



**Weatherford**

**COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG**

COMPANY

MURFIN DRILLING COMPANY, INC.

WELL

MOONRAKER #6-27

FIELD

WILDCAT

PROVINCE/COUNTY LINCOLN

COUNTRY/STATE U.S.A. / COLORADO

LOCATION 2300' FNL & 1500' FWL

SEC 27

TWP 10S

RGE 56W

Other Services

Latitude

39.150720

MAI/MFE

MSS

Longitude

-103.654100

API Number

05-073-06757

Permanent Datum GL, Elevation 5462 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

20-JAN-2019

ONE

17876-235128055

8300.00

8303.00

8280.00

4200.00

455.00

443.00

7.875

CHEMICAL

9.40

10.50

0.76 @ 94.0

0.57 @ 94.0

0.91 @ 94.0

CALC

0.40 @179.0

5 HOURS

179.00

13096

BANDAR BINOSFUR

GREGG SMITH

5475.00

5473.00

5462.00

**BOREHOLE RECORD**

Last Edited: 20-JAN-2019 13:54

Bit Size  
inches

7.875

Depth From  
feet

455.00

Depth To  
feet

8300.00

**CASING RECORD**

Type

Size  
inches

8.625

Depth From  
feet

0.00

Shoe Depth  
feet

455.00

Weight  
pounds/ft

24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 18.03.9344.

- RUN ONE: SHA, MCG, MML, MDN, MPD, SKJ, MFE, MSS, MAI RAN IN COMBINATION.

- RUN TWO: SHA, MCG, MSS RAN 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.

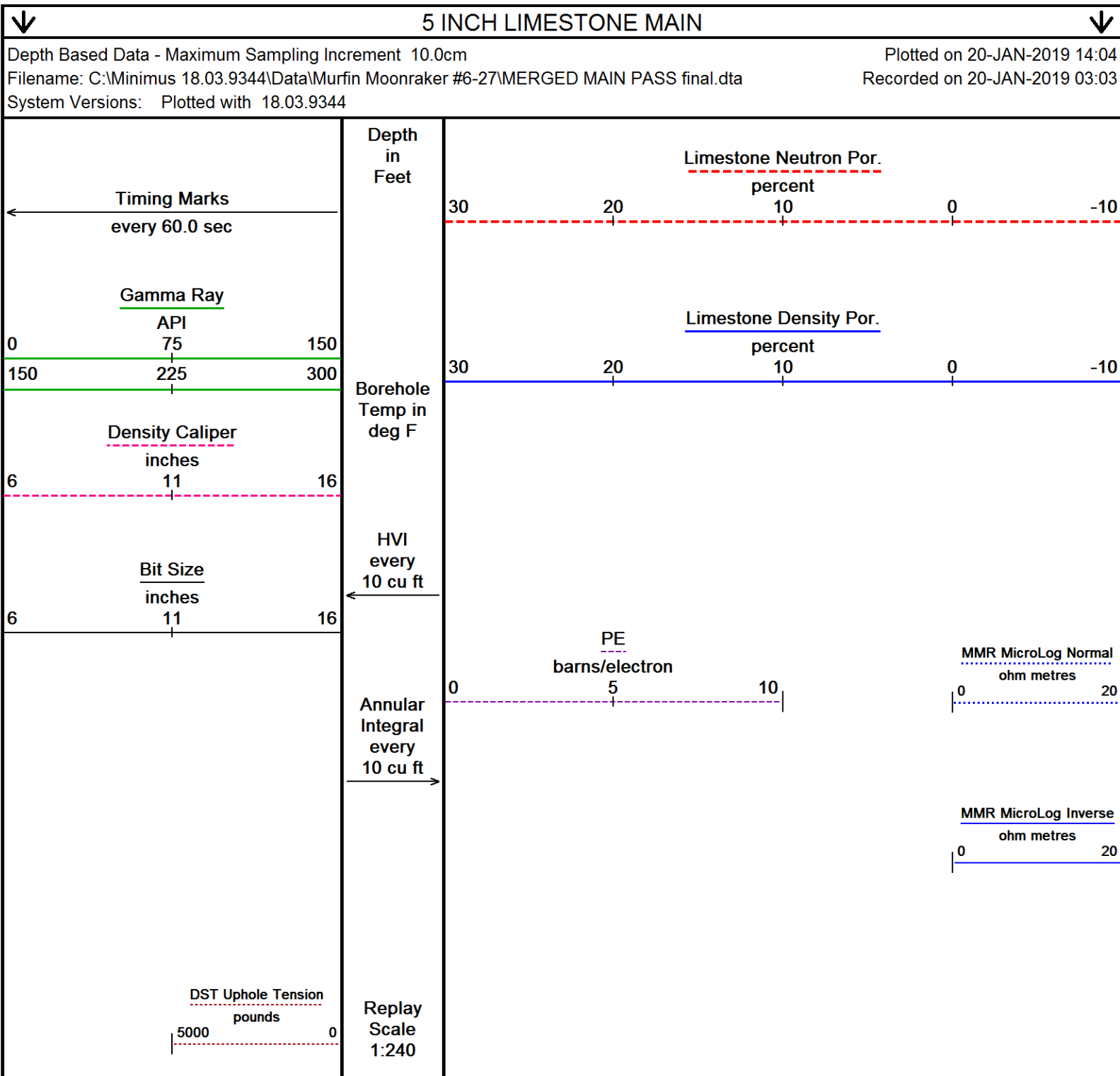
- CALIPERS CLOSED FROM 5707' UNTIL 5594' DUE TO CLIENT REQUEST.

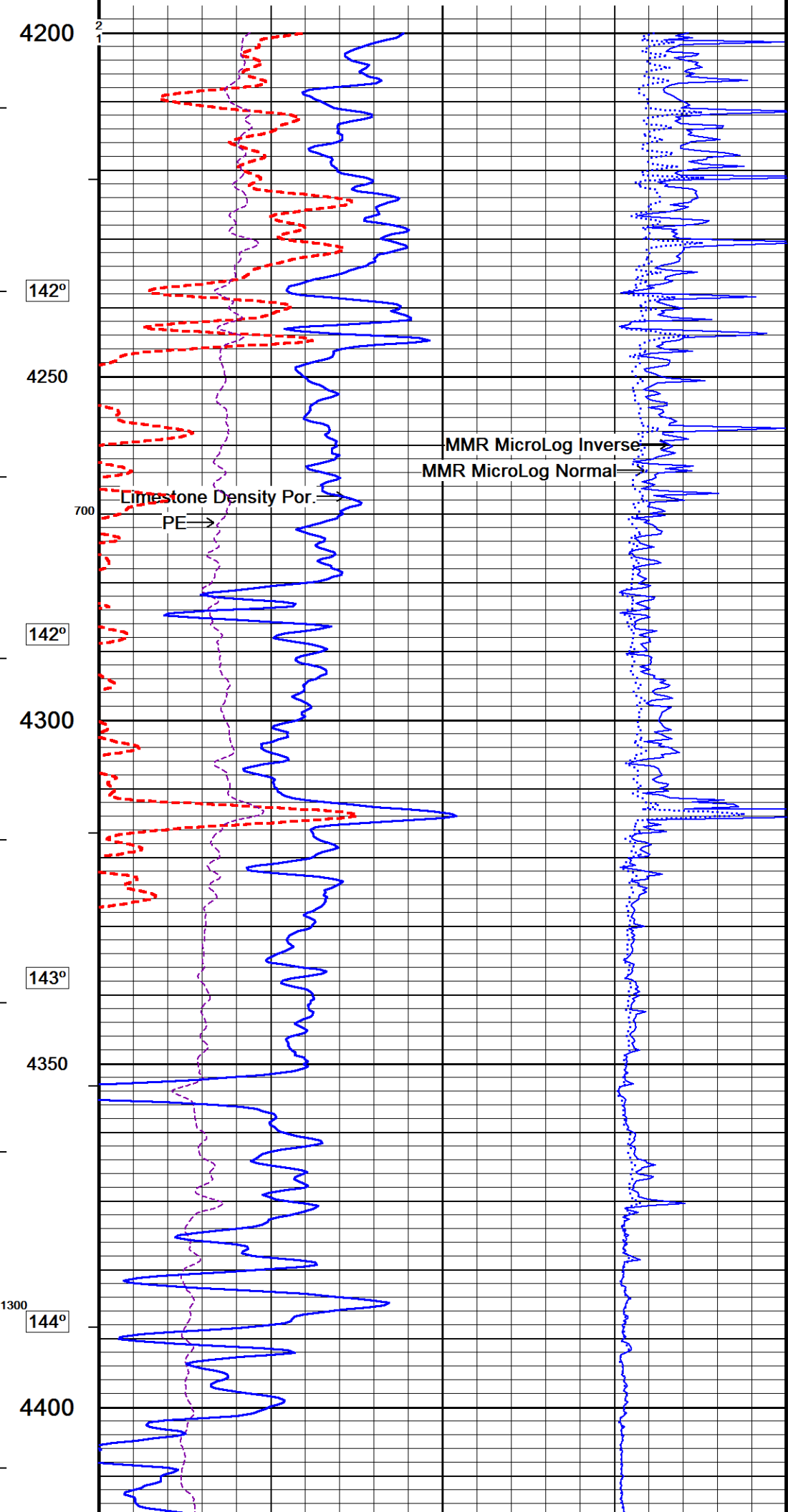
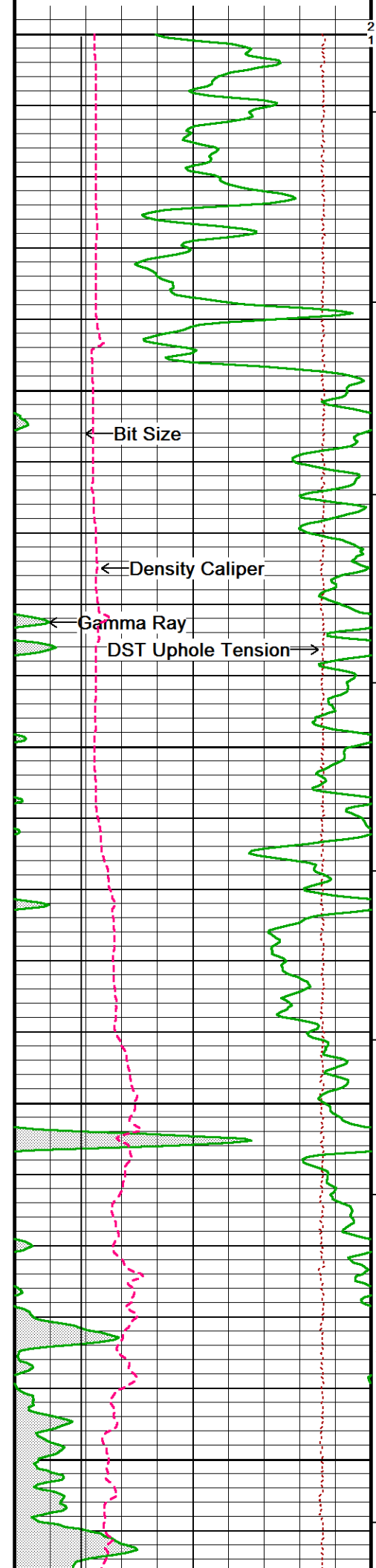
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

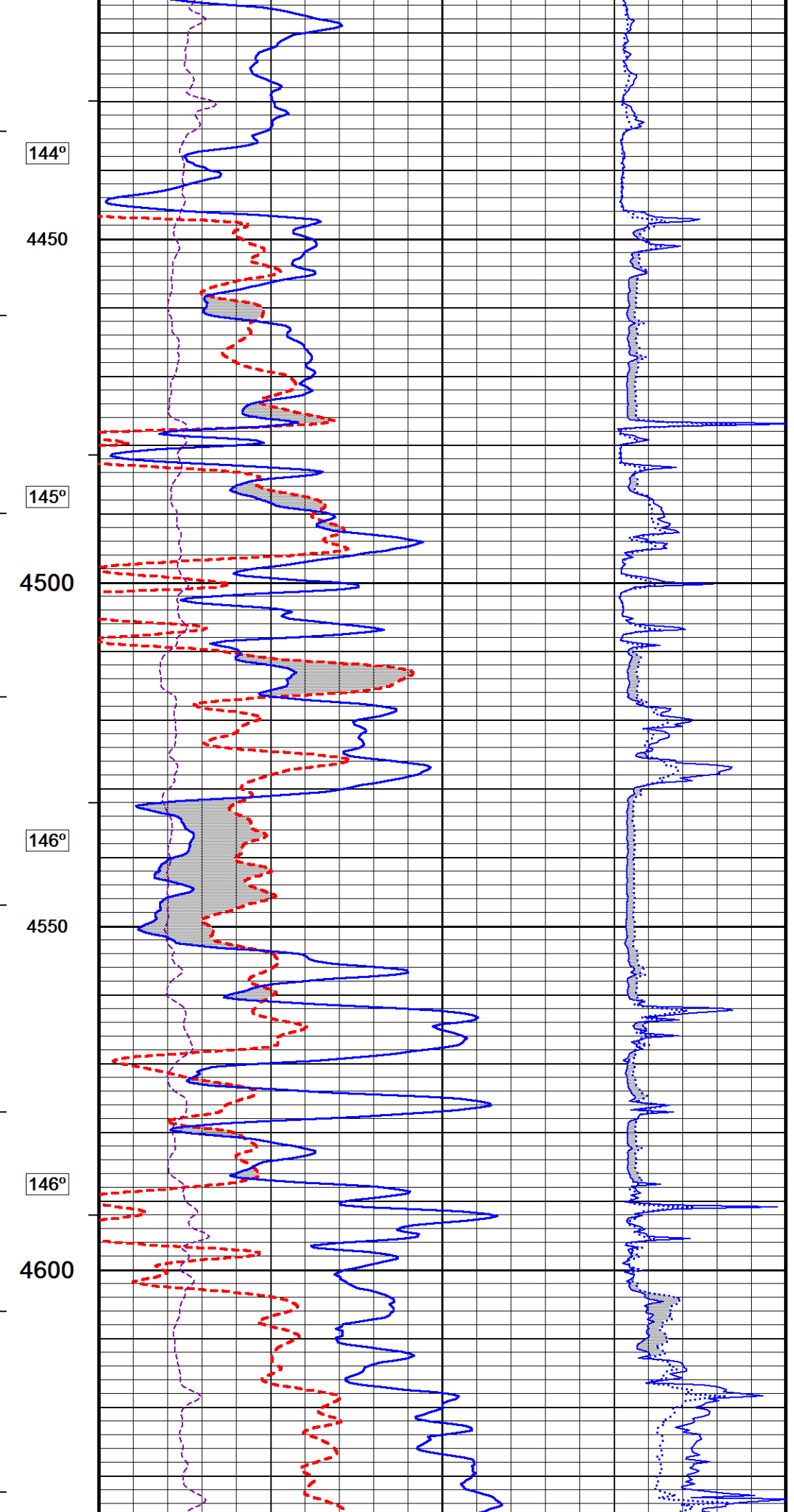
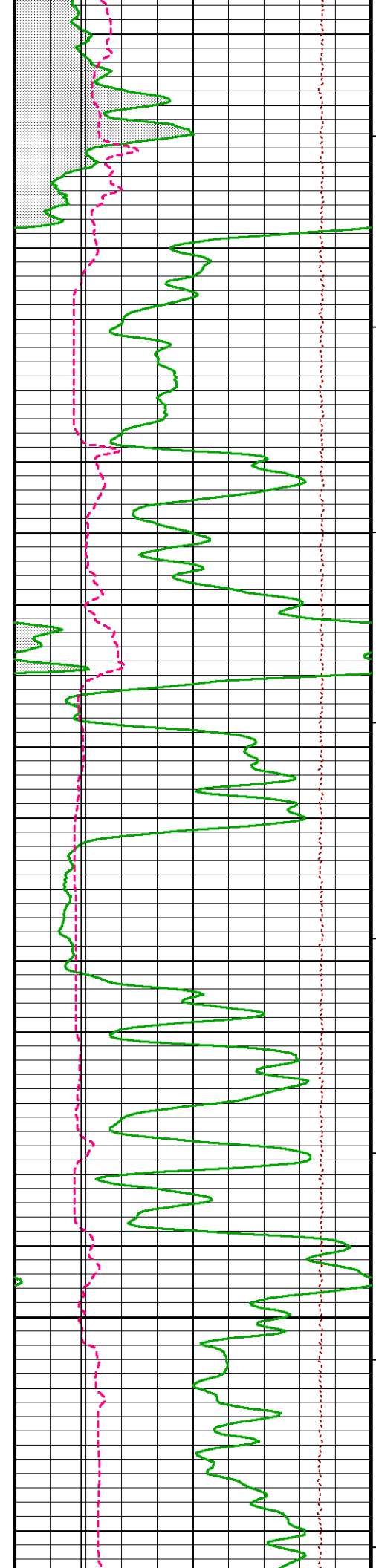
- ENGINEER: B. BINOSFUR.

- OPERATOR: B. TOVAR, B. COPELAND.

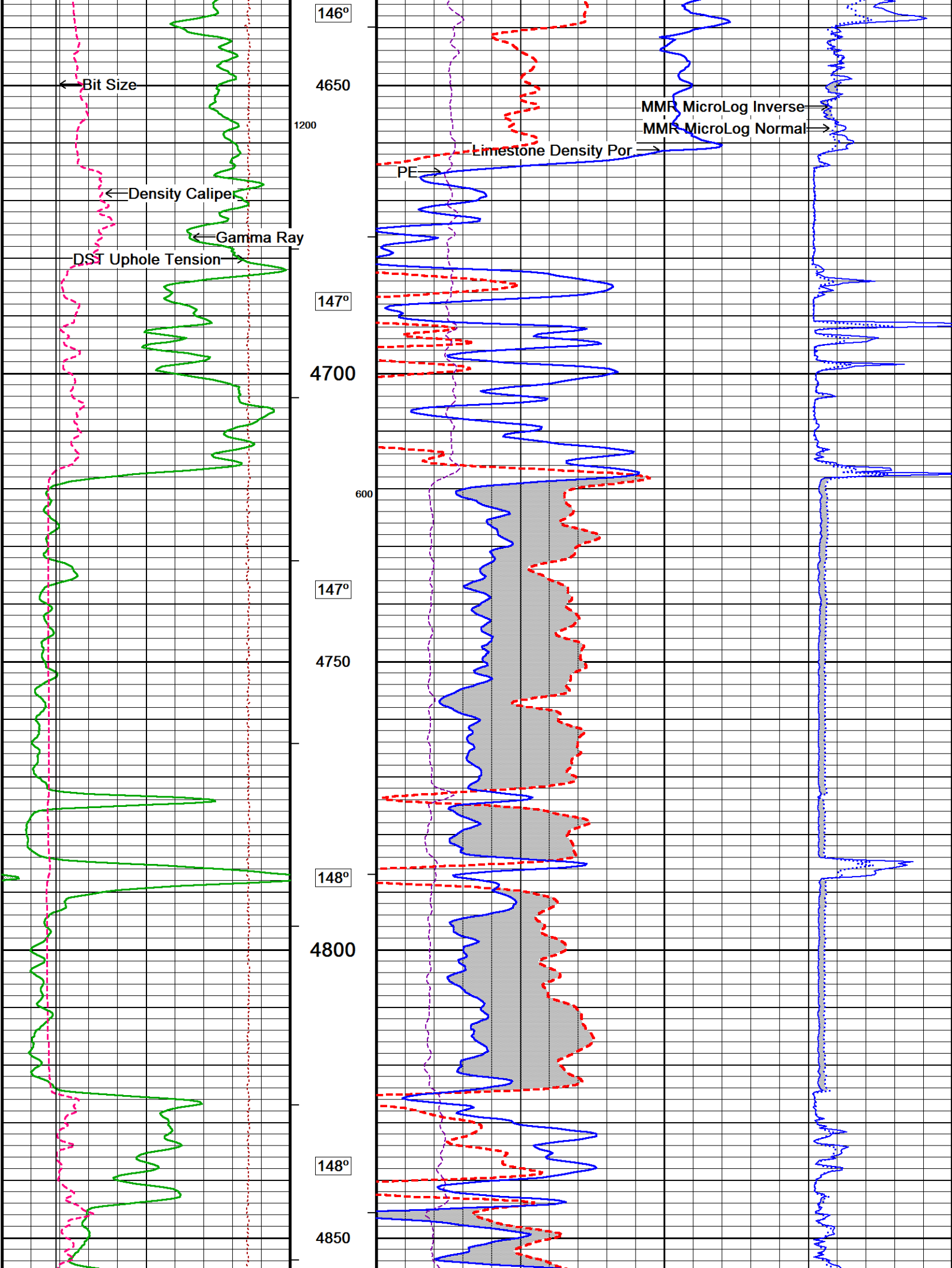
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

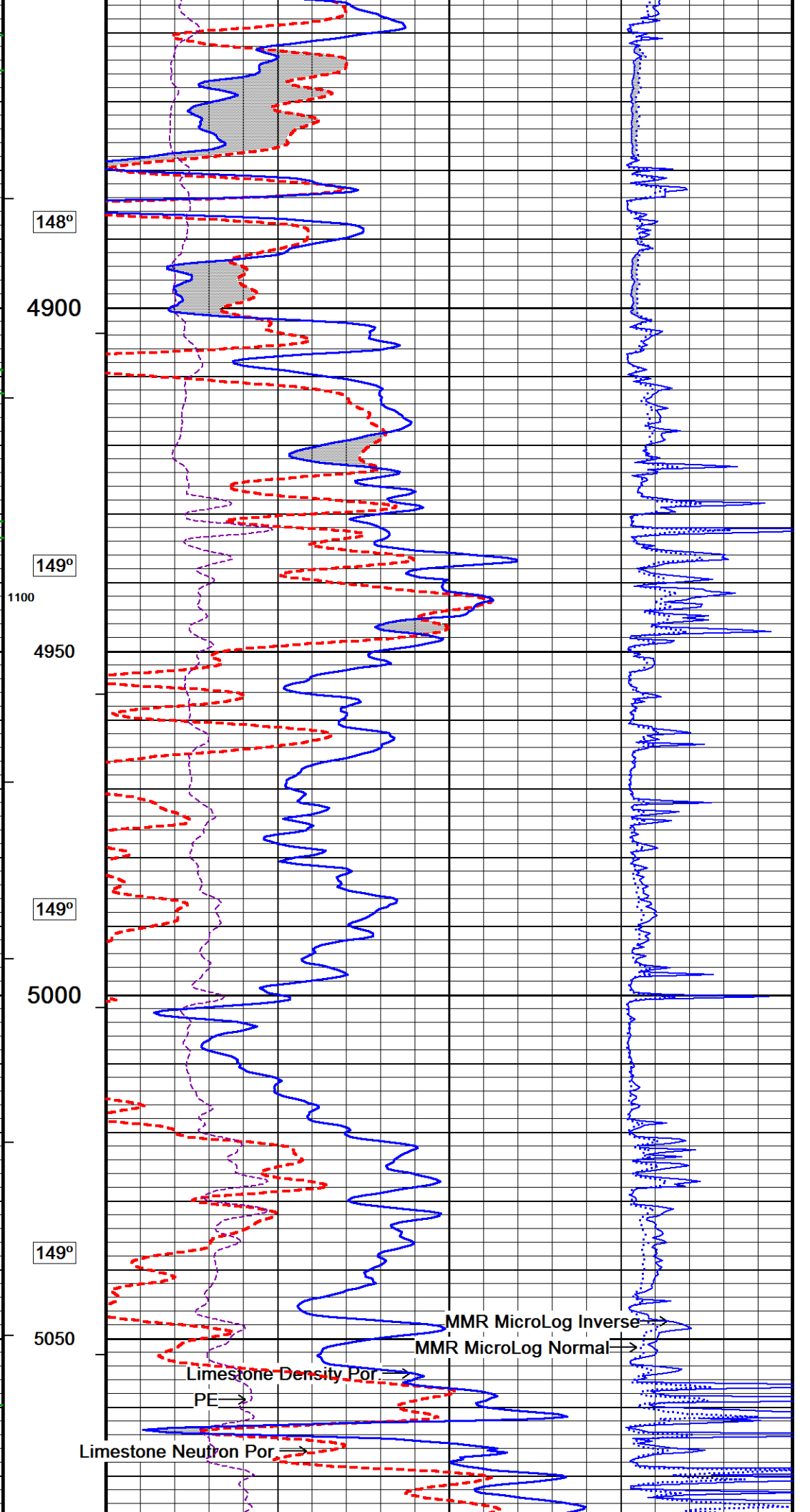
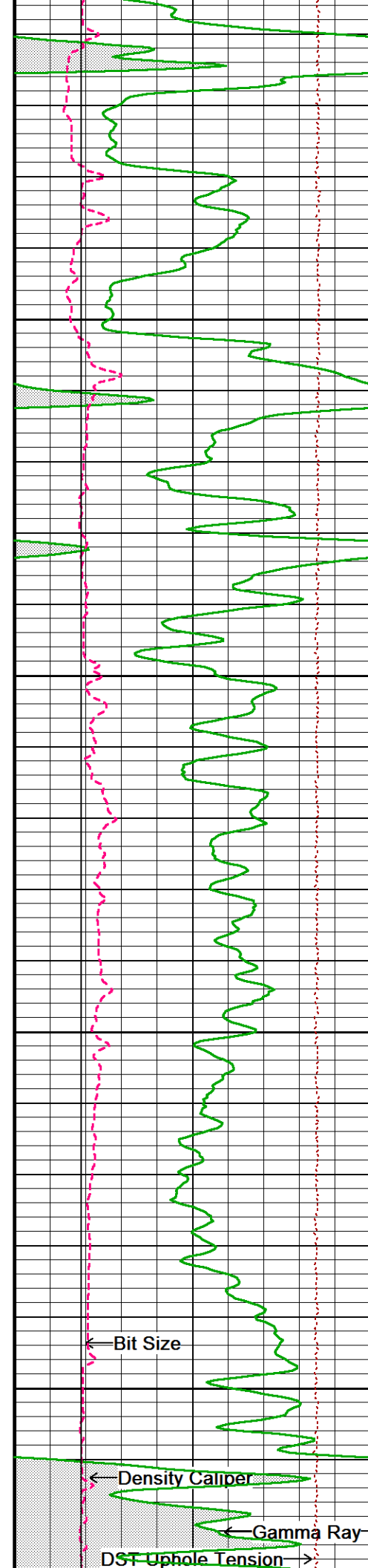


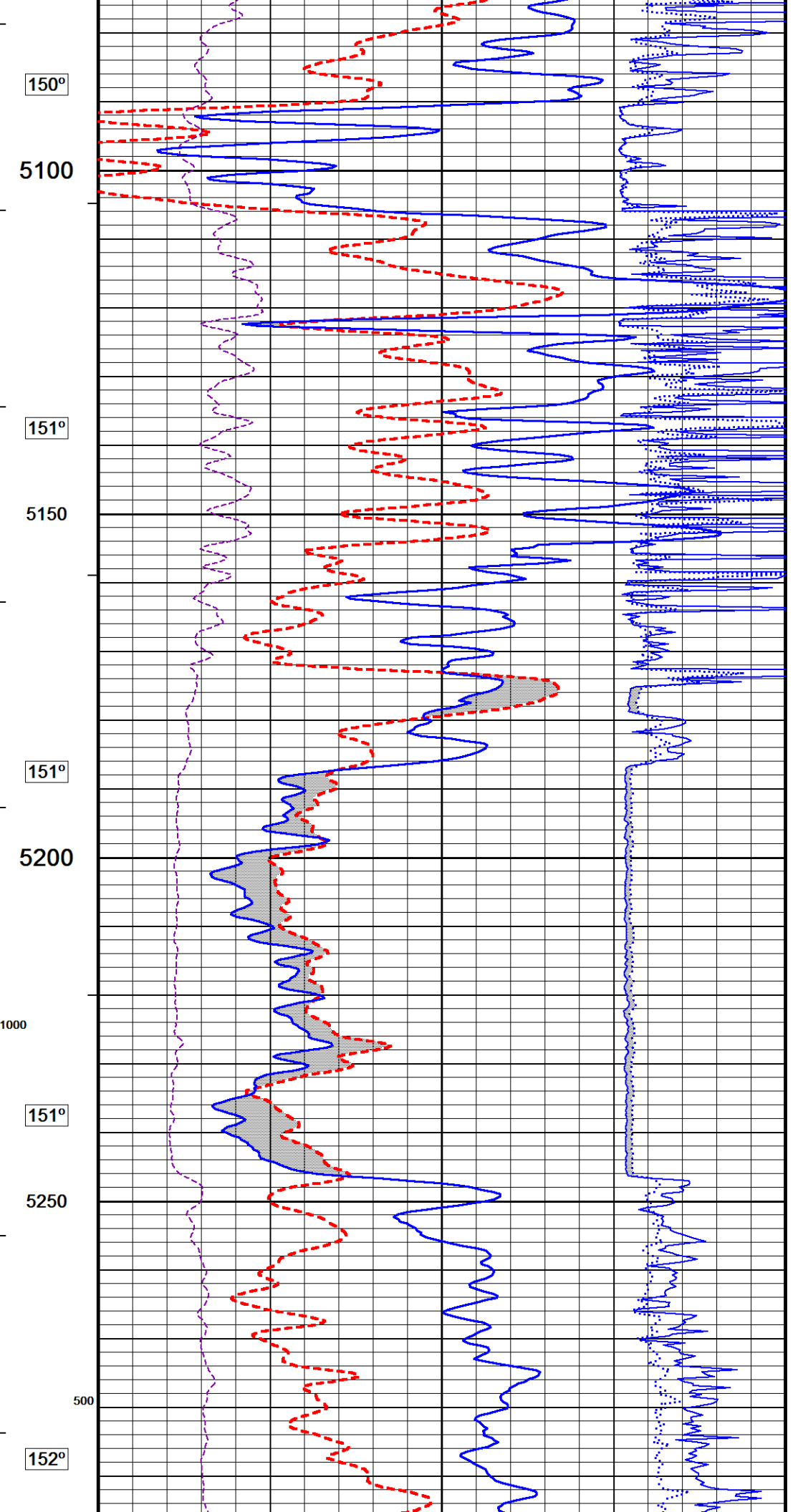
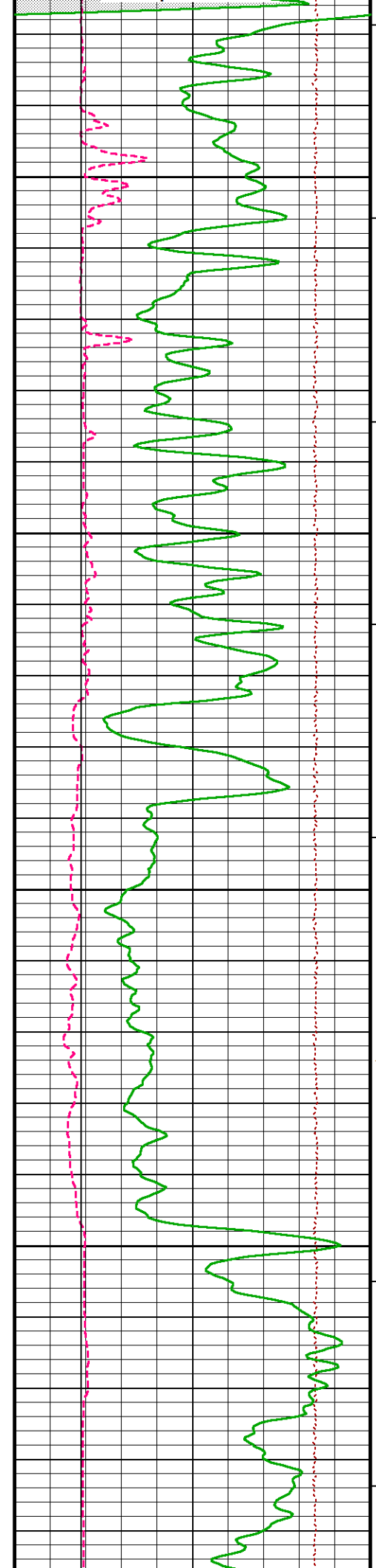


