MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	OTTLEY #1-8
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2301' FSL & 2270' FEL
	SE/4

SEC	TWP	RGE	Other Services
8	14S	32W	MAI/MFE MPD/MDN
			MSS

API Number 15-109-21098
Permit Number

Permanent Datum G.L., Elevation 2843 feet
Log Measured From KB
Drilling Measured From K.B.

Elevations:	feet
KB	2853.00
DF	2852.00
GL	2843.00

Date	15-SEP-2012			
Run Number	ONE			
Depth Driller	4600.00	feet		
Depth Logger	4599.00	feet		
First Reading	4553.00	feet		
Last Reading	3600.00	feet		
Casing Driller	222.00	feet		
Casing Logger	222.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.20 lb/USg	58.00 CP		
PH / Fluid Loss	10.50	9.20 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.51 @ 88.0	ohm-m		
Rmf @ Measured Temp	0.41 @ 88.0	ohm-m		
Rmc @ Measured Temp	0.61 @ 88.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.41 @111.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	111.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13096	LIB		
Recorded By	LYNN SCOTT			
Witnessed By	TIM PRIEST			
S.O.# / JOB#	3537885		LB12-252	

BOREHOLE RECORD

Last Edited: 15-SEP-2012 22:29

Bit Size inches	Depth From feet	Depth To feet
7.875	222.00	4599.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	222.00	24.00

REMARKS

Tools Used: MPD, MCG, MDN, MFE, MAI, MSS, MML
Hardware: MPD: 8 inch profile plate used. MAI, MFE, and MSS: 0.5 Inch standoffs used. MDN: Dual Bowspring used.
2.71 G/CC Limestone density matrix used to calculate porosity.
Sonic porosity calculated using 47.5 usec/ft Limestone scale.
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 the top of detail = 224 cubic feet
Total hole volume from TD to Surface casing= 2034 cubic feet
Service order #3537885
Rig: HD #2
Engineer: L. Scott
Operator(s): B. Reeves

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 16-SEP-2012 01:03
Filename: C:\Minimus 13.02.6600\Data\Shakespeare ...\Shakespeare Oil Company Ottley #1-8_002.dta
Recorded on 15-SEP-2012 22:39
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

