COMPACT WELL SHUTTLE
COMPENSATED PHOTO DENSITY
COMPENSATED DUAL NEUTRON LOG

COMPANY	EXXON MOBIL CORPORATION
WELL	FREEDOM RANCH UNIT 197-33B8
FIELD	PICEANCE CREEK
PROVINCE/COUNTY	RIO BLANCO
COUNTRY/STATE	U.S.A. / COLORADO
LOCATION	SHL: 2397' FNL & 1406' FEL

LSD	SEC	TWP	RGE
	33	1S	97W

Other Services
MAI/MFE
MSS

API Number 05-103-1142100
Permit Number 05-103-1142100

Permanent Datum G.L., Elevation 6446 feet
Log Measured From K.B. @ 30 FEET above Permanent Datum
Drilling Measured From K.B.

Elevations:	feet
KB	6476.00
DF	6475.00
GL	6446.00

Date	20-FEB-2010			
Run Number	TWO			
Depth Driller	12830.00	feet		
Depth Logger	12796.00	feet		
First Reading	12748.00	feet		
Last Reading	8655.00	feet		
Casing Driller	8657.00	feet		
Casing Logger	8655.00	feet		
Bit Size	6.125	inches		
Hole Fluid Type	LSND			
Density / Viscosity	9.80 lb/USg	48.00 CP		
PH / Fluid Loss	9.40	7.50 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	2.34 @ 78.0	ohm-m		
Rmf @ Measured Temp	1.87 @ 78.0	ohm-m		
Rmc @ Measured Temp	2.80 @ 78.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.775 @242.0	ohm-m		
Time Since Circulation	.5 HOURS			
Max Recorded Temp	242.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13038	GDJCT		
Recorded By	C. PHILLIPS			
Witnessed By	C. JARVIS			
Last Title	Last Line		Last Line	

Last Edited: 20-FEB-2010 17:56

BOREHOLE RECORD

Bit Size inches	Depth From feet	Depth To feet
6.125	8657.00	12830.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
INTERMED	7.000	0.00	8657.00	26.00

REMARKS

TOOLS: COMPACT WELL SHUTTLE. GAMMA RAY, NEUTRON, DENSITY, FOCUSED ELECTRIC, SONIC, AND INDUCTION RAN IN COMBINATION.

HARDWARE: DENSITY: 4 INCH PROFILE PLATE USED.
FOCUSED ELECTRIC: INLINE CENTRALIZERS USED.
SONIC: INLINE CENTRALIZERS USED.
INDUCTION: INLINE CENTRALIZERS USED.
DUAL BOWSPRINGS USED FOR ECENTRALIZATION OF POROSITY TOOLS.

2.65 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY.

ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

DEPTH CONTROL TAKEN FROM PIPE STRAP AND TIED INTO INTERMEDIATE LOG.

TOTAL HOLE VOLUME FROM T.D. TO SURFACE CASING = 955 CUBIC FEET

ANNULAR HOLE VOLUME FROM T.D. TO SURFACE CASING BASED ON 4.5" PRODUCTION CASING = 495 CUBIC FEET

TIGHT PULLS, BOREHOLE SIZE, AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.

ENGINEER(S): C. PHILLIPS, M. RICHINS

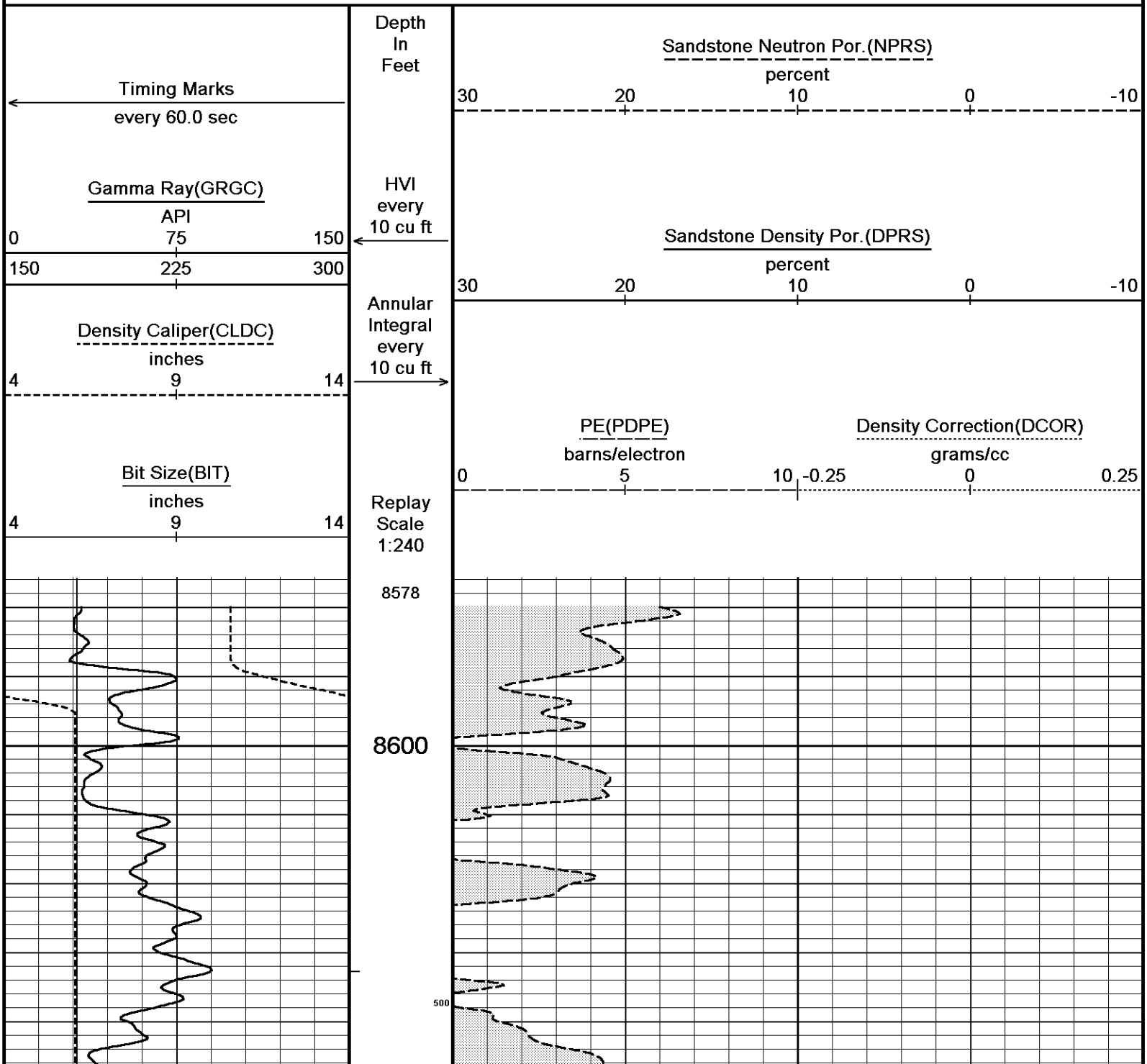
OPERATOR: D. GARVIN

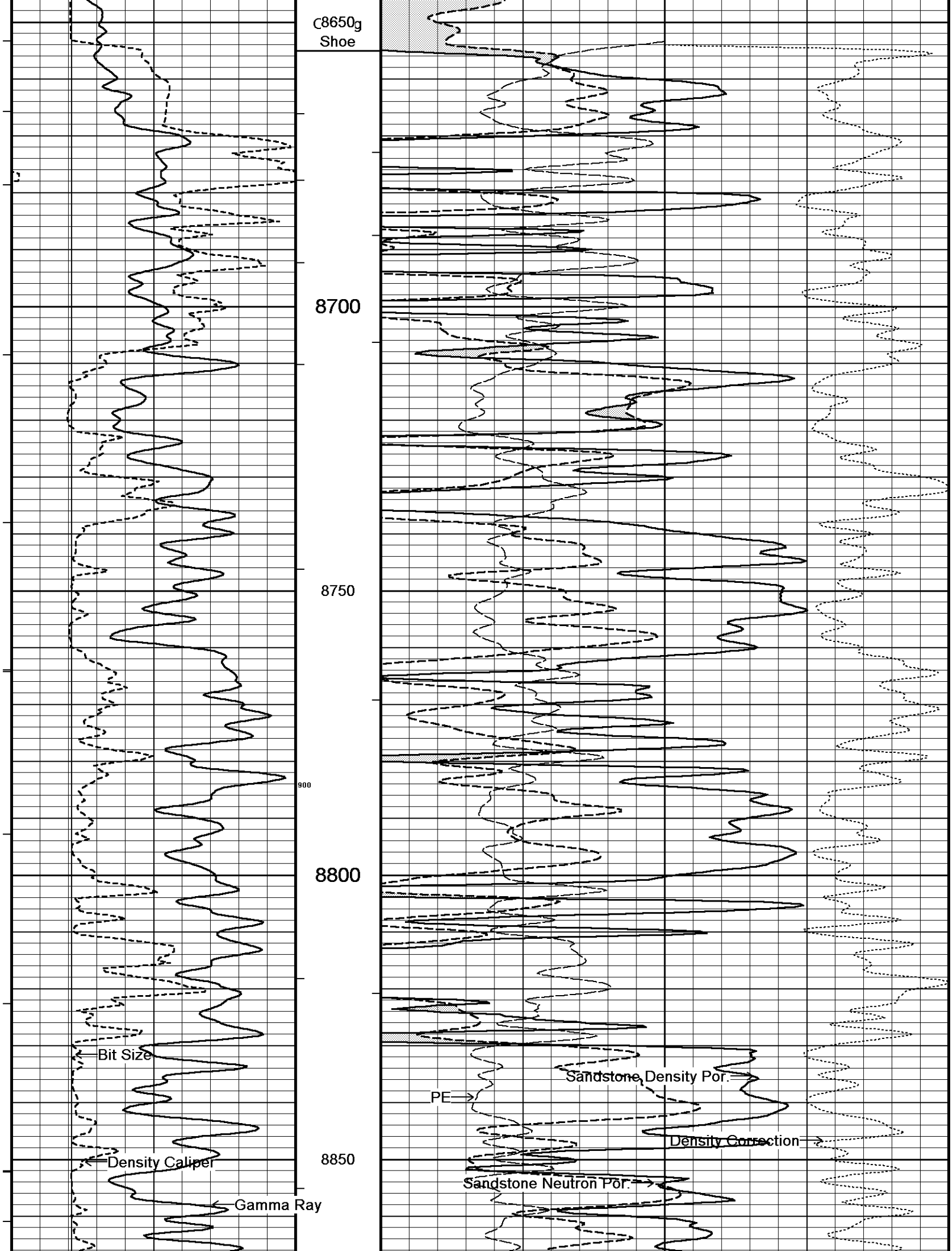
SERVICE ORDER: #3521370

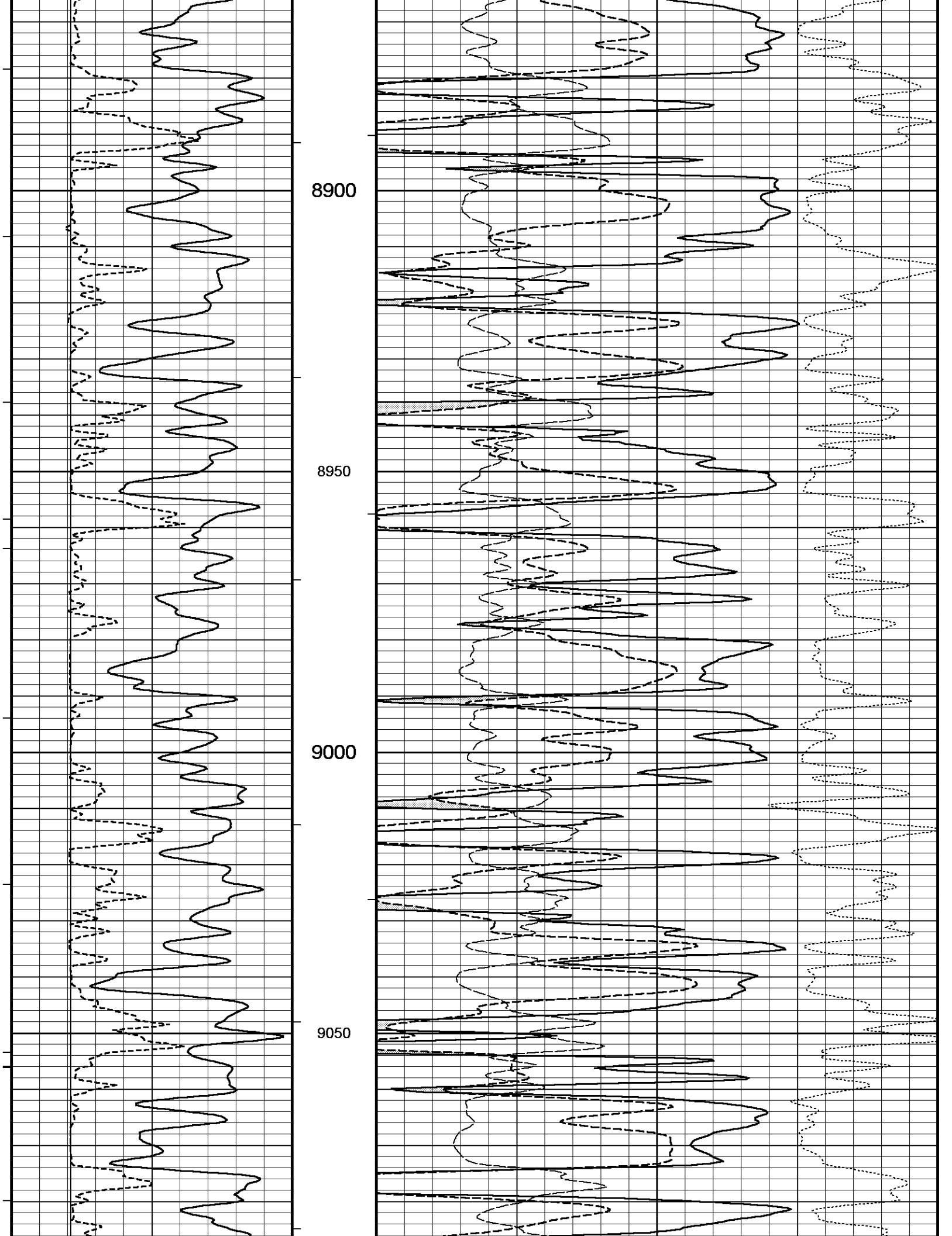
RIG: HP 321

5 INCH MAIN LOG

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 21-FEB-2010 15:04
Filename: C:\DOCUME~1\Hopkinjg\LOCALS~1\Temp\Weatherford PreView\0\depth.dta
Recorded on 20-FEB-2010 23:10
System Versions: Logged with 10.06.0425 Processed with 10.06.0425 Plotted with 10.01.0765




