



**Weatherford**<sup>®</sup>

**MICRORESISTIVITY LOG**

COMPANY		O'BRIEN ENERGY RESOURCES CORP.	
WELL		RICKERS RANCH #8-17	
FIELD		ANGELL SOUTH	
PROVINCE/COUNTY		MEADE	
COUNTRY/STATE		U.S.A. / KANSAS	
LOCATION		1980' FSL & 1780' FEL	
SEC	TWP	RGE	Other Services
17	33S	29W	MPD/MDN
API Number	15-119-21349		MAI/MFE
Permit Number			
Permanent Datum GL, Elevation 2663 feet			
Log Measured From KB		Elevations: KB 2675.00	
Drilling Measured From KB@12FEET		DF 2673.00	
		GL 2663.00	
Date	13-SEP-2013		
Run Number	ONE		
Service Order	3541082		
Depth Driller	6315.00 feet		
Depth Logger	6315.00 feet		
First Reading	6282.00 feet		
Last Reading	3800.00 feet		
Casing Driller	1475.00 feet		
Casing Logger	1491.00 feet		
Bit Size	7.875 inches		
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.20 lb/USg	53.00 CP	
PH / Fluid Loss	9.50	8.80 ml/30Min	
Sample Source	MUDDPIT		
Rm @ Measured Temp	1.30 @ 93.0	ohm-m	
Rmf @ Measured Temp	1.04 @ 93.0	ohm-m	
Rmc @ Measured Temp	1.56 @ 93.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.97 @125.0	ohm-m	
Time Since Circulation	5 HOURS		
Max Recorded Temp	125.00	deg F	
Equipment / Base	13096	LIB	
Recorded By	ROB HOFFMAN		
Witnessed By	PETER DEBENHAM		
JOB #	LB13-258		

**BOREHOLE RECORD**

Last Edited: 13-SEP-2013 21:17

Bit Size inches	Depth From feet	Depth To feet
7.875	1475.00	6315.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1475.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 13.05.9583.
- 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.
- 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: 1865 CU. FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH CASING FROM TD TO 3800 FEET: 605 CU. FT.
- RIG: DUKE #6

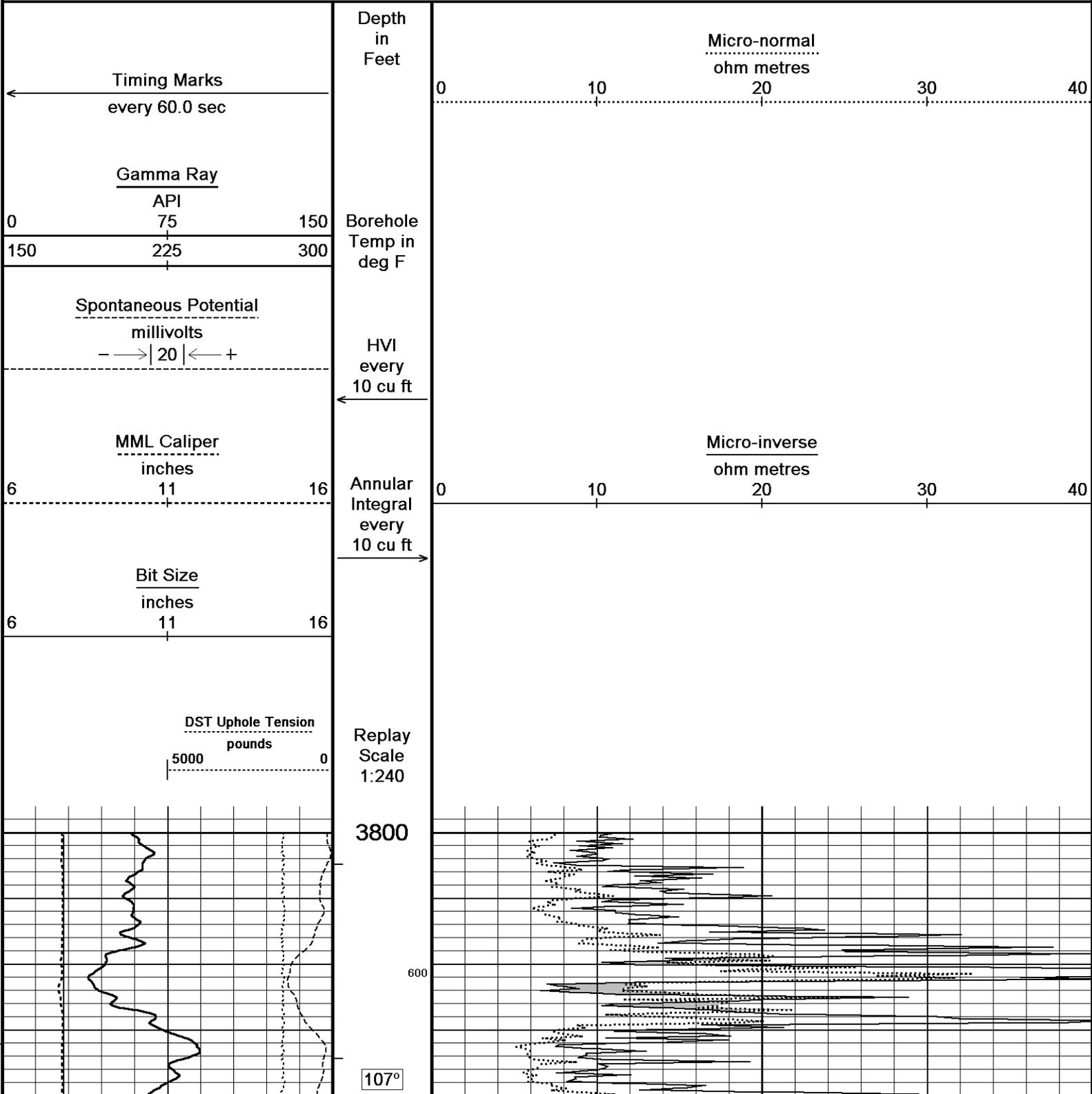
- ENGINEER: R. HOFFMAN

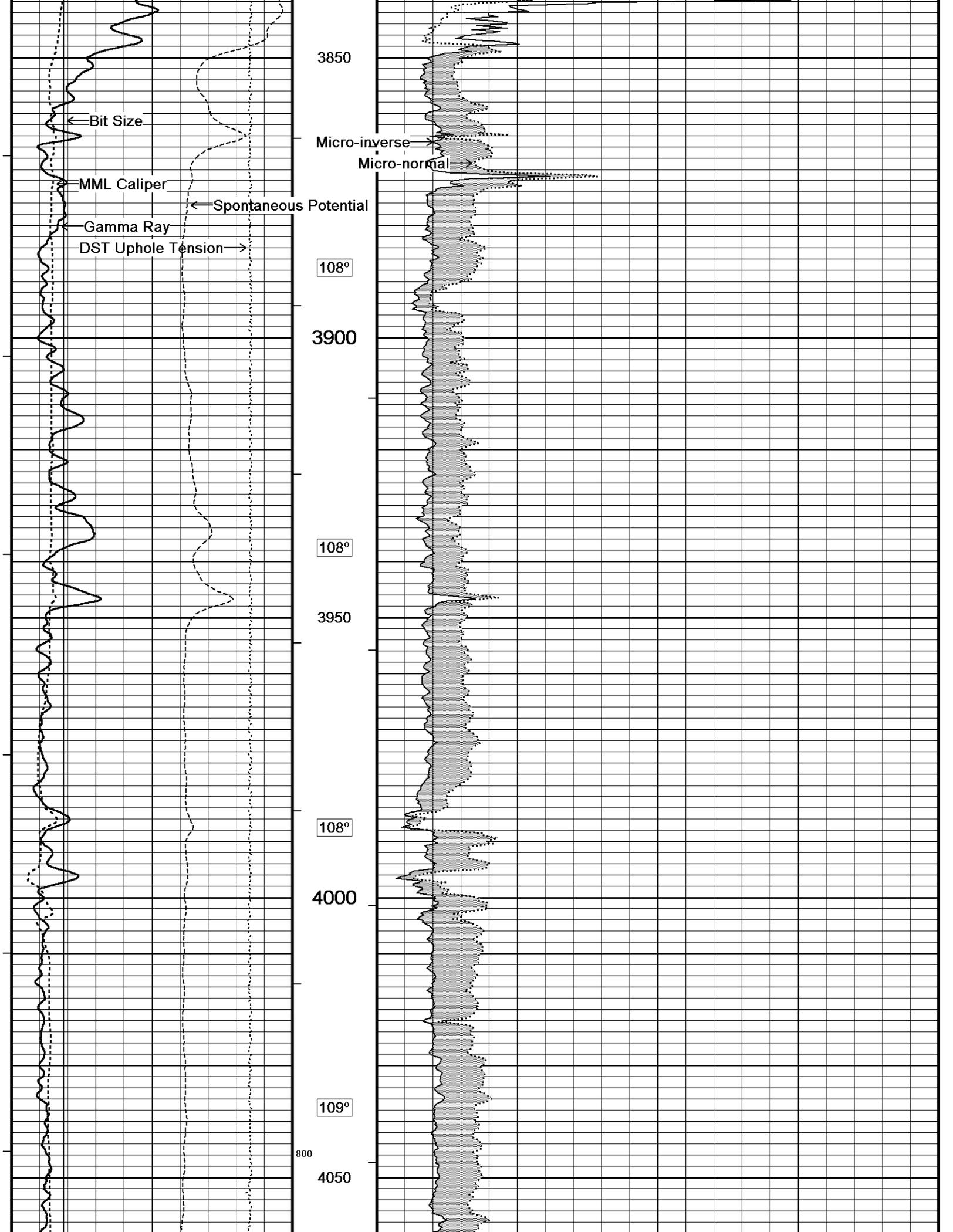
- OPERATOR(S): K. RINEHART, J. DUNLAP

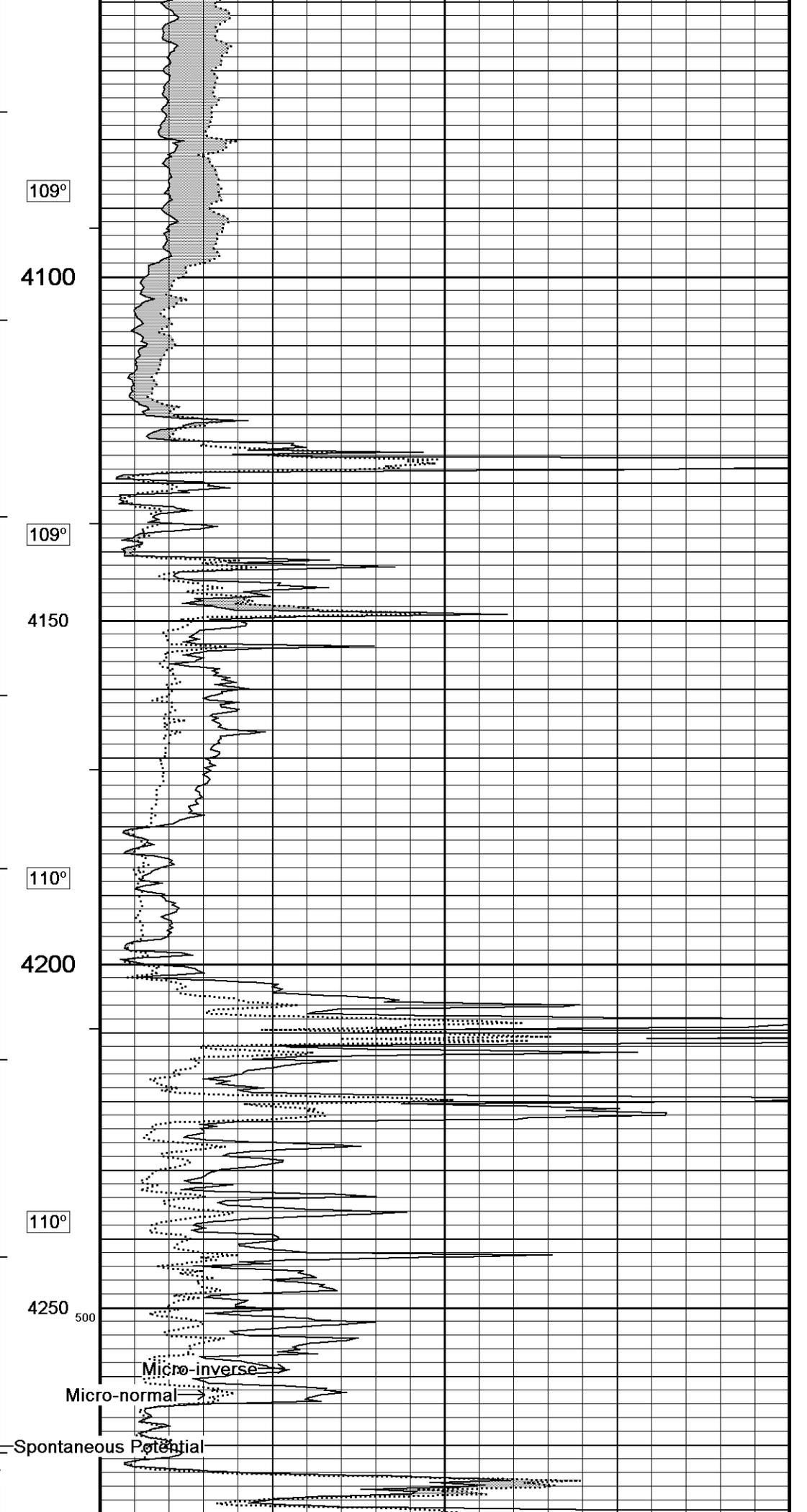
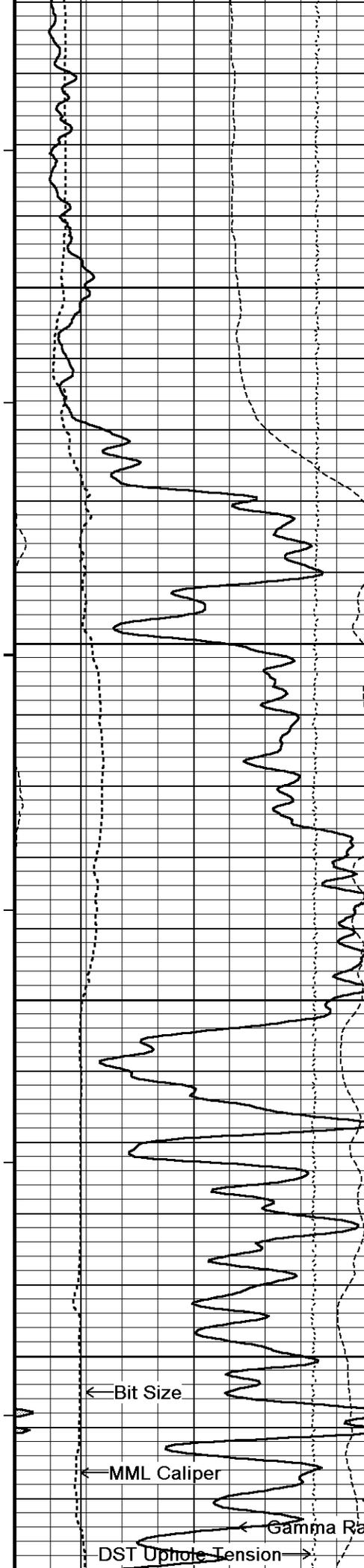
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm  
Plotted on 14-SEP-2013 03:14  
Filename: C:\Minimus 13.05.9583\Log\O'Brien Rickers Ranch ...\O'Brien Rickers Ranch #8-17\_Main.dta  
Recorded on 14-SEP-2013 00:38  
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583







