Weatherford

MICRORESISTIVITY LOG

COMPANY	WESTERN OPERATING CO.
WELL	HASLETT 2-30
FIELD	GOULD
PROVINCE/COUNTY	HAMILTON
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2288' FNL & 1780' FWL NW SE SE NW

SEC	TWP	RGE	Other Services
30	25S	41W	MDN/MPD MAI/MFE

API Number 15-075-20871
Permit Number

Permanent Datum GL, Elevation 3583.00 feet
Log Measured From KB
Drilling Measured From KB @ 11 FEET

Elevations:	feet
KB	3594.00
DF	3592.00
GL	3583.00

Date	20-JUL-2013		
Run Number	ONE		
Service Order	3541024		
Depth Driller	5550.00	feet	
Depth Logger	5548.00	feet	
First Reading	5514.00	feet	
Last Reading	2300.00	feet	
Casing Driller	838.00	feet	
Casing Logger	838.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEM		
Density / Viscosity	9.40 lb/USg	54.00 CP	
PH / Fluid Loss	10.00	8.80 ml/30Min	
Sample Source	PIT		
Rm @ Measured Temp	0.50 @ 95.0	ohm-m	
Rmf @ Measured Temp	0.40 @ 95.0	ohm-m	
Rmc @ Measured Temp	0.60 @ 95.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.37 @126.0	ohm-m	
Time Since Circulation	5 HRS		
Max Recorded Temp	126.00	deg F	
Equipment / Base	13379	KANSAS	
Recorded By	D. COLE		
Witnessed By	A. GARNER		
JOB #	LB 13-207		

BOREHOLE RECORD

Last Edited: 20-JUL-2013 10:33

Bit Size (inches)	Depth From (feet)	Depth To (feet)
7.875	838.00	5550.00

CASING RECORD

Type	Size (inches)	Depth From (feet)	Shoe Depth (feet)	Weight (pounds/ft)
SURFACE	8.625	0.00	838.00	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.

- 2.65 G/CC SANDSTONE 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 2300 FEET: 1280 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 2300 FEET: 740 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 2300 FEET: 140 CU. FT.

- RIG: MURFIN #21

- ENGINEER: D. COLE

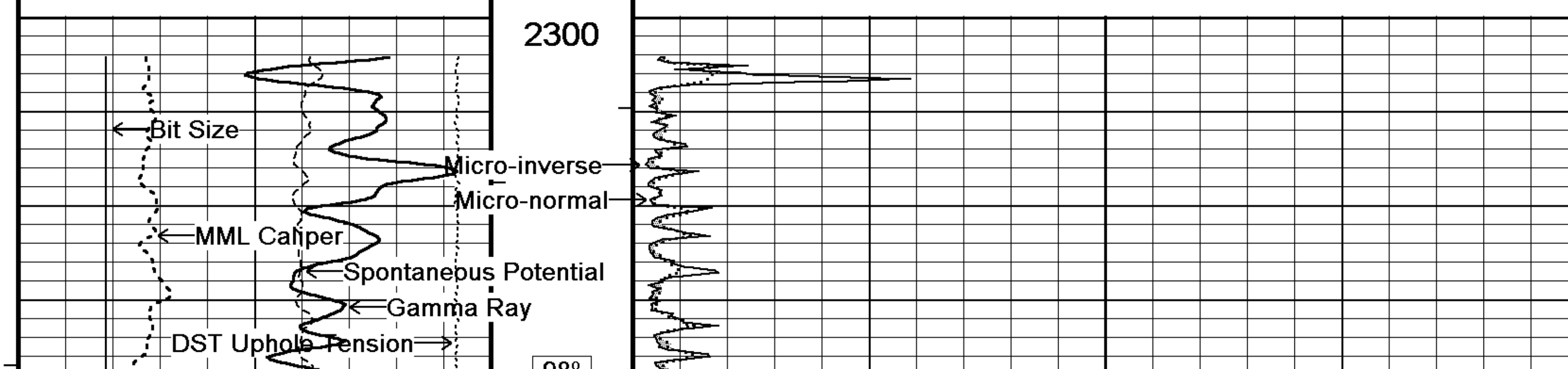
- OPERATOR(S): J. LAPOINT AND D. CANADAY.