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

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

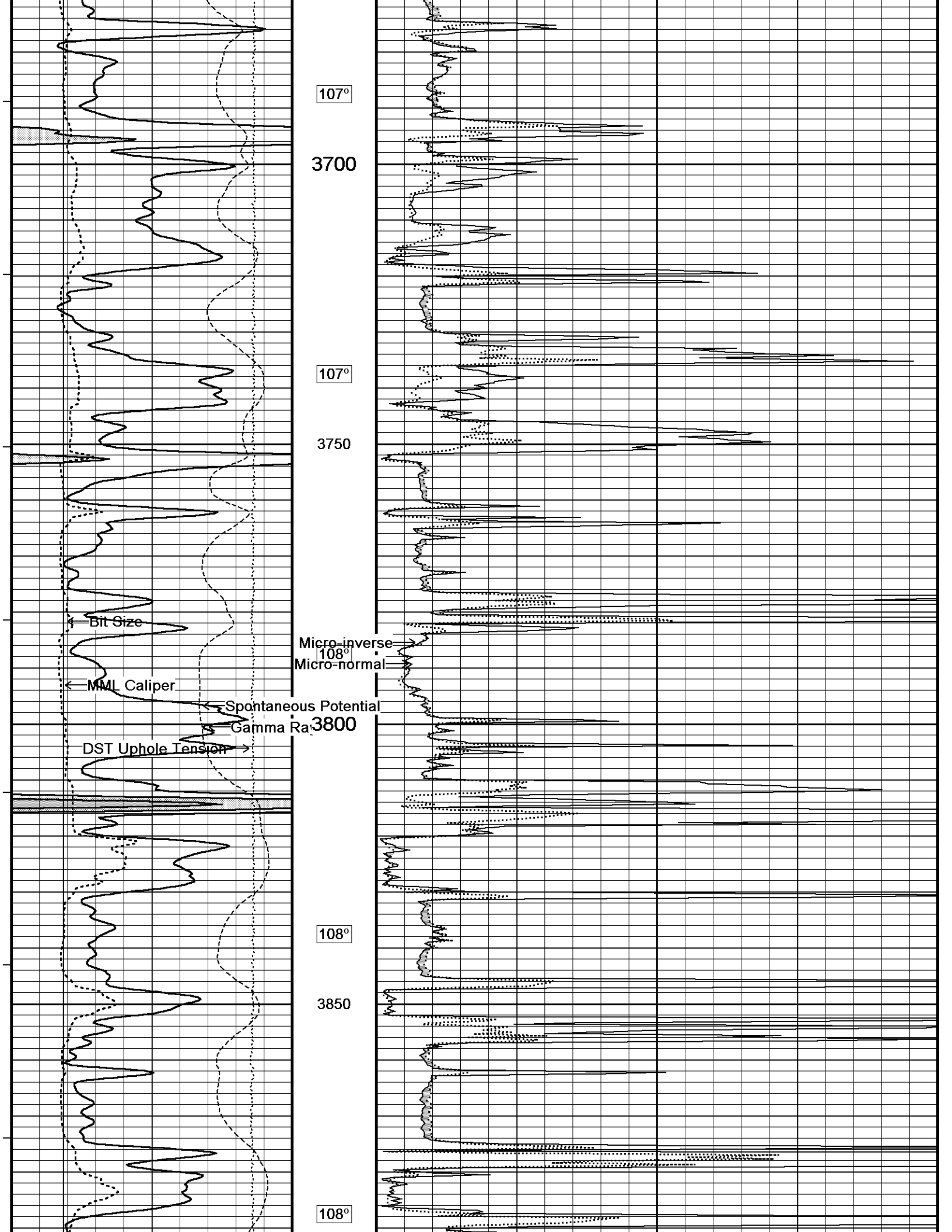
Micro-normal
ohm metres
0 10 20 30 40

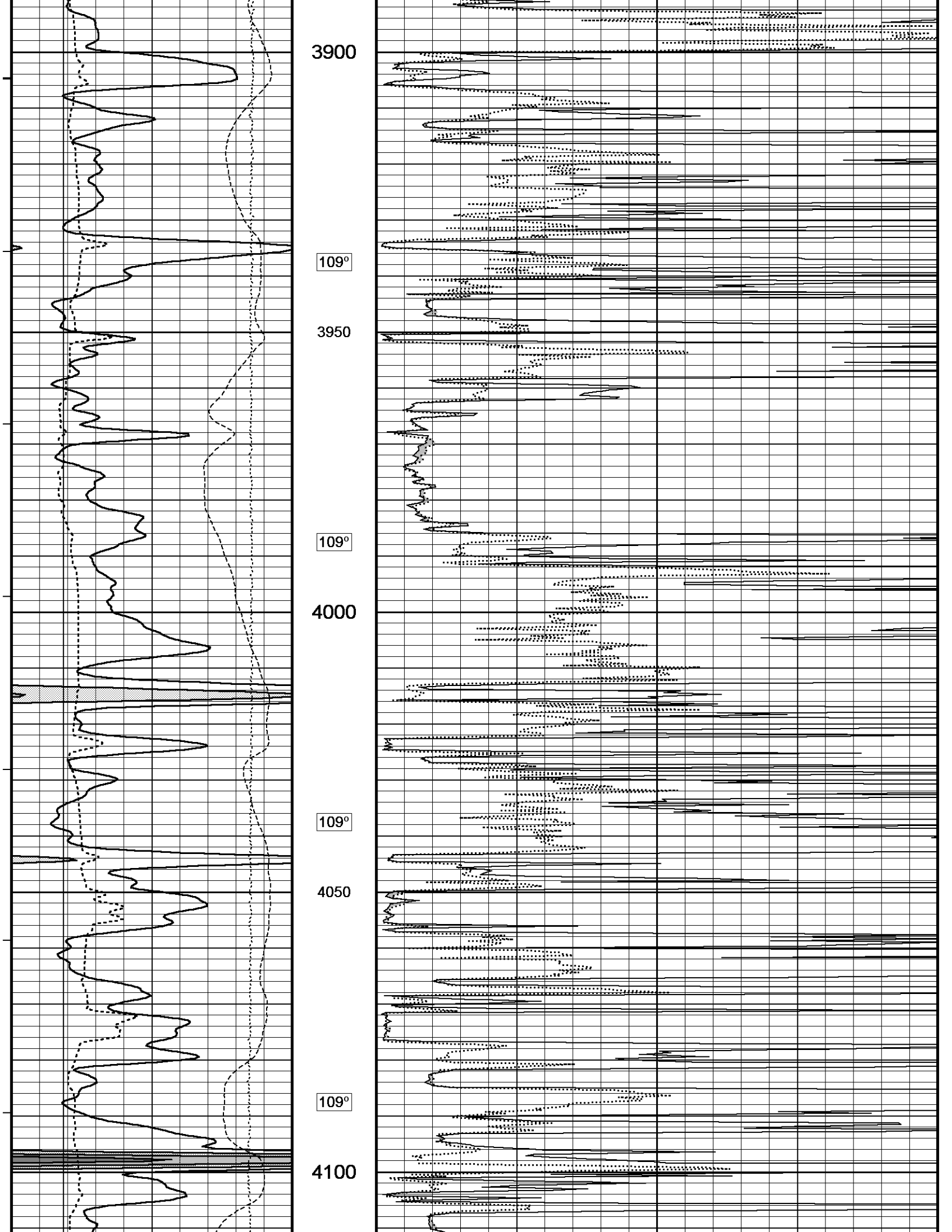
Micro-inverse
