MICRORESISTIVITY LOG

Weatherford

COMPANY	GRAND MESA OPERATING
WELL	CSC #1-21
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1200' FNL & 1040' FWL

40 Years of Wireline 1970 2010

SEC	TWP	RGE	Other Services
21	13S	31W	MAI/MFE
			MDN/MPD

API Number 15-063-21983
Permit Number

Permanent Datum G.L., Elevation 2888 feet
Log Measured From KB
Drilling Measured From K.B.

Elevations:	feet
KB	2893.00
DF	2891.00
GL	2888.00

Date	24-APR-2012			
Run Number	ONE			
Depth Driller	4640.00	feet		
Depth Logger	4644.00	feet		
First Reading	4609.00	feet		
Last Reading	3644.00	feet		
Casing Driller	213.00	feet		
Casing Logger	213.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.30 lb/USg	56.00 CP		
PH / Fluid Loss	8.00	8.00 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.78 @ 84.0	ohm-m		
Rmf @ Measured Temp	0.62 @ 84.0	ohm-m		
Rmc @ Measured Temp	0.94 @ 84.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.56 @117.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	117.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13025	LIB		
Recorded By	R. HOFFMAN			
Witnessed By	KENT MATSON			
S.O. # / JOB #	3534649		LB12-104	

BOREHOLE RECORD

Last Edited: 25-APR-2012 02:10

Bit Size inches	Depth From feet	Depth To feet
7.875	213.00	4644.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	213.00	24.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, SKJ, MFE, MAI.
Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used. MFE and MAI 0.5 inch standoffs used.
2.71 g/cc Limestone Density Matrix used to calculate porosity.
All intervals logged and scaled per customer's request.
Annular volume with 5.5 inch production casing = 219 cu. ft.
Service order #3534649
Rig: Murfin Drilling Rig #24
Engineer: R. Hoffman
Operator(s): K. Rinehart

5 INCH MAIN

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_003.dta
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

Plotted on 25-APR-2012 02:14
Recorded on 24-APR-2012 23:50

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

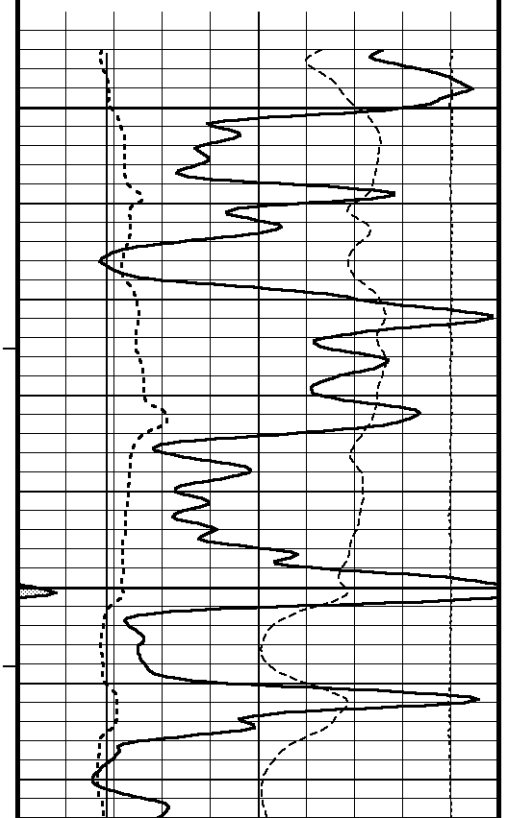
Micro-inverse
ohm metres
0 10 20 30 40

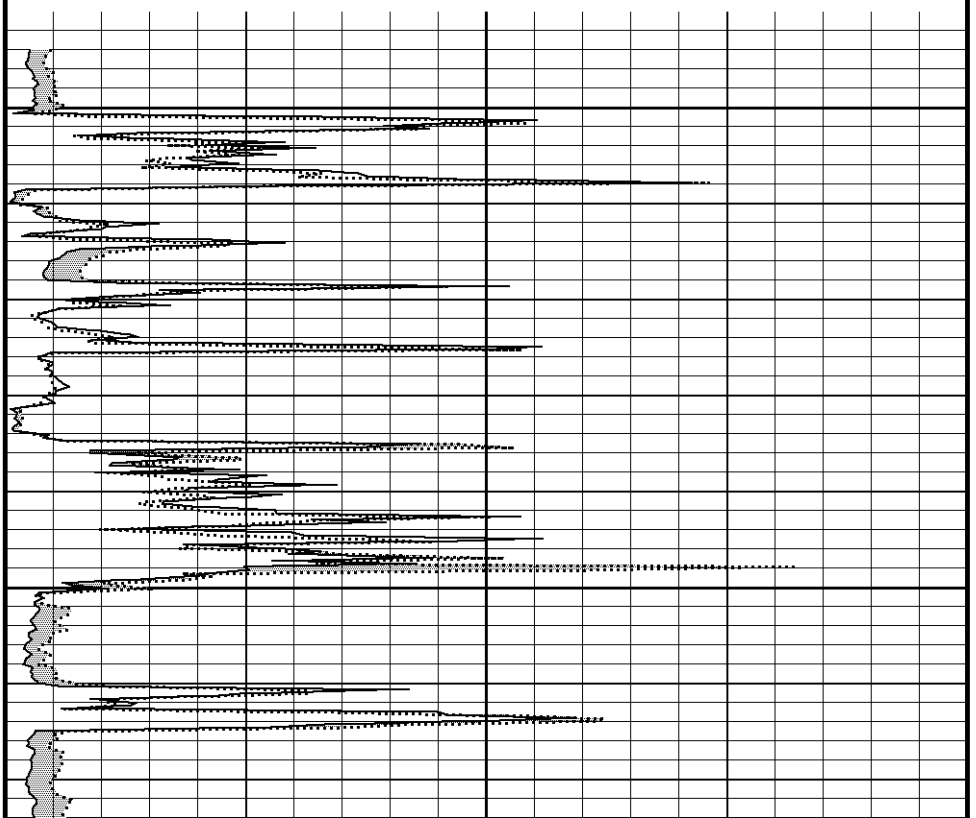
3642

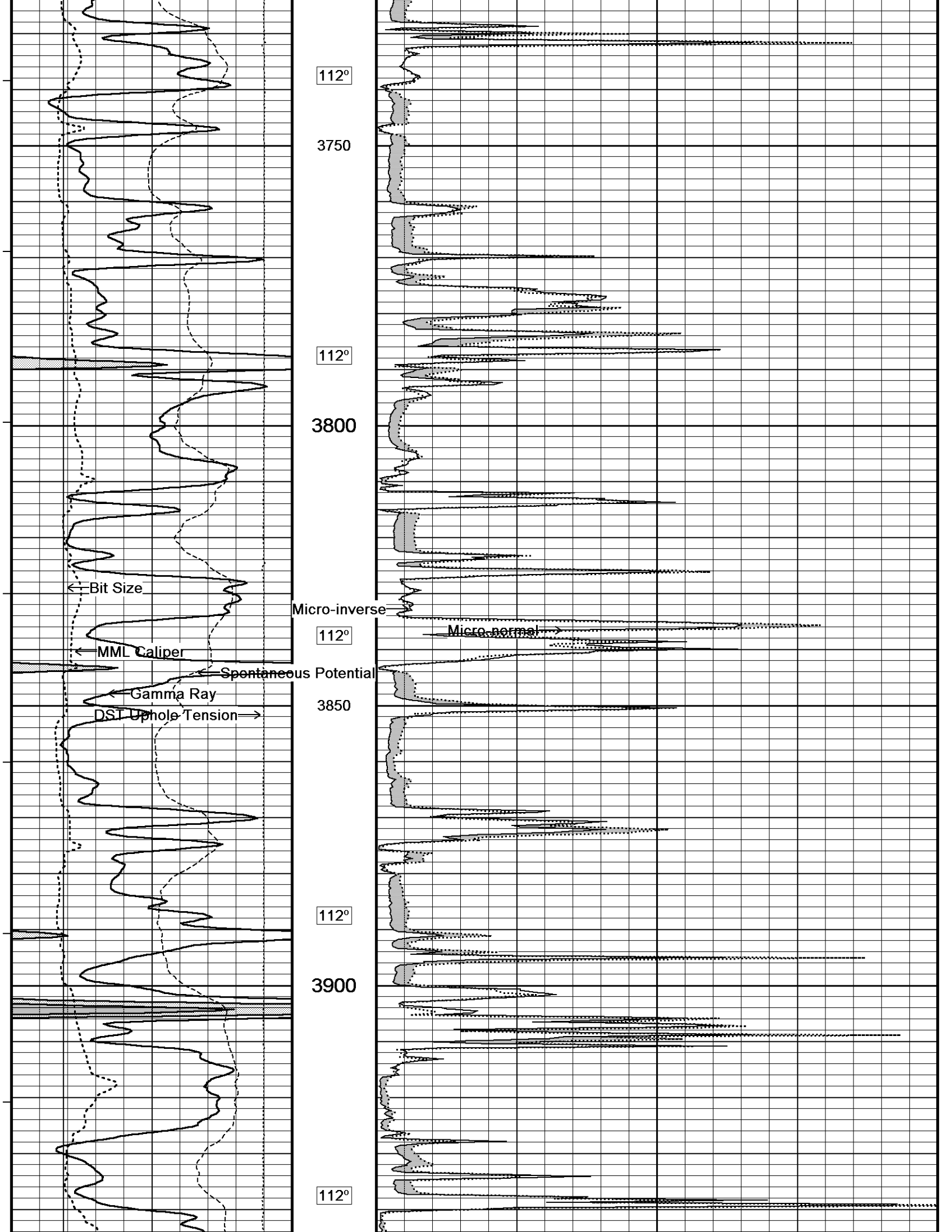
3650

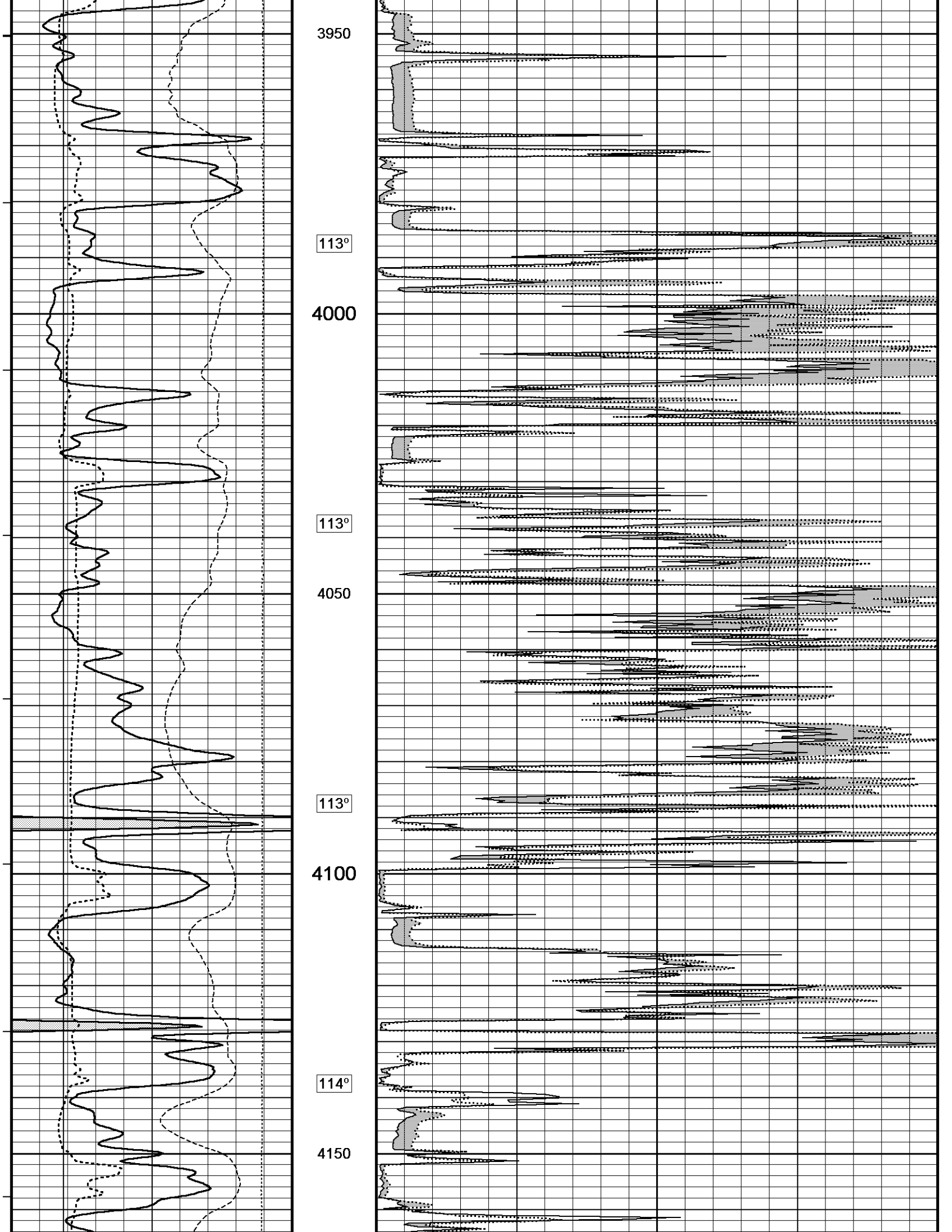
112°

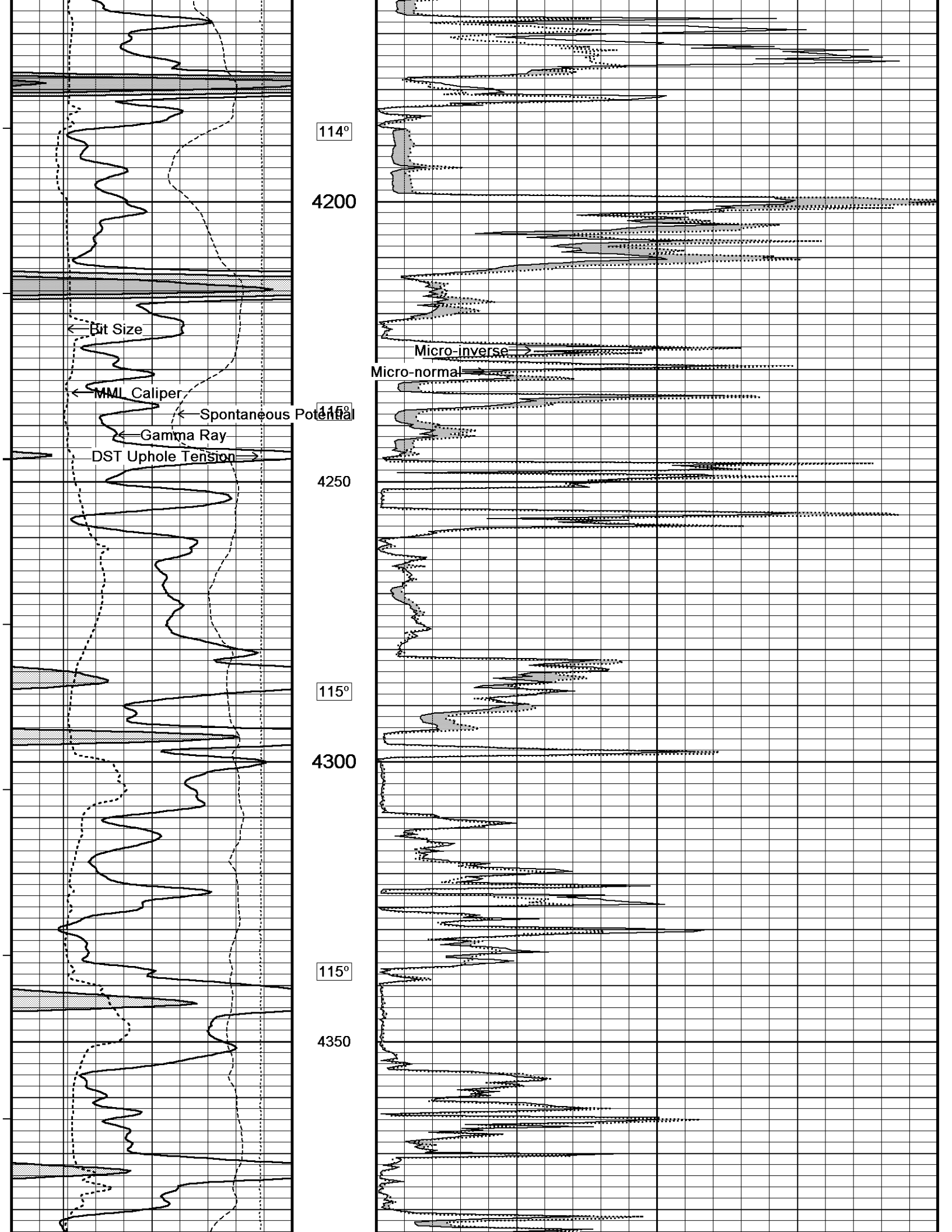