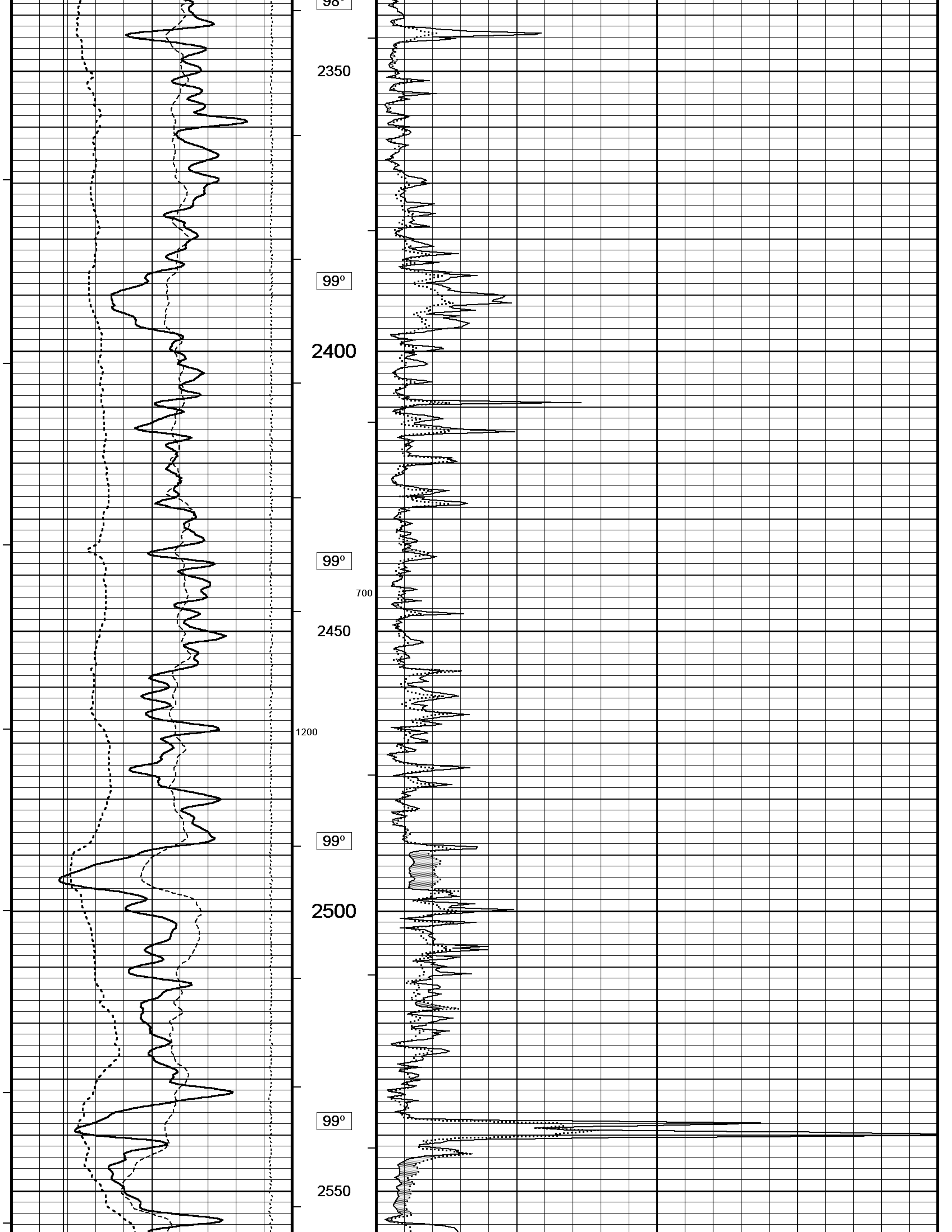
5 INCH MAIN

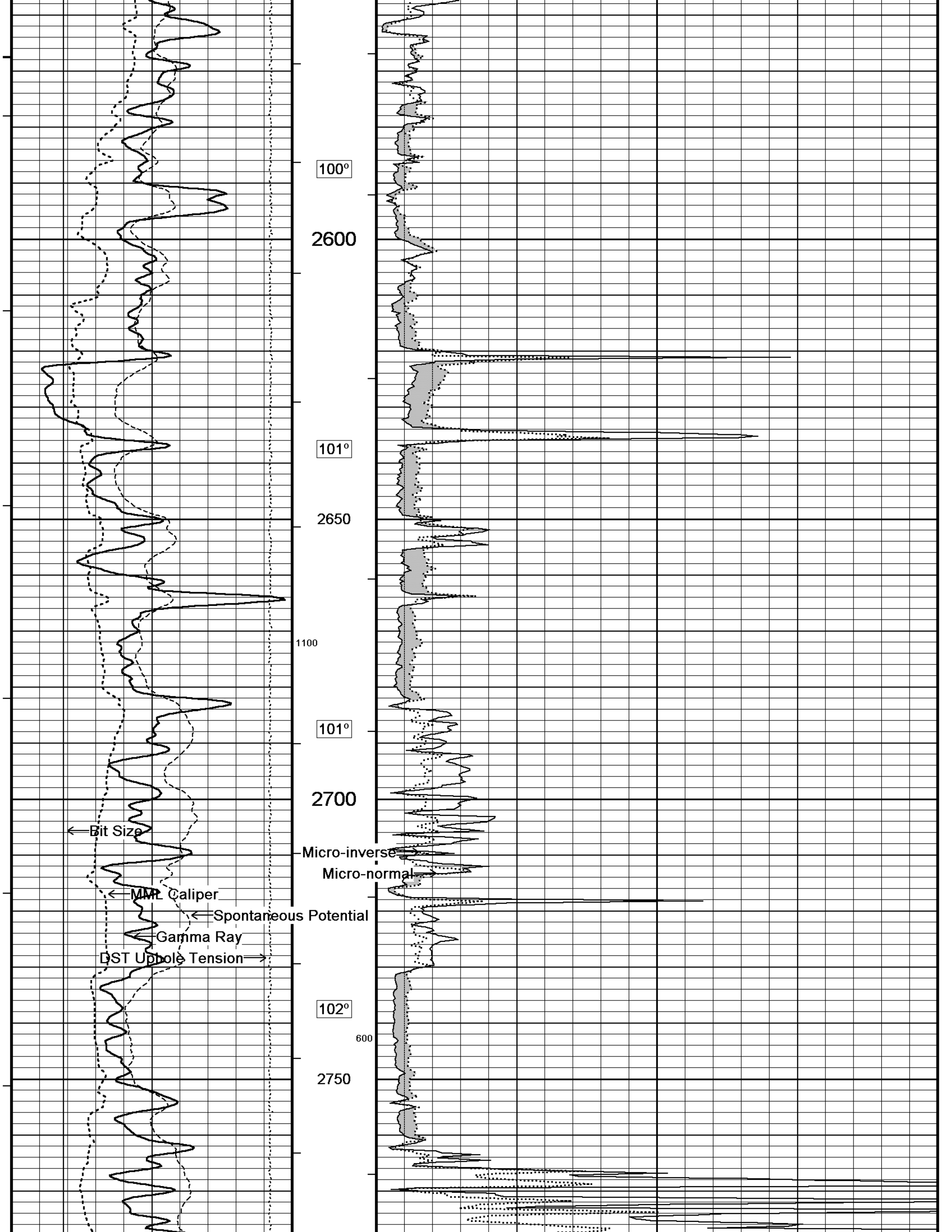
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Logs\Western Haslett 2-30\Western Haslett 2-30 MAIN DETAIL.dta
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

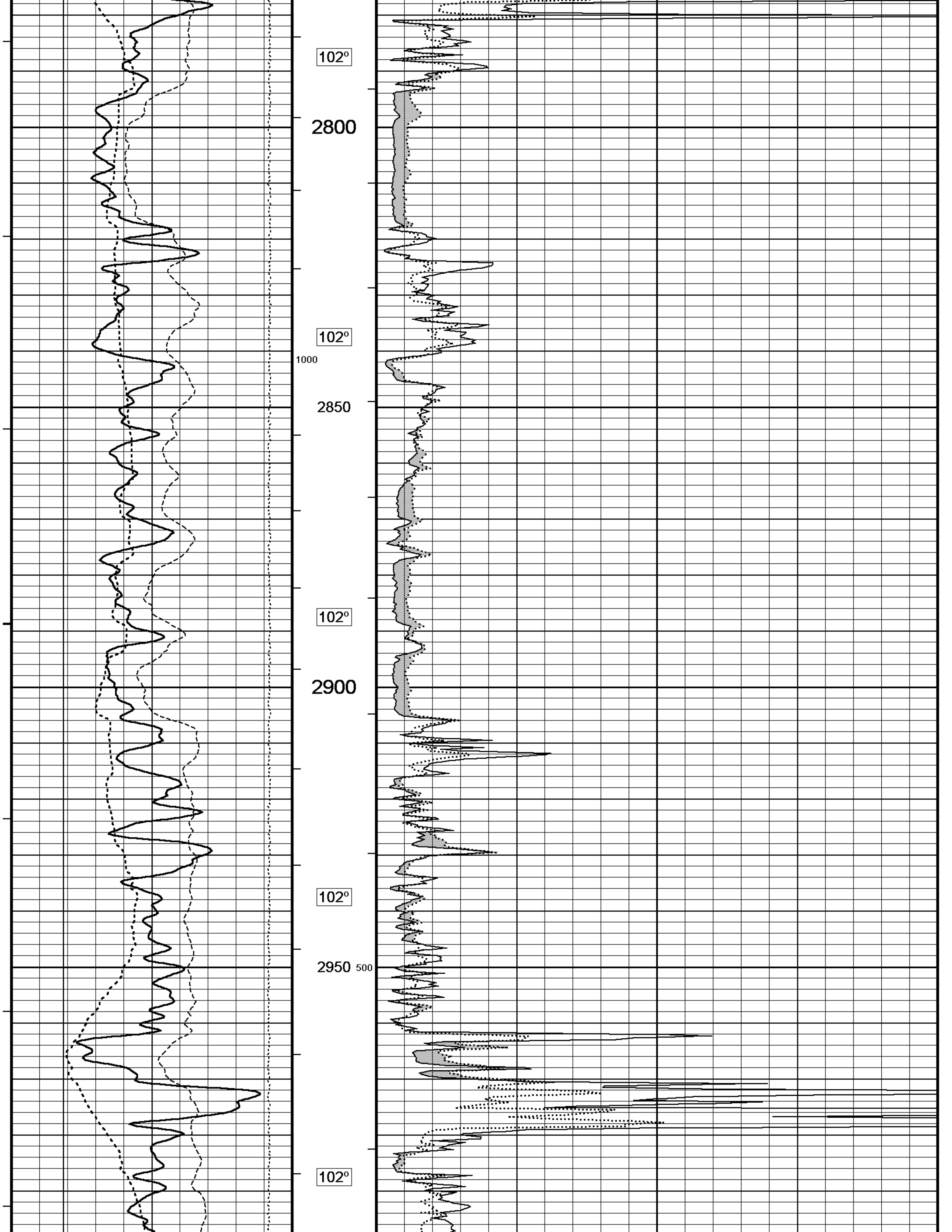
Plotted on 20-JUL-2013 14:01
Recorded on 20-JUL-2013 13:09

Timing Marks, every 60.0 sec	Depth in Feet	Micro-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	
MML Caliper, inches: 6 11 16	Annular Integral every 10 cu ft	Micro-inverse, ohm metres: 0 10 20 30 40
Bit Size, inches: 6 11 16		
DST Uphole Tension, pounds: 5000 0	Replay Scale 1:240	

