



**Weatherford®**

**HOLE VOLUME  
CALIPER  
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	DUAL SPACED NEUTRON			
Longitude	-104.463560	PHOTO DENSITY			
API Number	05-123-44047-00	ARRAY INDUCTION			
Permanent Datum GL, Elevation 4643 feet					Elevations: KB 4856.00 DF 4856.00 GL 4843.00
Log Measured From KB					
Drilling Measured From KB					
Date	28-JAN-2017				
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				

Elevations:	feet
KB	4856.00
DF	4856.00
GL	4843.00

**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

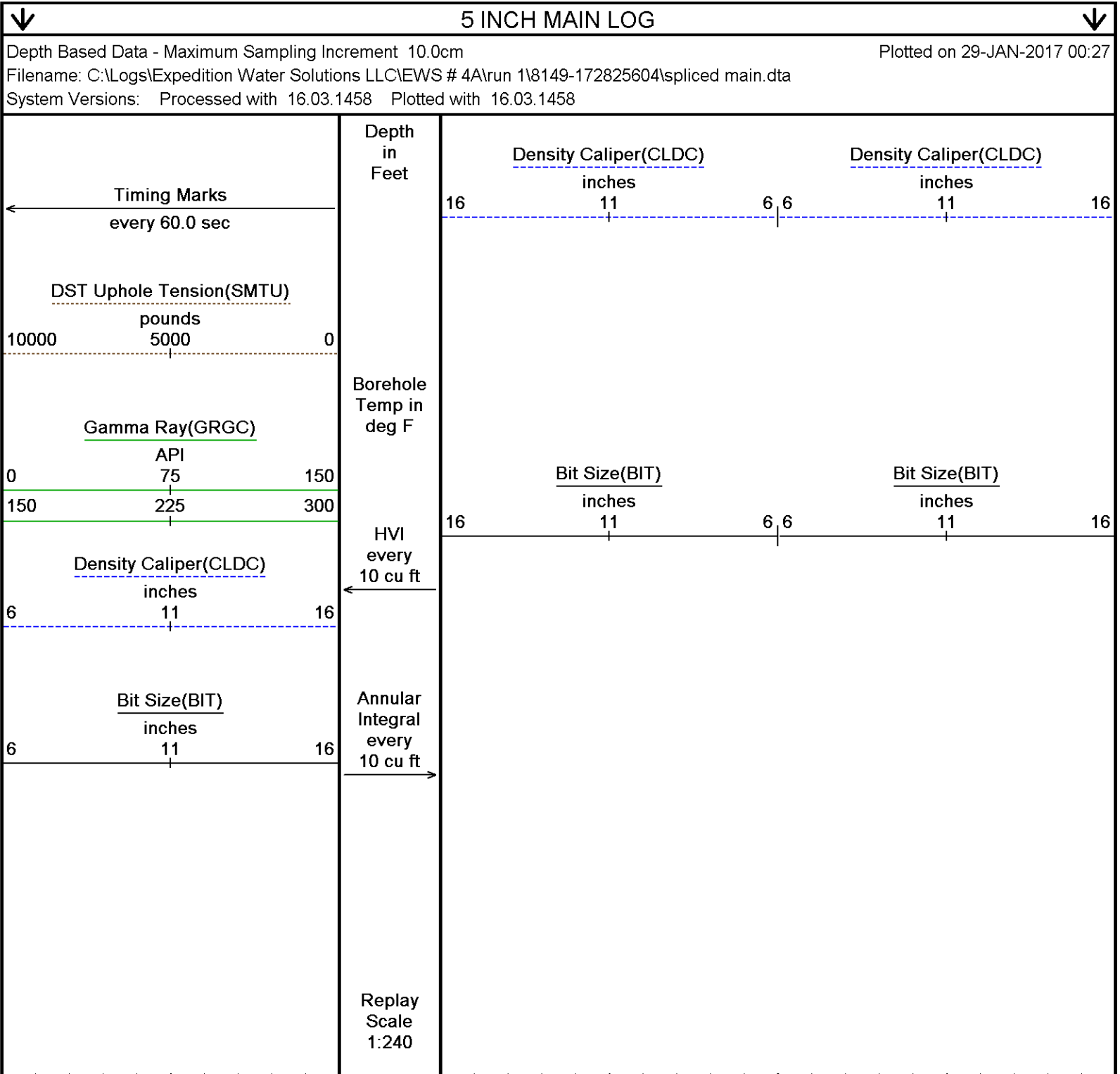
TIGHT PULLS, BOREHOLE SIZE AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.

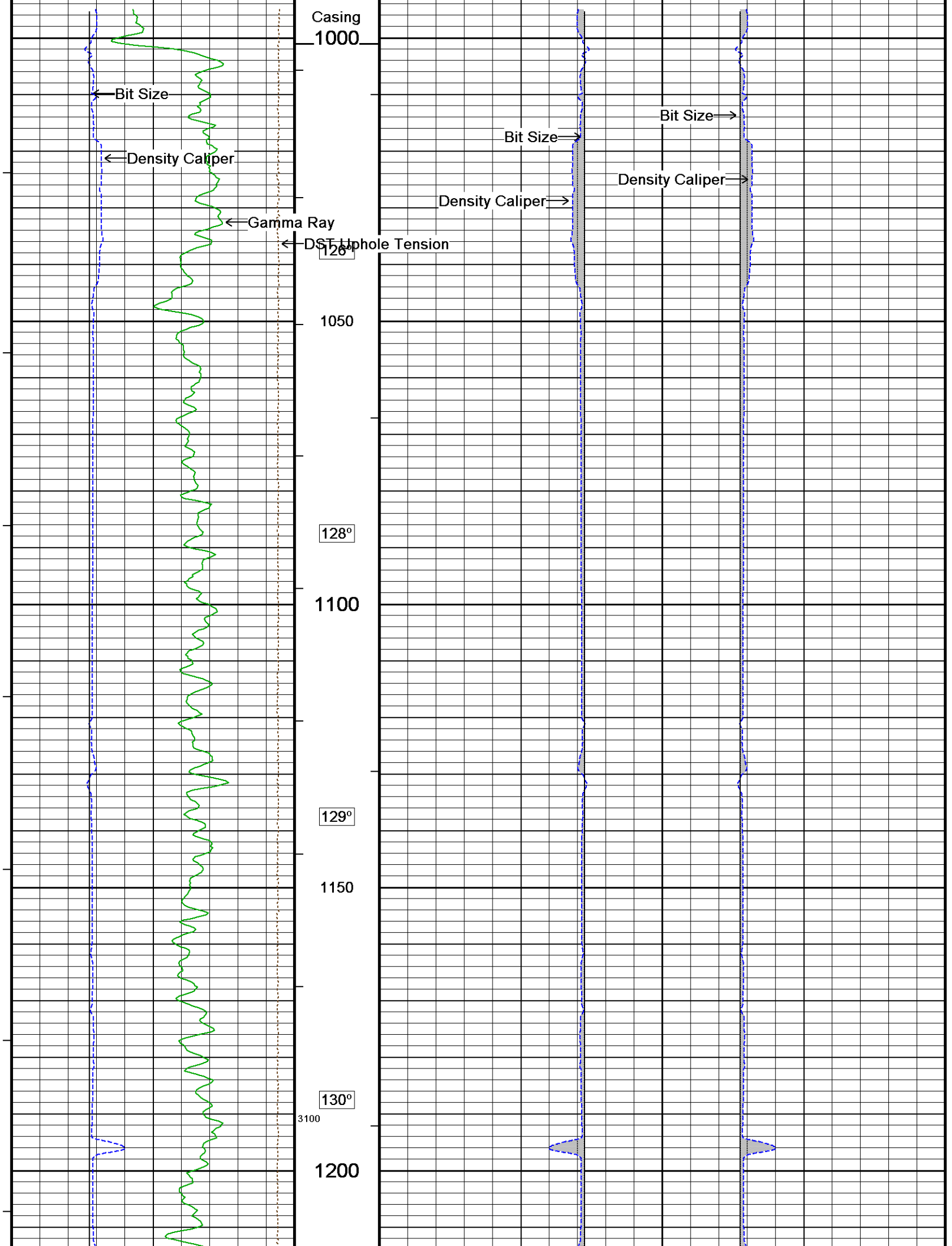
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

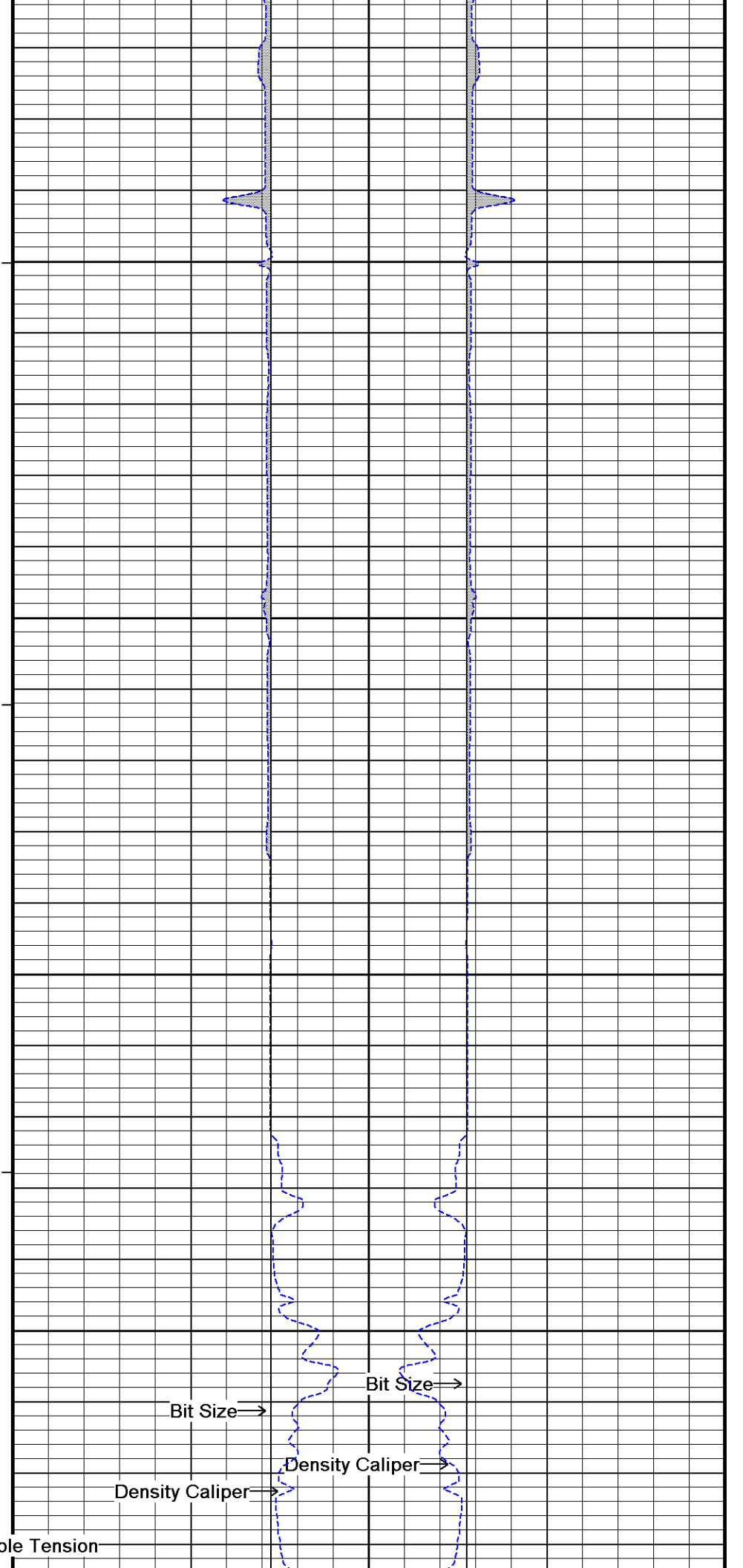
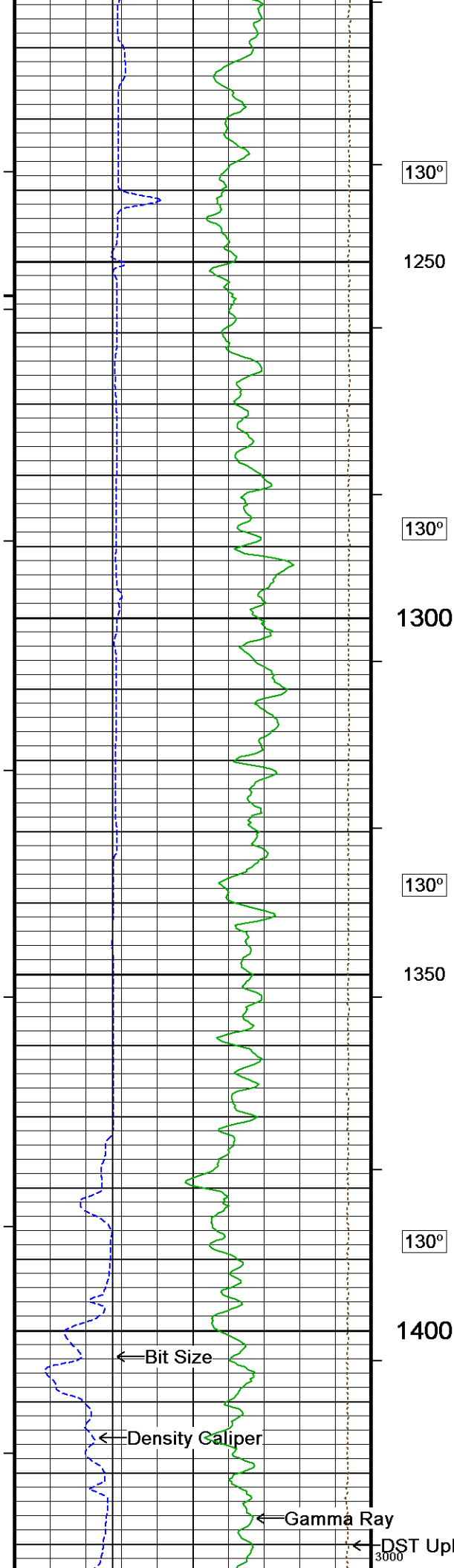
TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 3190 CUBIC FEET

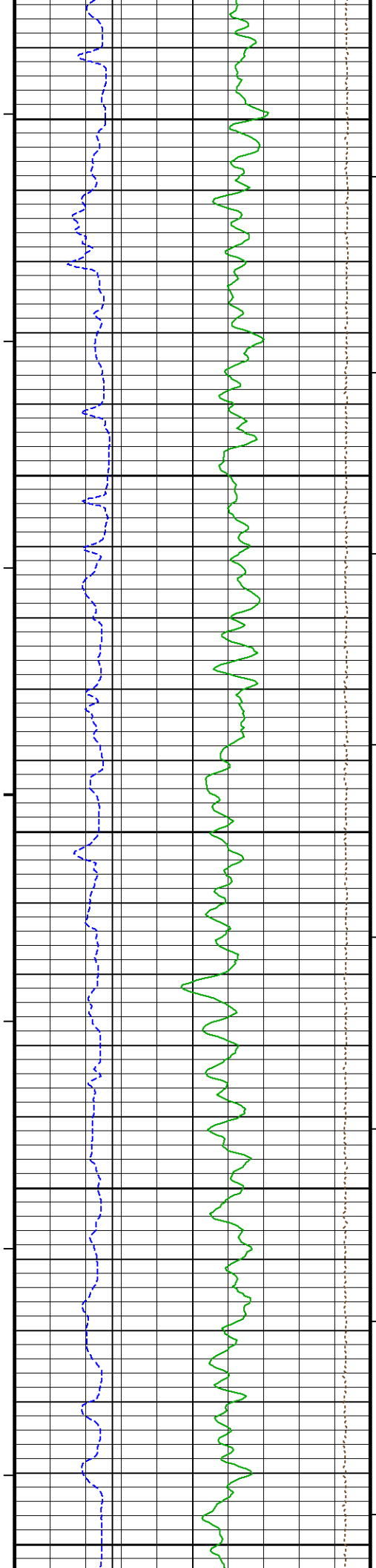
ANNULAR VOLUME FROM TD TO SURFACE CASING WITH 7 INCH PRODUCTION CASING: 1180 CUBIC FEET

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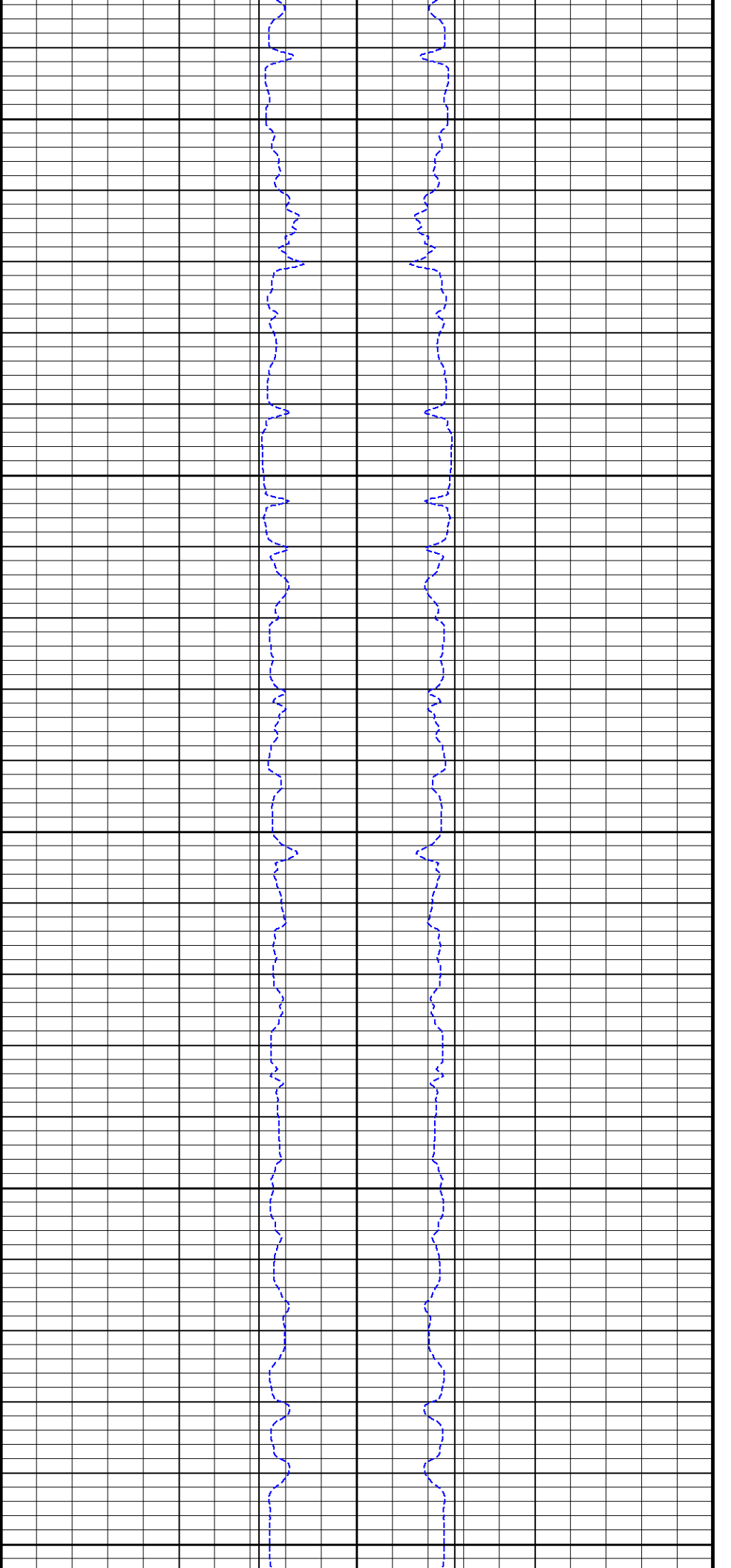


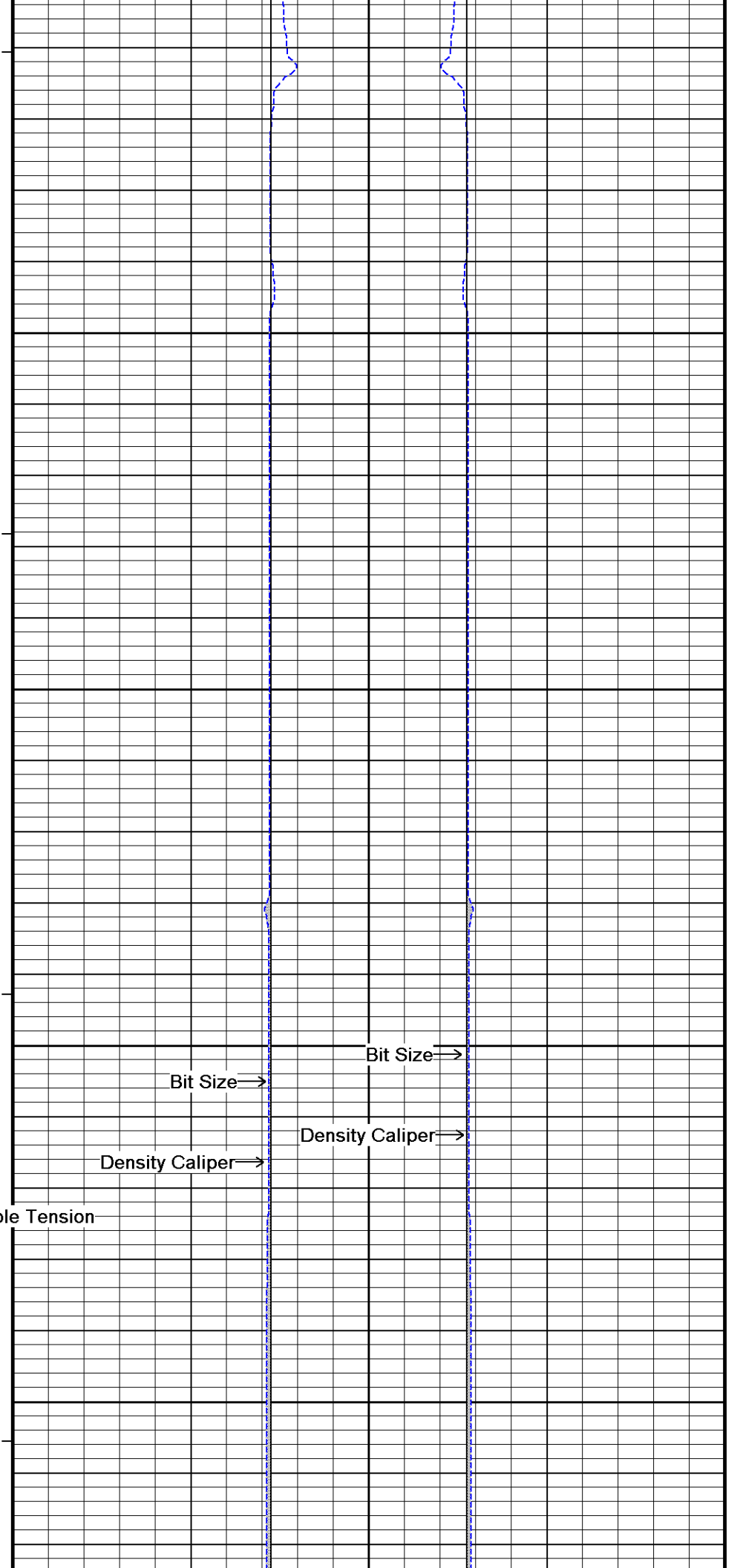
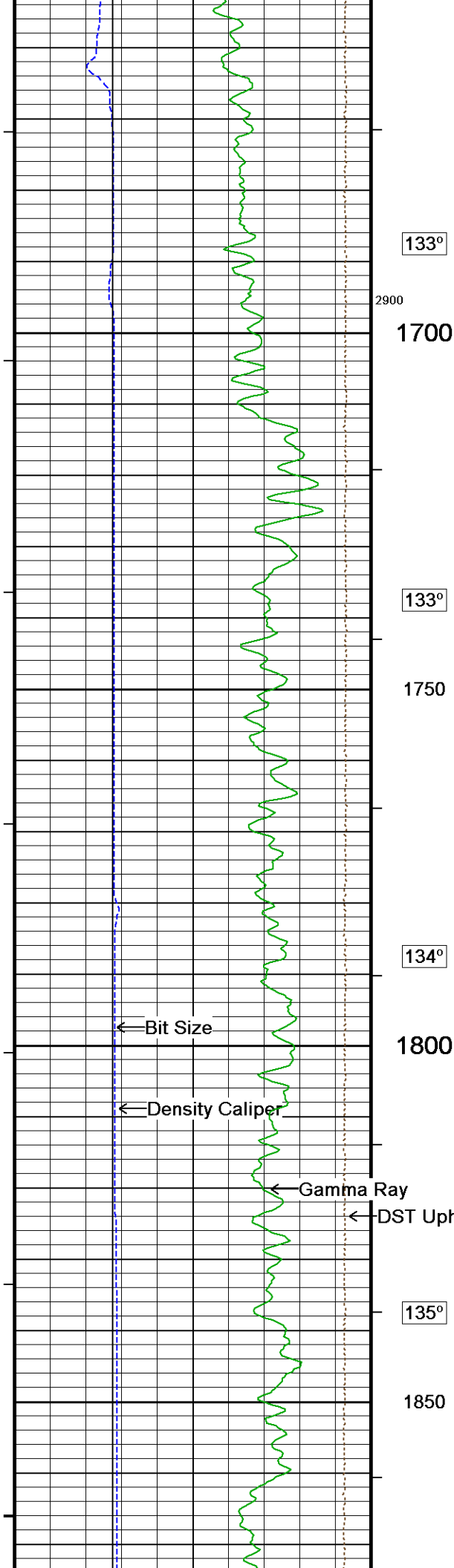


