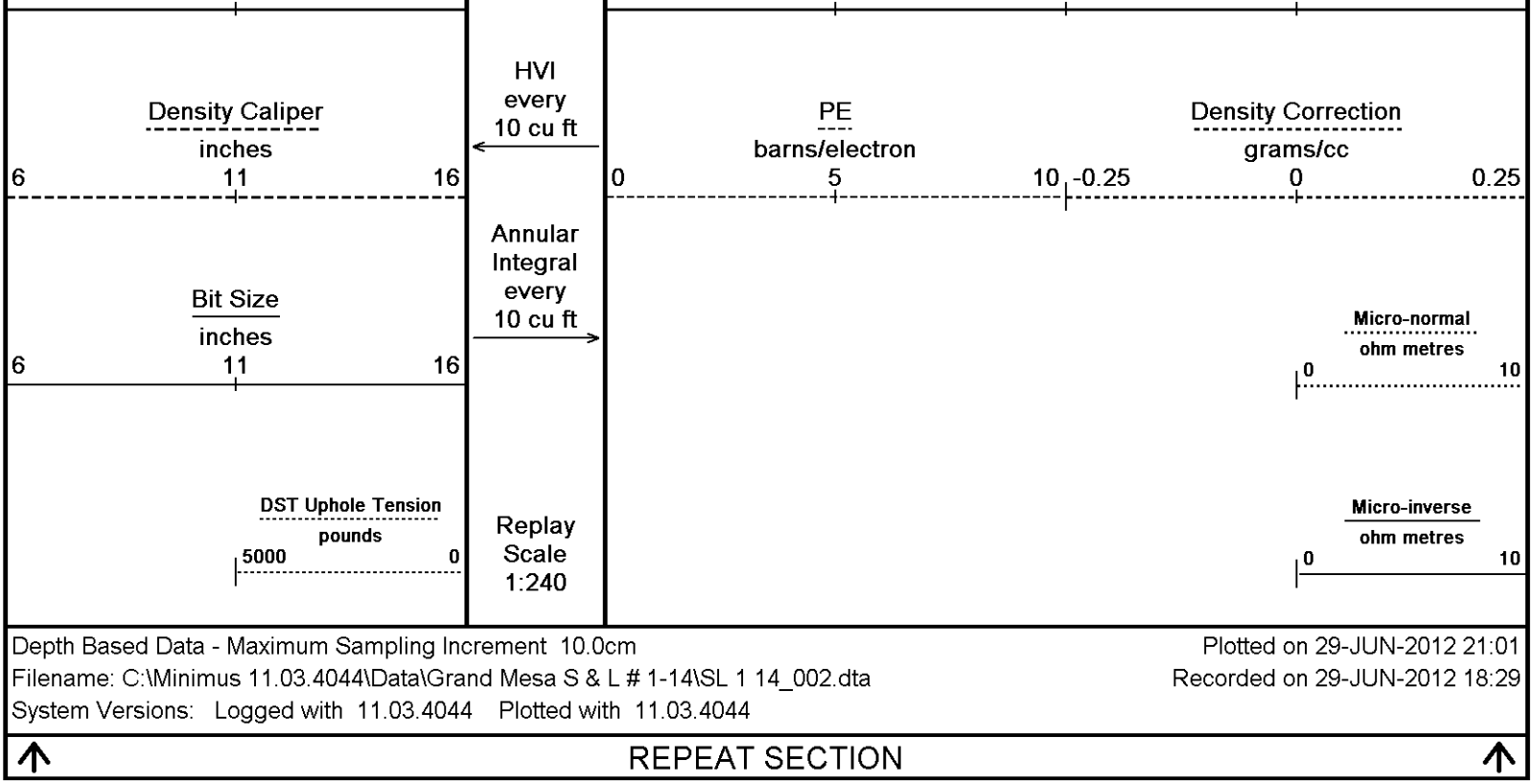
Micro-inverse
ohm metres
0 10

4500



123°


4550
124°
4600
124°
4650
4700
4724
FR Gamma Ray
Bit Size
Density Caliper
FR Density Caliper
DST Uphole Tension
FR DST Uphole Tension
Limestone Density Por.
PE
FR Limestone Neutron Por.
Density Correction
FR PE
FR Limestone Density Por.
Density Correction
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



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 29-JUN-2012 21:01
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_002.dta
Recorded on 29-JUN-2012 18:29
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REPEAT SECTION