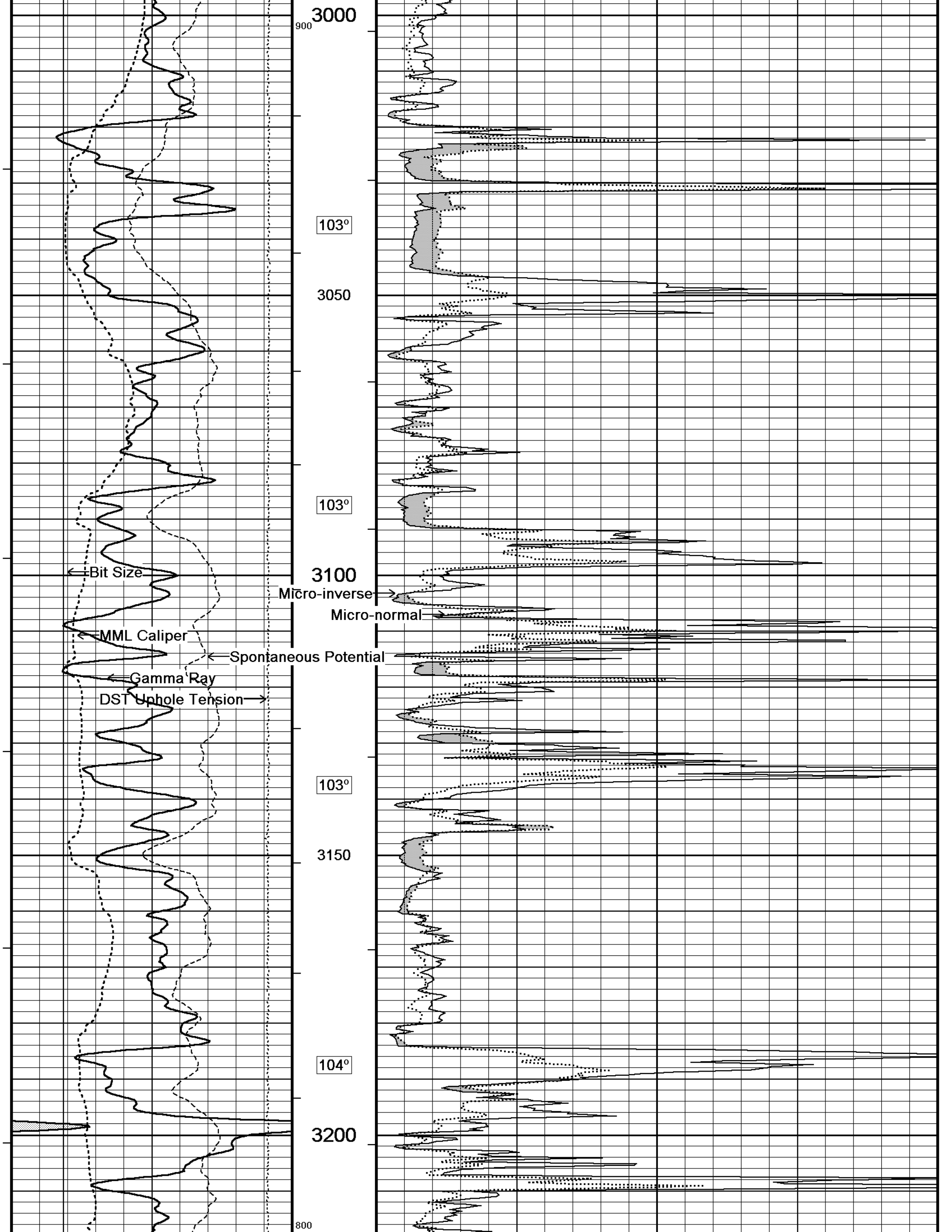



98°
2350
99°
2400
99°
700
2450
1200
99°
2500
99°
2550

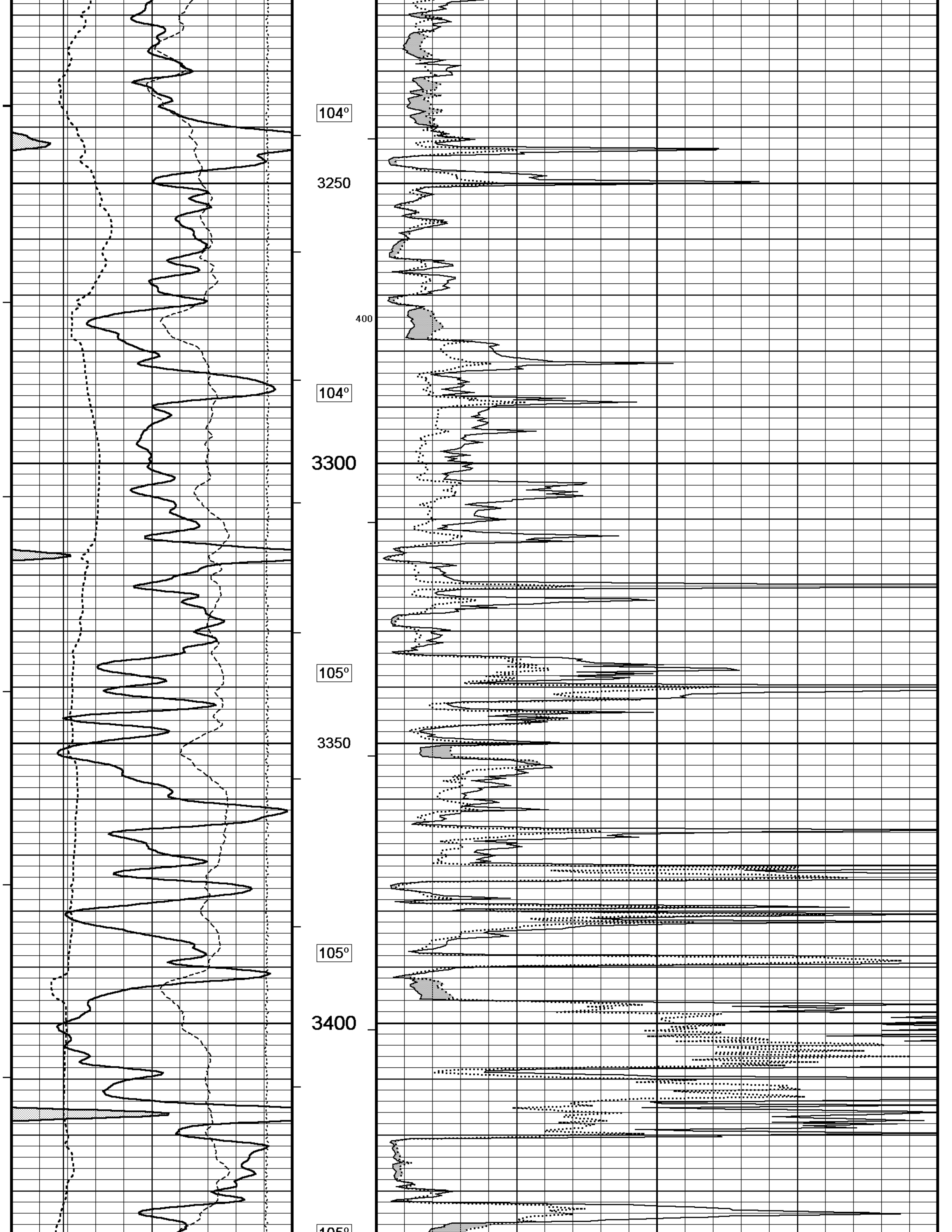

100°
2600
101°
2650
1100
101°
2700
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
102°
600
2750

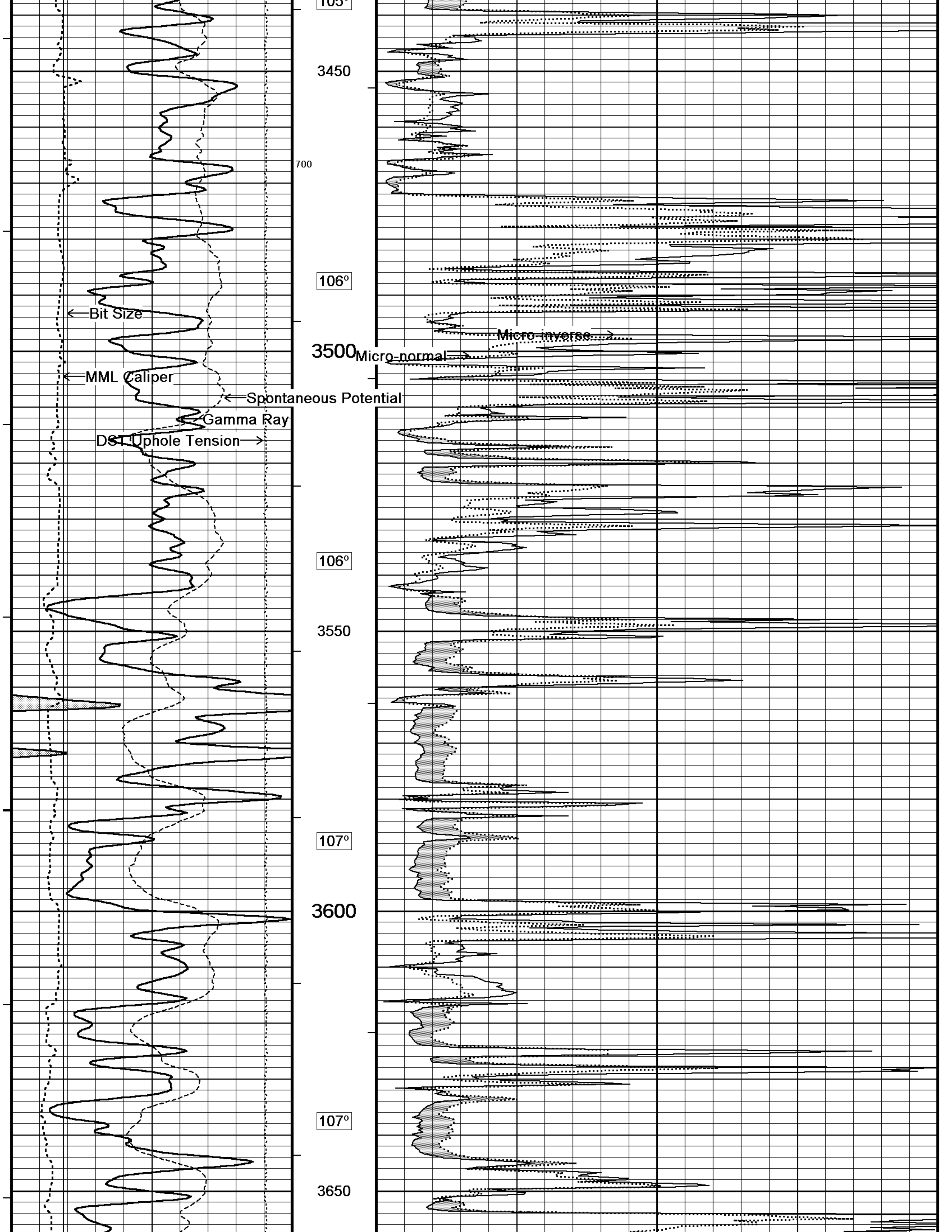


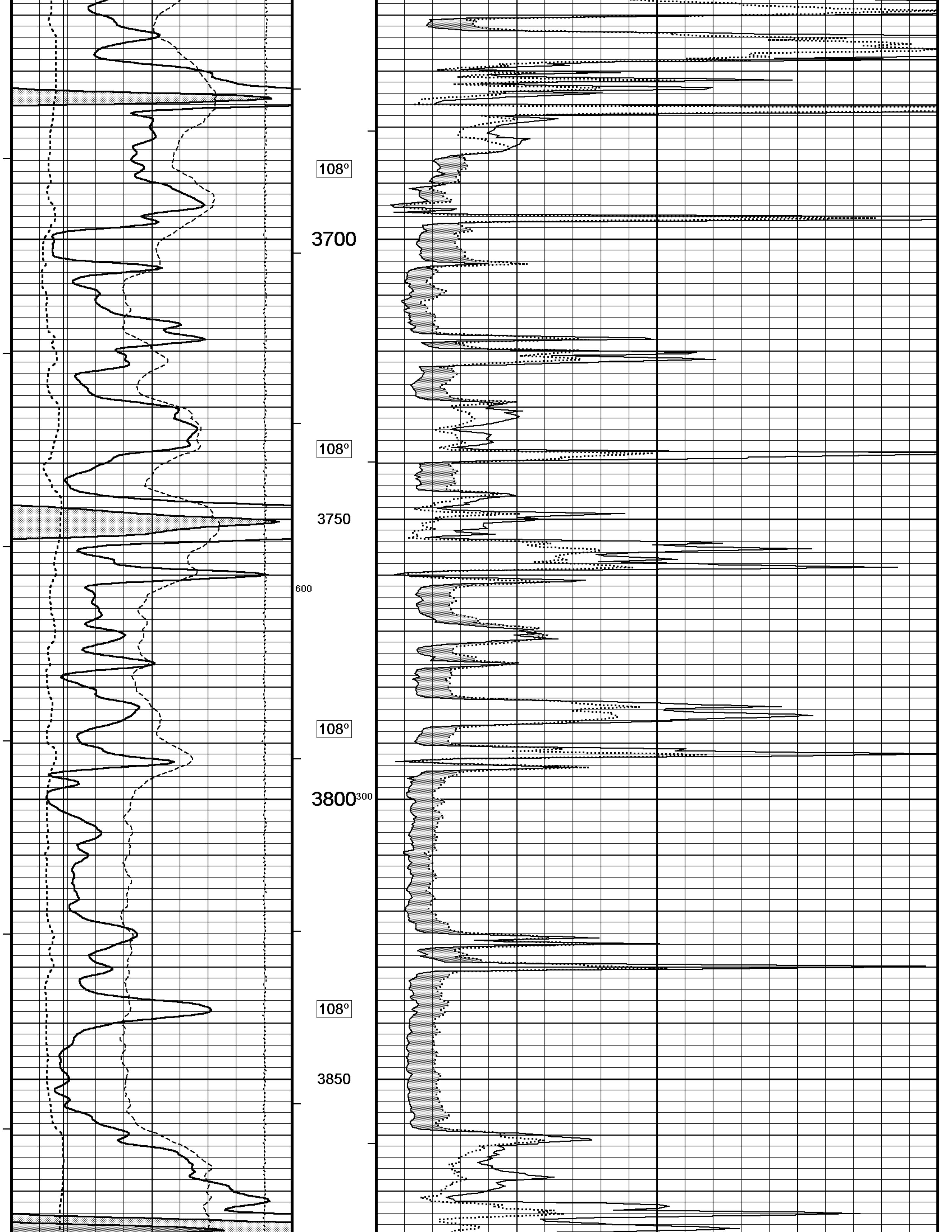
102°
2800
102°
1000
2850
102°
2900
102°
2950
500
102°

