MICRORESISTIVITY LOG

Weatherford®

COMPANY	GRAND MESA
WELL	ELLIS 1-23
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A./KANSAS
LOCATION	1711' FSL & 2310' FWL

40 Years of Wireline 1970 2010

SEC	TWP	RGE
23	14S	32W

API Number 15-109-21001
Permit Number

Other Services
MPD/MDN MAI/MFE
MSS

Permanent Datum G.L., Elevation 2780 feet
Log Measured From K.B. @ 5 FEET above Permanent Datum
Drilling Measured From K.B.

Elevations:	feet
KB	2785.00
DF	2784.00
GL	2780.00

Date	26-APR-2011		
Run Number	ONE		
Depth Driller	4570.00	feet	
Depth Logger	4572.00	feet	
First Reading	4524.00	feet	
Last Reading	3500.00	feet	
Casing Driller	214.00	feet	
Casing Logger	212.00	feet	
Bit Size	7.880	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.50 lb/USg	59.00 CP	
PH / Fluid Loss	9.00	10.40 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.70 @ 81.0	ohm-m	
Rmf @ Measured Temp	0.56 @ 81.0	ohm-m	
Rmc @ Measured Temp	0.84 @ 81.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.50 @114.0	ohm-m	
Time Since Circulation	3 HOURS		
Max Recorded Temp	114.00	deg F	
Equipment Name	COMPACT		
Equipment / Base	13025	LIB	
Recorded By	SHAWN NUTT		
Witnessed By	WES HANSEN		
S.O.#/JOB#	3529182		LB11-091

BOREHOLE RECORD

Last Edited: 26-APR-2011 16:10

Bit Size inches	Depth From feet	Depth To feet
7.880	212.00	4572.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	212.00	24.00

REMARKS

Tools Used: MPD, MCG, MDN, MFE, MAI, MML, MSS
Hardware: MPD: 8 inch profile plate used. MAI, MSS 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 = 253 cu. ft
Service order #3529182
Rig: Murfin #8
Engineer: Shawn Nutt
Operator(s): Ken Rinehart, Nick Adame

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 02-MAY-2011 10:30
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford ...\Ellis 1-23_002 spooled section.dta
Recorded on 26-APR-2011 16:09
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