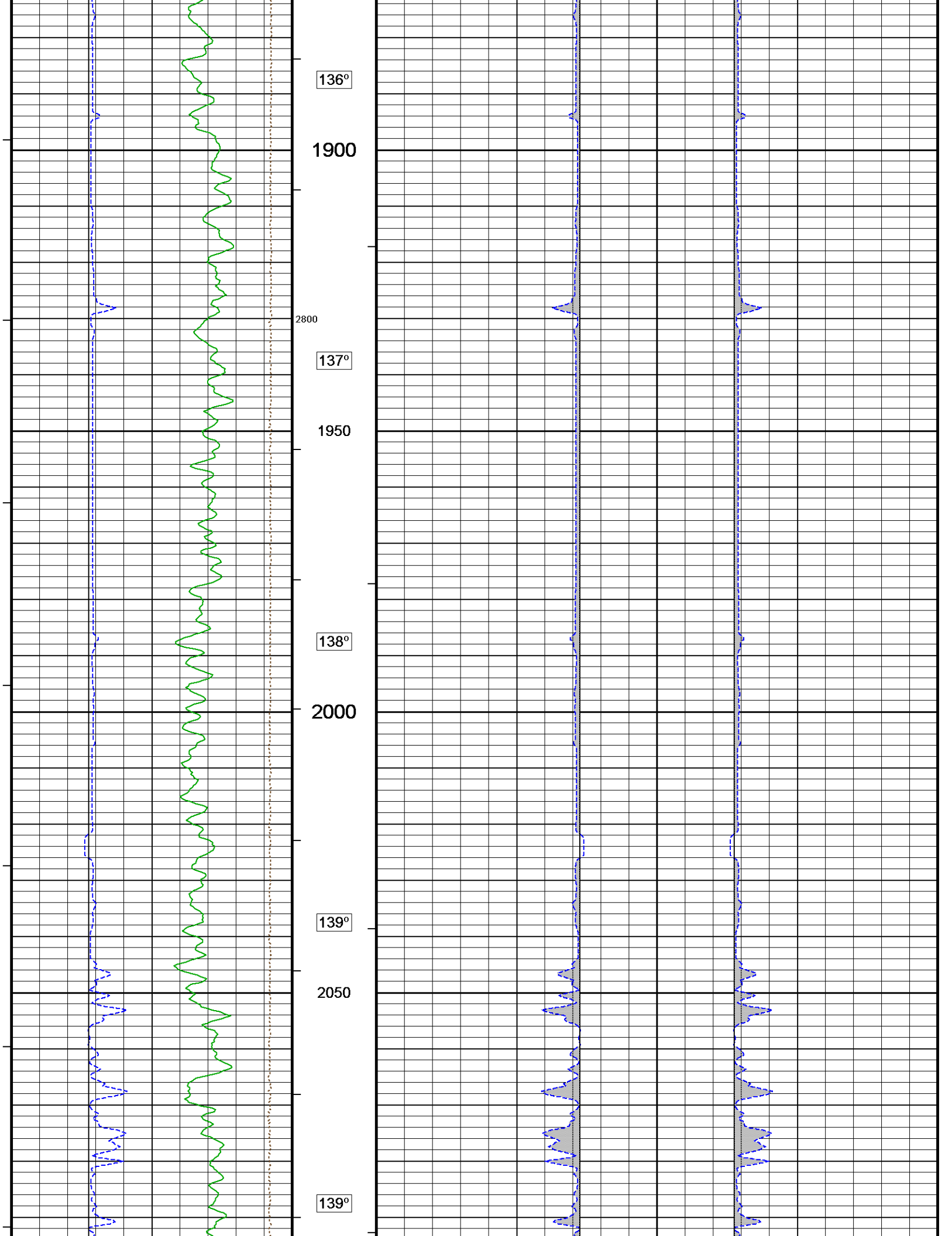


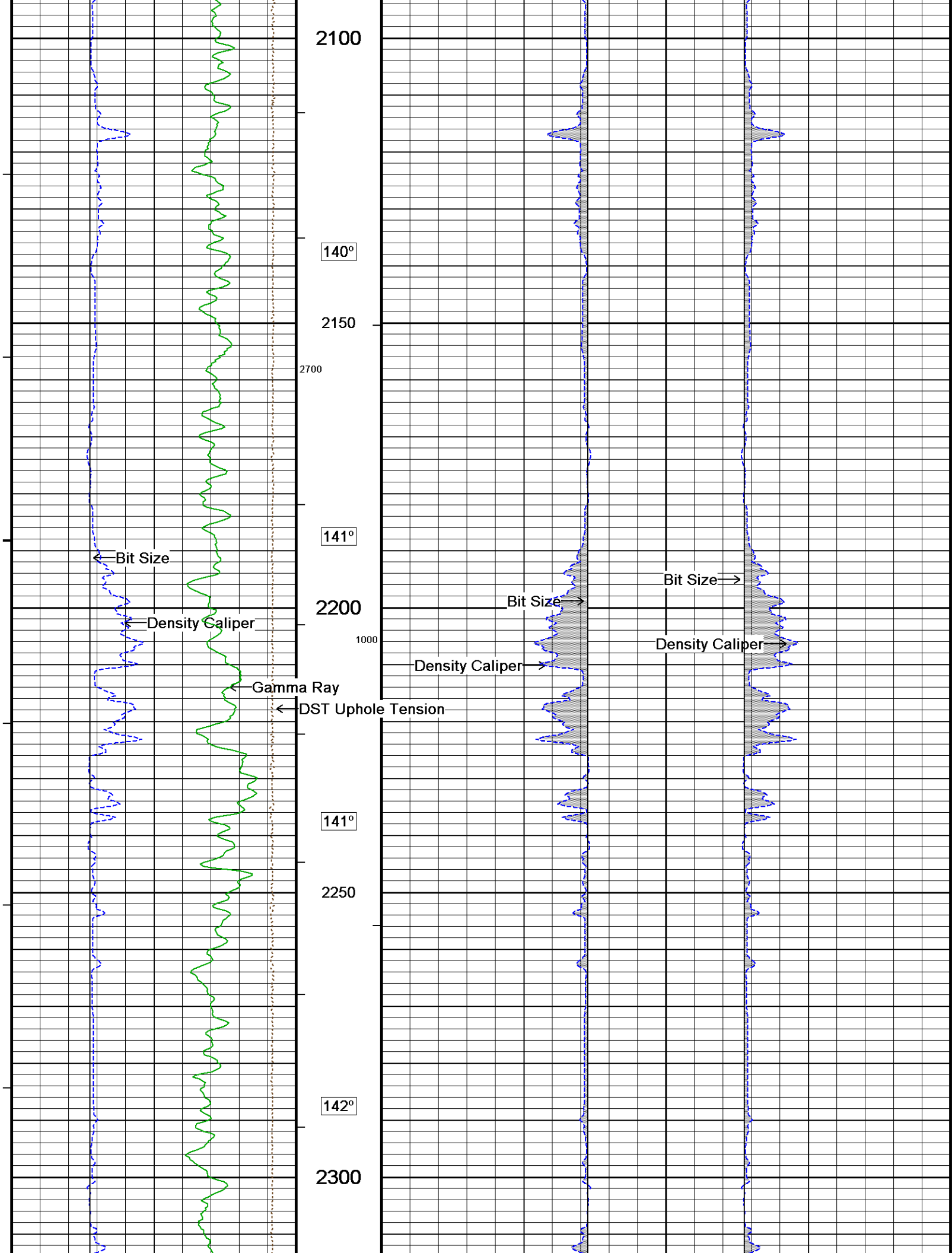


131°  
1450  
131°  
1500  
132°  
1550  
1100  
132°  
1600  
133°  
1650

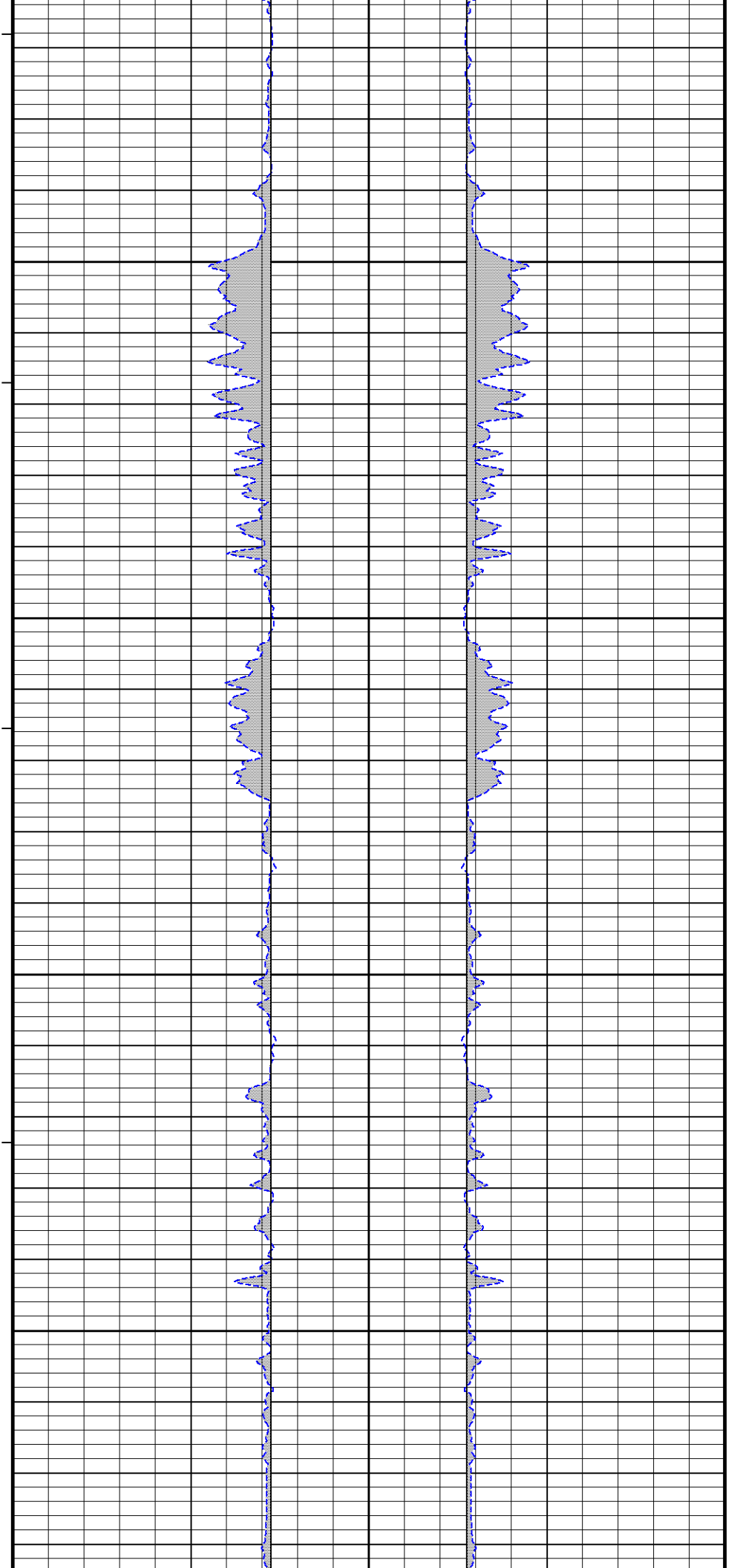
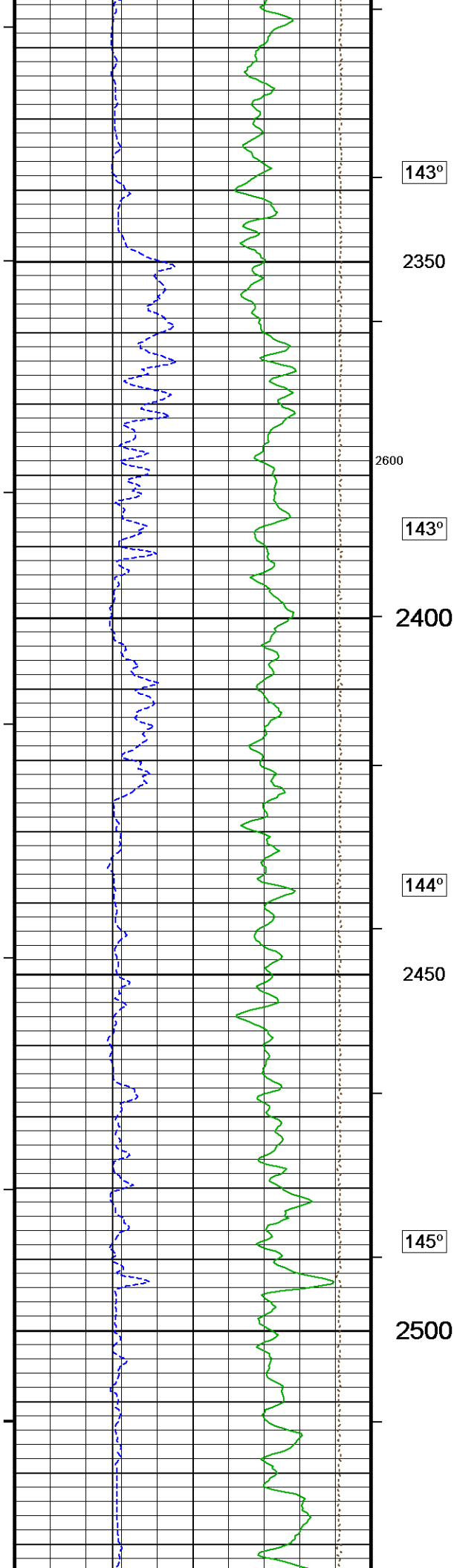


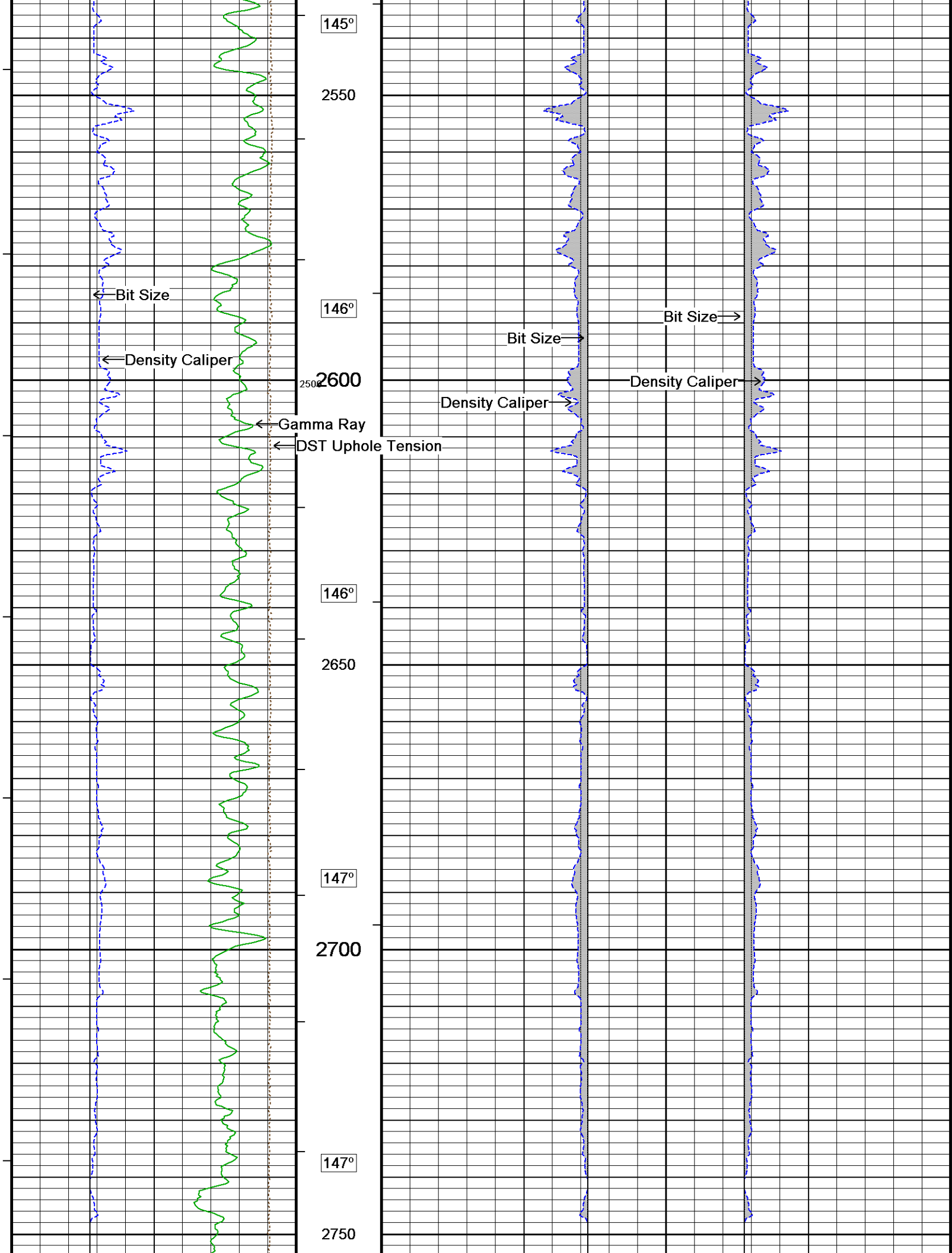


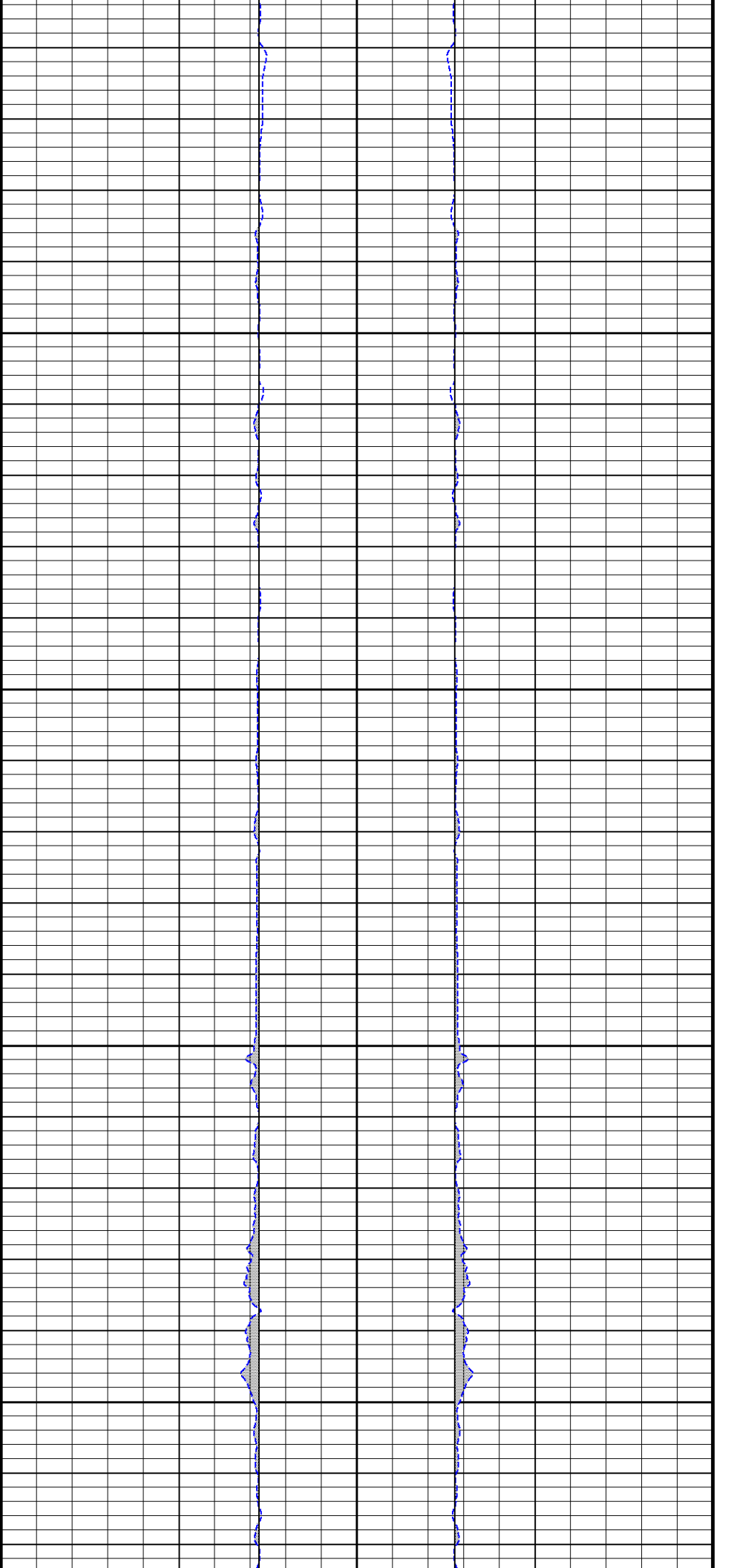
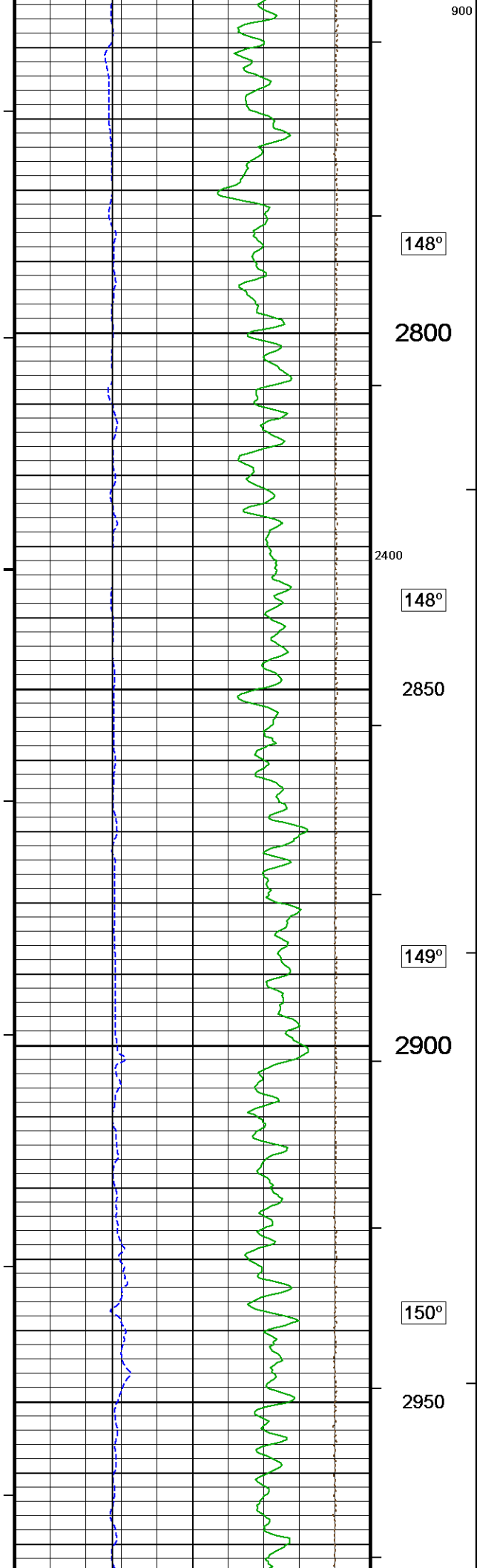