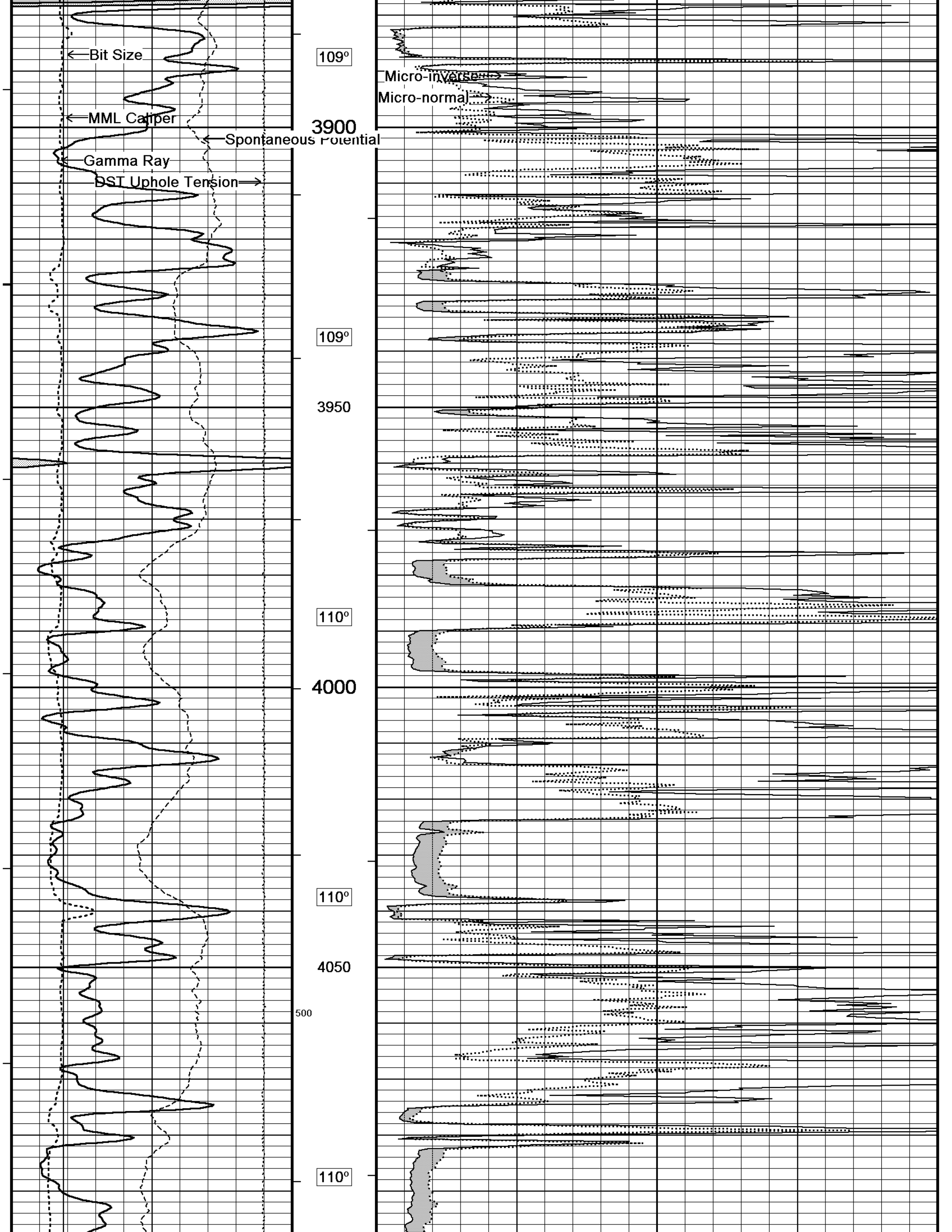


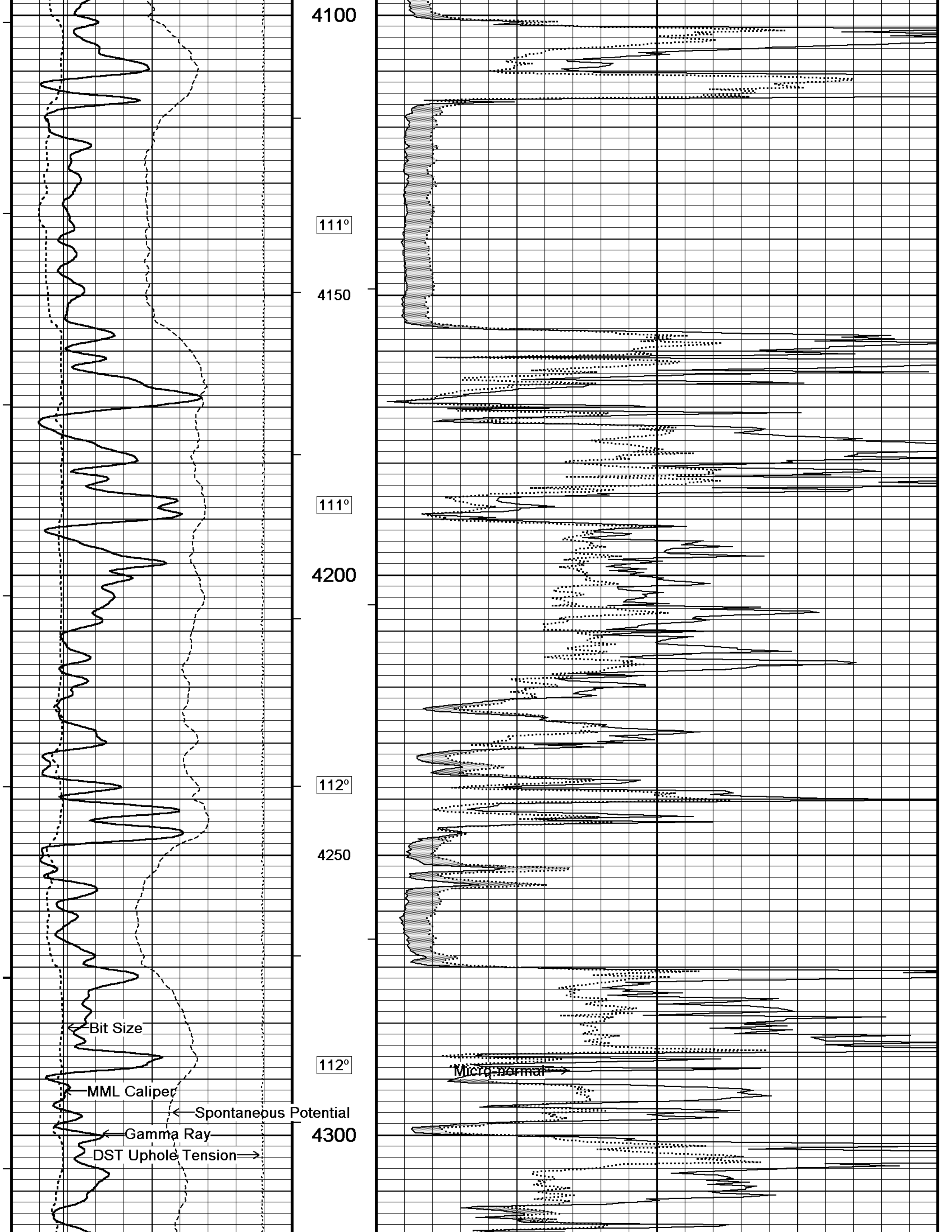
900
3000
103°
3050
103°
3100
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
103°
3150
104°
3200
800

