



**Weatherford**

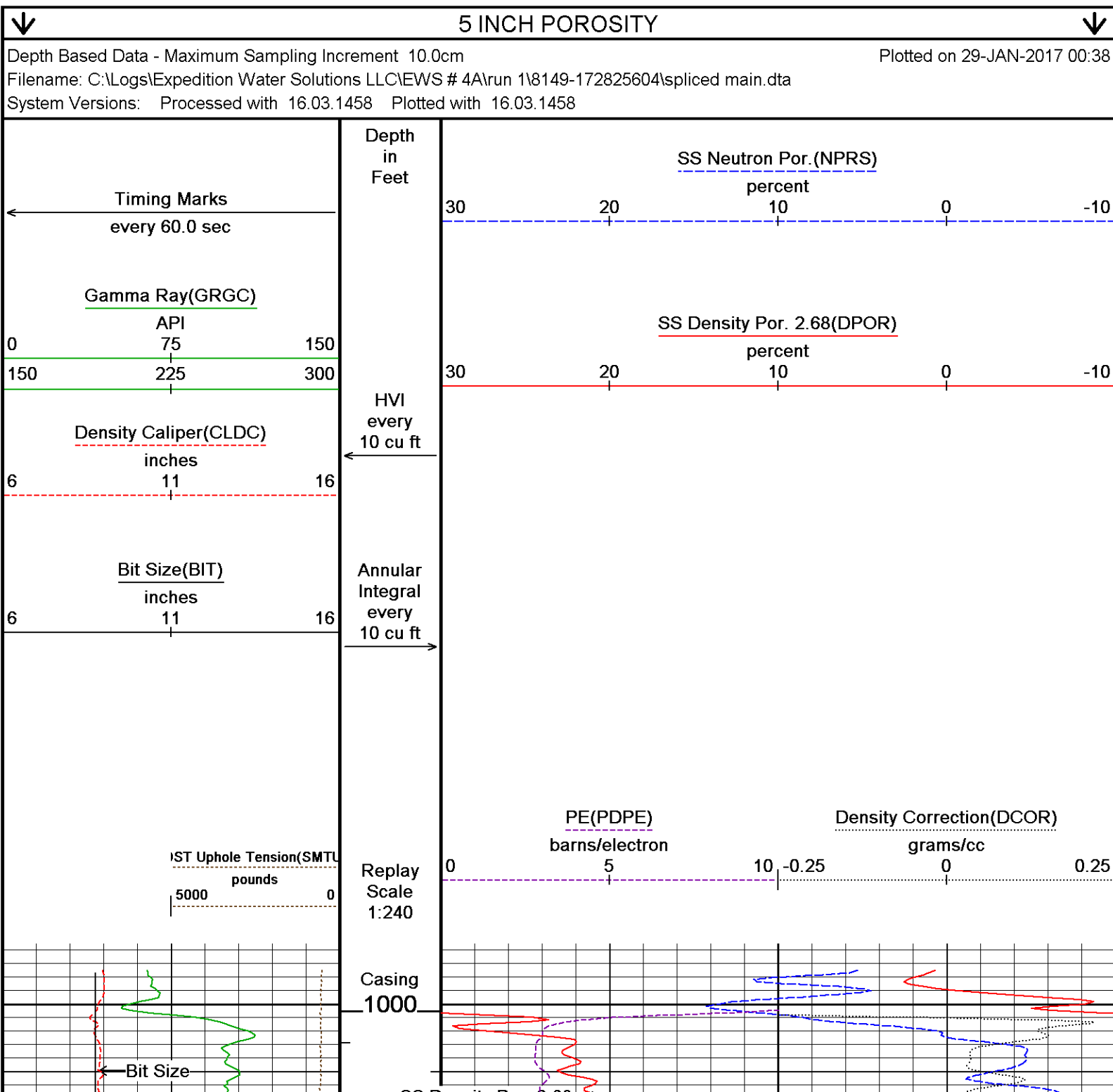
**DUAL SPACED NEUTRON  
PHOTO DENSITY  
LOG**

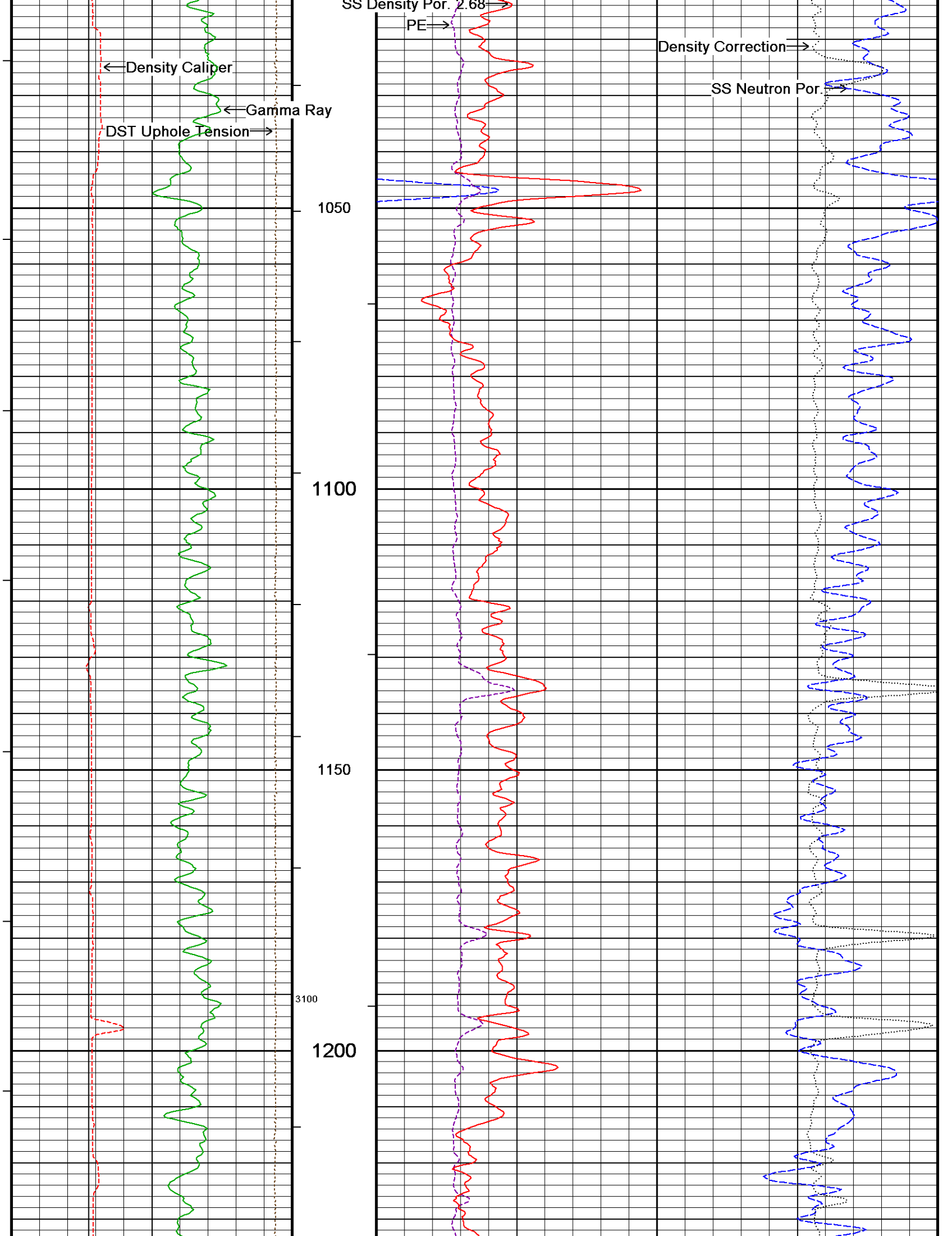
COMPANY		EXPEDITION WATER SOLUTIONS COLORADO LLC			
WELL		EWS # 4A			
FIELD		WATTENBERG			
PROVINCE/COUNTY		WELD			
COUNTRY/STATE		USA / COLORADO			
LOCATION		SHL: 2232' FNL & 2037' FWL			
SEC 17	TWP 2N	RGE 63W	Other Services		
Latitude		40.139470		ARRAY INDUCTION	
Longitude		-104.463560			
API Number		05-123-44047-00			
Permanent Datum GL, Elevation 4643 feet					
Log Measured From KB					
Drilling Measured From KB					
Date	28-JAN-2017				Elevations: KB 4856.00 DF 4856.00 GL 4843.00
Run Number	ONE				
Service Order	8149-172825604				
Depth Driller	8501.00				feet
Depth Logger	8510.00				feet
First Reading	8479.00				feet
Last Reading	1001.00				feet
Casing Driller	1000.00				feet
Casing Logger	1001.00				feet
Bit Size	8.750				inches
Hole Fluid Type	WBM				
Density / Viscosity	9.90	lb/USg	54.00	sec/Ct	
PH / Fluid Loss	8.10		6.40	ml/30Min	
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.98 @ 86.4				ohm-m
Rmf @ Measured Temp	0.78 @ 86.4				ohm-m
Rmc @ Measured Temp	1.18 @ 86.4				ohm-m
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.39 @224.0				ohm-m
Time Since Circulation	4 HOURS				
Max Recorded Temp	224.00		deg F		
Equipment / Base	13173		CASPER		
Recorded By	D. BEANS				
Witnessed By	J. DEMUTH				

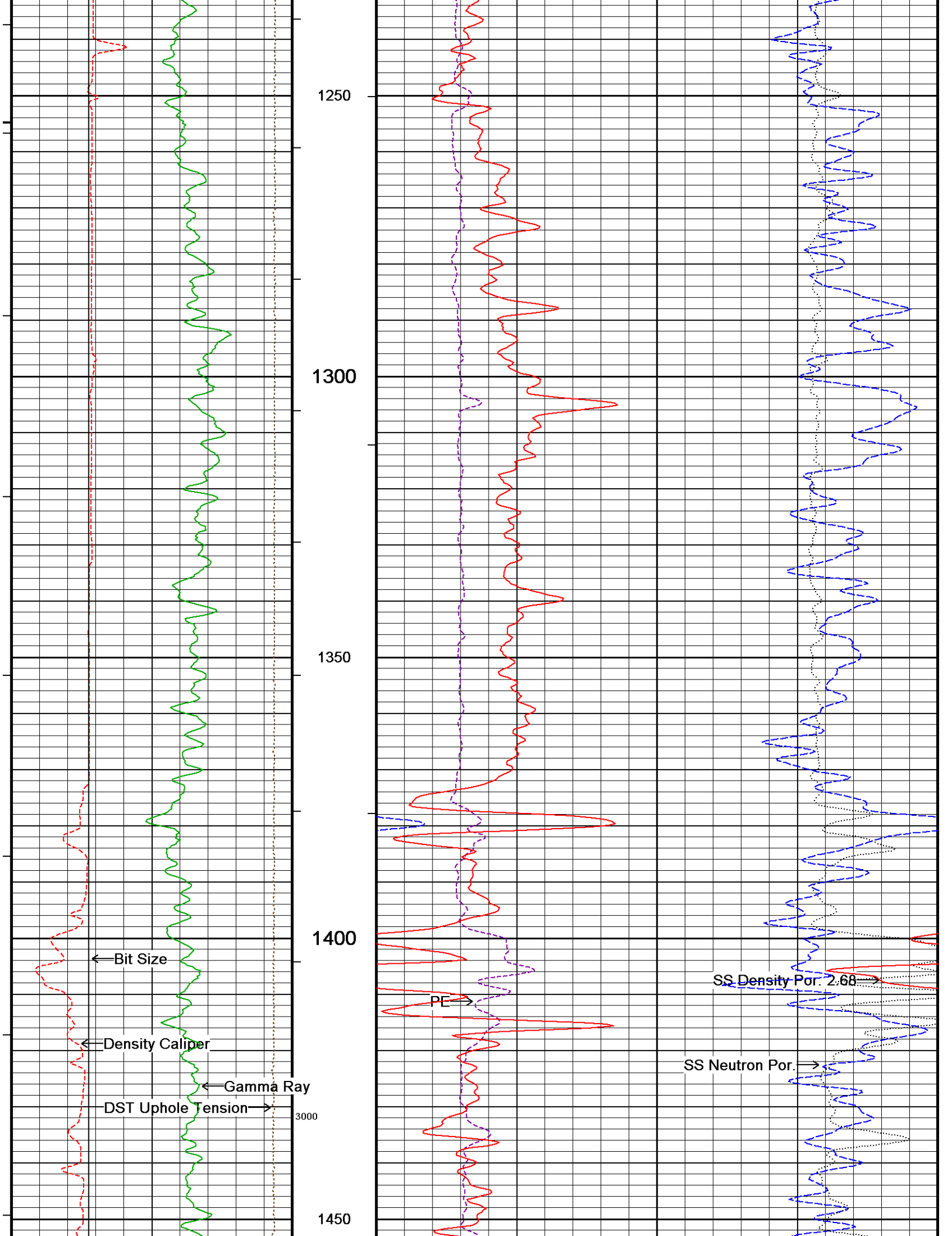
BOREHOLE RECORD					Last Edited: 28-JAN-2017 14:18
Bit Size inches		Depth From feet		Depth To feet	
8.750		1000.00		8501.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	9.625	0.00	1000.00	36.00	

REMARKS	
SOFTWARE VERSION 16.03.1458	
TOOLS RUN: SHA, MCG, MDN, MPD, MVC, SKJ, MFE, AND MAI RUN IN COMBINATION.	
HARDWARE: MPD: 8" PROFILE PLATE USED. MDN: DUAL BOWSPRING MFE: 0.5" STANDOFF MAI: 2 x 0.5" STANDOFFS	
2.68 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY	
TIGHT PULLS, BOREHOLE SIZE AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.	
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.	
TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 3190 CUBIC FEET	
ANNULAR VOLUME FROM TD TO SURFACE CASING WITH 7 INCH PRODUCTION CASING: 1180 CUBIC FEET	

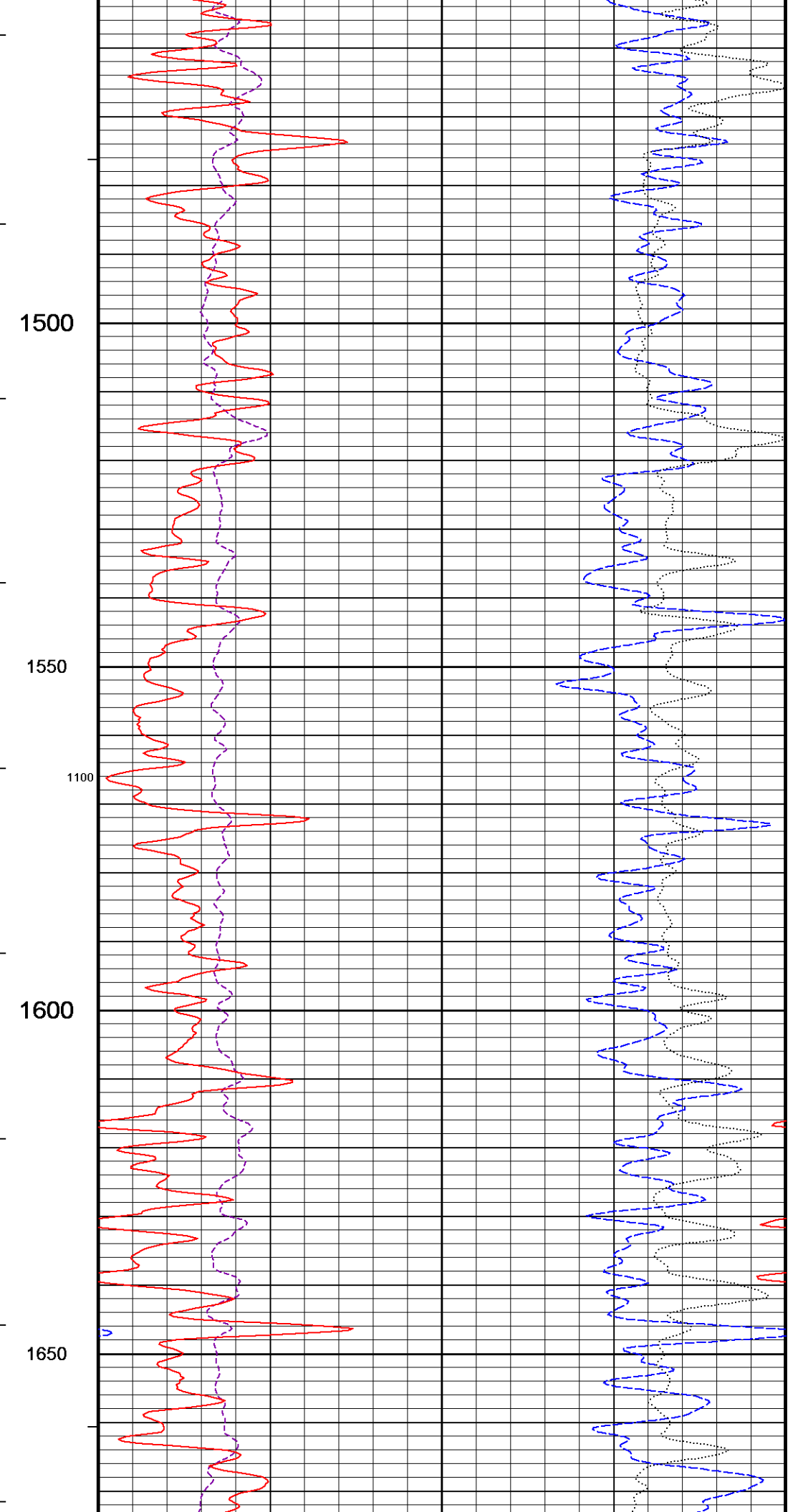
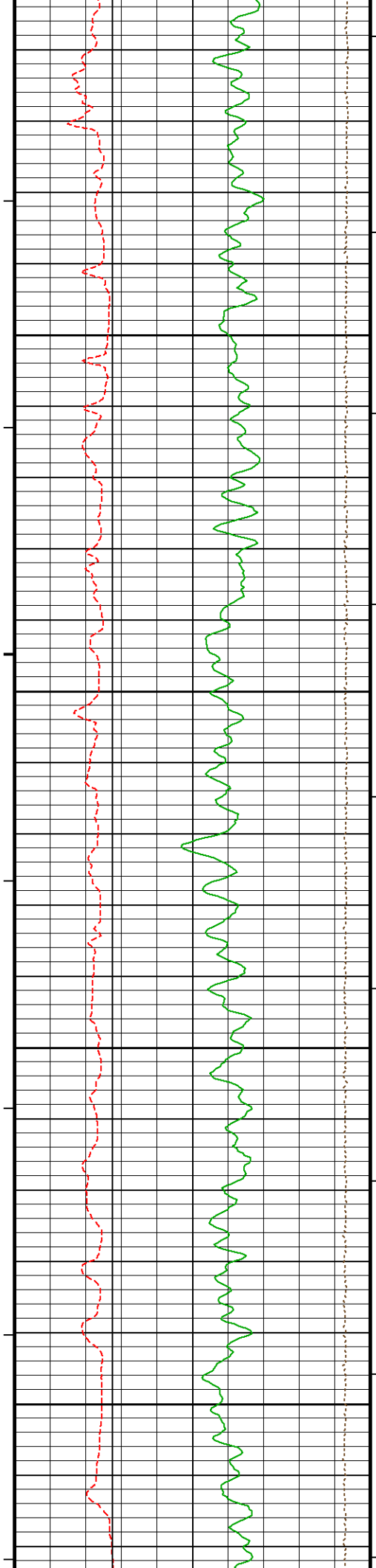
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