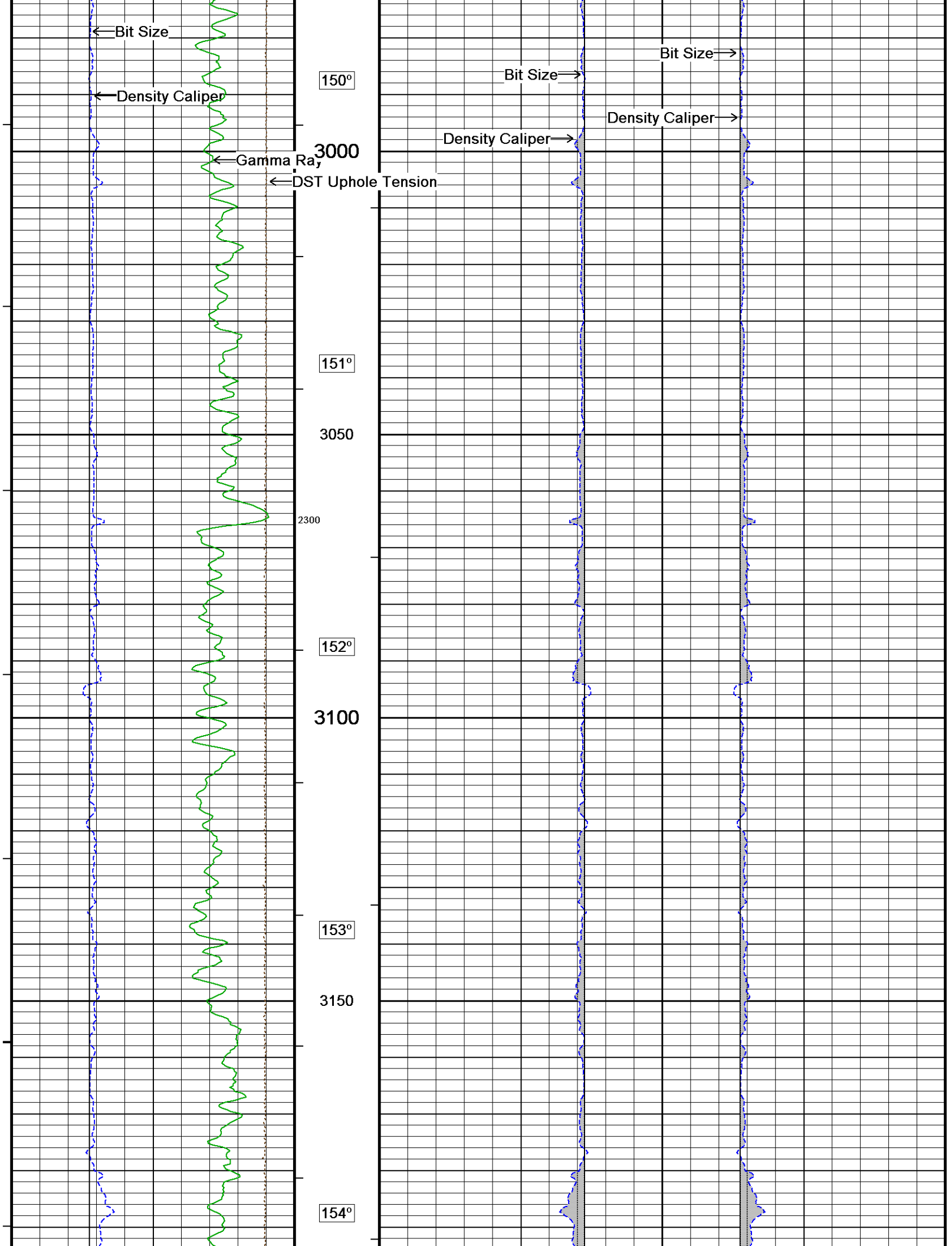


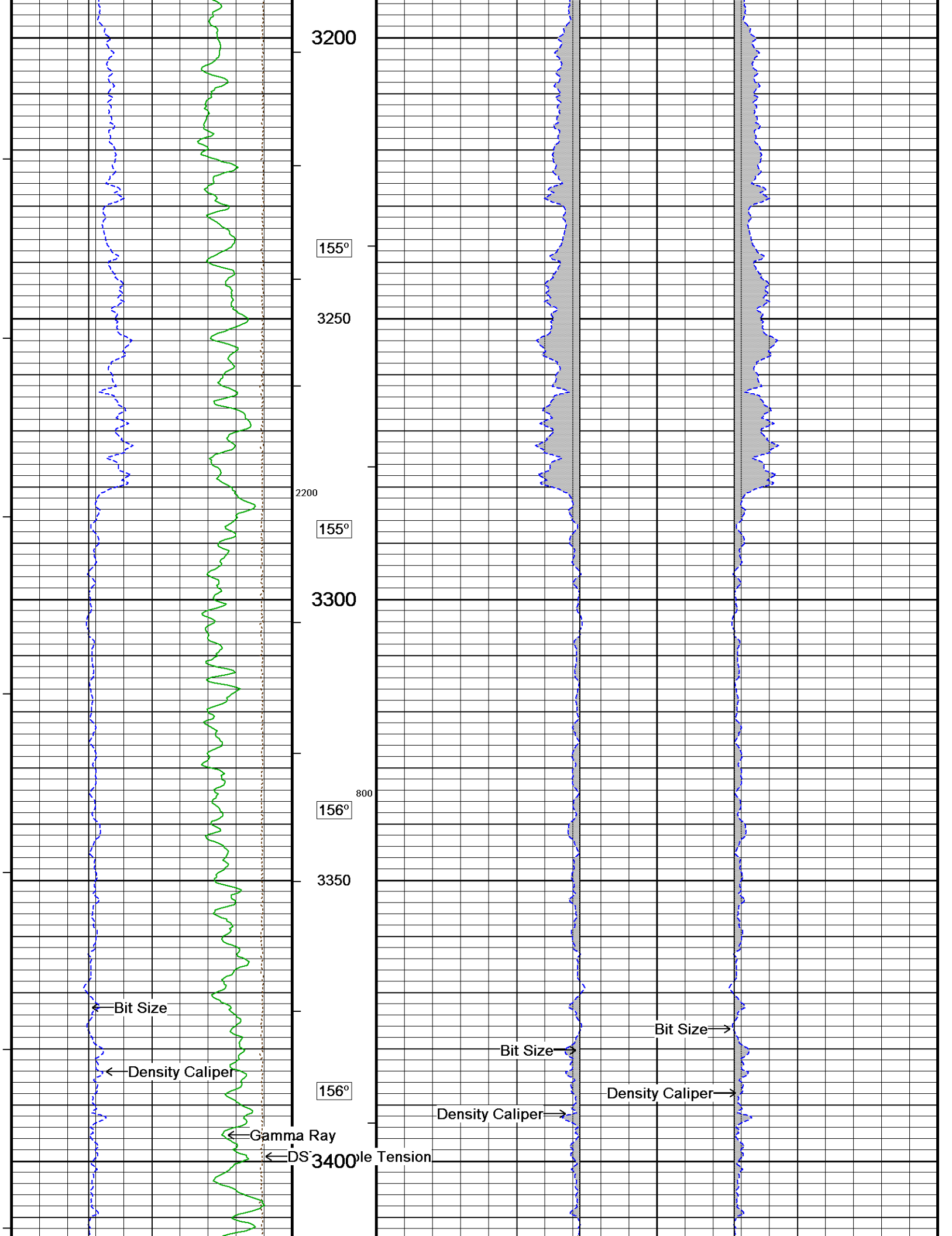


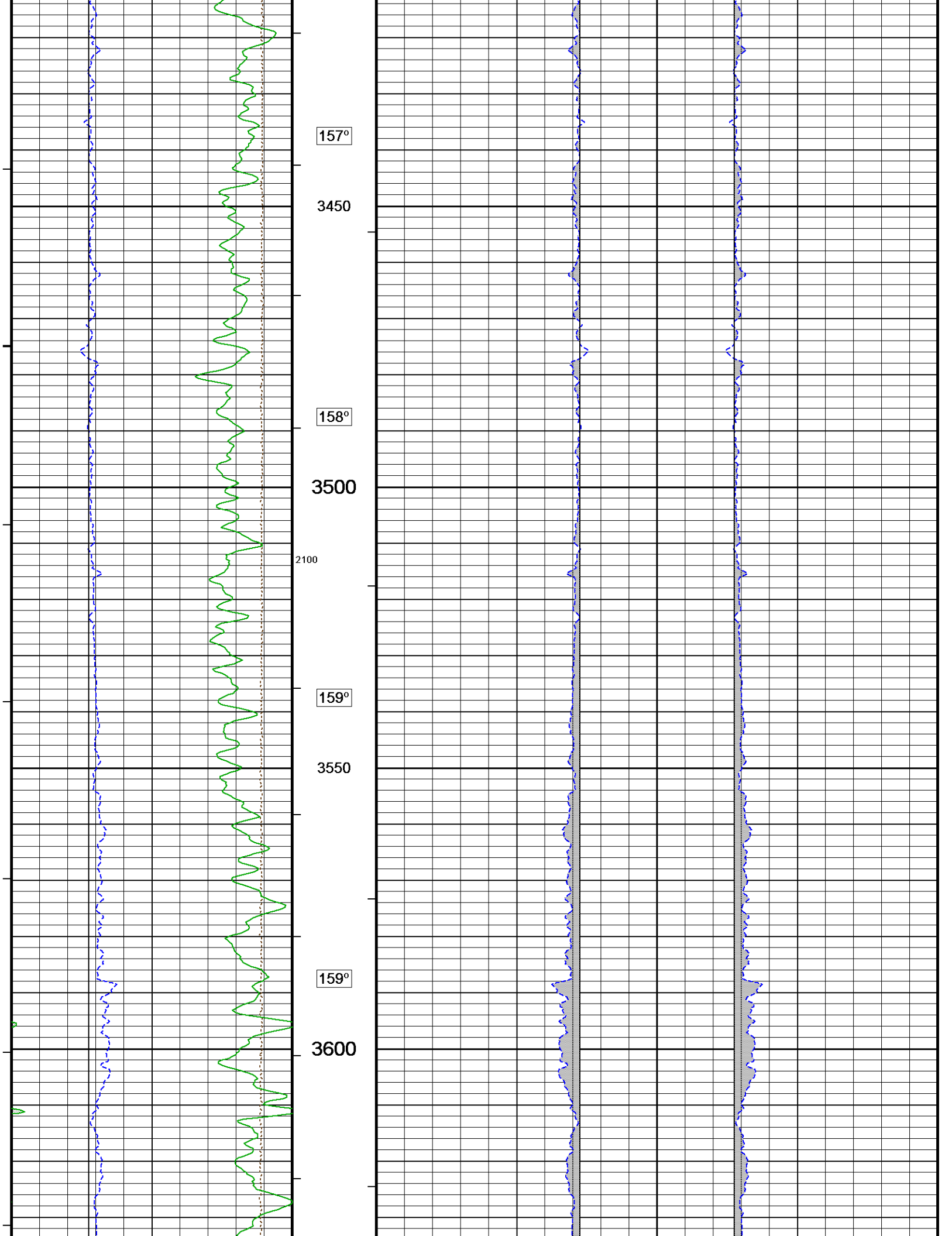


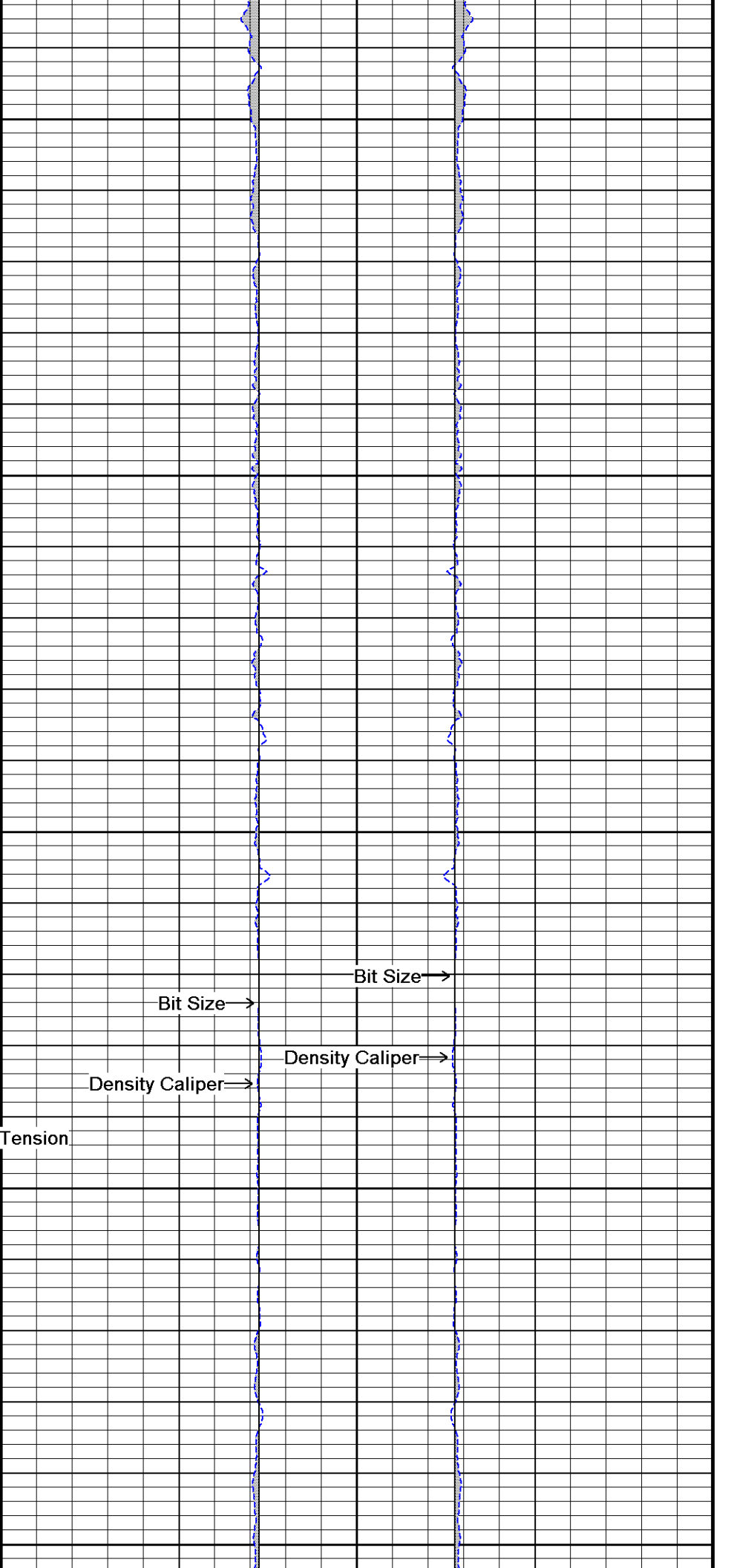
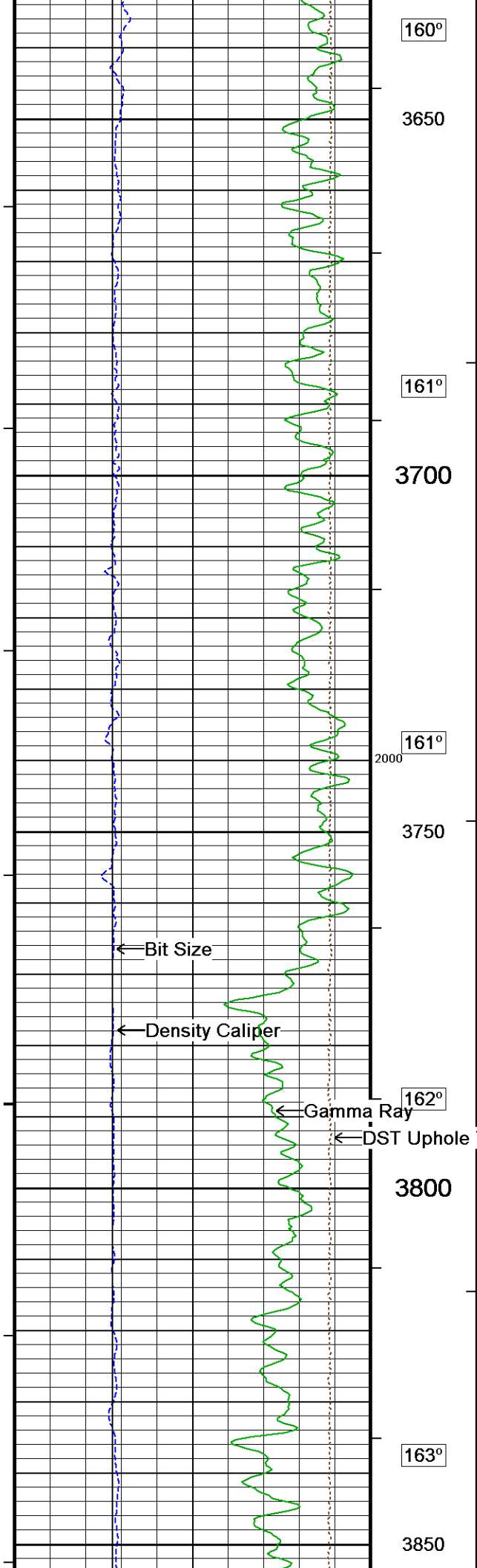


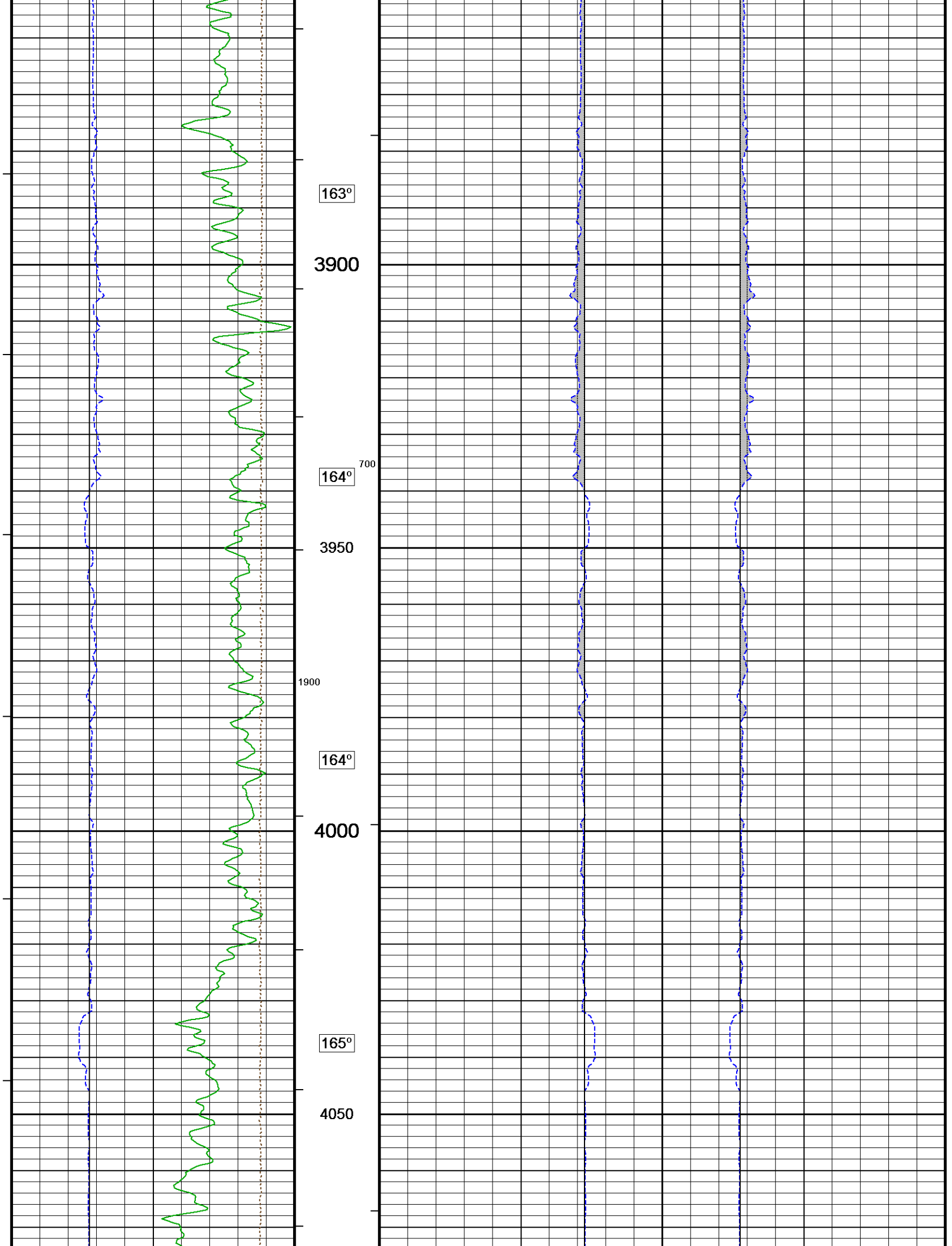




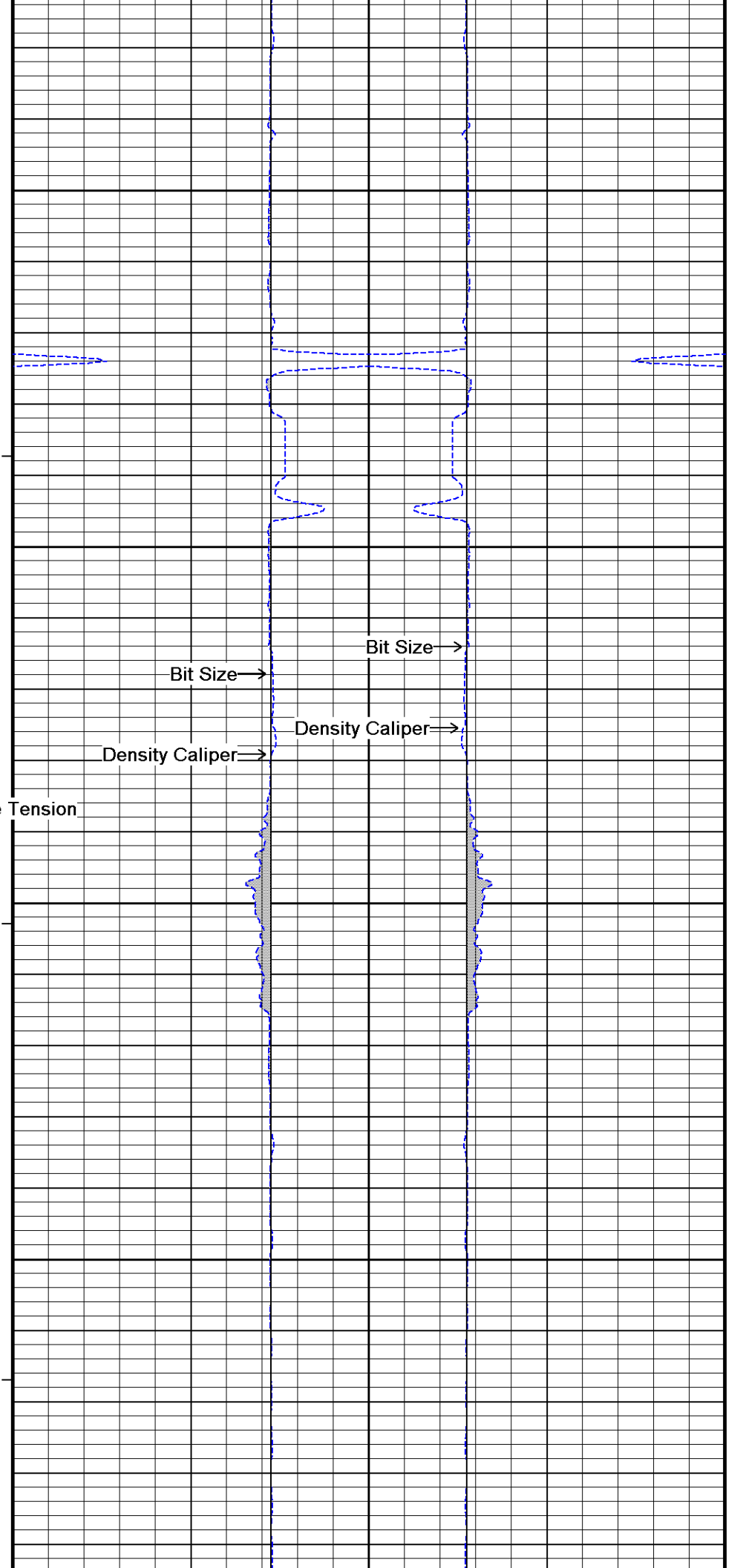
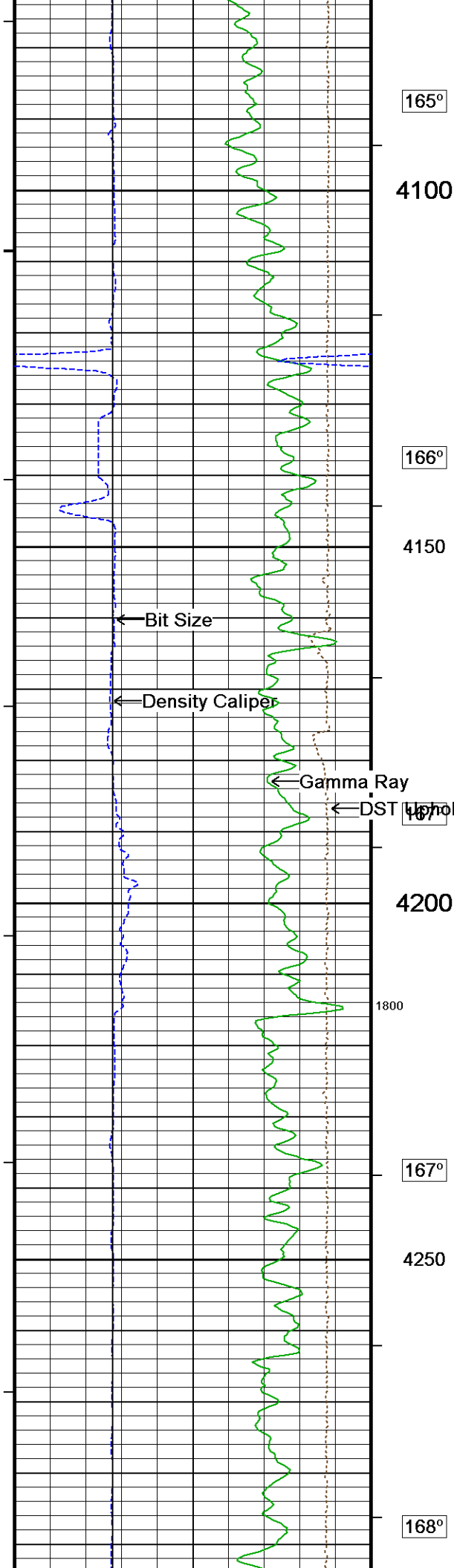