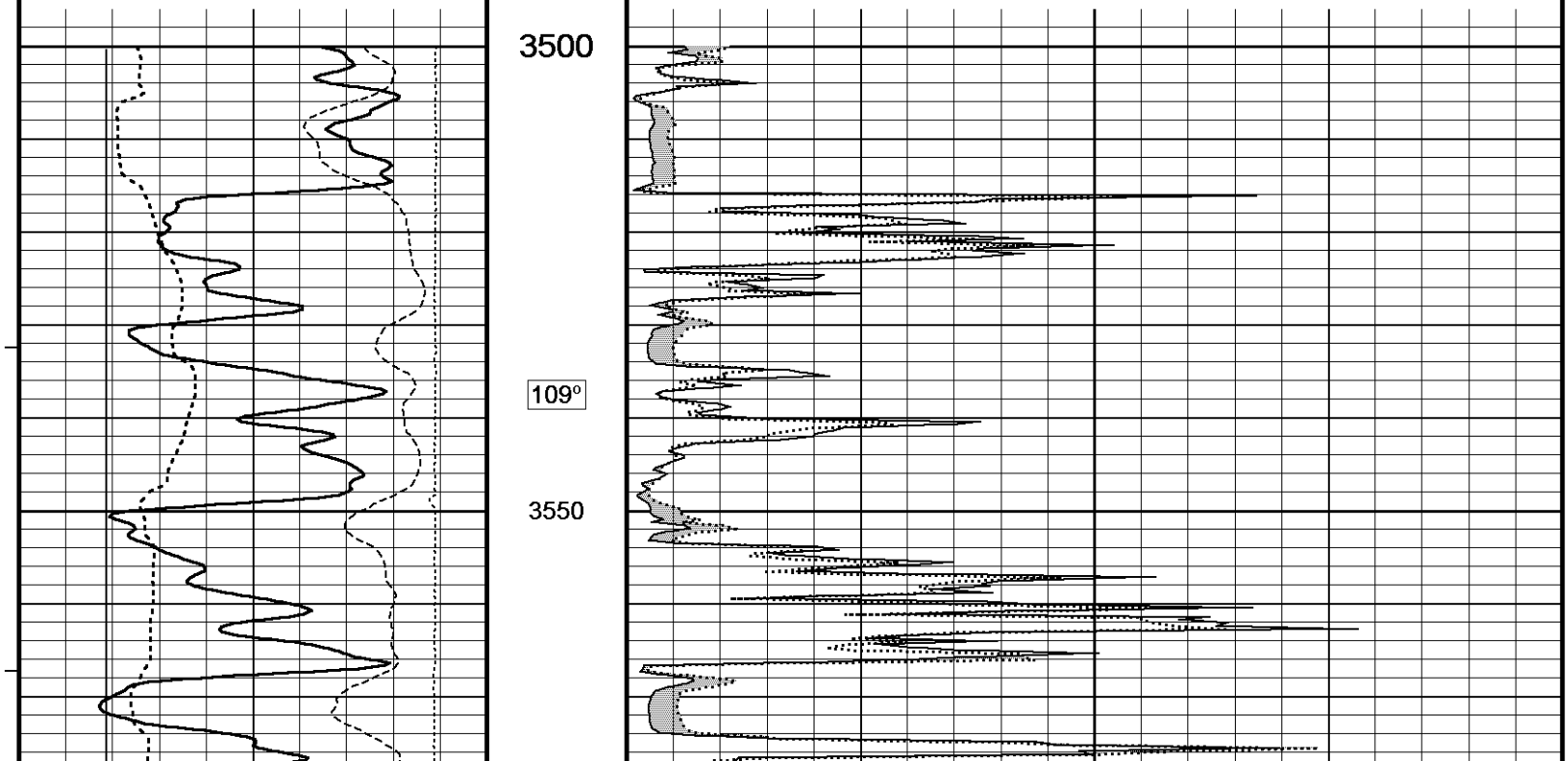
Micro-normal
ohm metres
0 10 20 30 40

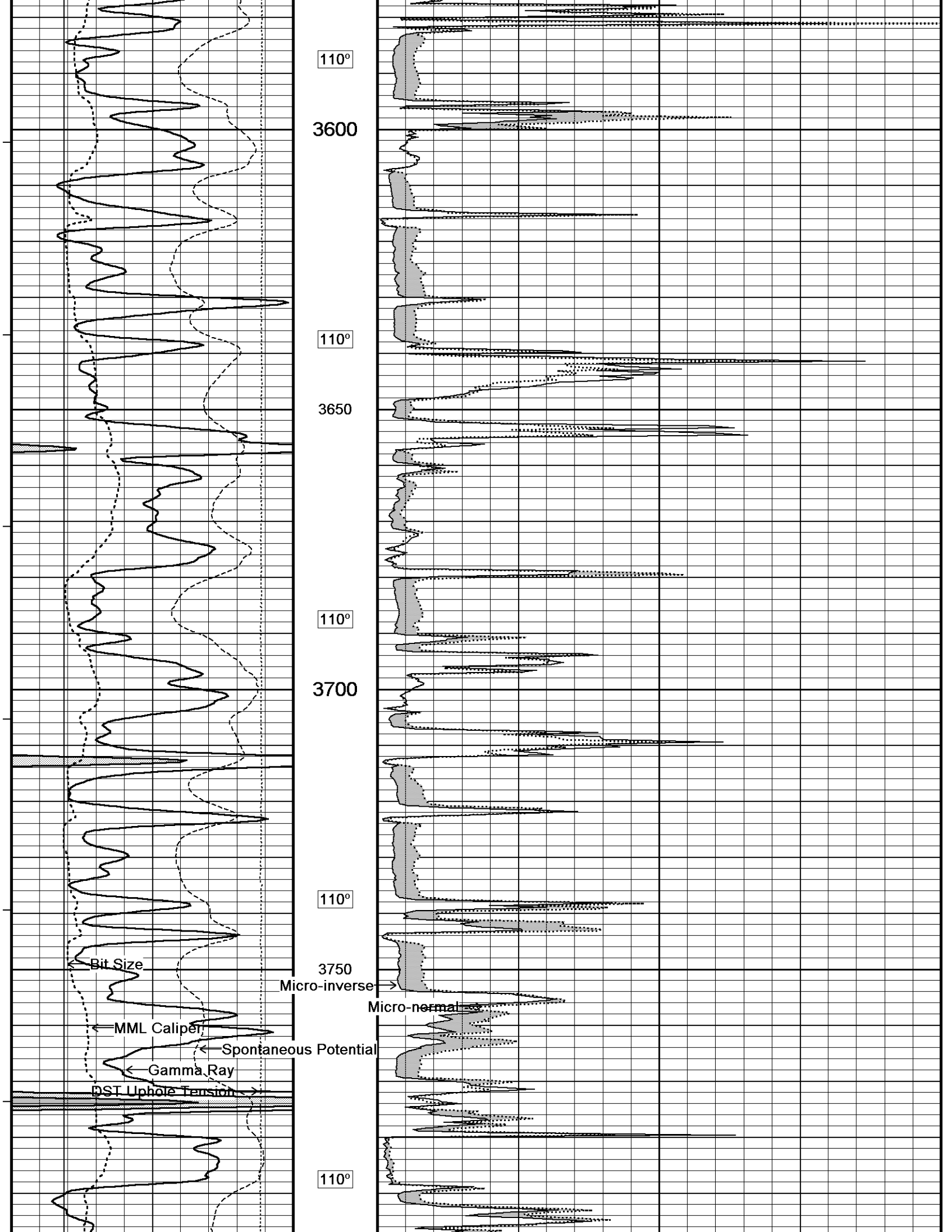
Micro-inverse
ohm metres
0 10 20 30 40

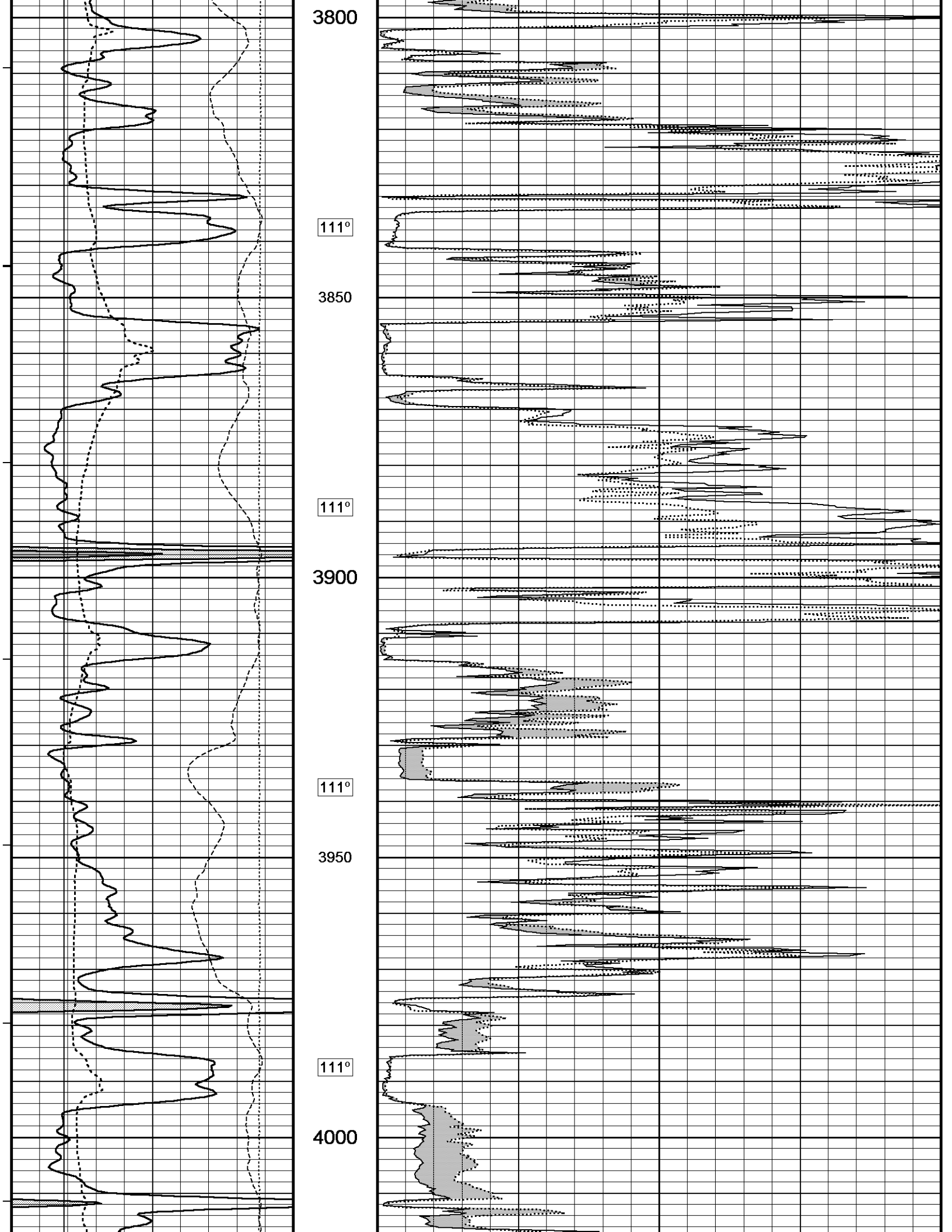
3500

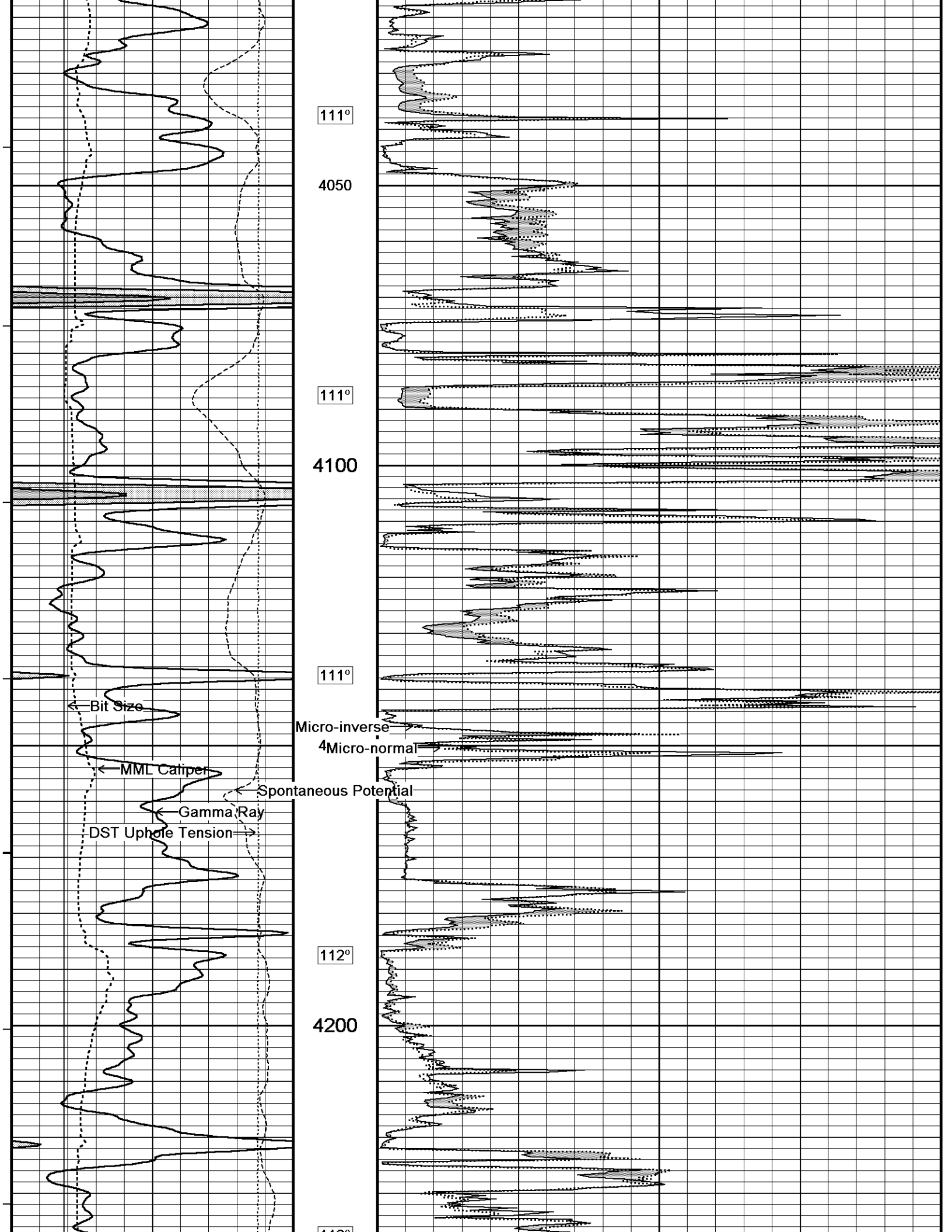
109°

