



**Weatherford**

**MICRORESISTIVITY LOG**

COMPANY **O'BRIEN ENERGY RESOURCES CORP.**

WELL **PREEDY #3-4**

FIELD **ANGELL SOUTHEAST**

PROVINCE/COUNTY **MEADE**

COUNTRY/STATE **U.S.A. / KANSAS**

LOCATION **1980' FSL & 2305' FEL**

SEC 3 TWP 33S RGE 29W Other Services  
MAI/MFE MPD/MDN

Latitude Longitude

API Number 15-119-21425

Permanent Datum GL, Elevation 2668 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

Elevations: KB 2681.00 feet  
DF 2679.00  
GL 2668.00

Date 07-SEP-2018

Run Number ONE

Service Order 4558-223534615

Depth Driller 6350.00 feet

Depth Logger 6351.00 feet

First Reading 6316.00 feet

Last Reading 4000.00 feet

Casing Driller 1528.00 feet

Casing Logger 1530.00 feet

Bit Size 7.875 inches

Hole Fluid Type CHEMICAL

Density / Viscosity 9.10 lb/USg 58.00 CP

PH / Fluid Loss 10.50 7.20 ml/30Min

Sample Source FLOWLINE

Rm @ Measured Temp 1.18 @ 75.0 ohm-m

Rmf @ Measured Temp 0.94 @ 75.0 ohm-m

Rmc @ Measured Temp 1.42 @ 75.0 ohm-m

Source Rmf / Rmc CALC CALC

Rm @ BHT 0.69 @ 129.0 ohm-m

Time Since Circulation 5 HOURS

Max Recorded Temp 129.00 deg F

Equipment / Base 13096 LIB

Recorded By ADAM SILL

Witnessed By CASEY COATS

Recorded By ADAM SILL

Witnessed By CASEY COATS

Recorded By ADAM SILL

Witnessed By CASEY COATS

**BOREHOLE RECORD**

Last Edited: 07-SEP-2018 15:29

Bit Size inches	Depth From feet	Depth To feet
7.875	1528.00	6350.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1528.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 18.01.6830.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.  
- HARDWARE: DUAL BOWSPRING USED ON MDN.  
0.5 INCH STANDOFF USED ON MFE.  
0.5 INCH STANDOFF USED ON MAI.
- 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 2150 FEET: 1455 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 4000 FEET: 533 CU.FT.
- RIG: DUKE #7.
- ENGINEER: A. SILL



5000 pounds 0

Scale 1:240

4000

108°

4050

109°

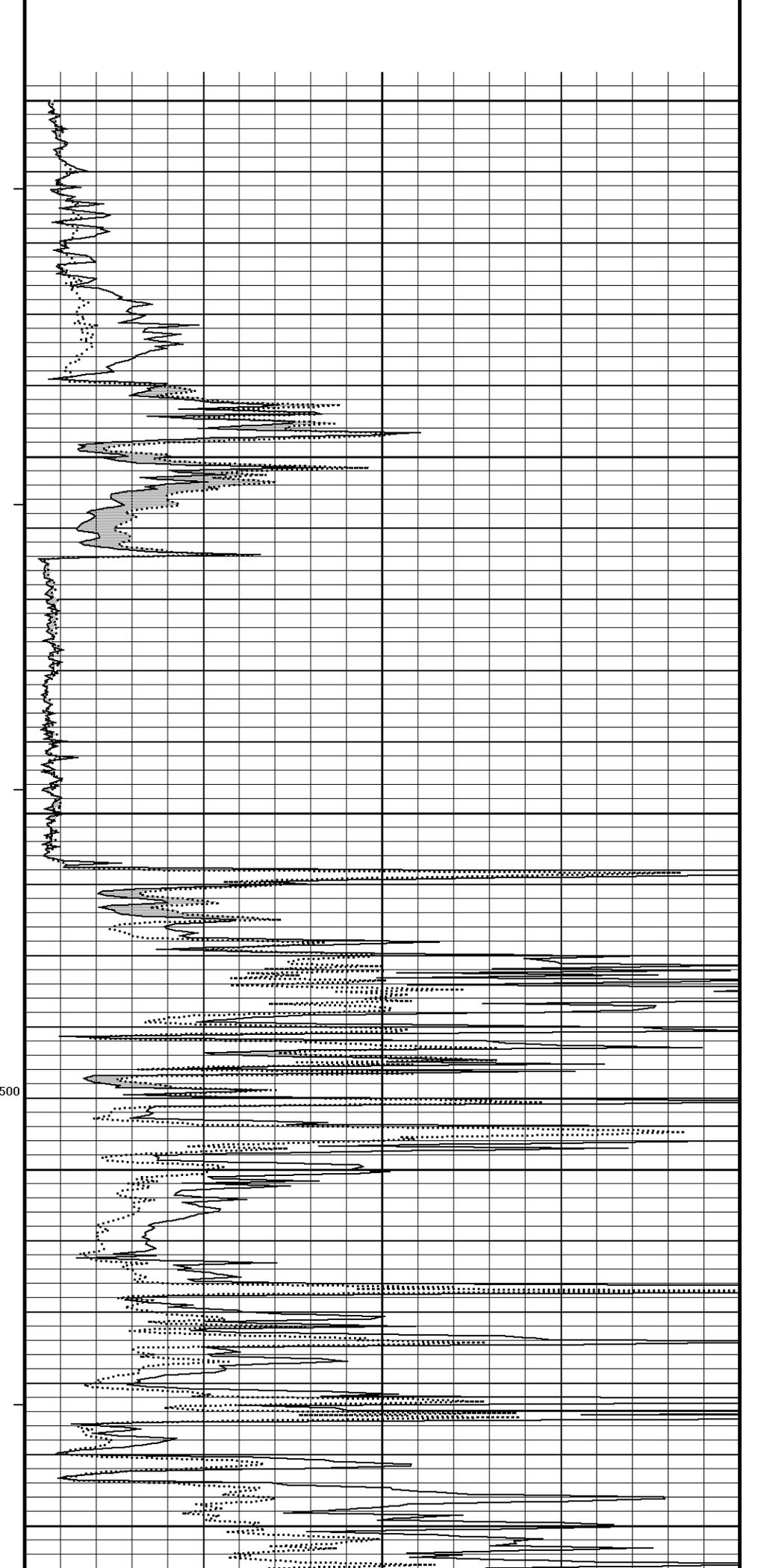
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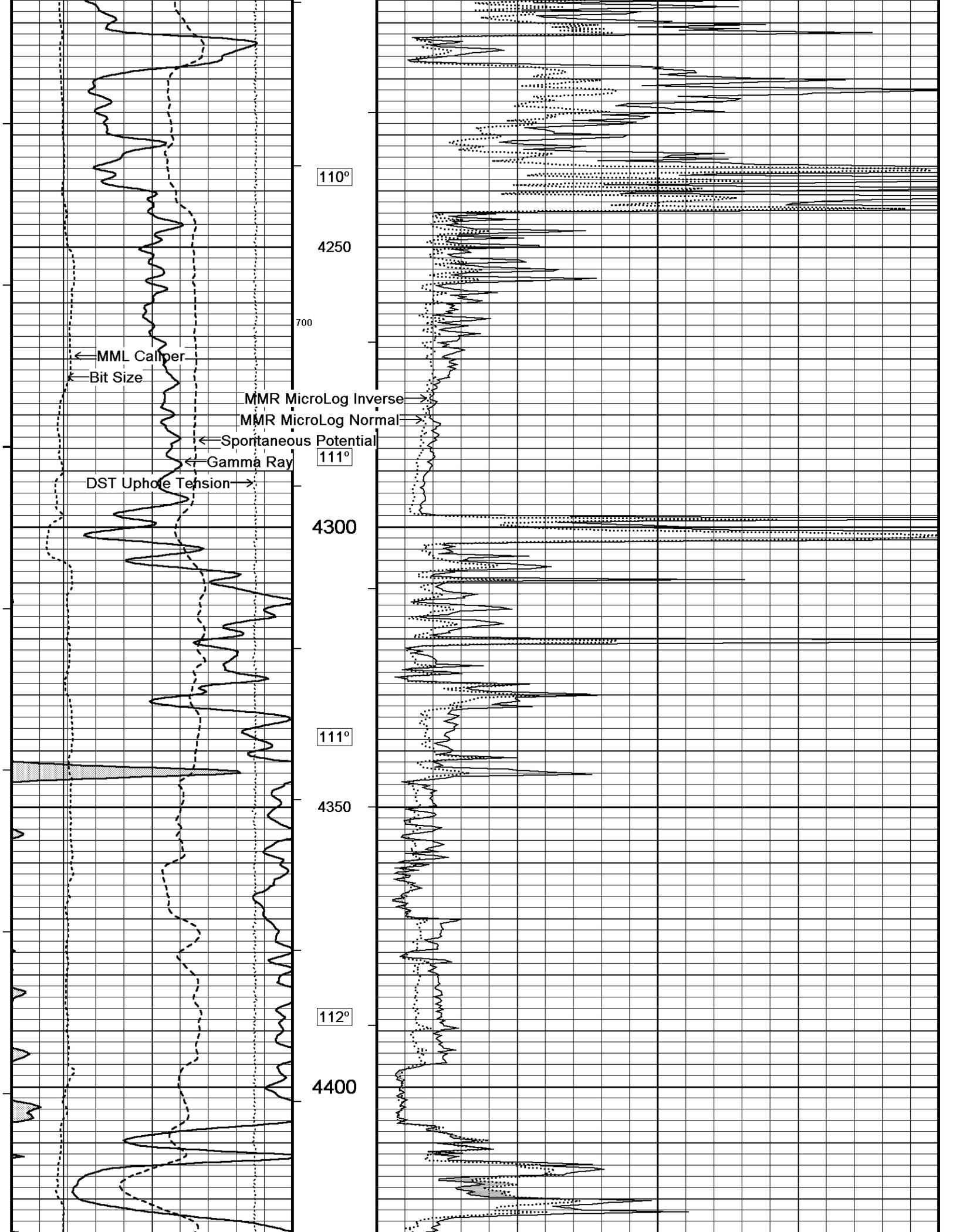
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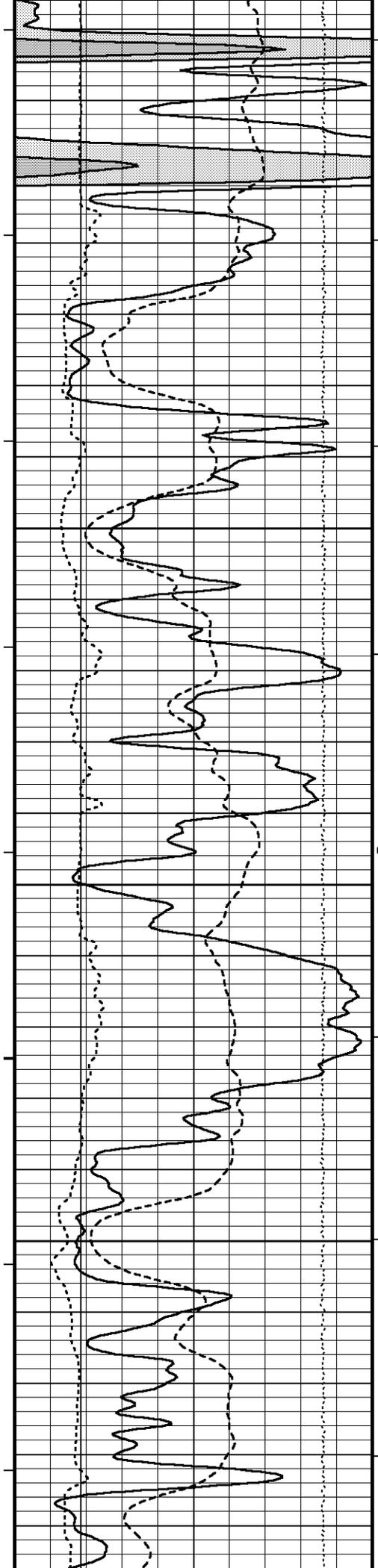
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110°

