MICRORESISTIVITY LOG

COMPANY	GRAND MESA OPERATING COMPANY
WELL	DBY #4-16
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1370' FSL & 1840' FWL

SEC	TWP	RGE	Other Services
16	16S	33W	MPD/MDN MAI/MFE

API Number 15-171-20922
Permit Number

Permanent Datum G.L., Elevation 3071 feet
Log Measured From KB
Drilling Measured From K.B.

Elevations:	feet
KB	3076.00
DF	3075.00
GL	3071.00

Date	08-JAN-2013			
Run Number	ONE			
Service Order	3538968			
Depth Driller	4756.00	feet		
Depth Logger	4756.00	feet		
First Reading	4722.00	feet		
Last Reading	3700.00	feet		
Casing Driller	262.00	feet		
Casing Logger	261.00	inches		
Bit Size	7.875			
Hole Fluid Type	CHEMICAL	lb/USg		
Density / Viscosity	9.20 lb/USg	68.00 CP		
PH / Fluid Loss	11.00	11.00		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.74 @ 77.0	ohm-m		
Rmf @ Measured Temp	0.59 @ 77.0	ohm-m		
Rmc @ Measured Temp	0.89 @ 77.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.53 @108.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	108.00	deg F		
Equipment / Base	13057	LIB		
Recorded By	LYNN SCOTT			
Witnessed By	JOHN GOLDSMITH			
JOB#	LB13-006			

BOREHOLE RECORD

Last Edited: 08-JAN-2013 08:55

Bit Size inches	Depth From feet	Depth To feet
7.875	261.00	4756.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	261.00	24.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MAI ran in combination.
Hardware Used: MPD: 8 inch profile plate used. MAI and MFE: 0.5 inch standoffs used. MDN: Dual Bowspring used.
2.71 G/CC Limestone Density porosity 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 Surface casing= 2173 cubic feet
Annular hole volume with 5.5 Inch casing from TD to 3700 ft.=225 cubic feet
Service order: 3538968
Rig: Murfin #24
Engineer: L. Scott
Operator(s): R. Venegas

Software duplicates the pH value and the fluid loss value. The fluid loss is 7.6.

employees. These interpretations are also subject to our general terms and conditions in our price schedule.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 08-JAN-2013 12:06
Filename: C:\Minimus 13.04.8492\Data\Grand M...\Grand Mesa Operating Company DBY 4-16_002.dta
Recorded on 08-JAN-2013 09:38
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
− → | 20 | ← +

MMR 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

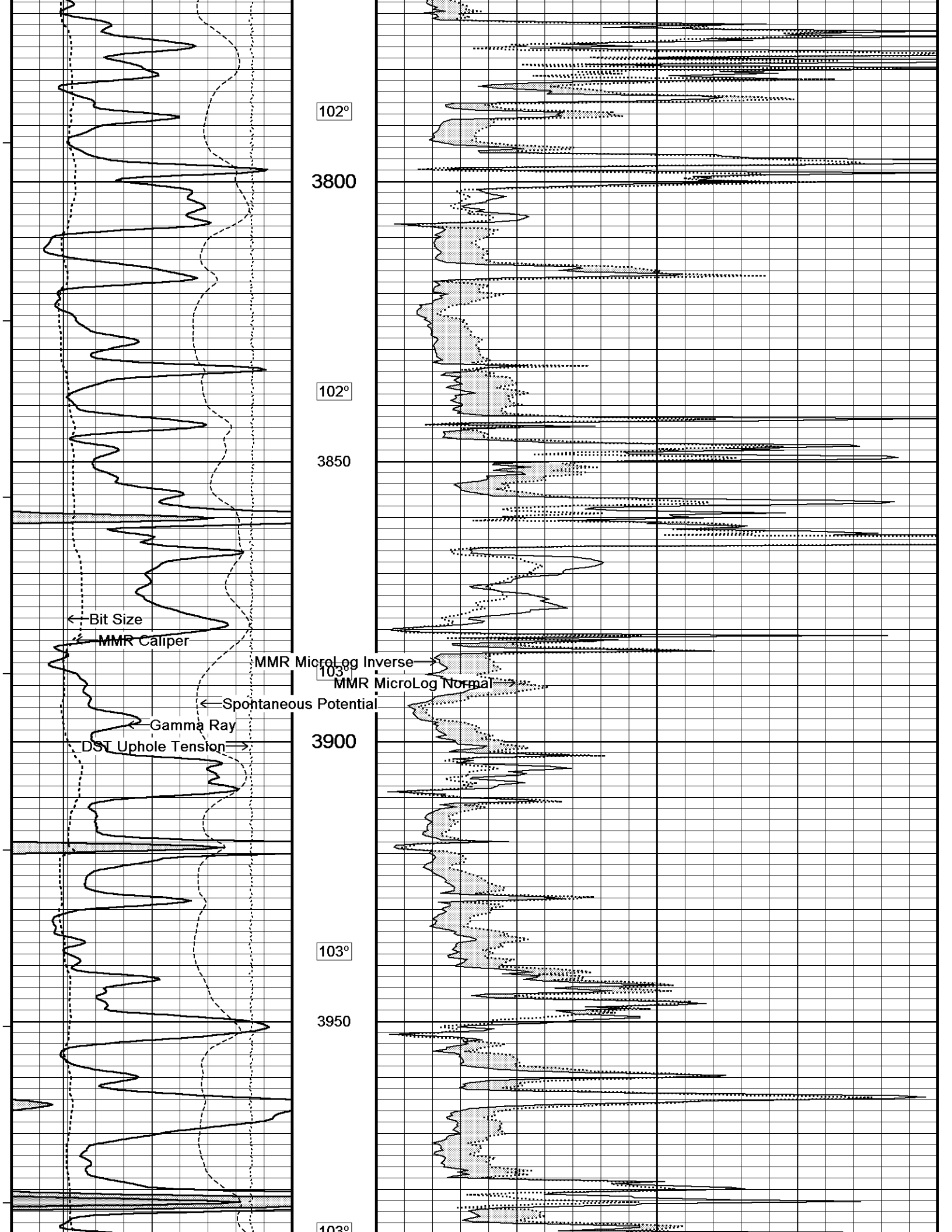
MMR MicroLog Normal
ohm metres
0 10 20 30 40

