



Weatherford[®]

MICRORESISTIVITY LOG

COMPANY

GRAND MESA OPERATING COMPANY

WELL

J A NOVA #2-27

FIELD

WILDCAT

PROVINCE/COUNTY LOGAN

COUNTRY/STATE U.S.A. / KANSAS

LOCATION **2420' FNL & 753 FEL**

SEC

TWP

12S

32W

Other Services

API Number

15-109-21183

Permit Number

Permanent Datum G.L., Elevation 3015 feet

Log Measured From KB

Drilling Measured From K.B. @ 9 FEET

Date 30-MAY-2013

Run Number

ONE

Service Order

3539060

Depth Driller

4715.00 feet

Depth Logger

4710.00 feet

First Reading

4678.00 feet

Last Reading

3600.00 feet

Casing Driller

216.00 feet

Casing Logger

216.00 feet

Bit Size

7.875

inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.50 lb/USg

54.00 CP

PH / Fluid Loss

9.50

8.80 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

1.52 @ 85.0 ohm-m

Rmf @ Measured Temp

1.22 @ 85.0 ohm-m

Rmc @ Measured Temp

1.82 @ 85.0 ohm-m

Source Rmf / Rmc

CALC

Rm @ BHT

1.08 @120.0 ohm-m

Time Since Circulation

4 HOURS

Max Recorded Temp

120.00 deg F

Equipment / Base

13057 LIB

Recorded By

W STAMBAUGH

Witnessed By

JOHN GOLDSMITH

JOB #

LB13-157

Elevations:
KB 3024.00
DF 3023.00
GL 3015.00

BOREHOLE RECORD

Last Edited: 30-MAY-2013 23:04

Bit Size inches	Depth From feet	Depth To feet
7.875	216.00	4710.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	216.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583.
- RUN 1: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL ECCENTRALISER USED ON MDN
 - 0.5 INCH STANDOFF USED ON MFE.
 - 0.5 INCH STANDOFF USED ON MAI.
- 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.
- TOTAL HOLE VOLUME FROM TD TO 216 FEET: 1870 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3750 FEET: 1130 CU. FT.
- RIG: DUKE DRILLING #4

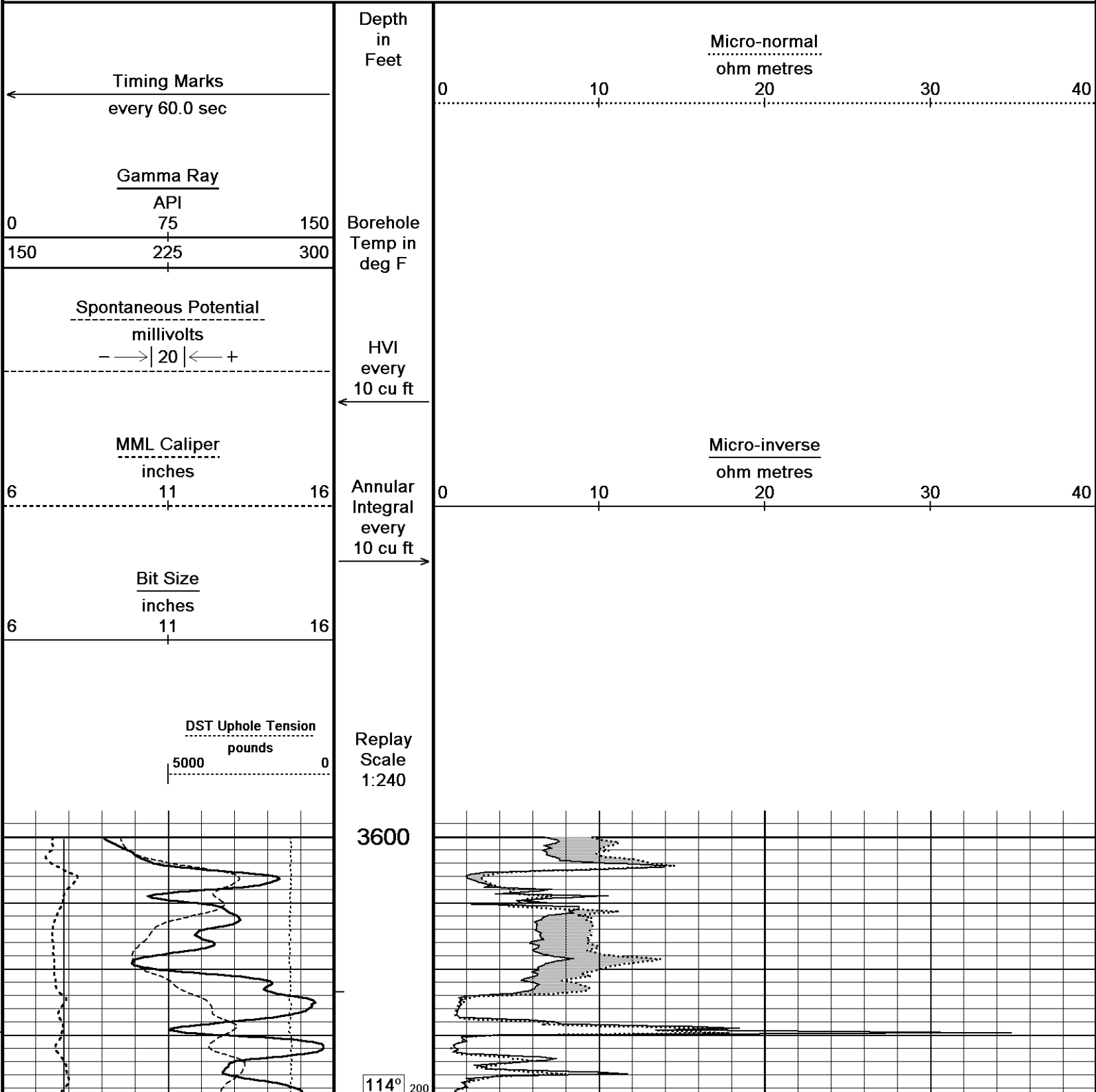
- ENGINEER: WILLIAM STAMBAUGH,

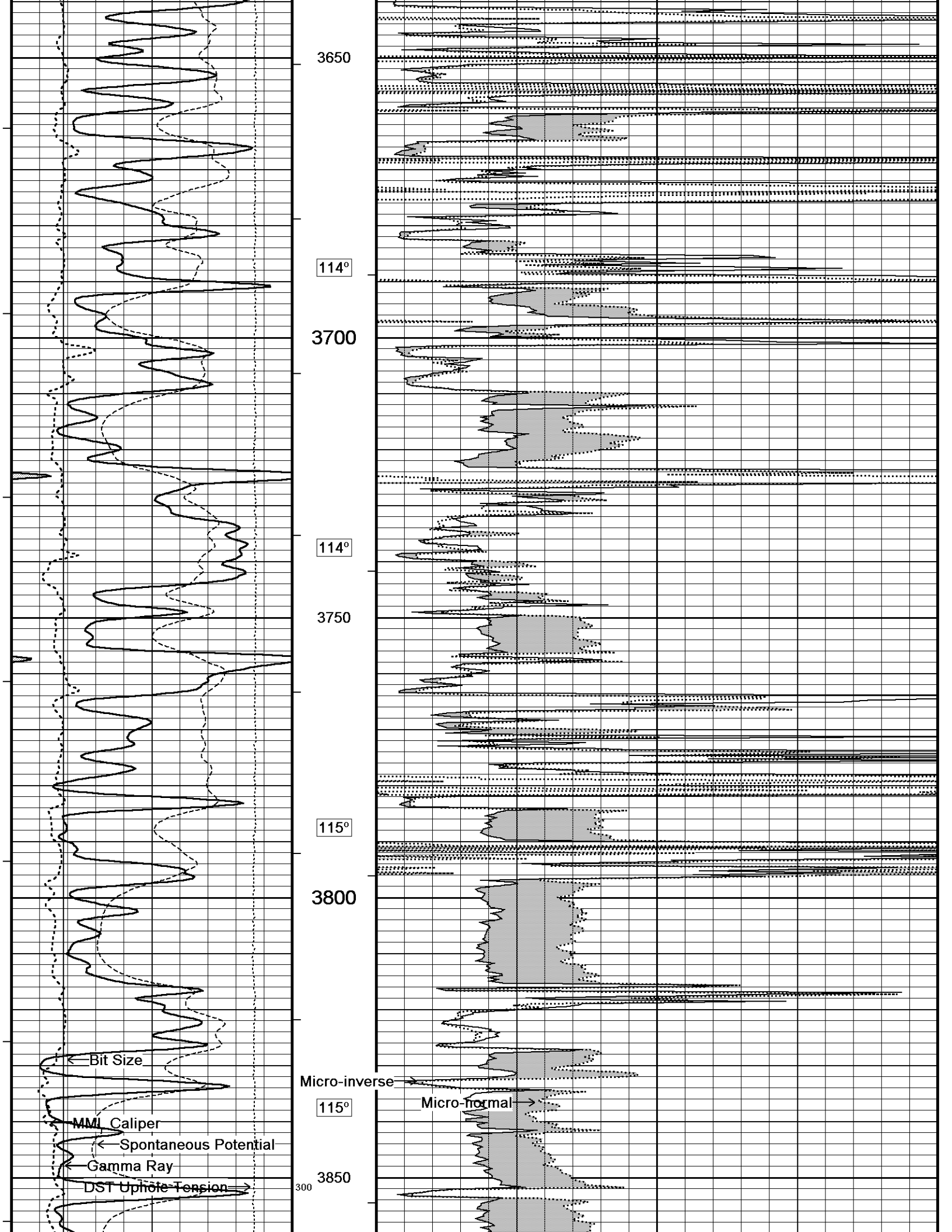
- OPERATOR(S): NICOLAS ADAME, MANUEL HERNANDEZ

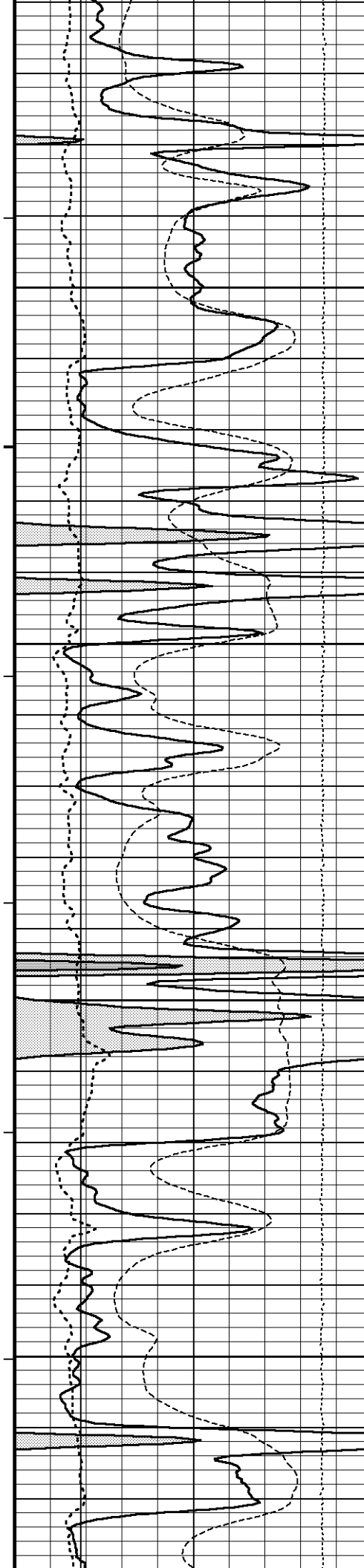
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, 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 31-MAY-2013 14:07
 Filename: C:\Minimus 13.05.9583\Logs\Grand Mesa Janova #2-27\Grand Mesa Janova #2-27_002.dta Recorded on 30-MAY-2013 19:40
 System Versions: Logged with 13.05.9583 Plotted with 13.05.9583







115°

3900

116°

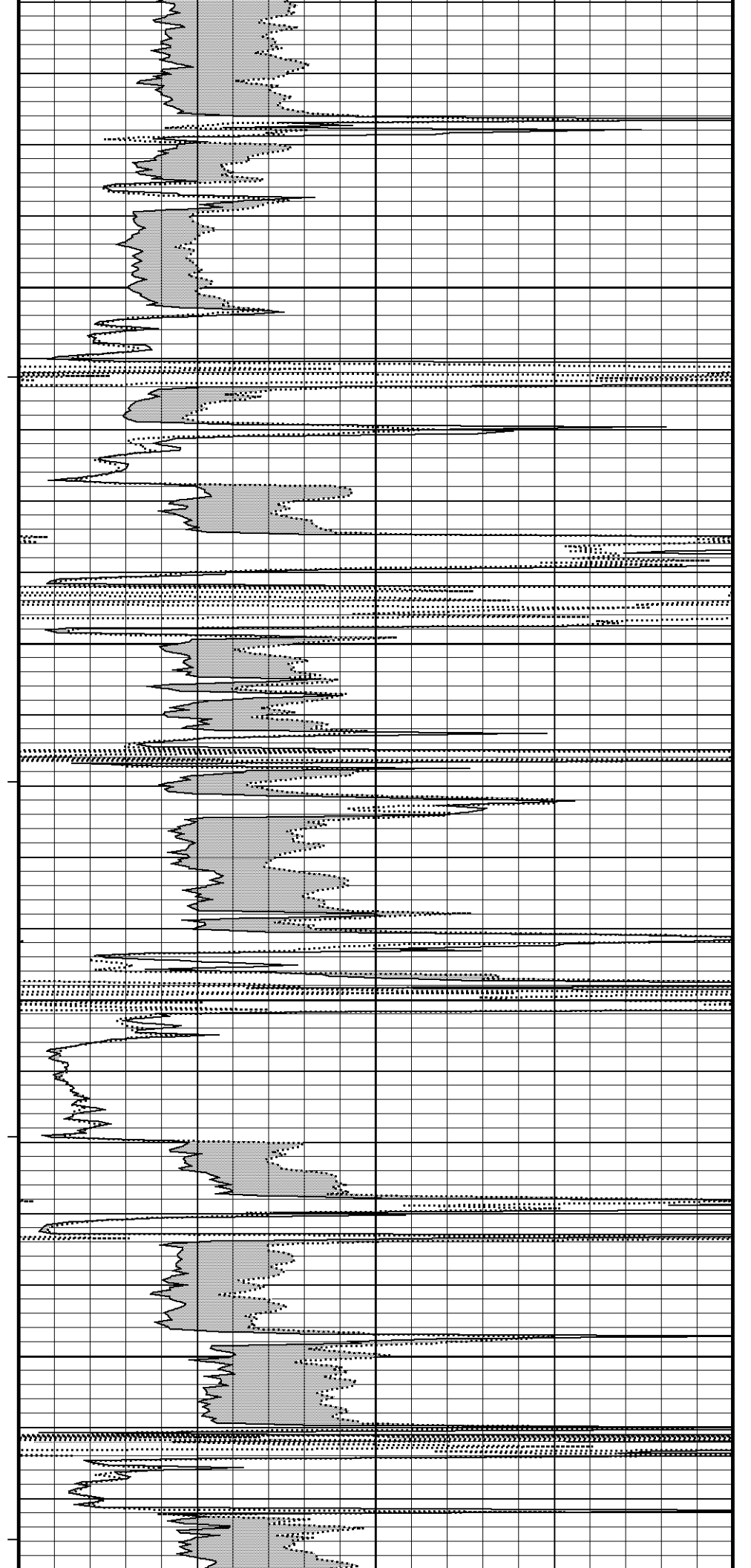
3950

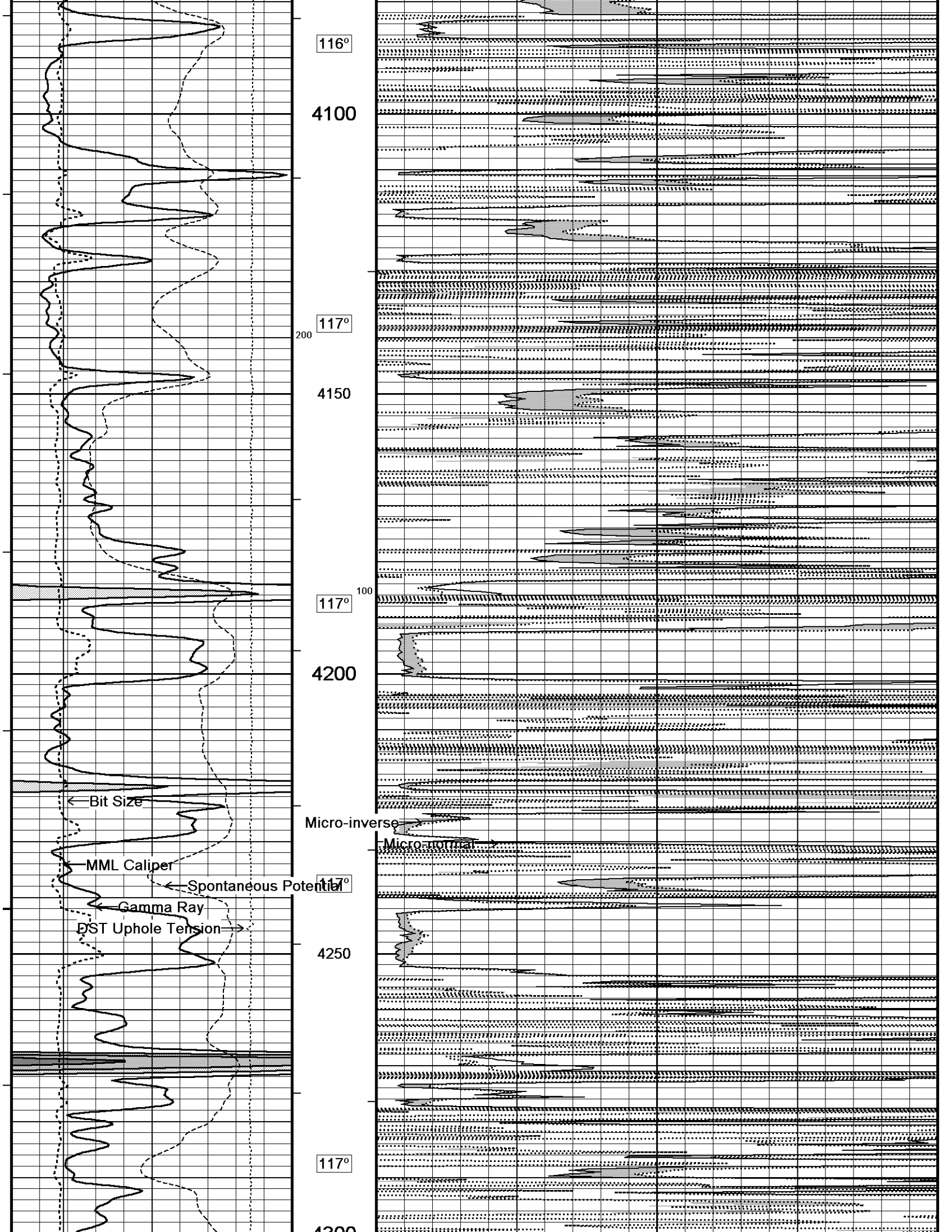
116°

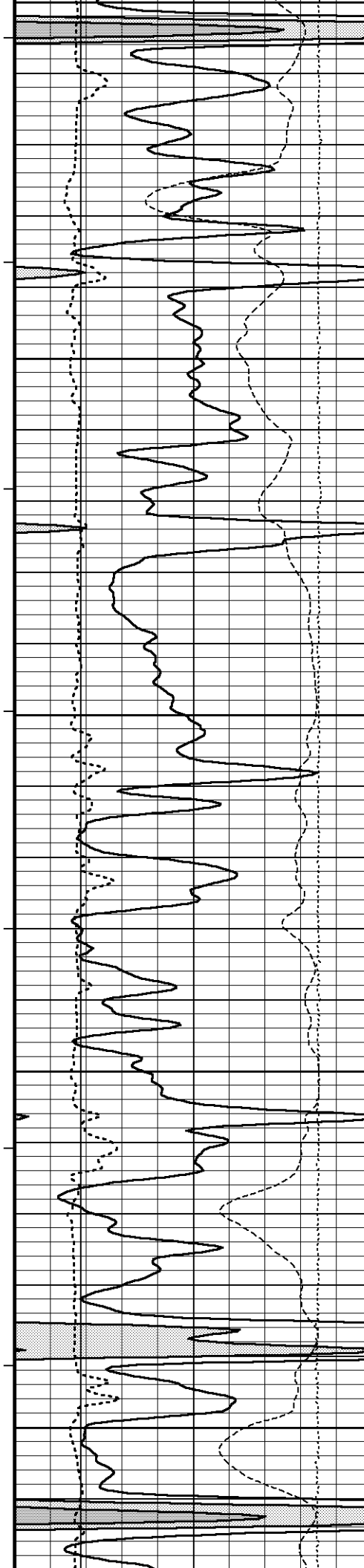
4000

116°

4050







4500

118°

4350

118°

4400

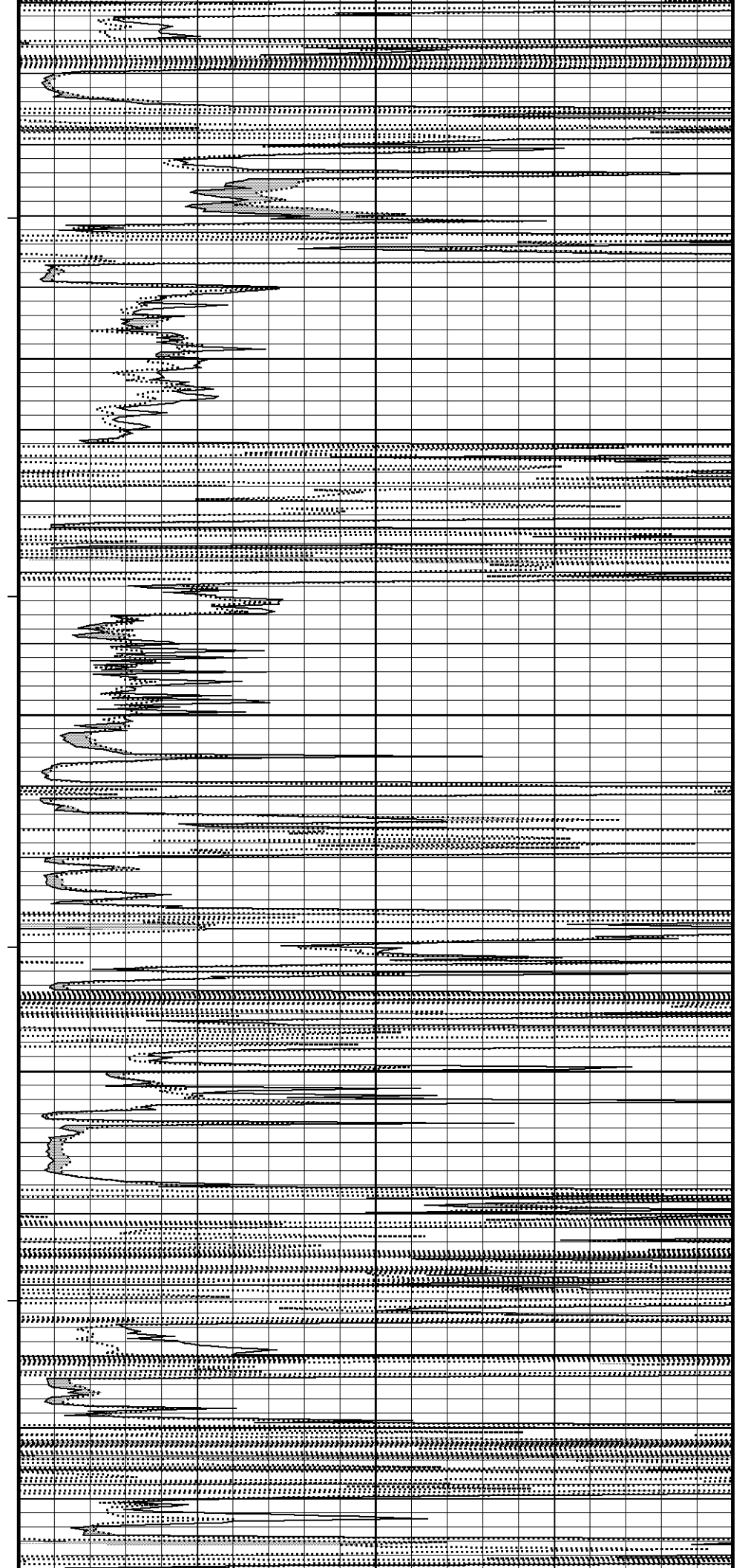
100

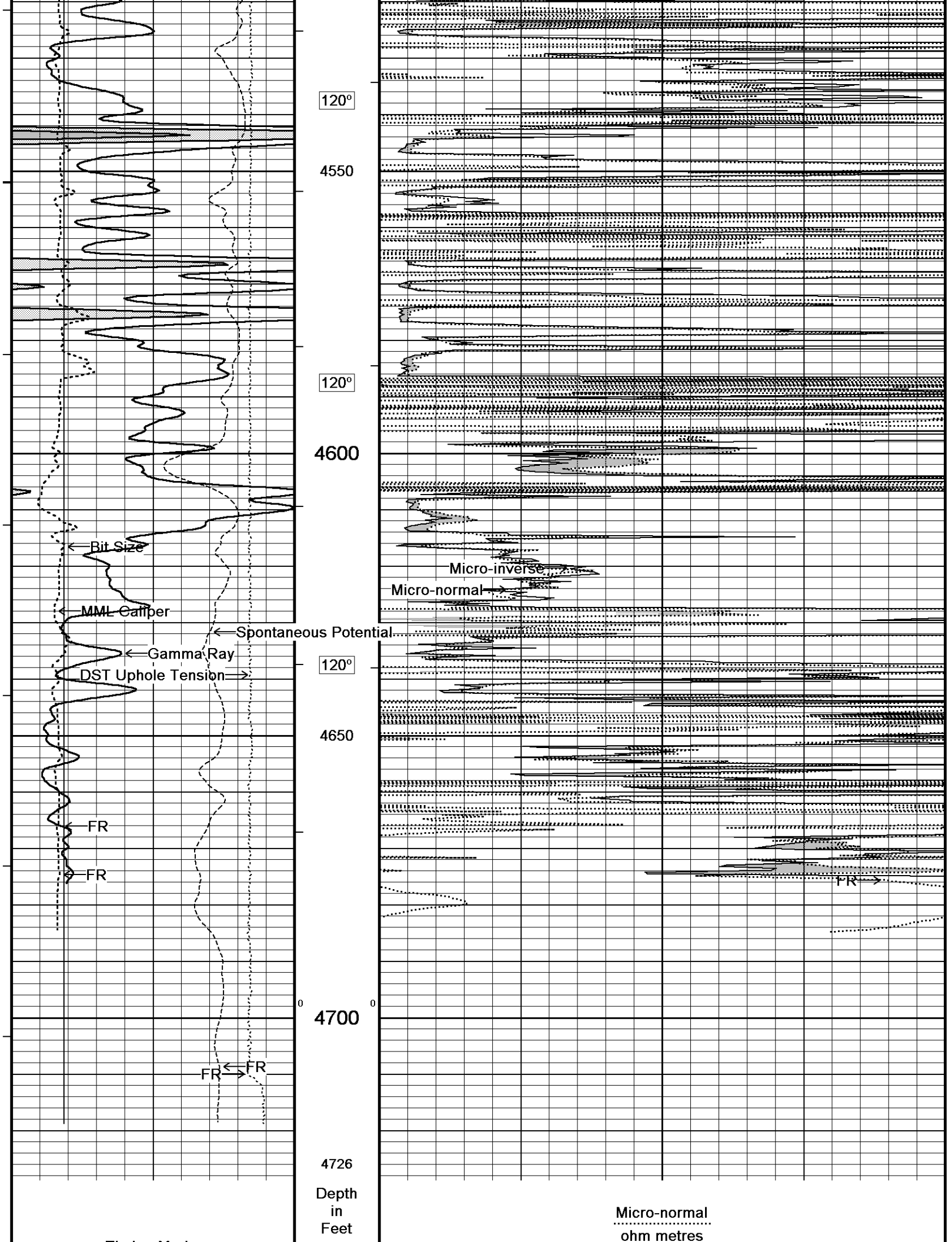
119°

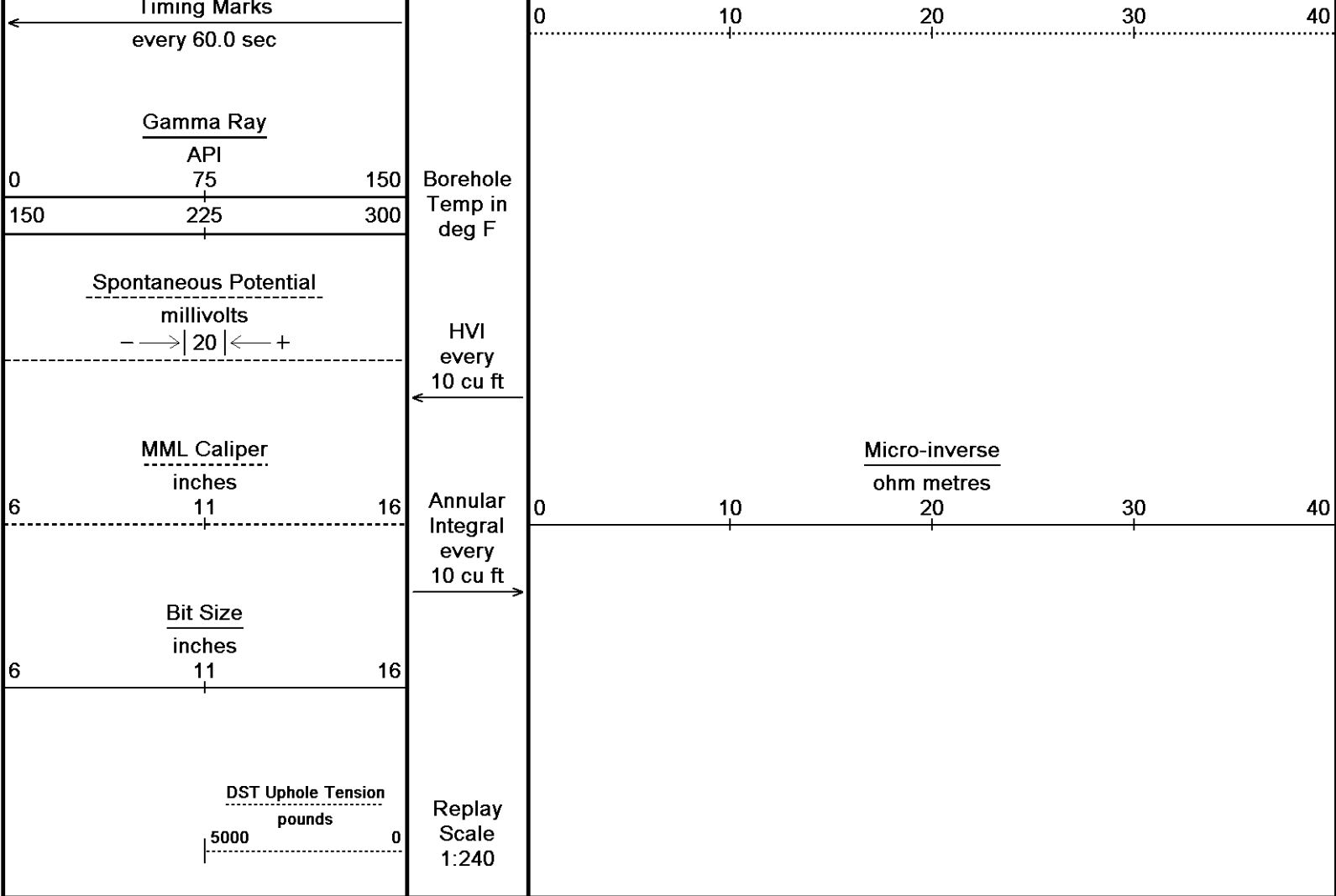
4450

119°

4500



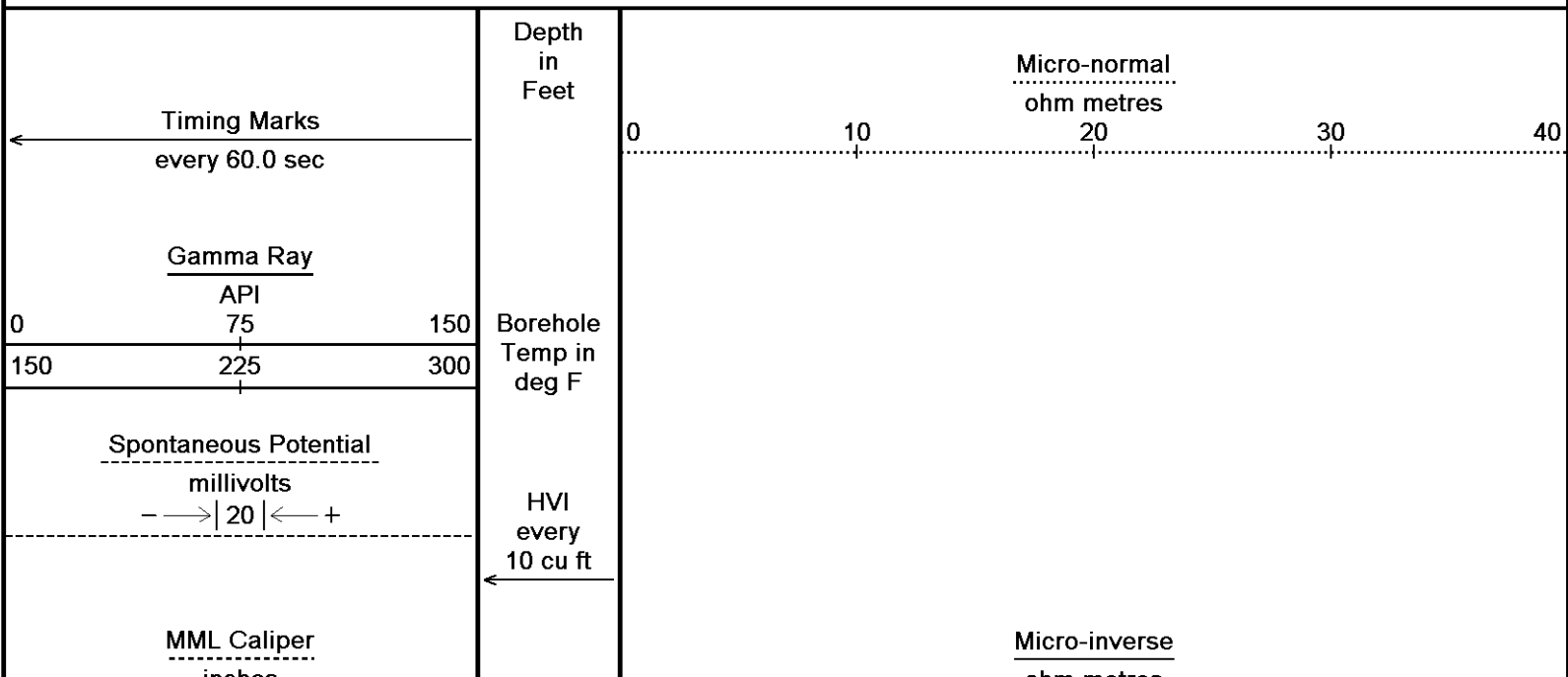




↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Logs\Grand Mesa Janova #2-27\Grand Mesa Janova #2-27_001.dta
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583
Plotted on 31-MAY-2013 14:07
Recorded on 30-MAY-2013 19:05



6 11 16
inches

Bit Size
inches

6 11 16

DST Uphole Tension
pounds
5000 0

Annular
Integral
every
10 cu ft

0 10 20 30 40
ohm metres

Replay
Scale
1:240

4400

100

118°

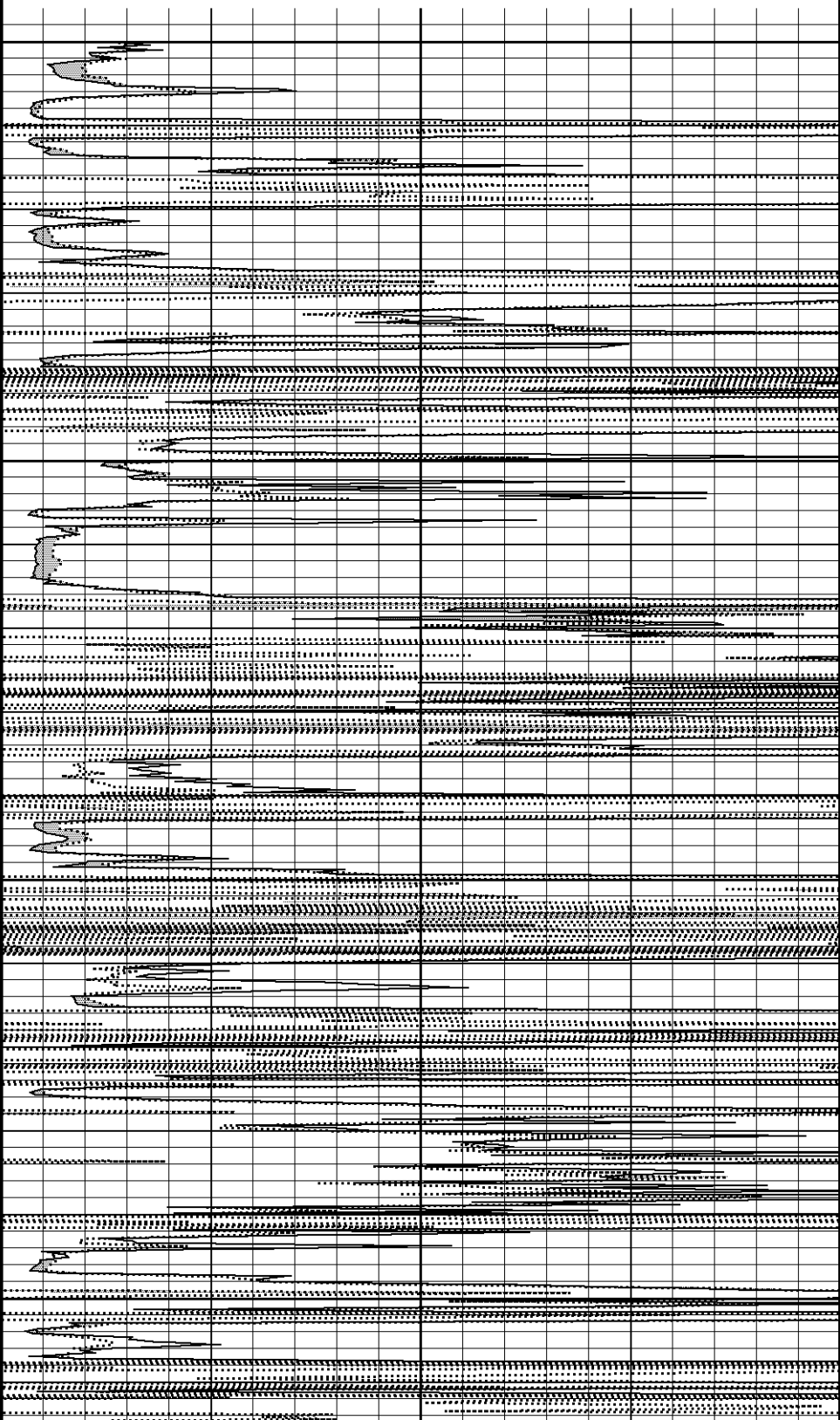
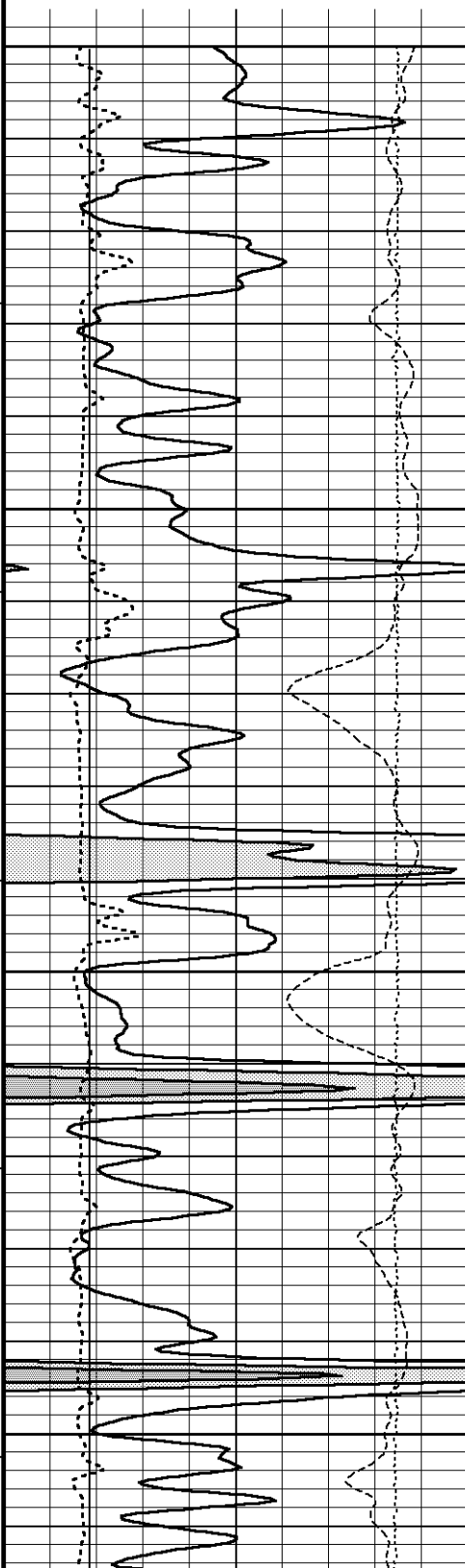
4450

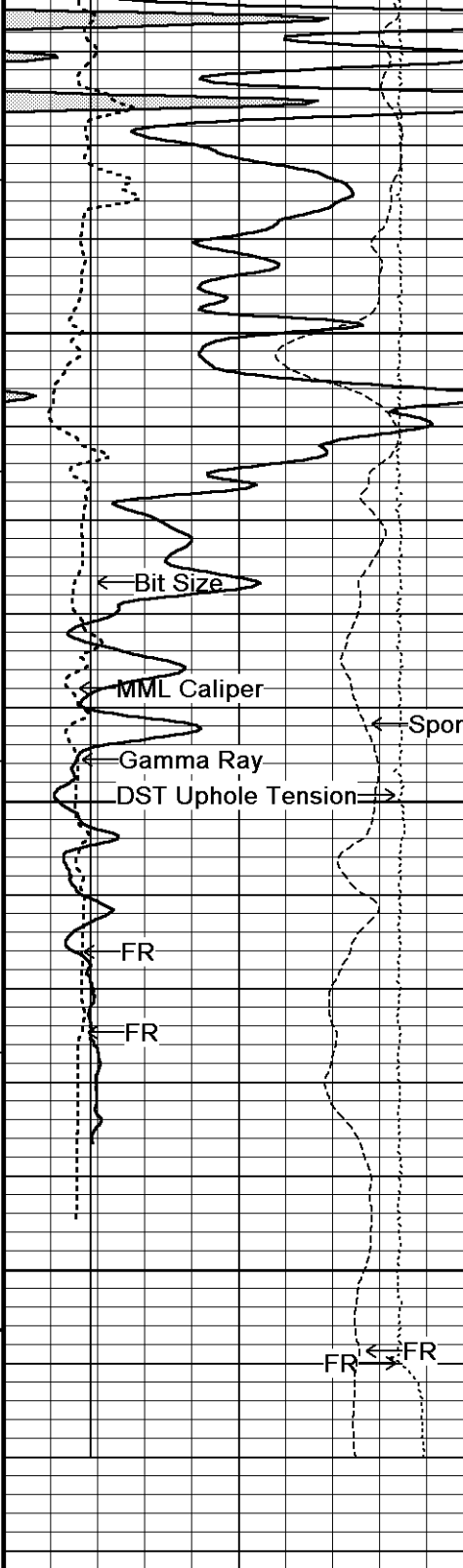
118°

4500

118°

4550





119°

4600

120°

4650

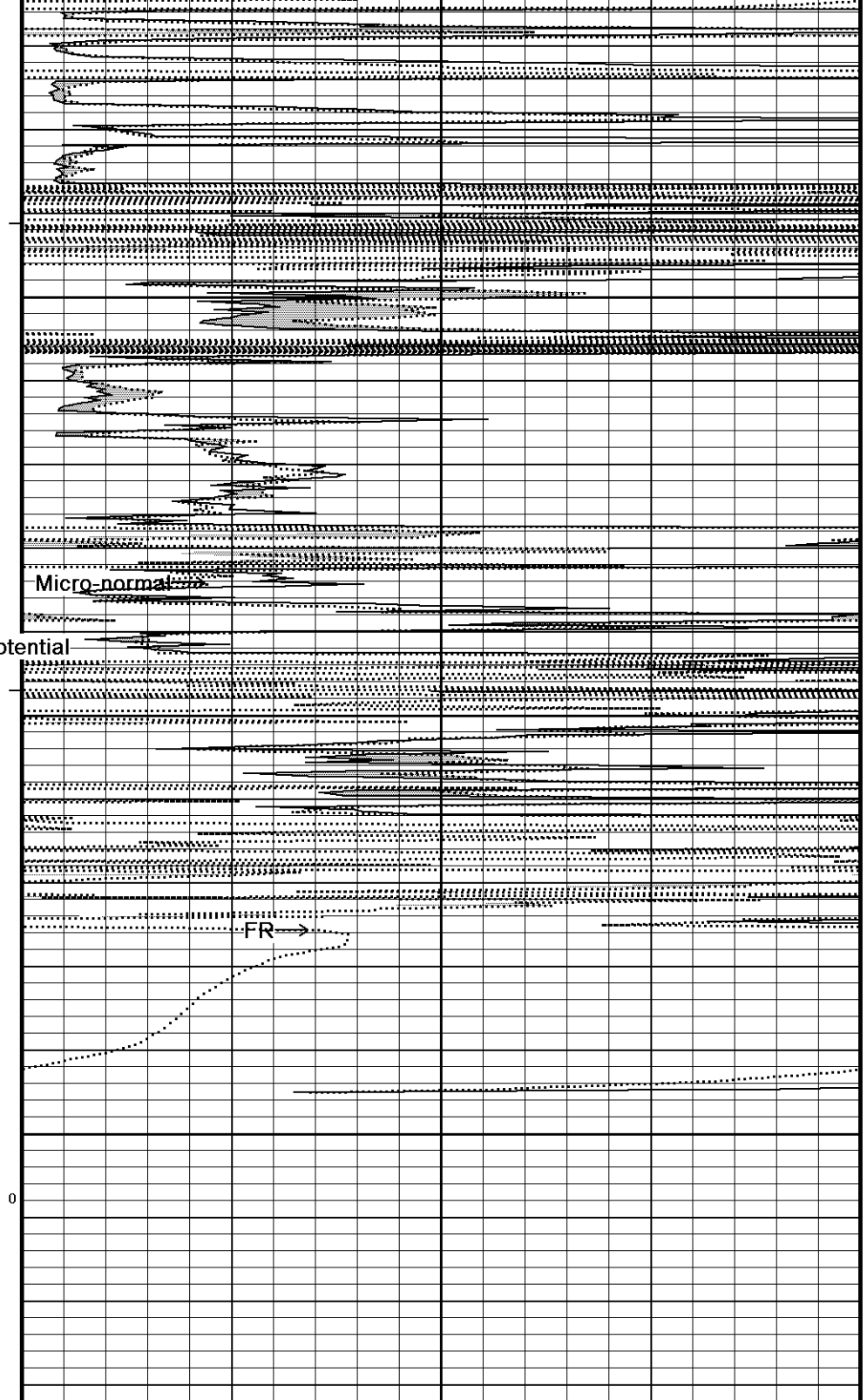
120°

4700

0

4730

Depth in Feet



0 10 20 30 40

Micro-normal ohm metres

← Timing Marks every 60.0 sec

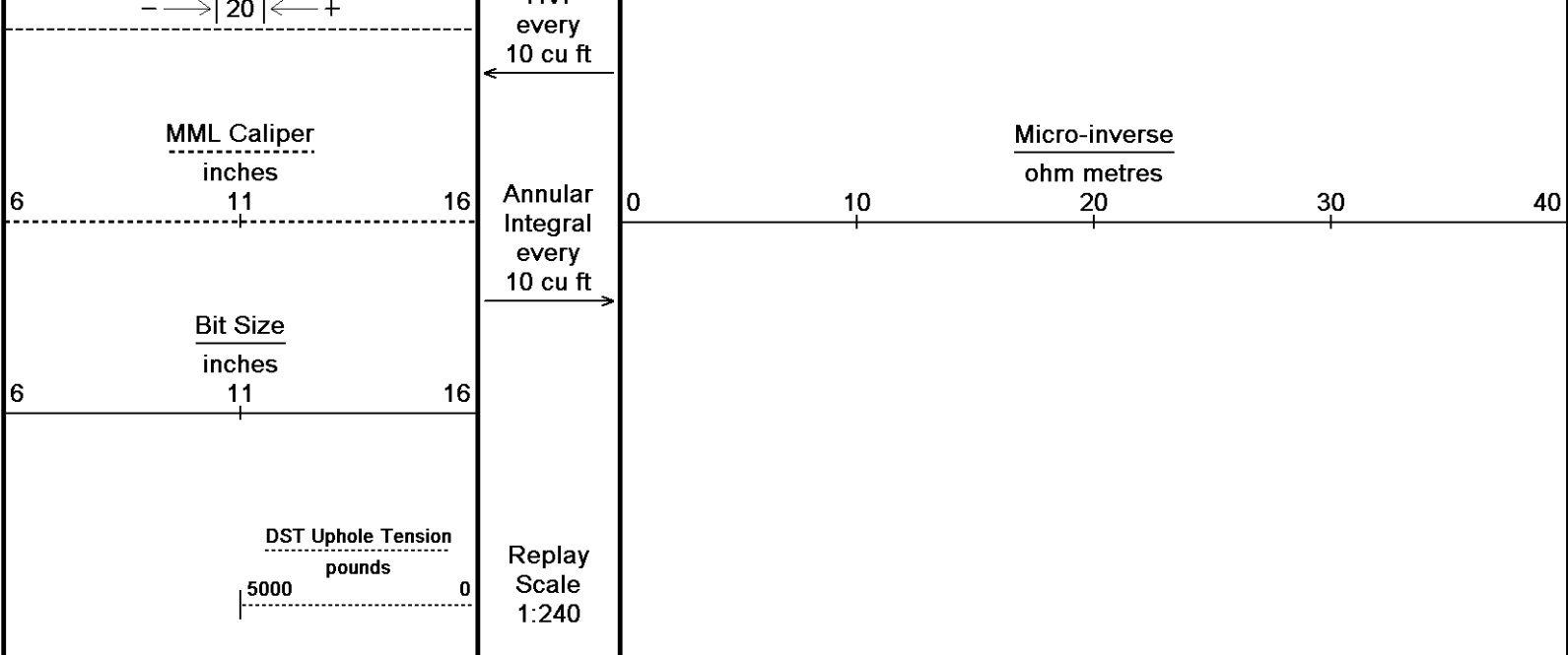
Gamma Ray

API	
0	150
75	
150	300
225	

Borehole Temp in deg F

Spontaneous Potential millivolts

HVI



Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 31-MAY-2013 14:07
 Filename: C:\Minimus 13.05.9583\Logs\Grand Mesa Janova #2-27\Grand Mesa Janova #2-27_001.dta Recorded on 30-MAY-2013 19:05
 System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Logs\Grand Mesa Janova #2-27\Grand Mesa Janova #2-27_002.dta