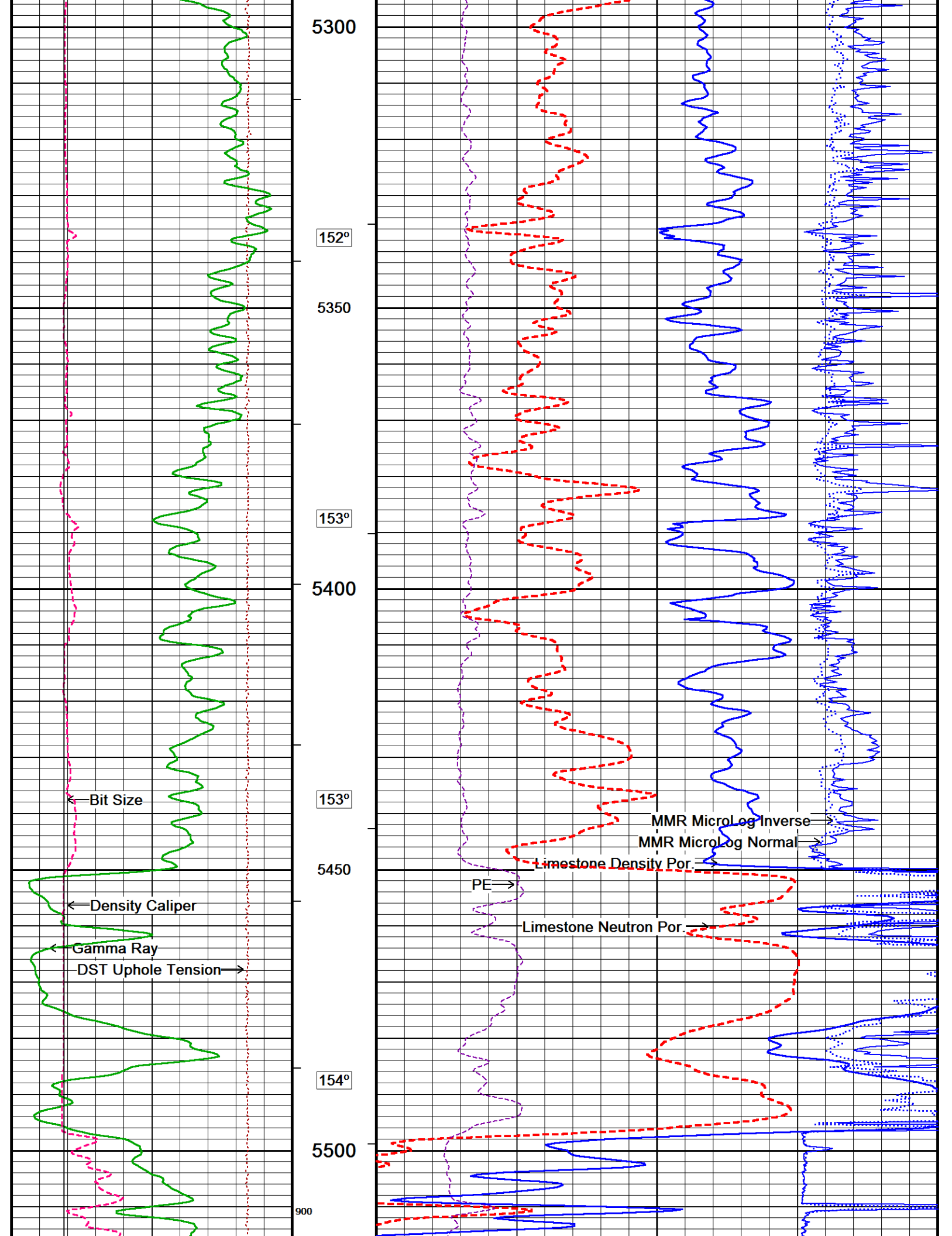


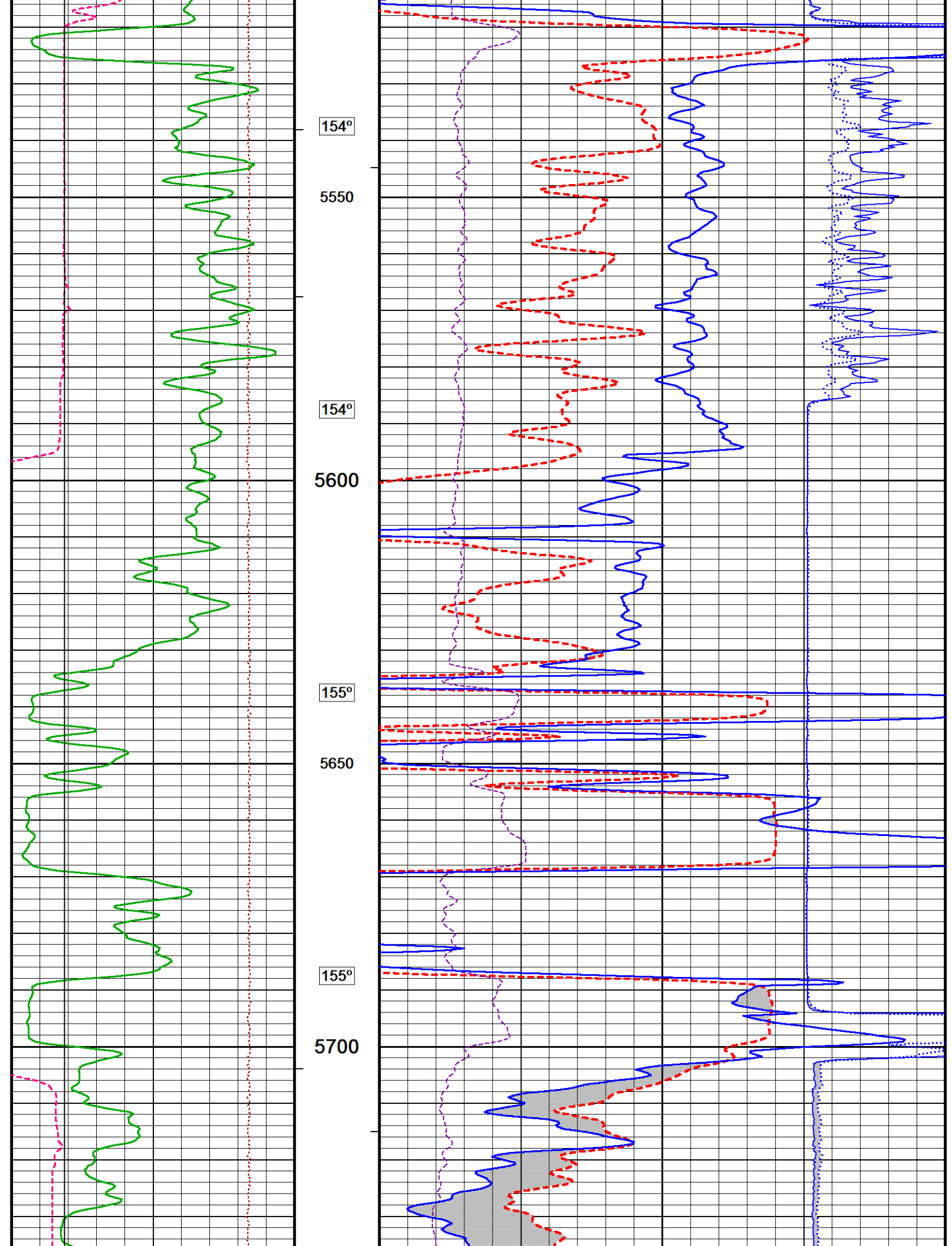


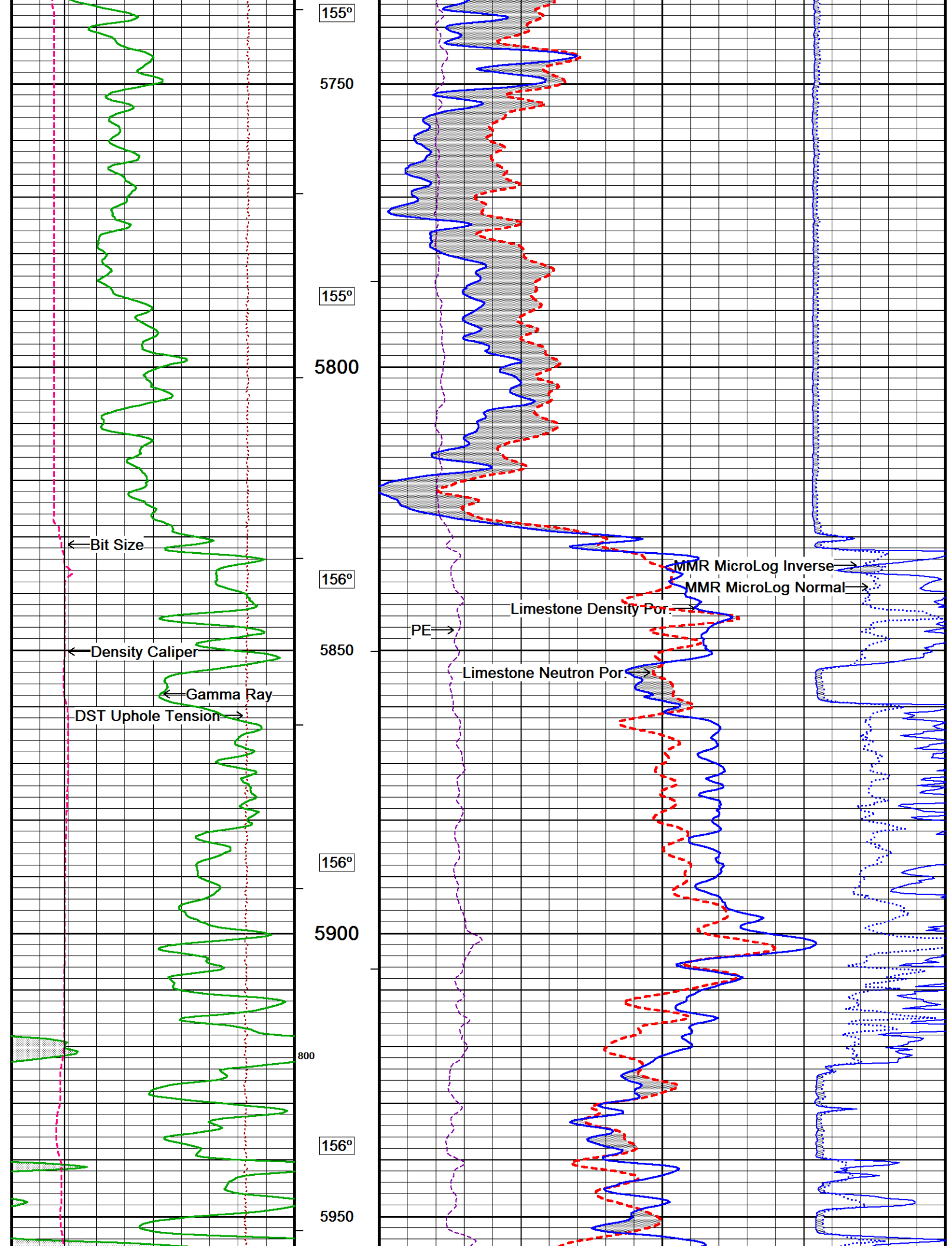




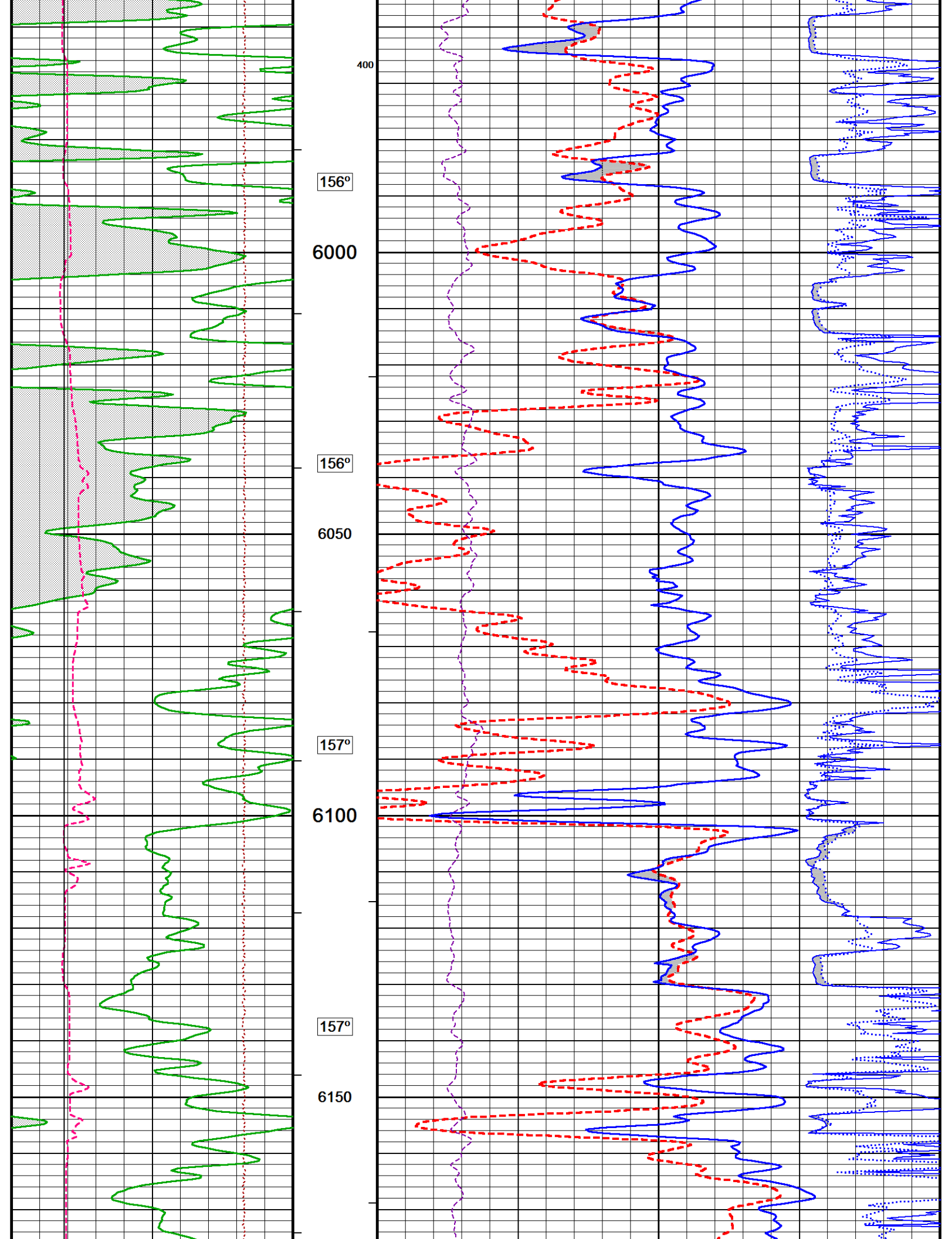


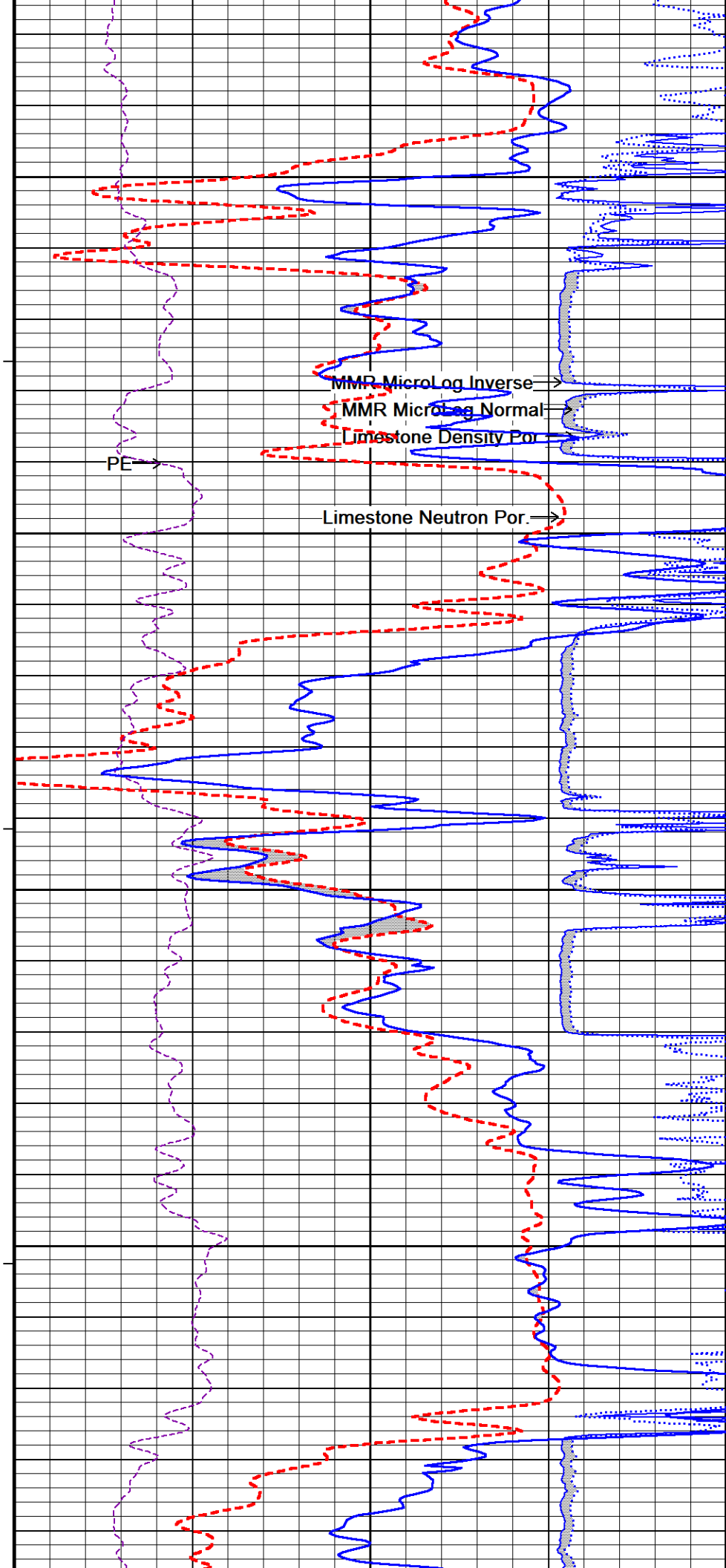
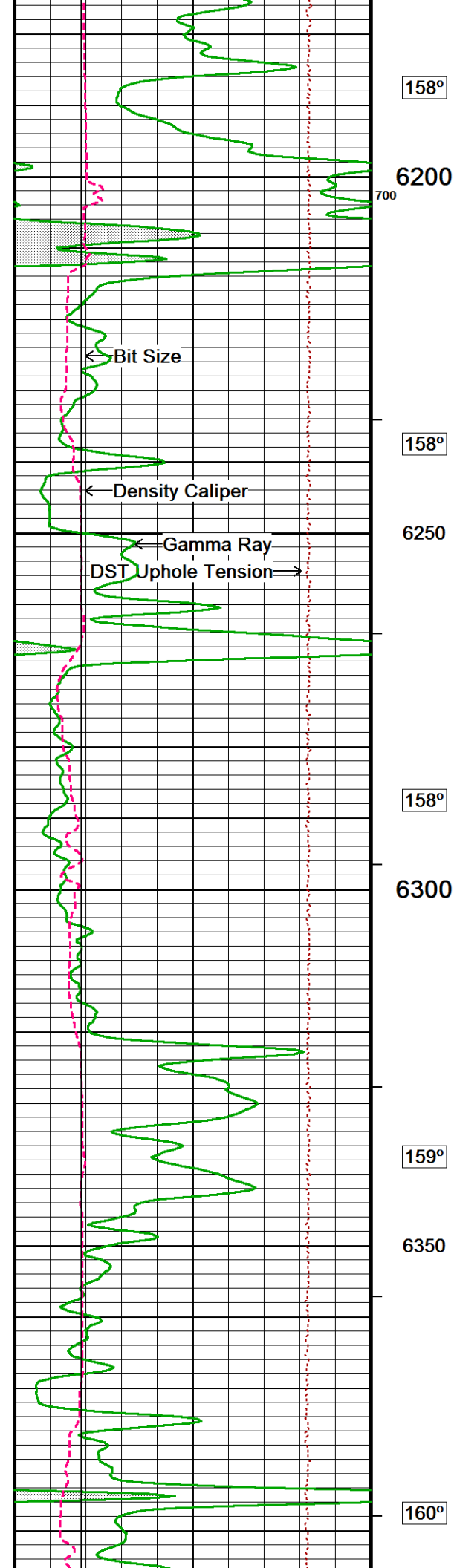


