



Weatherford[®]

CALIPER LOG

COMPANY

SHAKESPEARE OIL CO., INC.

WELL

GOERING #1-5

FIELD

WILDCAT

PROVINCE/COUNTY LANE

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

1580' FNL & 360' FEL

SEC 5

TWP 20S

RGE 30W

Other Services

Latitude

Longitude

API Number

15-101-22596

Permanent Datum GL, Elevation 2940 feet

Log Measured From KB, 11.00 feet above Permanent Datum

Drilling Measured From KB

Date

21-JUL-2017

Run Number

ONE

Service Order

4558-187851123

Depth Driller

4800.00 feet

Depth Logger

4802.00 feet

First Reading

4770.00 feet

Last Reading

266.00 feet

Casing Driller

265.00 feet

Casing Logger

266.00 feet

Bit Size

7.875 inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.10 lb/USg 49.00 CP

PH / Fluid Loss

10.50 7.20 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

0.96 @ 75.0 ohm-m

Rmf @ Measured Temp

0.77 @ 75.0 ohm-m

Rmc @ Measured Temp

1.15 @ 75.0 ohm-m

Source Rmf / Rmc

CALC CALC

Rm @ BHT

0.57 @126.0 ohm-m

Time Since Circulation

5 HOURS

Max Recorded Temp

126.00 deg F

Equipment / Base

13096 LIB

Recorded By

ADAM SILL

Witnessed By

TIM PRIEST

Elevations:
KB 2951.00 feet
DF 2949.00
GL 2940.00

BOREHOLE RECORD

Last Edited: 21-JUL-2017 20:12

Bit Size inches	Depth From feet	Depth To feet
7.875	265.00	4800.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	265.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 17.01.7206.
- RUN ONE: MCG, MML, MDN, MPD, 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: 1722 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 222 CU.FT.

- RIG: DUKE #5.

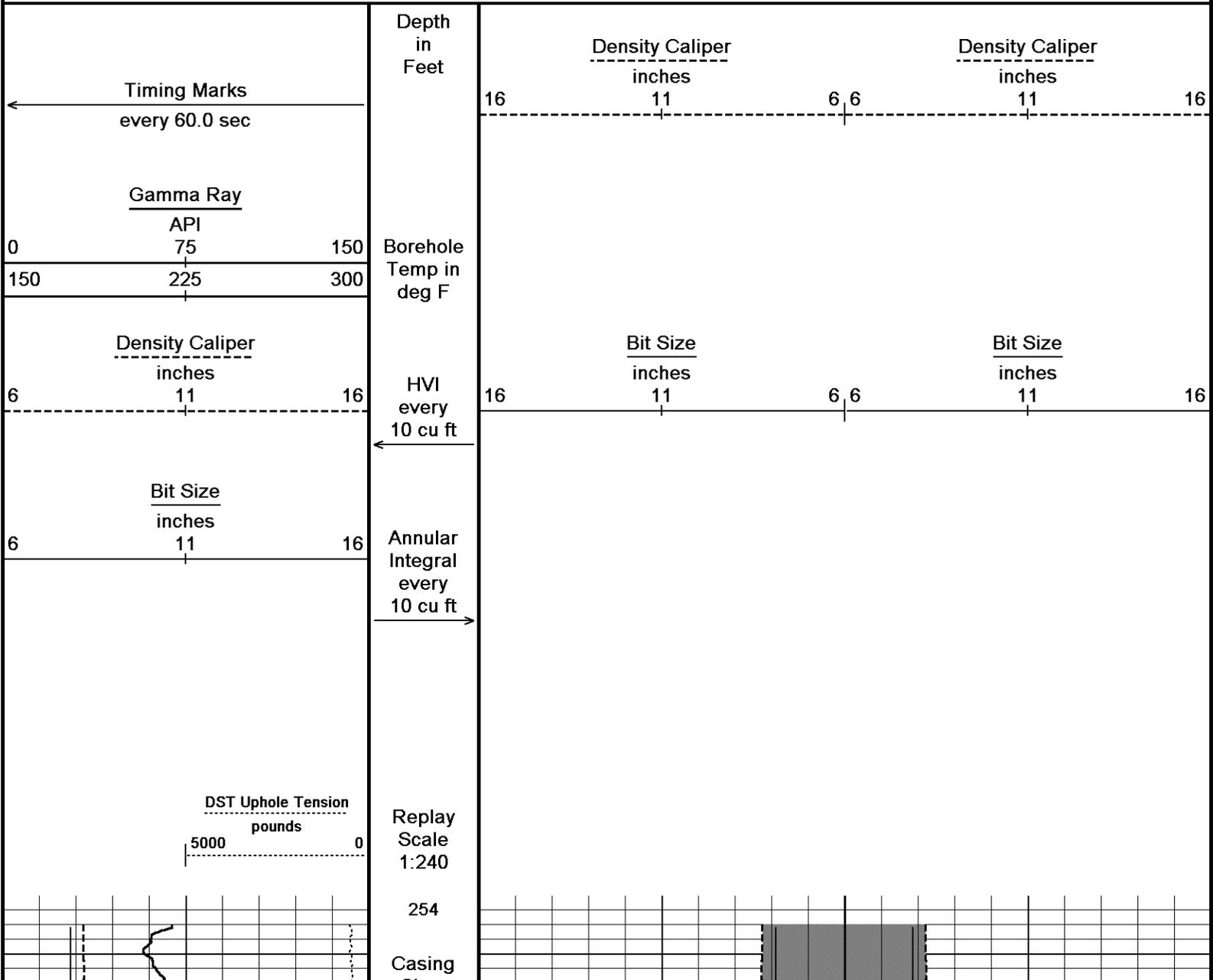
- ENGINEER: A. SILL.

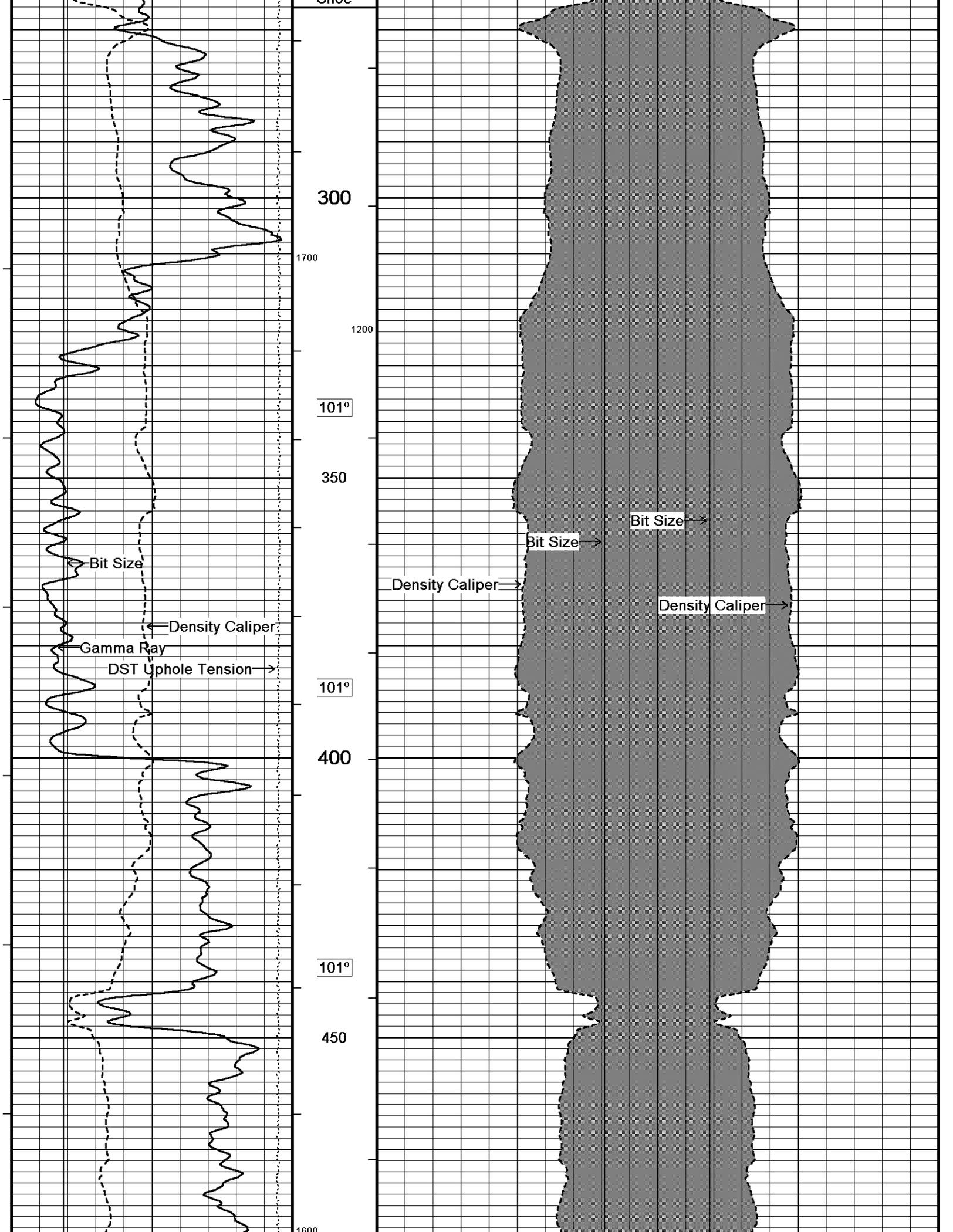
- OPERATOR: B. TOVAR.

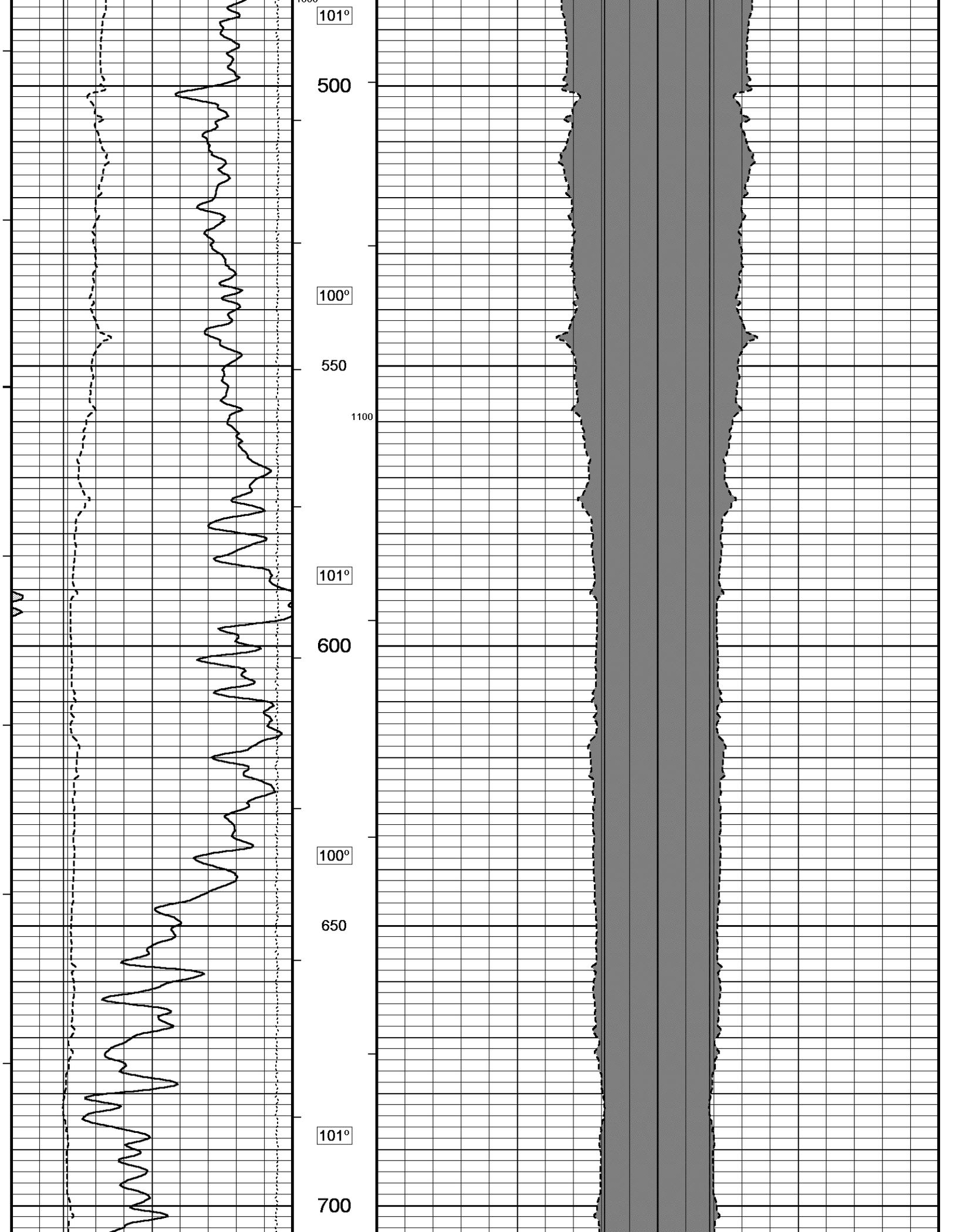
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

