MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL CO., INC.
WELL	COG #2-35
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1000' FSL & 1300' FEL

SEC 35	TWP 16S	RGE 34W	Other Services
Latitude			MAI/MFE MPD/MDN
Longitude			
API Number	15-171-21091		

Permanent Datum GL, Elevation 3105 feet
Log Measured From KB
Drilling Measured From KB @ 10 FEET

Elevations:	feet
KB	3115.00
DF	3113.00
GL	3105.00

Date	22-NOV-2014			
Run Number	ONE			
Service Order	4558-103839570			
Depth Driller	5100.00	feet		
Depth Logger	5103.00	feet		
First Reading	5070.00	feet		
Last Reading	3800.00	feet		
Casing Driller	267.00	feet		
Casing Logger	266.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.00 lb/USg		51.00 CP	
PH / Fluid Loss	9.00		9.60 ml/30Min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.37 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.30 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.44 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.24 @117.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	117.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	ADAM SILL			
Witnessed By	TIM PRIEST			
JOB #	LB14-363			

BOREHOLE RECORD

Last Edited: 22-NOV-2014 07:51

Bit Size inches	Depth From feet	Depth To feet
7.875	267.00	5100.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	267.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 14.05.5280.
- 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.
- 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: 2247 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 244 CU.FT.
- RIG: H-D DRILLING #2

- RIG: TPD DRILLING #2.

- ENGINEER: A. SILL.

- OPERATOR: J. DUNLAP.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 22-NOV-2014 17:38

Filename: C:\Minimus 14.05\Log Data\Shakespeare COG #2-35\Shakespeare COG #2-35_002.dta — Recorded on 22-NOV-2014 14:20