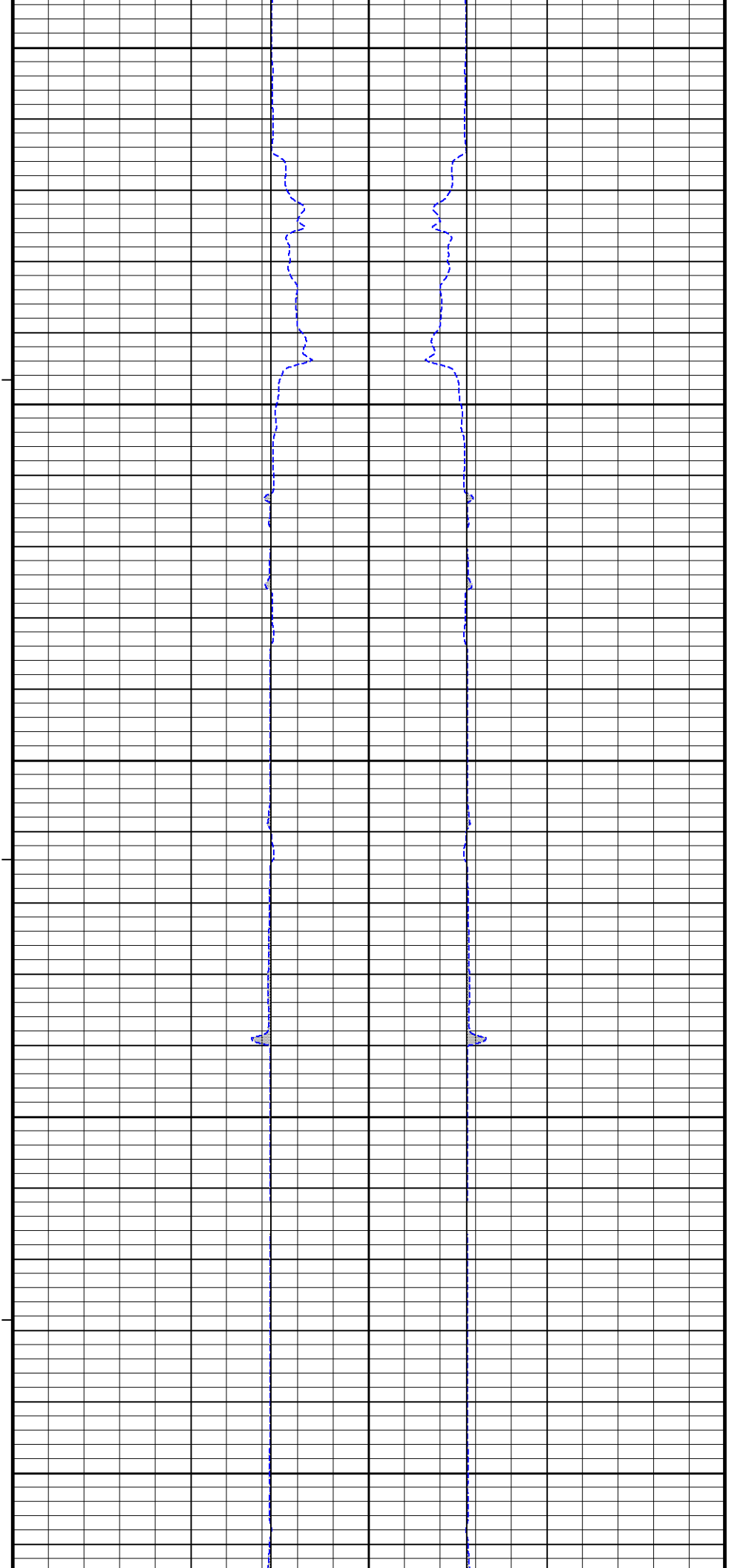
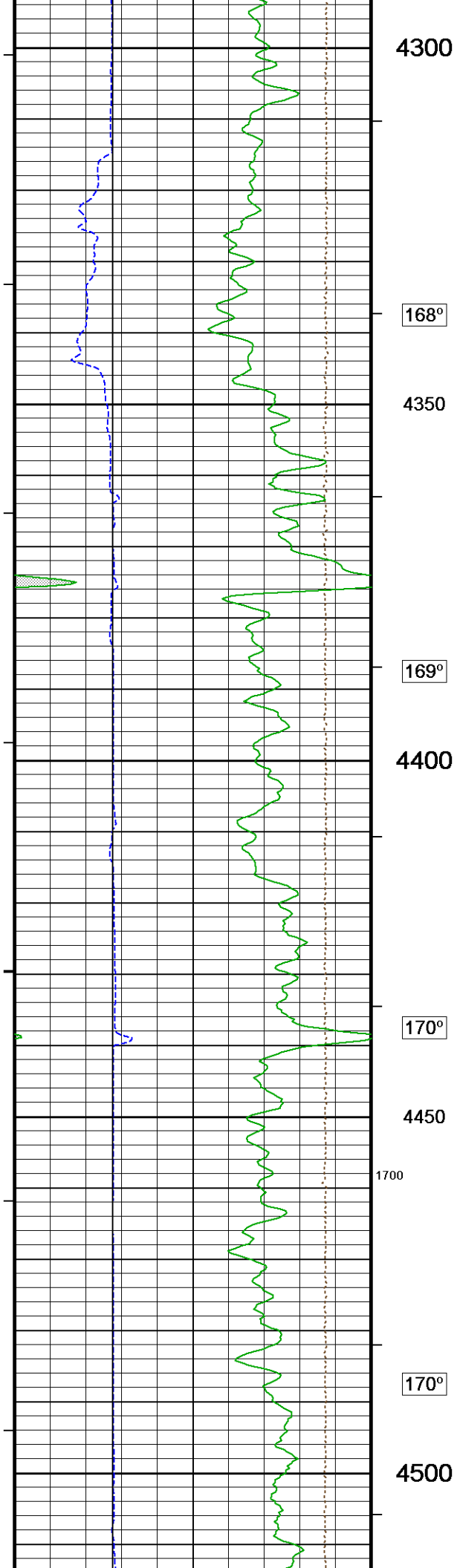


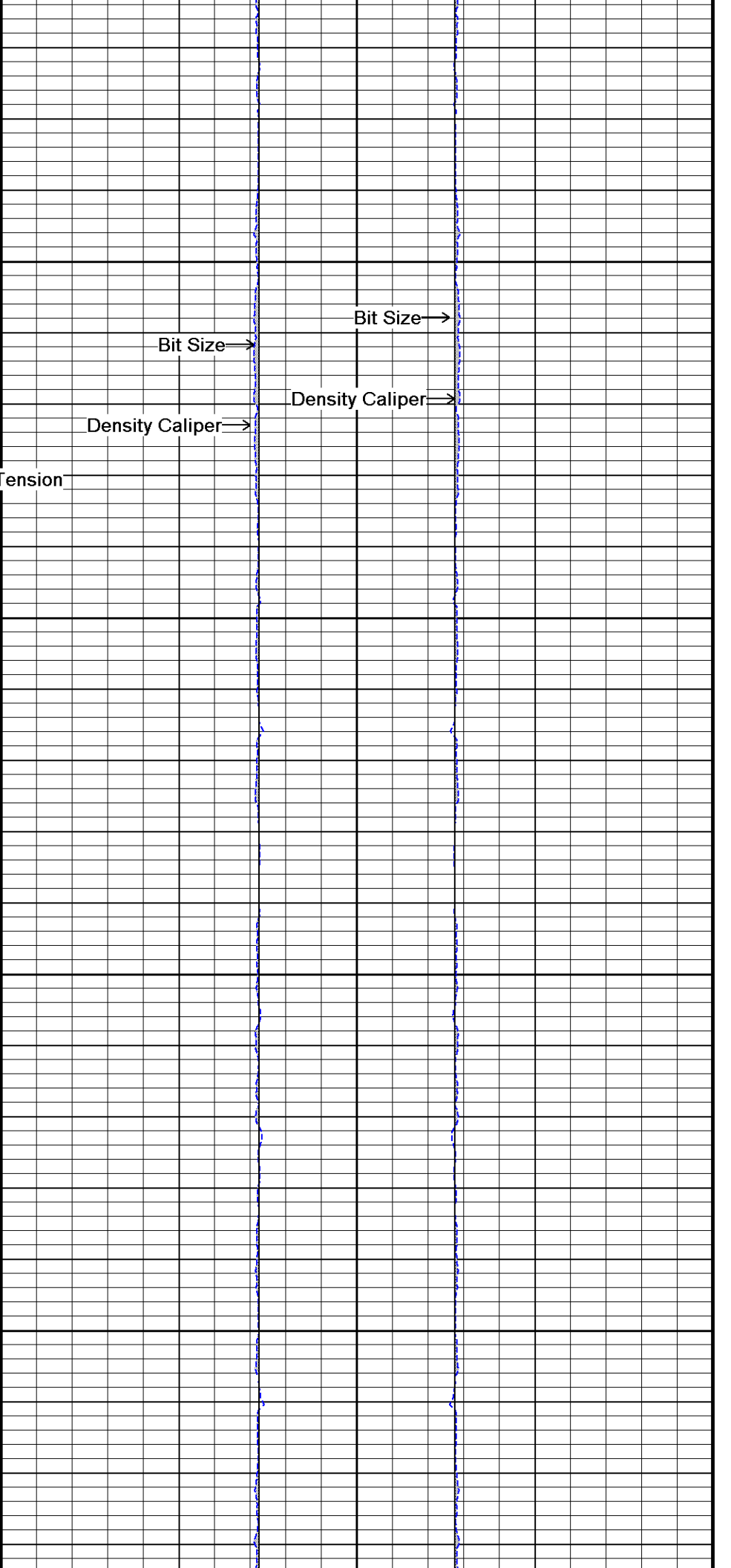
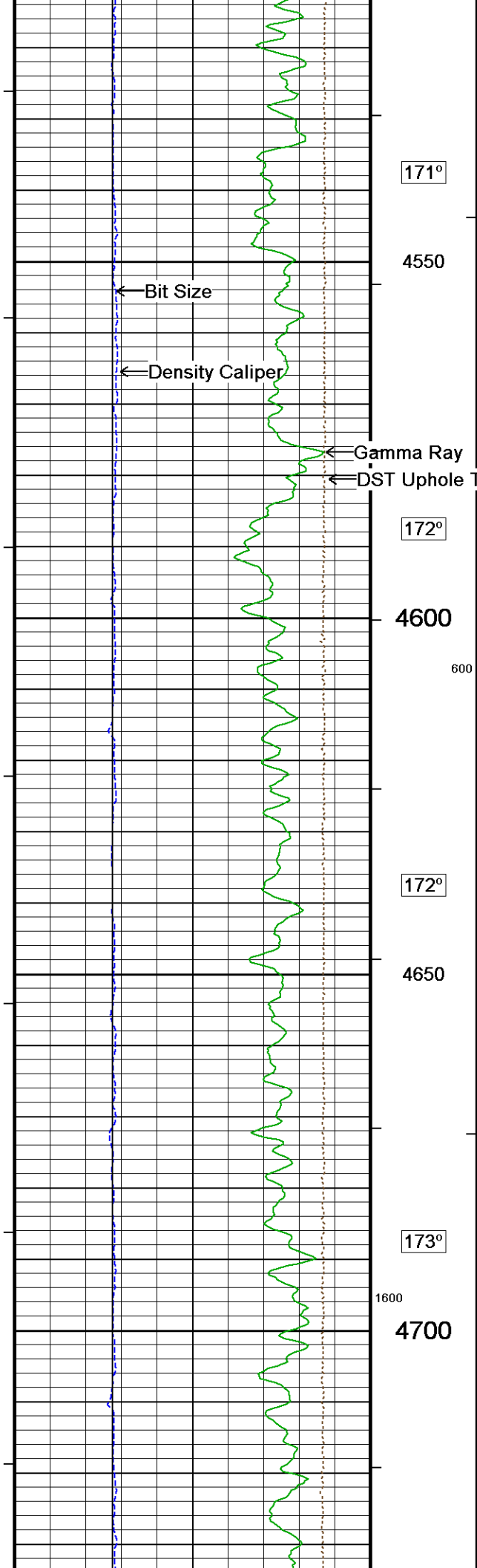


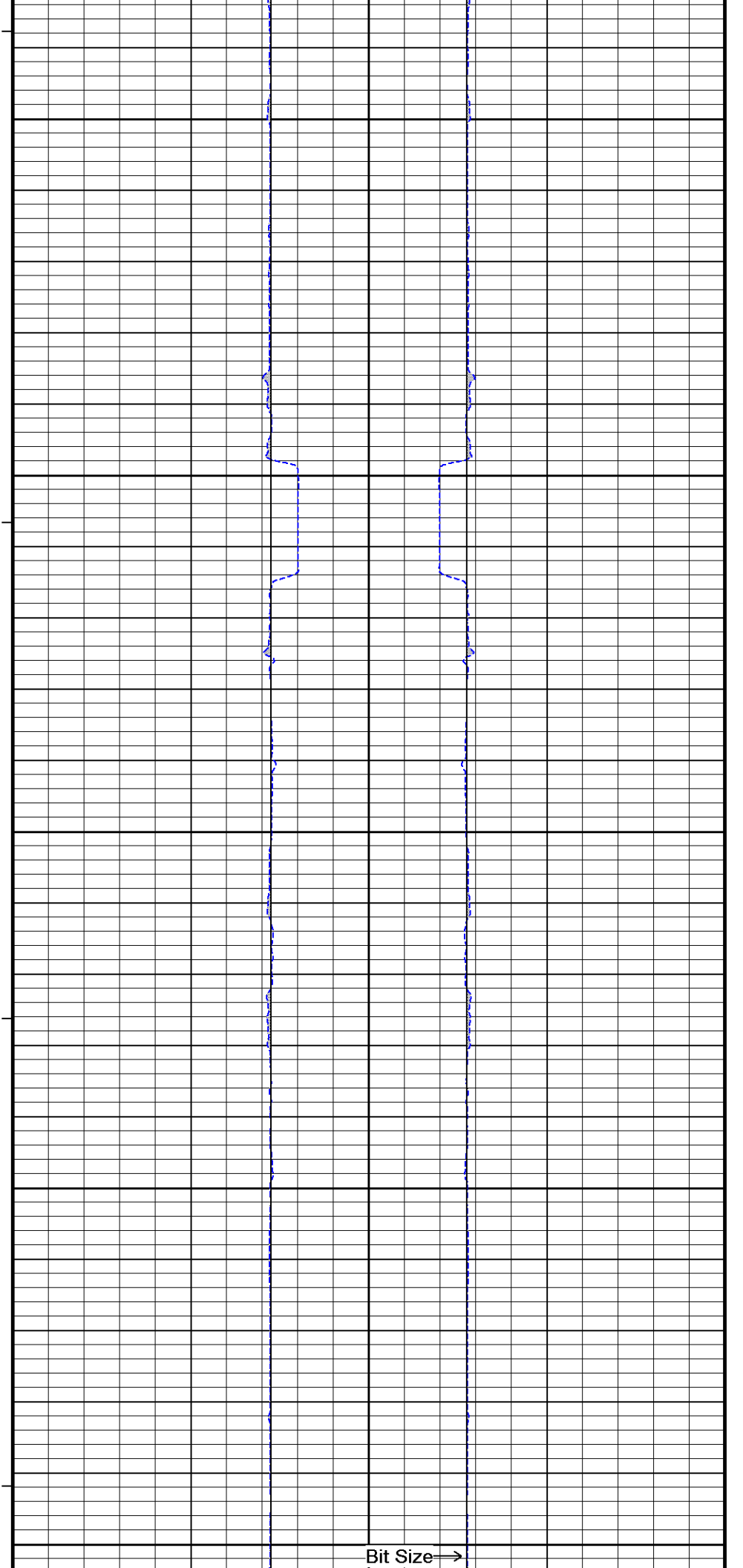
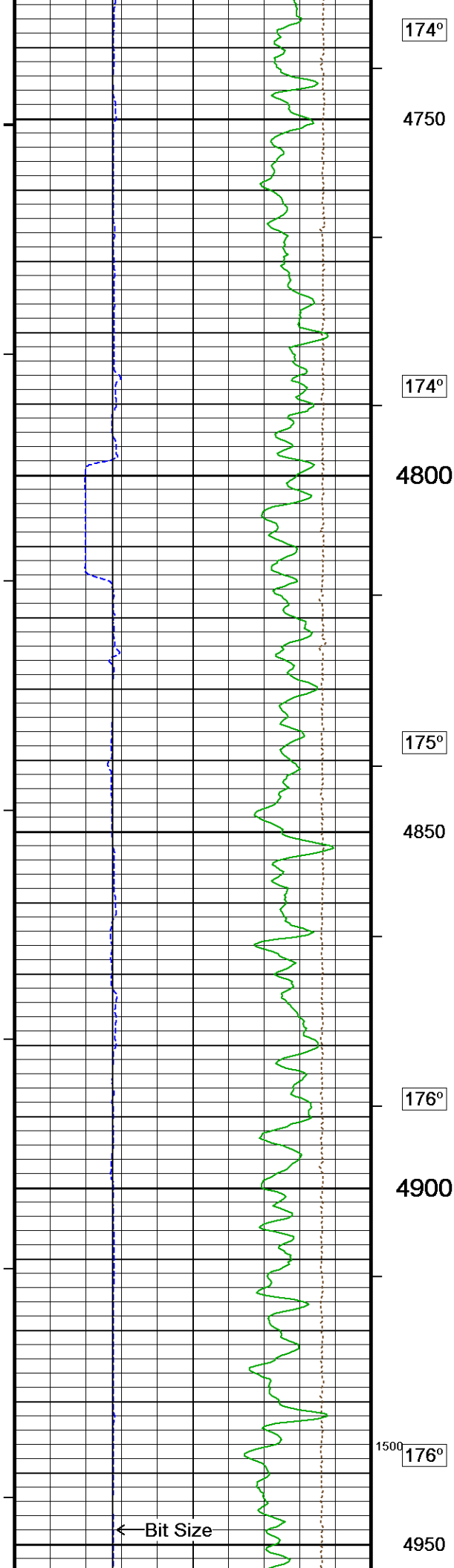