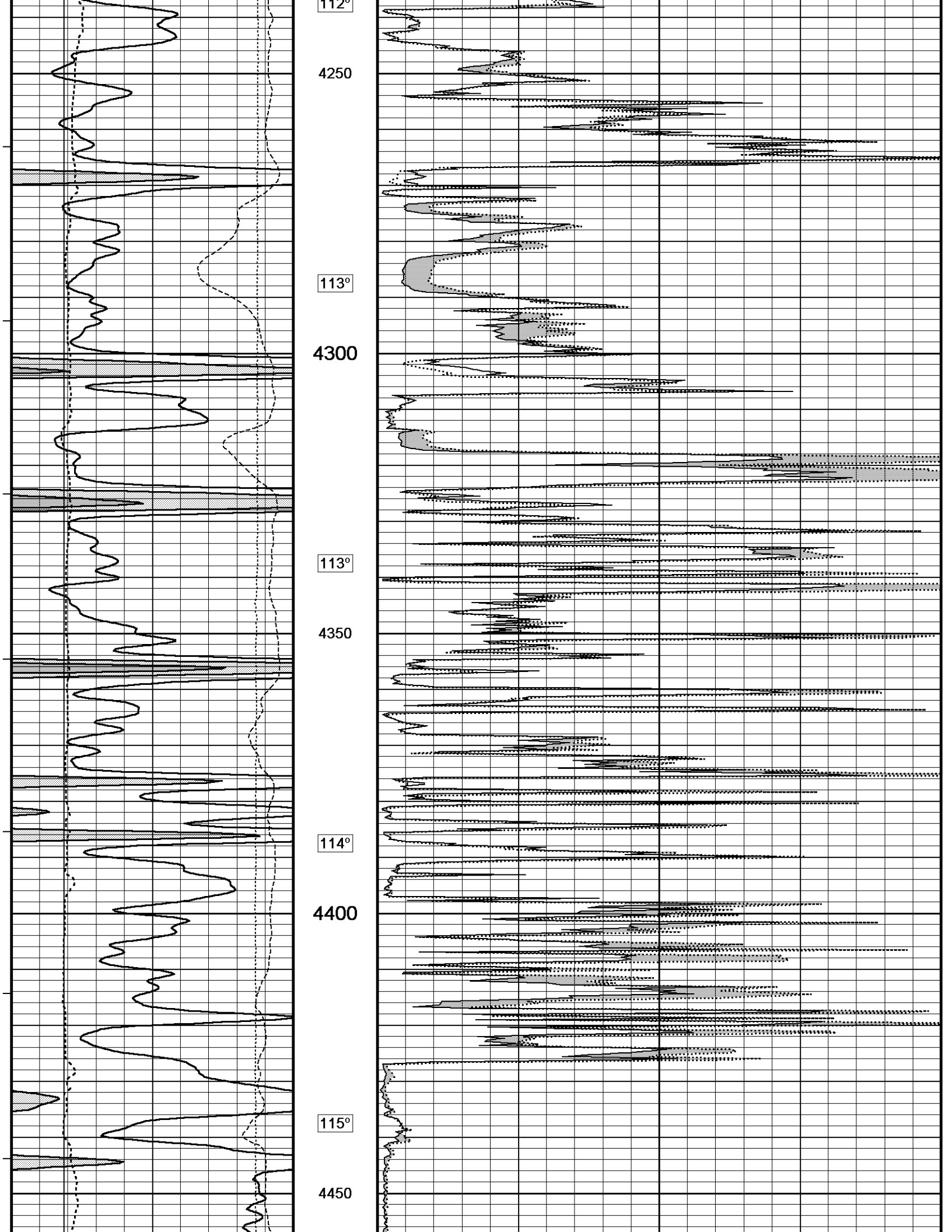
3550

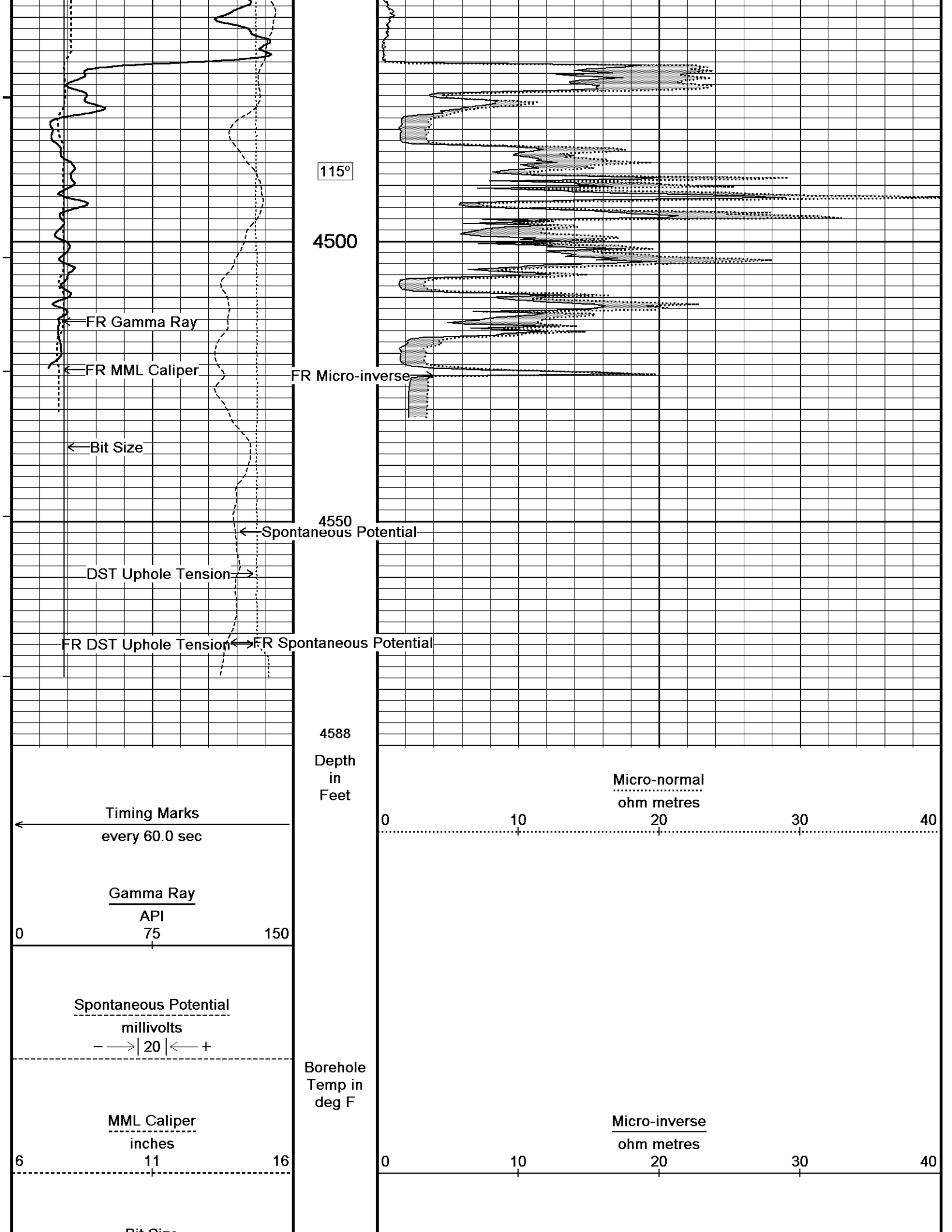



110°
3600
110°
3650
110°
3700
110°
3750
110°
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension


3800
111°
3850
111°
3900
111°
3950
111°
4000


111°
4050
111°
4100
111°
Bit Size
Micro-inverse
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
112°
4200


112°
4250
113°
4300
113°
4350
114°
4400
115°
4450


115°
4500
FR Gamma Ray
FR MML Caliper
FR Micro-inverse
Bit Size
4550
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
FR Spontaneous Potential
4588
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 02-MAY-2011 10:30
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford ...\Ellis 1-23_002 spooled section.dta — Recorded on 26-APR-2011 16:09
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 02-MAY-2011 10:30
Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreView\0\Copy of Ellis 1-23_001.dta — Recorded on 26-APR-2011 15:14
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

