



Weatherford
LOG

MICRORESISTIVITY LOG

COMPANY				SHAKESPEARE OIL CO, INC.			
WELL				TUCKER 1-5			
FIELD				WILDCAT			
PROVINCE/COUNTY				SCOTT			
COUNTRY/STATE				U.S.A. / KANSAS			
LOCATION				2305' FSL & 2310' FEL			
SEC	TWP	RGE	Other Services				
5	16	34W	MPD/MDN				
API Number	15-171-20976		MAI/MFE				
Permit Number			MSS				
Permanent Datum GL, Elevation 3102 feet					Elevations:		
Log Measured From KB					KB 3112.00		
Drilling Measured From KB					DF 3110.00		
					GL 3102.00		
Date	20-OCT-2013						
Run Number	ONE						
Service Order	3539909						
Depth Driller	4865.00				feet		
Depth Logger	4864.00				feet		
First Reading	48.00				feet		
Last Reading	3800.00				feet		
Casing Driller	268.00				feet		
Casing Logger	262.00				feet		
Bit Size	7.875				inches		
Hole Fluid Type	CHEM						
Density / Viscosity	8.80		lb/USg		46.00		CP
PH / Fluid Loss	10.50				8.80		ml/30Min
Sample Source	MUDPIT						
Rm @ Measured Temp	0.46 @ 62.0				ohm-m		
Rmf @ Measured Temp	0.37 @ 62.0				ohm-m		
Rmc @ Measured Temp	0.55 @ 62.0				ohm-m		
Source Rmf / Rmc	CALC				CALC		
Rm @ BHT	0.27 @109.0				ohm-m		
Time Since Circulation	4 HRS						
Max Recorded Temp	109.00				deg F		
Equipment / Base	13057				LIB		
Recorded By	ROB HOFFMAN				DEREK CARTER		
Witnessed By	TIM PRIEST						
JOB #	LB13-297						

BOREHOLE RECORD			Last Edited: 21-OCT-2013 03:14	
Bit Size inches	Depth From feet		Depth To feet	
7.875	268.00		4865.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	268.00	24.00

REMARKS
- SOFTWARE ISSUE: WLS 13.05.9583
- TOOLS: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION
- HARDWARE: MDN: DUAL BOWSPRING ECCENTRALIZER MFE: 1 X 0.5 INCH STANDOFF MSS: 2 X 0.5 INCH STANDOFF MAI: 2 X 0.5 INCH STANDOFF
- 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 3800 FT.: 370 CU. FT.

- ANNULAR HOLE VOLUME WITH 4.5 INCH CASING FROM TD TO 3800 FT.: 260 CU. FT.

- RIG: HD DRILLING #2

- ENGINEER: ROB HOFFMAN, DEREK CARTER

- OPERATOR: OSCAR CRUZ

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

↓

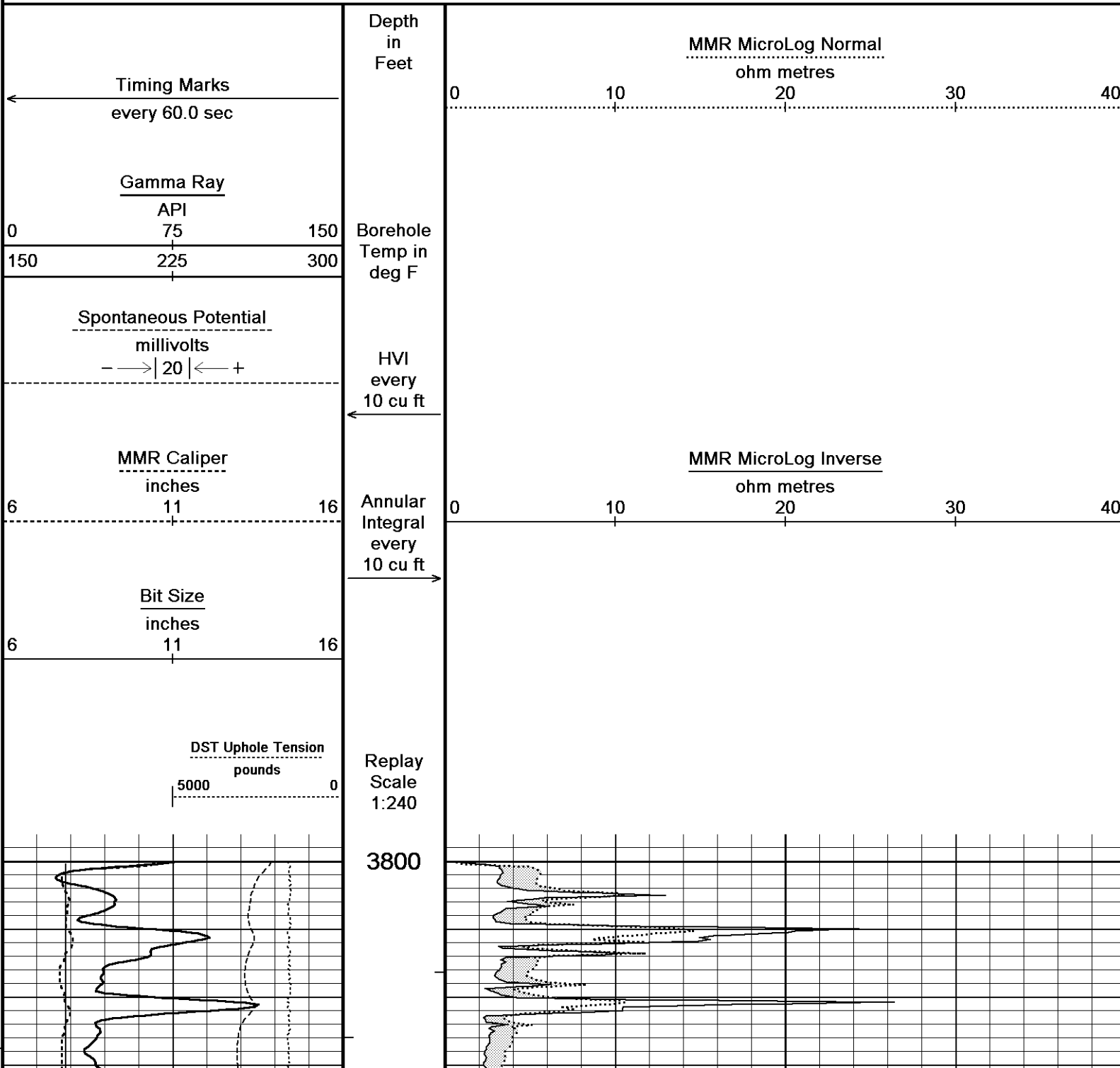
Depth Based Data - Maximum Sampling Increment 10.0cm