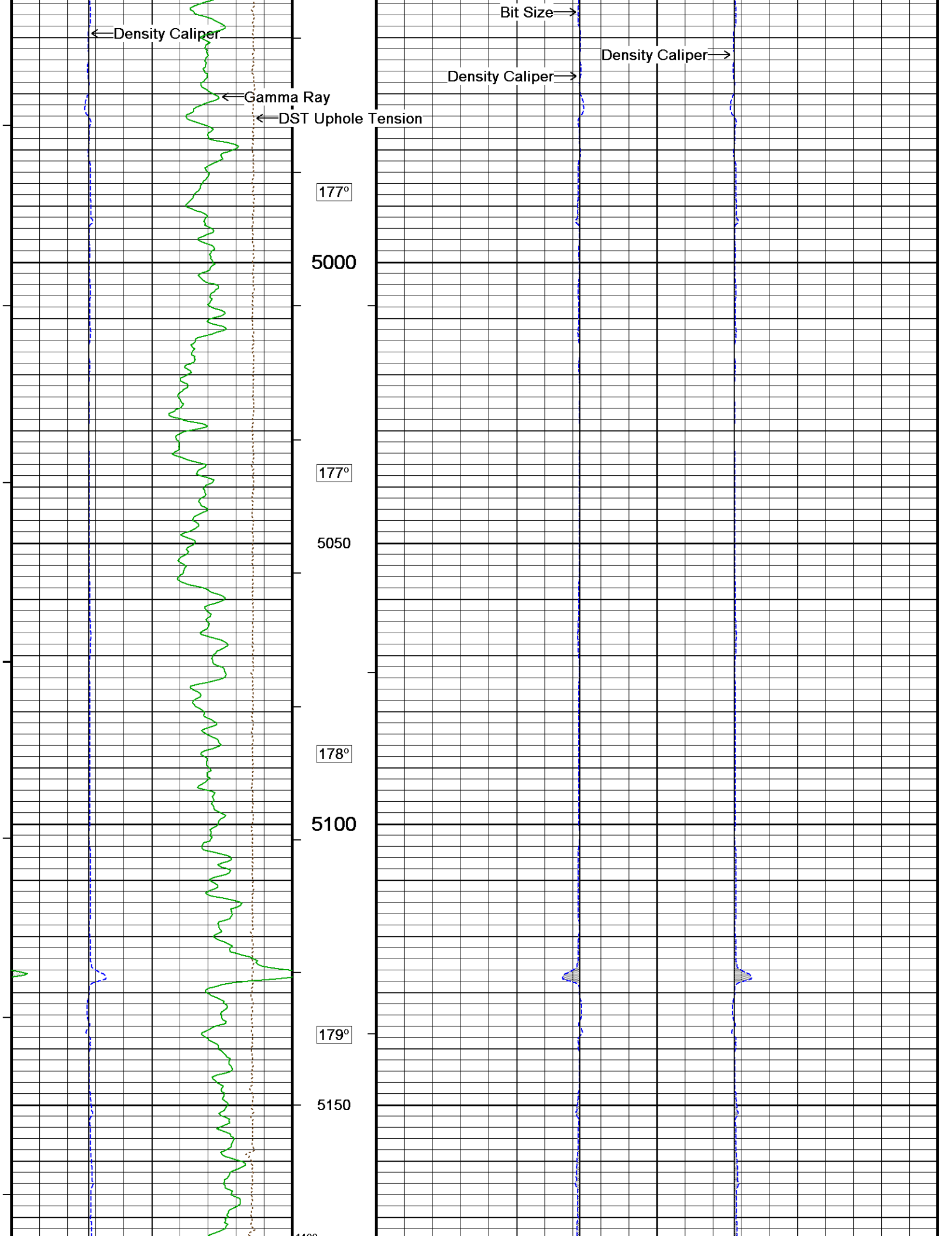


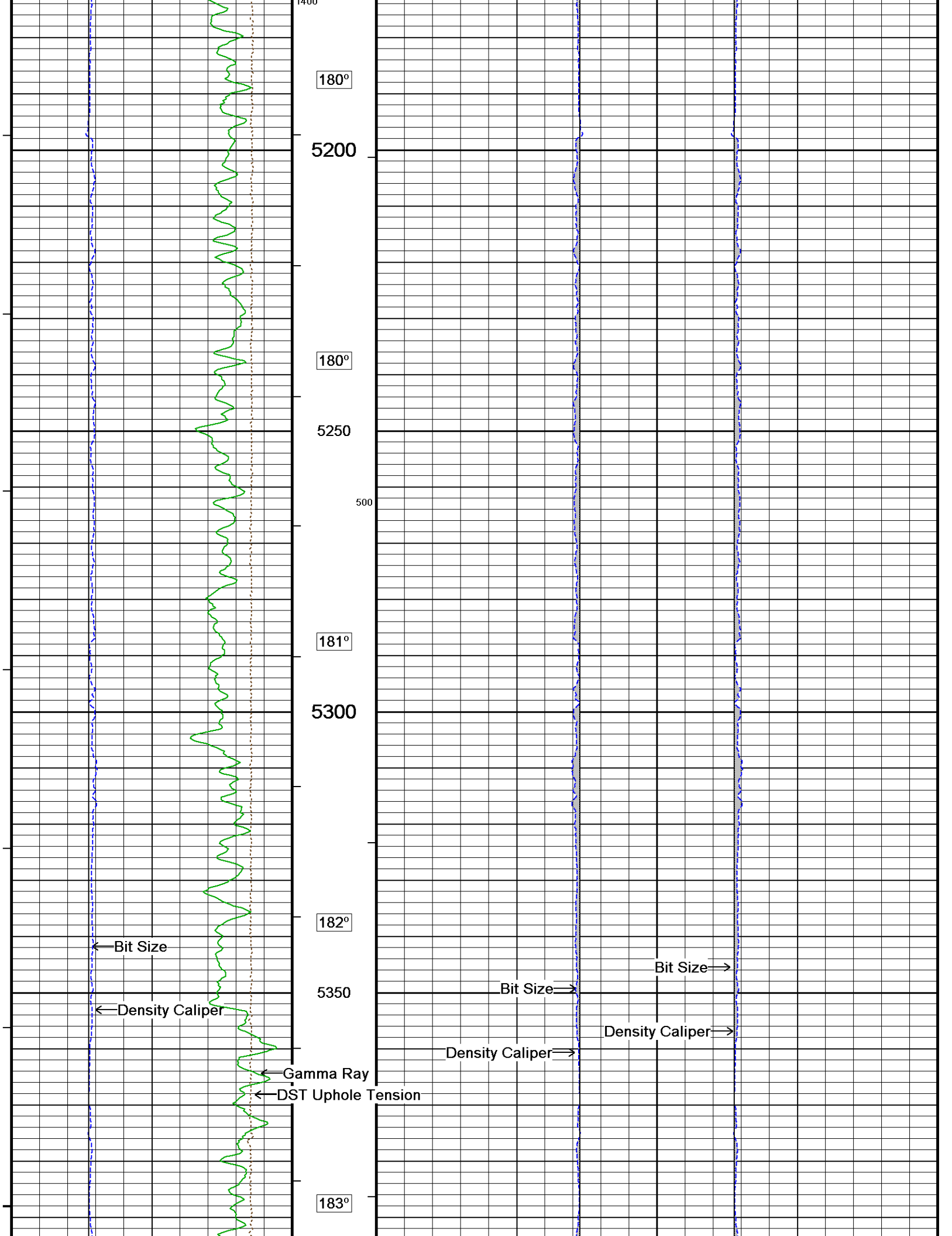


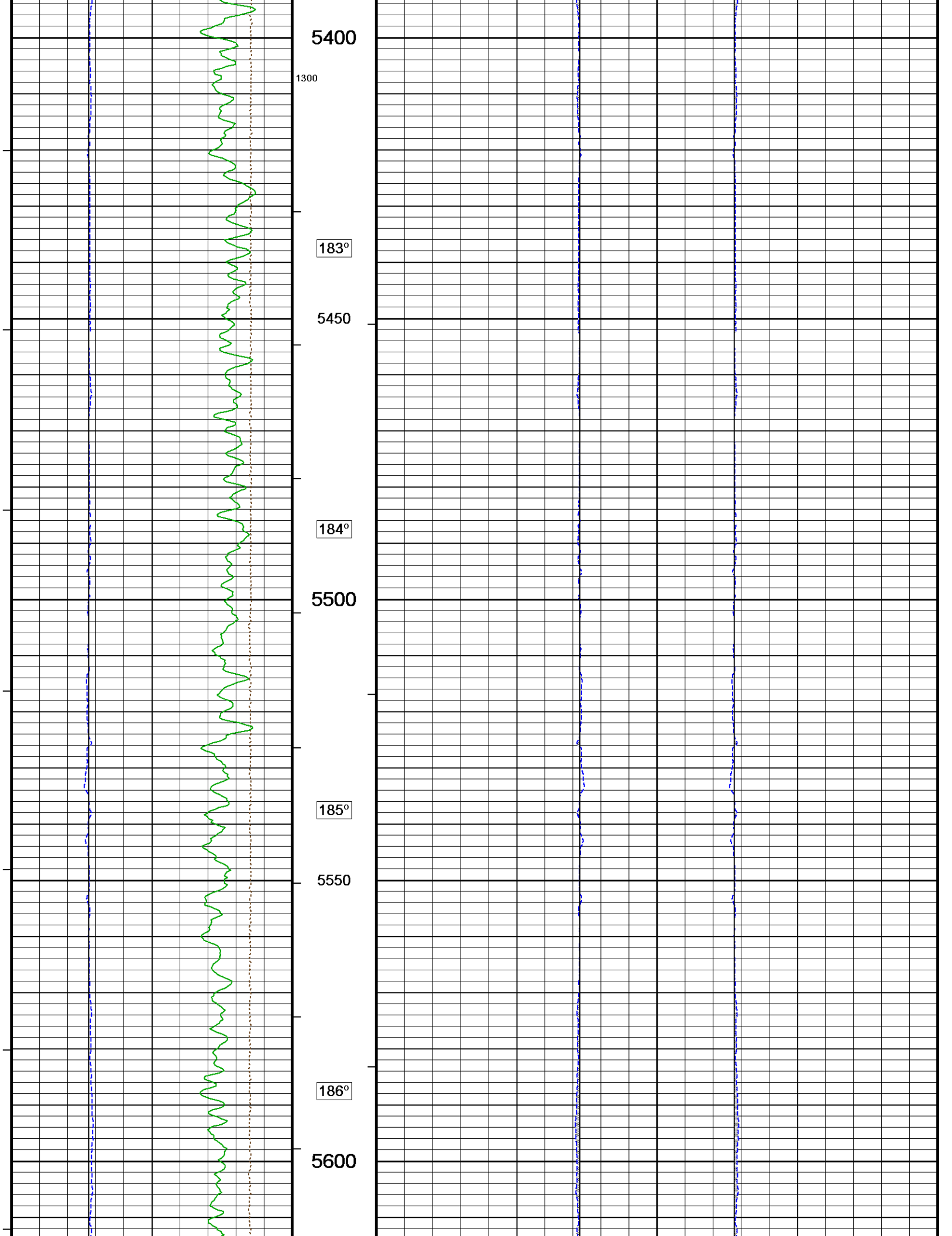


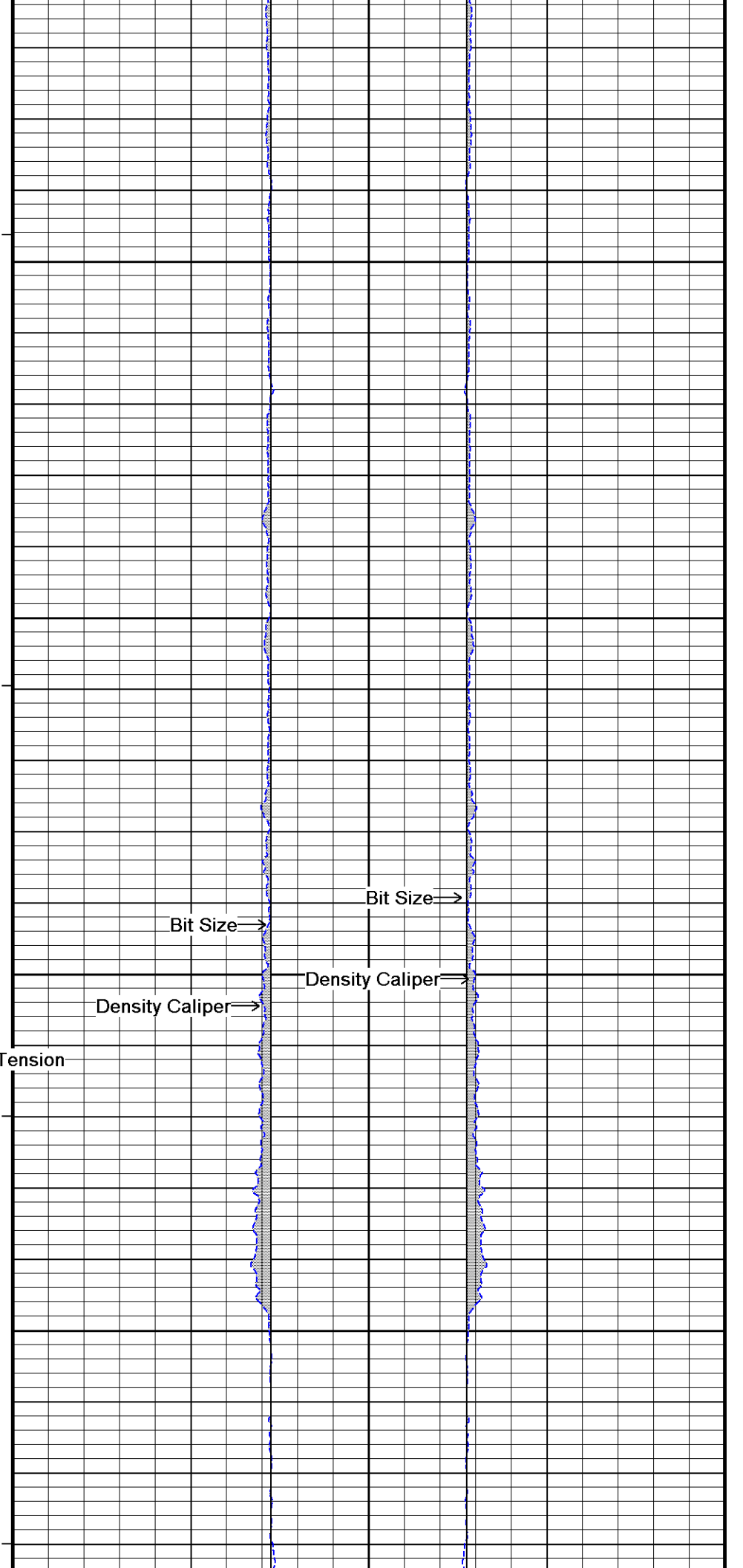
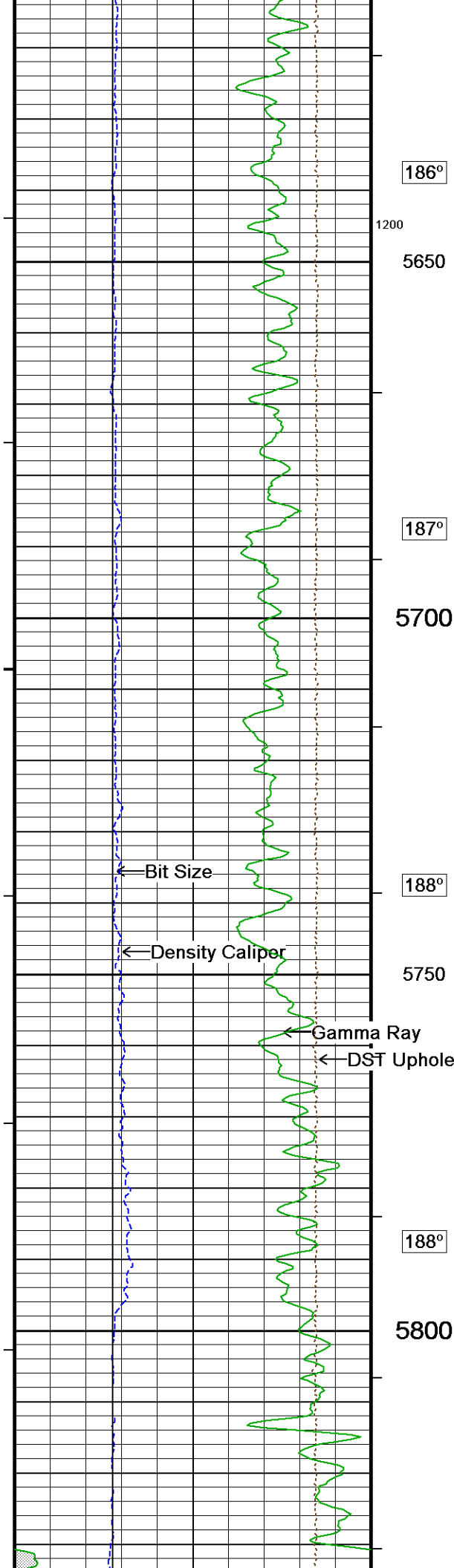