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
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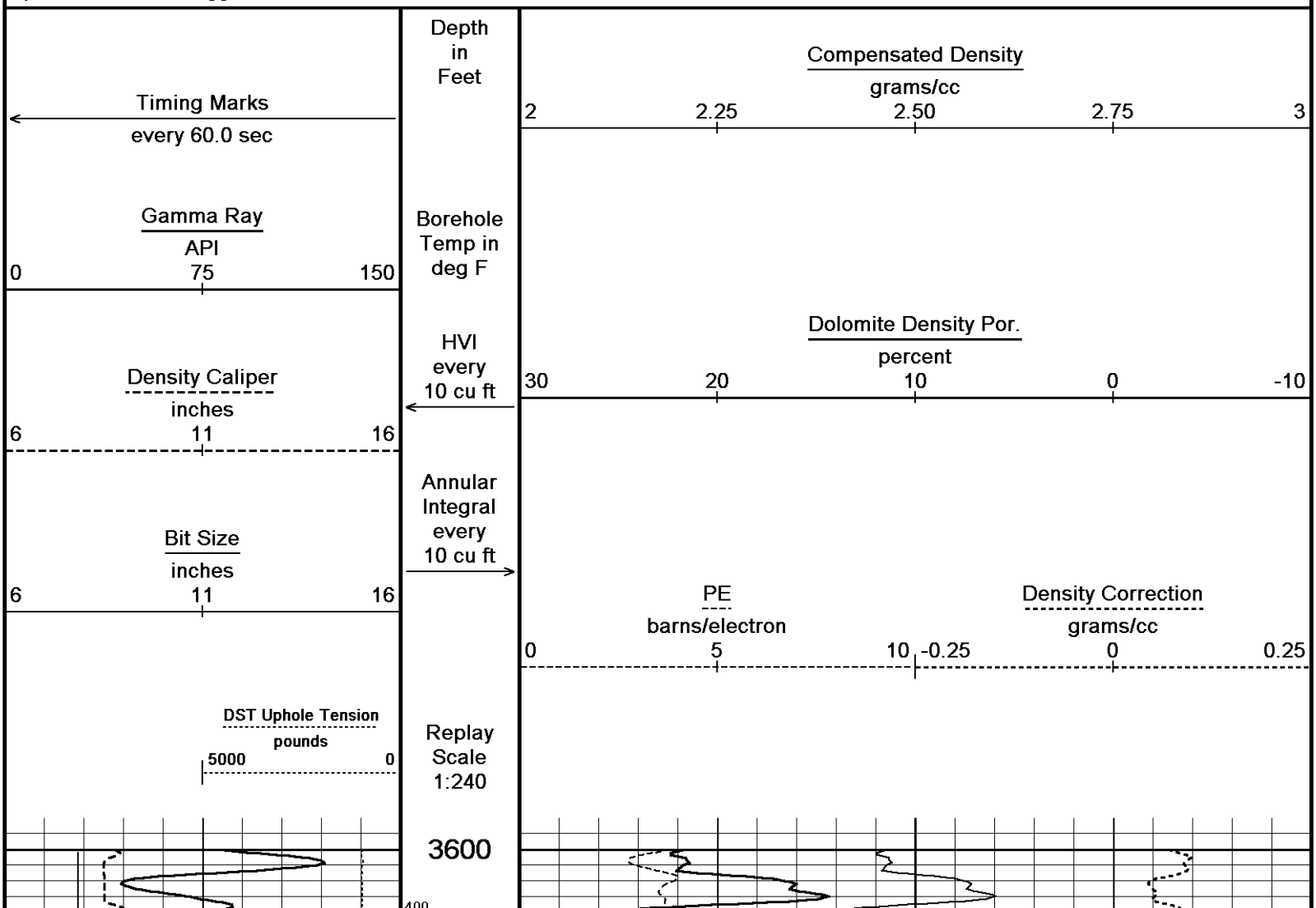
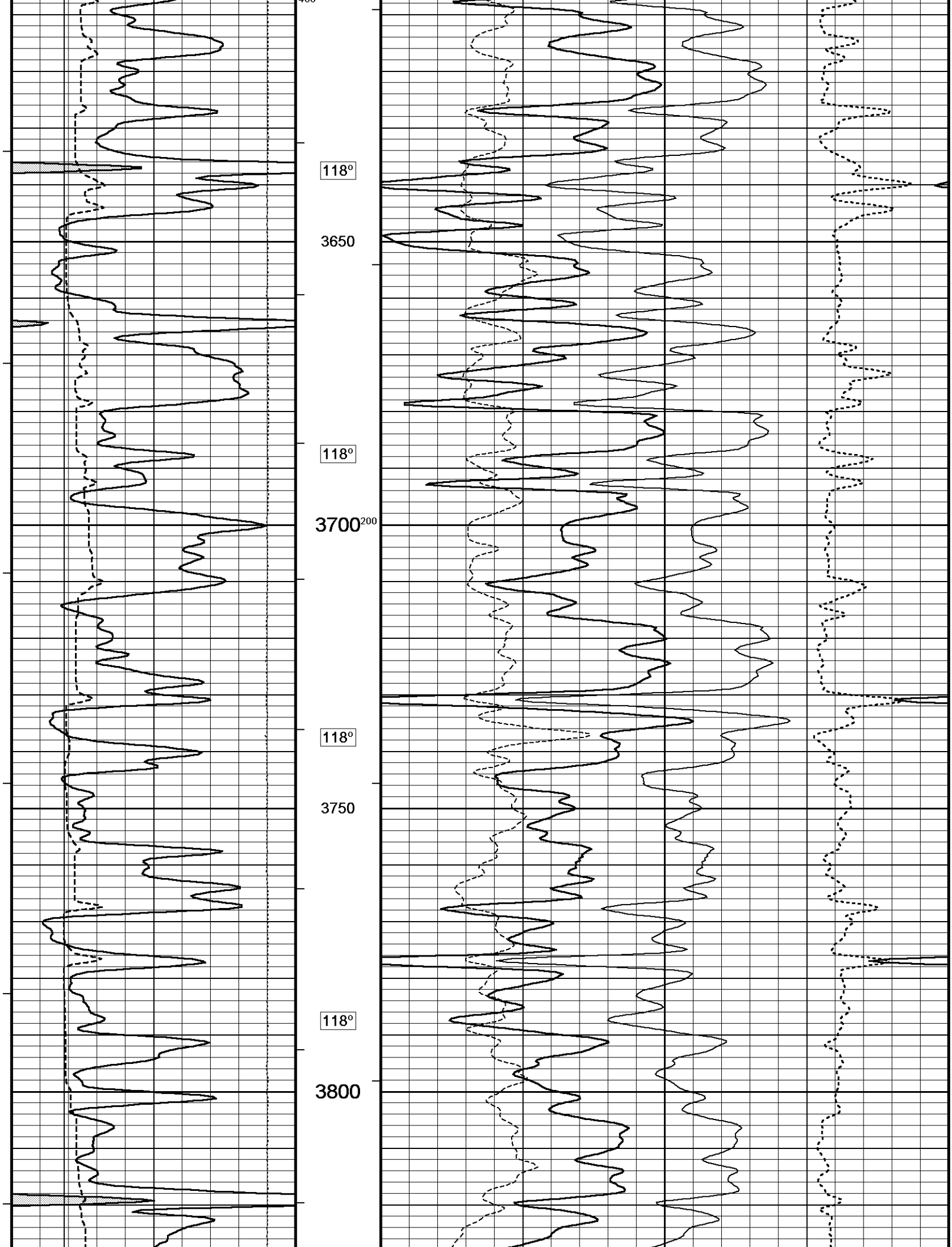
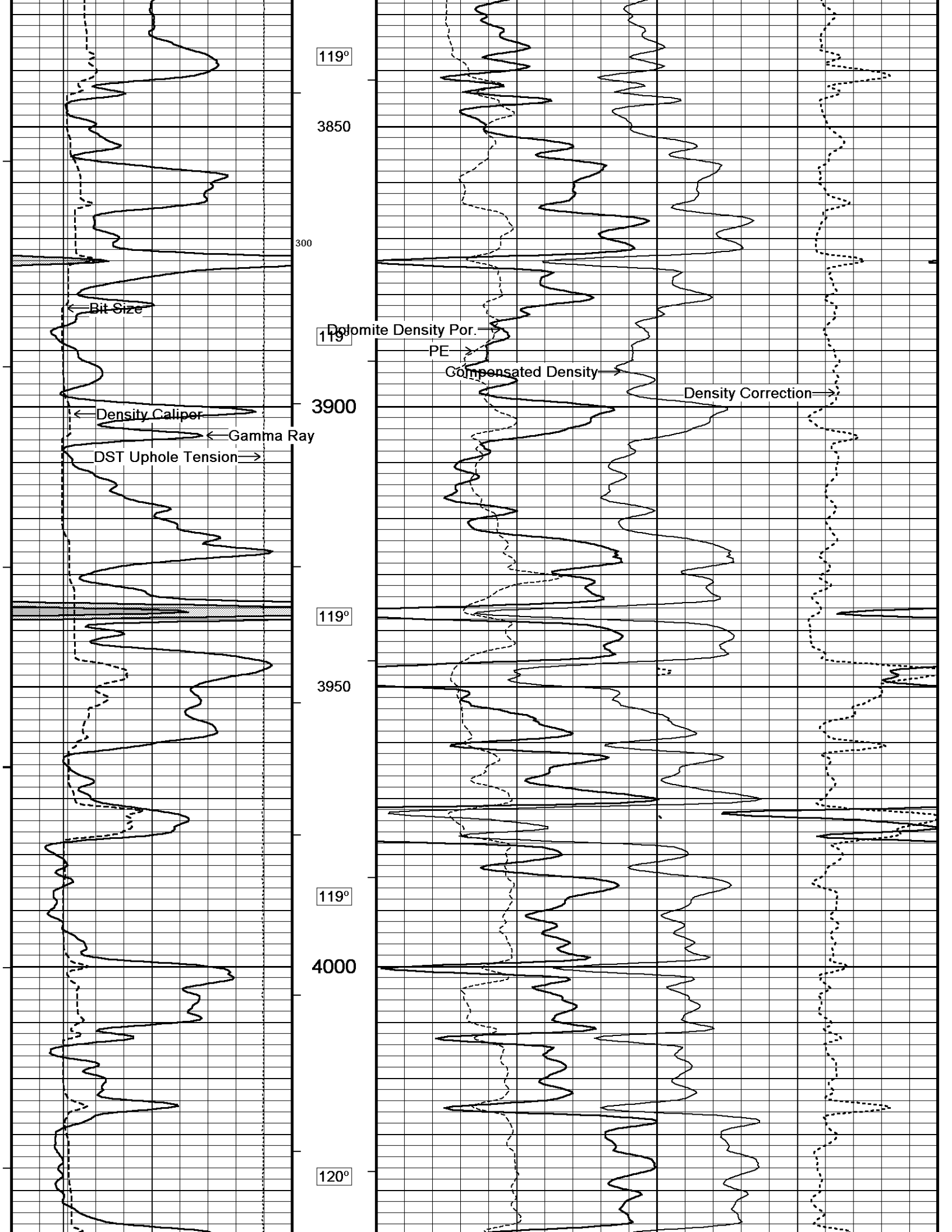
