



**Weatherford**<sup>®</sup>

**CML WELL SHUTTLE  
COMPENSATED PHOTO-DENSITY  
COMPENSATED NEUTRON LOG**

COMPANY **UNIT PETROLEUM**  
WELL **LOUDENBACK 7-1H**  
FIELD **WILDCAT**  
PROVINCE/COUNTY **RENO**  
COUNTRY/STATE **USA / KANSAS**  
LOCATION **150' FWL & 850' FEL**  
**NE NW NE NE**

SEC **TWP** **RGE** **Other Services**  
**7** **25 S** **10 W** **MAI**  
**API Number 15-155-21662-01** **CMI**  
**Permit Number**  
**Permanent Datum G.L., Elevation 1770 feet**  
**Log Measured From KB**  
**Drilling Measured From K.B.**

Date	02-AUG-2013	Elevations:	KB	1784.00
Run Number	ONE	DF	1784.00	
Depth Driller	8615.00	GL	1770.00	
Depth Logger	8482.00			
First Reading	8428.00			
Last Reading	4326.00			
Casing Driller	4320.00			
Casing Logger	4326.00			
Bit Size	6.125			
Hole Fluid Type	WBM			
Density / Viscosity	8.50	lb/USg	28.00	CP
PH / Fluid Loss	8.00		99.00	ml/30Min
Sample Source	FLOWLINE			
Rm @ Measured Temp	2.10 @ 77.0		ohm-m	
Rmf @ Measured Temp	1.68 @ 77.0		ohm-m	
Rmc @ Measured Temp	2.52 @ 77.0		ohm-m	
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	1.23 @ 131.0		ohm-m	
Time Since Circulation	1 HOUR			
Max Recorded Temp	131.00		deg F	
Equipment Name	COMPACT			
Equipment / Base	18064		OKC	
Recorded By	C. GRIFFIN			
Witnessed By	R. WILSON		J.SCHULER	
S.O.#/AFE	3540222 / 1307200			

**BOREHOLE RECORD**

Last Edited: 02-AUG-2013 15:13

Bit Size inches	Depth From feet	Depth To feet
6.125	4320.00	8615.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
INTERMED	7.000	0.00	4320.00	26.00

**REMARKS**

WLS SOFTWARE VERSION 13.03. USED.

TOOLS RUN ON DRILLPIPE USING COMPACT WELL SHUTTLE DEPLOYMENT TECHNIQUE.

DEPTH MEASURED USING ADVANTAGE RIG DEPTH CORRECTED TO PIPE TALLY.

TOOLS DEPLOYED WITH MULE SHOE SITTING AT 8379 FT.  
AFTER DEPLOYMENT LOGGING TOOL WAS AT 8482 FT.

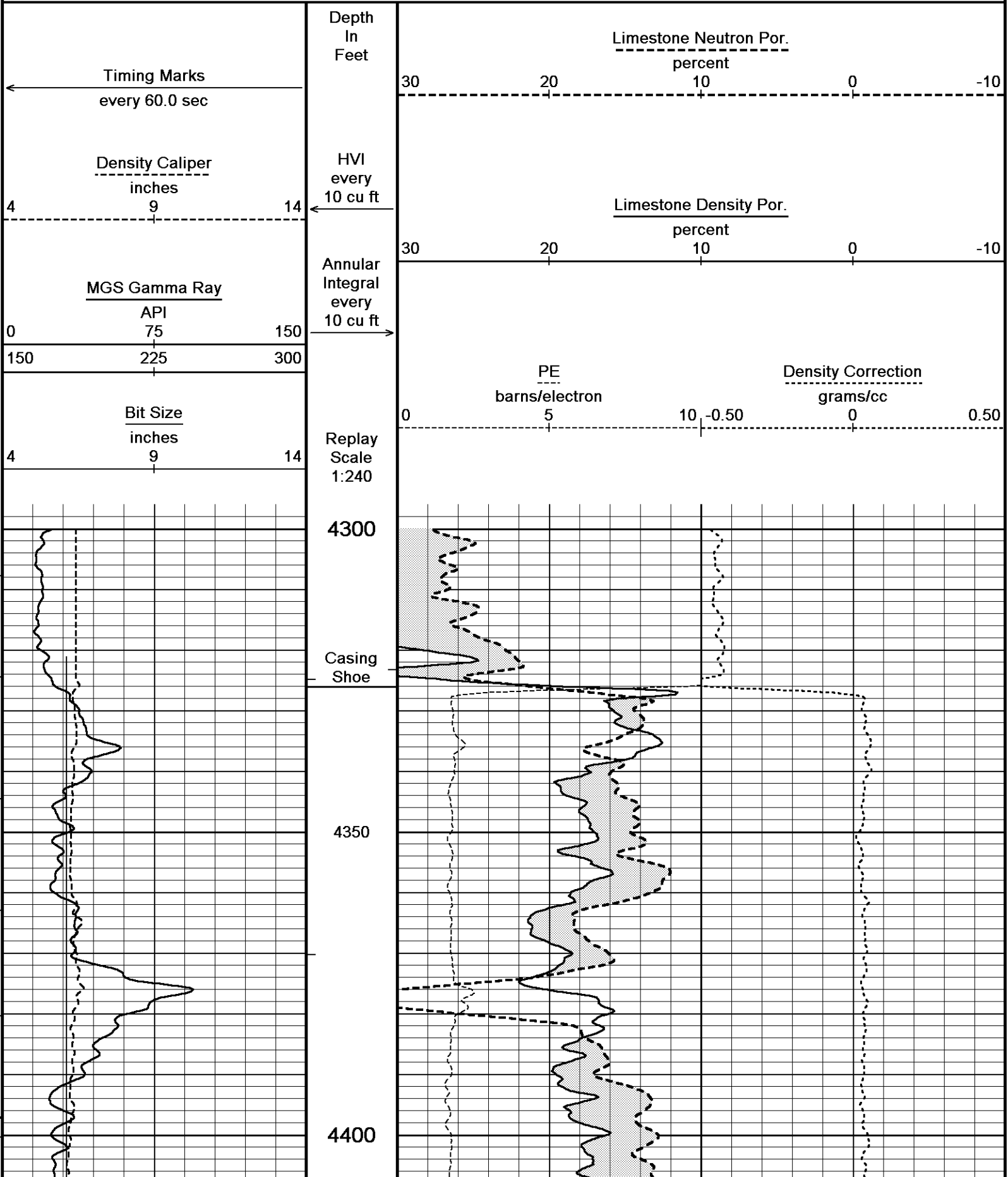
4.5 " PRODUCTION CASING USED TO CALCULATE ANNULAR HOLE VOLUMES.

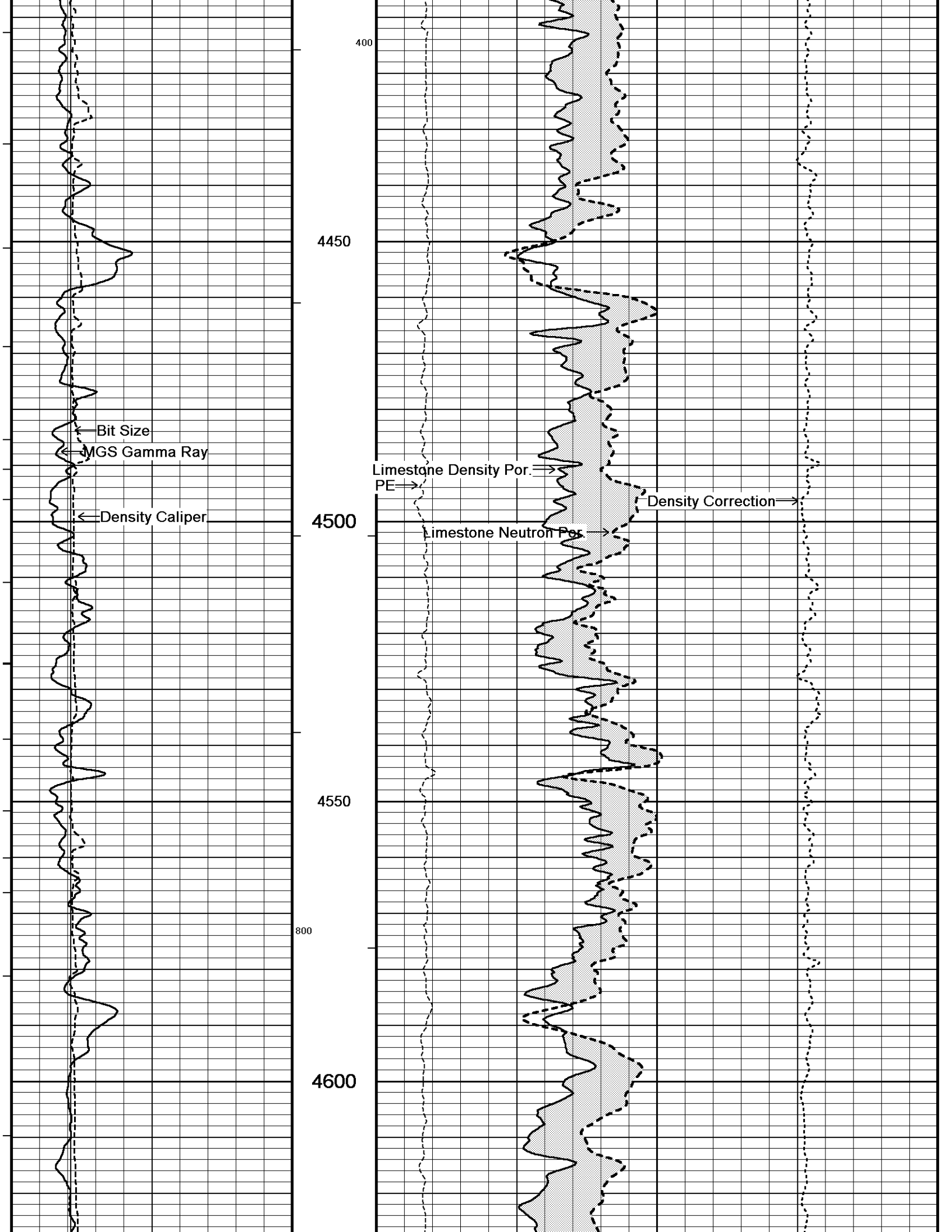
OPERATORS: G. GARCIA, C. ALEXANDER  
RIG: UNIT 331

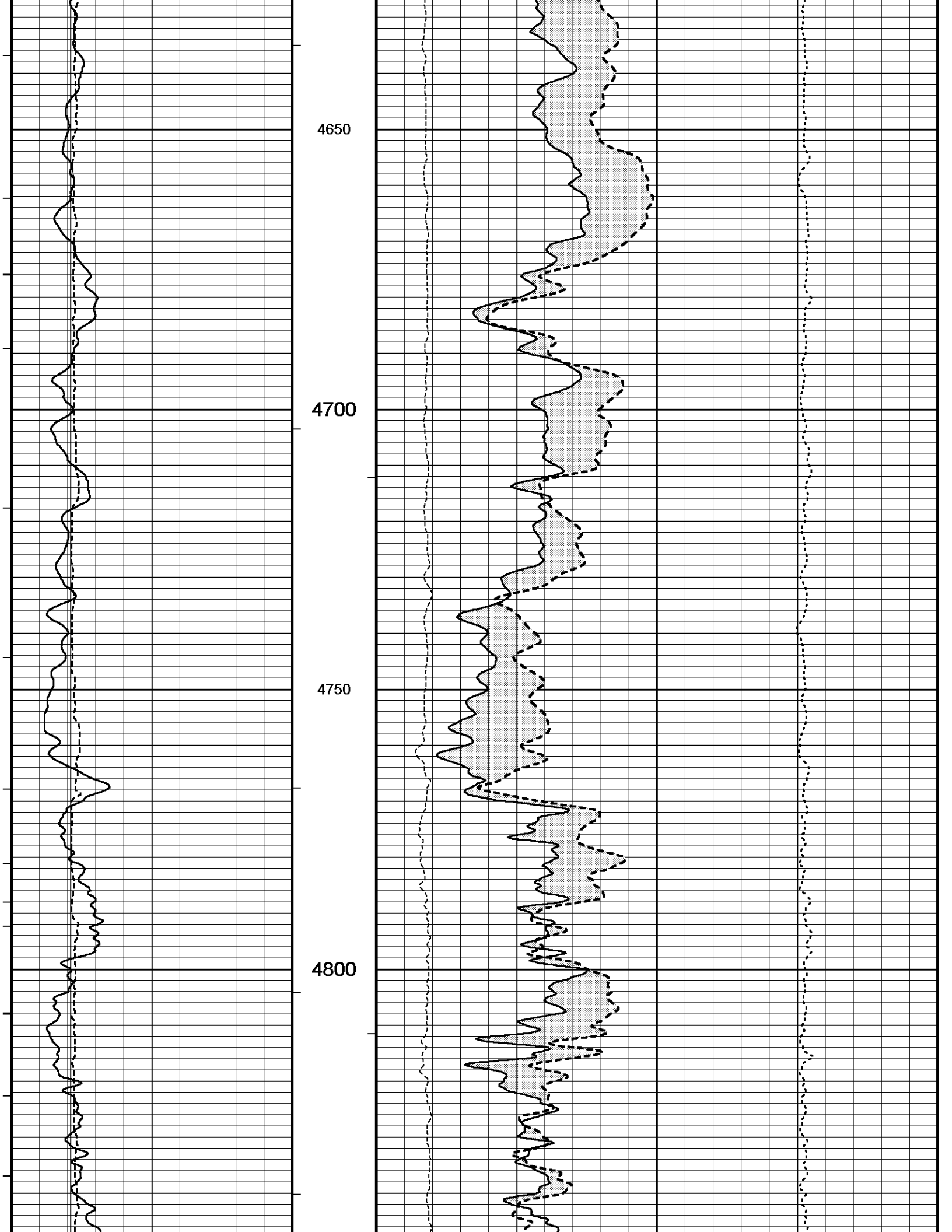
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or

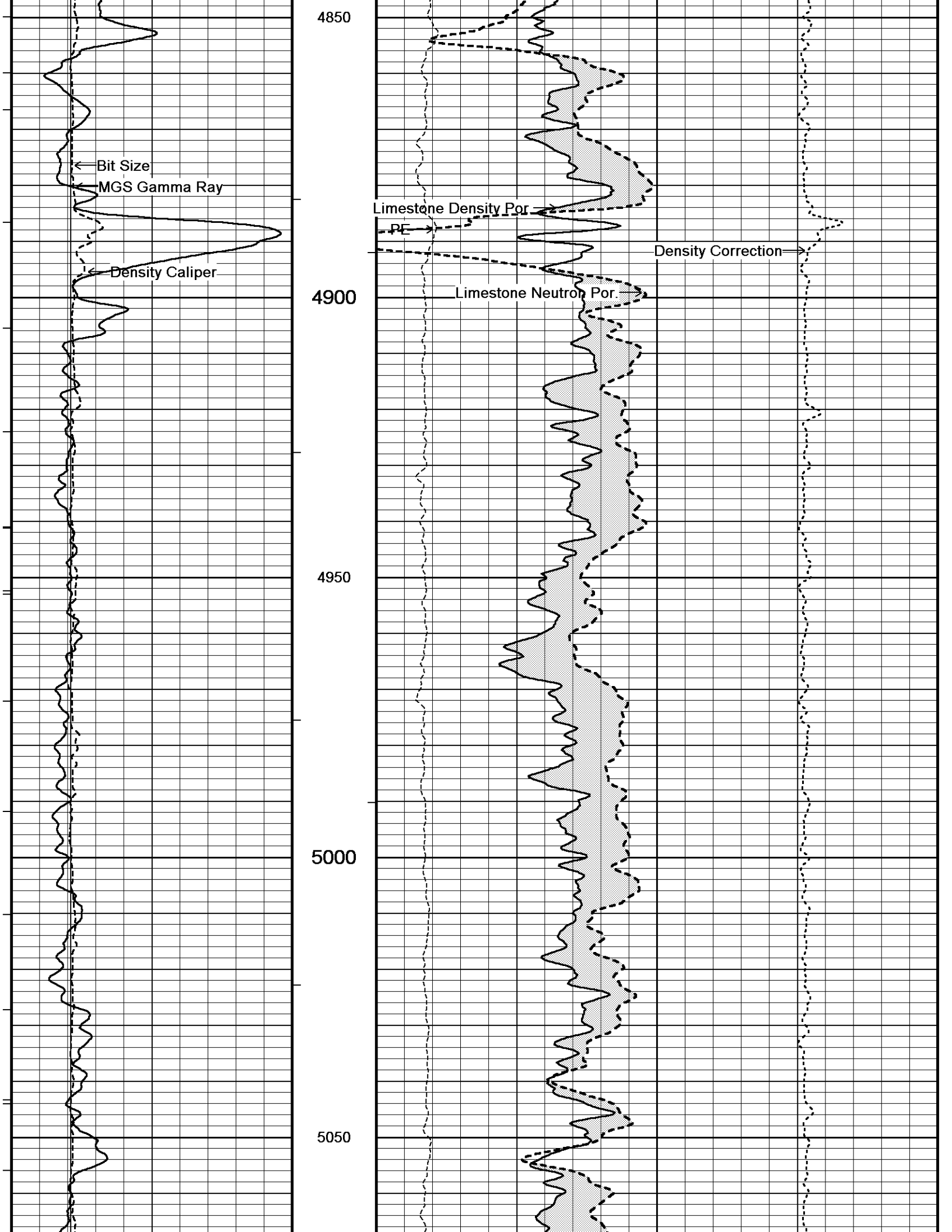
**5 INCH MAIN PASS DSC**

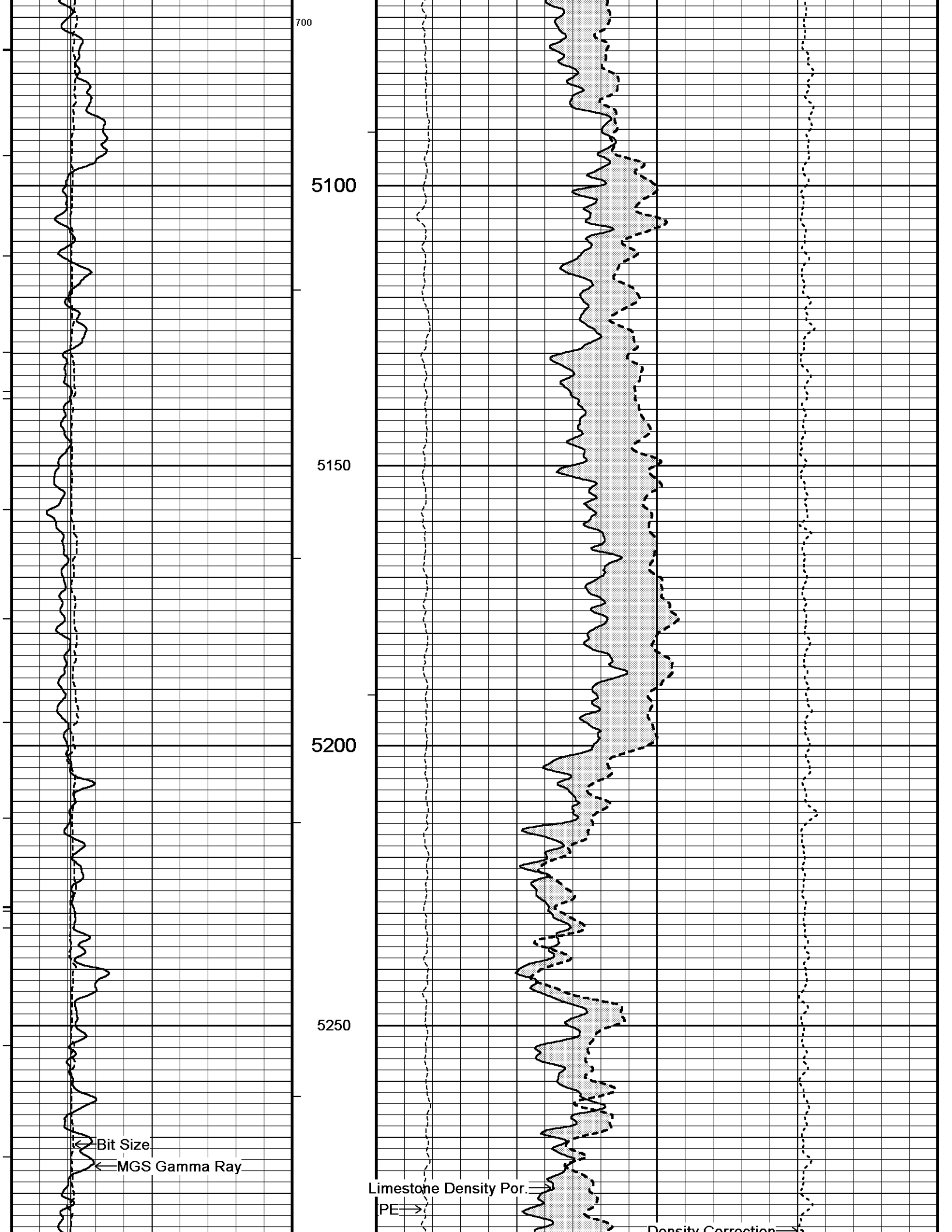
Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 03-AUG-2013 11:17  
 Filename: C:\Data\Unit\Unit Loudenback 7-1H\MSS 166 Depth Log2.dta Recorded on 03-AUG-2013 10:21  
 System Versions: Processed with 13.03.7779 Plotted with 13.03.7779

