



Weatherford

MICRORESISTIVITY LOG

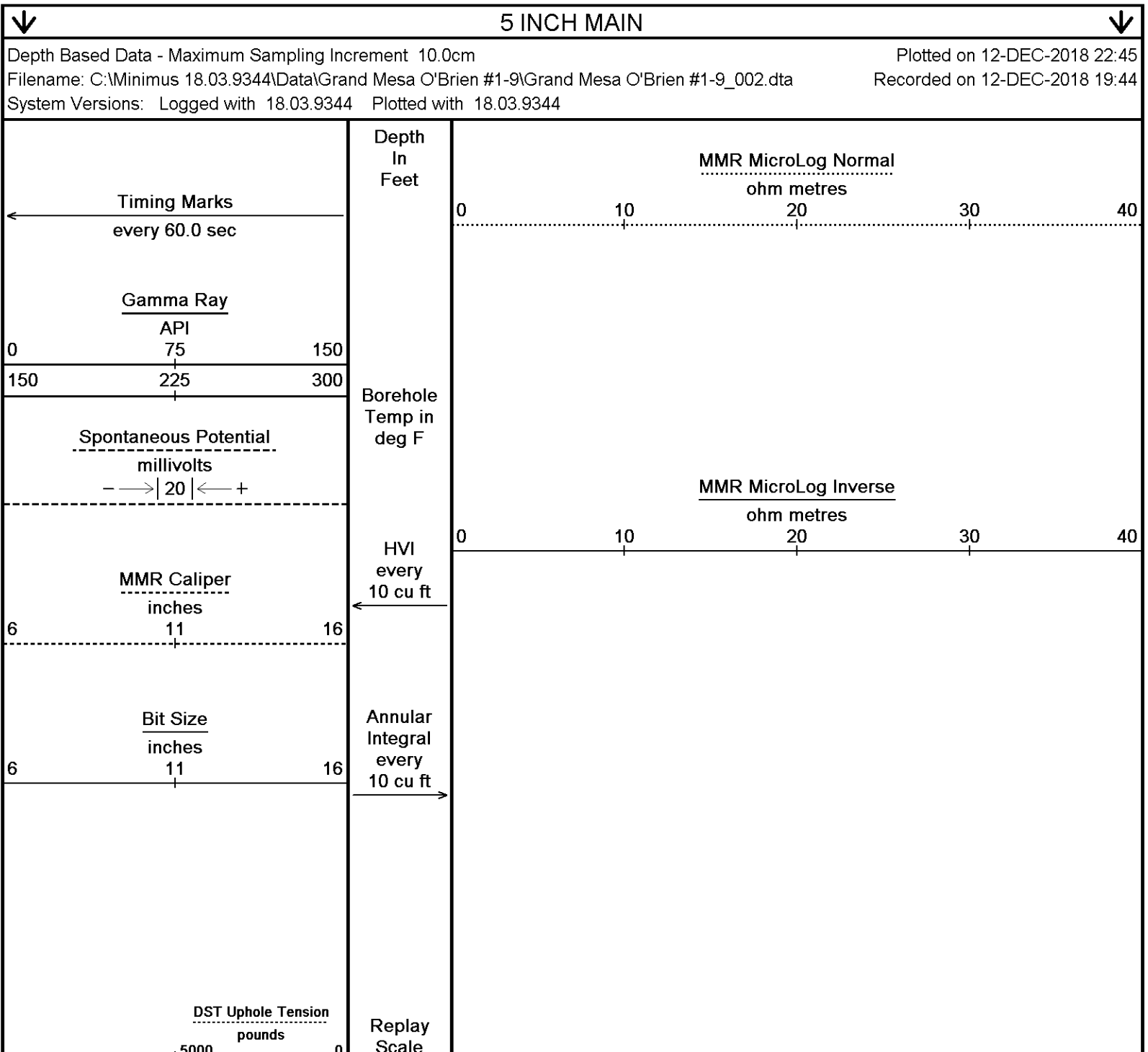
COMPANY			GRAND MESA OPERATING COMPANY		
WELL			OBRIEN #1-9		
FIELD			WILDCAT		
PROVINCE/COUNTY LANE					
COUNTRY/STATE			U.S.A. / KANSAS		
LOCATION			2225' FSL & 2305' FEL		
SEC 9	TWP 16S	RGE 29W	Other Services		MPD/MDN
Latitude			MAI/MFE		
Longitude			MSS		
API Number	15-101-22619				
Permanent Datum GL, Elevation 2656 feet					
Log Measured From KB, 5.00 feet above Permanent Datum					
Drilling Measured From KB			Elevations: KB 2661.00 DF 2659.00 GL 2656.00		
Date	12-DEC-2018				
Run Number	ONE				
Service Order	4558-231823318				
Depth Driller	4520.00		feet		
Depth Logger	4521.00		feet		
First Reading	4473.00		feet		
Last Reading	219.00		feet		
Casing Driller	219.00		feet		
Casing Logger	219.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.30 lb/USg		52.00 CP		
PH / Fluid Loss	10.00		7.20 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.27 @ 75.0		ohm-m		
Rmf @ Measured Temp	1.02 @ 75.0		ohm-m		
Rmc @ Measured Temp	1.52 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.81 @117.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	117.00		deg F		
Equipment / Base	13096		LIB		
Recorded By	ADAM SILL				
Witnessed By	GARET DINKEL				

BOREHOLE RECORD					Last Edited: 12-DEC-2018 16:55
Bit Size inches		Depth From feet		Depth To feet	
7.875		219.00		4520.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	219.00	24.00	

REMARKS
- SOFTWARE ISSUE: WLS 18.03.9344.
- 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: 1802 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1096 CU.FT.

- RIG: WW DRILLING #2.
- ENGINEER: A. SILL.
- 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.



5000

1:240

208

Casing
Shoe

1800

250

90°

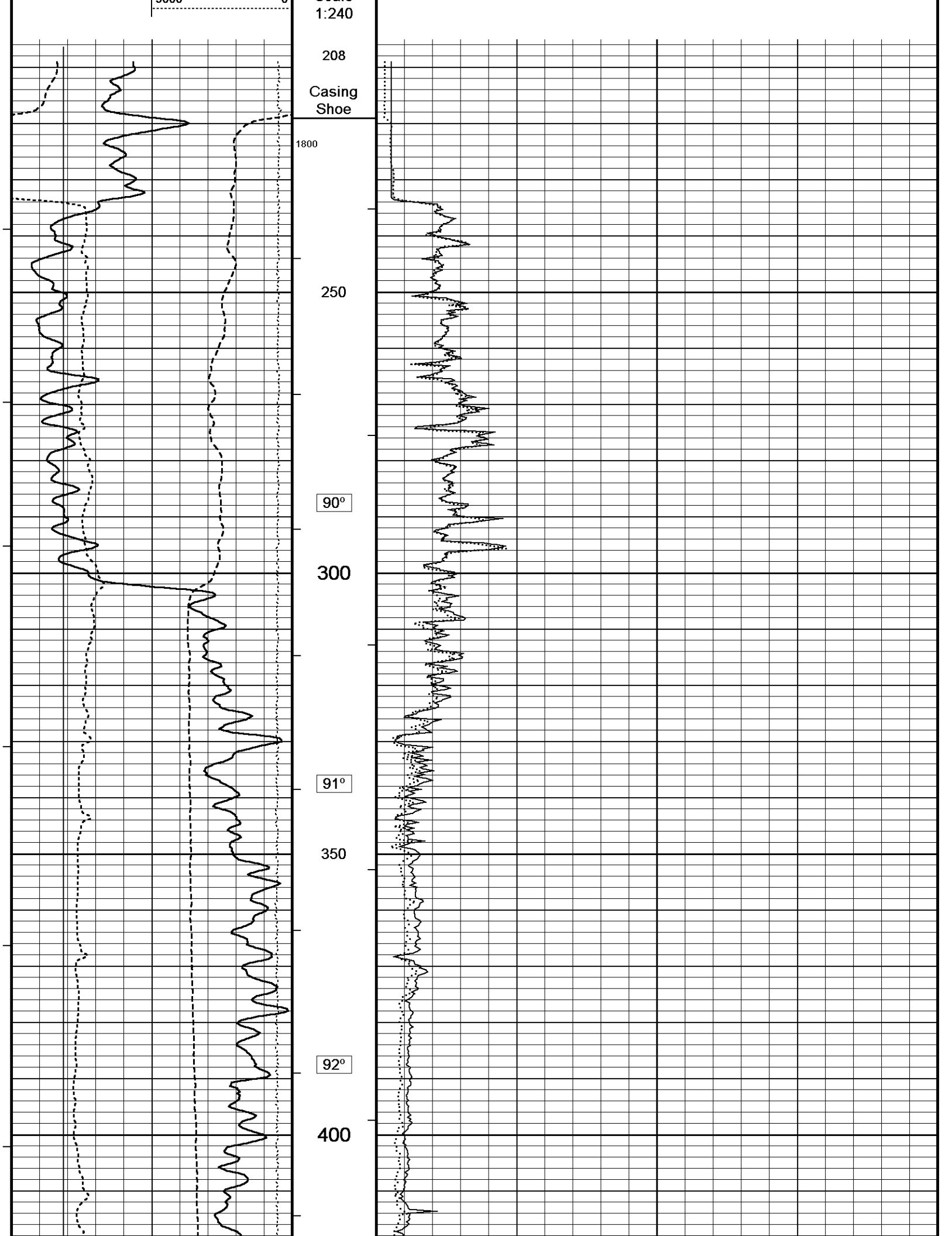
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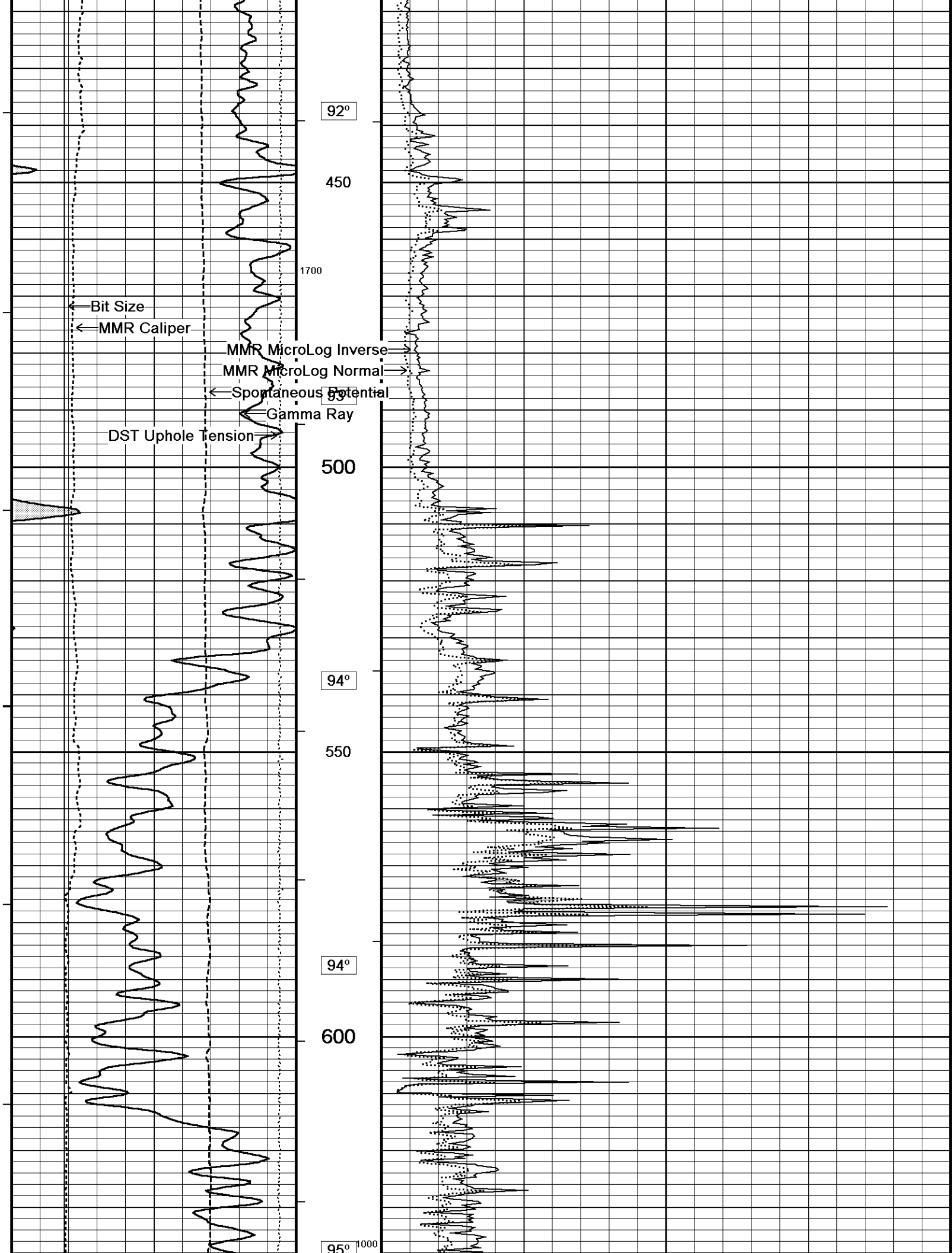
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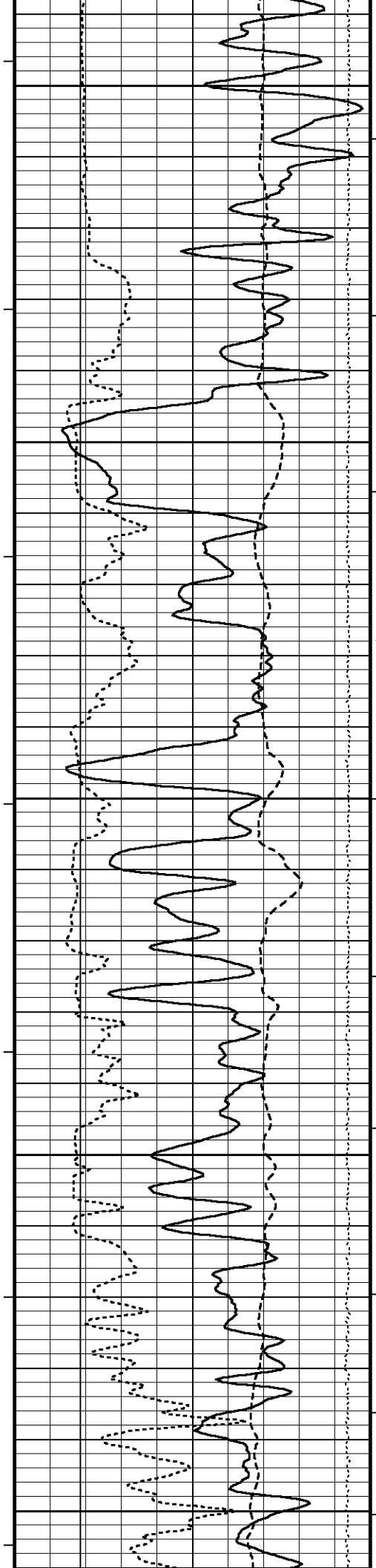
350