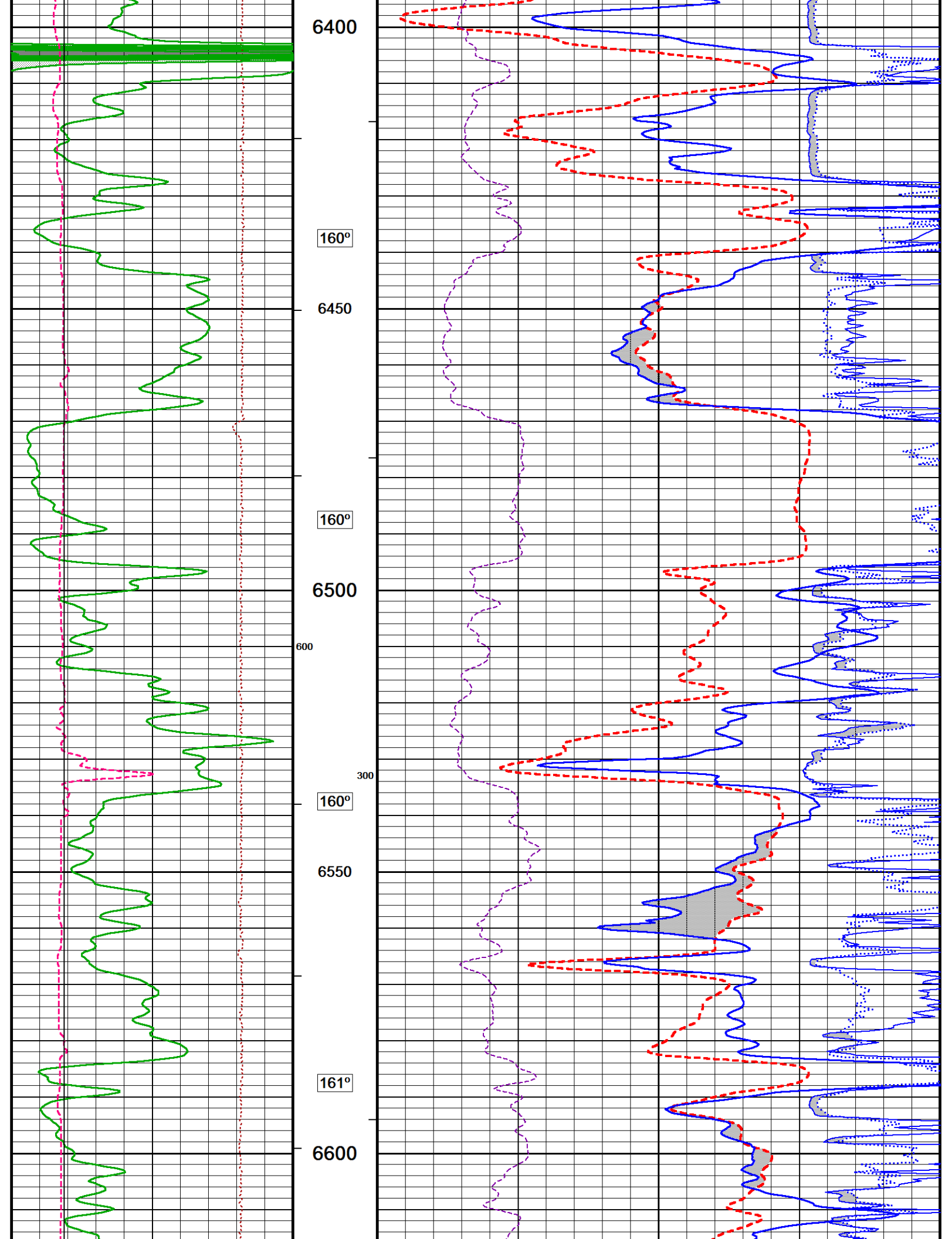


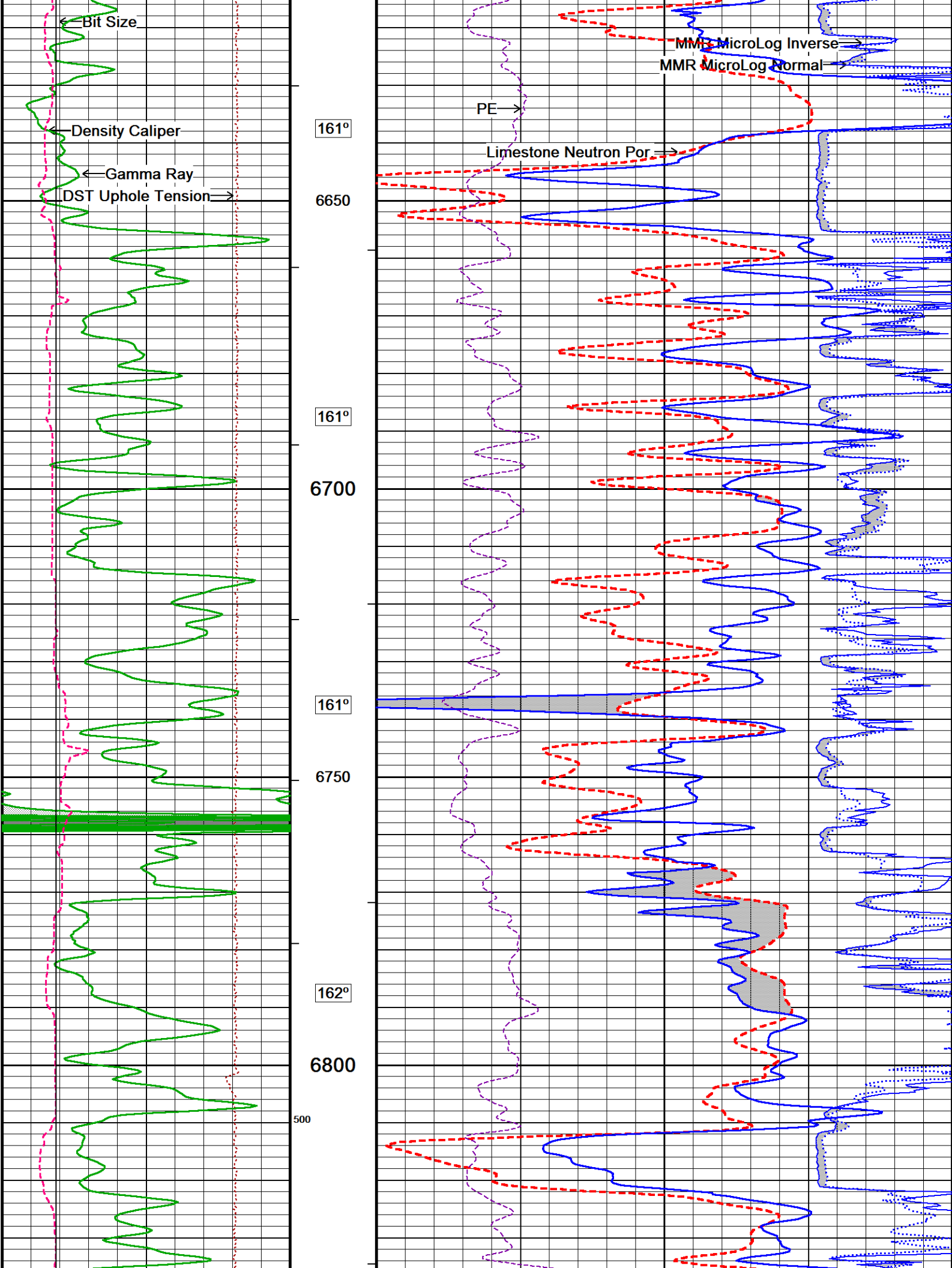


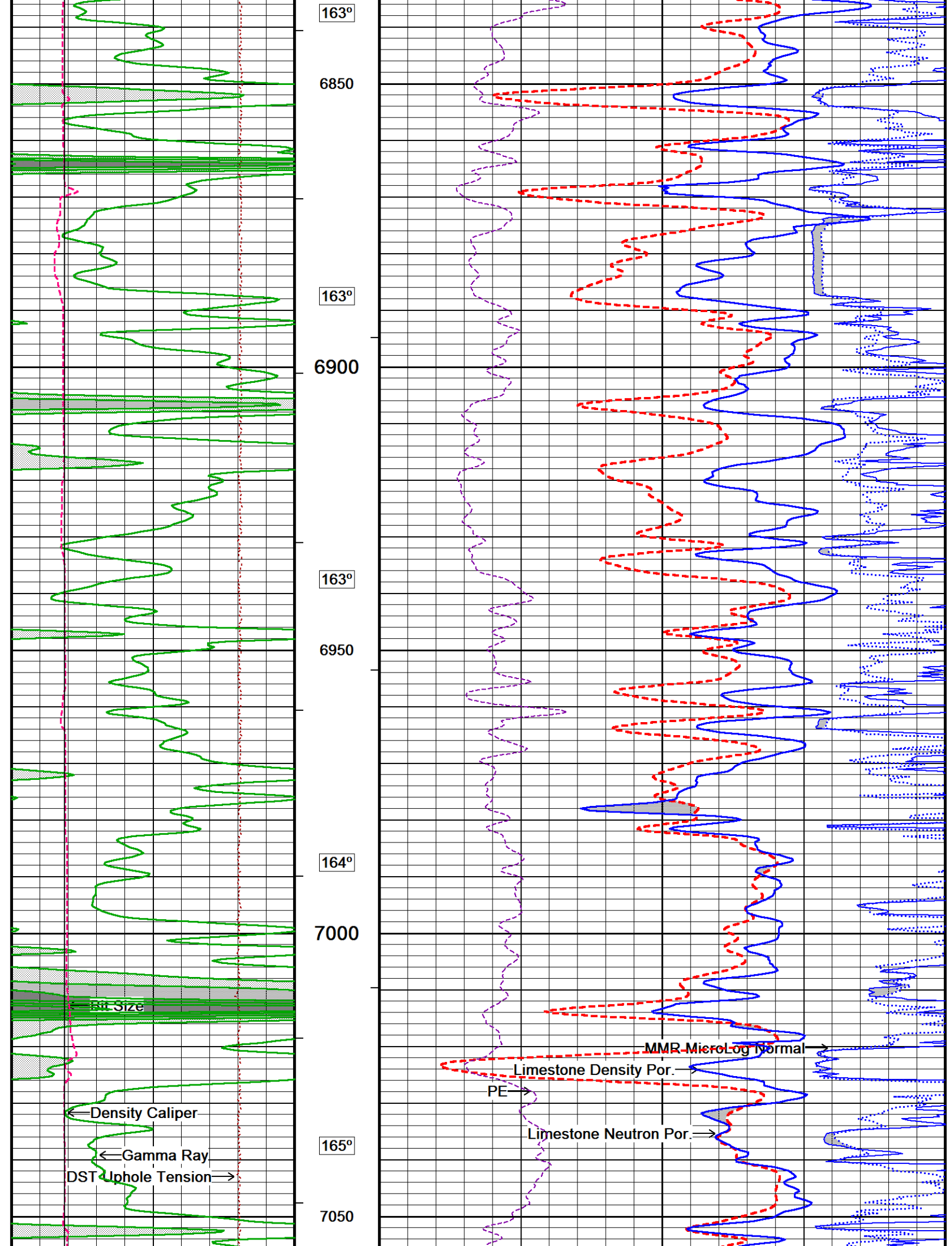




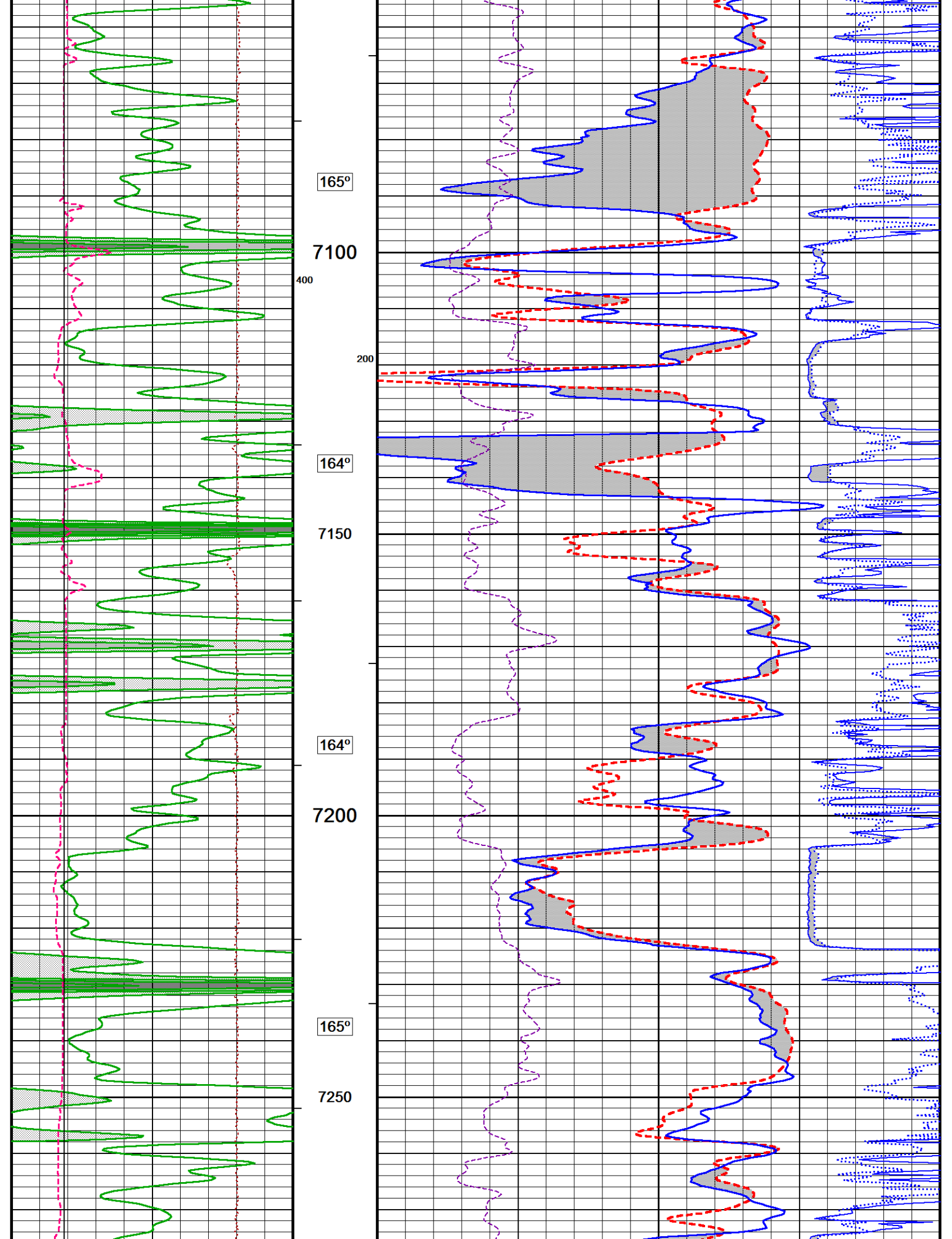




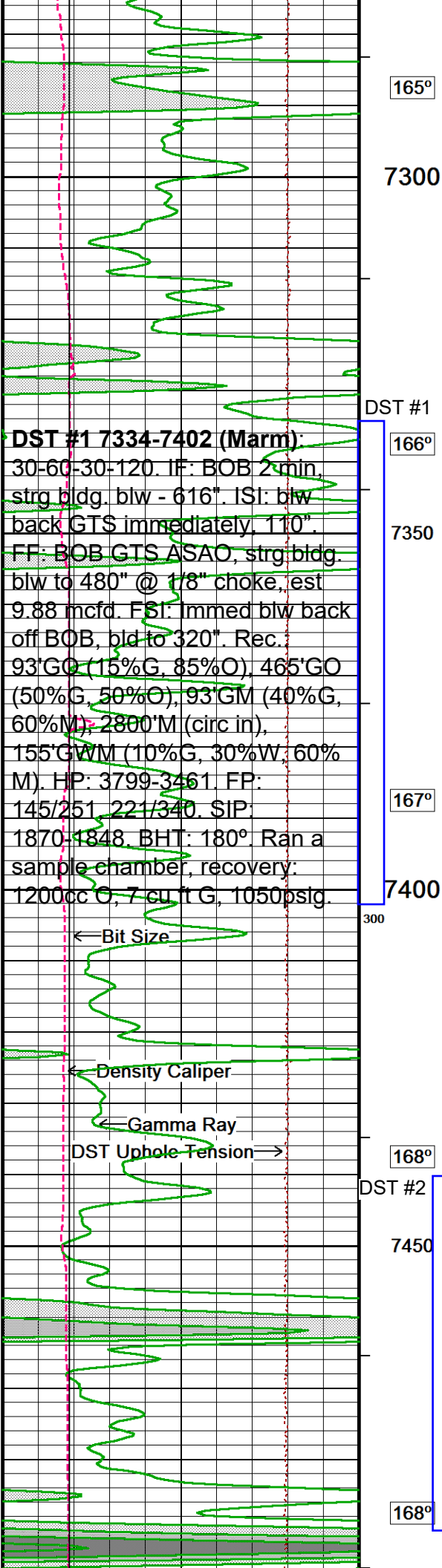




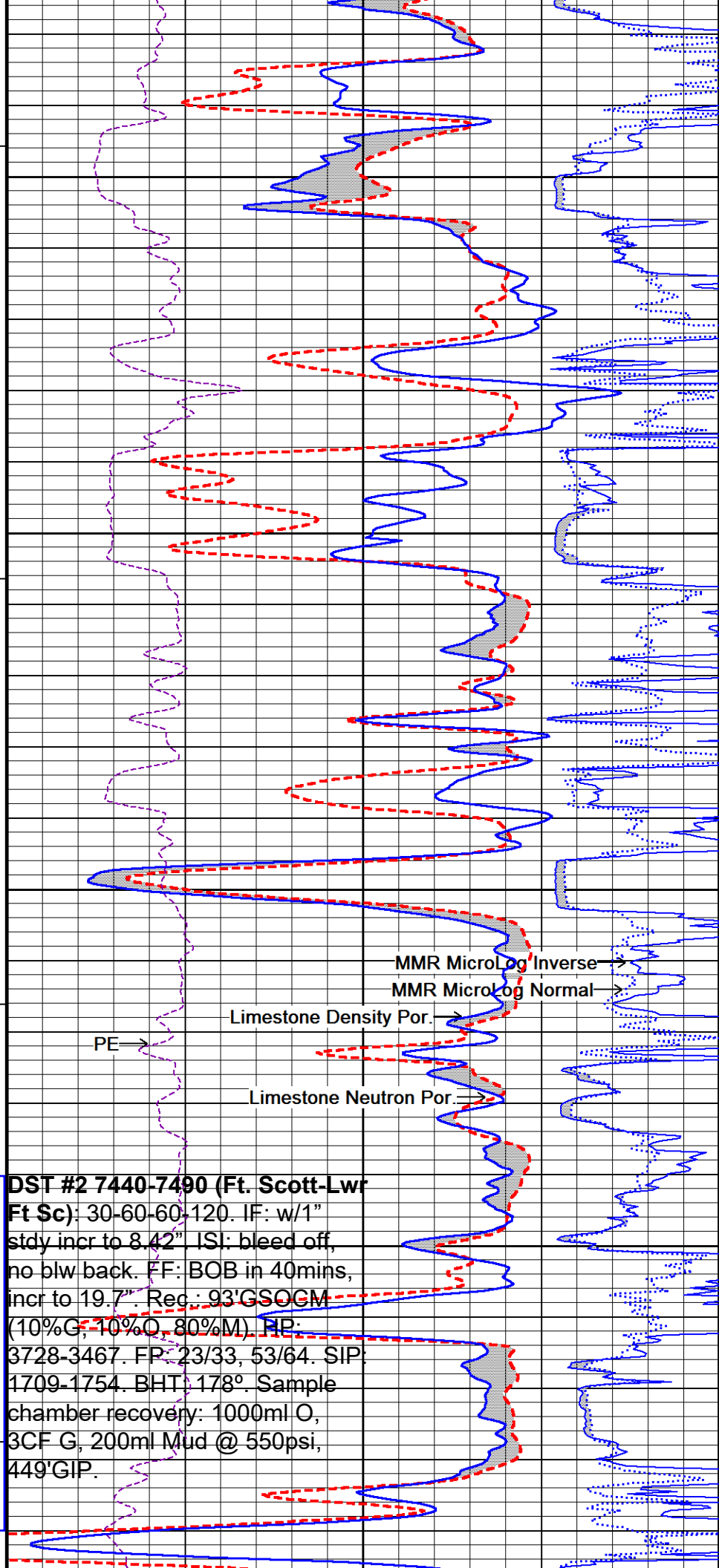




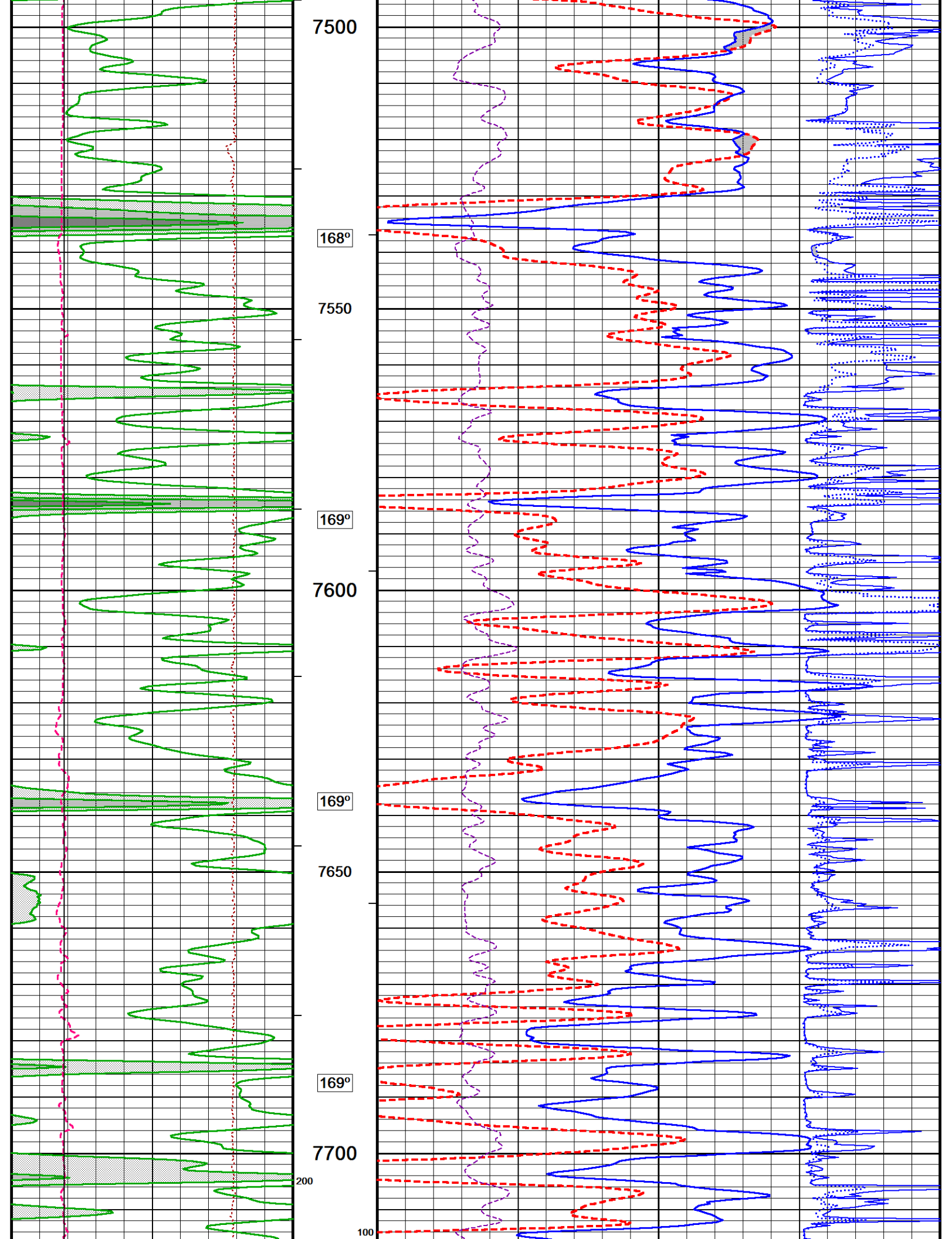


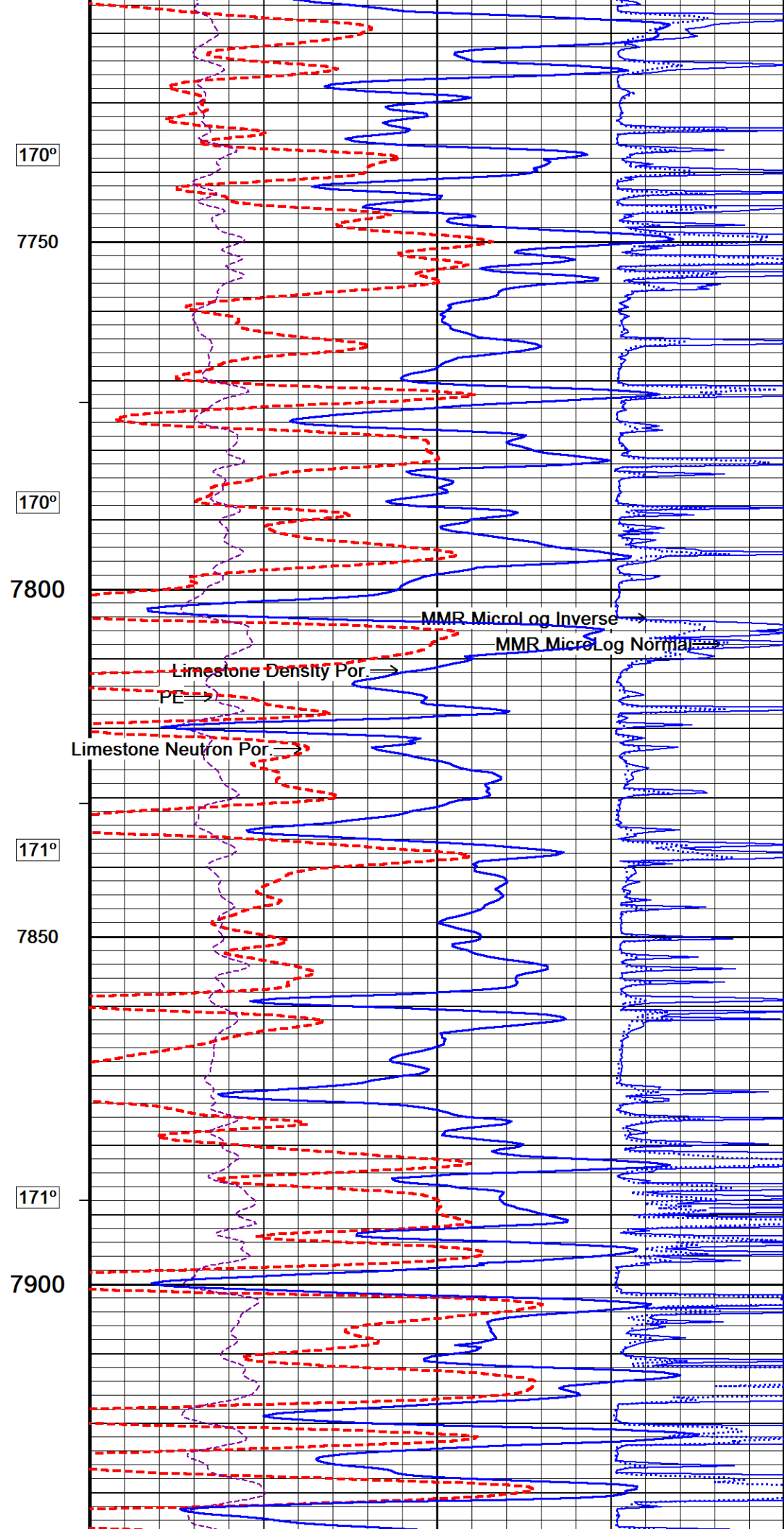
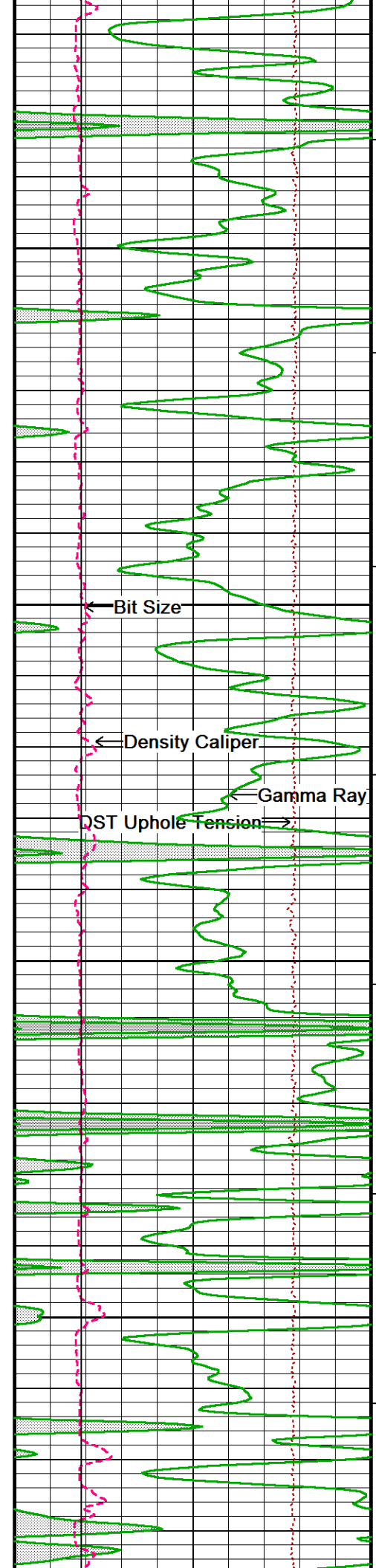


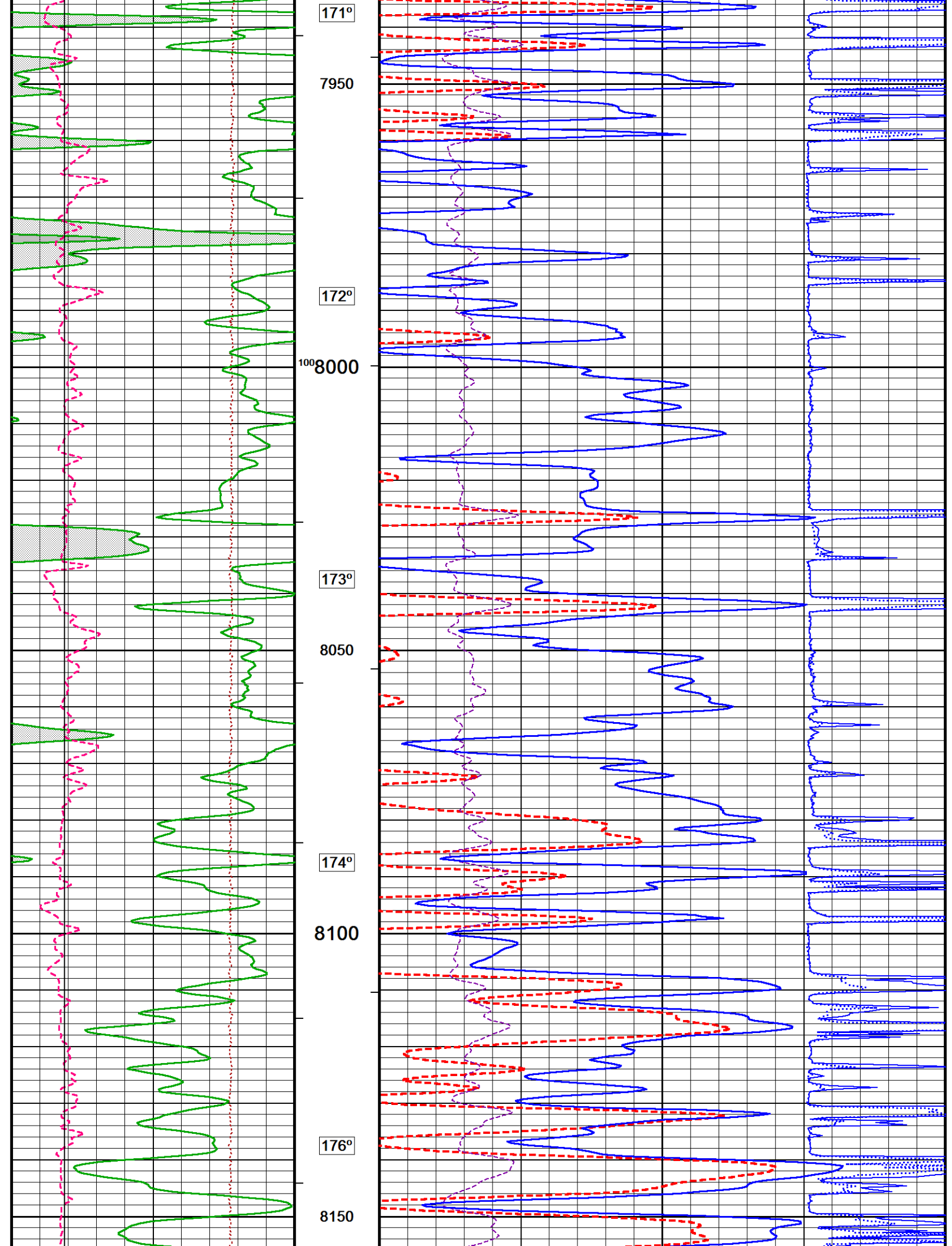
**DST #1 7334-7402 (Marm):**  
 30-60-30-120. IF: BOB 2 min, strg bldg. blw - 616". ISI: blw back GTS immediately, 110". FF: BOB GTS ASAO, strg bldg. blw to 480" @ 1/8" choke, est 9.88 mcf. FSI: Immed blw back off BOB, bld to 320". Rec: 93'GO (15%G, 85%O), 465'GO (50%G, 50%O), 93'GM (40%G, 60%M), 2800'M (circ in), 155'GWM (10%G, 30%W, 60%M). HP: 3799-3461. FP: 145/251, 221/340. SIP: 1870-1848. BHT: 180°. Ran a sample chamber, recovery: 1200cc O, 7 cu ft G, 1050psig.

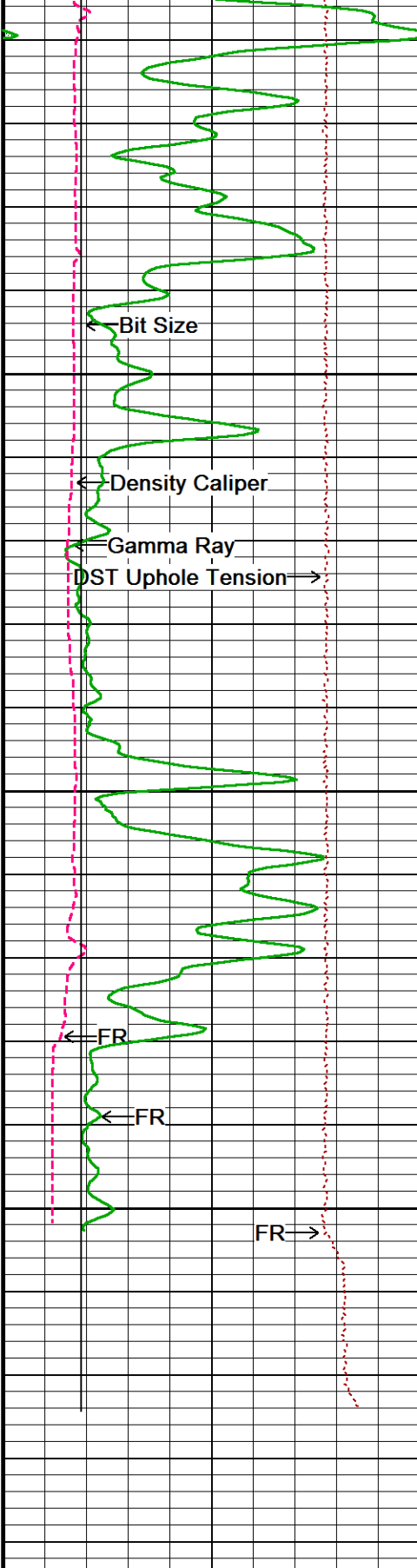


**DST #2 7440-7490 (Ft. Scott-Lwr Ft Sc):** 30-60-60-120. IF: w/1" stdy incr to 8.42". ISI: bleed off, no blw back. FF: BOB in 40mins, incr to 19.7". Rec: 93'GSOCM (10%G, 10%O, 80%M). HP: 3728-3467. FP: 23/33, 53/64. SIP: 1709-1754. BHT: 178°. Sample chamber recovery: 1000ml O, 3CF G, 200ml Mud @ 550psi, 449'GIP.









179°

8200

179°

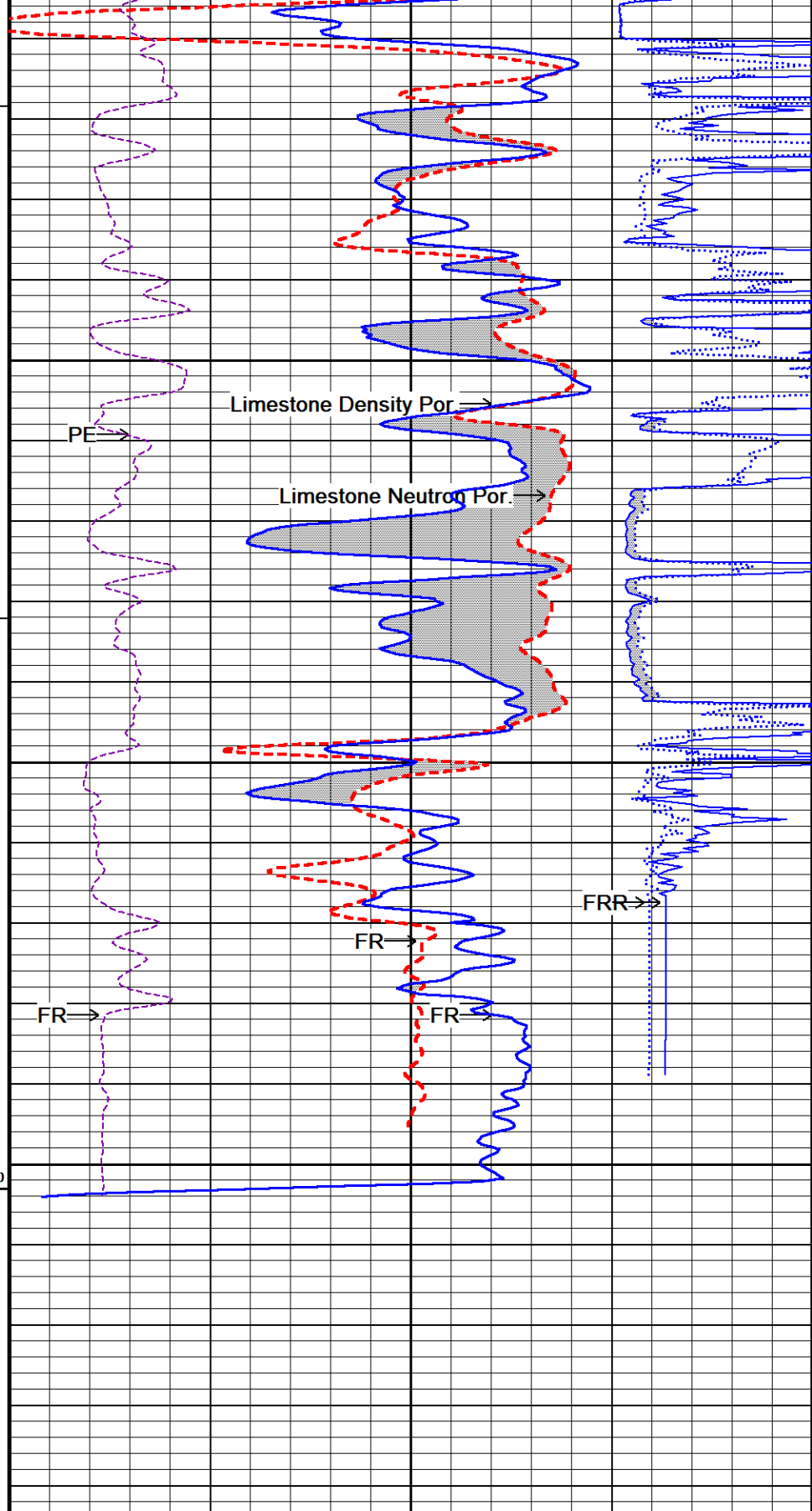
8250

8300

Depth  
in  
Feet

Timing Marks  
every 60.0 sec

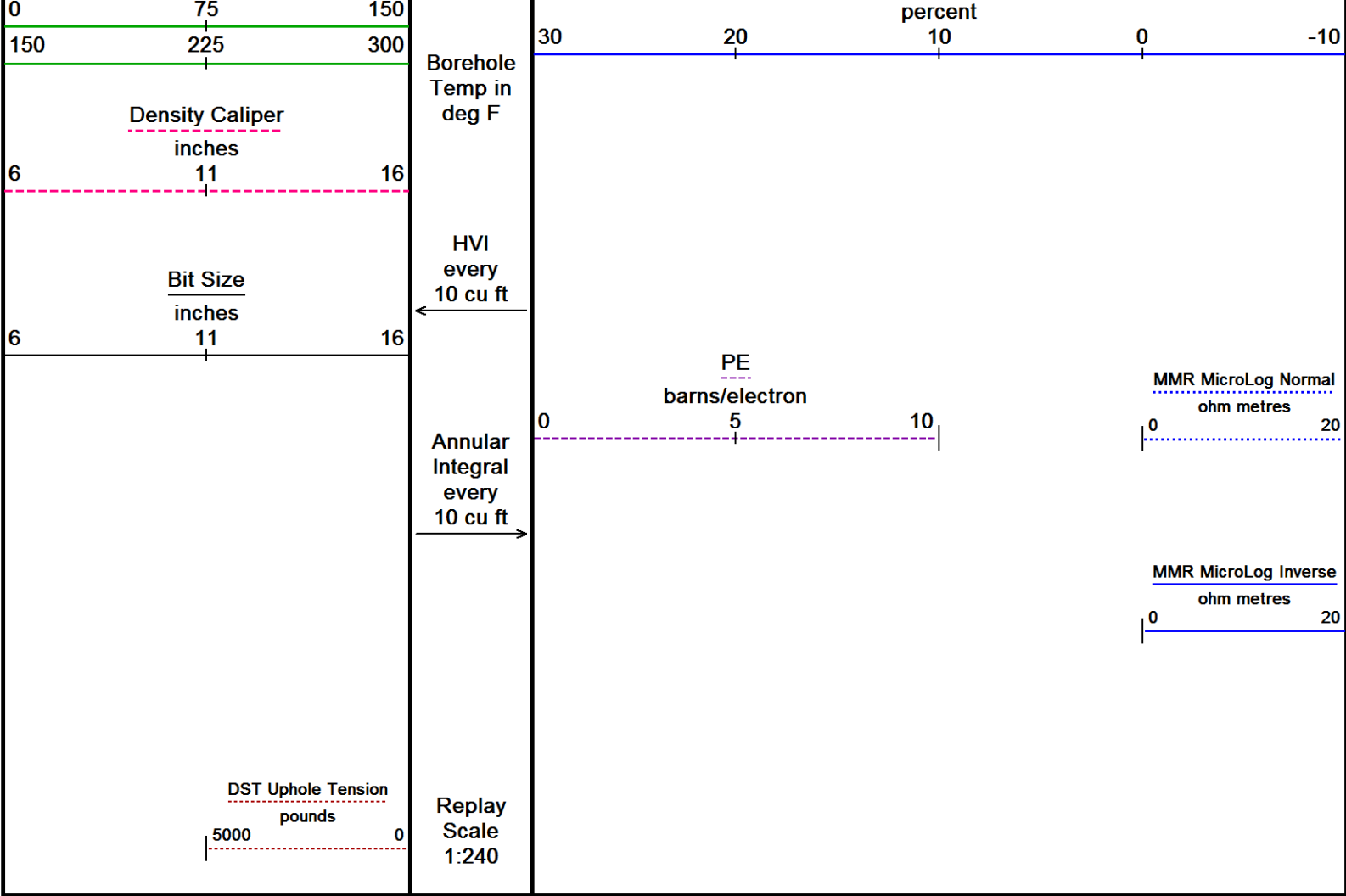
Gamma Ray  
API



Limestone Neutron Por.  
percent

Limestone Density Por.

