



Weatherford

MICRORESISTIVITY LOG

COMPANY			BEREXCO LLC.		
WELL			ELNORA #2-20		
FIELD			WILDCAT		
PROVINCE/COUNTY			FINNEY		
COUNTRY/STATE			U.S.A. / KANSAS		
LOCATION			940' FNL & 1655' FWL		
SEC 20	TWP 26S	RGE 33W	Other Services		MAI/MFE
Latitude			MPD/MDN		
Longitude			MSS		
API Number	15-055-22288				
Permanent Datum GL, Elevation 2928 feet					
Log Measured From KB					
Drilling Measured From KB			Elevations: KB 2941.00 DF 2939.00 GL 2928.00		
Date	04-APR-2014				
Run Number	ONE				
Service Order	3487-83817538				
Depth Driller	5400.00		feet		
Depth Logger	5393.00		feet		
First Reading	5347.00		feet		
Last Reading	3800.00		feet		
Casing Driller	1772.00		feet		
Casing Logger	1783.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.20 lb/USg	51.00 CP			
PH / Fluid Loss	9.50	7.60 ml/30Min			
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.48 @ 84.0		ohm-m		
Rmf @ Measured Temp	0.38 @ 84.0		ohm-m		
Rmc @ Measured Temp	0.58 @ 84.0		ohm-m		
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	0.34 @120.0		ohm-m		
Time Since Circulation	5 HOURS				
Max Recorded Temp	120.00		deg F		
Equipment / Base	13244	LIB			
Recorded By	ADAM SILL				
Witnessed By	IAN BOSMEIJER				
JOB #	LB14-100				

BOREHOLE RECORD

Last Edited: 04-APR-2014 15:44

Bit Size inches	Depth From feet	Depth To feet
7.875	1772.00	5400.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1772.00	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.
- RUN TWO: SHA, MCG, MIM, MIE RUN IN COMBINATION.
 - HARDWARE: CENTRALIZER BOWSPRING USED ON MIM.
 - 1.5 INCH STANDOFF USED ON MIE.
- 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: 1789 CU.FT.

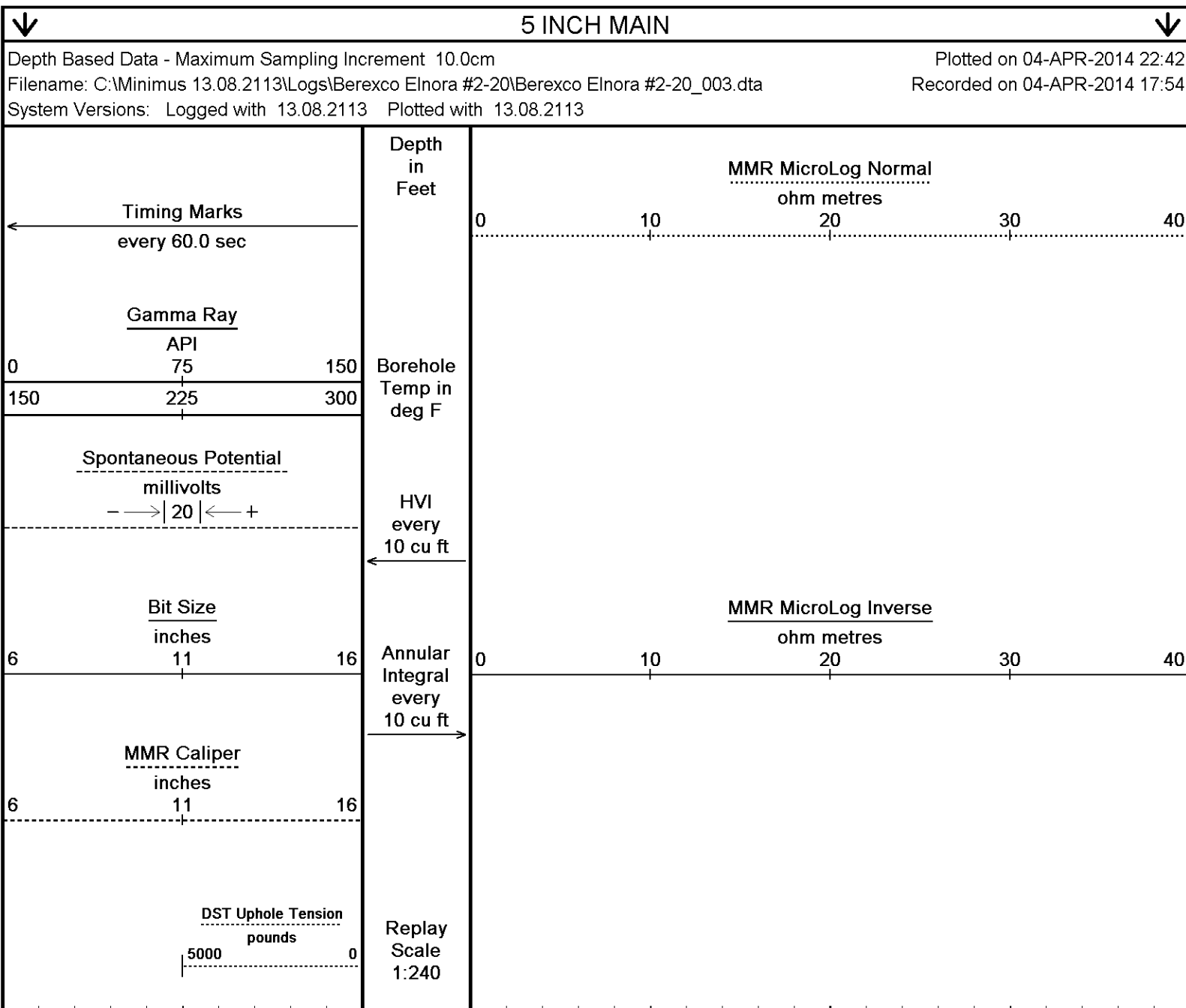
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 353 CU.FT.

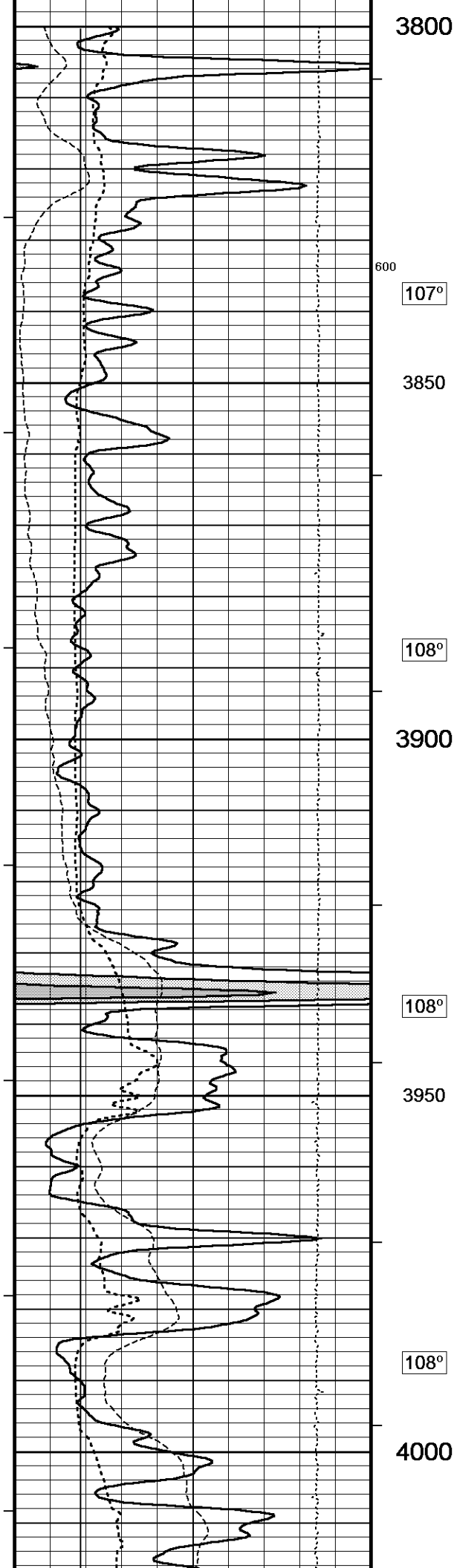
- RIG: BEREDCO #1.

- 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.