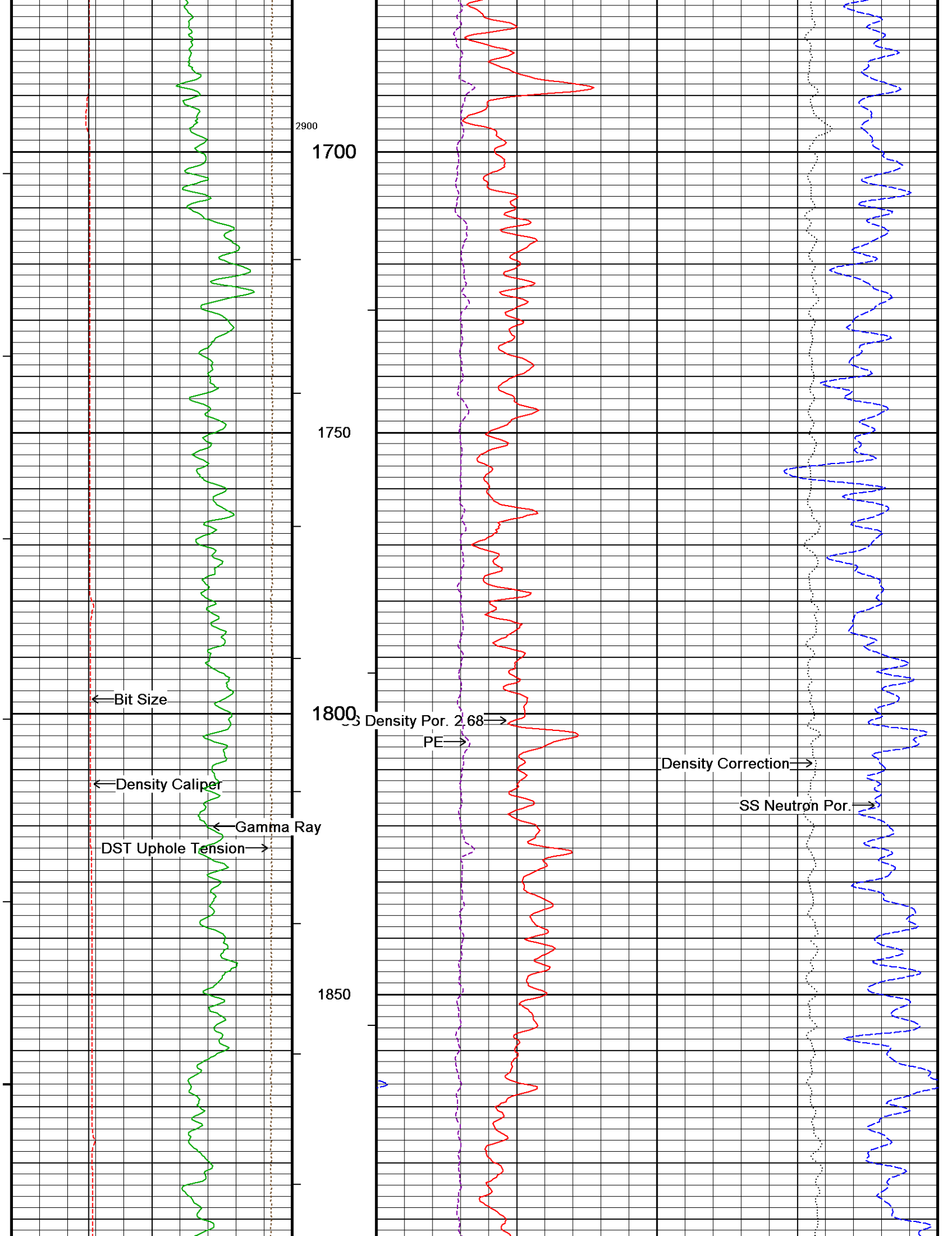


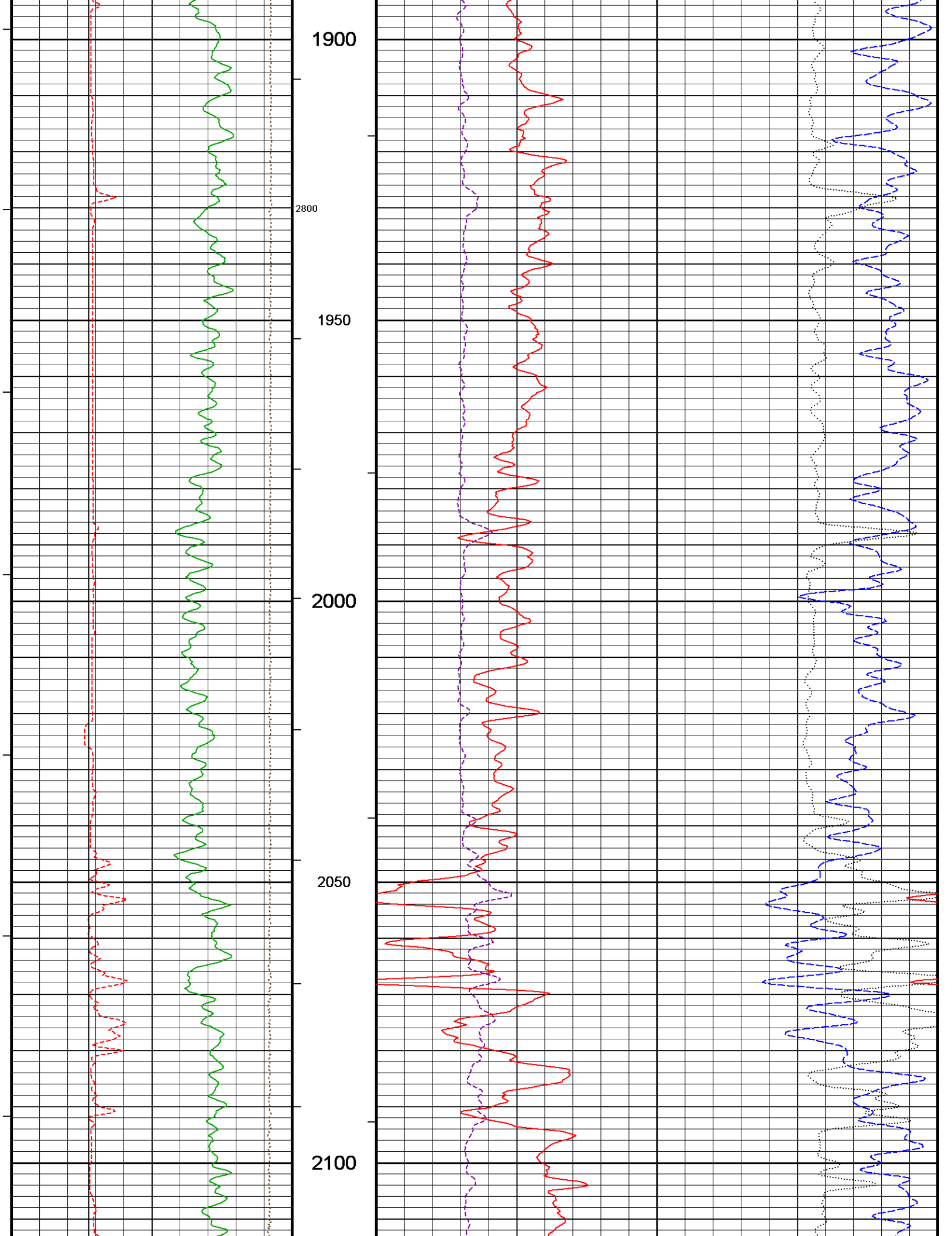


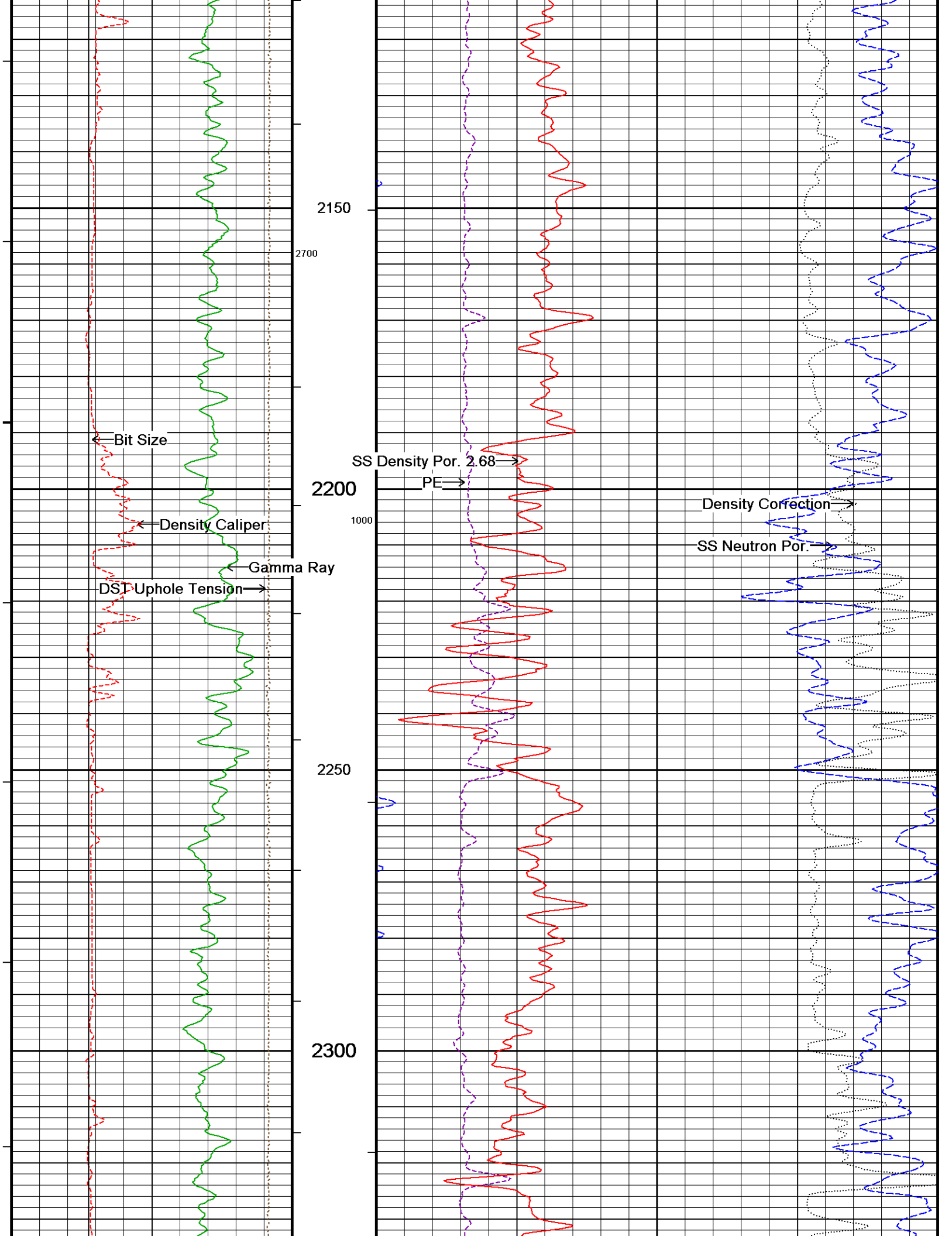


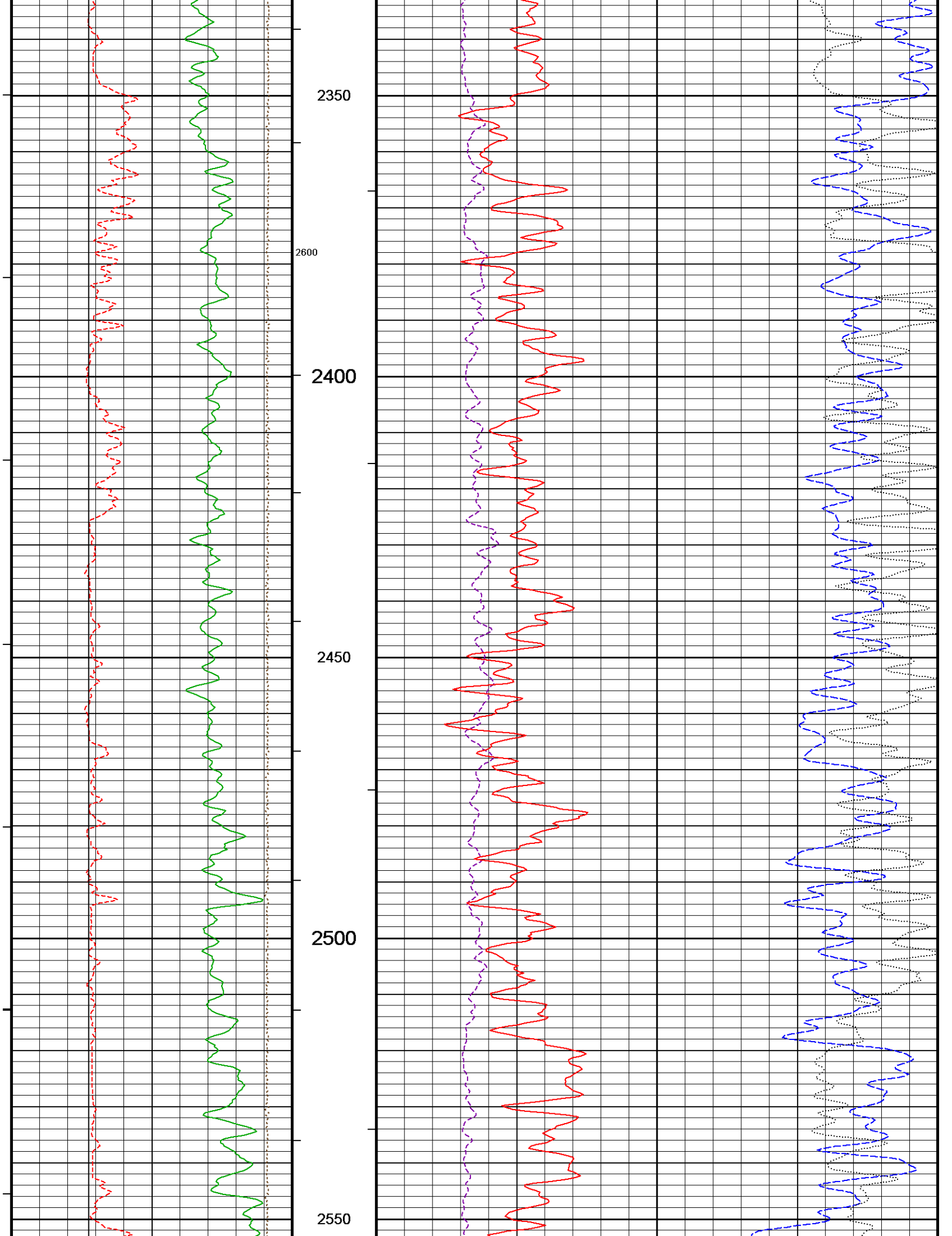


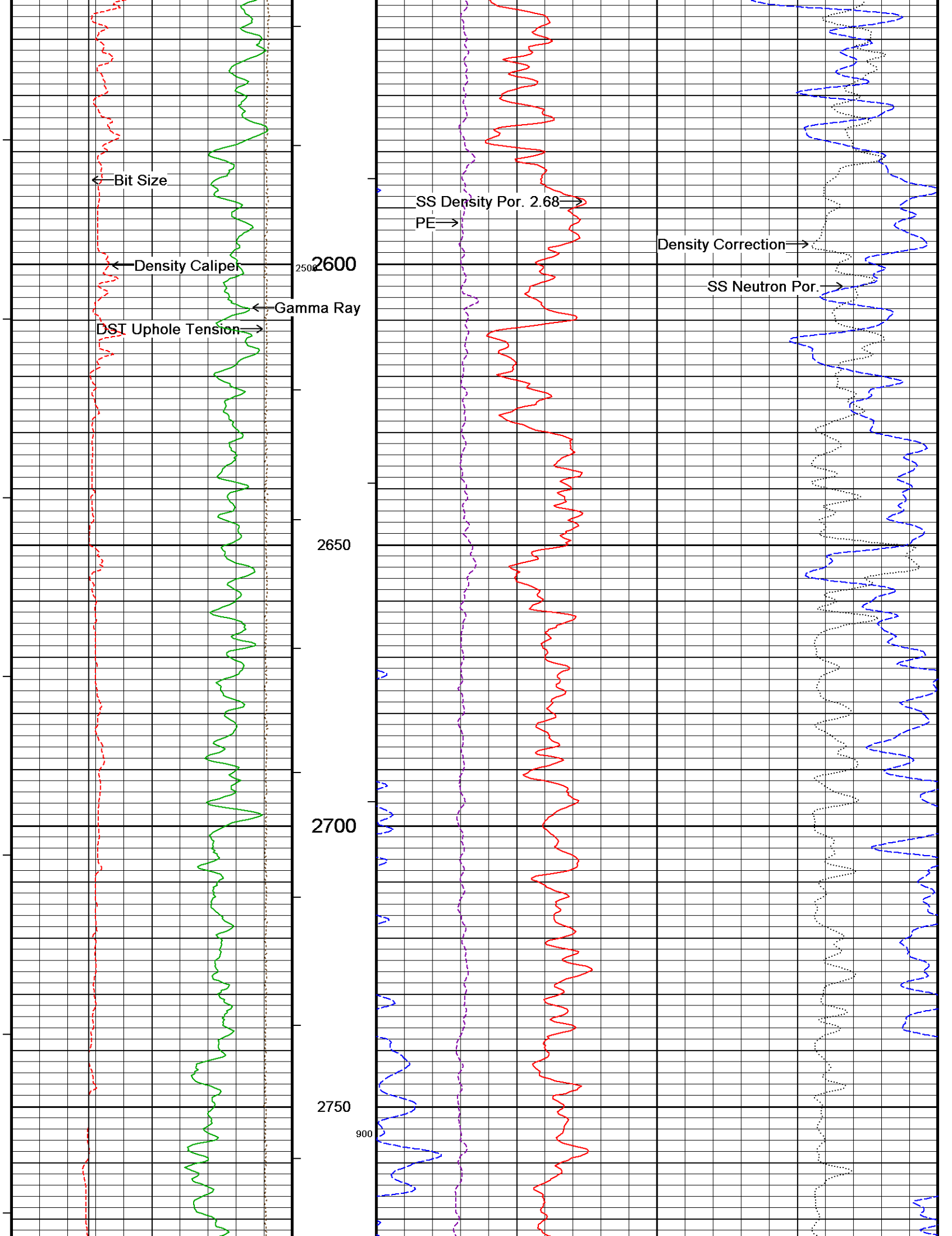


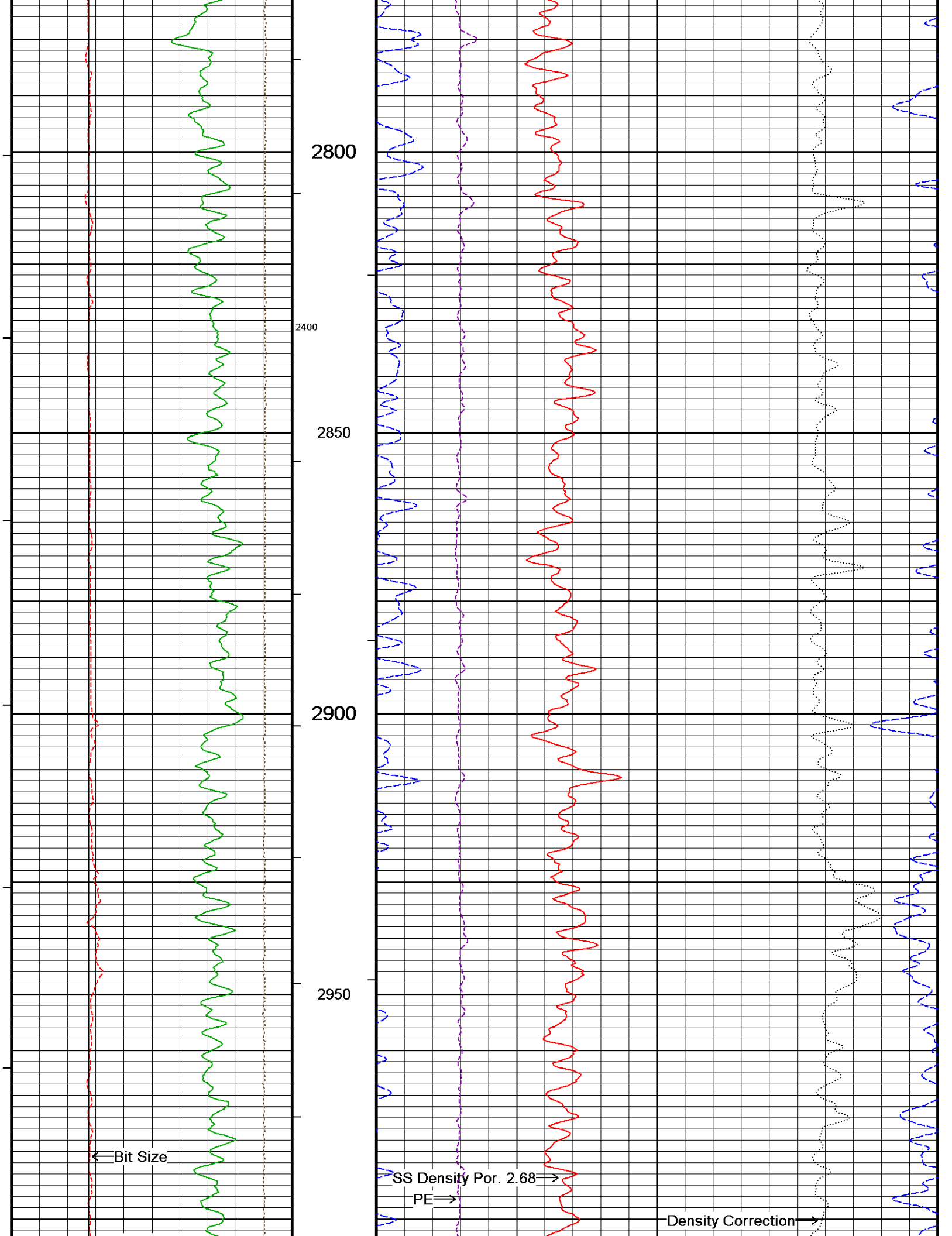


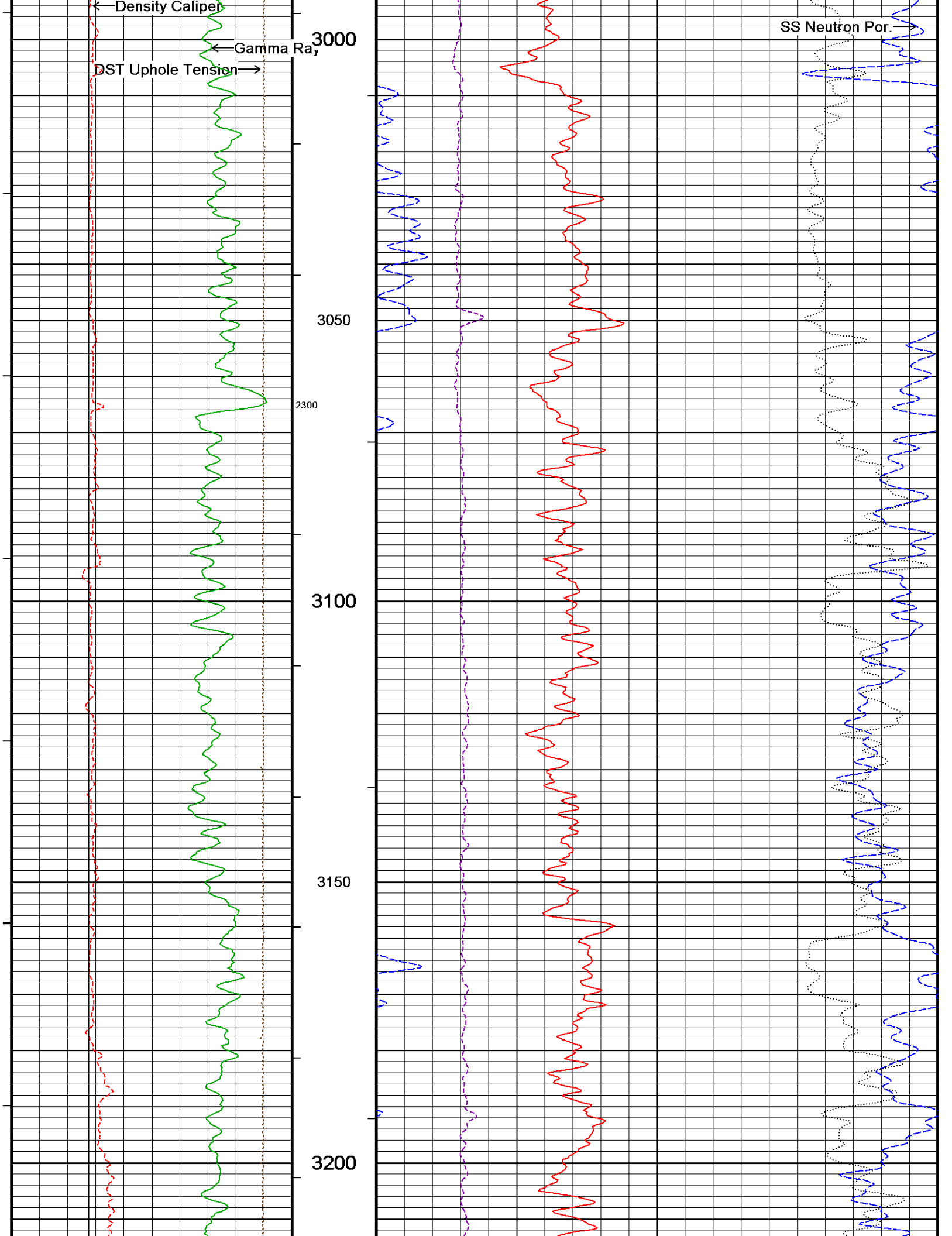




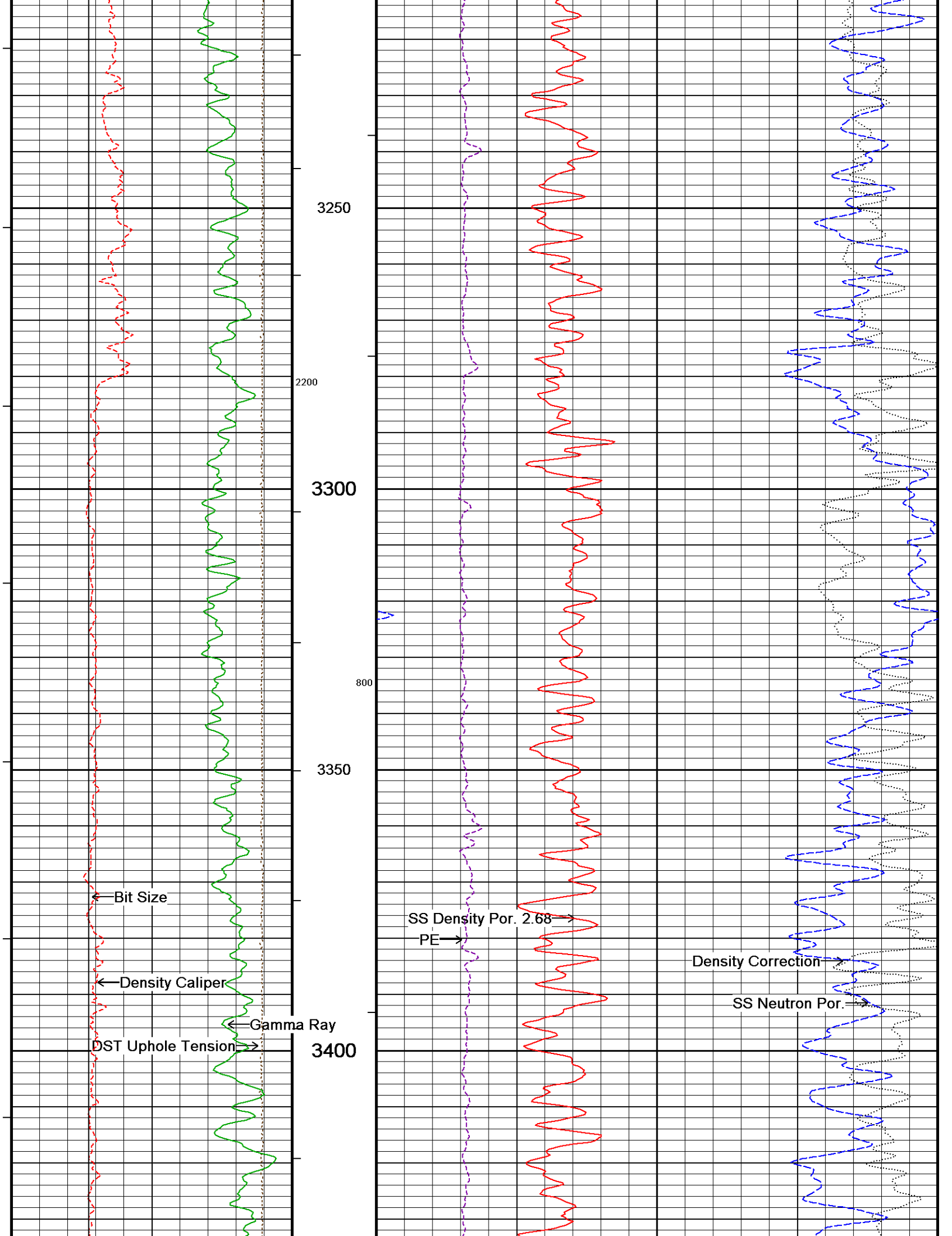


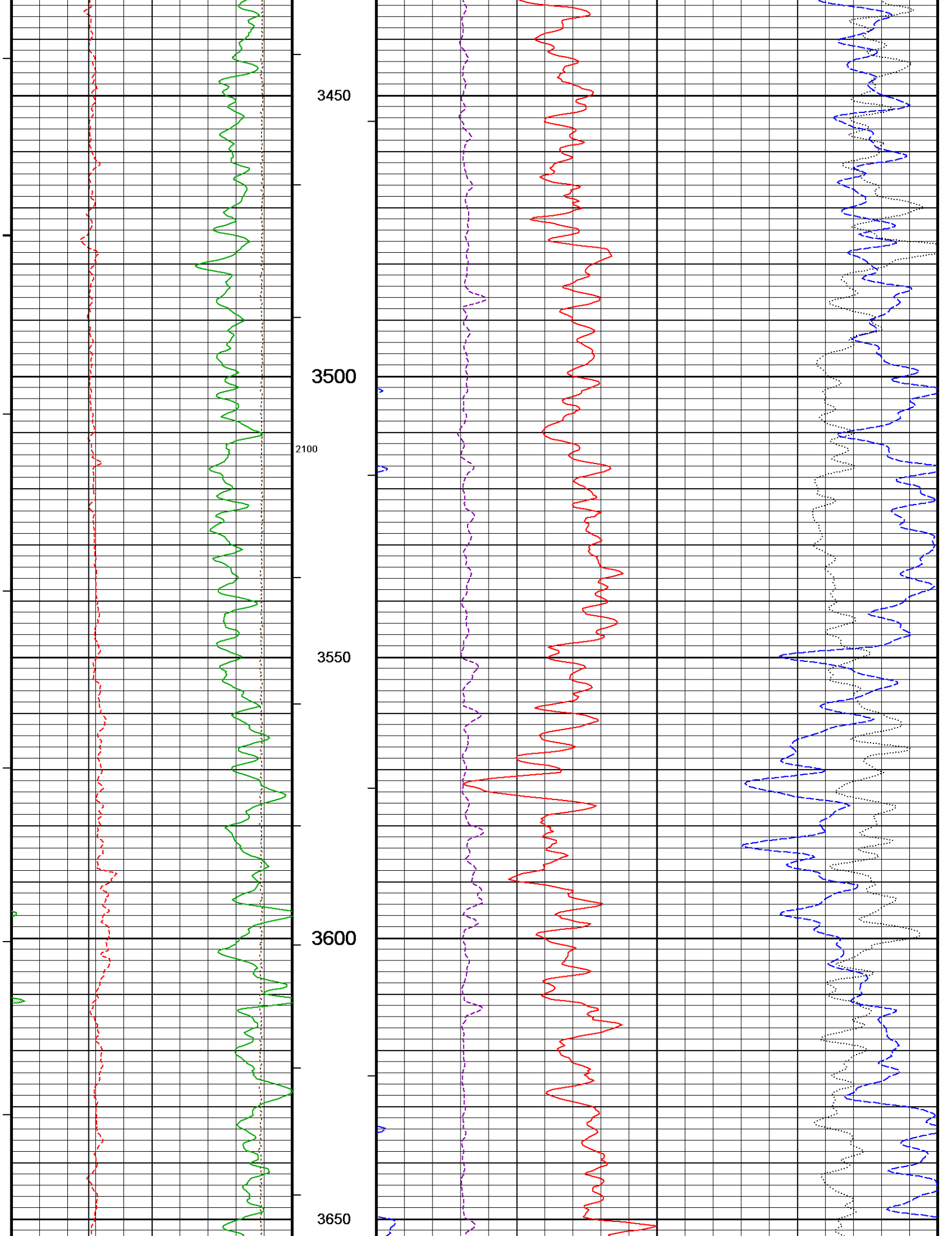


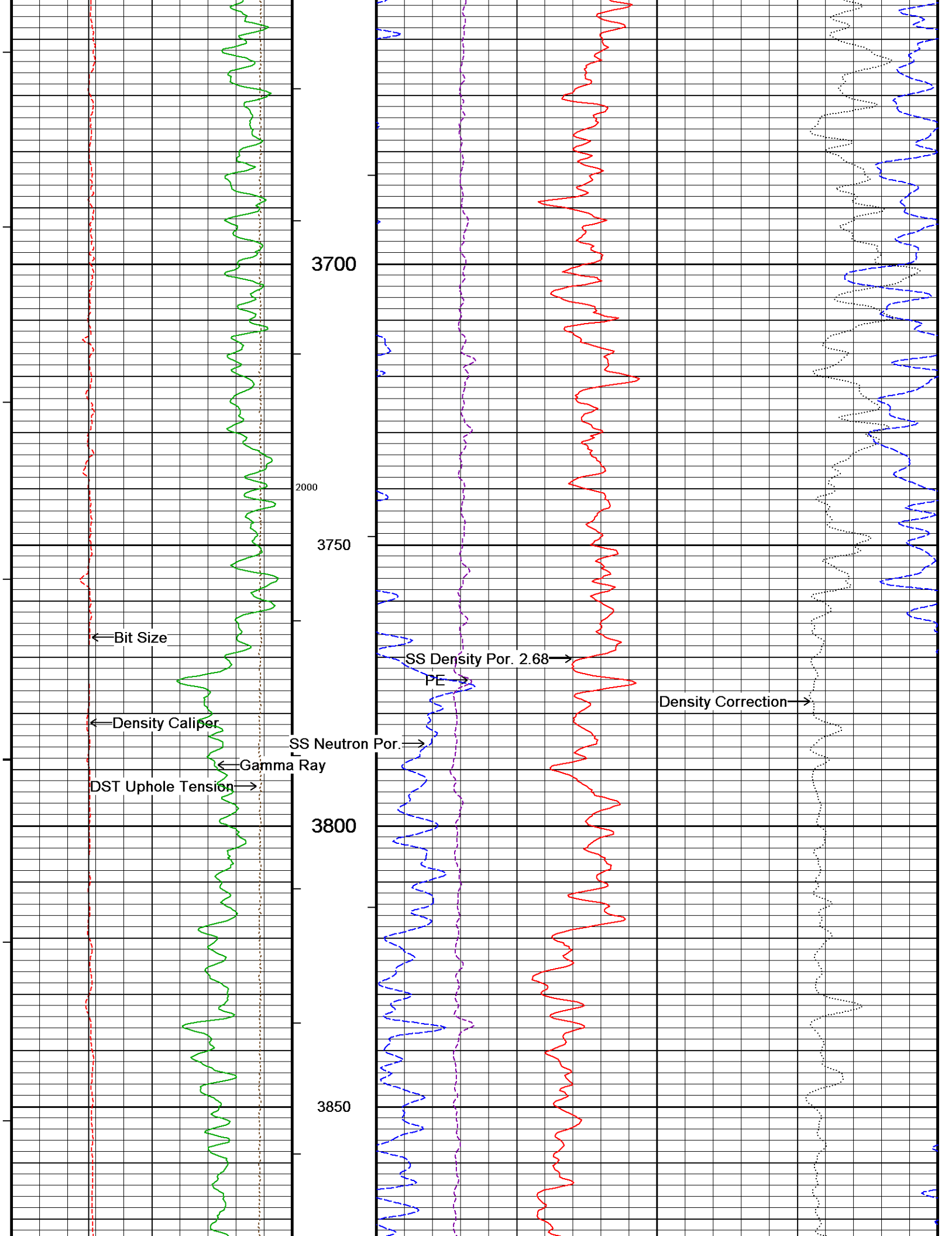


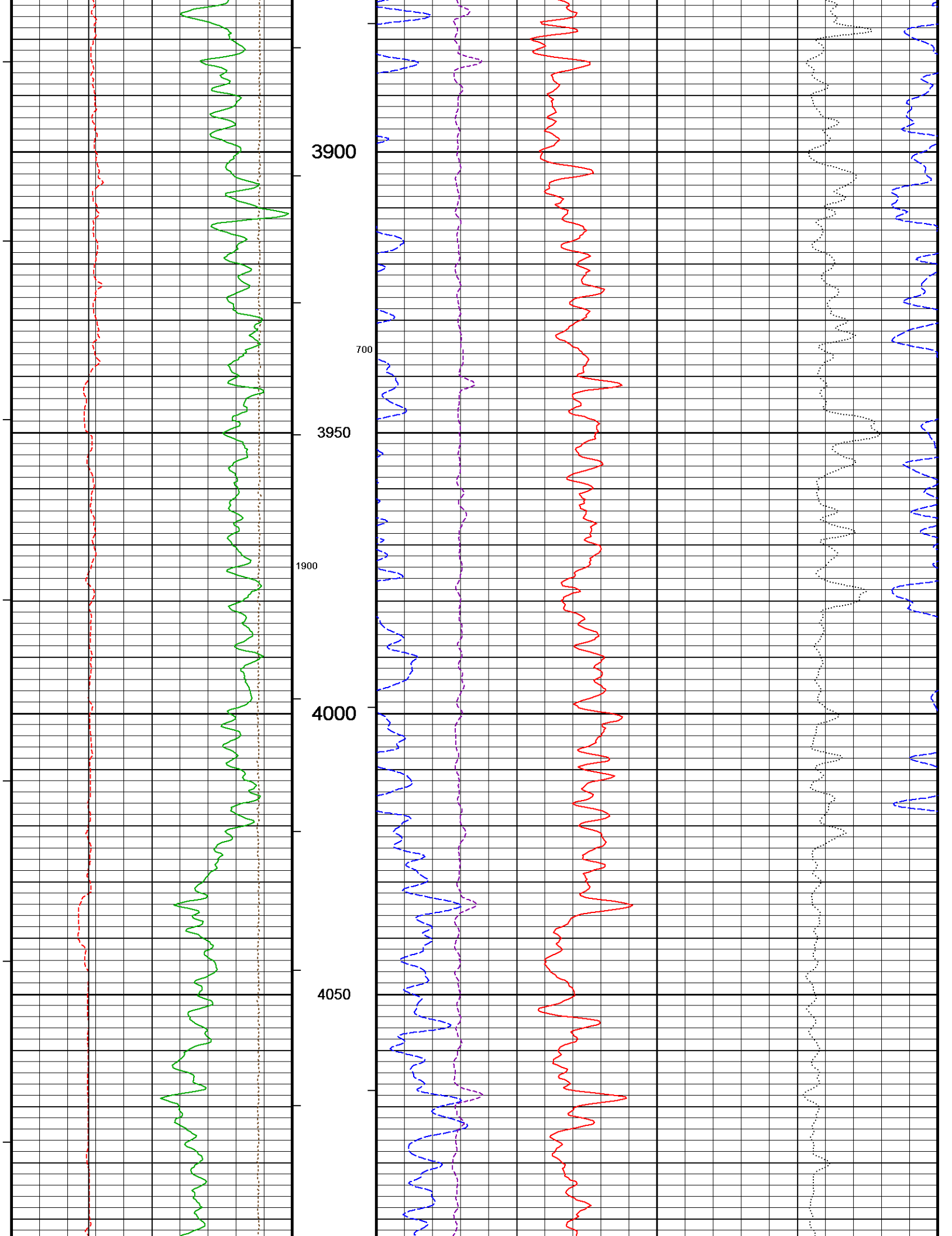


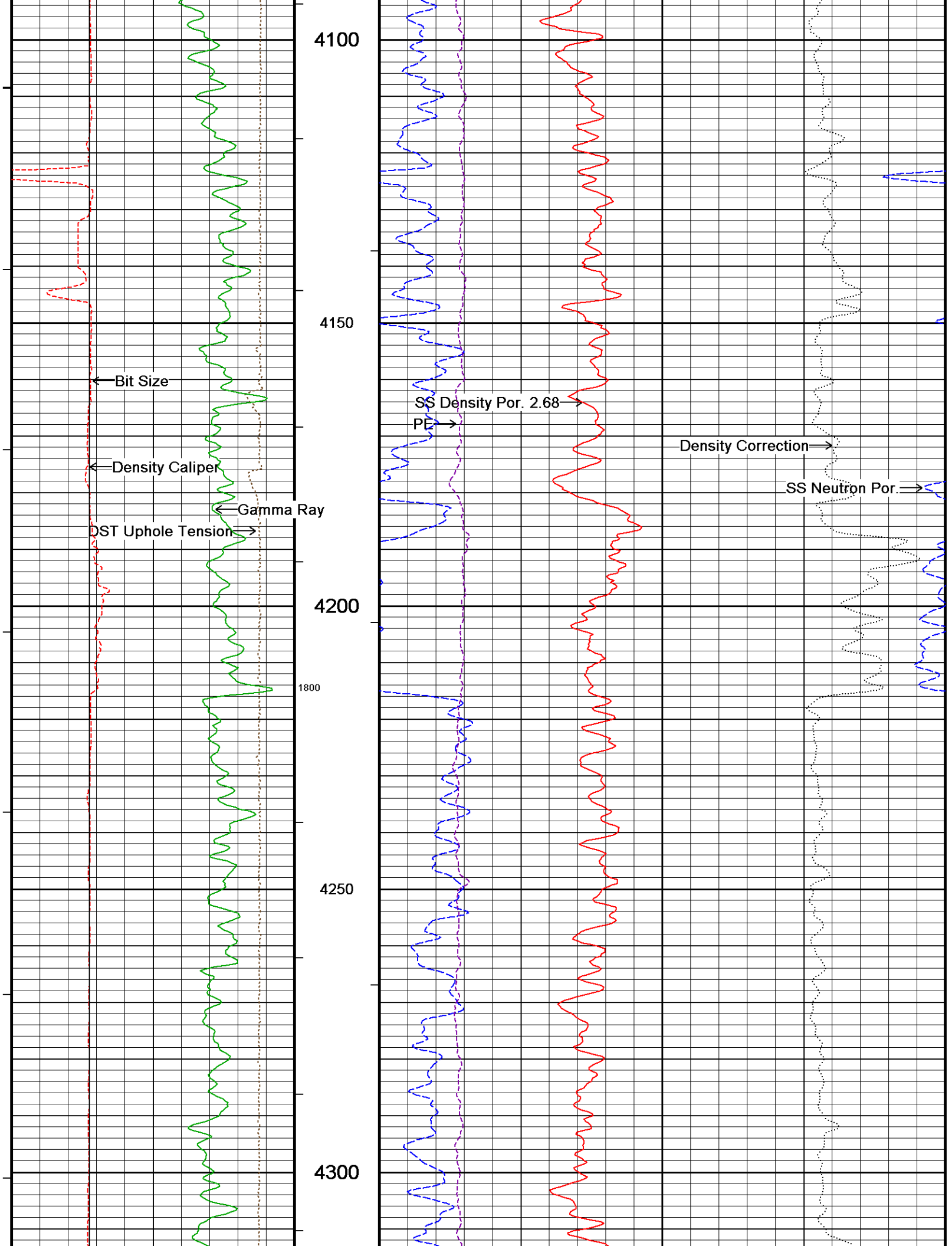


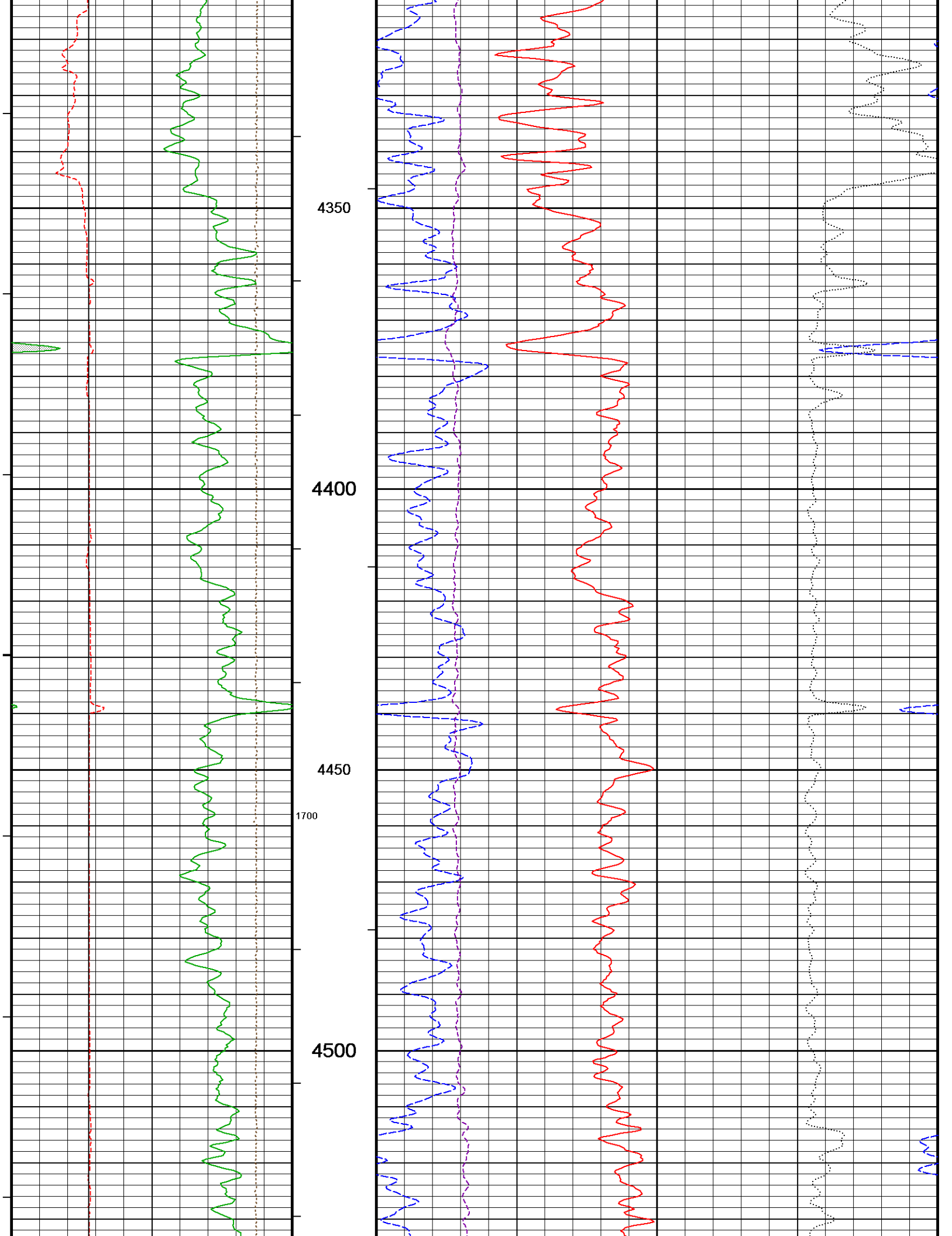


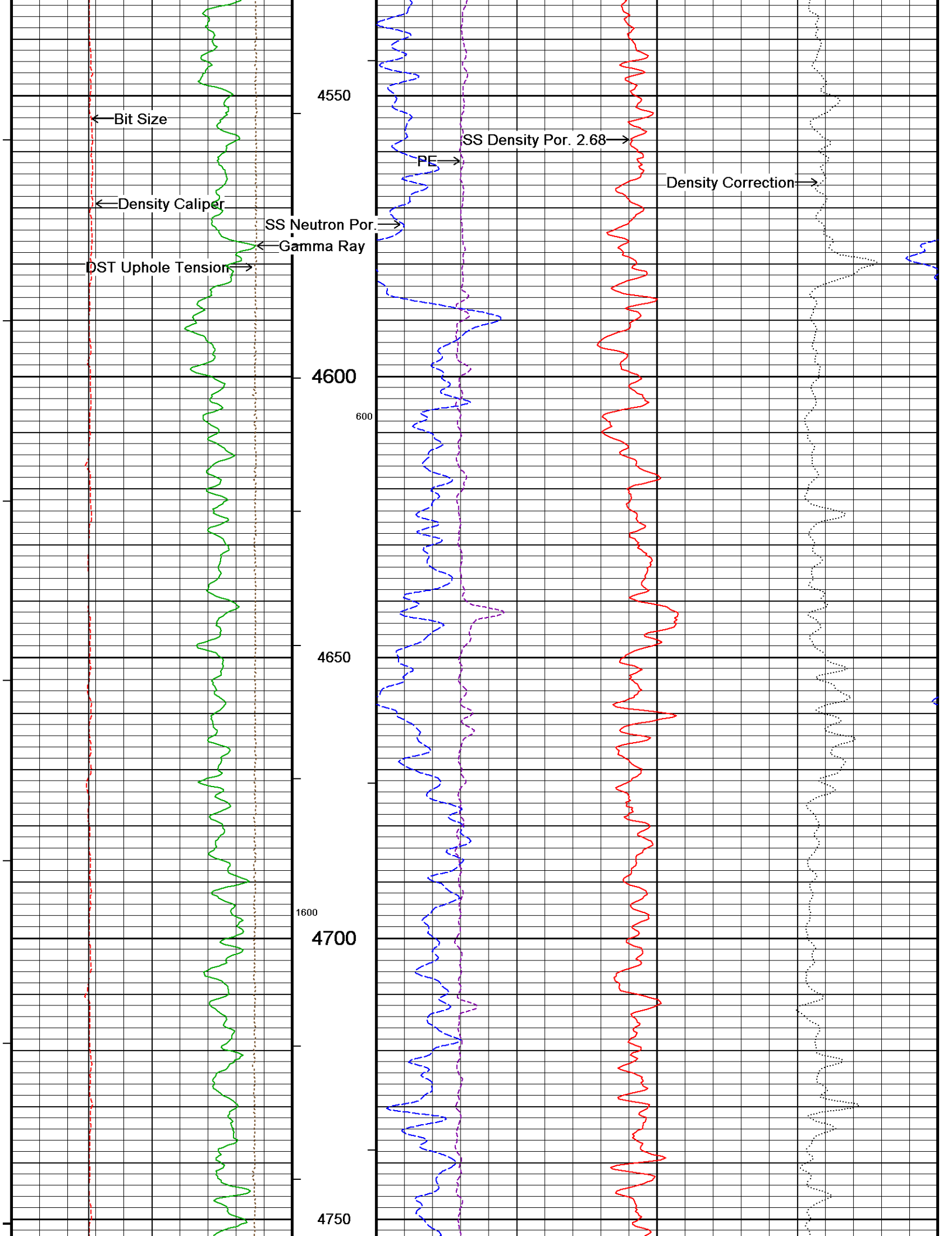