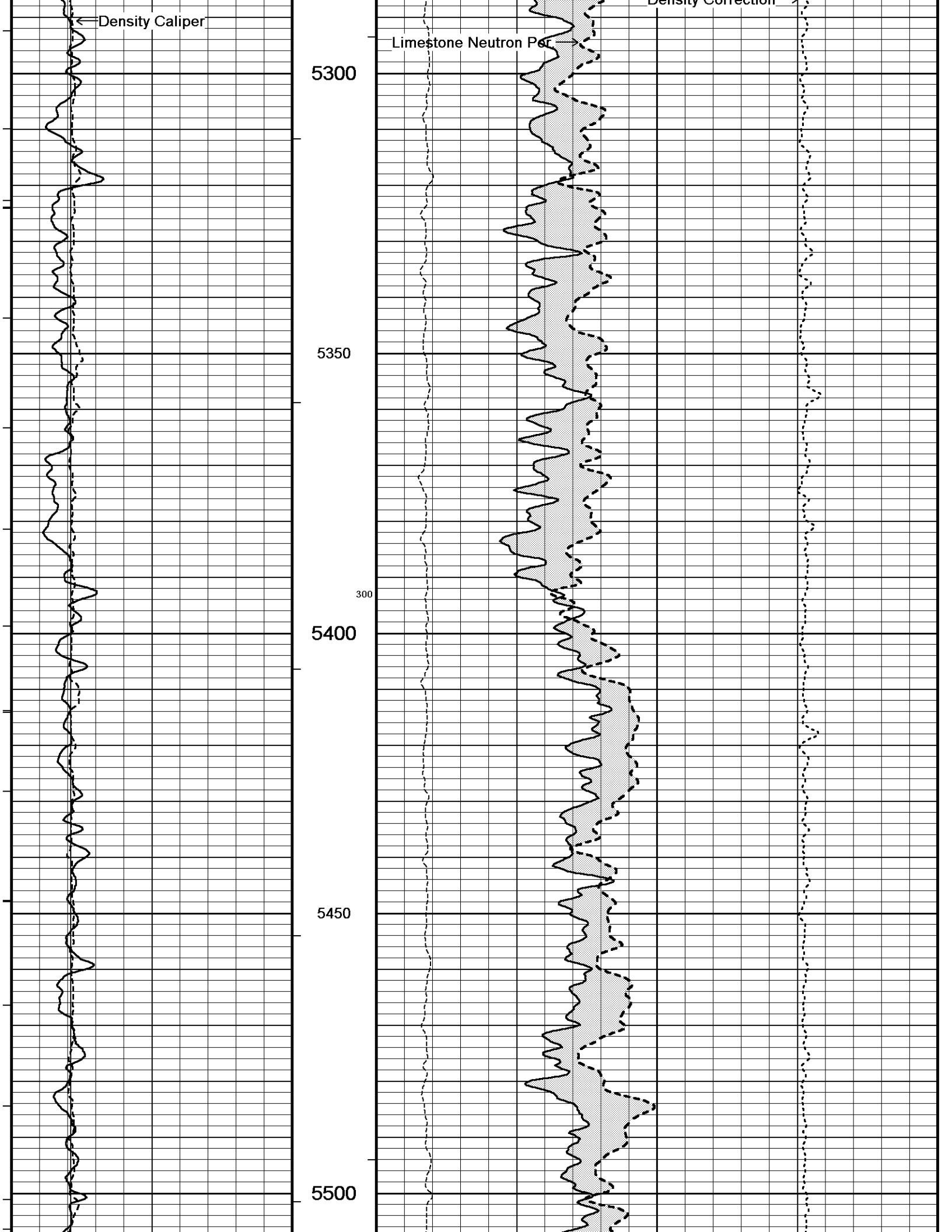


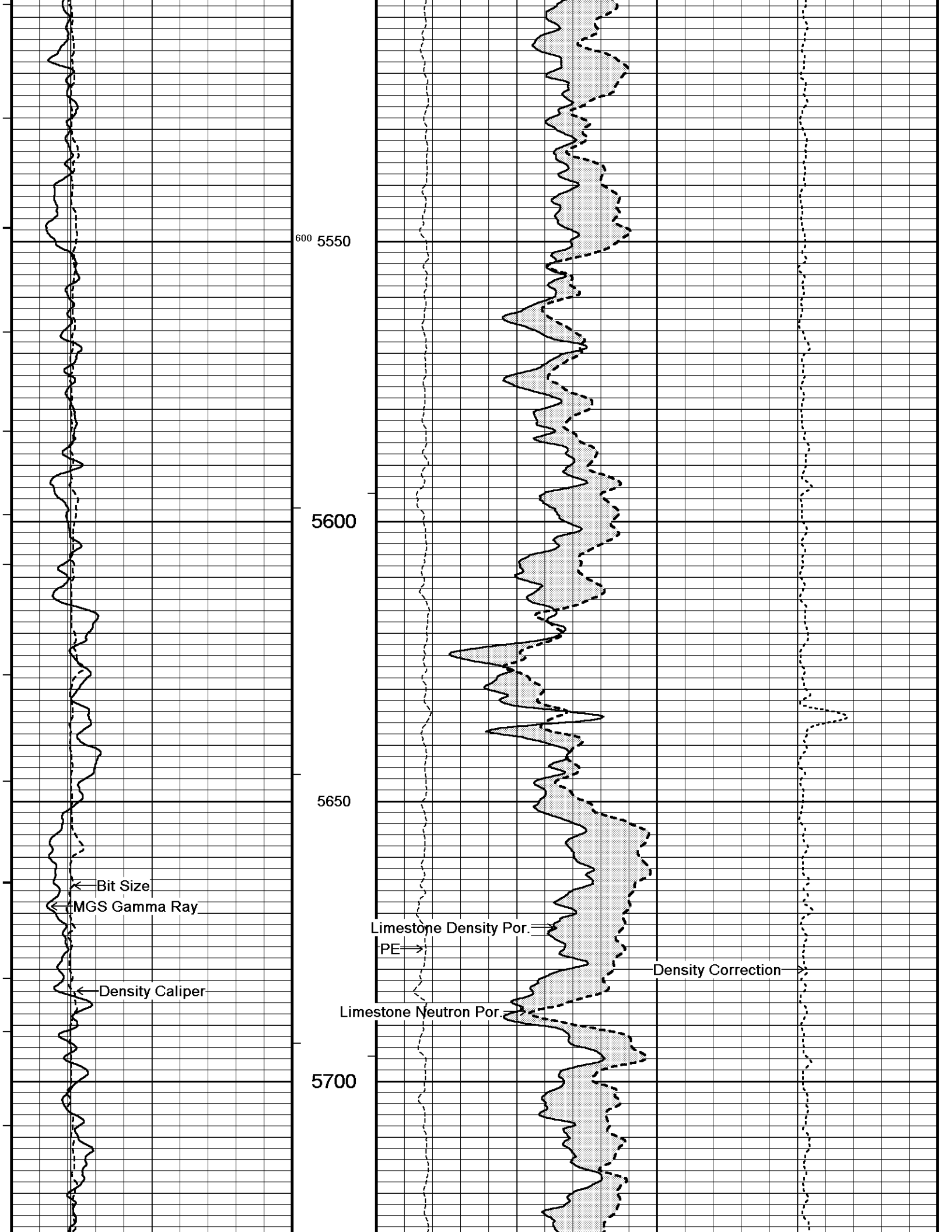












600 5550

5600

5650

5700

Bit Size

MGS Gamma Ray

Density Caliper

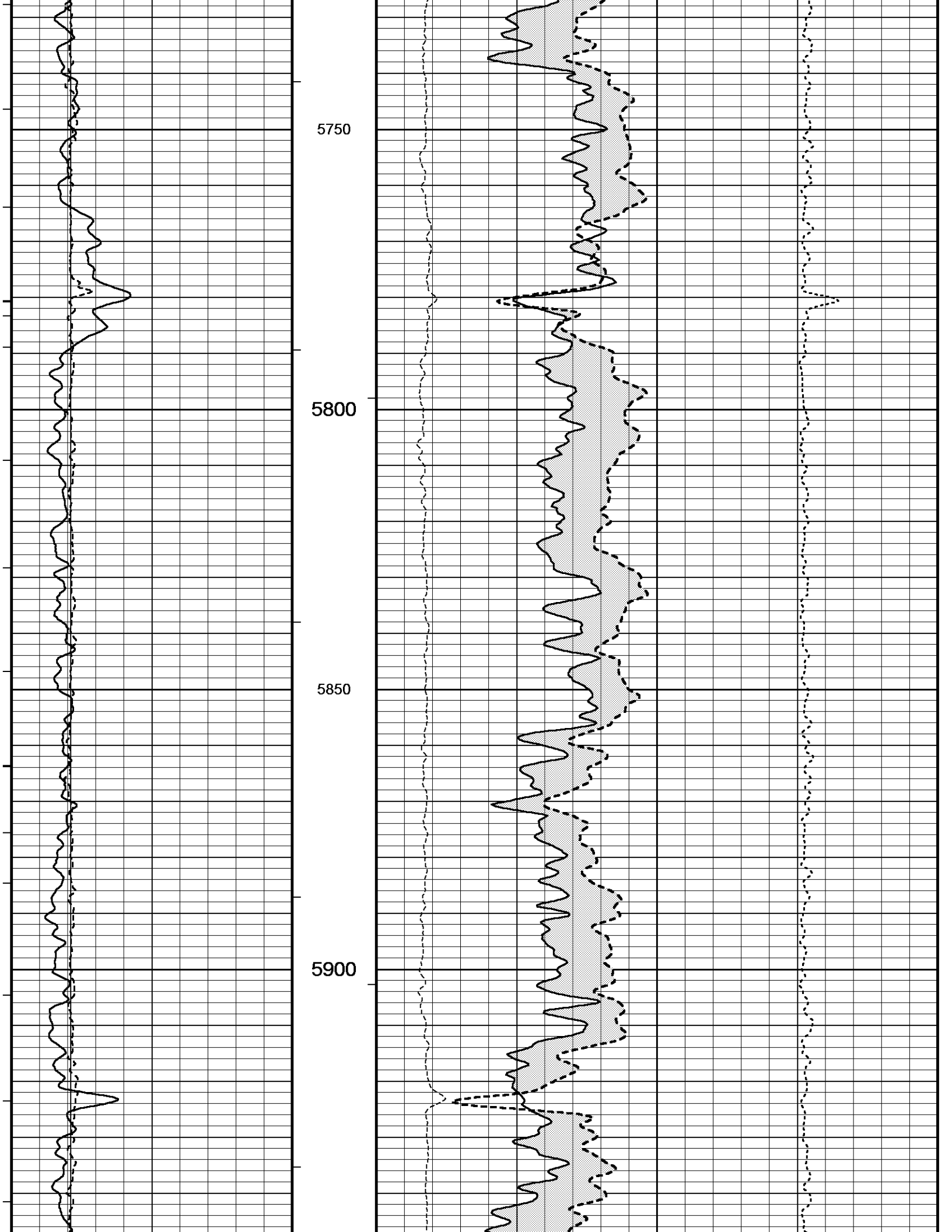
Limestone Density Por.

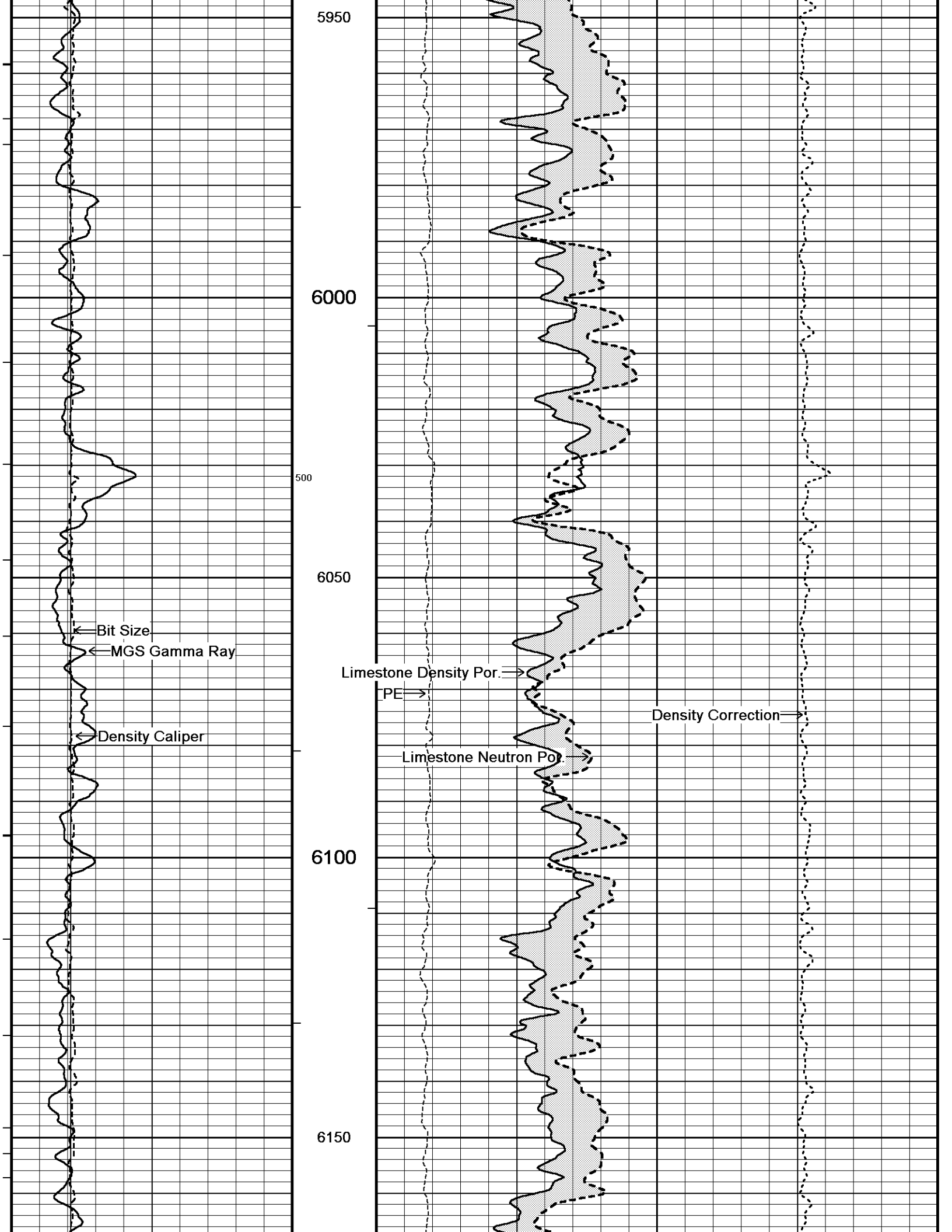
PE

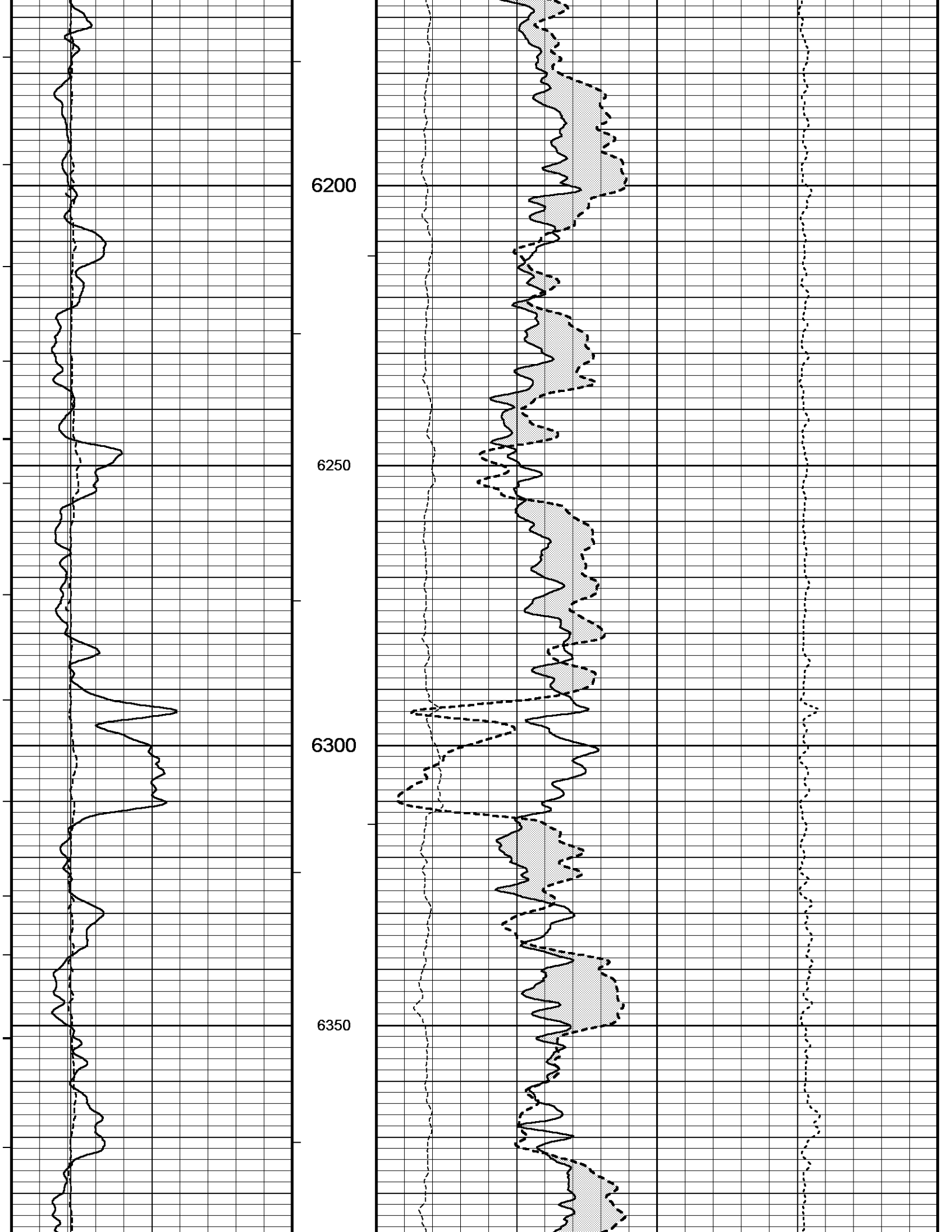
Limestone Neutron Por.

