

**Weatherford****MICRORESISTIVITY LOG**

COMPANY				SHAKESPEARE OIL COMPANY			
WELL				UNRUH 1-13			
FIELD				WILDCAT			
PROVINCE/COUNTY				SCOTT			
COUNTRY/STATE				UNITED STATES / KANSAS			
LOCATION				2540' FNL & 520' FWL SE SW SW NW			
SEC	TWP	RGE	Other Services				
13	16S	34W	MPD/MDN				
API Number		15-171-20950		MAI/MFE			
Permit Number				MSS			
Permanent Datum G.L., Elevation 3106 feet						Elevations:	
Log Measured From KB						KB 3113.00	
Drilling Measured From K.B. @ 7 FEET						DF 3112.00	
						GL 3106.00	
Date	29-JUN-2013						
Run Number	ONE						
Service Order	3539945						
Depth Driller	4850.00					feet	
Depth Logger	4848.00					feet	
First Reading	4801.00					feet	
Last Reading	3800.00					feet	
Casing Driller	262.00					feet	
Casing Logger	260.00					feet	
Bit Size	7.875					inches	
Hole Fluid Type	CHEMICAL						
Density / Viscosity	9.30	lb/USg	53.00	CP			
PH / Fluid Loss	10.00		8.80	ml/30Min			
Sample Source	FLOW LINE						
Rm @ Measured Temp	0.55 @ 78.0					ohm-m	
Rmf @ Measured Temp	0.44 @ 78.0					ohm-m	
Rmc @ Measured Temp	0.66 @ 78.0					ohm-m	
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	0.37 @115.0					ohm-m	
Time Since Circulation	4 HOURS						
Max Recorded Temp	115.00					deg F	
Equipment / Base	13096		LIB				
Recorded By	D. COLE						
Witnessed By	S. DAVIS						
IOB#	LB13-188						

BOREHOLE RECORD

Last Edited: 29-JUN-2013 20:04

Bit Size inches	Depth From feet	Depth To feet
7.875	262.00	4850.00

CASING RECORD

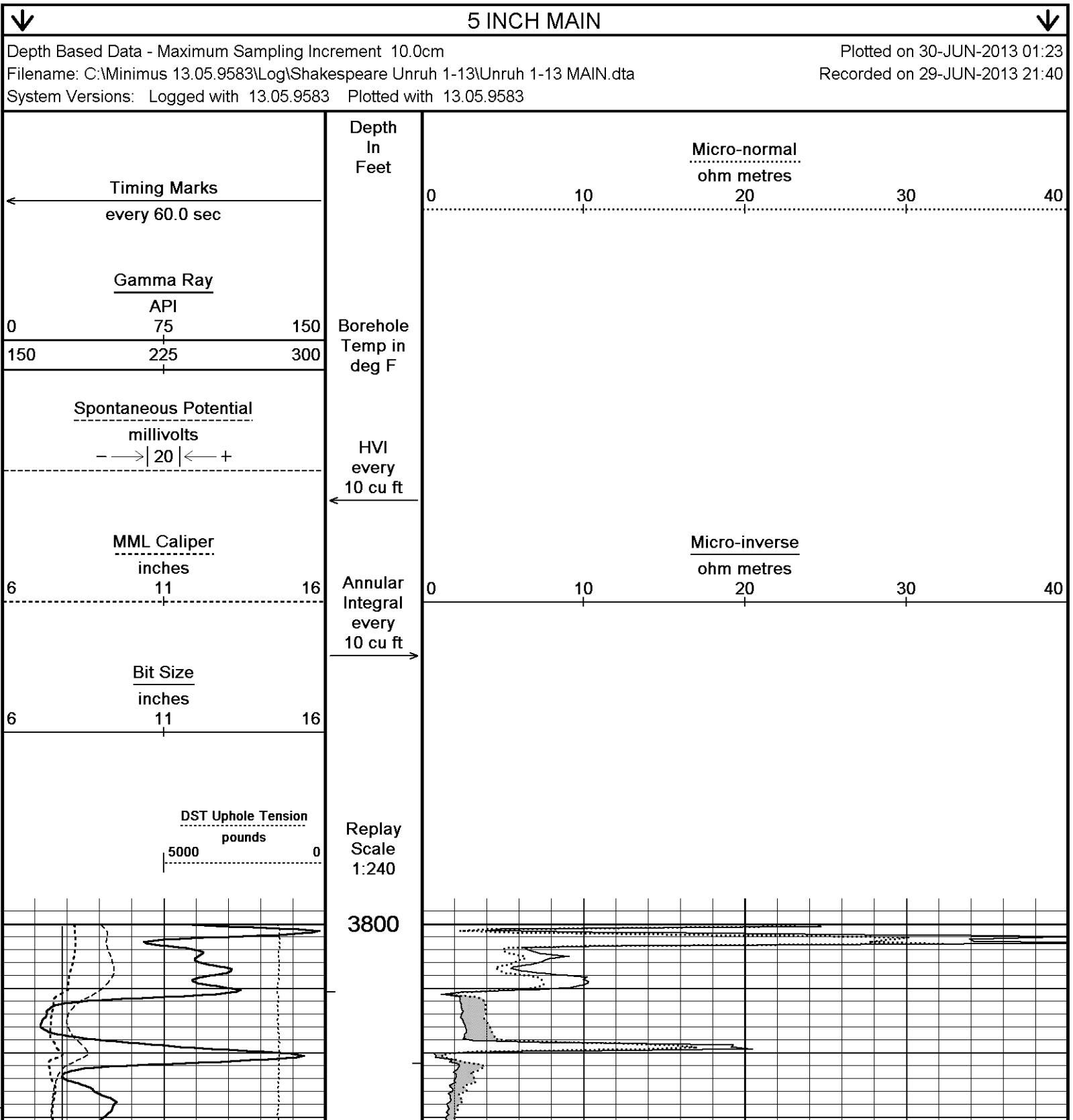
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	262.00	23.00

