MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL CO., INC.
WELL	BAHM 2-21
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	335' FNL & 2120' FEL
PERMIT NUMBER	SE NW NW NE

SEC 21	TWP 16S	RGE 34W	Other Services
Latitude	38.655160581		MPD/MDN
Longitude	-101.080919172		
API Number	15-171-21101		

Permanent Datum GL, Elevation 3135 feet
Log Measured From KB
Drilling Measured From KB @ 10 FEET

Elevations:	feet
KB	3145.00
DF	3143.00
GL	3135.00

Date	02-NOV-2014			
Run Number	ONE			
Service Order	7036-102129390			
Depth Driller	4890.00	feet		
Depth Logger	4890.00	feet		
First Reading	4844.24	feet		
Last Reading	3800.00	feet		
Casing Driller	267.00	feet		
Casing Logger	266.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	WBM			
Density / Viscosity	9.20	lb/USg	53.00 CP	
PH / Fluid Loss	10.00		8.90 ml/30Min	
Sample Source	MUDPIT			
Rm @ Measured Temp	0.425 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.34 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.51 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.297 @110.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	111.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	DEREK CARTER			
Witnessed By	TIM PRIEST			
JOB #	LB14-343			

BOREHOLE RECORD

Last Edited: 02-NOV-2014 12:41

Bit Size inches	Depth From feet	Depth To feet
7.875	267.00	4890.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	267.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 14.03.4558
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - MFE: 1 X 0.5 INCH STANDOFF
  - MSS: 2 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 3800 FT.: 360 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 3800 FT.: 280 CU. FT.

