# MICRORESISTIVITY LOG

Weatherford

| | |
|---|---|
| COMPANY | APACHE CORP. |
| WELL | HAGER 1-12 |
| FIELD | UNNAMED |
| PROVINCE/COUNTY | MEADE |
| COUNTRY/STATE | U.S.A. / KANSAS |
| LOCATION | 1320' FSL & 1320' FWL |

40 Years of Wireline 1970 2010

| SEC | TWP | RGE | Other Services |
|---|---|---|---|
| 12 | 34S | 28W | MAI/MFE MPD/MDN |

API Number 15-119-21263
Permit Number

Permanent Datum G.L., Elevation 2359 feet
Log Measured From K.B. @ 12 FEET above Permanent Datum
Drilling Measured From K.B.

| Elevations: | feet |
|---|---|
| KB | 2371.00 |
| DF | 2369.00 |
| GL | 2359.00 |

| | | | | |
|---|---|---|---|---|
| Date | 02-APR-2011 | | | |
| Run Number | ONE | | | |
| Depth Driller | 6260.00 | feet | | |
| Depth Logger | 6265.00 | feet | | |
| First Reading | 6229.00 | feet | | |
| Last Reading | 2000.00 | feet | | |
| Casing Driller | 1630.00 | feet | | |
| Casing Logger | 1631.00 | feet | | |
| Bit Size | 7.875 | inches | | |
| Hole Fluid Type | CHEMICAL | | | |
| Density / Viscosity | 9.00 lb/USg | 56.00 CP | | |
| PH / Fluid Loss | 10.00 | 7.20 ml/30Min | | |
| Sample Source | FLOWLINE | | | |
| Rm @ Measured Temp | 0.87 @ 78.0 | ohm-m | | |
| Rmf @ Measured Temp | 0.70 @ 78.0 | ohm-m | | |
| Rmc @ Measured Temp | 1.04 @ 78.0 | ohm-m | | |
| Source Rmf / Rmc | CALC | CALC | | |
| Rm @ BHT | 0.58 @118.0 | ohm-m | | |
| Time Since Circulation | 6 HOURS | | | |
| Max Recorded Temp | 118.00 | deg F | | |
| Equipment Name | COMPACT | | | |
| Equipment / Base | 13025 | LIB | | |
| Recorded By | L. SCOTT | | | |
| Witnessed By | KARL GRAHAM | | CODY MARTIN | |
| S.O.# / JOB# | 3529171 | | LB11-065 | |

## BOREHOLE RECORD

Last Edited: 03-APR-2011 04:15

| Bit Size inches | Depth From feet | Depth To feet |
|---|---|---|
| 7.875 | 1631.00 | 6265.00 |

## CASING RECORD

| Type | Size inches | Depth From feet | Shoe Depth feet | Weight pounds/ft |
|---|---|---|---|---|
| SURFACE | 8.625 | 0.00 | 1631.00 | 24.00 |

## REMARKS

ols Used: MAI, MPD, MCG, MDN, MML, MFE, SKJ
Hardware: MPD: 8 inch profile plate. MAI and MFE: 0.5 Inch standoffs used. MDN: Dual Bowspring used.
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.
Annular volume with 5.5 inch production casing = 907 cu. ft.
Service order #3529171
Rig: Duke Rig #6
Engineer: L. Scott
Operator(s): N. Adame, J. LaPoint

# 5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 03-APR-2011 13:05
Filename: C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12_002.dta
Recorded on 03-APR-2011 01:40
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150

