



Weatherford

MICRORESISTIVITY LOG

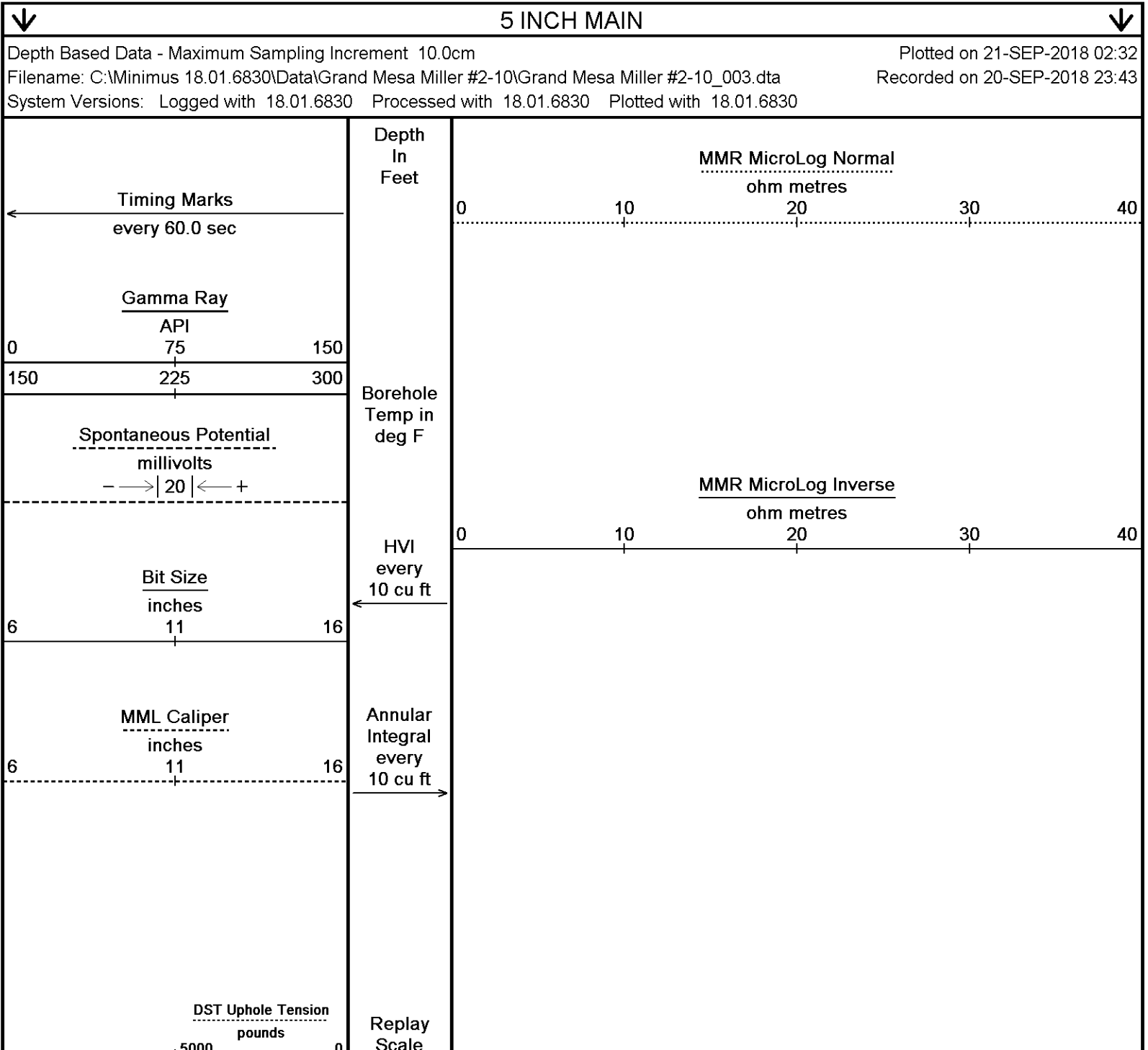
COMPANY			GRAND MESA OPERATING COMPANY		
WELL			MILLER #2-10		
FIELD			ZENITH-PEACE CREEK		
PROVINCE/COUNTY			RENO		
COUNTRY/STATE			U.S.A. / KANSAS		
LOCATION			1950' FSL & 1273' FWL		
SEC 10	TWP 23S	RGE 10W	Other Services		MPD/MDN
Latitude		MAI/MFE			
Longitude		MSS			
API Number		15-155-21759			
Permanent Datum GL, Elevation 1765 feet					Elevations: KB 1770.00
Log Measured From KB, 5.00 feet above Permanent Datum					DF 1765.00
Drilling Measured From KB					GL
Date	20-SEP-2018				
Run Number	ONE				
Service Order	4558-224651393				
Depth Driller	3860.00				feet
Depth Logger	3856.00				feet
First Reading	3808.00				feet
Last Reading	169.00				feet
Casing Driller	168.00				feet
Casing Logger	169.00				feet
Bit Size	7.875				inches
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.25 lb/USg		48.00 CP		
PH / Fluid Loss	9.00		12.40 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.43 @ 75.0		ohm-m		
Rmf @ Measured Temp	0.34 @ 75.0		ohm-m		
Rmc @ Measured Temp	0.52 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	0.30 @107.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	107.00		deg F		
Equipment / Base	13096	LIB			
Recorded By	ADAM SILL				
Witnessed By	STEVE CARL				

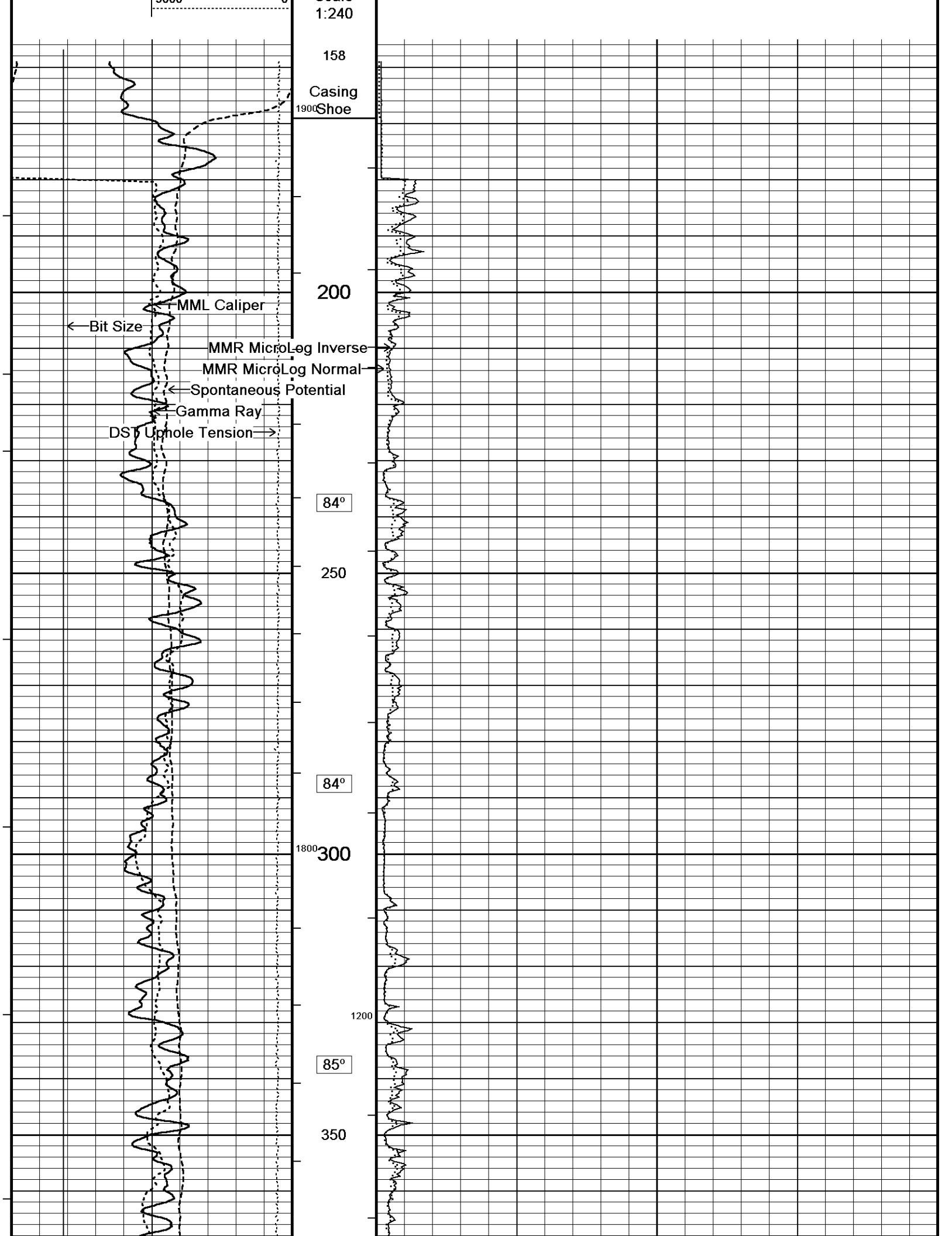
BOREHOLE RECORD			Last Edited: 20-SEP-2018 20:35	
Bit Size inches	Depth From feet		Depth To feet	
7.875	168.00		3860.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	168.00	24.00

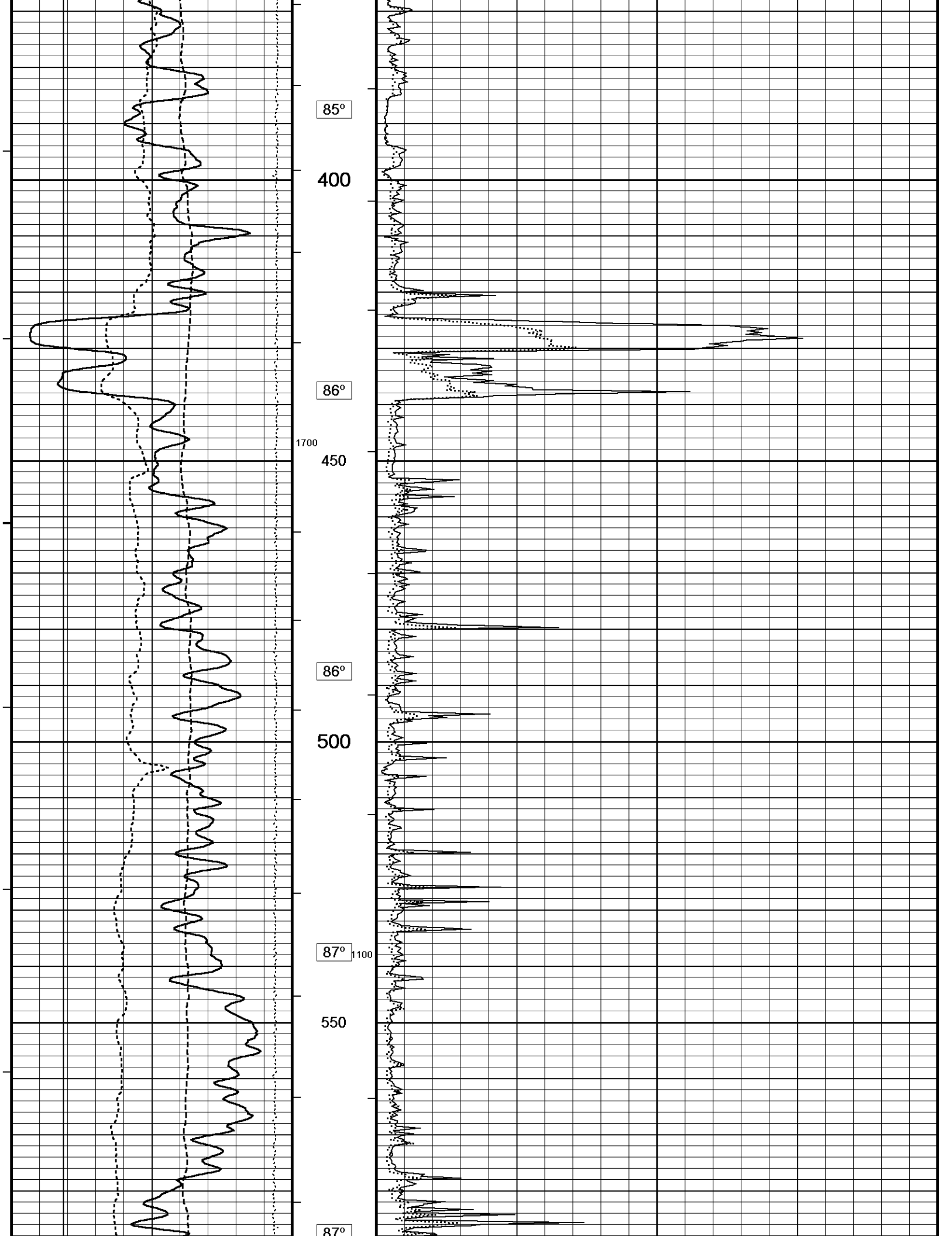
REMARKS
- SOFTWARE ISSUE: WLS 18.01.6830.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 1899 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1293 CU.FT.

