



**Weatherford®**

**COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG**

COMPANY		GRAND MESA OPERATING COMPANY			
WELL		SEQUOIA #1-36			
FIELD		WILDCAT			
PROVINCE/COUNTY		WASHINGTON			
COUNTRY/STATE		U.S.A. / COLORADO			
LOCATION		1172' FNL & 932' FEL			
SEC 36	TWP 7S	RGE 55W	Other Services		MSS
Latitude	39.40027778		MAI/MFE		
Longitude	-103.49444444				
API Number	05-073-06730				
Permanent Datum GL, Elevation 5451 feet					
Log Measured From KB, 19.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	20-DEC-2017				Elevations: KB 5470.00 DF 5468.00 GL 5451.00
Run Number	ONE				
Service Order	17937-200937803				
Depth Driller	8462.00				feet
Depth Logger	8457.00				feet
First Reading	8423.00				feet
Last Reading	437.00				feet
Casing Driller	437.00				feet
Casing Logger	437.00				feet
Bit Size	7.875				inches
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.30 lb/USg		75.00	sec/qt	
PH / Fluid Loss	10.50		6.40	ml/30Min	
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.10 @ 77.0				ohm-m
Rmf @ Measured Temp	0.88 @ 77.0				ohm-m
Rmc @ Measured Temp	1.32 @ 77.0				ohm-m
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.49 @177.0				ohm-m
Time Since Circulation	6 HOURS				
Max Recorded Temp	177.00				deg F
Equipment / Base	13057		OKC		
Recorded By	M. MCGLOTHLIN				H. LEJEUNE
Witnessed By	KENT MATSON				

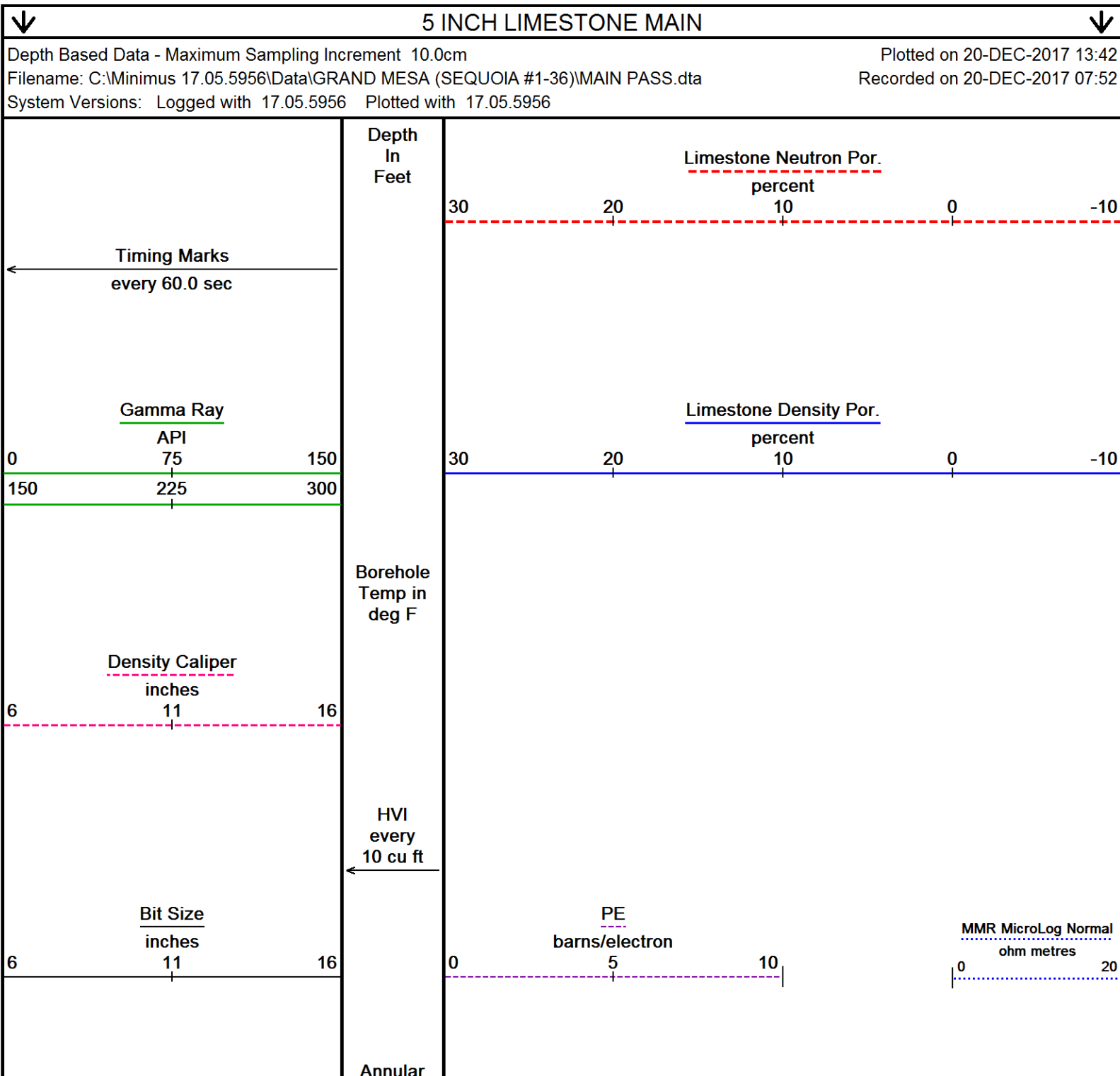
BOREHOLE RECORD					Last Edited: 20-DEC-2017 10:34
Bit Size inches		Depth From feet		Depth To feet	
7.875		437.00		8500.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	437.00	24.00	

REMARKS
- SOFTWARE ISSUE: WLS 17.05.5956.
- RUN ONE: SHA, MCG, MML, MDN, MPD, SKJ, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 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.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 3530 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 2210 CU.FT.

- ENGINEER: M. MCGLOTHLIN, H. LEJEUNE.

- OPERATOR: D. GILLISPIE.

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.



Integral  
every  
10 cu ft

### MMR MicroLog Inverse

ohm metres

0

20

### DST Uphole Tension

pounds

5000

0

Replay  
Scale  
1:240

426

## Casing Shoe

450

← Bit Size

Limestone Density Por.:

← Density Caliper

82°

PE →

MMR MicroLog Inverse-

MMR MicroLog Normal

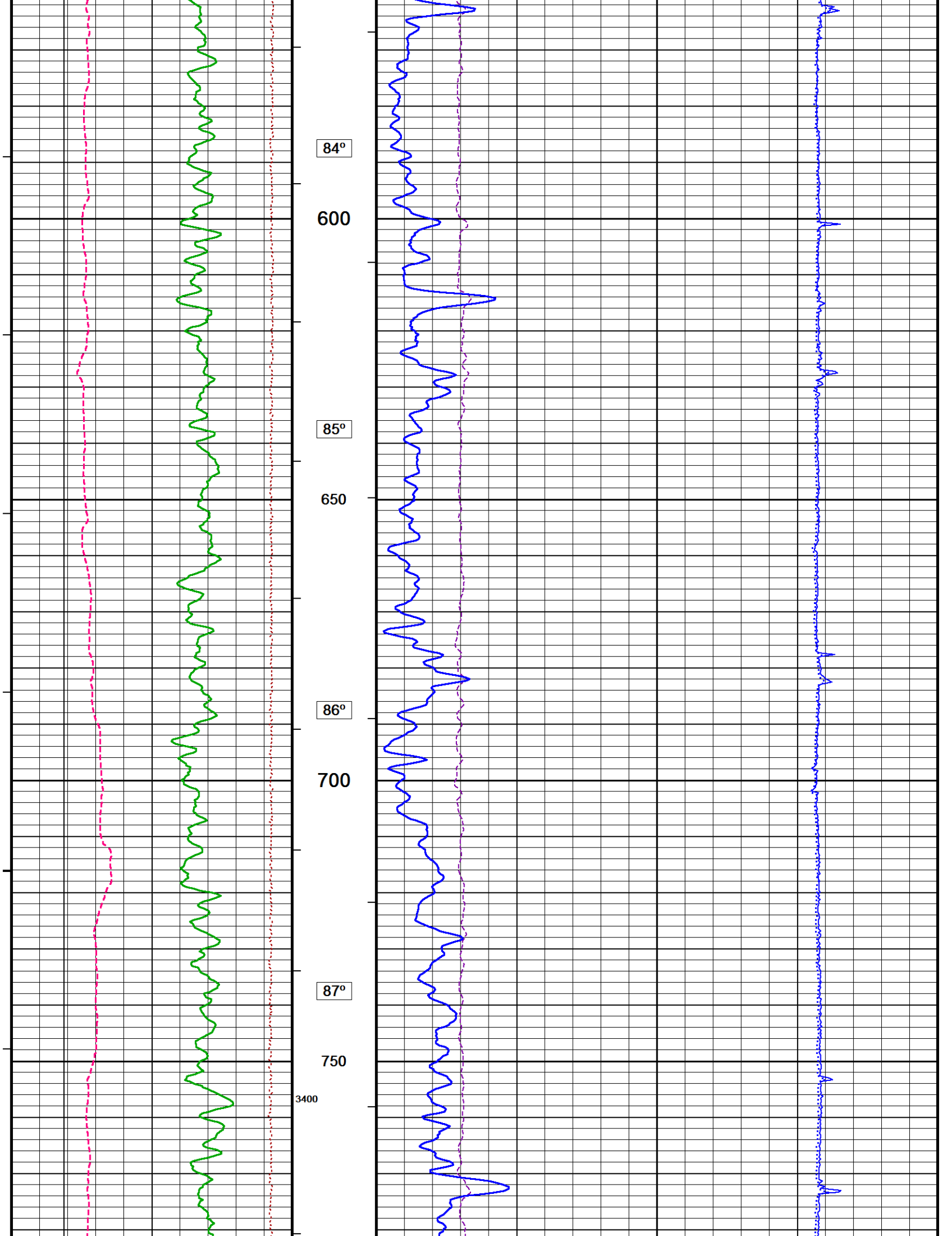
-DST Uphole Tension  $\Rightarrow$

500

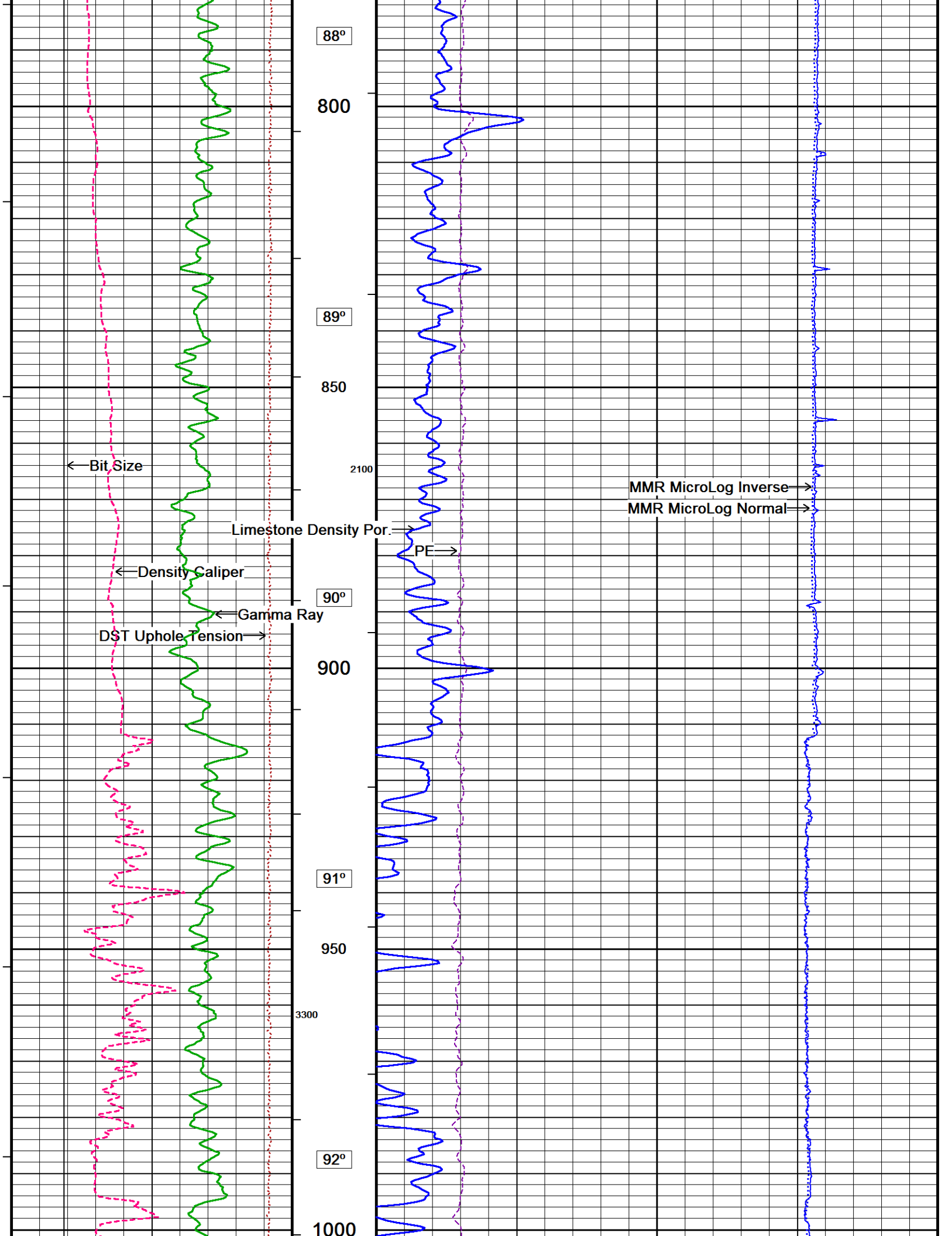
3500

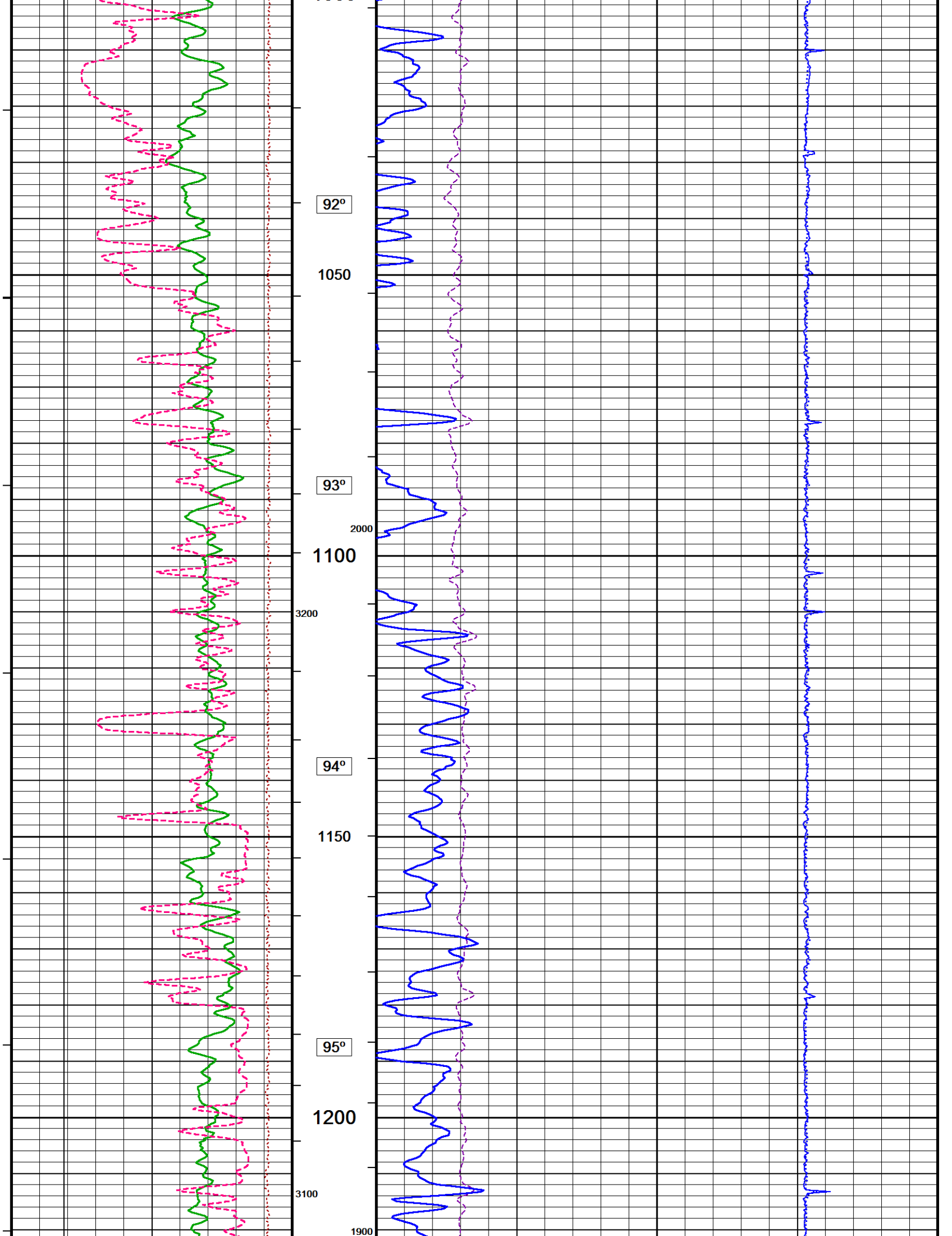
83°

550









← Bit Size

Limestone Density Por. →

← Density Caliper

← Gamma Ray

DST Uphole Tension →

PF →

MMR MicroLog Inverse →

MMR MicroLog Normal →

95°

1250

96°

1300

97°

3000

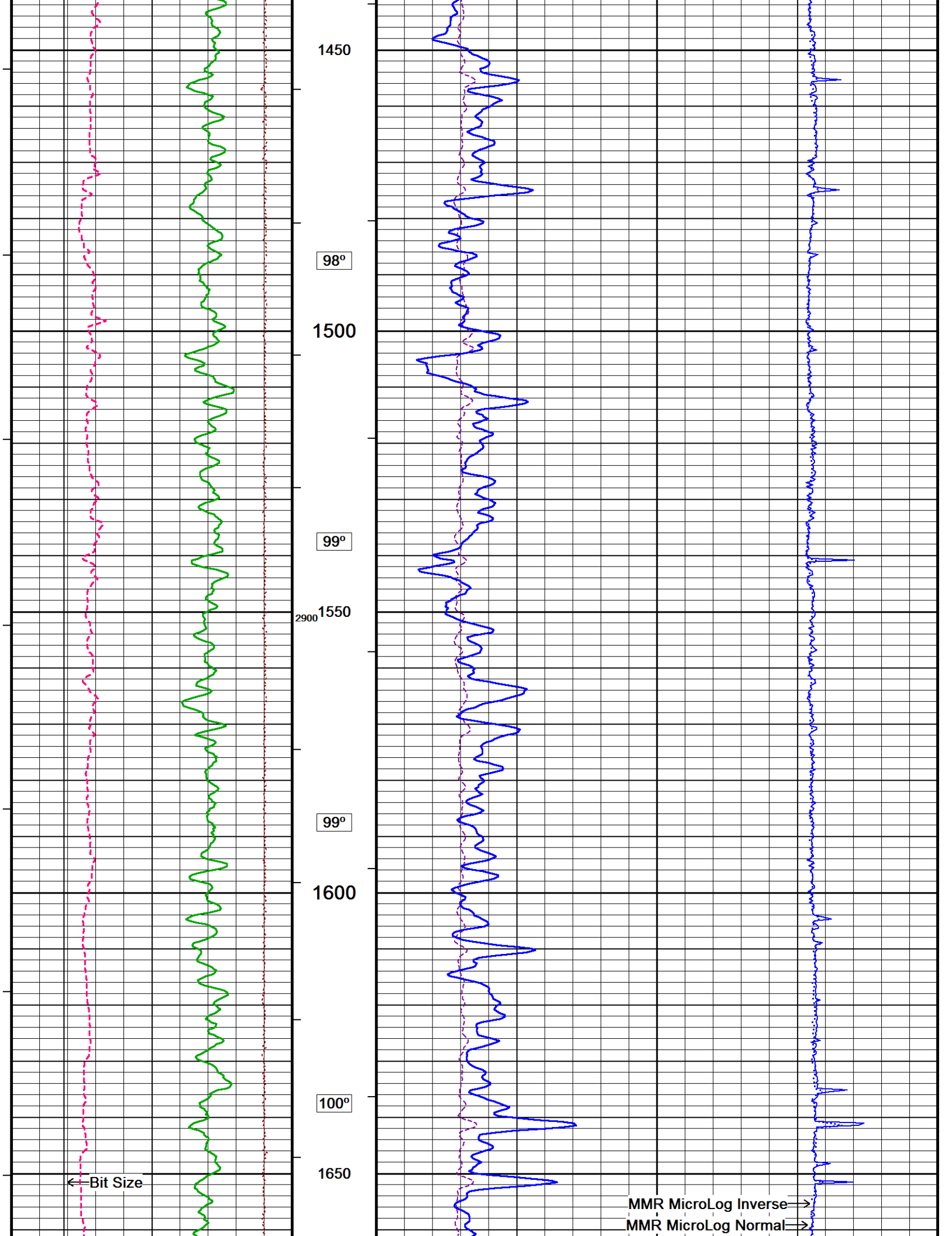
1350

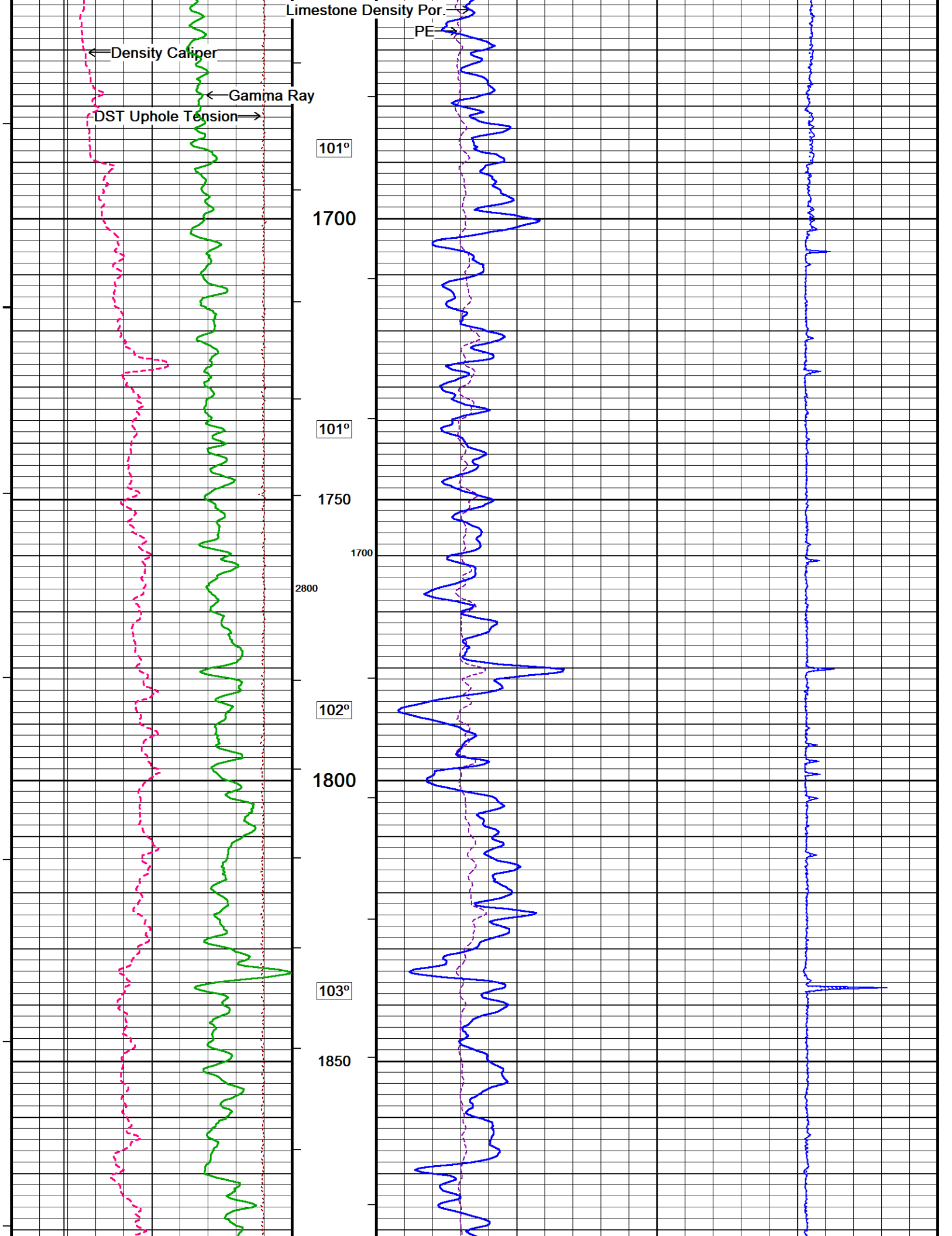
97°

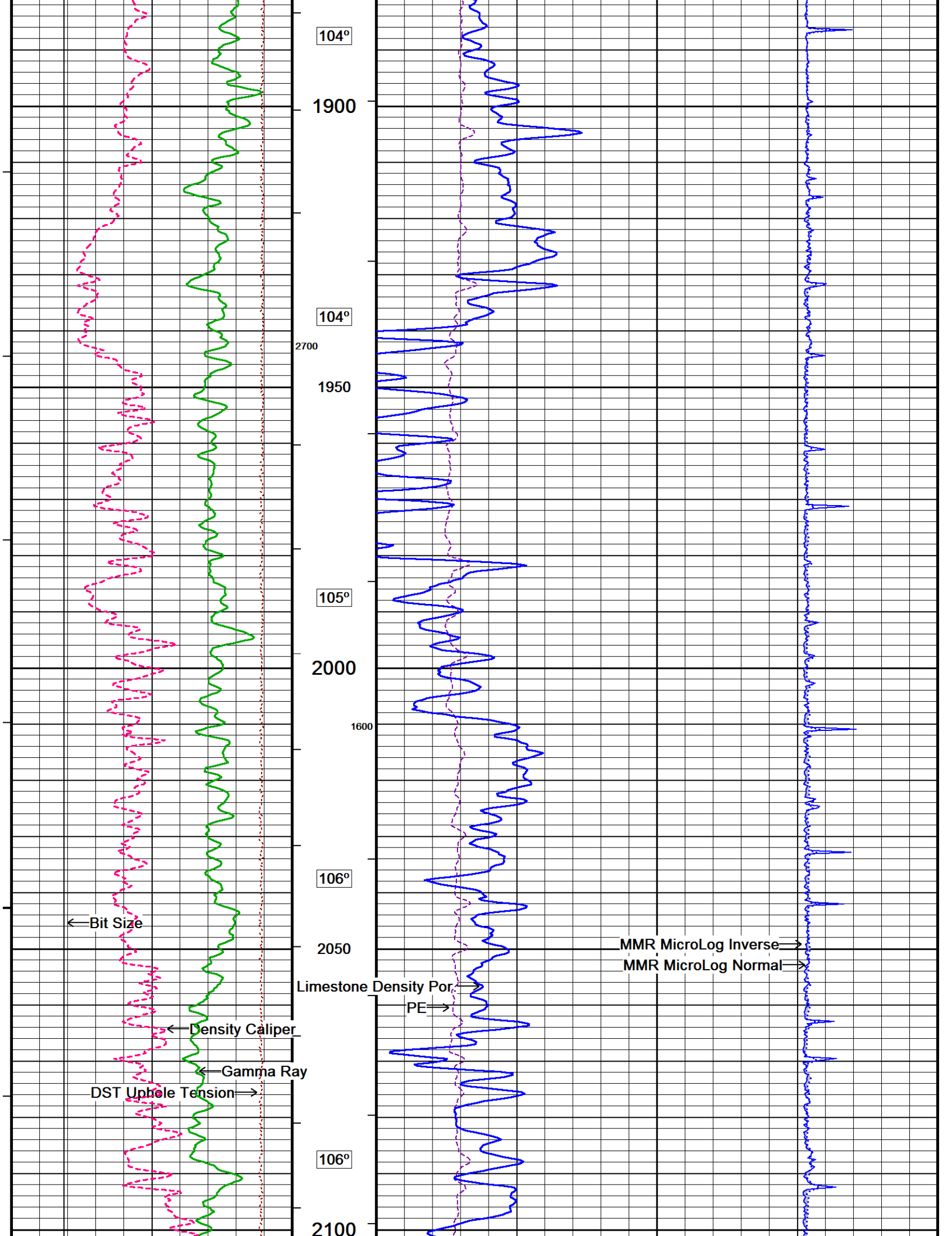
1400

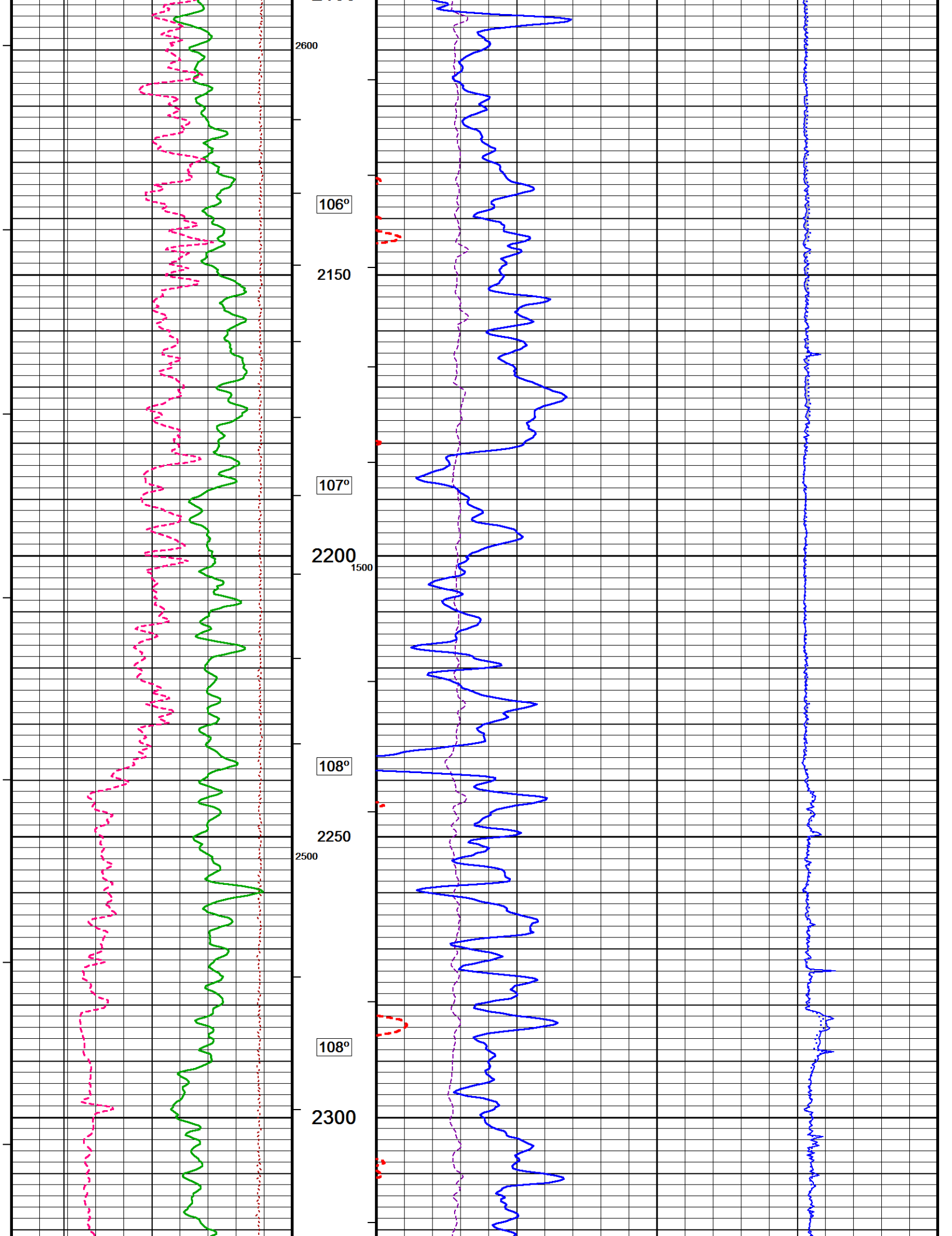
1800

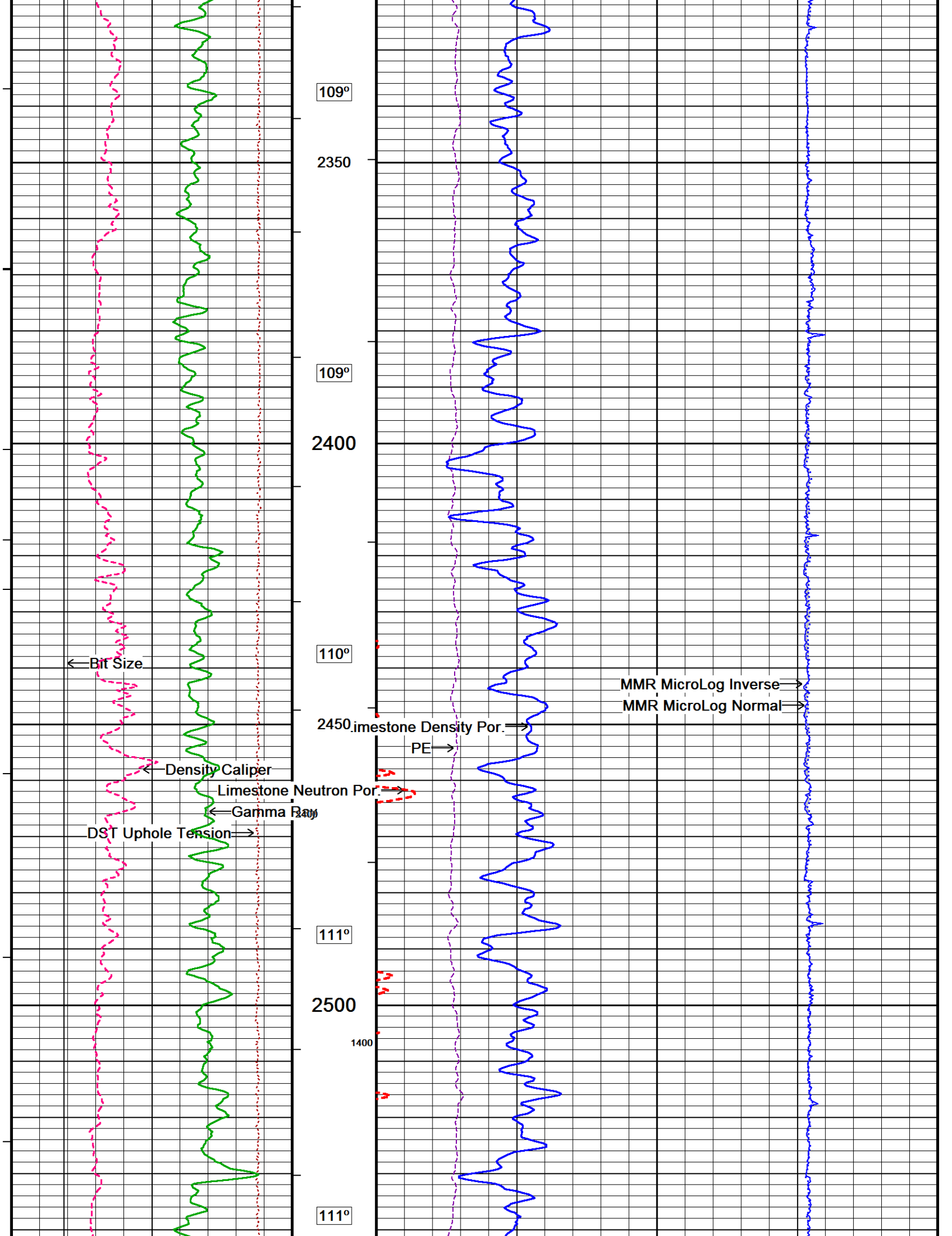
98°



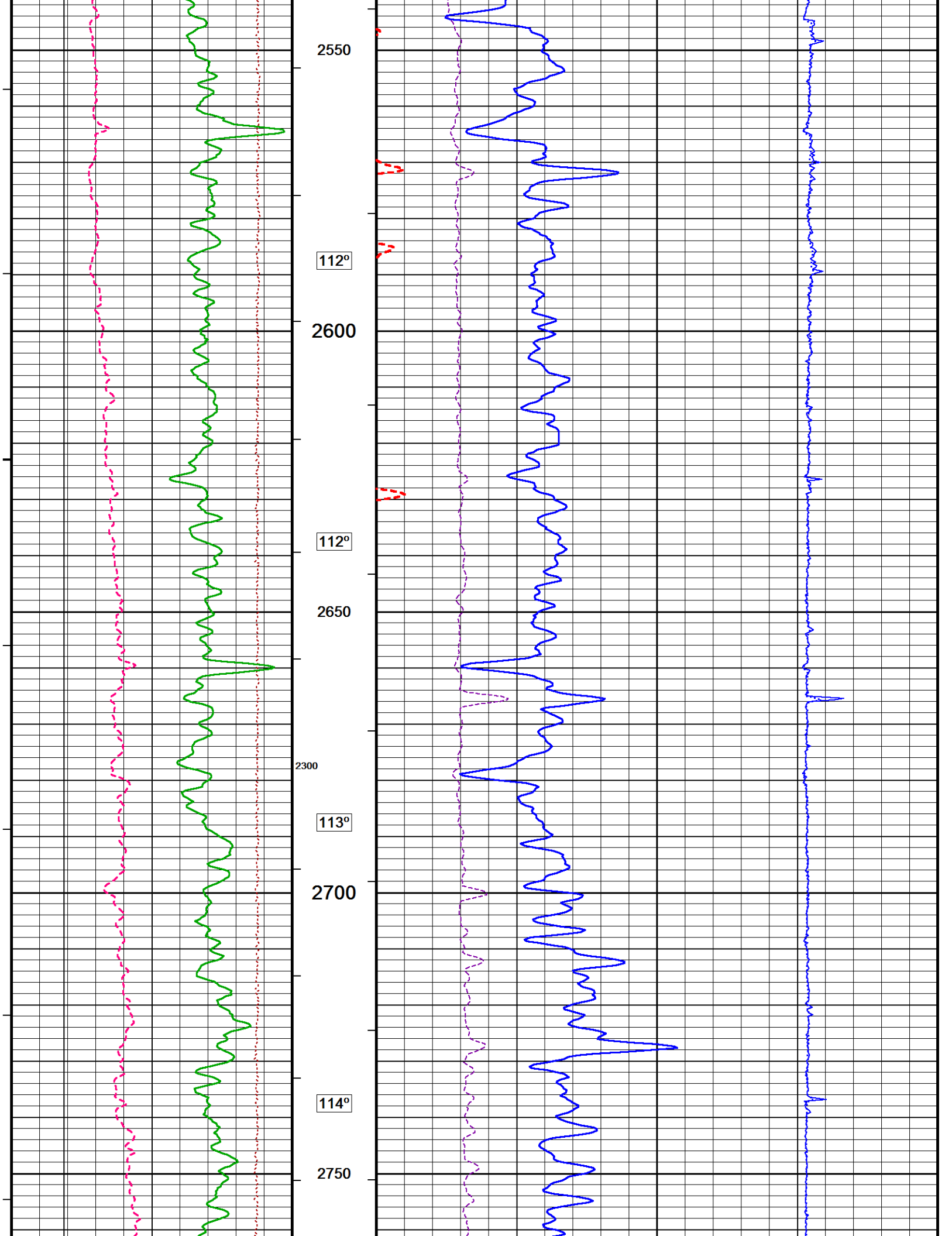


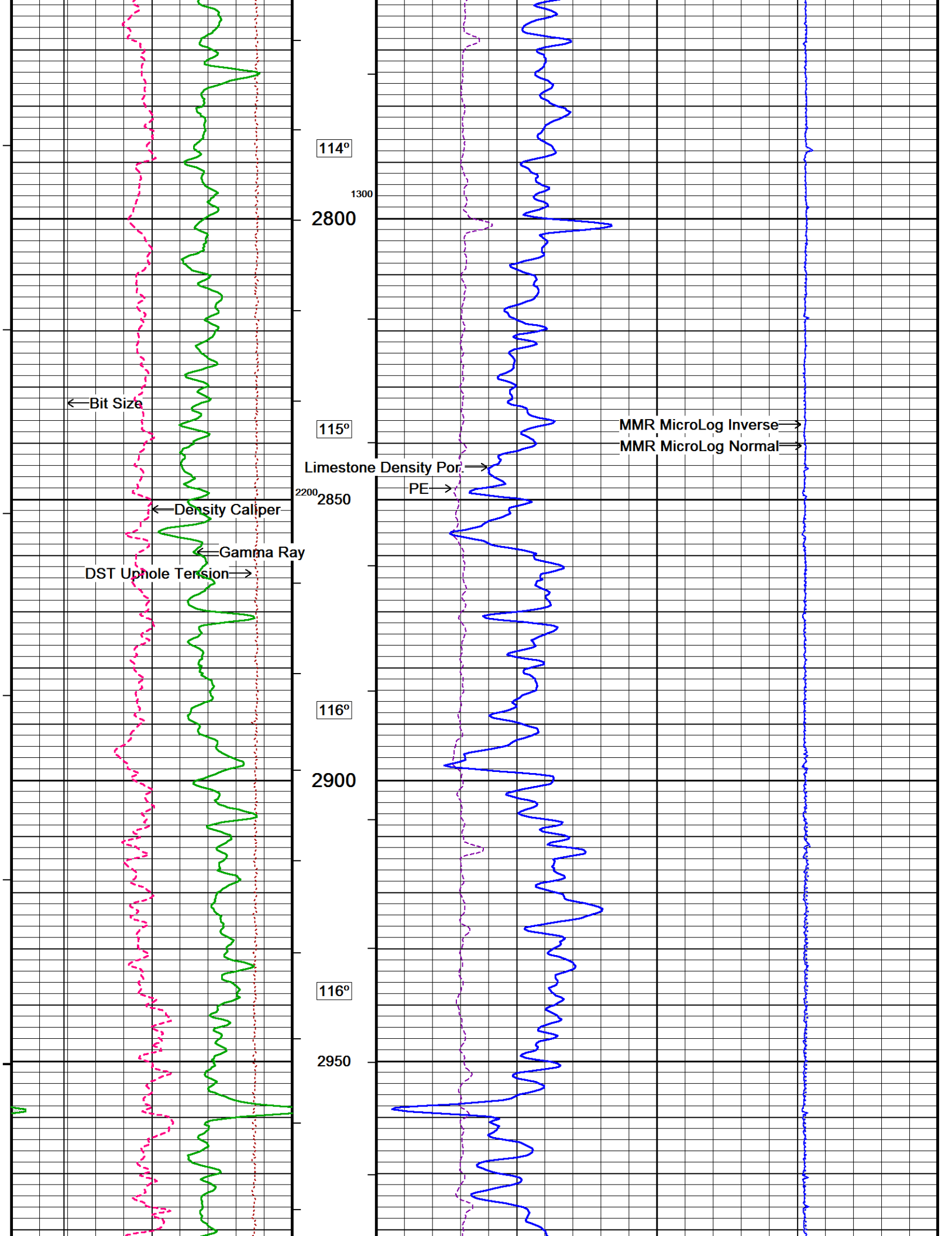


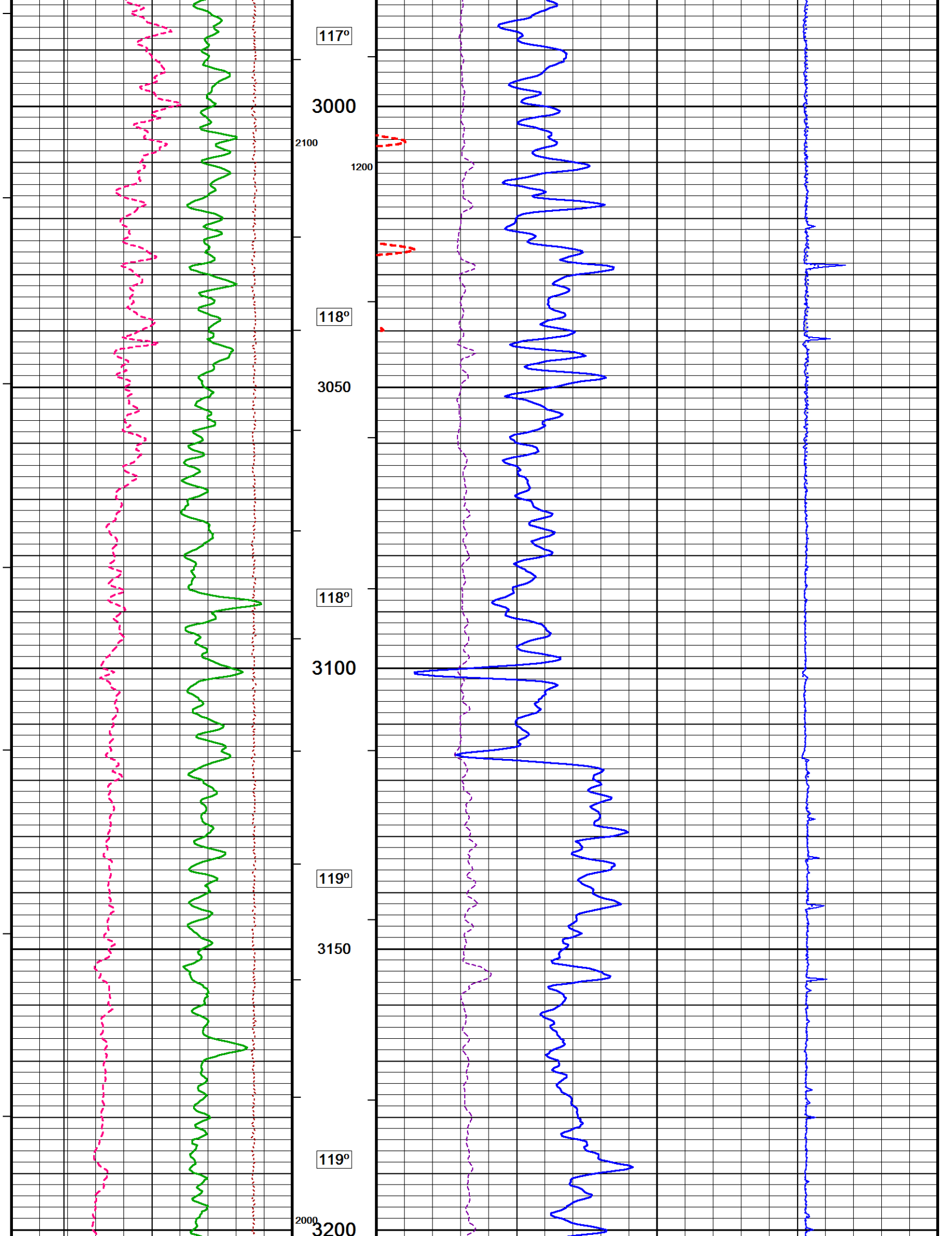


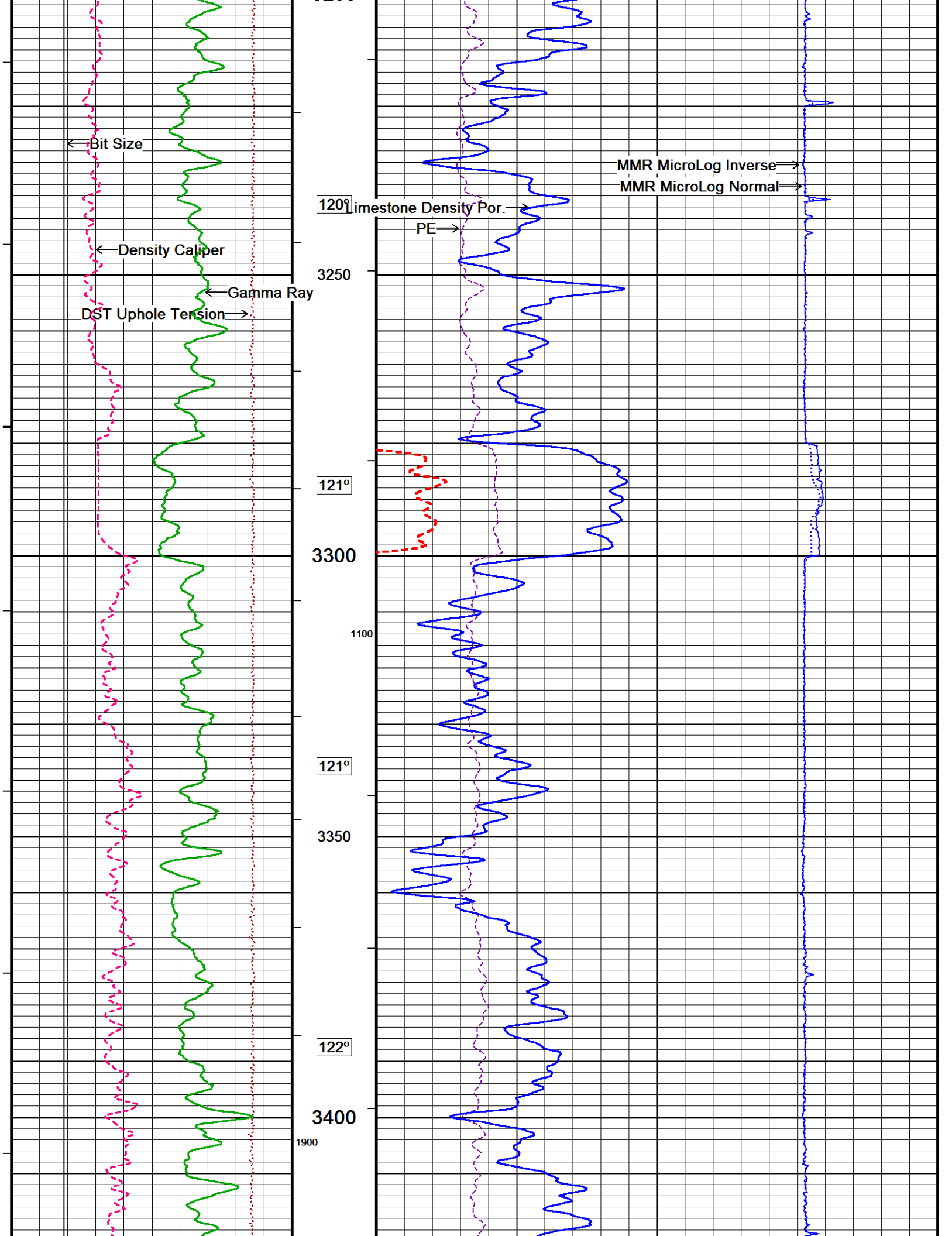


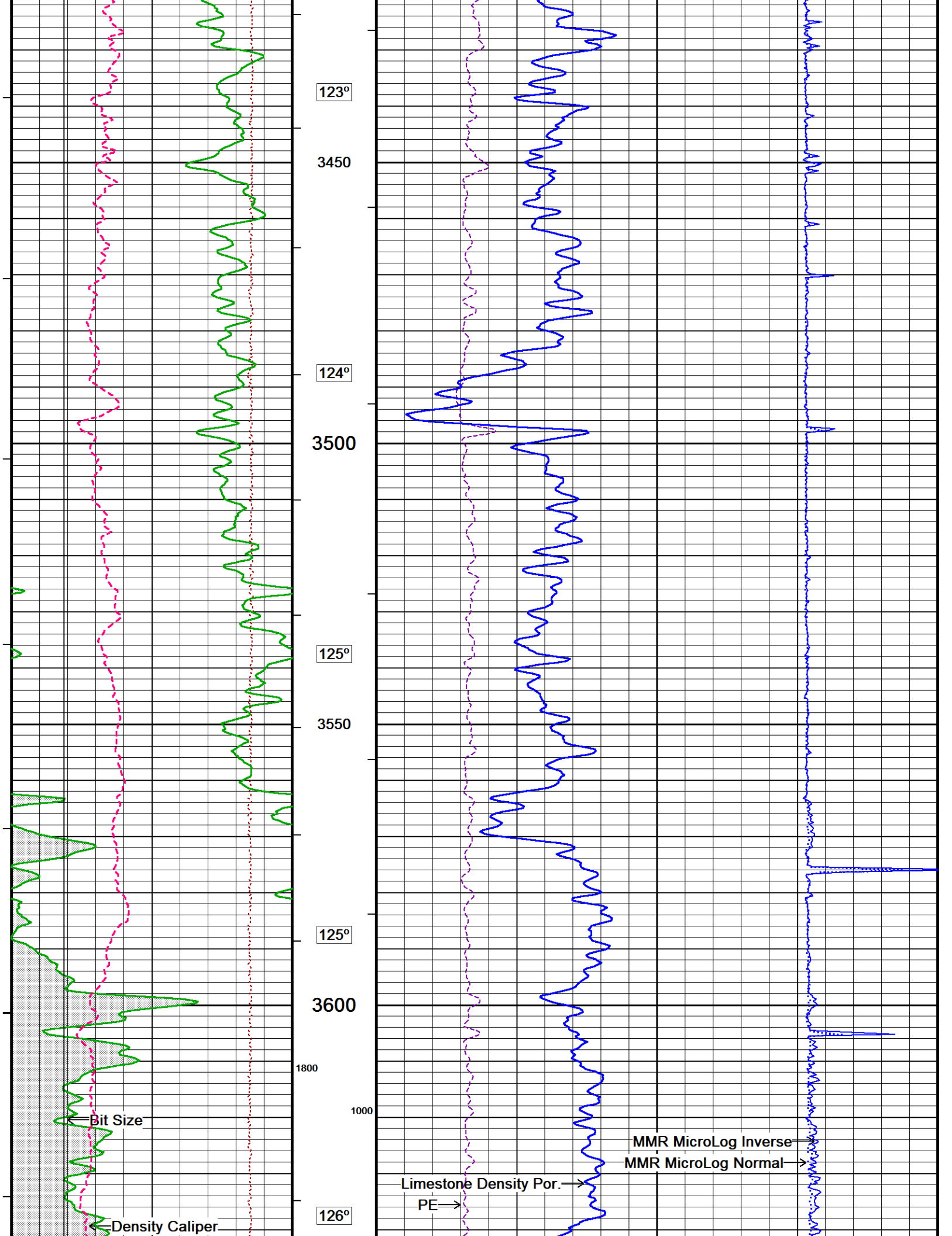


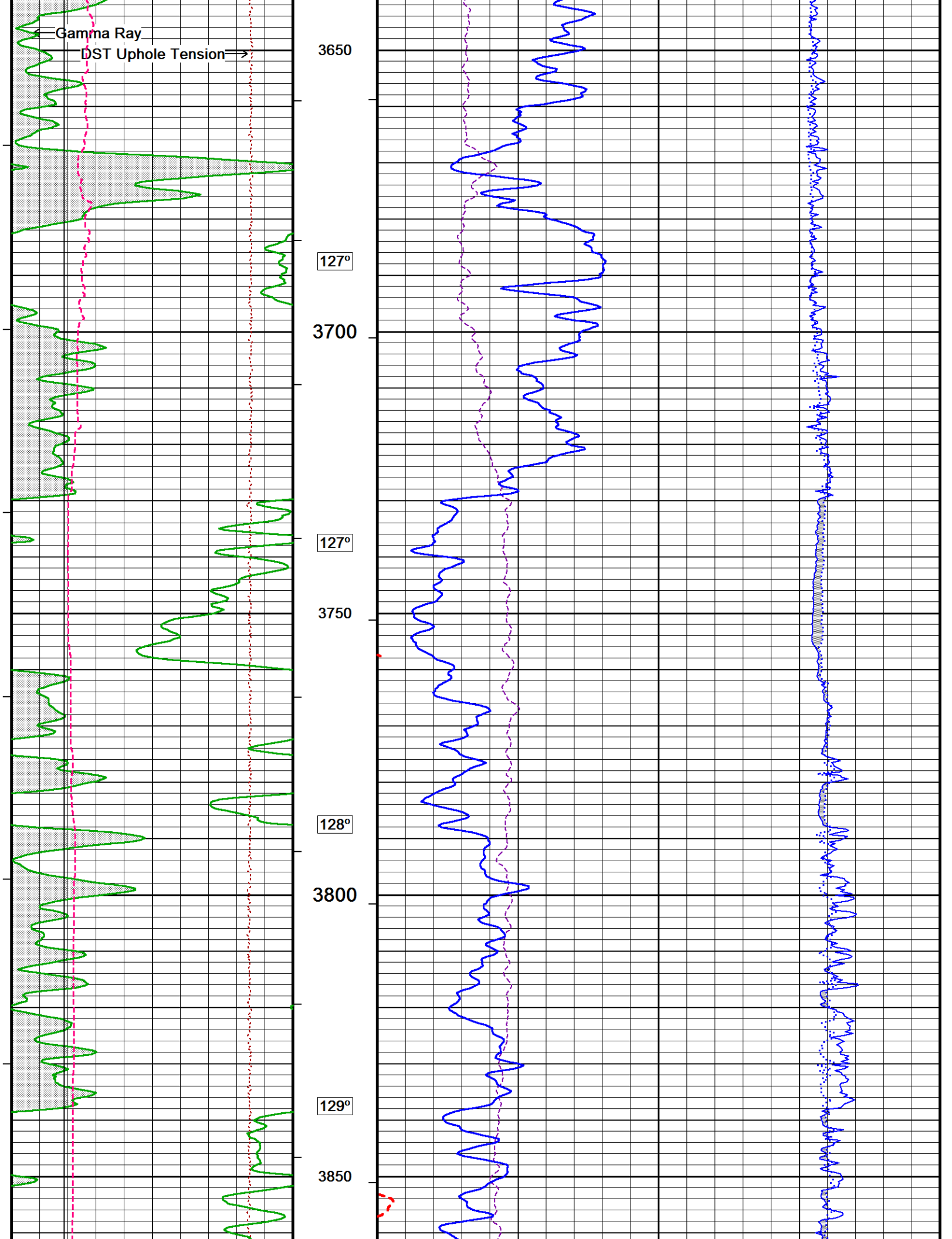


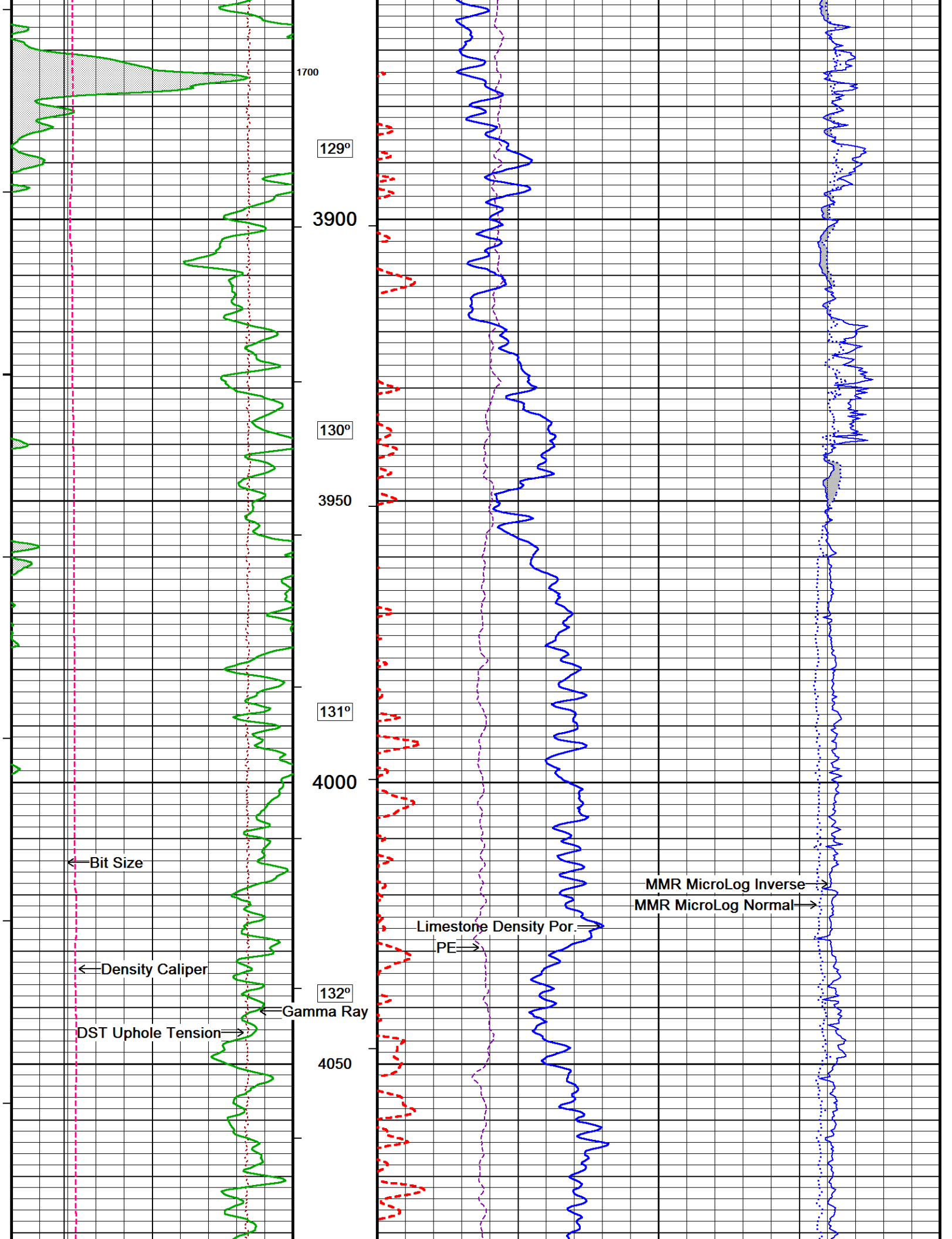


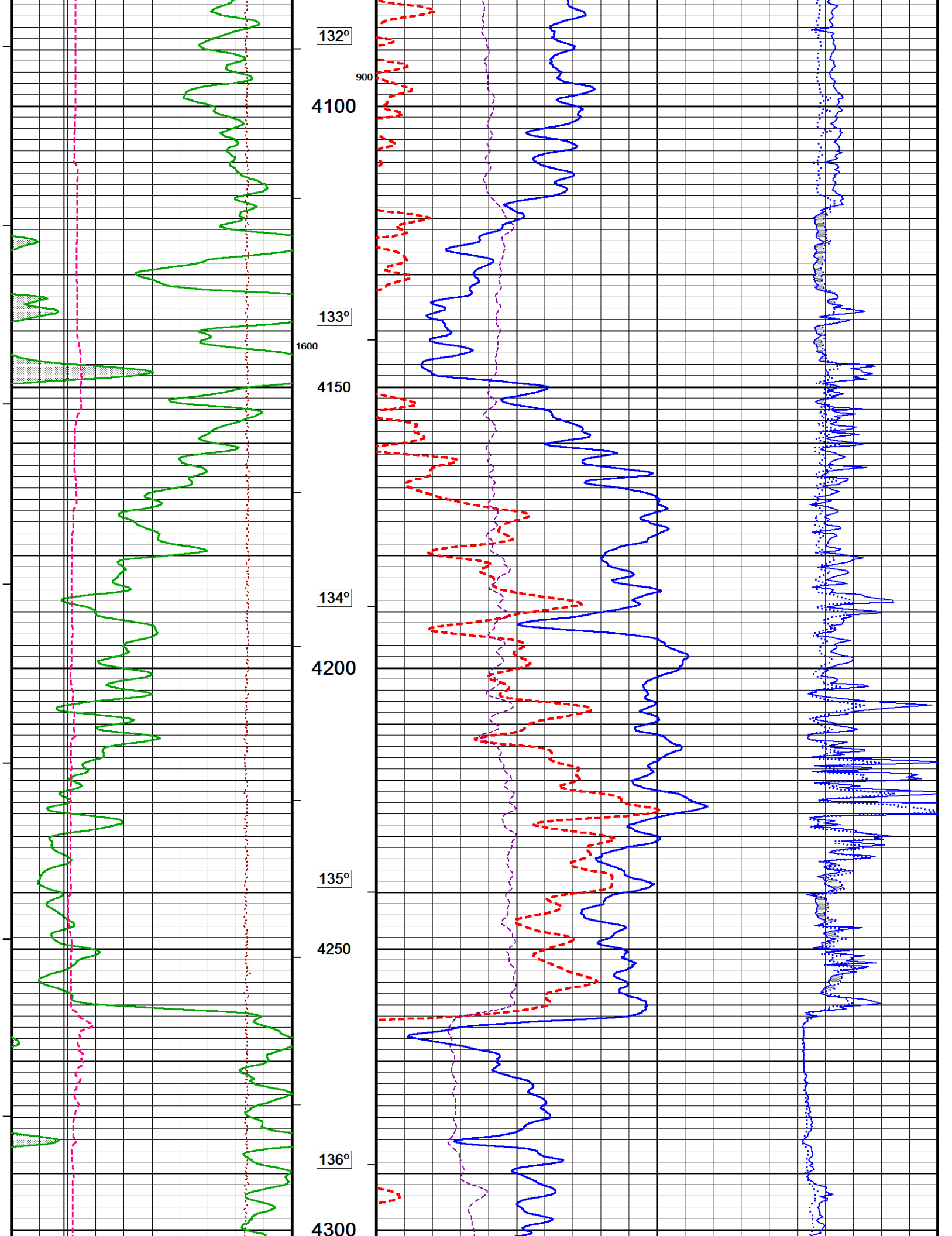




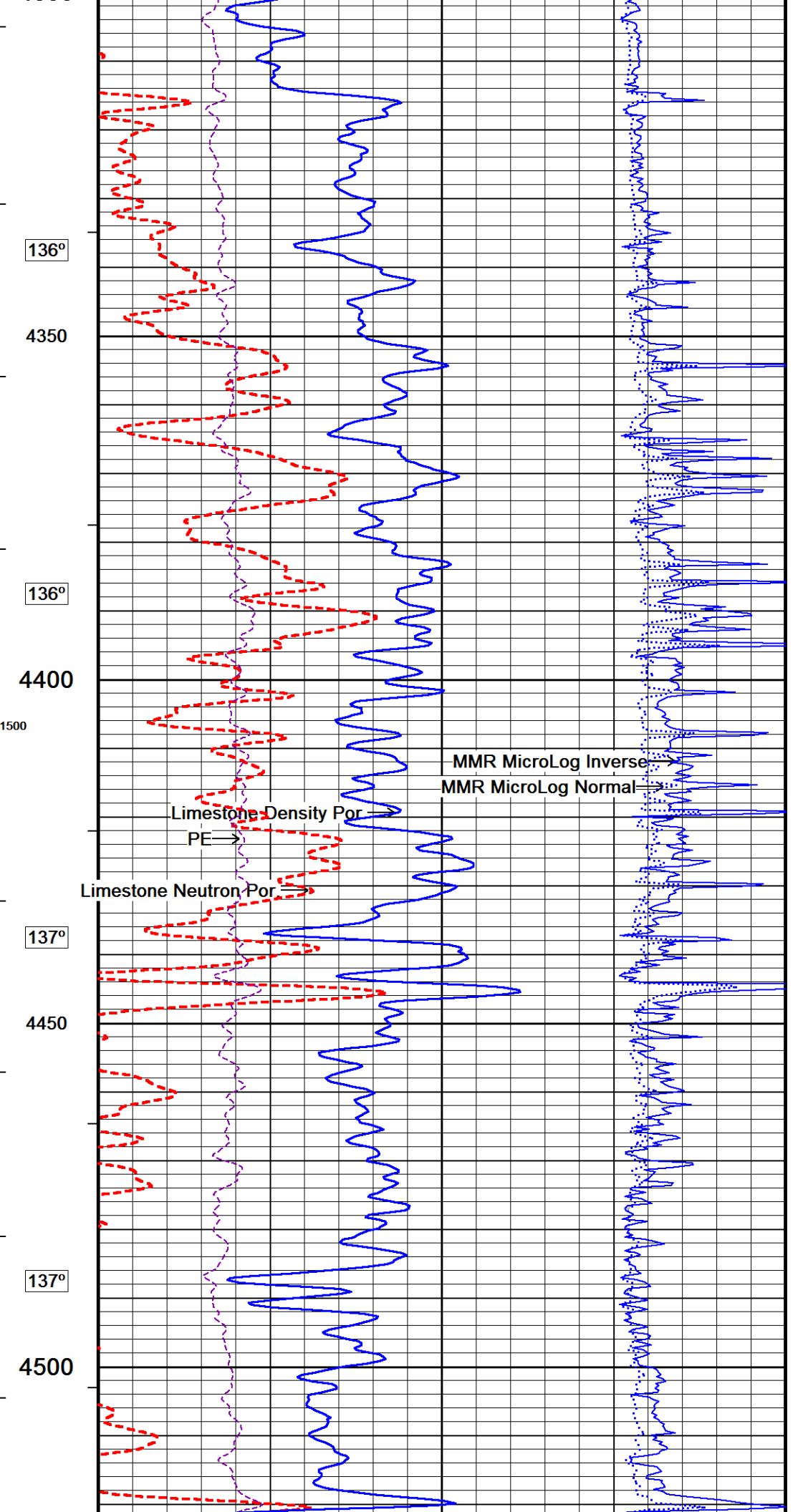
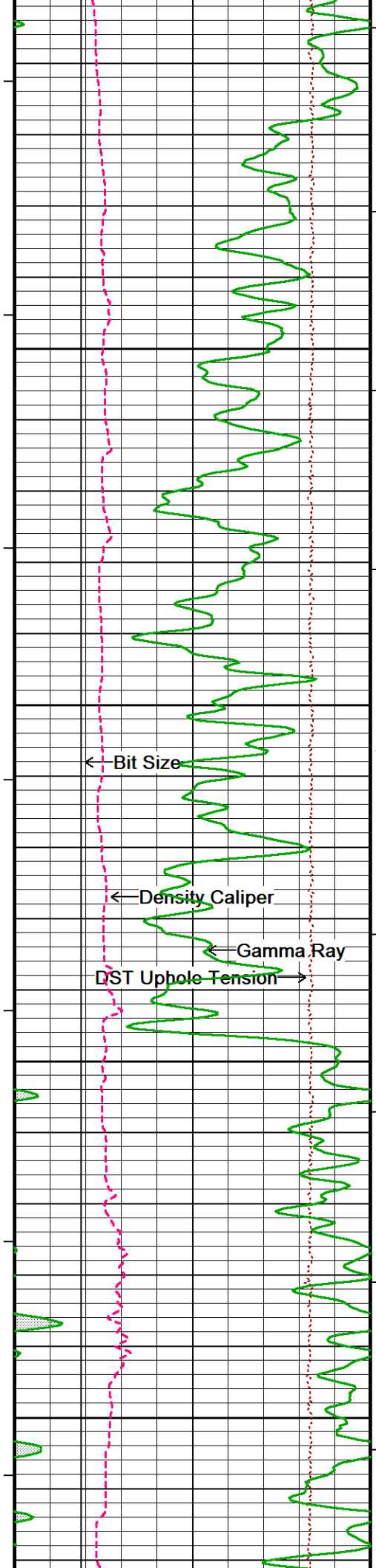


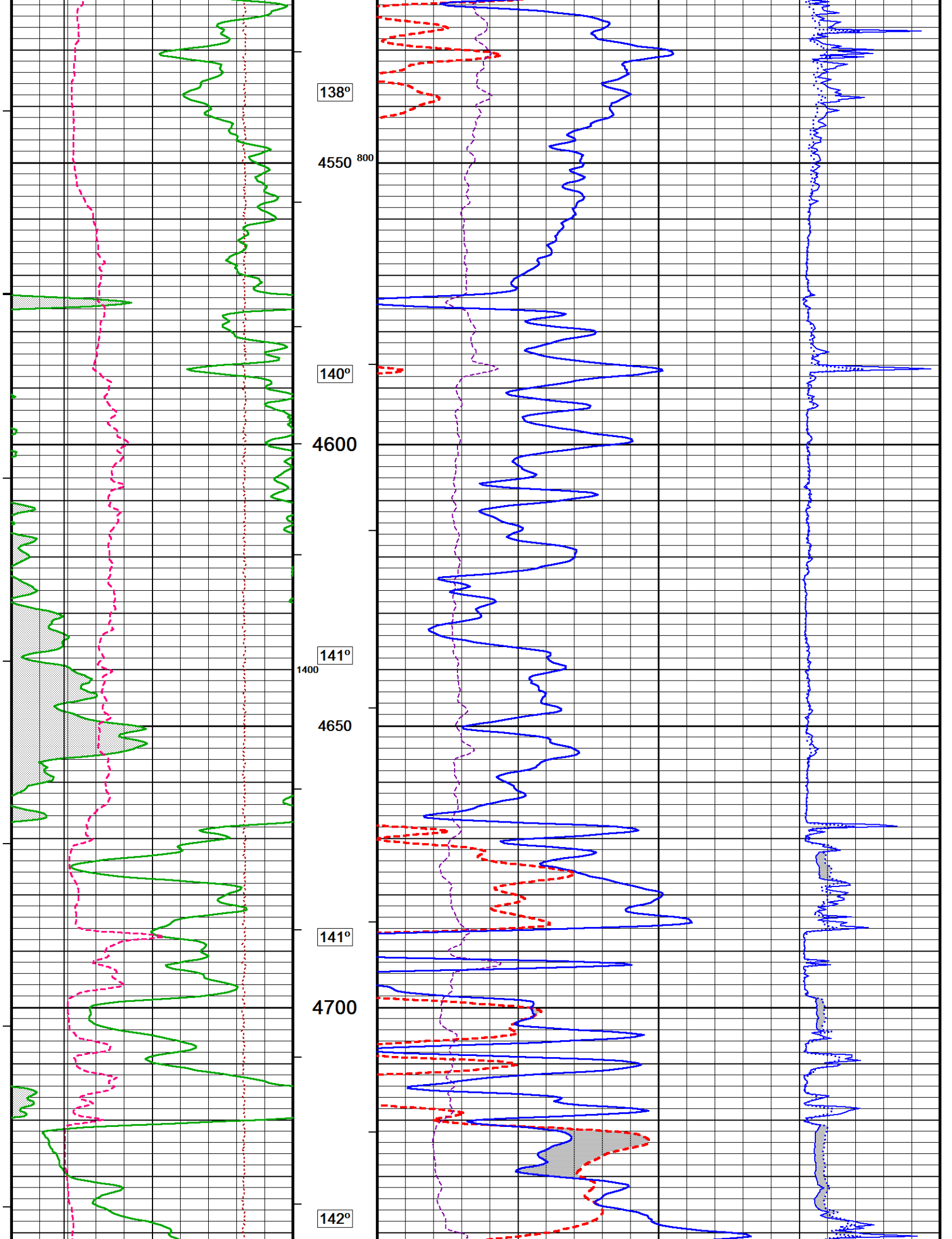


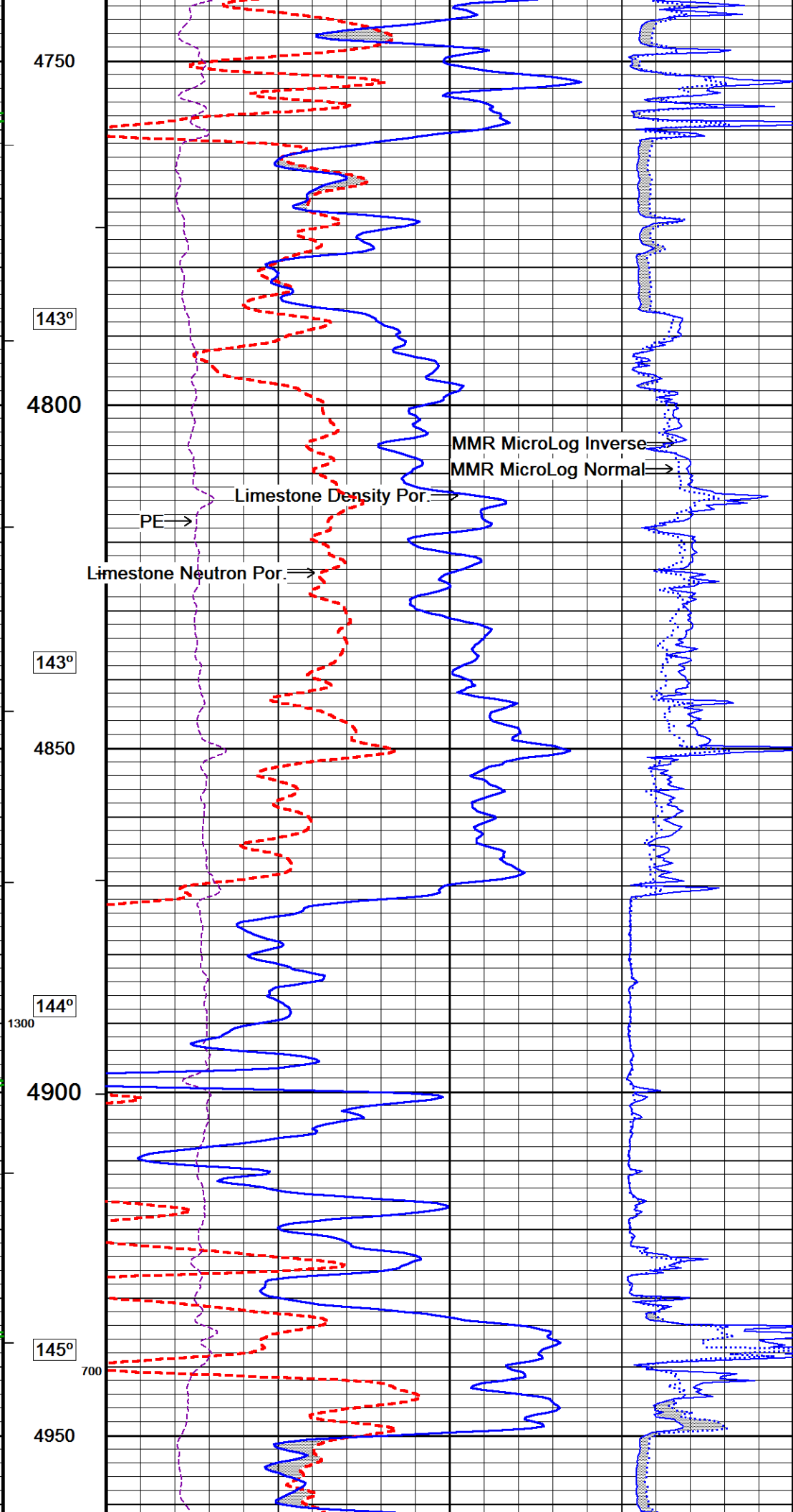
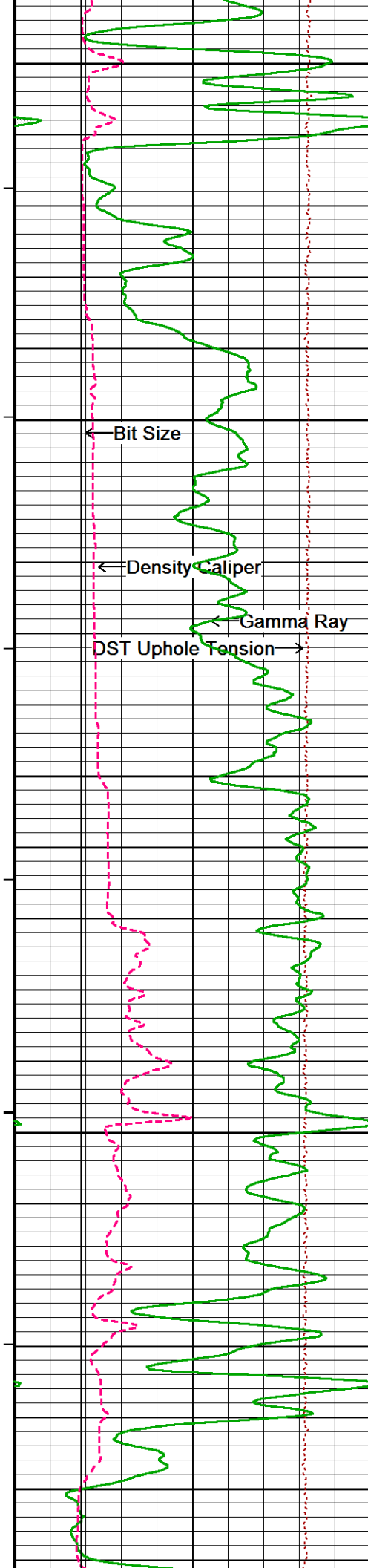


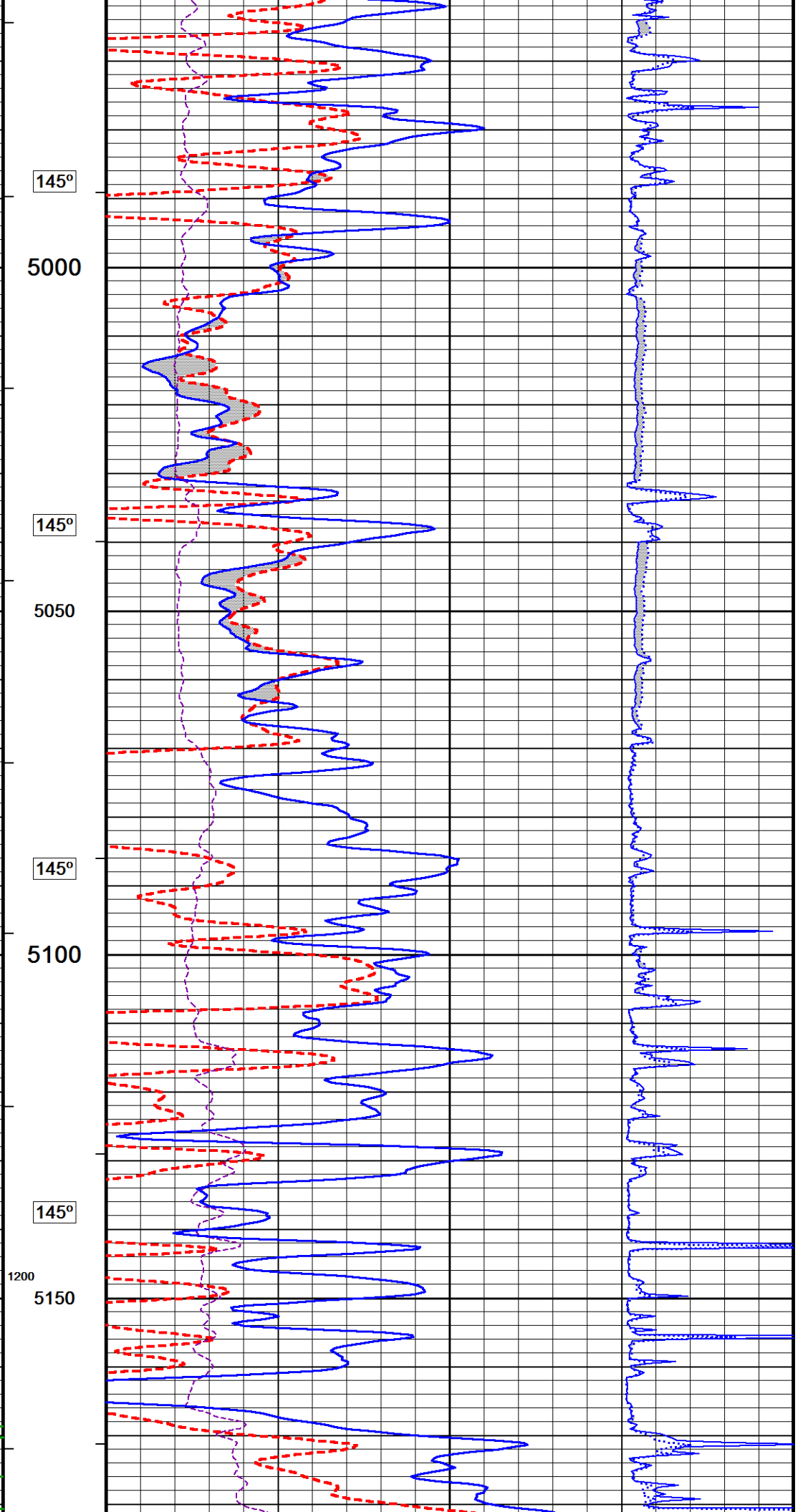
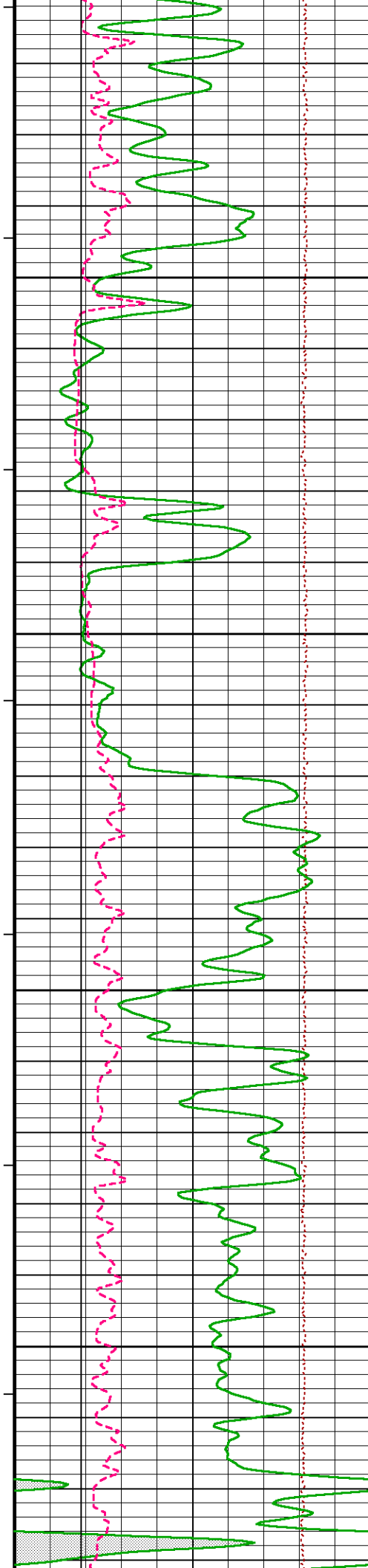


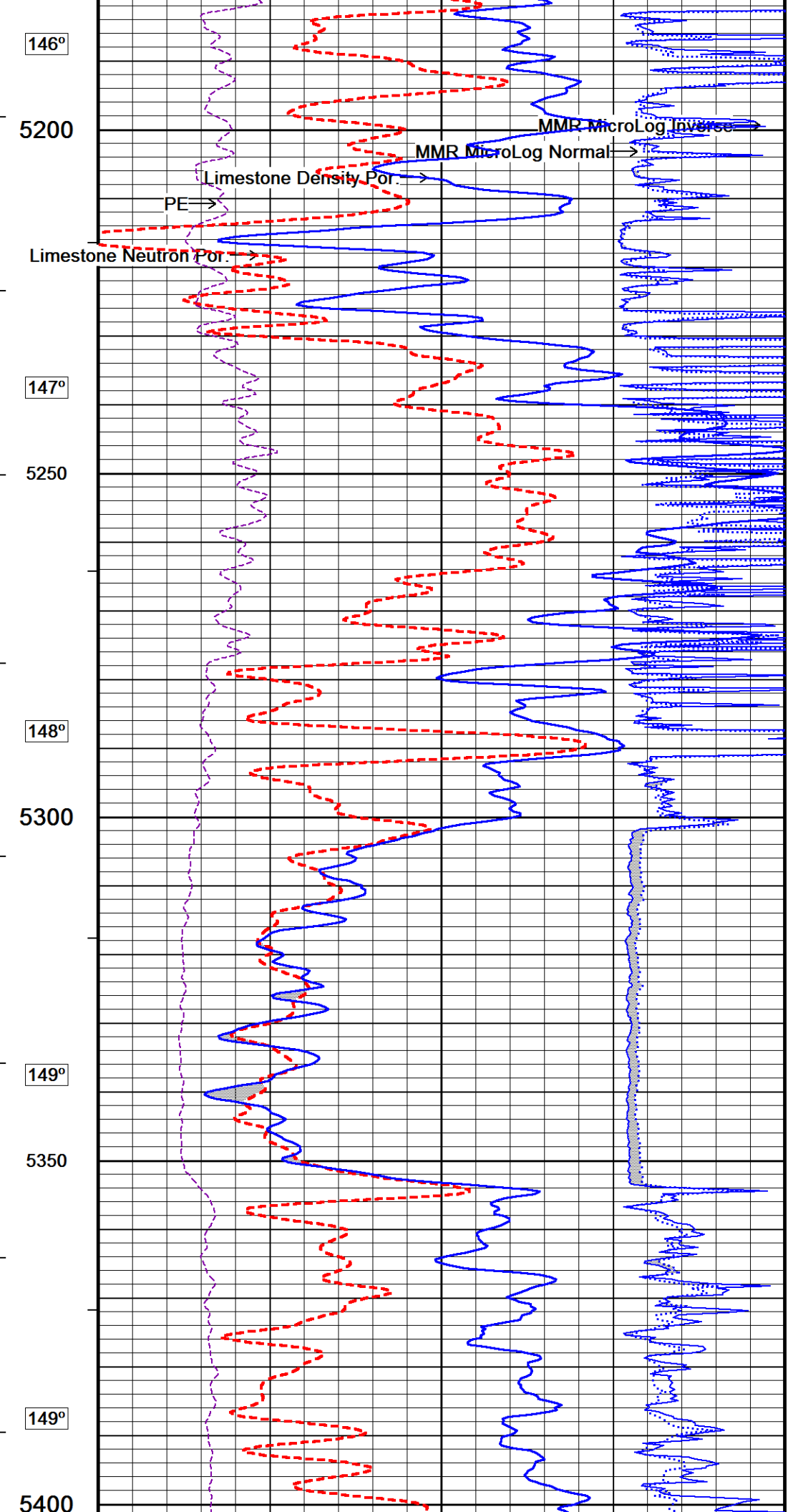
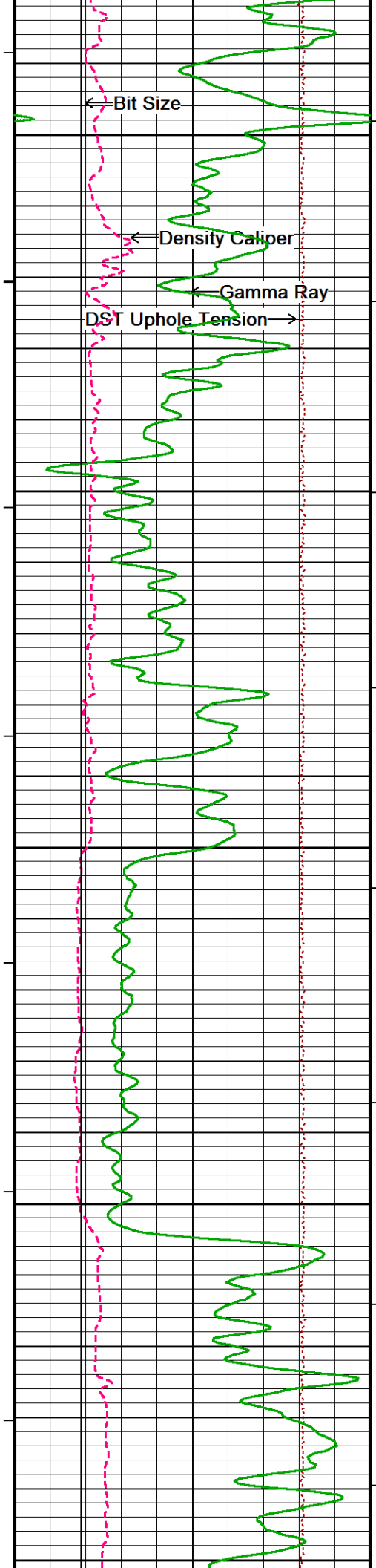