3700

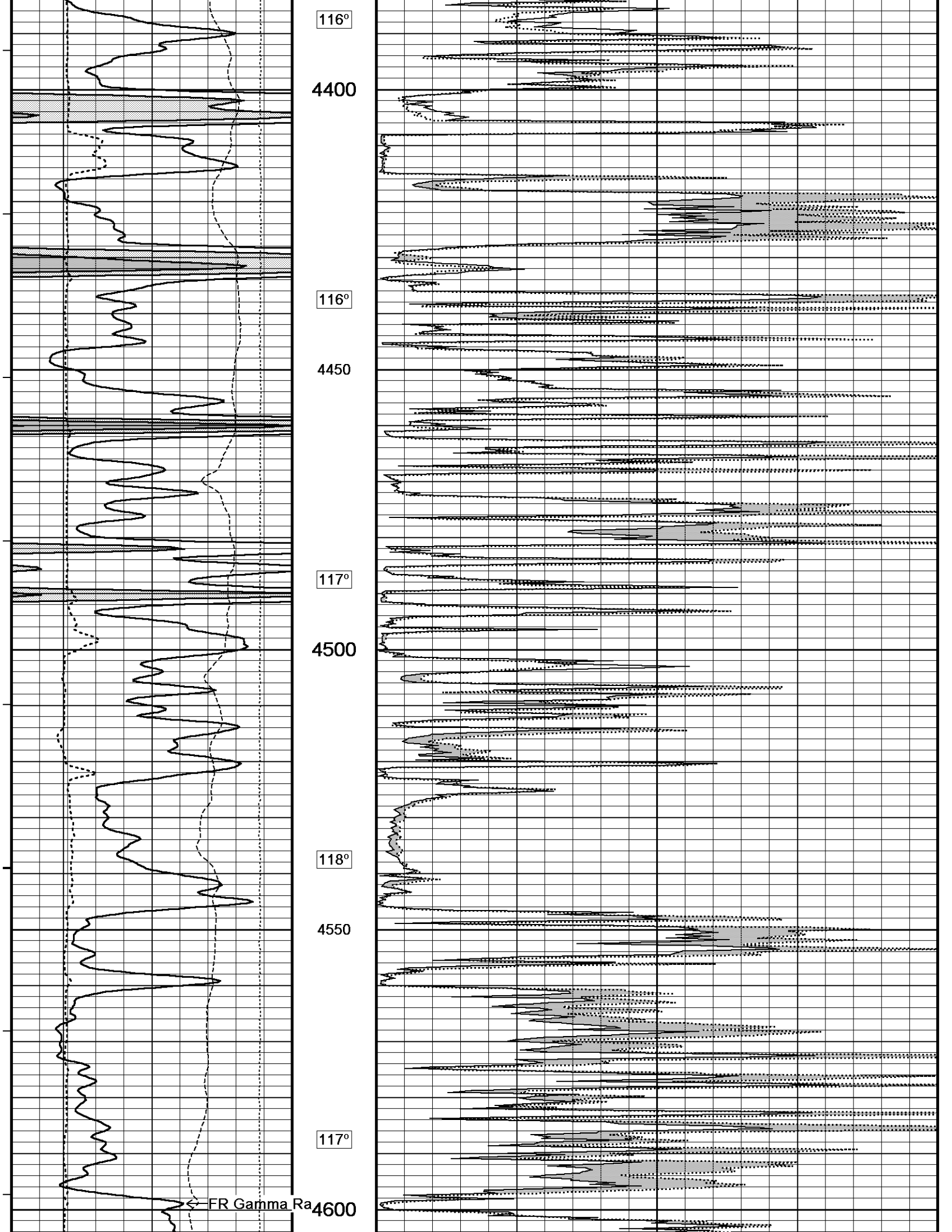


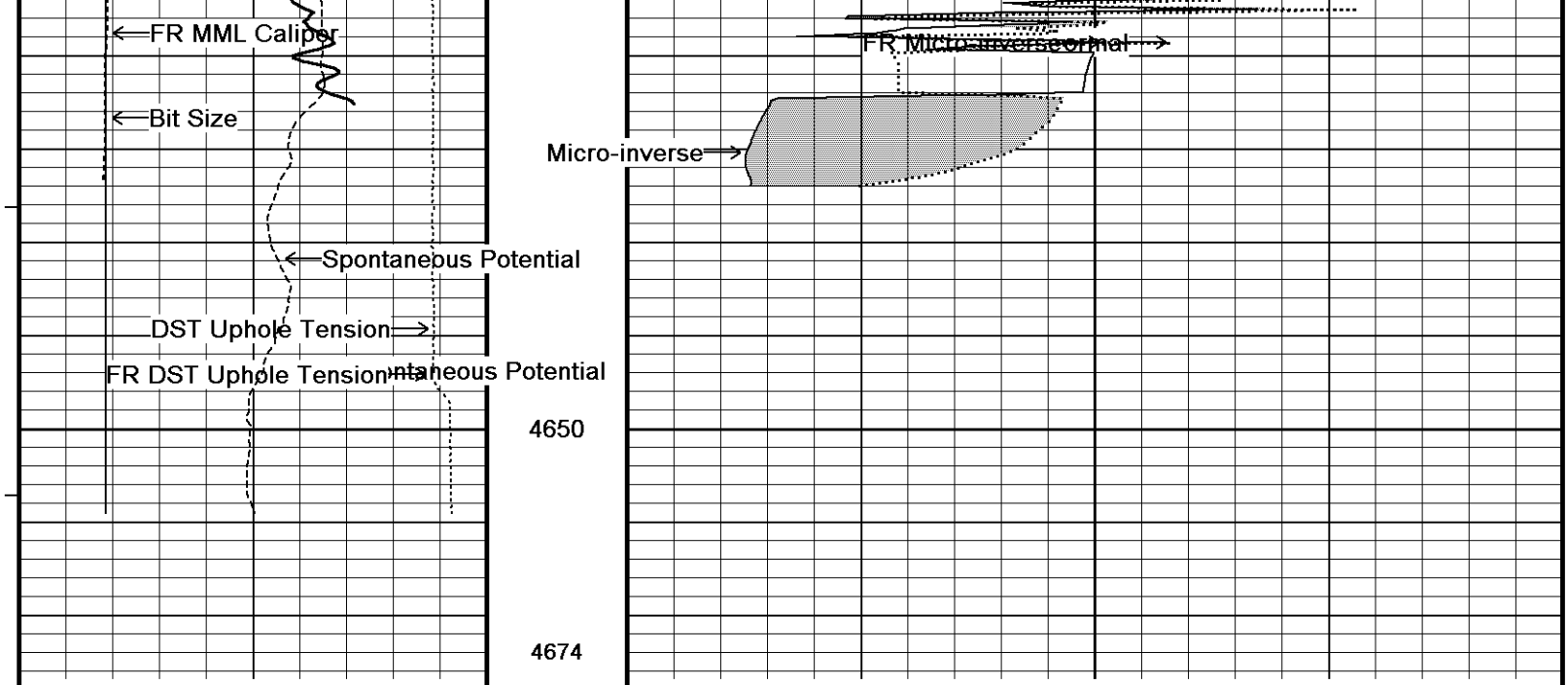



112°
3750
112°
3800
Bit Size
Micro-inverse
Micro-normal
112°
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
3850
112°
3900
112°


3950
113°
4000
113°
4050
113°
4100
114°
4150


114°
4200
Bit Size
MML Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
Micro-inverse
Micro-normal
115°
4250
115°
4300
115°
4350


116°
4400
116°
4450
117°
4500
118°
4550
117°
FR Gamma Ra
4600



4650

4674

Depth in Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150

Micro-normal
ohm metres
0 10 20 30 40

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 25-APR-2012 02:15
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_003.dta
Recorded on 24-APR-2012 23:50
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

5 INCH MAIN

REPEAT SECTION

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 25-APR-2012 02:15
Filename: C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_001.dta
Recorded on 24-APR-2012 23:16
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

