



Weatherford

MICRORESISTIVITY LOG

COMPANY	LARSON ENGINEERING, INC			
WELL	KIRSTING-WILLIAMS #1-1			
FIELD	WILDCAT			
PROVINCE/COUNTY	FORD			
COUNTRY/STATE	U.S.A. / KANSAS			
LOCATION	330' FSL & 2790' FWL			
SEC 1	TWP 26S	RGE 21W	Other Services	
Latitude			MDN/MPD	MAI/MFE
Longitude			SGS	
API Number	15-057-20966			
Permanent Datum GL, Elevation	2263 feet			Elevations:
Log Measured From KB				KB 2272.00
Drilling Measured From KB @ 9 feet				DF 2270.00
				GL 2263.00
Date	14-OCT-2015			
Run Number	ONE			
Service Order	7577-131963122			
Depth Driller	4850.00			feet
Depth Logger	4850.00			feet
First Reading	4850.00			feet
Last Reading	3950.00			feet
Casing Driller	265.00			feet
Casing Logger	265.00			feet
Bit Size	7.875			inches
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.30 lb/USg			65.00 CP
PH / Fluid Loss	9.50			10.00 ml/30Min
Sample Source	MUD PIT			
Rm @ Measured Temp	0.74 @ 75.0			ohm-m
Rmf @ Measured Temp	0.59 @ 75.0			ohm-m
Rmc @ Measured Temp	0.89 @ 75.0			ohm-m
Source Rmf / Rmc	CALC			CALC
Rm @ BHT	0.52 @ 110.0			ohm-m
Time Since Circulation	4 HOURS			
Max Recorded Temp	110.00			deg F
Equipment / Base	13096			OKC
Recorded By	JEFFREY RANDLE			
Witnessed By	VERN SCHRAG			THOMAS LARSON

BOREHOLE RECORD

Last Edited: 14-OCT-2015 06:42

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	270.00
7.875	270.00	4850.00

CASING RECORD

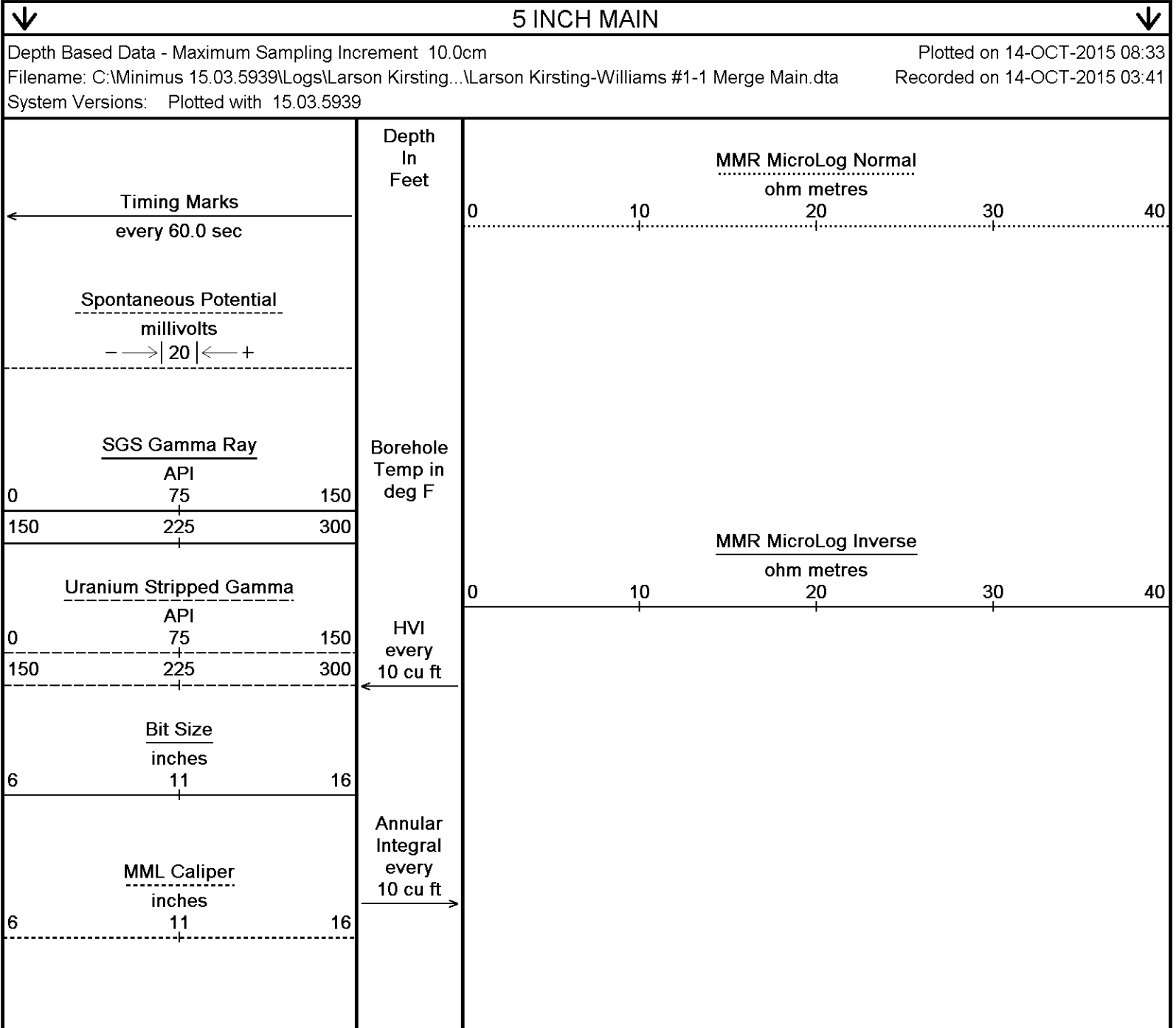
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	265.00	36.00

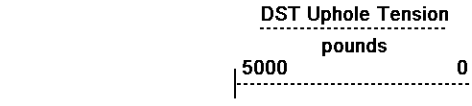
REMARKS

- SOFTWARE ISSUE: WLS 15.03.5939.
- TOOL STRING: MCG, SGS, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
- HARDWARE: MDN: DUAL BOWSPRING ECCENTRALIZER.
MPD: 8 INCH PROFILE PLATE FITTED.
MFE: 1 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 SURFACE CASING.: 2069 CU. FT.