30 20 10 0 -10



Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-JAN-2019 14:04

Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\MERGED MAIN PASS final.dta

Recorded on 20-JAN-2019 03:03

System Versions: Plotted with 18.03.9344

↑

5 INCH LIMESTONE MAIN

↑

↓

REPEAT SECTION

↓

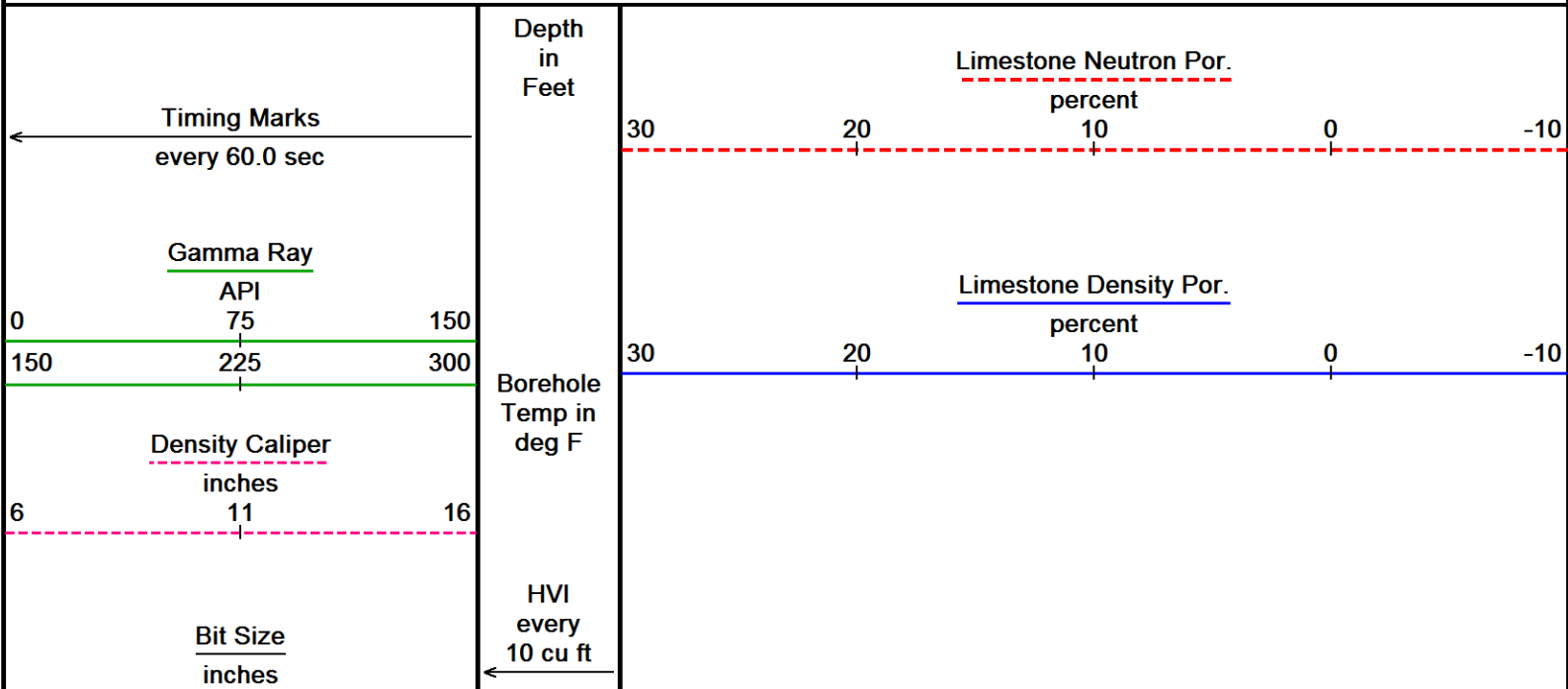
Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-JAN-2019 14:04

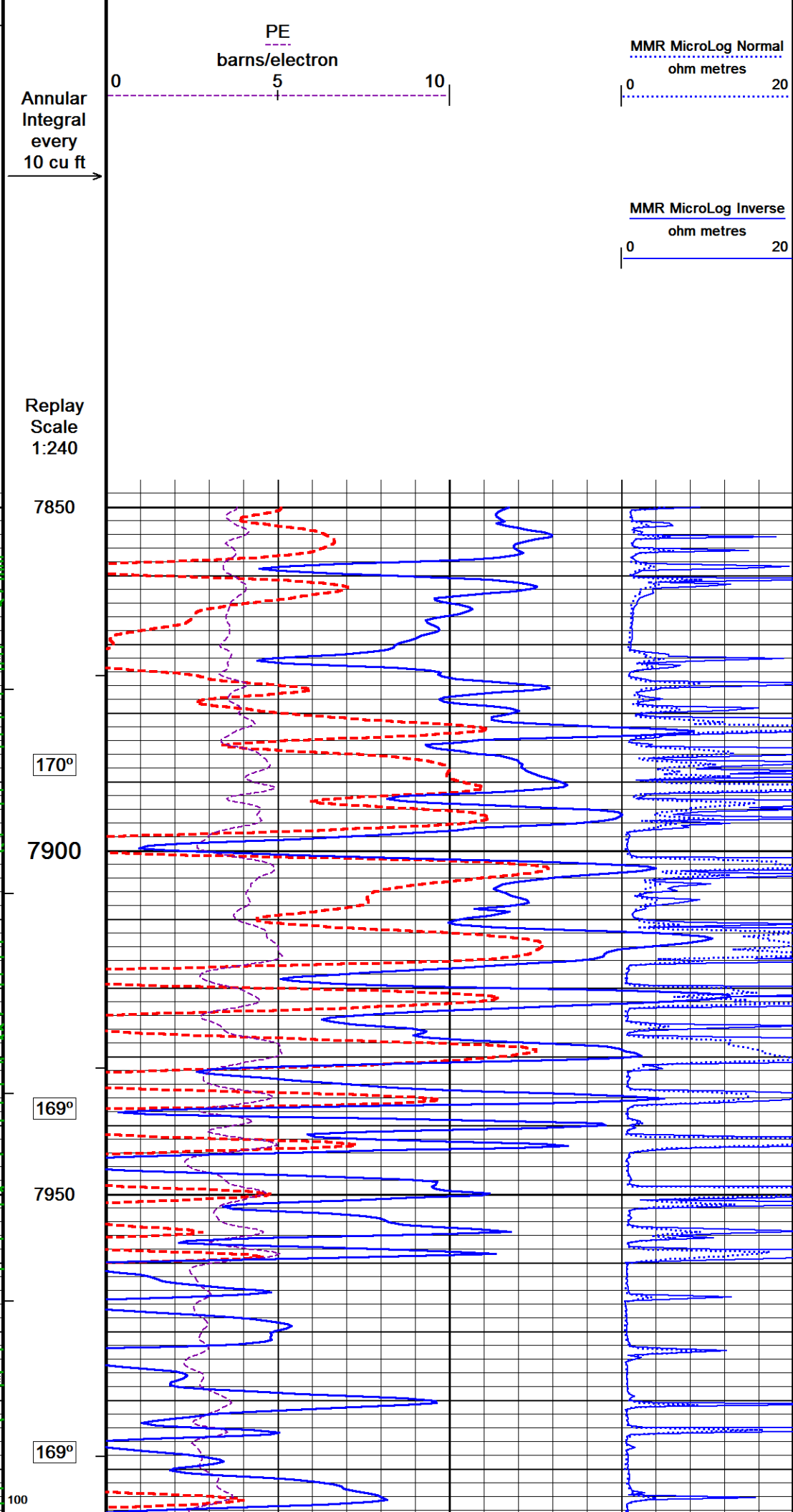
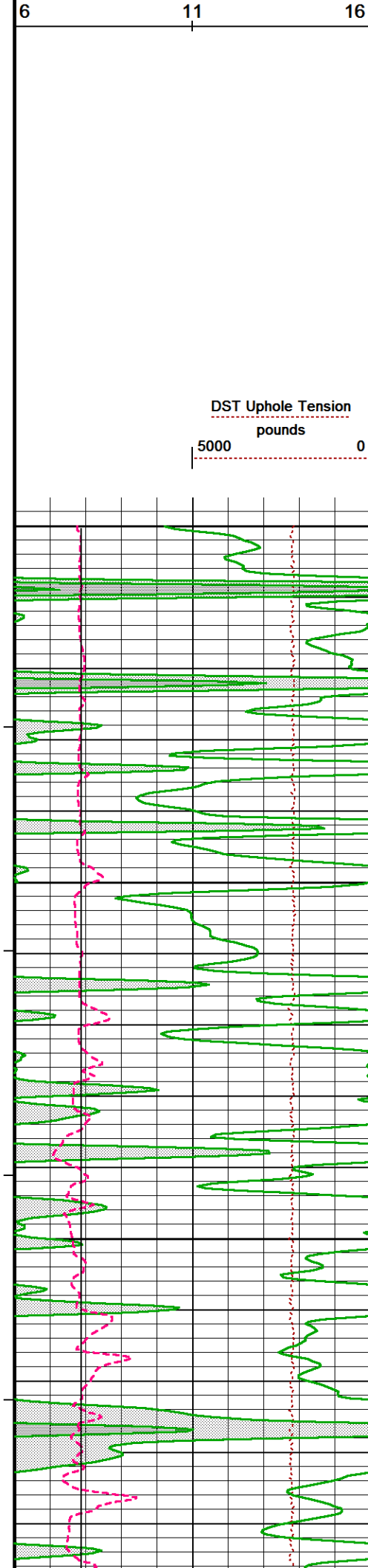
Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\REPEAT PASS.dta

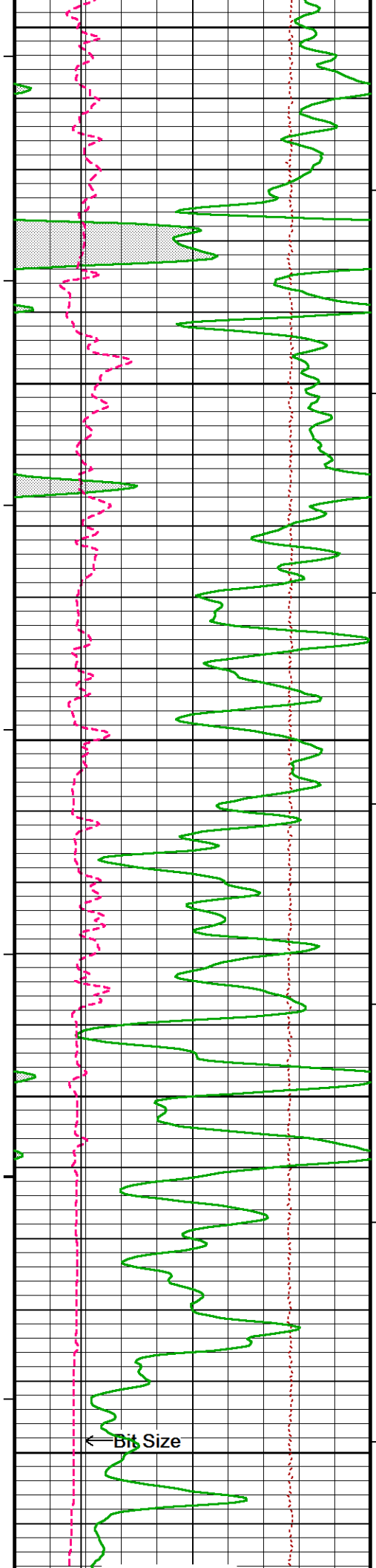
Recorded on 20-JAN-2019 02:40

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344









8000

170°

8050

172°

8100

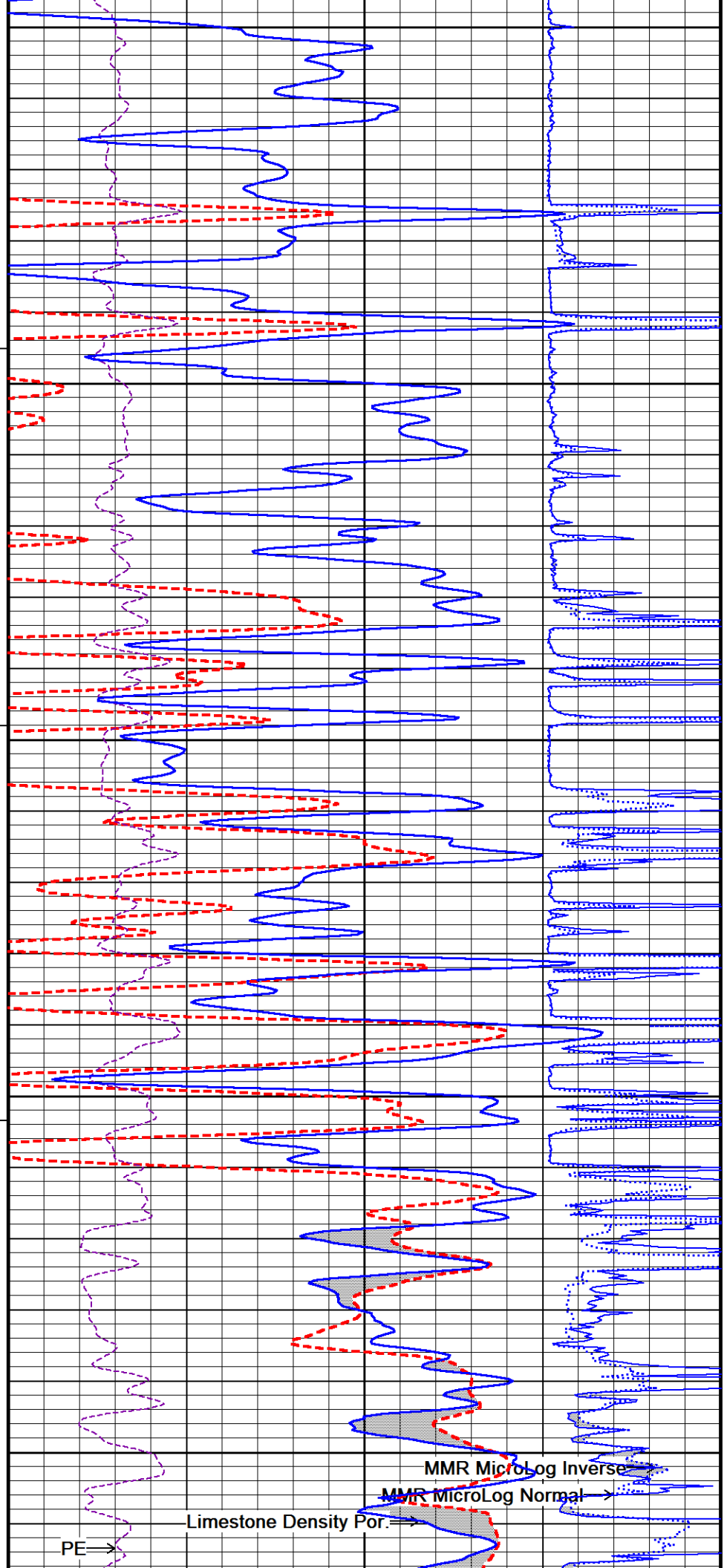
175°

8150

177°

8200

← Bit Size

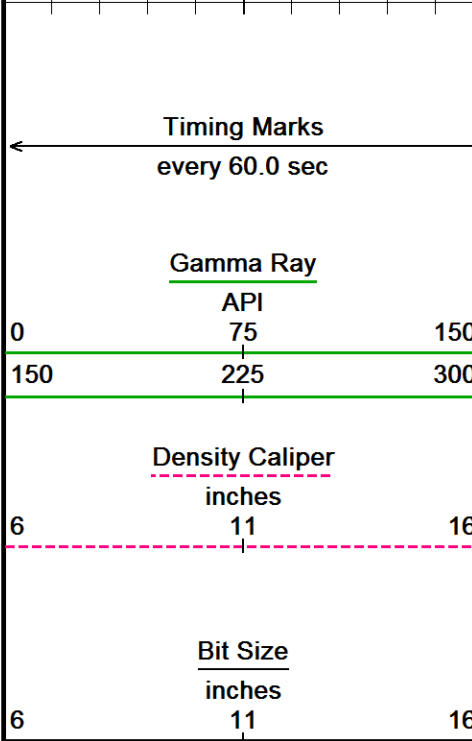
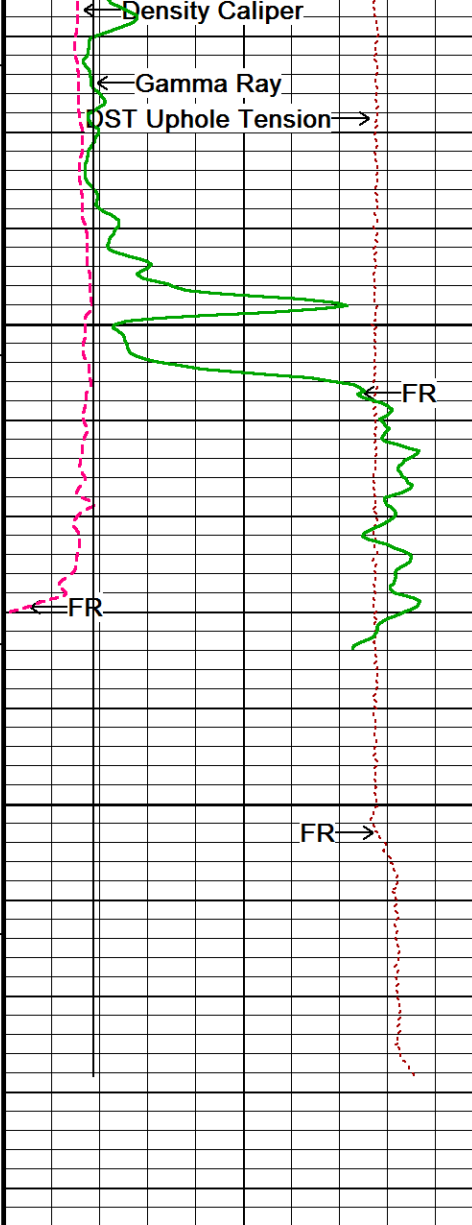


MMR MicroLog Inverse →

MMR MicroLog Normal →

Limestone Density Por. →

PE →



178°

8250

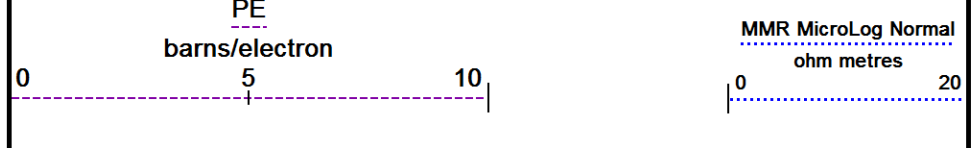
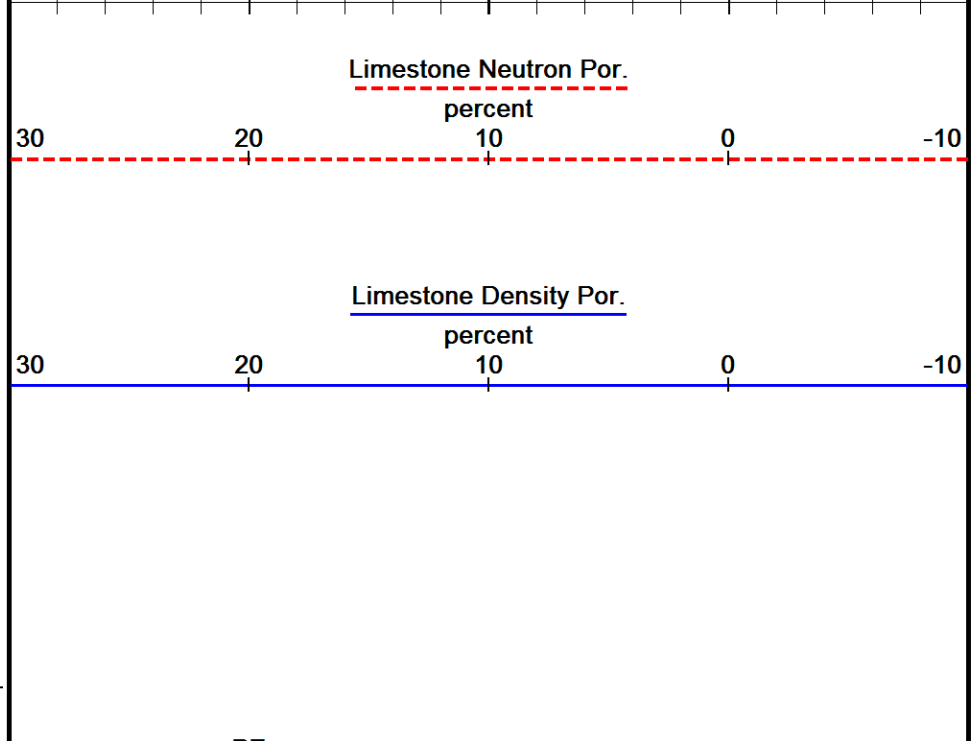
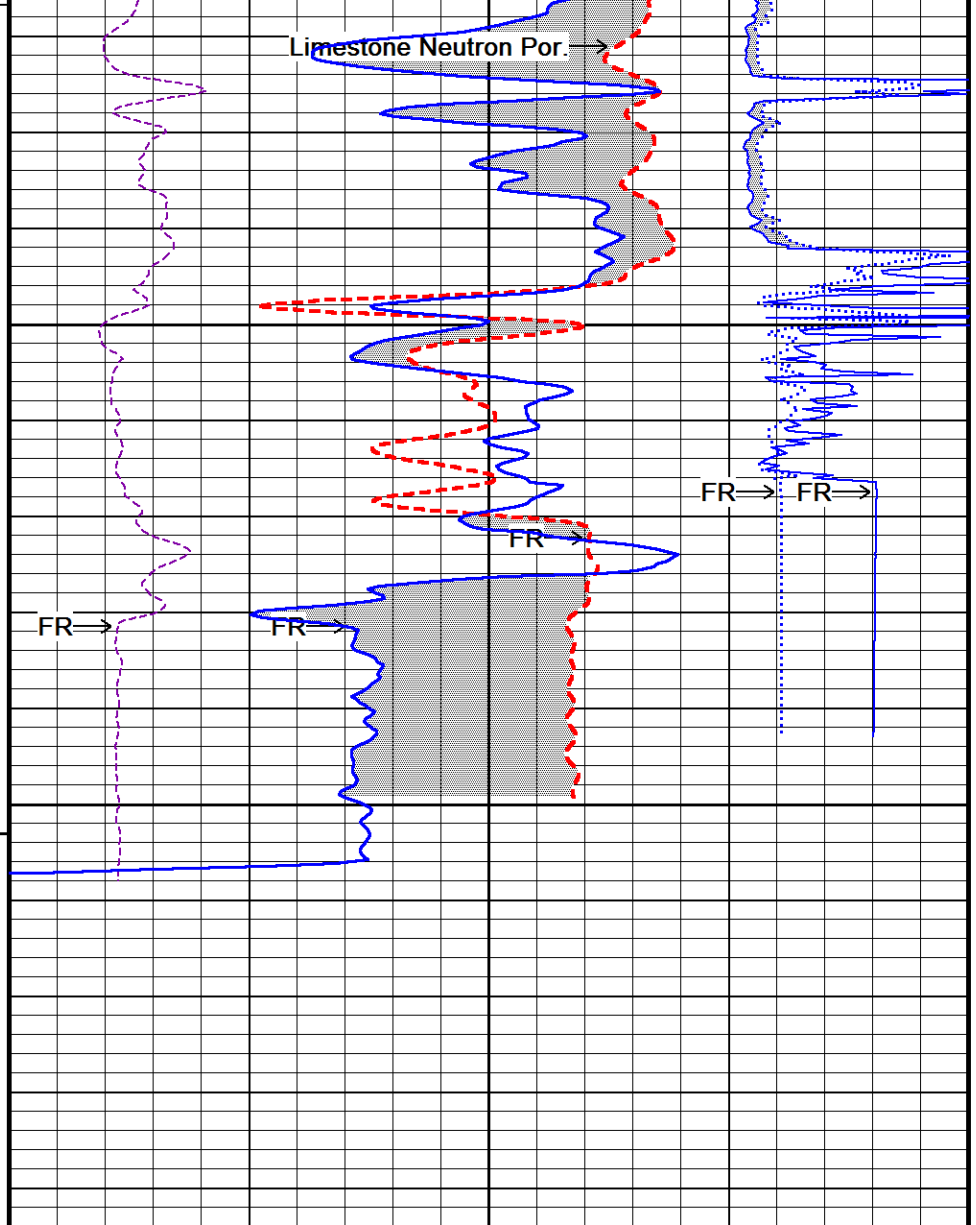
8300

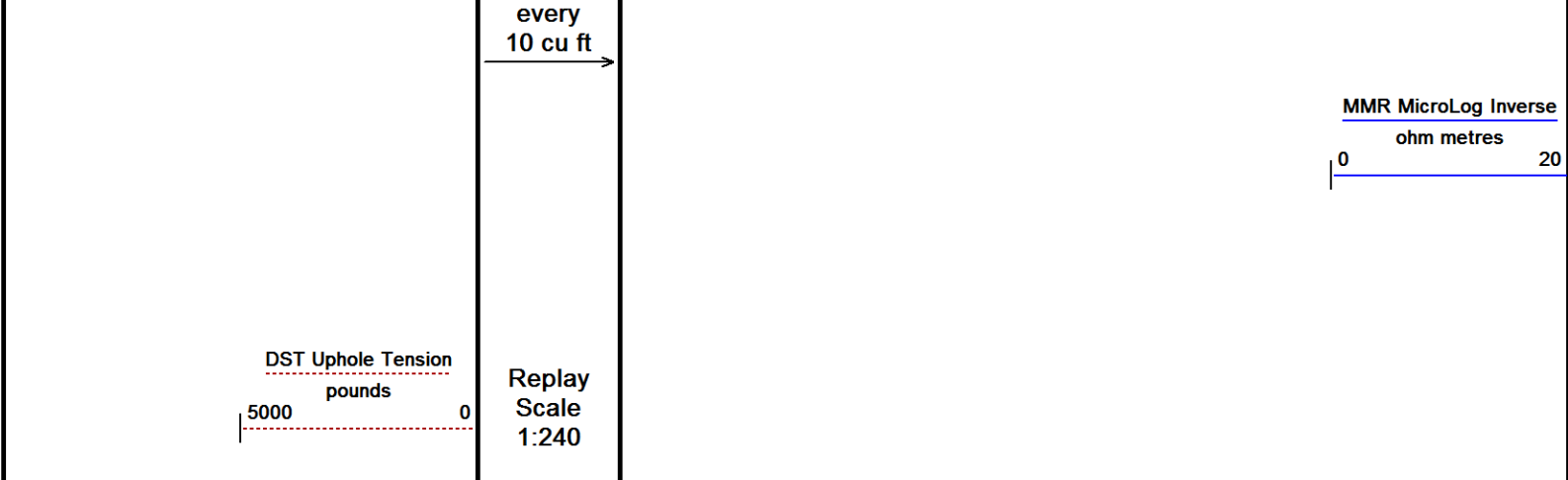
Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral





Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\REPEAT PASS.dta  
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 20-JAN-2019 14:04  
Recorded on 20-JAN-2019 02:40

↑

REPEAT SECTION

↑

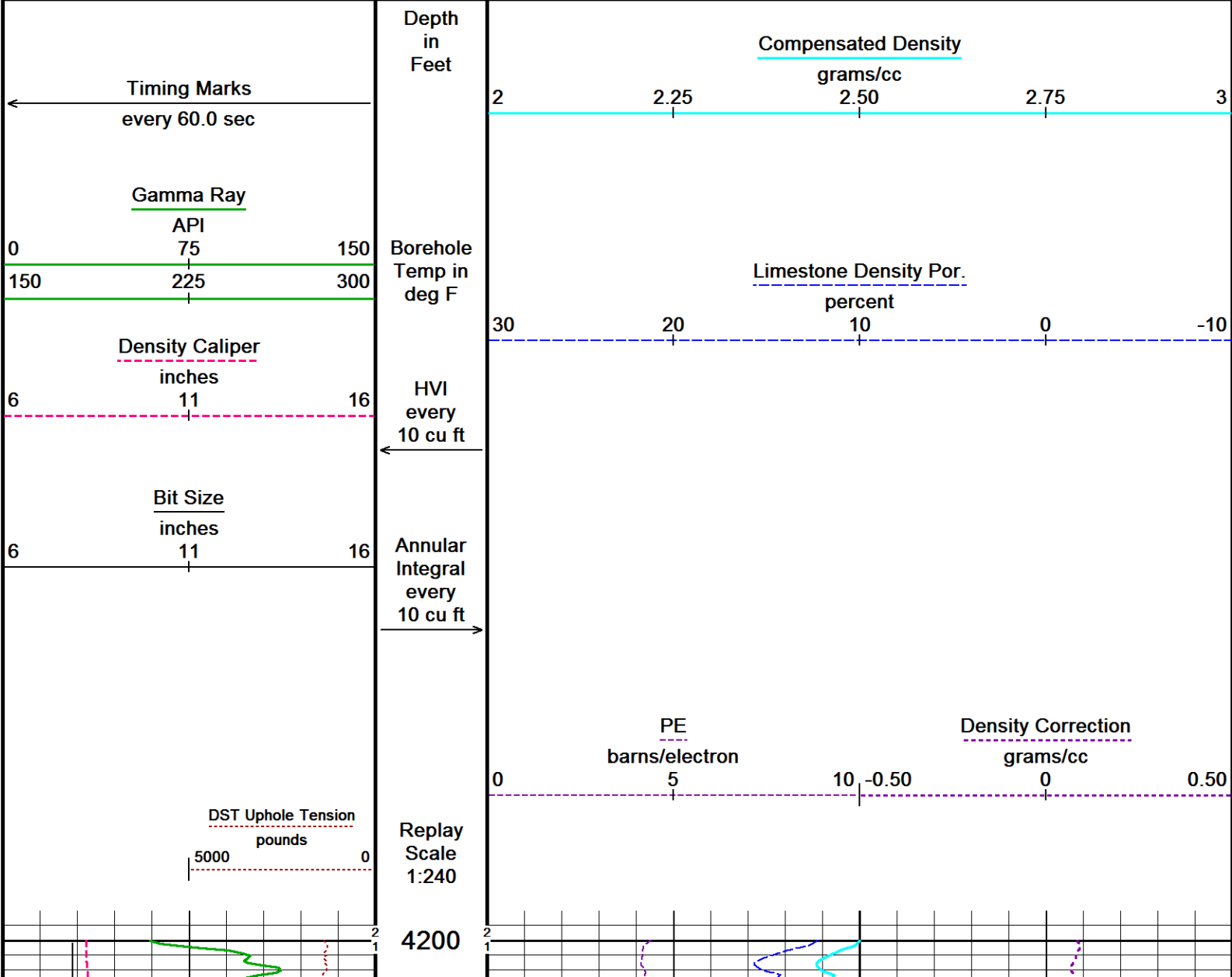
↓

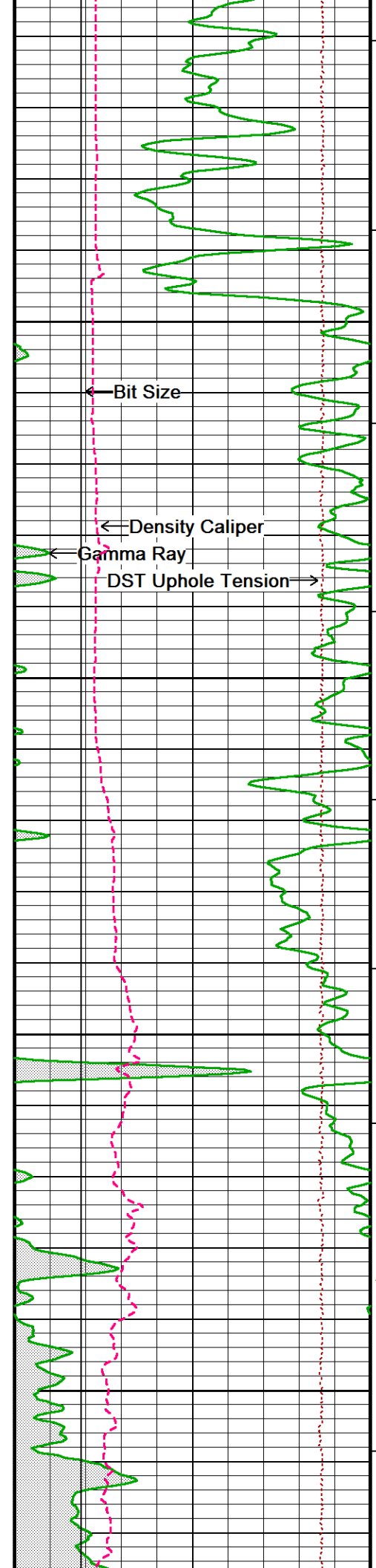
5 INCH BULK DENSITY MAIN

↓

Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\MERGED MAIN PASS final.dta  
System Versions: Plotted with 18.03.9344