8650g
Shoe
8700
8750
900
8800
8850
Bit Size
Density Caliper
Gamma Ray
PE
Sandstone Density Por.
Density Correction
Sandstone Neutron Por.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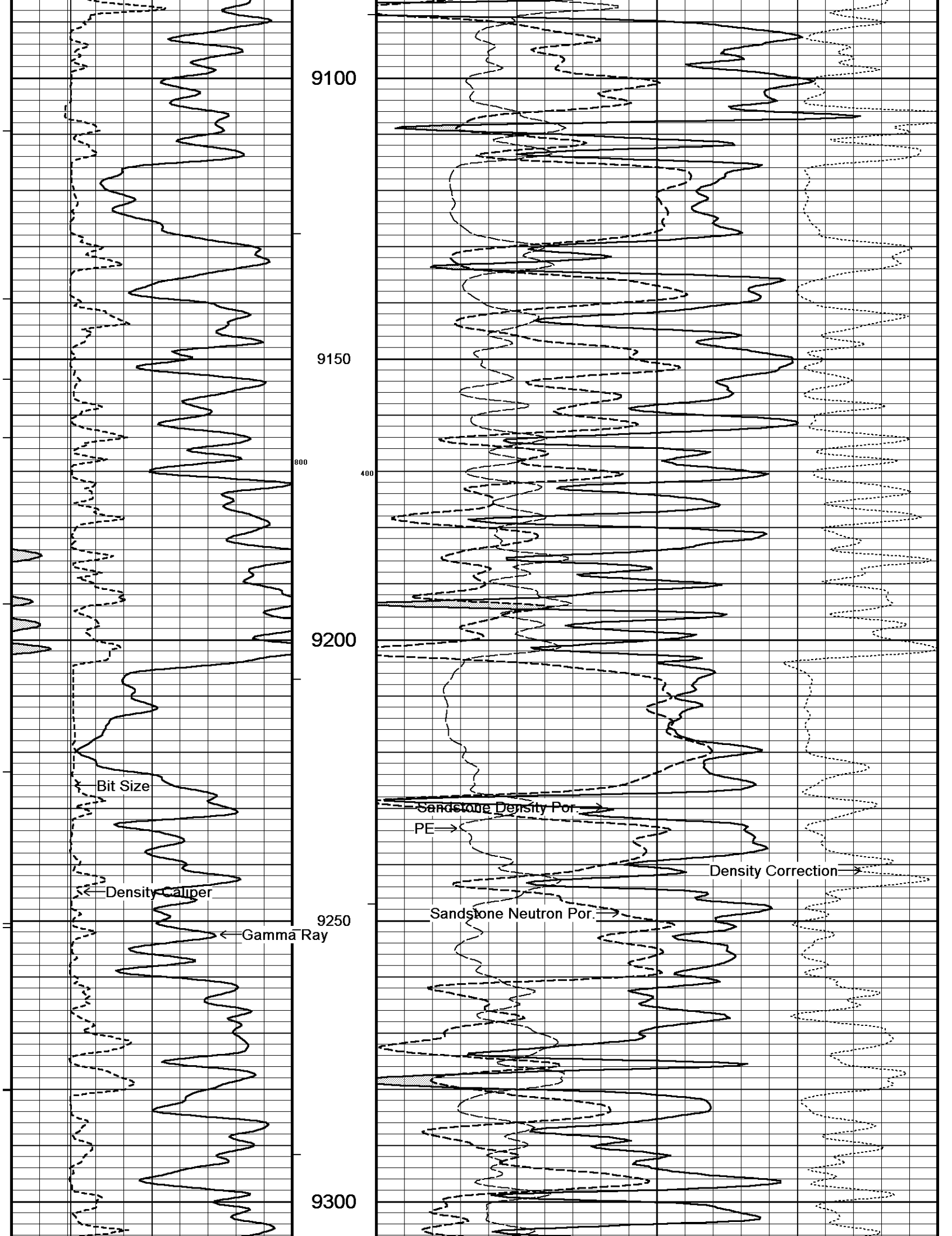
8950
9000
9050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9150
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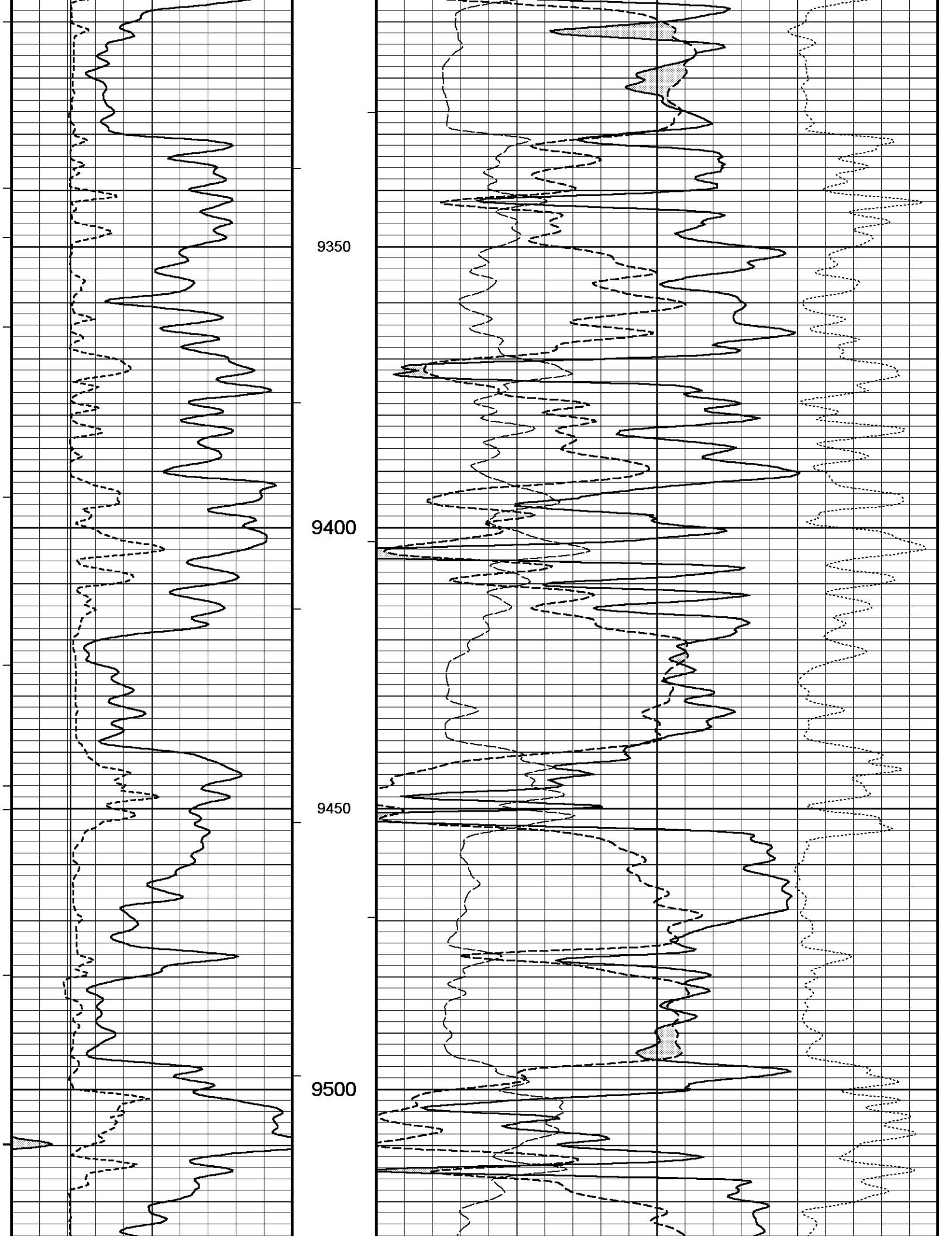
9250
9300
800
400
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por.
PE
Density Correction
Sandstone Neutron Por.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9450
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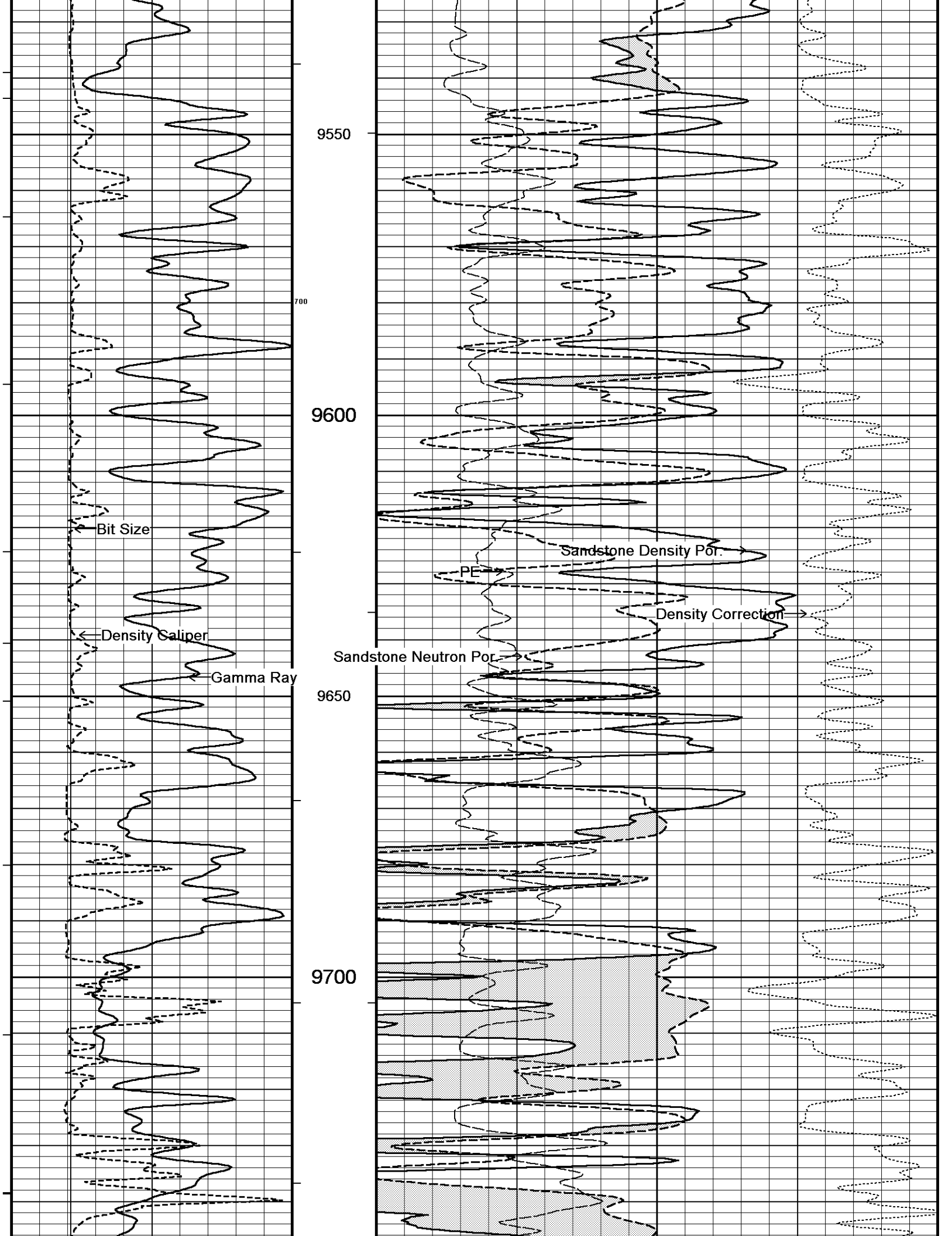
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700
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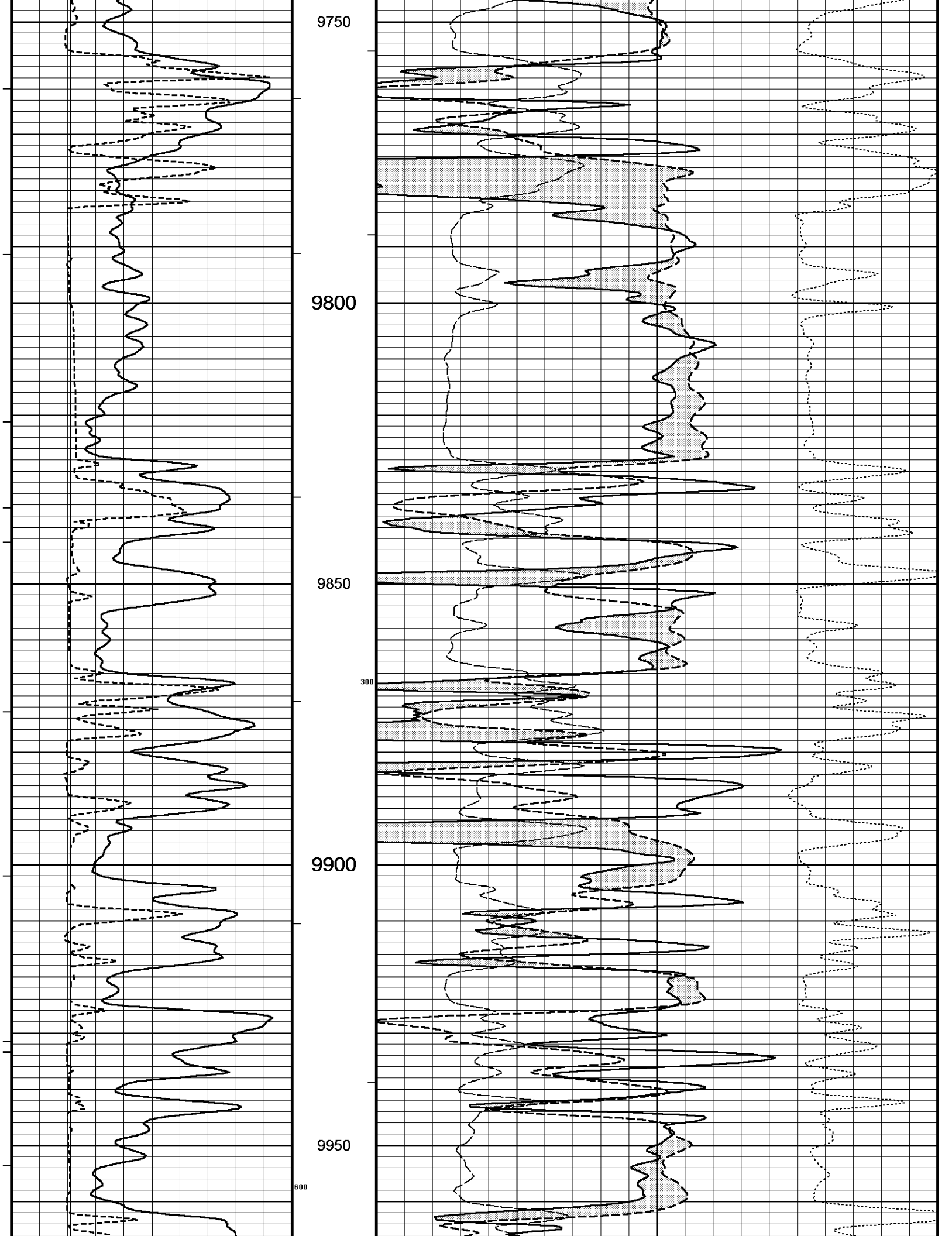
Bit Size
Sandstone Density Por.
PE
Density Correction
Density Caliper
Sandstone Neutron Por.
Gamma Ray
9650
9700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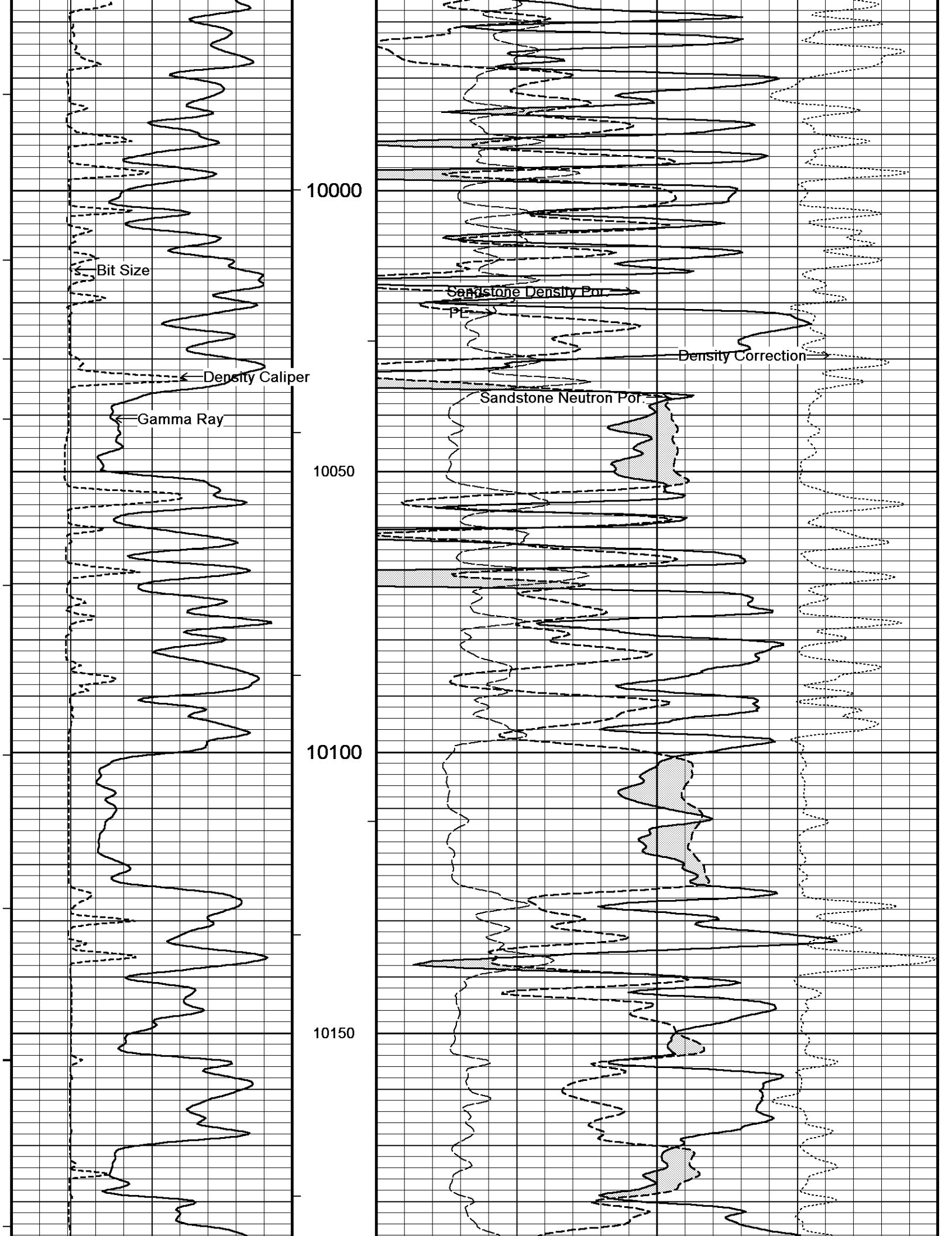
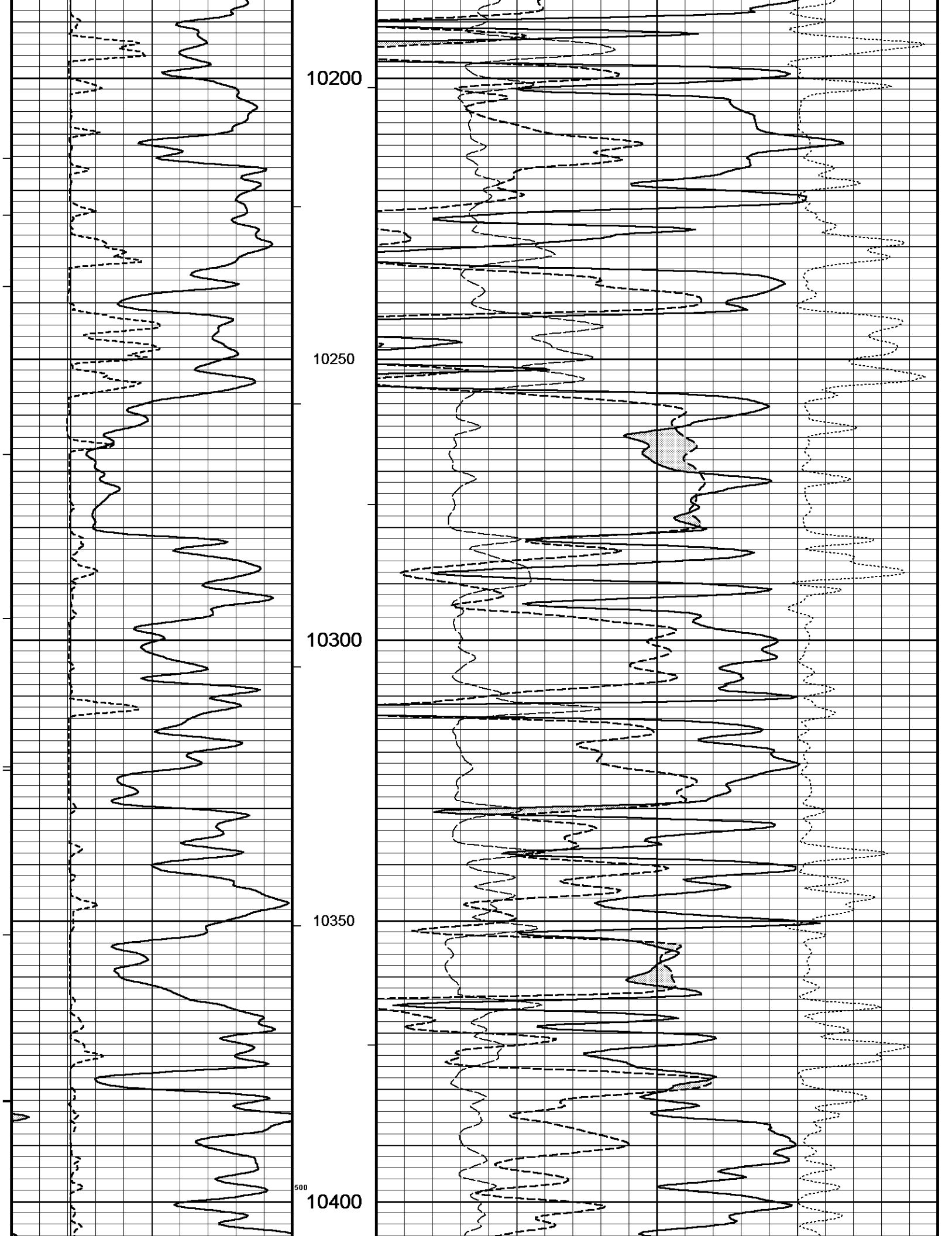
9800
9850
300
9900
9950
600