92°

400







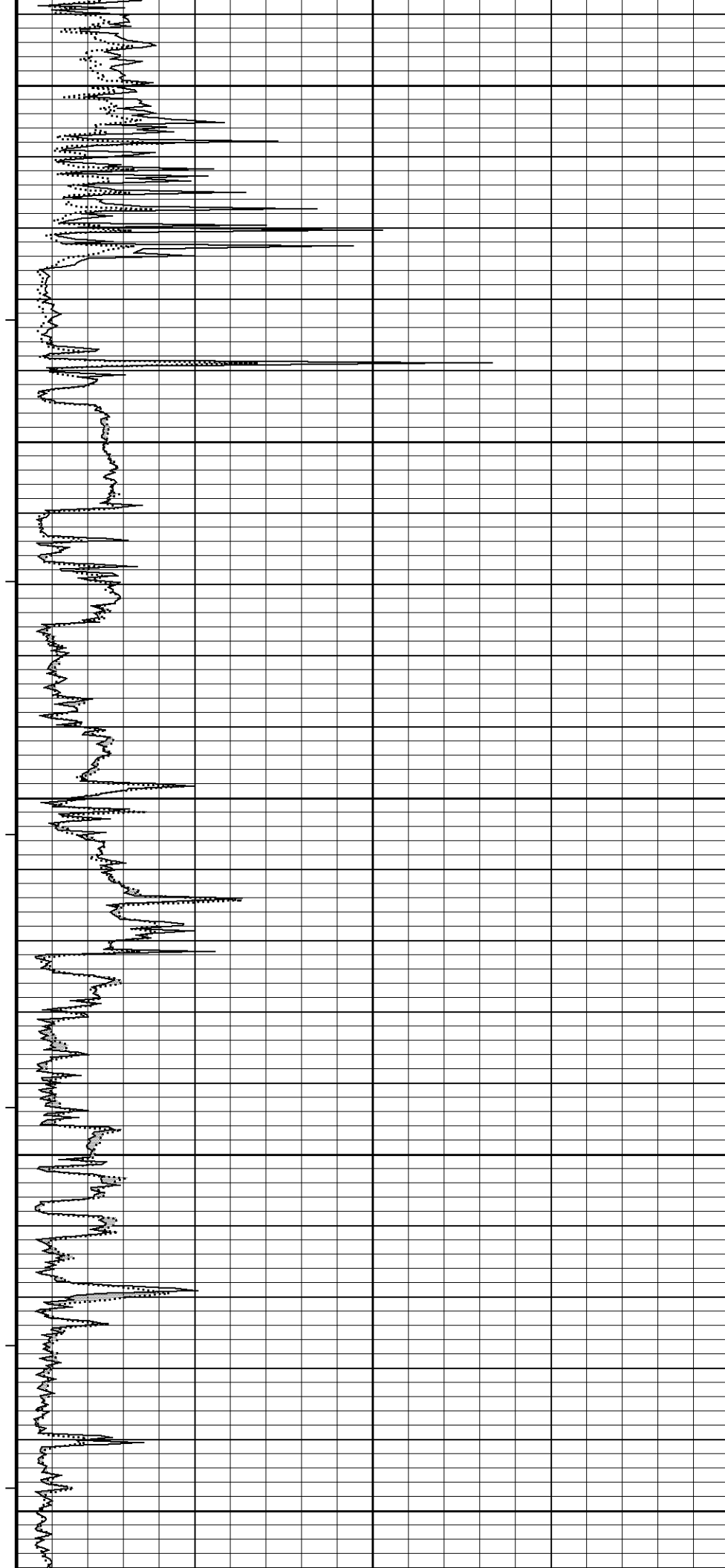
650
700
1600
750
800
850

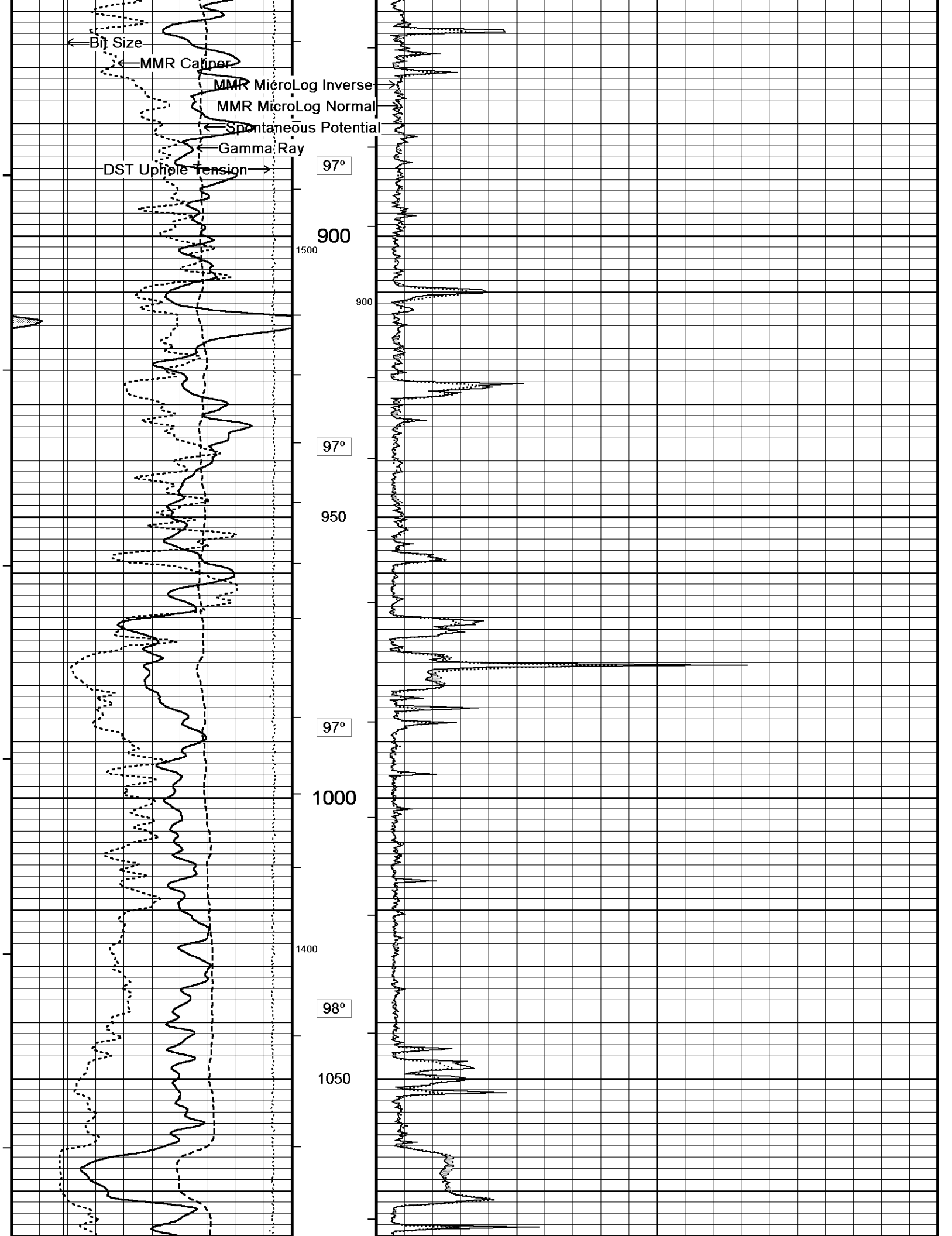
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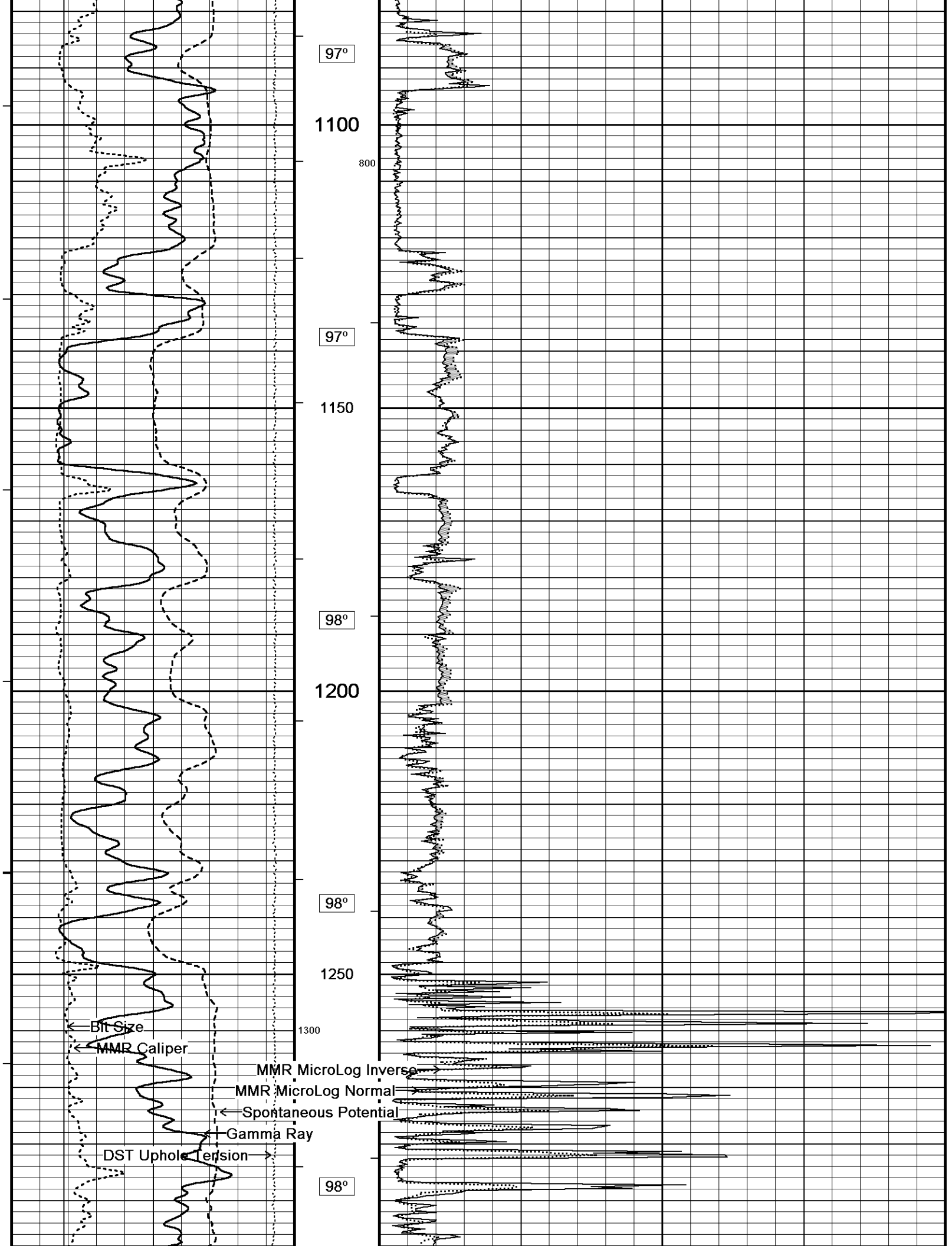
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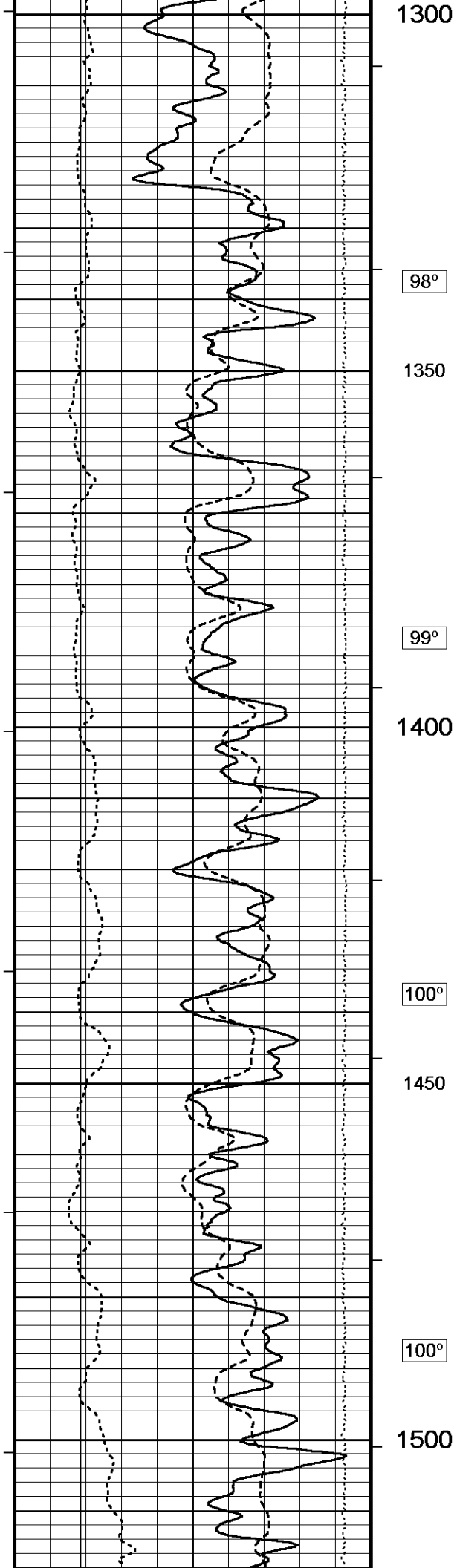
96°

96°









1300

98°

1350

99°

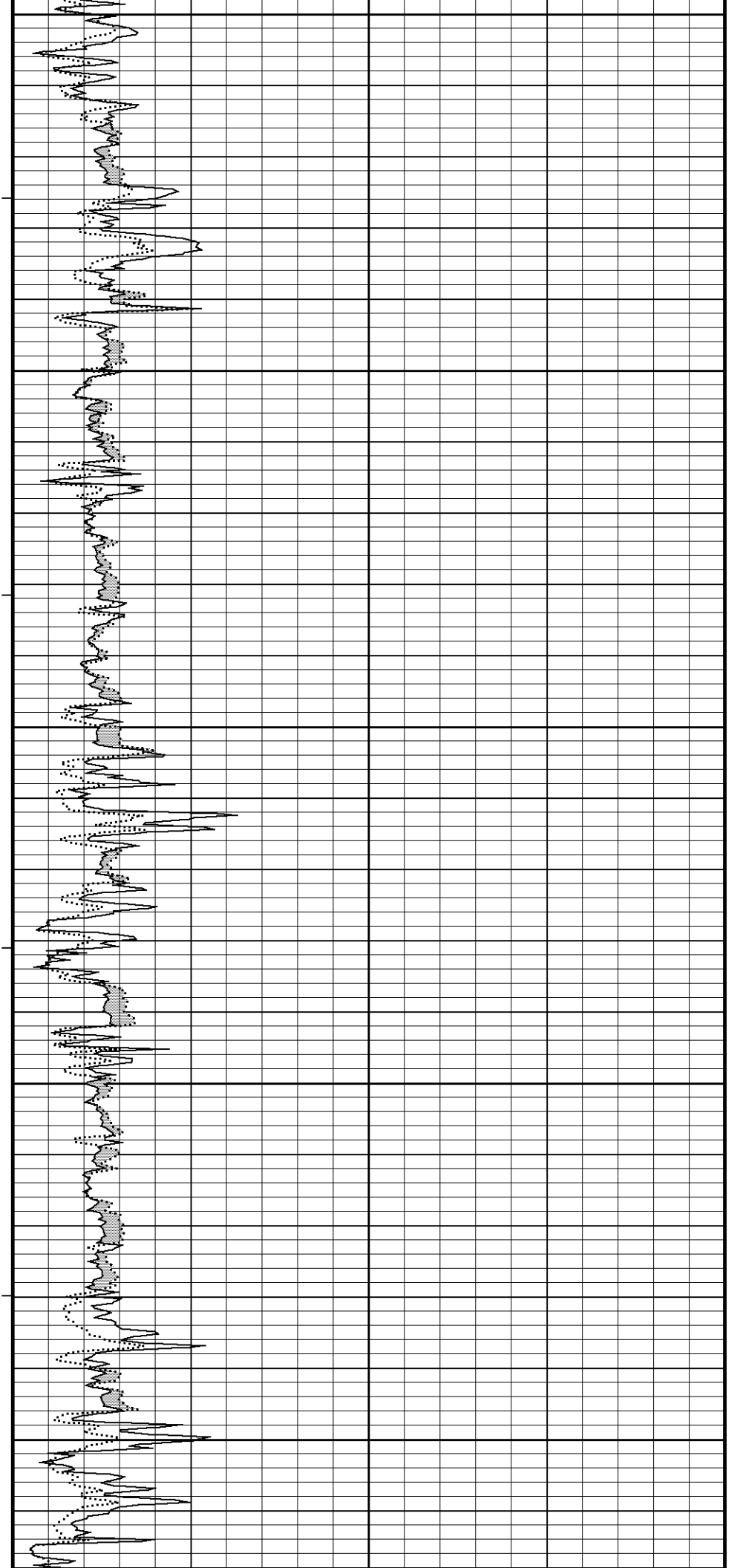
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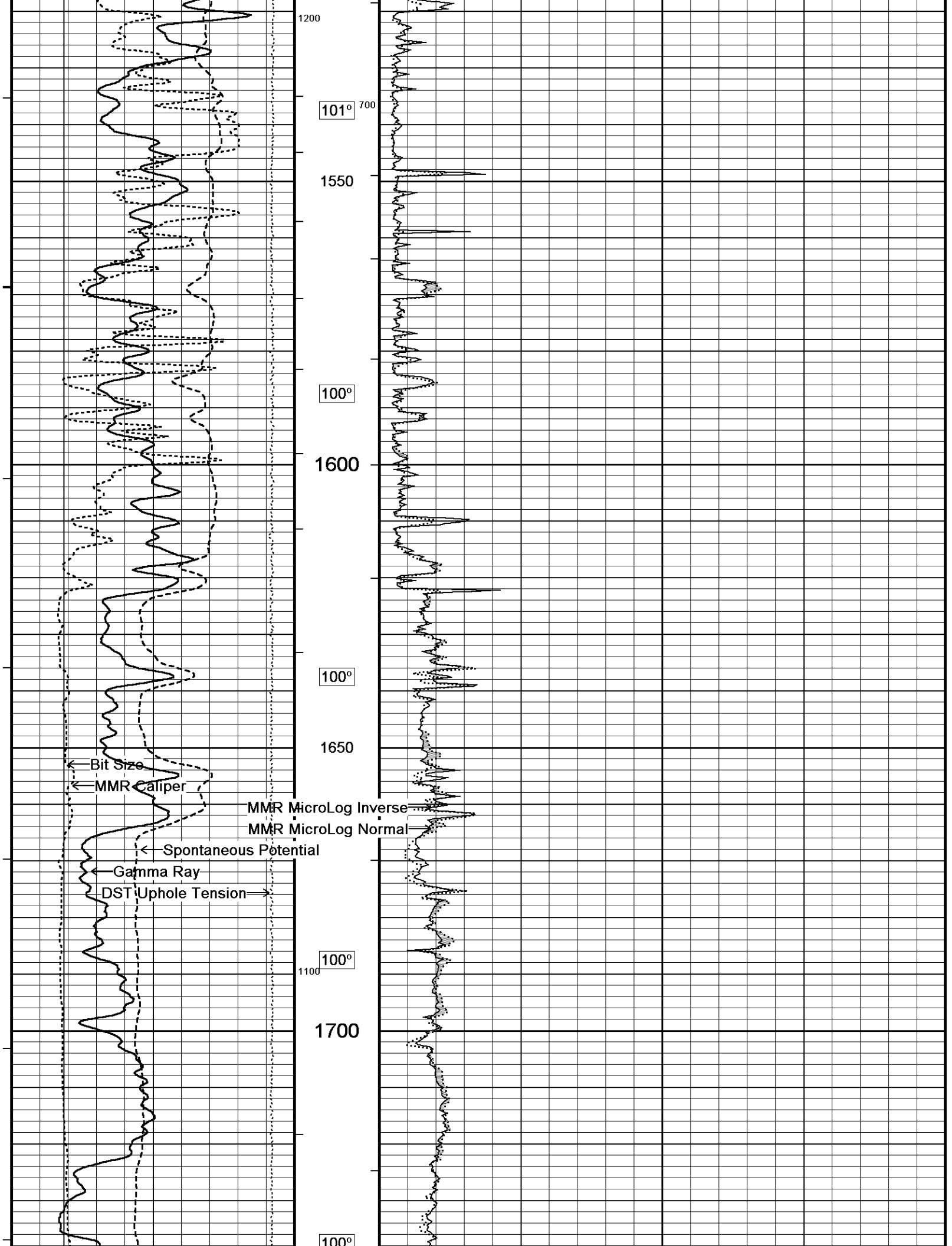
100°

