

**Weatherford****MICRORESISTIVITY LOG**

COMPANY

O'BRIEN ENERGY RESOURCES CORP.

WELL

ARDREY #2-2

FIELD

ARDREY

PROVINCE/COUNTY

CLARK

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

1485' FNL & 2310' FEL**N2 NW SW NE**

SEC

TWP

31S

RGE

24W

Other Services

MPD/MDN

MAI/MFE

API Number

15-025-21559

Permit Number

Permanent Datum G.L., Elevation 2541 feet

Log Measured From KB

Drilling Measured From K.B. @ 12 FEET

Date

12-APR-2013

Run Number

ONE

Service Order

3539884

Depth Driller

5750.00

feet

Depth Logger

5748.00

feet

First Reading

5714.00

feet

Last Reading

4000.00

feet

Casing Driller

730.00

feet

Casing Logger

728.00

inches

Bit Size

7.875

Hole Fluid Type

CHEMICAL

lb/USg

Density / Viscosity

9.25 lb/USg

45.00 CP

PH / Fluid Loss

9.00

9.00

Sample Source

FLOWLINE

Rm @ Measured Temp

0.34 @ 77.0

ohm-m

Rmf @ Measured Temp

0.27 @ 77.0

ohm-m

Rmc @ Measured Temp

0.41 @ 77.0

ohm-m

Source Rmf / Rmc

CALC

CALC

Rm @ BHT

0.23 @ 115.0

ohm-m

Time Since Circulation

4 HOURS

Max Recorded Temp

115.00

deg F

LIB

J.LAPOINT

PETER DEBENHAM

PETER DEBENHAM

PETER DEBENHAM

PETER DEBENHAM

PETER DEBENHAM

PETER DEBENHAM

PETER DEBENHAM

BOREHOLE RECORD

Last Edited: 12-APR-2013 16:11

Bit Size
inches

7.875

Depth From
feet

728.00

Depth To
feet

5748.00

CASING RECORD

Type

Size
inches

8.625

Depth From
feet

5748.00

Shoe Depth
feet

728.00

Weight
pounds/ft

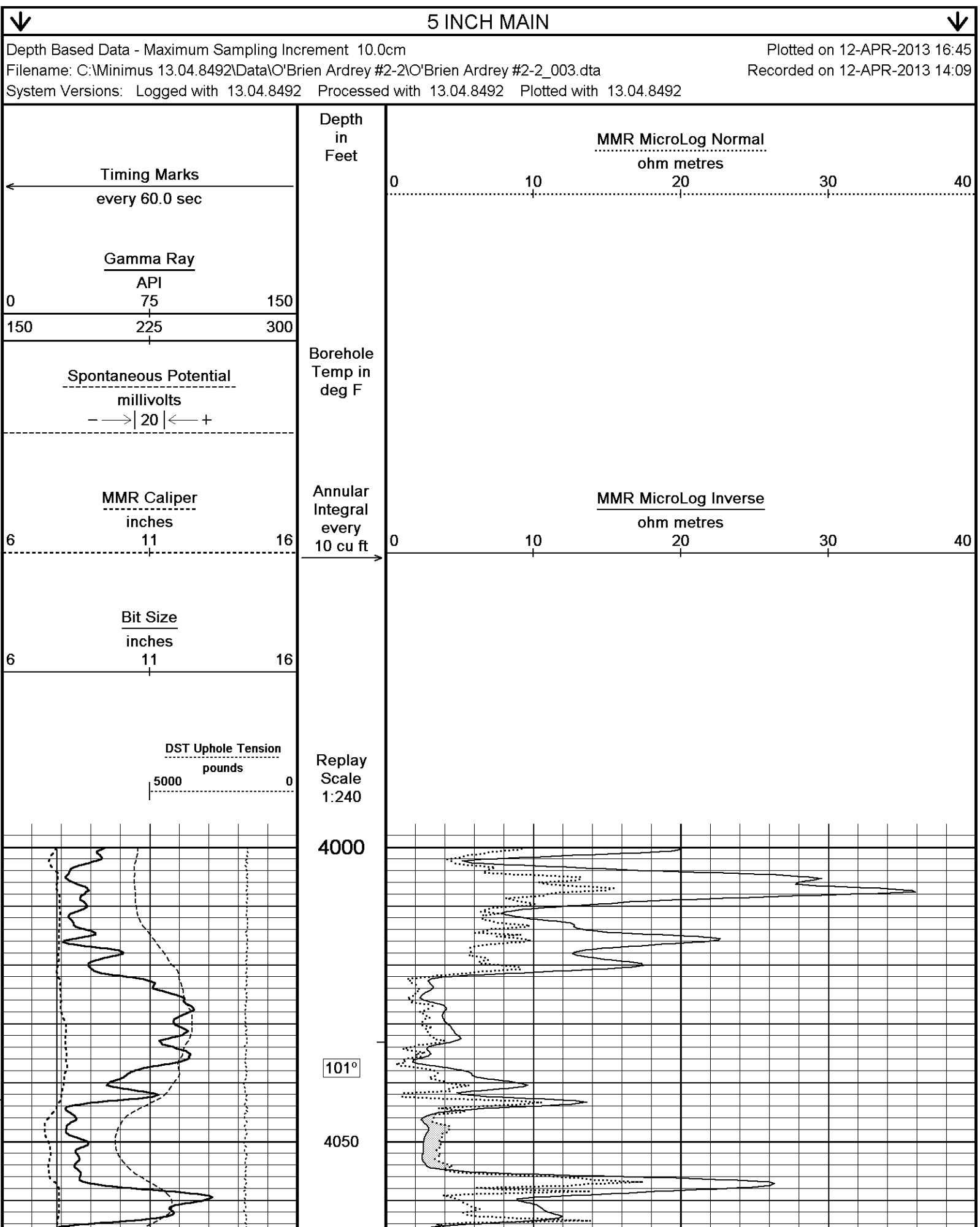
24.00

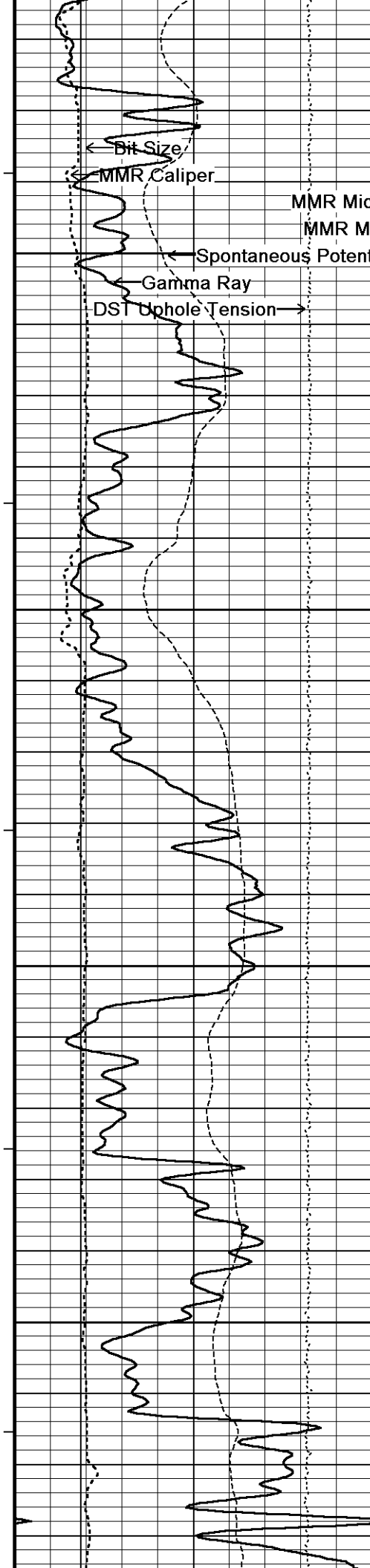
REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MAI ran in combination.
Hardware Used: MDN Dual bowspring used. MPD 8 inch profile plate used. MAI and MFE 0.5 Inch standoffs used.
2.71 g/cc Limestone Density Matrix used to calculate porosity.
All intervals logged and scaled per customer's request.
Tight pulls, washouts and borehole rugosity will affect data quality.
Total hole volume from TD to Surface Casing= 2500 cu. ft.
Annular volume with 4.5 inch production casing from TD to 4000 ft.= 418 cu. ft.
Service order: #3539884
Rig: Duke #6
Engineer: W. Stambaugh, J. LaPoint
Operator(s): R. Venegas