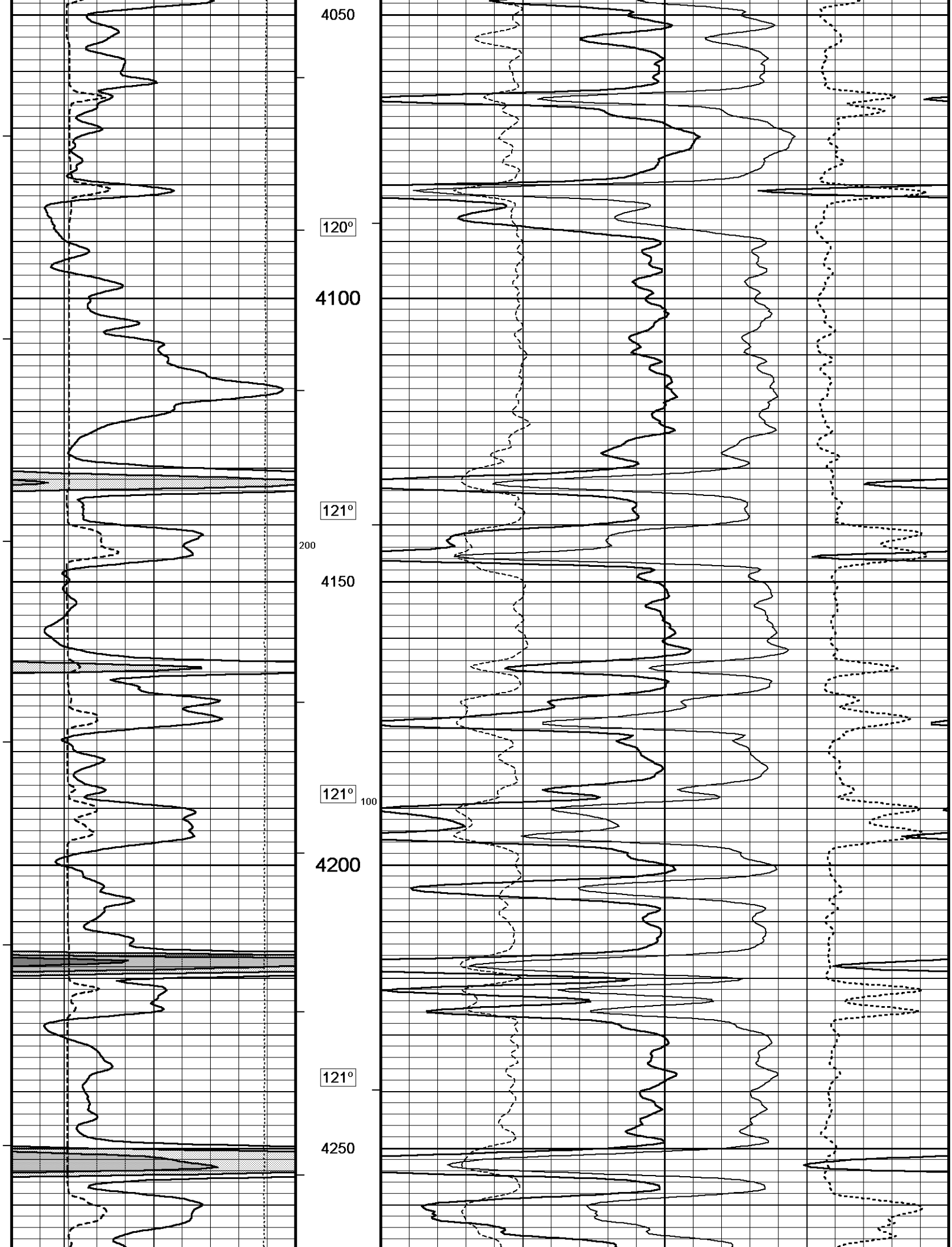
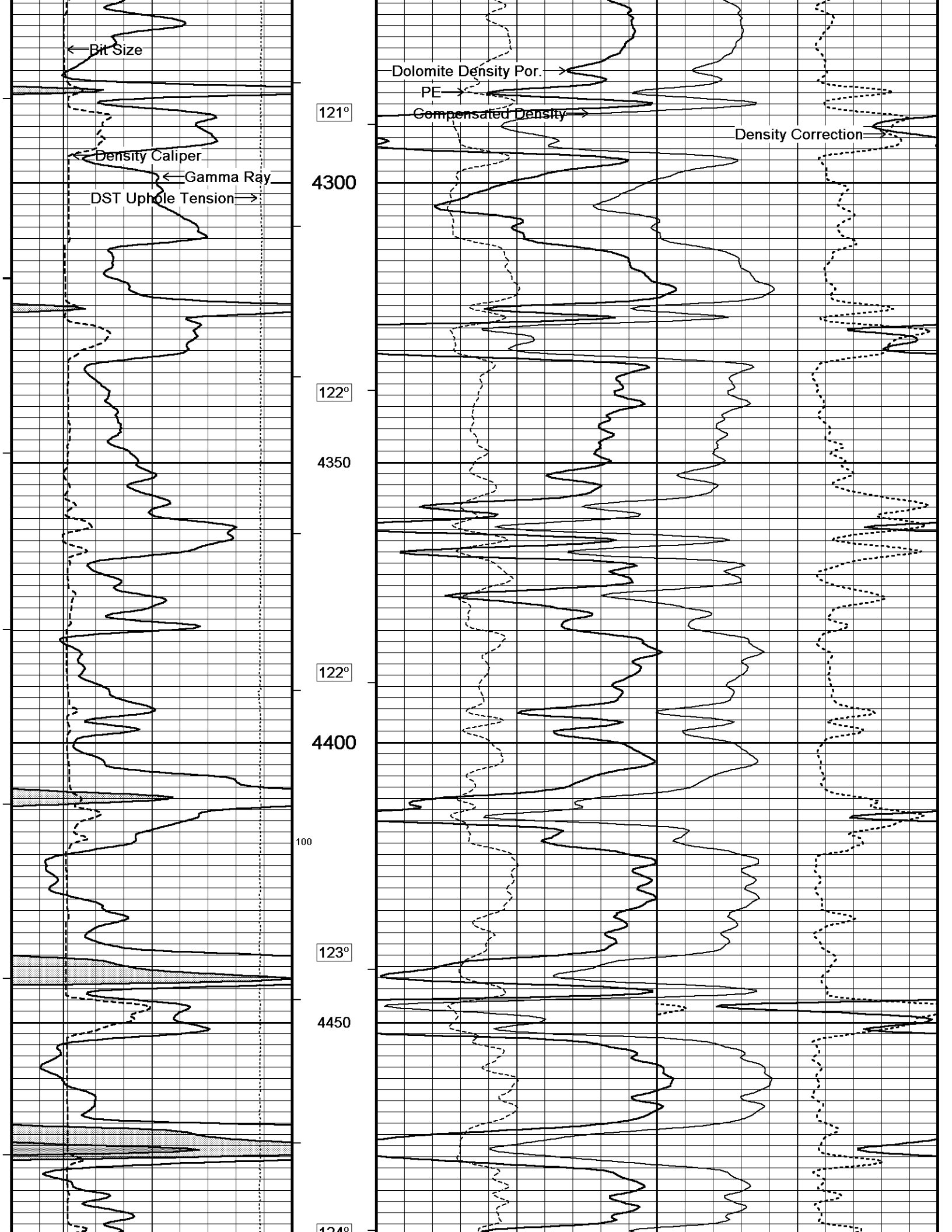
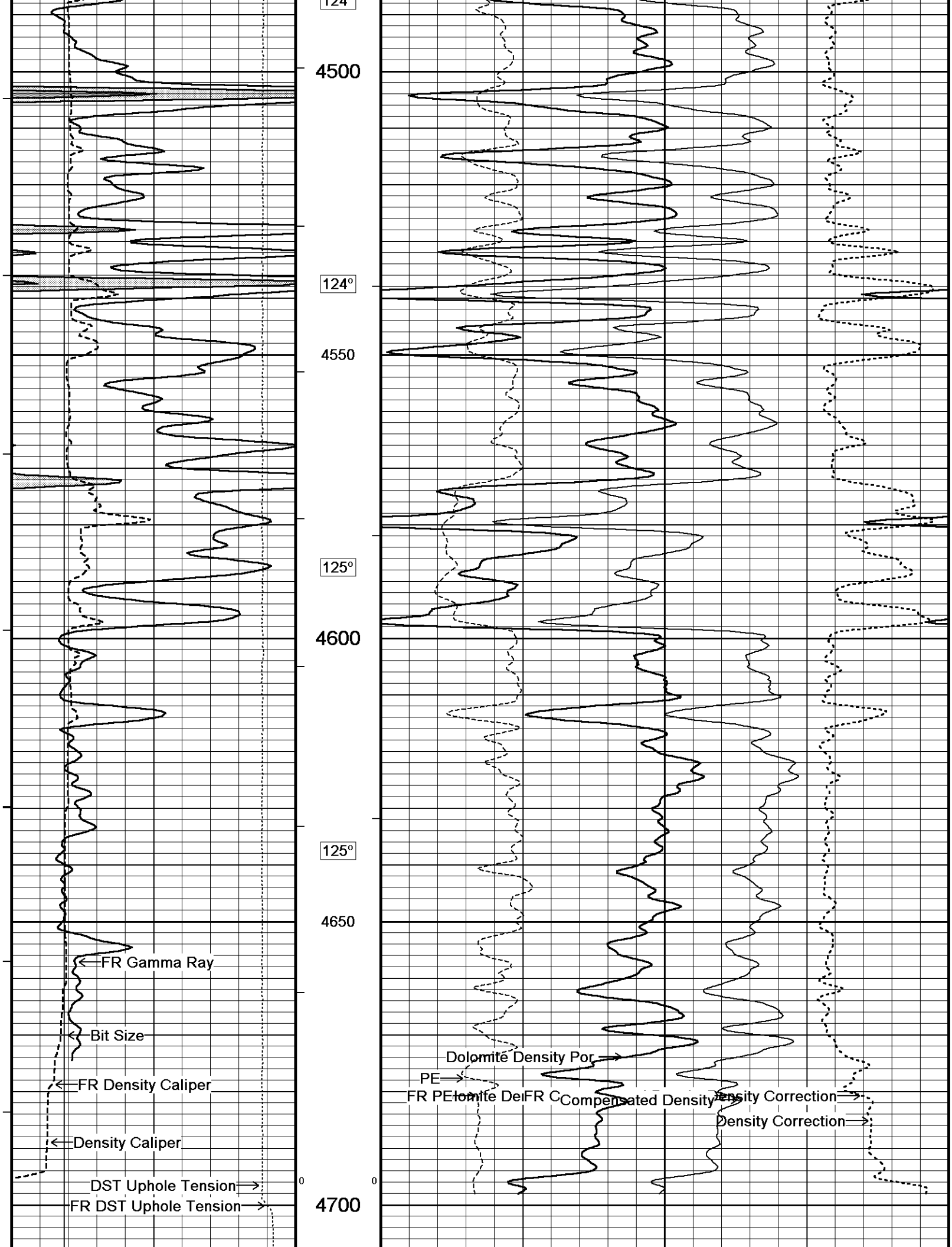


