MICRORESISTIVITY LOG

Weatherford®

COMPANY	GRAND MESA OPERATING COMPANY
WELL	HUND #1-9
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A./KANSAS
LOCATION	1482' FSL & 1873' FWL

40 Years of Wireline 1970 2010

SEC	TWP	RGE	Other Services
9	14S	31W	MPD/MDN
			MAI/MFE

API Number 15-063-21890
Permit Number

Permanent Datum G.L., Elevation 2946 feet
Log Measured From K.B. @ 5 FEET above Permanent Datum
Drilling Measured From K.B.

Elevations:	feet
KB	2951.00
DF	2950.00
GL	2946.00

Date	26-FEB-2011			
Run Number	ONE			
Depth Driller	4690.00	feet		
Depth Logger	4688.00	feet		
First Reading	4653.00	feet		
Last Reading	3600.00	feet		
Casing Driller	222.00	feet		
Casing Logger	217.00	feet		
Bit Size	7.880	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.10 lb/USg	55.00 CP		
PH / Fluid Loss	10.00	7.20 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.84 @ 78.0	ohm-m		
Rmf @ Measured Temp	0.67 @ 78.0	ohm-m		
Rmc @ Measured Temp	1.01 @ 78.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.62 @106.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	106.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13057	LIB		
Recorded By	SHAWN NUTT			
Witnessed By	MACKLIN ARMSTRONG			
S.O.#/JOB#	3529062		LB11-037	

BOREHOLE RECORD

Last Edited: 01-JAN-2003 07:12

Bit Size inches	Depth From feet	Depth To feet
7.880	217.00	4688.00

CASING RECORD

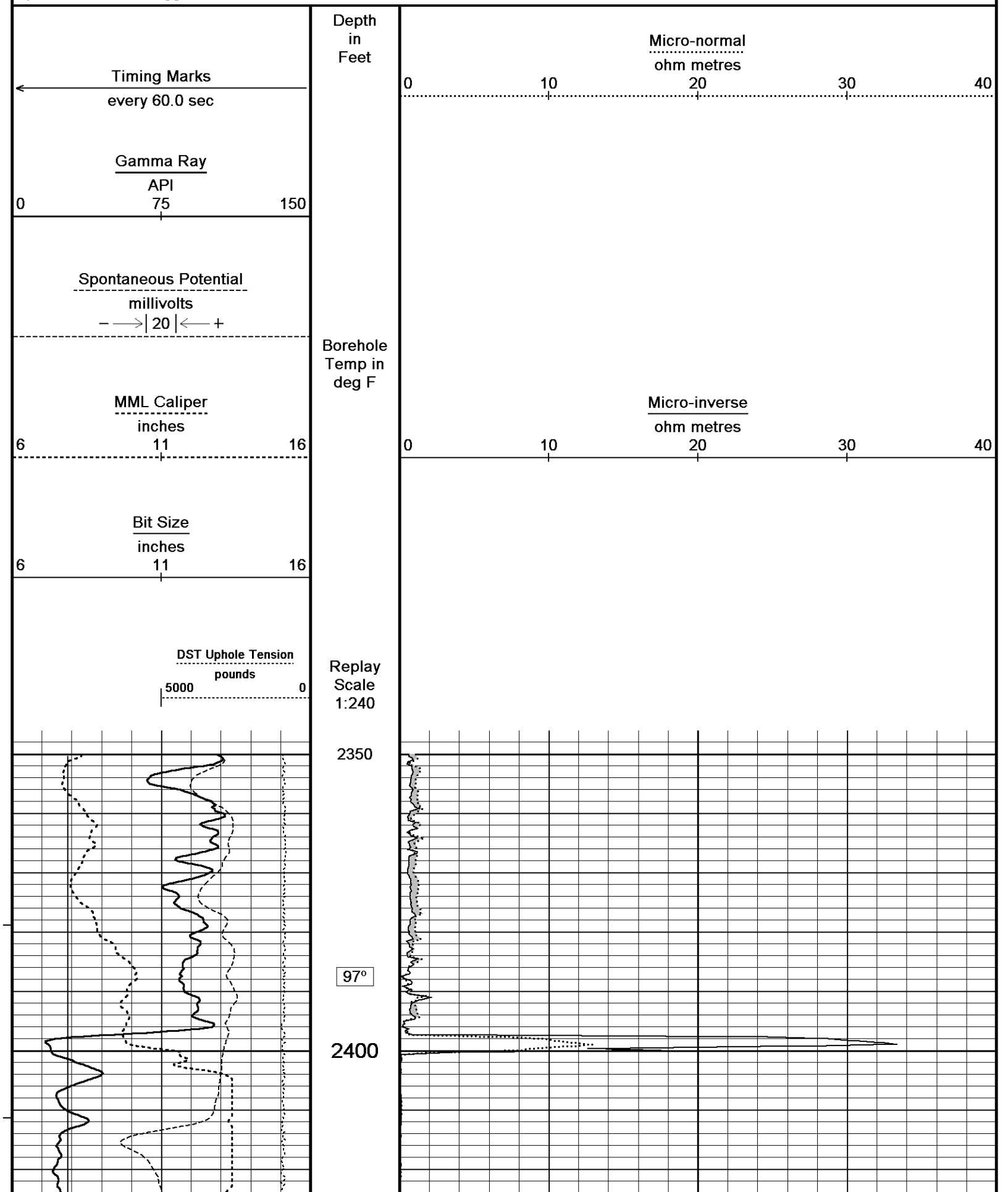
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	217.00	24.00