3800

600

107°

3850

108°

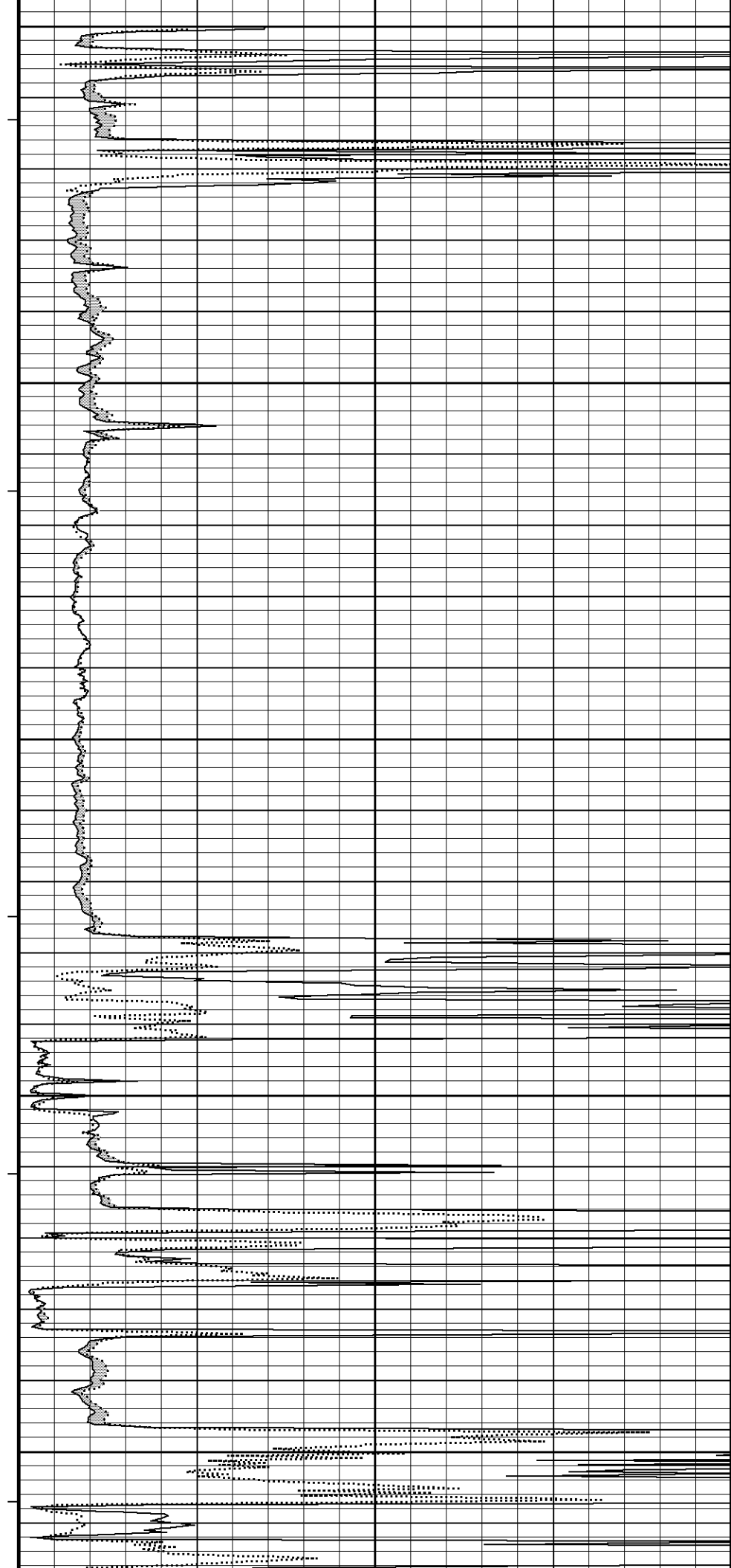
3900

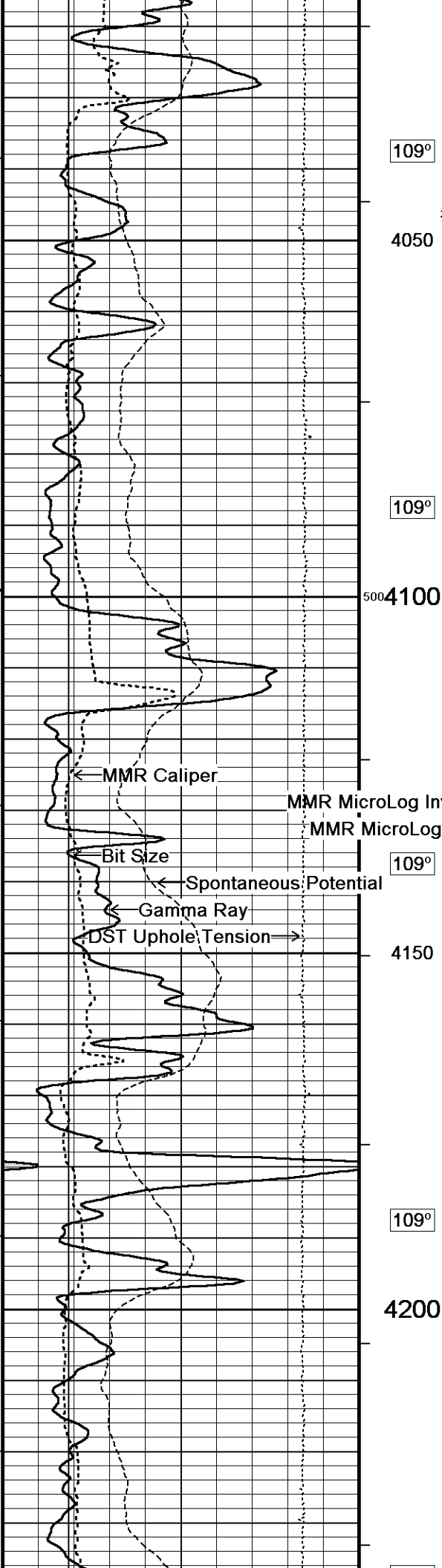
108°

3950

108°

4000





109°

4050

109°

500 4100

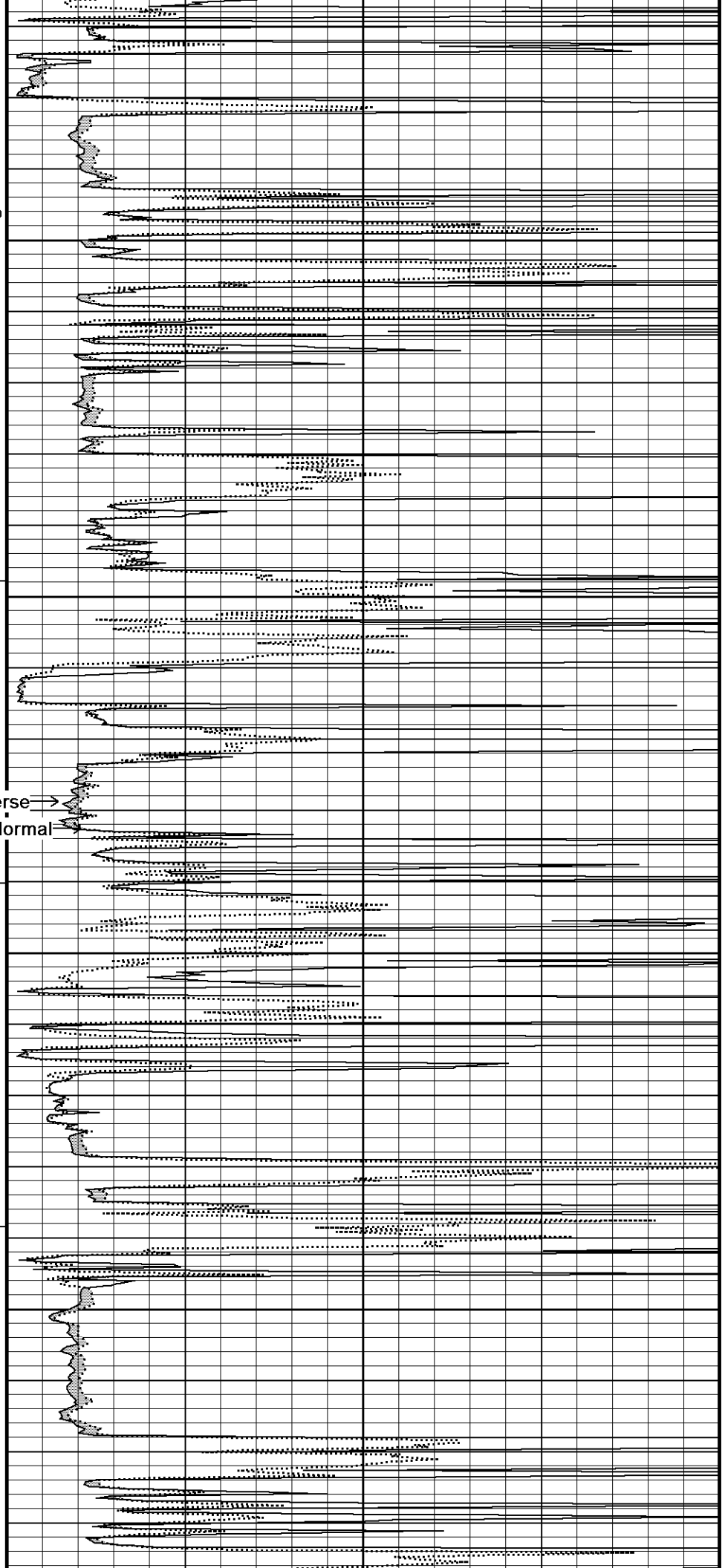
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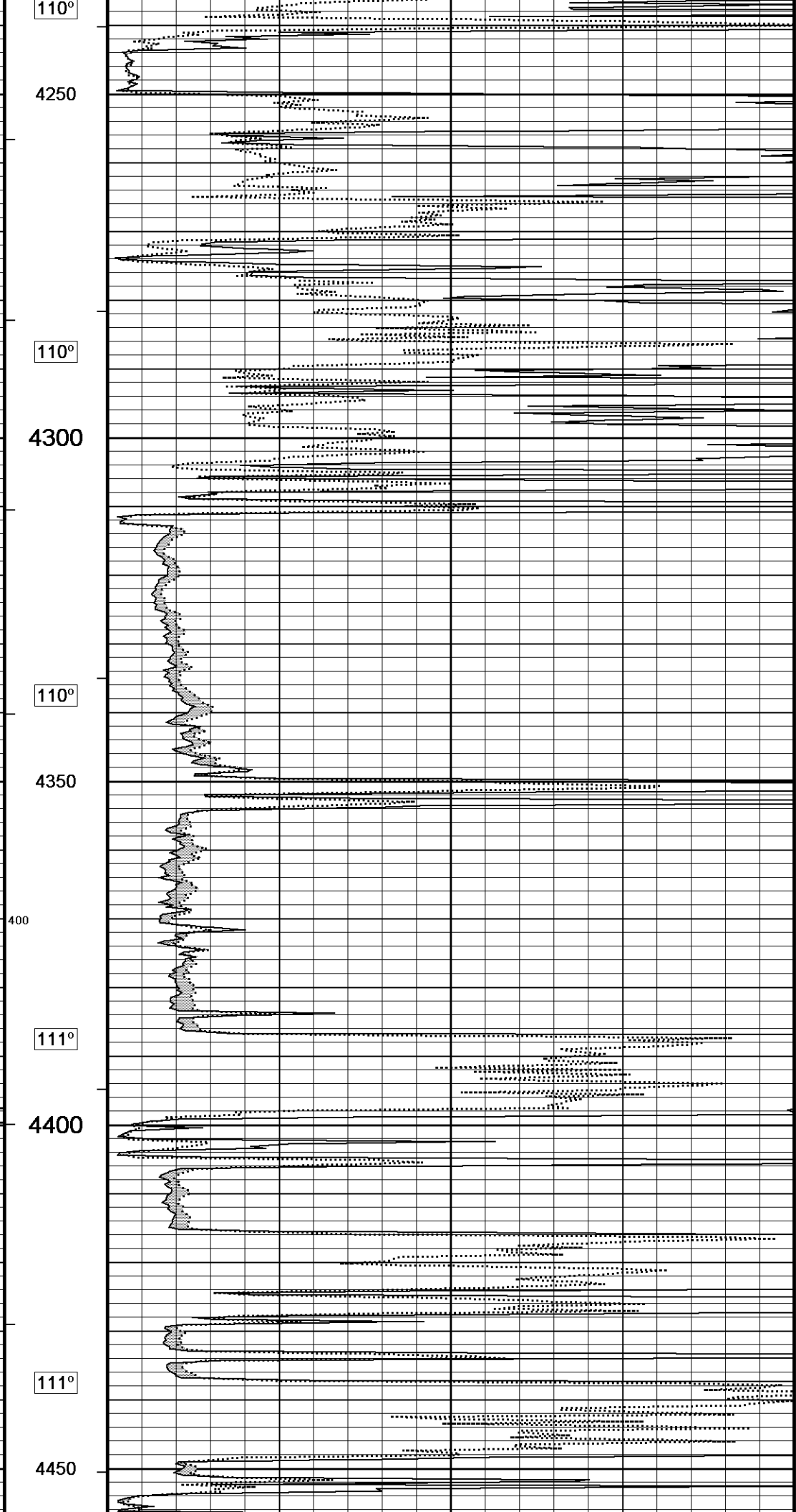
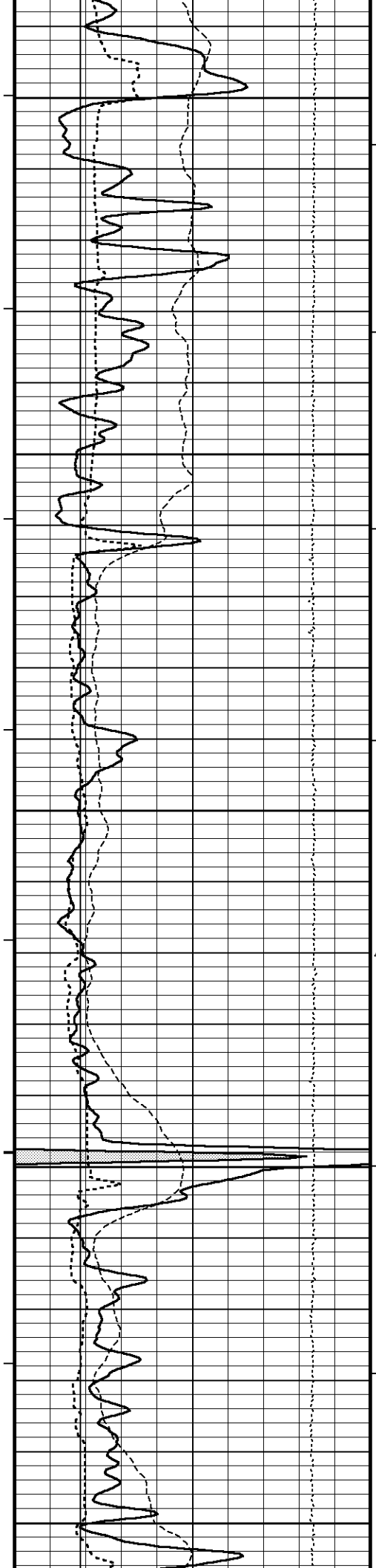
4150