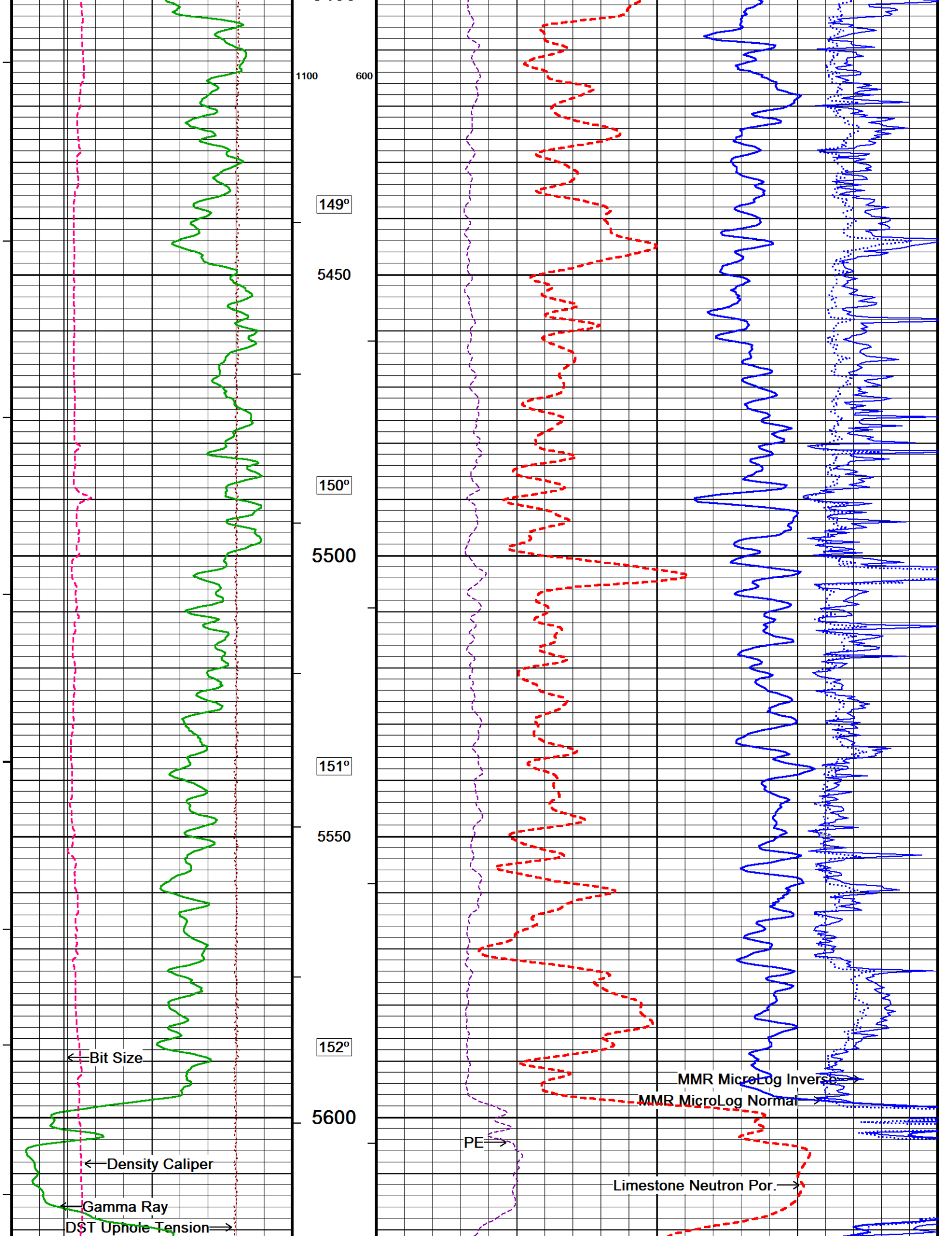


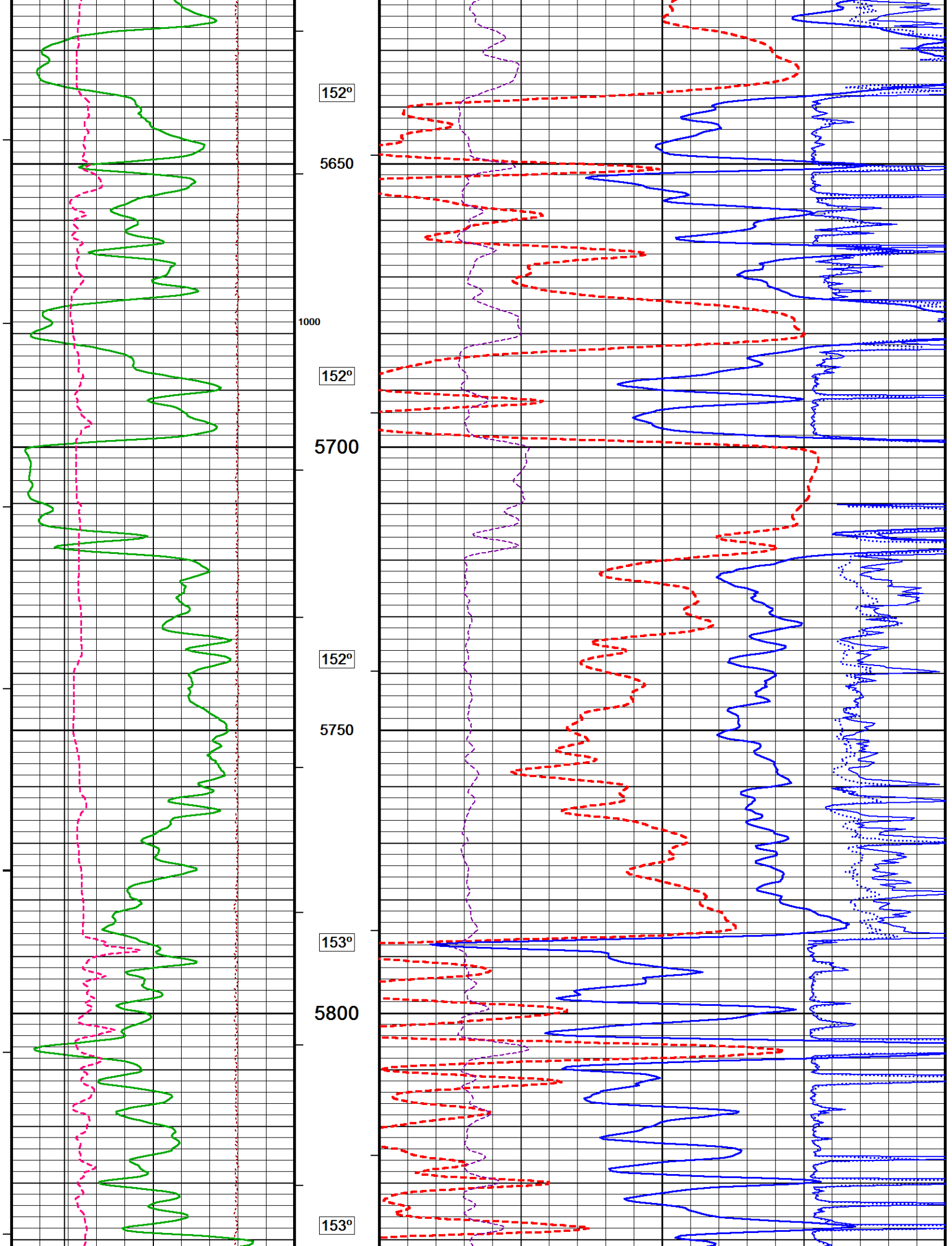




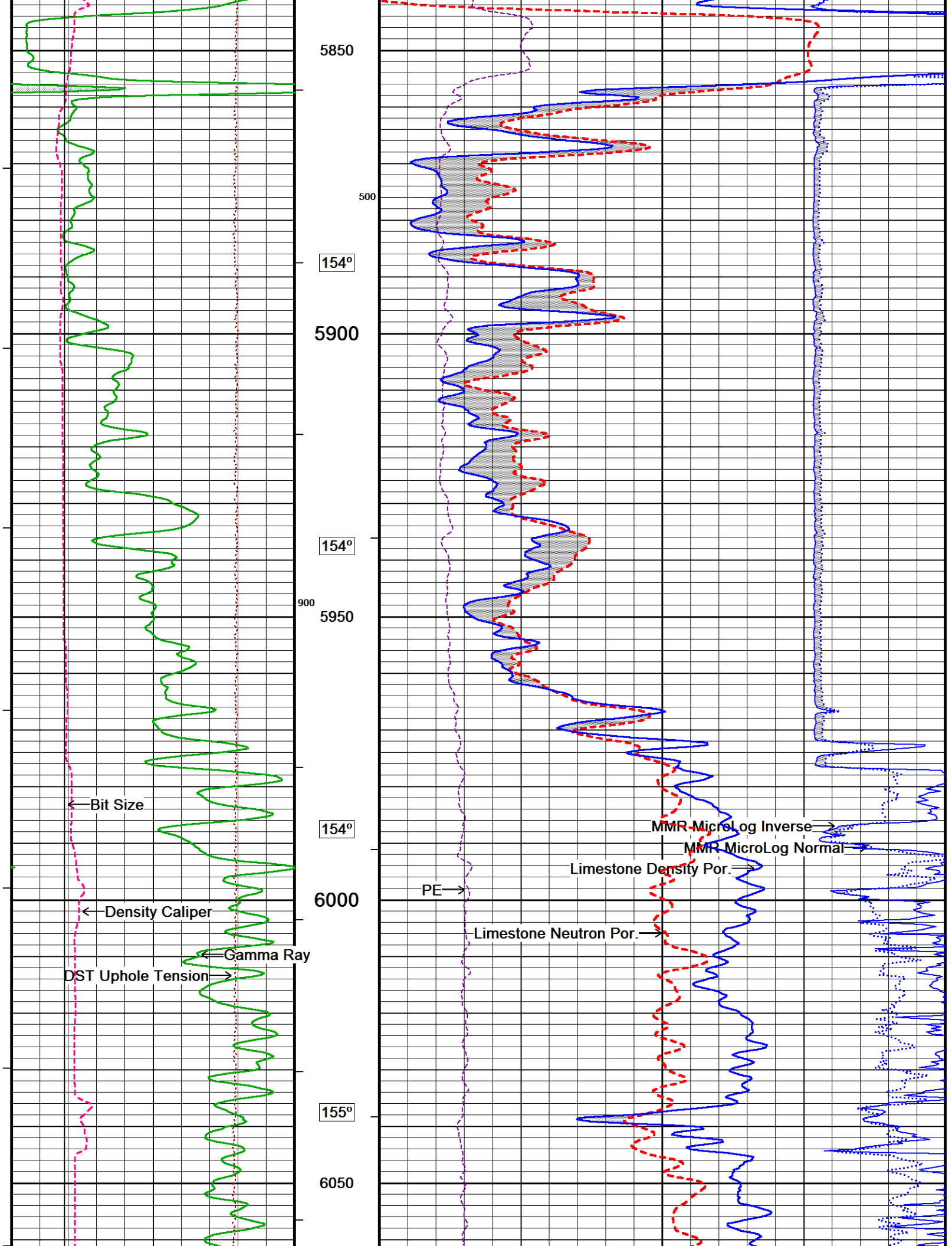




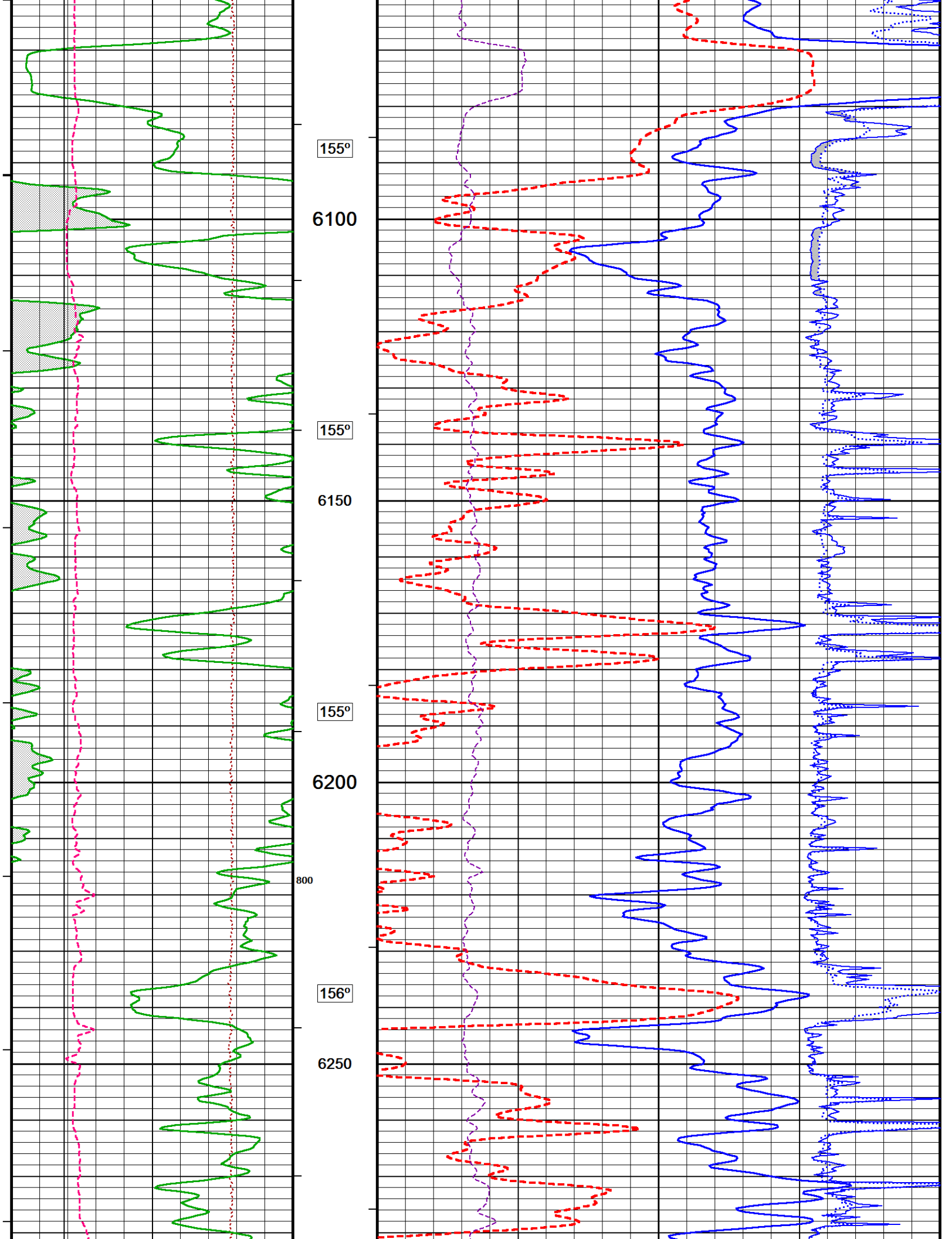


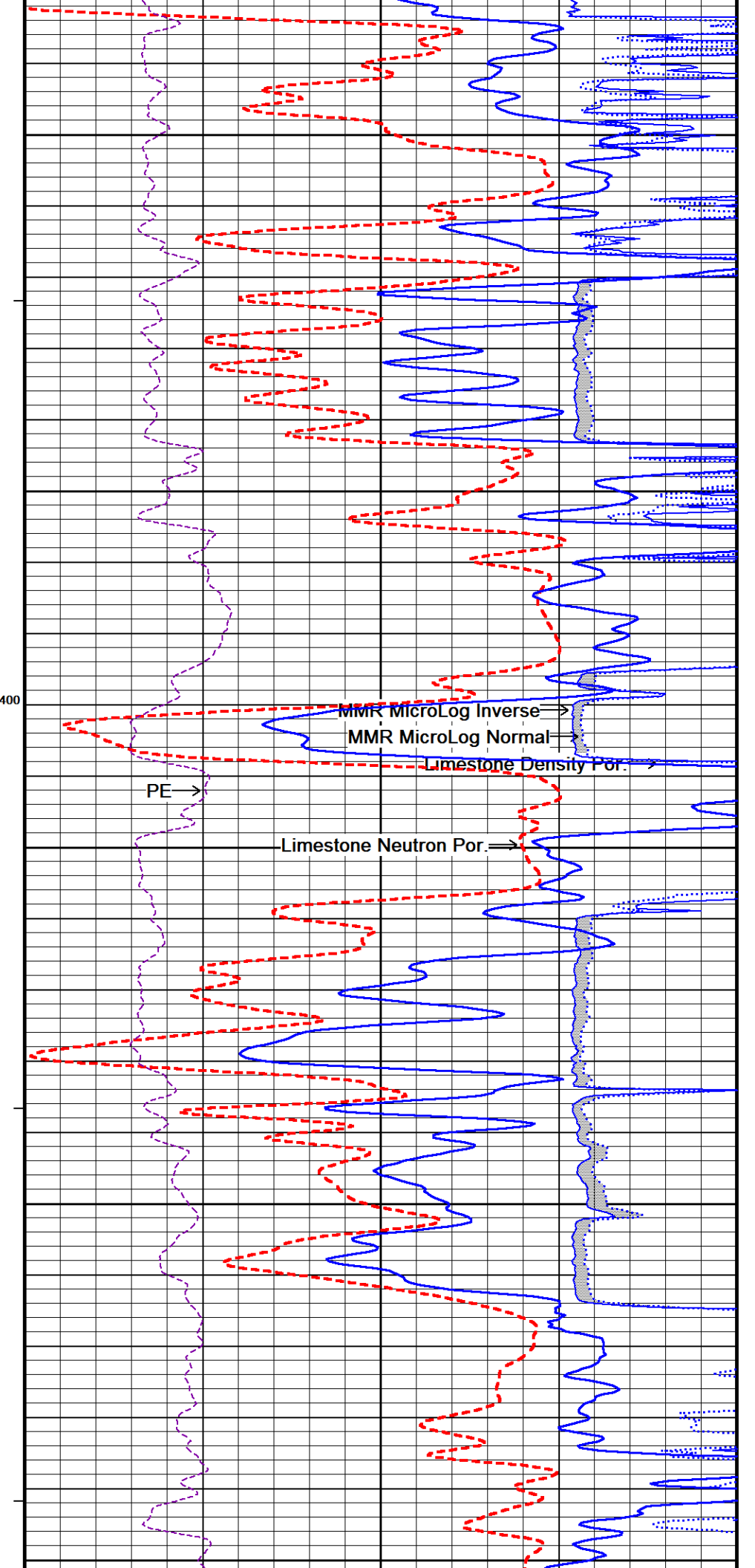
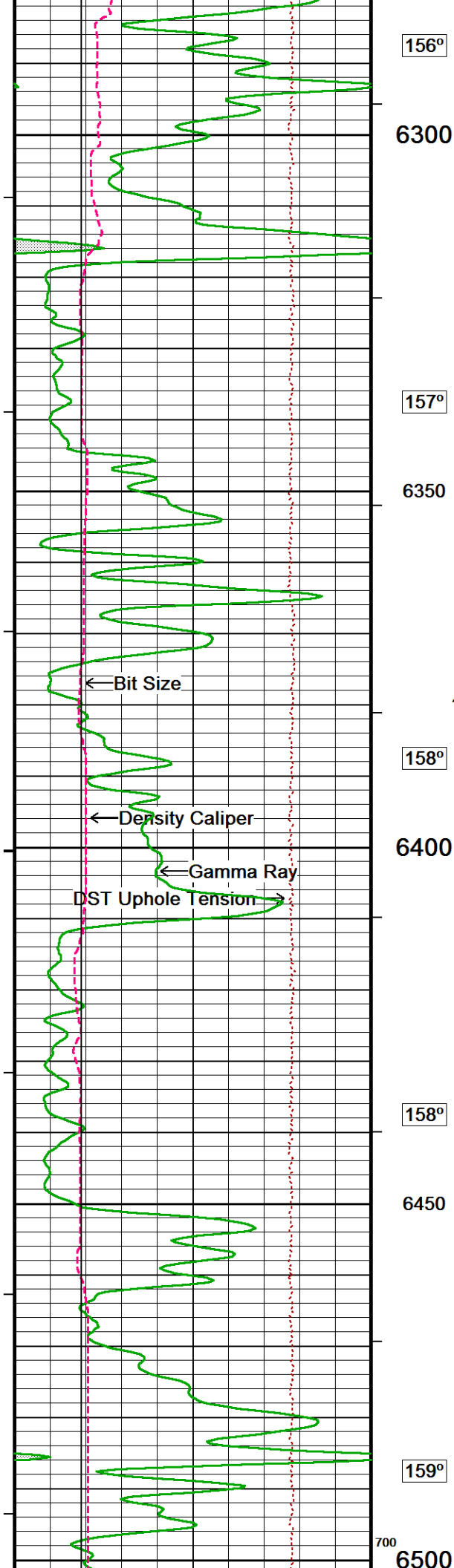


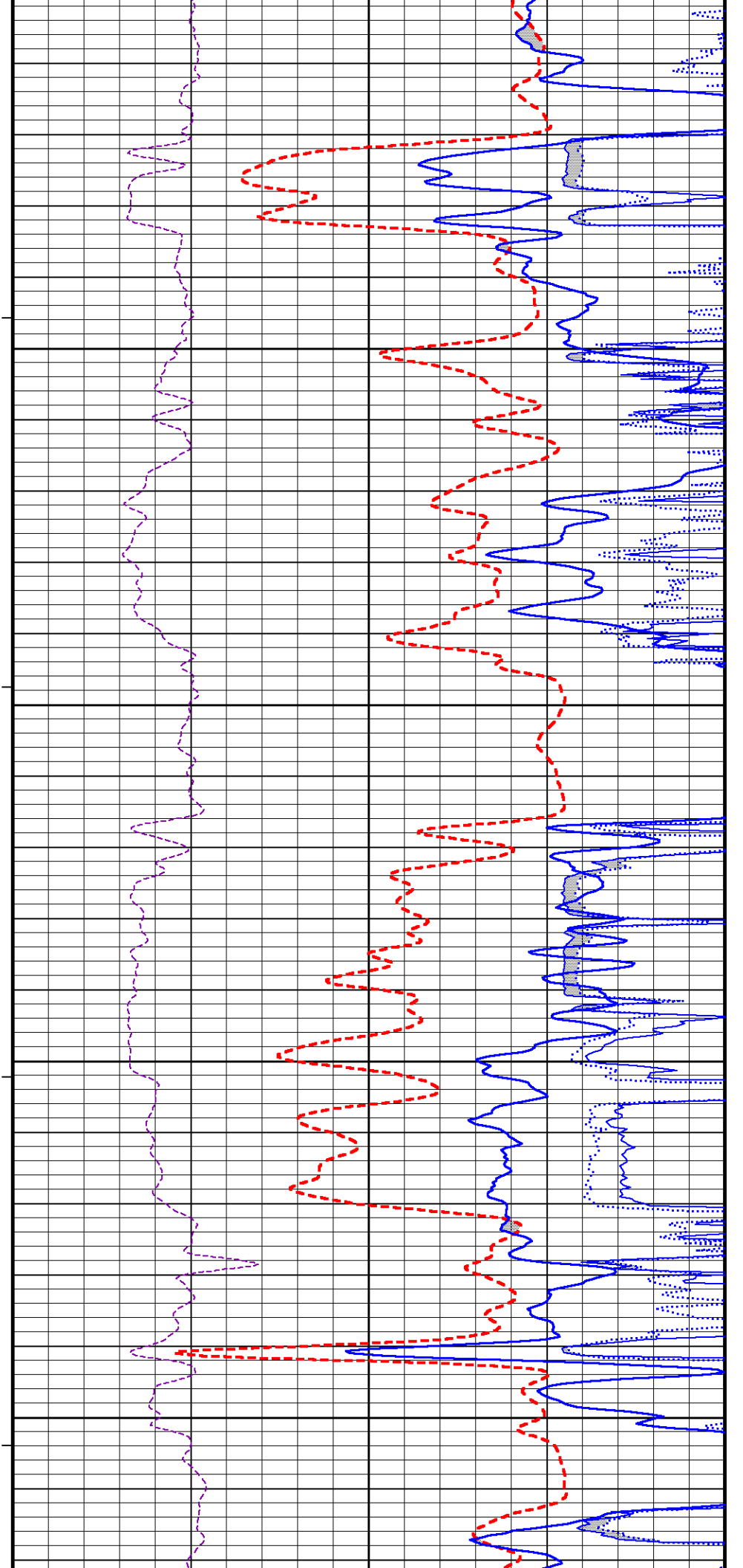
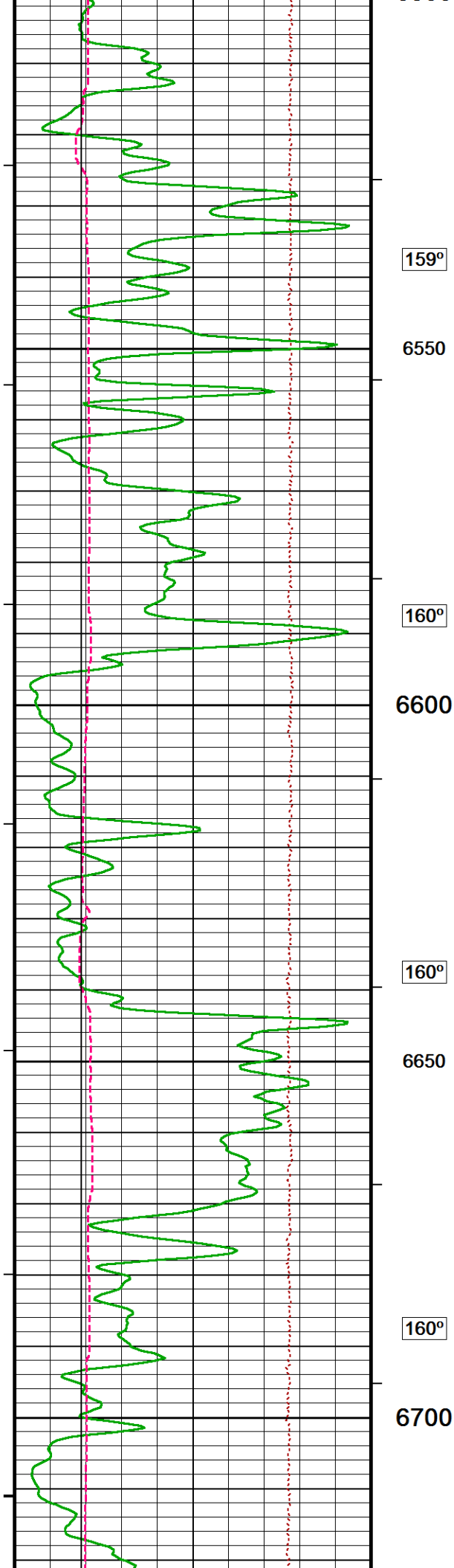


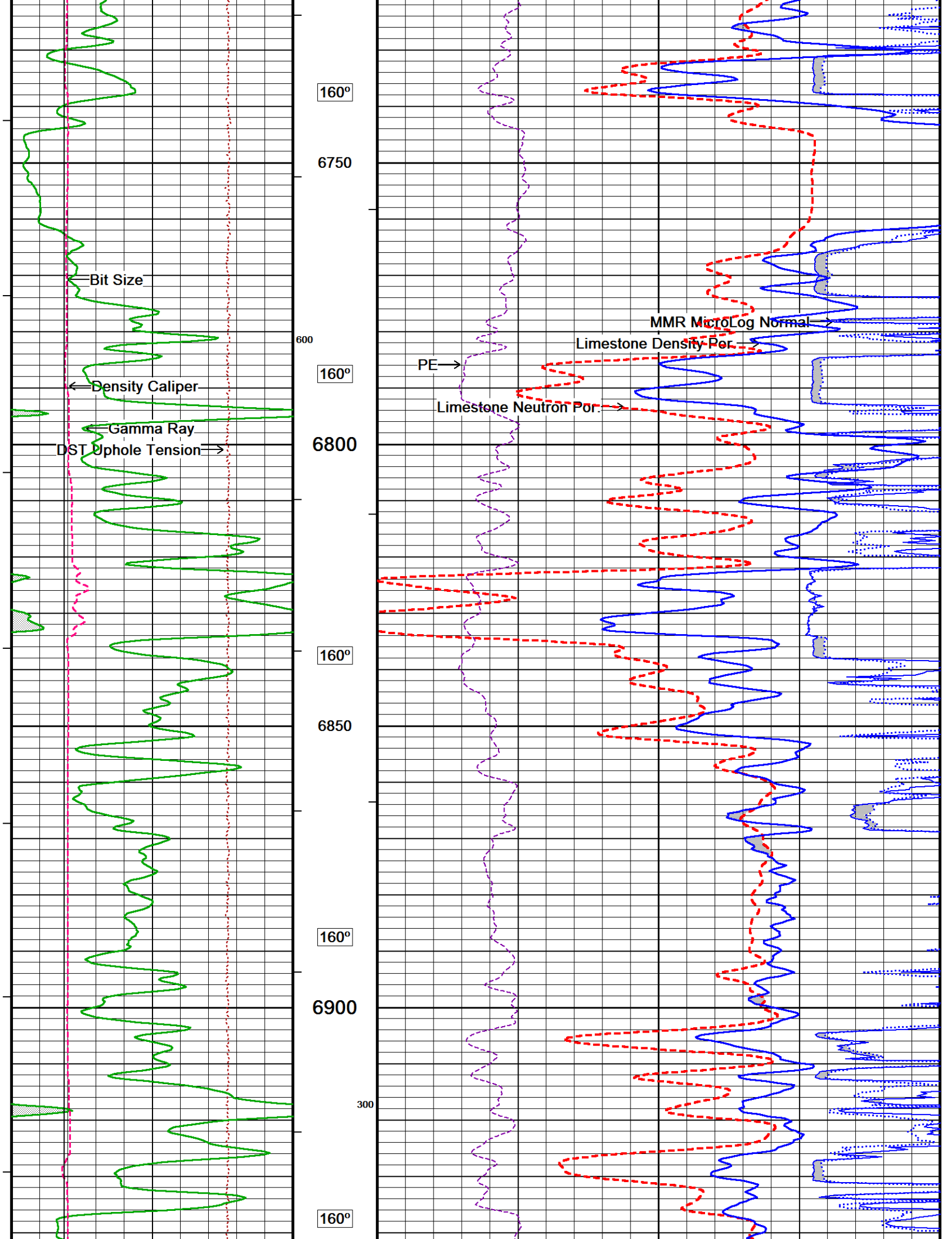


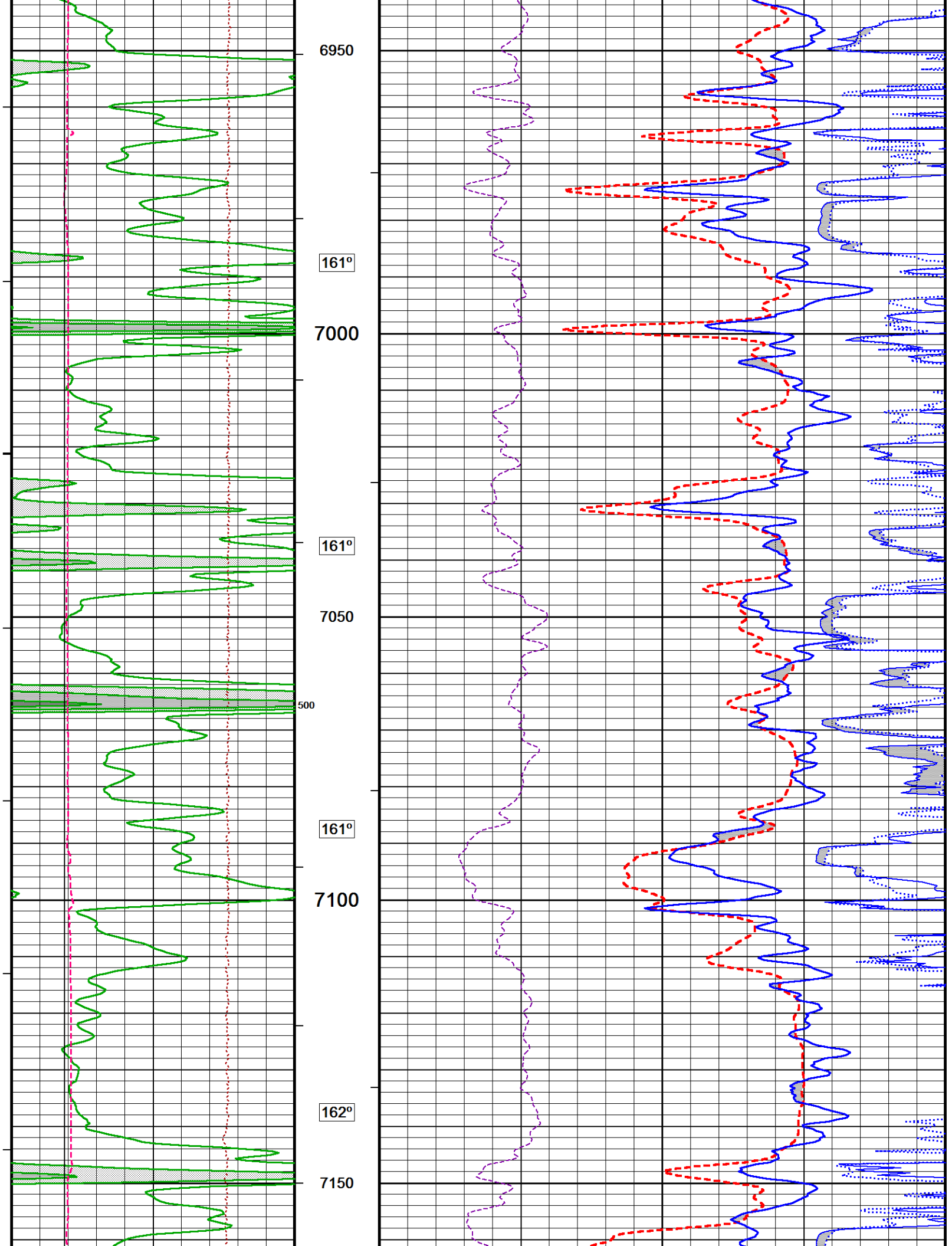


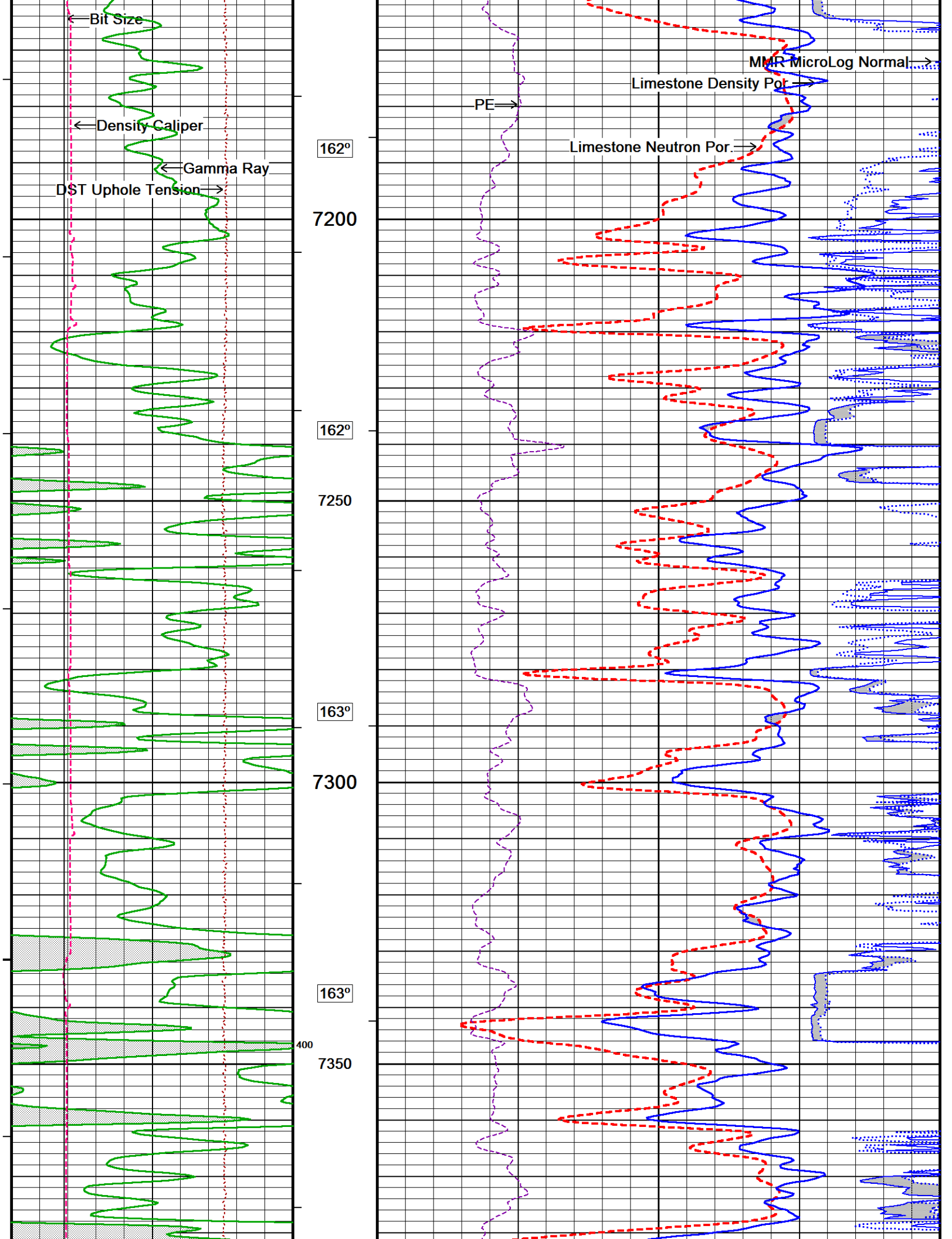


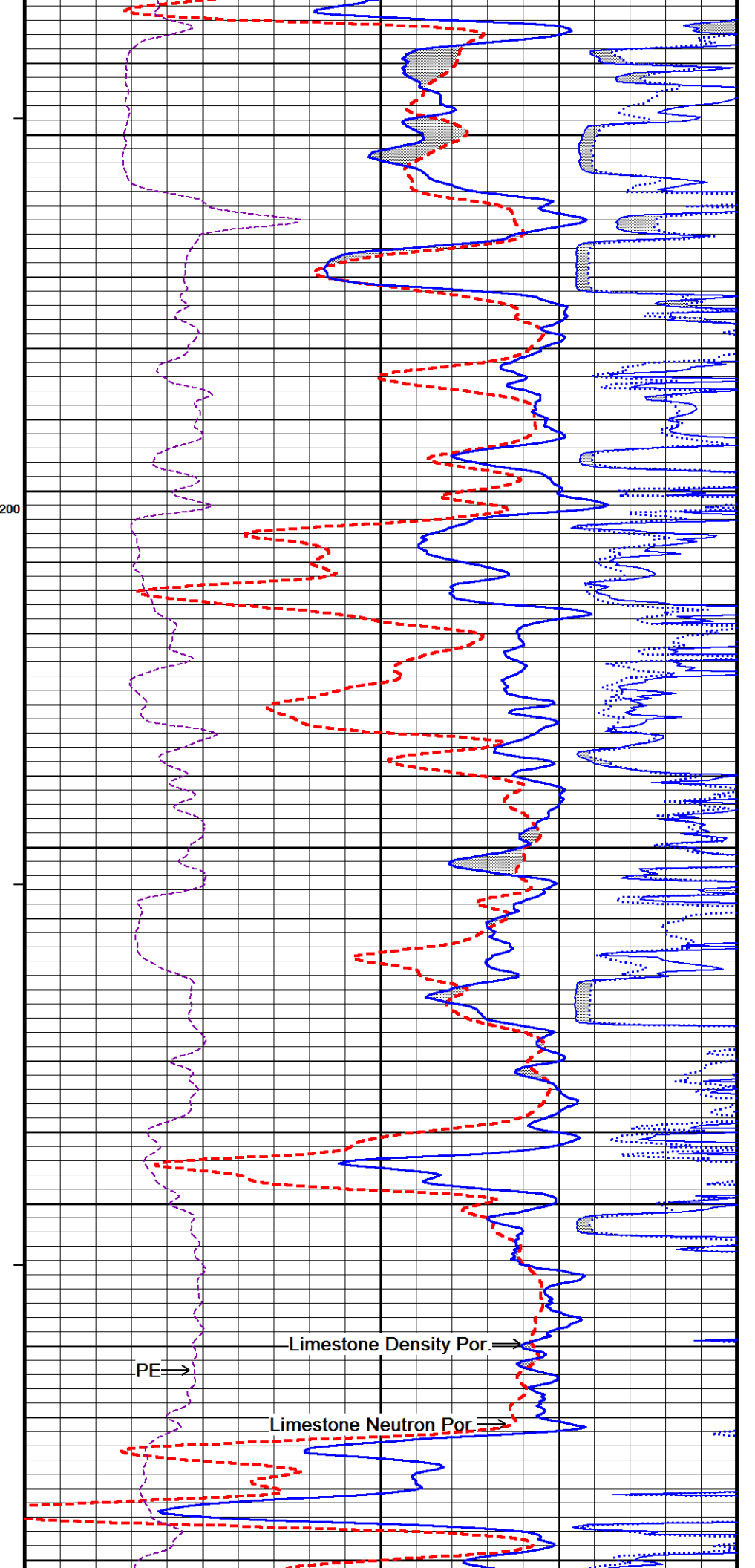
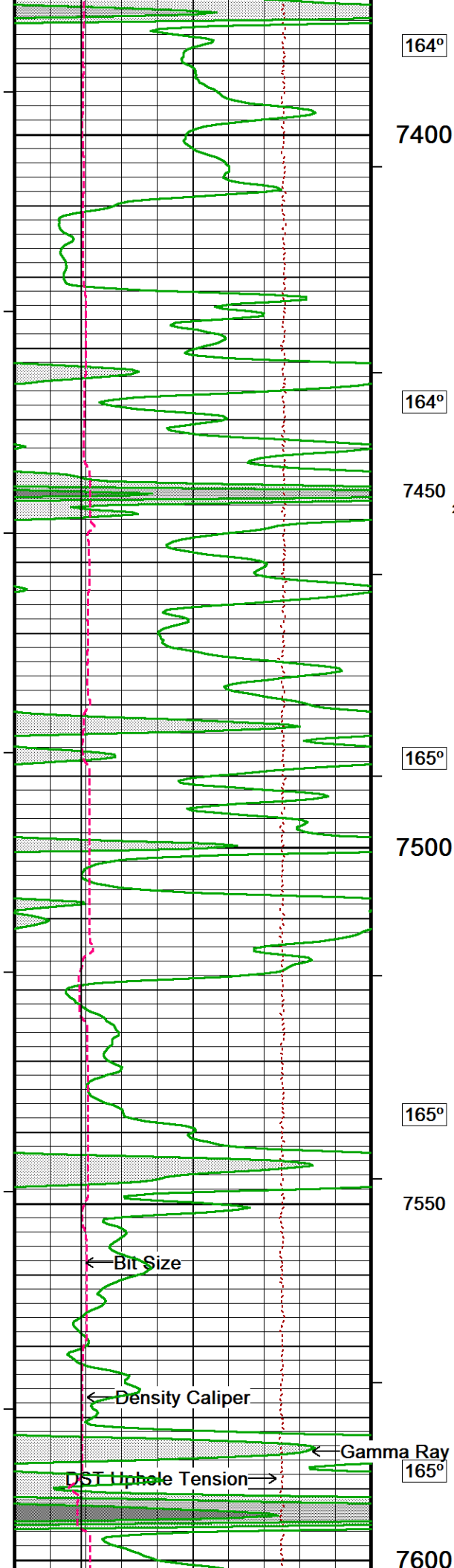




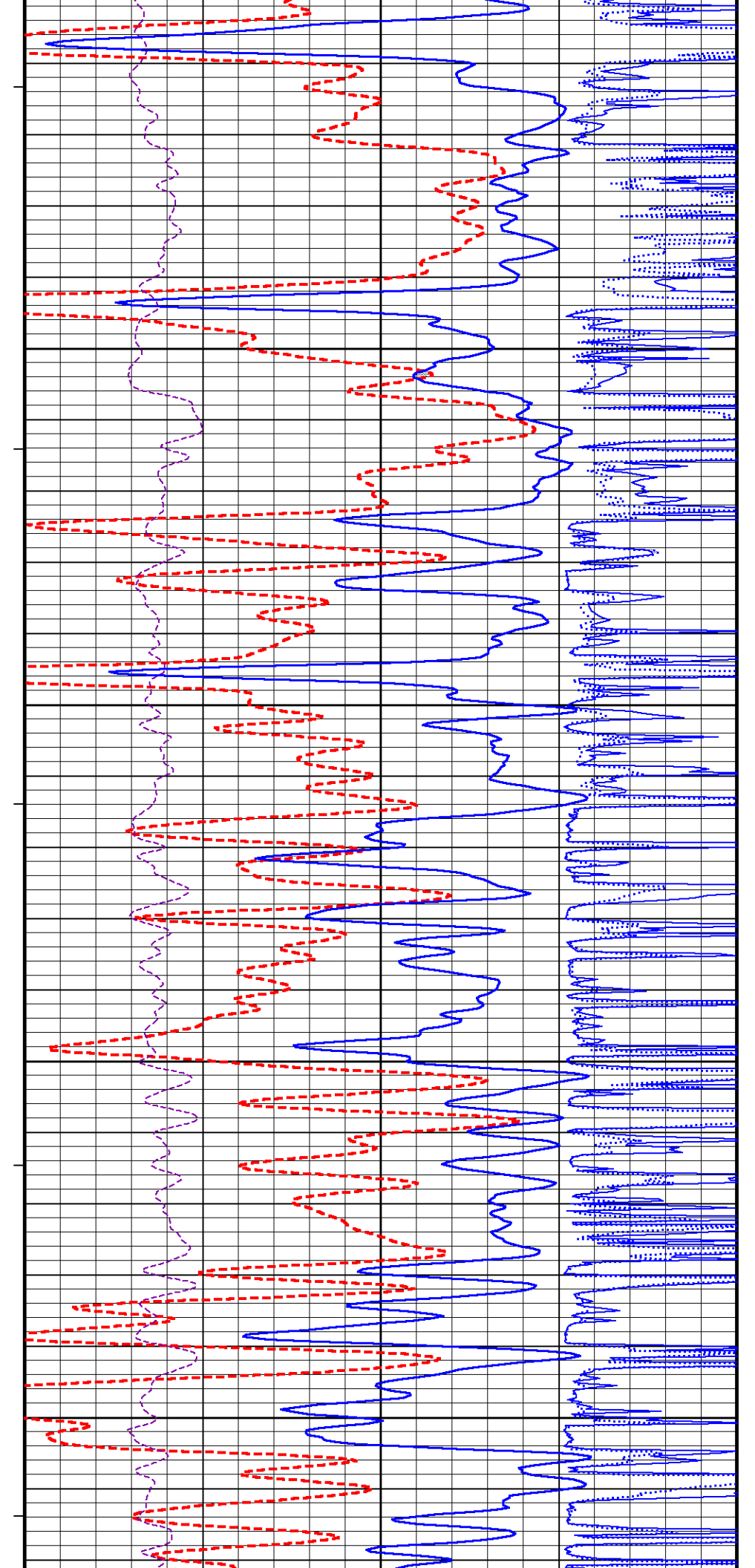
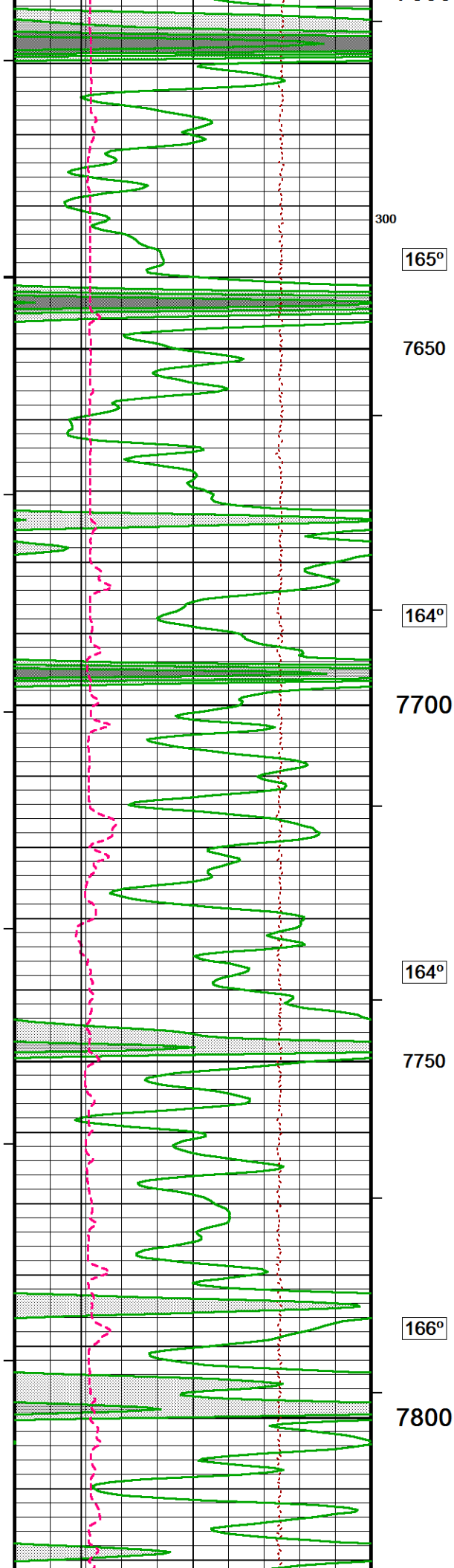




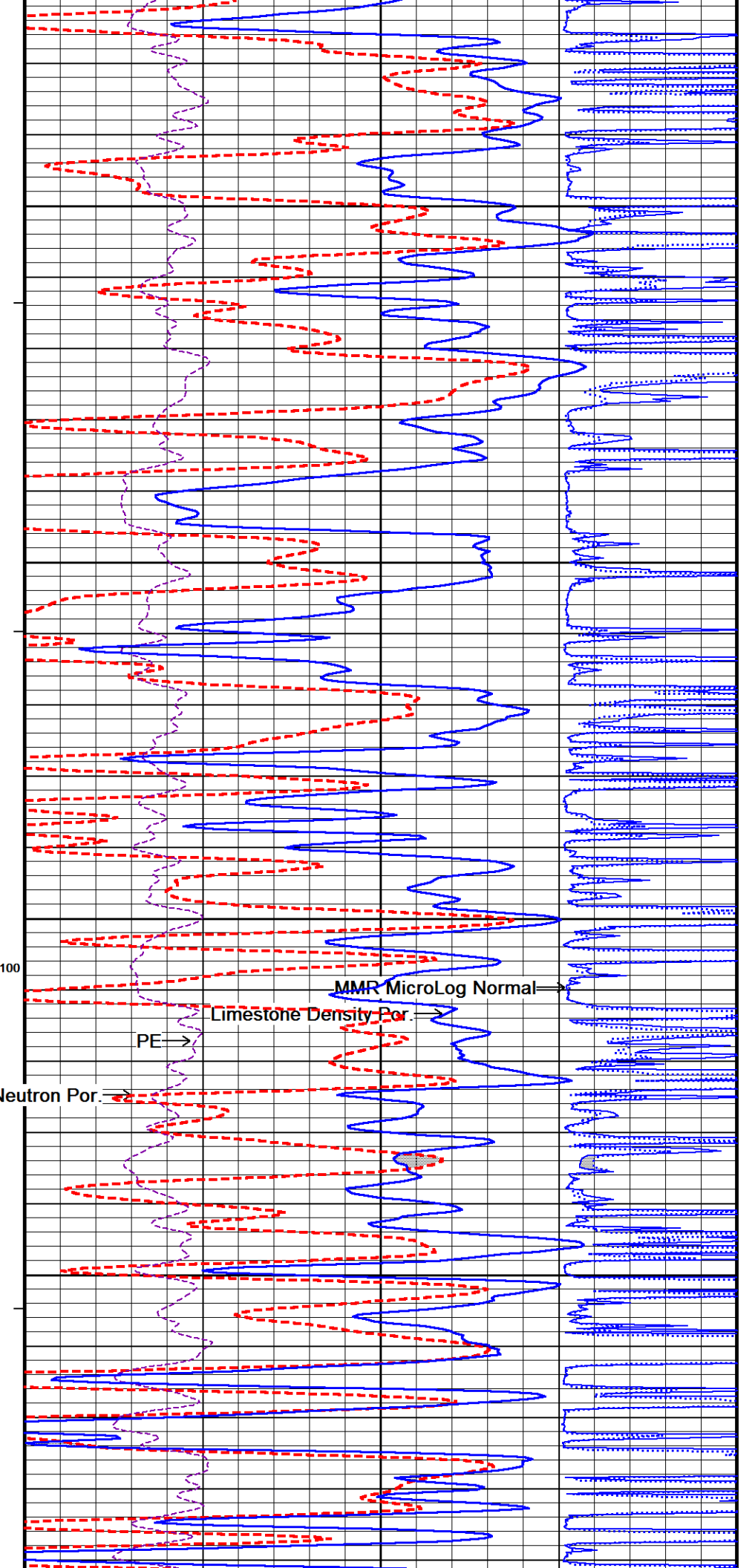
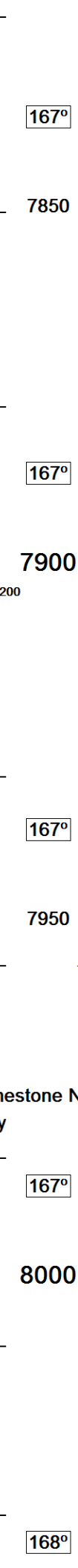
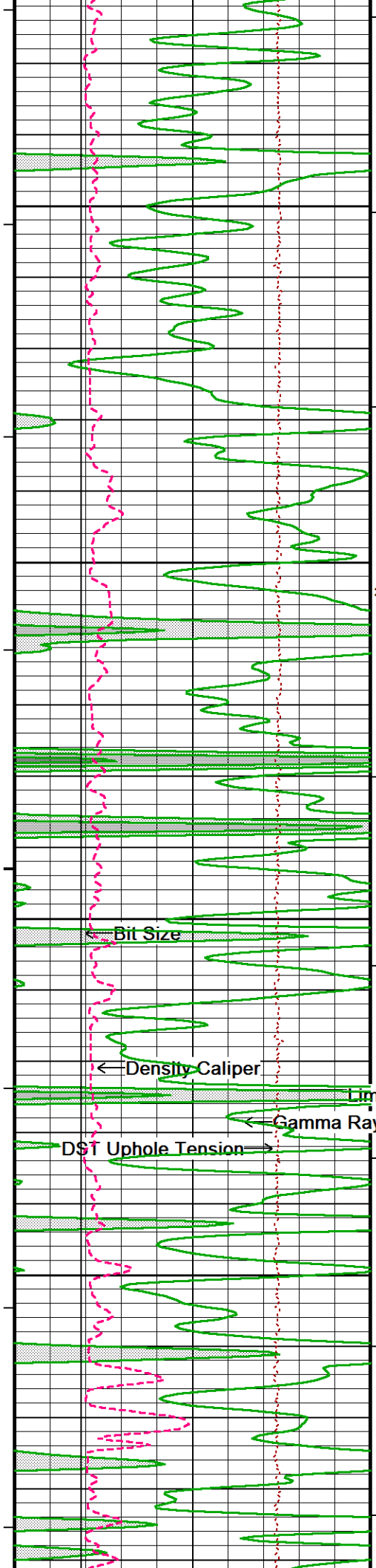