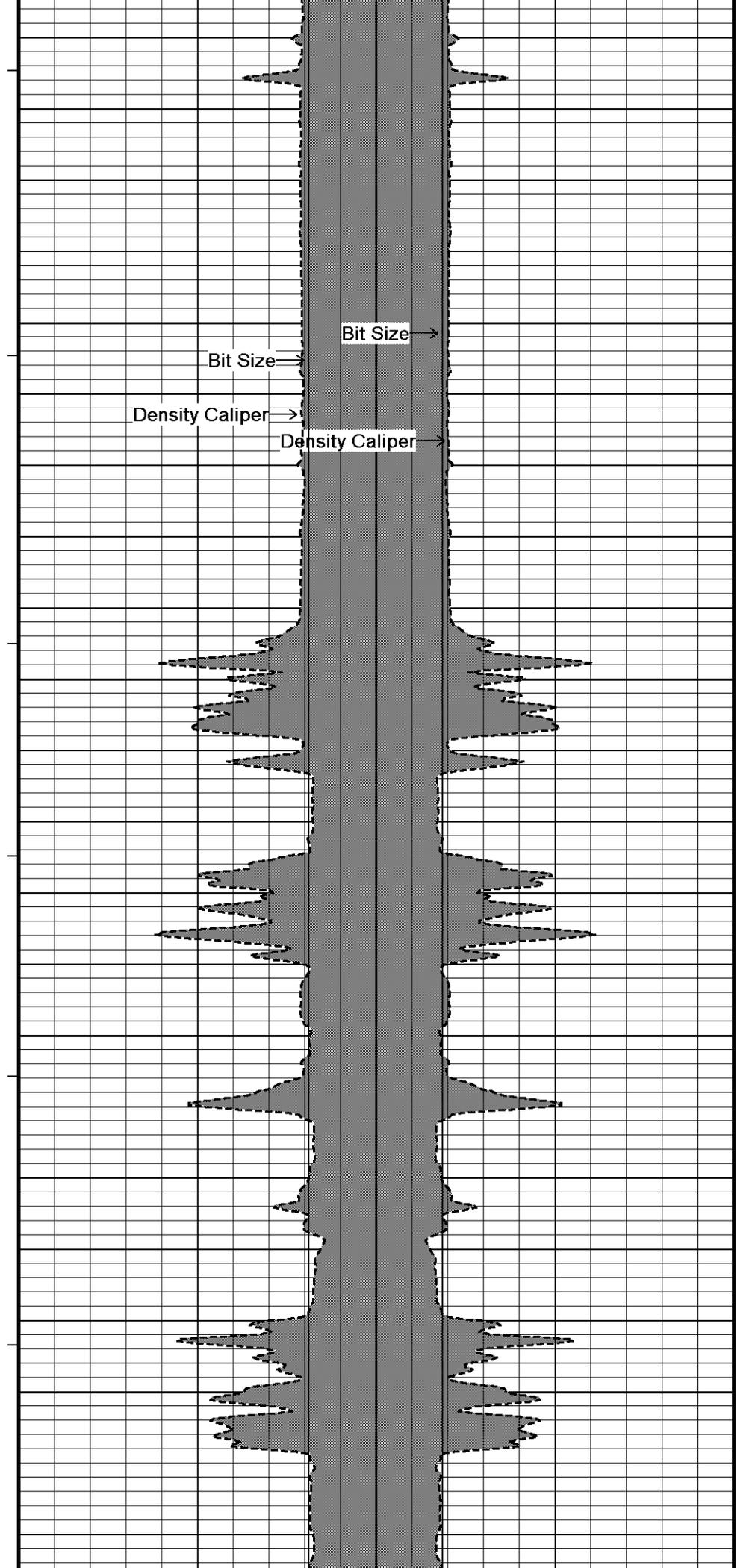
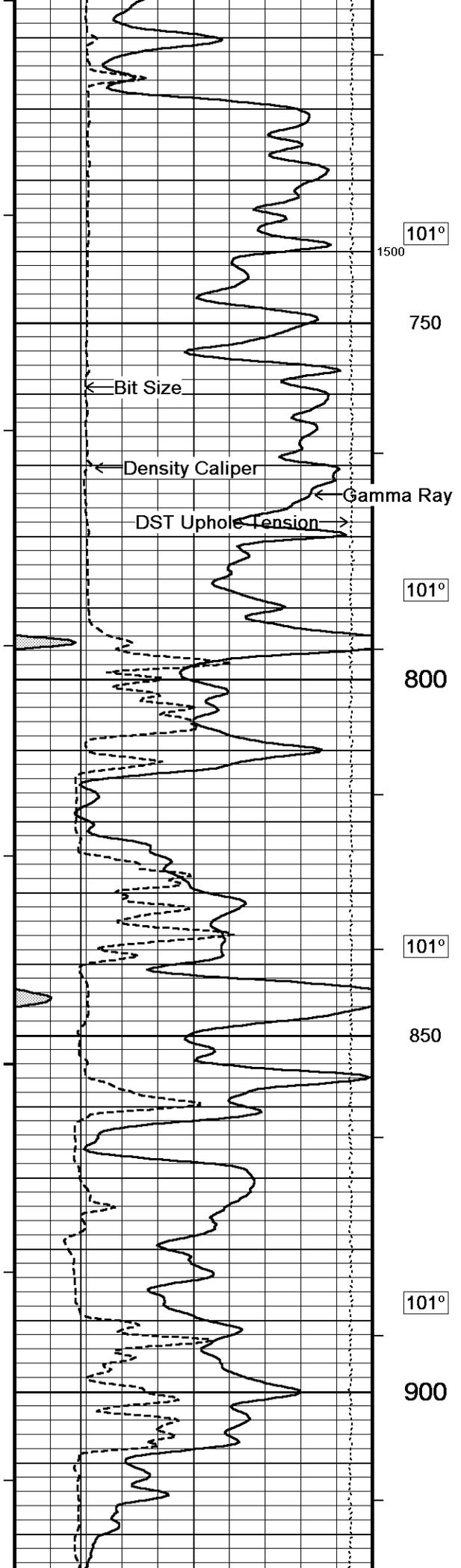
5 INCH MAIN

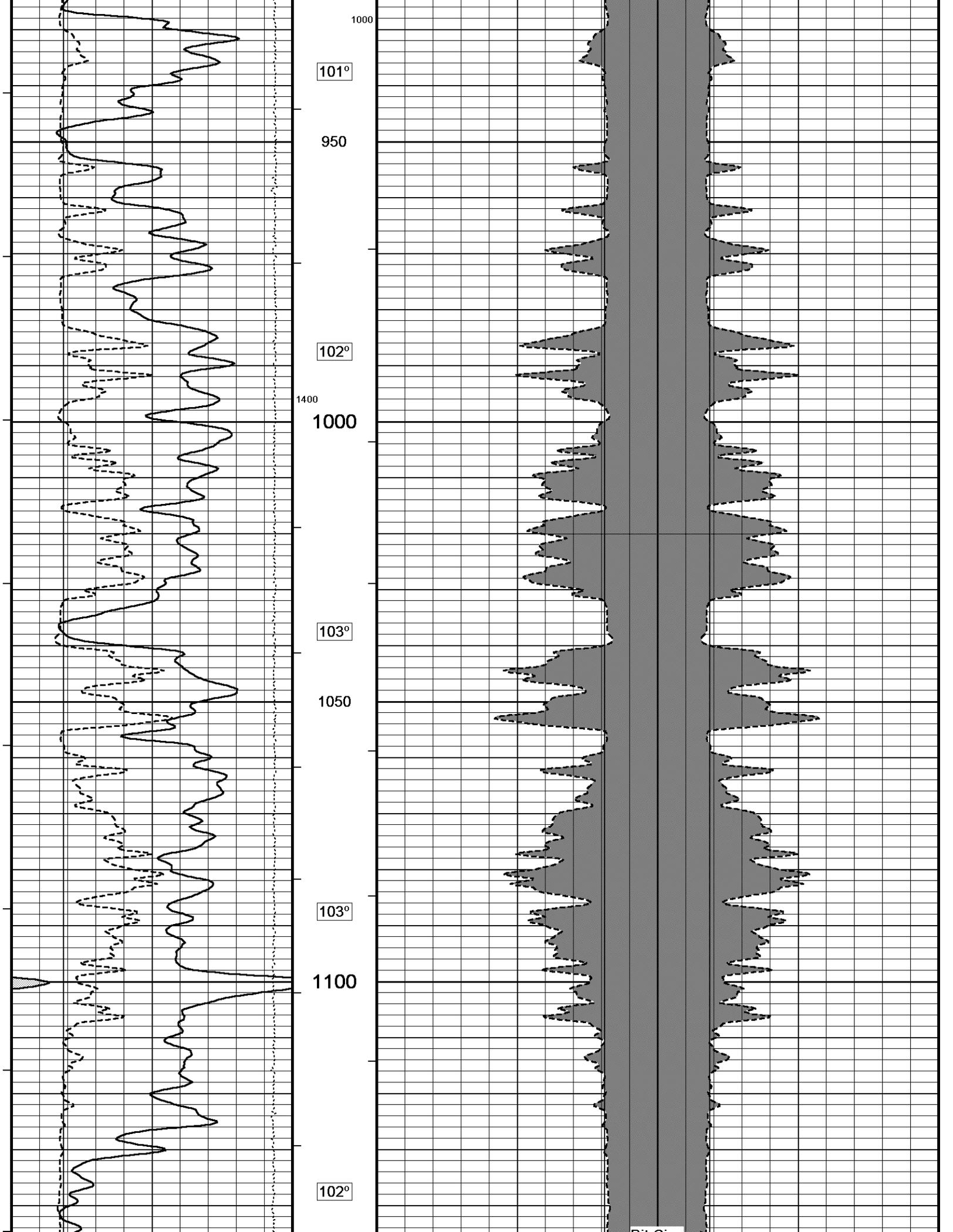
Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 22-JUL-2017 02:28
 Filename: C:\Minimus 17.01.7206\Data\Shakespeare Goering #1-5\Shakespeare Goering #1-5_002.dta Recorded on 21-JUL-2017 23:39
 System Versions: Logged with 17.01.7206 Plotted with 17.01.7206