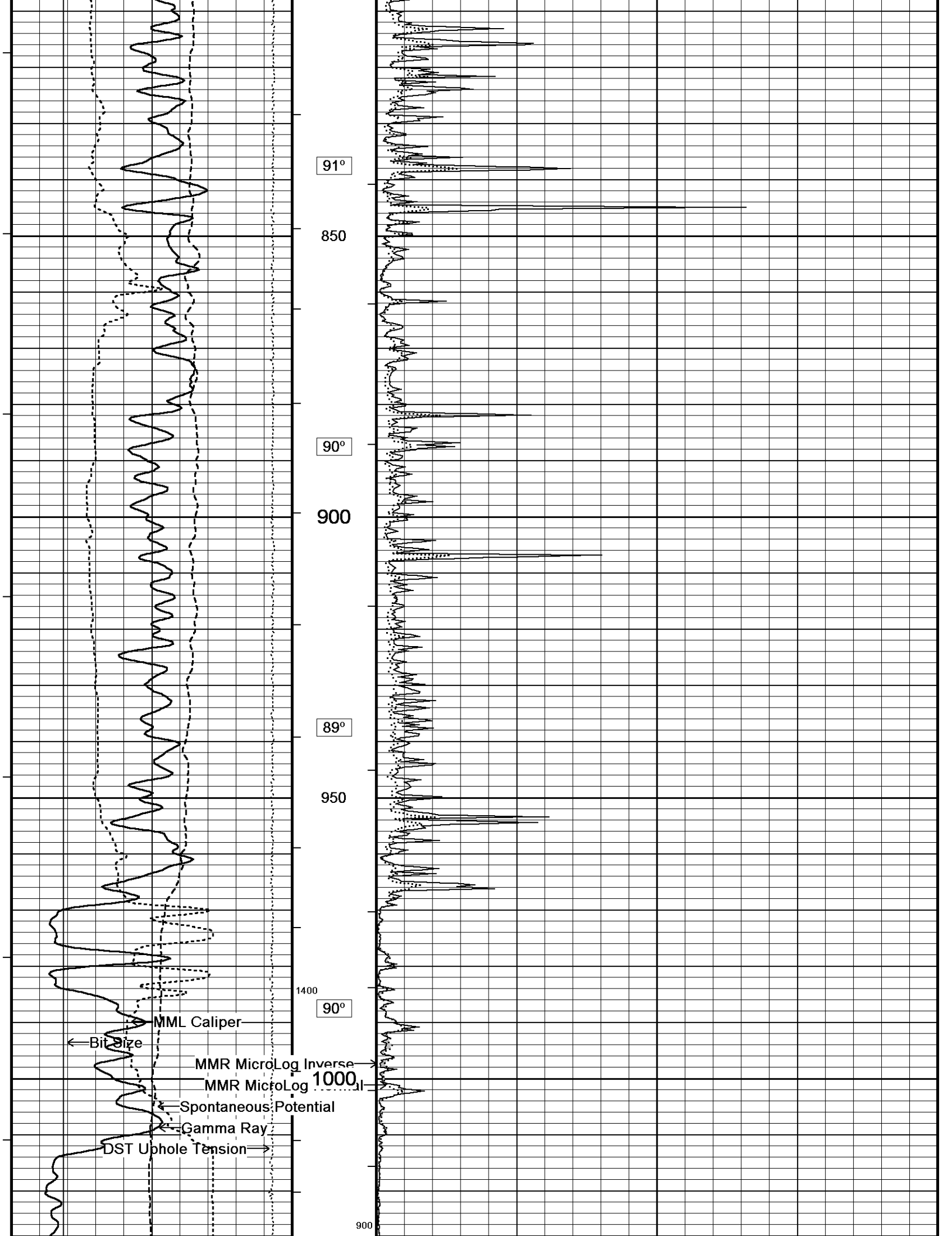
- RIG: WW DRILLING #4.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR.

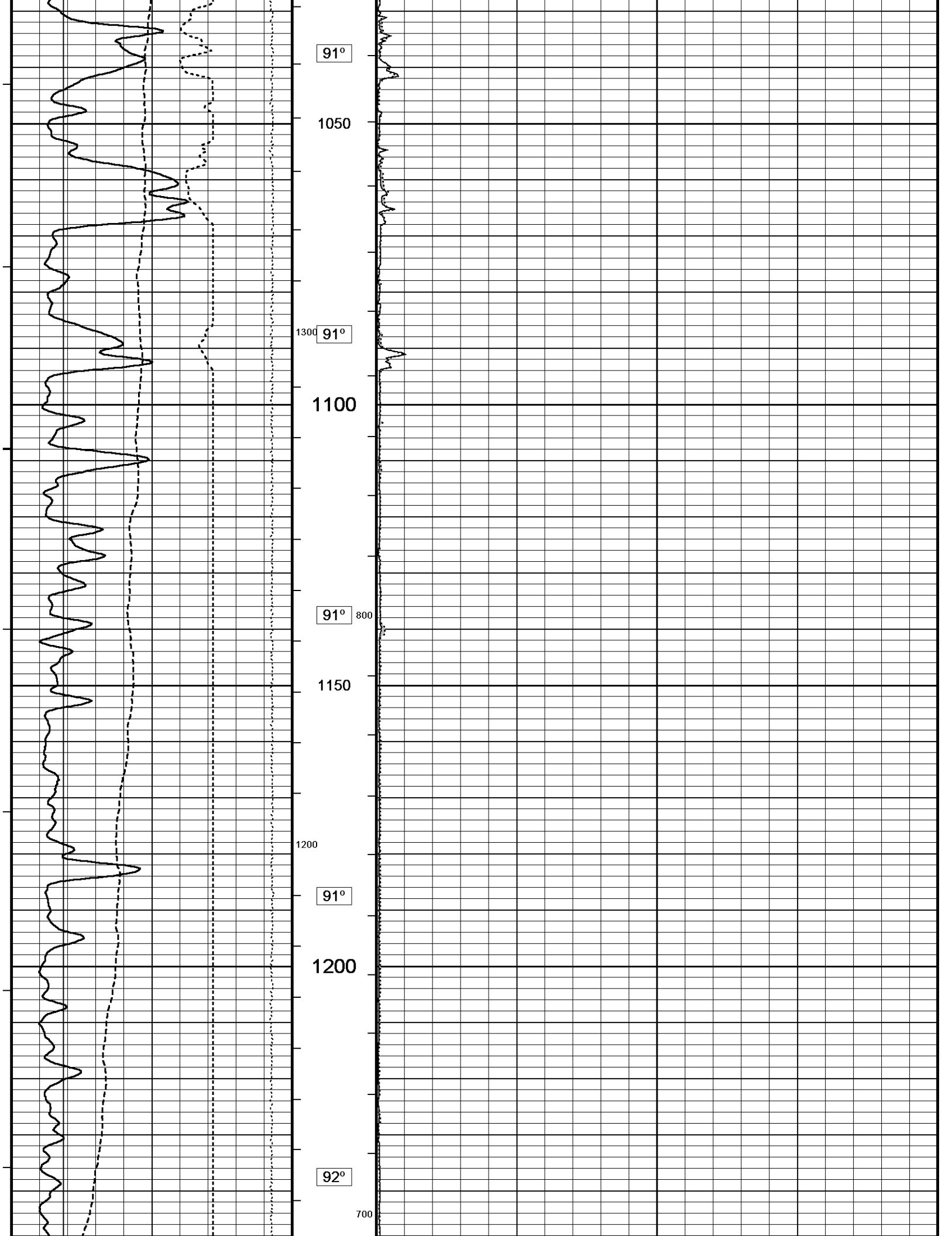
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