****Software issue changed fluid loss to match Ph fluid loss should be 11.6 ml/30min.****

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





102°

102°

102°

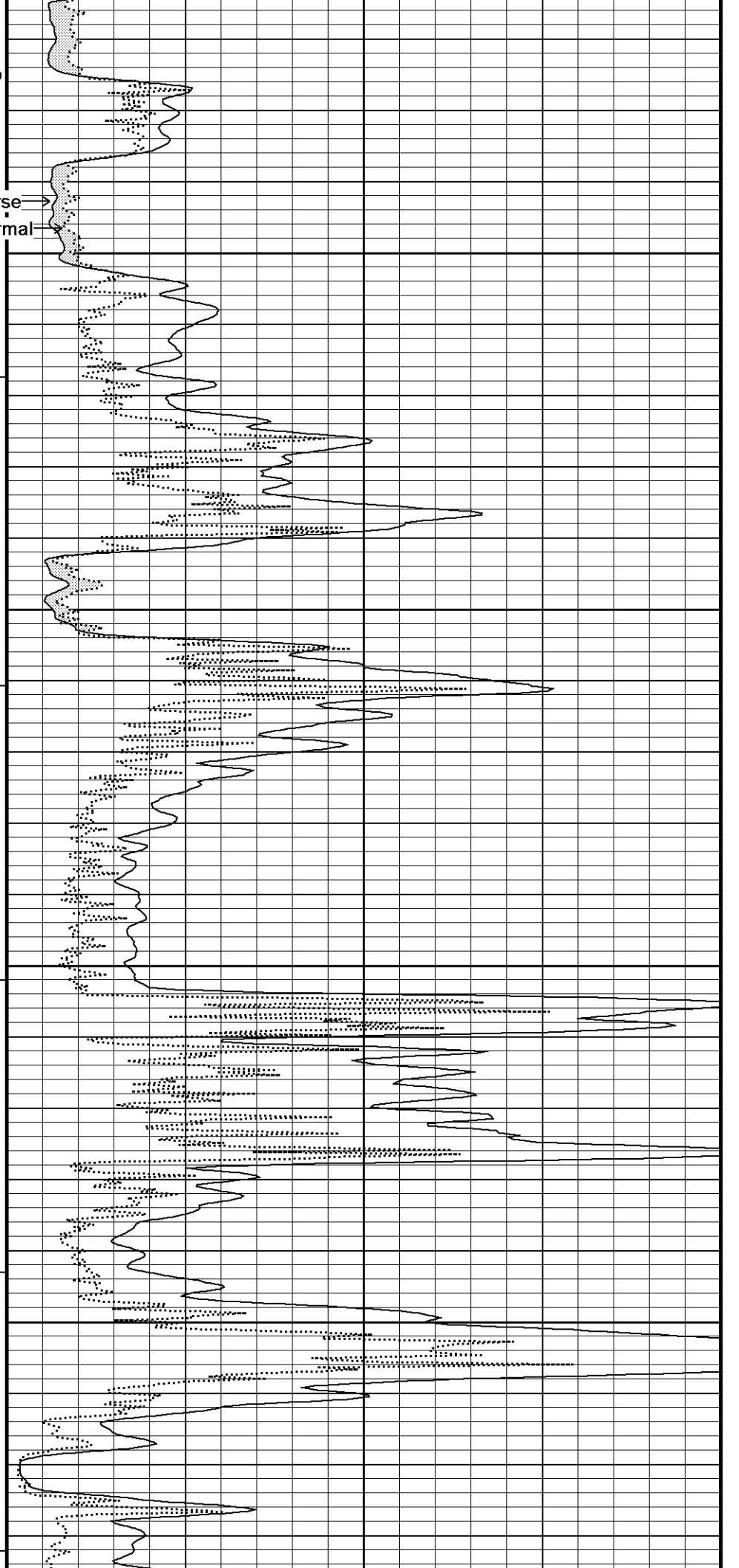
103°

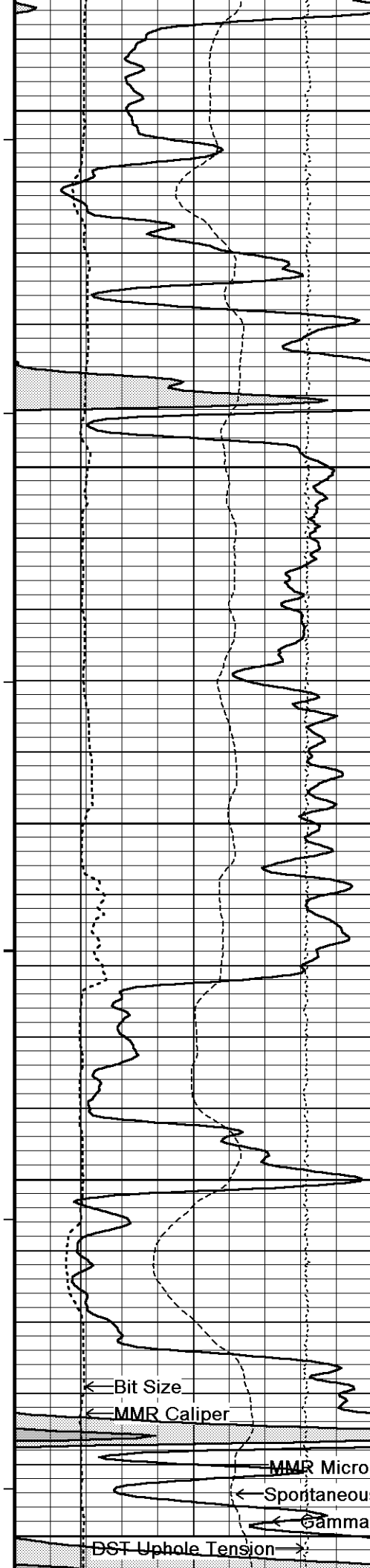
4100

4150

4200

4250





103°

4300

103°

4350

104°

4400

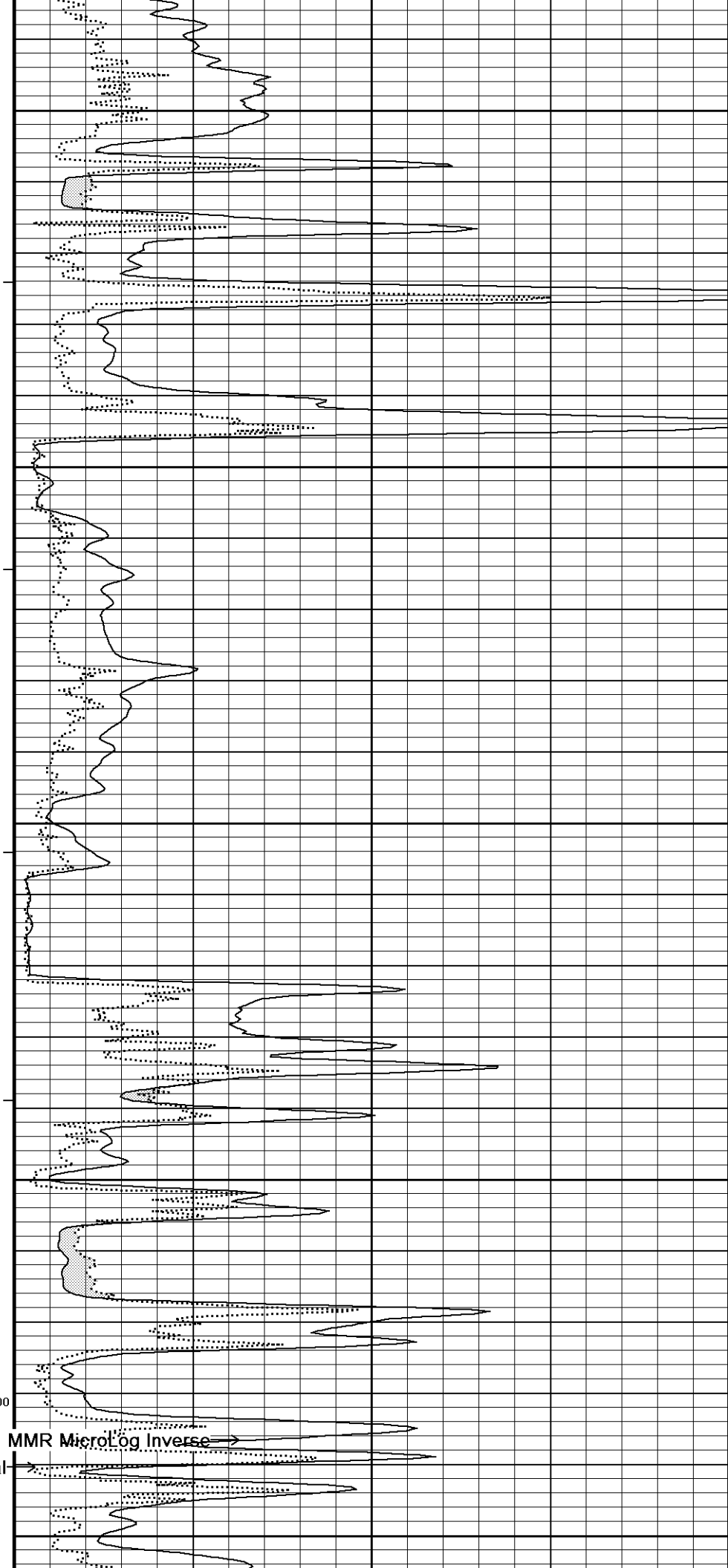
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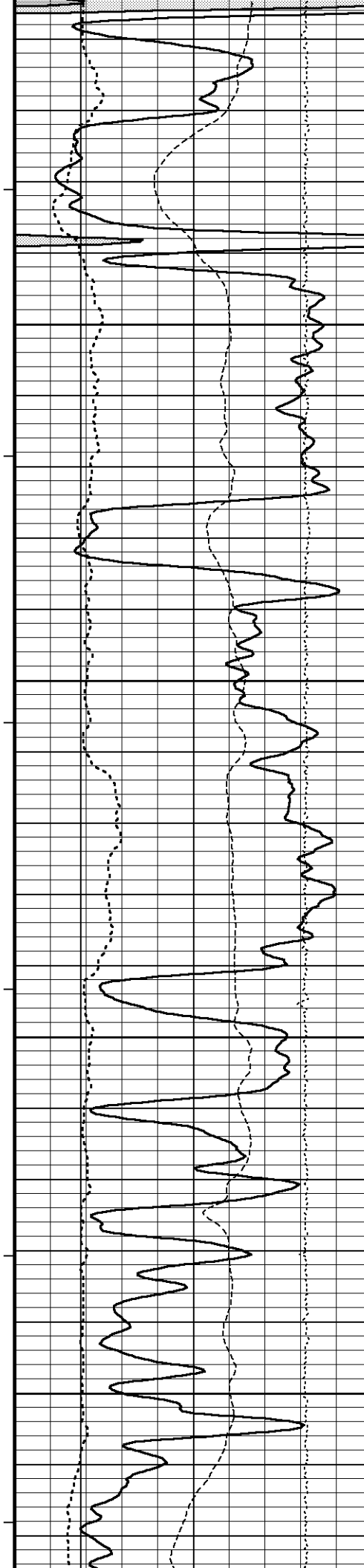
4450

300

104°

4500





105°

4550

105°

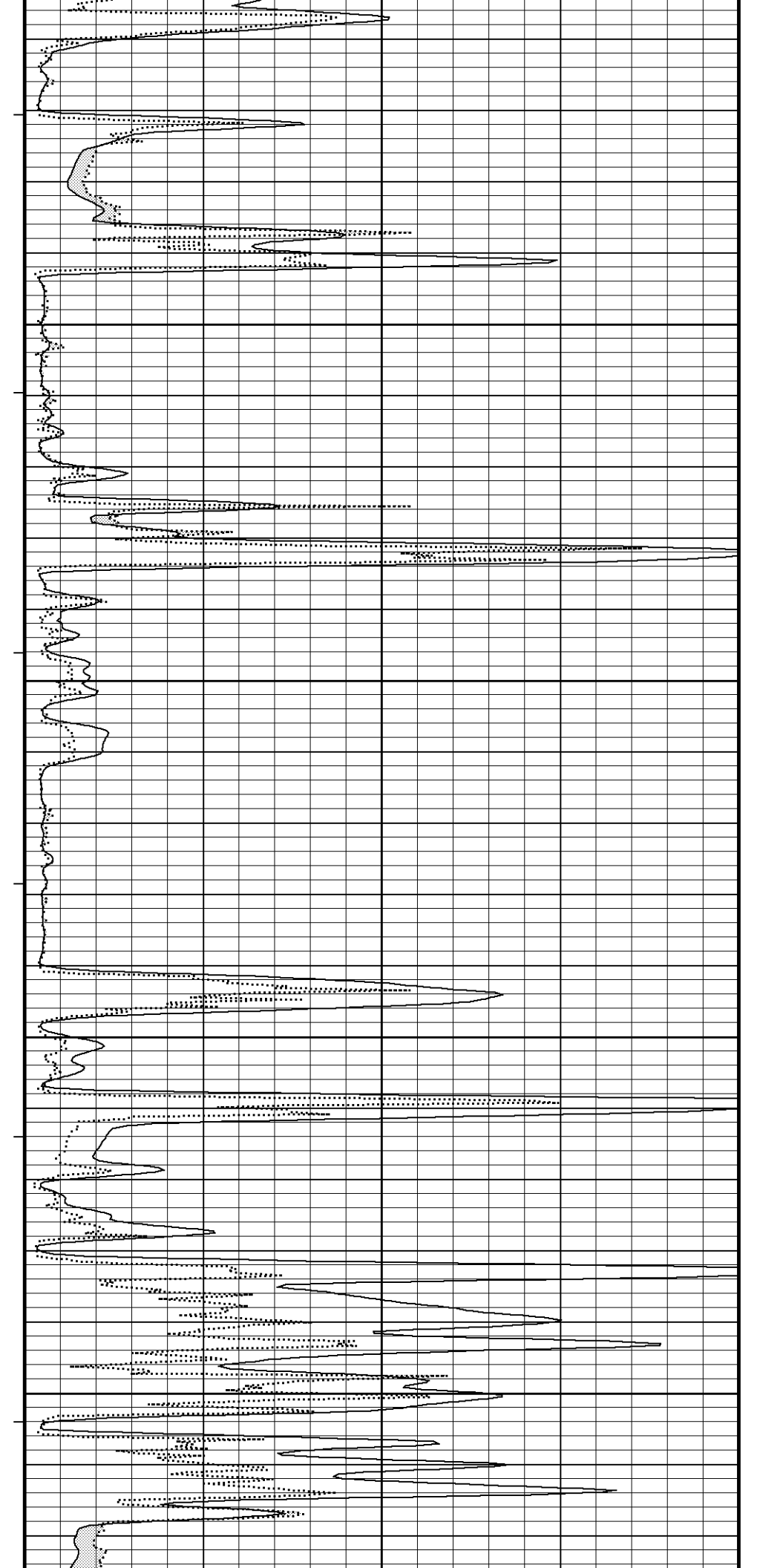
4600

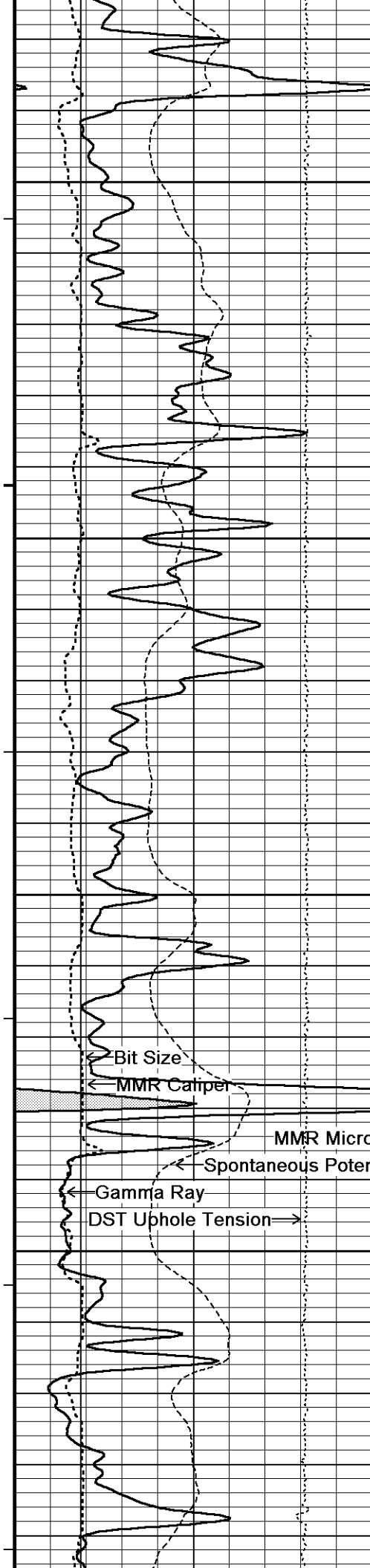
106°

4650

106°

4700





107°

4750

107°

4800

107°

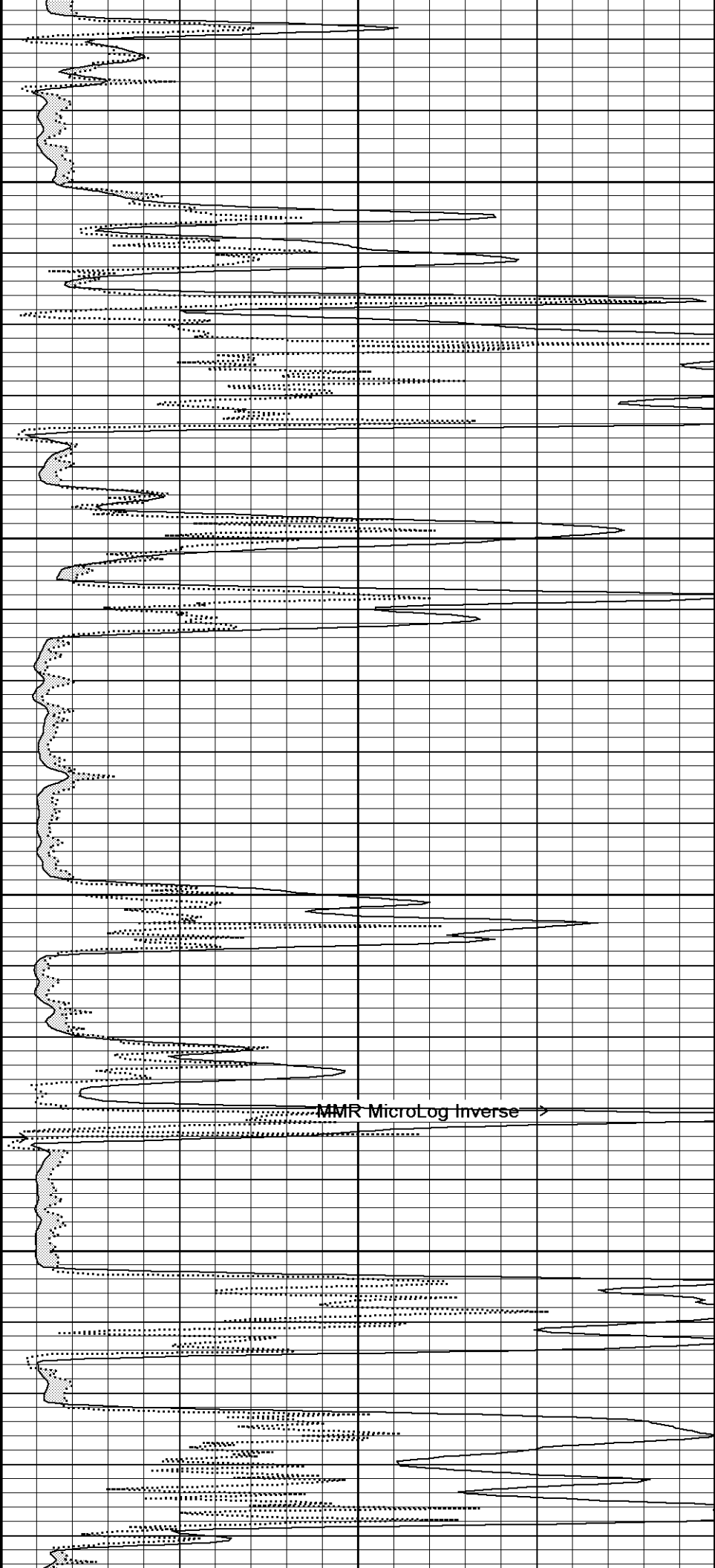
4850

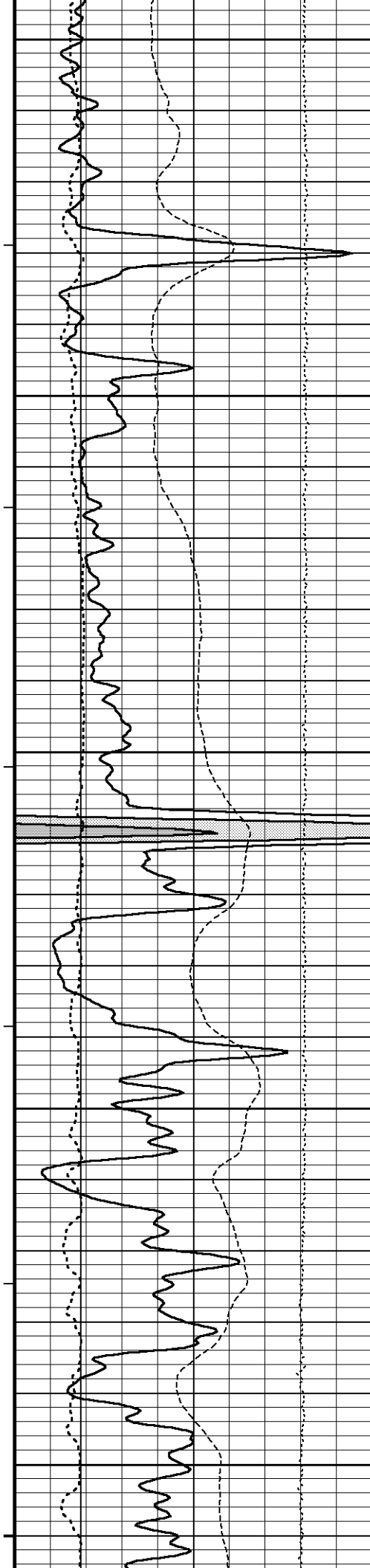
200

107°

4900

108°





4950

108°

5000