- SERVICE ORDER # 7036-102129390

- RIG: H.D. DRILLING #2

- ENGINEER: DEREK CARTER

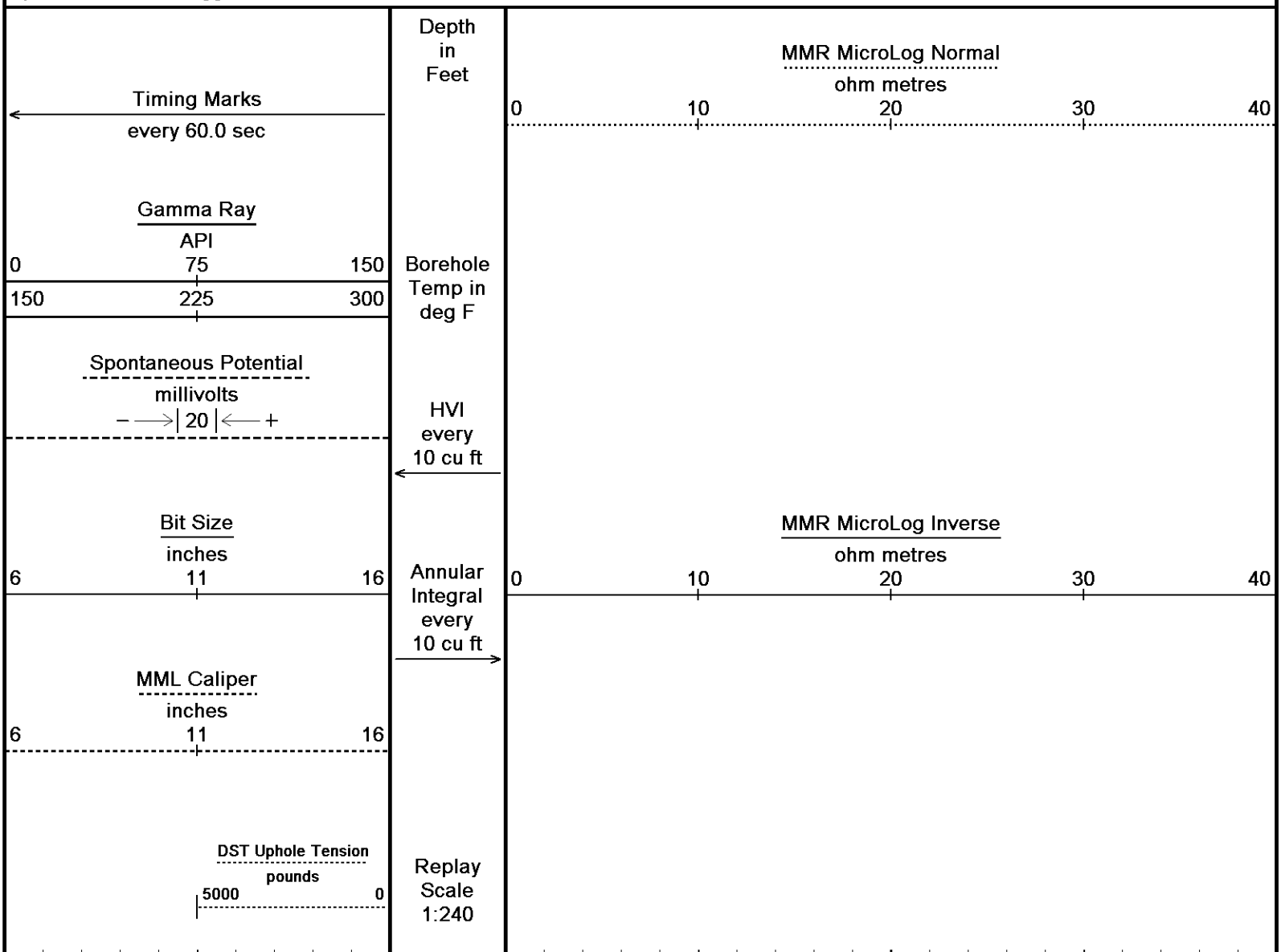
- OPERATORS: CARLOS RAMIREZ