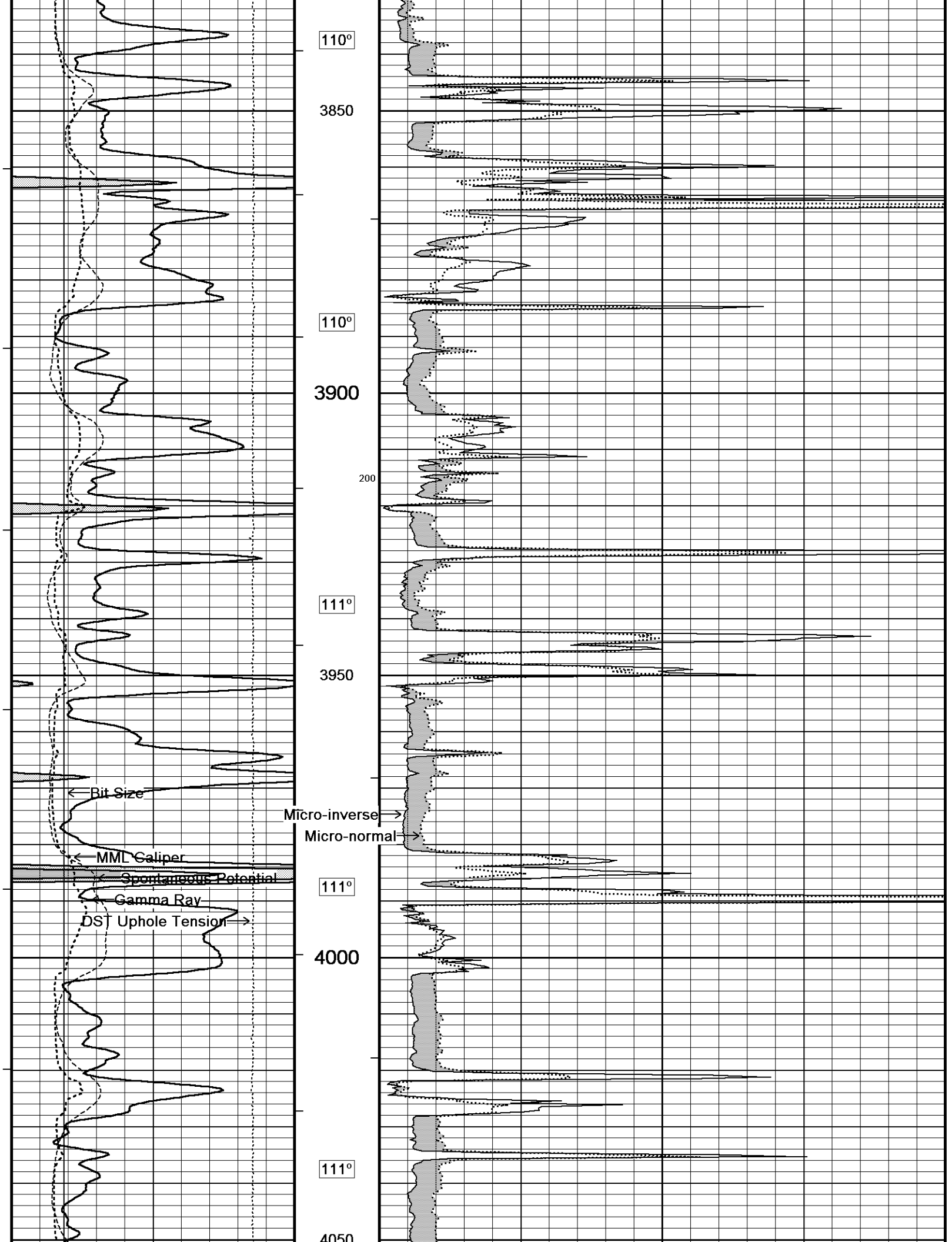
REMARKS

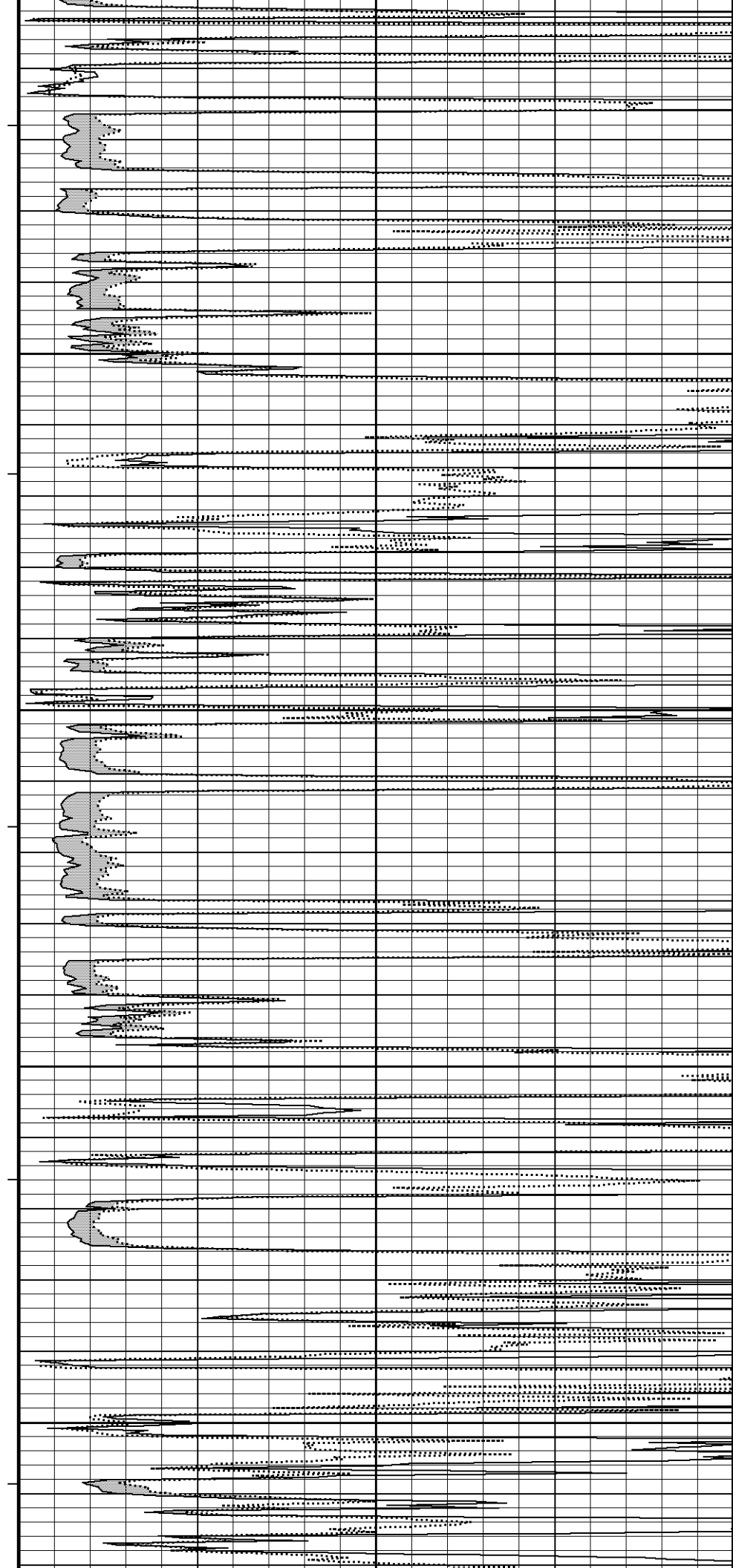
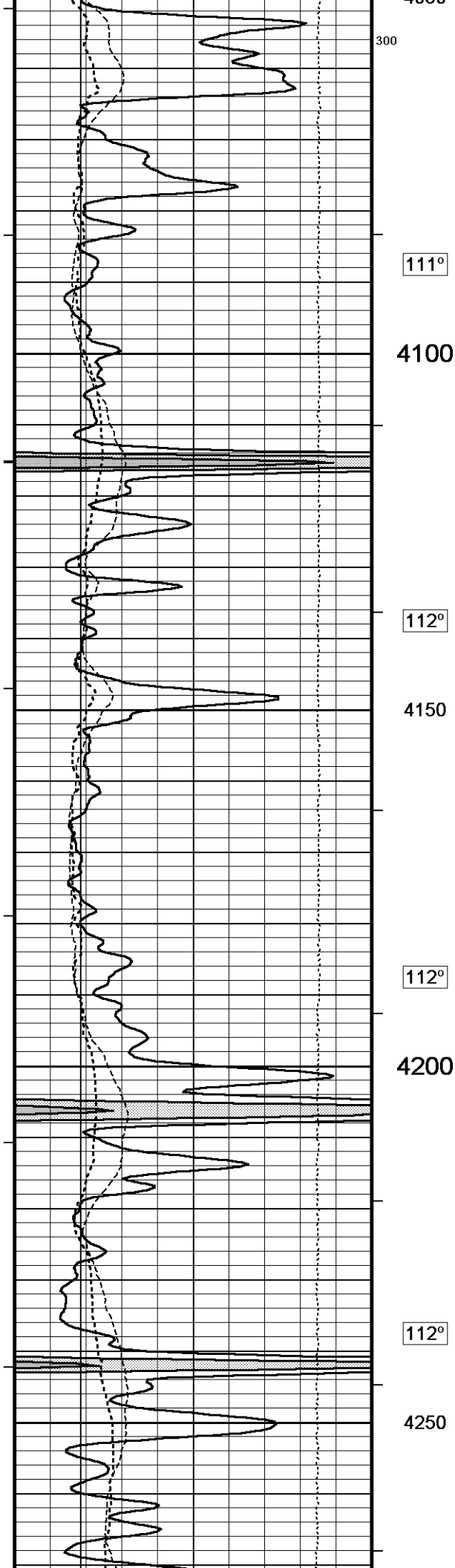
- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 2210 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 1450 CU. FT.