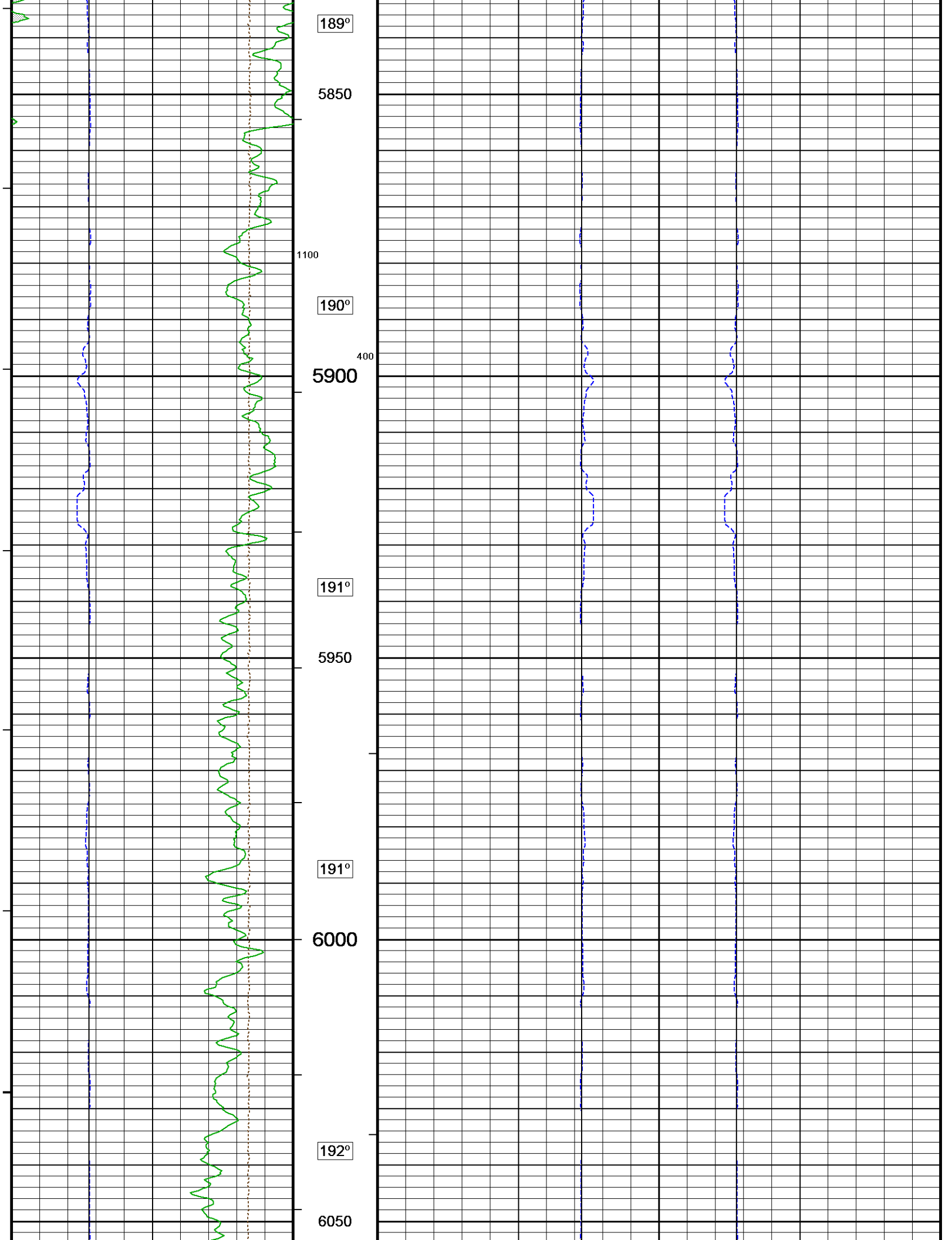


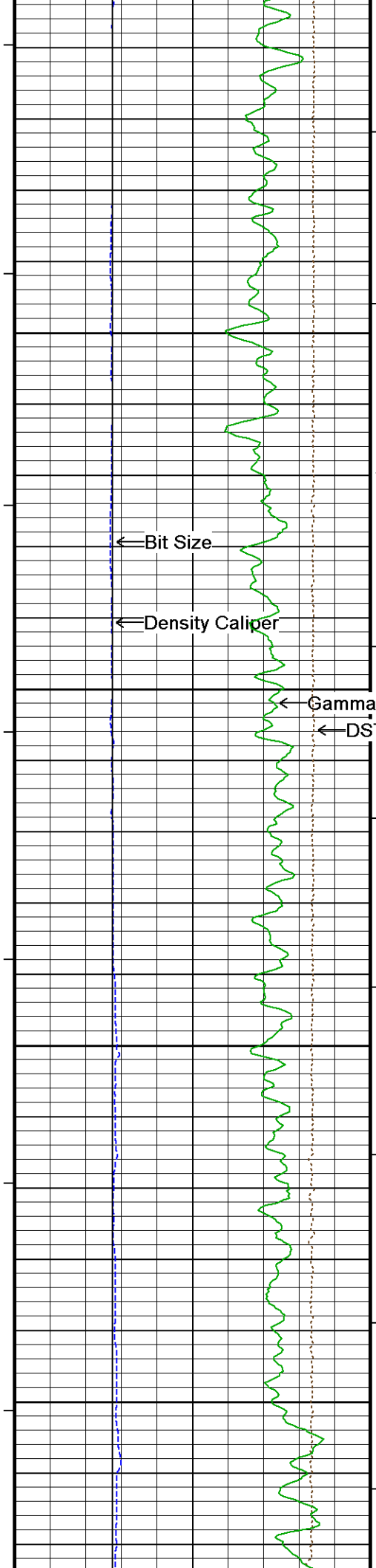




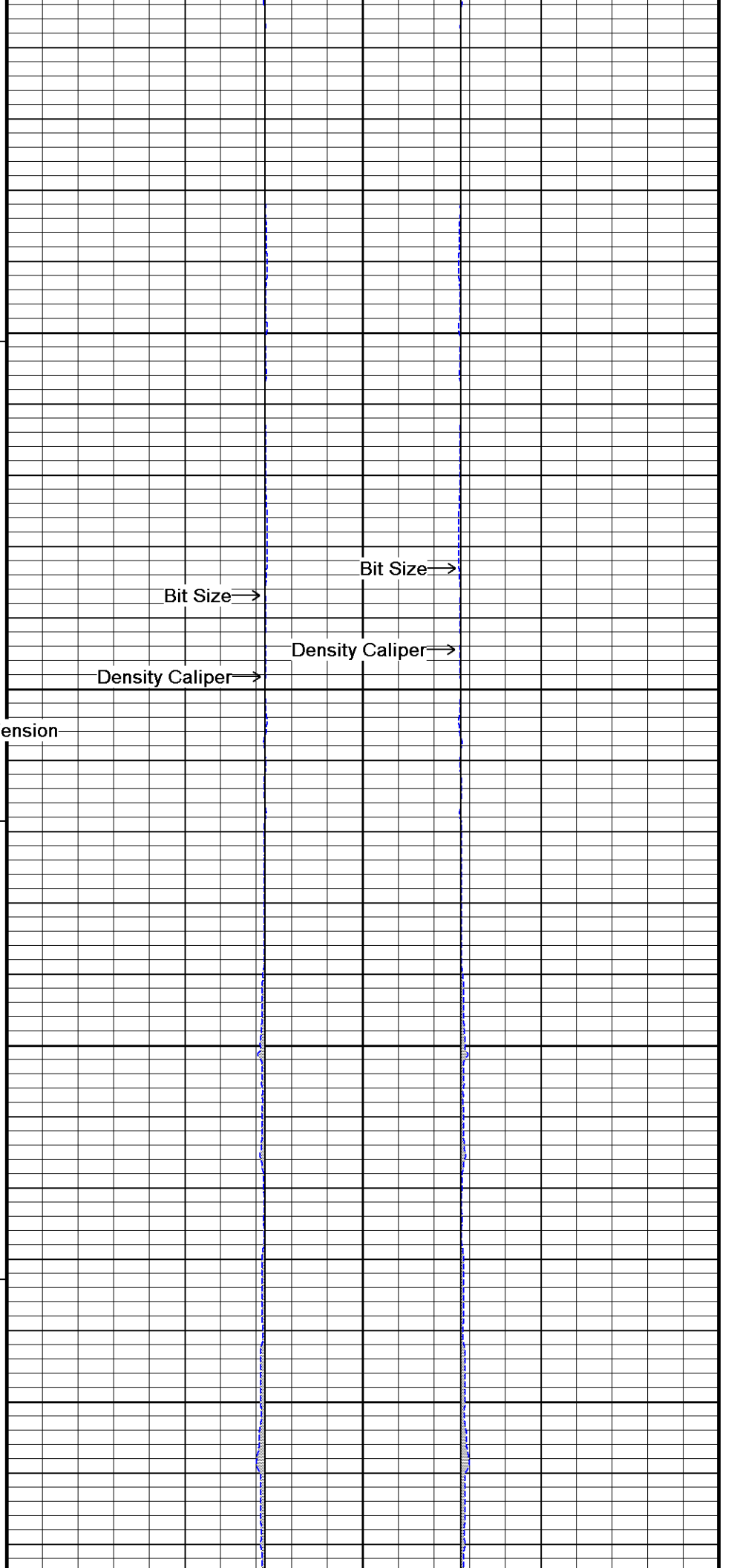




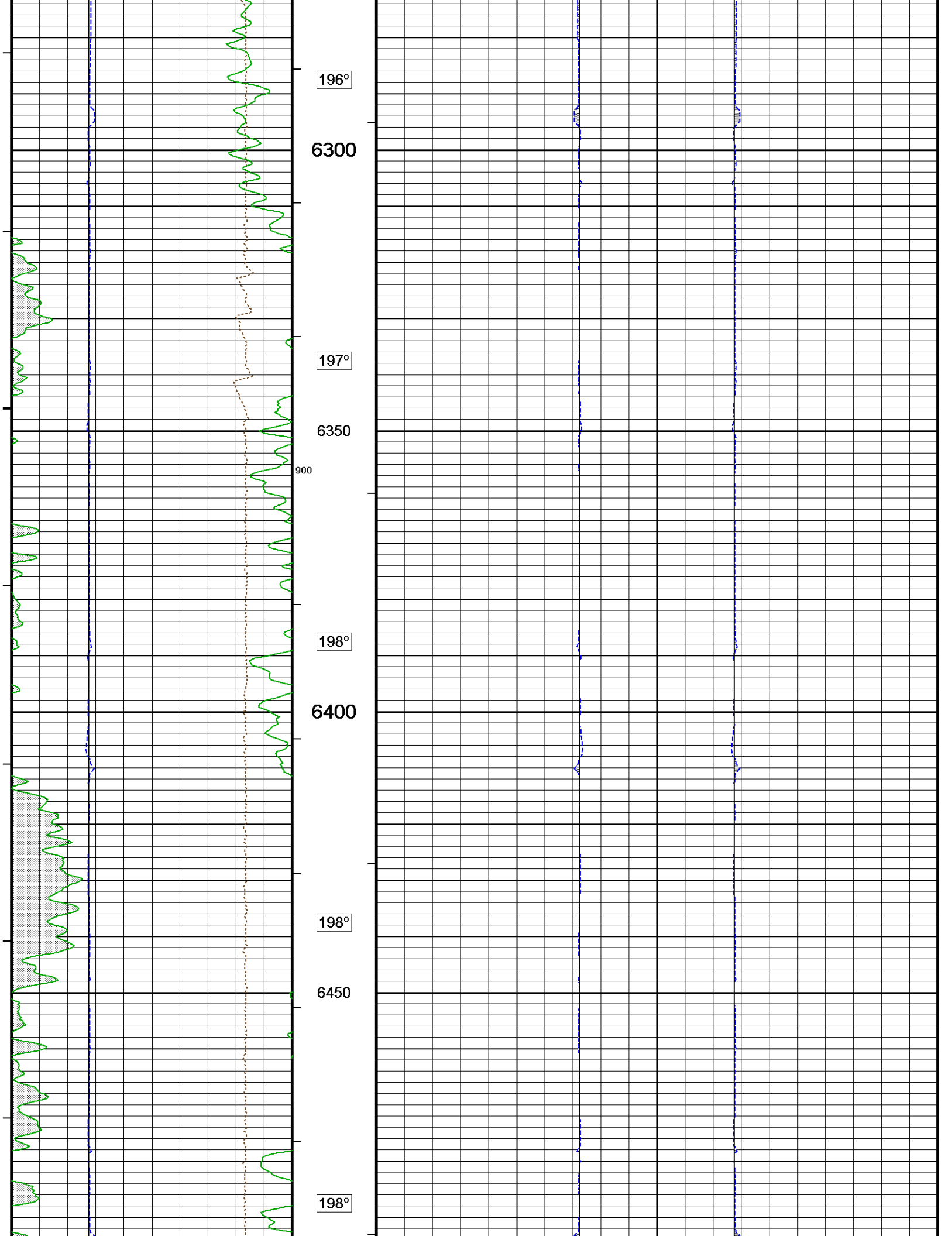


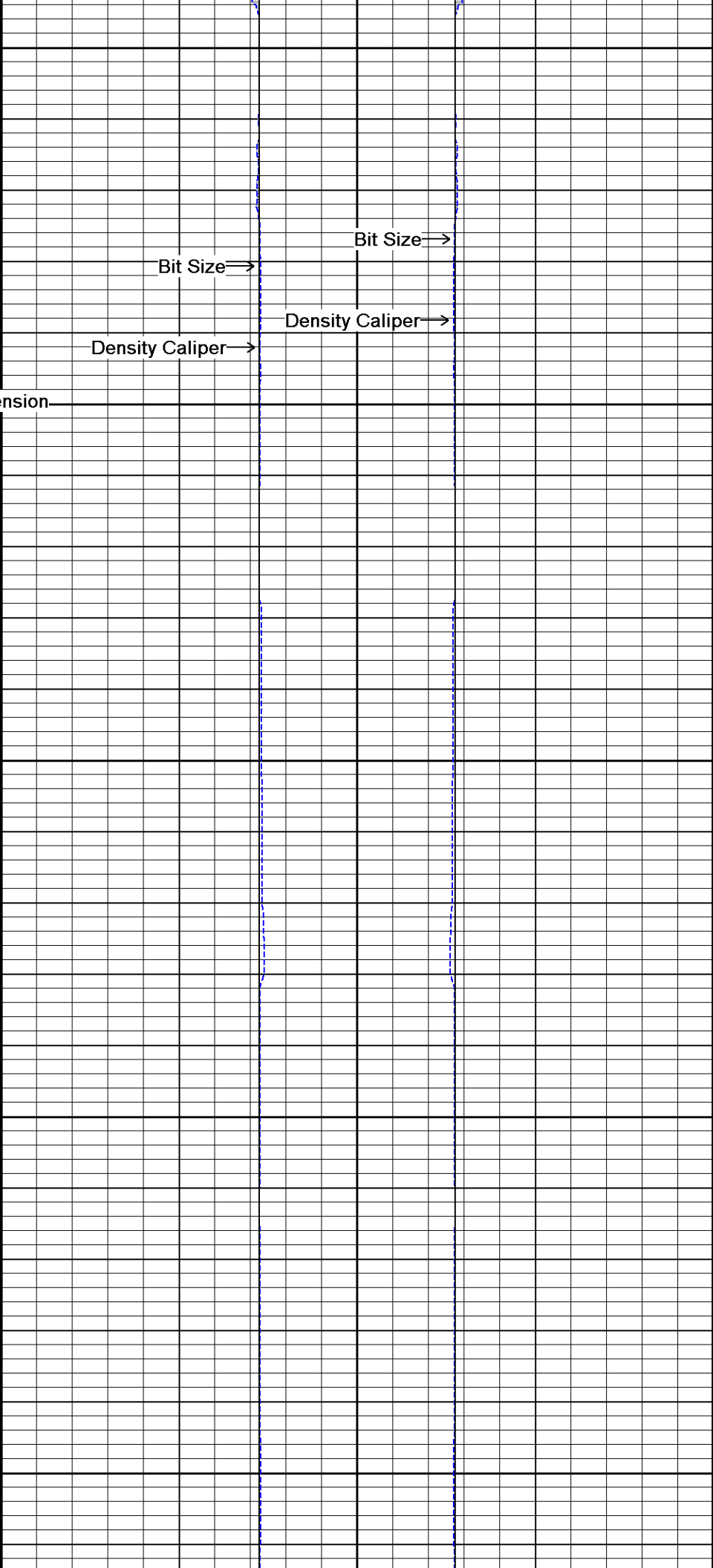
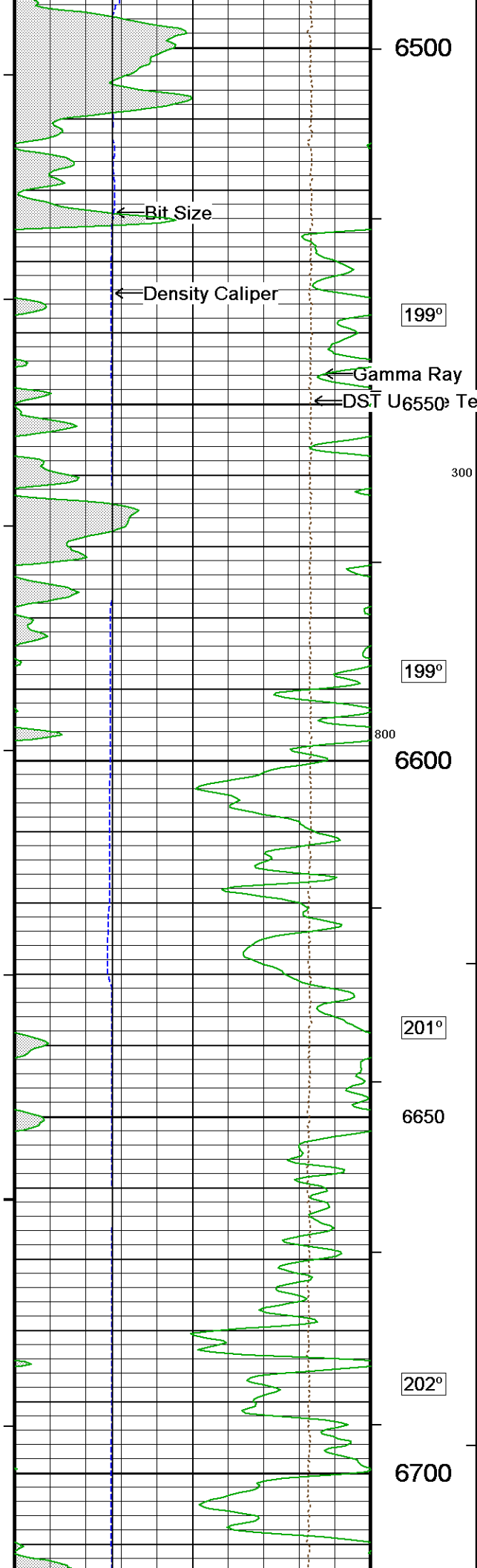


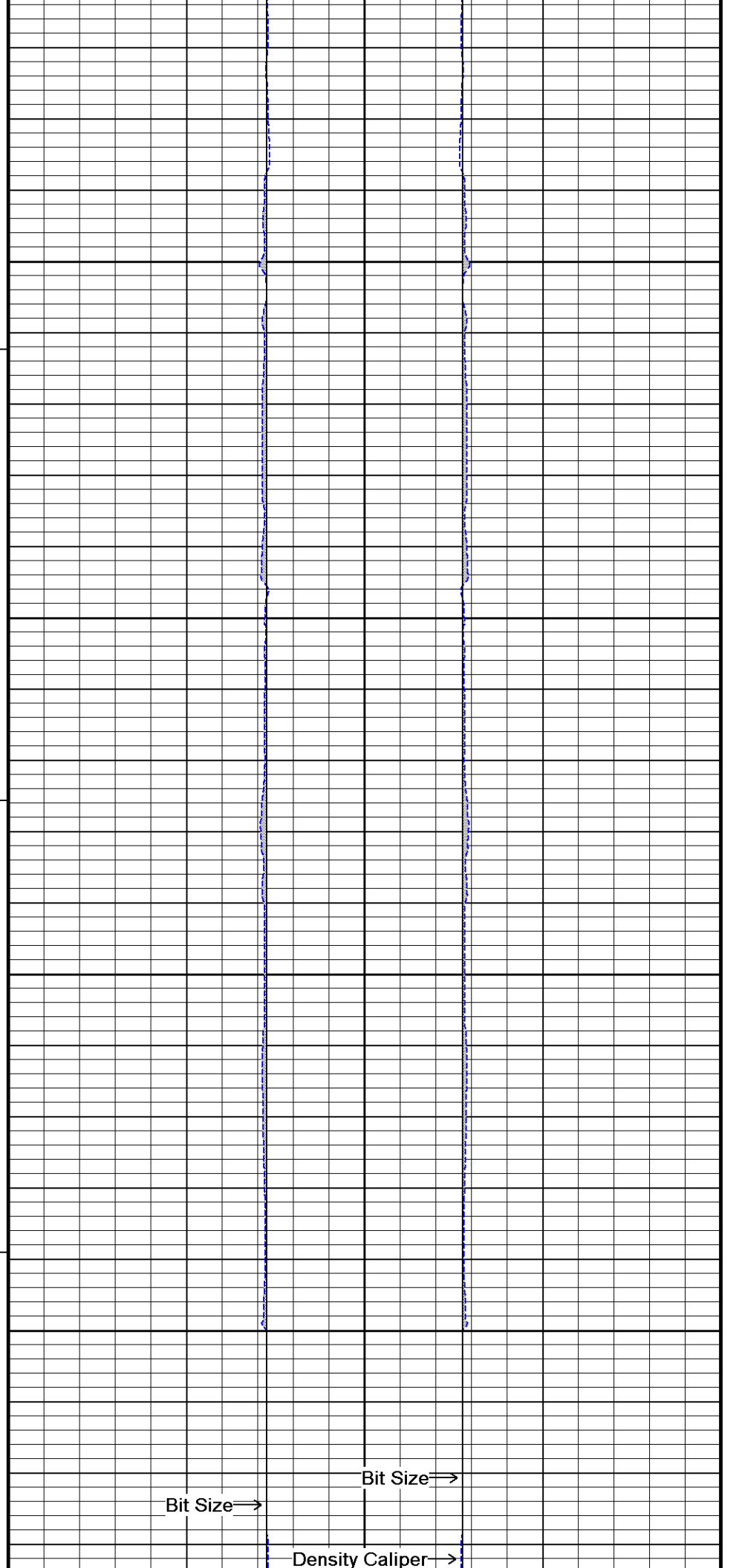
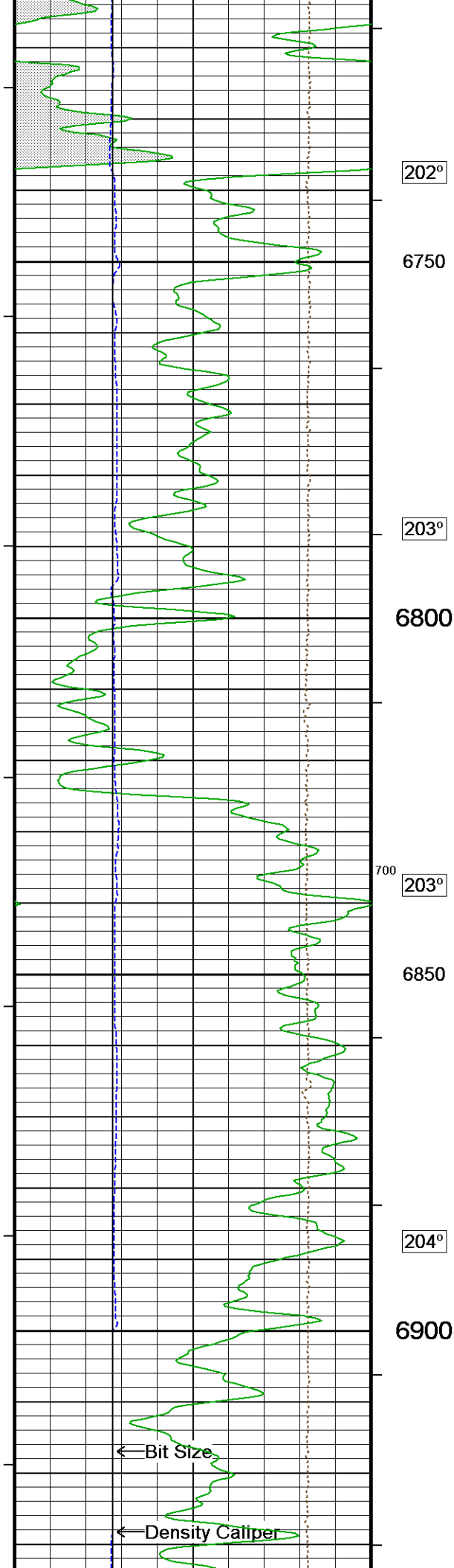
194°  
6100  
1000  
194°  
6150  
195°  
6200  
195°  
6250

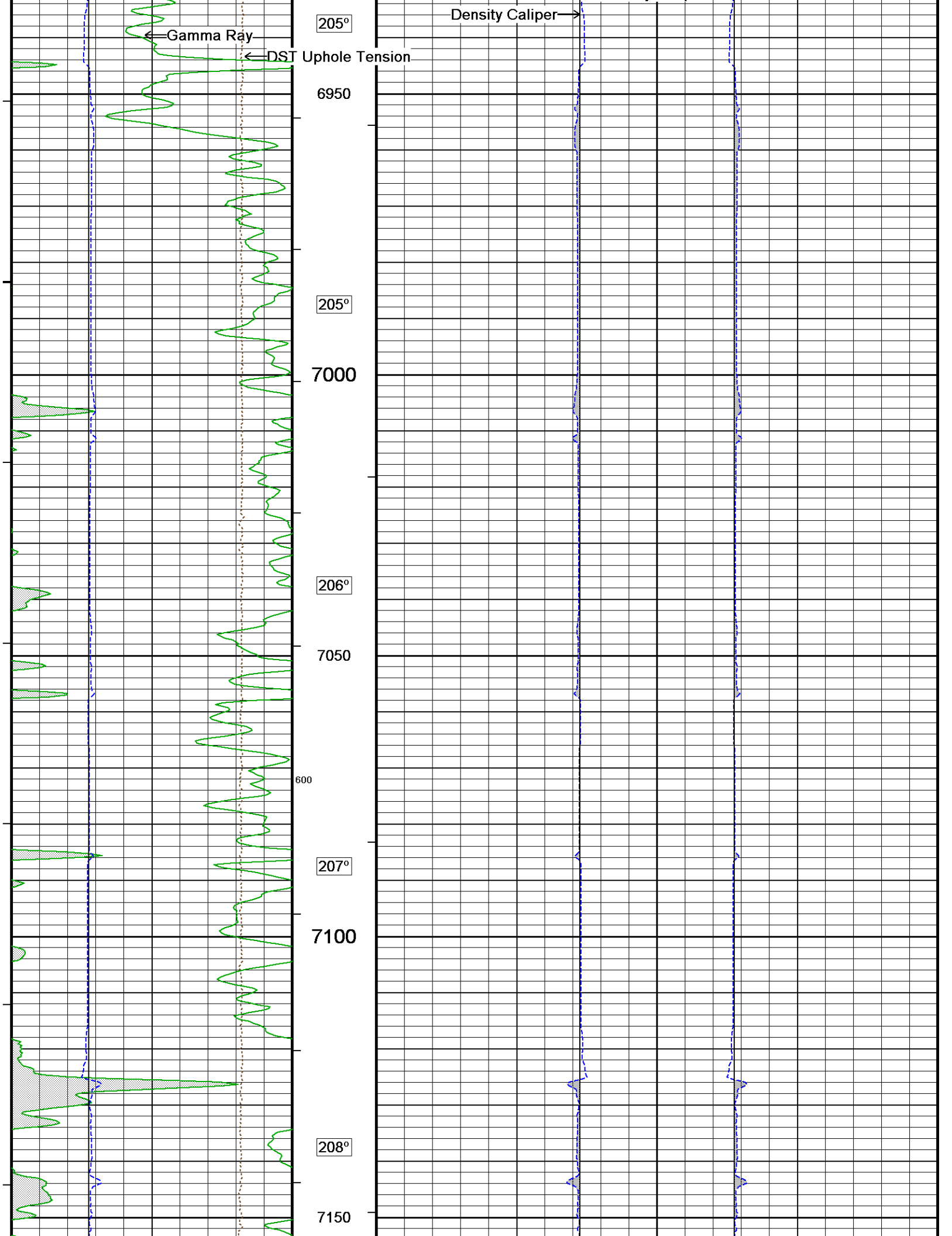


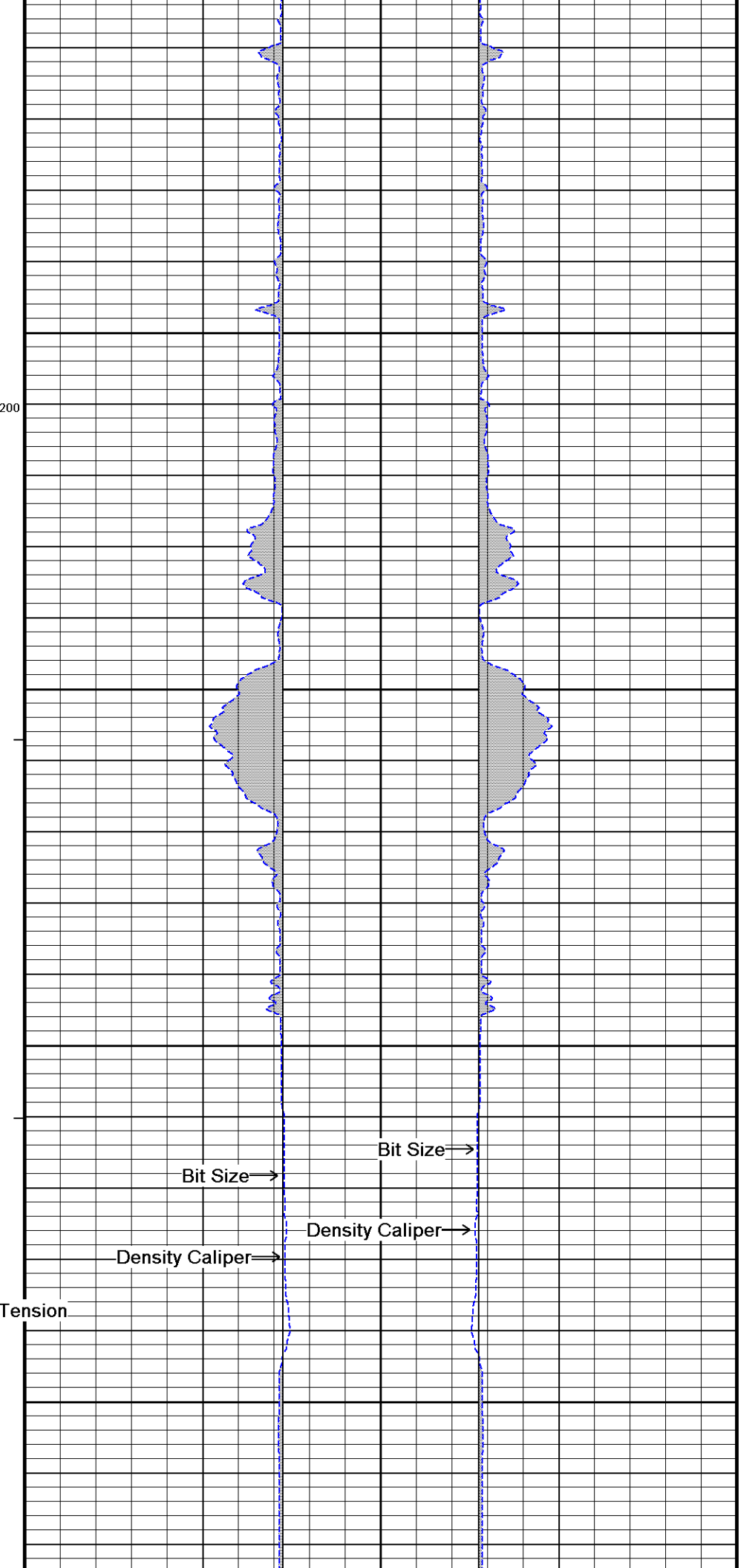
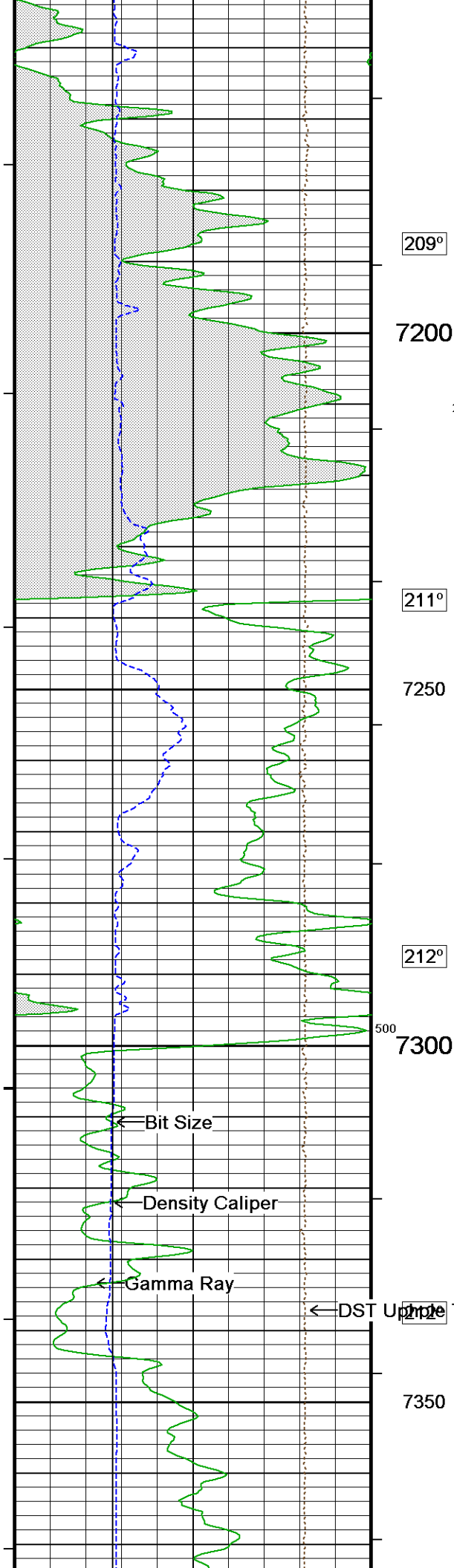
Bit Size  
Density Caliper  
Bit Size  
Density Caliper

