



Weatherford[®]

MICRORESISTIVITY LOG

COMPANY GRAND MESA OPERATING COMPANY

WELL BREIT-HOSS #1-22

FIELD WILDCAT

PROVINCE/COUNTY NESS

COUNTRY/STATE U.S.A. / KANSAS

LOCATION 118' FSL & 1952' FEL

SW SE SW SE

SEC 22	TWP 19S	RGE 23W	Other Services MA/MFE	MPD/MDN
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Permit Number 15-135-25530

Permanent Datum G.L., Elevation 2234 feet

Log Measured From KB

Drilling Measured From K.B.

Date 14-FEB-2013

Run Number ONE

Service Order 3538970

Depth Driller 4470.00 feet

Depth Logger 4470.00 feet

First Reading 4436.00 feet

Last Reading 3450.00 feet

Casing Driller 220.00 feet

Casing Logger 221.00 inches

Bit Size 7.875

Hole Fluid Type CHEMICAL

Density / Viscosity 9.30 lb/USg 48.00

PH / Fluid Loss 10.50 10.50

Sample Source FLOWLINE

Rm @ Measured Temp 0.85 @ 87.0 ohm-m

Rmf @ Measured Temp 0.68 @ 87.0 ohm-m

Rmc @ Measured Temp 1.02 @ 87.0 ohm-m

Source Rmf / Rmc CALC CALC

Rm @ BHT 0.68 @109.0 ohm-m

Time Since Circulation 4 HOURS

Max Recorded Temp 109.00 deg F

Equipment / Base 13096 LIB

Recorded By LYNN SCOTT

Witnessed By JOHN GOLDSMITH

JOB# LB13-045

Elevations:	feet
KB	2239.00
DF	2238.00
GL	2234.00

BOREHOLE RECORD

Last Edited: 13-FEB-2013 23:17

Bit Size inches	Depth From feet	Depth To feet
7.875	220.00	4470.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	220.00	24.00

REMARKS

Tools Used: MCG, MML, MDN, MPD, MFE, MAI ran in combination.

Hardware: MPD: 8 inch profile plate used.

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 from TD to 3450 feet = 240 cubic feet

Total hole volume from TD to Surface casing= 2437 cubic feet

Service order #3538970

Rig: Murfin #24

Engineer: L. Scott

Operator(s): M. Stegman

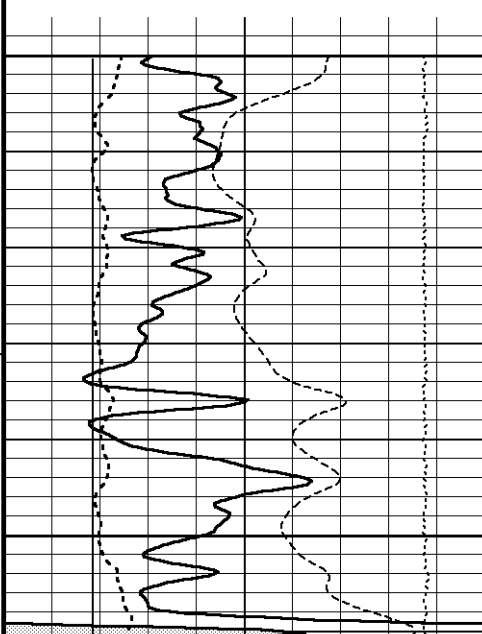
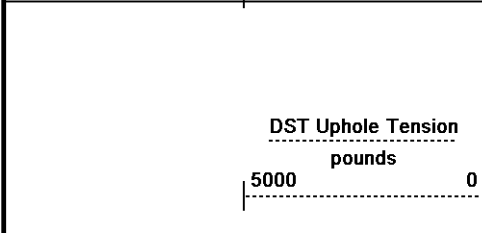
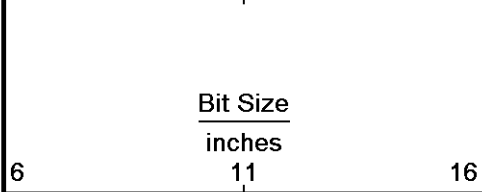
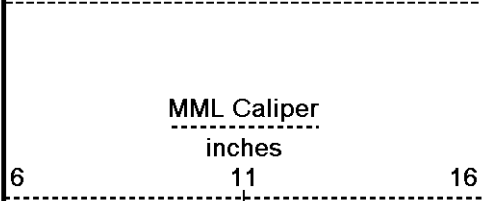
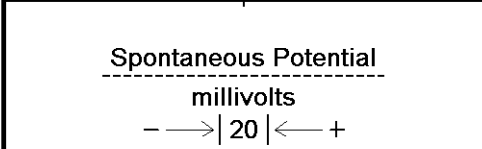
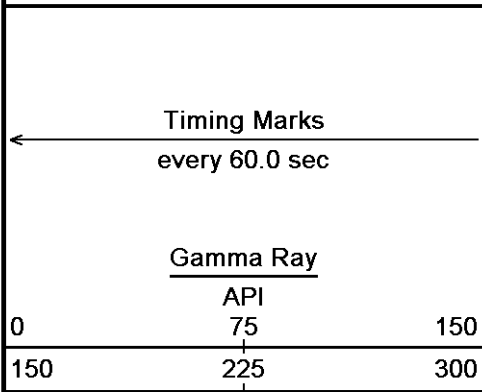
The software duplicates the pH value onto the fluid loss value. The fluid loss is 6.8.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy

or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence, on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or 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 14-FEB-2013 01:20
 Filename: C:\Minimus 13.04.8492\Data\Grand Mesa Breit-Hoss ...\Grand Mesa Breit-Hoss 1-22_002.dta Recorded on 13-FEB-2013 23:15
 System Versions: Logged with 13.04.8492 Processed with 13.04.8492 Plotted with 13.04.8492



