



Weatherford

MICRORESISTIVITY LOG

COMPANY

BLACK OAK EXPLORATION

WELL

FRISBIE FAMILY 1-15

FIELD

WILDCAT

PROVINCE/COUNTY

RAWLINS

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

SE NW NW SE 2180' FSL & 2300' FEL

PERMIT NUMBER

SE NE NW SE

SEC 15 TWP 2S RGE 36W

Other Services

Latitude

39.865833

MAI/MFE

MPD/MDN

Longitude

-101.360000

MSS

API Number

15-153-21221

Permanent Datum GL, Elevation 3330 feet

Log Measured From KB, 5.00 feet above Permanent Datum

Drilling Measured From KB

Elevations:
KB 3335.00 feet
DF 3333.00
GL 3330.00

Date

21-MAR-2019

Run Number

ONE

Service Order

17937-240384345

Depth Driller

4860.00 feet

Depth Logger

4865.00 feet

First Reading

4817.00 feet

Last Reading

420.00 feet

Casing Driller

420.00 feet

Casing Logger

420.00 feet

Bit Size

7.875 inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.00 lb/USg 65.00 sec/qt

PH / Fluid Loss

10.00 8.80 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

1.04 @103.0 ohm-m

Rmf @ Measured Temp

0.83 @103.0 ohm-m

Rmc @ Measured Temp

1.25 @103.0 ohm-m

Source Rmf / Rmc

CALC CALC

Rm @ BHT

0.80 @135.0 ohm-m

Time Since Circulation

4 HOURS

Max Recorded Temp

135.00 deg F

Equipment / Base

13244 LIB

Recorded By

MATT MCGLOTHLIN

Witnessed By

CLAYTON CAMOZZI

BOREHOLE RECORD

Last Edited: 22-MAR-2019 00:06

Bit Size inches	Depth From feet	Depth To feet
7.875	420.00	4860.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	420.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 18.05.4364
- TOOLSTRING: CBH, SHA, MCG, MML, MDN, MPD, SKJ, MFE, MSS, MAI LOGGED IN COMBINATION.
- HARDWARE:
 - MDN: DUAL BOWSPRING FOR DECENTRALIZATION
 - MFE: 1 X 0.5 INCH STANDOFF
 - MSS: 2 X 0.5 INCH STANDOFF
 - MAI: 2 X 0.5 INCH STANDOFF
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST:
 - NEUTRON / DENSITY / MICROLOG / SONIC / INDUCTION: TD - SURFACE CASING.
 - GAMMA RAY: TD - SURFACE.
- CREW: J. JOHNSON, B. COPELAND.

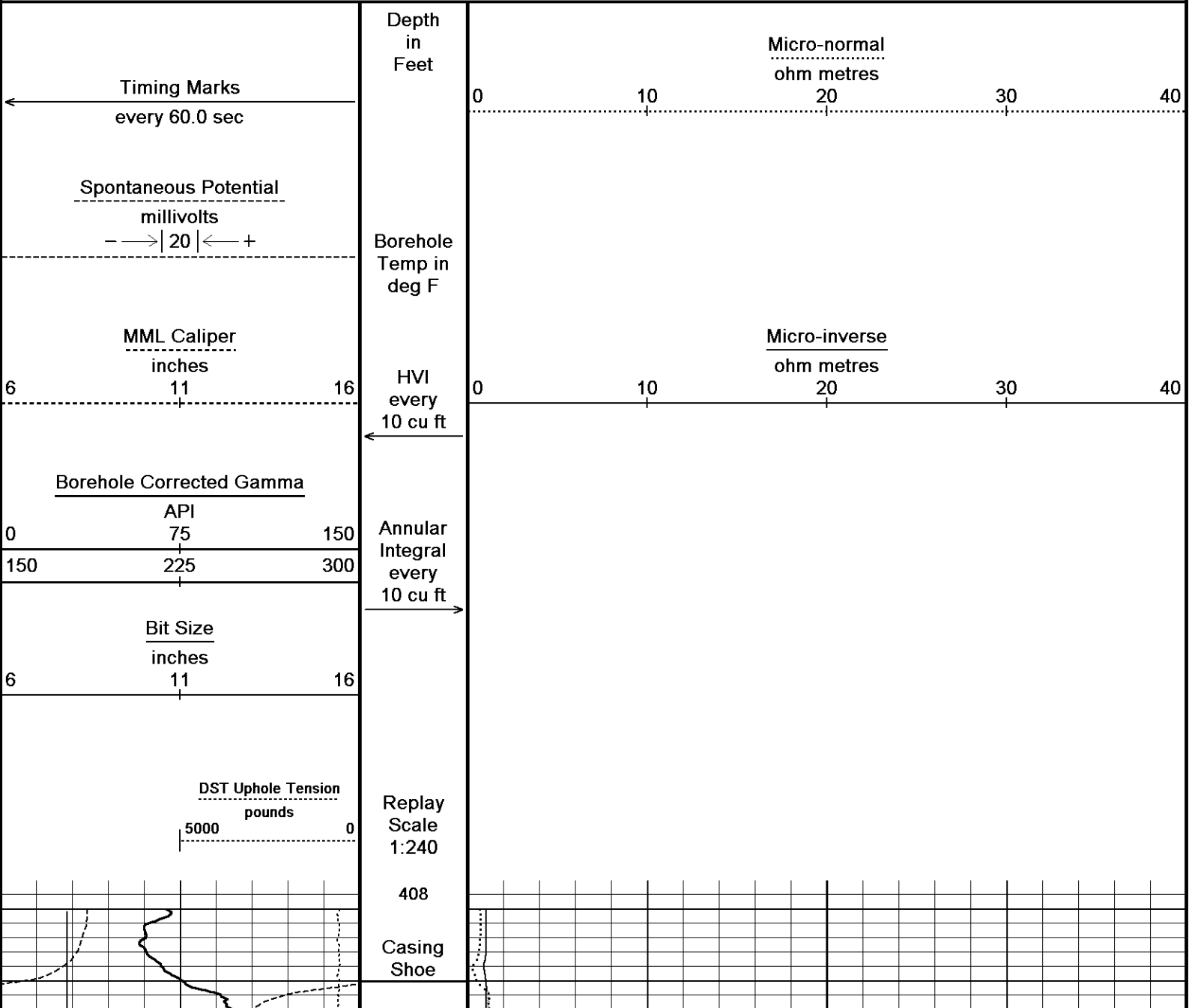
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.

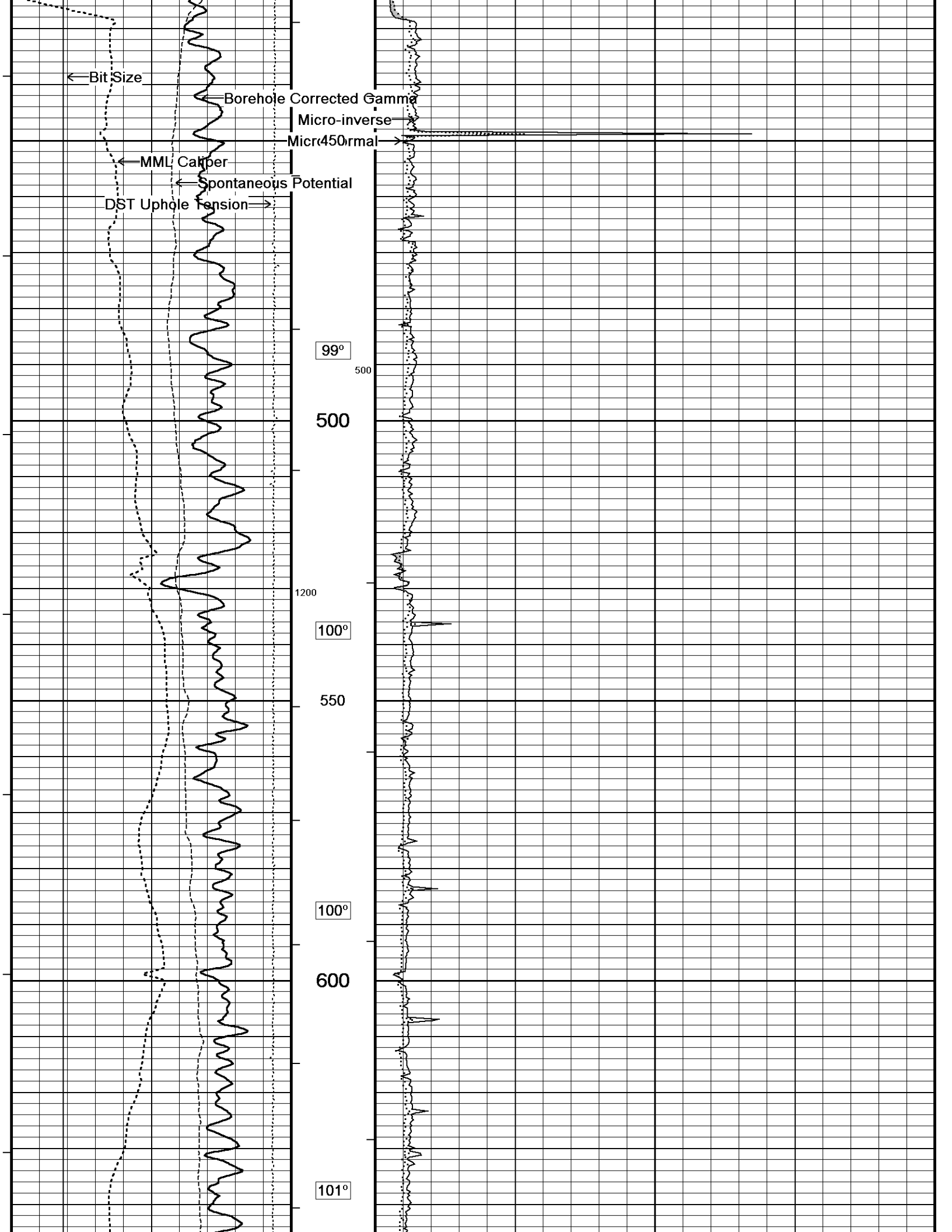
****CLIENT REQUESTE TO PULL REPEAT PASS UP TO 4000 FEET FROM TD.****

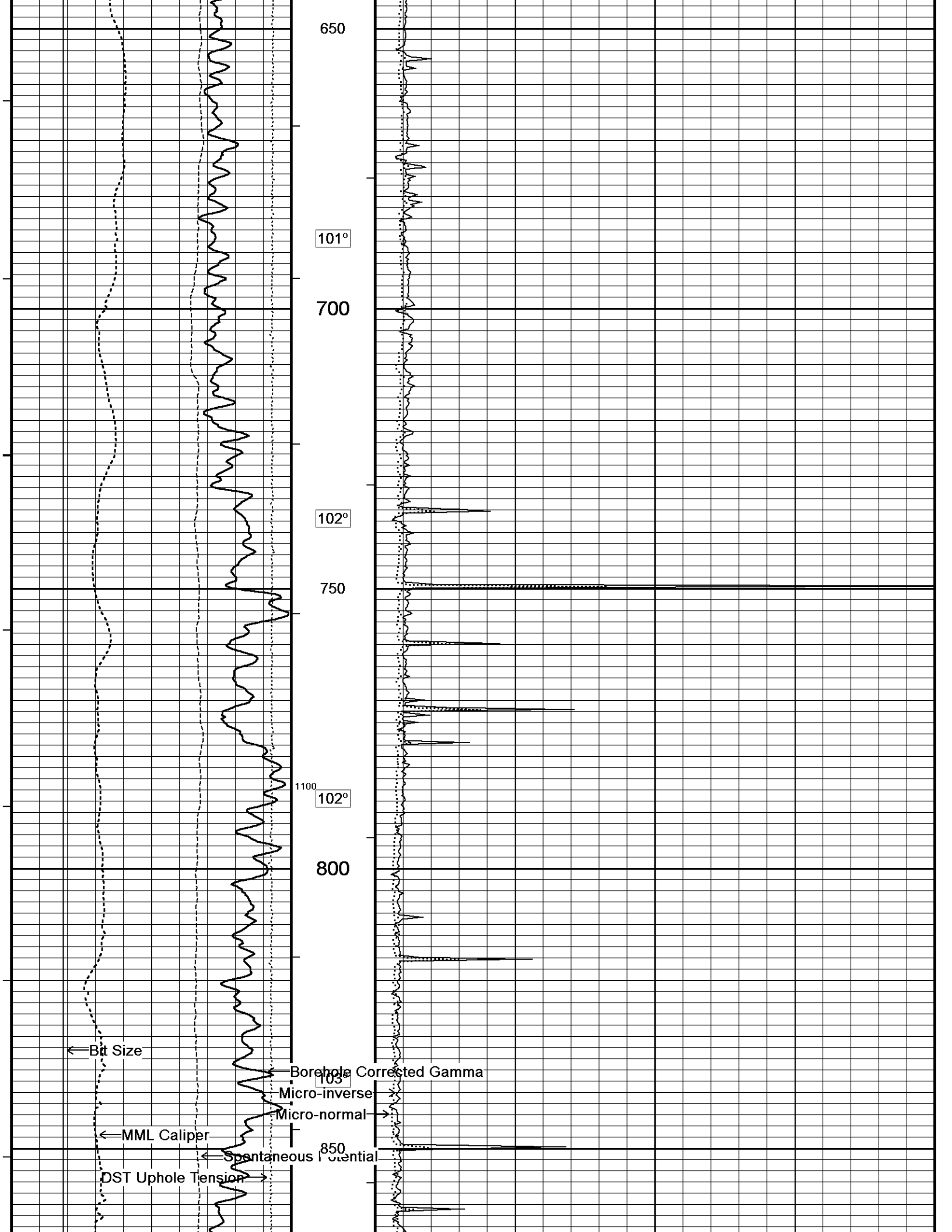
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