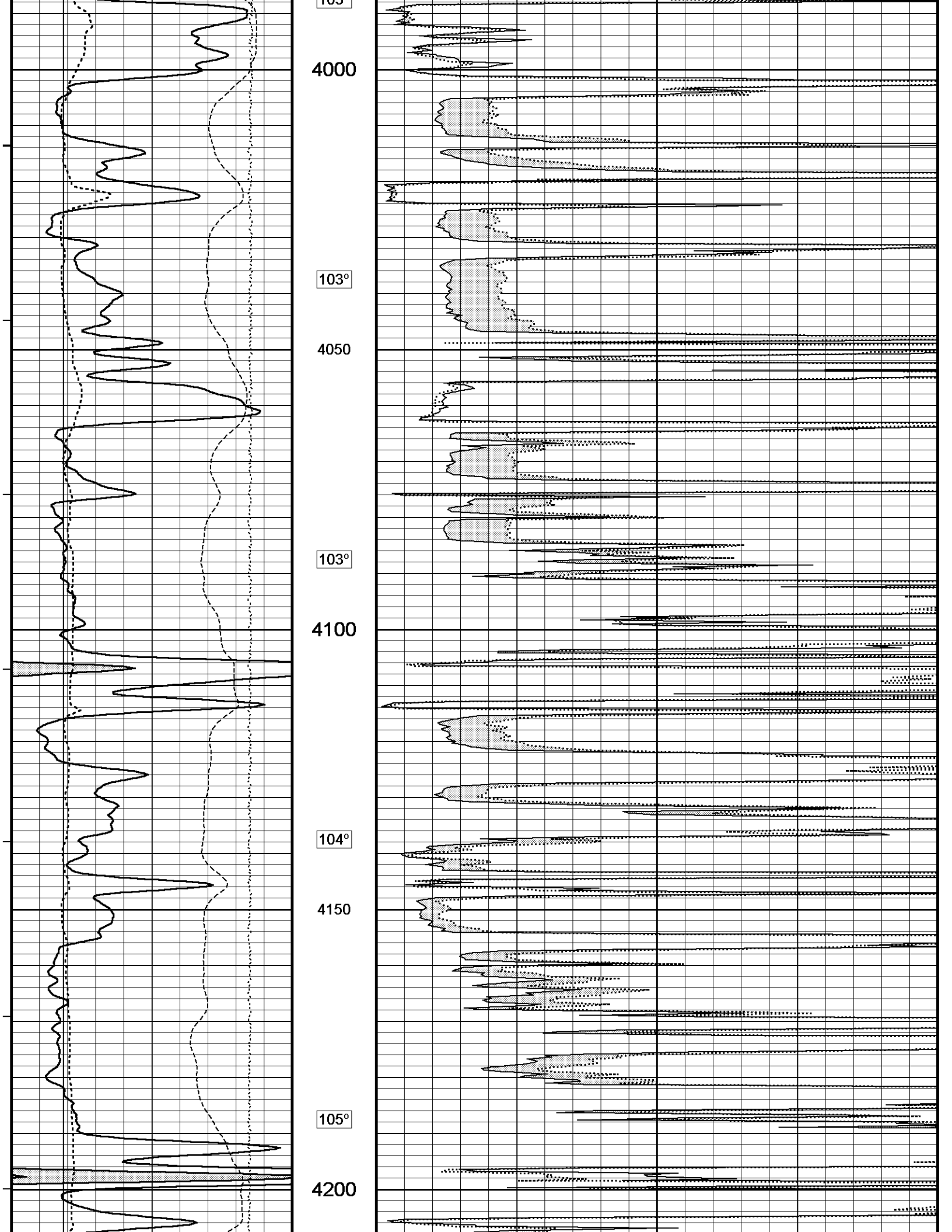
MMR MicroLog Inverse
ohm metres
0 10 20 30 40