Depth in Feet

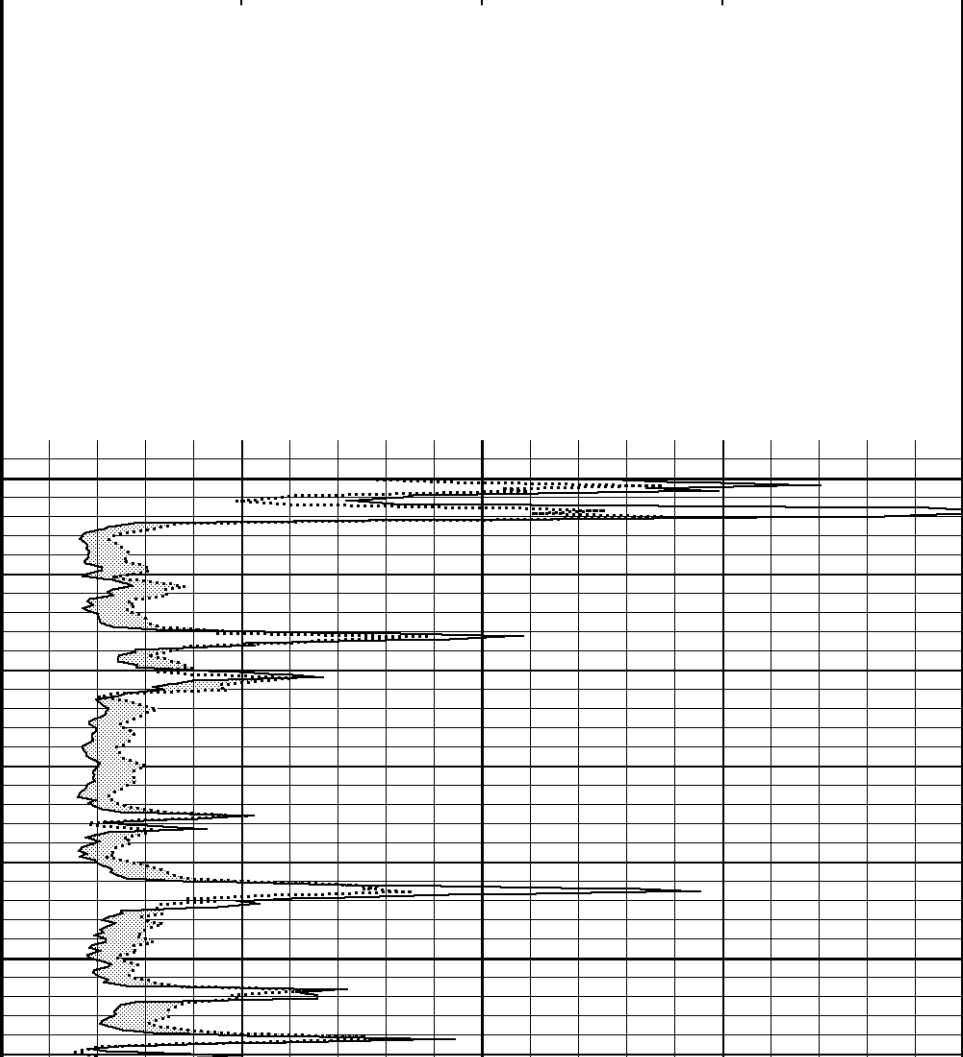
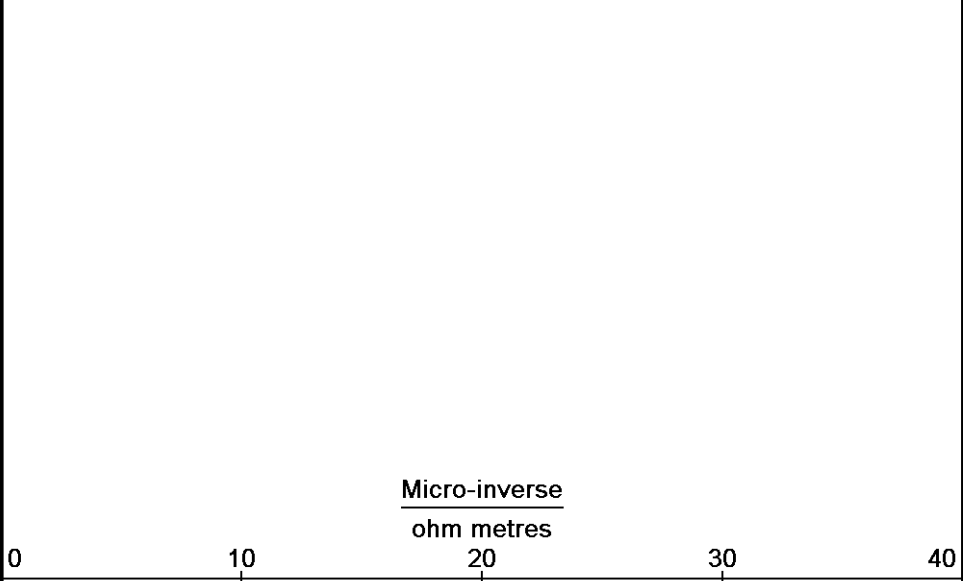
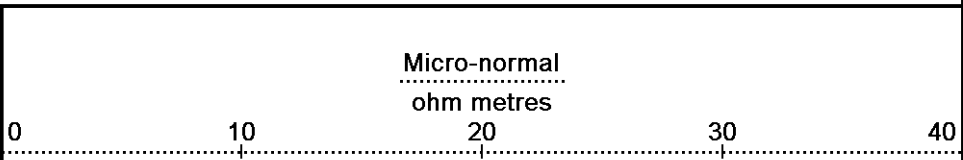
Borehole Temp in deg F

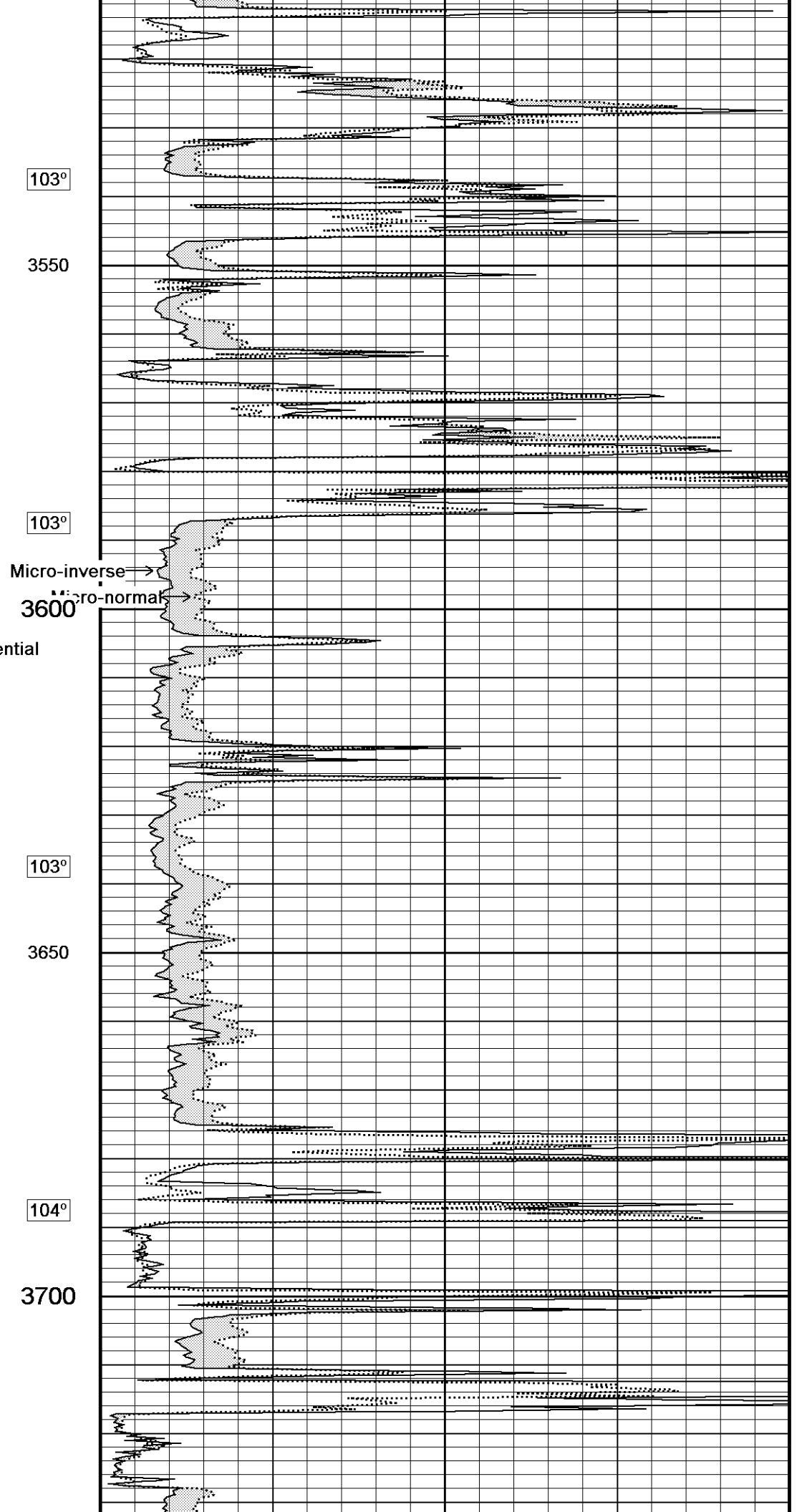
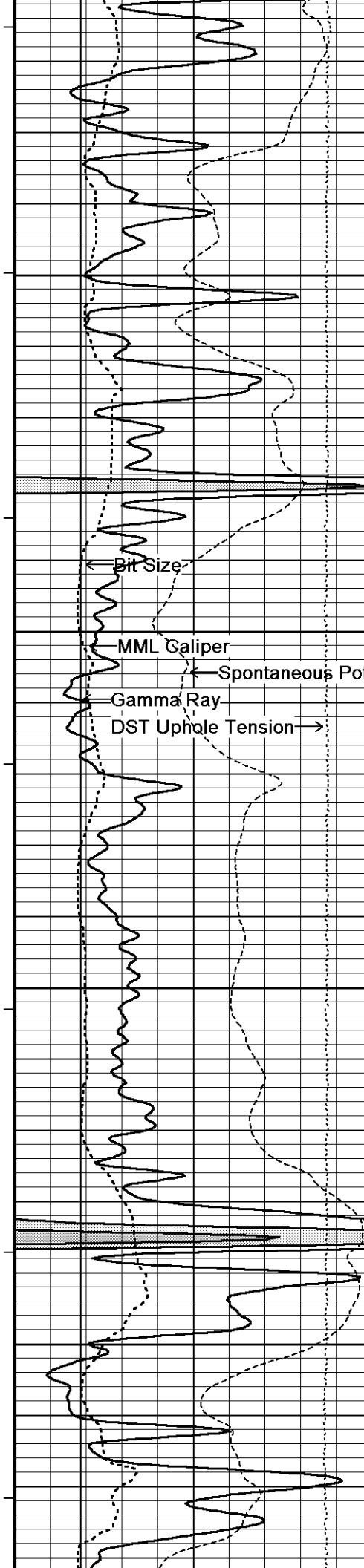
Replay Scale 1:240