109°

4100

109°

4150

110°

4200

110°

4250

500

← Bit Size

← MML Caliper

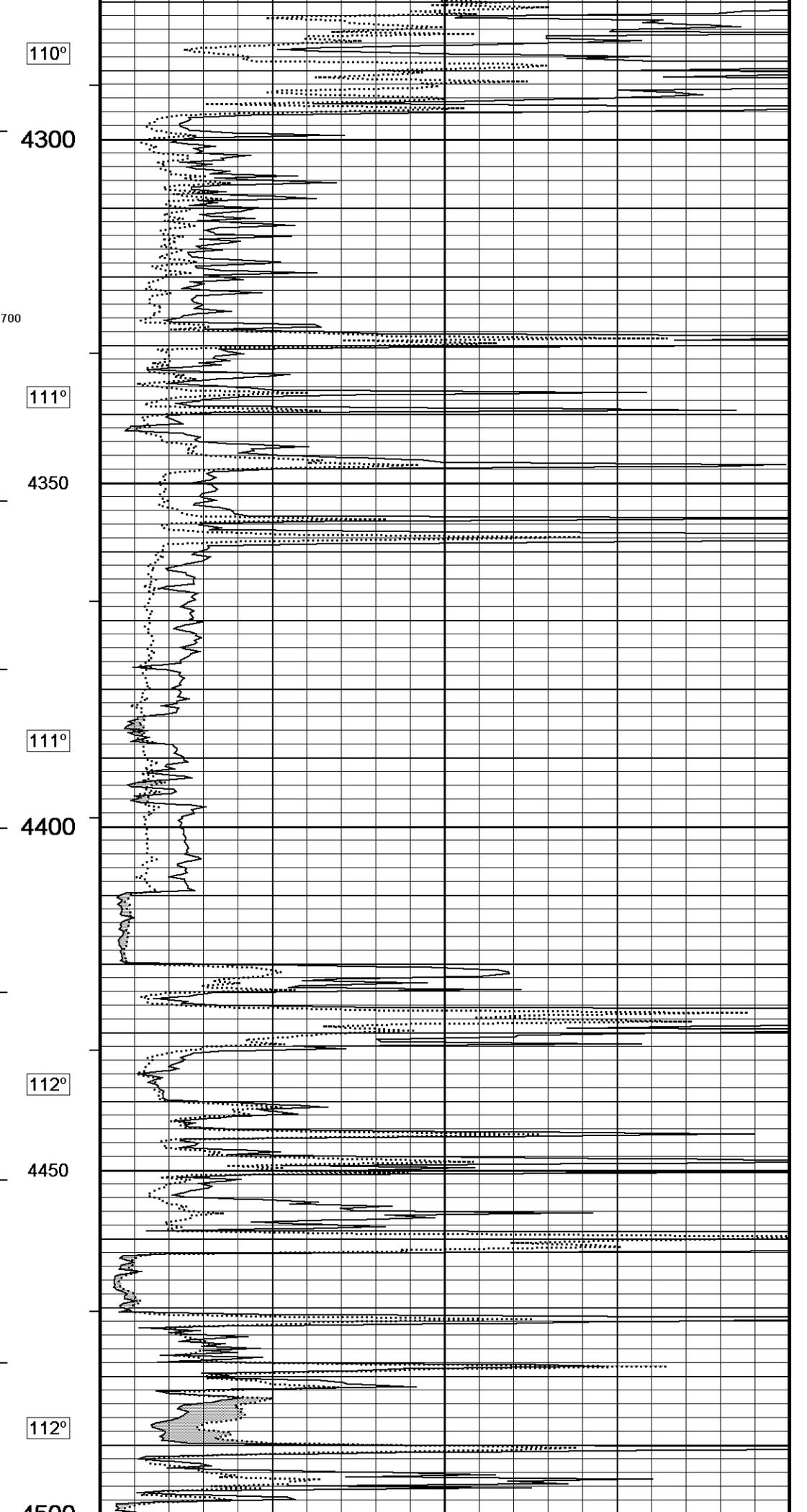
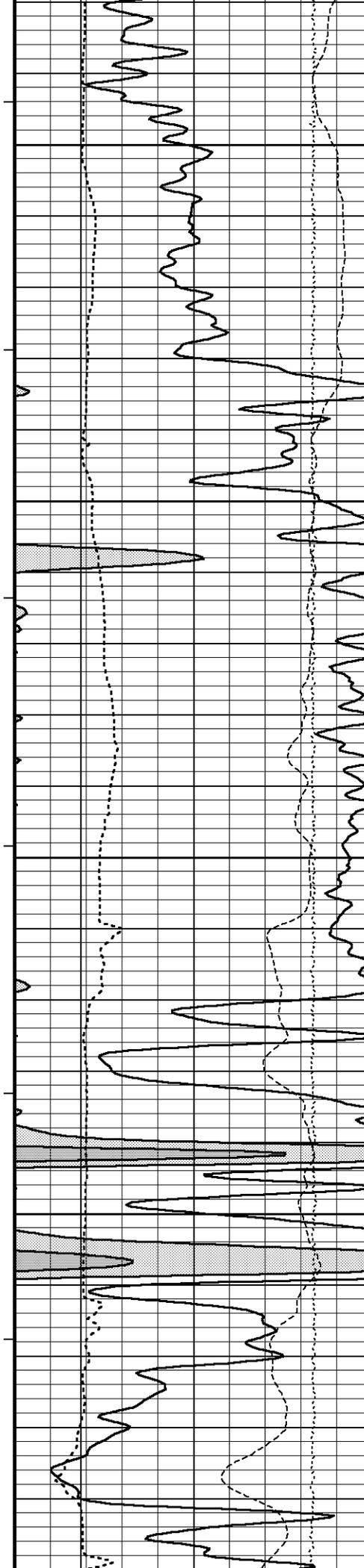
← Gamma Ray