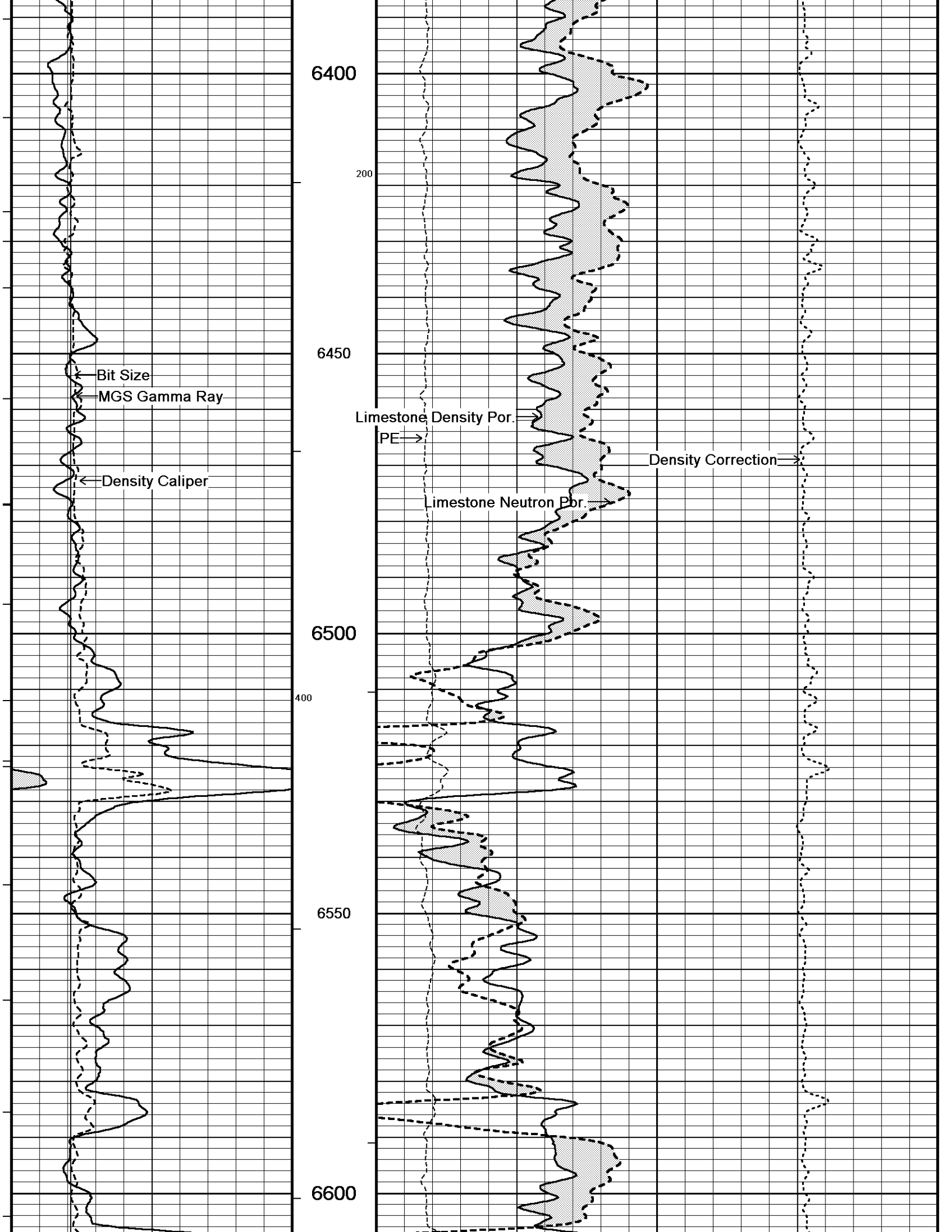
Density Correction

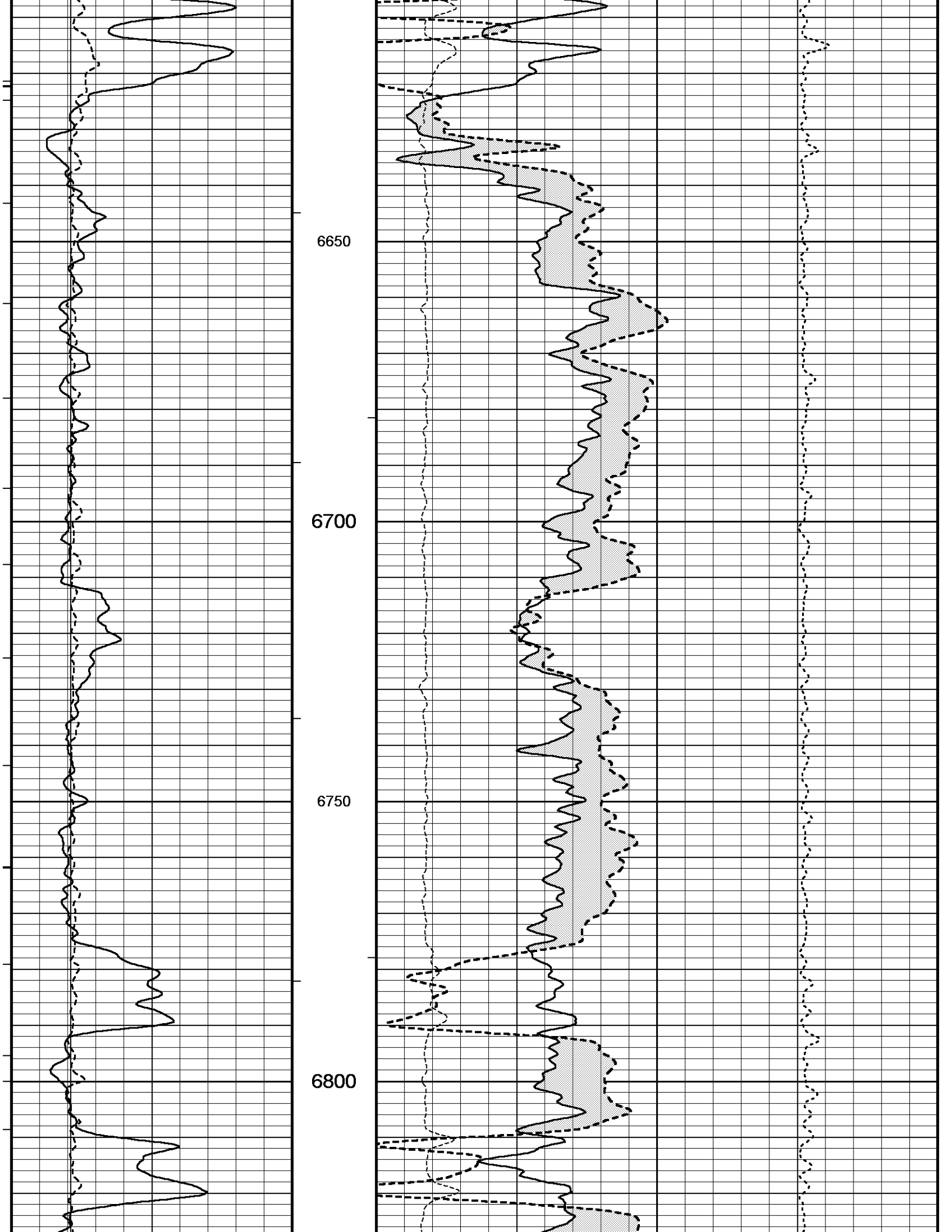


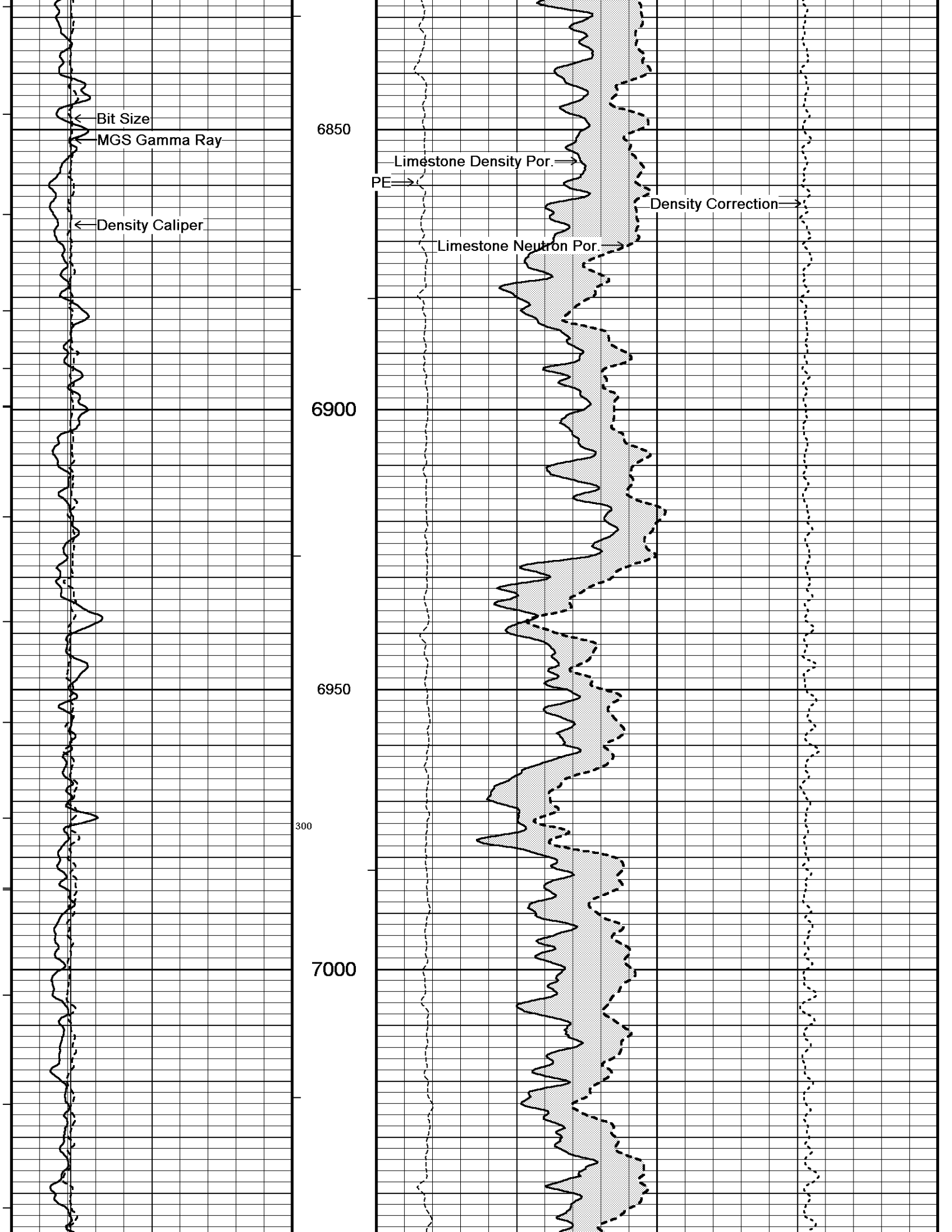


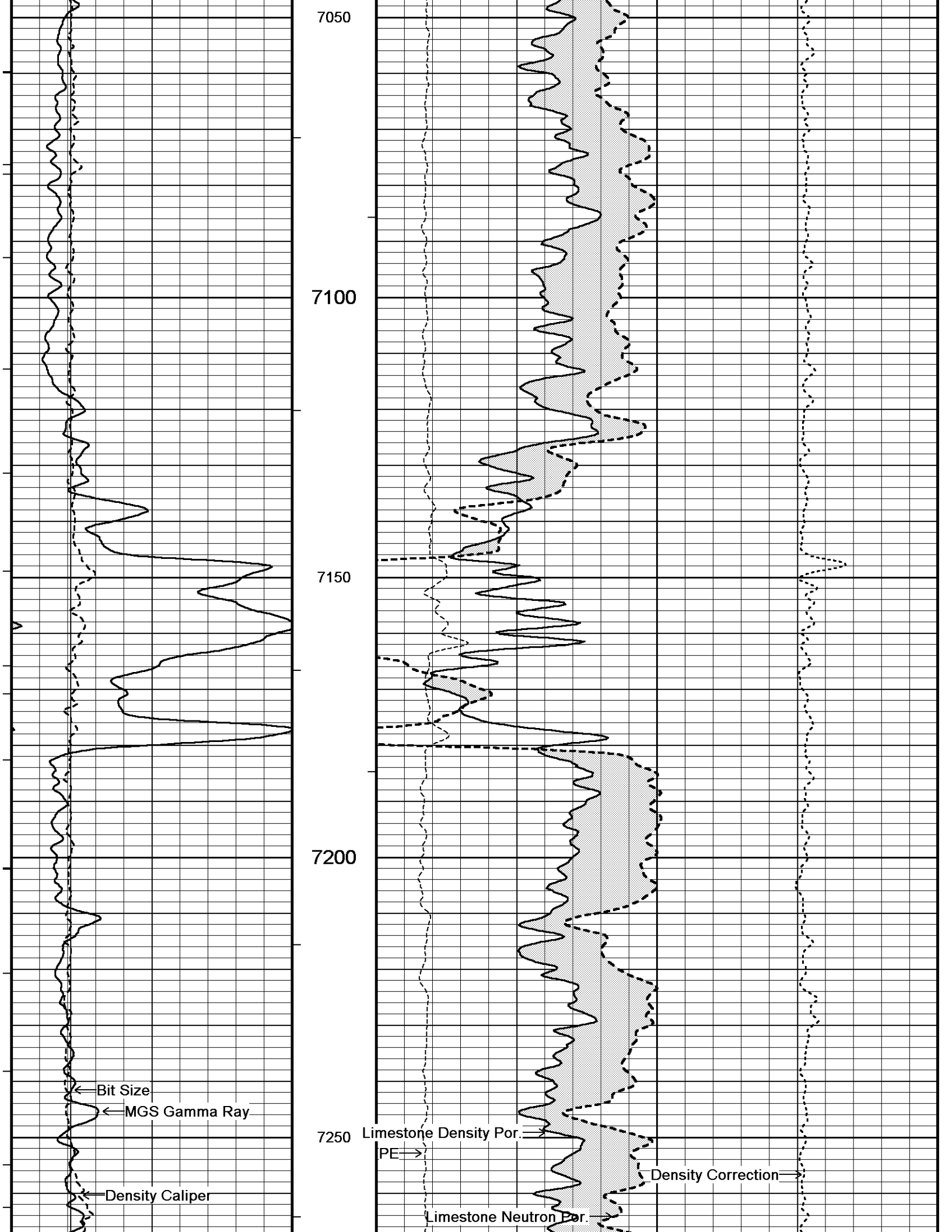


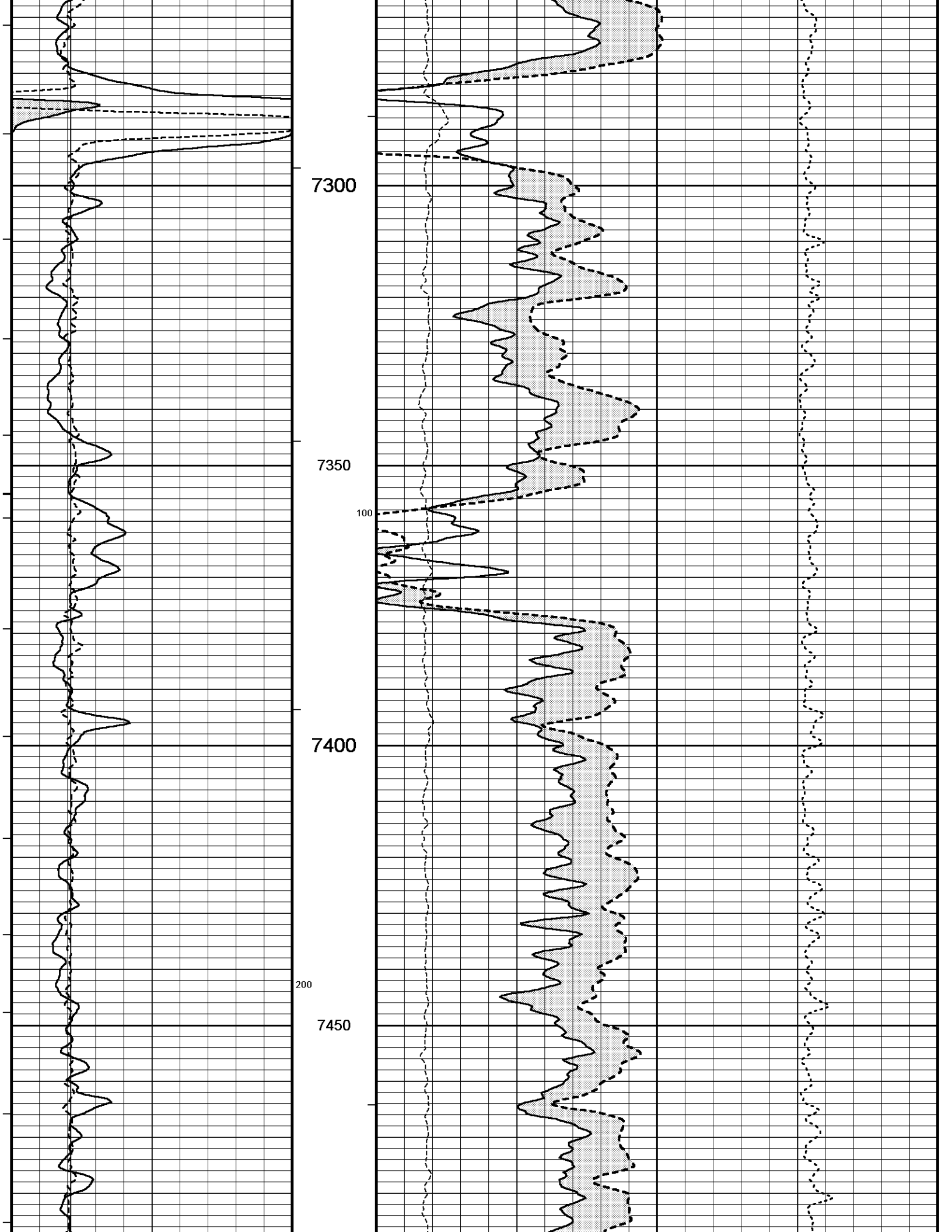




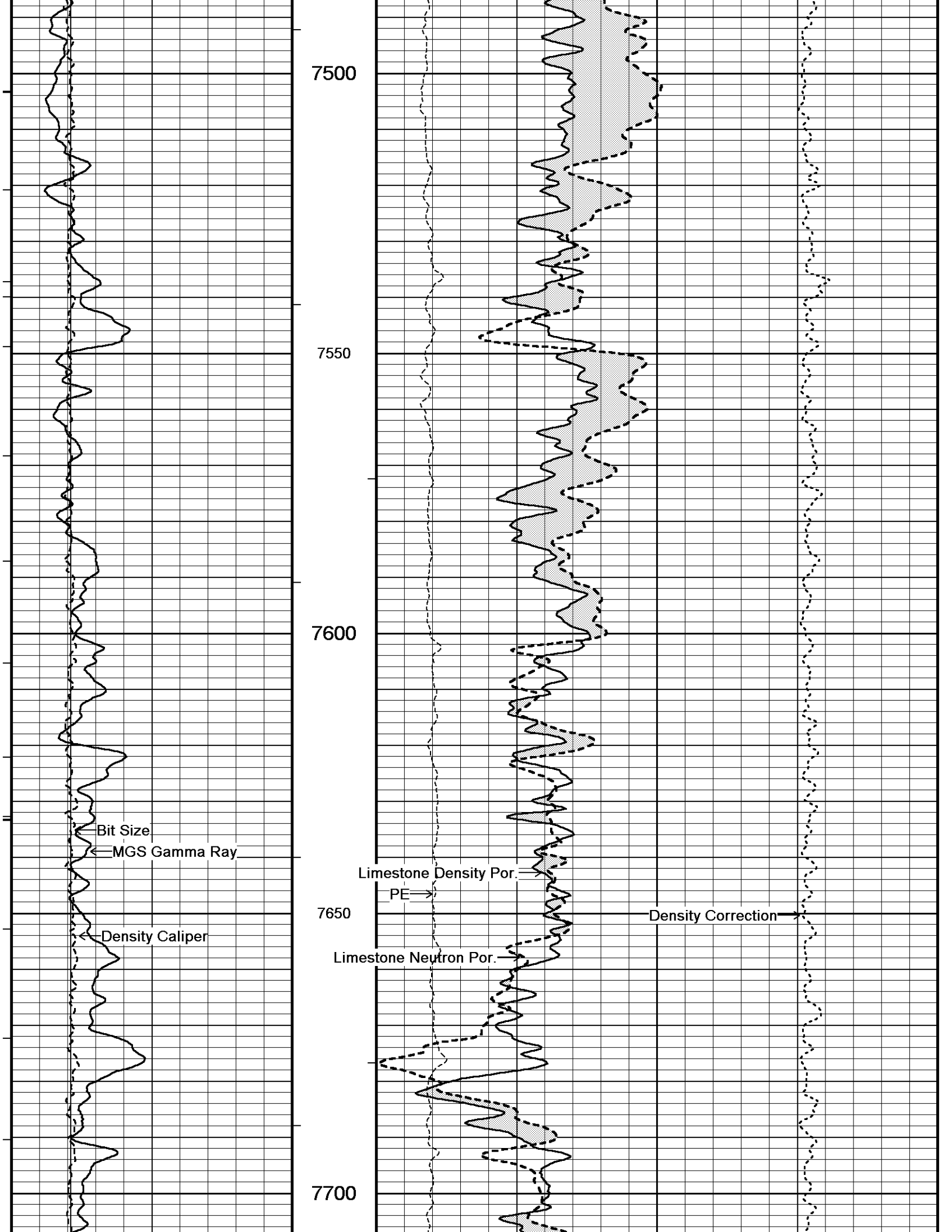


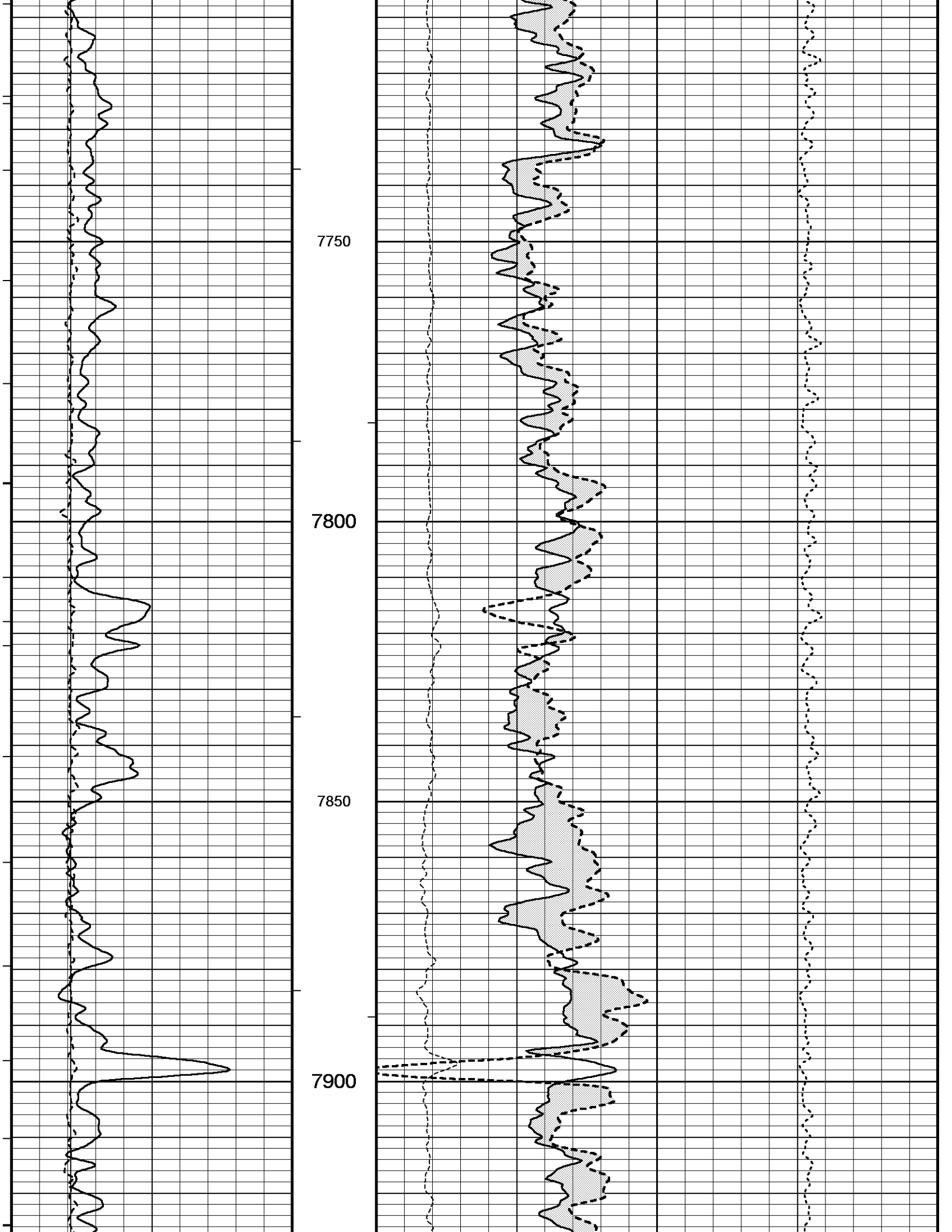


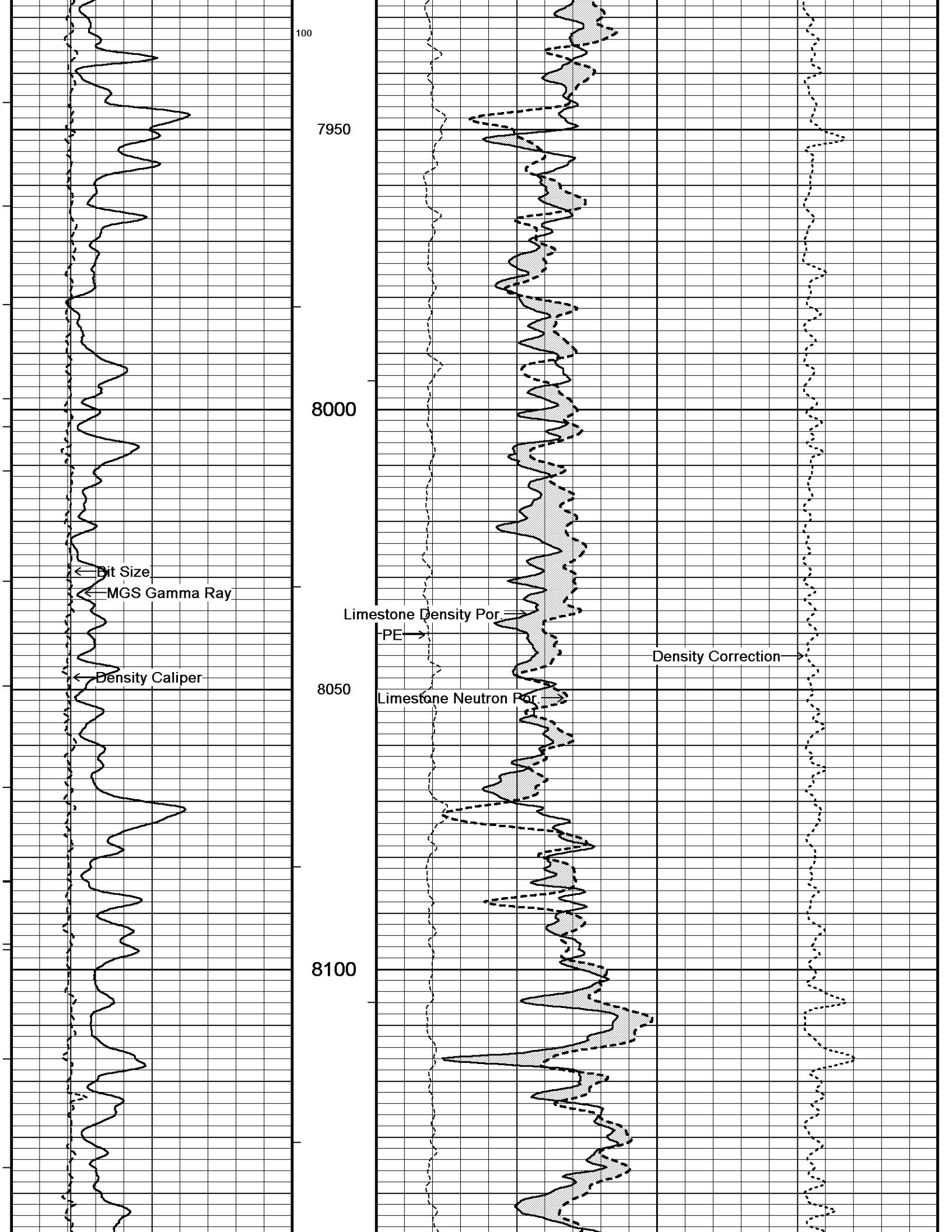


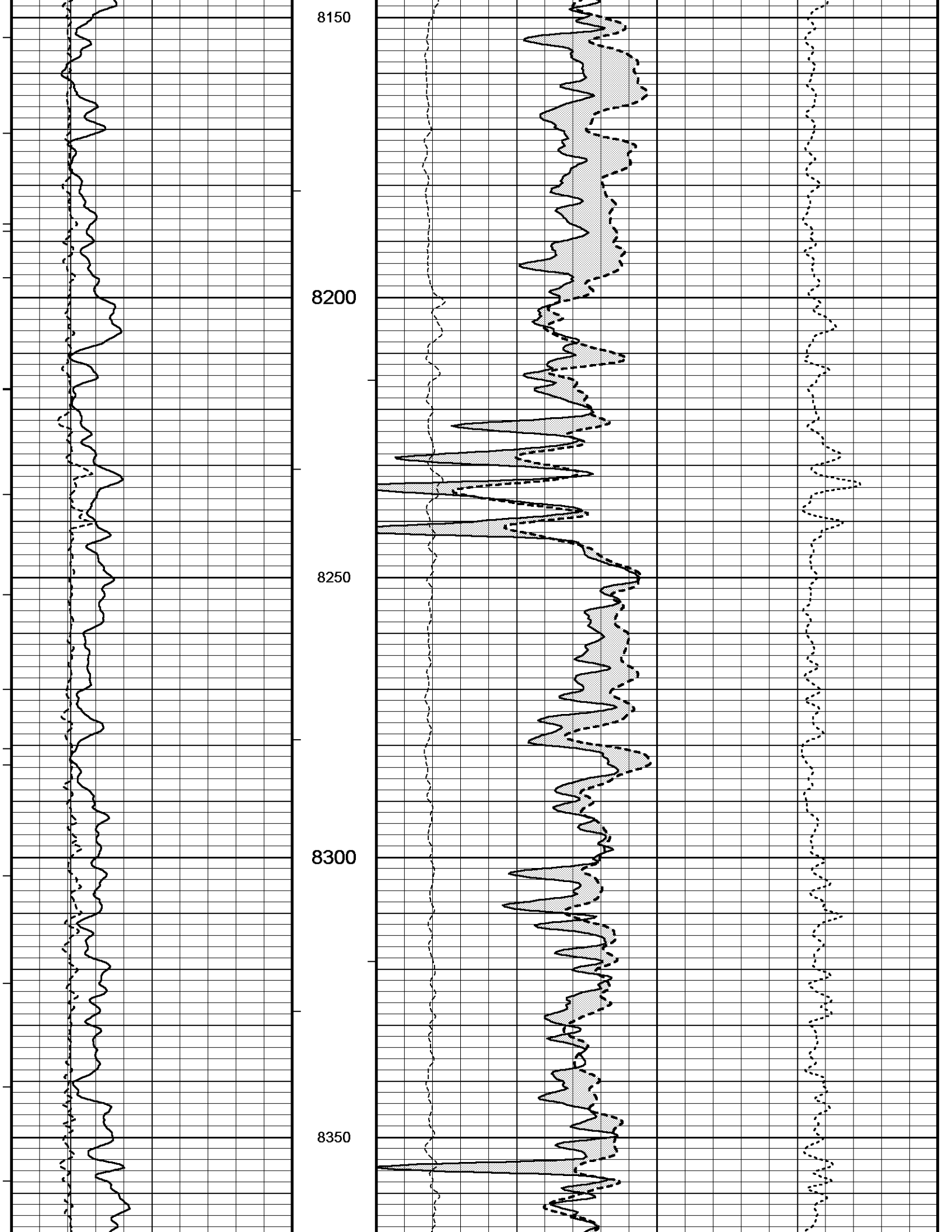