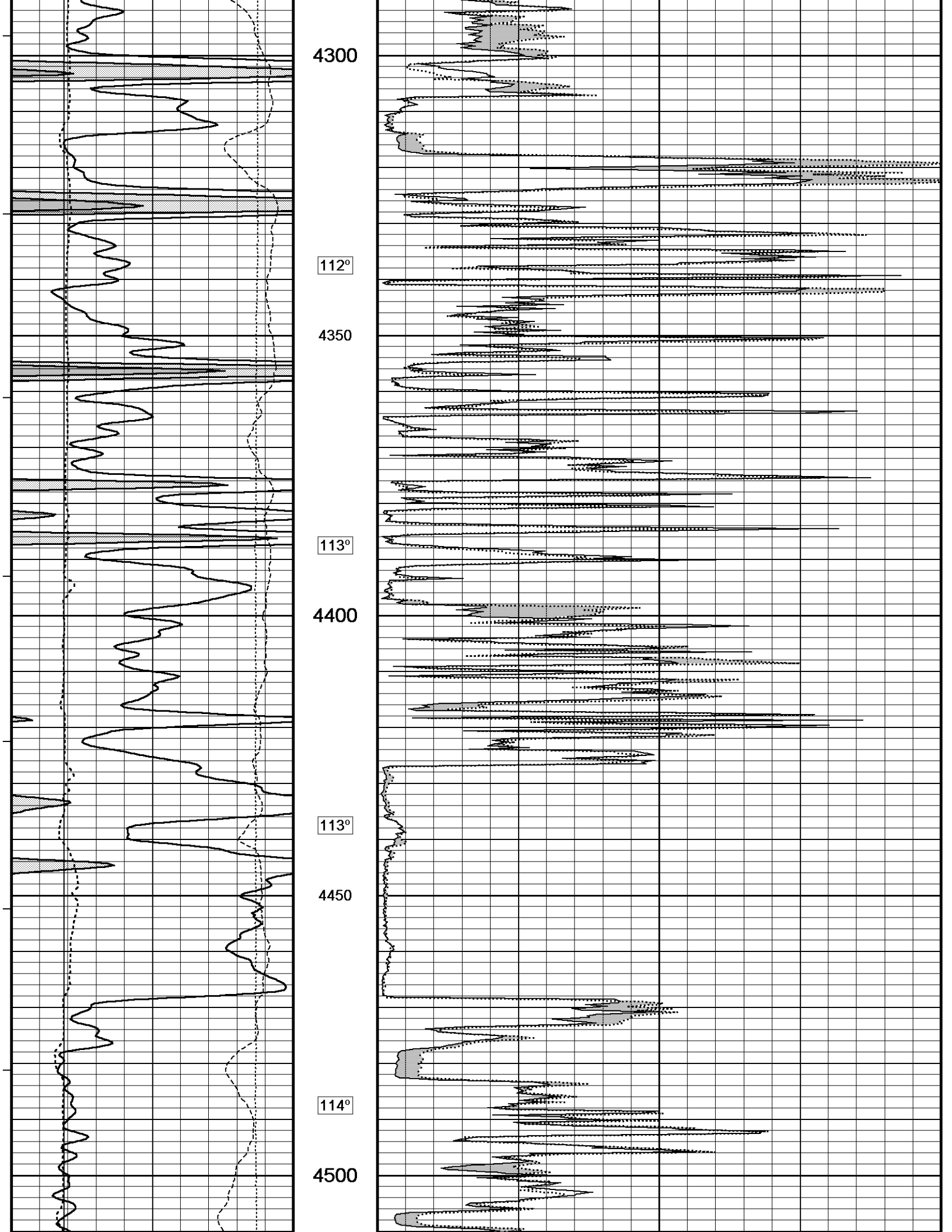
Borehole Temp in deg F

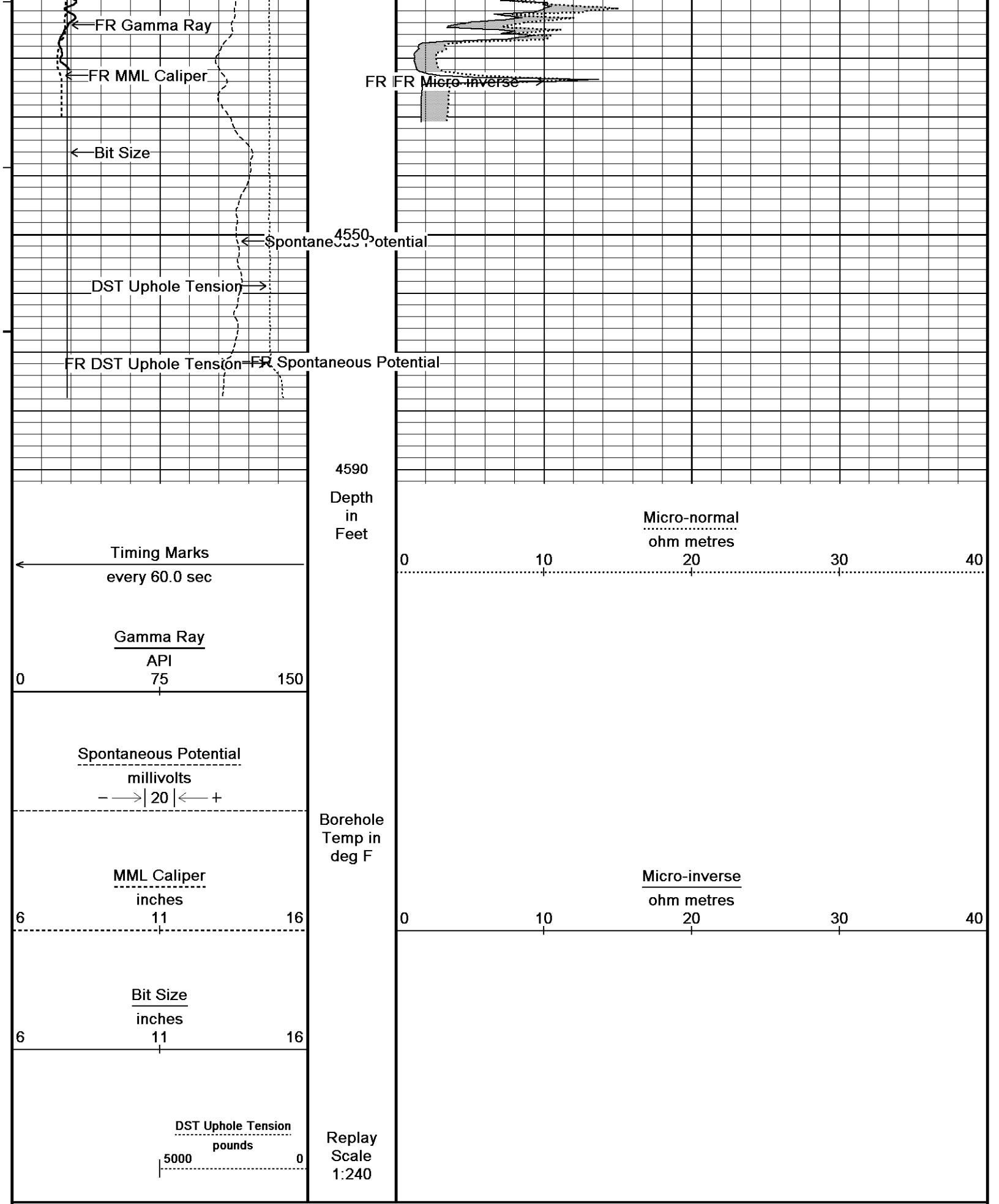
Replay Scale 1:240

4268

Micro-normal
ohm metres
0 10 20 30 40

Micro-inverse
ohm metres
0 10 20 30 40


4300
112°
4350
113°
4400
113°
4450
114°
4500



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-MAY-2011 10:30

Filename: C:\Users\SSTRIB~1\AppData\Local\Temp\Weatherford PreView\0\Copy of Ellis 1-23_001.dta — Recorded on 26-APR-2011 15:14