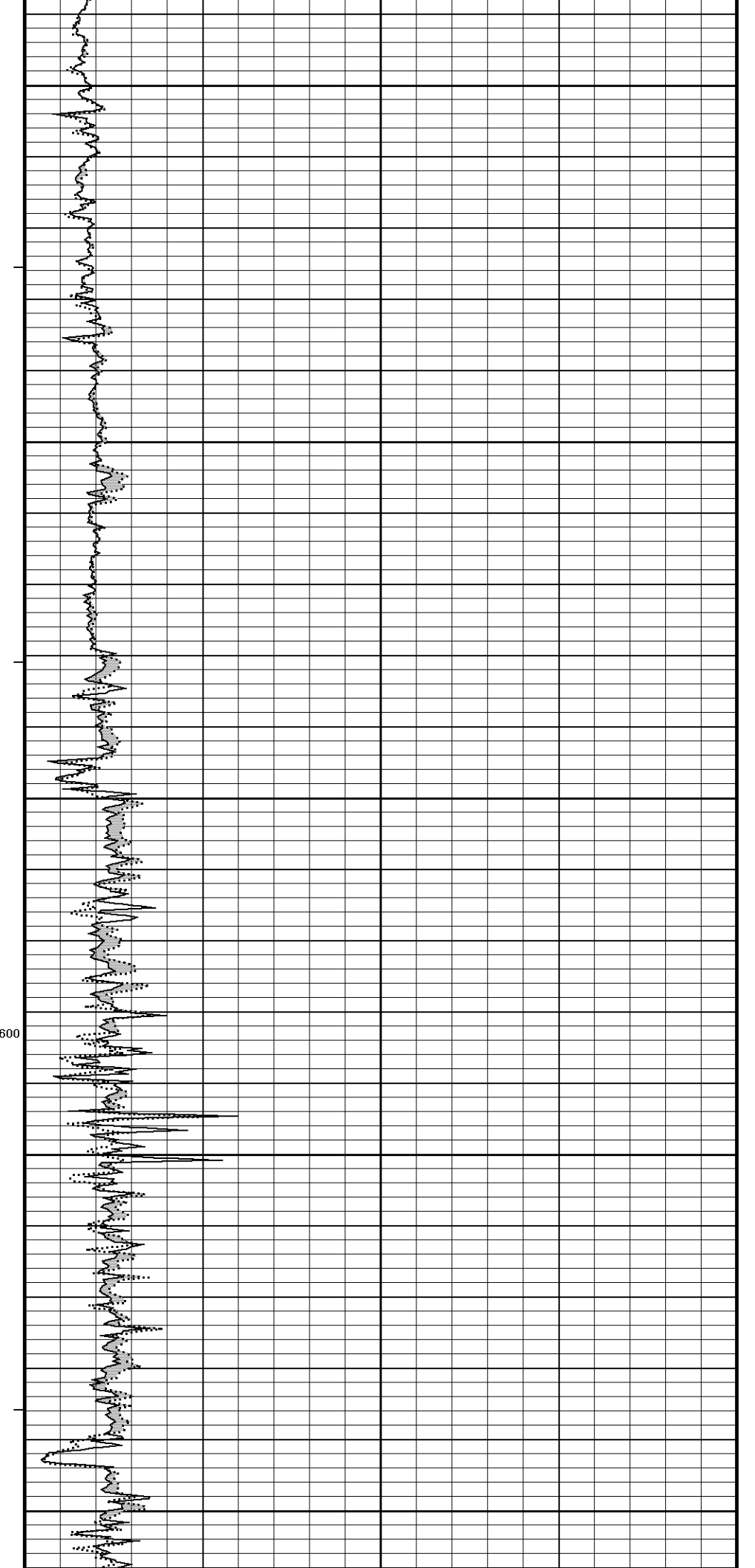
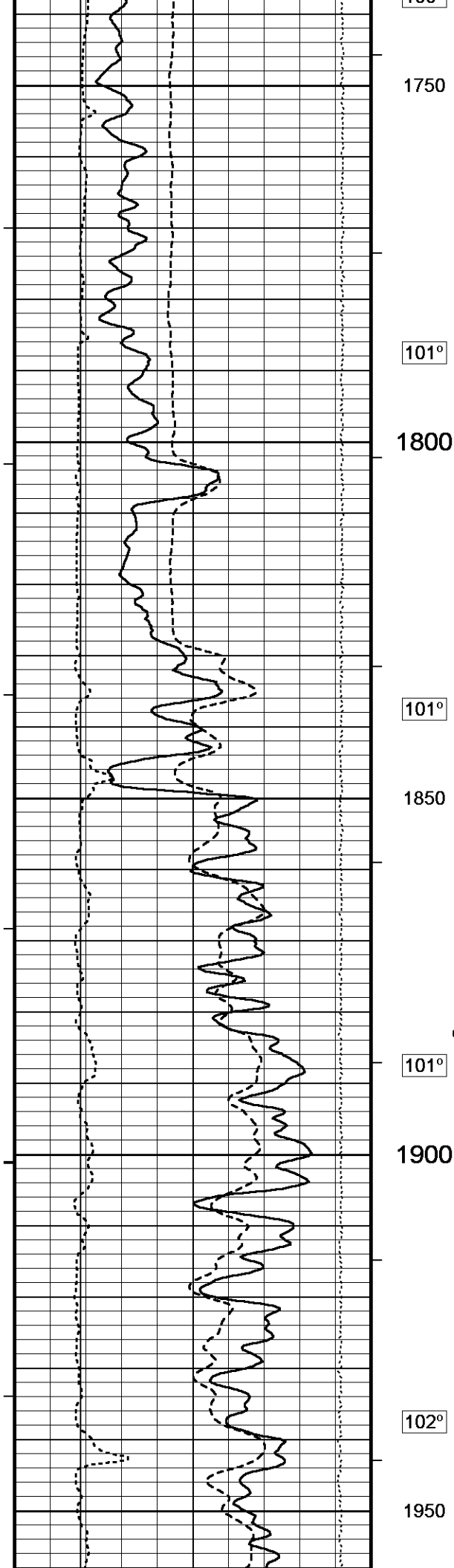
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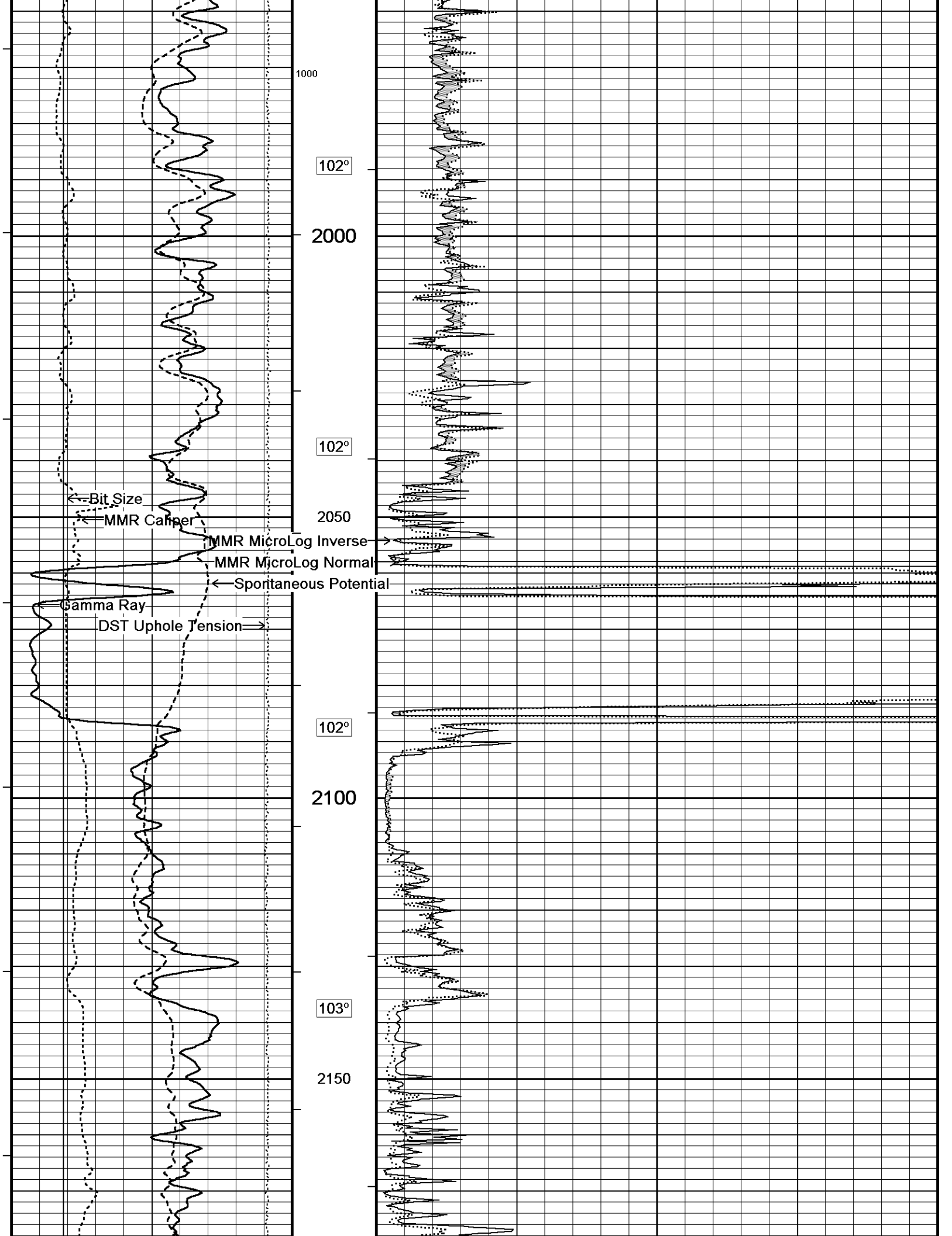
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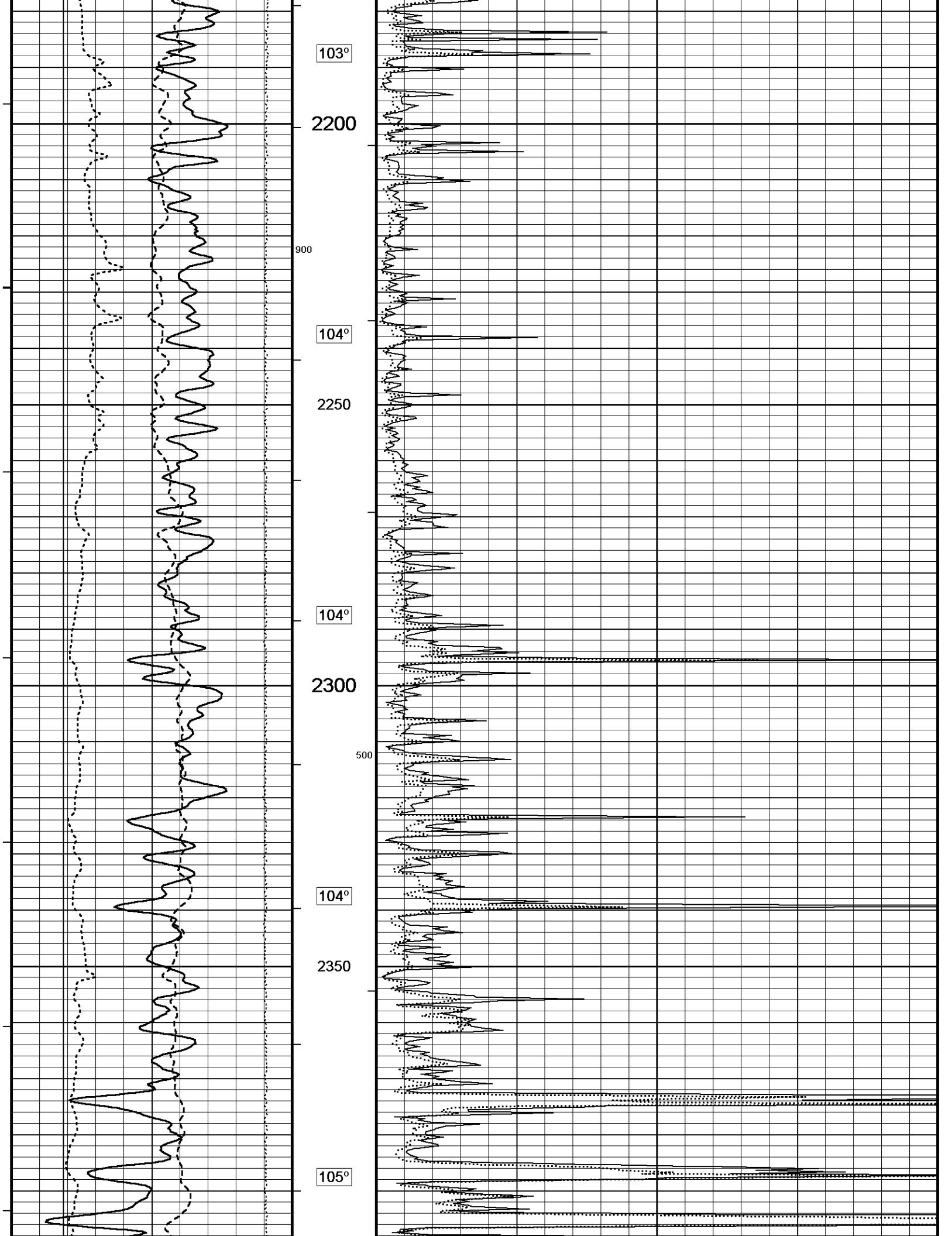
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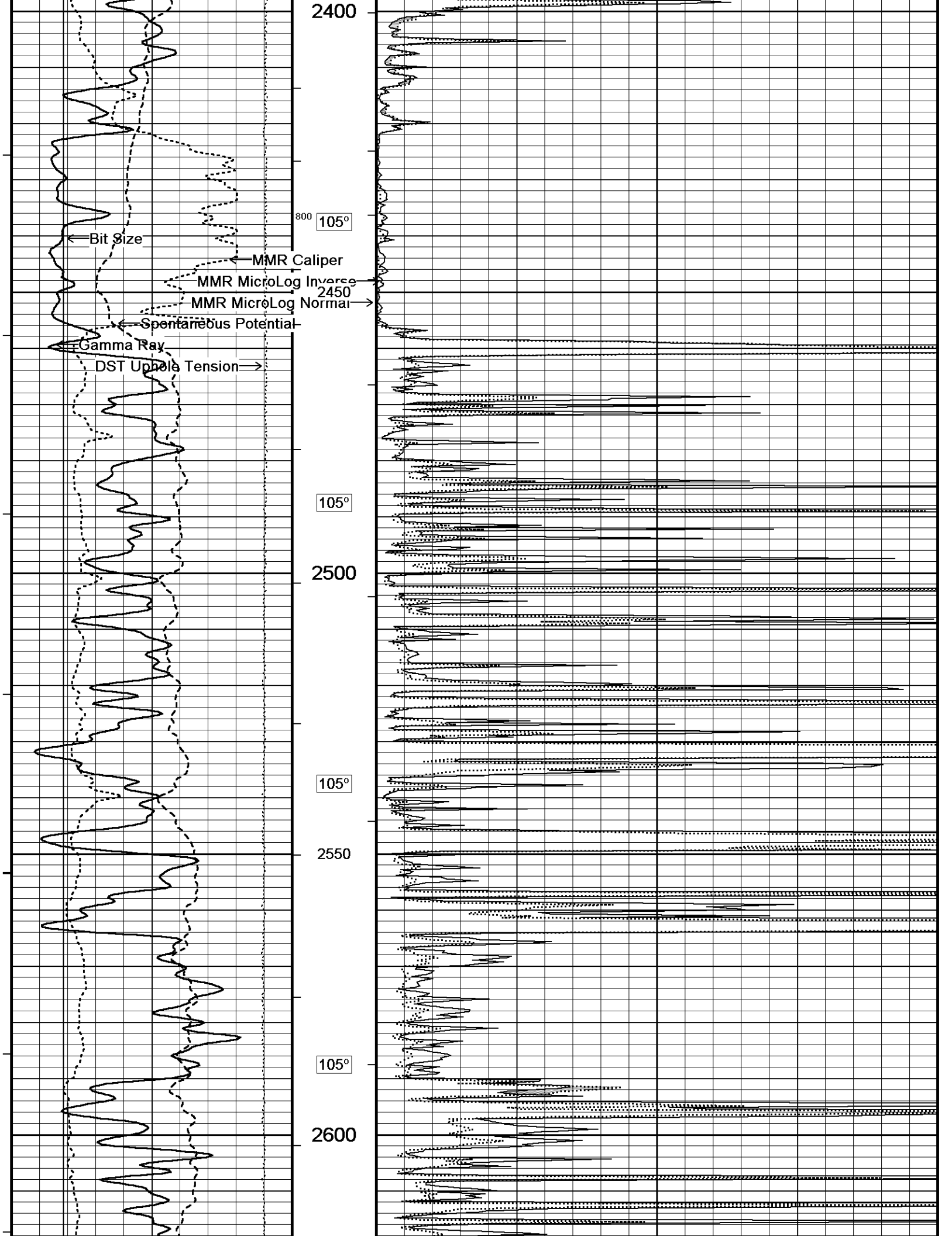