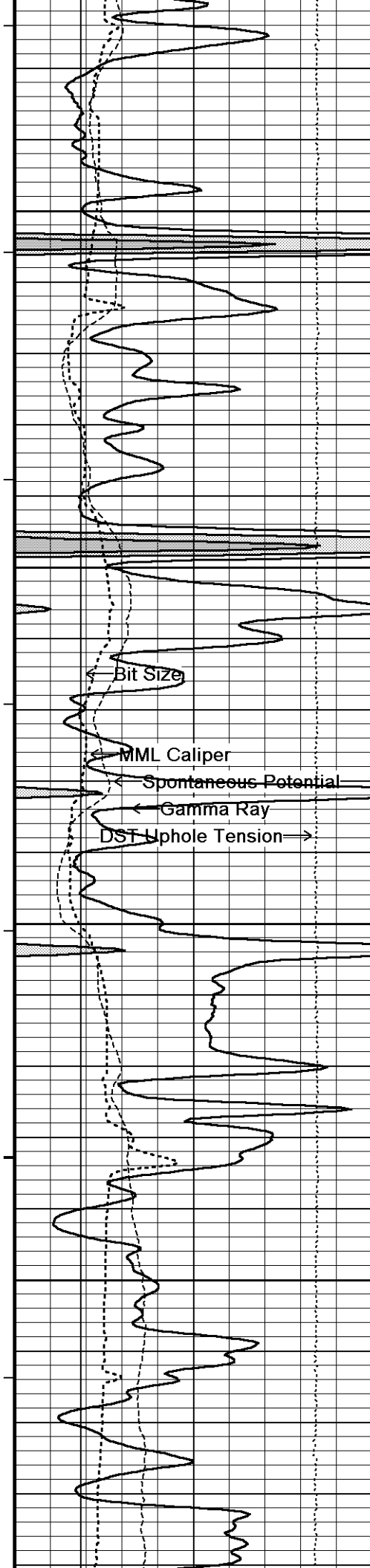
- RIG: HD DRILLING #3
- ENGINEER: D. COLE
- OPERATOR(S): B. REEVES AND C. RIMEREZ

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.









113°

4300

200

113°

4350

113°

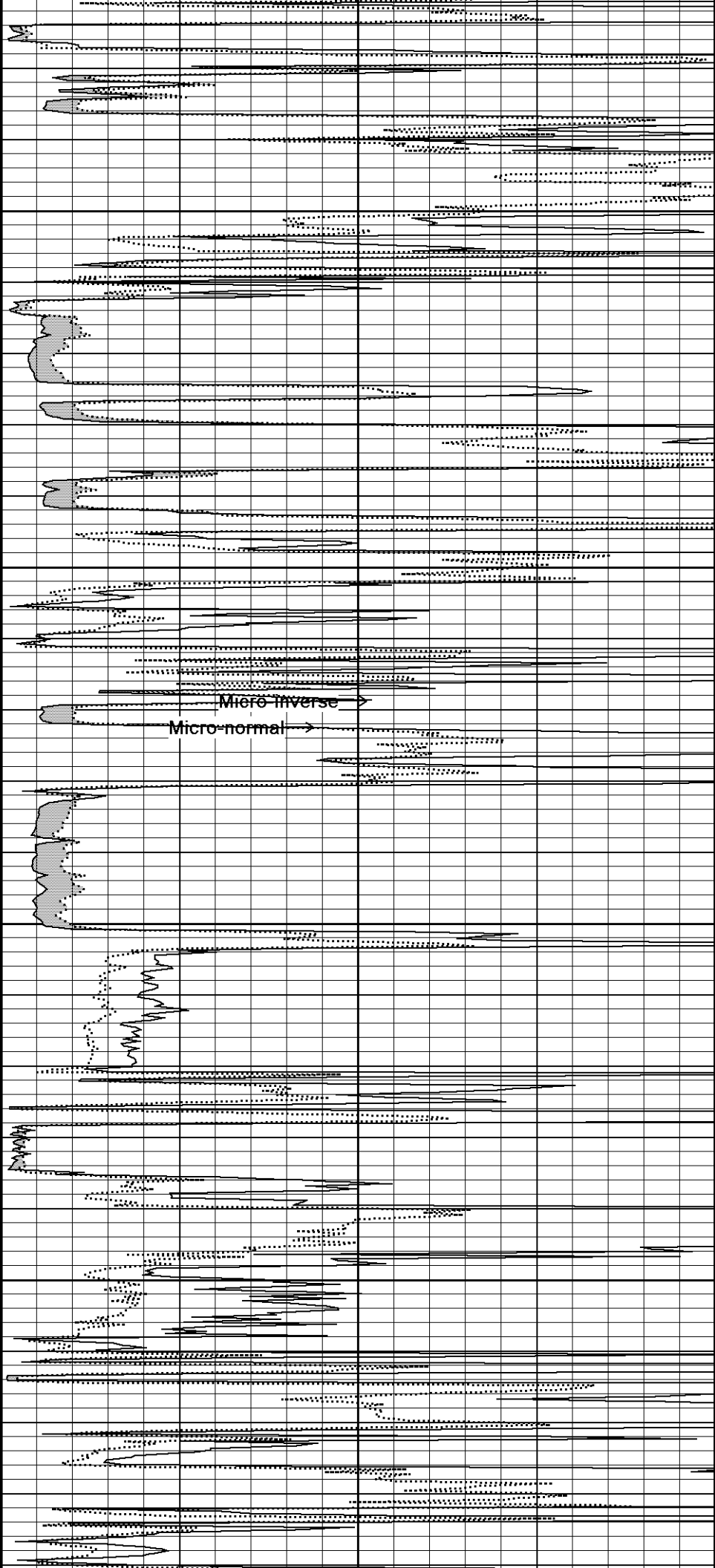
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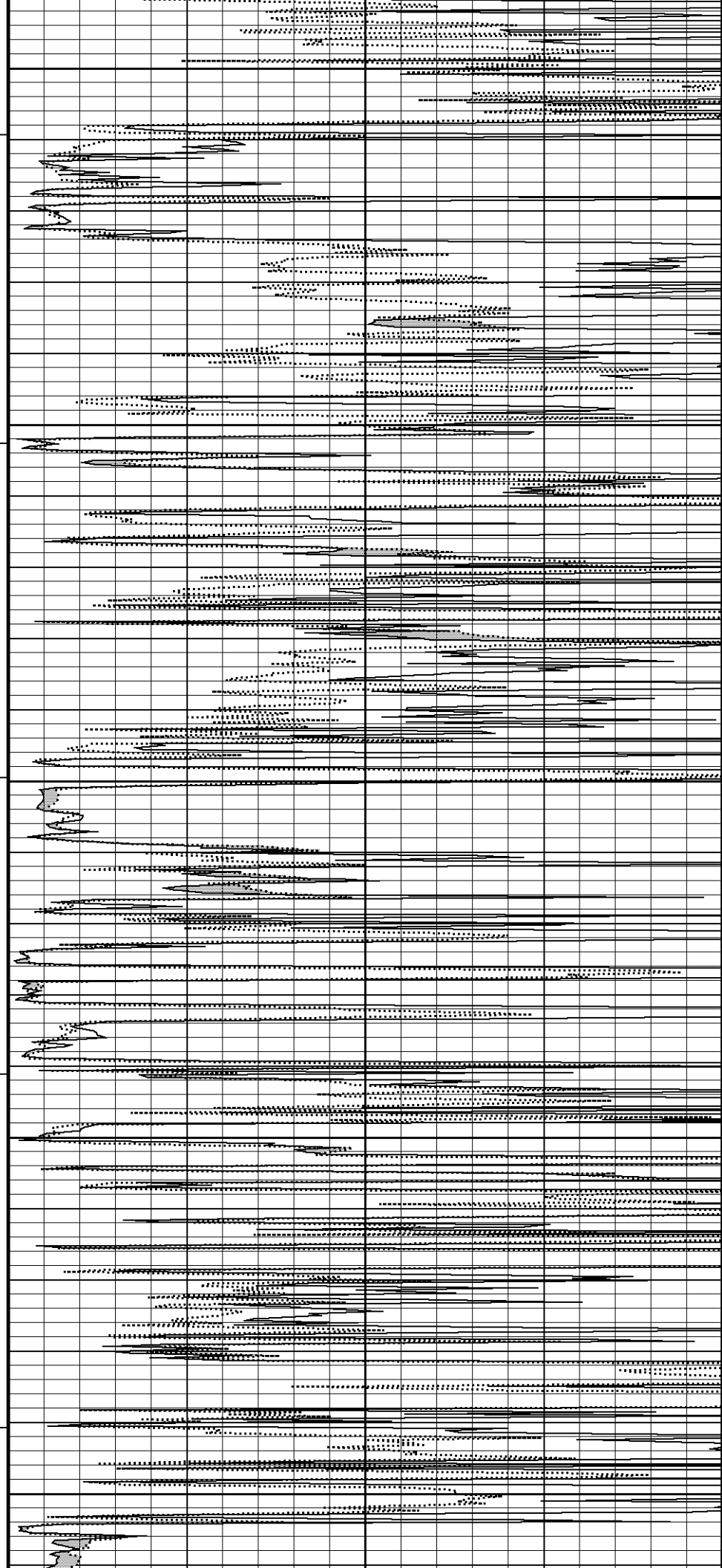