4200







112°

4450

112°

4500

113°

600

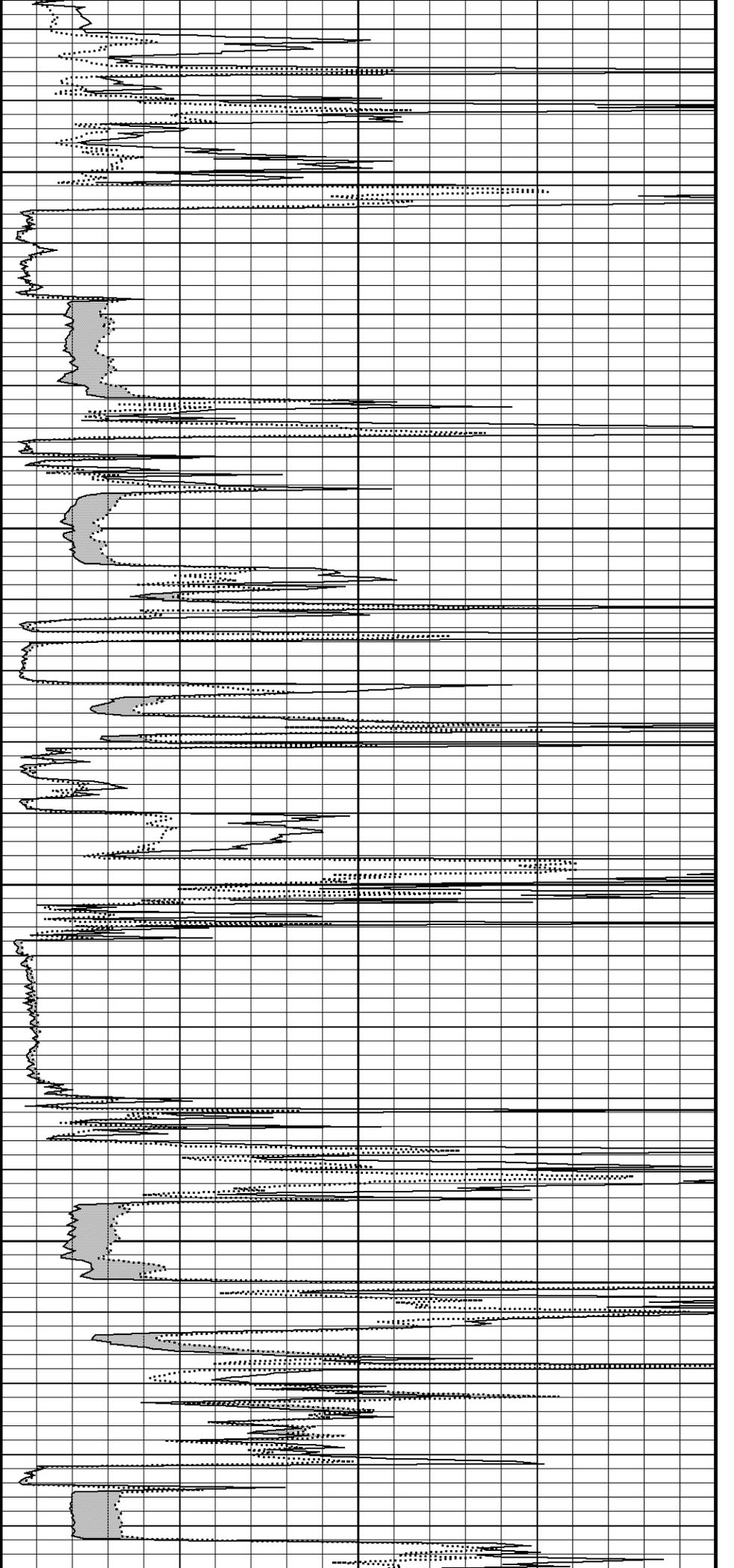
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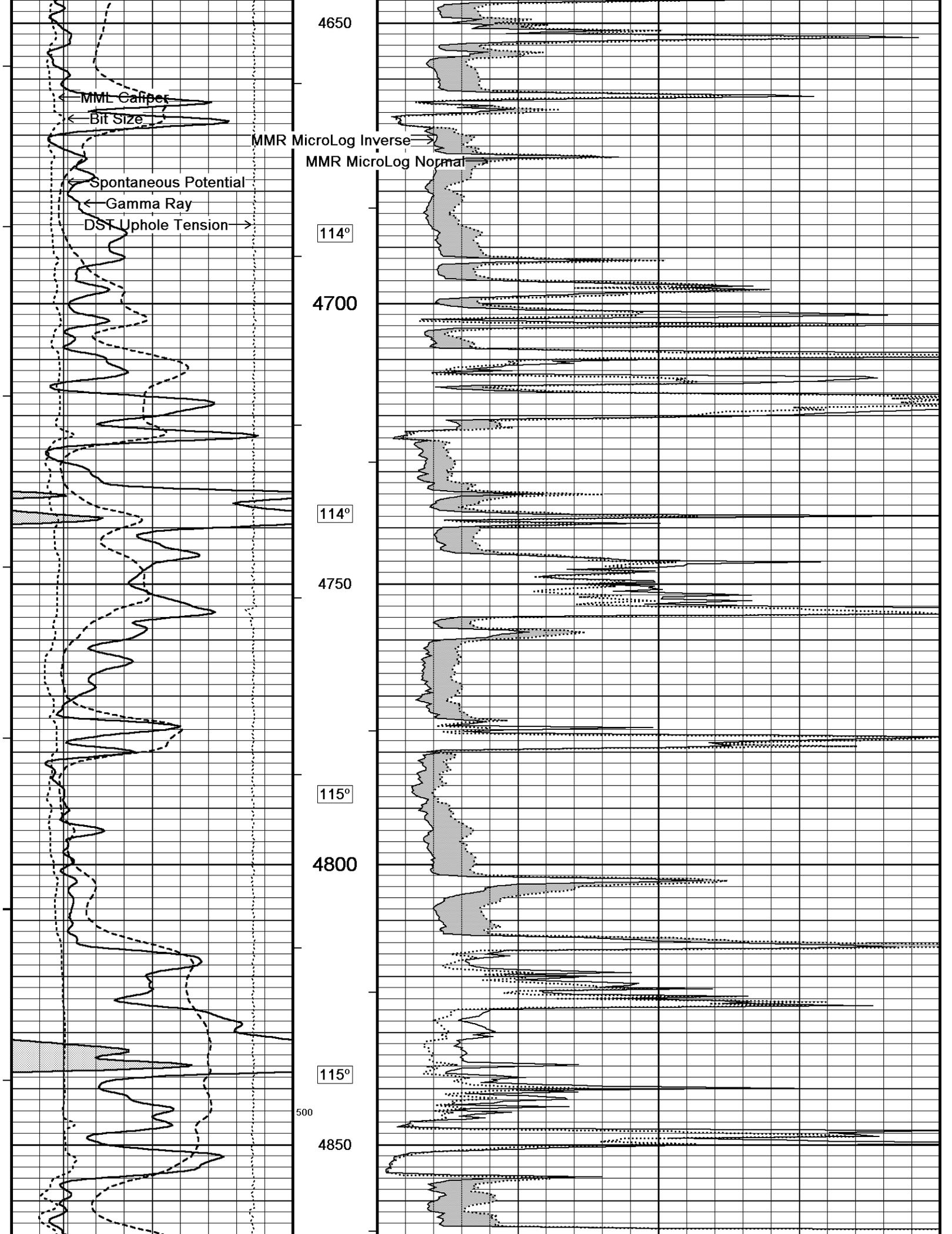
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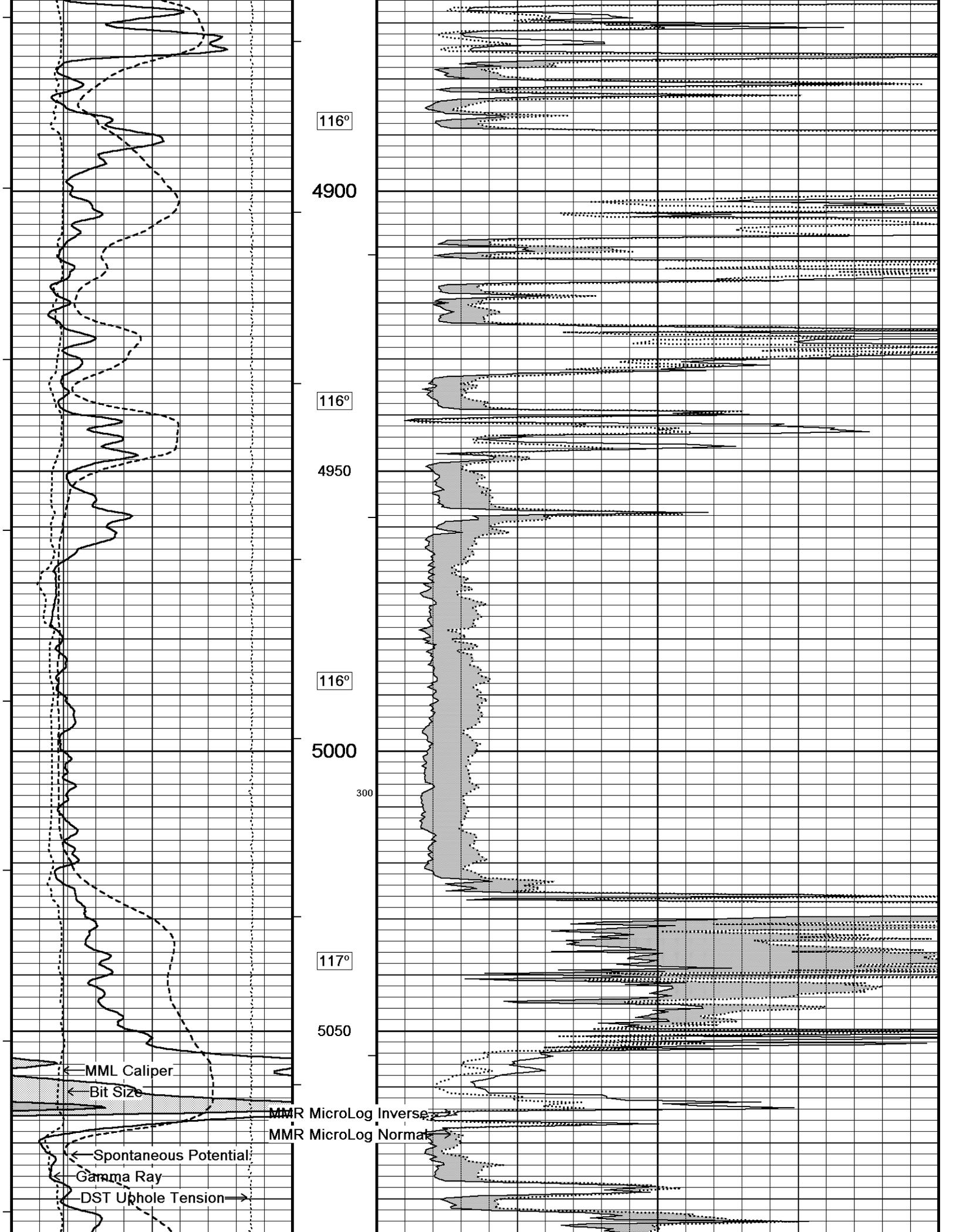
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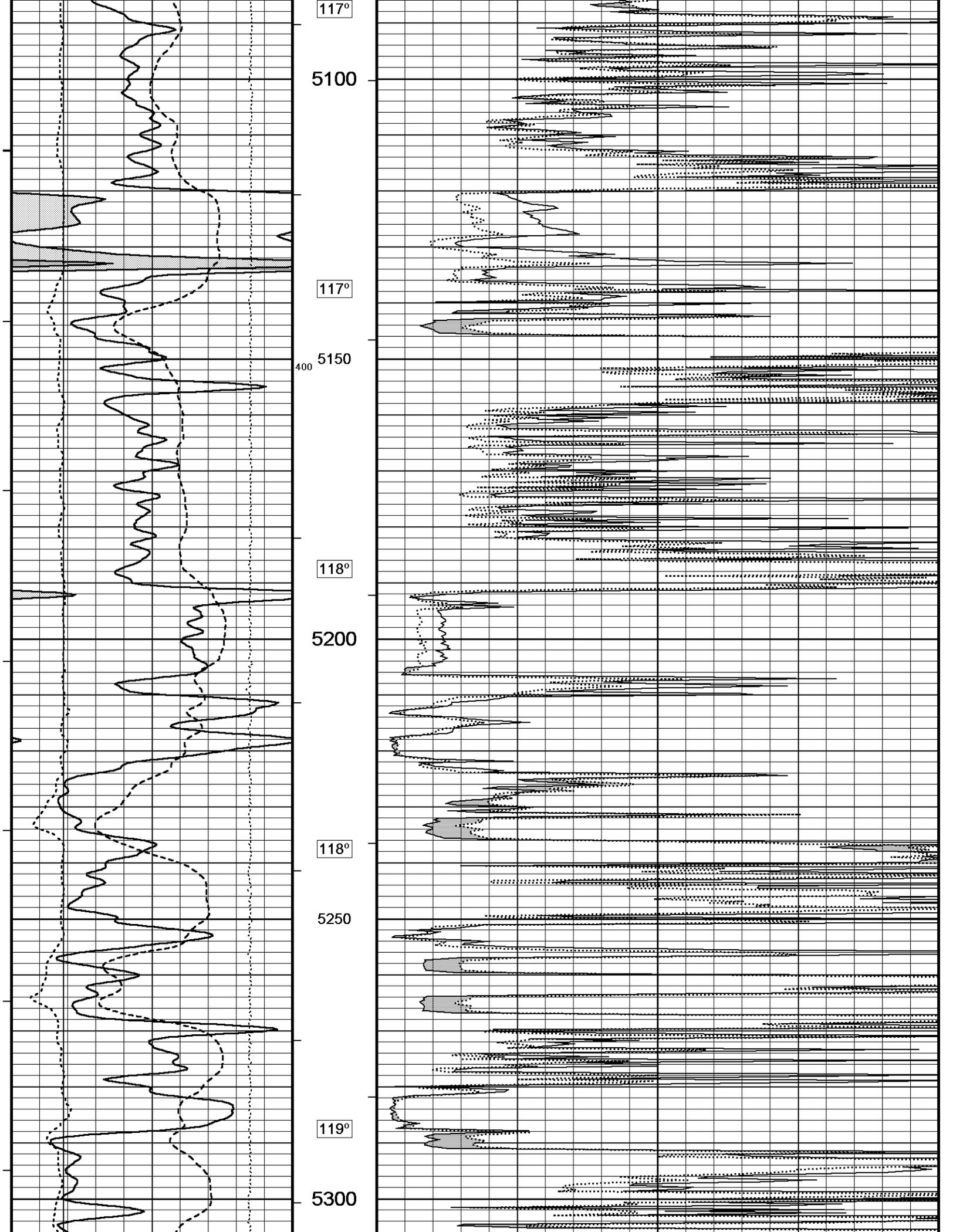
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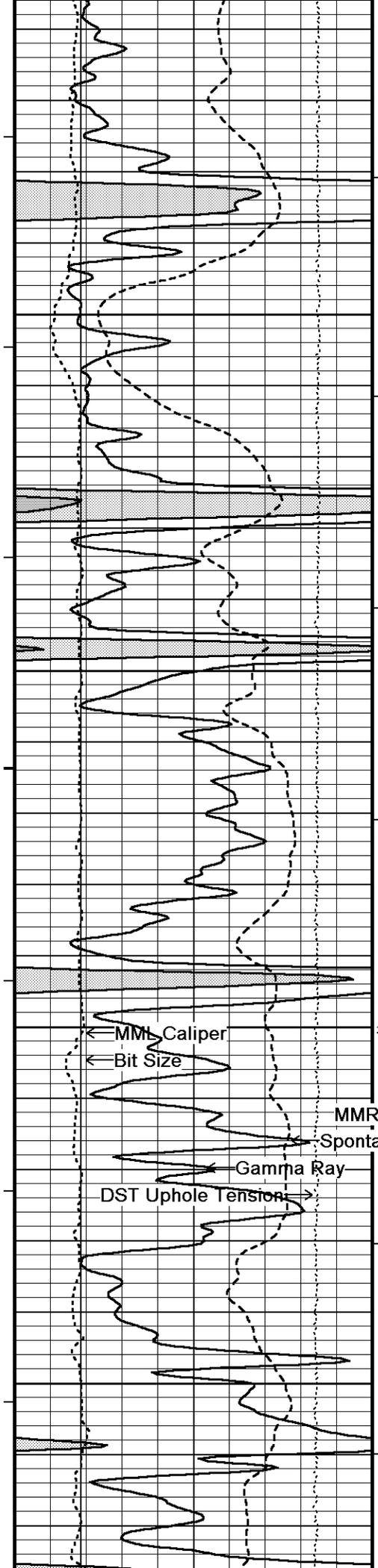
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119°

5350

120°

5400

120°

300 5450

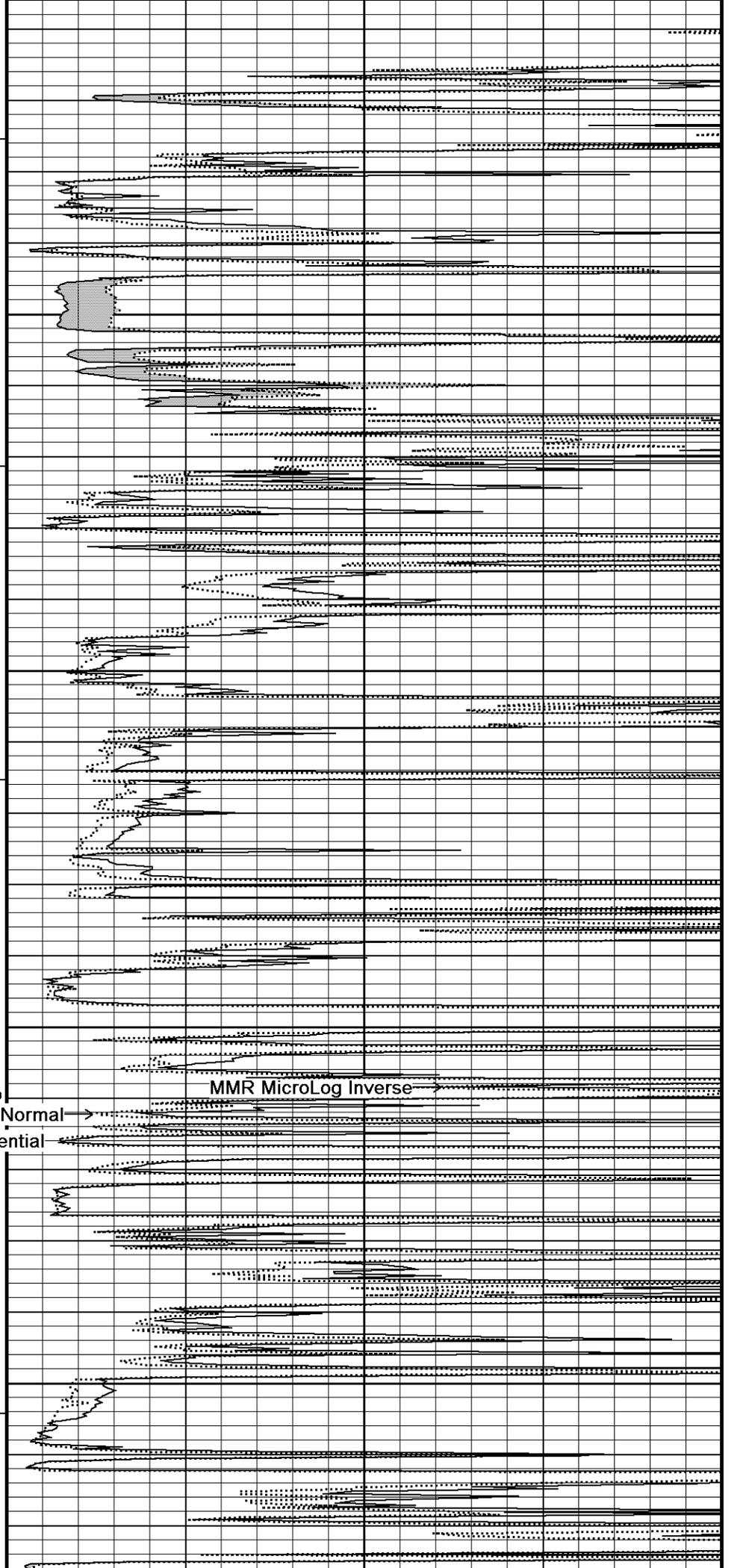
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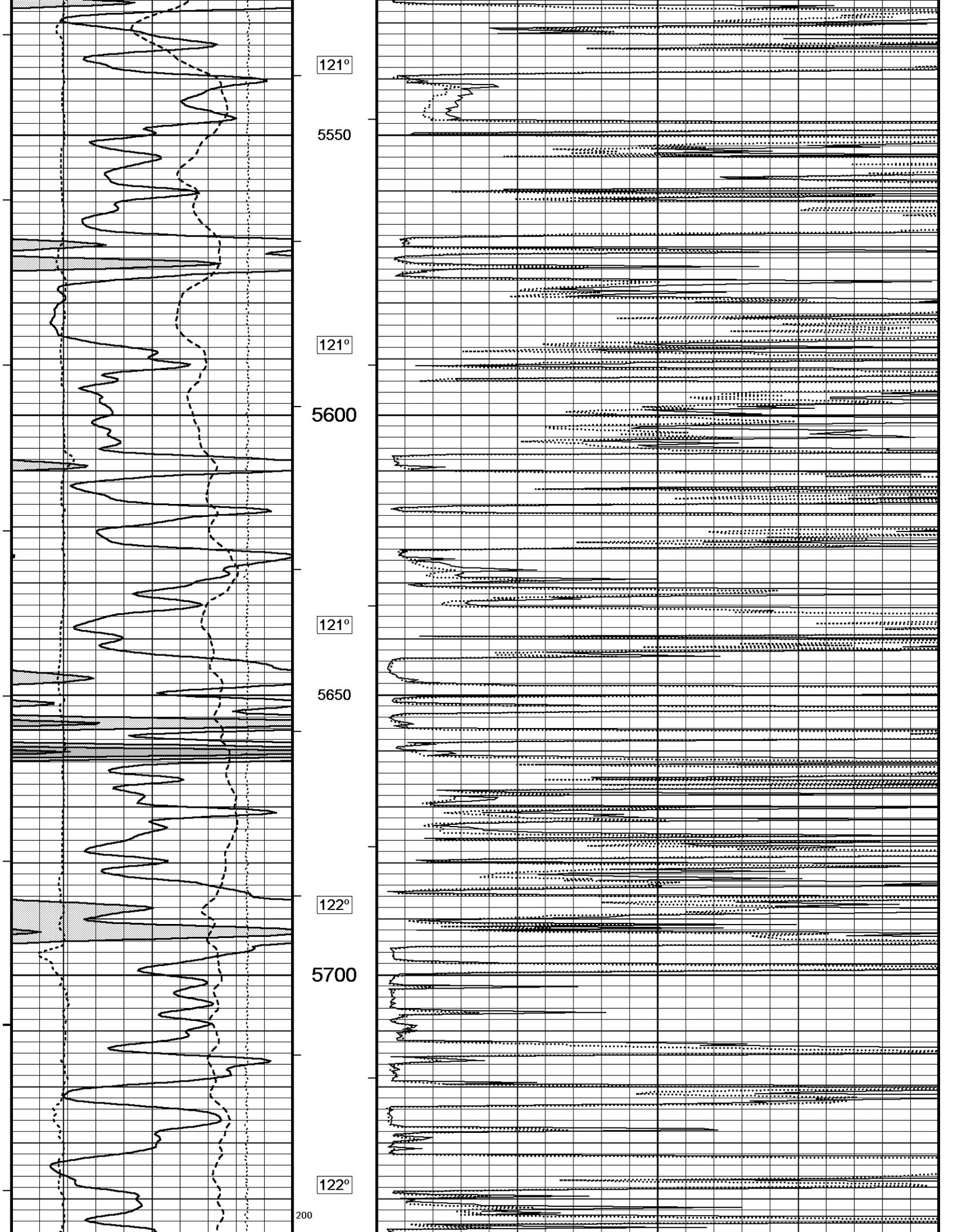
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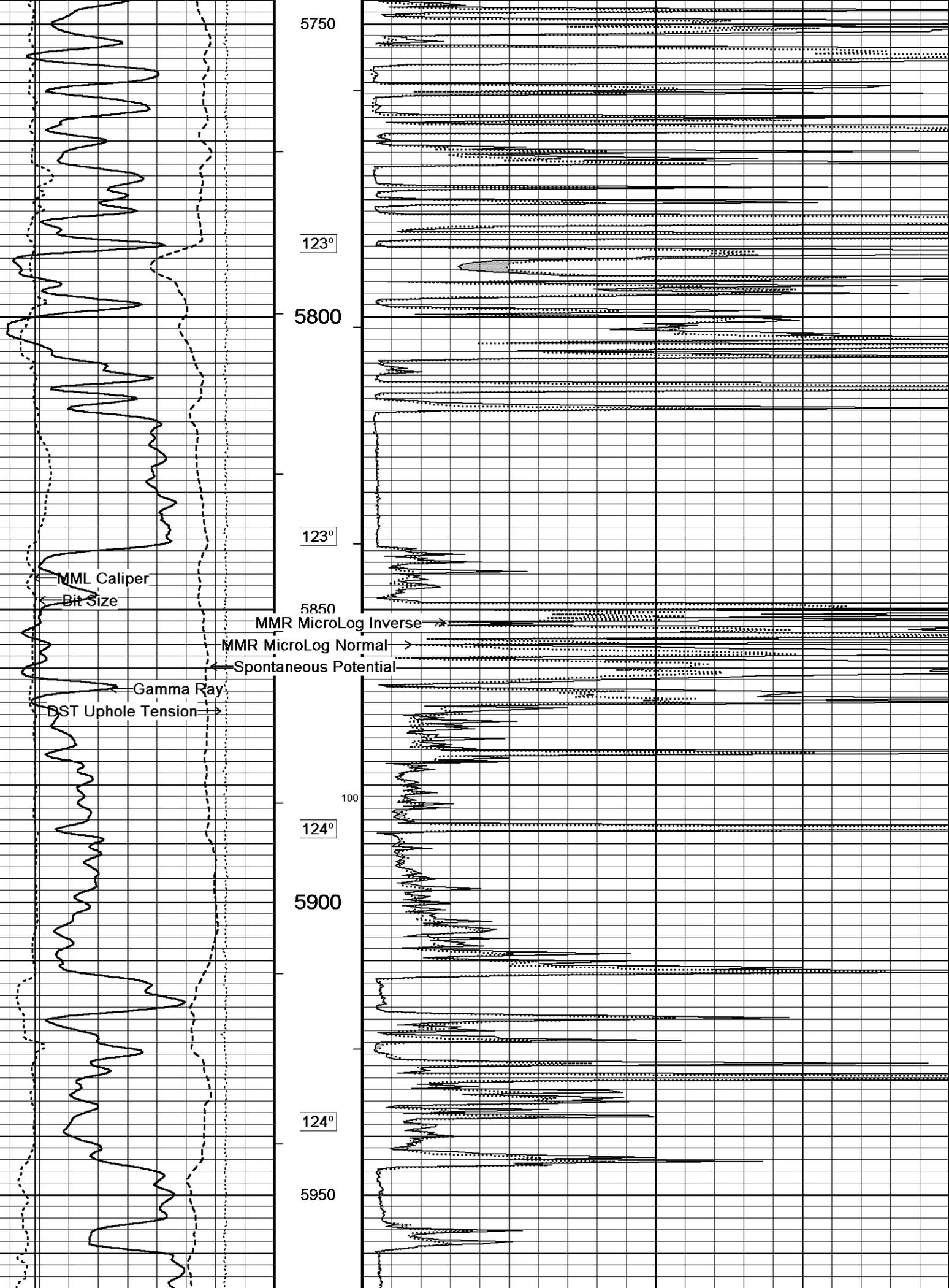
200 MMR MicroLog Normal