Plotted on 20-JAN-2019 14:04  
Recorded on 20-JAN-2019 03:03





142°

4250

142°

4300

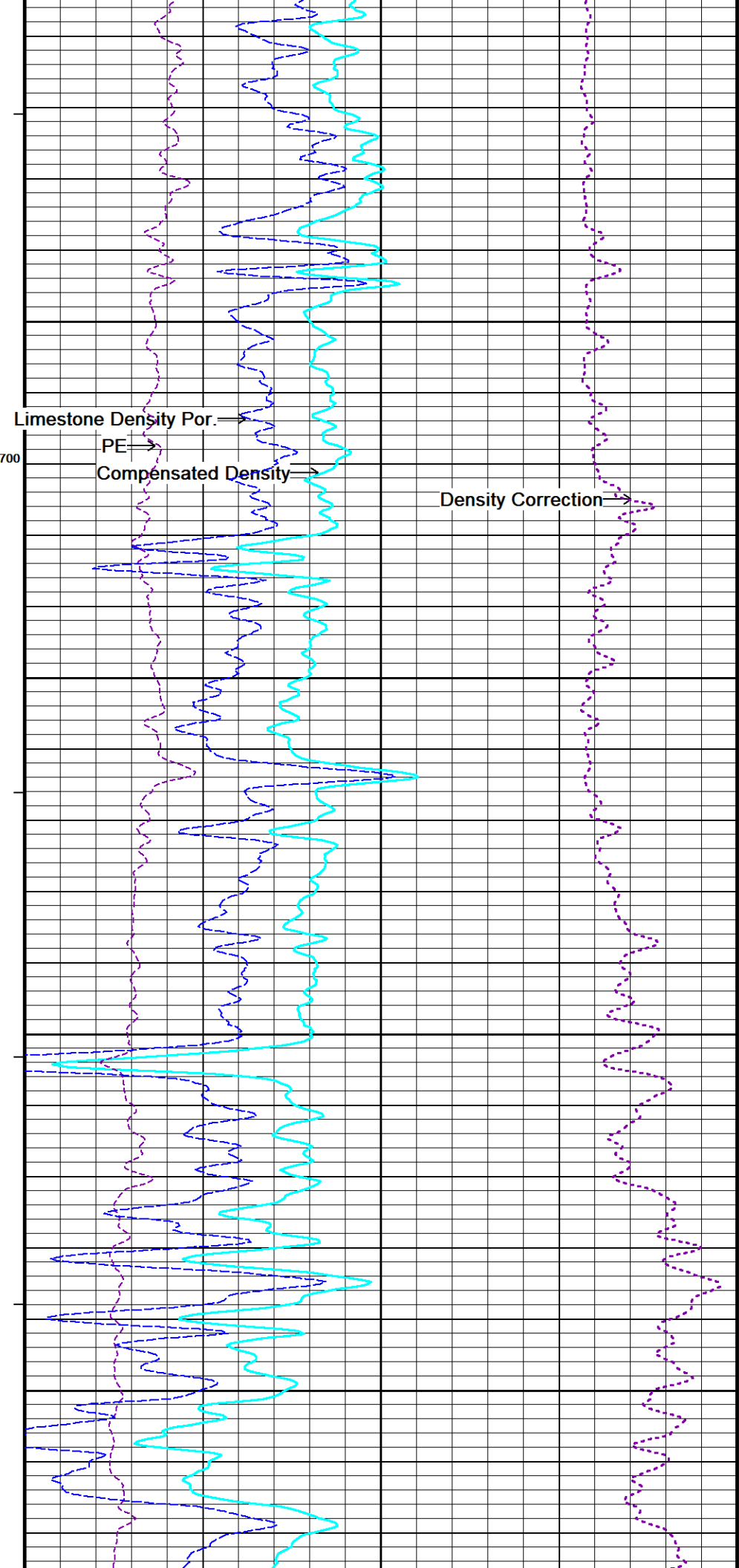
143°

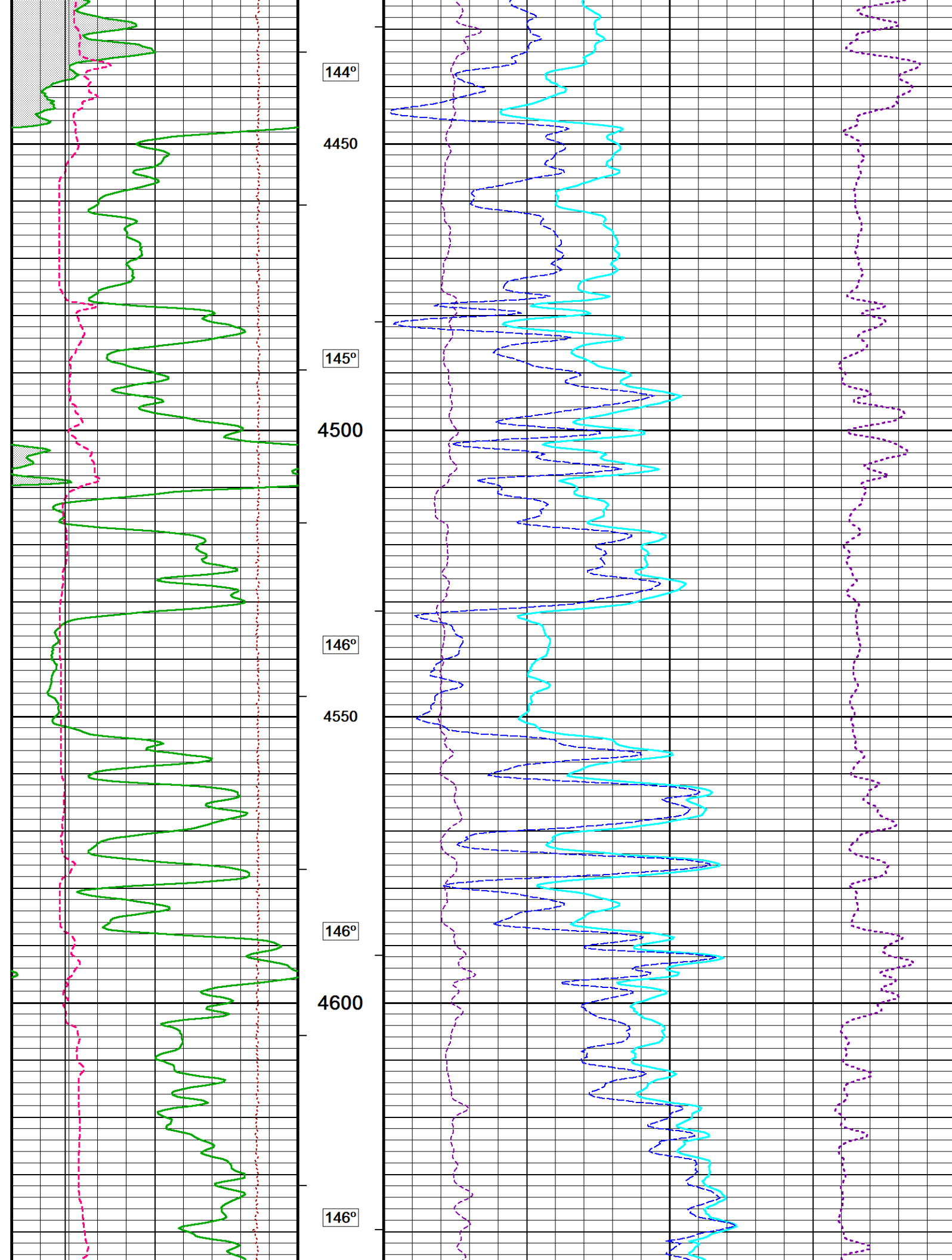
4350

1300

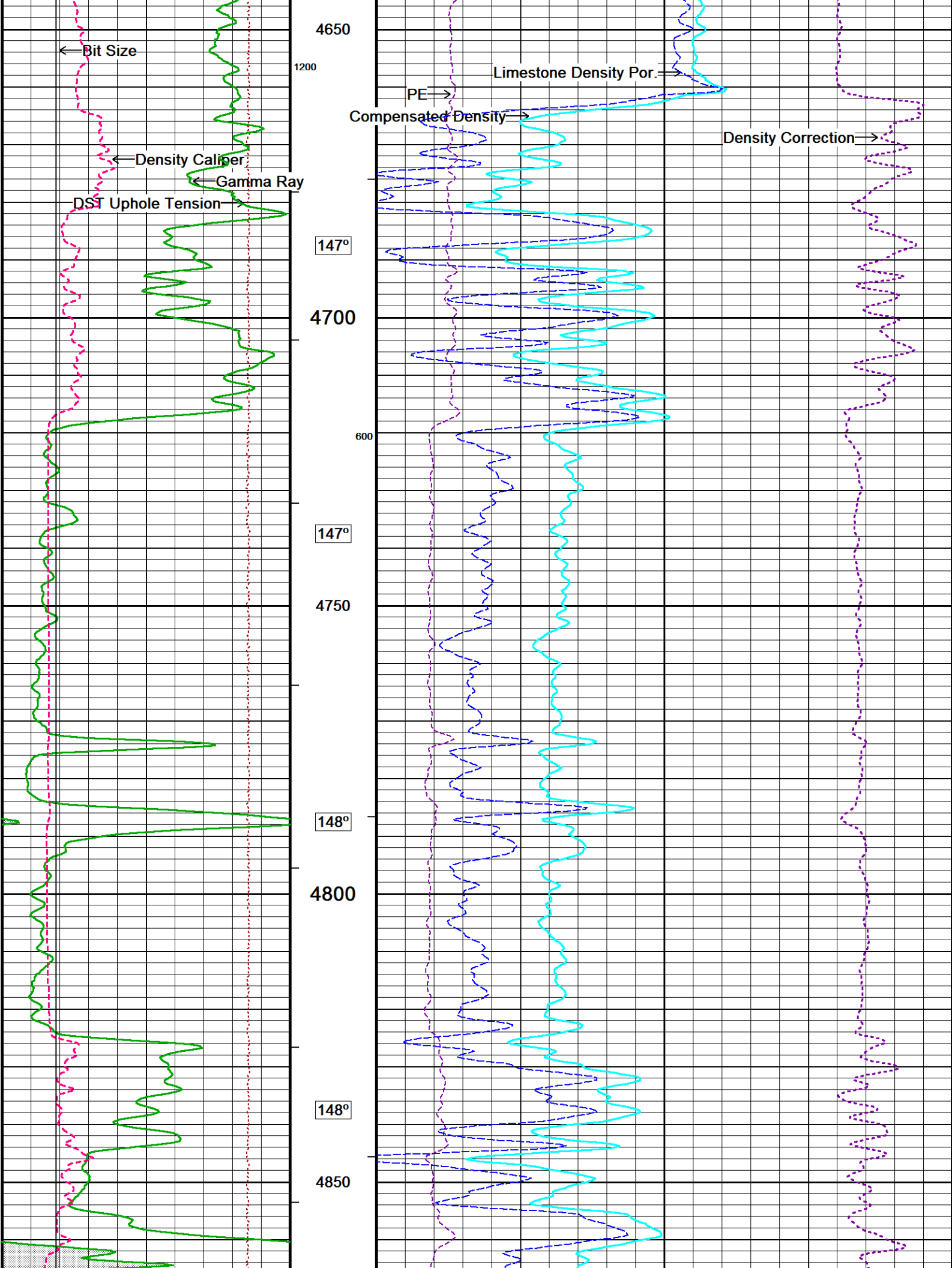
144°

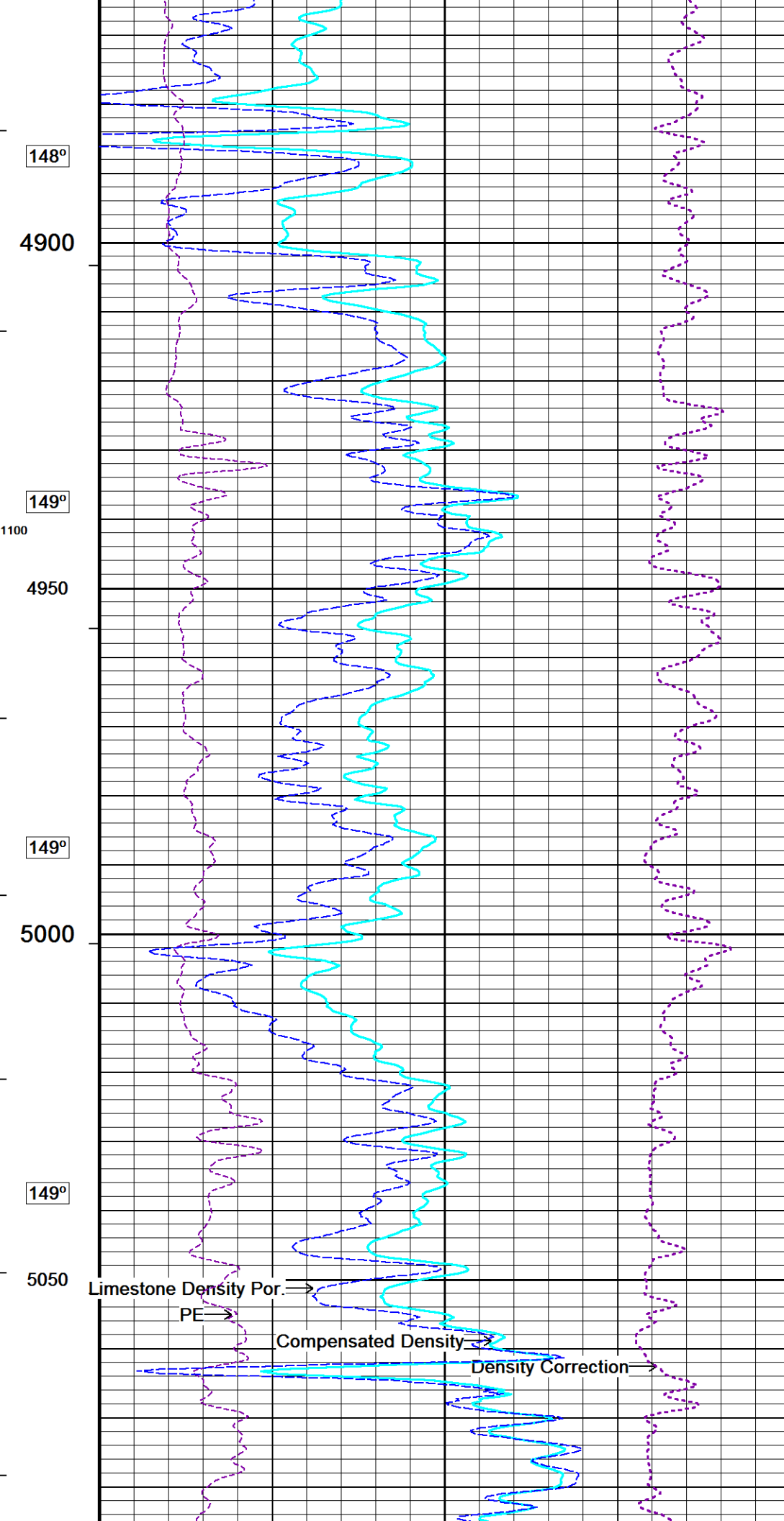
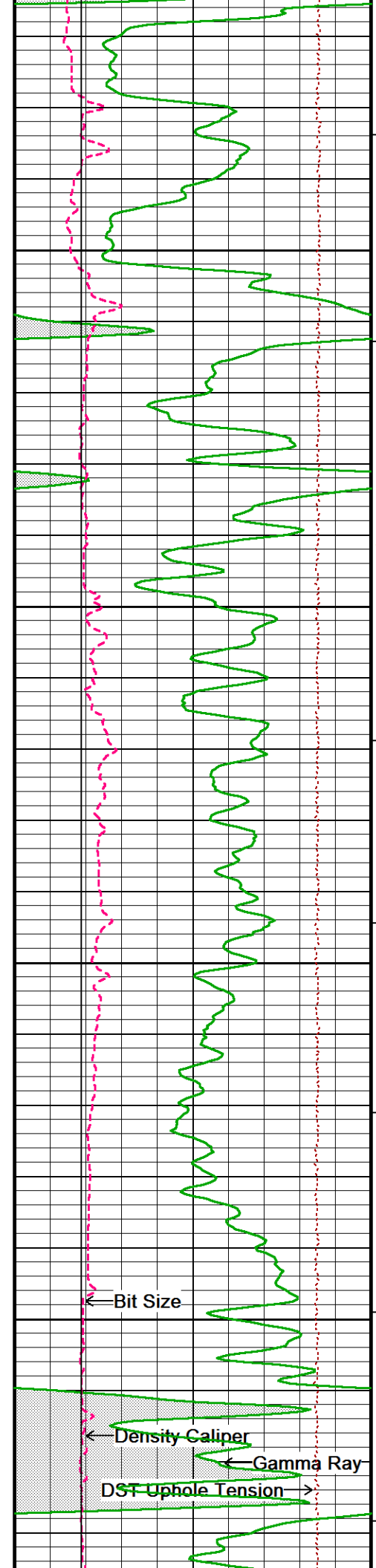
4400

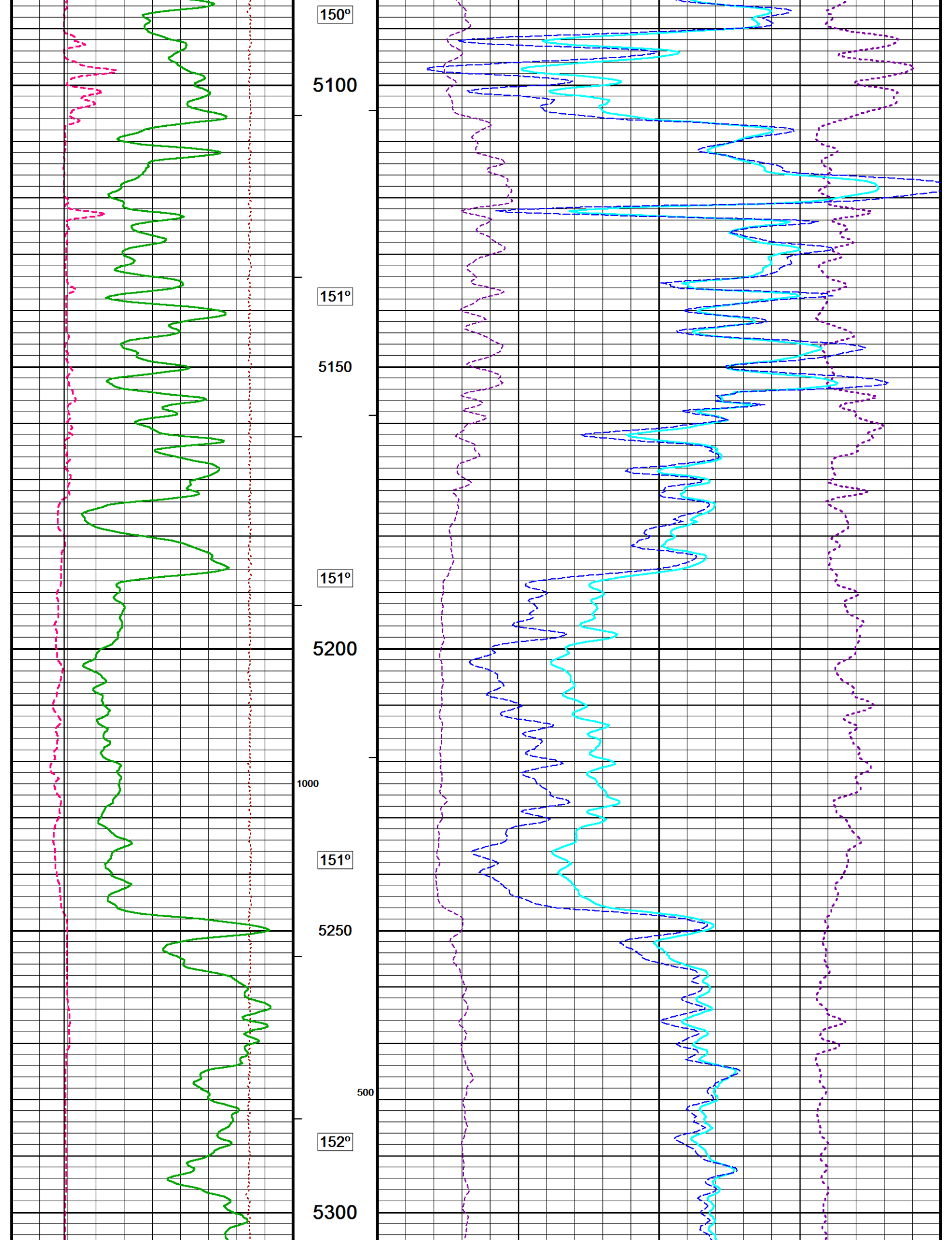


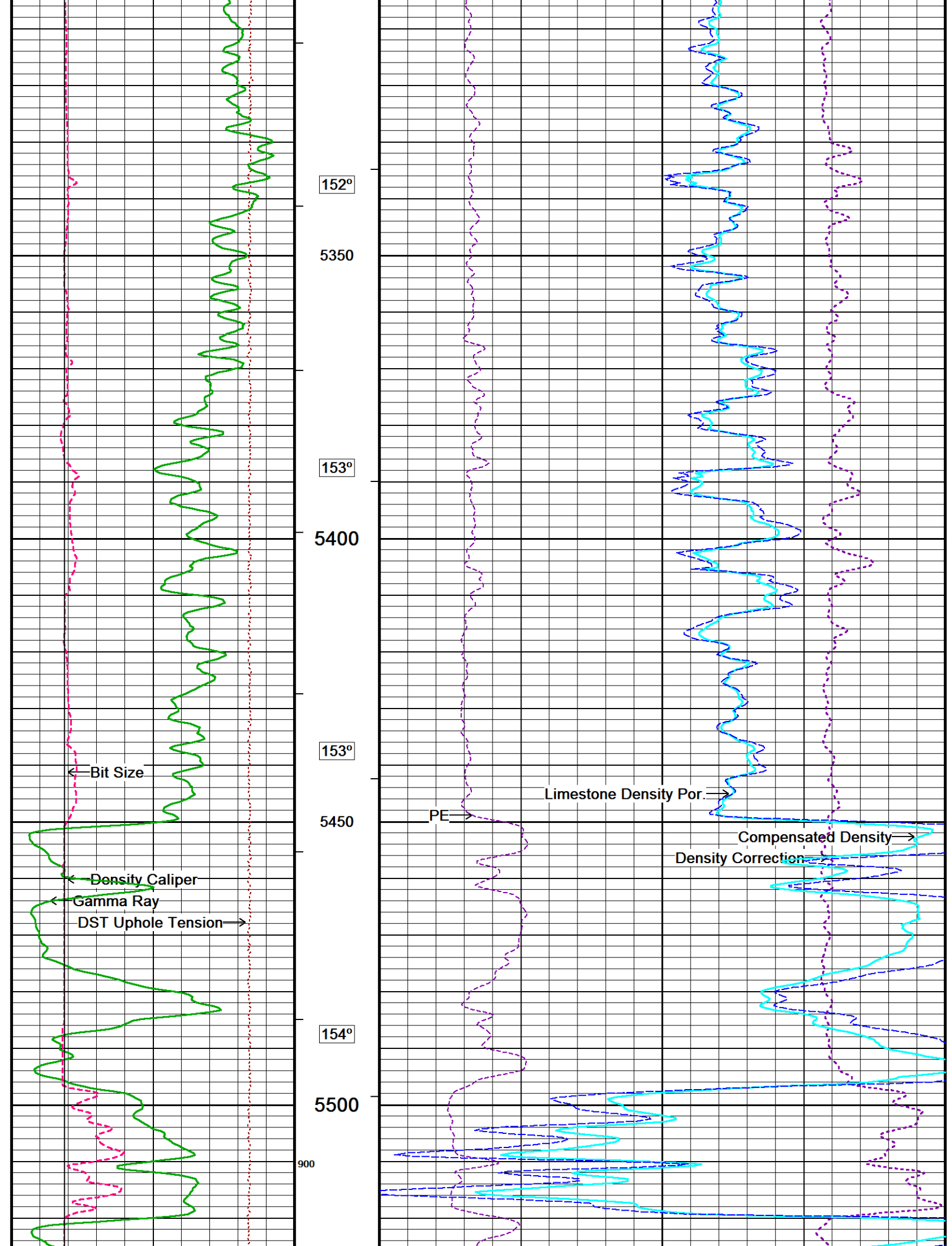


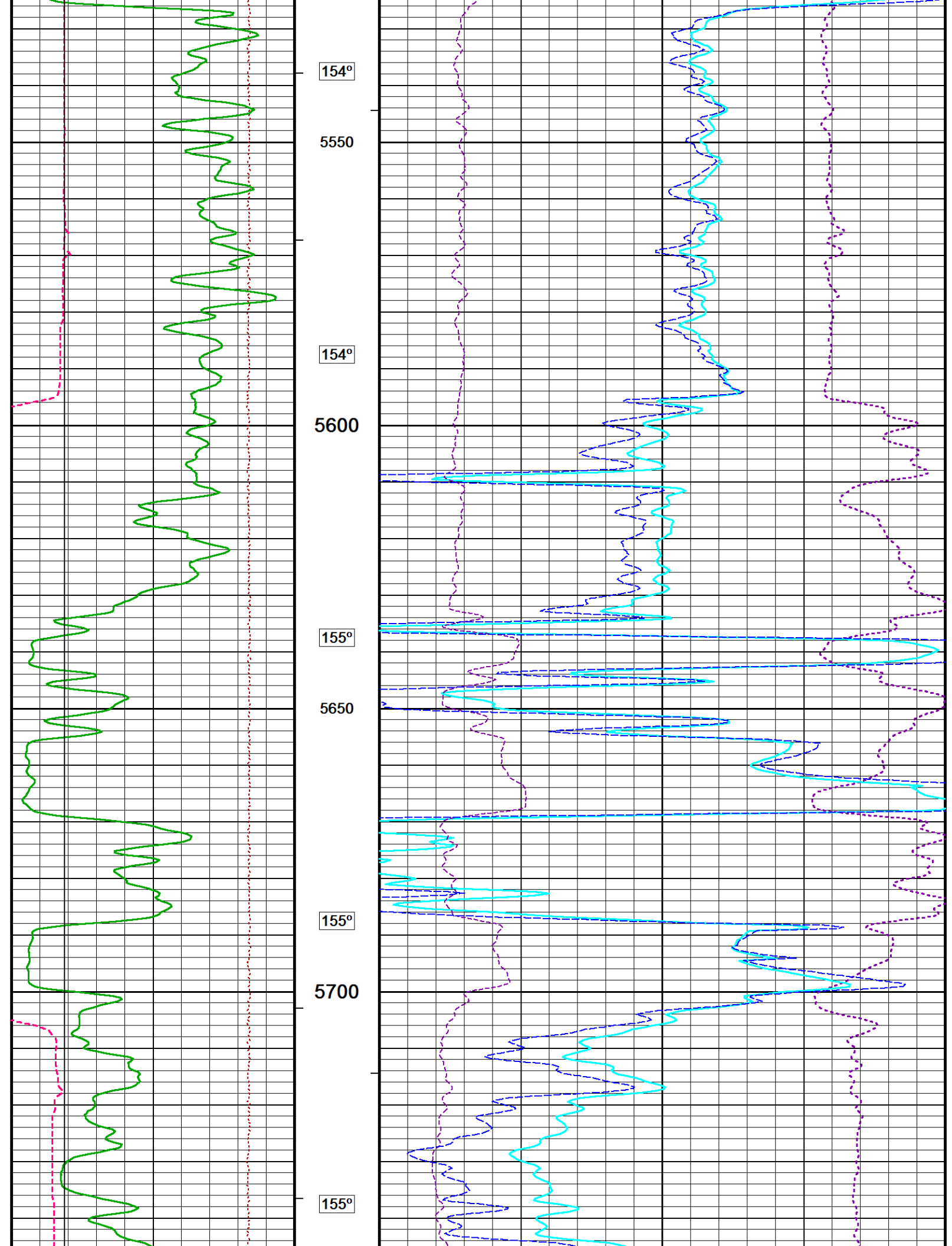


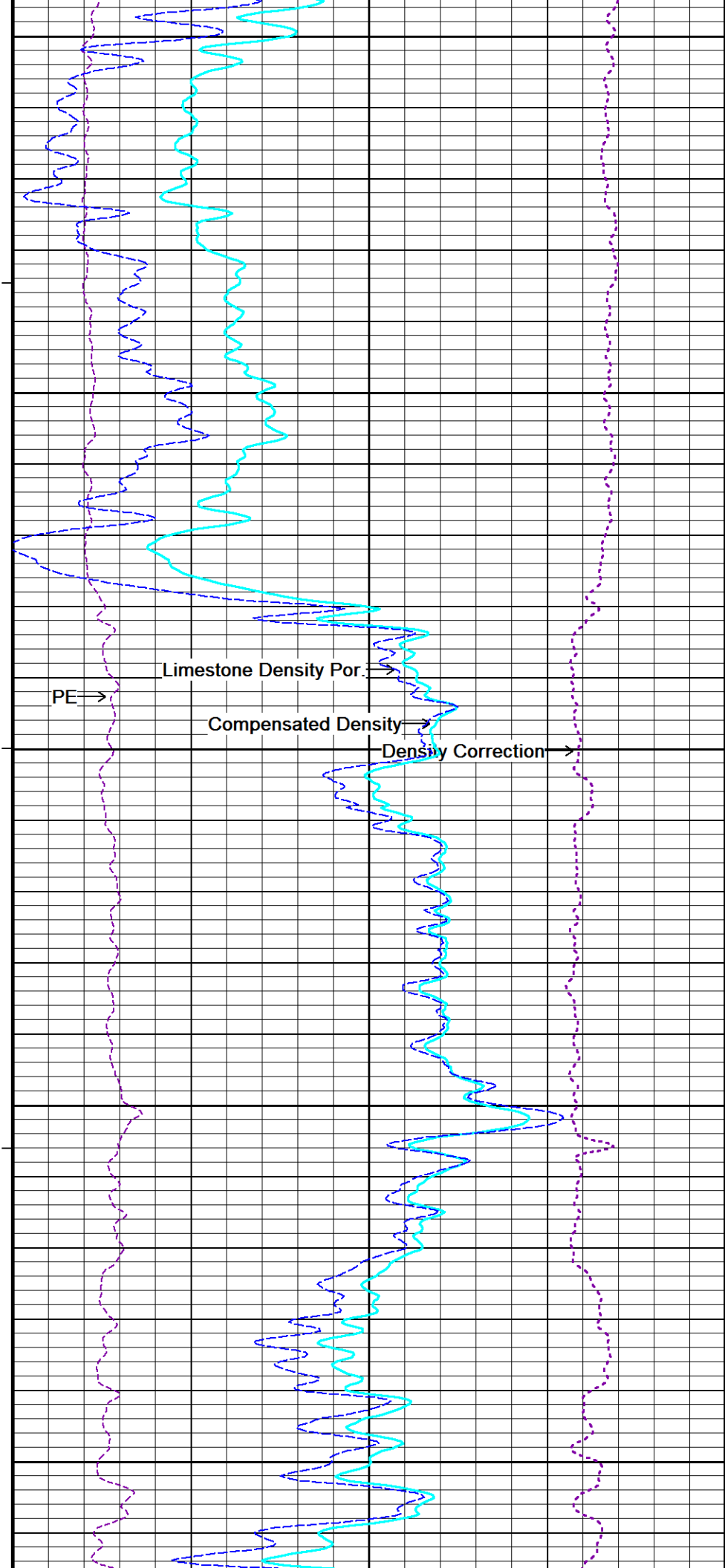
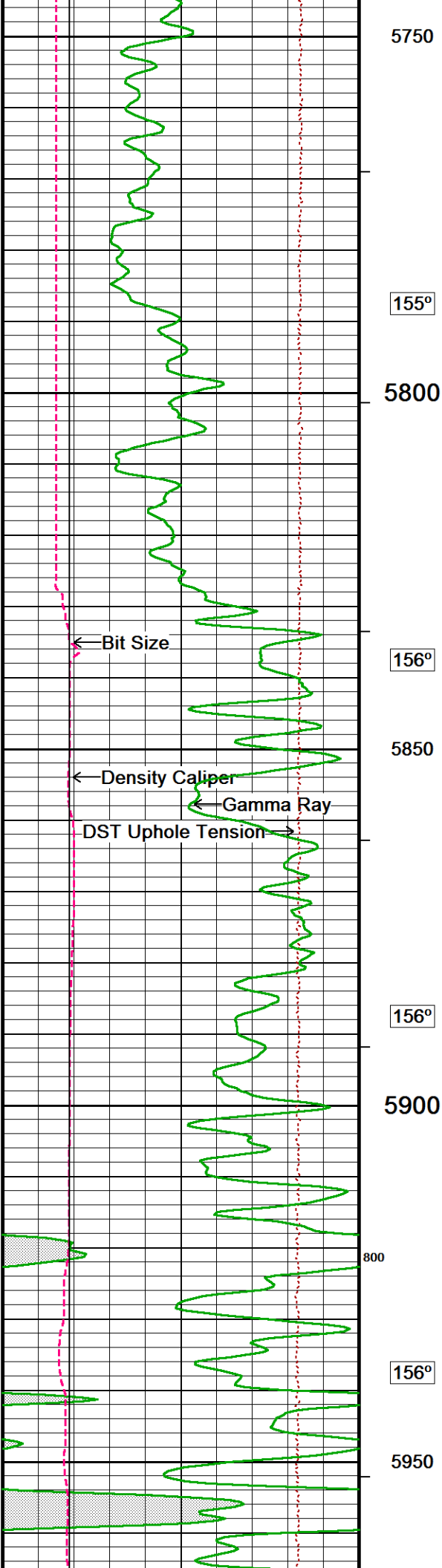