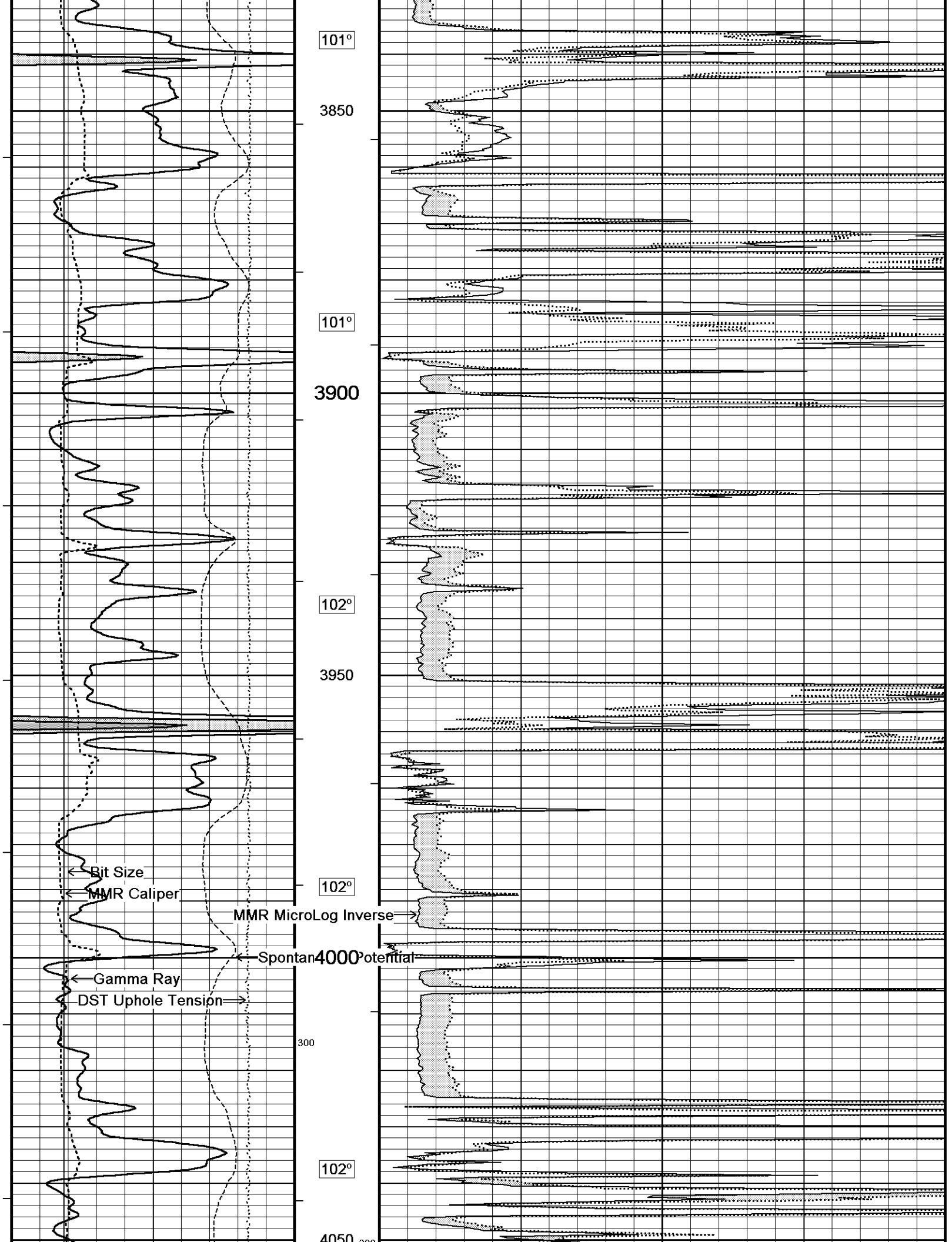
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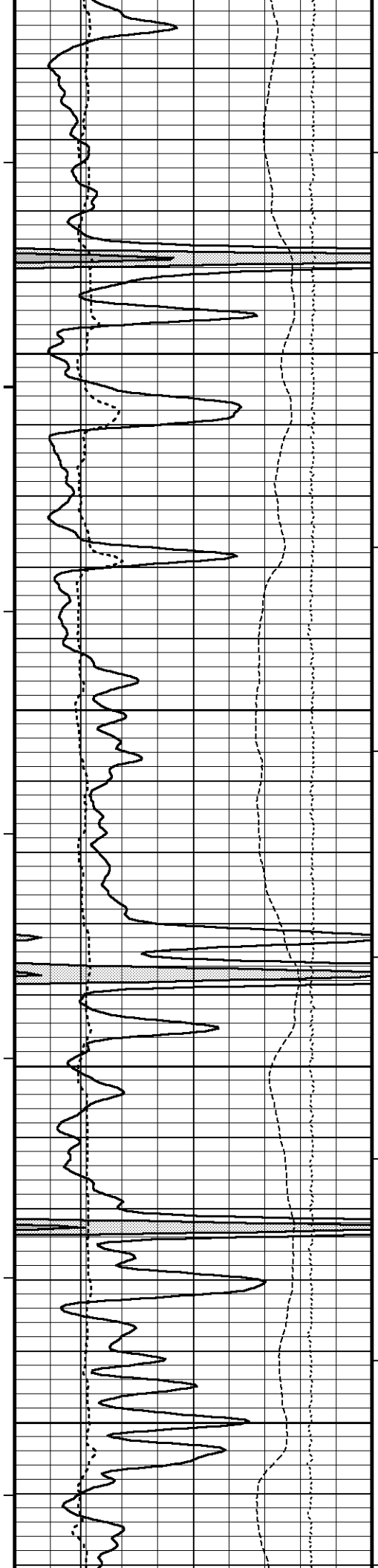
Filename: C:\Minimus 13.05.9583\Logs\Shakespeare Tucker...\Shakespeare Tucker 1-5 Main Detail.dta

Recorded on 21-OCT-2013 01:17

System Versions: Logged with 13.05.9583 Plotted with 13.05.9583







4300 200

103°

4100

103°

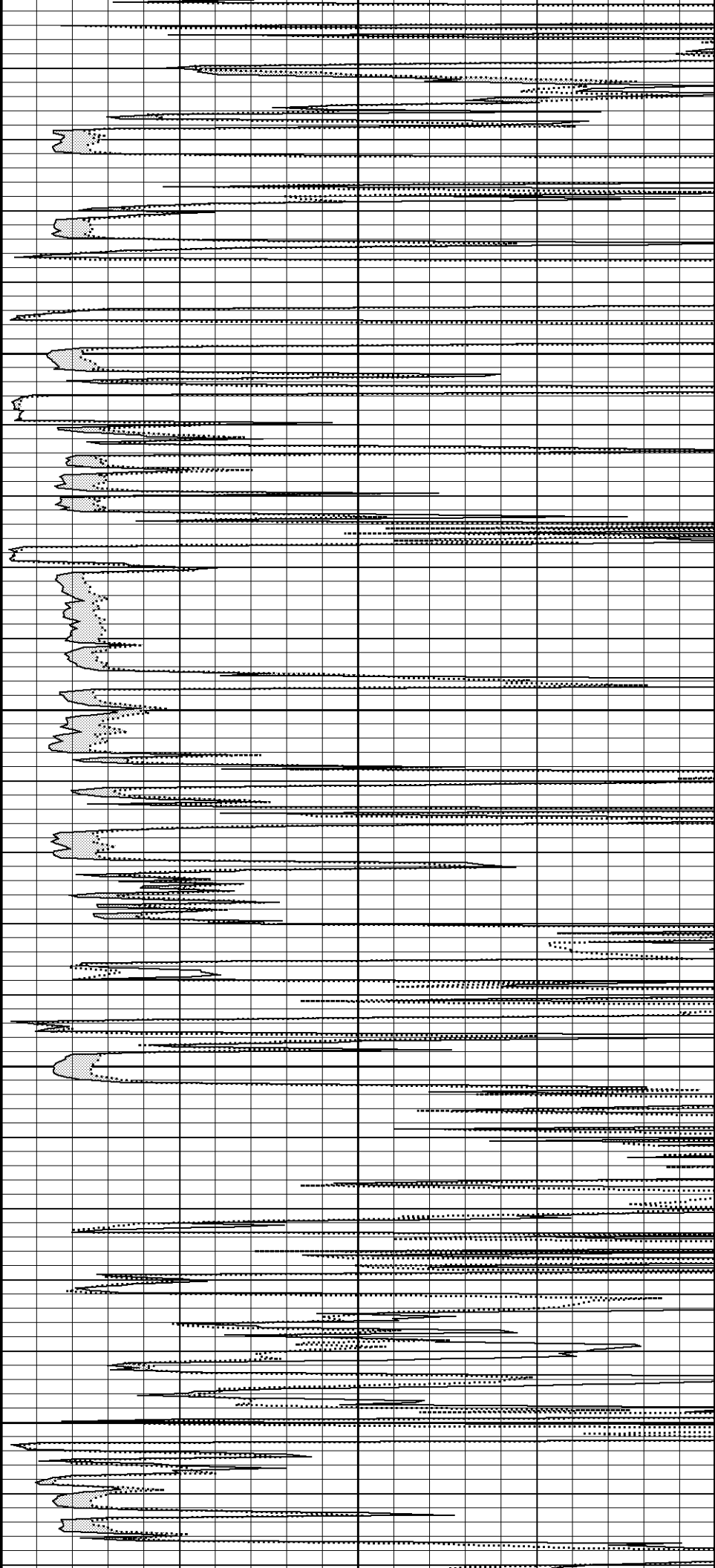
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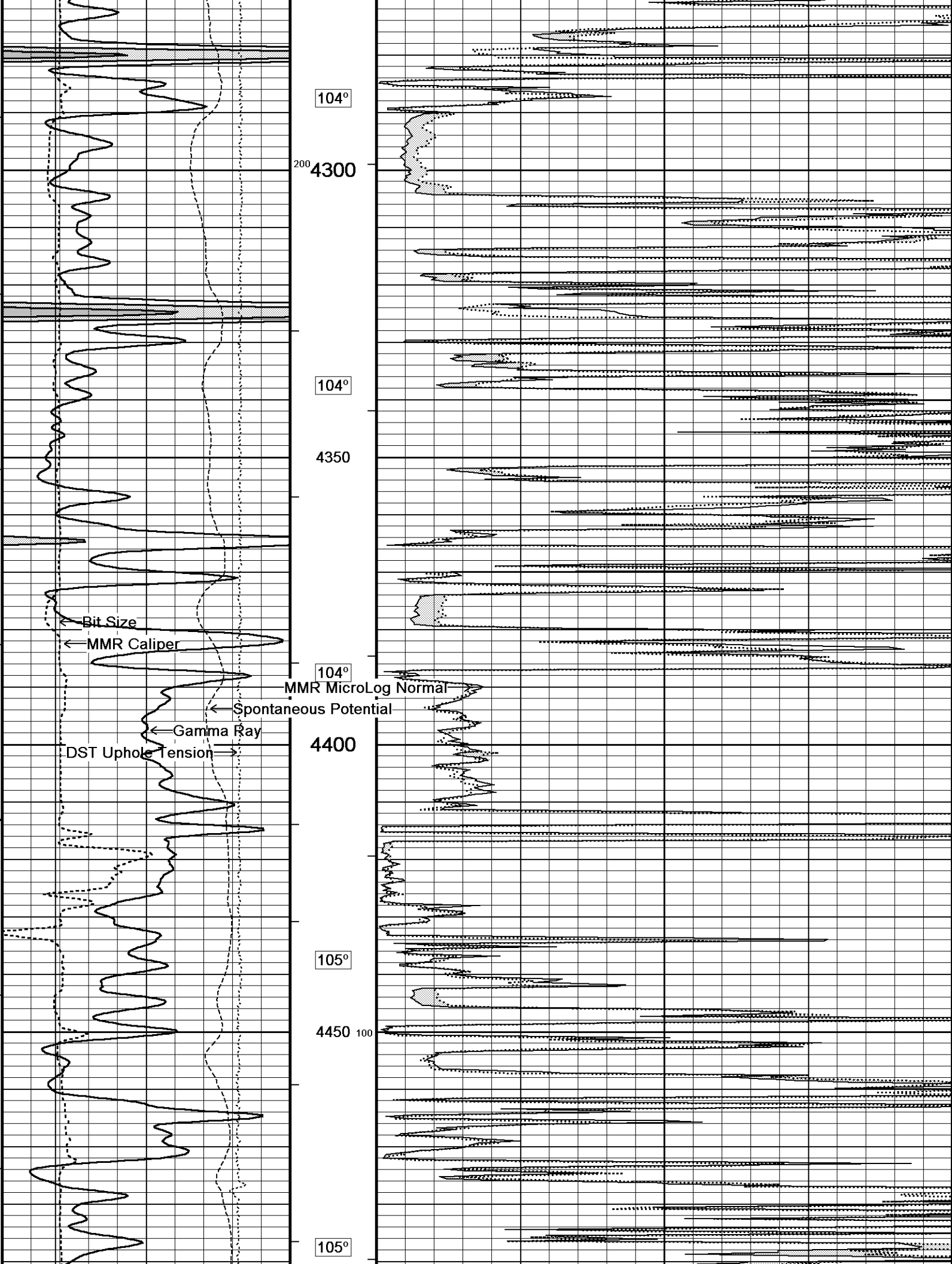
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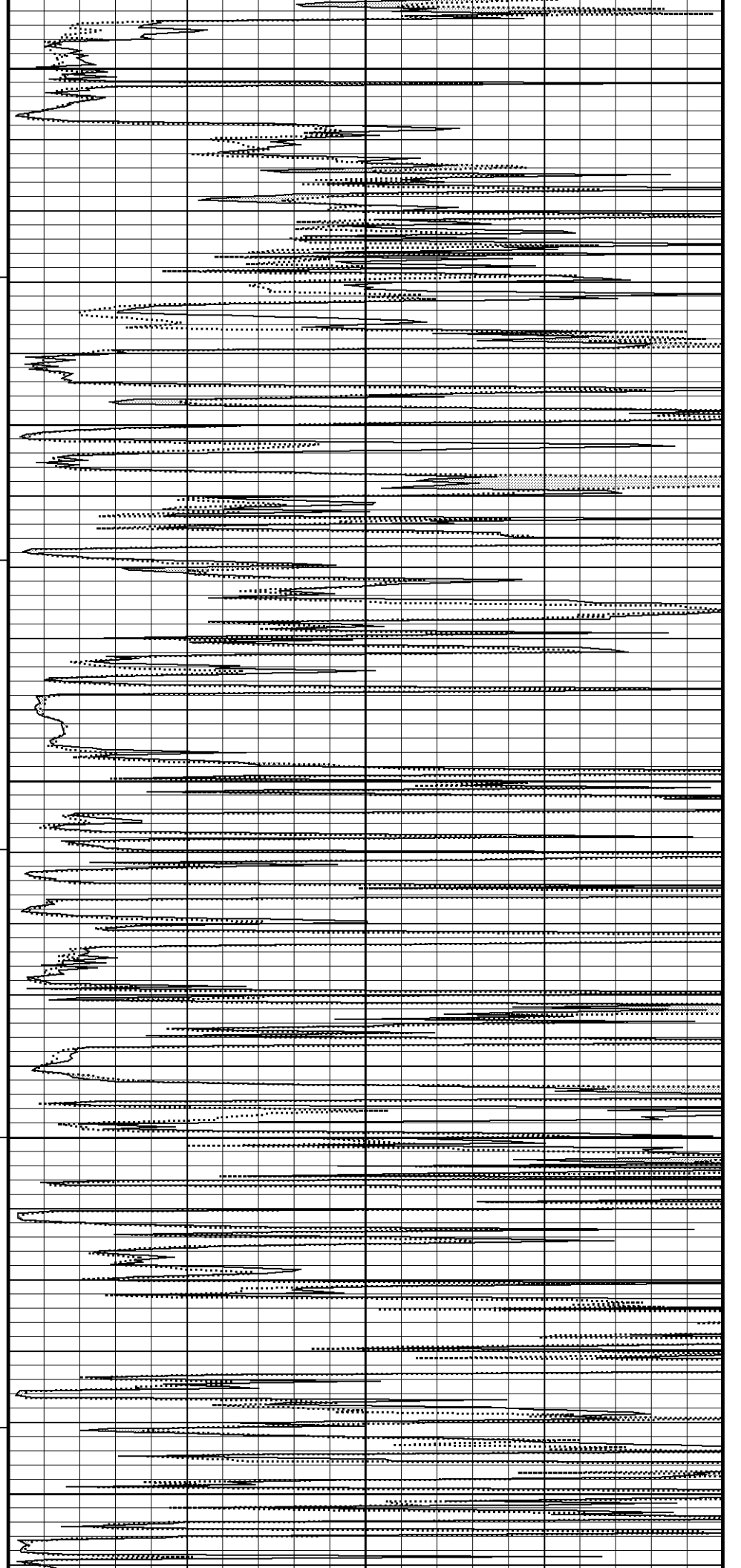
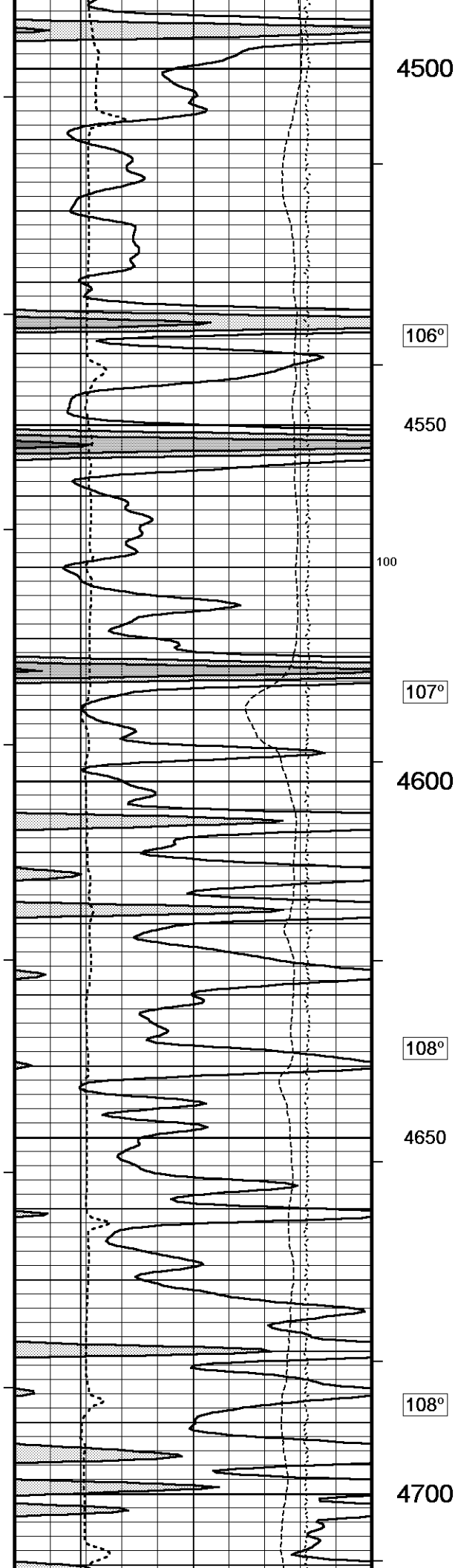
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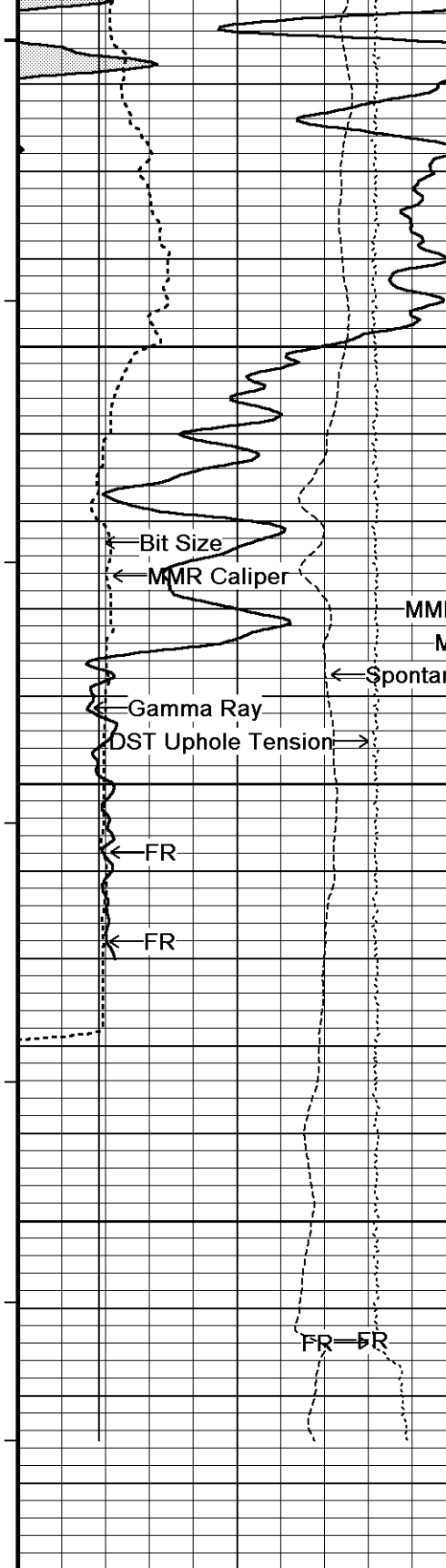
103°

4250

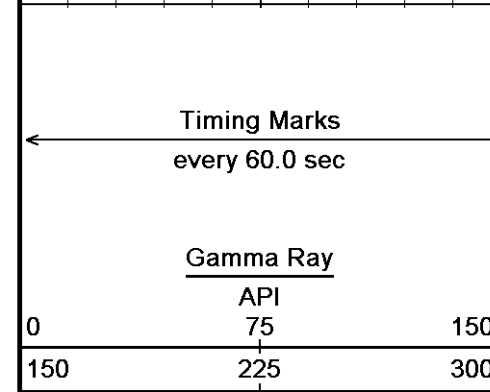
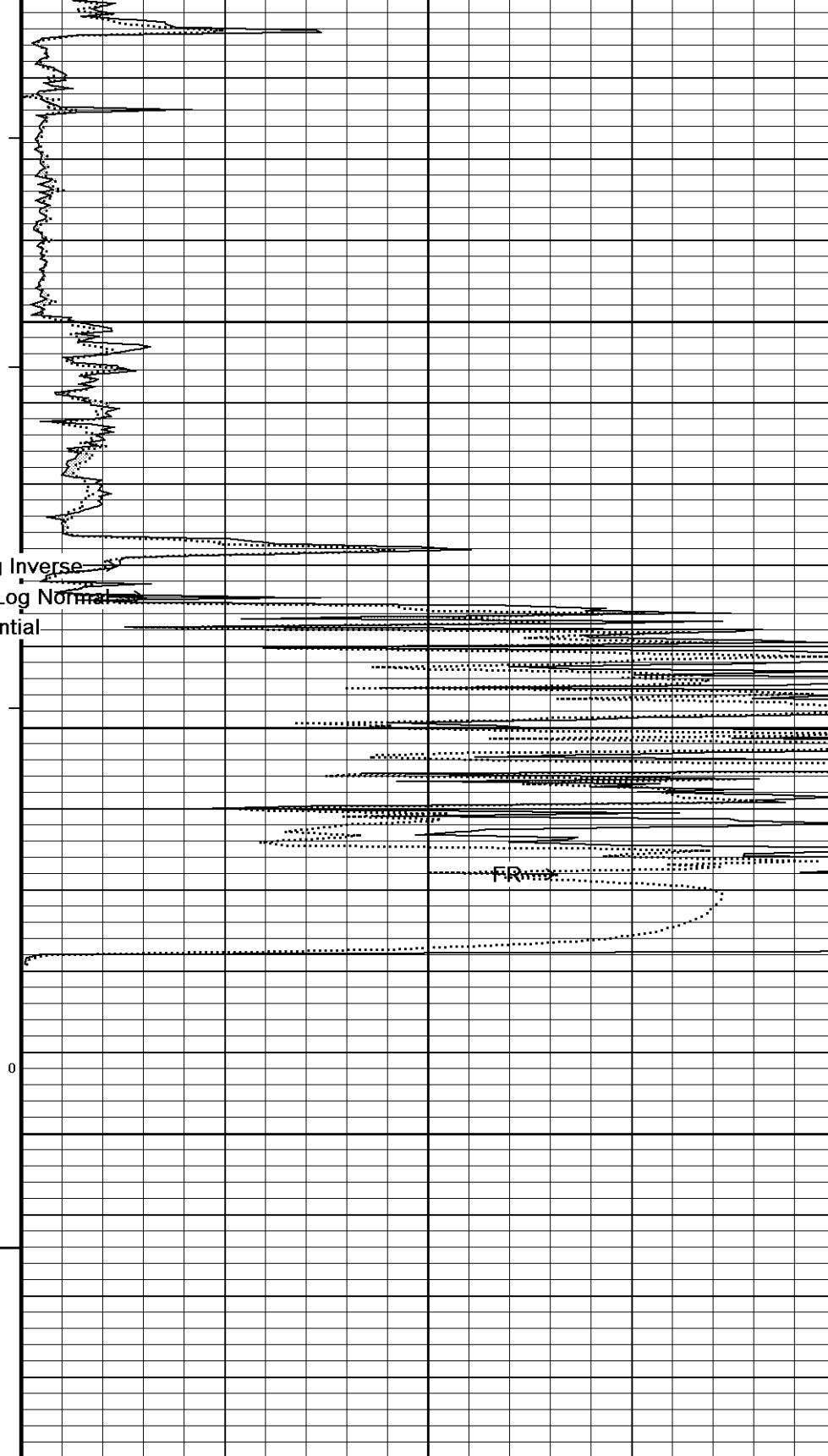






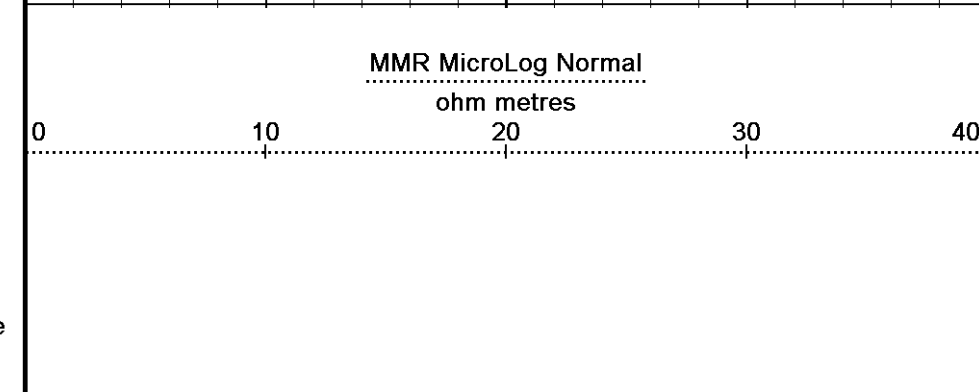


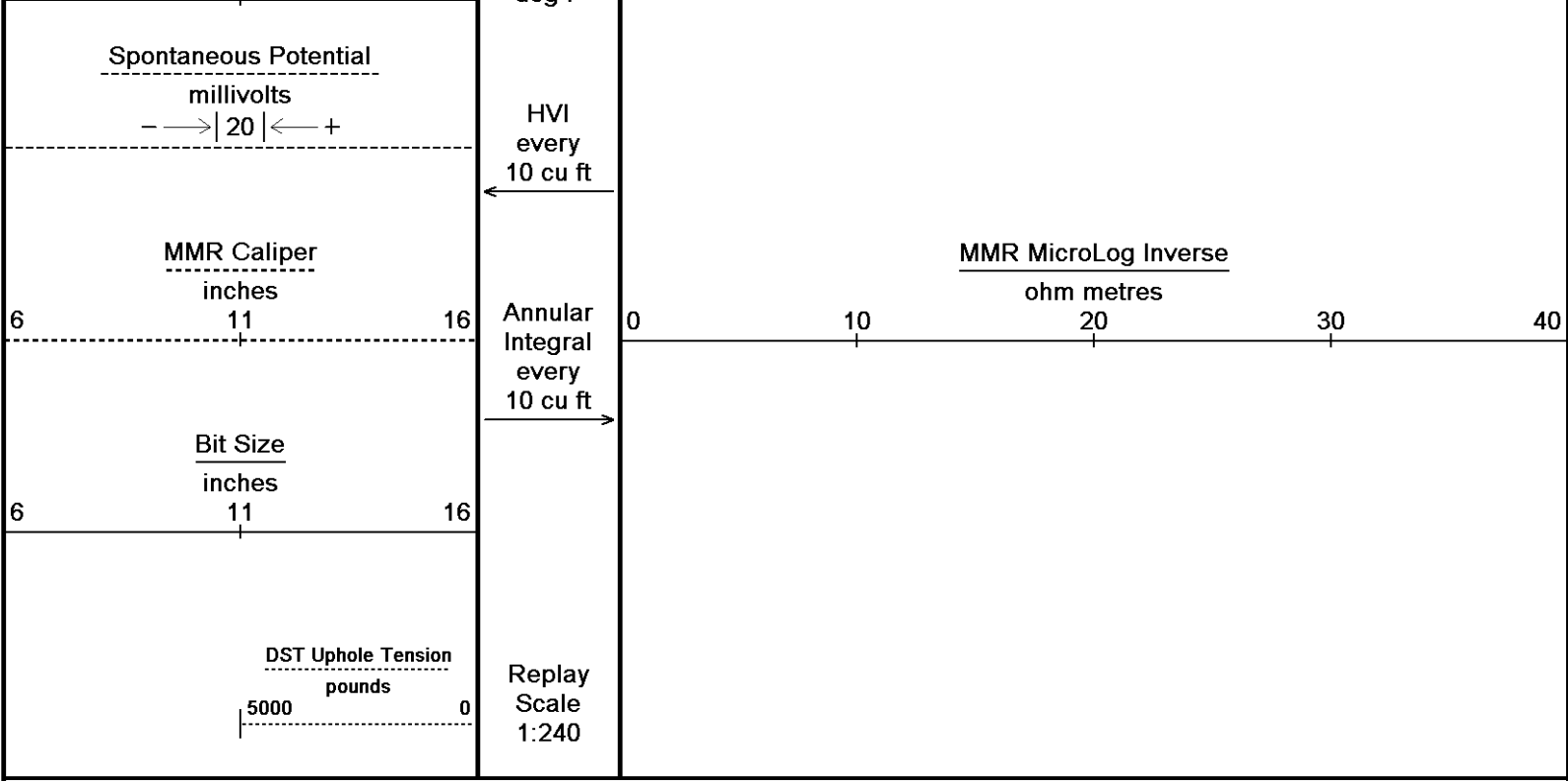
109°
4750
4800
4850
TD



Depth
in
Feet

Borehole
Temp in
deg F

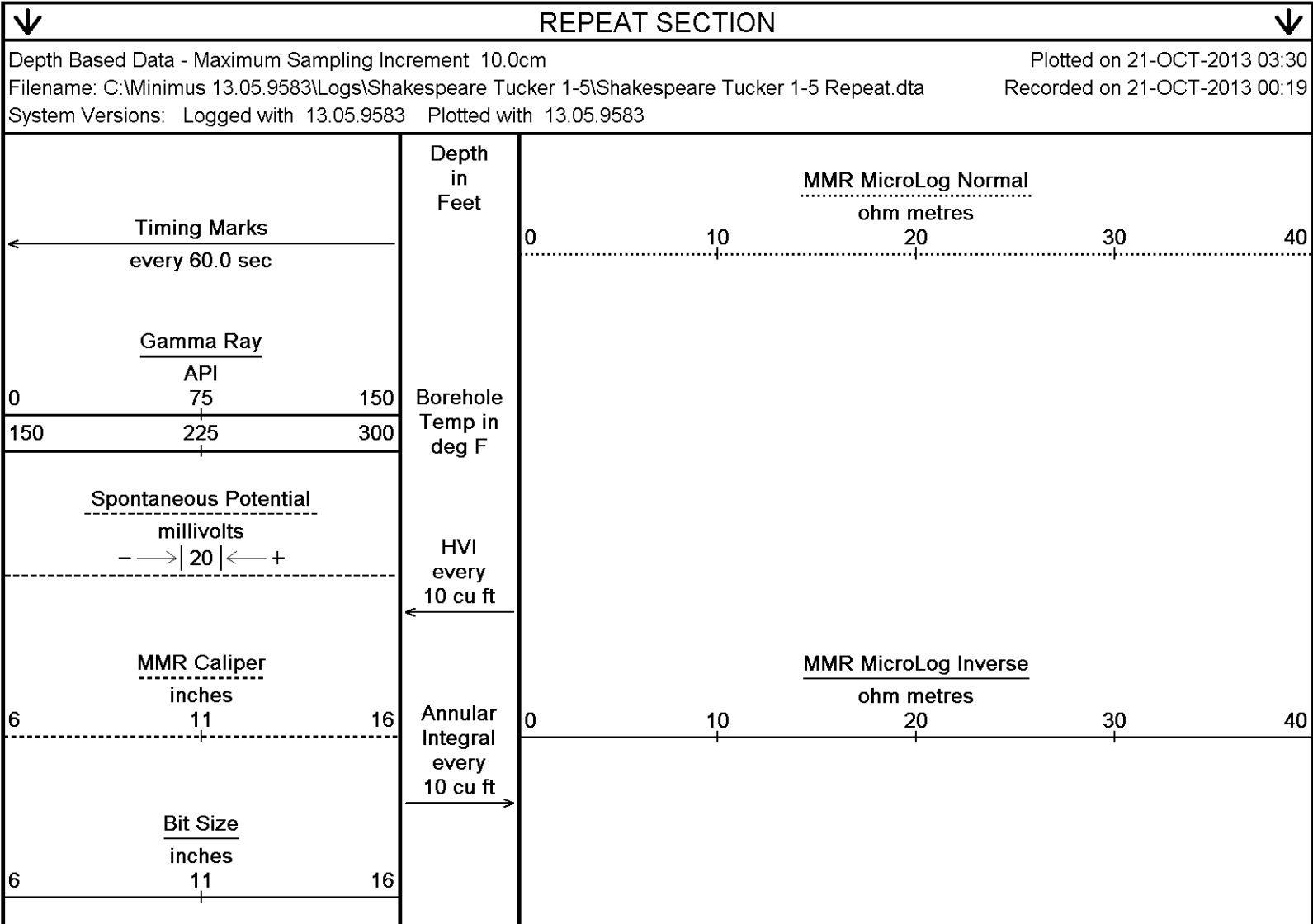




Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Logs\Shakespeare Tucker...\Shakespeare Tucker 1-5 Main Detail.dta
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

Plotted on 21-OCT-2013 03:30
Recorded on 21-OCT-2013 01:17

↑ 5 INCH MAIN ↑



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

4662

4700

108°

4750

107°

4800

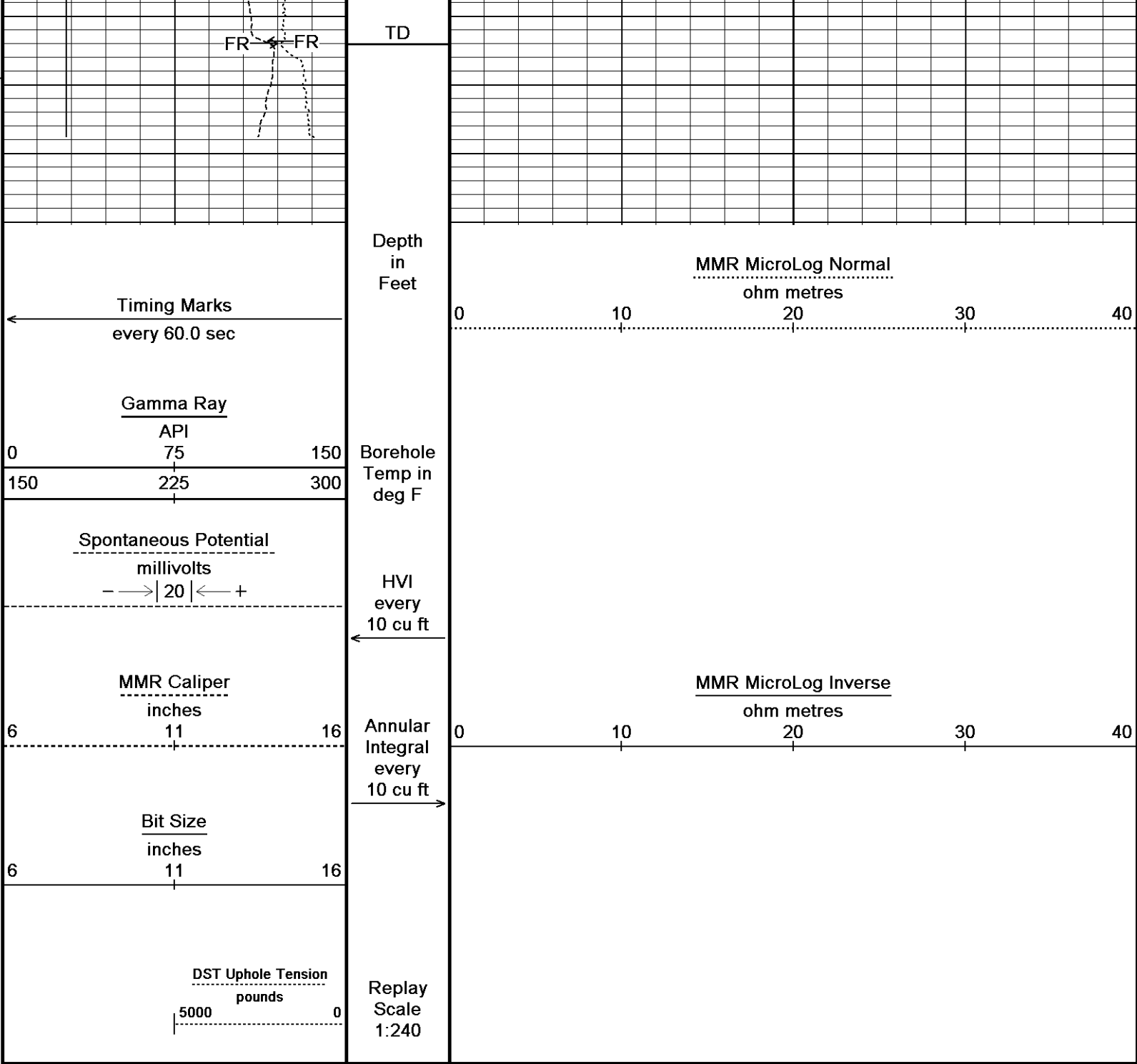
4850

Bit Size
MMR Caliper
Gamma Ray
DST Uphole Tension
FR
FR

MMR MicroLog Inverse
Spontaneous Potential

MMR MicroLog Normal

FR



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Logs\Shakespeare Tucker 1-5\Shakespeare Tucker 1-5 Repeat.dta
System Versions: Logged with 13.05.9583 Plotted with 13.05.9583
Plotted on 21-OCT-2013 03:30
Recorded on 21-OCT-2013 00:19

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION		
C:\Minimus 13.05.9583\Logs\Shakespeare Tucker 1-5\Shakespeare Tucker 1-5 Main Detail.dta		
General Constants All 000		Last Edited on 20-OCT-2013,21:58
General Parameters		
Mud Resistivity	0.460	ohm-metres
Mud Resistivity Temperature	62.000	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 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	MMR Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One 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 20-OCT-2013 23:23
Reading No	Measured	Calibrated (lbs)	
1	15564.19	1.00	
2	17369.66	575.00	

SP Calibration MCG-D.K 442			Field Calibration on 20-OCT-2013 18:26
	Measured	Calibrated (mV)	
Reference 1	101.8	100.9	
Reference 2	-99.5	-100.5	

High Resolution Temperature Calibration MCG-D.K 442			Field Calibration on 20-OCT-2013,18:27
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-D.K 442			Last Edited on 20-OCT-2013,18:27
Pre-filter Length	11		

Gamma Calibration MCG-D.K 442			Field Calibration on 20-OCT-2013 18:30
	Measured	Calibrated (API)	
Background	69	47	
Calibrator (Gross)	1135	772	
Calibrator (Net)	1067	725	

Gamma Constants MCG-D.K 442			Last Edited on 20-OCT-2013,21:58
Gamma Calibrator Number	GRC38		
Mud Density	1.06	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Concentration of KCl		kppm	
K Mud Type	Chloride		
K Mud Concentration	0.00	%	

Micro Laterolog Calibration MMR-A 11			Base Calibration on 31-DEC-1999 00:00
Base Calibration			Field Check on 31-DEC-1999 00:00
	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
Pad Type	6 in Solid Nylon B23059		
Micro Laterolog K Factor	0.0128		
Standoff Offset	0.0000	inches	
Mudcake Thickness Correction Constants			
Mud Cake Source	Constant Value		
Mud Cake Thickness	0.4000	inches	
Mud Cake Thickness Caliper			
Mud Cake Resistivity	0.1500	ohm-m	
Mud Cake Resistivity Temp.	68.00	Deg F	
Mud Cake Resistivity Source	Constant Value		

Caliper Calibration MMR-A 11

Base Calibration on 01-OCT-2013 09:07
Field Calibration on 20-OCT-2013 18:23

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14311	5.98
2	17410	7.97
3	20706	9.86
4	24667	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.91	5.98