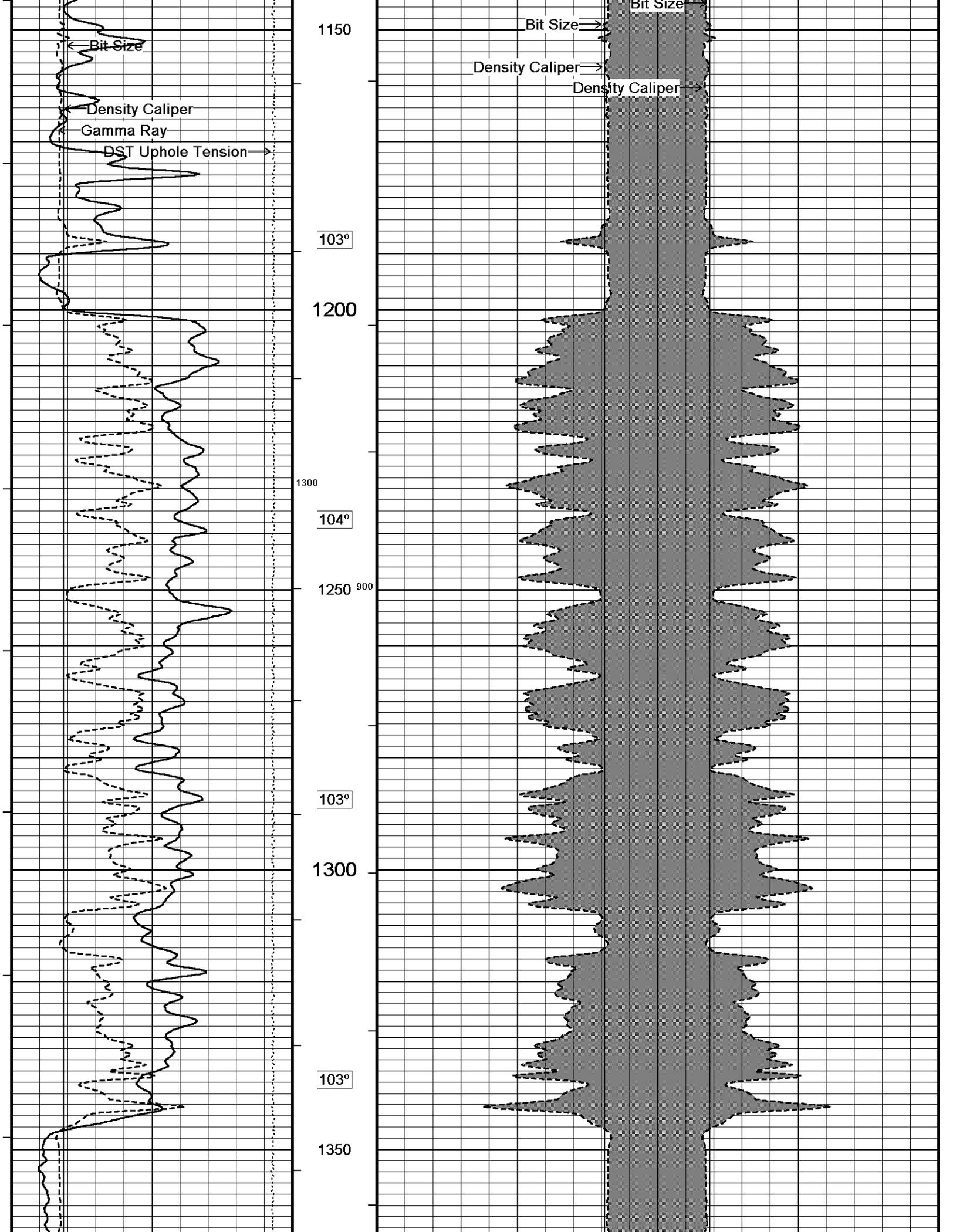


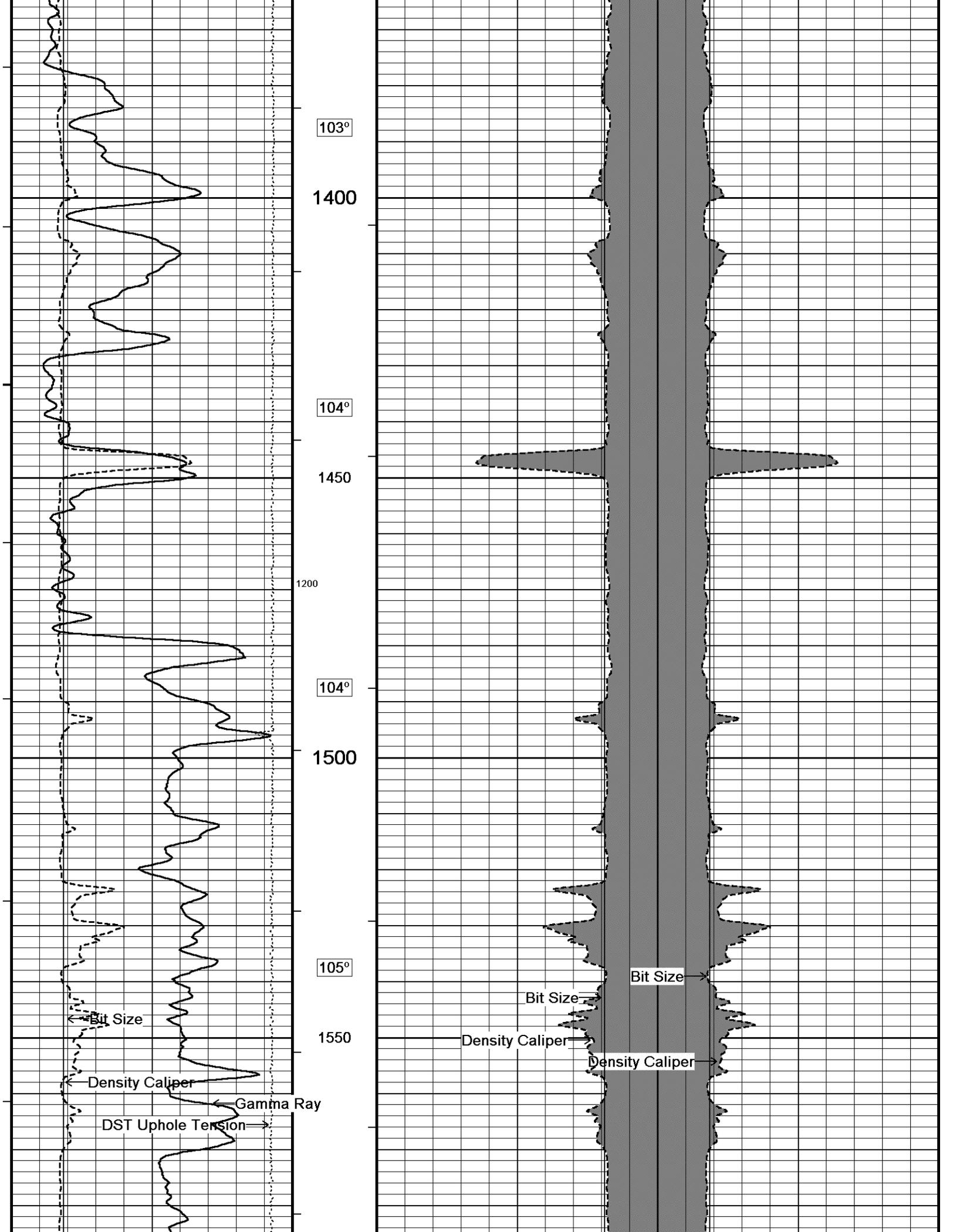


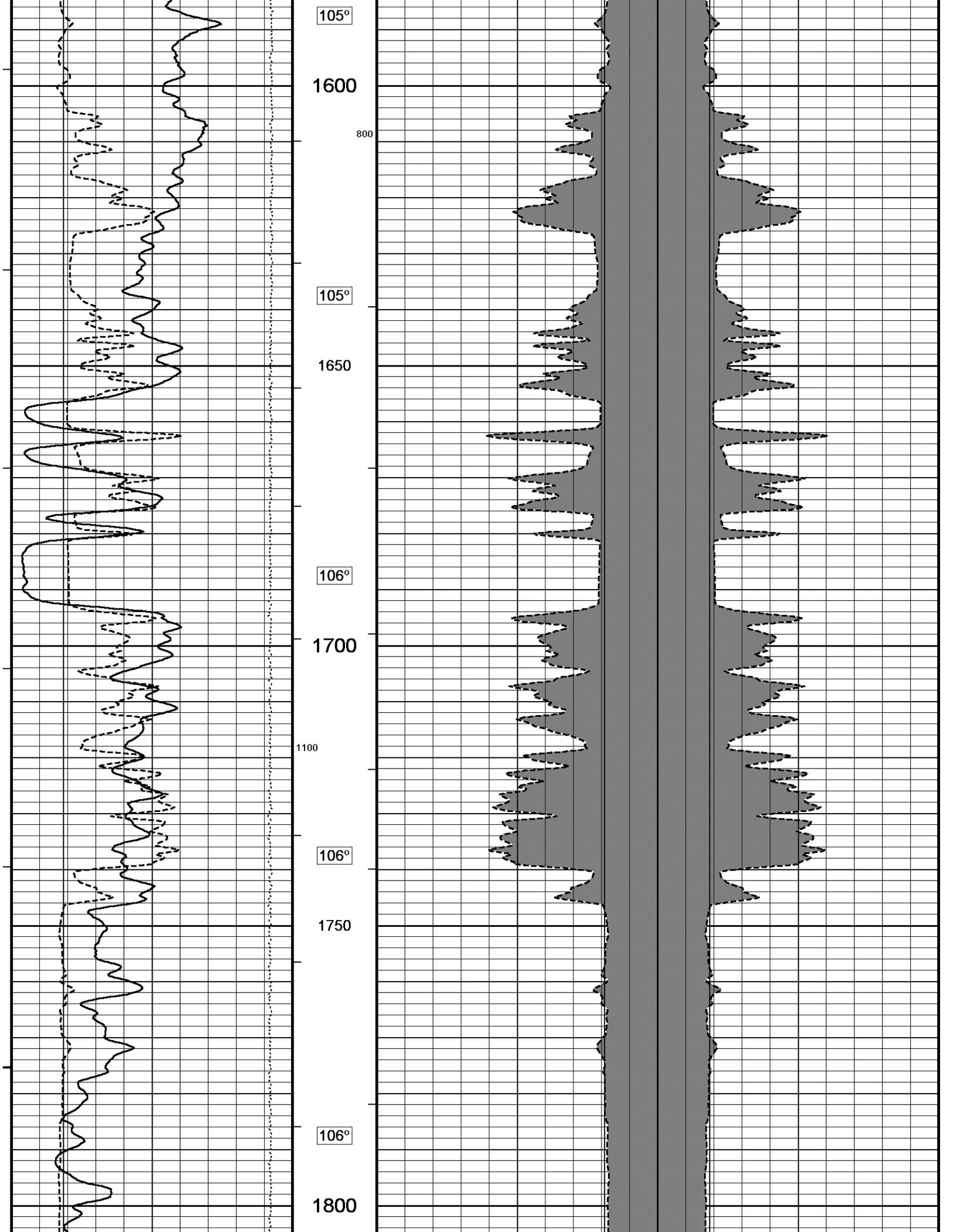


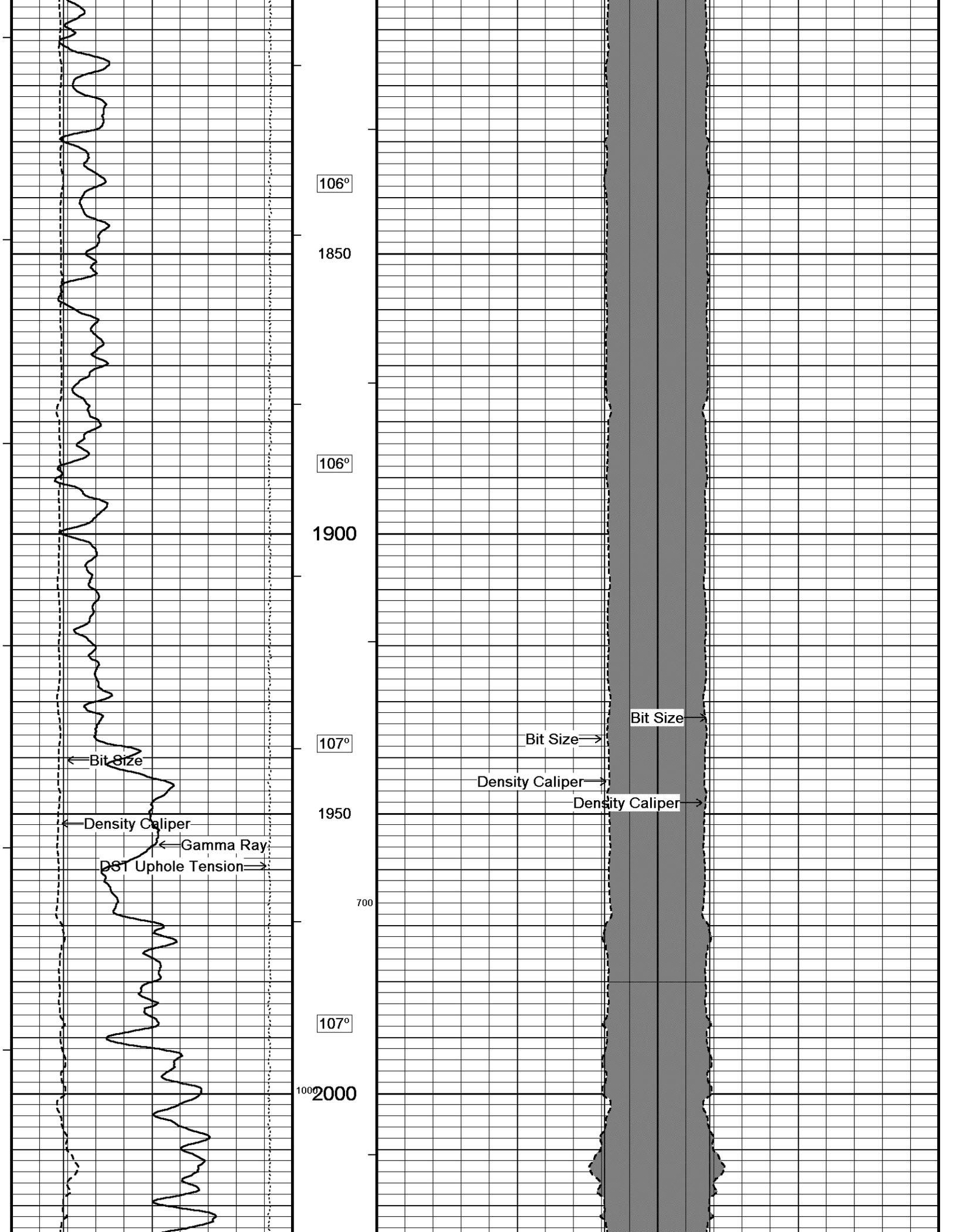


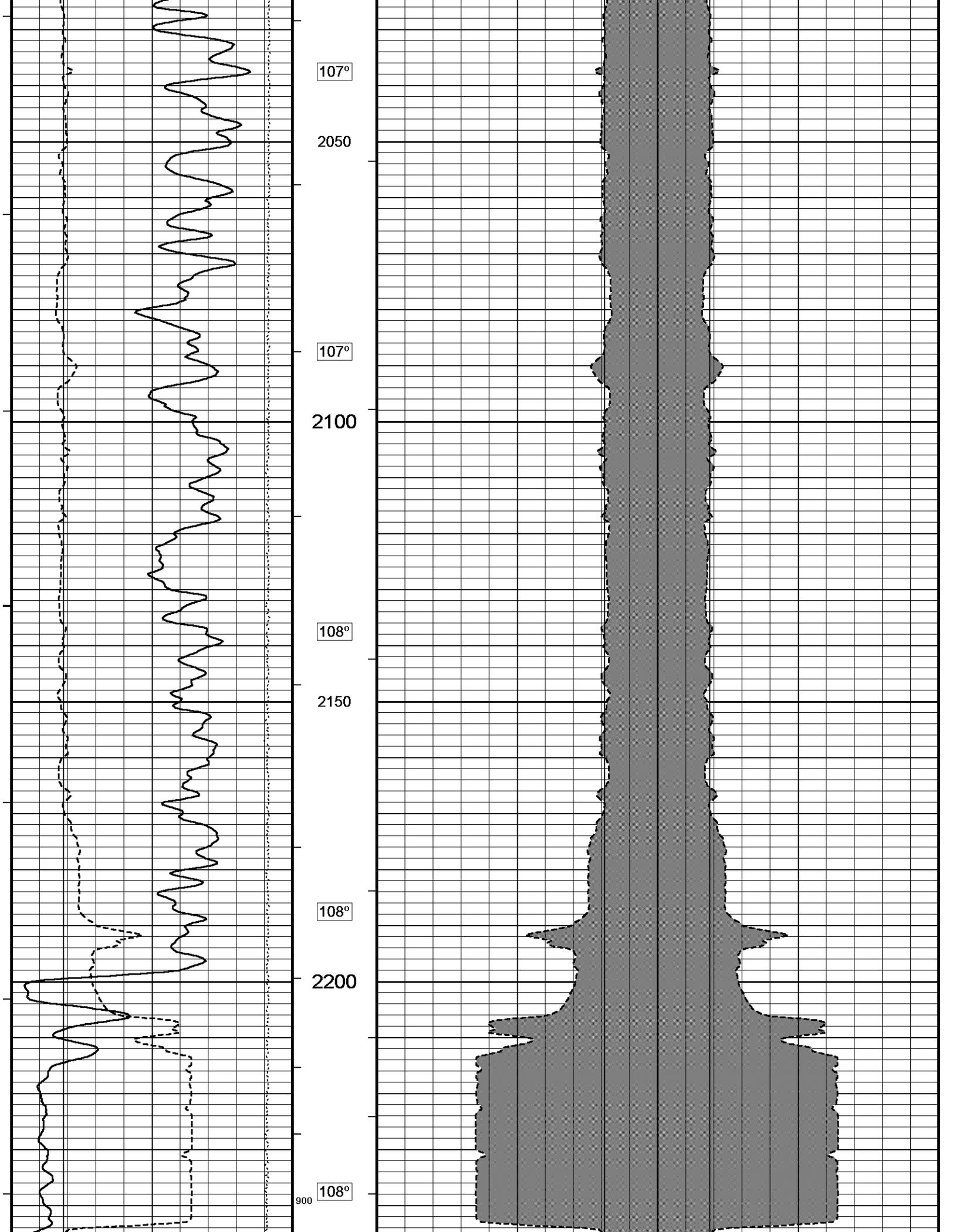