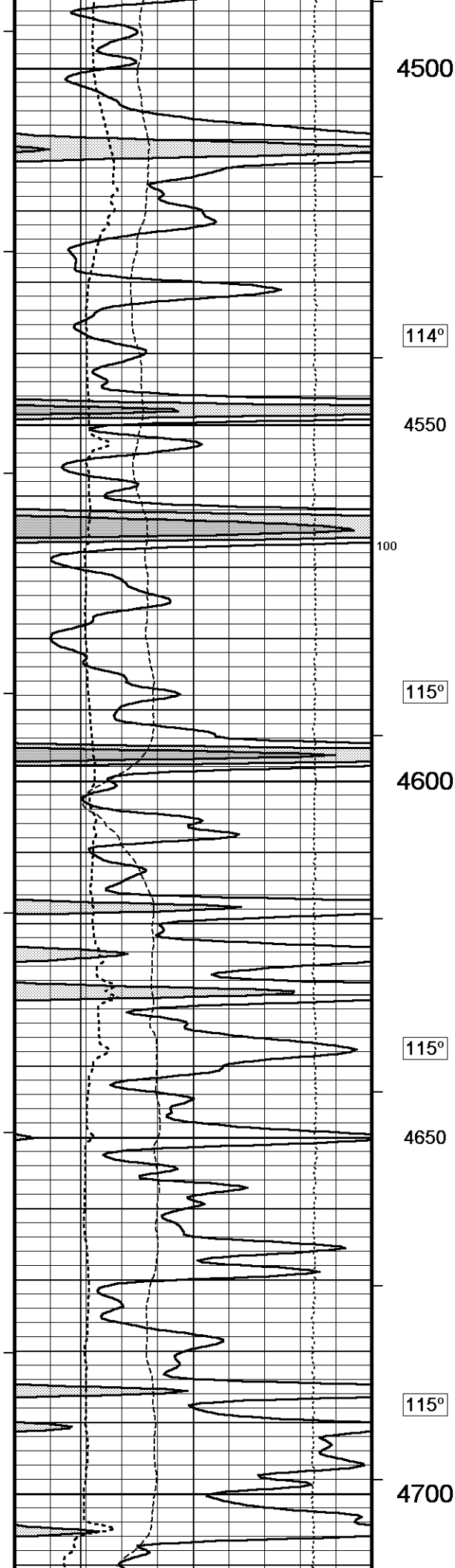
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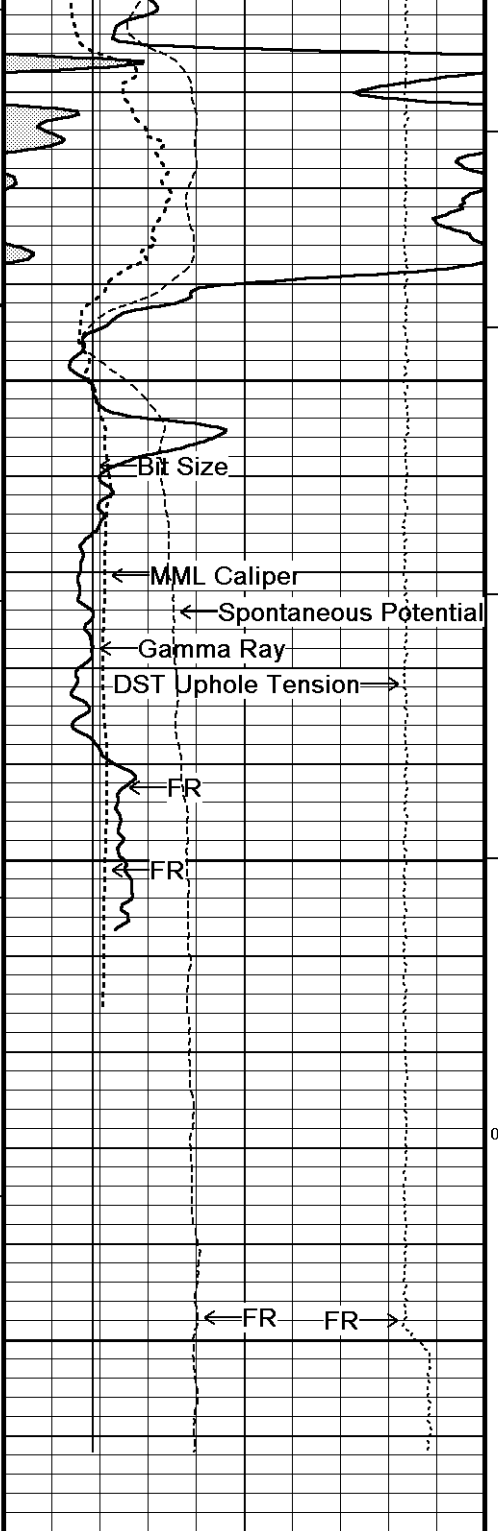
113°

4450

114°







114°

4750

114°

4800

4850

4868

Depth
In
Feet

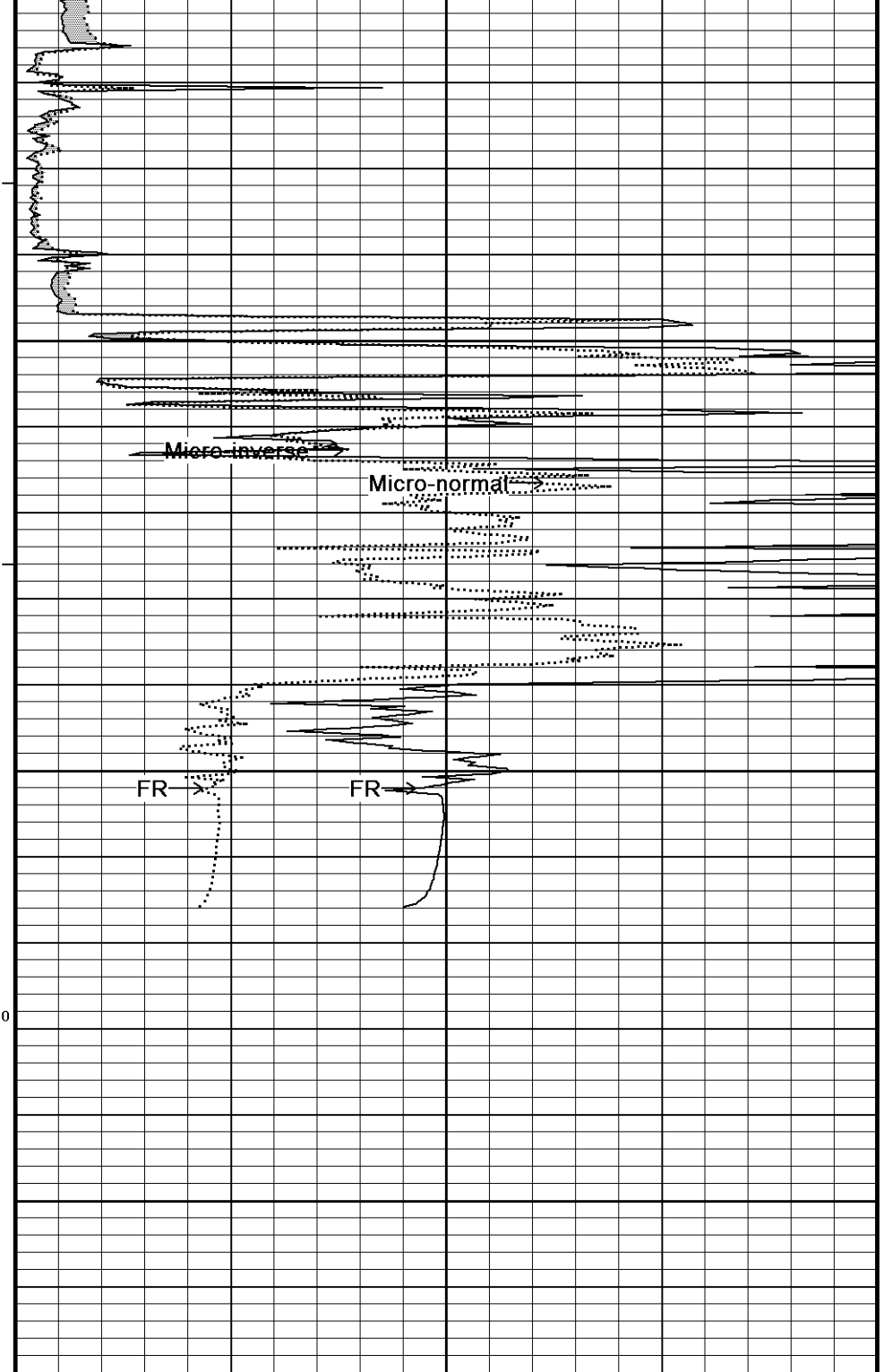
← Timing Marks
every 60.0 sec

Gamma Ray			
API			
0	75	150	
150	225	300	

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

Borehole
Temp in
deg F

HVI
every
10 cu ft



Micro-inverse

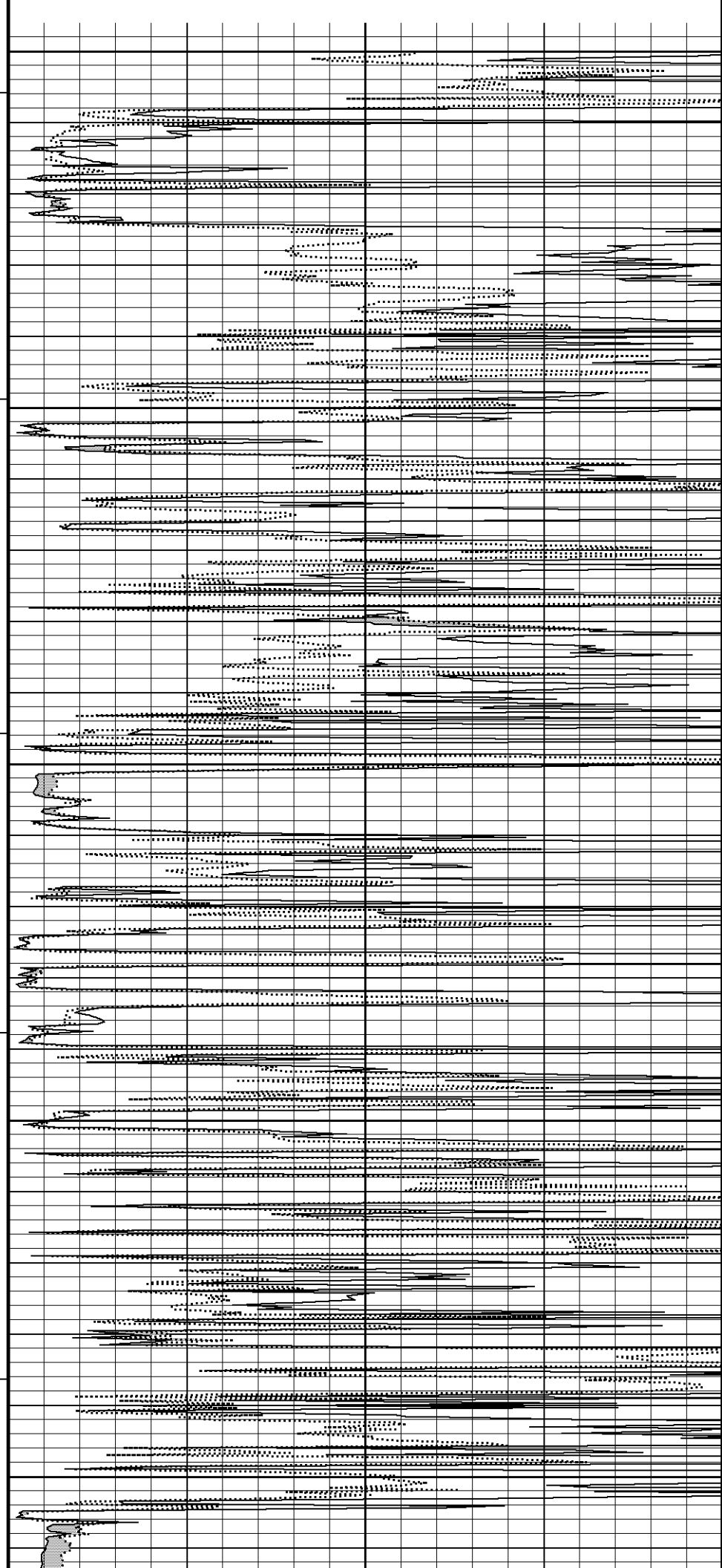
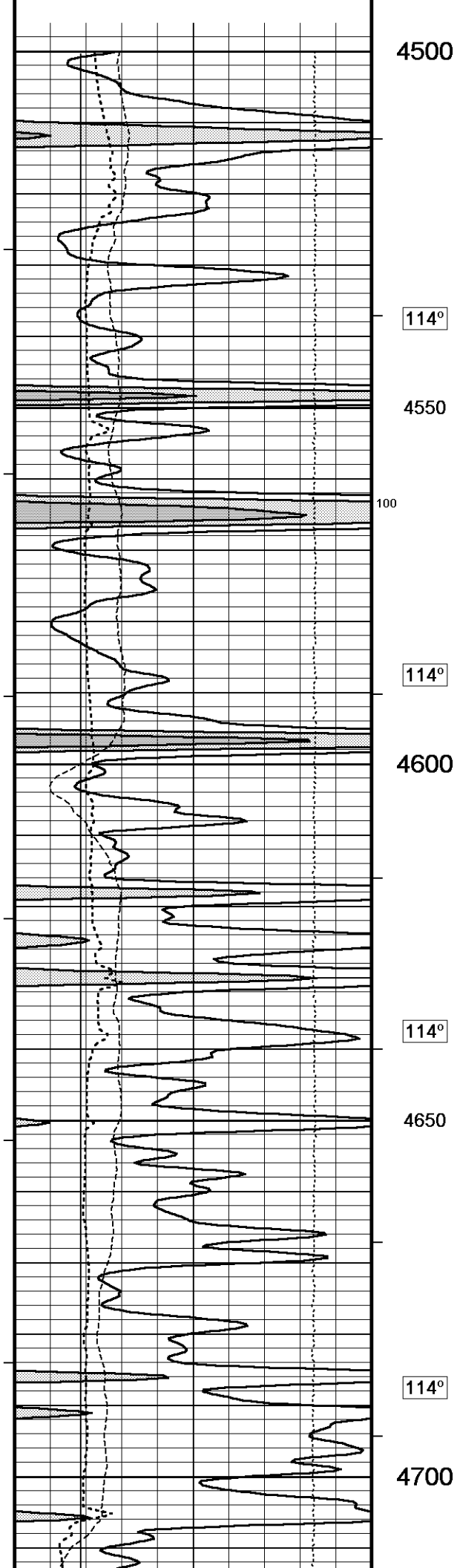
Micro-normal