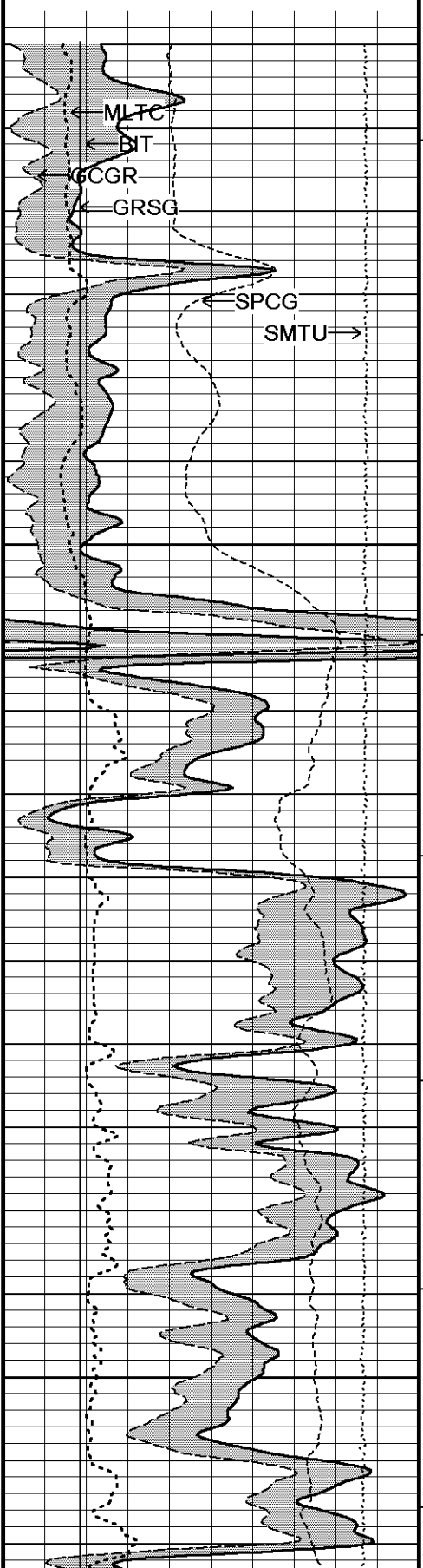
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING.: 1312 CU. FT.
- RIG: HD #3.
- ENGINEER: JEFFREY RANDLE.
- OPERATOR: JOHN LAPOINT.

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.