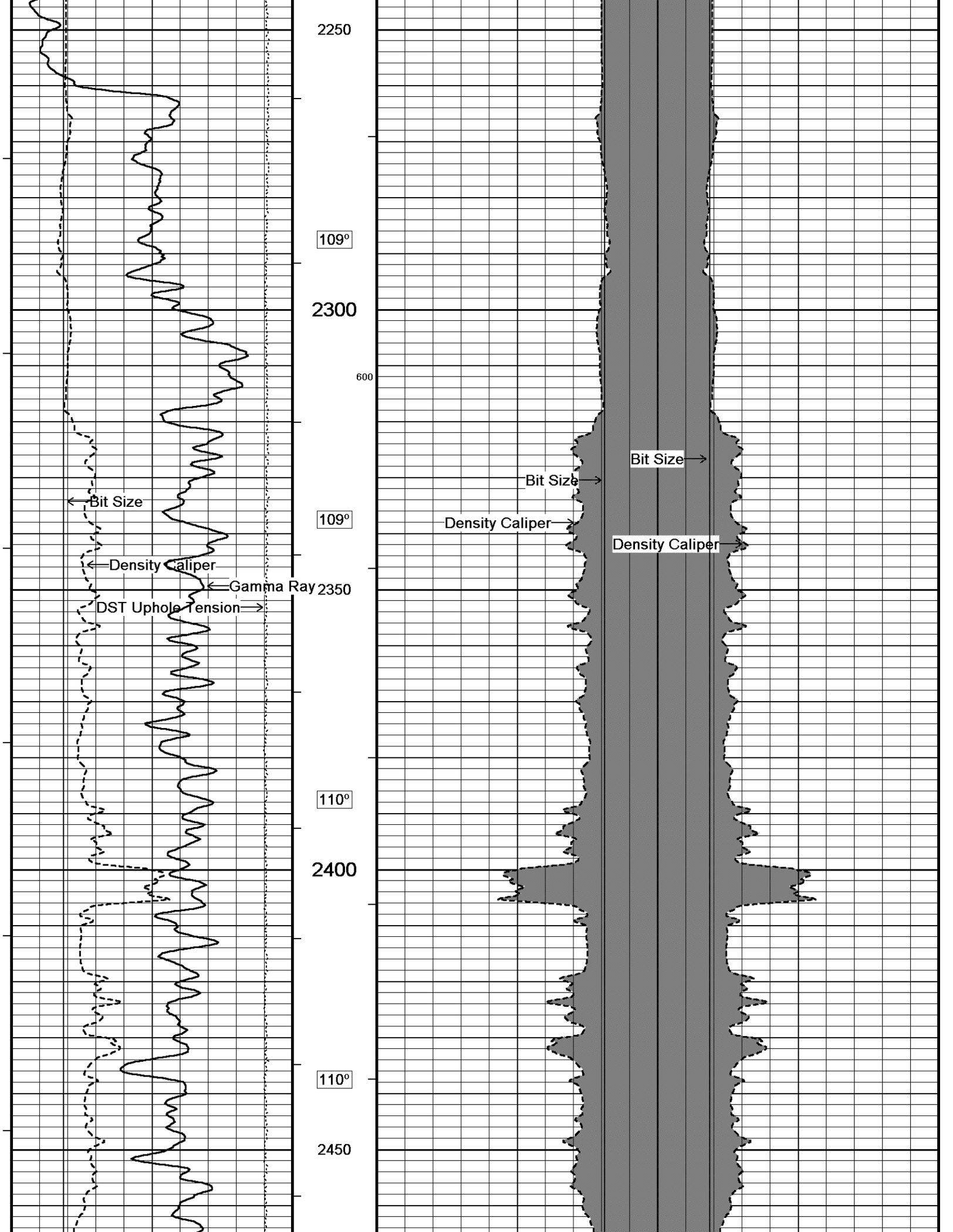


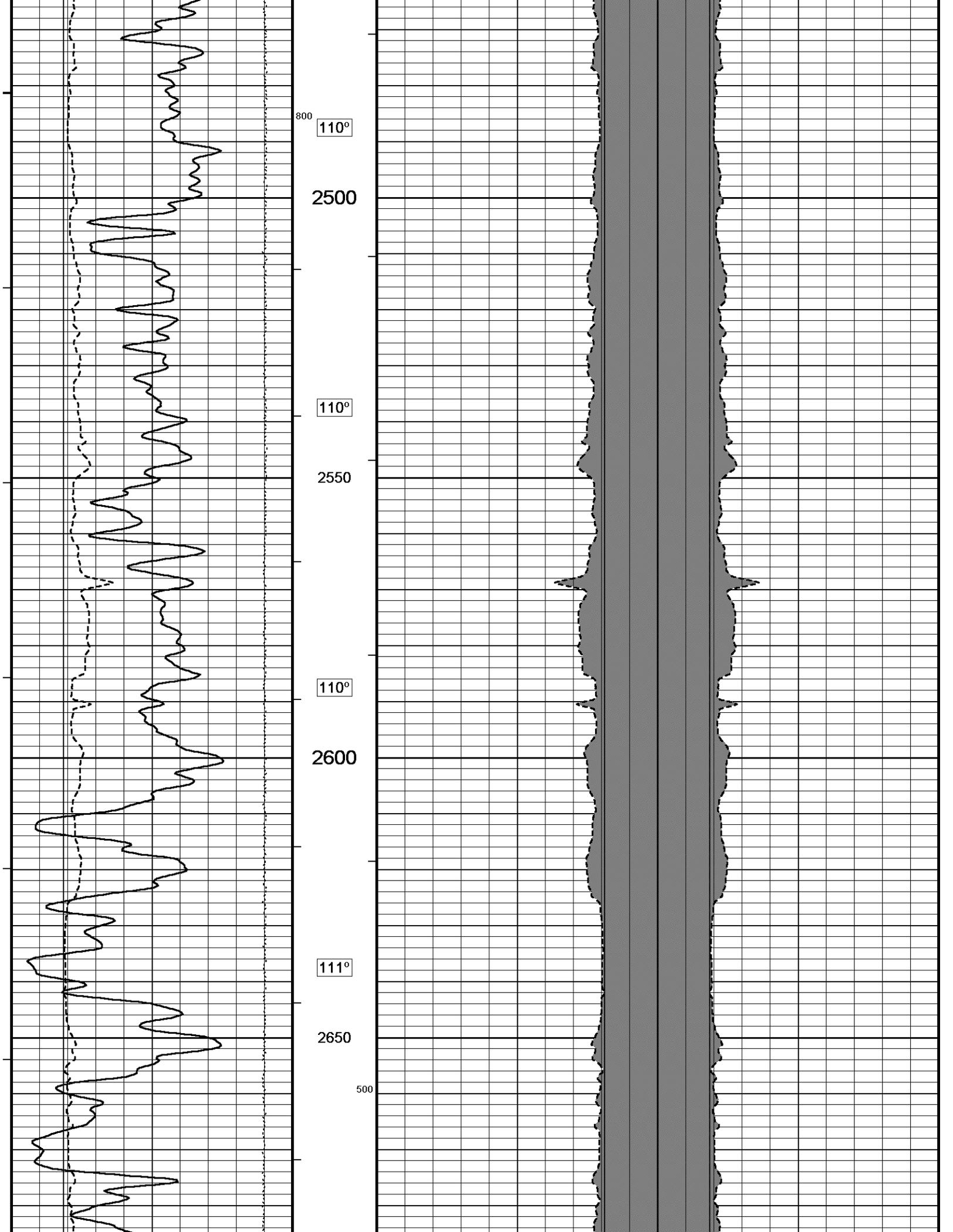


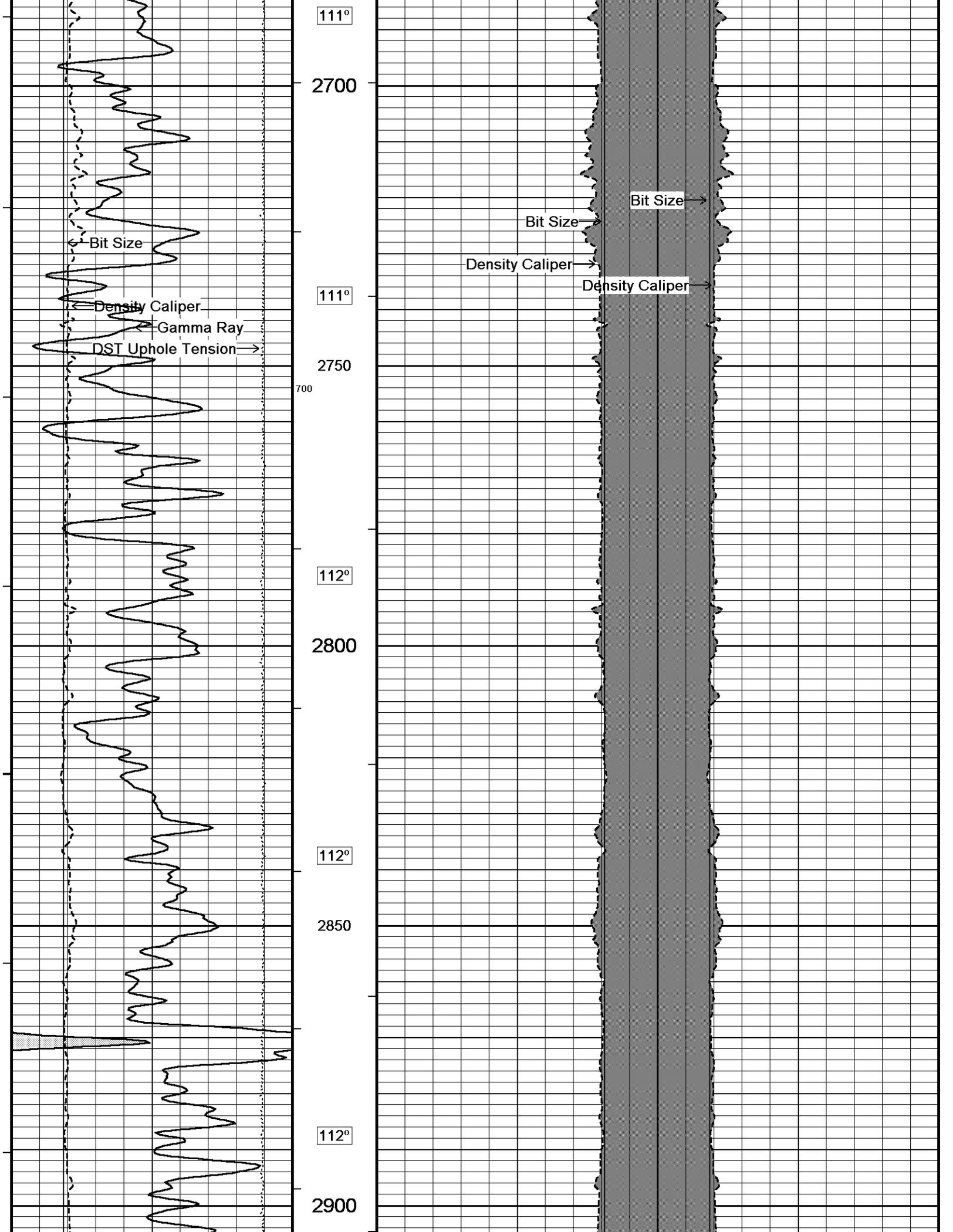


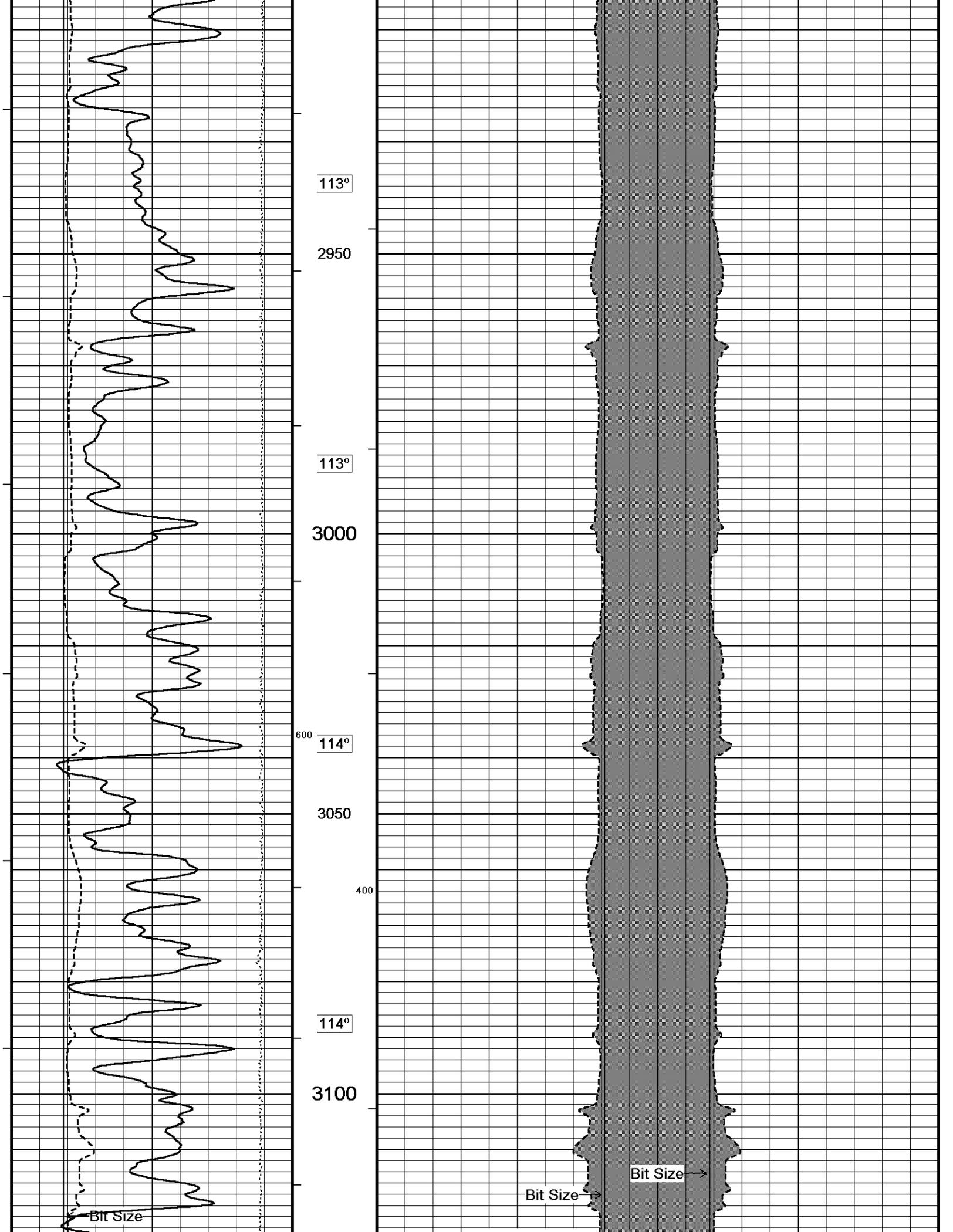


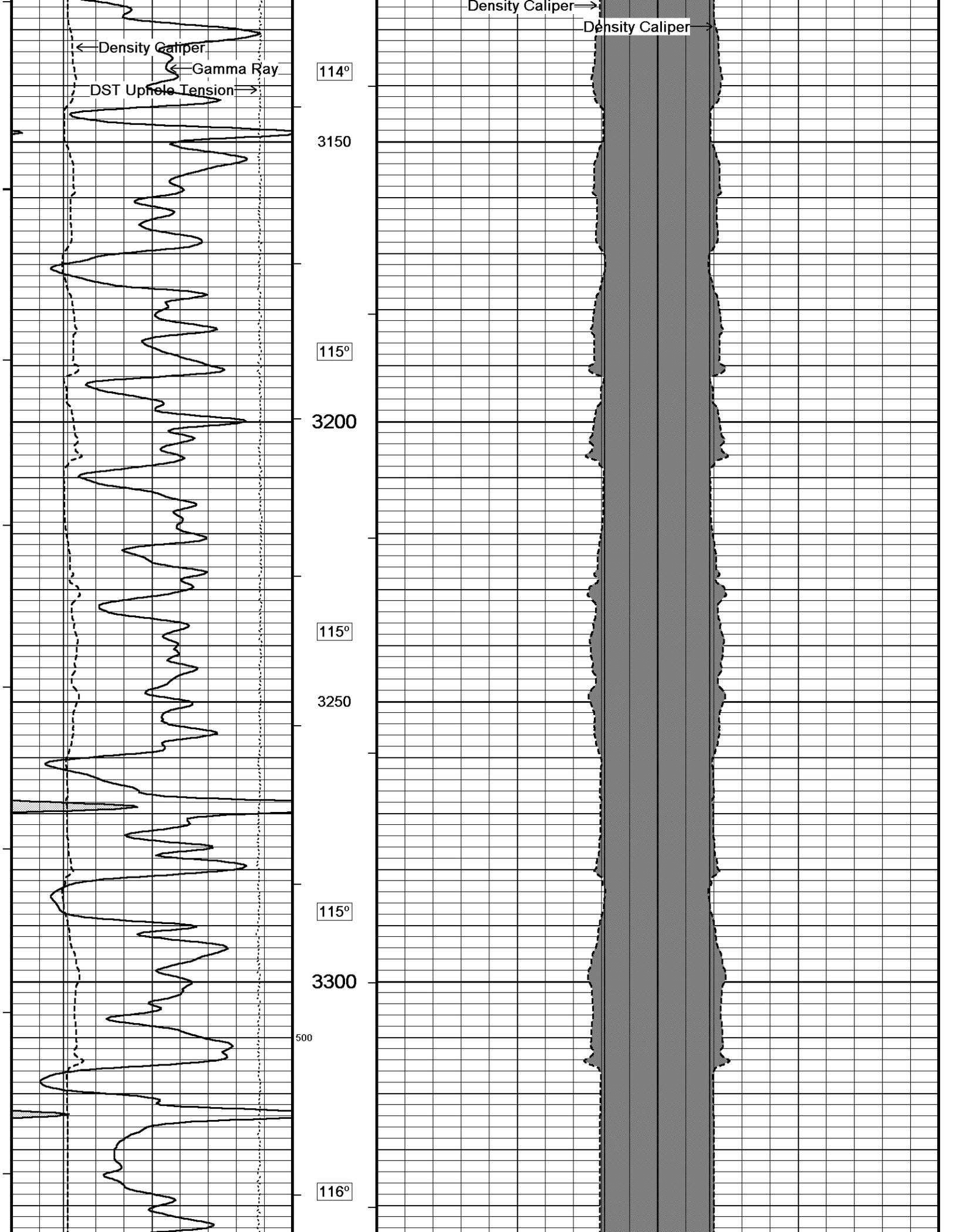


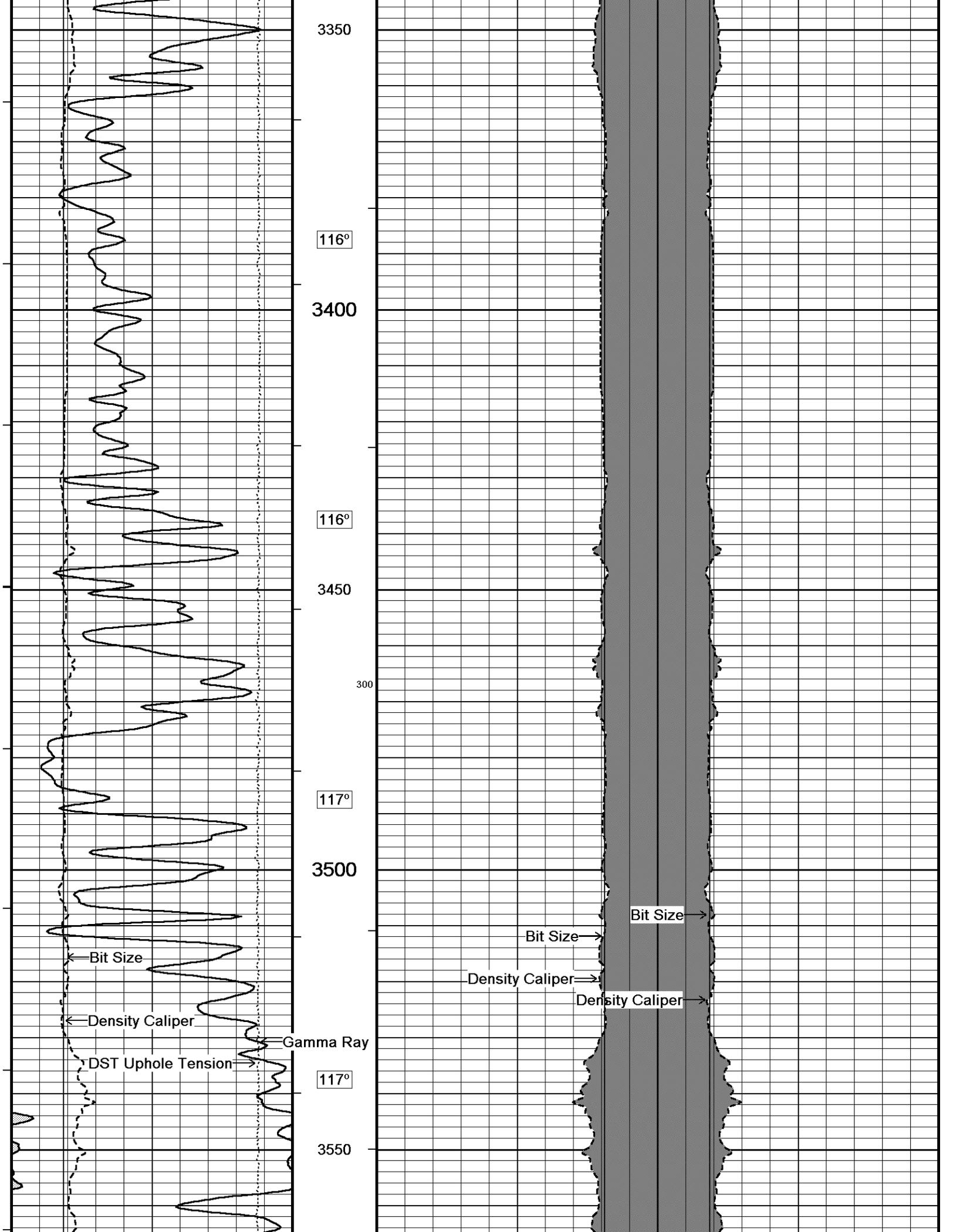