System Versions: Logged with 11.03.2789 Plotted with 11.02.2164

REPEAT SECTION

BEFORE SURVEY CALIBRATION

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General Constants All 000

Last Edited on 26-APR-2011,14:20

General Parameters

Mud Resistivity	0.700	ohm-metres
Mud Resistivity Temperature	81.000	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 25-APR-2011 20:54

	Measured	Calibrated (API)
Background	92	61
Calibrator (Gross)	1187	786
Calibrator (Net)	1095	725

Gamma Constants MCG-C 139

Last Edited on 26-APR-2011,14:21

Gamma Calibrator Number	grc38	
Mud Density	1.14	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 25-APR-2011 20:38

Base Calibration

	Measured	Calibrated (ohm-m)
Channel	Resistor 1	Resistor 2

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 11-APR-2011,09:08

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 25-APR-2011 20:37

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)
6.03	5.98

Neutron Calibration MDN-A.B 66

Base Calibration on 11-MAR-2011 13:54
Field Check on 25-APR-2011 20:50

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)	
	1673	2396
Ratio	0.698	

Neutron Constants MDN-A.B 66

Last Edited on 26-APR-2011,14:21

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.14	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 25-APR-2011 20:34

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 26-APR-2011,02:53

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 126

Last Edited on 11-APR-2011,08:33

Maximum Boundary Contrast	100.00	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)	Depth (ft)
N/A	N/A	N/A	
N/A	N/A	N/A	0.00
N/A	N/A	N/A	0.00
N/A	N/A	N/A	0.00
N/A	N/A	N/A	0.00
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

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 25-APR-2011 20:33

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	12.0	3842.1	
2	0.0	0.0	29.3	3480.2	
3	0.0	0.0	28.9	3055.9	
4	0.0	0.0	19.7	2083.5	
Deep	0.0	0.0	18.4	2050.7	
Medium	0.0	0.0	42.1	3995.2	
Shallow	0.0	0.0	42.5	5059.1	
Array Temperature		0.0		57.8	Deg F

Induction Constants MAI-A.A 167

Last Edited on 24-APR-2011,22:39

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 25-APR-2011 20:40

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)
6.02	5.98

Photo Density Calibration MPD-B 35

Base Calibration on 11-MAR-2011 11:54
Field Check on 25-APR-2011 20:44

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

1171.2	1390.3

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

210.1	1035.0

Density Constants MPD-B 35

Last Edited on 26-APR-2011,14:21

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	1.14	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 Ellis 1-23_001.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

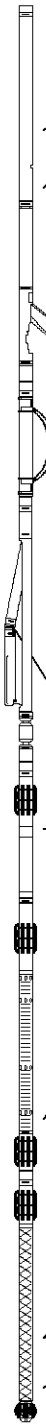
SKJ-D.A Compact Knuckle Joint
SKJ-D.A 36 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

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

Compact Sonic
MSS-A.A 126 LG: 12.52 ft WT: 72.8 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: 62.84 ft Weight: 480.6 lb



57.56 ft	GRGC - Gamma Ray
54.65 ft	CGXT - MCG External Temperature
47.93 ft	MINV - Micro-inverse
47.93 ft	MNRL - Micro-normal
48.92 ft	MLTC - MML Caliper
43.13 ft	NPRL - Limestone Neutron Por.
35.89 ft	CLDC - Density Caliper
33.96 ft	DPRL - Limestone Density Por.
33.96 ft	DEN - Compensated Density
33.96 ft	DCOR - Density Correction
33.90 ft	PDPE - PE
26.24 ft	FEFE - Shallow FE
12.96 ft	DT35 - 3-5' Compensated Sonic
12.96 ft	SPRL - Wyllie Lime. Sonic Por.
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
WELL	ELLIS 1-23
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A./KANSAS

Elevation Kelly Bushing	2785.00	feet	First Reading	4524.00	feet
Elevation Drill Floor	2784.00	feet	Depth Driller	4570.00	feet
Elevation Ground Level	2780.00	feet	Depth Logger	4572.00	feet

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MICRORESISTIVITY LOG

Years of Wireline 1970 2010