

**Weatherford****MICRORESISTIVITY LOG**

COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	ZANOBIA #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1090' FSL & 2305' FWL SW/4

40

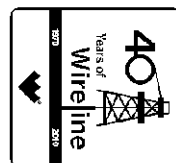
Years of
Wireline



2017

2016





SEC 22	TWP 15S	RGE 33W	Other Services MPD/MDN MSS	MAI/MFE	Elevations: KB 2812.00 DF 2811.00 GL 2802.00
API Number 15-109-21088			Permanent Datum G.L., Elevation 2802 feet		
Permit Number			Log Measured From KB		
Date			Drilling Measured From K.B.		
Run Number	ONE		13-JUL-2012		
Depth Driller	4585.00		feet		
Depth Logger	4585.00		feet		
First Reading	4539.00		feet		
Last Reading	3600.00		feet		
Casing Driller	253.00		feet		
Casing Logger	253.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	CHEMICAL				
Density / Viscosity	8.70 lb/USg		54.00 CP		
PH / Fluid Loss	10.00		10.40 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.34 @ 87.0		ohm-m		
Rmf @ Measured Temp	0.27 @ 87.0		ohm-m		
Rmc @ Measured Temp	0.41 @ 87.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.27 @109.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	109.00		deg F		
Equipment Name	COMPACT				
Equipment / Base	13057		LIB		
Recorded By	L. SCOTT				
Witnessed By	TIM PRIEST				
S O # / JOB#	3534557		LB12-179		

BOREHOLE RECORD

Last Edited: 13-JUL-2012 12:39

Bit Size inches	Depth From feet	Depth To feet
7.875	253.00	4585.00

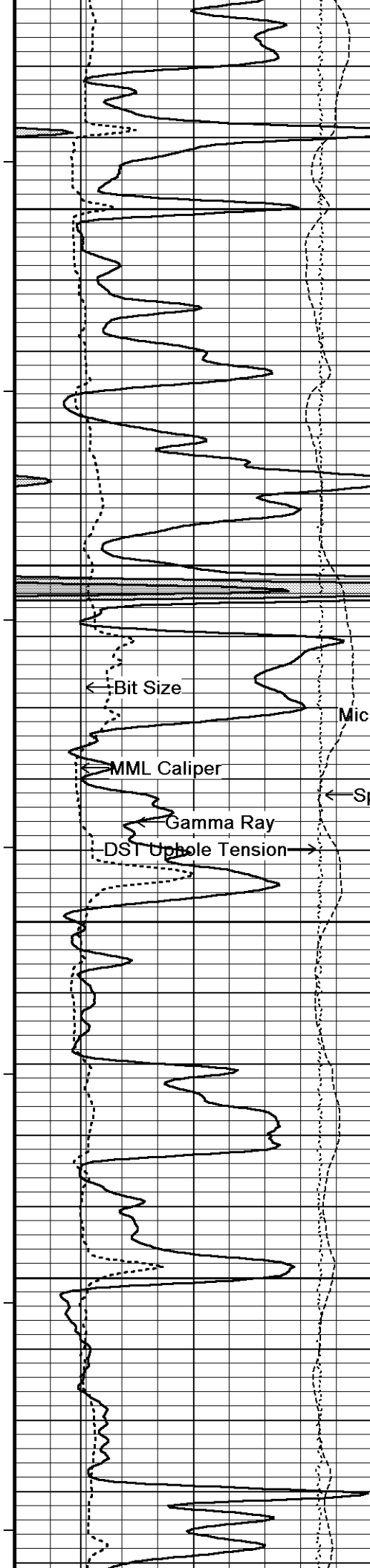
CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	253.00	24.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MSS, MAI.
Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used. MFE, MSS and MAI 0.5 inch standoffs used.
2.71 g/cc Limestone Density Matrix used to calculate porosity.
Sonic porosity calculated using a Limestone scale (47.5 usec/ft).
All intervals logged and scaled per customer's request.
Tight pulls, washouts and borehole rugosity will affect data quality.
Annular volume with 4.5 inch production casing= 247 cu. ft.
Total hole volume from TD to Surface casing= 2128 cu. ft.
Service order: #3534557
Rig: HD Drilling #2
Engineer: L. Scott
Operator(s): N. Adame

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.



105°

3700

105°

3750

← Bit Size

← MML Caliper

← Gamma Ray

DST Up-hole Tension →

Micro-inverse

← Spontaneous Potential

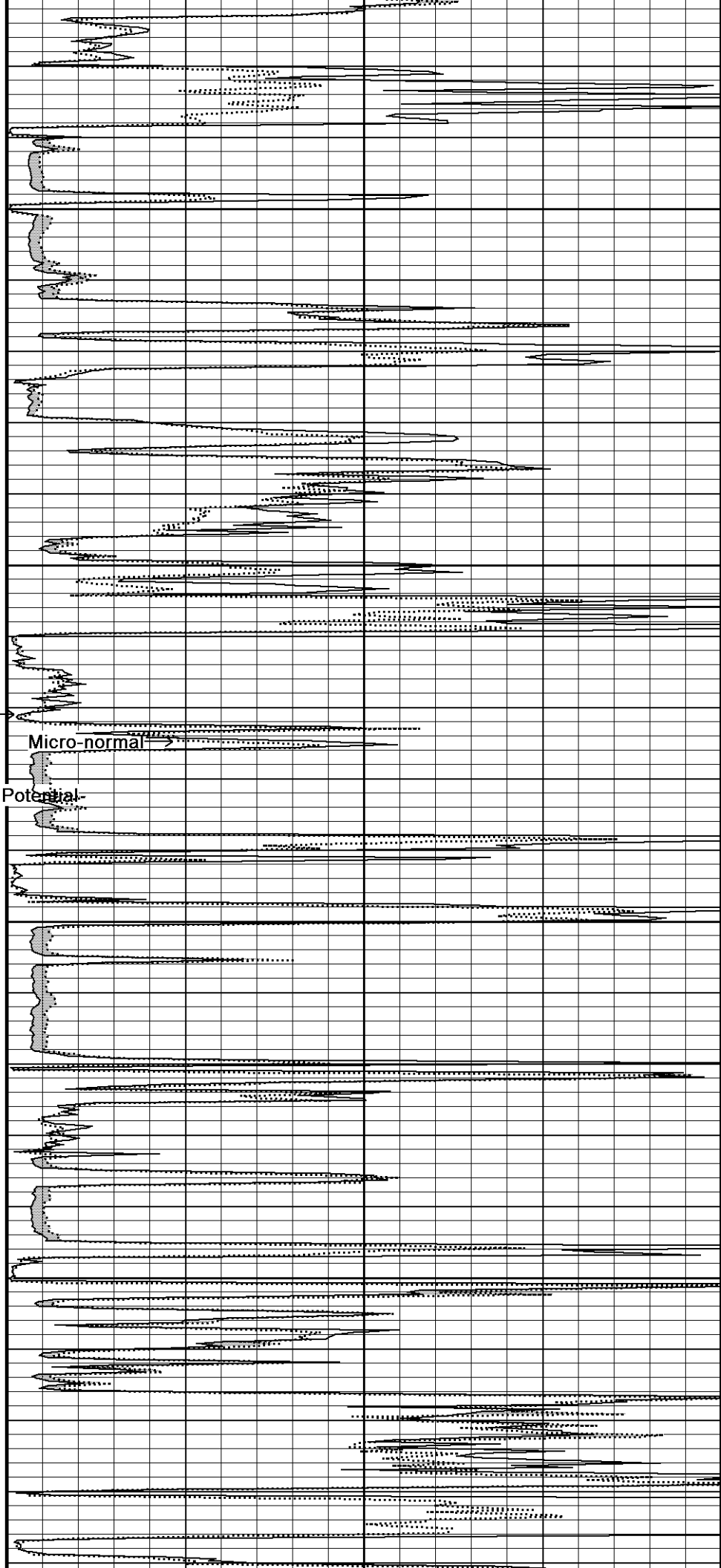
105°

3800

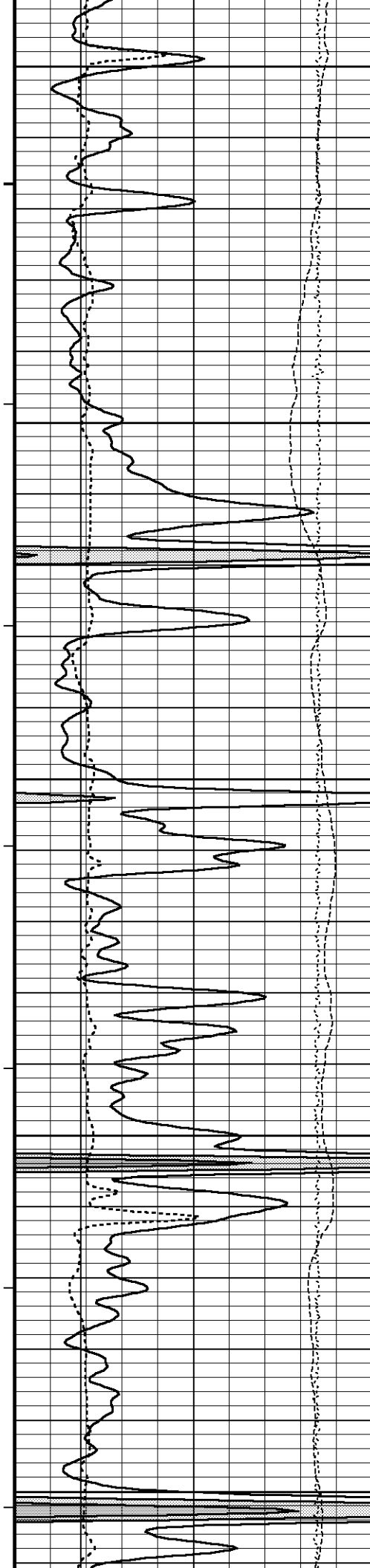
105°

3850

105°



Micro-normal →



3900

106°

3950

106°

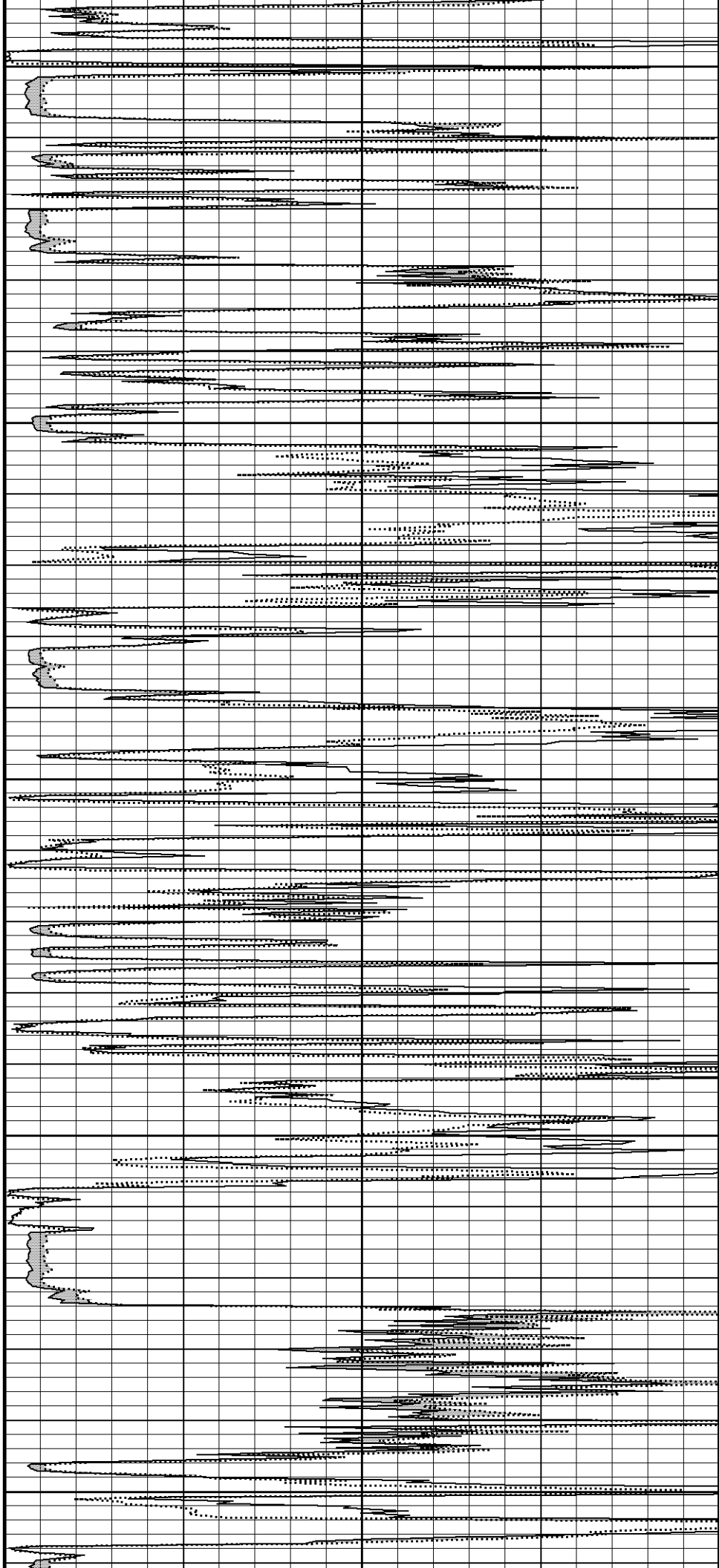
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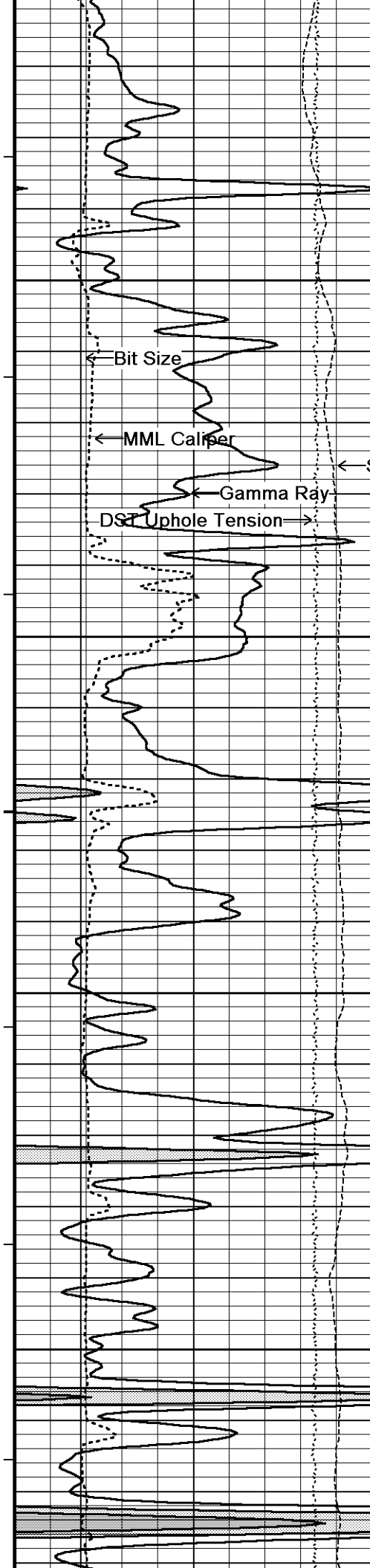
106°

4050

106°

4100





106°

4150

Micro-inverse
Micro-normal

Spontaneous Potential

107°

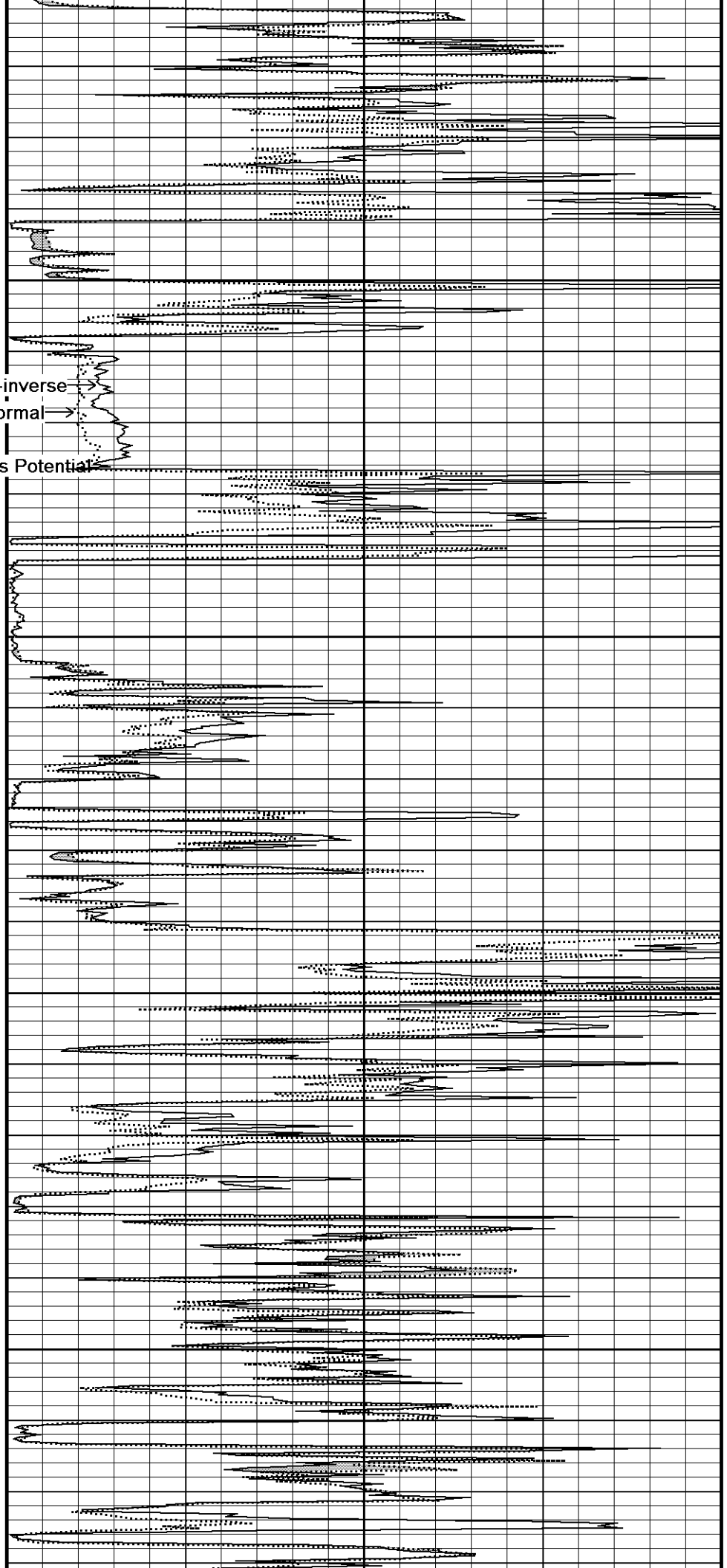
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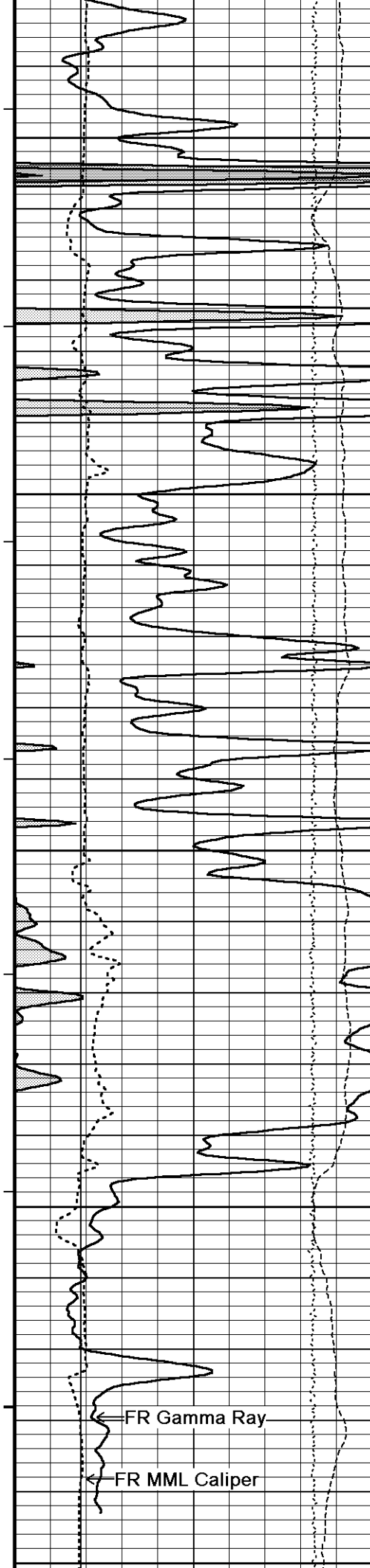
107°

4250

108°

4300





109°

4350

109°

4400

109°

4450

110°

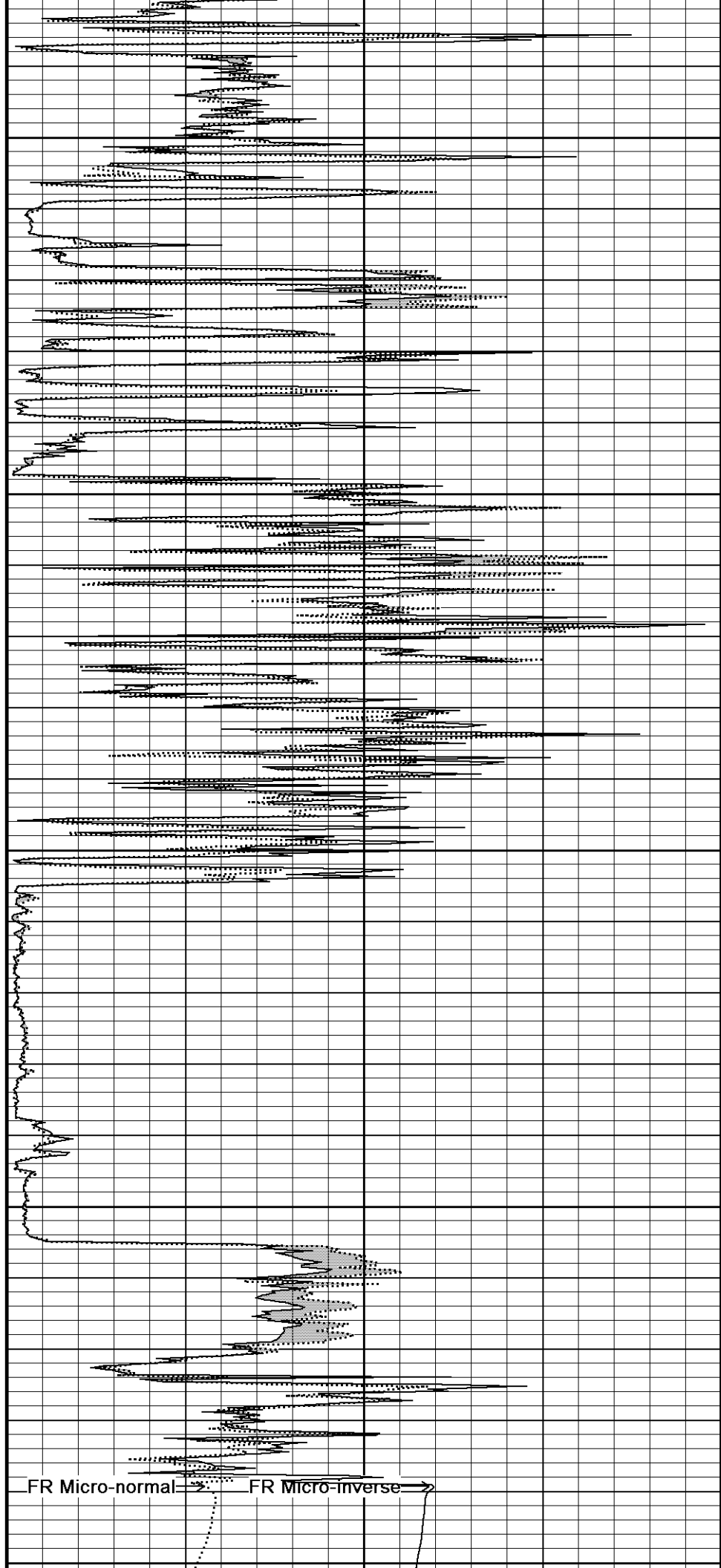
4500

FR Gamma Ray

FR MML Caliper

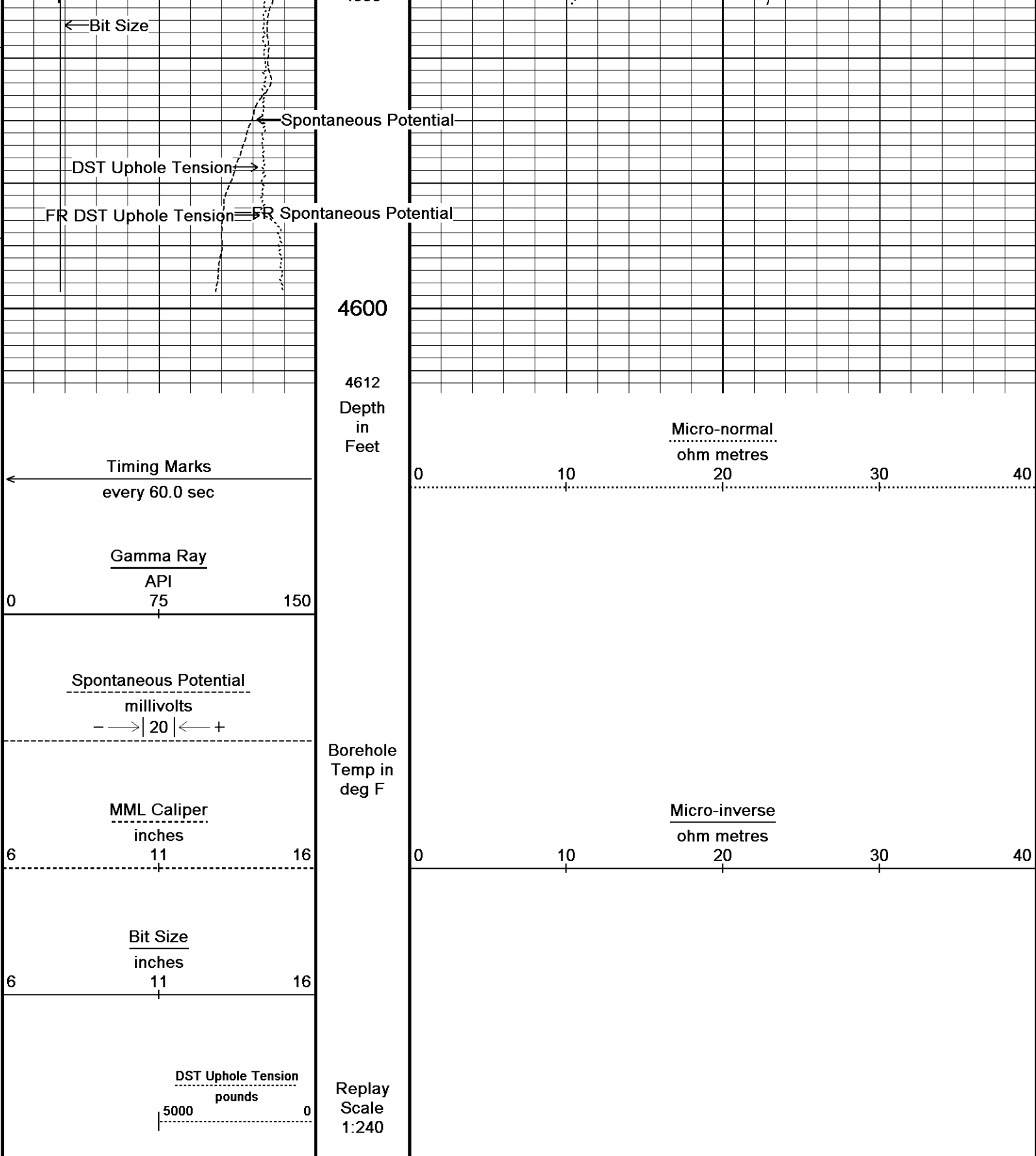
109°

4550



FR Micro-normal

FR Micro-inverse

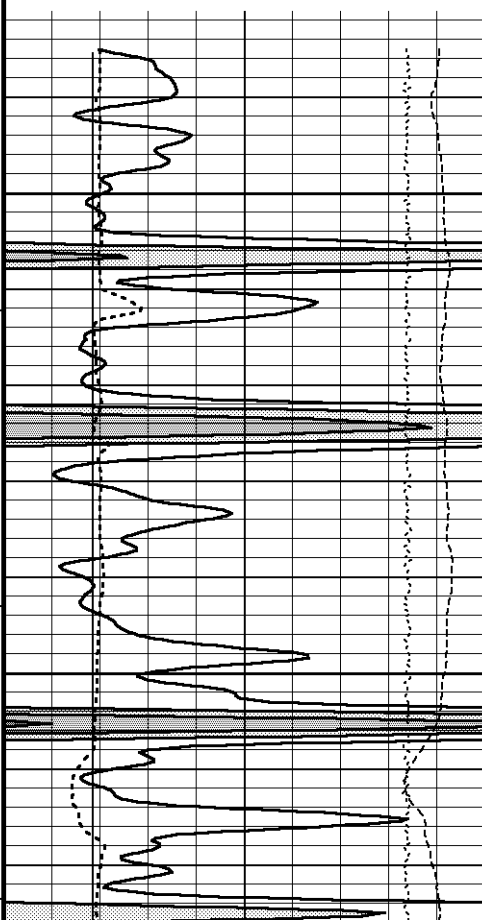
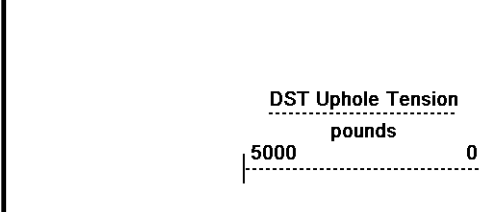
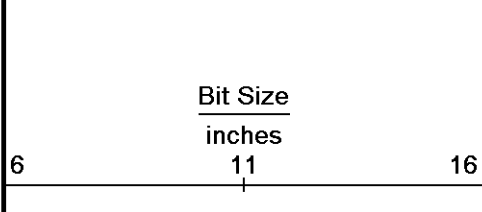
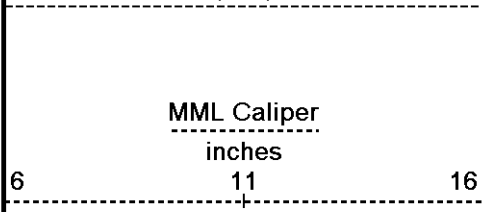
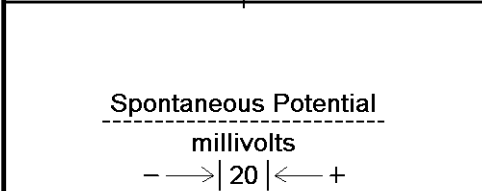
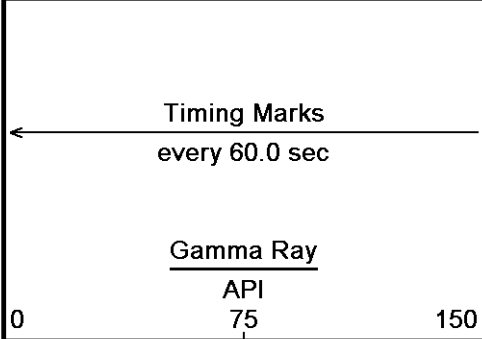


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 13-JUL-2012 12:42