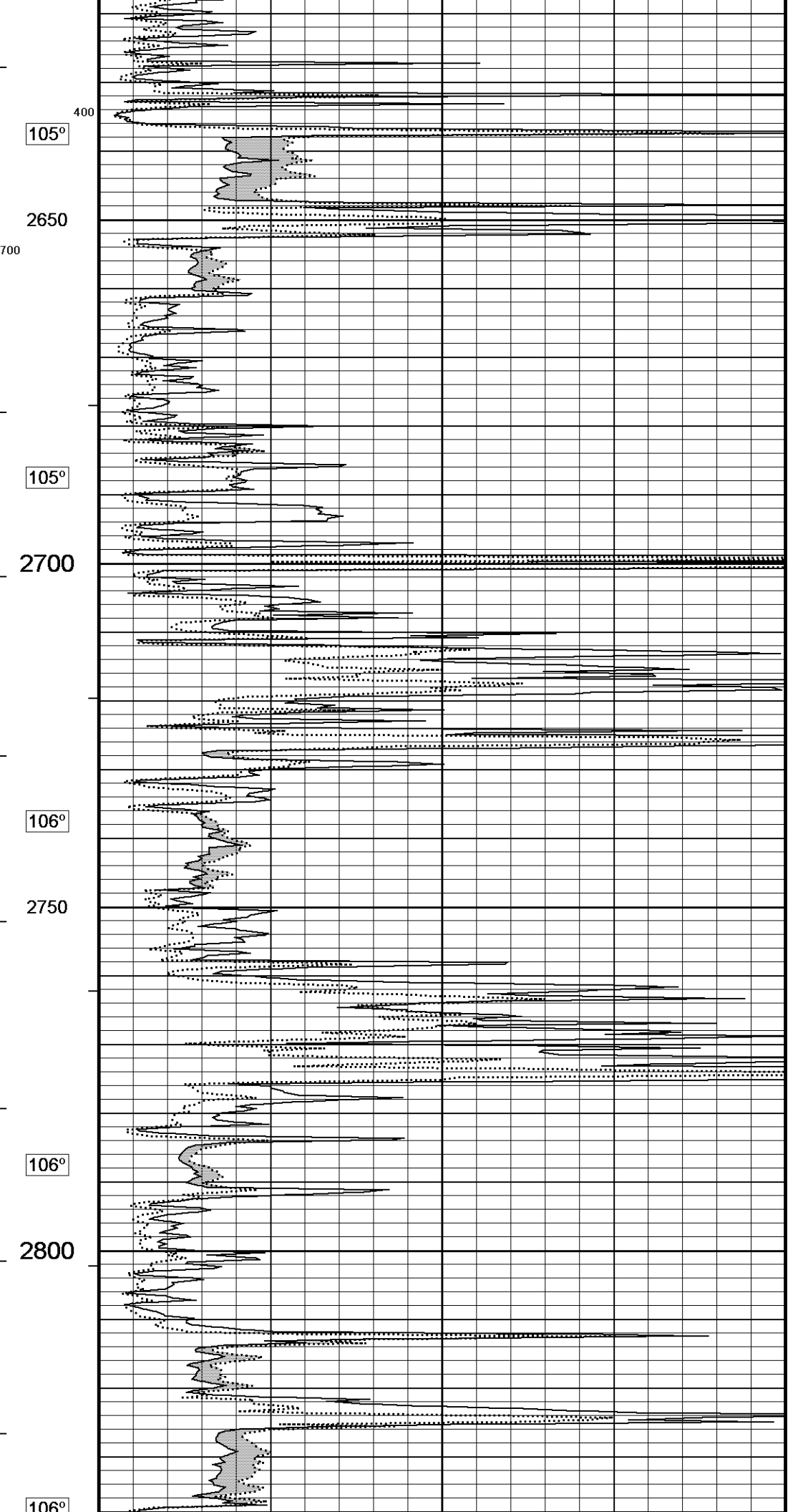
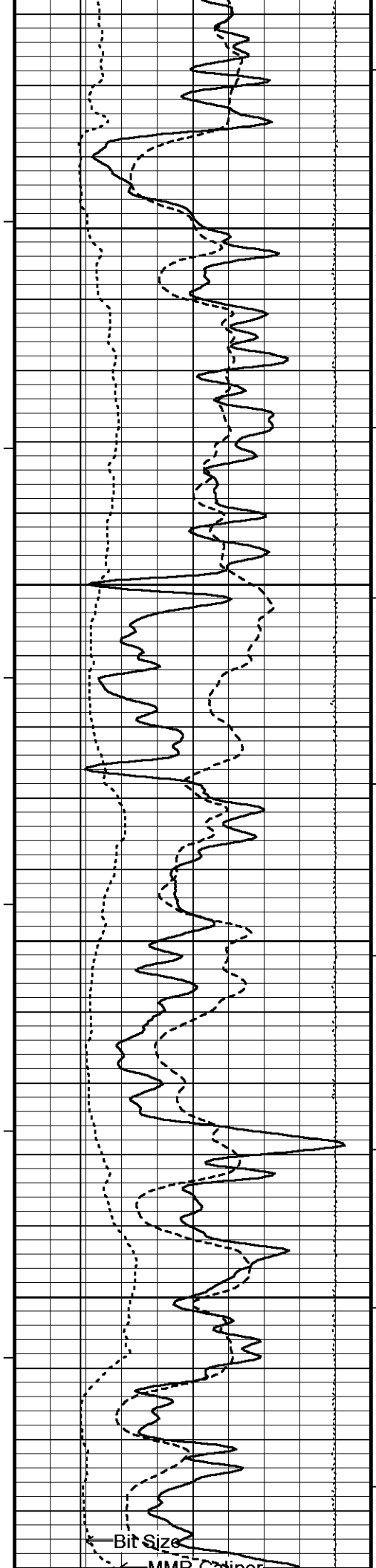