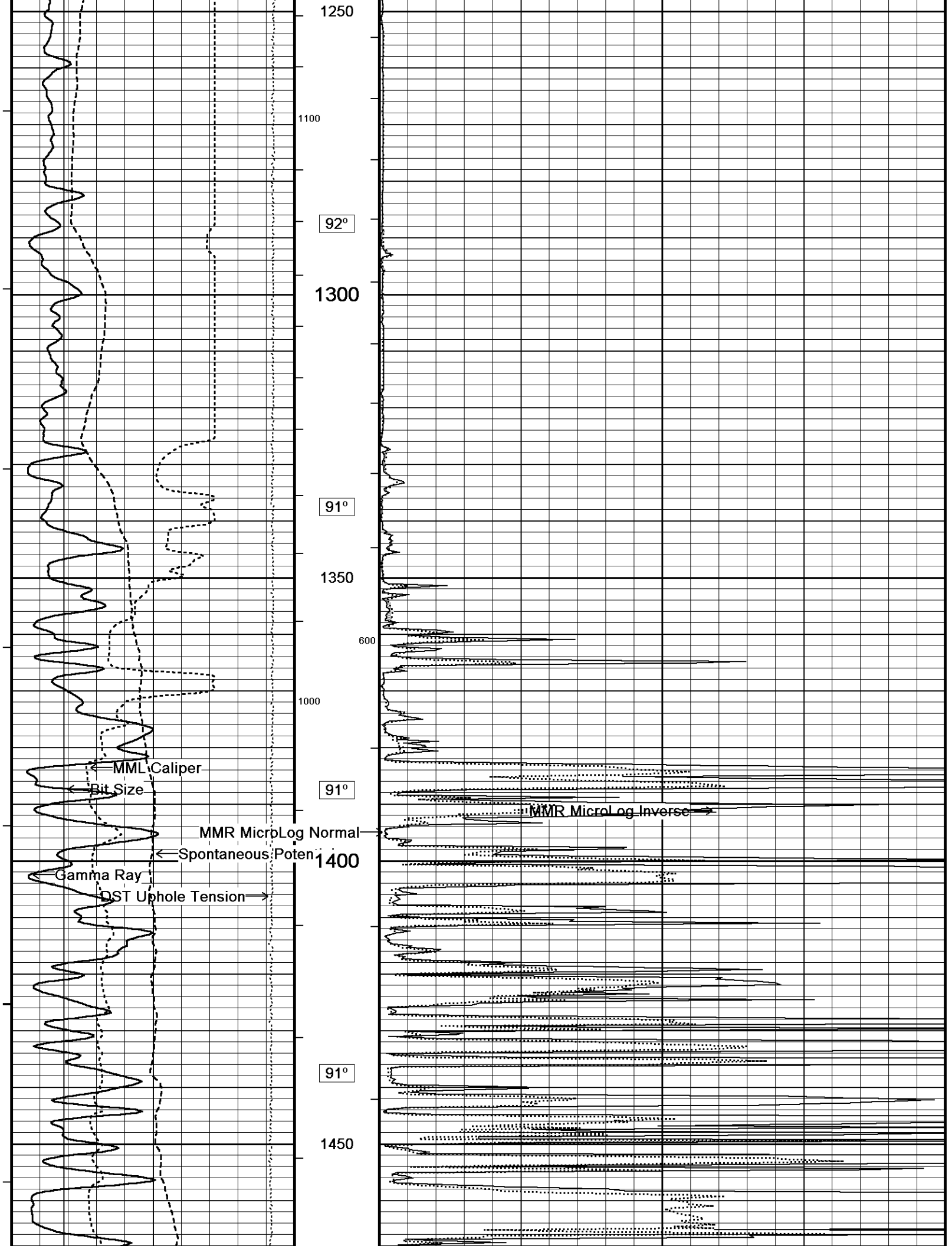


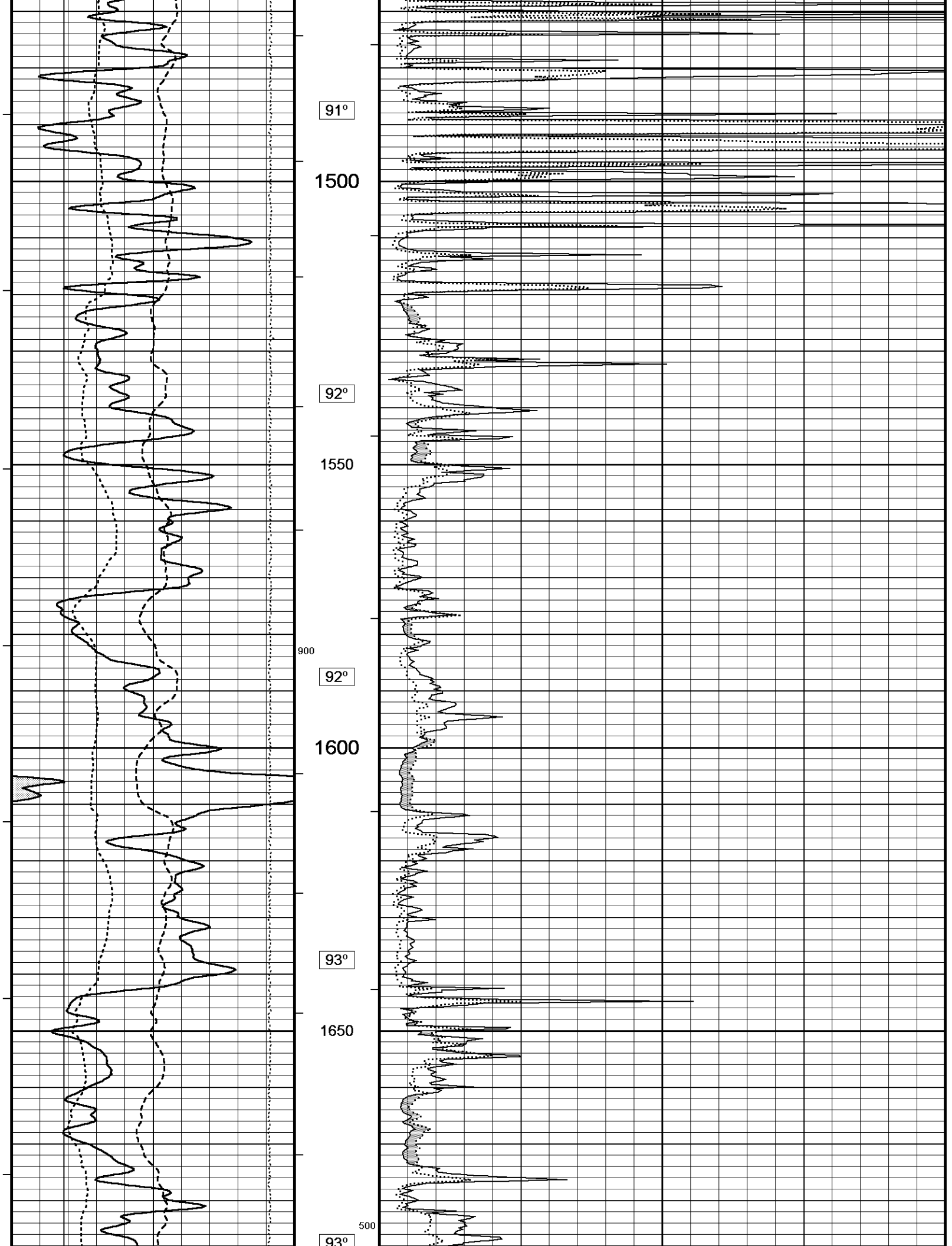


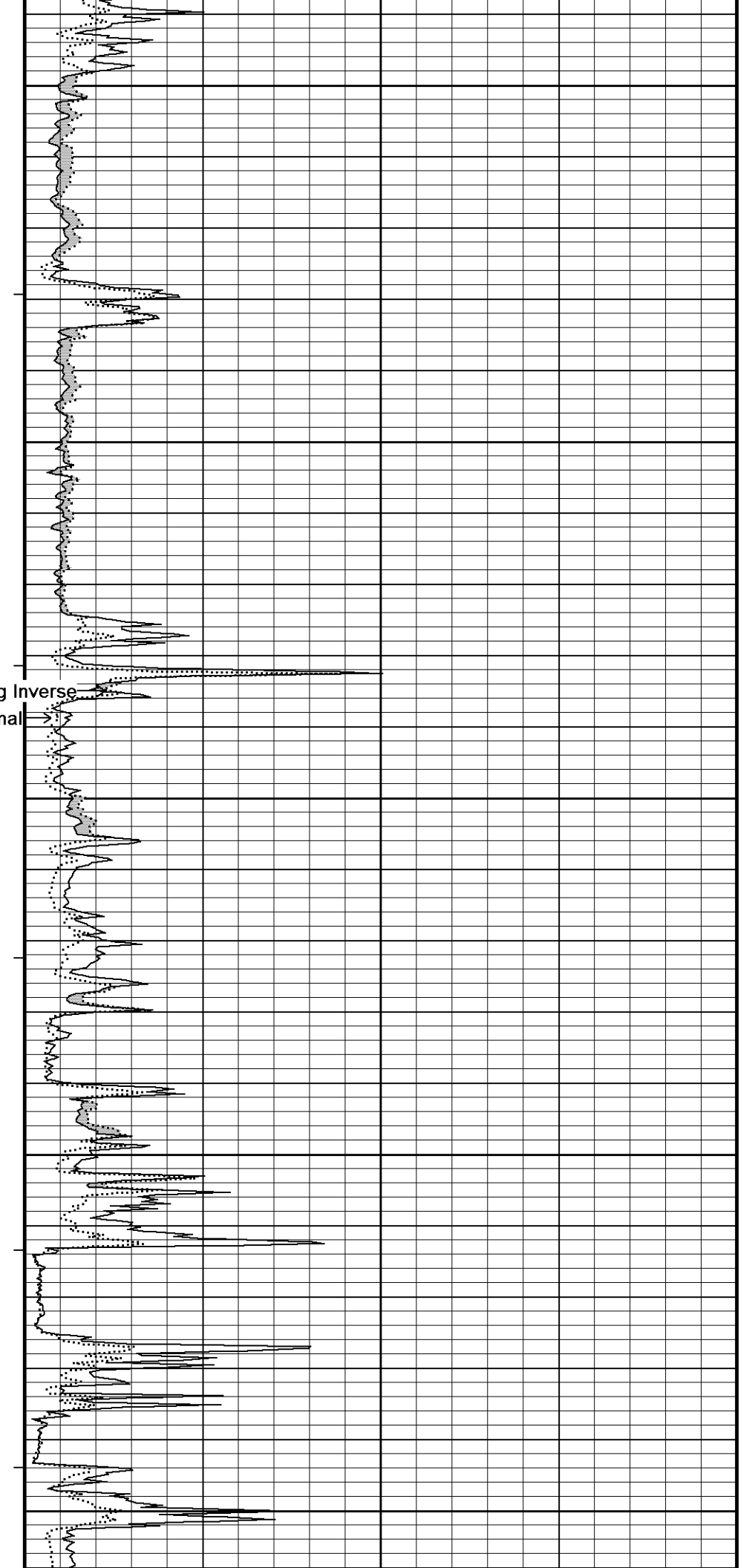
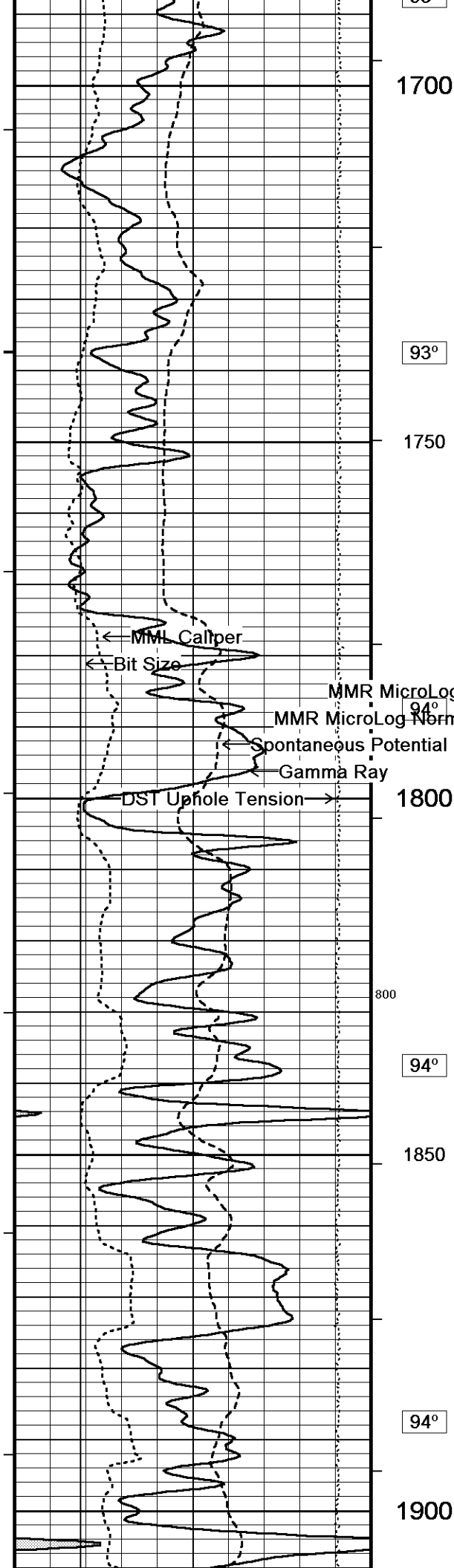


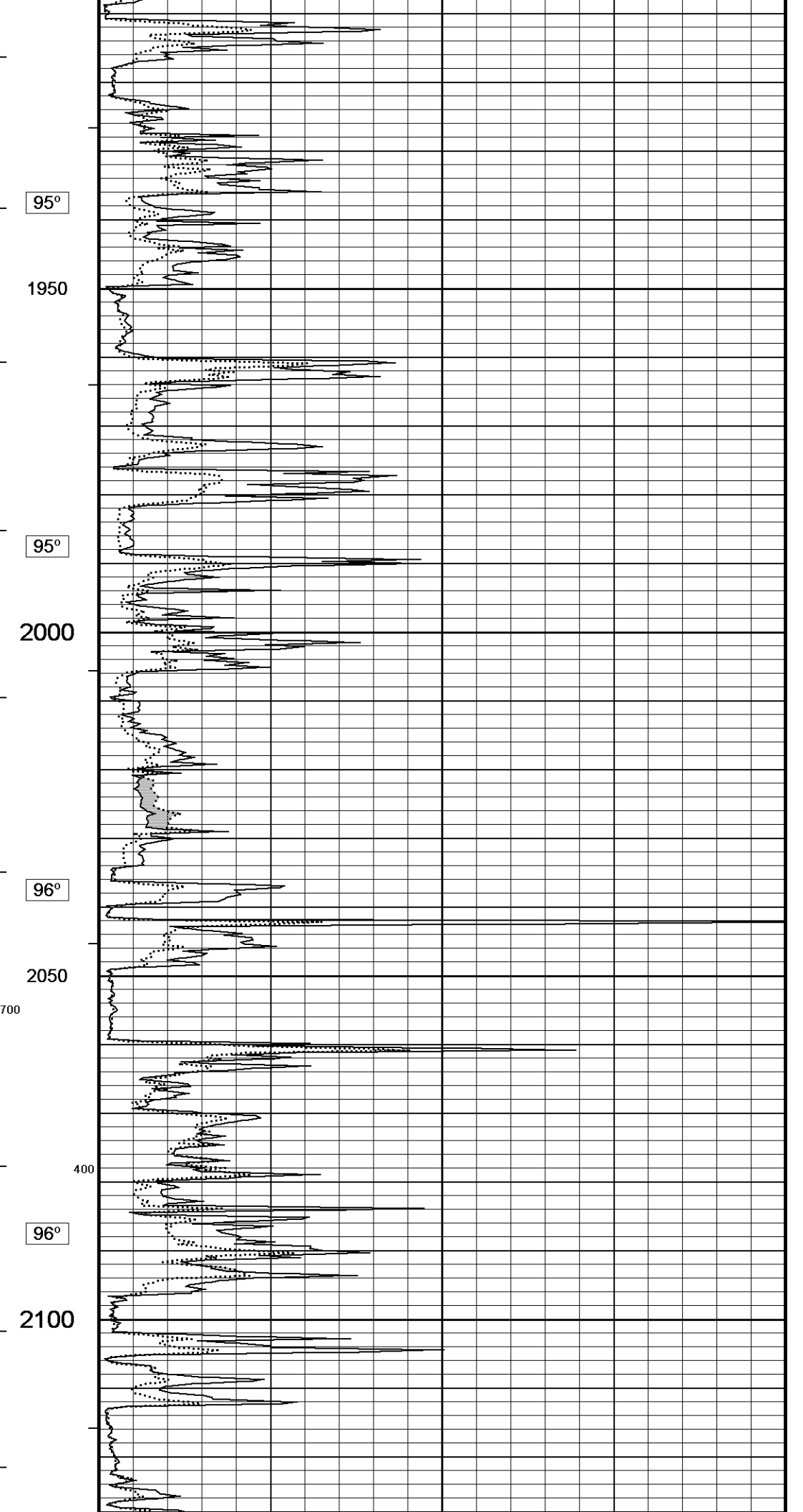
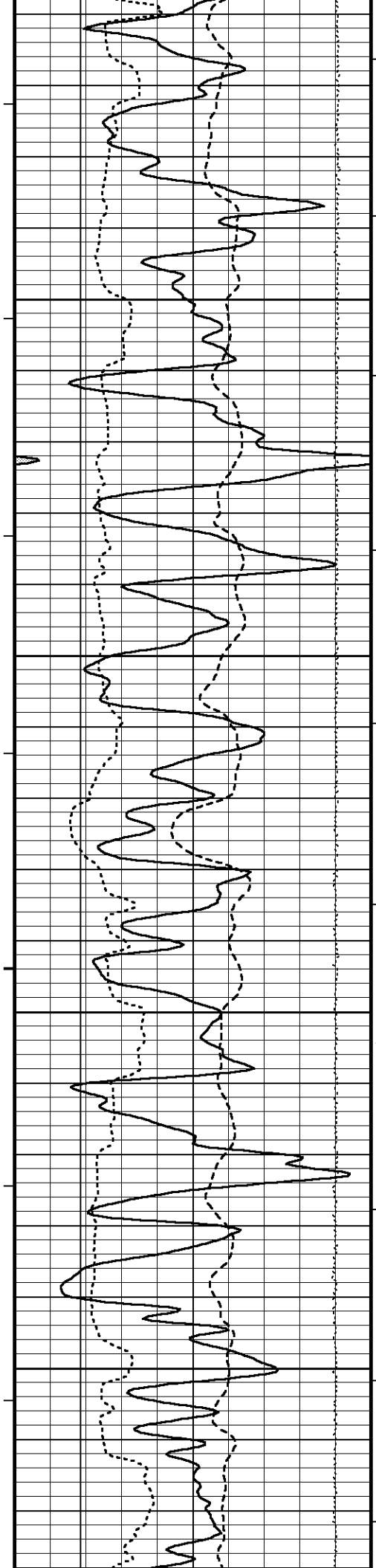