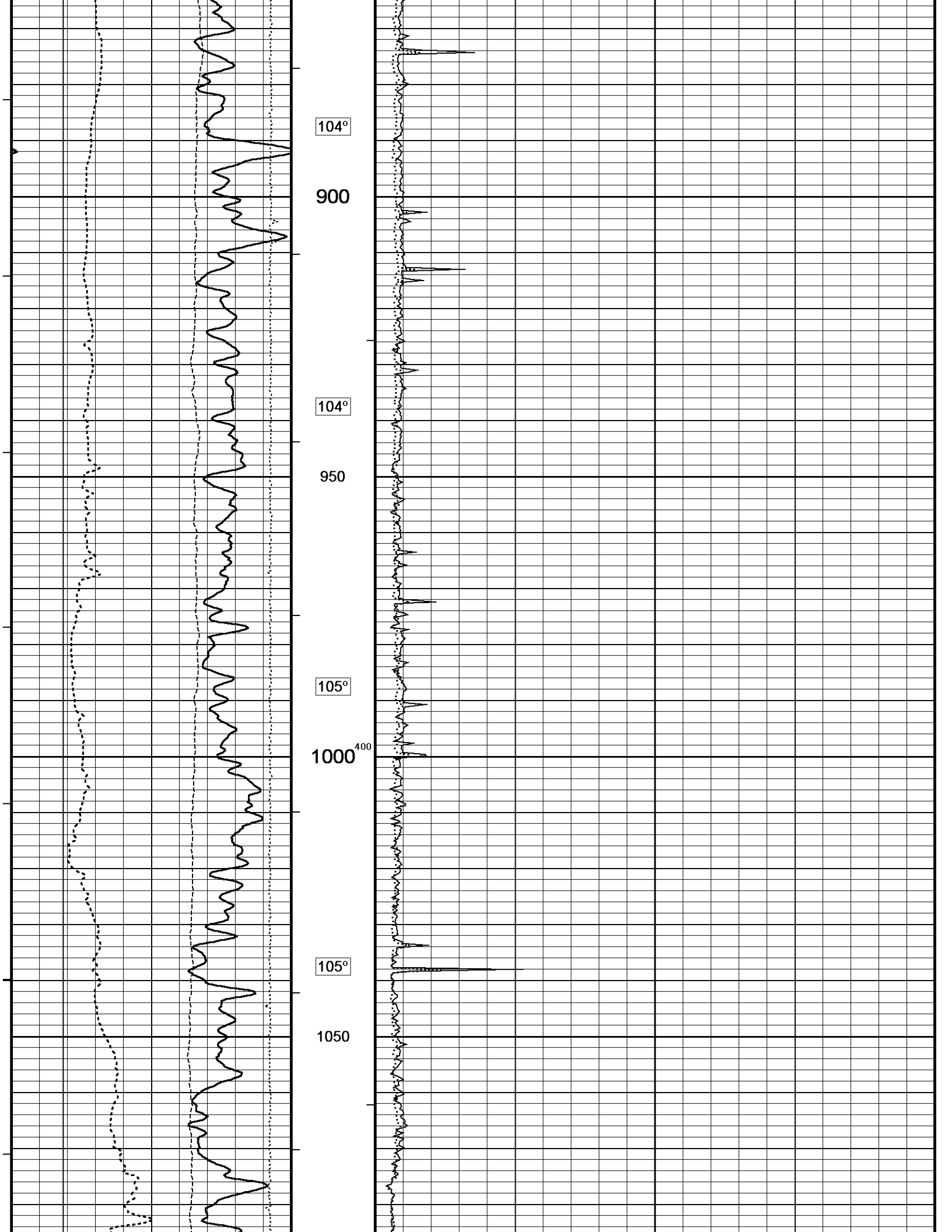
5 INCH MAIN 1:240

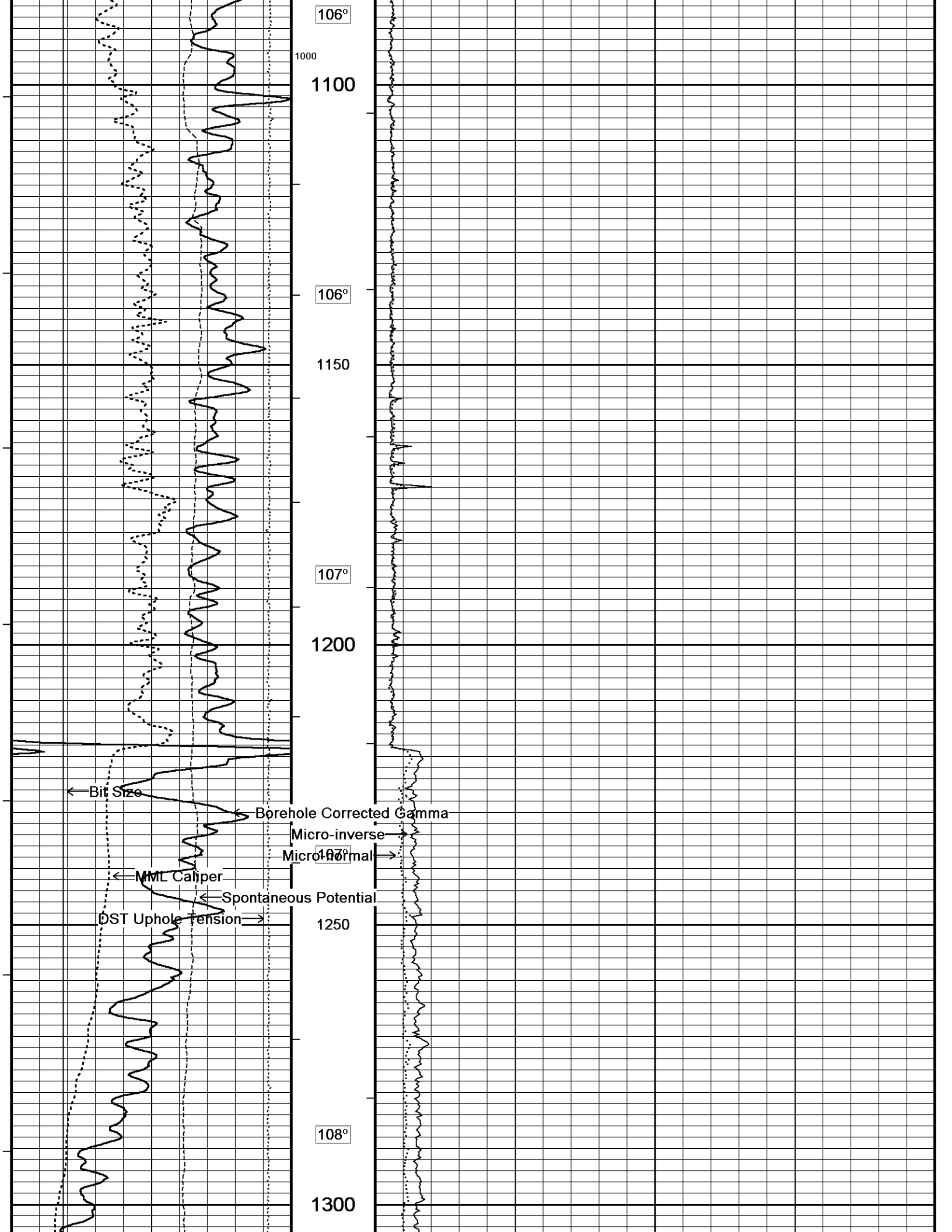
Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 22-MAR-2019 08:17
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 System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

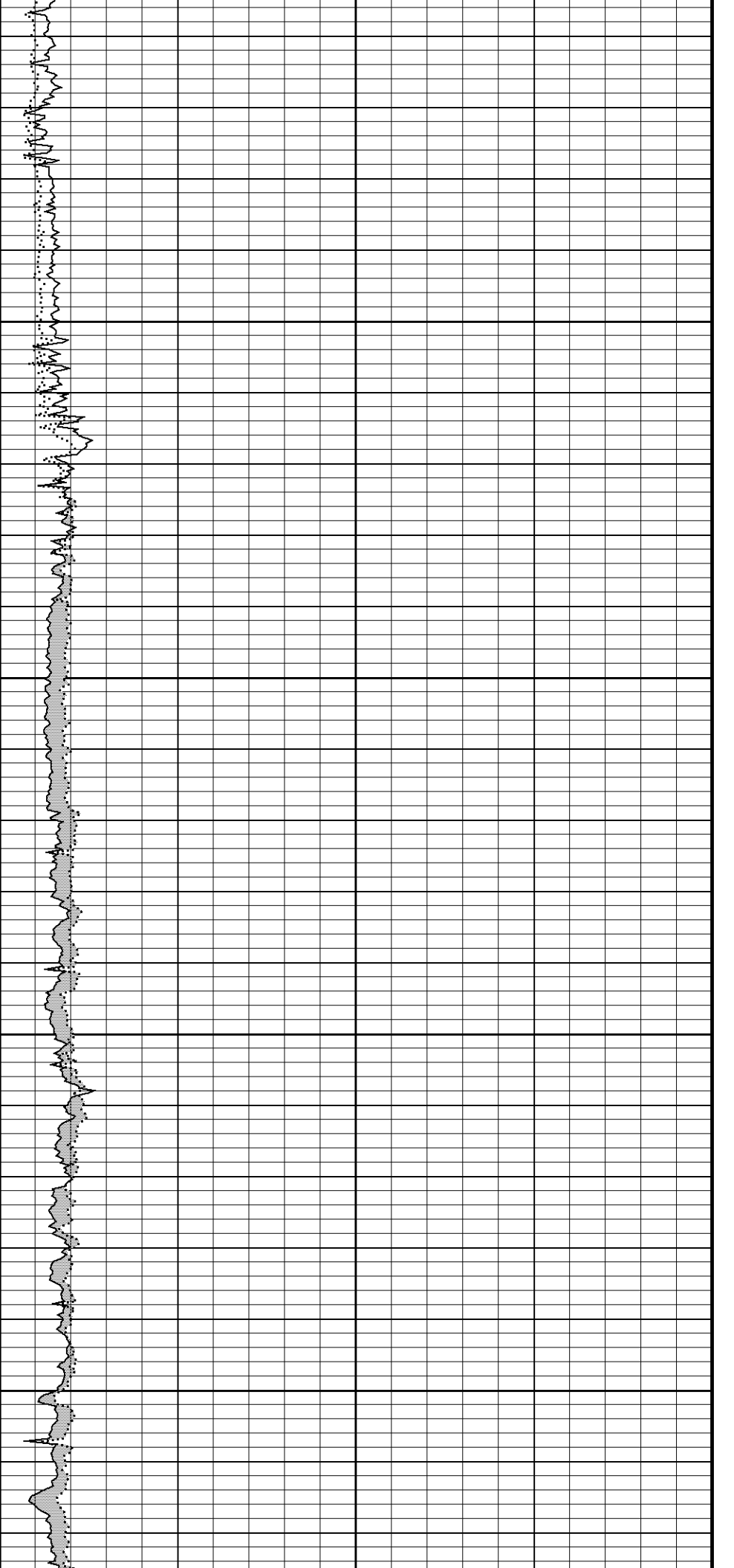
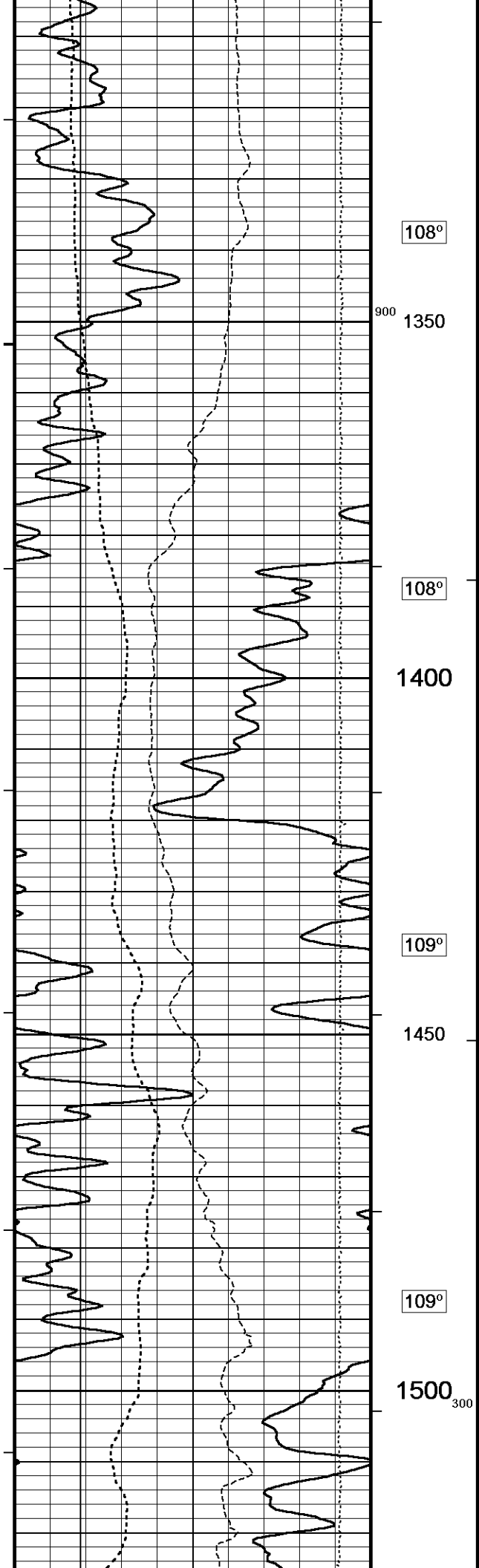