10000
10050
10100
10150
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por
PE
Density Correction
Sandstone Neutron Por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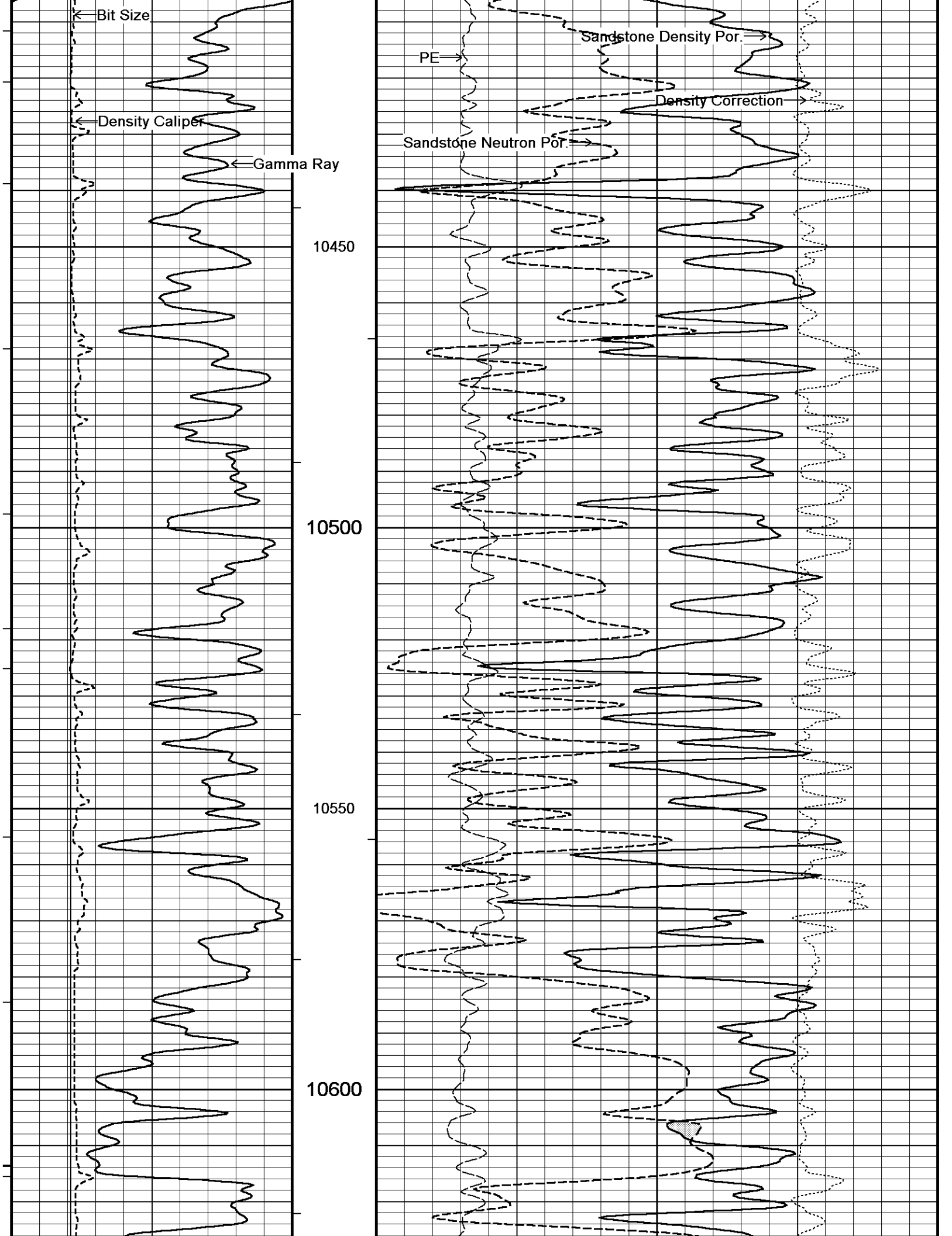
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Density Caliper
Gamma Ray
PE
Sandstone Density Por.
Density Correction
Sandstone Neutron Por.
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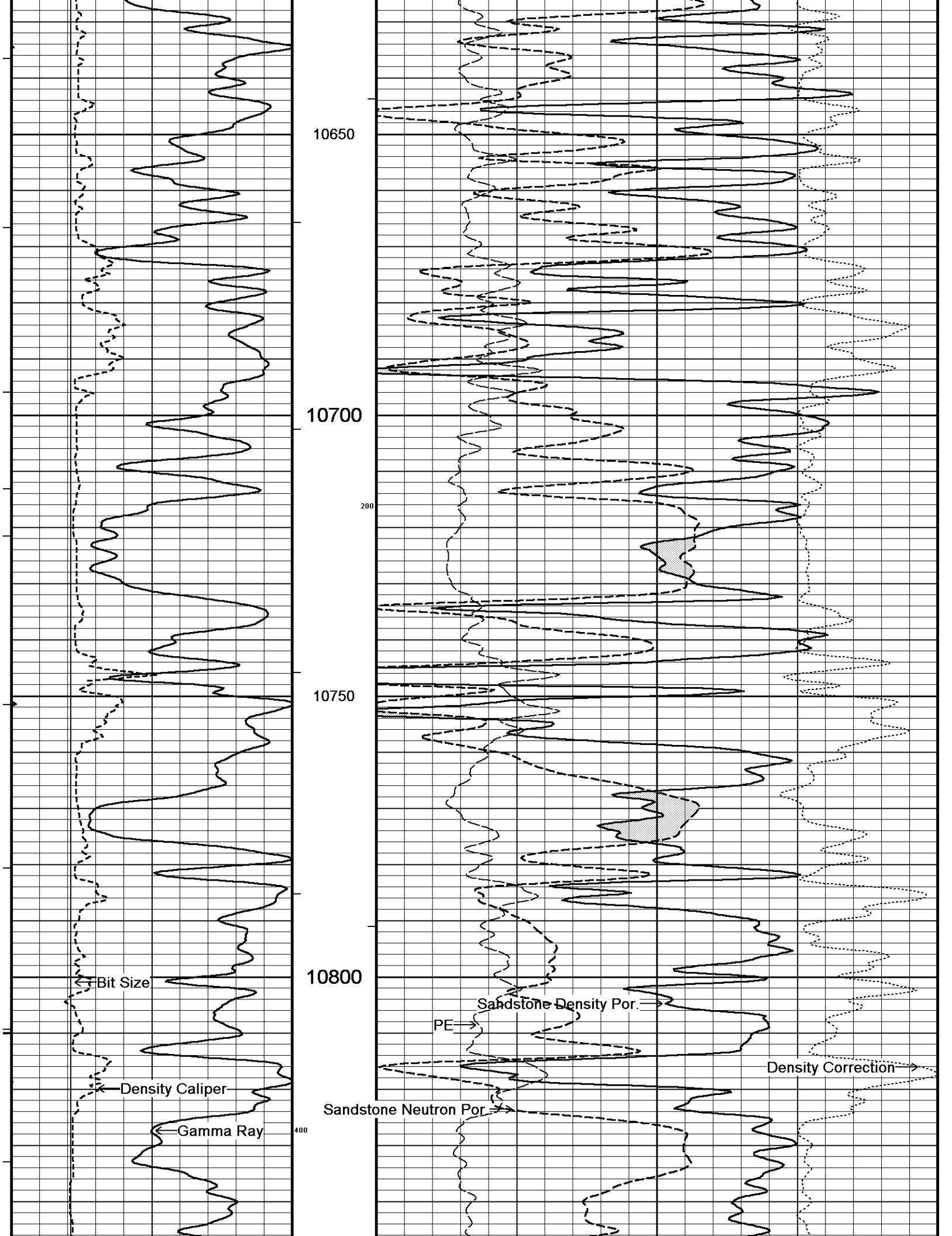
10500
10550
10600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10750
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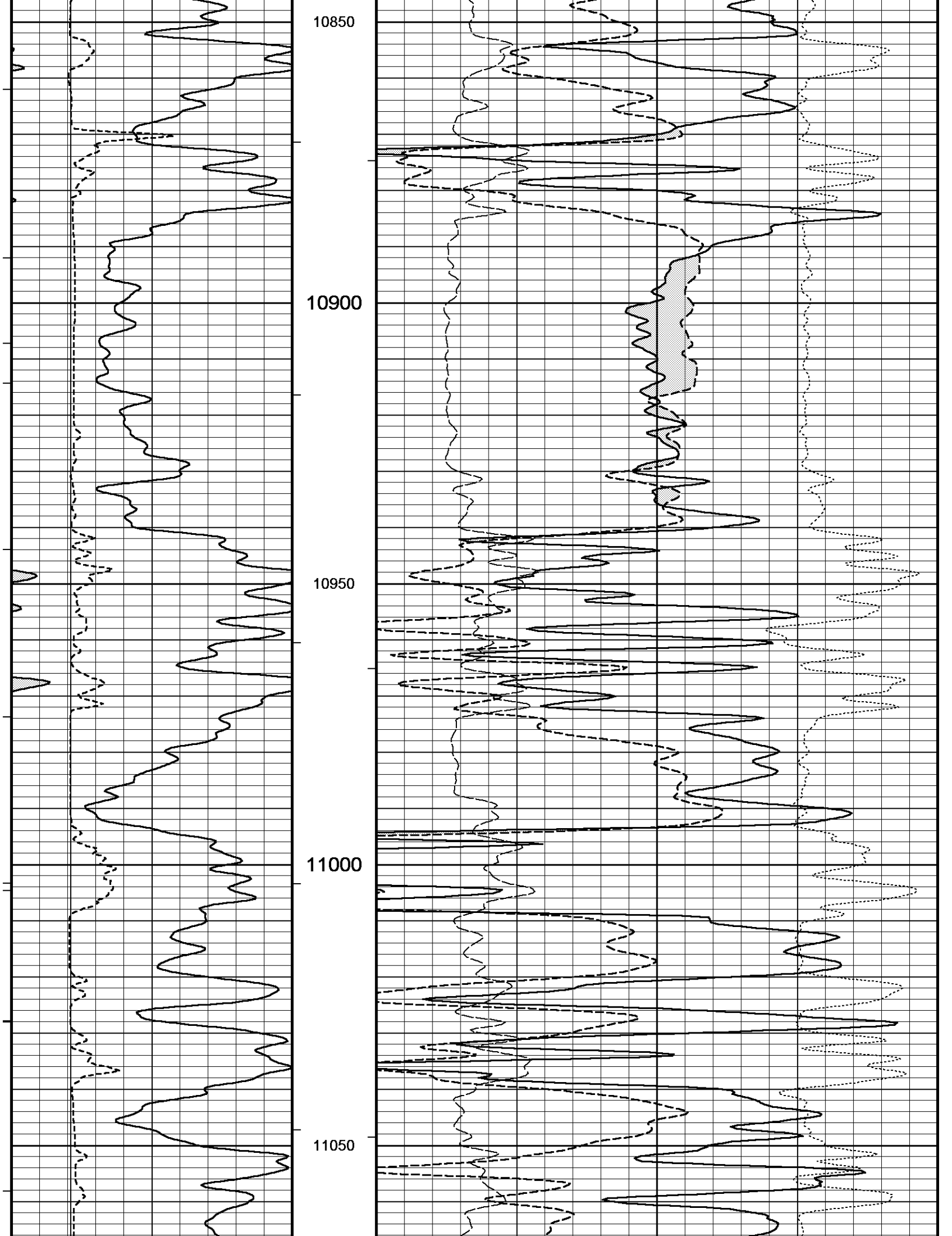
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por.
PE
Density Correction
Sandstone Neutron Por.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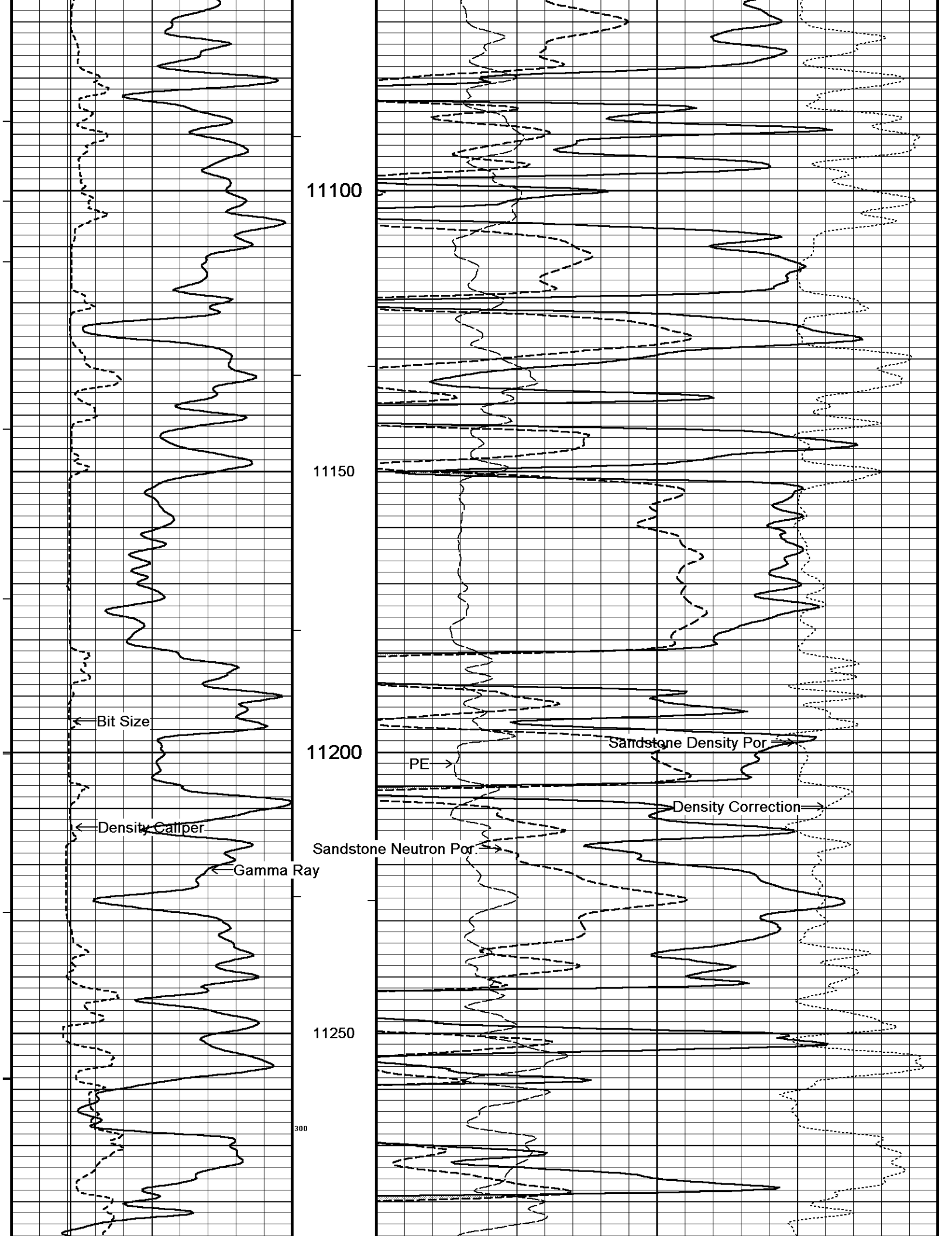
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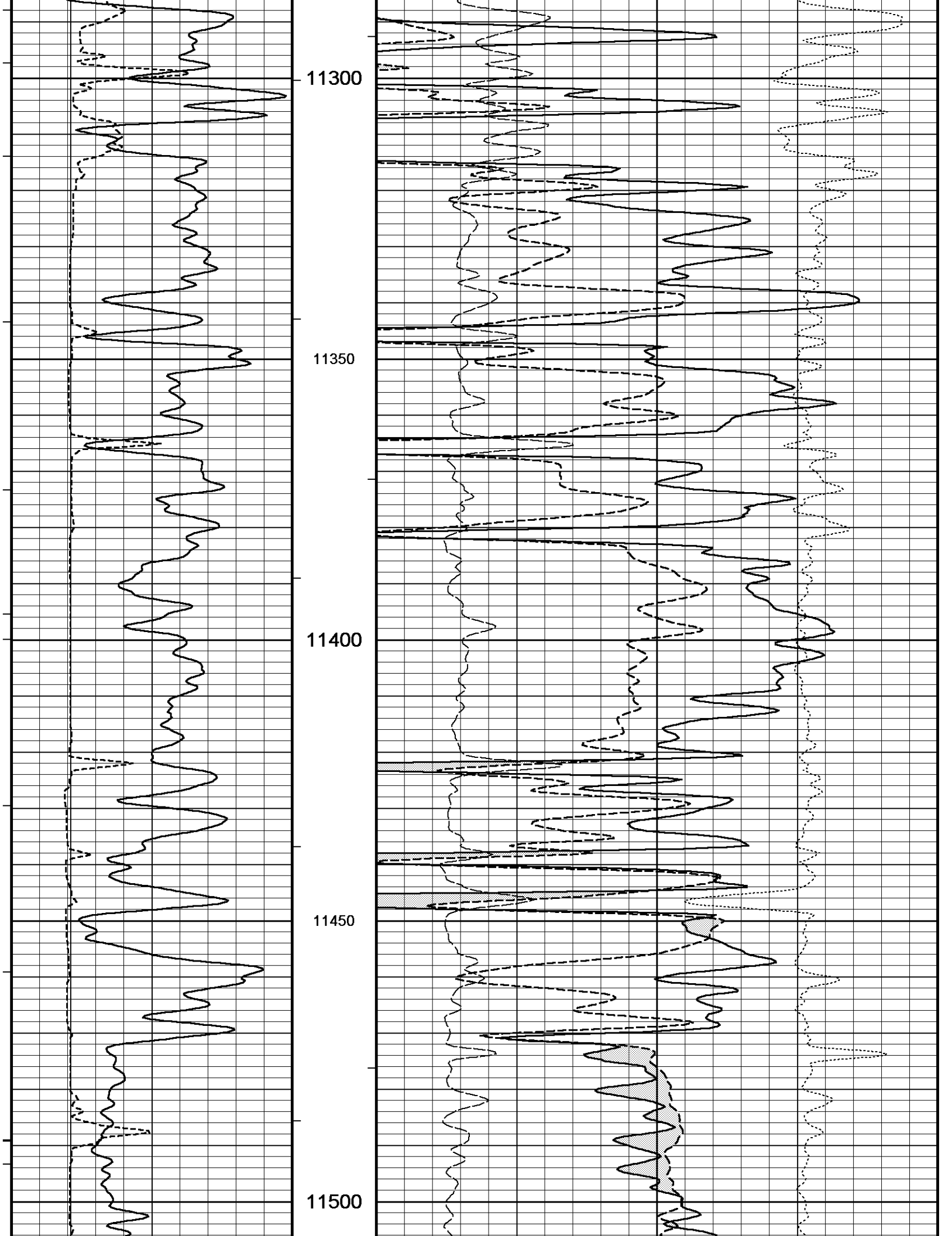
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por
PE
Density Correction
Sandstone Neutron Por
300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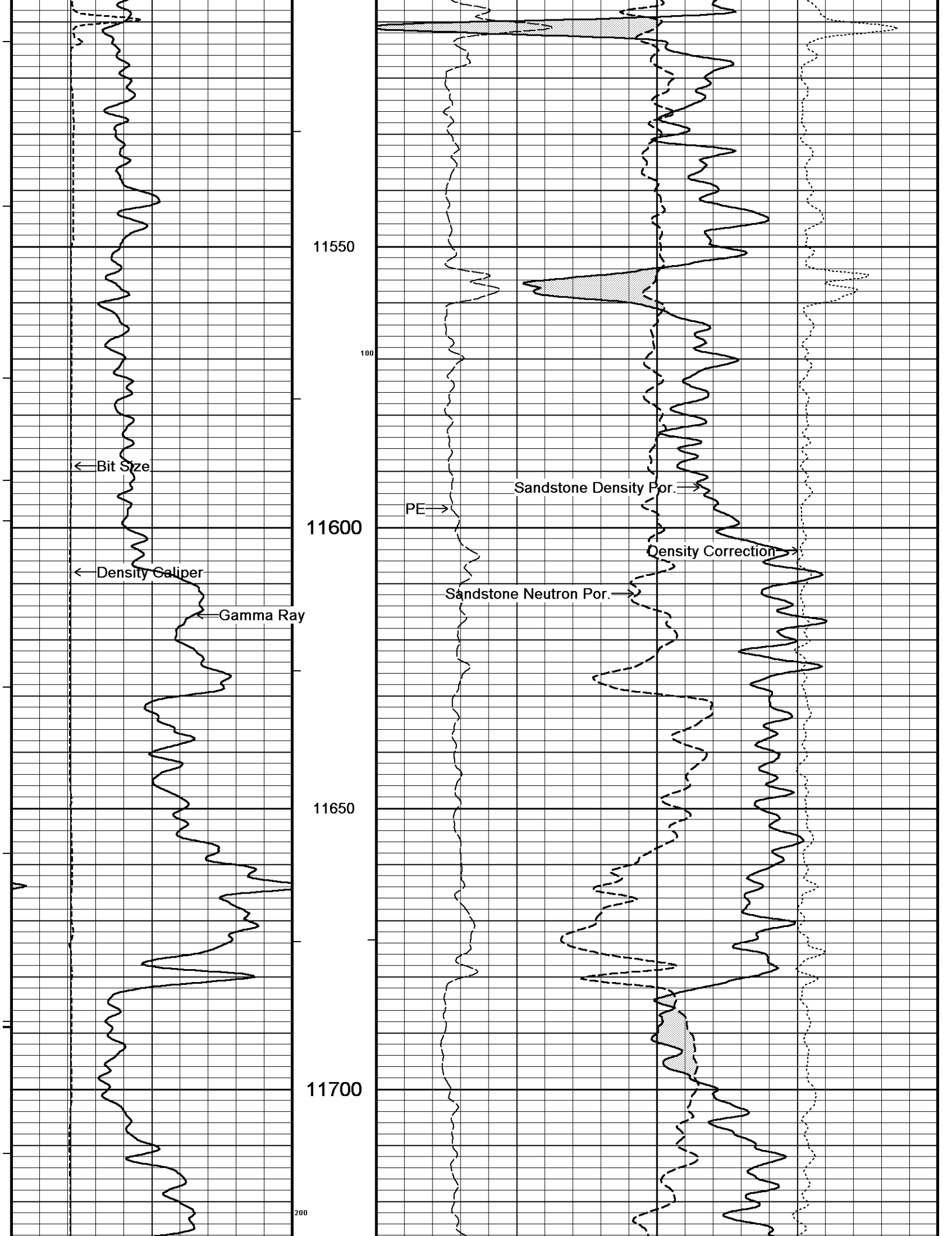
11350
11400
11450
11500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100
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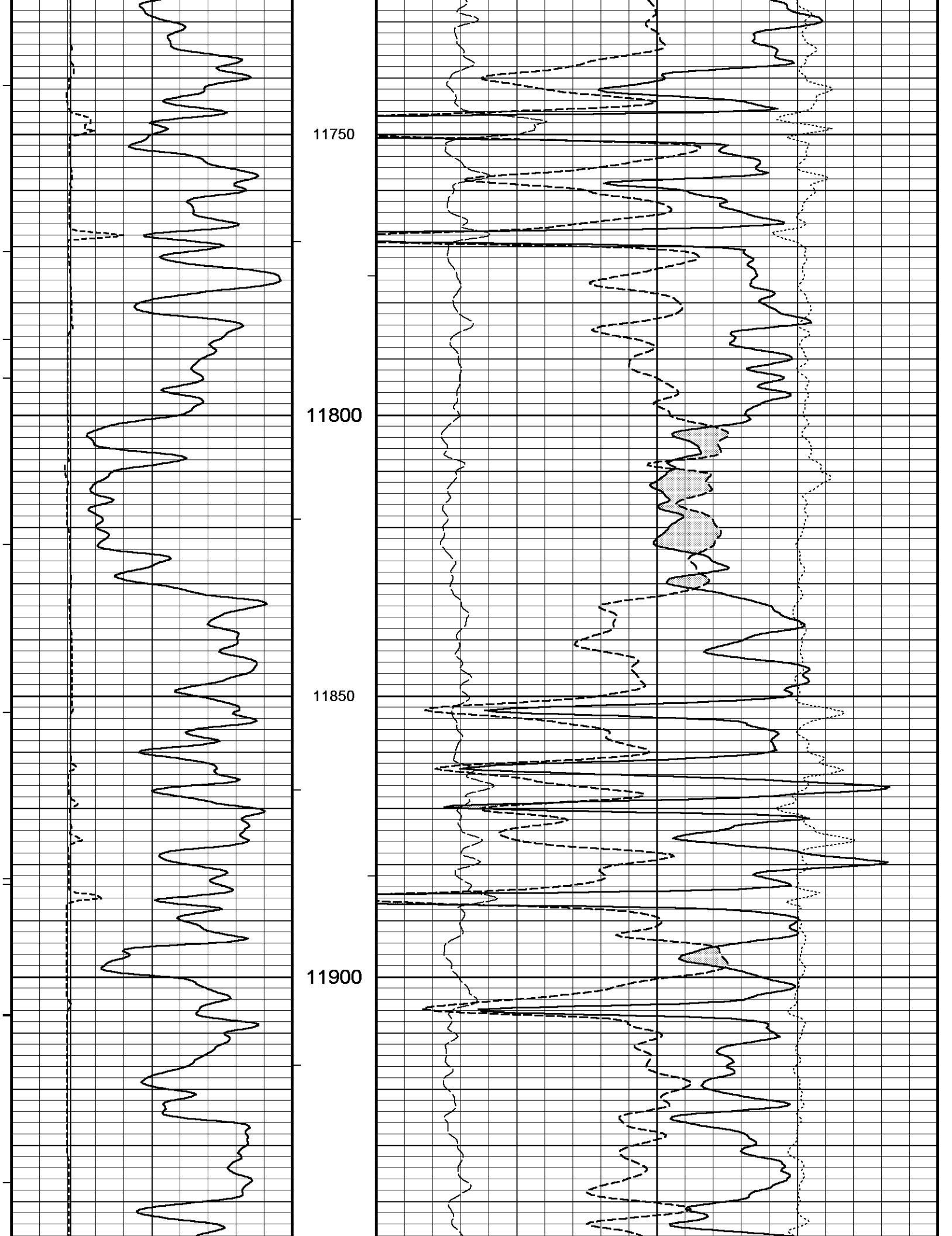
Gamma Ray
PE
Sandstone Density Por.
Density Correction
Sandstone Neutron Por.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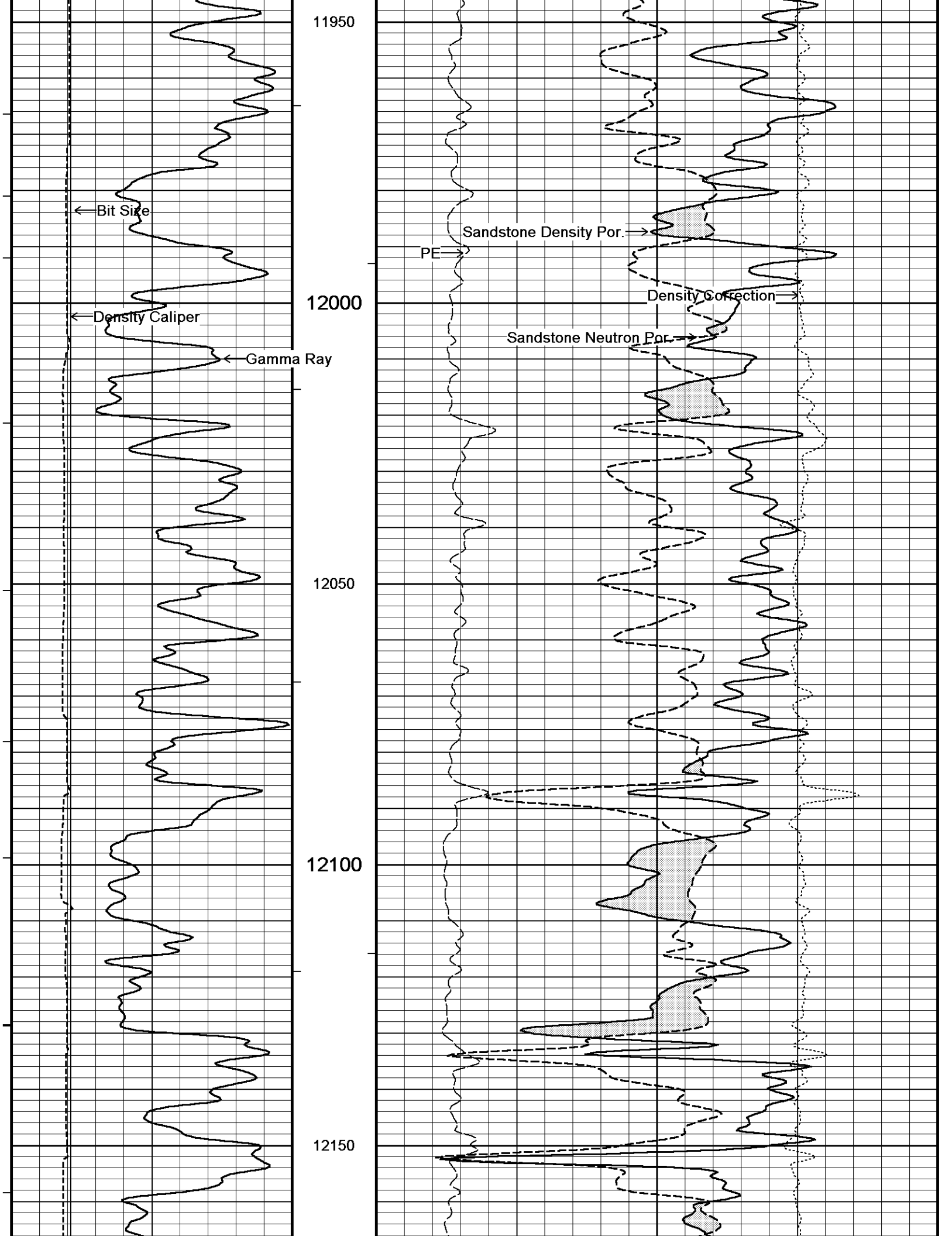
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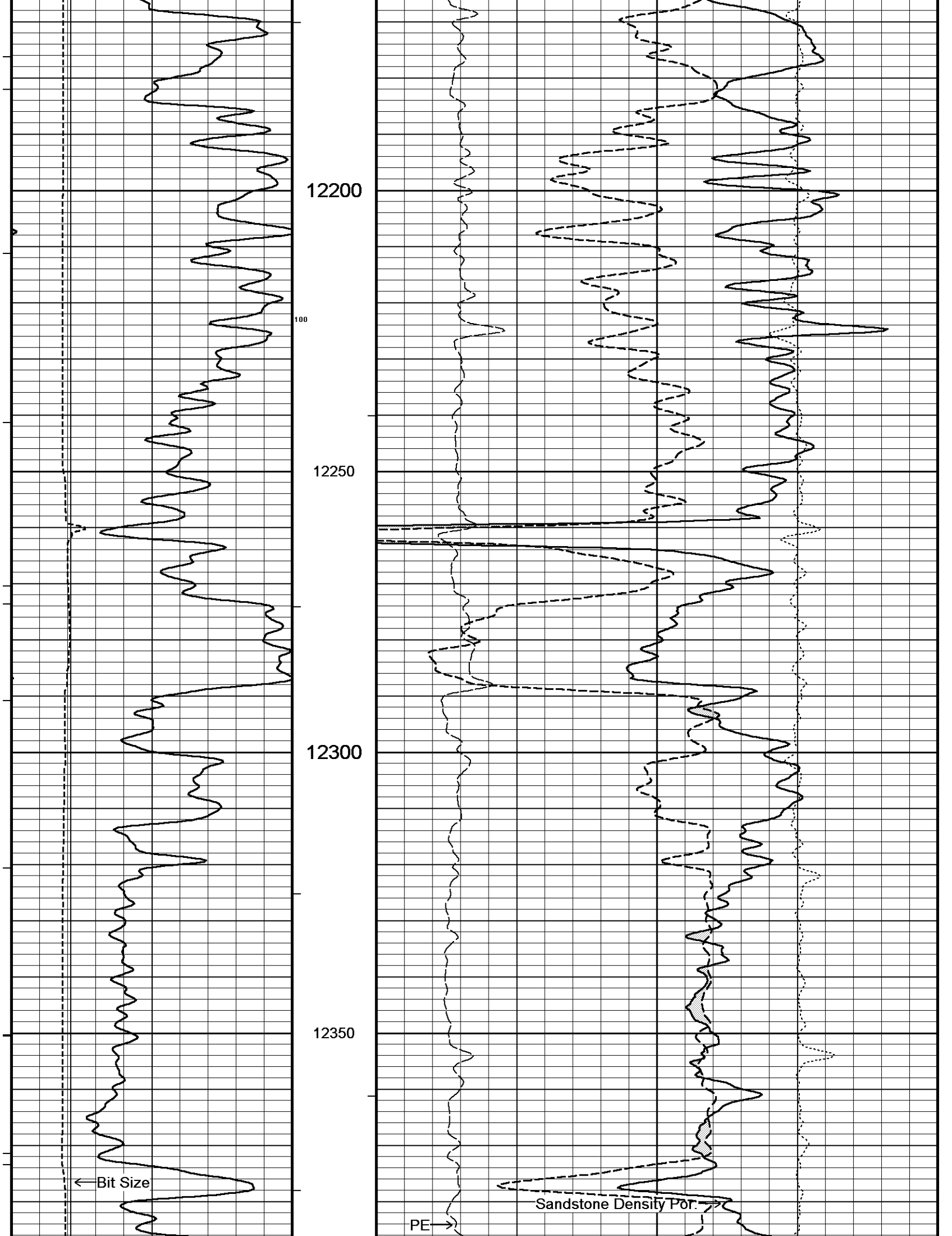
Gamma Ray
PE
Sandstone Density Por.
Density Correction
Sandstone Neutron Por.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100
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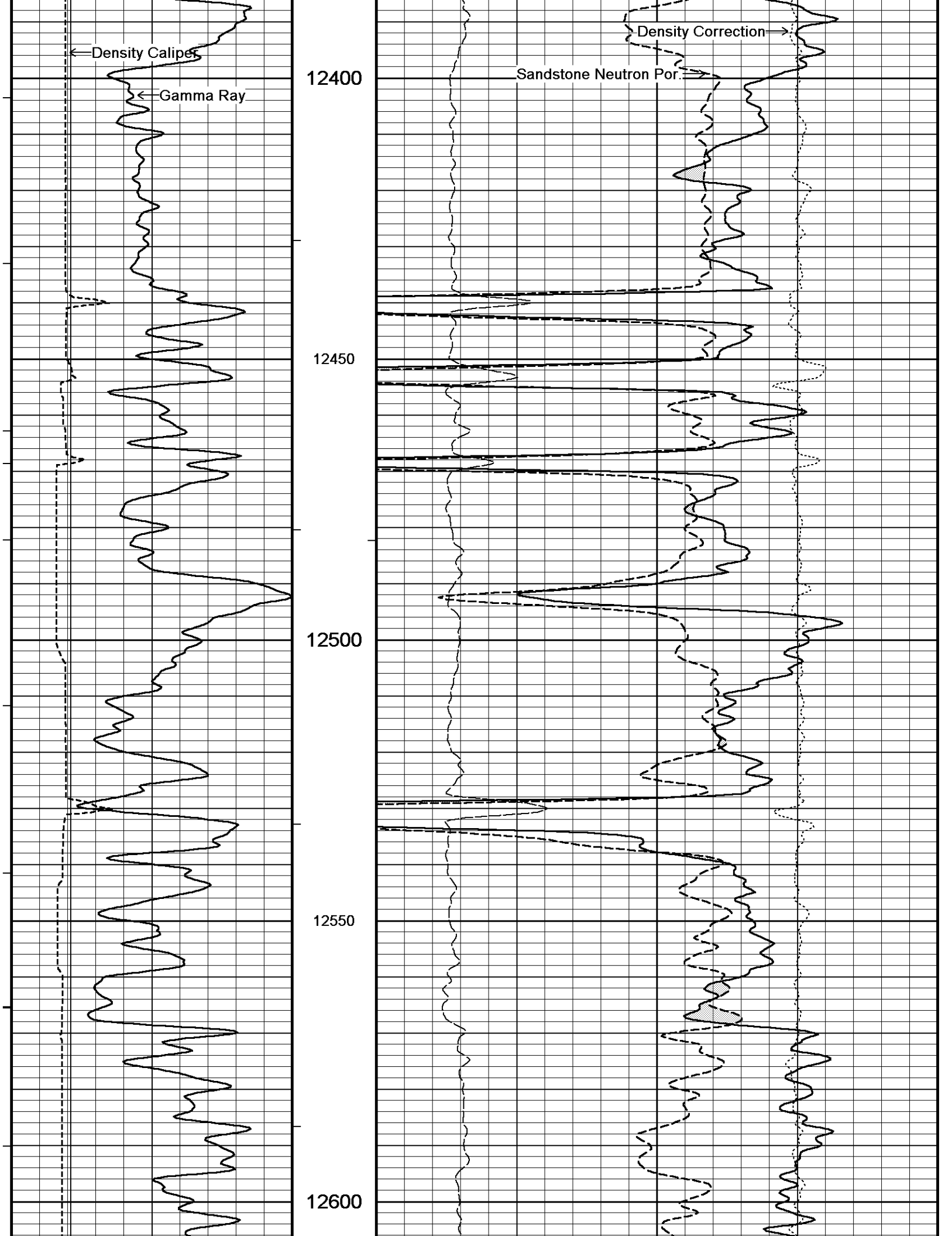
←Bit Size
PE→
Sandstone Density Por.→