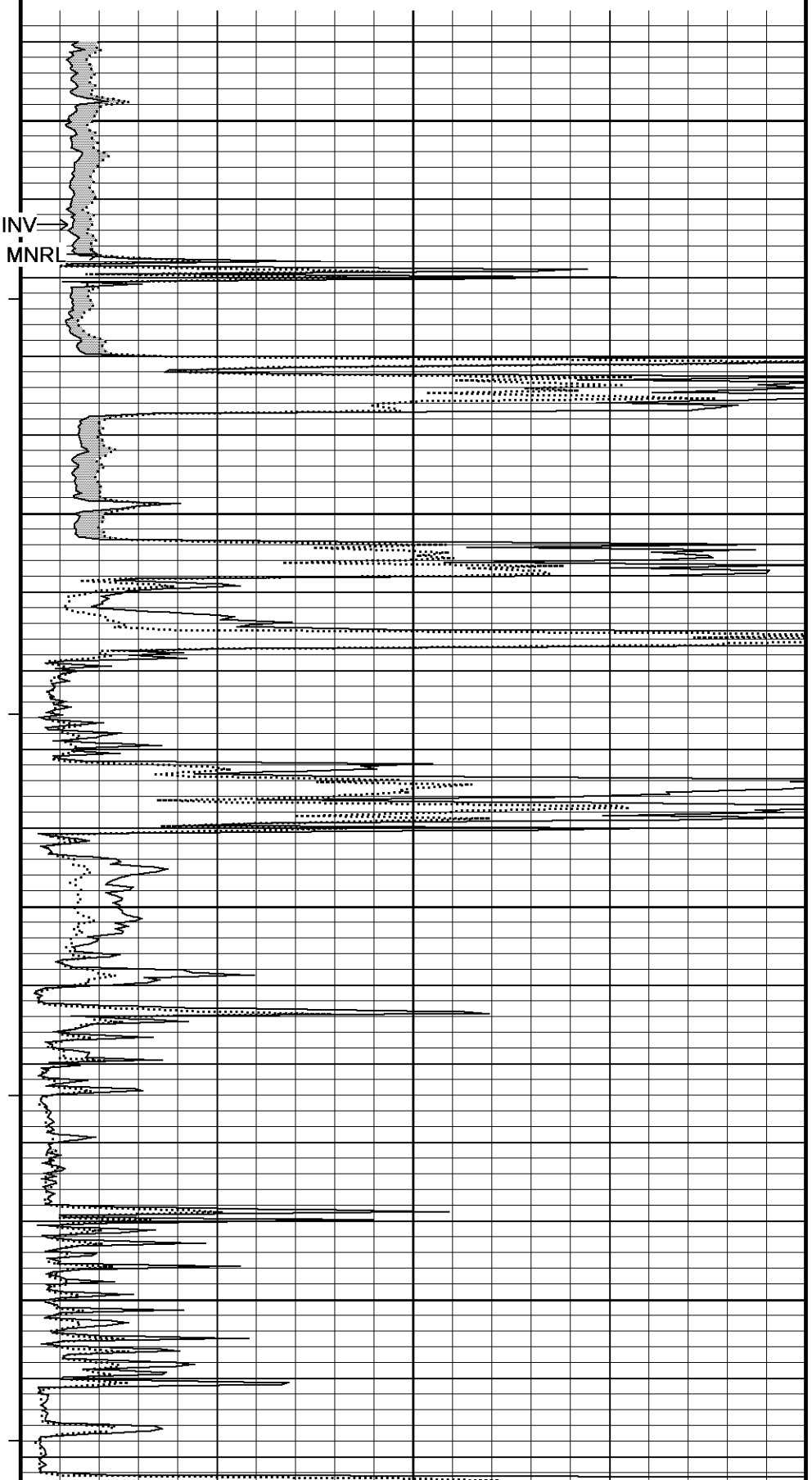


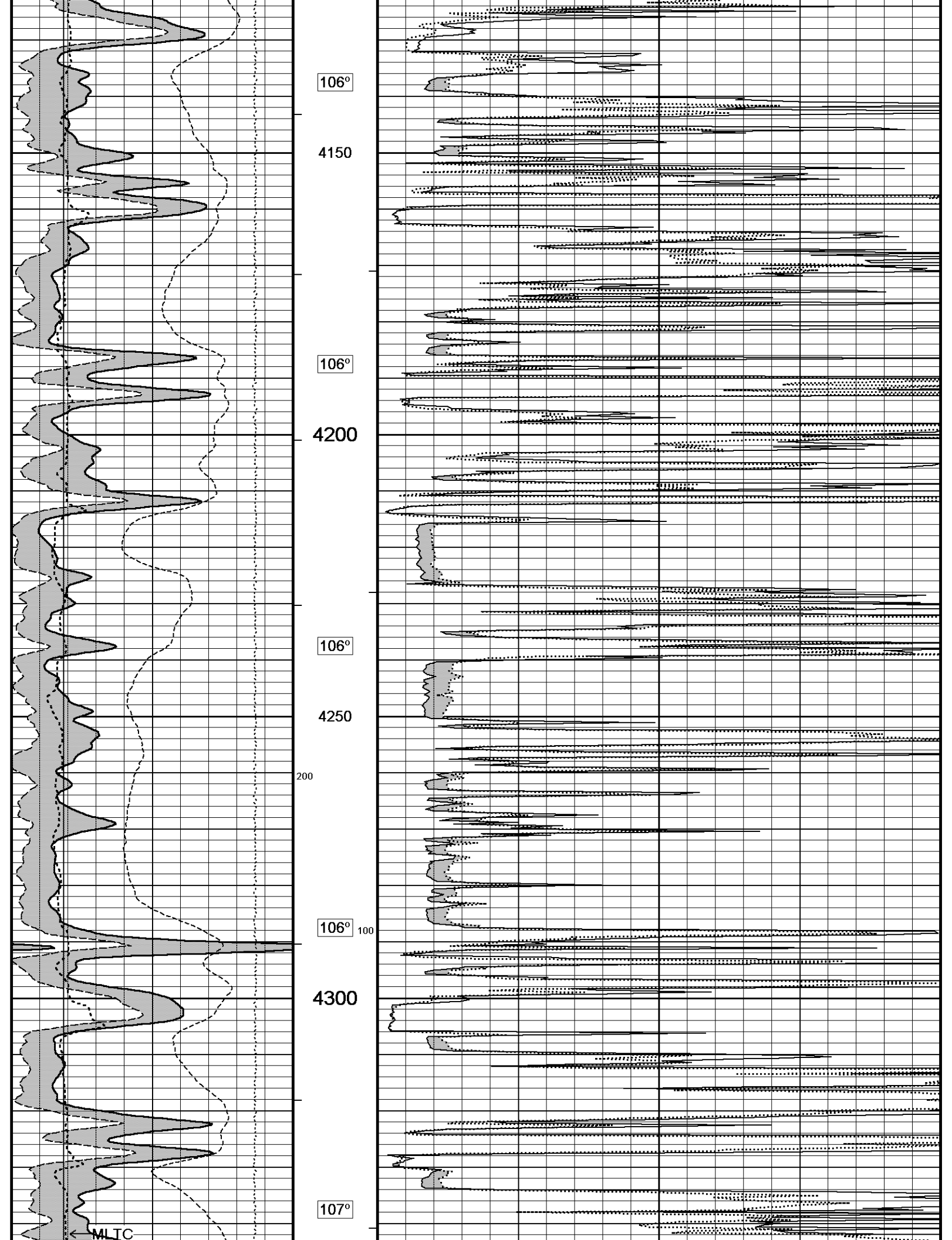
Replay
Scale
1:240

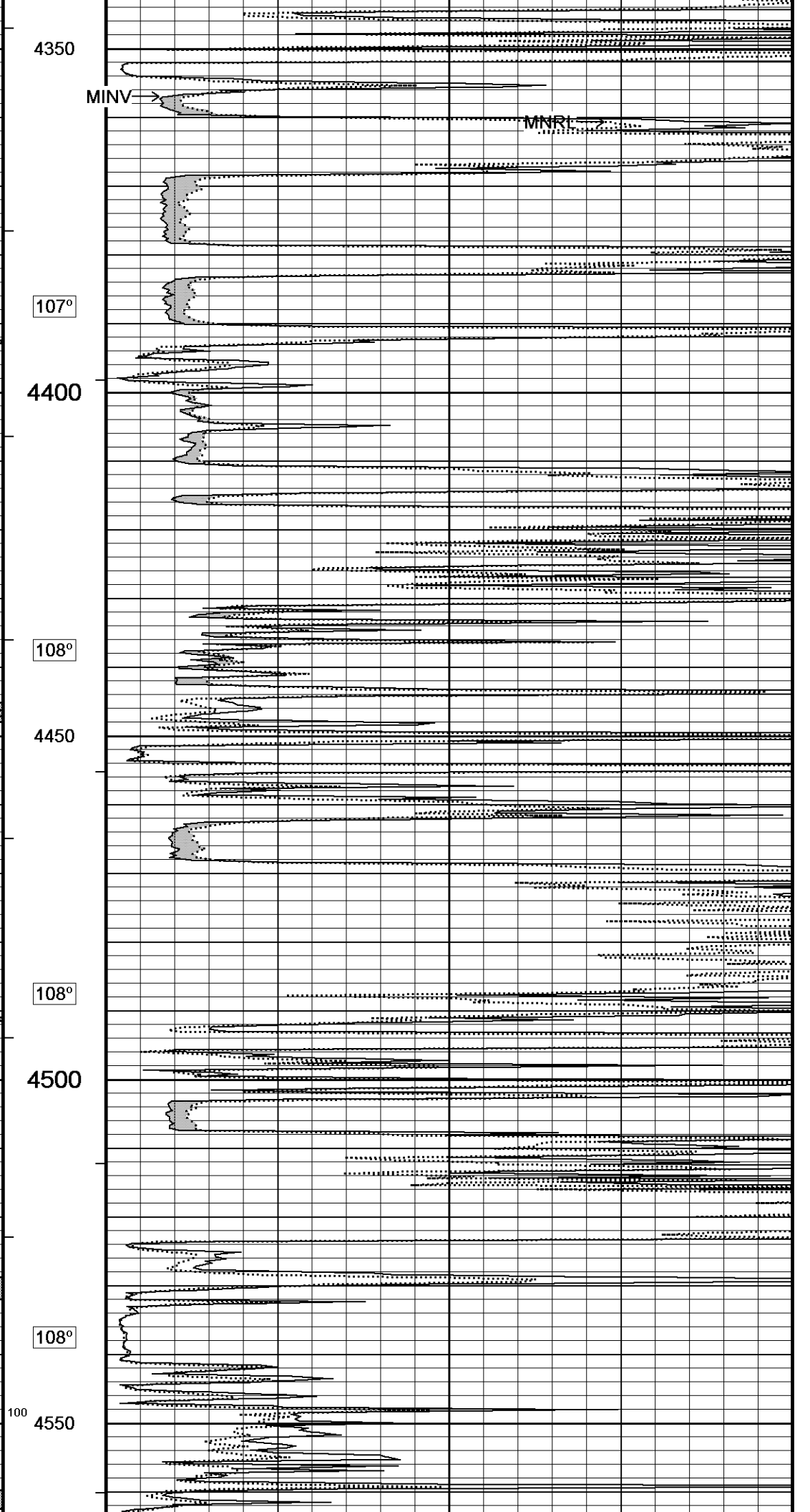
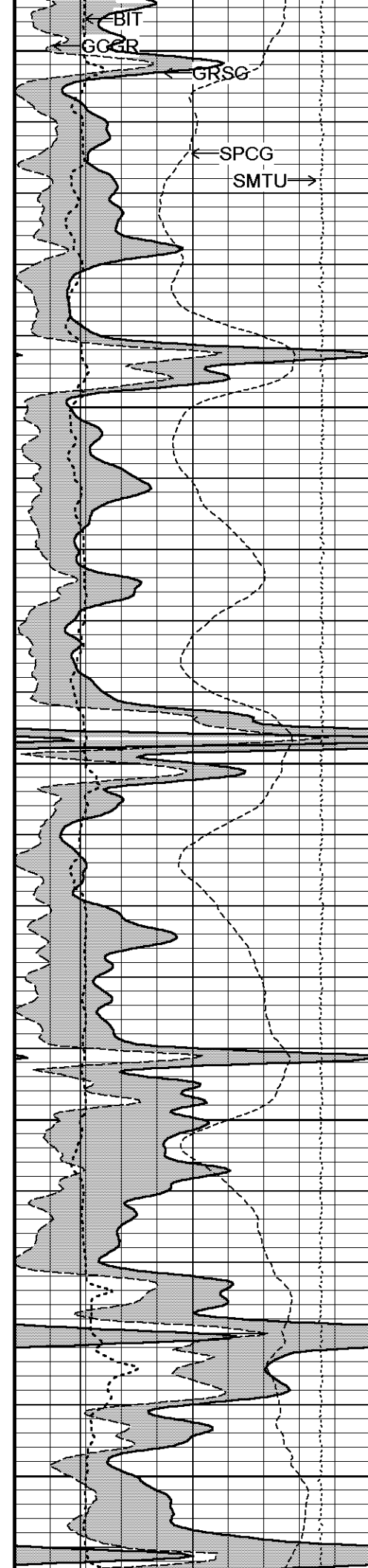