System Versions: Logged with 14.05.5280 Plotted with 14.05.5280

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

MML Caliper
inches
6 — 11 — 16

DST Uphole Tension
pounds
5000 — 0

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

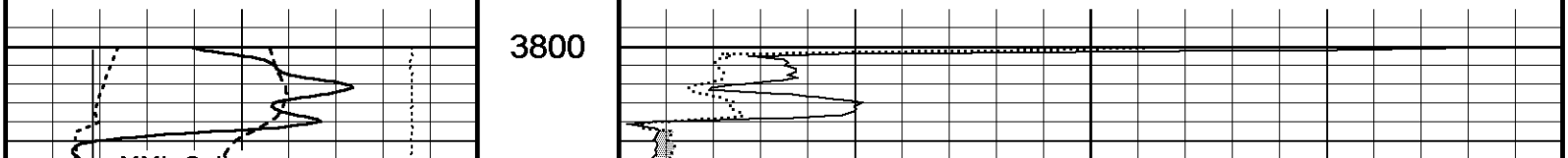
Annular Integral every 10 cu ft

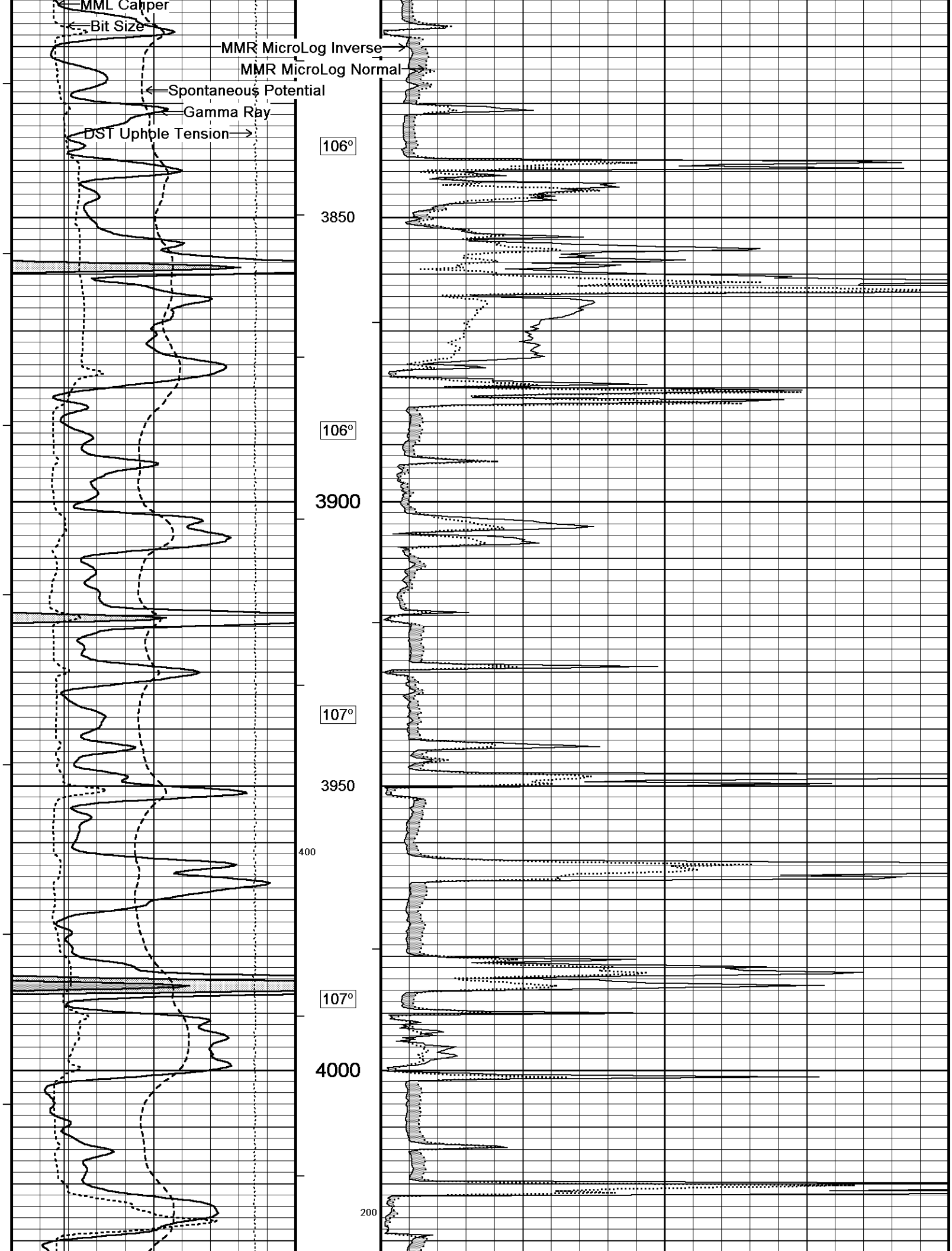
Replay Scale 1:240

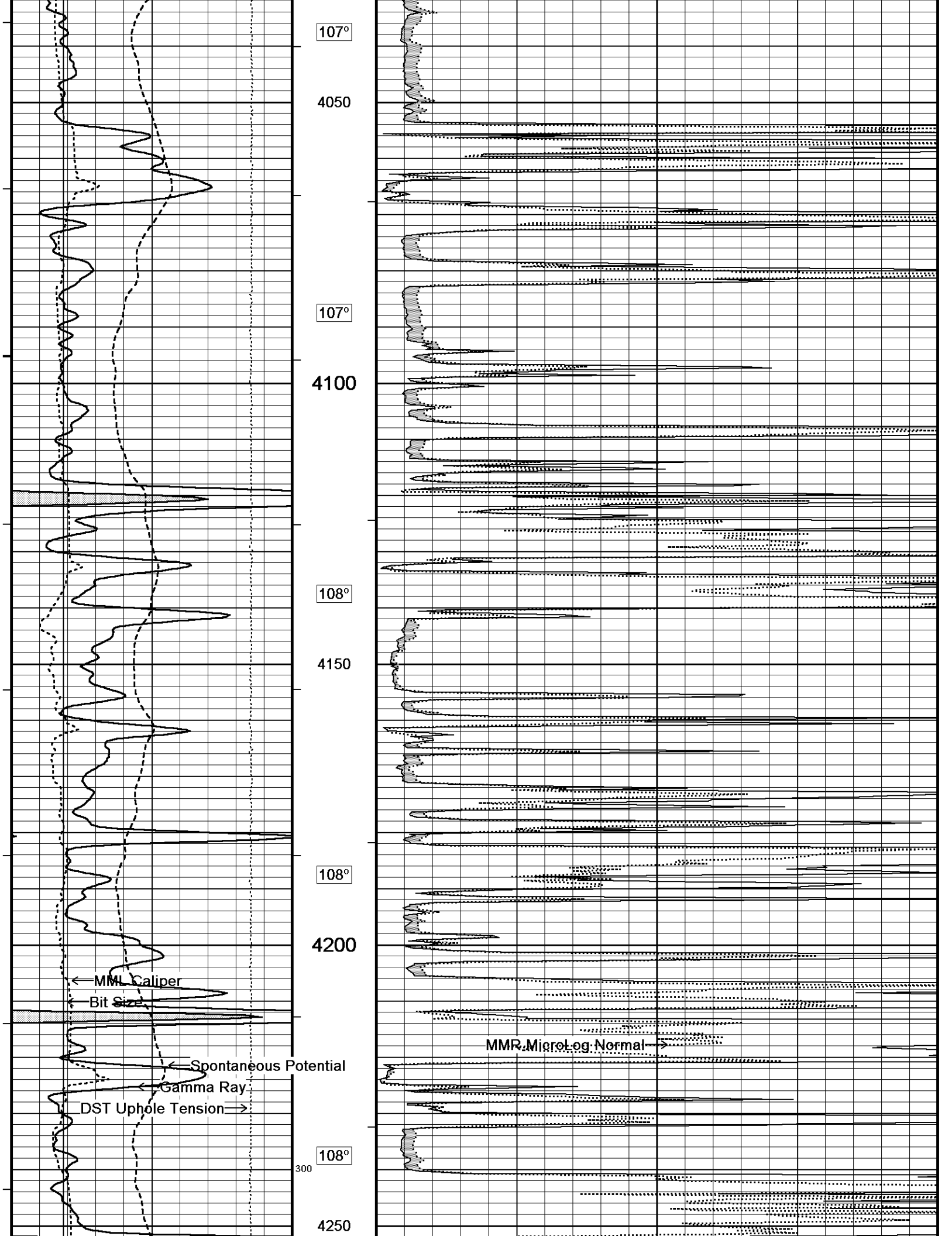
3800

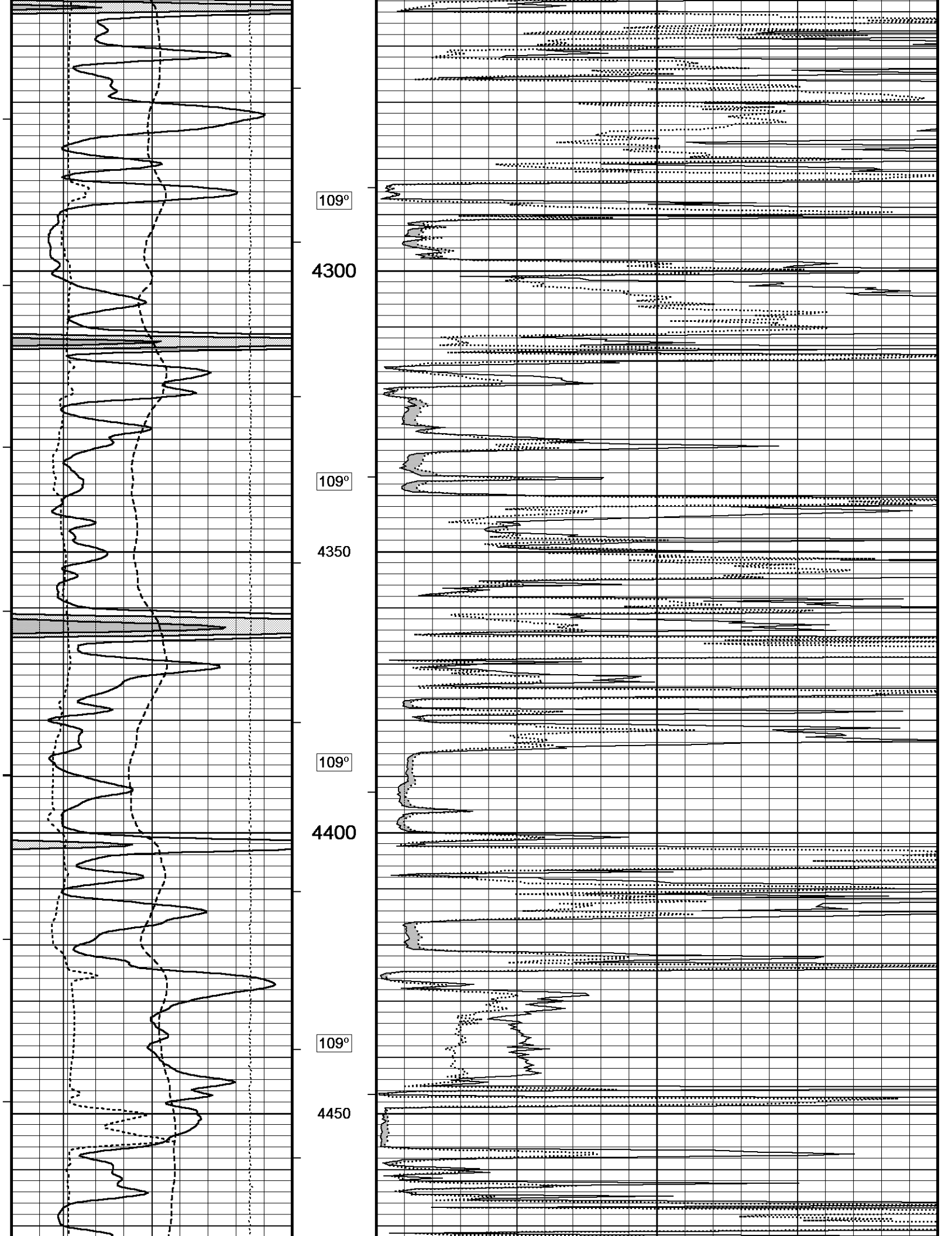
MMR MicroLog Normal
ohm metres
0 — 10 — 20 — 30 — 40

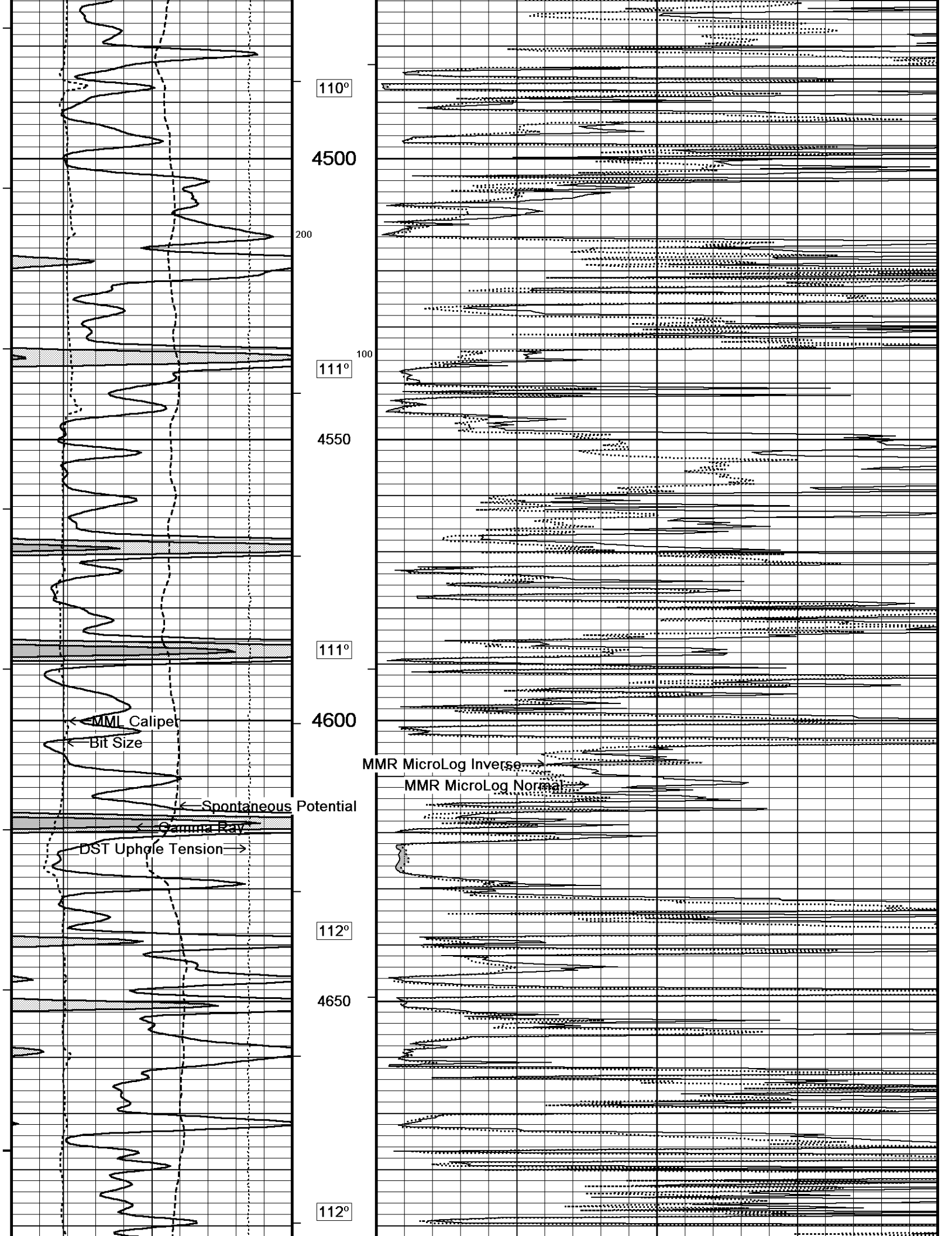
MMR MicroLog Inverse
ohm metres
0 — 10 — 20 — 30 — 40