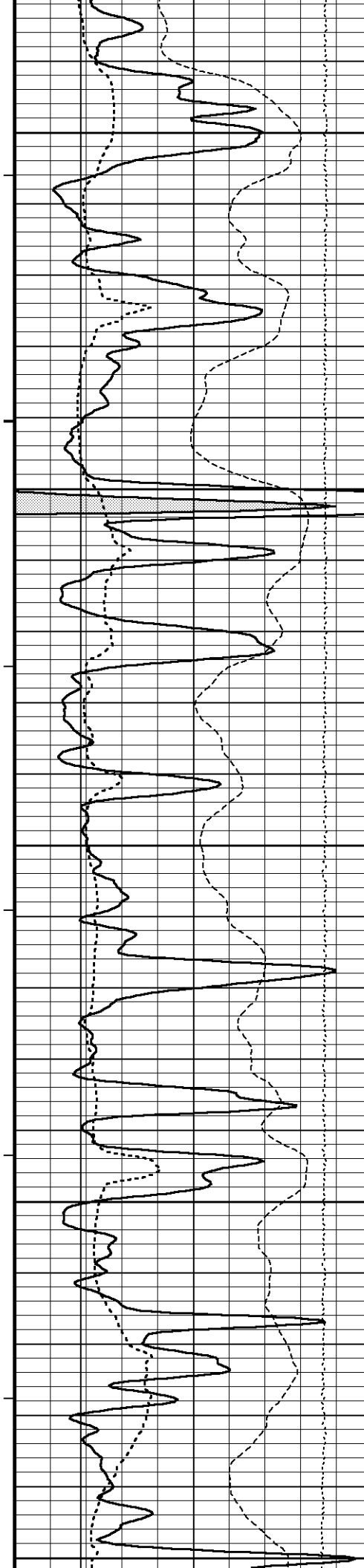
3450

103°

3500







104°

3750

104°

3800

105°

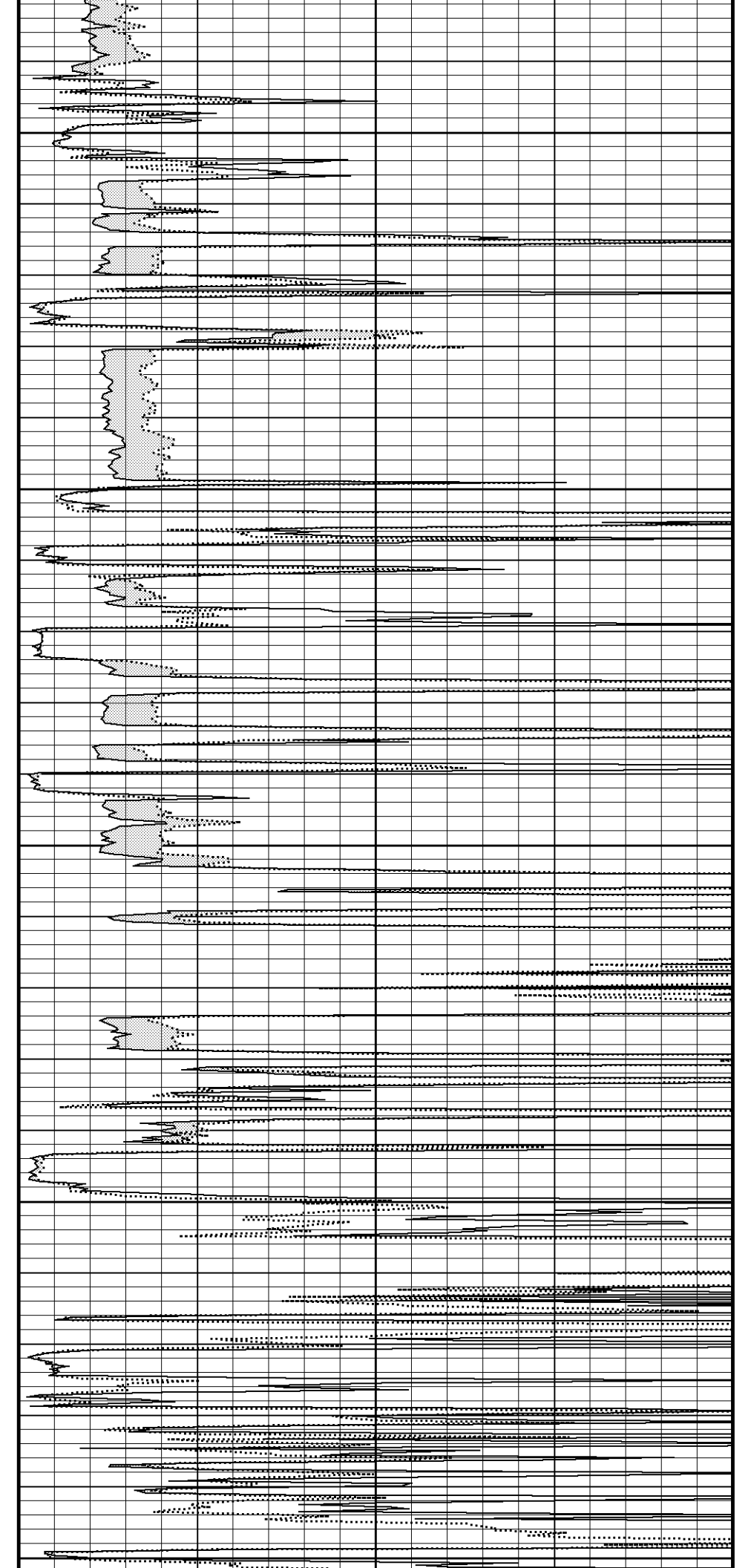
3850

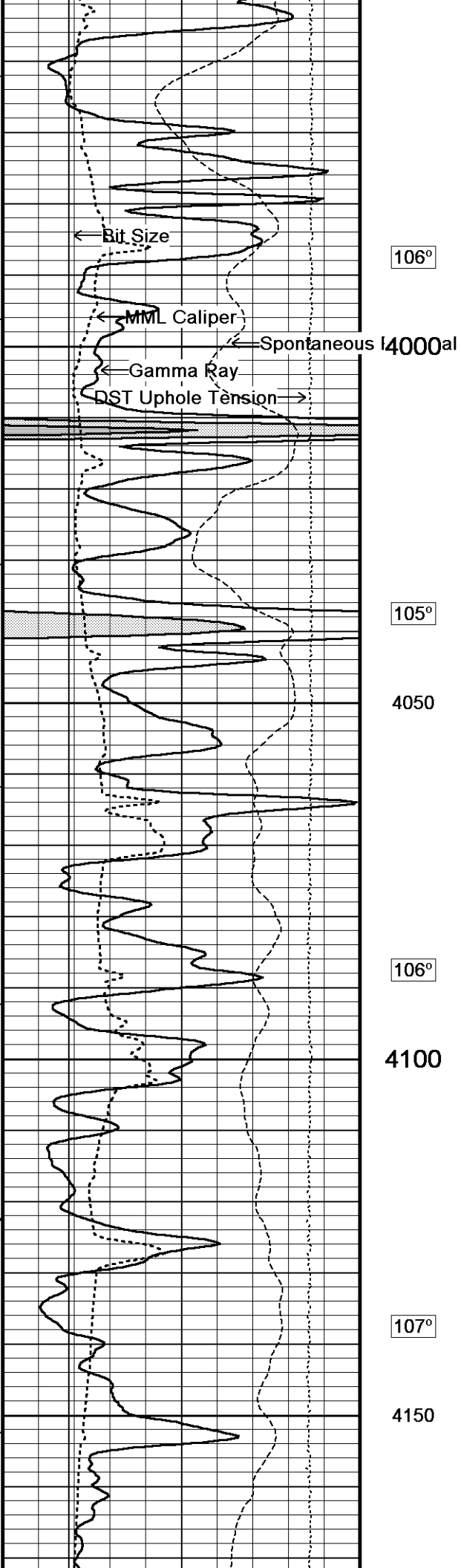
105°

3900

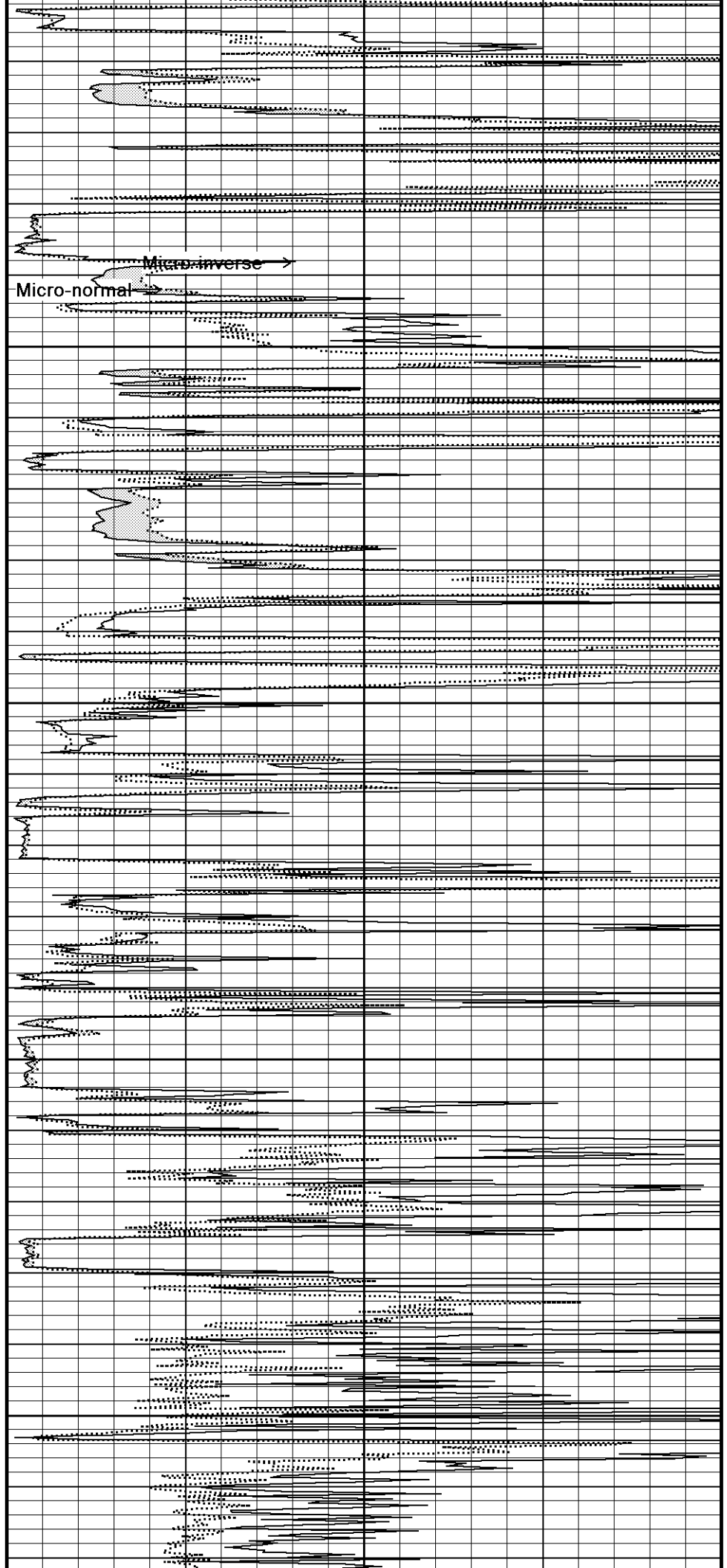
105°

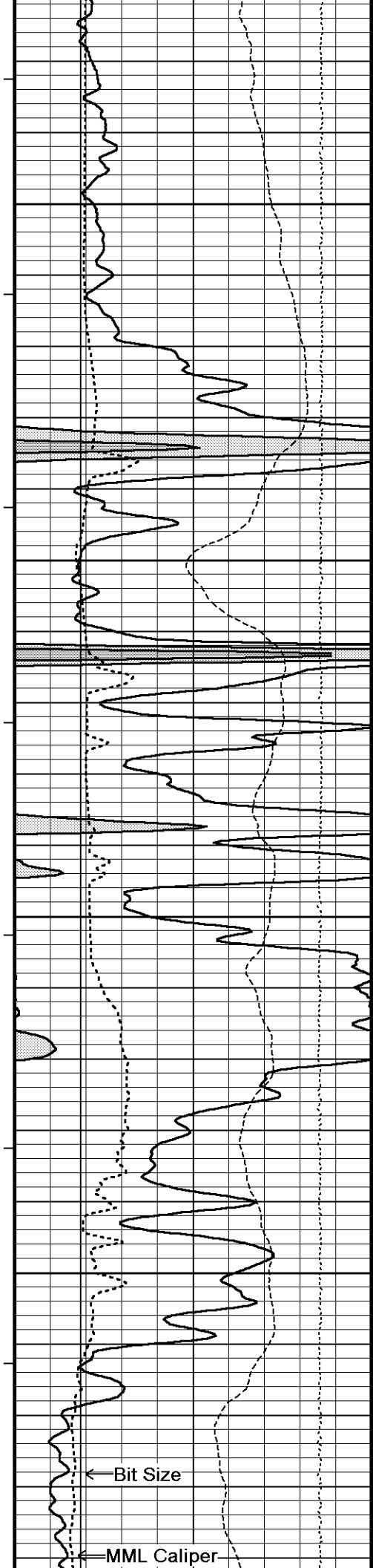
3950