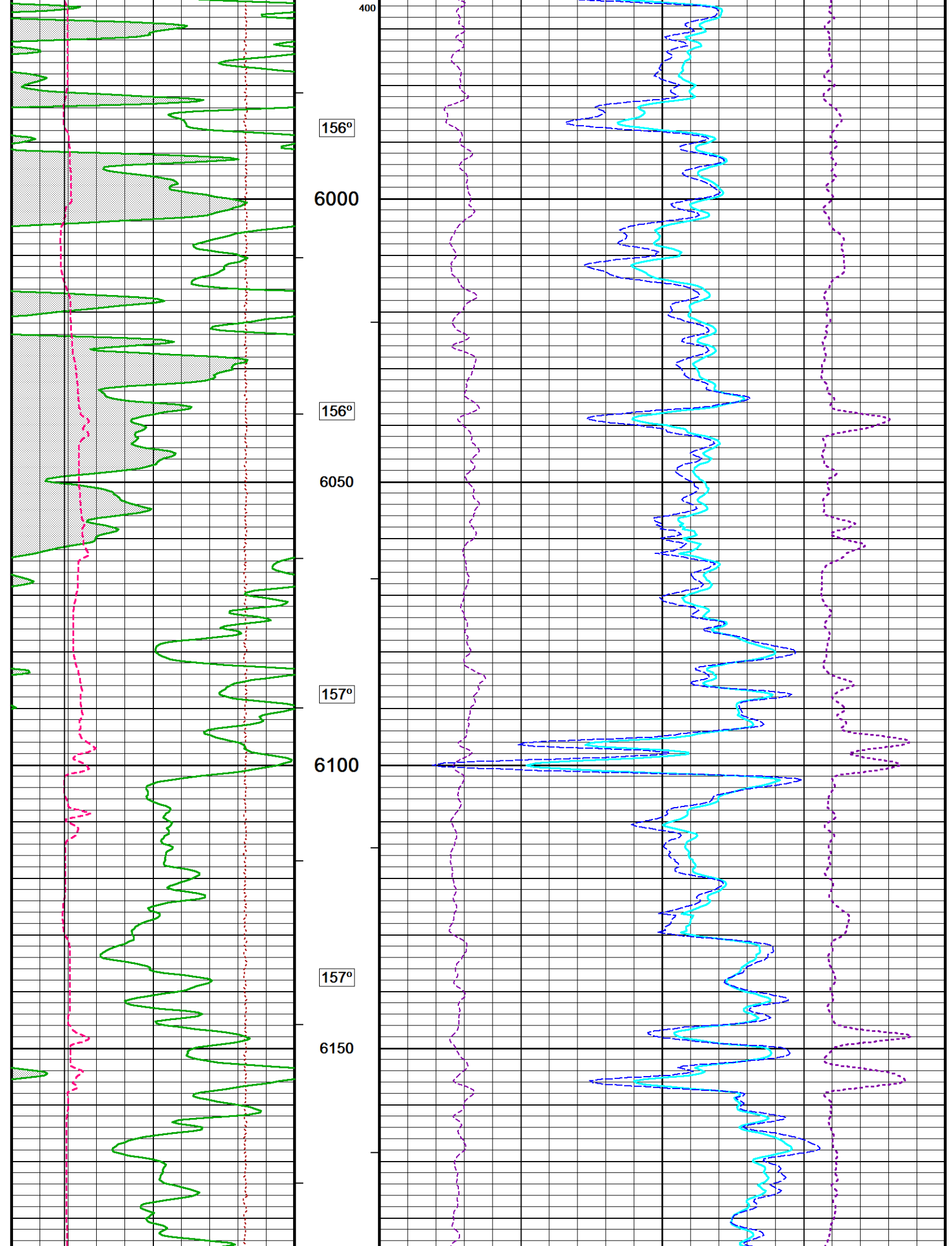


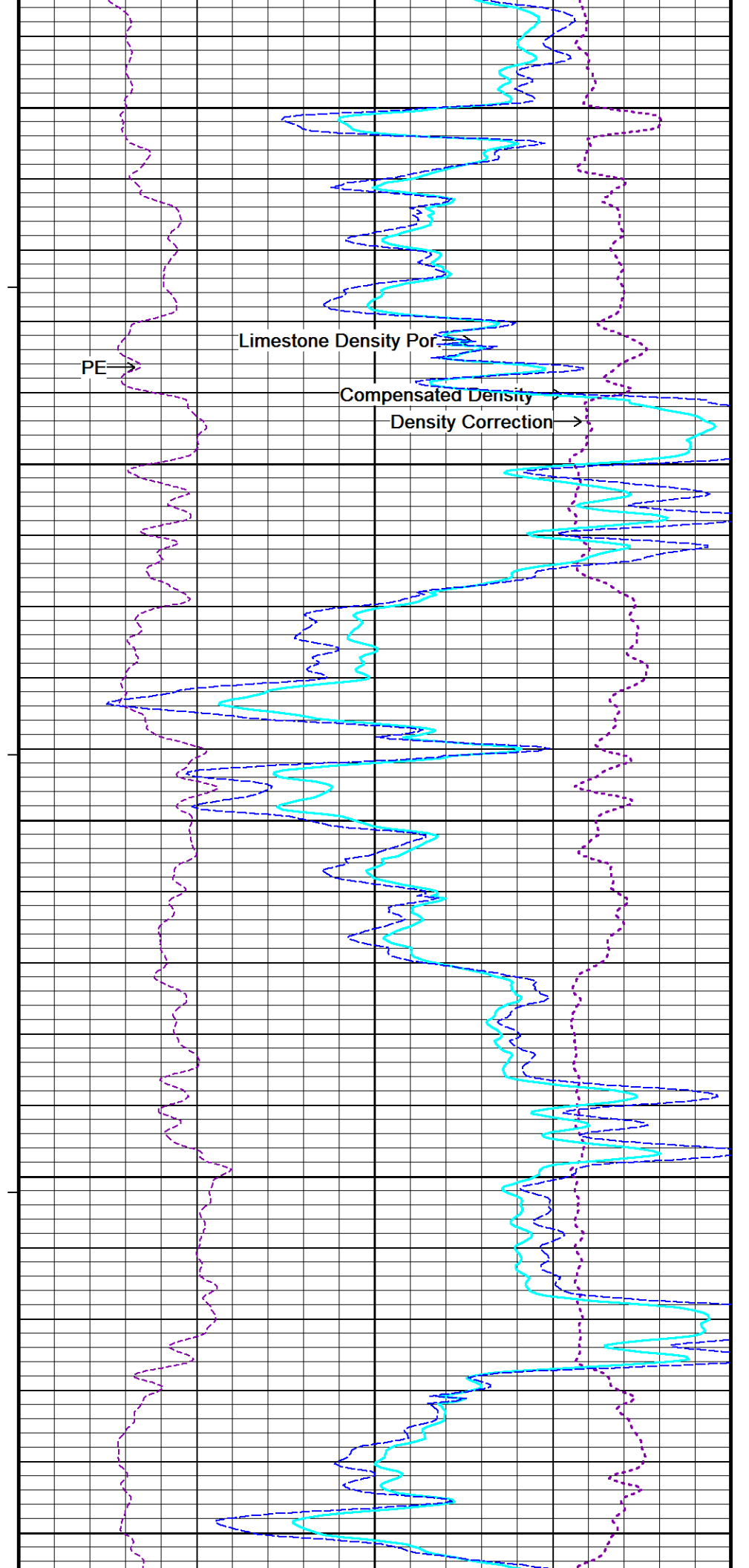
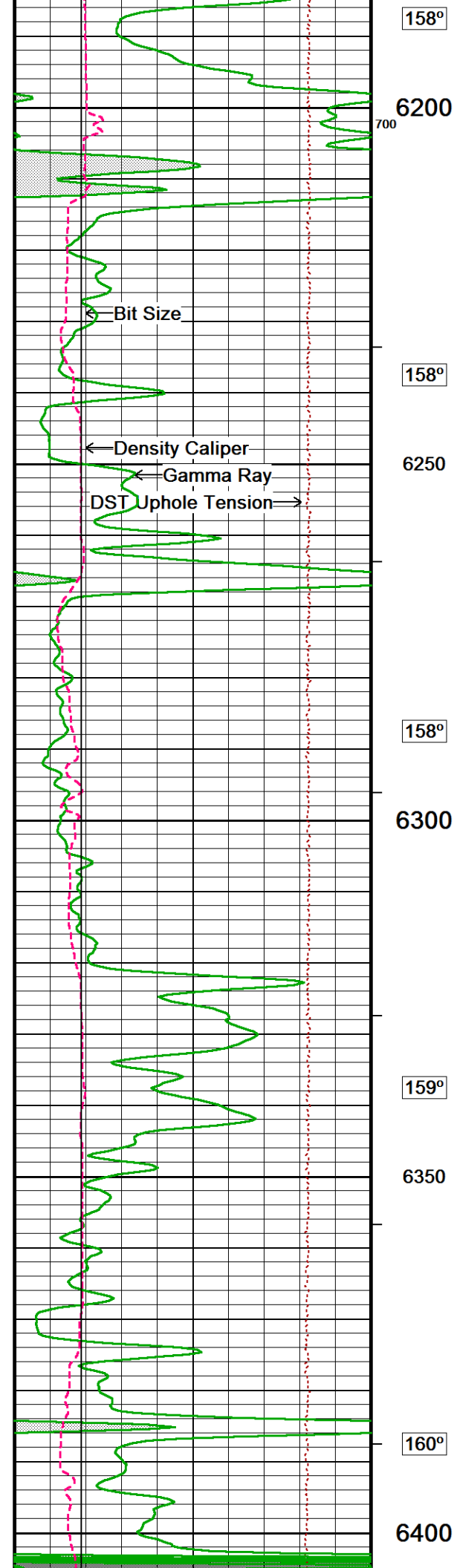


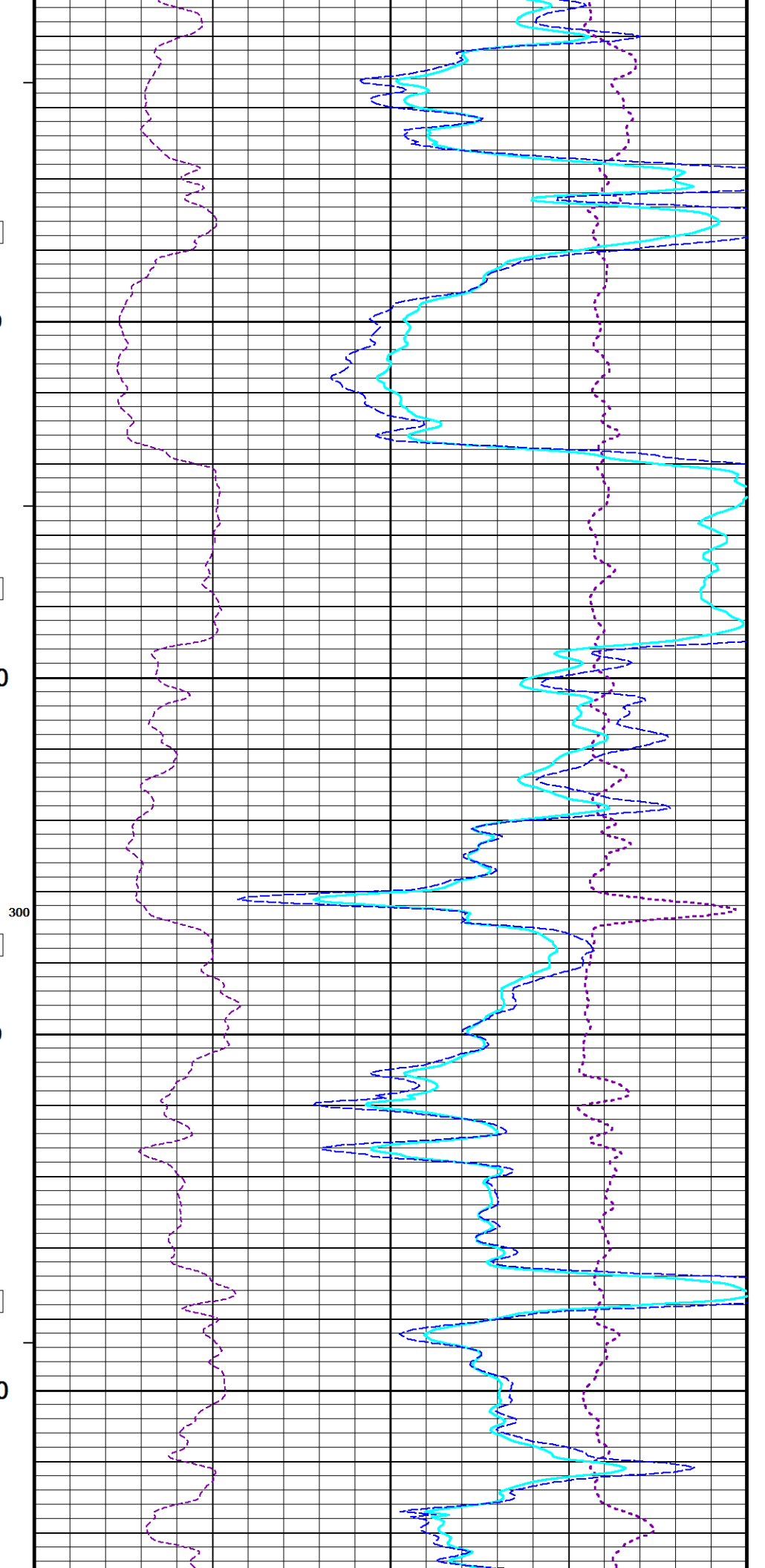
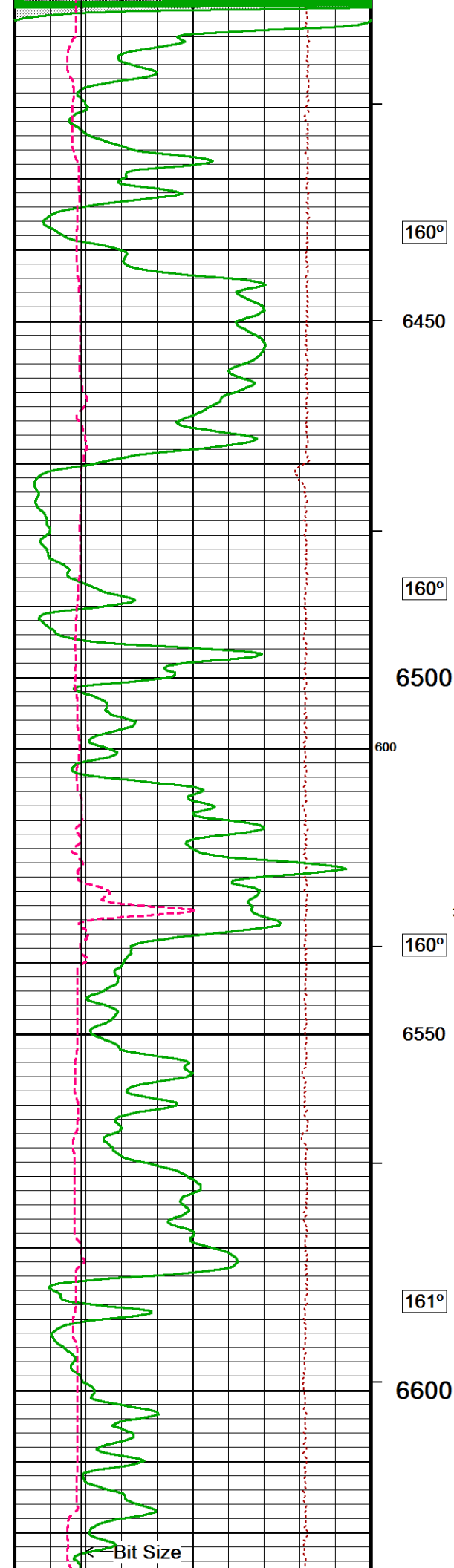


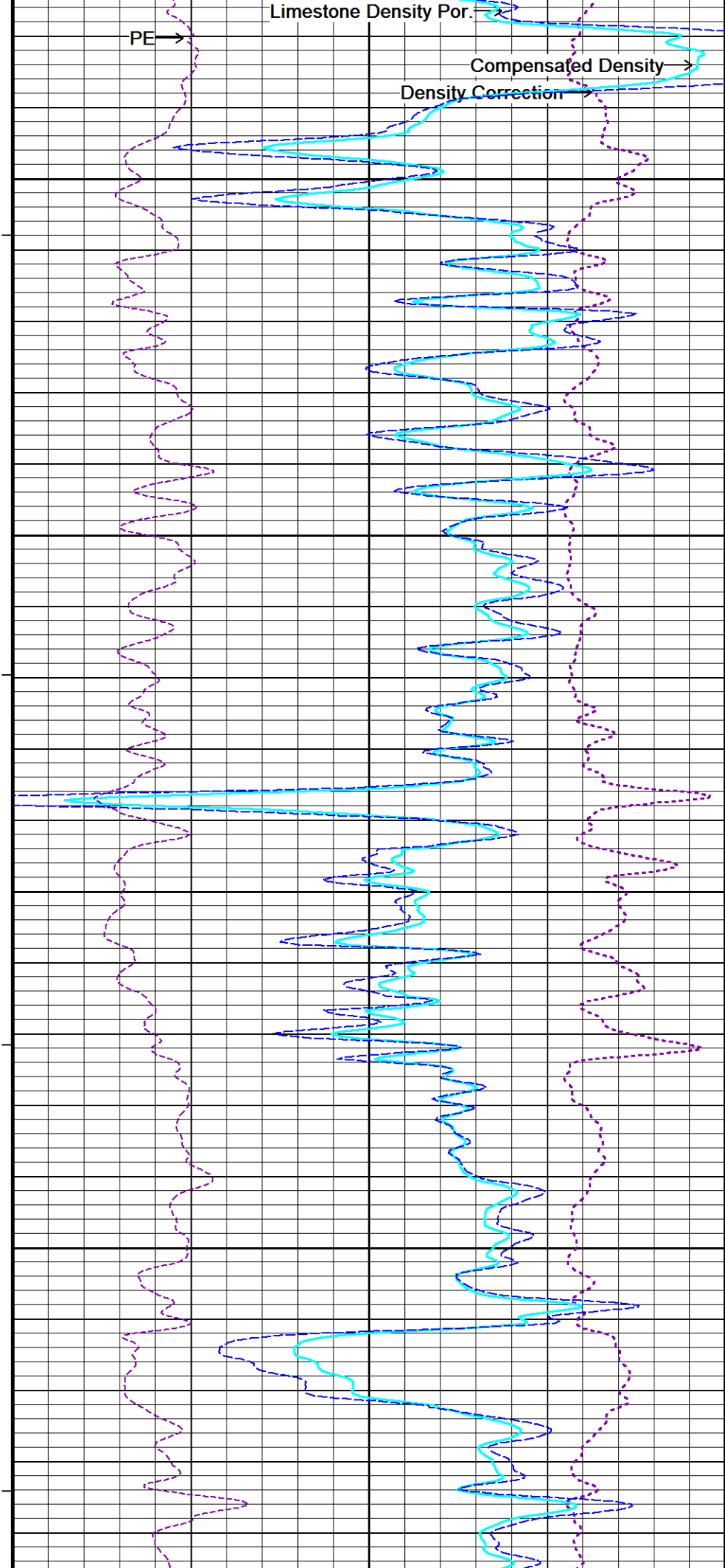
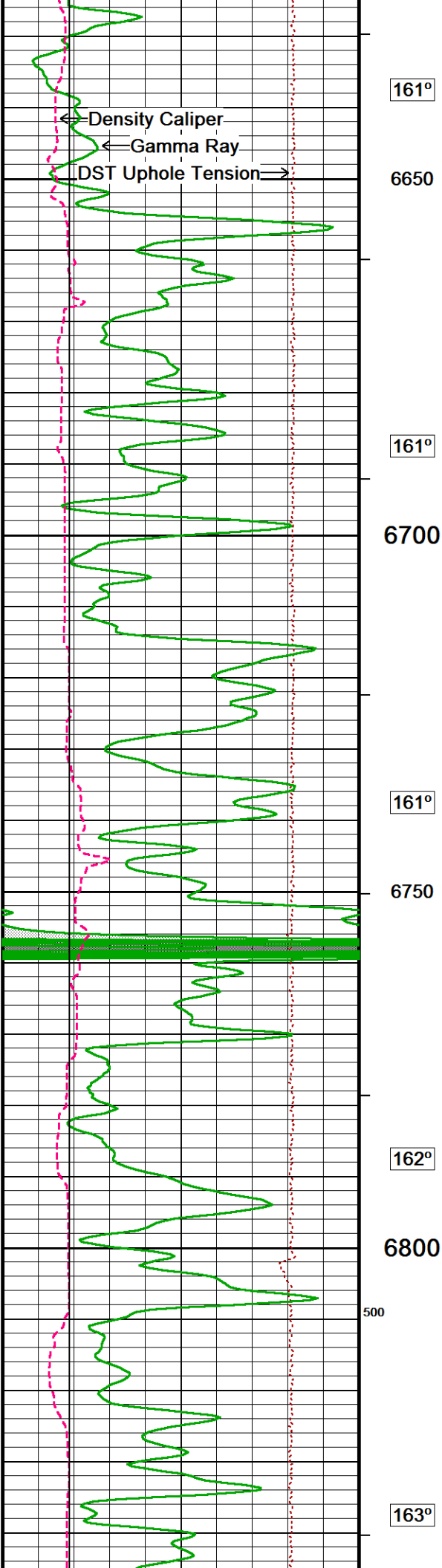