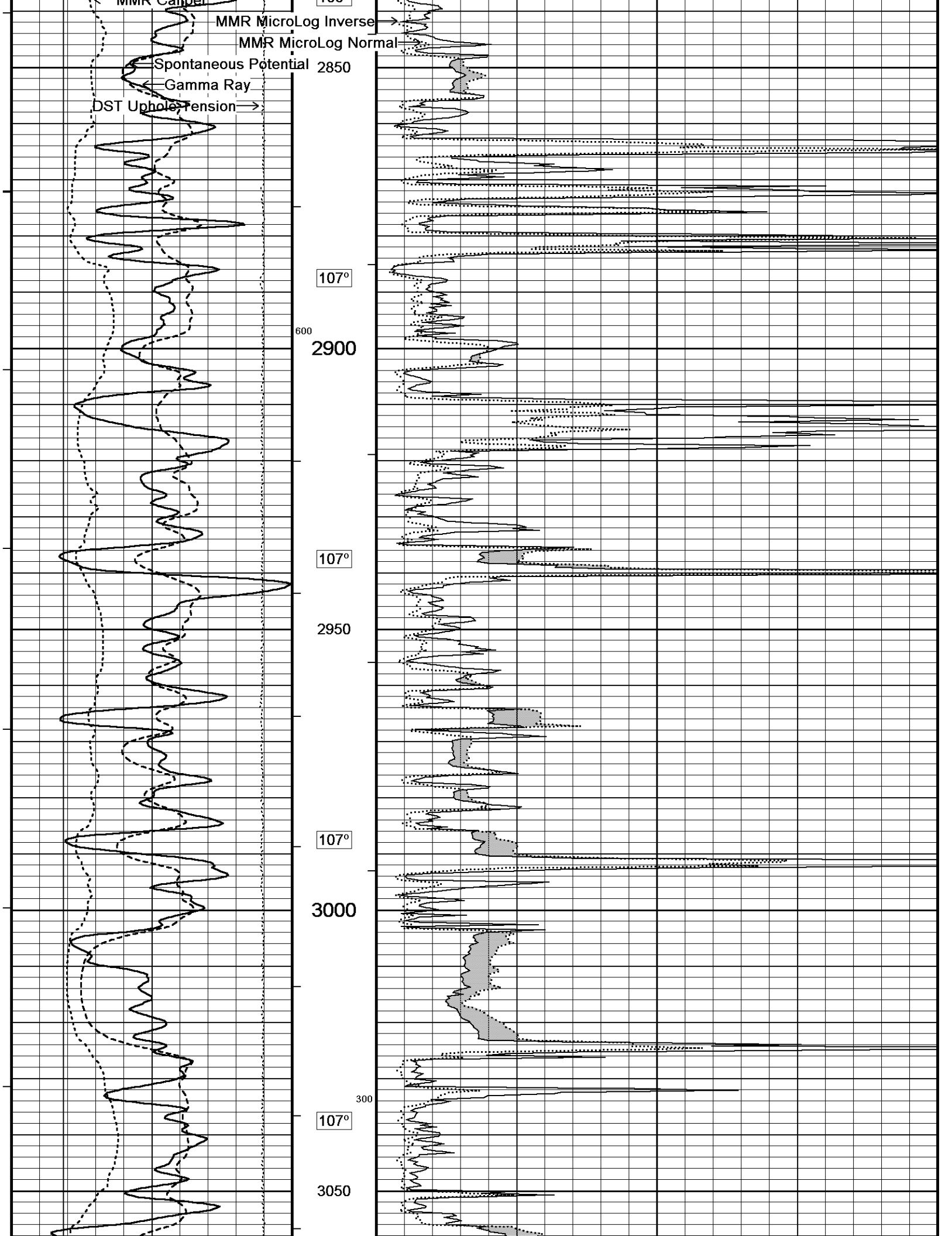


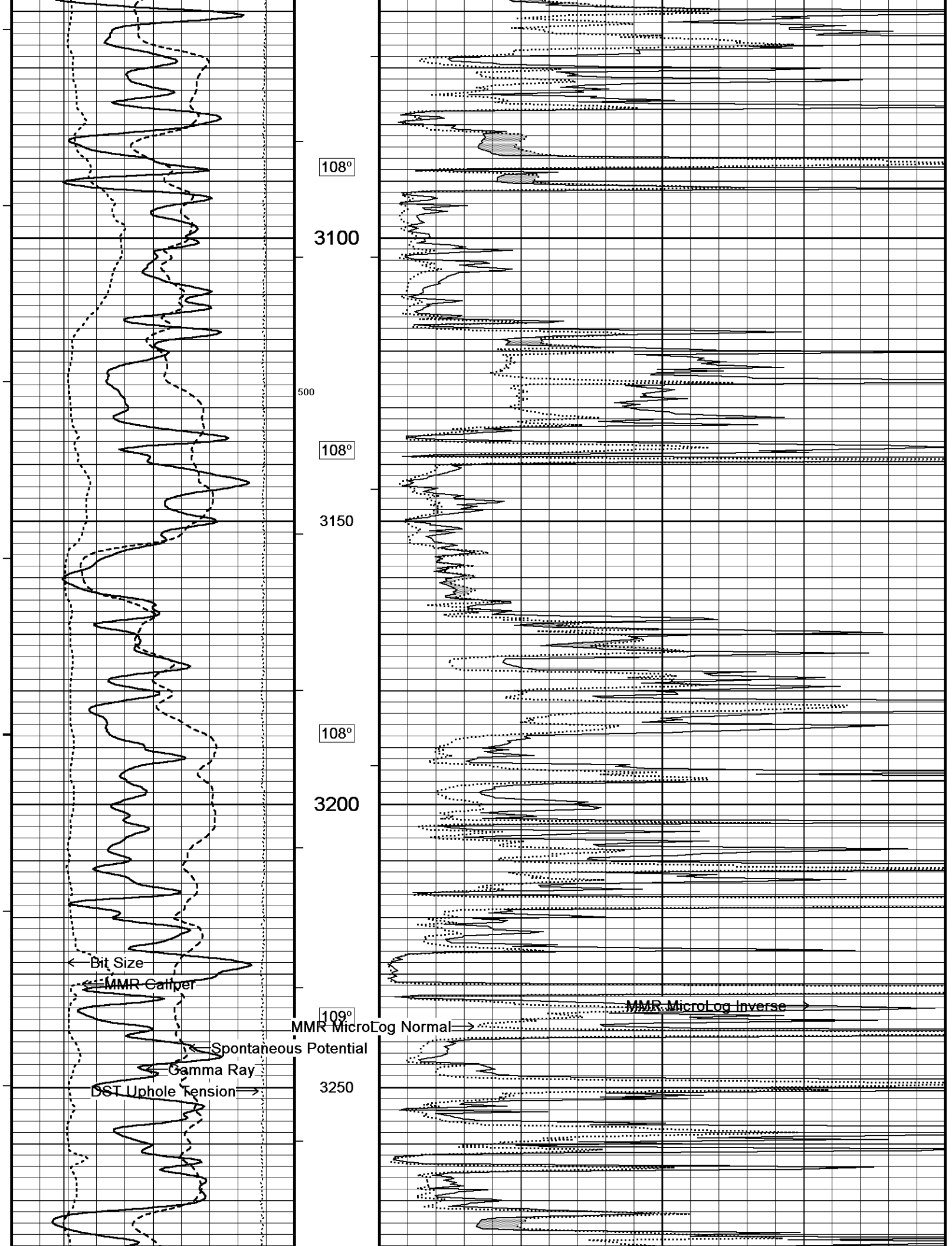


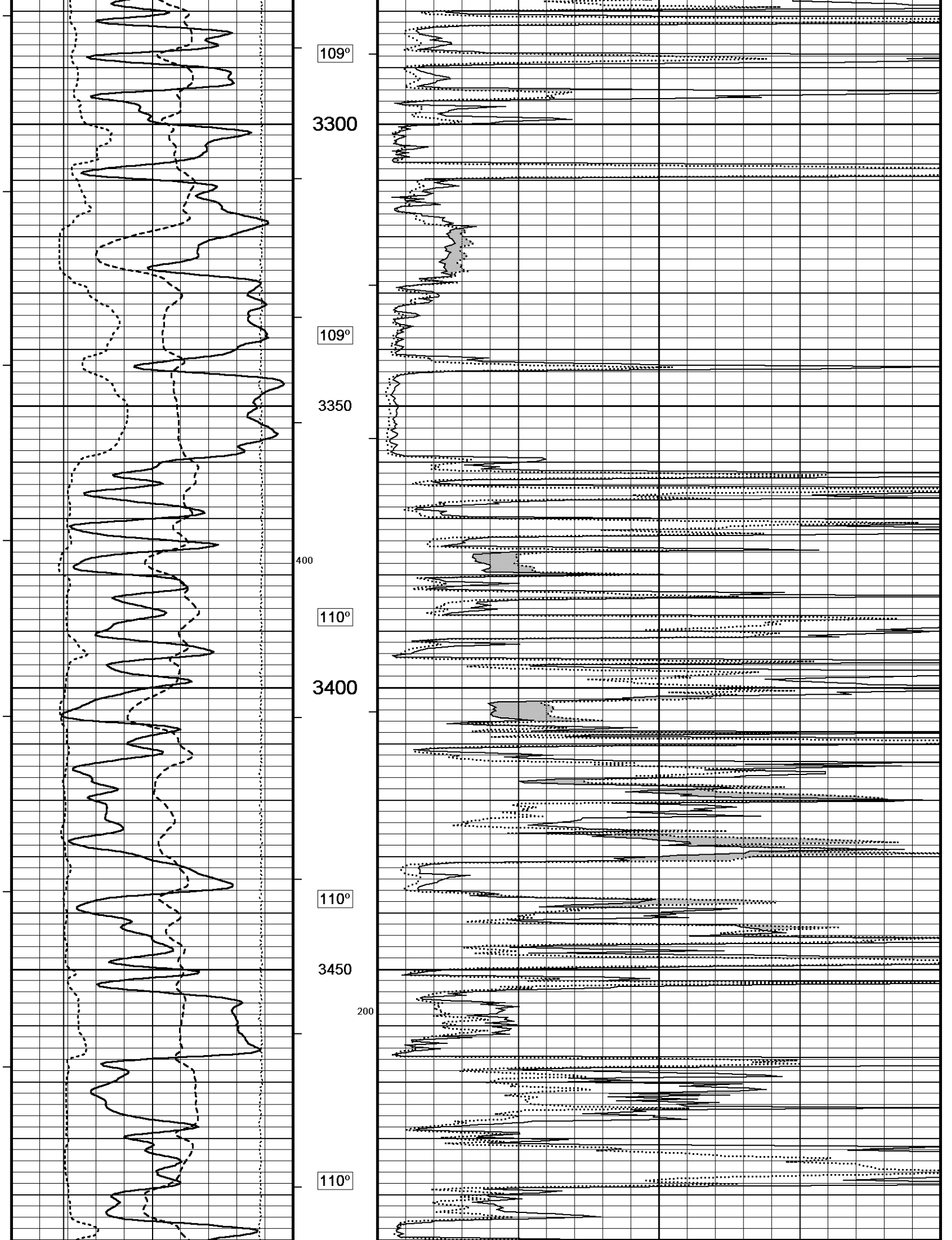


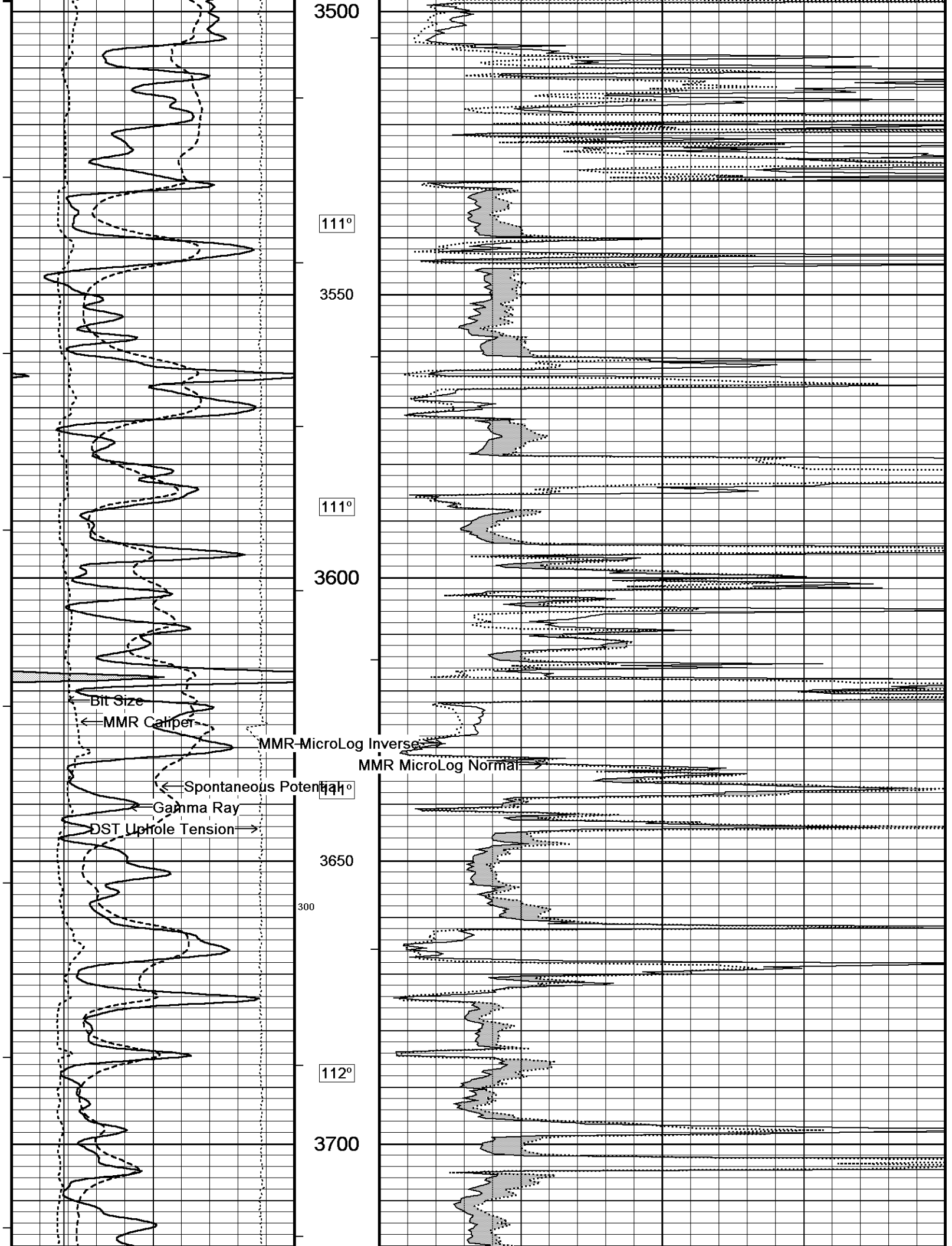


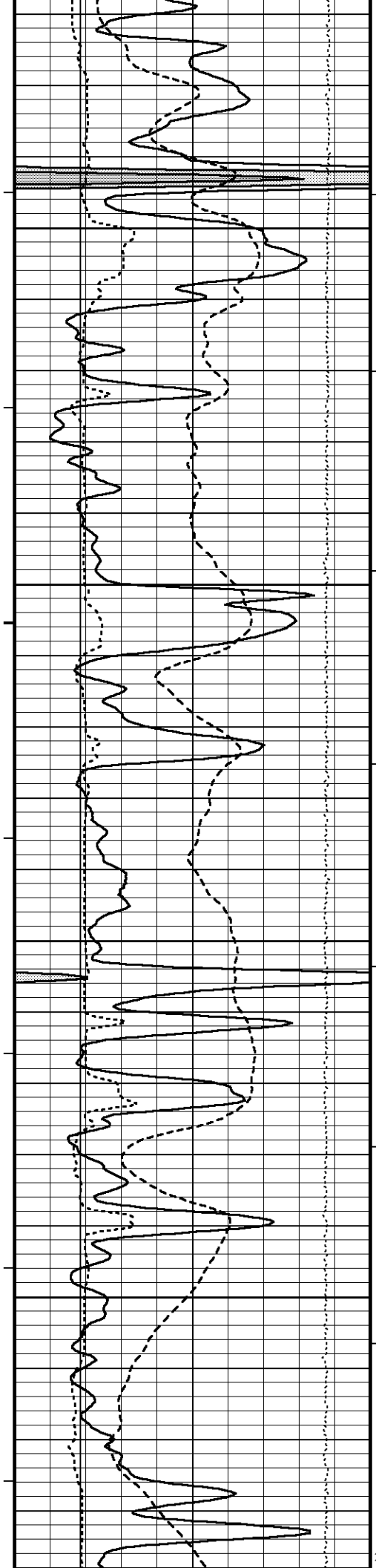












112°

3750

112°

3800

113°

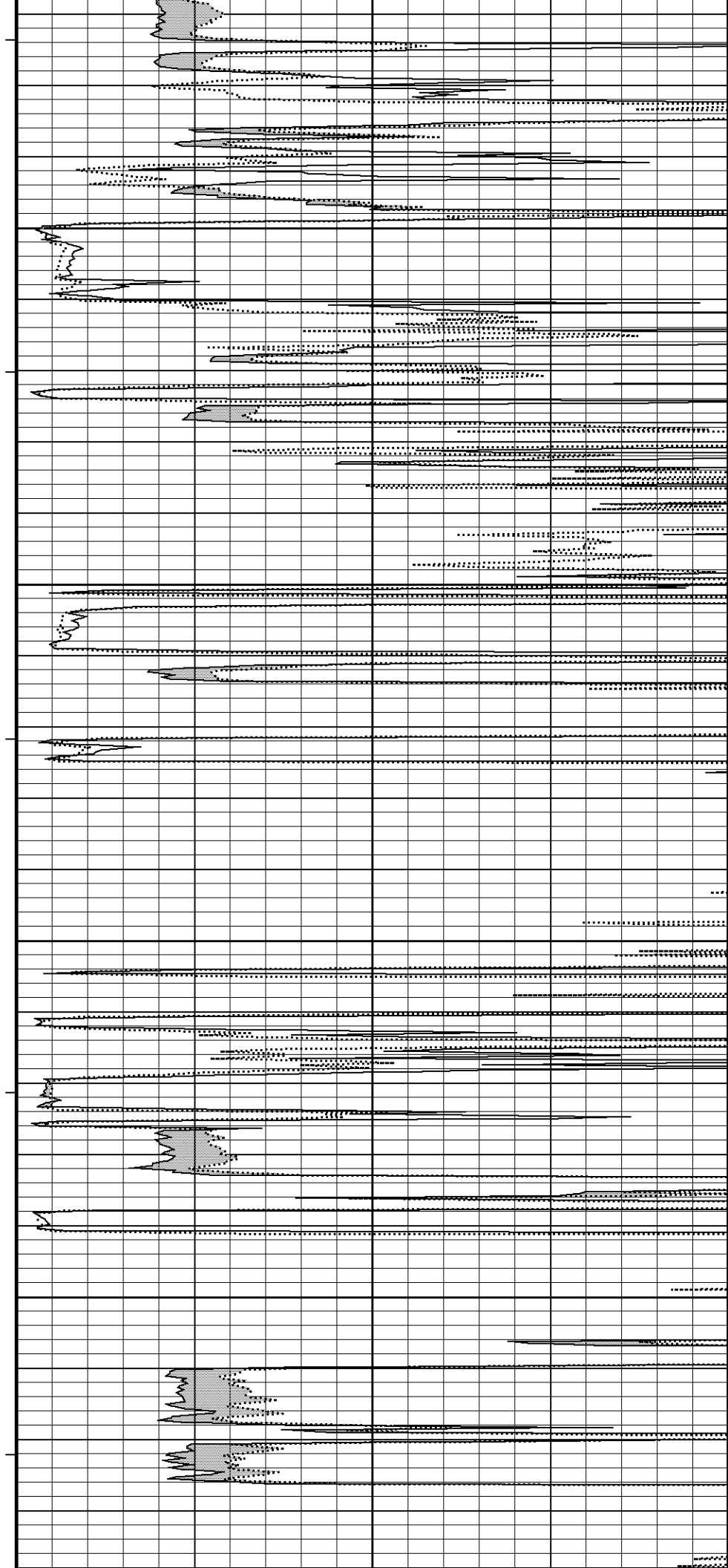
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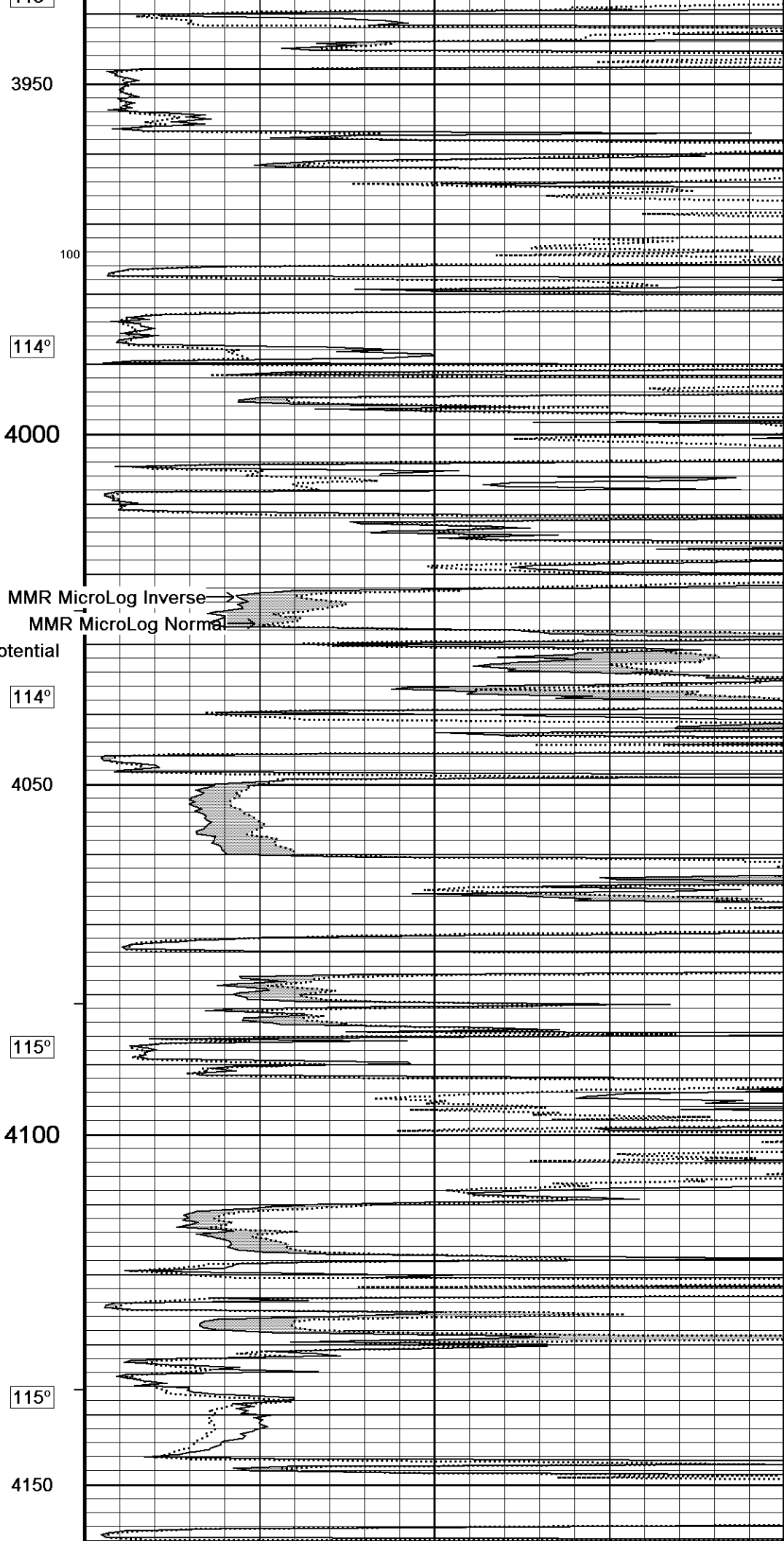
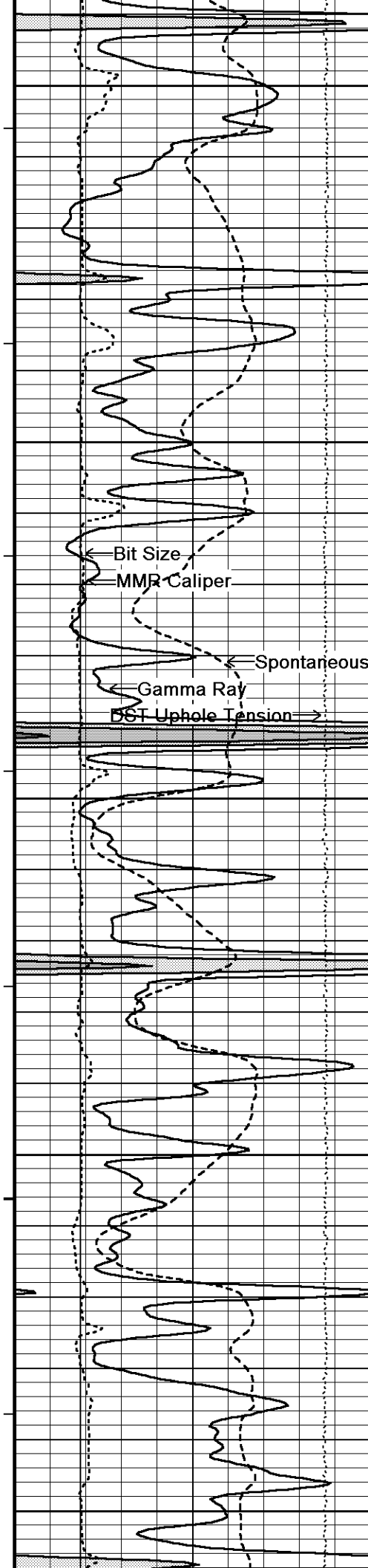
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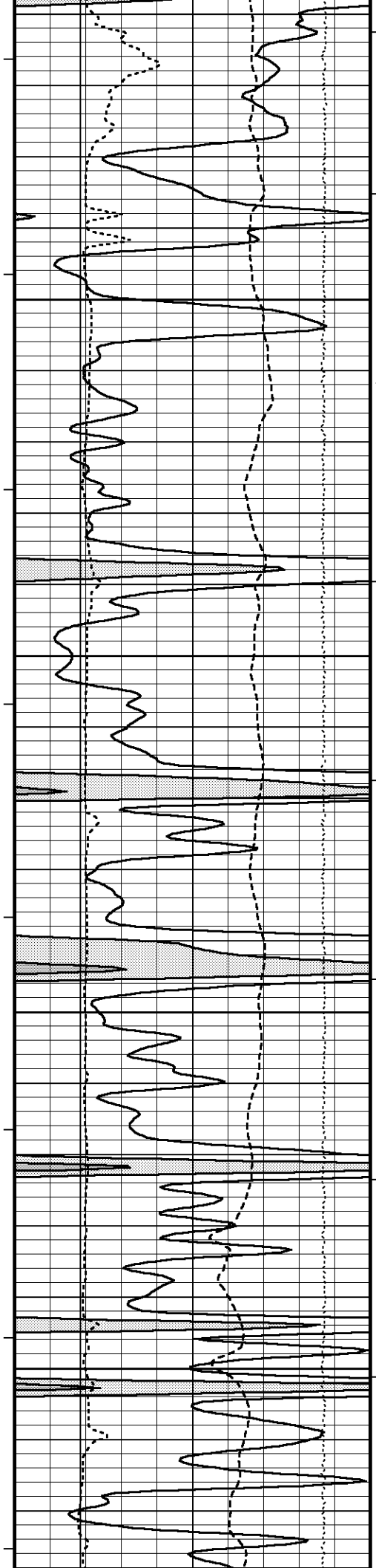
3900