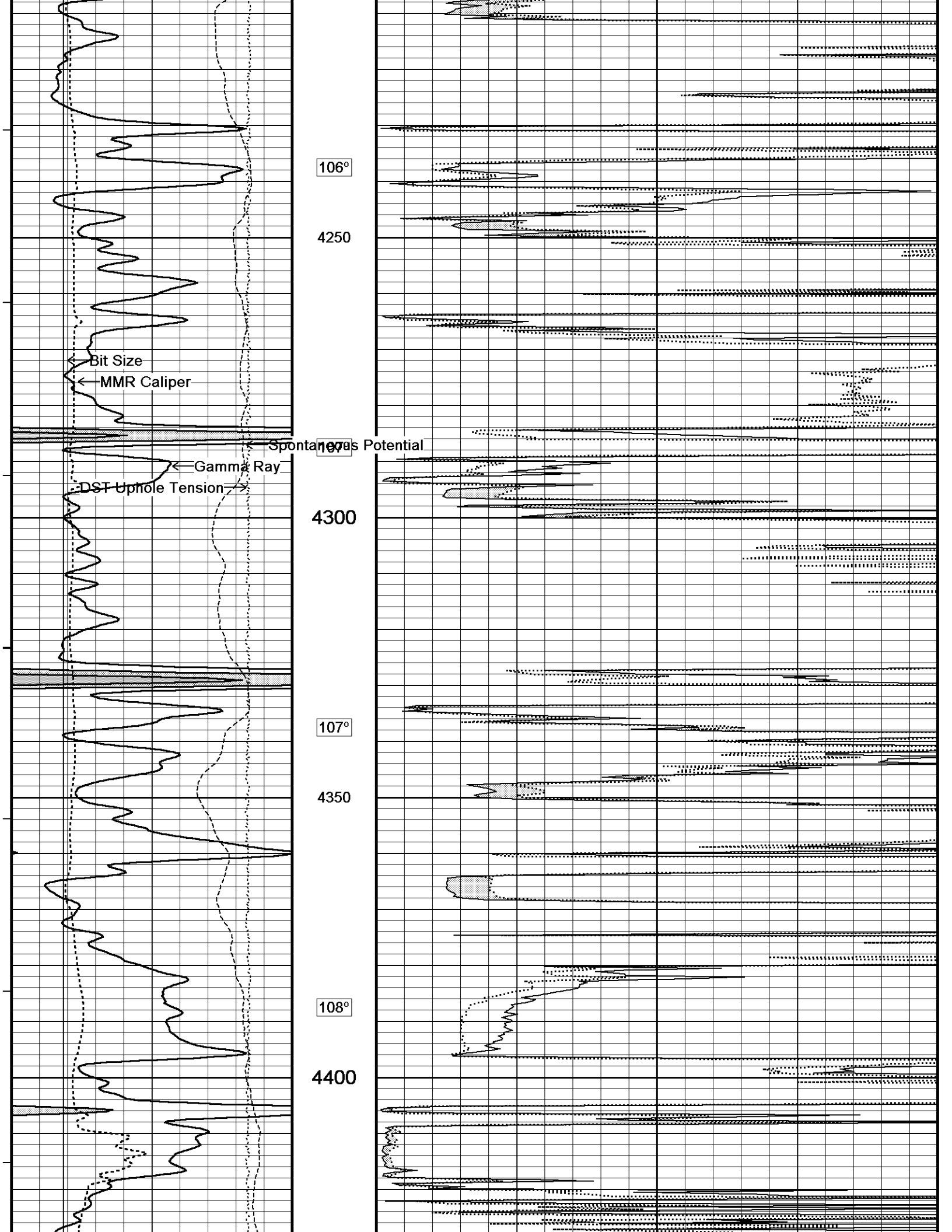
3700

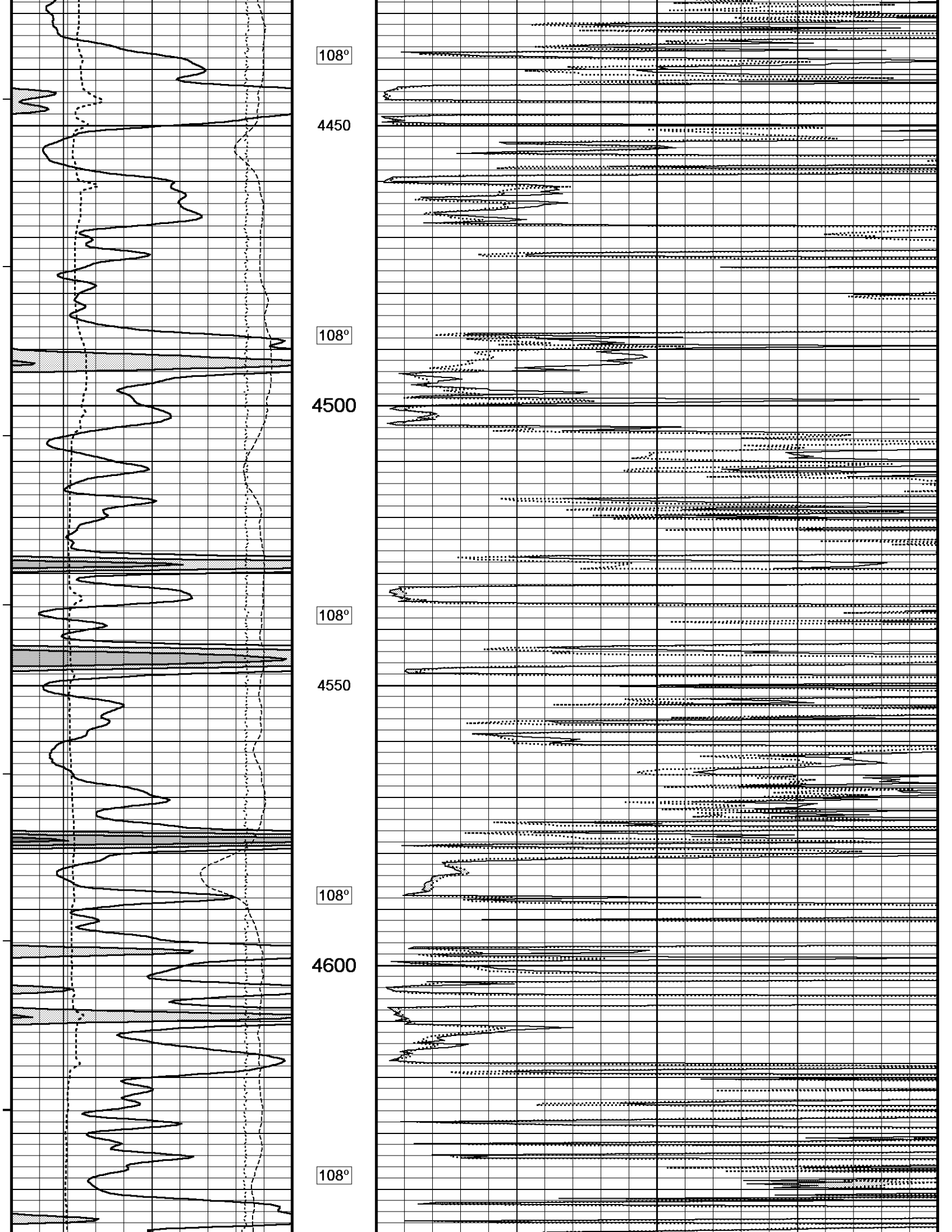
102°

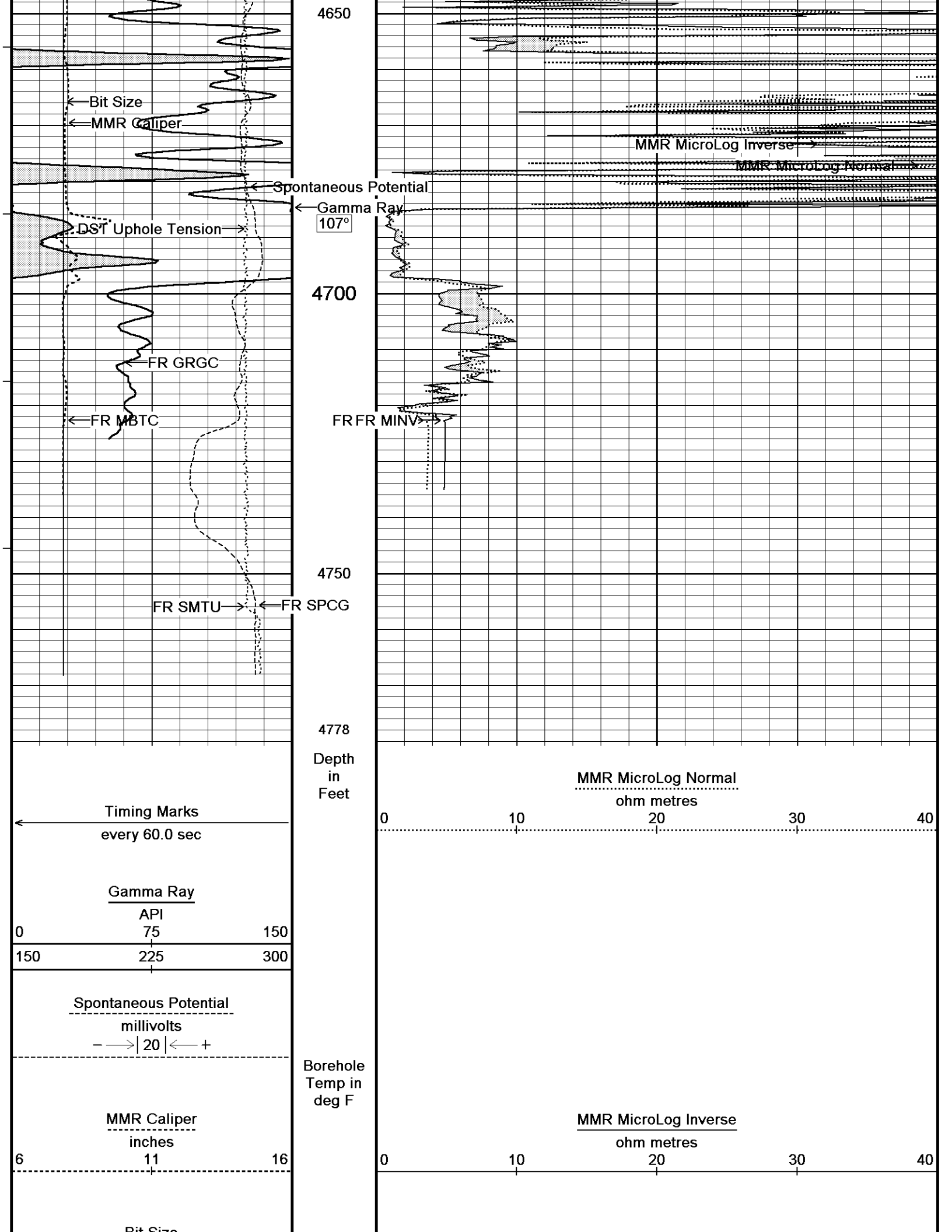
3750


102°
3800
102°
3850
Bit Size
MMR Caliper
MMR MicroLog Inverse
103°
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
3900
103°
3950
103°