ohm metres
0 10 20 30 40

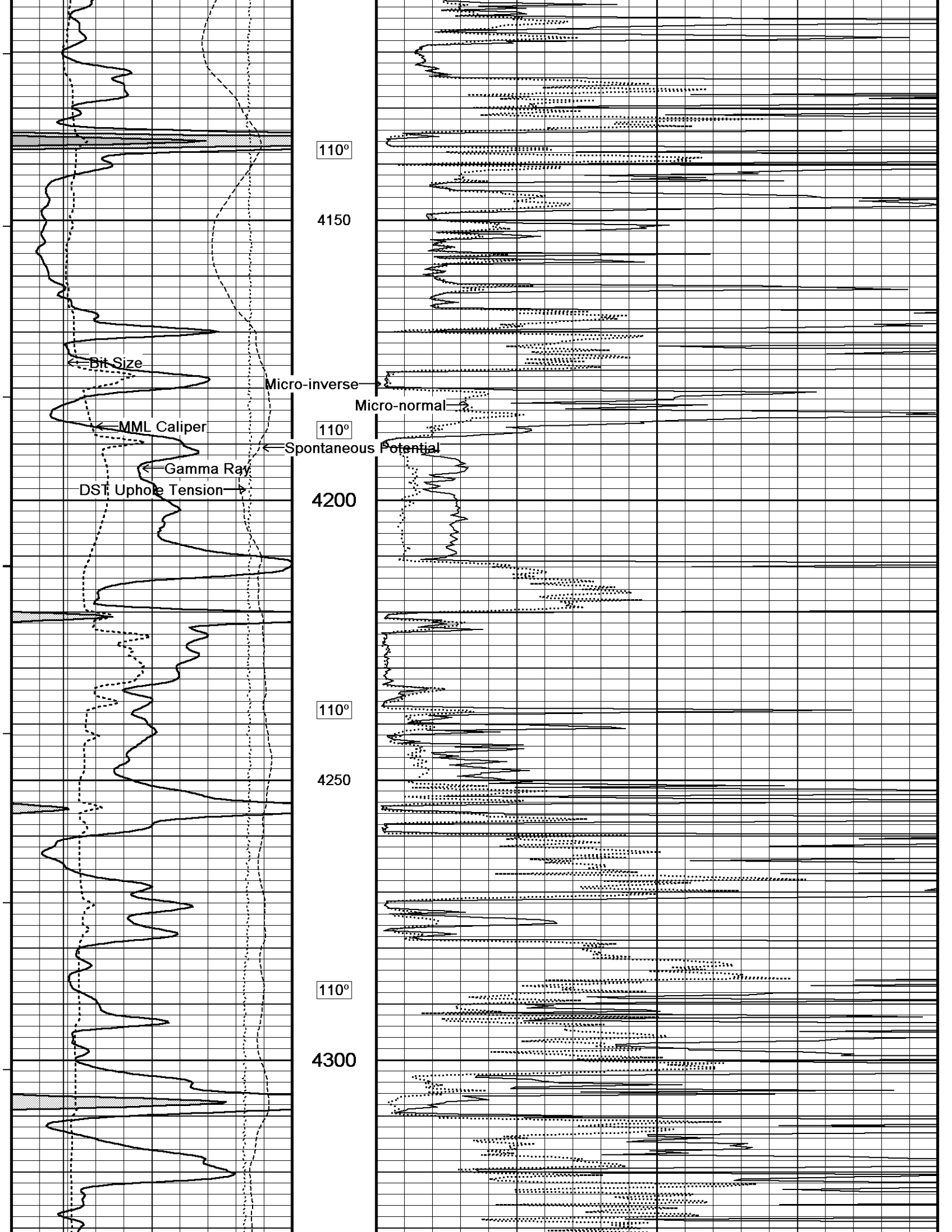
3600

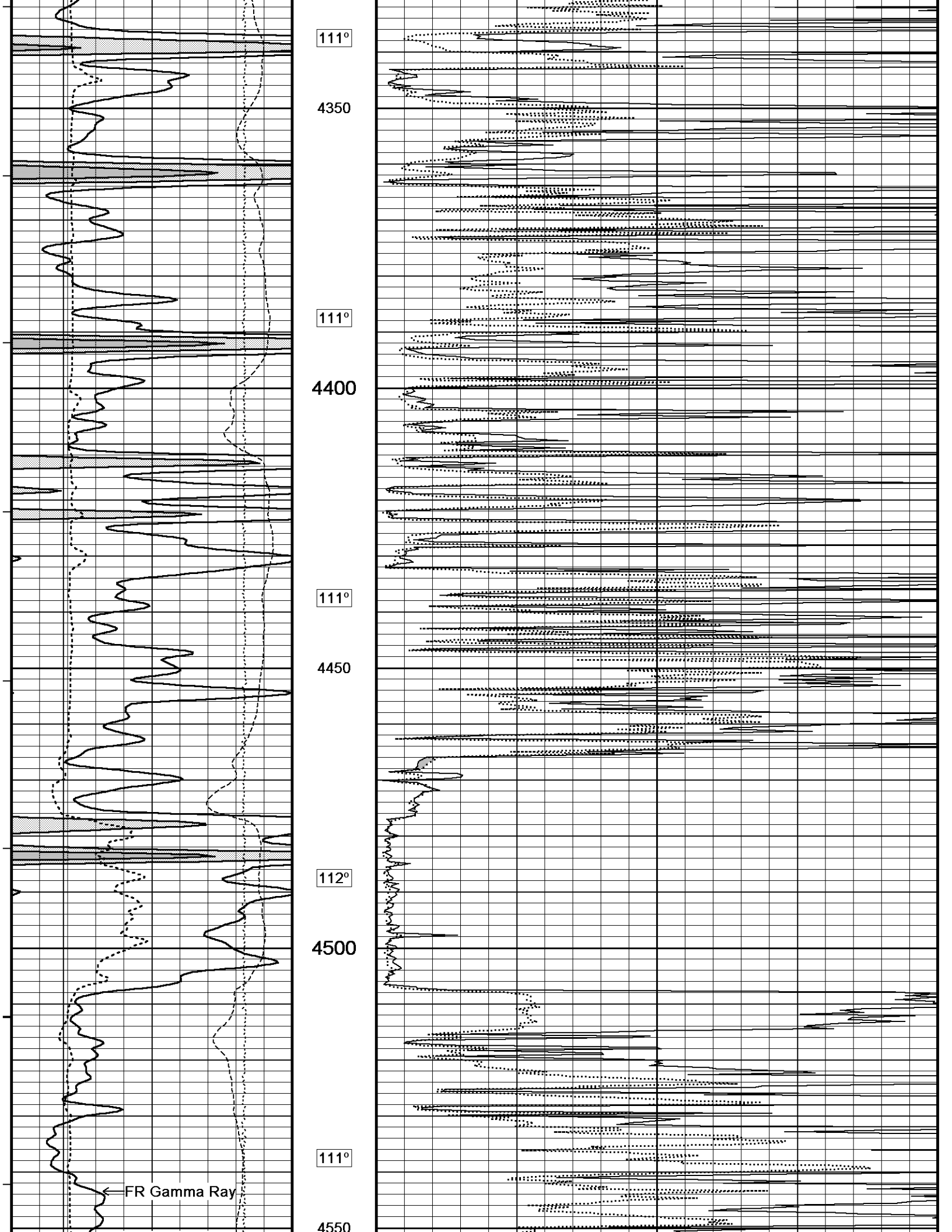
107°

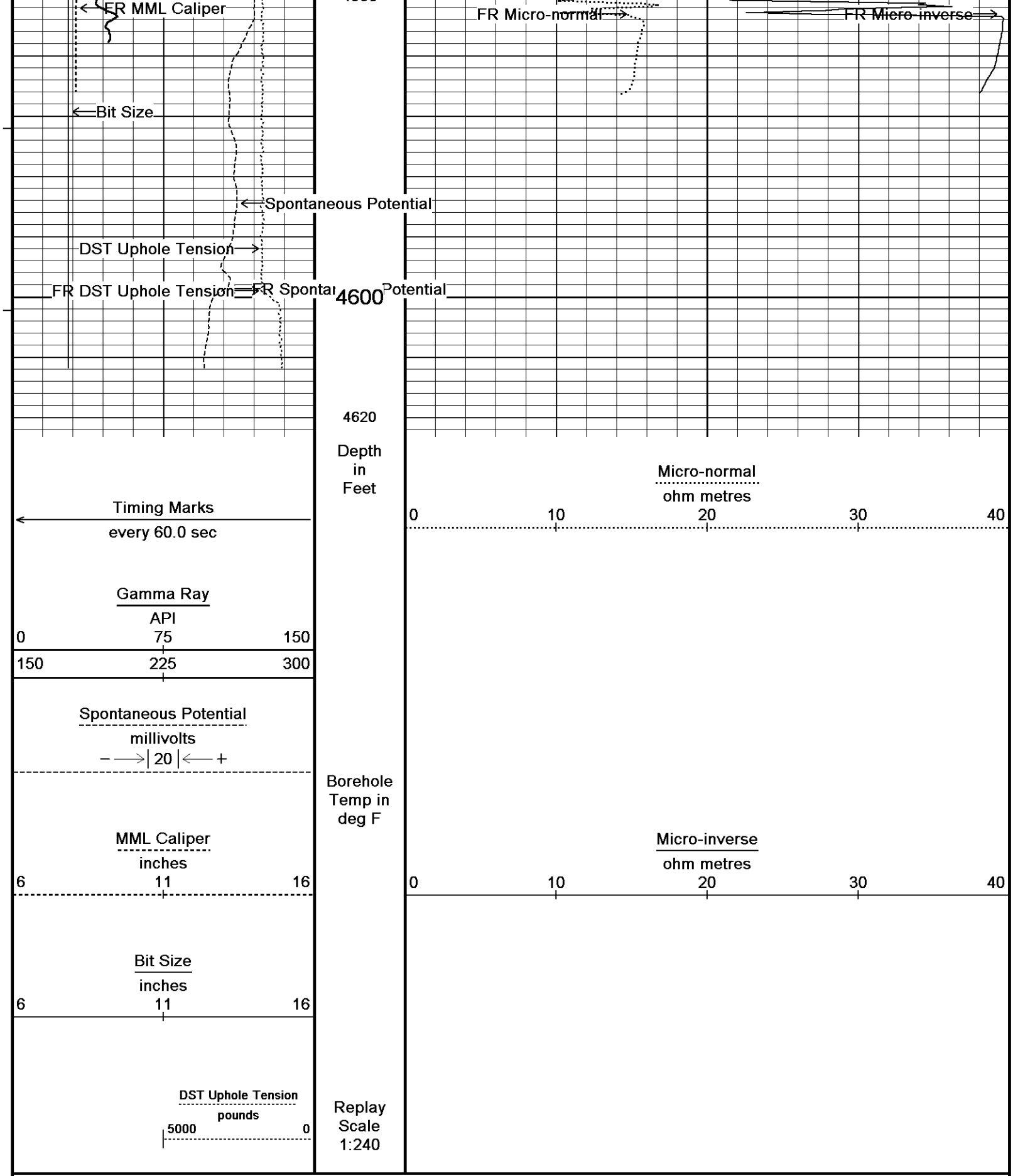
3650


107°
3700
107°
3750
Bit Size
Micro-inverse
108°
Micro-normal
MML Caliper
Spontaneous Potential
Gamma Ra
3800
DST Uphole Tension
108°
3850
108°


3900
109°
3950
109°
4000
109°
4050
109°
4100


110°
4150
Bit Size
Micro-inverse
Micro-normal
MML Caliper
110°
Spontaneous Potential
Gamma Ray
DST Uphole Tension
4200
110°
4250
110°
4300