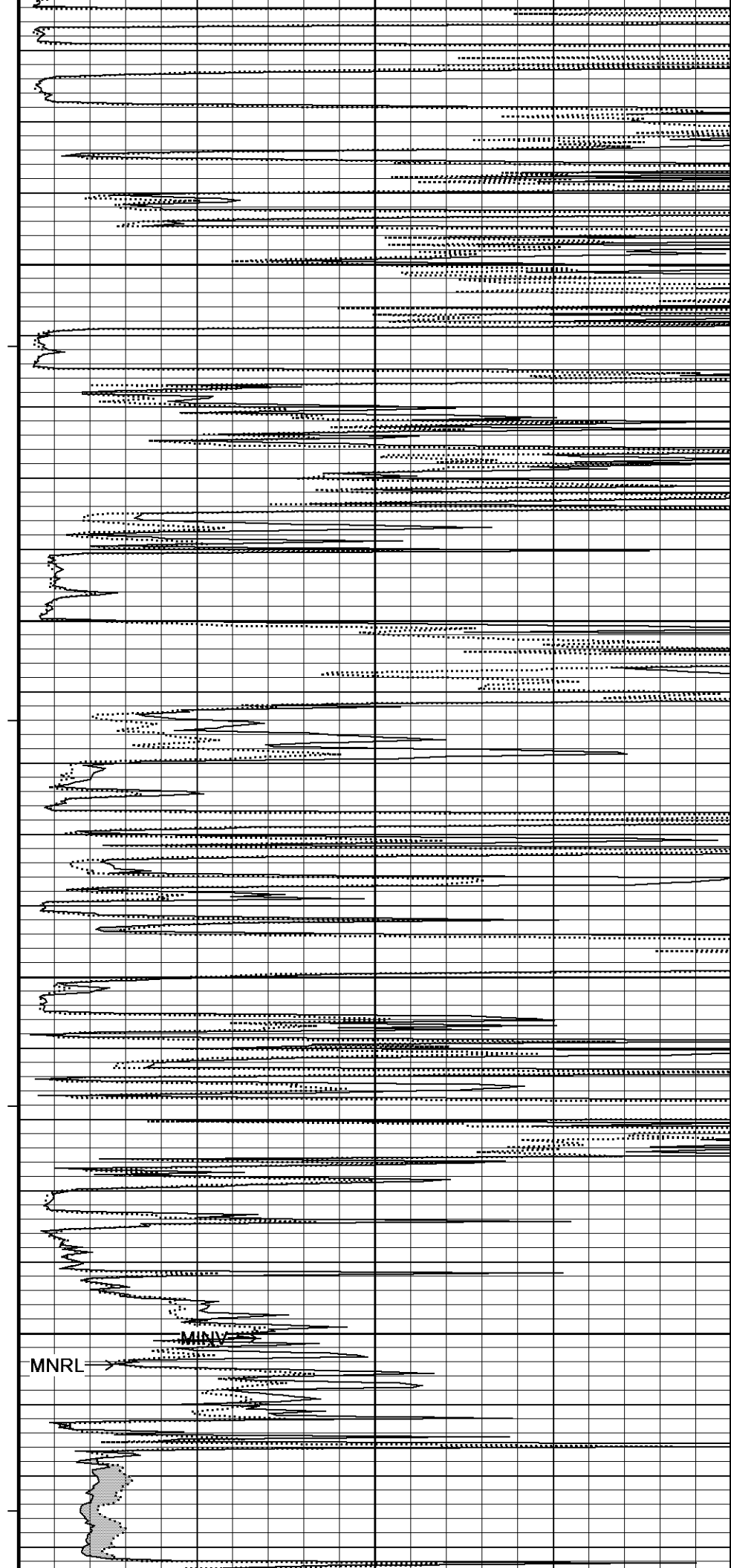
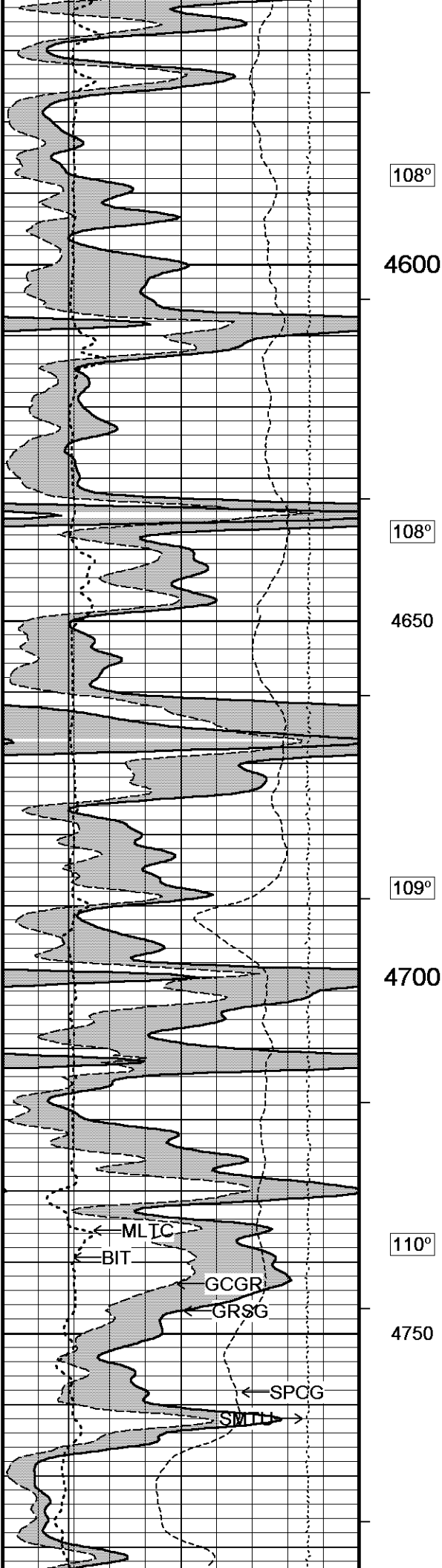
3938
3950
300
105°
4000
105°
4050
106°
4100

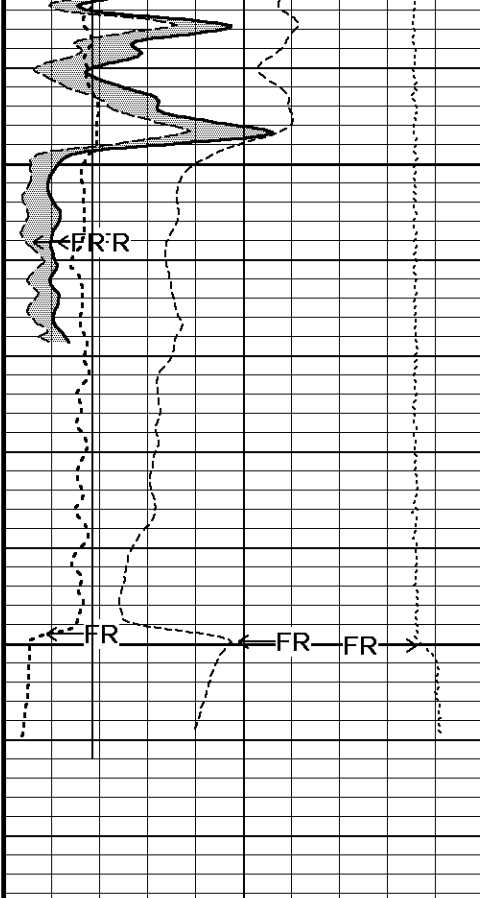
MINV
MNRL











109°

4800

TD
4850-FFFR

Depth
In
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Timing Marks
every 60.0 sec

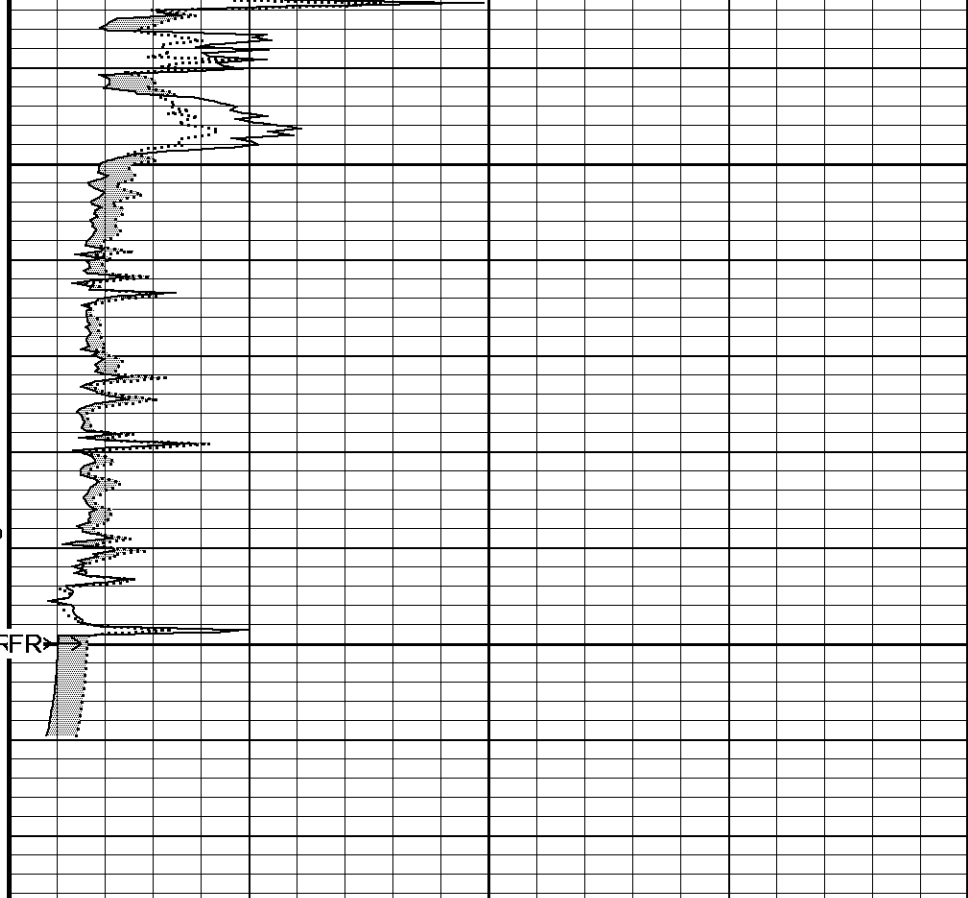
Spontaneous Potential
millivolts
- - - - -> | 20 | < - - - - - +