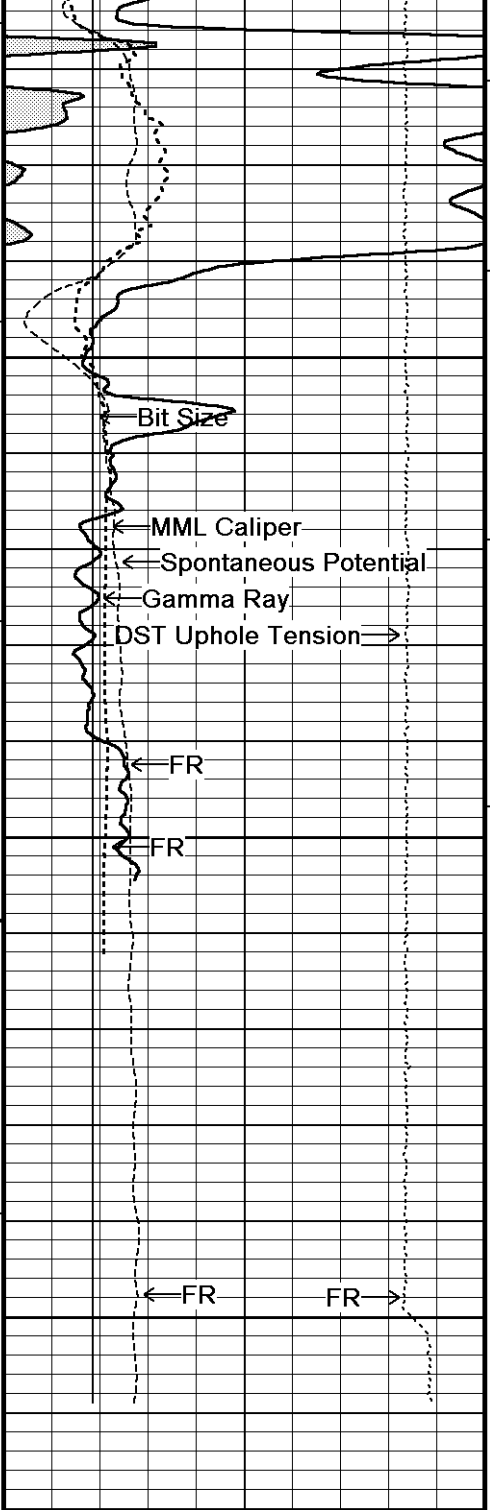
FR

FR

Micro-normal
ohm metres

0 10 20 30 40





114°

4750

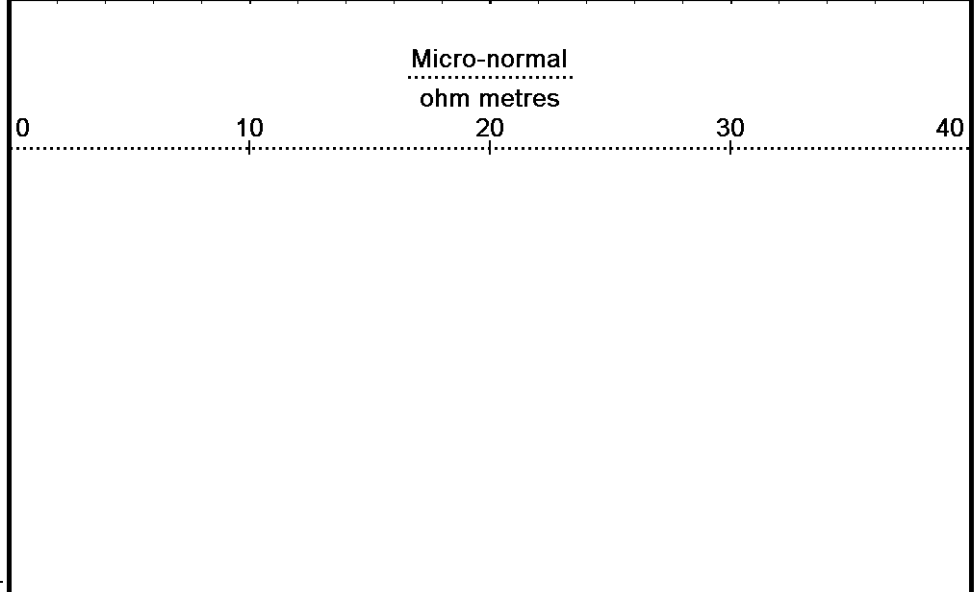
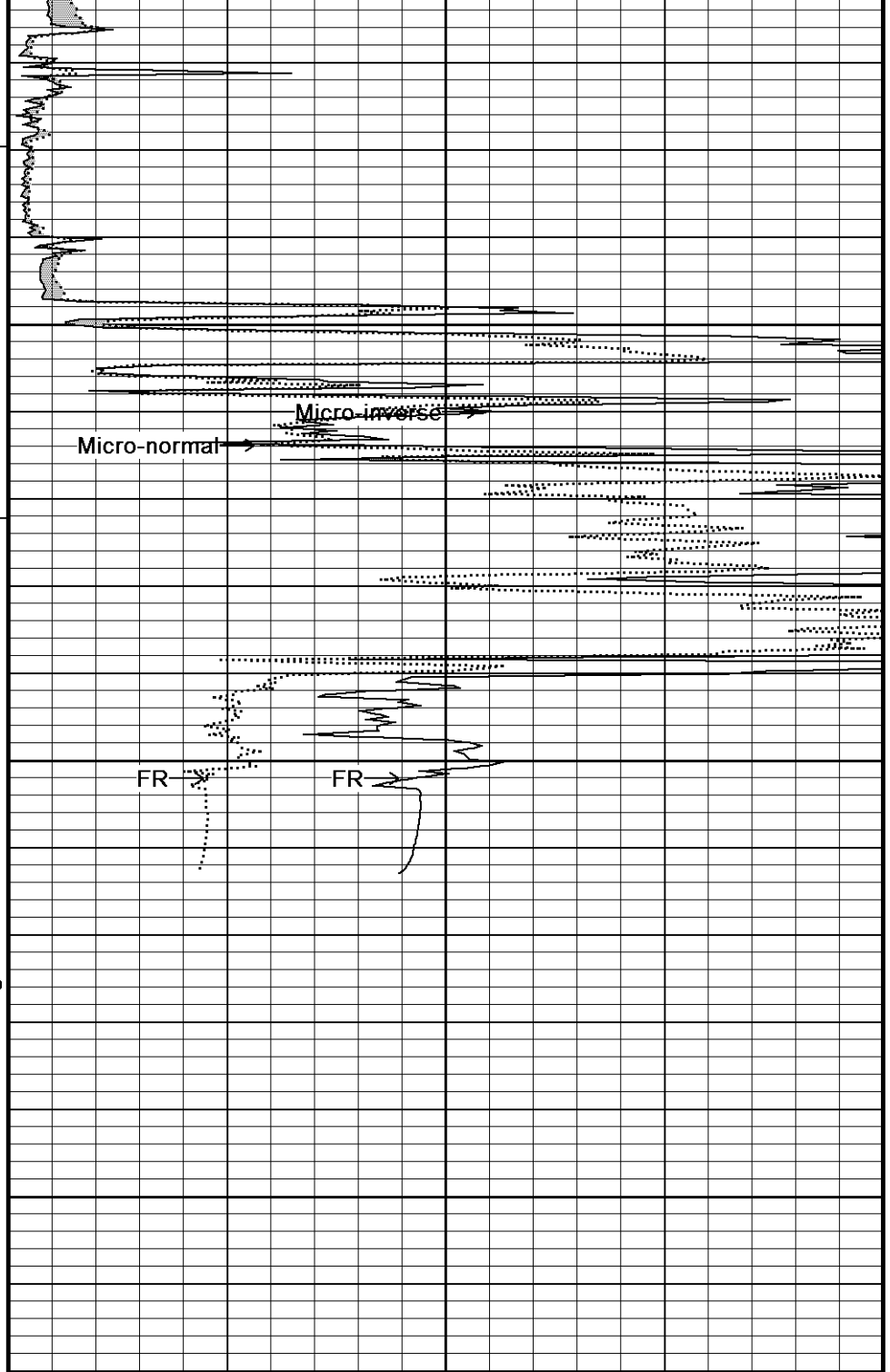
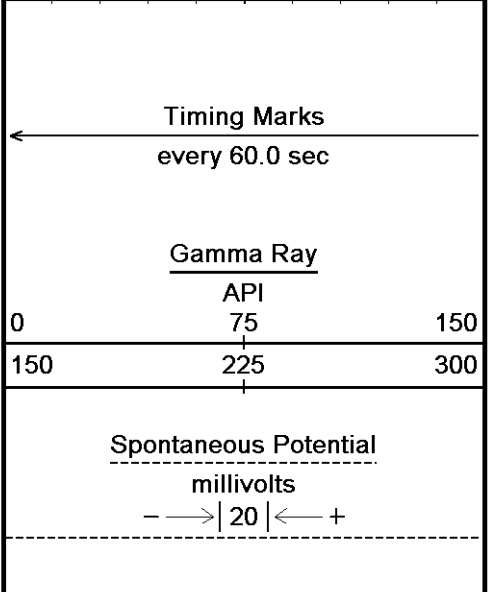
113°