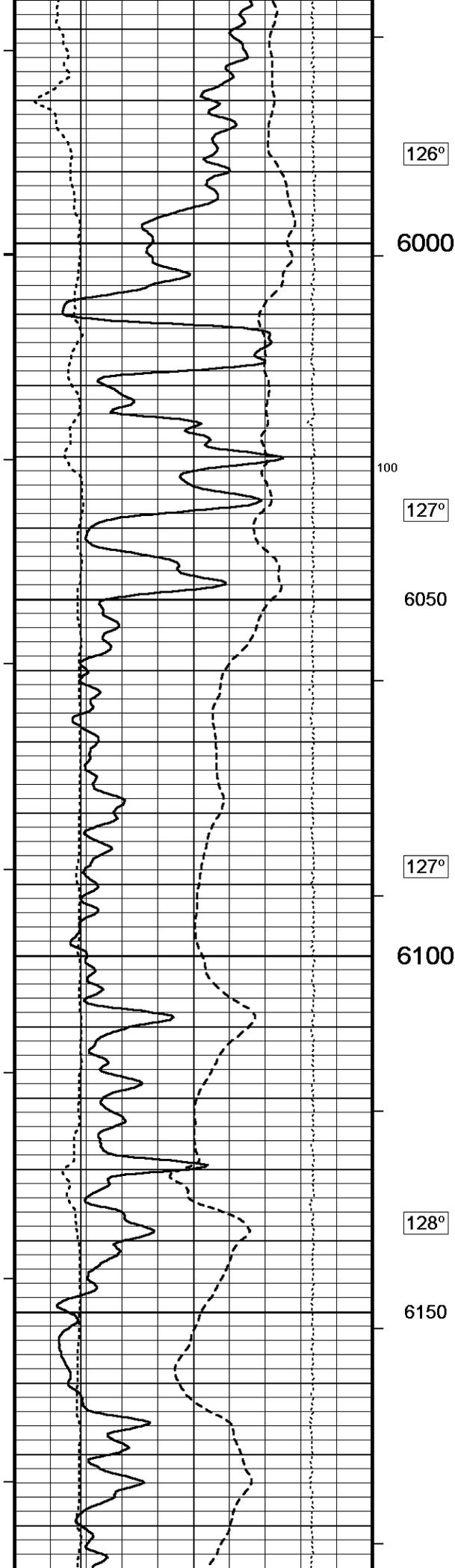
Spontaneous Potential

MMR MicroLog Inverse









126°

6000

100

127°

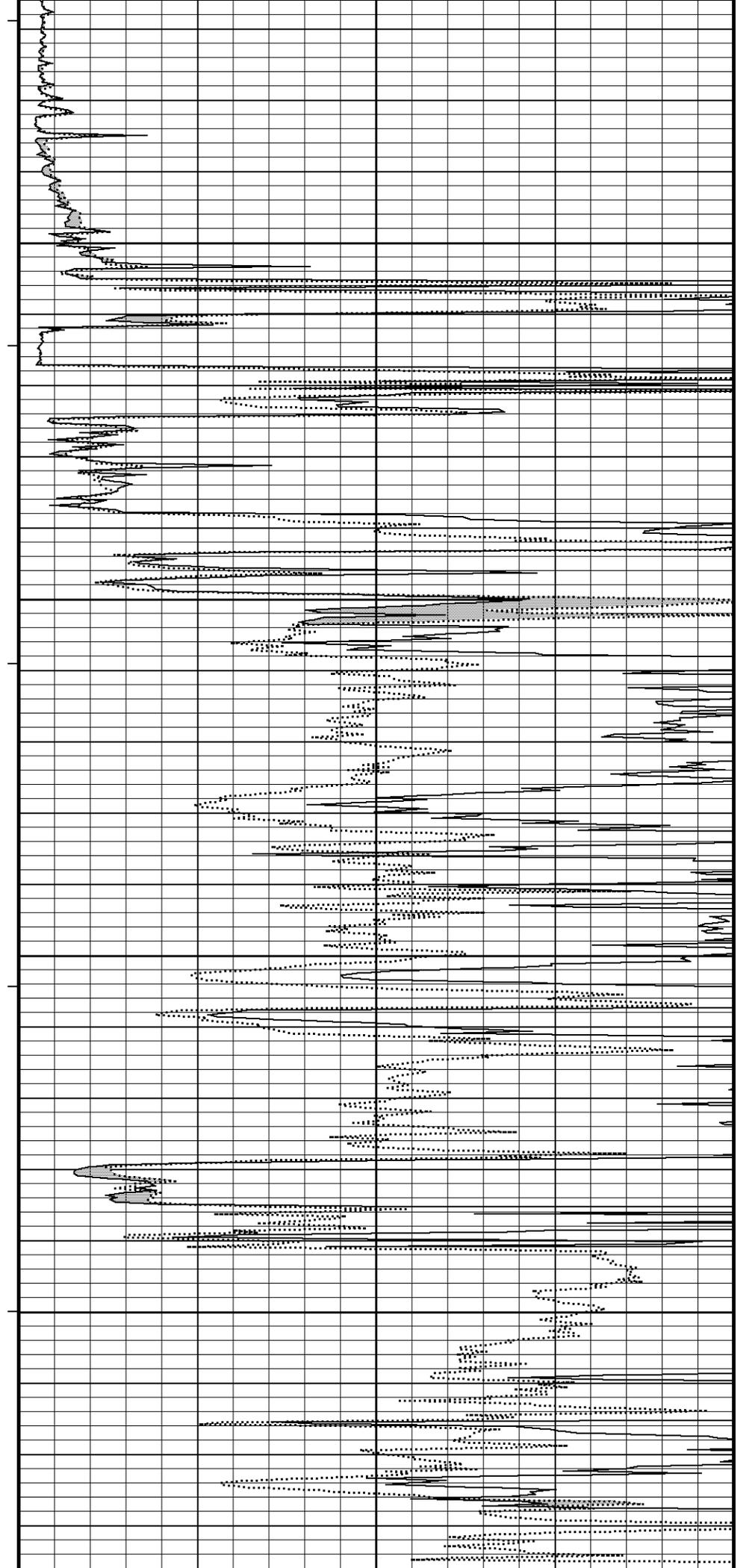
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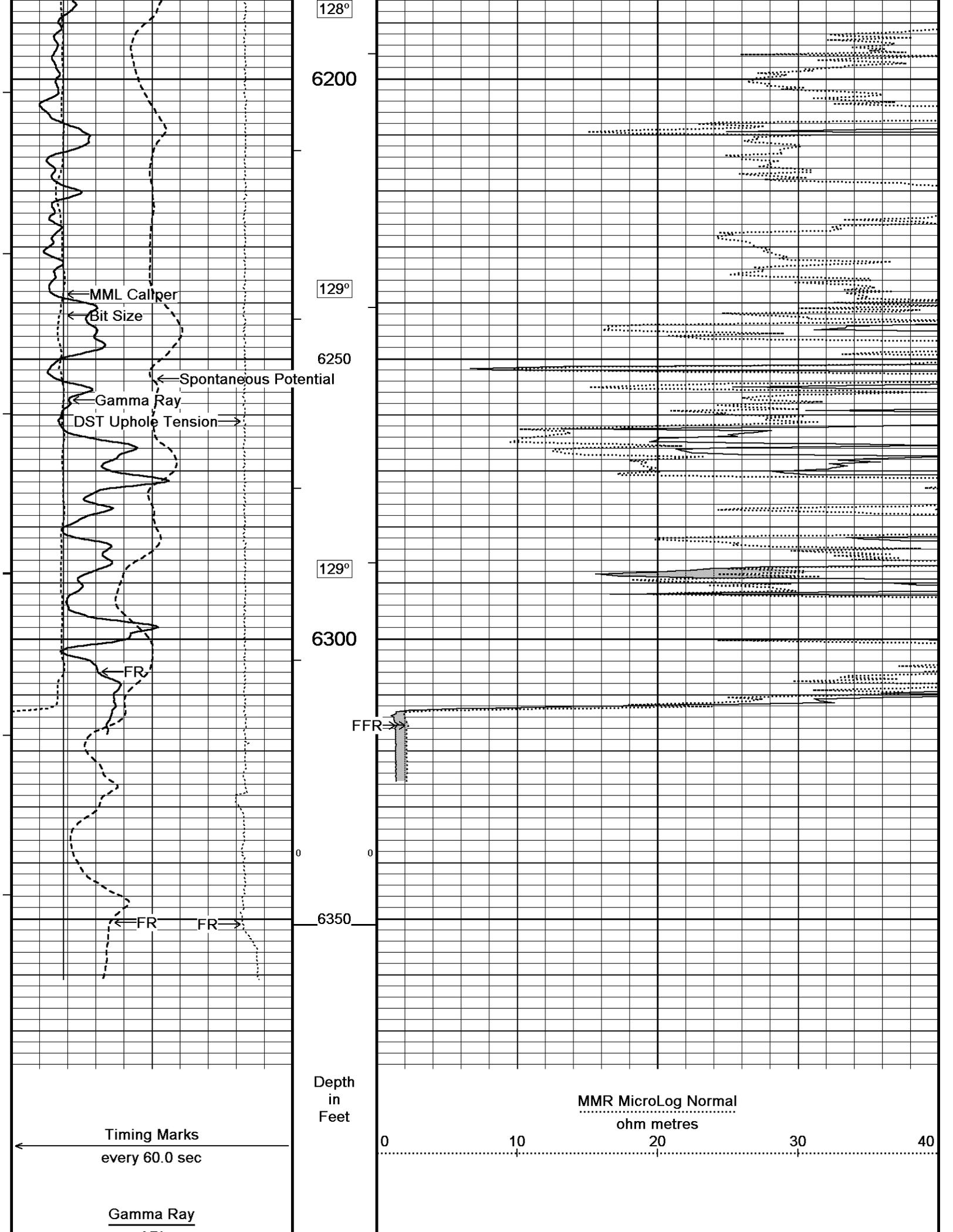
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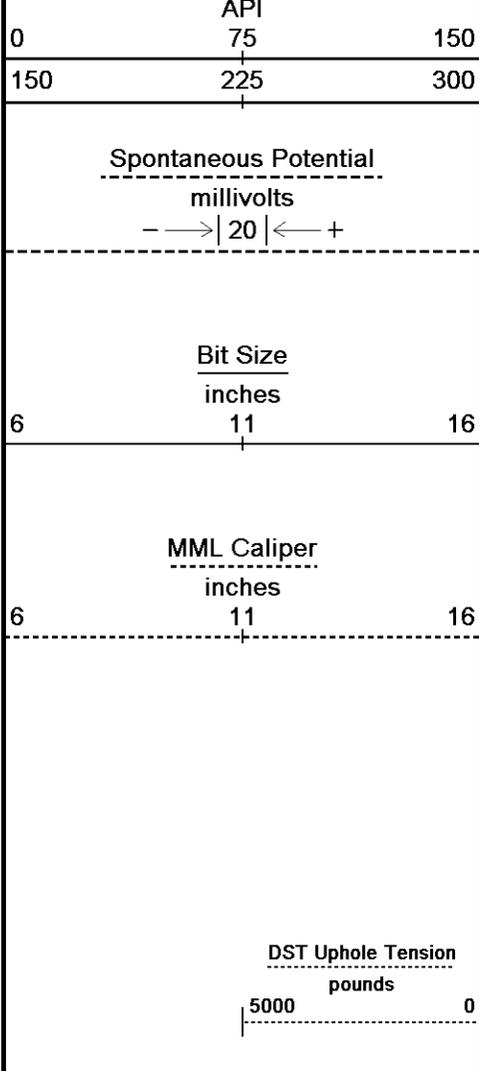
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128°

6150





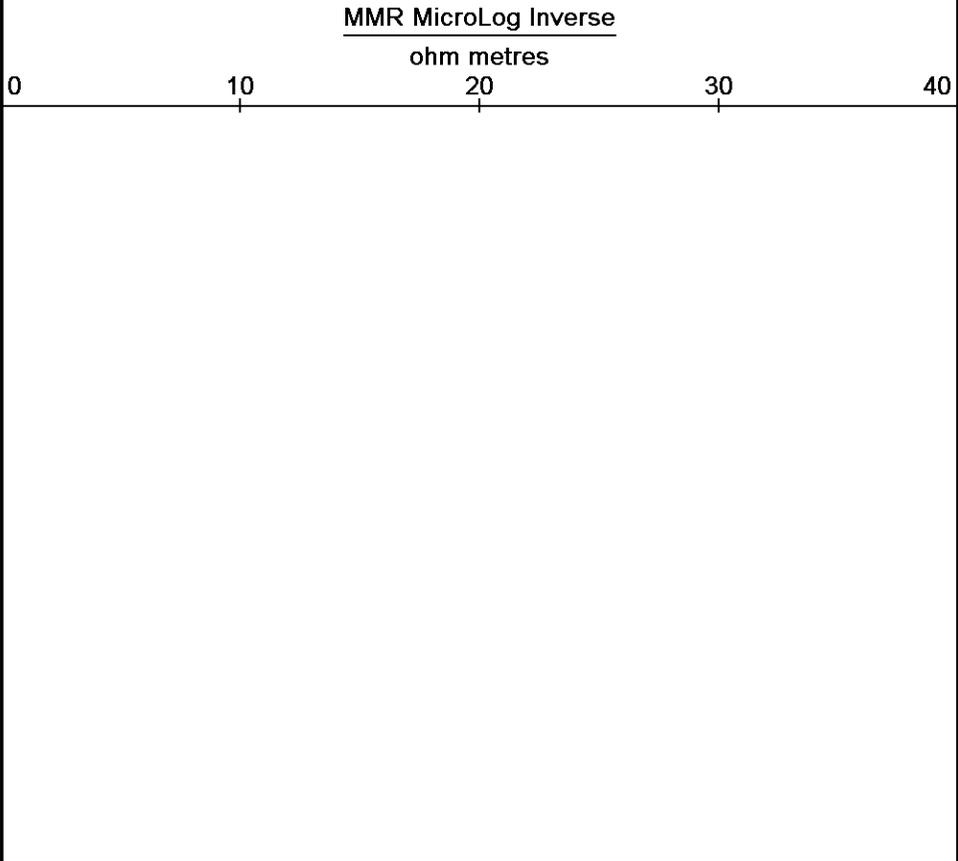


Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

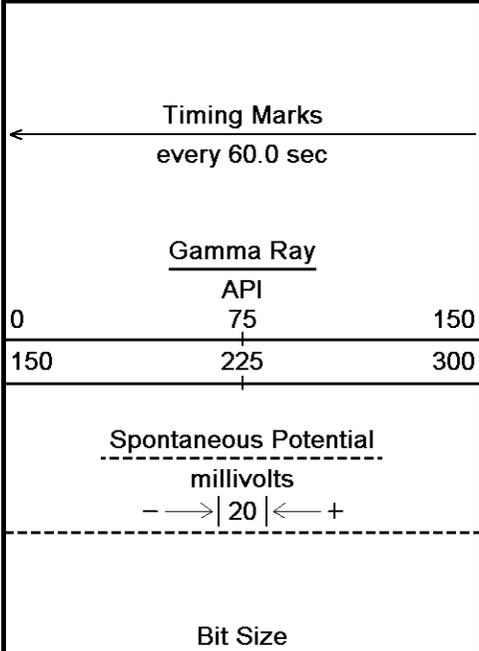


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 07-SEP-2018 23:07  
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 System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830

↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

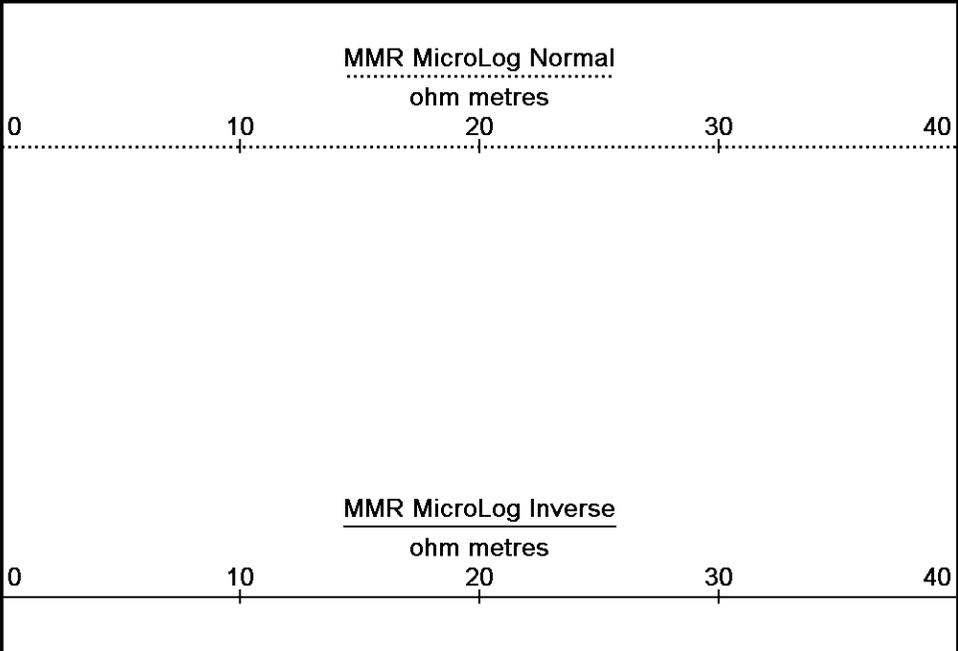
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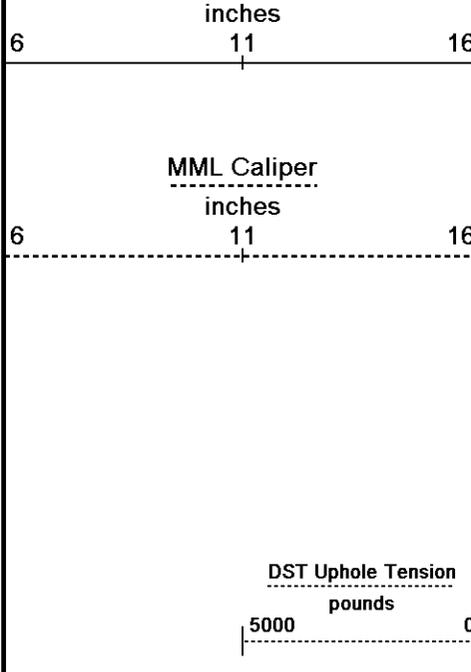


Depth in Feet

Borehole Temp in deg F

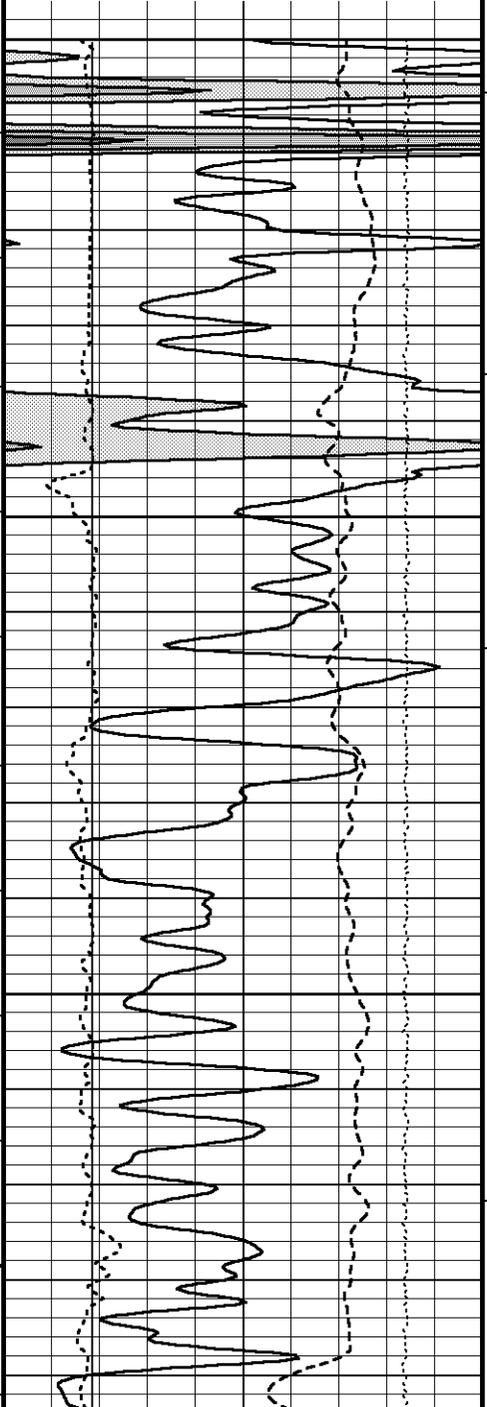
HVI every 10 cu ft





Annular  
Integral  
every  
10 cu ft

Replay  
Scale  
1:240



5650

121°

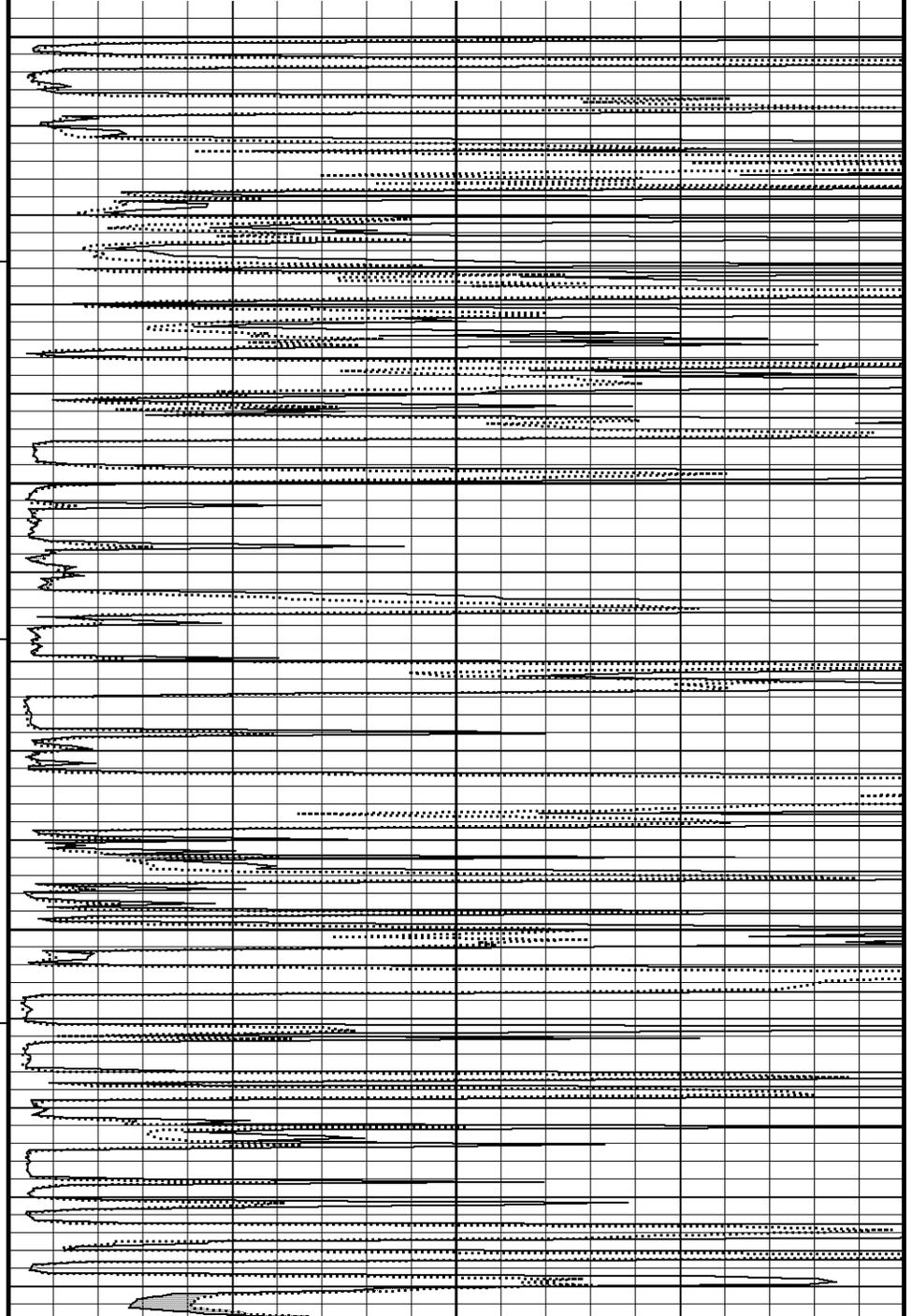
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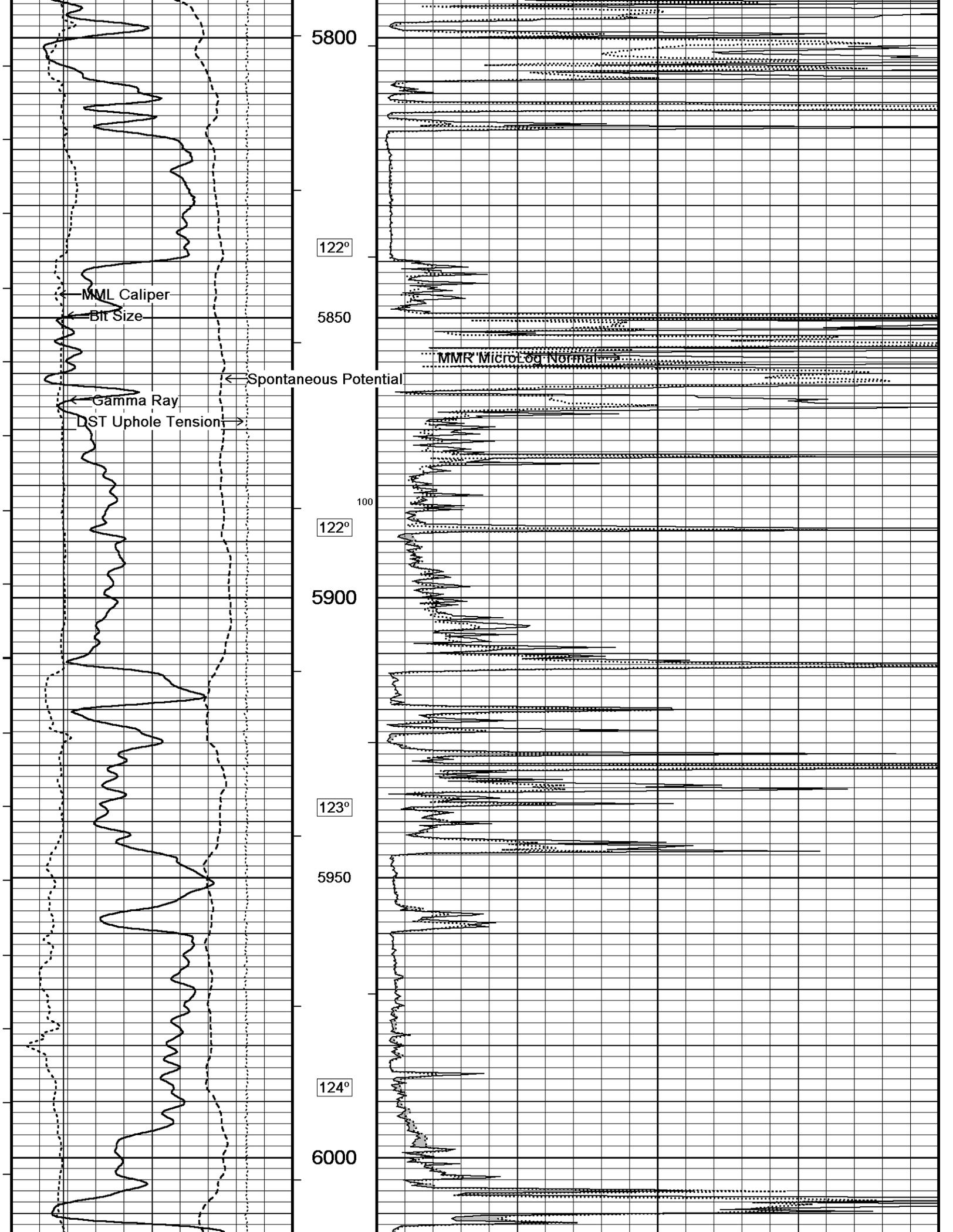
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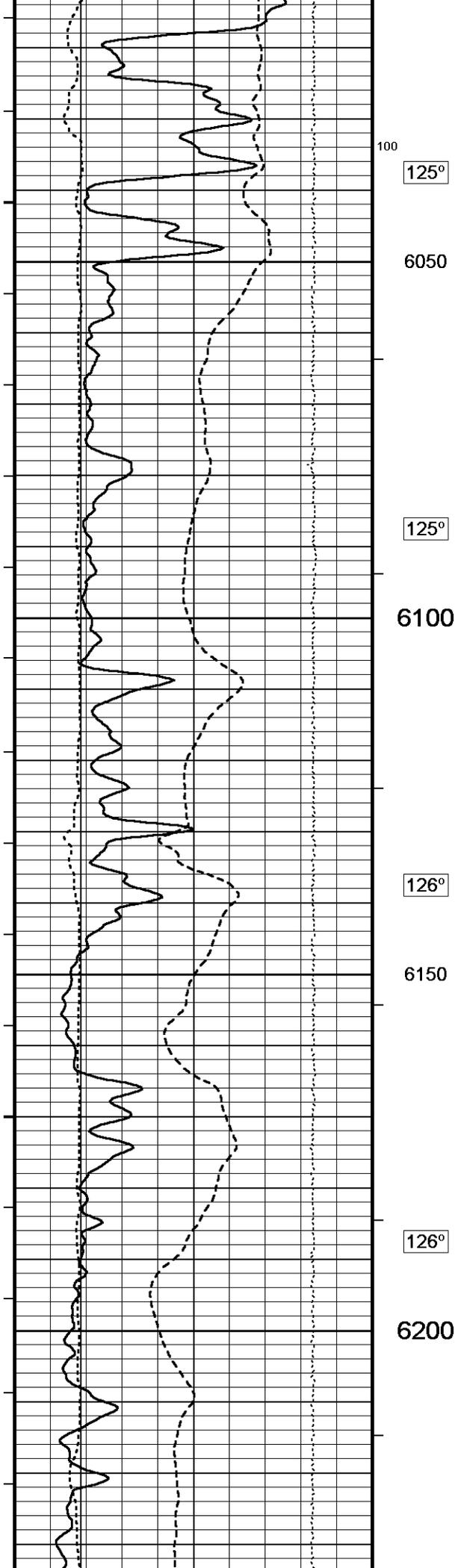
200

5750

121°







125°

6050

125°

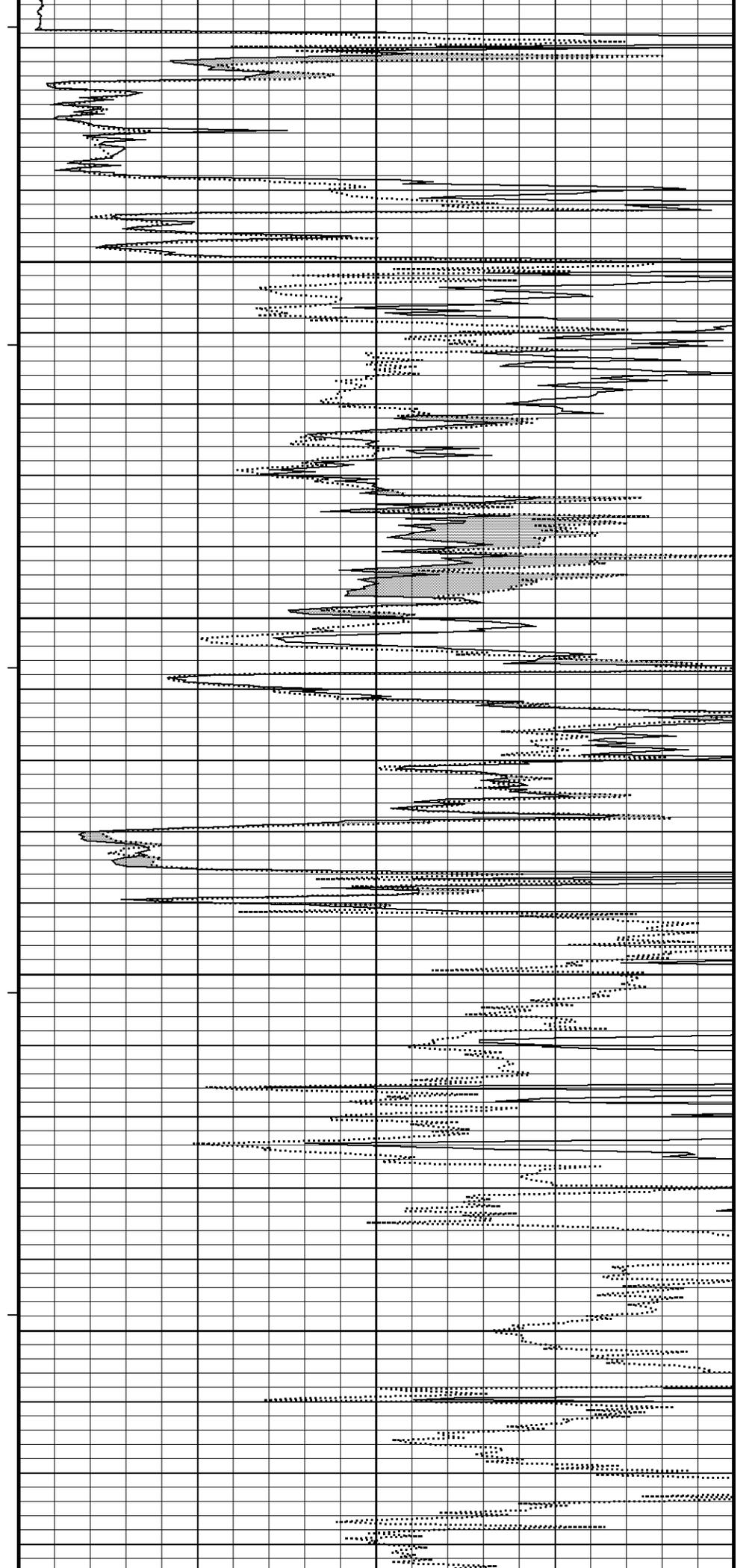
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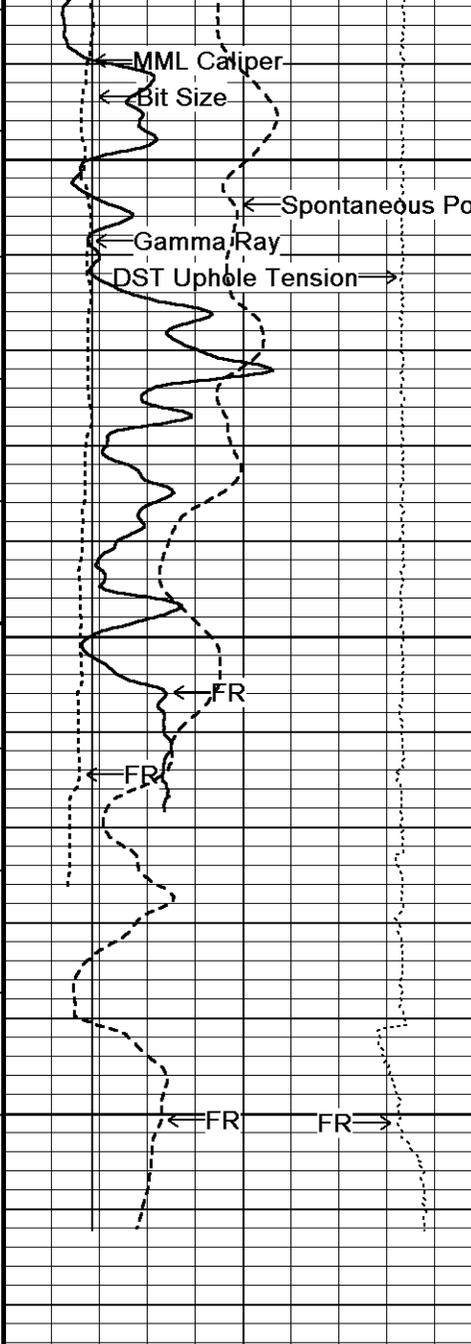
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6150

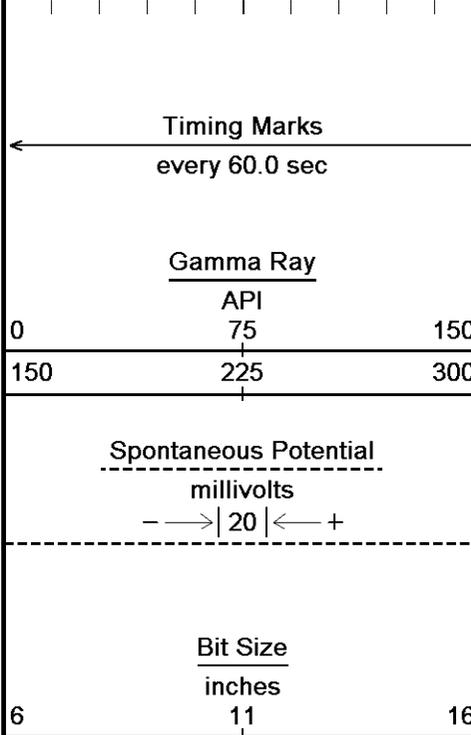
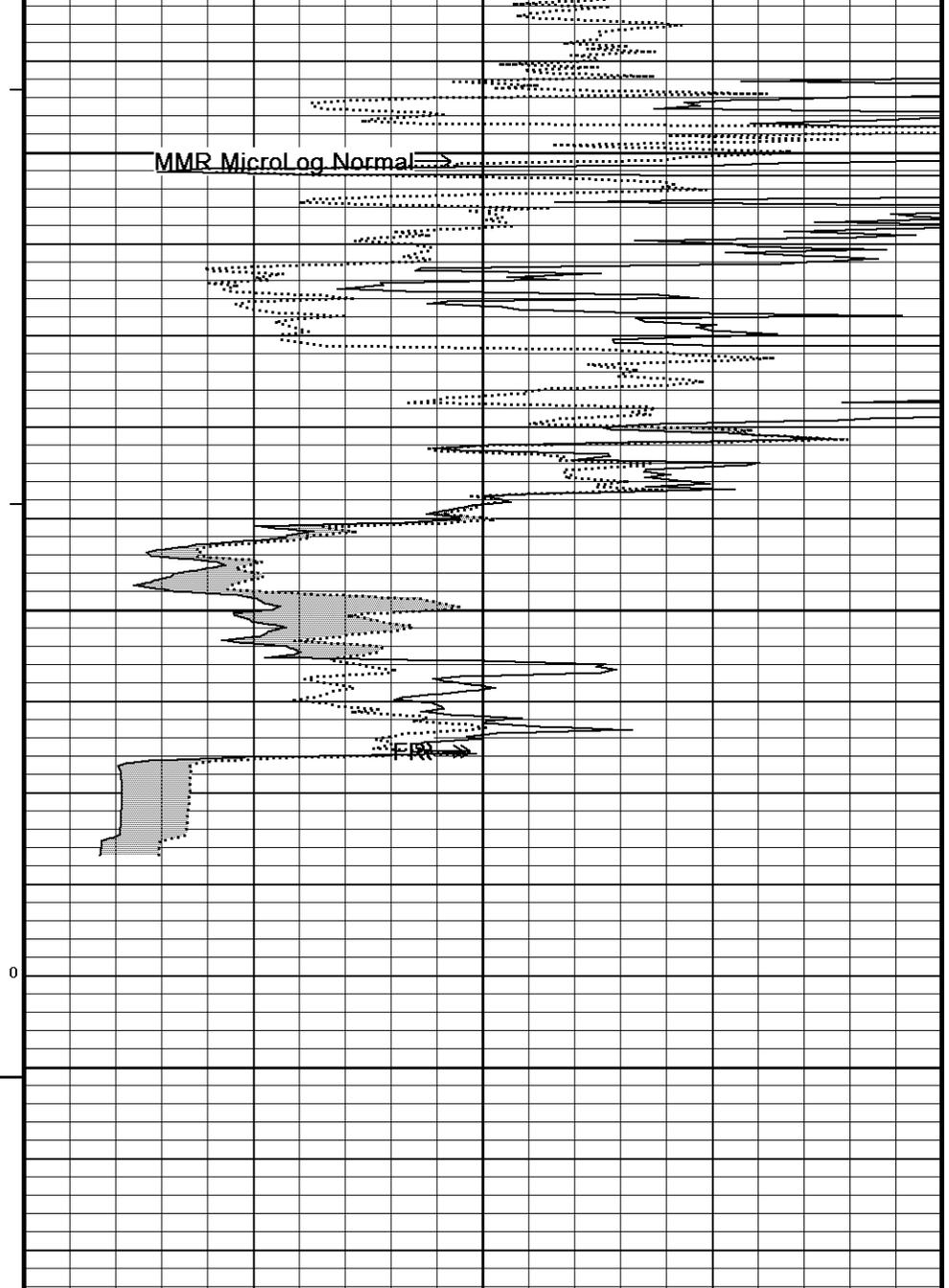
126°

6200

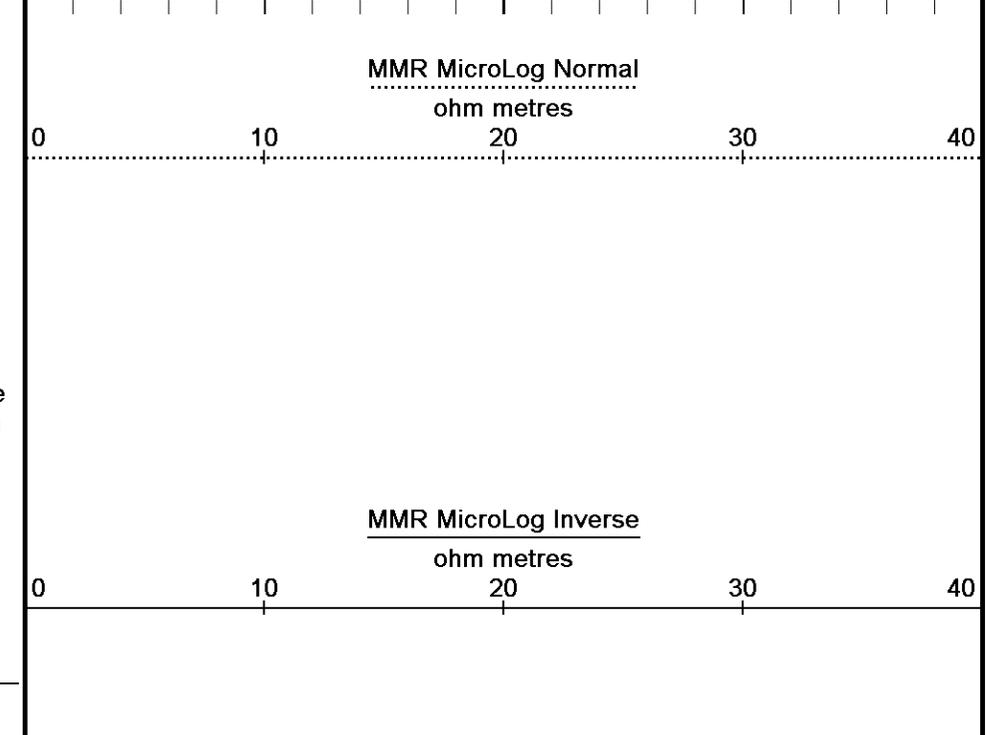


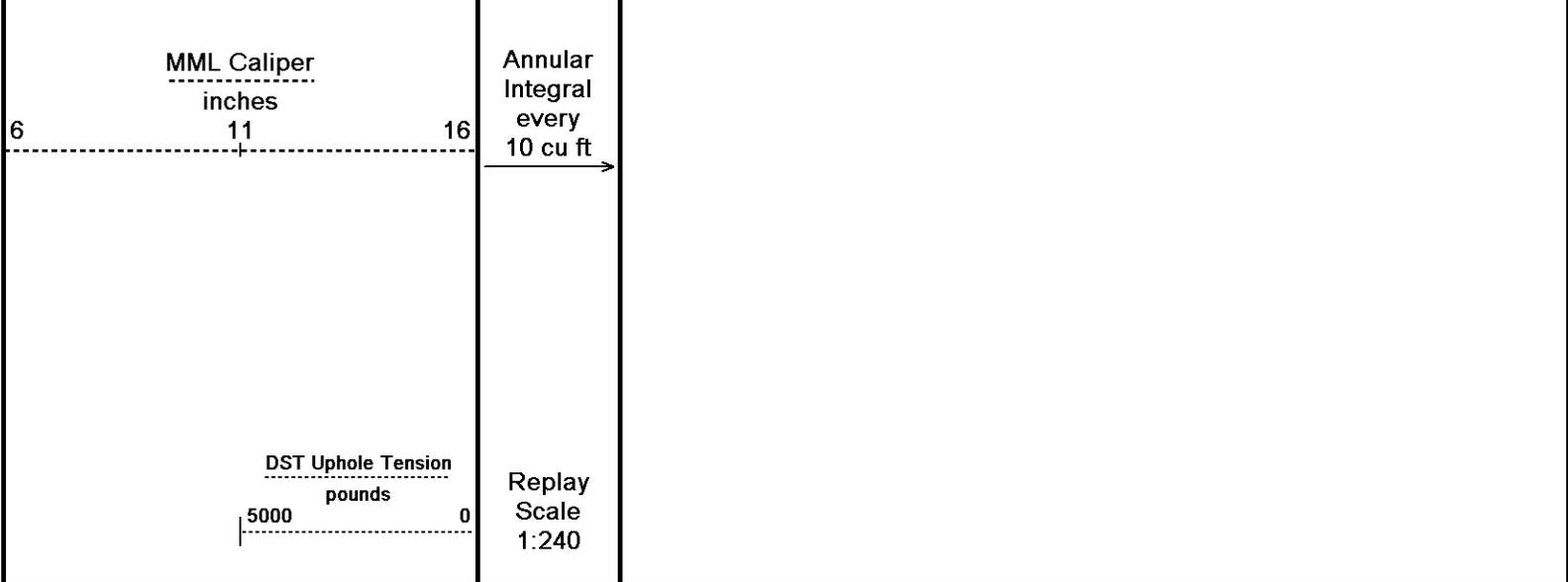


126°  
 6250  
 126°  
 6300  
 0  
 6350



Depth in Feet  
 Borehole Temp in deg F  
 HVI every 10 cu ft



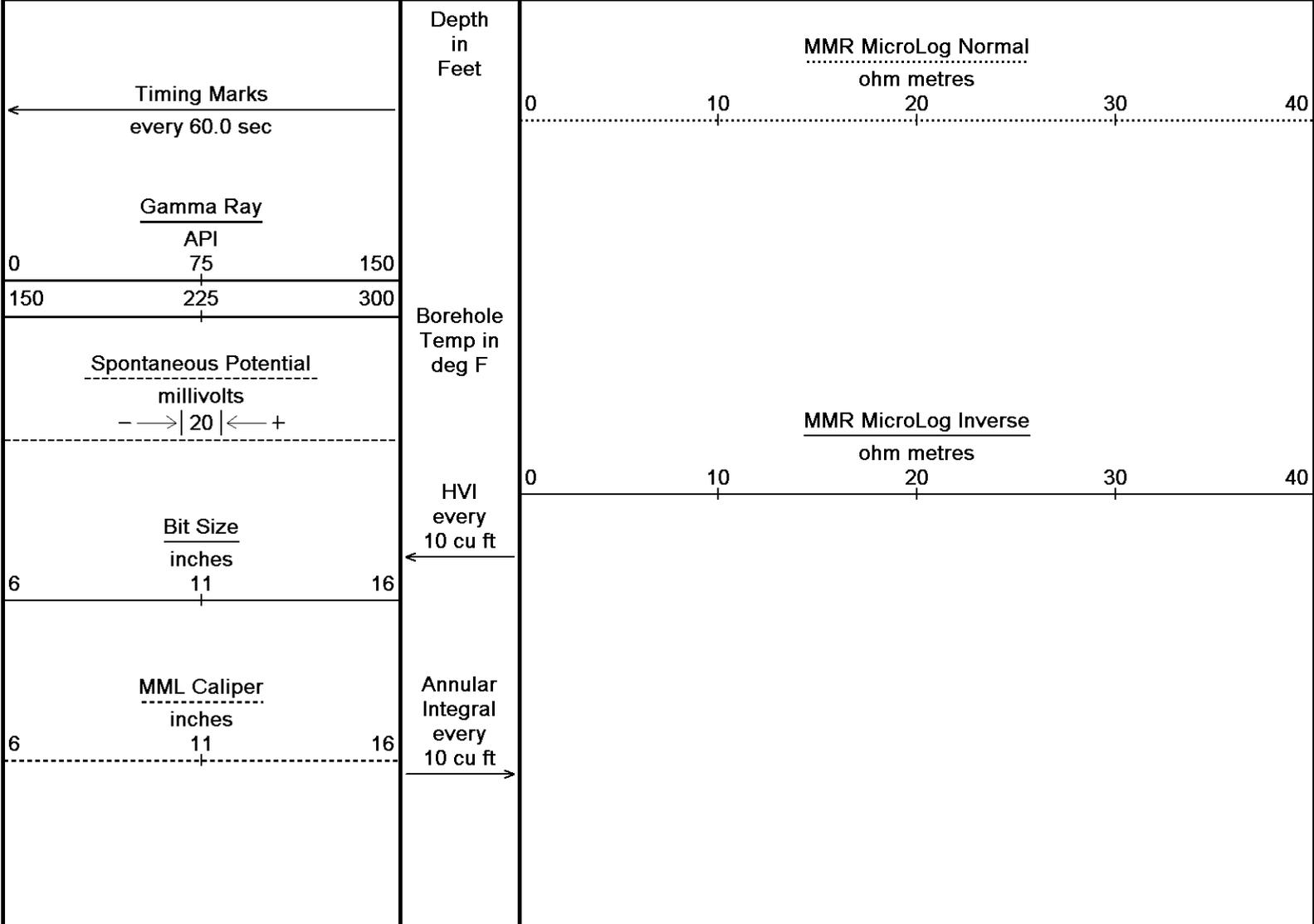


Depth Based Data - Maximum Sampling Increment 10.0cm  
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 Filename: C:\Minimus 18.01.6830\Data\O'Brien Preedy #3-4\O'Brien Preedy #3-4\_002.dta  
 Recorded on 07-SEP-2018 17:09  
 System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830

↑ REPEAT SECTION ↑

↓ 10 INCH HIGH RESOLUTION ↓

Depth Based Data - Maximum Sampling Increment 2.5cm  
 Plotted on 07-SEP-2018 23:07  
 Filename: C:\Minimus 18.01.6830\Data\O'Brien Preedy #3-4\O'Brien Preedy #3-4\_001.dta  
 Recorded on 07-SEP-2018 17:09  
 System Versions: Logged with 18.01.6830 Plotted with 18.01.6830



DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:120

5650

121°

5700

MNRL

121°

200

← MLTC

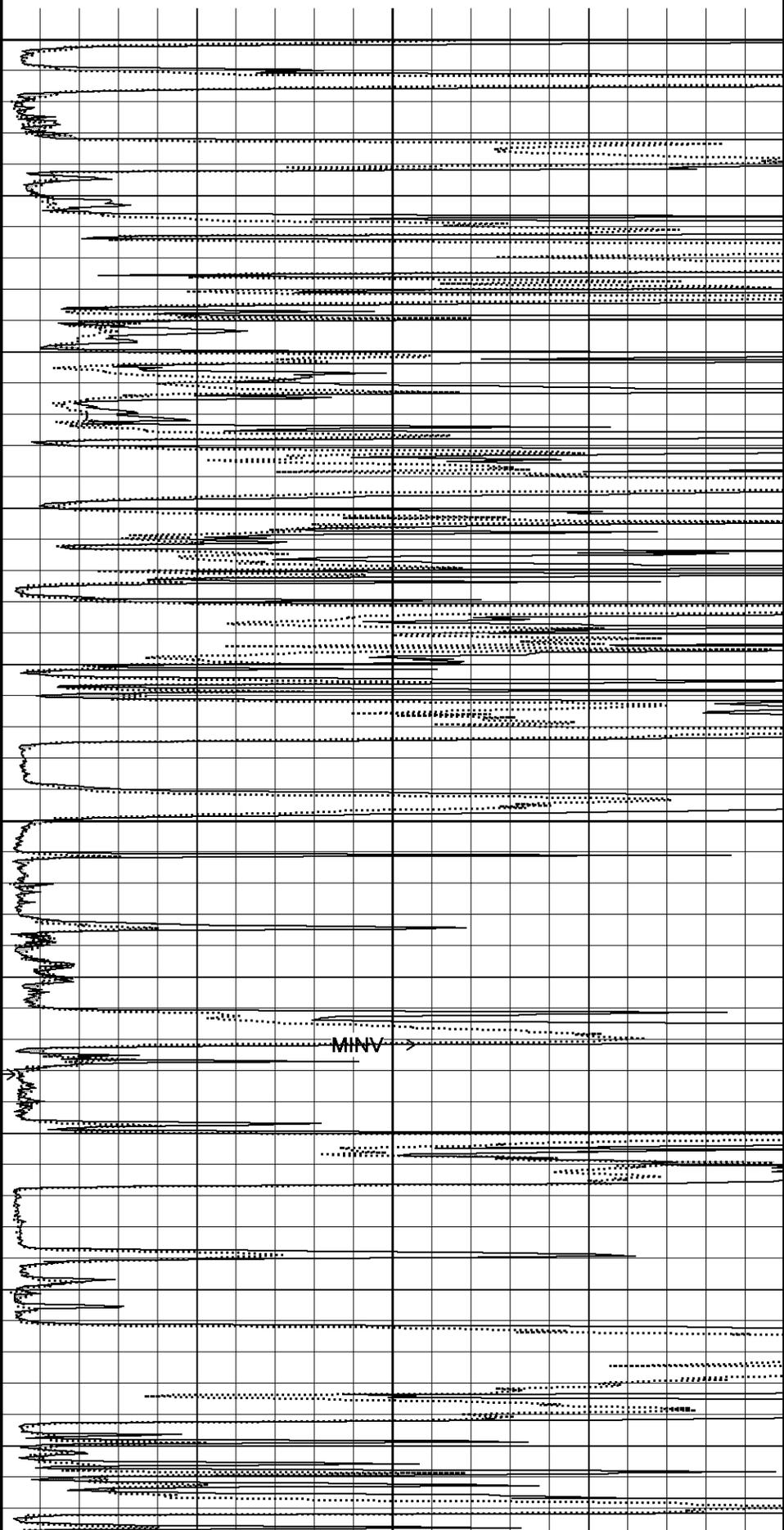
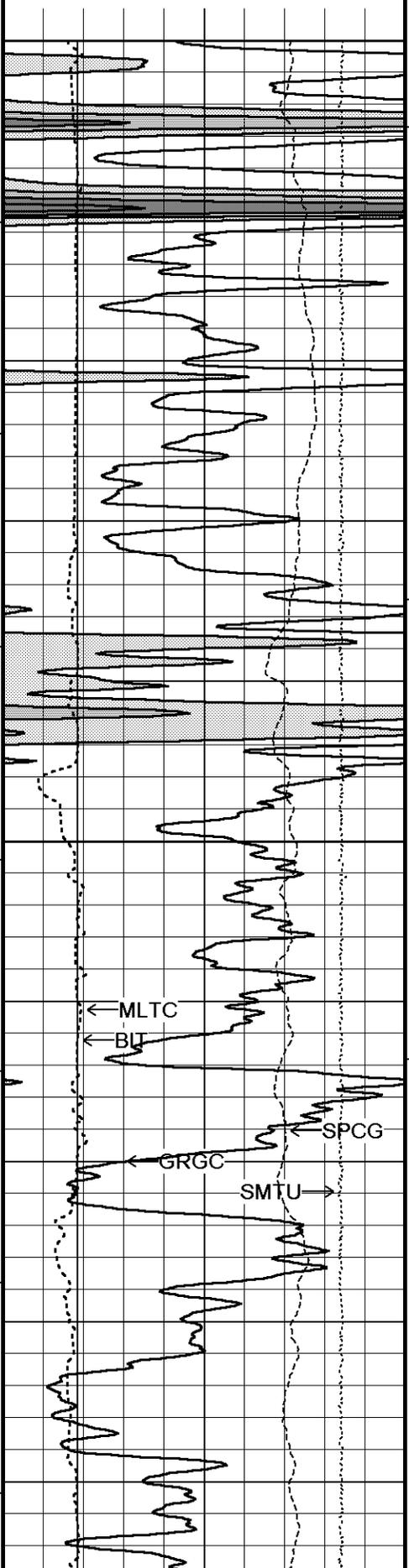
← BU

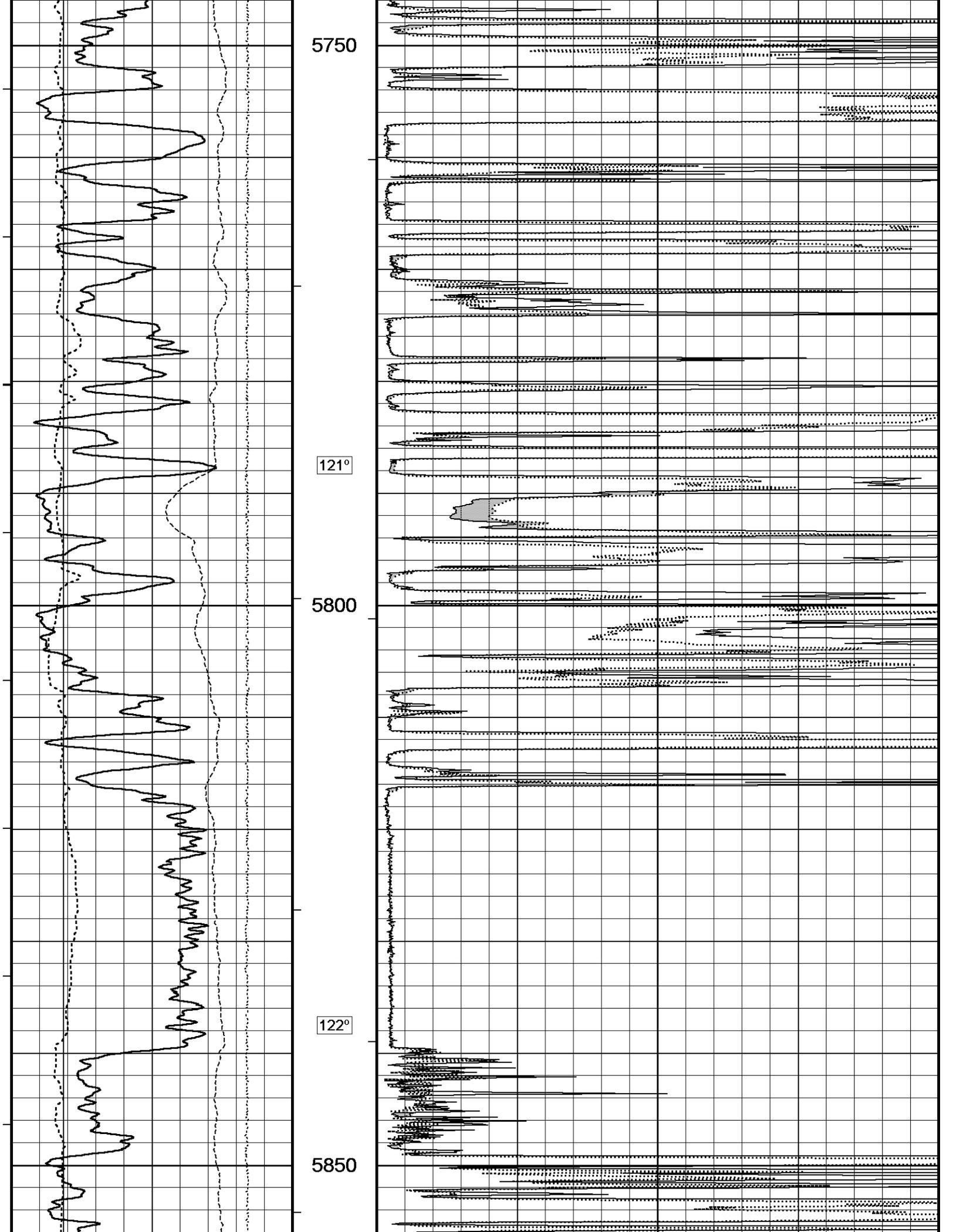
← GRGC

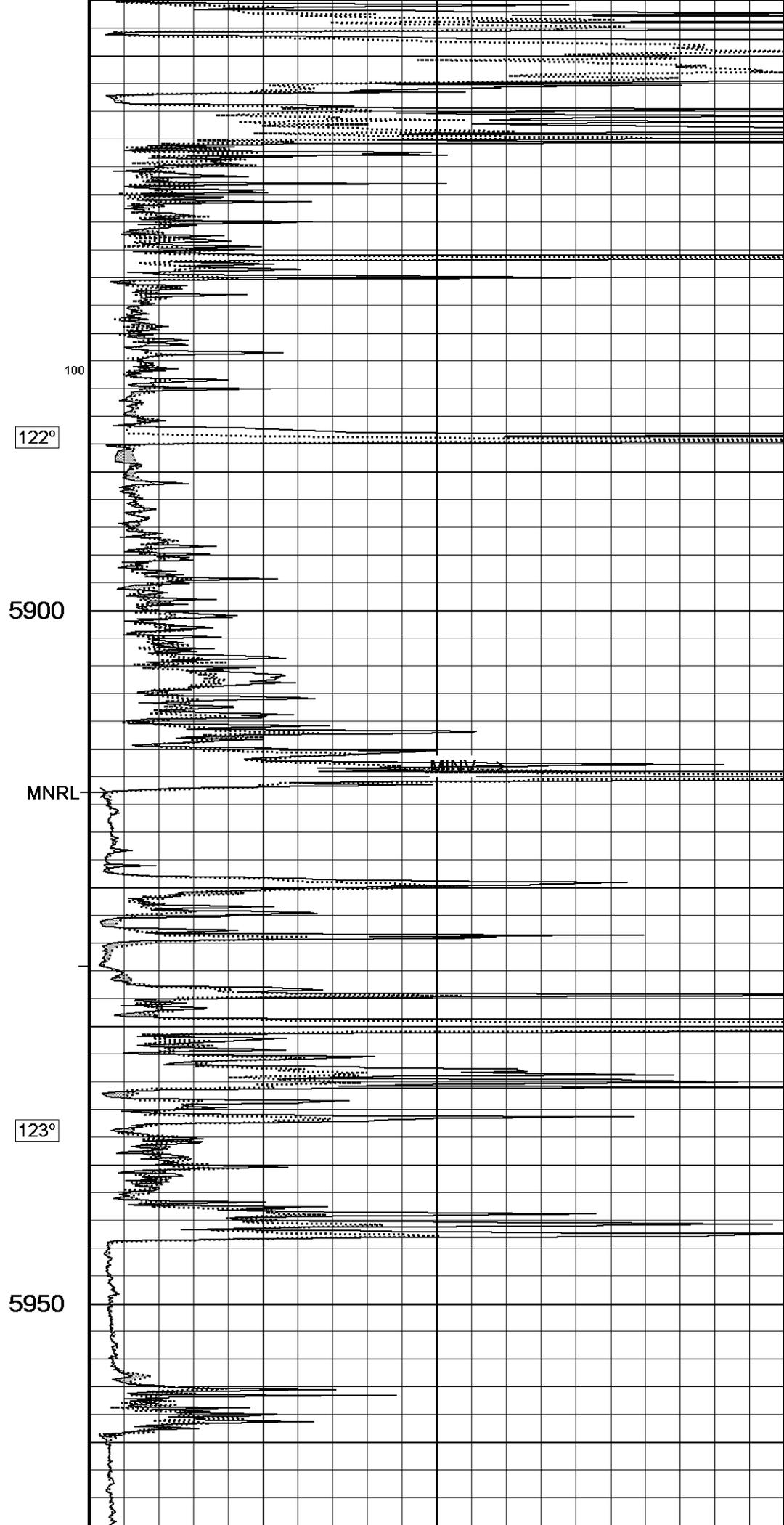
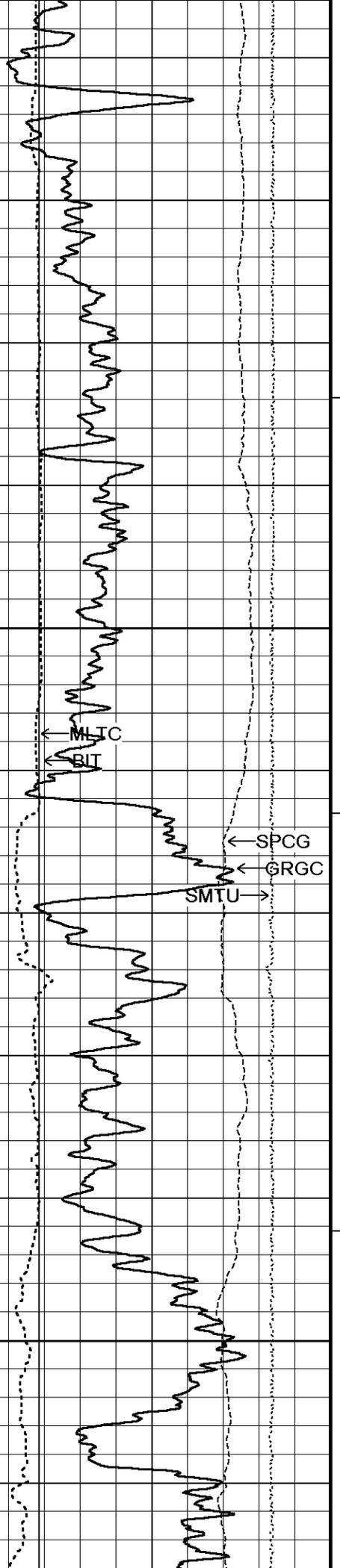
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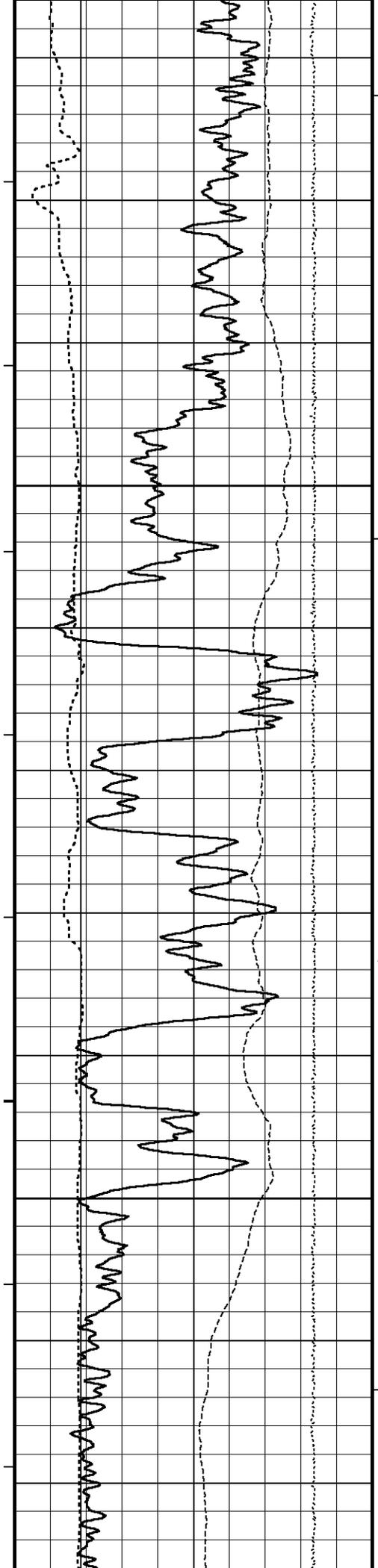
SPCG

MINV →









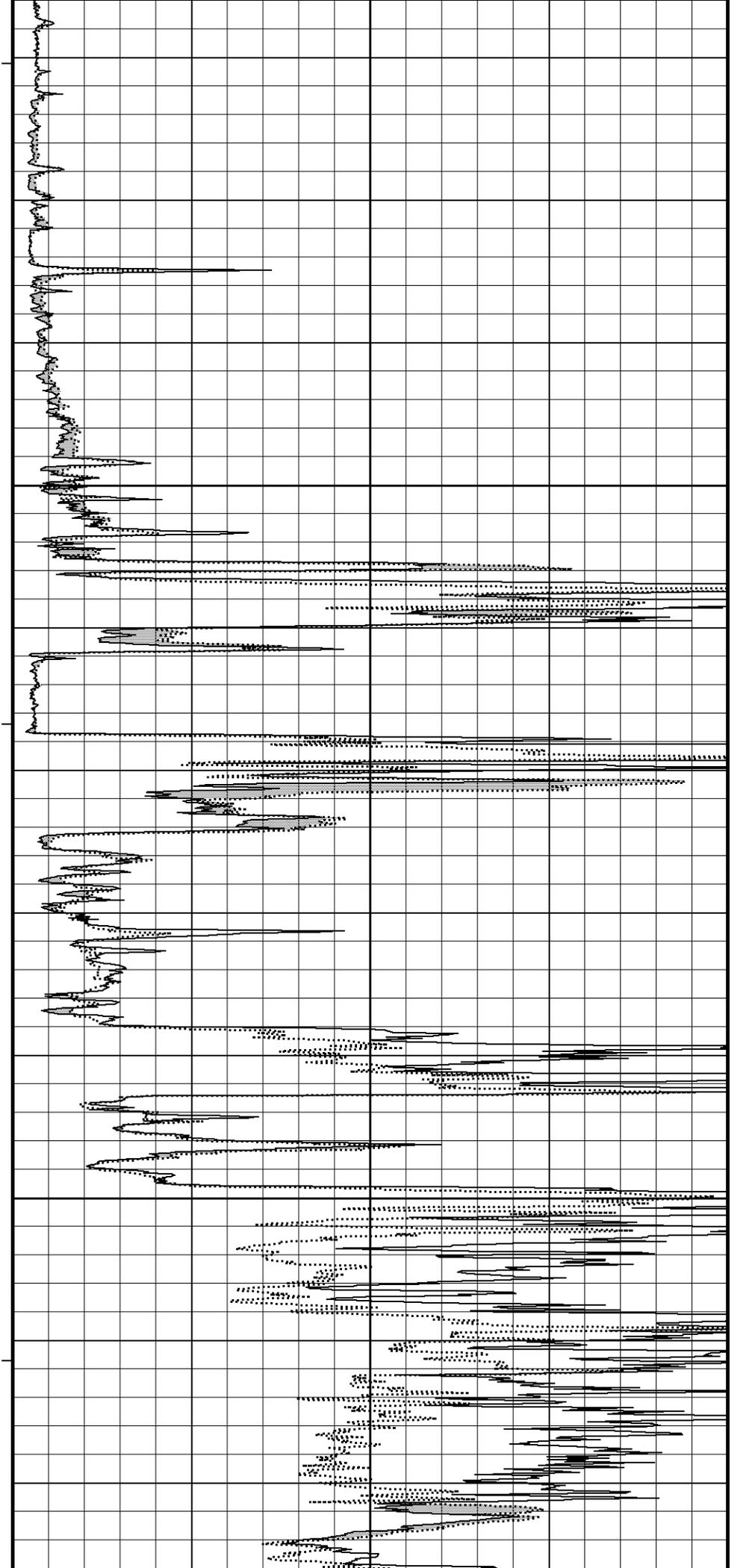
124°

6000

100

125°

6050



125°

6100

126°

6150

MINV

MNRL

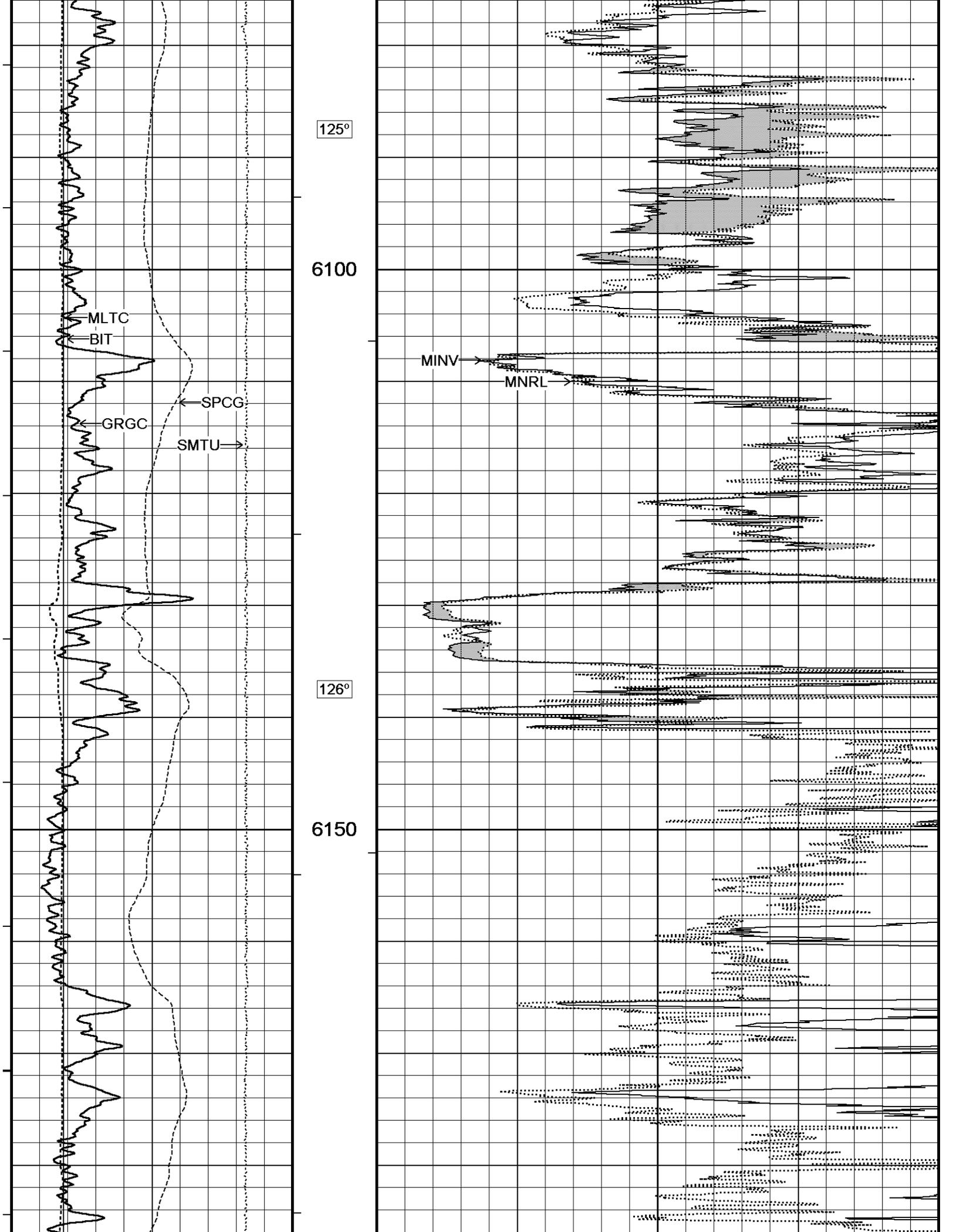
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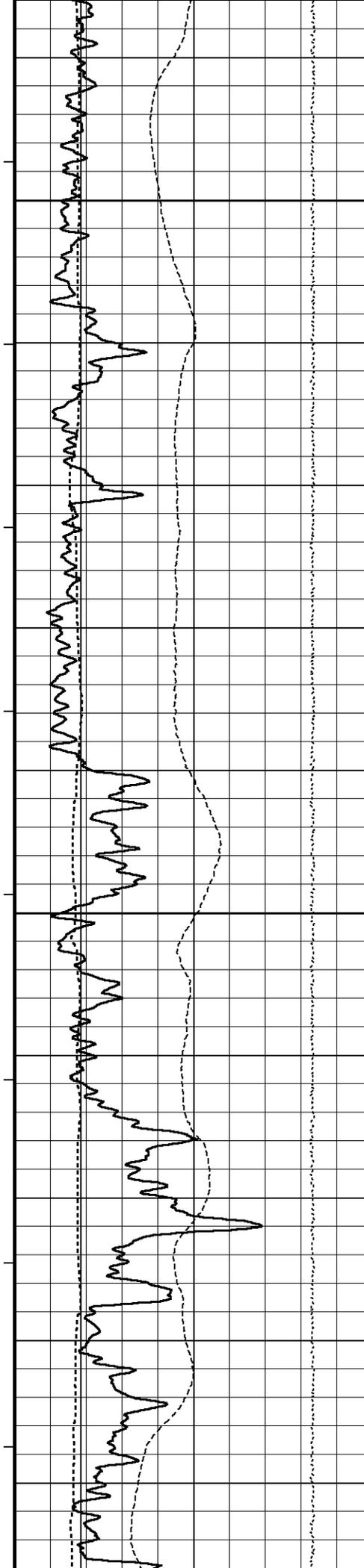
BIT

GRGC

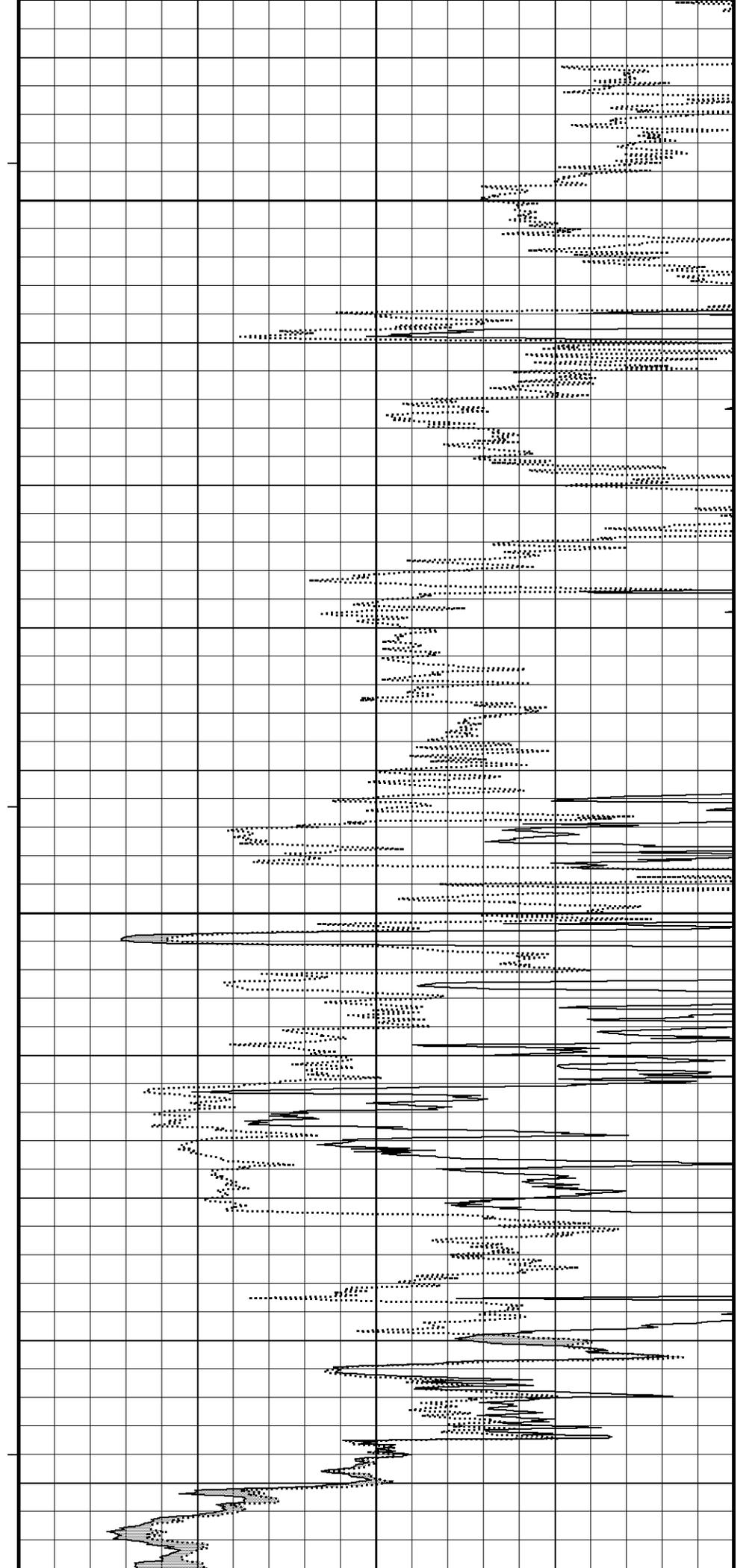
SPCG

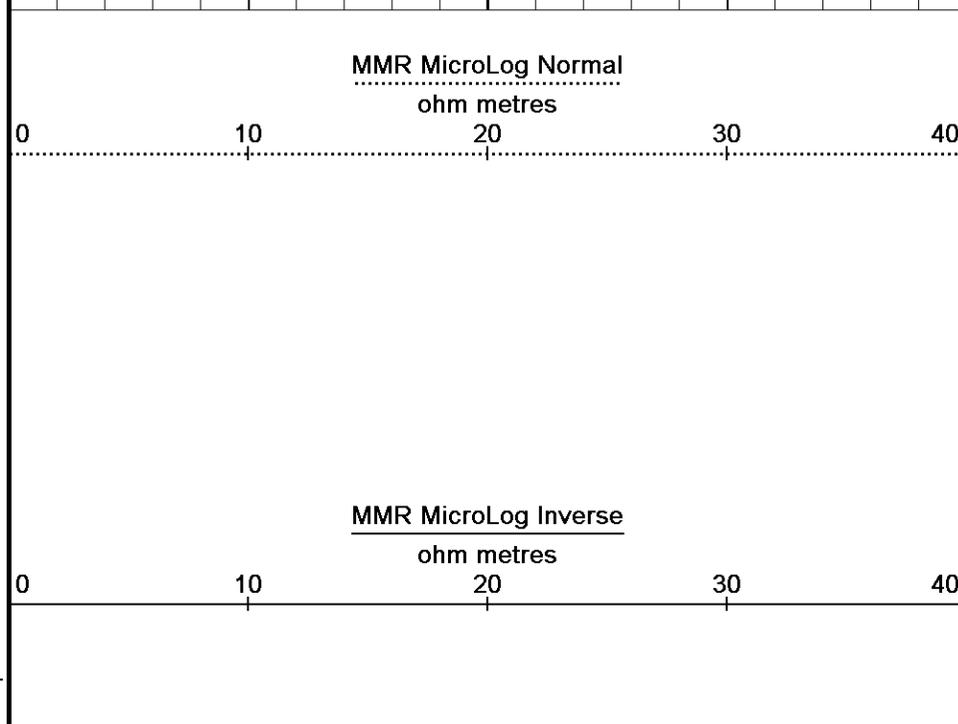
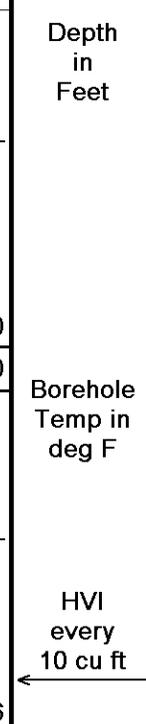
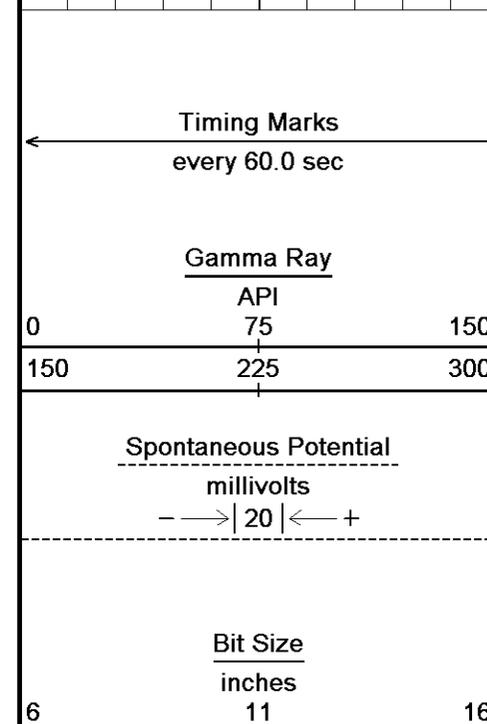
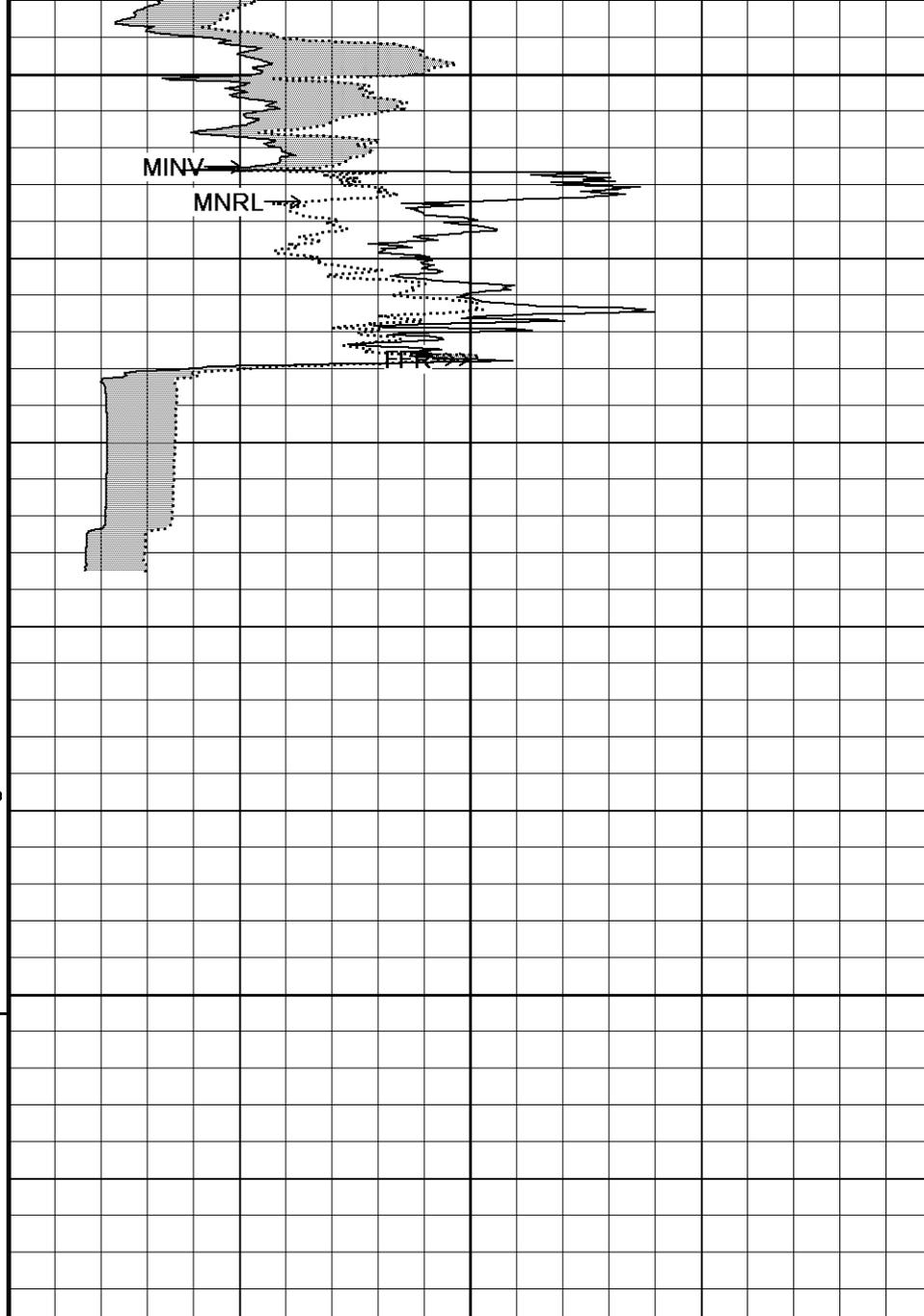
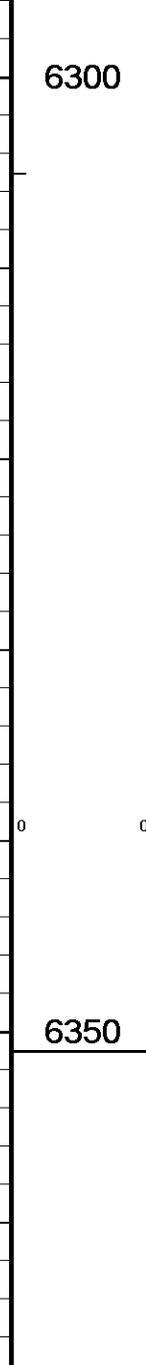
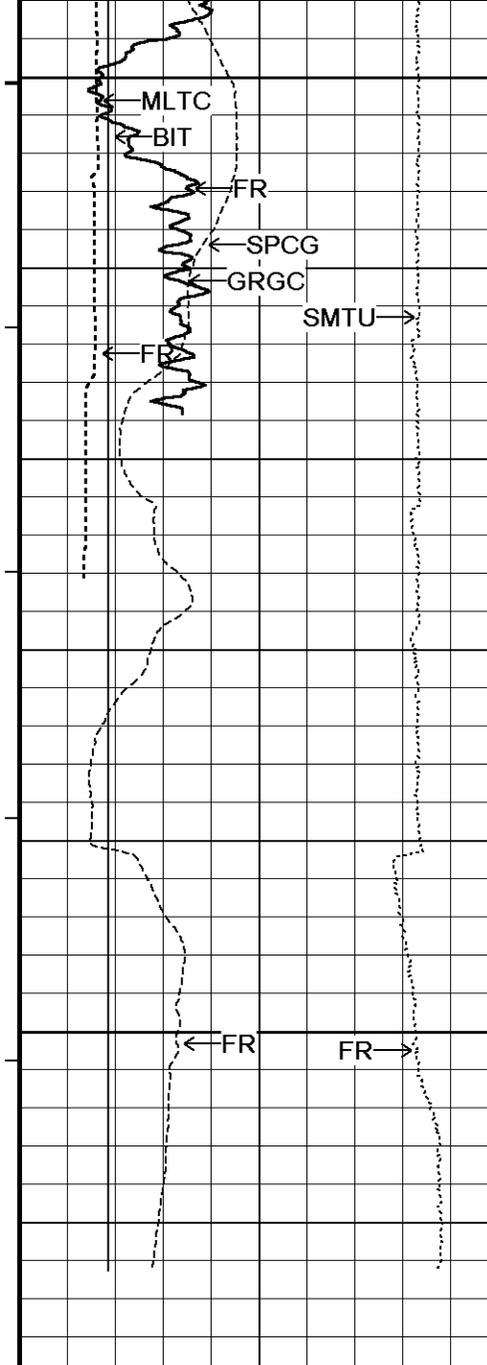
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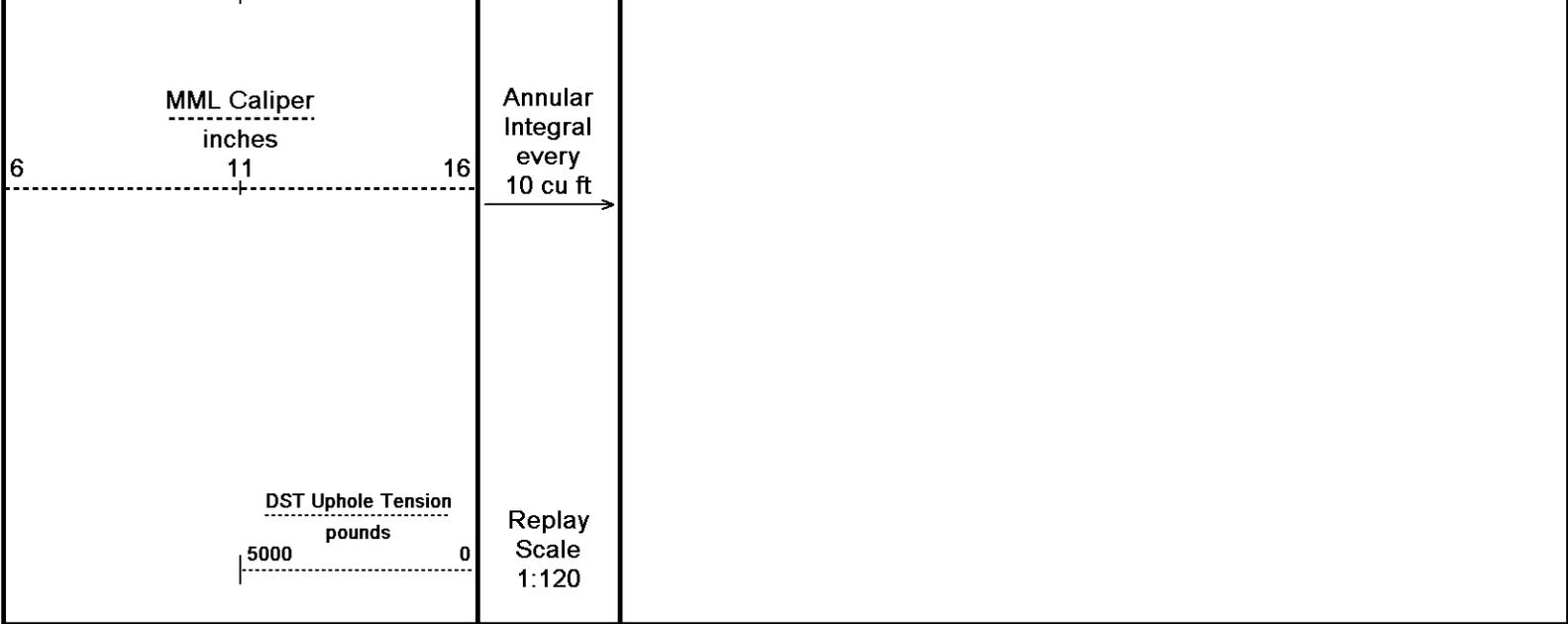