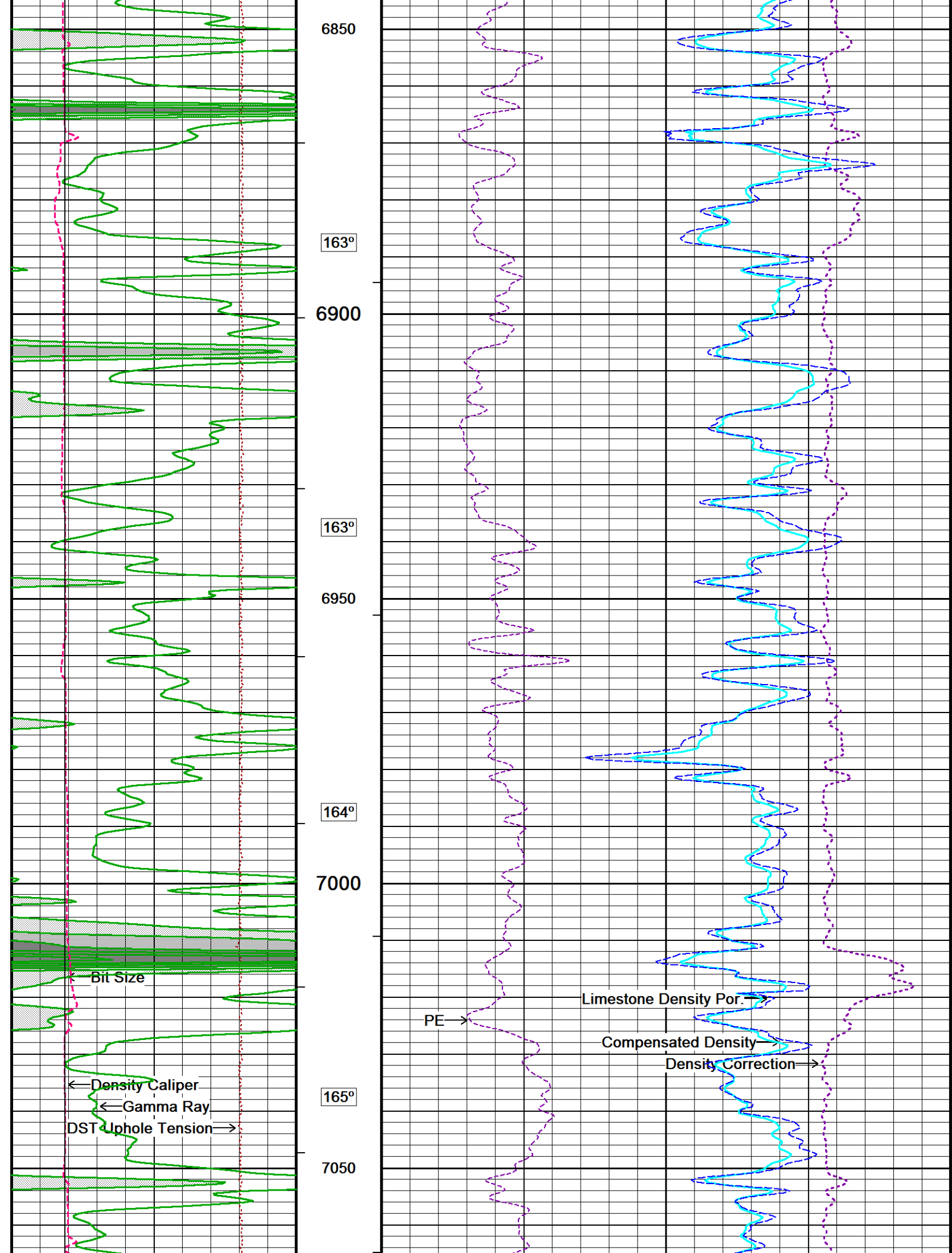


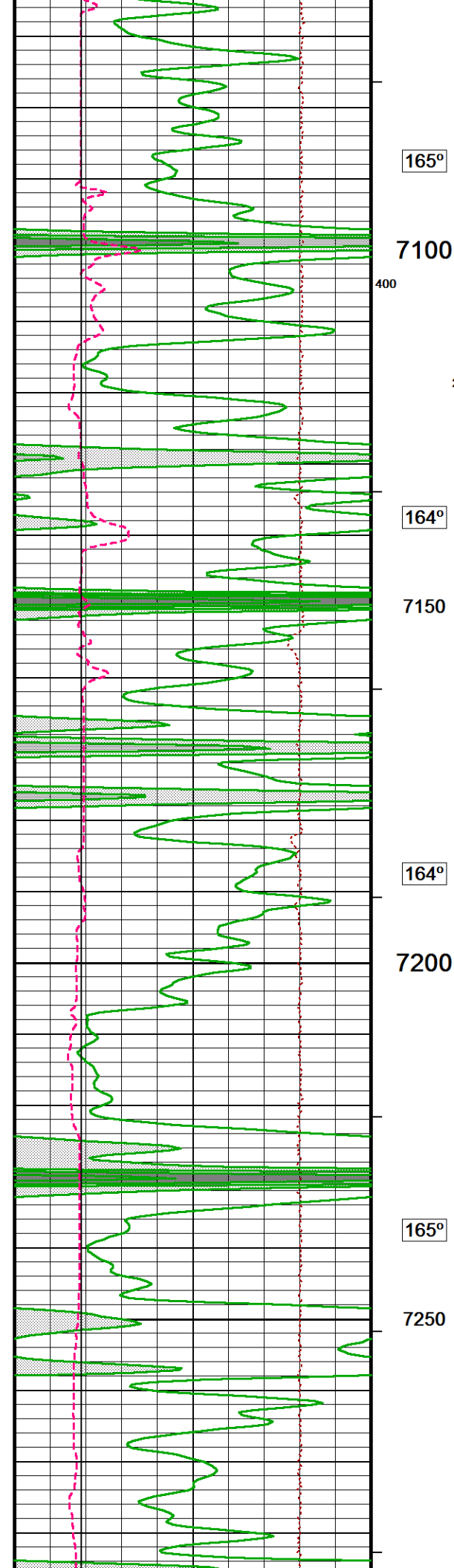












165°

7100

400

200

164°

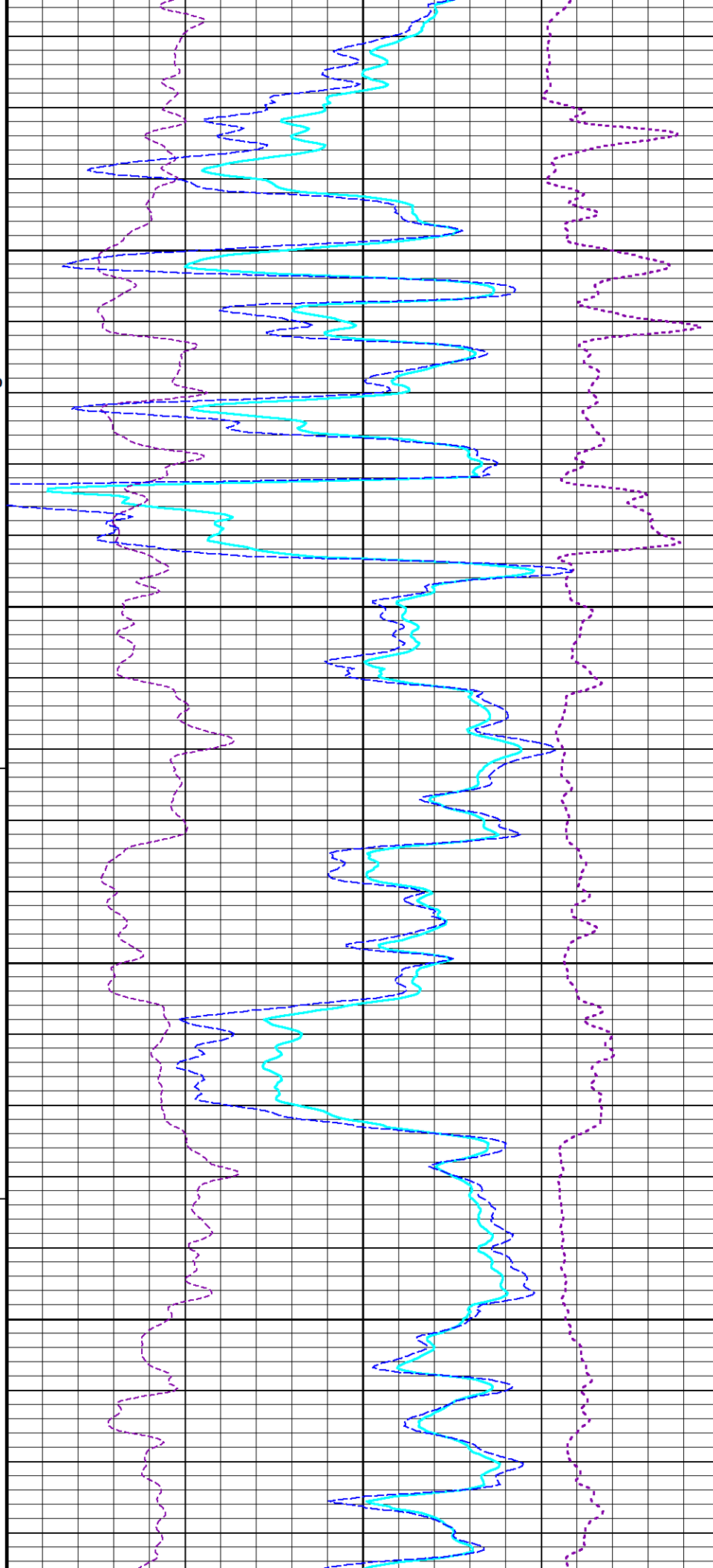
7150

164°

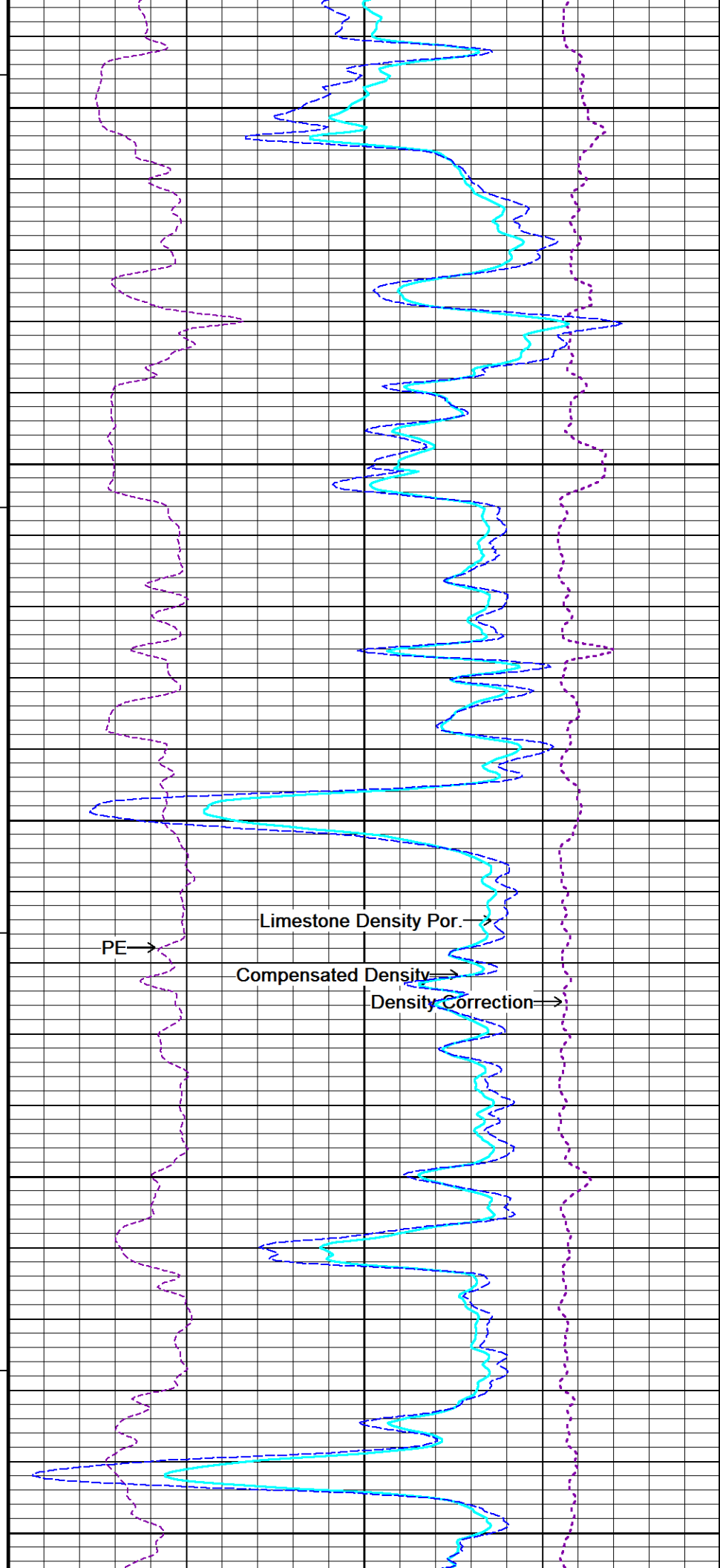
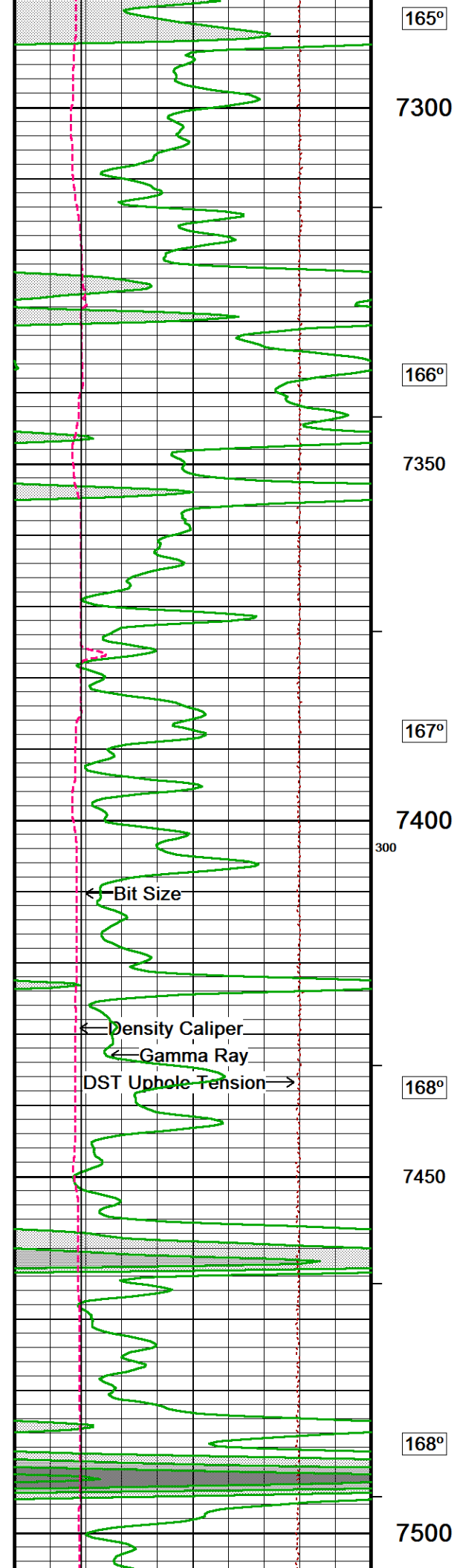
7200

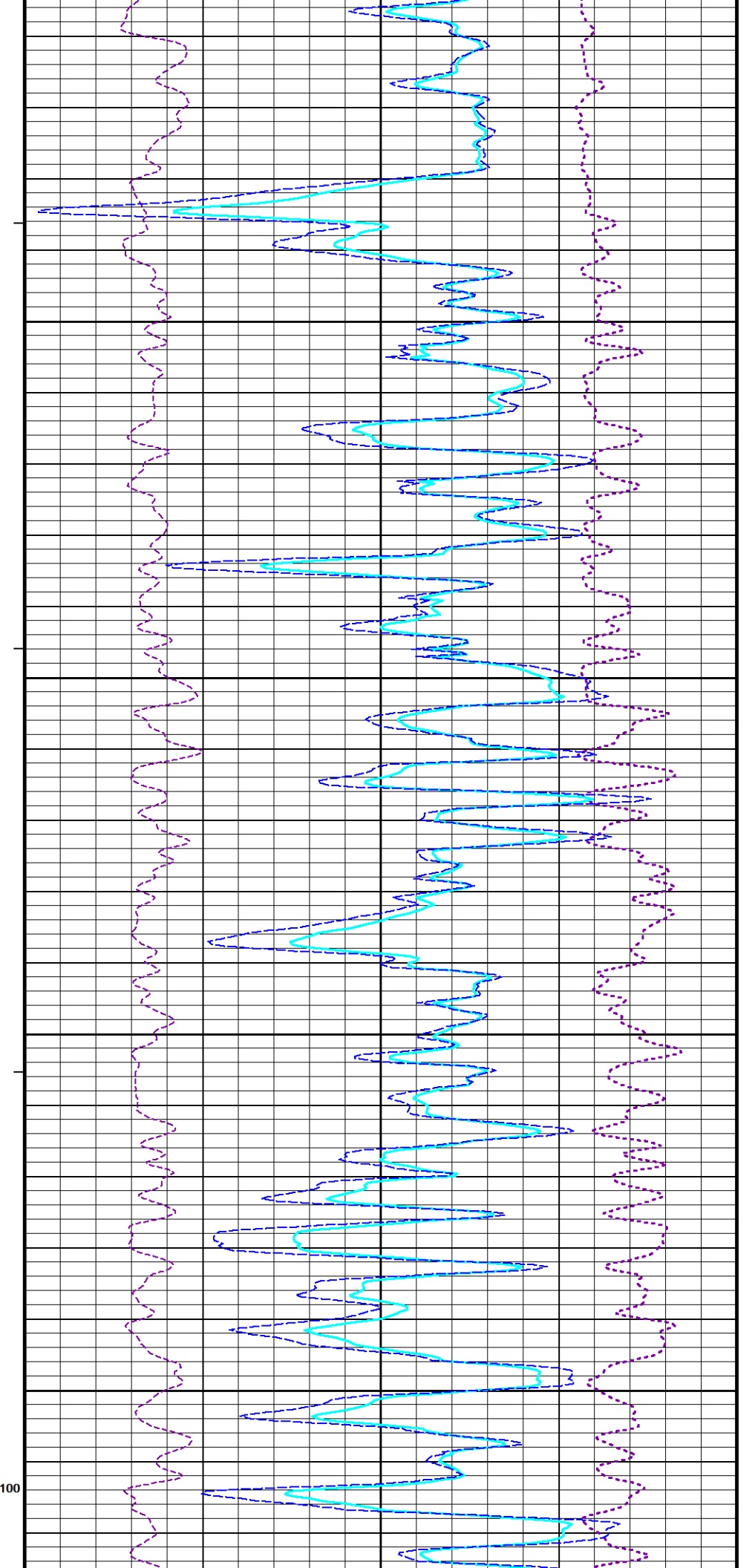
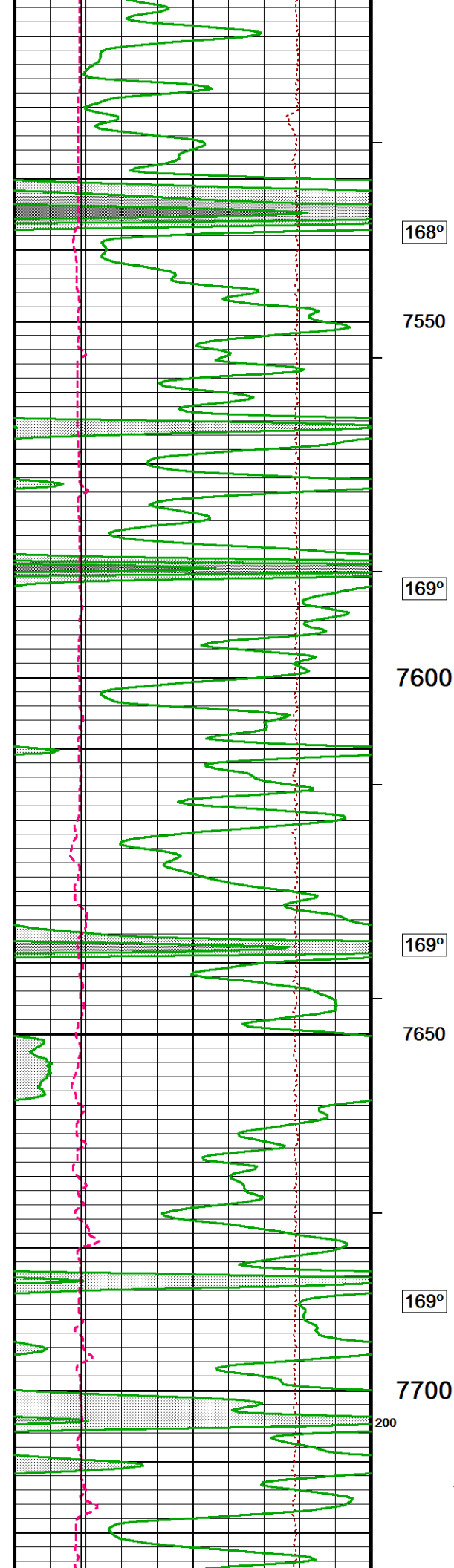
165°

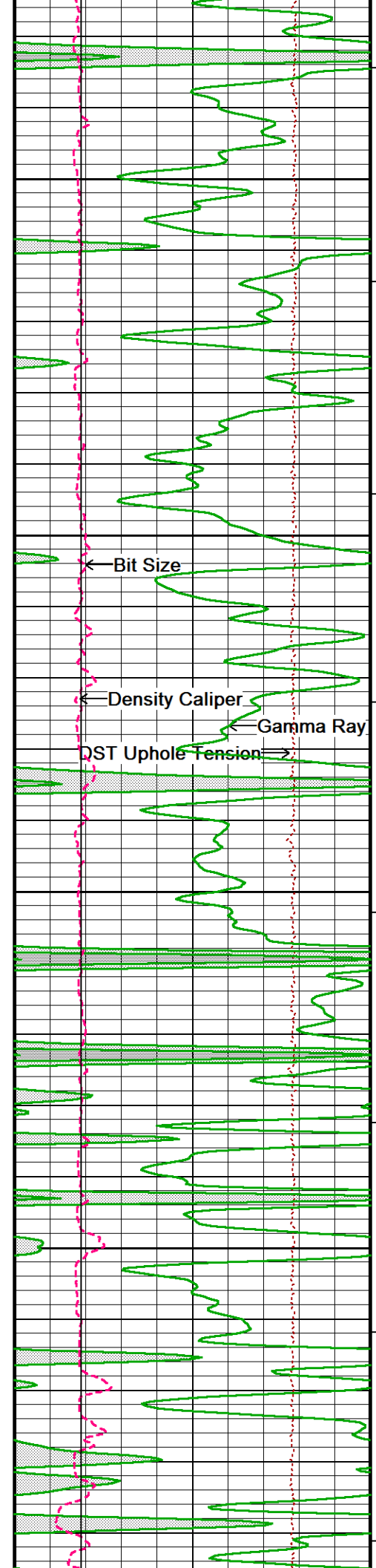
7250











170°

7750

170°

7800

171°

7850

171°

7900

171°

← Bit Size

← Density Caliper

← Gamma Ray

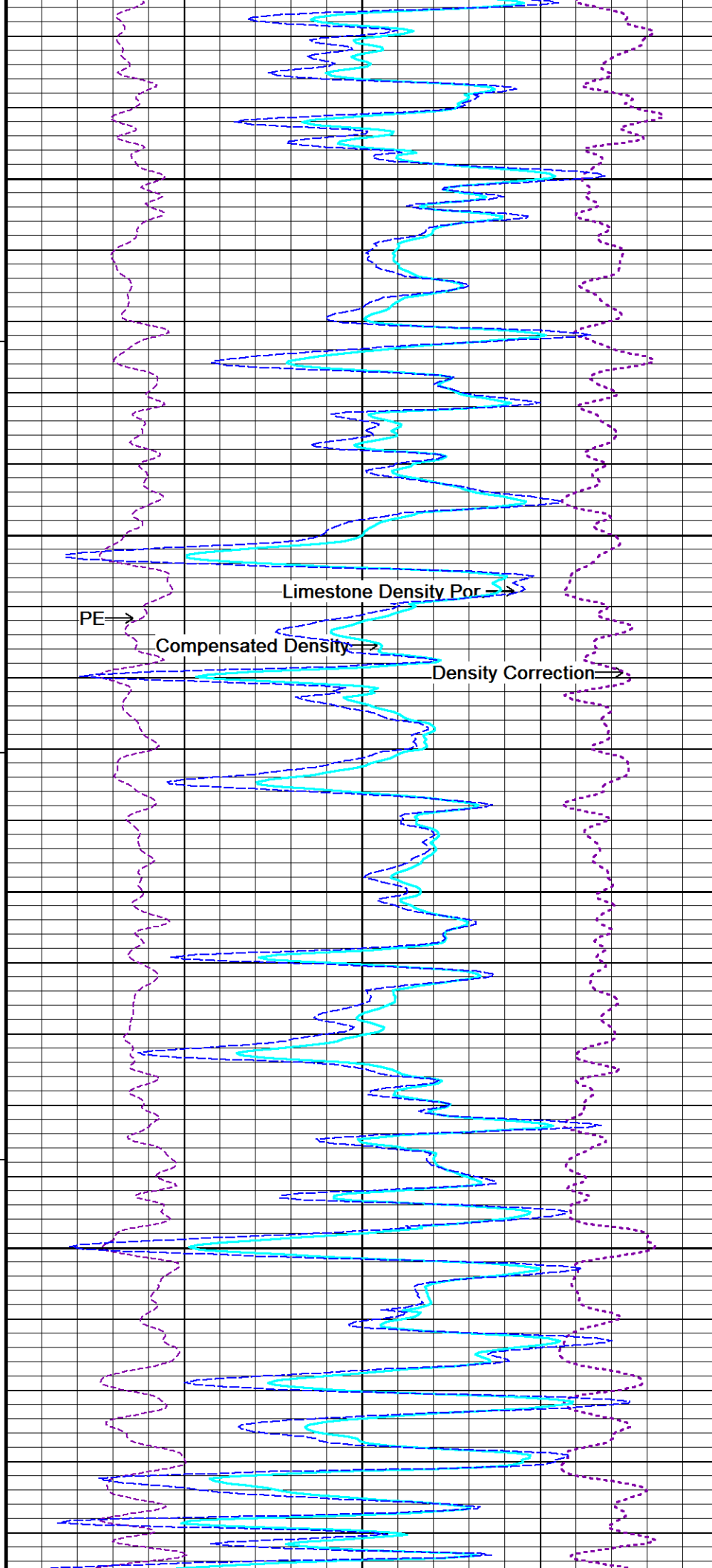
DST Uphole Tension →

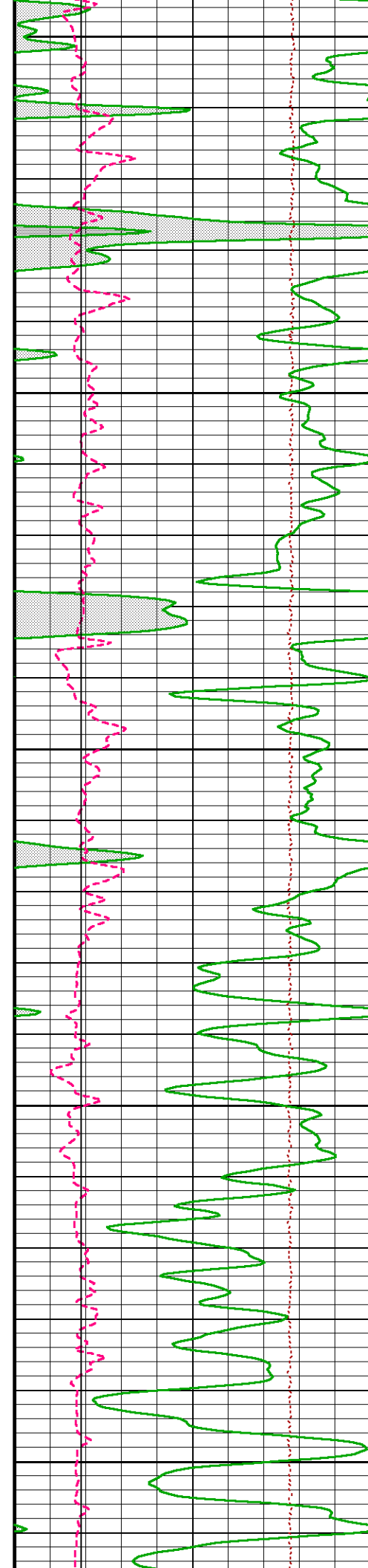
PE →

Compensated Density →

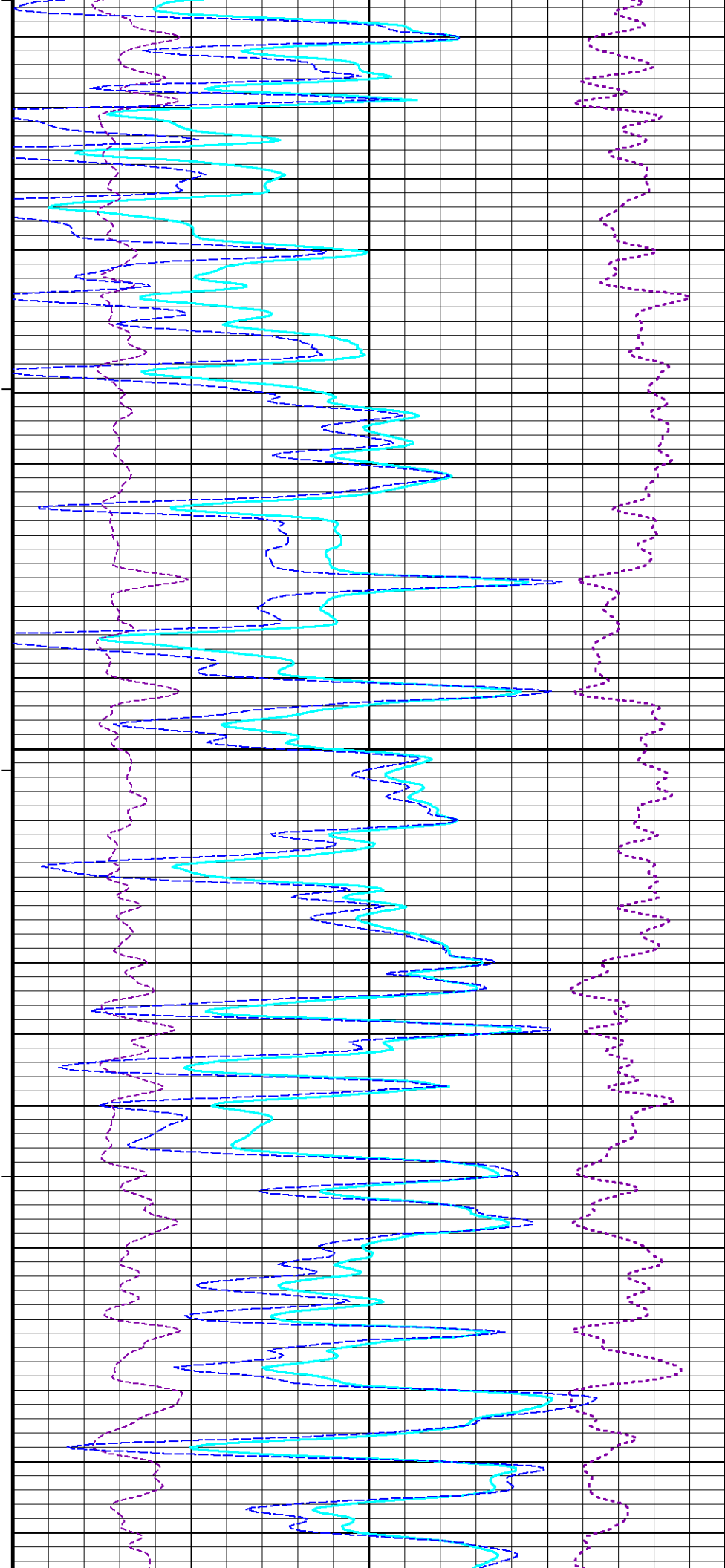
Limestone Density Por →

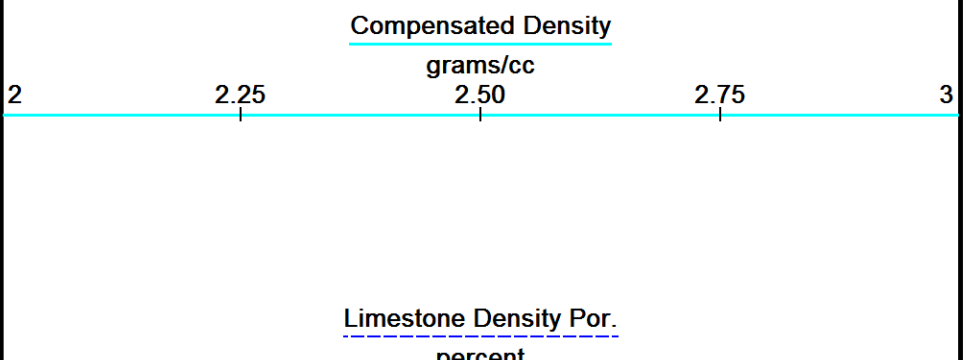
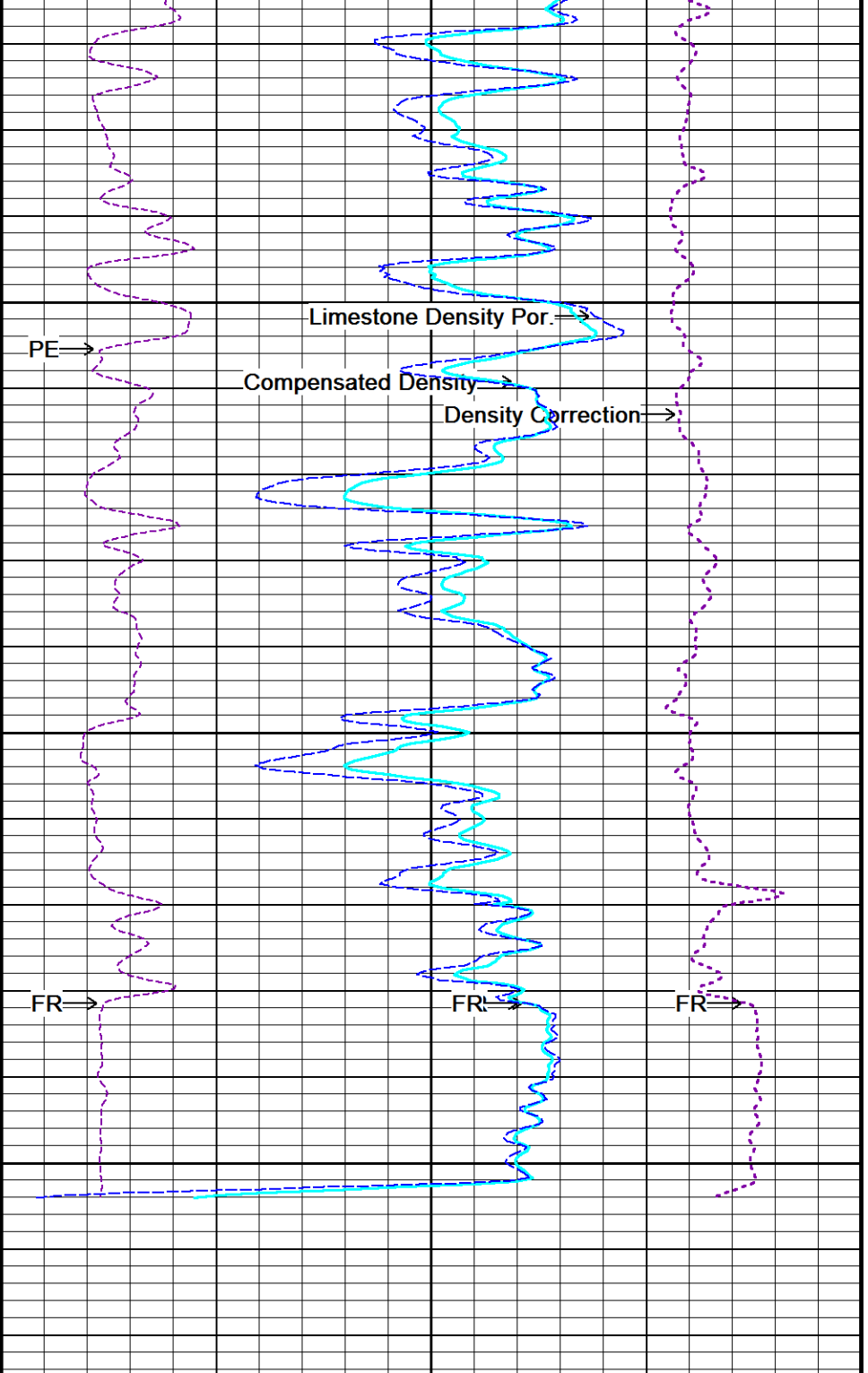
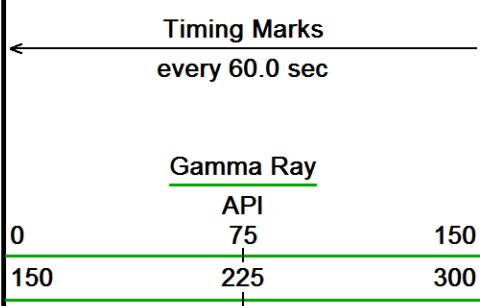
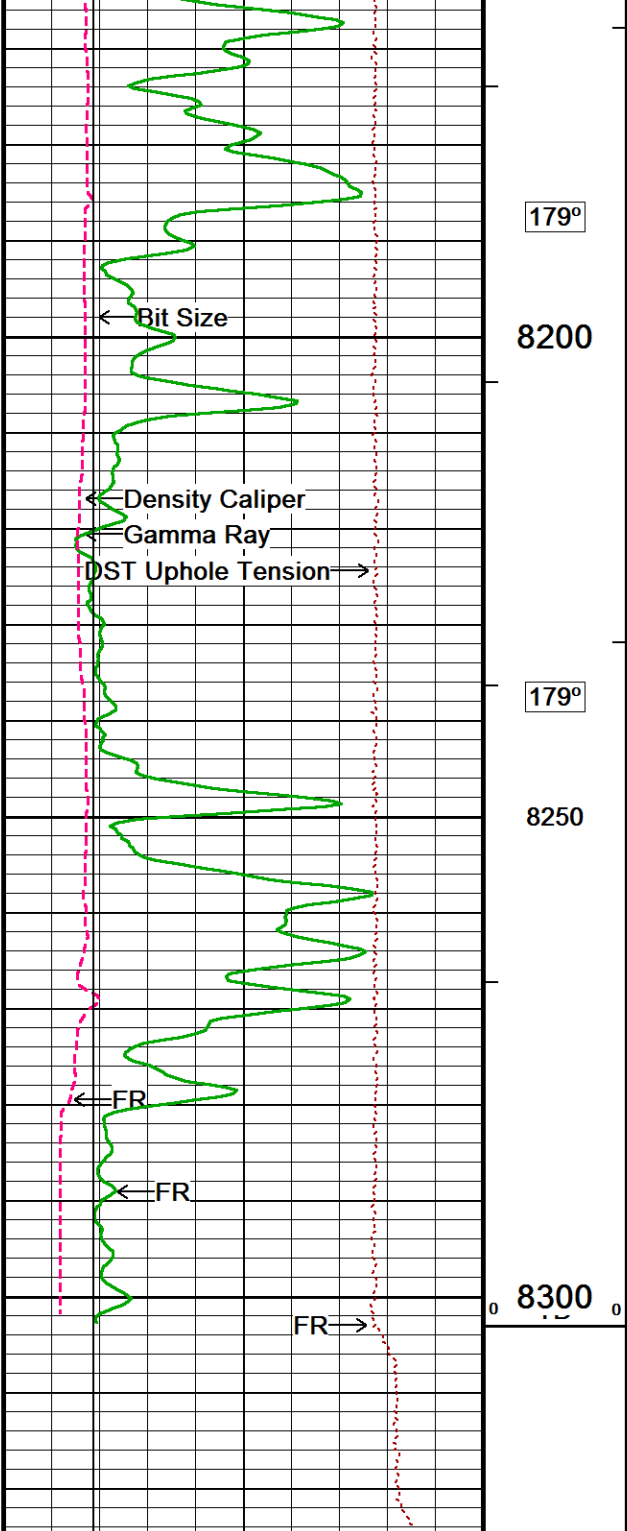
Density Correction →