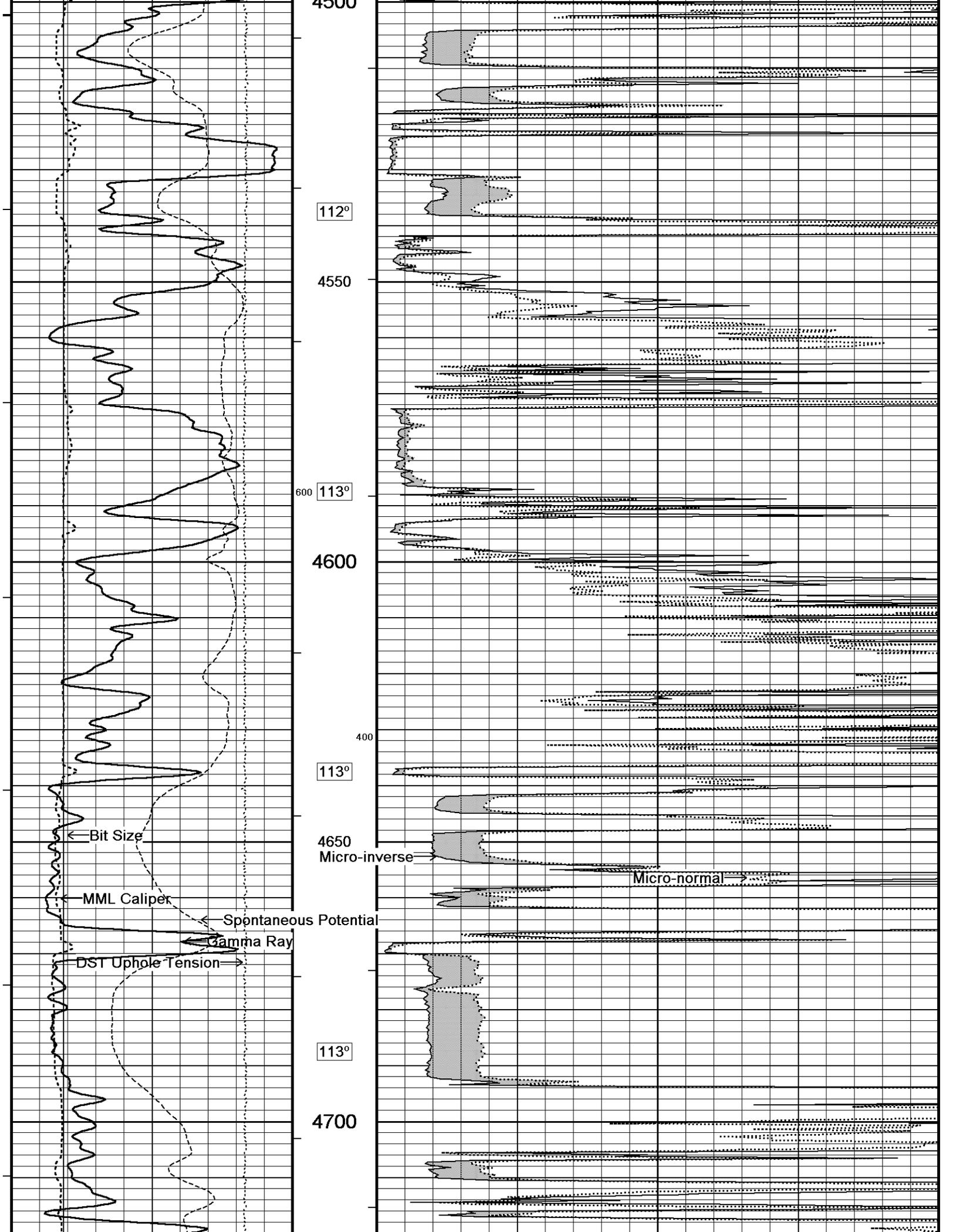
DST Uphole Tension →

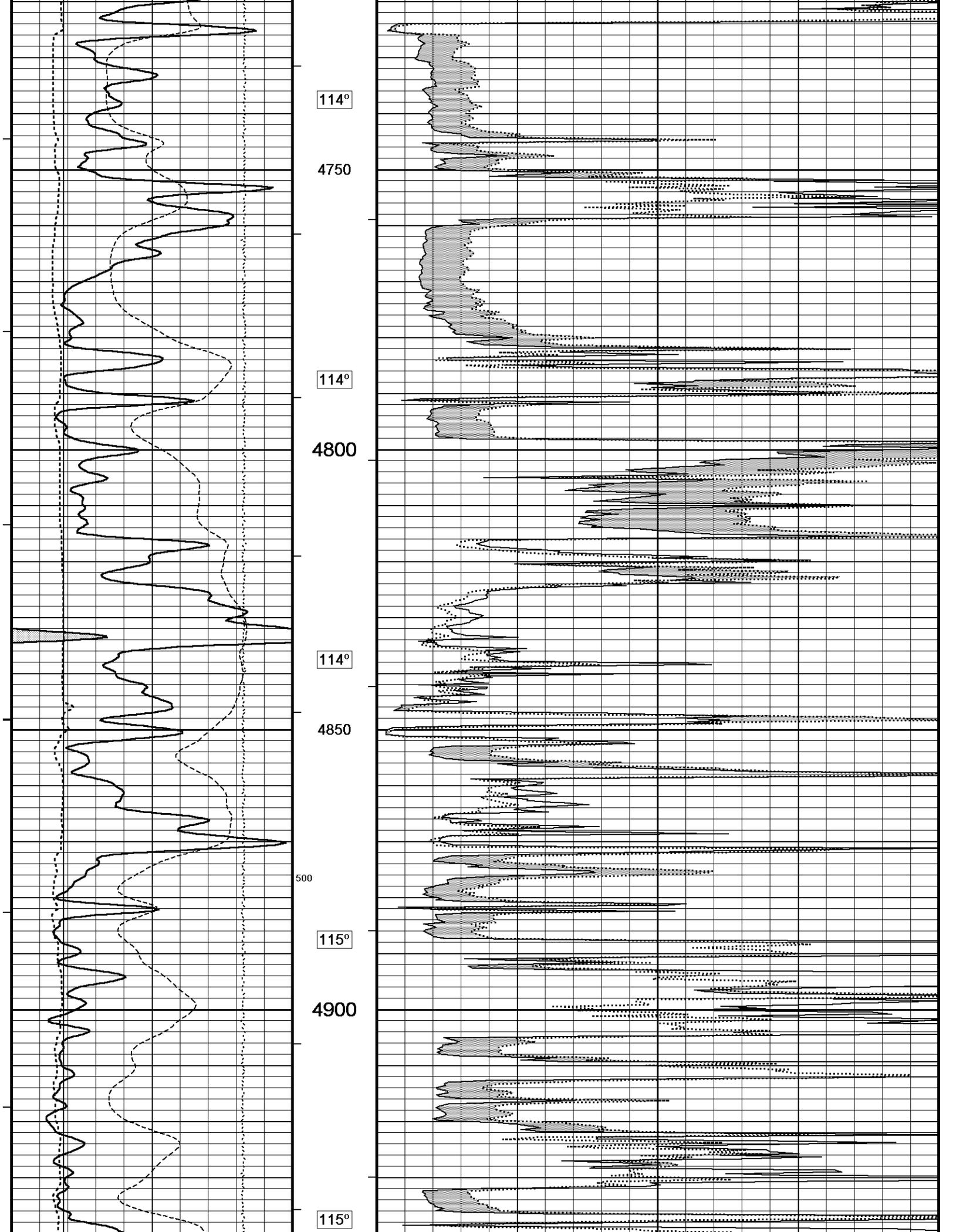
Micro-inverse →

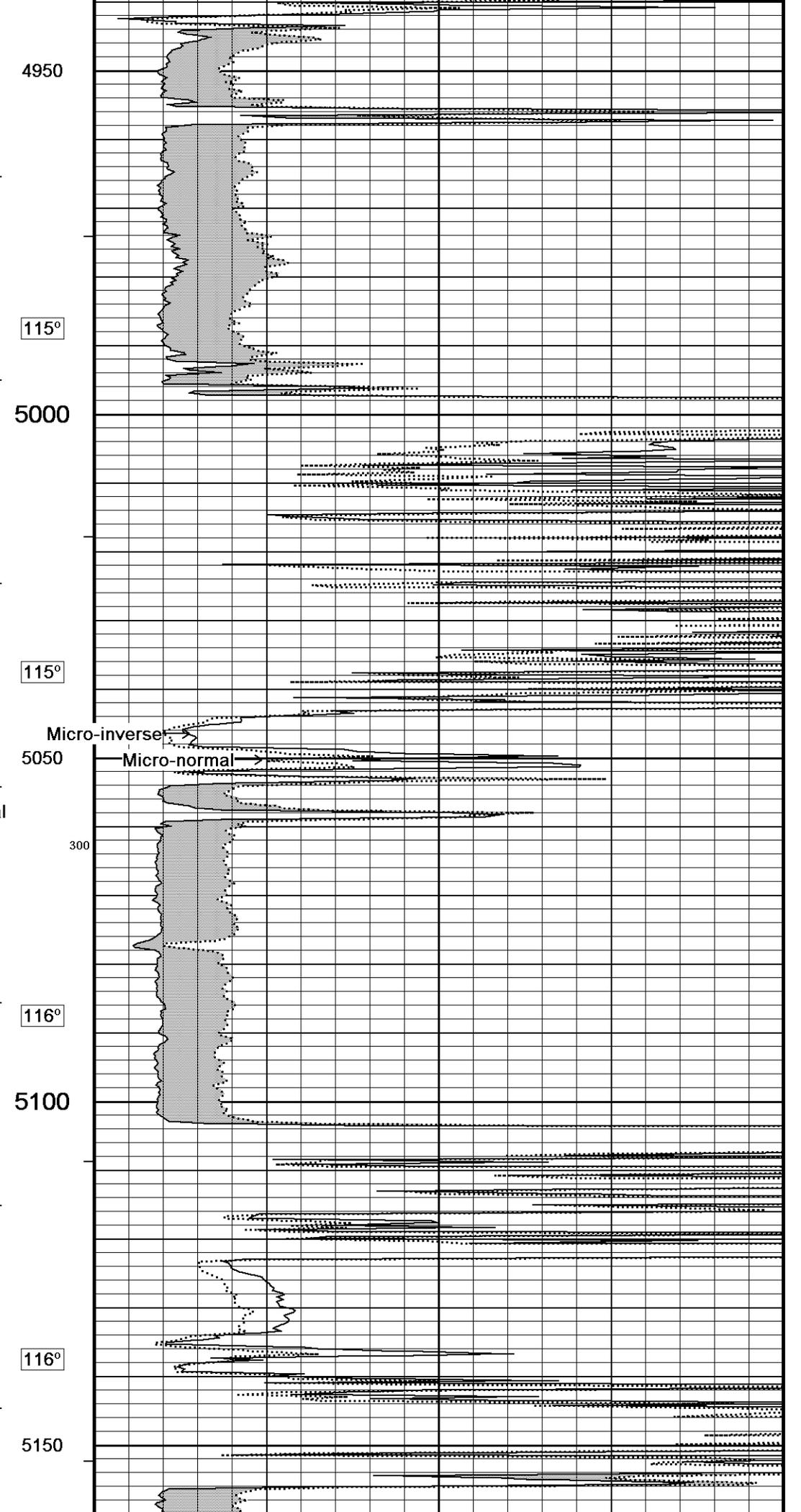
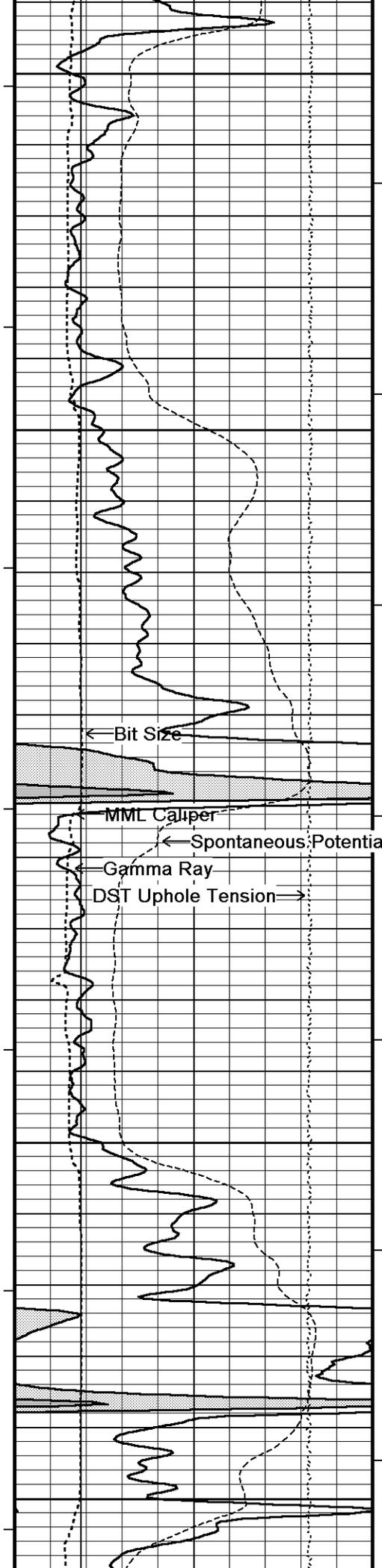
Micro-normal →

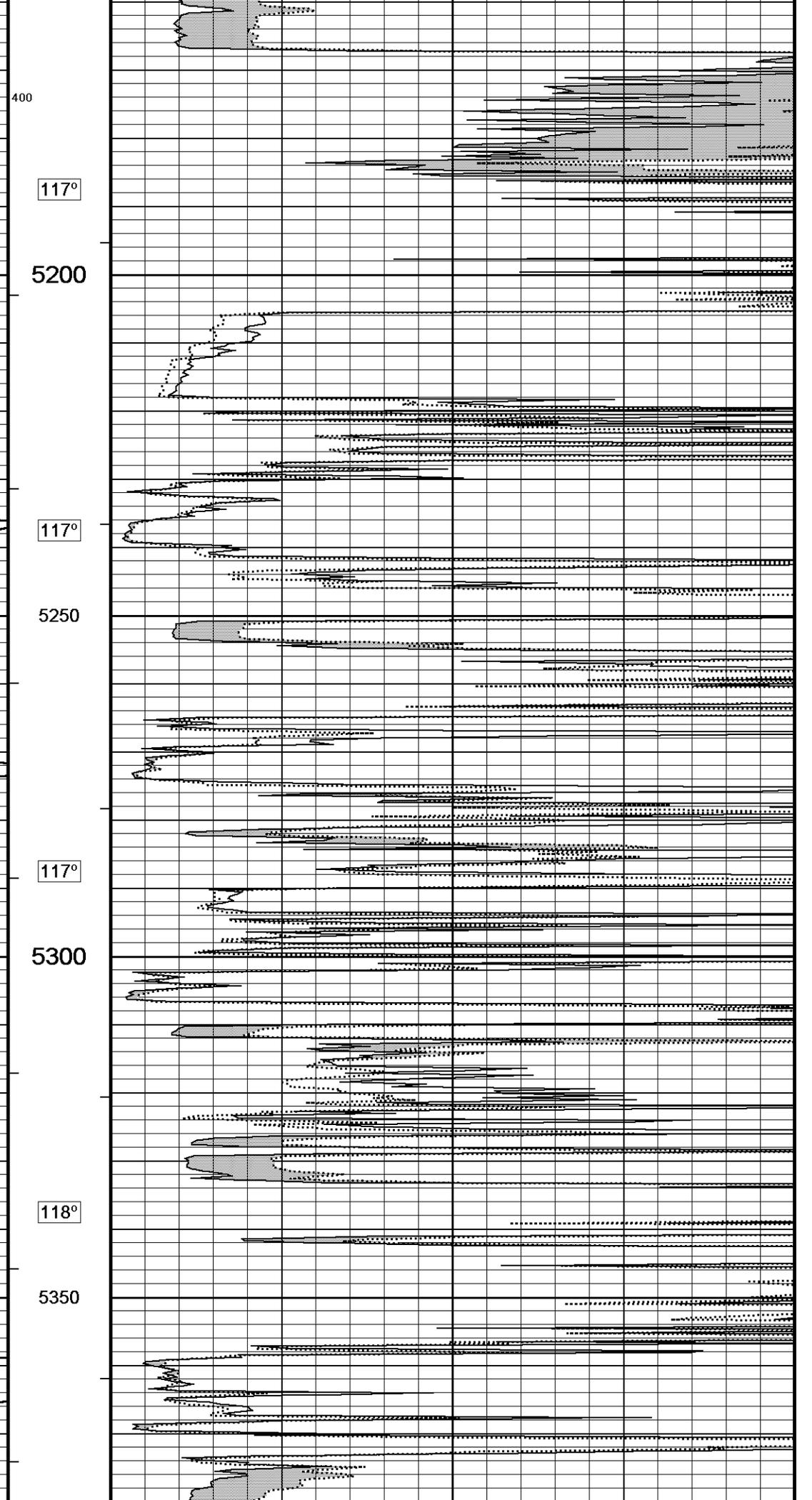
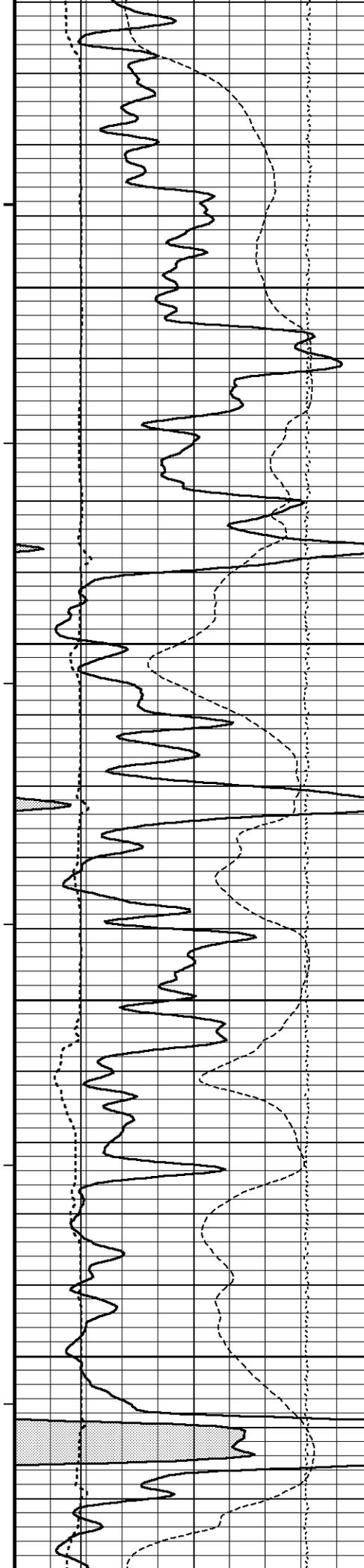
← Spontaneous Potential

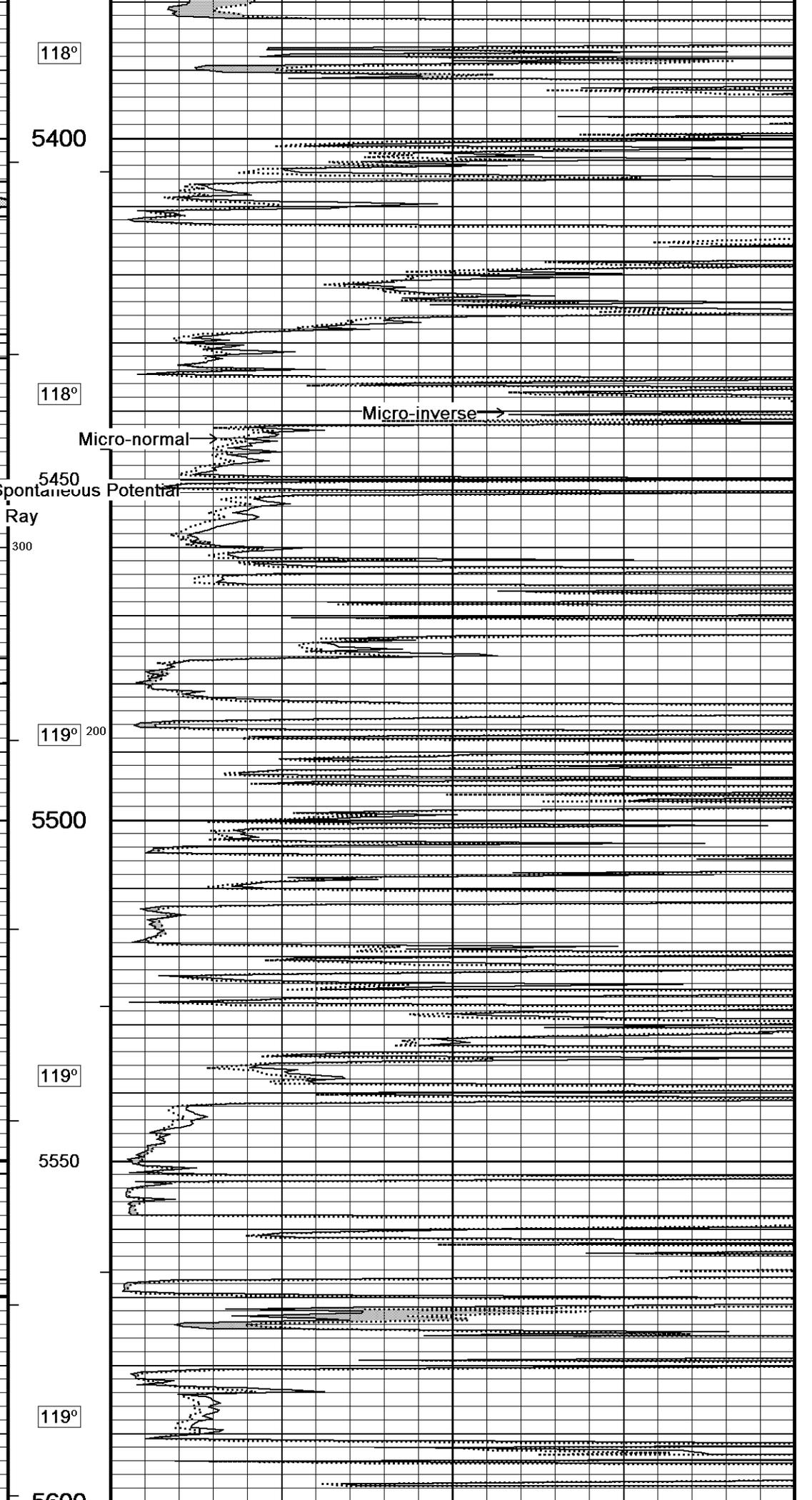
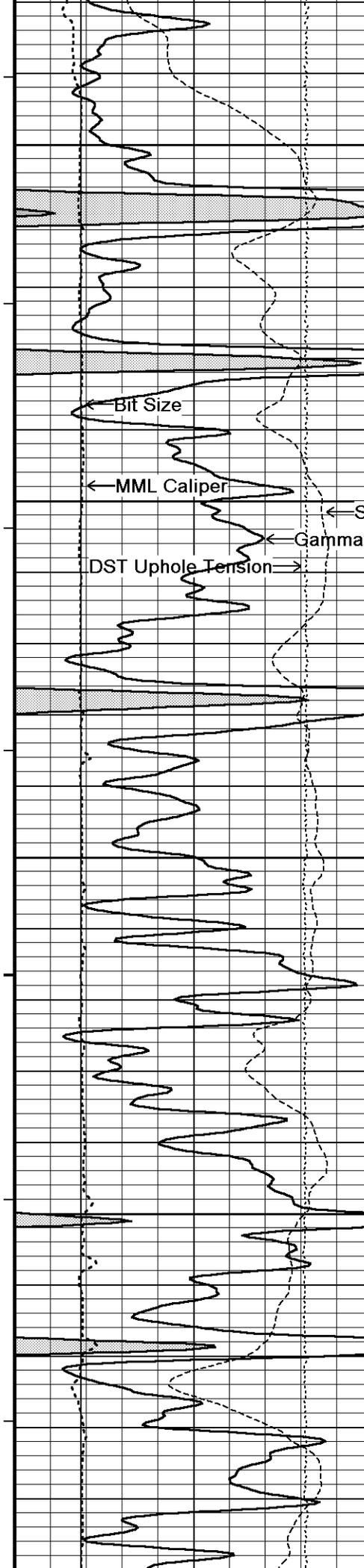












