MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	HOLADAY #1-19
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	335' FSL & 947' FWL
	NW SE SW SW

SEC	TWP	RGE	Other Services
19	13S	30W	MPD/MDN MAI/MFE

API Number 15-063-21989
Permit Number

Permanent Datum G.L., Elevation 2828 feet
Log Measured From KB
Drilling Measured From K.B.

Elevations:	feet
KB	2838.00
DF	2837.00
GL	2828.00

Date	08-FEB-2013		
Run Number	ONE		
Service Order	3537859		
Depth Driller	4620.00	feet	
Depth Logger	4619.00	feet	
First Reading	4585.00	feet	
Last Reading	3600.00	feet	
Casing Driller	225.00	feet	
Casing Logger	221.00	inches	
Bit Size	7.875		
Hole Fluid Type	CHEMICAL	lb/USg	
Density / Viscosity	9.20 lb/USg	53.00	
PH / Fluid Loss	9.50	9.50	
Sample Source	FLOWLINE		
Rm @ Measured Temp	1.15 @ 82.0	ohm-m	
Rmf @ Measured Temp	0.92 @ 82.0	ohm-m	
Rmc @ Measured Temp	1.38 @ 82.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.82 @116.0	ohm-m	
Time Since Circulation	5 HOURS		
Max Recorded Temp	116.00	deg F	
Equipment / Base	13057	LIB	
Recorded By	LYNN SCOTT		
Witnessed By	TIM PRIEST		
JOB#	LB13-037		

BOREHOLE RECORD

Last Edited: 08-FEB-2013 15:08

Bit Size inches	Depth From feet	Depth To feet
7.875	225.00	4620.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	225.00	24.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MAI ran in combination.
Hardware Used: MDN Dual bowspring used. MPD 8 inch profile plate used. MAI and MFE 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.
Tight pulls, washouts and borehole rugosity will affect data quality.
Total hole volume from TD to Surface Casing= 1880 cu. ft.
Annular volume with 5.5 inch production casing from TD to 3600 ft.= 210 cu. ft.
Service order: #3537859
Rig: HD #2
Engineer: L. Scott
Operator(s): K. Rinehart

Software duplicates the pH value onto the fluid loss. The fluid loss is 7.2

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-FEB-2013 20:25
Filename: C:\Minimus 13.04.8492\Data\Shakespeare Holaday #...\Shakespeare Holaday #1-19_002.dta
Recorded on 08-FEB-2013 18:05
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

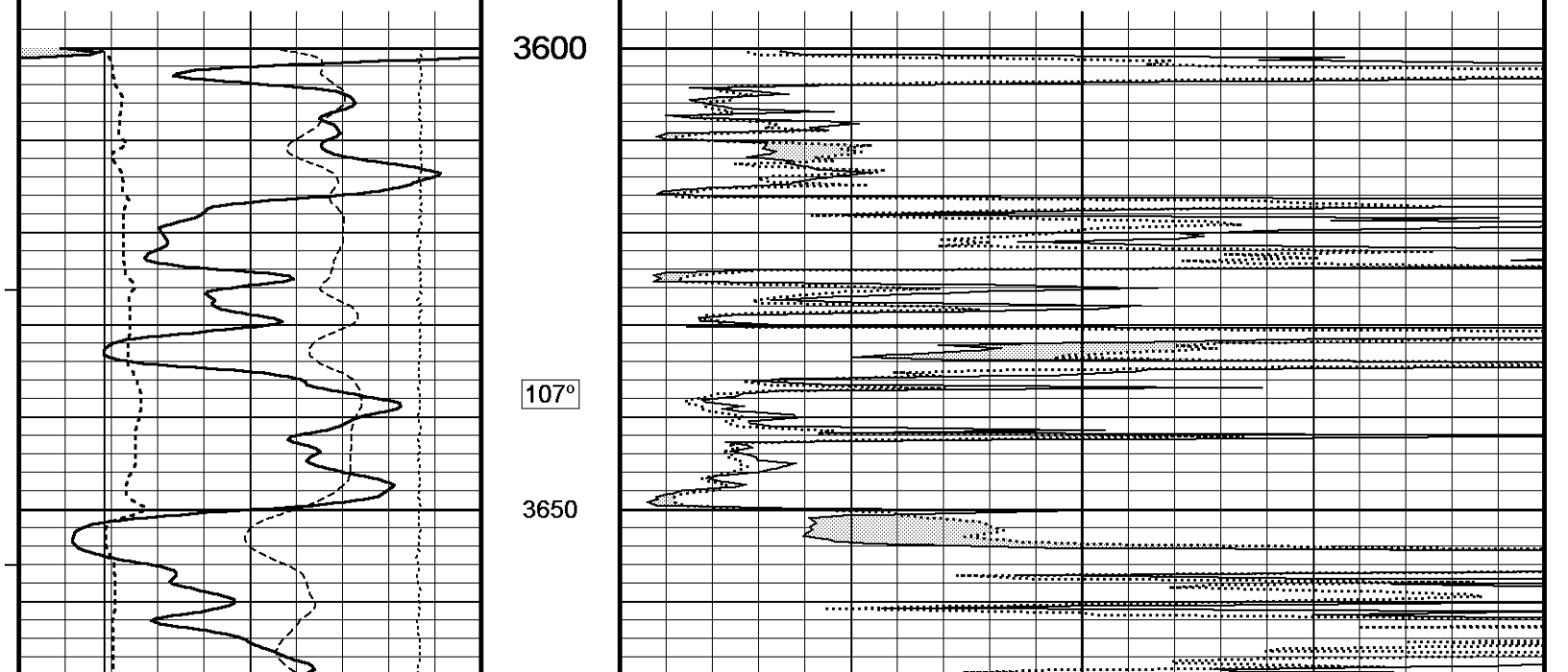
MMR MicroLog Normal
ohm metres
0 10 20 30 40

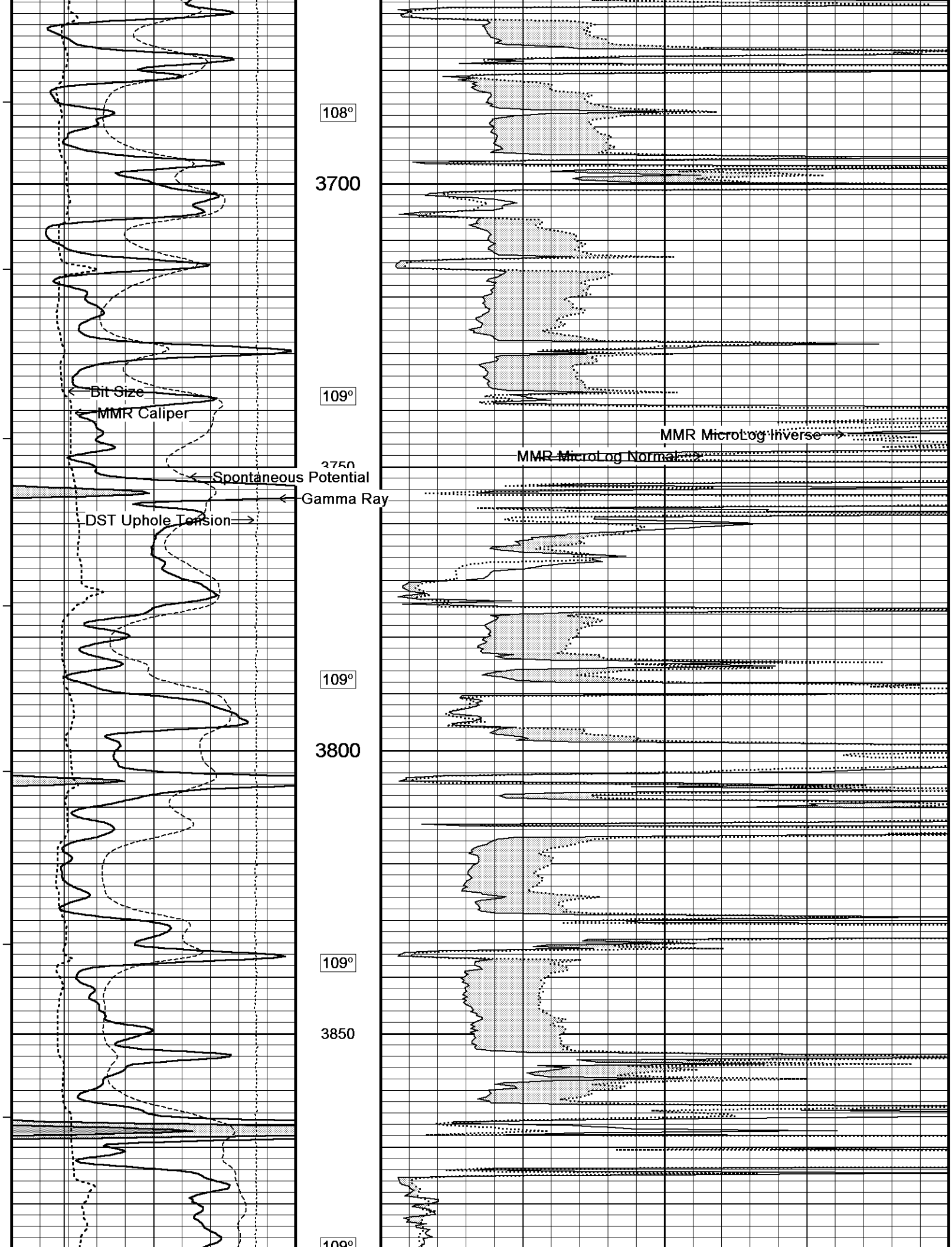
MMR MicroLog Inverse
ohm metres
0 10 20 30 40

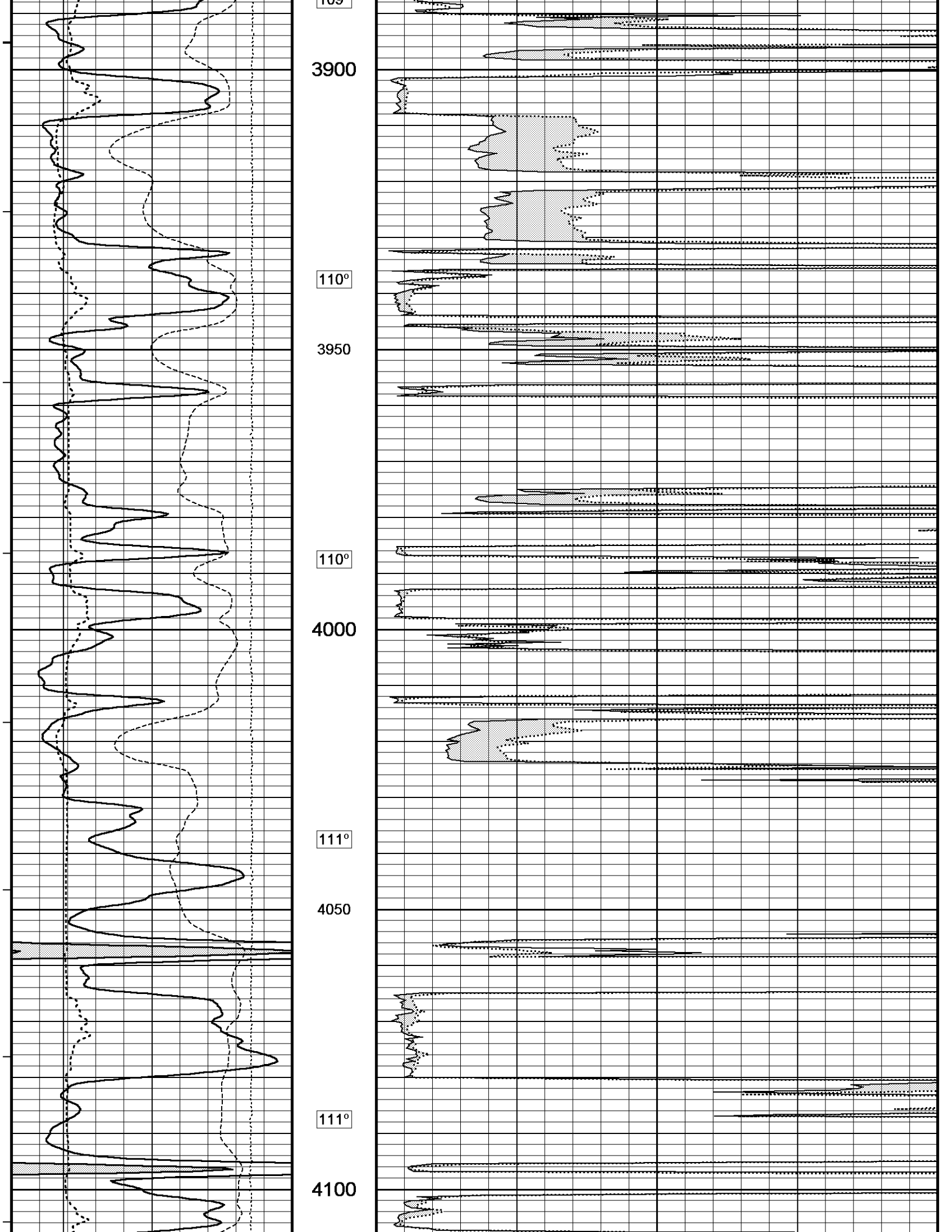
3600

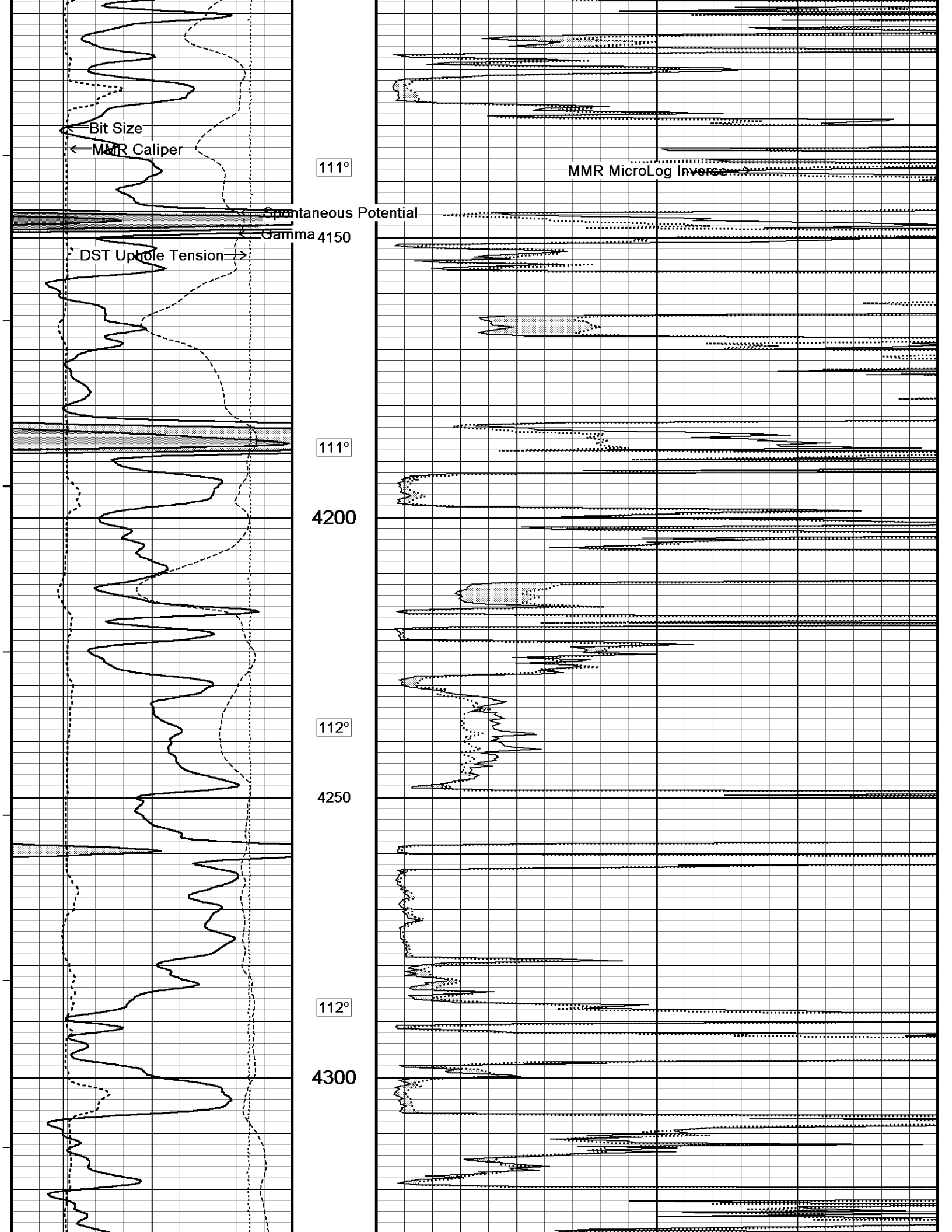
107°

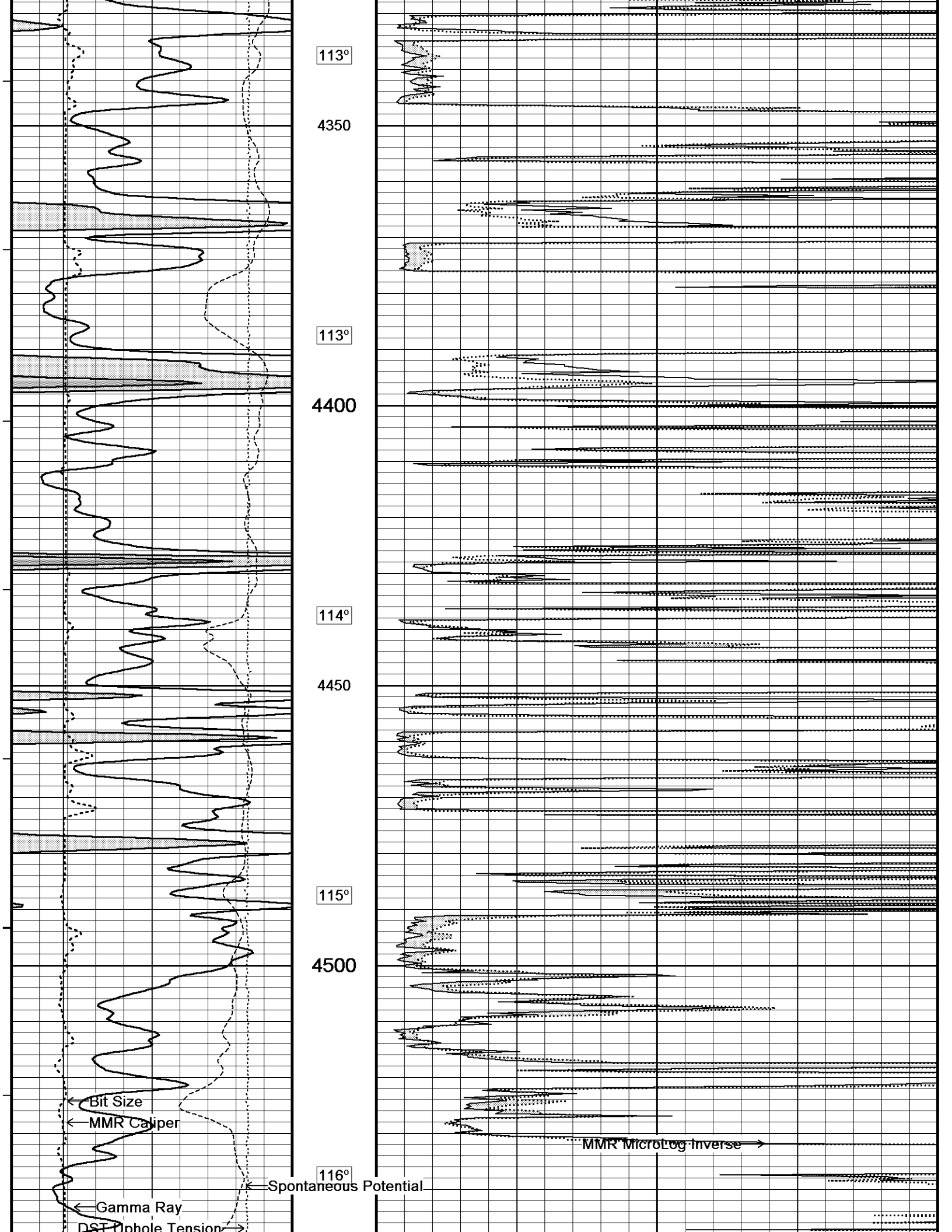
3650

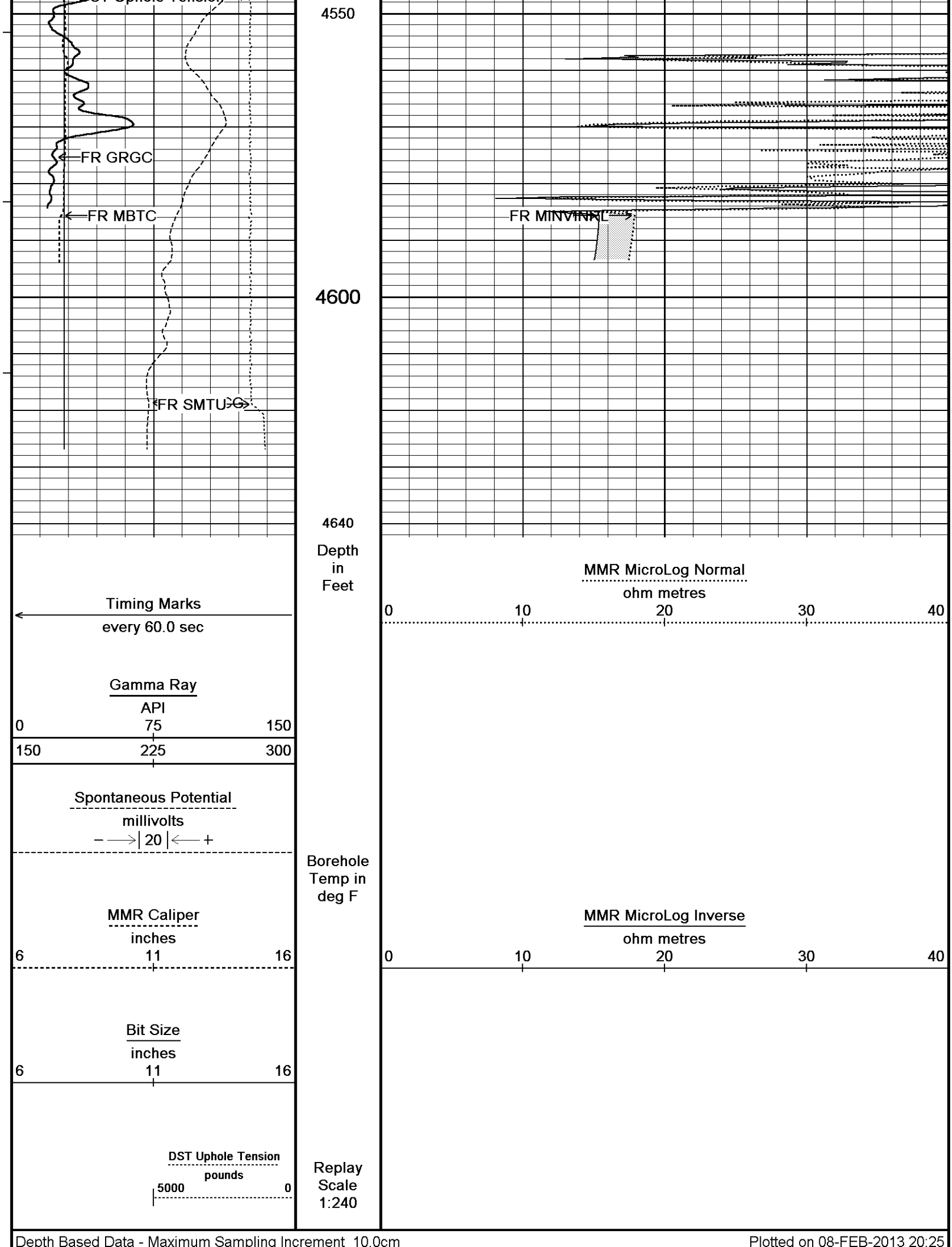



108°
3700
109°
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
3750
Spontaneous Potential
Gamma Ray
DST Uphole Tension
109°
3800
109°
3850
109°


109
3900
110°
3950
110°
4000
111°
4050
111°
4100


Bit Size
MMR Caliper
111°
MMR MicroLog Inverse
Spontaneous Potential
Gamma
4150
DST Uphole Tension
111°
4200
112°
4250
112°
4300


113°
4350
113°
4400
114°
4450
115°
4500
116°
Bit Size
MMR Caliper
Gamma Ray
DST Uphole Tension
Spontaneous Potential
MMR MicroLog Inverse



Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 08-FEB-2013 20:25

Filename: C:\Minimus 13.04.8492\Data\Shakespeare Holaday #...\Shakespeare Holaday #1-19_002.dta Recorded on 08-FEB-2013 18:05
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-FEB-2013 20:25
Filename: C:\Minimus 13.04.8492\Data\Shakespeare Holaday #...\Shakespeare Holaday #1-19_001.dta Recorded on 08-FEB-2013 17:47
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

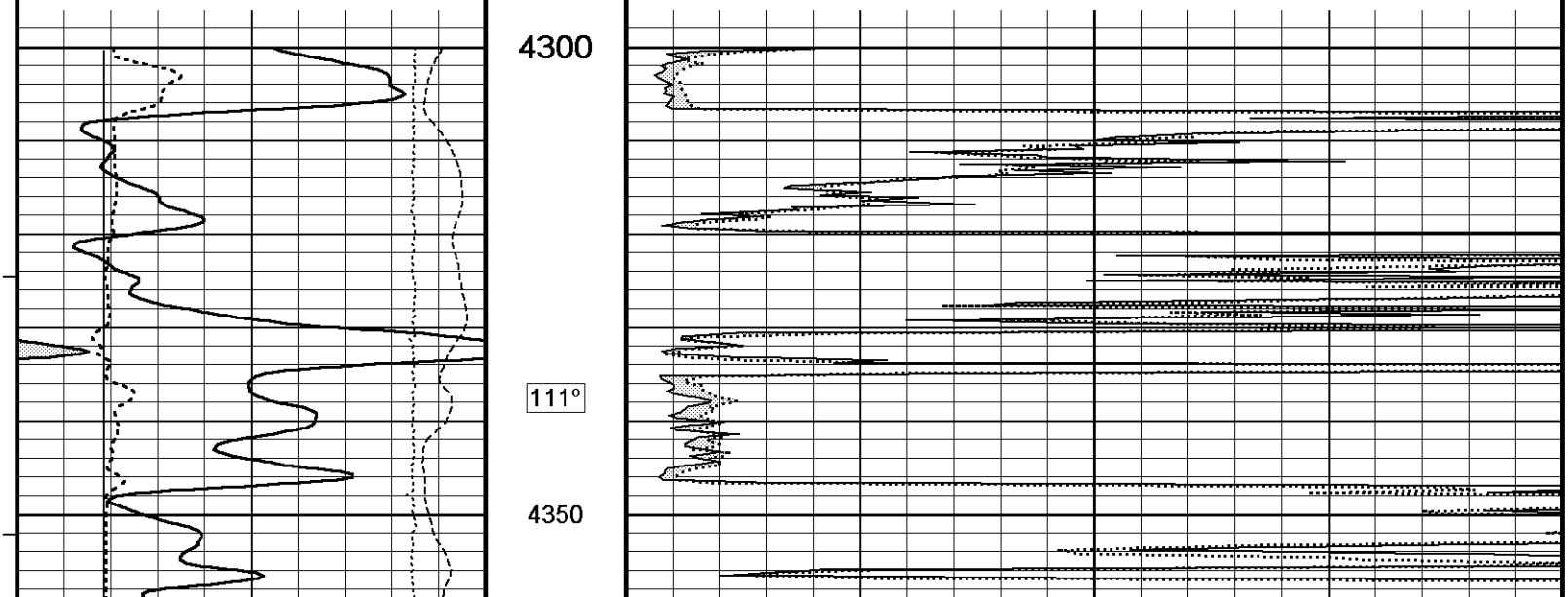
Depth in Feet

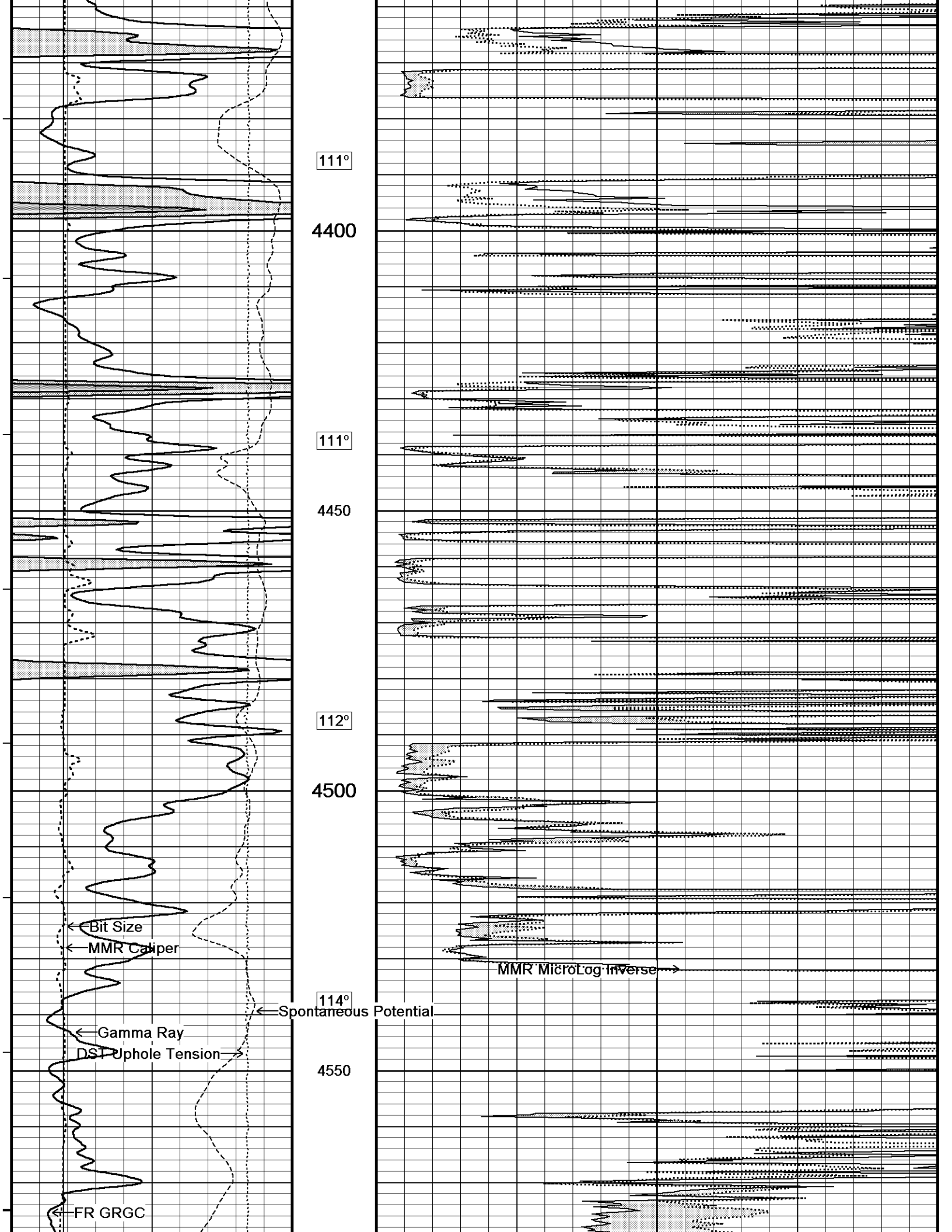
Borehole Temp in deg F

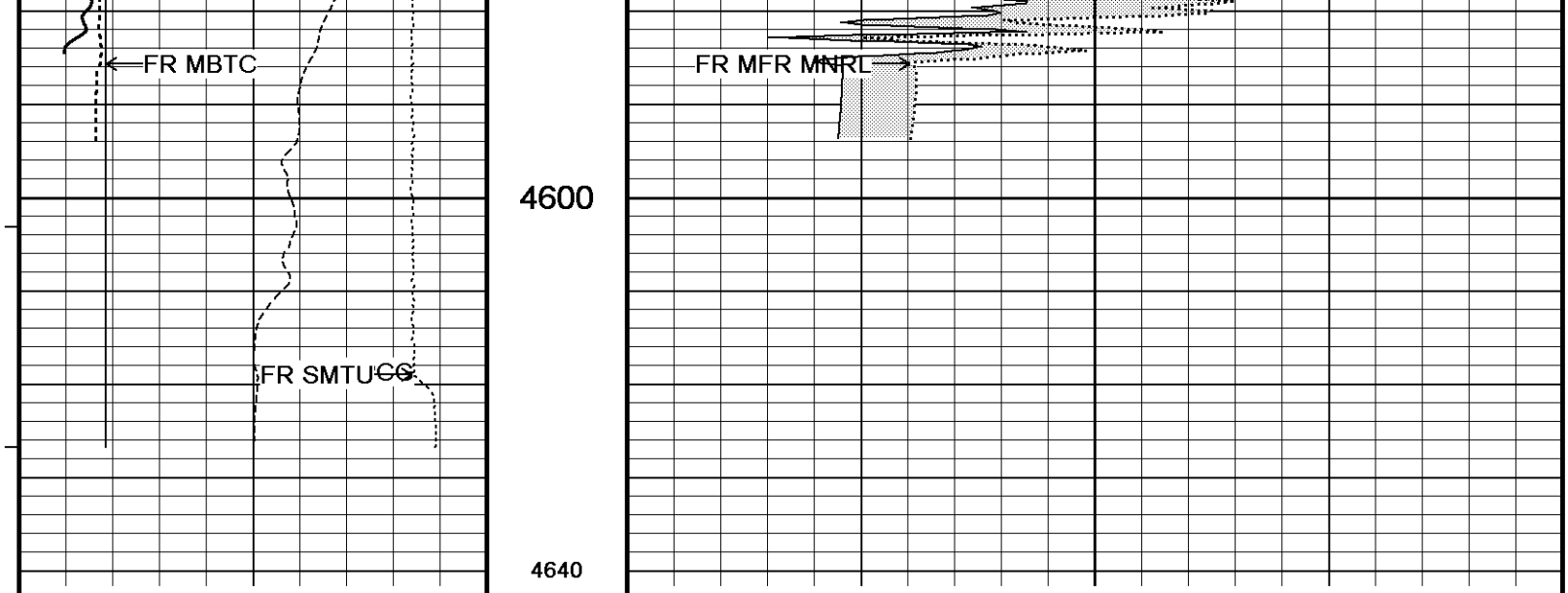
Replay Scale 1:240

MMR MicroLog Normal
ohm metres
0 10 20 30 40

MMR MicroLog Inverse
ohm metres
0 10 20 30 40




111°
4400
111°
4450
112°
4500
114°
4550
Bit Size
MMR Caliper
MMR MicroLog Inverse
Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR GRGC