Density Caliper
Gamma Ray
Density Correction
Sandstone Neutron Por
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12500
12550
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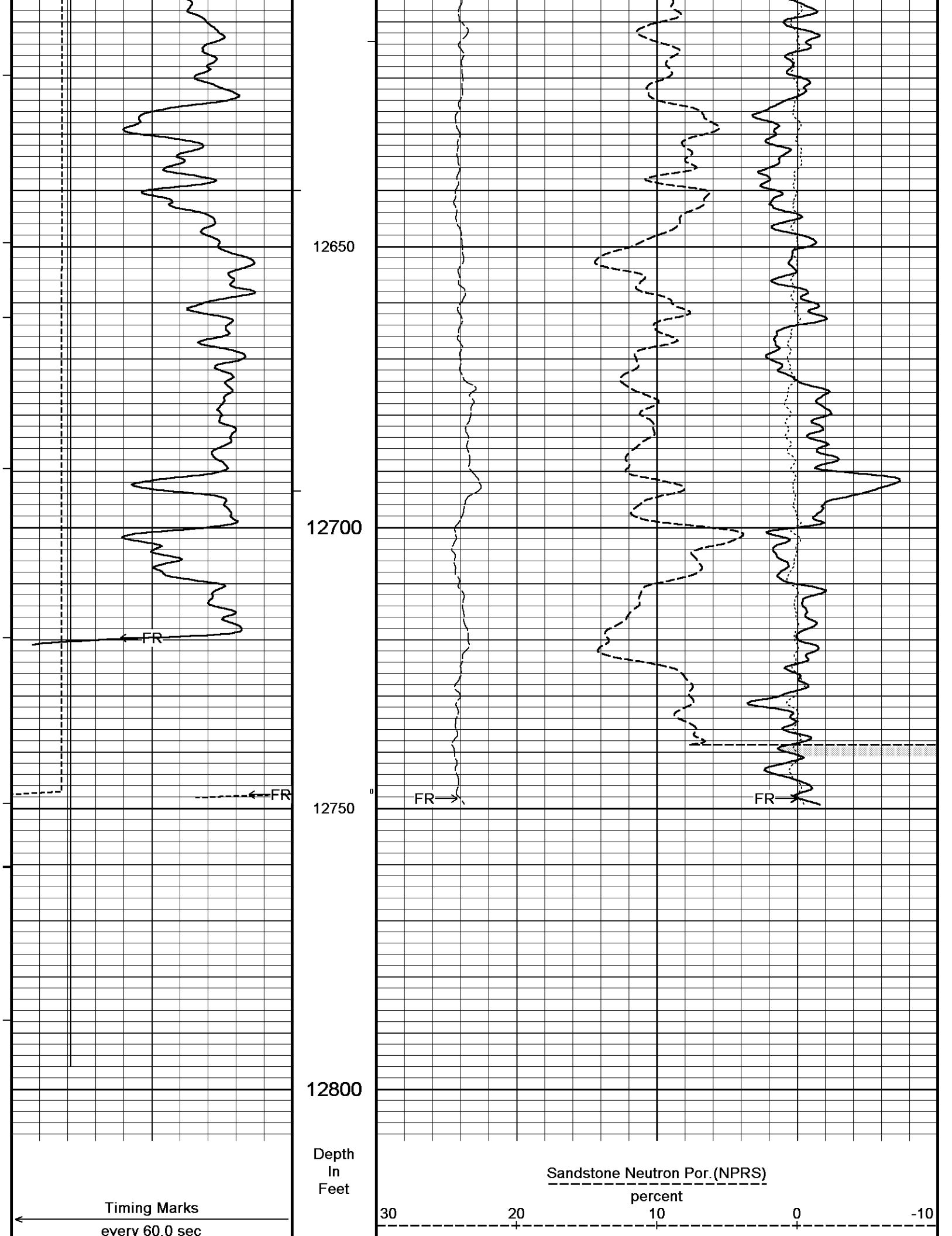
12650
12700
12750
12800
FR
FR
FR
FR
Depth
In
Feet
Timing Marks
every 60.0 sec
Sandstone Neutron Por.(NPRS)
percent
30
20
10
0
-10

Gamma Ray(GRGC)
API
0 75 150
150 225 300

Density Caliper(CLDC)
inches
4 9 14

Bit Size(BIT)
inches
4 9 14

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

Sandstone Density Por.(DPRS)
percent
30 20 10 0 -10

PE(PDPE)
barns/electron
0 5 10

Density Correction(DCOR)
grams/cc
-0.25 0 0.25

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 21-FEB-2010 15:04
Filename: C:\DOCUME~1\Hopkinjg\LOCALS~1\Temp\Weatherford PreView\0\depth.dta
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System Versions: Logged with 10.06.0425 Processed with 10.06.0425 Plotted with 10.01.0765

5 INCH MAIN LOG

5 INCH MAIN LOG

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 21-FEB-2010 15:04
Filename: C:\DOCUME~1\Hopkinjg\LOCALS~1\Temp\Weatherford PreView\0\depth.dta
Recorded on 20-FEB-2010 23:10
System Versions: Logged with 10.06.0425 Processed with 10.06.0425 Plotted with 10.01.0765

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
4 9 14

Bit Size
inches
4 9 14

DSC in Feet

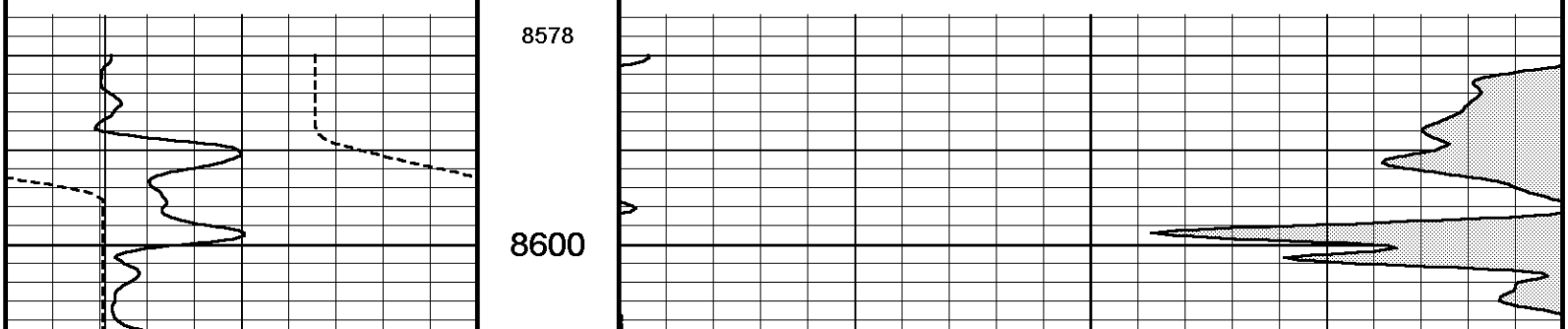
Replay Scale 1:240

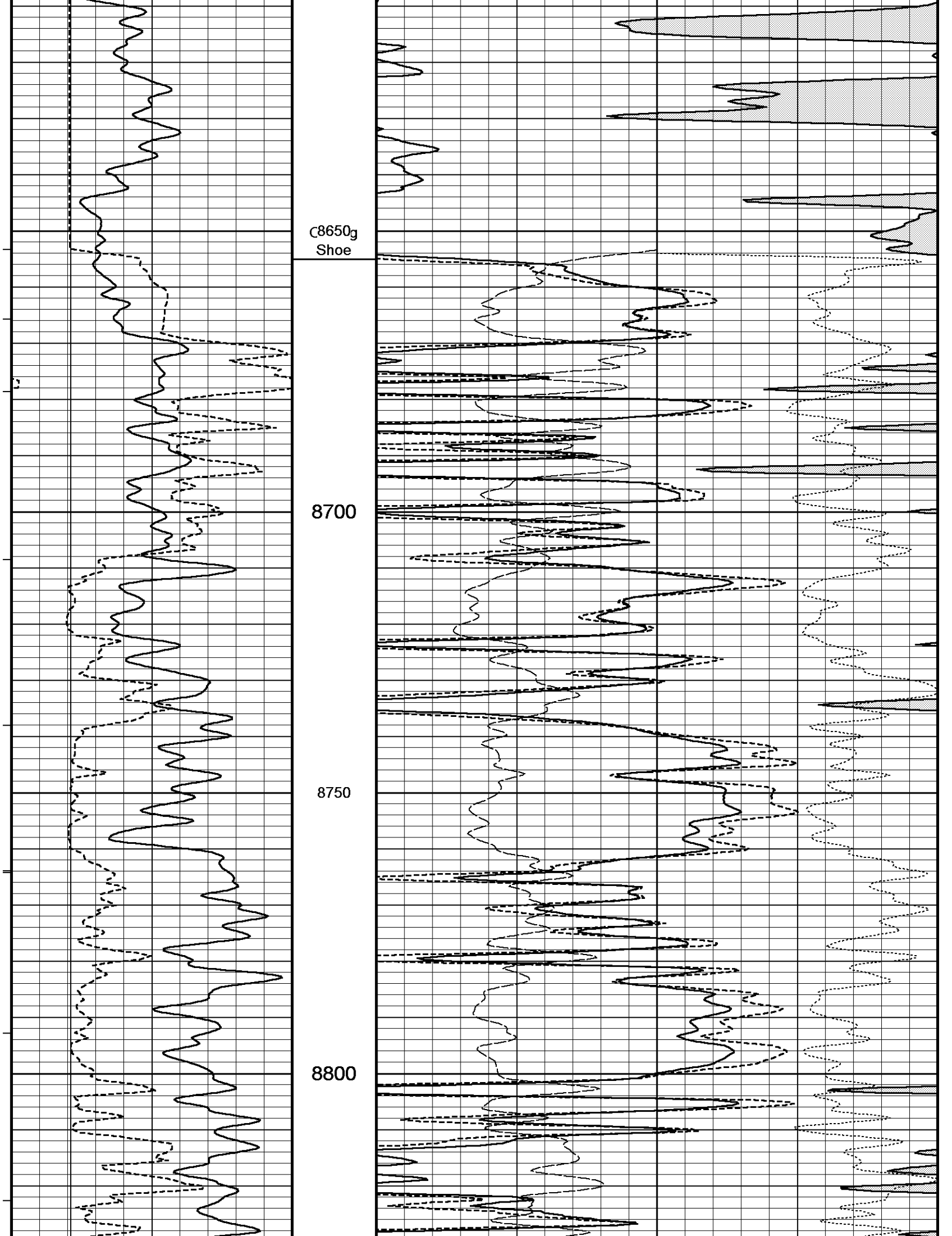
Compensated Density
grams/cc
2 2.25 2.50 2.75 3
1 1.25 1.50 1.75 2