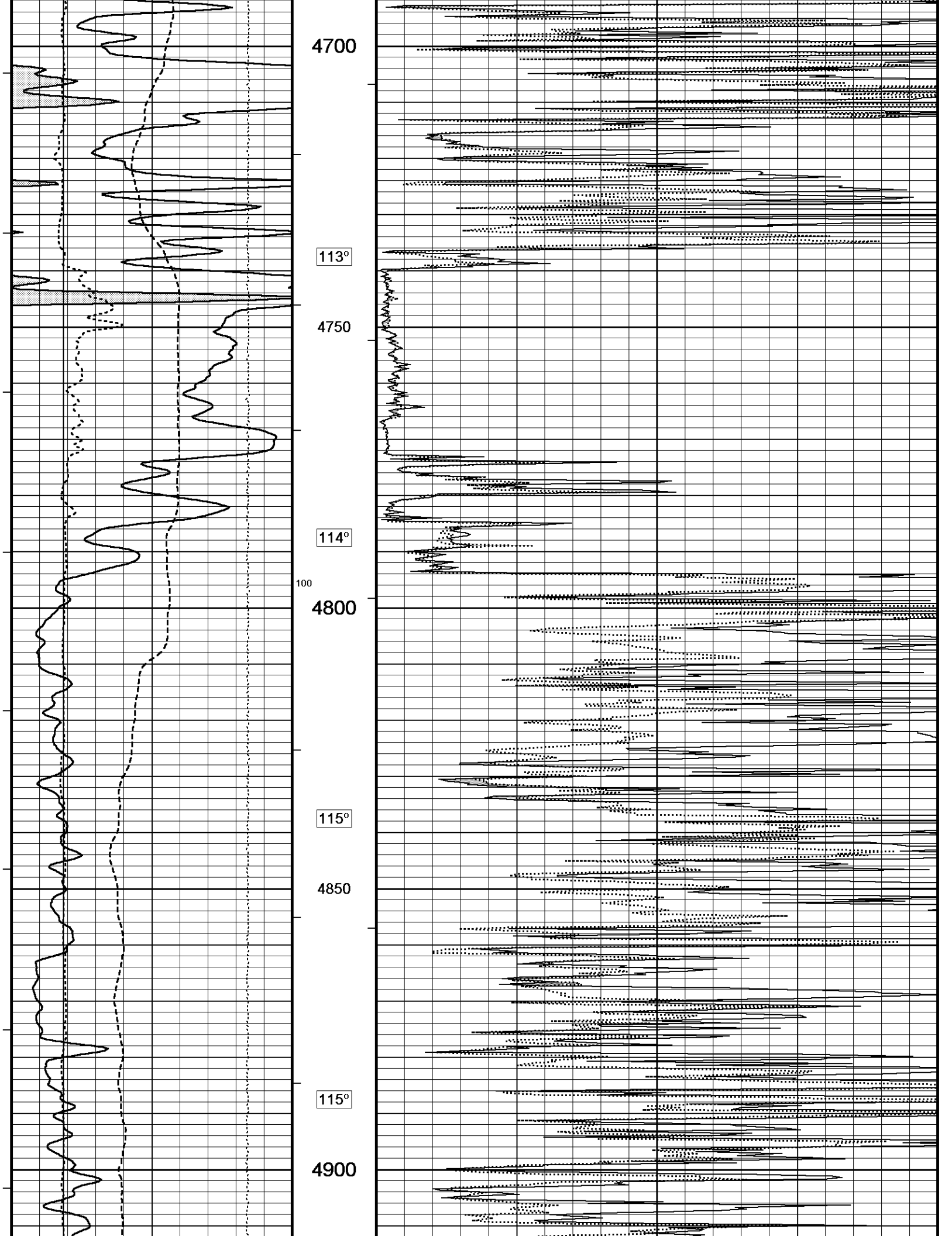


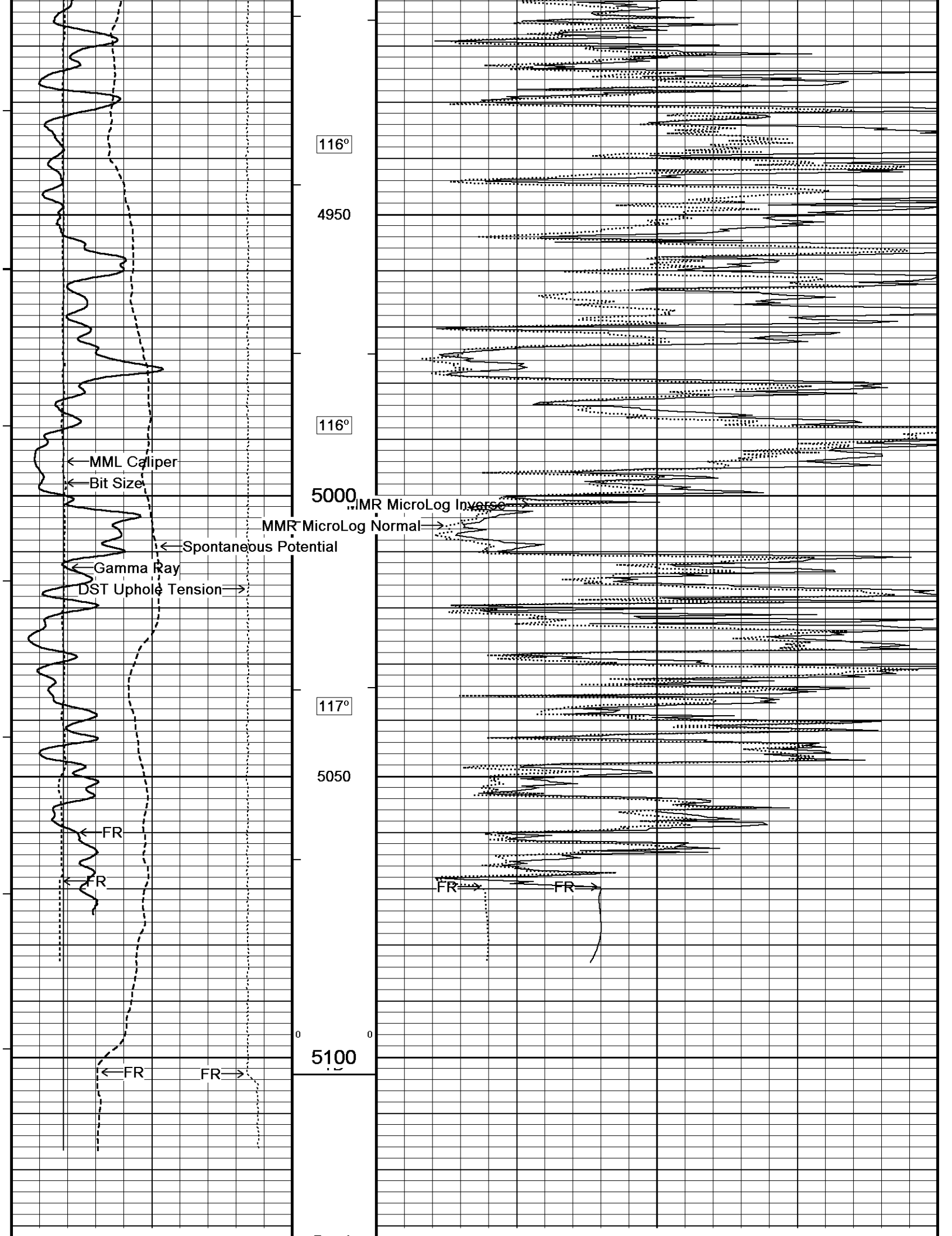

MML Caliper
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
106°
3850
106°
3900
107°
3950
400
107°
4000
200

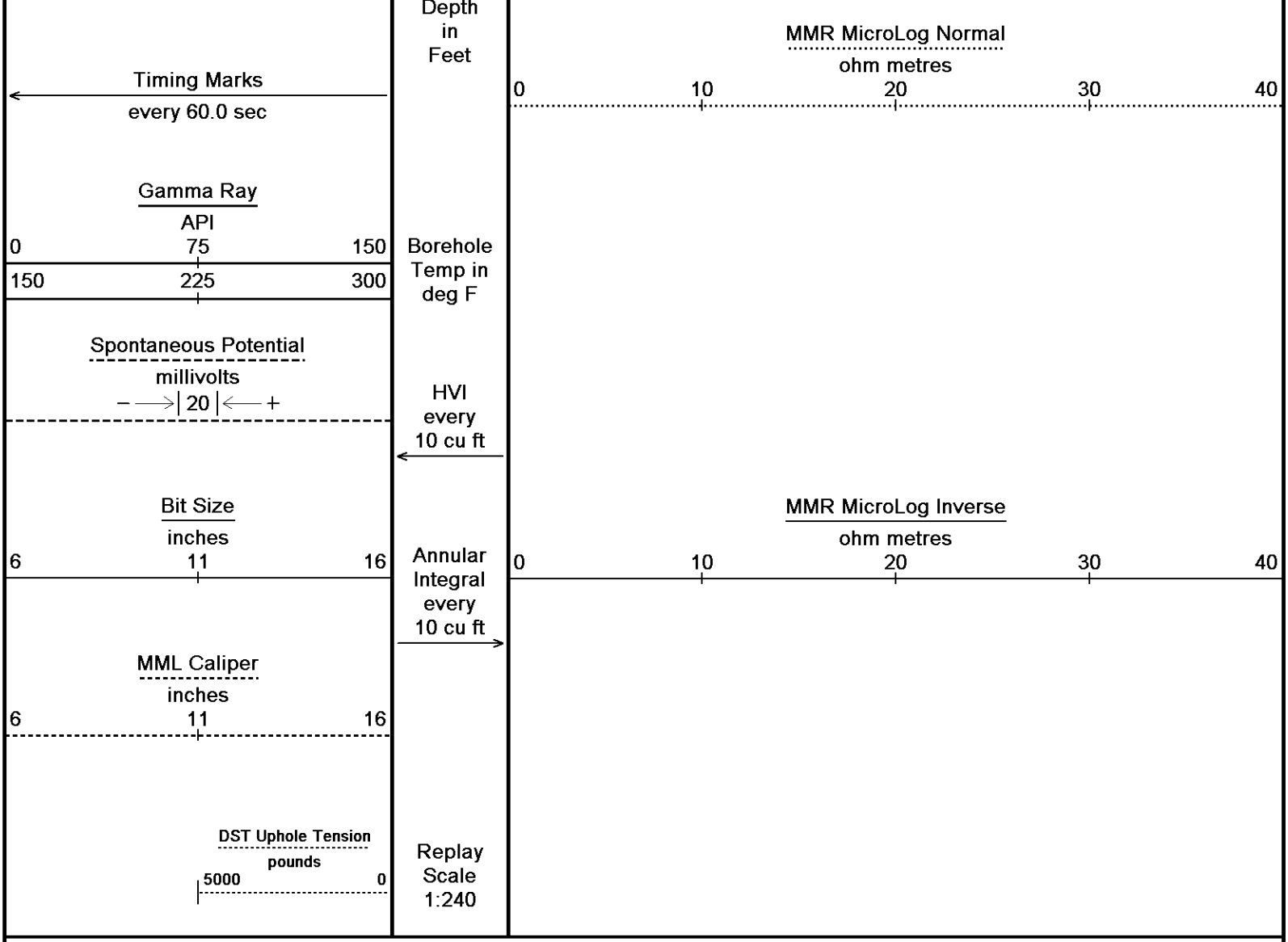

107°
4050
107°
4100
108°
4150
108°
4200
MML Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Normal
108°
300
4250