108°

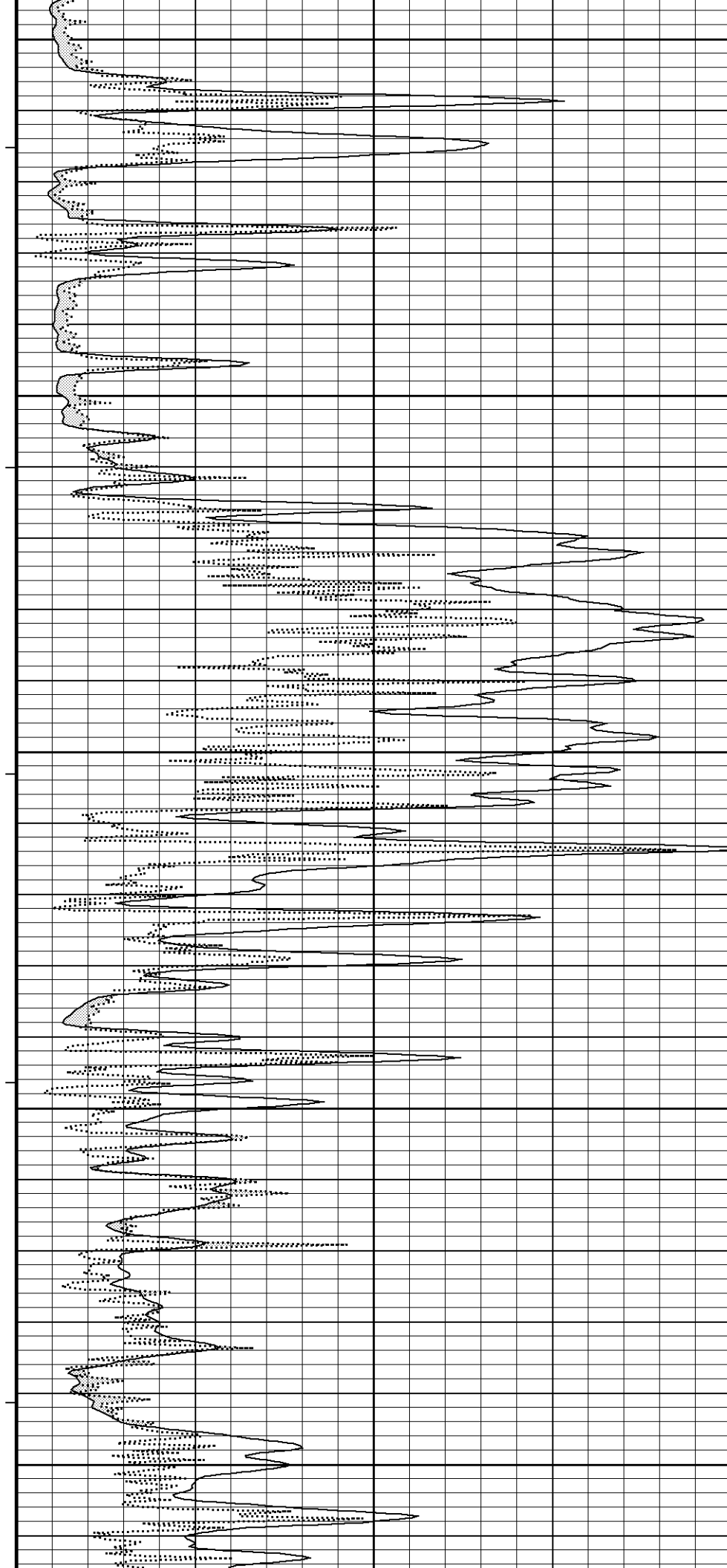
5050

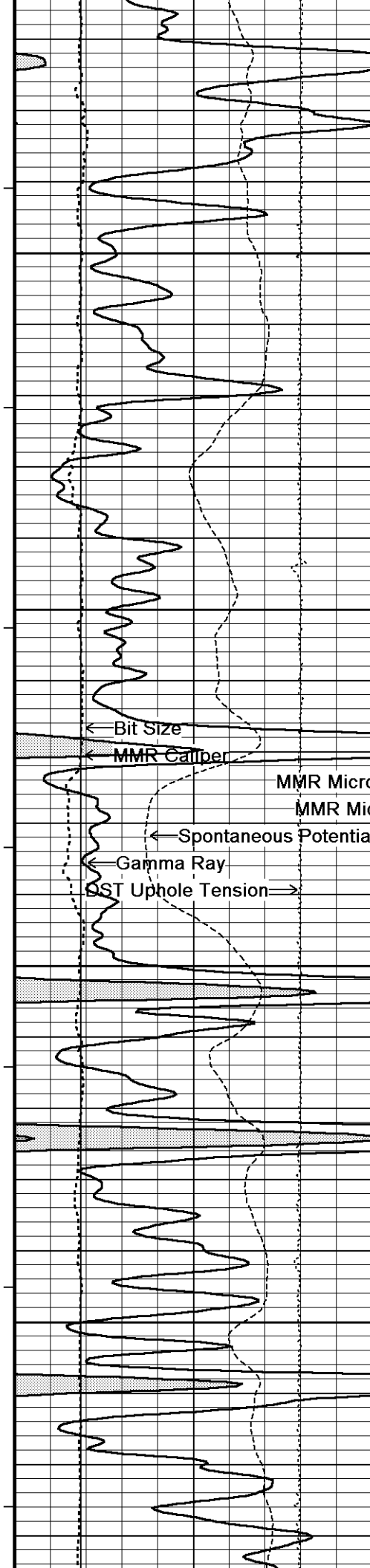
108°

5100

109°

5150





110°

5200

110°

5250

MMR MicroLog Inverse

MMR MicroLog Normal

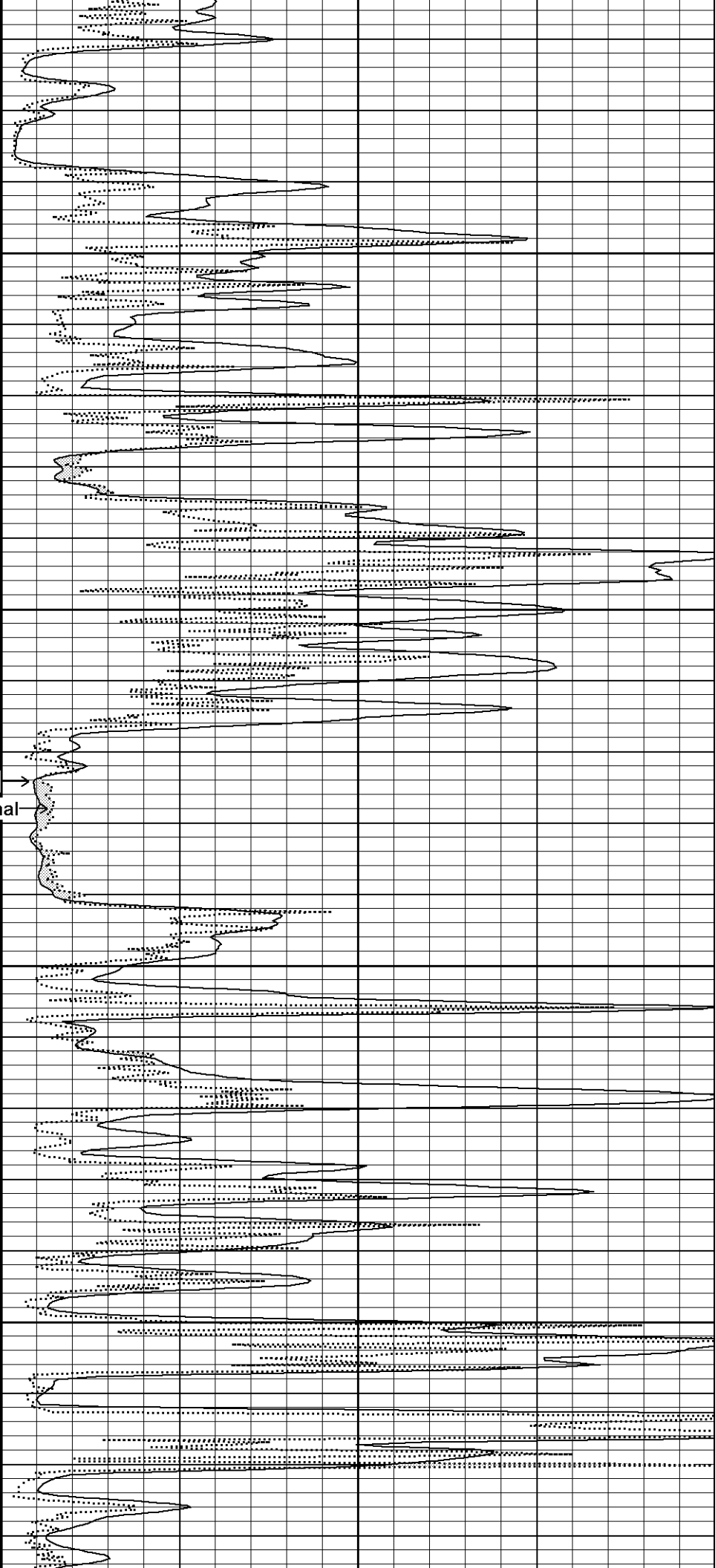
110°

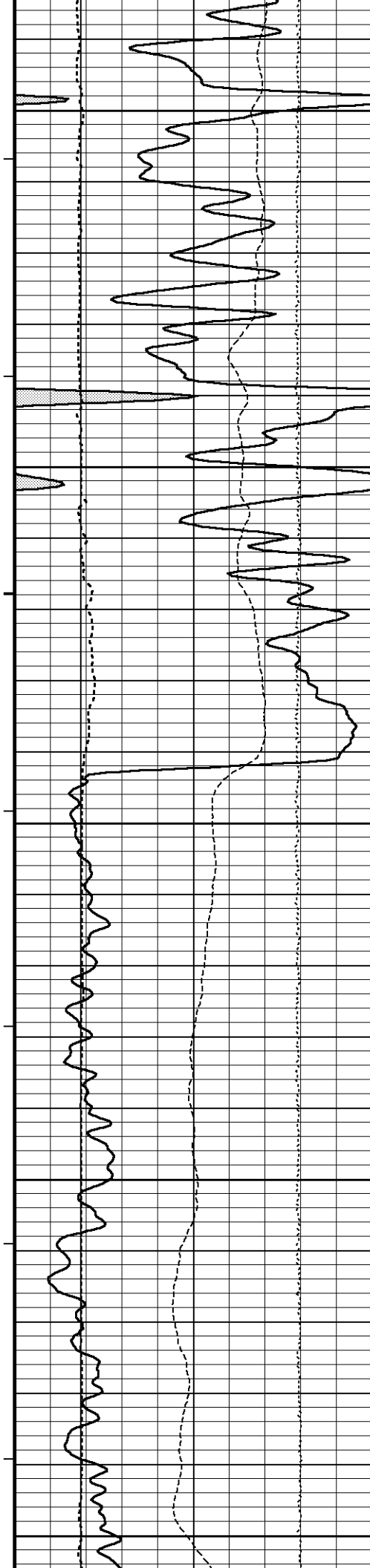
5300

100

110°

5350





111°

5400

112°

