



Weatherford¹⁸⁰

MICRORESISTIVITY LOG

COMPANY				SHAKESPEARE OIL CO, INC.			
WELL				YORK #1-2			
FIELD				WILDCAT			
PROVINCE/COUNTY				SCOTT			
COUNTRY/STATE				UNITED STATES / KANSAS			
LOCATION				1734' FSL & 1348' FEL			
SEC	TWP	RGE	Other Services				
2	16S	31W	MPD/MDN				
API Number		15-171-20967		MAI/MFE			
Permit Number				MSS			
Permanent Datum G.L., Elevation 2866 feet							Elevations:
Log Measured From KB							KB
Drilling Measured From K.B. @ 10 FEET							DF
							GL
Date	26-AUG-2013						
Run Number	ONE						
Service Order	3541074						
Depth Driller	4630.00			feet			
Depth Logger	4629.00			feet			
First Reading	4583.00			feet			
Last Reading	3700.00			feet			
Casing Driller	226.00			feet			
Casing Logger	222.00			feet			
Bit Size	7.880			inches			
Hole Fluid Type	CHEMICAL						
Density / Viscosity	9.30 lb/USg		52.00 CP				
PH / Fluid Loss	10.50		7.60 ml/30Min				
Sample Source	MUDPIT						
Rm @ Measured Temp	1.62 @ 75.0			ohm-m			
Rmf @ Measured Temp	1.29 @ 75.0			ohm-m			
Rmc @ Measured Temp	1.94 @ 75.0			ohm-m			
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	1.06 @115.0			ohm-m			
Time Since Circulation	4 HOURS						
Max Recorded Temp	115.00			deg F			
Equipment / Base	13096		LIB				
Recorded By	W. STAMBAUGH						
Witnessed By	TIM PRIEST						
JOB#	LB13-235						

BOREHOLE RECORD

Last Edited: 26-AUG-2013 09:51

Bit Size inches	Depth From feet	Depth To feet
7.880	222.00	4629.00

CASING RECORD

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

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583
- TOOLS: MCG, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION
- HARDWARE:
 - MDN: DUAL BOWSPRING ECCENTRALIZER
 - MFE 1 x 0.5 INCH STANDOFF
 - MSS 2x 0.5 INCH STANDOFF
 - MAI 1 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 SURFACE CASING AT 226 FEET : 1980 CU. FT

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING AT 226 FT: 1260 CU. FT

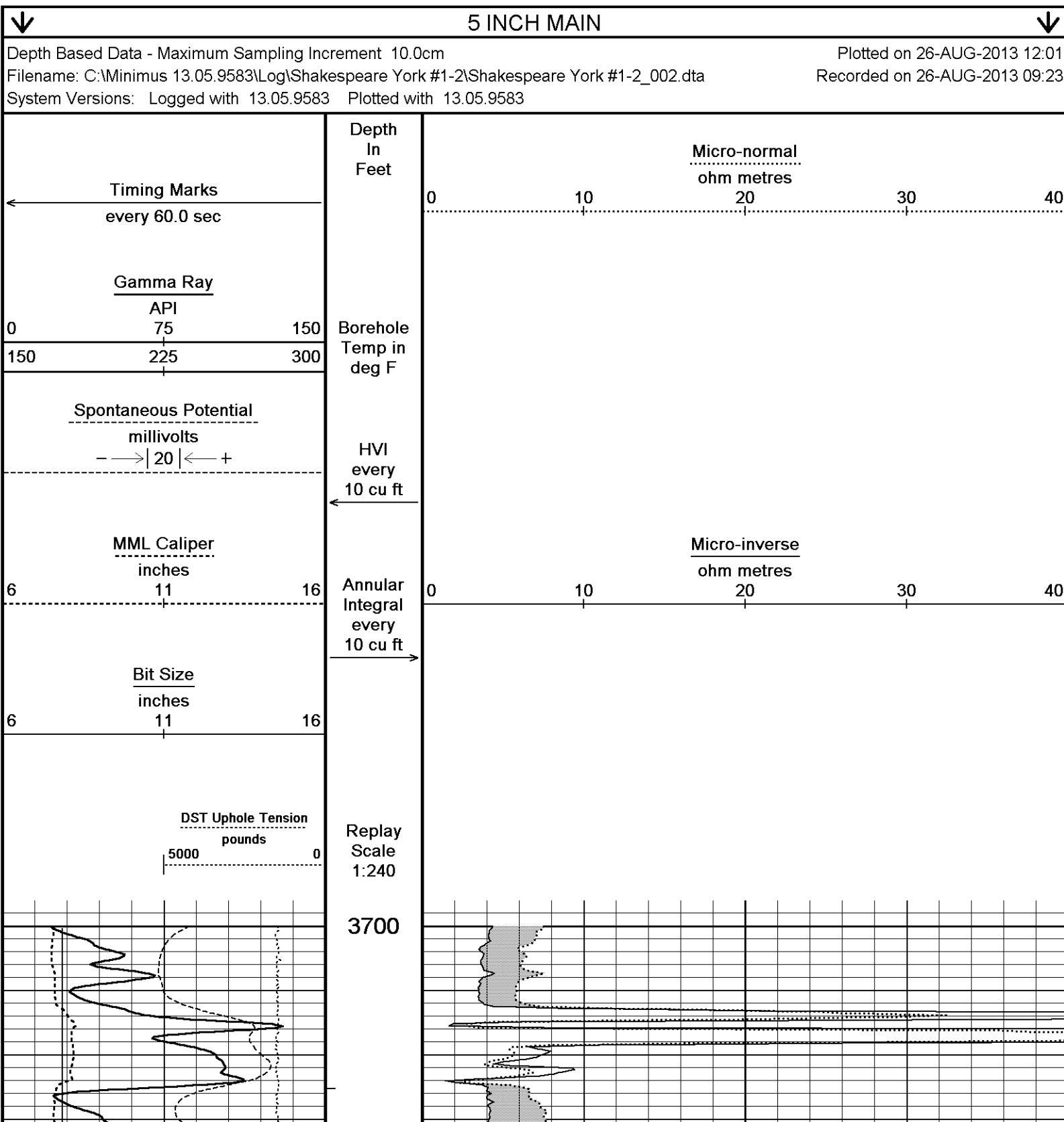
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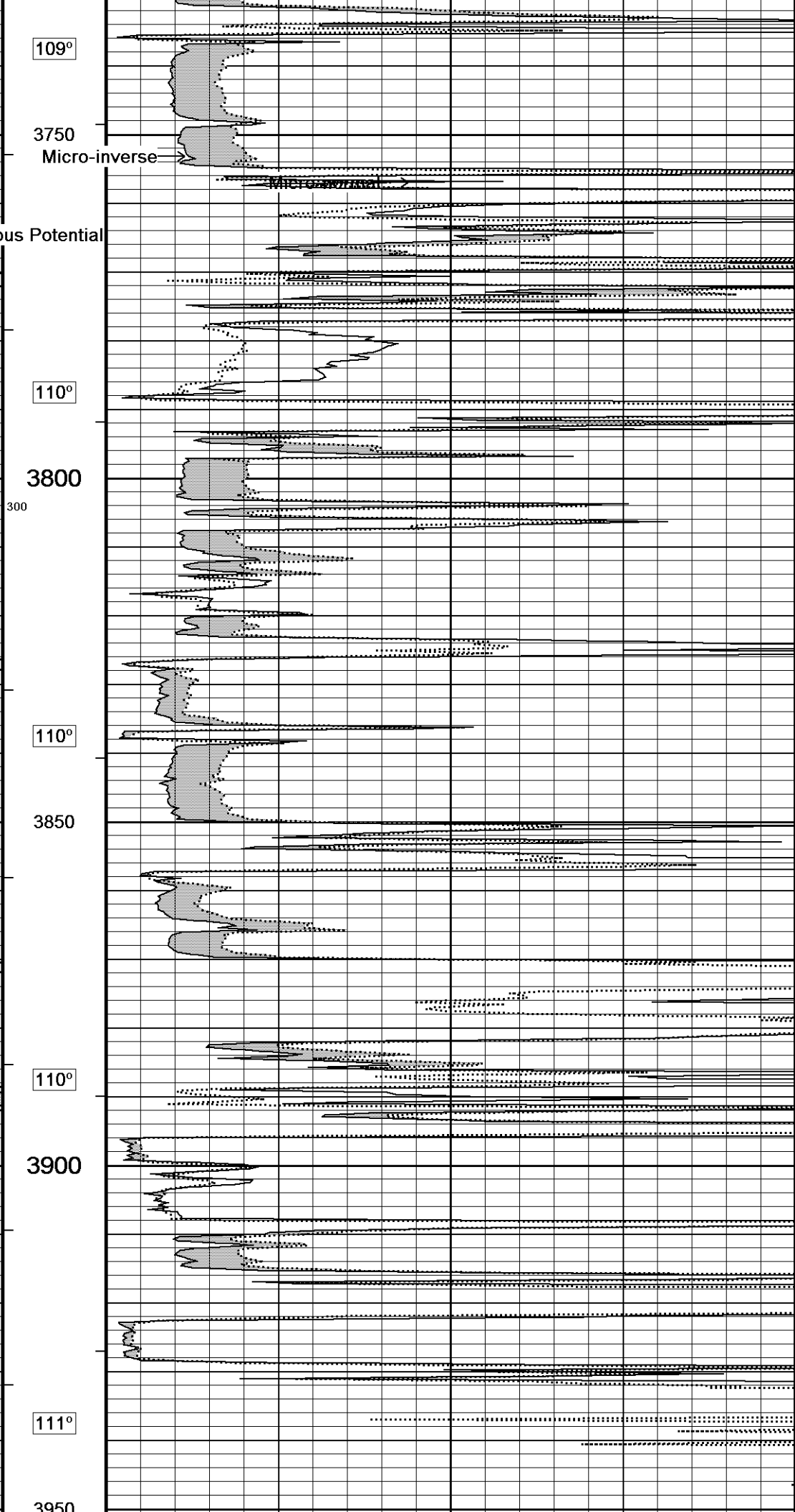