103°
4000
103°
4050
103°
4100
104°
4150
105°
4200


106°
4250
Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
4300
107°
4350
108°
4400


108°
4450
108°
4500
108°
4550
108°
4600
108°


4650
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
107°
DST Uphole Tension
4700
FR GRGC
FR MBTC
FR FR MINV
4750
FR SMTU
FR SPCG
4778
Depth
in
Feet
MMR MicroLog Normal
ohm metres
0
10
20
30
40
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Spontaneous Potential
millivolts
− 20 +
Borehole
Temp in
deg F
MMR Caliper
inches
6
11
16
MMR MicroLog 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 08-JAN-2013 12:06
Filename: C:\Minimus 13.04.8492\Data\Grand M...\Grand Mesa Operating Company DBY 4-16_002.dta
Recorded on 08-JAN-2013 09:38
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 08-JAN-2013 12:06
Filename: C:\Minimus 13.04.8492\Data\Grand M...\Grand Mesa Operating Company DBY 4-16_001.dta
Recorded on 08-JAN-2013 09:18
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
– → | 20 | ← +

MMR Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth
in
Feet

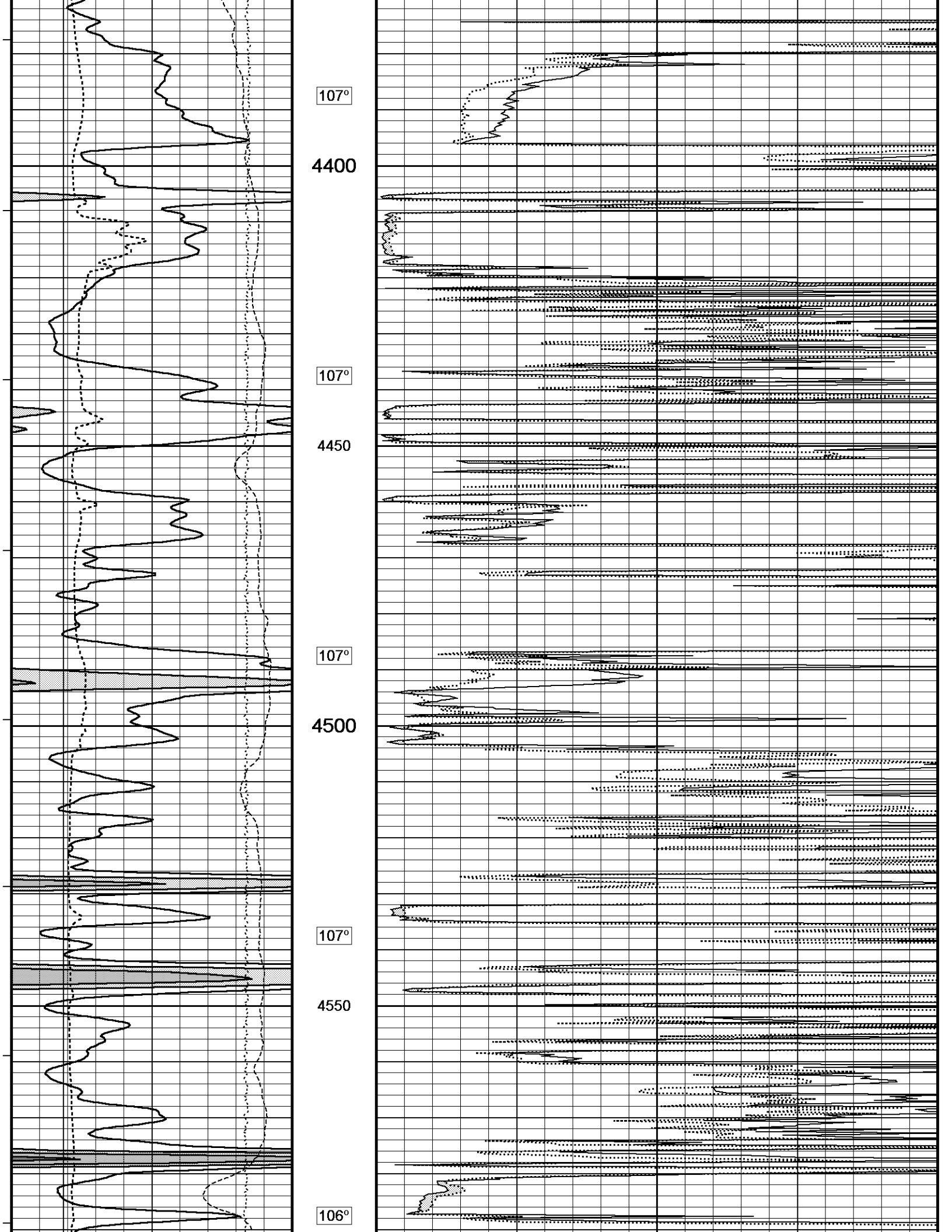
Borehole
Temp in
deg F

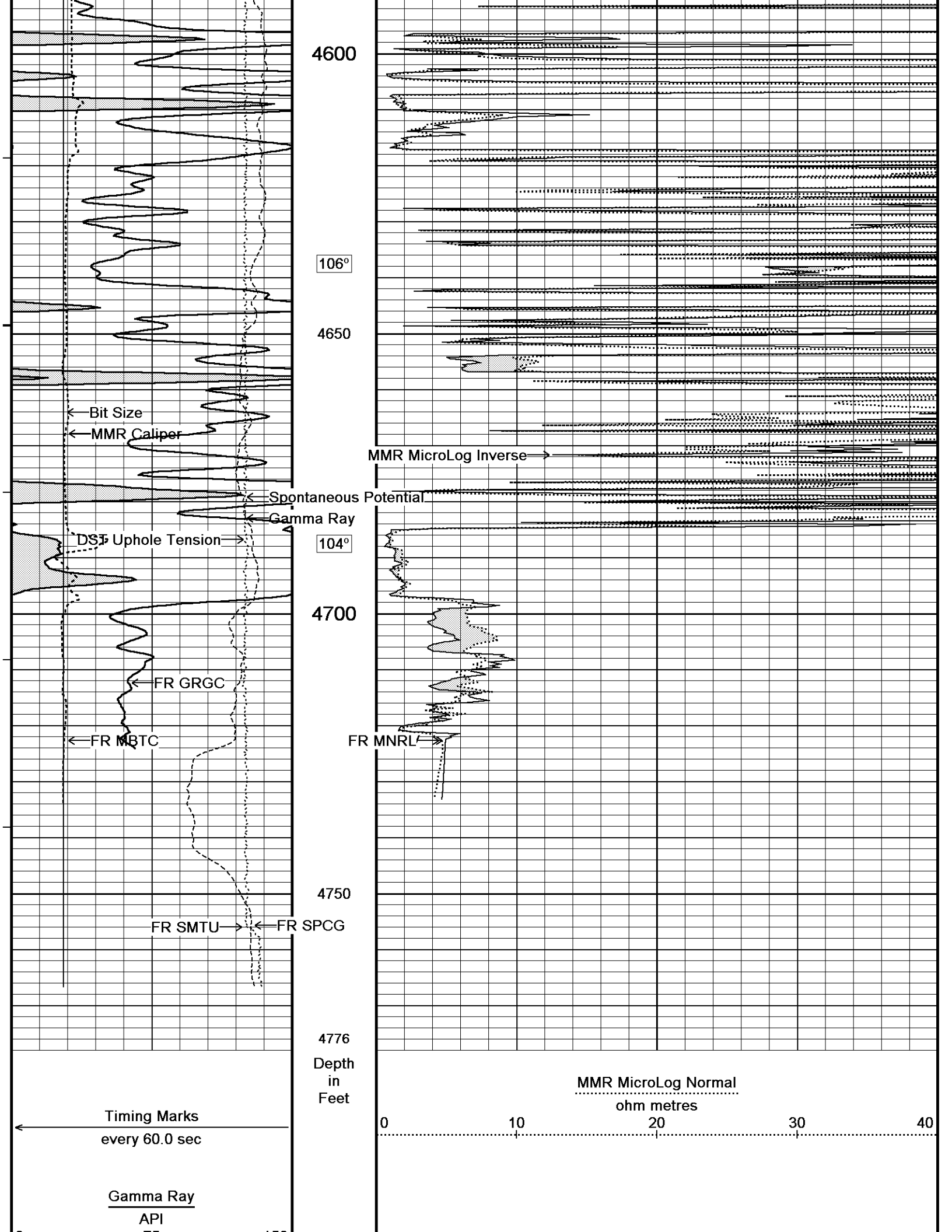