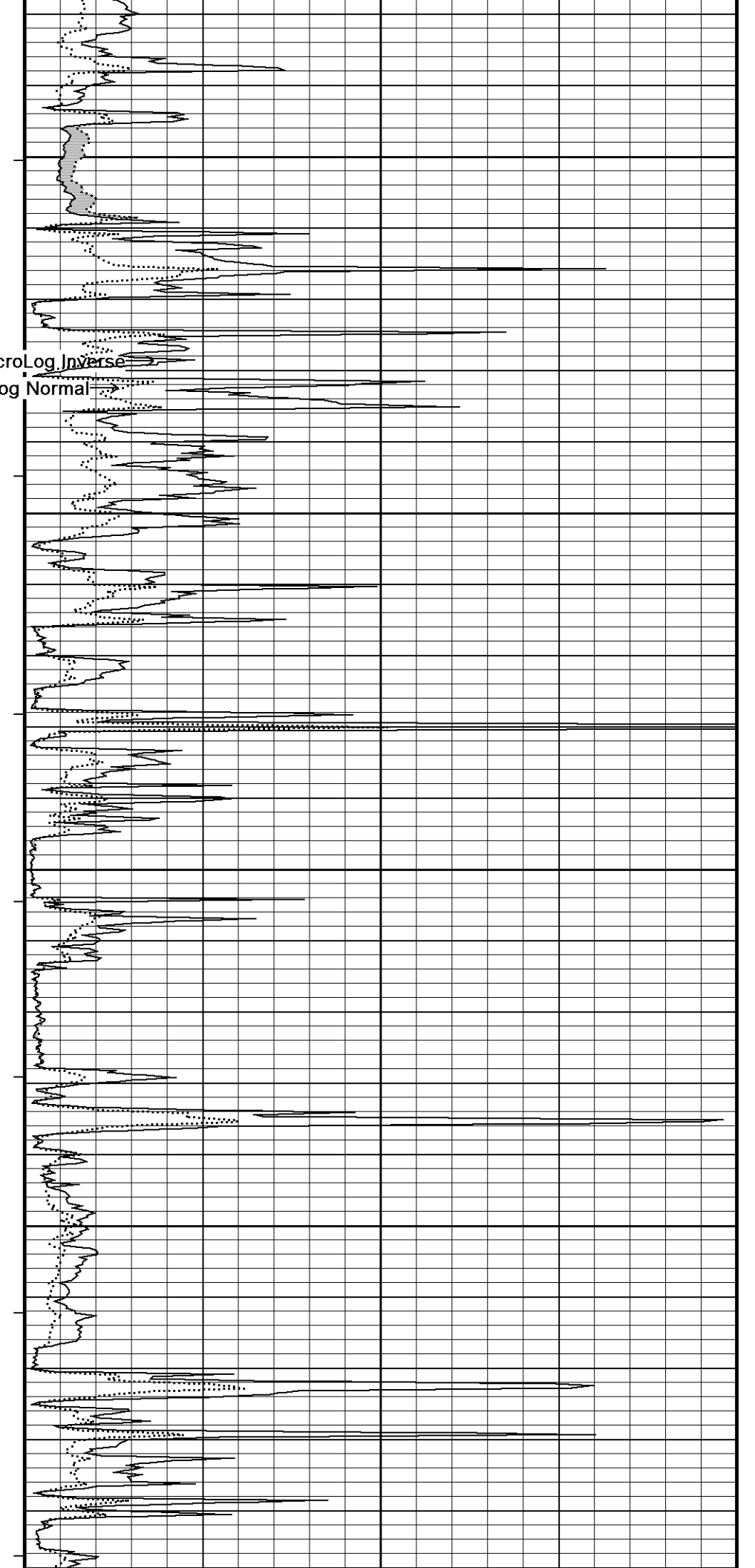
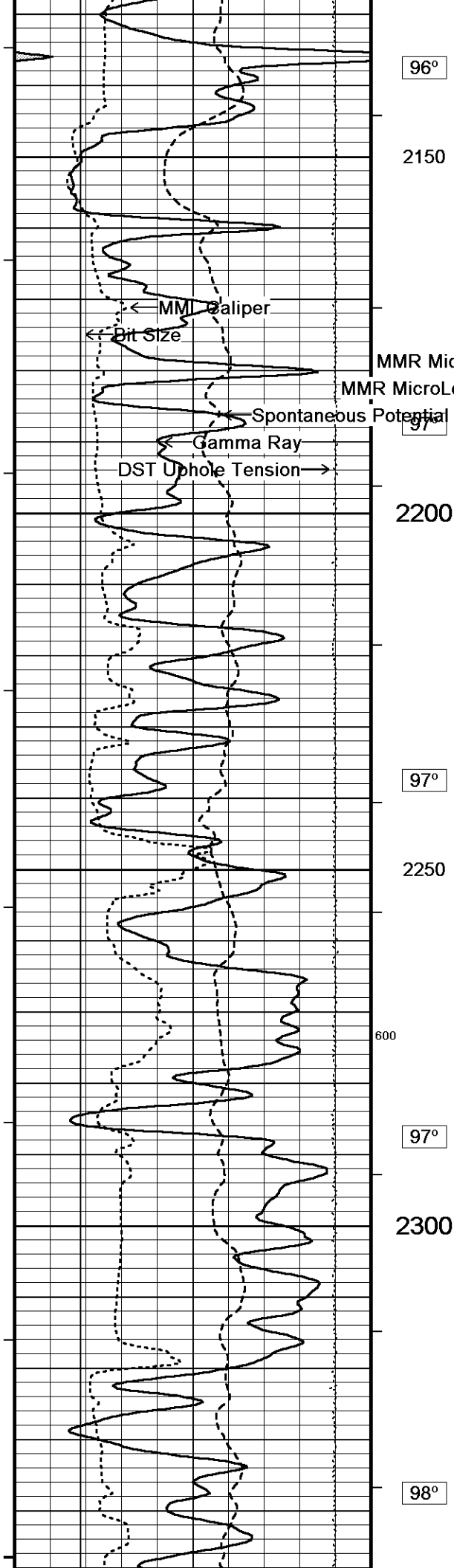