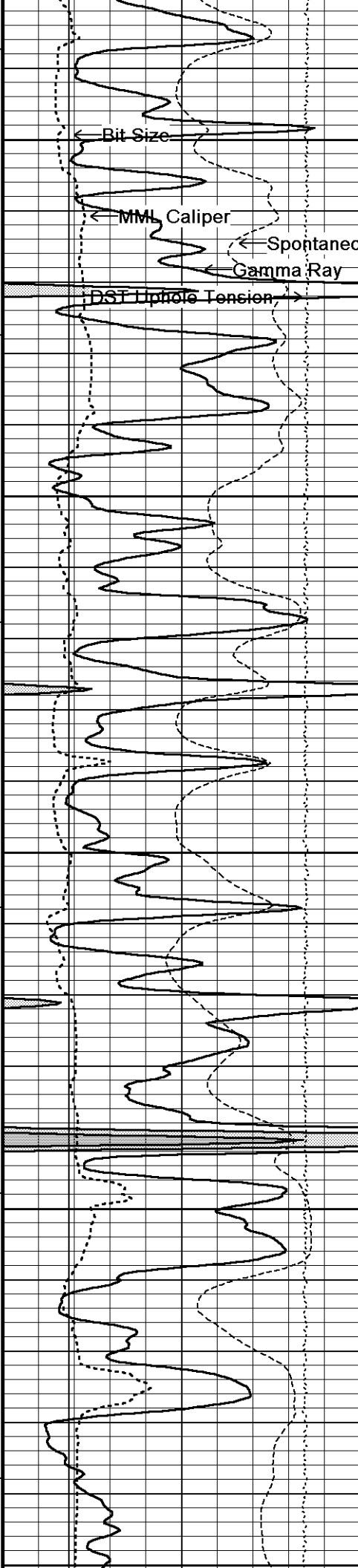
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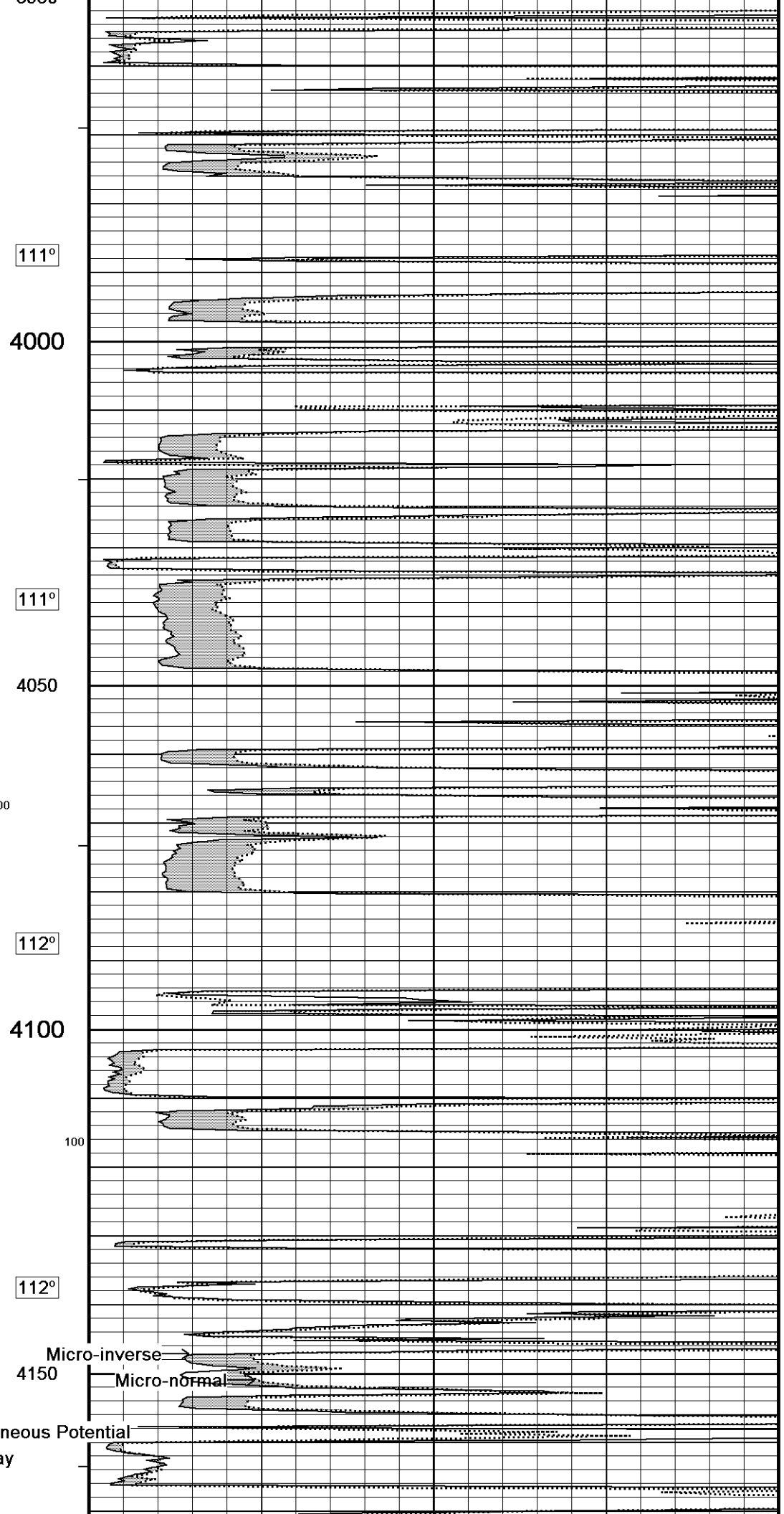
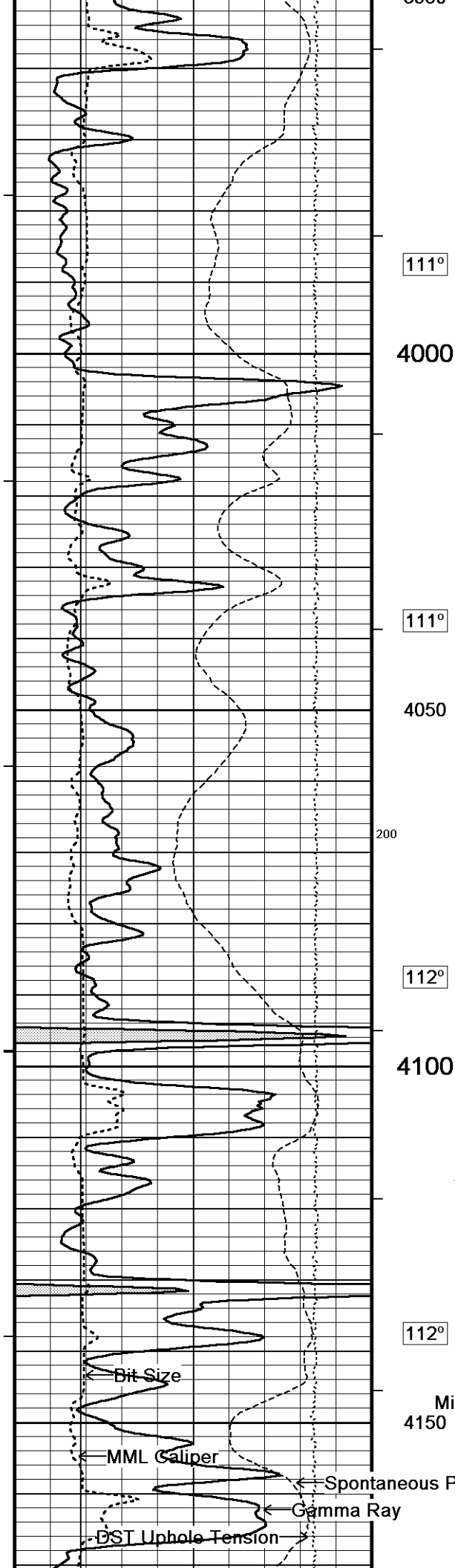
- ENGINEERS: WILLIAM STAMBAUGH

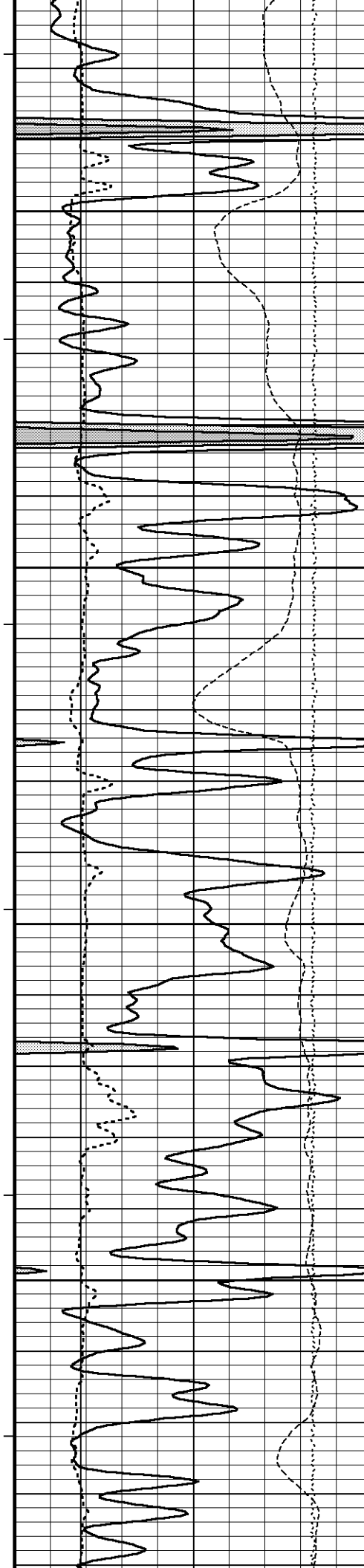
- OPERATORS: K. RINEHART / JOHN DUNLAP

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113°

4200

113°

4250

112°

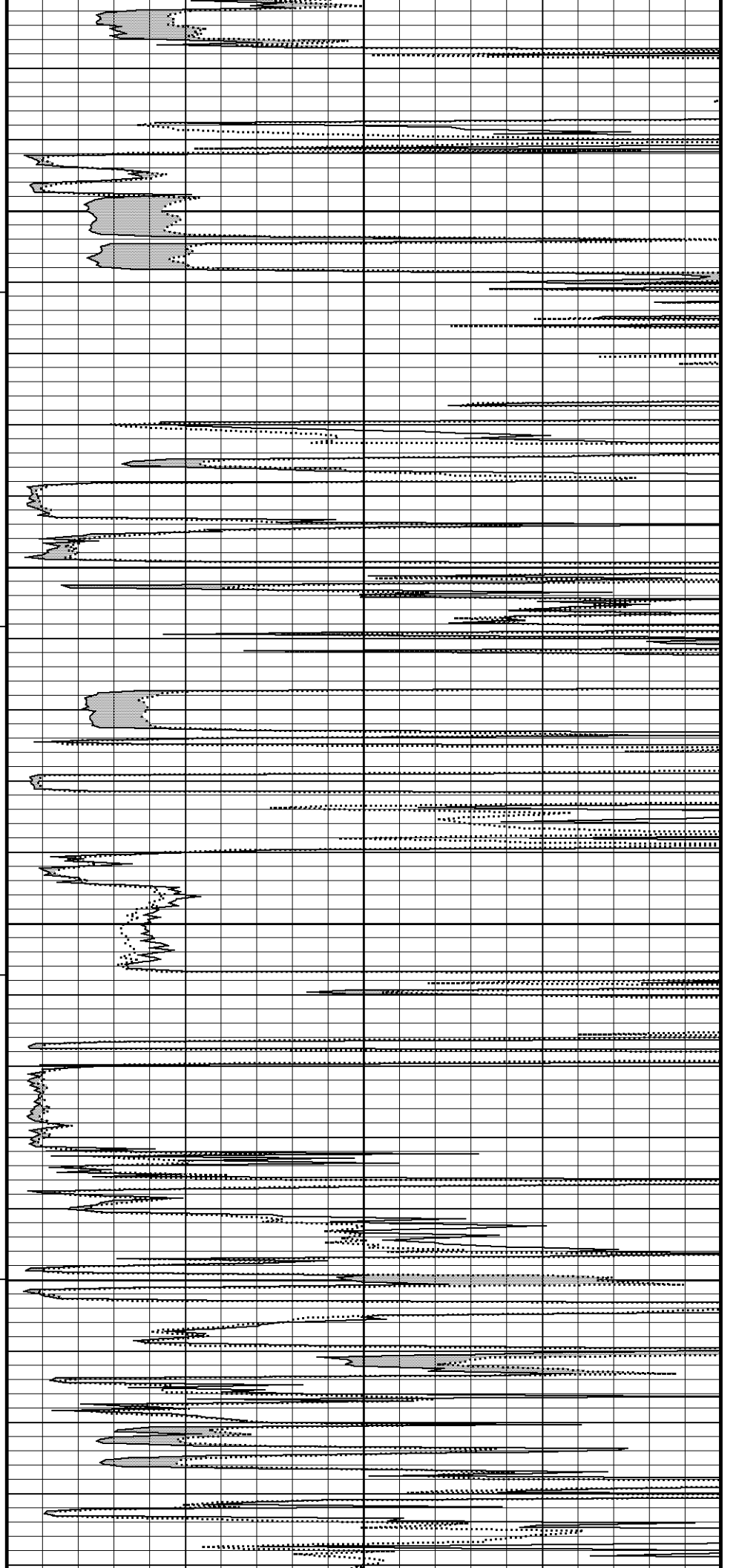
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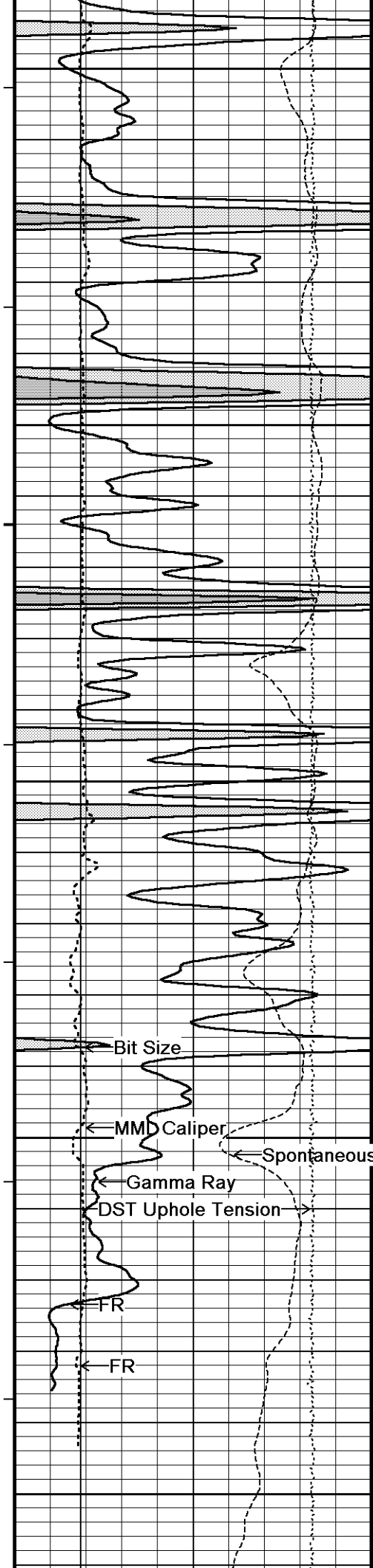
100

113°

4350

114°





4400

114°

4450

115°

4500

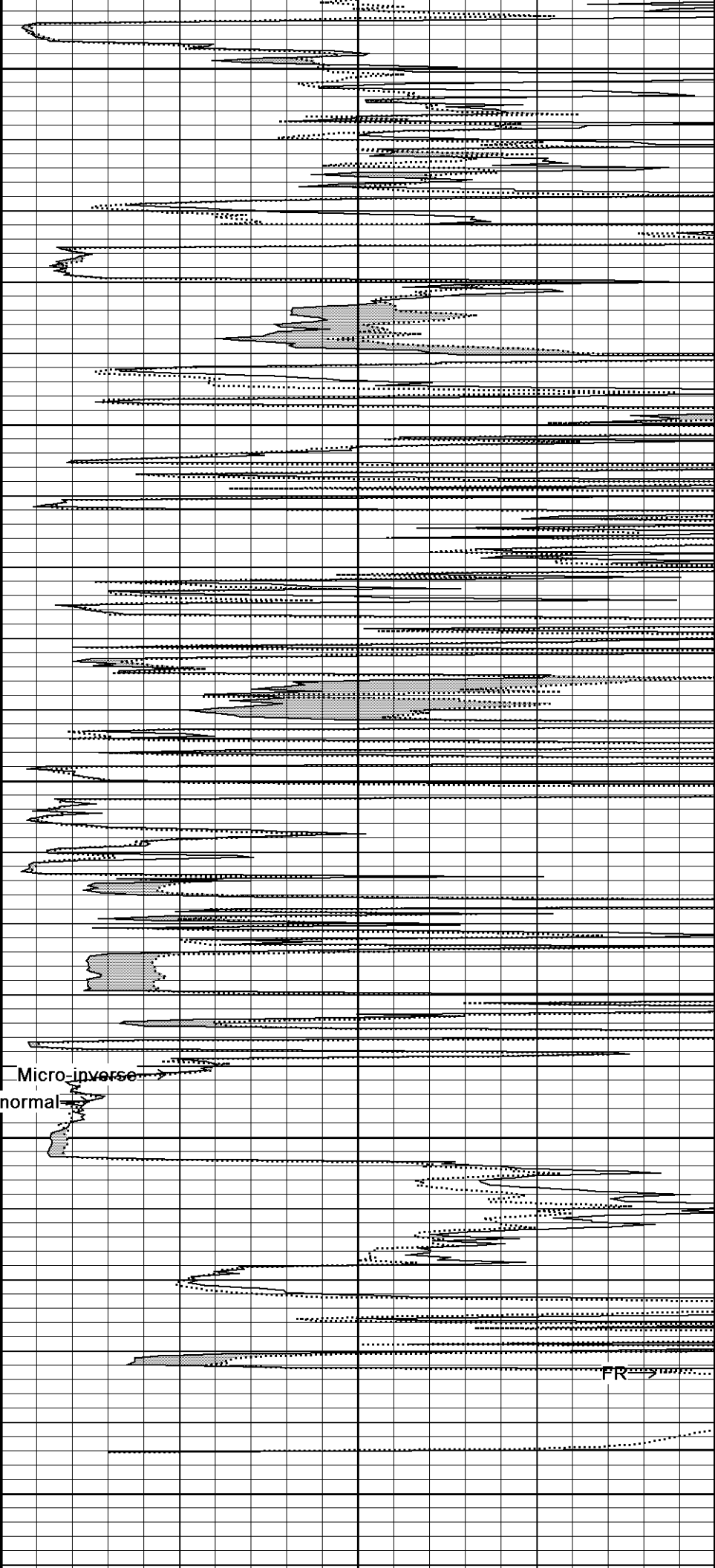
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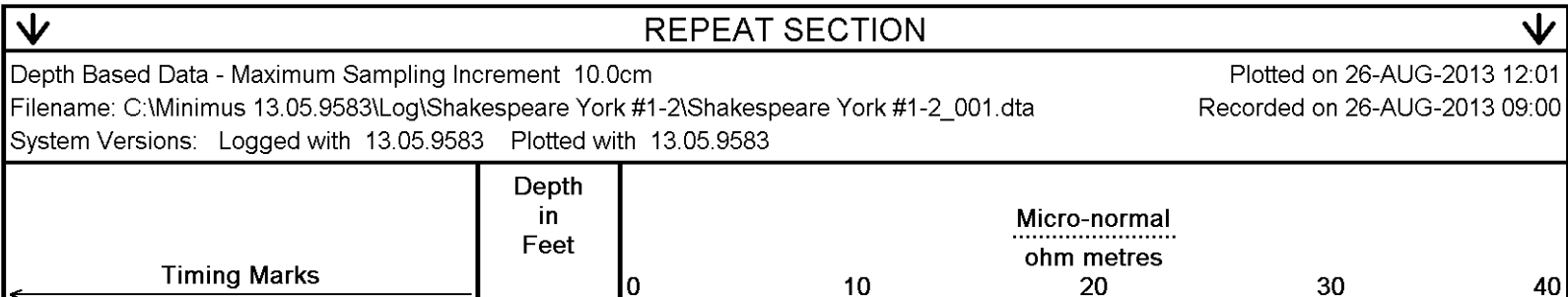
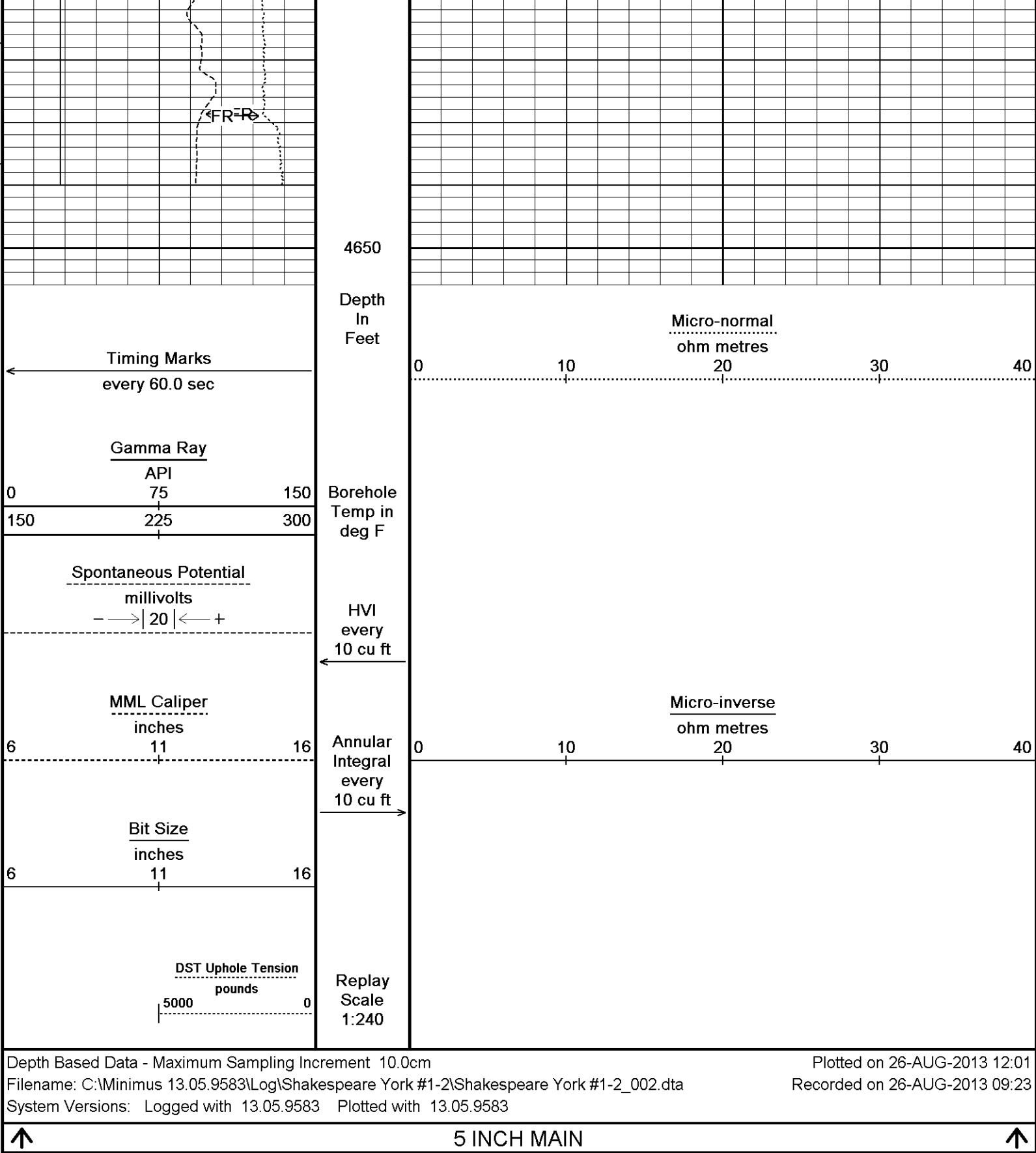
4550