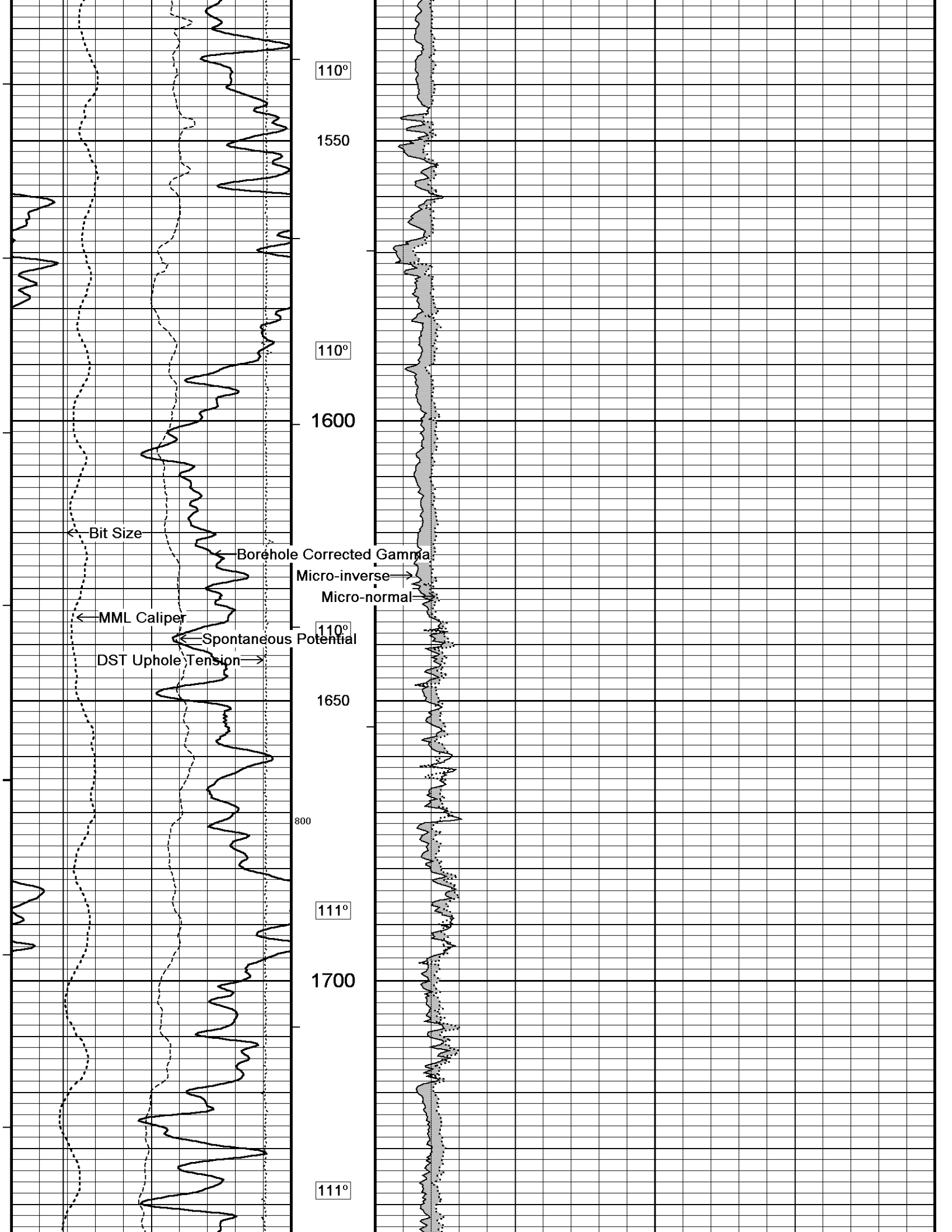


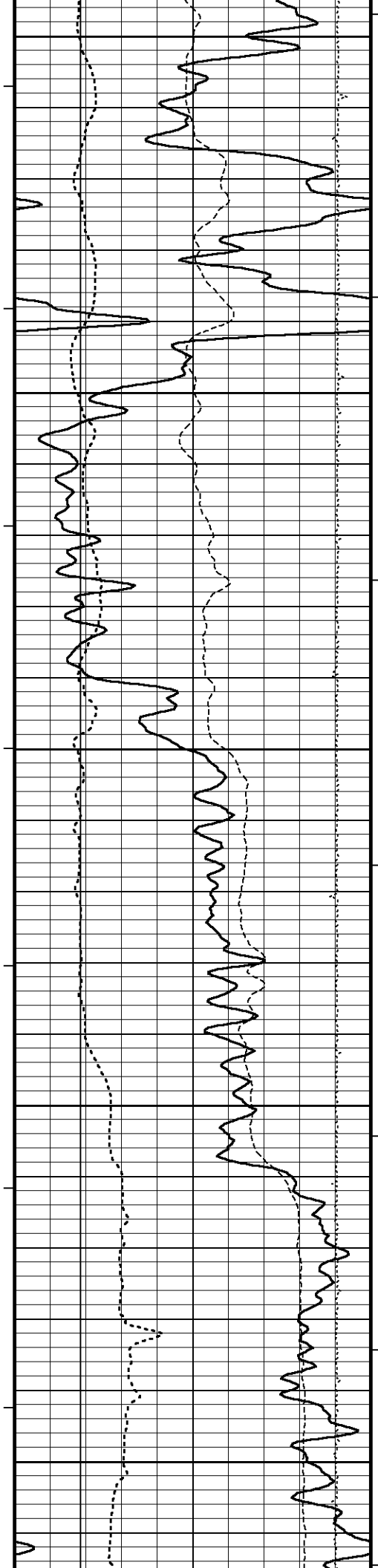












1750

112°

1800

112°

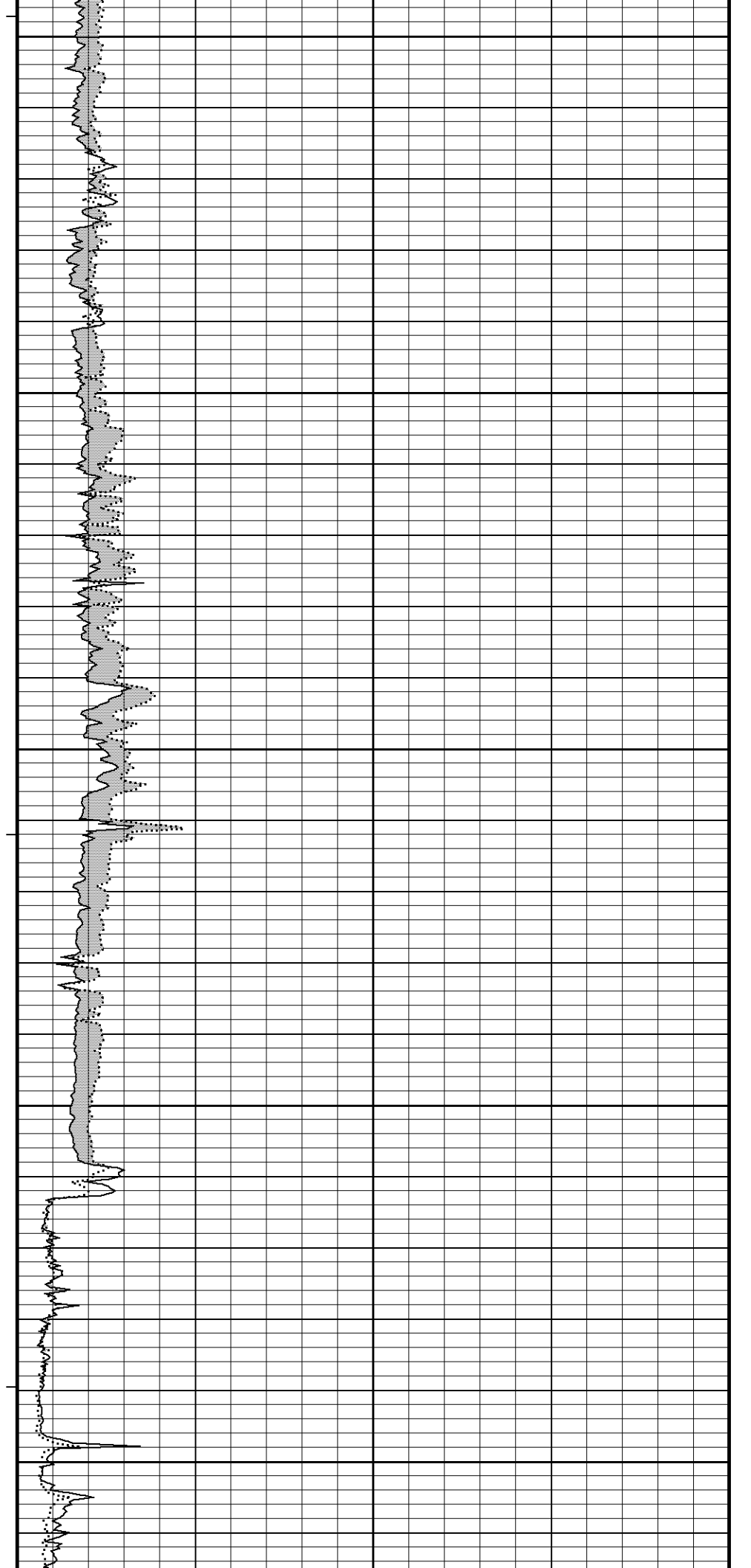
1850

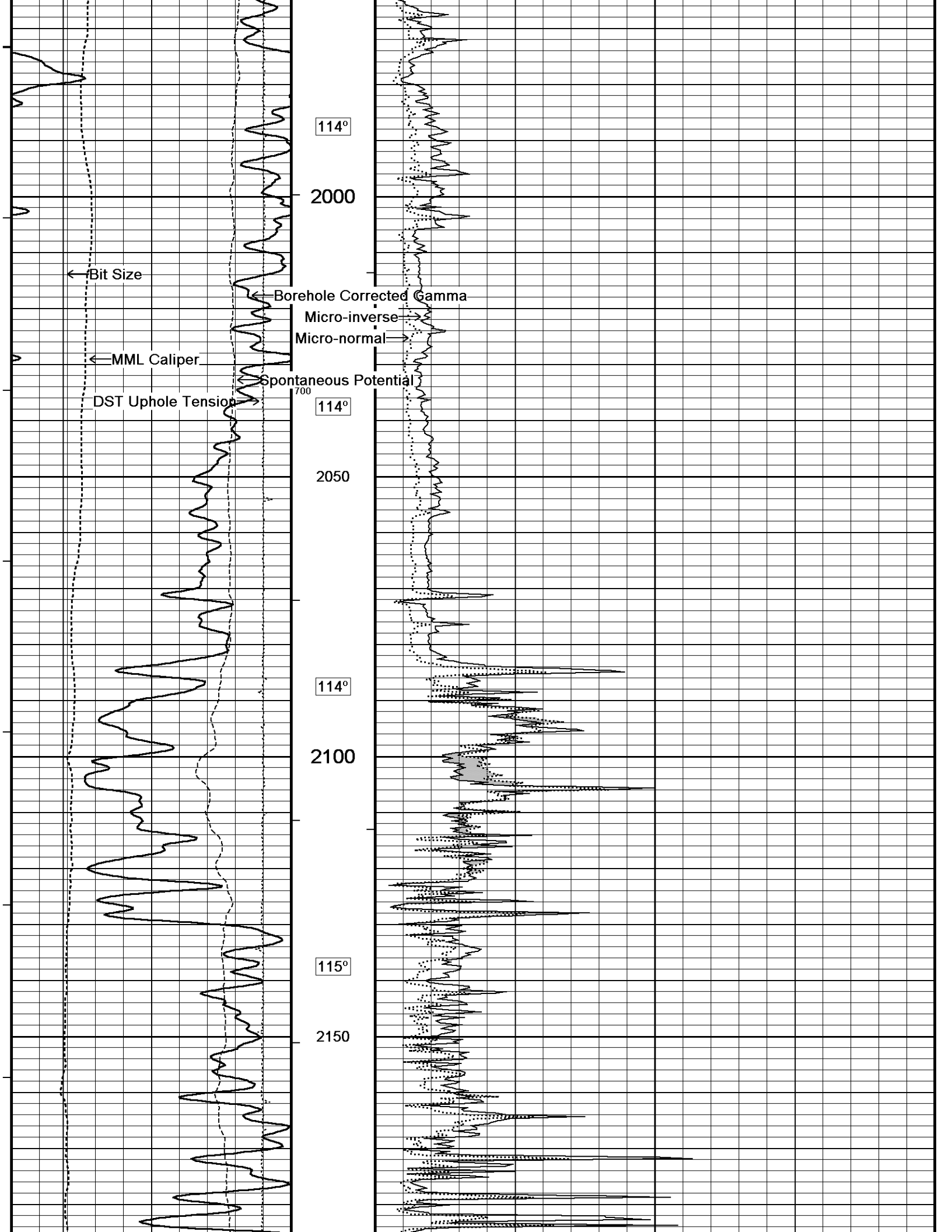
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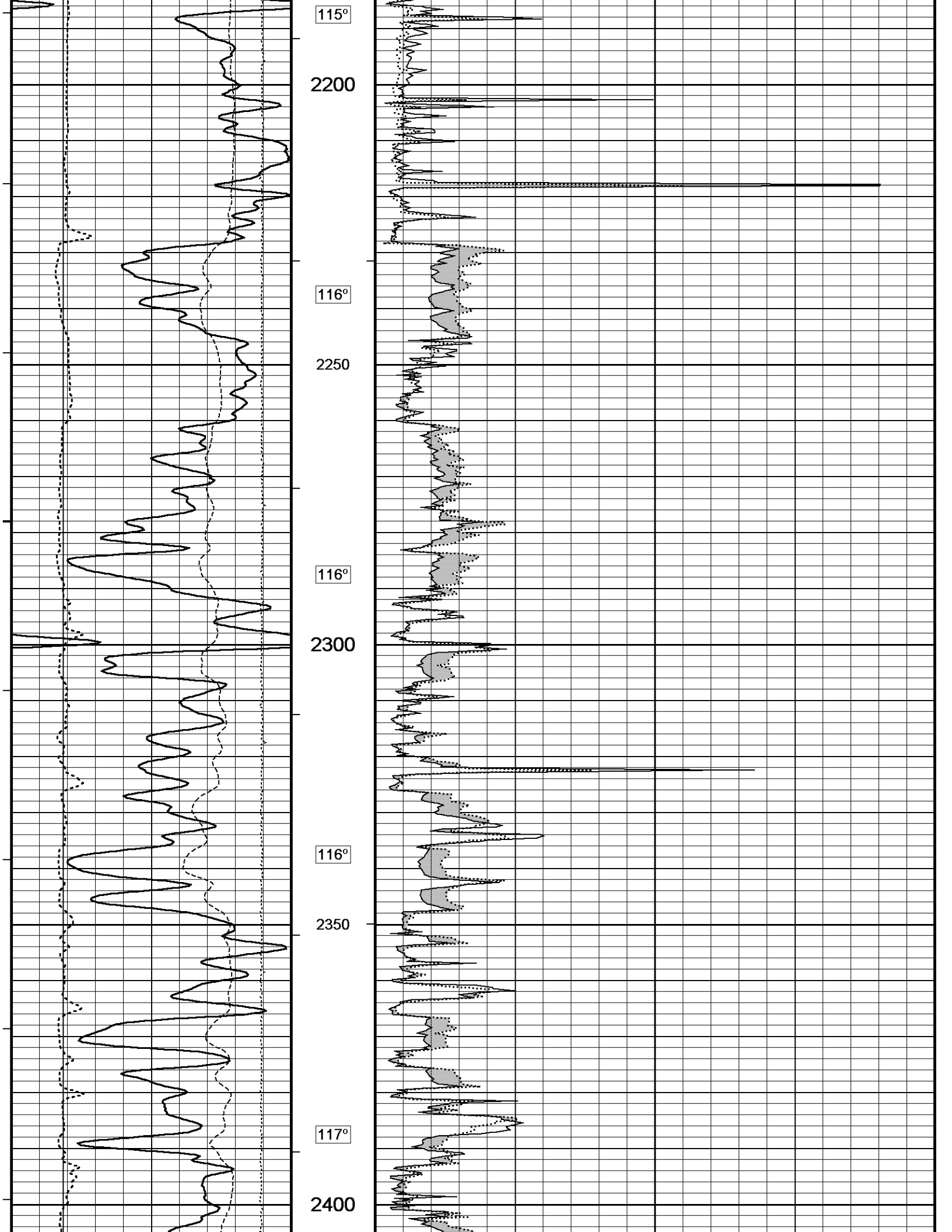
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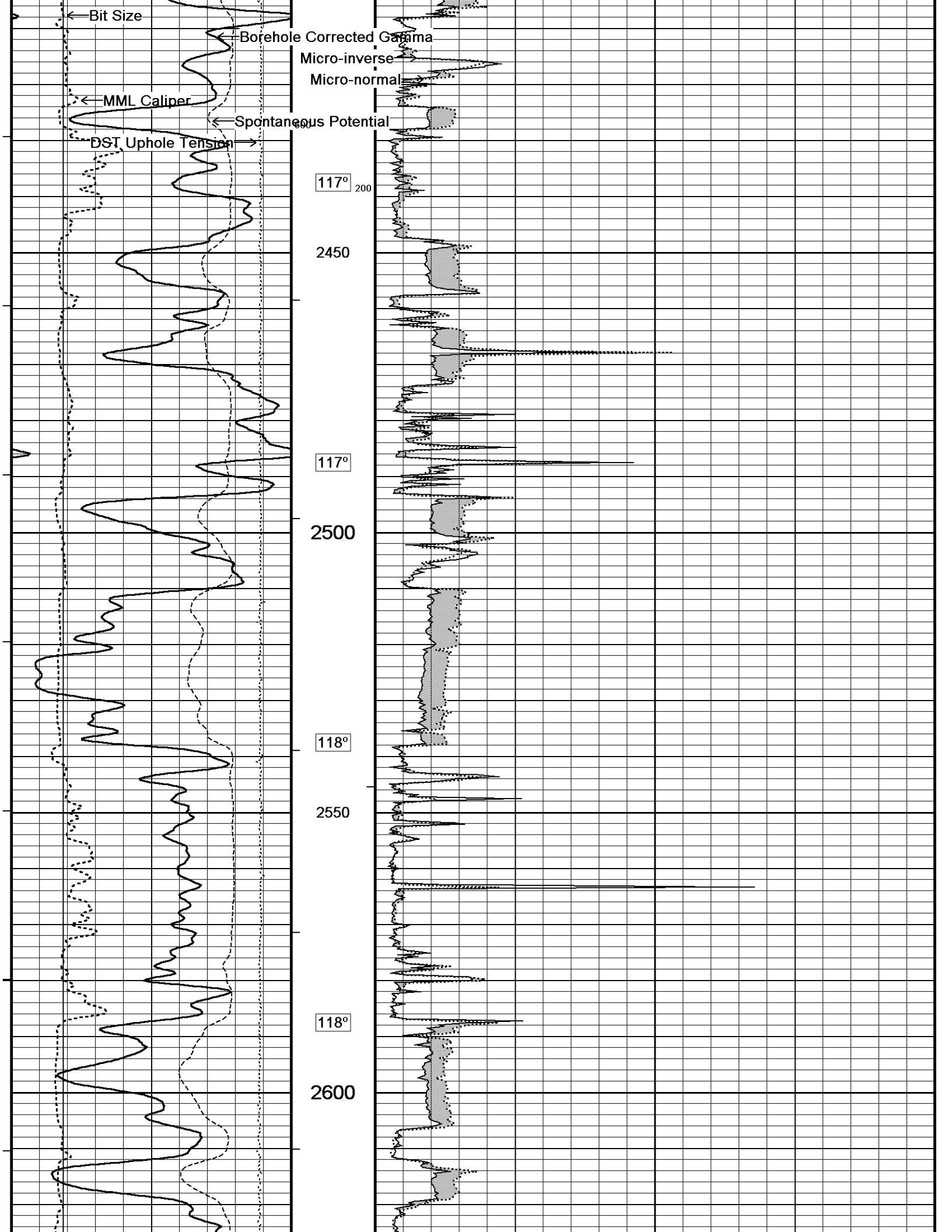
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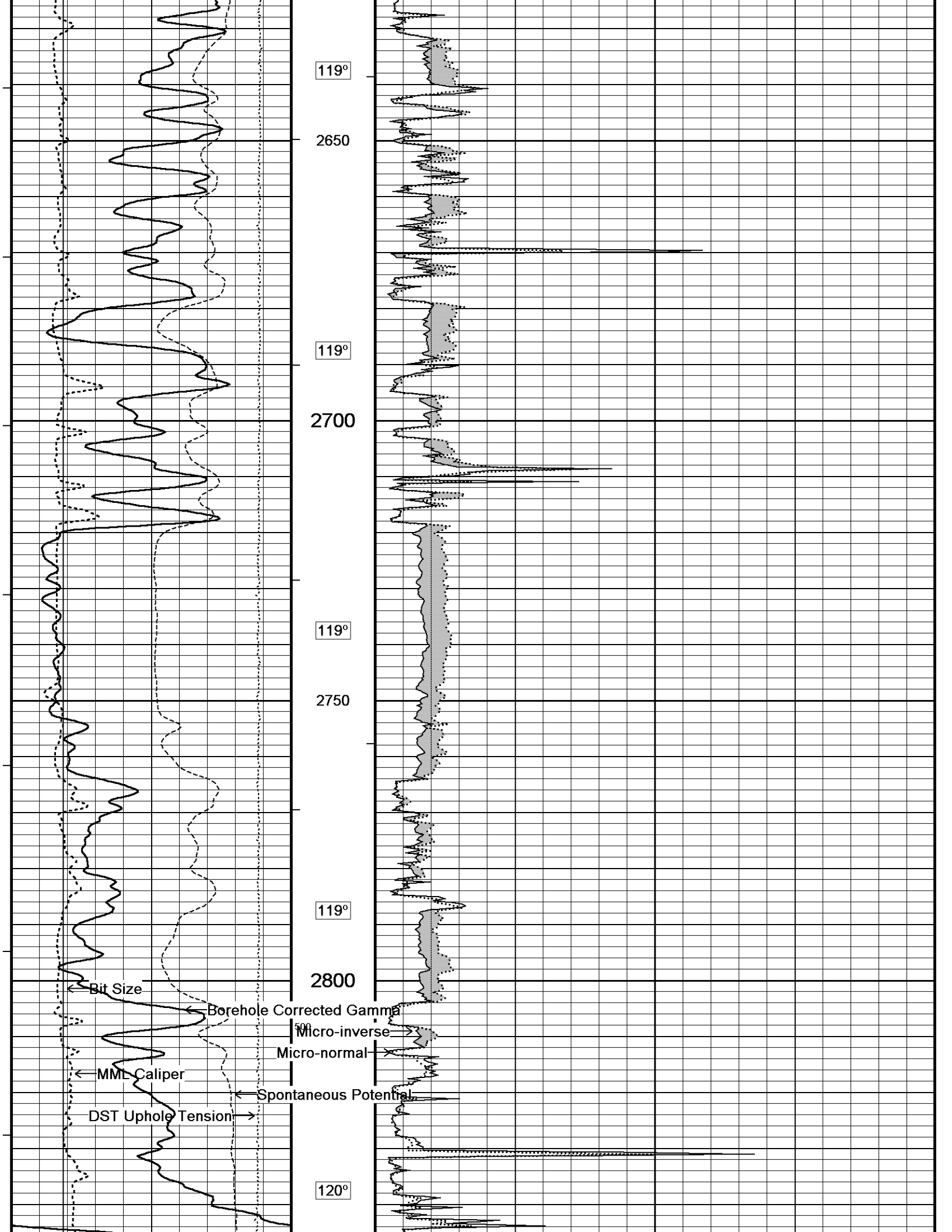
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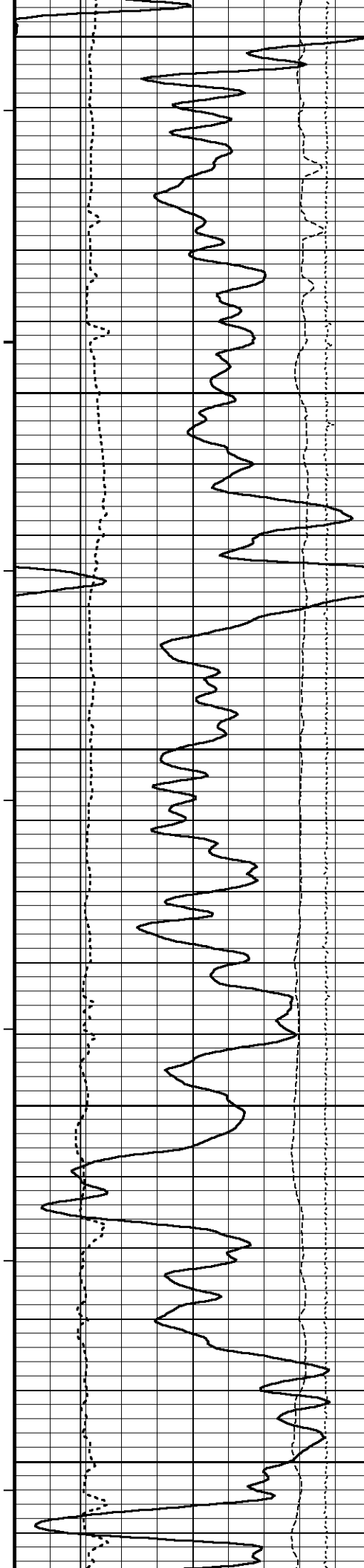