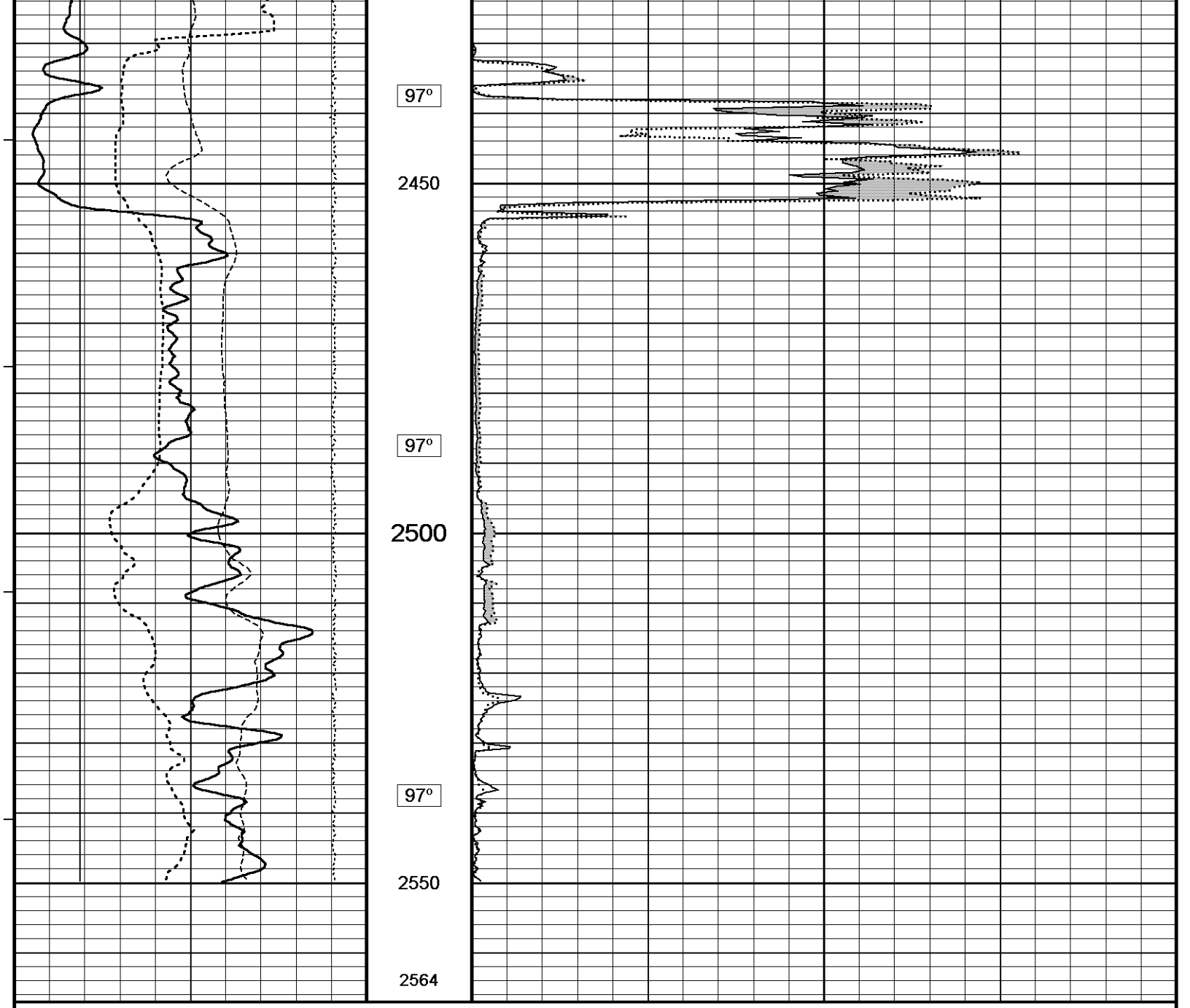
REMARKS

Tools Used: MAI, MPD, MCG, MDN, MML, MFE, SKJ
Hardware: MPD: 4 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.
Sonic porosity calculated on a limestone scale (47.5 usec/ft).
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 = 235 cu. ft.
Service order #3529062
Rig: Murfin #24
Engineer: Shawn Nutt
Operator(s): Ken Rinehart, Nick Adame

5 INCH MAIN PASS

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-APR-2011 10:25
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford...\Hund #1-9_002 spooled section.dta
Recorded on 01-JAN-2003 07:11
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164





Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 20-APR-2011 10:25
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford...\Hund #1-9_002 spooled section.dta
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5 INCH MAIN PASS