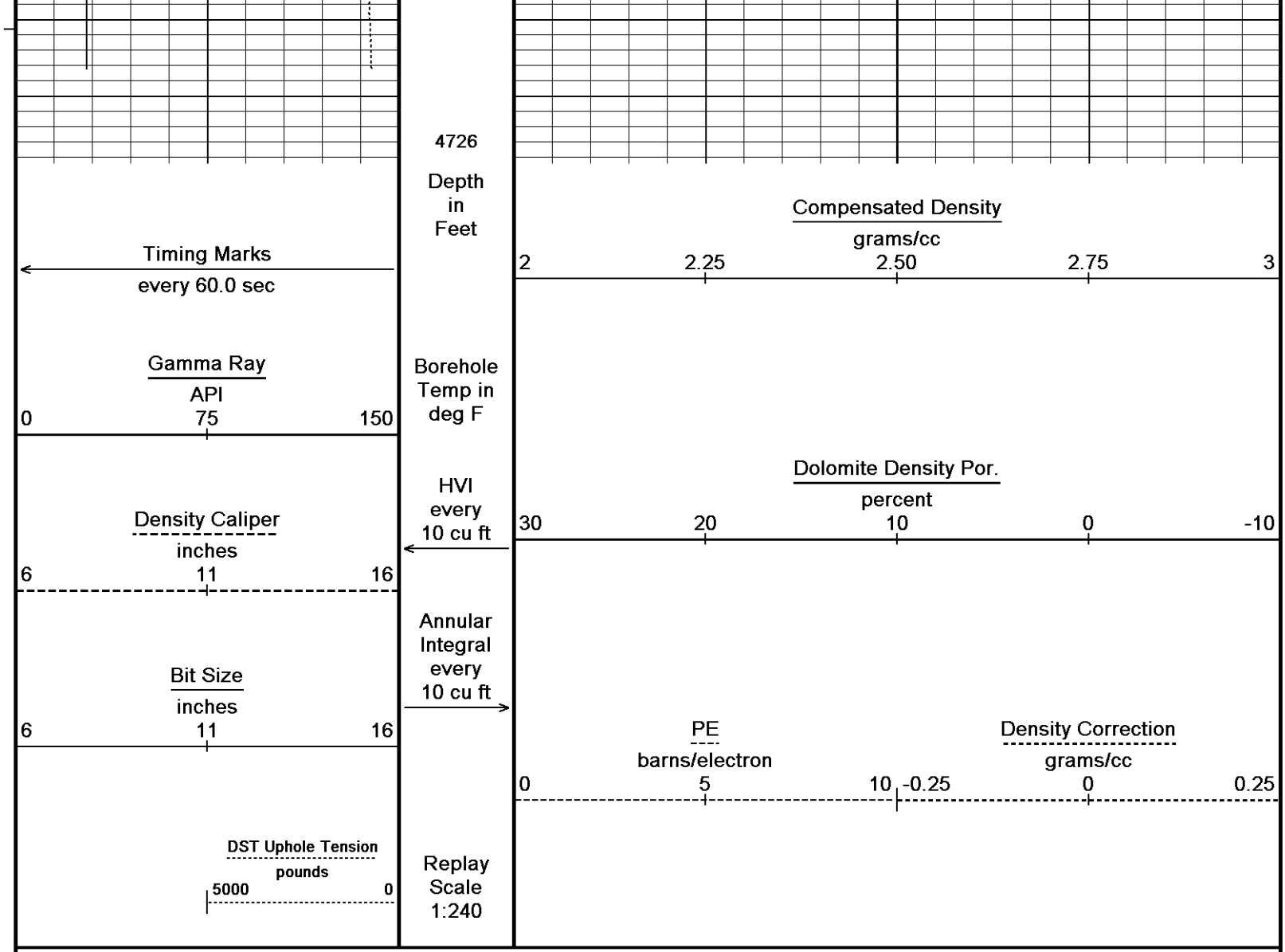

118°
3650
118°
3700
200
118°
3750
118°
3800


119°
3850
300
Bit Size
Dolomite Density Por.
119°
PE
Compensated Density
Density Correction
3900
Density Caliper
Gamma Ray
DST Uphole Tension
119°
3950
119°
4000
120°