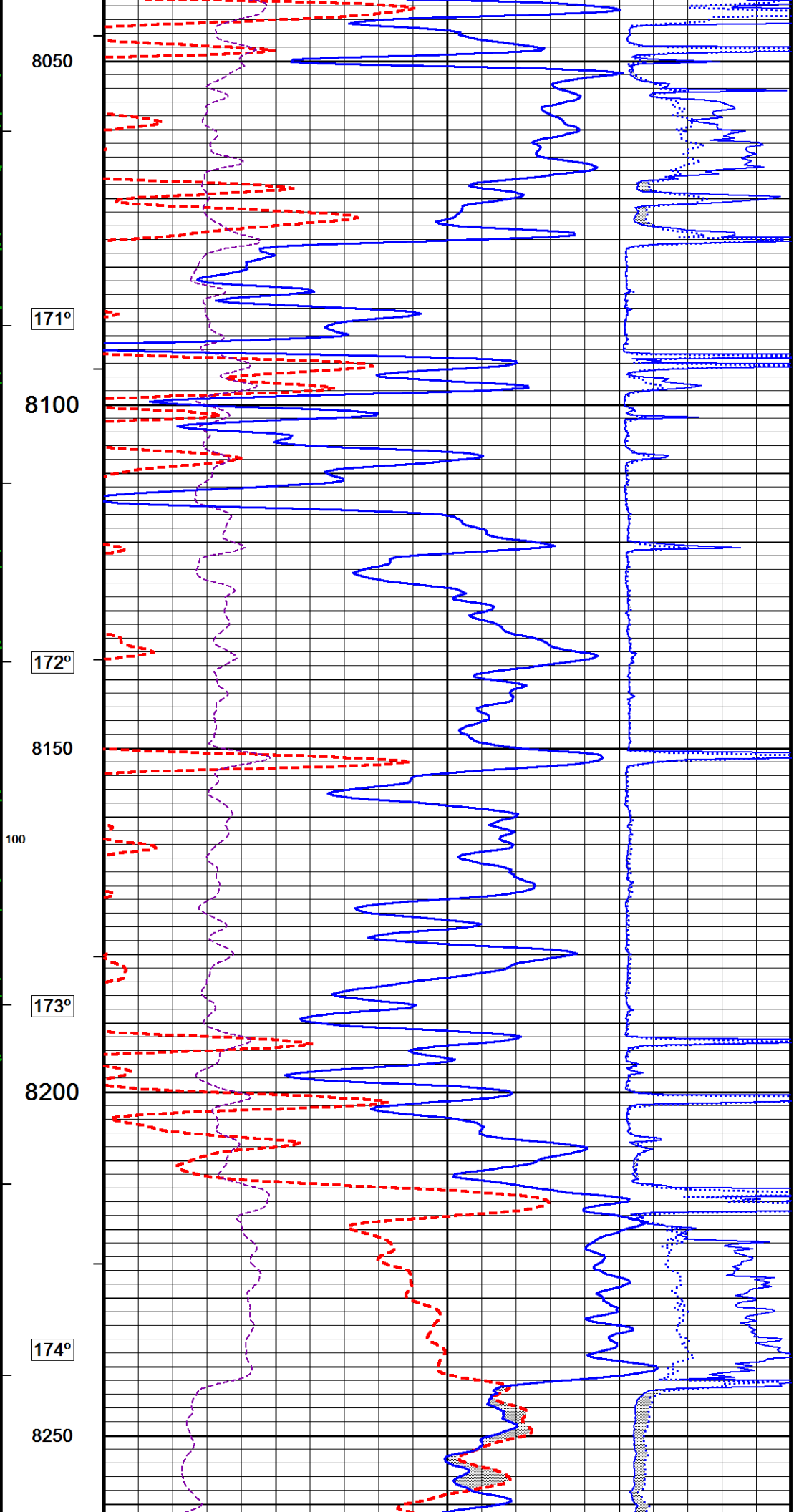
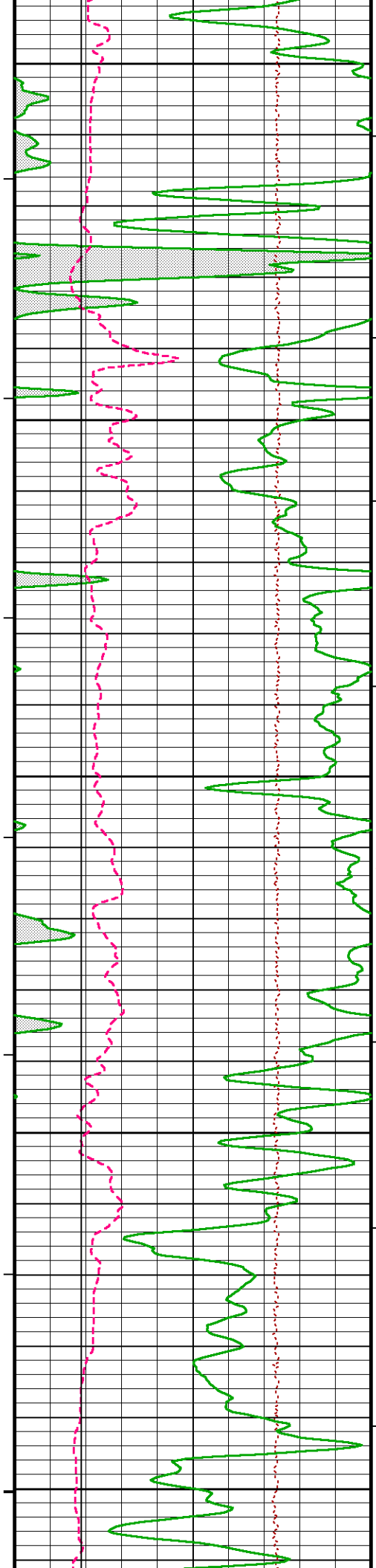


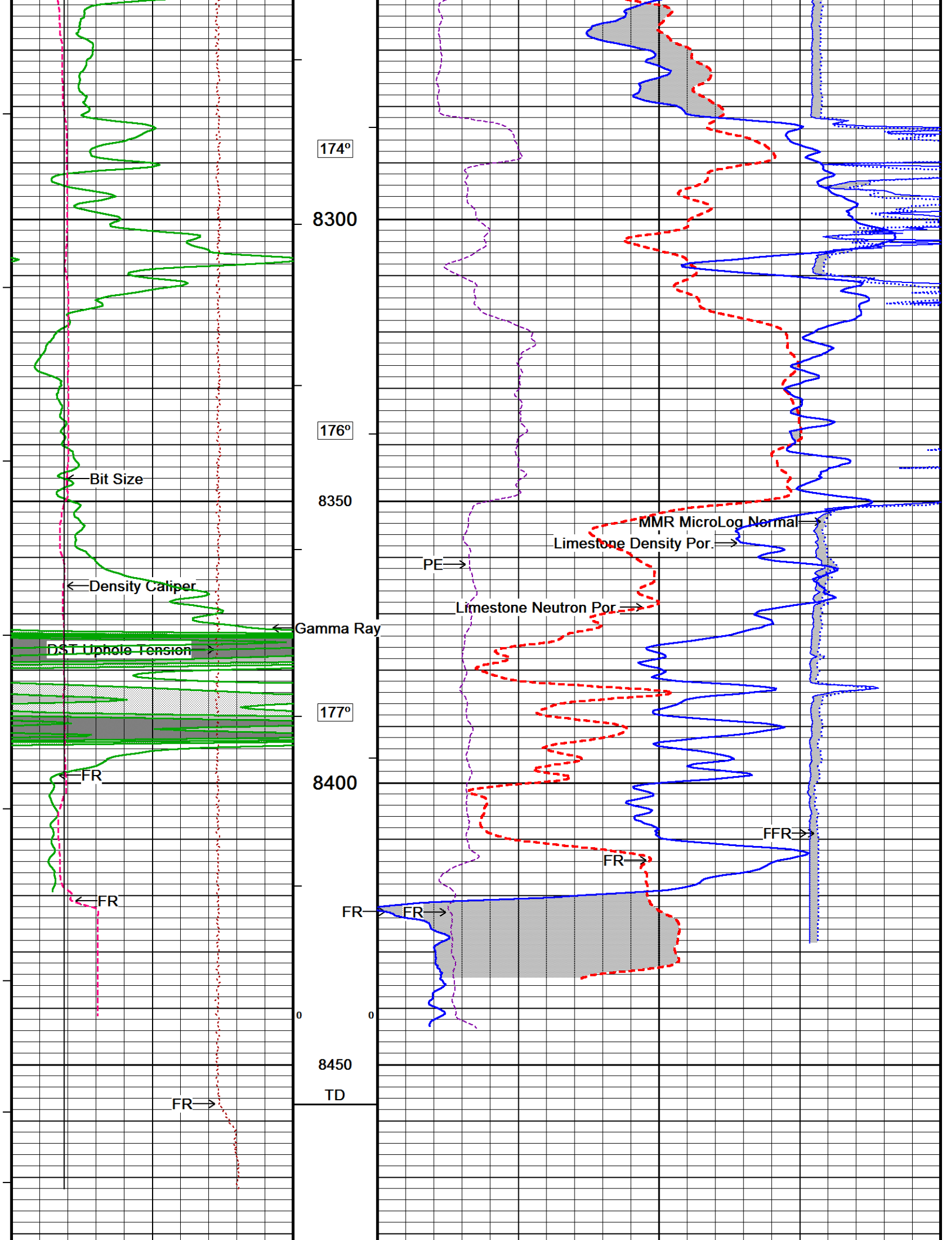


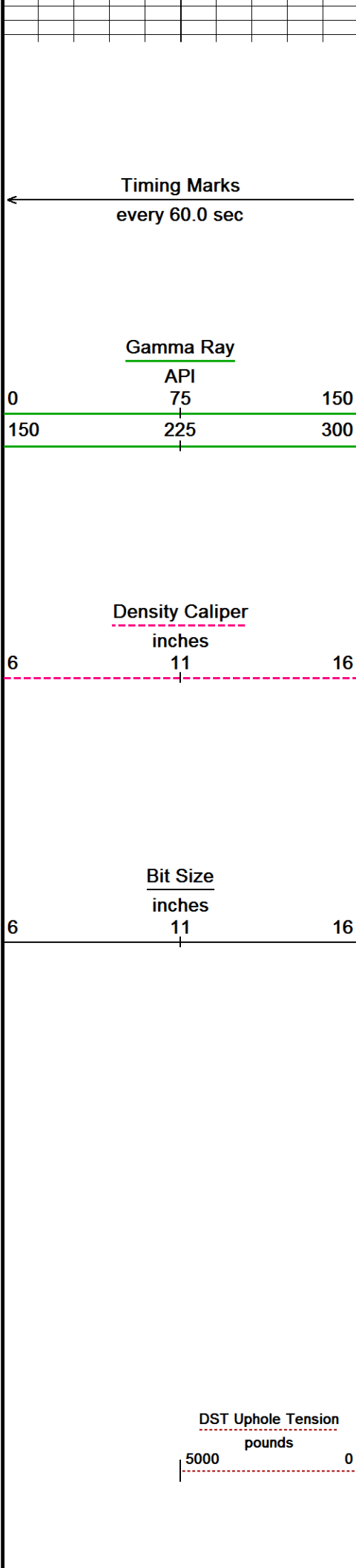












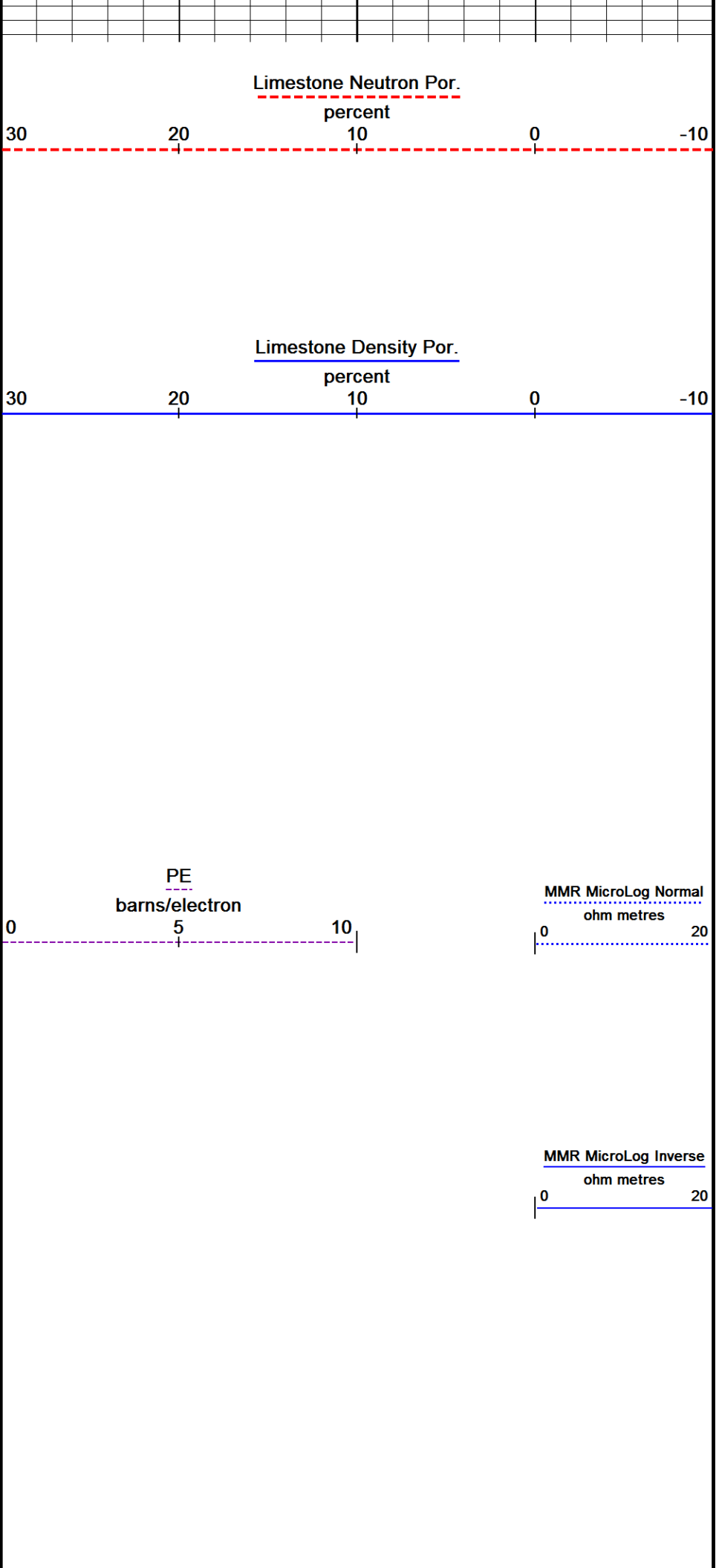
Depth  
In  
Feet

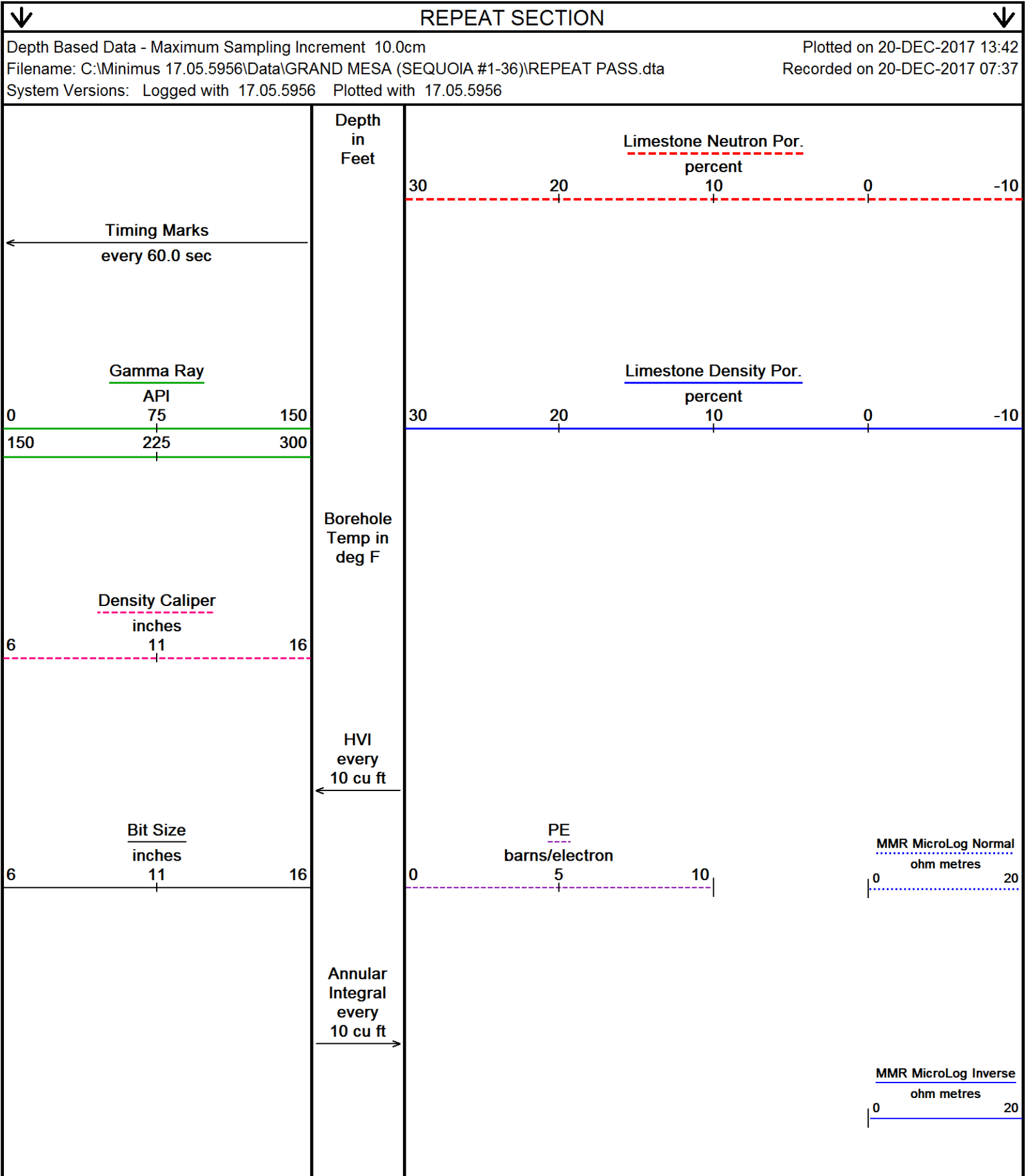
Borehole  
Temp in  
deg F

HVI  
every  
10 cu ft

Annular  
Integral  
every  
10 cu ft

Replay





DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:240

8174

8200

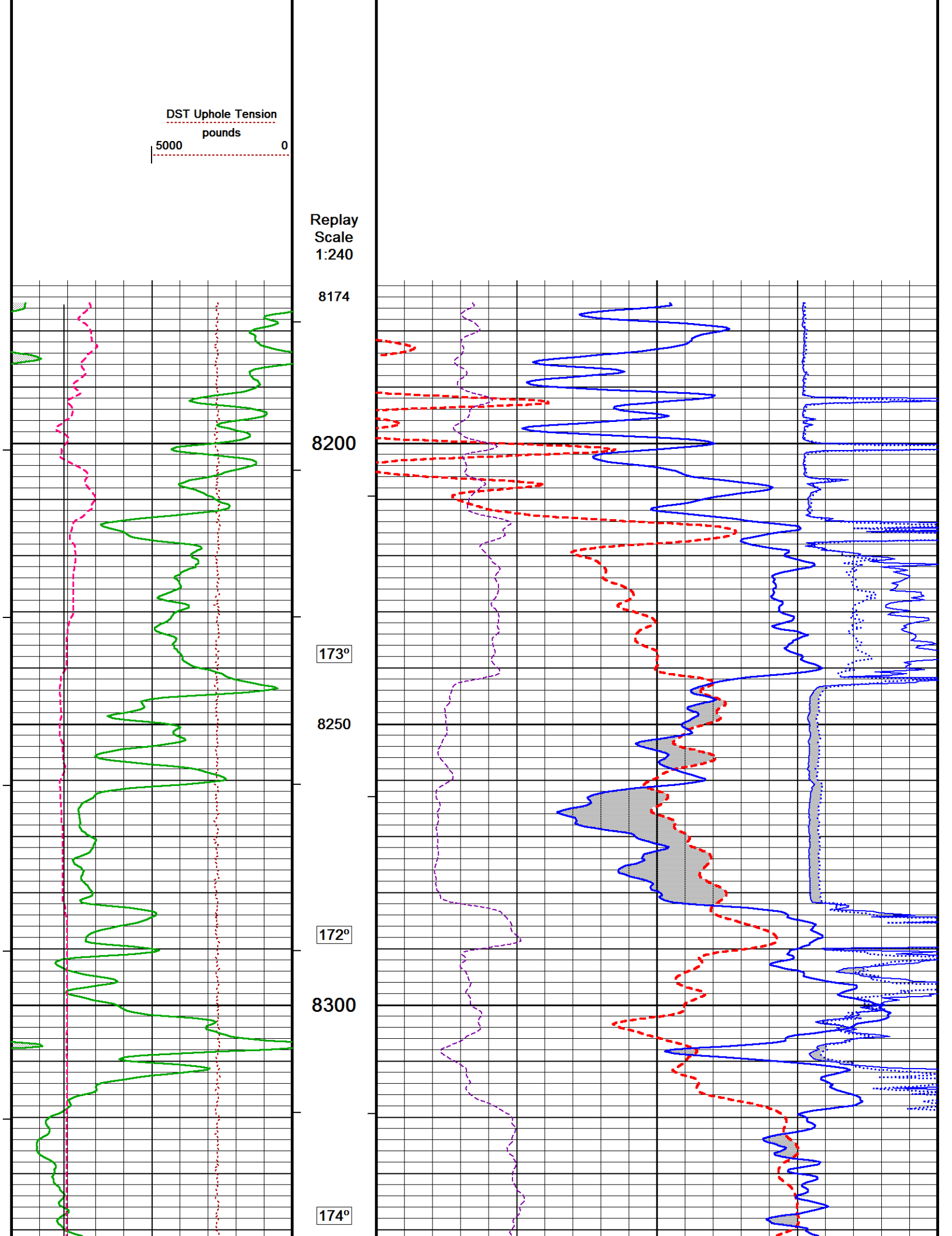
173°

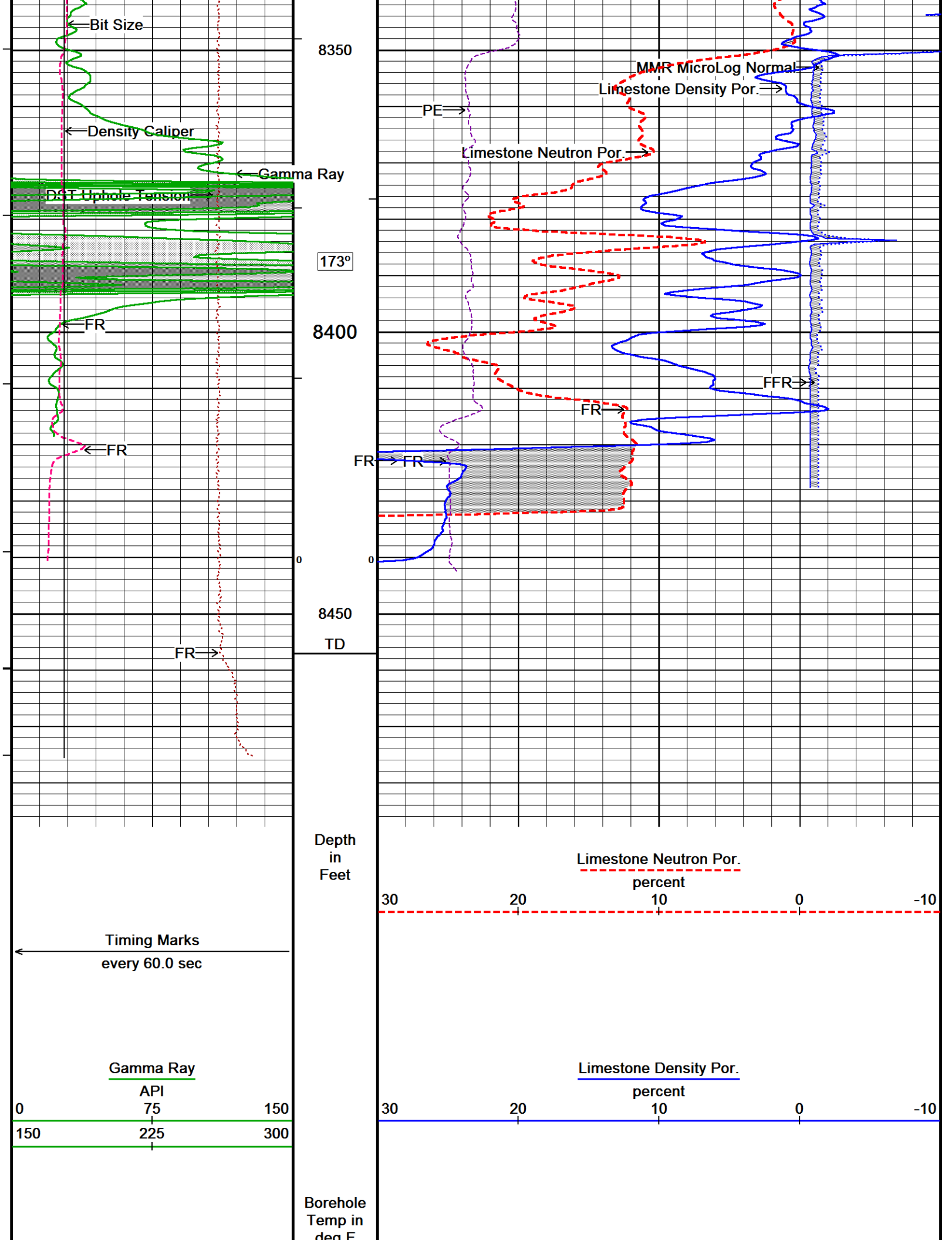
8250

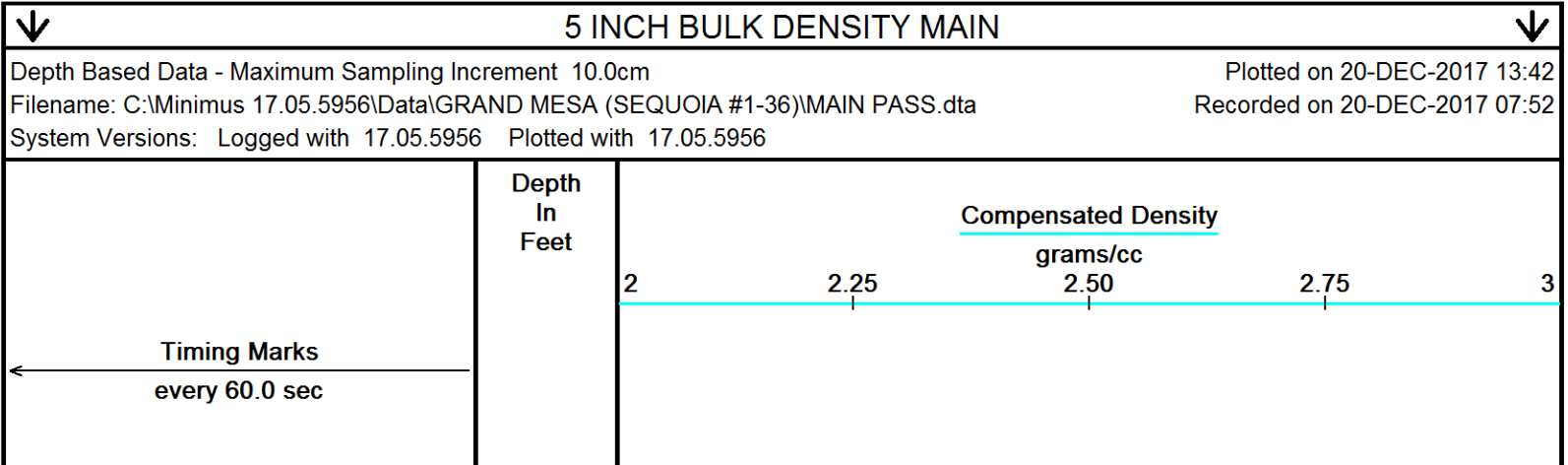
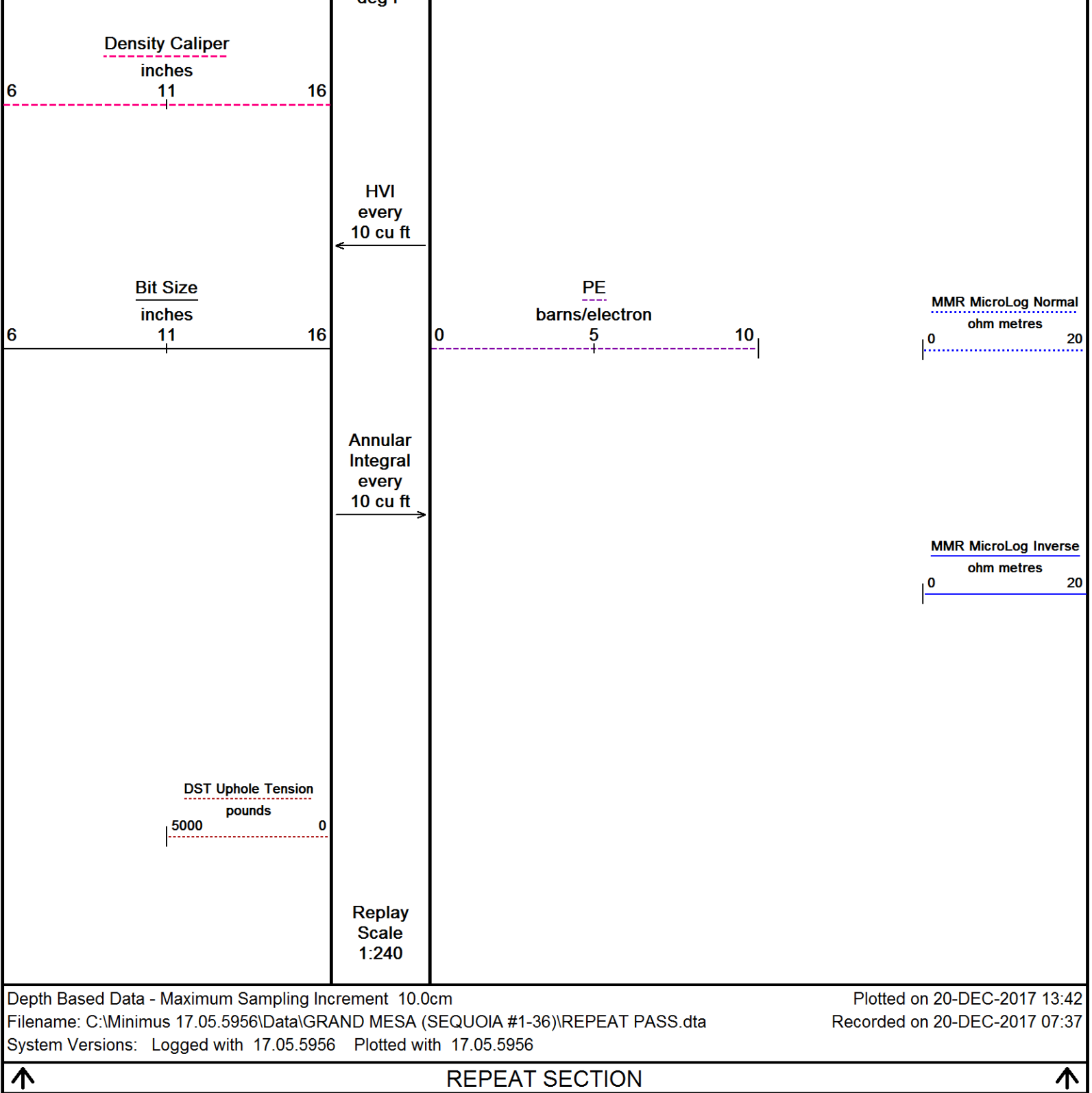
172°