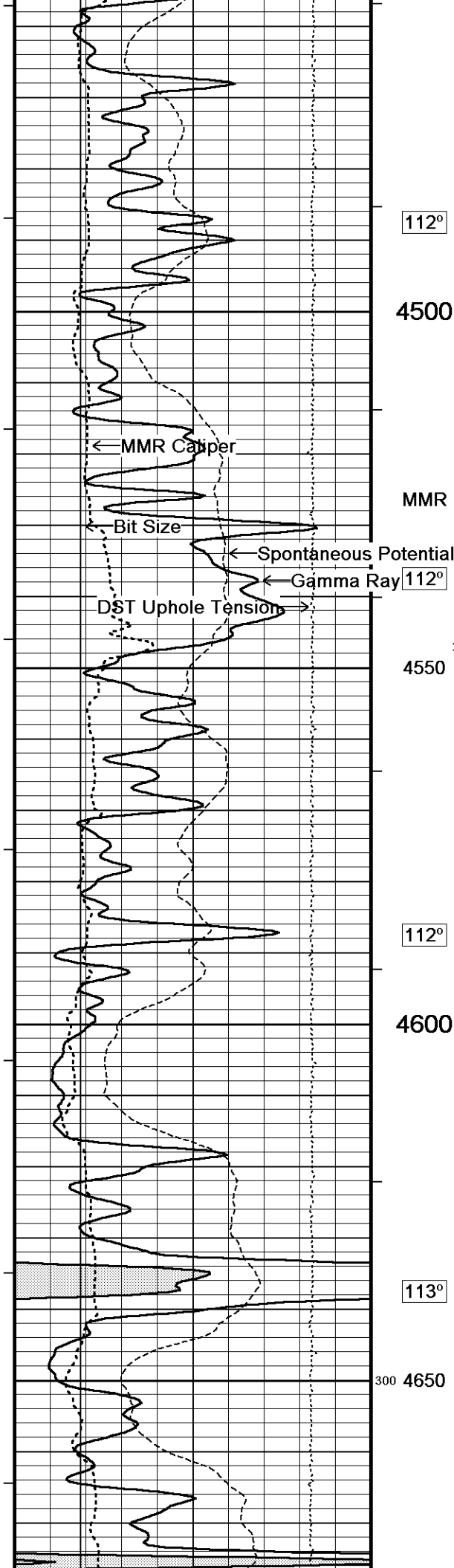
109°

4200

MMR MicroLog Inverse
MMR MicroLog Normal







112°

4500

MMR MicroLog Normal

112°

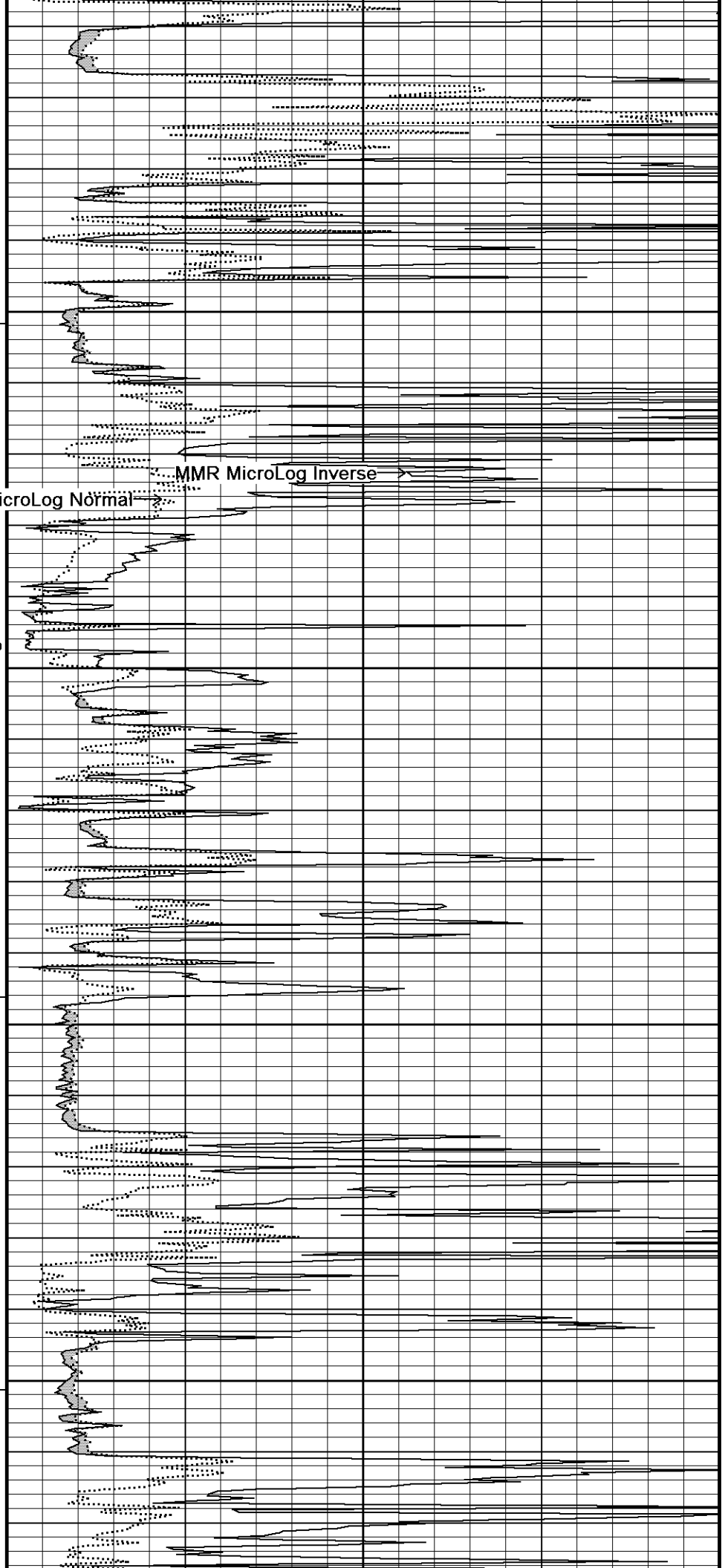
4550

112°

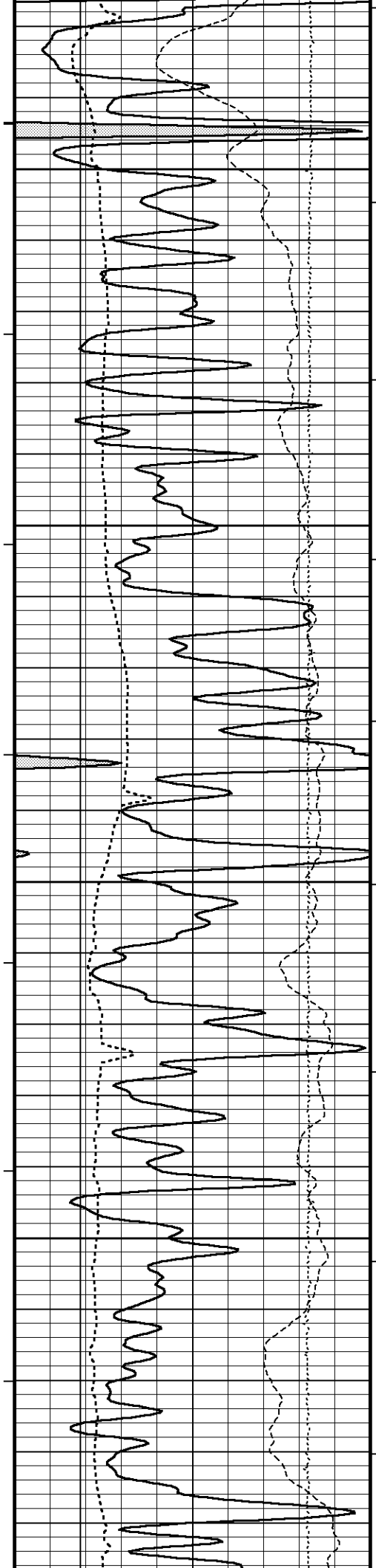
4600

113°

300 4650



MMR MicroLog Inverse



113°

4700

113°