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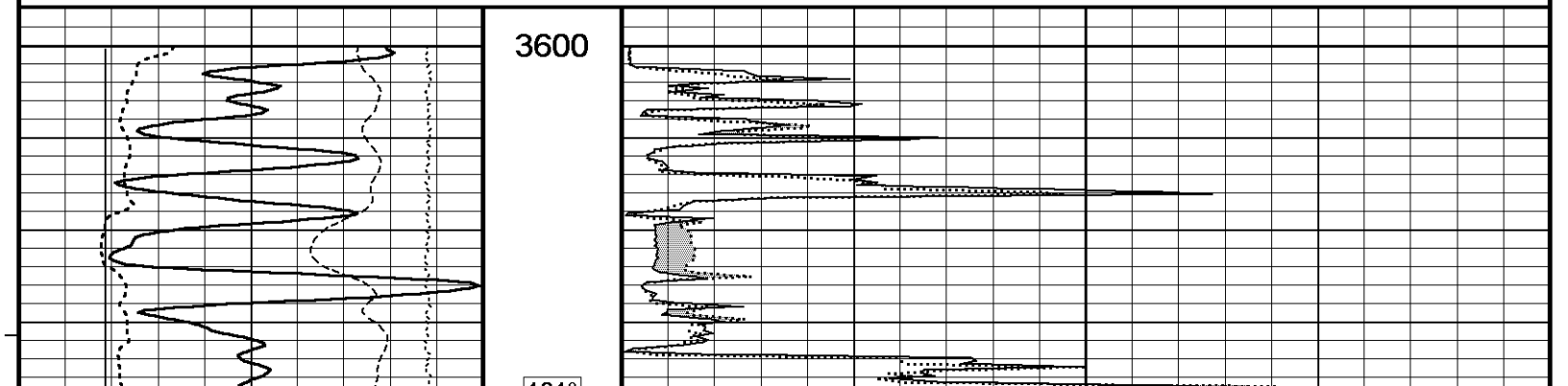
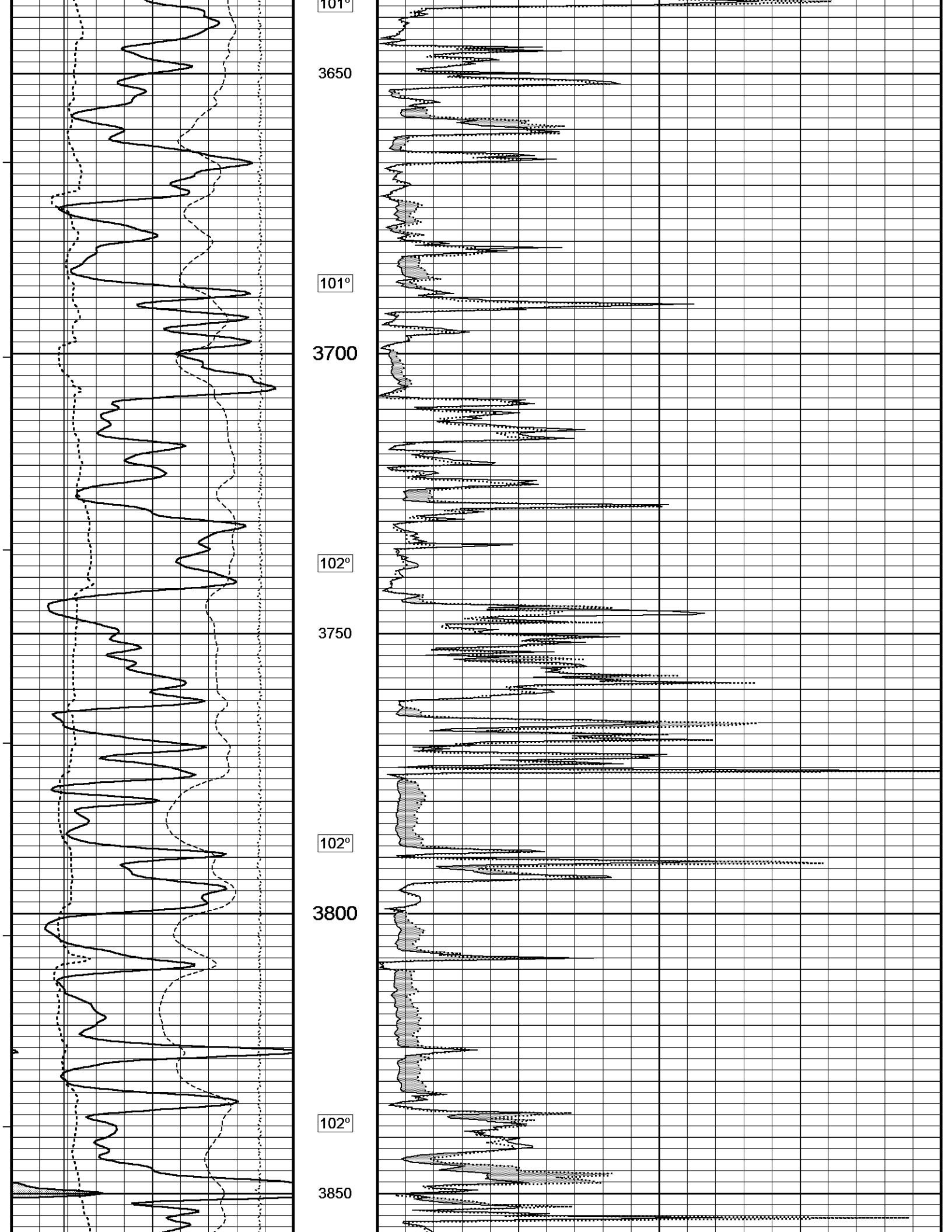
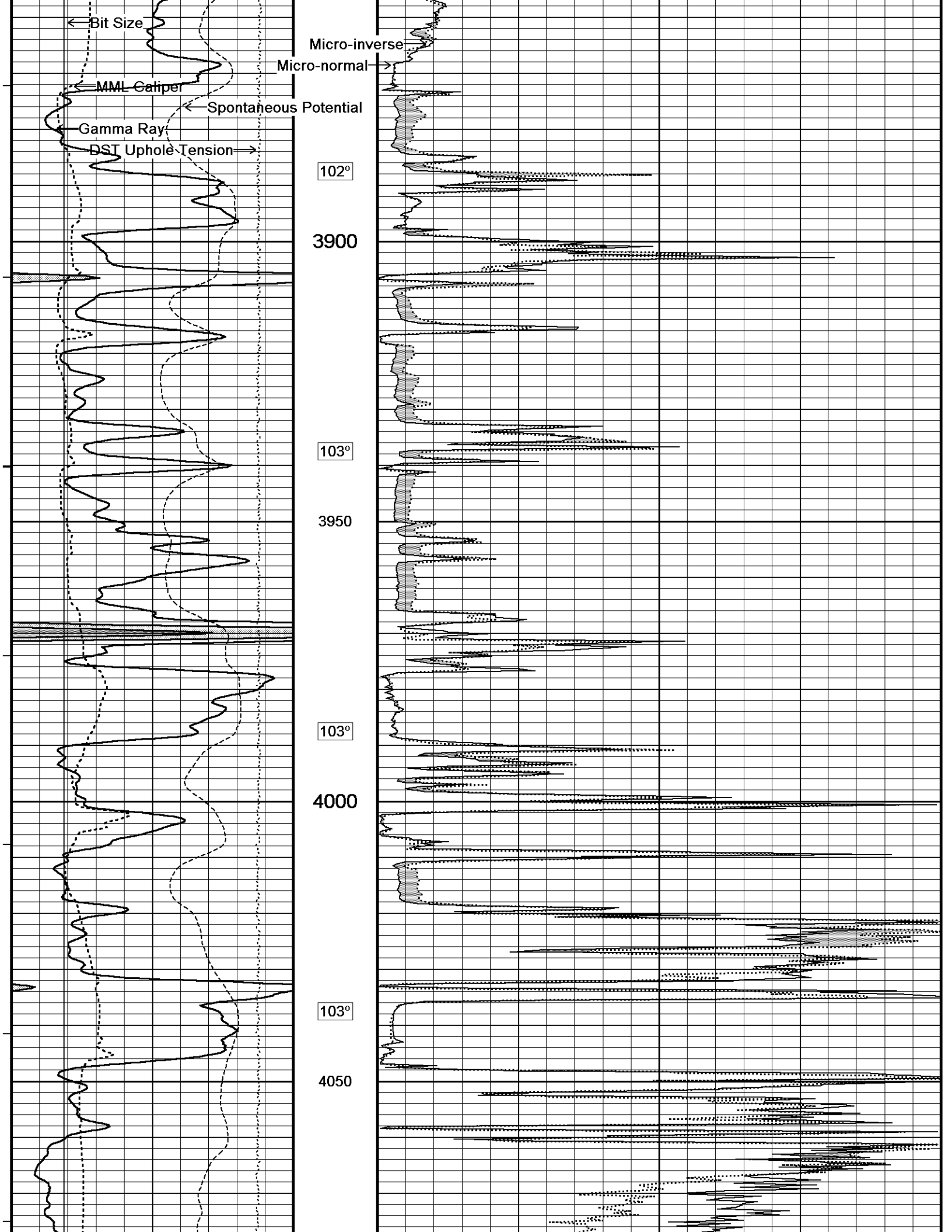
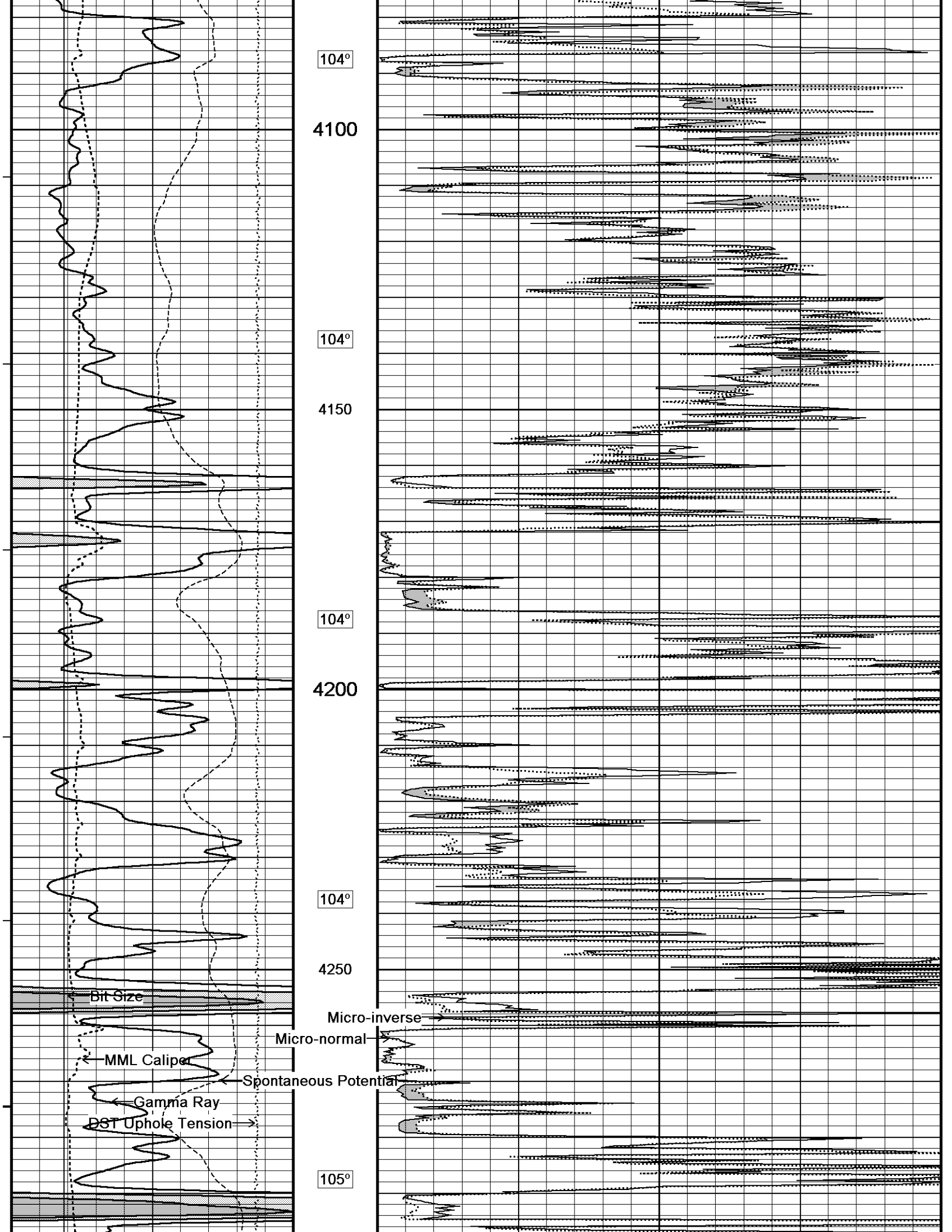