126°  
6200  
126°  
6250  
126°







Depth Based Data - Maximum Sampling Increment 2.5cm Plotted on 07-SEP-2018 23:07  
 Filename: C:\Minimus 18.01.6830\Data\O'Brien Preedy #3-4\O'Brien Preedy #3-4\_001.dta Recorded on 07-SEP-2018 17:09  
 System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

↑ 10 INCH HIGH RESOLUTION ↑

### BEFORE SURVEY CALIBRATION

C:\Minimus 18.01.6830\Data\O'Brien Preedy #3-4\O'Brien Preedy #3-4\_002.dta

General Constants All 000

Last Edited on 07-SEP-2018,16:38

**General Parameters**

Mud Resistivity	1.180	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	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

Down-hole Tension Calibration SMS 0

Field Calibration on 06-SEP-2018 14:13

Reading No	Measured	Calibrated (lbs)
1	14944.57	0.00
2	15736.14	527.00

Gamma Calibration MCG-D.A 246

Field Calibration on 06-SEP-2018,04:31

	Measured	Calibrated (API)
Background	107	75
Calibrator (Gross)	763	531
Calibrator (Net)	656	456

Gamma Calibration Tolerances MCG-D.A 246

Ratio 1.438 Counts/API

Gamma Constants MCG-D.A 246

Last Edited on 07-SEP-2018,15:32

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	%	

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

SP Calibration MCG-D.A 246

Field Calibration on 01-AUG-2018,13:35

	Measured	Calibrated (mV)
Reference 1	103.5	100.0
Reference 2	-96.9	-100.1

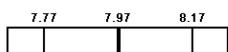
Caliper Calibration MML-A 7

Base Calibration on 07-SEP-2018 12:58  
Field Calibration on 07-SEP-2018 13:00

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)
	7.98	7.97

Caliper Calibration Tolerances MML-A 7

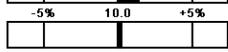
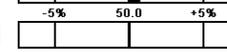
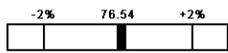
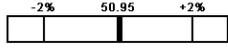
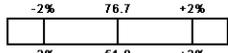
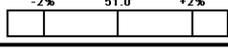
Short Arm Field Cal. 7.98  in

Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 07-SEP-2018 13:13  
Field Check on 07-SEP-2018 13:16

	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	76.7	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

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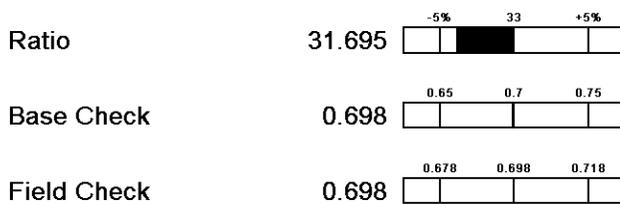
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159		
Micro Normal K Factor	0.5110		
Micro Inverse K Factor	0.3380		
Standoff Offset	N/A	inches	

**Neutron Calibration MDN-B.A 292**

Base Calibration on 02-SEP-2018,10:44  
Field Check on 06-SEP-2018,04:24

Base Calibration		Measured	Calibrated (cps)	
		Near	Near	Far
		2951	3714	110
Ratio		31.695	33.764	
Field Calibrator at Base			Calibrated (cps)	
			2190	3136
Ratio			0.698	
Field Check			Calibrated (cps)	
			2180	3125
Ratio			0.698	

**Neutron Calibration Tolerances MDN-B.A 292**



**Neutron Constants MDN-B.A 292**

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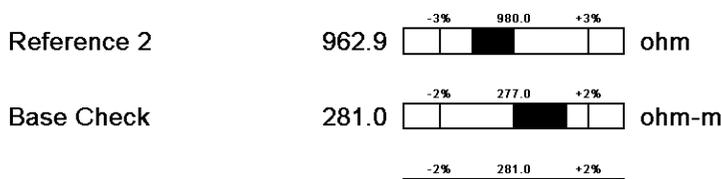
Neutron Source Id	P0204NN		
Neutron Jig Number	NJ5736		
Air Hole Processing	Legacy		
Caliper Source for Processing	Density Caliper		
Stand-off	0.00	inches	
Mud Density	1.00	gm/cc	
Limestone Sigma	7.10	cu	
Sandstone Sigma	4.26	cu	
Dolomite Sigma	4.70	cu	
Formation Pressure Source	None		
Formation Pressure	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-A.A 135**

Base Calibration on 02-SEP-2018,10:12  
Field Check on 06-SEP-2018,04:16

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.9	126.8
Base Check		281.0
Field Check		281.1

**FE Calibration Tolerances MFE-A.A 135**



FE Constants MFE-A.A 135

Last Edited on 07-SEP-2018,15:32

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

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 01-AUG-2018,13:29

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

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length 11

Induction Calibration MAI-A.A 111

Factory Loop Calibration 09-AUG-2018 16:18  
Field Check on 06-SEP-2018,04:15

Factory Loop Calibration  
High Conductivity Reference Resistor 3.3 ohm  
Low Conductivity Reference Resistor 333.3 ohm

Array	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
	Low	High	Low	High	Gain	Offset
1 (near)	17.6	473.6	9.3	966.2	0.000	0.0
2	6.4	385.9	7.6	821.4	0.000	0.0
3	3.2	264.0	5.2	566.0	0.000	0.0
4 (far)	2.1	135.5	2.6	279.2	0.000	0.0
Array Temperature	23.0		Deg F			

Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)		Deg F
	Low	High	Low	High	
1 (near)	9.8	3840.7	8.8	3839.2	87.9
2	27.9	3498.4	27.0	3497.5	
3	27.5	2996.0	26.7	2994.9	
4 (far)	18.1	2040.7	17.6	2040.3	
Array Temperature	87.9		85.9		Deg F

Induction Check Tolerances MAI-A.A 111

Low Array 1	8.8		mmho/m	High Array 1	3839.2		mmho/m
Low Array 2	27.0		mmho/m	High Array 2	3497.5		mmho/m
Low Array 3	26.7		mmho/m	High Array 3	2994.9		mmho/m
Low Array 4	17.6		mmho/m	High Array 4	2040.3		mmho/m

Induction Constants MAI-A.A 111

Last Edited on 07-SEP-2018,15:31

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. Borehole Temp. Unfilt.  
Borehole Correction Method Default

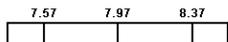
Borehole Correction Method		Default	
Squasher Start		0.0020	mhos/metre
Squasher Offset		N/A	mhos/metre
<b>Borehole Normalisation</b>			
DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000
<b>Calibration Site Corrections</b>			
Channel 1		0.00	mmhos/metre
Channel 2		0.00	mmhos/metre
Channel 3		0.00	mmhos/metre
Channel 4		0.00	mmhos/metre
<b>Symmetrised Receiver Gains</b>			
Receiver 1		1.00	
Receiver 2		1.00	
Receiver 3		1.00	
Receiver 4		1.00	
<b>Apparent Porosity and Water Saturation Constants</b>			
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	

### Caliper Calibration MPD-C.A 216

Base Calibration on 02-SEP-2018,10:42  
Field Calibration on 06-SEP-2018,04:16

Base Calibration		
Reading No	Measured	Calibrator Size (in)
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
<b>Field Calibration</b>		
	Measured Caliper (in)	Actual Caliper (in)
	7.97	7.97

### Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.97  in

### Photo Density Calibration MPD-C.A 216

Base Calibration on 02-SEP-2018,10:27  
Field Check on 06-SEP-2018,04:18

Density Calibration				
Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1002	1196		
Reference 1	49599	24164	59556	30836
Reference 2	19816	2269	24941	2541
<b>Field Check at Base</b>				
	1002.2	1196.2		
<b>Field Check</b>				
	1009.6	1208.8		

PE Calibration			
Base Calibration	Measured		Calibrated
	WGR	WLL Ratio	Ratio

	WS	WH	Ratio	Ratio
Background	183	902		
Reference 1	21103	49447	0.431	0.371
Reference 2	5778	19707	0.298	0.272

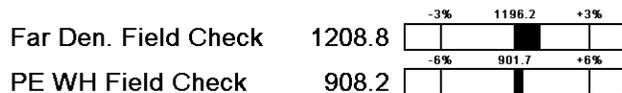
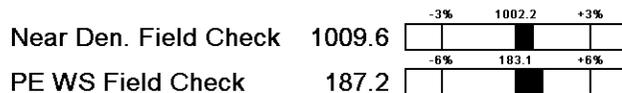
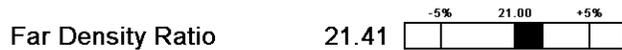
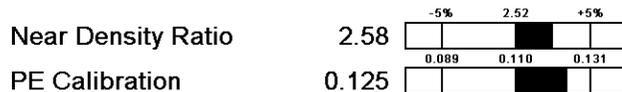
Field Check at Base

183.1      901.7

Field Check

187.2      908.2

Photo Density Calibration Tolerances MPD-C.A 216



Density Constants MPD-C.A 216

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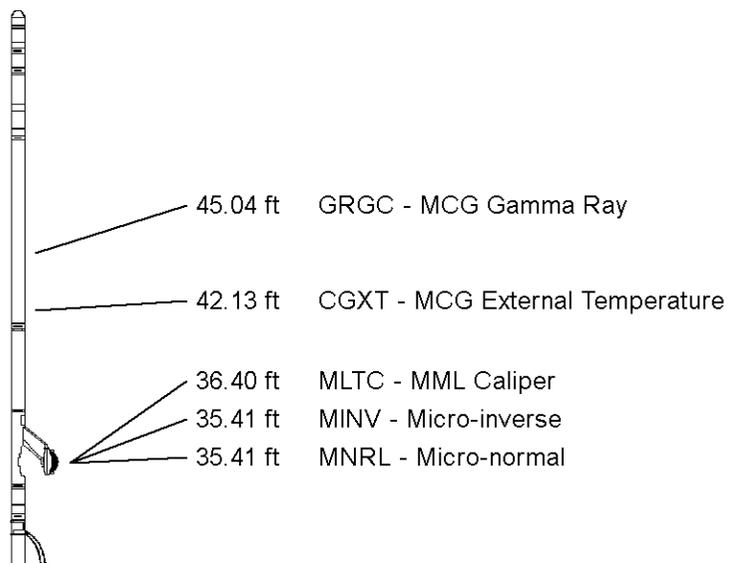
Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.09	gm/cc
Mud Density Type		
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Precision Enhanced Density Processing	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

DOWNHOLE EQUIPMENT

C:\Minimus 18.01.6830\Data\O'Brien Preedy #3-4\O'Brien Preedy #3-4\_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



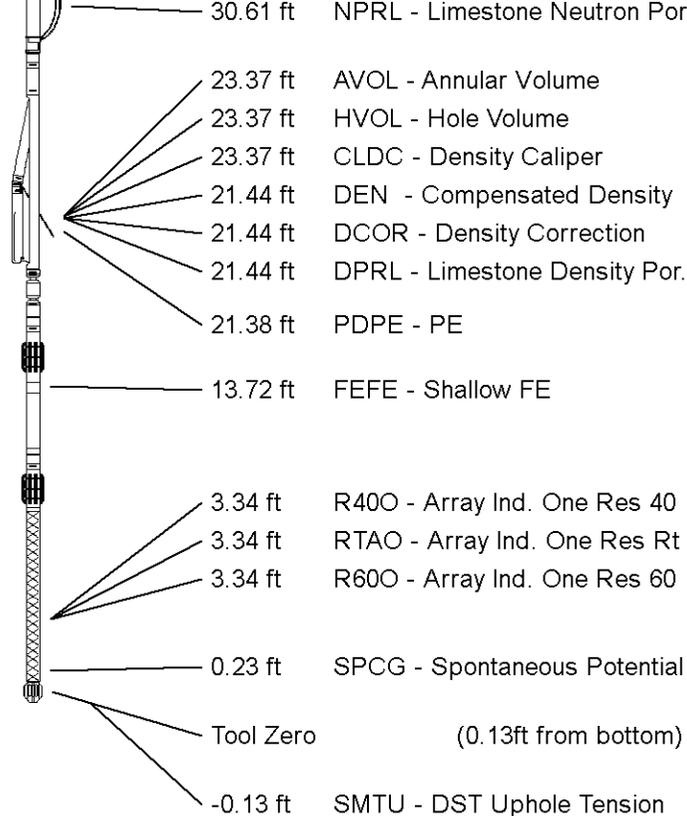
Compact Density/Caliper  
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in

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 Induction  
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 55.02 ft Weight: 454.2 lb



All measurements relative to tool zero.

COMPANY O'BRIEN ENERGY RESOURCES CORP.  
WELL PREEDY #3-4  
FIELD ANGELL SOUTHEAST  
PROVINCE/COUNTY MEADE  
COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	2681	feet	First Reading	6316.00	feet
Elevation Drill Floor	2679	feet	Depth Driller	6350.00	feet
Elevation Ground Level	2668	feet	Depth Logger	6351.00	feet



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