111°
4350
111°
4400
111°
4450
112°
4500
111°
FR Gamma Ray
4550



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 16-SEP-2012 01:03
Filename: C:\Minimus 13.02.6600\Data\Shakespeare ...\Shakespeare Oil Company Ottley #1-8_002.dta
Recorded on 15-SEP-2012 22:39
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 16-SEP-2012 01:03
Filename: C:\Minimus 13.02.6600\Data\Shakespeare ...\Shakespeare Oil Company Ottley #1-8_001.dta
Recorded on 15-SEP-2012 22:23
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

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

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

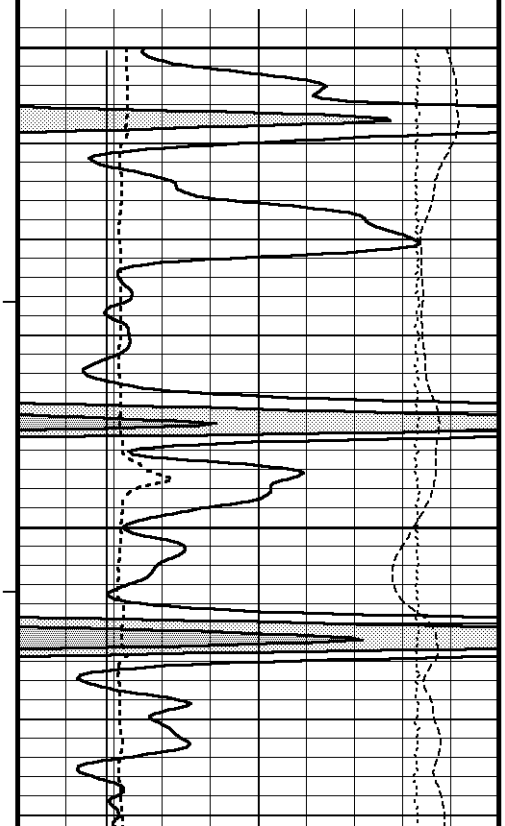
Micro-normal
ohm metres
0 10 20 30 40

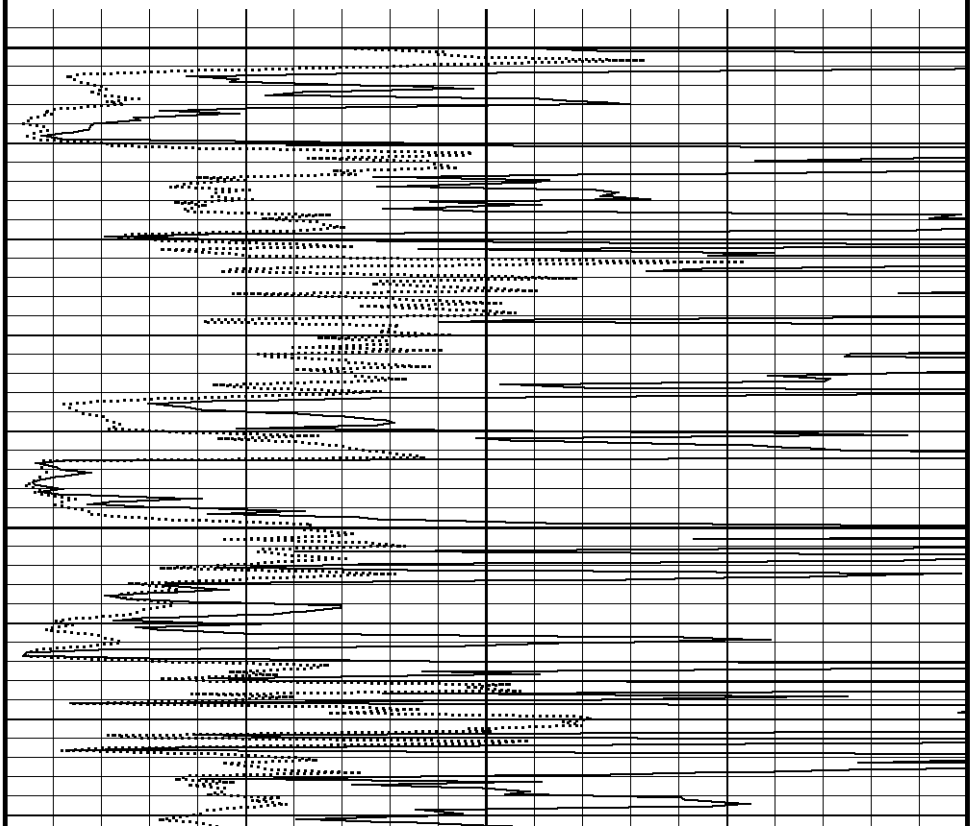
Micro-inverse
ohm metres
0 10 20 30 40

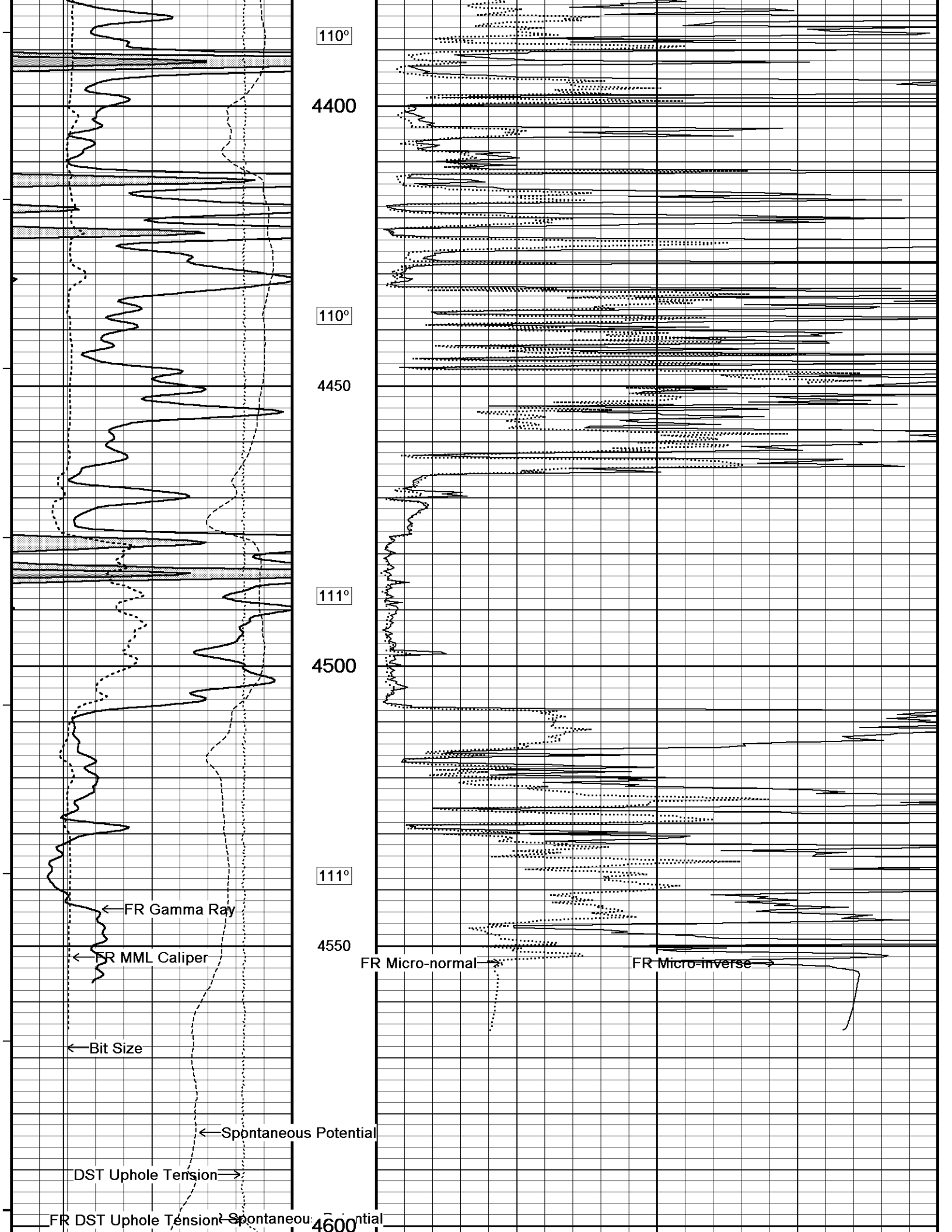
4300

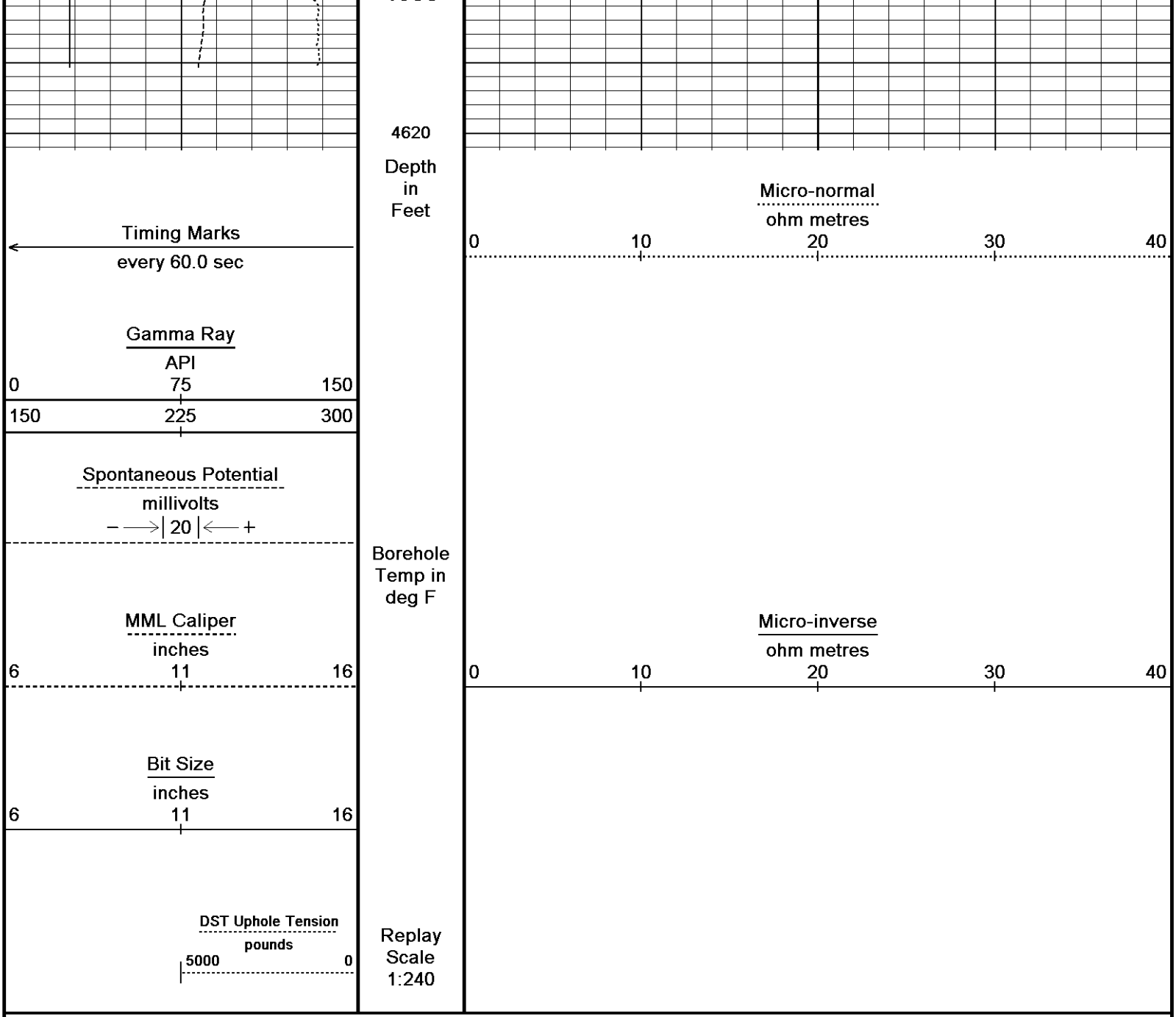
110°

4350






110°
4400
110°
4450
111°
4500
111°
4550
FR Gamma Ray
FR MML Caliper
Bit Size
Spontaneous Potential
DST Uphole Tension
FR DST Uphole Tension
Spontaneou
ntial
4600
FR Micro-normal
FR Micro-inverse



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 16-SEP-2012 01:03

Filename: C:\Minimus 13.02.6600\Data\Shakespeare ...\Shakespeare Oil Company Ottley #1-8_001.dta — Recorded on 15-SEP-2012 22:23

System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.02.6600\Data\Shakespeare Oil Company Ottley 1-8\Shakespeare Oil Company Ottley #1-8_001.dta

General Constants All 000 — Last Edited on 15-SEP-2012,21:35

General Parameters		
Mud Resistivity	0.510	ohm-metres