4750

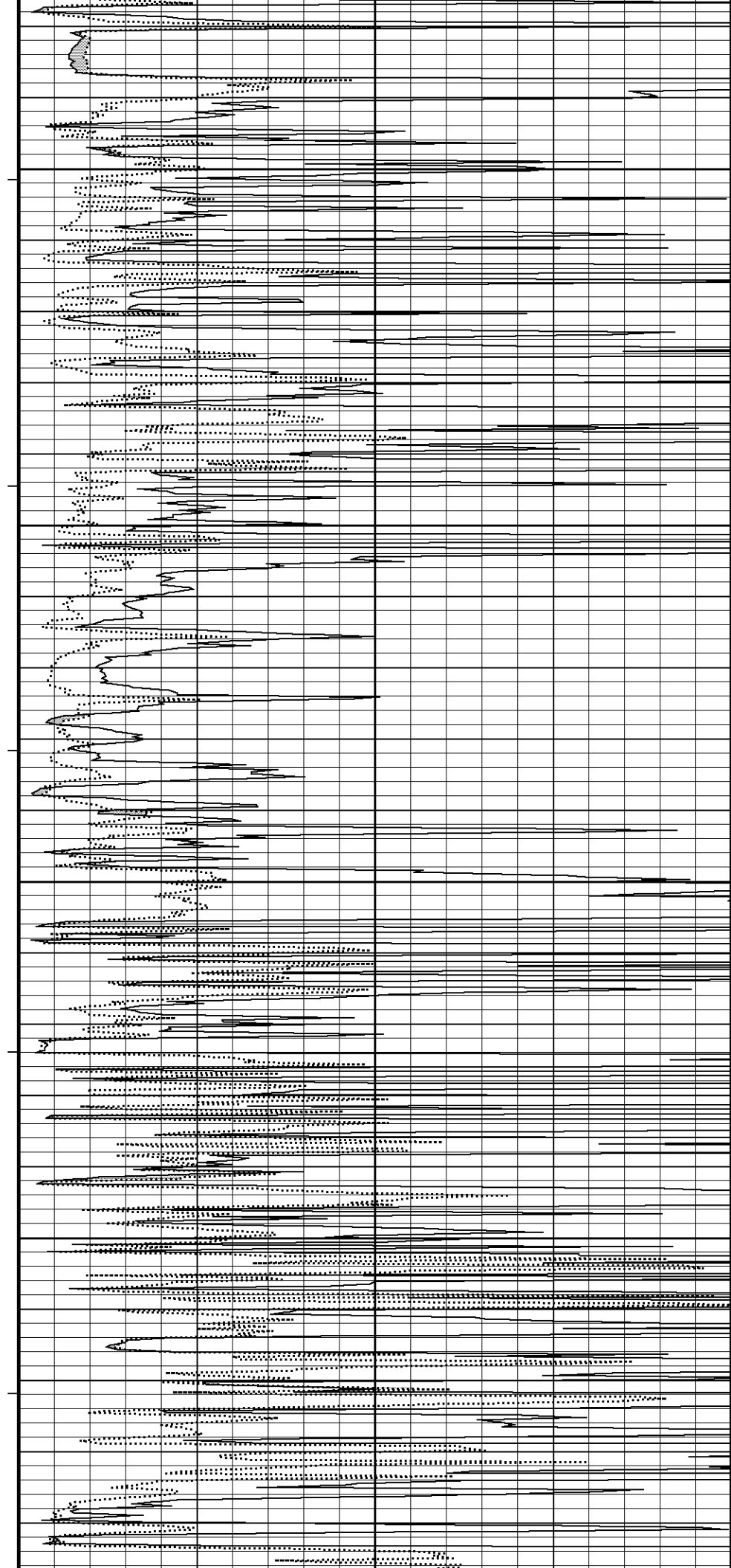
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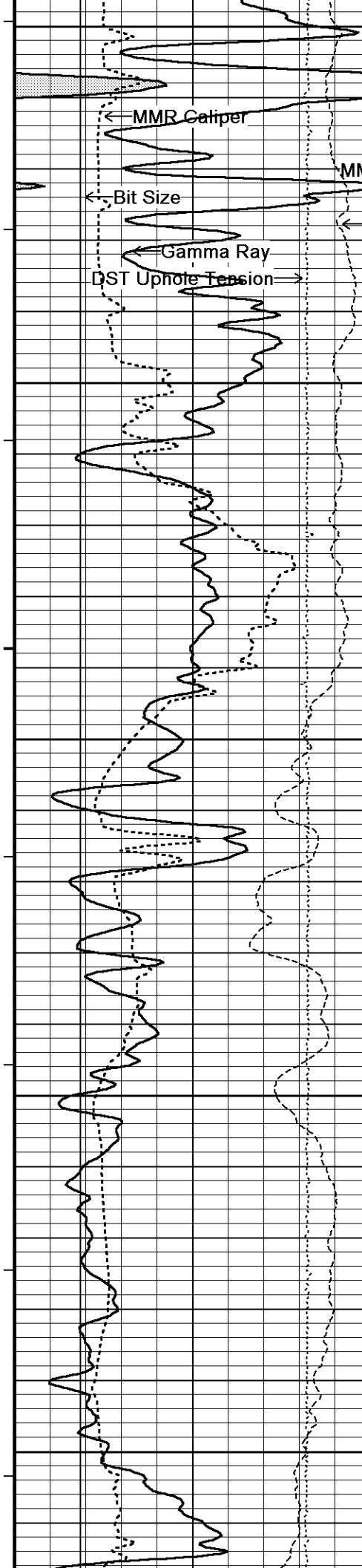
4800

113°

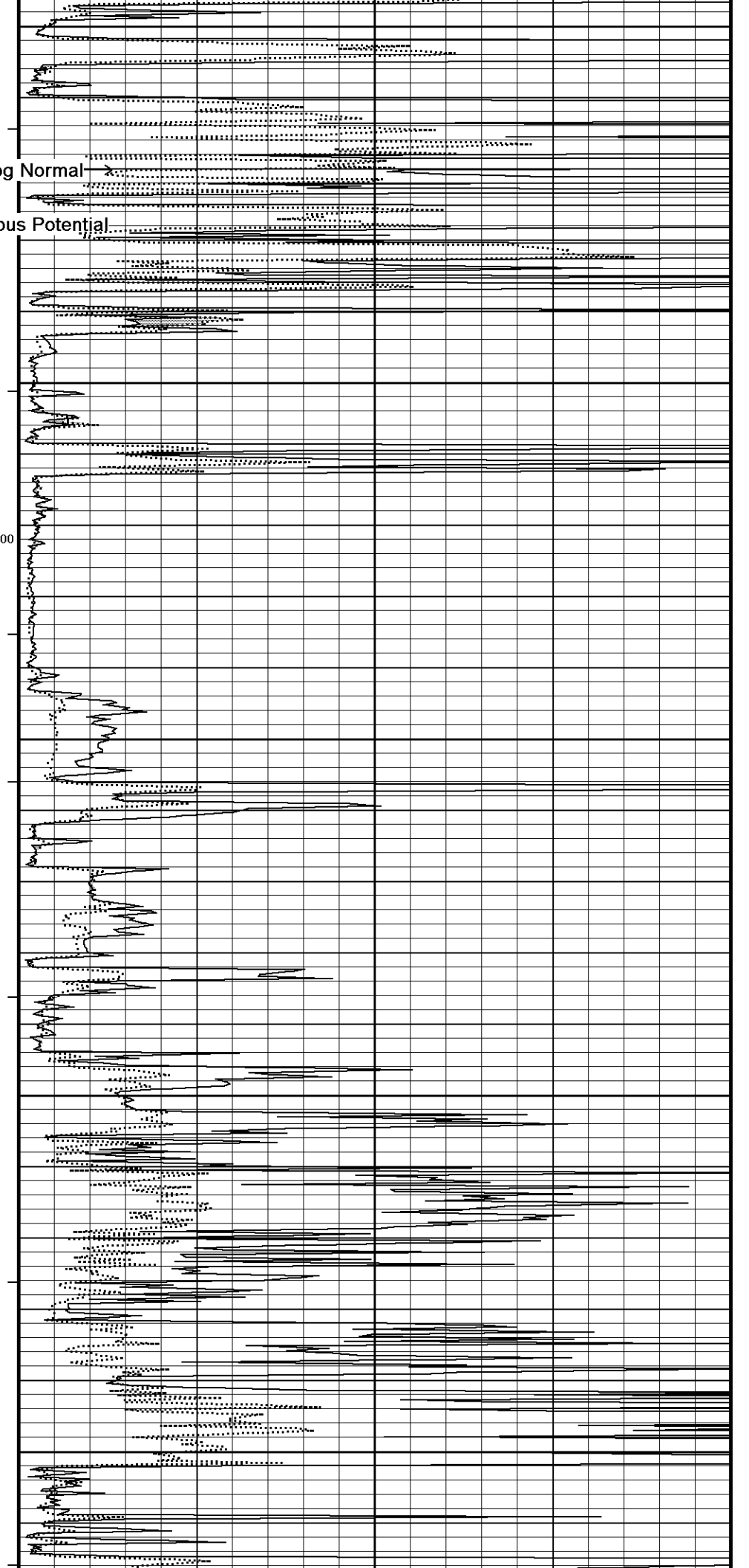
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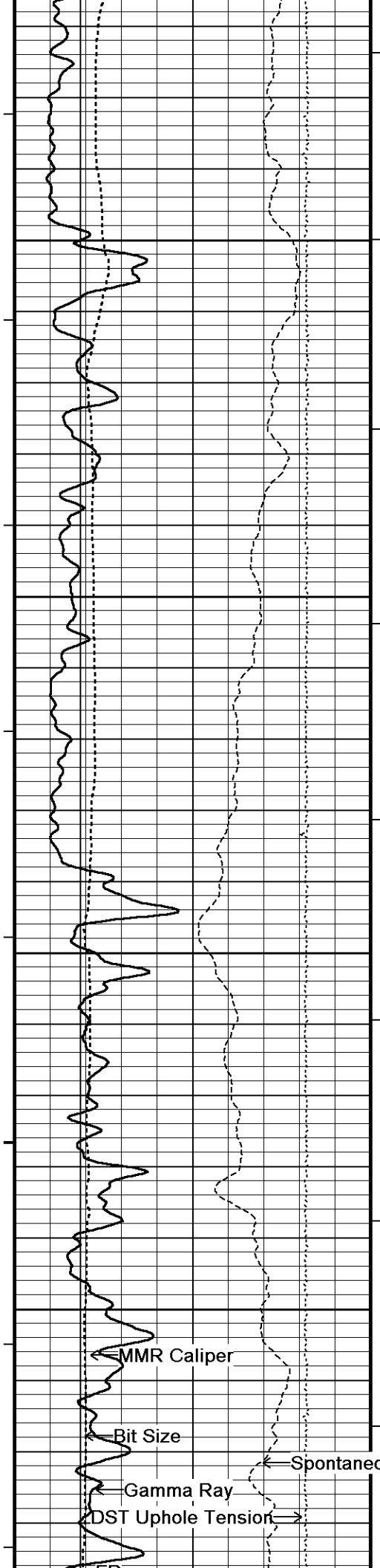
113°