2850

120°

2900

121°

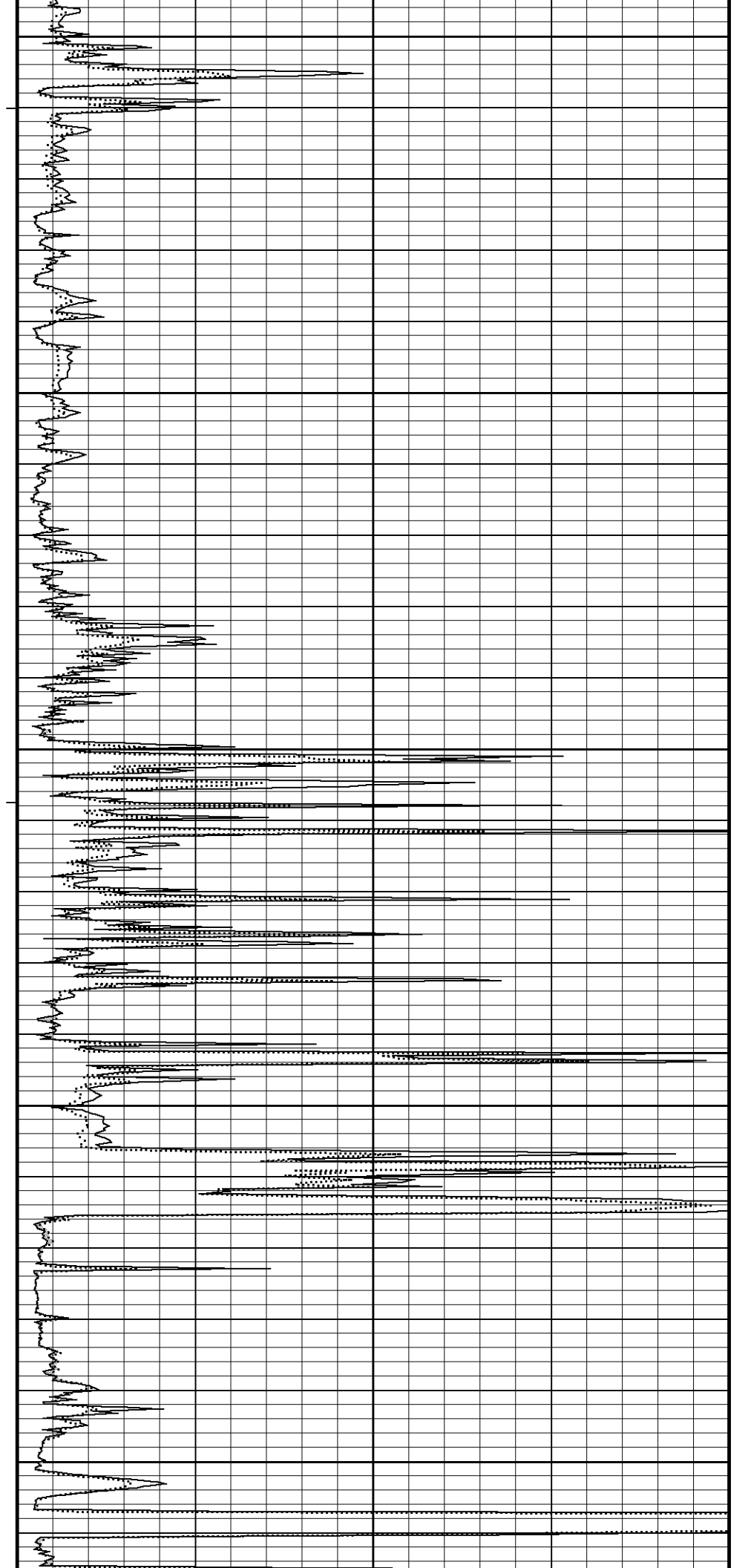
2950

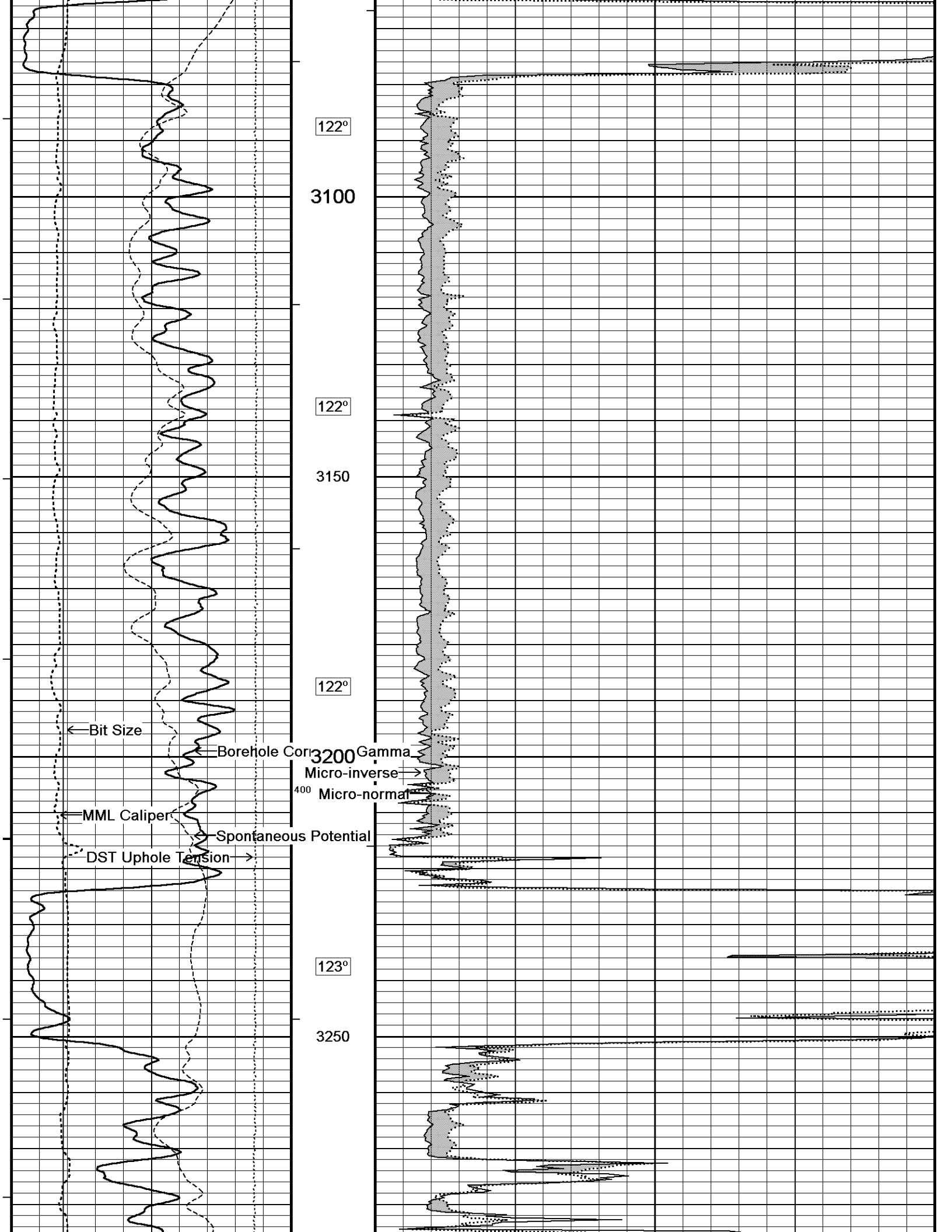
121°

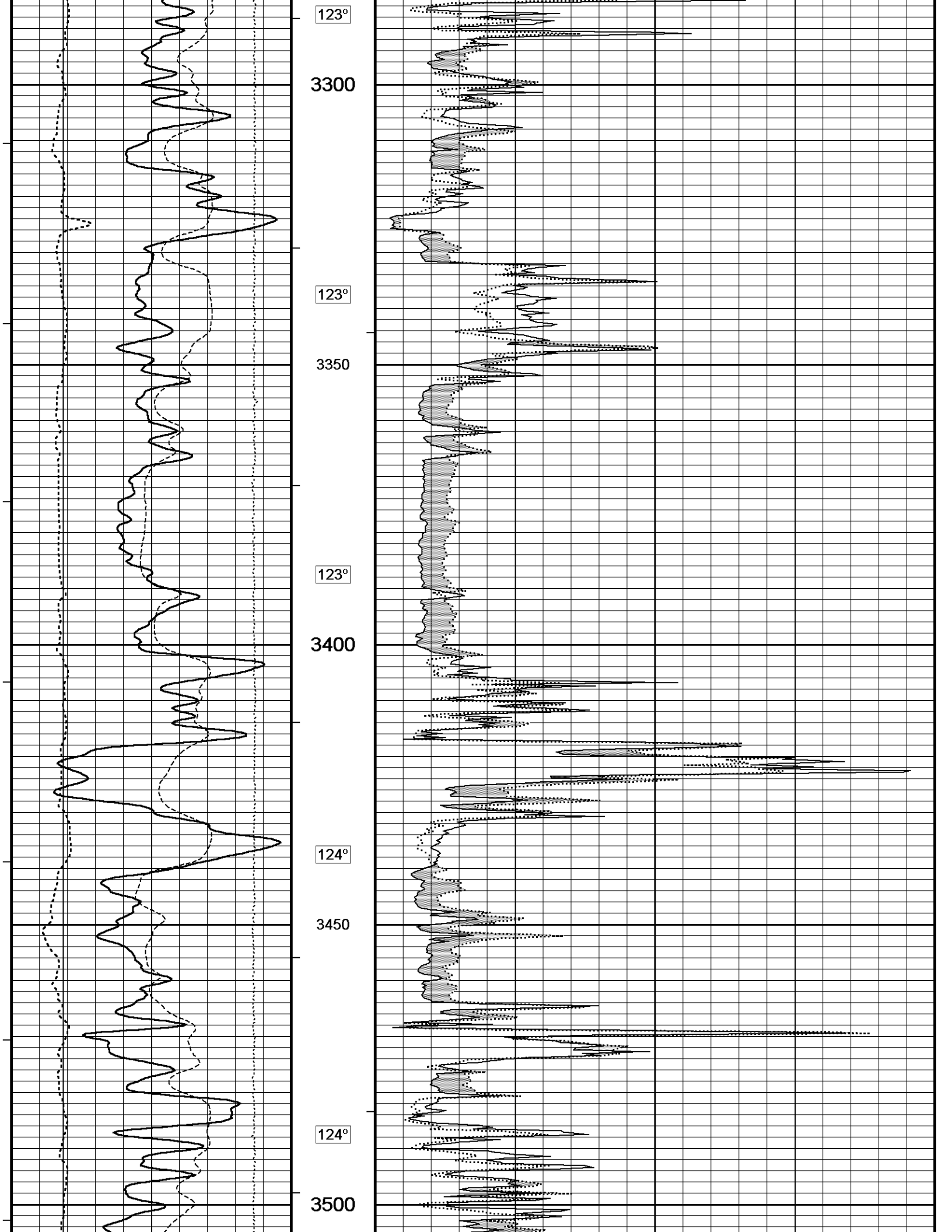
3000

121°

3050







124°

3550

124°

3600

300

125°

3650

125°

3700

← Bit Size

← Borehole Corrected Gamma

← MML Caliper

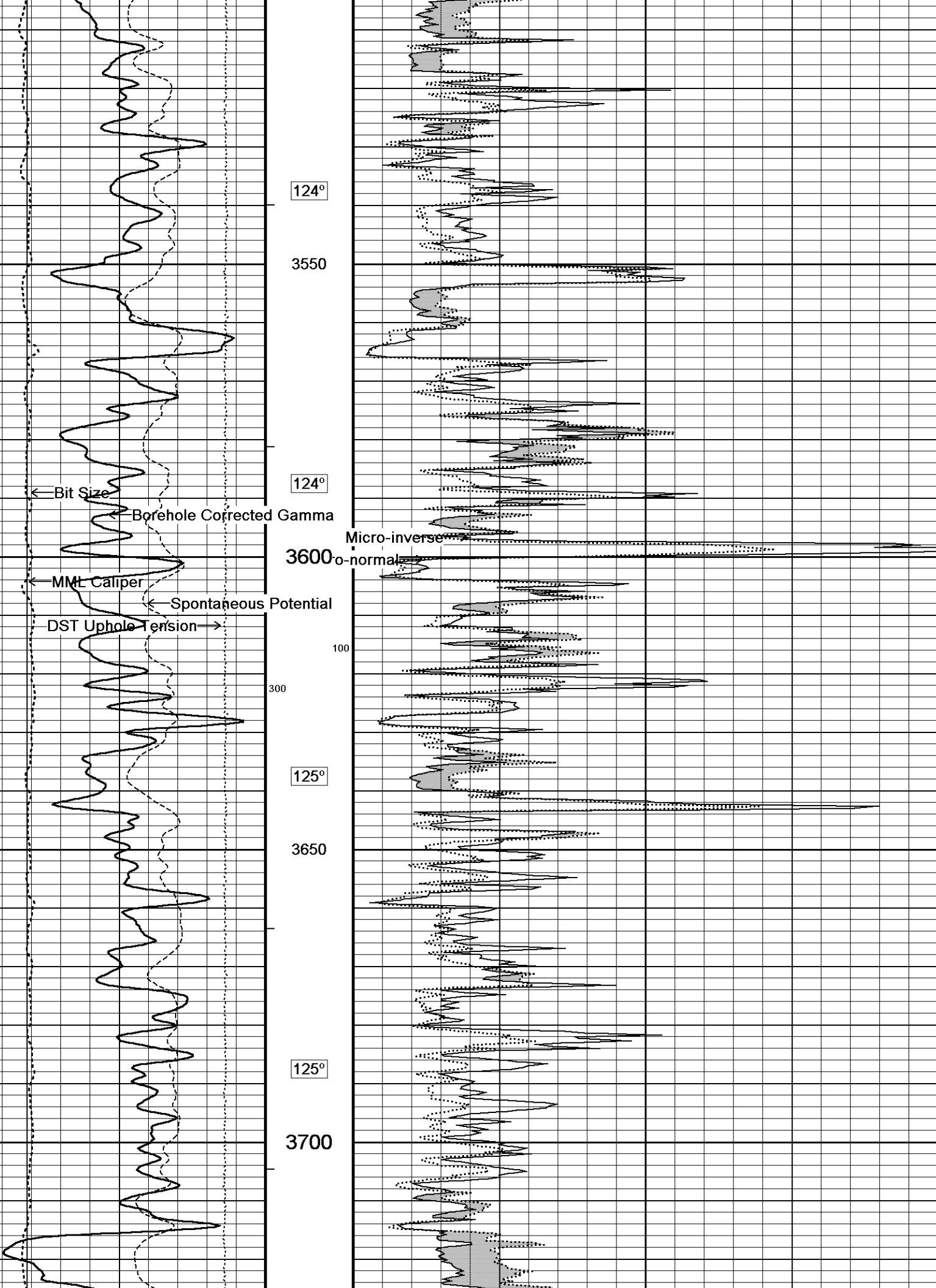
← Spontaneous Potential

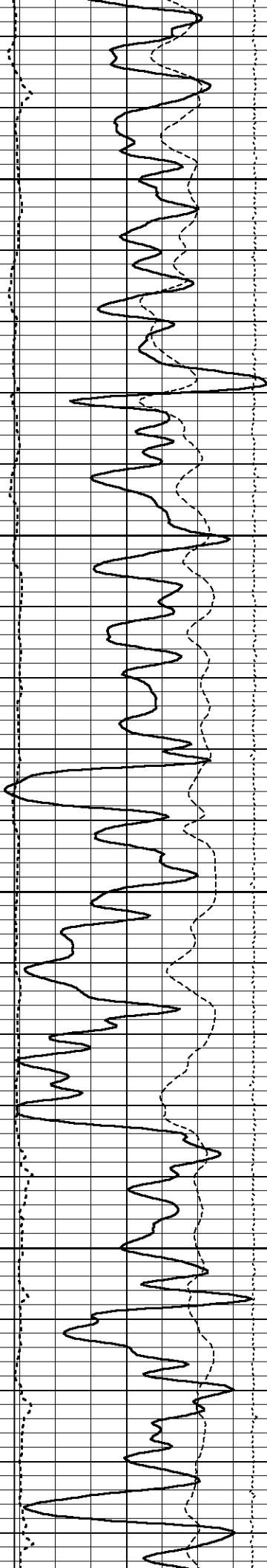
DST Uphole Tension →

Micro-inverse

o-normal