109°
4300
109°
4350
109°
4400
109°
4450


110°
4500
200
111°
100
4550
111°
4600
MML Caliper
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
112°
4650
112°


4700
113°
4750
114°
100
4800
115°
4850
115°
4900


116°
4950
116°
MML Caliper
Bit Size
5000
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
117°
5050
FR
FR
FR
FR
FR
FR
5100

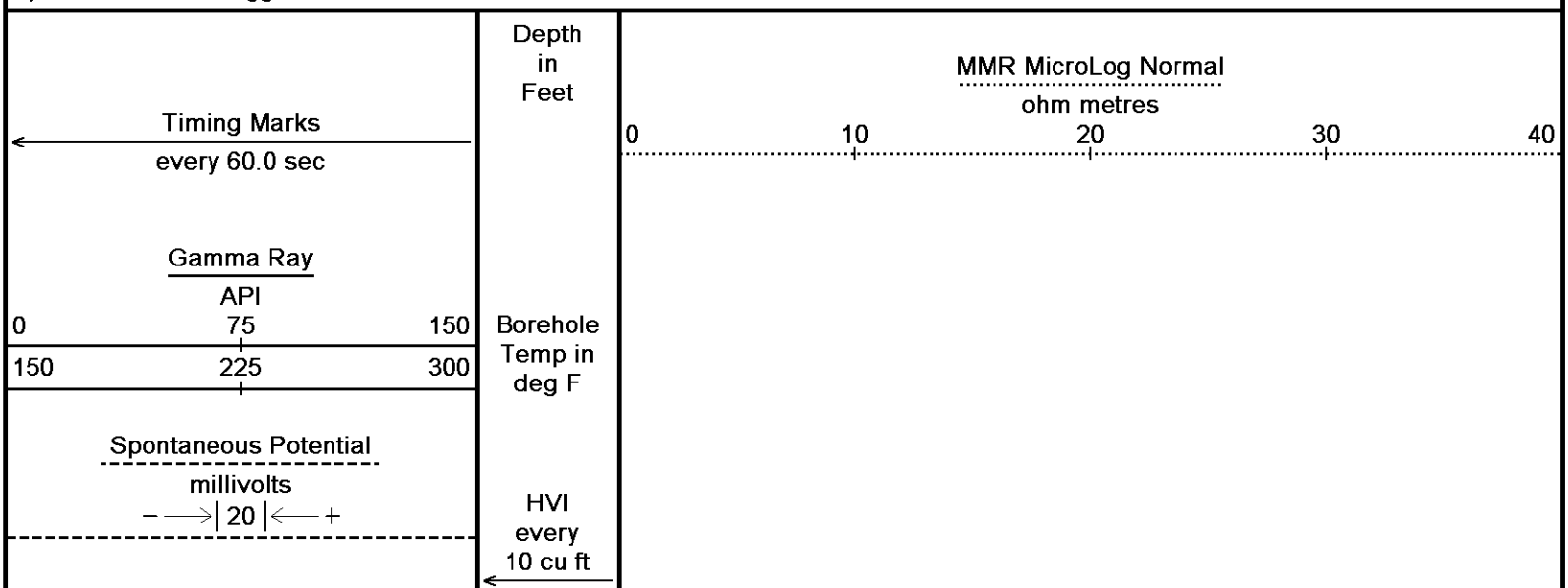


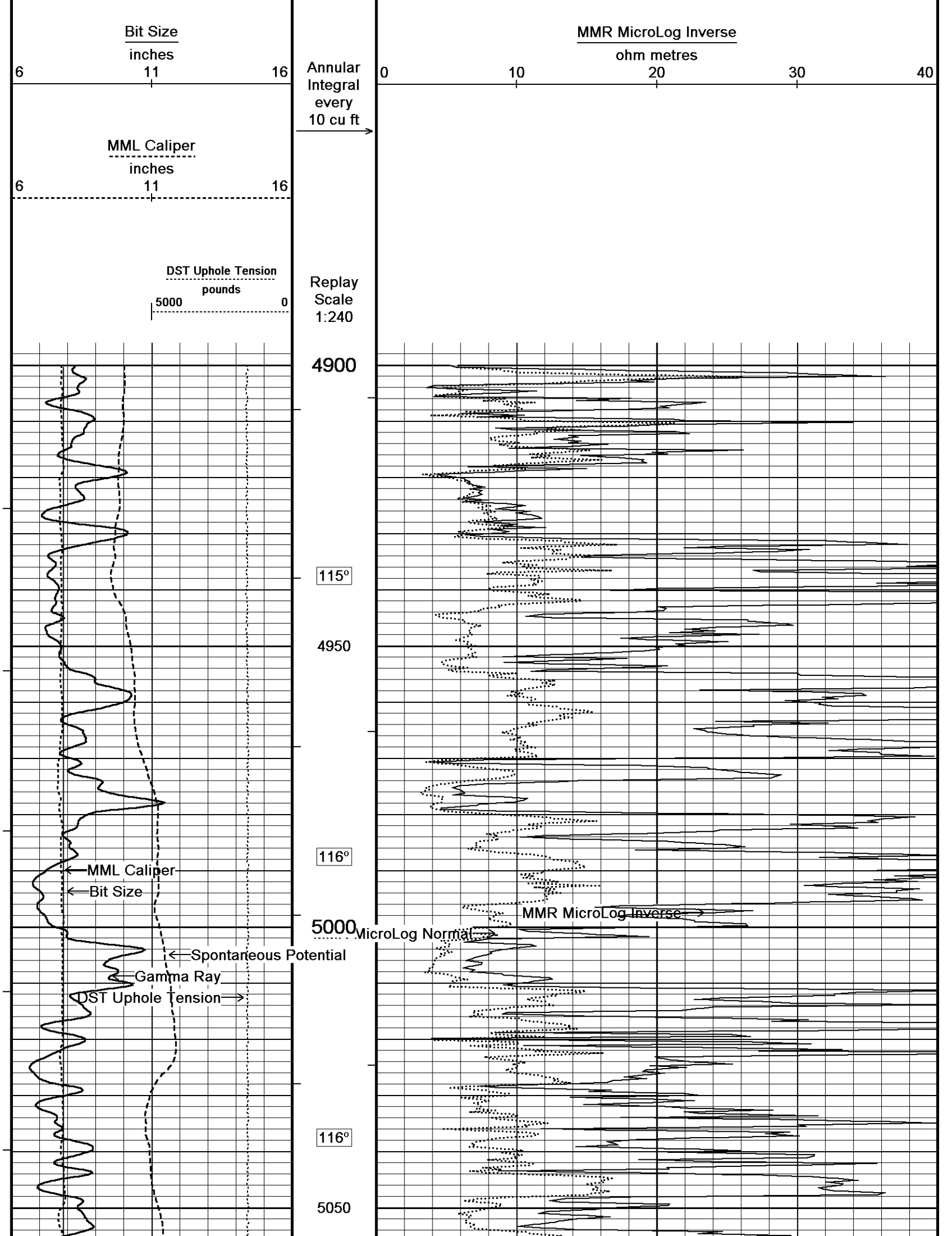
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 22-NOV-2014 17:38
Filename: C:\Minimus 14.05\Log Data\Shakespeare COG #2-35\Shakespeare COG #2-35_002.dta — Recorded on 22-NOV-2014 14:20
System Versions: Logged with 14.05.5280 Plotted with 14.05.5280