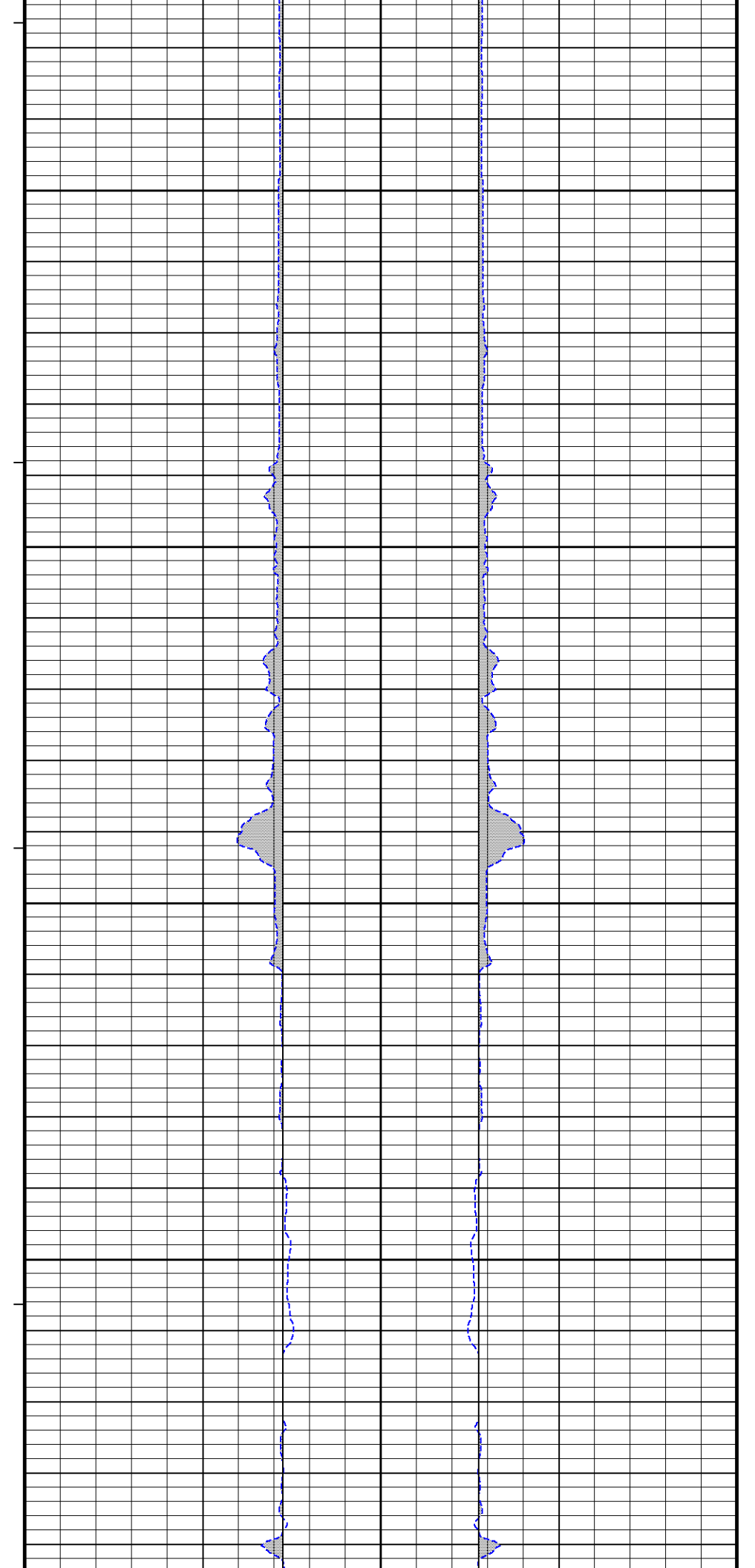
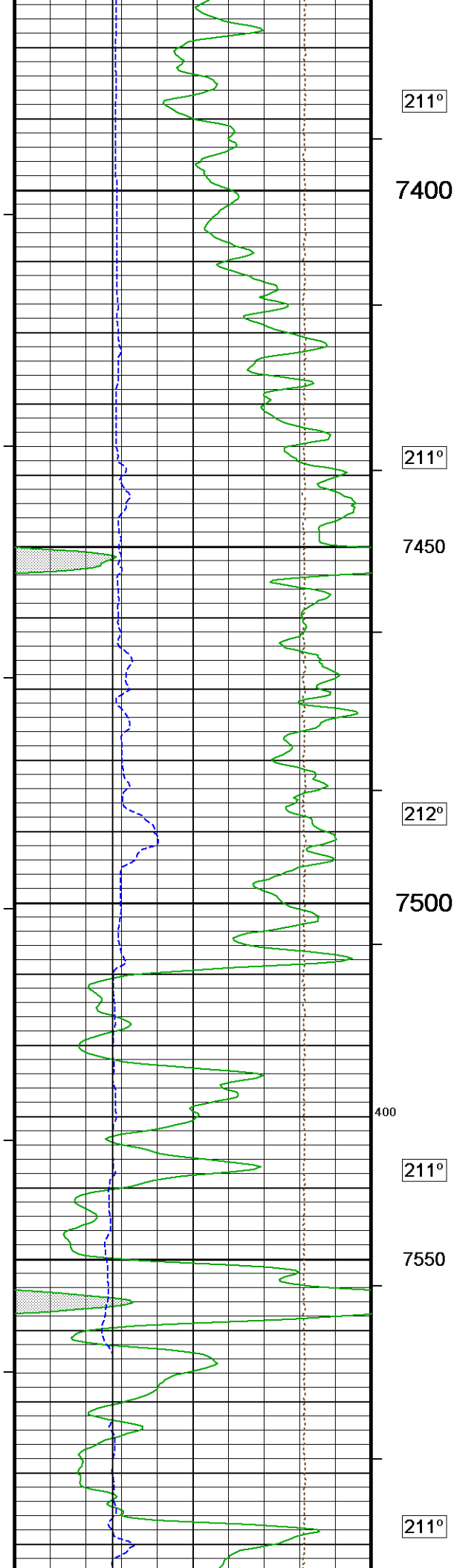




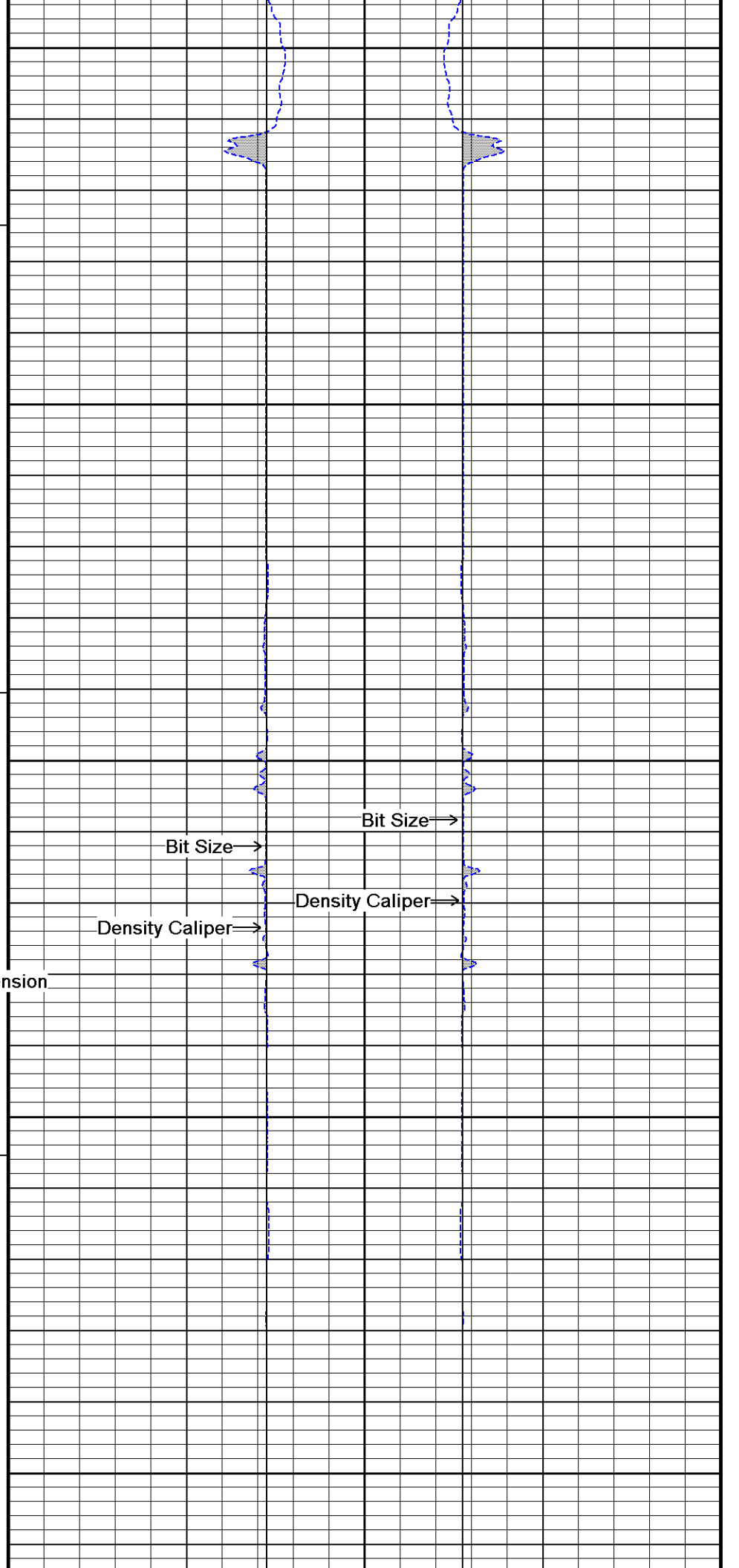
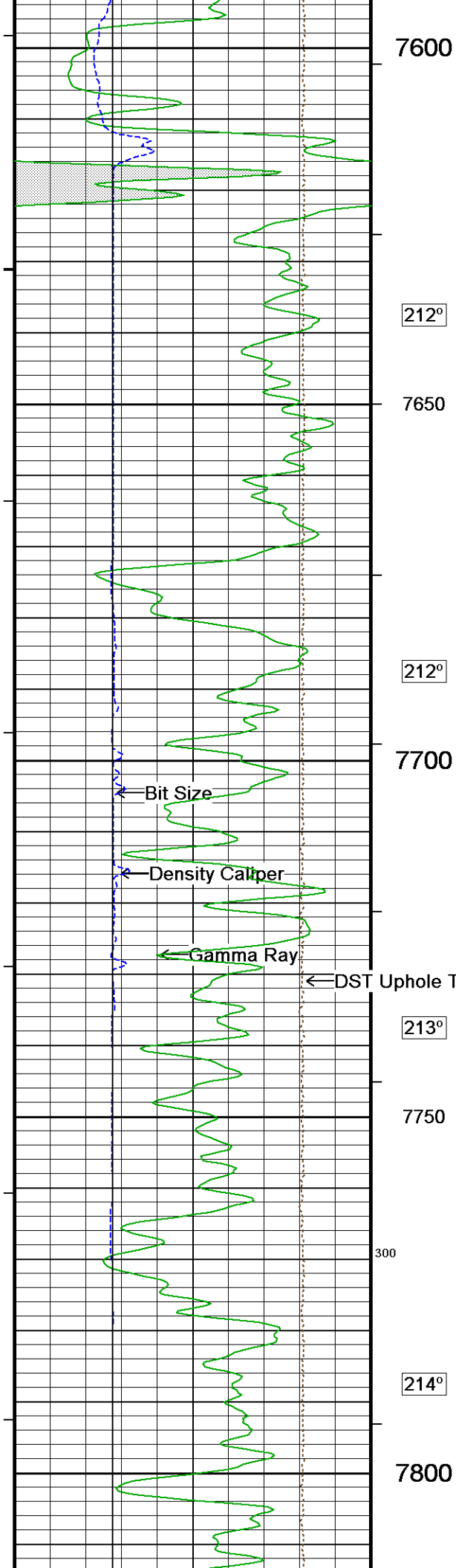


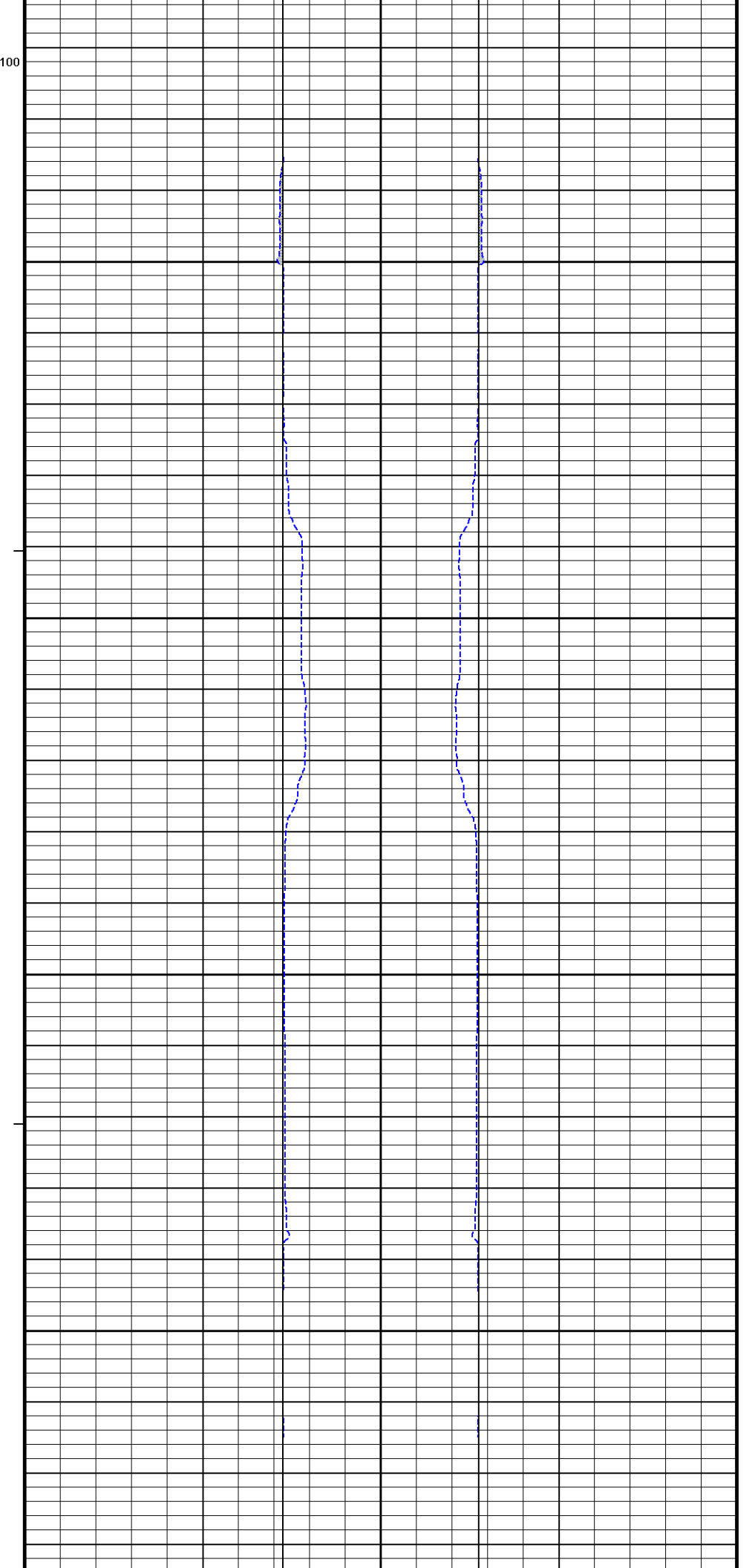
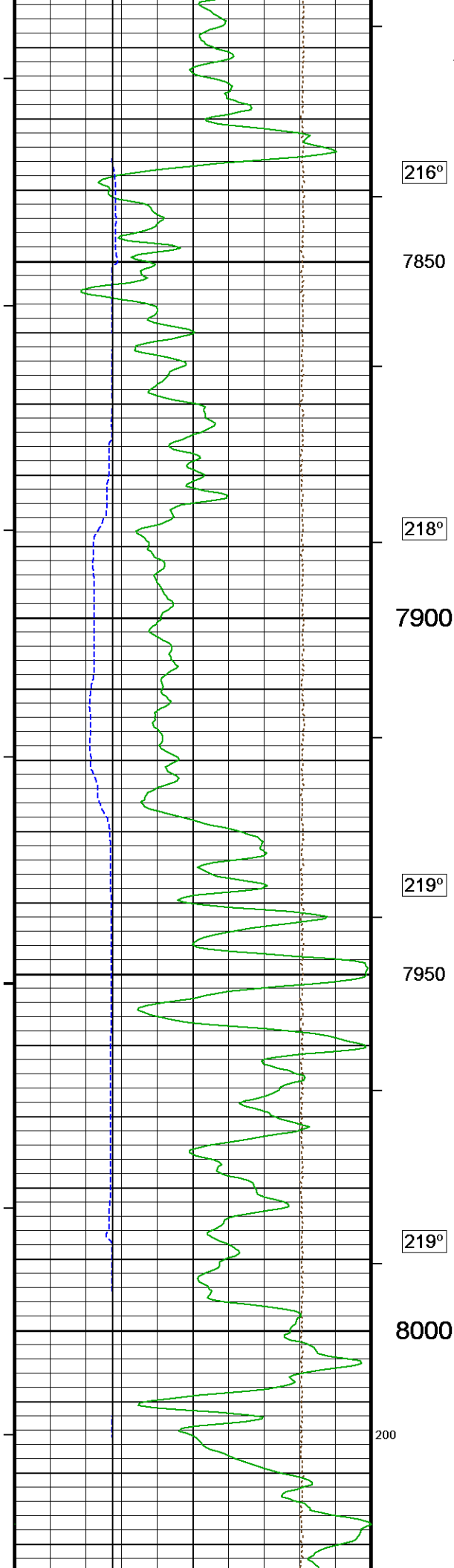


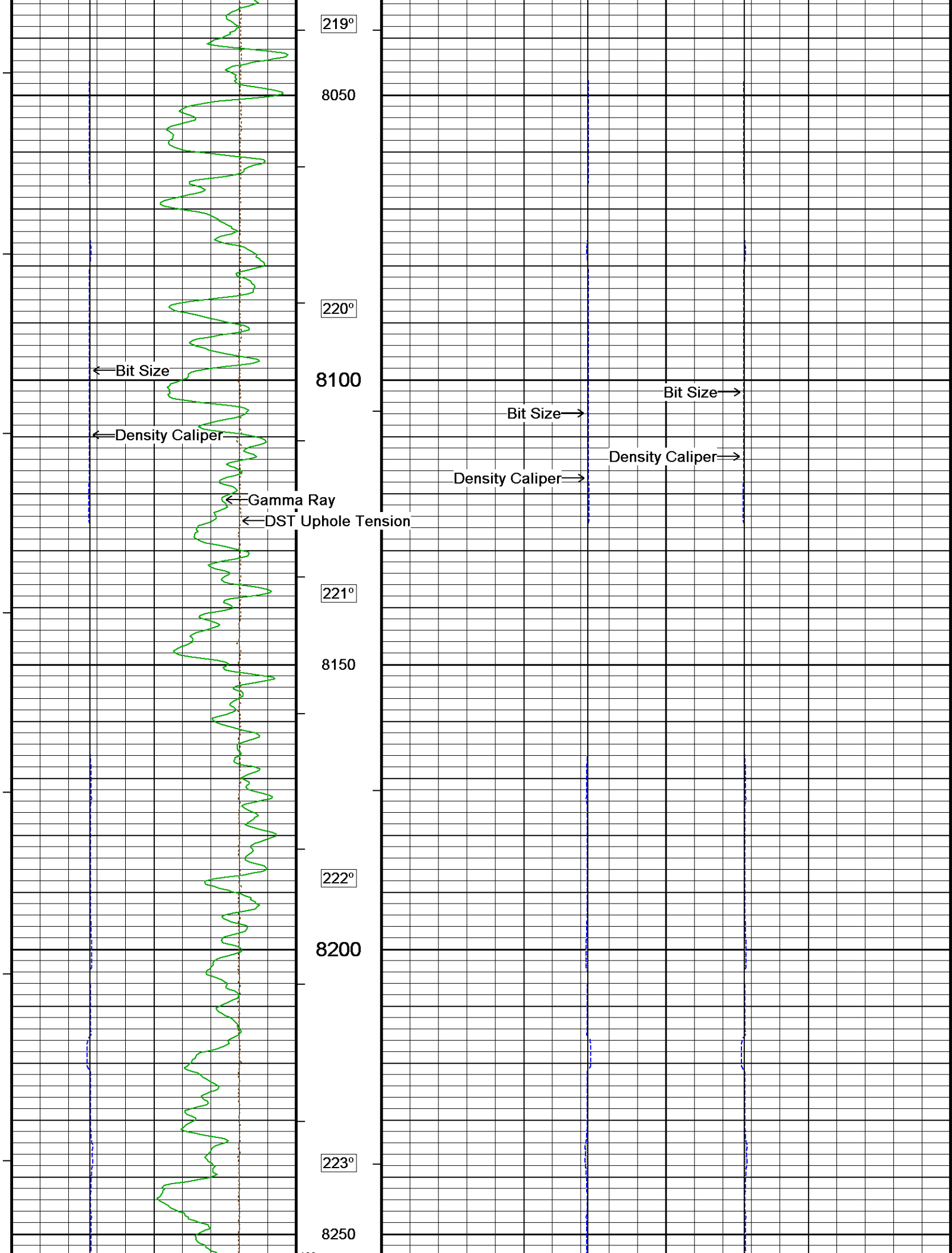


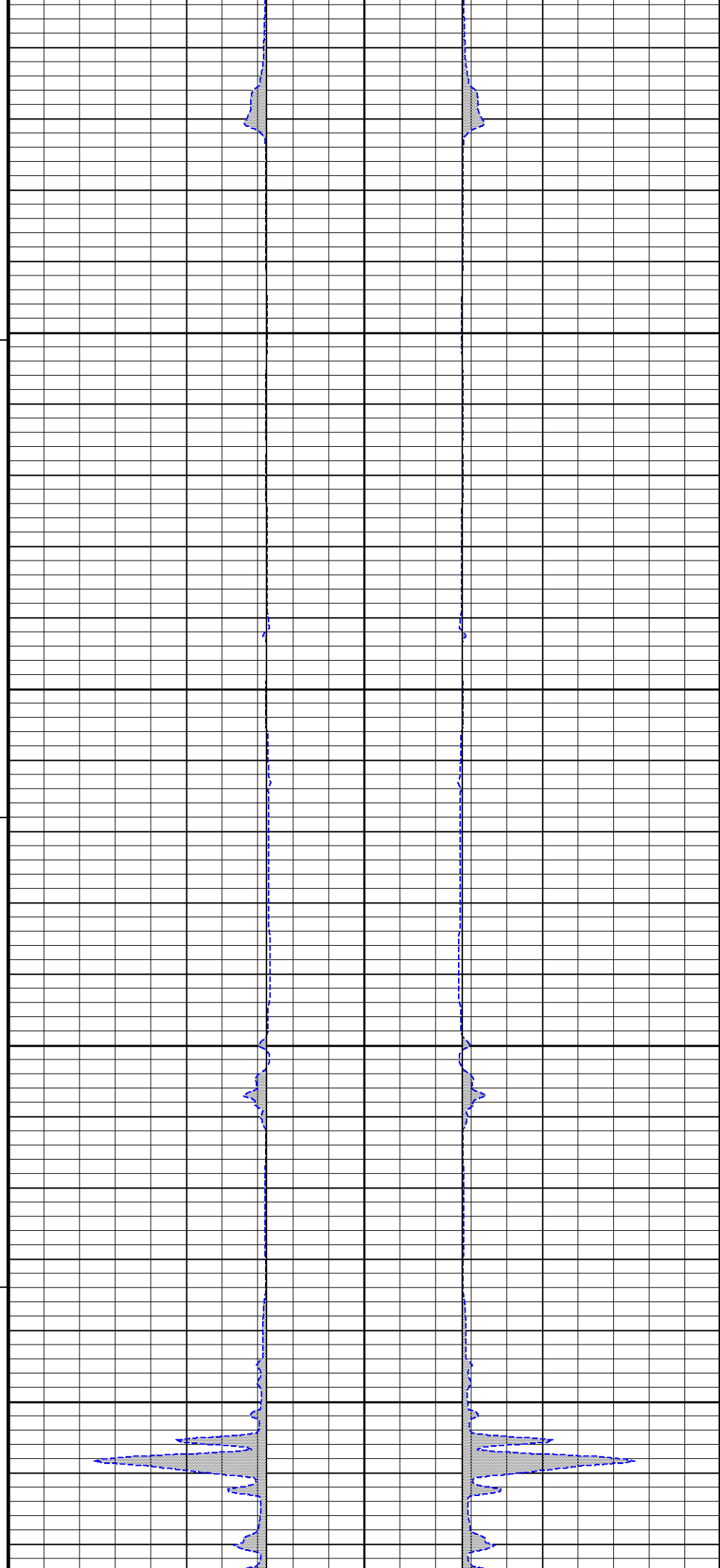
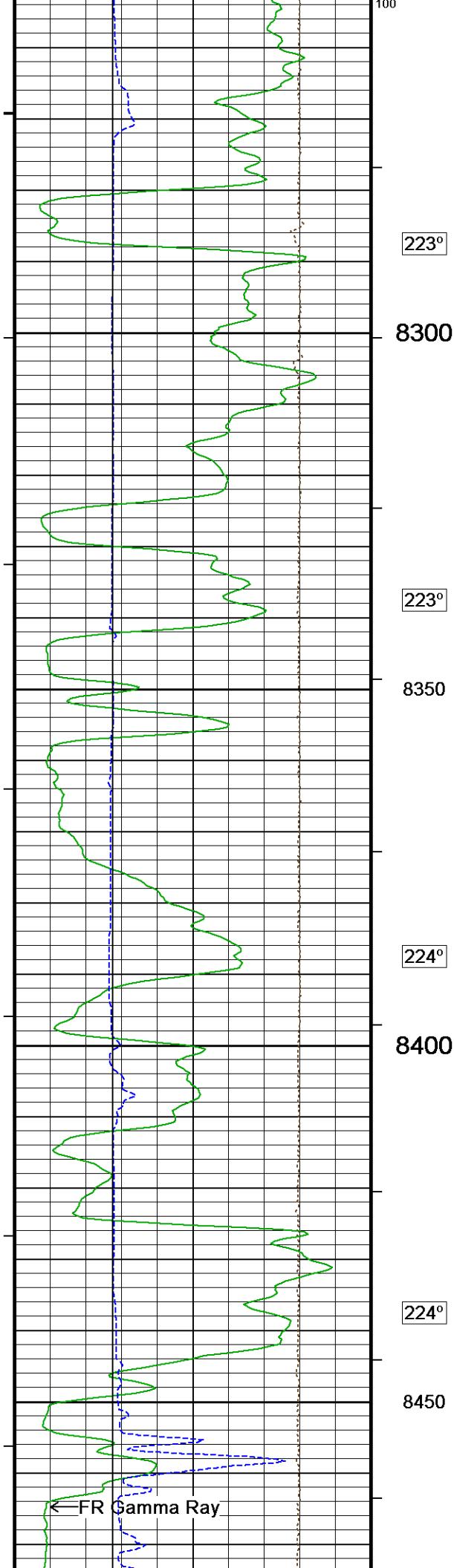