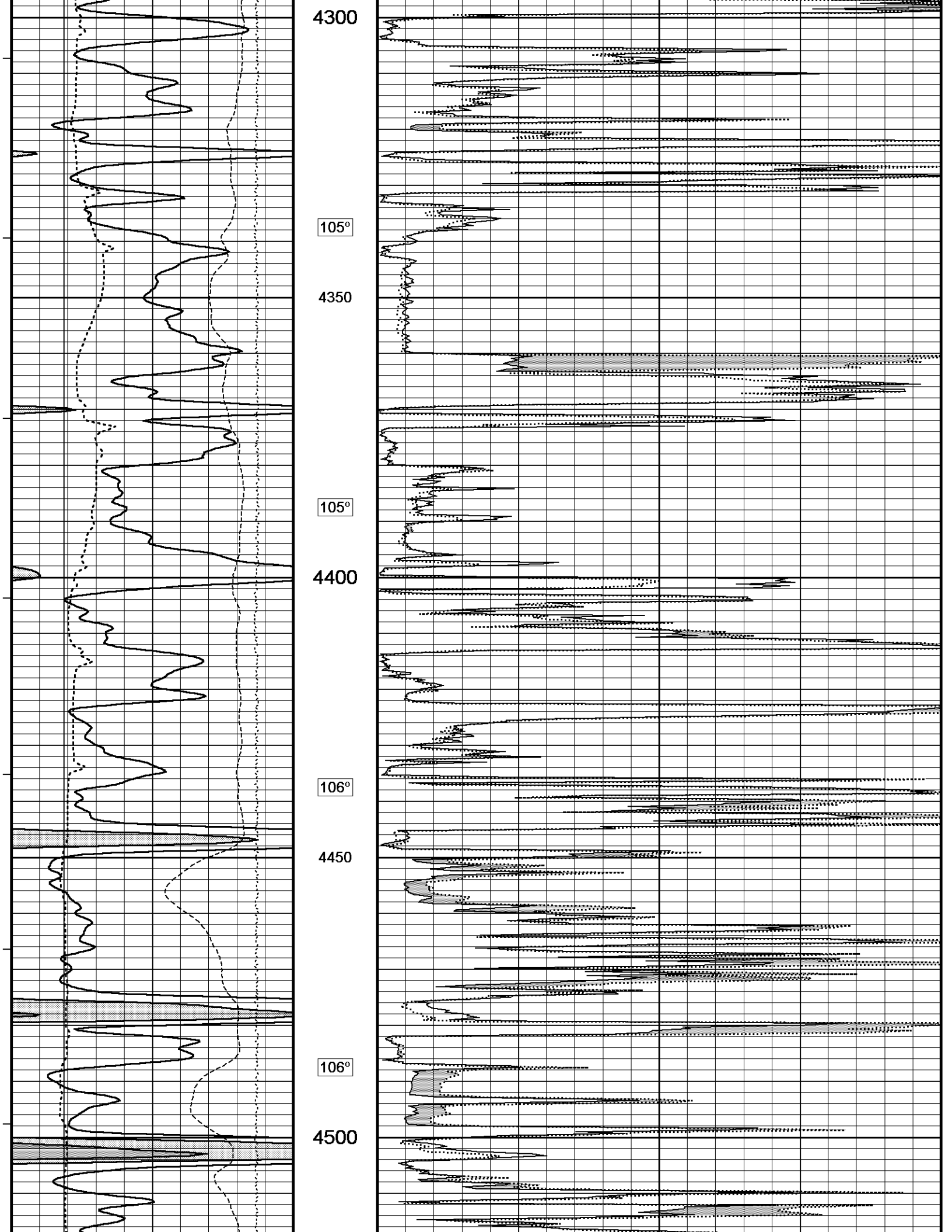
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford...\Hund #1-9_002 spooled section.dta
Recorded on 01-JAN-2003 07:11
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