4050
120°
4100
121°
200
4150
121°
100
4200
121°
4250


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Dolomite Density Por.
PE
Compensated Density
Density Correction
121°
4300
122°
4350
122°
4400
100
123°
4450
124°


124
4500
124°
4550
125°
4600
125°
4650
4700
FR Gamma Ray
Bit Size
FR Density Caliper
Density Caliper
DST Uphole Tension
FR DST Uphole Tension
0
0
Dolomite Density Por
PE
FR PE
Dolomite Del
FR C
Compensated Density
Density Correction
Density Correction



Depth Based Data - Maximum Sampling Increment 10.0cm
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Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_003.dta
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5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
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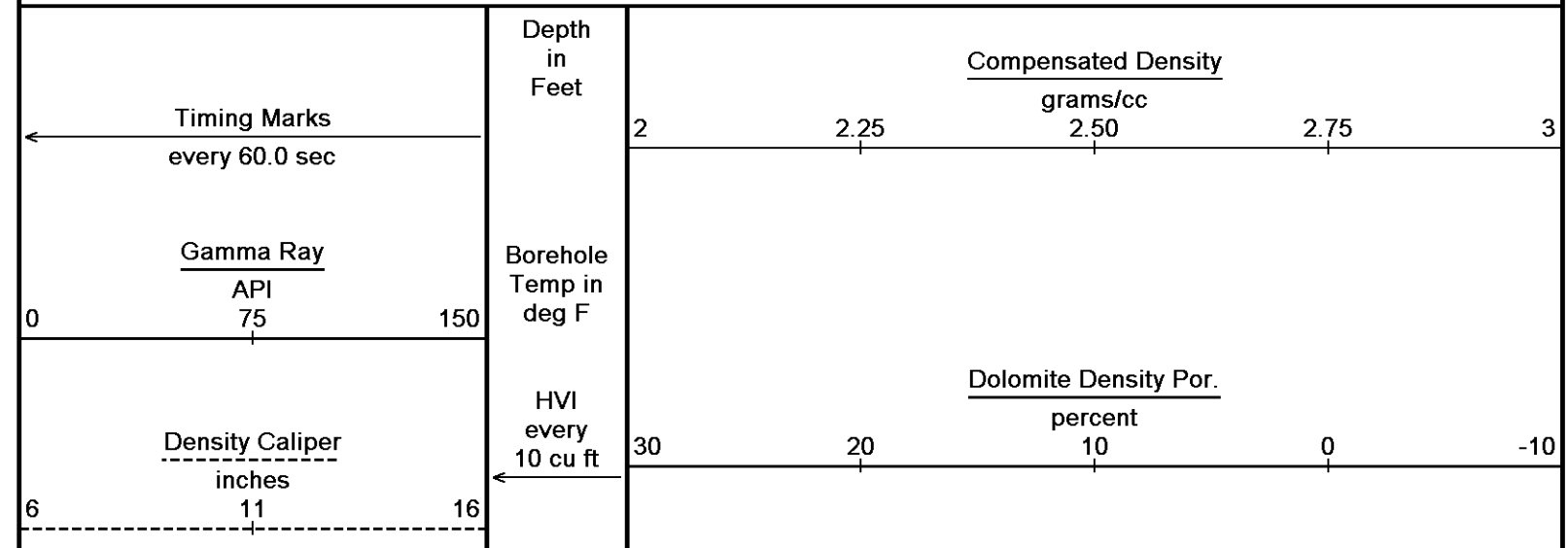
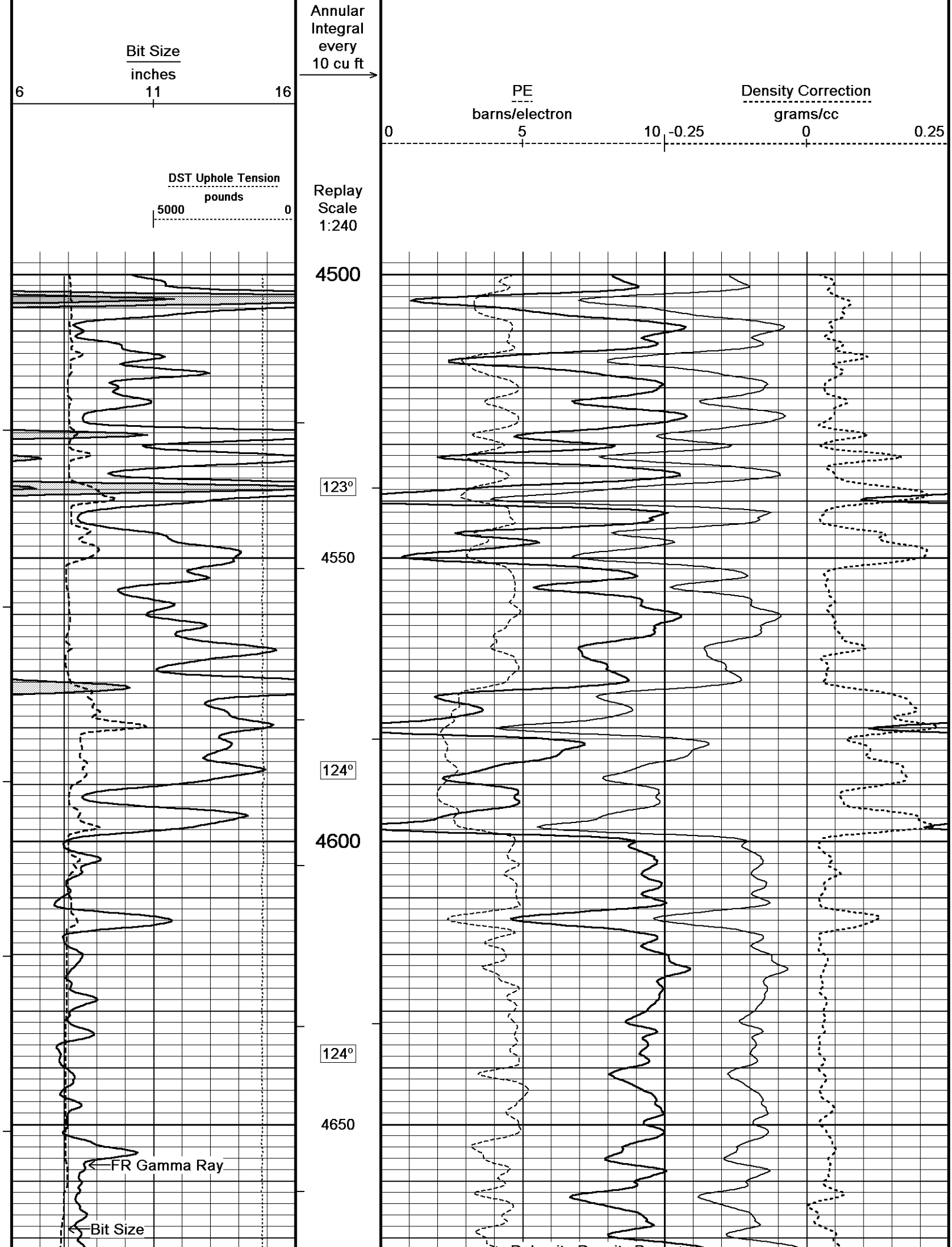
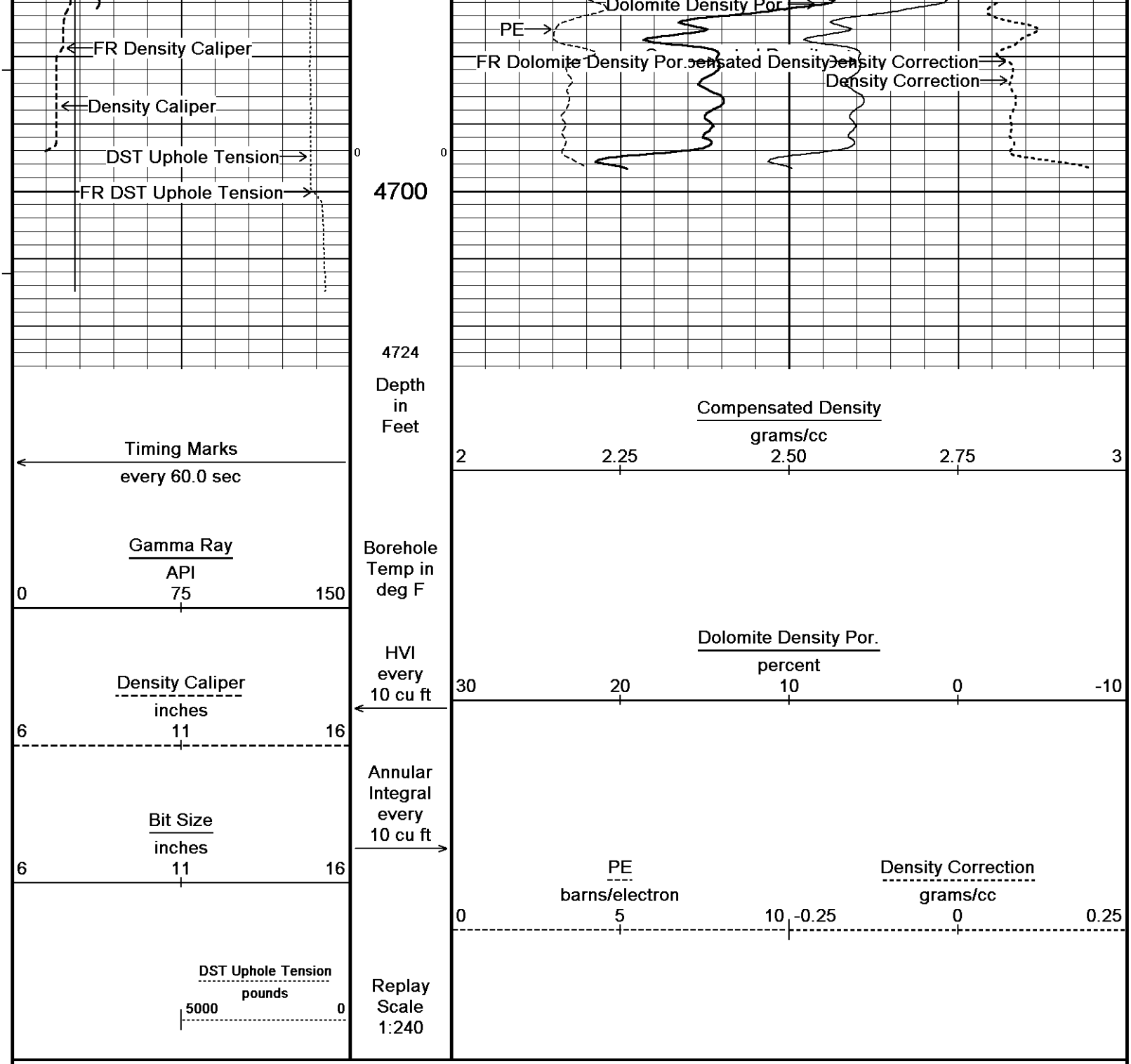