100





125°

3750

125°

3800

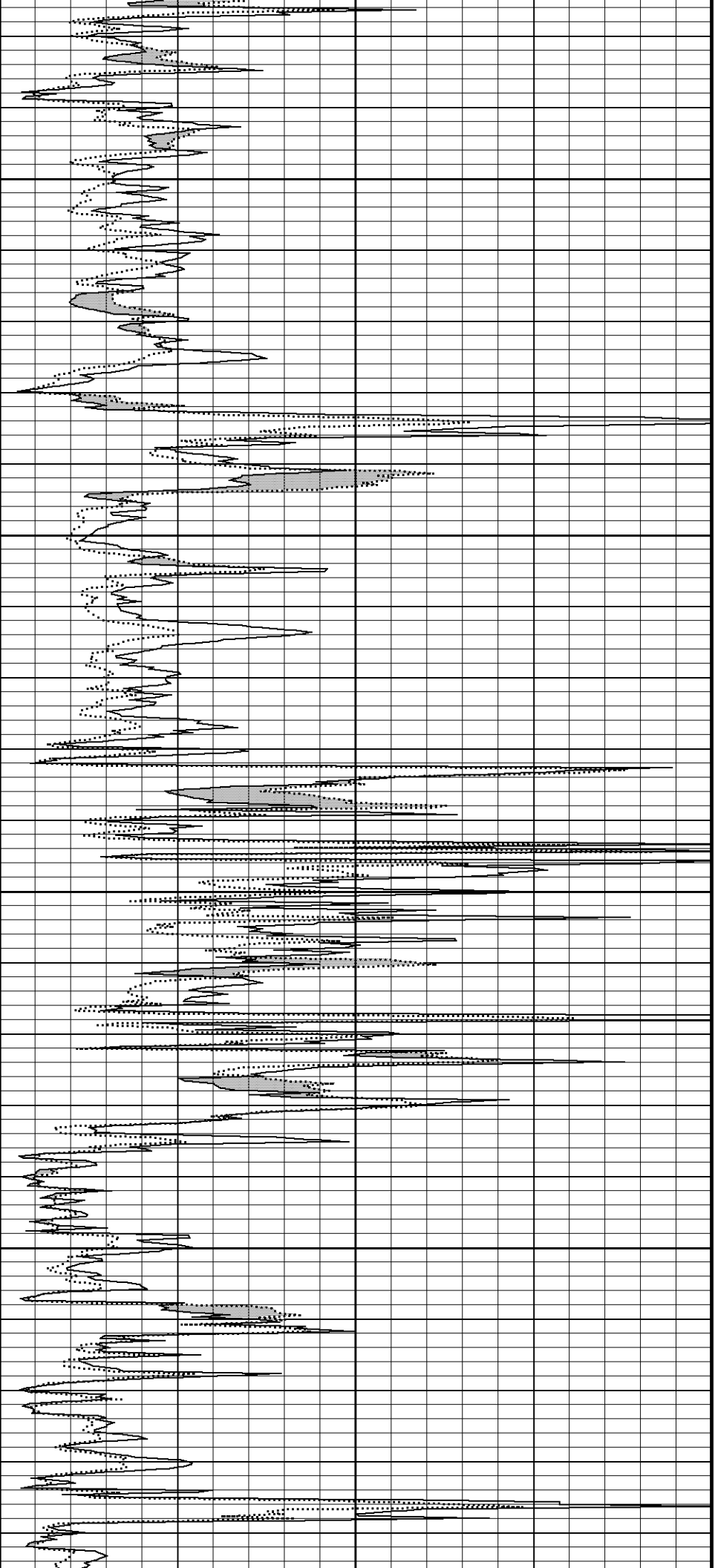
125°

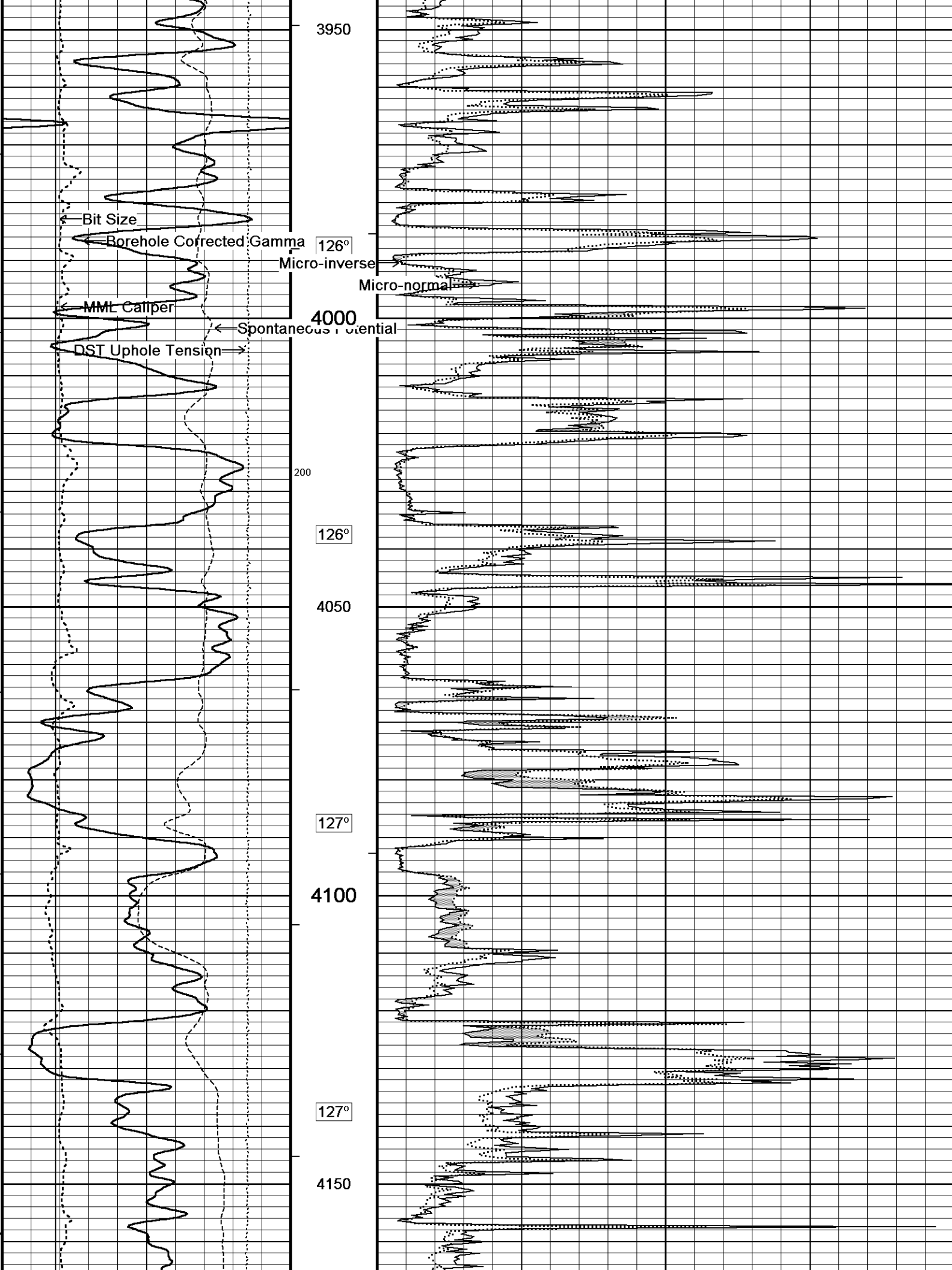
3850

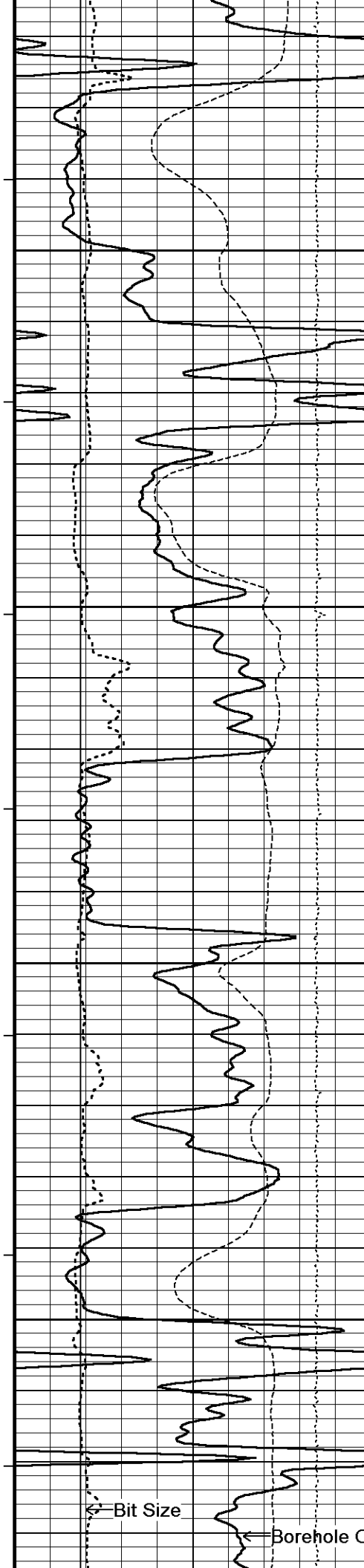
125°

3900

126°







128°

4200

128°

4250

129°

4300

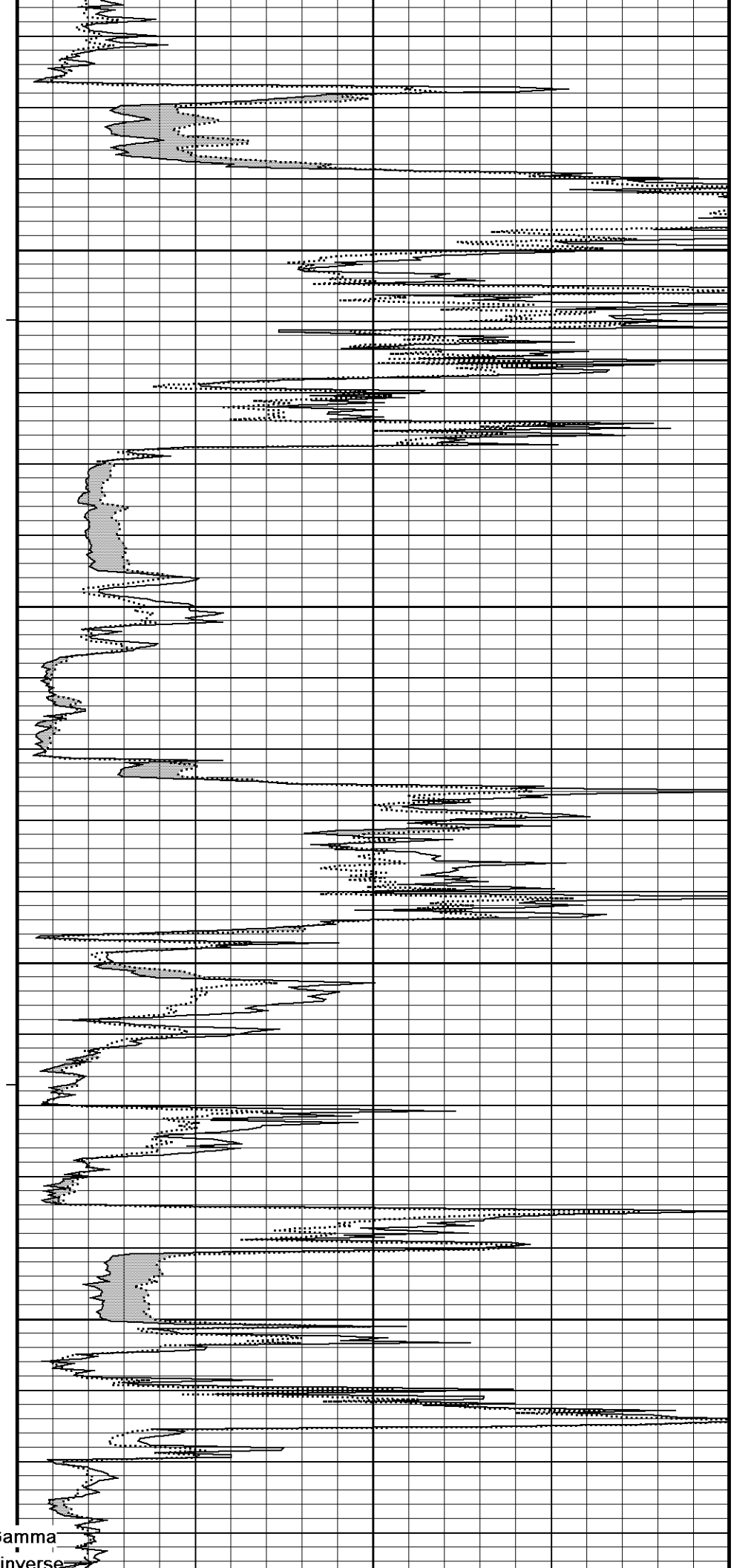
129°

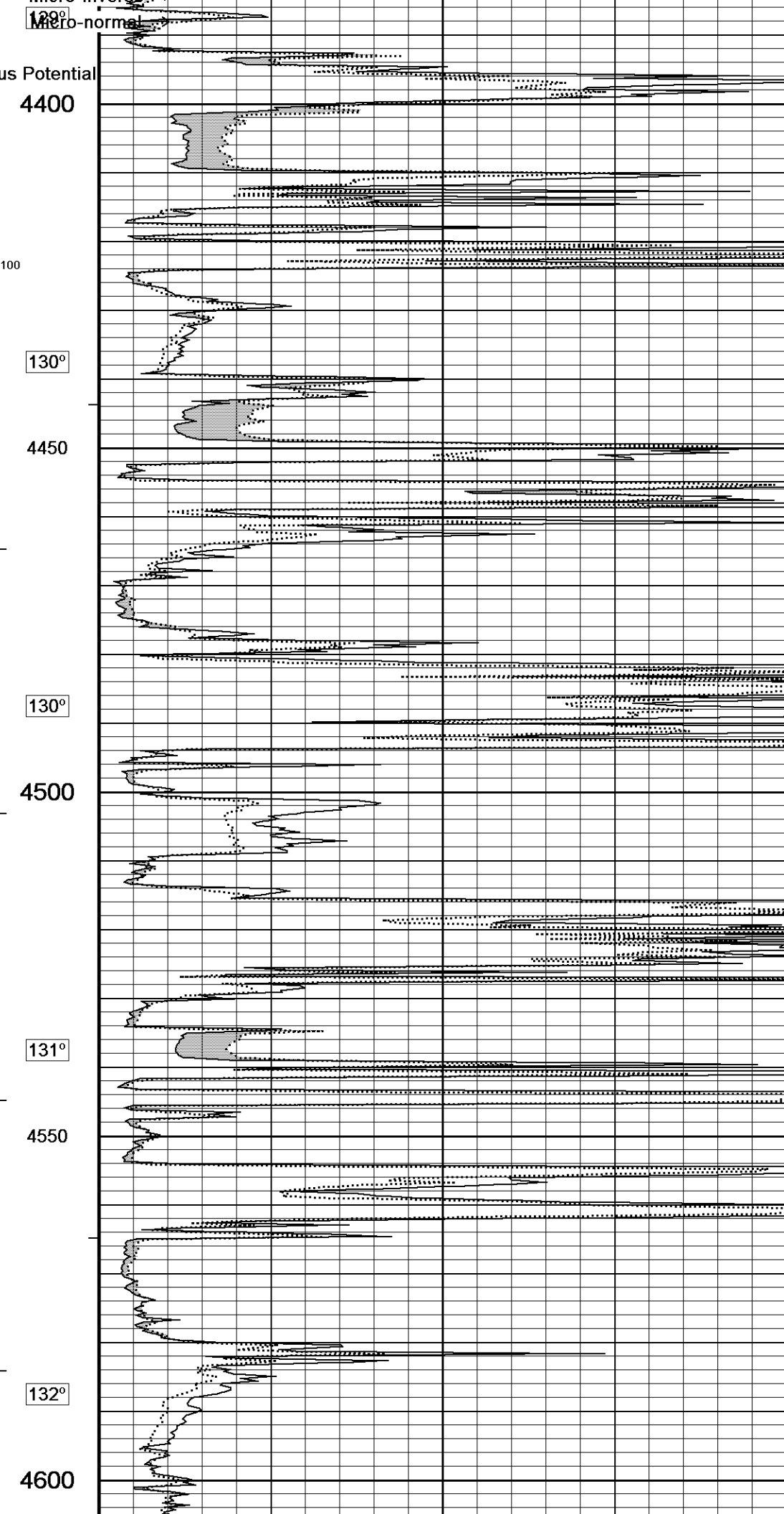
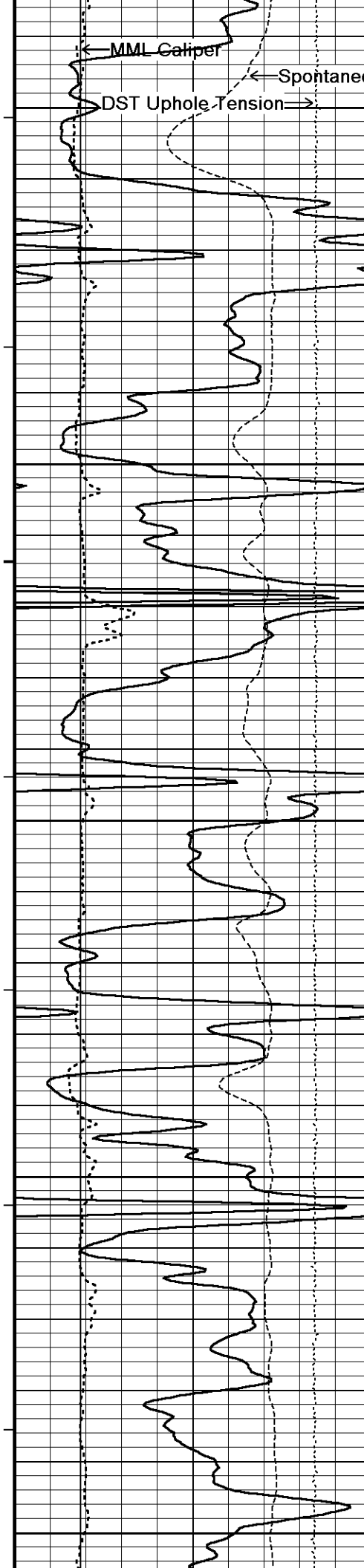
4350

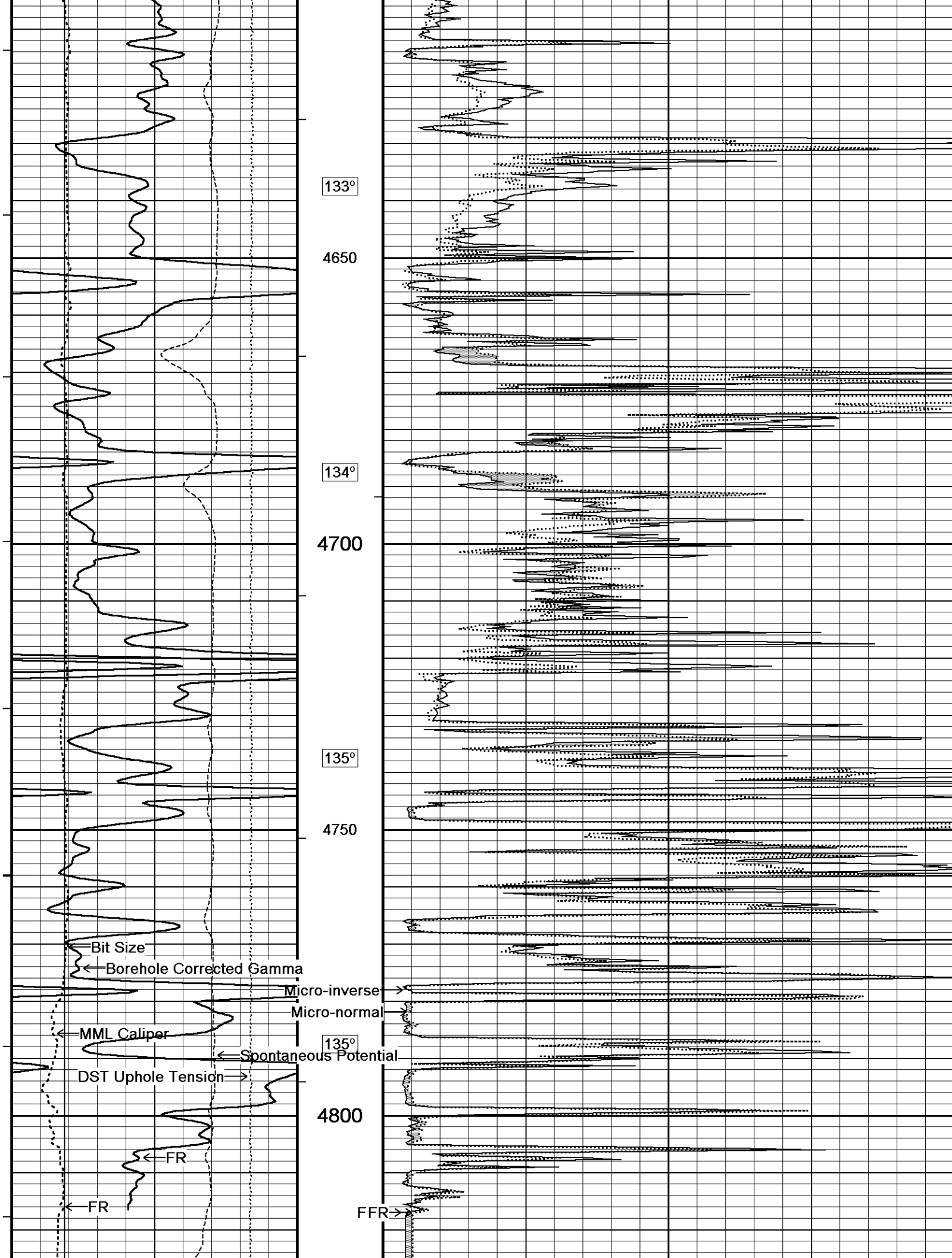
← Bit Size

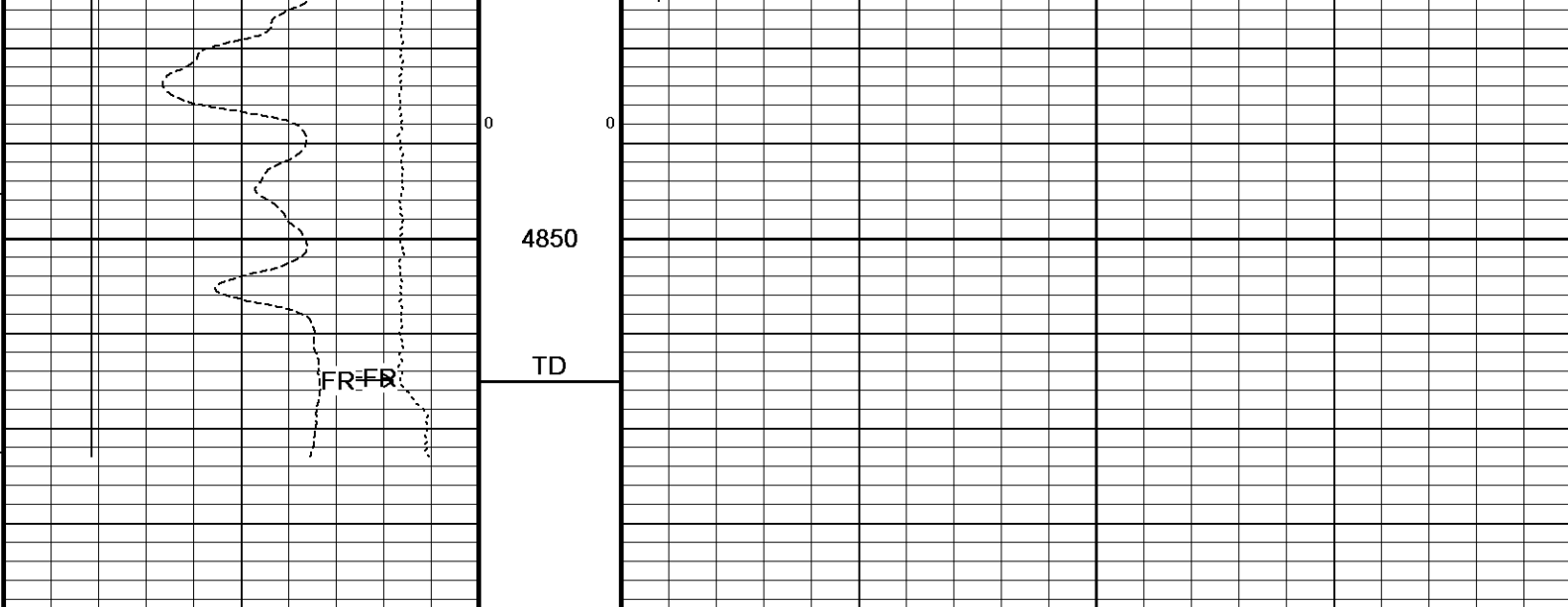