Mud Resistivity Temperature	88.000	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	Base Density Porosity
Resistivity used	Array Ind. Four Res Rt
RWA Constant A	0.610
RWA Constant M	2.150

Down-hole Tension Calibration SMS 0

Field Calibration on 10-SEP-2012 04:28

Reading No	Measured	Calibrated (lbs)
1	15456.86	0.00
2	16071.78	384.00

Gamma Calibration MCG-D.K 442

Field Calibration on 15-SEP-2012 17:27

	Measured	Calibrated (API)
Background	72	49
Calibrator (Gross)	1147	774
Calibrator (Net)	1074	725

Gamma Constants MCG-D.K 442

Last Edited on 15-SEP-2012,21:26

Gamma Calibrator Number	GRC38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG-D.K 442

Field Calibration on 17-JUL-2012 16:34

	Measured	Calibrated (mV)
Reference 1	100.2	100.0
Reference 2	-99.9	-100.0

High Resolution Temperature Calibration MCG-D.K 442

Field Calibration on 17-JUL-2012,16:35

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

High Resolution Temperature Constants MCG-D.K 442

Last Edited on

Pre-filter Length	11

Caliper Calibration MML-A 16

Base Calibration on 07-SEP-2012 10:01
Field Calibration on 15-SEP-2012 17:20

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13823	5.98
2	16876	7.97
3	20058	9.86
4	23883	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.02	5.98

Micro Normal and Micro Inverse Calibration MML-A 16

Base Calibration on 07-SEP-2012 10:10
Field Check on 15-SEP-2012 17:21

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	78.3	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 15-SEP-2012,17:20

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 07-SEP-2012 14:38
Field Check on 15-SEP-2012 17:32