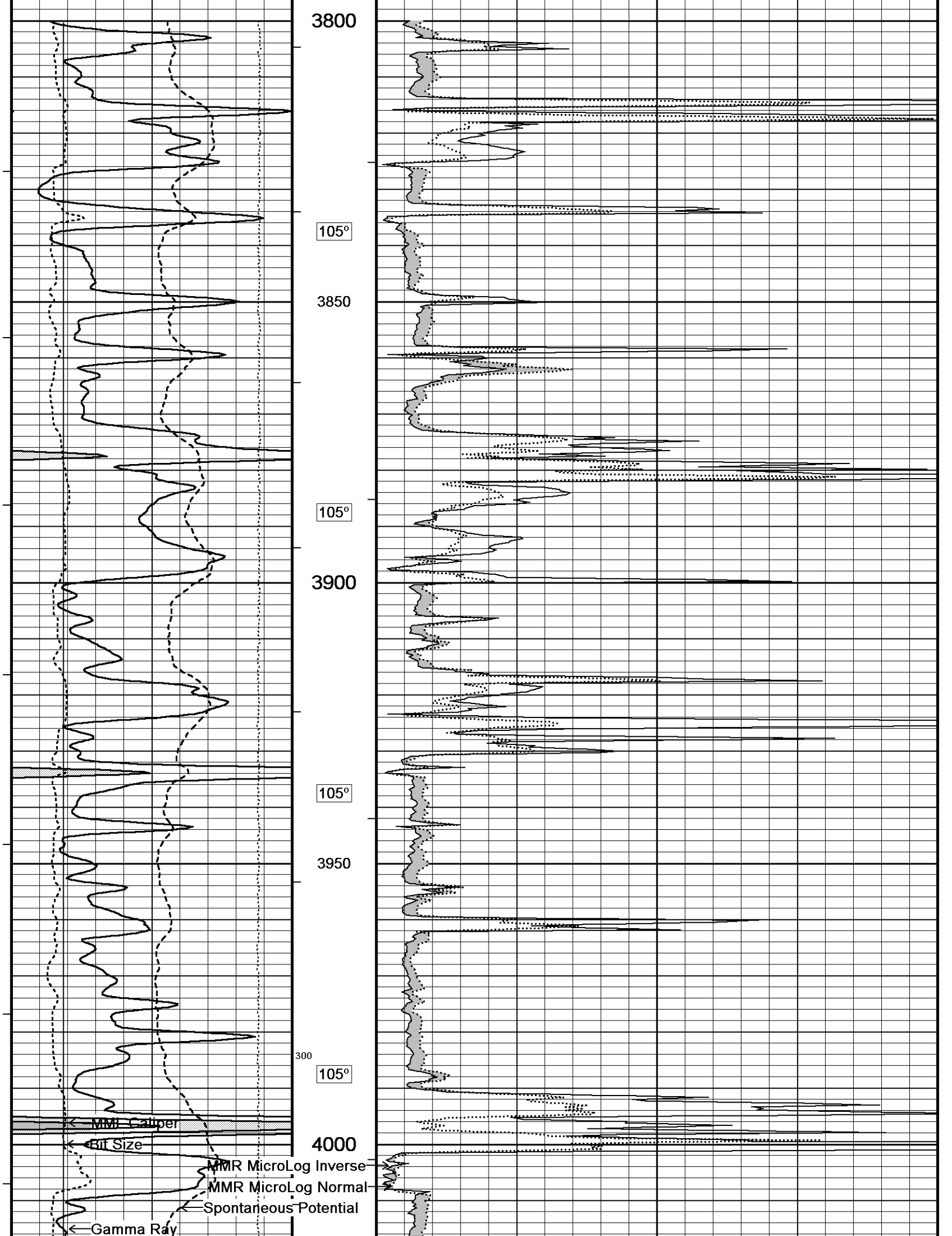
5 INCH MAIN

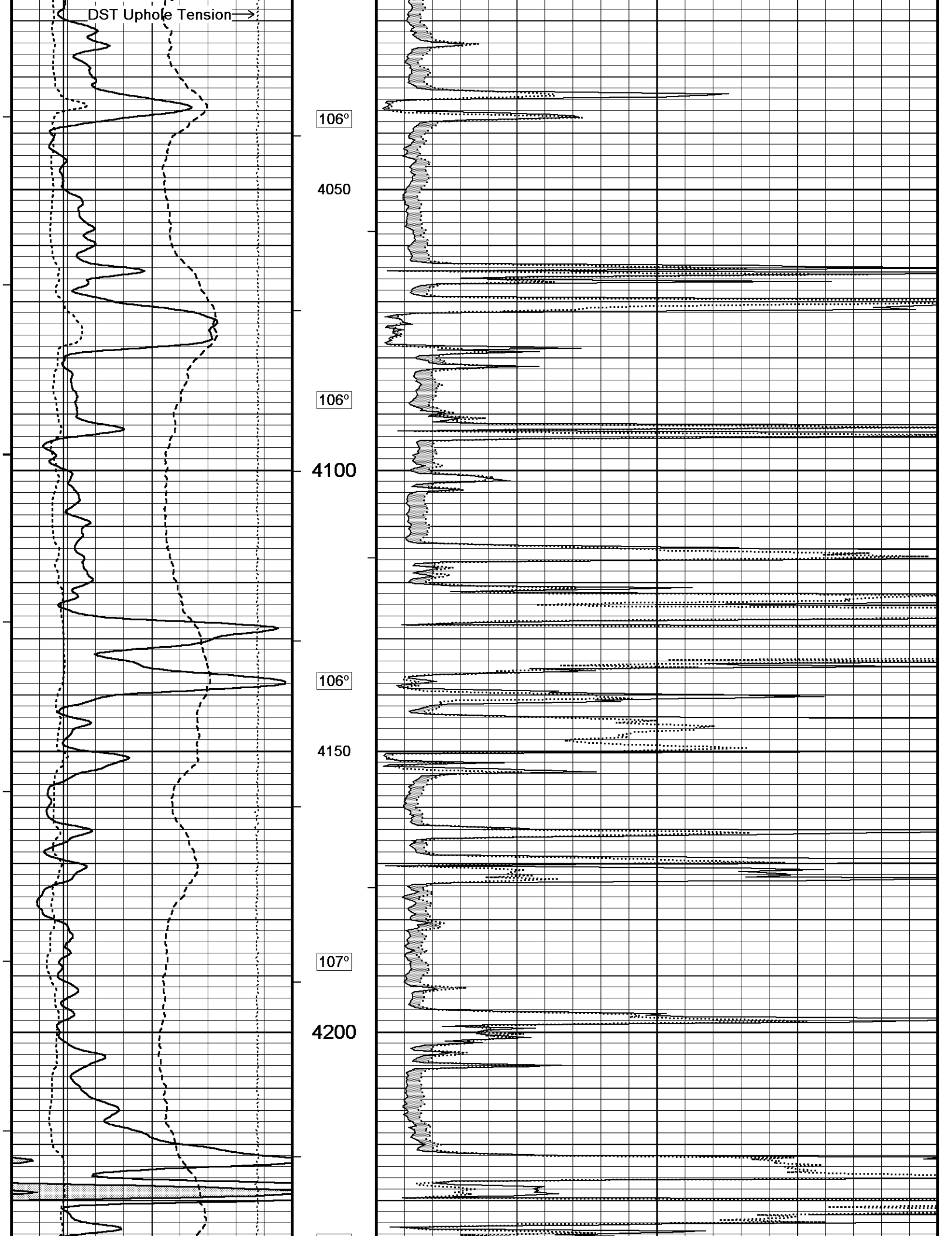
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 15:50