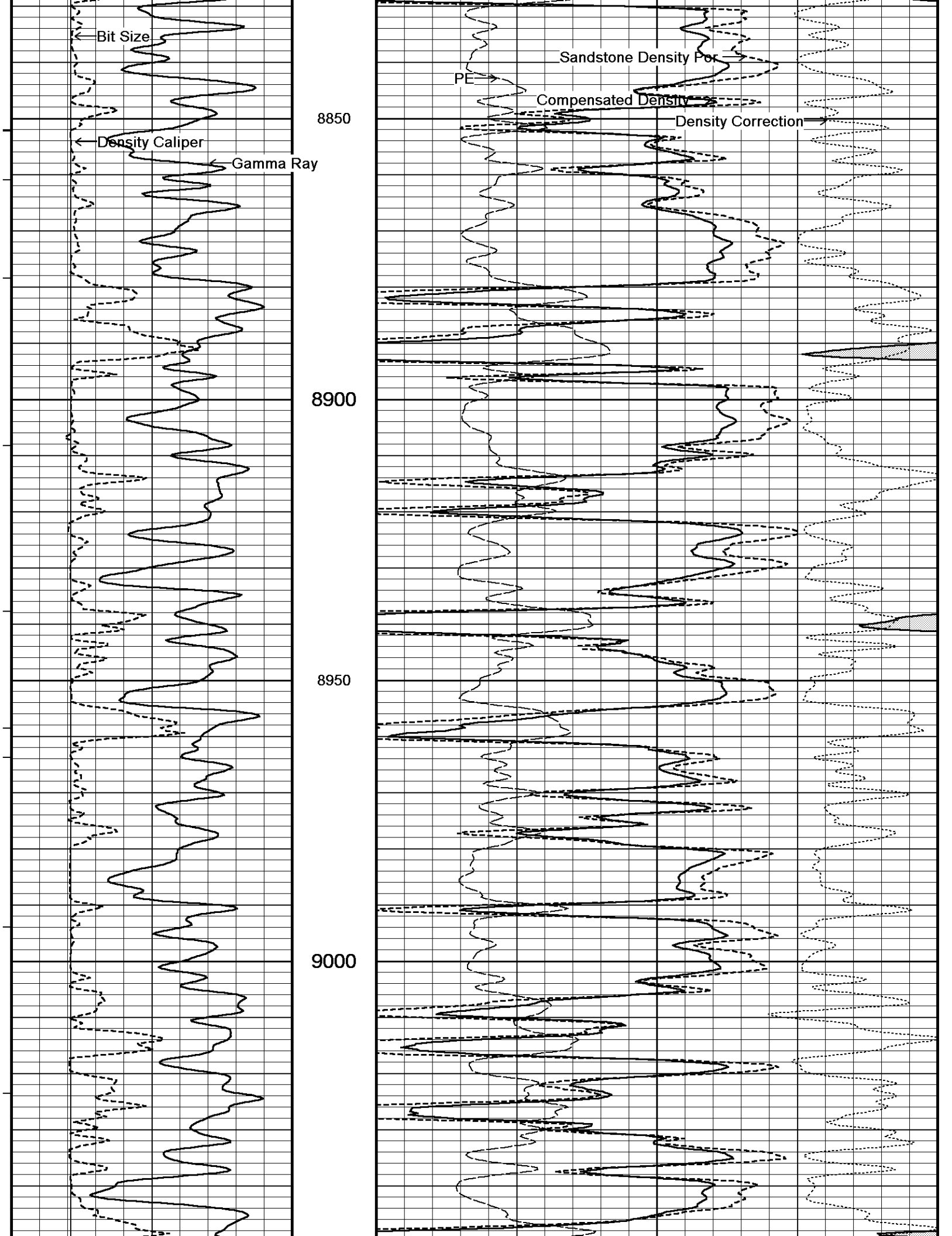
Sandstone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

