MICRORESISTIVITY LOG

COMPANY	FIML NATURAL RESOURCES, LLC.
WELL	MULVILLE #15B-18-2029
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	900' FSL & 2280' FEL

SEC 18	TWP 20S	RGE 29W	Other Services
Latitude			MPD/MDN MAI/MFE
Longitude			MSS
API Number	15-101-22501		

Permanent Datum GL, Elevation 2889 feet		Elevations:	feet
Log Measured From KB		KB	2899.00
Drilling Measured From KB		DF	2897.00
		GL	2889.00

Date	01-APR-2014				
Run Number	ONE				
Service Order	4558-83548386				
Depth Driller	4935.00	feet			
Depth Logger	4938.00	feet			
First Reading	4892.00	feet			
Last Reading	2500.00	feet			
Casing Driller	435.00	feet			
Casing Logger	438.00	feet			
Bit Size	7.875	inches			
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.40 lb/USg		68.00 CP		
PH / Fluid Loss	10.00		8.00 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.81 @ 95.0	ohm-m			
Rmf @ Measured Temp	0.65 @ 95.0	ohm-m			
Rmc @ Measured Temp	0.97 @ 95.0	ohm-m			
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.64 @121.0	ohm-m			
Time Since Circulation	4 HOURS				
Max Recorded Temp	121.00	deg F			
Equipment / Base	13244		LIB		
Recorded By	ADAM SILL				
Witnessed By	JIM MUSGROVE			GARY DOKE	
JOB #	LB14-098				

BOREHOLE RECORD

Last Edited: 01-APR-2014 12:37

Bit Size inches	Depth From feet	Depth To feet
7.875	435.00	4935.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	435.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113.
- 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: 1745 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1005 CU.FT.

- RIG: H2 DRILLING #1.

- ENGINEER: A. SILL.

- OPERATOR: J. LaPOINT.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 01-APR-2014 18:37

Filename: C:\Minimus 13.08.2113\Logs\FIML ...\FIML Natural Resources Mulville #15B-18-2029_002.dta — Recorded on 01-APR-2014 15:18

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
– → | 20 | ← +

Bit Size
inches
6 11 16

MMR Caliper
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

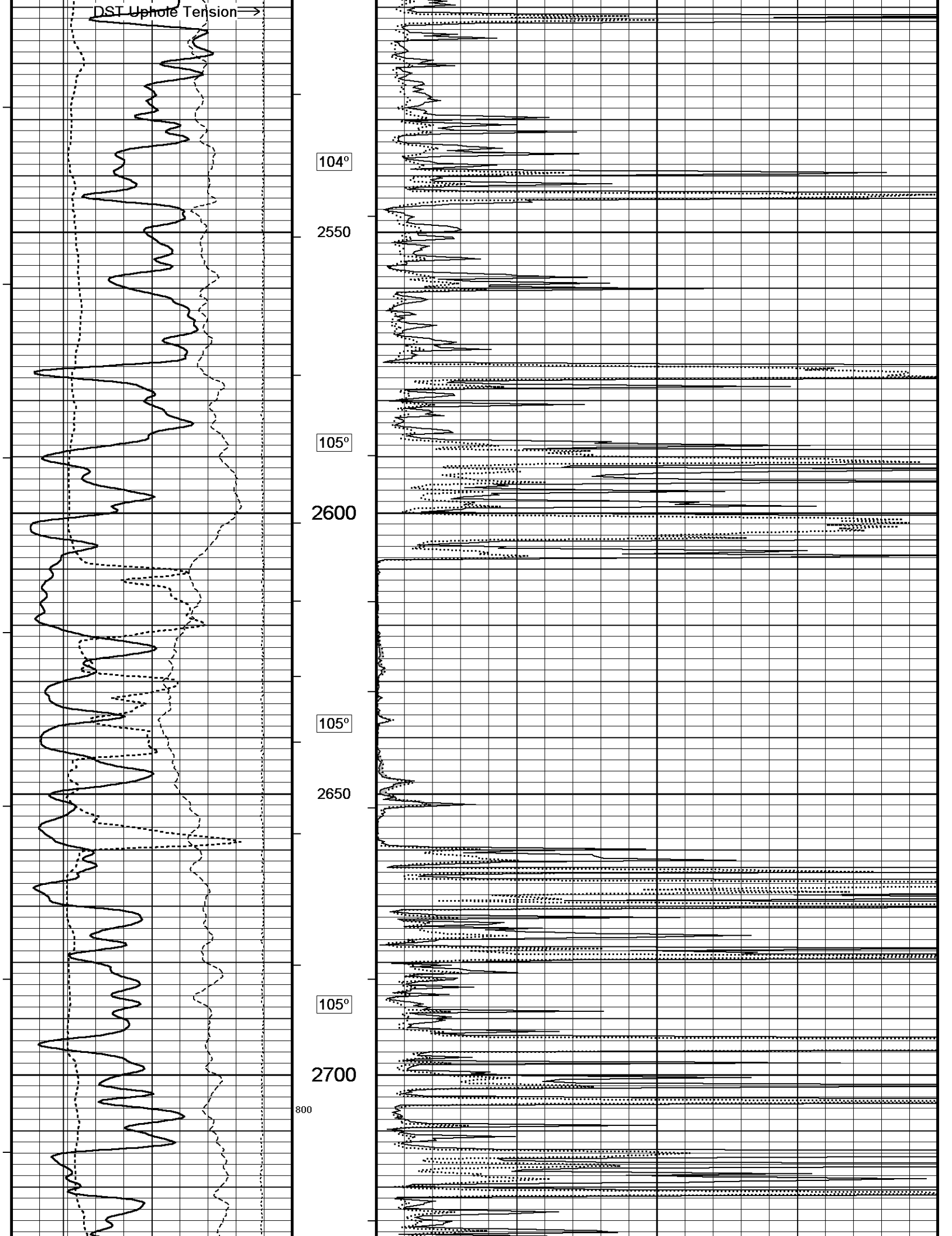
MMR MicroLog Normal
ohm metres
0 10 20 30 40

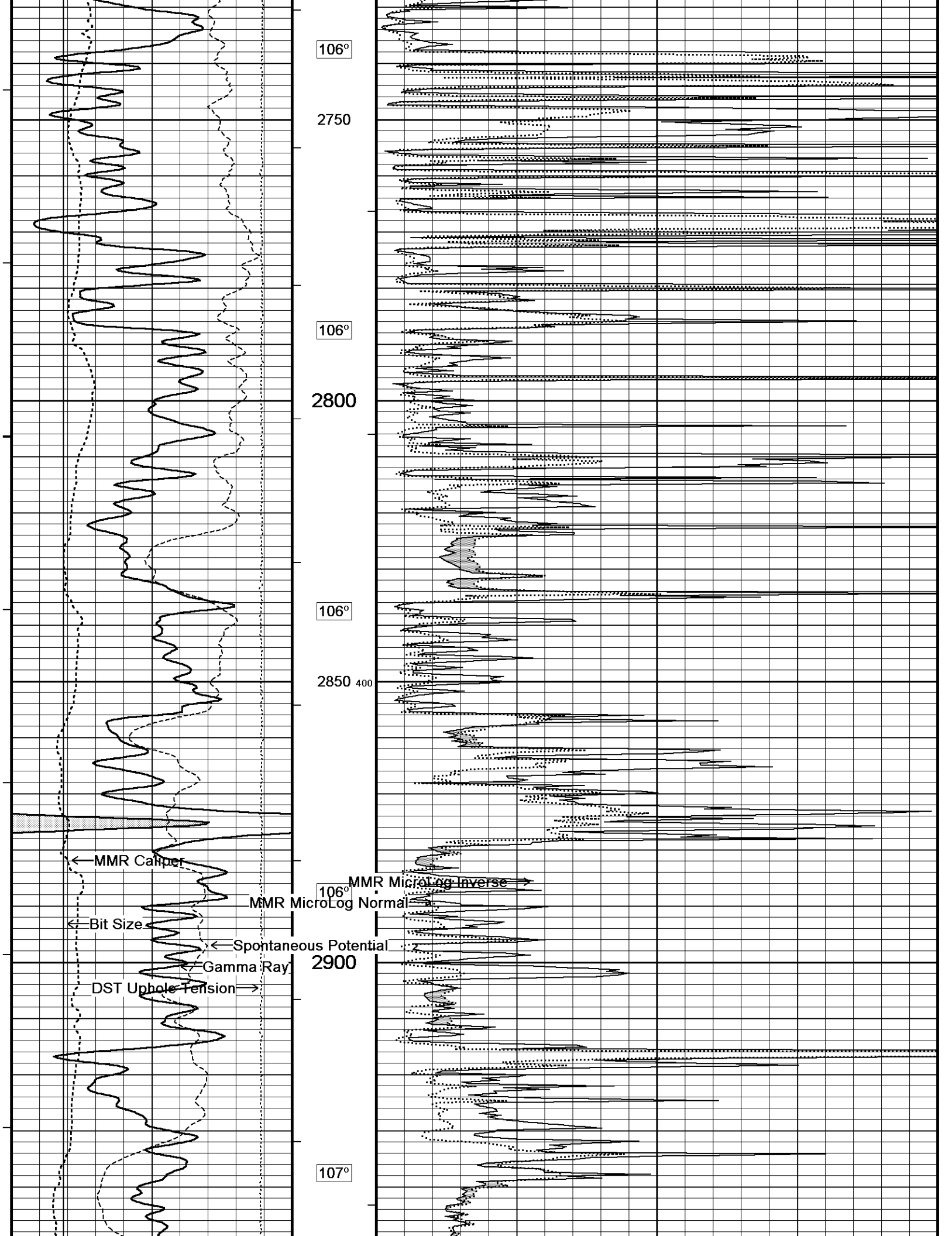
MMR MicroLog Inverse
ohm metres
0 10 20 30 40

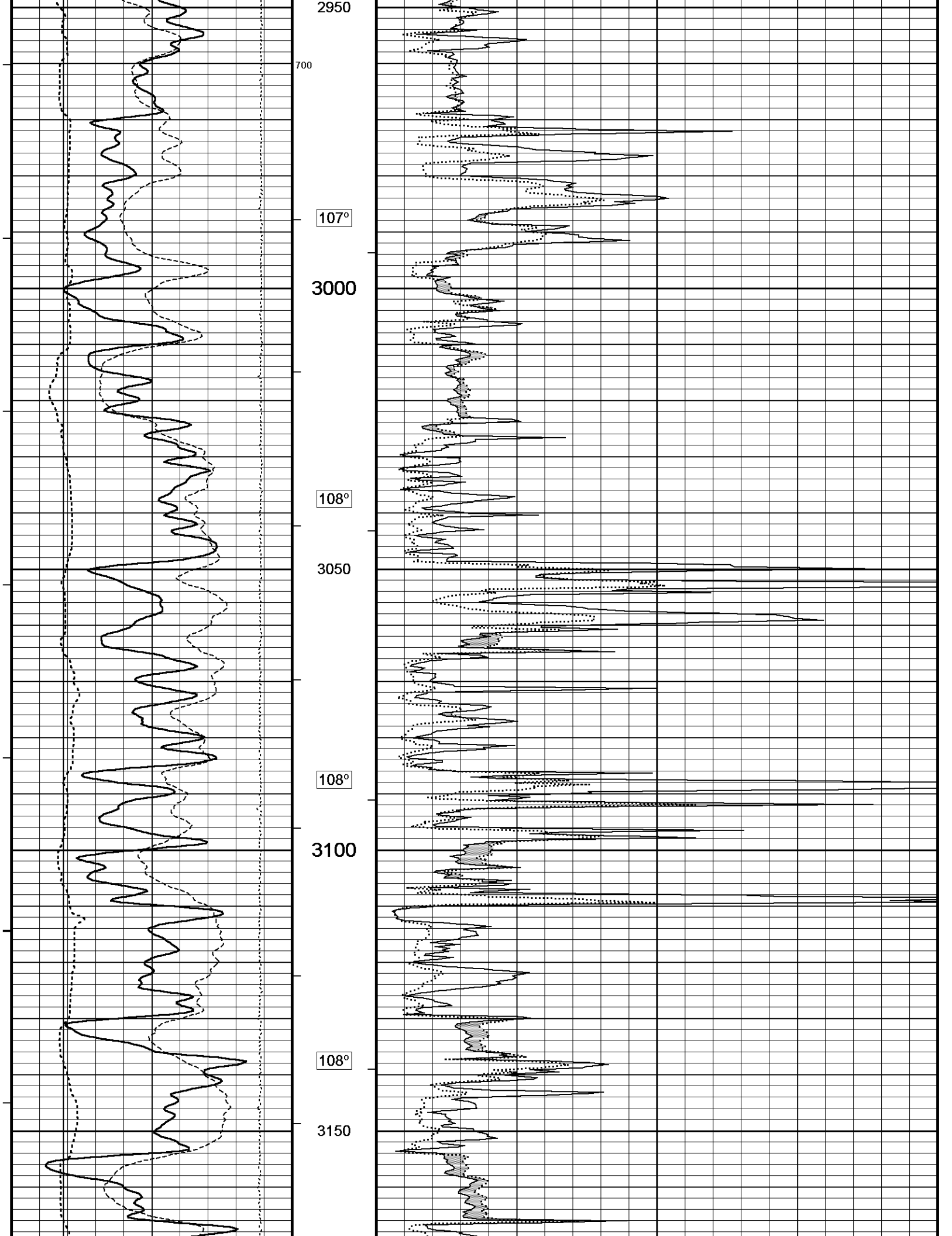
900 2500

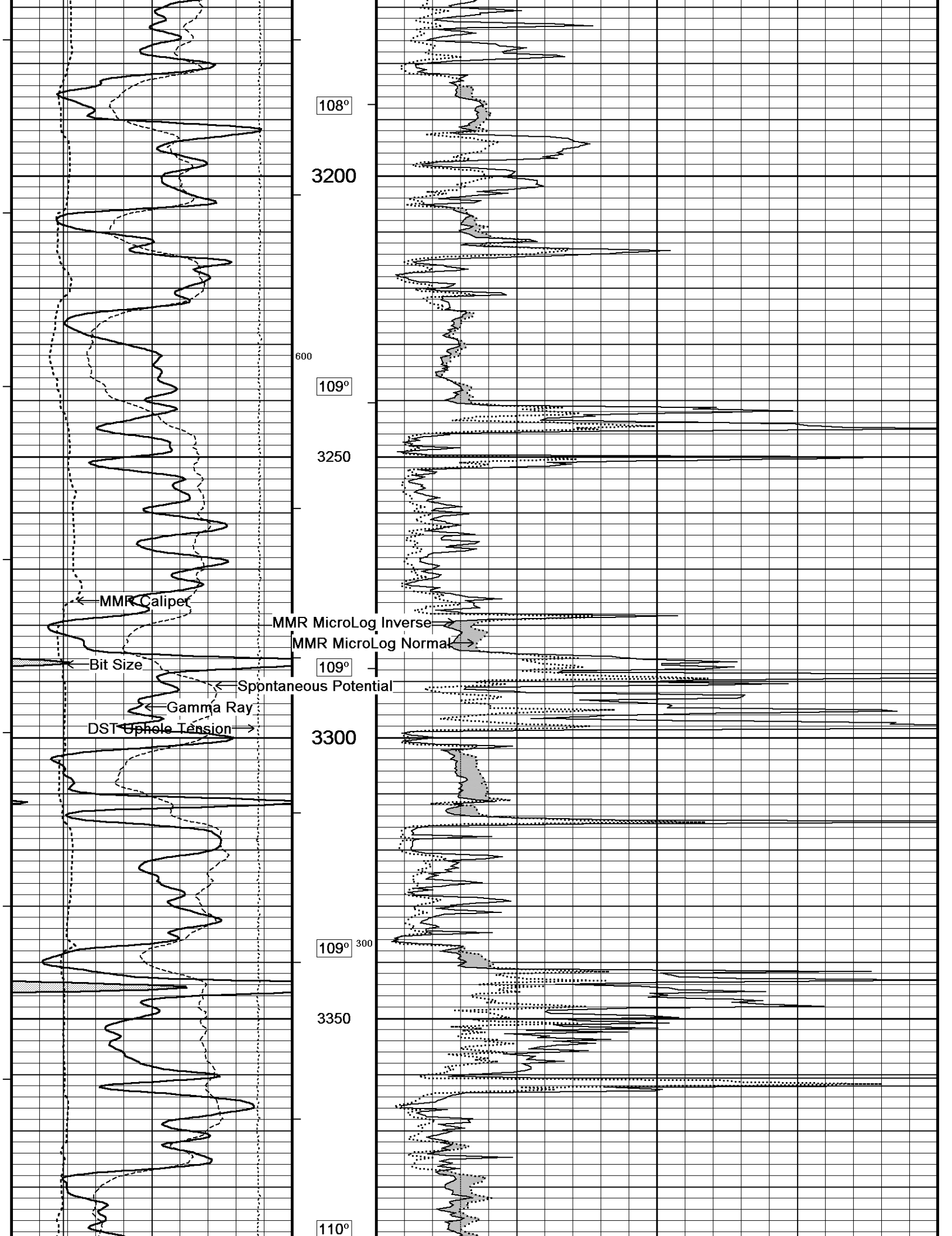
← Spontaneous Potential

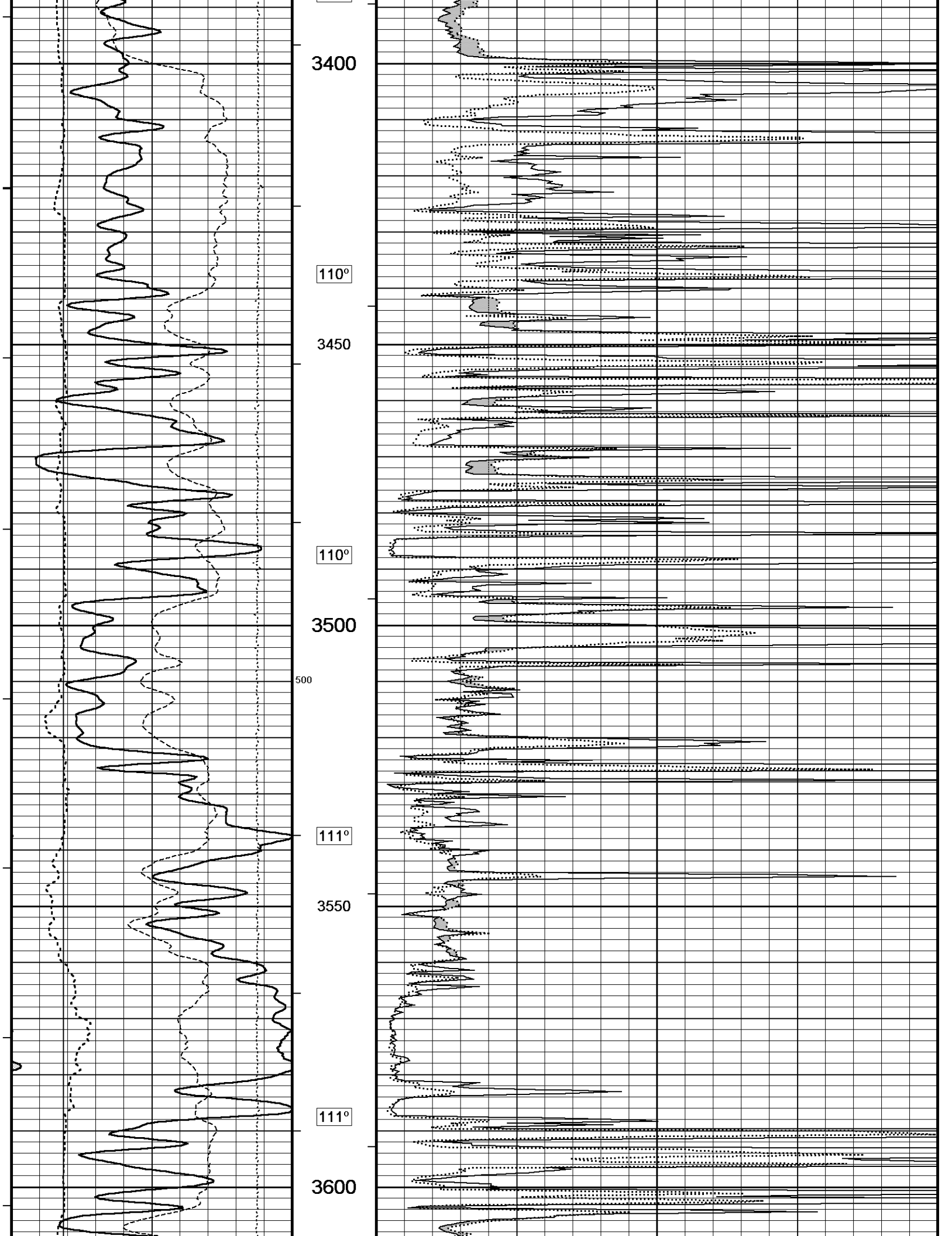
← Gamma Ray

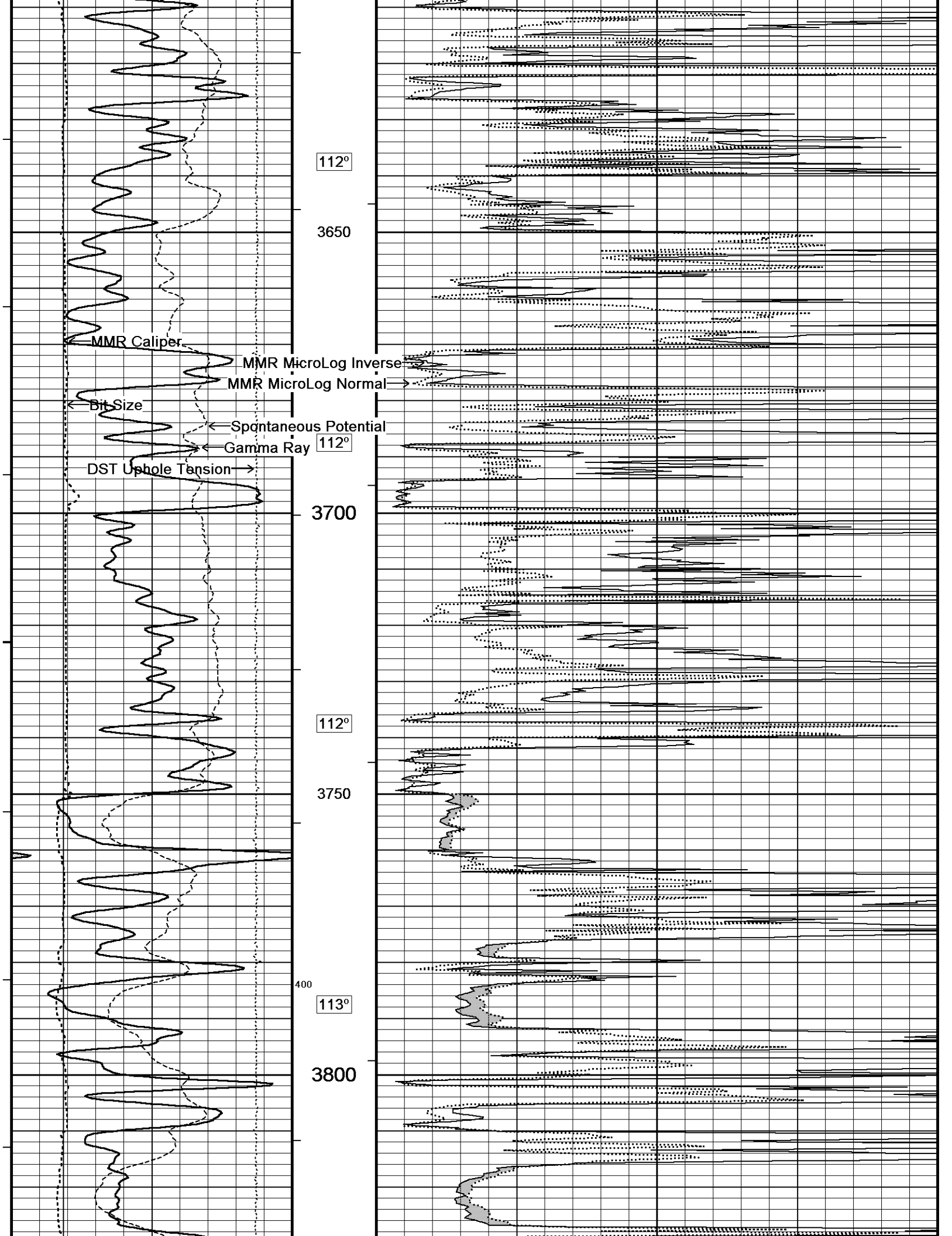

DST Uphole Tension
104°
2550
105°
2600
105°
2650
105°
2700
800

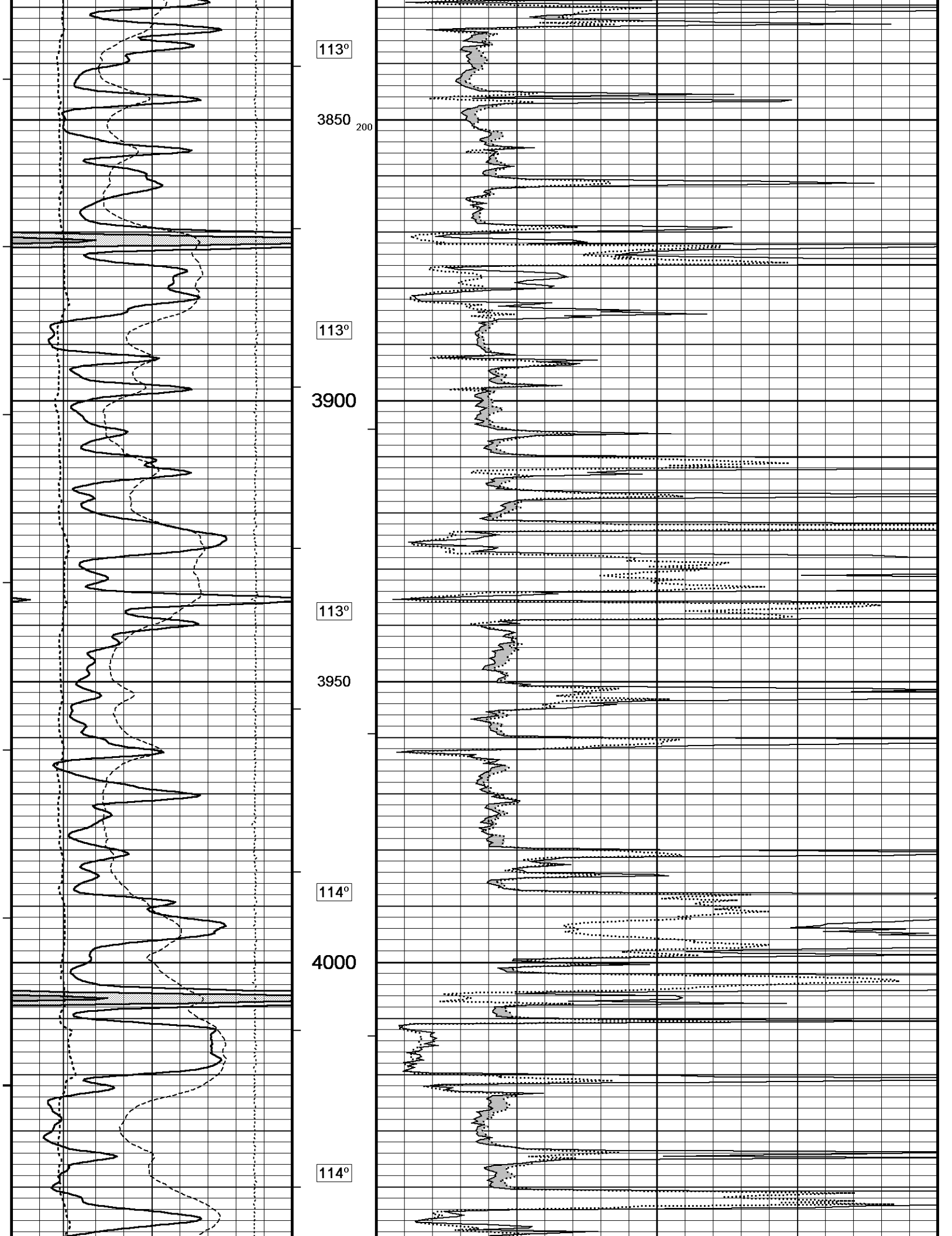

106°
2750
106°
2800
106°
2850
400
MMR Caliper
MMR MicroLog Inverse
106°
MMR MicroLog Normal
Bit Size
Spontaneous Potential
2900
Gamma Ray
DST Uphole Tension
107°

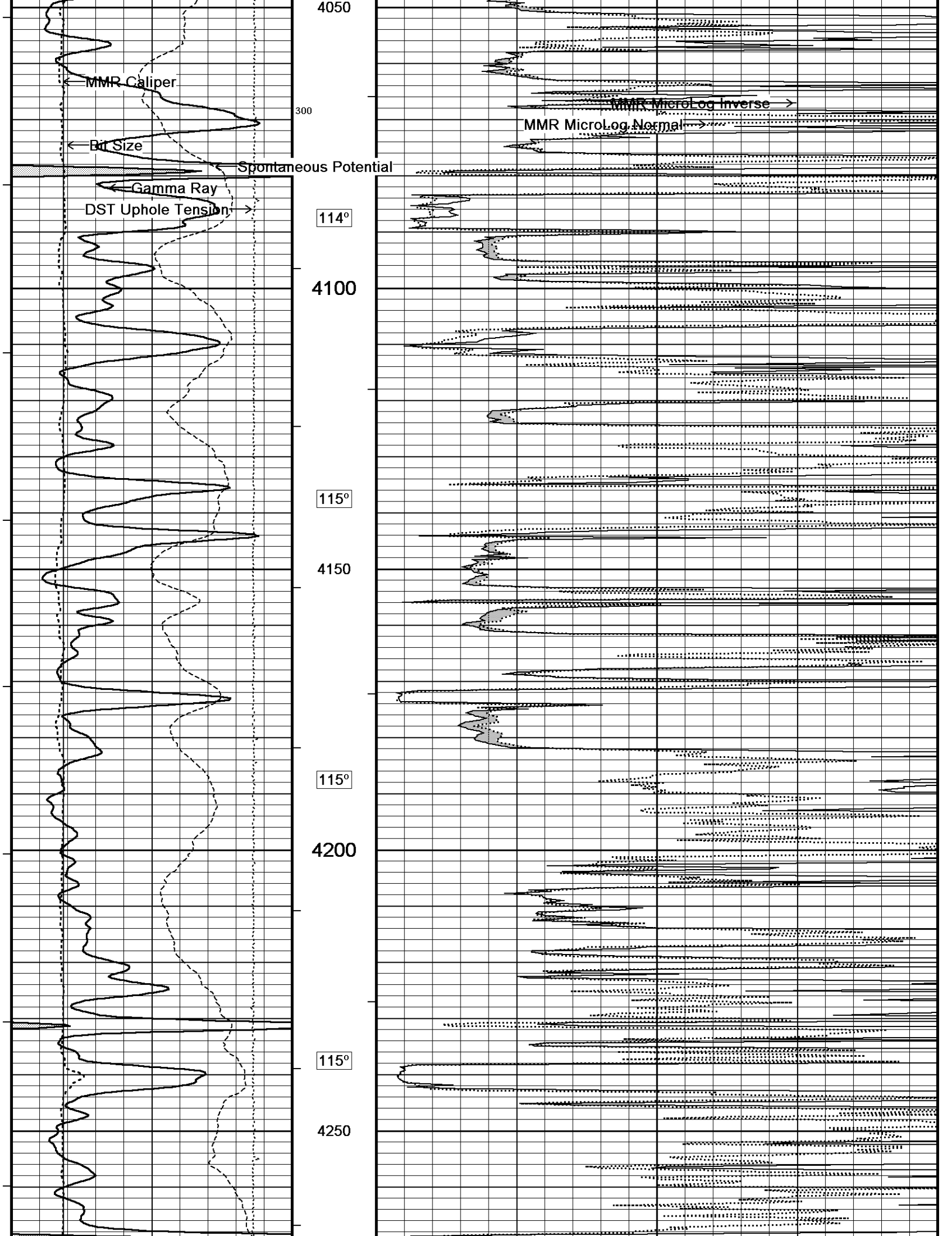

2950
700
107°
3000
108°
3050
108°
3100
108°
3150

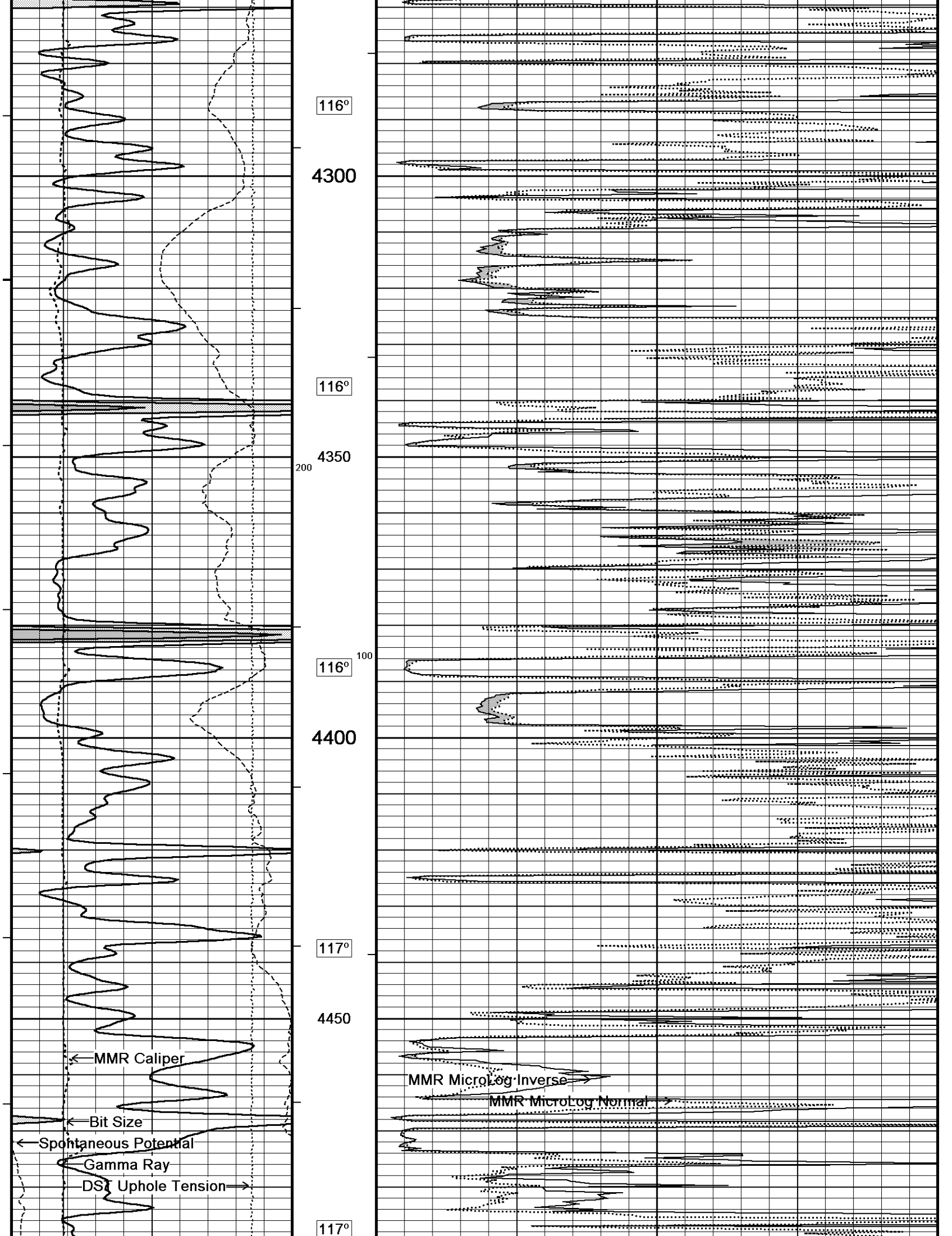

108°
3200
600
109°
3250
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Bit Size
109°
Spontaneous Potential
Gamma Ray
DST Uphole Tension
3300
109°
300
3350
110°

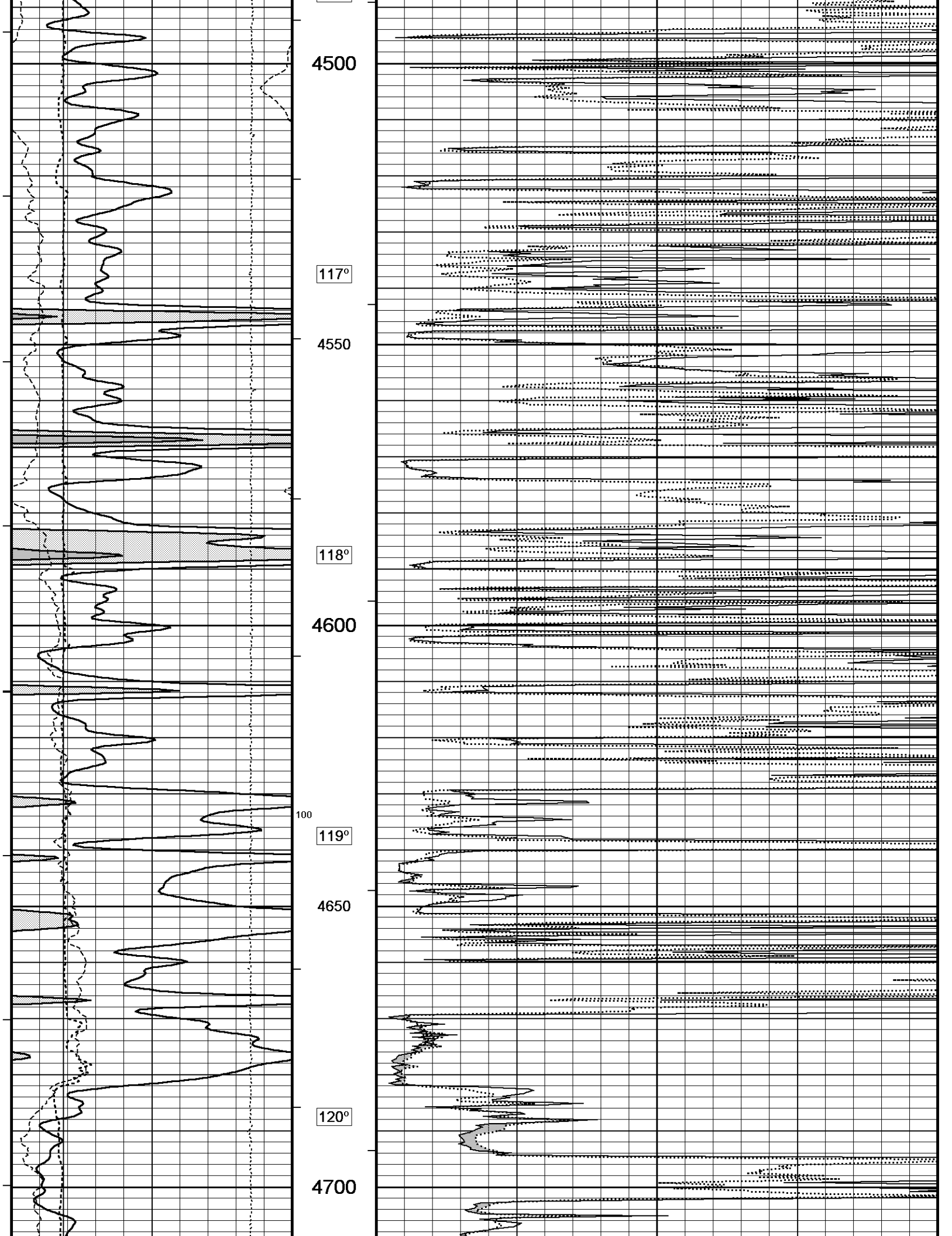

3400
110°
3450
110°
3500
500
111°
3550
111°
3600

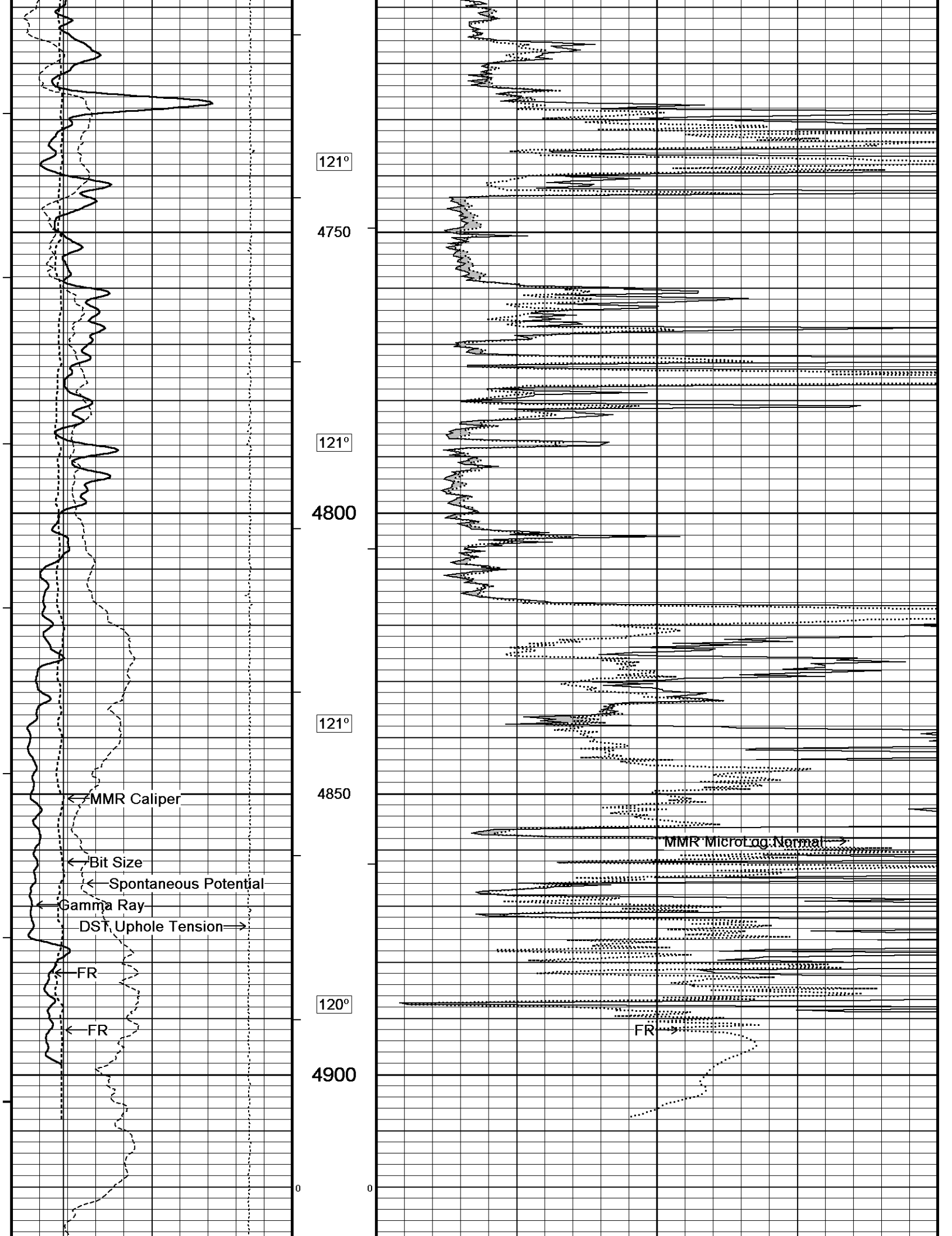

112°
3650
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Bit Size
Spontaneous Potential
Gamma Ray
112°
DST Uphole Tension
3700
112°
3750
400
113°
3800

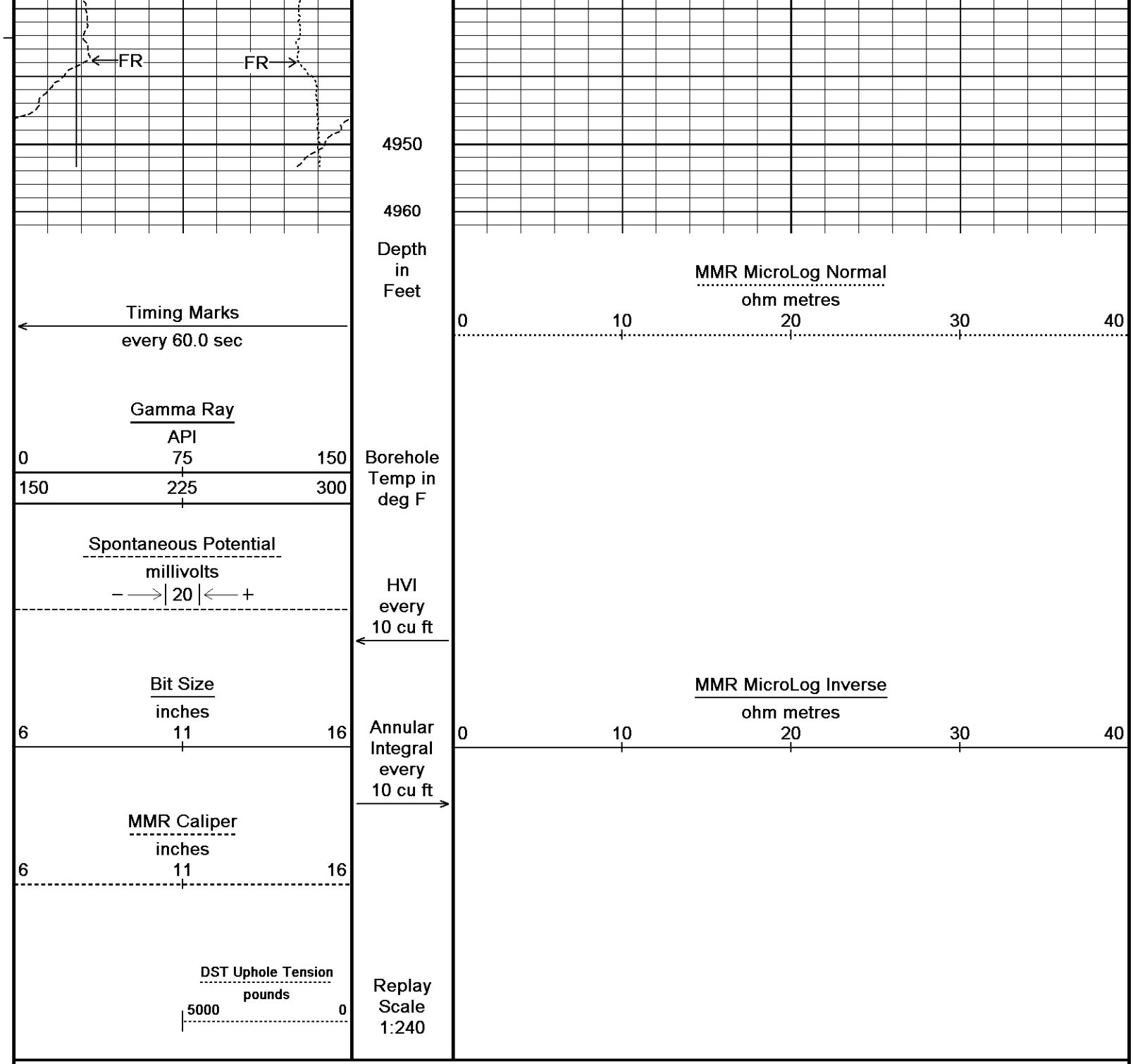

113°
3850
200
113°
3900
113°
3950
114°
4000
114°


4050
MMR Caliper
300
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
114°
4100
115°
4150
115°
4200
115°
4250
MMR MicroLog Inverse
MMR MicroLog Normal


116°
4300
116°
4350
200
116°
100
4400
117°
4450
MMR Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
117°


4500
117°
4550
118°
4600
100
119°
4650
120°
4700


121°
4750
121°
4800
121°
4850
120°
4900
MMR Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR
FR
MMR Microl og Normal
FR
0
0

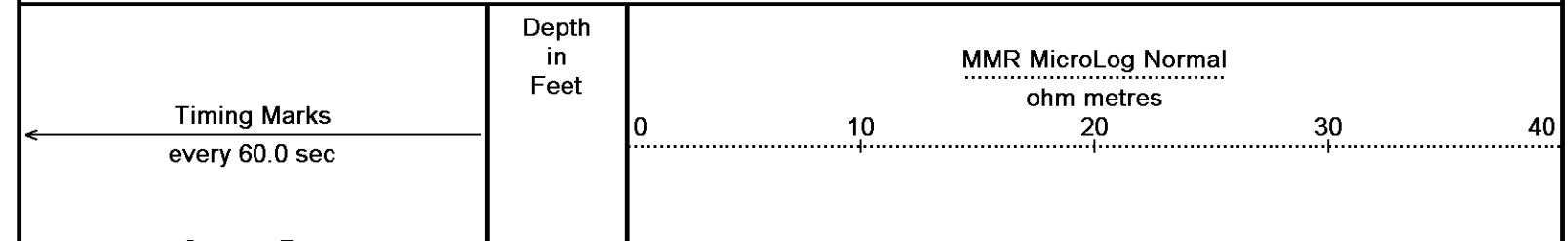


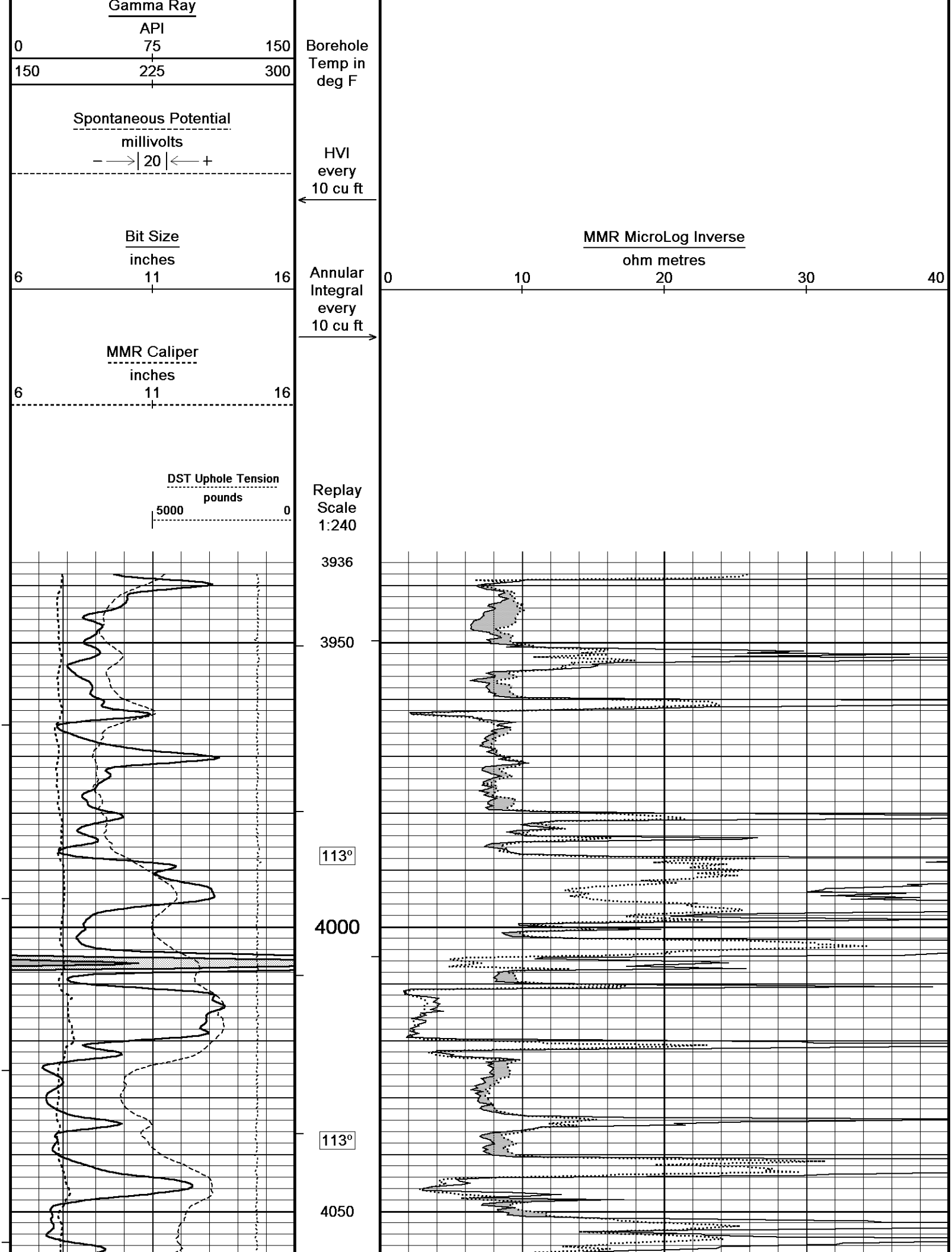
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 01-APR-2014 18:37
Filename: C:\Minimus 13.08.2113\Logs\FIML ...\FIML Natural Resources Mulville #15B-18-2029_002.dta — Recorded on 01-APR-2014 15:18
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

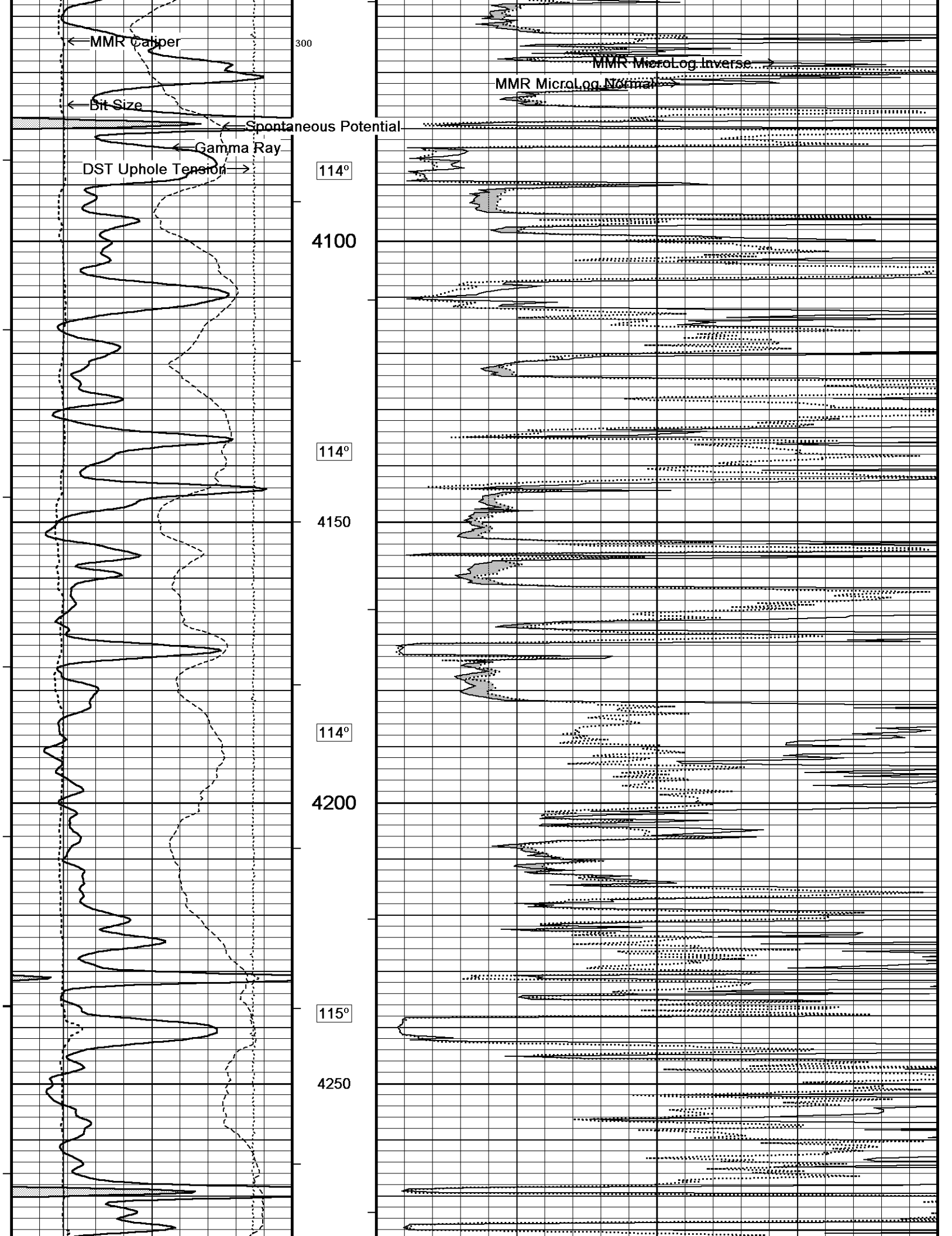
5 INCH MAIN

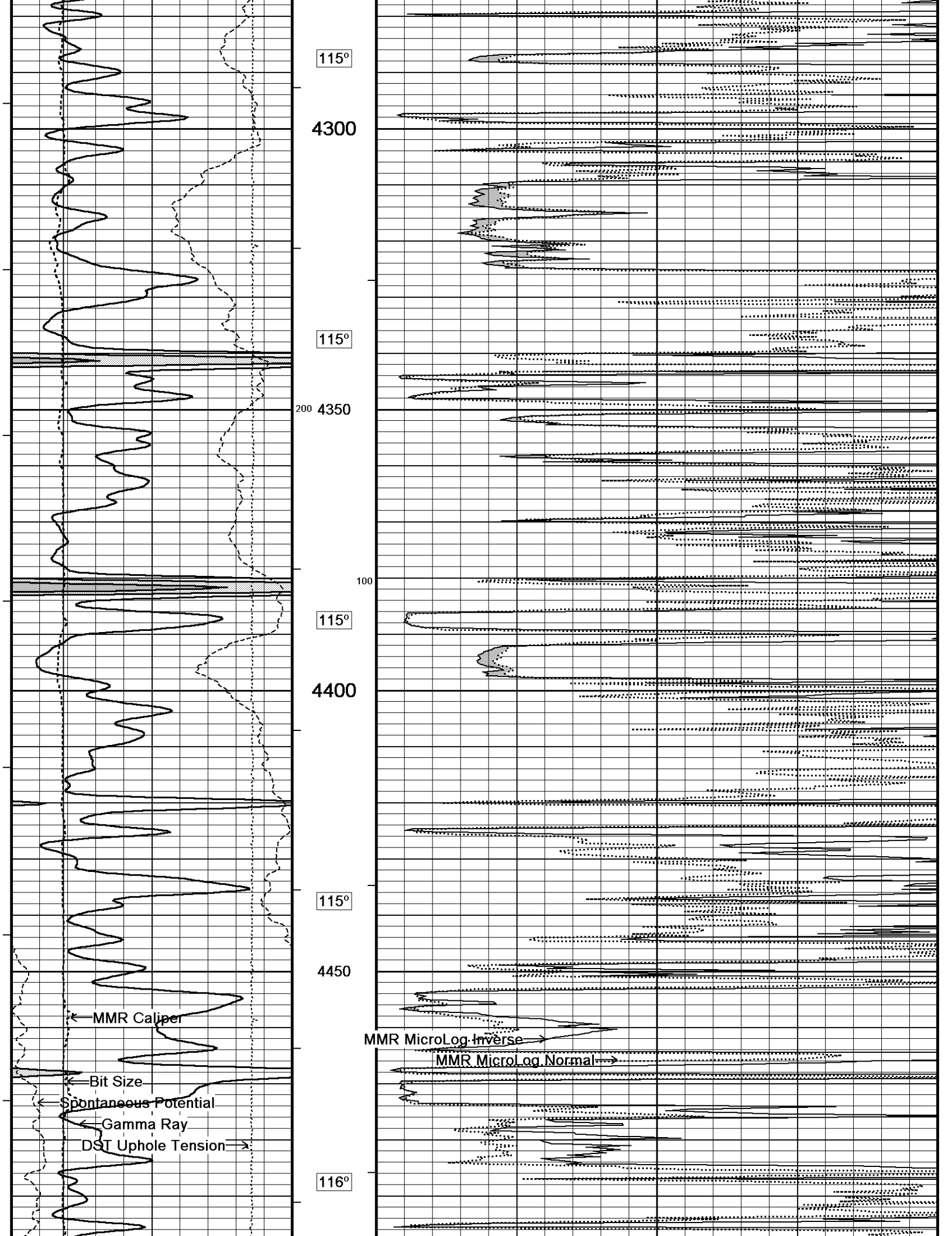
REPEAT SECTION

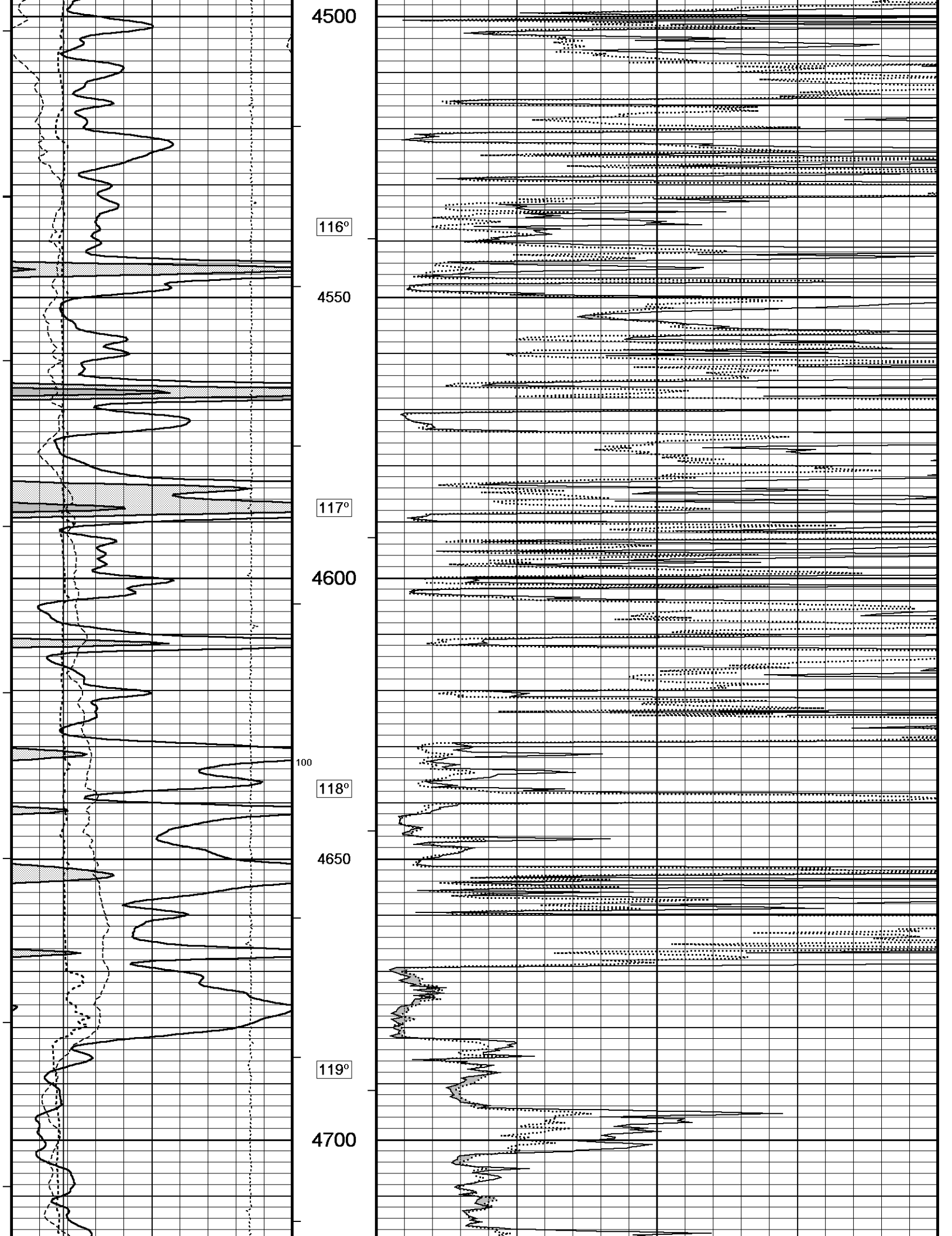
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 01-APR-2014 18:37
Filename: C:\Minimus 13.08.2113\Logs\FIML ...\FIML Natural Resources Mulville #15B-18-2029_001.dta — Recorded on 01-APR-2014 14:29
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