← Borehole Corrected Gamma

Micro-inverse









← Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
- → | 20 | ← +

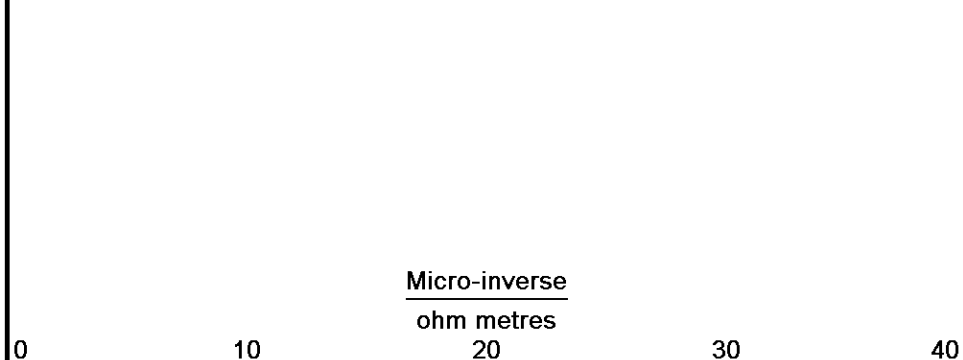
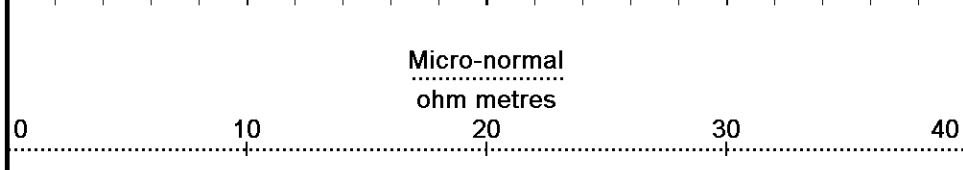
MML Caliper
inches
6 11 16

Borehole Corrected Gamma
API
0 75 150
150 225 300

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet
4850
TD
Borehole Temp in deg F
HVI every 10 cu ft
Annular Integral every 10 cu ft
Replay Scale 1:240