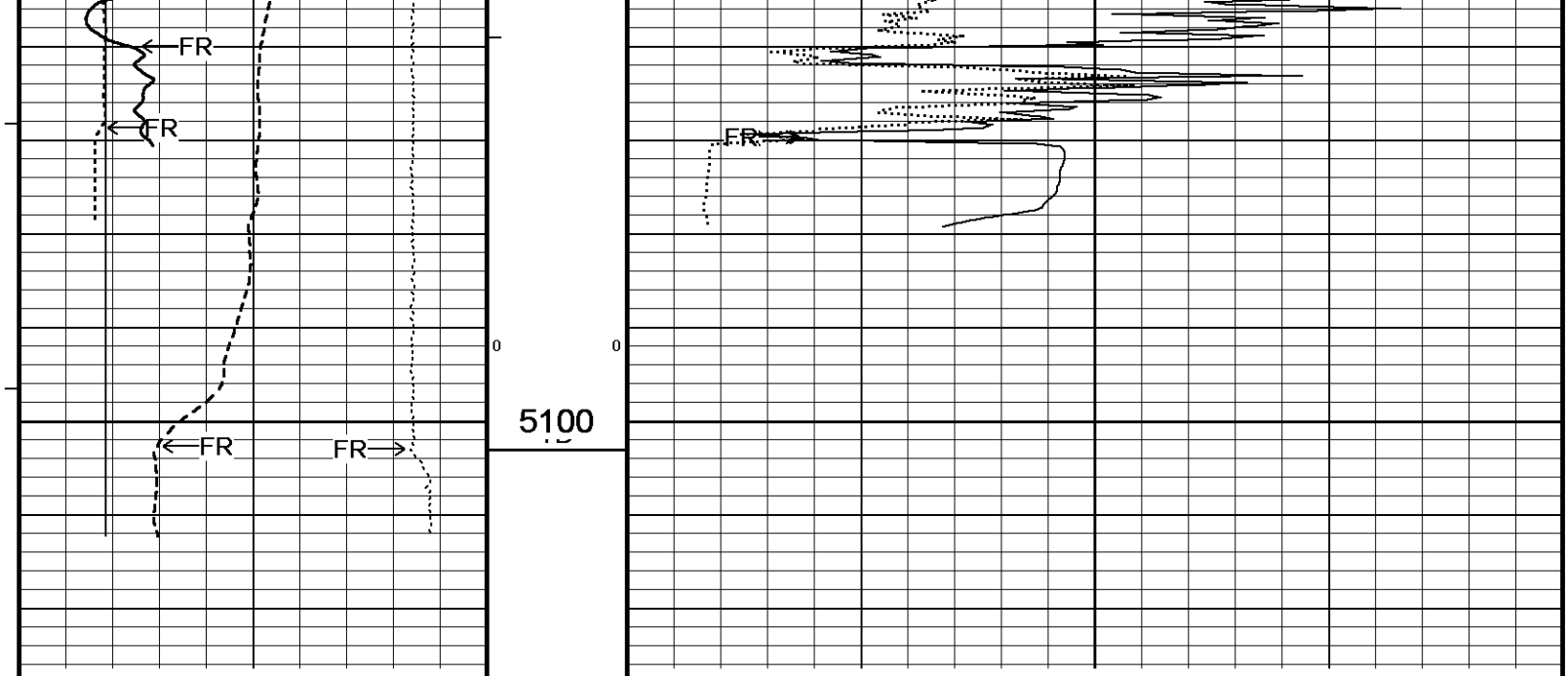
5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 22-NOV-2014 17:38
Filename: C:\Minimus 14.05\Log Data\Shakespeare COG #2-35\Shakespeare COG #2-35_001.dta — Recorded on 22-NOV-2014 13:55
System Versions: Logged with 14.05.5280 Plotted with 14.05.5280




Bit Size
inches
6
11
16
MML Caliper
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Annular Integral every 10 cu ft
Replay Scale 1:240
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
4900
115°
4950
116°
5000
116°
5050
MML Caliper
Bit Size
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MicroLog Normal