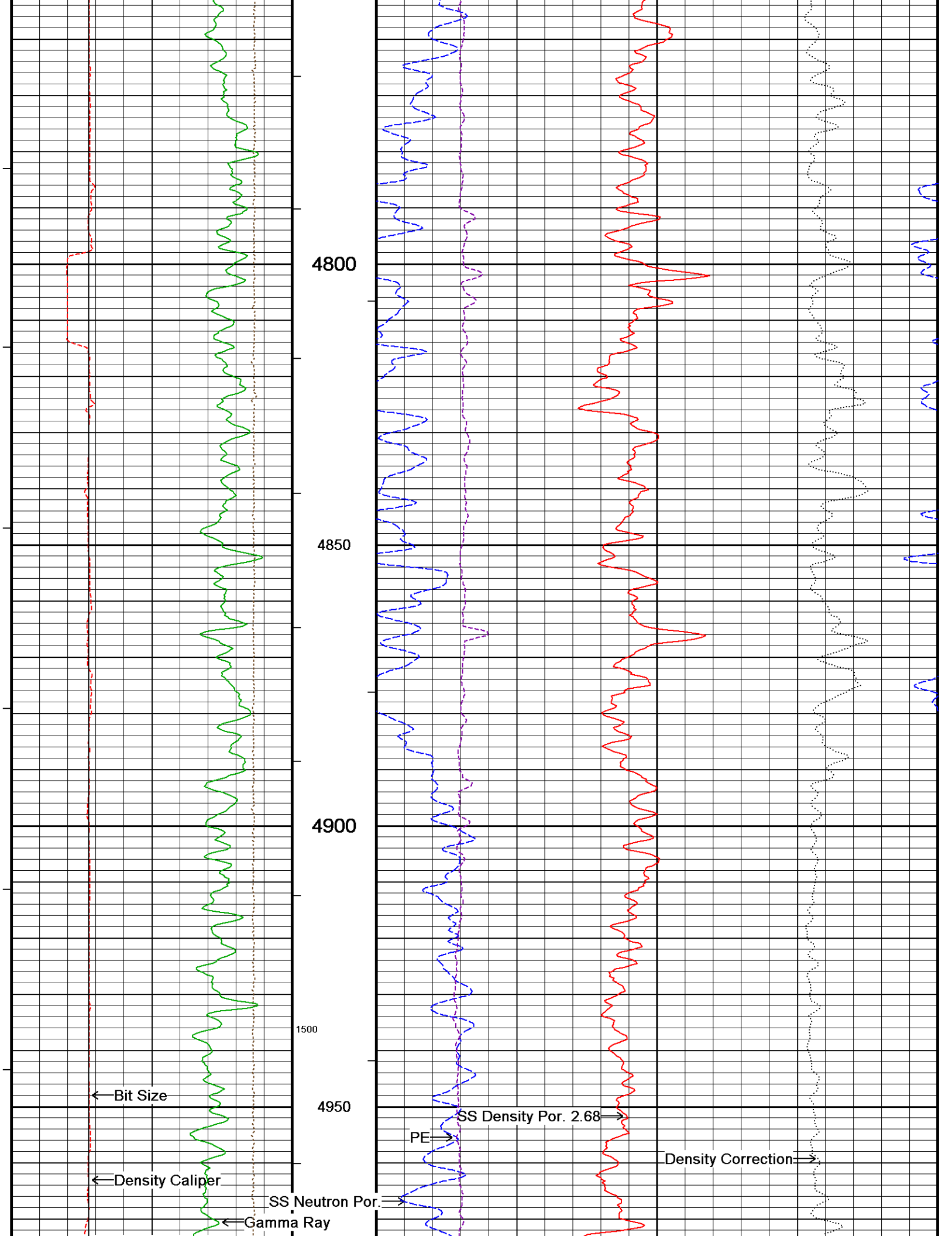




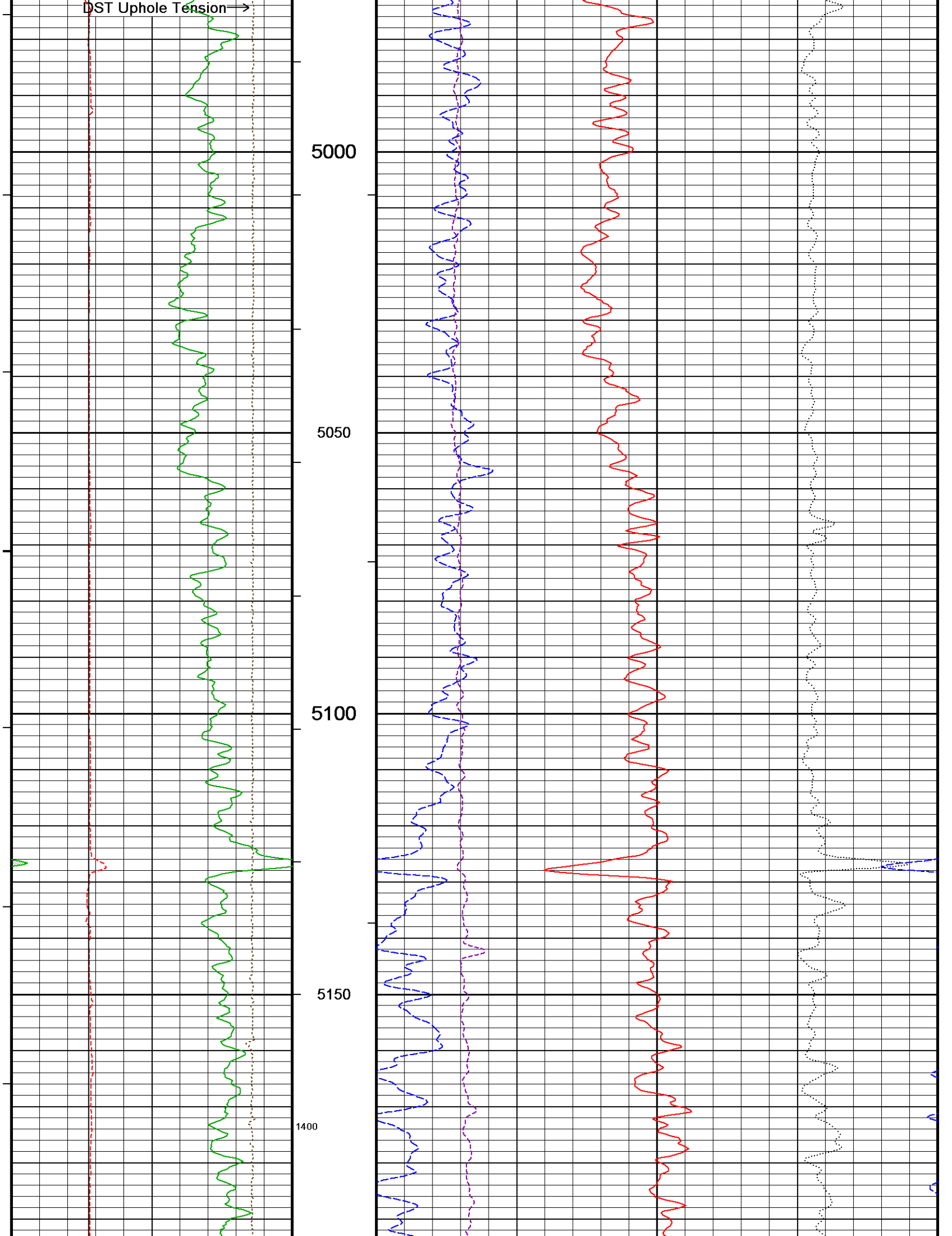


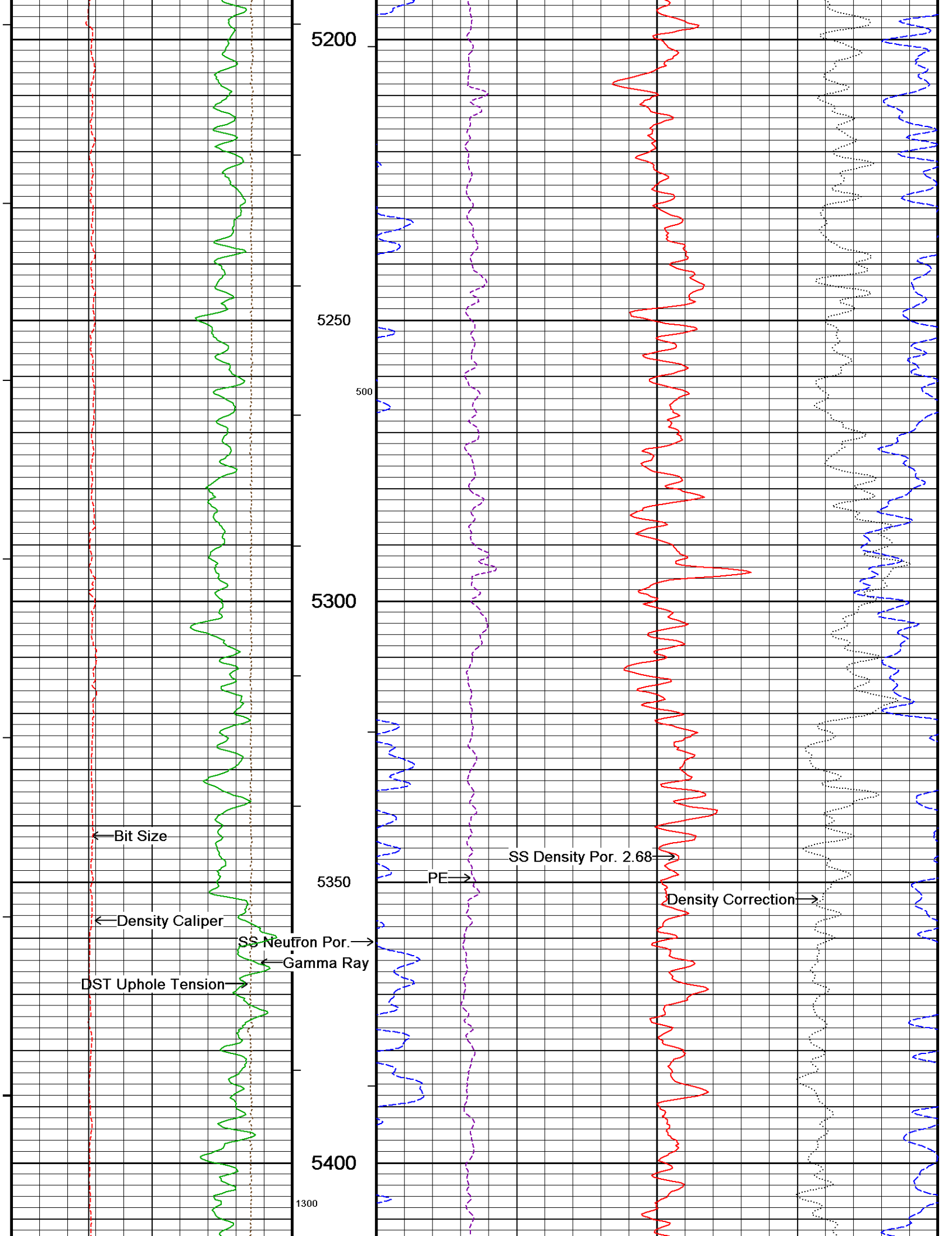


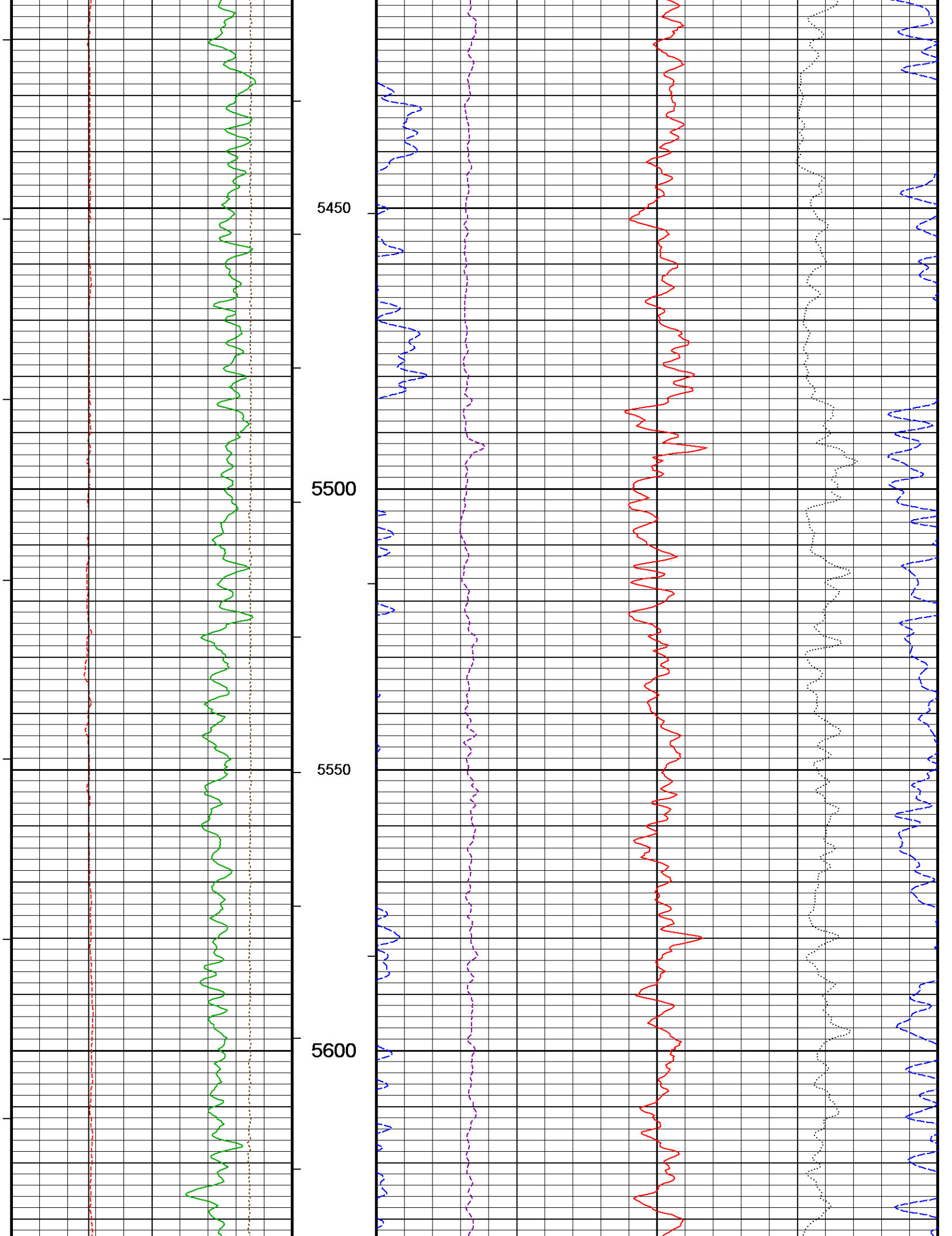


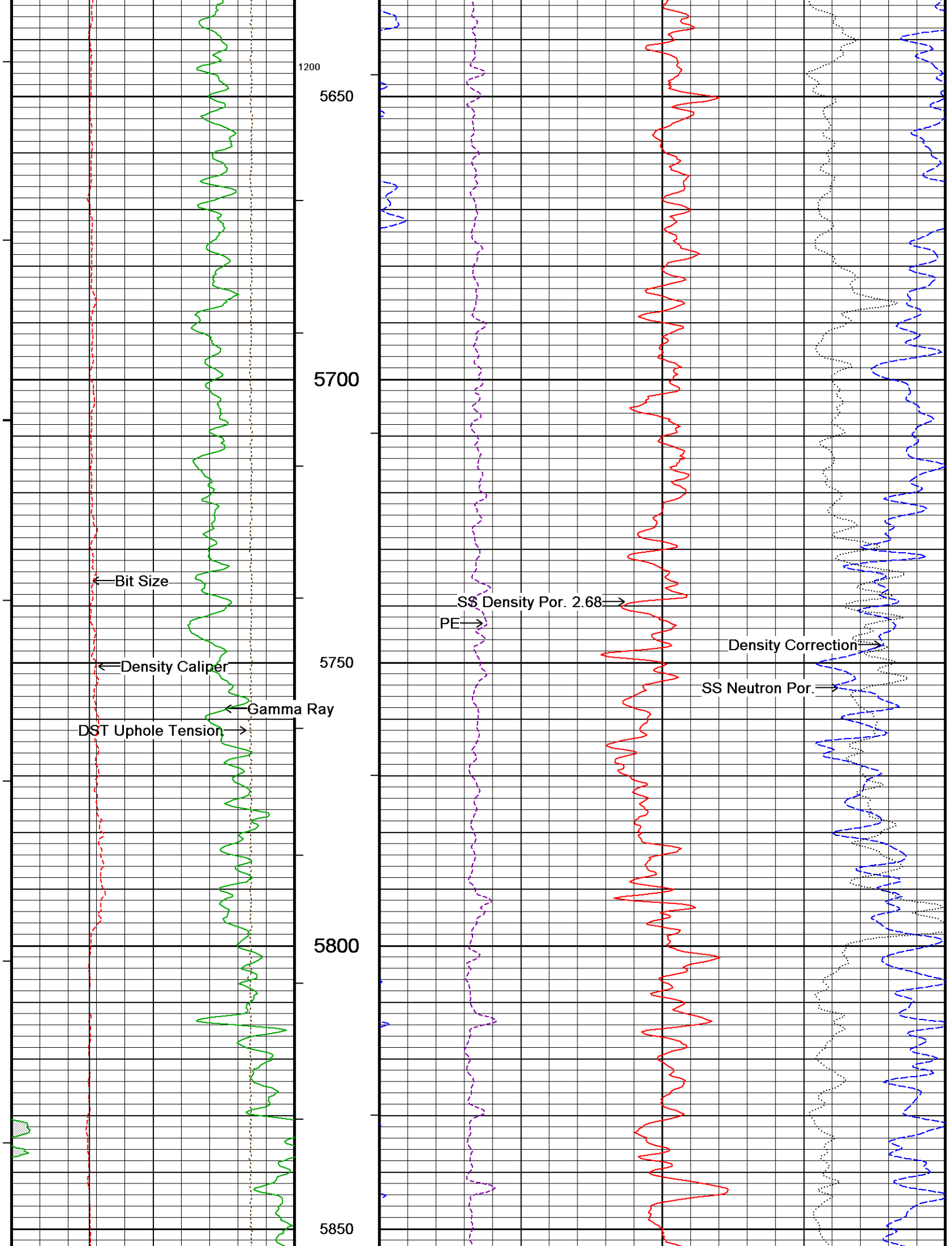


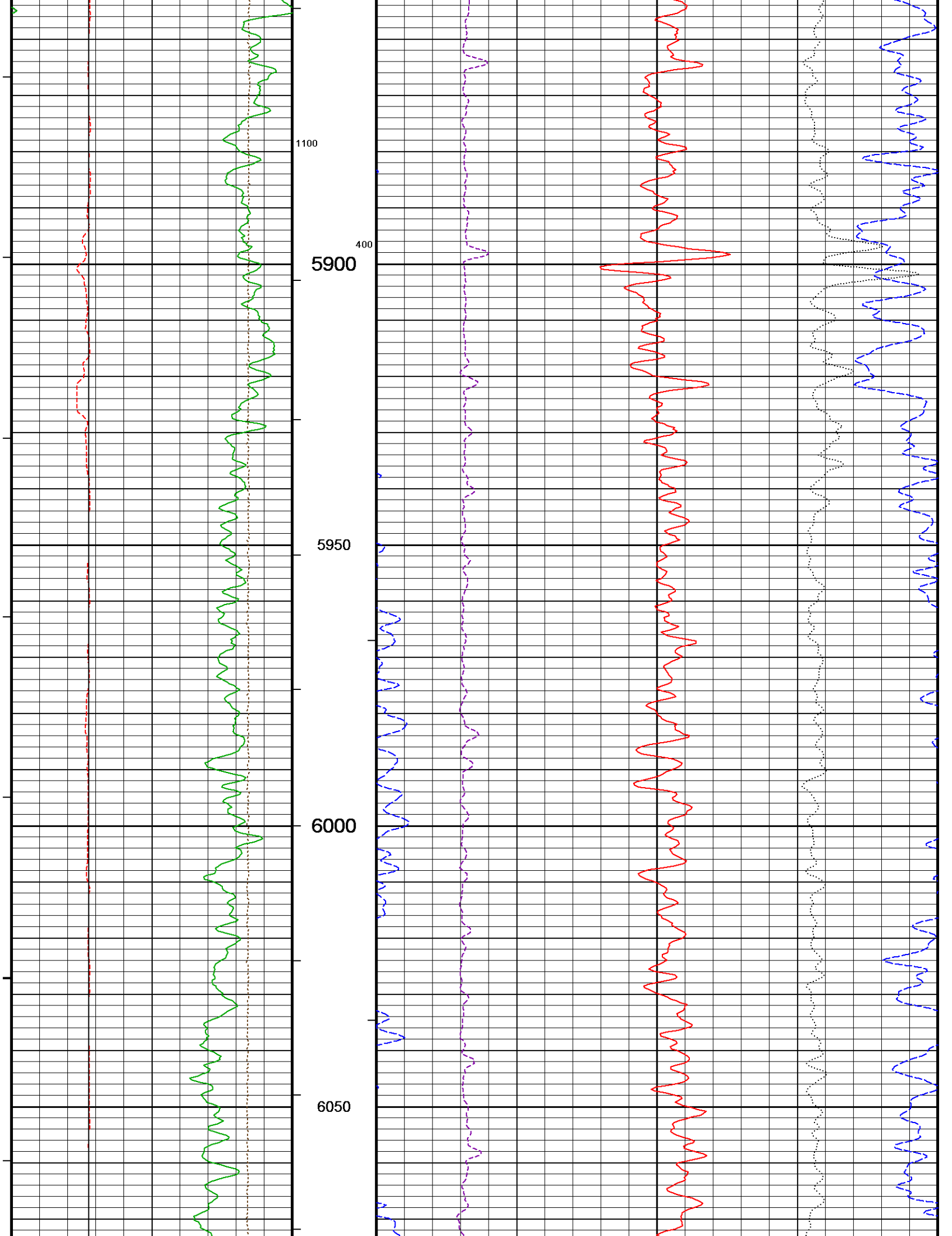


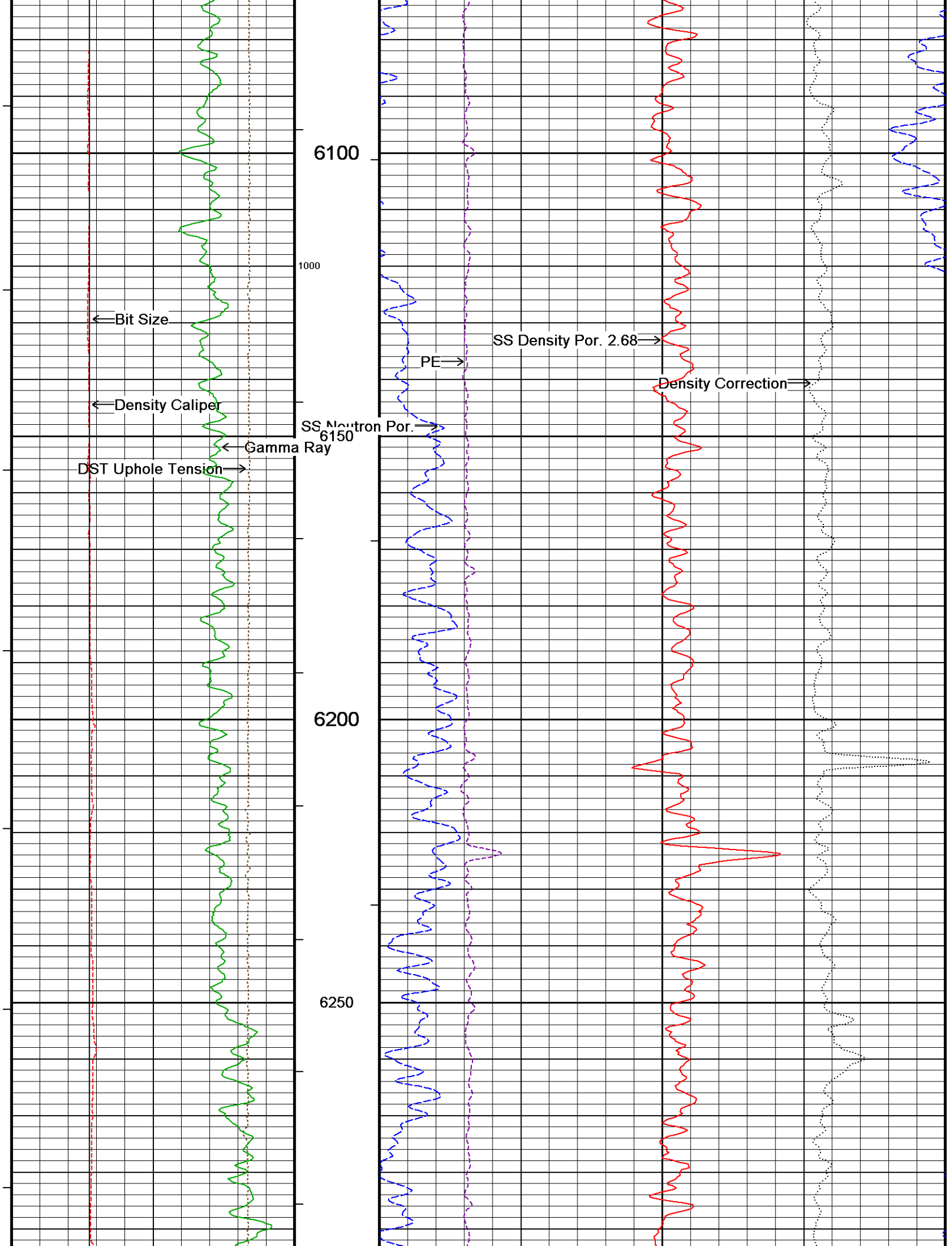


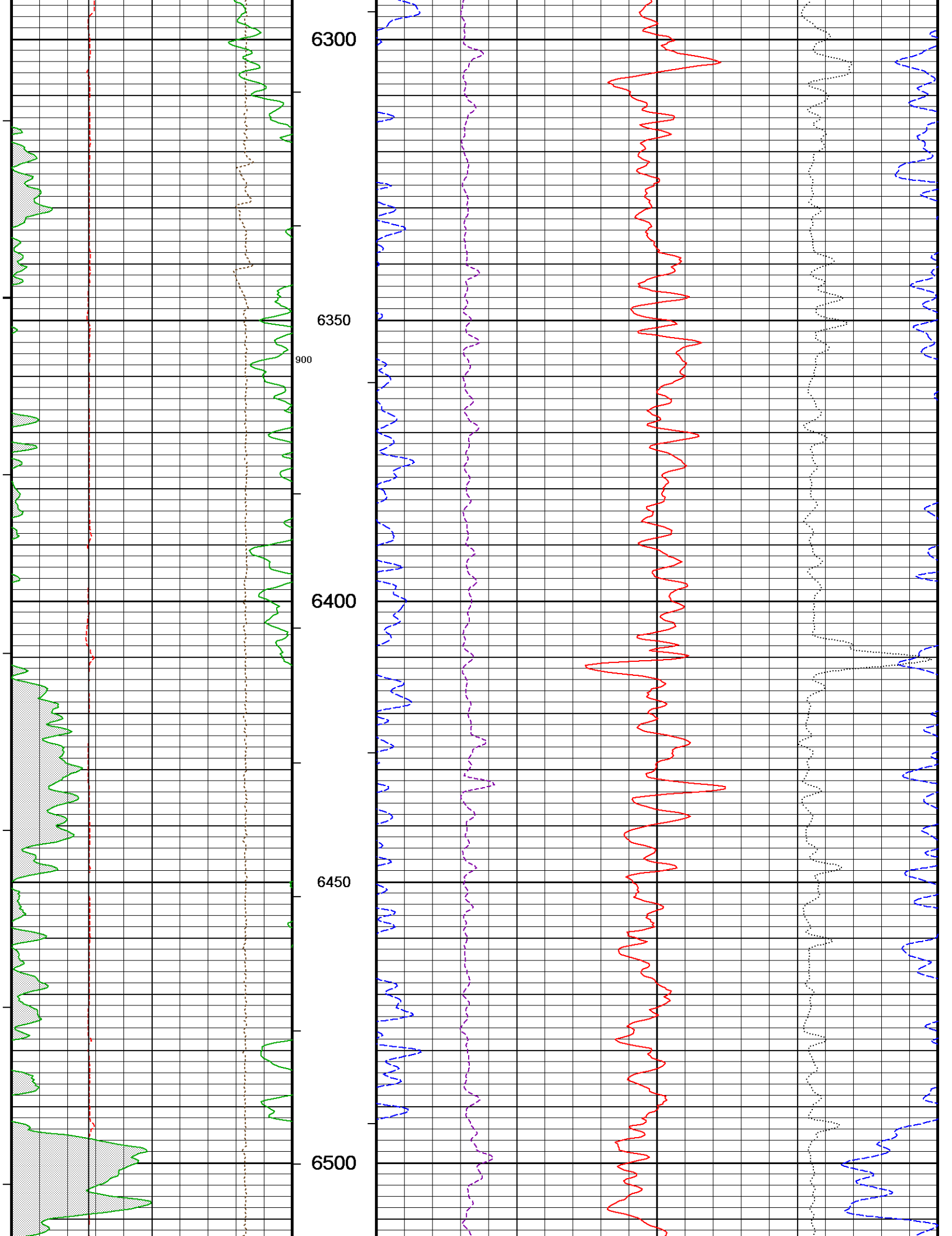


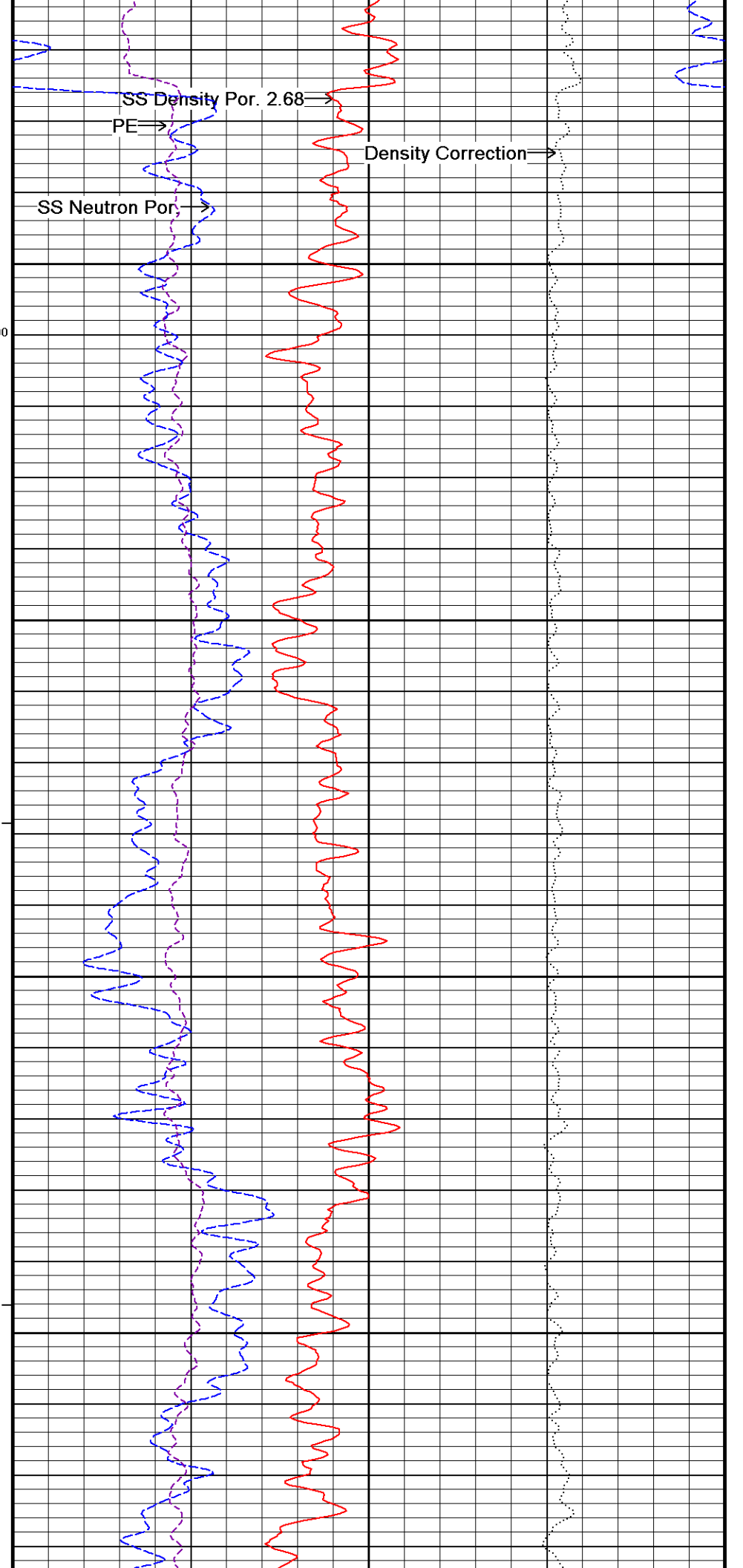
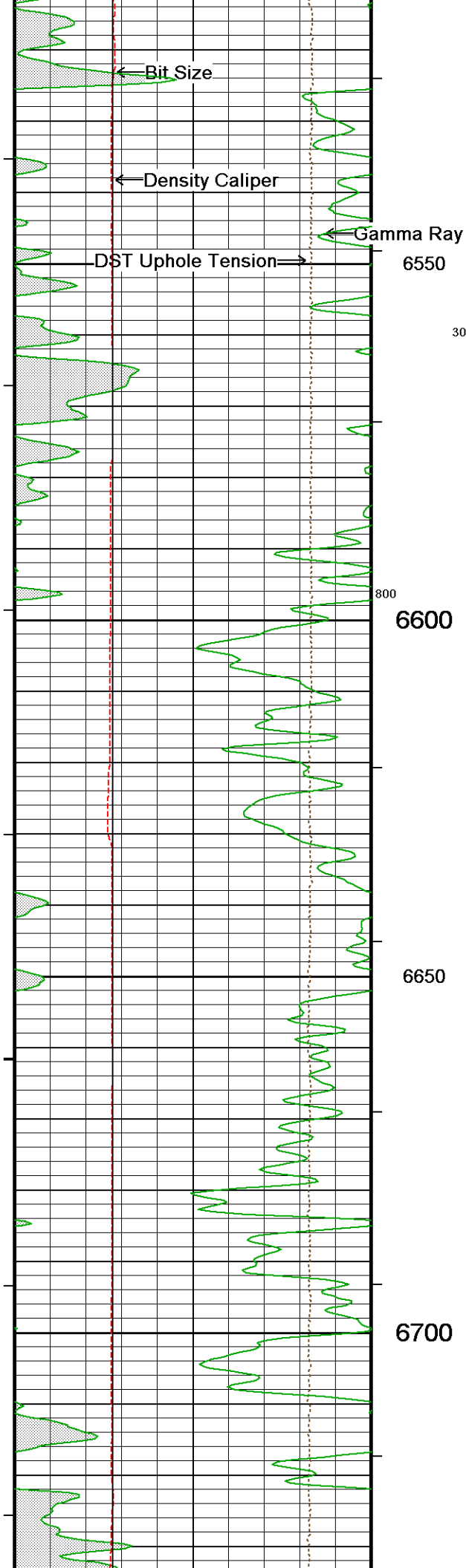




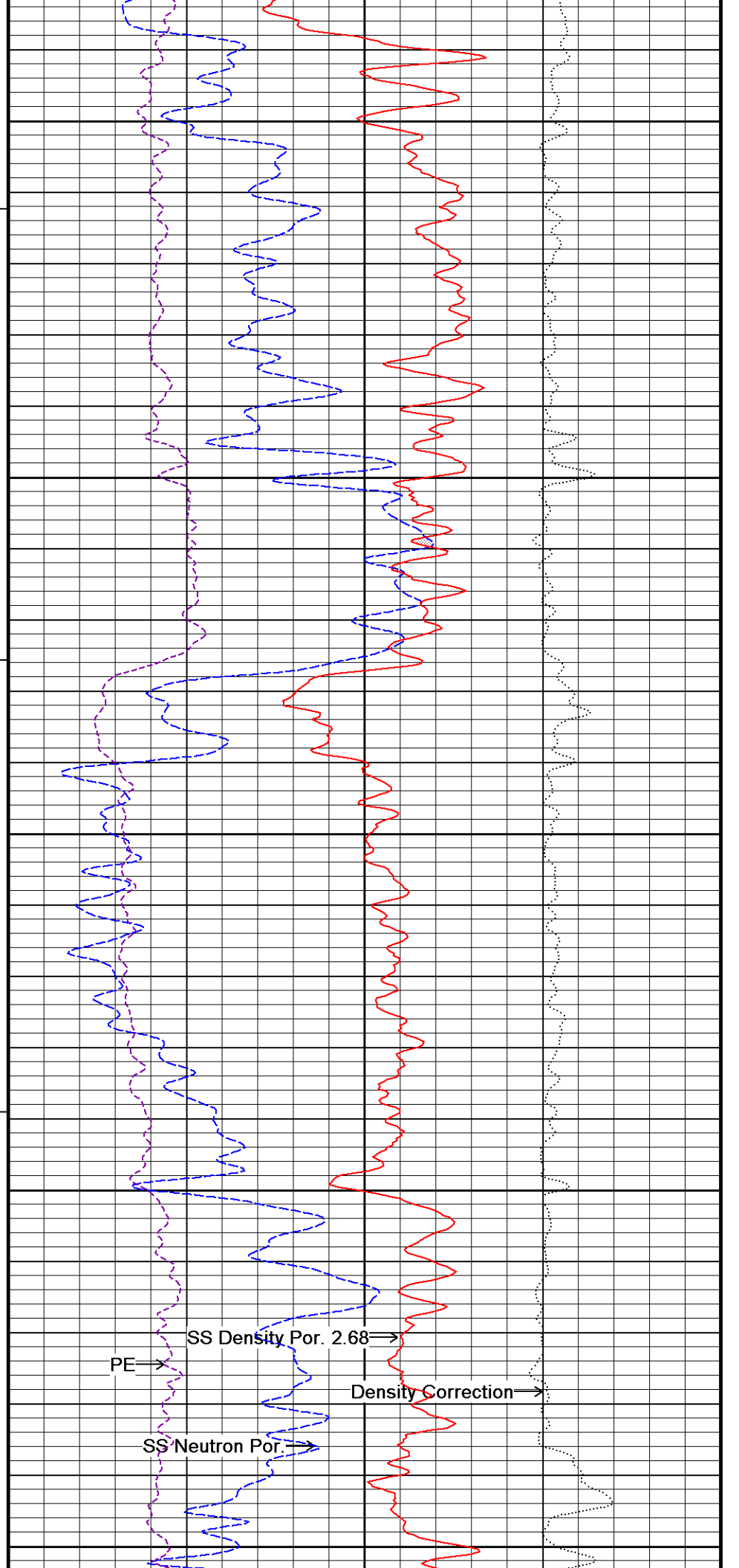
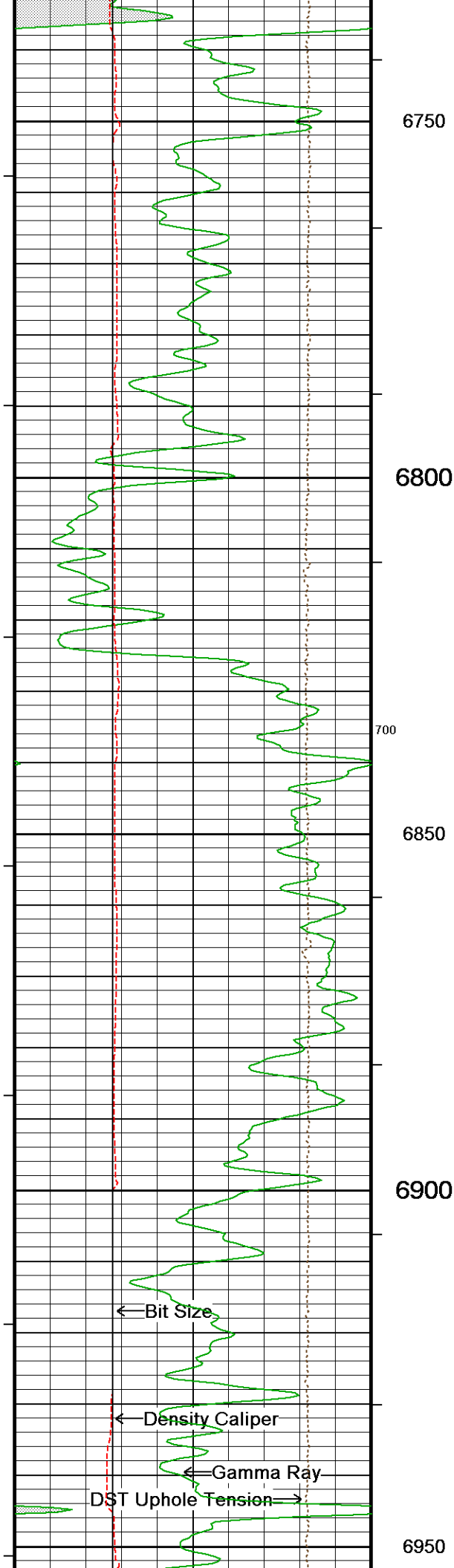


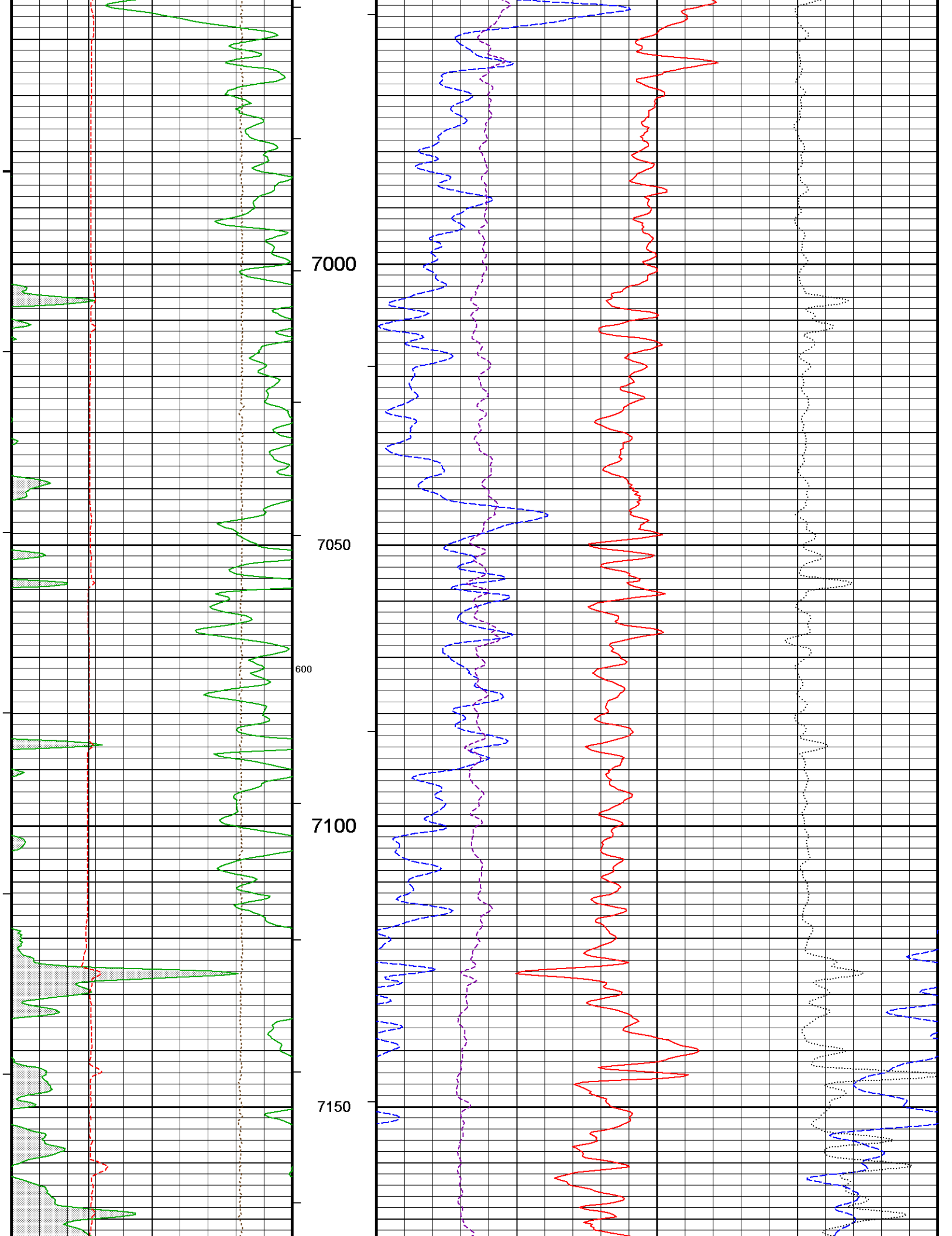


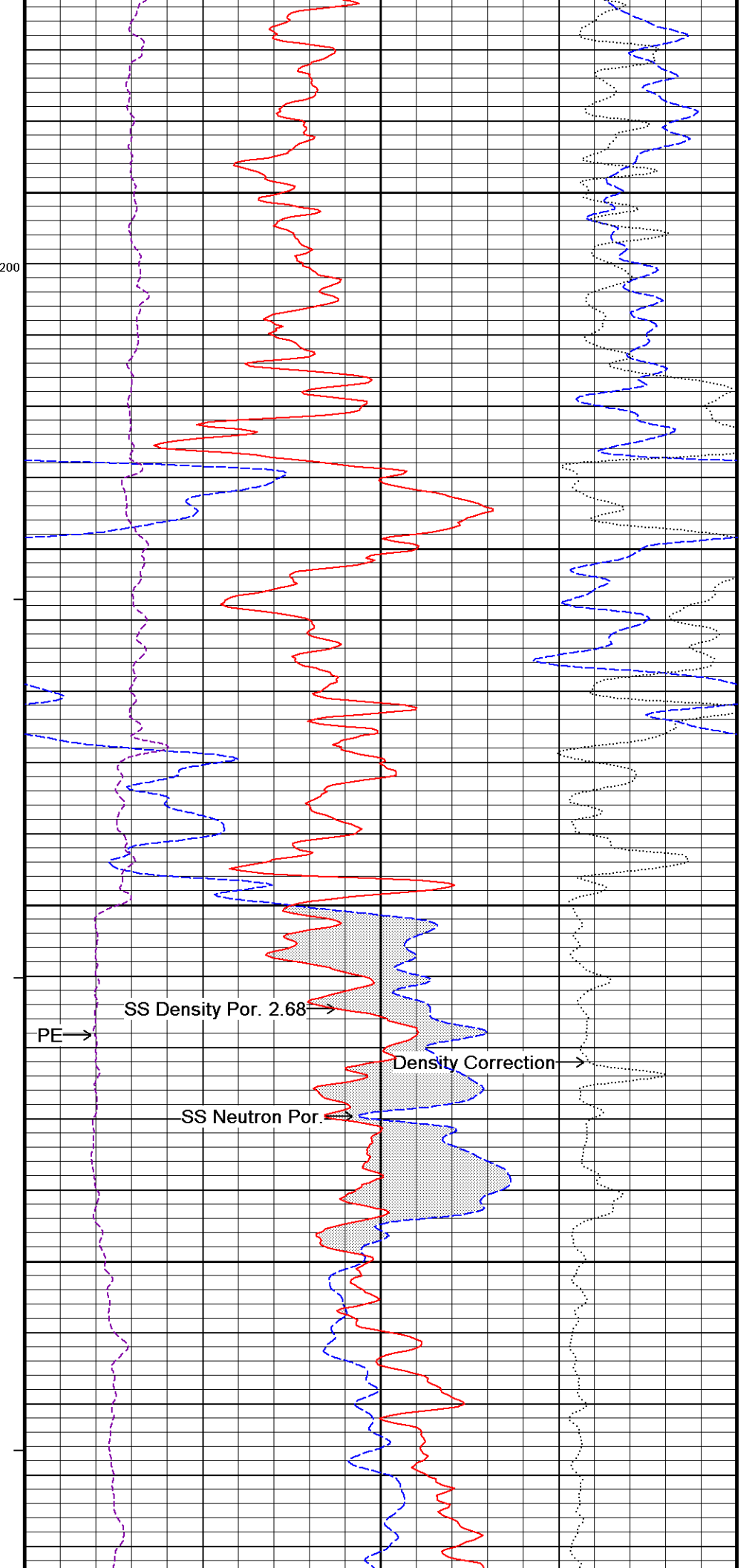
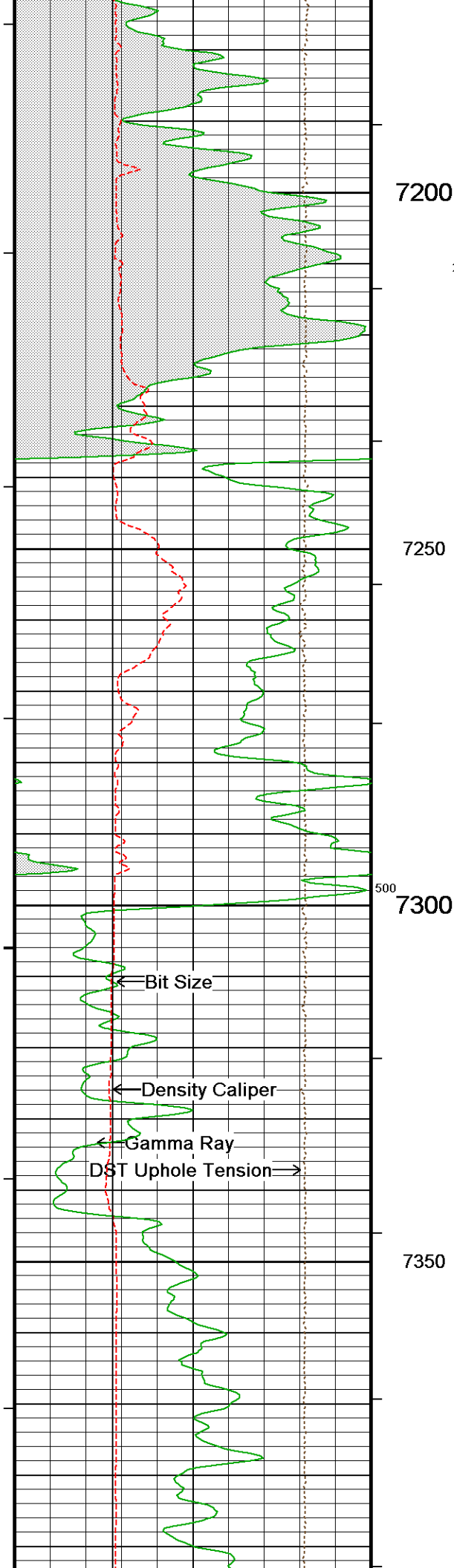