4900
200
114°
4950
100
116°
5000
117°
5050
118°
5100
100





118°

5150

119°

5200

120°

5250

119°

5300

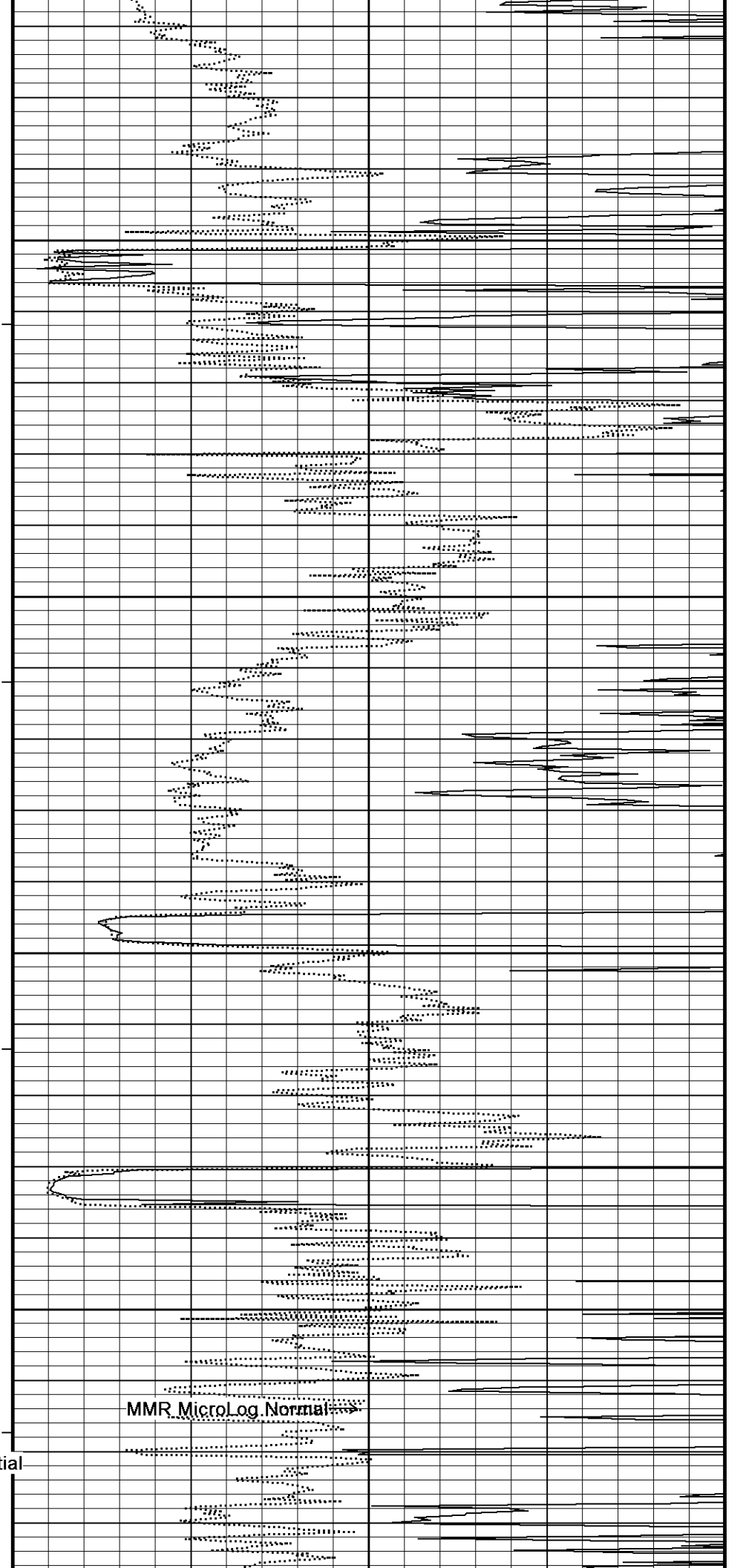
MMR Caliper

Bit Size

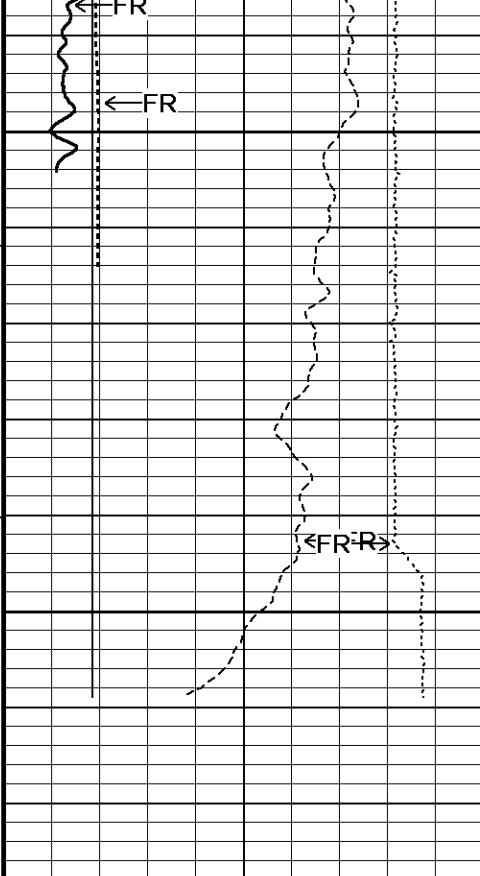
Gamma Ray

DST Uphole Tension

Spontaneous Potential



MMR MicroLog Normal



117°

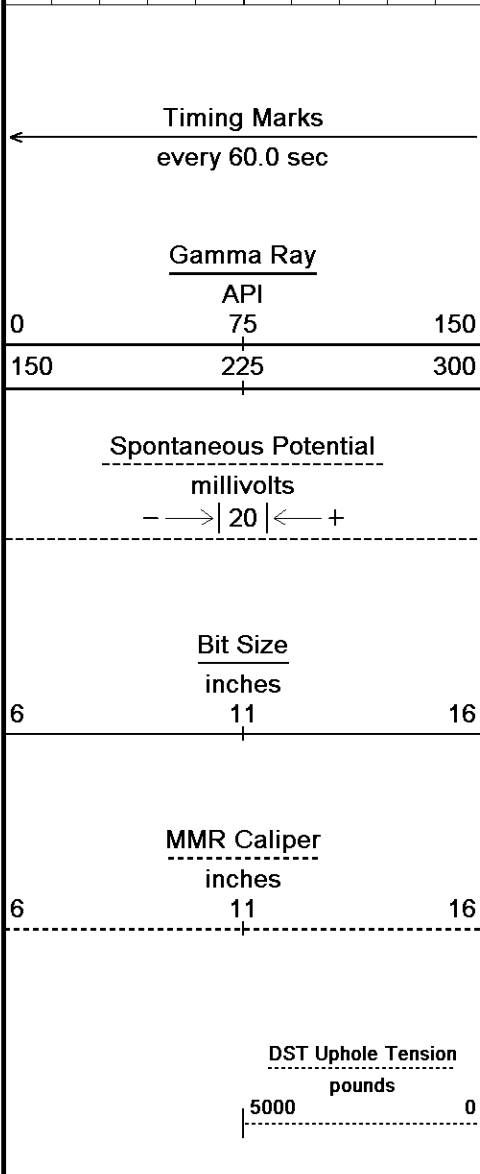
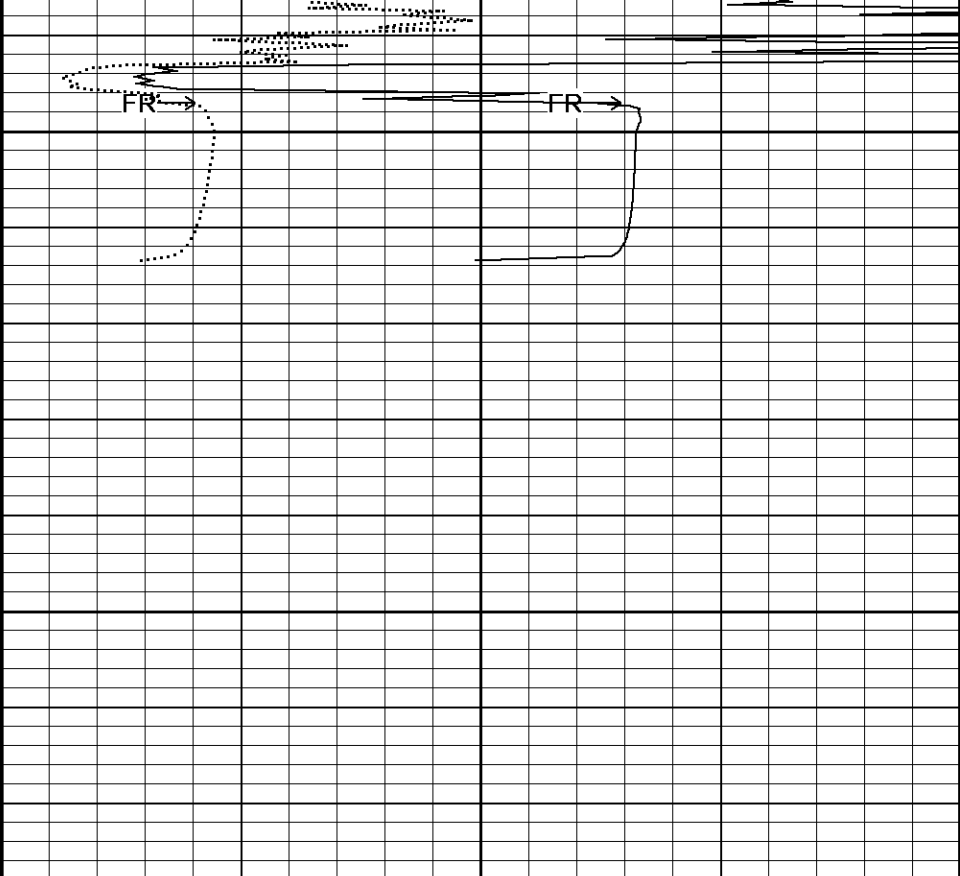
5350