Spontaneous Potential
millivolts
− → | 20 | ← +

MML Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

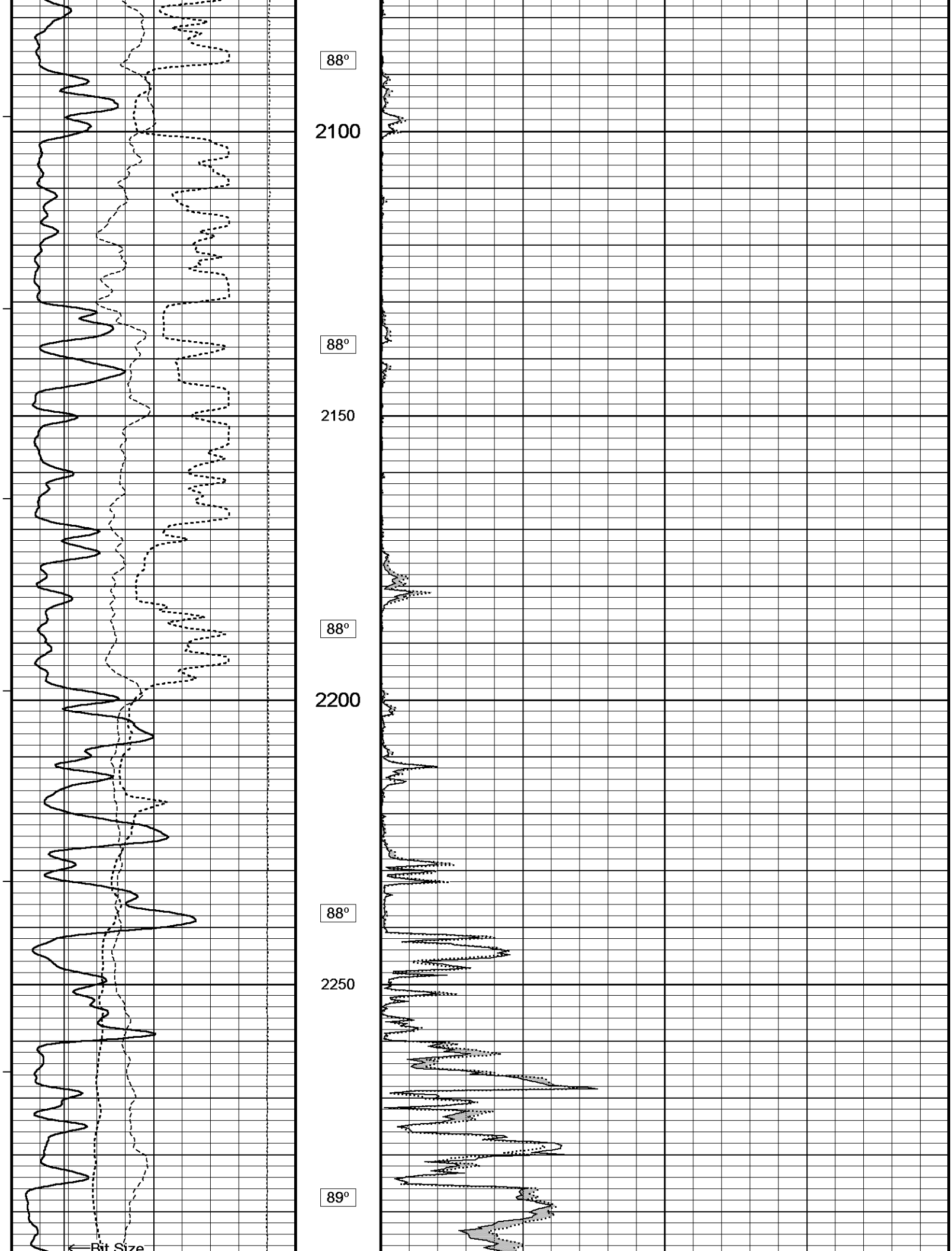
2000

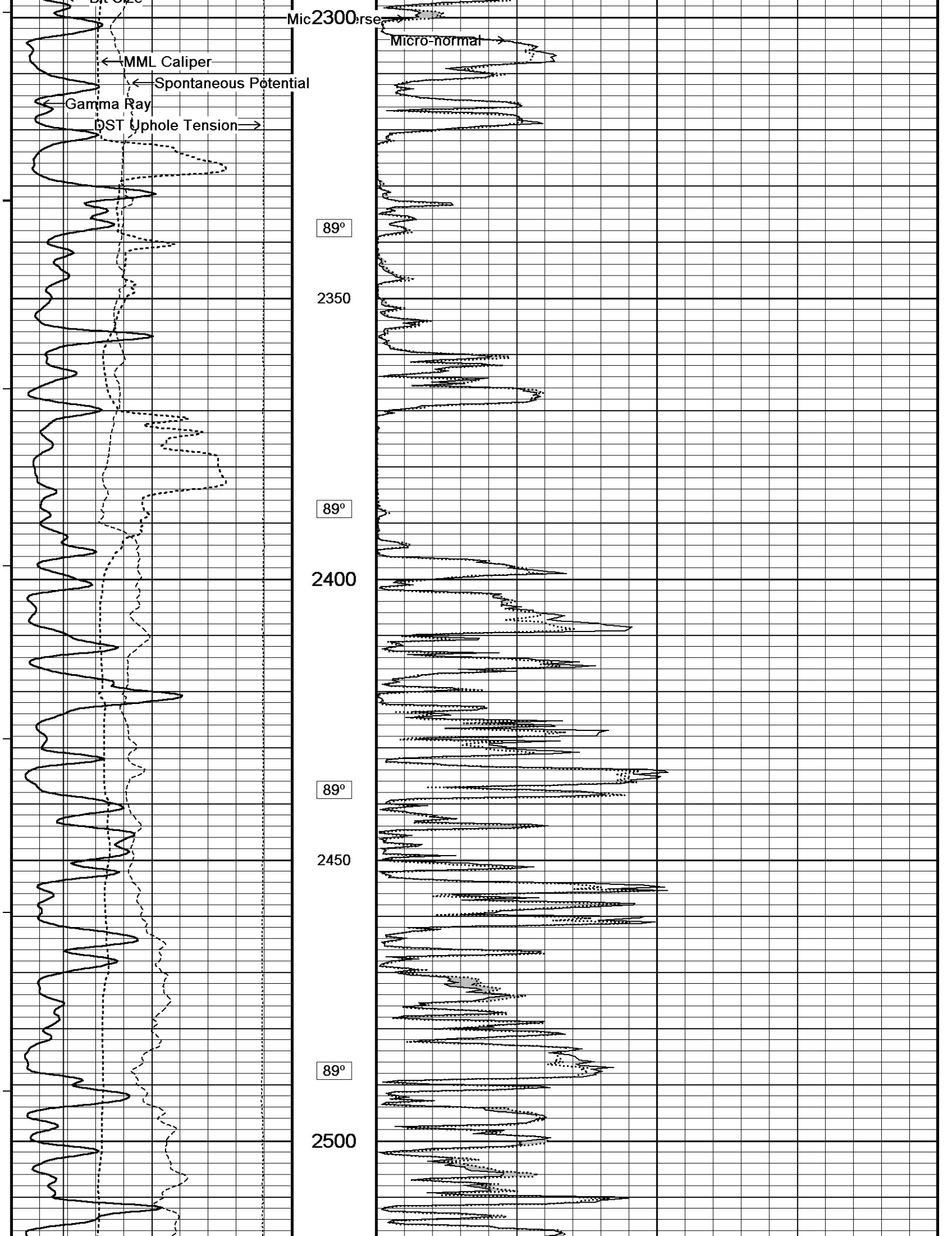
88°

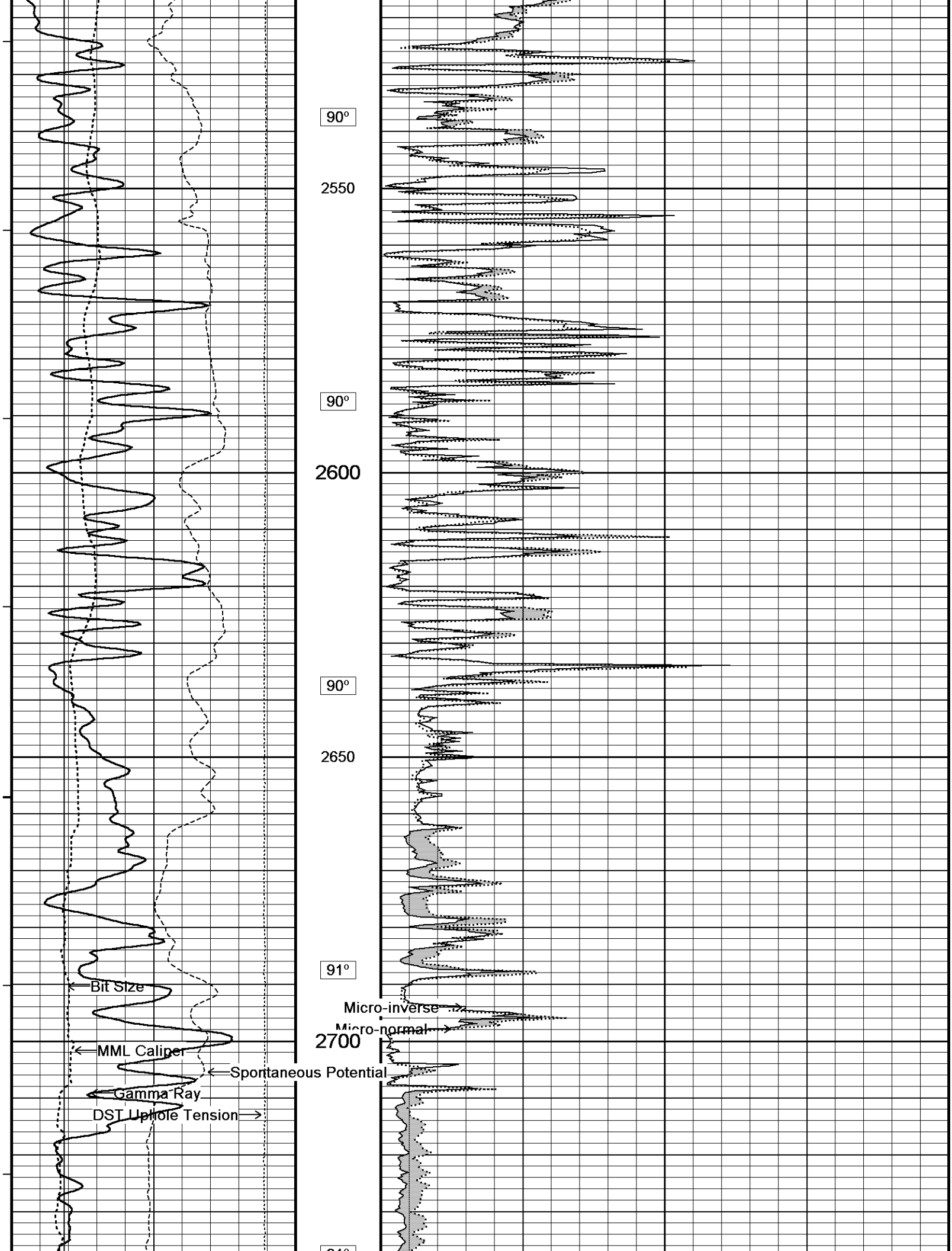
2050

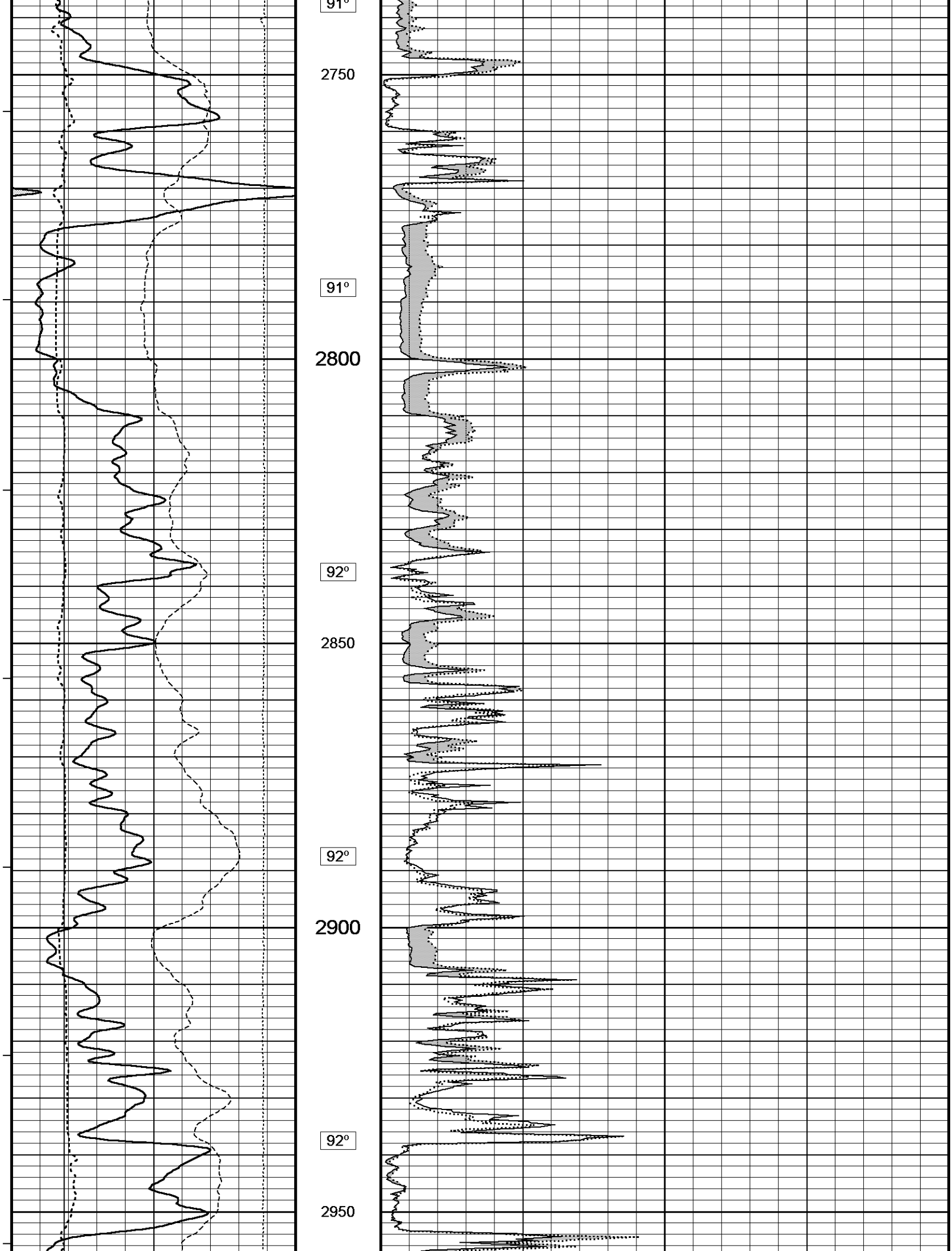
Micro-normal
ohm metres
0 10 20 30 40

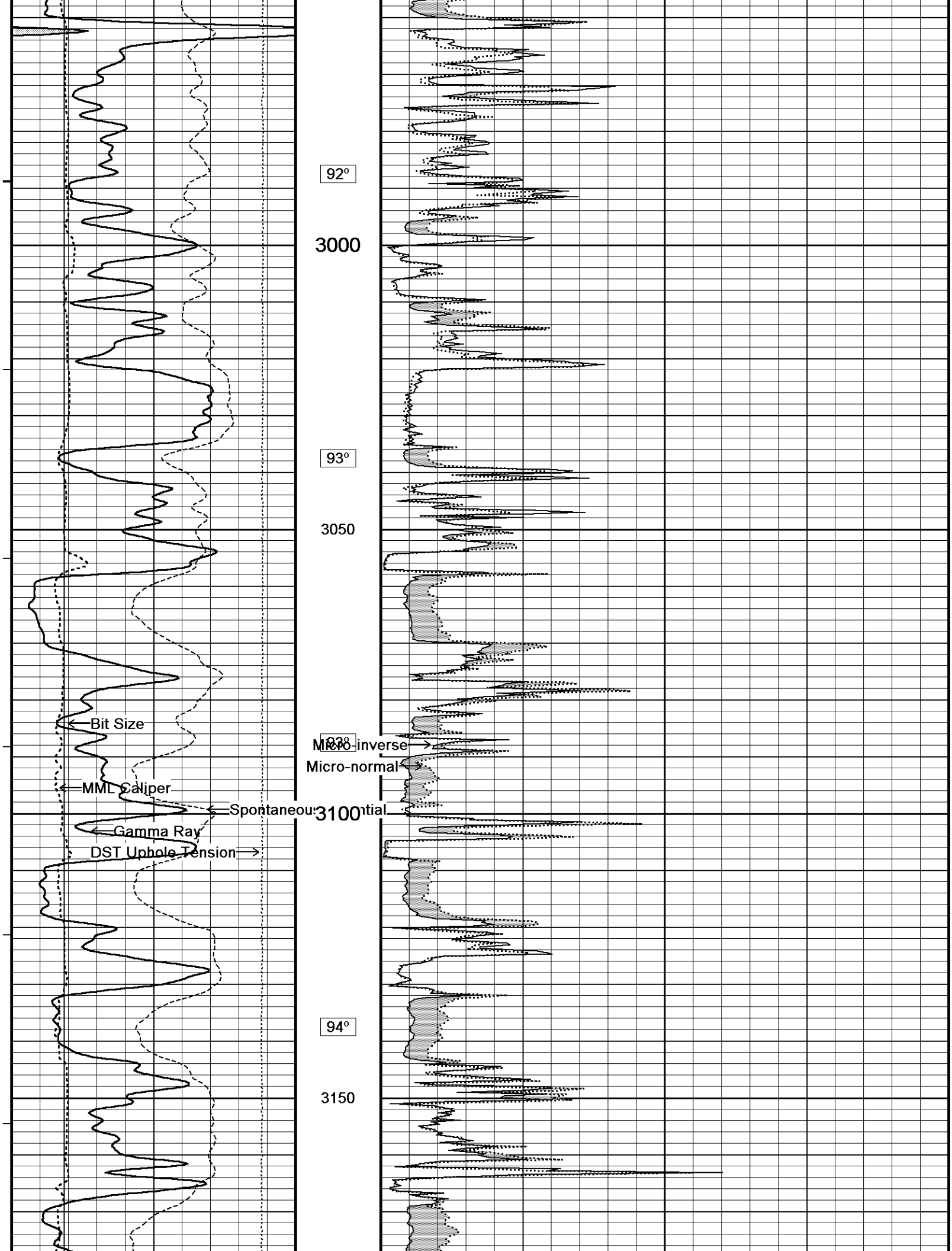
Micro-inverse
ohm metres
0 10 20 30 40

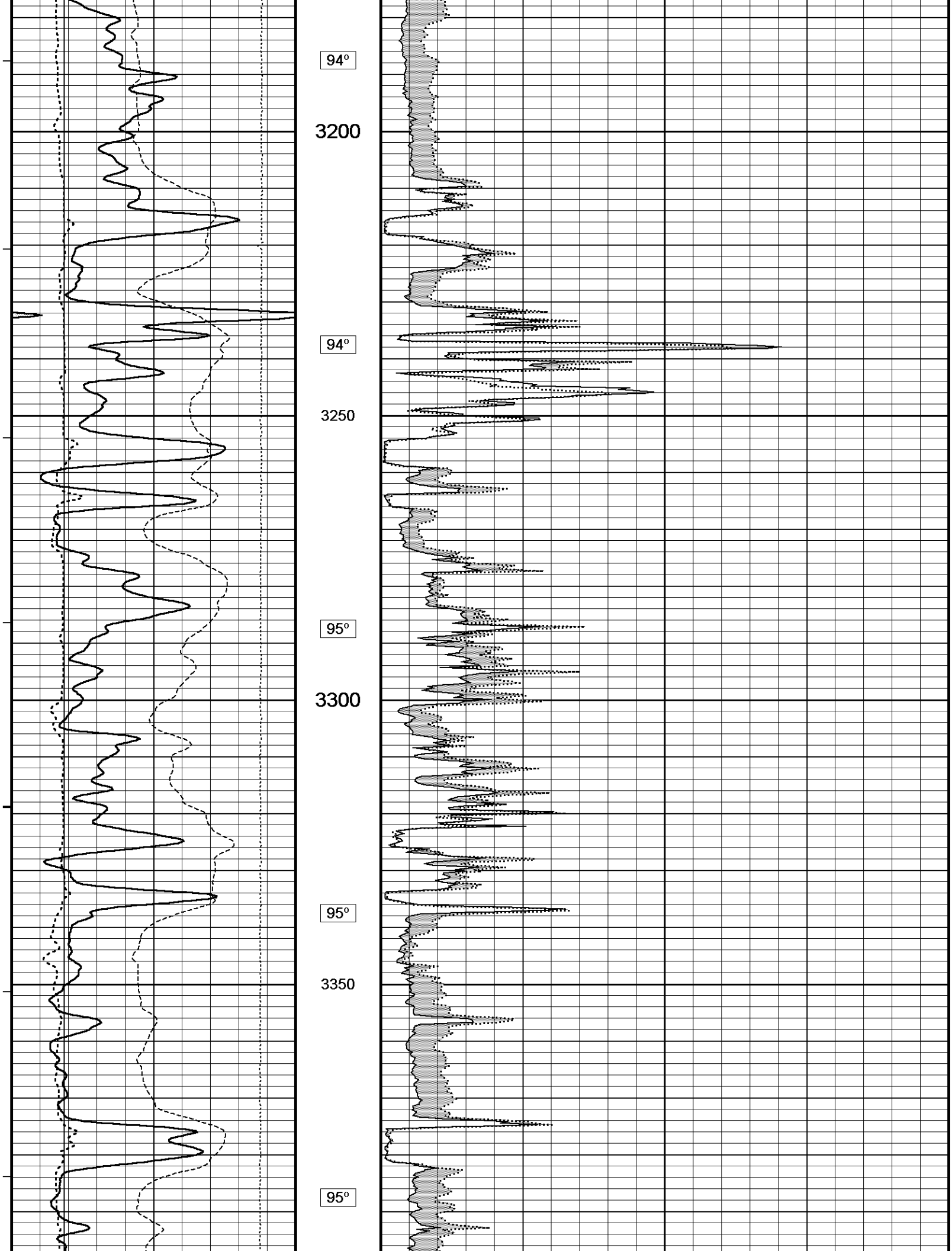

88°
2100
88°
2150
88°
2200
88°
2250
89°
Bit Size

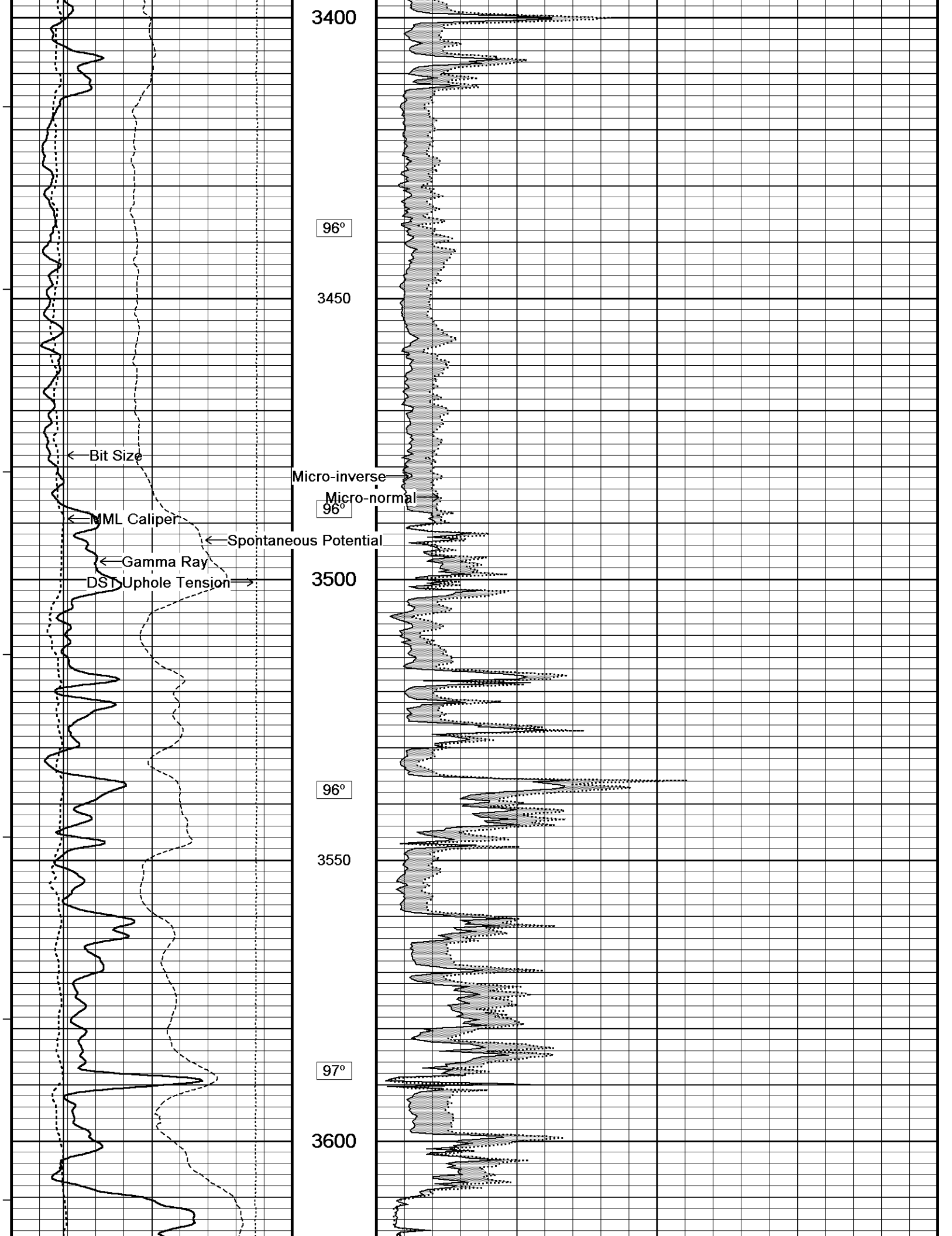

Bit Size