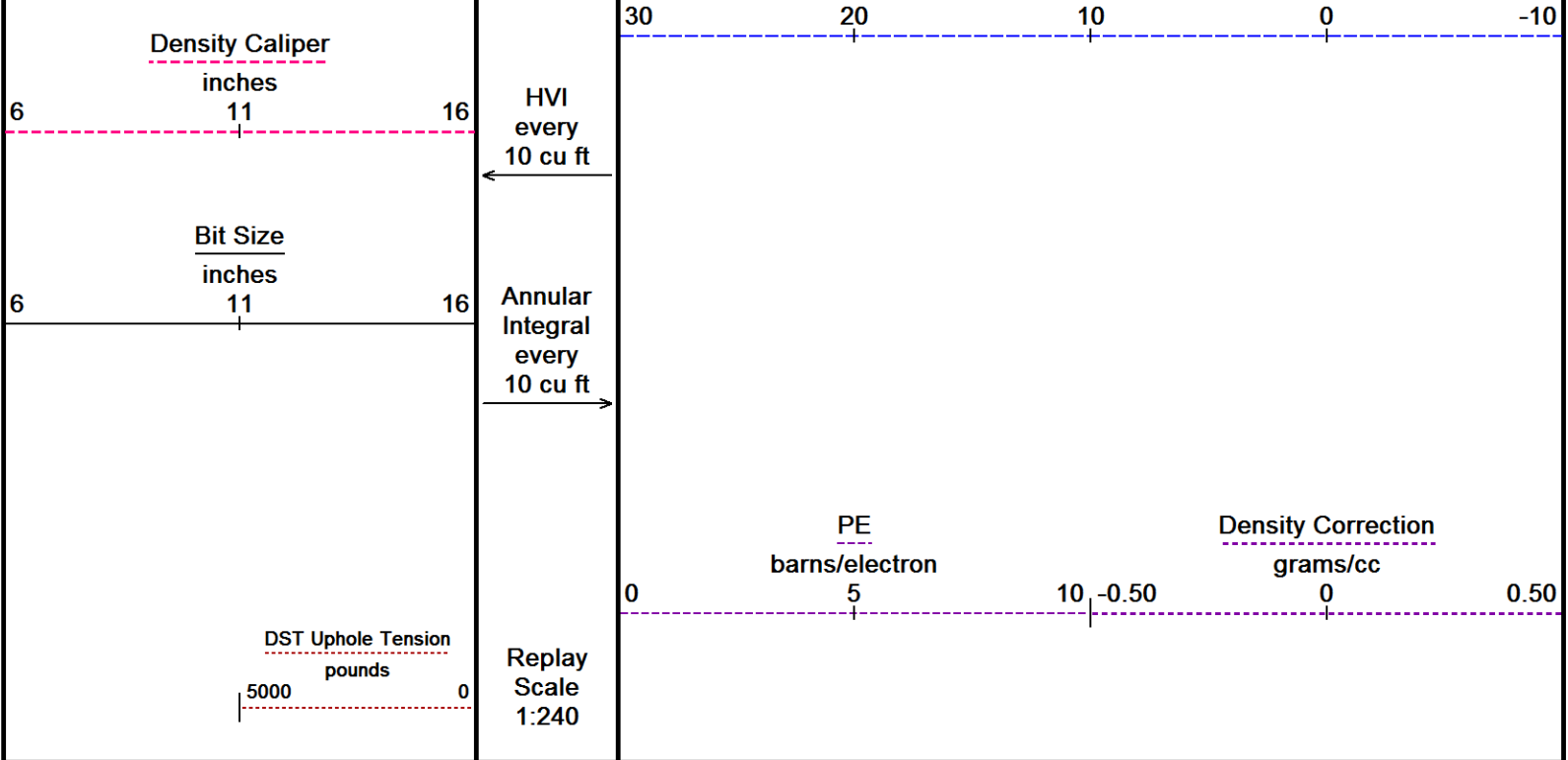
7950  
172°  
100 8000  
173°  
8050  
174°  
8100  
176°  
8150





Depth  
in  
Feet

Borehole  
Temp in  
deg F



Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-JAN-2019 14:04

Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\MERGED MAIN PASS final.dta

Recorded on 20-JAN-2019 03:03

System Versions: Plotted with 18.03.9344

↑

5 INCH BULK DENSITY MAIN

↑

↓

REPEAT SECTION

↓

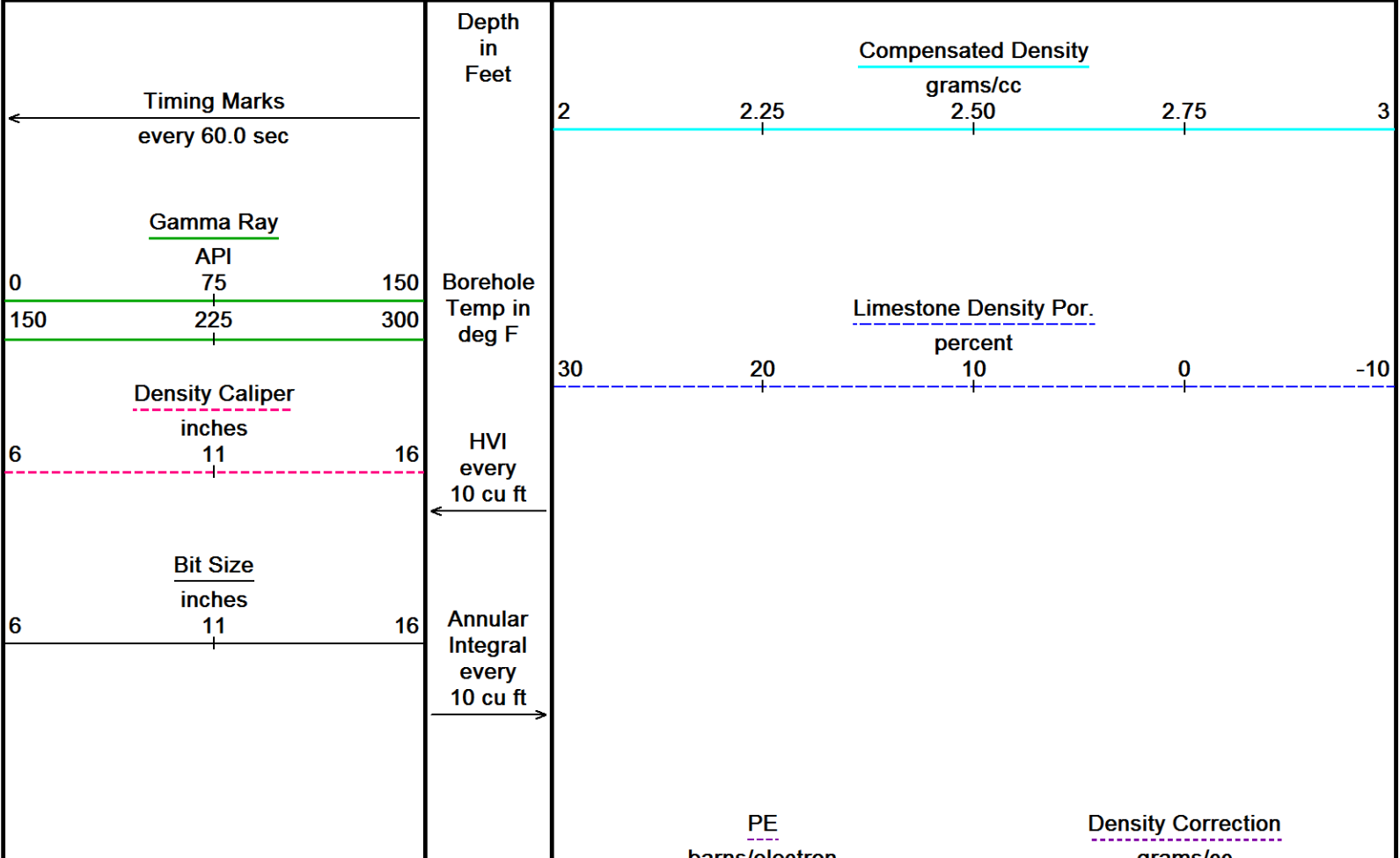
Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-JAN-2019 14:04

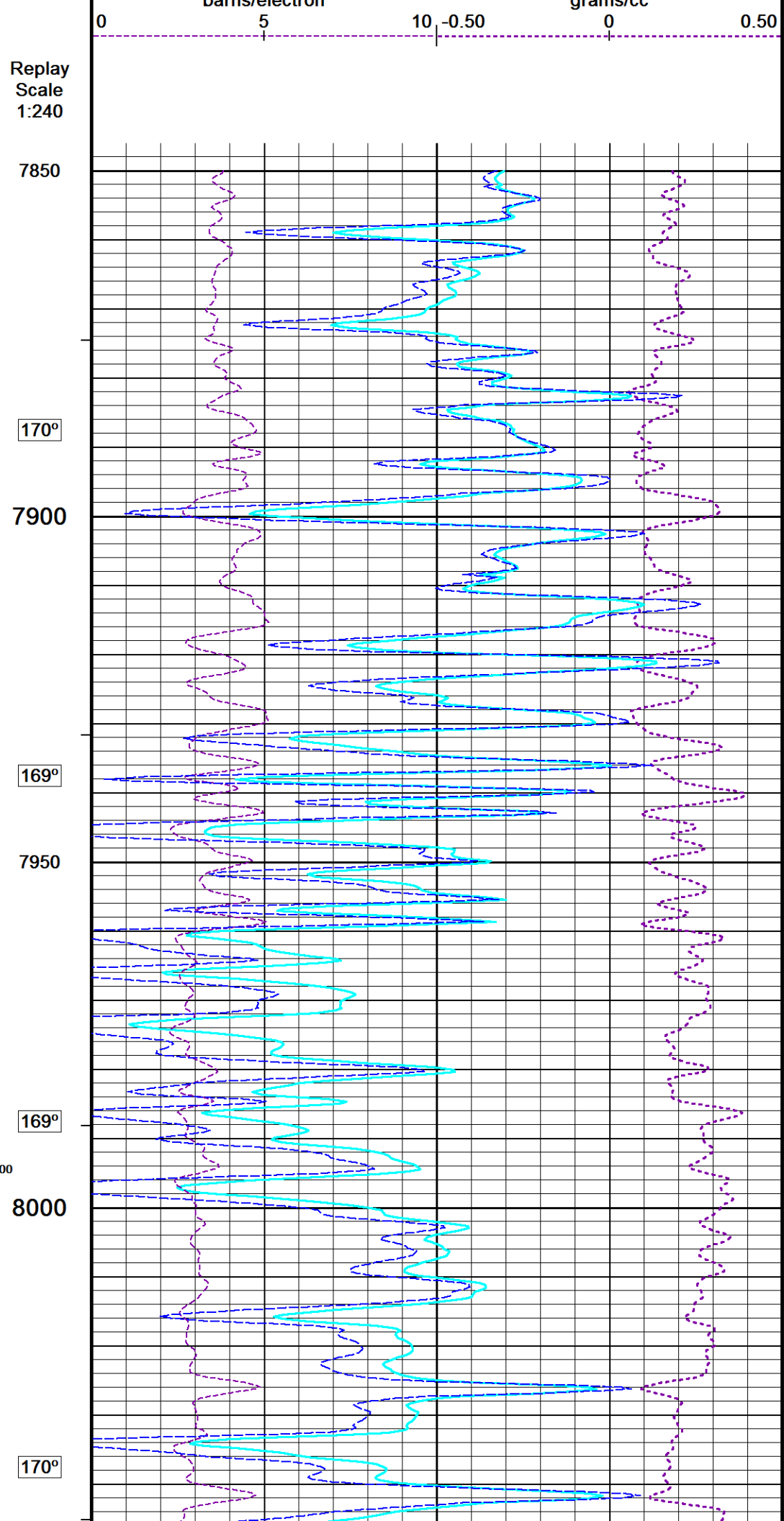
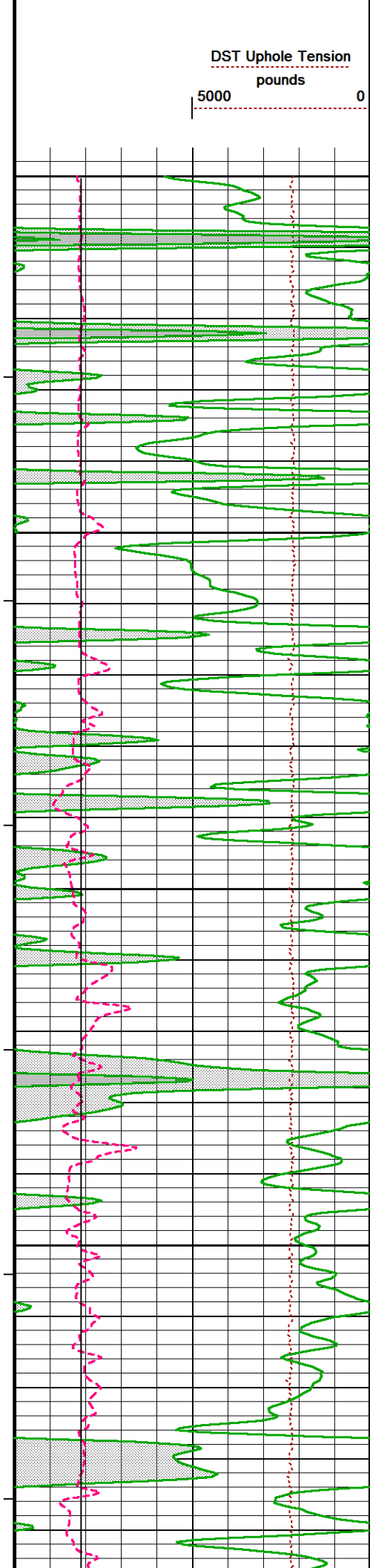
Filename: C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\REPEAT PASS.dta

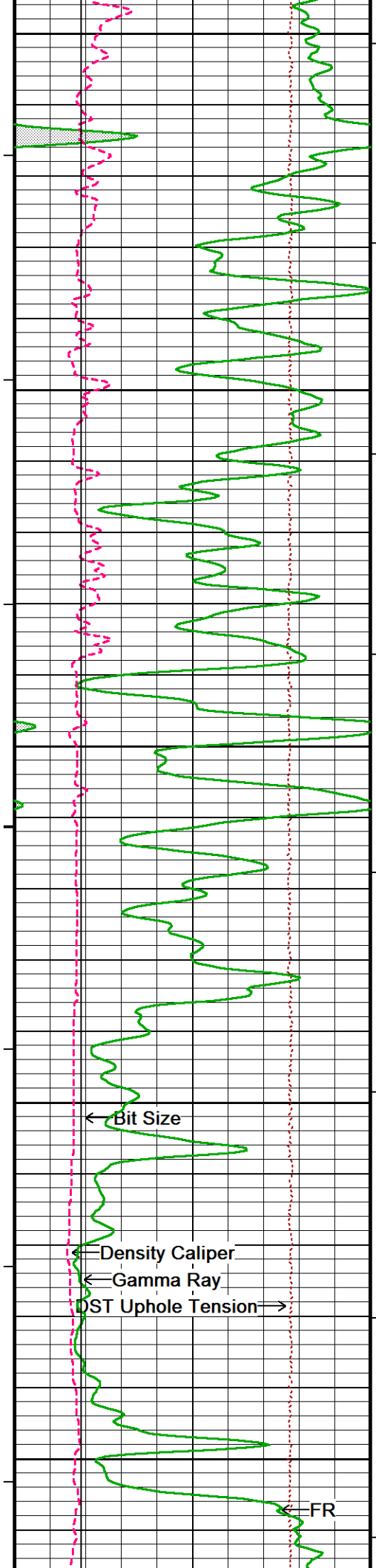
Recorded on 20-JAN-2019 02:40

System Versions: Logged with 18.03.9344 Plotted with 18.03.9344









8050

172°

8100

175°

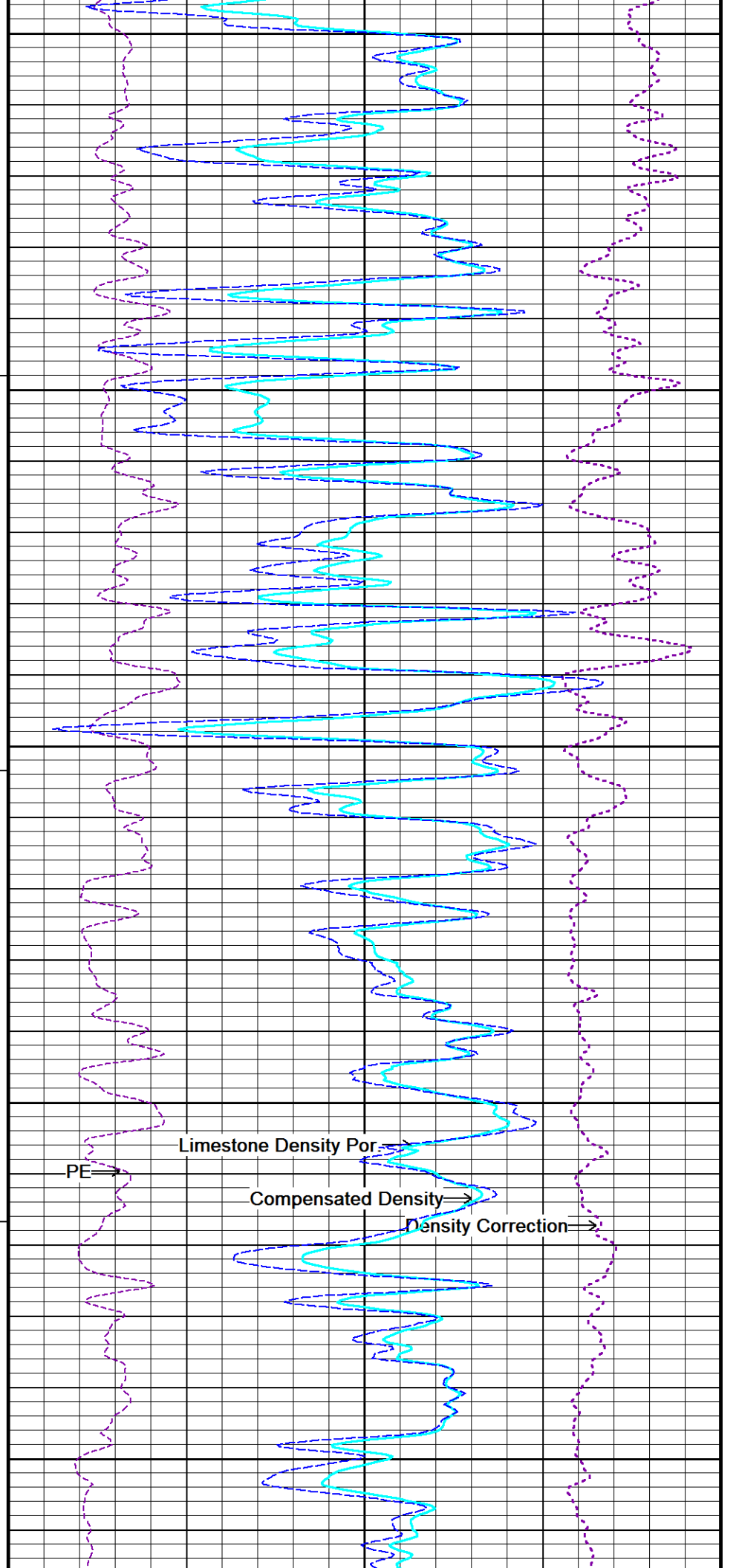
8150

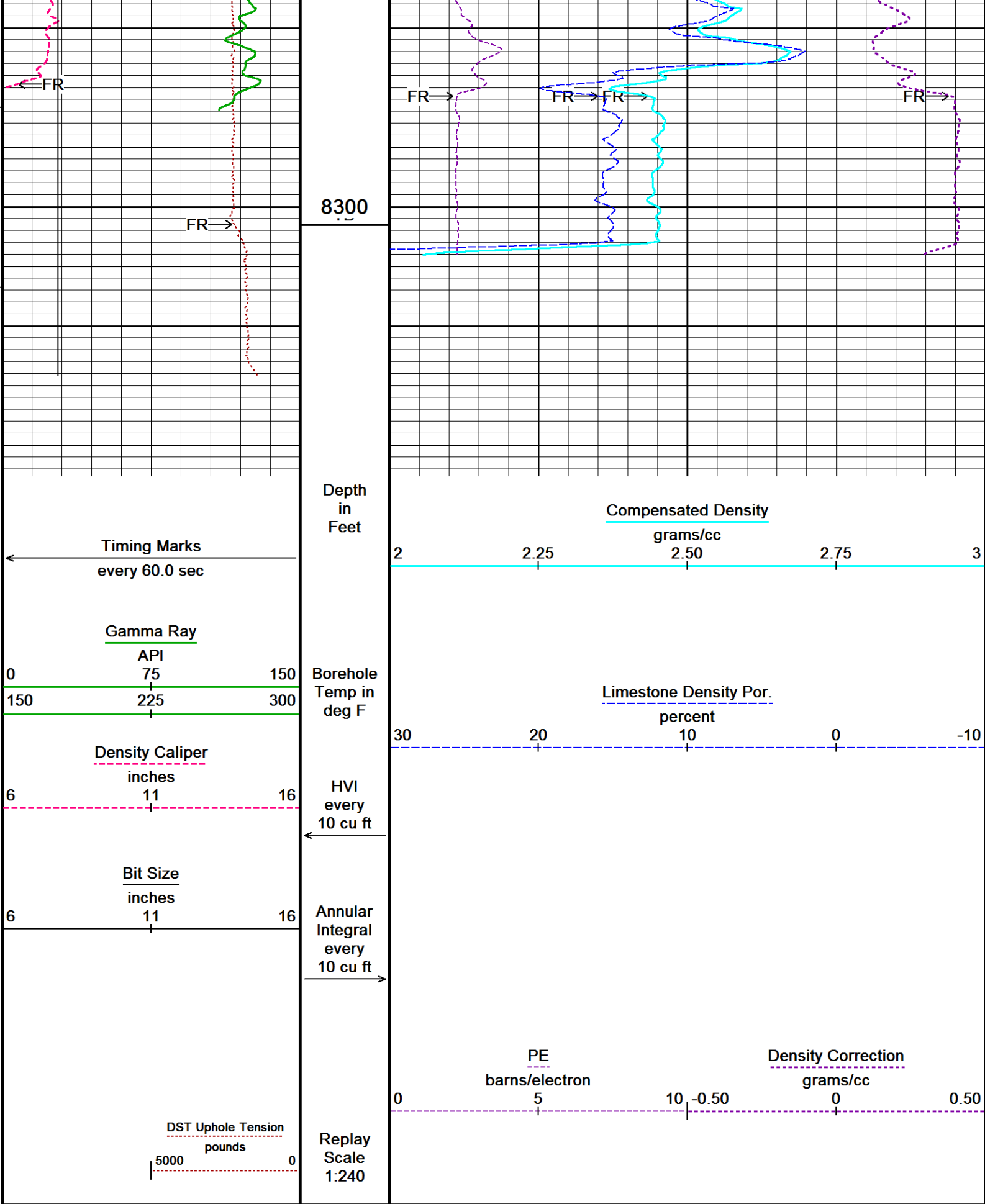
177°

8200

178°

8250





# BEFORE SURVEY CALIBRATION

C:\Minimus 18.03.9344\Data\Murfin Moonraker #6-27\TOOLSTRING.dta

General Constants All 000

Last Edited on 20-JAN-2019,06:53

## General Parameters

Mud Resistivity	0.760	ohm-metres
Mud Resistivity Temperature	94.000	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	None	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	None	

## Rwa Parameters

Porosity used	N/A
Resistivity used	N/A
RWA Constant A	N/A
RWA Constant M	N/A
SW/APOR Tool Source	0.000

High Resolution Temperature Calibration MCG-D.K 443

Field Calibration on 12-OCT-2018,05:20

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	212.00	212.00

High Resolution Temperature Constants MCG-D.K 443

Last Edited on 12-OCT-2018,05:20

Pre-filter Length 11

Gamma Calibration MCG-D.K 443

Field Calibration on 18-JAN-2019 15:28

	Measured	Calibrated (API)
Background	192	135
Calibrator (Gross)	841	591
Calibrator (Net)	648	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio	1.422	<div style="display: inline-block; width: 100px; height: 15px; border: 1px solid black; position: relative;"> <div style="position: absolute; left: 0; width: 20%; height: 100%; background-color: #f0f0f0;"></div> <div style="position: absolute; left: 20%; width: 20%; height: 100%; background-color: #00ff00;"></div> <div style="position: absolute; left: 40%; width: 20%; height: 100%; background-color: #f0f0f0;"></div> <div style="position: absolute; left: 60%; width: 20%; height: 100%; background-color: #f0f0f0;"></div> </div>	Counts/API
		<div style="display: flex; justify-content: space-between; width: 100px;"> <span>1.40</span> <span>1.475</span> <span>1.55</span> </div>	

Gamma Constants MCG-D.K 443

Last Edited on 20-JAN-2019,00:40

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

Caliper Calibration MPD-C.A 216

Base Calibration on 18-JAN-2019 17:06

Field Calibration on 18-JAN-2019 17:08

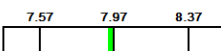
## Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16199	3.99
2	24624	5.98
3	33344	7.97
4	41632	9.86
5	50912	11.92
6	N/A	N/A

## Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.93	7.97

# Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.93  in

## Photo Density Calibration MPD-C.A 216

Base Calibration on 18-JAN-2019 16:36  
Field Check on 18-JAN-2019 16:51

Density Calibration Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	993	1180		
Reference 1	46604	22300	59556	30836
Reference 2	18380	2158	24941	2541

Field Check at Base  
993.3 1179.8

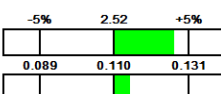
Field Check  
994.1 1177.2

PE Calibration Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	179	890		
Reference 1	19088	46448	0.415	0.371
Reference 2	5249	18271	0.292	0.272

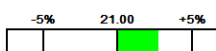
Field Check at Base  
179.3 890.5

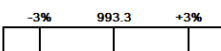
Field Check  
183.2 889.7

## Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio 2.62 

PE Calibration 0.115 

Far Density Ratio 21.59 

Near Den. Field Check 994.1 

PE WS Field Check 183.2 

Far Den. Field Check 1177.2 

PE WH Field Check 889.7 

## Density Constants MPD-C.A 216

Last Edited on 20-JAN-2019,00:42

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.13	gm/cc
Mud Density Type		
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	
Precision Enhanced Density Processing	Applied	
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	
0.00	0.00	

Cablehead, 11 pin  
CBH-CB 264 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor  
SHA-J.B 595 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma  
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity  
MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron  
MDN-B.A 292 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper  
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in

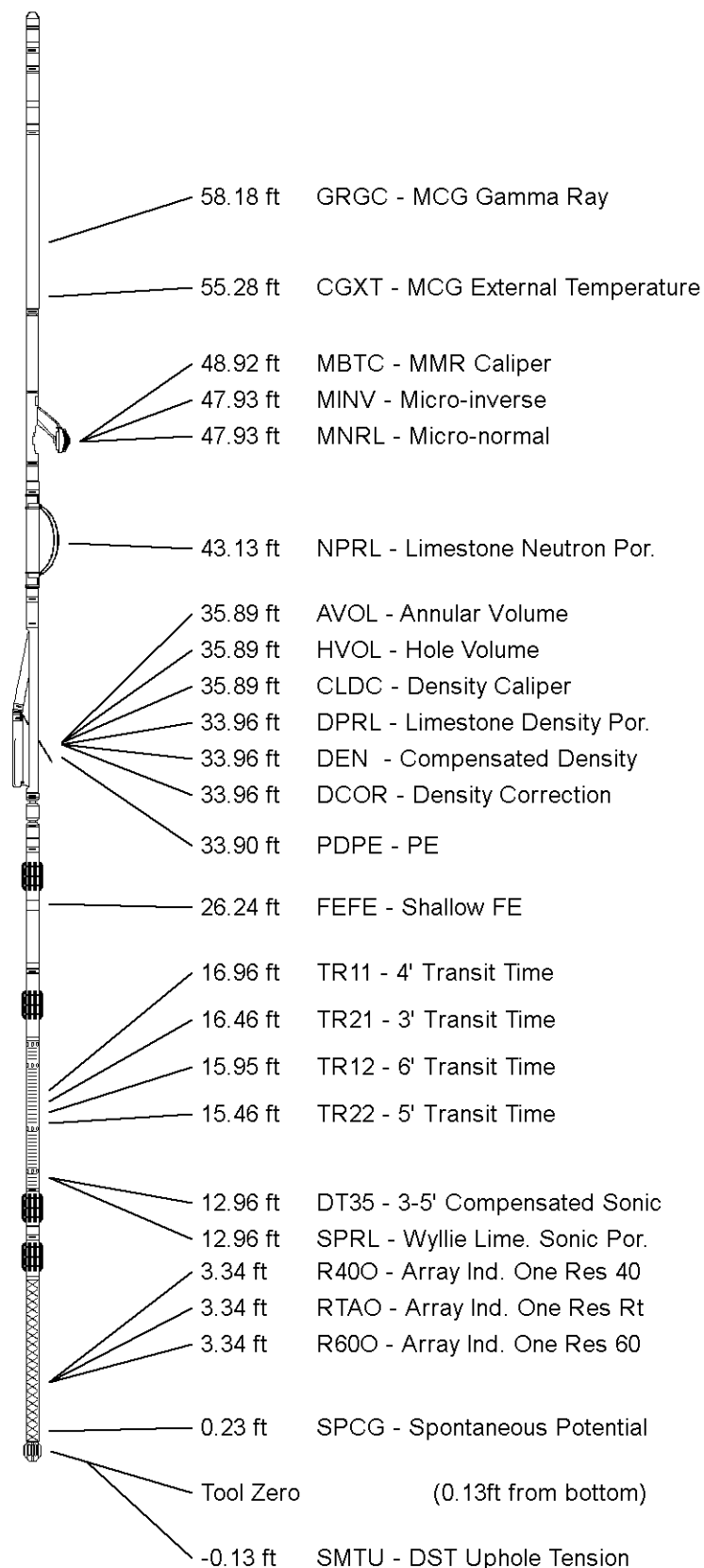
Compact Knuckle Joint  
SKJ-E.B 733 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric  
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic  
MSS-C.K 319 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction  
MAI-B.J 390 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 68.16 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY

MURFIN DRILLING COMPANY, INC.

WELL

MOONRAKER #6-27

FIELD

WILDCAT

PROVINCE/COUNTY


LINCOLN

COUNTRY/STATE

U.S.A. / COLORADO



COUNTRY/STATE			U.S.A. / COLORADO		
Elevation Kelly Bushing	5475	feet	First Reading	8280.00	feet
Elevation Drill Floor	5473	feet	Depth Driller	8300.00	feet
Elevation Ground Level	5462	feet	Depth Logger	8303.00	feet



COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG