



**Weatherford**<sup>®</sup>

**MICRORESISTIVITY LOG**

COMPANY	SHAKESPEARE OIL CO., INC.		
WELL	B4US #1-32		
FIELD	WILDCAT		
PROVINCE/COUNTY	SCOTT		
COUNTRY/STATE	U.S.A. / KANSAS		
LOCATION	335' FNL & 1440' FWL		
SEC 32	TWP 17S	RGE 33W	Other Services
Latitude			MPD/MDN
Longitude			MSS
API Number	15-171-21051		MAI/MFE
Permanent Datum GL, Elevation	3056 feet		Elevations:
Log Measured From KB			KB 3066.00
Drilling Measured From KB			DF 3064.00
			GL 3056.00
Date	10-MAY-2014		
Run Number	ONE		
Service Order	4558-86926003		
Depth Driller	4845.00	feet	
Depth Logger	4842.00	feet	
First Reading	4796.00	feet	
Last Reading	3800.00	feet	
Casing Driller	270.00	feet	
Casing Logger	266.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.30 lb/USg	54.00 CP	
PH / Fluid Loss	10.50	8.00 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.37 @ 93.0	ohm-m	
Rmf @ Measured Temp	0.30 @ 93.0	ohm-m	
Rmc @ Measured Temp	0.44 @ 93.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.30 @ 115.0	ohm-m	
Time Since Circulation	4 HOURS		
Max Recorded Temp	115.00	deg F	
Equipment / Base	13244	LIB	
Recorded By	ADAM SILL		
Witnessed By	TIM PRIEST		
JOB #	LB14-140		

**BOREHOLE RECORD**

Last Edited: 10-MAY-2014 18:38

Bit Size inches	Depth From feet	Depth To feet
7.875	270.00	4845.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	270.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: 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: 2321 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 227 CU.FT.

- RIG: H-D DRILLING #2.

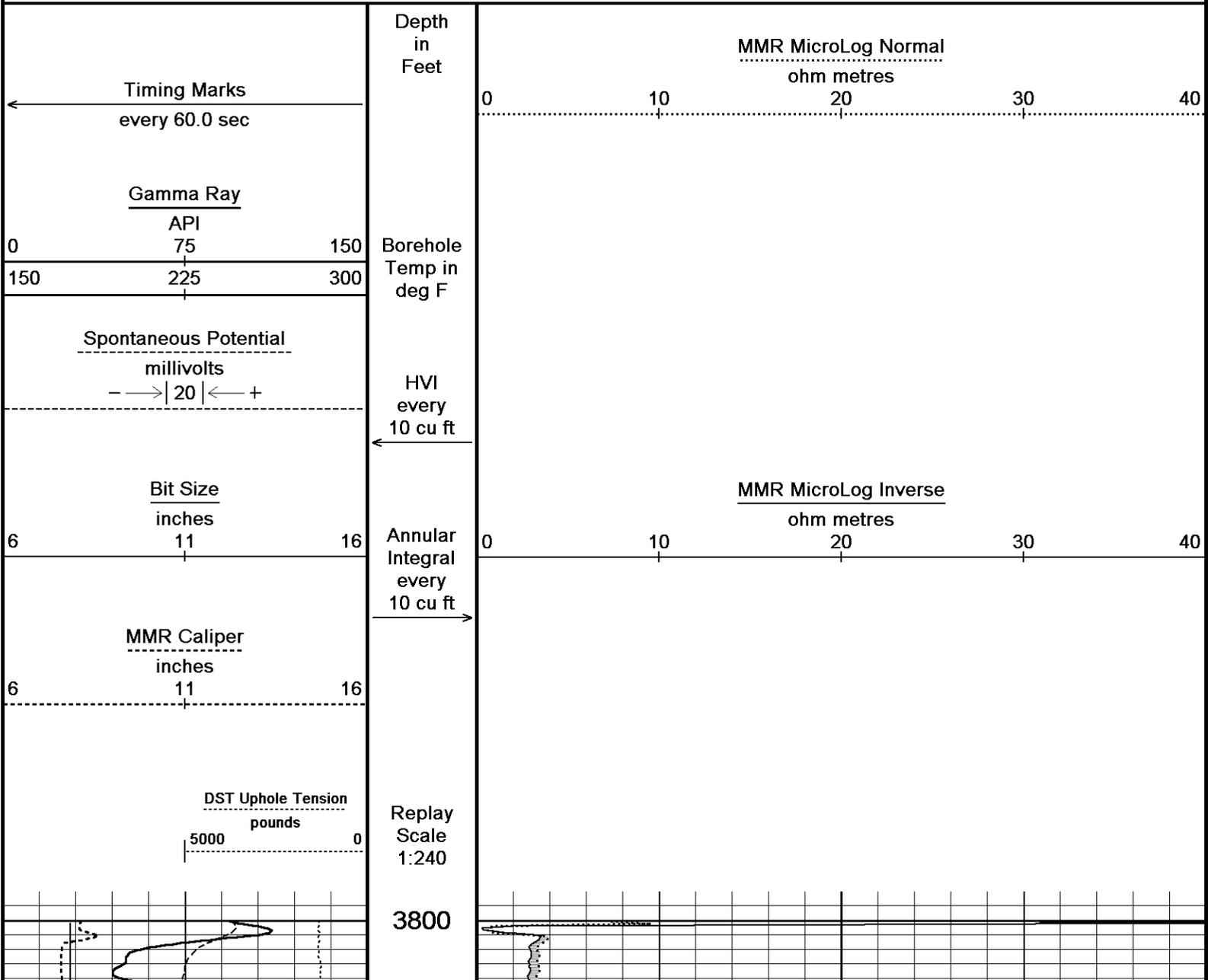
- ENGINEER: A. SILL.

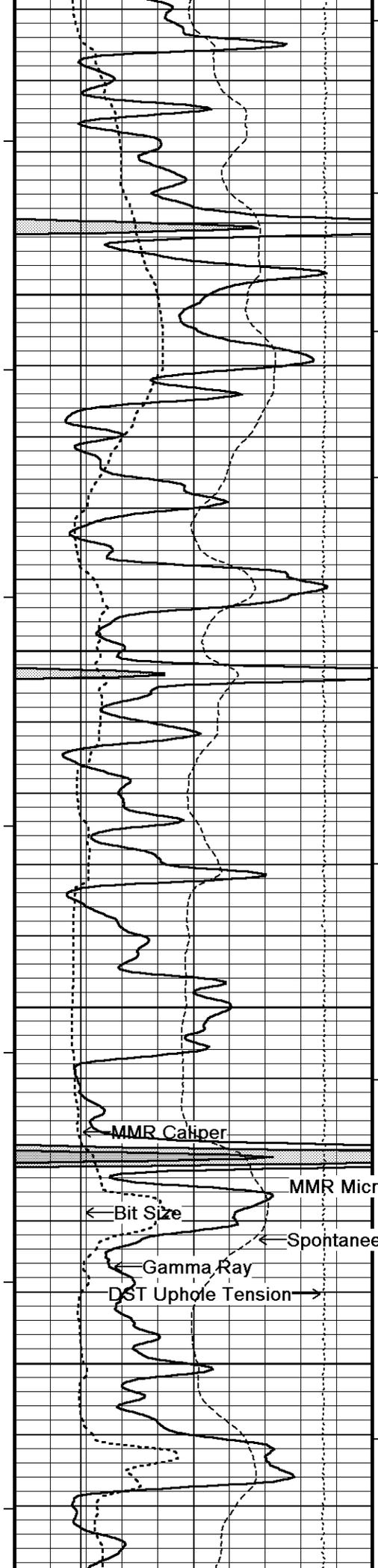
- OPERATOR: J. LaPOINT.

In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

**5 INCH MAIN**

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 11-MAY-2014 00:13  
 Filename: C:\Minimus 13.08.2113\Logs\Shakespeare B4US #1-32\Shakespeare B4US #1-32\_002.dta Recorded on 10-MAY-2014 21:00  
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113





108°

3850

109°

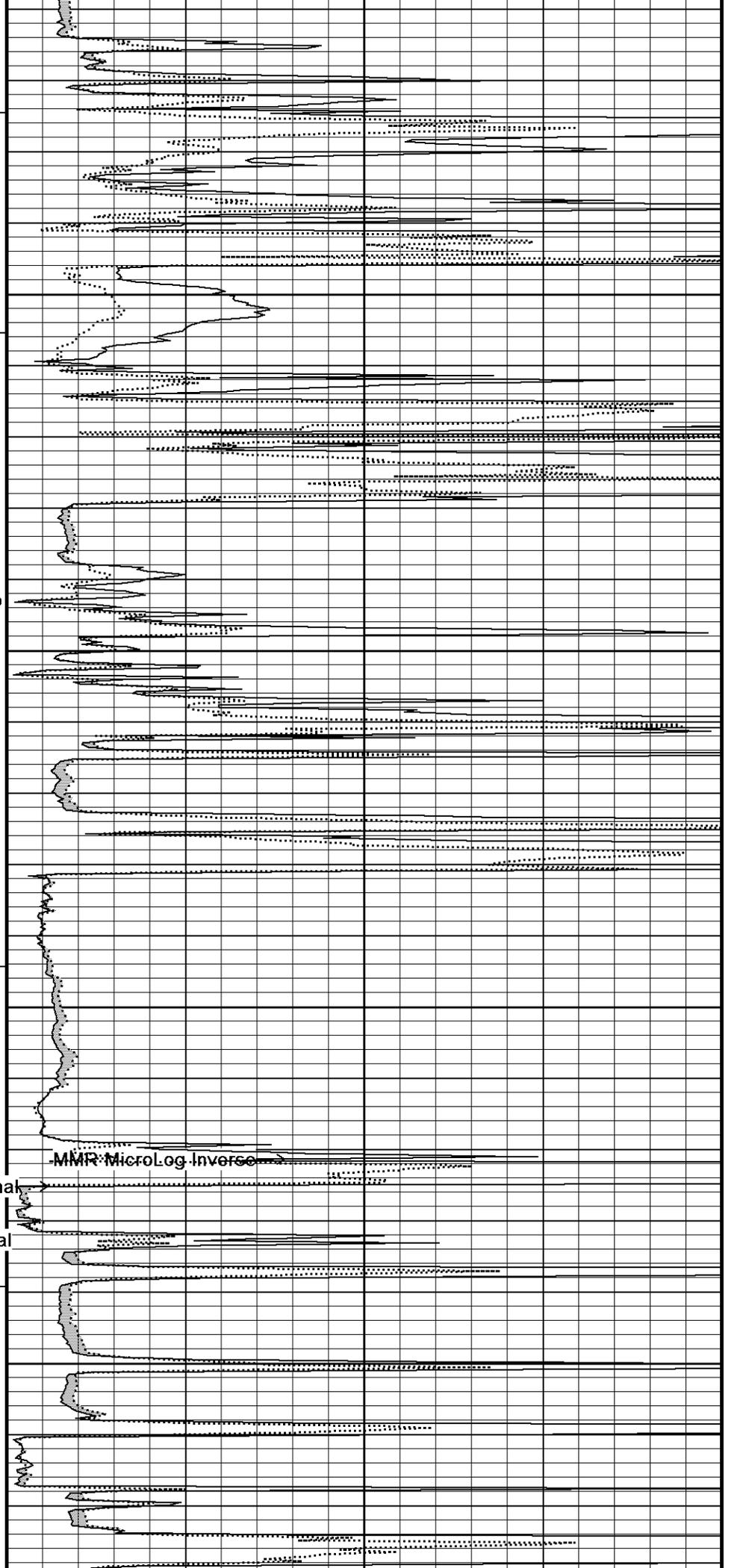
3900

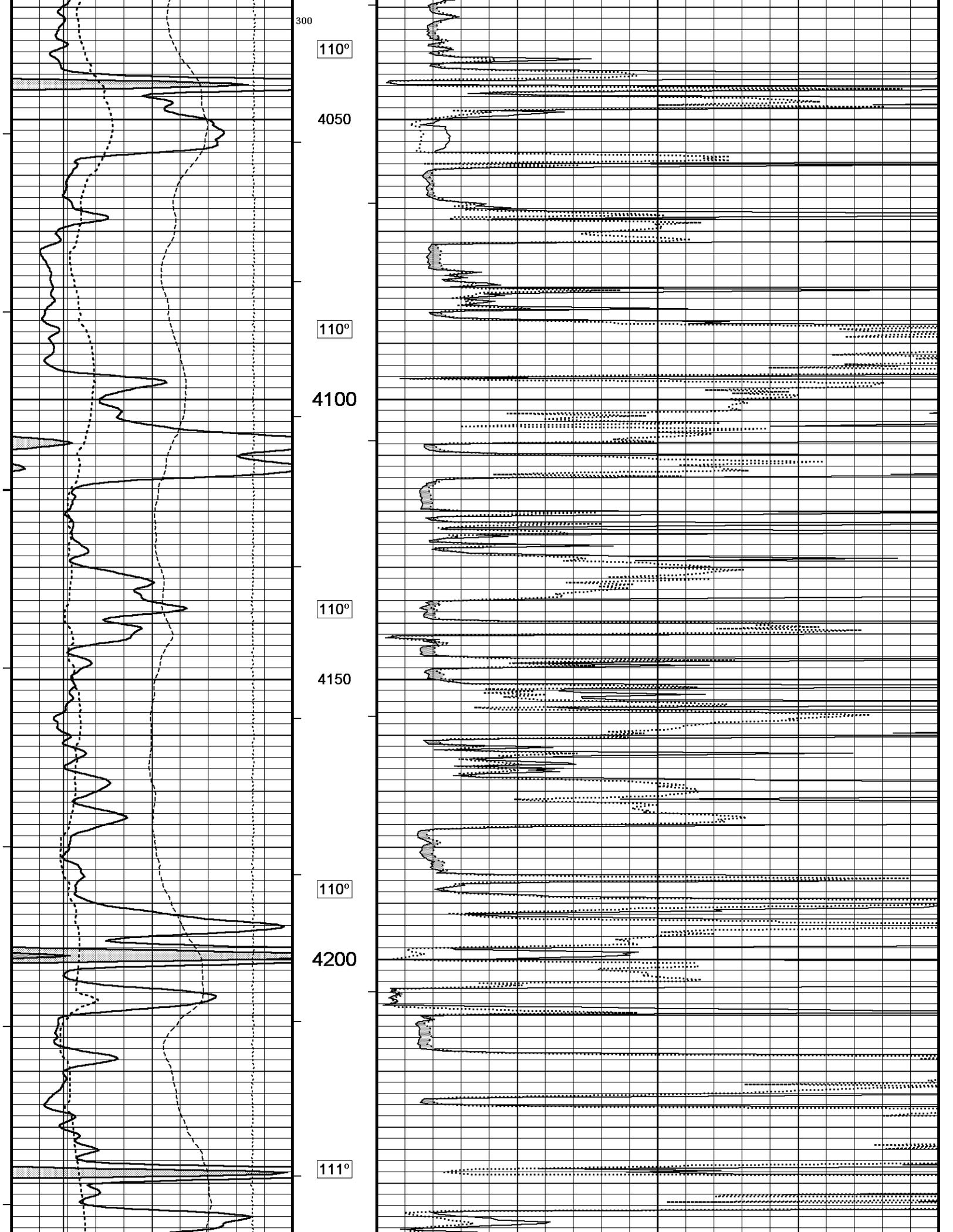
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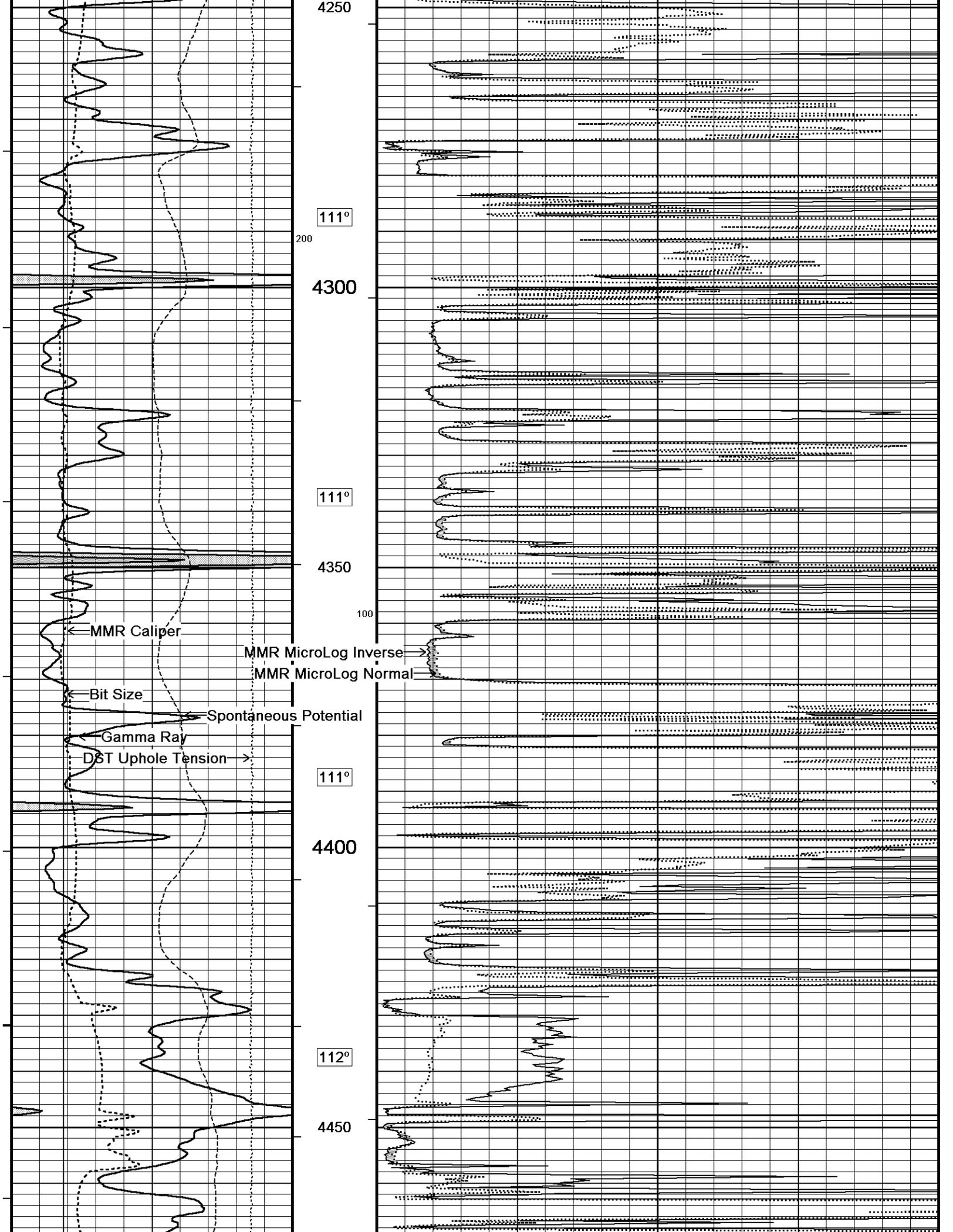
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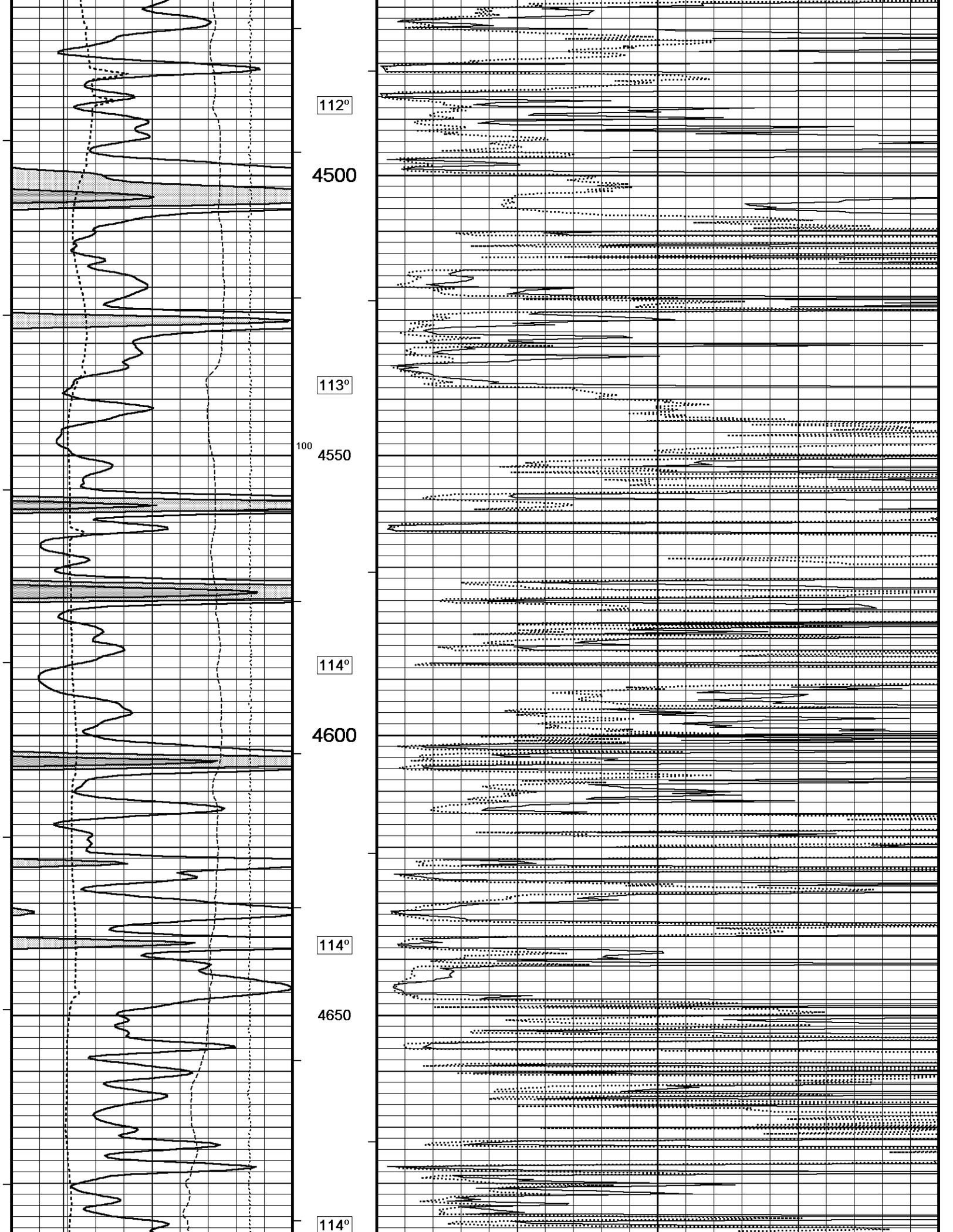
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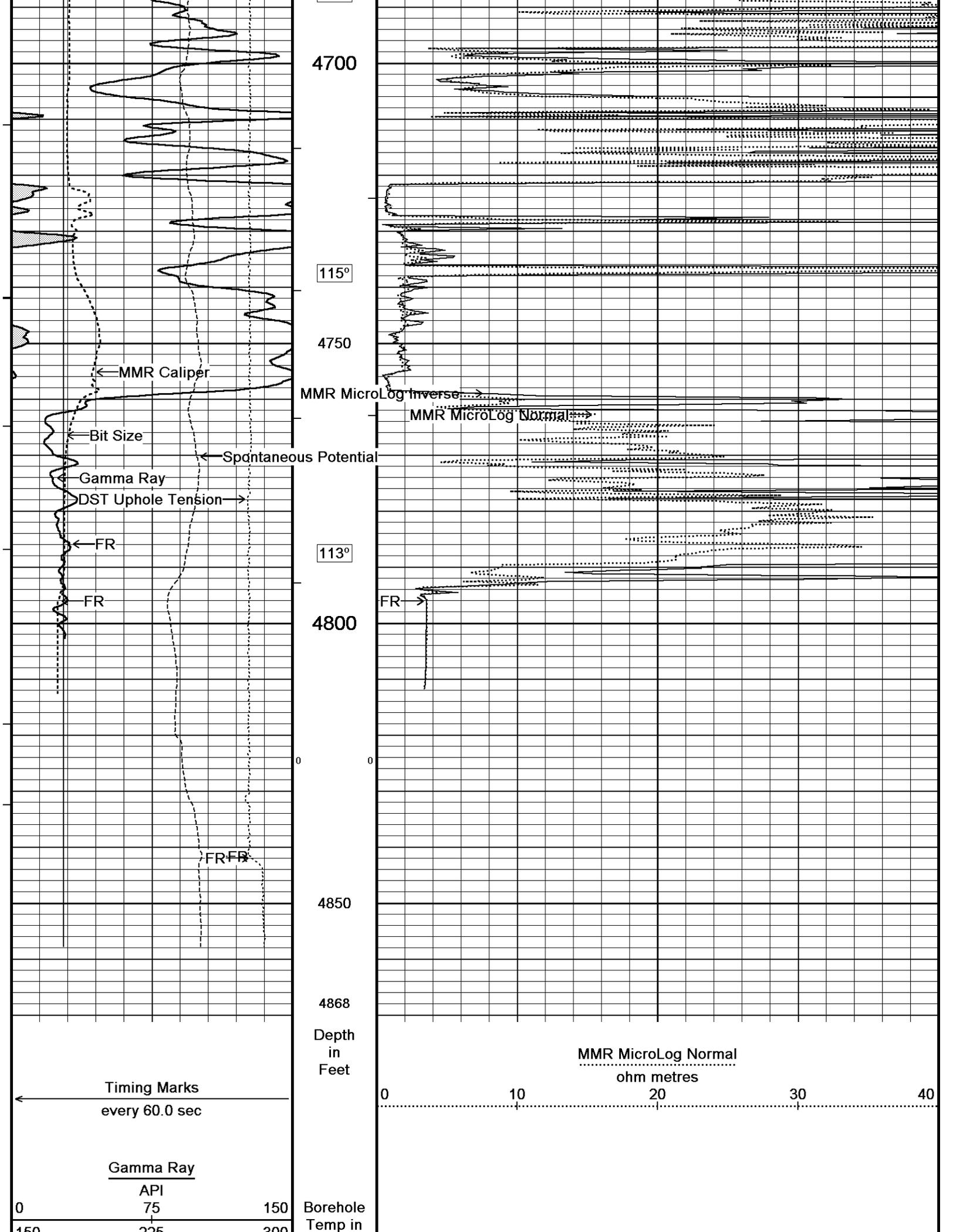
4000







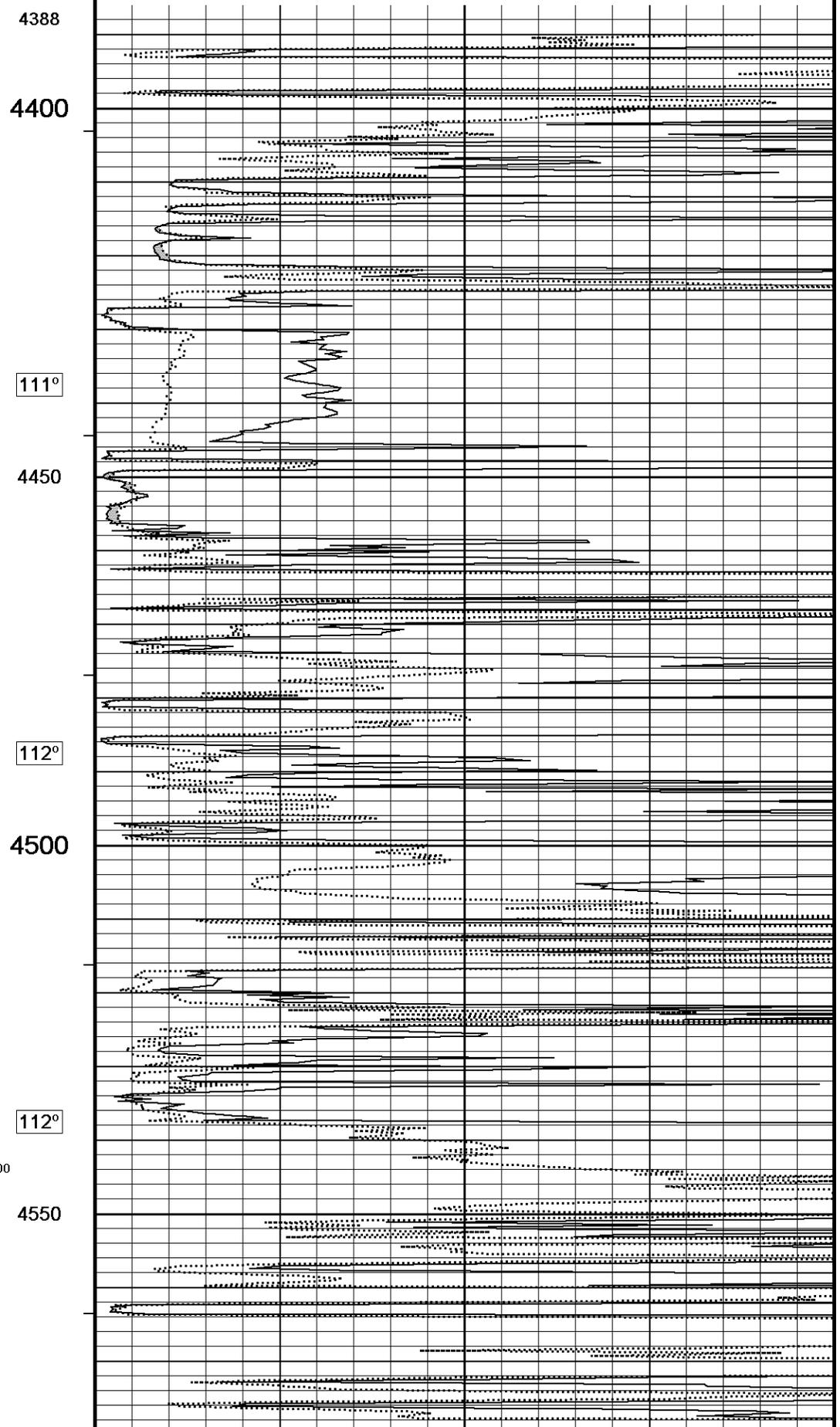
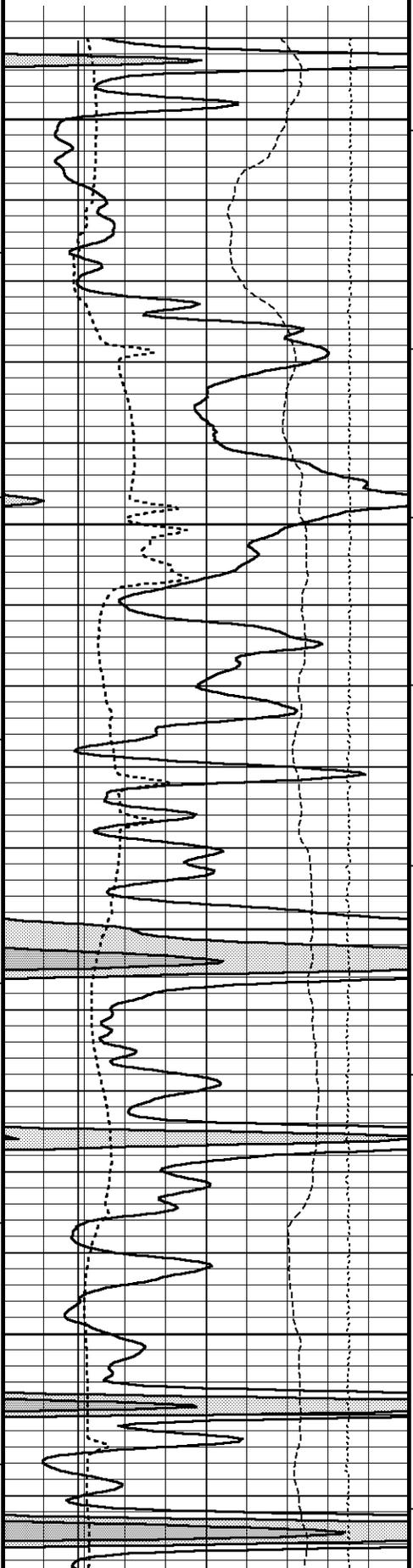






DST Uphole Tension  
pounds  
5000 0

Replay  
Scale  
1:240

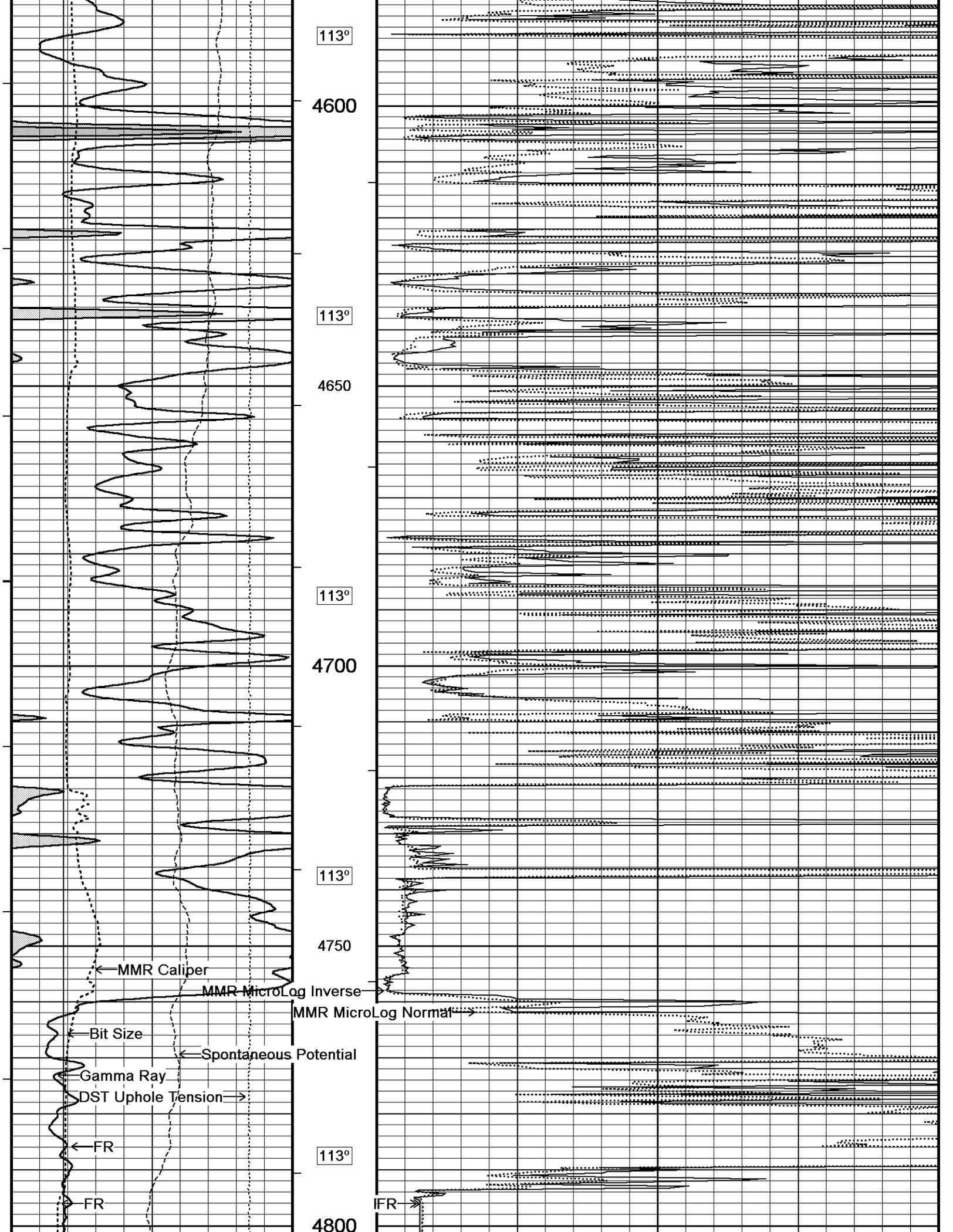


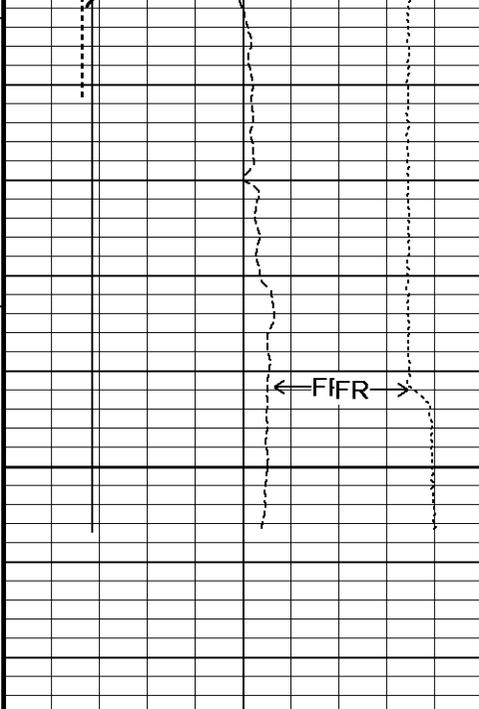
111°

112°

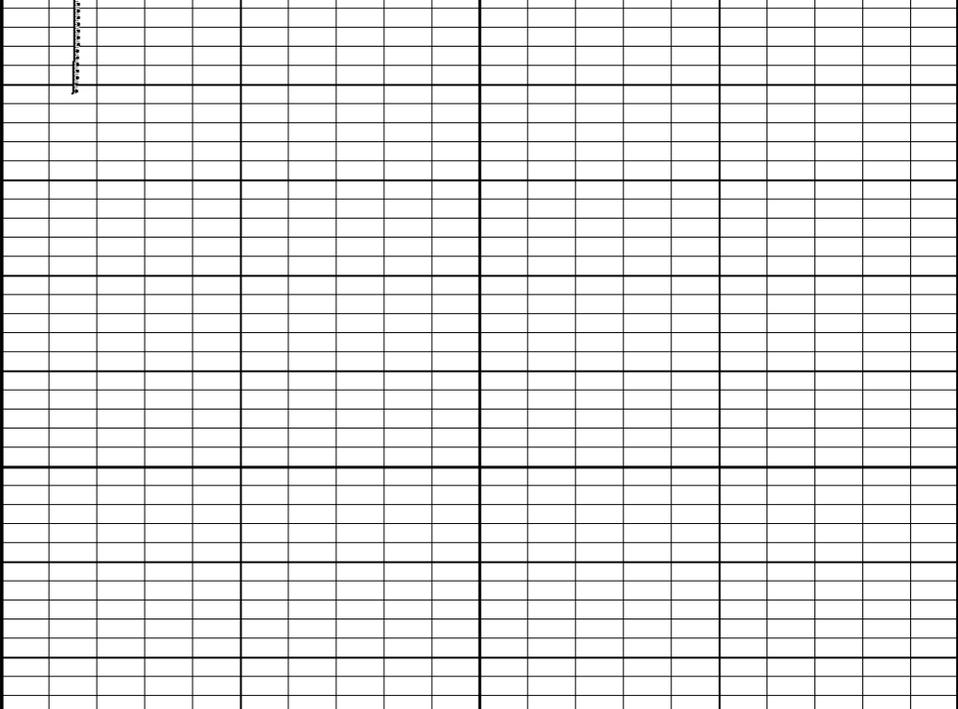
112°

100

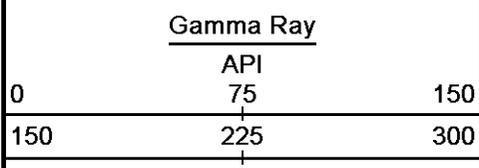




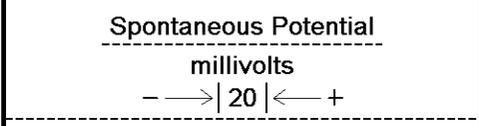
0  
4850  
4874  
Depth in Feet



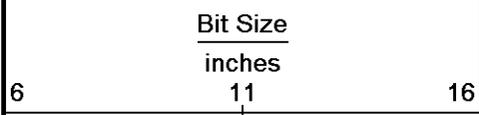
← Timing Marks every 60.0 sec



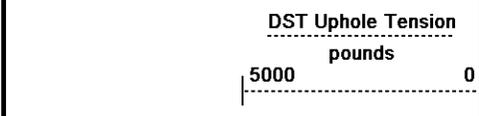
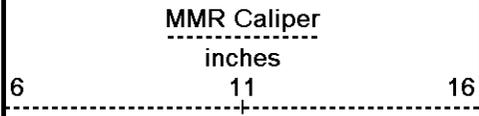
Borehole Temp in deg F



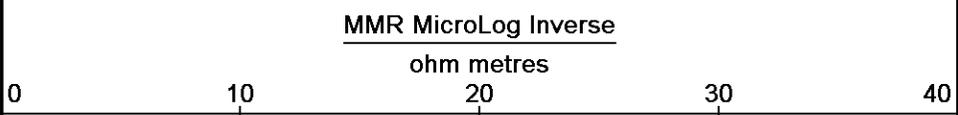
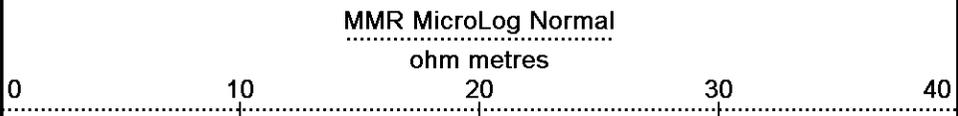
HVI every 10 cu ft



Annular Integral every 10 cu ft



Replay Scale 1:240



**BEFORE SURVEY CALIBRATION**

C:\Minimus 13.08.2113\Logs\Shakespeare B4US #1-32\Shakespeare B4US #1-32\_001.dta

<b>General Constants All 000</b>		Last Edited on 10-MAY-2014,20:10	
<b>General Parameters</b>			
Mud Resistivity	0.370	ohm-metres	
Mud Resistivity Temperature	93.000	degrees F	
Water Level	0.000	feet	
Borehole Fluid Processing	Wet Hole		
<b>Hole/Annular Volume and Differential Caliper Parameters</b>			
HVOL Method	Single Caliper		
HVOL Caliper 1	Density Caliper		
HVOL Caliper 2	N/A		
Annular Volume Diameter	5.500	inches	
Caliper for Differential Caliper	MMR Caliper		
<b>Rwa Parameters</b>			
Porosity used	Base Density Porosity		
Resistivity used	Array Ind. One Res Rt		
RWA Constant A	0.610		
RWA Constant M	2.150		
SW/APOR Tool Source	0.000		

<b>Down-hole Tension Calibration SMS 0</b>		Field Calibration on 06-MAY-2014 23:40	
<b>Reading No</b>	<b>Measured</b>	<b>Calibrated (lbs)</b>	
1	15071.71	0.00	
2	15879.48	481.00	

<b>Gamma Calibration MCG-C 208</b>		Field Calibration on 10-MAY-2014 11:35	
	<b>Measured</b>	<b>Calibrated (API)</b>	
Background	69	48	
Calibrator (Gross)	1124	773	
Calibrator (Net)	1055	725	

<b>Gamma Constants MCG-C 208</b>		Last Edited on 10-MAY-2014,18:40	
Gamma Calibrator Number	GRC038		
Mud Density	1.12	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Concentration of KCl		kppm	
K Mud Type	Chloride		
K Mud Concentration	0.00	%	

<b>SP Calibration MCG-C 208</b>		Field Calibration on 10-MAY-2014 11:38	
	<b>Measured</b>	<b>Calibrated (mV)</b>	
Reference 1	99.7	99.0	
Reference 2	-97.7	-98.8	

<b>High Resolution Temperature Calibration MCG-C 208</b>		Field Calibration on 23-JAN-2014,17:11	
	<b>Measured</b>	<b>Calibrated(Deg F)</b>	
Lower	50.00	50.00	
Upper	75.00	75.00	

<b>High Resolution Temperature Constants MCG-C 208</b>		Last Edited on 23-JAN-2014,17:11	
Pre-filter Length	11		

<b>Caliper Calibration MMR-C.A 248</b>		Base Calibration on 10-MAY-2014 09:28	
		Field Calibration on 10-MAY-2014 09:30	
<b>Base Calibration</b>			
<b>Reading No</b>	<b>Measured</b>	<b>Calibrator Size (in)</b>	
1	13446	5.98	
2	16585	7.97	
3	19782	9.86	
4	23693	11.92	
5	0	0.00	
6	N/A	N/A	

6	N/A	N/A
Field Calibration	Measured Caliper (in) 7.99	Actual Caliper (in) 7.97

Micro Normal and Micro Inverse Calibration MMR-C.A 248		Base Calibration on 10-MAY-2014 09:40 Field Check on 10-MAY-2014 09:43	
Base Calibration			
Channel	Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1 Resistor 2
Micro Normal	10.1	49.8	5.1 25.6
Micro Inverse	9.9	49.5	3.4 16.9
Channel	Base Check (ohm-m)		Field Check (ohm-m)
Micro Normal	93.6		93.6
Micro Inverse	62.2		62.2

Micro Normal and Micro Inverse Constants MMR-C.A 248		Last Edited on 23-JAN-2014,17:04	
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159		
Micro Normal K Factor	0.5110		
Micro Inverse K Factor	0.3380		
Standoff Offset	0.0000	inches	

Neutron Calibration MDN-B.J 387		Base Calibration on 08-MAY-2014 14:03 Field Check on 08-MAY-2014 14:19	
Base Calibration			
	Near	Measured Far	Calibrated (cps) Near Far
Ratio	2970	91	3714 110
	32.668		33.764
Field Calibrator at Base		Calibrated (cps)	
Ratio			1688 2486
			0.679
Field Check		Calibrated (cps)	
Ratio			1694 2467
			0.687

Neutron Constants MDN-B.J 387		Last Edited on 10-MAY-2014,18:40	
Neutron Source Id	P58125B		
Neutron Jig Number	5824NE		
Epithermal Neutron			
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		

FE Calibration MFE-A.A 55		Base Calibration on 10-MAY-2014 09:55 Field Check on 10-MAY-2014 10:04	
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	952.2	126.8	
Base Check			281.3
Field Check			281.3

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 73

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
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 5

Base Calibration		Measured		Calibrated (mmho/m)	
Test Loop Calibration		Low	High	Low	High
Channel					
1		16.3	470.8	9.3	966.2
2		5.6	376.1	7.6	821.4
3		2.6	266.1	5.2	566.0
4		1.6	130.0	2.6	279.2
Array Temperature		71.1		Deg F	
Channel		Base Check (mmho/m)		Field Check (mmho/m)	
		Low	High	Low	High
1		15.5	3863.1	15.5	3862.9
2		31.9	3590.9	31.9	3590.8
3		29.9	2971.4	29.9	2971.4
4		20.8	2126.1	20.8	2126.1
Deep		18.5	1912.1	18.5	1912.2
Medium		43.1	3861.3	43.1	3861.2
Shallow		47.4	5372.9	47.5	5372.7
Array Temperature		78.9		79.0 Deg F	

Induction Constants MAI-A.A 5				Last Edited on 10-MAY-2014,18:39	
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 5			Field Calibration on 21-JAN-2014,15:43	
		Measured	Calibrated(Deg F)	
Lower		50.00	50.00	
Upper		75.00	75.00	

High Resolution Temperature Constants MAI-A.A 5		Last Edited on 09-MAY-2014,12:22	
Pre-filter Length	11		

## Base Calibration

Reading No	Measured	Calibrator Size (in)
1	17491	3.99
2	27463	5.98
3	37484	7.97
4	47415	9.86
5	58518	11.92
6	N/A	N/A

## Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

## Photo Density Calibration MPD-D.A 480

Base Calibration on 08-MAY-2014 14:53  
Field Check on 08-MAY-2014 15:00

## Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1275	1464		
Reference 1	55908	26147	59556	30836
Reference 2	22982	2651	24941	2541

## Field Check at Base

1274.5 1464.0

## Field Check

1277.3 1470.9

## PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	241	1140		
Reference 1	23265	55701	0.422	0.371
Reference 2	6806	22836	0.303	0.272

## Field Check at Base

240.7 1139.6

## Field Check

239.8 1141.3

## Density Constants MPD-D.A 480

Last Edited on 10-MAY-2014,18:39

Density Source Id	P50557B
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	1.12 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 (m)

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

## DOWNHOLE EQUIPMENT

CBH-C, Cablehead, 11 pin  
 CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma  
 MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity  
 MMR-C.A 248 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron  
 MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

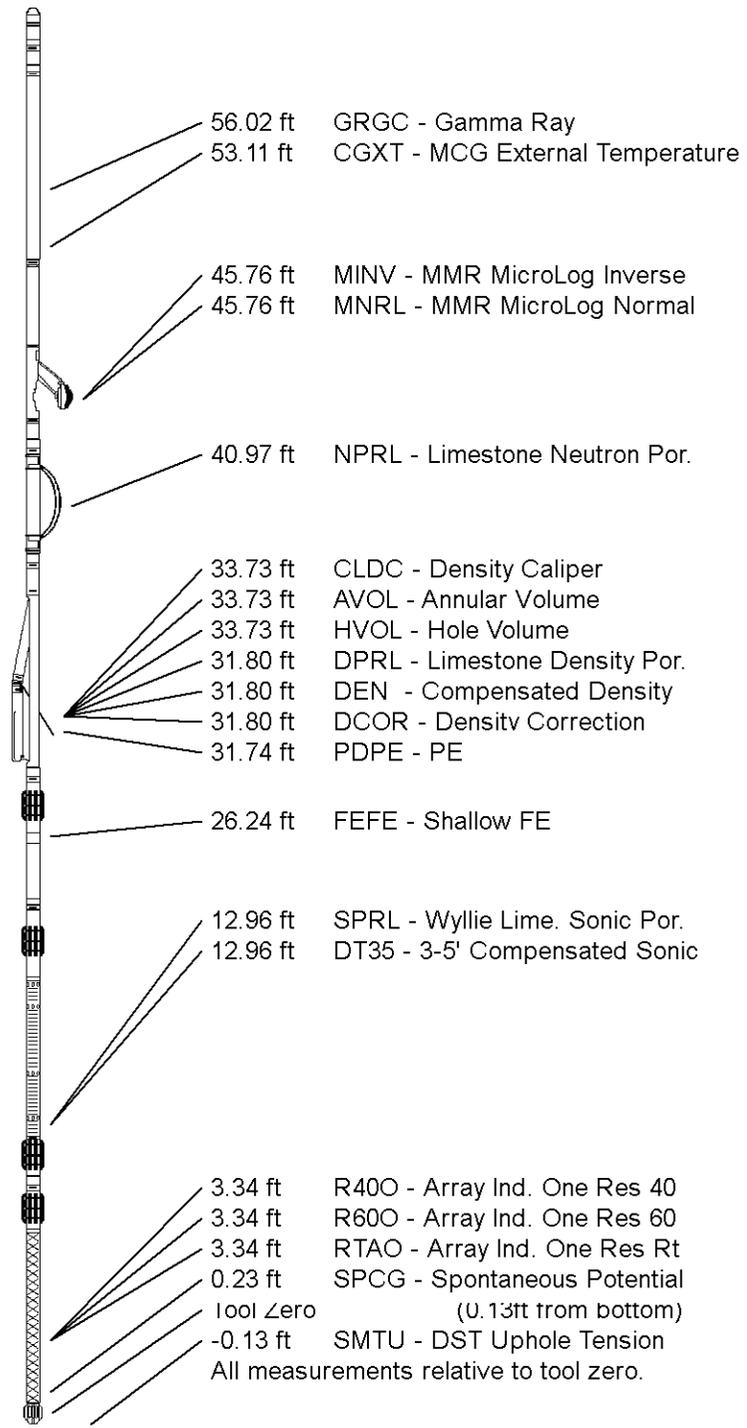
Compact Density/Caliper  
 MPD-D.A 480 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric  
 MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic  
 MSS-A.A 73 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction  
 MAI-A.A 5 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 63.70 ft Weight: 480.6 lb



COMPANY SHAKESPEARE OIL CO., INC.  
 WELL B4US #1-32  
 FIELD WILDCAT  
 PROVINCE/COUNTY SCOTT  
 COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	3066.00	feet	First Reading	4796.00	feet
Elevation Drill Floor	3064.00	feet	Depth Driller	4845.00	feet
Elevation Ground Level	3056.00	feet	Depth Logger	4842.00	feet



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