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
Micro-inverse
Micro-normal
2300
89°
2350
89°
2400
89°
2450
89°
2500

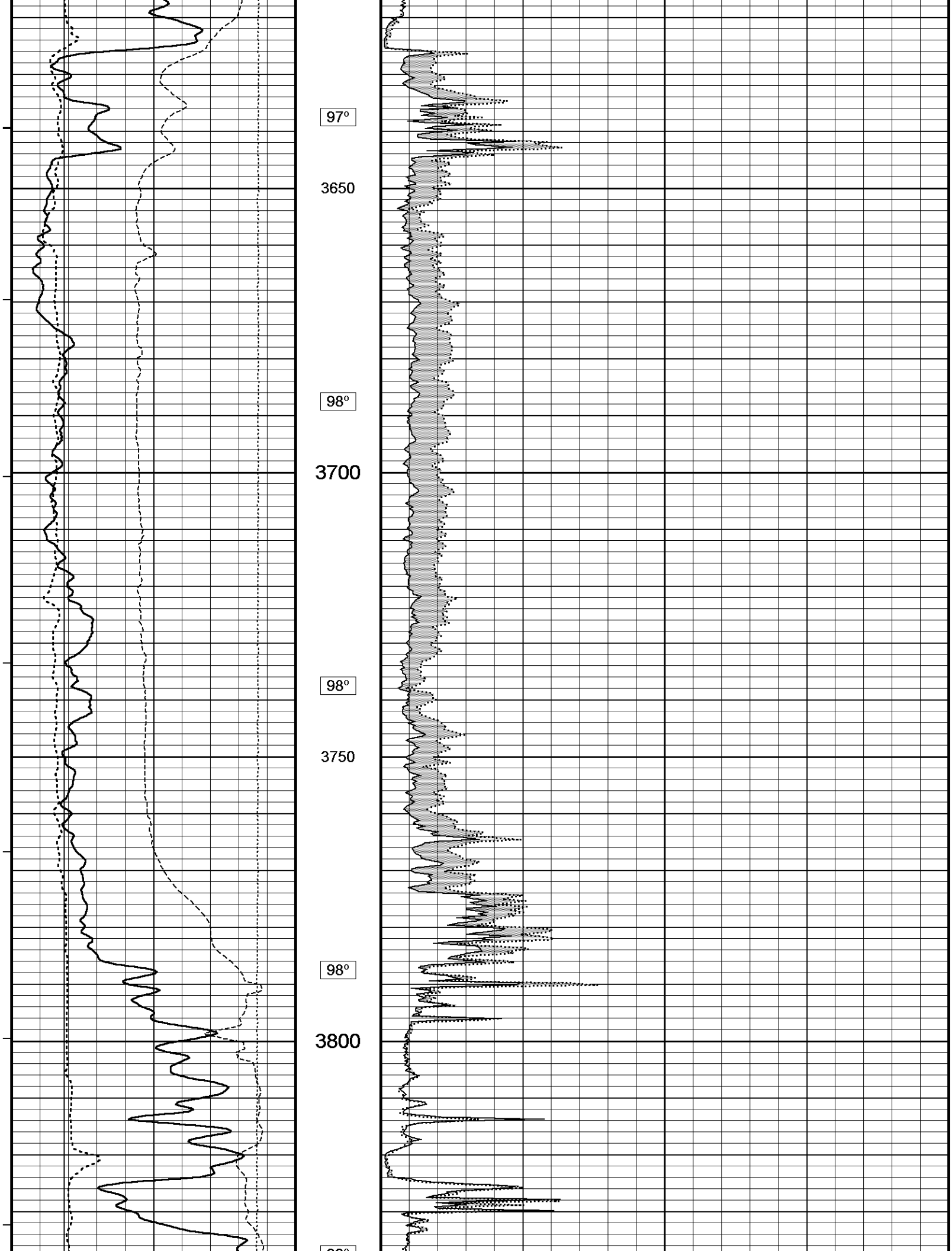

90°
2550
90°
2600
90°
2650
91°
Bit Size
Micro-inverse
Micro-normal
2700
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension

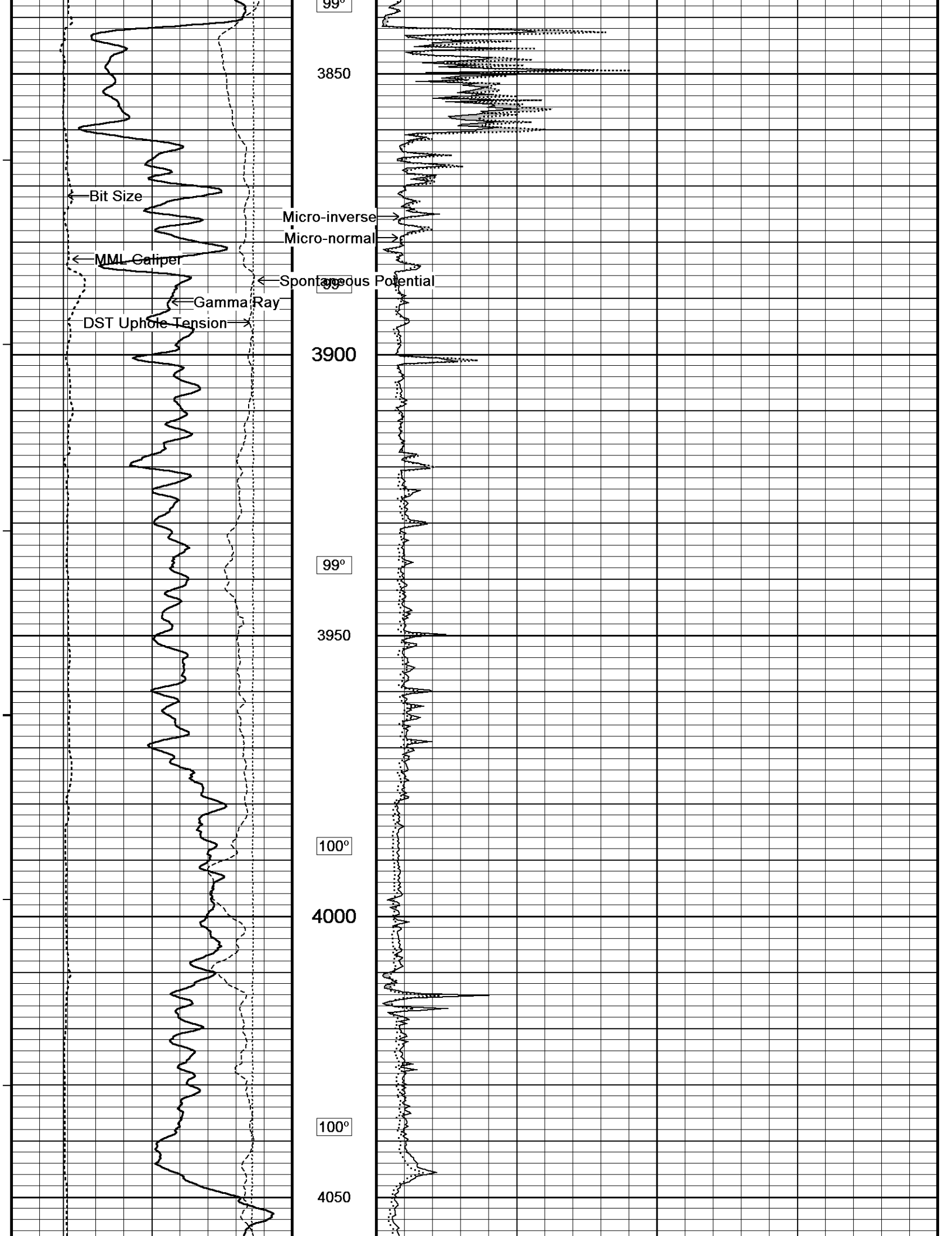

91°
2750
91°
2800
92°
2850
92°
2900
92°
2950

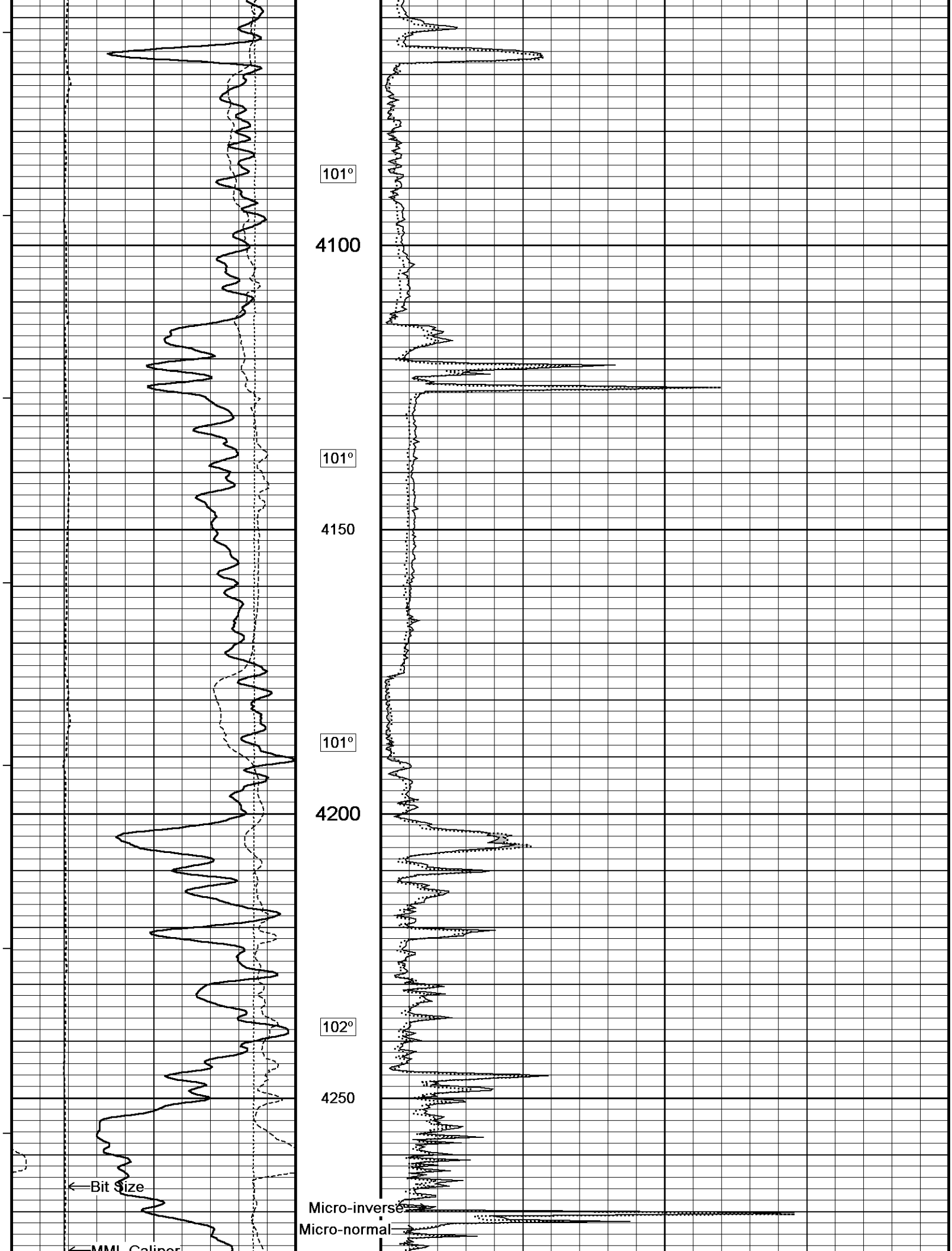

92°
3000
93°
3050
Bit Size
93°
Micro-inverse
Micro-normal
MML Caliper
Spontaneous
3100
Gamma Ray
DST Uphole Tension
94°
3150

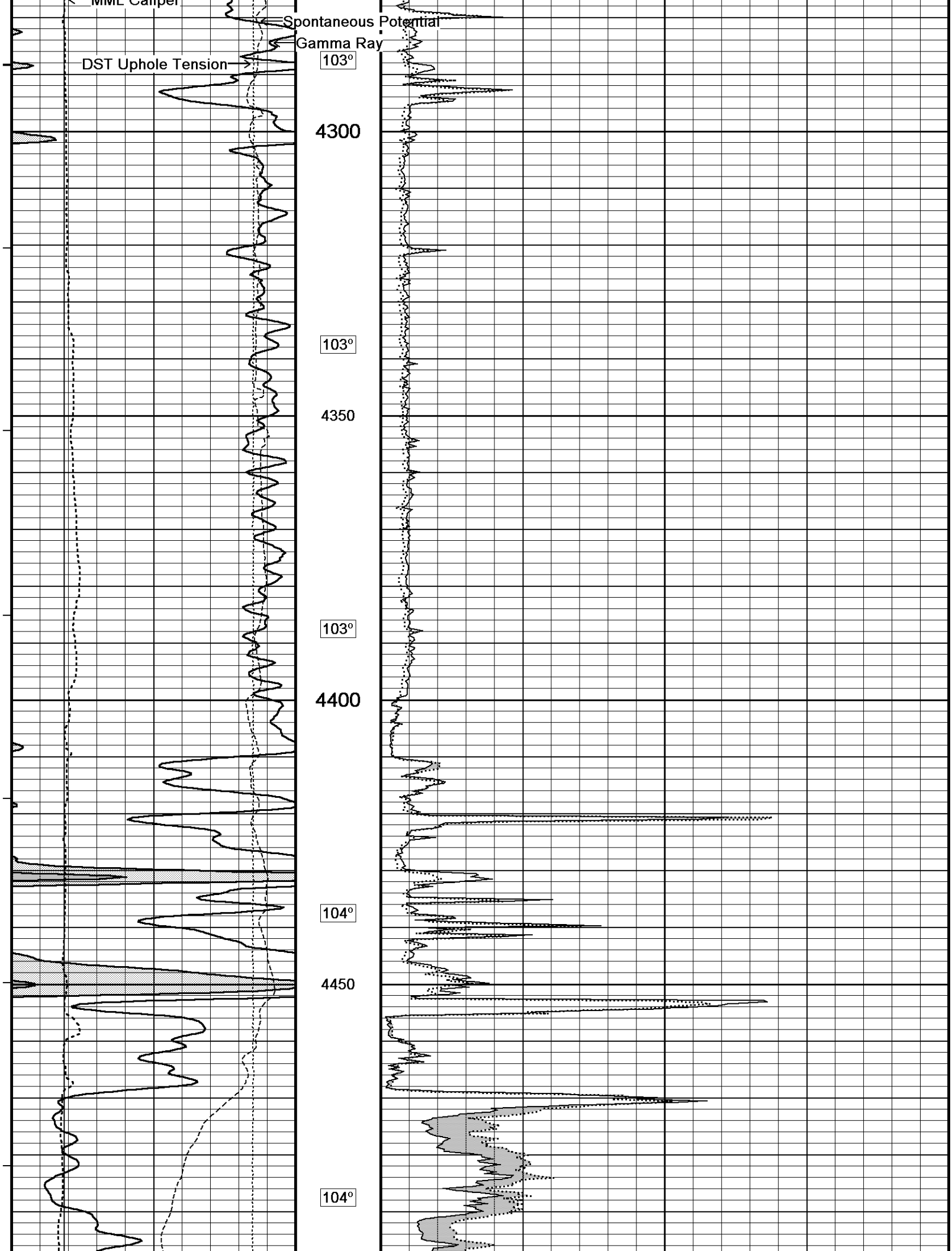

94°
3200
94°
3250
95°
3300
95°
3350
95°

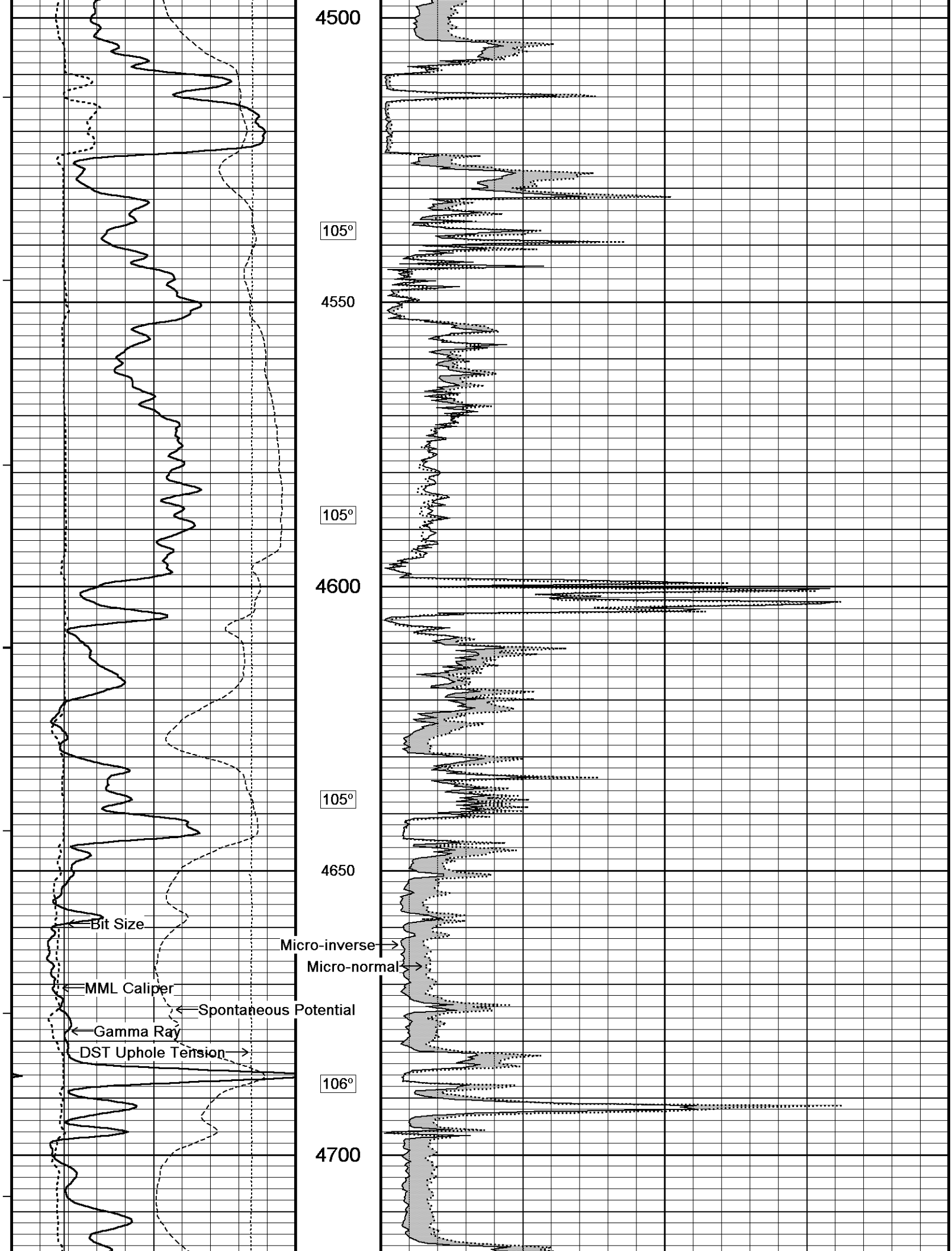

3400
96°
3450
Bit Size
Micro-inverse
Micro-normal
96°
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
3500
96°
3550
97°
3600

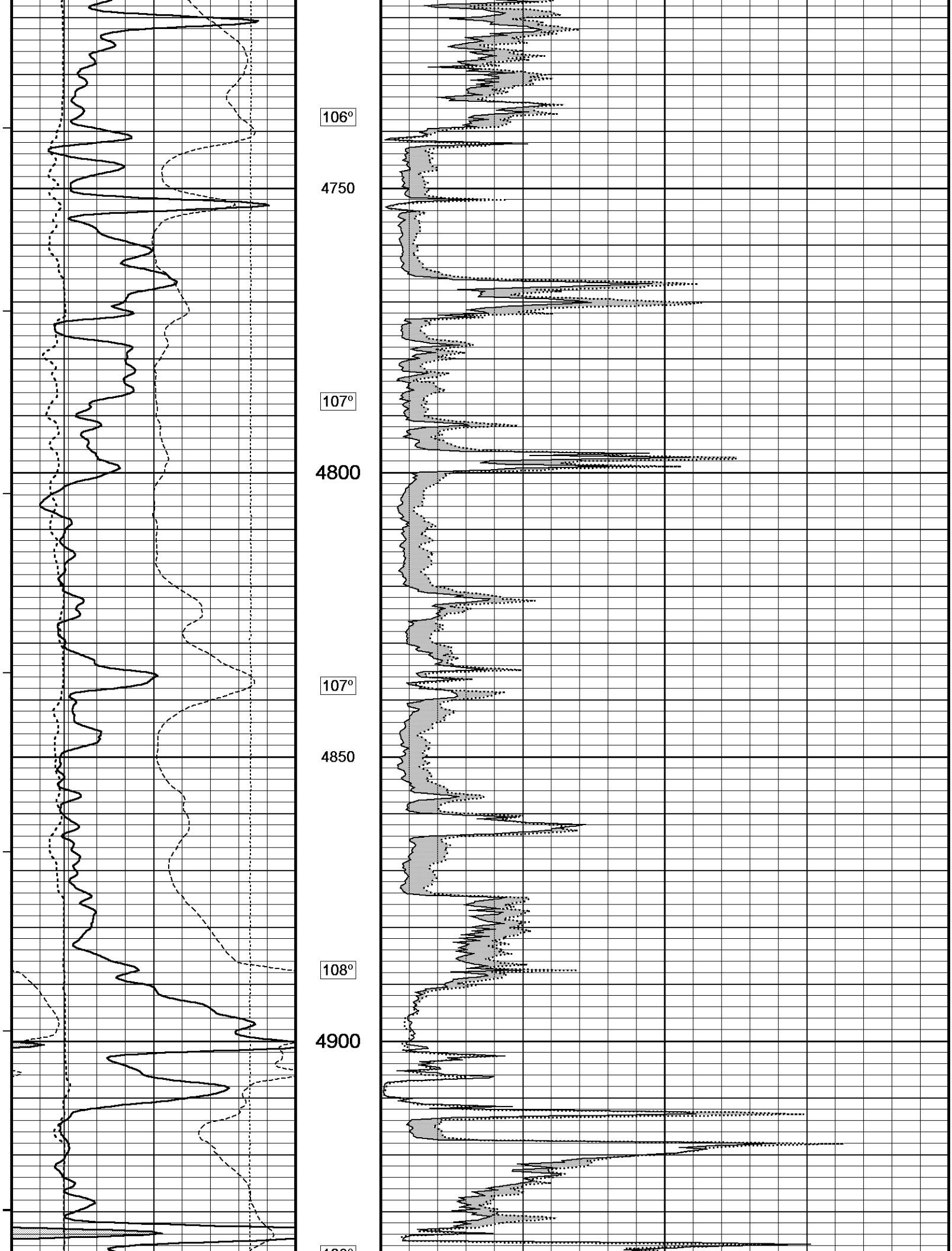

97°
3650
98°
3700
98°
3750
98°
3800

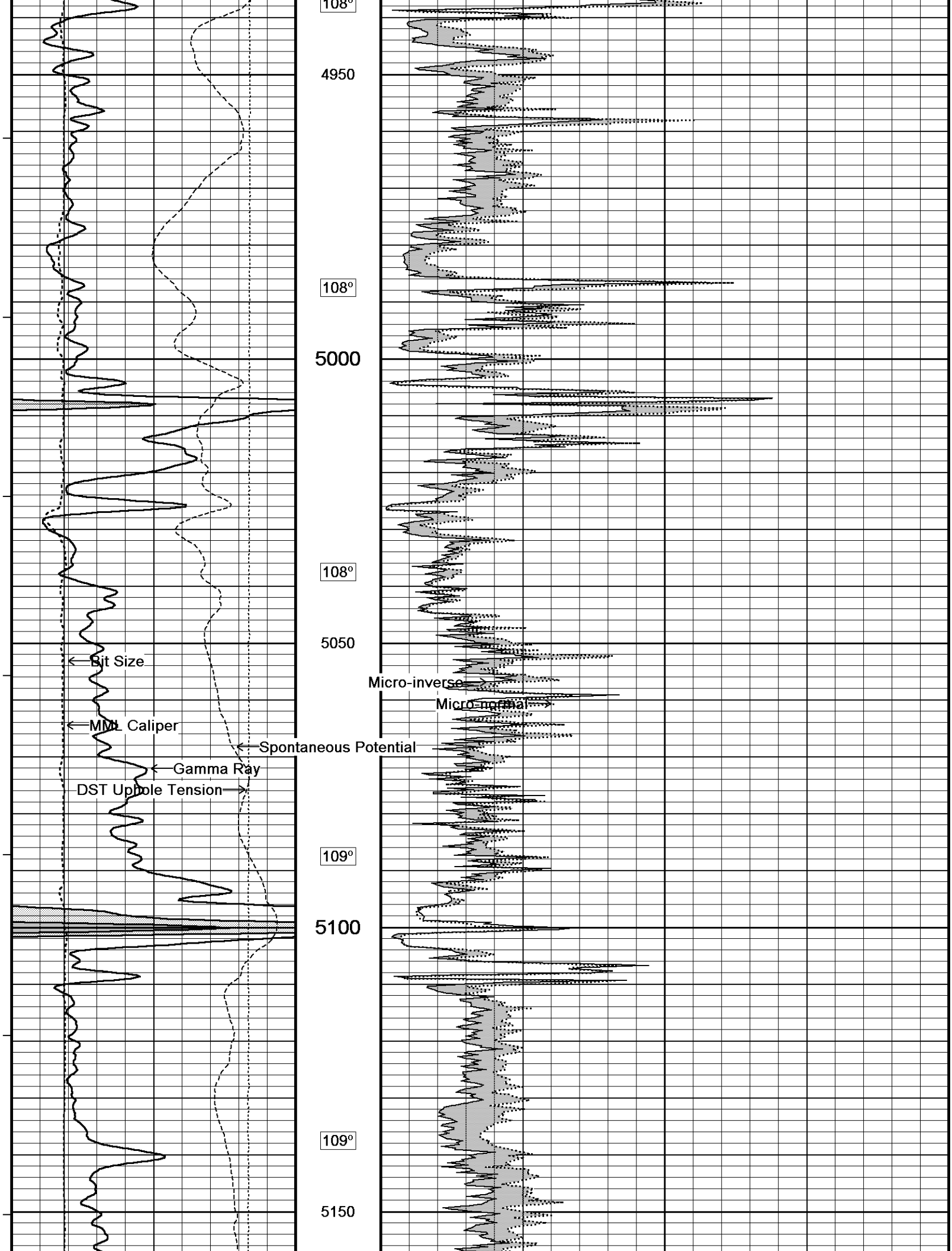

99°
3850
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
99°
Gamma Ray
DST Uphole Tension
3900
99°
3950
100°
4000
100°
4050

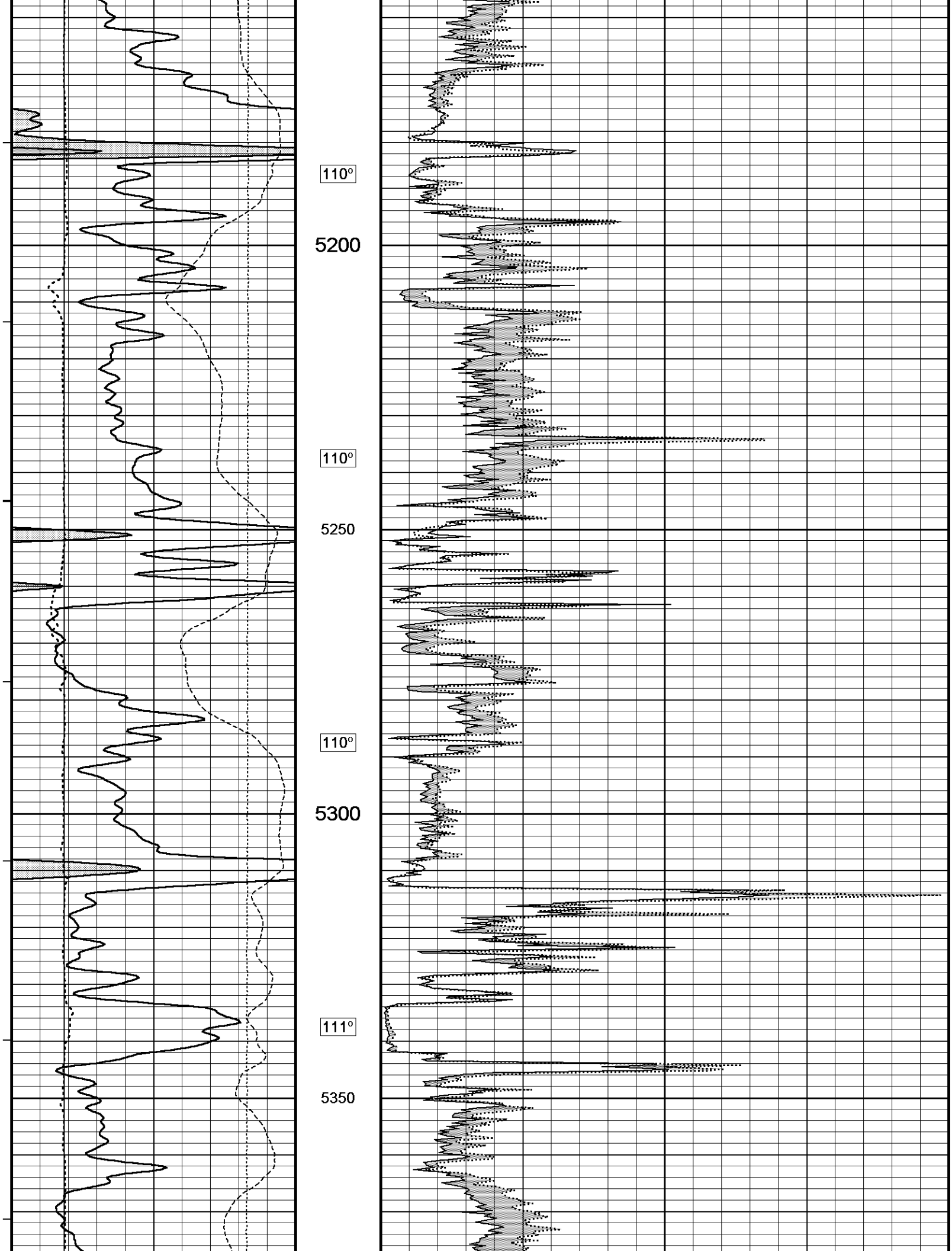

101°
4100
101°
4150
101°
4200
102°
4250
Bit Size
Micro-inverse
Micro-normal

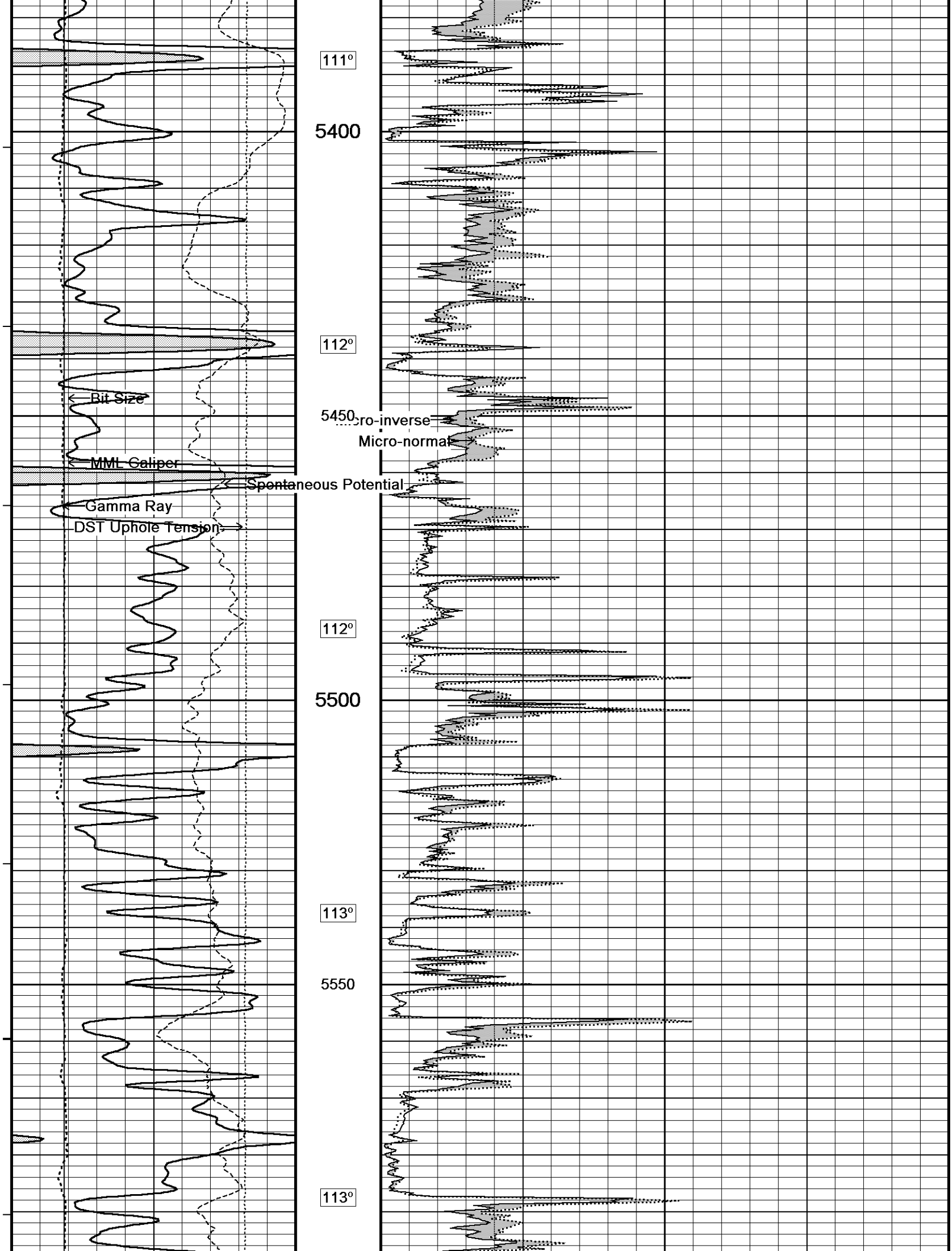

MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
103°
4300
103°
4350
103°
4400
104°
4450
104°

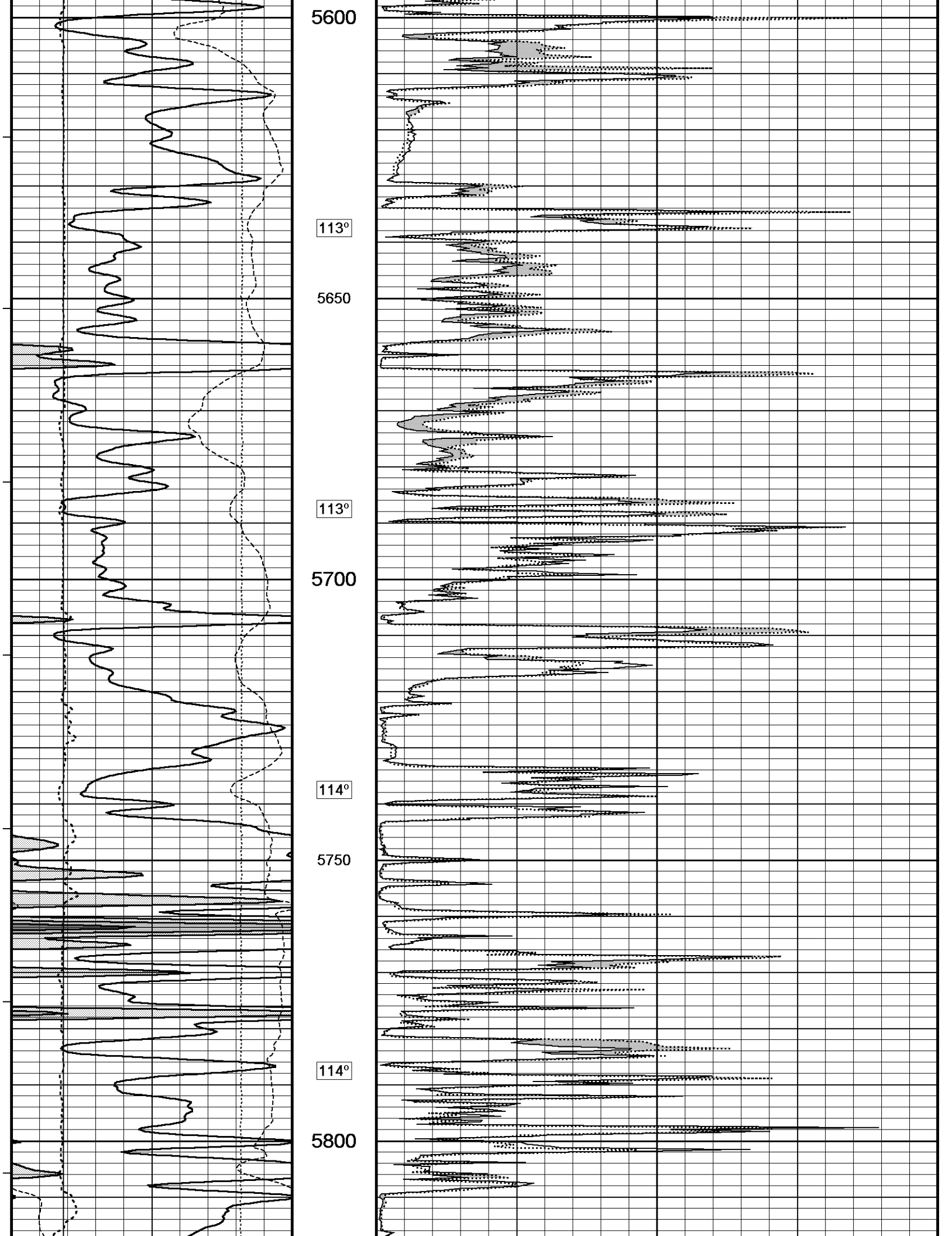

4500
105°
4550
105°
4600
105°
4650
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
106°
4700

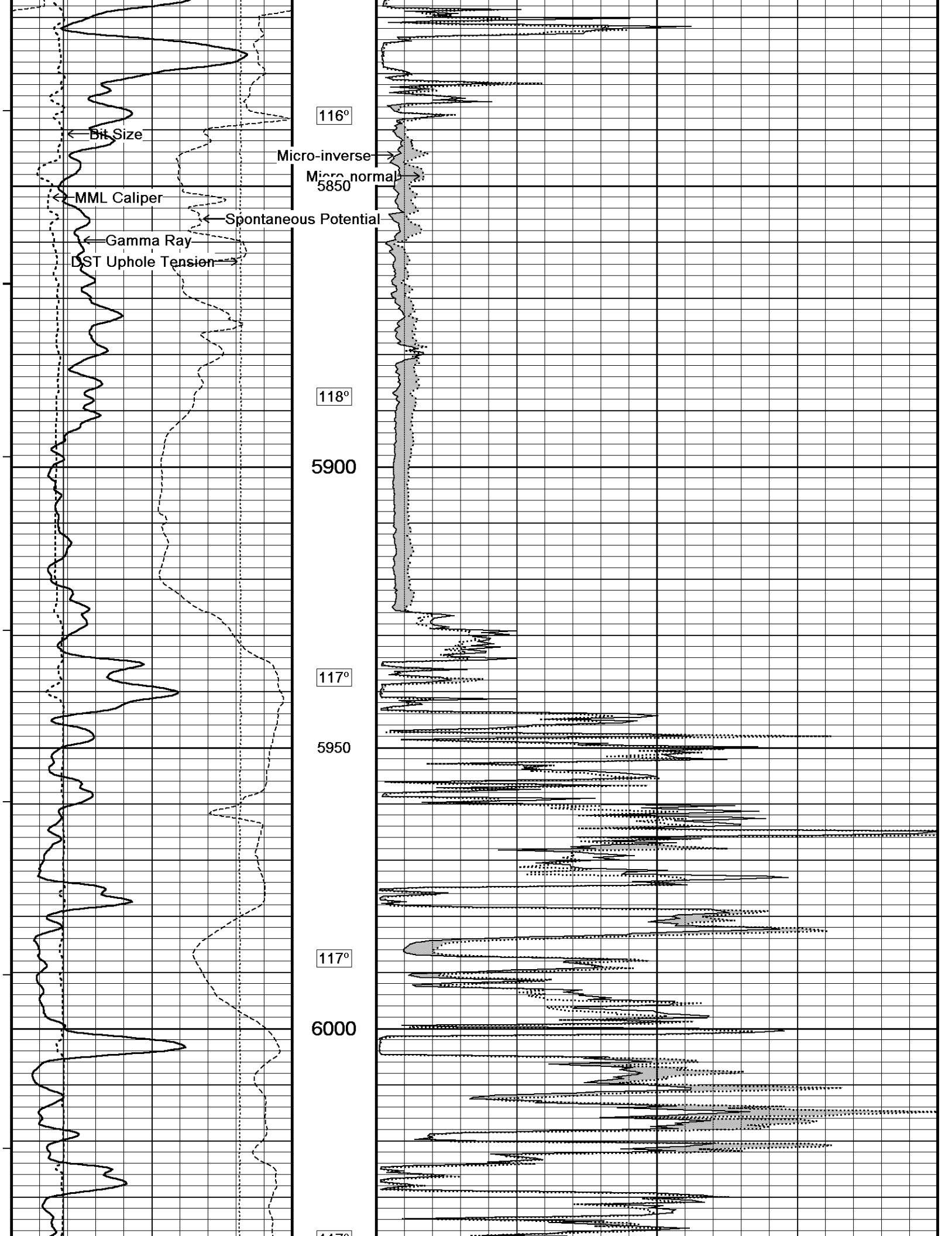

106°
4750
107°
4800
107°
4850
108°
4900

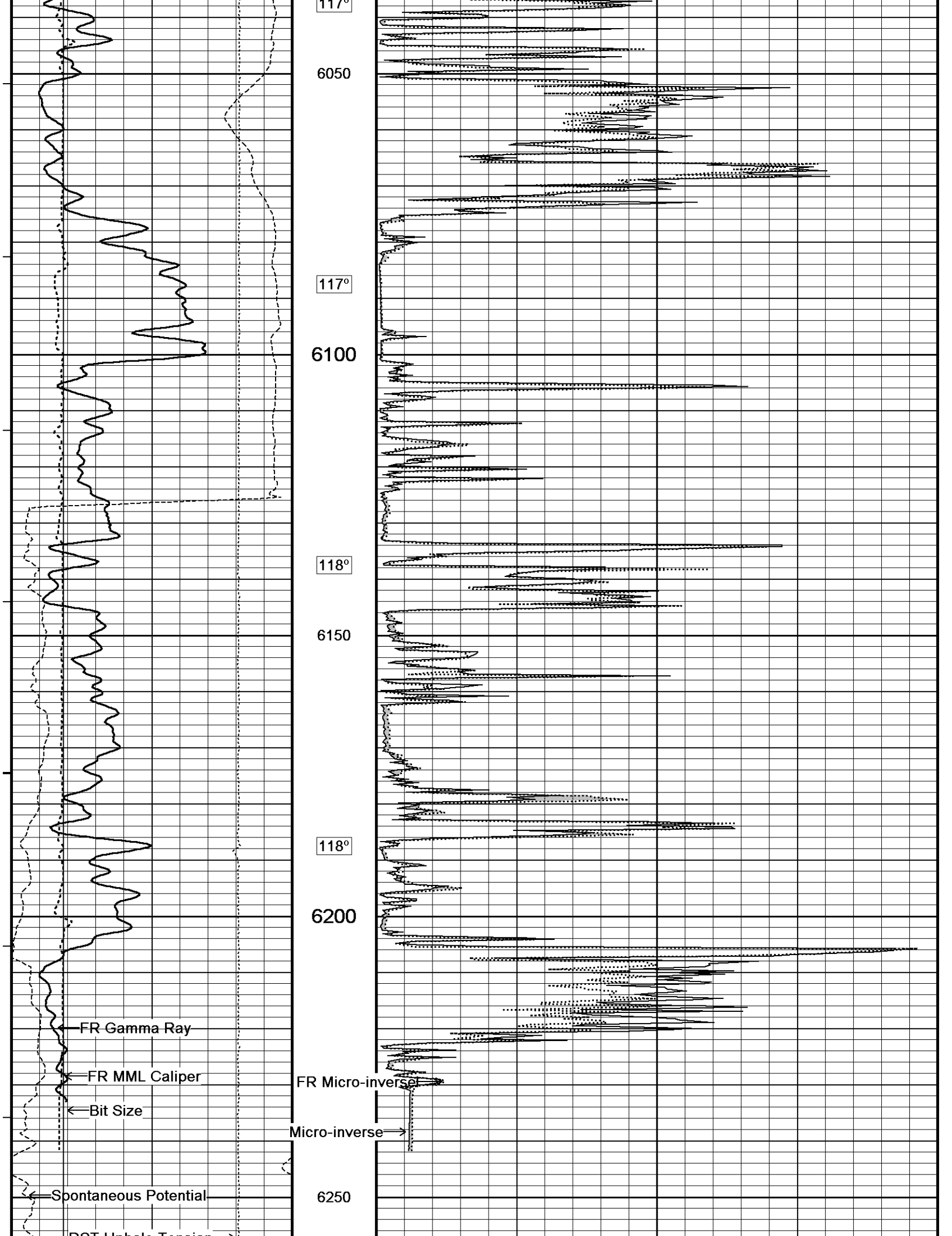

108°
4950
108°
5000
108°
5050
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
109°
5100
109°
5150

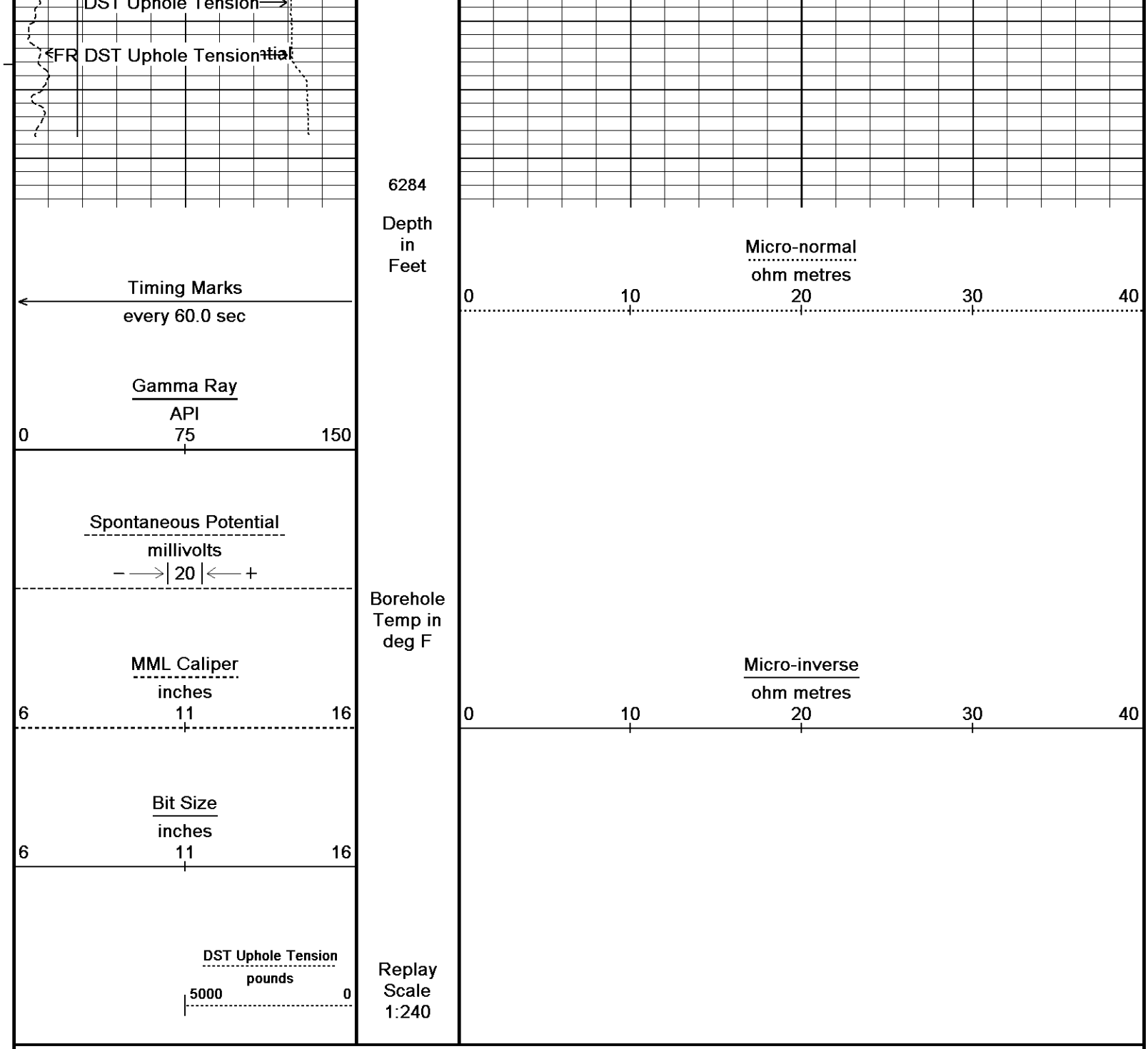

110°
5200
110°
5250
110°
5300
111°
5350


111°
5400
112°
Bit Size
5450
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
112°
5500
113°
5550
113°


5600
113°
5650
113°
5700
114°
5750
114°
5800


116°
Bit Size
Micro-inverse
Micro normal
5850
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
118°
5900
117°
5950
117°
6000


117°
6050
117°
6100
118°
6150
118°
6200
6250
FR Gamma Ray
FR MML Caliper
Bit Size
Spontaneous Potential
FR Micro-inverse
Micro-inverse

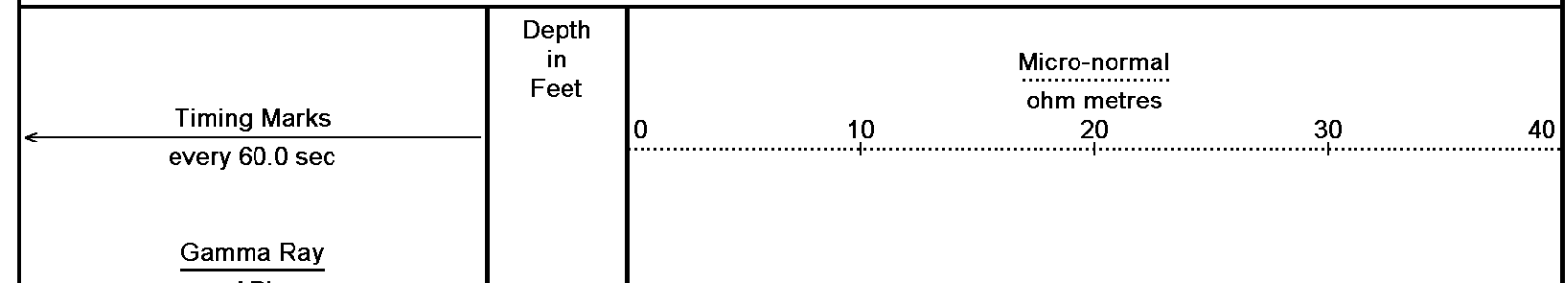


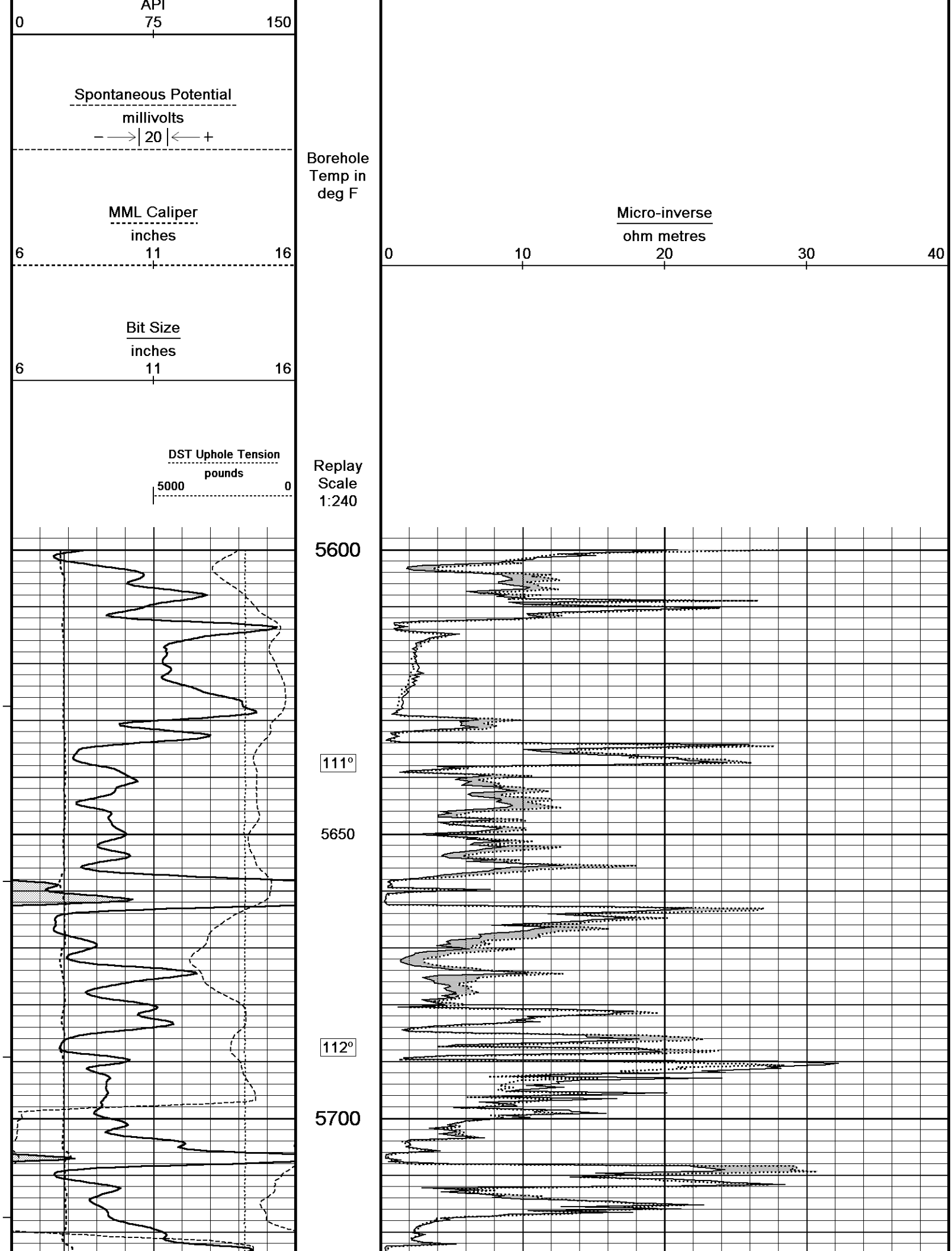

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 03-APR-2011 13:05
Filename: C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12_002.dta — Recorded on 03-APR-2011 01:40
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

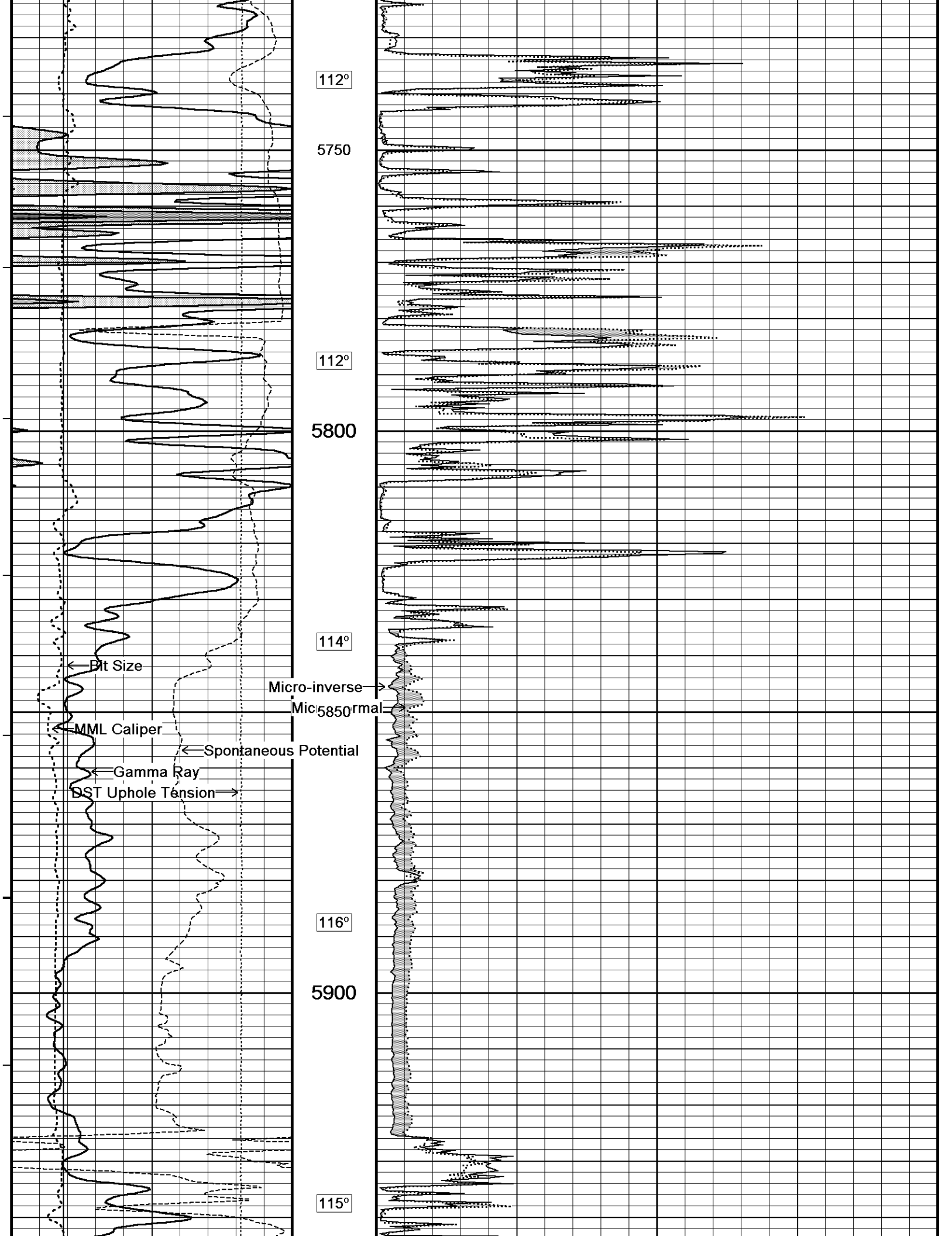
5 INCH MAIN

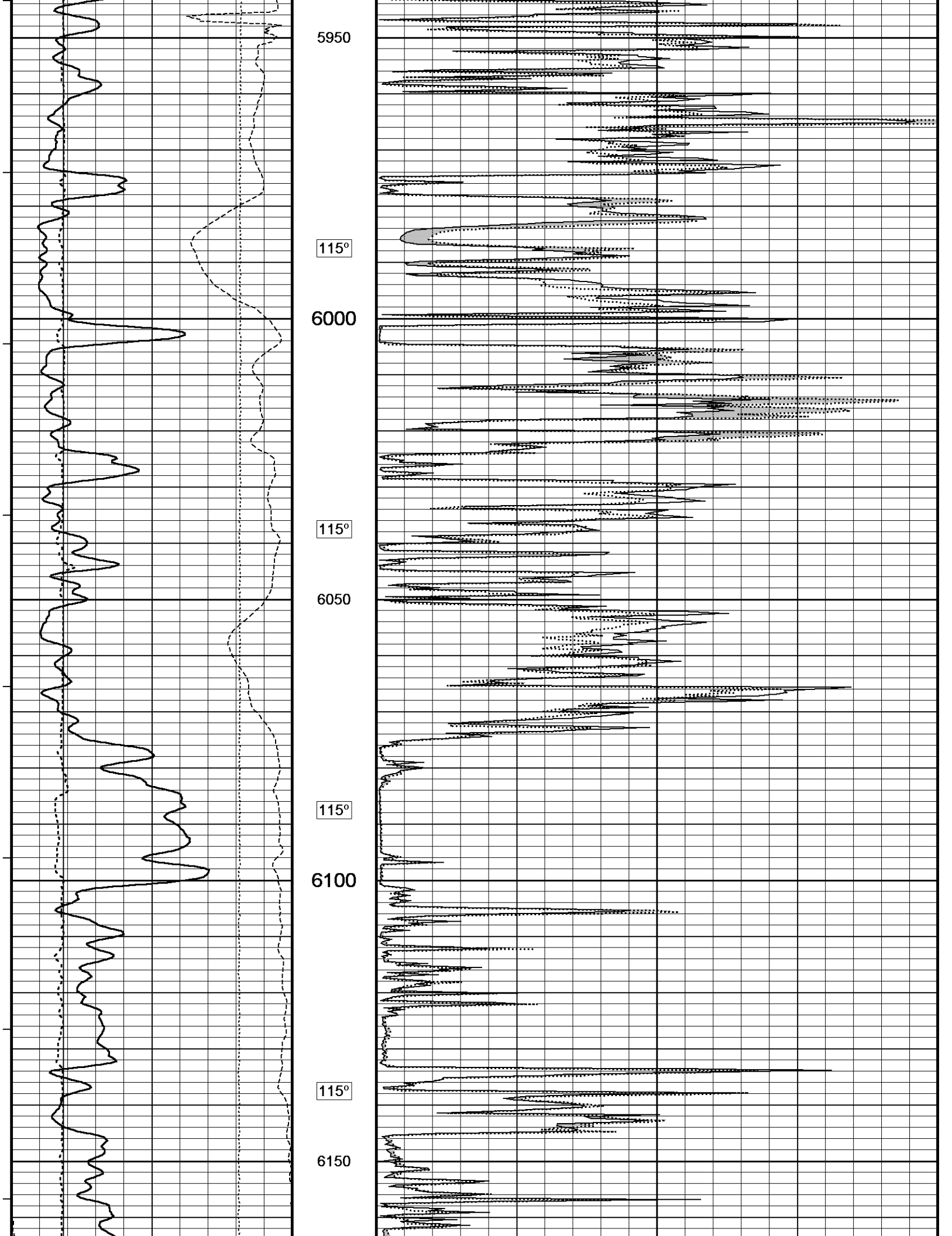
REPEAT SECTION

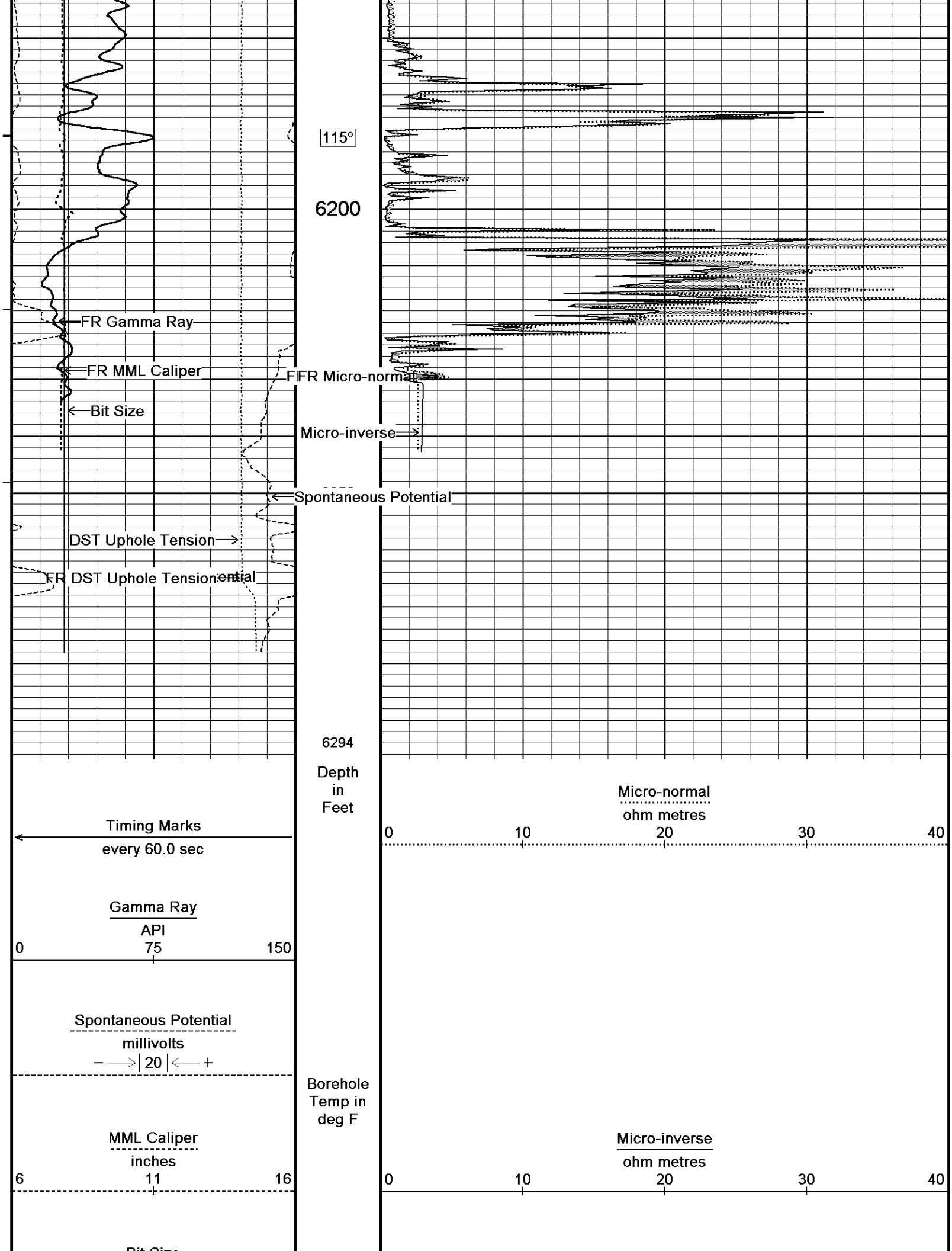
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 03-APR-2011 13:05
Filename: C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12_001.dta — Recorded on 03-APR-2011 00:59
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164