114°

4600

0





every 60.0 sec

Gamma Ray

API

0 75 150
150 225 300

Borehole
Temp in
deg F

Spontaneous Potential

millivolts

- -> | 20 | <- +

HVI
every
10 cu ft

MML Caliper

inches

6 11 16

Annular
Integral
every
10 cu ft

Bit Size

inches

6 11 16

DST Uphole Tension

pounds

5000 0

Replay
Scale
1:240

4428

4450

114°

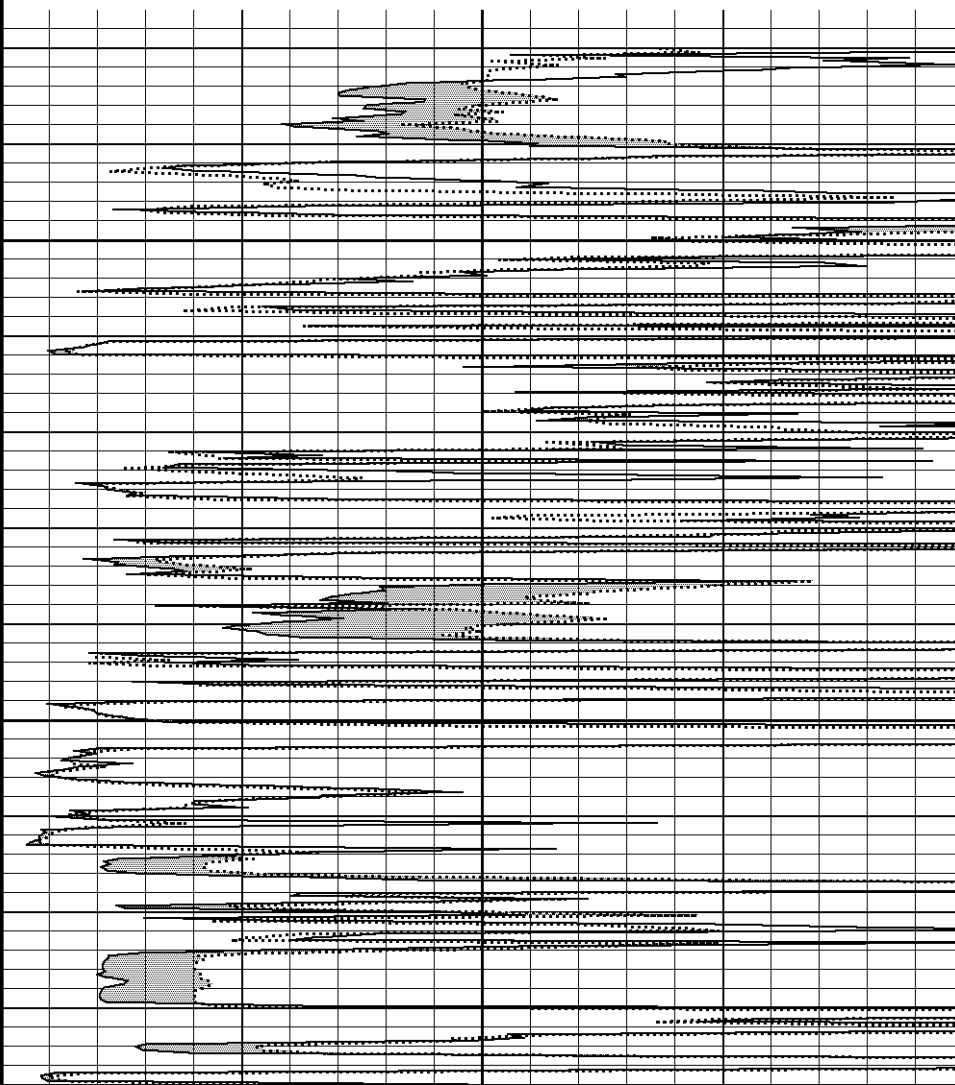
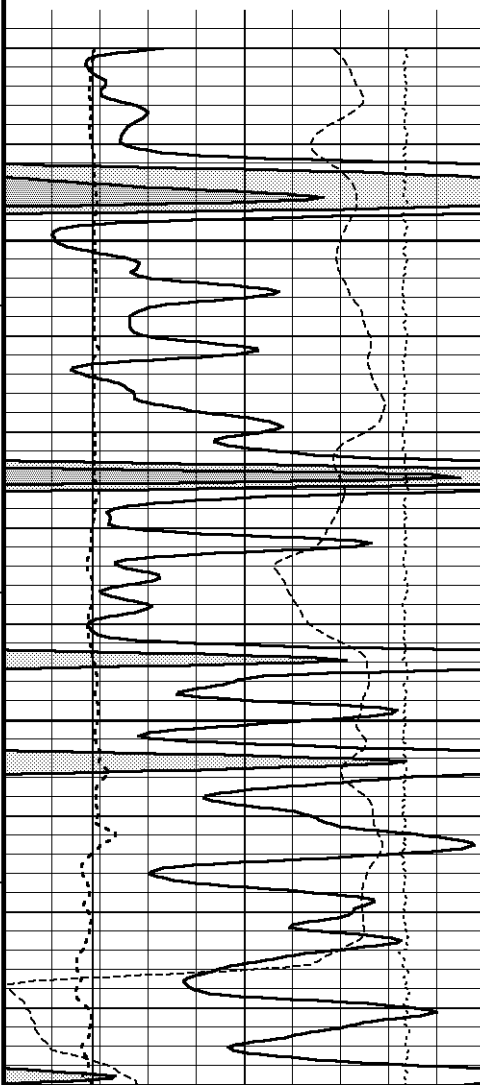
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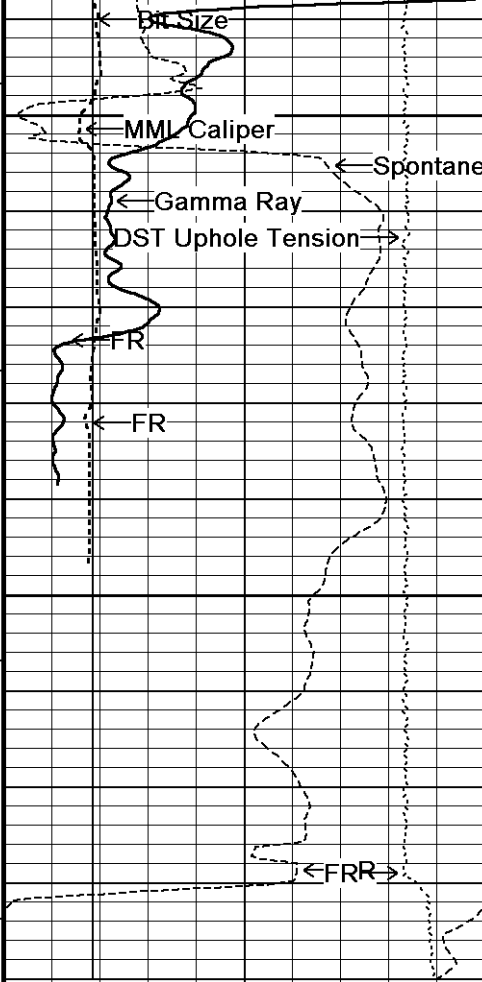
115°