Density Correction
grams/cc
-0.25 0 0.25




8650g
Shoe
8700
8750
8800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Density Caliper
Gamma Ray
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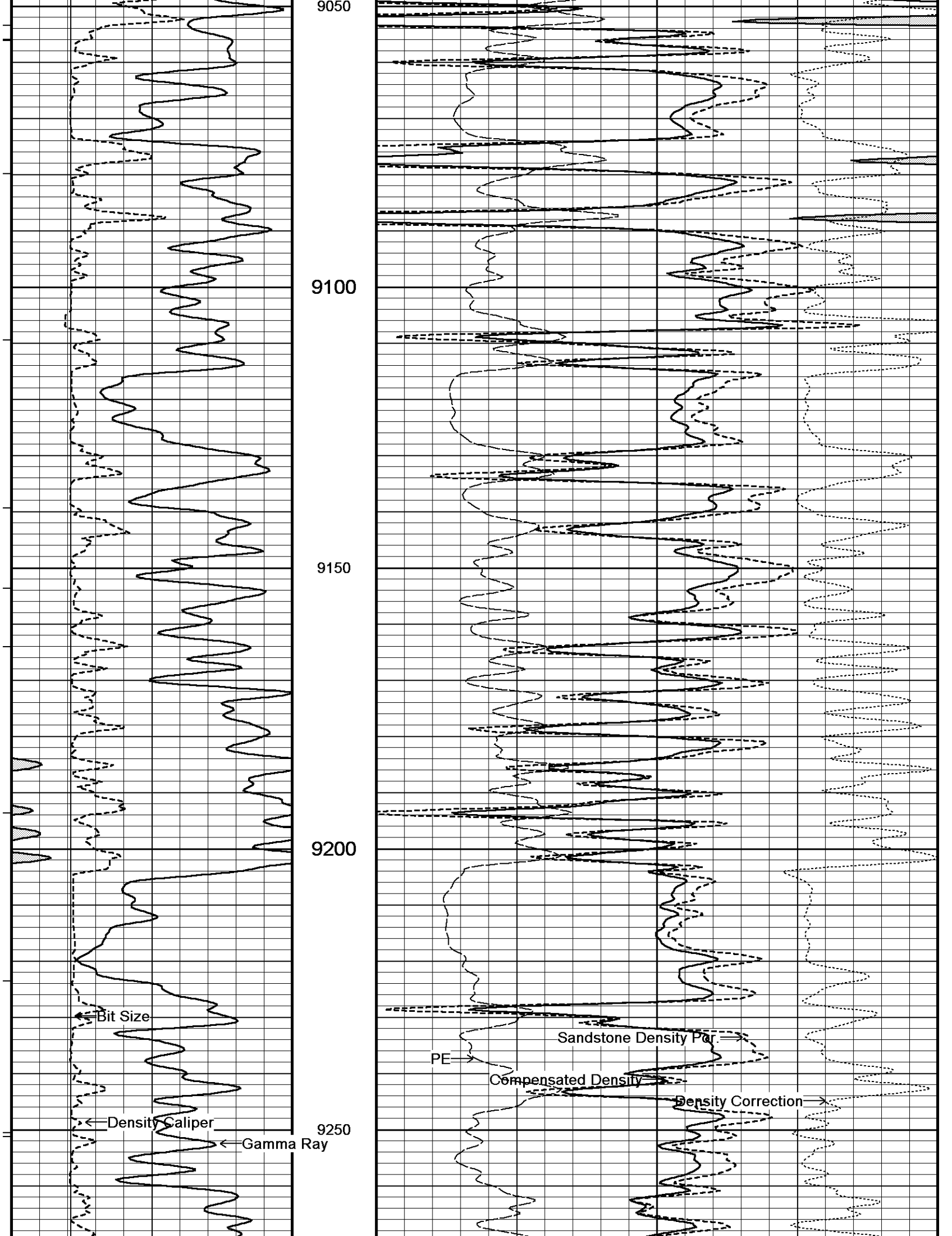
8900
8950
9000
Sandstone Density Por
PE
Compensated Density
Density Correction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9100
9150
9200
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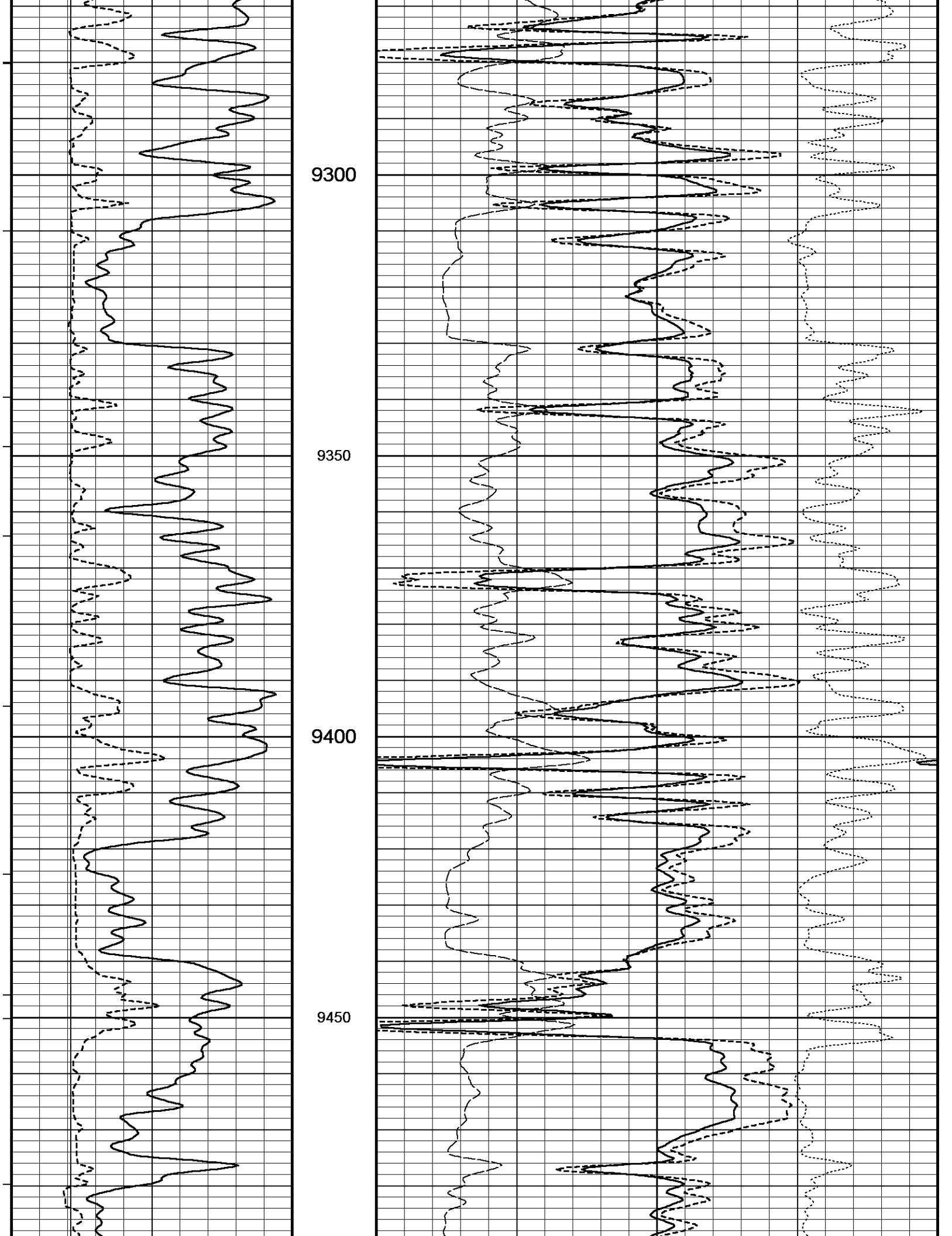
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por.
PE
Compensated Density
Density Correction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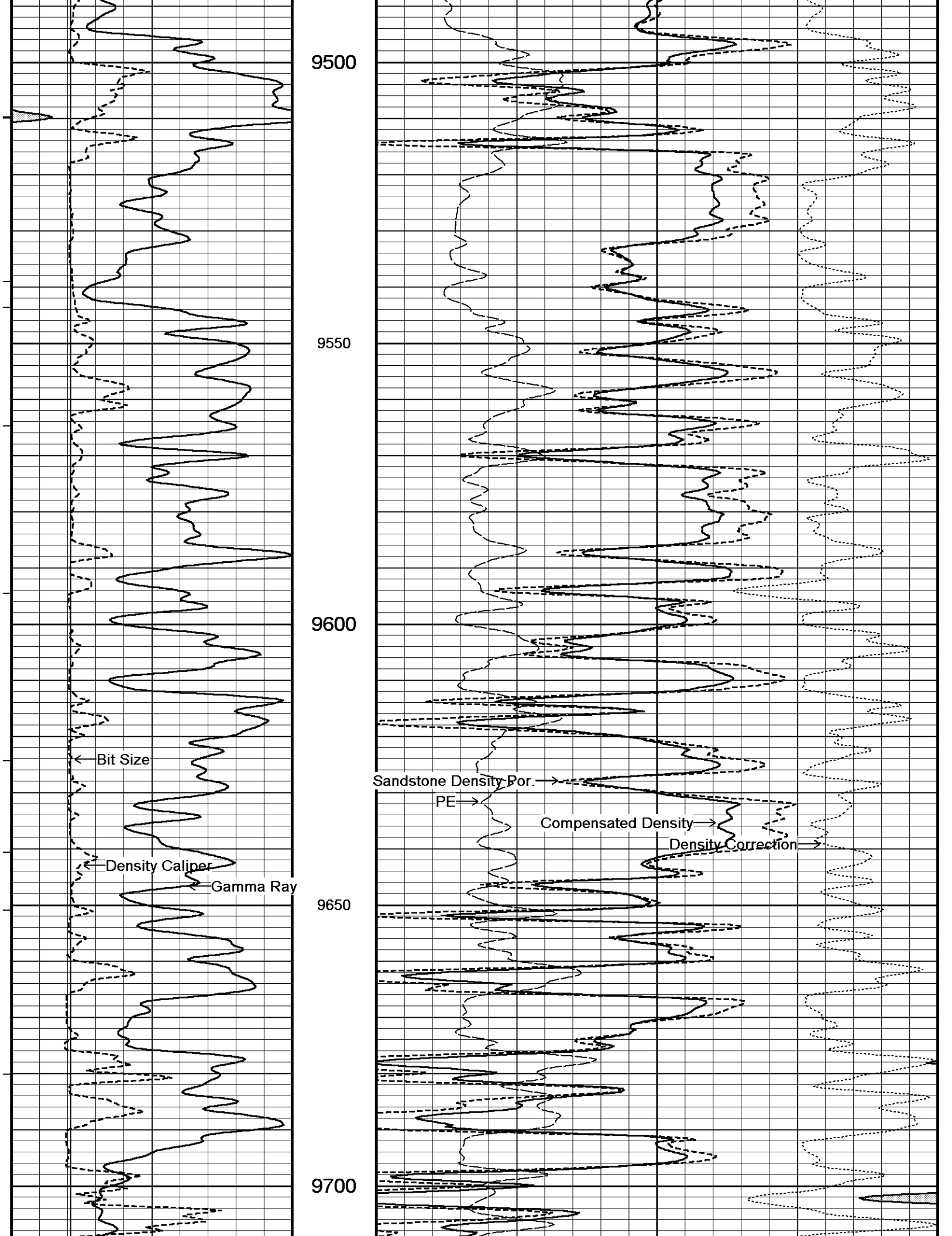
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Gamma Ray
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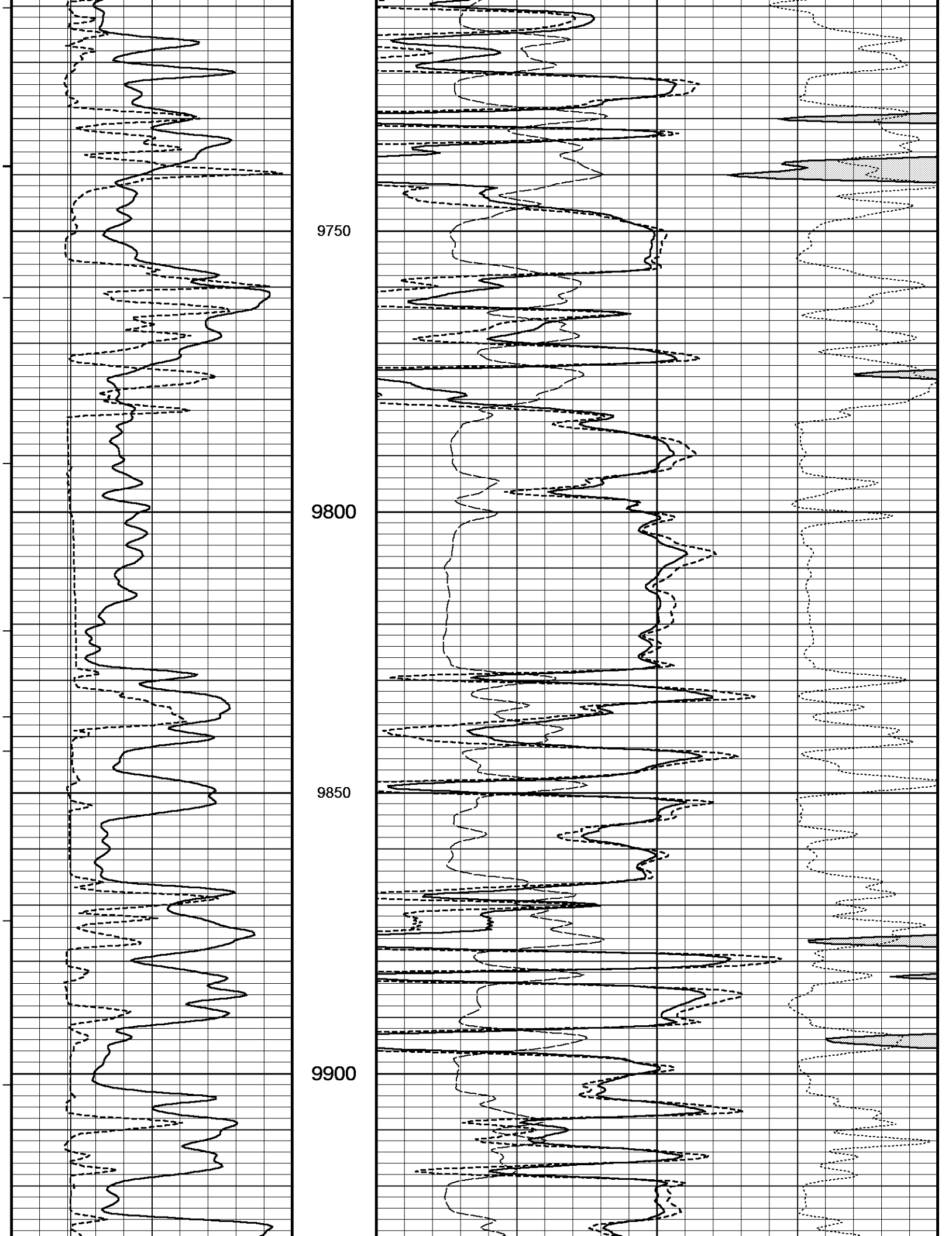
PE
Compensated Density
Density Correction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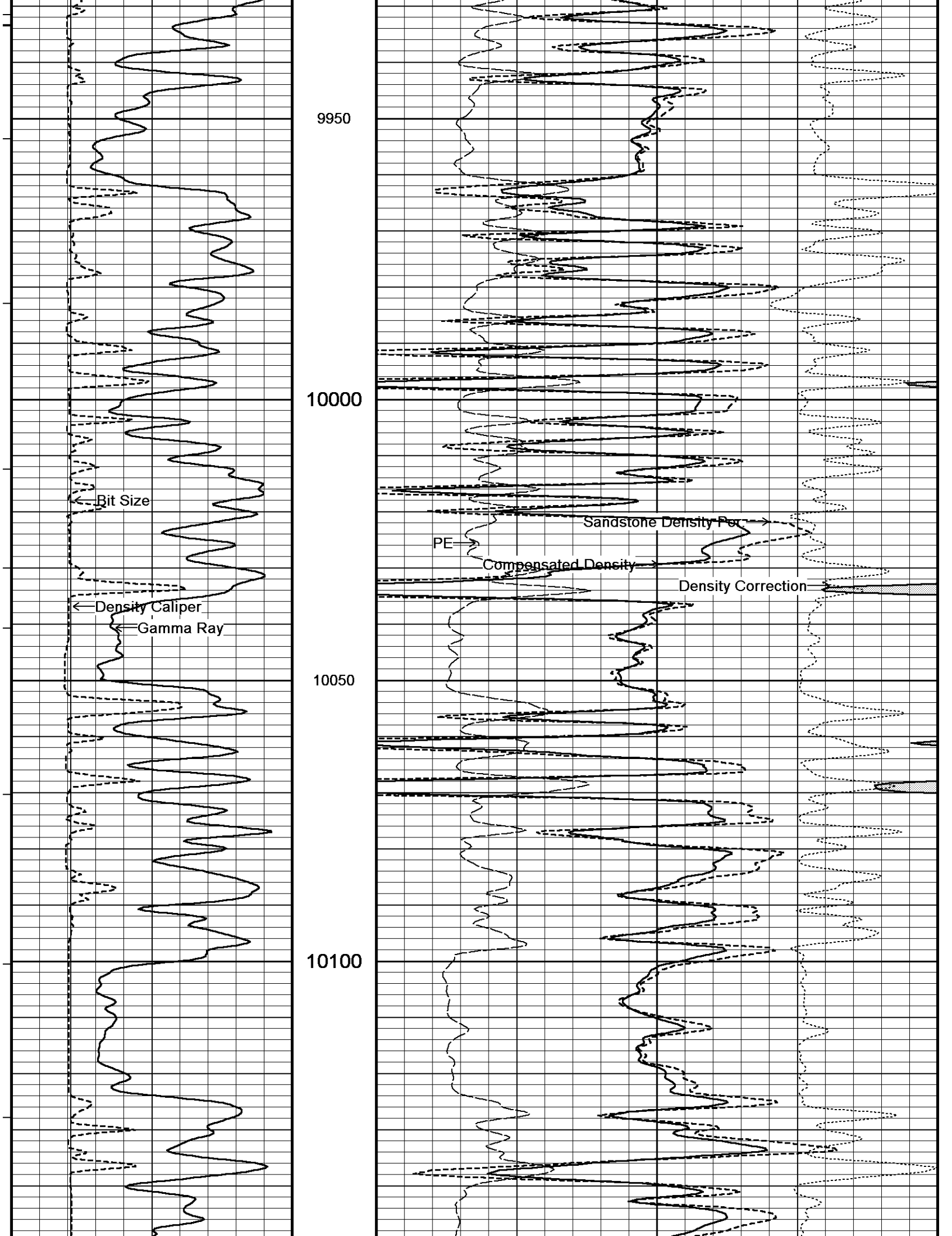
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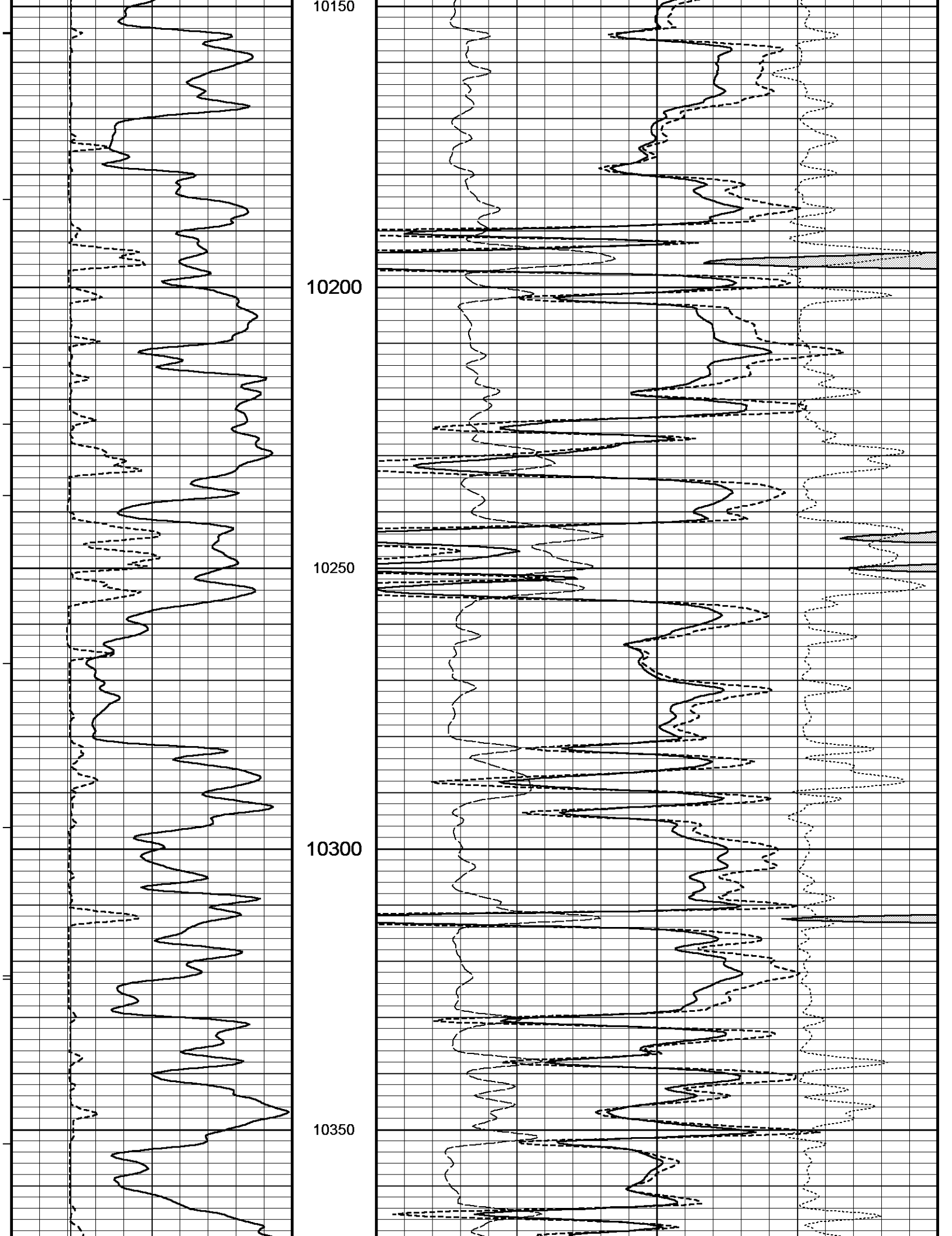
Density Correction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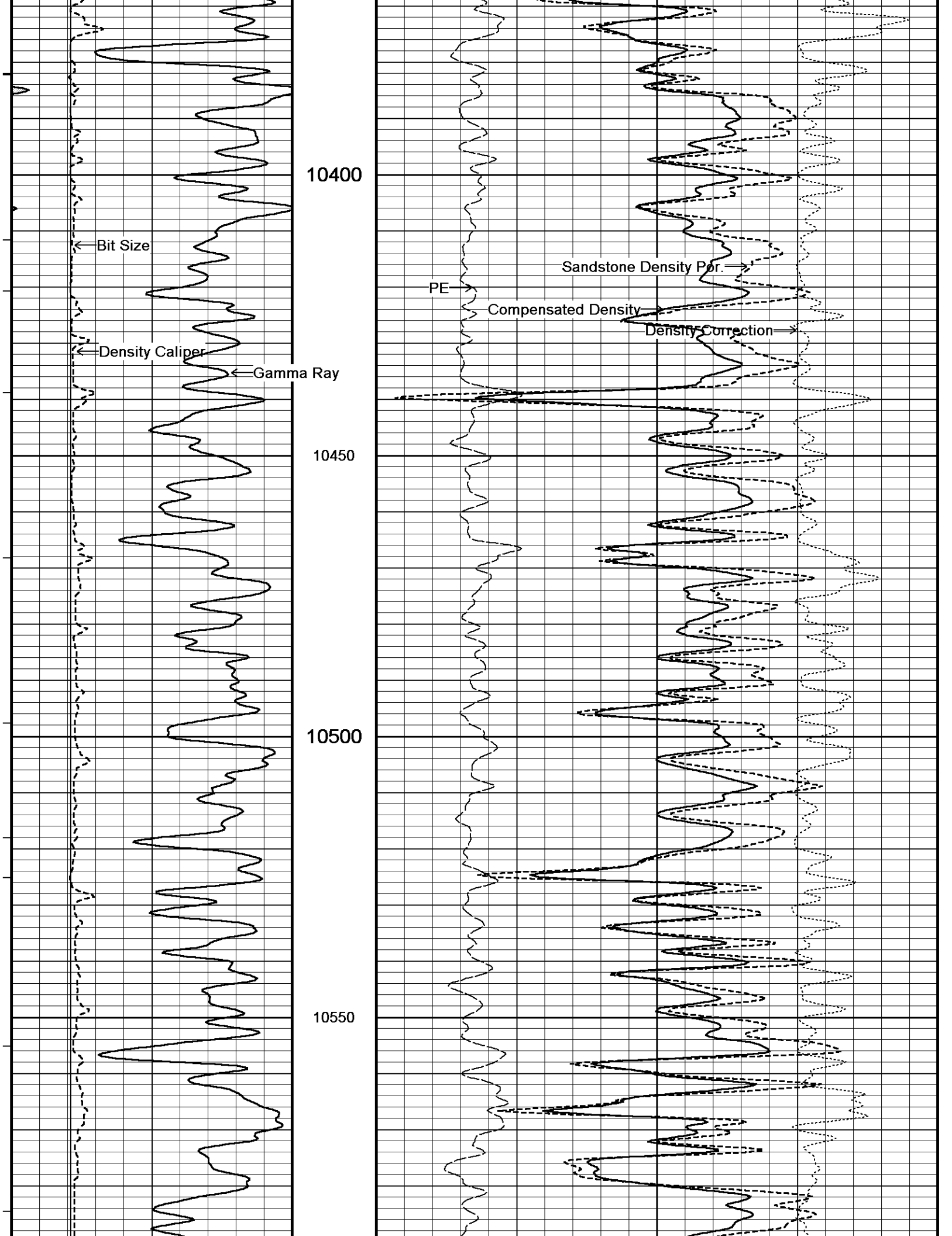
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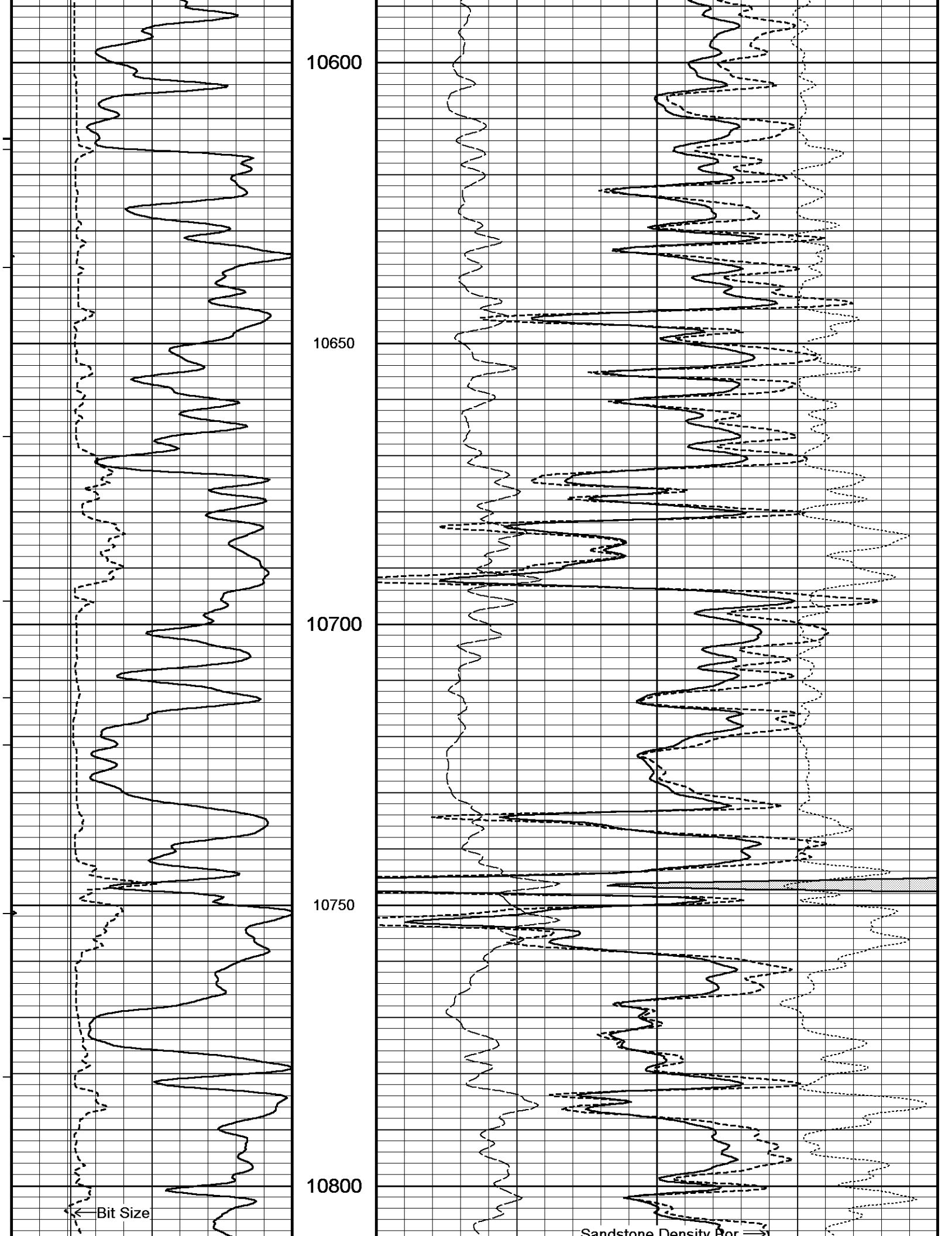
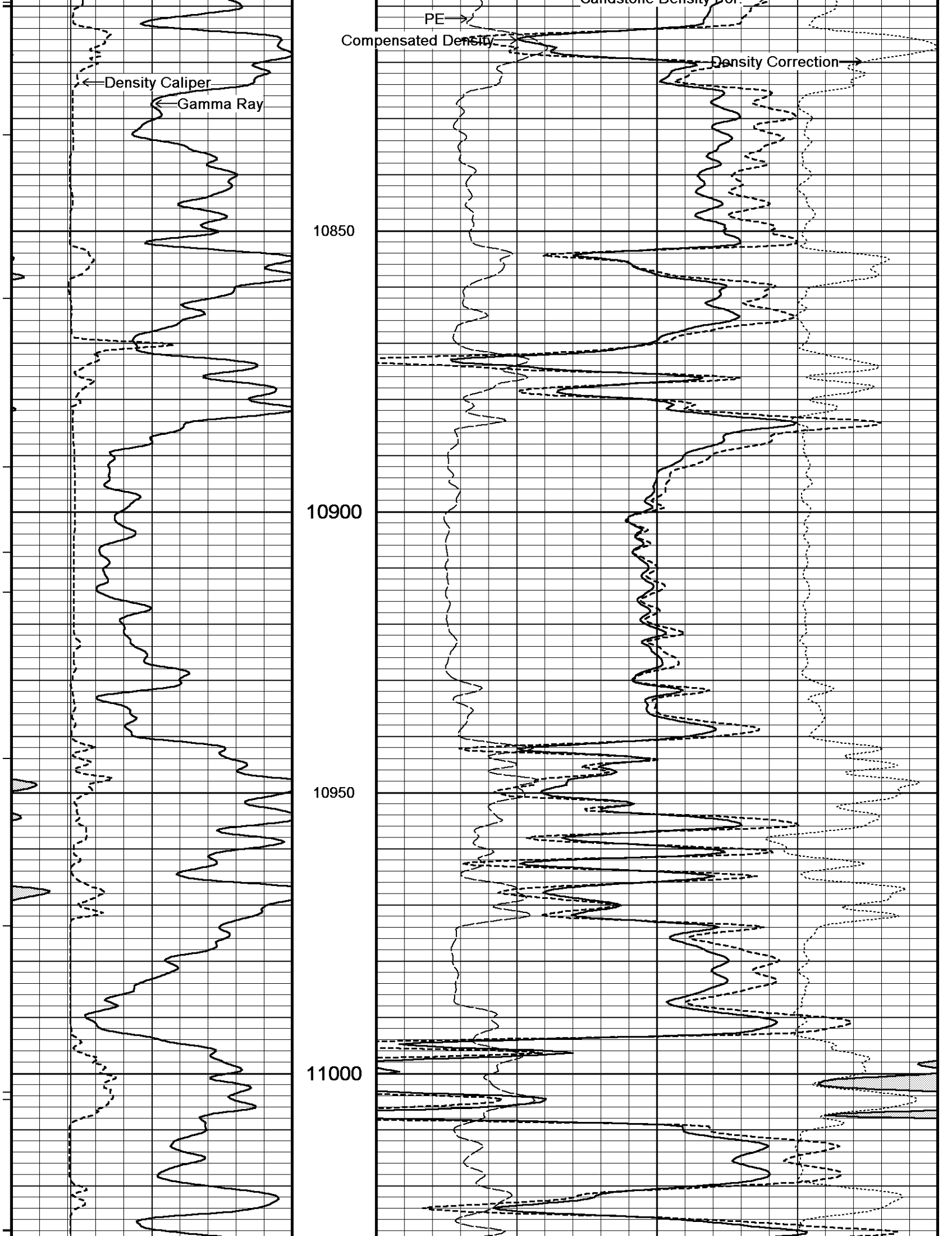
Density Caliper
Gamma Ray
PE
Sandstone Density Por.
Compensated Density
Density Correction