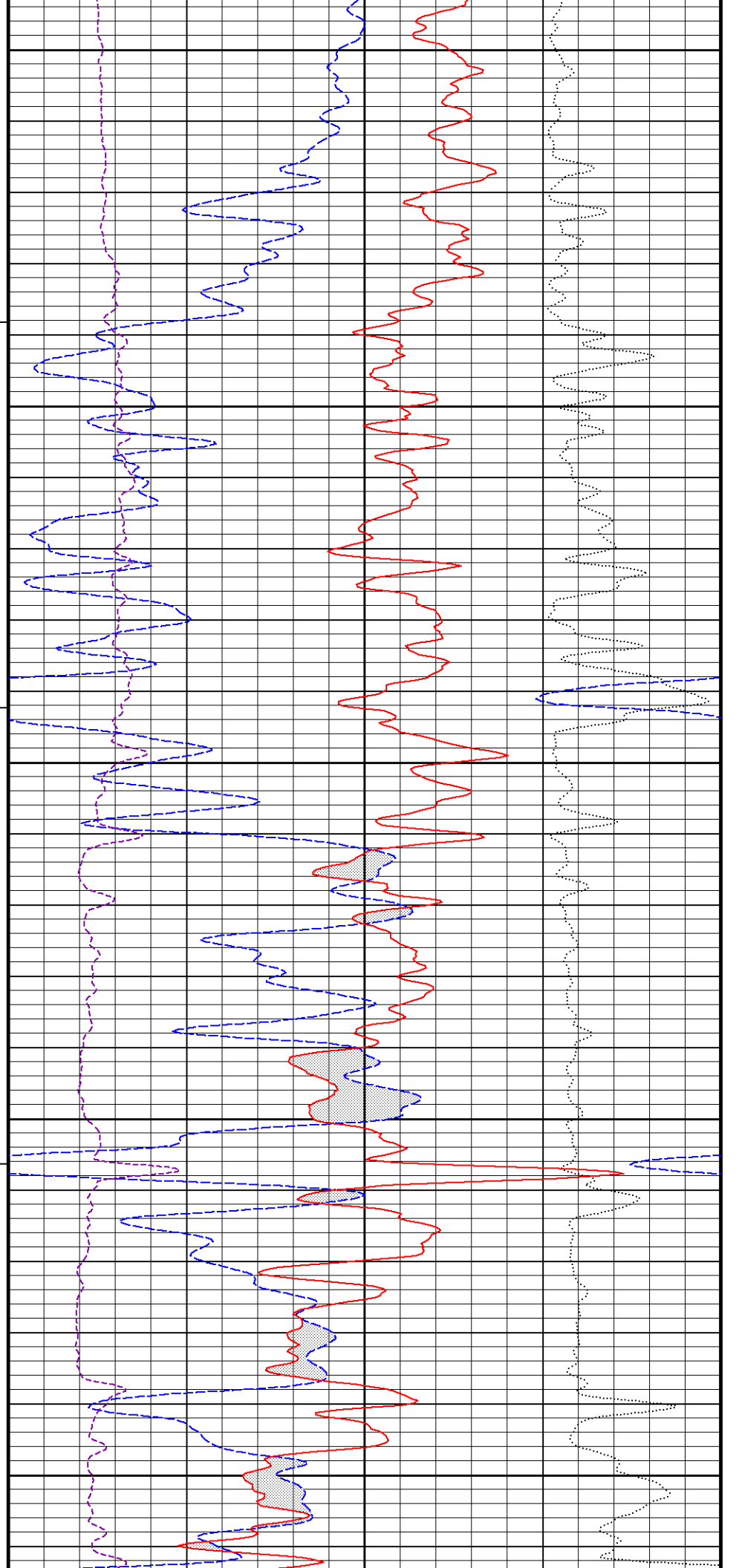
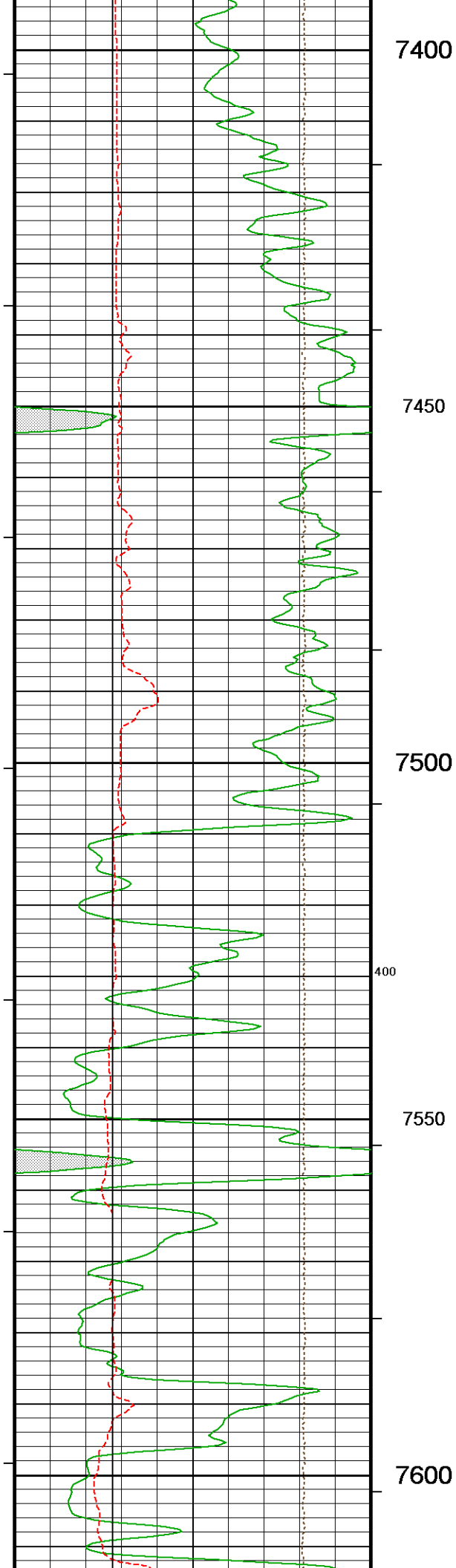


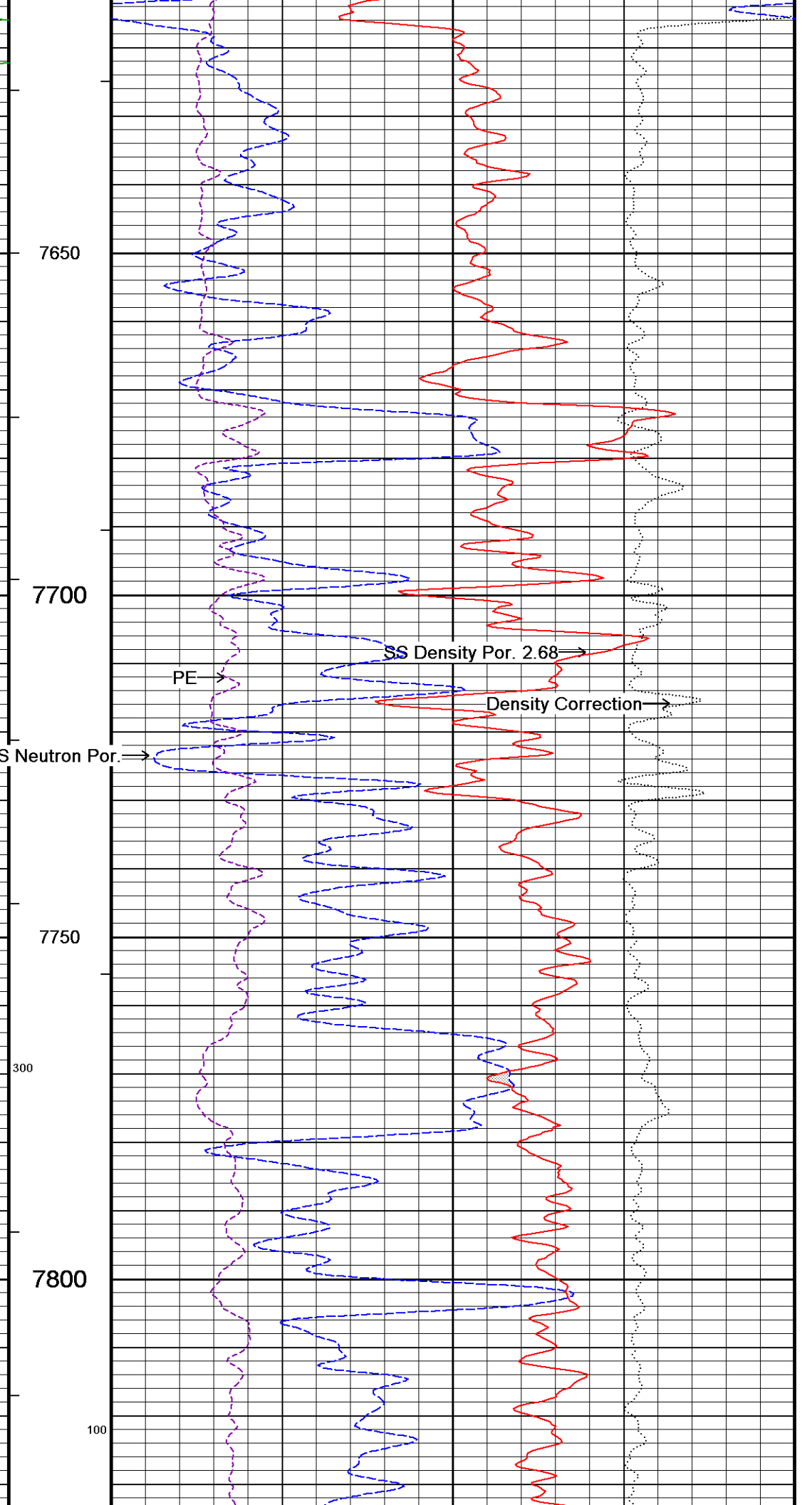
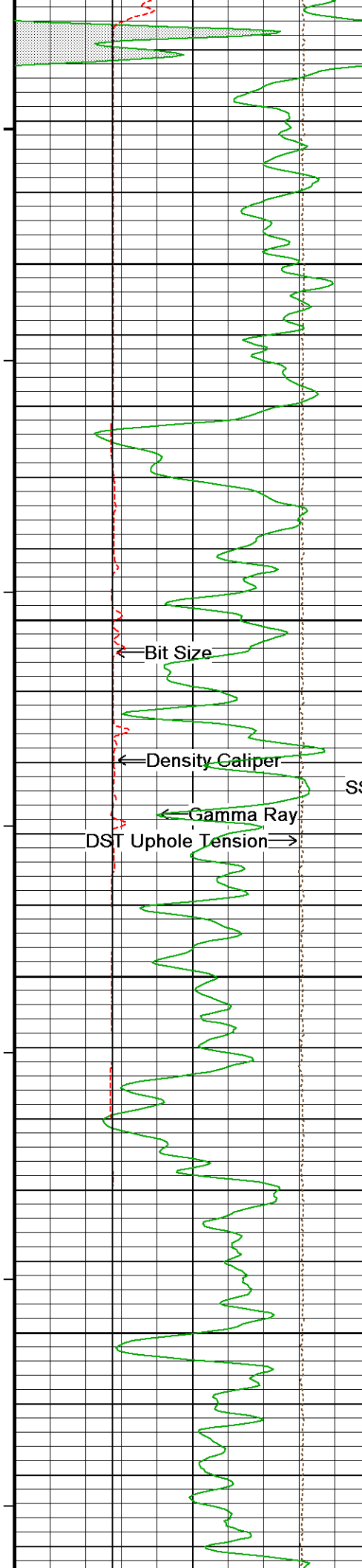












7650

7700

7750

7800

300

100

← Bit Size

← Density Caliper

← Gamma Ray

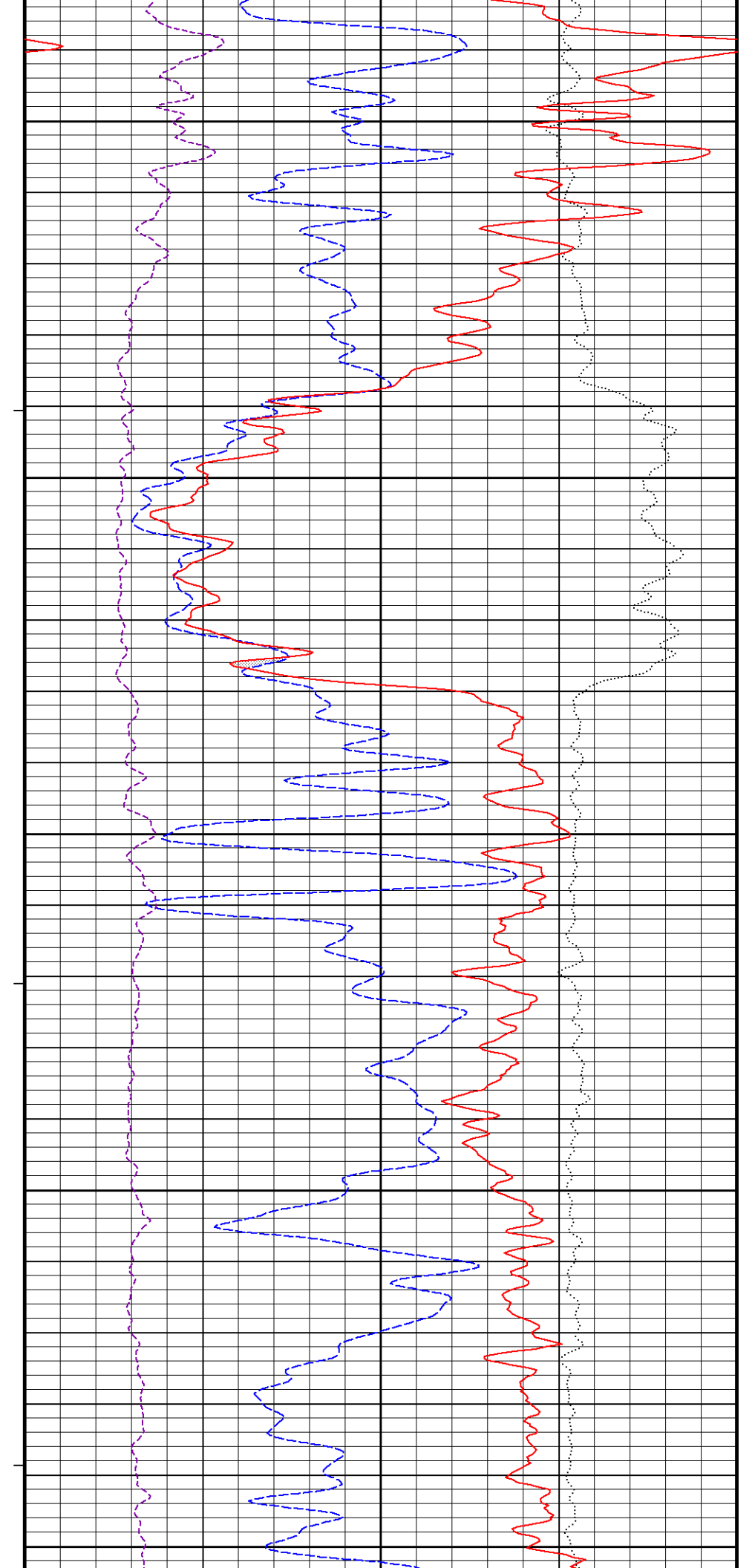
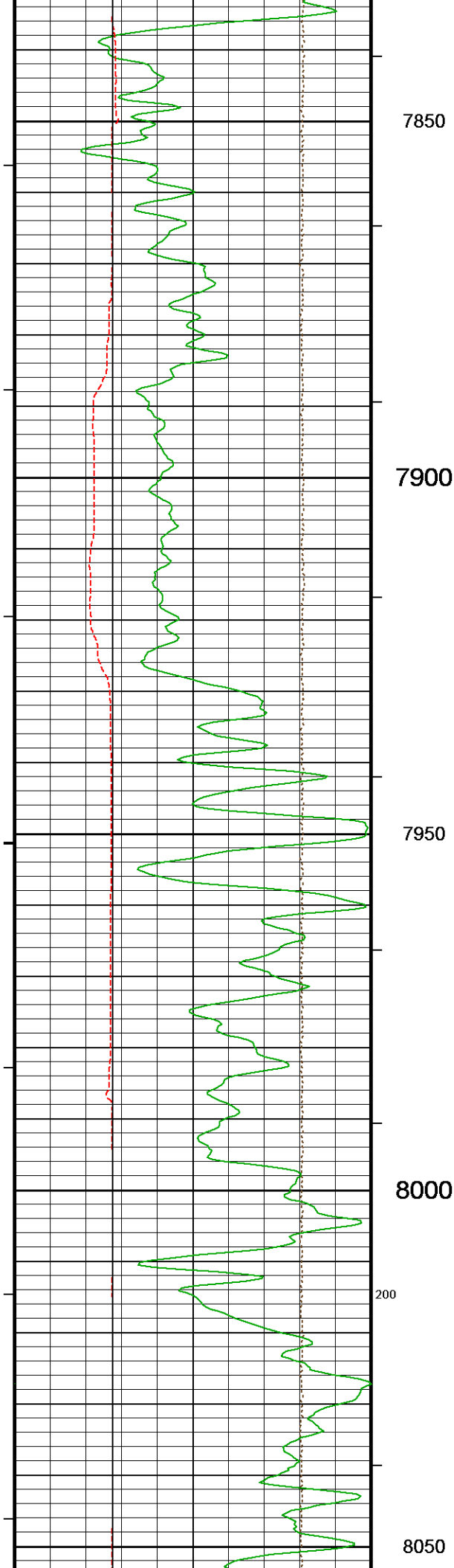
DST Uphole Tension →

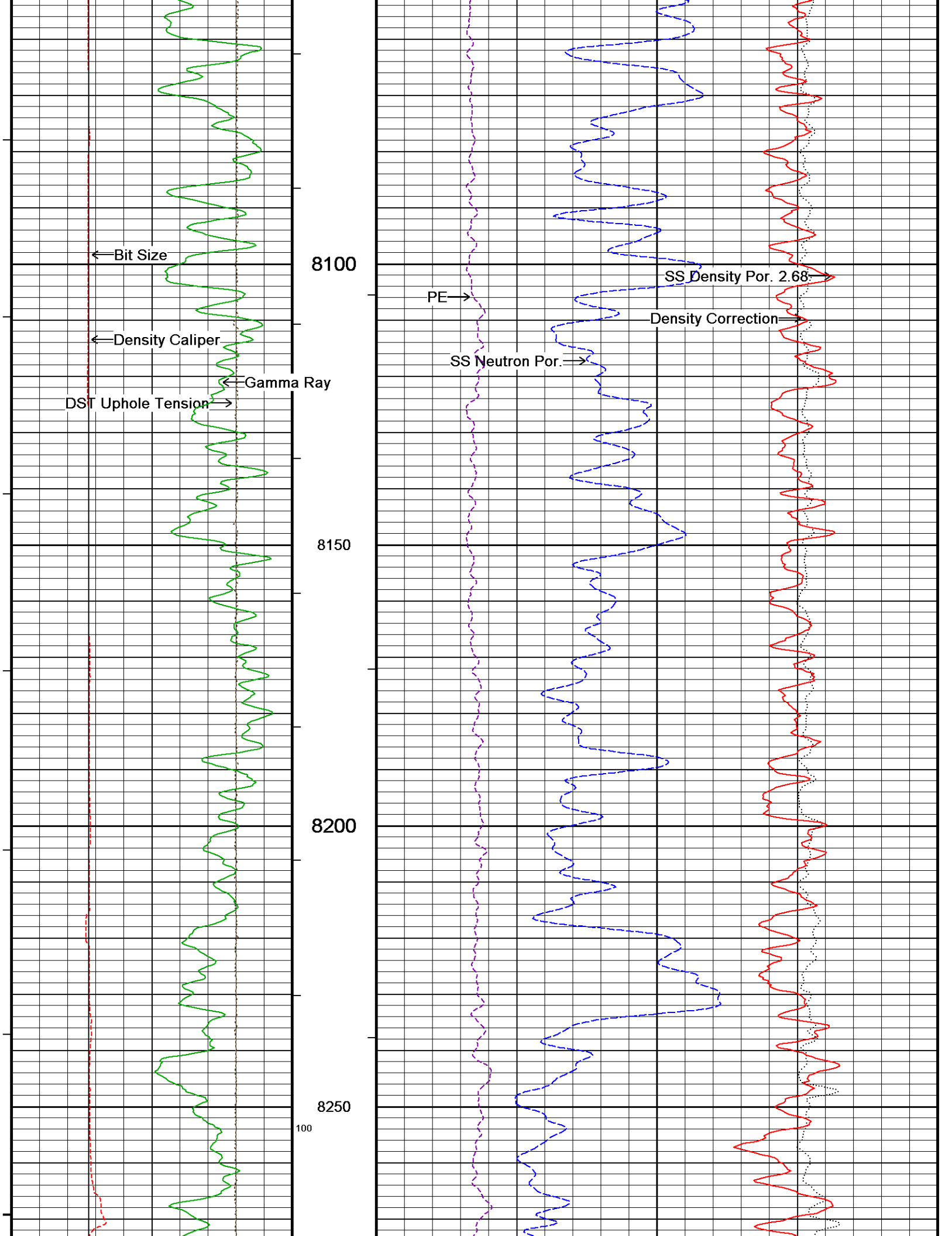
SS Neutron Por. →

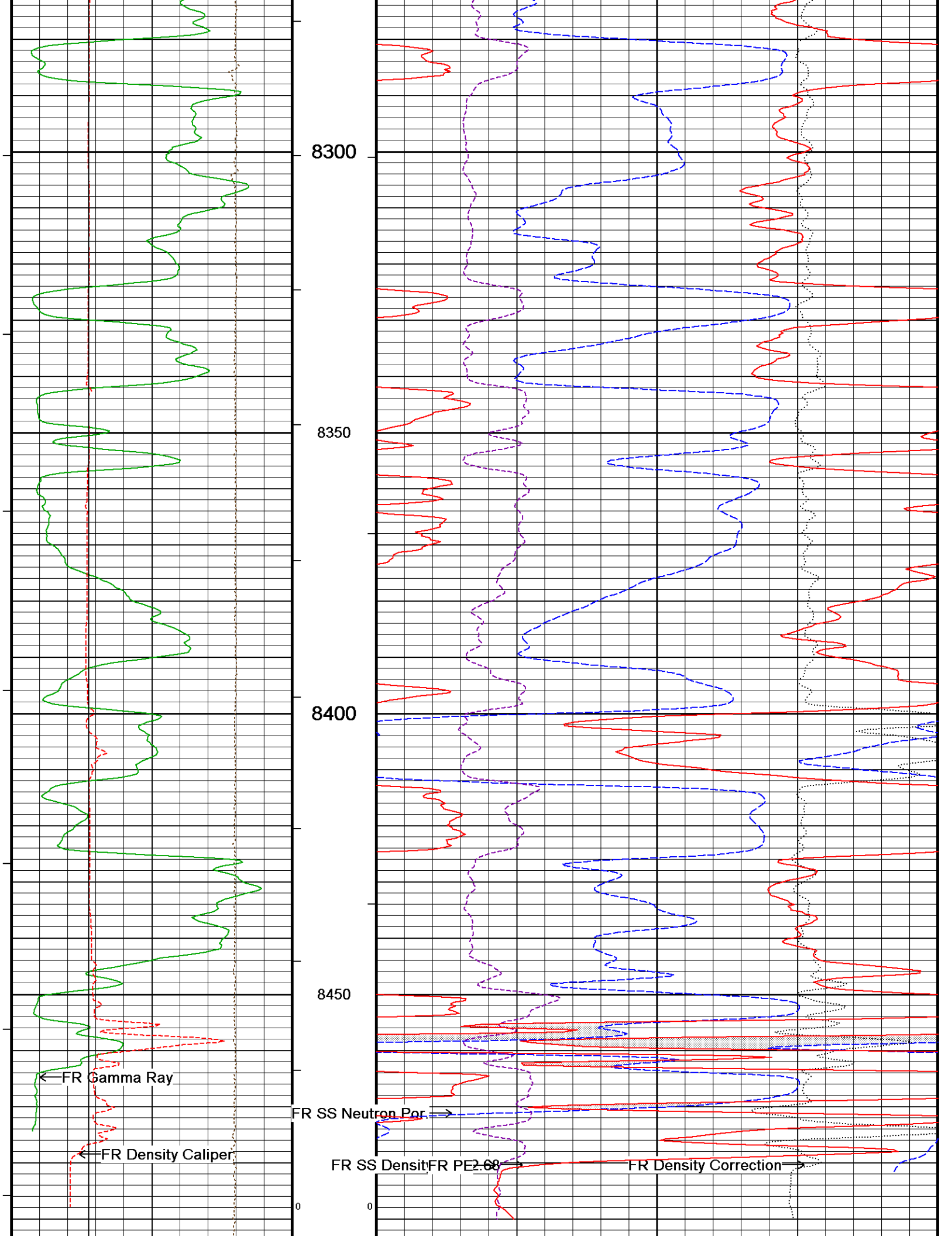
PE →

SS Density Por. 2.68 →

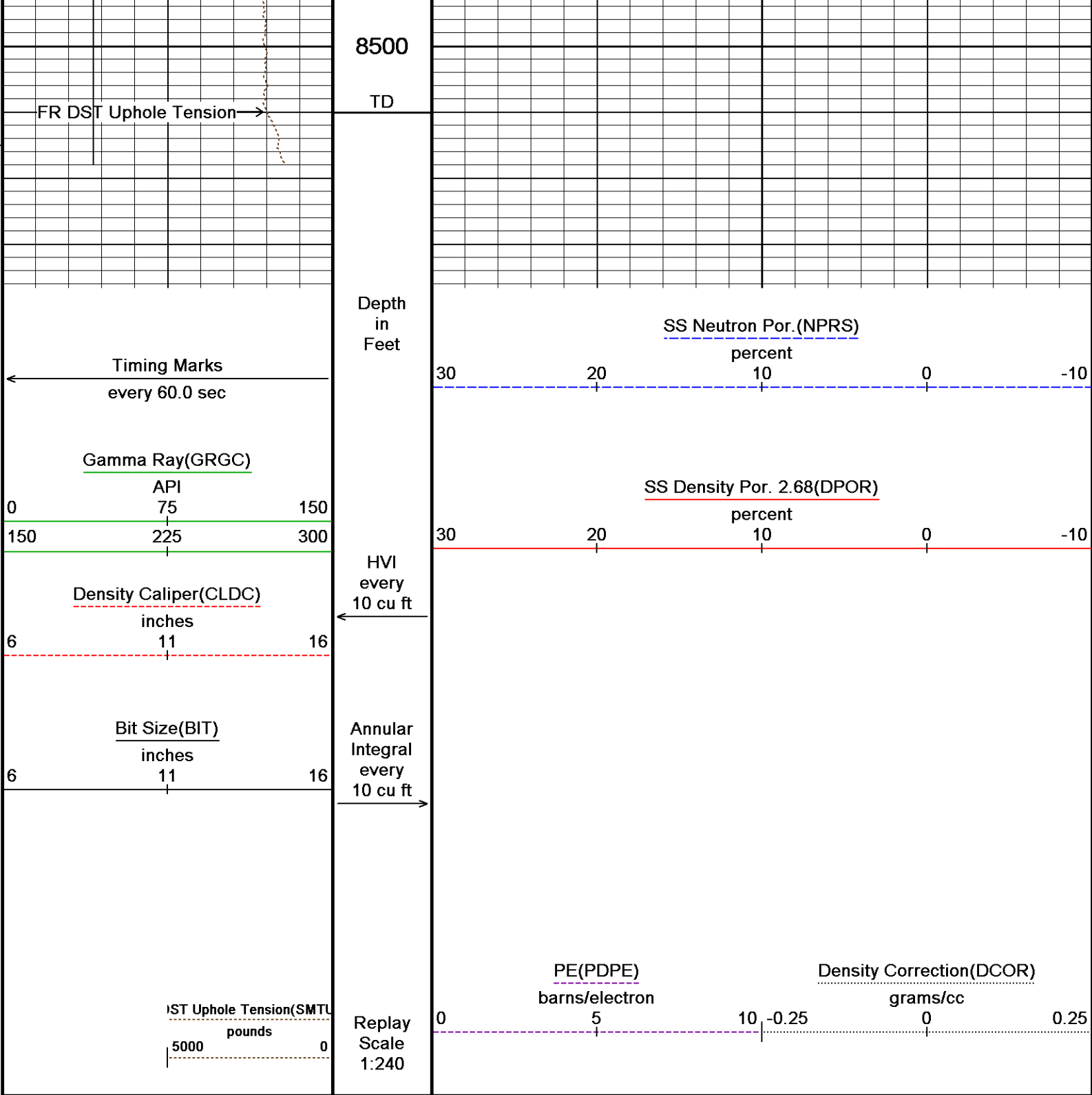
Density Correction →









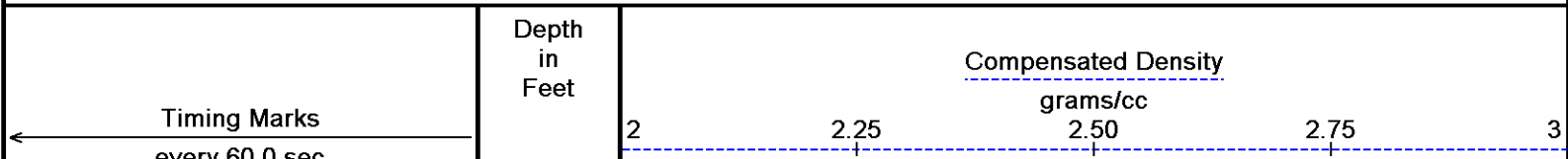


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 29-JAN-2017 00:38  
Filename: C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\spliced main.dta  
System Versions: Processed with 16.03.1458 Plotted with 16.03.1458

↑ 5 INCH POROSITY ↑

↓ 5 INCH BULK DENSITY ↓

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 29-JAN-2017 00:38  
Filename: C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\spliced main.dta  
System Versions: Processed with 16.03.1458 Plotted with 16.03.1458