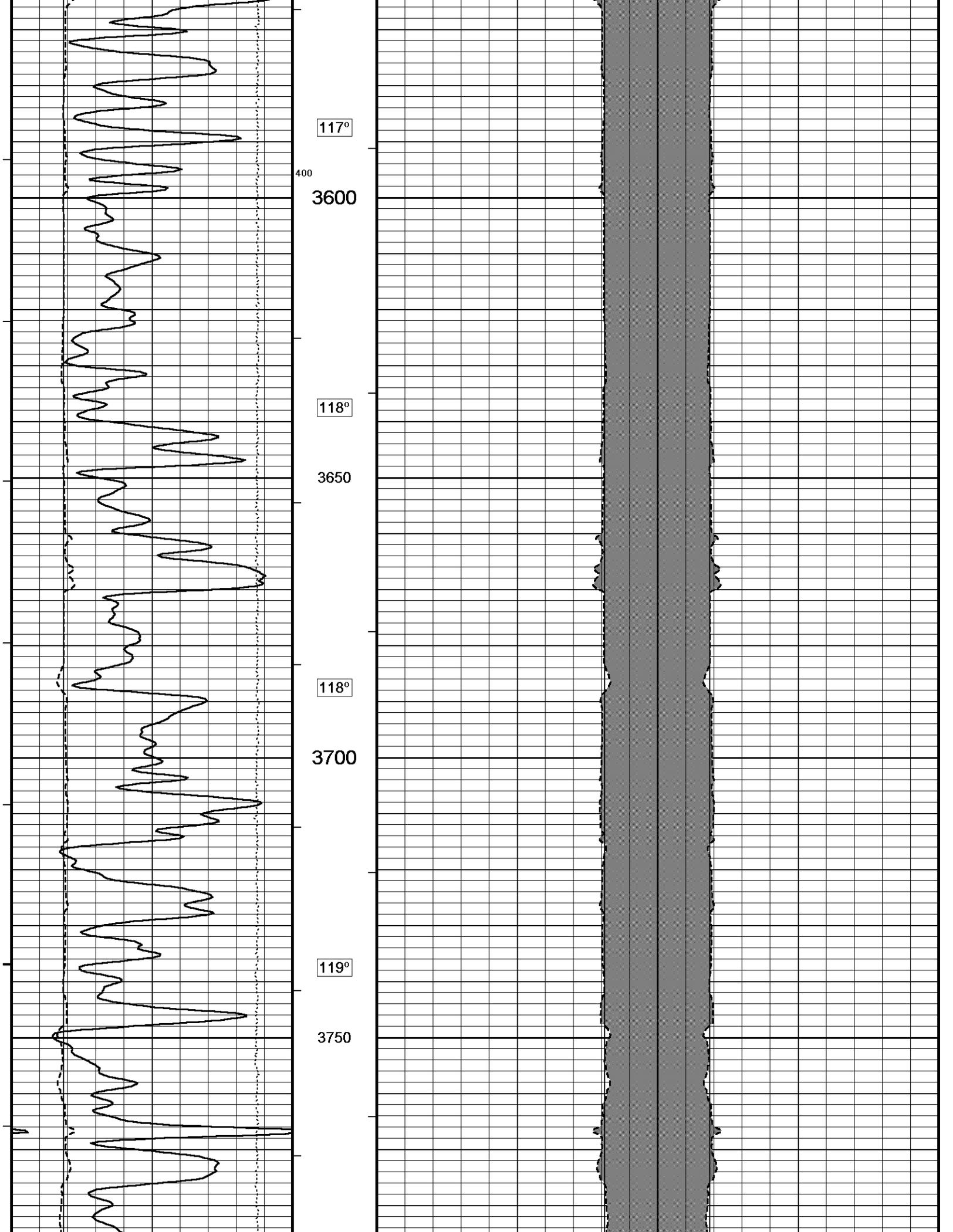


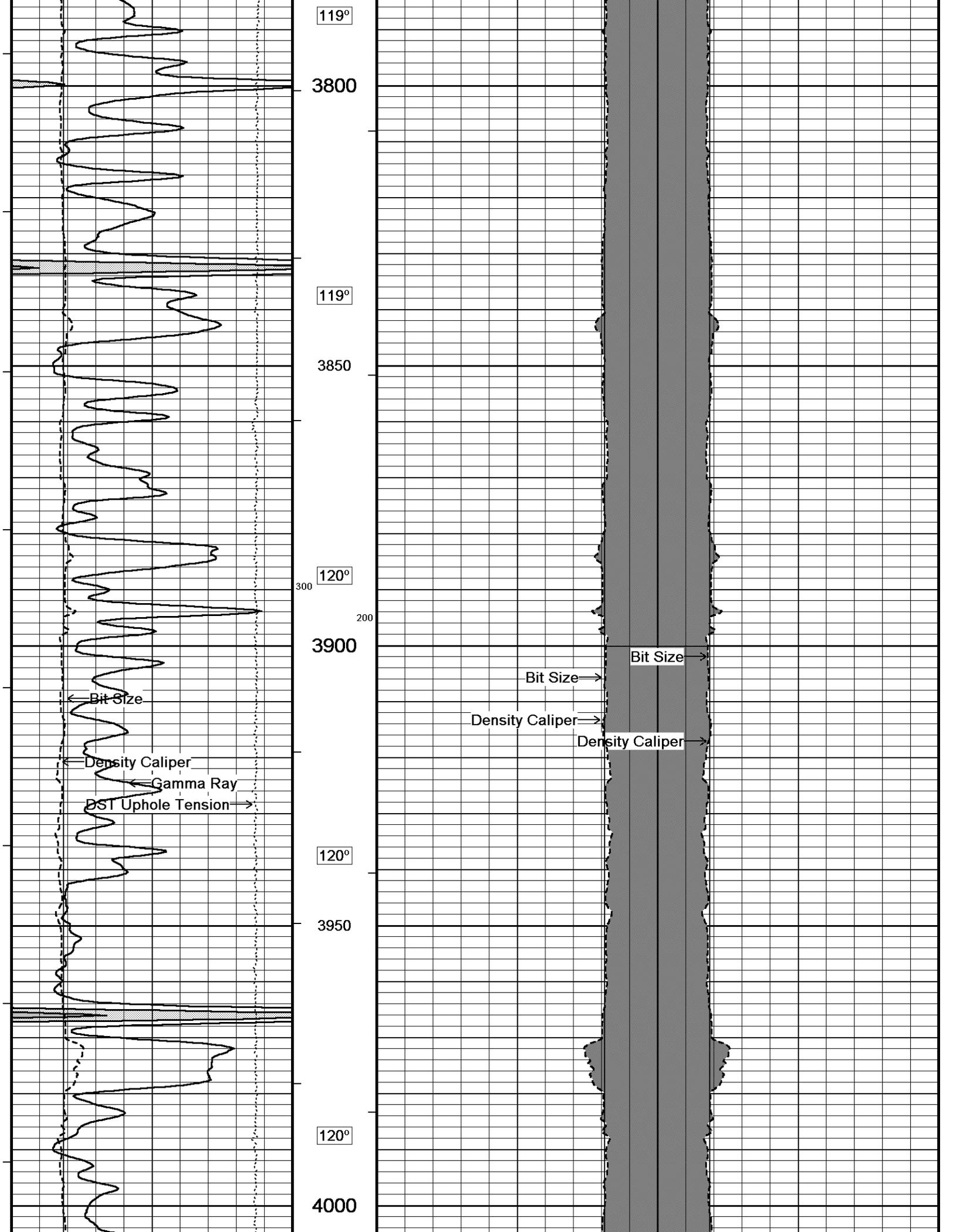












119°

3800

119°

3850

120°

300

200

3900

Bit Size

Bit Size

Density Caliper

Density Caliper

Bit Size