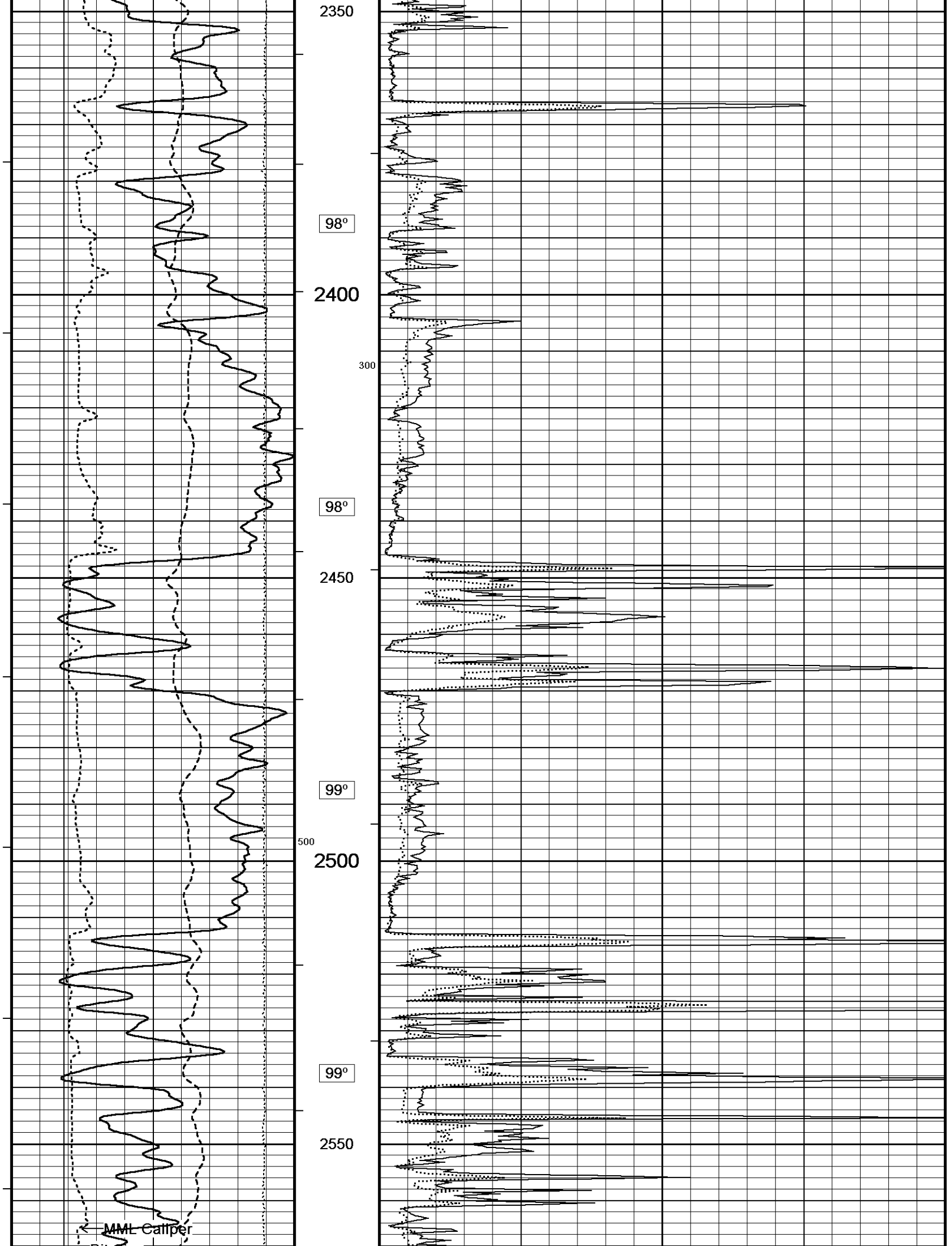


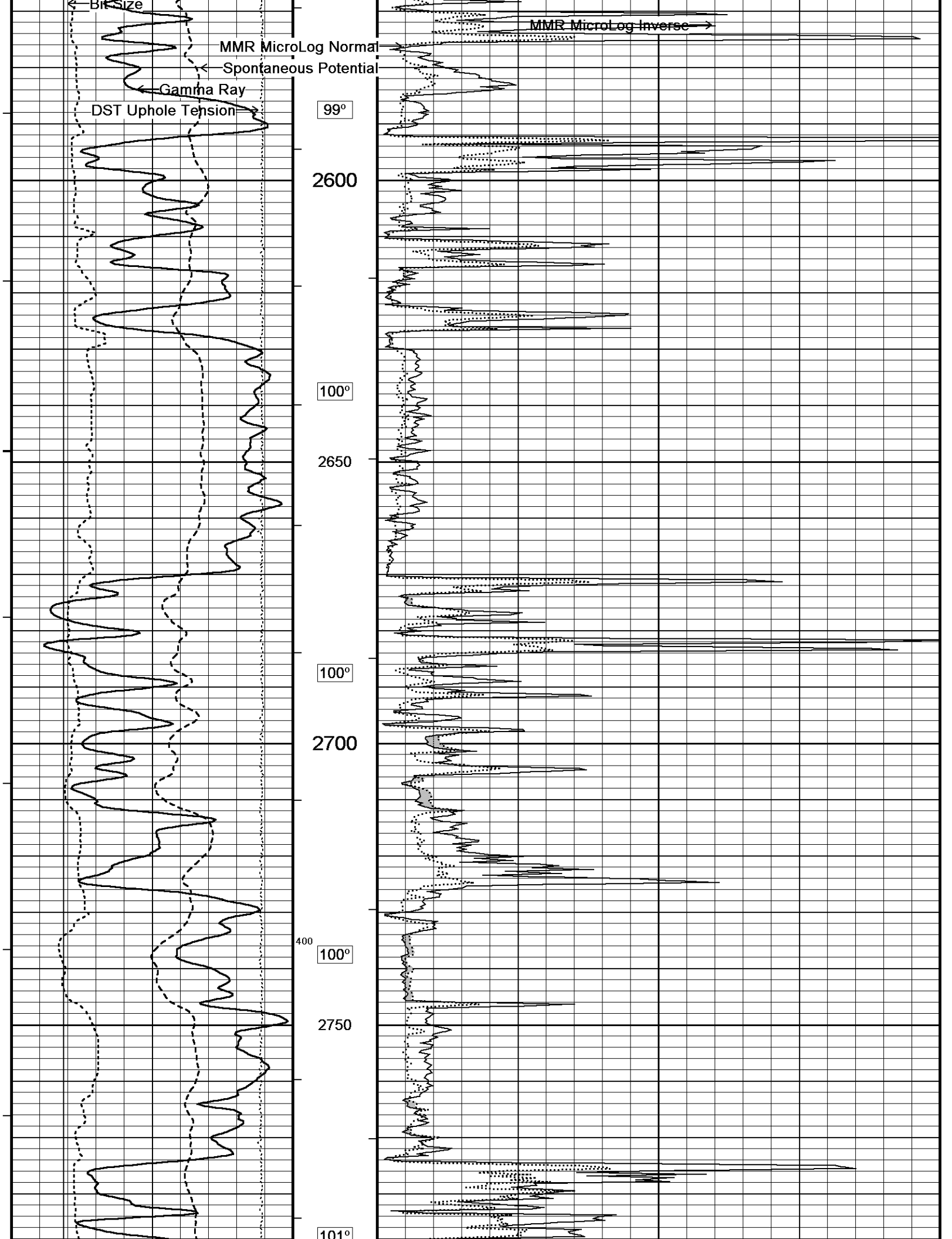


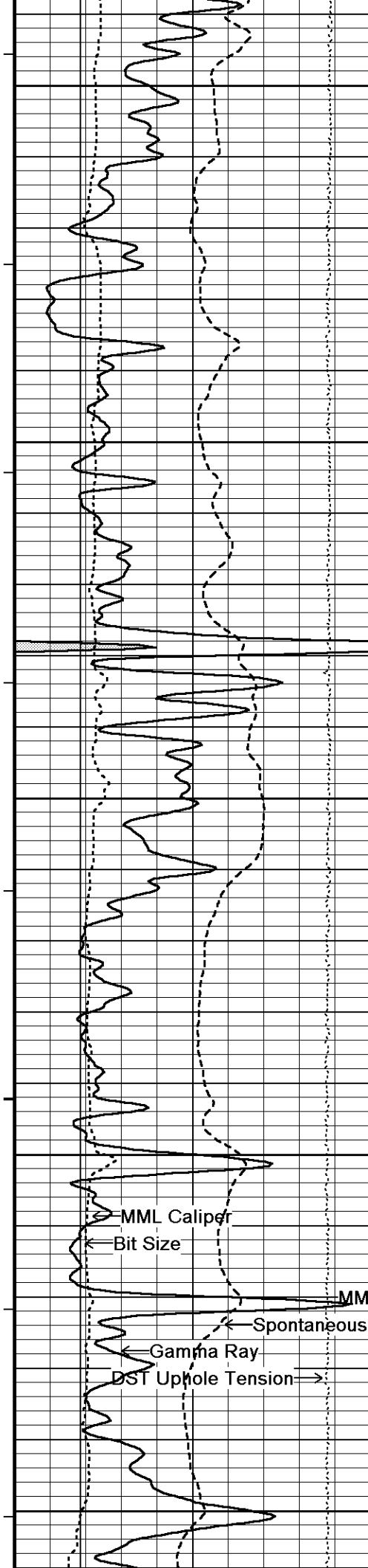












2800

200

101°

2850

101°

2900

102°

2950

MML Caliper

Bit Size

MMR MicroLog Normal

Spontaneous Potential

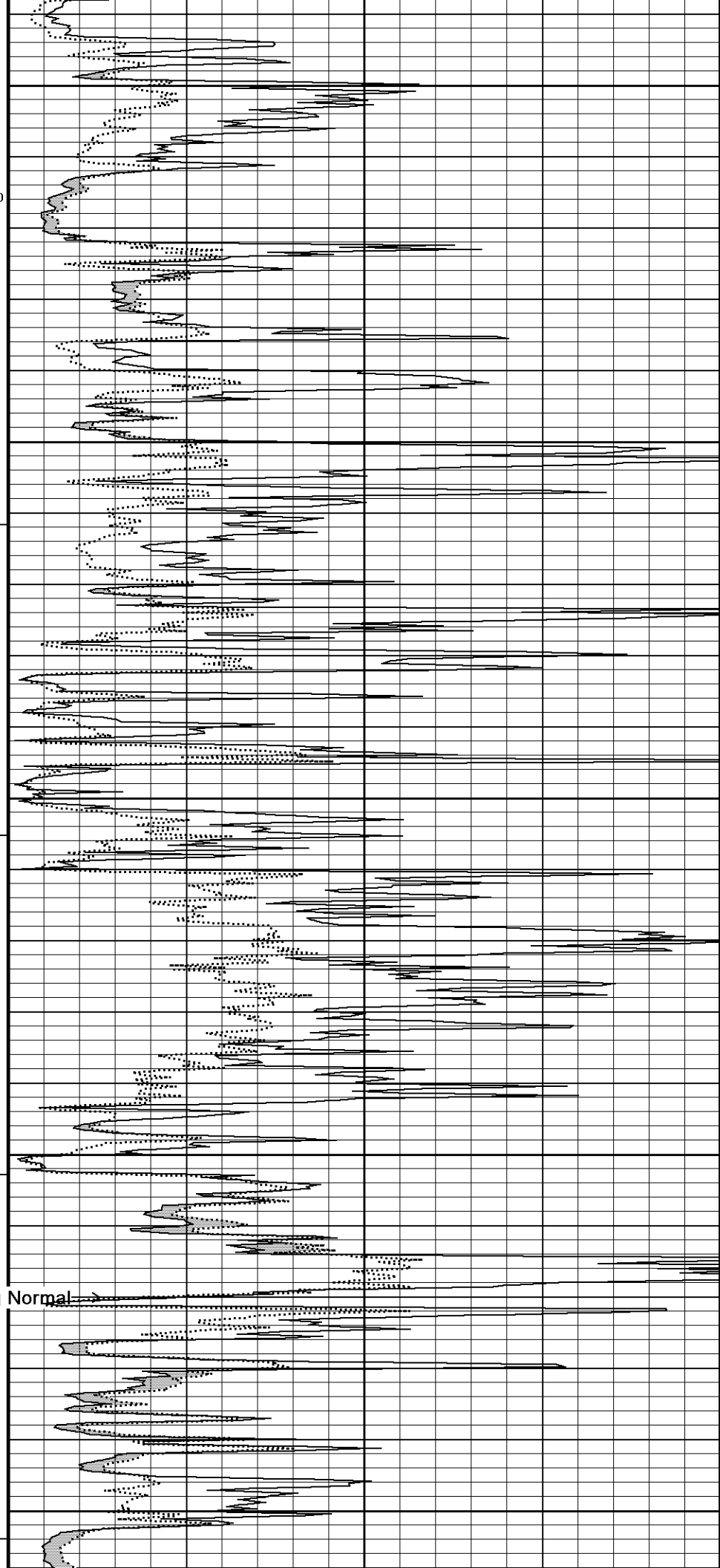