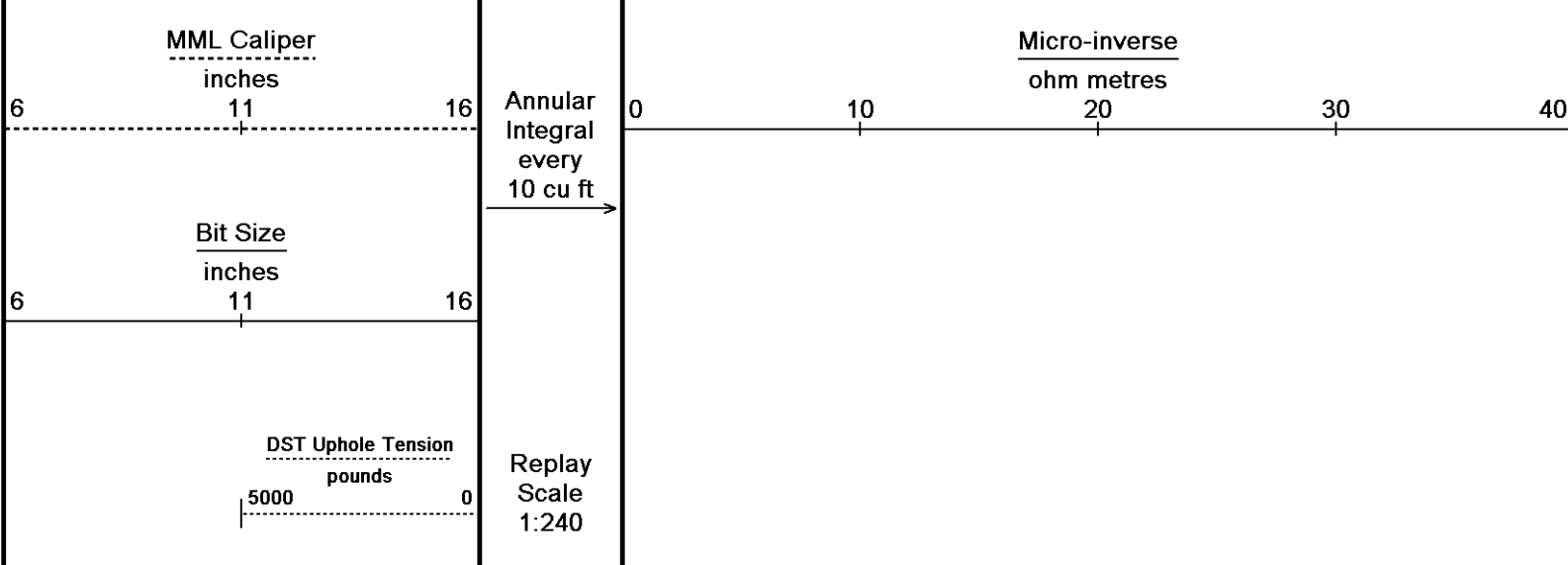
4800

4850

4868

Depth
in
Feet





Depth Based Data - Maximum Sampling Increment 10.0cm Filename: C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta System Versions: Logged with 13.05.9583 Plotted with 13.05.9583	Plotted on 30-JUN-2013 01:23 Recorded on 29-JUN-2013 21:21
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↑
REPEAT SECTION
↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta

General Constants All 000		Last Edited on 29-JUN-2013,19:31
General Parameters		
Mud Resistivity	0.550	ohm-metres
Mud Resistivity Temperature	78.000	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	MML Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	1.000	
RWA Constant M	2.000	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.K 469		Field Calibration on 28-JUN-2013 10:15
	Measured	Calibrated (API)
Background	78	54
Calibrator (Gross)	1127	779
Calibrator (Net)	1049	725

Gamma Constants MCG-D.K 469		Last Edited on 29-JUN-2013,19:15
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 28-JUN-2013,10:23
	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 28-JUN-2013,10:23

Pre-filter Length 11

Caliper Calibration MML-A 3

Base Calibration on 05-JUN-2013 15:43
Field Calibration on 28-JUN-2013 10:06

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14624	5.98
2	17958	7.97
3	21263	9.86
4	25213	11.92
5	0	0.00
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	6.06	5.98

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 05-JUN-2013 15:36
Field Check on 28-JUN-2013 10:04

Base Calibration		Measured	Calibrated (ohm-m)
Channel	Resistor 1	Resistor 2	Resistor 1 Resistor 2
Micro Normal	12.2	60.2	5.0 25.0
Micro Inverse	15.7	78.3	5.0 25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	63.0	63.0
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 3

Last Edited on 29-JUN-2013,19:15

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 MPD-B 64

Base Calibration on 21-MAY-2013 17:34
Field Calibration on 28-JUN-2013 10:03

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14464	3.99
2	23406	5.98
3	32206	7.97
4	40368	9.86
5	50018	11.92
6	N/A	N/A

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

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Log\Shakespeare Unruh 1-13\Unruh 1-13 REPEAT.dta

CBH-C, Cablehead, 11 pin
CBH-CA 900 LG: 2.40 ft WT: 24.3 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



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 MMLTC - MML Caliper

Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

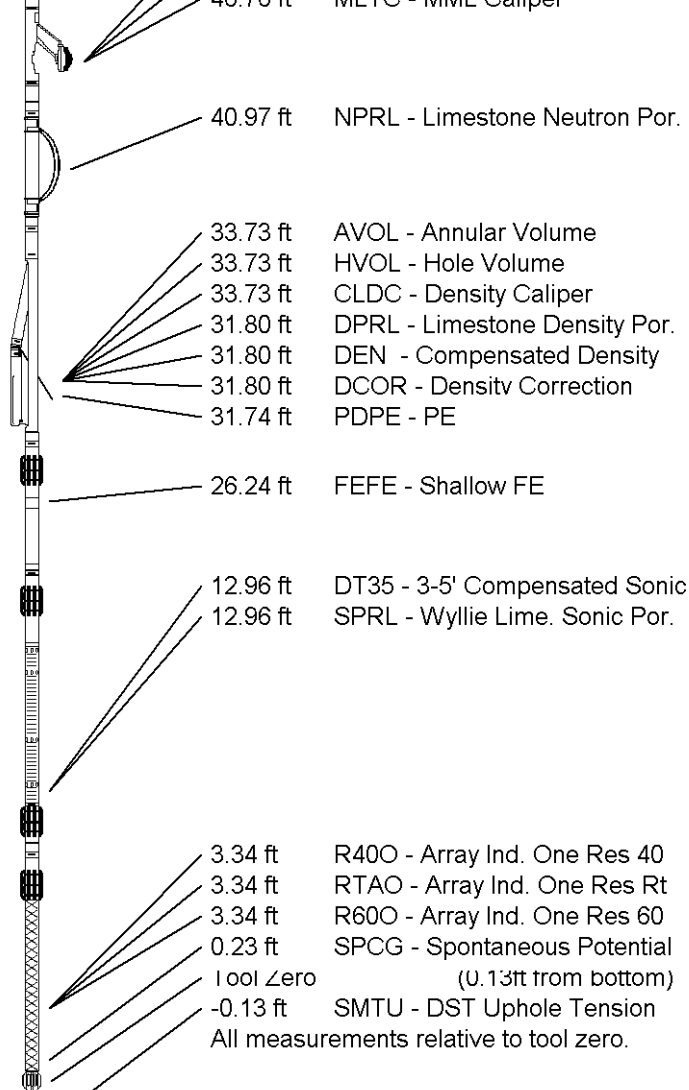
Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

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

Compact Sonic
MSS-C.K 330 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: 63.07 ft Weight: 480.6 lb



COMPANY	SHAKESPEARE OIL COMPANY
WELL	UNRUH 1-13
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	UNITED STATES / KANSAS

Elevation Kelly Bushing	3113.00	feet	First Reading	4801.00	feet
Elevation Drill Floor	3112.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	3106.00	feet	Depth Logger	4848.00	feet



Weatherford®

MICRORESISTIVITY LOG