0

5400

5426

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

Bit Size
inches

6 11 16

Annular
Integral
every
10 cu ft

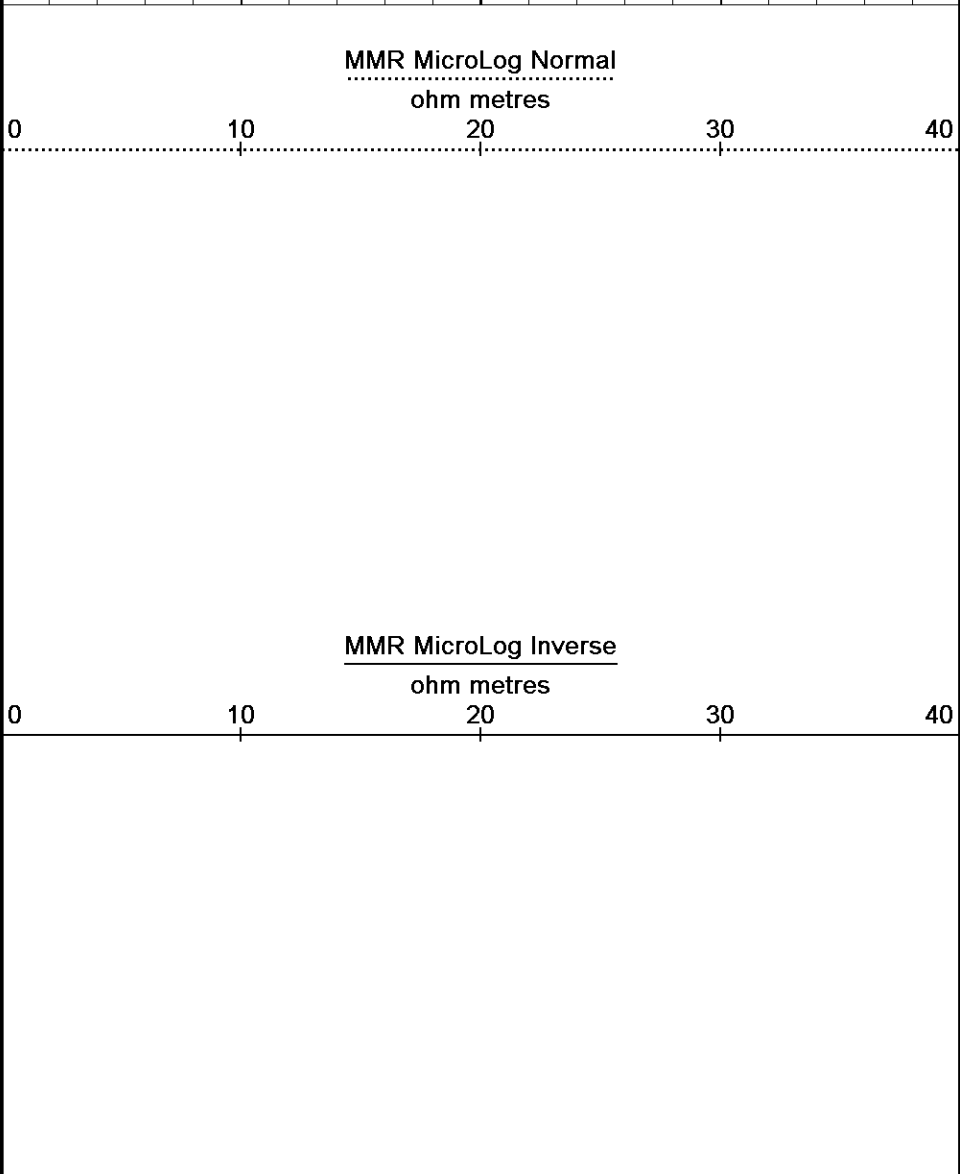
MMR Caliper
inches

6 11 16

DST Uphole Tension
pounds

5000 0

Replay
Scale
1:240



↑

5 INCH MAIN

↑

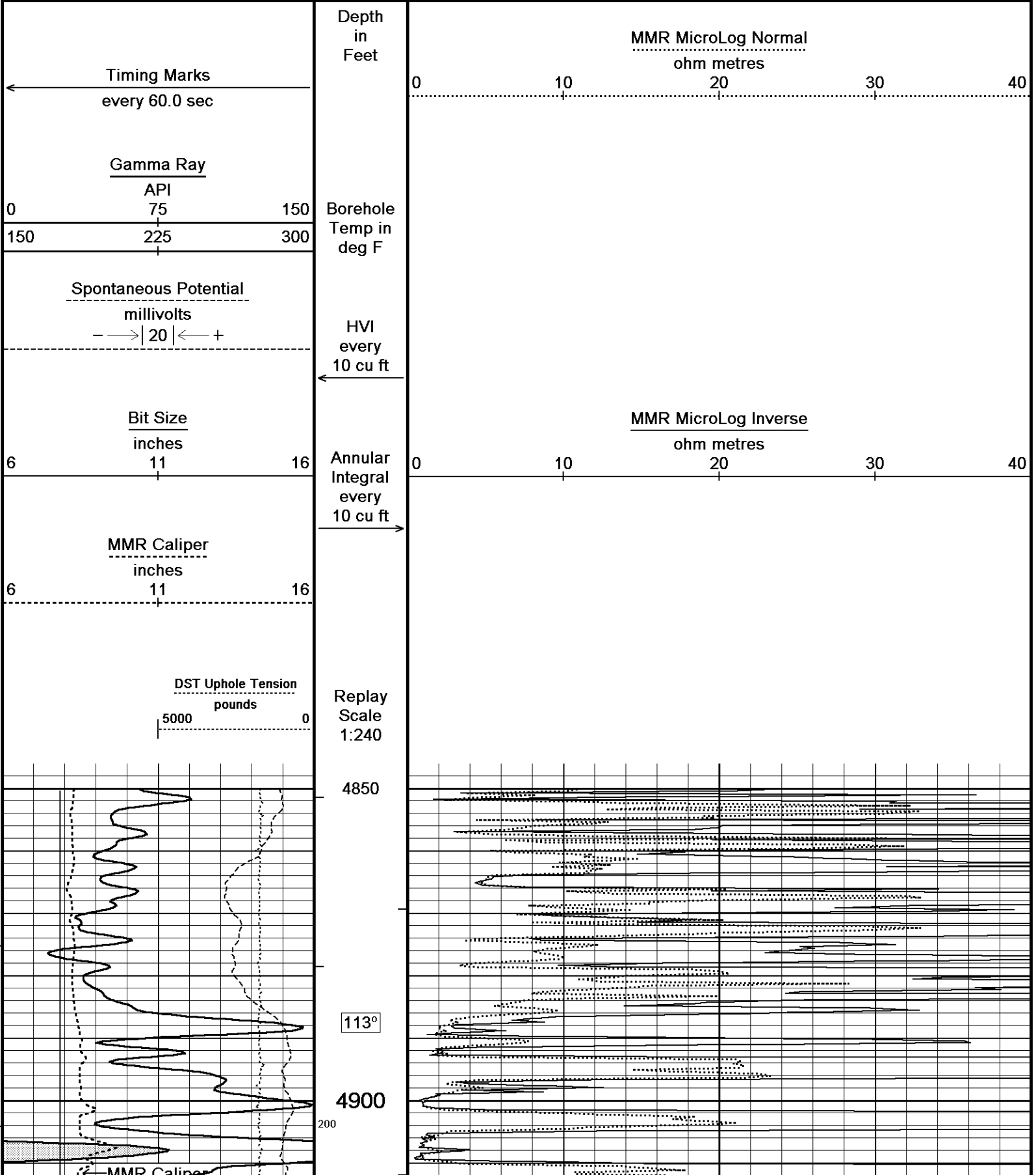
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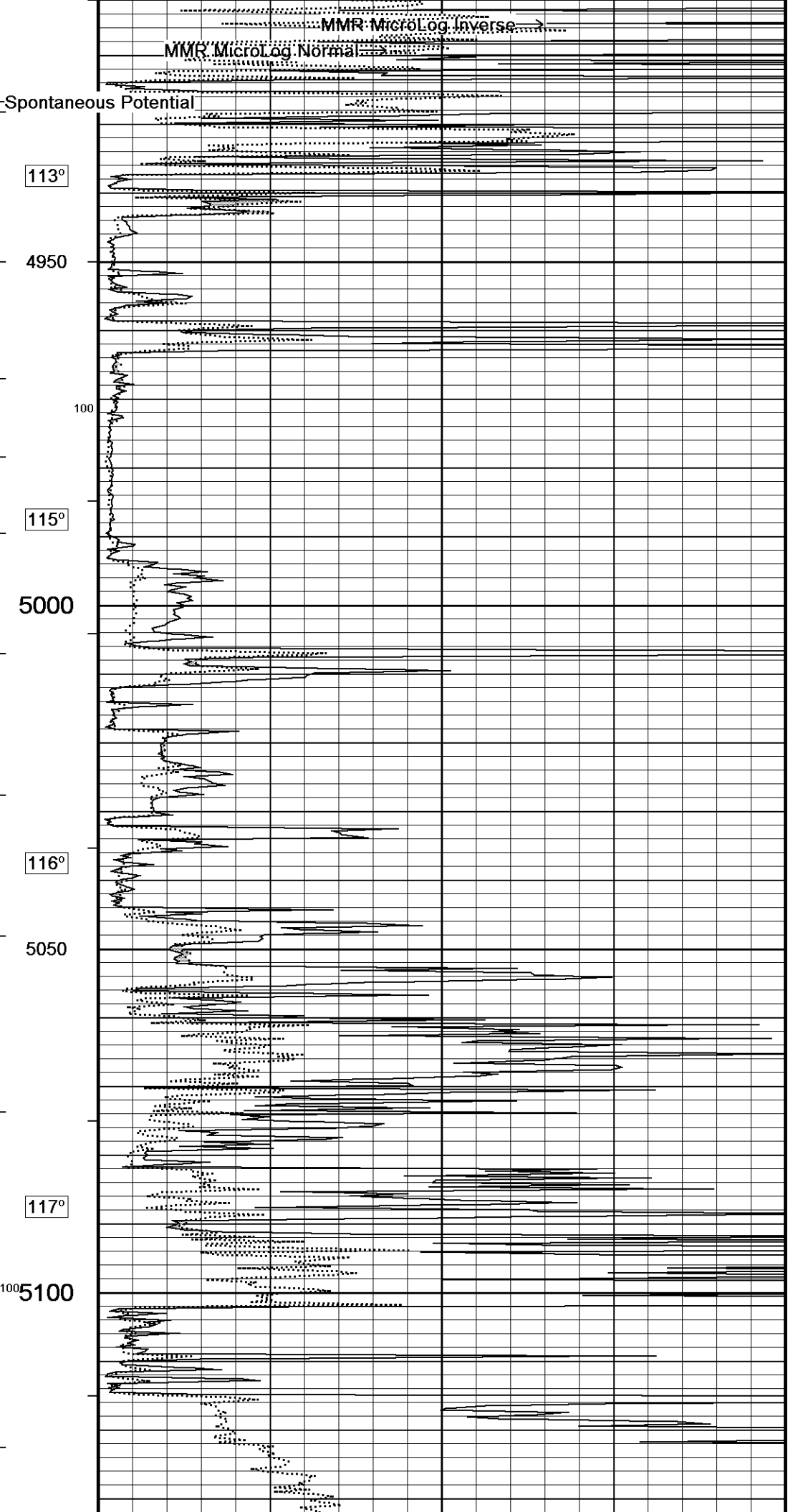
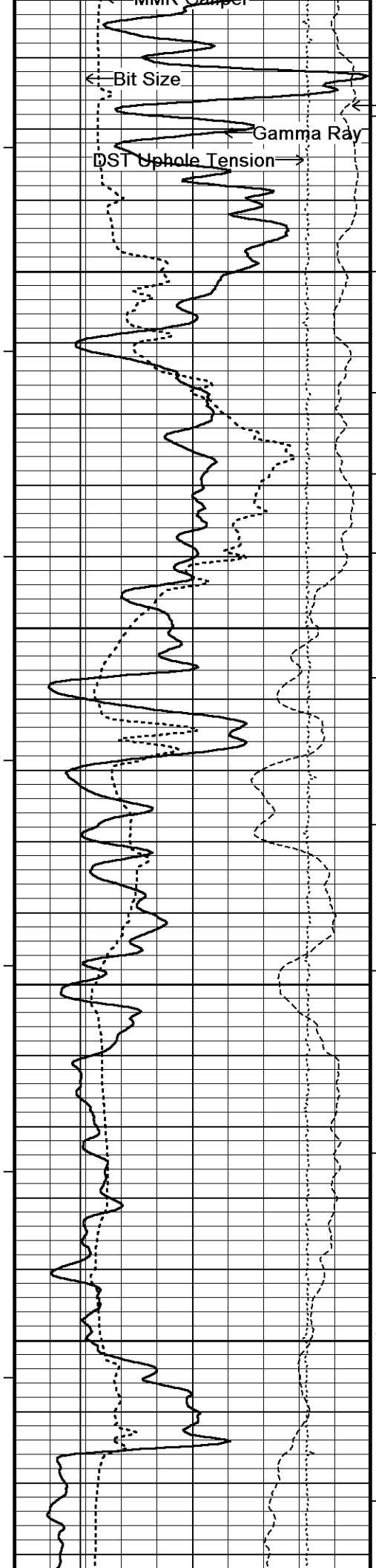
REPEAT SECTION