SGS Gamma Ray
API
0 75 150
150 225 300

Uranium Stripped Gamma
API
0 75 150
150 225 300

Bit Size
inches
6 11 16

MML Caliper
inches
6 11 16



MMR MicroLog Normal
ohm metres

MMR MicroLog Inverse
ohm metres

0 10 20 30 40

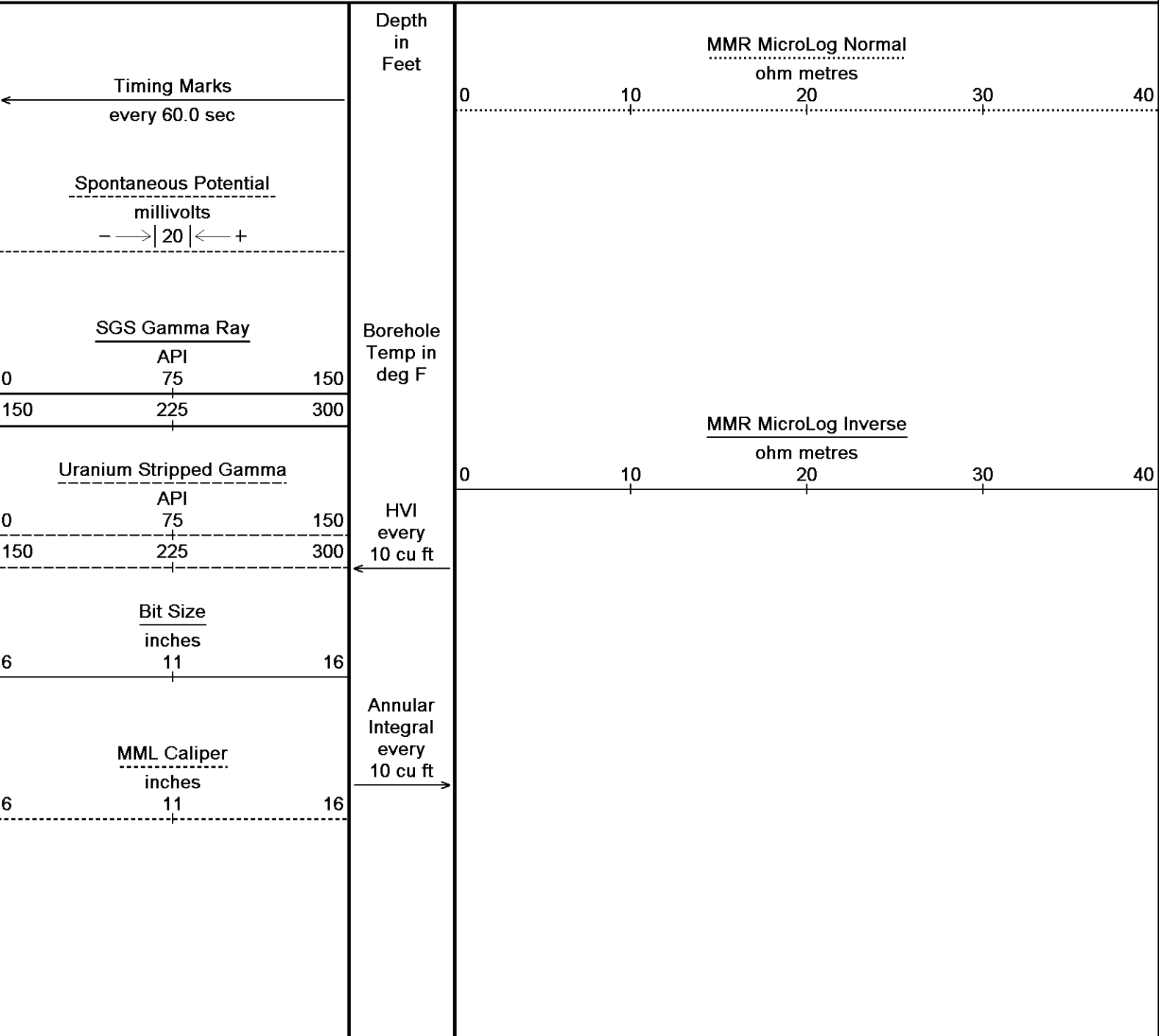
0 10 20 30 40



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 14-OCT-2015 08:33
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsting...\Larson Kirsting-Williams #1-1 Merge Main.dta	Recorded on 14-OCT-2015 03:41
System Versions: Plotted with 15.03.5939	

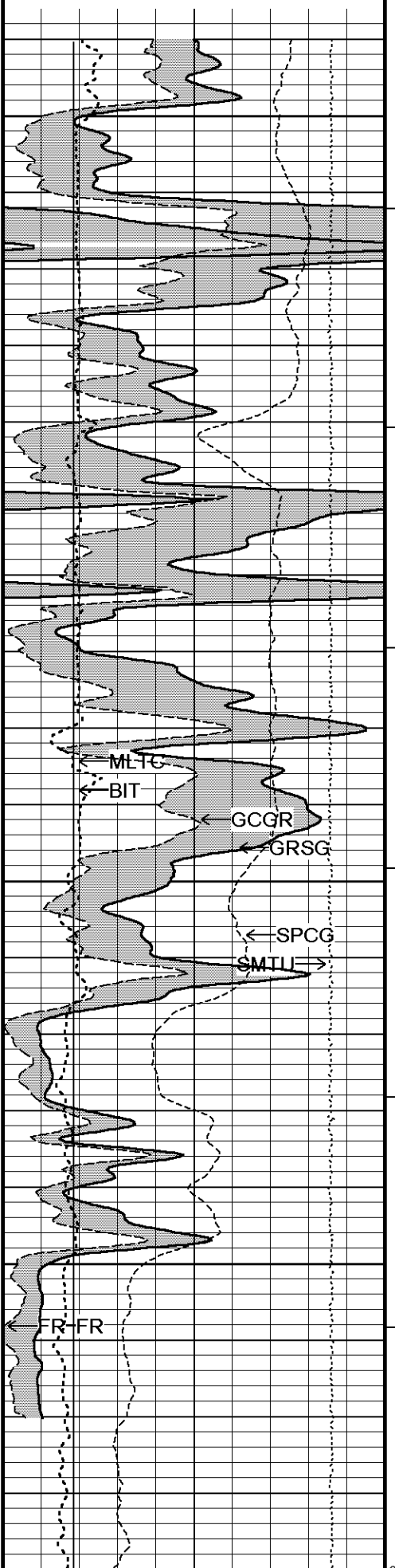
↑	5 INCH MAIN	↑
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↓	REPEAT SECTION	↓
Depth Based Data - Maximum Sampling Increment 10.0cm		
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsti...\Larson Kirsting-Williams #1-1 Merge Repeat.dta		
System Versions: Plotted with 15.03.5939		
Plotted on 14-OCT-2015 08:33		
Recorded on 14-OCT-2015 03:21		