Depth in Feet

Timing Marks
every 60.0 sec

MMR MicroLog Normal
ohm metres
0 10 20 30 40

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

MML Caliper
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 22-NOV-2014 17:38
Filename: C:\Minimus 14.05\Log Data\Shakespeare COG #2-35\Shakespeare COG #2-35_001.dta
Recorded on 22-NOV-2014 13:55
System Versions: Logged with 14.05.5280 Plotted with 14.05.5280

REPEAT SECTION

BEFORE SURVEY CALIBRATION

General Constants All 000

Last Edited on 22-NOV-2014,13:18

General Parameters		
Mud Resistivity	0.370	ohm-metres
Mud Resistivity Temperature	75.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

High Resolution Temperature Calibration MCG-B 39

Field Calibration on 18-NOV-2014,10:02

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

High Resolution Temperature Constants MCG-B 39

Last Edited on 28-AUG-2014,01:02

Pre-filter Length	11

Gamma Calibration MCG-B 39

Field Calibration on 20-NOV-2014 15:11

	Measured	Calibrated (API)
Background	67	46
Calibrator (Gross)	1140	771
Calibrator (Net)	1072	725

Gamma Calibration Tolerances MCG-B 39

Ratio 1.479 (1.40 – 1.475 – 1.55) Counts/API

Gamma Constants MCG-B 39

Last Edited on 20-NOV-2014,14:59

Gamma Calibrator Number	GRC038	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.00	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 24-OCT-2014 15:09
Field Check on 20-NOV-2014 14:59

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.0	49.9	5.1	25.6
Micro Inverse	10.0	49.9	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	77.4	77.4
Micro Inverse	51.3	51.3

Micro Normal & Micro Inverse Calibration Tolerance MML-A 3

Micro Normal Res. 1: 10.0 (-5% 10.0 +5%) ohm
Micro Normal Res. 2: 49.9 (-5% 50.0 +5%) ohm

Micro Inverse Res. 1 10.0 ohm Micro Inverse Res. 2 49.9 ohm

Micro Normal Base Check 77.4 (-2% 77.28 +2%) ohm-m
Micro Inverse Base Check 51.3 (-2% 51.19 +2%) ohm-m

Micro Normal Field Check 77.4 (-2% 77.4 +2%) ohm-m
Micro Inverse Field Check 51.3 (-2% 51.3 +2%) ohm-m

Micro Normal and Micro Inverse Constants MML-A 3

Last Edited on 22-NOV-2014,08:00

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

Caliper Calibration MML-A 3

Base Calibration on 24-OCT-2014 14:47
Field Calibration on 20-NOV-2014 14:57

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15153	5.98
2	18429	7.97
3	21713	9.86
4	25537	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.92	7.97

Caliper Calibration Tolerances MML-A 3

Short Arm Field Cal. 7.92 (7.77 7.97 8.17) in

Caliper Calibration MPD-C.A 216

Base Calibration on 24-OCT-2014 11:23
Field Calibration on 20-NOV-2014 14:50

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18960	3.99
2	28807	5.98
3	38852	7.97
4	48518	9.86
5	59792	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

Caliper Calibration Tolerances MPD-C.A 216

Short Arm Field Cal. 7.96 (7.77 7.97 8.17) in

DOWNHOLE EQUIPMENT

C:\Minimus 14.05\Log Data\Shakespeare COG #2-35\Shakespeare COG #2-35_001.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-B 39 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

42.87 ft GRGC - Gamma Ray
39.96 ft CGXT - MCG External Temperature

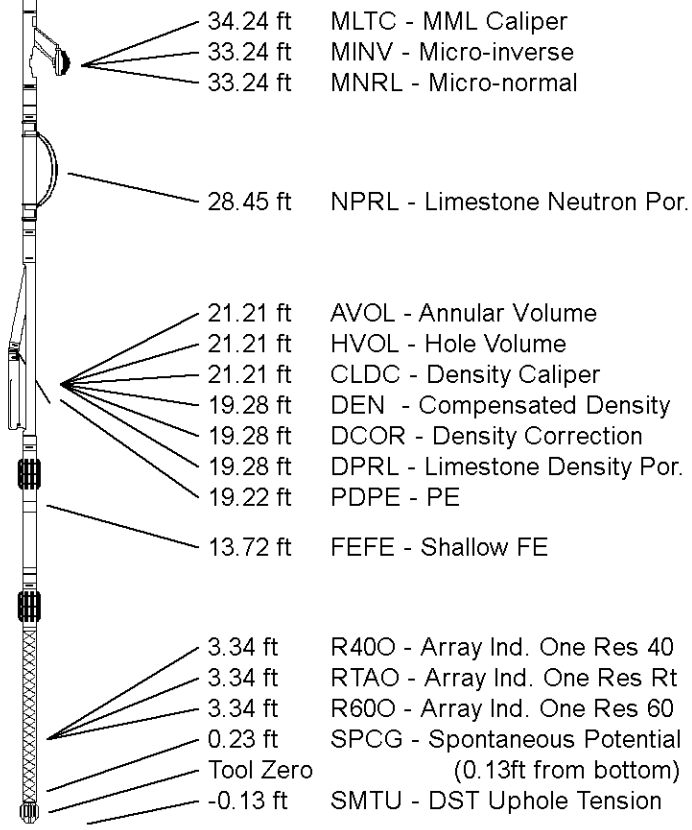
Compact Neutron
MDN-A.B 152 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 50.55 ft Weight: 407.9 lb



COMPANY	SHAKESPEARE OIL CO., INC.
WELL	COG #2-35
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3115.00	feet	First Reading	5070.00	feet
Elevation Drill Floor	3113.00	feet	Depth Driller	5100.00	feet
Elevation Ground Level	3105.00	feet	Depth Logger	5103.00	feet

Weatherford®

MICRORESISTIVITY LOG