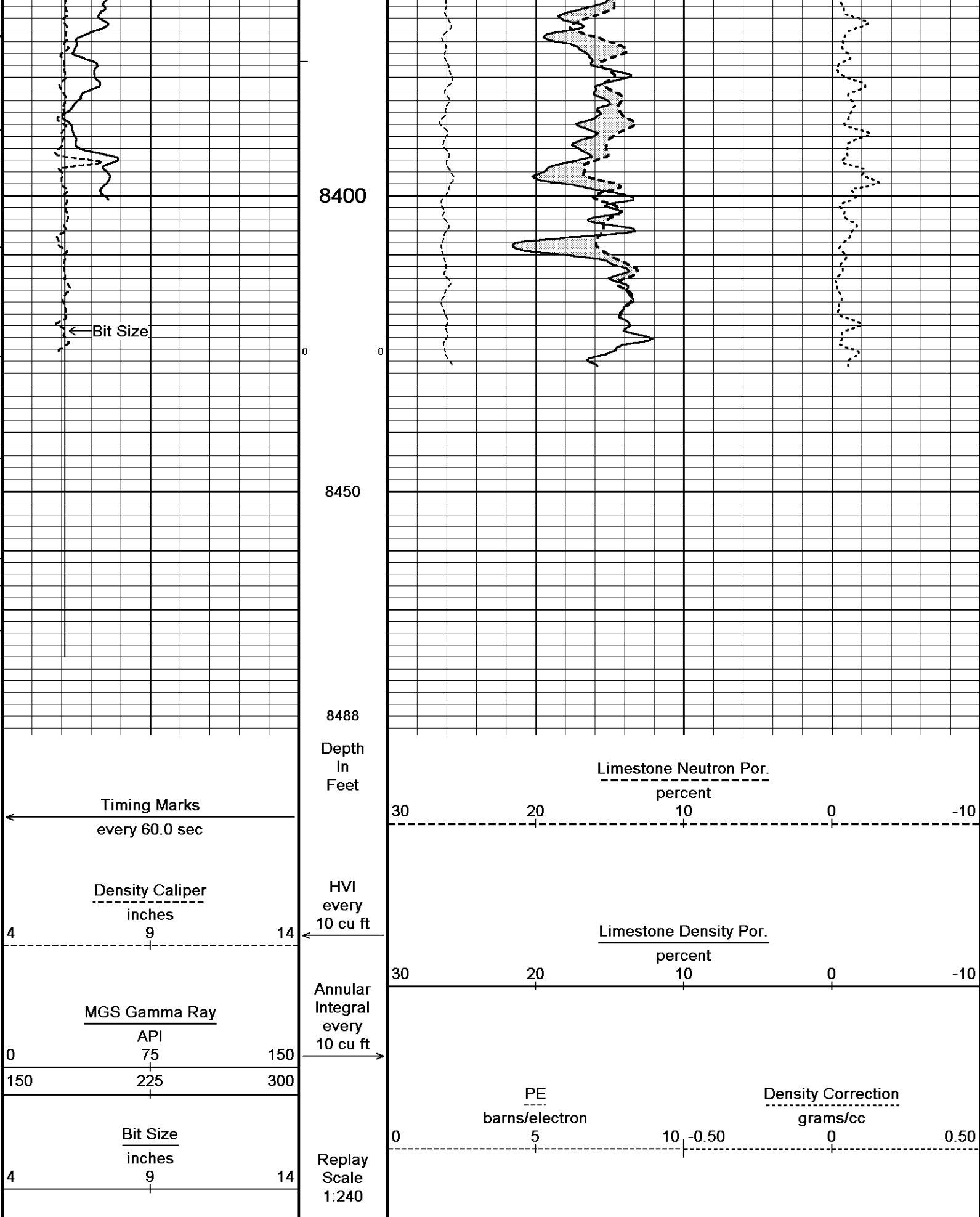






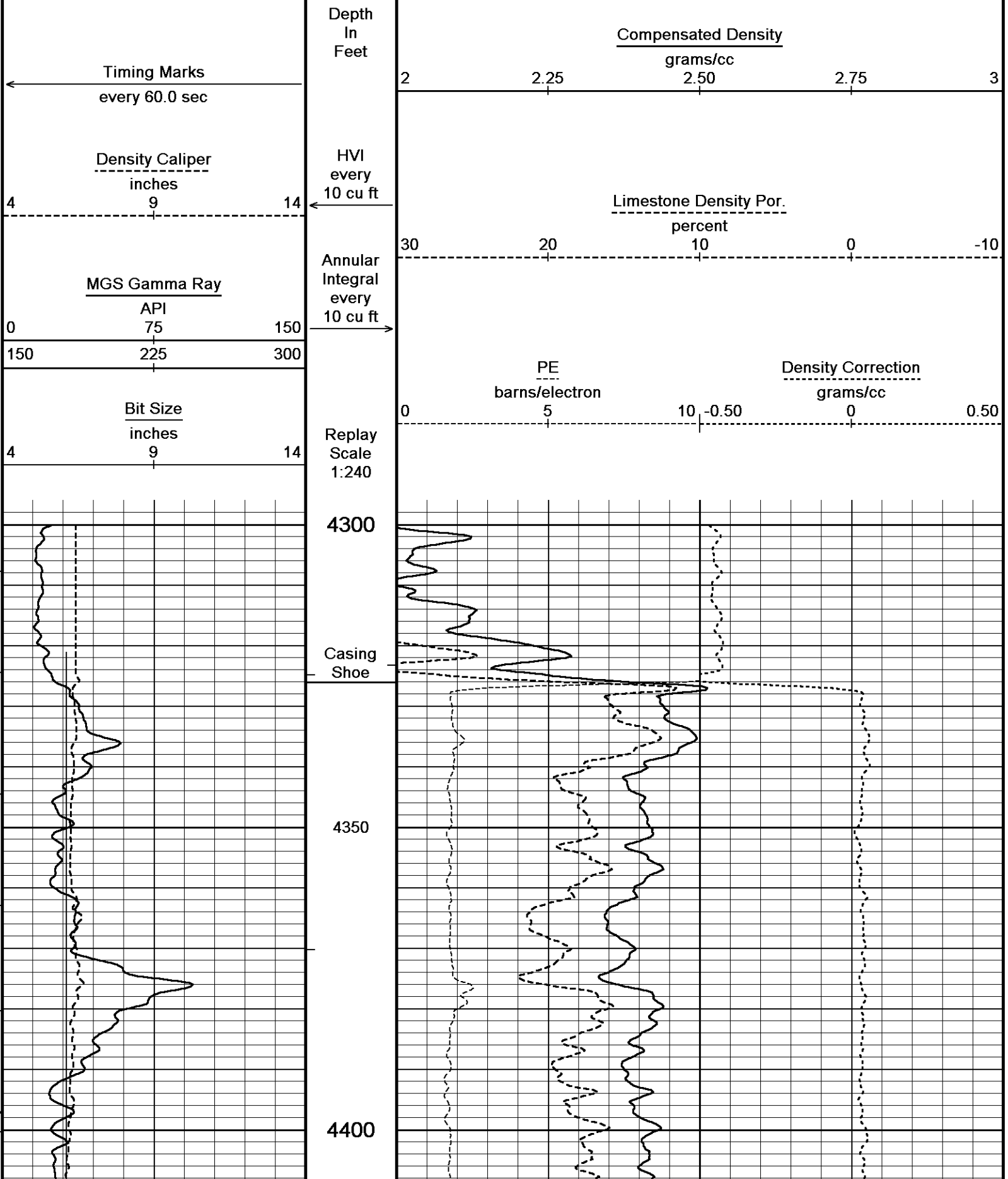


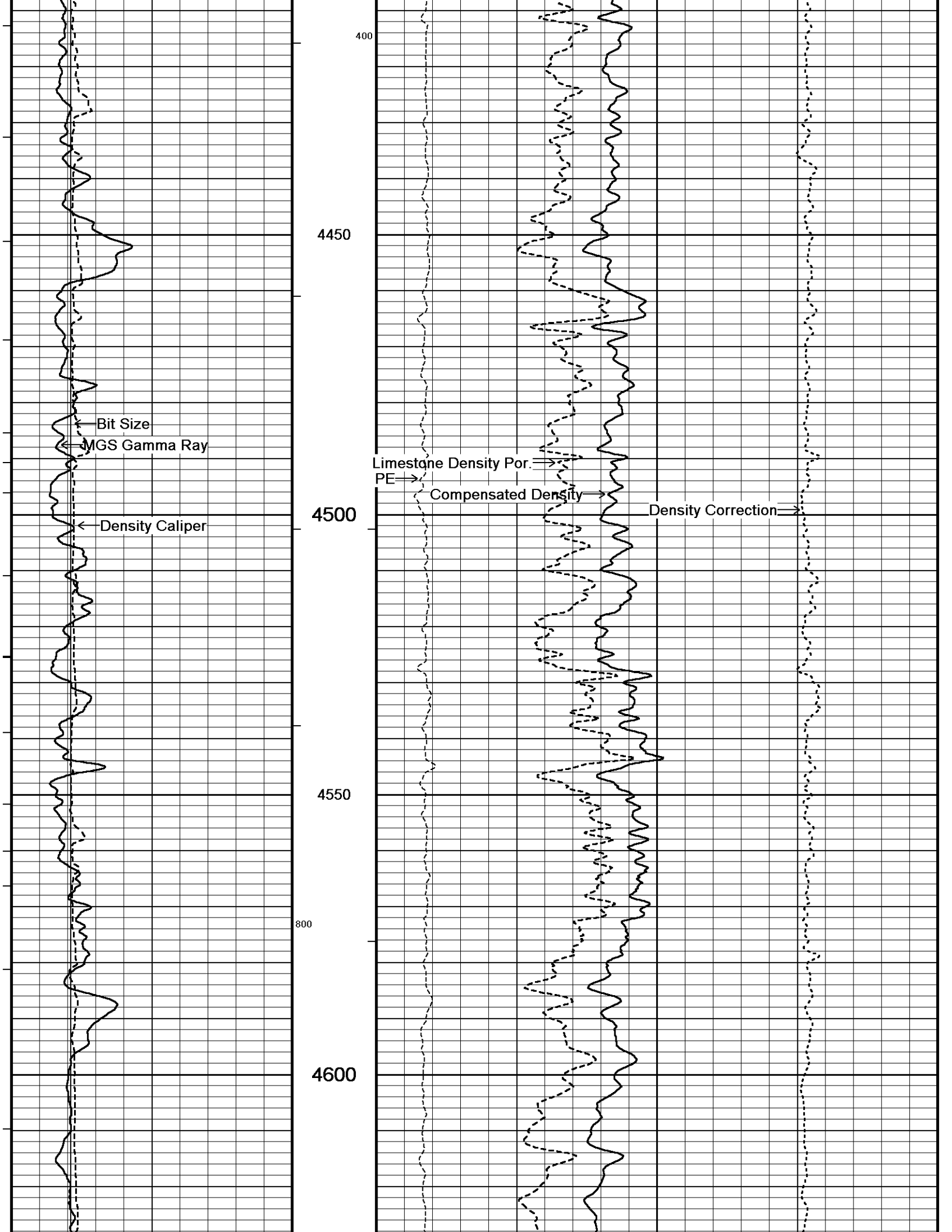


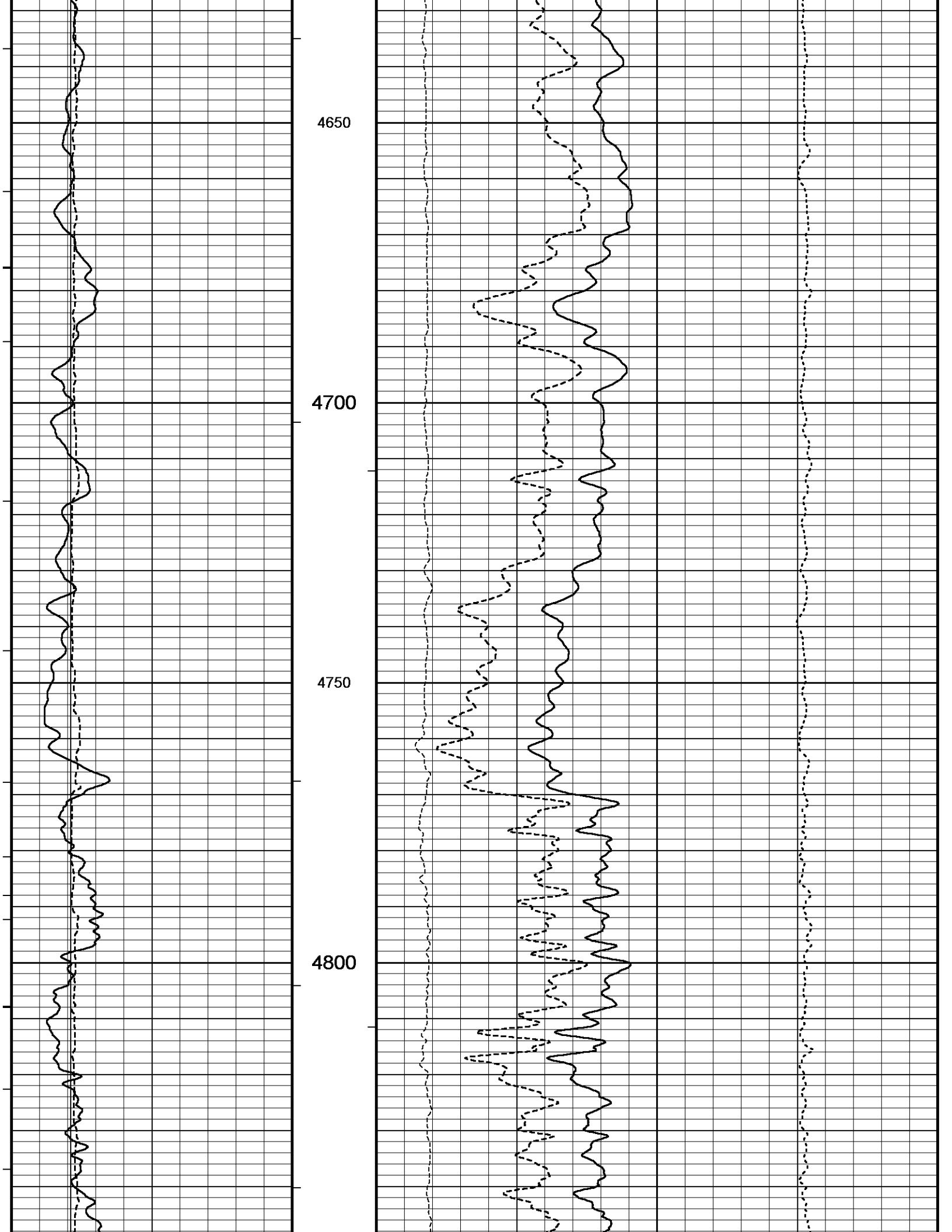


5 INCH BULK DENSITY DSC

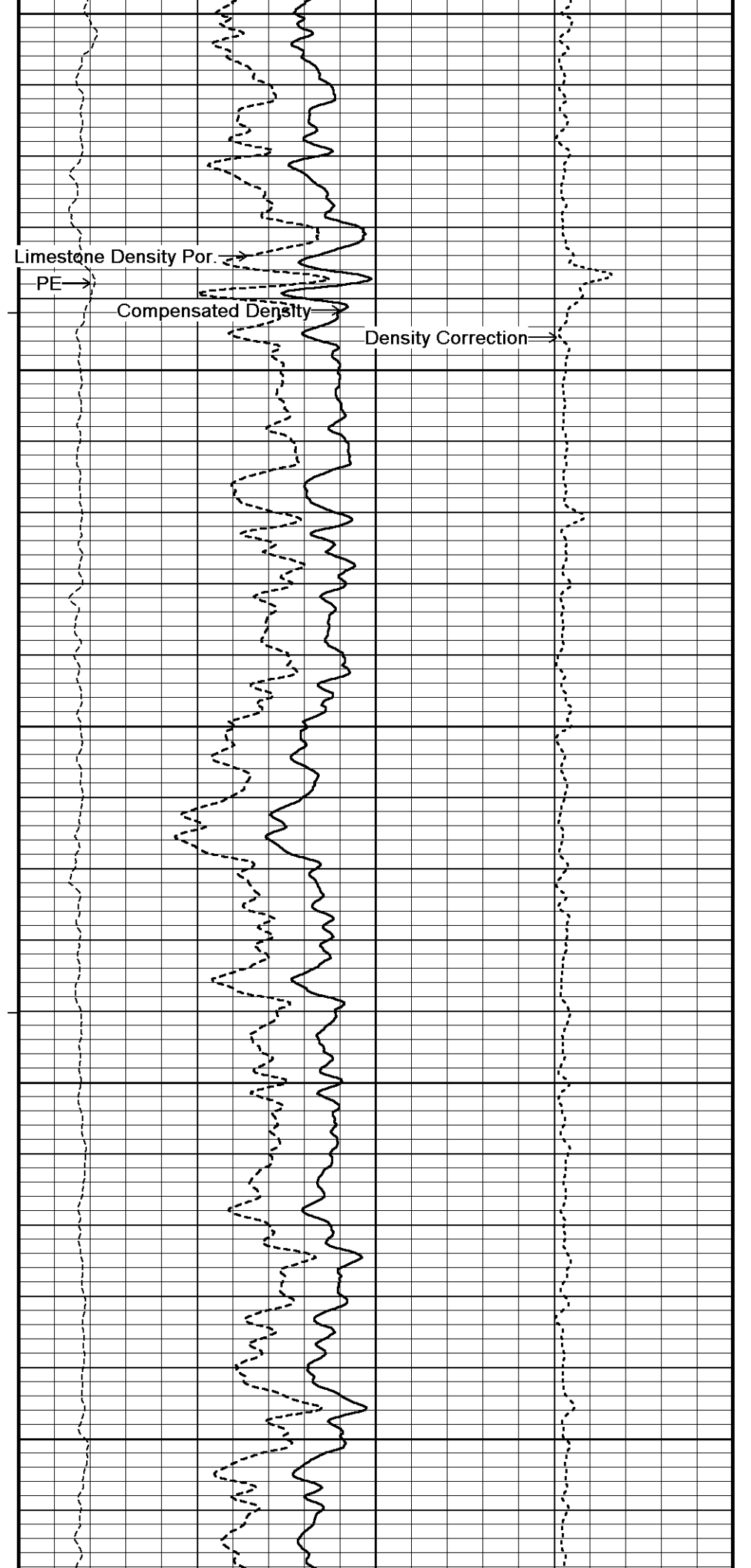
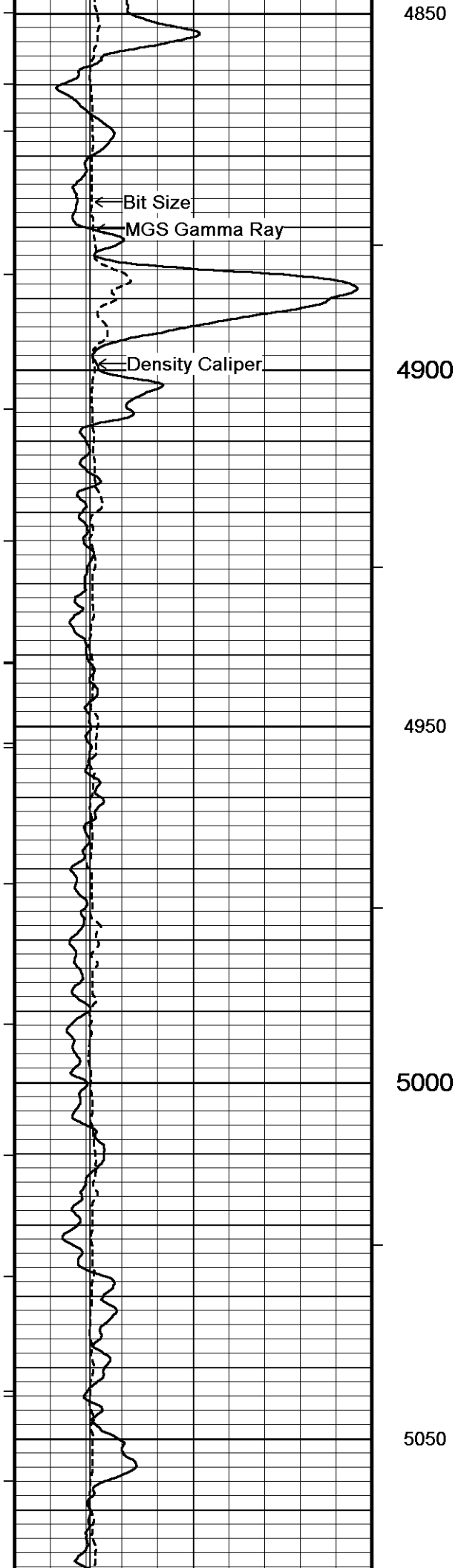
Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 03-AUG-2013 11:17  
 Filename: C:\Data\Unit\Unit Loudenback 7-1HMSS 166 Depth Log2.dta  