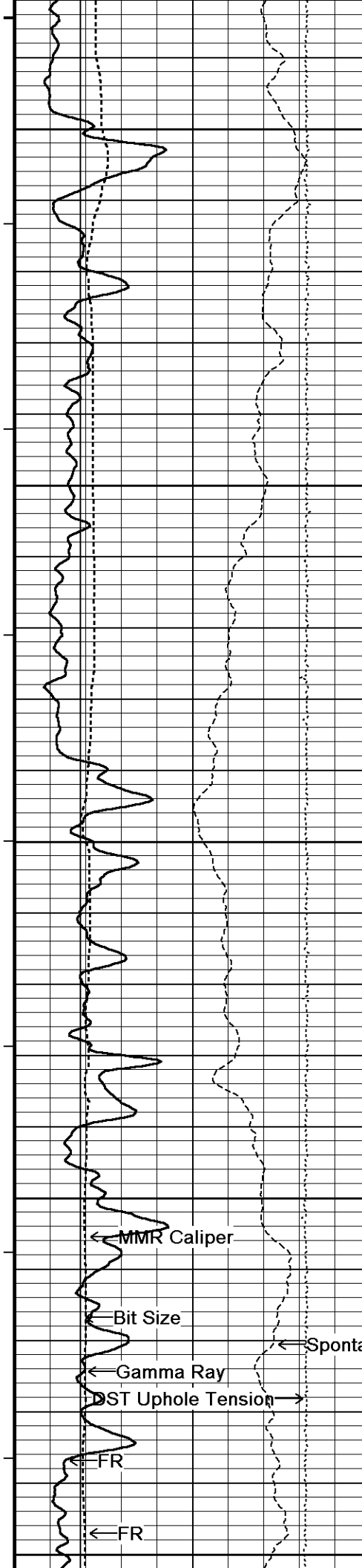
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Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Logs\Borexco Elnora #2-20\Borexco Elnora #2-20_002.dta
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Plotted on 04-APR-2014 22:42
Recorded on 04-APR-2014 17:22