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3154	98	3714	110
Ratio	32.161		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1643	2350
Ratio	0.699	

Field Check

	Calibrated (cps)	
	1632	2346
Ratio	0.696	

Neutron Constants MDN-A.B 66

Last Edited on 15-SEP-2012,17:28

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	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 353

Base Calibration on 27-AUG-2012 09:28
Field Check on 15-SEP-2012 17:12

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.3	126.8
Base Check		281.0
Field Check		281.0

FE Constants MFE-B.J 353

Last Edited on 15-SEP-2012,17:11

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

Sonic Constants MSS-A.A 126

Last Edited on 15-SEP-2012,21:16

Maximum Boundary Contrast	100.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3ET	N/A	micro-sec

MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft

Sonde Mode	Compensated
Hole Type	Open Hole

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A

Peak Amplitude Source N/A

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	N/A
N/A	N/A	N/A	
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A	
Use 4' Waveform to derive TR	N/A	
Use 5' Waveform to derive TR	N/A	
Use 6' Waveform to derive TR	N/A	
3' Waveform Discriminator Level	N/A	mV
4' Waveform Discriminator Level	N/A	mV
5' Waveform Discriminator Level	N/A	mV
6' Waveform Discriminator Level	N/A	mV
3' Waveform Filter	N/A	
4' Waveform Filter	N/A	
5' Waveform Filter	N/A	
6' Waveform Filter	N/A	
Semblance Level	N/A	
Semblance Window Width	N/A	micro-sec
Sonic 1 Despiker	N/A	N/A
Sonic 2 Despiker	N/A	N/A