 Recorded on 03-AUG-2013 10:21  
 System Versions: Processed with 13.03.7779 Plotted with 13.03.7779

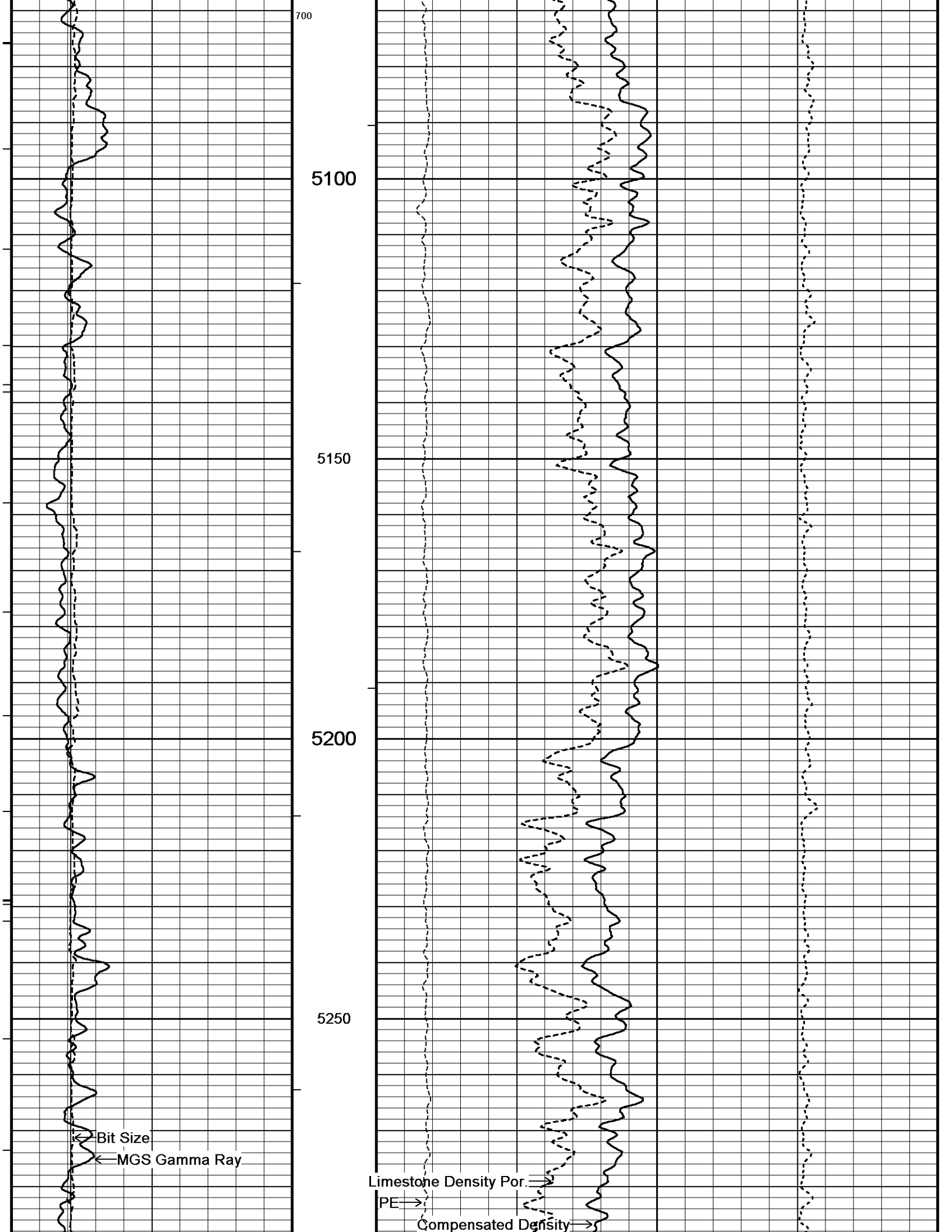












700

5100

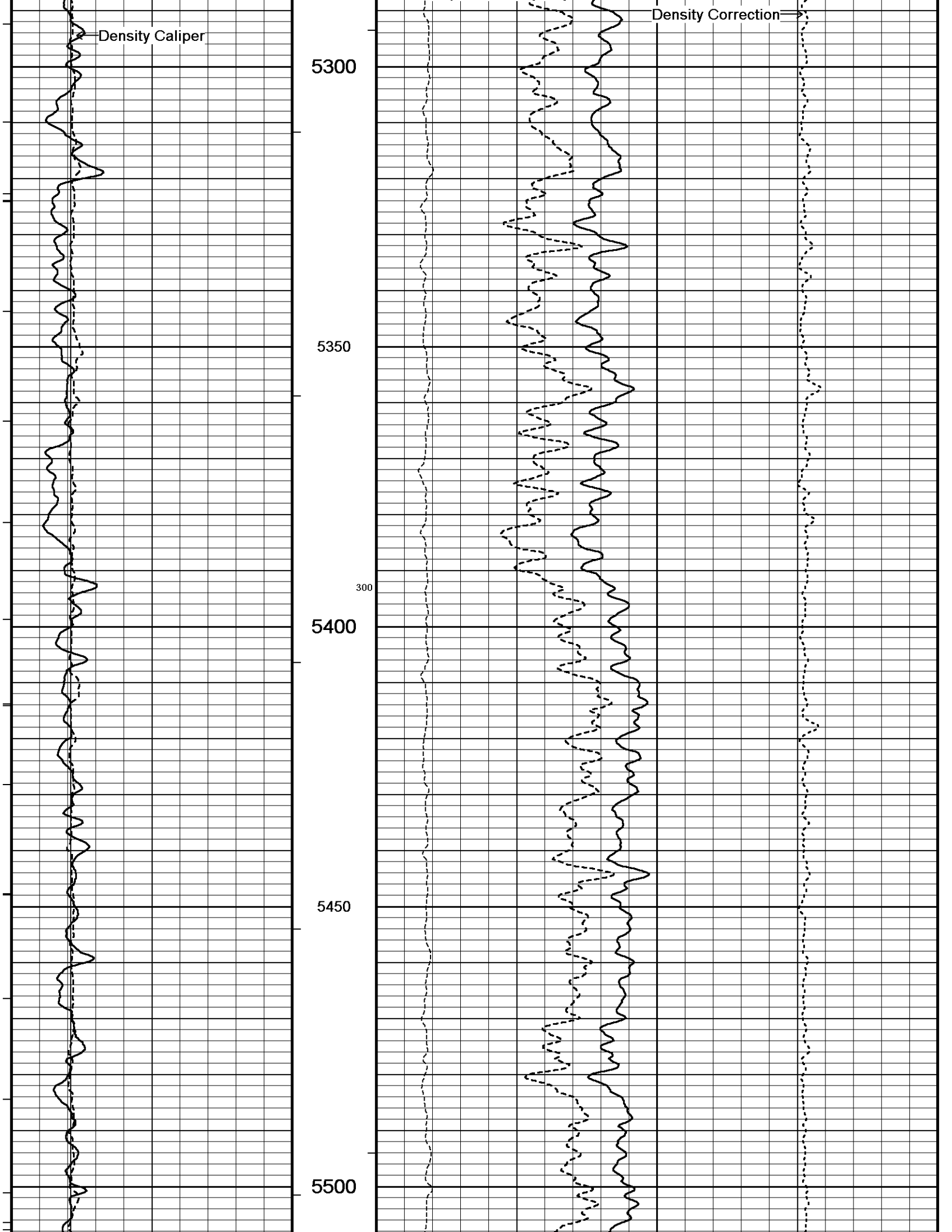
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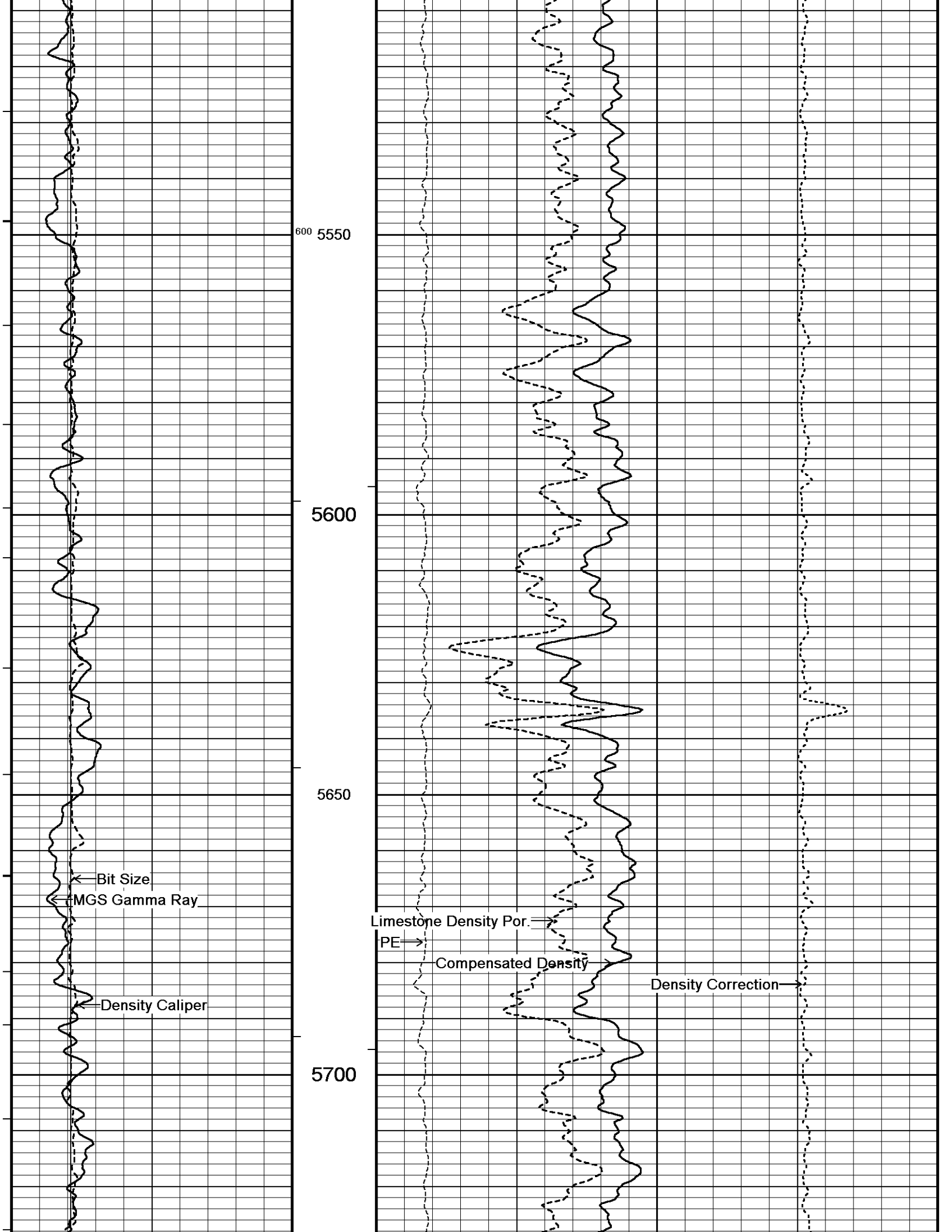
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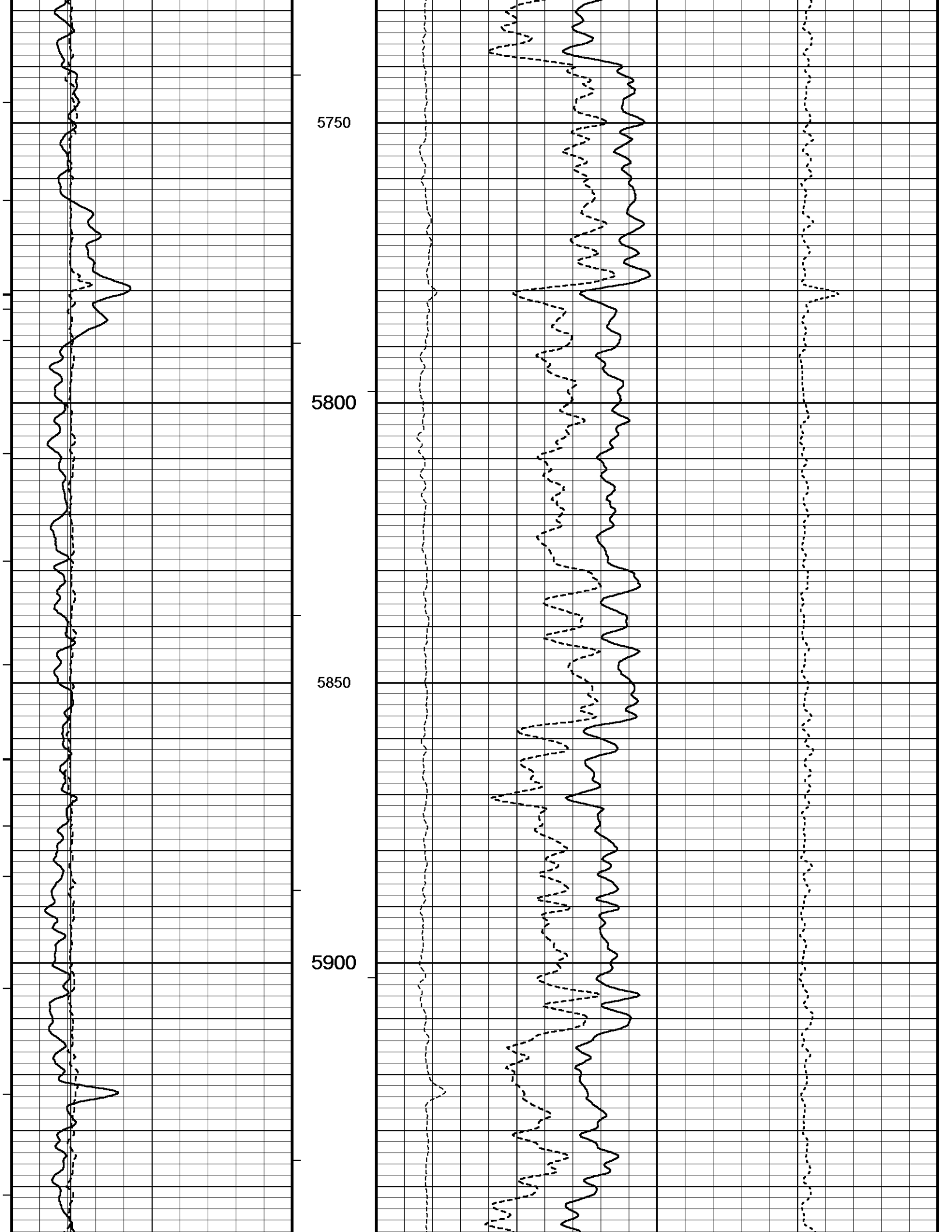
5250