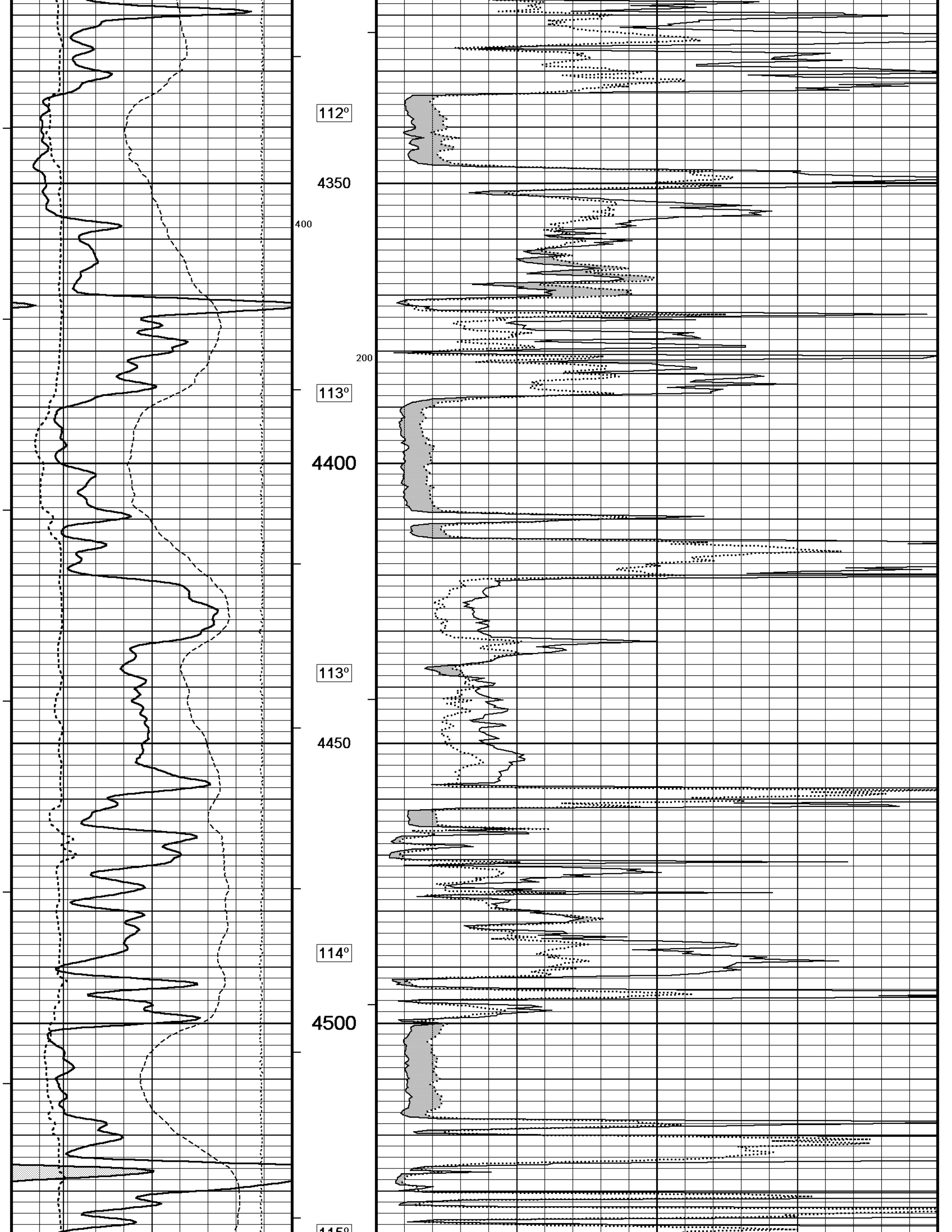

104°
3250
400
104°
3300
105°
3350
105°
3400


105°
3450
700
106°
Bit Size
Micro-inverse
3500
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
106°
3550
107°
3600
107°
3650

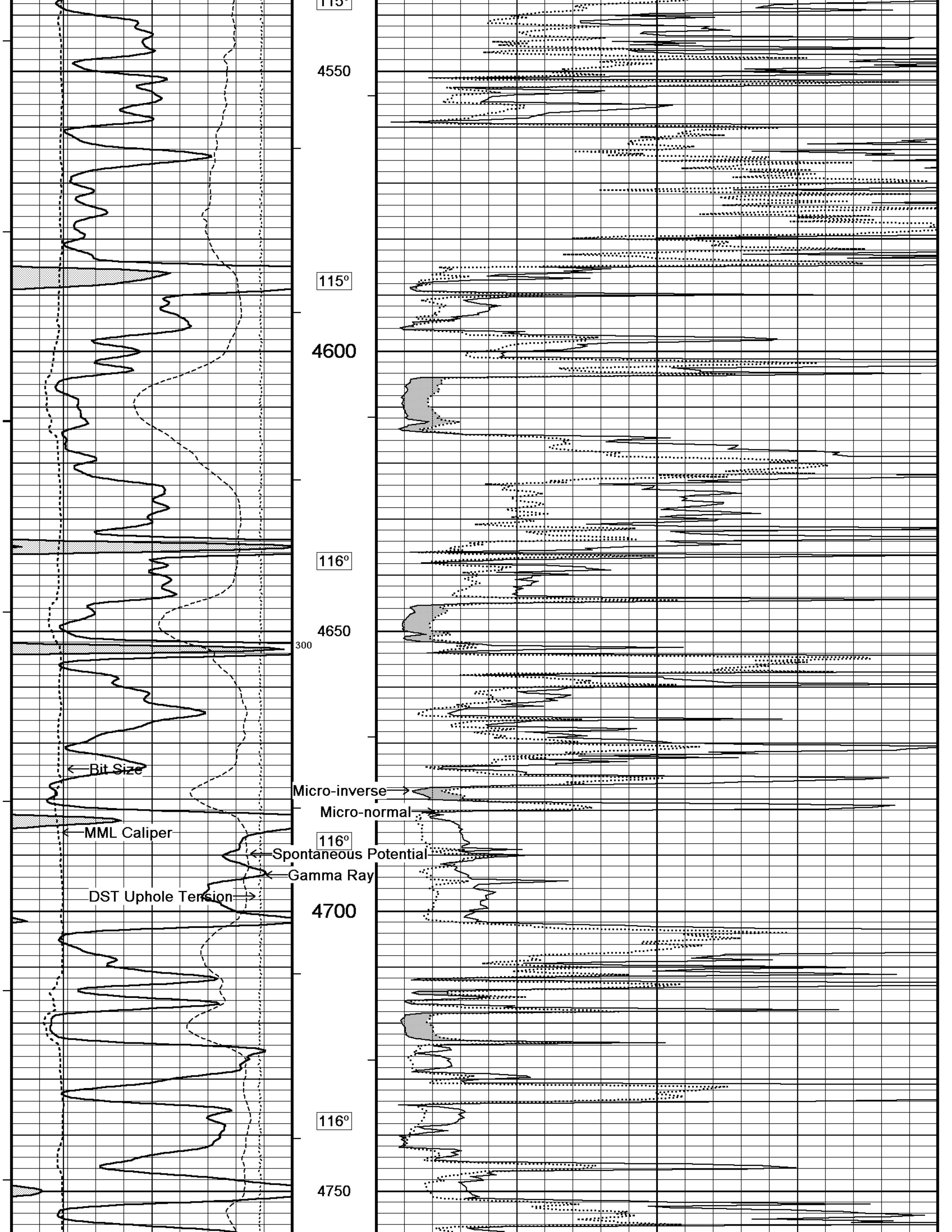

108°
3700
108°
3750
600
108°
3800
300
108°
3850

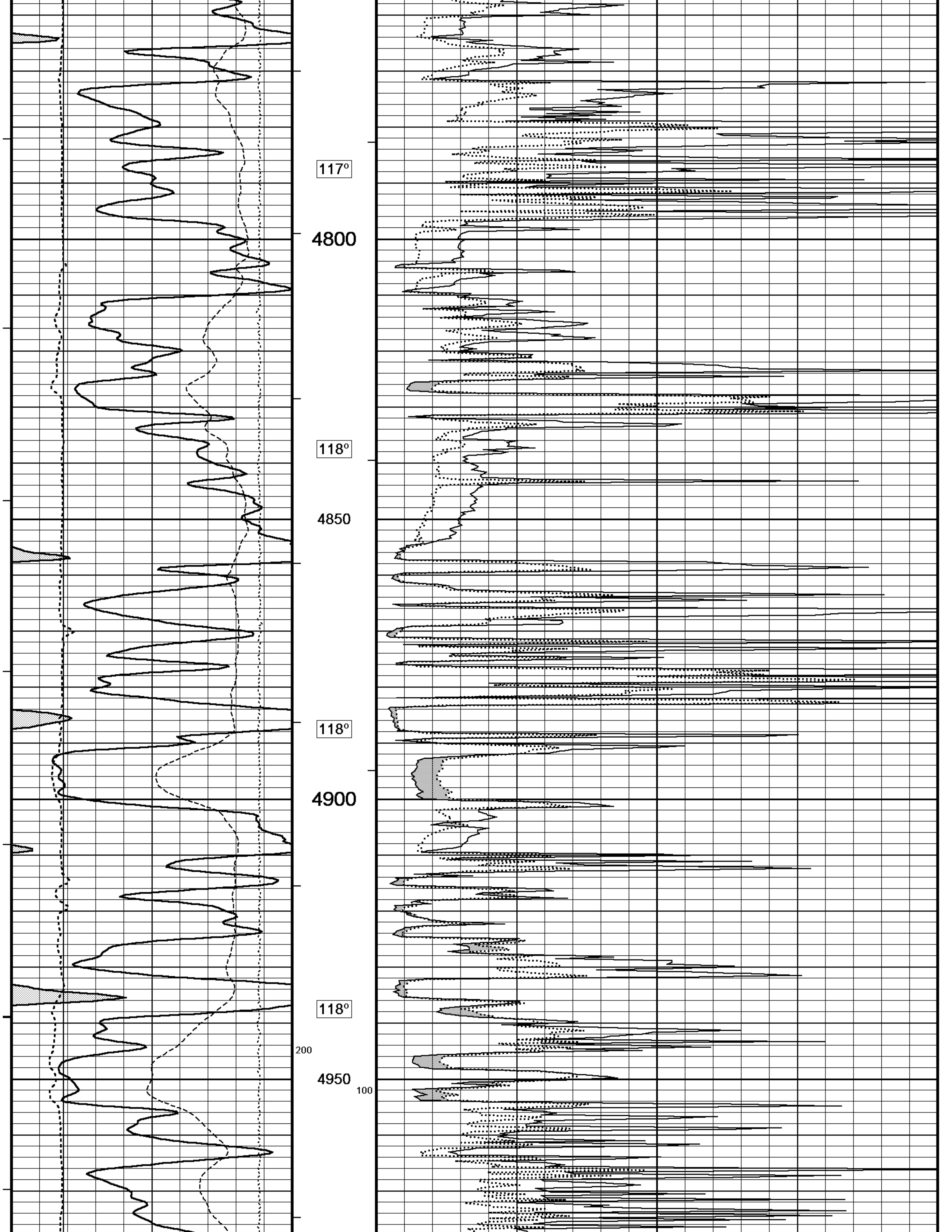

Bit Size
109°
Micro-inverse
Micro-normal
MML Caliper
3900
Spontaneous Potential
Gamma Ray
DST Uphole Tension
109°
3950
110°
4000
110°
4050
500
110°