8300

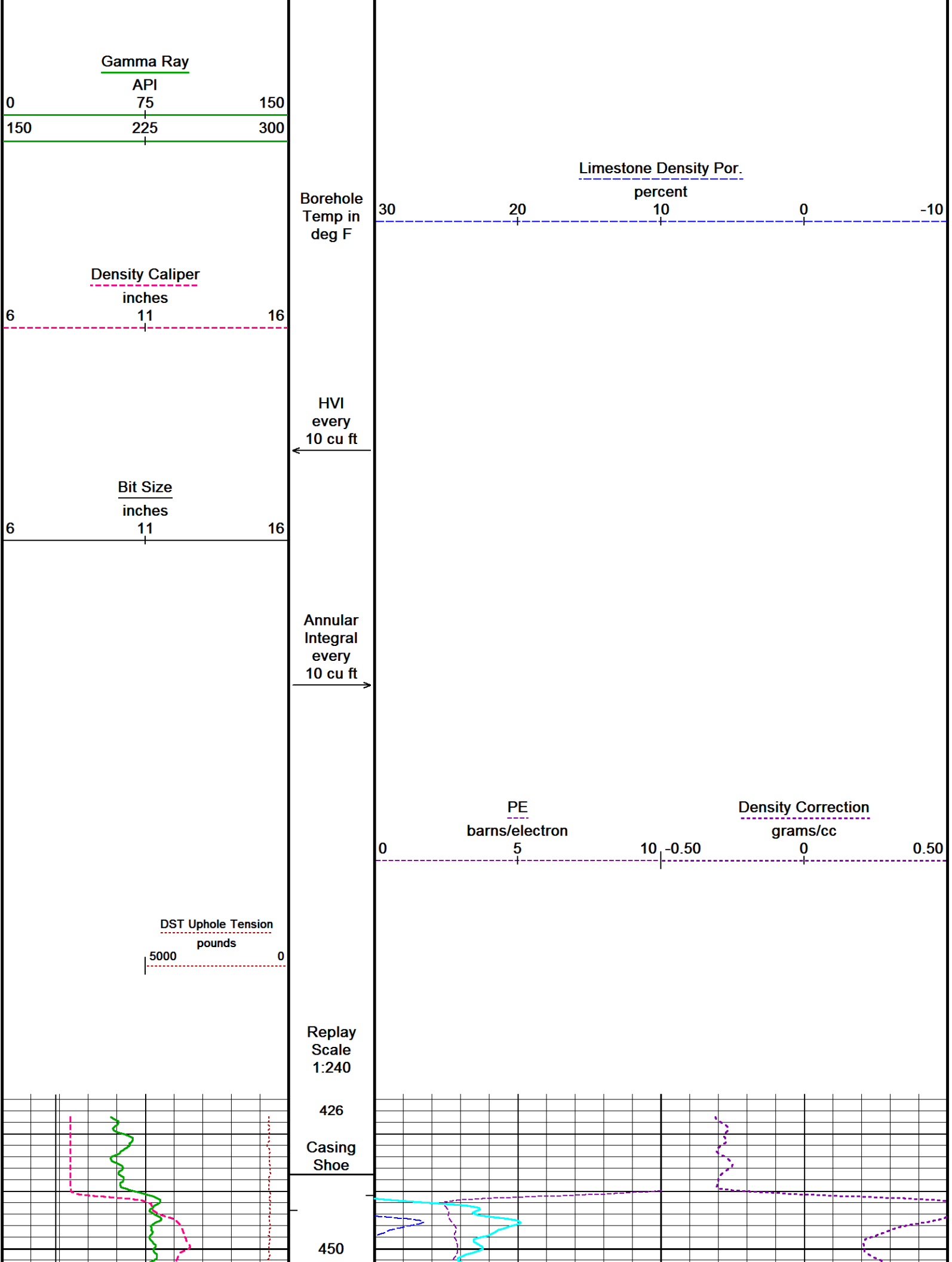
174°

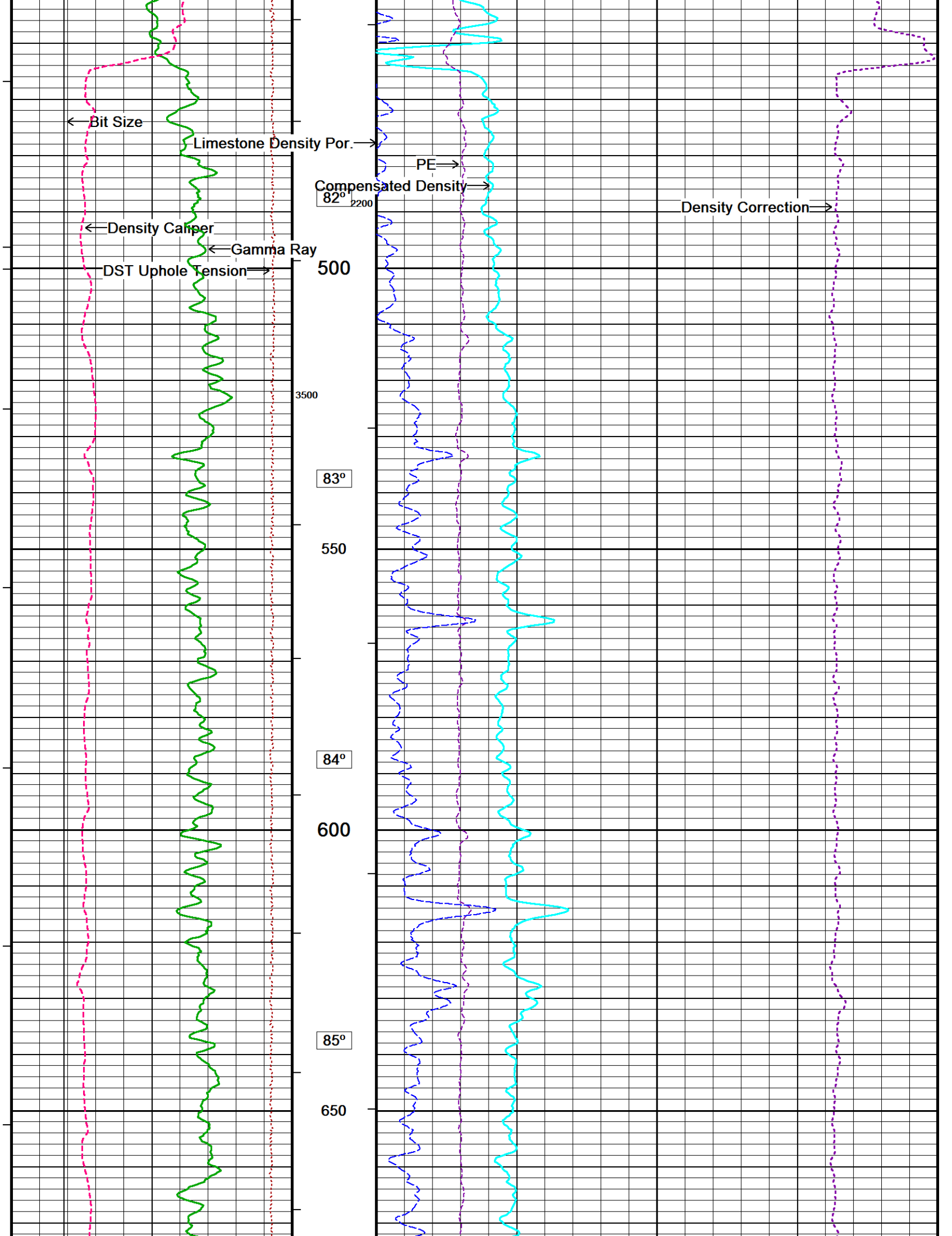


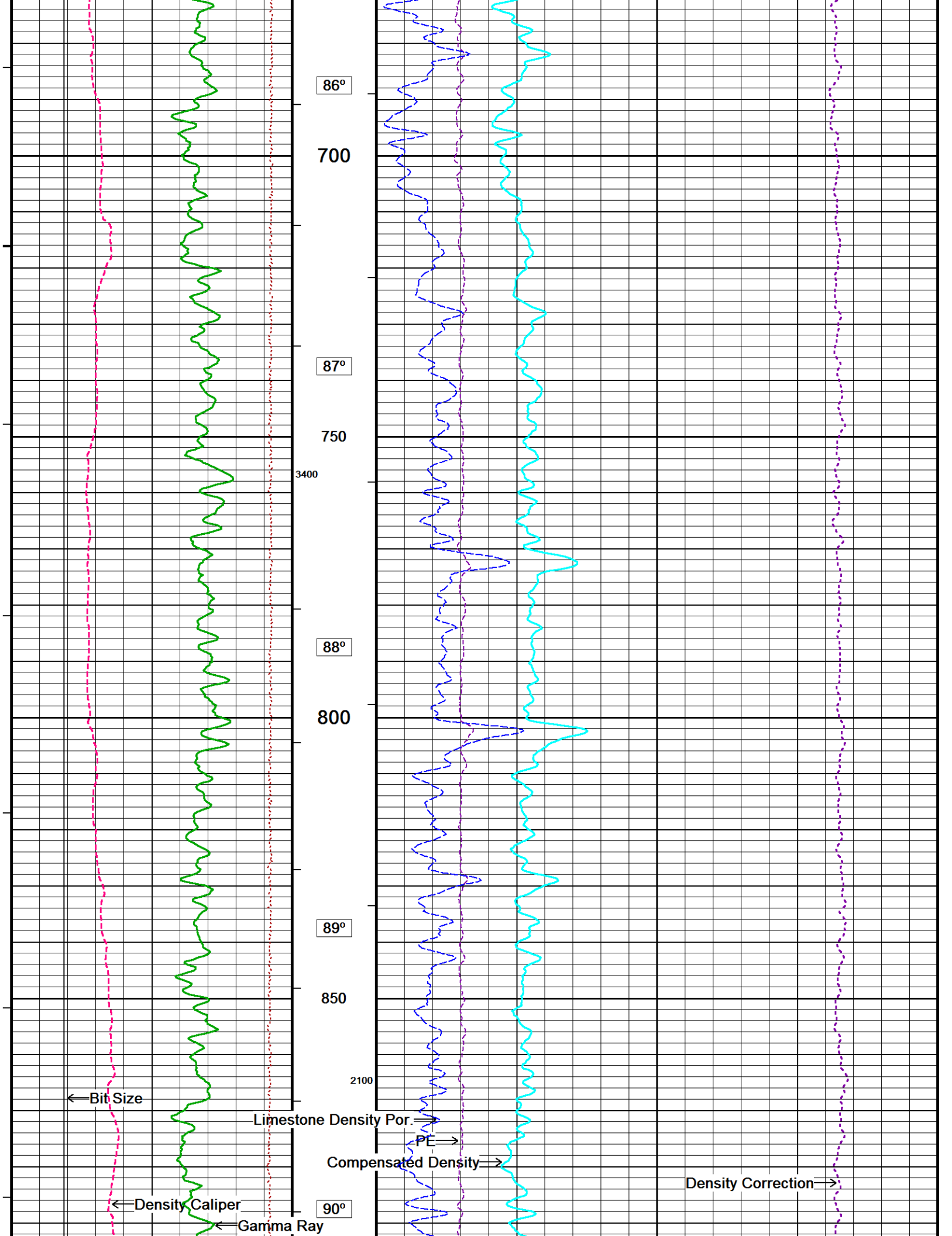


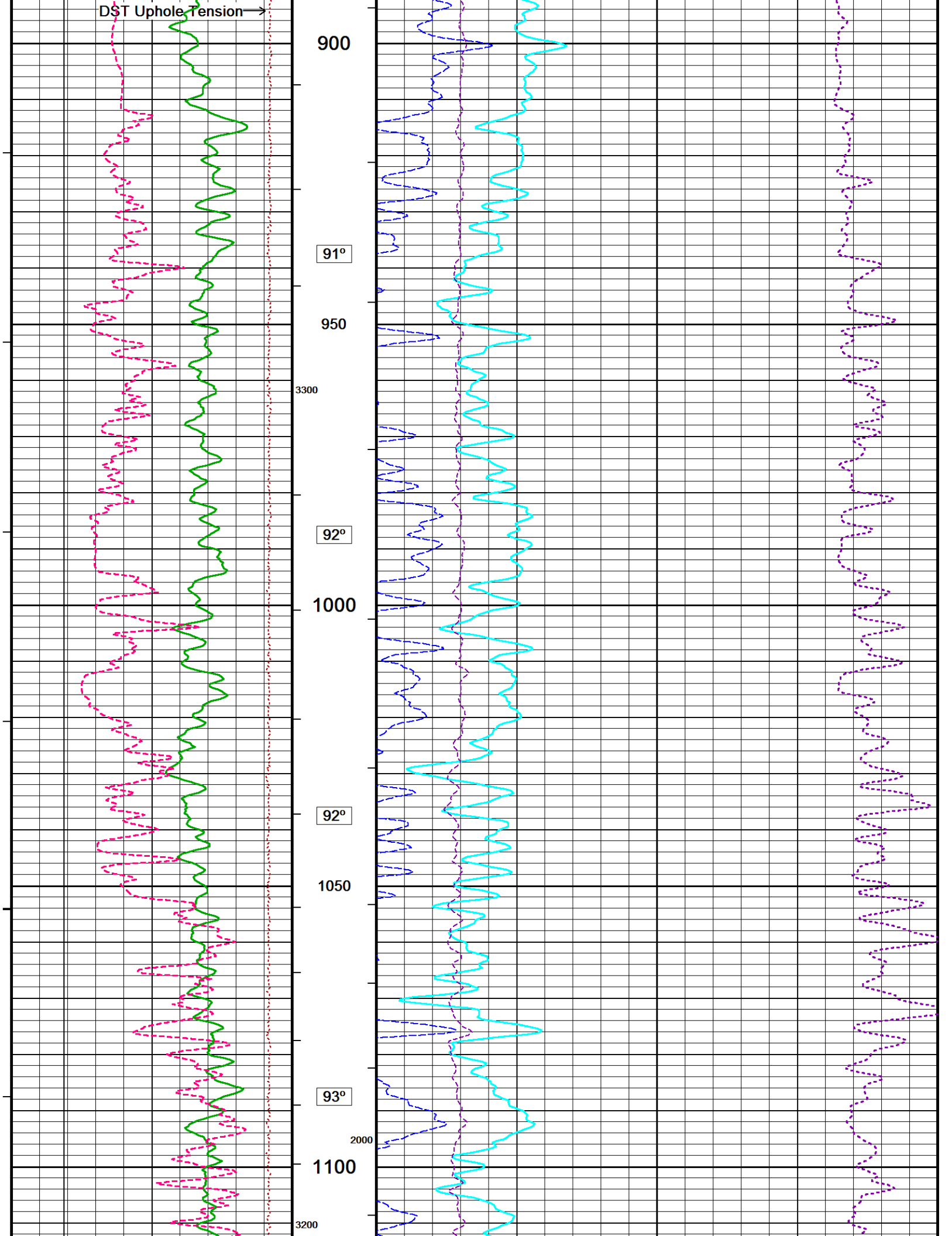


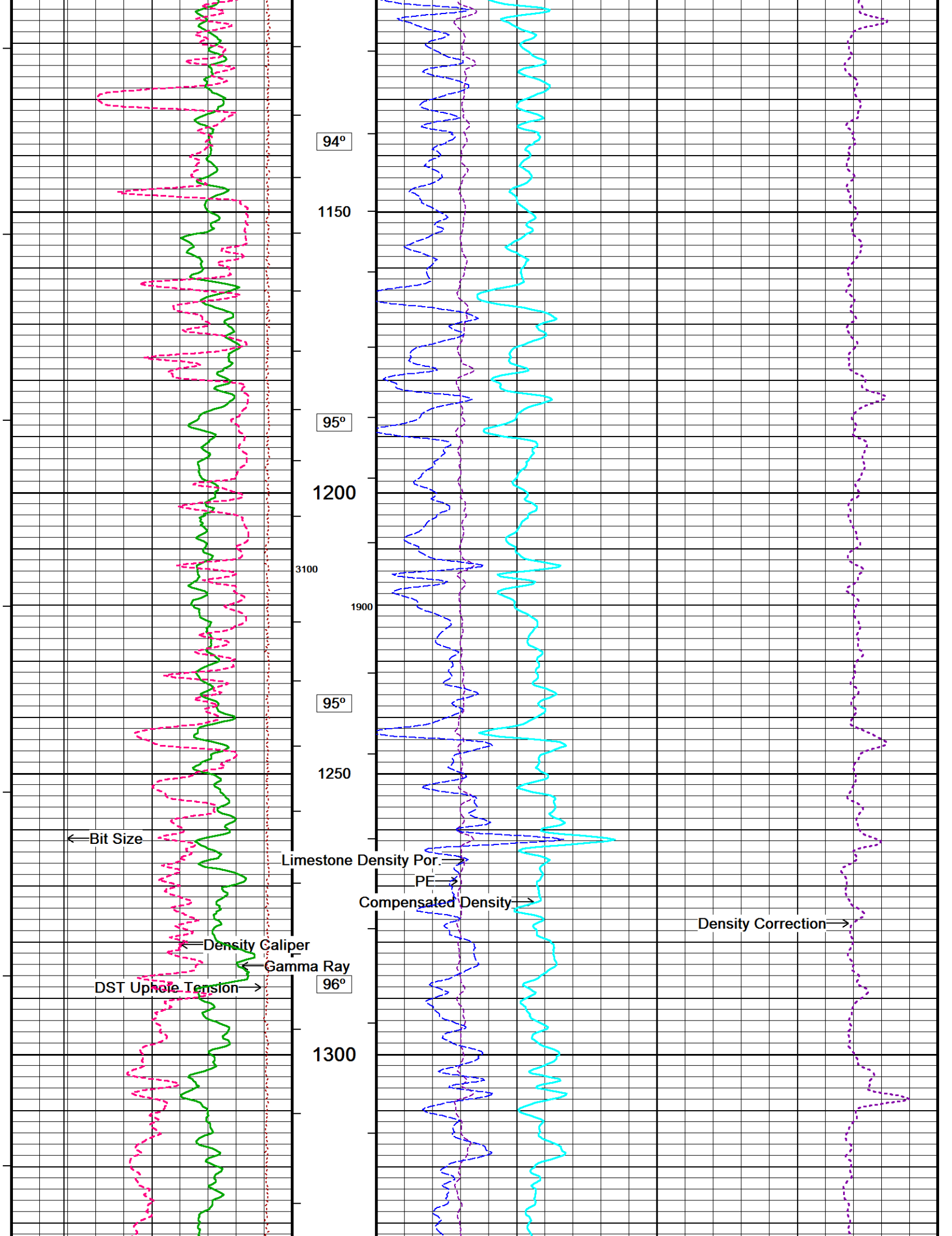


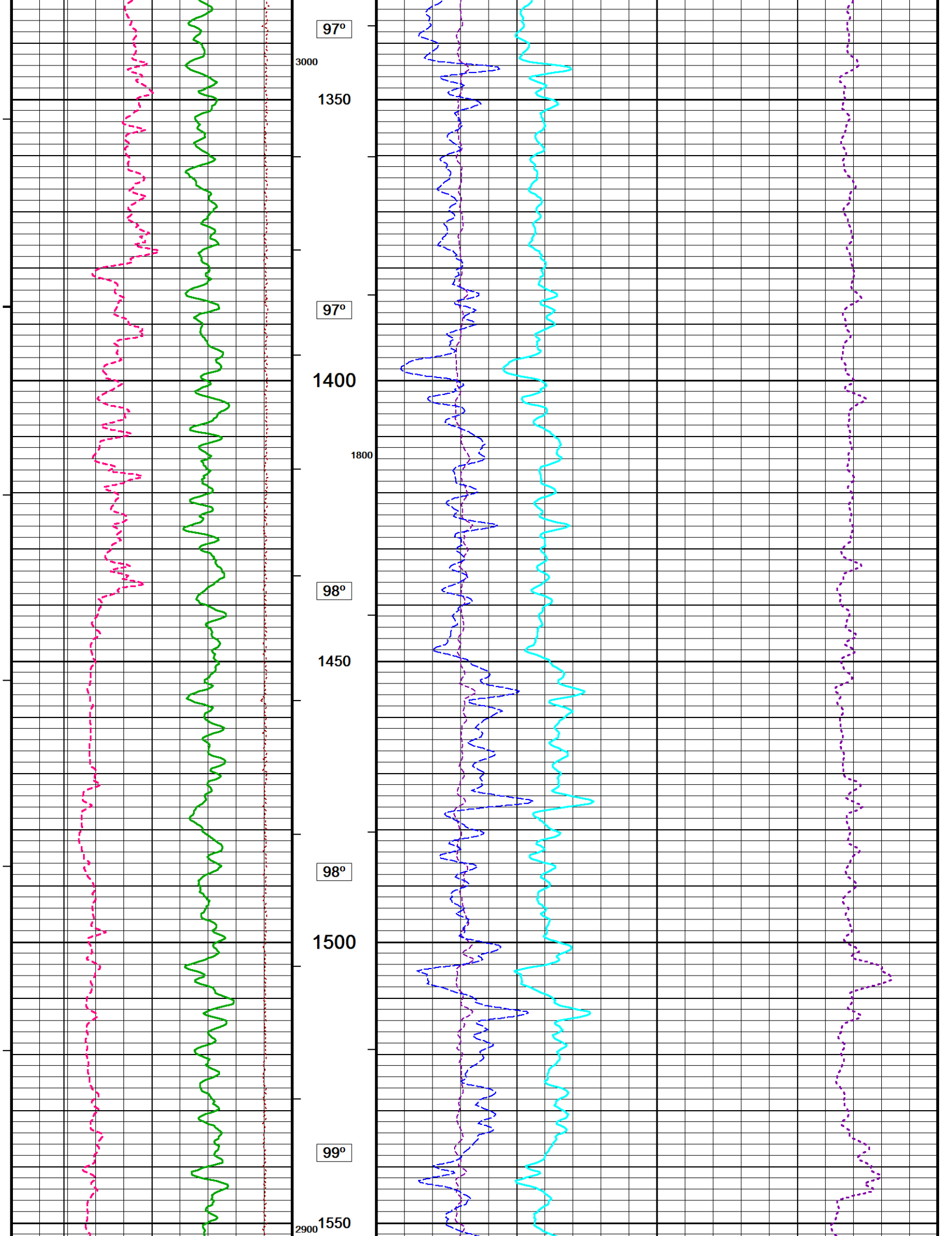


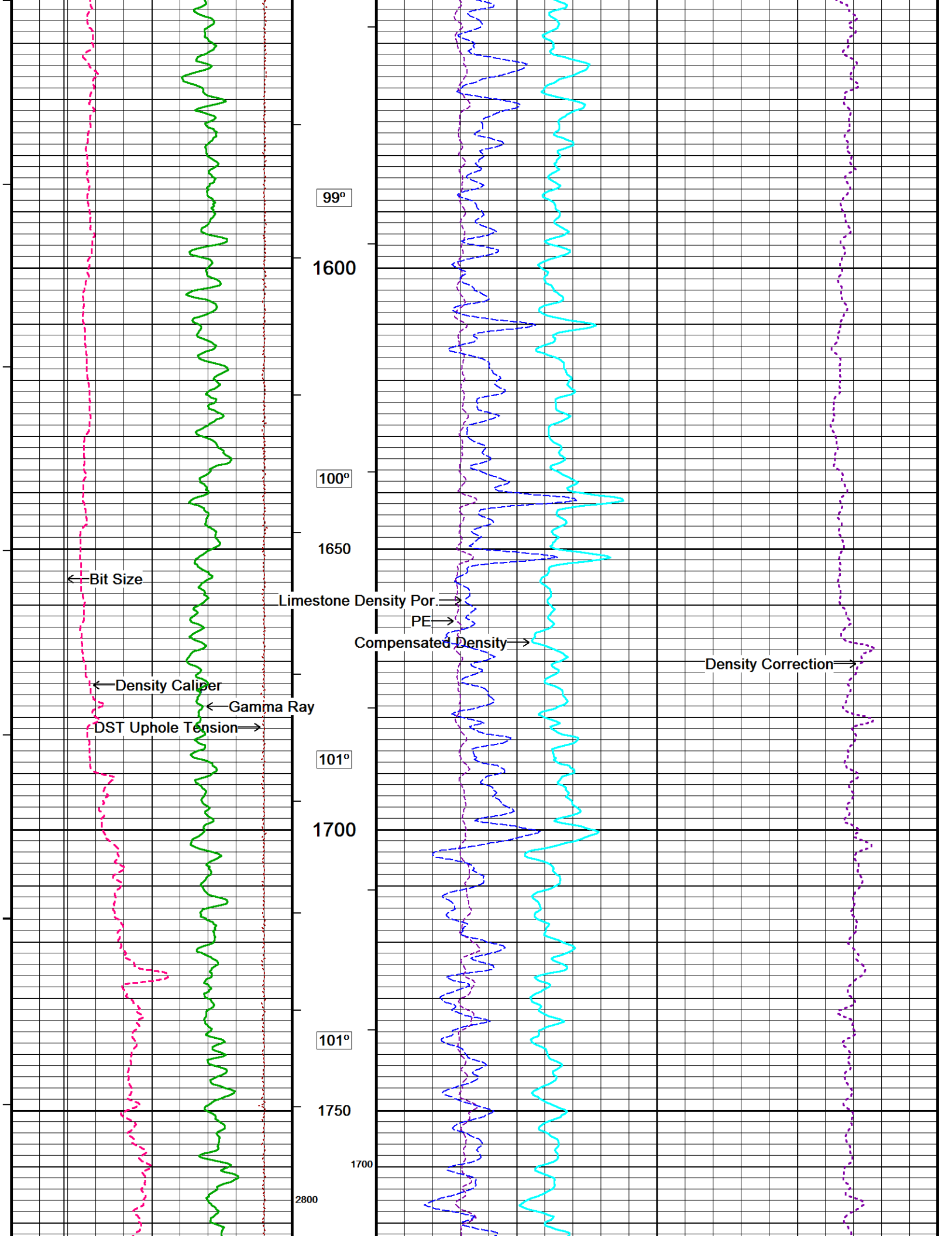


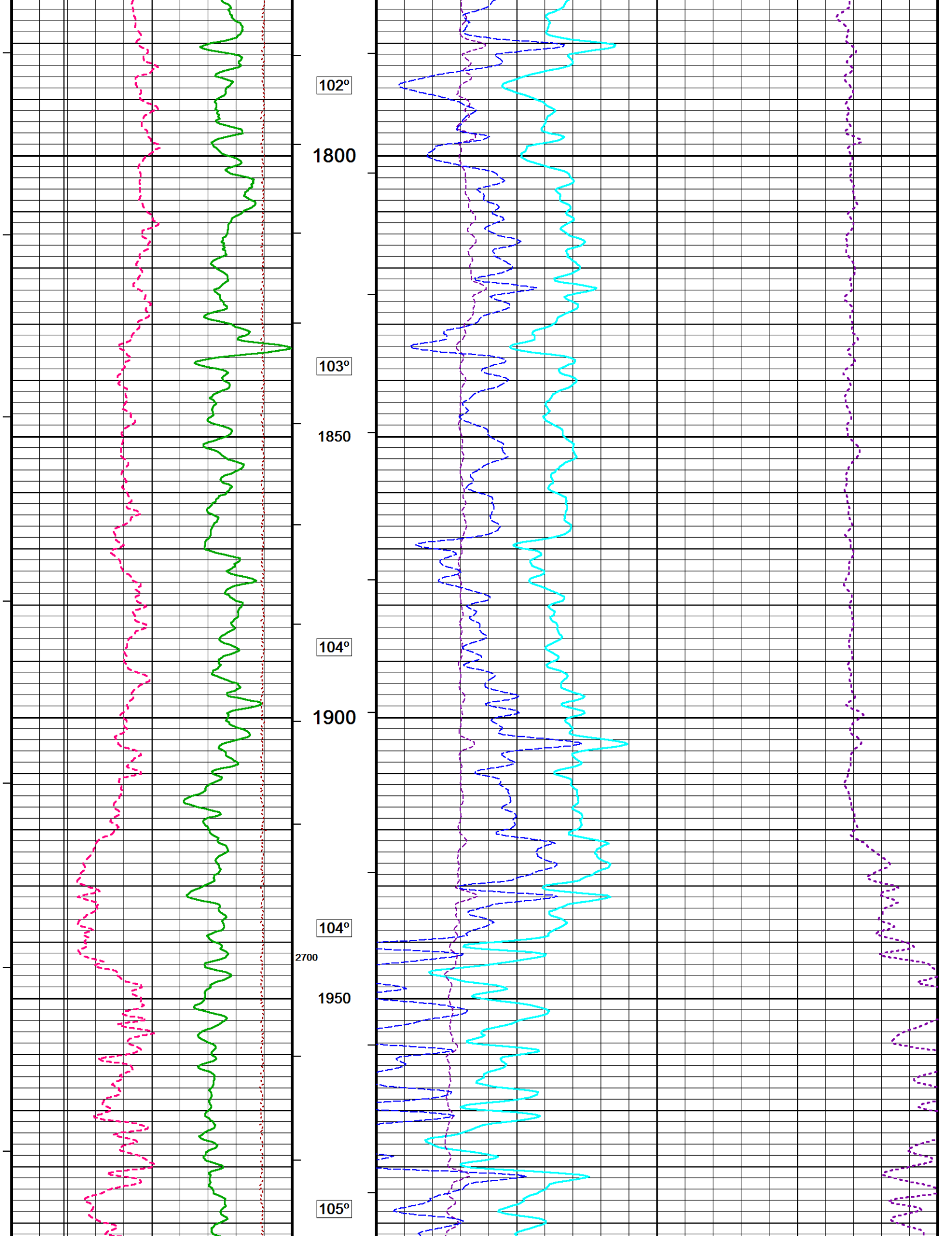




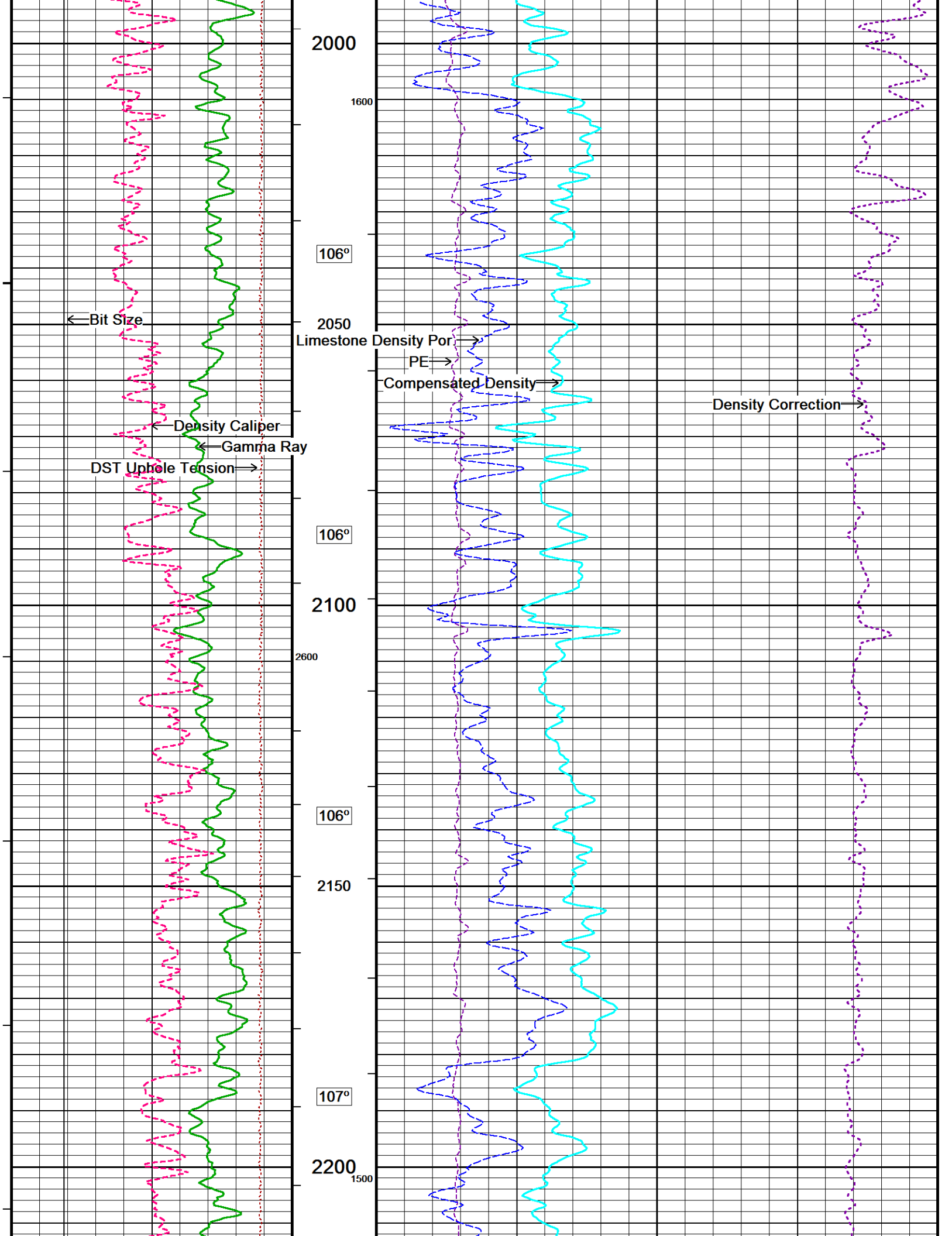


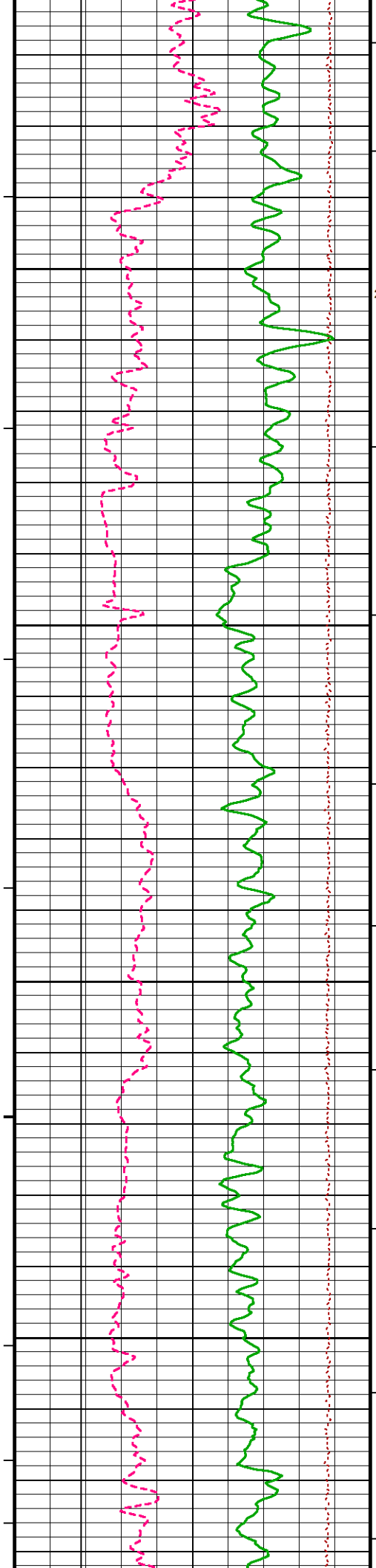




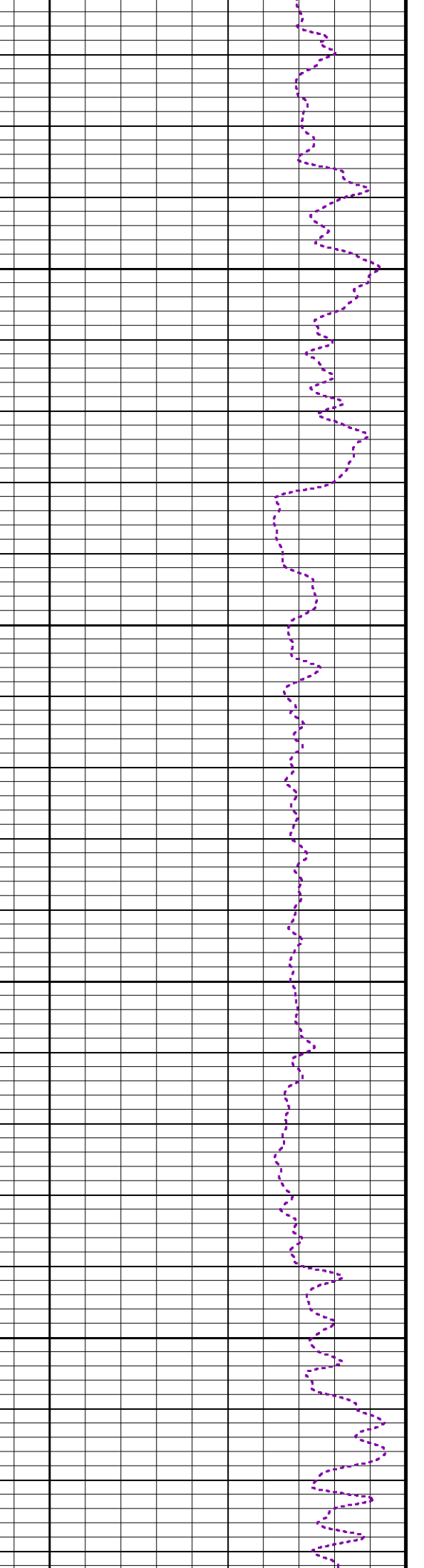
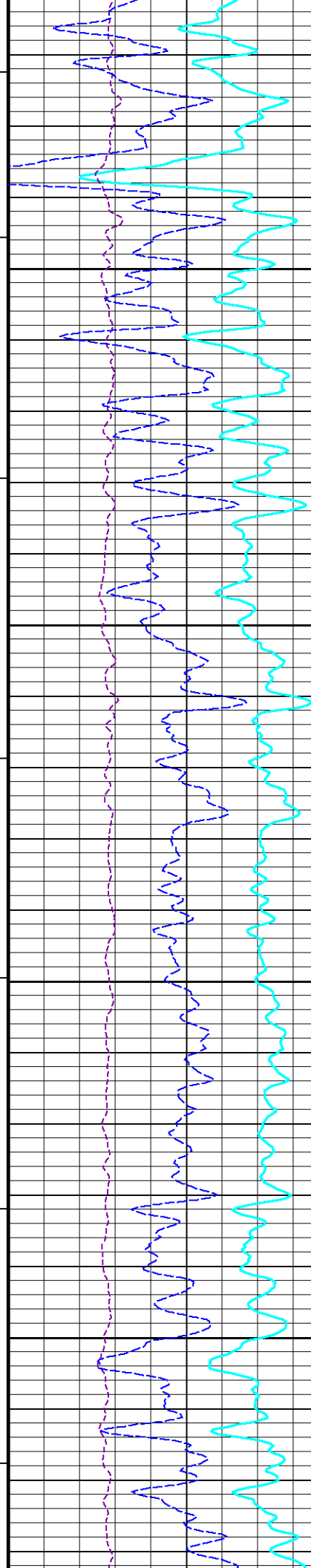


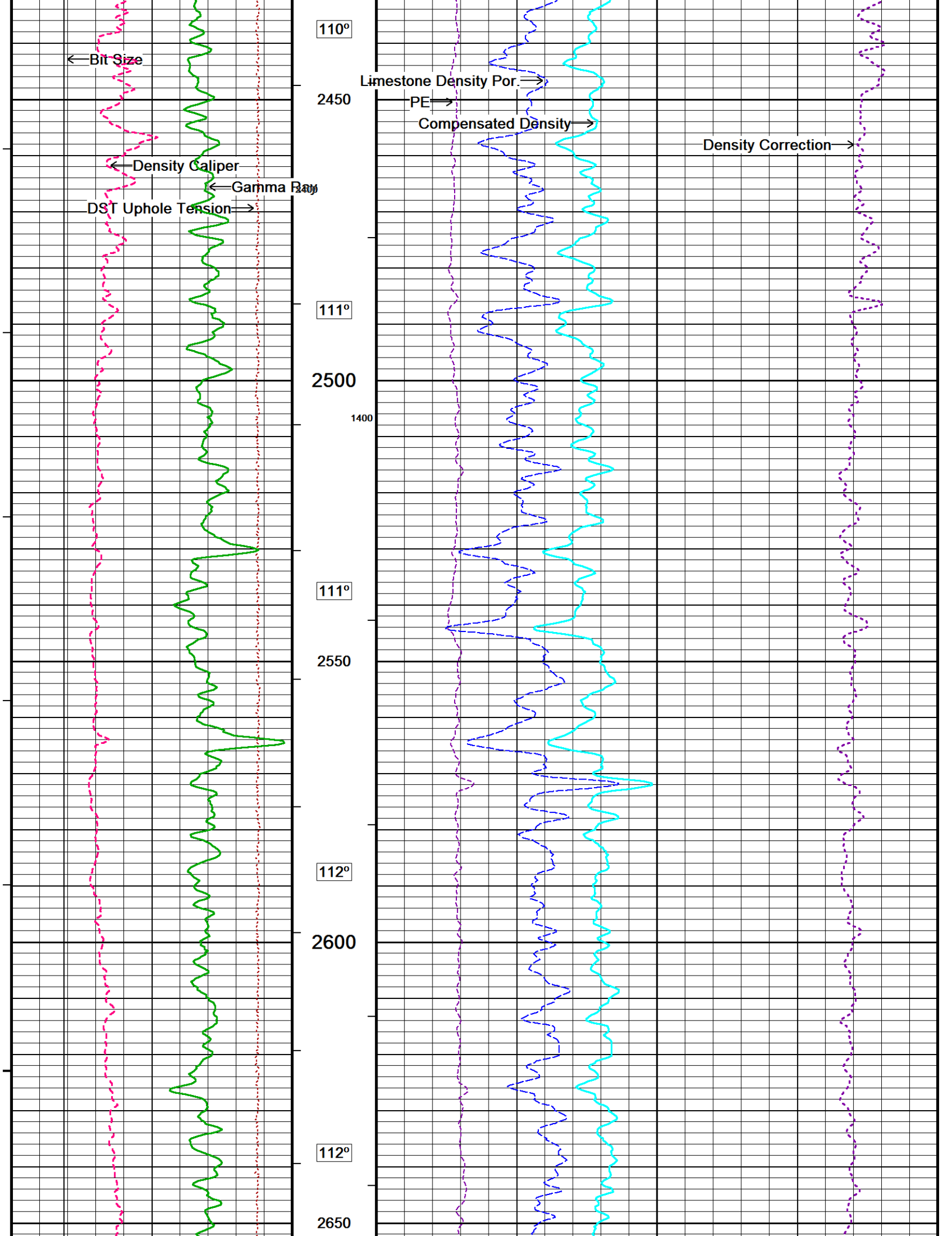


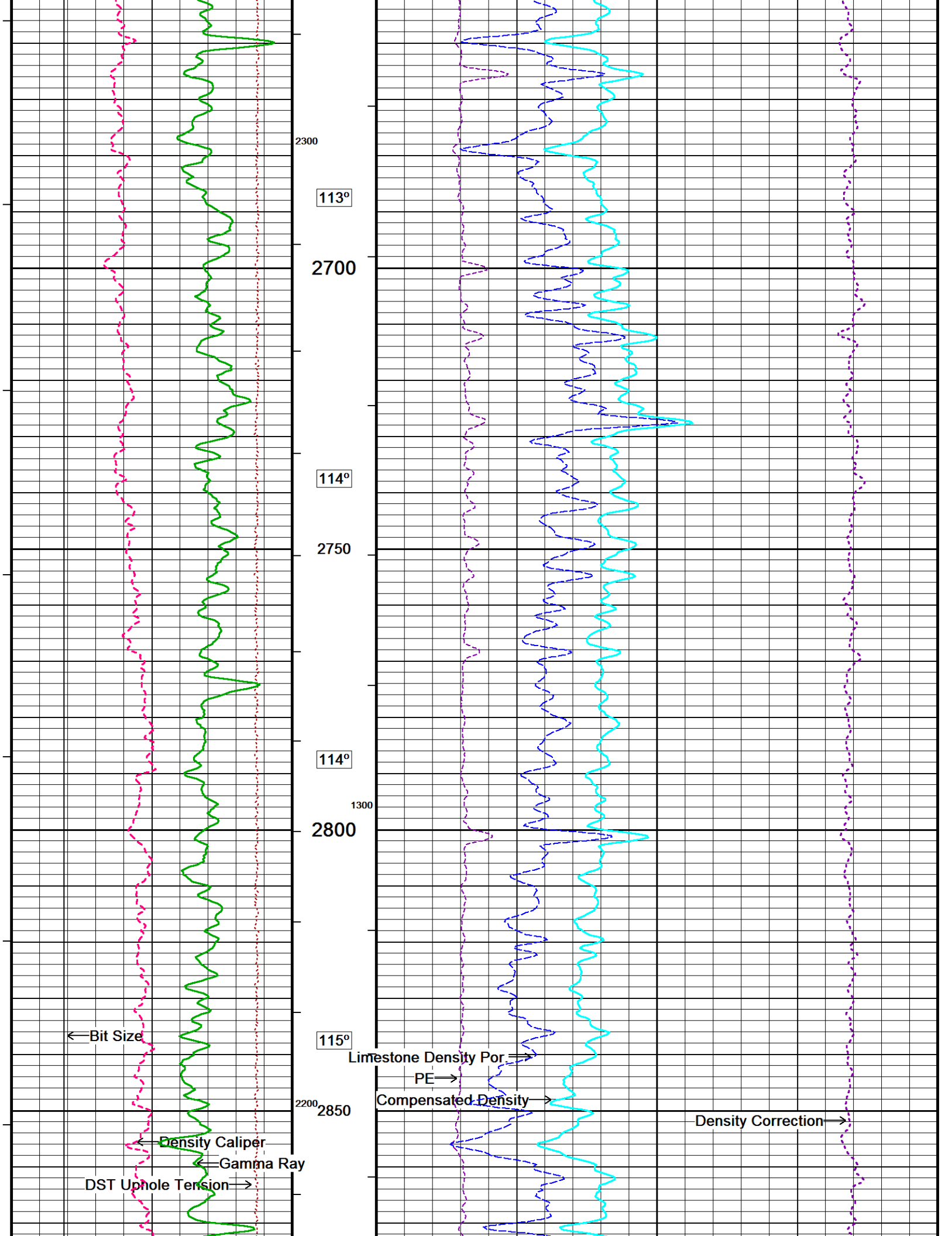


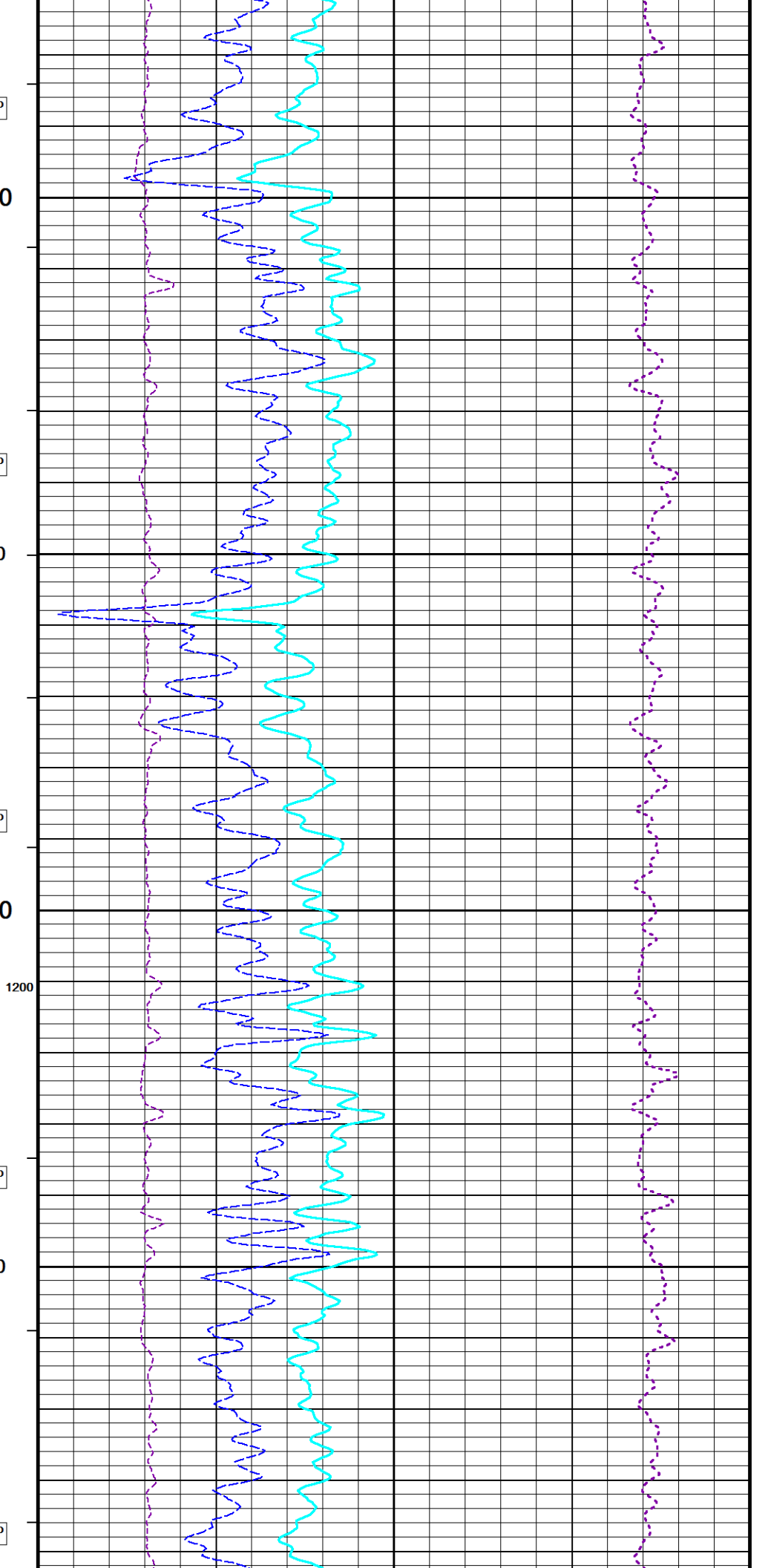
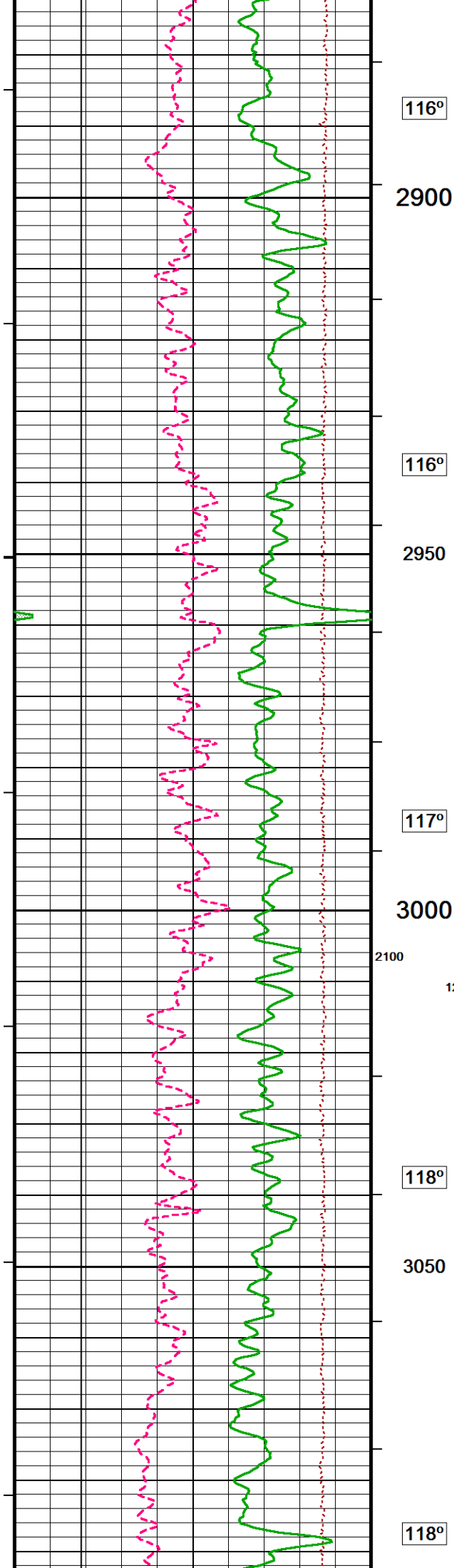


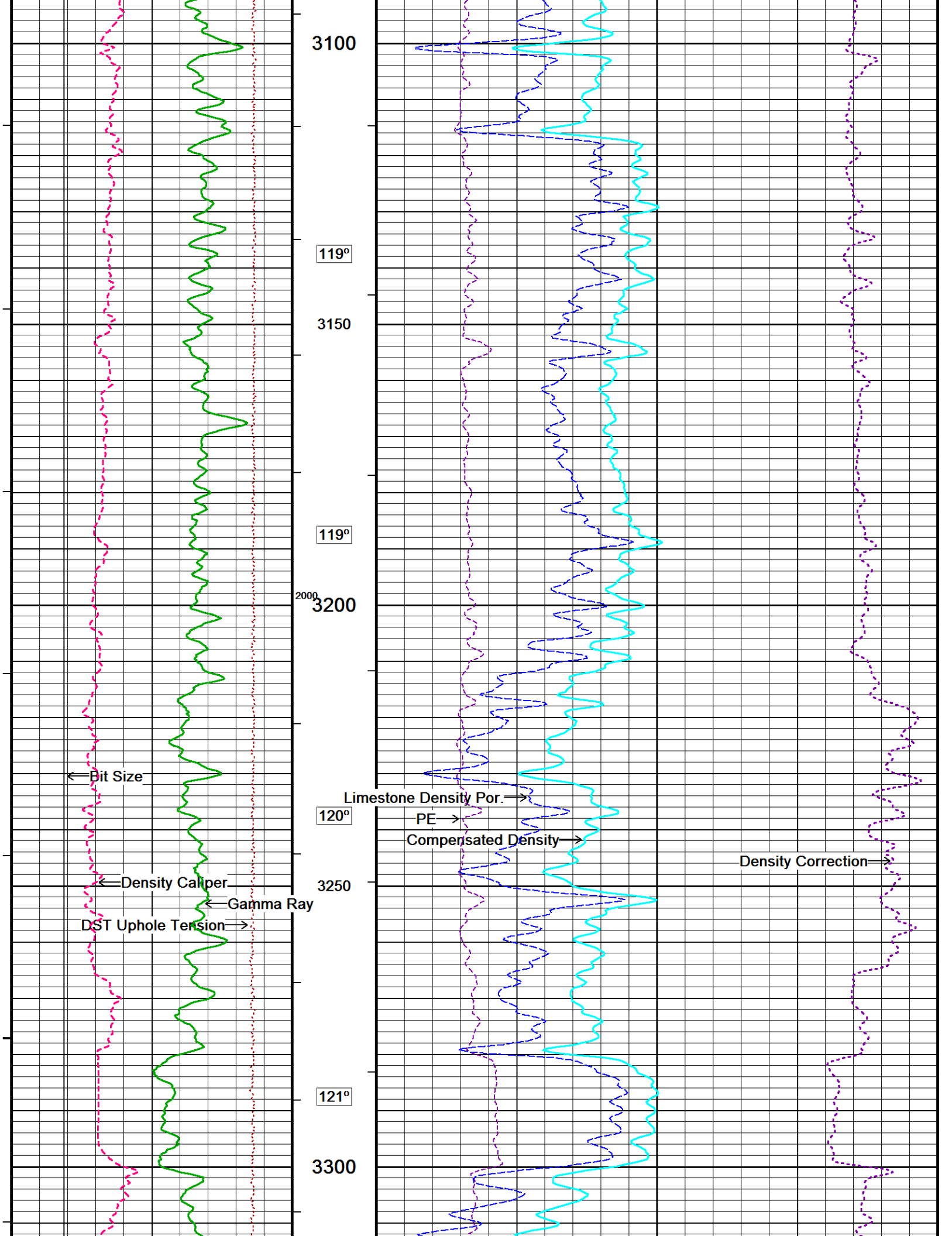
108°  
2250  
2500  
108°  
2300  
109°  
2350  
109°  
2400

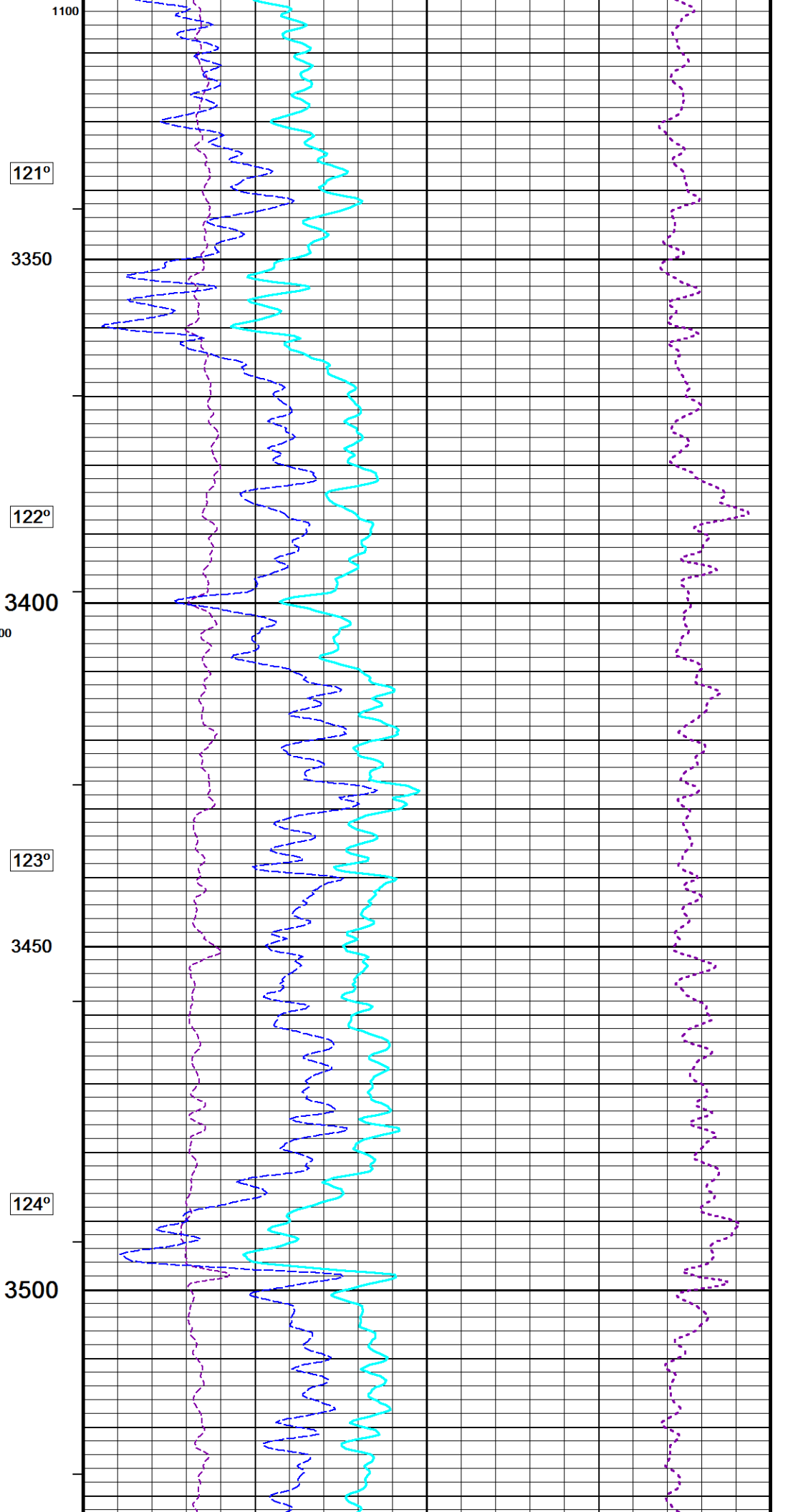
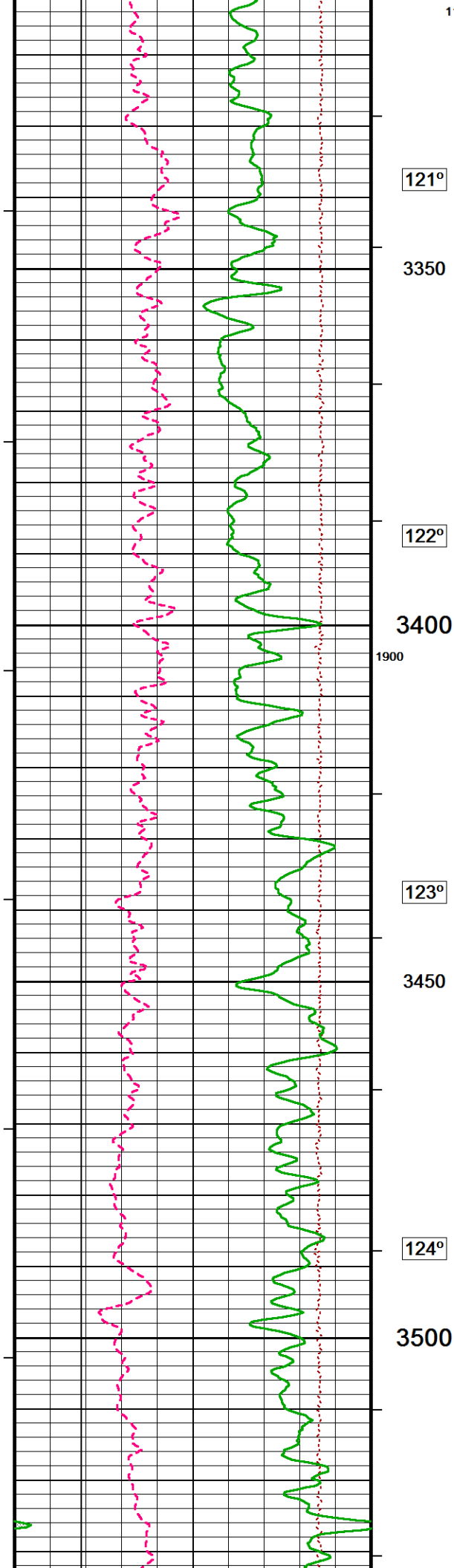


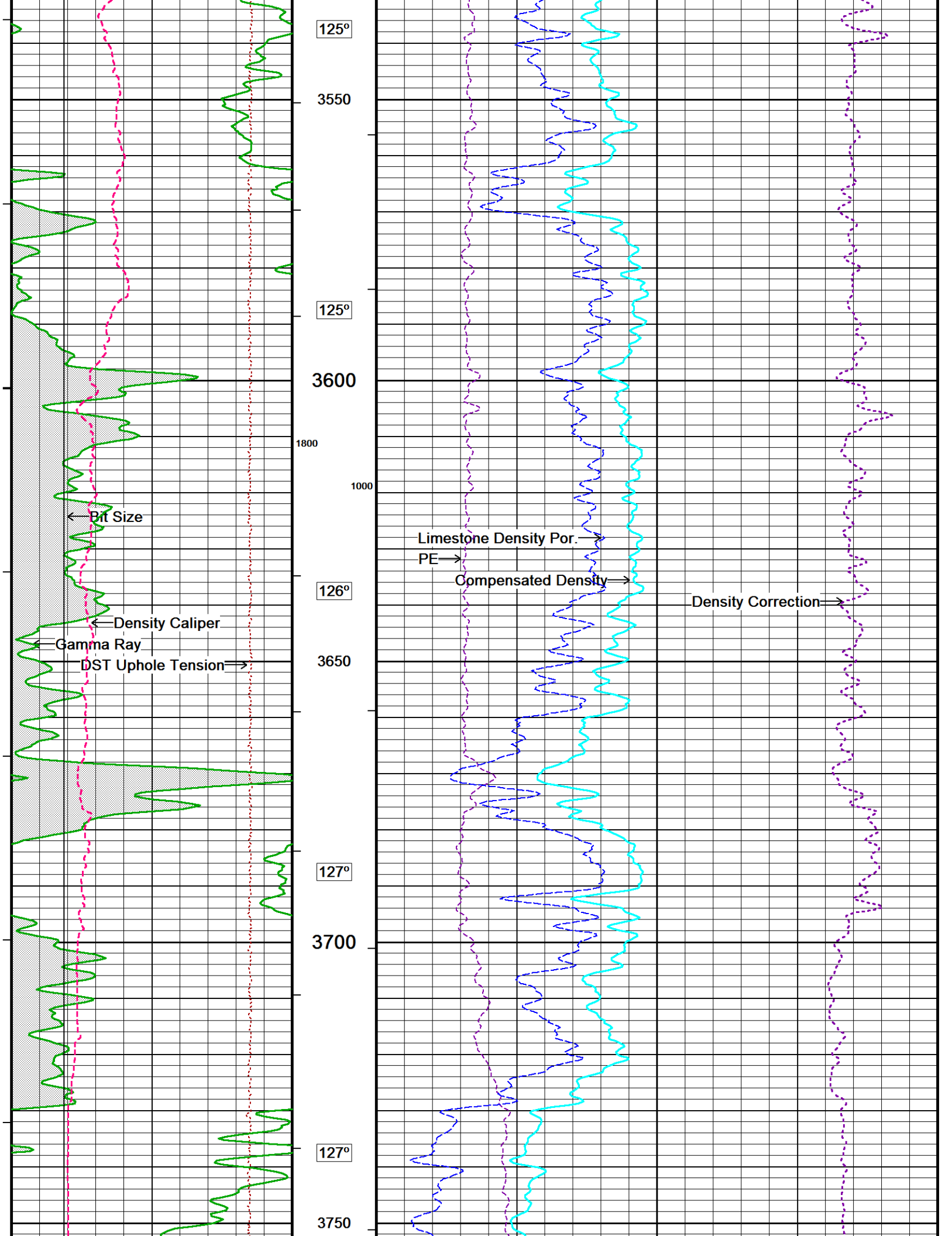




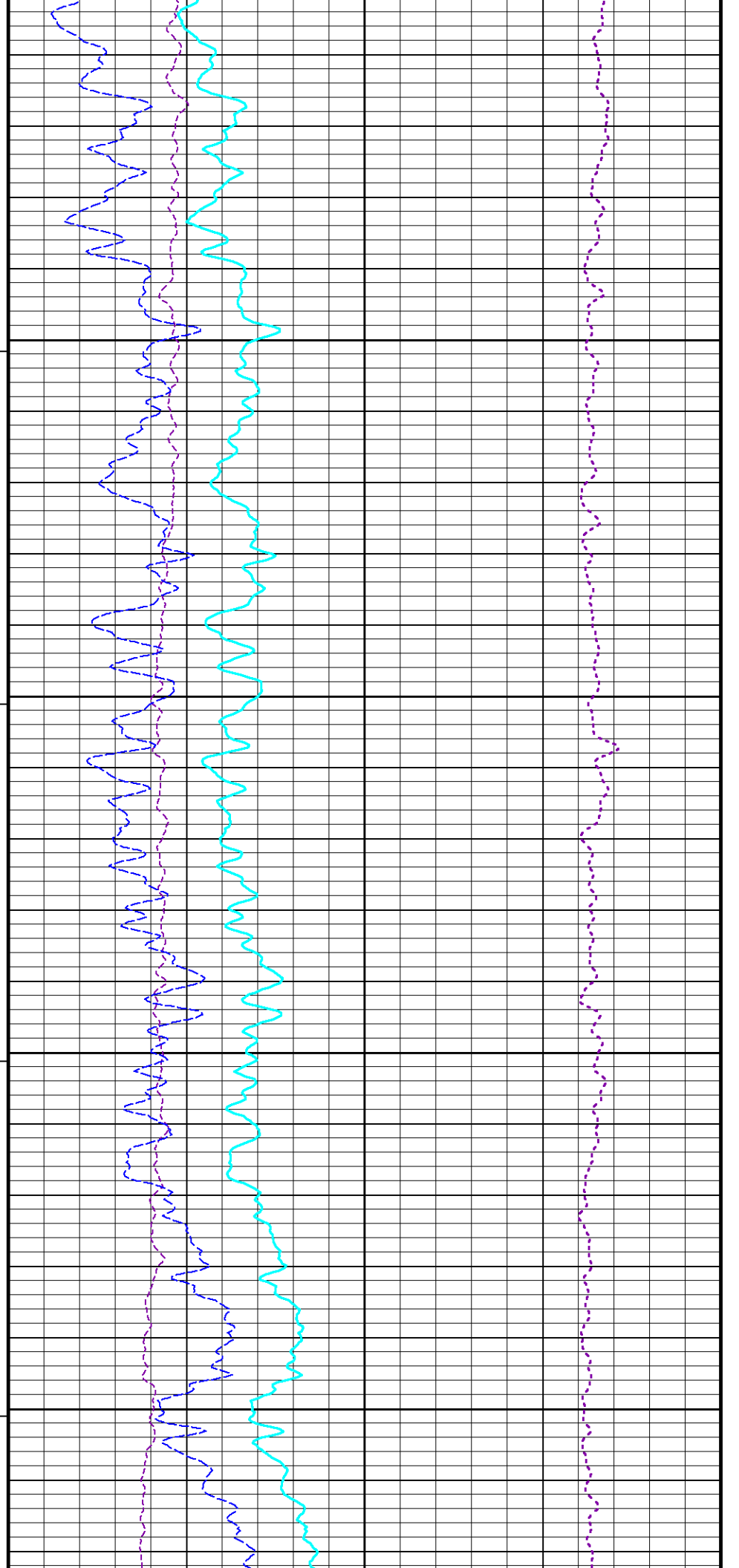
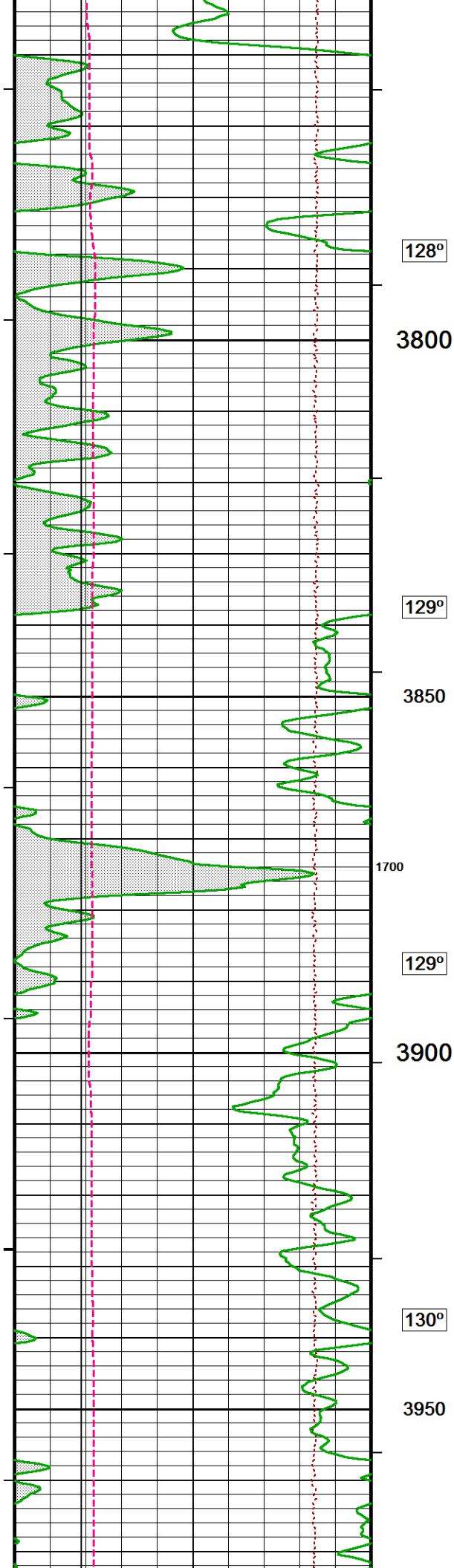