Gamma Ray

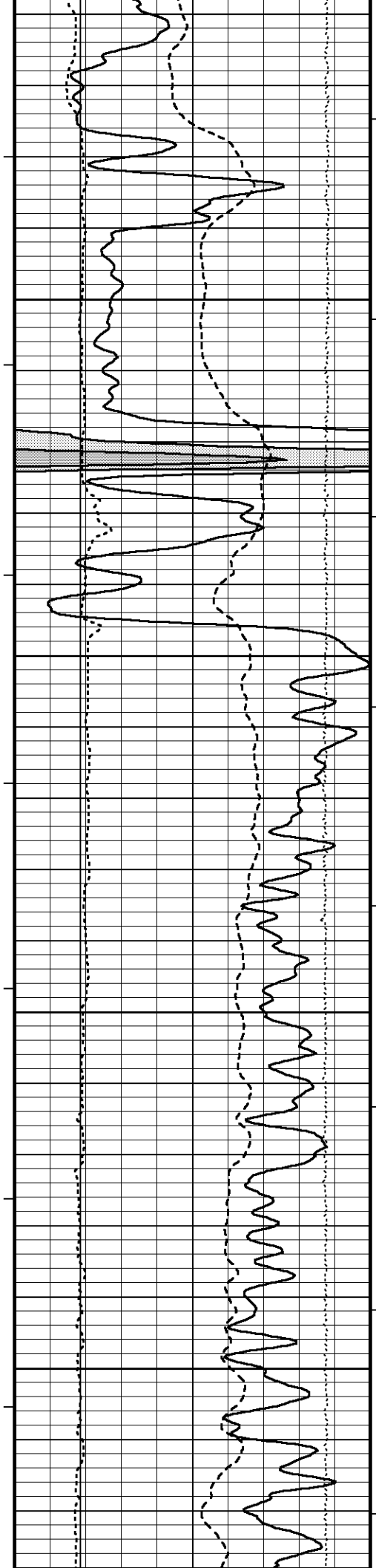
DST Uphole Tension

102°

300

3000





102°

3050

103°

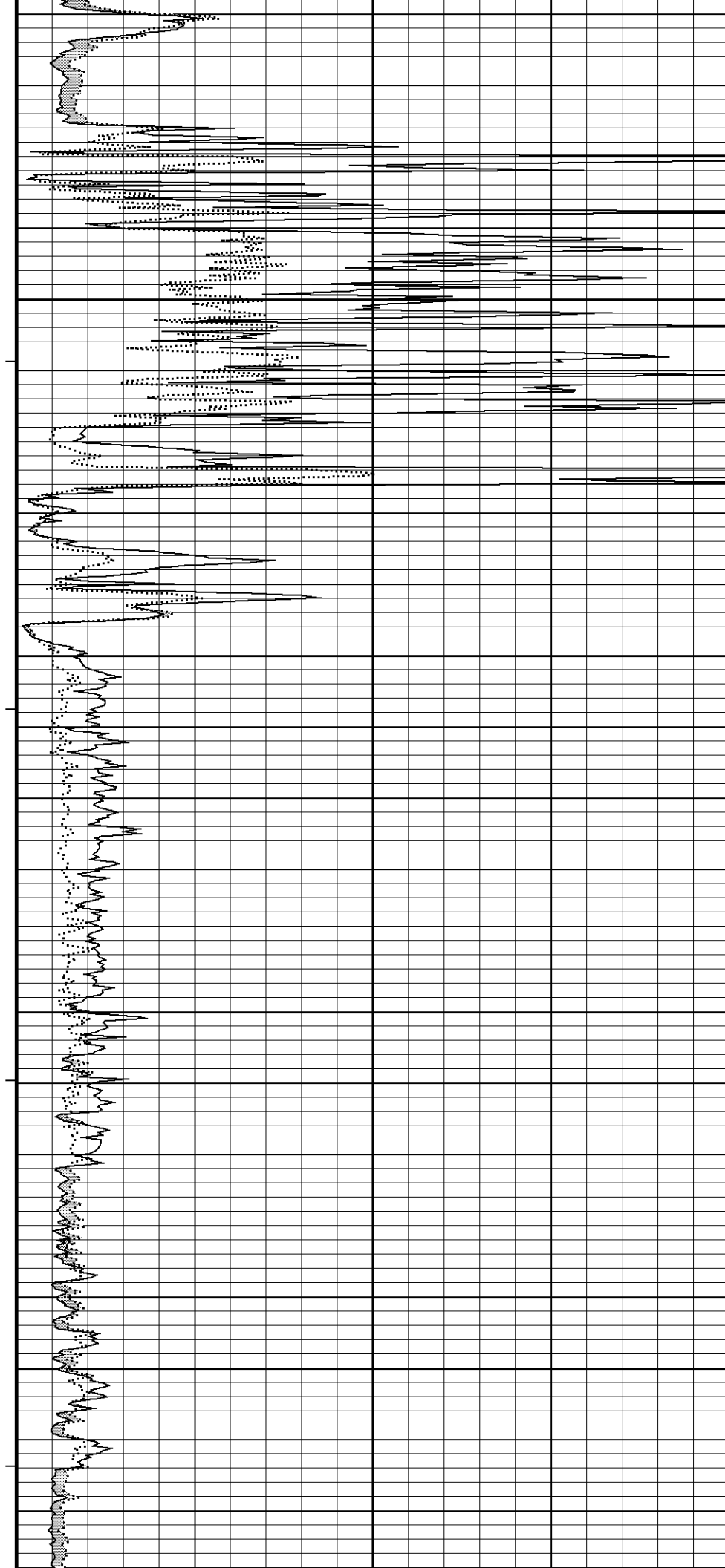
3100

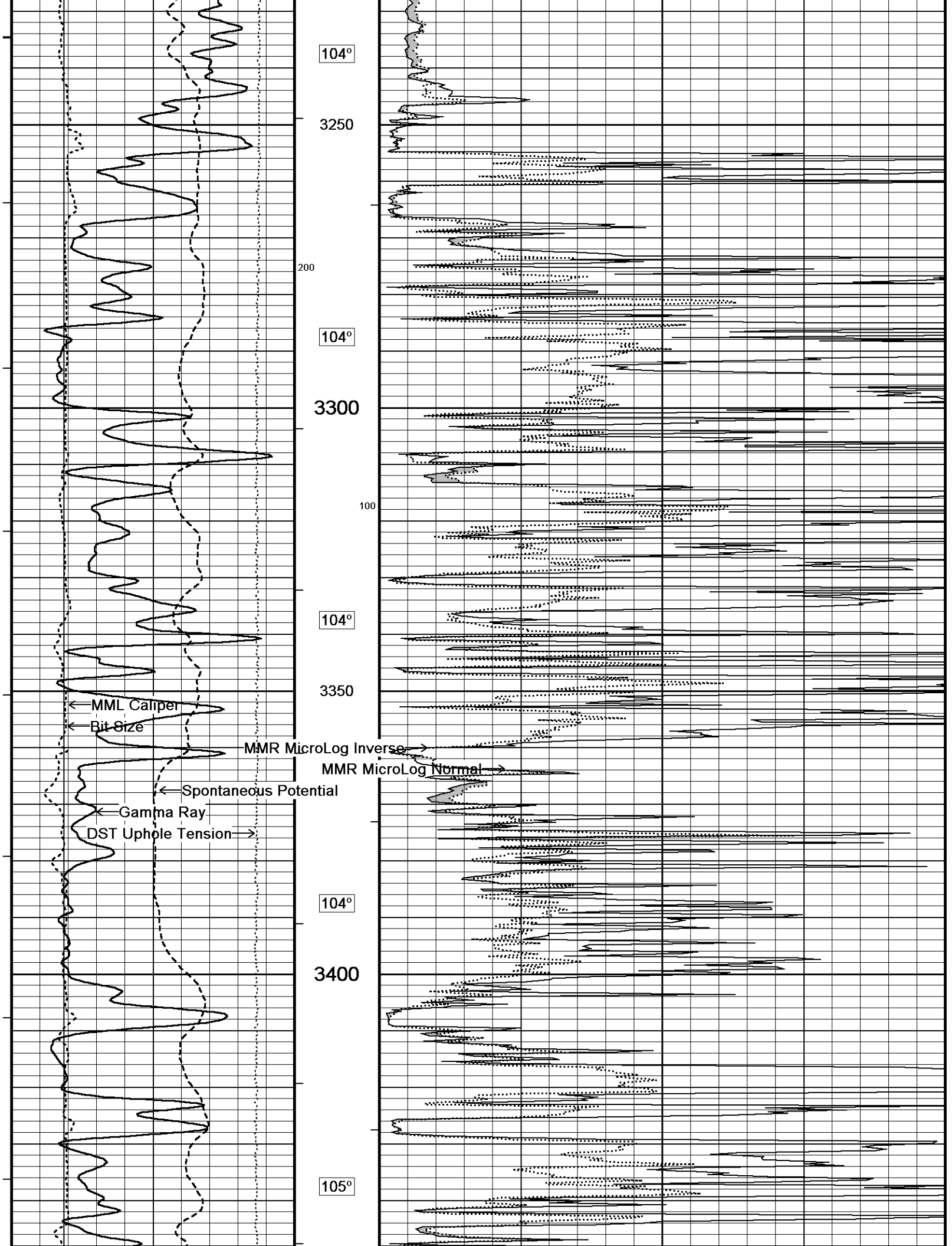
103°

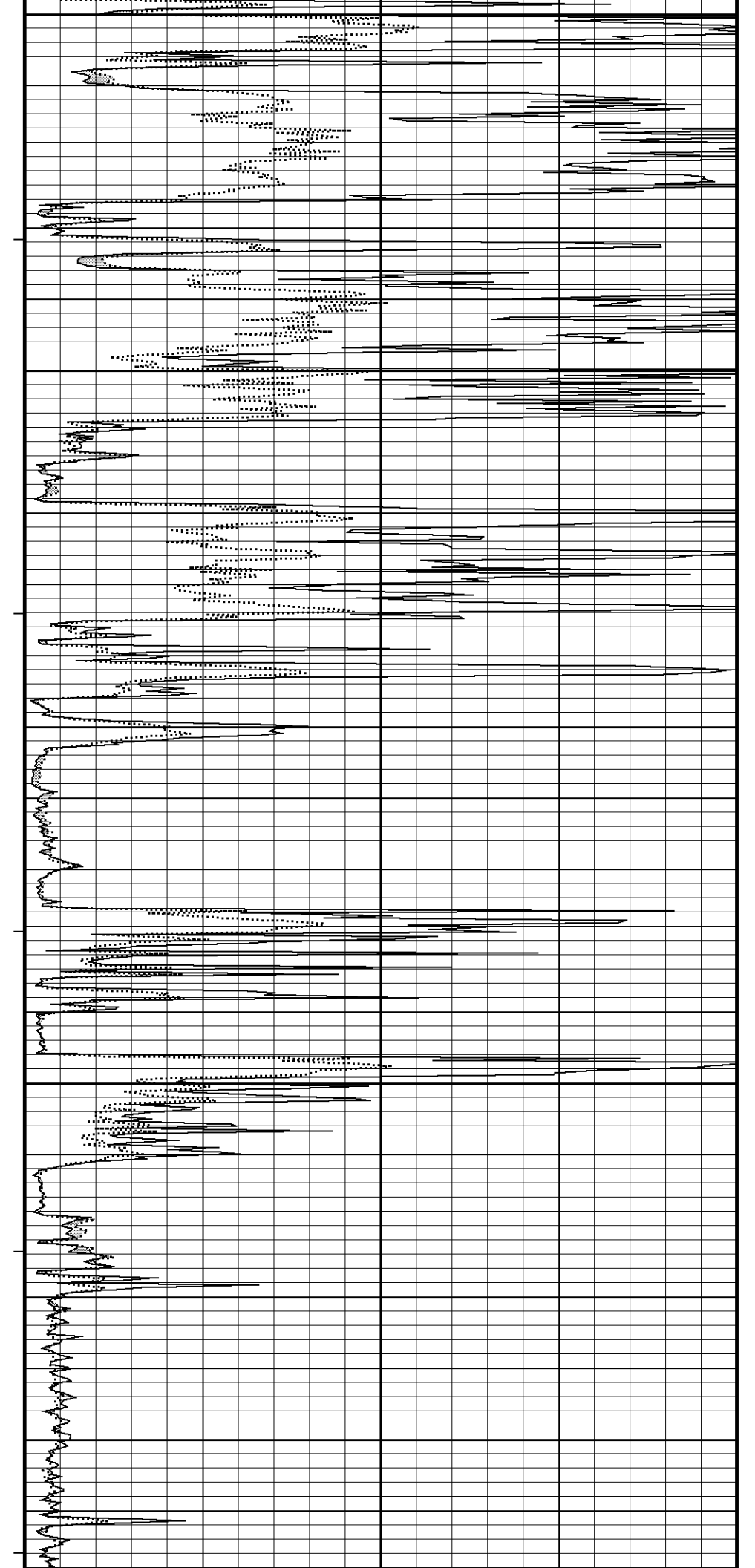
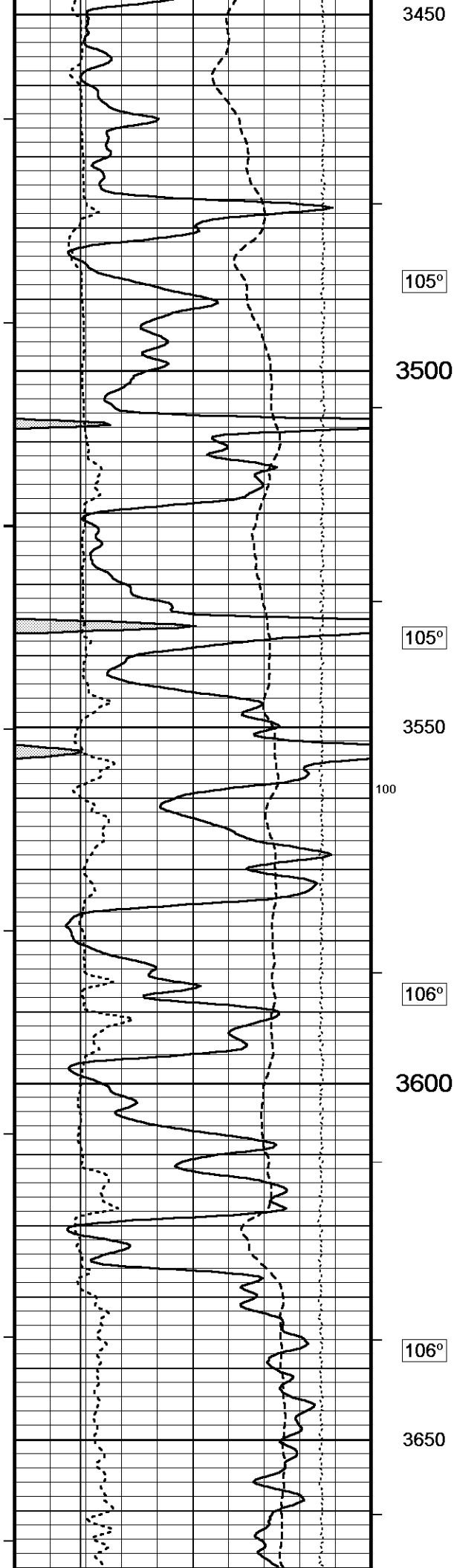
3150