API
0
75
150
Spontaneous Potential
millivolts
– 20 +
Borehole Temp in deg F
MML Caliper
inches
6
11
16
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
5600
111°
5650
112°
5700


112°
5750
112°
5800
114°
Bit Size
Micro-inverse
Micro-normal
5850
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
116°
5900
115°


5950
115°
6000
115°
6050
115°
6100
115°
6150


115°
6200
FR Gamma Ray
FR MML Caliper
Bit Size
FFR Micro-normal
Micro-inverse
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
6294
Depth in Feet
Micro-normal
ohm metres
0
10
20
30
40
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
Spontaneous Potential
millivolts
20
Borehole Temp in deg F
MML Caliper
inches
6
11
16
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 03-APR-2011 13:05
Filename: C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford Pr...\APACHE HAGER 1-12_001.dta — Recorded on 03-APR-2011 00:59
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

REPEAT SECTION

## BEFORE SURVEY CALIBRATION

C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford PreView\0\APACHE HAGER 1-12.dta

### General Constants All 000

Last Edited on 02-APR-2011,20:45

| | | |
|---|---|---|
| General Parameters | | |
| Mud Resistivity | 0.870 | ohm-metres |
| Mud Resistivity Temperature | 78.000 | degrees F |
| Water Level | 0.000 | feet |
| Density/Neutron 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 | 1.000 | |
| RWA Constant M | 2.000 | |

### Down-hole Tension Calibration All 000

Field Calibration on 30-JUN-2010

| Reading No | Measured | Calibrated (lbs) |
|---|---|---|
| 1 | 14112.01 | 10.00 |
| 2 | 15164.79 | 427.00 |

### Down-hole Tension Calibration SMS 0

Field Calibration on 30-JUN-2010

| Reading No | Measured | Calibrated (lbs) |
|---|---|---|
| 1 | 14112.01 | 10.00 |
| 2 | 15164.79 | 427.00 |

### High Resolution Temperature Calibration MCG-C 139

Field Calibration on 03-SEP-2010,11:23

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

### High Resolution Temperature Constants MCG-C 139

Last Edited on

| | |
|---|---|
| Pre-filter Length | 11 |

### SP Calibration MCG-C 139

Field Calibration on 04-MAR-2011 06:37

| | Measured | Calibrated (mV) |
|---|---|---|
| Reference 1 | 103.7 | 100.0 |
| Reference 2 | -96.9 | -100.0 |

### Gamma Calibration MCG-C 139

Field Calibration on 02-APR-2011 19:01

| | Measured | Calibrated (API) |
|---|---|---|
| Background | 68 | 46 |
| Calibrator (Gross) | 1138 | 771 |
| Calibrator (Net) | 1071 | 725 |

## Gamma Constants MCG-C 139

Last Edited on 02-APR-2011,20:45

| | | |
|---|---|---|
| Gamma Calibrator Number | grc38 | |
| Mud Density | 1.08 | gm/cc |
| Caliper Source for Processing | Density Caliper | |
| Tool Position | Eccentred | |
| Concentration of KCl | 0.00 | kppm |

## Micro Normal and Micro Inverse Calibration MML-A 16

Base Calibration on 11-MAR-2011 11:10
Field Check on 02-APR-2011 18:47

Base Calibration

| | Measured | | Calibrated (ohm-m) | |
|---|---|---|---|---|
| Channel | Resistor 1 | Resistor 2 | Resistor 1 | Resistor 2 |
| Micro Normal | 12.2 | 60.2 | 2.6 | 12.8 |
| Micro Inverse | 15.6 | 78.3 | 1.7 | 8.4 |

| Channel | Base Check (ohm-m) | Field Check (ohm-m) |
|---|---|---|
| Micro Normal | 32.1 | 32.1 |
| Micro Inverse | 16.3 | 16.3 |

## Micro Normal and Micro Inverse Constants MML-A 16

Last Edited on 02-APR-2011,18:46

| | | |
|---|---|---|
| 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 16

Base Calibration on 11-MAR-2011 11:20
Field Calibration on 02-APR-2011 18:51

Base Calibration

| Reading No | Measured | Calibrator Size (in) |
|---|---|---|
| 1 | 13875 | 5.98 |
| 2 | 17350 | 7.97 |
| 3 | 20581 | 9.86 |
| 4 | 24656 | 11.92 |
| 5 | 0 | 0.00 |
| 6 | N/A | N/A |

Field Calibration

| Measured Caliper (in) | Actual Caliper (in) |
|---|---|
| 6.01 | 5.98 |

## Neutron Calibration MDN-A.B 66

Base Calibration on 11-MAR-2011 13:54
Field Check on 02-APR-2011 18:55

Base Calibration

| | Measured | | Calibrated (cps) | |
|---|---|---|---|---|
| | Near | Far | Near | Far |
| | 3091 | 97 | 3714 | 110 |
| Ratio | 31.957 | | 33.764 | |

Field Calibrator at Base

| | Calibrated (cps) | |
|---|---|---|
| | 1660 | 2371 |
| Ratio | 0.700 | |

Field Check

| | Calibrated (cps) | |
|---|---|---|
| | 1663 | 2382 |
| Ratio | 0.698 | |

## Neutron Constants MDN-A.B 66

Last Edited on 02-APR-2011,20:46

| | | |
|---|---|---|
| Neutron Source Id | P58125B | |
| Neutron Jig Number | 5824NE | |
| Epithermal Neutron | No | |
| Caliper Source for Processing | Density Caliper | |
| Stand-off | 0.00 | inches |
| Mud Density | 1.08 | gm/cc |
| Limestone Sigma | 7.10 | cu |
| Sandstone Sigma | 4.26 | cu |

| | | |
|---|---|---|
| Dolomite Sigma | 4.70 | cu |
| Formation Pressure Source | Constant Value | |
| Formation Pressure | 0.00 | kpsi |
| Temperature Source | Constant Value | |
| Temperature | 68.00 | degrees F |
| Mud Salinity | 0.00 | kppm |
| Formation Fluid Salinity Source | Constant Value | |
| Formation Fluid Salinity | 0.00 | kppm |
| Barite Mud Correction | Not Applied | |

## FE Calibration MFE-A.A 52

Base Calibration on 11-MAR-2011 10:55
Field Check on 02-APR-2011 18:41

Base Calibration

| | Measured | Calibrated (ohm-m) |
|---|---|---|
| Reference 1 | 0.0 | 0.0 |
| Reference 2 | 965.7 | 126.8 |
| Base Check | | 279.9 |
| Field Check | | 279.9 |

## FE Constants MFE-A.A 52

Last Edited on 02-APR-2011,18:40

| | | |
|---|---|---|
| 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 167

Field Calibration on 17-JAN-2011,18:32

| | Measured | Calibrated(Deg F) |
|---|---|---|
| Lower | 1.00 | 33.80 |
| Upper | 11.00 | 51.80 |

## High Resolution Temperature Constants MAI-A.A 167

Last Edited on

| | |
|---|---|
| Pre-filter Length | 11 |

## Induction Calibration MAI-A.A 167

Base Calibration on 11-MAR-2011,09:58
Field Check on 02-APR-2011 18:40

Base Calibration

Test Loop Calibration

| Channel | Measured Low | Measured High | Calibrated (mmho/m) Low | Calibrated (mmho/m) 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) Low | Base Check (mmho/m) High | Field Check (mmho/m) Low | Field Check (mmho/m) High |
|---|---|---|---|---|
| 1 | 0.0 | 0.0 | 13.0 | 3839.1 |
| 2 | 0.0 | 0.0 | 29.5 | 3476.9 |
| 3 | 0.0 | 0.0 | 29.0 | 3053.1 |
| 4 | 0.0 | 0.0 | 19.7 | 2081.9 |
| Deep | 0.0 | 0.0 | 18.5 | 2049.2 |
| Medium | 0.0 | 0.0 | 42.1 | 3991.2 |
| Shallow | 0.0 | 0.0 | 42.9 | 5053.8 |
| Array Temperature | 0.0 | | 74.7 | Deg F |

## Induction Constants MAI-A.A 167

Last Edited on 02-APR-2011,18:37

| | | |
|---|---|---|
| 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 35

Base Calibration on 11-MAR-2011 11:34
Field Calibration on 02-APR-2011 18:49

Base Calibration

| Reading No | Measured | Calibrator Size (in) |
|---|---|---|
| 1 | 17936 | 3.99 |
| 2 | 28079 | 5.98 |
| 3 | 38384 | 7.97 |
| 4 | 48048 | 9.86 |
| 5 | 59047 | 11.92 |
| 6 | N/A | N/A |

Field Calibration

| Measured Caliper (in) | Actual Caliper (in) |
|---|---|
| 5.98 | 5.98 |

## Photo Density Calibration MPD-B 35

Base Calibration on 11-MAR-2011 11:54
Field Check on 02-APR-2011 18:46

Density Calibration

| Base Calibration | Measured | | Calibrated (sdu) | |
|---|---|---|---|---|
| | Near | Far | Near | Far |
| Reference 1 | 57876 | 27553 | 59556 | 30836 |
| Reference 2 | 23524 | 2615 | 24941 | 2541 |

Field Check at Base

| | |
|---|---|
| 1175.2 | 1398.5 |

Field Check

| | |
|---|---|
| 1173.8 | 1392.5 |

PE Calibration

| Base Calibration | Measured | | | Calibrated |
|---|---|---|---|---|
| | WS | WH | Ratio | Ratio |
| Background | 211 | 1039 | | |
| Reference 1 | 21426 | 57673 | 0.375 | 0.371 |
| Reference 2 | 6234 | 23377 | 0.270 | 0.272 |

Field Check at Base

| | |
|---|---|
| 211.2 | 1039.0 |

| | | |
|---|---|---|
| Field Check | | |
| | 209.4 | 1039.0 |

## Density Constants MPD-B 35

Last Edited on 02-APR-2011,20:46

| | | |
|---|---|---|
| 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 | 1.08 | 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 |
| 0.00 | |

## DOWNHOLE EQUIPMENT

C:\DOCUME~1\garcianr\LOCALS~1\Temp\Weatherford PreView\0\APACHE HAGER 1-12.dta

Compact Comms Gamma
MCG-C 139 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
MML-A 16 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

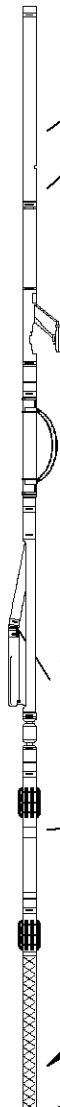
Compact Density/Caliper
MPD-B 35 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

SKJ-D.A Compact Knuckle Joint
SKJ-D.A 36 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

Compact Focussed Electric
MFE-A.A 52 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

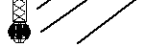
Compact Induction
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 50.32 ft Weight: 407.9 lb



| | |
|---|---|
| 45.04 ft | GRGC - Gamma Ray |
| 42.13 ft | CGXT - MCG External Temperature |
| 35.41 ft | MINV - Micro-inverse |
| 35.41 ft | MNRL - Micro-normal |
| 36.40 ft | MLTC - MML Caliper |
| 30.61 ft | NPRL - Limestone Neutron Por. |
| 23.37 ft | CLDC - Density Caliper |
| 21.44 ft | DPRL - Limestone Density Por. |
| 21.44 ft | DEN - Compensated Density |
| 21.44 ft | DCOR - Density Correction |
| 21.38 ft | PDPE - PE |
| 13.72 ft | FEFE - Shallow FE |
| 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.



| | |
|---|---|
| COMPANY | APACHE CORP. |
| WELL | HAGER 1-12 |
| FIELD | UNNAMED |
| PROVINCE/COUNTY | MEADE |
| COUNTRY/STATE | U.S.A. / KANSAS |

| | | | | | |
|---|---|---|---|---|---|
| Elevation Kelly Bushing | 2371.00 | feet | First Reading | 6229.00 | feet |
| Elevation Drill Floor | 2369.00 | feet | Depth Driller | 6260.00 | feet |
| Elevation Ground Level | 2359.00 | feet | Depth Logger | 6265.00 | feet |

Weatherford®

# MICRORESISTIVITY LOG

40 Years of Wireline 1970 2010