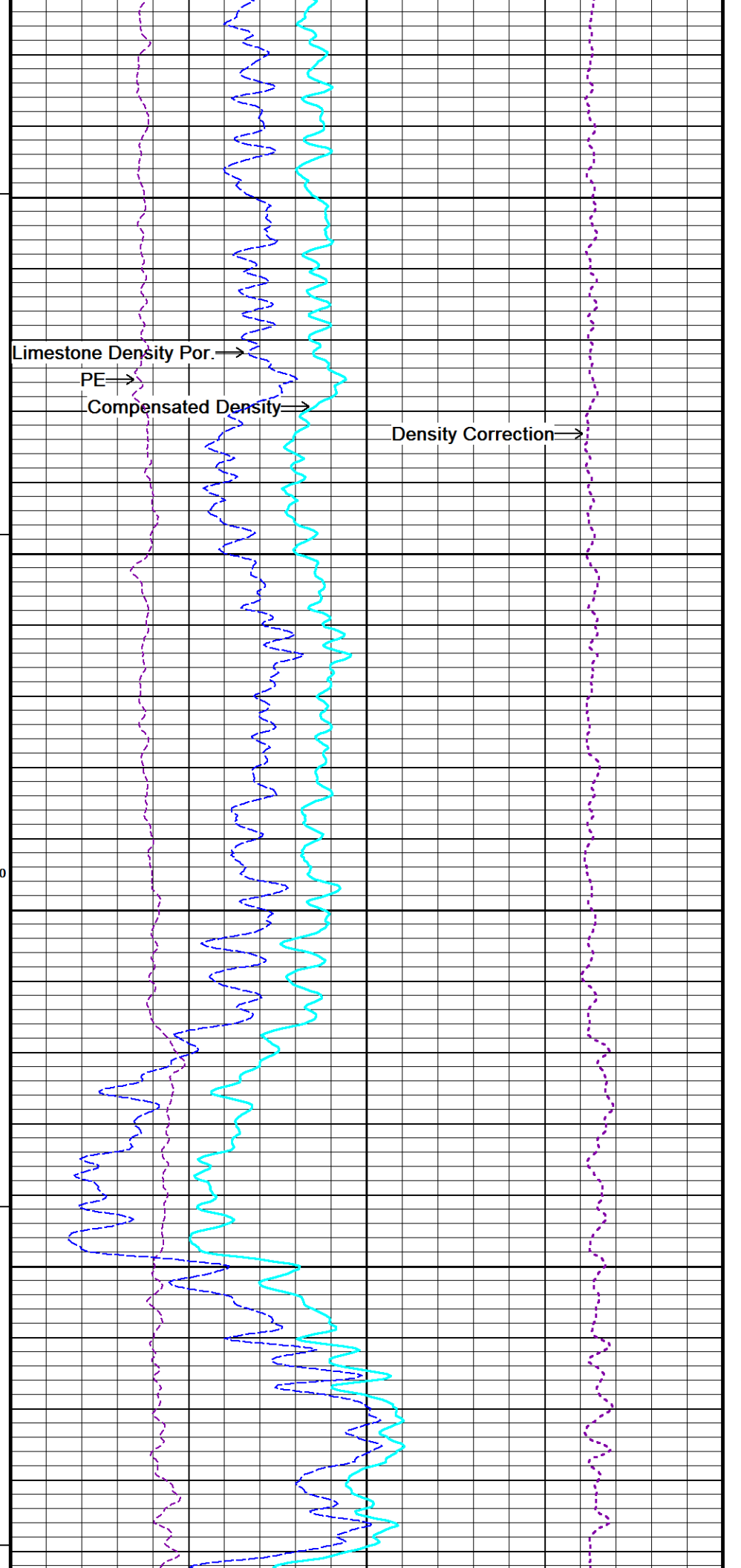
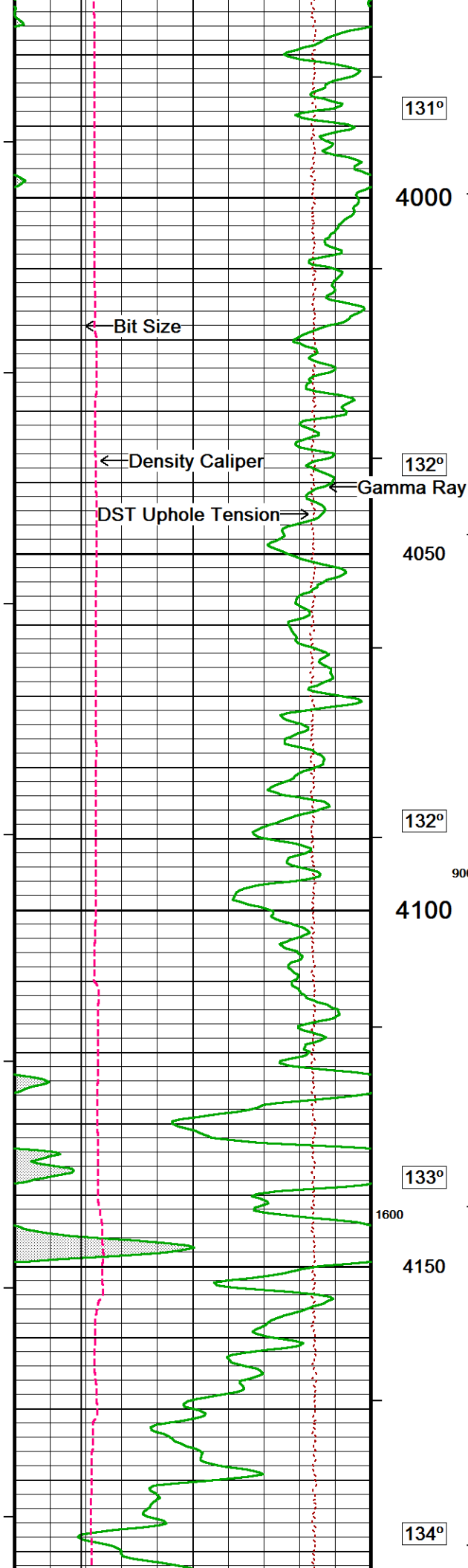




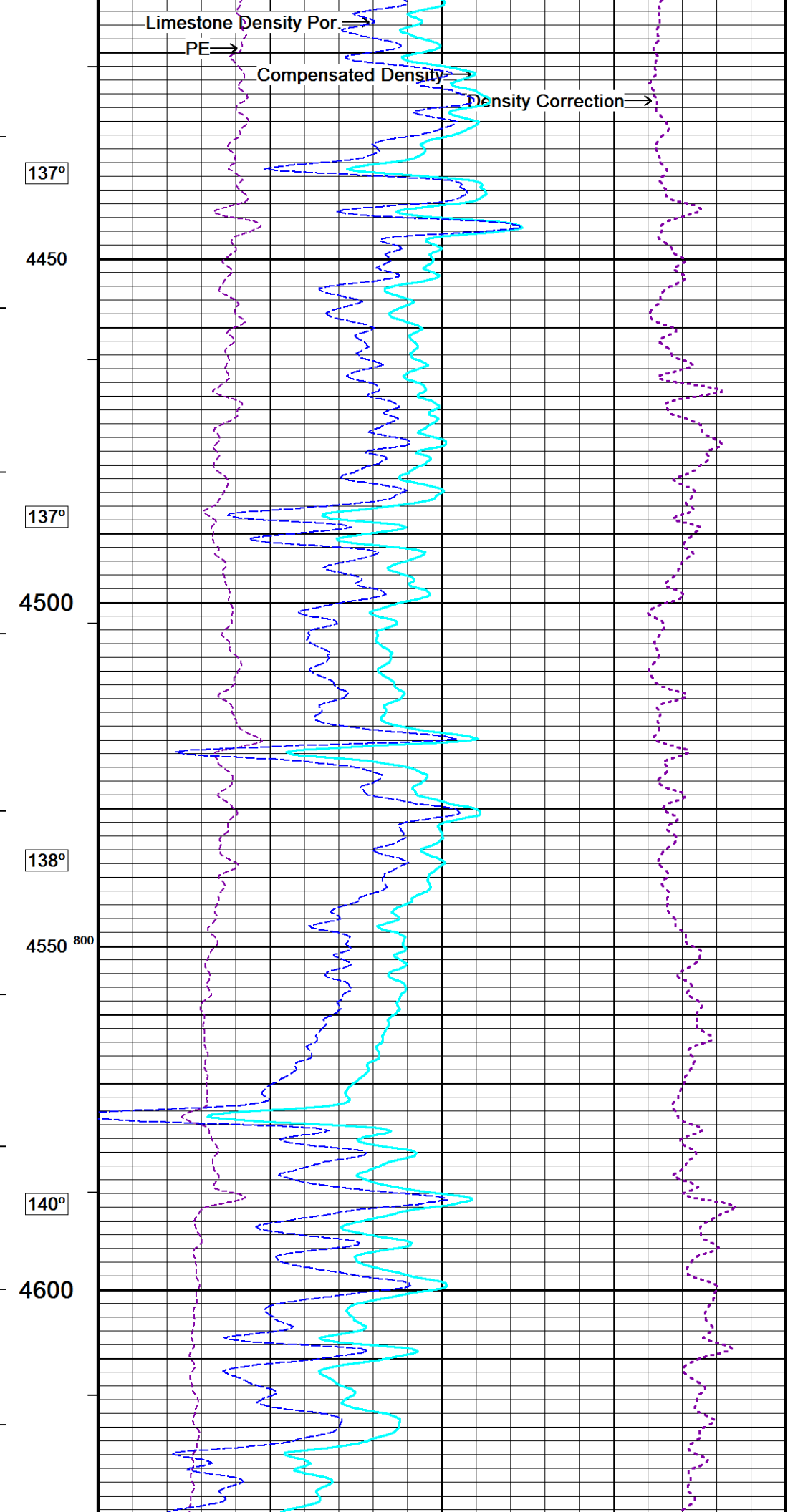
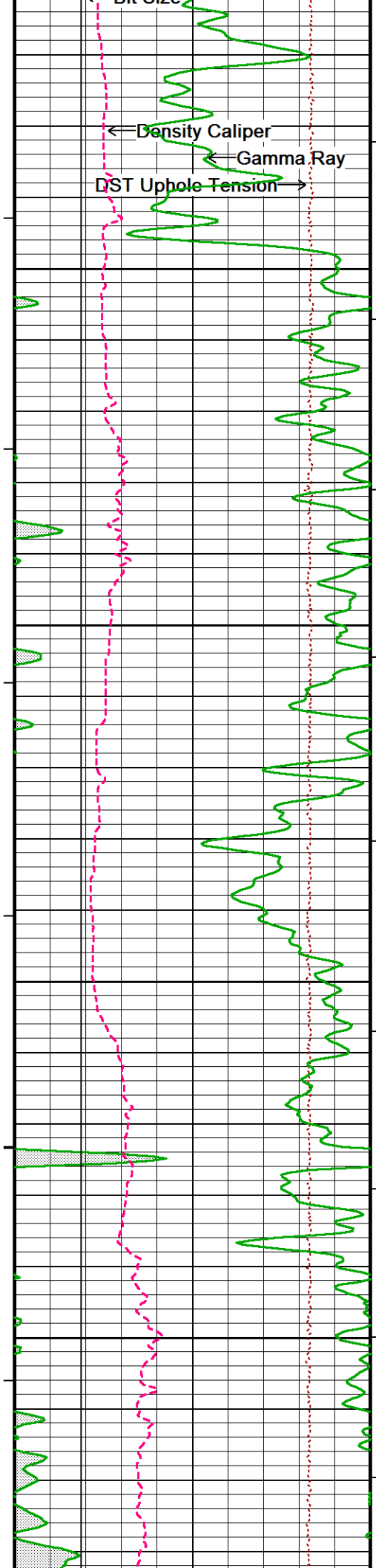


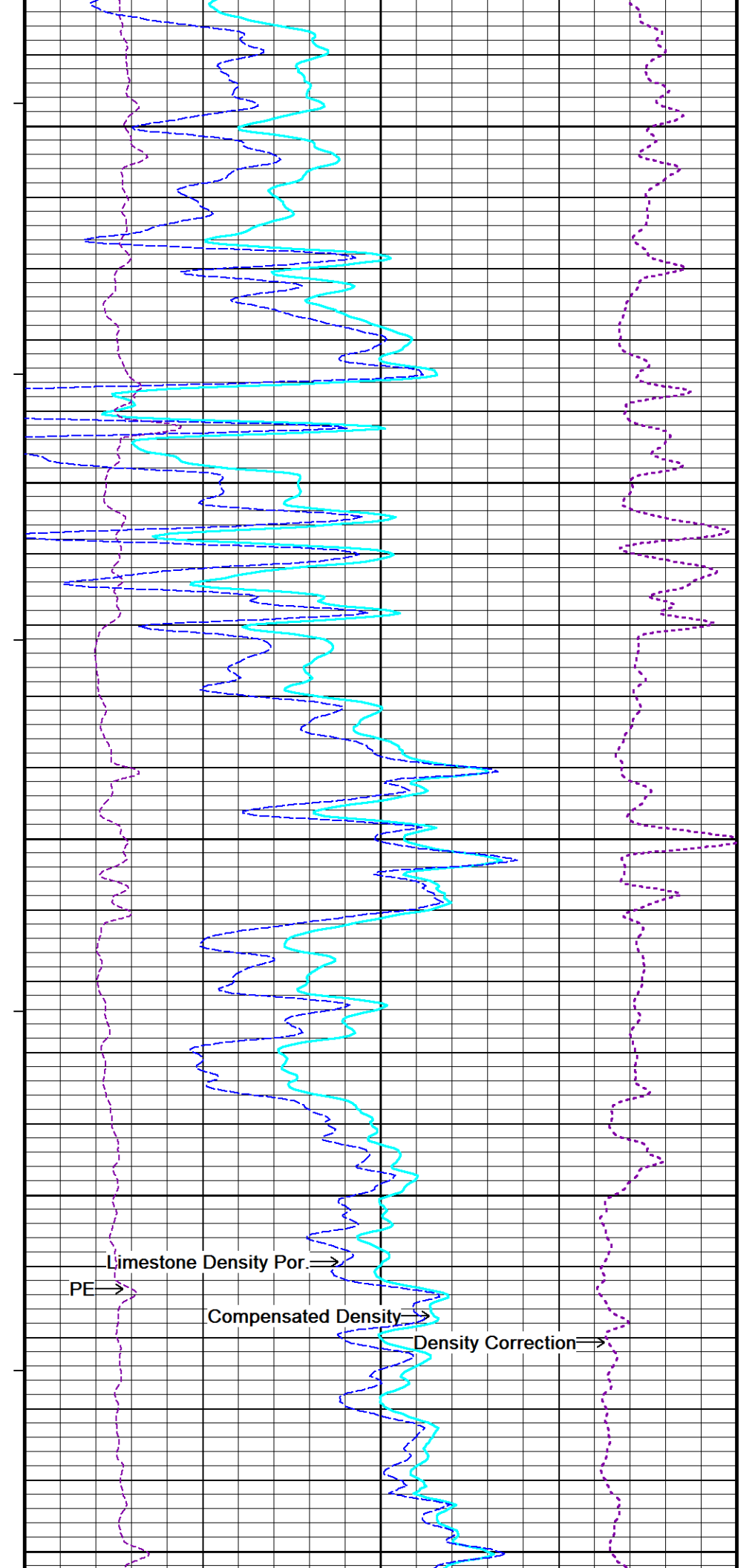
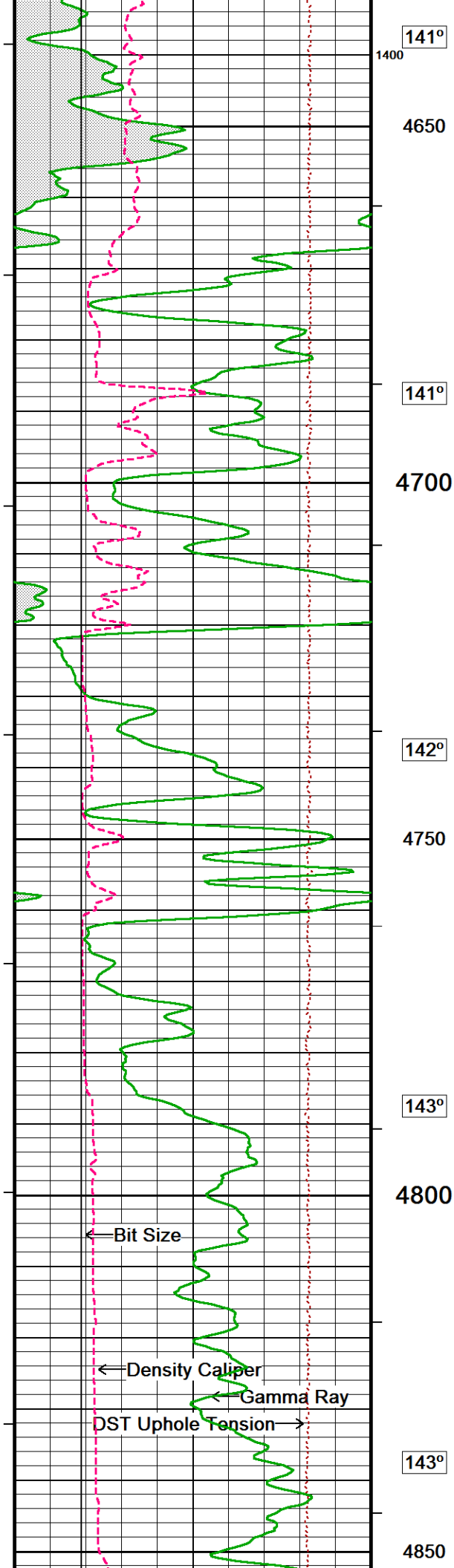


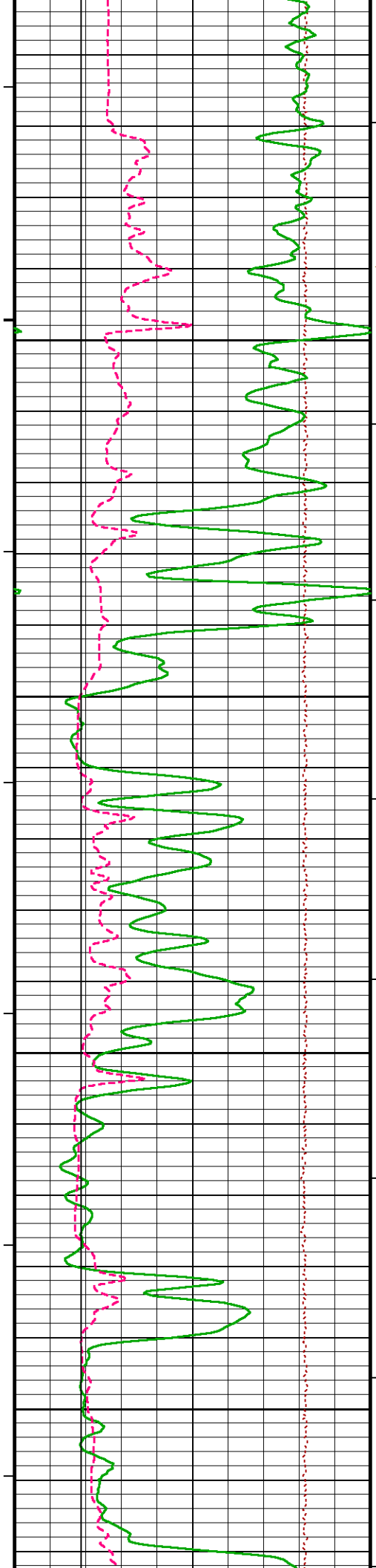












144°

1300

4900

145°

700

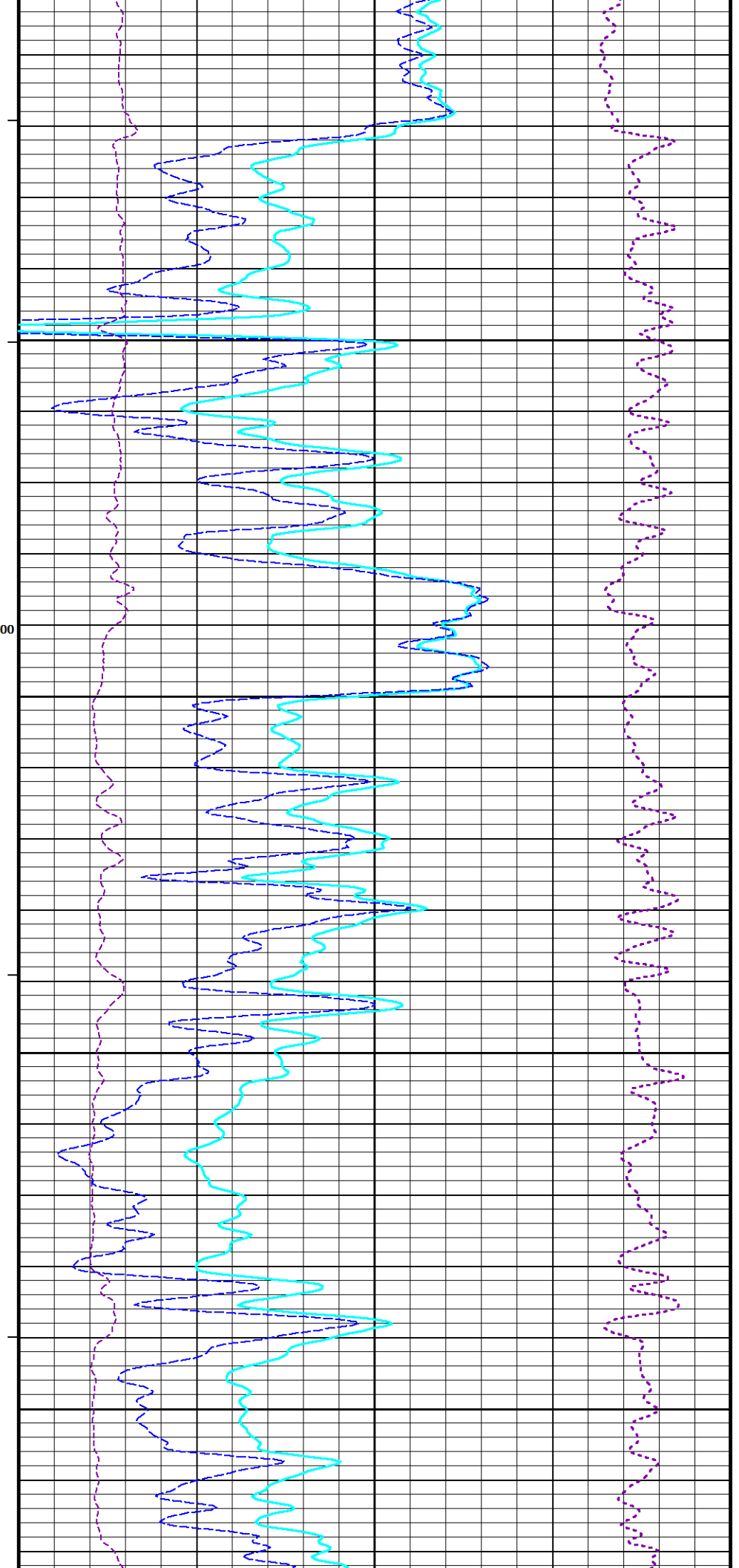
4950

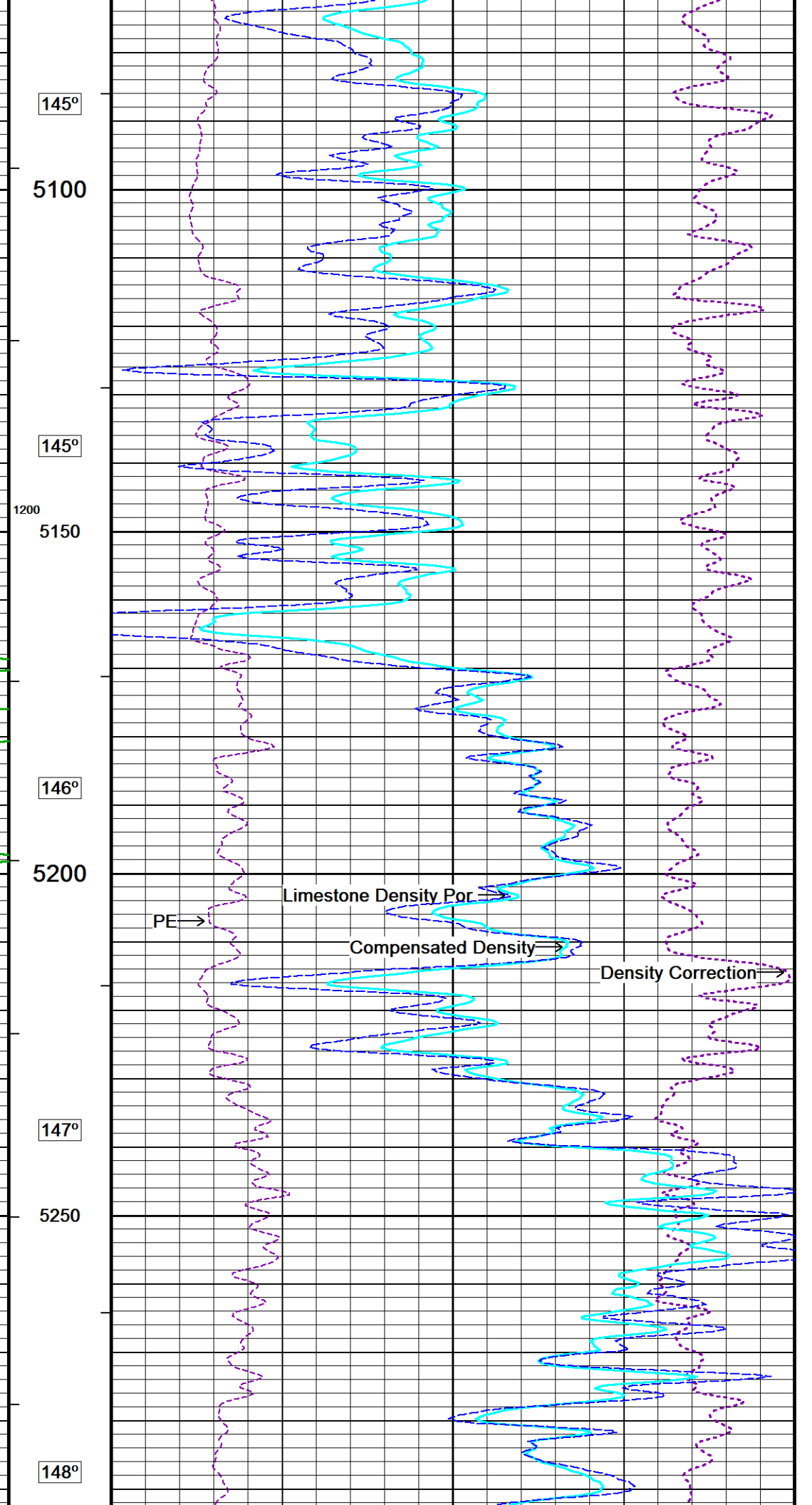
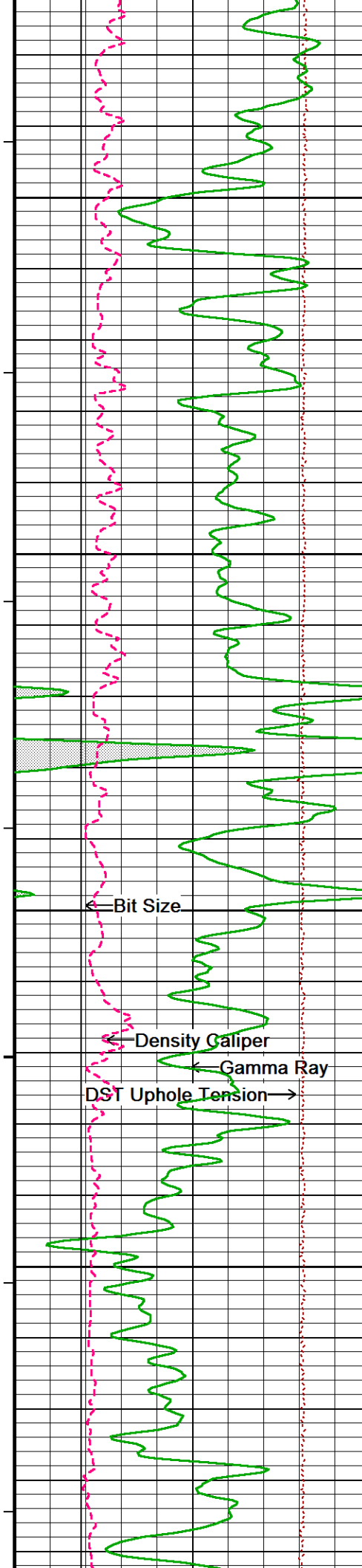
145°

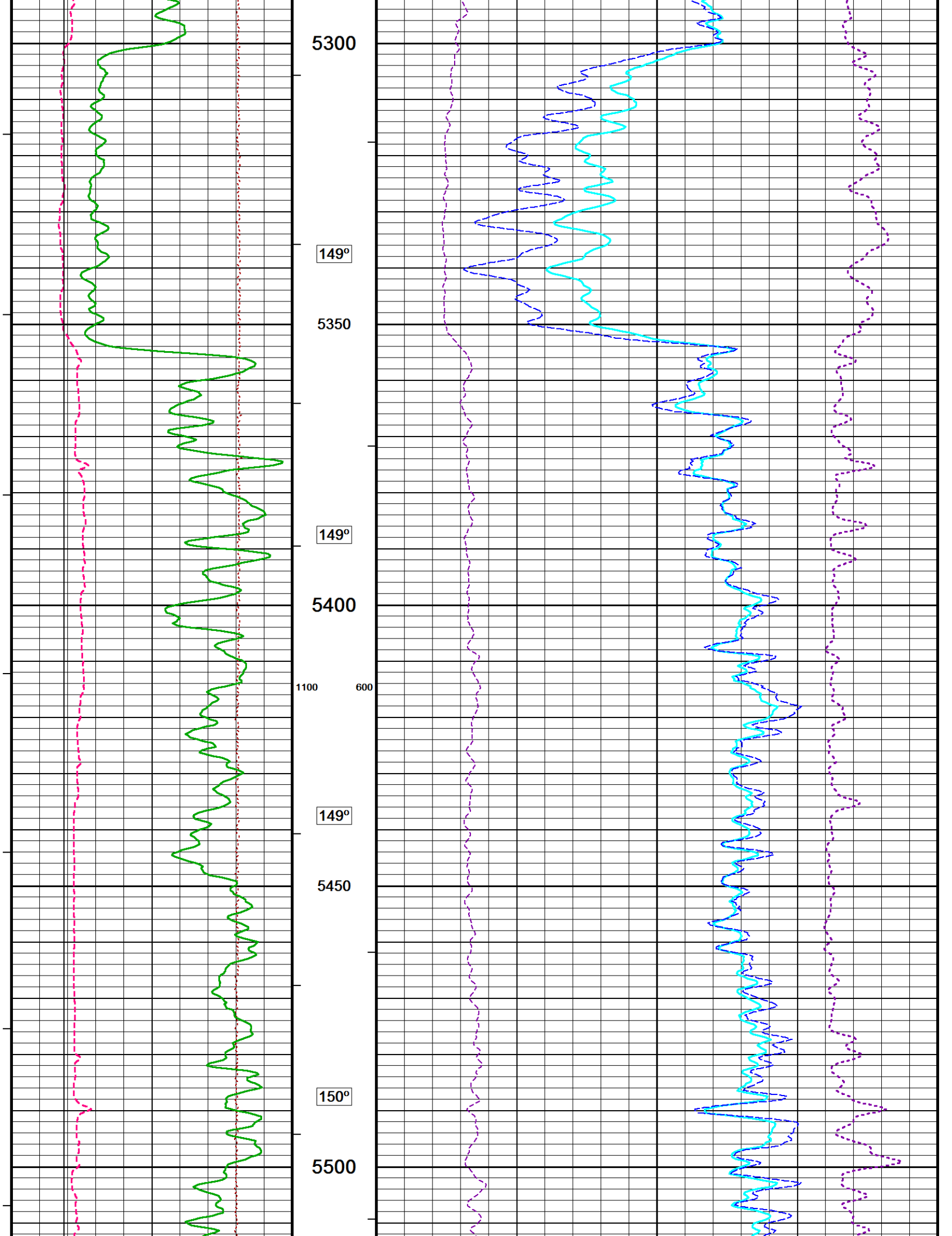
5000

145°

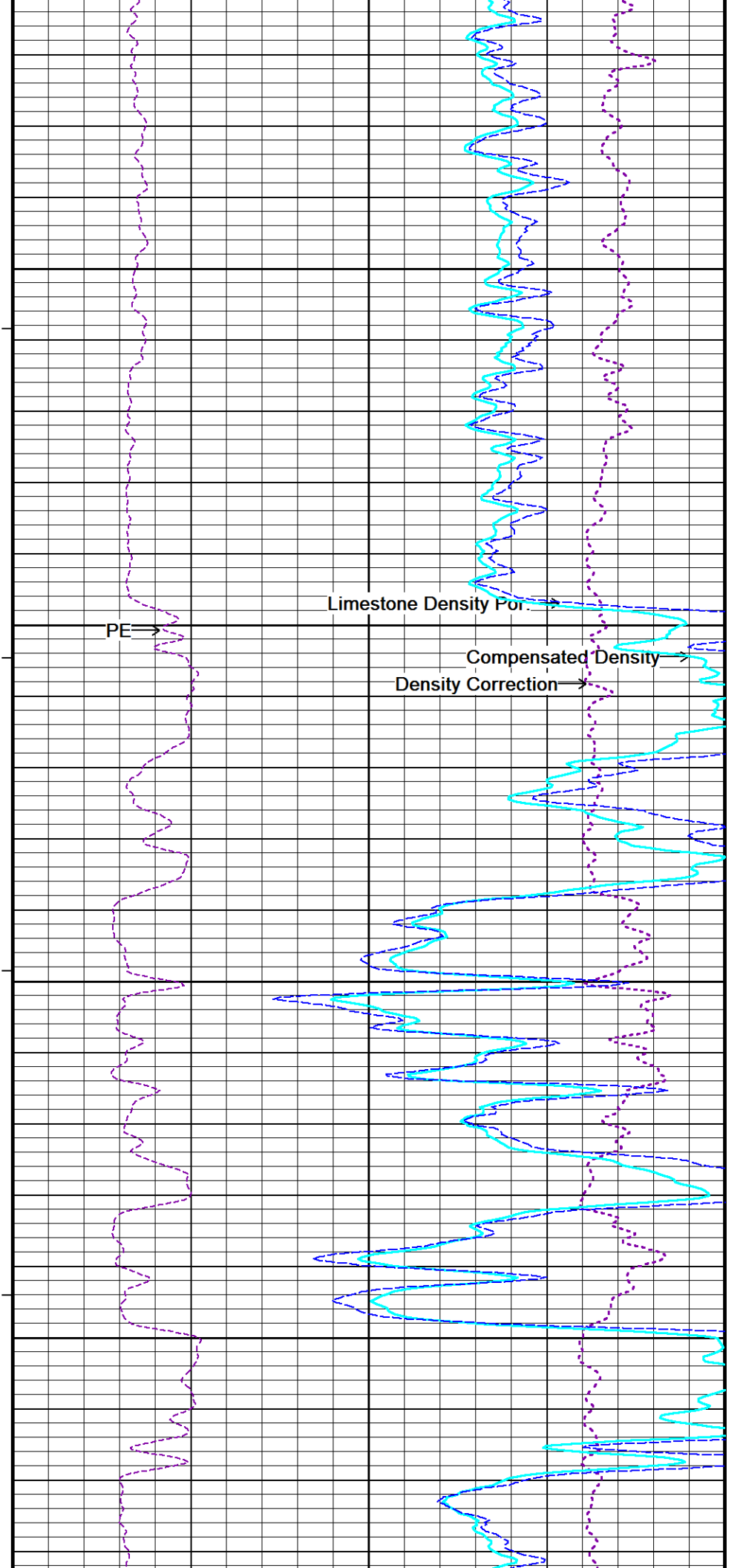
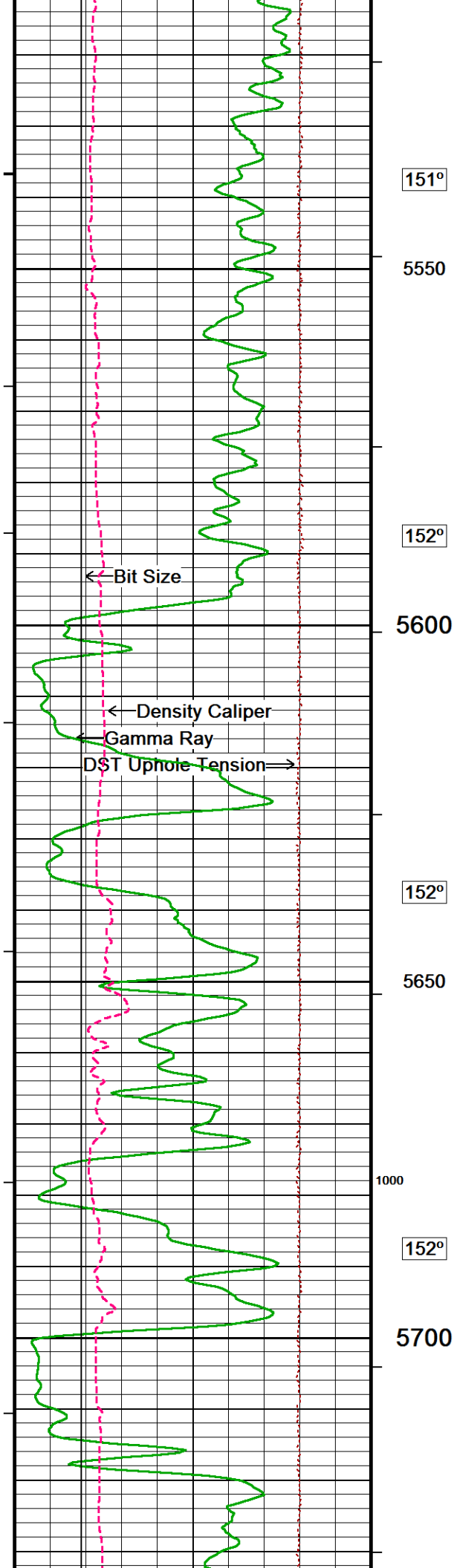
5050

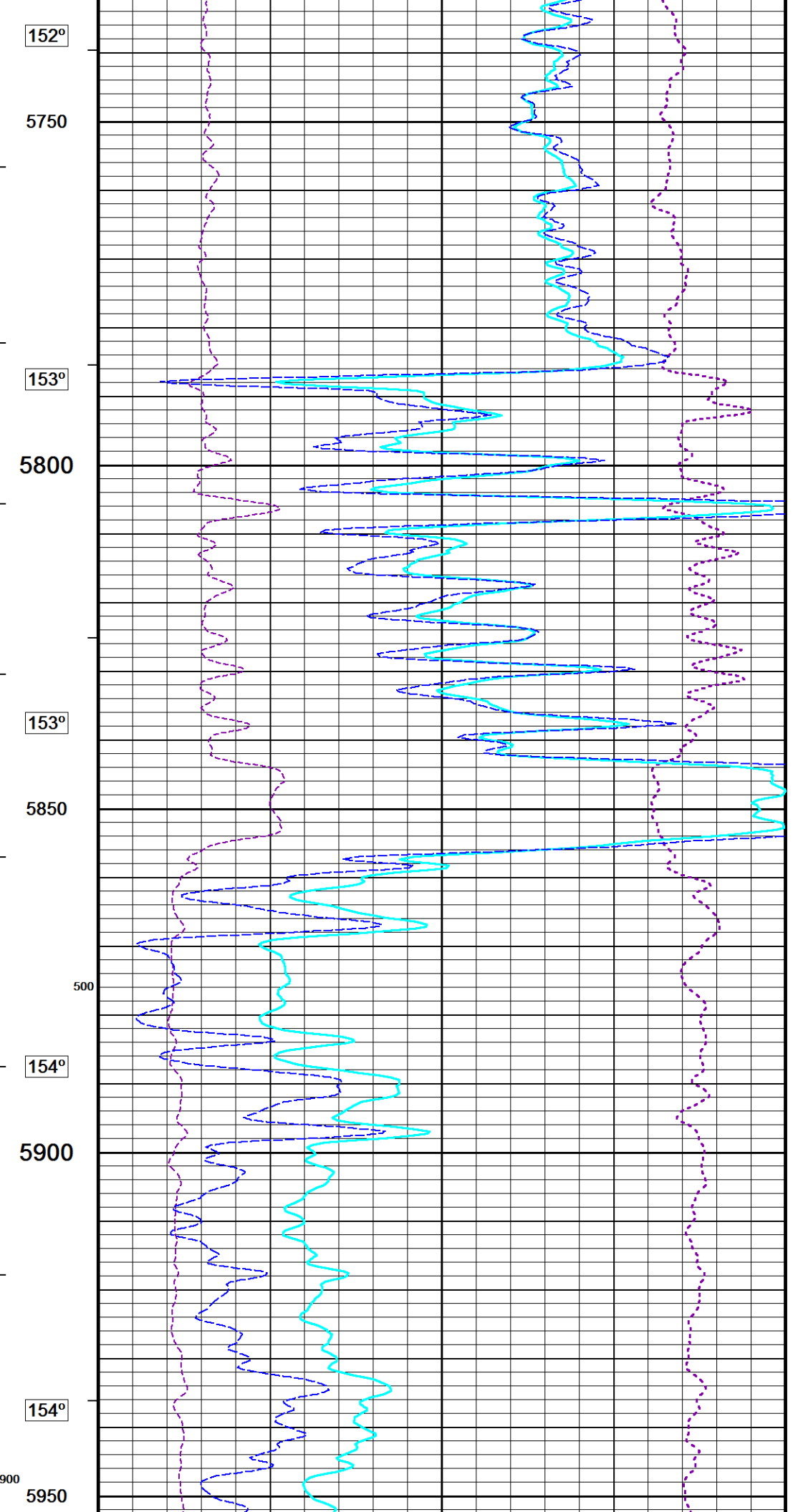
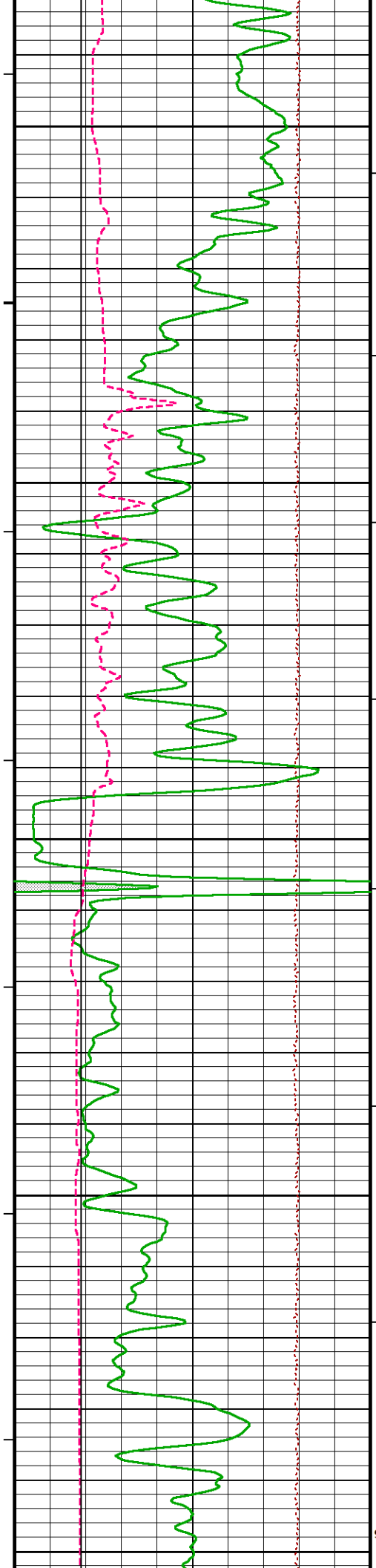