every 00.0 sec

Gamma Ray

API

75

225

0

150

300

Density Caliper

inches

11

6

16

Bit Size

inches

11

6

16

HVI  
every  
10 cu ft



Annular  
Integral  
every  
10 cu ft



DST Uphole Tension

pounds

5000

0

Replay  
Scale  
1:240

Casing  
1000

1050

1100

← Bit Size

← Density Caliper

← Gamma Ray

DST Uphole Tension →

SS Density Por. 2.68

percent

30

20

10

0

-10

PE

barns/electron

0

5

10

-0.25

Density Correction

grams/cc

0

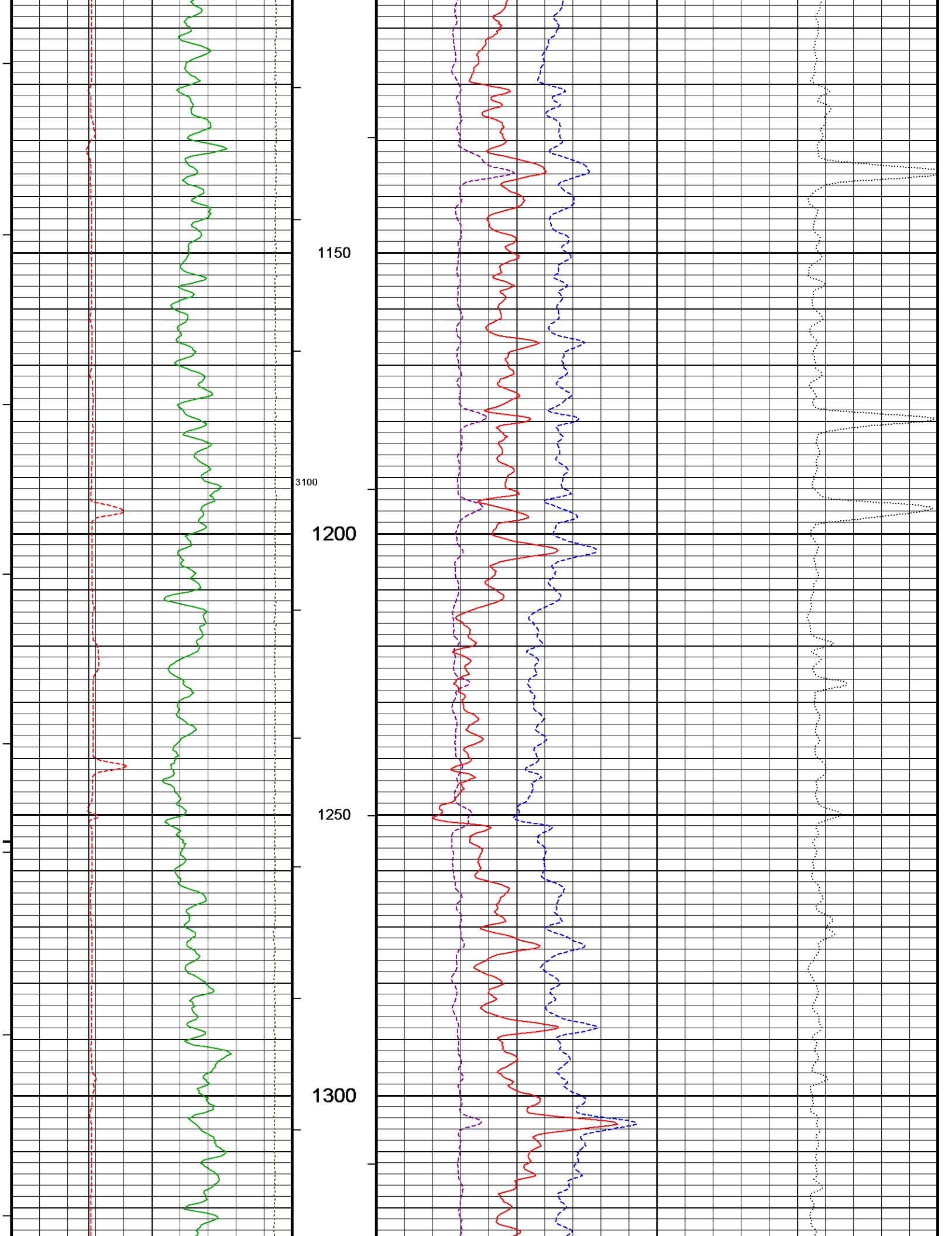
0.25

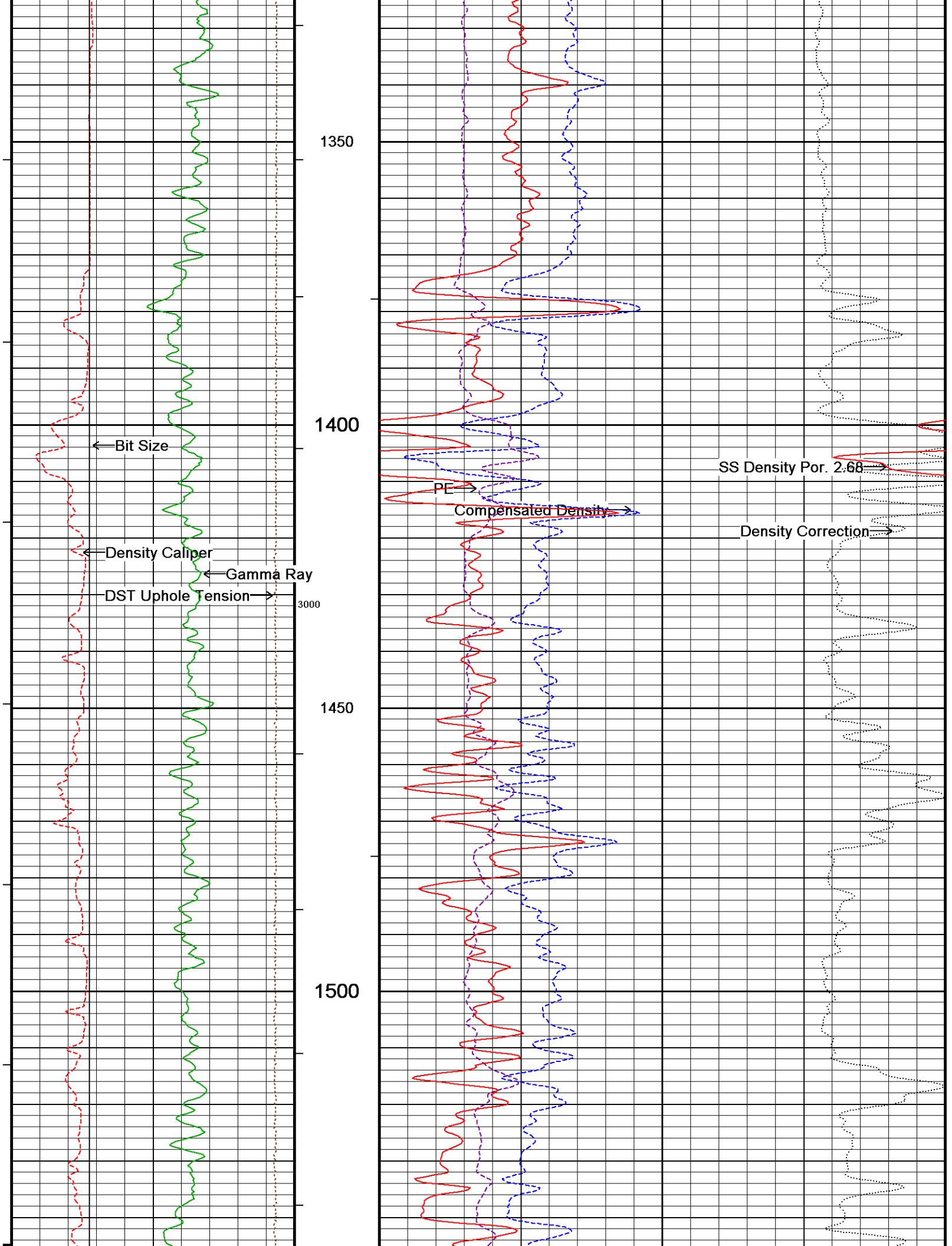
SS Density Por. 2.68 →

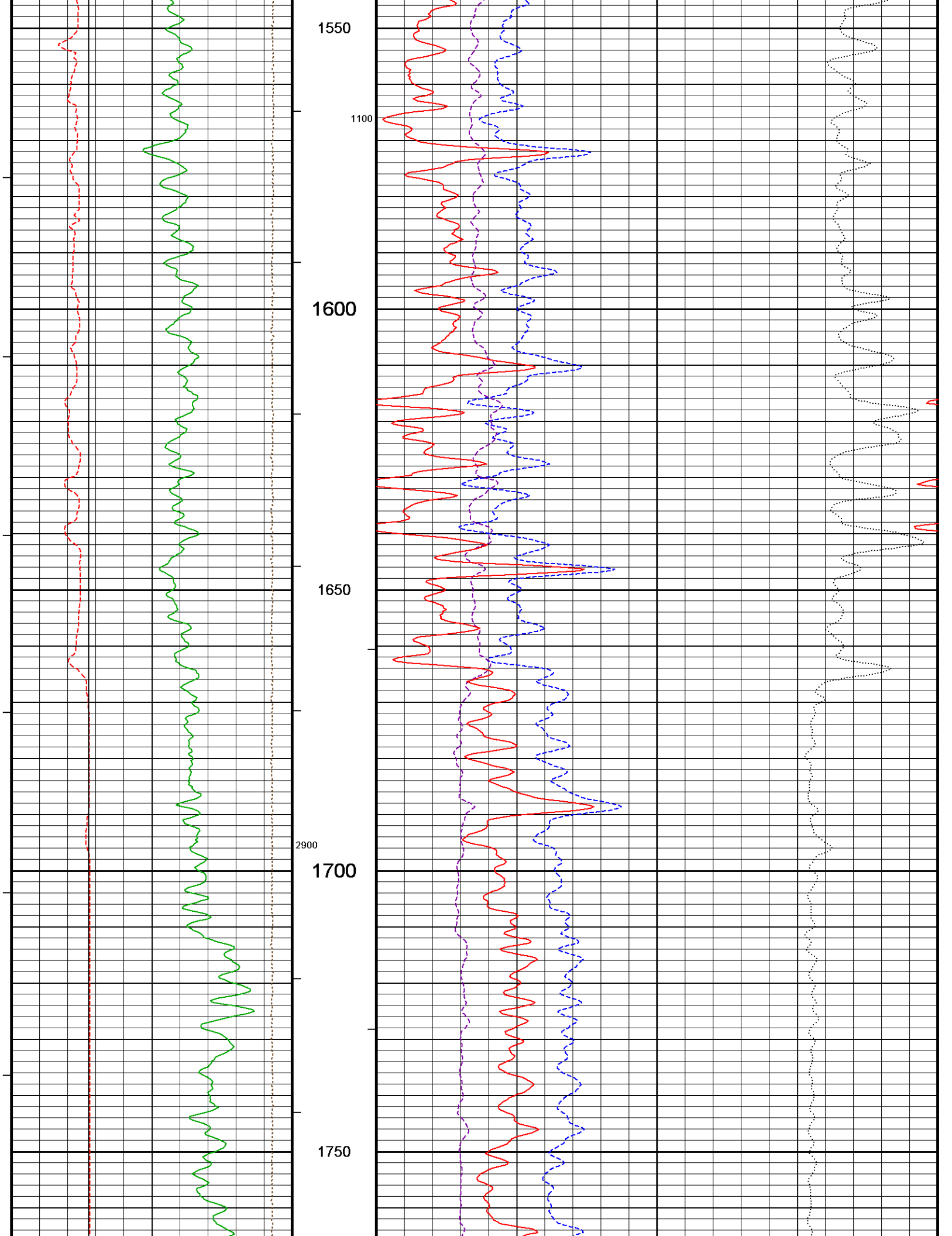
PE →

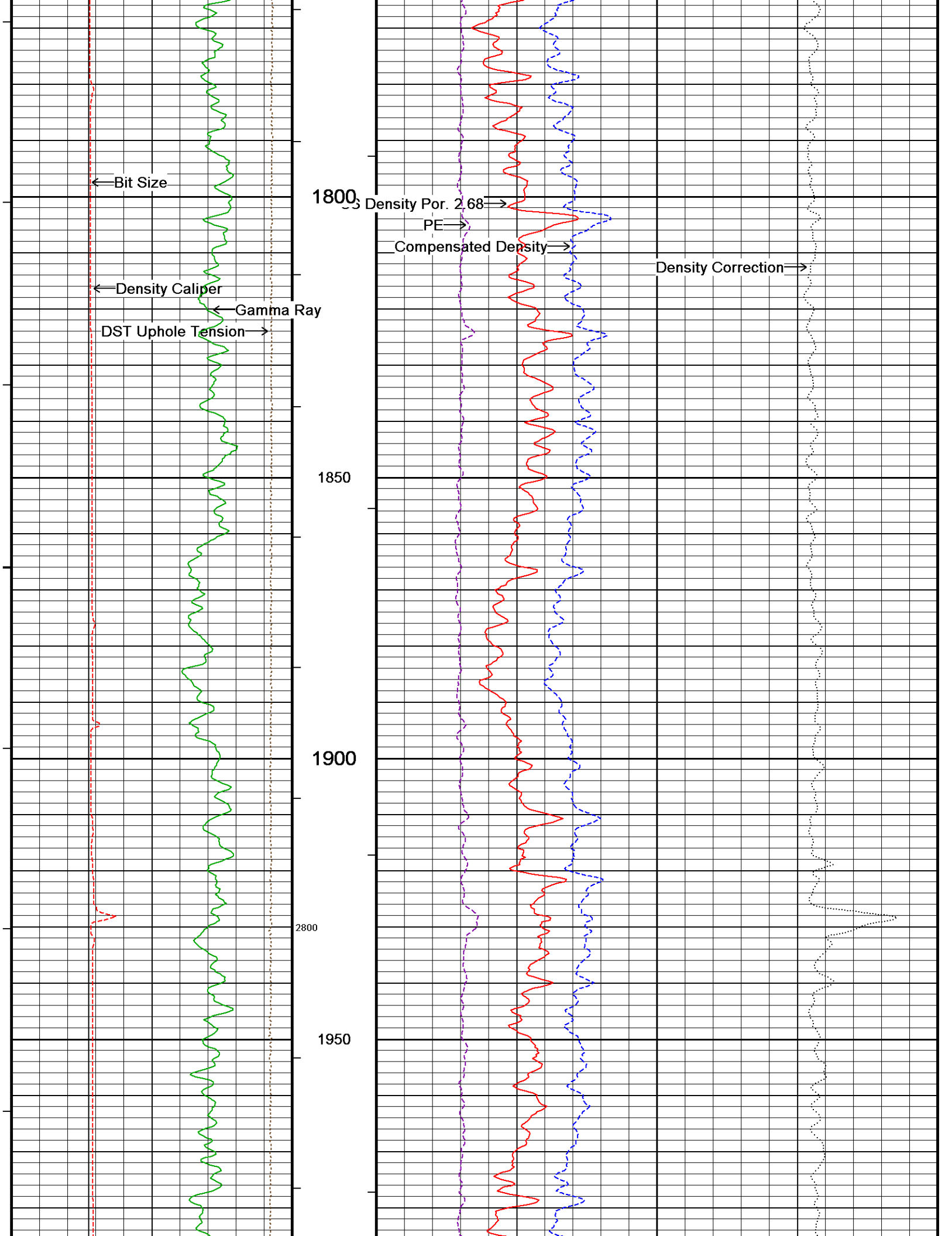
Compensated Density →