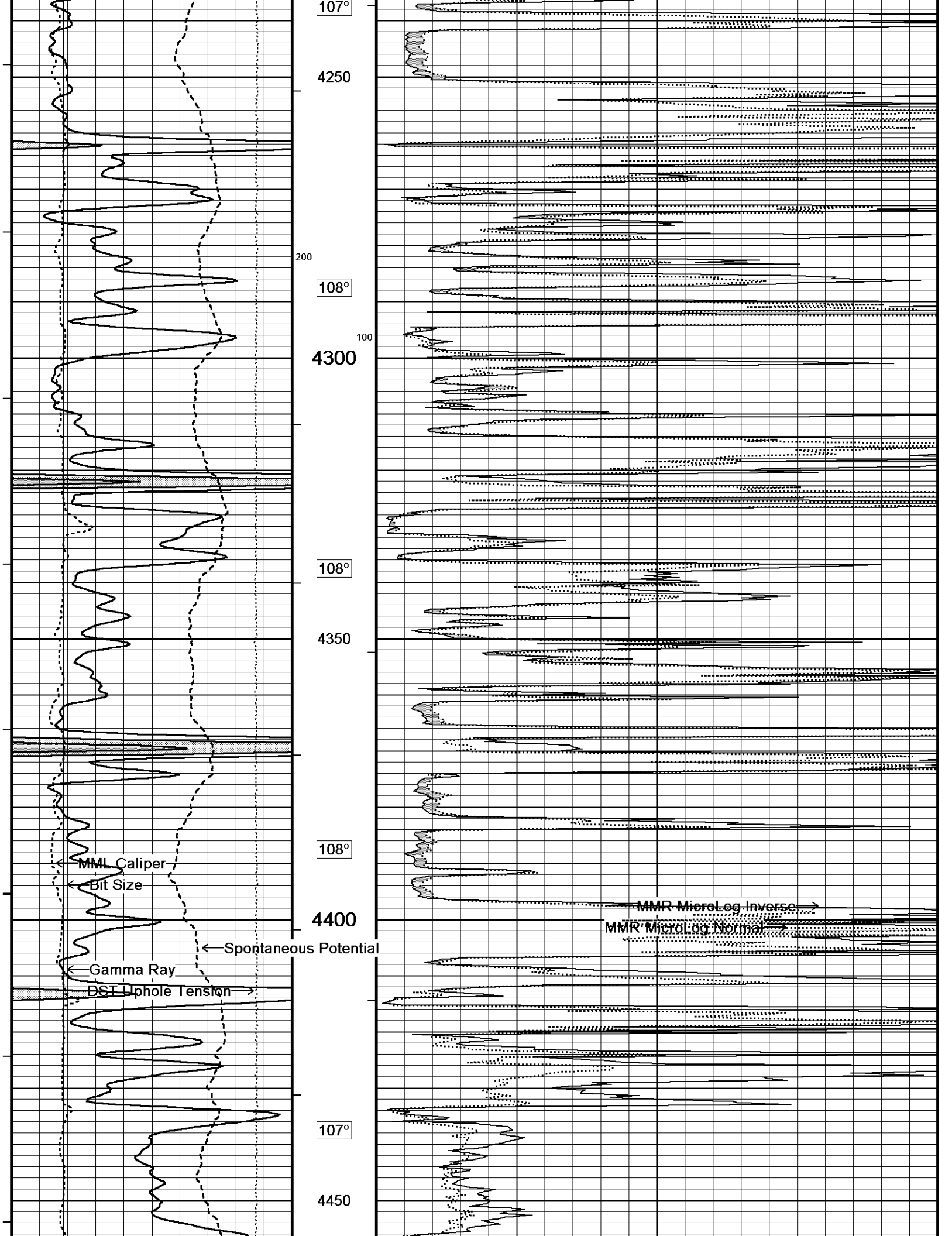
Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare...\Shakespeare Bahm 2-21 Main Anhydrite.dta — Recorded on 02-NOV-2014 15:48