4100
111°
4150
111°
4200
112°
4250
112°
4300
Bit Size
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
Micro-normal

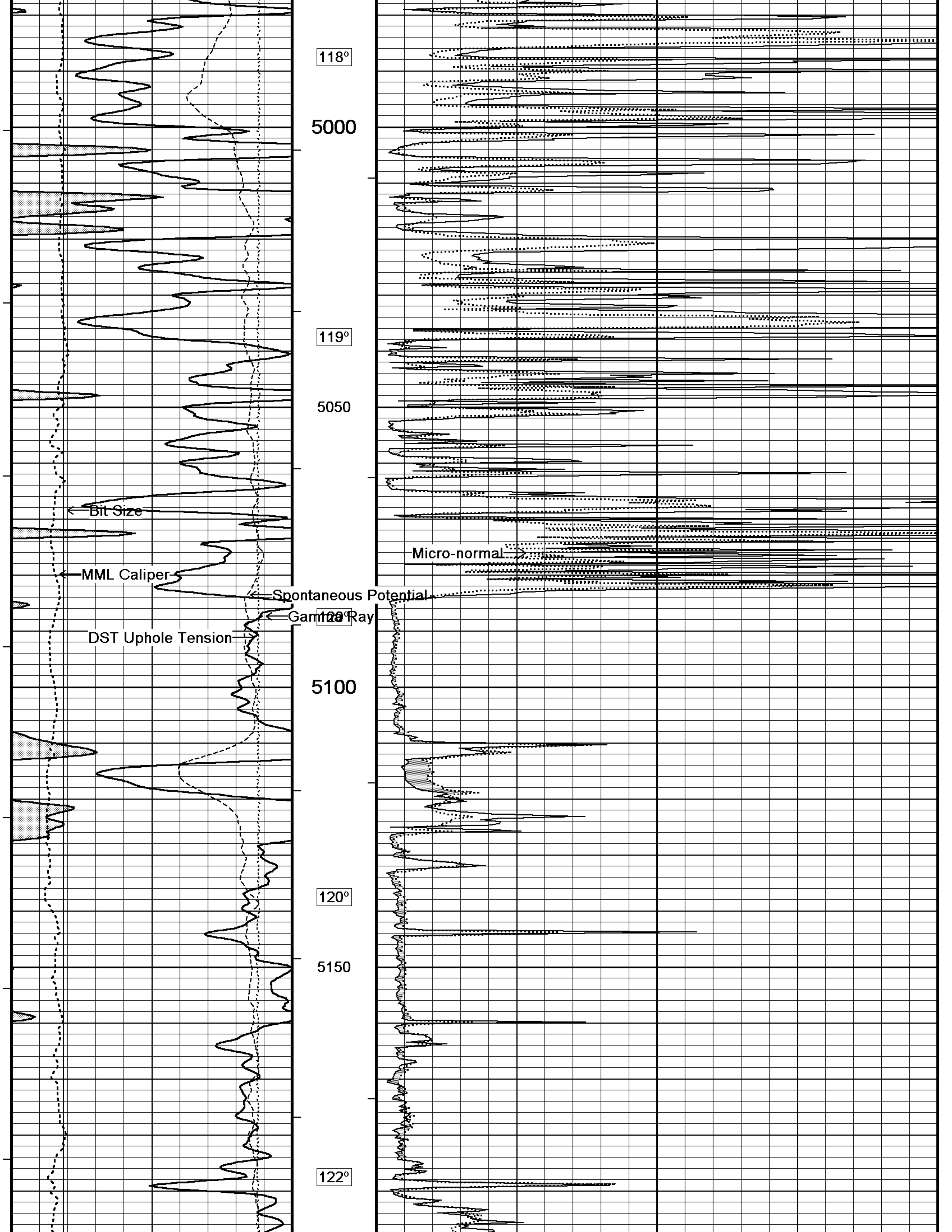


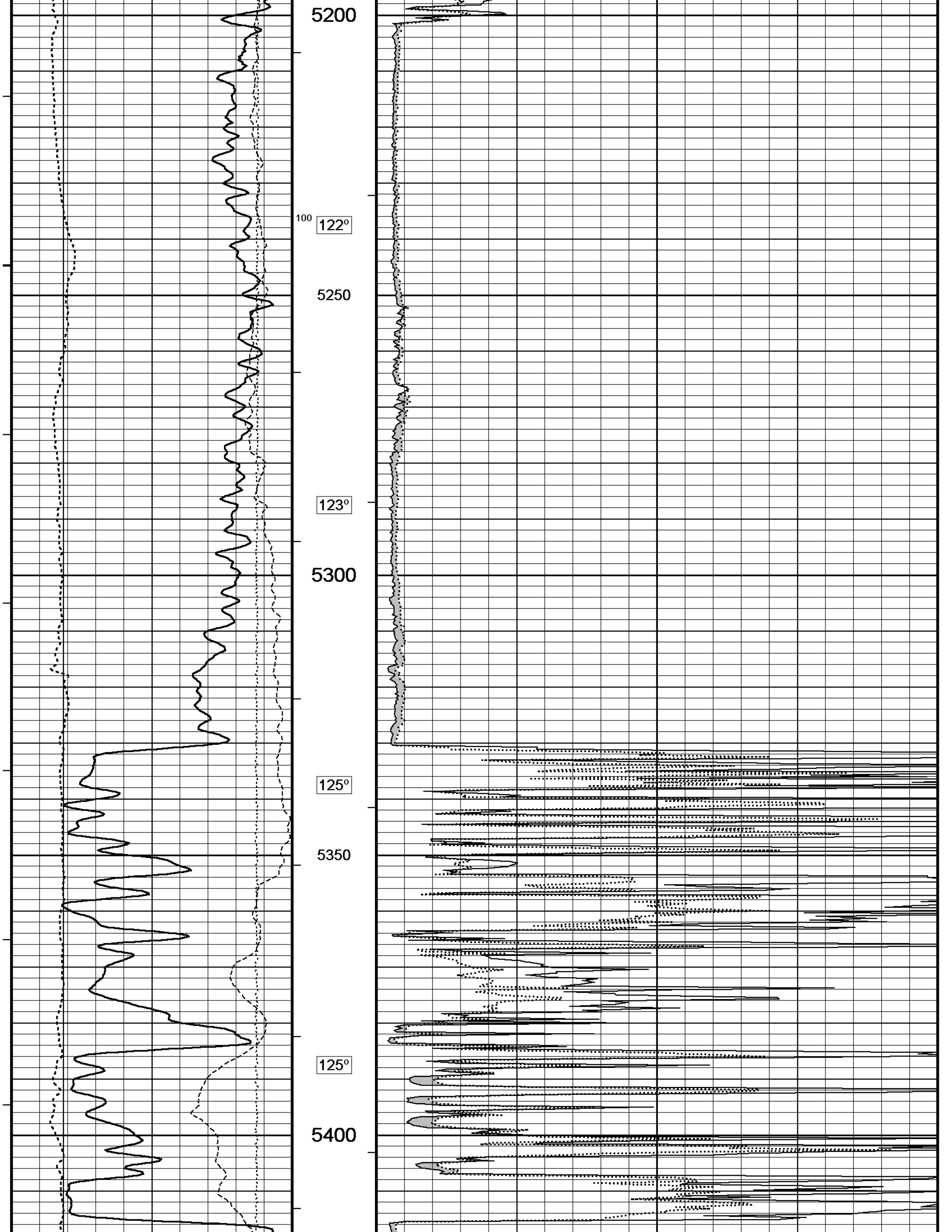
112°
4350
400
200
113°
4400
113°
4450
114°
4500


115°
4550
115°
4600
116°
4650
300
Bit Size
Micro-inverse
Micro-normal
MML Caliper
116°
Spontaneous Potential
Gamma Ray
DST Uphole Tension
4700
116°
4750