4640

Depth in Feet

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

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

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 08-FEB-2013 20:25
Filename: C:\Minimus 13.04.8492\Data\Shakespeare Holaday #...\Shakespeare Holaday #1-19_001.dta
Recorded on 08-FEB-2013 17:47
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.04.8492\Data\Shakespeare Holaday #1-19\Shakespeare Holaday #1-19_001.dta

General Constants All 000
Last Edited on 08-FEB-2013 15:45

General Parameters

Mud Resistivity	1.150	ohm-metres
Mud Resistivity Temperature	82.000	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. Six Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 02-FEB-2013 03:49

Reading No	Measured	Calibrated (lbs)
1	13535.91	0.00
2	14074.23	471.00

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 05-FEB-2013 10:10

	Measured	Calibrated (API)
Background	69	48
Calibrator (Gross)	1110	773
Calibrator (Net)	1041	725

Gamma Constants MCG-C 208

Last Edited on 08-FEB-2013,15:45

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

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 16-JAN-2013 10:32
Field Calibration on 05-FEB-2013 09:58

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13881	5.98
2	17138	7.97
3	20398	9.86
4	24351	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.09	5.98

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 16-JAN-2013 10:36
Field Check on 05-FEB-2013 09:54

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.3	59.9	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	76.3	76.3
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 24-JAN-2013 15:09
Field Check on 05-FEB-2013 10:14

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2952	92	3714	110
Ratio	32.138		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1720	2499
Ratio	0.688	

Field Check

	Calibrated (cps)	
	1721	2500
Ratio	0.696	

Neutron Constants MDN-A.B 65

Last Edited on 08-FEB-2013,15:46

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	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 352

Base Calibration on 16-JAN-2013 10:20
Field Check on 05-FEB-2013 09:44

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.3	126.8
Base Check		281.2
Field Check		281.4

FE Constants MFE-B.J 352

Last Edited on 08-FEB-2013,15:46

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 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

Induction Calibration MAI-A.A 45

Base Calibration on 26-JUL-2012,09:22
Field Check on 05-FEB-2013 09:43

Base Calibration

Test Loop Calibration	Measured		Calibrated (mmho/m)	
Channel	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		78.4	Deg F	

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			18.6	3851.7
2			31.8	3629.3
3			28.7	3049.2
4			18.4	2079.1
Deep			16.1	1911.0
Medium			42.6	4060.2
Shallow			49.7	5483.2
Array Temperature			60.2	Deg F

Induction Constants MAI-A.A 45

Last Edited on 08-FEB-2013,15:46

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	

Photo Density Calibration MPD-B 31

Base Calibration on 24-JAN-2013 09:49
Field Check on 05-FEB-2013 09:50

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	45759	23102	59556	30836
Reference 2	18982	1934	24941	2541
Field Check at Base	680.7	842.1		
Field Check	682.0	839.6		

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	127	606		
Reference 1	19469	45650	0.429	0.371
Reference 2	5712	18903	0.305	0.272
Field Check at Base	126.6	606.1		
Field Check	124.3	605.7		

Density Constants MPD-B 31

Last Edited on 08-FEB-2013,15:46

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

Caliper Calibration MPD-B 31

Base Calibration on 28-JAN-2013 08:35
Field Calibration on 05-FEB-2013 09:46

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15824	3.99
2	24384	5.98
3	33040	7.97
4	41376	9.86
5	50943	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.99	5.98

DOWNHOLE EQUIPMENT

C:\Minimus 13.04.8492\Data\Shakespeare Holaday #1-19\Shakespeare Holaday #1-19_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

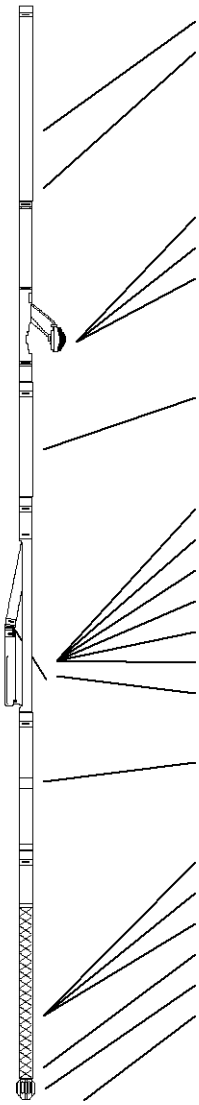
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

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	SHAKESPEARE OIL COMPANY, INC.
WELL	HOLADAY #1-19
FIELD	WILDCAT
PROVINCE/COUNTY	GOVE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2838.00	feet	First Reading	4585.00	feet
Elevation Drill Floor	2837.00	feet	Depth Driller	4620.00	feet
Elevation Ground Level	2828.00	feet	Depth Logger	4619.00	feet

Weatherford®

MICRORESISTIVITY LOG