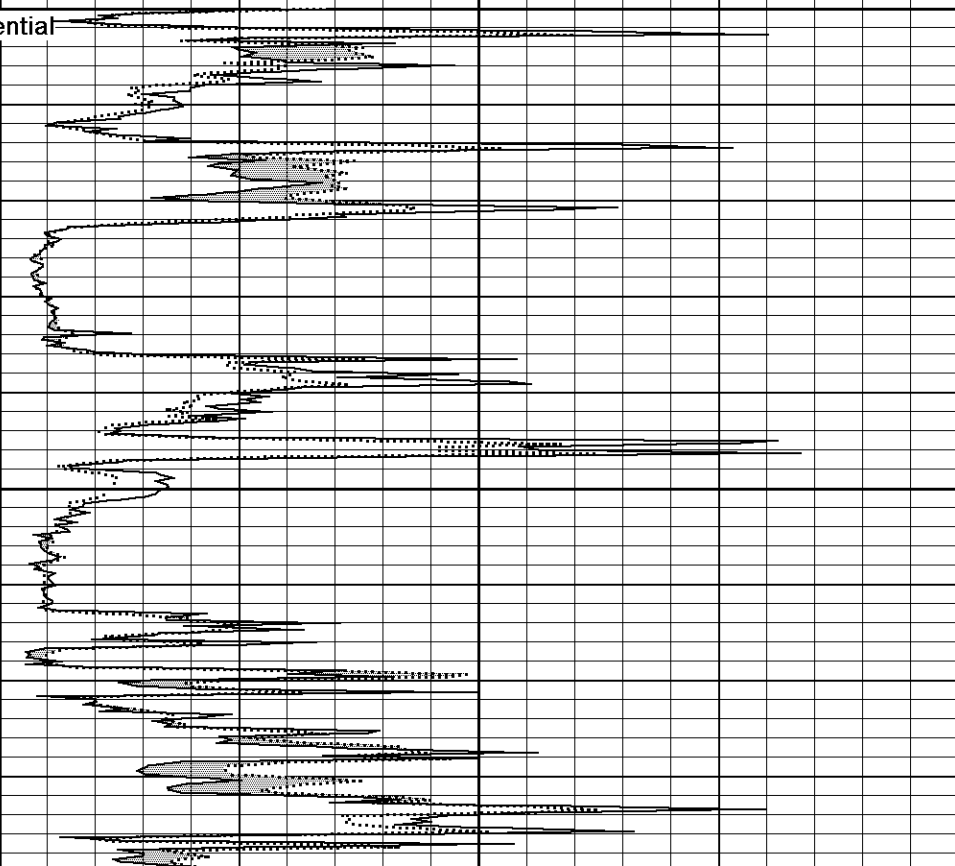
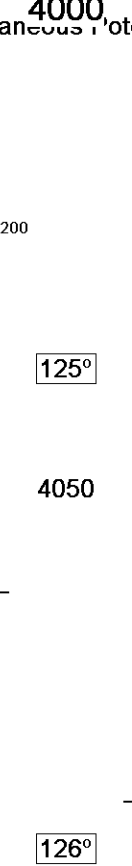
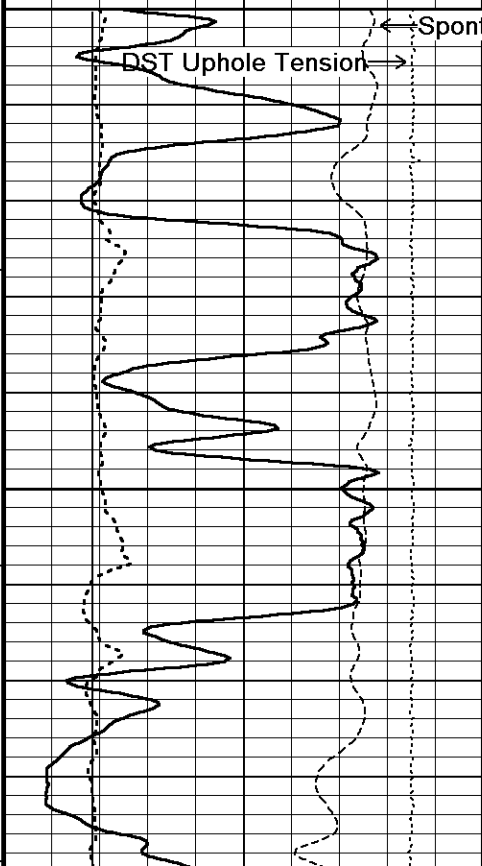
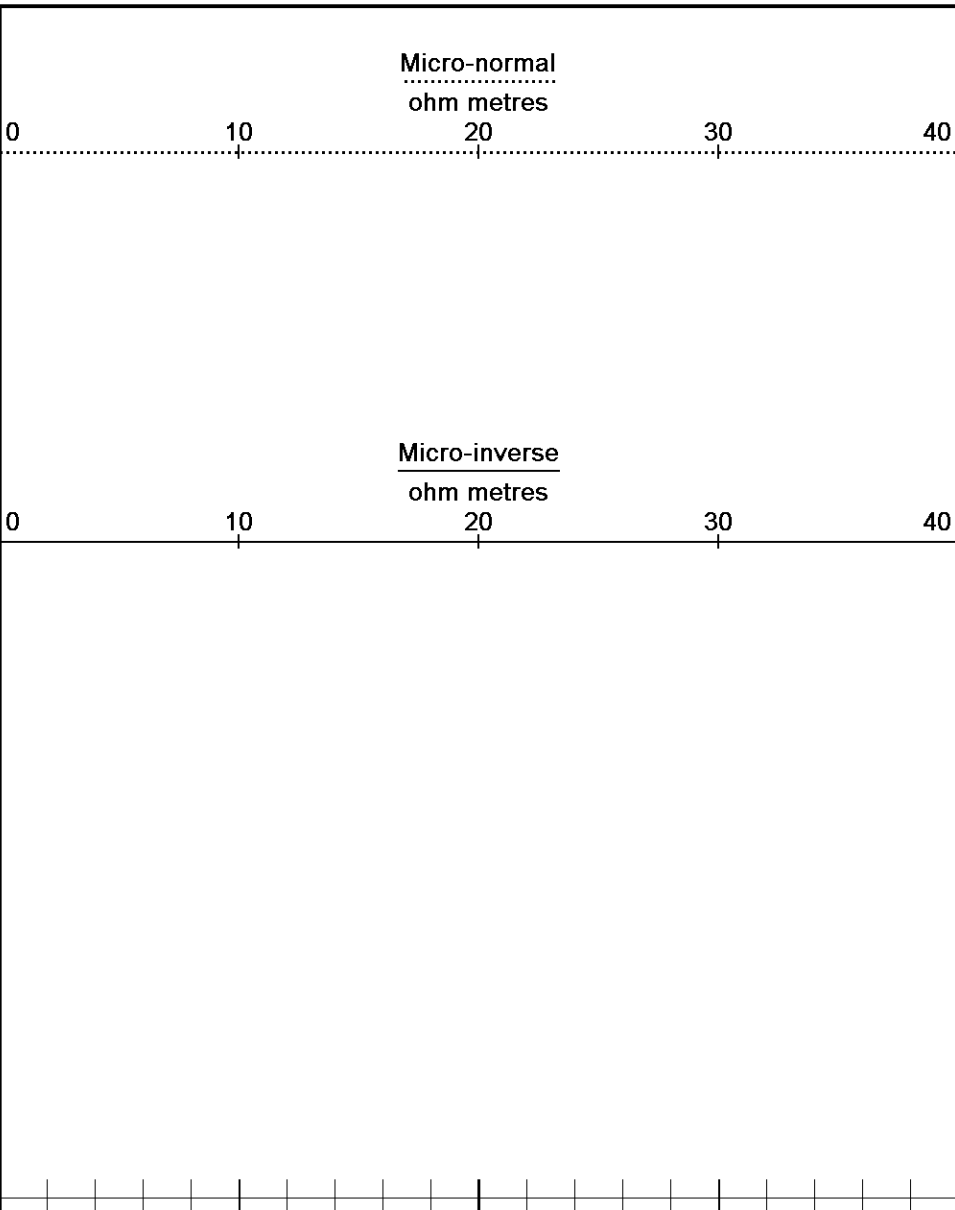
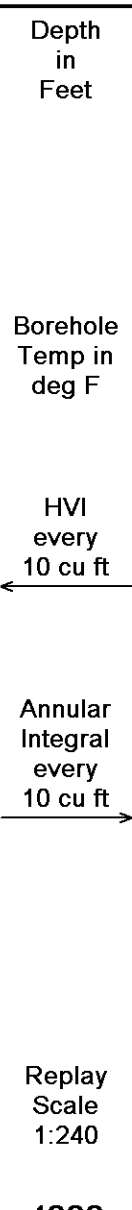
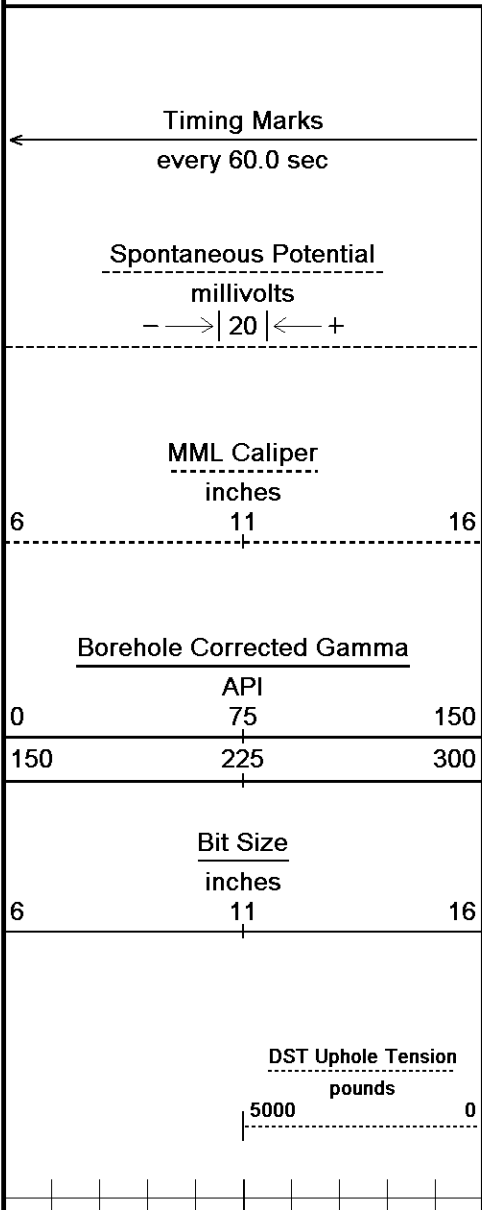


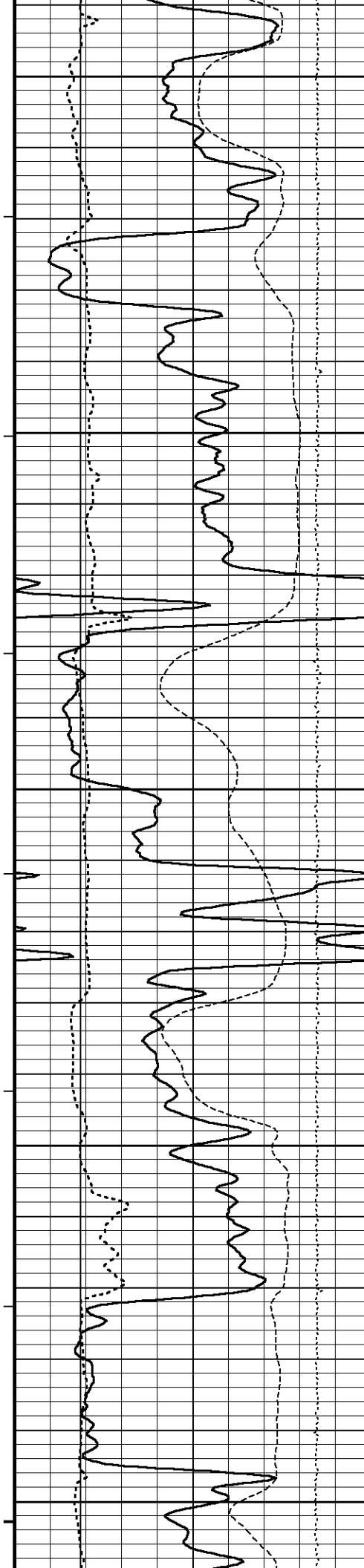
Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta
 System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
 Plotted on 22-MAR-2019 08:17
 Recorded on 22-MAR-2019 00:23

↑ 5 INCH MAIN 1:240 ↑

↓ REPEAT SECTION 1:240 ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS_001.dta
 System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761
 Plotted on 22-MAR-2019 08:17
 Recorded on 21-MAR-2019 23:34