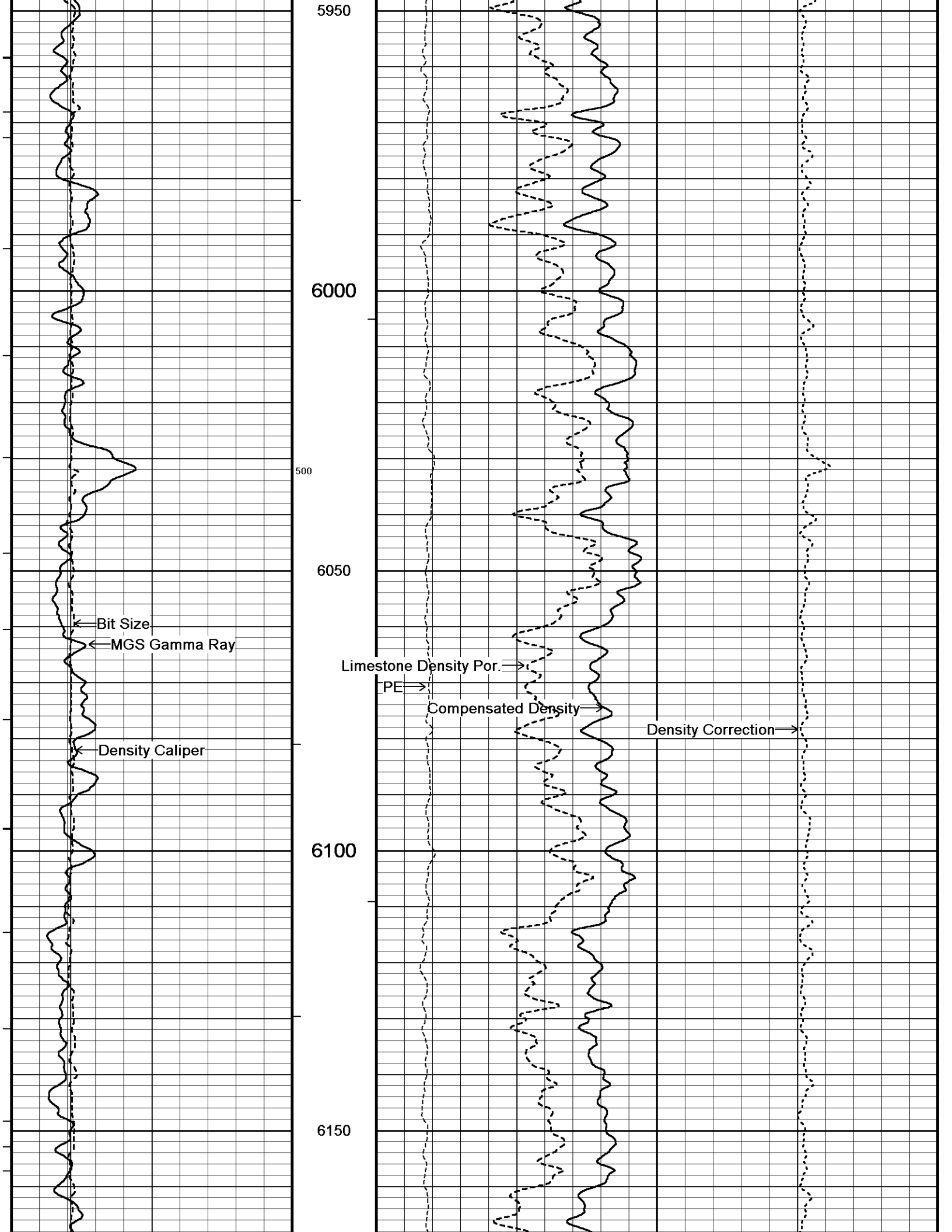
← Bit Size  
← MGS Gamma Ray

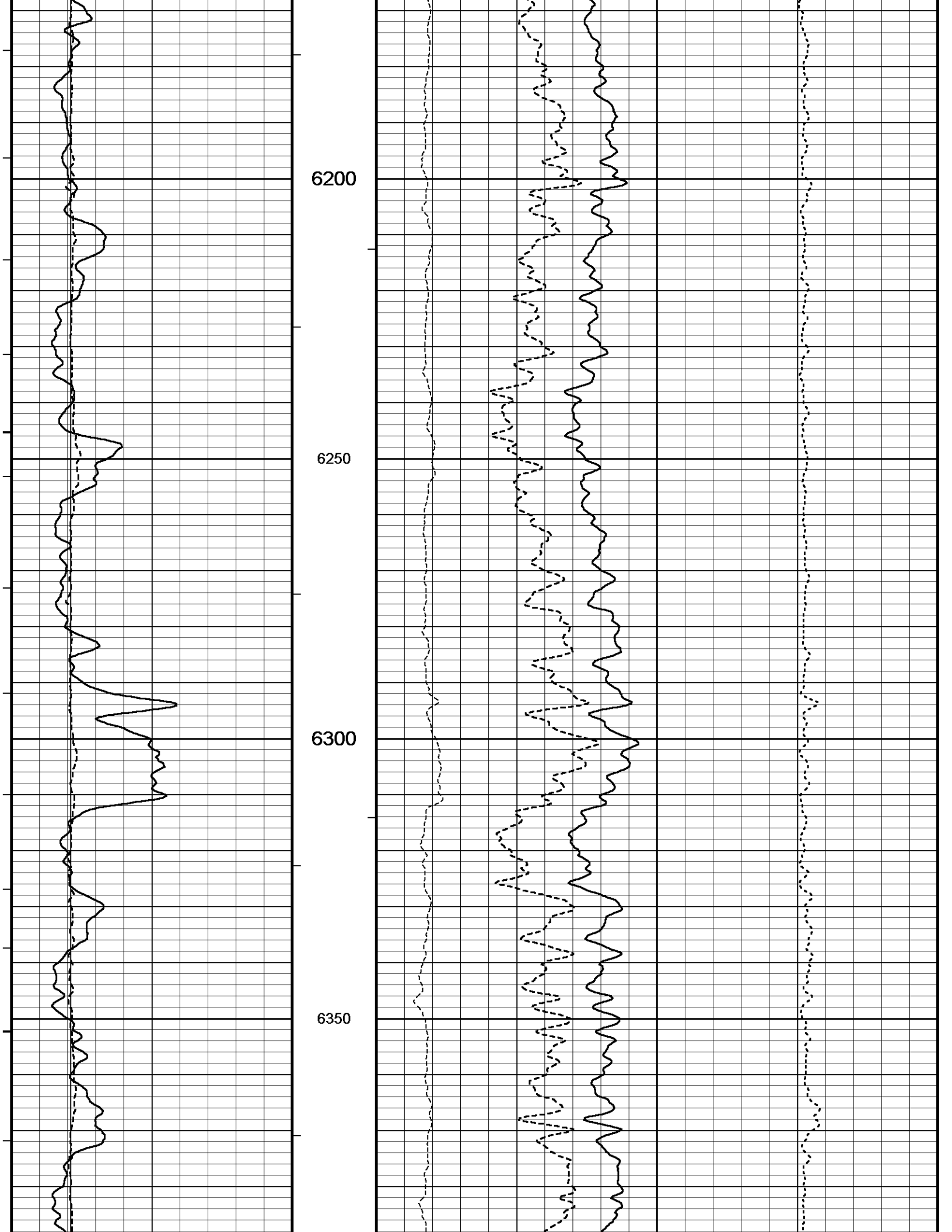
Limestone Density Por. →  
PE →  
Compensated Density →