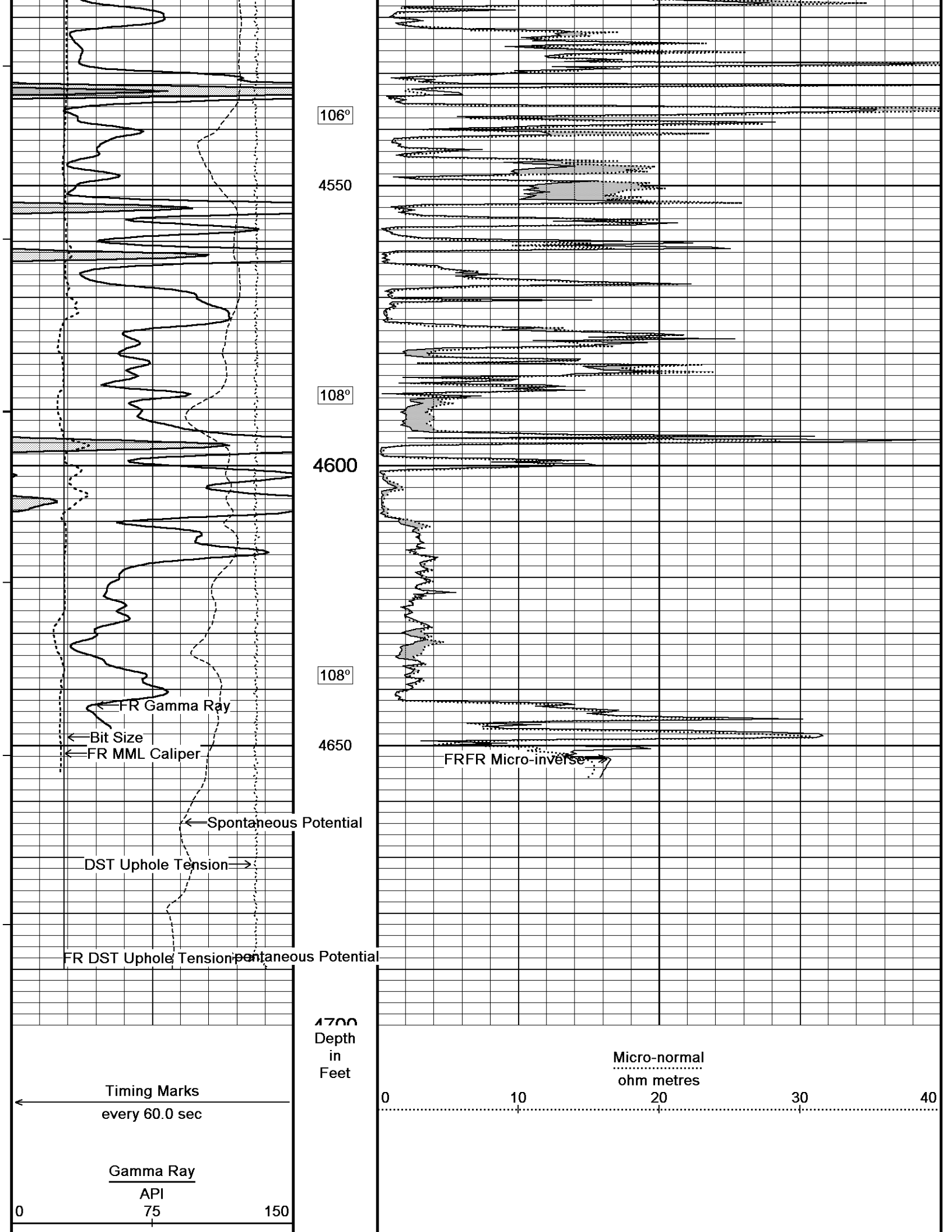


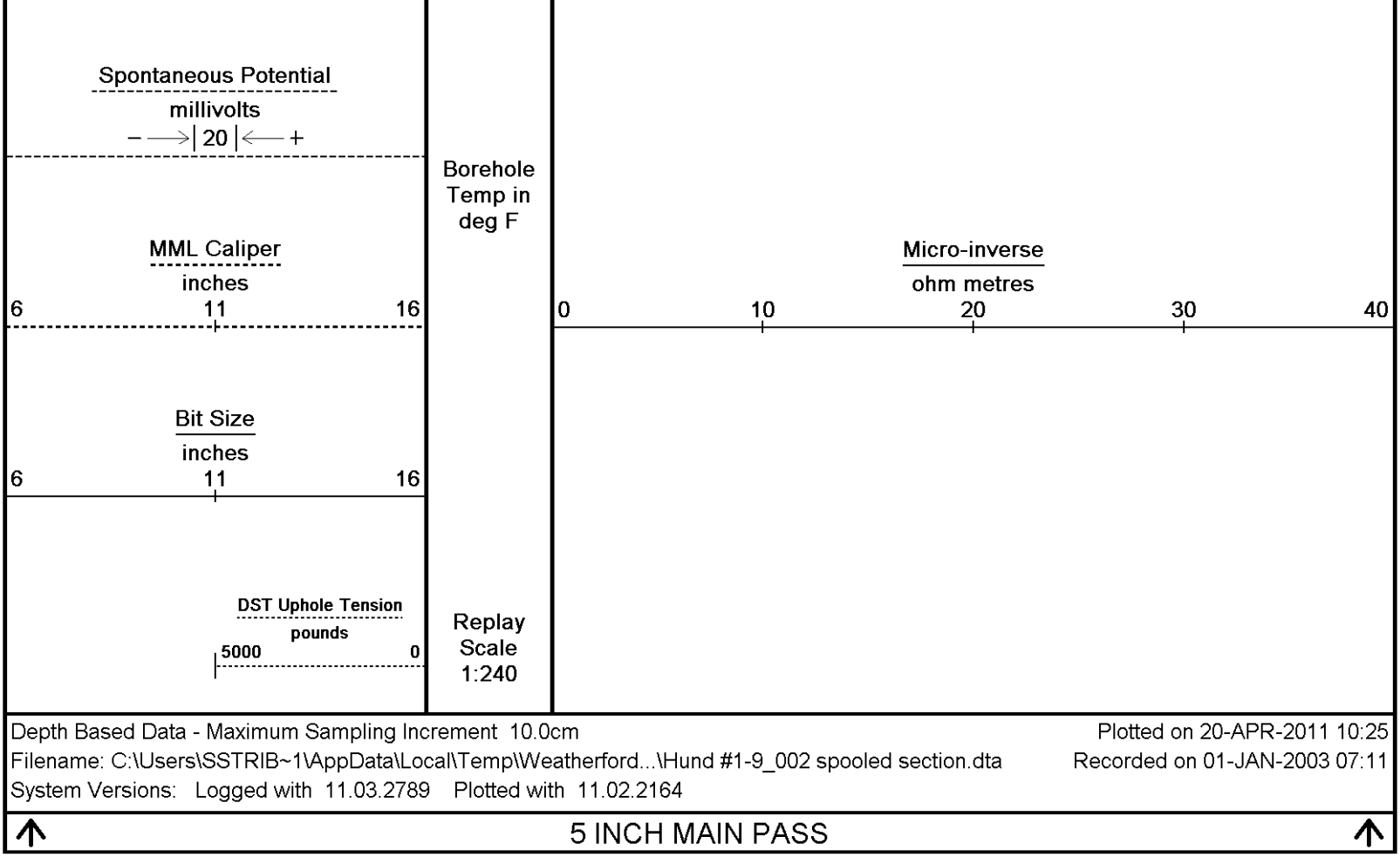

101°
3650
101°
3700
102°
3750
102°
3800
102°
3850


Bit Size
MML Caliper
Gamma Ray
DST Uphole Tension
Micro-inverse
Micro-normal
Spontaneous Potential
102°
3900
103°
3950
103°
4000
103°
4050


104°
4100
104°
4150
104°
4200
104°
4250
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
105°


4300
105°
4350
105°
4400
106°
4450
106°
4500


106°
4550
108°
4600
108°
4650
FR Gamma Ray
Bit Size
FR MML Caliper
FRFR Micro-inverse
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
pontaneous Potential
Depth
in
Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
Micro-normal
ohm metres
0
10
20
30
40