Replay
Scale
1:240

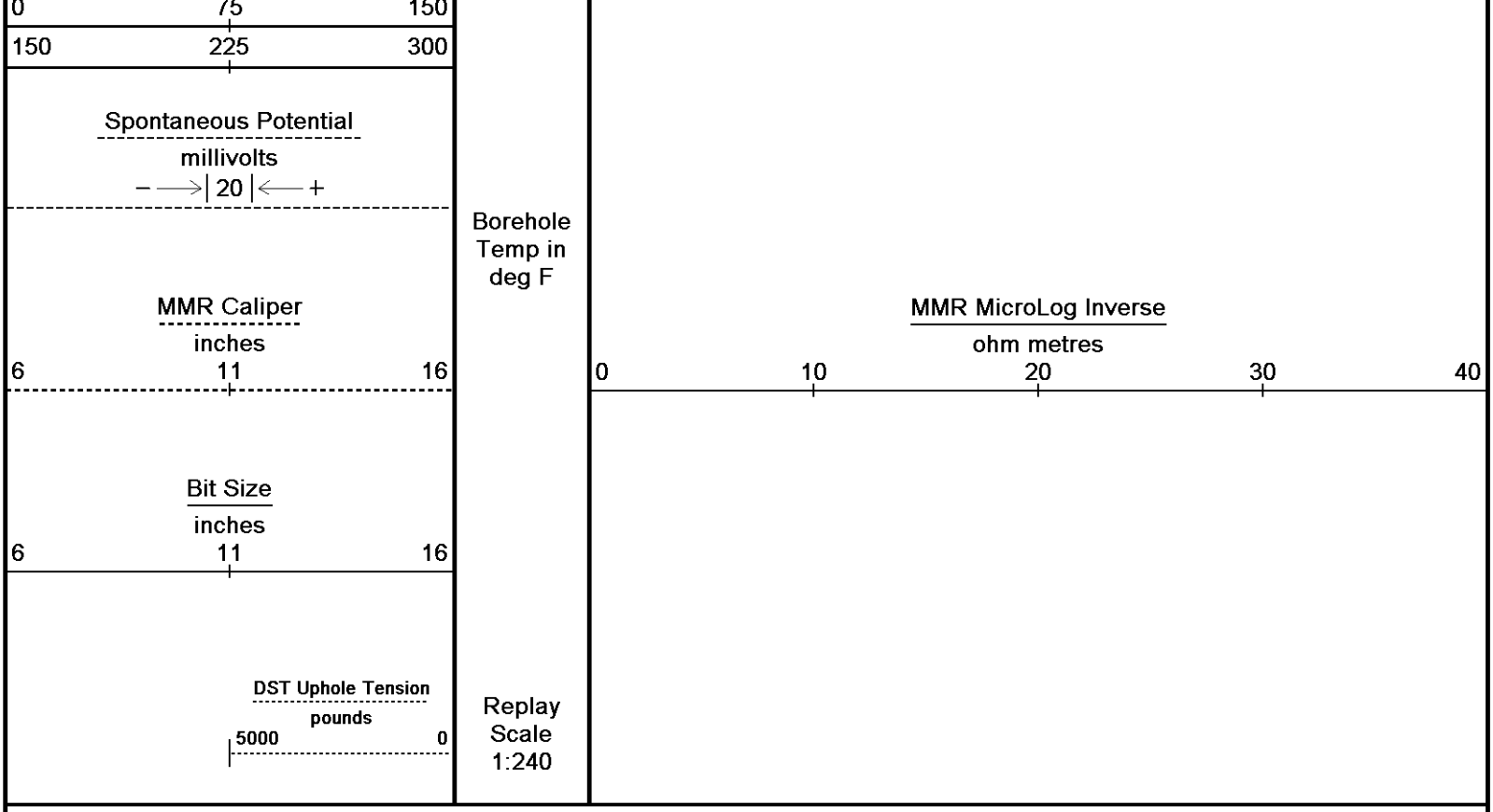
4350

MMR MicroLog Normal
ohm metres
0 10 20 30 40

MMR MicroLog Inverse
ohm metres
0 10 20 30 40


107°
4400
107°
4450
107°
4500
107°
4550
106°


4600
106°
4650
Bit Size
MMR Caliper
MMR MicroLog Inverse
Spontaneous Potential
Gamma Ray
DSI Uphole Tension
104°
4700
FR GRGC
FR MBTC
FR MNRL
4750
FR SMTU
FR SPCG
4776
Depth
in
Feet
MMR MicroLog Normal
ohm metres
0
10
20
30
40
Timing Marks
every 60.0 sec
Gamma Ray
API



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 08-JAN-2013 12:06

Filename: C:\Minimus 13.04.8492\Data\Grand M...\Grand Mesa Operating Company DBY 4-16_001.dta — Recorded on 08-JAN-2013 09:18

System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.04.8492\Data\Grand Mesa DBY 4-16\Grand Mesa Operating Company DBY 4-16_001.dta

General Constants All 000

Last Edited on 08-JAN-2013,08:01

General Parameters		
Mud Resistivity	0.740	ohm-metres
Mud Resistivity Temperature	77.000	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	Density Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. Four Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 29-DEC-2012 22:07