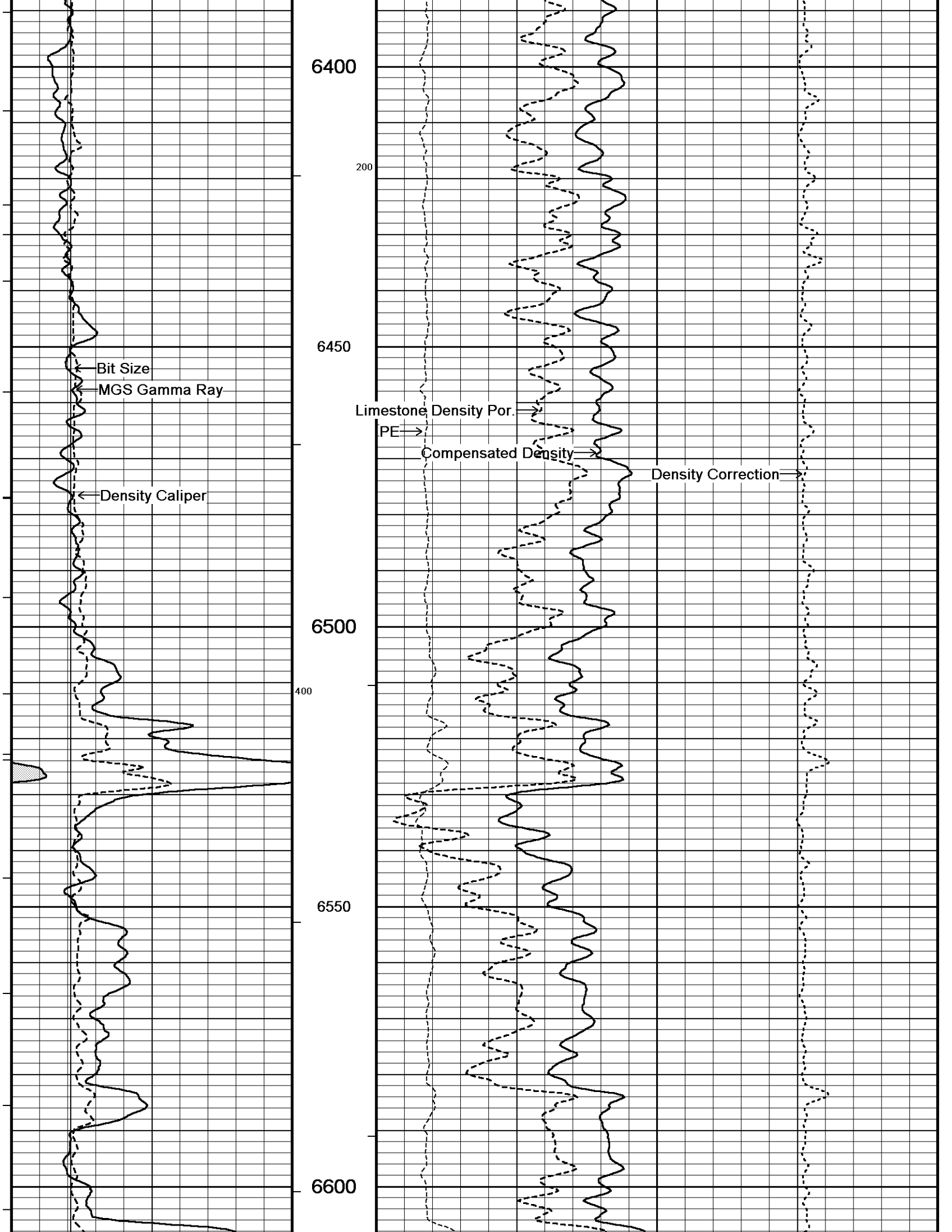




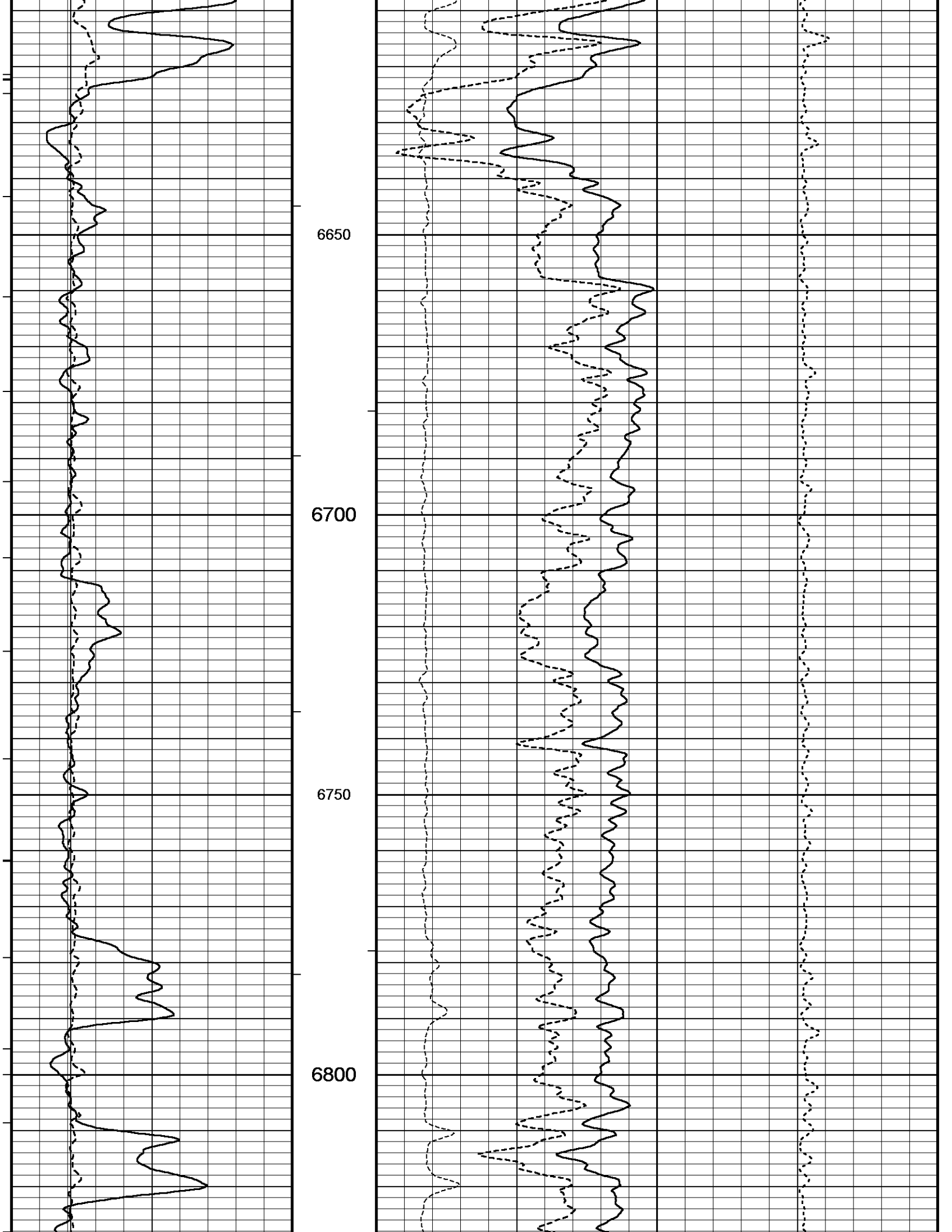


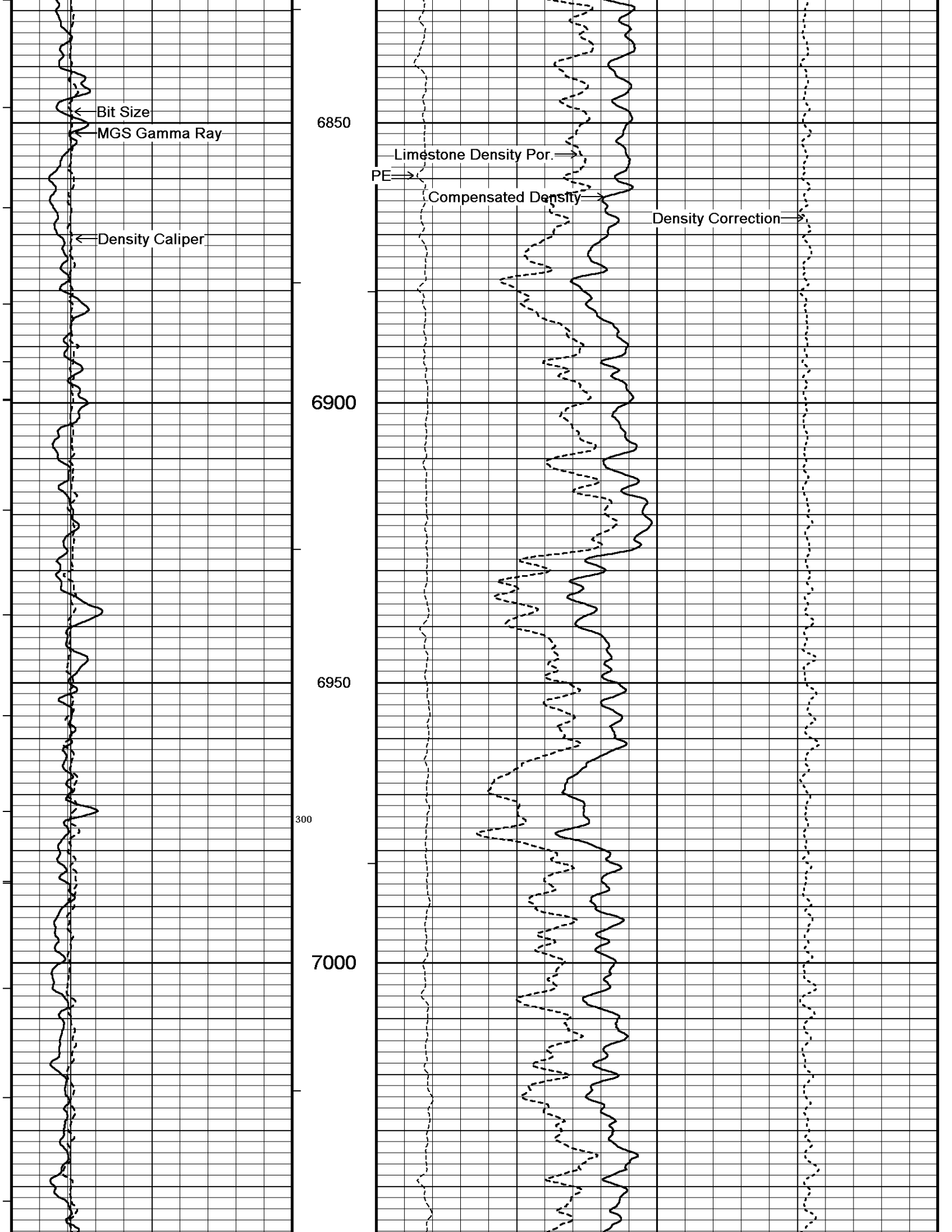


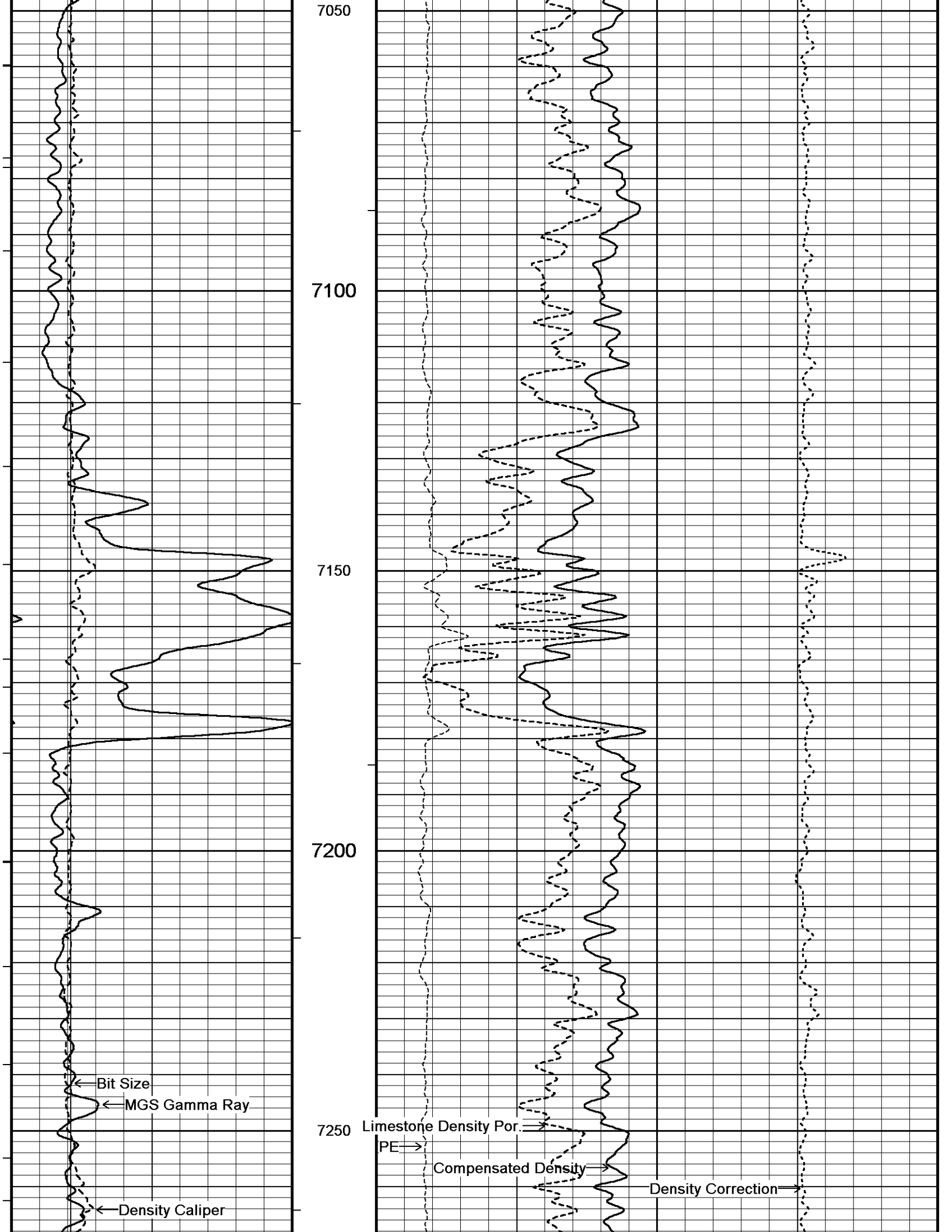


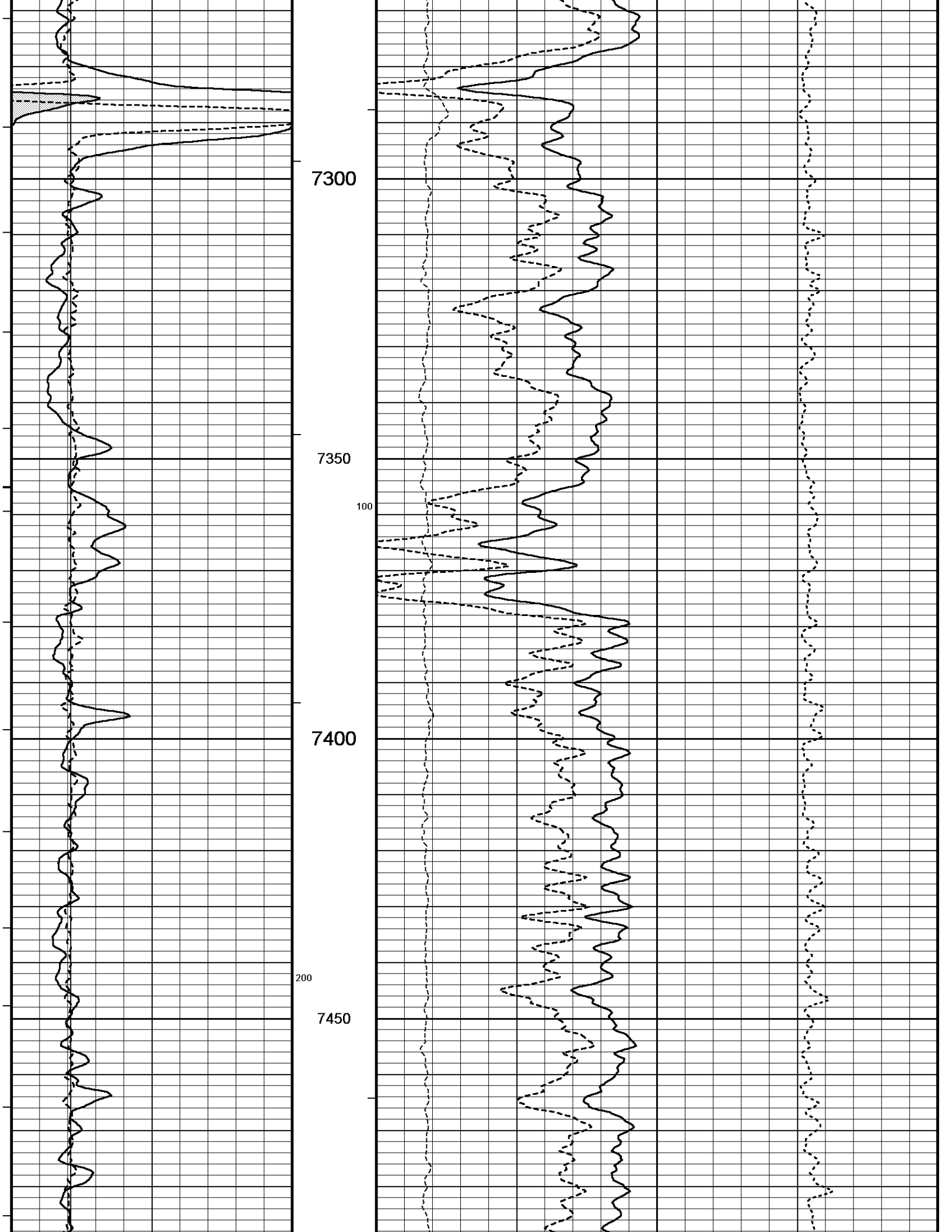


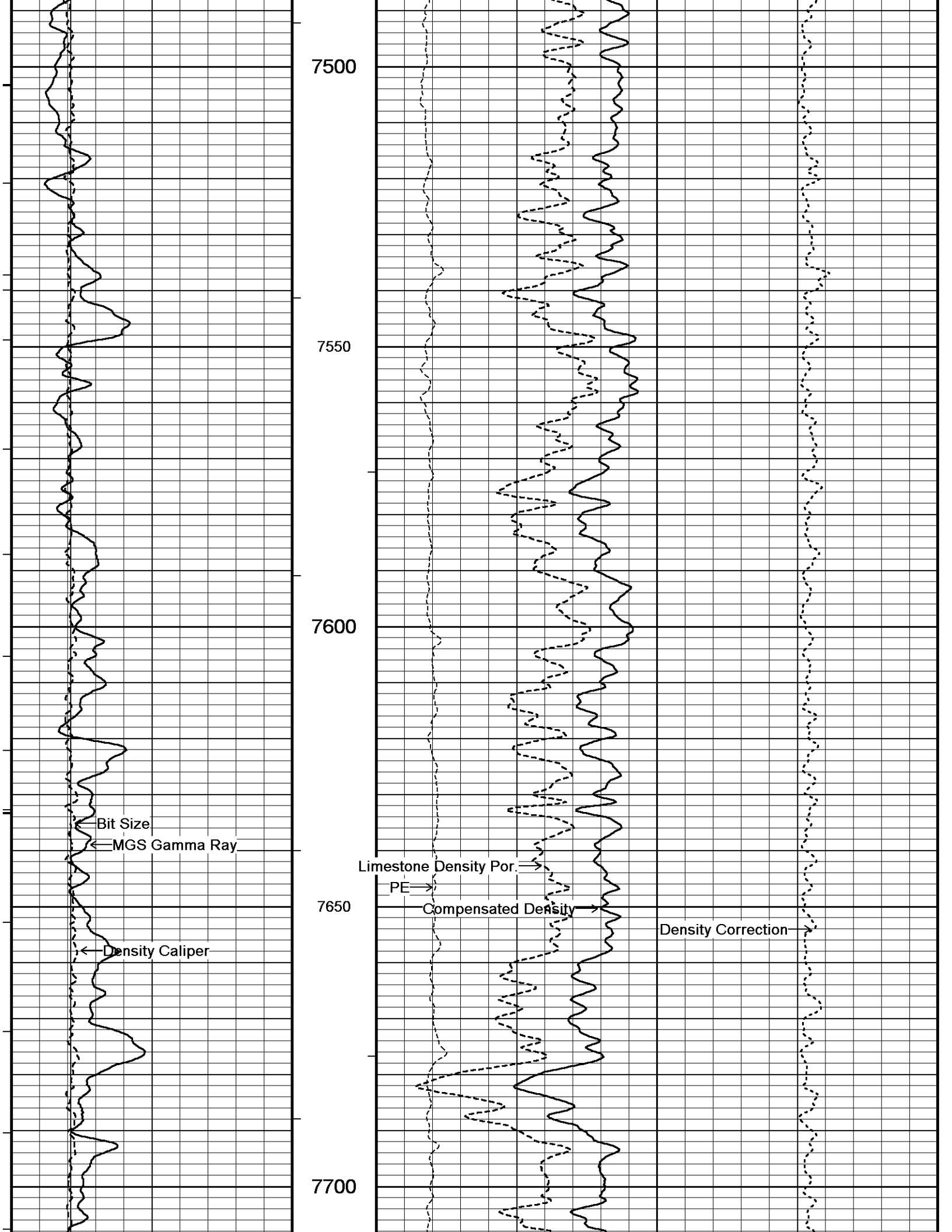












7500

7550

7600

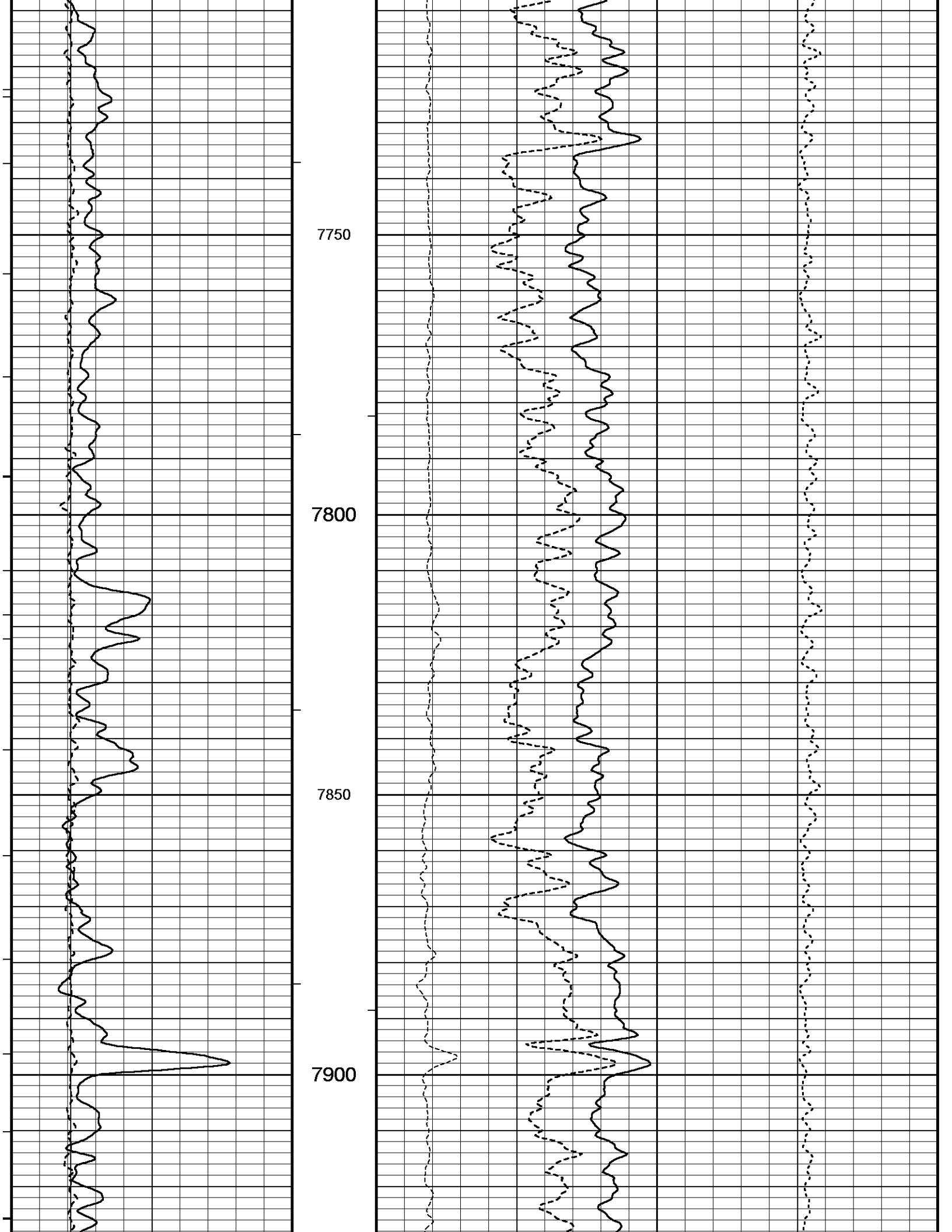
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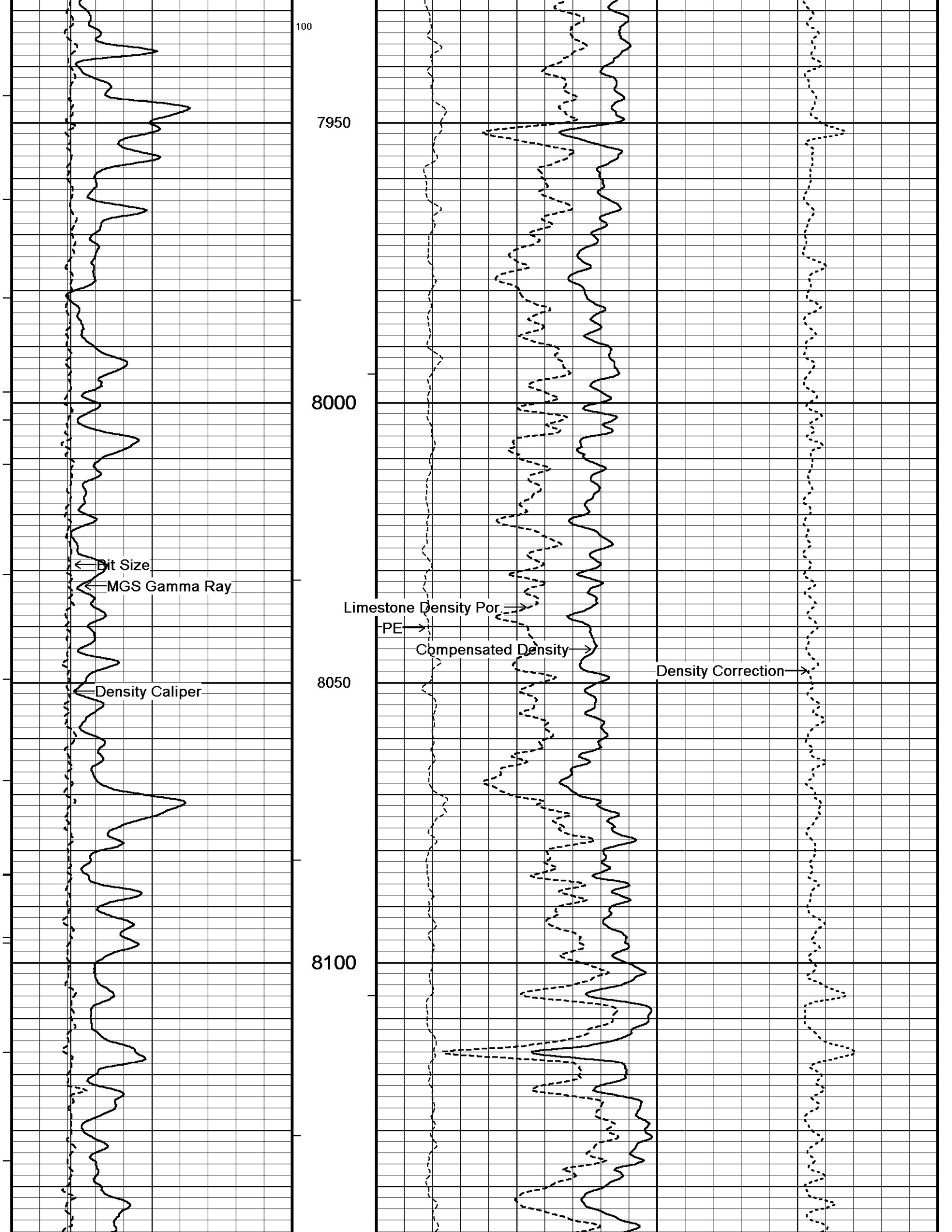
7700