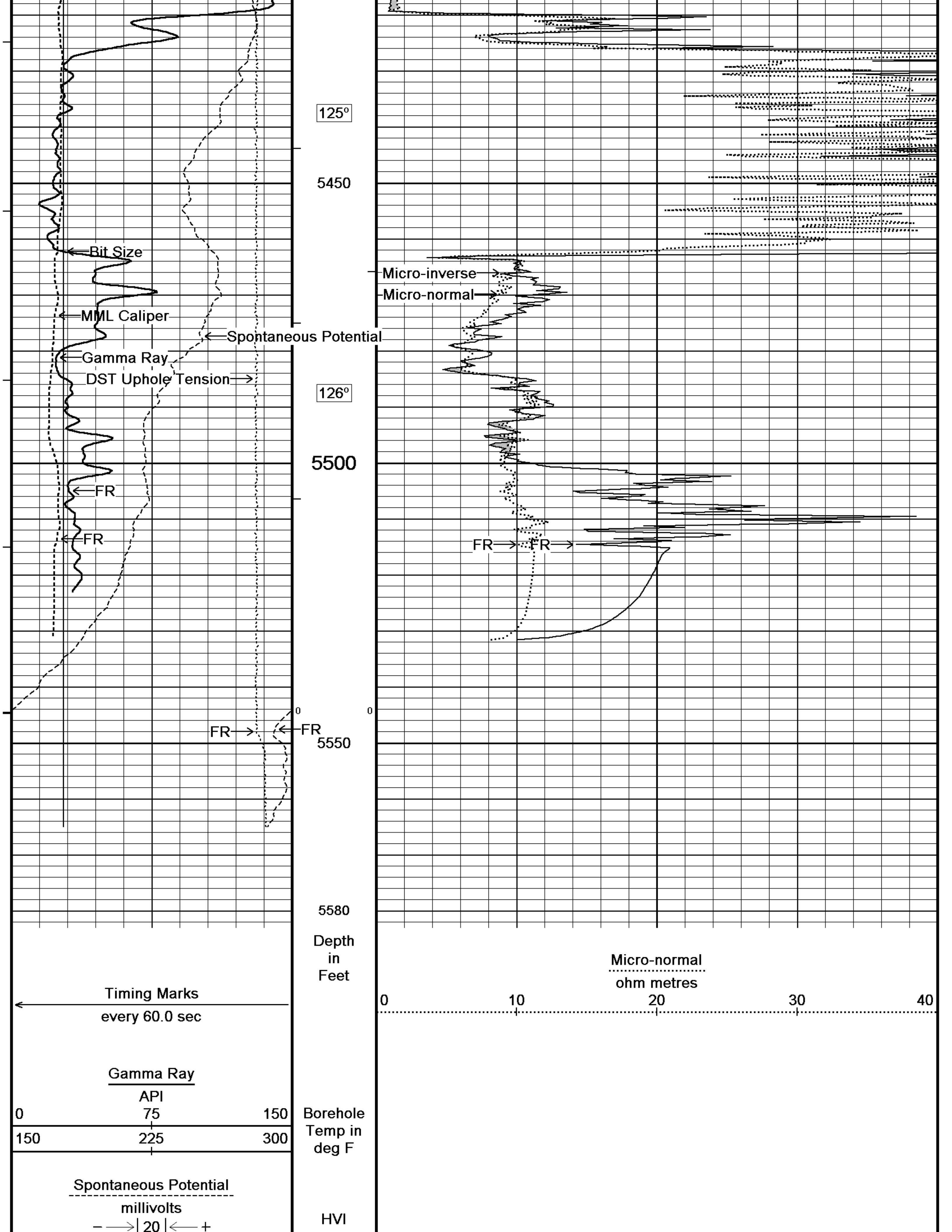


117°
4800
118°
4850
118°
4900
118°
200
4950
100


118°
5000
119°
5050
Bit Size
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
5100
120°
5150
122°



5200
100
122°
5250
123°
5300
125°
5350
125°
5400


125°
5450
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
126°
5500
FR
FR
FR
FR
0
0
FR
FR
5550
5580
Depth
in
Feet
Micro-normal
ohm metres
0
10
20
30
40
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

Micro-inverse
ohm metres
0 10 20 30 40

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 20-JUL-2013 14:01
Filename: C:\Minimus 13.05.9583\Logs\Western Haslett 2-30\Western Haslett 2-30 MAIN DETAIL.dta
Recorded on 20-JUL-2013 13:09
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-JUL-2013 14:01
Filename: C:\Minimus 13.05.9583\Logs\Western Haslett 2-30\Western Haslett 2-30 REPEAT.dta
Recorded on 20-JUL-2013 10:43
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