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

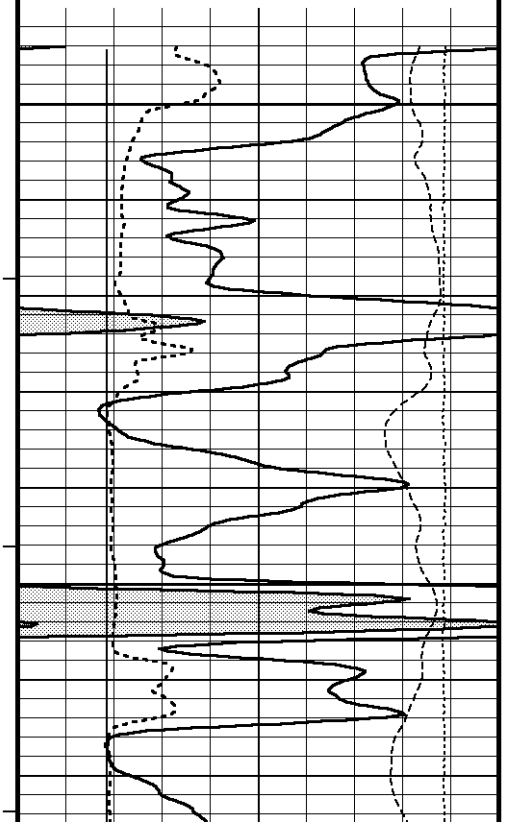
Micro-inverse
ohm metres
0 10 20 30 40

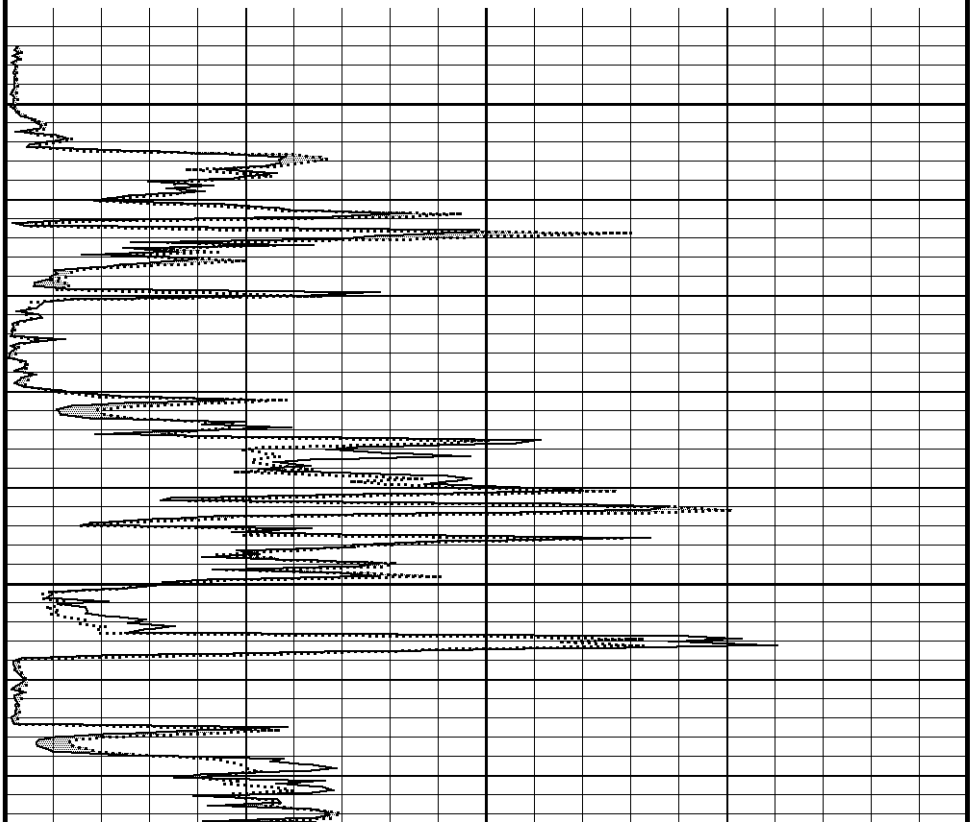
4342

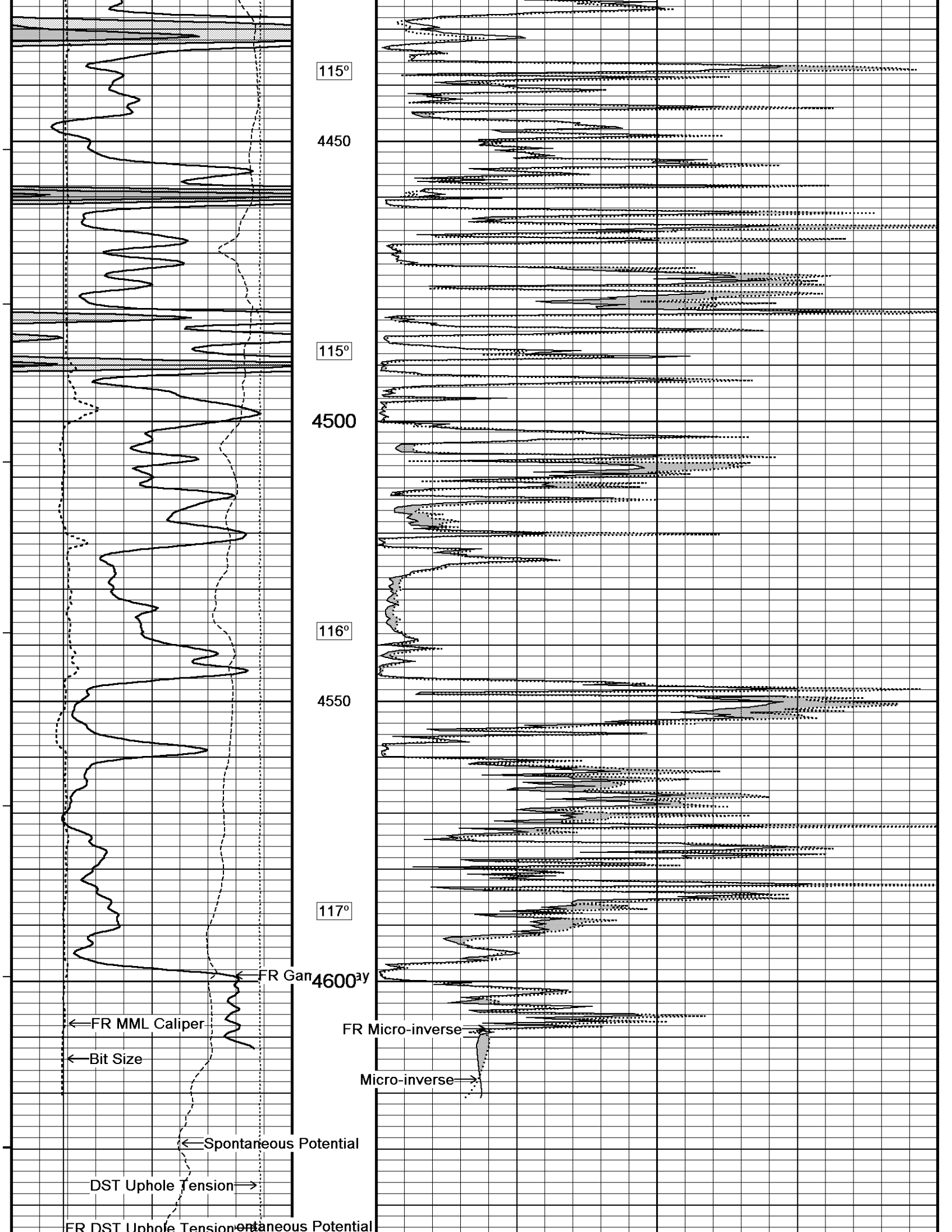
4350

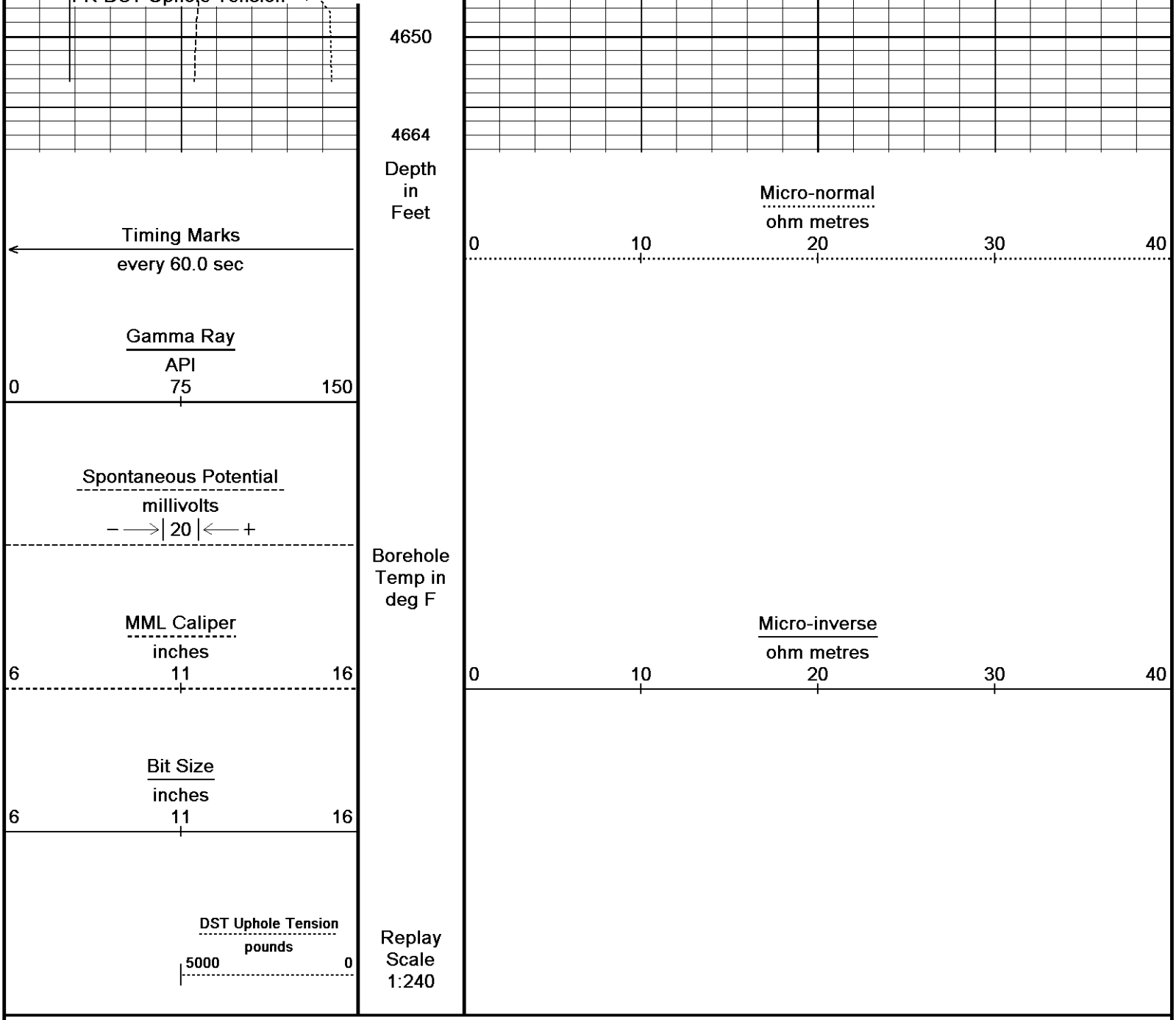
115°

4400






115°
4450
115°
4500
116°
4550
117°
4600
FR Gamma Ray
FR MML Caliper
Bit Size
FR Micro-inverse
Micro-inverse
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
Spontaneous Potential



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 25-APR-2012 02:15

Filename: C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_001.dta — Recorded on 24-APR-2012 23:16

System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_003.dta

General Constants All 000 — Last Edited on 24-APR-2012,22:12

General Parameters		
Mud Resistivity	0.780	ohm-metres
Mud Resistivity Temperature	84.000	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	0.610
RWA Constant M	2.150

Gamma Calibration MCG-C 208

Field Calibration on 24-APR-2012 07:33

	Measured	Calibrated (API)
Background	81	60
Calibrator (Gross)	1057	785
Calibrator (Net)	976	725

Gamma Constants MCG-C 208

Last Edited on 24-APR-2012,12:07

Gamma Calibrator Number	grc38	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 18-OCT-2011,14:32

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

High Resolution Temperature Constants MCG-C 208

Last Edited on

Pre-filter Length	11

Caliper Calibration MML-A 16

Base Calibration on 12-MAR-2012 08:42
Field Calibration on 24-APR-2012 07:43

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14446	5.98
2	17749	7.97
3	20974	9.86
4	24969	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.03	5.98