10600
10650
10700
10750
10800
Bit Size
Sandstone Density Por


Sandstone Density Cor.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
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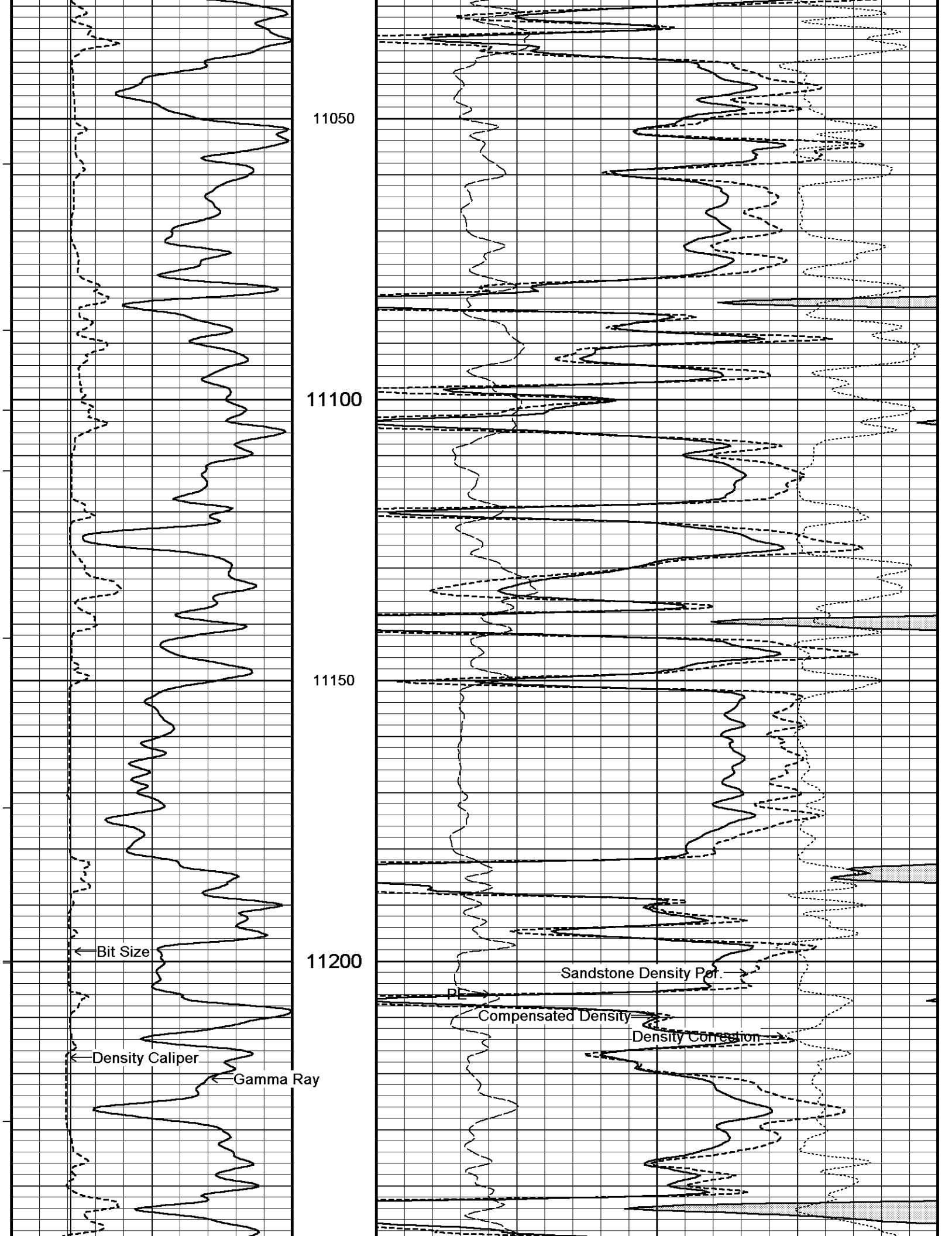
10900
10950
11000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11150
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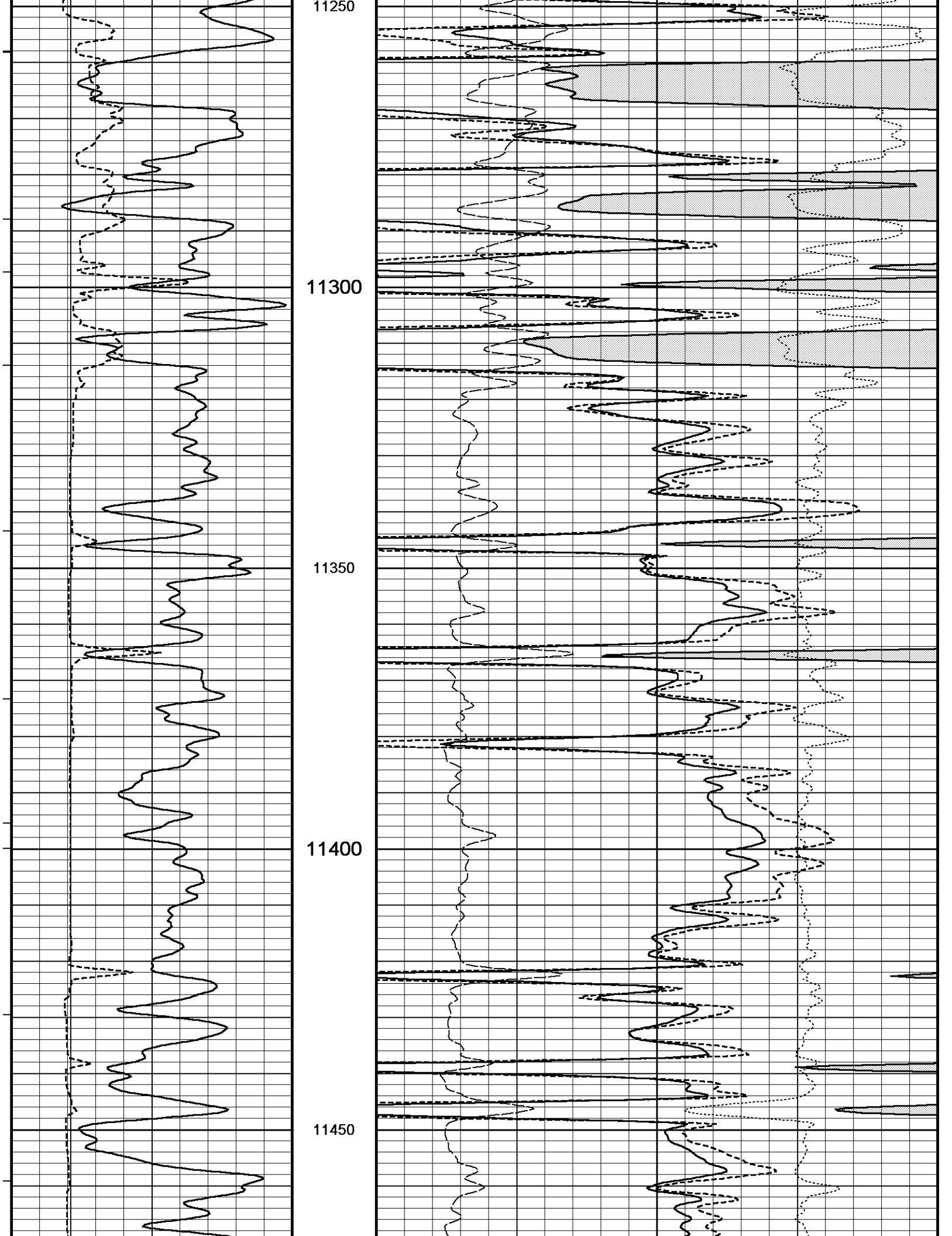
Bit Size
Density Caliper
Gamma Ray
Sandstone Density Por.
PE
Compensated Density
Density Correction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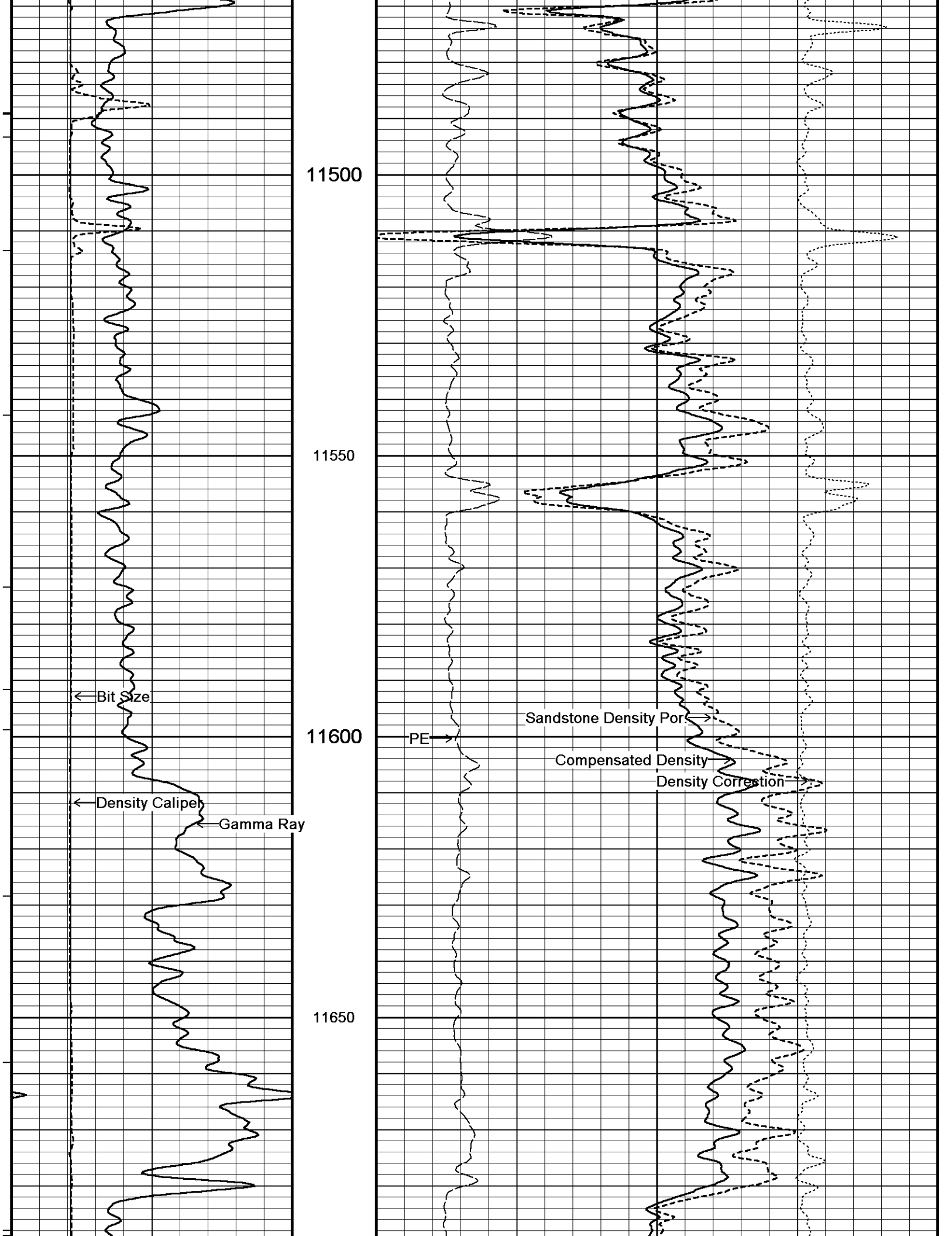
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11600
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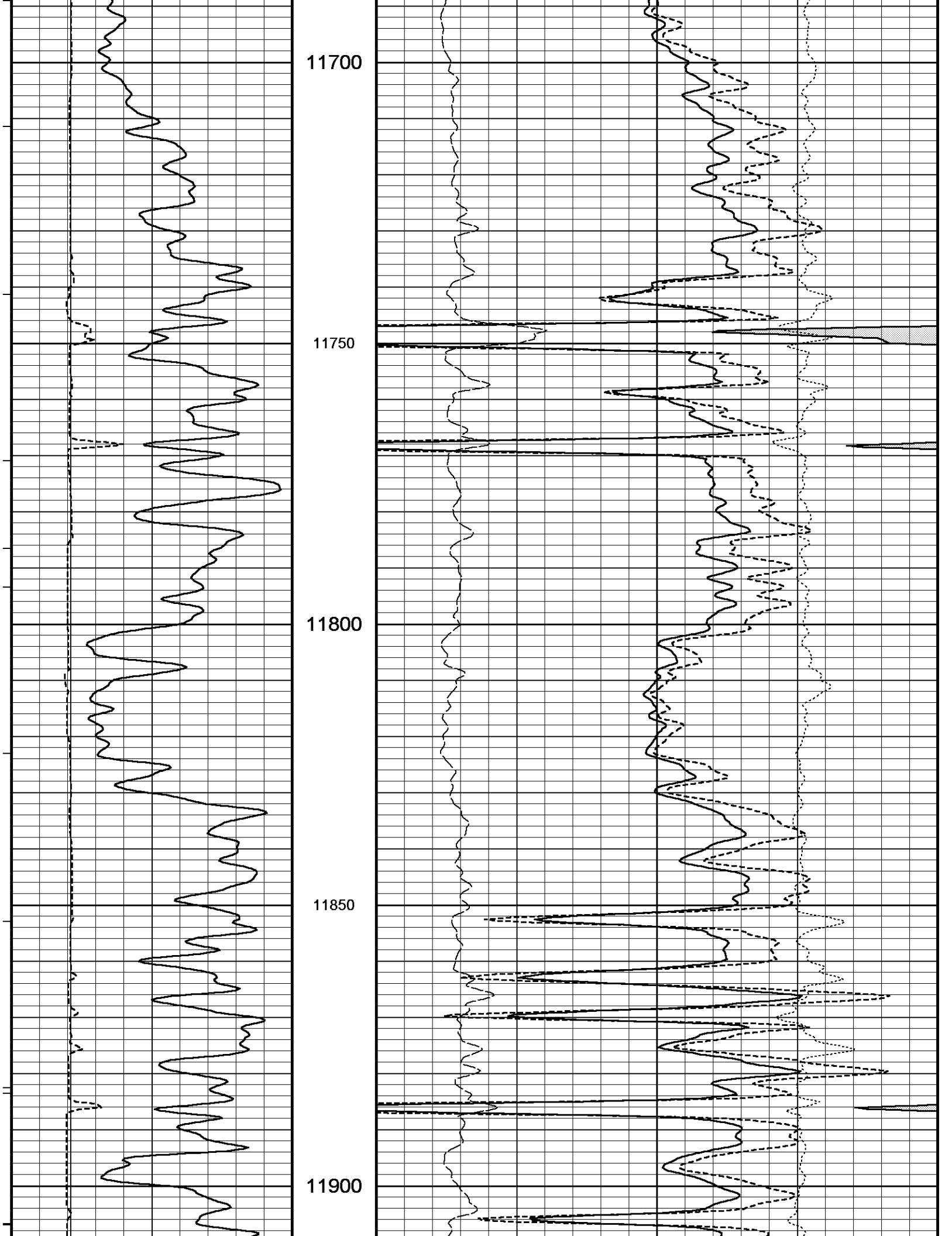
Bit Size
Density Caliper
Gamma Ray
PE
Sandstone Density Por
Compensated Density
Density Correction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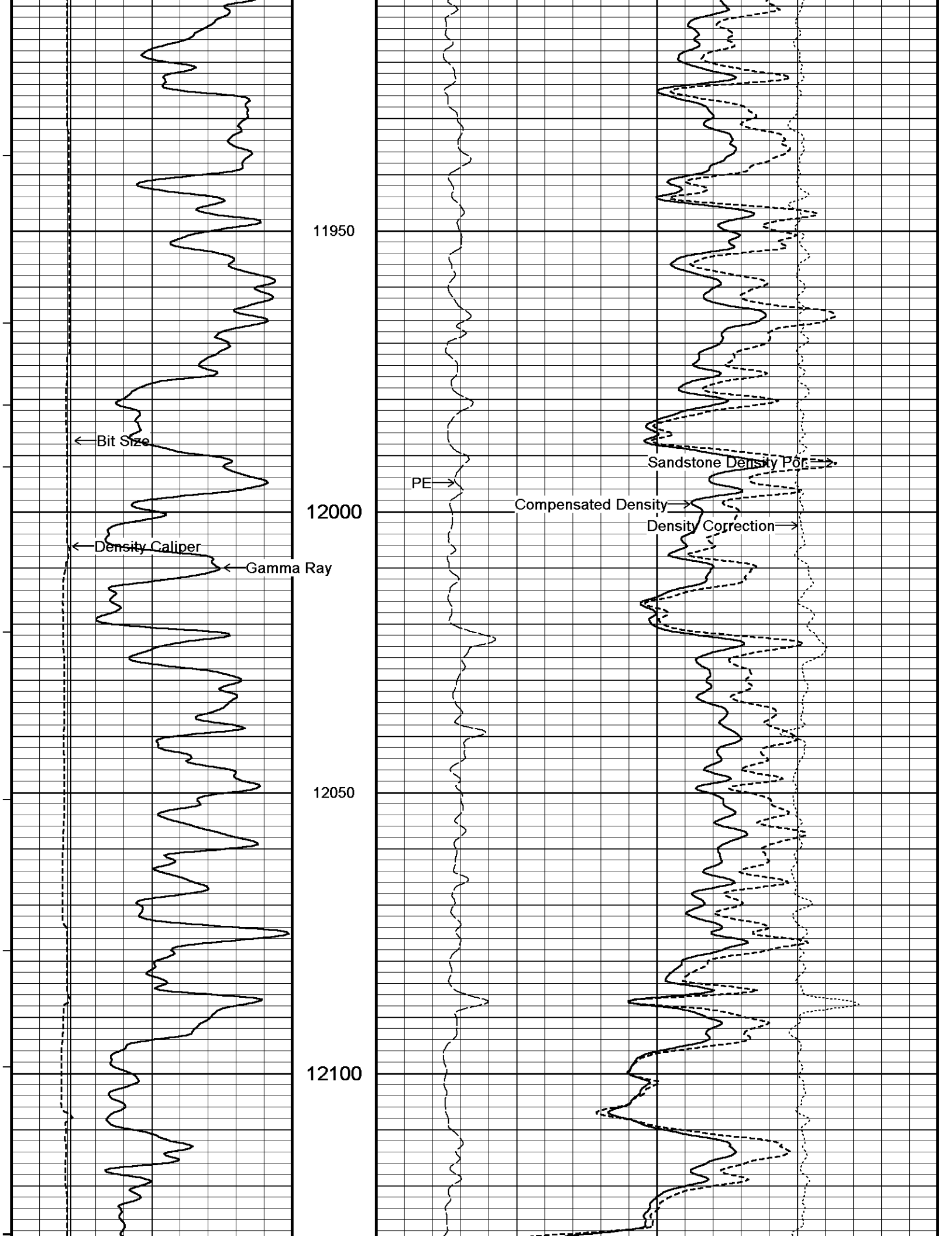
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12050
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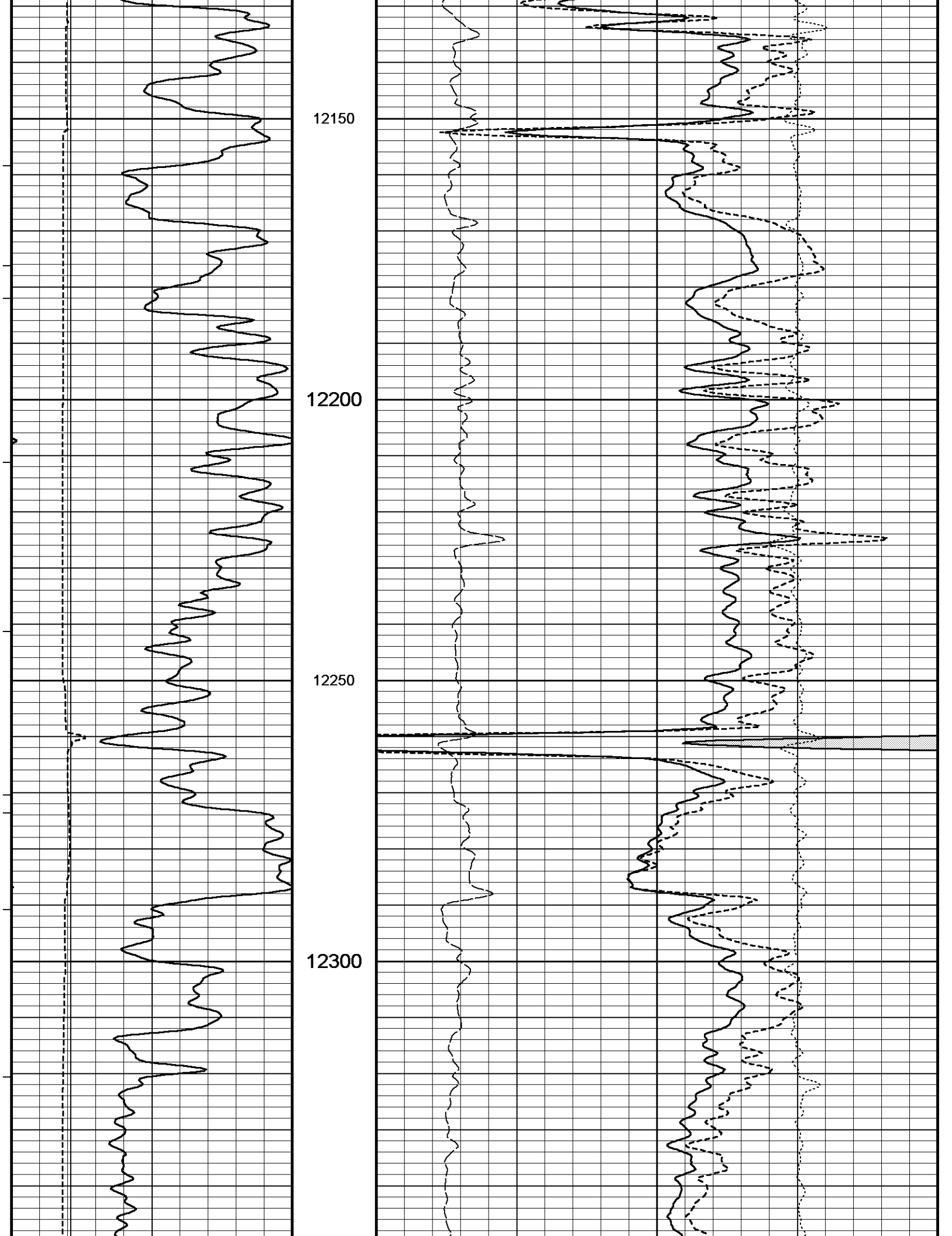
Density Caliper
Gamma Ray
PE
Compensated Density
Sandstone Density Por.
Density Correction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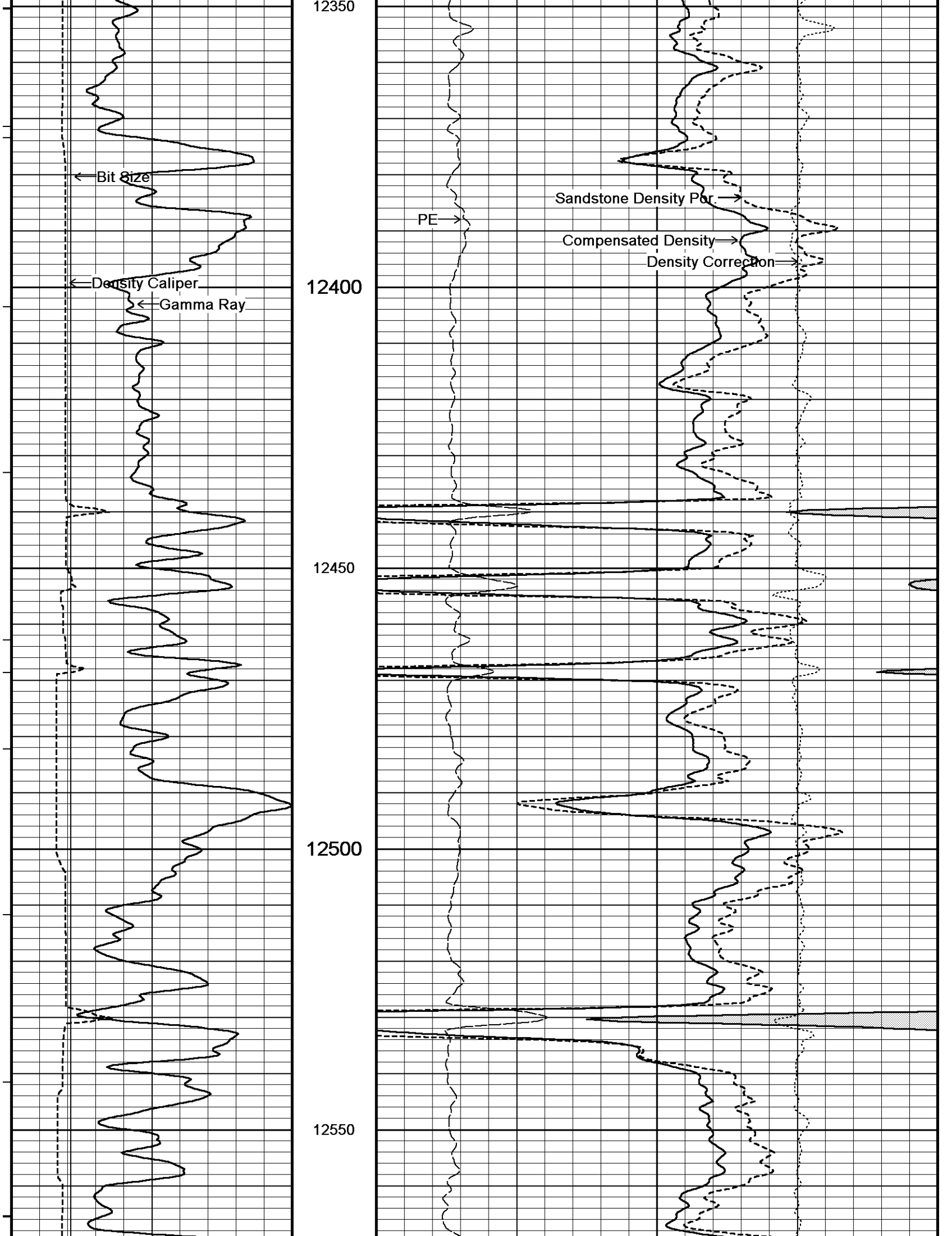
12200
12250
12300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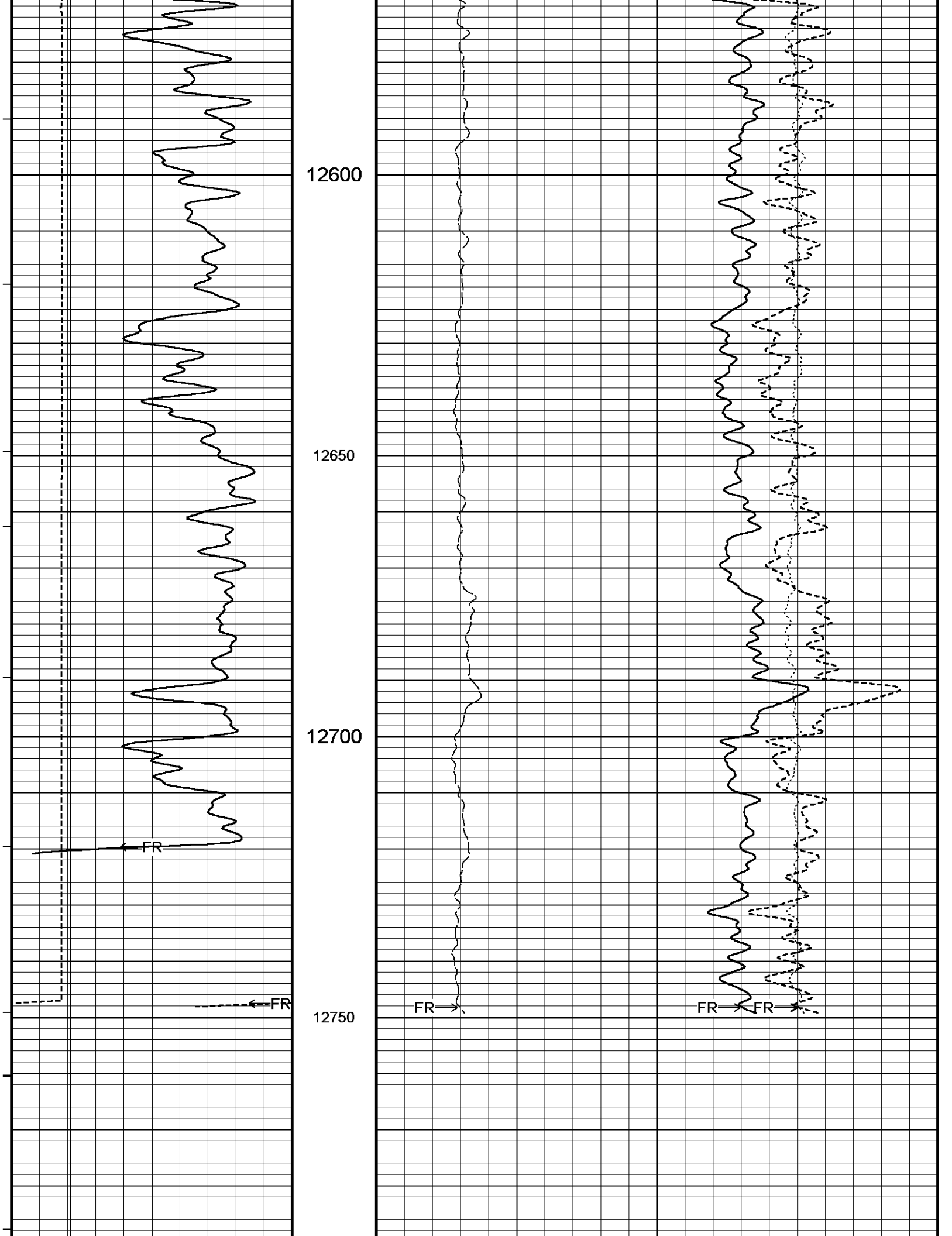
Bit Size
Density Caliper
Gamma Ray
PE
Sandstone Density Por
Compensated Density
Density Correction
12400
12450
12500
12550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12650
12700
12750
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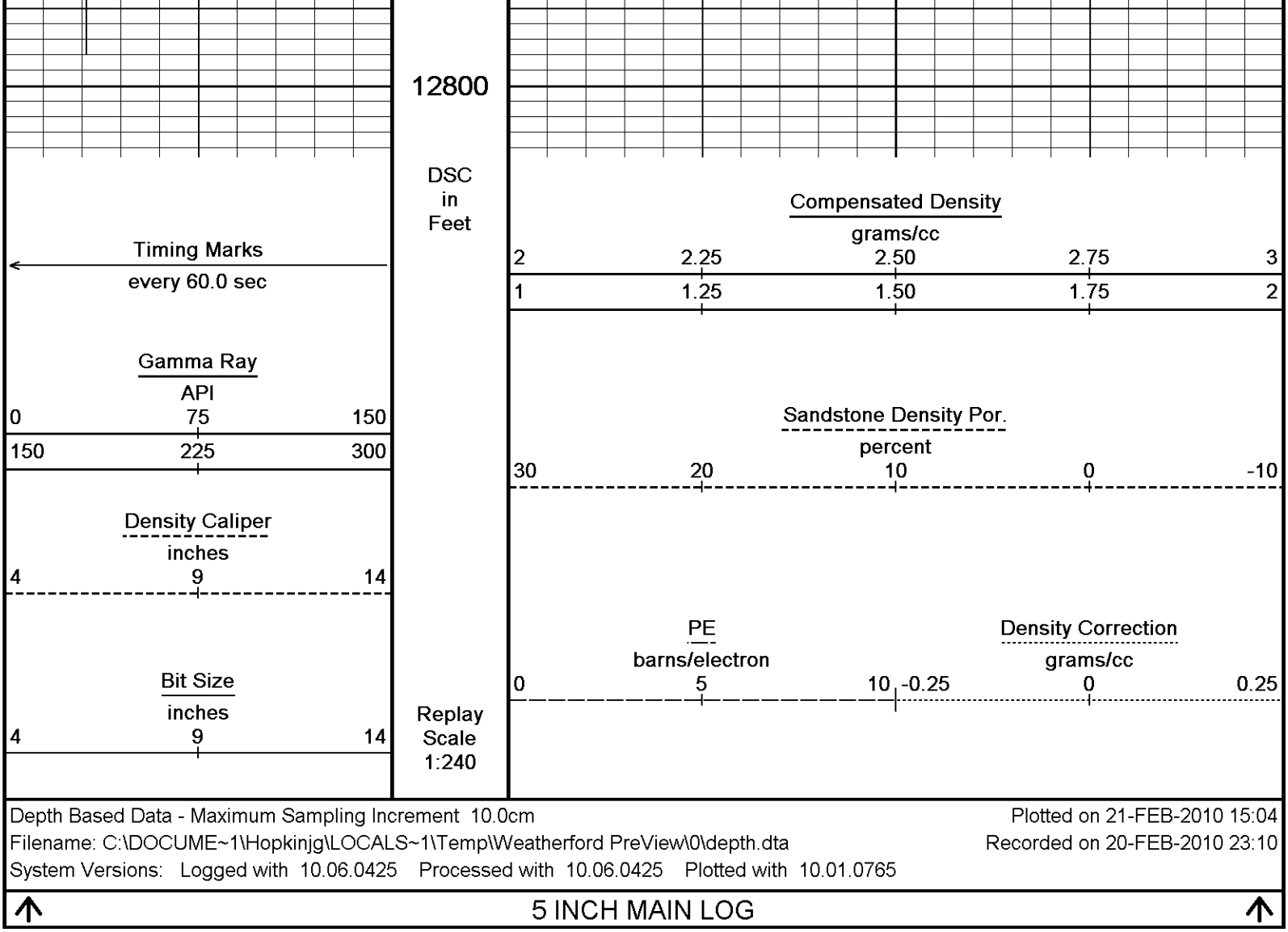