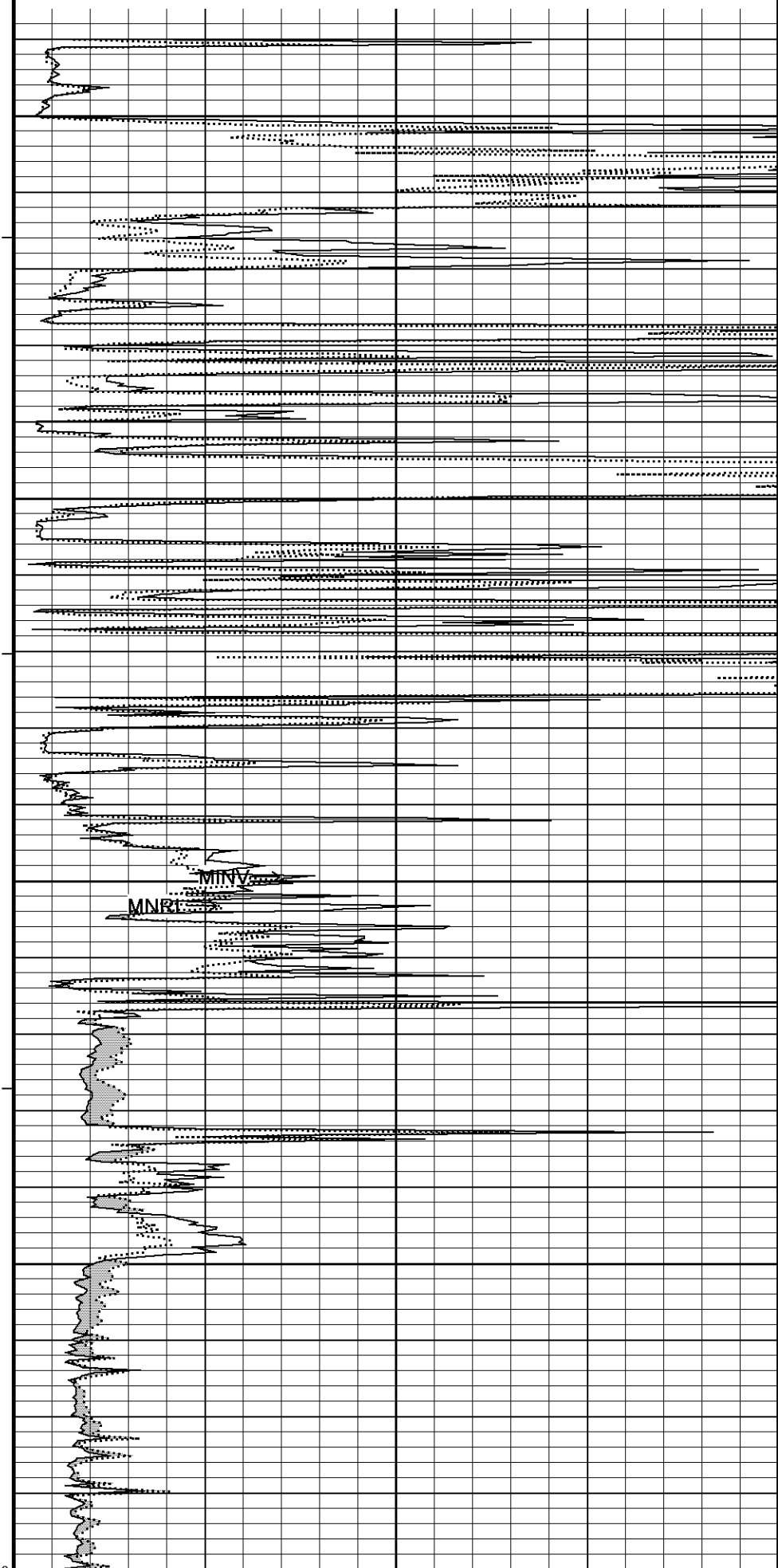


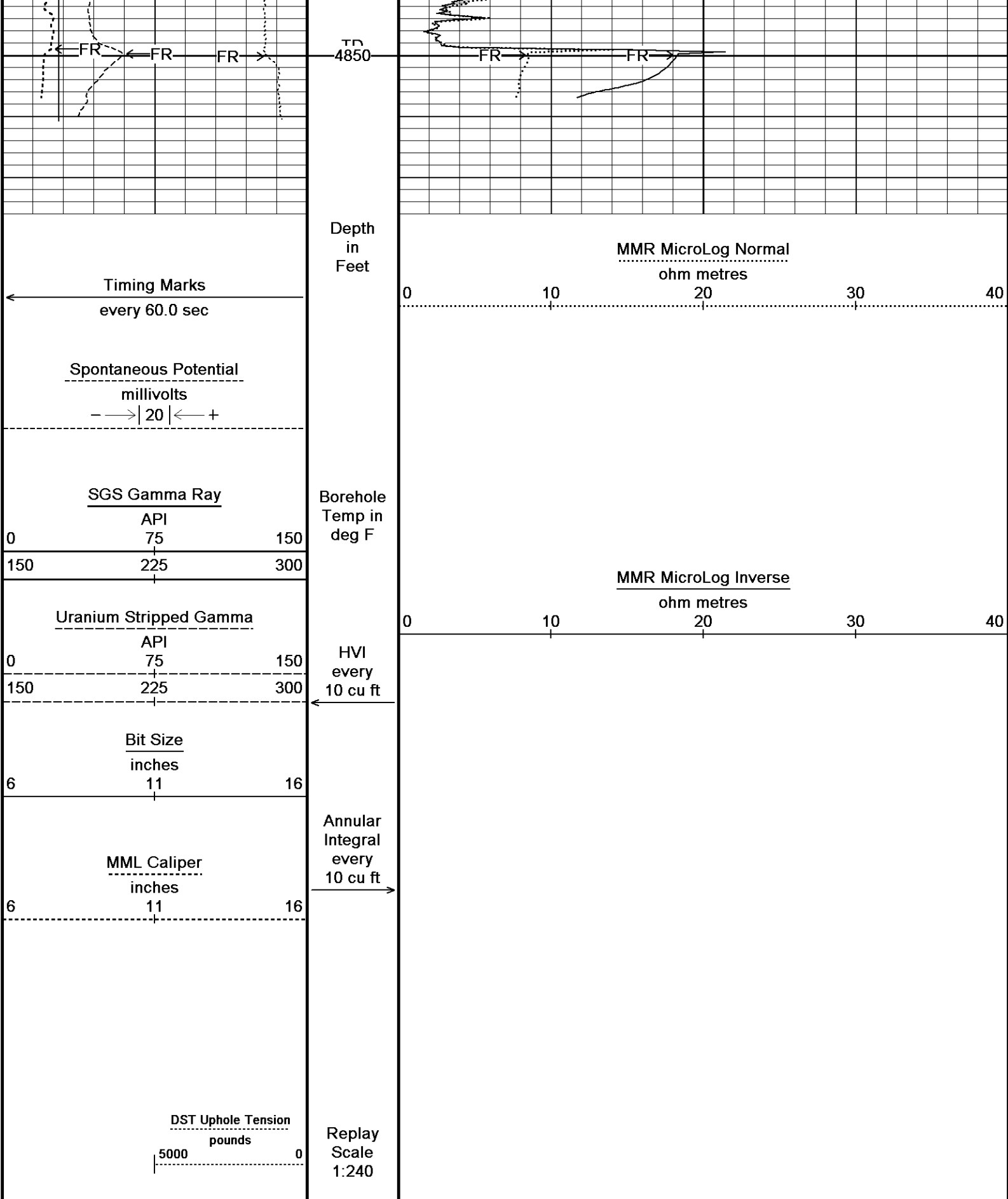
DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240