Reading No	Measured	Calibrated (lbs)
1	15337.85	0.00
2	15893.74	383.60

SP Calibration MCG-C 208

Field Calibration on 27-DEC-2012 10:06

	Measured	Calibrated (mV)
Reference 1	100.9	100.0
Reference 2	-100.6	-100.0

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 05-NOV-2012,14:26

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

High Resolution Temperature Constants MCG-C 208

Last Edited on 05-NOV-2012,14:25

Pre-filter Length	11

Gamma Calibration MCG-C 208

Field Calibration on 07-JAN-2013 15:22

	Measured	Calibrated (API)
Background	66	47
Calibrator (Gross)	1080	772
Calibrator (Net)	1015	725

Gamma Constants MCG-C 208

Last Edited on 08-JAN-2013,08:01

Gamma Calibrator Number	GR38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

Micro Laterolog Calibration MMR-A 11

Base Calibration on 31-DEC-1999 00:00
Field Check on 31-DEC-1999 00:00

Base Calibration

	Measured		Calibrated (ohm-m)	
	Ref 1	Ref 2	Ref 1	Ref 2
	0.0	0.0	0.0	0.0

Base Check (ohm-m)	Field Check (ohm-m)
0.0	0.0

Micro Laterolog Constants MMR-A 11

Last Edited on 12-NOV-2012,01:59

Pad Type	6 in Solid Nylon B23059	
Micro Laterolog K Factor	0.0128	
Standoff Offset	0.0000	inches

Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper	N/A	
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	68.00	Deg F
Mud Cake Resistivity Source	Constant Value	
Temp. Source Rmc Correc.	N/A	

Caliper Calibration MMR-A 11

Base Calibration on 12-DEC-2012 09:20
Field Calibration on 07-JAN-2013 15:36

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13821	5.98
2	17082	7.97
3	20336	9.86
4	24304	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.95	5.98

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 12-DEC-2012 09:26
Field Check on 07-JAN-2013 15:26

Base Calibration

		Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.3	59.8	5.0	25.0
Micro Inverse	15.5	77.5	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.5	76.5
Micro Inverse	58.7	58.7

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 05-NOV-2012,13:54

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	0.0000	inches

Neutron Calibration MDN-A.B 65

Base Calibration on 13-DEC-2012 16:03
Field Check on 07-JAN-2013 15:25

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2945	91	3714	110
Ratio	32.377		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1743	2519
Ratio	0.692	

Field Check

	Calibrated (cps)	
	1729	2508
Ratio	0.662	

Neutron Constants MDN-A.B 65

Last Edited on 07-JAN-2013,15:22

Neutron Source Id	PN-521	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	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
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-B.J 352

Base Calibration on 12-DEC-2012 09:38
Field Check on 07-JAN-2013 15:29

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.4	126.8
Base Check		281.6
Field Check		281.6

FE Constants MFE-B.J 352

Last Edited on 08-JAN-2013,08:01

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

Induction Calibration MAI-A.A 45

Base Calibration on 26-JUL-2012,09:22
Field Check on 07-JAN-2013 15:28

Base Calibration

	Measured	Calibrated (mmho/m)
Test Loop Calibration		

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	14.4	472.6	9.3	966.2
2	5.7	374.0	7.6	821.4
3	3.4	261.2	5.2	566.0
4	2.5	133.9	2.6	279.2

Array Temperature 78.4 Deg F

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1			18.9	3851.3
2			31.9	3629.2
3			28.8	3049.3
4			18.4	2079.2
Deep			16.2	1911.2
Medium			42.8	4060.4
Shallow			50.0	5482.8

Array Temperature 64.5 Deg F

Induction Constants MAI-A.A 45

Last Edited on 08-JAN-2013,08:02

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 MAI-A.A 45

Field Calibration on 13-DEC-2012,10:54

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

High Resolution Temperature Constants MAI-A.A 45

Last Edited on 13-DEC-2012,10:53

Pre-filter Length	11

Caliper Calibration MPD-B 31

Base Calibration on 13-DEC-2012 14:11
Field Calibration on 07-JAN-2013 15:30

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15472	3.99
2	24160	5.98
3	32703	7.97
4	41008	9.86
5	50231	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.95	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 13-DEC-2012 14:32
Field Check on 07-JAN-2013 15:35

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Reference 1	46489	23675	59556	30836
Reference 2	18873	1941	24941	2541
Field Check at Base	683.9	844.6		
Field Check	682.6	841.2		

PE Calibration

Base Calibration	WS	Measured WH	Measured Ratio	Calibrated Ratio
Background	126	608		
Reference 1	18821	46368	0.409	0.371
Reference 2	5566	18789	0.299	0.272
Field Check at Base	125.8	608.0		
Field Check	125.7	605.8		

Density Constants MPD-B 31

Last Edited on 08-JAN-2013,08:01

Density Source Id	254	
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	1.10	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:\Minimus 13.04.8492\Data\Grand Mesa DBY 4-16\Grand Mesa Operating Company DBY 4-16_001.dta

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

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.88 in

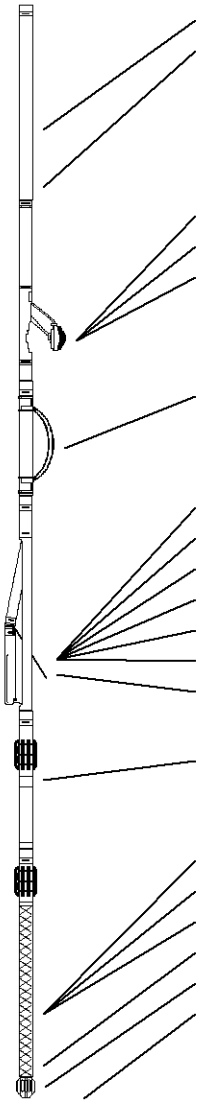
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 48.78 ft Weight: 383.6 lb



43.50 ft	GRGC - Gamma Ray
40.59 ft	CGXT - MCG External Temperature
33.24 ft	MBTC - MMR Caliper
33.24 ft	MINV - MMR MicroLog Inverse
33.24 ft	MNRL - MMR MicroLog Normal
28.45 ft	NPRL - Limestone Neutron Por.
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
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	DBY #4-16
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3076.00	feet	First Reading	4722.00	feet
Elevation Drill Floor	3075.00	feet	Depth Driller	4756.00	feet
Elevation Ground Level	3071.00	feet	Depth Logger	4756.00	feet

Weatherford®

MICRORESISTIVITY LOG