118°

5150

118°

5200

119°

5250

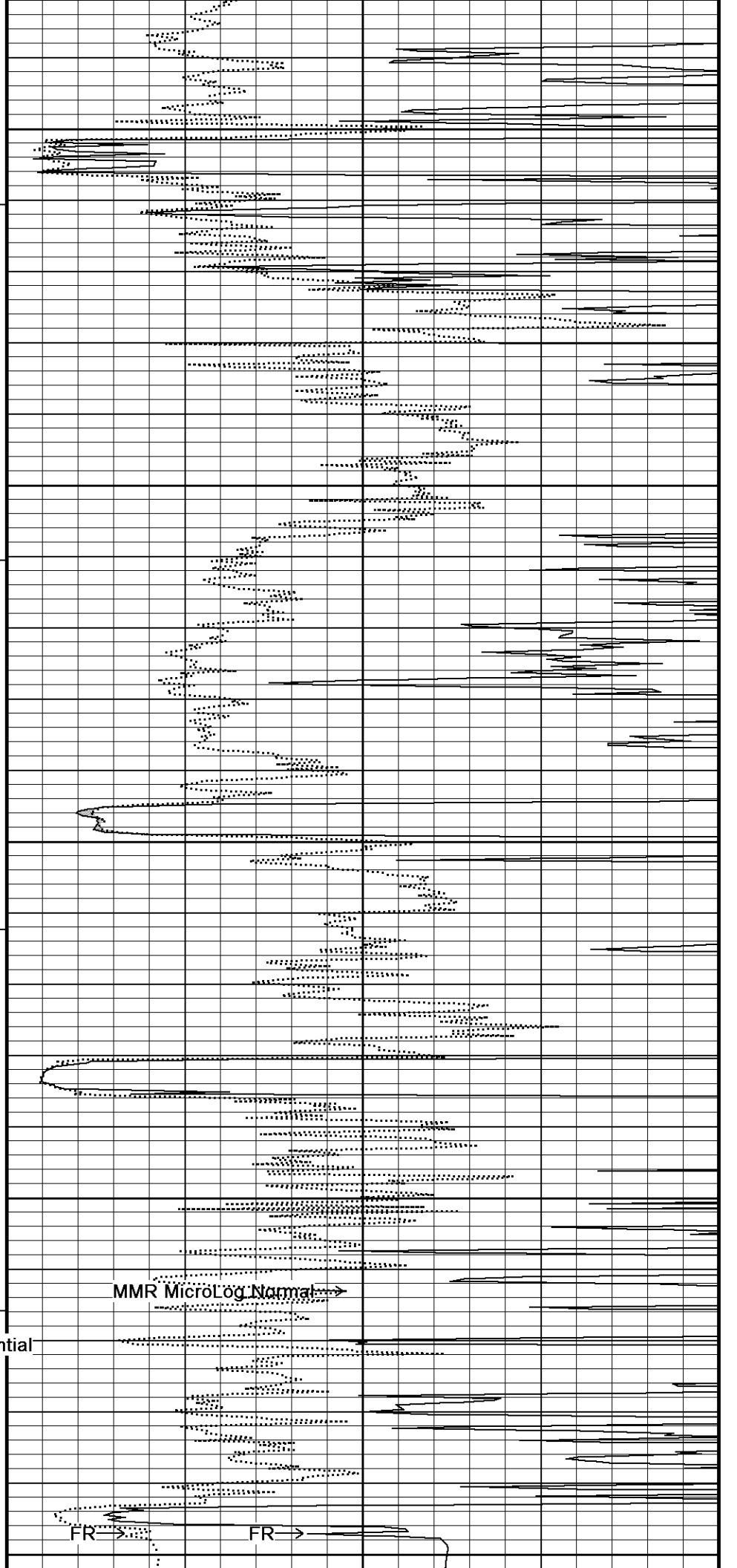
117°

5300

115°

5350

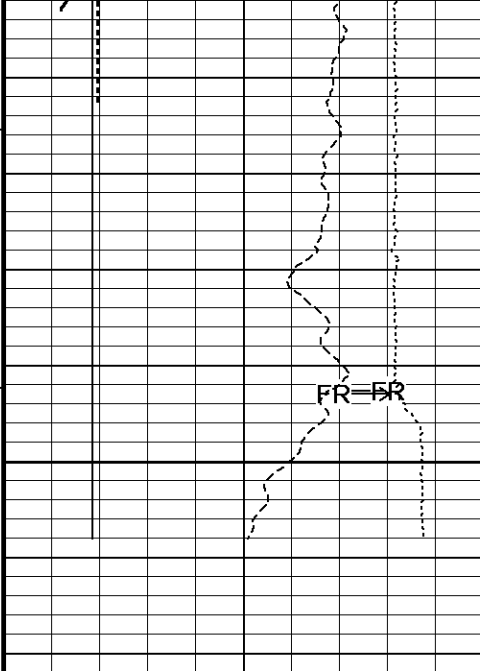
Spontaneous Potential



MMR MicroLog Normal

FR

FR



5400

5420
Depth
in
Feet

← Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

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

Bit Size
inches
6 11 16

MMR Caliper
inches
6 11 16

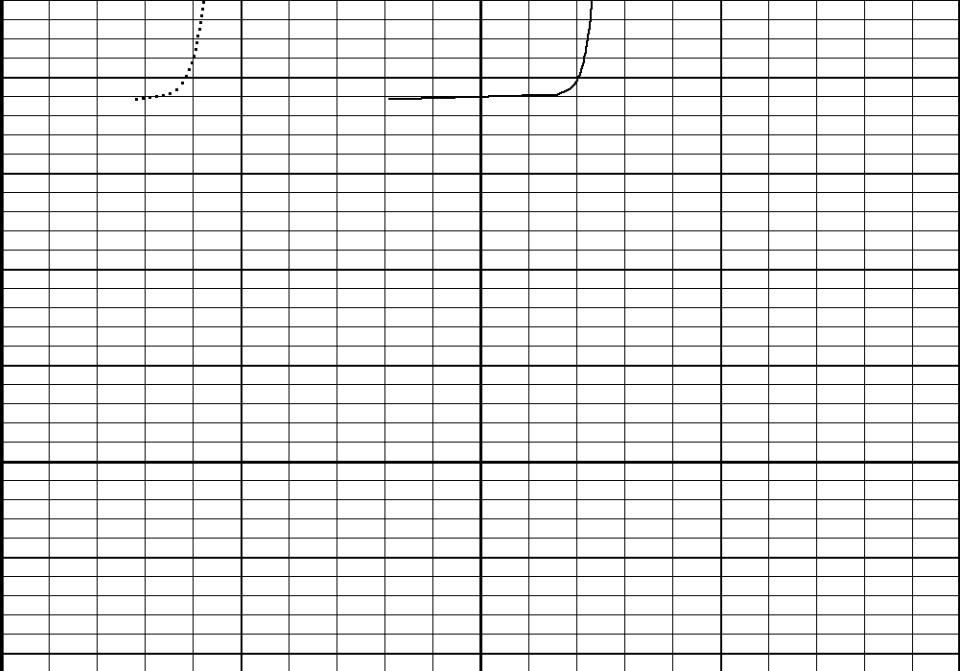
DST Uphole Tension
pounds
5000 0

Borehole
Temp in
deg F

HVI
every
10 cu ft
←

Annular
Integral
every
10 cu ft
→

Replay
Scale
1:240



MMR MicroLog Normal
ohm metres
0 10 20 30 40

MMR MicroLog Inverse
ohm metres
0 10 20 30 40

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_002.dta
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113
Plotted on 04-APR-2014 22:42
Recorded on 04-APR-2014 17:22

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION

General Constants All 000

Last Edited on 04-APR-2014,16:49

General Parameters

Mud Resistivity	0.480	ohm-metres
Mud Resistivity Temperature	84.000	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. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 18-MAR-2014 09:04

Reading No	Measured	Calibrated (lbs)
1	15374.81	0.00
2	15847.36	399.00

Gamma Calibration MCG-C 150

Field Calibration on 04-APR-2014 11:36

	Measured	Calibrated (API)
Background	70	48
Calibrator (Gross)	1142	773
Calibrator (Net)	1071	725

Gamma Constants MCG-C 150

Last Edited on 04-APR-2014,15:46

Gamma Calibrator Number	GRC038	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-C 150

Field Calibration on 10-MAR-2014 13:42

	Measured	Calibrated (mV)
Reference 1	99.9	99.0
Reference 2	-97.7	-98.8

High Resolution Temperature Calibration MCG-C 150

Field Calibration on 08-MAR-2014,10:59

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-C 150

Last Edited on 04-APR-2014,15:47

Pre-filter Length	11
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Caliper Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:12

Field Calibration on 01-APR-2014 09:23

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13253	5.96
2	16528	7.97
3	19726	9.95
4	23473	11.91
5	0	0.00
6	N/A	N/A

Field Calibration		Measured Caliper (in)	Actual Caliper (in)
		8.00	7.97
Micro Normal and Micro Inverse Calibration MMR-C.A 248			Base Calibration on 24-MAR-2014 11:03 Field Check on 01-APR-2014 09:24
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 21-JAN-2014 13:56 Field Check on 04-APR-2014 11:42
Base Calibration			
	Near	Measured Far	Calibrated (cps) Near Far
	2848	86	3714 110
Ratio	32.942		33.764
Field Calibrator at Base	Calibrated (cps)		
	1737 2564		
Ratio	0.677		
Field Check	Calibrated (cps)		
	1718 2552		
Ratio	0.674		
Neutron Constants MDN-B.J 387			Last Edited on 04-APR-2014,15:46
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 24-MAR-2014 10:21 Field Check on 04-APR-2014 11:19
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	951.2	126.8	
Base Check	281.7		
Field Check	281.6		
FE Constants MFE-A.A 55			Last Edited on 04-APR-2014,15:45

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

Last Edited on 04-APR-2014,15:45

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

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 on 21-JAN-2014,09:50
Field Check on 03-APR-2014 14:51

Base Calibration		
Test Loop Calibration	Measured	Calibrated (mmho/m)

Channel	Low	High	Low	High
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	13.7	3863.6	13.6	3863.5
2	31.5	3592.9	31.4	3592.8
3	29.7	2973.4	29.7	2973.5
4	20.8	2127.8	20.8	2127.8
Deep	18.3	1913.7	18.4	1913.7
Medium	43.0	3863.9	43.0	3864.1
Shallow	46.8	5375.4	46.7	5375.3

Array Temperature 47.7 47.5 Deg F

Induction Constants MAI-A.A 5

Last Edited on 04-APR-2014,15:45

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 04-APR-2014,15:47

Pre-filter Length 11

Caliper Calibration MPD-D.A 480

Base Calibration on 02-APR-2014 14:28

Field Calibration on 02-APR-2014 14:29

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17565	3.99
2	27501	5.98
3	37544	7.97
4	47406	9.86
5	58484	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.94	7.97

Photo Density Calibration MPD-D.A 480

Base Calibration on 02-APR-2014 14:48

Field Check on 02-APR-2014 14:55

Density Calibration				
Base Calibration		Measured		Calibrated (sdu)
	Near	Far	Near	Far
Background	1280	1474		
Reference 1	56490	26296	59556	30836
Reference 2	23070	2655	24941	2541

Field Check at Base

1280.1 1473.9

Field Check

1276.2 1470.6

PE Calibration				
Base Calibration		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background	244	1141		
Reference 1	23700	56281	0.425	0.371
Reference 2	6865	22924	0.304	0.272

Field Check at Base

243.9 1141.4

Field Check

239.9 1140.2

Density Constants MPD-D.A 480

Last Edited on 04-APR-2014,15:46

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	1.10 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	0.00

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_003.dta

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 150 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

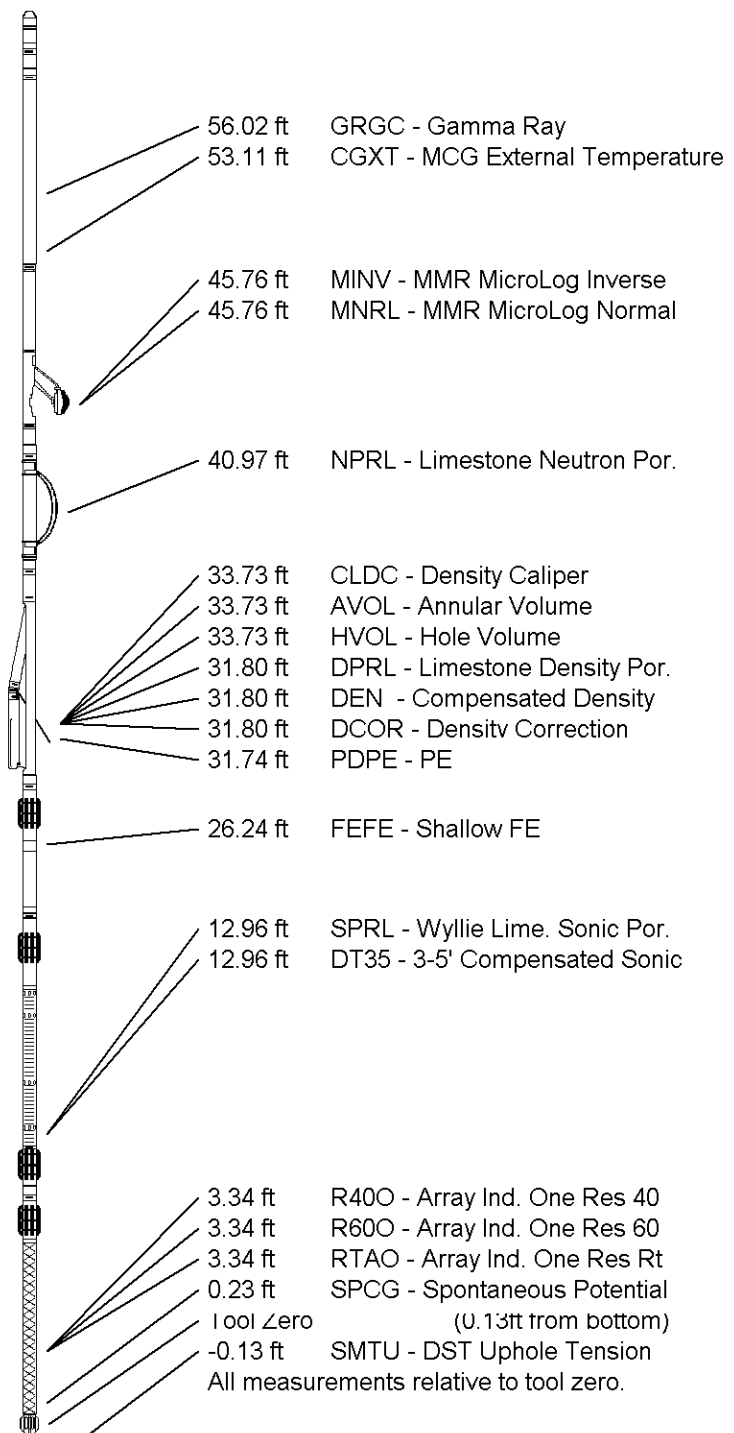
Compact Density/Caliper
MPD-D.A 480 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

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: 2.240 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 BEREXCO LLC.
WELL ELNORA #2-20
FIELD WILDCAT
PROVINCE/COUNTY FINNEY
COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing 2941.00 feet
Elevation Drill Floor 2939.00 feet
Elevation Ground Level 2928.00 feet

First Reading 5347.00 feet
Depth Driller 5400.00 feet
Depth Logger 5393.00 feet



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MICRORESISTIVITY LOG