$118^\circ$

5400

$118^\circ$

5450

300

$119^\circ$  200

5500

$119^\circ$

5550

$119^\circ$

5600

← Bit Size

← MML Caliper

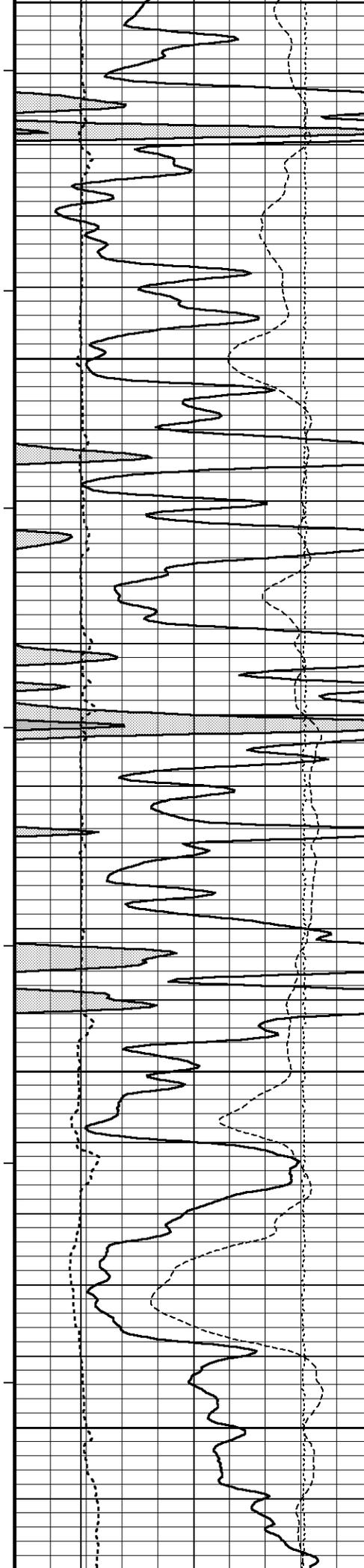
← Spontaneous Potential

← Gamma Ray

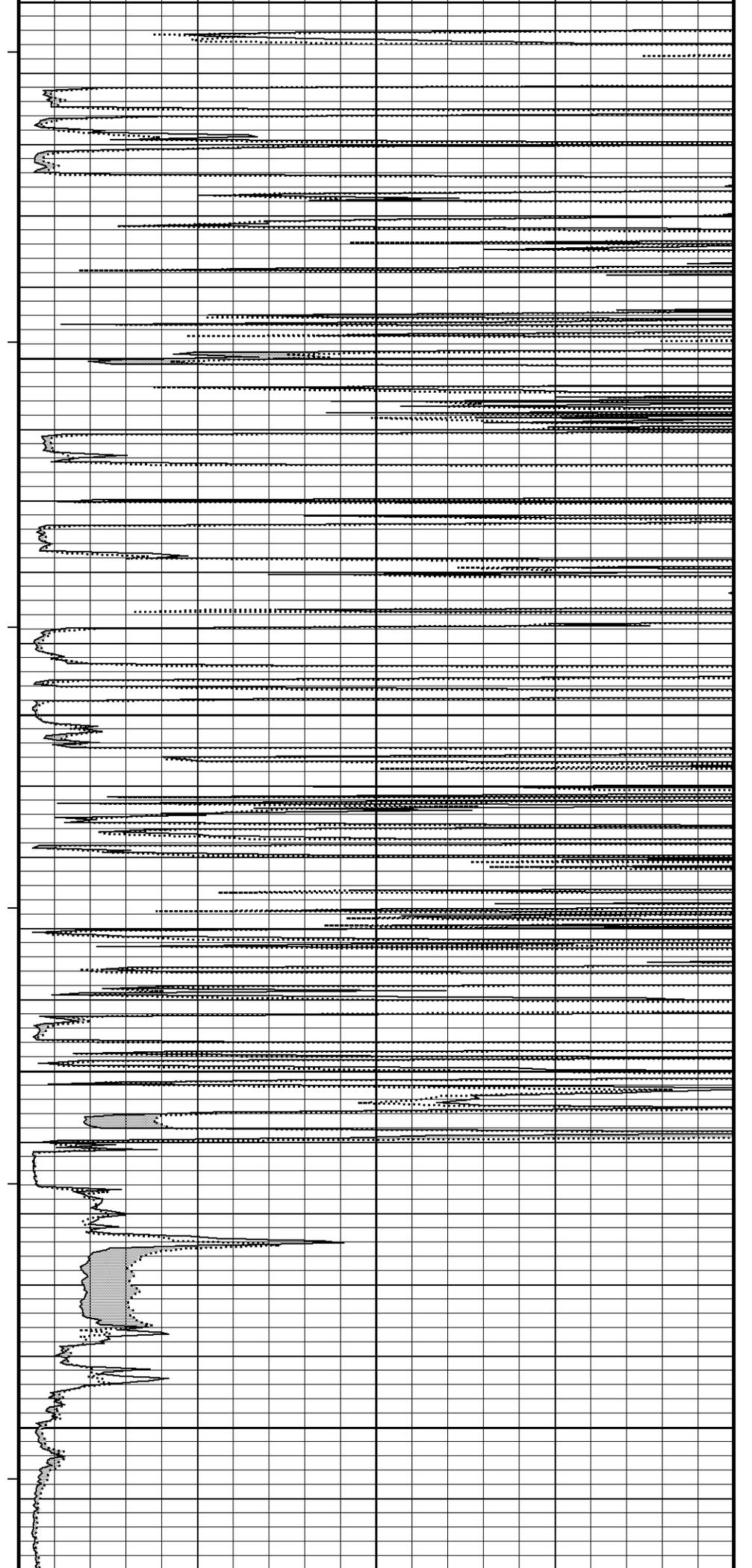
DST Uphole Tension →

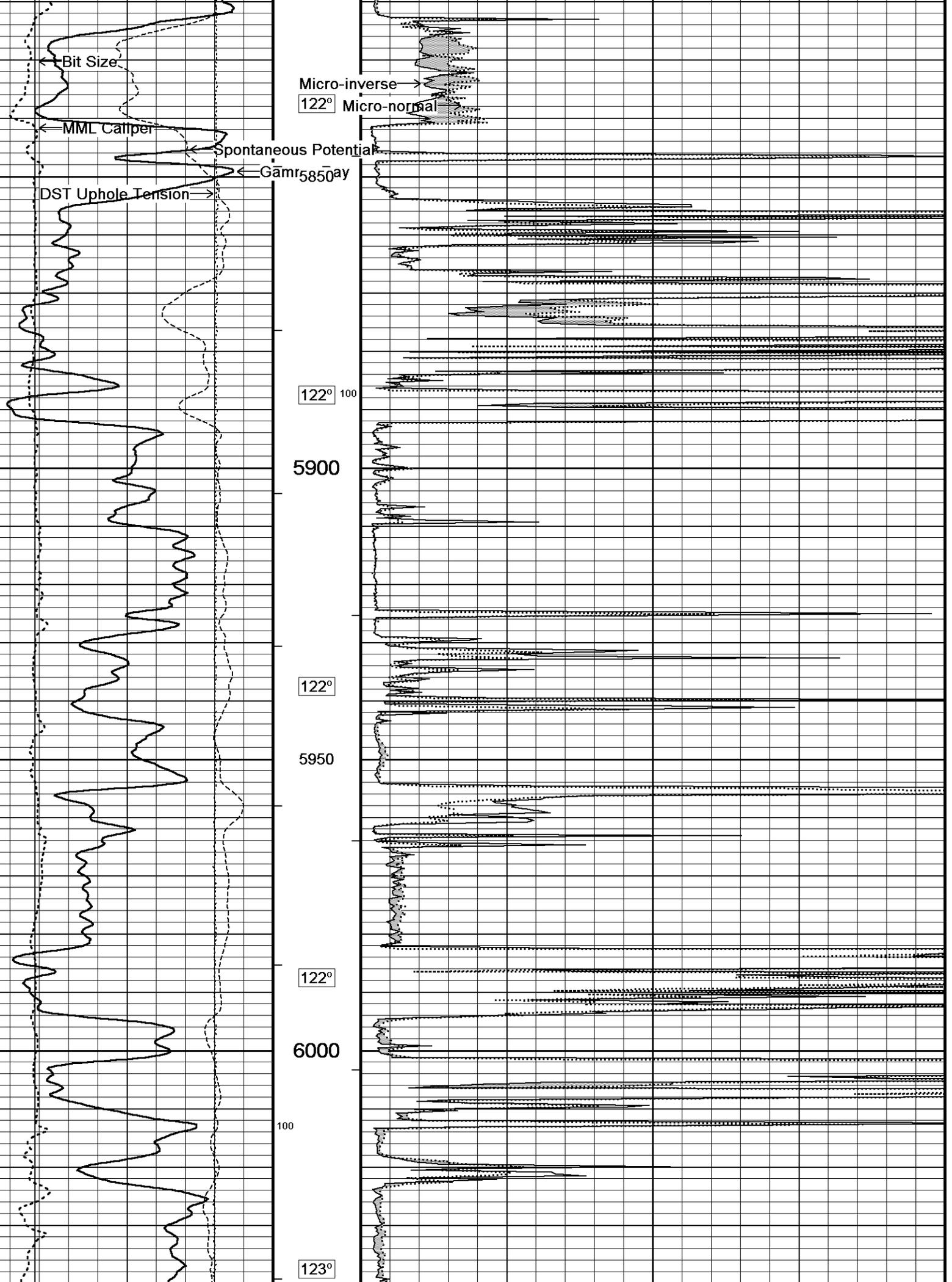
Micro-normal →

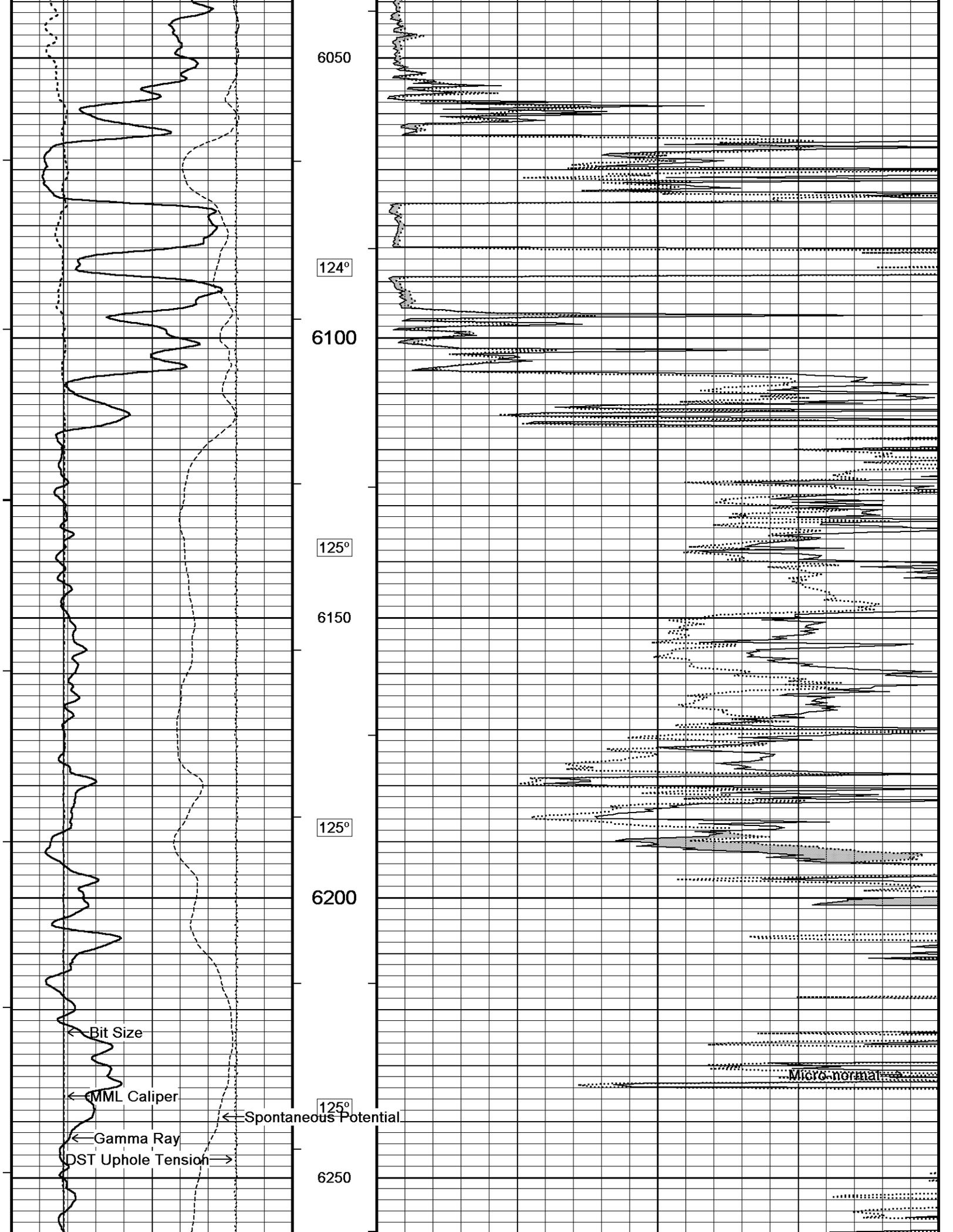
Micro-inverse →

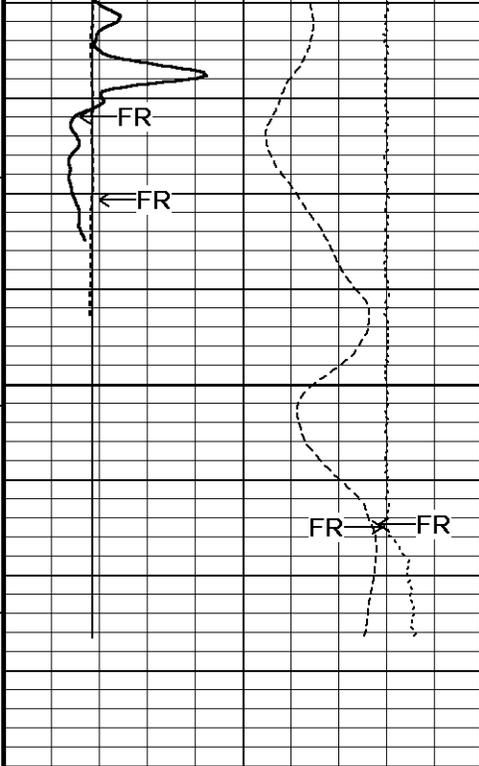


5600  
120°  
5650  
120°  
5700  
200 121°  
5750  
121°  
5800









6300

6338

Depth  
in  
Feet

← Timing Marks  
every 60.0 sec

Gamma Ray  
API  
0 75 150  
150 225 300

Borehole  
Temp in  
deg F

Spontaneous Potential  
millivolts  
- -> | 20 | <- +

HVI  
every  
10 cu ft

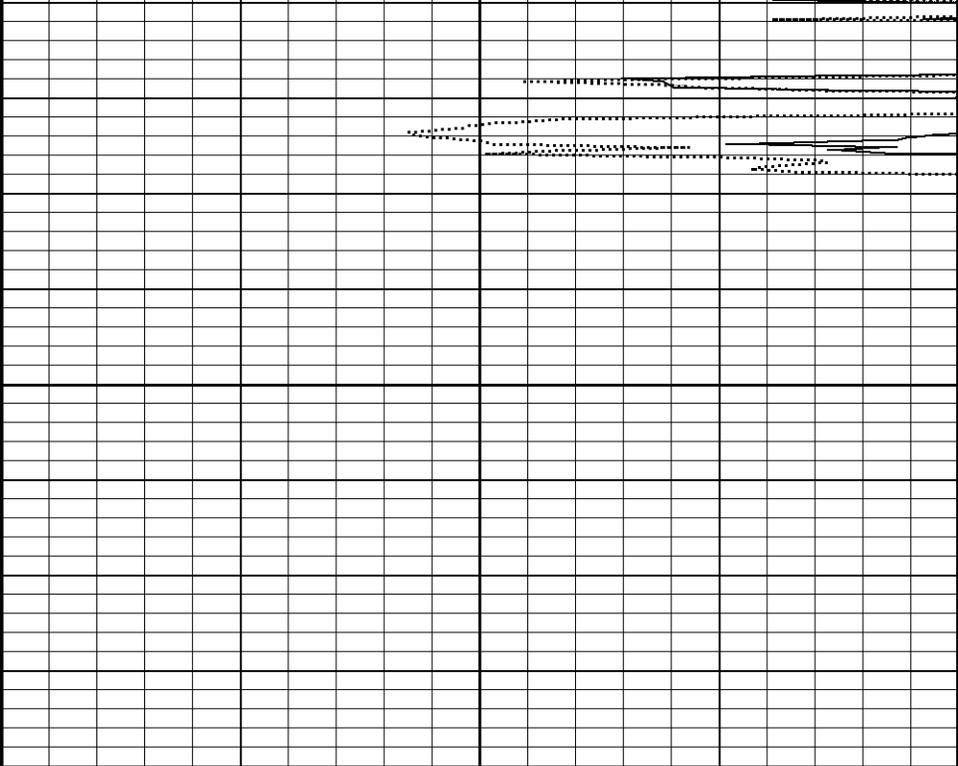
MML Caliper  
inches  
6 11 16

Annular  
Integral  
every  
10 cu ft

Bit Size  
inches  
6 11 16

DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:240



Micro-normal  
ohm metres

0 10 20 30 40

Micro-inverse  
ohm metres

0 10 20 30 40



# 10 INCH HI-RES



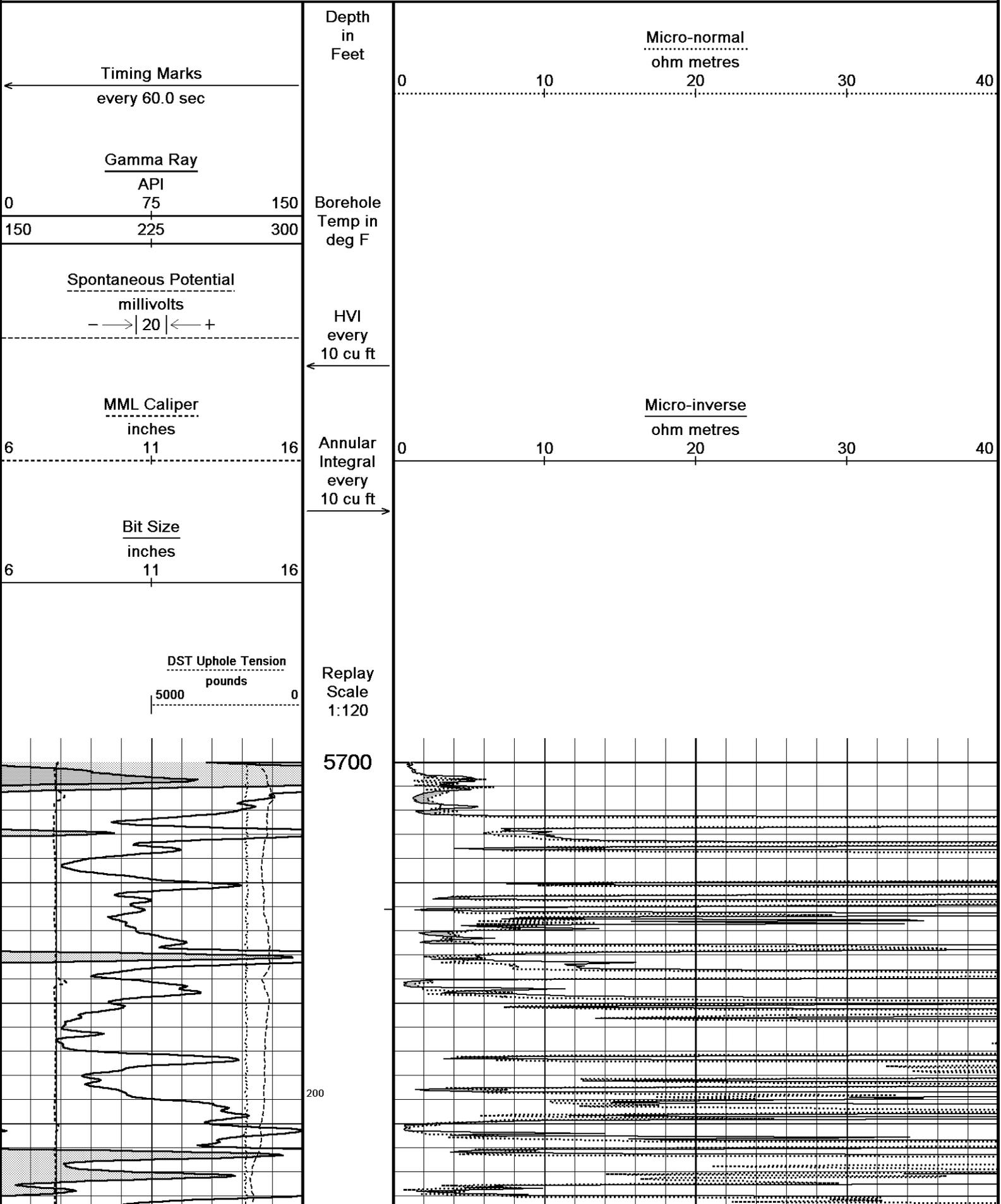
Depth Based Data - Maximum Sampling Increment 2.5cm

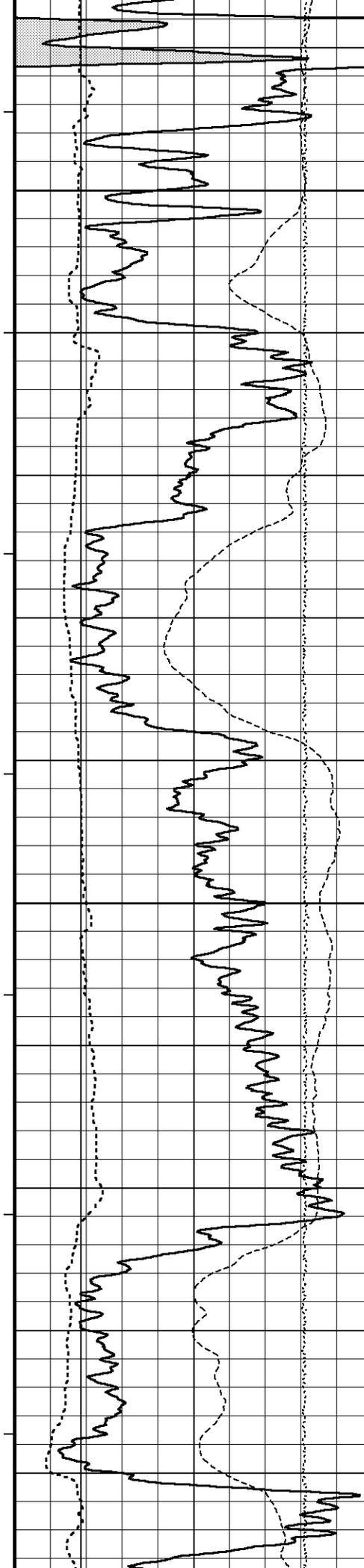
Plotted on 14-SEP-2013 03:14

Filename: C:\Minimus 13.05.9583\Log\O'Brien Rickers Ranch #...O'Brien Rickers Ranch #8-17\_001.dta