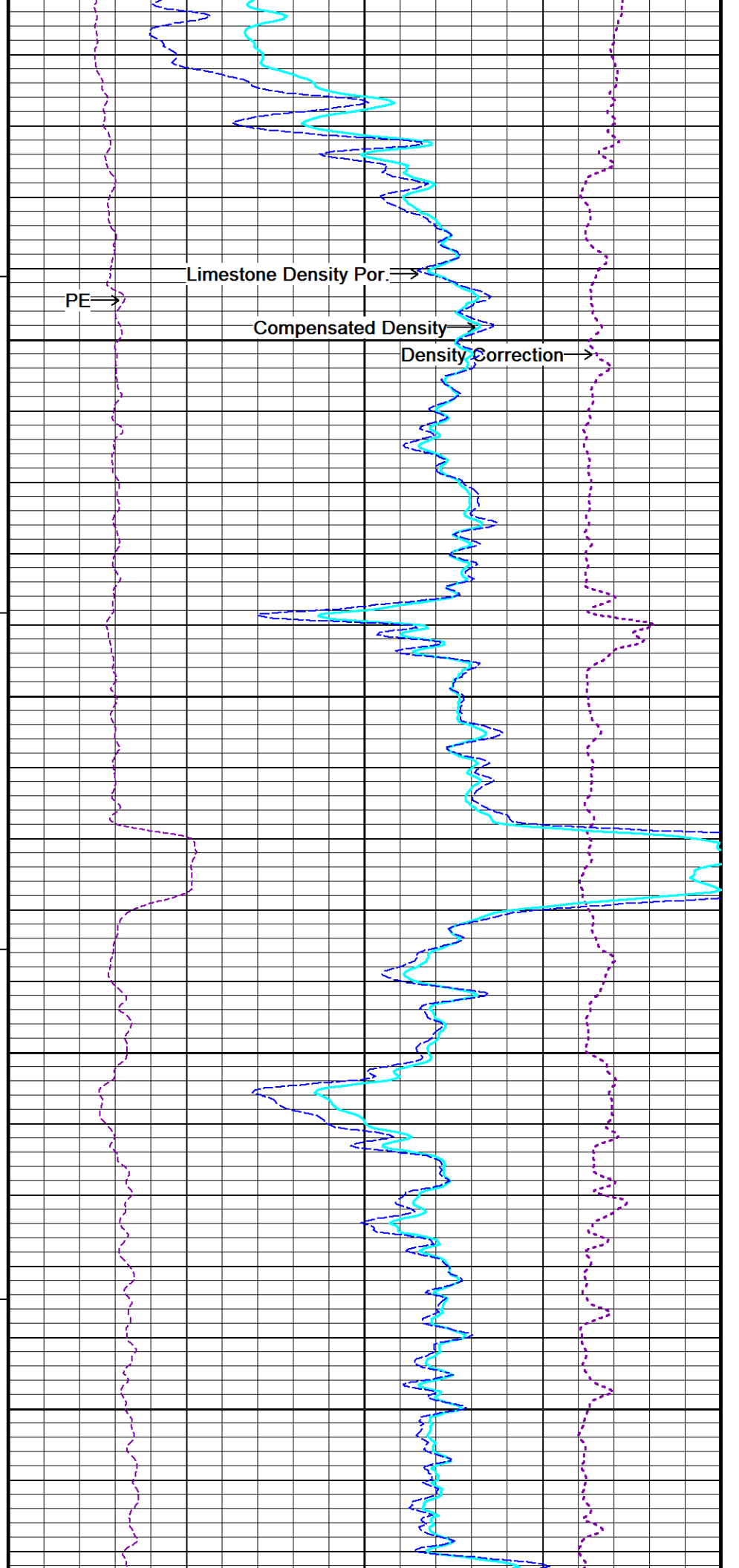
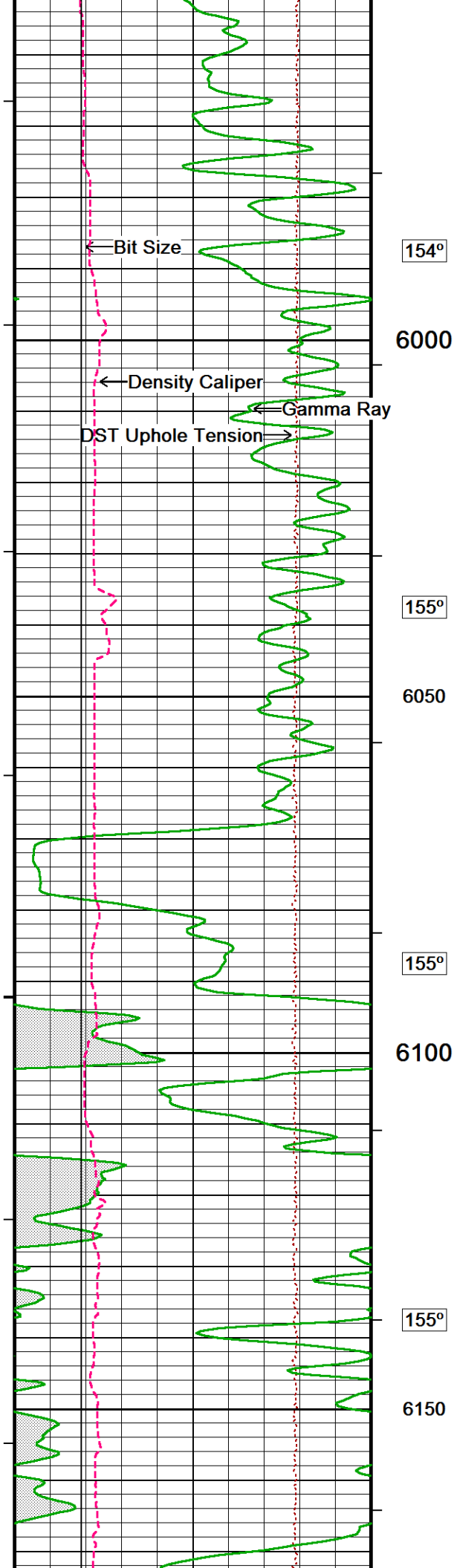


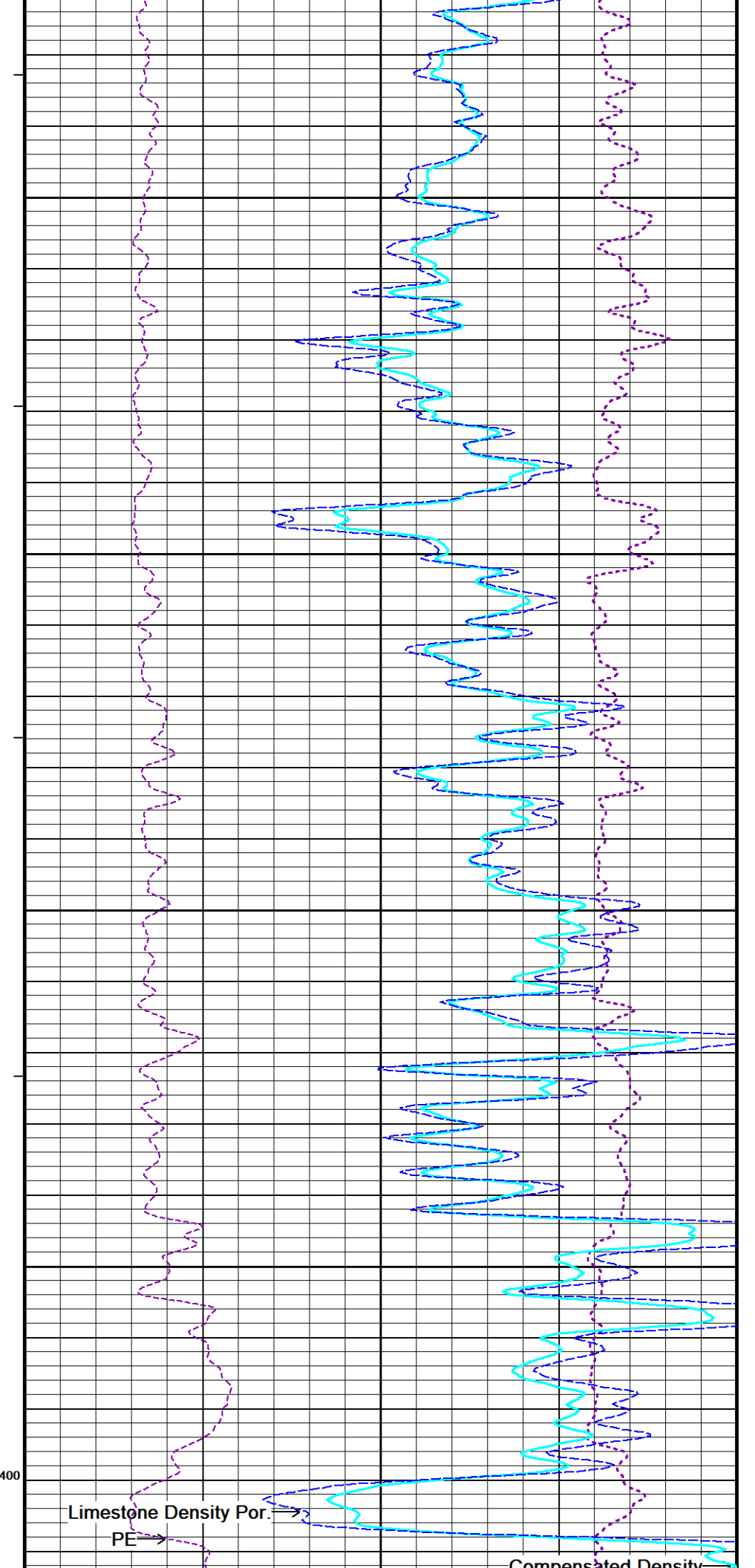
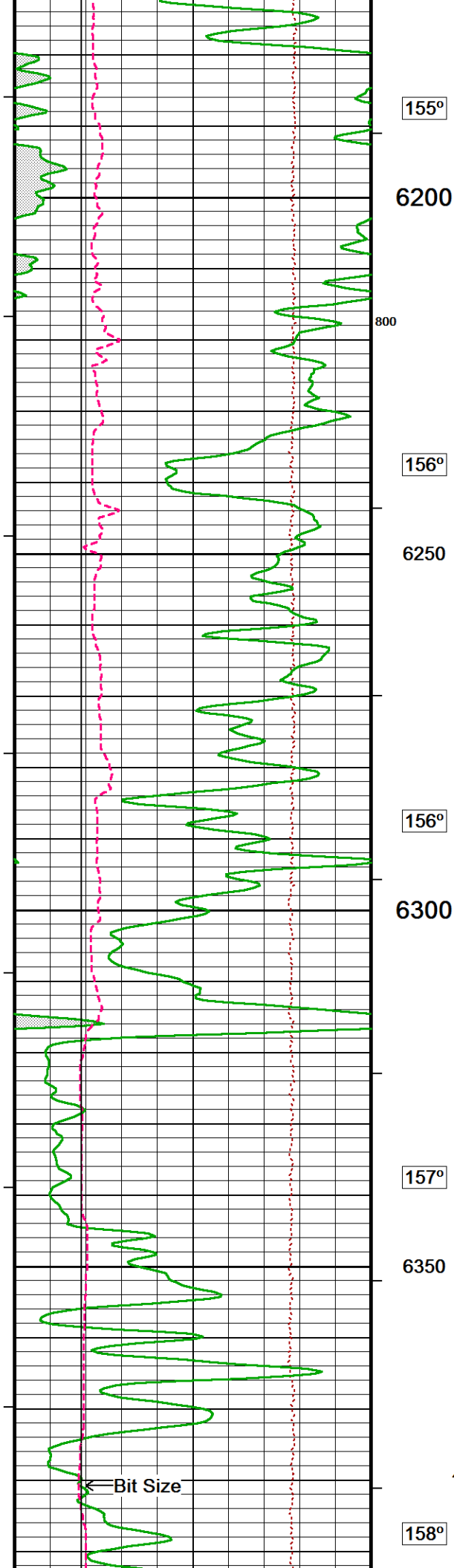


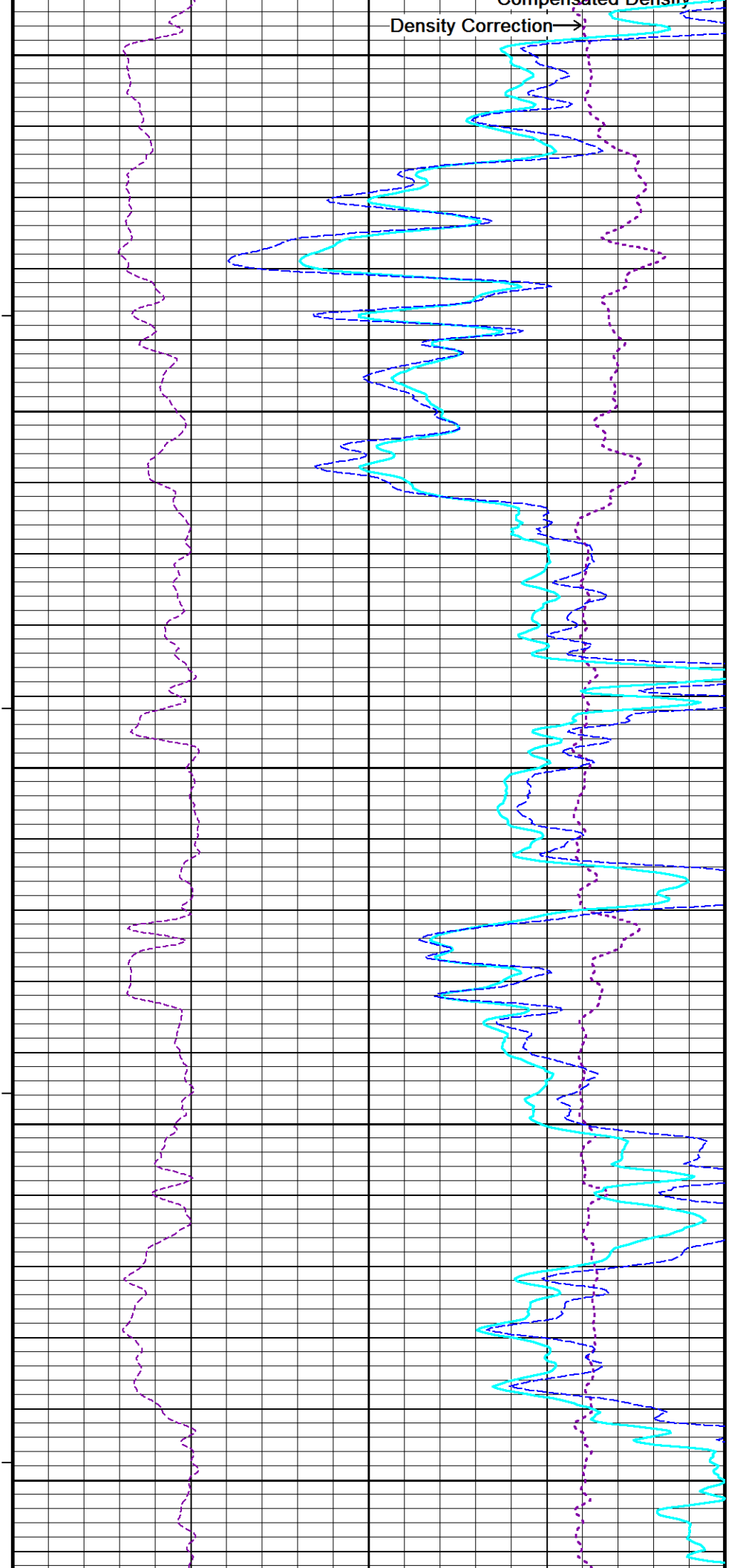
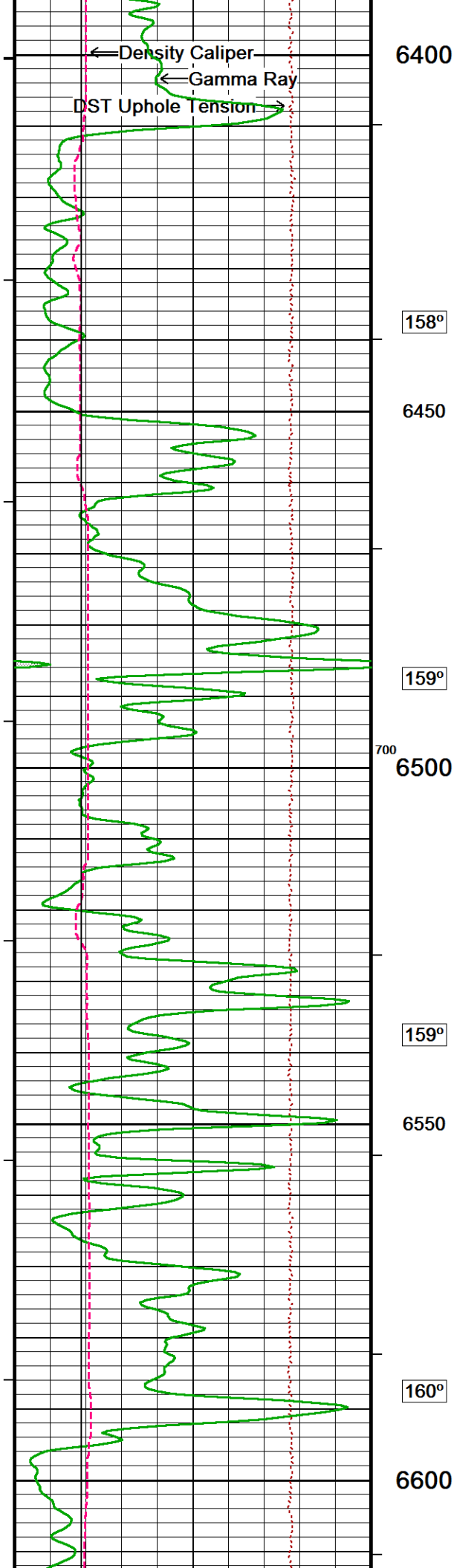


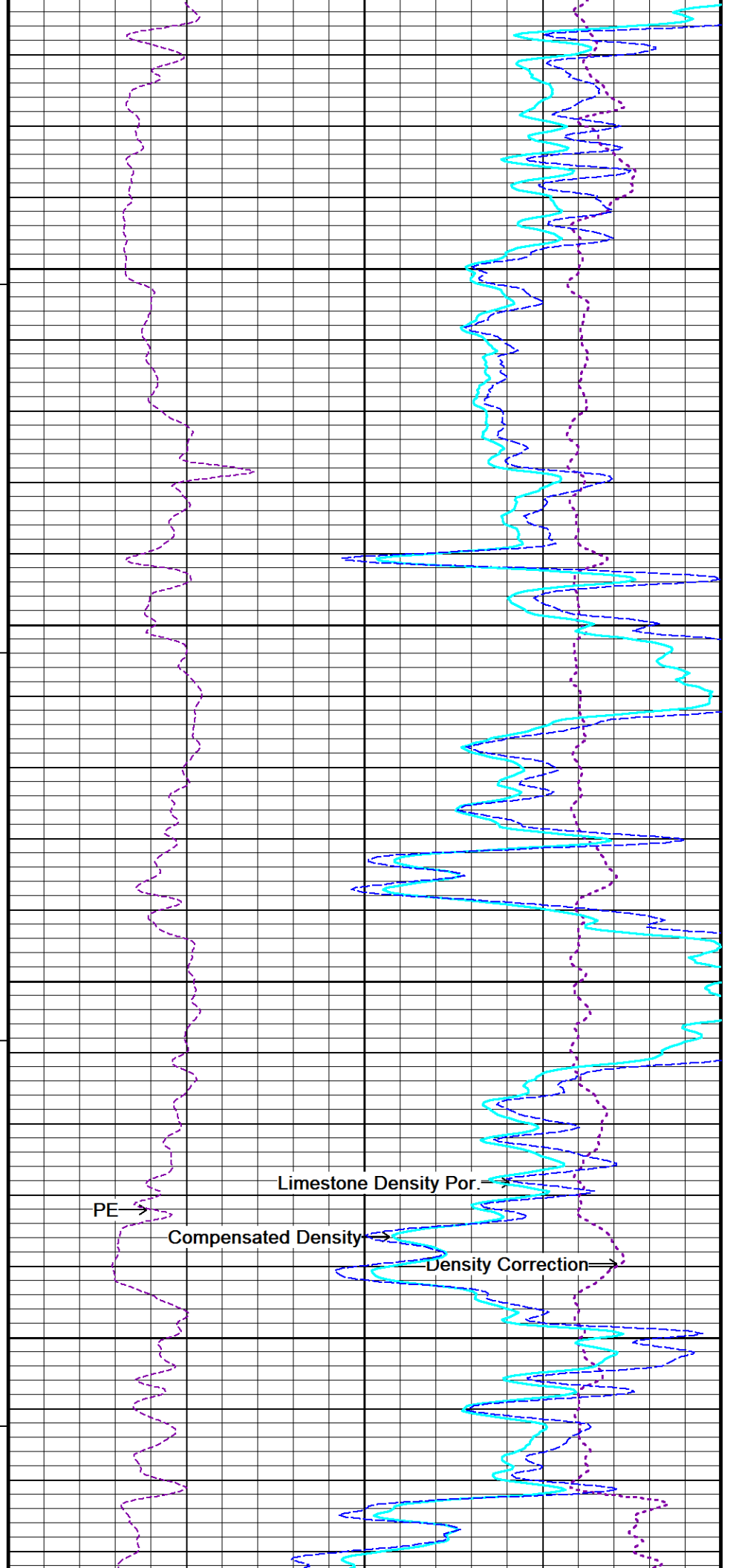
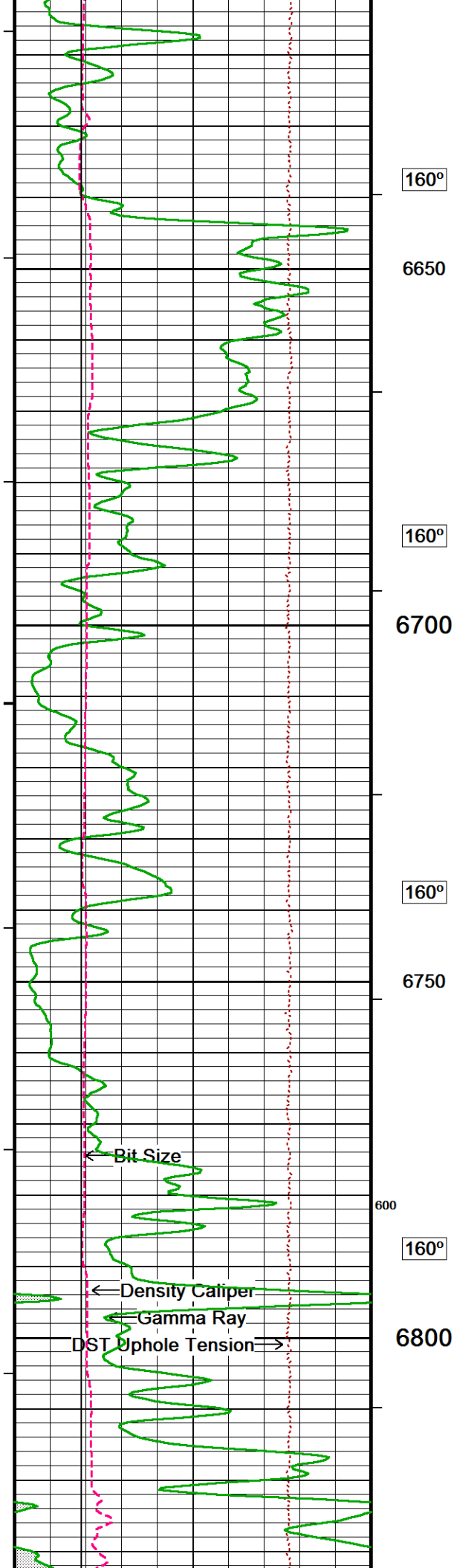


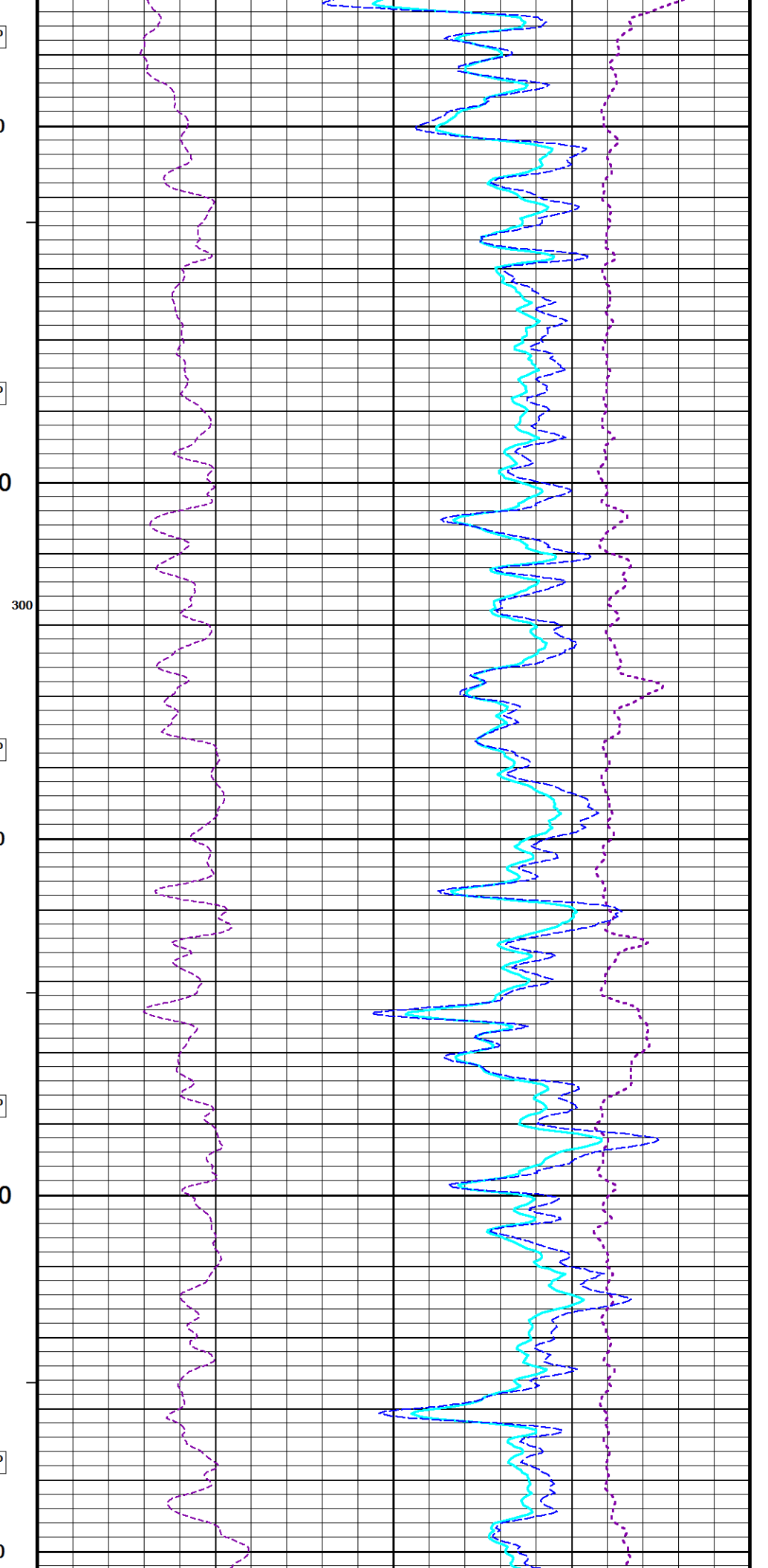
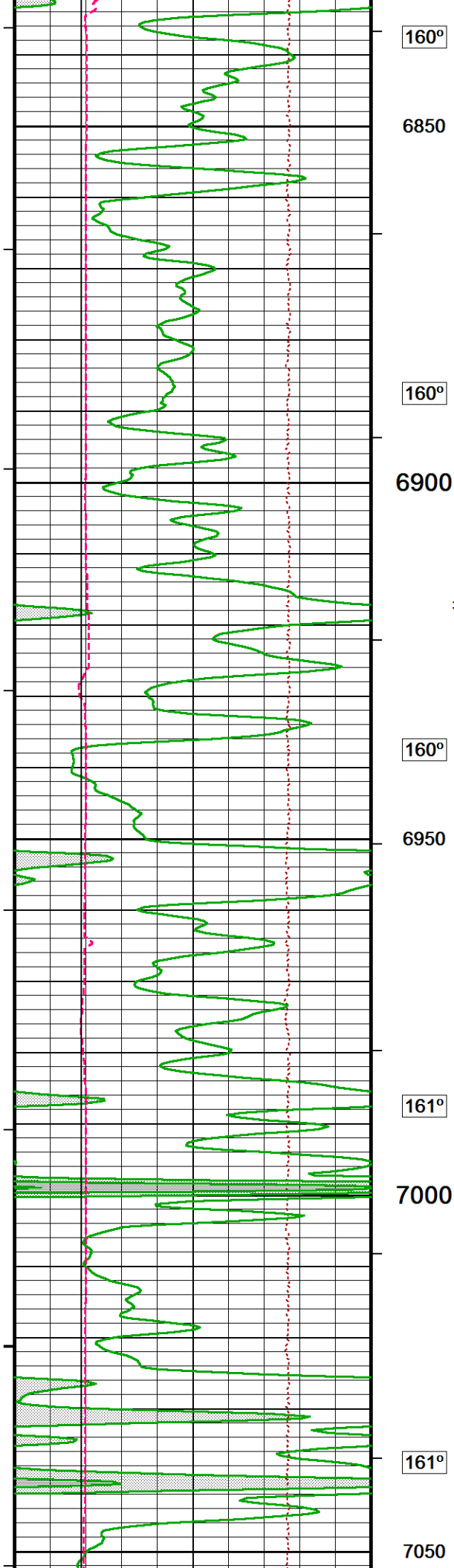


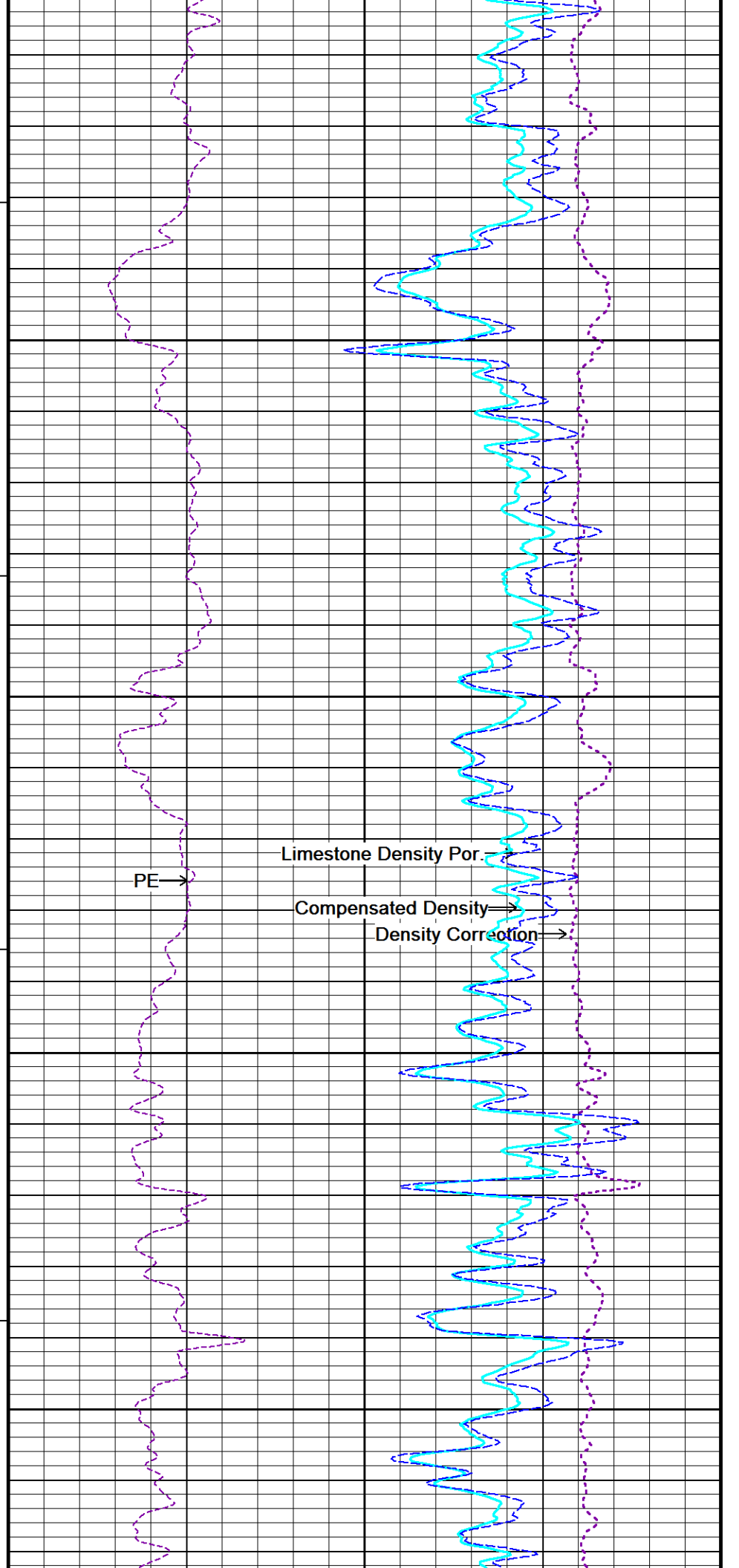
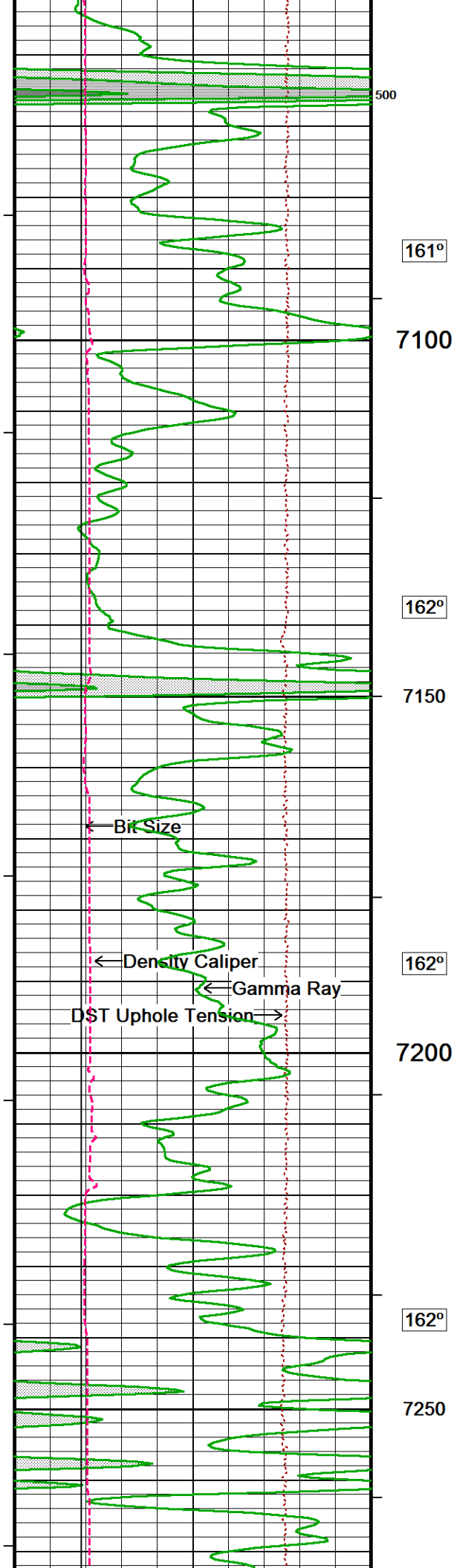




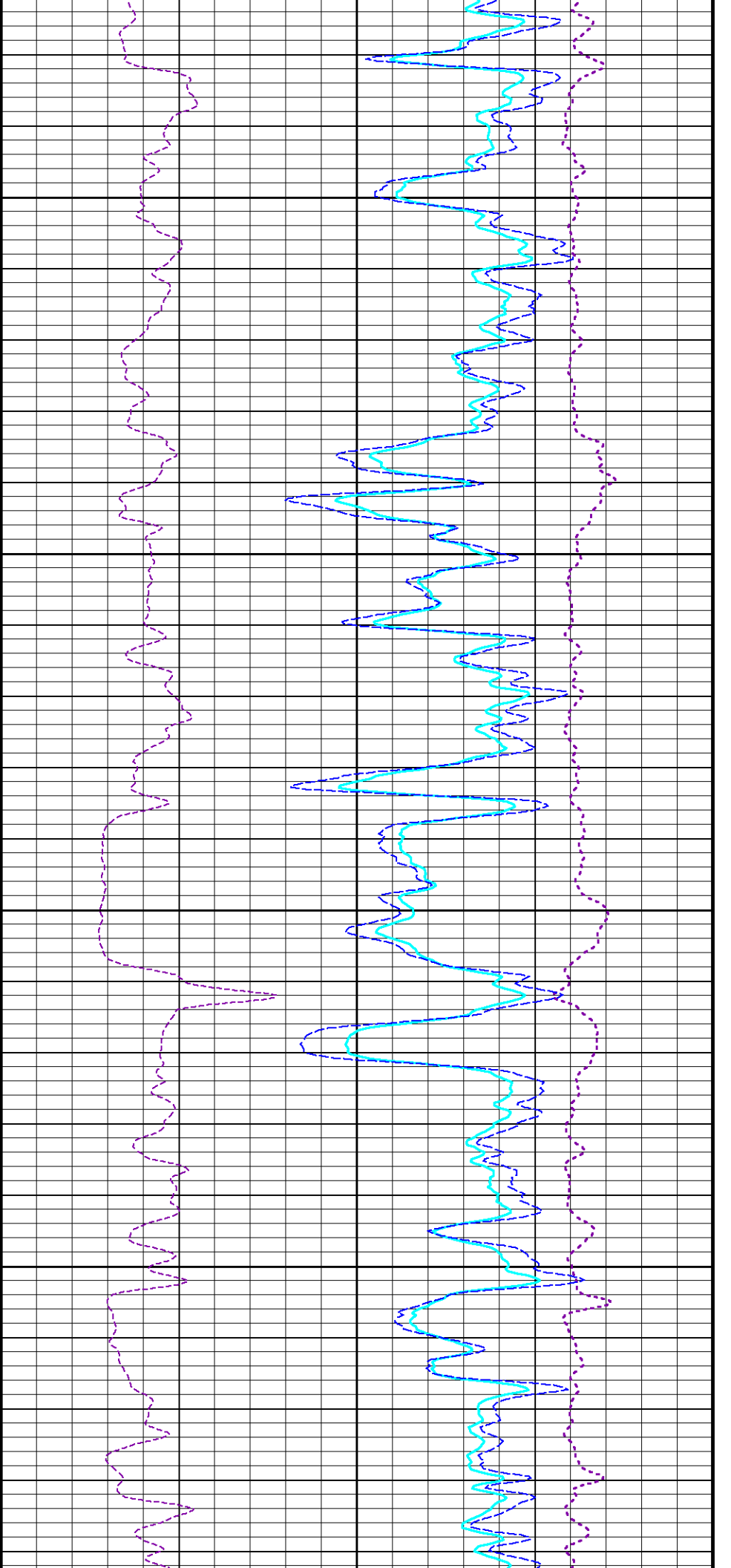
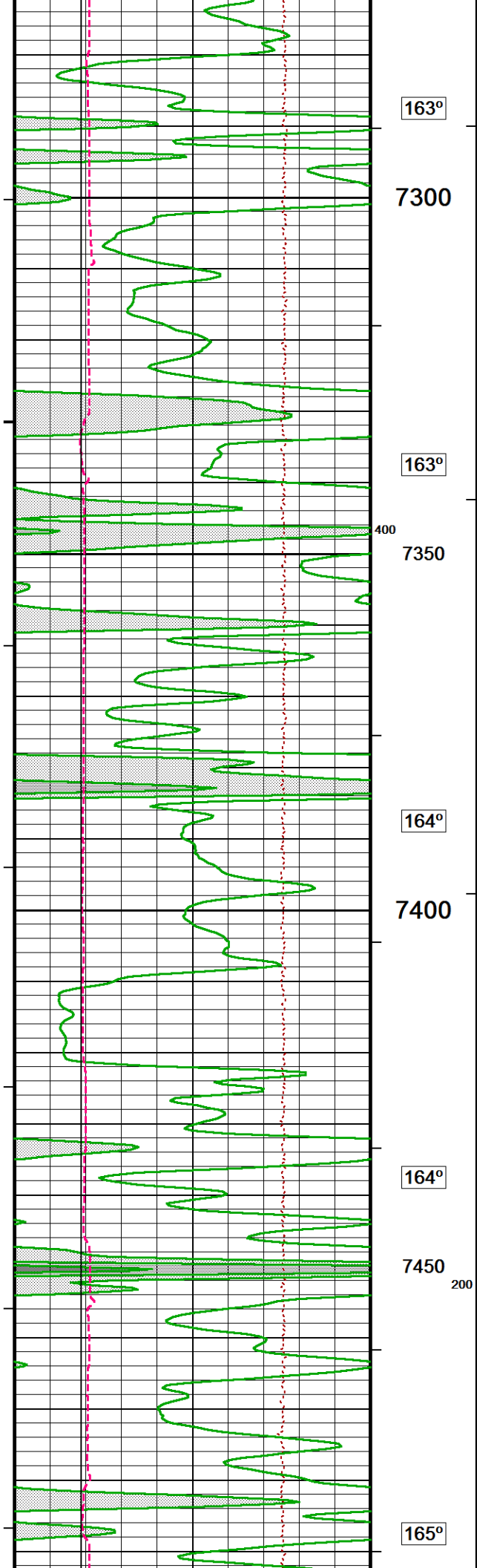


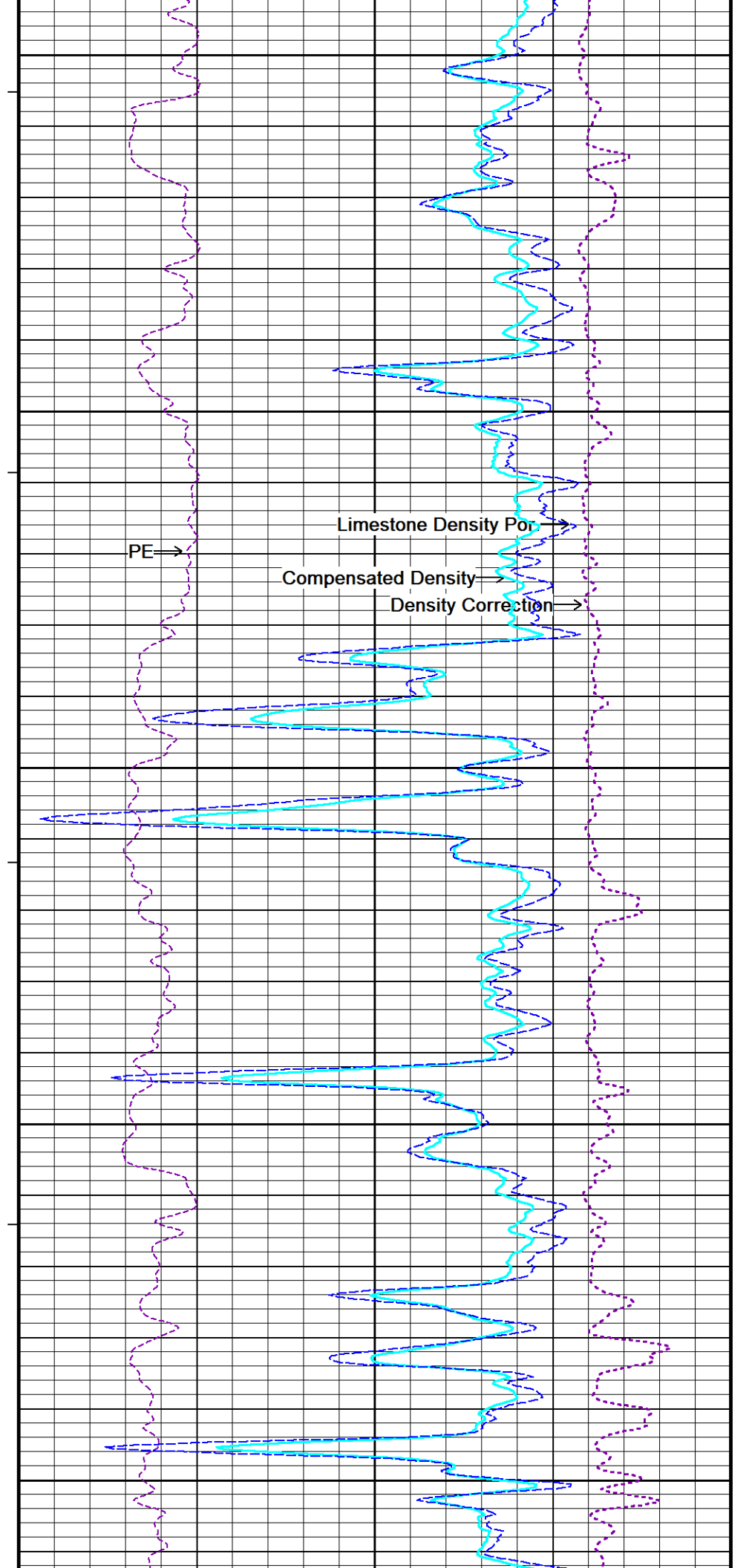
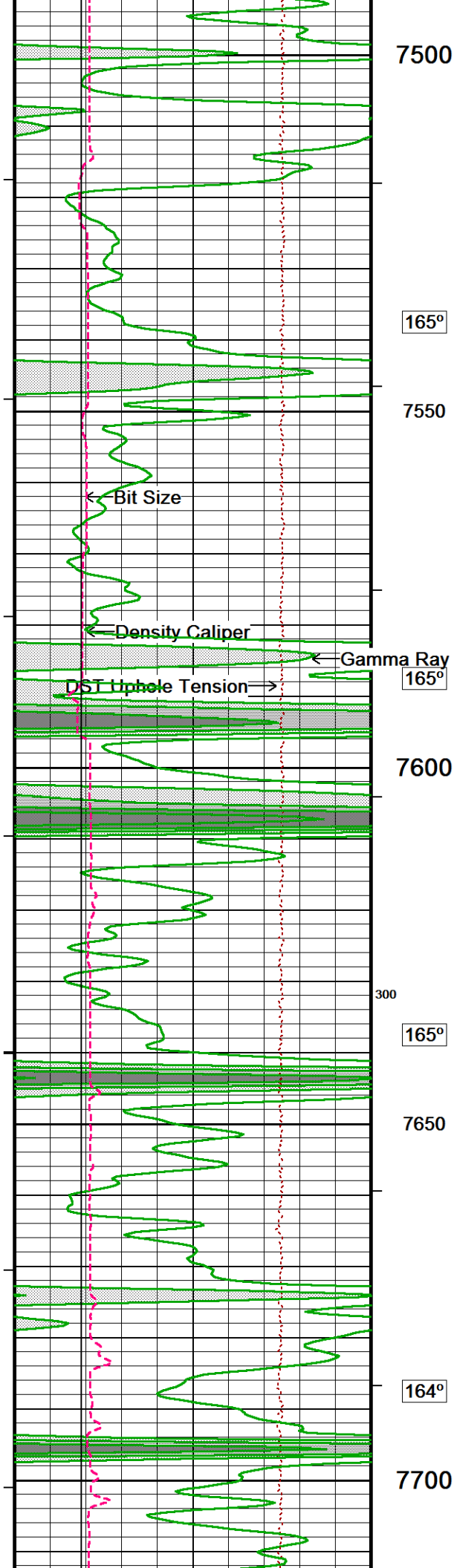