High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 17-JUL-2012,13:53

	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 17-JUL-2012,13:49

Pre-filter Length 11

Induction Calibration MAI-A.A 167

Base Calibration on 17-JUL-2012,13:55
Field Check on 15-SEP-2012 17:10

Base Calibration

Test Loop Calibration Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) 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) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High

1	0.0	0.0	13.3	3839.2	
2	0.0	0.0	29.7	3476.8	
3	0.0	0.0	29.2	3053.0	
4	0.0	0.0	19.8	2081.7	
Deep	0.0	0.0	18.7	2049.0	
Medium	0.0	0.0	42.2	3991.1	
Shallow	0.0	0.0	43.0	5053.9	
Array Temperature		0.0		79.1	Deg F

Induction Constants MAI-A.A 167

Last Edited on 15-SEP-2012,21:16

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	

Caliper Calibration MPD-B 64

Base Calibration on 07-SEP-2012 15:19
Field Calibration on 15-SEP-2012 17:14

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	12187	3.99
2	20933	5.98
3	29363	7.97
4	37866	9.86
5	47152	11.92
6	N/A	N/A

Field Calibration

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

Photo Density Calibration MPD-B 64

Base Calibration on 07-SEP-2012 15:36
Field Check on 15-SEP-2012 17:19

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	63262	35109	59556	30836

Reference 2	26458	3017	24941	2541

Field Check at Base

	1187.6	1377.3

Field Check

	1184.2	1371.4

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	215	1060		
Reference 1	23956	63052	0.383	0.371
Reference 2	7220	26320	0.277	0.272

Field Check at Base

	215.3	1059.6

Field Check

	212.7	1055.5

Density Constants MPD-B 64

Last Edited on 15-SEP-2012,21:26

Density Source Id	18235B	
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)
2.87	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

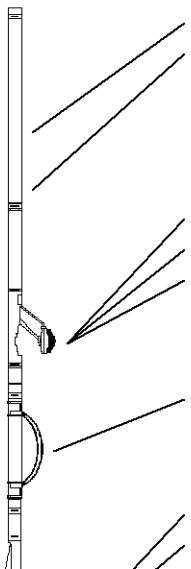
C:\Minimus 13.02.6600\Data\Shakespeare Oil Company Ottley 1-8\Shakespeare Oil Company Ottley #1-8_001.dta

Compact Comms Gamma
MCG-D.K 442 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

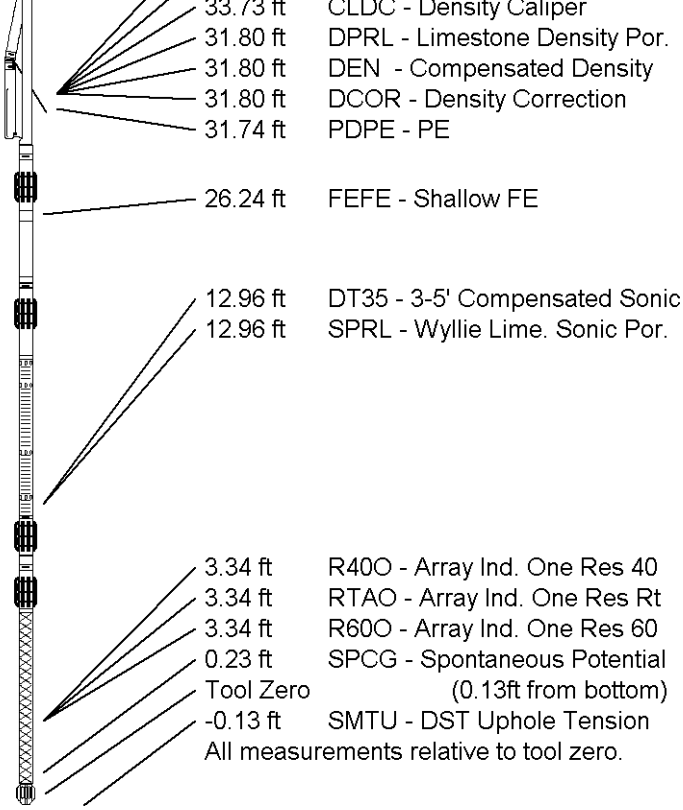
Compact Micro-log
MML-A 16 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

Compact Neutron
MDN-A.B 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



55.39 ft	GRGC - Gamma Ray
52.48 ft	CGXT - MCG External Temperature
45.76 ft	MINV - Micro-inverse
45.76 ft	MNRL - Micro-normal
46.76 ft	MLTC - MML Caliper
40.97 ft	NPRL - Limestone Neutron Por.
33.73 ft	AVOL - Annular Volume
33.73 ft	HVOL - Hole Volume



33.73 ft CLDC - Density Caliper
31.80 ft DPRL - Limestone Density Por.
31.80 ft DEN - Compensated Density
31.80 ft DCOR - Density Correction
31.74 ft PDPE - PE

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

26.24 ft FEFE - Shallow FE

Compact Sonic
MSS-A.A 126 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

12.96 ft DT35 - 3-5' Compensated Sonic
12.96 ft SPRL - Wyllie Lime. Sonic Por.

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

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.

Total Length: 60.68 ft Weight: 456.4 lb

COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	OTTLEY #1-8
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2853.00	feet	First Reading	4553.00	feet
Elevation Drill Floor	2852.00	feet	Depth Driller	4600.00	feet
Elevation Ground Level	2843.00	feet	Depth Logger	4599.00	feet

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