Recorded on 13-SEP-2013 23:48

System Versions: Logged with 13.05.9583 Plotted with 13.05.9583





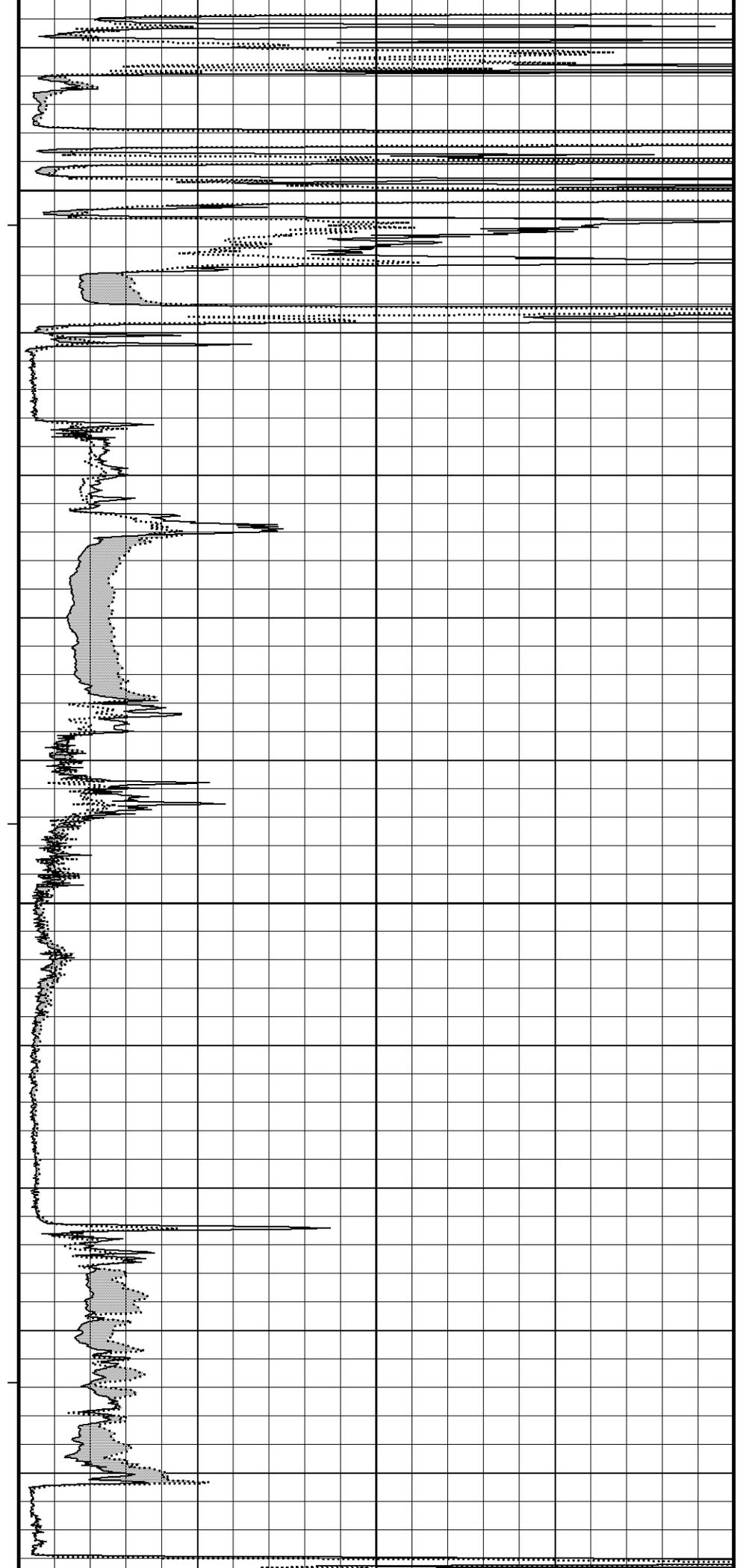
120°

5750

121°

5800

120°



5850

Micro-normal

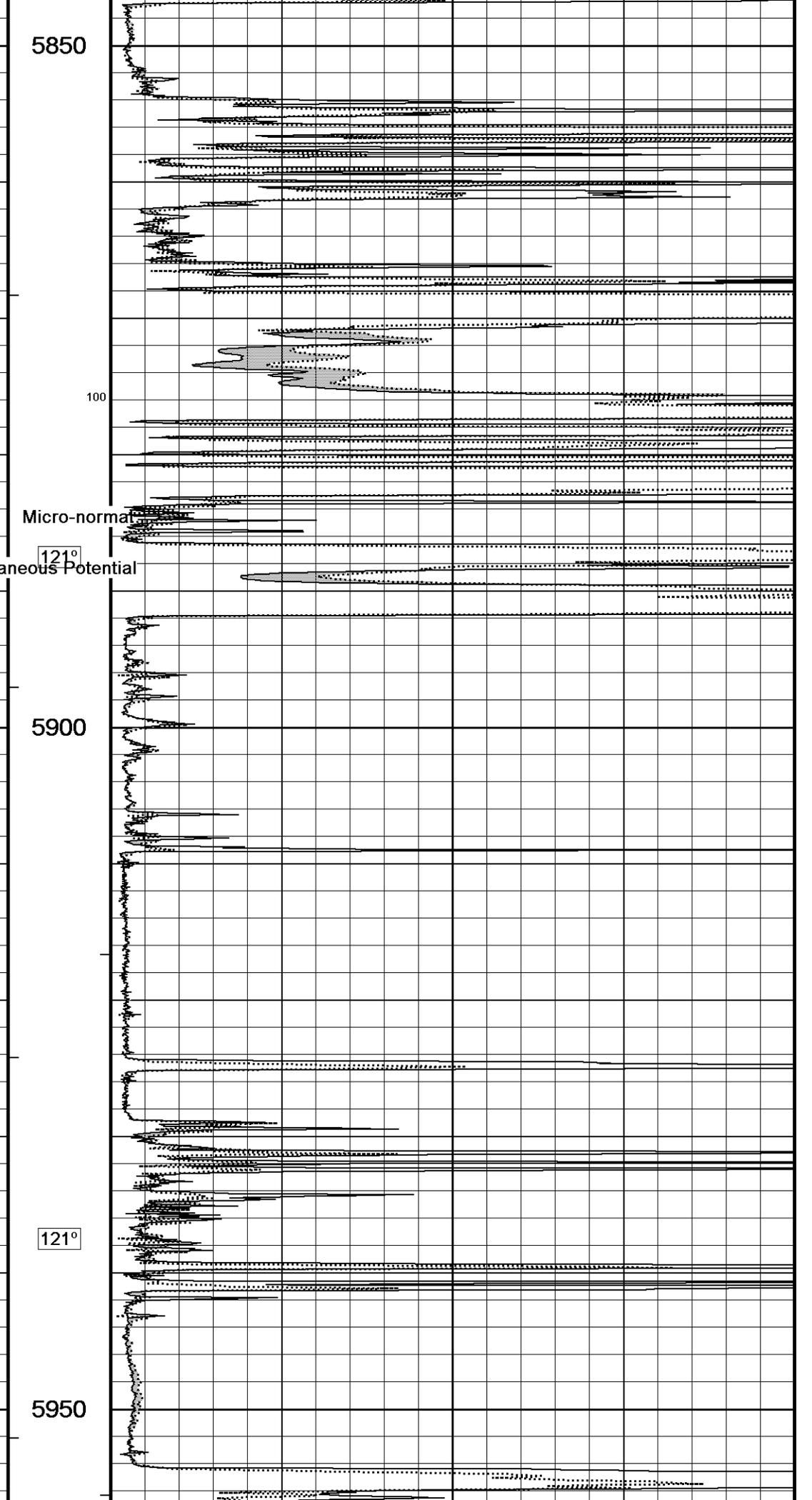
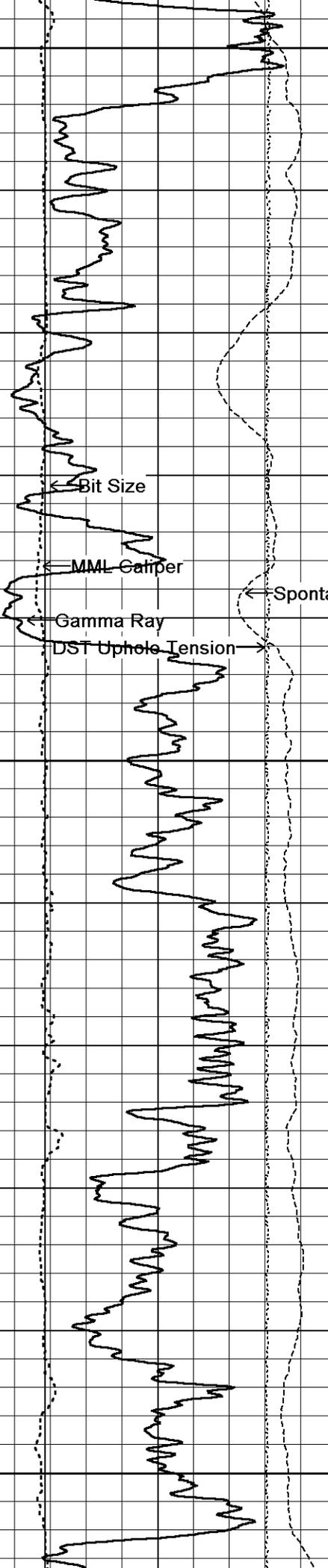
121°