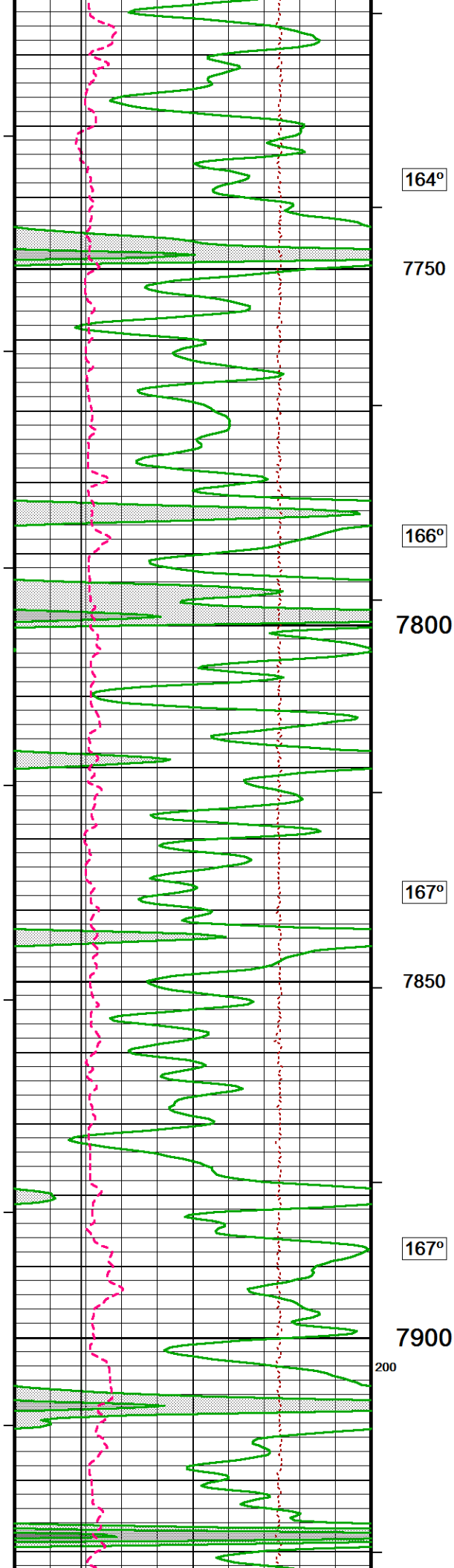












164°

7750

166°

7800

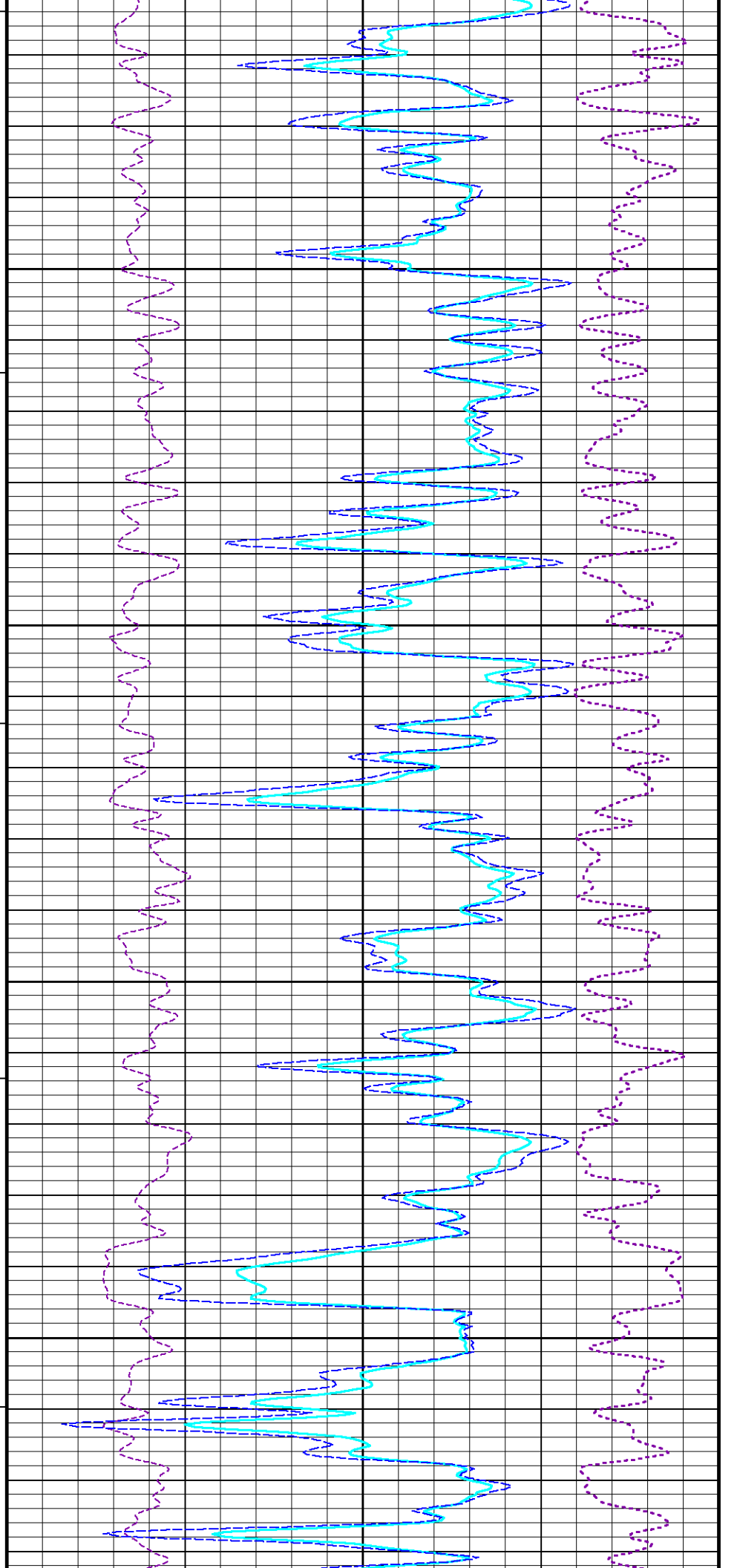
167°

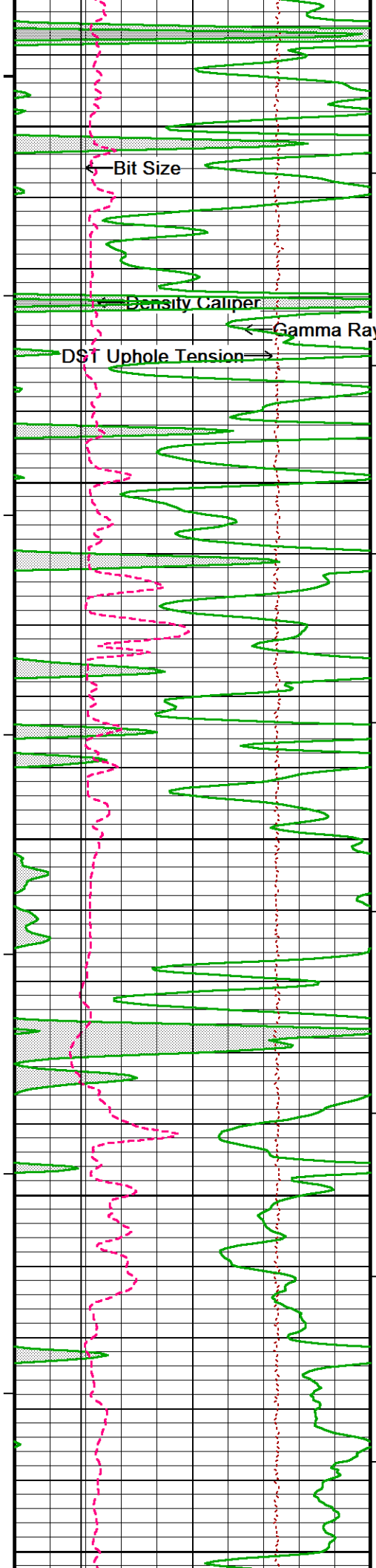
7850

167°

7900

200





167°

7950

167°

8000

168°

8050

171°

8100

172°

8150

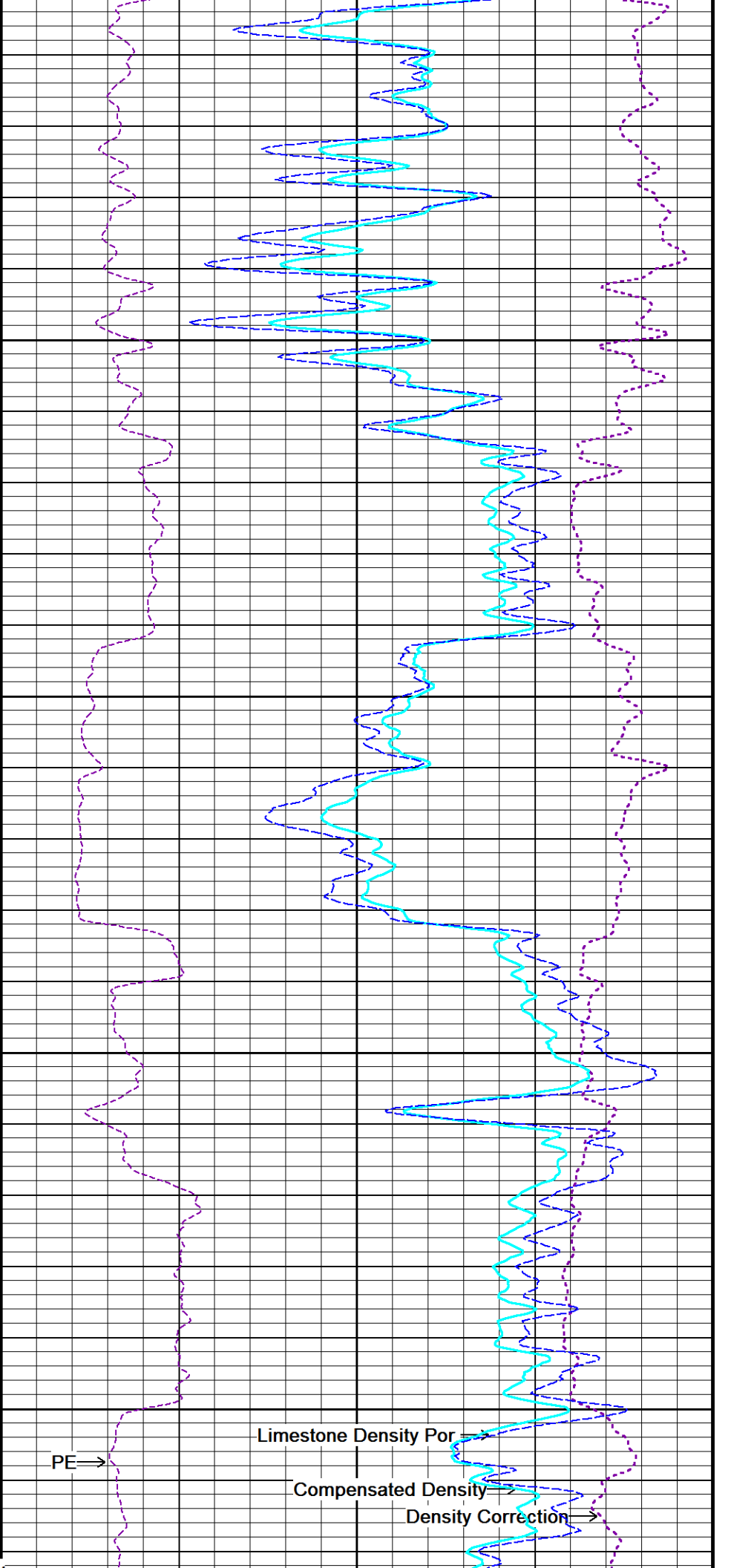
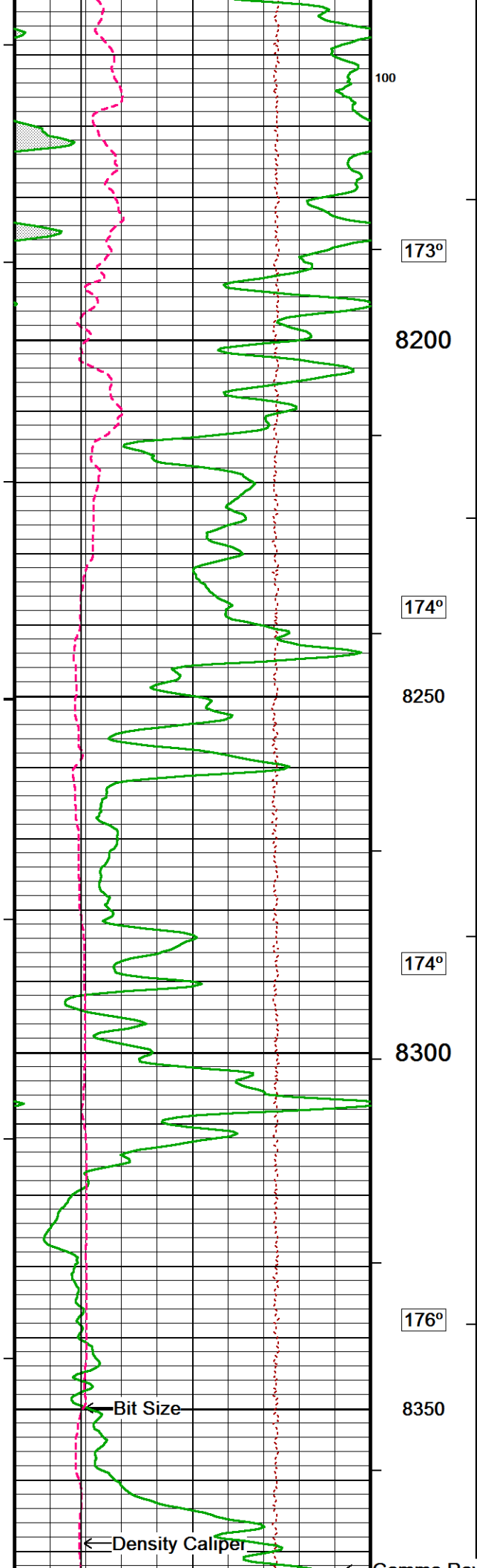
100

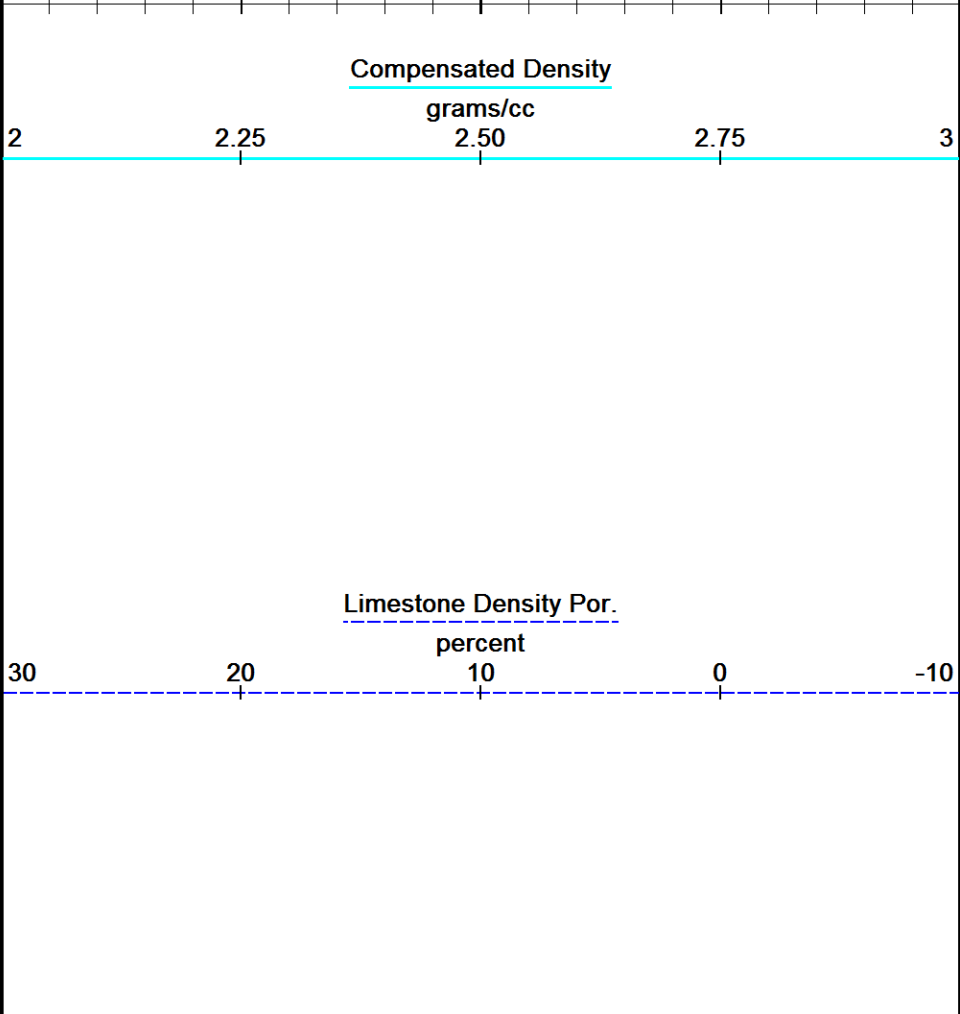
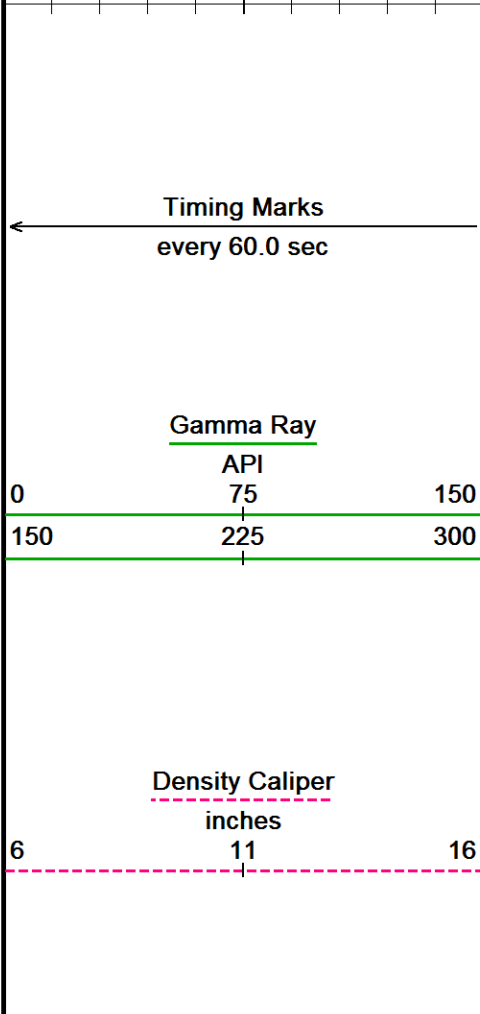
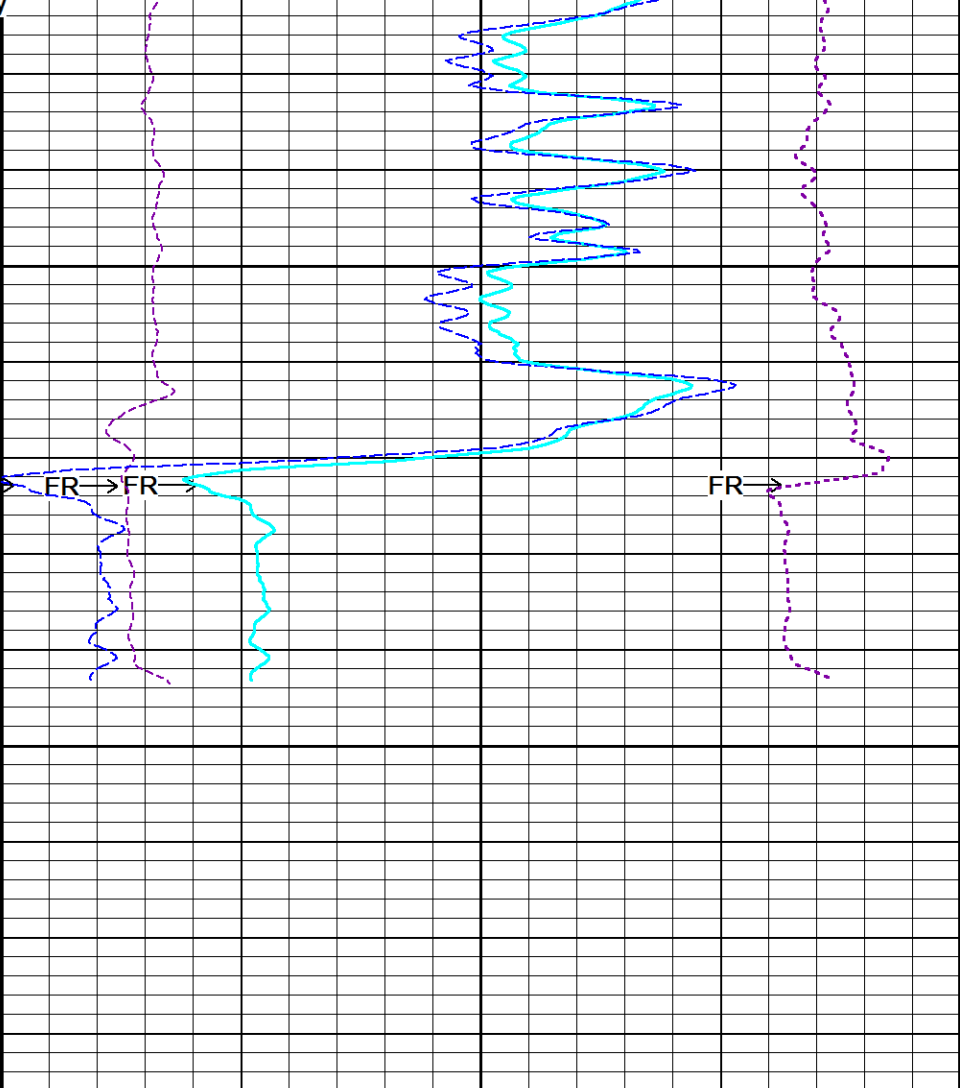
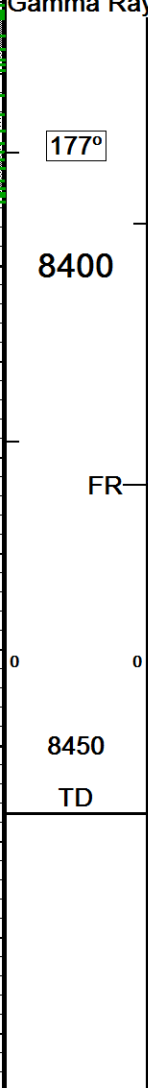
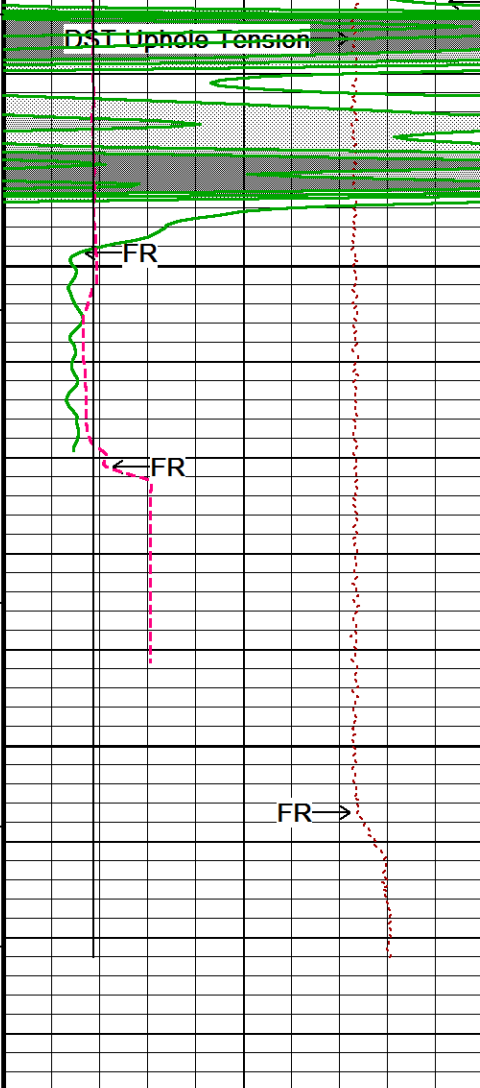
Limestone Density Por.

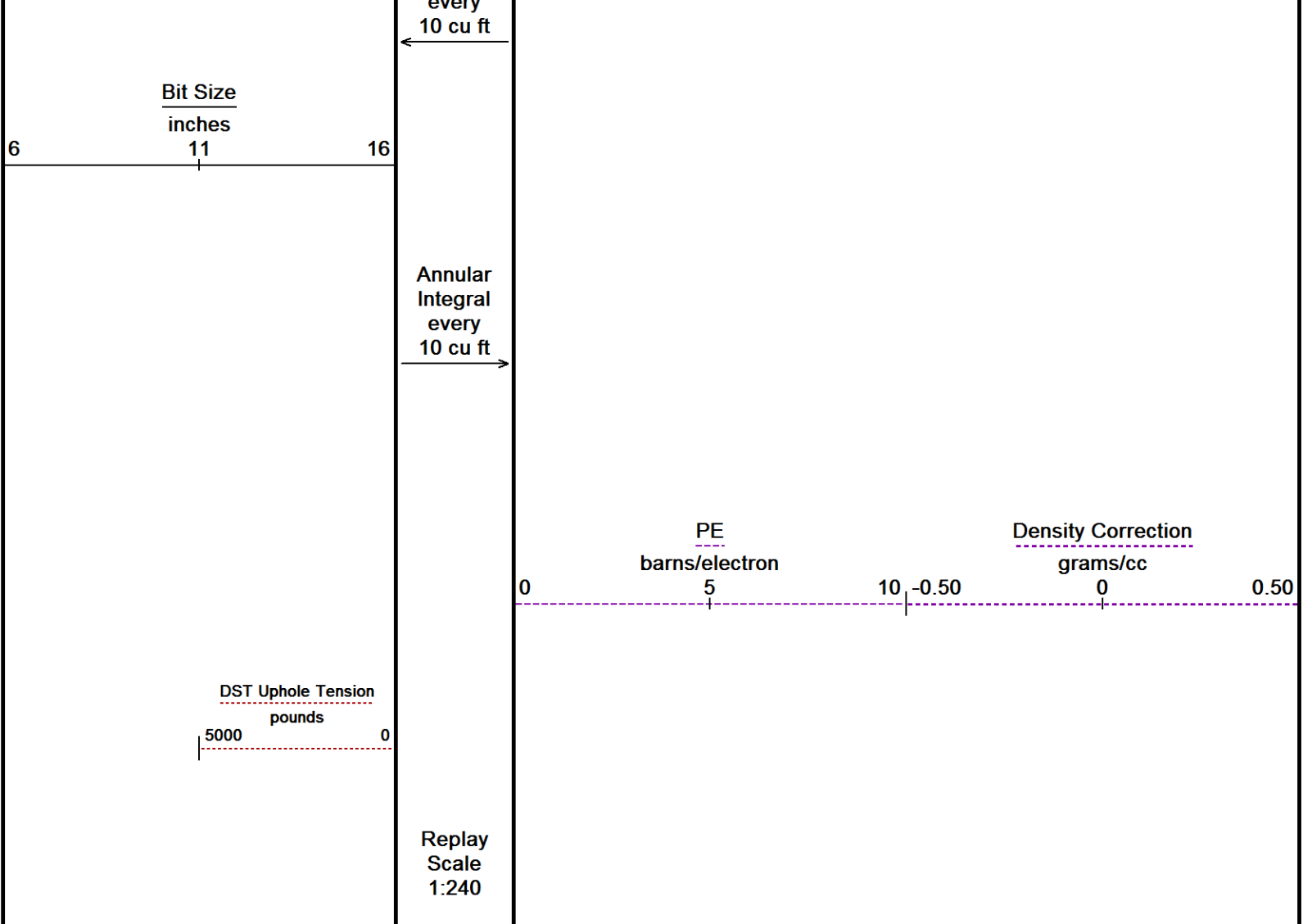
PE

Compensated Density

Density Correction





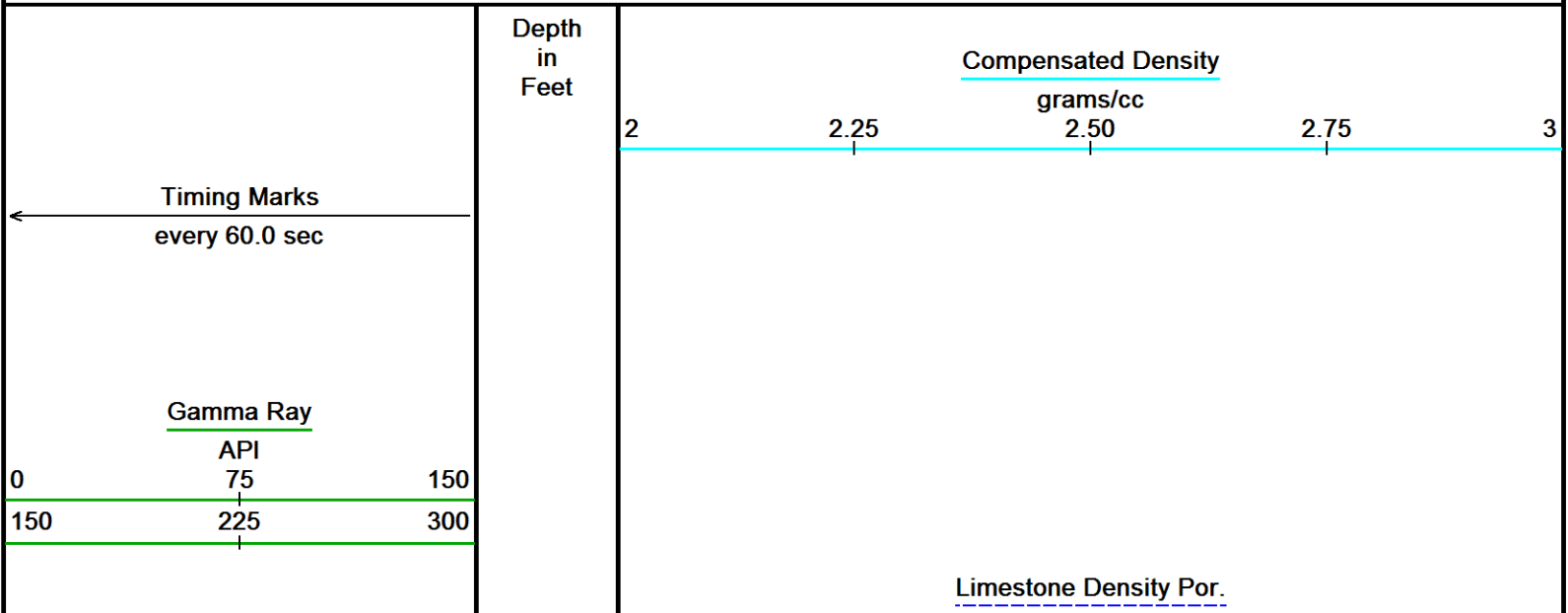


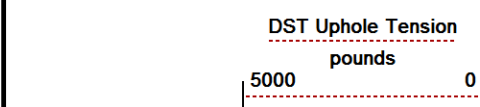
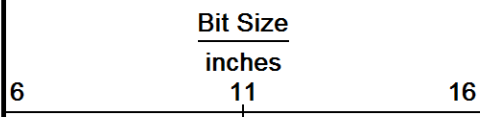
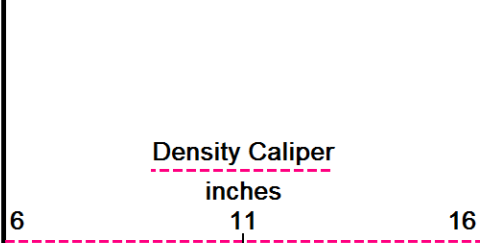
Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 20-DEC-2017 13:42
Filename: C:\Minimus 17.05.5956\Data\GRAND MESA (SEQUOIA #1-36)\MAIN PASS.dta	Recorded on 20-DEC-2017 07:52
System Versions: Logged with 17.05.5956 Plotted with 17.05.5956	

↑	5 INCH BULK DENSITY MAIN	↑
---	--------------------------	---

↓	REPEAT SECTION	↓
---	----------------	---

Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 20-DEC-2017 13:42
Filename: C:\Minimus 17.05.5956\Data\GRAND MESA (SEQUOIA #1-36)\REPEAT PASS.dta	Recorded on 20-DEC-2017 07:37
System Versions: Logged with 17.05.5956 Plotted with 17.05.5956	

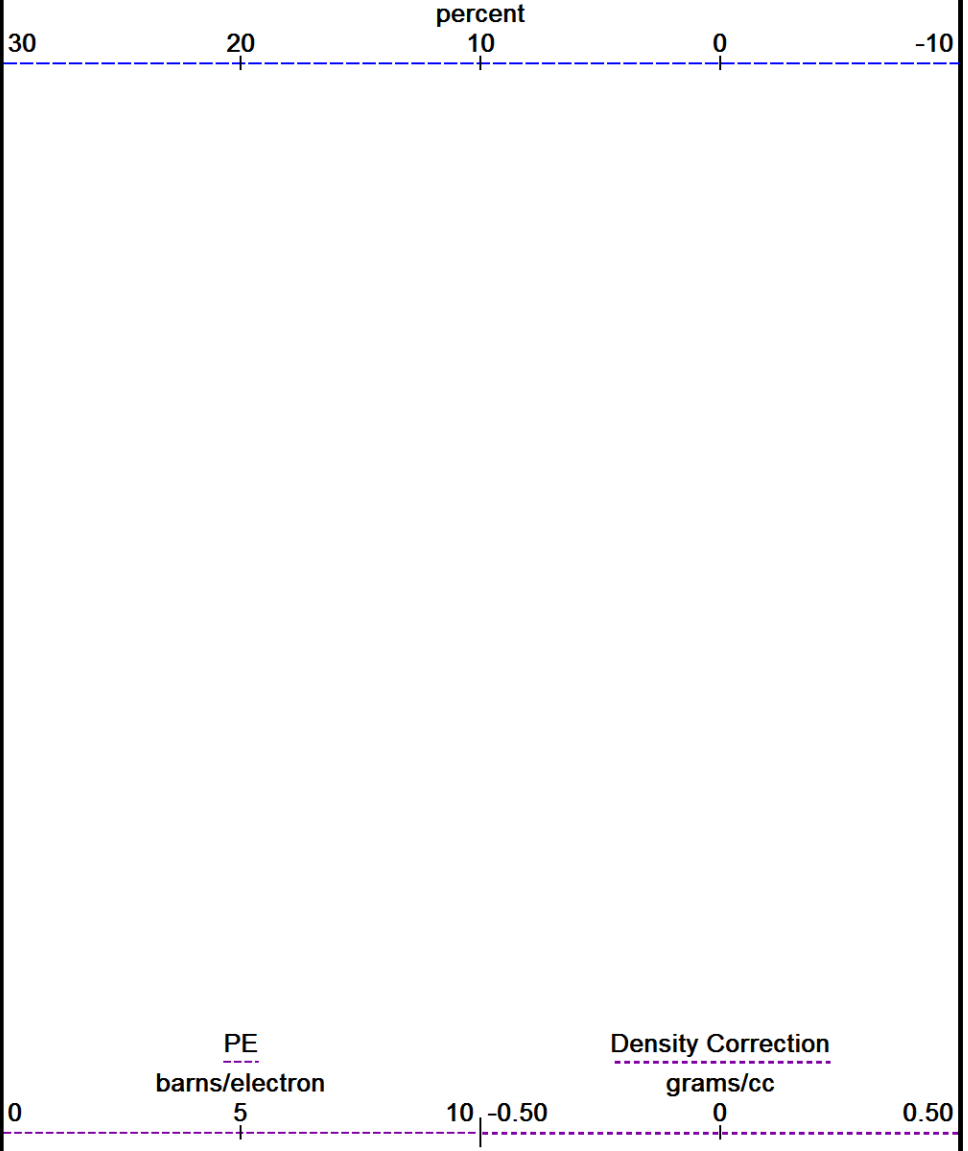




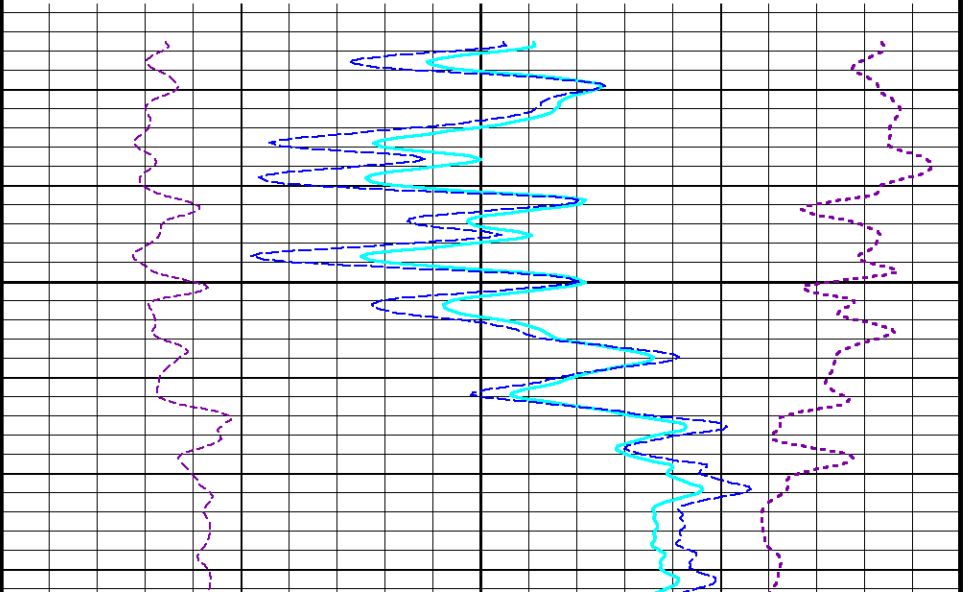
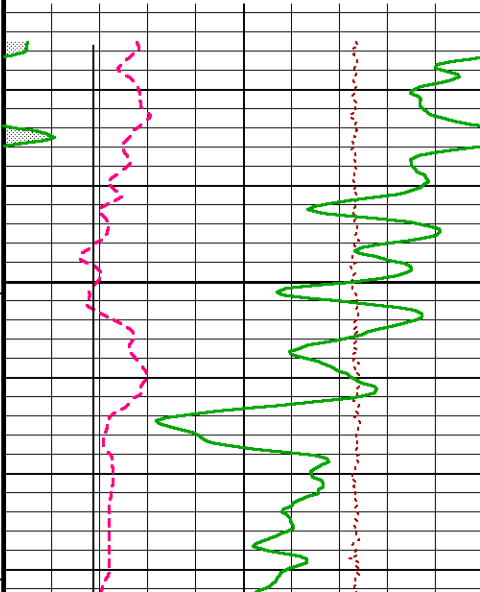
Borehole  
Temp in  
deg F

HVI  
every  
10 cu ft

Annular  
Integral  
every  
10 cu ft

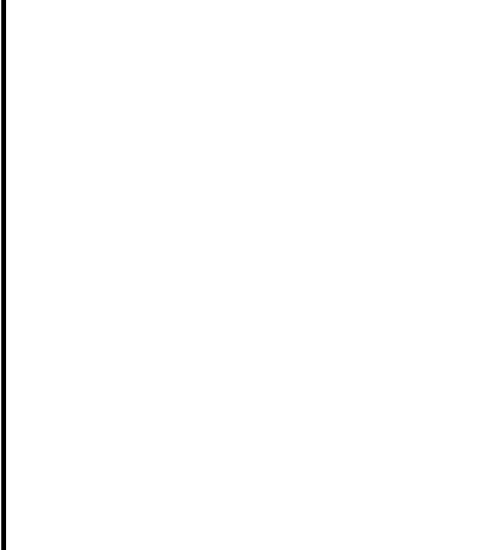
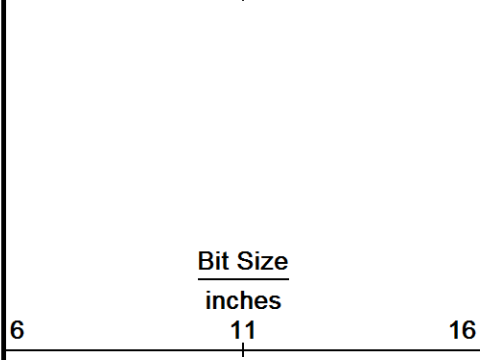
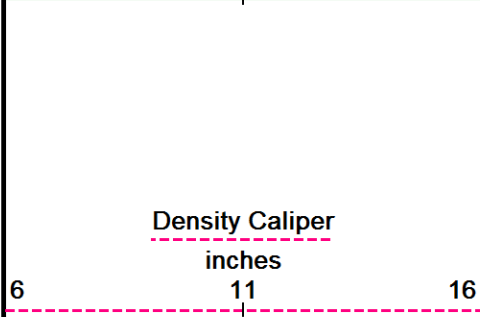
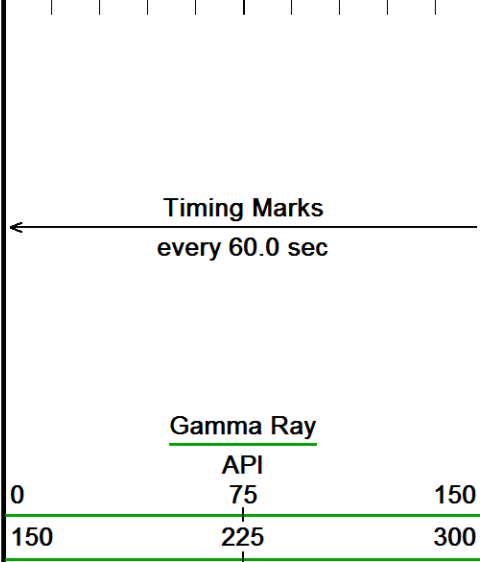
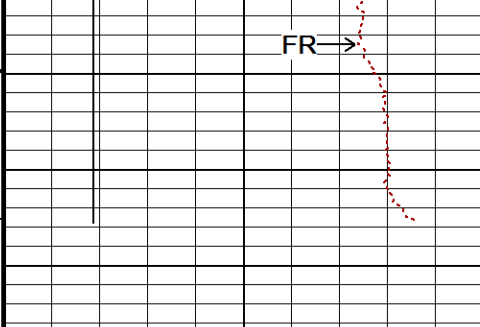


Replay  
Scale  
1:240









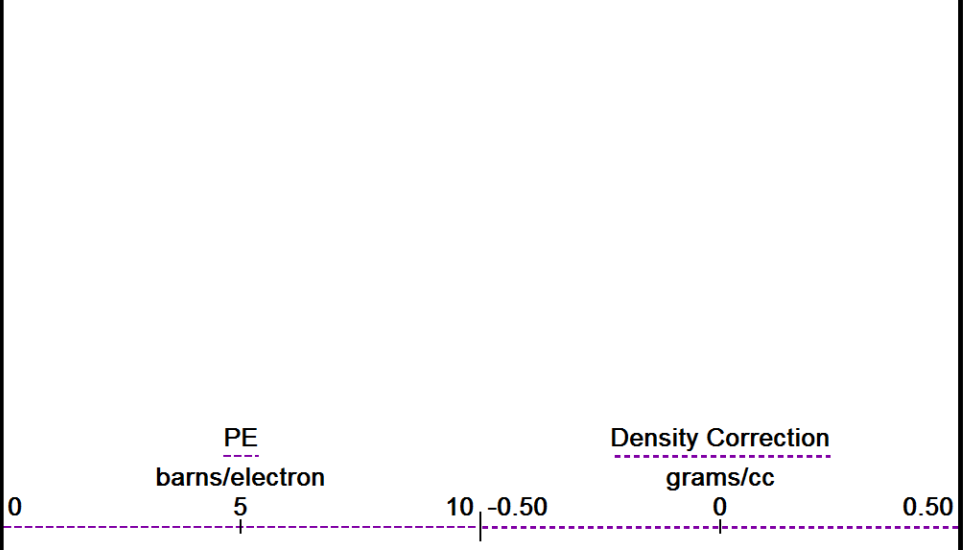
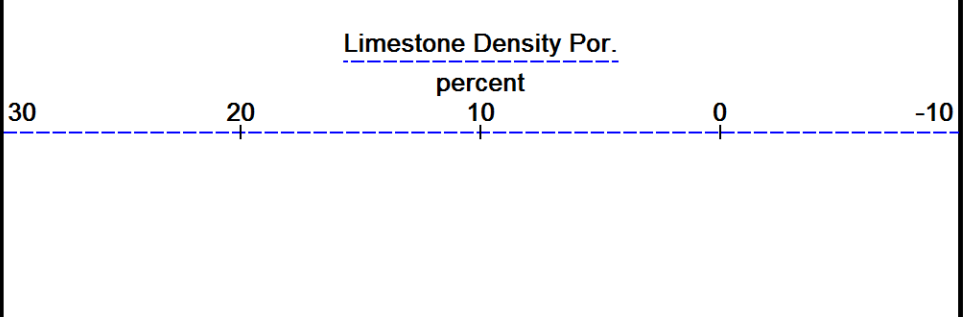
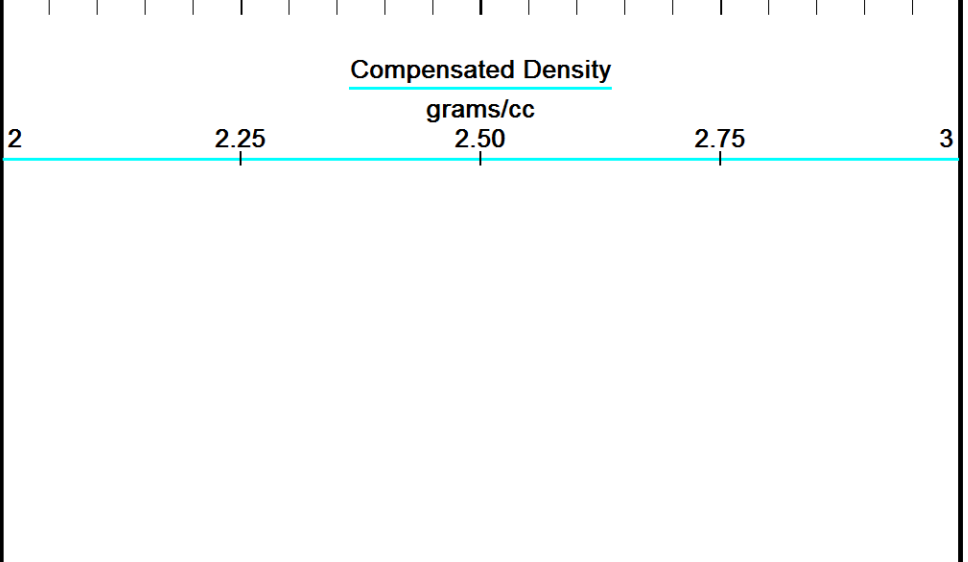
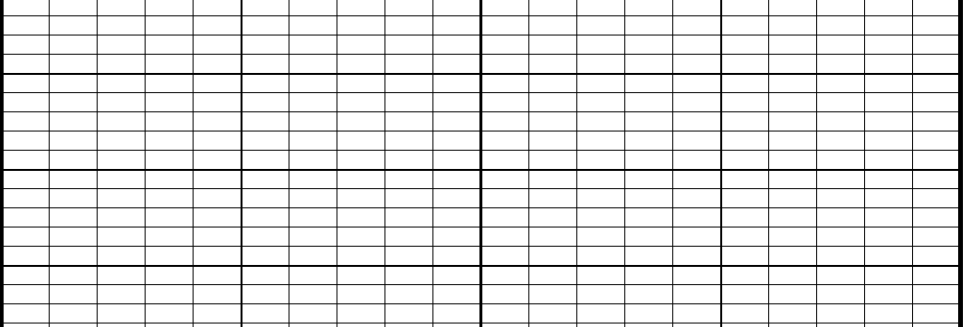
TD

Depth  
in  
Feet

Borehole  
Temp in  
deg F

HVI  
every  
10 cu ft

$\leftarrow$



DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-DEC-2017 13:42

Filename: C:\Minimus 17.05.5956\Data\GRAND MESA (SEQUOIA #1-36)\REPEAT PASS.dta

Recorded on 20-DEC-2017 07:37

System Versions: Logged with 17.05.5956 Plotted with 17.05.5956



REPEAT SECTION



## BEFORE SURVEY CALIBRATION

C:\Minimus 17.05.5956\Data\GRAND MESA (SEQUOIA #1-36)\MAIN PASS.dta

General Constants All 000

Last Edited on 16-DEC-2017,09:16

### General Parameters

Mud Resistivity	1.000	ohm-metres
Mud Resistivity Temperature	73.000	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	5.500	inches
Caliper for Differential Caliper	Density Caliper	

### Rwa Parameters

Porosity used	Crossplot Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	0.620
RWA Constant M	2.150
SW/APOR Tool Source	0.000

High Resolution Temperature Calibration MCG-D.K 475

Field Calibration on 15-DEC-2017,10:22

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	200.00	200.00

High Resolution Temperature Constants MCG-D.K 475

Last Edited on 11-MAY-2016 11:23

Pre-filter Length 11

Gamma Calibration MCG-D.K 475

Field Calibration on 20-DEC-2017,05:33

	Measured	Calibrated (API)
Background	46	31
Calibrator (Gross)	1905	1292
Calibrator (Net)	1859	1261

Gamma Calibration Tolerances MCG-D.K 475

Ratio 1.474     Counts/API

Gamma Constants MCG-D.K 475

Last Edited on 16-DEC-2017,09:16

Gamma Calibrator Number	GRC.C 46	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	

Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

### Caliper Calibration MPD-B 120

Base Calibration on 04-DEC-2017 08:42  
Field Calibration on 20-DEC-2017 06:25

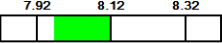
#### Base Calibration

Reading No	Measured	Calibrator Size (in)
1	17603	4.00
2	26000	5.96
3	34637	7.96
4	43056	9.86
5	52138	11.88
6	N/A	N/A

#### Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.97	8.12

### Caliper Calibration Tolerances MPD-B 120

Short Arm Field Cal. 7.97  in

### Photo Density Calibration MPD-B 120

Base Calibration on 01-DEC-2017 12:44  
Field Check on 20-DEC-2017 05:32

#### Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	902	1137		
Reference 1	45220	22202	59494	30754
Reference 2	18316	2130	24557	2522

#### Field Check at Base

902.2 1137.1

#### Field Check

893.3 1127.0

#### PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	162	801		
Reference 1	17484	45083	0.391	0.367
Reference 2	4866	18215	0.270	0.271

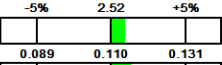

#### Field Check at Base

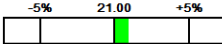
161.5 801.4

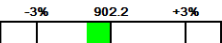
#### Field Check

161.9 804.7

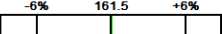
### Photo Density Calibration Tolerances MPD-B 120

Near Density Ratio 2.54   
PE Calibration 0.116 

Far Density Ratio 21.21 

Near Den. Field Check 893.3 

Far Den. Field Check 1127.0 

PE WS Field Check 161.9 

PE WH Field Check 804.7 

### Density Constants MPD-B 120

Last Edited on 16-DEC-2017,09:16

Density Source Id	P5771B
Nylon Calibrator Number	766
Aluminium Calibrator Number	633
Density Shoe Profile	8 inch
Caliper Source for Processing	Density Caliper
PE Correction to Density	Not Applied
Mud Density	1.12 gm/cc
Mud Density Type	
Mud Filtrate Density	1.00 gm/cc





All measurements relative to tool zero.

COMPANY	GRAND MESA OPERATING COMPANY
WELL	SEQUOIA #1-36
FIELD	WILDCAT
PROVINCE/COUNTY	WASHINGTON
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5470	feet	First Reading	8423.00	feet
Elevation Drill Floor	5468	feet	Depth Driller	8462.00	feet
Elevation Ground Level	5451	feet	Depth Logger	8457.00	feet



COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG

**Weatherford®**