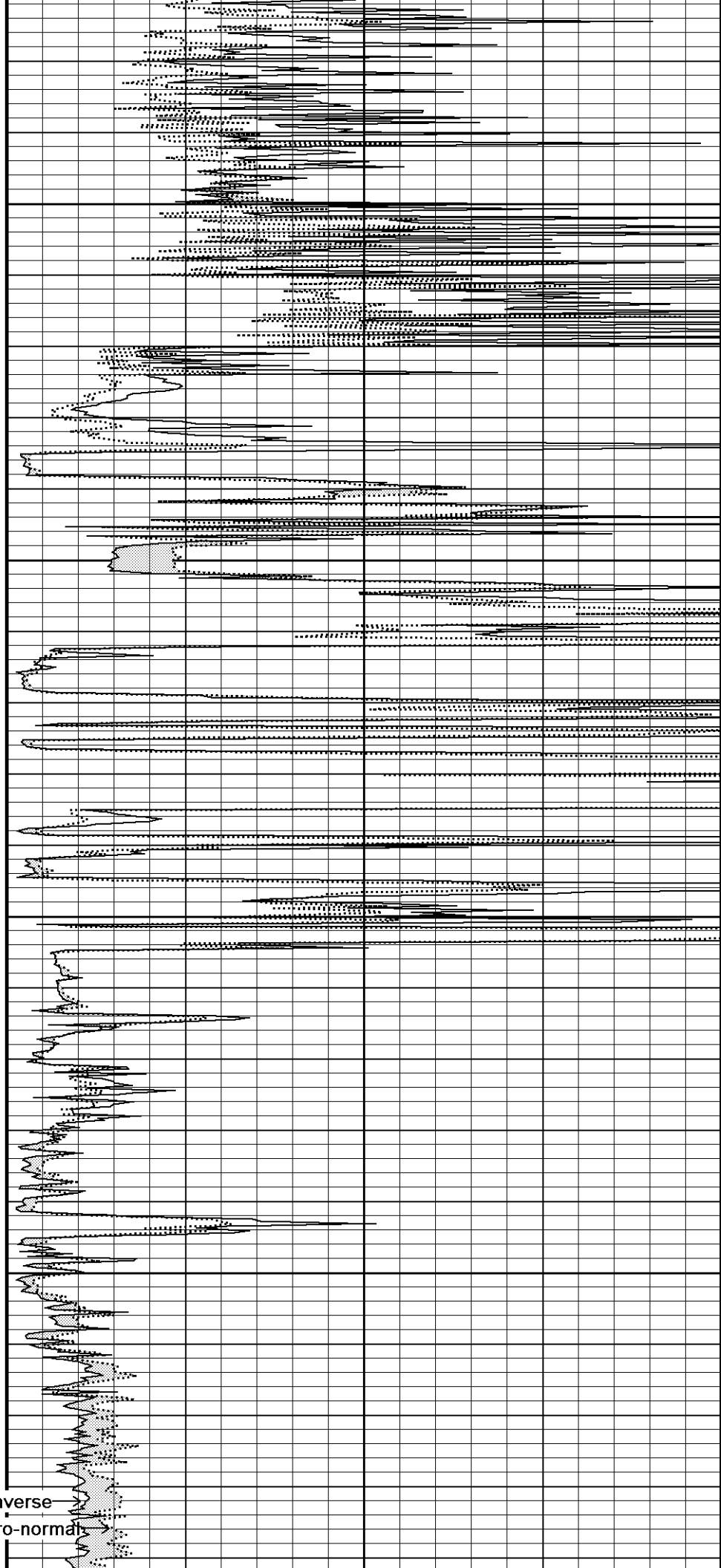


106°
4000al
105°
4050
106°
4100
107°
4150

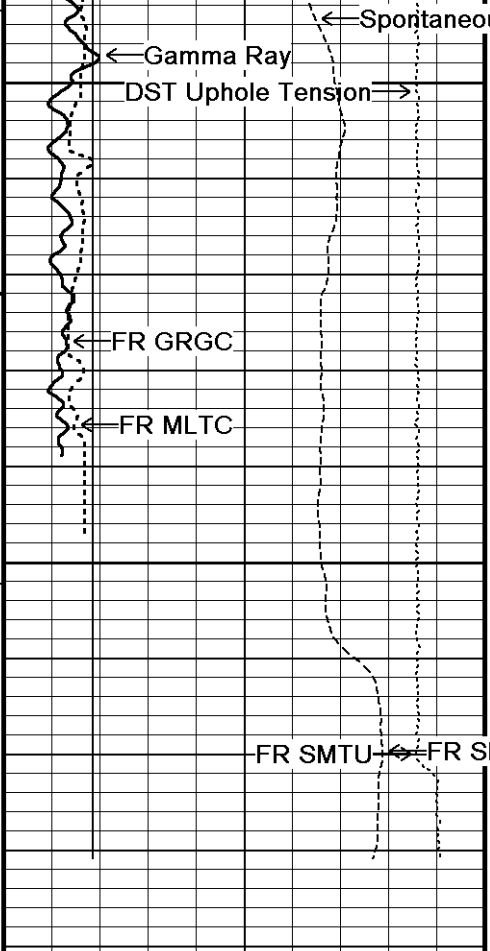




107°
4200
108°
4250
109°
4300
110°
4350
109°



Micro-inverse
Micro-normal



4400

109
FR MNRL

4450

4490

Depth
in
Feet

← Timing Marks
every 60.0 sec

Gamma Ray
 API
 0 75 150
 150 225 300

Spontaneous Potential
 millivolts
 - → | 20 | ← +

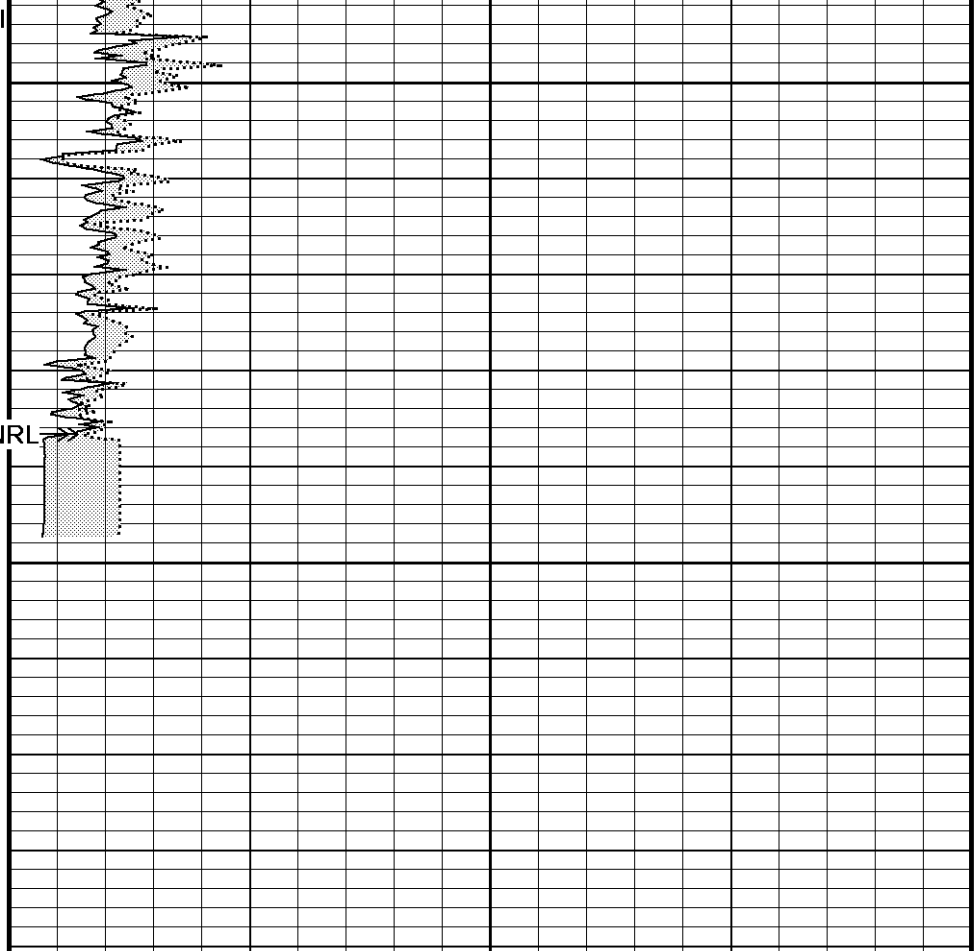
MML Caliper
 inches
 6 11 16

Bit Size
 inches
 6 11 16

DST Uphole Tension
 pounds
 5000 0

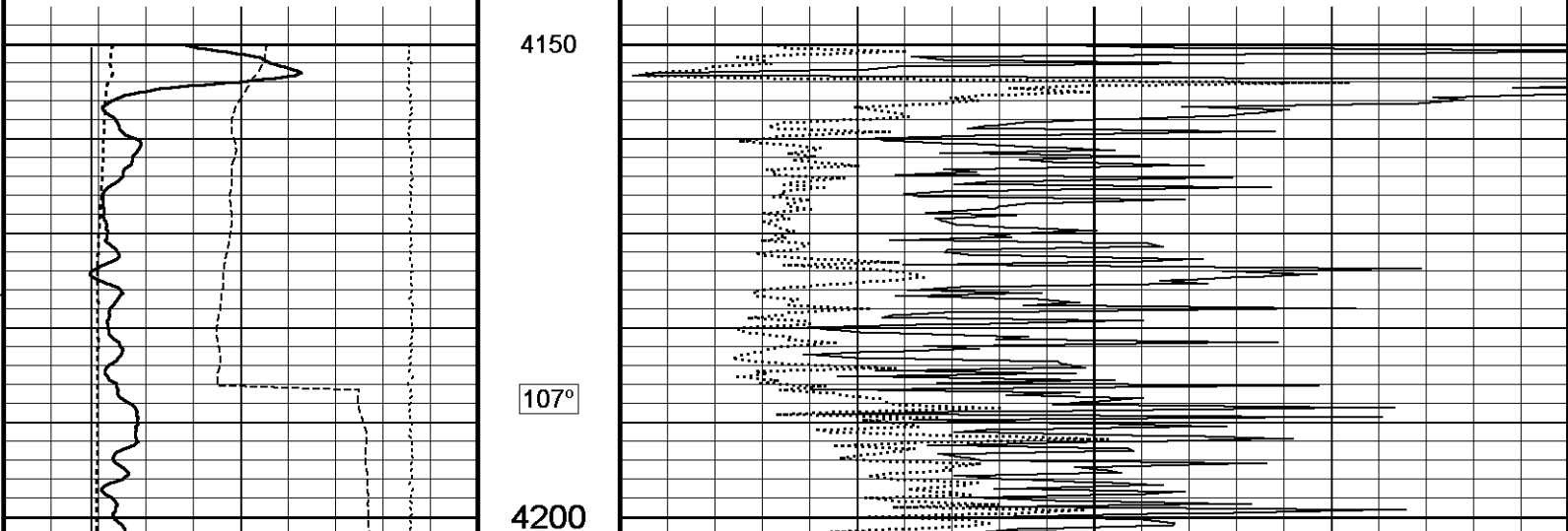
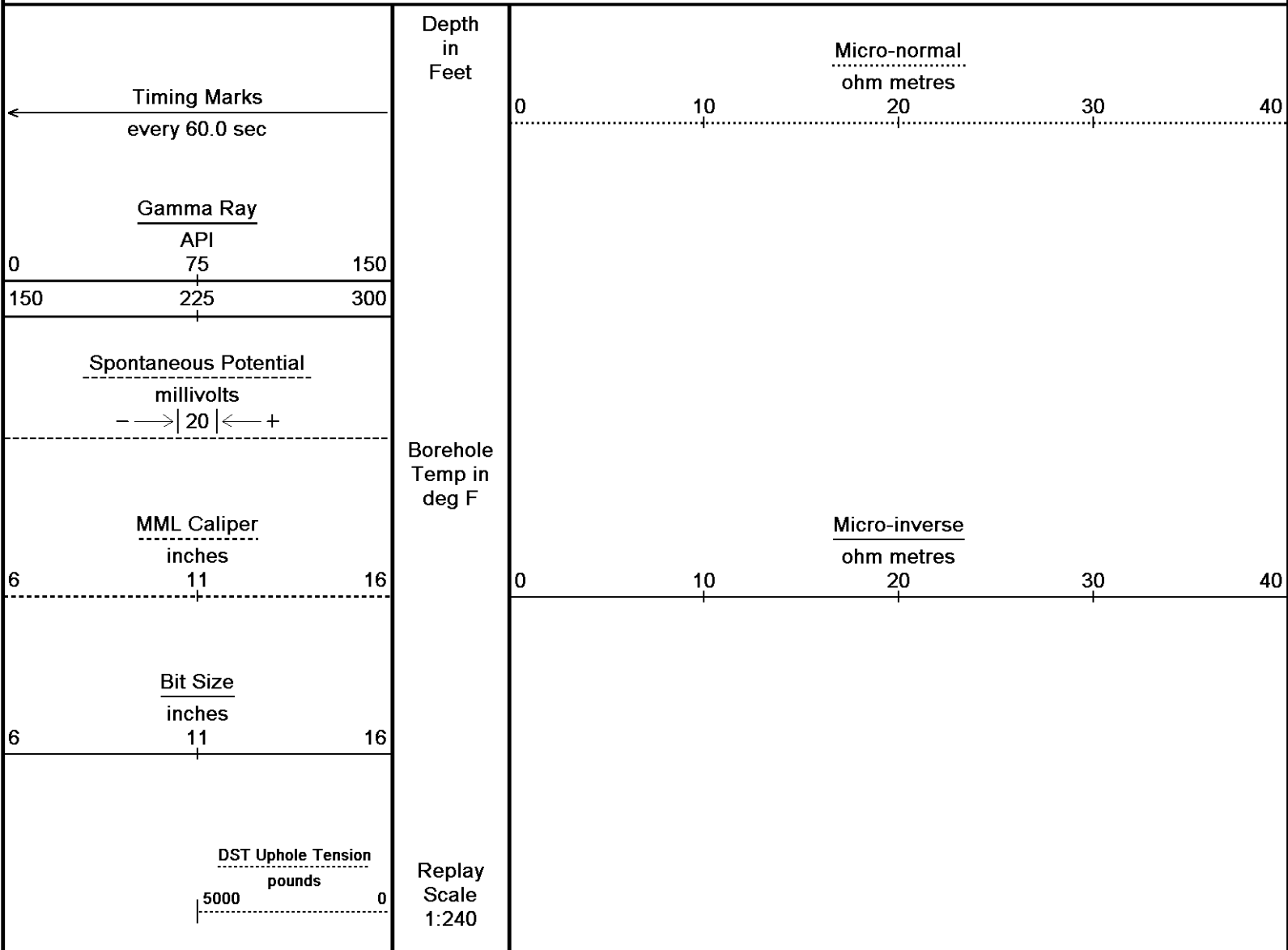
Borehole
Temp in
deg F

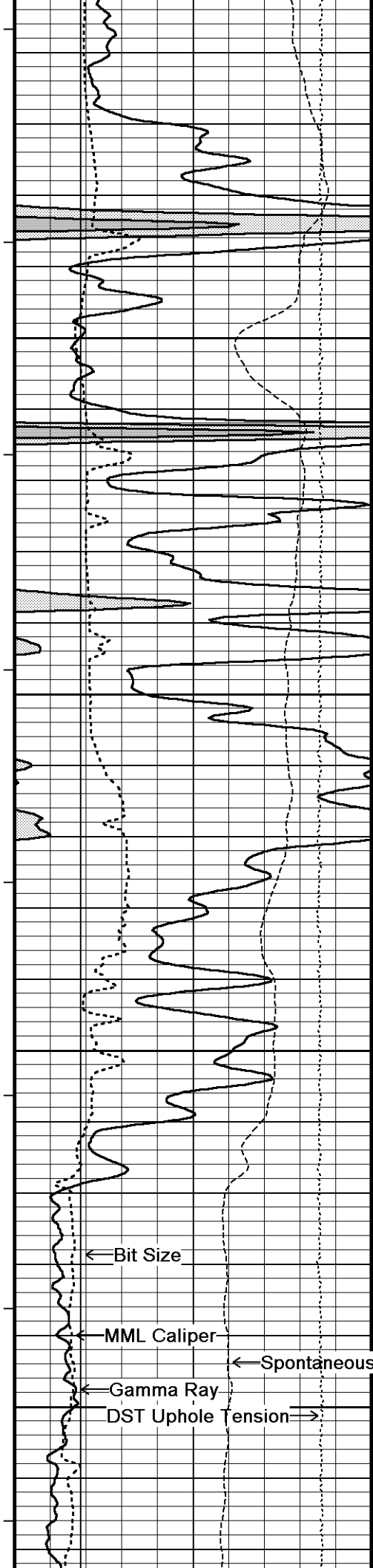
Replay
Scale
1:240



↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓





107°

4250

108°

4300

109°

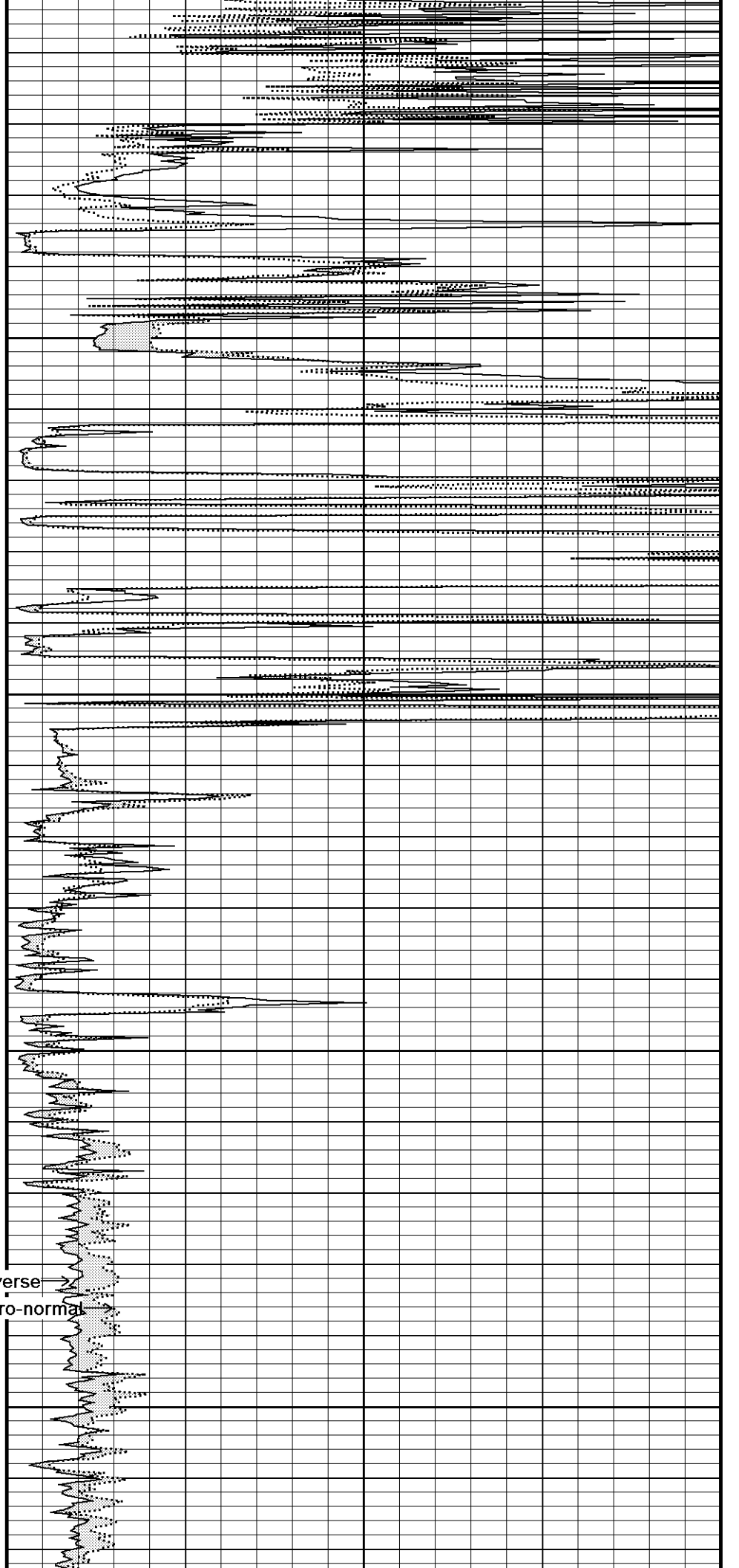