Density Caliper

Gamma Ray

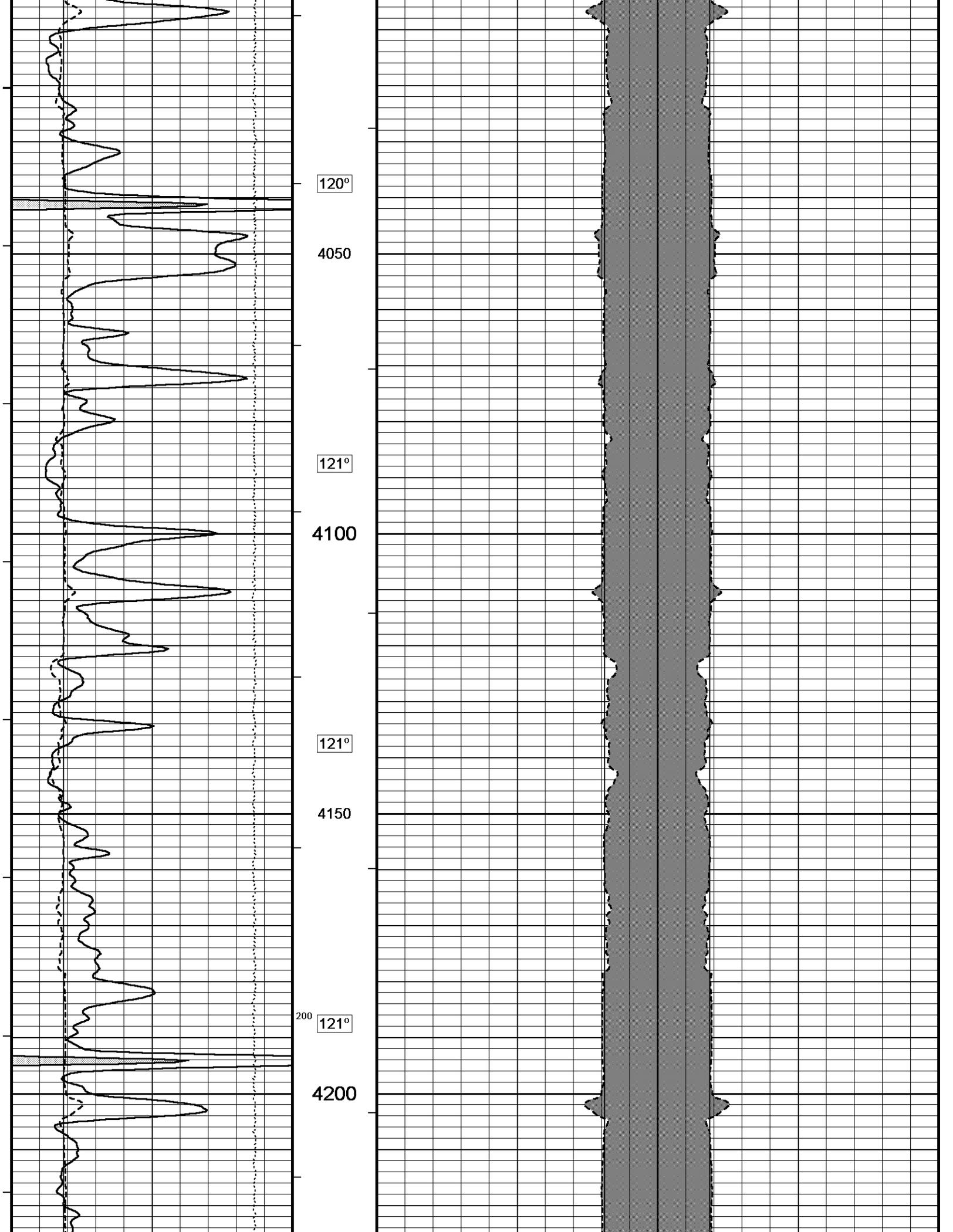
DST Uphole Tension

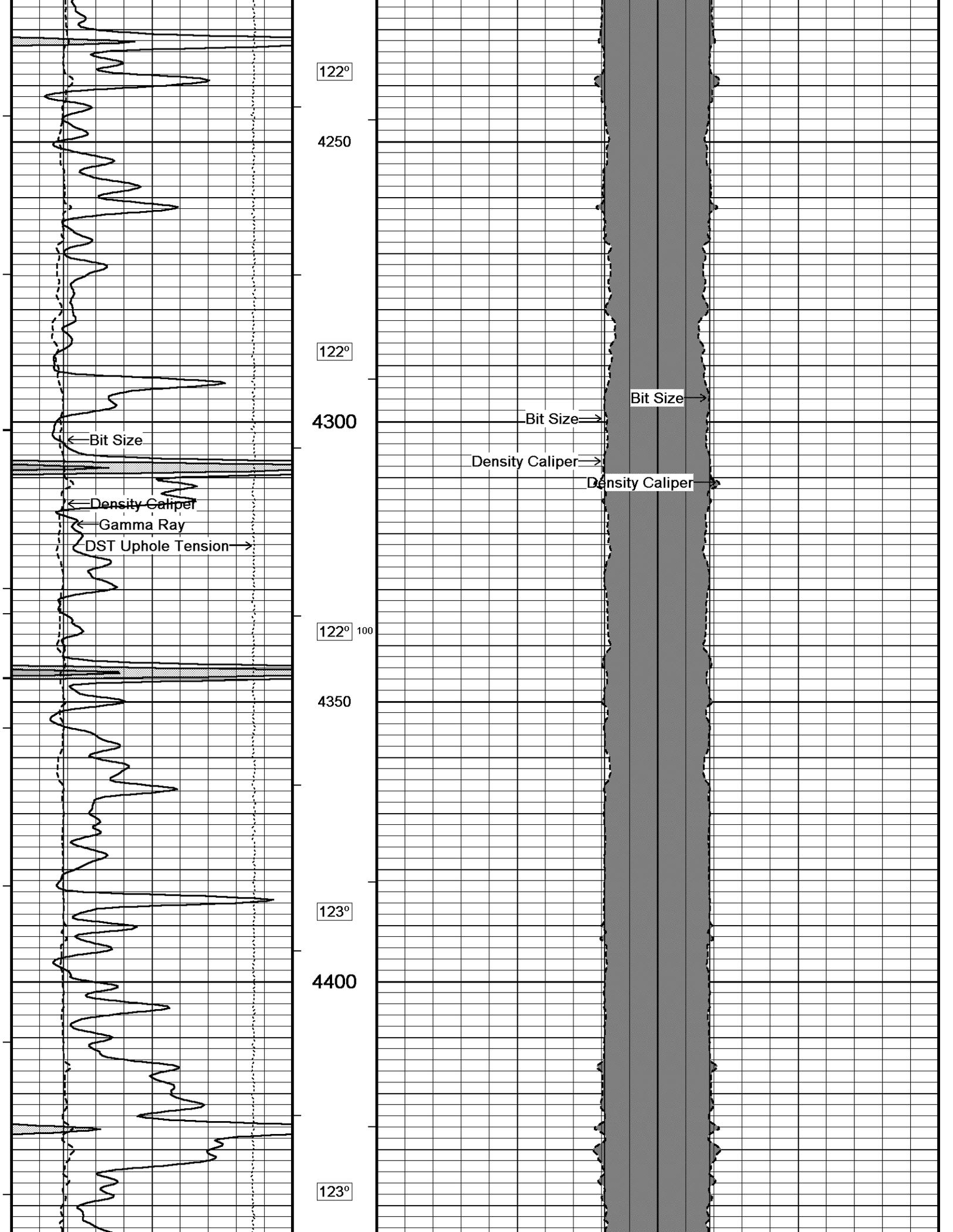
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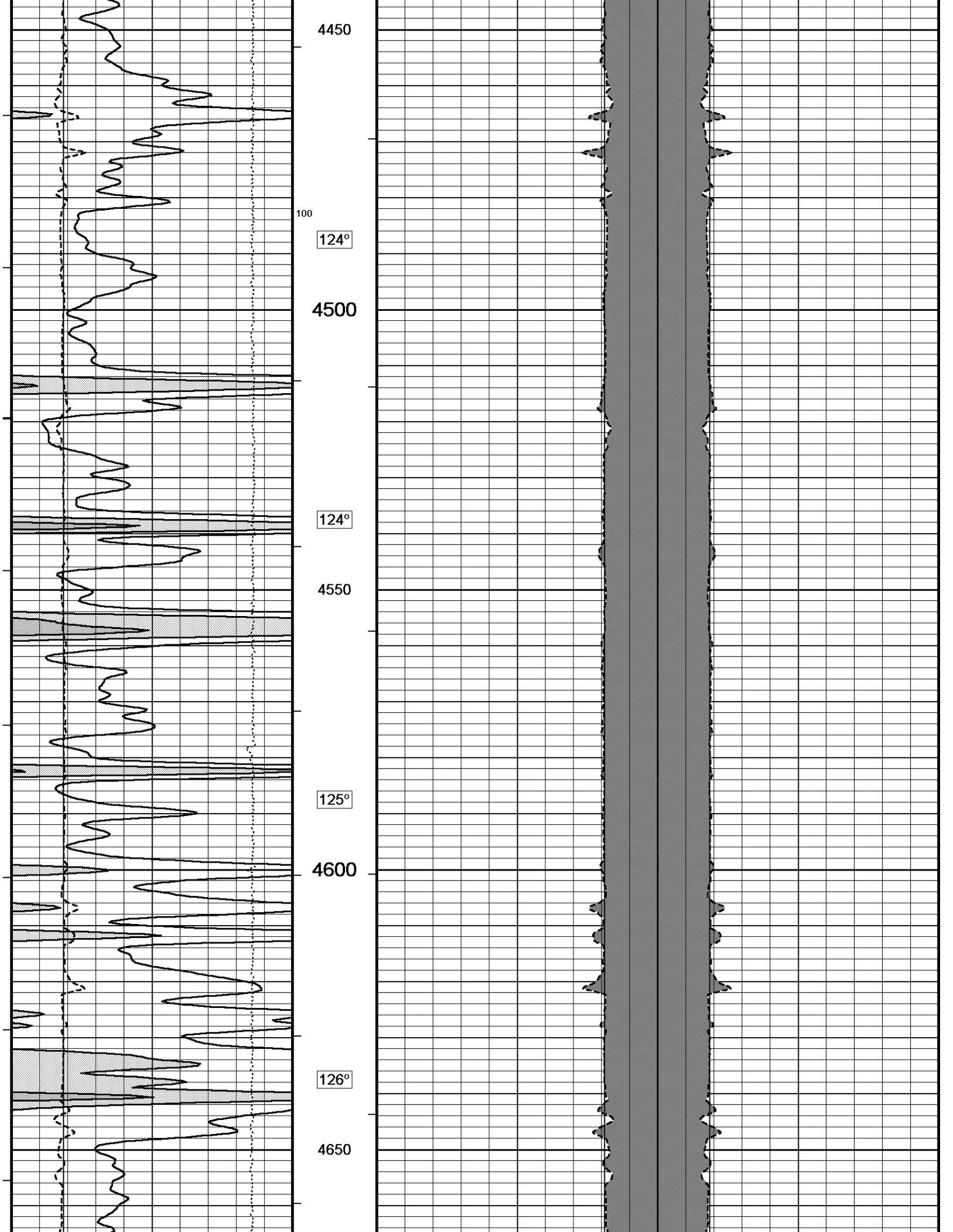
3950