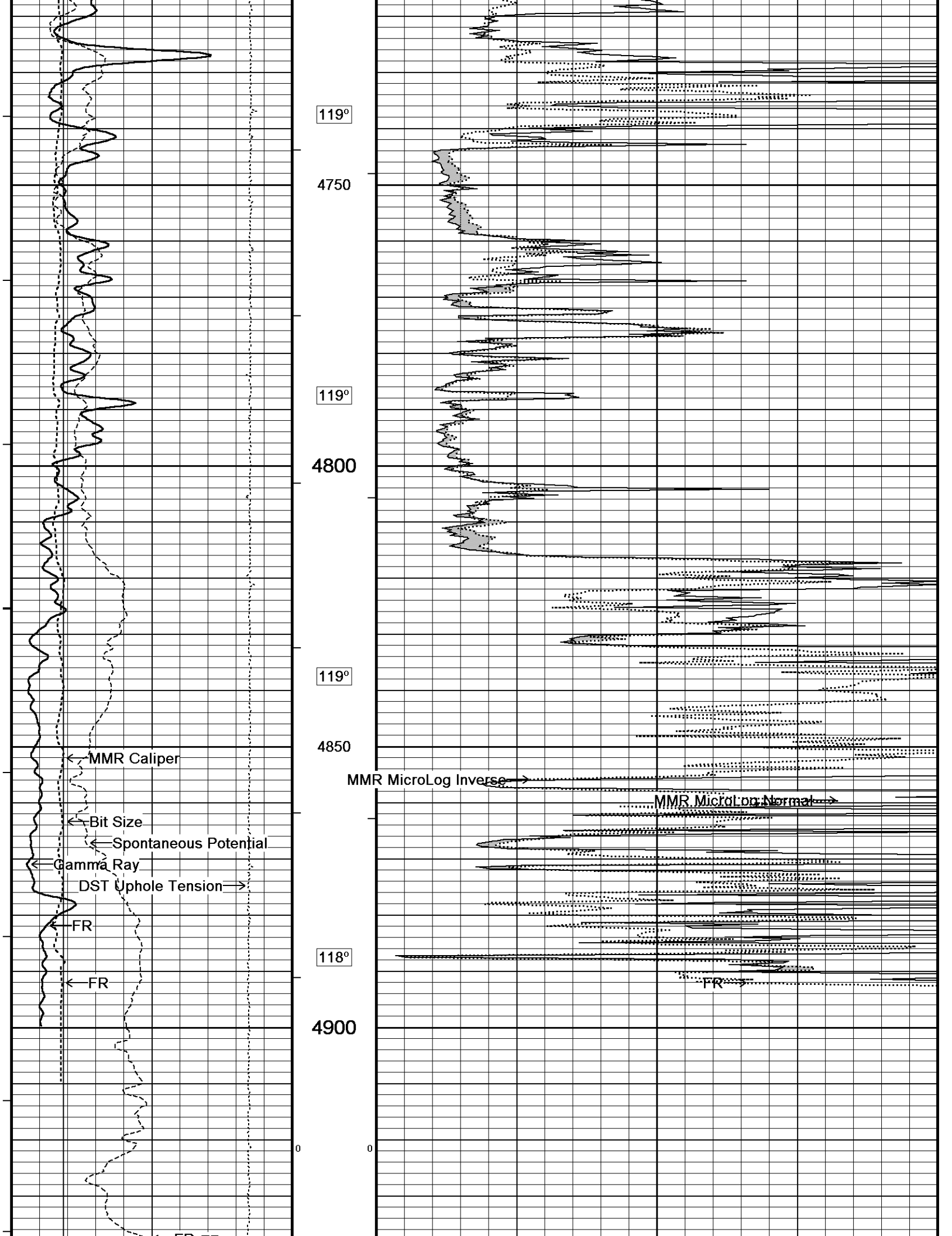


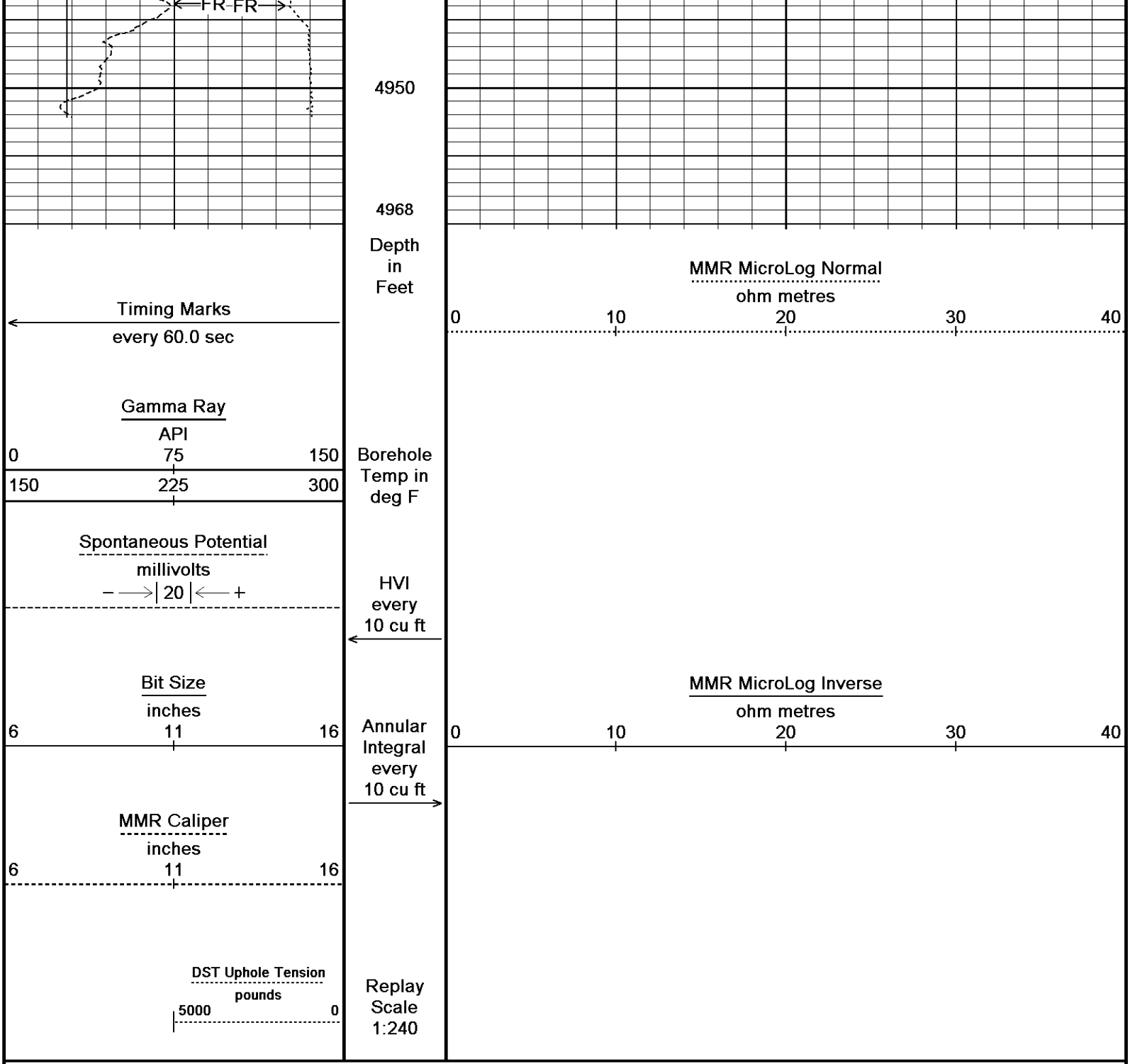

Gamma Ray
API
0
75
150
150
225
300
Borehole Temp in deg F
Spontaneous Potential
millivolts
– 20 +
HVI every 10 cu ft
Bit Size
inches
6
11
16
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
Annular Integral every 10 cu ft
MMR Caliper
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
3936
3950
113°
4000
113°
4050


MMR Caliper
300
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
114°
4100
114°
4150
114°
4200
115°
4250


115°
4300
115°
200
4350
100
115°
4400
115°
4450
116°
MMR Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal


4500
116°
4550
117°
4600
100
118°
4650
119°
4700


119°
4750
119°
4800
119°
4850
118°
4900
MMR Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR
FR
MMR MicroLog Inverse
MMR MicroLog Normal
FR
0
0



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 01-APR-2014 18:37

Filename: C:\Minimus 13.08.2113\Logs\FIML ...\FIML Natural Resources Mulville #15B-18-2029_001.dta — Recorded on 01-APR-2014 14:29

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\FIML Natural Resources Mulville #15B-18-2...\FIML Natural Resources Mulville #15B-18-2029_002.dta

General Constants All 000 — Last Edited on 01-APR-2014,14:04

General Parameters

Mud Resistivity	0.810	ohm-metres
Mud Resistivity Temperature	95.000	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	Base Density Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	0.610
RWA Constant M	2.150
SW/APOR Tool Source	0.000

Down-hole Tension Calibration SMS 0

Field Calibration on 18-MAR-2014 09:04

Reading No	Measured	Calibrated (lbs)
1	15374.81	0.00
2	15847.36	399.00

Gamma Calibration MCG-C 150

Field Calibration on 01-APR-2014 09:38

	Measured	Calibrated (API)
Background	70	48
Calibrator (Gross)	1142	773
Calibrator (Net)	1072	725

Gamma Constants MCG-C 150

Last Edited on 01-APR-2014,12:39

Gamma Calibrator Number	GRC038	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-C 150

Field Calibration on 10-MAR-2014 13:42

	Measured	Calibrated (mV)
Reference 1	99.9	99.0
Reference 2	-97.7	-98.8

High Resolution Temperature Calibration MCG-C 150

Field Calibration on 08-MAR-2014,10:59

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

High Resolution Temperature Constants MCG-C 150

Last Edited on 19-MAR-2014,20:39

Pre-filter Length	11

Caliper Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:12
Field Calibration on 01-APR-2014 09:23

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13253	5.96
2	16528	7.97
3	19726	9.95
4	23473	11.91
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.00	7.97

Micro Normal and Micro Inverse Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:03
Field Check on 01-APR-2014 09:24

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.1	49.8	5.1	25.6
Micro Inverse	9.9	49.5	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	93.6	93.6
Micro Inverse	62.2	62.2

Micro Normal and Micro Inverse Constants MMR-C.A 248

Last Edited on 23-JAN-2014,17:04

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

Neutron Calibration MDN-B.J 387

Base Calibration on 21-JAN-2014 13:56
Field Check on 01-APR-2014 09:42

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2848	86	3714	110
Ratio	32.942		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1737	2564
Ratio	0.677	

Field Check

	Calibrated (cps)	
	1718	2552
Ratio	0.668	

Neutron Constants MDN-B.J 387

Last Edited on 01-APR-2014,12:39

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron		
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 55

Base Calibration on 24-MAR-2014 10:21
Field Check on 01-APR-2014 09:13

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	951.2	126.8
Base Check		281.7
Field Check		281.7

FE Constants MFE-A.A 55

Last Edited on 01-APR-2014,12:38

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

Sonic Constants MSS-A.A 73

Last Edited on 01-APR-2014,12:38

Maximum Boundary Contrast	100.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft

Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft

Sonde Mode	Compensated
Hole Type	Open Hole

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A

Peak Amplitude Source N/A

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	N/A
N/A	N/A	N/A	
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A	
Use 4' Waveform to derive TR	N/A	
Use 5' Waveform to derive TR	N/A	
Use 6' Waveform to derive TR	N/A	
3' Waveform Discriminator Level	N/A	mV
4' Waveform Discriminator Level	N/A	mV
5' Waveform Discriminator Level	N/A	mV
6' Waveform Discriminator Level	N/A	mV
3' Waveform Filter	N/A	
4' Waveform Filter	N/A	
5' Waveform Filter	N/A	
6' Waveform Filter	N/A	
Semblance Level	N/A	
Semblance Window Width	N/A	micro-sec
Sonic 1 Despiker	N/A	N/A
Sonic 2 Despiker	N/A	N/A

Induction Calibration MAI-A.A 5

Base Calibration on 21-JAN-2014,09:50
Field Check on 01-APR-2014 09:12

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	16.3	470.8	9.3	966.2
2	5.6	376.1	7.6	821.4
3	2.6	266.1	5.2	566.0
4	1.6	130.0	2.6	279.2

Array Temperature 71.1 Deg F

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1			14.4	3862.9
2			31.7	3592.6

3	29.9	2973.5	
4	20.8	2127.8	
Deep	18.5	1913.8	
Medium	43.2	3864.1	
Shallow	47.2	5374.9	
Array Temperature		57.5	Deg F

Induction Constants MAI-A.A 5

Last Edited on 01-APR-2014,12:38

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	

High Resolution Temperature Calibration MAI-A.A 5

Field Calibration on 21-JAN-2014,15:43

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

High Resolution Temperature Constants MAI-A.A 5

Last Edited on 12-MAR-2014,16:38

Pre-filter Length	11

Photo Density Calibration MPD-B 64

Base Calibration on 21-JAN-2014 13:19
Field Check on 01-APR-2014 09:21

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1151	1332		
Reference 1	54413	28212	59556	30836
Reference 2	21794	2569	24941	2541
Field Check at Base	1151.0	1331.7		
Field Check	1136.0	1330.1		

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	207	1021		
Reference 1	20693	54218	0.385	0.371
Reference 2	5952	21660	0.278	0.272

Field Check at Base

WS	WH
206.5	1020.6

Field Check

WS	WH
206.1	1008.0

Density Constants MPD-B 64

Last Edited on 01-APR-2014,12:39

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	1.13	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

Caliper Calibration MPD-B 64

Base Calibration on 13-FEB-2014 15:49
Field Calibration on 01-APR-2014 09:14

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16976	3.99
2	26016	5.98
3	34528	7.97
4	42943	9.86
5	52224	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.94	7.97

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\FIML Natural Resources Mulville #15B-18-2...\FIML Natural Resources Mulville #15B-18-2029_002.dta

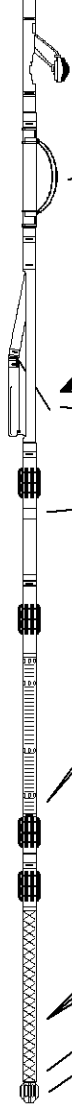
CBH-C, Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 150 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-C.A 248 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

56.02 ft GRGC - Gamma Ray
53.11 ft CGXT - MCG External Temperature

45.76 ft MINV - MMR MicroLog Inverse
45.76 ft MNRL - MMR MicroLog Normal



Compact Neutron
MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

40.97 ft NPRL - Limestone Neutron Por.

Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

33.73 ft CLDC - Density Caliper
33.73 ft AVOL - Annular Volume
33.73 ft HVOL - Hole Volume
31.80 ft DPRL - Limestone Density Por.
31.80 ft DEN - Compensated Density
31.80 ft DCOR - Density Correction
31.74 ft PDPE - PE

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

26.24 ft FEFE - Shallow FE

Compact Sonic
MSS-A.A 73 LG: 12.52 ft WT: 72.8 lb OD: 2.240 in

12.96 ft SPRL - Wyllie Lime. Sonic Por.
12.96 ft DT35 - 3-5' Compensated Sonic

Compact Induction
MAI-A.A 5 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

3.34 ft R40O - Array Ind. One Res 40
3.34 ft R60O - Array Ind. One Res 60
3.34 ft RTAO - Array Ind. One Res Rt
0.23 ft SPCG - Spontaneous Potential
Tool Zero (0.13ft from bottom)
-0.13 ft SMTU - DST Uphole Tension

Total Length: 63.70 ft Weight: 480.6 lb

All measurements relative to tool zero.

COMPANY	FIML NATURAL RESOURCES, LLC.
WELL	MULVILLE #15B-18-2029
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2899.00	feet	First Reading	4892.00	feet
Elevation Drill Floor	2897.00	feet	Depth Driller	4935.00	feet
Elevation Ground Level	2889.00	feet	Depth Logger	4938.00	feet

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