Micro Normal and Micro Inverse Calibration MML-A 16

Base Calibration on 12-MAR-2012 08:50
Field Check on 24-APR-2012 07:42

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 24-APR-2012,12:15

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

DOWNHOLE EQUIPMENT

C:\Minimus 11.03.4044\Data\Grand Mesa CSC 1-21\Grand Mesa CSC 1-21_003.dta

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

Compact Comms Gamma
MCG-C 208 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 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 Neutron
MDN-A.B 66 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: 2.45 in

Compact Density/Caliper
MPD-B 64 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

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-C.A 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

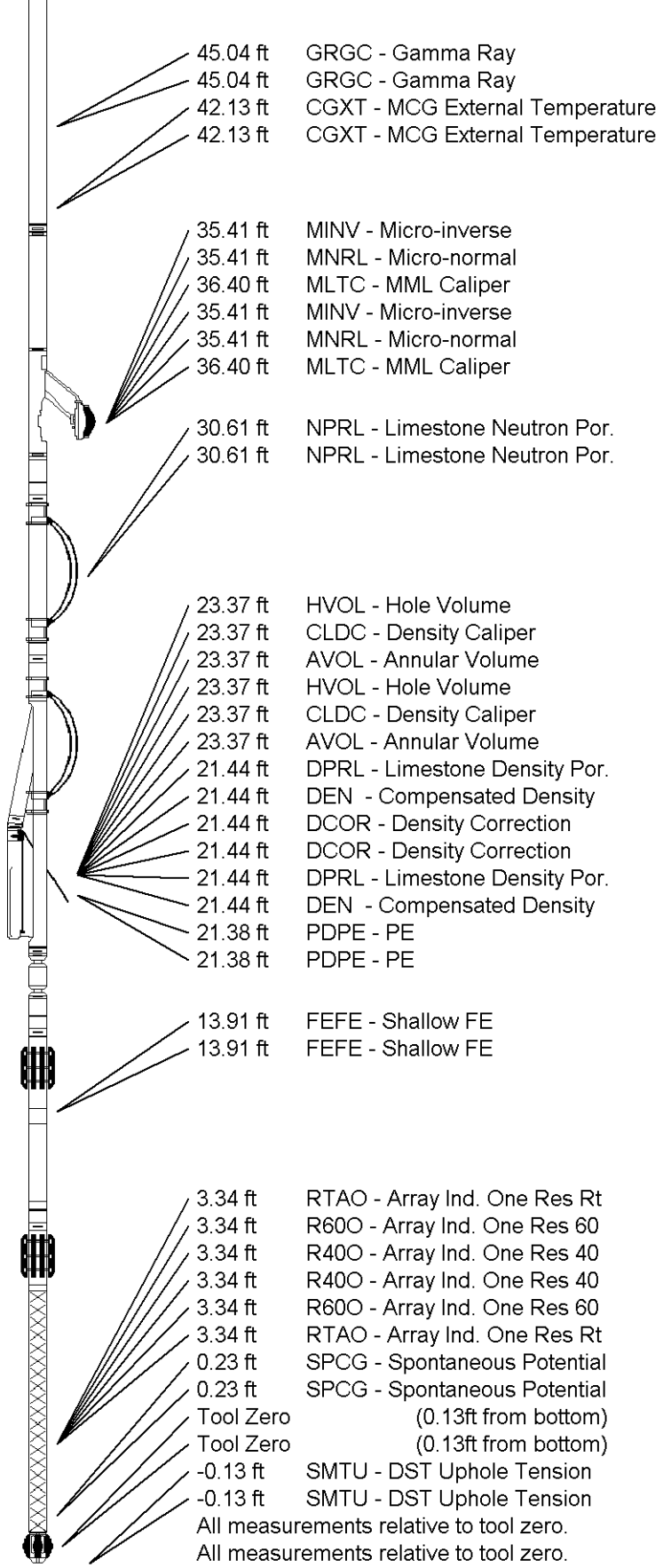
Compact Focussed Electric
MFE-C.A 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

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

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

Total Length: 50.32 ft Weight: 407.9 lb



45.04 ft	GRGC - Gamma Ray
45.04 ft	GRGC - Gamma Ray
42.13 ft	CGXT - MCG External Temperature
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
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.
30.61 ft	NPRL - Limestone Neutron Por.
23.37 ft	HVOL - Hole Volume
23.37 ft	CLDC - Density Caliper
23.37 ft	AVOL - Annular Volume
23.37 ft	HVOL - Hole Volume
23.37 ft	CLDC - Density Caliper
23.37 ft	AVOL - Annular Volume
21.44 ft	DPRL - Limestone Density Por.
21.44 ft	DEN - Compensated Density
21.44 ft	DCOR - Density Correction
21.44 ft	DCOR - Density Correction
21.44 ft	DPRL - Limestone Density Por.
21.44 ft	DEN - Compensated Density
21.38 ft	PDPE - PE
21.38 ft	PDPE - PE
13.91 ft	FEFE - Shallow FE
13.91 ft	FEFE - Shallow FE
3.34 ft	RTAO - Array Ind. One Res Rt
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	RTAO - Array Ind. One Res Rt
0.23 ft	SPCG - Spontaneous Potential
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension
-0.13 ft	SMTU - DST Uphole Tension

All measurements relative to tool zero.

All measurements relative to tool zero.

COMPANY	GRAND MESA OPERATING
WELL	CSC #1-21
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2893.00	feet	First Reading	4609.00	feet
Elevation Drill Floor	2891.00	feet	Depth Driller	4640.00	feet
Elevation Ground Level	2888.00	feet	Depth Logger	4644.00	feet

Weatherford®

MICRORESISTIVITY LOG

40 Years of Wireline 1970 2010