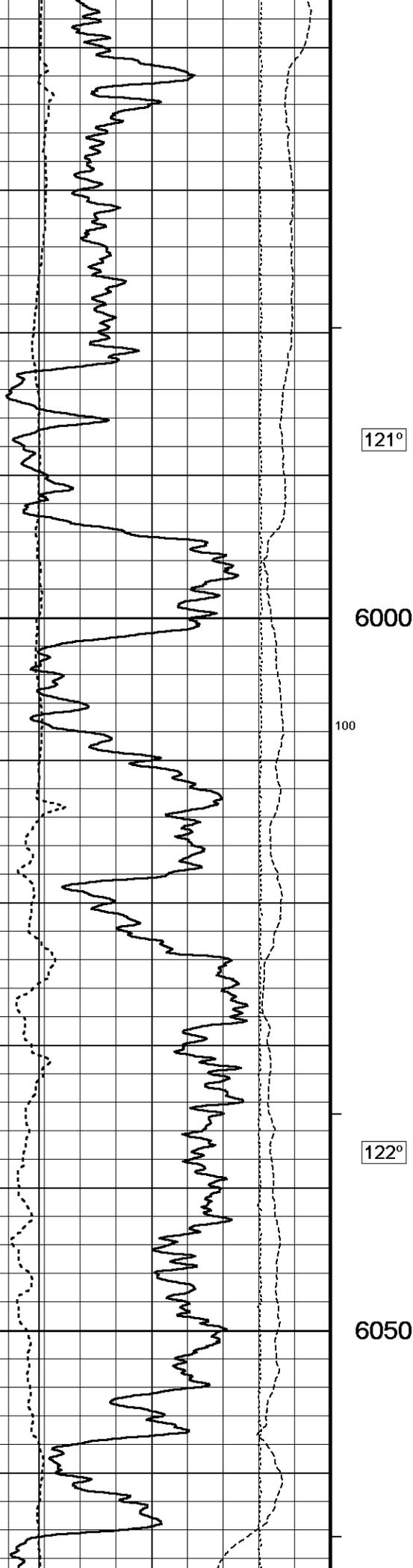
Spontaneous Potential

5900

121°

5950





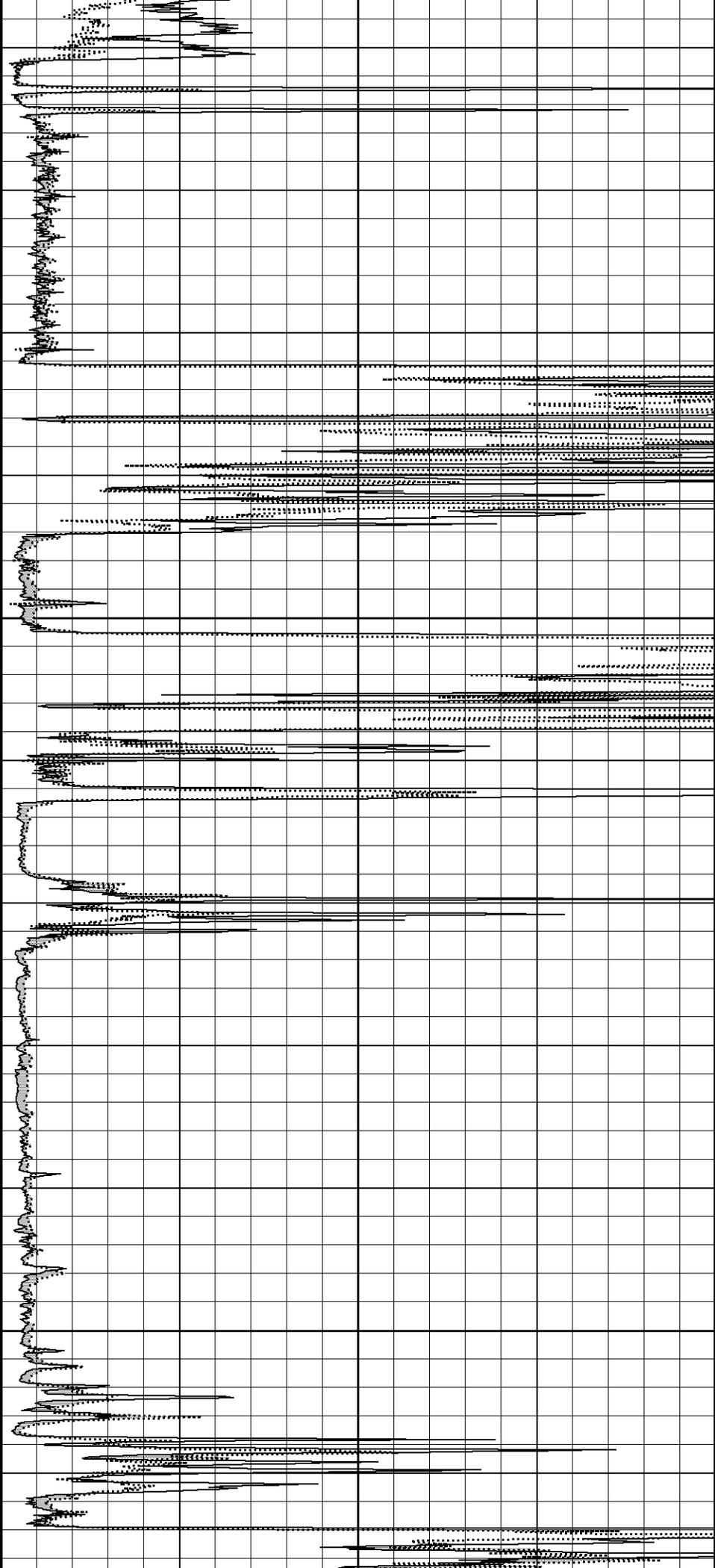
121°

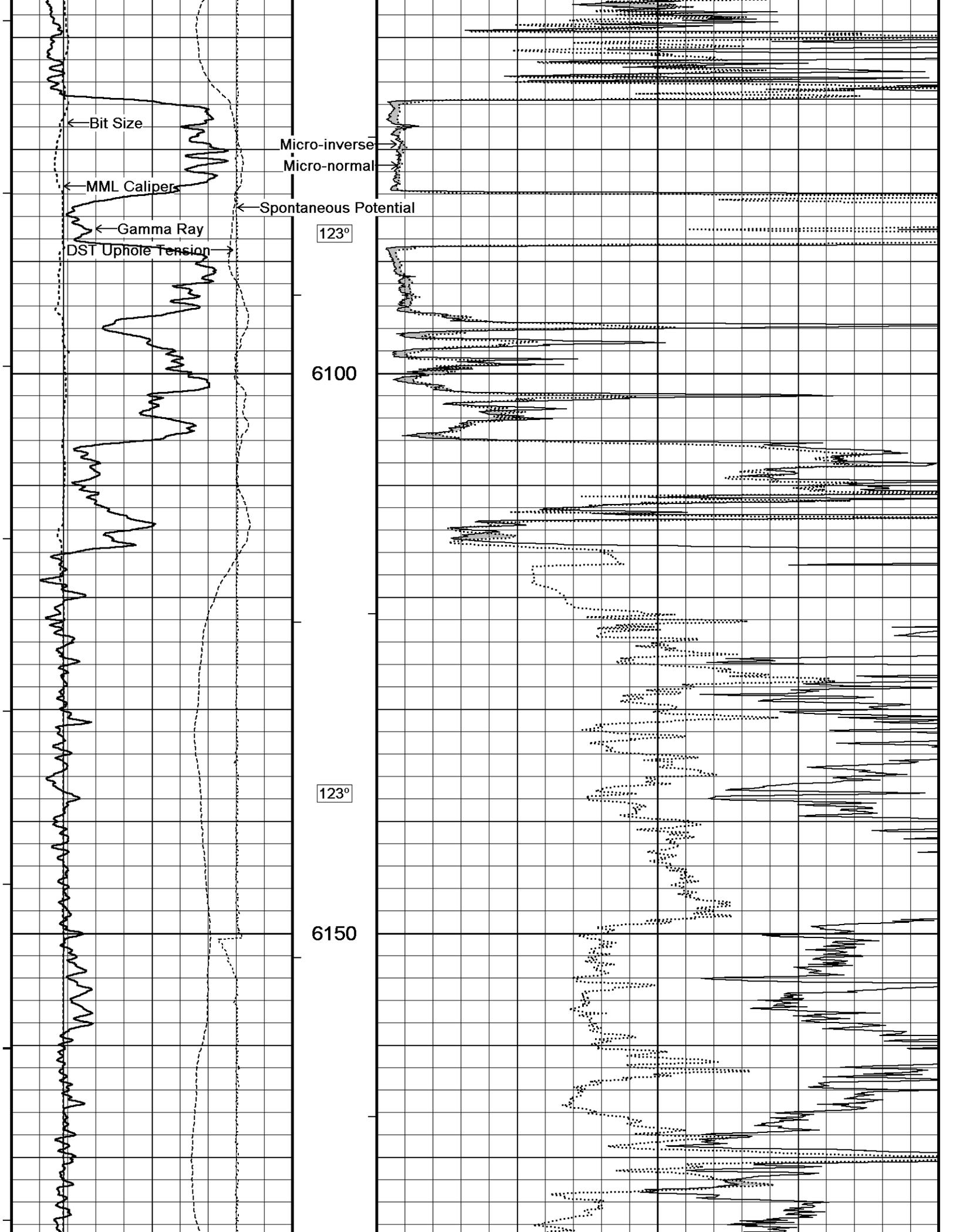
6000

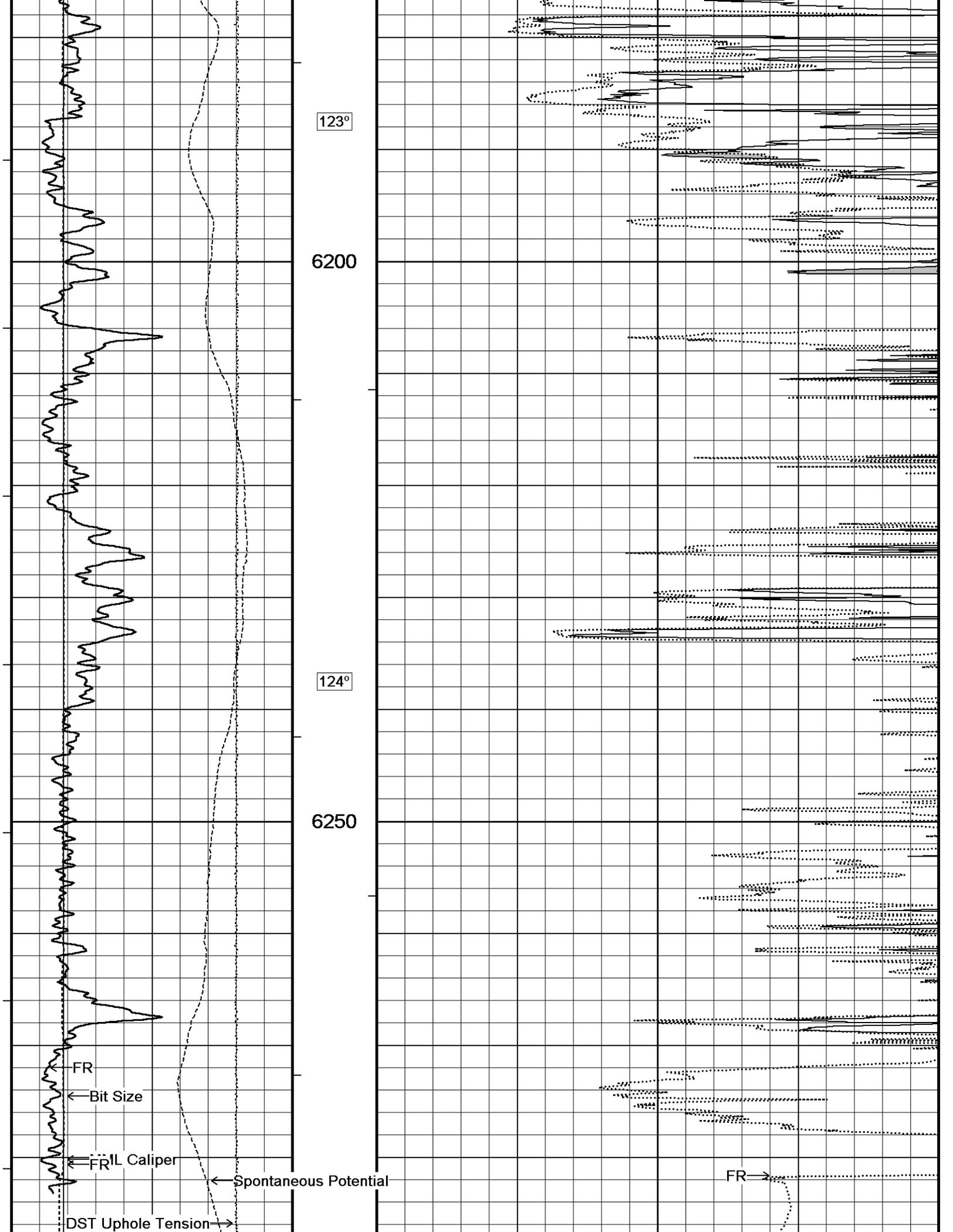
100

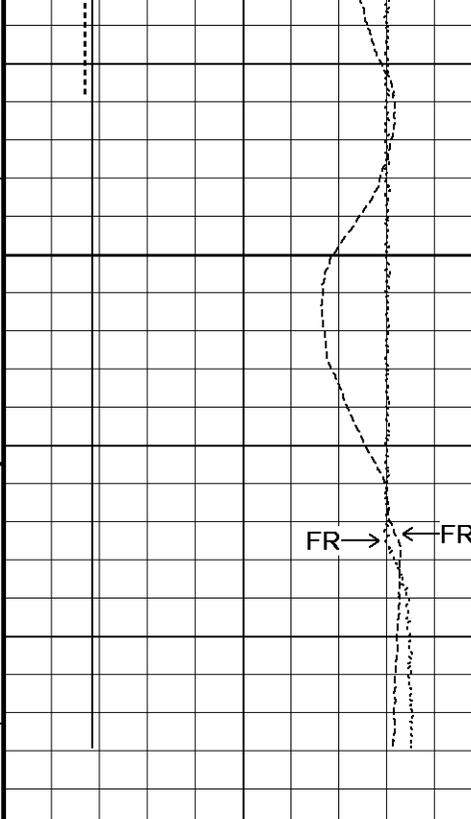
122°

6050









6300

0

FR → ← FR

6330

Depth  
in  
Feet

Timing Marks  
every 60.0 sec

Gamma Ray

API

75

0 150

150 225 300

Borehole  
Temp in  
deg F

Spontaneous Potential

millivolts

- → | 20 | ← +

HVI  
every  
10 cu ft

MML Caliper

inches

11

6 16

Annular  
Integral  
every  
10 cu ft

Bit Size

inches

11

6 16

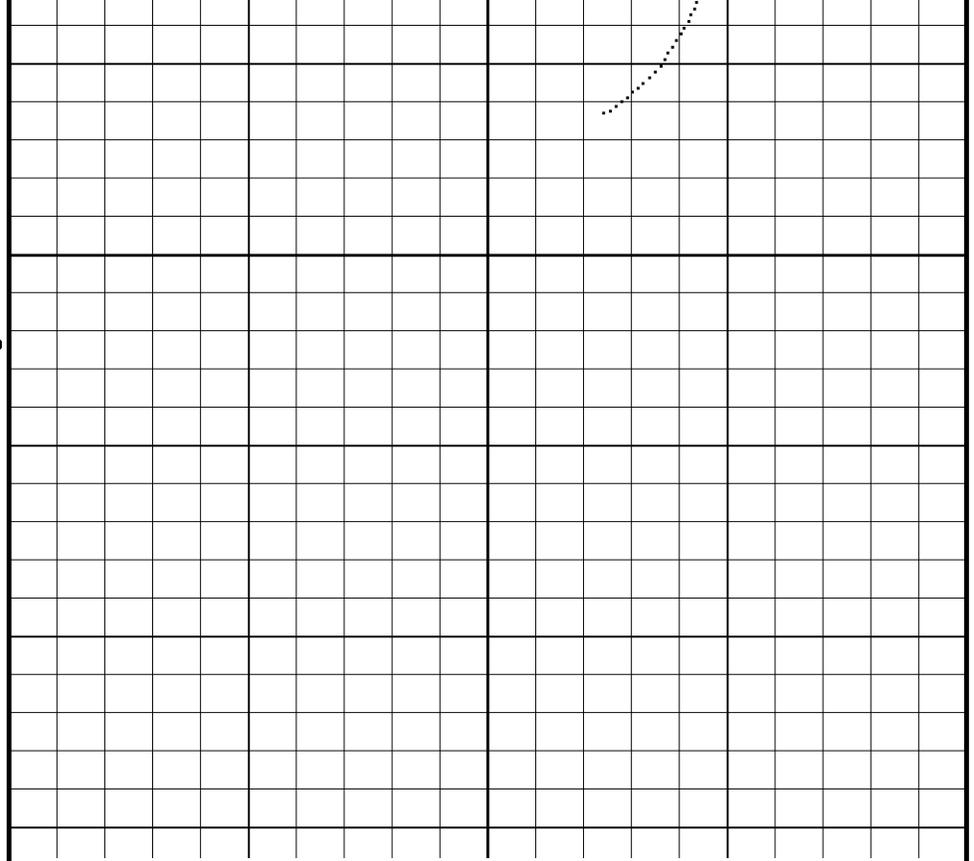
DST Uphole Tension

pounds

5000

0

Replay  
Scale  
1:120



Micro-normal  
ohm metres

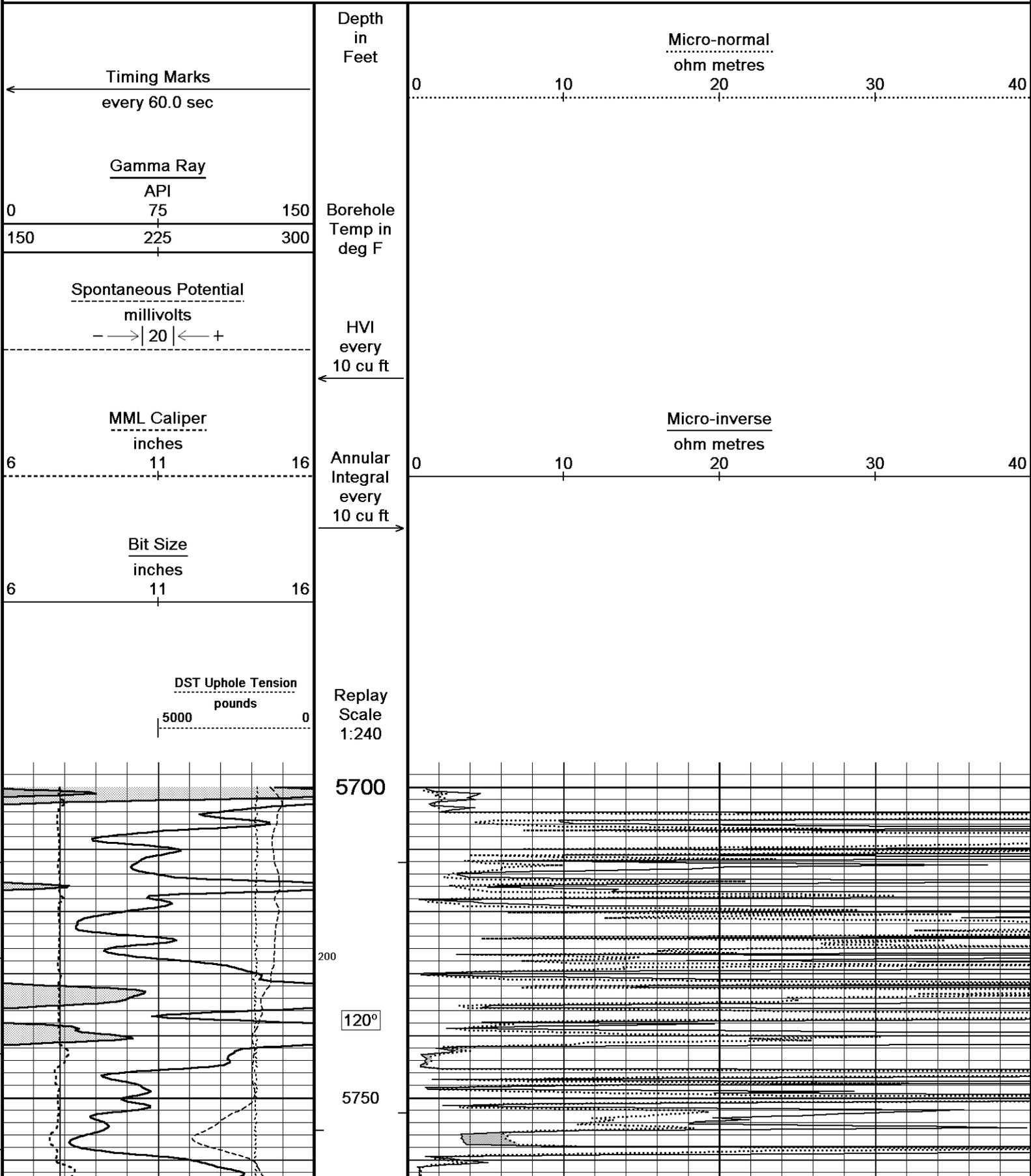
0 10 20 30 40

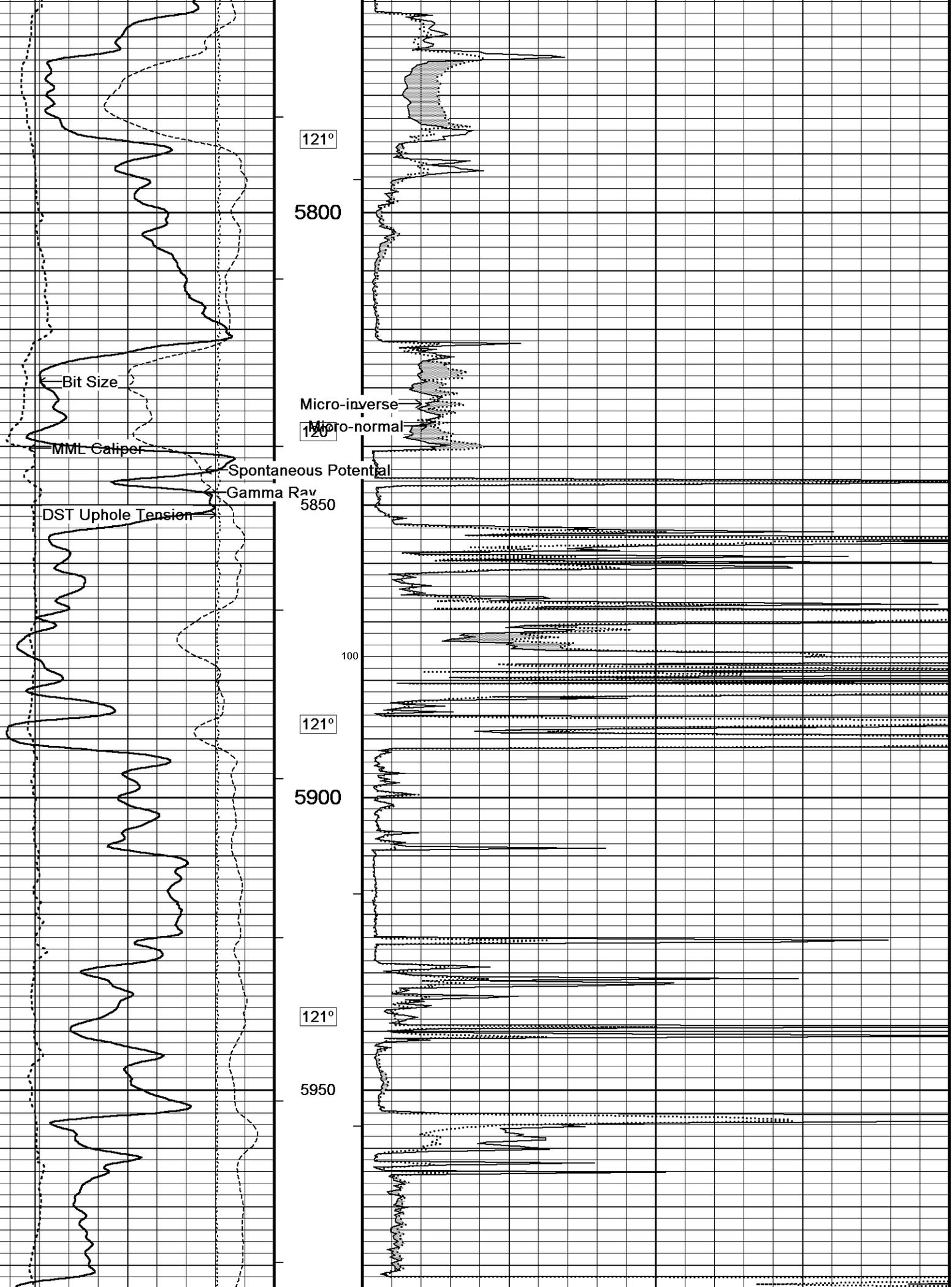
Micro-inverse  
ohm metres

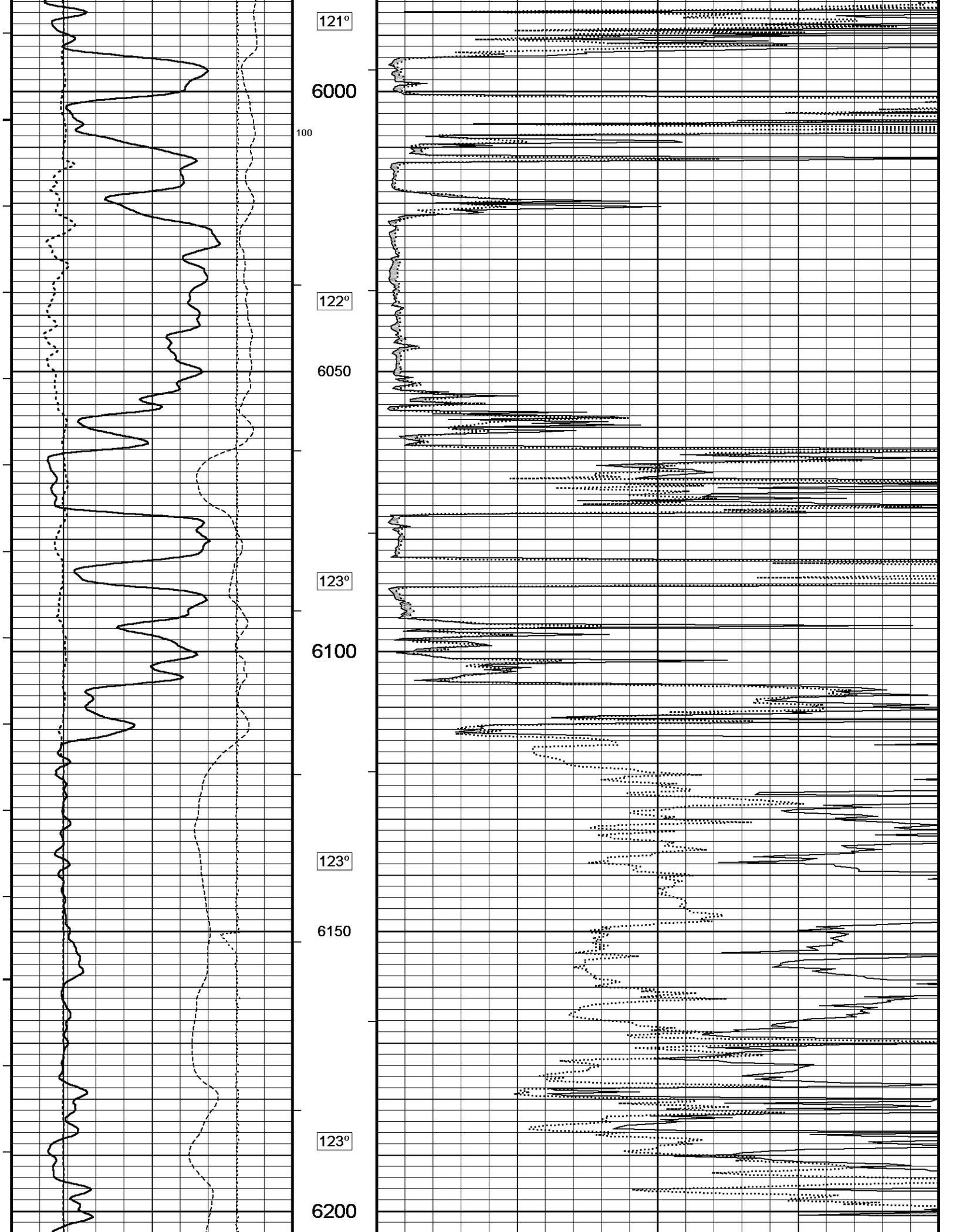
0 10 20 30 40

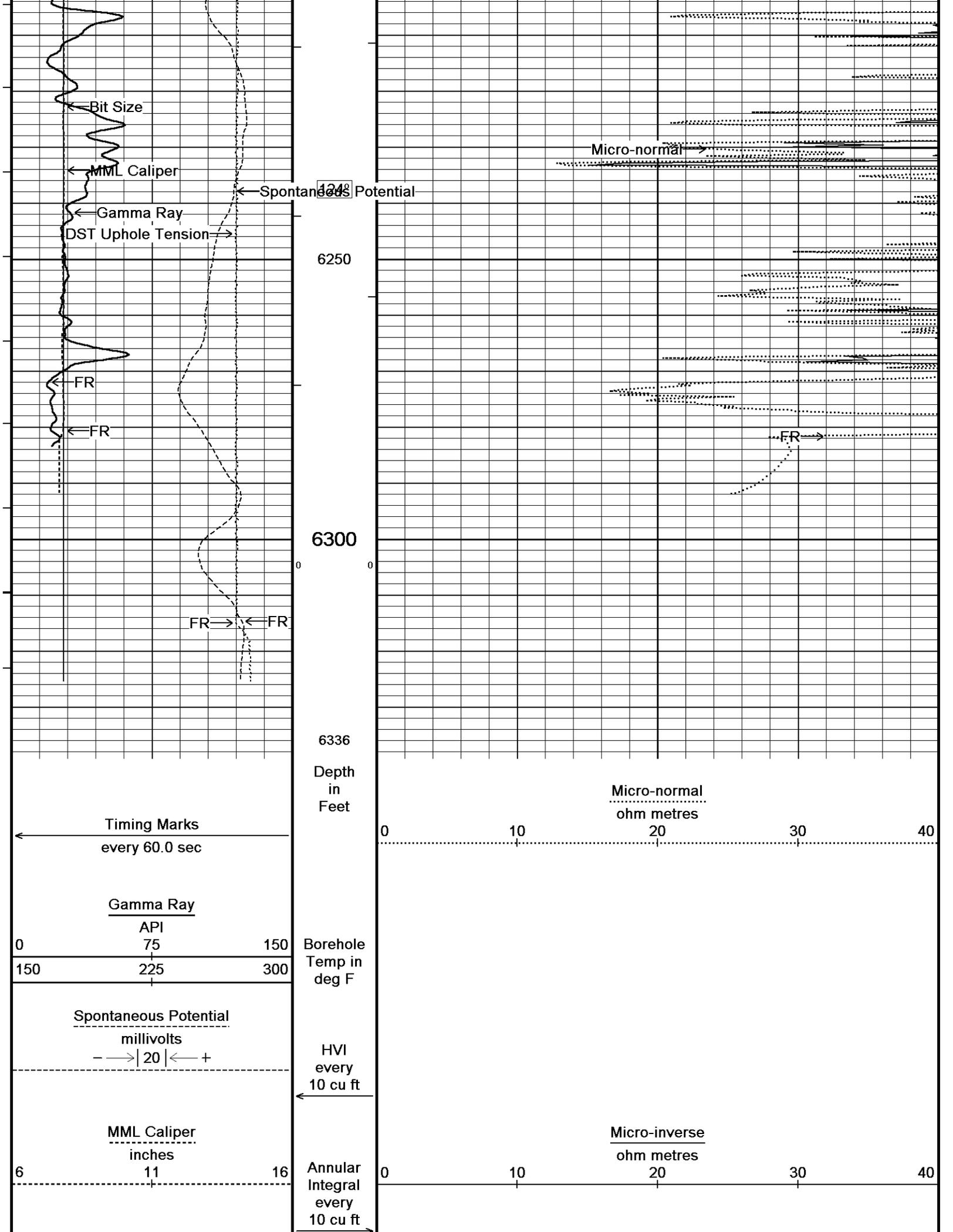
REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm  
Plotted on 14-SEP-2013 03:14  
Filename: C:\Minimus 13.05.9583\Log\O'Brien Rickers Ran...\O'Brien Rickers Ranch #8-17\_Repeat.dta  
Recorded on 13-SEP-2013 23:48  
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583









Bit Size

inches

6 11 16

DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 14-SEP-2013 03:14

Filename: C:\Minimus 13.05.9583\Log\O'Brien Rickers Ran...\O'Brien Rickers Ranch #8-17\_Repeat.dta

Recorded on 13-SEP-2013 23:48

System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583



REPEAT SECTION



### BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Log\O'Brien Rickers Ranch #8-17\O'Brien Rickers Ranch #8-17\_Main.dta

General Constants All 000

Last Edited on 13-SEP-2013,21:28

#### General Parameters

Mud Resistivity	1.300	ohm-metres
Mud Resistivity Temperature	93.000	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	Base Density Porosity	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 13-SEP-2013 23:03

Reading No	Measured	Calibrated (lbs)
1	13565.27	0.00
2	14027.40	395.00

Gamma Calibration MCG-D.K 469

Field Calibration on 11-SEP-2013 14:30

	Measured	Calibrated (API)
Background	68	47
Calibrator (Gross)	1124	772
Calibrator (Net)	1055	725

Gamma Constants MCG-D.K 469

Last Edited on 13-SEP-2013,07:33

Gamma Calibrator Number	GRC38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 18-AUG-2013,02:35

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

Pre-filter Length 11

SP Calibration MCG-D.K 469 Field Calibration on 12-SEP-2013 15:11

	Measured	Calibrated (mV)
Reference 1	100.2	100.0
Reference 2	-99.2	-100.1

Caliper Calibration MML-A 3 Base Calibration on 15-AUG-2013 08:50  