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 11-OCT-2013 11:00
Field Check on 20-OCT-2013 18:22

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.1	59.0	5.0	25.0
Micro Inverse	15.5	76.7	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	77.5	77.5
Micro Inverse	59.4	59.4

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 18-APR-2013,13:52

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 11-OCT-2013 14:23
Field Check on 20-OCT-2013 18:34

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3088	96	3714	110
Ratio	32.181		33.764	

Field Calibrator at Base

Calibrated (cps)
1674 2387
Ratio 0.701

Field Check

Calibrated (cps)
1677 2401
Ratio 0.695

Neutron Constants MDN-A.B 65

Last Edited on 20-OCT-2013,21:57

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	Constant Value	
Temperature	68.00	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	

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	965.0	126.8
Base Check		281.1
Field Check		281.1

FE Constants MFE-B.J 352

Last Edited on 20-OCT-2013,21:57

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 20-OCT-2013,21:57

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
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

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 45			Field Calibration on 20-OCT-2013,18:08
	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 20-OCT-2013,18:08
Pre-filter Length	11	

Induction Calibration MAI-A.A 45					Base Calibration on 21-MAY-2013,16:47	
					Field Check on 20-OCT-2013 18:08	
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		0.0		Deg F		
Channel	Base Check (mmho/m)			Field Check (mmho/m)		
	Low	High		Low	High	
1				18.8	3850.9	
2				31.8	3628.8	
3				28.7	3048.9	
4				18.4	2078.8	
Deep				16.1	1910.9	
Medium				42.6	4059.9	
Shallow				49.8	5482.3	
Array Temperature				66.3		Deg F

Induction Constants MAI-A.A 45			Last Edited on 20-OCT-2013,21:57
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 11-OCT-2013 13:32
Field Check on 20-OCT-2013 18:14

Density Calibration		Measured		Calibrated (sdu)	
Base Calibration		Near	Far	Near	Far
Reference 1	44679	22866	59556	30836	
Reference 2	18345	1888	24941	2541	
Field Check at Base					
	669.8	824.9			
Field Check					
	668.7	823.6			

PE Calibration

Base Calibration		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background	125	594		
Reference 1	18704	44569	0.422	0.371
Reference 2	5436	18261	0.301	0.272
Field Check at Base				
	124.9	594.3		
Field Check				
	124.5	593.5		

Density Constants MPD-B 31

Last Edited on 20-OCT-2013,21:57

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	1.06	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 11-OCT-2013 13:50
Field Calibration on 20-OCT-2013 18:15

Base Calibration		Calibrator Size (in)
Reading No	Measured	
1	18160	3.99
2	27038	5.98
3	35584	7.97
4	43976	9.86

5
653328
N/A11.92
N/A

Field Calibration

Measured Caliper (in)
7.95Actual Caliper (in)
7.97

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Logs\Shakespeare Tucker 1-5\Shakespeare Tucker 1-5 Main Detail.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-D.K 442 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

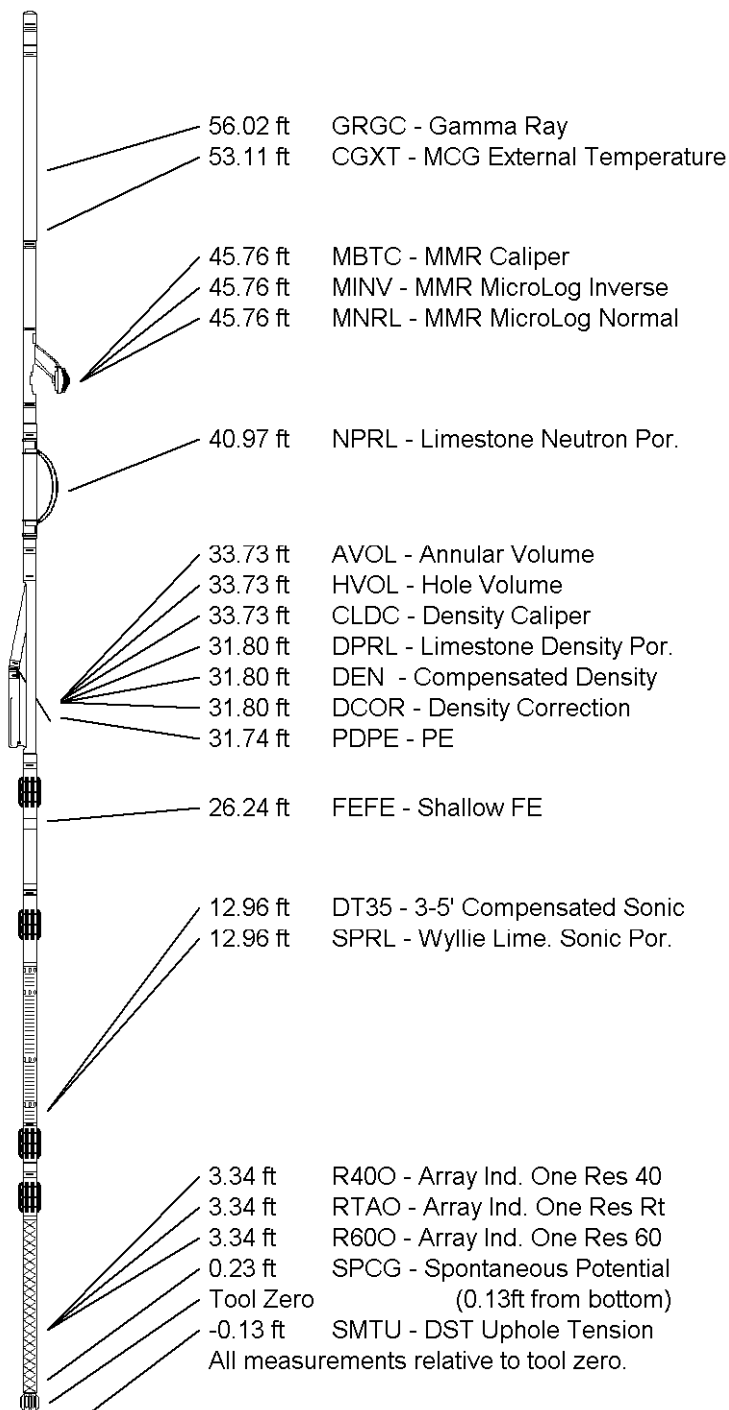
Compact Sonic

MSS-A.A 126 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

Total Length: 62.88 ft Weight: 471.8 lb



COMPANY

SHAKESPEARE OIL CO, INC.

WELL

TUCKER 1-5

FIELD

WILDCAT

PROVINCE/COUNTY

SCOTT

COUNTRY/STATE

U.S.A. / KANSAS

Elevation Kelly Bushing	3112.00	feet	First Reading	48.00	feet
Elevation Drill Floor	3110.00	feet	Depth Driller	4865.00	feet
Elevation Ground Level	3102.00	feet	Depth Logger	4864.00	feet

**Weatherford**[®]

MICRORESISTIVITY LOG