200

113°







115°

4200

100

115°

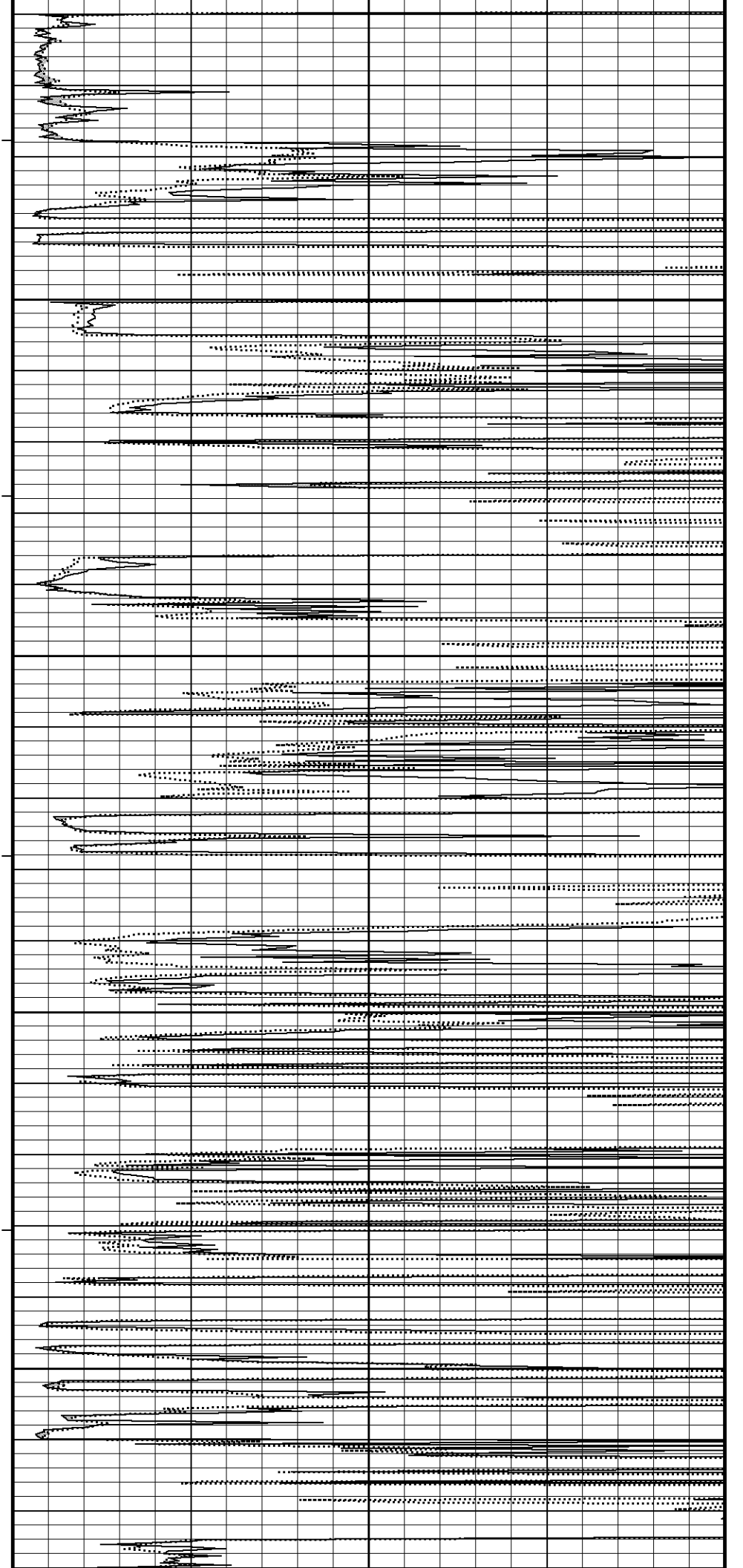
4250

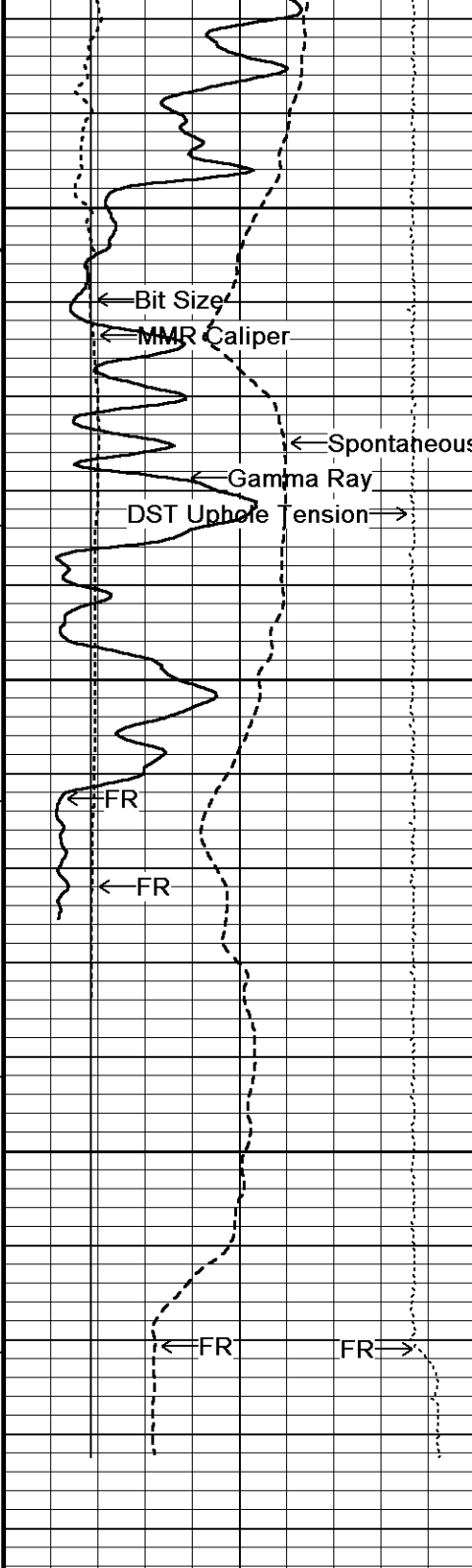
116°

4300

117°

4350





117°

4400

117°

4450

4500

TD

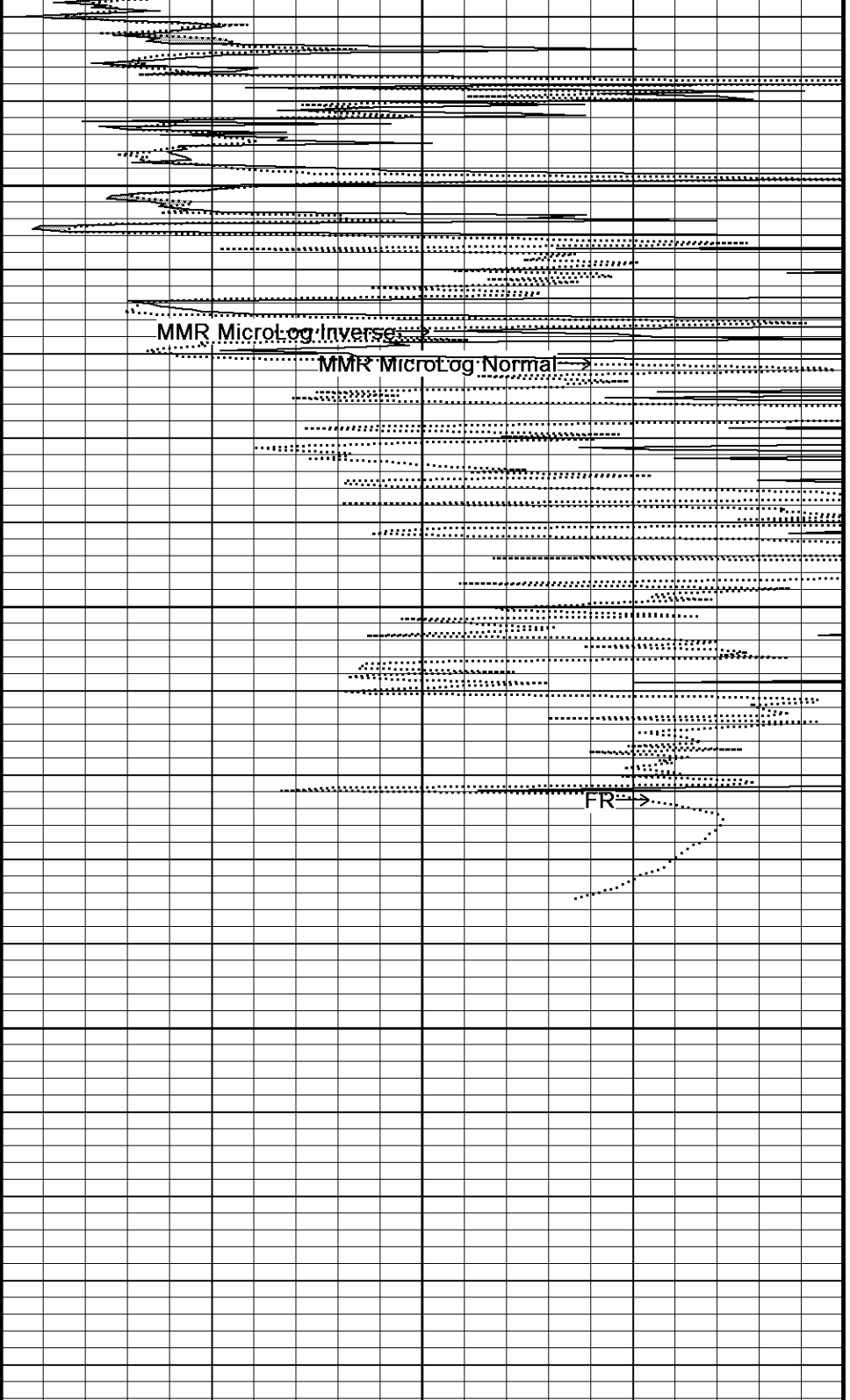
Depth
In
Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
- - - - - 20 - - - - - +

Borehole
Temp in
deg F



MMR MicroLog Inverse

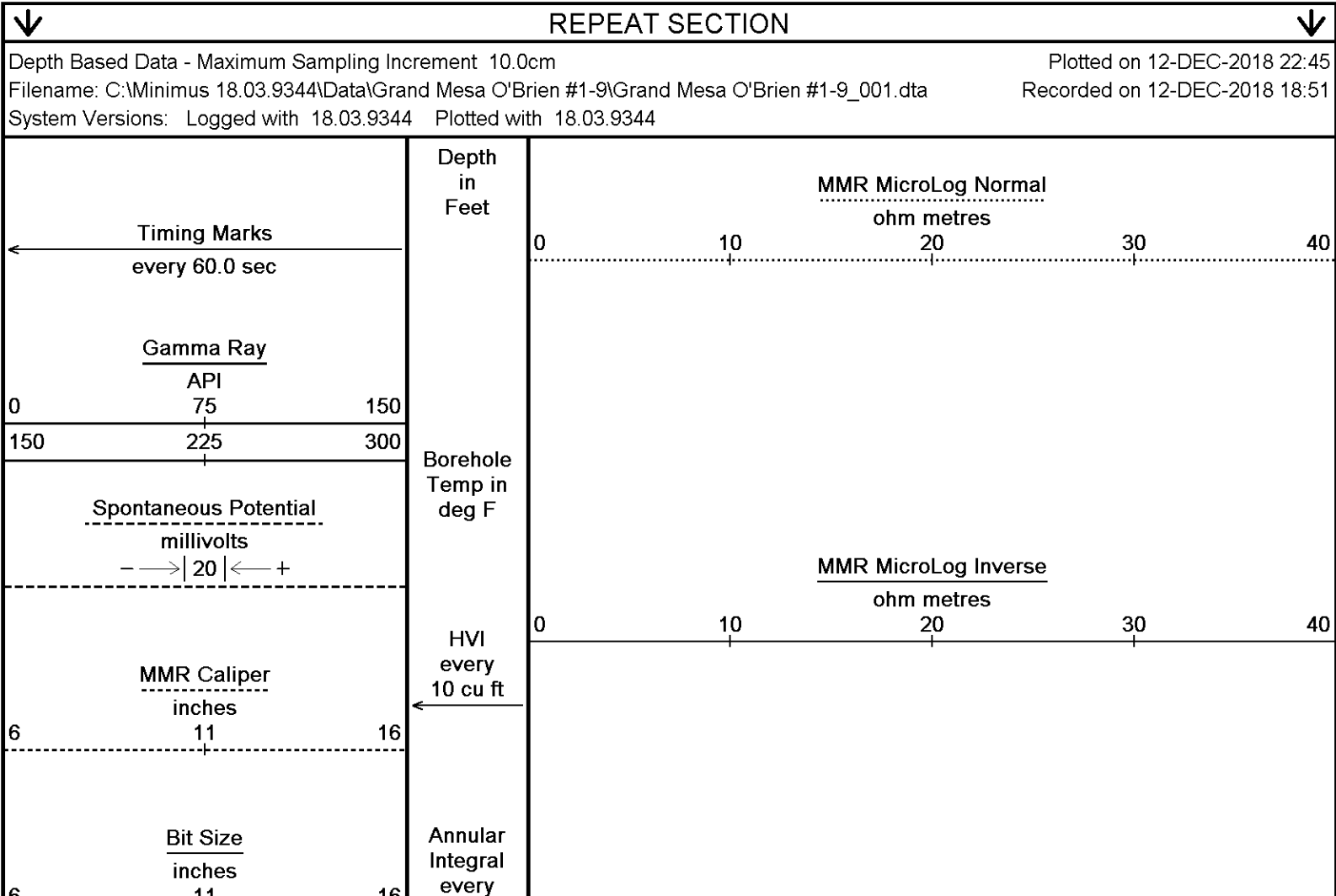
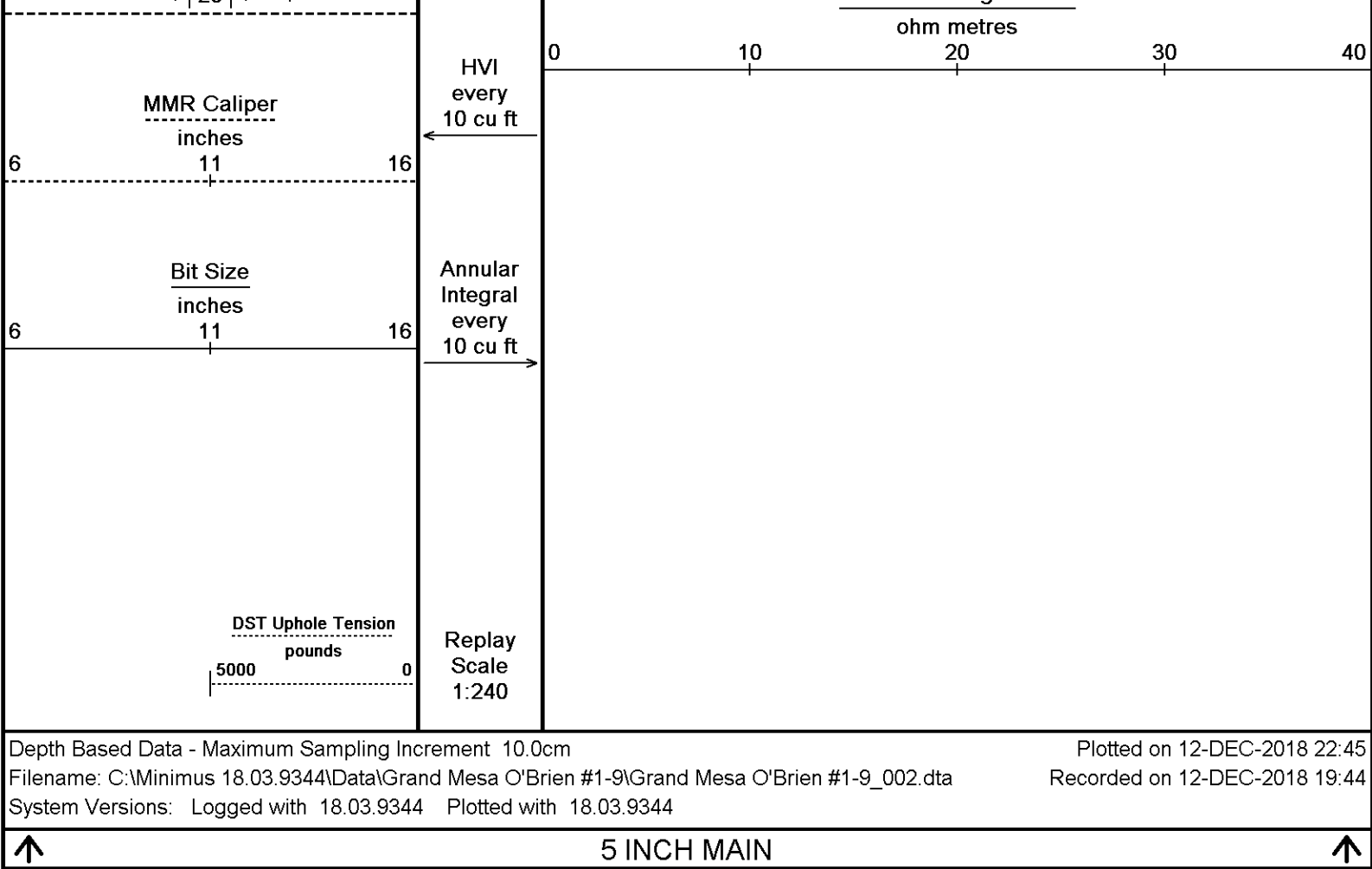
MMR MicroLog Normal