 Field Calibration on 11-SEP-2013 14:21

Base Calibration	Measured	Calibrator Size (in)
Reading No		
1	14887	5.98
2	18120	7.97
3	21042	9.86
4	25322	11.92
5	0	0.00
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	5.99	5.98

Micro Normal and Micro Inverse Calibration MML-A 3 Base Calibration on 15-AUG-2013 09:16  
 Field Check on 11-SEP-2013 14:19

Base Calibration	Measured	Calibrated (ohm-m)
Channel	Resistor 1 Resistor 2	Resistor 1 Resistor 2
Micro Normal	12.3 60.3	5.0 25.0
Micro Inverse	15.7 78.4	5.0 25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	62.9	62.9
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 3 Last Edited on 11-SEP-2013,14:18

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159
Micro Normal K Factor	1.0000
Micro Inverse K Factor	1.0000
Standoff Offset	N/A inches

Neutron Calibration MDN-A.B 66 Base Calibration on 31-JUL-2013 10:25  
 Field Check on 11-SEP-2013 14:35

Base Calibration	Measured	Calibrated (cps)
	Near Far	Near Far
Ratio	3180 99	3714 110
	32.180	33.764

Field Calibrator at Base	Calibrated (cps)
Ratio	1617 2323
	0.696

Field Check	Calibrated (cps)
Ratio	1626 2326
	0.693

Neutron Constants MDN-A.B 66 Last Edited on 13-SEP-2013,21:28

Neutron Source Id	P0204NN
Neutron Jig Number	5824NE
Epithermal Neutron	No
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 353**

 Base Calibration on 15-AUG-2013 09:33  
 Field Check on 11-SEP-2013 11:33

**Base Calibration**

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.1	126.8
Base Check		280.9
Field Check		281.0

**FE Constants MFE-B.J 353**

Last Edited on 13-SEP-2013,21:27

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Caliper Source for FE correction	Density Caliper	
Caliper Value for FE correction	N/A	inches
Rm Source for FE correction	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	
Stand-off	0.5	inches

**Induction Calibration MAI-A.A 167**

 Base Calibration on 19-APR-2013,13:41  
 Field Check on 11-SEP-2013 11:22

**Base Calibration**

Test Loop Calibration Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	17.3	474.2	9.3	966.2
2	6.3	388.4	7.6	821.4
3	3.3	259.4	5.2	566.0
4	1.9	133.0	2.6	279.2

Array Temperature 76.8 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	13.4	3837.8
2	0.0	0.0	29.7	3475.3
3	0.0	0.0	29.1	3051.7
4	0.0	0.0	19.8	2080.7

Deep	18.6	2048.1
Medium	42.2	3989.4
Shallow	43.1	5051.7

Array Temperature 0.0 80.9 Deg F

**Induction Constants MAI-A.A 167**

Last Edited on 13-SEP-2013,21:27

Induction Model	RtAP-WBM	
Caliper for Borehole Corr.	Density Caliper	
Hole Size for Borehole Correction	N/A	inches
Tool Centred	No	
Stand-off Type	Fins	
Stand-off	0.50	inches
Number of Fins on Stand-off	8.0000	
Stand-off Fin Angle	60.00	degrees