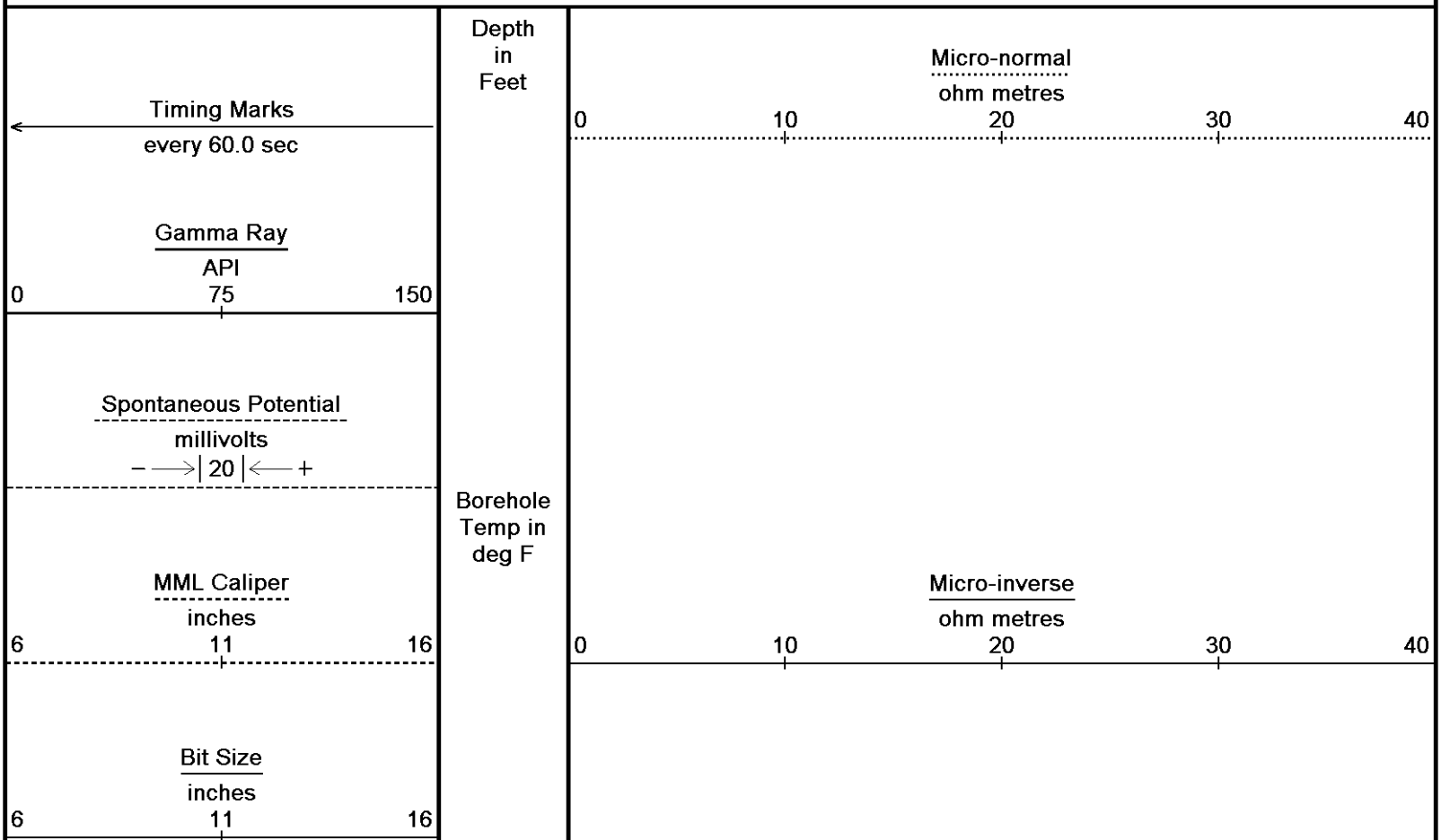


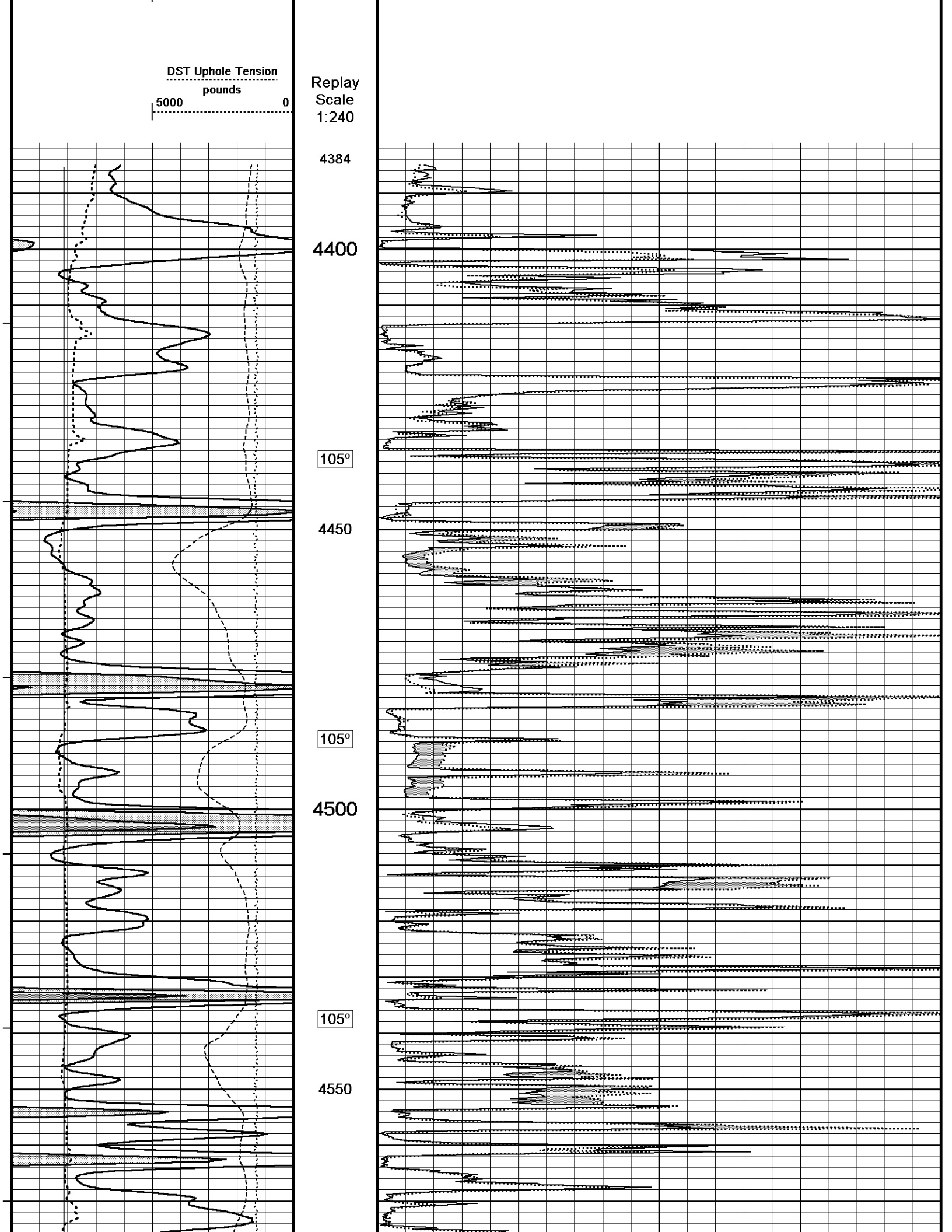
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 20-APR-2011 10:25
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford...\Hund #1-9_002 spooled section.dta — Recorded on 01-JAN-2003 07:11
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