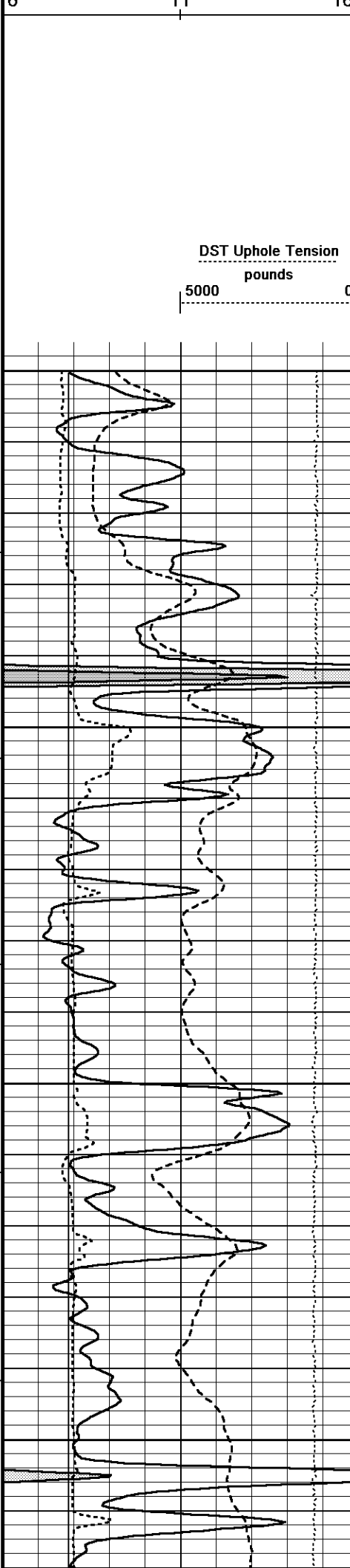
FR

MMR MicroLog Normal
ohm metres

0 10 20 30 40

MMR MicroLog Inverse





10 cu ft

Replay
Scale
1:240

3700

111°

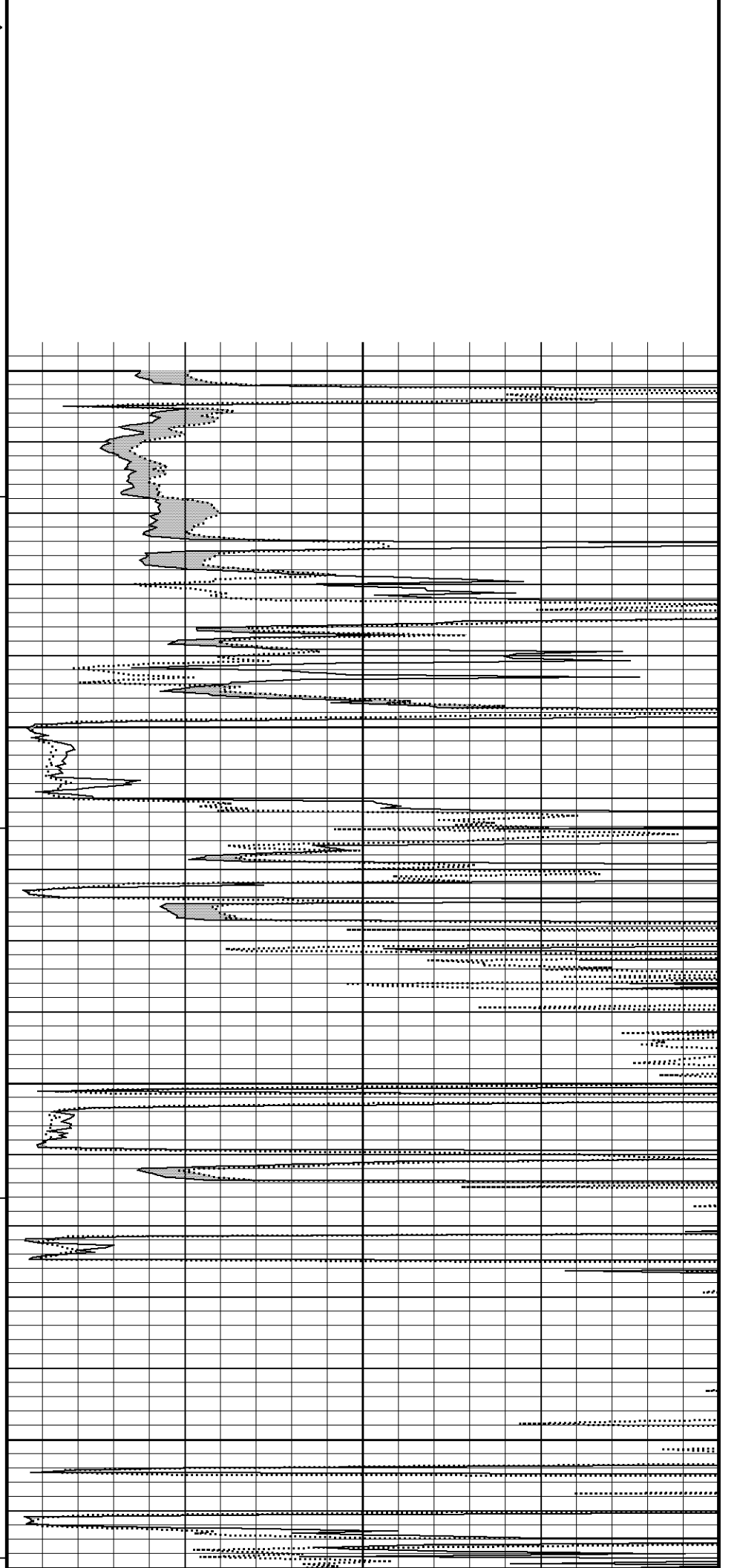
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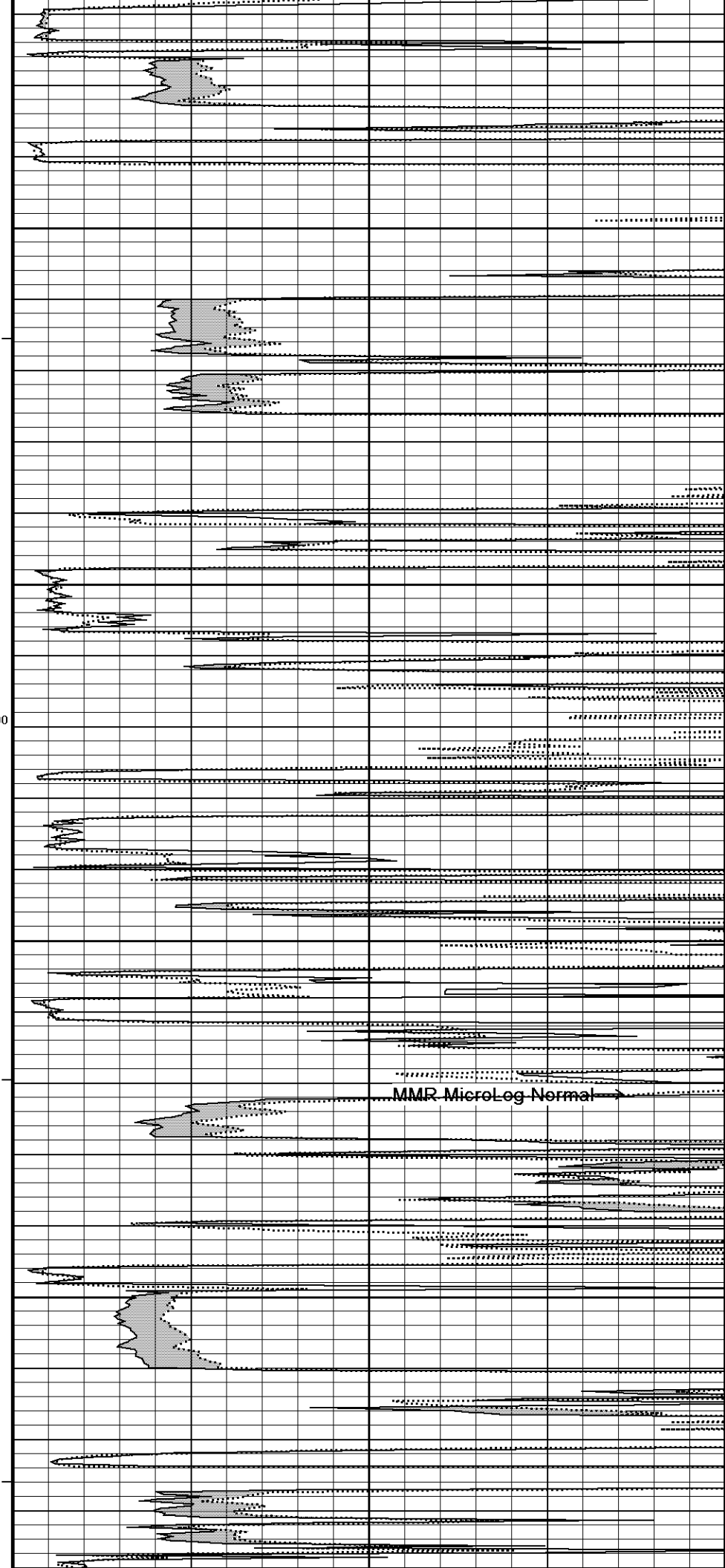
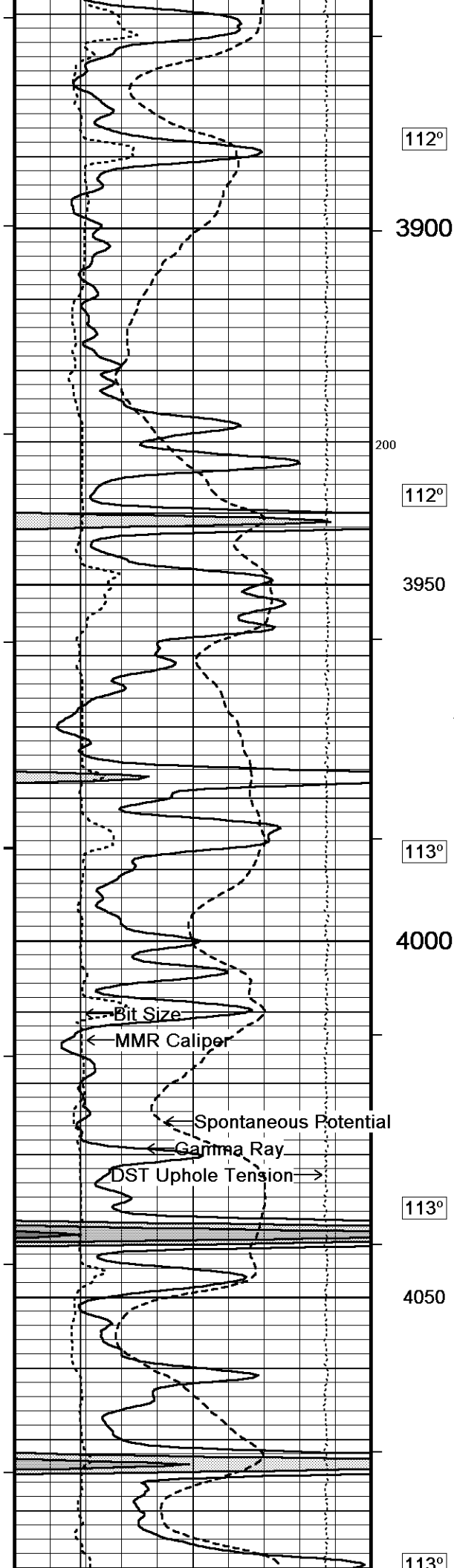
111°