Filename: C:\Minimus 11.03.4044\Data\Shakespeare Zanobia #1...\Shakespeare Zanobia 1-22_002.dta Recorded on 13-JUL-2012 10:29
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

↑ 5 INCH MAIN PASS ↑

↓ 5 INCH REPEAT PASS ↓

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 13-JUL-2012 12:42
Filename: C:\Minimus 11.03.4044\Data\Shakespeare Zanobia #1...\Shakespeare Zanobia 1-22_001.dta Recorded on 13-JUL-2012 10:09
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044

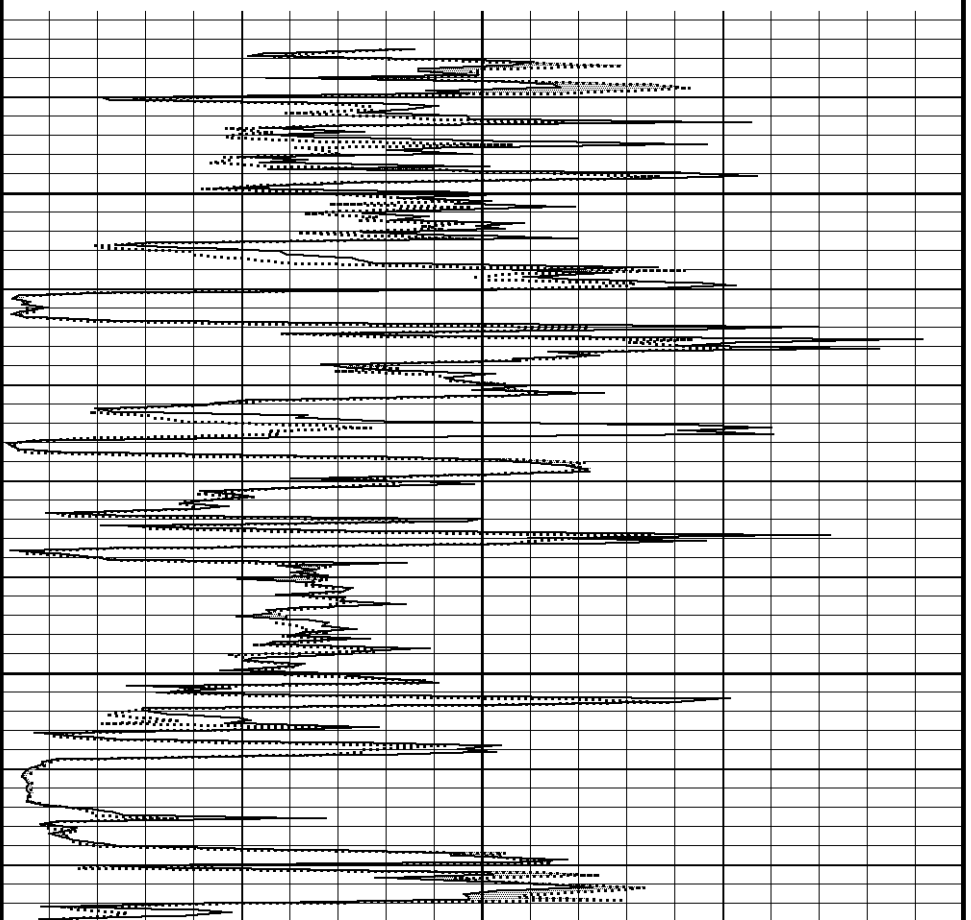
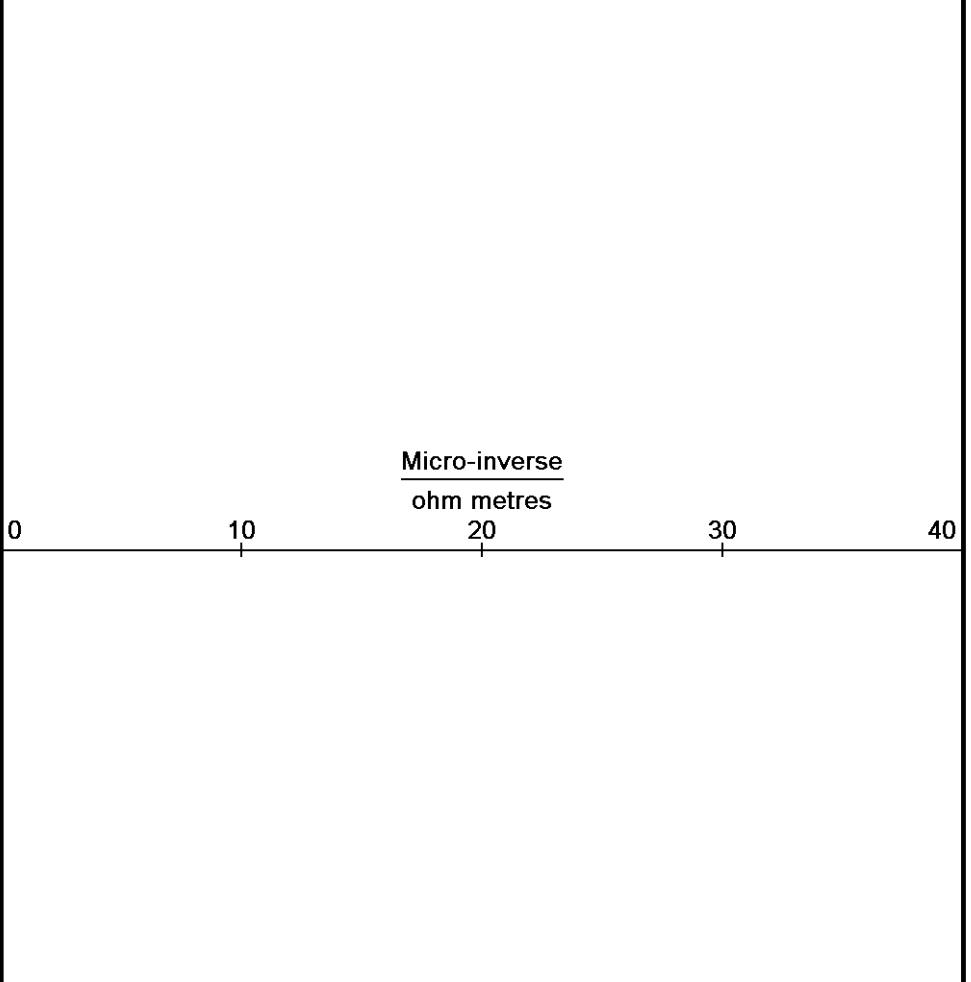
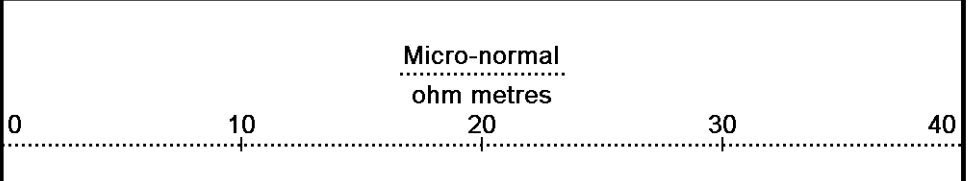


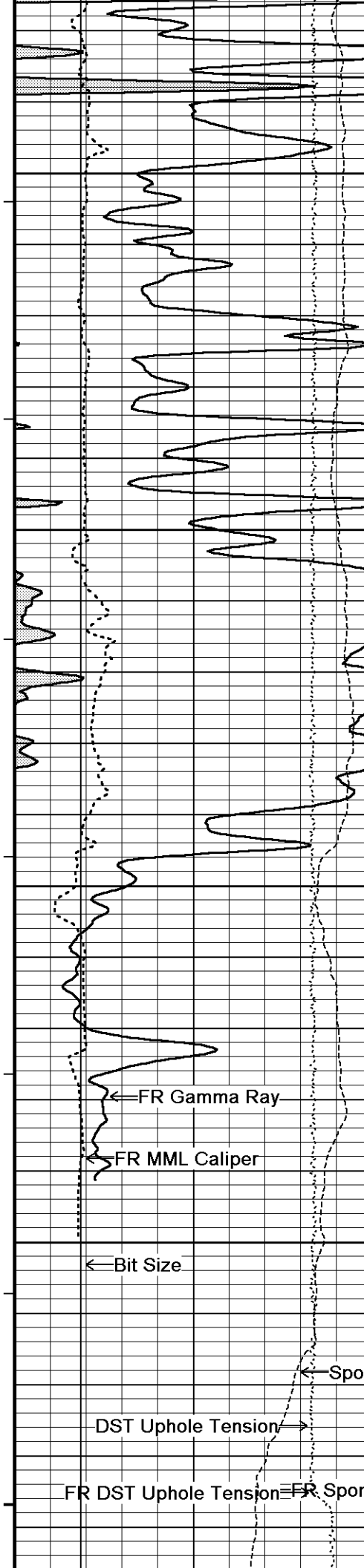
Depth
in
Feet

Borehole
Temp in
deg F

Replay
Scale
1:240

4284
4300
108°
4350





108°

4400

109°

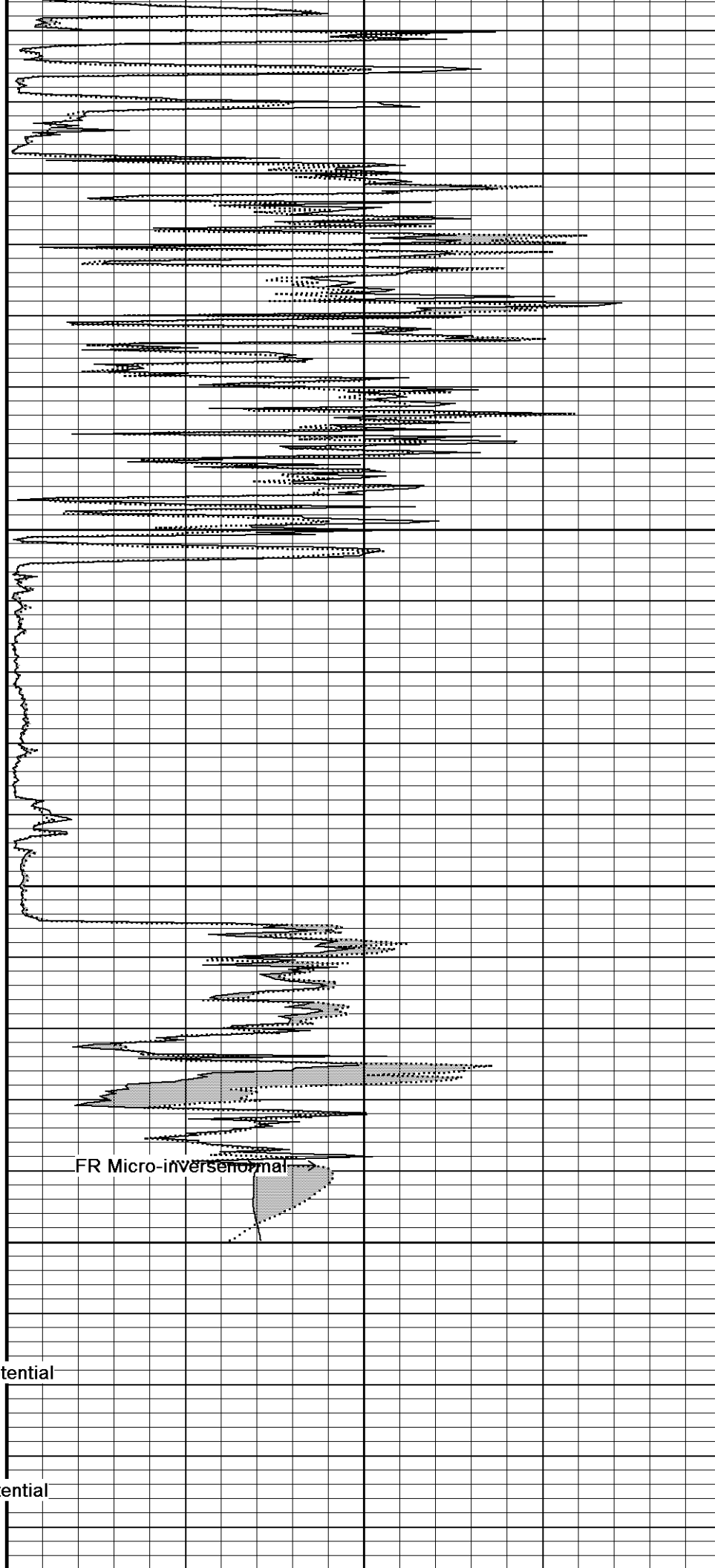
4450

110°

4500

109°

4550



FR Micro-inversion normal

← FR Gamma Ray

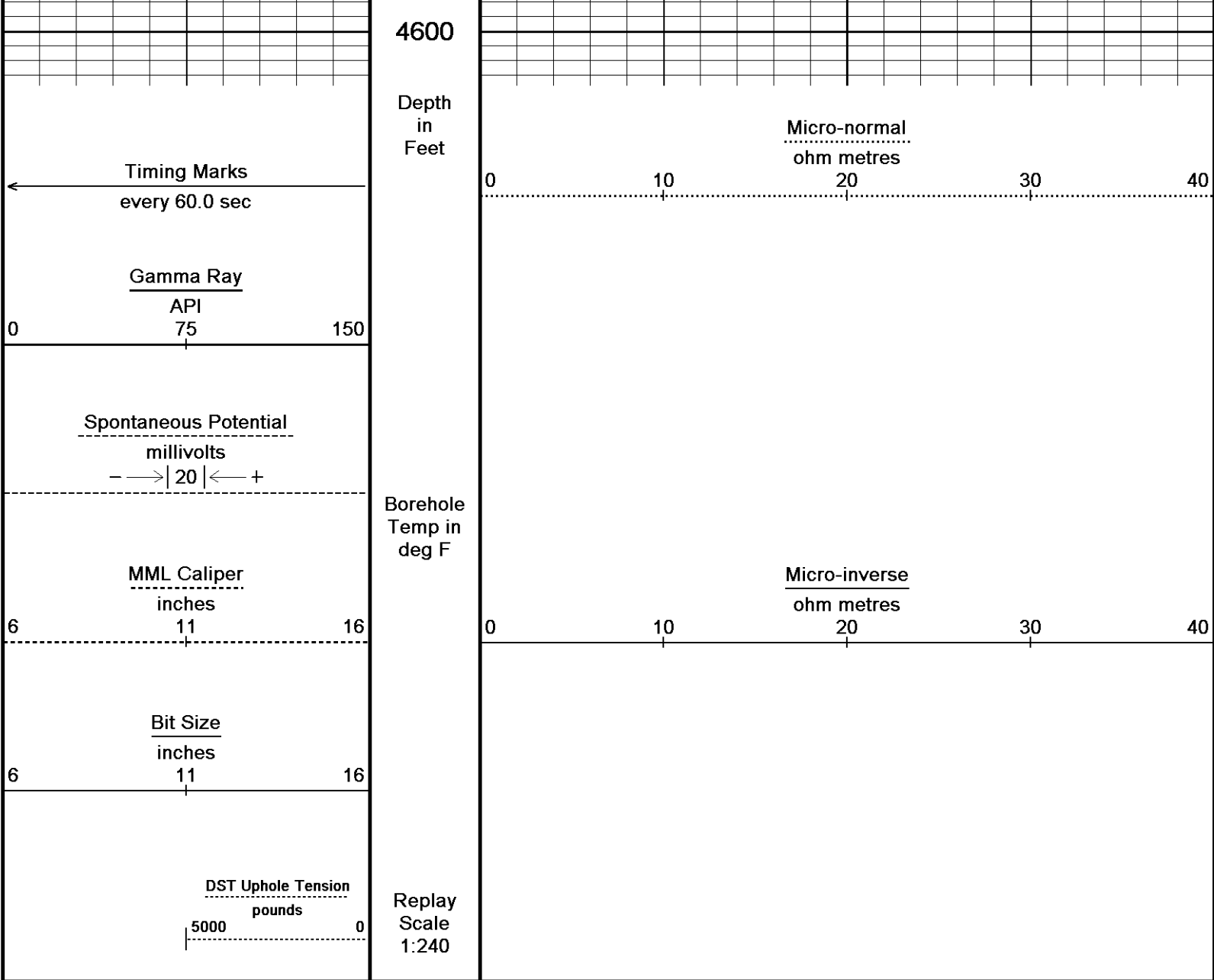
← FR MML Caliper

← Bit Size

← Spontaneous Potential

DST Uphole Tension →

FR DST Uphole Tension = FR Spontaneous Potential



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 13-JUL-2012 12:42
Filename: C:\Minimus 11.03.4044\Data\Shakespeare Zanobia #1...\Shakespeare Zanobia 1-22_001.dta	Recorded on 13-JUL-2012 10:09
System Versions: Logged with 11.03.4044 Plotted with 11.03.4044	

↑	5 INCH REPEAT PASS	↑
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BEFORE SURVEY CALIBRATION	
C:\Minimus 11.03.4044\Data\Shakespeare Zanobia #1-22\Shakespeare Zanobia 1-22.dta	

General Constants All 000	Last Edited on 13-JUL-2012,09:08
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General Parameters		
Mud Resistivity	0.340	ohm-metres
Mud Resistivity Temperature	87.000	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	4.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Limestone Density Por.	

Resistivity used		Array Ind. One Res Rt		
RWA Constant A				0.610
RWA Constant M				2.150
Down-hole Tension Calibration SMS 0				Field Calibration on 08-JUL-2012 04:57
Reading No	Measured	Calibrated (lbs)		
1	13893.37	0.00		
2	13954.26	582.00		
Gamma Calibration MCG-C 84				Field Calibration on 12-JUL-2012 15:43
	Measured	Calibrated (API)		
Background	72	49		
Calibrator (Gross)	1139	774		
Calibrator (Net)	1067	725		
Gamma Constants MCG-C 84				Last Edited on 13-JUL-2012,09:08
Gamma Calibrator Number	GR38			
Mud Density	1.04	gm/cc		
Caliper Source for Processing	Density Caliper			
Tool Position	Eccentred			
Concentration of KCl	0.00	kppm		
SP Calibration MCG-C 84				Field Calibration on 06-JUL-2012 09:32
	Measured	Calibrated (mV)		
Reference 1	105.6	101.0		
Reference 2	-96.1	-101.0		
High Resolution Temperature Calibration MCG-C 84				Field Calibration on 28-MAY-2012,07:32
	Measured	Calibrated(Deg F)		
Lower	50.00	50.00		
Upper	75.00	75.00		
High Resolution Temperature Constants MCG-C 84				Last Edited on
Pre-filter Length	11			
Micro Normal and Micro Inverse Calibration MML-A 4				Base Calibration on 28-JUN-2012 09:09 Field Check on 12-JUL-2012 15:34
Base Calibration				
Channel	Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1 Resistor 2	
Micro Normal	12.2	60.3	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 4				Last Edited on 12-JUL-2012,15:32
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 4				Base Calibration on 28-JUN-2012 09:05 Field Calibration on 12-JUL-2012 15:32
Base Calibration				
Reading No	Measured	Calibrator Size (in)		
1	15261	5.98		
2	18643	7.97		
3	21962	9.86		
4	25966	11.92		
5	0	0.00		
6	N/A	N/A		
Field Calibration				
	Measured Caliper (in)	Actual Caliper (in)		
	6.09	5.98		

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3161	99	3714	110
Ratio	31.971		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1631	2328
Ratio	0.700	

Field Check

	Calibrated (cps)	
	1629	2346
Ratio	0.695	

Neutron Constants MDN-A.B 65

Last Edited on 13-JUL-2012,09:09

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	
Formation Fluid Salinity Source	Constant Value		
Formation Fluid Salinity	0.00	kppm	
Barite Mud Correction	Not Applied		

FE Calibration MFE-A.A 55

Base Calibration on 19-JUN-2012 09:07
Field Check on 12-JUL-2012 15:22

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	952.0	126.8
Base Check		281.3
Field Check		281.3