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 21-FEB-2010 15:04

Filename: C:\DOCUME~1\Hopkinjg\LOCALS~1\Temp\Weatherford PreView\0\depth.dta — Recorded on 20-FEB-2010 23:10

System Versions: Logged with 10.06.0425 Processed with 10.06.0425 Plotted with 10.01.0765

5 INCH MAIN LOG

BEFORE SURVEY CALIBRATION

C:\DOCUME~1\Hopkinjg\LOCALS~1\Temp\Weatherford PreView\0\depth.dta

General Constants All 000

Last Edited on 20-FEB-2010,04:45

General Parameters		
Mud Resistivity	2.340	ohm-metres
Mud Resistivity Temperature	78.000	degrees F
Water Level	0.000	feet
Density/Neutron Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	0	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	None	
Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Deep Induction	
RWA Constant A	0.610	
RWA Constant M	2.150	

Down-hole Tension Calibration SMS 000

Field Calibration on 25-JAN-2010 11:38

Reading No	Measured	Calibrated (lbs)
1	14334.21	0.00
2	15360.88	400.00

Gamma Calibration MCG 342

Field Calibration on 19-FEB-2010,22:21

	Measured	Calibrated (API)
Background	86	58
Calibrator (Gross)	1023	684
Calibrator (Net)	937	626

Gamma Constants MCG 342

Last Edited on 20-FEB-2010,04:45

Gamma Calibrator Number	GRC-005	
Mud Density	1.00	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG 342

Field Calibration on 19-FEB-2010,22:21

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

High Resolution Temperature Calibration MCG 342

Field Calibration on 19-FEB-2010,22:22

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

High Resolution Temperature Constants MCG 342

Last Edited on 8-DEC-2009,15:54

Pre-filter Length	11

Neutron Calibration MDN 250

Base Calibration on 25-AUG-2009 11:29
Field Check on 19-FEB-2010 21:40

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2977	91	3714	110
Ratio	32.702		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1610	2357
Ratio	0.683	

Field Check

	Calibrated (cps)	
	1694	2474
Ratio	0.684	

Neutron Constants MDN 250

Last Edited on 19-FEB-2010,22:22

Neutron Source Id	755	
Neutron Jig Number	6532	
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	7.00	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	20.00	degrees F
Mud Salinity	0.00	kppm
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE 236

Base Calibration on 5-DEC-2009 15:33
Field Check on 19-FEB-2010 21:54

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.9	126.8

Base Check	281.2
Field Check	281.4

FE Constants MFE 236

Last Edited on 19-FEB-2010,22:22

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	1.0	inches

Sonic Constants MSS 221

Last Edited on 19-FEB-2010,22:22

Maximum Boundary Contrast	60.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft
Sonde Mode	Full Waveform	
Hole Type	Open Hole	

Sonde Parameters

	Measured	Calibrated
Offset	0.0000	0.0000
Free Pipe	0.0000	0.0000

Peak Amplitude Source 0

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing 3 foot

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)
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
0.00	0.00	0.00	

Full Waveform Parameters

Use 3' Waveform to derive TR	Yes	
Use 4' Waveform to derive TR	Yes	
Use 5' Waveform to derive TR	Yes	
Use 6' Waveform to derive TR	Yes	
3' Waveform Discriminator Level	0.30	mV
4' Waveform Discriminator Level	0.30	mV
5' Waveform Discriminator Level	0.15	mV
6' Waveform Discriminator Level	0.15	mV
3' Waveform Filter	None	
4' Waveform Filter	None	
5' Waveform Filter	None	
6' Waveform Filter	None	
Semblance Level	0.50	
Semblance Window Width	120.00	micro-sec
Sonic 1 Despiker	30.48	micro-sec/ft

Sonic 2 Despiker	30.48	micro-sec/ft

Induction Calibration MAI 287

Base Calibration on 9-FEB-2010,13:46
Field Check on 19-FEB-2010 21:56

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	16.6	472.0	9.3	966.2
2	6.0	384.6	7.6	821.4
3	3.3	258.9	5.2	566.0
4	2.2	137.2	2.6	279.2

Array Temperature 77.0 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	15.0	3831.4	12.3	3832.4	
2	31.9	3493.7	29.6	3494.9	
3	30.7	3046.7	28.7	3047.8	
4	19.7	2010.9	18.4	2011.6	
Deep	18.3	1971.3	16.9	1972.0	
Medium	45.6	4058.0	43.0	4059.7	
Shallow	48.2	5177.1	44.9	5178.9	
Array Temperature		44.0		42.0	Deg F

Induction Constants MAI 287

Last Edited on 19-FEB-2010,22:23

Induction Model	VECTAR	
Caliper for Borehole Corr.	Density Caliper	
Hole Size for Borehole Correction	N/A	inches
Tool Centred	No	
Stand-off Type	Fins	
Stand-off	0.50	inches
Number of Fins on Stand-off	6.0000	
Stand-off Fin Angle	60.00	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	0.0000	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

High Resolution Temperature Calibration MAI 287

Field Calibration on 19-FEB-2010,21:56

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	50.00	50.00

High Resolution Temperature Constants MAI 287

Last Edited on 9-FEB-2010,13:50

Pre-filter Length	11

Caliper Calibration MPD 220

Base Calibration on 20-JAN-2010 13:56
Field Calibration on 19-FEB-2010,21:52

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14272	4.00
2	22416	5.96
3	30368	7.98
4	38432	9.86
5	47536	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.97	5.96

Photo Density Calibration MPD 220

Base Calibration on 13-FEB-2010,09:45
Field Check on 19-FEB-2010 21:45

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	45083	16661	53115	19186
Reference 2	21601	2751	25020	2536

Field Check at Base

1285.0	1528.4

Field Check

1290.9	1536.3

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	230	1135		
Reference 1	16270	44889	0.367	0.320
Reference 2	6180	21438	0.293	0.272

Field Check at Base

230.1	1134.6

Field Check

232.7	1138.6

Density Constants MPD 220

Last Edited on 19-FEB-2010,21:45

Density Source Id	271	
Nylon Calibrator Number	507	
Aluminium Calibrator Number	507	
Density Shoe Profile	4 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.17	gm/cc
Mud Density Z/A Correction	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	Standard	

Matrix Density (gm/cc)	Depth (ft)
2.65	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

DOWNHOLE EQUIPMENT

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Shuttle Running Tool 3.5" (SRT A)
SRT 1 Length: 0.33 ft Weight: 37.5 lb

MBS-A.A 400v Compact Battery Sub
MBS 52 Length: 14.24 ft Weight: 105.8 lb

Compact Gamma
MCG 342 Length: 8.70 ft Weight: 63.9 lb

Compact Memory Sub A.C
MMS 21 Length: 3.12 ft Weight: 30.9 lb

SKJ-D.A Compact Knuckle Joint
SKJ 172 Length: 2.17 ft Weight: 24.3 lb

SHA-J.A Compact Swivel Head Adaptor
SHA 214 Length: 2.30 ft Weight: 22.0 lb

MIS-D.A Compact Inline Bowspring sub
MIS 315 Length: 5.70 ft Weight: 33.1 lb

Compact Neutron
MDN 250 Length: 5.04 ft Weight: 50.7 lb

Compact Density/Caliper
MPD 220 Length: 9.59 ft Weight: 90.4 lb

MIS-D.A Compact Inline Bowspring sub
MIS 442 Length: 5.70 ft Weight: 33.1 lb

SHA-J.A Compact Swivel Head Adaptor
SHA 316 Length: 2.30 ft Weight: 22.0 lb

SKJ-D.A Compact Knuckle Joint
SKJ 154 Length: 2.17 ft Weight: 24.3 lb

MIS-B Compact Inline Standoff sub
MIS 277 Length: 2.14 ft Weight: 15.4 lb

Compact Focussed Electric
MFE 236 Length: 6.03 ft Weight: 48.5 lb

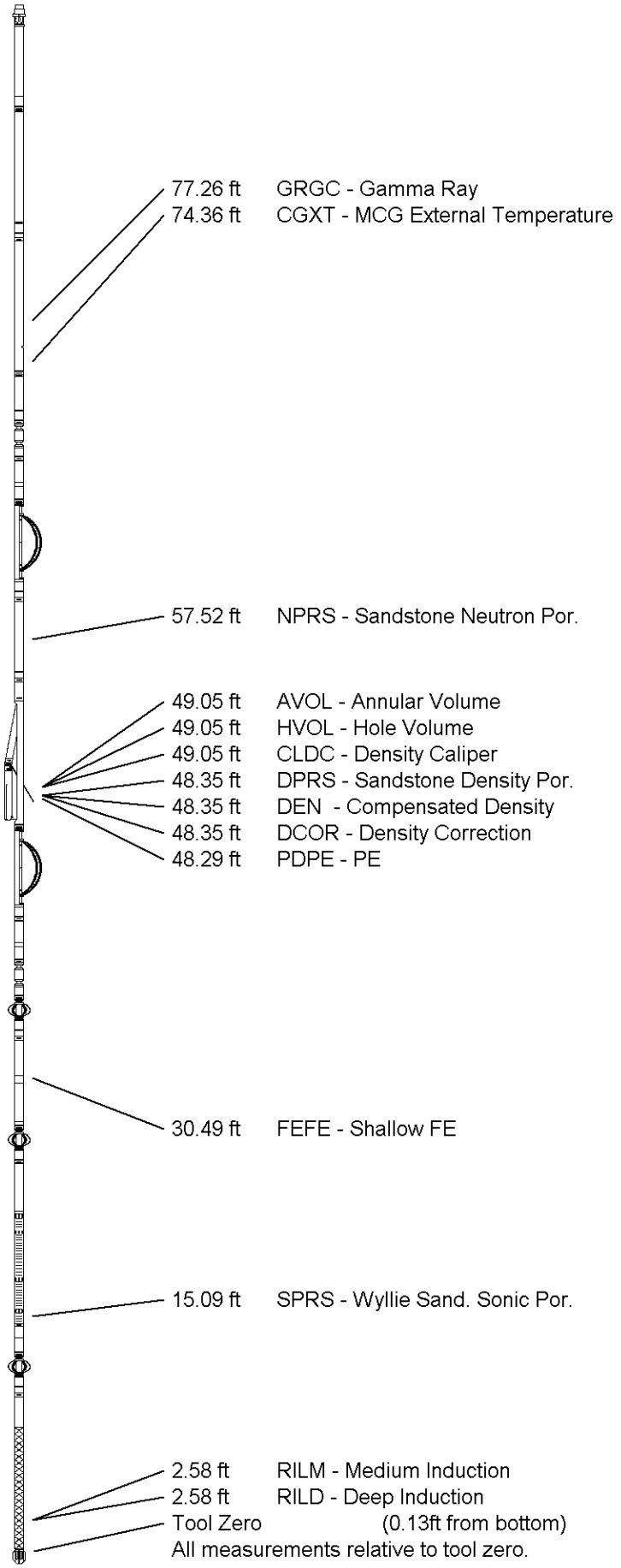
MIS-B Compact Inline Standoff sub
MIS 182 Length: 2.14 ft Weight: 15.4 lb

Compact Sonic
MSS 221 Length: 12.52 ft Weight: 72.8 lb

MIS-B Compact Inline Standoff sub
MIS 365 Length: 2.14 ft Weight: 15.4 lb

Compact Induction
MAI 287 Length: 10.81 ft Weight: 48.5 lb

Total Length: 97.12 ft Weight: 754.0 lb



COMPANY	EXXON MOBIL CORPORATION
WELL	FREEDOM RANCH UNIT 197-33B8

FIELD	PICEANCE CREEK
PROVINCE/COUNTY	RIO BLANCO
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	6476.00	feet	First Reading	12748.00	feet
Elevation Drill Floor	6475.00	feet	Depth Driller	12830.00	feet
Elevation Ground Level	6446.00	feet	Depth Logger	12796.00	feet

Weatherford®

COMPACT WELL SHUTTLE

COMPENSATED PHOTO DENSITY

COMPENSATED DUAL NEUTRON LOG