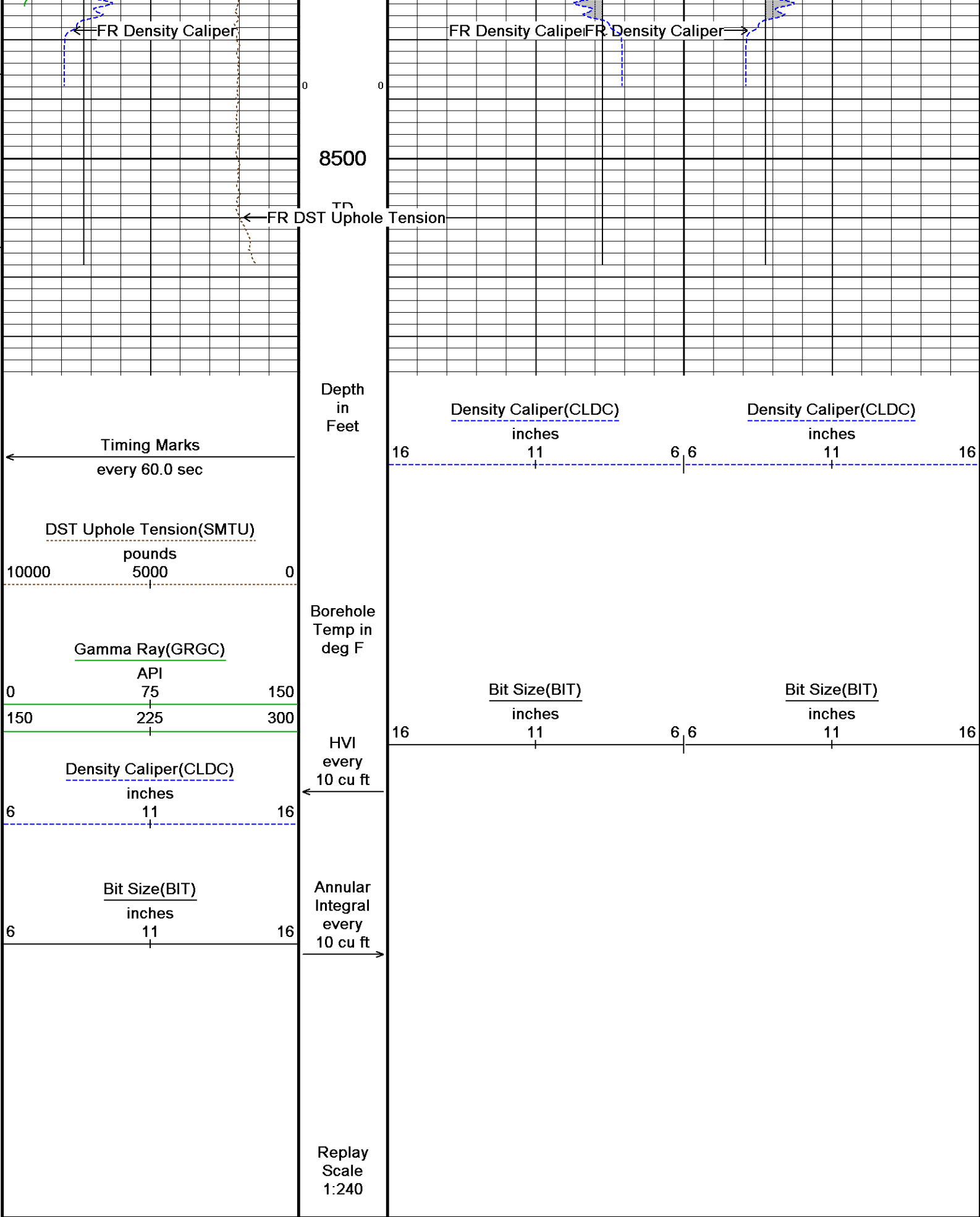


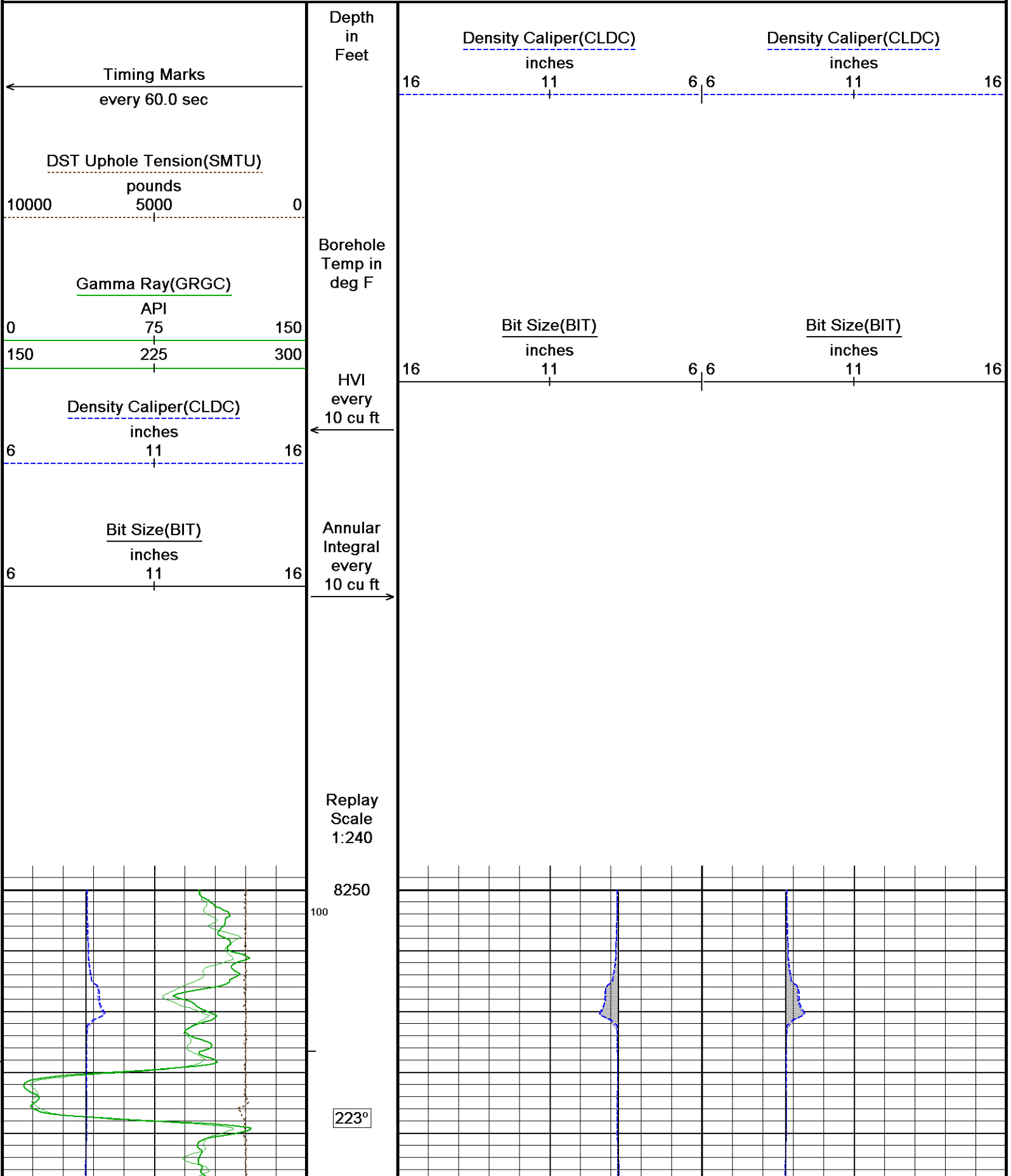


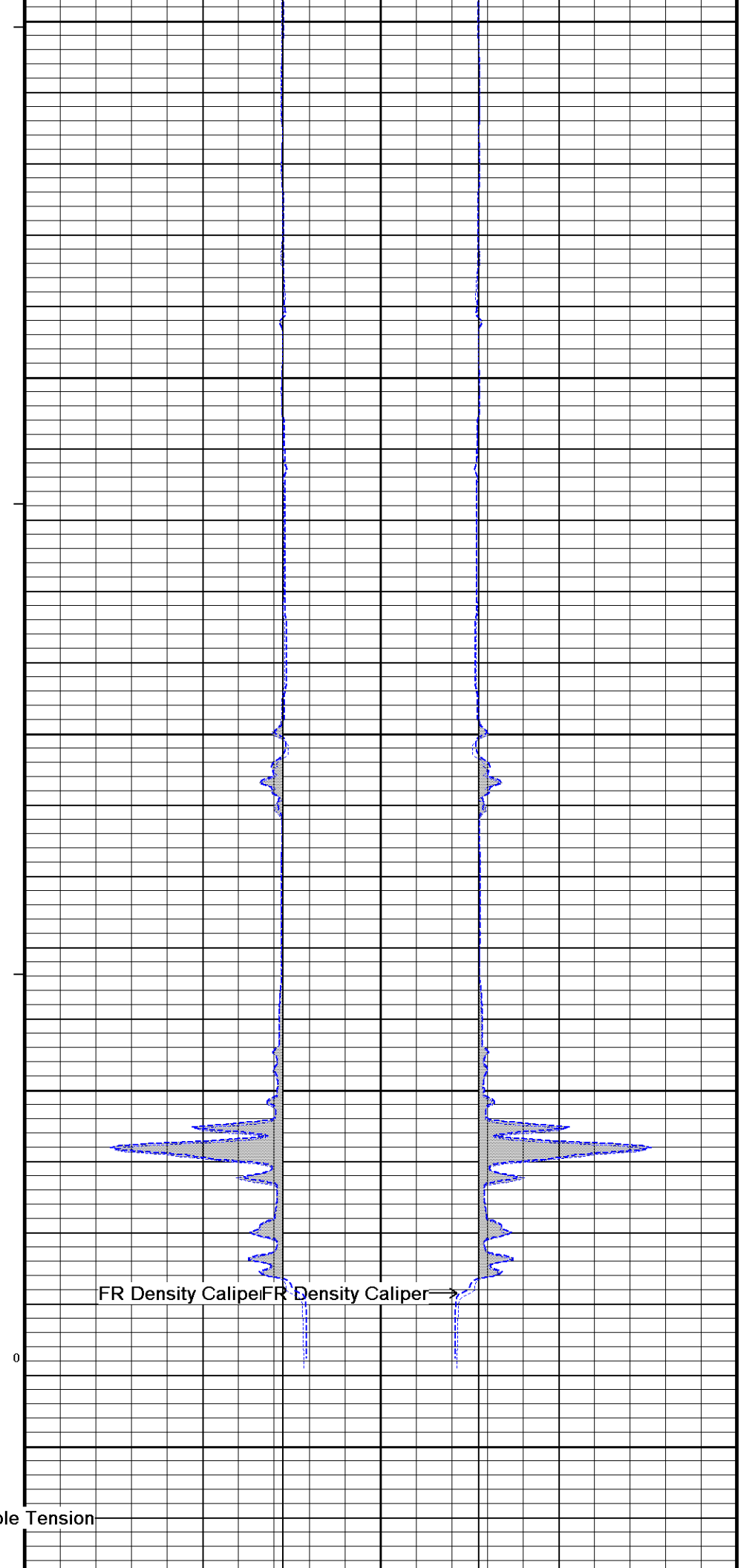
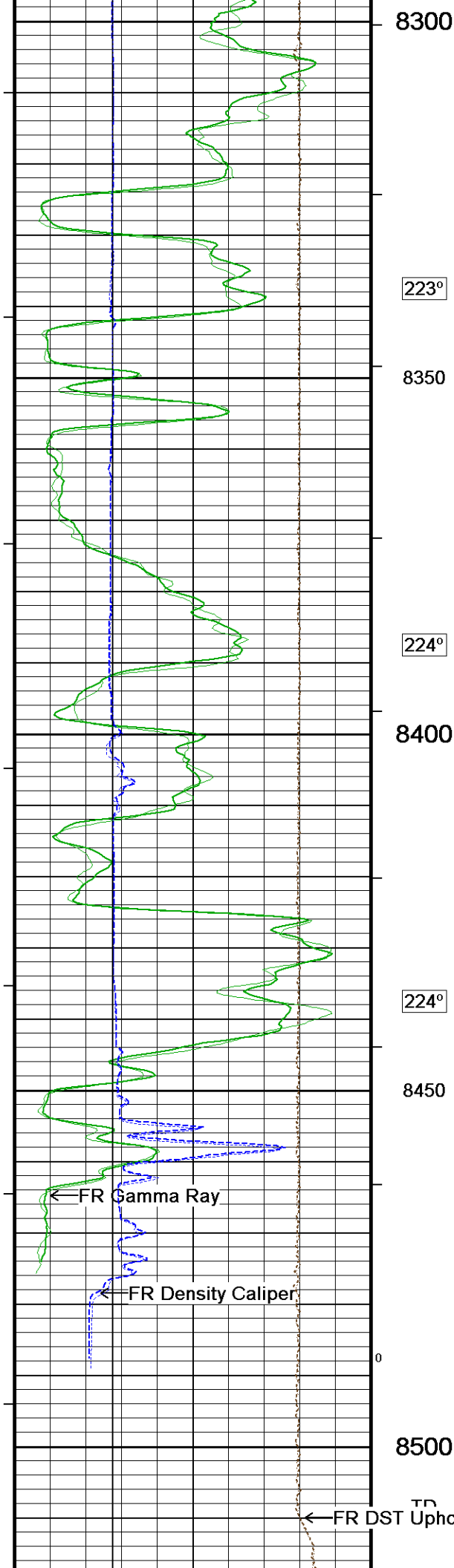


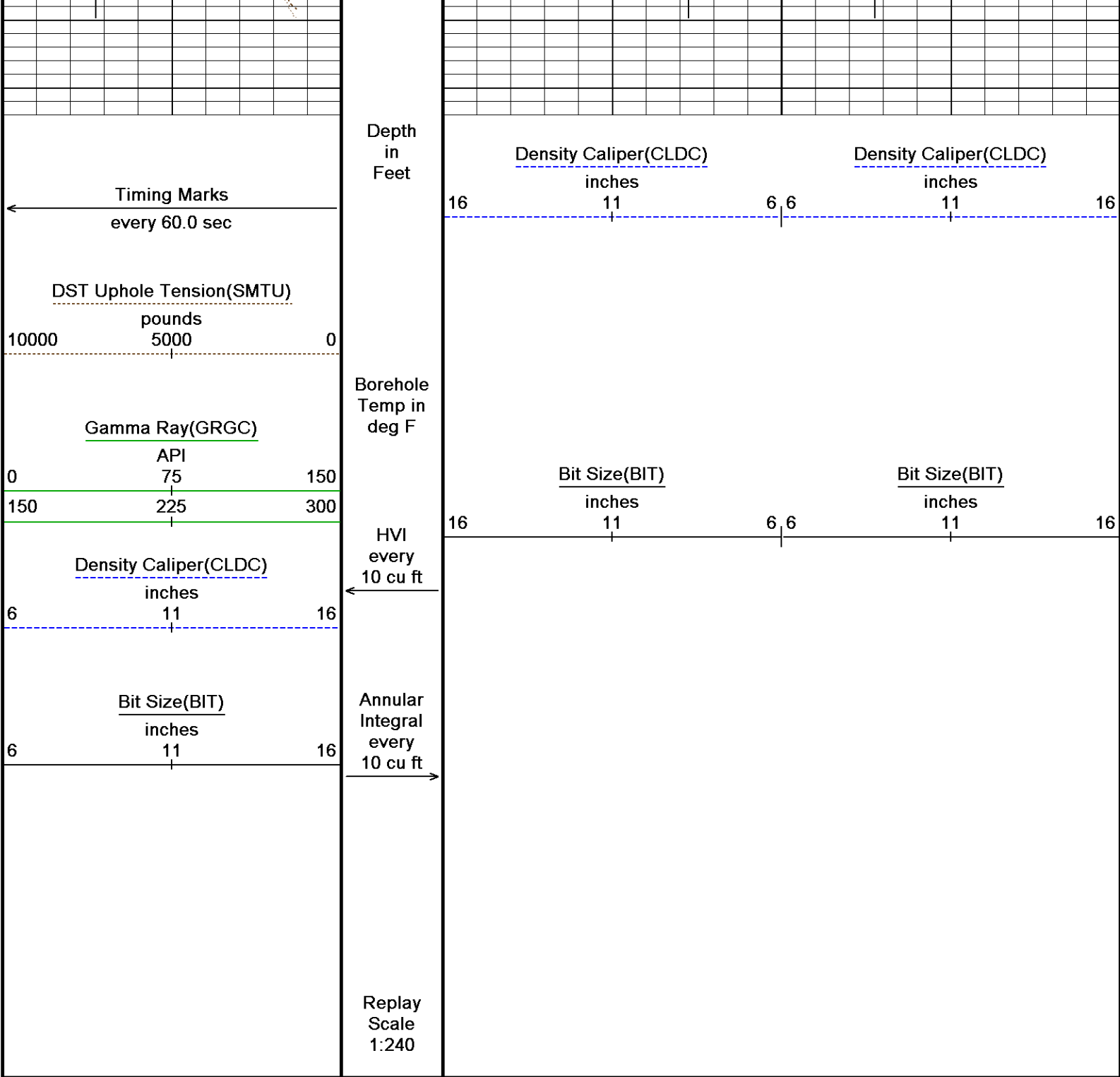












Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 29-JAN-2017 00:27

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

↑

REPEAT SECTION OVERLAY

↑

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

#### High Resolution Temperature Calibration MCG-D.K 483

Field Calibration on 10-SEP-2015,22:02

	Measured	Calibrated(Deg F)
Lower	55.00	55.00
Upper	80.00	80.00

#### High Resolution Temperature Constants MCG-D.K 483

Last Edited on 02-OCT-2012,09:19

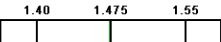
Pre-filter Length 11

#### 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  Counts/API

The scale shows three segments: 1.40 (white), 1.475 (green), and 1.55 (white). The value 1.473 is indicated by a green vertical line within the 1.475 segment.

#### 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	%

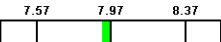
#### Caliper Calibration MPD-D.A 478

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

The scale shows three segments: 7.57 (white), 7.97 (green), and 8.37 (white). The value 7.92 is indicated by a green vertical line within the 7.97 segment.

### DOWNHOLE EQUIPMENT

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

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

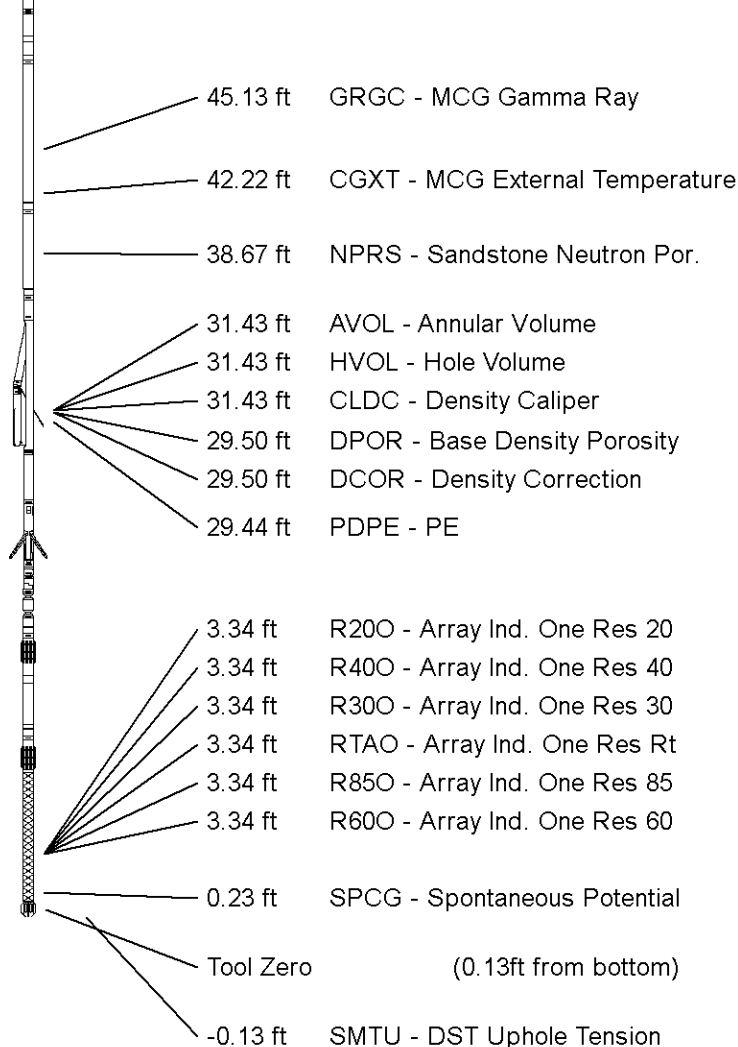
Compact Focussed Electric

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
Elevation Drill Floor	4856	feet
Elevation Ground Level	4843	feet

First Reading	8479.00	feet
Depth Driller	8501.00	feet
Depth Logger	8510.00	feet



HOLE VOLUME

CALIPER

LOG

**Weatherford®**