Bit Size
inches
6
11
16
Annular Integral every 10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.25
0
0.25
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
4500
123°
4550
124°
4600
124°
4650
FR Gamma Ray
Bit Size



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 29-JUN-2012 21:01
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_002.dta
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REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 11.03.4044\Data\Grand Mesa S & L # 1-14\SL 1 14_003.dta

General Constants All 000

Last Edited on 29-JUN-2012,17:06

General Parameters

Mud Resistivity	0.570	ohm-metres
Mud Resistivity Temperature	99.800	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	Limestone Density Por.	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	

Down-hole Tension Calibration All 000

Field Calibration on 30-JUN-2010

Reading No	Measured	Calibrated (lbs)
1	14112.01	10.00
2	15164.79	427.00

Down-hole Tension Calibration SMS 0

Field Calibration on 29-MAR-2012 11:07

Reading No	Measured	Calibrated (lbs)
1	-2133.10	0.00
2	-2135.89	100.00

Gamma Calibration MCG-E.A 443

Field Calibration on 29-JUN-2012 00:51

	Measured	Calibrated (API)
Background	74	50
Calibrator (Gross)	1153	775
Calibrator (Net)	1079	725

Gamma Constants MCG-E.A 443

Last Edited on 29-JUN-2012,17:07

Gamma Calibrator Number	grc38	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG-E.A 443

Field Calibration on 27-JUN-2012,16:46

	Measured	Calibrated (mV)
Reference 1	98.6	100.0
Reference 2	-101.8	-100.0

High Resolution Temperature Calibration MCG-E.A 443

Field Calibration on 27-JUN-2012,16:47

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

High Resolution Temperature Constants MCG-E.A 443

Last Edited on 27-JUN-2012,16:45

Pre-filter Length	11

Caliper Calibration MML-A 16

Base Calibration on 23-MAY-2012 08:49
Field Calibration on 29-JUN-2012 00:44

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14648	5.98
2	17884	7.97
3	21168	9.86
4	25204	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.99	5.98

Micro Normal and Micro Inverse Calibration MML-A 16

Base Calibration on 23-MAY-2012 08:57
Field Check on 29-JUN-2012 00:35

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	15.6	78.3	5.0	25.0

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

Micro Normal and Micro Inverse Constants MML-A 16

Last Edited on 27-JUN-2012,15:28

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 66

Base Calibration on 17-MAY-2012 12:54
Field Check on 29-JUN-2012 00:56

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3162	99	3714	110
Ratio	31.795		33.764	

Field Calibrator at Base	Calibrated (cps)	
	1615	2304
Ratio	0.701	

Field Check	Calibrated (cps)	
	1620	2323
Ratio	0.697	

Neutron Constants MDN-A.B 66

Last Edited on 29-JUN-2012,17:07

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.11	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	MCG External Temperature	
Temperature	N/A	degrees F
Mud Salinity	0.00	kppm
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-C.A 353

Base Calibration on 19-JUN-2012 09:41
Field Check on 28-JUN-2012 13:02

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	966.3	126.8
Base Check		280.4
Field Check		280.3

FE Constants MFE-C.A 353

Last Edited on 28-JUN-2012,13:01

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	0.0	inches

Induction Calibration MAI-A.A 167

Base Calibration on 11-MAR-2011,09:58

Field Check on 28-JUN-2012 13:00

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	17.3	474.2	9.3	966.2
2	6.3	388.4	7.6	821.4
3	3.3	259.4	5.2	566.0
4	1.9	133.0	2.6	279.2

Array Temperature	76.8	Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	14.5	3837.1
2	0.0	0.0	29.9	3473.2
3	0.0	0.0	29.2	3049.2
4	0.0	0.0	19.8	2079.1
Deep	0.0	0.0	18.6	2046.4
Medium	0.0	0.0	42.3	3985.8
Shallow	0.0	0.0	43.6	5048.9
Array Temperature	0.0		96.9	Deg F

Induction Constants MAI-A.A 167

Last Edited on 29-JUN-2012,05:02

Induction Model	RtAP-WBM	
Caliper for Borehole Corr.	Density Caliper	
Hole Size for Borehole Correction	N/A	inches
Tool Centred	No	
Stand-off Type	Fins	
Stand-off	0.00	inches
Number of Fins on Stand-off	8.0000	
Stand-off Fin Angle	45.00	degrees
Stand-off Fin Width	0.0000	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 167

Field Calibration on 17-MAY-2012,10:07

	Measured	Calibrated(Deg F)
Lower	1.00	33.80
Upper	11.00	51.80

High Resolution Temperature Constants MAI-A.A 167

Last Edited on

Pre-filter Length	11

Caliper Calibration MPD-B 64

Base Calibration on 24-JUN-2012 14:30
Field Calibration on 29-JUN-2012 00:32

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13920	3.99
2	22688	5.98
3	31088	7.97
4	39486	9.86
5	48676	11.92
6	N/A	N/A

Field Calibration

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

Photo Density Calibration MPD-B 64

Base Calibration on 24-JUN-2012 14:54
Field Check on 29-JUN-2012 00:29

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	56338	29291	59556	30836
Reference 2	22715	2675	24941	2541

Field Check at Base

	1198.8	1389.9

Field Check

	1192.9	1382.1

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	217	1071		
Reference 1	21443	56144	0.385	0.371
Reference 2	6237	22577	0.280	0.272

Field Check at Base

216.7	1070.6	

Field Check

217.8	1066.0	

Density Constants MPD-B 64

Last Edited on 29-JUN-2012,17:07

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	1.11	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

DOWNHOLE EQUIPMENT

Compact Comms Gamma
MCG-E.A 443 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
MML-A 16 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

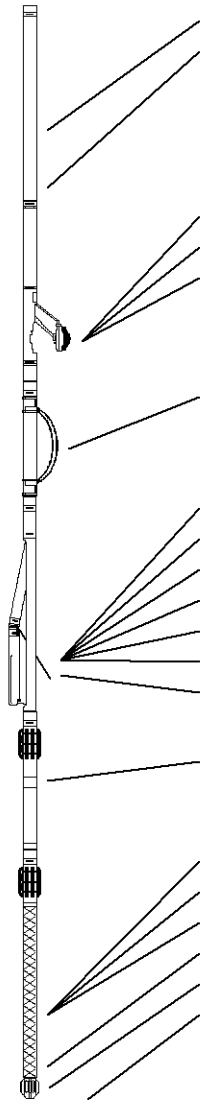
Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-C.A 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 48.16 ft Weight: 383.6 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	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
13.91 ft	FEFE - Shallow FE
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	RTAO - Array Ind. One Res Rt
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	Grand Mesa Operating Co.
WELL	S & L #1-14
FIELD	Maurice Prospect
PROVINCE/COUNTY	Gove
COUNTRY/STATE	U.S.A. / Kansas

Elevation Kelly Bushing	2909.00	feet	First Reading	4681.00	feet
Elevation Drill Floor	2911.00	feet	Depth Driller	4700.00	feet
Elevation Ground Level	2904.00	feet	Depth Logger	4700.00	feet

Weatherford®

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

40 Years of Wireline 1970 2010