4350

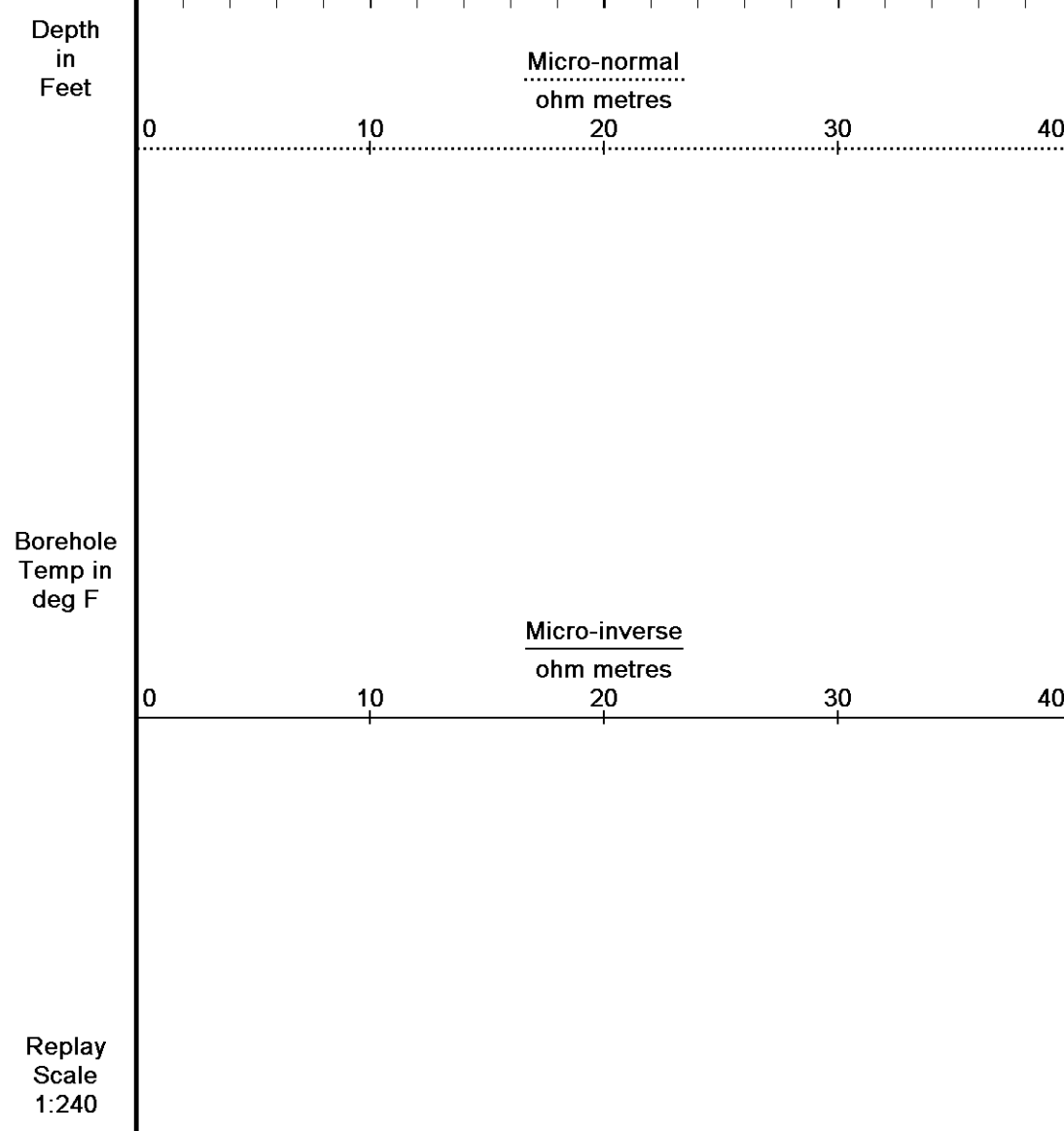
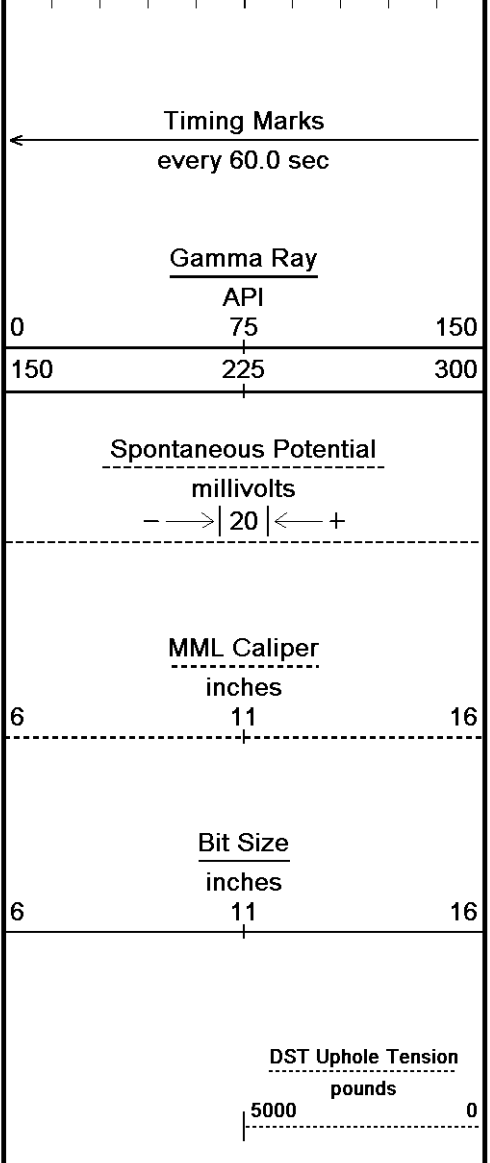
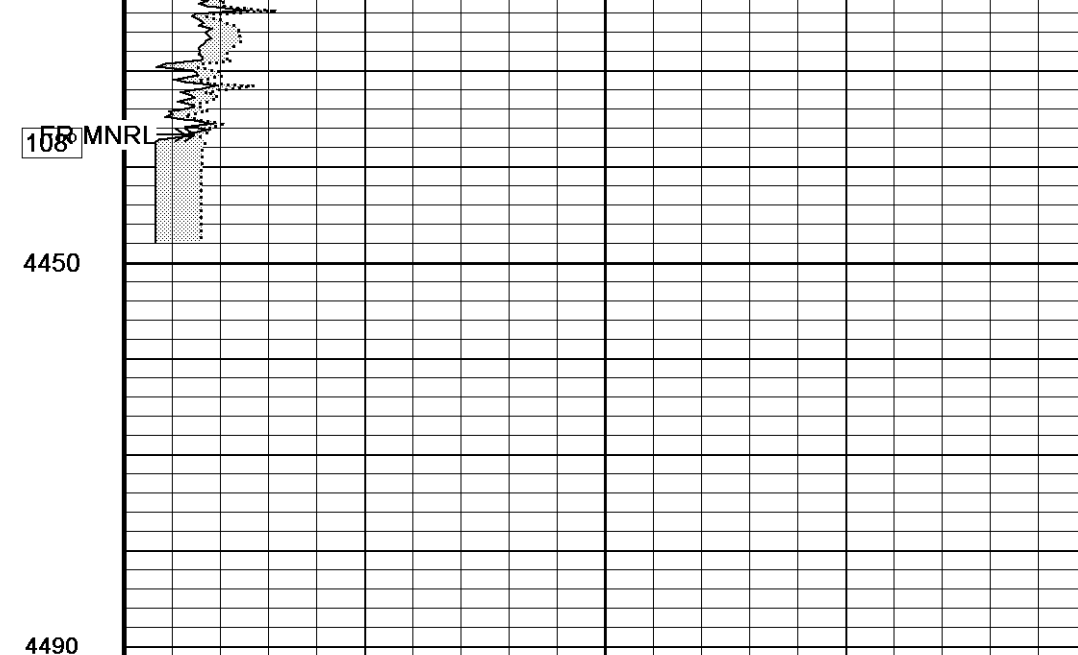
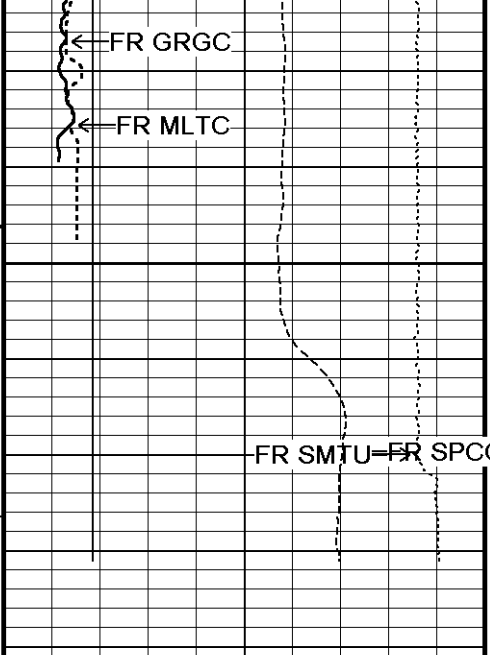
109°