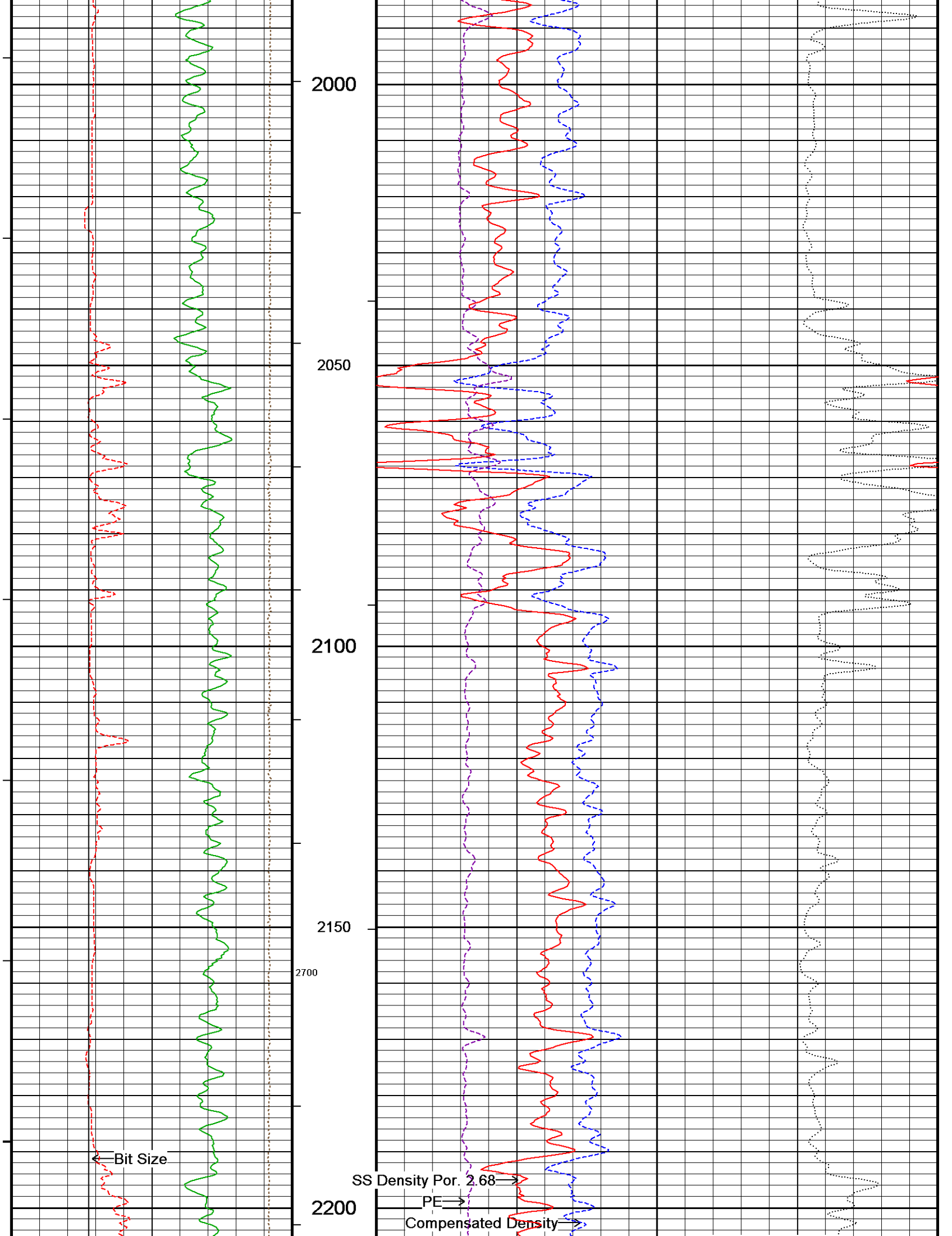
Density Correction →

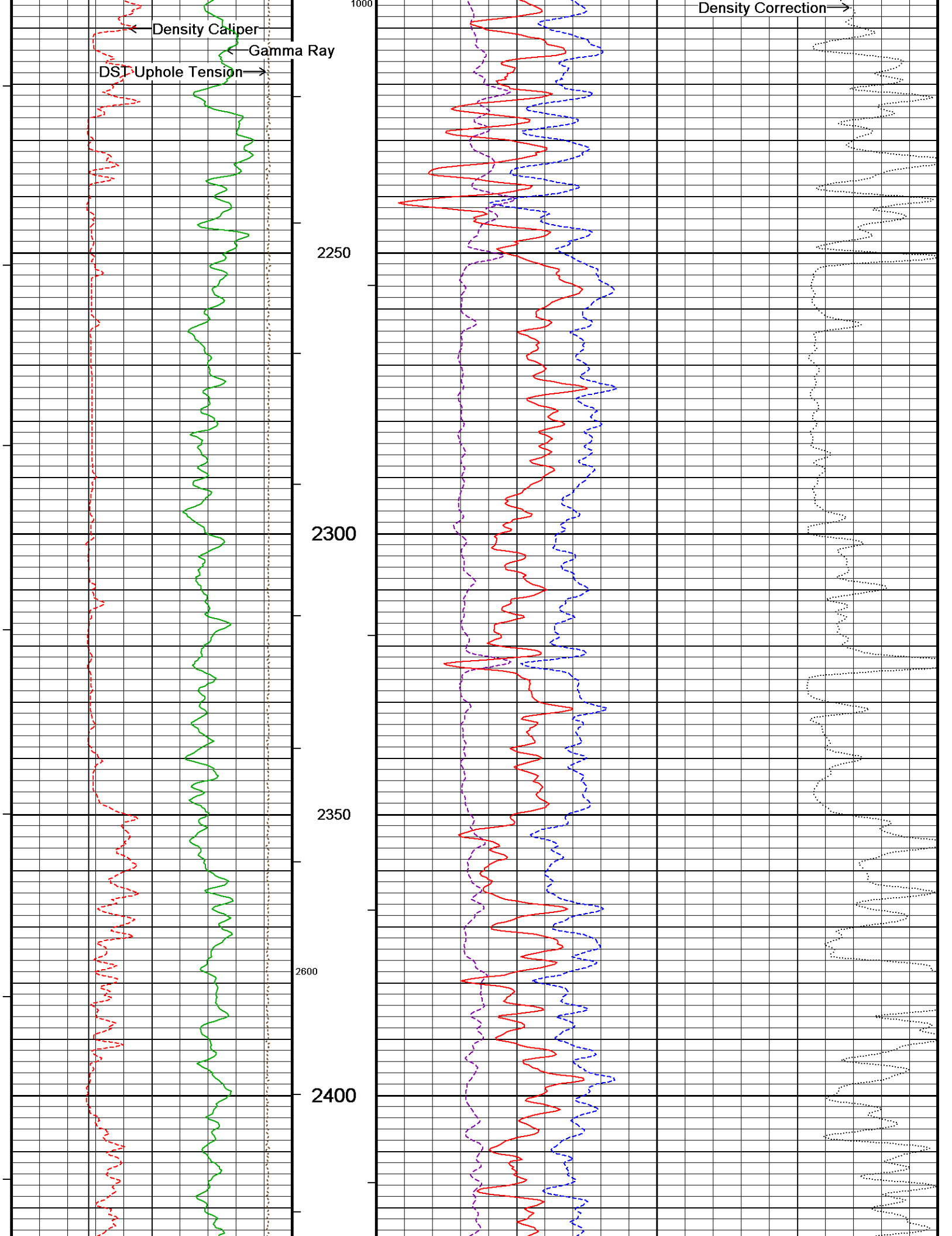




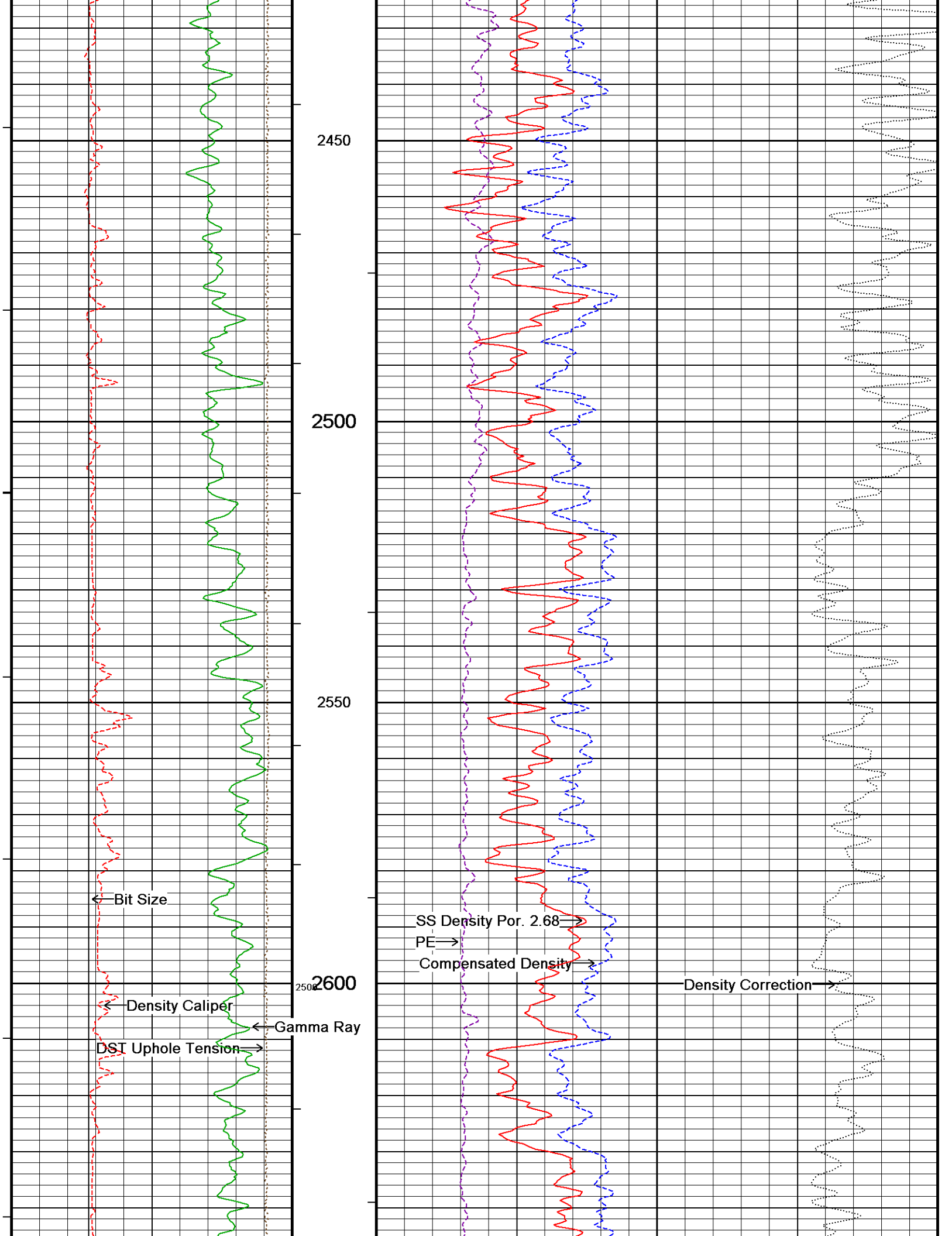


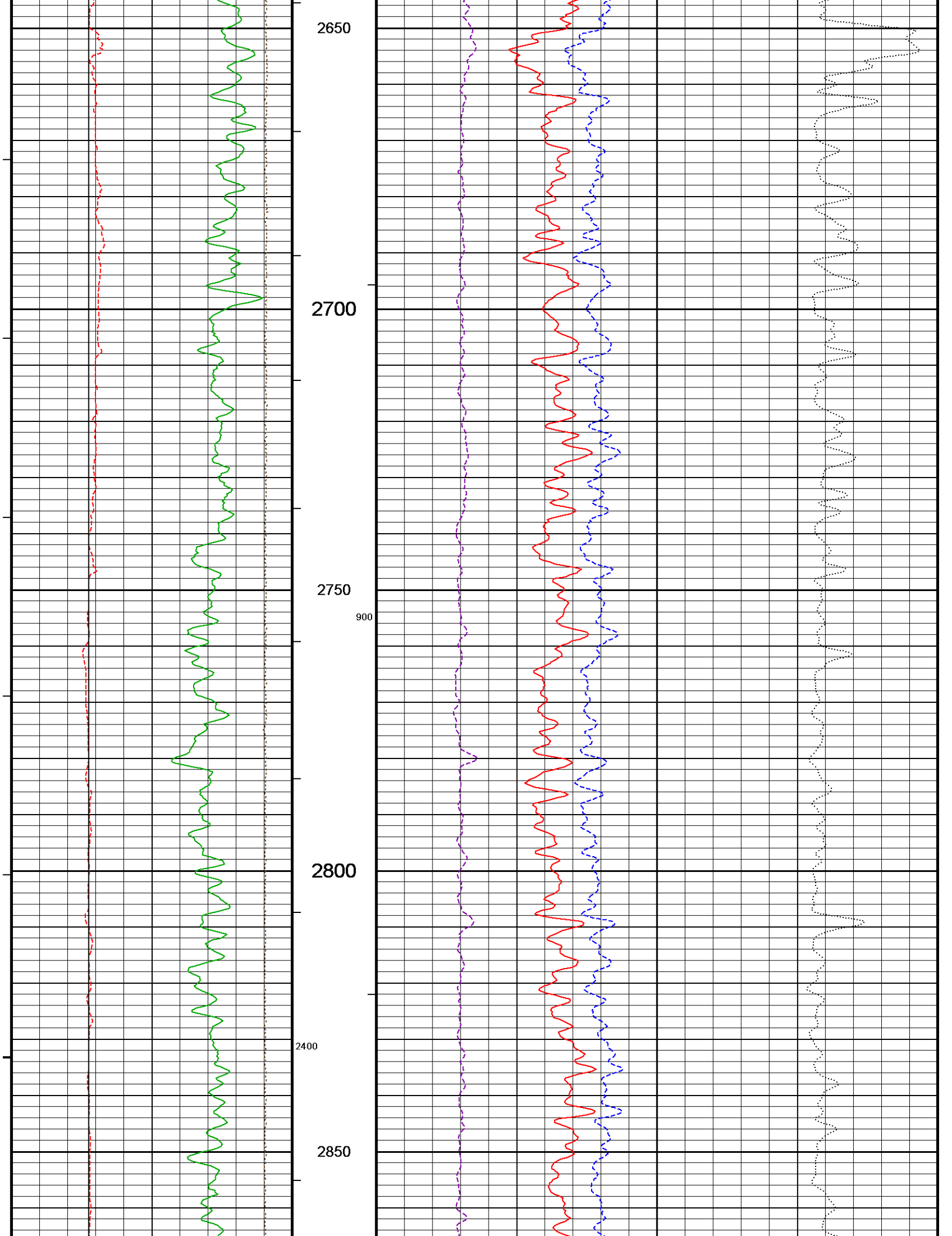


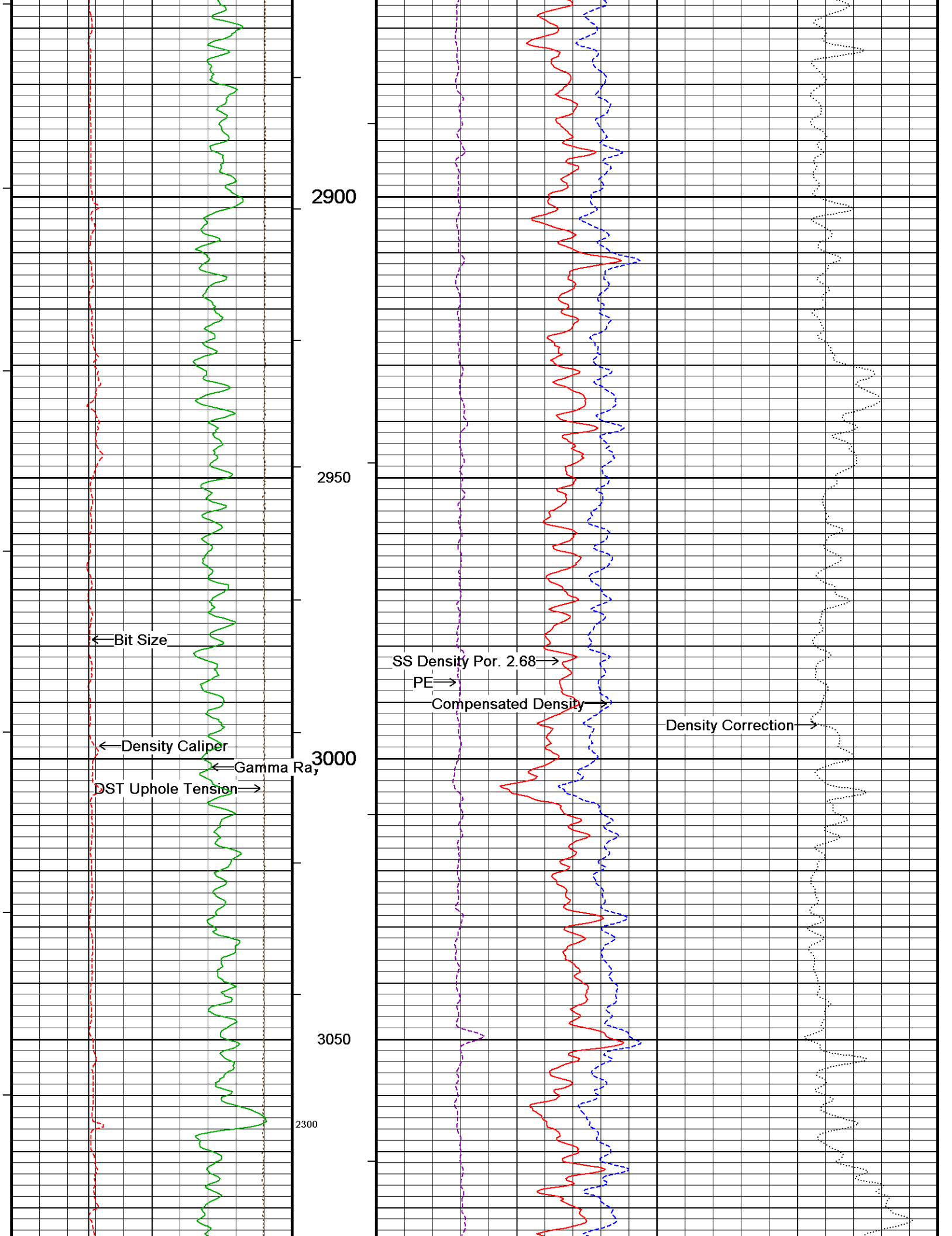


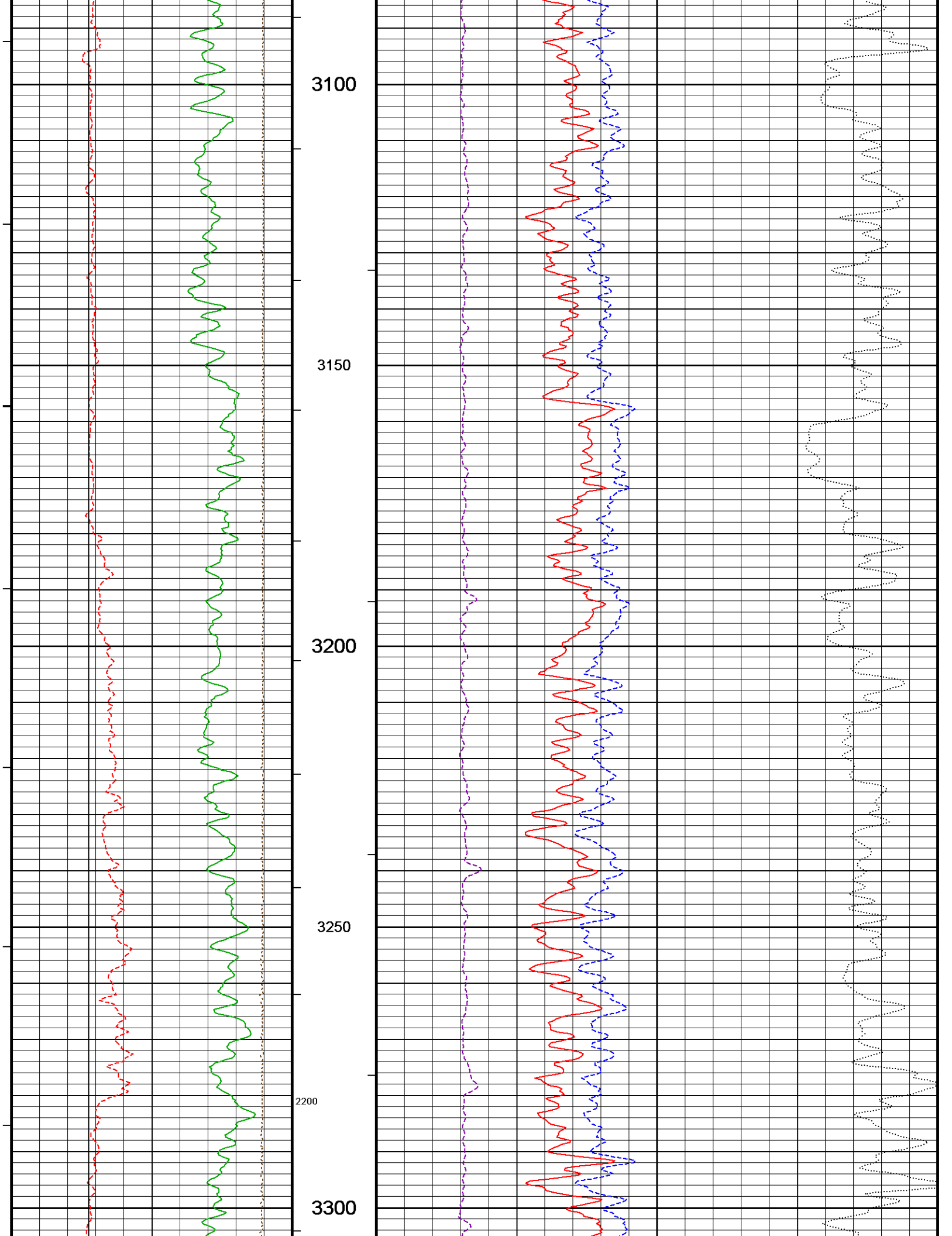


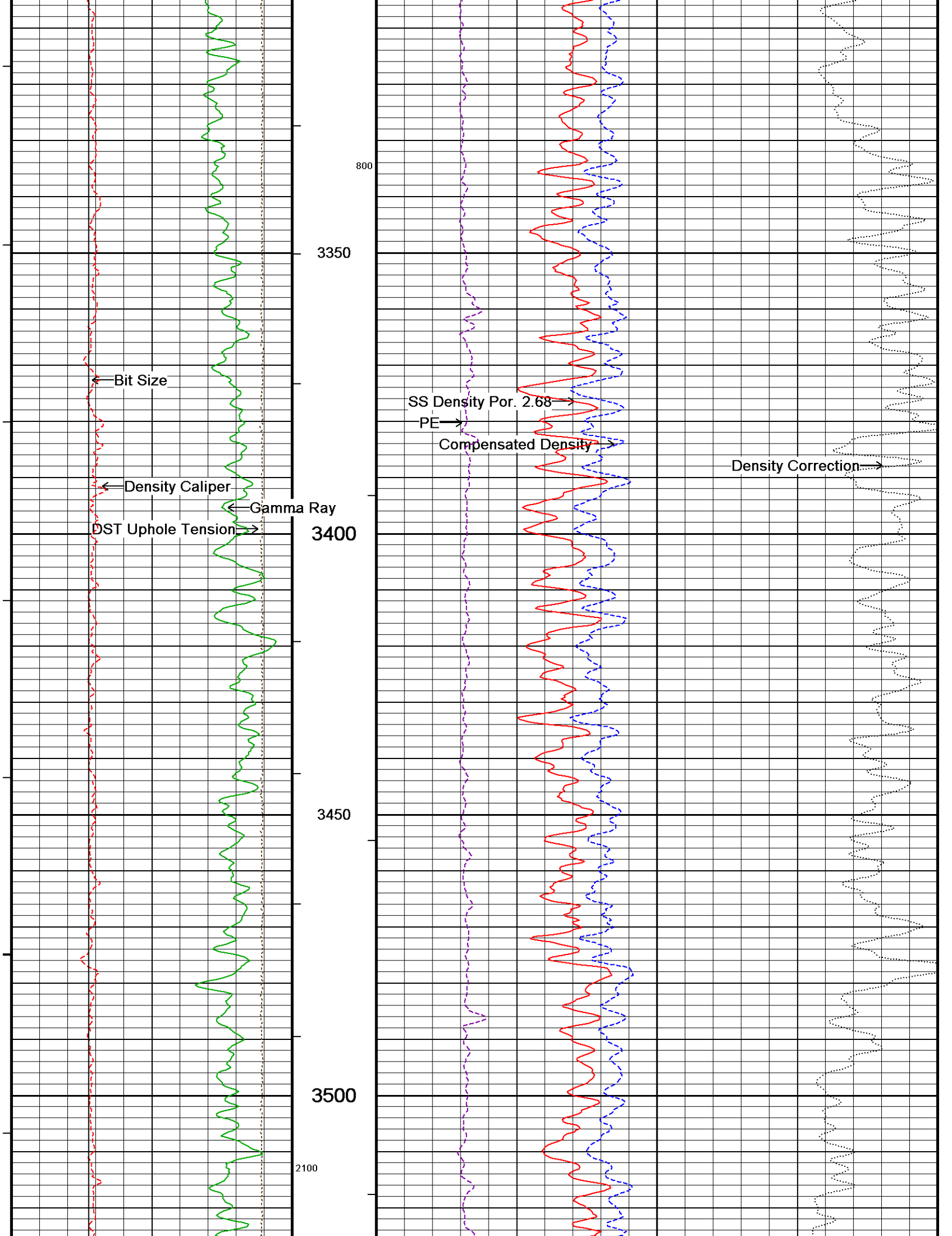


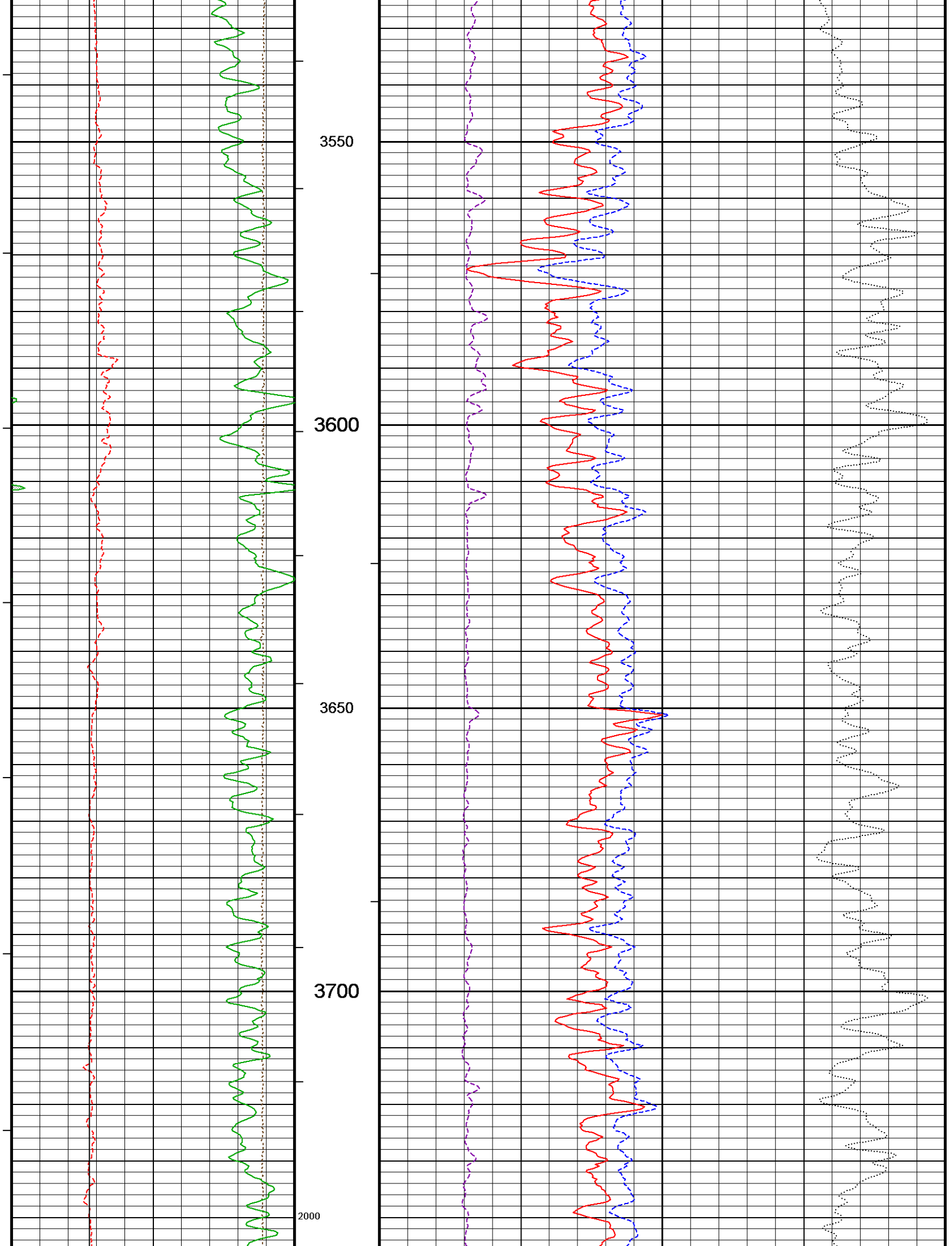


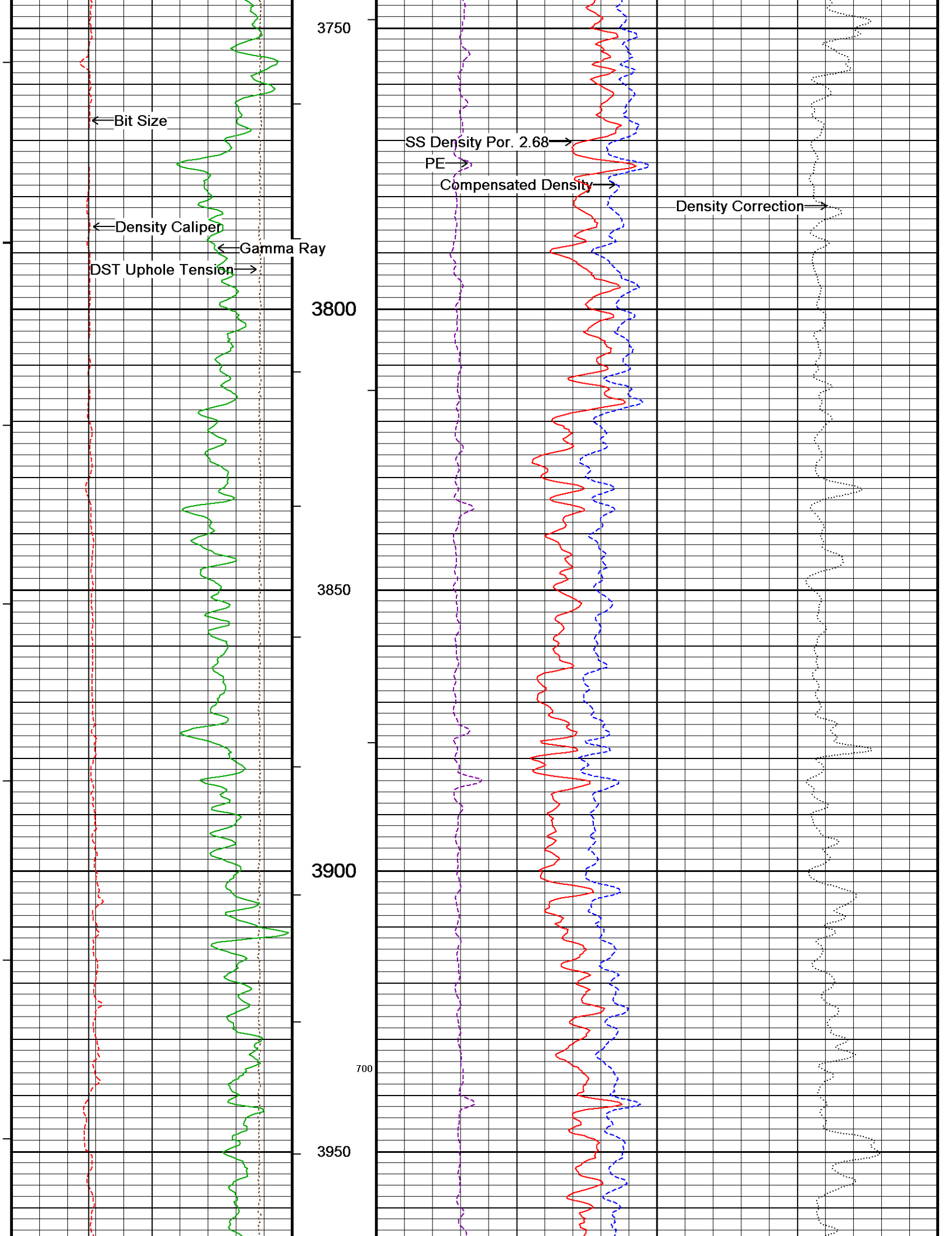


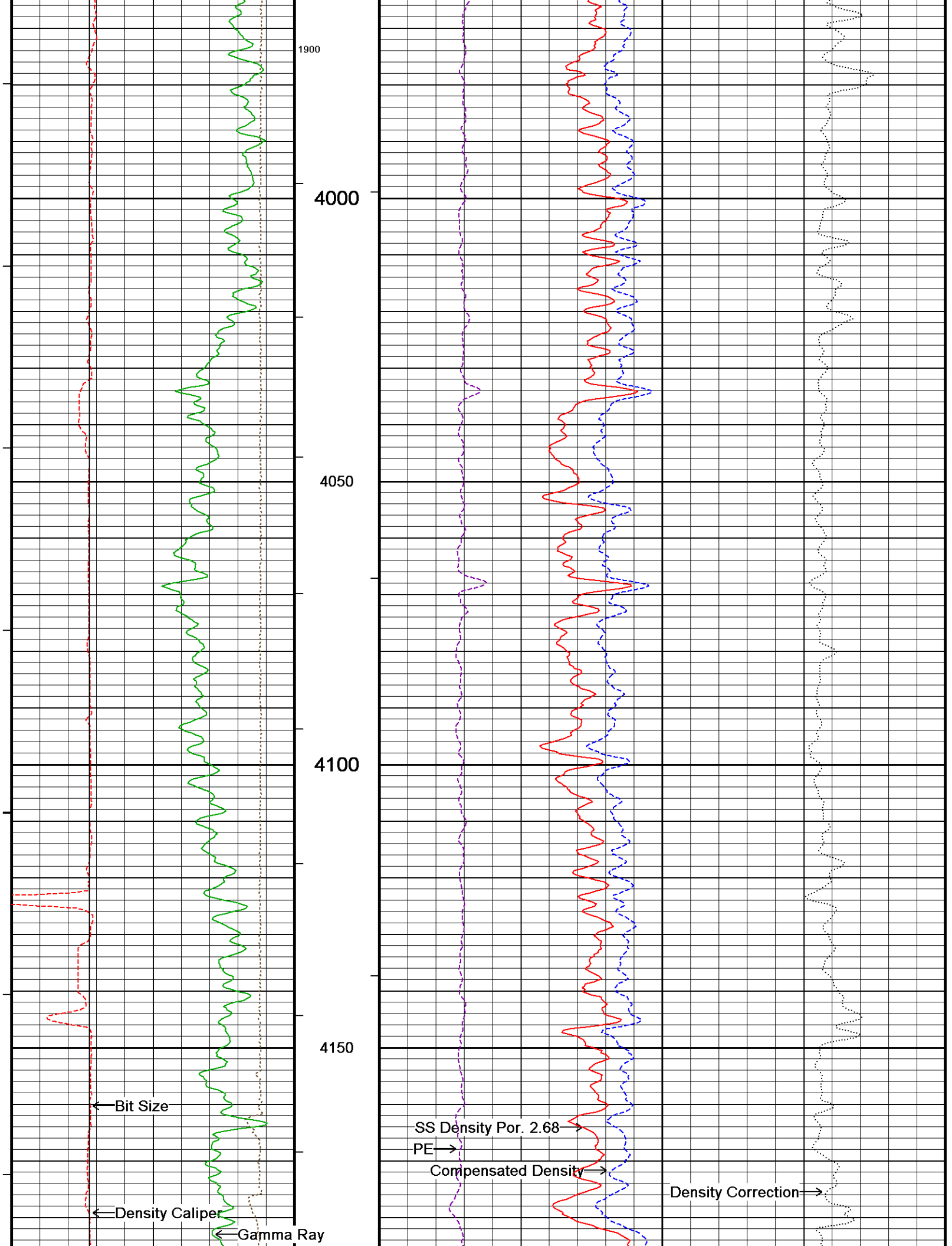




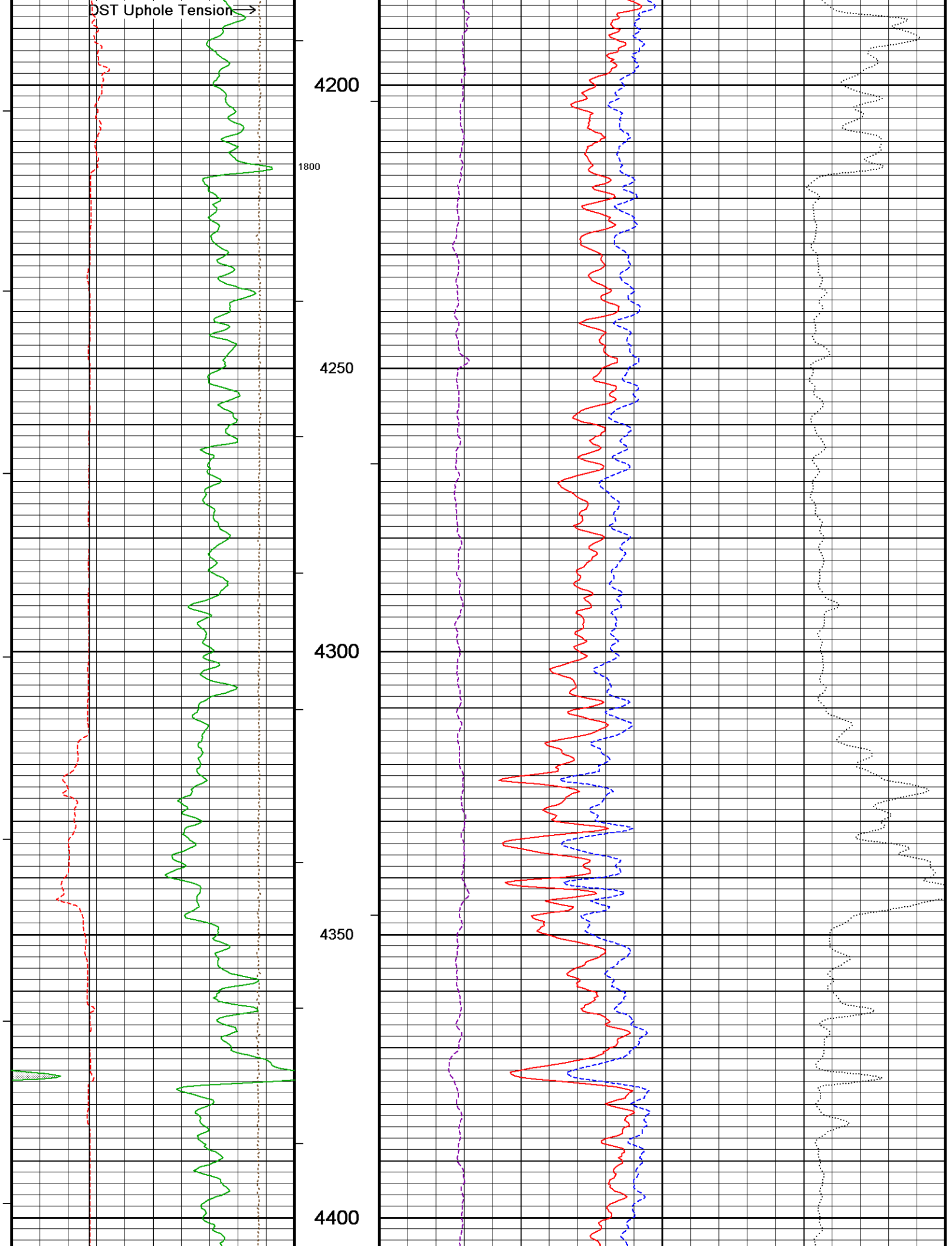


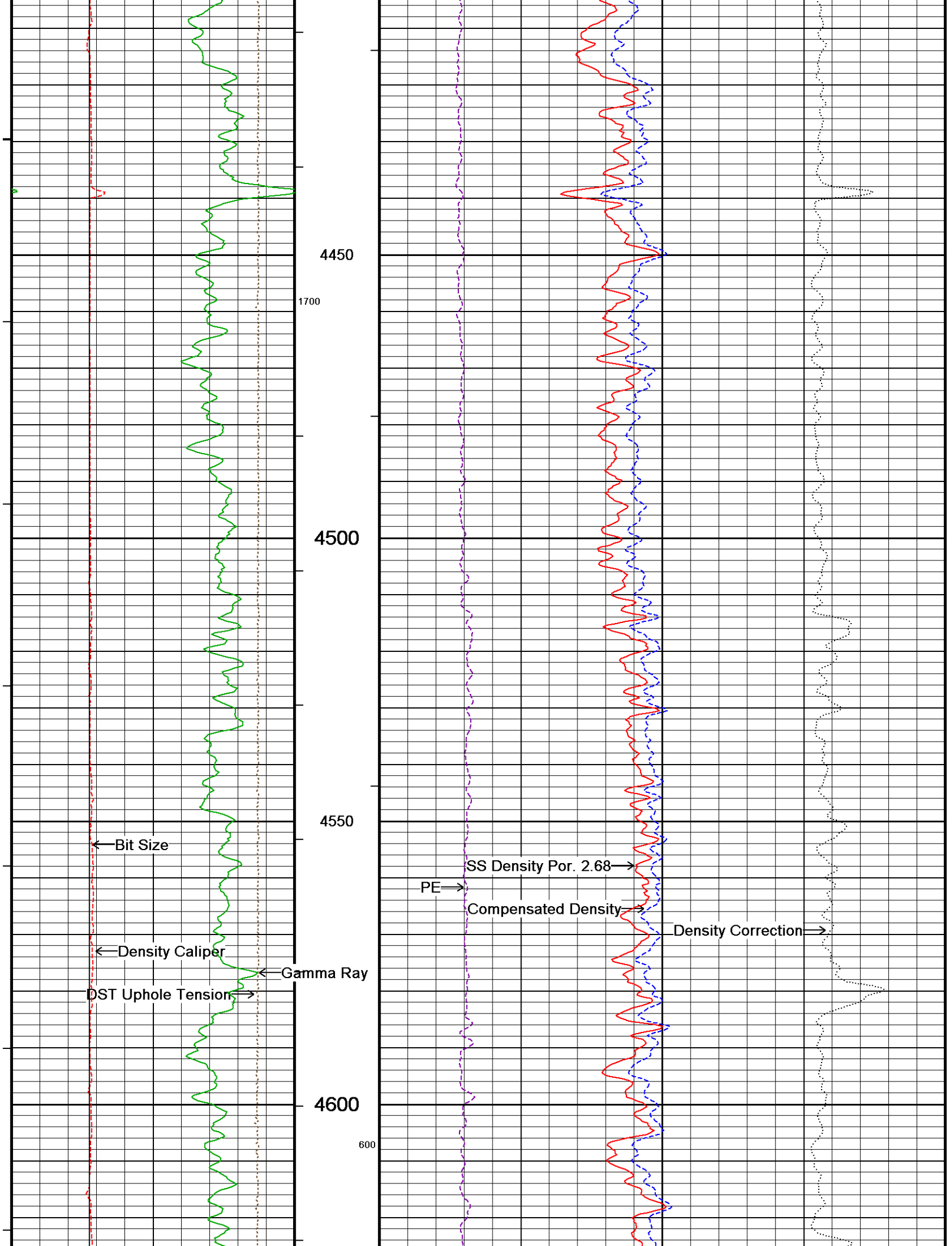


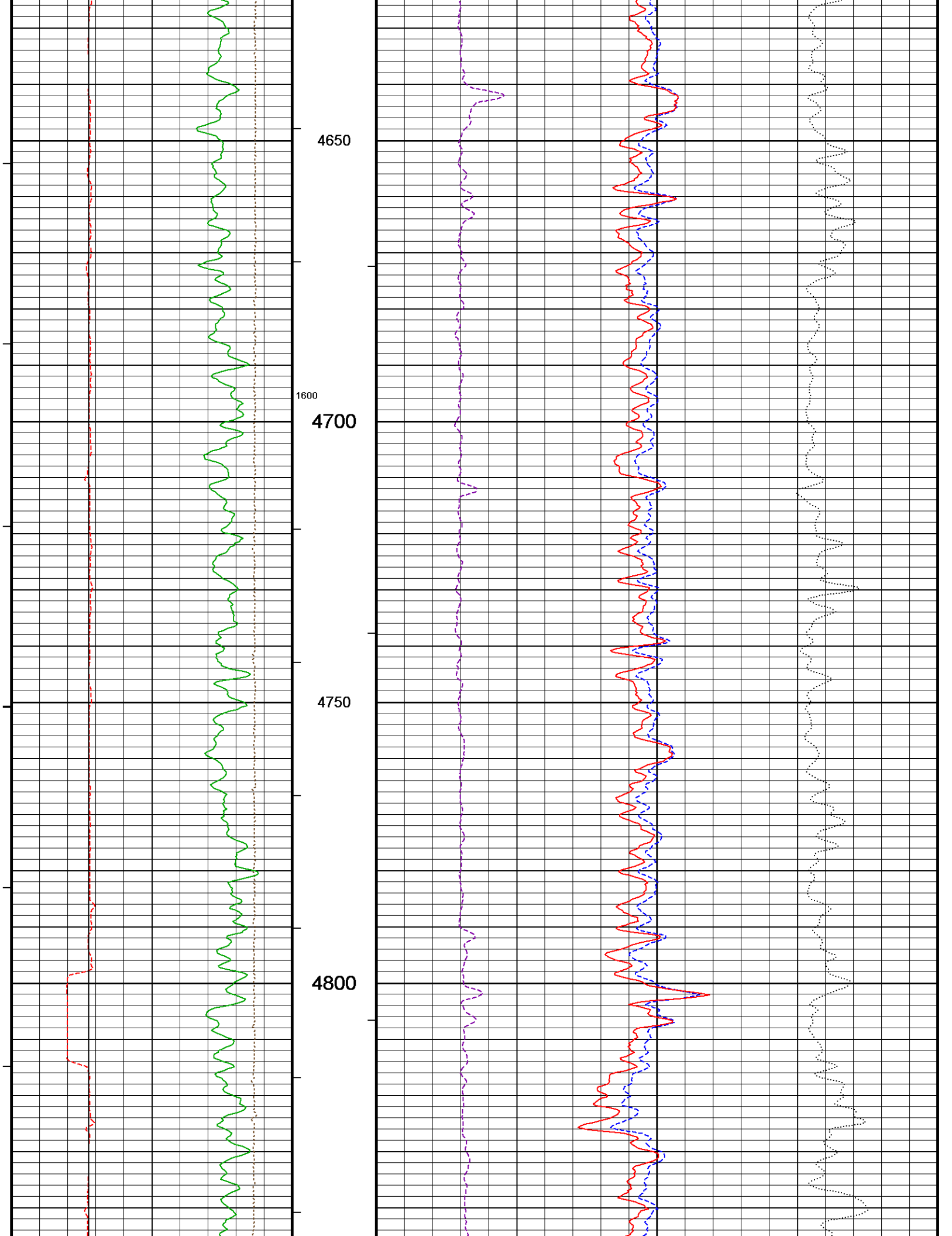


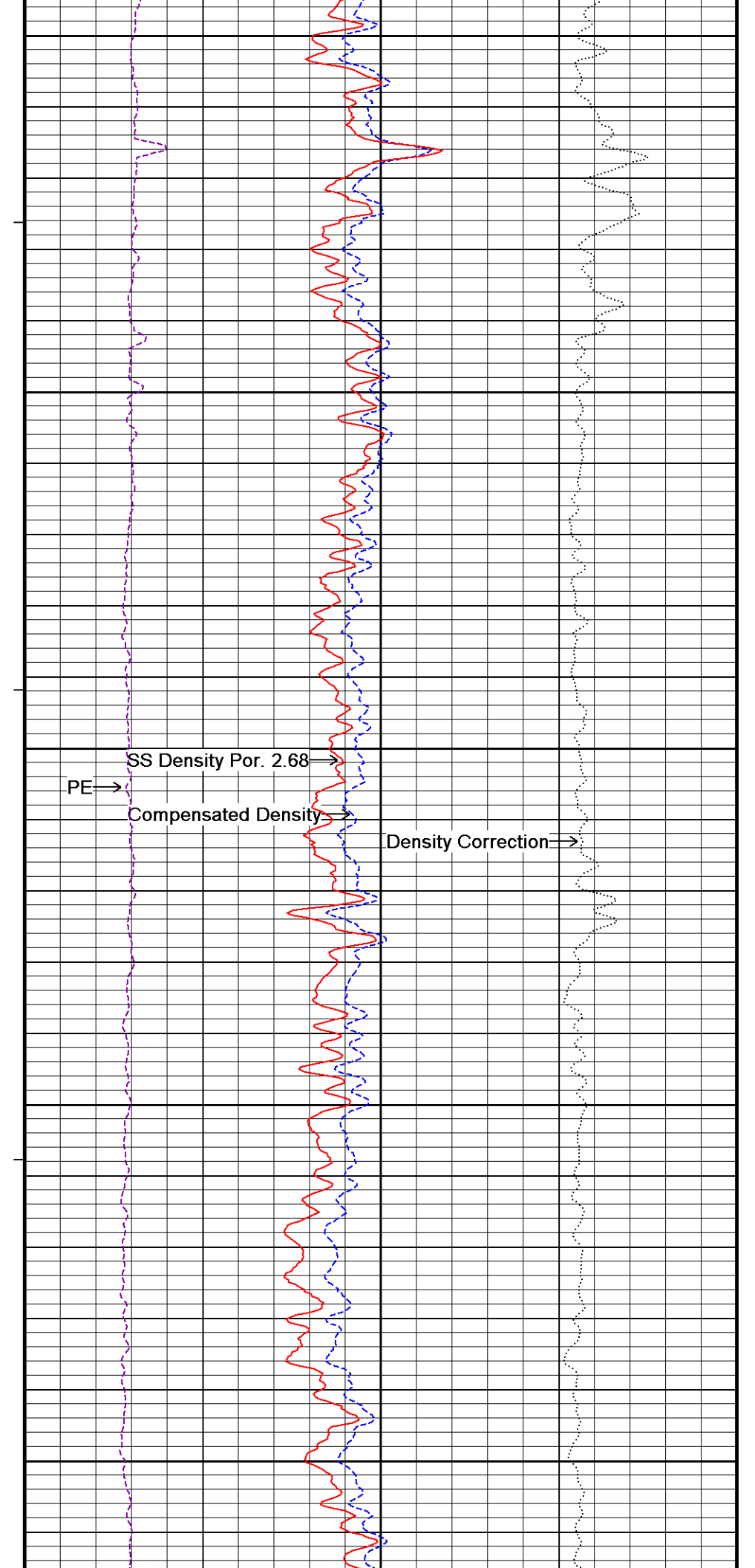
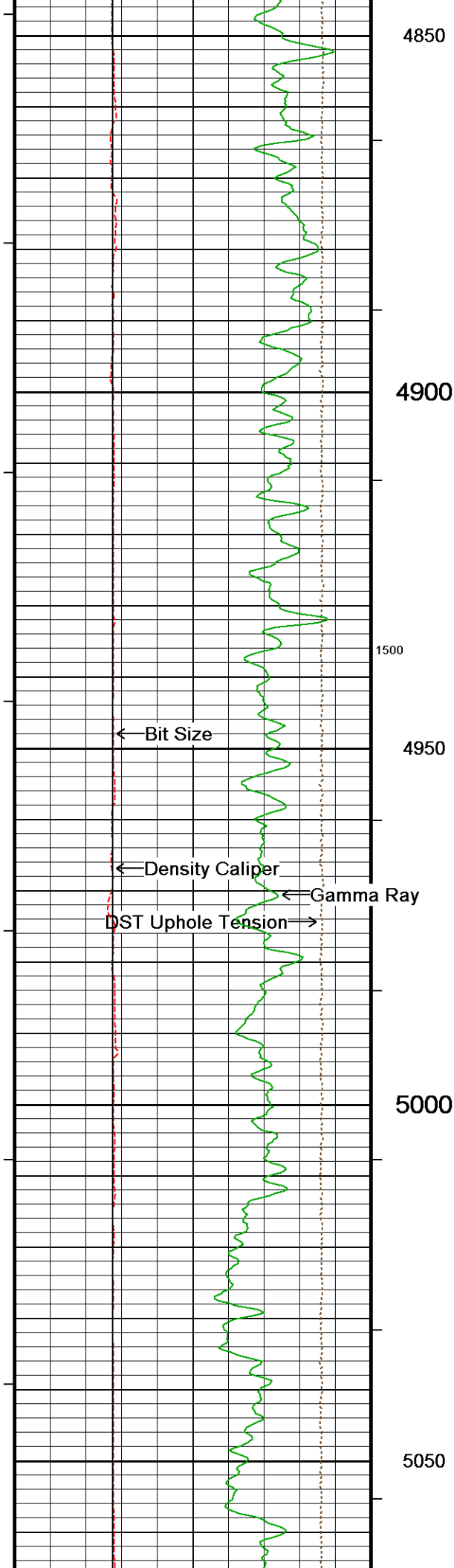