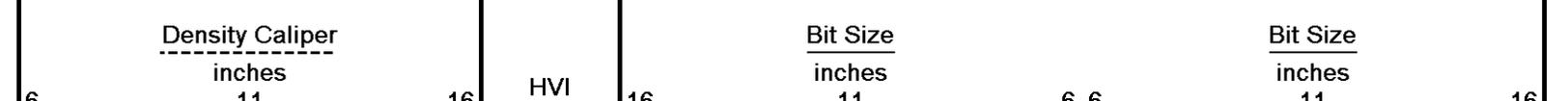
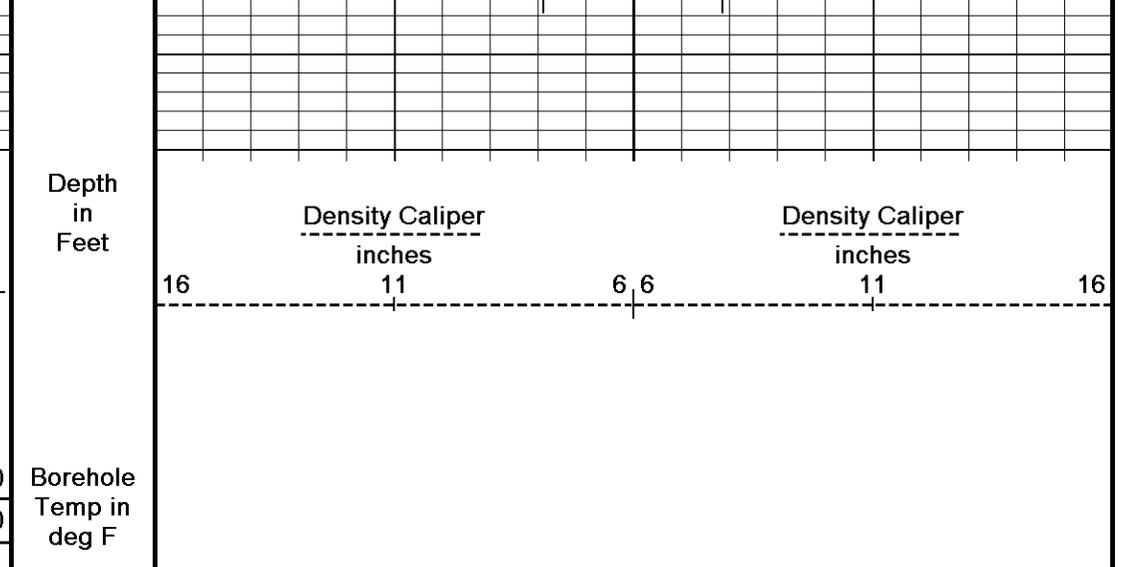
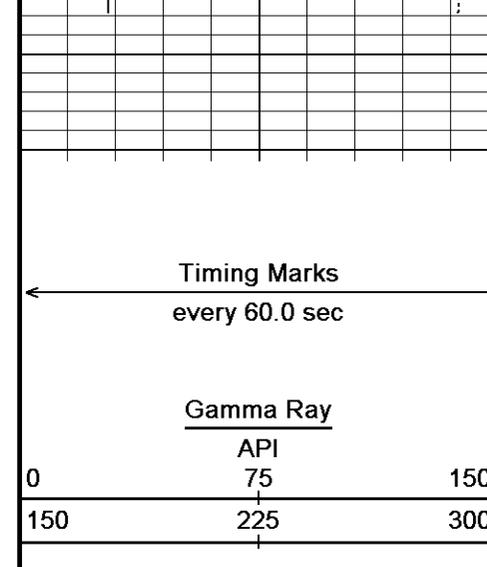
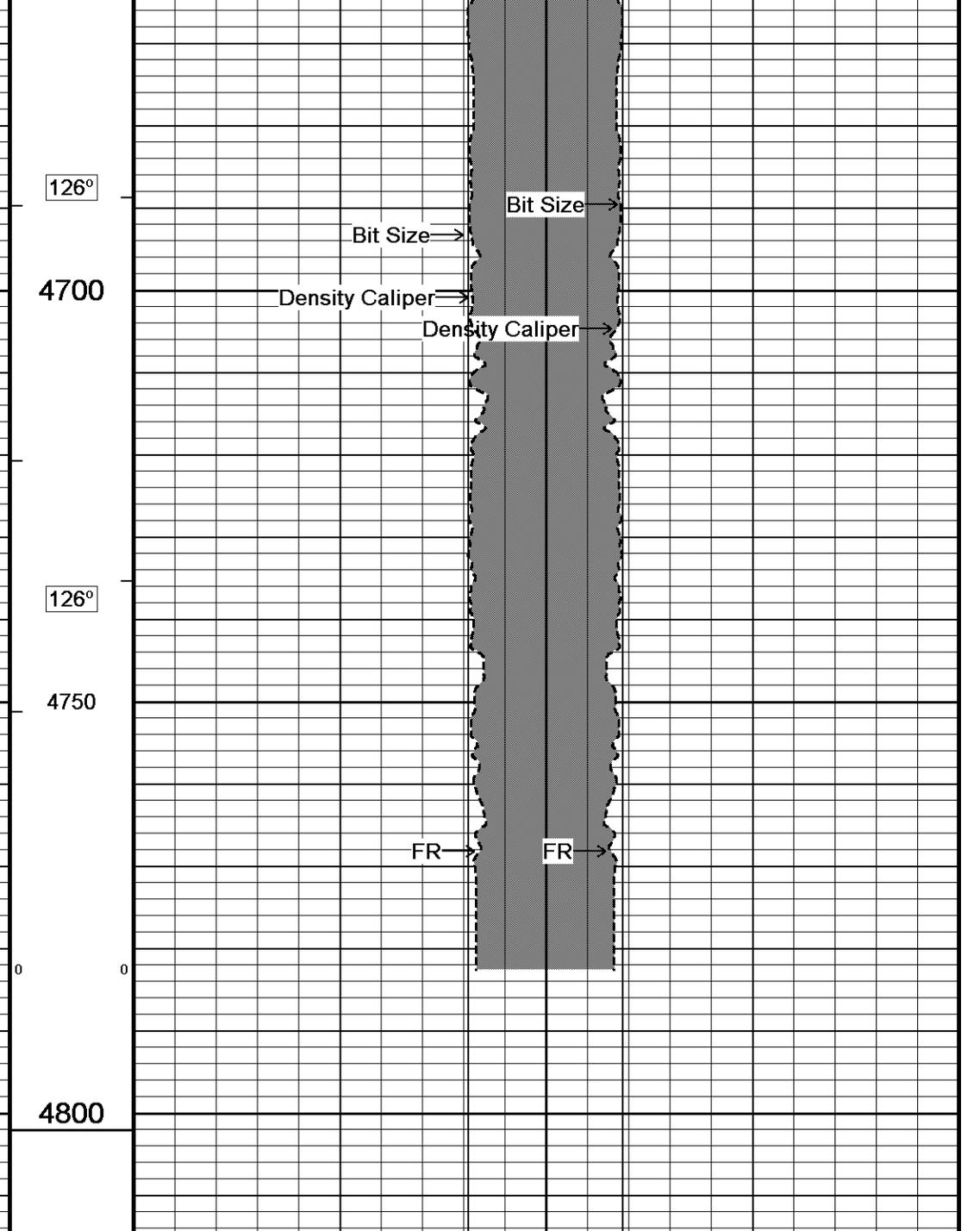
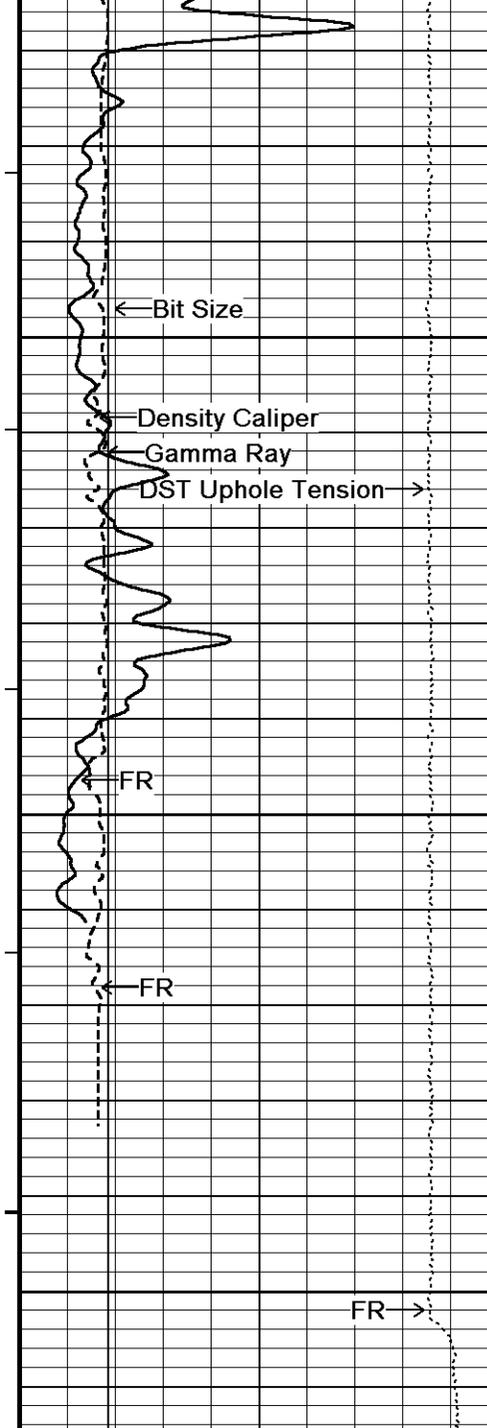
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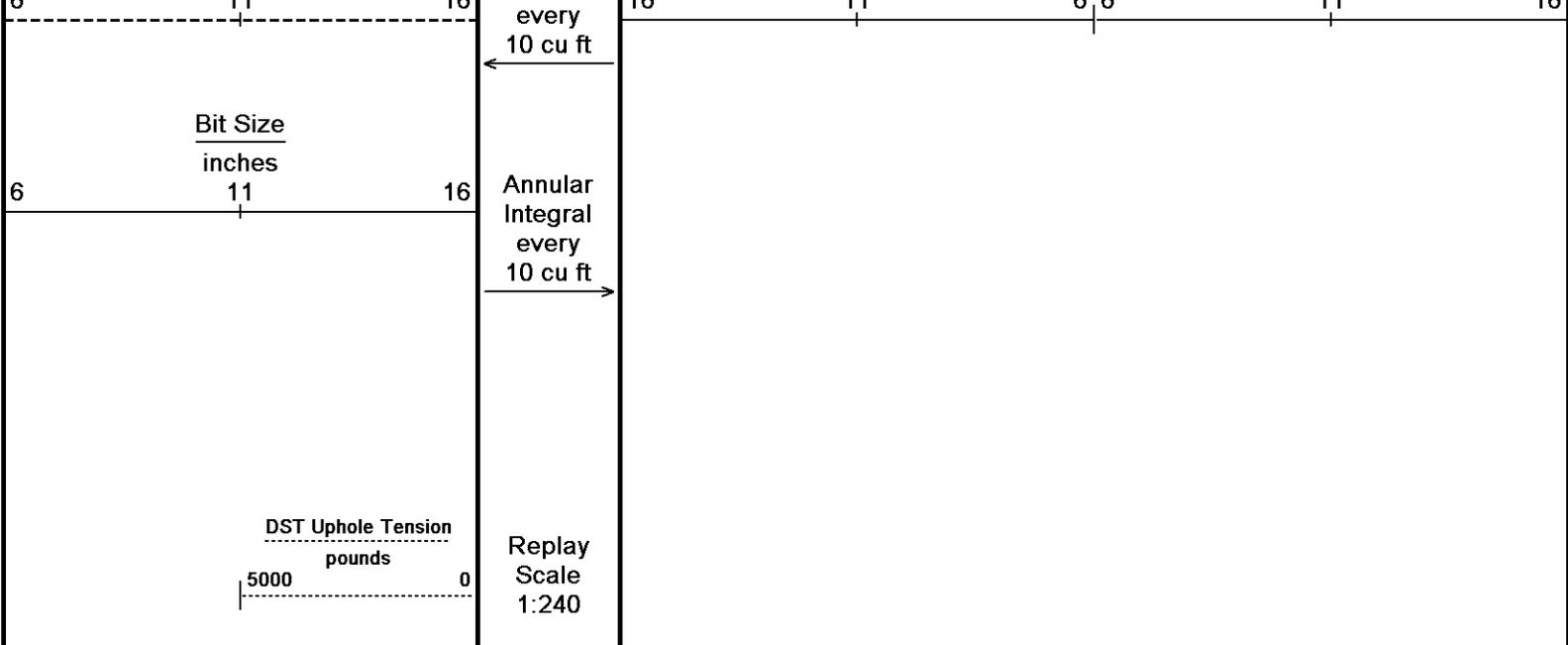
4000











Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 22-JUL-2017 02:28
 Filename: C:\Minimus 17.01.7206\Data\Shakespeare Goering #1-5\Shakespeare Goering #1-5_002.dta
 Recorded on 21-JUL-2017 23:39
 System Versions: Logged with 17.01.7206 Plotted with 17.01.7206

↑ 5 INCH MAIN ↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 17.01.7206\Data\Shakespeare Goering #1-5\Shakespeare Goering #1-5_001.dta

General Constants All 000 Last Edited on 21-JUL-2017,22:39

General Parameters		
Mud Resistivity	0.960	ohm-metres
Mud Resistivity Temperature	75.000	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	4.500	inches
Caliper for Differential Caliper	None	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0 Field Calibration on 21-JUL-2017 22:14

Reading No	Measured	Calibrated (lbs)
1	14039.09	0.00
2	14869.52	481.00

Gamma Calibration MCG-C 84 Field Calibration on 21-JUL-2017 17:00

	Measured	Calibrated (API)
Background	142	95
Calibrator (Gross)	825	551
Calibrator (Net)	683	456



Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.09	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-C 84

Field Calibration on 03-JUL-2017,10:23

	Measured	Calibrated (mV)
Reference 1	104.4	100.1
Reference 2	-95.8	-100.1

High Resolution Temperature Calibration MCG-C 84

Field Calibration on 03-JUL-2017,10:23

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-C 84

Last Edited on 09-SEP-2014,02:23

Pre-filter Length 11

Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 21-JUL-2017,09:26

Field Check on 21-JUL-2017 16:43

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.0	49.7	5.1	25.6
Micro Inverse	10.0	50.1	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	77.9	77.9
Micro Inverse	51.0	51.0

Micro Normal & Micro Inverse Calibration Tolerance MML-A 7

Micro Normal Res. 1	10.0		ohm	Micro Normal Res. 2	49.7		ohm
Micro Inverse Res. 1	10.0		ohm	Micro Inverse Res. 2	50.1		ohm
Micro Normal Base Check	77.9		ohm-m				
Micro Inverse Base Check	51.0		ohm-m				
Micro Normal Field Check	77.9		ohm-m				
Micro Inverse Field Check	51.0		ohm-m				