General Constants All 000 Last Edited on 30-MAY-2013,18:40

General Parameters		
Mud Resistivity	1.520	ohm-metres
Mud Resistivity Temperature	85.000	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	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0 Field Calibration on 30-MAY-2013 18:09

Reading No	Measured	Calibrated (lbs)
1	14947.71	0.00
2	15585.25	399.00

Gamma Calibration MCG-B 34 Field Calibration on 29-MAY-2013 15:06

	Measured	Calibrated (API)
Background	65	44
Calibrator (Gross)	1145	769
Calibrator (Net)	1080	725

Gamma Constants MCG-B 34 Last Edited on 30-MAY-2013,18:41

Gamma Calibrator Number	GRC38	
Mud Density	1.13	gm/cc

Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-B 34			Field Calibration on 29-MAY-2013,14:59
	Measured	Calibrated (mV)	
Reference 1	106.4	100.0	
Reference 2	-95.3	-100.0	

High Resolution Temperature Calibration MCG-B 34			Field Calibration on 29-MAY-2013,14:59
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-B 34			Last Edited on 29-MAY-2013,14:59
Pre-filter Length	11		

Micro Normal and Micro Inverse Calibration MML-A 16			Base Calibration on 16-MAY-2013 12:07	Field Check on 29-MAY-2013 14:58	
Base Calibration					
		Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.1	60.2	5.0	25.0	
Micro Inverse	15.6	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 16			Last Edited on 29-MAY-2013,14:57
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

Caliper Calibration MML-A 16			Base Calibration on 16-MAY-2013 11:56	Field Calibration on 29-MAY-2013 14:58
Base Calibration				
Reading No	Measured		Calibrator Size (in)	
1	14258		5.98	
2	17442		7.97	
3	20671		9.86	
4	24432		11.92	
5	0		0.00	
6	N/A		N/A	
Field Calibration				
	Measured Caliper (in)		Actual Caliper (in)	
	6.09		5.98	

Neutron Calibration MDN-A.B 65			Base Calibration on 22-MAY-2013 14:17	Field Check on 29-MAY-2013 15:12	
Base Calibration					
		Measured		Calibrated (cps)	
	Near	Far	Near	Far	
Ratio	3104	96	3714	110	
	32.242		33.764		
Field Calibrator at Base					
			Calibrated (cps)		
Ratio			1657	2415	
			0.686		
Field Check					
			Calibrated (cps)		
Ratio			1660	2408	
			0.698		

Neutron Constants MDN-A.B 65			Last Edited on 29-MAY-2013,15:07
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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 16-MAY-2013 15:06

Field Check on 29-MAY-2013 14:44

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.9	126.8
Base Check		281.3
Field Check		281.3

FE Constants MFE-B.J 352

Last Edited on 29-MAY-2013,14:42

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 45

Field Calibration on 29-MAY-2013,14:59

	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 29-MAY-2013,14:59

Pre-filter Length 11

Induction Calibration MAI-A.A 45

Base Calibration on 21-MAY-2013,16:47

Field Check on 29-MAY-2013 14:41

Base Calibration

Test Loop Calibration Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	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 0.0 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			19.8	3853.7
2			32.1	3630.5
3			28.9	3050.2
4			18.4	2079.4
Deep			16.2	1911.5
Medium			42.7	4061.7
Shallow			50.1	5485.2

Induction Constants MAI-A.A 45

Last Edited on 30-MAY-2013,08:26

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.	Borehole Temp. Unfilt.		
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 31

Base Calibration on 19-MAY-2013 17:48

Field Calibration on 29-MAY-2013 14:51

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	17088	3.99
2	25888	5.98
3	34607	7.97
4	42944	9.86
5	52301	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.92	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 19-MAY-2013 18:09

Field Check on 29-MAY-2013 14:49

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	45338	23124	59556	30836
Reference 2	18546	1915	24941	2541

Field Check at Base

677.6	838.3
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Field Check

680.4	836.2
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PE Calibration

Base Calibration	WS	Measured WH	Ratio	Calibrated Ratio
Background	125	601		
Reference 1	19261	45226	0.429	0.371
Reference 2	5568	18464	0.305	0.272
Field Check at Base				
	125.4	601.0		
Field Check				
	124.8	603.7		

Density Constants MPD-B 31

Last Edited on 30-MAY-2013,18:41

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	1.13	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	
0.00	0.00	

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Logs\Grand Mesa Janova #2-27\Grand Mesa Janova #2-27_002.dta

3/8" Triple Cone Cable Head (MCB C A)
 MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

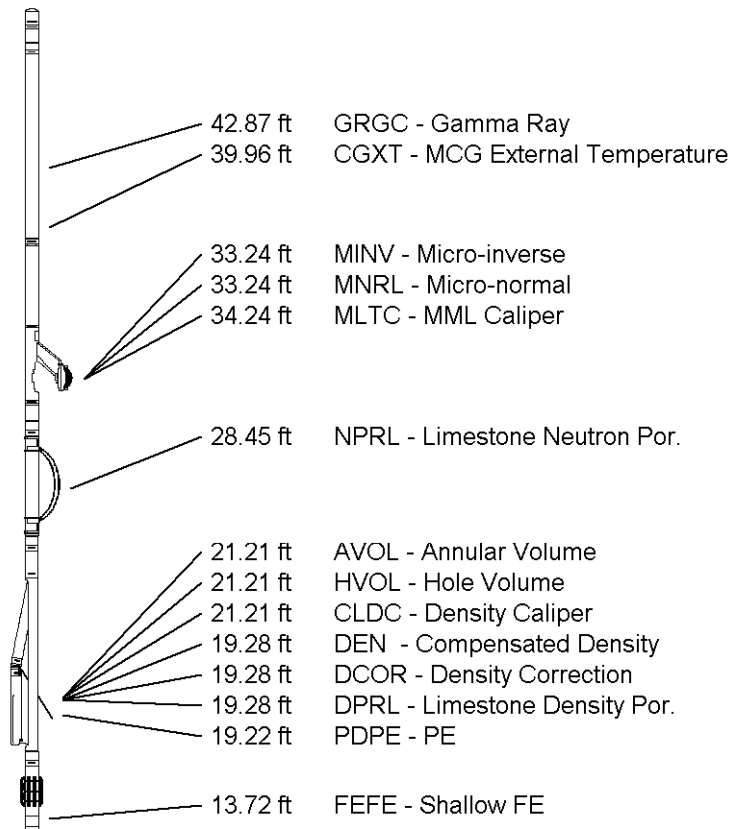
Compact Comms Gamma
 MCG-B 34 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
 MML-A 16 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 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
 MFE-B 1250 LG: 9.25 ft WT: 43.5 lb OD: 2.24 in



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

Compact Induction

MAI-A.A 45 LG: 11.79 ft WT: 48.5 lb OD: 2.24 in

Total Length: 50.72 ft Weight: 399.0 lb



3.34 ft R400 - Array Ind. One Res 40
 3.34 ft RTAO - Array Ind. One Res Rt
 3.34 ft R600 - Array Ind. One Res 60
 0.23 ft SPCG - Spontaneous Potential

Tool Zero (1.12ft from bottom)
 -1.12 ft SMTU - DST Uphole Tension
 All measurements relative to tool zero.

COMPANY GRAND MESA OPERATING COMPANY
 WELL J A NOVA #2-27
 FIELD WILDCAT
 PROVINCE/COUNTY LOGAN
 COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	3024.00	feet	First Reading	4678.00	feet
Elevation Drill Floor	3023.00	feet	Depth Driller	4715.00	feet
Elevation Ground Level	3015.00	feet	Depth Logger	4710.00	feet



Weatherford[®]

MICRORESISTIVITY LOG