5450

113°

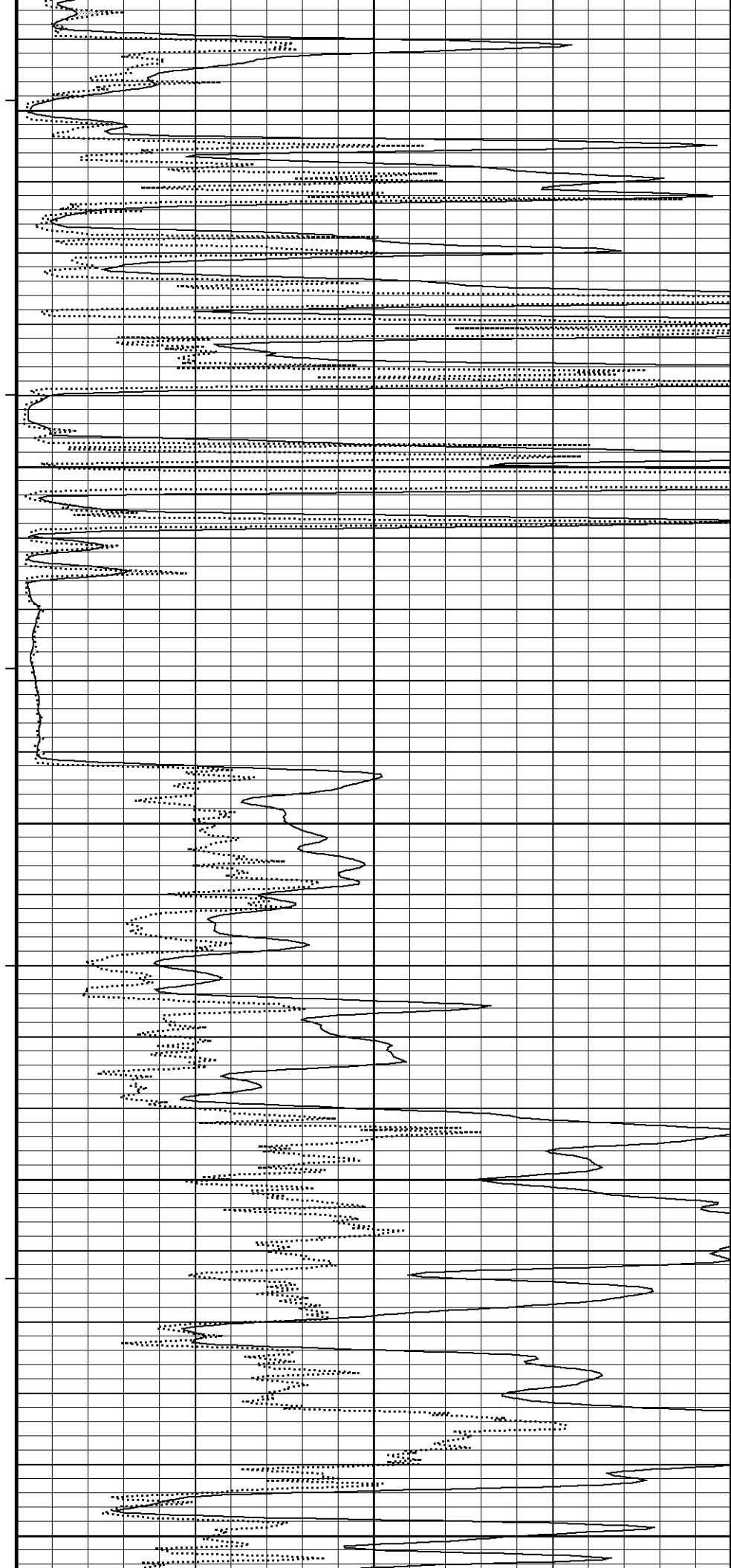
5500

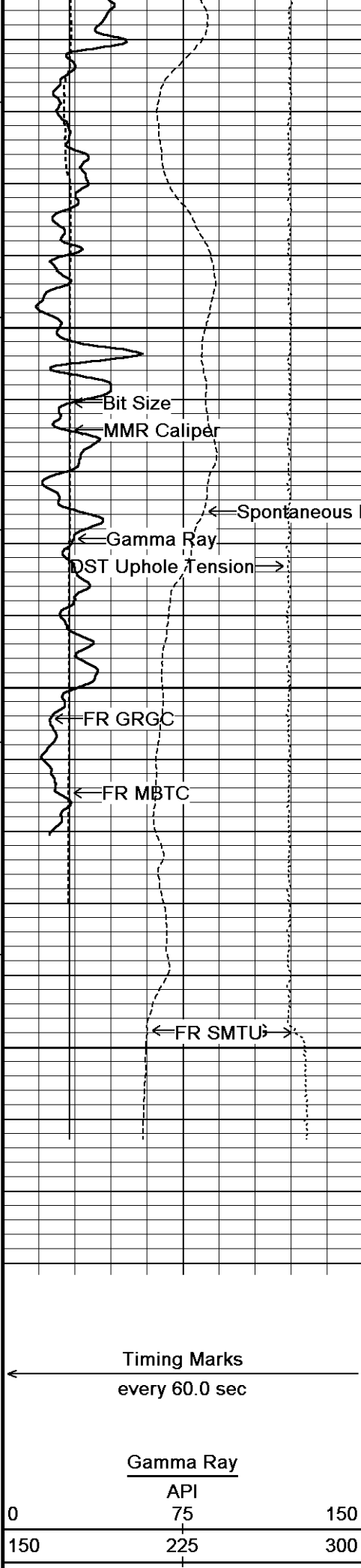
114°

5550

114°

5600





115°

5650

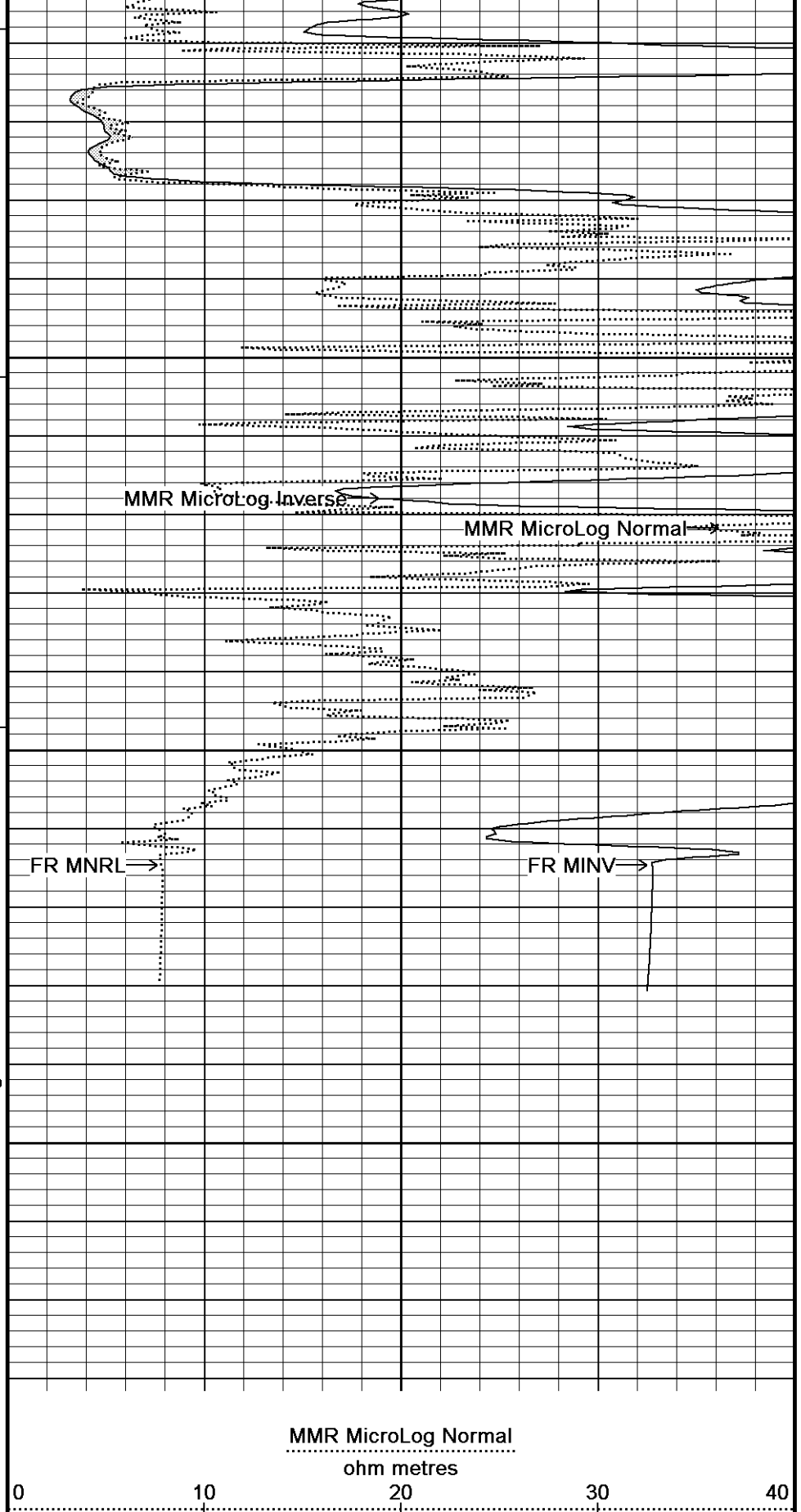
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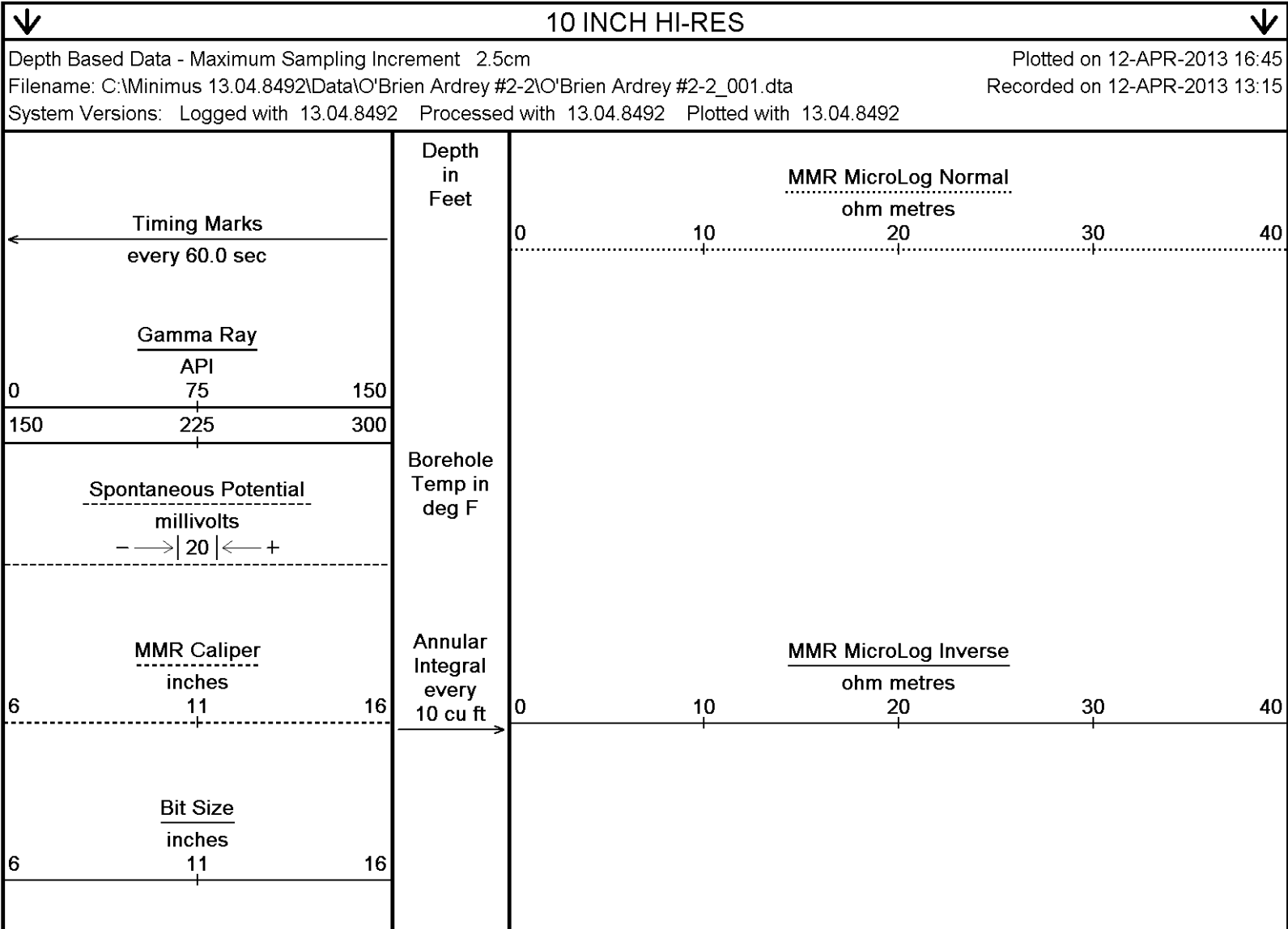
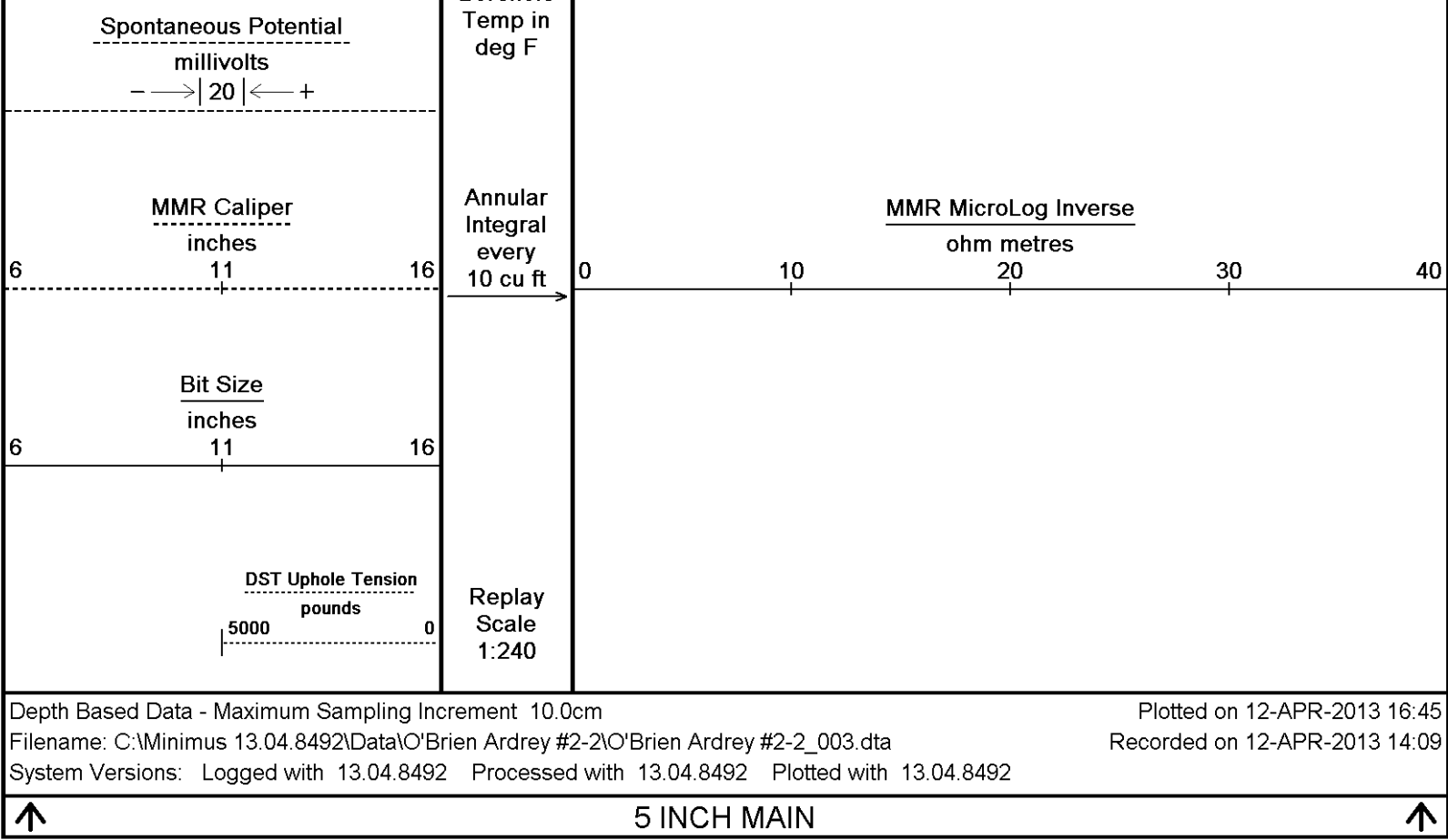
5700