Micro-inverse

ohm metres

0 10 20 30 40





114°

4600

4650

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Borehole
Temp in
deg F

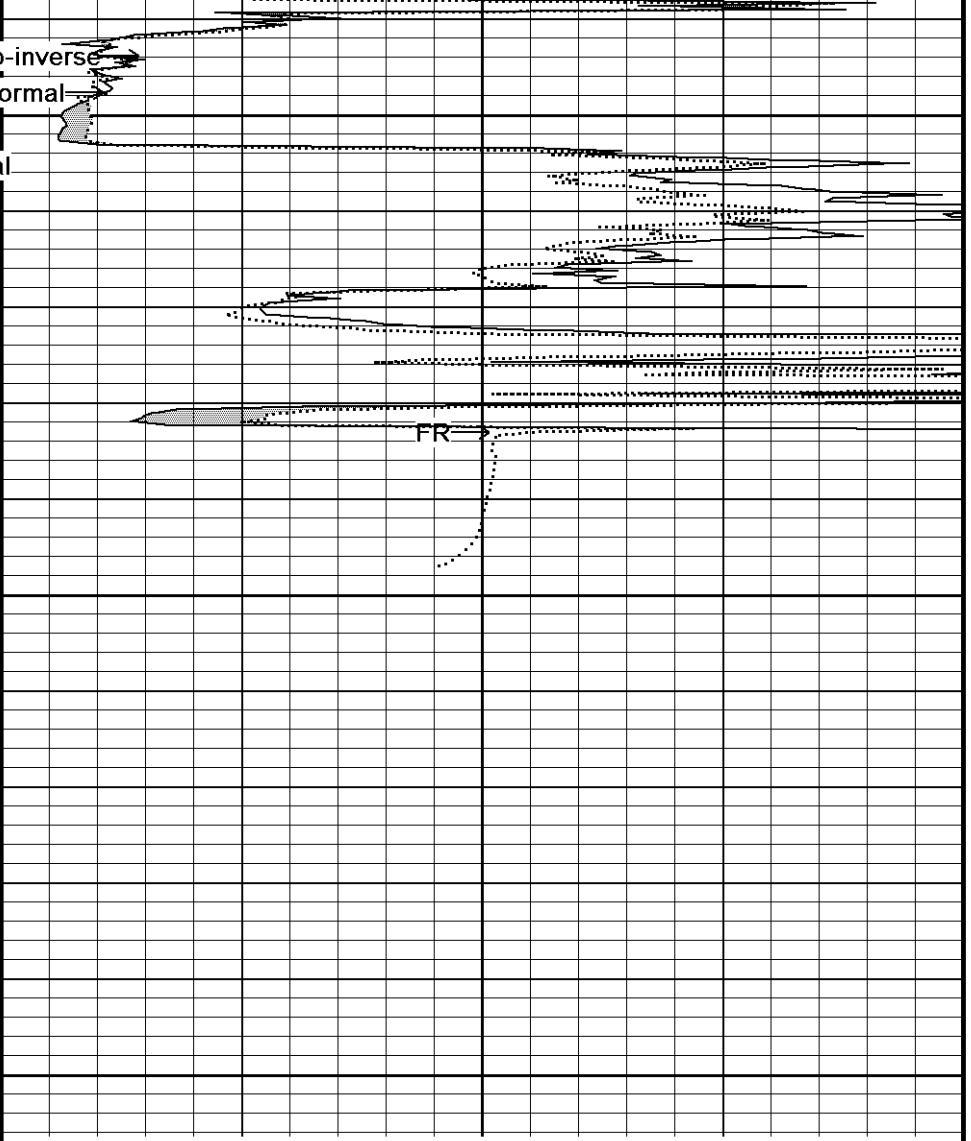
Spontaneous Potential
millivolts
- -> | 20 | <- +

HVI
every
10 cu ft

MML Caliper
inches
6 11 16

Annular
Integral
every
10 cu ft

Bit Size
inches
6 11 16



Micro-normal
ohm metres
0 10 20 30 40

Micro-inverse
ohm metres
0 10 20 30 40

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 26-AUG-2013 12:01

Filename: C:\Minimus 13.05.9583\Log\Shakespeare York #1-2\Shakespeare York #1-2_001.dta

Recorded on 26-AUG-2013 09:00

System Versions: Logged with 13.05.9583 Plotted with 13.05.9583



REPEAT SECTION



BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Log\Shakespeare York #1-2\Shakespeare York #1-2_002.dta

General Constants All 000

Last Edited on 26-AUG-2013,08:25

General Parameters

Mud Resistivity	1.620	ohm-metres
Mud Resistivity Temperature	75.000	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
SW/APOR Tool Source	0.000

Down-hole Tension Calibration SMS 0

Field Calibration on 26-AUG-2013 07:59

Reading No	Measured	Calibrated (lbs)
1	13268.39	0.00
2	13791.97	471.80

Gamma Calibration MCG-D.K 469

Field Calibration on 20-AUG-2013 09:30

	Measured	Calibrated (API)
Background	71	48
Calibrator (Gross)	1141	773
Calibrator (Net)	1070	725

Gamma Constants MCG-D.K 469

Last Edited on 23-AUG-2013,22:32

Gamma Calibrator Number	GRC38	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 18-AUG-2013,02:35

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

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 18-AUG-2013,02:35

Pre-filter Length	11
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SP Calibration MCG-D.K 469

		Measured	Calibrated (mV)	Field Calibration on 18-AUG-2013,02:35	
Reference 1		105.8	100.0		
Reference 2		-94.3	-100.0		
Caliper Calibration MML-A 3				Base Calibration on 15-AUG-2013 08:50	
				Field Calibration on 20-AUG-2013 09:51	
Base Calibration					
Reading No		Measured	Calibrator Size (in)		
1		14887	5.98		
2		18120	7.97		
3		21042	9.86		
4		25322	11.92		
5		0	0.00		
6		N/A	N/A		
Field Calibration					
		Measured Caliper (in)	Actual Caliper (in)		
		5.97	5.98		
Micro Normal and Micro Inverse Calibration MML-A 3				Base Calibration on 15-AUG-2013 09:16	
				Field Check on 20-AUG-2013 09:19	
Base Calibration					
		Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.3	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 3				Last Edited on 20-AUG-2013,09:17	
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 31-JUL-2013 10:25	
				Field Check on 20-AUG-2013 09:35	
Base Calibration					
		Measured		Calibrated (cps)	
	Near	Far	Near	Far	
	3180	99	3714	110	
Ratio	32.180		33.764		
Field Calibrator at Base			Calibrated (cps)		
			1617	2323	
Ratio	0.696				
Field Check			Calibrated (cps)		
			1624	2337	
Ratio	0.694				
Neutron Constants MDN-A.B 66				Last Edited on 20-AUG-2013,09:30	
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	None				
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	None				
Formation Fluid Salinity	0.00	kppm			
Barite Mud Correction	Not Applied				
FE Calibration MFE-B.J 353			Base Calibration on 15-AUG-2013 09:33 Field Check on 20-AUG-2013 09:12		
Base Calibration					
	Measured	Calibrated (ohm-m)			
Reference 1	0.0	0.0			
Reference 2	964.1	126.8			
Base Check		280.9			
Field Check		281.0			
FE Constants MFE-B.J 353			Last Edited on 20-AUG-2013,09:11		
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 55			Last Edited on 18-AUG-2013,09:24		
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		Not 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