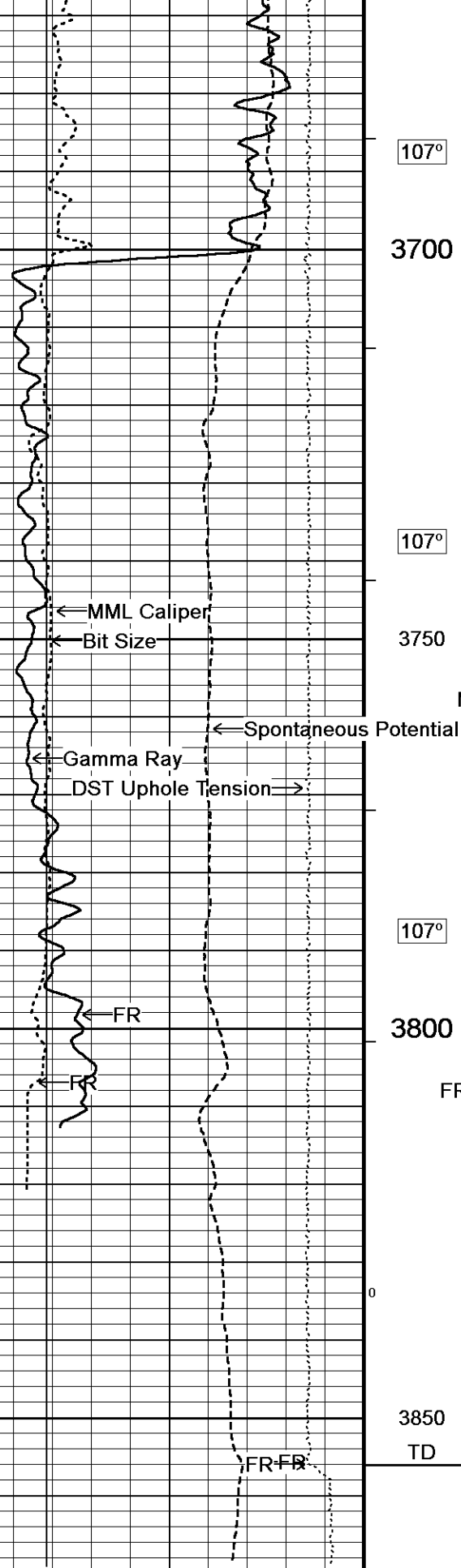
103°

3200









107°

3700

107°

3750

107°

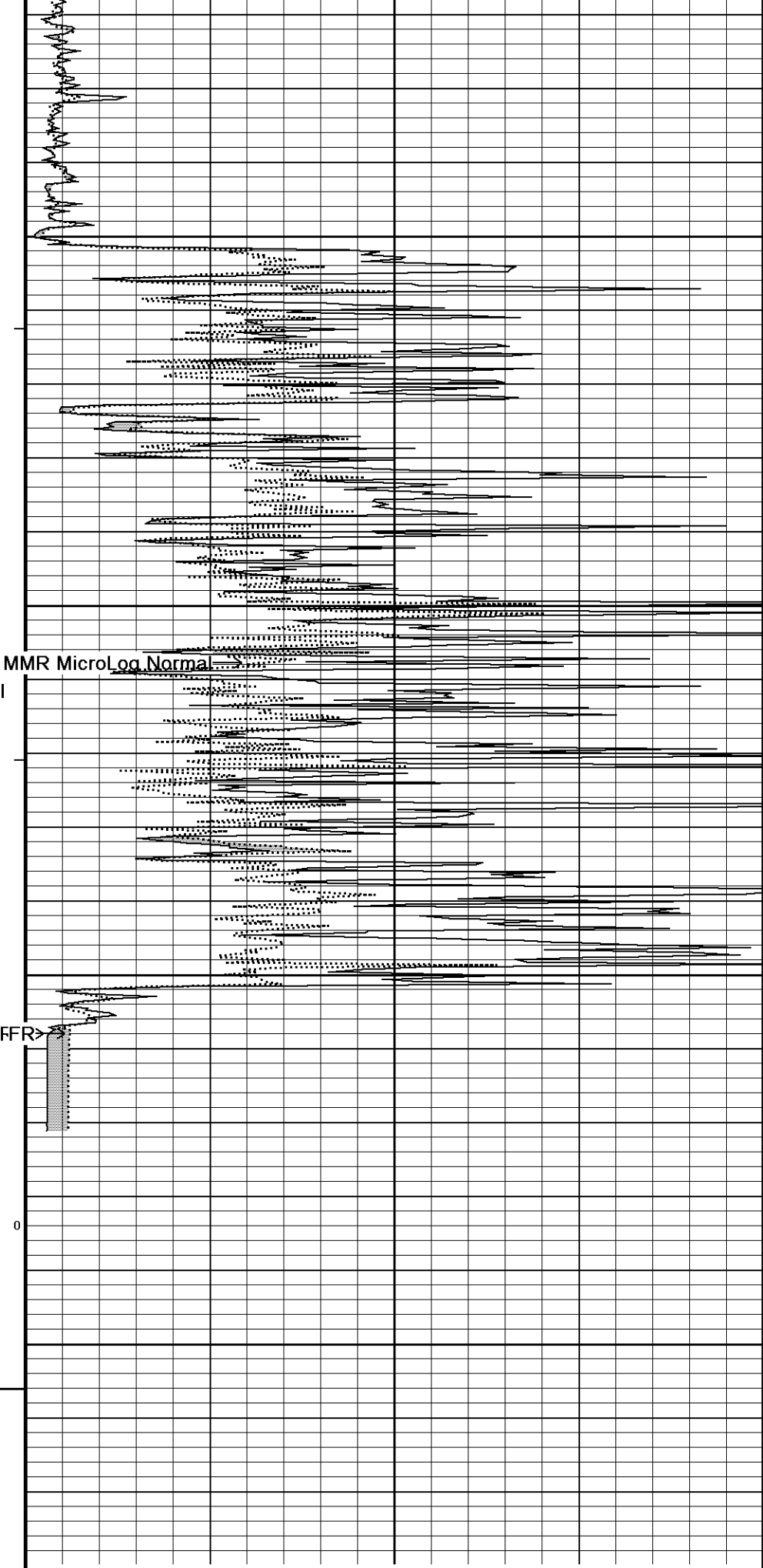
3800

0

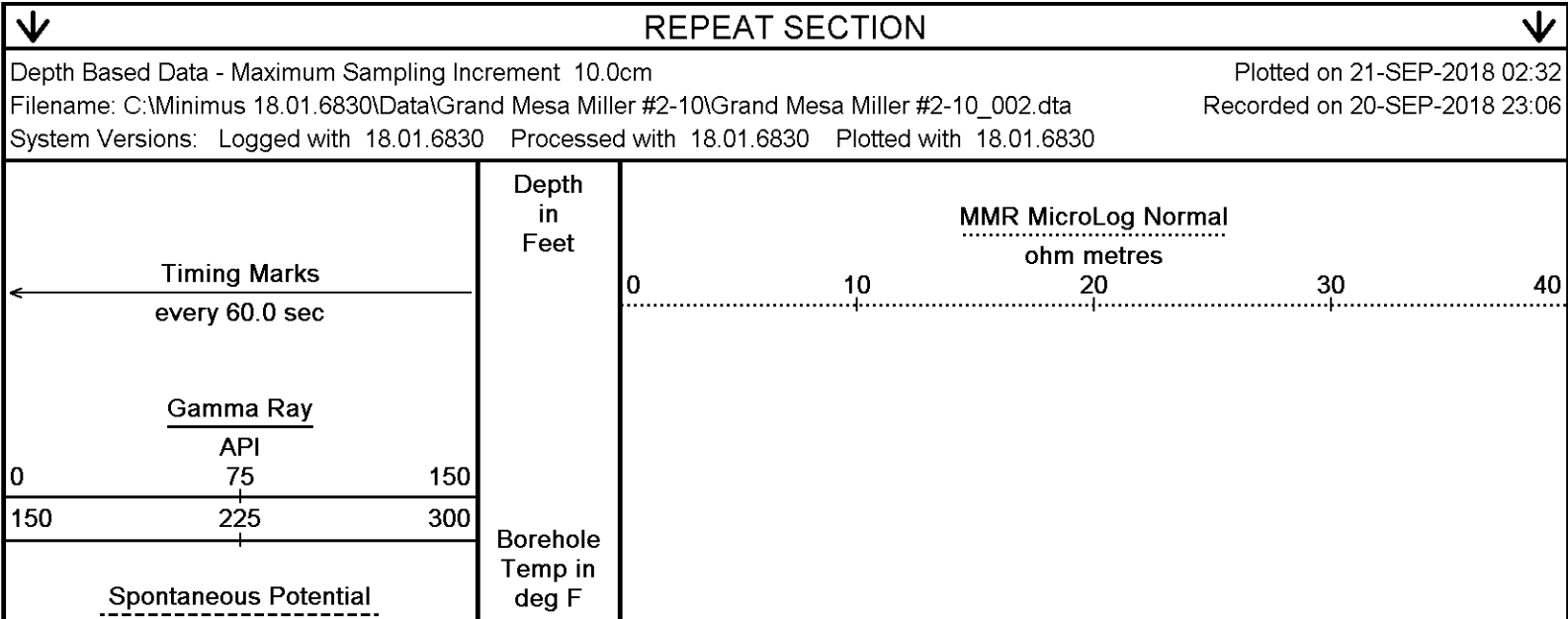
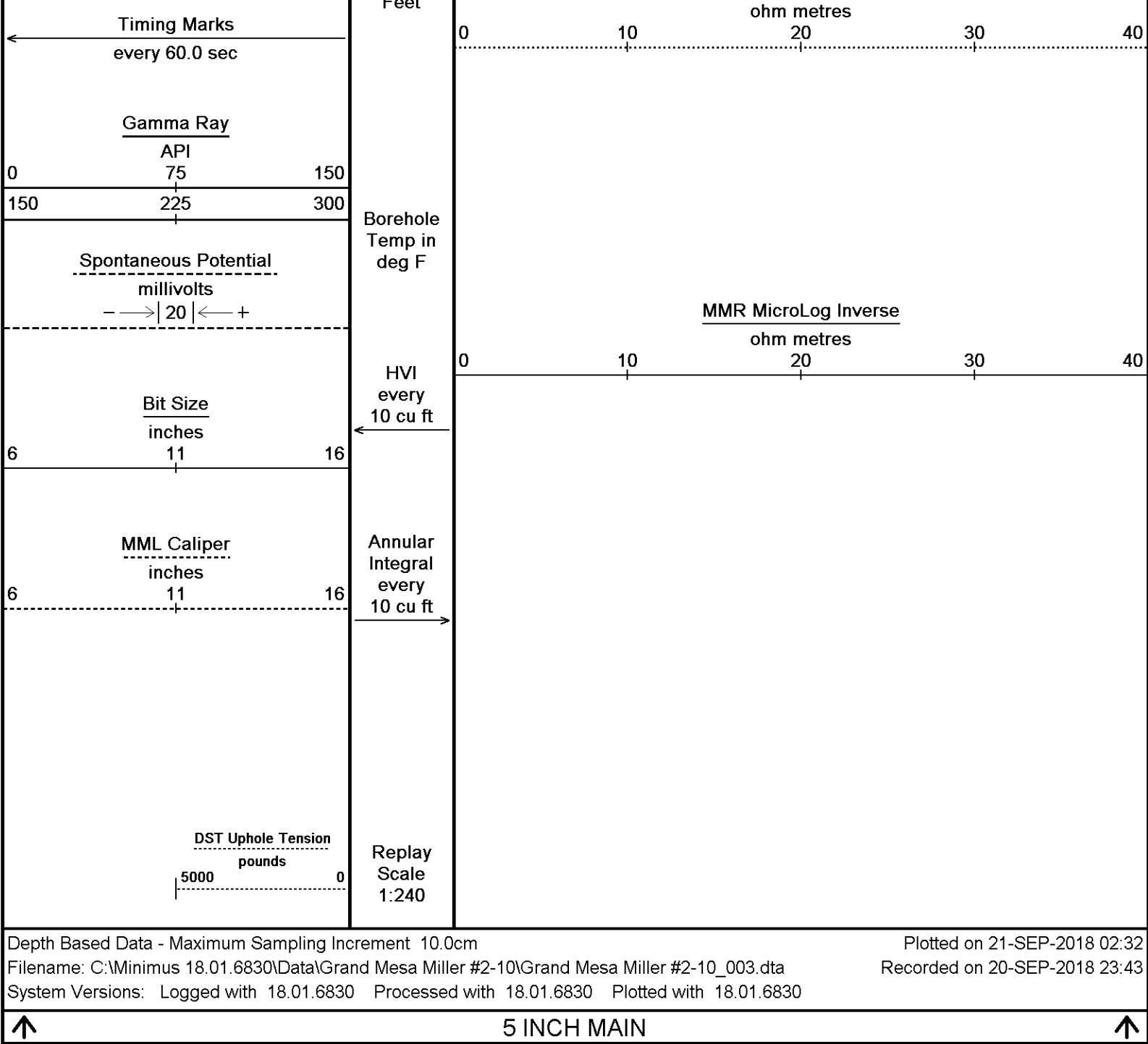
3850

TD

Depth
In
Feet



MMR MicroLog Normal



millivolts

— —> | 20 | <— +

Bit Size
inches

6 11 16

MML Caliper
inches

6 11 16

DST Uphole Tension
pounds

5000 0

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240

3500

104°

3550

100

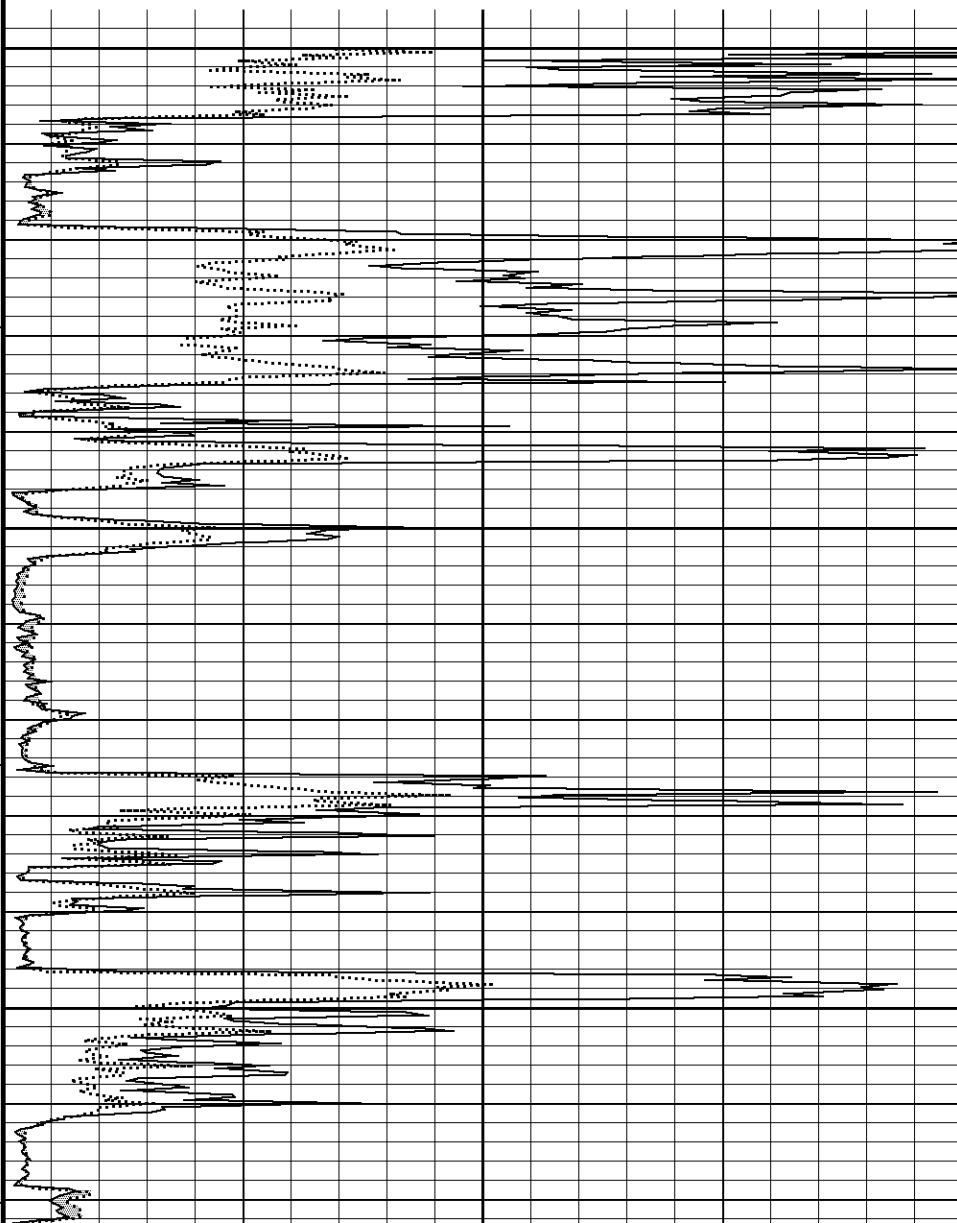
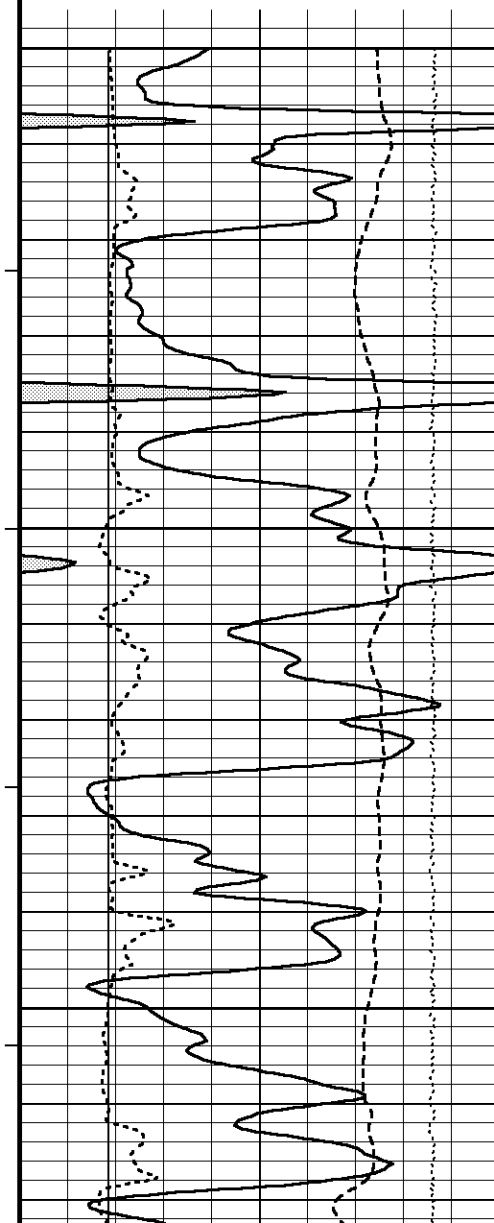
105°