5750

5780
Depth
in
Feet

Borehole





DST Uphole Tension
pounds
5000 0

Replay
Scale
1:120

5300

100

Bit Size
MMR Caliper

MMR MicroLog Normal

Spontaneous Potential

Gamma Ray

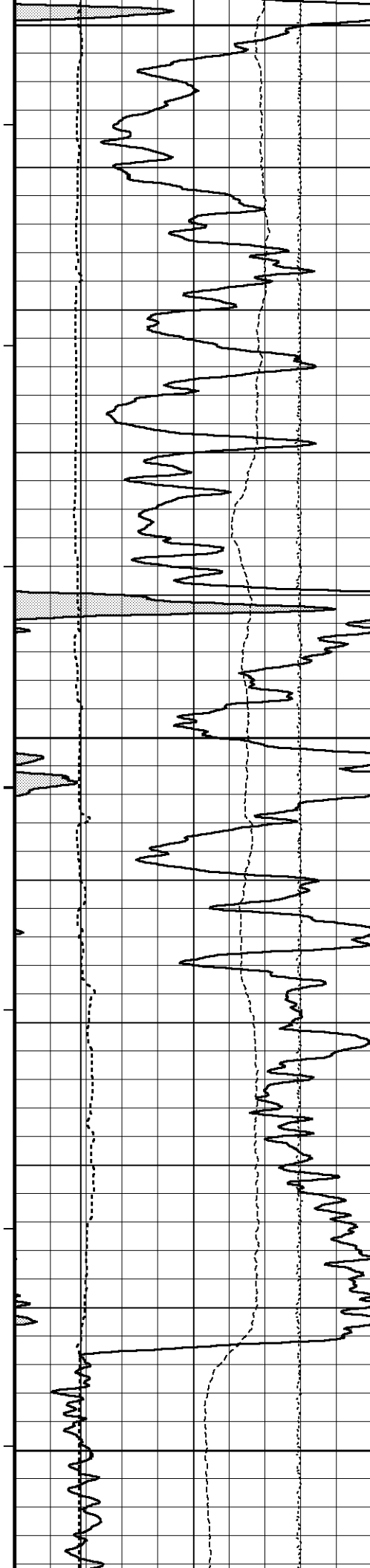
DST Uphole Tension

MMR MicroLog Inverse

109°

5350

109°



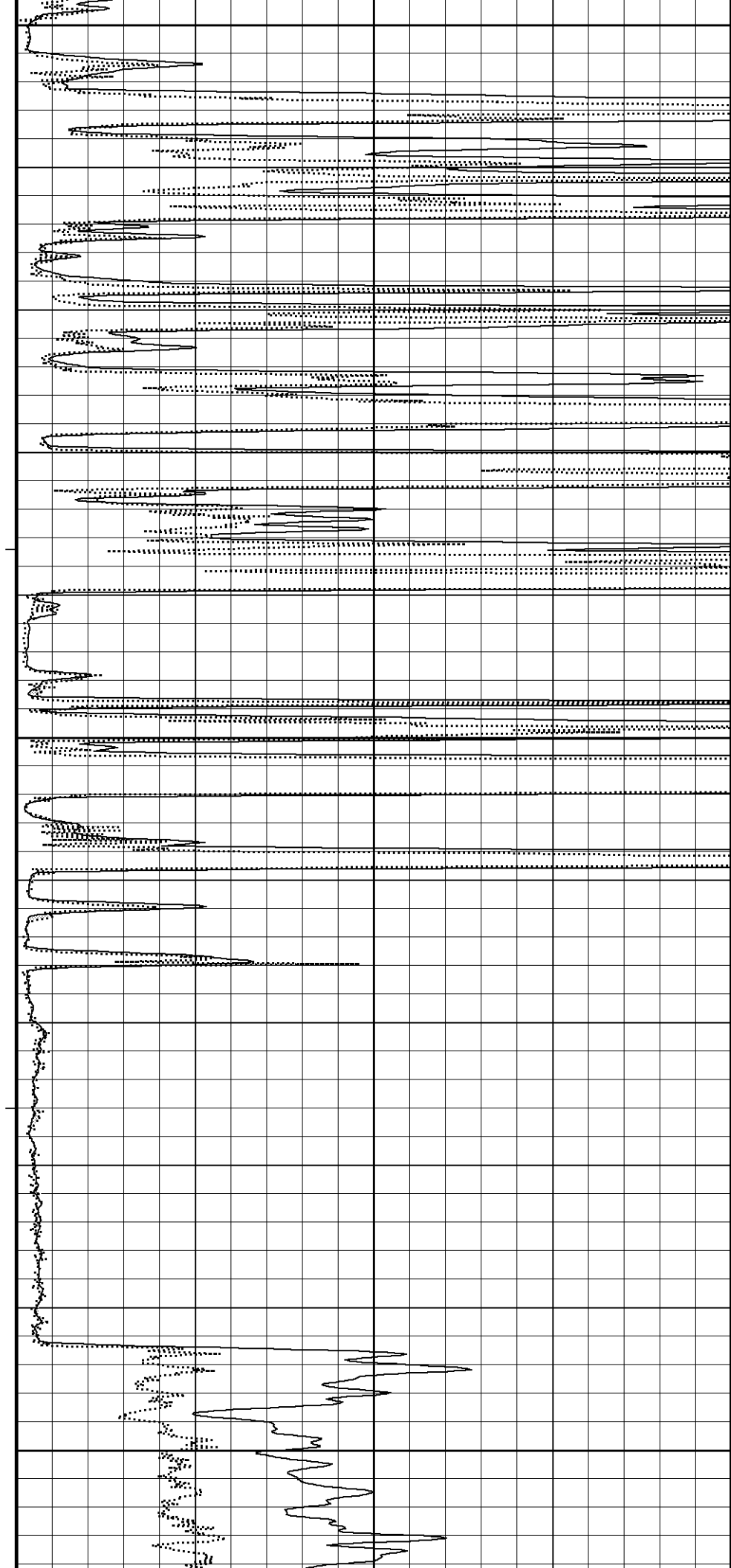
5400

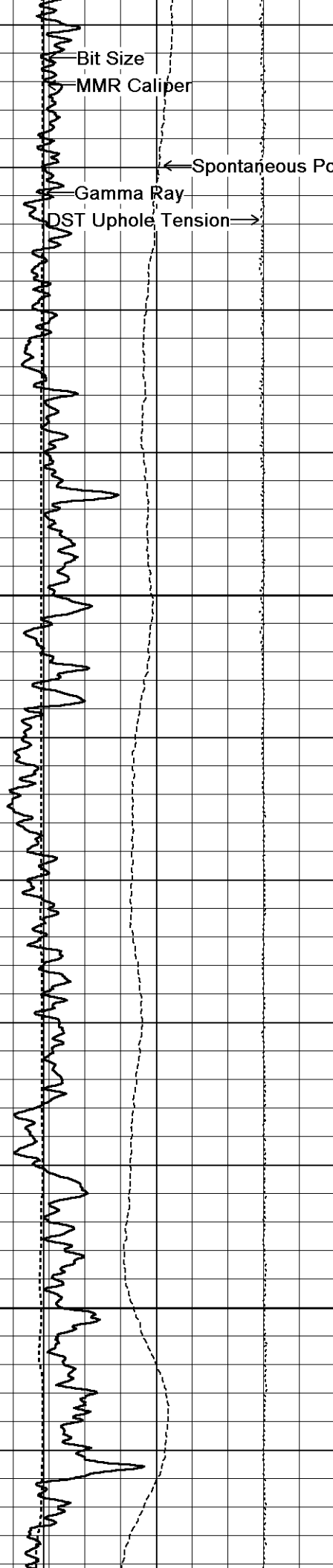
110°

5450

111°

5500





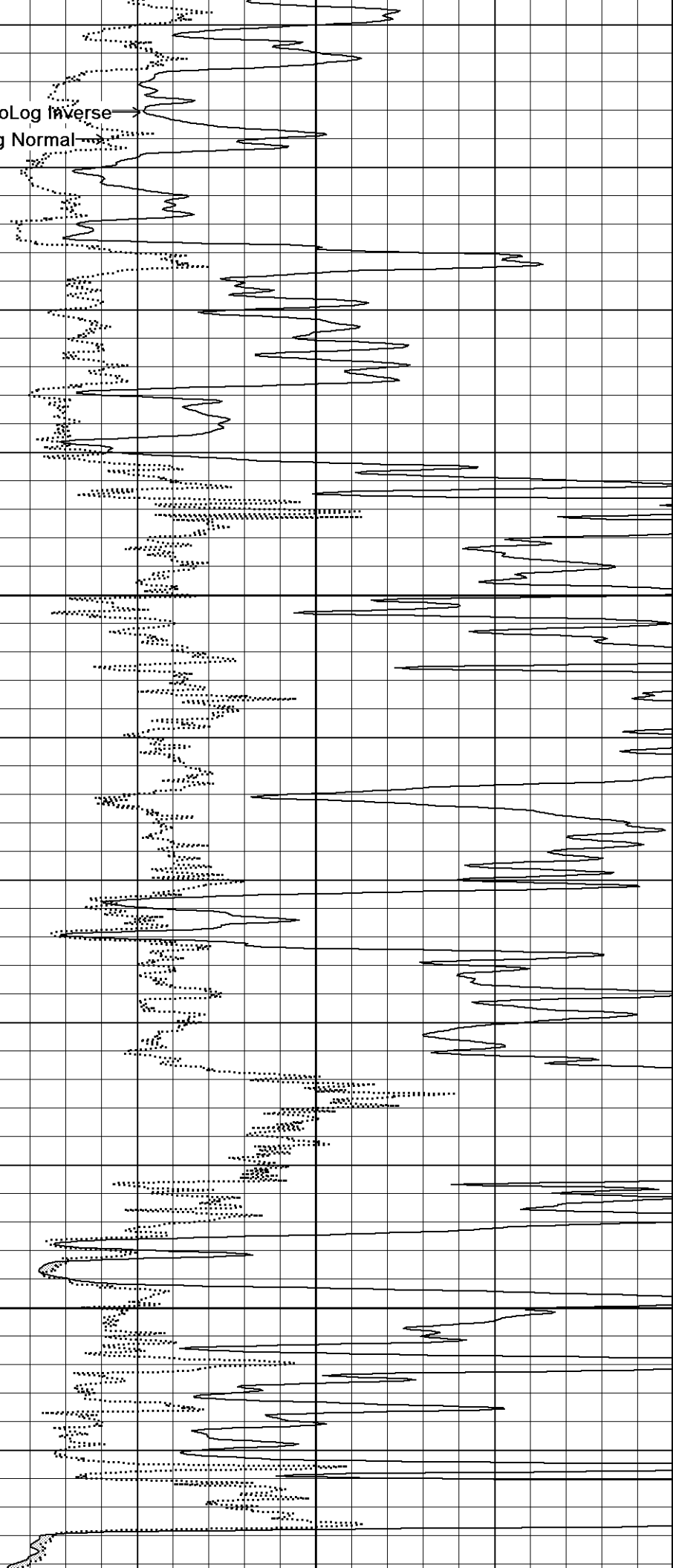
MMR MicroLog Inverse
MMR MicroLog Normal

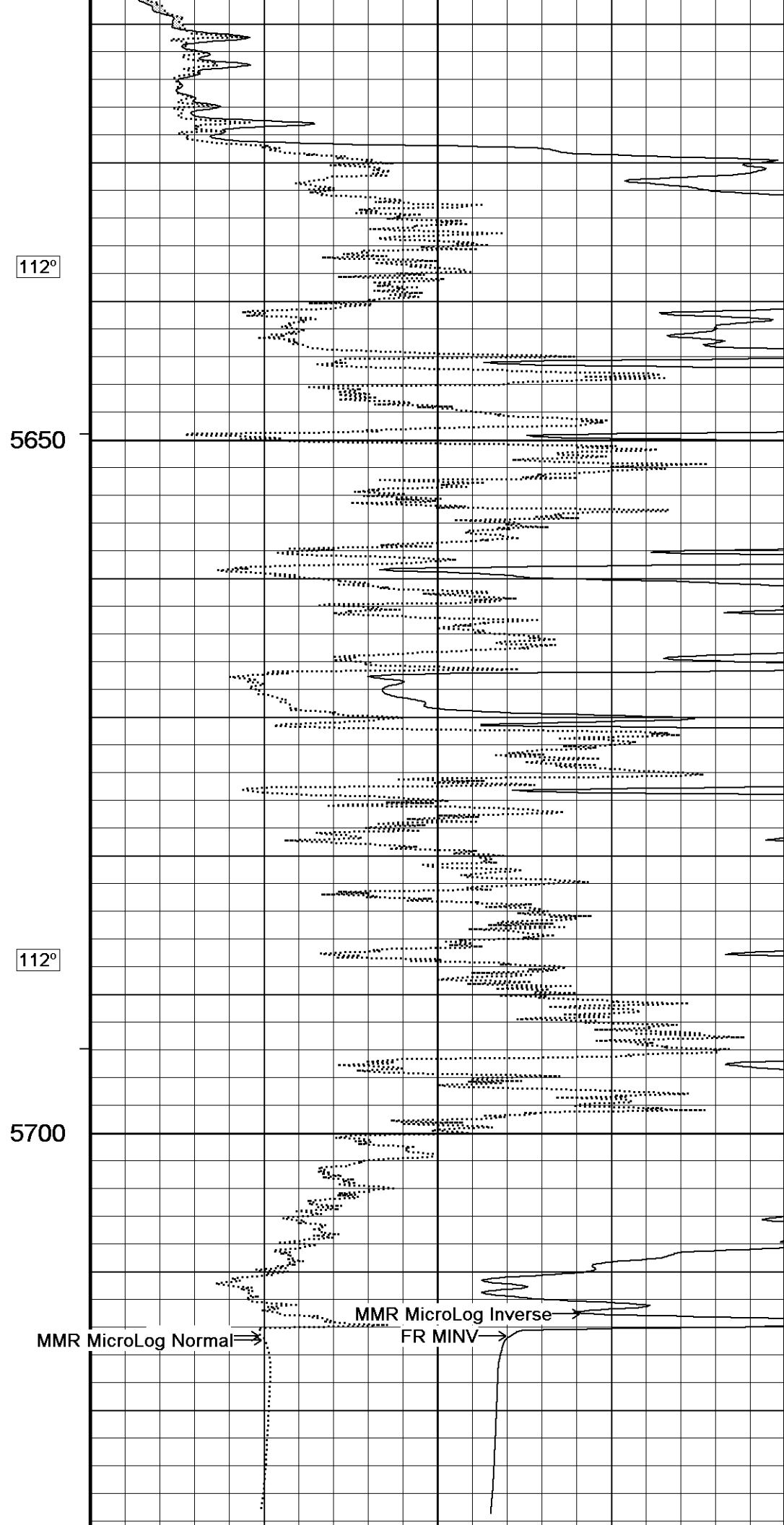
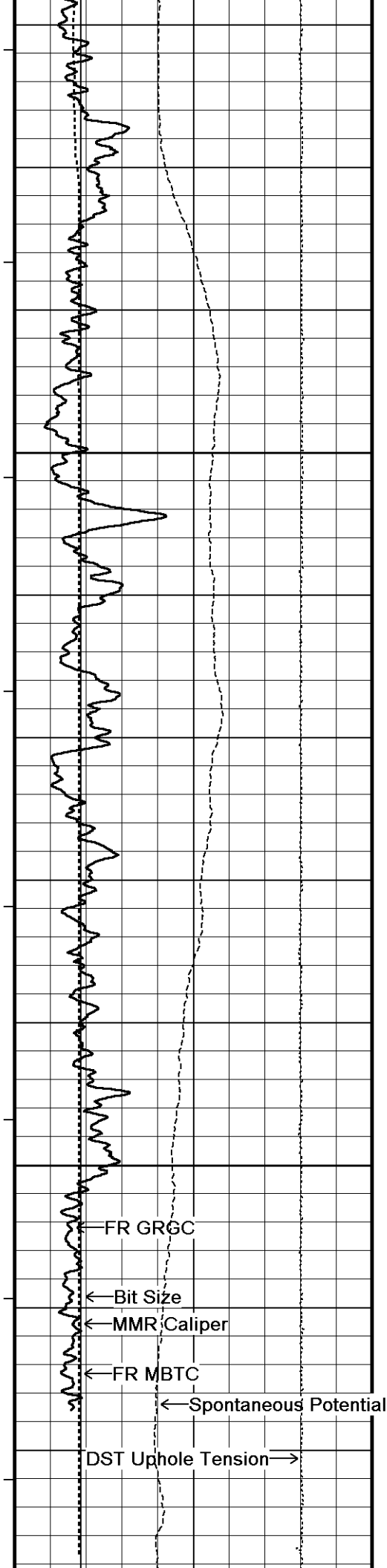
112°