Induction Calibration MAI-A.A 167

Base Calibration on 19-APR-2013,13:41
Field Check on 20-AUG-2013 09:11

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	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)		Field Check (mmho/m)	
	Low	High	Low	High
1			13.2	3838.4
2			29.6	3476.1
3			29.2	3052.2
4			19.8	2081.0
Deep			18.6	2048.3
Medium			42.3	3990.2
Shallow			43.0	5053.0

Array Temperature 76.3 Deg F

Induction Constants MAI-A.A 167

Last Edited on 22-AUG-2013,16:31

Induction Model	RtAP-NC		
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	60.00	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 Appor	100.00	percent
Porosity of Water for Appor	0.25	

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 167			Field Calibration on 18-AUG-2013,02:21
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MAI-A.A 167		Last Edited on 18-AUG-2013,02:21
Pre-filter Length	11	

Caliper Calibration MPD-B 64			Base Calibration on 15-AUG-2013 14:54
			Field Calibration on 20-AUG-2013 09:48
Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	16560	3.99	
2	24992	5.98	
3	32880	7.97	
4	41184	9.86	
5	50688	11.92	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	5.79	5.98	

Photo Density Calibration MPD-B 64			Base Calibration on 15-AUG-2013 14:37
			Field Check on 20-AUG-2013 09:16
Density Calibration			
Base Calibration			
	Measured	Calibrated (sdu)	
	Near	Far	
Reference 1	60206	33560	59556 30836
Reference 2	25378	2915	24941 2541
Field Check at Base			
	1155.1	1345.7	
Field Check			
	1158.0	1349.3	
PE Calibration			
Base Calibration			
	Measured	Calibrated	
	WS	WH	Ratio
Background	211	1029	
Reference 1	22957	60005	0.386 0.371
Reference 2	6904	25238	0.276 0.272
Field Check at Base			
	211.2	1028.9	
Field Check			
	209.8	1032.0	

Density Constants MPD-B 64			Last Edited on 23-AUG-2013,22:32
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	1.11	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)

2.71

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

Depth (m)

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\Log\Shakespeare York #1-2\Shakespeare York #1-2_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-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log

MML-A 3 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

Compact Focussed Electric

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

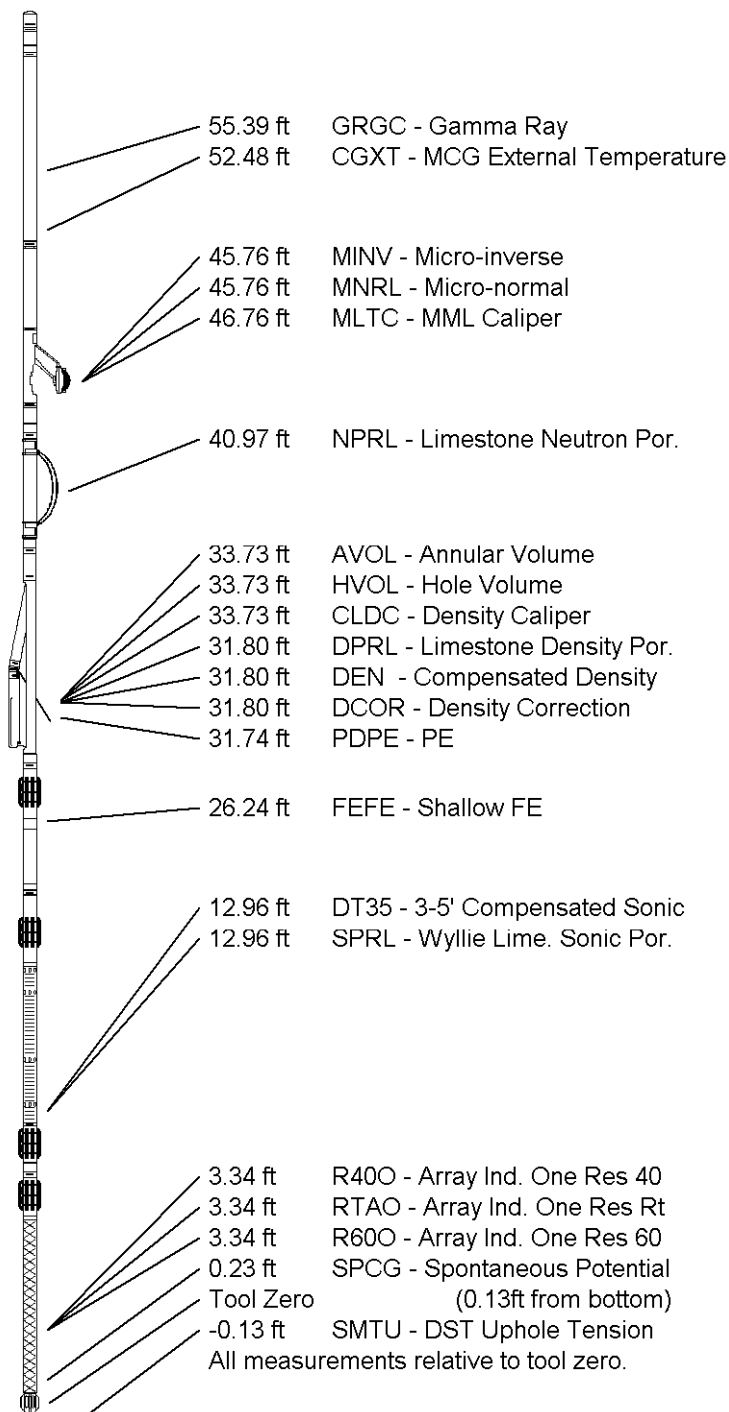
Compact Sonic

MSS-A.A 55 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

Compact Induction

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

Total Length: 62.25 ft Weight: 471.8 lb



COMPANY
WELL
FIELD

SHAKESPEARE OIL CO, INC.
YORK #1-2
WILDCAT

PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	UNITED STATES / KANSAS

Elevation Kelly Bushing	2876.00	feet	First Reading	4583.00	feet
Elevation Drill Floor	2874.00	feet	Depth Driller	4630.00	feet
Elevation Ground Level	2866.00	feet	Depth Logger	4629.00	feet



Weatherford®

MICRORESISTIVITY LOG