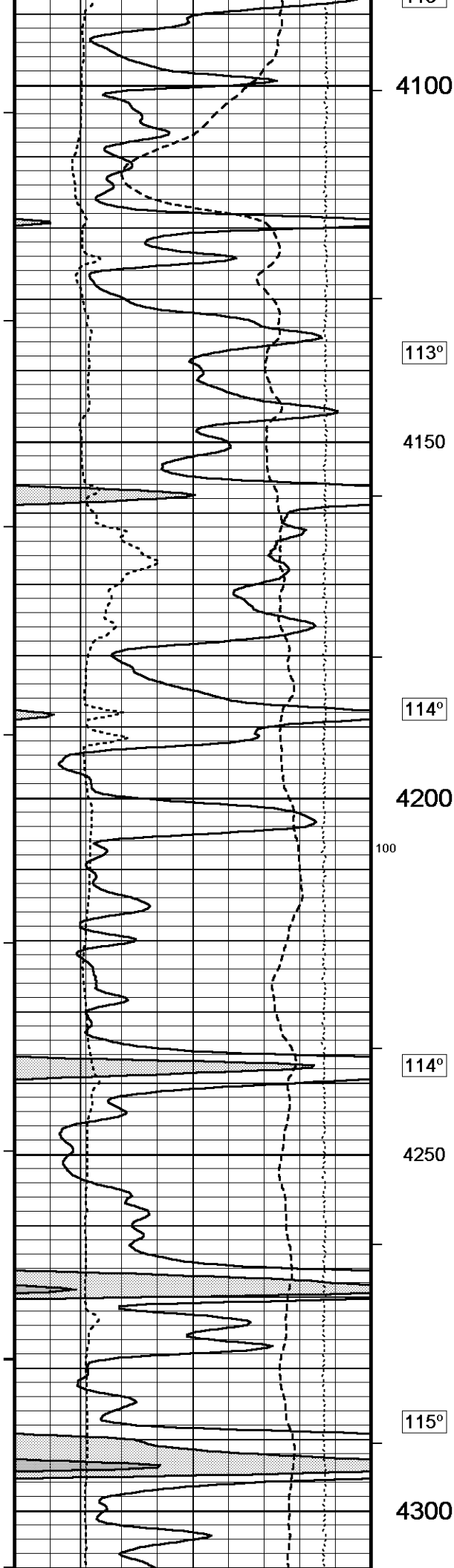
3800

112°

3850







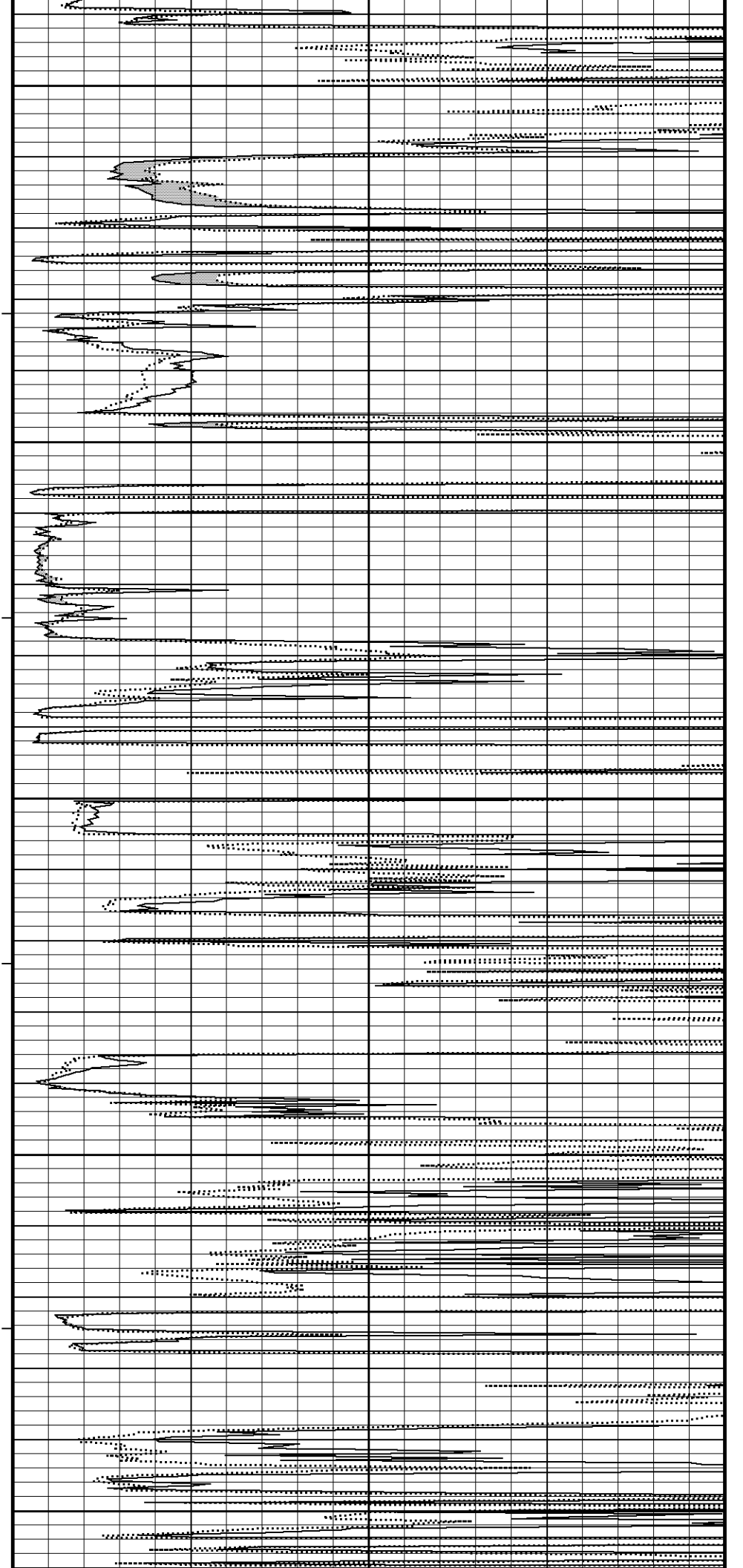
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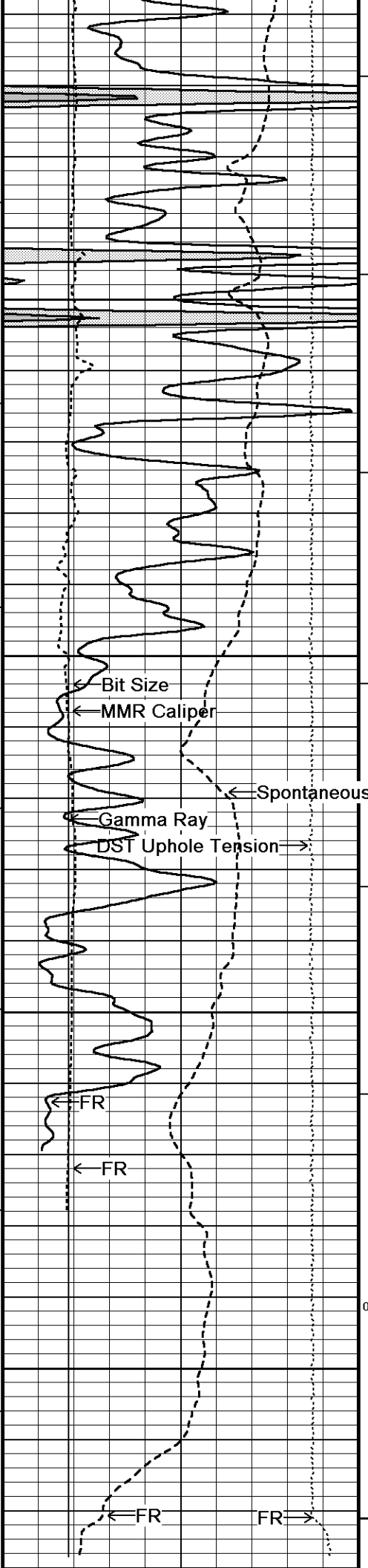
113°

114°

114°

115°





115°

4350

116°

4400

MMR MicroLog Normal

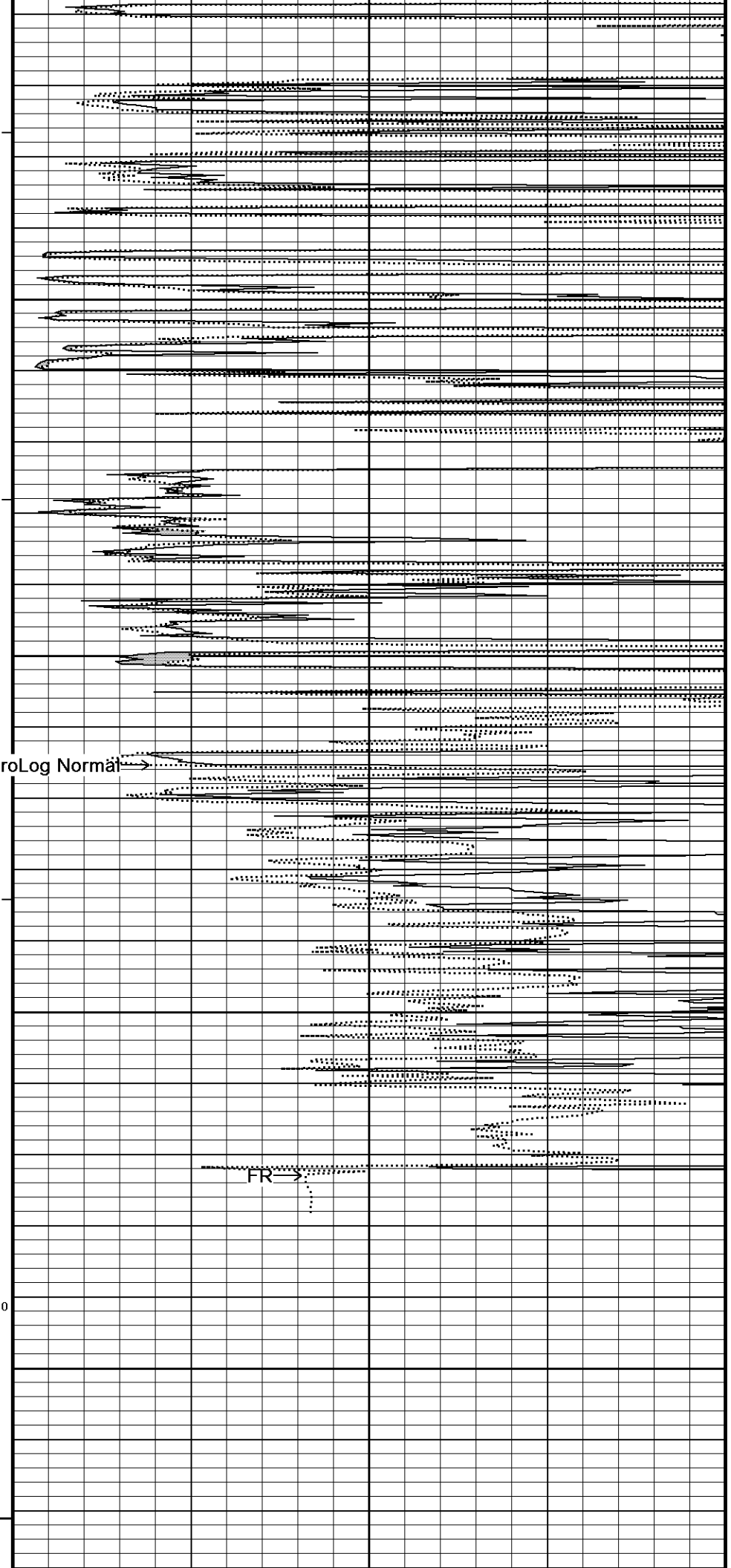
115°

4450

0

4500

TD



IVOL Caliper 1	Density Caliper	N/A	
HVOL Caliper 2			
Annular Volume Diameter	5.500	inches	
Caliper for Differential Caliper	Density Caliper		
Rwa Parameters			
Porosity used	Crossplot Porosity		
Resistivity used	Array Ind. Two Res Rt		
RWA Constant A	0.620		
RWA Constant M	2.150		
SW/APOR Tool Source	0.000		

High Resolution Temperature Calibration MCG-D.K 443			Field Calibration on 12-OCT-2018,05:20
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	212.00	212.00	

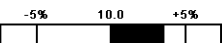
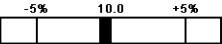
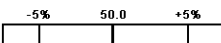
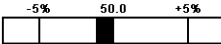
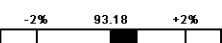
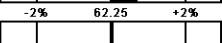
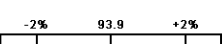
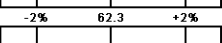
High Resolution Temperature Constants MCG-D.K 443			Last Edited on 12-OCT-2018,05:20
Pre-filter Length	11		

Gamma Calibration MCG-D.K 443			Field Calibration on 10-DEC-2018 18:45
	Measured	Calibrated (API)	
Background	103	72	
Calibrator (Gross)	759	528	
Calibrator (Net)	656	456	

Gamma Calibration Tolerances MCG-D.K 443			
Ratio	1.439		Counts/API

Gamma Constants MCG-D.K 443			Last Edited on 12-DEC-2018,16:59
Gamma Calibrator Number	MCGGRCC141		
GRC-M Calibrator Jig in Use?	NO		
Inactive Background Jig in Use?	NO		
Mud Density	1.12	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Potassium Equivalence	Chloride		
K Mud Concentration	0.00	%	

Micro Normal and Micro Inverse Calibration MMR-B.A 91			Base Calibration on 04-DEC-2018 12:12
	Resistor 1 (ohm)	Resistor 2 (ohm)	Field Check on 10-DEC-2018 18:31
	10.0	50.0	
Base Calibration			
	Measured	Calibrated (ohm-m)	
Micro Normal	10.4 49.9	5.1 25.6	
Micro Inverse	9.9 49.4	3.4 16.9	
Channel			
	Base Check (ohm-m)	Field Check (ohm-m)	
Micro Normal	93.9	93.9	
Micro Inverse	62.3	62.3	

Micro Normal & Micro Inverse Calibration Tolerance MMR-B.A 91			
Micro Normal Res. 1	10.4		ohm
Micro Inverse Res. 1	9.9		ohm
Micro Normal Res. 2	49.9		ohm
Micro Inverse Res. 2	49.4		ohm
Micro Normal Base Check	93.9		ohm-m
Micro Inverse Base Check	62.3		ohm-m
Micro Normal Field Check	93.9		ohm-m
Micro Inverse Field Check	62.3		ohm-m

Micro Normal and Micro Inverse Constants MMR-B.A 91			Last Edited on 13-APR-2018,05:04
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	0.0000	inches

Caliper Calibration MMR-B.A 91

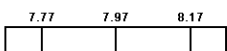
Base Calibration on 04-DEC-2018 12:06
Field Calibration on 10-DEC-2018 18:30

Base Calibration Reading No	Measured	Calibrator Size (in)
1	14099	5.98
2	17485	7.97
3	20790	9.86
4	24525	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

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

Caliper Calibration Tolerances MMR-B.A 91

Short Arm Field Cal. 7.97  in

Caliper Calibration MPD-C.A 216

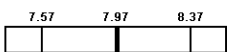
Base Calibration on 04-DEC-2018 12:24
Field Calibration on 10-DEC-2018 18:22

Base Calibration Reading No	Measured	Calibrator Size (in)
1	15599	3.99
2	24289	5.98
3	32989	7.97
4	41250	9.86
5	50464	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.99	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.99  in

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta

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

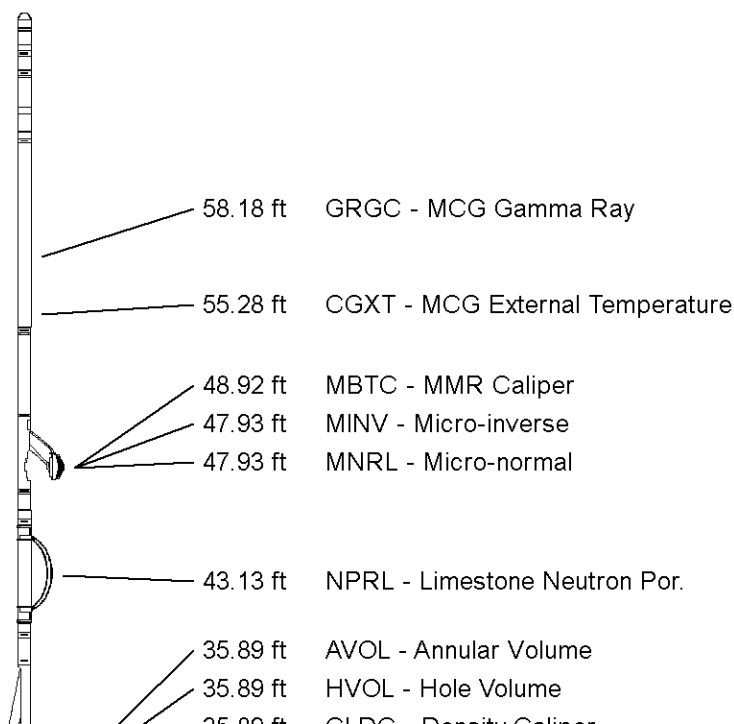
Compact Swivel Head Adaptor
SHA-J.B 595 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

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



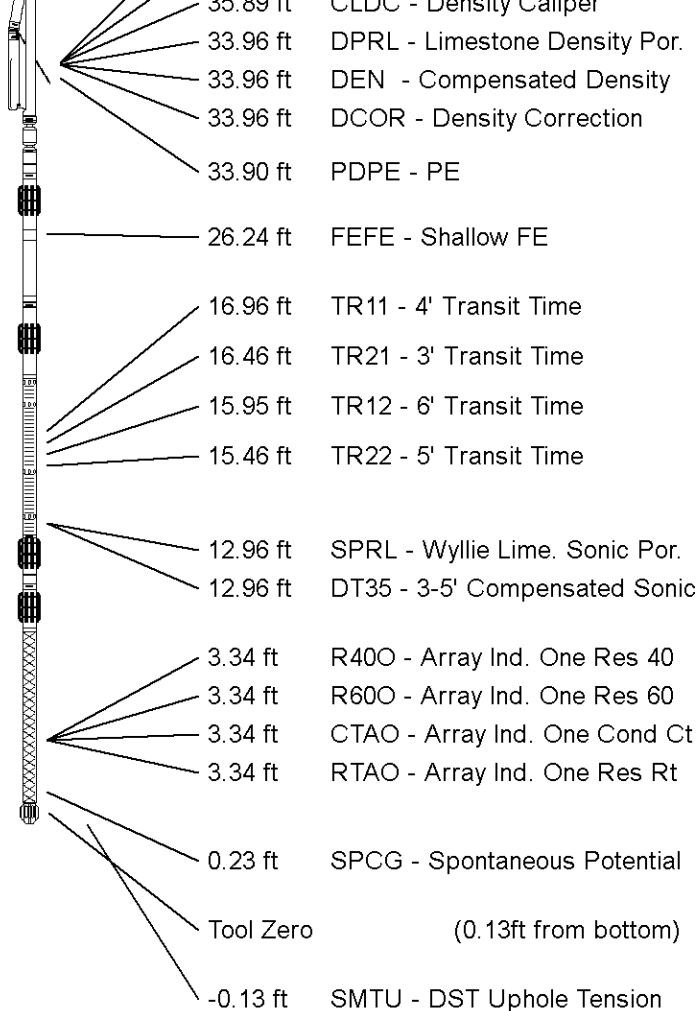
Compact Knuckle Joint
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

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	GRAND MESA OPERATING COMPANY
WELL	OBRIEN #1-9
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2661	feet	First Reading	4473.00	feet
Elevation Drill Floor	2659	feet	Depth Driller	4520.00	feet
Elevation Ground Level	2656	feet	Depth Logger	4521.00	feet



Weatherford®

MICRORESISTIVITY LOG