Stand-off Fin Width	0.5000	inches
Borehole Corr. Rm Source	Temperature Corr	
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

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	

High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 18-AUG-2013,02:21

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

High Resolution Temperature Constants MAI-A.A 167

Last Edited on 18-AUG-2013,02:21

Pre-filter Length	11
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Caliper Calibration MPD-B 64

Base Calibration on 15-AUG-2013 14:54  
Field Calibration on 11-SEP-2013 11:34

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16560	3.99
2	24992	5.98
3	32880	7.97
4	41184	9.86
5	50688	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.89	5.98

Photo Density Calibration MPD-B 64

Base Calibration on 15-AUG-2013 14:37  
Field Check on 11-SEP-2013 14:18

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	60206	33560	59556	30836
Reference 2	25378	2915	24941	2541

Field Check at Base

1155.1	1345.7
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Field Check

1161.0	1348.7
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PE Calibration

Base Calibration	WS	Measured		Calibrated
		WH	Ratio	Ratio
Background	211	1029		
Reference 1	22957	60005	0.386	0.371
Reference 2	6904	25238	0.276	0.272

Field Check at Base

211.2	1028.9
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Field Check

## Density Constants MPD-B 64

Last Edited on 13-SEP-2013,07:33

Density Source Id	18235B	
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	1.10	gm/cc
Mud Density Z/A Multiplier	1.11	
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	

Matrix density (gm/cc)	Depth (m)
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

## DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Log\O'Brien Rickers Ranch #8-17\O'Brien Rickers Ranch #8-17\_Main.dta

Compact Comms Gamma  
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log  
MML-A.3 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

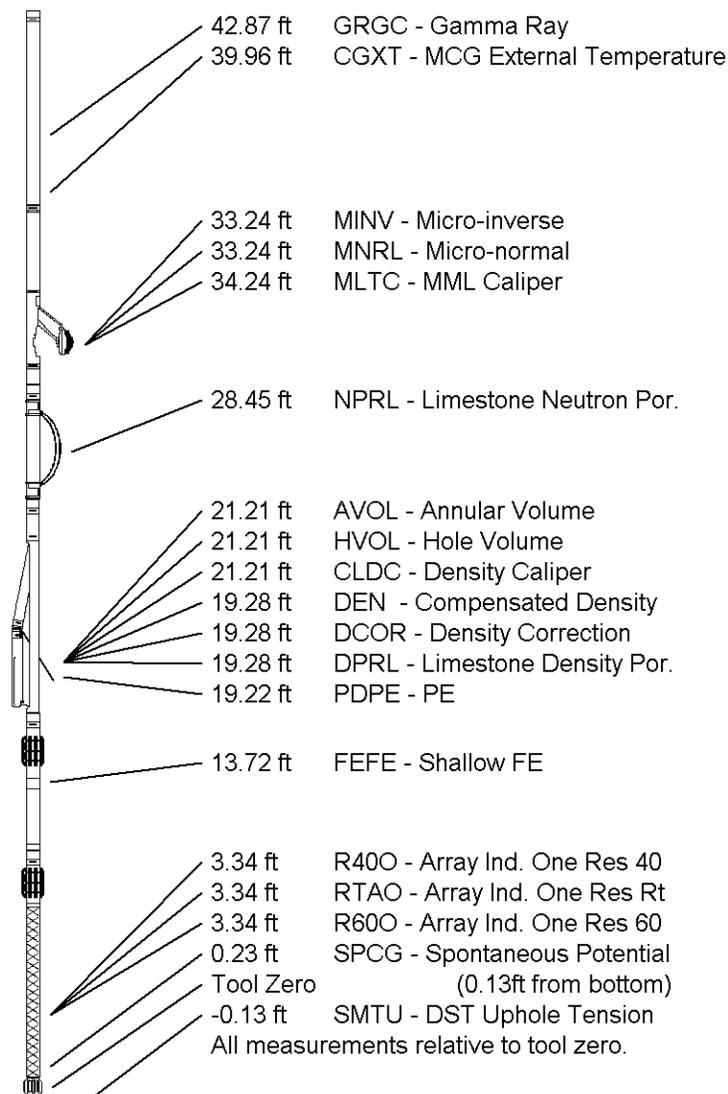
Compact Neutron  
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper  
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric  
MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction  
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 48.16 ft Weight: 383.6 lb



COMPANY	O'BRIEN ENERGY RESOURCES CORP.
WELL	RICKERS RANCH #8-17
FIELD	ANGELL SOUTH
PROVINCE/COUNTY	MEADE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2675.00	feet	First Reading	6282.00	feet
Elevation Drill Floor	2673.00	feet	Depth Driller	6315.00	feet
Elevation Ground Level	2663.00	feet	Depth Logger	6315.00	feet



**Weatherford**<sup>®</sup>

MICRORESISTIVITY LOG