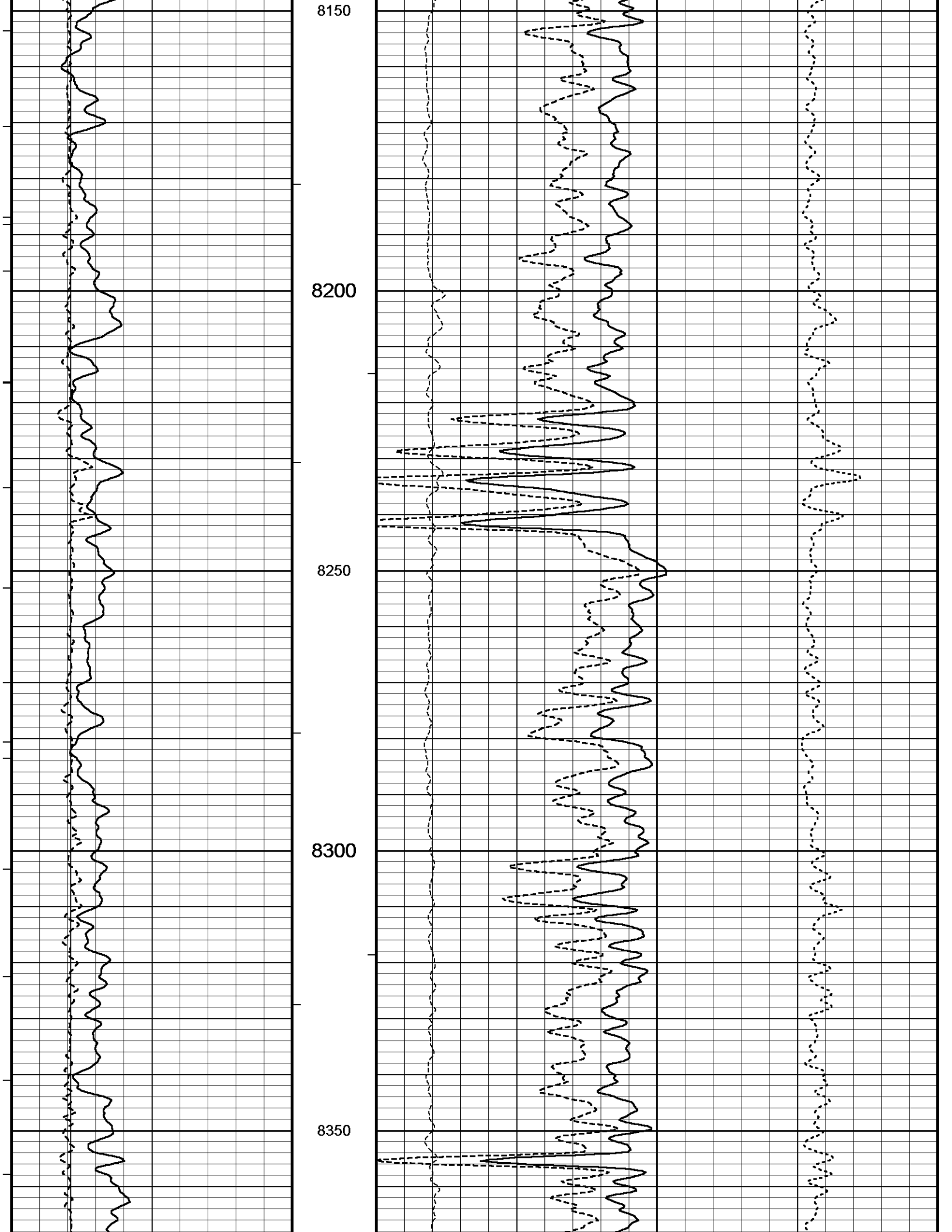
← Bit Size  
← MGS Gamma Ray  
  
← Density Caliper

Limestone Density Por. →  
PE →  
Compensated Density →

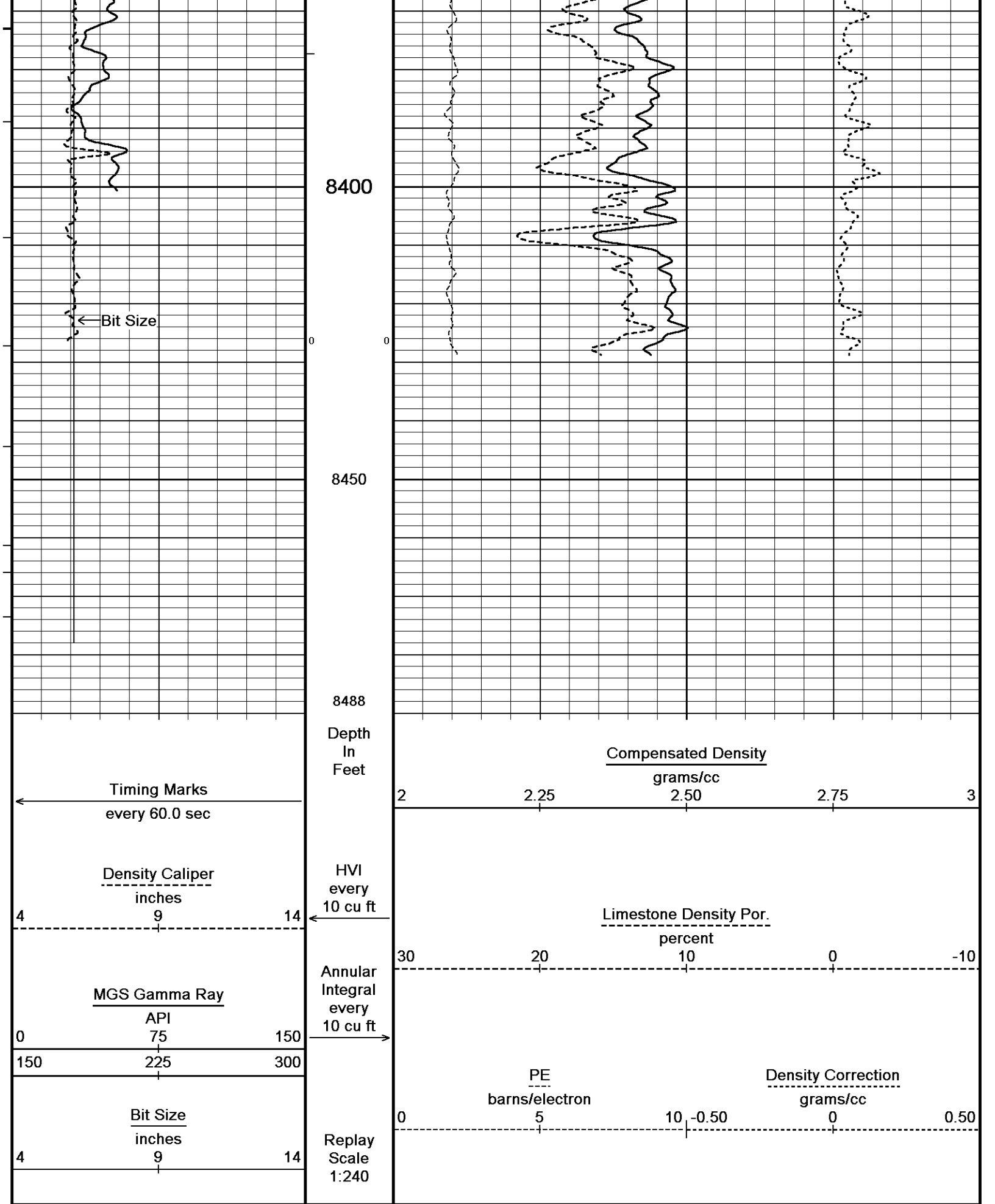
Density Correction →











## BEFORE SURVEY CALIBRATION

C:\Data\Unit\Unit Loudenback 7-1HMSS 166 Depth Log2.dta

### General Constants All 000

Last Edited on 03-AUG-2013,10:28

#### General Parameters

Mud Resistivity	2.100	ohm-metres
Mud Resistivity Temperature	77.900	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	4.500	inches
Caliper for Differential Caliper	Density Caliper	

#### Rwa Parameters

Porosity used	Base Neutron 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 05-SEP-2012,13:01

Reading No	Measured	Calibrated (lbs)
1	15152.07	0.00
2	18386.74	2000.00

### Strain Gauge Constants MMS-E.B 166

Last Edited on 30-JAN-2013,09:56

Atmospheric Pressure	14.70	psi
Serial Number	262005	
Calibration Date	04-Jan-2011	
Base Check Date		
Dead Weight Serial Number	0	
Dead Weight Gravitational Correction	1.0	

Temperature	75.0		150.0		250.0		350.0		degrees F
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	
Pressure psia									
0.0	0.096	0.097	0.113	0.113	0.129	0.129	0.138	0.139	
3000.0	5.275	5.280	5.290	5.294	5.303	5.306	5.307	5.310	
6000.0	10.464	10.472	10.478	10.485	10.488	10.494	10.487	10.494	
9000.0	15.664	15.672	15.676	15.684	15.683	15.691	15.679	15.687	
12000.0	20.876	20.882	20.888	20.893	20.892	20.898	20.885	20.890	
15000.0	26.101		26.111		26.114		26.103		

### Gamma Calibration MGS-C.J 133

Field Calibration on 02-AUG-2013 08:33

	Measured	Calibrated (API)
Background	118	82
Calibrator (Gross)	1938	1343
Calibrator (Net)	1820	1261

### Gamma Constants MGS-C.J 133

Last Edited on 24-JUL-2013,07:01

Gamma Calibrator Number	46	
Mud Density	1.05	gm/cc
Caliper Source for Processing	MIE Caliper X	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

### SP Calibration MGS-C.J 133

Field Calibration on 07-FEB-2013 10:52

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

### High Resolution Temperature Calibration MGS-C.J 133

Field Calibration on 09-FEB-2013 12:46

	Measured	Calibrated(Deg F)
Lower	0.00	0.00
Upper	0.00	0.00

## High Resolution Temperature Constants MGS-C.J 133

Last Edited on 20-MAR-2013,13:25

Pre-filter Length 11

## Neutron Calibration MDN-B.J 423

Base Calibration on 31-JUL-2013 08:30

Field Check on 02-AUG-2013 08:28

## Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2937	90	3714	110
Ratio	32.765		33.764	

## Field Calibrator at Base

	Calibrated (cps)	
	1295	1933
Ratio	0.670	

## Field Check

	Calibrated (cps)	
	1333	1985
Ratio	0.671	

## Neutron Constants MDN-B.J 423

Last Edited on 02-AUG-2013,08:22

Neutron Source Id	000	
Neutron Jig Number	000	
Epithermal Neutron	No	
Caliper Source for Processing	Bit Size	
Stand-off	0.00	inches
Mud Density	1.05	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	Constant Value	
Temperature	20.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

## Magnetometer Parameters MIE-A.A 205

Date Of Last Magnetometer Calibration	03-NOV-2010,10:42		
	X Magnetometer	Y Magnetometer	Z Magnetometer
Slope	-1.000000	-1.009681	-1.005139
Offset	0.010971	-0.020272	0.014048

## Magnetometer Constants MIE-A.A 205

Last Edited on

Magnetometer Calibrator Number 000

## Accelerometer Parameters MIE-A.A 205

Date Of Last Accelerometer Calibration	01-NOV-2010,20:15		
	X Accelerometer	Y Accelerometer	Z Accelerometer
Slope	-1.102577	-1.095892	-1.099279
Offset	0.005245	0.001380	-0.006964

## Accelerometer Constants MIE-A.A 205

Last Edited on 01-NOV-2010,20:18

Accelerometer Calibrator Number 000

## Accelerometer Temperature Characterisation

## X Accelerometer

Serial Number	829
Calibration Date	01-Jan-1998

B0

B1

B2

B3

Bias(g)	0.00000e+000	3.85446e-005	-3.97712e-008	1.22710e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.75555e-004	4.16325e-007	4.80125e-010
Y Accelerometer				
Serial Number	901			
Calibration Date	12-Apr-2010			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.24151e-005	-6.79414e-009	7.96660e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.38432e-004	6.40058e-007	-1.92725e-010
Z Accelerometer				
Serial Number	890			
Calibration Date	10-Apr-2010			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	9.15265e-006	-6.81619e-009	1.46787e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.78599e-004	2.72844e-007	9.01795e-010

Caliper Calibration MIE-A.A 205 Base Calibration on 01-NOV-2010 20:12  
Field Calibration on

Base Calibration					
Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)		
1	27006	26164	5.96		
2	37039	36625	7.97		
3	46872	46116	9.84		
4	58291	57849	11.91		
5	0	0	0.00		
Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	25116	23882	25036	24789	5.96
2	33940	32930	33993	33467	7.97
3	41946	41141	42331	41802	9.84
4	51857	51034	52212	51630	11.91
5	0	0	0	0	0.00

Field Calibration					
	Measured	Measured	Actual		
	Measured	Measured	Measured	Measured	Actual

Caliper Constants MIE-A.A 205 Last Edited on 02-NOV-2010,12:29

Caliper Difference for BRKT 0.120 inches

Navigation Constants MIE-A.A 205 Last Edited on

Magnetic Declination 0.00 degrees East

Imager Pad Check MIE-A.A 205 Field Check on

Pad 1	Pad Not Tested	Pad 5	Pad Not Tested
Pad 2	Pad Not Tested	Pad 6	Pad Not Tested
Pad 3	Pad Not Tested	Pad 7	Pad Not Tested
Pad 4	Pad Not Tested	Pad 8	Pad Not Tested

Compact Micro Imager Constants MIE-A.A 205 Last Edited on 02-AUG-2013,09:07

Sonde Configuration	Imager Mode
Arm-Pad Kit	Normal Pads (12.25 in)
Arm-Pad Kit Serial Number	N/A
Centre Pad 1 Rotational Offset	0.00 degrees
Image/Borehole Ovality Reference	Azimuth of Pad 1
Non Active Buttons	Omit
Search Angle	0.00 degrees
Correlation Interval	3.28 feet
Correlation Step	1.64 feet
Current Offset	0.0000 mAmp
Squasher Start	0.0500

Squasher Start 0.0500 mAmp  
 Image Processing Enabled

High Resolution Temperature Calibration MAI-B.J 392			Field Calibration on 23-APR-2013,20:26
	Measured	Calibrated(Deg F)	
Lower	10.00	10.00	
Upper	100.00	100.00	

High Resolution Temperature Constants MAI-B.J 392		Last Edited on 23-APR-2013,20:26
Pre-filter Length	11	

Induction Calibration MAI-B.J 392			Base Calibration on 23-APR-2013,20:27 Field Check on 02-AUG-2013 08:13	
Base Calibration				
Test Loop Calibration				
Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	15.4	450.7	9.3	966.2
2	5.4	363.0	7.6	821.4
3	3.4	248.8	5.2	566.0
4	2.1	125.2	2.6	279.2
Array Temperature	24.2		Deg F	
Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			17.9	4026.6
2			33.5	3712.2
3			30.0	3181.6
4			20.6	2210.9
Deep			17.4	2094.0
Medium			43.8	4157.8
Shallow			51.6	5468.9
Array Temperature			79.4	Deg F

Induction Constants MAI-B.J 392			Last Edited on 03-AUG-2013,10:28
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	0.50 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.	MGS 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	

Photo Density Calibration MPD-D.A 471

Base Calibration on 31-JUL-2013 10:32  
Field Check on 02-AUG-2013 08:17

Density Calibration		Measured		Calibrated (sdu)	
Base Calibration		Near	Far	Near	Far
Reference 1	52204	26606	59494	30754	
Reference 2	22924	2688	26390	2598	
Field Check at Base		1258.9	1453.5		
Field Check		1258.8	1461.4		

PE Calibration		Measured		Calibrated	
Base Calibration		WS	WH	Ratio	Ratio
Background	243	1129			
Reference 1	22789	52005	0.443	0.367	
Reference 2	7166	22780	0.320	0.270	
Field Check at Base		242.9	1128.6		
Field Check		242.0	1126.0		

Density Constants MPD-D.A 471

Last Edited on 08-JUL-2013,06:46

Density Source Id	243	
Nylon Calibrator Number	633	
Aluminium Calibrator Number	633	
Density Shoe Profile	4 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.05	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	

Caliper Calibration MPD-D.A 471

Base Calibration on 31-JUL-2013 10:58  
Field Calibration on 02-AUG-2013 08:20

Base Calibration		Measured	Calibrator Size (in)
Reading No			
1		17903	3.99
2		26260	5.97
3		34744	7.99
4		42995	9.86
5		52322	11.93
6		N/A	N/A
Field Calibration		Measured Caliper (in)	Actual Caliper (in)
		5.88	5.97

# DOWNHOLE EQUIPMENT

C:\Data\Unit\Unit Loudenback 7-1HMSS 166 Depth Log2.dta

Shuttle Running Tool 3.5" )  
 SRT-A.A 40 LG: 6.62 ft WT: 37.5 lb OD: 2.52 in

Empty Battery  
 MLK-A 2 LG: 14.23 ft WT: 30.9 lb OD: 2.24 in

Empty Battery  
 MLK-A 3 LG: 14.23 ft WT: 30.9 lb OD: 2.24 in

MBS-F.A 200v Compact Battery Sub  
 MBS-F.A 114 LG: 17.06 ft WT: 123.5 lb OD: 2.24 in

Compact Memory Sub E.B  
 MMS-E.B 166 LG: 5.20 ft WT: 37.5 lb OD: 2.24 in

Compact Tool Isolator sub.  
 MTI-B.A 63 LG: 1.54 ft WT: 13.2 lb OD: 2.24 in

Compact Short Gamma  
 MGS-C.J 133 LG: 3.41 ft WT: 24.3 lb OD: 2.24 in

Compact Collar Locator  
 MCL-B.J 72 LG: 3.17 ft WT: 26.5 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint  
 SKJ-D.A 165 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

SHA-J.A Compact Swivel Head Adaptor  
 SHA-J.A 432 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

MIS-A.A Compact Inline Bowspring sub  
 MIS-A.A 247 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact Neutron  
 MDN-B.J 423 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper  
 MPD-D.A 471 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub  
 MIS-D.A 435 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SHA-J.B Compact Swivel Head Adaptor  
 SHA-J.B 595 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

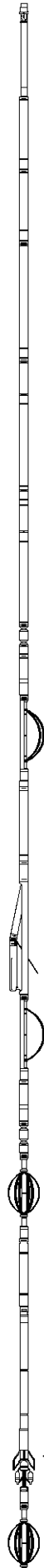
SKJ-E.B Compact Knuckle Joint  
 SKJ-E.B 480 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-A.A Compact Inline Bowspring sub  
 MIS-A.A 275 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact MMI Memory Section  
 MIM-B.A 254 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

Compact MMI Electrode Section  
 MIE-A.A 205 LG: 13.96 ft WT: 99.2 lb OD: 4.09 in

MIS-D.B Compact Inline Bowspring sub



20.89 ft IECY - MIE Caliper Y  
 20.89 ft IECX - MIE Caliper X

MIS-D.B Compact Inline Downspring sub  
MIS-D.B 707 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

MIS-E.B Compact Inline Standoff sub  
MIS-E.B 597 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

Compact Induction  
MAI-B.J 392 LG: 12.52 ft WT: 48.5 lb OD: 2.24 in

Total Length: 145.08 ft Weight: 879.6 lb



Tool Zero (1.84ft from bottom)  
All measurements relative to tool zero.

COMPANY	UNIT PETROLEUM
WELL	LOUDENBACK 7-1H
FIELD	WILDCAT
PROVINCE/COUNTY	RENO
COUNTRY/STATE	USA / KANSAS

Elevation Kelly Bushing	1784.00	feet	First Reading	8428.00	feet
Elevation Drill Floor	1784.00	feet	Depth Driller	8615.00	feet
Elevation Ground Level	1770.00	feet	Depth Logger	8482.00	feet



**Weatherford**<sup>®</sup>

CML WELL SHUTTLE  
COMPENSATED PHOTO-DENSITY  
COMPENSATED NEUTRON LOG