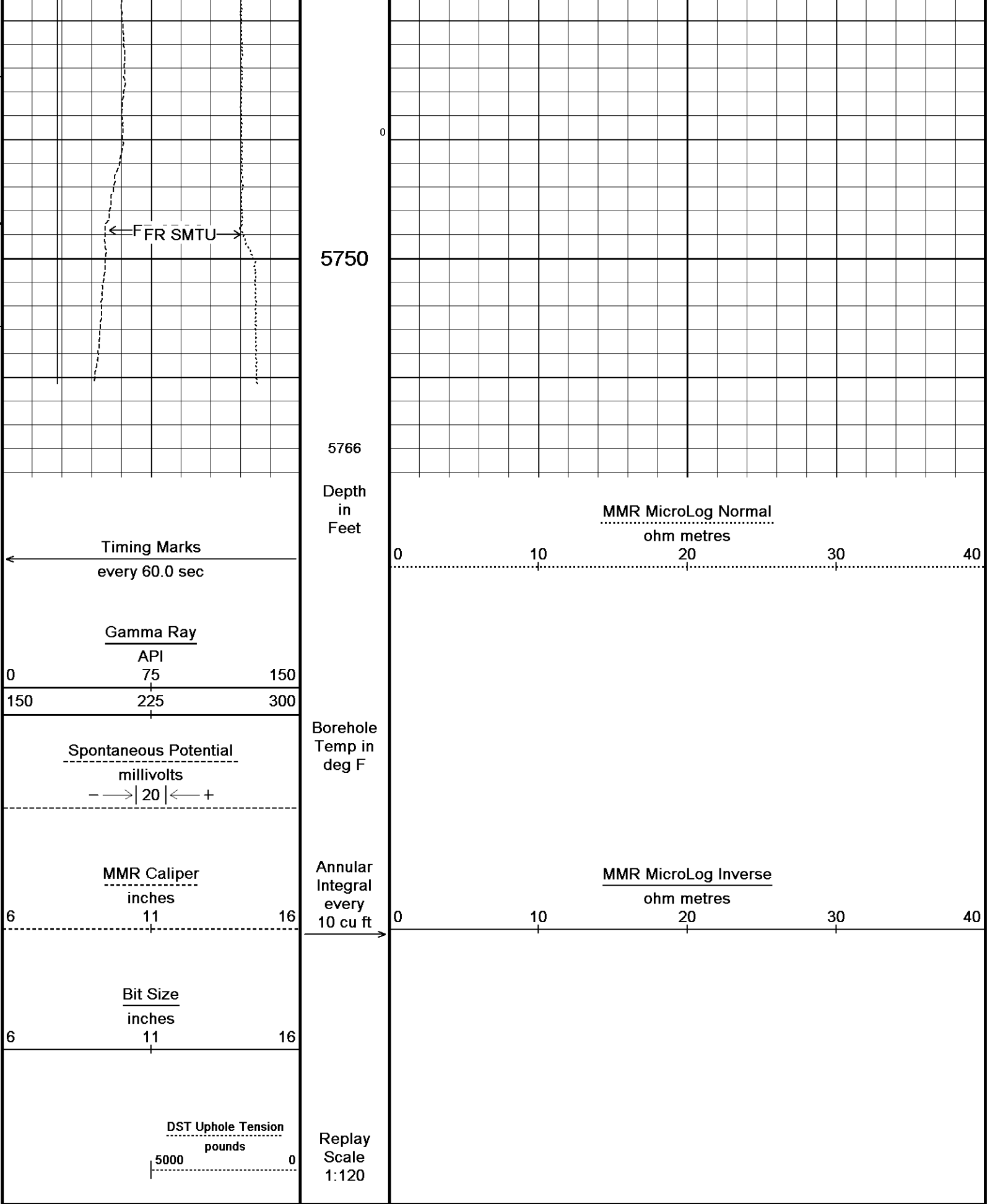
5550

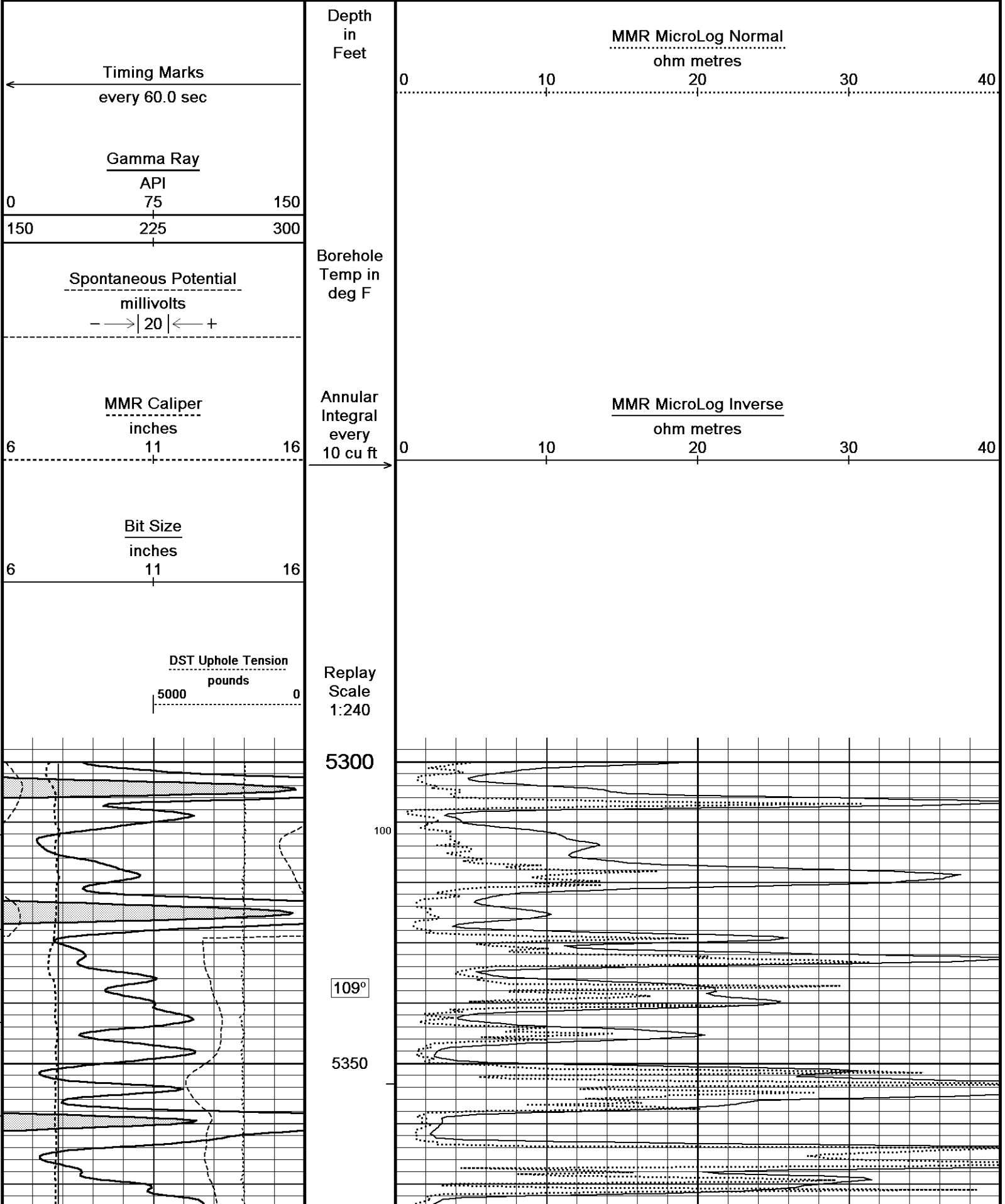
112°

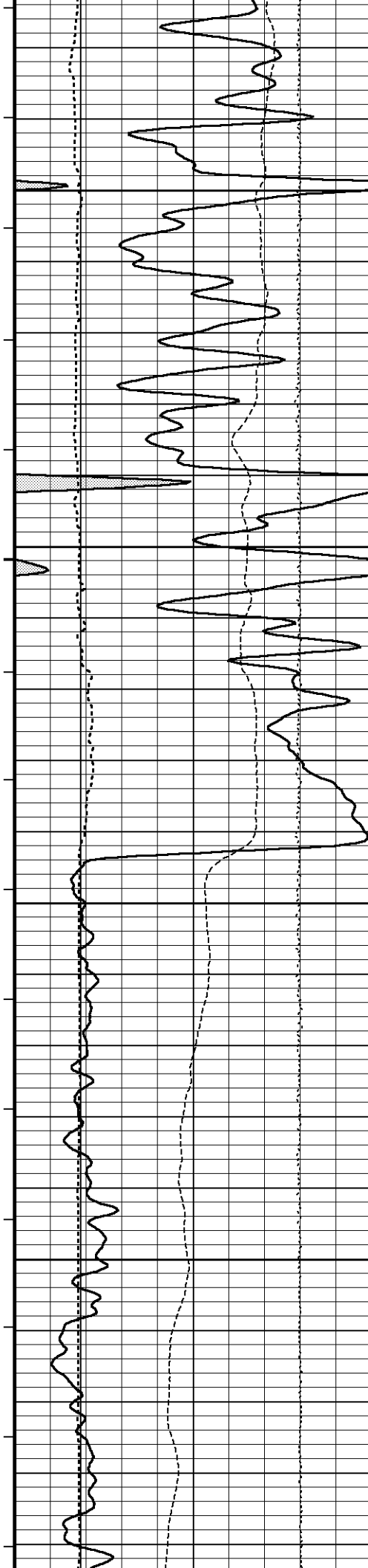
5600











109°

5400

110°

5450

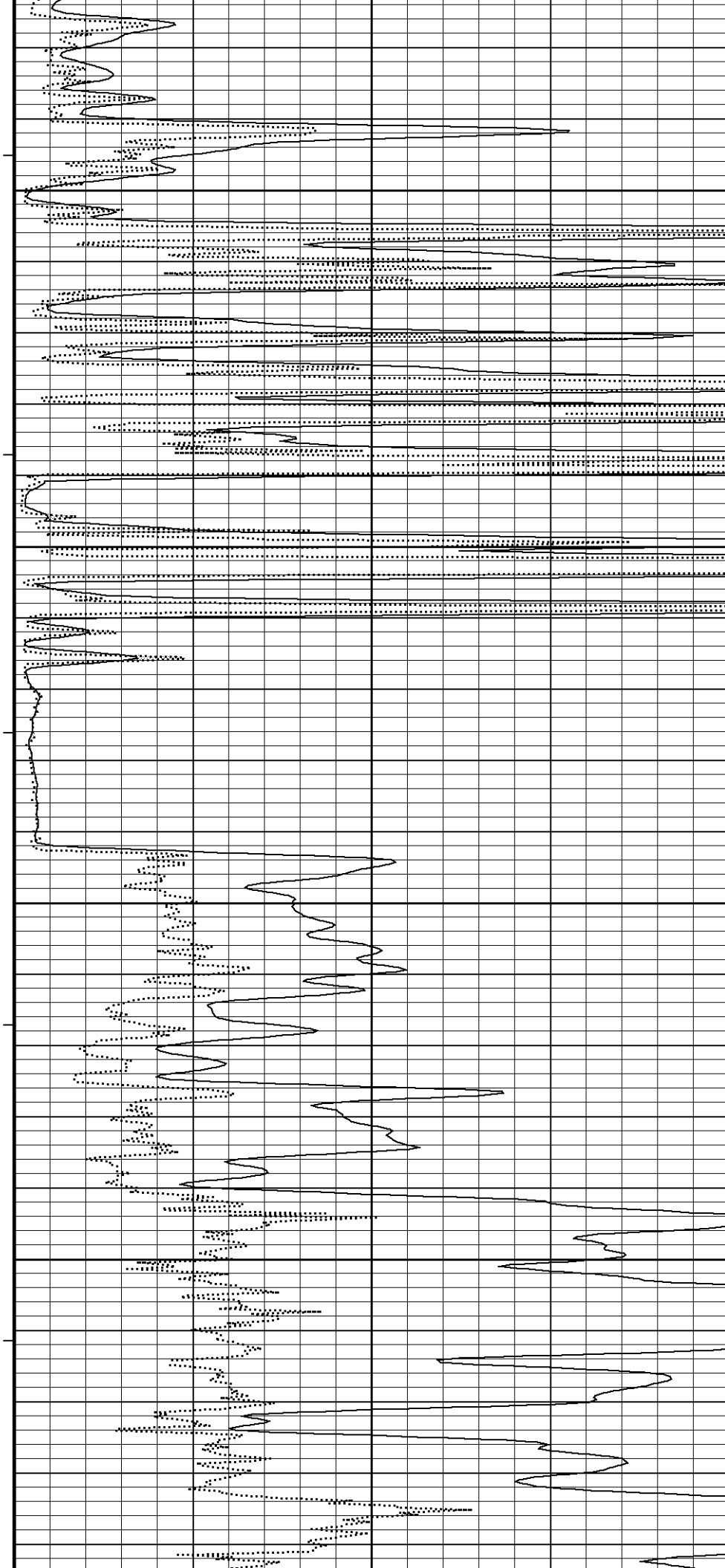
111°

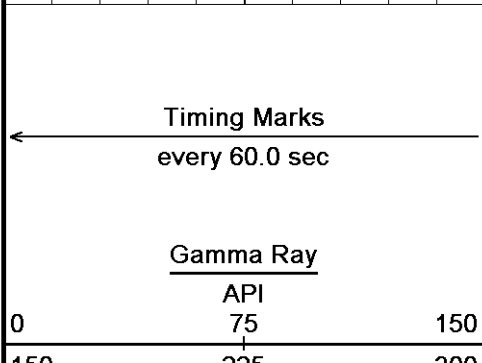
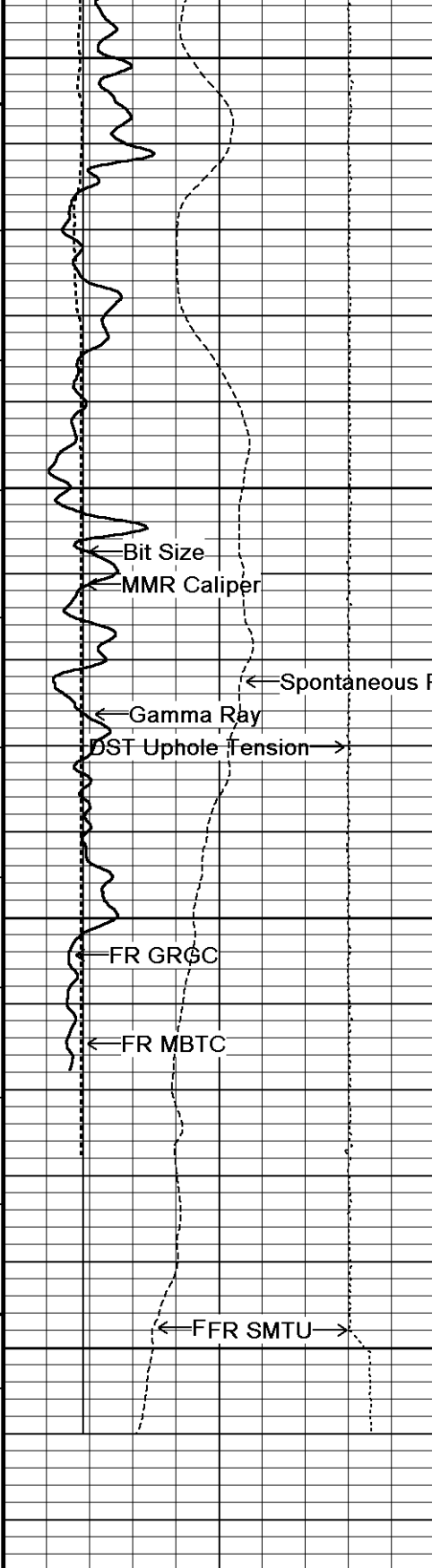
5500