4400

Micro-inverse
Micro-normal

Spontaneous Potential





Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 13.04.8492\Data\Grand Mesa Breit-Hoss ...\Grand Mesa Breit-Hoss 1-22_001.dta
 System Versions: Logged with 13.04.8492 Processed with 13.04.8492 Plotted with 13.04.8492
 Plotted on 14-FEB-2013 01:20
 Recorded on 13-FEB-2013 22:57

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 13.04.8492\Data\Grand Mesa Breit-Hoss 1-22\Grand Mesa Breit-Hoss 1-22_001.dta

General Constants All 000

Last Edited on 13-FEB-2013,19:59

General Parameters

Mud Resistivity	0.850	ohm-metres
Mud Resistivity Temperature	87.000	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	Crossplot Porosity	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 09-FEB-2013 07:52

Reading No	Measured	Calibrated (lbs)
1	15612.38	0.00
2	16153.00	384.00

High Resolution Temperature Calibration MCG-B 34

Field Calibration on 08-NOV-2012,10:05

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-B 34

Last Edited on 08-NOV-2012,10:04

Pre-filter Length	11
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SP Calibration MCG-B 34

Field Calibration on 08-NOV-2012 10:10

	Measured	Calibrated (mV)
Reference 1	107.1	100.0
Reference 2	-93.0	-100.0

Gamma Calibration MCG-B 34

Field Calibration on 11-FEB-2013 15:40

	Measured	Calibrated (API)
Background	67	46
Calibrator (Gross)	1123	771
Calibrator (Net)	1055	725

Gamma Constants MCG-B 34

Last Edited on 12-FEB-2013,03:33

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

Caliper Calibration MML-A 3

Base Calibration on 23-JAN-2013 09:15

Field Calibration on 11-FEB-2013 15:28

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14702	5.98
2	17956	7.97
3	21222	9.86
4	24713	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.04	5.98

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 23-JAN-2013 09:37
Field Check on 11-FEB-2013 15:30

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.2	60.2	5.0	25.0
Micro Inverse	15.7	78.4	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	62.9	62.9
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 3

Last Edited on 12-FEB-2013,03:33

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	N/A	inches	

Neutron Calibration MDN-A.B 66

Base Calibration on 24-JAN-2013 15:42
Field Check on 11-FEB-2013 15:47

Base Calibration	Measured		Calibrated (cps)	
	Near	Far	Near	Far
Ratio	2998	94	3714	110
	31.811		33.764	

Field Calibrator at Base	Calibrated (cps)
Ratio	1692 2389
	0.708

Field Check	Calibrated (cps)
Ratio	1682 2389
	0.695

Neutron Constants MDN-A.B 66

Last Edited on 13-FEB-2013,19:59

Neutron Source Id	P0204NN		
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	None		
Formation Pressure	N/A	kpsi	
Temperature Source	None		
Temperature	N/A	degrees F	
Mud Salinity	0.00	kppm	
Salinity Correction	Not Applied		
Formation Fluid Salinity Source	None		
Formation Fluid Salinity	N/A	kppm	
Barite Mud Correction	Not Applied		

FE Calibration MFE-B.J 353

Base Calibration on 23-JAN-2013 09:00
Field Check on 11-FEB-2013 15:16

Base Calibration	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.3	126.8
Base Check		281.1
Field Check		281.1

FE Constants MFE-B.J 353

Last Edited on 13-FEB-2013,19:59

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 14-NOV-2012,09:17

	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 16-DEC-2012,13:35

Pre-filter Length 11

Induction Calibration MAI-A.A 167

Base Calibration on 14-NOV-2012,09:21

Field Check on 11-FEB-2013 15:14

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	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)		Field Check (mmho/m)	
	Low	High	Low	High
1			12.0	3841.9
2			29.3	3480.1
3			28.9	3056.0
4			19.7	2083.8
Deep			18.5	2051.0
Medium			42.1	3995.1
Shallow			42.5	5058.6

Array Temperature 57.2 Deg F

Induction Constants MAI-A.A 167

Last Edited on 13-FEB-2013,19:59

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

0.00
0.00

0.00
0.00

DOWNHOLE EQUIPMENT

C:\Minimus 13.04.8492\Data\Grand Mesa Breit-Hoss 1-22\Grand Mesa Breit-Hoss 1-22_001.dta

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

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

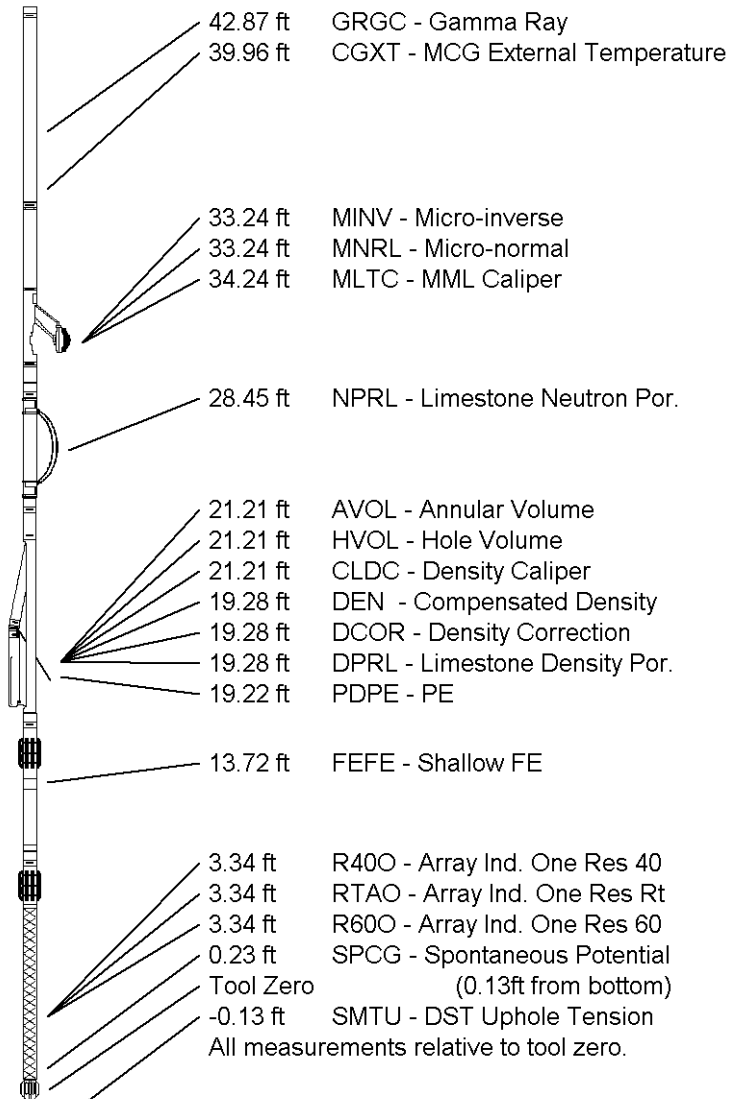
Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-B.J 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

Total Length: 48.16 ft Weight: 383.6 lb



COMPANY	GRAND MESA OPERATING COMPANY
WELL	BREIT-HOSS #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	NESS
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2239.00	feet	First Reading	4436.00	feet
Elevation Drill Floor	2238.00	feet	Depth Driller	4470.00	feet
Elevation Ground Level	2234.00	feet	Depth Logger	4470.00	feet



Weatherford®

MICRORESISTIVITY LOG