Micro Normal and Micro Inverse Constants MML-A 7

Last Edited on 21-JUL-2017,20:15

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159
Micro Normal K Factor	0.5110
Micro Inverse K Factor	0.3380
Standoff Offset	N/A inches

Caliper Calibration MML-A 7

Base Calibration on 21-JUL-2017,09:17

Field Calibration on 21-JUL-2017 16:41

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13752	5.98
2	16863	7.97
3	19899	9.86
4	23808	11.92
5	0	0.00
6	N/A	N/A

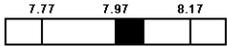
Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.04	7.07

Caliper Calibration Tolerances MML-A 7

0.04

1.97

Short Arm Field Cal. 8.04  in

Neutron Calibration MDN-A.B 114

Base Calibration on 21-JUL-2017,14:44
Field Check on 21-JUL-2017 17:05

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
Ratio	3156	98	3714	110
	32.298		33.764	

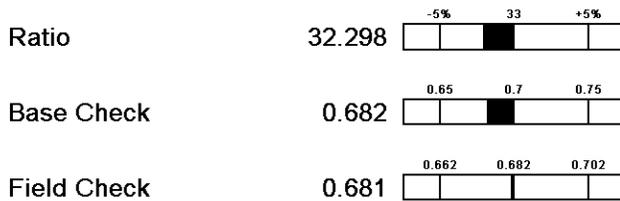
Field Calibrator at Base

	Calibrated (cps)
Ratio	0.682

Field Check

	Calibrated (cps)
Ratio	0.681

Neutron Calibration Tolerances MDN-A.B 114



Neutron Constants MDN-A.B 114

Last Edited on 21-JUL-2017,20:15

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Legacy	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-B.J 352

Base Calibration on 21-JUL-2017,09:08
Field Check on 21-JUL-2017 16:32

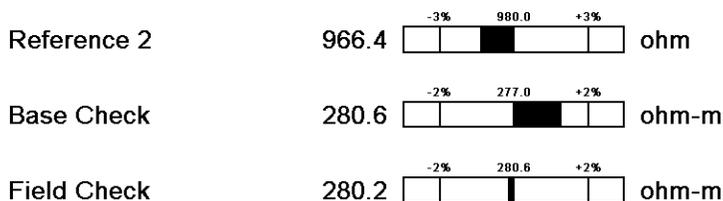
Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	966.4	126.8

Base Check 280.6

Field Check 280.2

FE Calibration Tolerances MFE-B.J 352



Running Mode No Sleeve
 MFE K Factor 0.1268

Borehole Correction Constants

Sonde Position 0.5 inches
 Hole Size Source Density Caliper
 Hole Size Constant Value N/A inches
 Rm Source Global Value: Temperature Corrected
 Temp. for Rm Corr. MCG External Temperature

Sonic Constants MSS-A.A 55

Last Edited on 21-JUL-2017,20:14

Maximum Boundary Contrast 100.00 micro-sec/ft
 Fluid Transit Time 189.00 micro-sec/ft
 Limestone Transit Time 47.50 micro-sec/ft
 Sandstone Transit Time 55.50 micro-sec/ft
 Dolomite Transit Time 43.50 micro-sec/ft

Sonic used for Porosities 3-5' Compensated Sonic
 Correction for Sonde Skew Applied
 Cycle Stretch Algorithm Applied
 MN3FT N/A micro-sec
 MX3FT N/A micro-sec
 Hunt-Raymer Constant 83.13 micro-sec/ft

Sonde Mode Compensated
 Hole Type Open Hole

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A
Peak Amplitude Source		N/A

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing	N/A		
Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A
Use 4' Waveform to derive TR	N/A
Use 5' Waveform to derive TR	N/A
Use 6' Waveform to derive TR	N/A
3' Waveform Discriminator Level	N/A mV
4' Waveform Discriminator Level	N/A mV
5' Waveform Discriminator Level	N/A mV
6' Waveform Discriminator Level	N/A mV
Waveform Discriminator Filter	N/A
Semblance Window Width	N/A micro-sec
Sonic Despiker	N/A

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 03-JUL-2017,10:17

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

Pre-filter Length 11

Induction Calibration MAI-A.A 111

Base Calibration on 21-JUL-2017,10:20
Field Check on 21-JUL-2017 16:30

Base Calibration

Test Loop Calibration Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	17.6	473.6	9.3	966.2
2	6.4	385.9	7.6	821.4
3	3.2	264.0	5.2	566.0
4	2.1	135.5	2.6	279.2
Array Temperature	23.0		Deg F	

Test Loop Calibration Verified

Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	13.7	3869.0	14.0	3870.2	
2	30.1	3523.0	30.4	3523.7	
3	29.2	3017.0	29.4	3017.1	
4	19.2	2055.4	19.3	2055.2	
Deep	17.8	1959.3	18.0	1959.0	
Medium	43.1	3970.5	43.4	3971.0	
Shallow	44.9	5225.2	45.3	5226.9	
Array Temperature	95.2		94.1		Deg F

Induction Calibration Tolerances MAI-A.A 111

Low Conductivity 1	17.6		mmho/m	High Conductivity 1	473.6		mmho/m
Low Conductivity 2	6.4		mmho/m	High Conductivity 2	385.9		mmho/m
Low Conductivity 3	3.2		mmho/m	High Conductivity 3	264.0		mmho/m
Low Conductivity 4	2.1		mmho/m	High Conductivity 4	135.5		mmho/m
Background Vx 1	0.0		mmho/m	Phase Check Loop 1	0.0		%
Background Vx 2	0.0		mmho/m	Phase Check Loop 2	0.0		%
Background Vx 3	0.0		mmho/m	Phase Check Loop 3	0.0		%
Background Vx 4	0.0		mmho/m	Phase Check Loop 4	0.0		%

Induction Constants MAI-A.A 111

Last Edited on 21-JUL-2017,20:15

Induction Model	RtAP-WBM		
Borehole Correction Constants			
Tool Centred	No		
Hole Size Source	Density Caliper		
Hole Size Constant Value	N/A	inches	
Stand-off Type	Fins		
Stand-off	0.50	inches	
Number of Fins on Stand-off	8.0000		
Stand-off Fin Angle	45.00	degrees	
Stand-off Fin Width	0.5000	inches	
Rm Source	Global Value: Temperature Corrected		
Temp. for Rm Corr.	MCG External Temperature		
Squasher Start	0.0020	mhos/metre	
Squasher Offset	N/A	mhos/metre	
Borehole Normalisation			
DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000

Calibration Site Corrections		
Channel 1	0.00	mmhos/metre
Channel 2	0.00	mmhos/metre
Channel 3	0.00	mmhos/metre
Channel 4	0.00	mmhos/metre
Symmetrised Receiver Gains		
Receiver 1	1.00	
Receiver 2	1.00	
Receiver 3	1.00	
Receiver 4	1.00	
Apparent Porosity and Water Saturation Constants		
Archie Constant (A)	1.00	
Cementation Exponent (M)	2.00	
Saturation Exponent (N)	2.00	
Saturation of Water for Apor	100.00	percent
Resistivity of Water for Apor and Sw	0.05	ohm-m
Resistivity of Mud Filtrate for Sw	0.00	ohm-m
Source for Rt	0.00	
Source for Rxo	0.00	

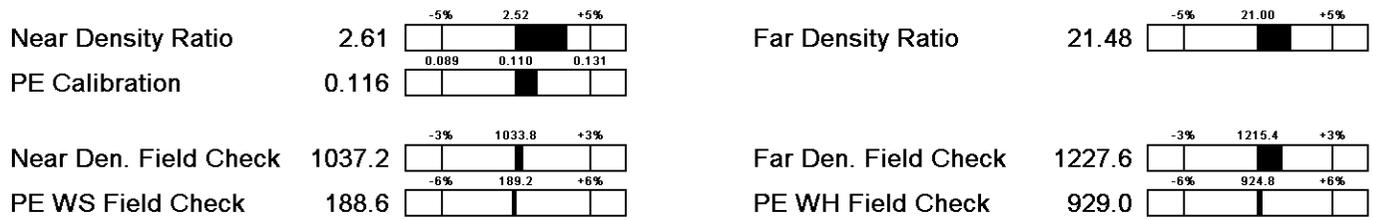
Photo Density Calibration MPD-C.A 216

Base Calibration on 21-JUL-2017,11:29
Field Check on 21-JUL-2017 16:39

Density Calibration					
Base Calibration		Measured		Calibrated (sdu)	
	Near	Far	Near	Far	
Background	1034	1215			
Reference 1	51875	24845	59556	30836	
Reference 2	20527	2316	24941	2541	
Field Check at Base					
	1033.8	1215.4			
Field Check					
	1037.2	1227.6			

PE Calibration					
Base Calibration		Measured		Calibrated	
	WS	WH	Ratio	Ratio	
Background	189	925			
Reference 1	21486	51702	0.419	0.371	
Reference 2	5928	20410	0.295	0.272	
Field Check at Base					
	189.2	924.8			
Field Check					
	188.6	929.0			

Photo Density Calibration Tolerances MPD-C.A 216



Density Constants MPD-C.A 216

Last Edited on 21-JUL-2017,20:14

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	1.09	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	Not 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	

Caliper Calibration MPD-C.A 216

Base Calibration on 21-JUL-2017,11:21
Field Calibration on 21-JUL-2017 16:35

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	18416	3.99
2	28544	5.98
3	38624	7.97
4	48448	9.86
5	59555	11.92
6	N/A	N/A

Field Calibration		
Measured Caliper (in)	Actual Caliper (in)	
7.92	7.97	

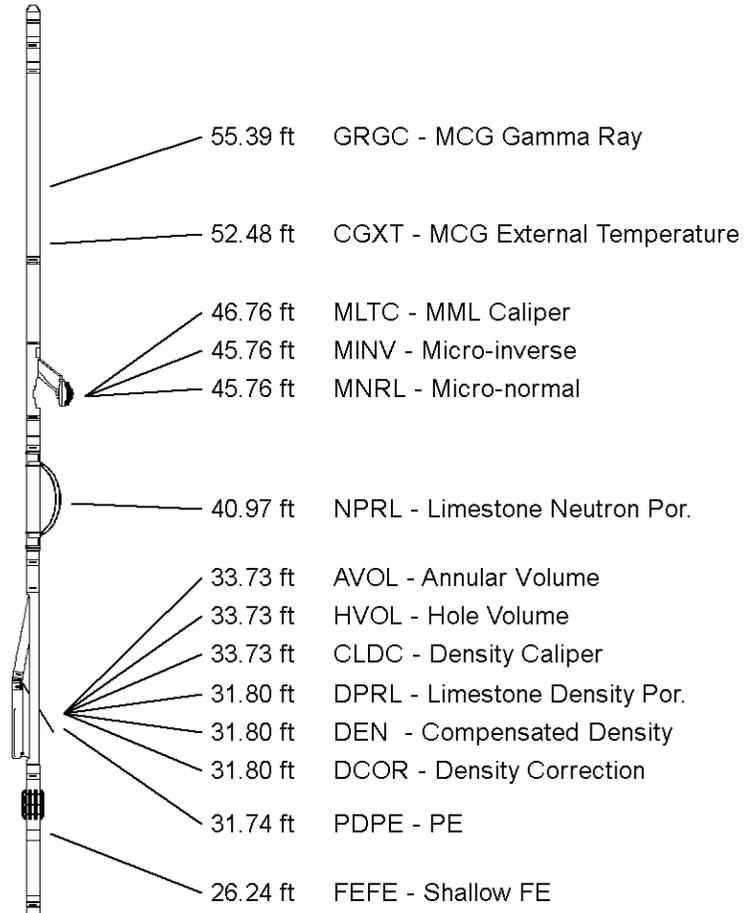
Caliper Calibration Tolerances MPD-C.A 216



DOWNHOLE EQUIPMENT

C:\Minimus 17.01.7206\Data\Shakespeare Goering #1-5\Shakespeare Goering #1-5_001.dta

- Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in
- Compact Comms Gamma
MCG-C 84 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in
- Compact Micro-log
MML-A 7 LG: 7.97 ft WT: 81.6 lb OD: 2.244 in
- Compact Neutron
MDN-A.B 114 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: 2.449 in
- Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in
- Compact Sonic

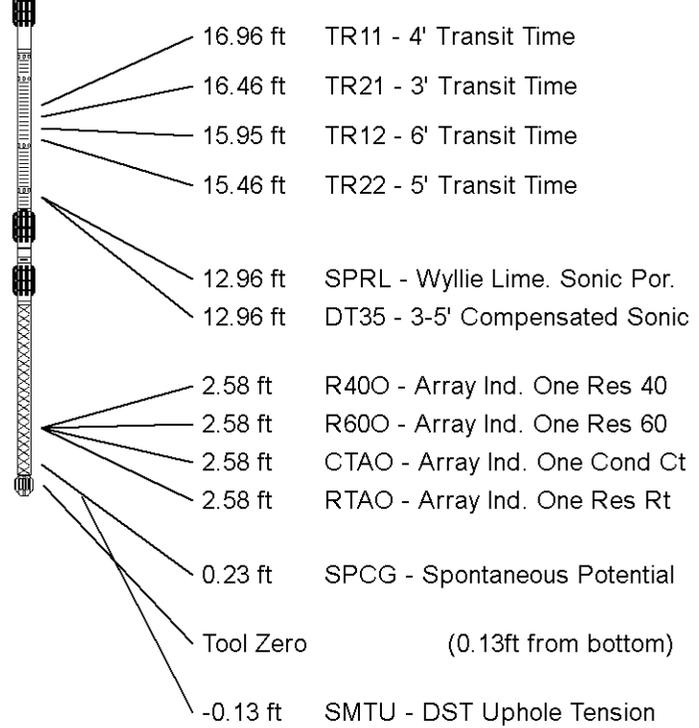


MSS-A.A 55 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction

MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 63.07 ft Weight: 480.6 lb



All measurements relative to tool zero.

COMPANY	SHAKESPEARE OIL CO., INC.
WELL	GOERING #1-5
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2951	feet	First Reading	4770.00	feet
Elevation Drill Floor	2949	feet	Depth Driller	4800.00	feet
Elevation Ground Level	2940	feet	Depth Logger	4802.00	feet



Weatherford[®]

CALIPER LOG