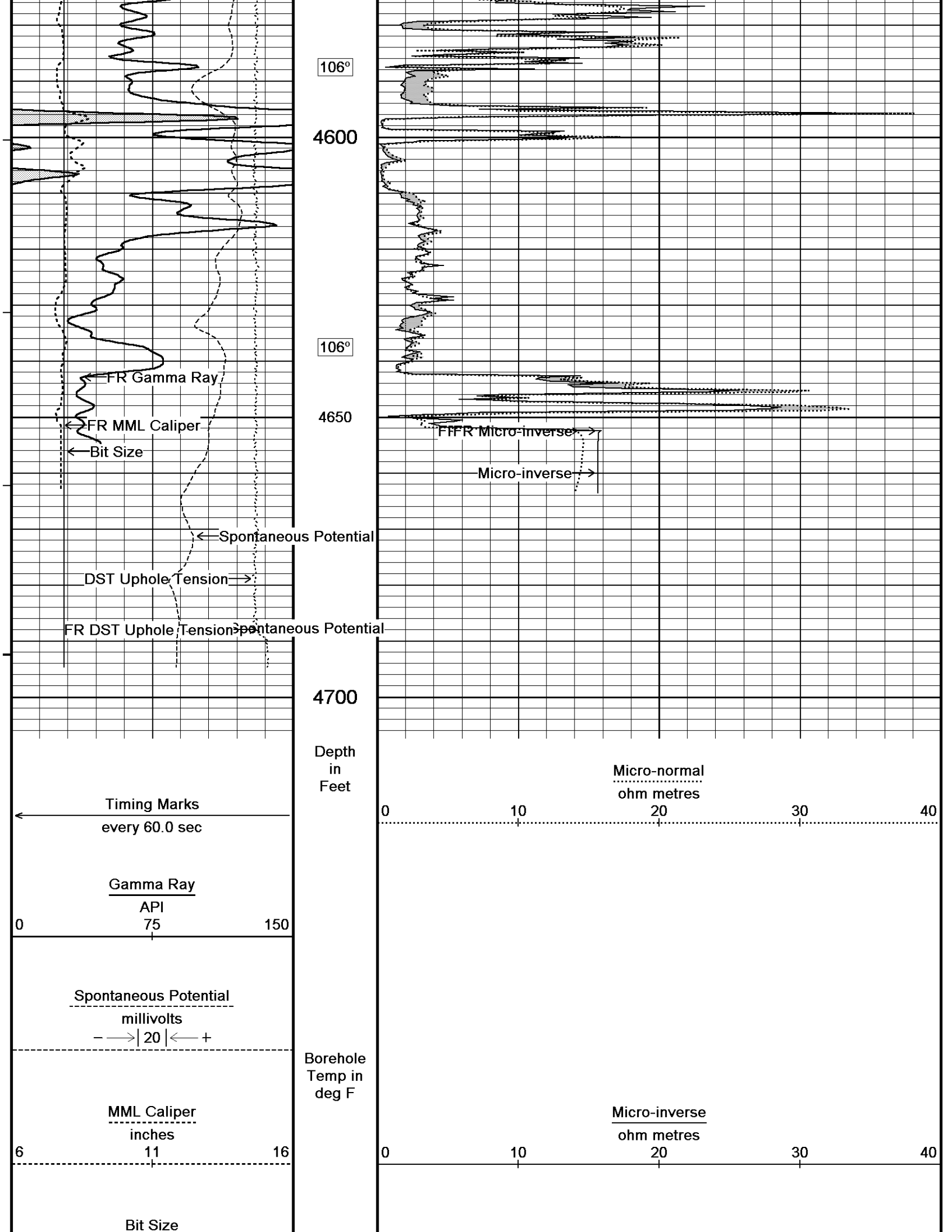
5 INCH MAIN PASS

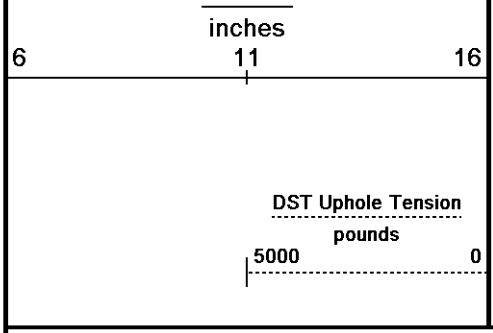
5 INCH REPEAT PASS

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 20-APR-2011 10:25
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreVie...\Copy of Hund #1-9_001.dta — Recorded on 01-JAN-2003 05:44
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164




DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
4384
4400
105°
4450
105°
4500
105°
4550


106°
4600
106°
FR Gamma Ray
FR MML Caliper
Bit Size
4650
FFFR Micro-inverse
Micro-inverse
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
Spontaneous Potential
4700
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



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 20-APR-2011 10:25
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreVie...\Copy of Hund #1-9_001.dta — Recorded on 01-JAN-2003 05:44
System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

5 INCH REPEAT PASS

BEFORE SURVEY CALIBRATION

C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreView\0\Copy of Hund #1-9_001.dta

General Constants All 000

Last Edited on 01-JAN-2003,03:41

General Parameters		
Mud Resistivity	0.840	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	Limestone Density Por.	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	

Micro Normal and Micro Inverse Calibration MML-A 9

Base Calibration on 17-JAN-2011 13:45
Field Check on 01-JAN-2003 00:22

Base Calibration

Channel	Measured Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1	Calibrated (ohm-m) Resistor 2
Micro Normal	12.1	59.8	2.6	12.8
Micro Inverse	15.6	78.1	1.7	8.4

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	32.4	32.4
Micro Inverse	16.4	16.4

Micro Normal and Micro Inverse Constants MML-A 9

Last Edited on 17-FEB-2011,21:07

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 9

Base Calibration on 17-JAN-2011 13:36
Field Calibration on 01-JAN-2003 00:20

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14751	5.96
2	18323	7.98
3	21735	9.95
4	25522	11.91
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.12	5.98

Neutron Calibration MDN-A.B 65

Base Calibration on 17-JAN-2011 15:12
Field Check on 01-JAN-2003 00:35

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3079	97	3714	110
Ratio	31.797		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1654	2338
Ratio	0.708	

Field Check

	Calibrated (cps)	
	1656	2349
Ratio	0.705	

Neutron Constants MDN-A.B 65

Last Edited on 01-JAN-2003,03:42

Neutron Source Id	757	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.09	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	MCG External Temperature	
Temperature	N/A	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 55

Base Calibration on 17-JAN-2011 13:58
Field Check on 01-JAN-2003 00:18

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	954.8	126.8
Base Check		281.8
Field Check		281.4

FE Constants MFE-A.A 55

Last Edited on 01-JAN-2003,03:42

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 178

Field Calibration on 28-MAR-2010,00:50

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

High Resolution Temperature Constants MAI-A.A 178

Last Edited on

Pre-filter Length	11

Induction Calibration MAI-A.A 178

Base Calibration on 17-JAN-2011,15:37

Field Check on 01-JAN-2003 00:17

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	17.6	484.7	9.3	966.2
2	6.2	391.4	7.6	821.4
3	4.0	264.5	5.2	566.0
4	2.3	135.1	2.6	279.2

Array Temperature	77.0	Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	11.9	3762.8
2	0.0	0.0	29.5	3466.5
3	0.0	0.0	27.1	3014.8
4	0.0	0.0	18.6	2063.9
Deep	0.0	0.0	15.7	1995.9
Medium	0.0	0.0	40.1	3957.0
Shallow	0.0	0.0	45.4	5080.7
Array Temperature	0.0		68.7	Deg F

Induction Constants MAI-A.A 178

Last Edited on 01-JAN-2003,03:43

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 MCG-B 34

Field Calibration on 19-OCT-2009,11:45

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

High Resolution Temperature Constants MCG-B 34

Last Edited on

Pre-filter Length	11

SP Calibration MCG-B 34

Field Calibration on 9-NOV-2009,18:07

	Measured	Calibrated (mV)
Reference 1	107.7	100.0
Reference 2	-93.8	-100.0

Gamma Calibration MCG-B 34

Field Calibration on 01-JAN-2003 00:40

	Measured	Calibrated (API)
Background	51	35
Calibrator (Gross)	1111	760
Calibrator (Net)	1061	725

Gamma Constants MCG-B 34

Last Edited on 01-JAN-2003,05:14

Gamma Calibrator Number	grc38	
Mud Density	1.09	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

Caliper Calibration MPD-B 64

Base Calibration on 17-JAN-2011 16:10
Field Calibration on 01-JAN-2003 00:24

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14192	4.01
2	22208	5.96
3	30608	7.98
4	39216	9.95
5	48142	11.91
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.38	5.98

Photo Density Calibration MPD-B 64

Base Calibration on 17-FEB-2011 08:46
Field Check on 01-JAN-2003 00:29

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	50033	26441	59556	30836
Reference 2	20539	2561	24941	2541

Field Check at Base

1112.6	1367.3

Field Check

1110.2	1367.9

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	200	995		
Reference 1	18927	49861	0.383	0.371
Reference 2	5504	20415	0.273	0.272

Field Check at Base

200.4	995.2

Field Check

200.6	992.5

Density Constants MPD-B 64

Last Edited on 01-JAN-2003,03:42

Density Source Id	254	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	4 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.09	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:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreView\0\Copy of Hund #1-9_001.dta

MCB-A 11B Tension Cablehead
MCB-A 1 LG: 2.18 ft WT: 19.8 lb OD: 2.24 in

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

Compact Micro-log
MML-A 9 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

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

Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint
SKJ-D.A 37 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

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

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

Total Length: 52.50 ft Weight: 427.7 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	GRAND MESA OPERATING COMPANY
WELL	HUND #1-9
FIELD	WILDCAT

PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A./KANSAS

Elevation Kelly Bushing	2951.00	feet	First Reading	4653.00	feet
Elevation Drill Floor	2950.00	feet	Depth Driller	4690.00	feet
Elevation Ground Level	2946.00	feet	Depth Logger	4688.00	feet

Weatherford®

MICRORESISTIVITY LOG

40 Years of Wireline 1970 2010