112°

5550

112°





5600

112°

5650

112°

5700

0

5750

5774

Depth
in
Feet

MMR MicroLog Normal

FR MNRL

FR MINV

MMR MicroLog Normal
ohm metres

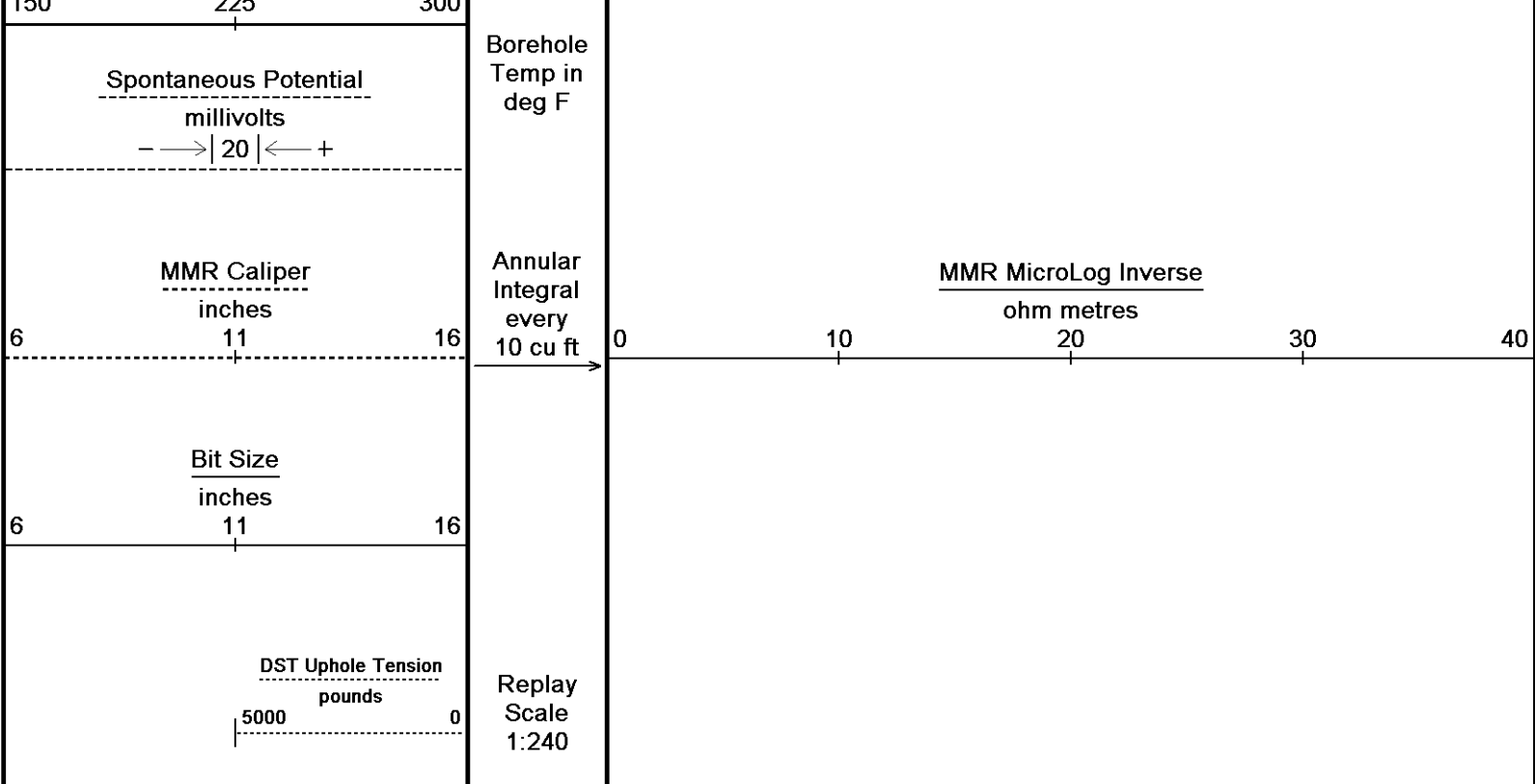
0

10

20

30

40



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.04.8492\Data\O'Brien Ardrey #2-2\O'Brien Ardrey #2-2_002.dta
System Versions: Logged with 13.04.8492 Processed with 13.04.8492 Plotted with 13.04.8492

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION			
C:\Minimus 13.04.8492\Data\O'Brien Ardrey #2-2\O'Brien Ardrey #2-2_003.dta			
General Constants All 000		Last Edited on 12-APR-2013,12:53	
General Parameters			
Mud Resistivity	0.340	ohm-metres	
Mud Resistivity Temperature	77.000	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		
Down-hole Tension Calibration SMS 0		Field Calibration on 12-APR-2013 12:12	
Reading No	Measured	Calibrated (lbs)	
1	15097.65	0.00	
2	15369.34	383.60	
Gamma Calibration MCG-B 34		Field Calibration on 10-APR-2013 10:25	
	Measured	Calibrated (API)	
Background	60	40	
Calibrator (Gross)	1154	765	
Calibrator (Net)	1095	725	

Gamma Calibrator Number	GR38	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG-B 34

Field Calibration on 29-MAR-2013,12:58

	Measured	Calibrated (mV)
Reference 1	101.0	100.0
Reference 2	-99.0	-100.0

High Resolution Temperature Calibration MCG-B 34

Field Calibration on 29-MAR-2013,12:58

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

High Resolution Temperature Constants MCG-B 34

Last Edited on 29-MAR-2013,12:58

Pre-filter Length	11
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Micro Laterolog Calibration MMR-A 11

Base Calibration on 31-DEC-1999 00:00

Field Check on 31-DEC-1999 00:00

Base Calibration

	Measured		Calibrated (ohm-m)	
	Ref 1	Ref 2	Ref 1	Ref 2
	0.0	0.0	0.0	0.0
	Base Check (ohm-m)		Field Check (ohm-m)	
	0.0		0.0	

Micro Laterolog Constants MMR-A 11

Last Edited on

Pad Type	6 in Solid Nylon B23059	
Micro Laterolog K Factor	0.0128	
Standoff Offset	0.0000	inches
Mudcake Thickness Correction Constants		
Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper		
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	20.00	Degrees C
Mud Cake Resistivity Source	Constant Value	
Temp. Source Rmc Correc.	MCG External Temperature	

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 08-MAR-2013 17:36

Field Check on 10-APR-2013 10:27

Base Calibration

		Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.4	60.0	5.0	25.0	
Micro Inverse	15.5	77.5	5.0	25.0	
Channel	Base Check (ohm-m)		Field Check (ohm-m)		
Micro Normal	76.3		76.3		
Micro Inverse	58.7		58.7		

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 05-NOV-2012,13:54

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	0.0000	inches

Caliper Calibration MMR-A 11

Base Calibration on 08-APR-2013 09:09

Field Calibration on 10-APR-2013 10:30

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13932	5.98
2	17063	7.97

3	20236	9.86
4	24170	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.93	5.98

Neutron Calibration MDN-A.B 65

Base Calibration on 13-MAR-2013 16:17
Field Check on 10-APR-2013 10:41

Base Calibration

	Measured	Calibrated (cps)
	Near Far	Near Far
	2980 92	3714 110
Ratio	32.499	33.764

Field Calibrator at Base

Calibrated (cps)
1736 2464
Ratio 0.705

Field Check

Calibrated (cps)
1736 2470
Ratio 0.680

Neutron Constants MDN-A.B 65

Last Edited on 12-APR-2013,11:36

Neutron Source Id	PN-521	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Bit Size	
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	None	
Temperature	N/A	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 352

Base Calibration on 16-JAN-2013 10:20
Field Check on 10-APR-2013 10:50

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.3	126.8

Base Check	281.2
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Field Check	281.3
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FE Constants MFE-B.J 352

Last Edited on 12-APR-2013,11:35

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

High Resolution Temperature Calibration MAI-A.A 45

Field Calibration on 13-DEC-2012,10:54

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

Pre-filter Length 11

Induction Calibration MAI-A.A 45

Base Calibration on 26-JUL-2012,09:22

Field Check on 10-APR-2013 10:52

Base Calibration

Test Loop Calibration

Measured

Calibrated (mmho/m)

Channel	Low	High	Low	High
1	14.4	472.6	9.3	966.2
2	5.7	374.0	7.6	821.4
3	3.4	261.2	5.2	566.0
4	2.5	133.9	2.6	279.2

Array Temperature 78.4 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			18.4	3850.4
2			31.7	3628.8
3			28.7	3049.3
4			18.3	2079.1
Deep			16.1	1911.4
Medium			42.5	4060.4
Shallow			49.5	5481.9

Array Temperature 60.4 Deg F

Induction Constants MAI-A.A 45

Last Edited on 12-APR-2013,11:35

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

45.00 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	

Caliper Calibration MPD-B 31

Base Calibration on 28-MAR-2013 13:43

Field Calibration on 08-APR-2013 08:48

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16832	3.99
2	24690	5.98
3	33328	7.97
4	41600	9.86
5	50976	11.92
6	N/A	N/A
Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	6.00	5.98

Photo Density Calibration MPD-B 31				Base Calibration on 13-MAR-2013 15:17 Field Check on 10-APR-2013 10:49	
Density Calibration					
Base Calibration		Measured		Calibrated (sdu)	
	Near	Far	Near	Far	
Reference 1	46119	23502	59556	30836	
Reference 2	19149	1933	24941	2541	
Field Check at Base					
	681.1	838.4			
Field Check					
	679.5	834.9			
PE Calibration					
Base Calibration		Measured		Calibrated	
	WS	WH	Ratio	Ratio	
Background	125	604			
Reference 1	19219	46004	0.421	0.371	
Reference 2	5674	19062	0.301	0.272	
Field Check at Base					
	125.1	603.7			
Field Check					
	124.6	603.1			

Density Constants MPD-B 31				Last Edited on 12-APR-2013,11:36	
Density Source Id		254			
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		1.12	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 (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			

DOWNHOLE EQUIPMENT			
C:\Minimus 13.04.8492\Data\O'Brien Ardrey #2-2\O'Brien Ardrey #2-2_003.dta			

Compact Comms Gamma		43.50 ft	GRGC - Gamma Ray
MCC 501-10-2720-WT 20.0 lb CD 0.01			CCYT 100-510-10-10

MCG-B 34 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-Resistivity

MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.88 in

Compact Neutron

MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper

MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

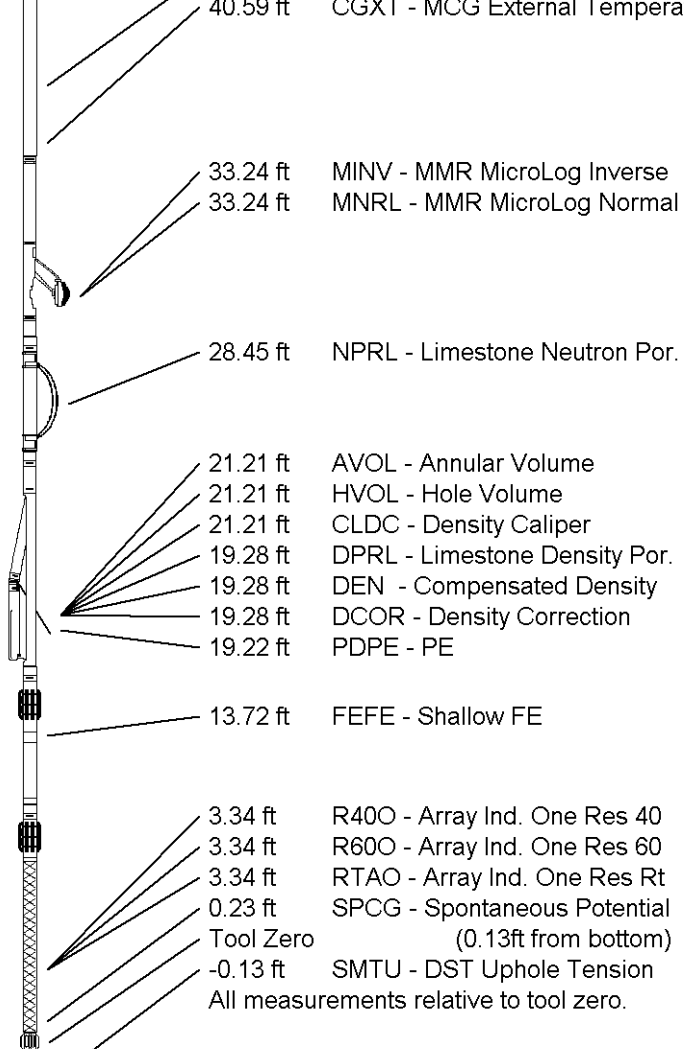
Compact Focussed Electric

MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction

MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 48.78 ft Weight: 383.6 lb



COMPANY

O'BRIEN ENERY RESOUCES CORP.

WELL

ARDREY #2-2

FIELD

ARDREY

PROVINCE/COUNTY

CLARK

COUNTRY/STATE

U.S.A. / KANSAS

Elevation Kelly Bushing	2553.00	feet
Elevation Drill Floor	2551.00	feet
Elevation Ground Level	2541.00	feet

First Reading	5714.00	feet
Depth Driller	5750.00	feet
Depth Logger	5748.00	feet



Weatherford®

MICRORESISTIVITY LOG