4100

126°

4150

126°

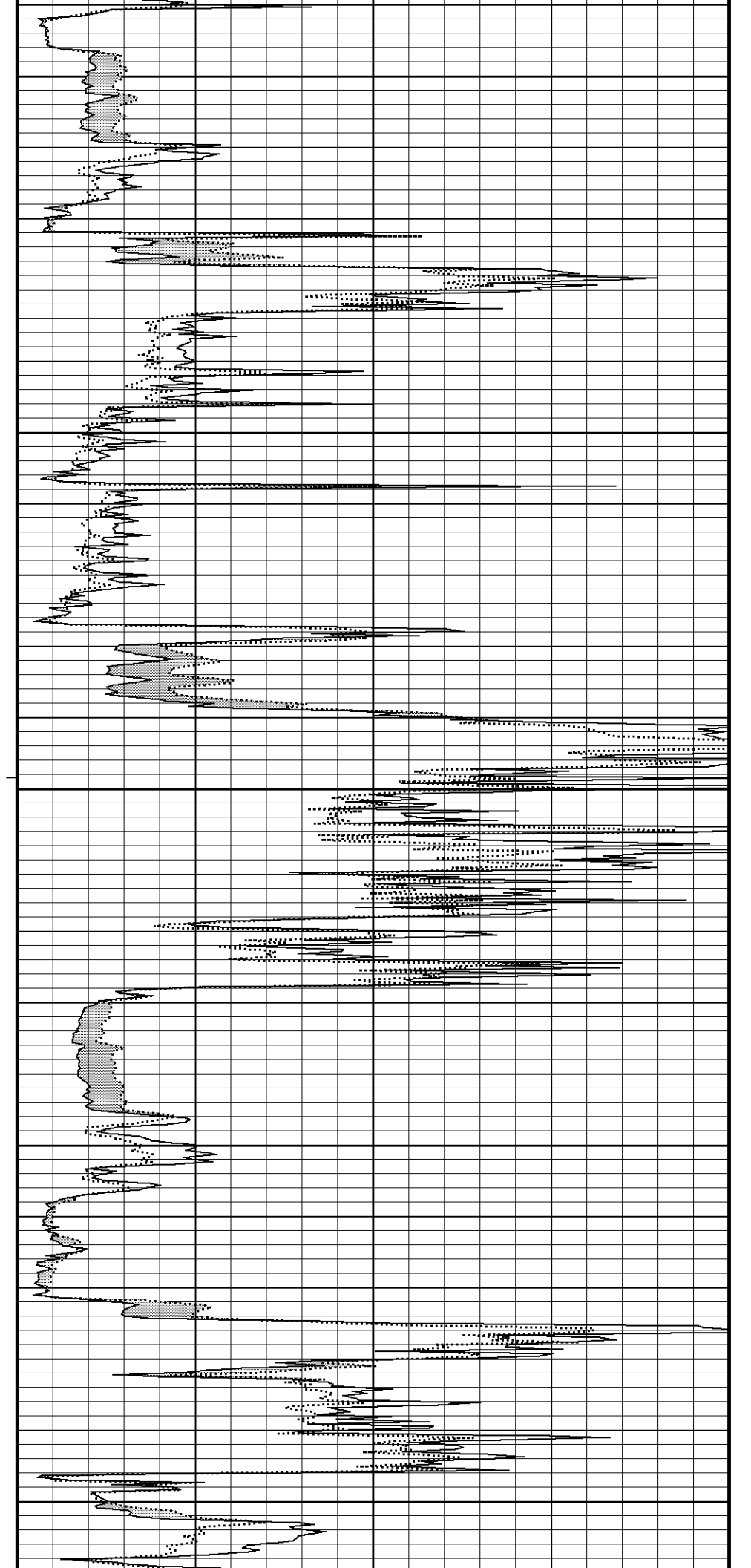
4200

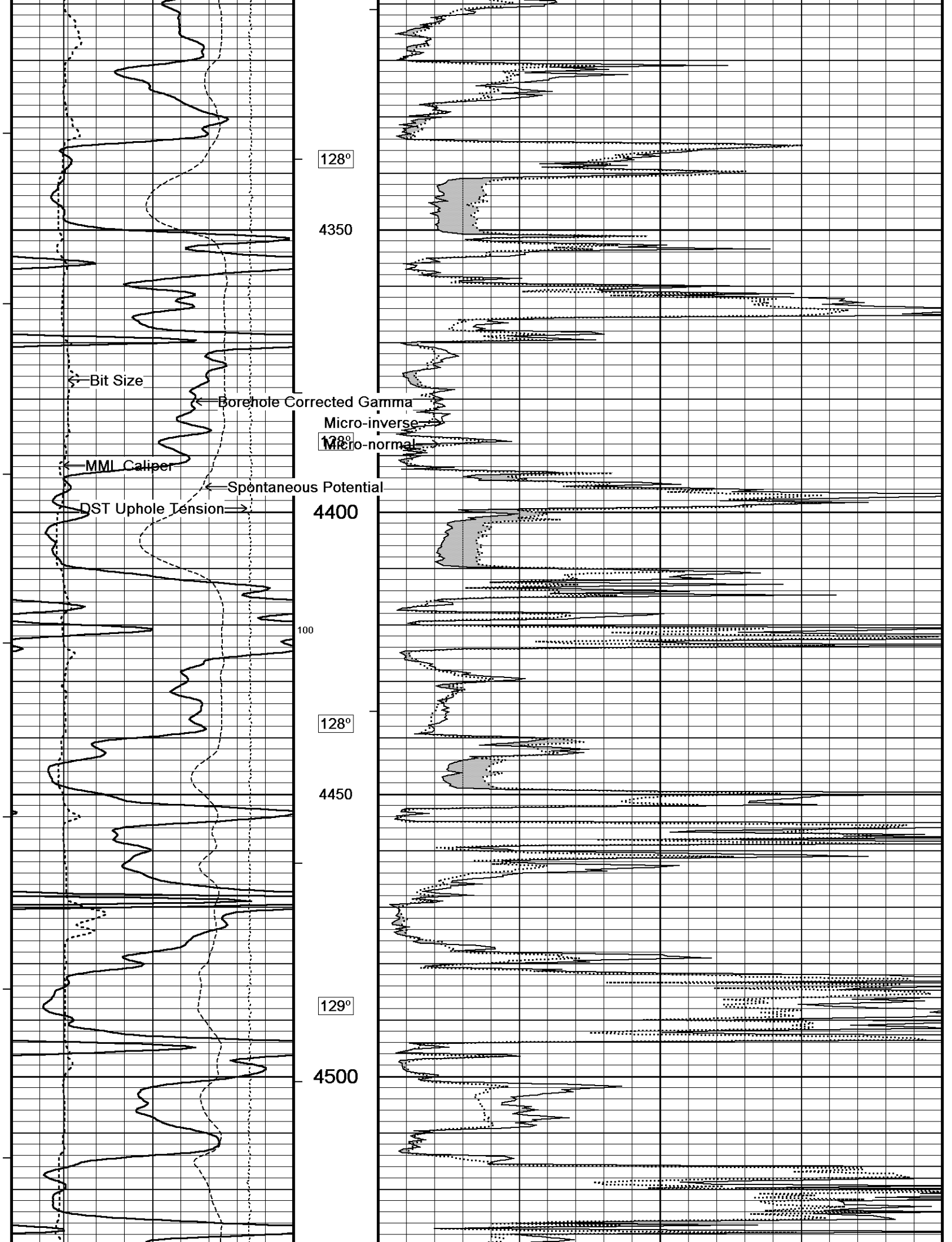
127°

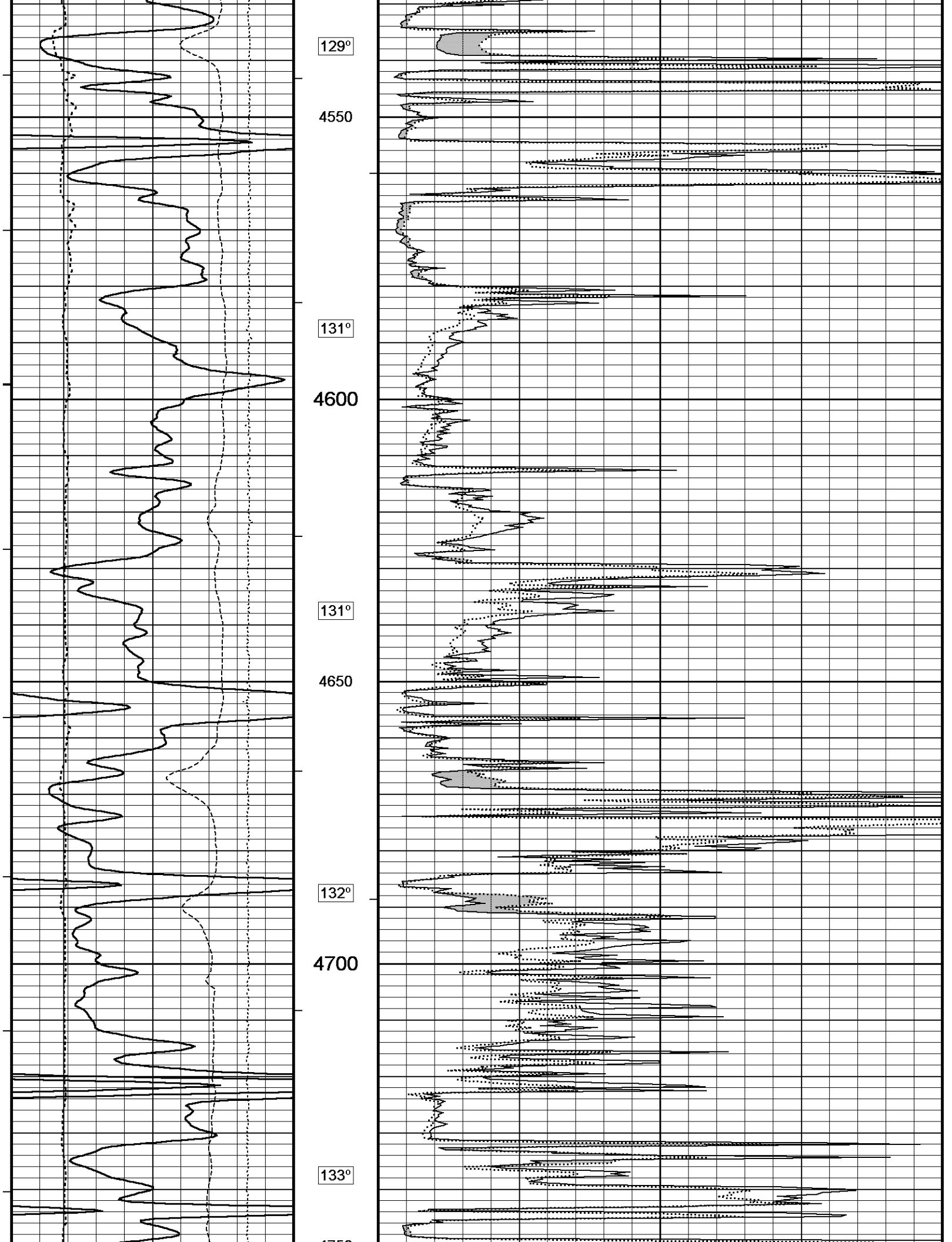
4250

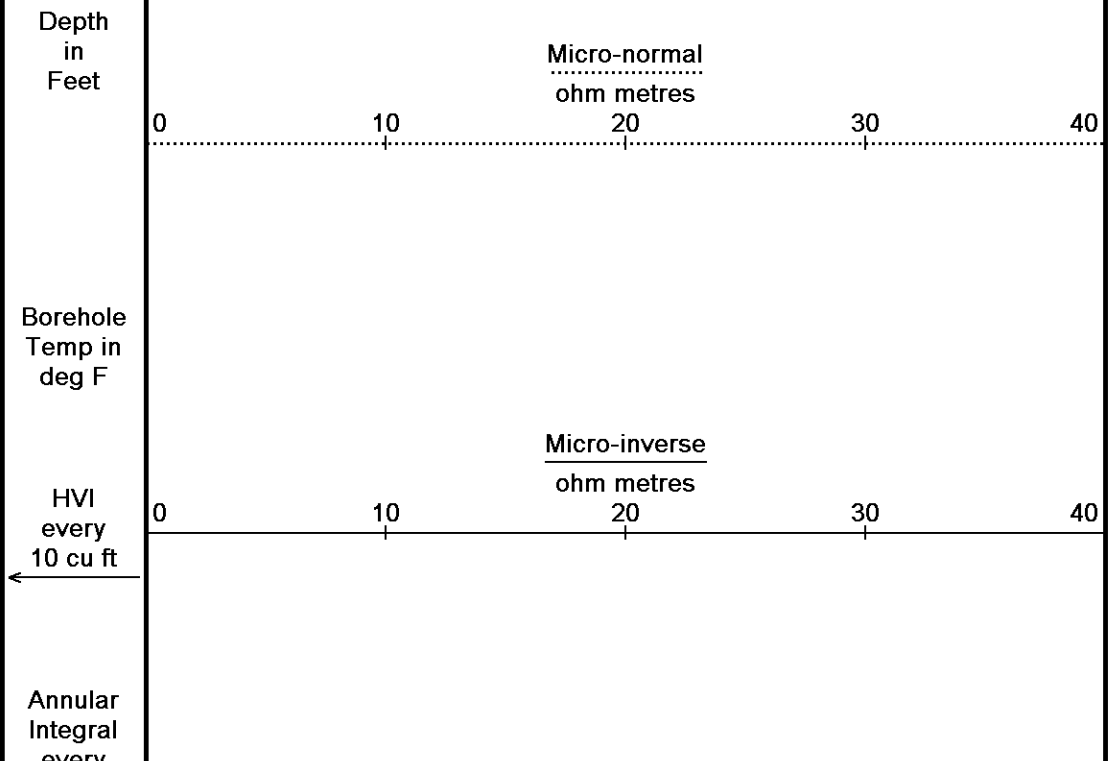
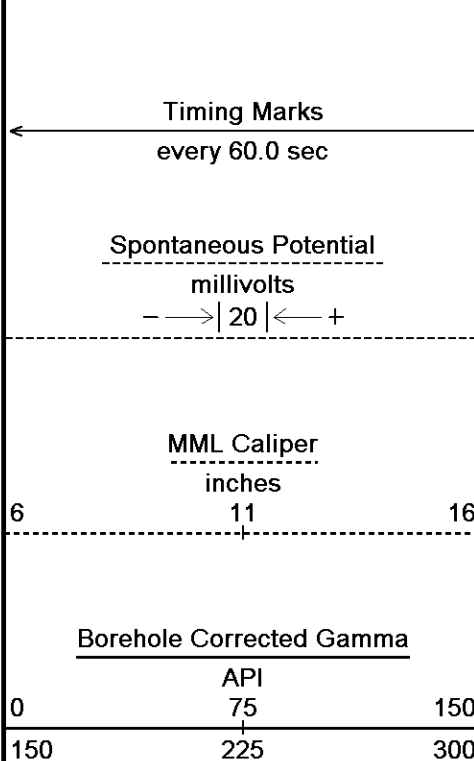
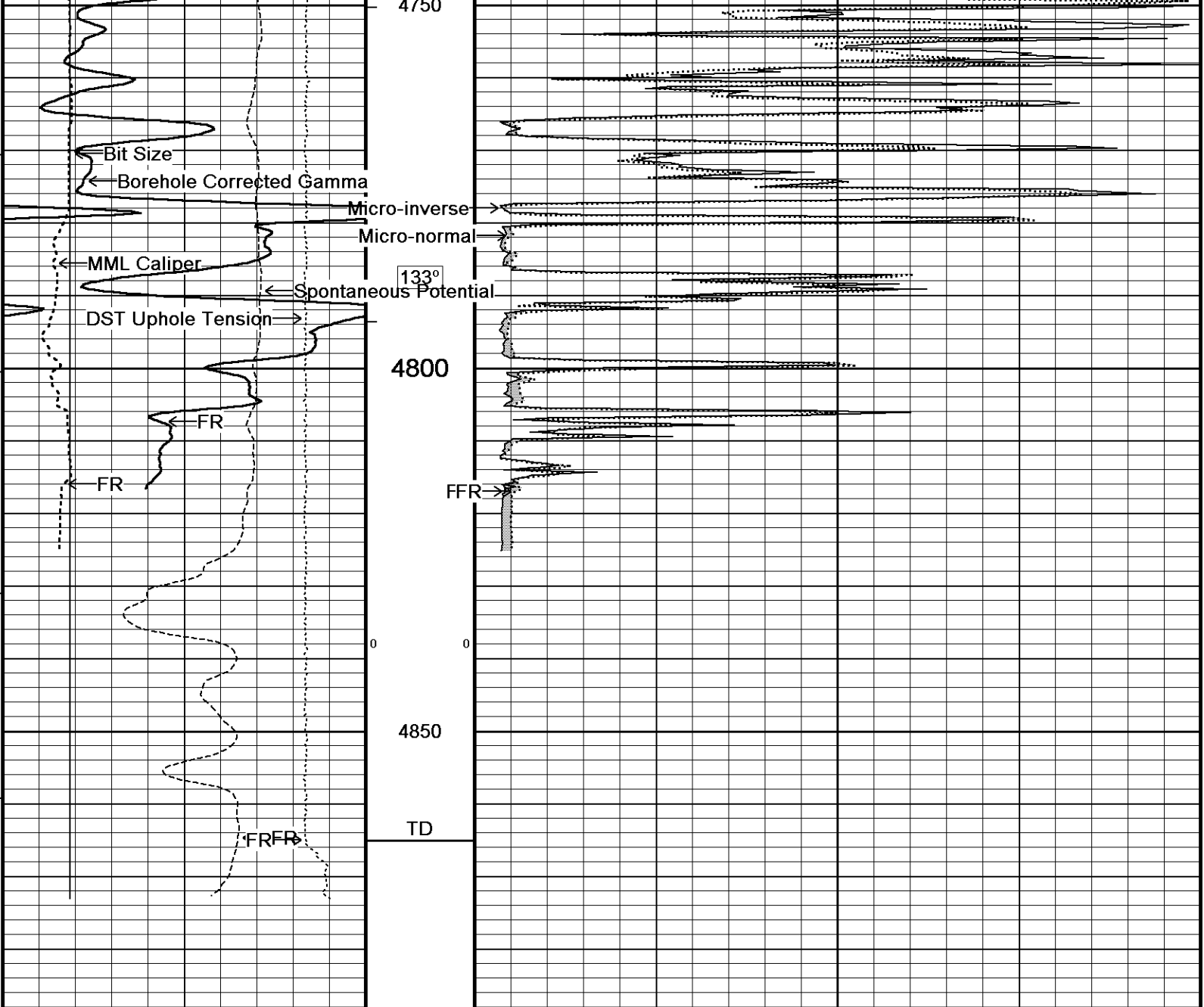
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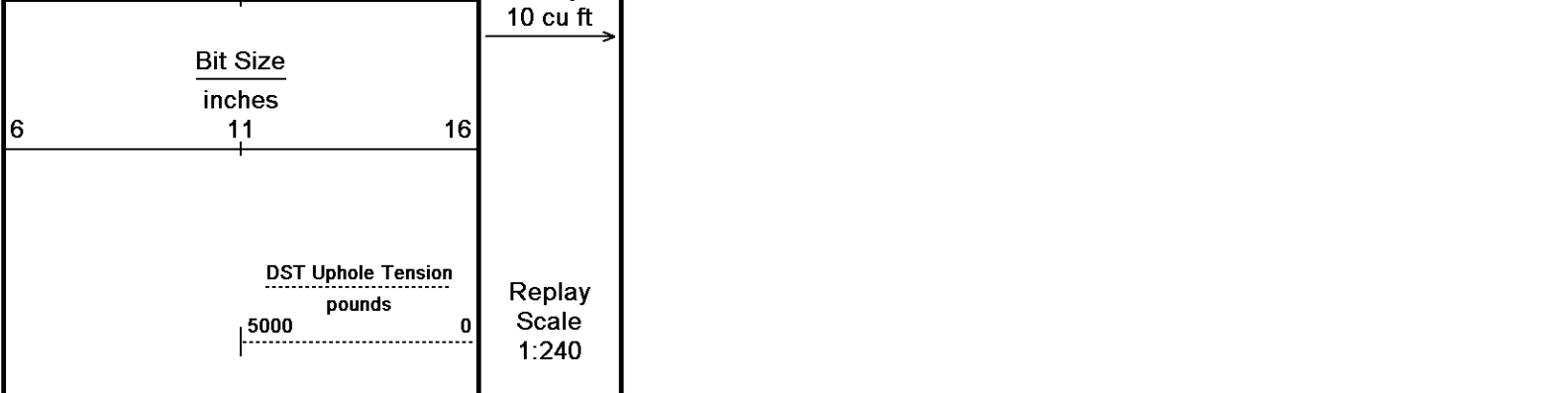
4300











Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 22-MAR-2019 08:17
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 Recorded on 21-MAR-2019 23:34
 System Versions: Logged with 18.05.4364 Processed with 18.05.4364 Plotted with 18.01.5761

↑ REPEAT SECTION 1:240 ↑

BEFORE SURVEY CALIBRATION
 C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView\0\MAIN PASS_001.dta

General Constants All 000 Last Edited on 21-MAR-2019,23:06

General Parameters		
Mud Resistivity	1.040	ohm-metres
Mud Resistivity Temperature	103.000	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	

Gamma Calibration MCG-D.K 443 Field Calibration on 21-MAR-2019 09:55

	Measured	Calibrated (API)
Background	64	45
Calibrator (Gross)	707	501
Calibrator (Net)	644	456

Gamma Calibration Tolerances MCG-D.K 443



Gamma Constants MCG-D.K 443 Last Edited on 21-MAR-2019,22:14

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.08	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 443 Field Calibration on 21-MAR-2019,09:56

	Measured	Calibrated(Deg F)
Lower	50.00	50.00

High Resolution Temperature Constants MCG-D.K 443

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

Pre-filter Length

11

Caliper Calibration MML-A 7

Base Calibration on 13-MAR-2019 13:20

Field Calibration on 21-MAR-2019 10:49

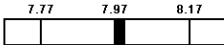
Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14099	5.98
2	17497	7.97
3	20709	9.86
4	24720	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.00	7.97

Caliper Calibration Tolerances MML-A 7

Short Arm Field Cal. 8.00  in

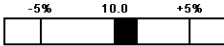
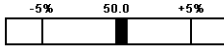
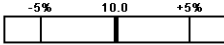
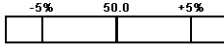
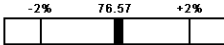
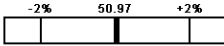
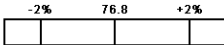
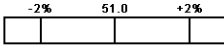
Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 13-MAR-2019 13:20

Field Check on 21-MAR-2019 10:48

	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Micro Normal	10.2 50.4	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	76.8	76.8
Micro Inverse	51.0	51.0

Micro Normal & Micro Inverse Calibration Tolerance MML-A 7

Micro Normal Res. 1	10.2		ohm	Micro Normal Res. 2	50.4		ohm
Micro Inverse Res. 1	10.0		ohm	Micro Inverse Res. 2	50.1		ohm
Micro Normal Base Check	76.8		ohm-m				
Micro Inverse Base Check	51.0		ohm-m				
Micro Normal Field Check	76.8		ohm-m				
Micro Inverse Field Check	51.0		ohm-m				

Micro Normal and Micro Inverse Constants MML-A 7

Last Edited on 21-MAR-2019,13:44

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 MPD-C.A 216

Base Calibration on 21-MAR-2019 10:44

Field Calibration on 21-MAR-2019 10:45

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16416	3.99
2	24992	5.98
3	33618	7.97
4	41920	9.86
5	51021	11.92
6	N/A	N/A

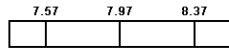
Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.

7.96



in

DOWNHOLE EQUIPMENT

C:\Users\cmcam\AppData\Local\Temp\Weatherford PreView0\MAIN PASS_001.dta

Cablehead, 11 pin

CBH-CB 267 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor

SHA-J.B 722 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-log

MML-A.7 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

Compact Neutron

MDN-B.A 295 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 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 308 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction

MAI-AA 111 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 67.54 ft Weight: 526.9 lb



57.56 ft GGCE - MCG BH Corrected Gamma

55.38 ft CCLG - Casing Collar Locator

54.65 ft CGXT - MCG External Temperature

47.93 ft MINV - Micro-inverse

47.93 ft MNRL - Micro-normal

48.92 ft MLTC - MML Caliper

43.13 ft NPRL - Limestone Neutron Por.

35.89 ft AVOL - Annular Volume

35.89 ft HVOL - Hole Volume

35.89 ft CLDC - Density Caliper

33.96 ft DPRL - Limestone Density Por.

33.96 ft DCOR - Density Correction

33.90 ft PDPE - PE

26.24 ft FEFE - Shallow FE

16.96 ft TR11 - 4' Transit Time

16.46 ft TR21 - 3' Transit Time

15.95 ft TR12 - 6' Transit Time

15.46 ft TR22 - 5' Transit Time

12.96 ft SPRL - Wyllie Lime. Sonic Por.

3.34 ft R40T - Array Ind. Two Res 40

3.34 ft R30T - Array Ind. Two Res 30

3.34 ft R20T - Array Ind. Two Res 20

3.34 ft R60T - Array Ind. Two Res 60

3.34 ft RTAO - Array Ind. One Res Rt

3.34 ft R60O - Array Ind. One Res 60

3.34 ft R40O - Array Ind. One Res 40

0.23 ft SPCG - Spontaneous Potential

Tool Zero (0.13ft from bottom)

All measurements relative to tool zero.

COMPANY BLACK OAK EXPLORATION
WELL FRISIBIE FAMILY 1-15
FIELD WILDCAT
PROVINCE/COUNTY RAWLINS
COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	3335	feet	First Reading	4817.00	feet
Elevation Drill Floor	3333	feet	Depth Driller	4860.00	feet
Elevation Ground Level	3330	feet	Depth Logger	4865.00	feet



Weatherford[®]

MICRORESISTIVITY LOG