FE Constants MFE-A.A 55

Last Edited on 13-JUL-2012,09:09

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-C.K 330

Last Edited on 13-JUL-2012,09:09

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

Sonde Mode Compensated

Sonde Mode
Hole Type

Compensated
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	

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

Induction Calibration MAI-A.A 45

Base Calibration on 12-JAN-2012,13:34
Field Check on 12-JUL-2012 15:21

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 79.4 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	0.0	0.0	18.3	3851.8	
2	0.0	0.0	31.6	3629.8	
3	0.0	0.0	28.6	3049.8	
4	0.0	0.0	18.3	2079.3	
Deep	0.0	0.0	16.0	1911.3	
Medium	0.0	0.0	42.5	4061.2	
Shallow	0.0	0.0	49.5	5483.8	

Array Temperature 0.0 88.5 Deg F

Induction Constants MAI-A.A 45

Last Edited on 13-JUL-2012,09:09

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 28-JUN-2012,09:51

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

High Resolution Temperature Constants MAI-A.A 45

Last Edited on 12-JAN-2012,11:13

Pre-filter Length	11
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Caliper Calibration MPD-B 31

Base Calibration on 17-JUN-2012 20:26

Field Calibration on 12-JUL-2012 15:23

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17360	3.99
2	25891	5.98
3	34800	7.97
4	43168	9.86
5	52528	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	6.00	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 17-JUN-2012 20:49

Field Check on 12-JUL-2012 15:29

Density Calibration				
Base Calibration				
	Measured	Calibrated (sdu)		
	Near	Far	Near	Far
Reference 1	48464	24458	59556	30836
Reference 2	19785	1991	24941	2541
Field Check at Base				
	695.5	853.6		

Field Check

693.4 856.0

PE Calibration

Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	128	610		
Reference 1	19401	48326	0.404	0.371
Reference 2	5740	19688	0.294	0.272

Field Check at Base

128.0 610.0

Field Check

127.7 608.0

Density Constants MPD-B 31

Last Edited on 13-JUL-2012,09:09

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	1.04 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

DOWNHOLE EQUIPMENT

C:\Minimus 11.03.4044\Data\Shakespeare Zanobia #1-22\Shakespeare Zanobia 1-22.dta

Compact Comms Gamma
MCG-C 84 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Comms Gamma
MCG-C 84 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

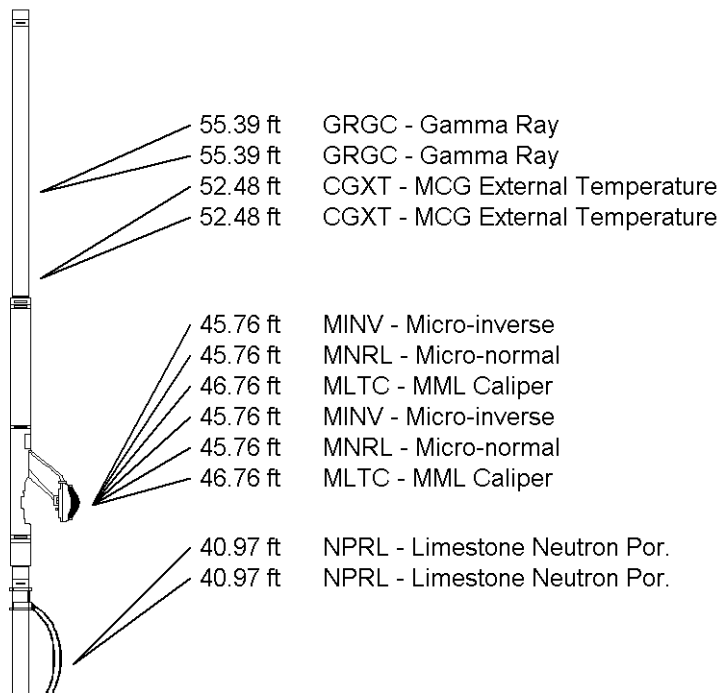
Compact Micro-log
MML-A 4 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

Compact Micro-log
MML-A 4 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 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 Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Sonic
MSS-C.K 330 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

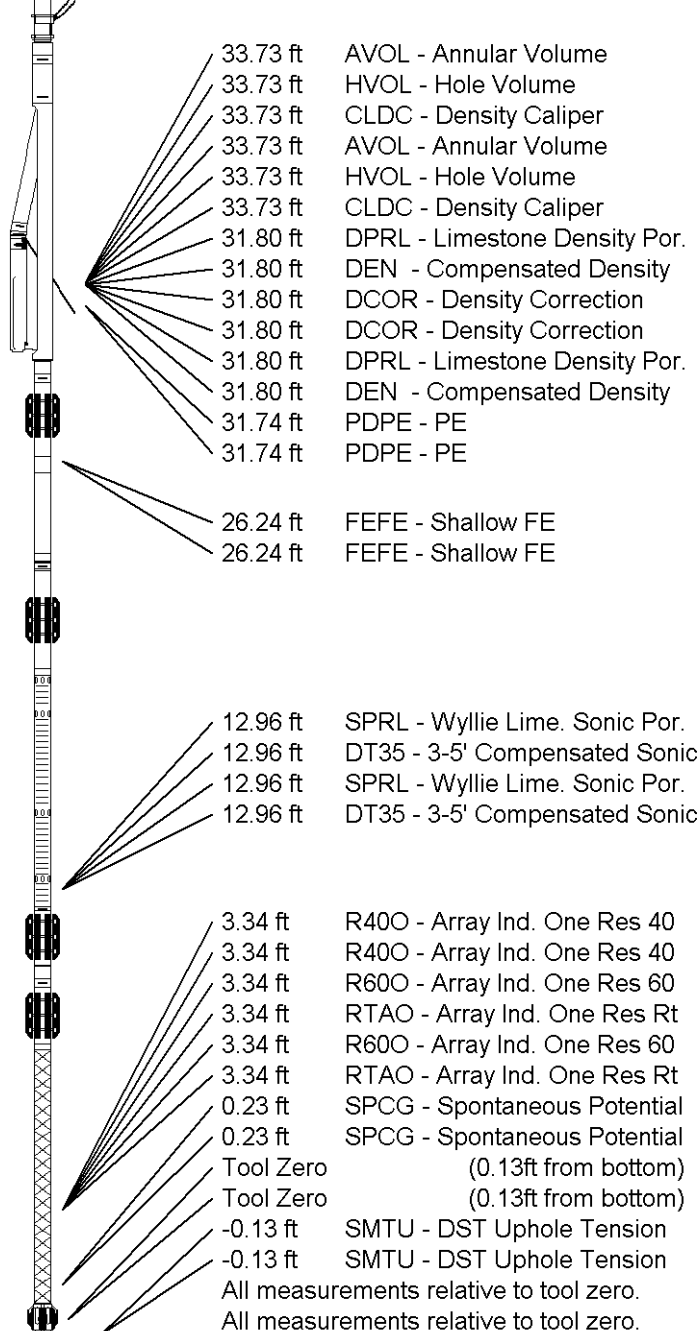
Compact Sonic
MSS-C.K 330 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

Compact Induction
MAI-A.A 45 LG: 10.81 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: 60.68 ft Weight: 456.4 lb

Total Length: 60.68 ft Weight: 456.4 lb



COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	ZANOBIA #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2812.00	feet	First Reading	4539.00	feet
Elevation Drill Floor	2811.00	feet	Depth Driller	4585.00	feet
Elevation Ground Level	2802.00	feet	Depth Logger	4585.00	feet



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