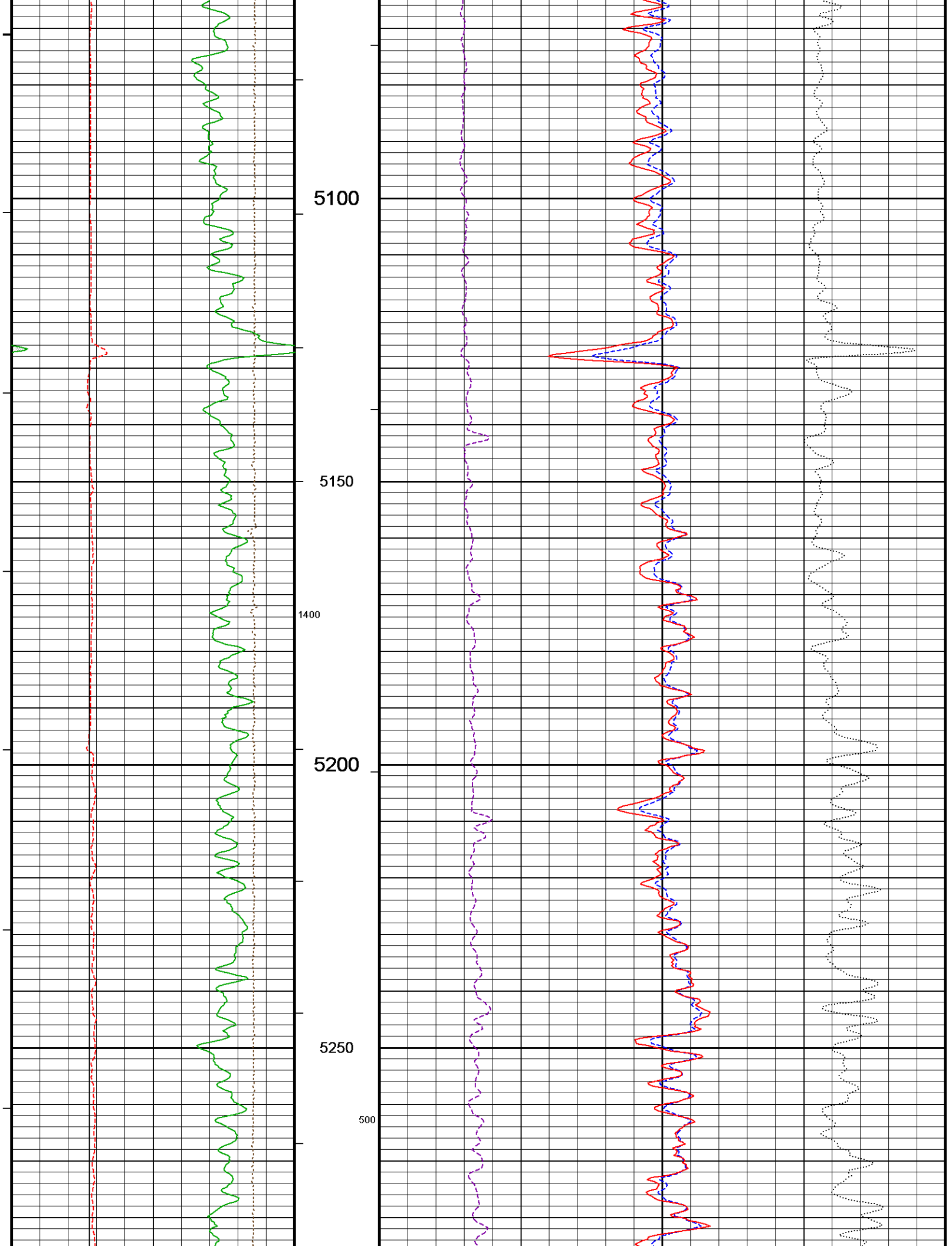


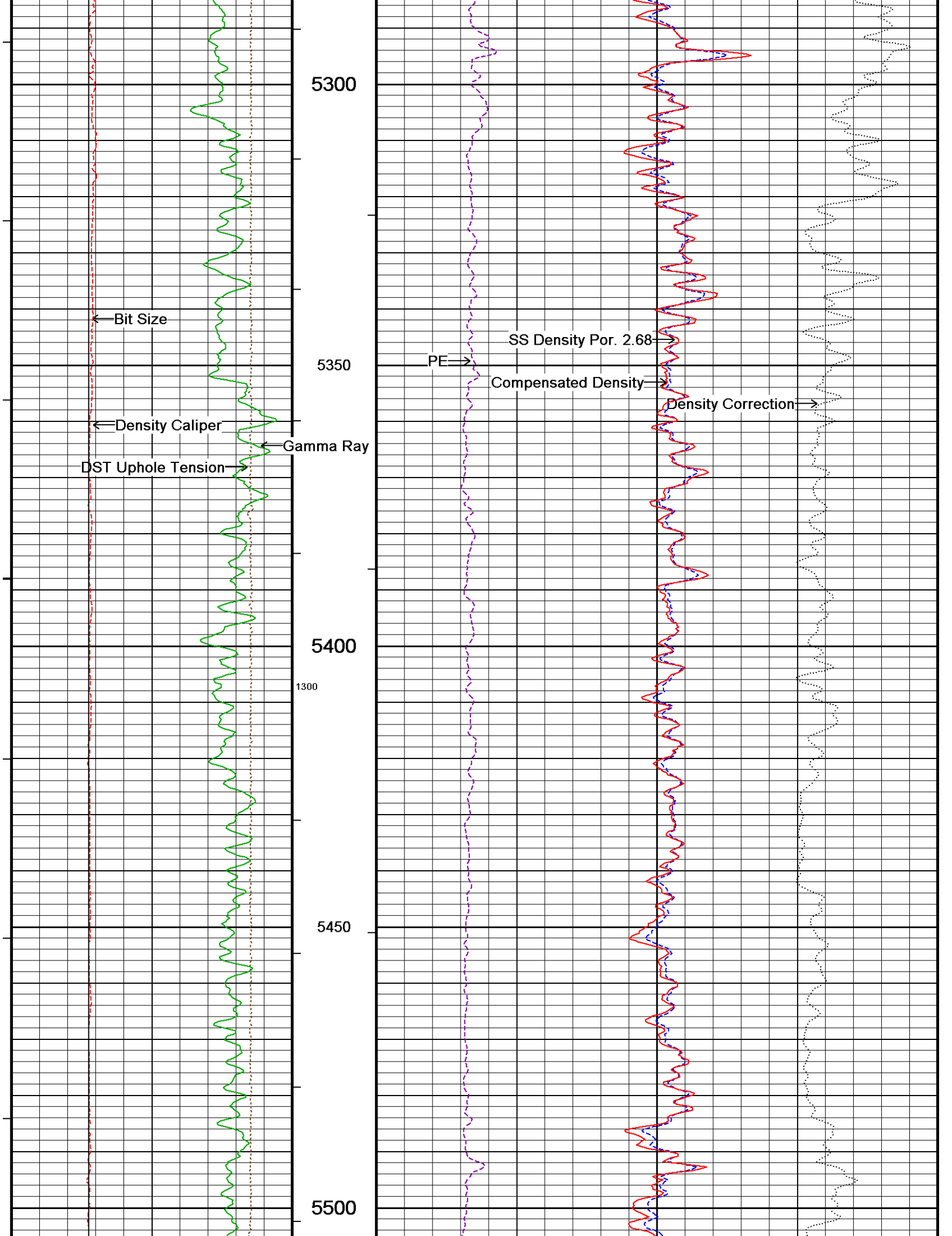


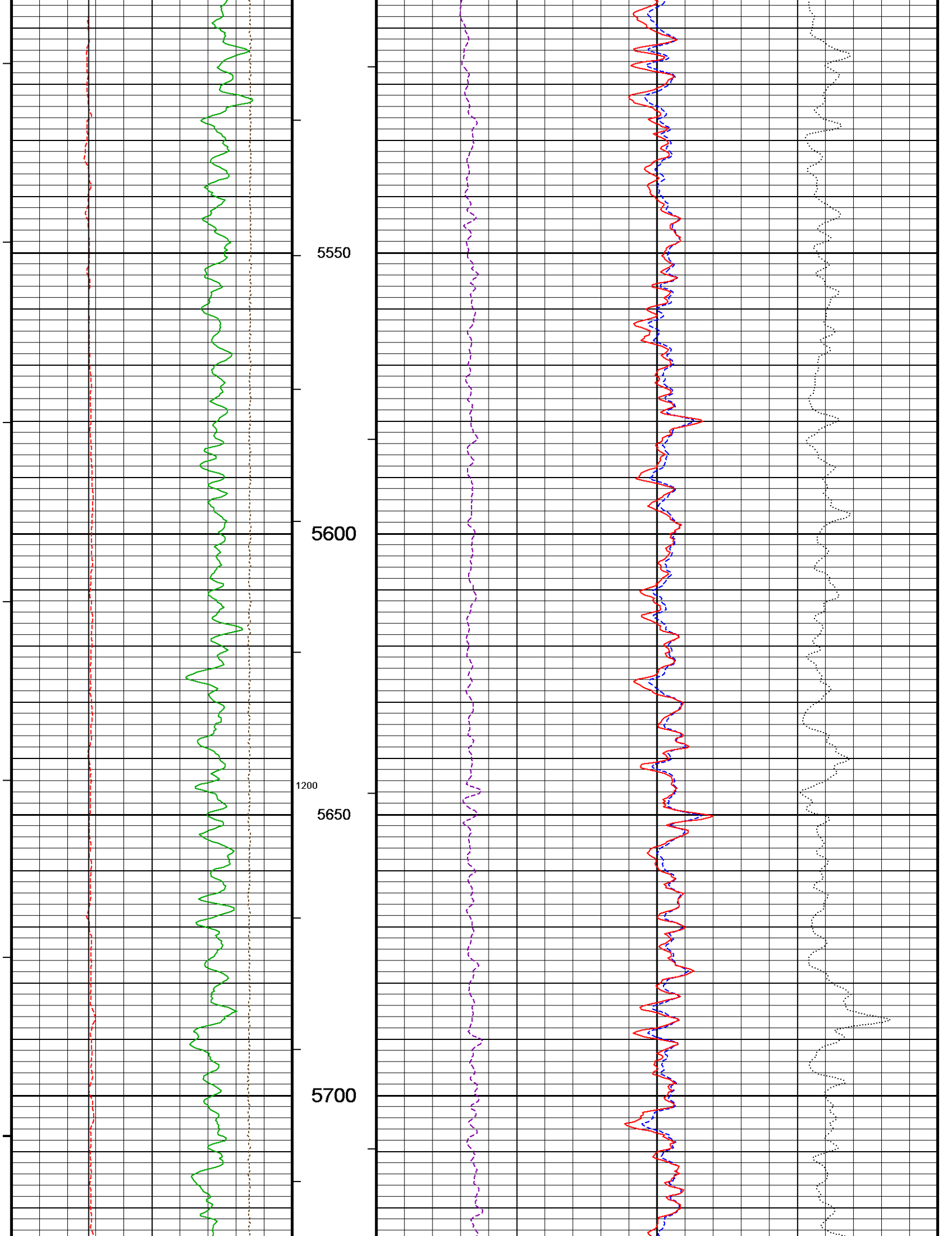


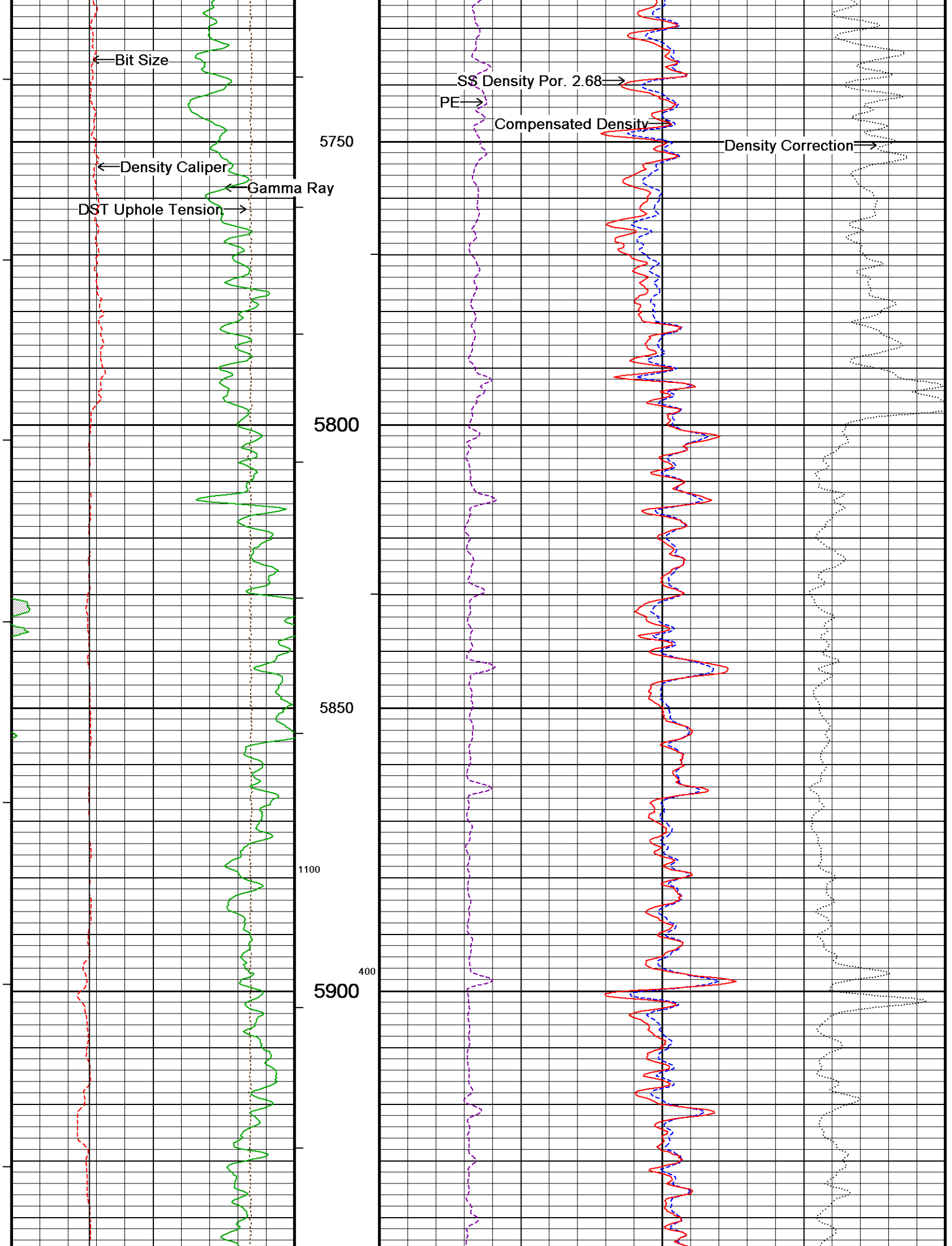




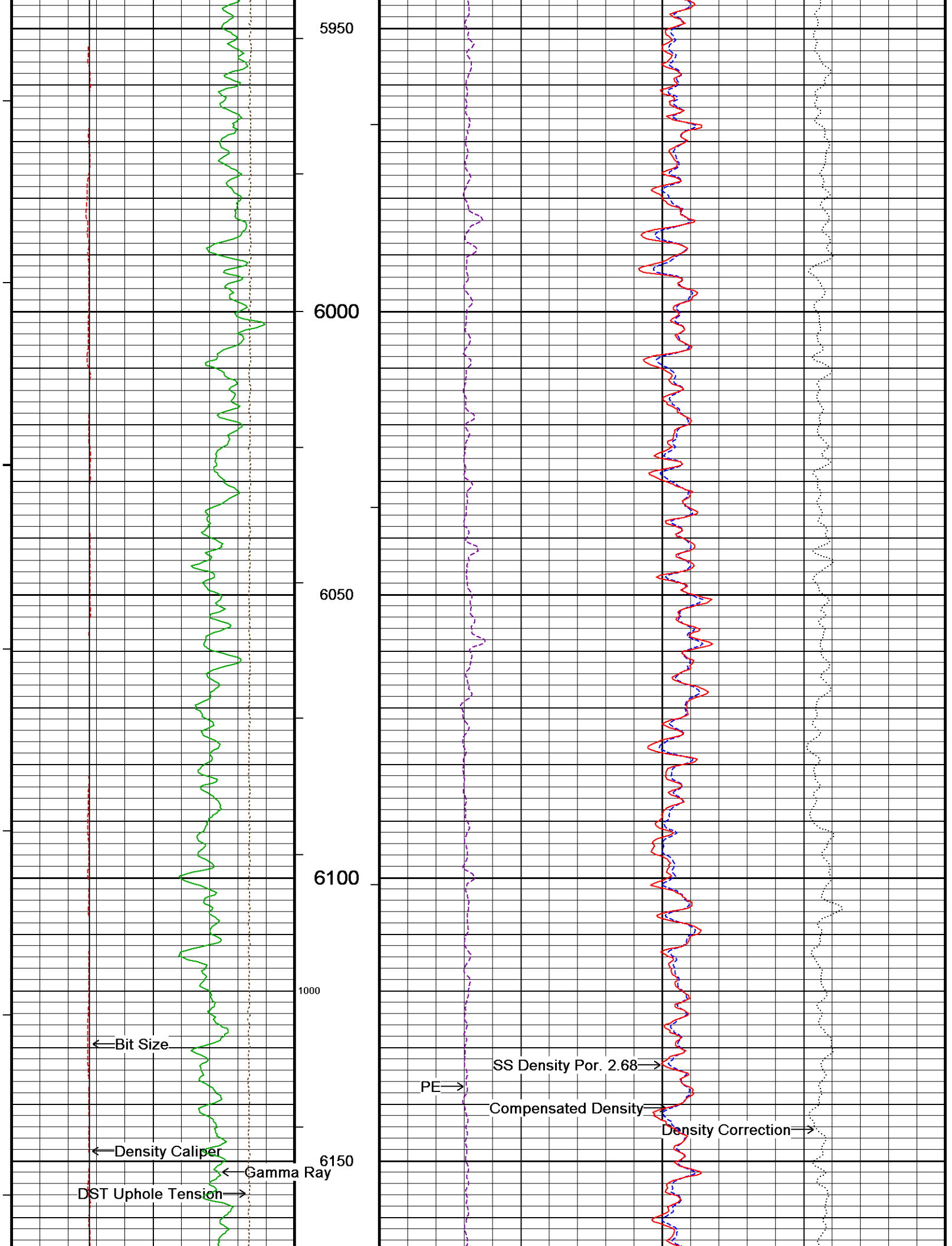


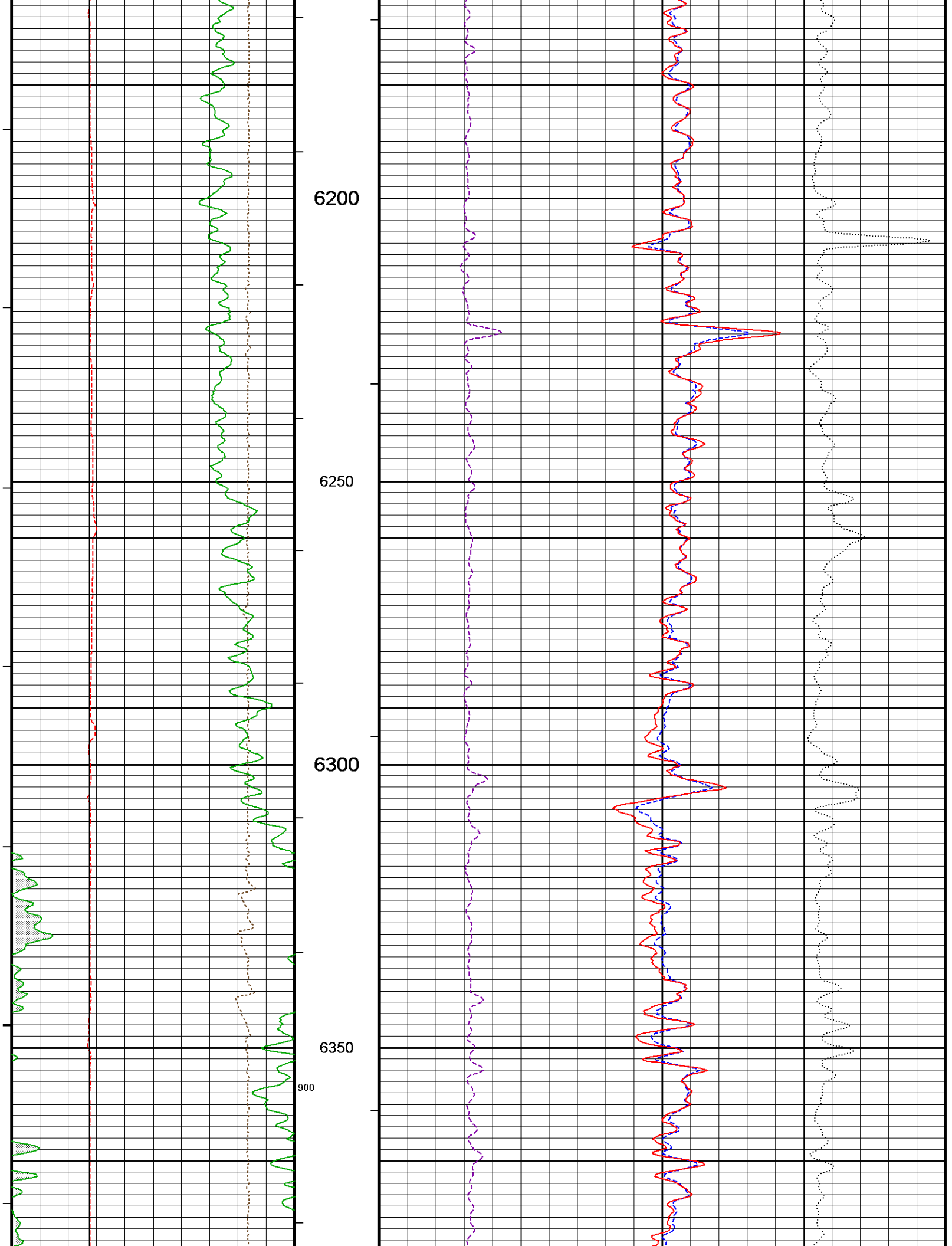


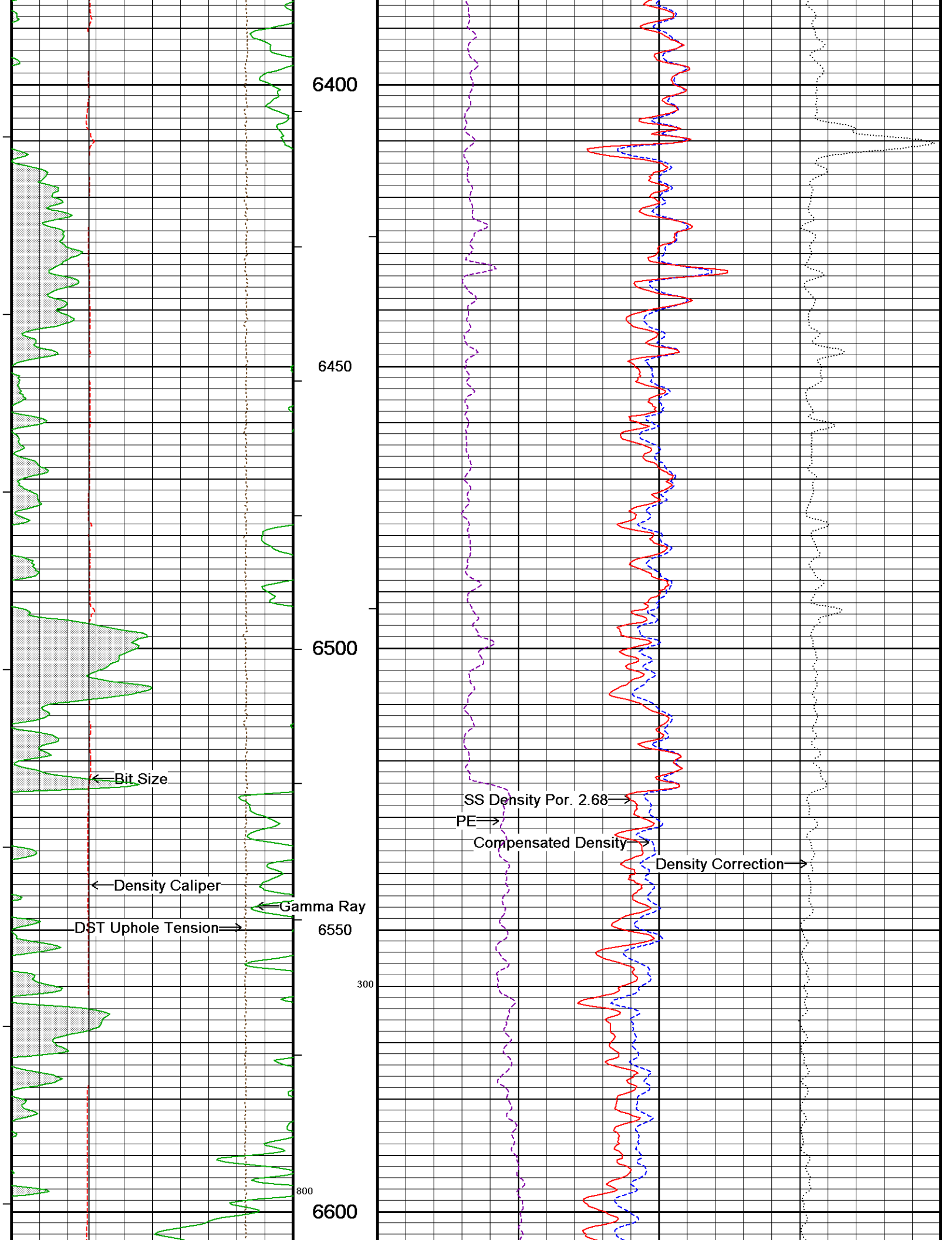


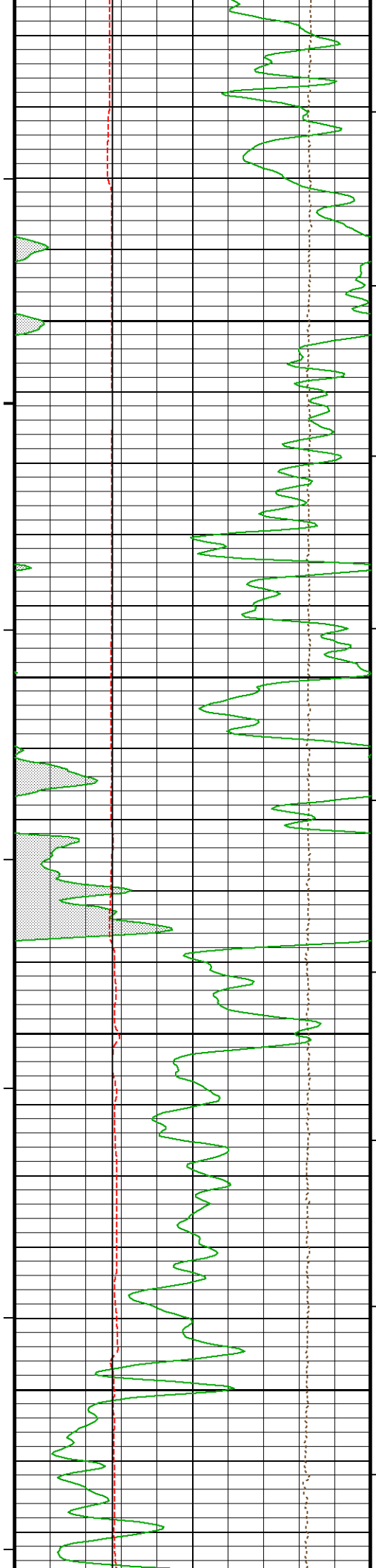










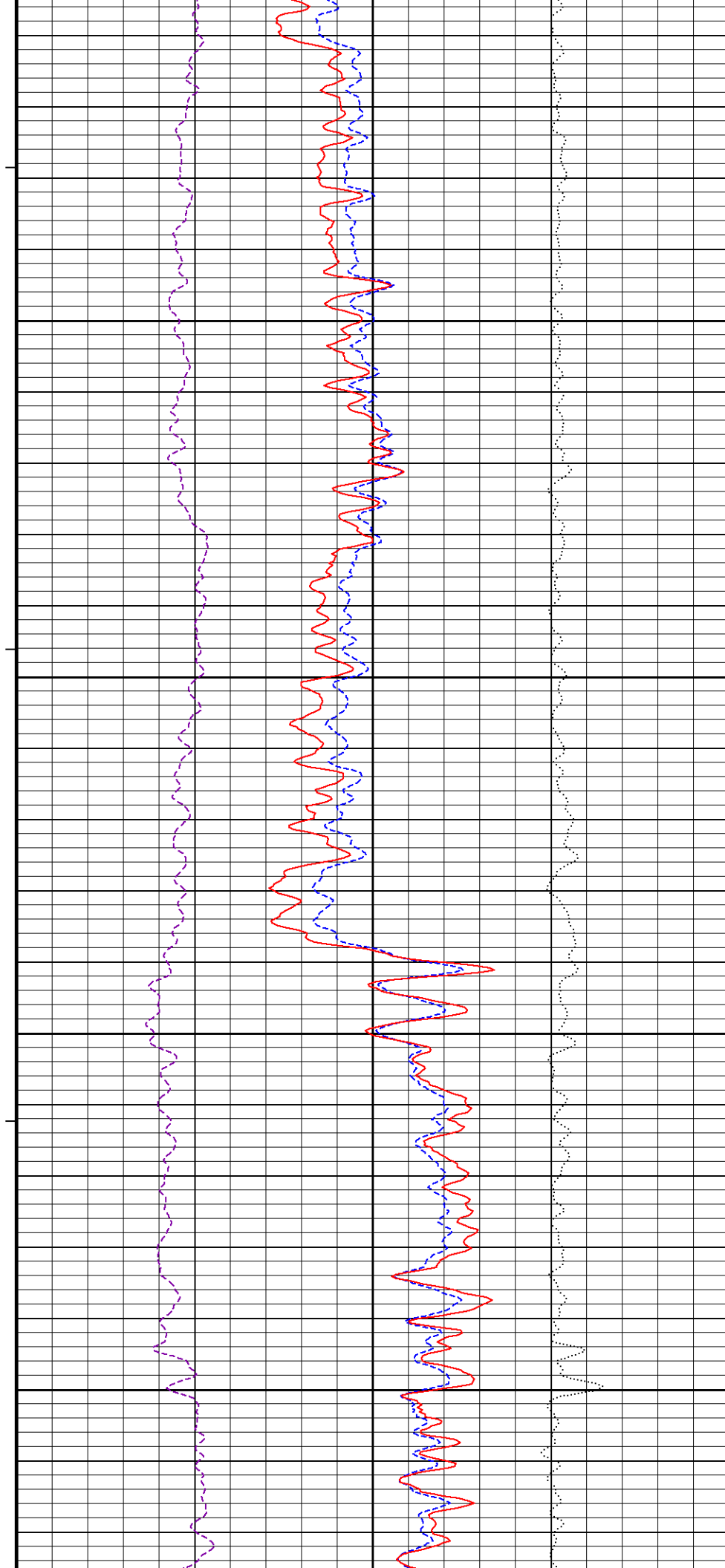


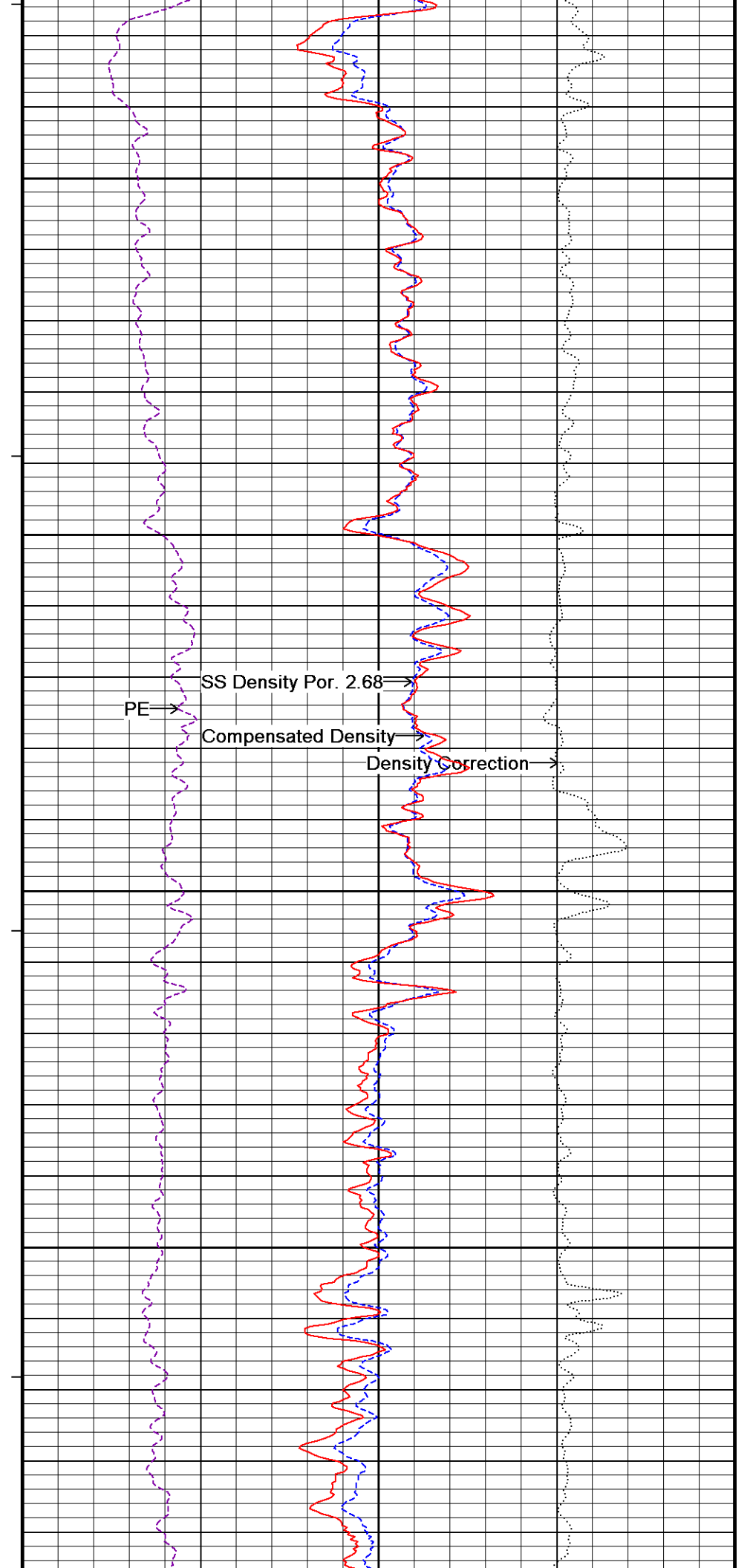
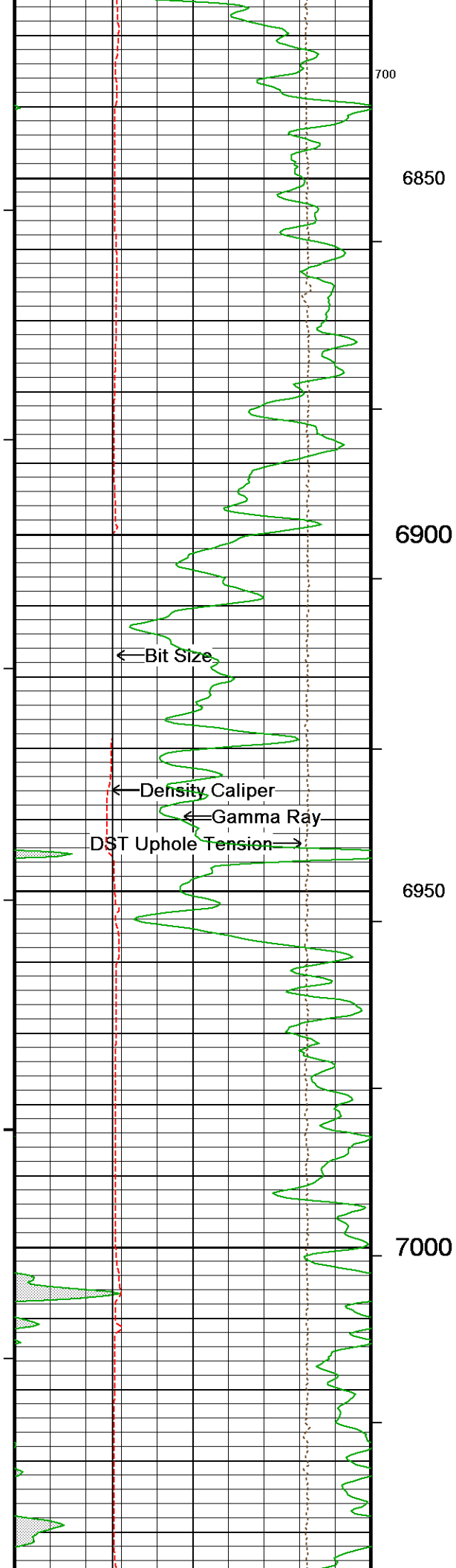
6650

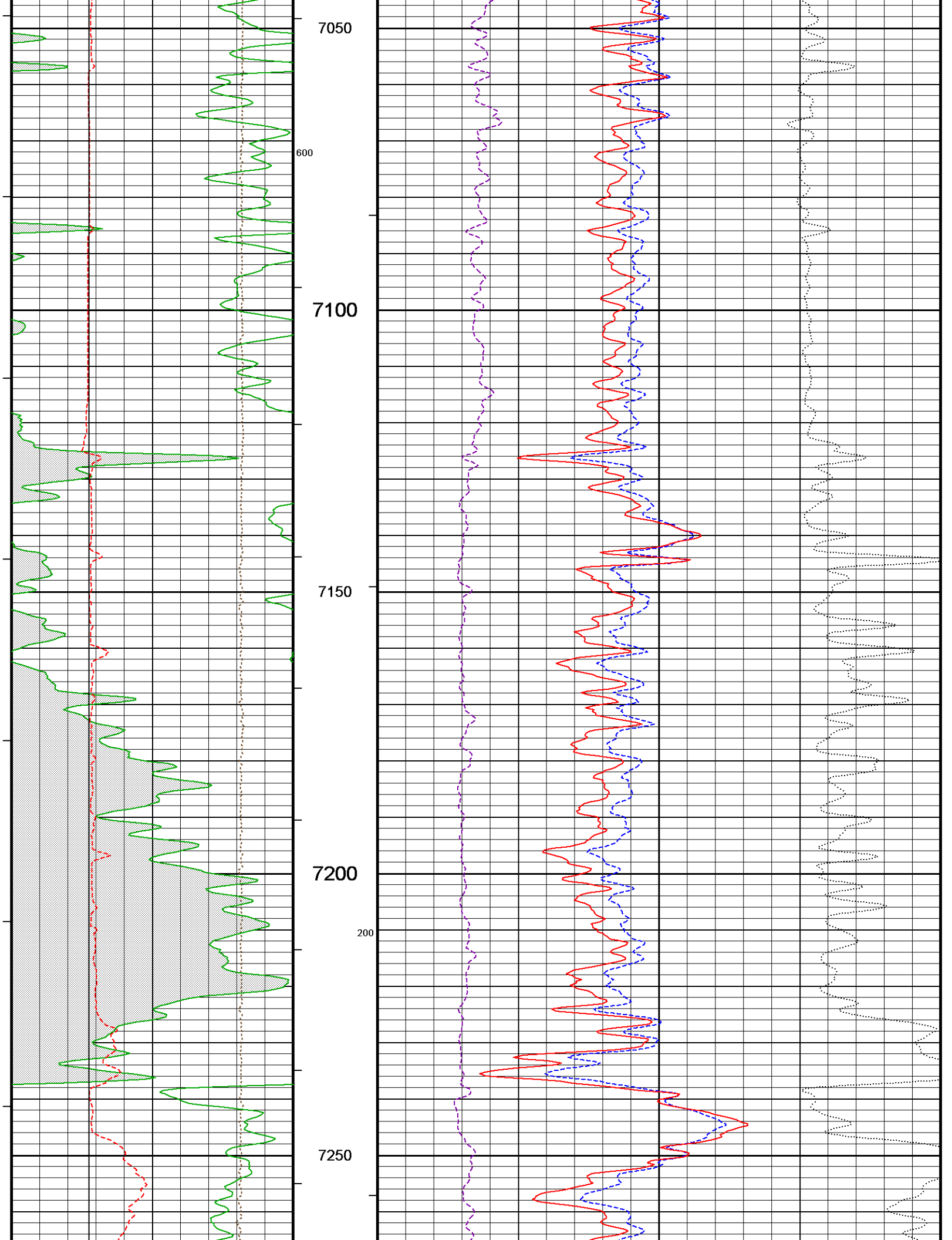
6700

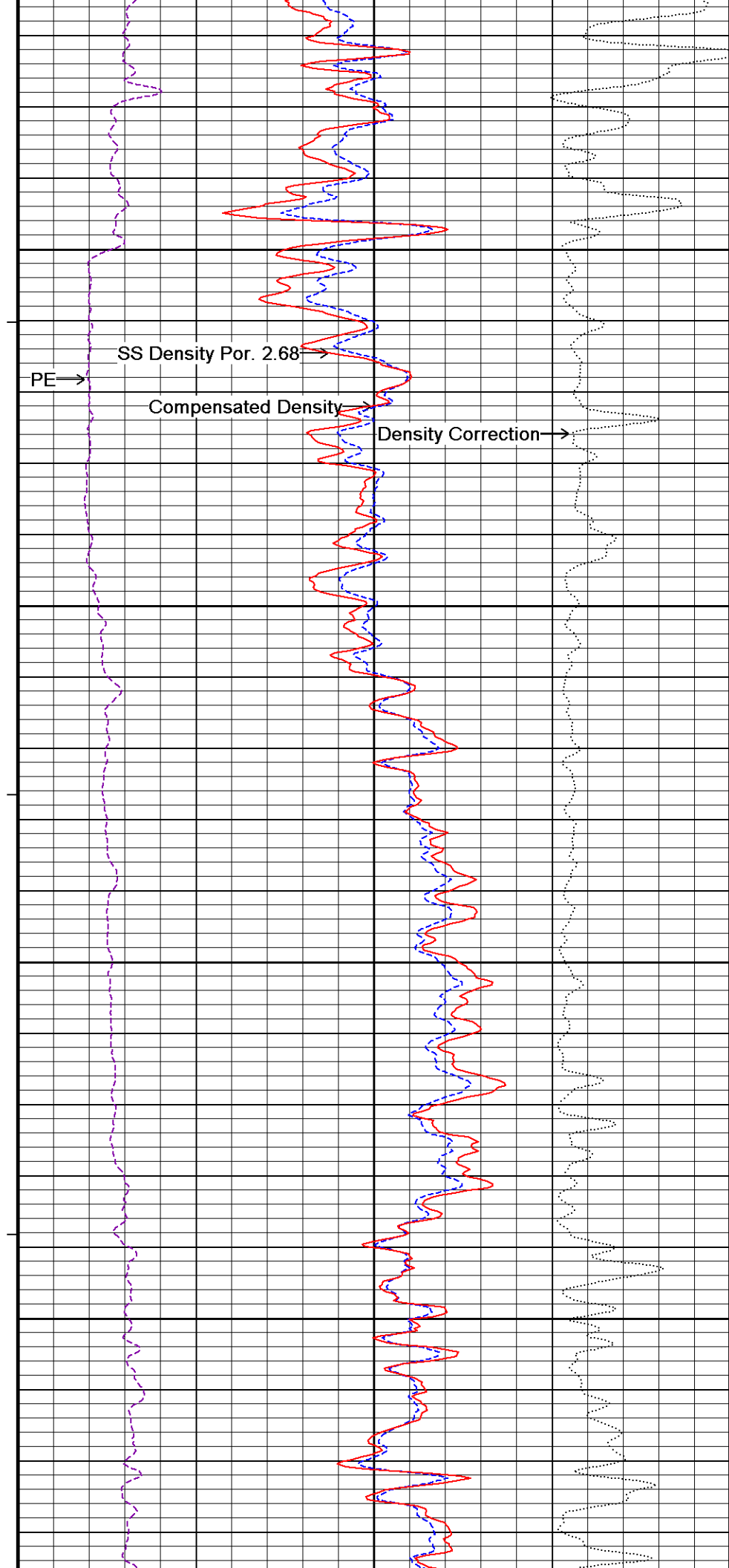
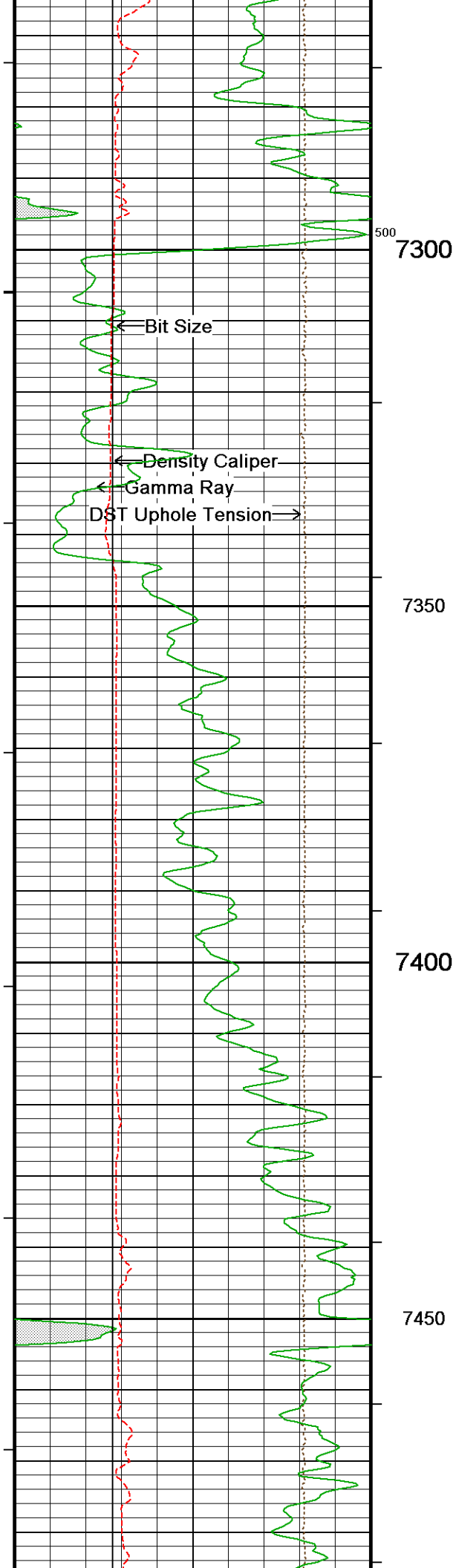
6750

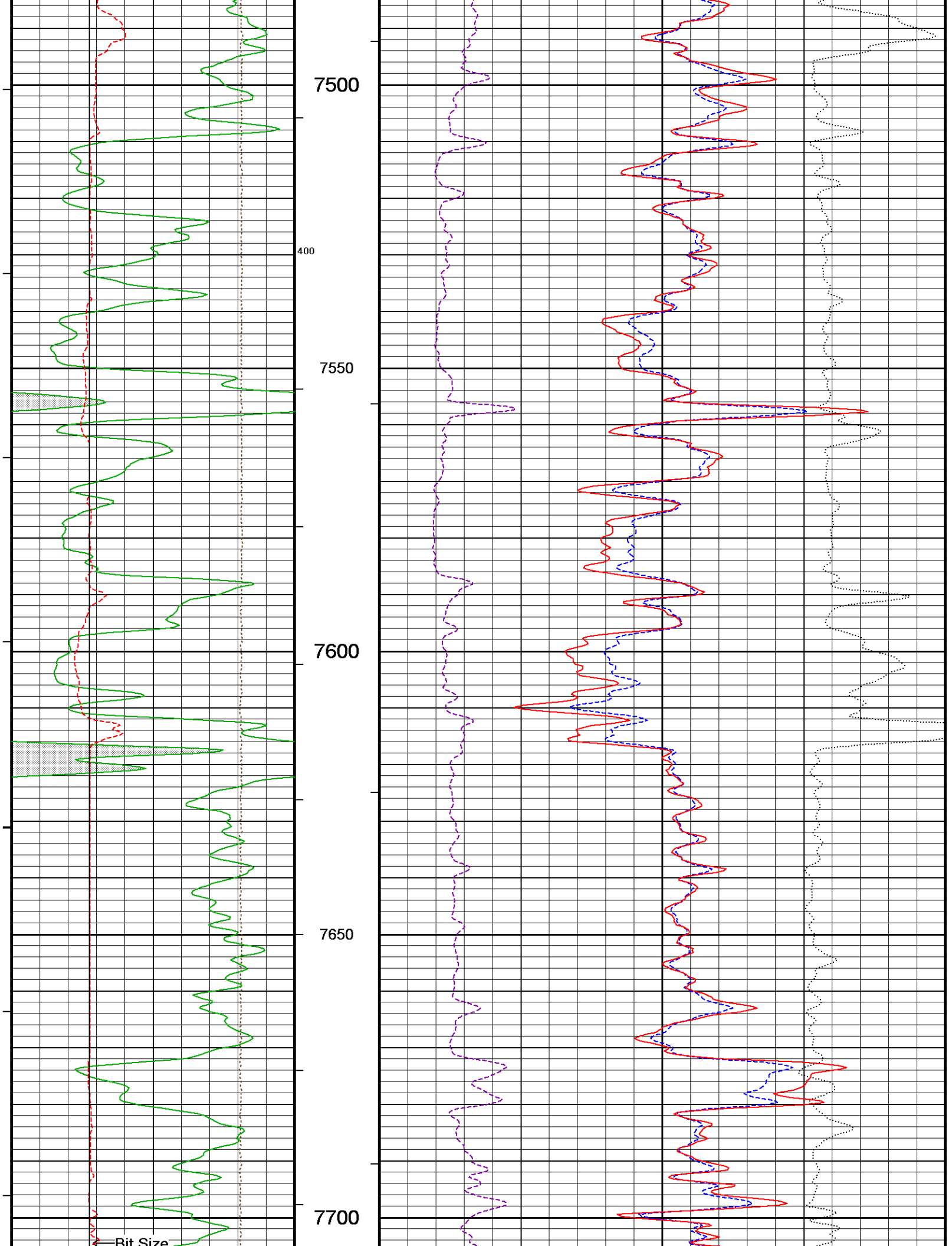
6800



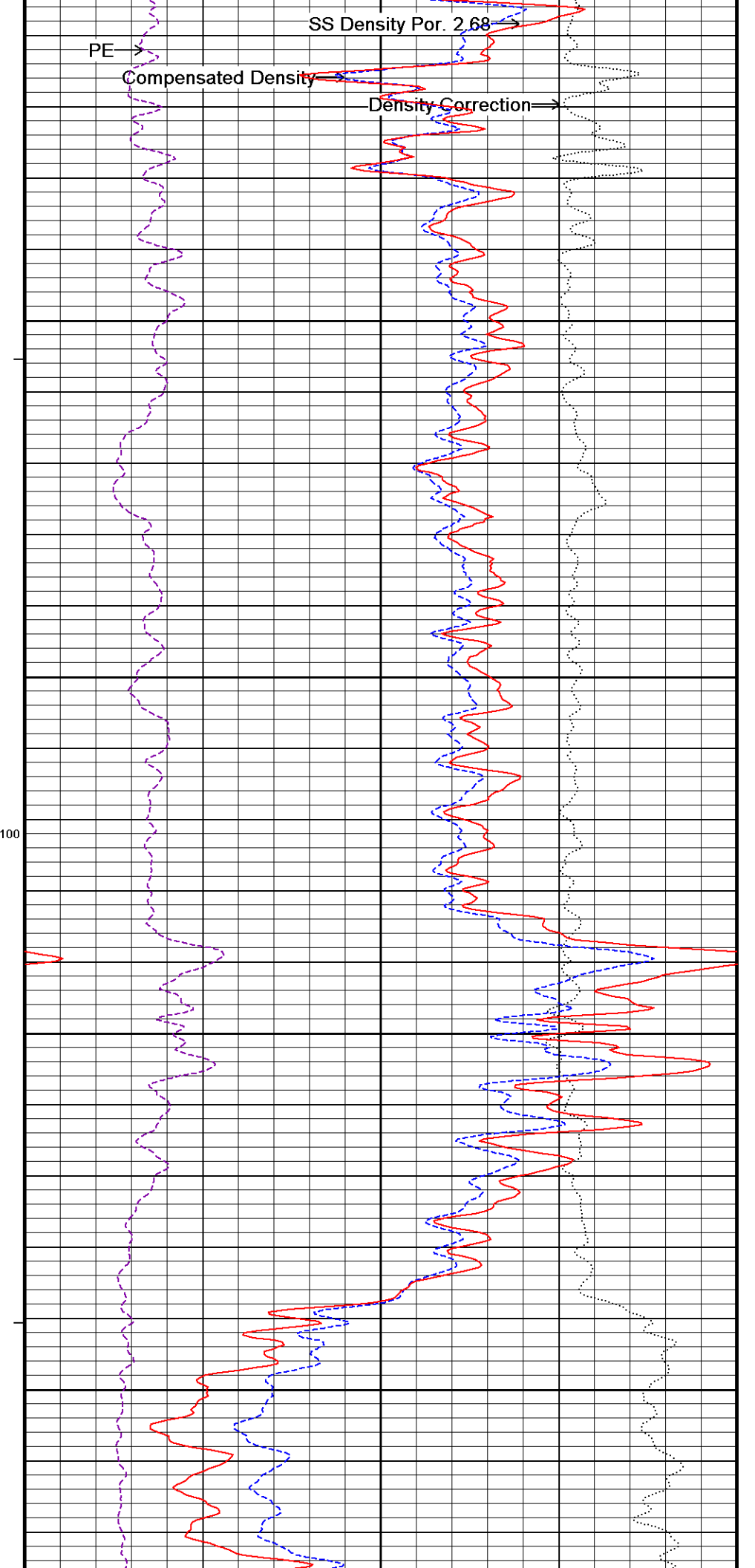
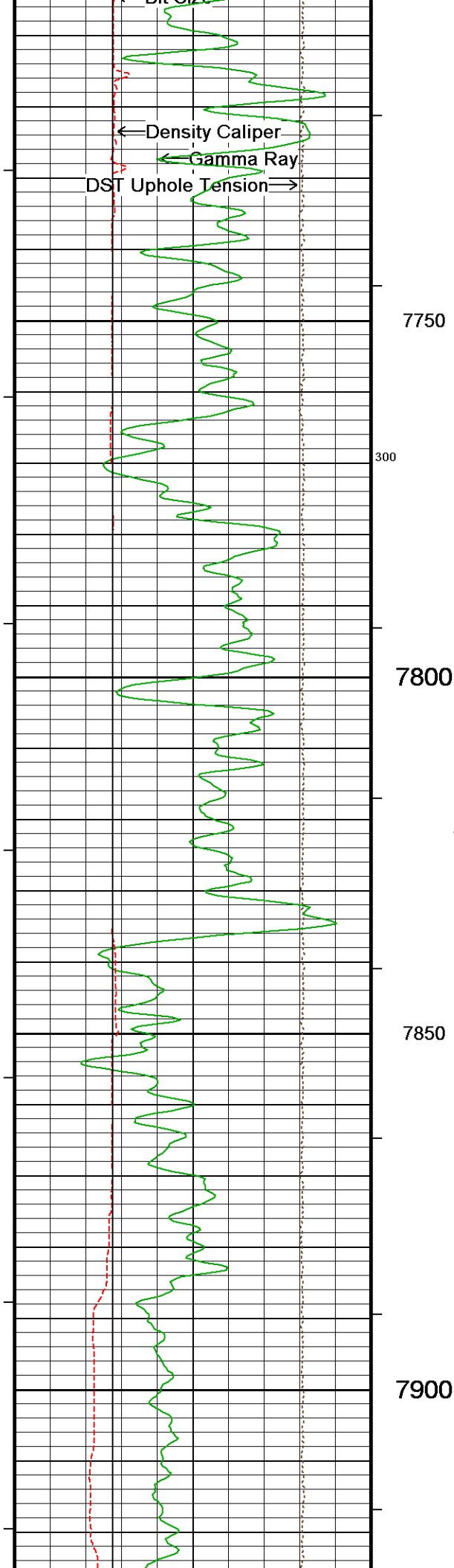