Depth in Feet

Timing Marks
every 60.0 sec

Micro-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

MML Caliper
inches
6 11 16

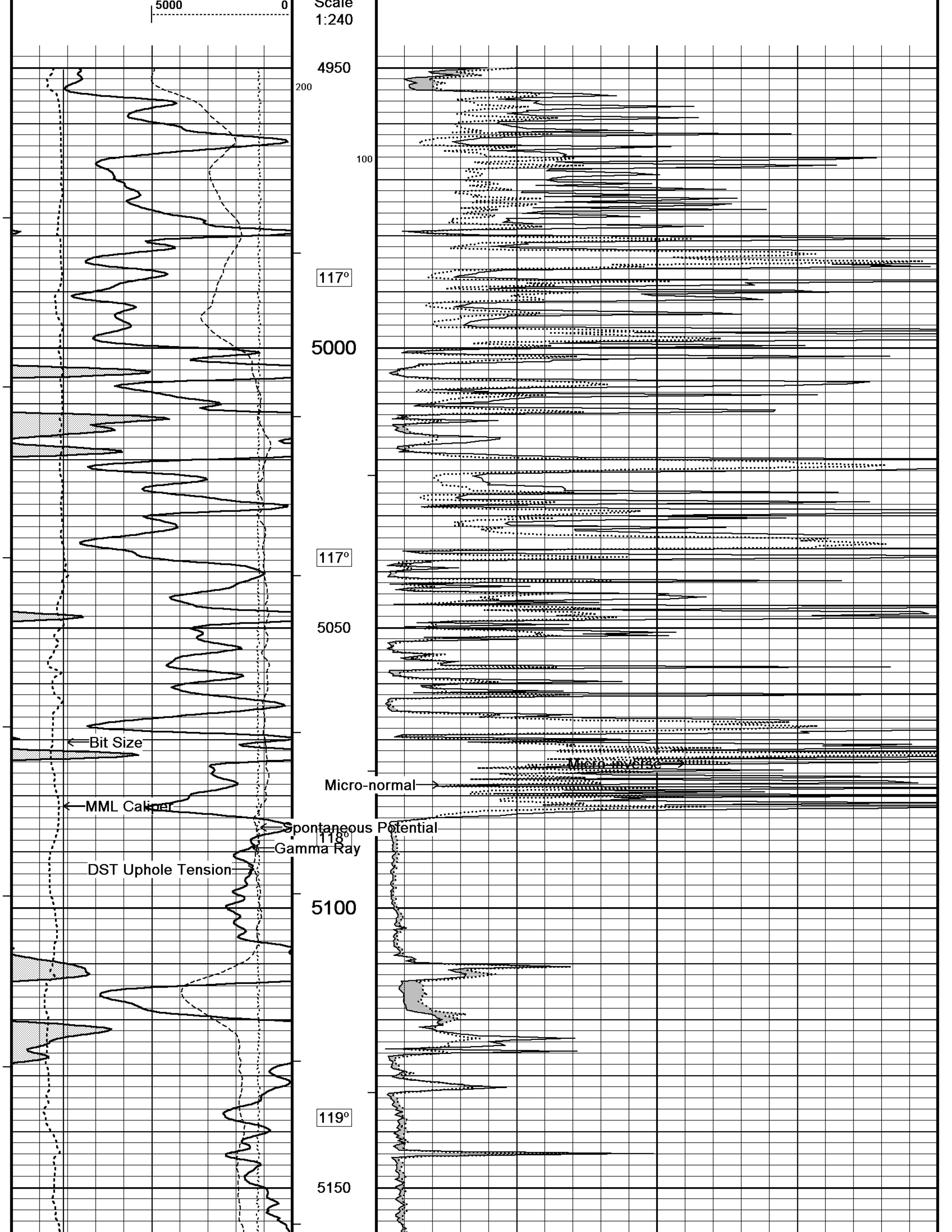
Annular Integral every 10 cu ft

Micro-inverse
ohm metres
0 10 20 30 40

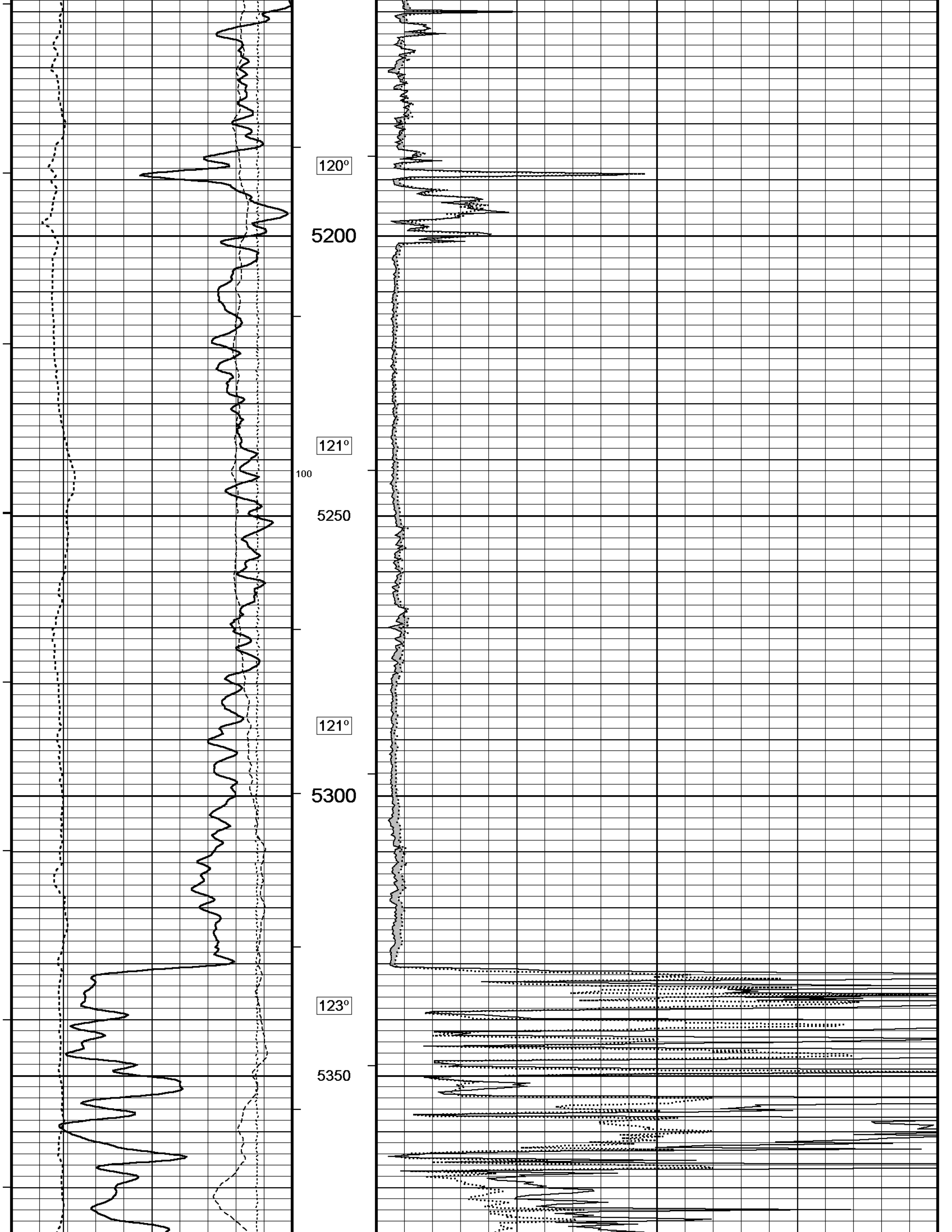
Bit Size
inches
6 11 16

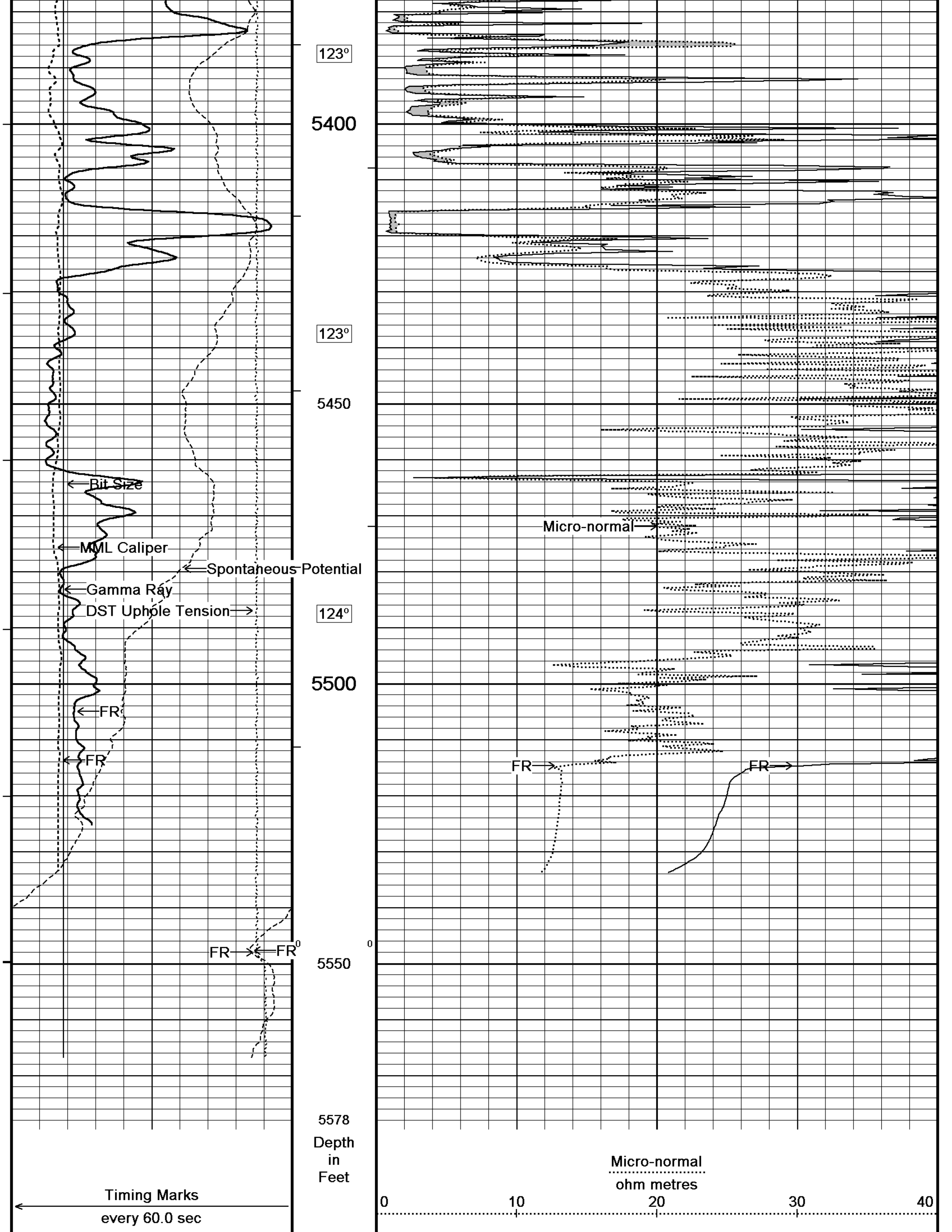
DST Uphole Tension
pounds

Replay
Scale



5000
0
Scale
1:240
4950
200
100
117°
5000
117°
5050
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
118°
Gamma Ray
DST Uphole Tension
5100
119°
5150


120°
5200
121°
100
5250
121°
5300
123°
5350



123°
5400
123°
5450
Bit Size
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
124°
5500
FR
FR
Micro-normal
FR
FR
FR
FR
0
5550
5578
Depth
in
Feet
Timing Marks
every 60.0 sec
Micro-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 ←

MML Caliper
inches
6 11 16

Annular Integral every 10 cu ft →

Micro-inverse
ohm metres
0 10 20 30 40

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 20-JUL-2013 14:01
Filename: C:\Minimus 13.05.9583\Logs\Western Haslett 2-30\Western Haslett 2-30 REPEAT.dta — Recorded on 20-JUL-2013 10:43
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Logs\Western Haslett 2-30\Western Haslett 2-30 REPEAT.dta

General Constants All 000

Last Edited on 20-JUL-2013,10:29

General Parameters		
Mud Resistivity	0.500	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	MML 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	

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 12-JUN-2013,14:22

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

High Resolution Temperature Constants MCG-C 208

Last Edited on 16-JUL-2013,06:07

Pre-filter Length	11

Gamma Calibration MCG-C 208

Field Calibration on 19-JUL-2013 16:10

	Measured	Calibrated (API)
Background	69	47
Calibrator (Gross)	1135	772
Calibrator (Net)	1066	725

Gamma Constants MCG-C 208

Last Edited on 20-JUL-2013,08:56

Gamma Calibrator Number	GRC038	
Mud Density	1.12	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 15-JUL-2013 11:15
Field Check on 19-JUL-2013 15:57

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.2	60.2	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 19-JUL-2013,15:56

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

Caliper Calibration MML-A 3

Base Calibration on 15-JUL-2013 11:02
Field Calibration on 19-JUL-2013 15:59

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14780	5.98
2	18077	7.97
3	21341	9.86
4	25295	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 MPD-B 59

Base Calibration on 15-JUL-2013 17:42
Field Calibration on 19-JUL-2013 15:55

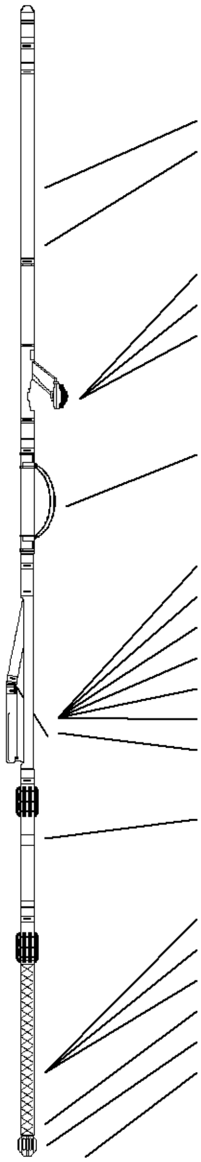
Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15286	3.99
2	23942	5.98
3	32512	7.97
4	40768	9.86
5	49984	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.89	7.97

DOWNHOLE EQUIPMENT



CBH-C, Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.24 in

Compact Comms Gamma
MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

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

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

33.24 ft	MINV - Micro-inverse
33.24 ft	MNRL - Micro-normal
34.24 ft	MLTC - MML Caliper

Compact Neutron
MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

28.45 ft	NPRL - Limestone Neutron Por.

Compact Density/Caliper
MPD-B 59 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
21.21 ft	CLDC - Density Caliper
19.28 ft	DEN - Compensated Density
19.28 ft	DCOR - Density Correction
19.28 ft	DPRL - Limestone Density Por.
19.22 ft	PDPE - PE

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

13.72 ft	FEFE - Shallow FE

Compact Induction
MAI-A.A 178 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

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

All measurements relative to tool zero.

Total Length: 50.55 ft Weight: 407.9 lb

COMPANY	WESTERN OPERATING CO.
WELL	HASLETT 2-30
FIELD	GOULD
PROVINCE/COUNTY	HAMILTON
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3594.00	feet	First Reading	5514.00	feet
Elevation Drill Floor	3592.00	feet	Depth Driller	5550.00	feet
Elevation Ground Level	3583.00	feet	Depth Logger	5548.00	feet

Weatherford®

MICRORESISTIVITY LOG