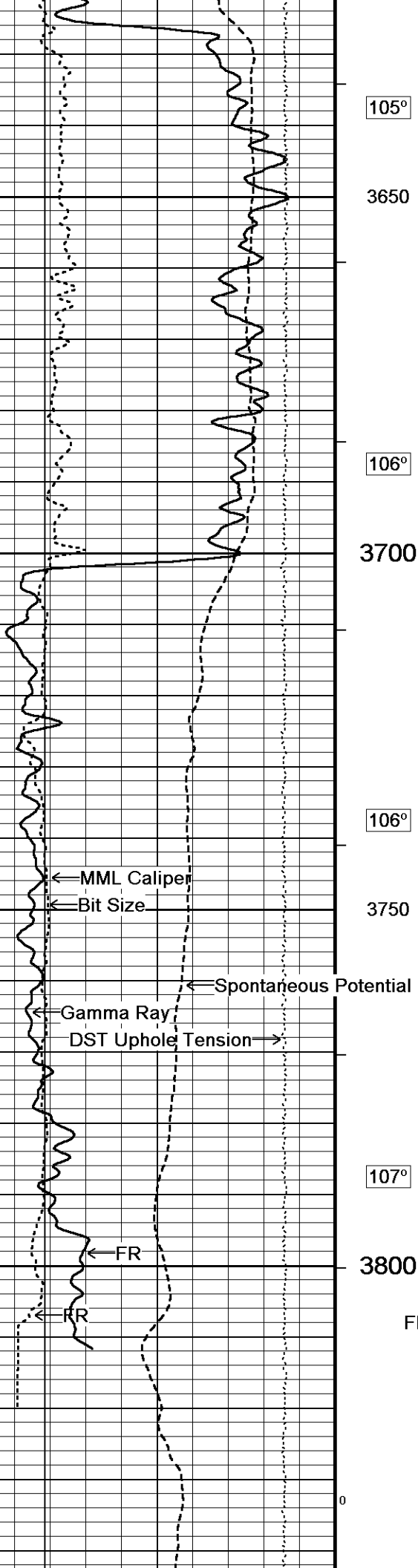
3600

MMR MicroLog Inverse

ohm metres

0 10 20 30 40





105°

3650

106°

3700

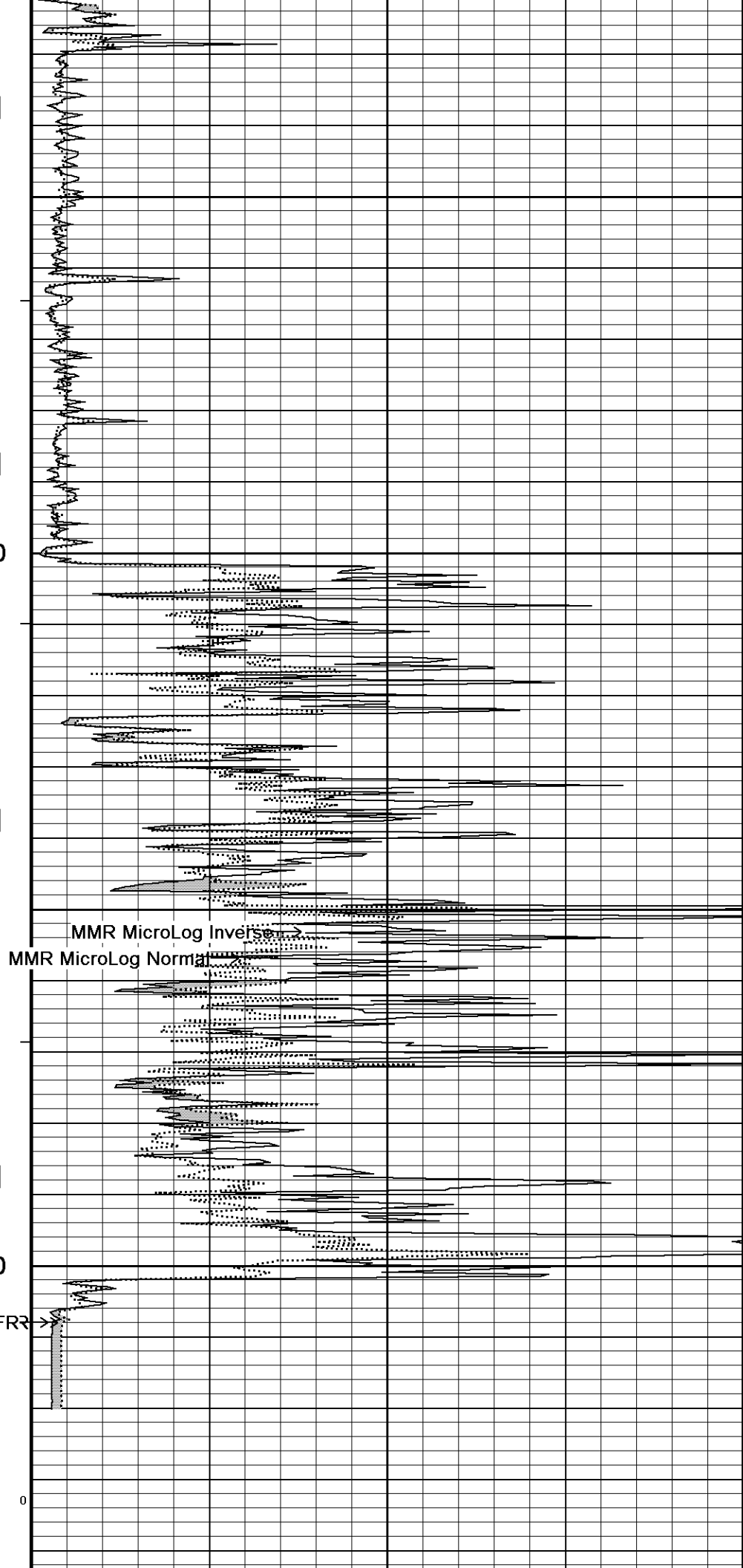
106°

3750

107°

3800

0

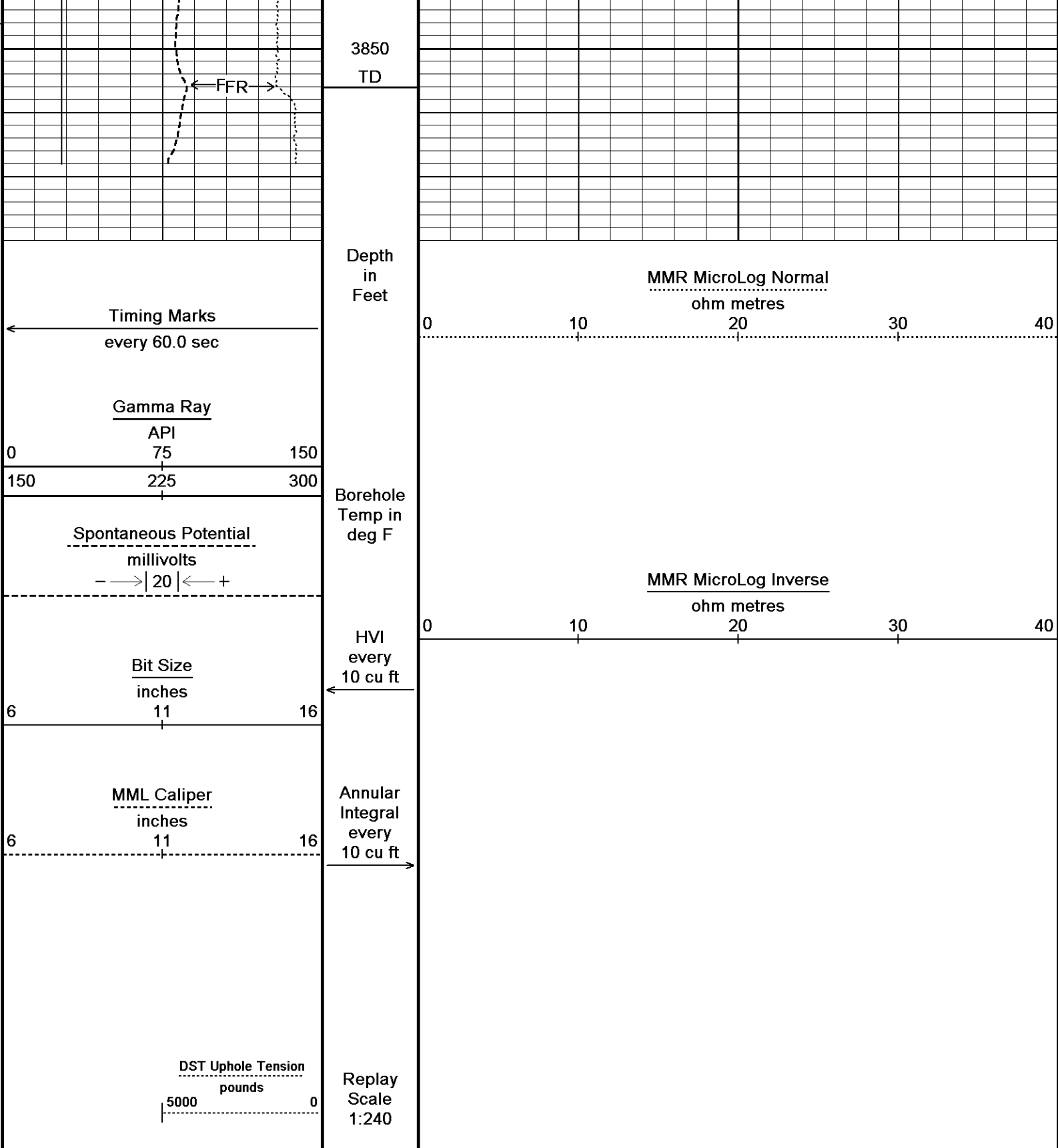


MMR MicroLog Inverse

MMR MicroLog Normal

FRR

0



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 21-SEP-2018 02:32
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Miller #2-10\Grand Mesa Miller #2-10_002.dta	Recorded on 20-SEP-2018 23:06
System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830	

↑	REPEAT SECTION	↑
---	----------------	---

BEFORE SURVEY CALIBRATION	
C:\Minimus 18.01.6830\Data\Grand Mesa Miller #2-10\Grand Mesa Miller #2-10_002.dta	

General Constants All 000	Last Edited on 20-SEP-2018,22:43
---------------------------	----------------------------------

General Parameters

General Parameters			
Mud Resistivity	0.430	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	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		

Gamma Calibration MCG-D.A 246			Field Calibration on 20-SEP-2018,10:55
	Measured	Calibrated (API)	
Background	107	74	
Calibrator (Gross)	770	530	
Calibrator (Net)	663	456	

Gamma Calibration Tolerances MCG-D.A 246		
Ratio	1.454	1.40 1.475 1.55 Counts/API

Gamma Constants MCG-D.A 246			Last Edited on 20-SEP-2018,21:39
Gamma Calibrator Number	MCGGRCC141		
GRC-M Calibrator Jig in Use?	NO		
Inactive Background Jig in Use?	NO		
Mud Density	1.11	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.A 246			Field Calibration on 01-AUG-2018,13:29
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	212.00	212.00	

High Resolution Temperature Constants MCG-D.A 246			Last Edited on 07-JUN-2018,10:42
Pre-filter Length	11		

Caliper Calibration MML-A 7			Base Calibration on 07-SEP-2018 12:58 Field Calibration on 20-SEP-2018,10:47
Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	14194	5.98	
2	17673	7.97	
3	20976	9.86	
4	25017	11.92	
5	0	0.00	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	8.07	8.10	

Caliper Calibration Tolerances MML-A 7		
Short Arm Field Cal.	8.07	7.90 8.10 8.30 in

Micro Normal and Micro Inverse Calibration MML-A 7			Base Calibration on 07-SEP-2018 13:13 Field Check on 20-SEP-2018,10:47
	Resistor 1 (ohm)	Resistor 2 (ohm)	

Resistor 1 (ohm) 10.0 Resistor 2 (ohm) 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	76.7	76.7
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	76.7		ohm-m				
Micro Inverse Base Check	51.0		ohm-m				
Micro Normal Field Check	76.7		ohm-m				
Micro Inverse Field Check	51.0		ohm-m				

Micro Normal and Micro Inverse Constants MML-A 7

Last Edited on 20-SEP-2018,10:47

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 02-SEP-2018,10:42
Field Calibration on 20-SEP-2018,10:42

Base Calibration	Measured	Calibrator Size (in)
Reading No		
1	14688	3.99
2	23495	5.98
3	32176	7.97
4	40480	9.86
5	49713	11.92
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	8.08	8.10

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	8.08		in
---------------------	------	--	----

DOWNHOLE EQUIPMENT

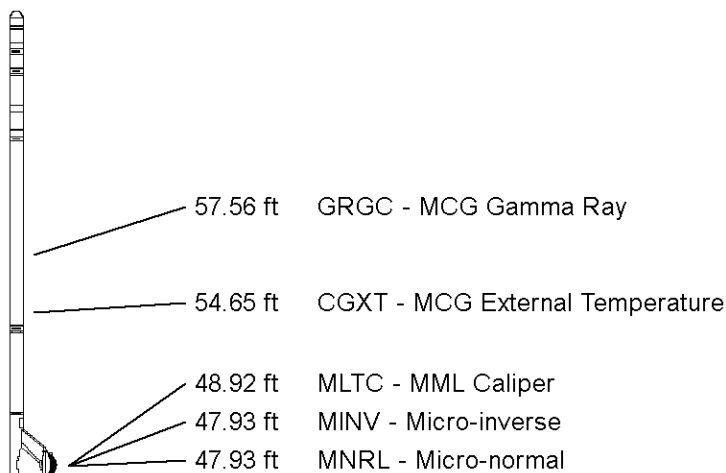
C:\Minimus 18.01.6830\Data\Grand Mesa Miller #2-10\Grand Mesa Miller #2-10_002.dta

Cablehead, 11 pin
CBH-C 0 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.A 246 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-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

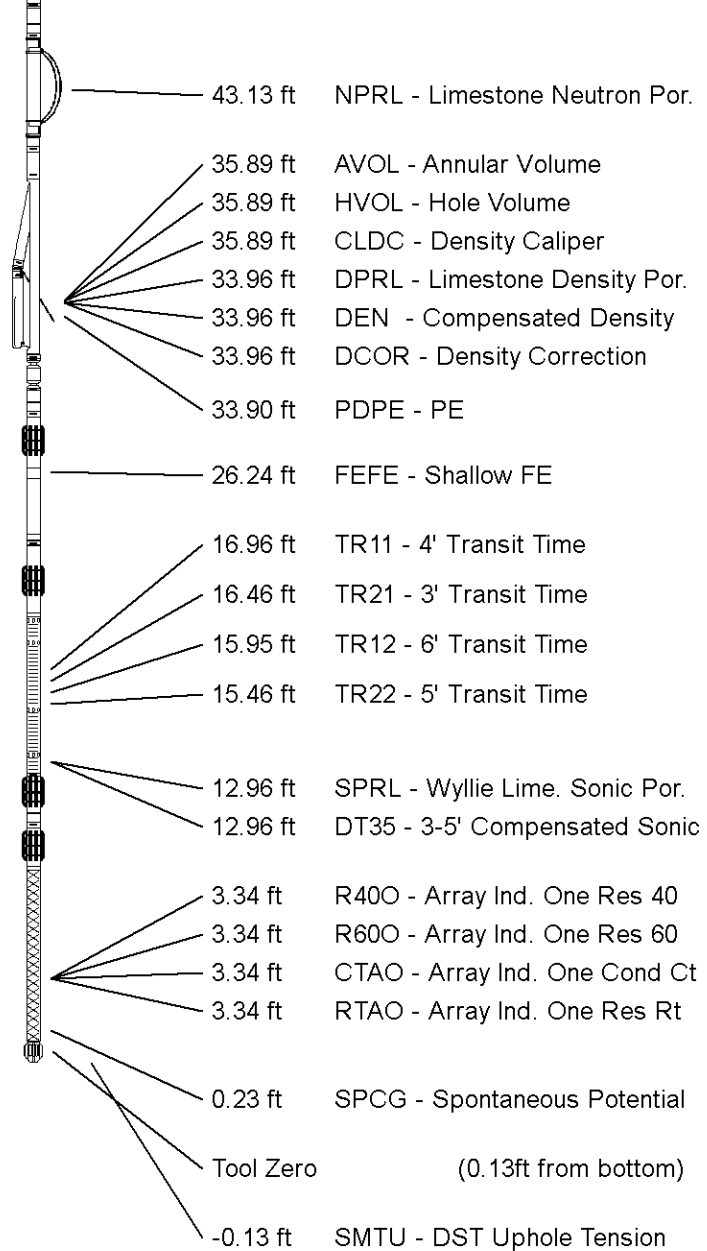
Compact Knuckle Joint
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.240 in

Compact Sonic
MSS-C.K 319 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: 2.240 in

Total Length: 67.54 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY	GRAND MESA OPERATING COMPANY
WELL	MILLER #2-10
FIELD	ZENITH-PEACE CREEK
PROVINCE/COUNTY	RENO
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1770	feet	First Reading	3808.00	feet
Elevation Drill Floor	1765	feet	Depth Driller	3860.00	feet
Elevation Ground Level		feet	Depth Logger	3856.00	feet



Weatherford®

MICRORESISTIVITY LOG