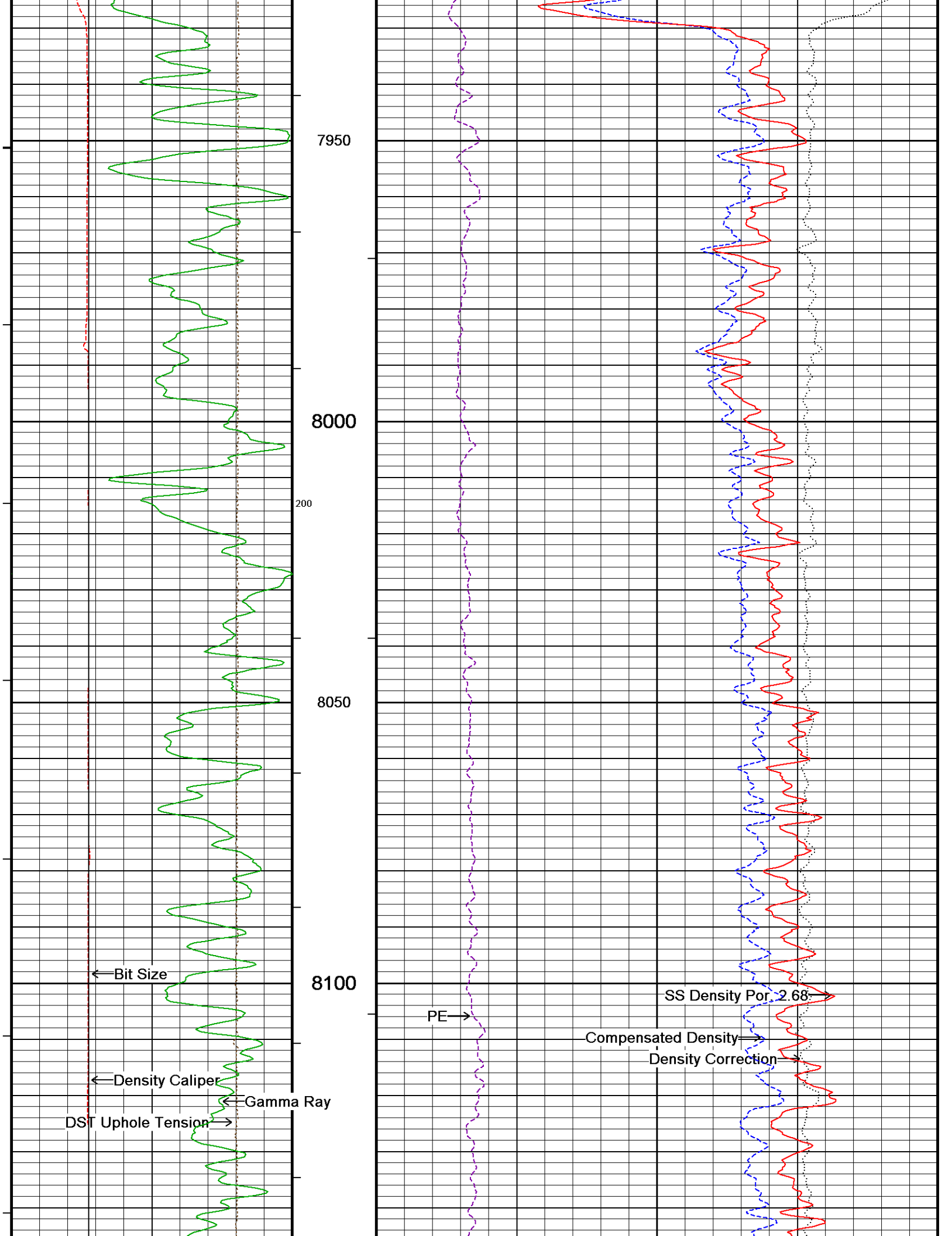


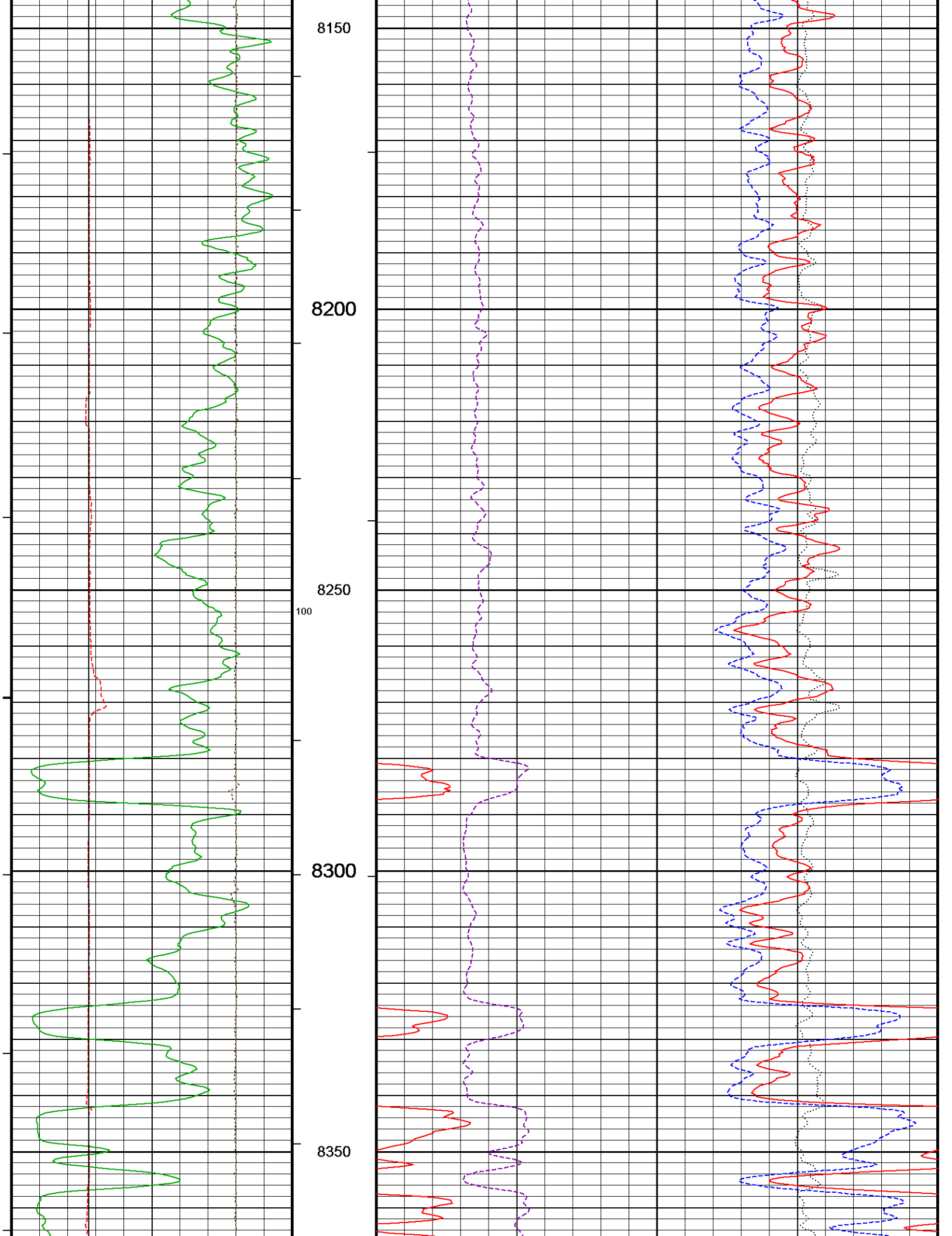


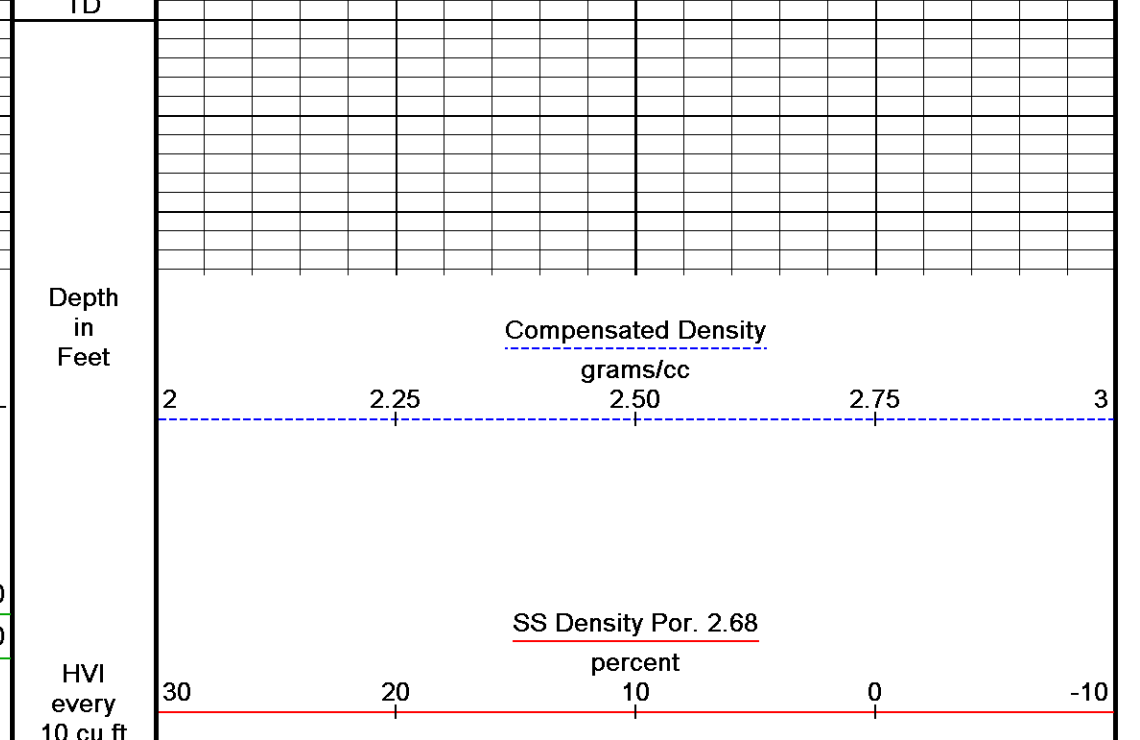
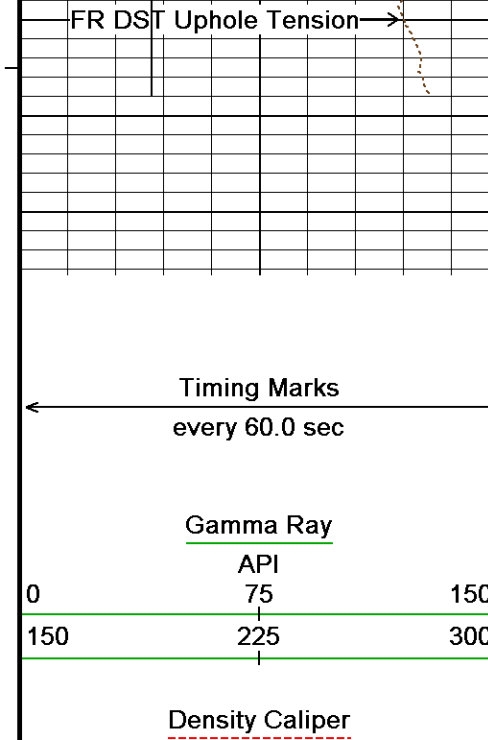
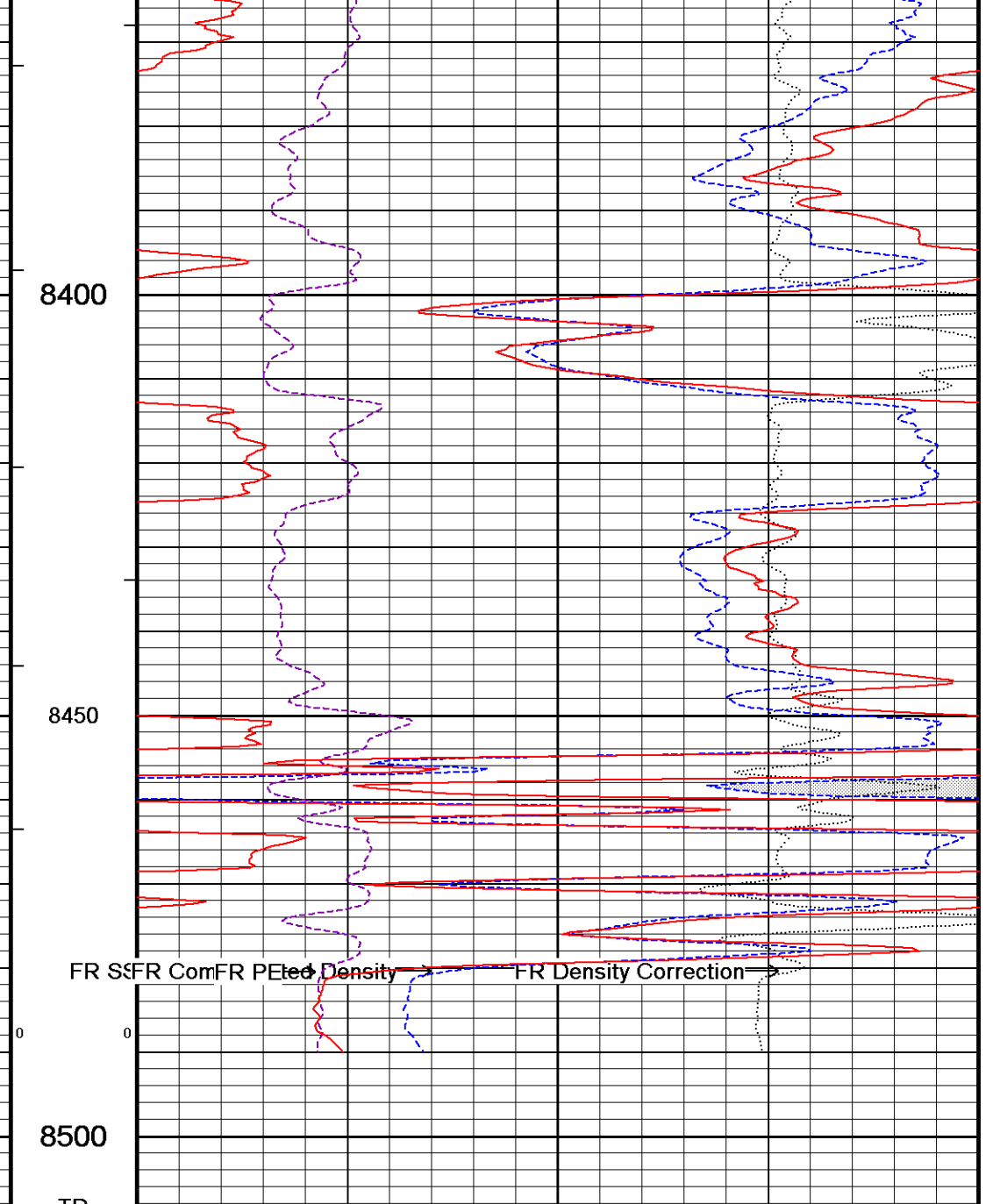
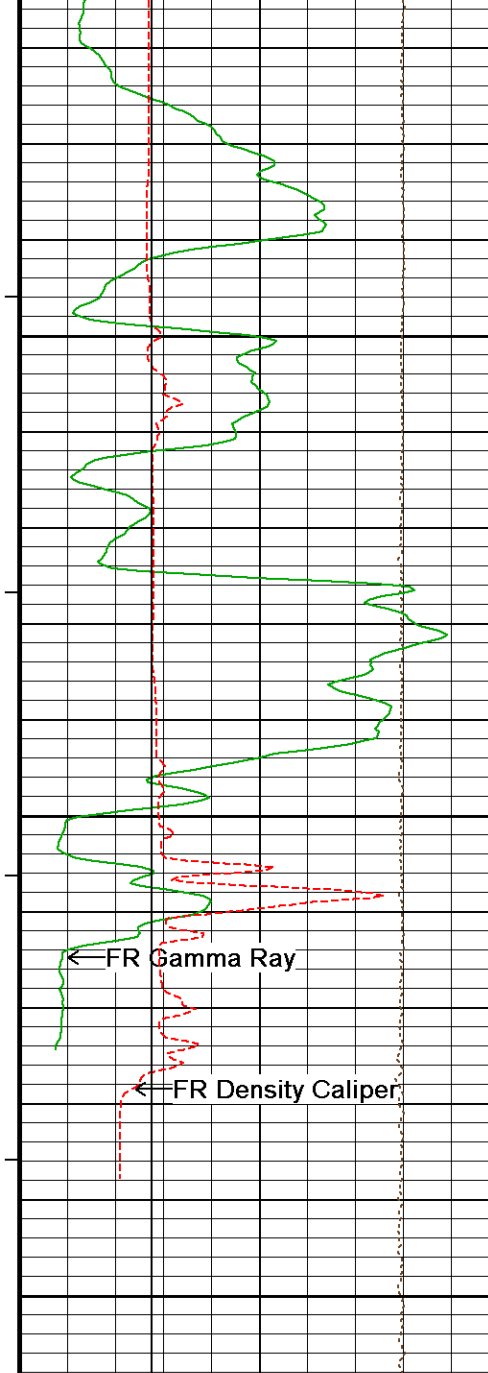


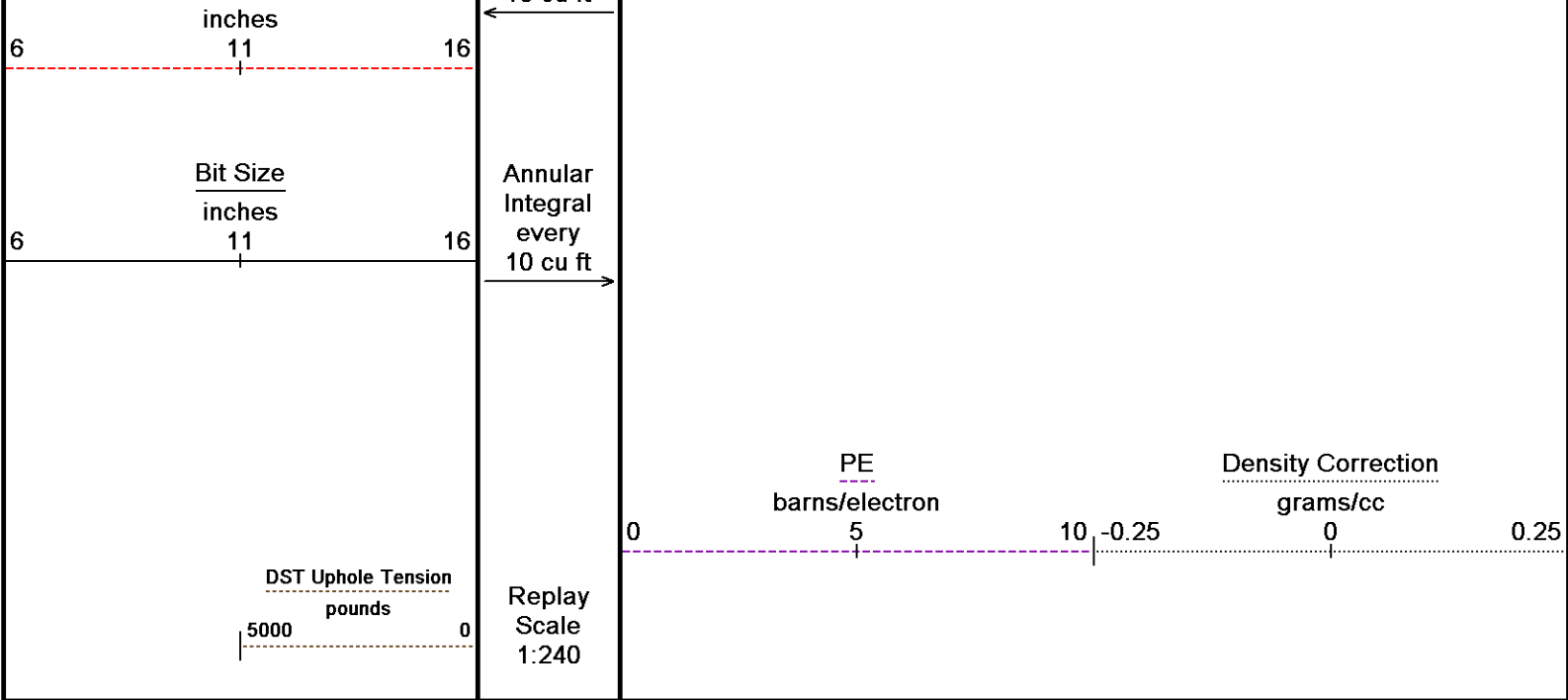










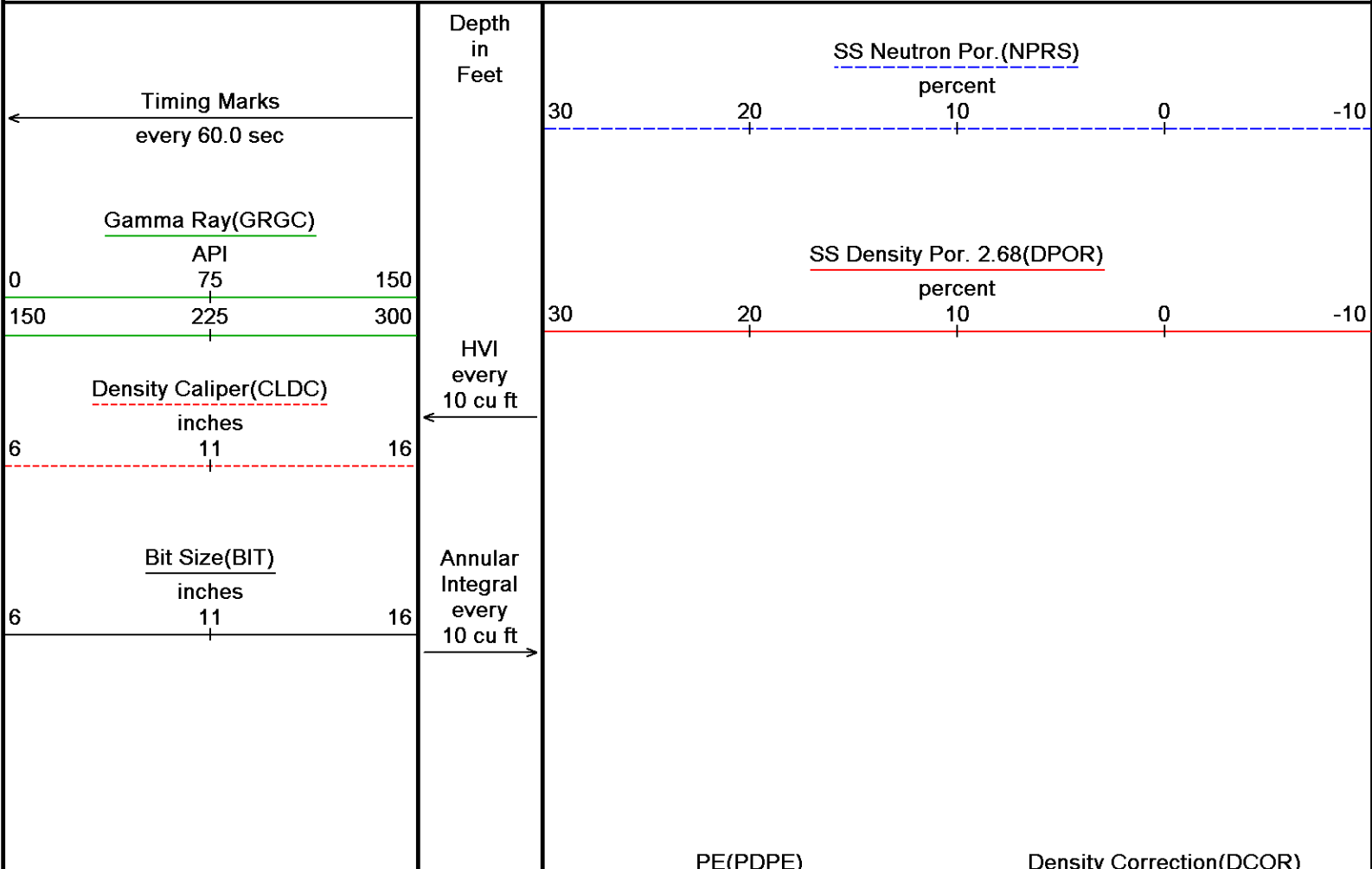


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 29-JAN-2017 00:38  
Filename: C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\spliced main.dta  
System Versions: Processed with 16.03.1458 Plotted with 16.03.1458

5 INCH BULK DENSITY

REPEAT SECTION OVERLAY

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 29-JAN-2017 00:38  
Filename: C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\spliced main.dta  
Filename: C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825...\REPEAT PASS.dta Recorded on 28-JAN-2017 18:25  
System Versions: Processed with 16.03.1458 Plotted with 16.03.1458



IST Uphole Tension(SMTU  
pounds

5000 0

Replay  
Scale  
1:240

0 5 10 barns/electron -0.25 0 0.25 grams/cc

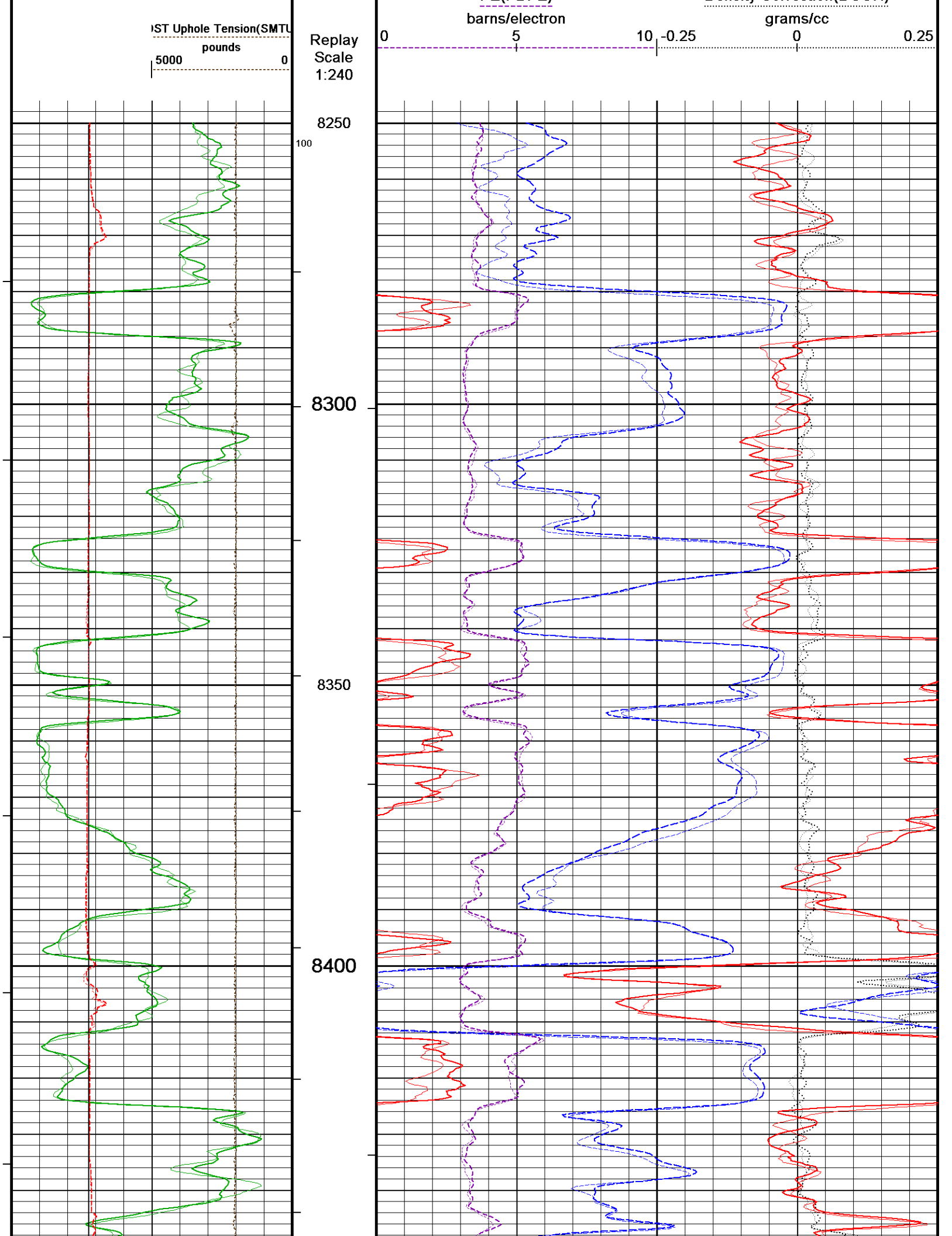
8250

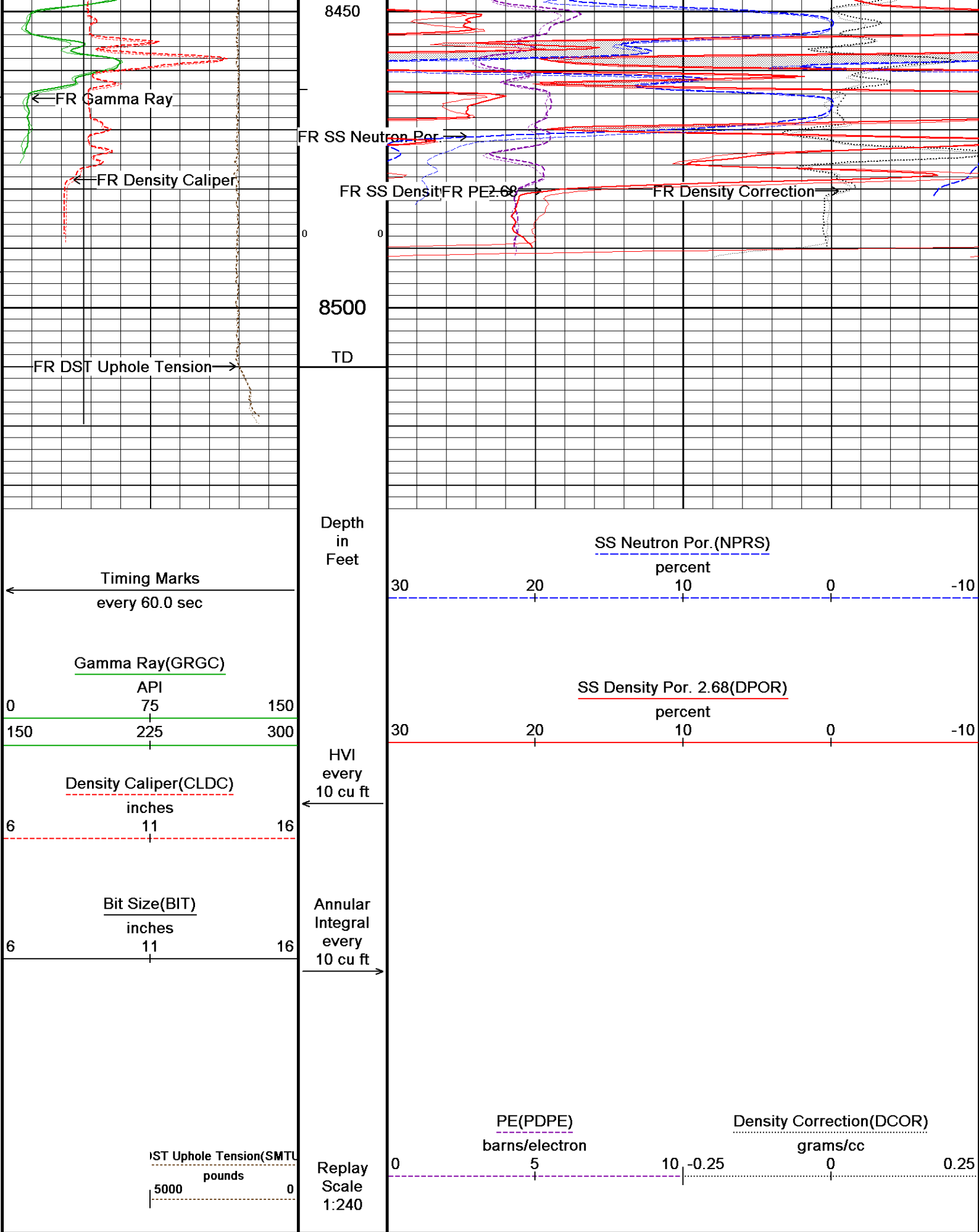
100

8300

8350

8400







## BEFORE SURVEY CALIBRATION

C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\setup.dta

General Constants All 000

Last Edited on 28-JAN-2017,14:17

## General Parameters

Mud Resistivity	0.980	ohm-metres
Mud Resistivity Temperature	86.400	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	

## Hole/Annular Volume and Differential Caliper Parameters

HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	7.000	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
SW/APOR Tool Source	0.000

Gamma Calibration MCG-D.K 483

Field Calibration on 28-JAN-2017,14:14

	Measured	Calibrated (API)
Background	126	86
Calibrator (Gross)	1048	712
Calibrator (Net)	922	626

Gamma Calibration Tolerances MCG-D.K 483

Ratio	1.473	<div><div>1.40</div><div>1.475</div><div>1.55</div></div>	Counts/API
-------	-------	---	------------

Gamma Constants MCG-D.K 483

Last Edited on 28-JAN-2017,14:14

Gamma Calibrator Number	GRC.C.072	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.19	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

Neutron Calibration MDN-C.A 464

Base Calibration on 28-DEC-2016 14:20

Field Check on 28-JAN-2017 14:14

## Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
Ratio	3126	96	3714	110
	32.494		33.764	

## Field Calibrator at Base

	Calibrated (cps)
Ratio	1224 1812
	0.676

## Field Check

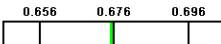
	Calibrated (cps)
Ratio	1230 1823
	0.675

Neutron Calibration Tolerances MDN-C.A 464

Ratio	32.494	<div><div>-5%</div><div>33</div><div>+5%</div></div>
-------	--------	--



Base Check 0.676 

Field Check 0.675 

## Neutron Constants MDN-C.A 464

Last Edited on 28-JAN-2017,14:08

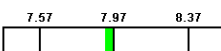
Neutron Source Id	N-1057	
Neutron Jig Number	5922NE	
Air Hole Processing	Modified Ratio	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	7.00	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	None	
Temperature	N/A	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	

## Caliper Calibration MPD-D.A 478

Base Calibration on 22-JAN-2017,13:20  
Field Calibration on 28-JAN-2017 14:01

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17153	3.98
2	25843	5.96
3	34378	7.97
4	42515	9.84
5	51814	11.91
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.92	7.97

## Caliper Calibration Tolerances MPD-D.A 478

Long Arm Field Cal. 7.92  in

## Photo Density Calibration MPD-D.A 478

Base Calibration on 22-JAN-2017,13:14  
Field Check on 28-JAN-2017 14:07

Density Calibration				
Base Calibration		Measured	Calibrated (sdu)	
	Near	Far	Near	Far
Background	1190	1357		
Reference 1	49260	24545	59443	30683
Reference 2	20371	2461	24540	2525
Field Check at Base				
	1189.8	1356.6		
Field Check				
	1183.4	1350.7		
PE Calibration				
Base Calibration		Measured	Calibrated	
	WS	WH	Ratio	Ratio
Background	232	1074		
Reference 1	22091	49086	0.455	0.372
Reference 2	6285	20249	0.316	0.271
Field Check at Base				
	232.1	1073.9		
Field Check				

		21.01		
Far Density Ratio				
Far Den. Field Check	1350.7	-3%	1356.6	+3%
PE WH Field Check	1067.5	-6%	1073.9	+6%

Last Edited on 28-JAN-2017,14:02

[illegible]

C:\Logs\Expedition Water Solutions LLC\EWS # 4A\run 1\8149-172825604\setup.dta

Cablehead, 11 pin  
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor  
SHA-J.B 573 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma  
MCG-D.K 483 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

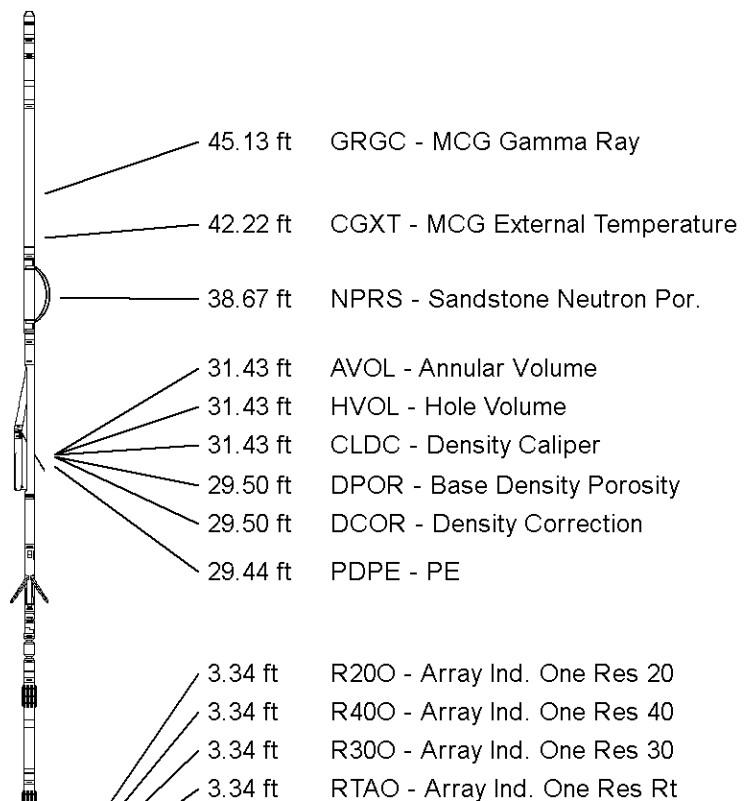
Compact Neutron  
MDN-C.A 464 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper  
MPD-D.A 478 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Vee Arm Caliper  
MVC-A.A 142 LG: 8.06 ft WT: 61.7 lb OD: 2.244 in

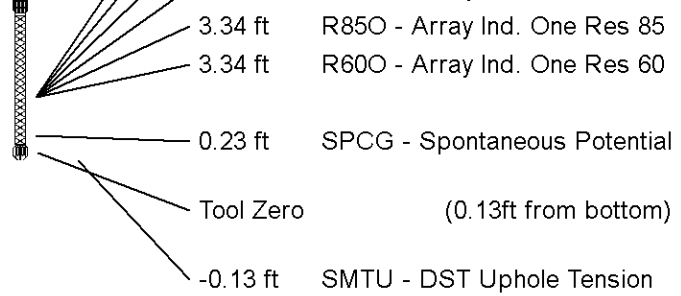
Compact Knuckle Joint  
SKJ-E.B 534 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric  
MFE-C.A 416 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in



Compact Induction  
MAI-C.A 456 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 55.11 ft Weight: 434.3 lb



All measurements relative to tool zero.

COMPANY	EXPEDITION WATER SOLUTIONS COLORADO LLC
WELL	EWS # 4A
FIELD	WATTENBERG
PROVINCE/COUNTY	WELD
COUNTRY/STATE	USA / COLORADO

Elevation Kelly Bushing	4856	feet	First Reading	8479.00	feet
Elevation Drill Floor	4856	feet	Depth Driller	8501.00	feet
Elevation Ground Level	4843	feet	Depth Logger	8510.00	feet



DUAL SPACED NEUTRON  
PHOTO DENSITY  
LOG

**Weatherford®**