4638
4650
108°
4700
109°
4750
109°
4800





BEFORE SURVEY CALIBRATION

C:\Minimus 15.03.5939\Logs\Larson Kirsting-Williams #1-1\Larson Kirsting-Williams #1-1 Microlog Repeat.dta

General Constants All 000

Last Edited on 14-OCT-2015,04:46

General Parameters

Mud Resistivity	0.740	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	None	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	MML Caliper	

Rwa Parameters

Porosity used	N/A
Resistivity used	N/A
RWA Constant A	N/A
RWA Constant M	N/A
SW/APOR Tool Source	

Down-hole Tension Calibration SMS 0

Field Calibration on 14-OCT-2015 02:38

Reading No	Measured	Calibrated (lbs)
1	13223.31	0.00
2	14120.71	513.70

Gamma Calibration MCG-C 123

Field Calibration on 13-OCT-2015 21:52

	Measured	Calibrated (API)
Background	68	46
Calibrator (Gross)	742	502
Calibrator (Net)	674	456

Gamma Calibration Tolerances MCG-C 123

Ratio	1.479	1.40 1.475 1.55	Counts/API
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Gamma Constants MCG-C 123

Last Edited on 14-OCT-2015,01:23

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-C 123

Field Calibration on 22-SEP-2015,11:43

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

High Resolution Temperature Constants MCG-C 123

Last Edited on 22-SEP-2015,11:43

Pre-filter Length	11
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SP Calibration MCG-C 123

Field Calibration on 13-OCT-2015,21:26

	Measured	Calibrated (mV)
Reference 1	100.6	100.3
Reference 2	-99.7	-99.9

Caliper Calibration MML-A 3

Base Calibration on 10-SEP-2015 10:51

Field Calibration on 14-OCT-2015 06:42

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	15005	5.00

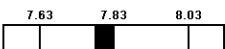
1	15085	5.98
2	18363	7.97
3	21598	9.86
4	25671	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)
7.77

Actual Caliper (in)
7.83

Caliper Calibration Tolerances MML-A 3

Short Arm Field Cal. 7.77  in

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 10-SEP-2015 10:30

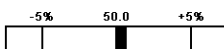
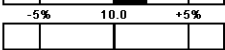
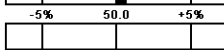
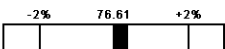
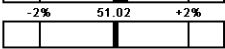
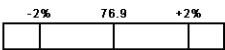
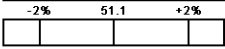
Field Check on 14-OCT-2015 06:40

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.2	50.4	5.1	25.6
Micro Inverse	10.0	50.0	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.9	76.9
Micro Inverse	51.1	51.1

Micro Normal & Micro Inverse Calibration Tolerance MML-A 3

Micro Normal Res. 1	10.2		ohm	Micro Normal Res. 2	50.4		ohm
Micro Inverse Res. 1	10.0		ohm	Micro Inverse Res. 2	50.0		ohm
Micro Normal Base Check	76.9		ohm-m				
Micro Inverse Base Check	51.1		ohm-m				
Micro Normal Field Check	76.9		ohm-m				
Micro Inverse Field Check	51.1		ohm-m				

Micro Normal and Micro Inverse Constants MML-A 3

Last Edited on 14-OCT-2015,06:39

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	N/A inches

DOWNHOLE EQUIPMENT

C:\Minimus 15.03.5939\Logs\Larson Kirsting-Williams #1-1\Larson Kirsting-Williams #1-1 Microlog Repeat.dta

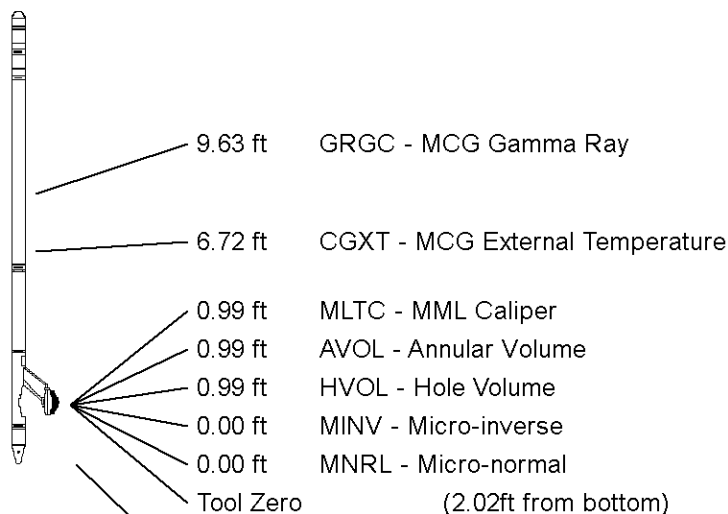
Cablehead, 11 pin
CBH-CA 155 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 123 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

Compact Pressure Bung
HFS 2 LG: 0.13 ft WT: 4.4 lb OD: 2.244 in

Total Length: 19.19 ft Weight: 174.2 lb



All measurements relative to tool zero.

COMPANY	LARSON ENGINEERING, INC
WELL	KIRSTING-WILLIAMS #1-1
FIELD	WILDCAT
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2272.00	feet	First Reading	4850.00	feet
Elevation Drill Floor	2270.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	2263.00	feet	Depth Logger	4850.00	feet



Weatherford®

MICRORESISTIVITY LOG