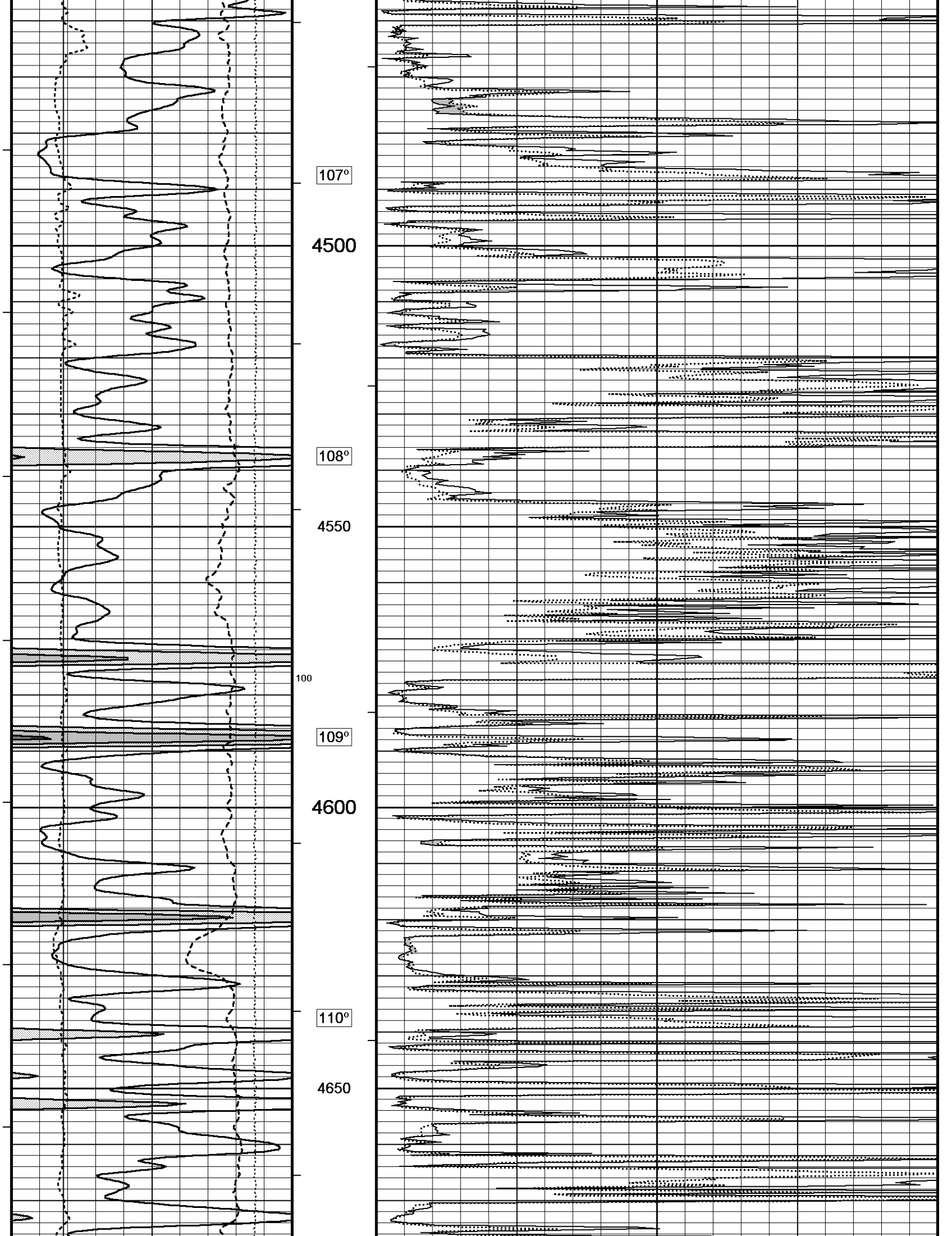
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

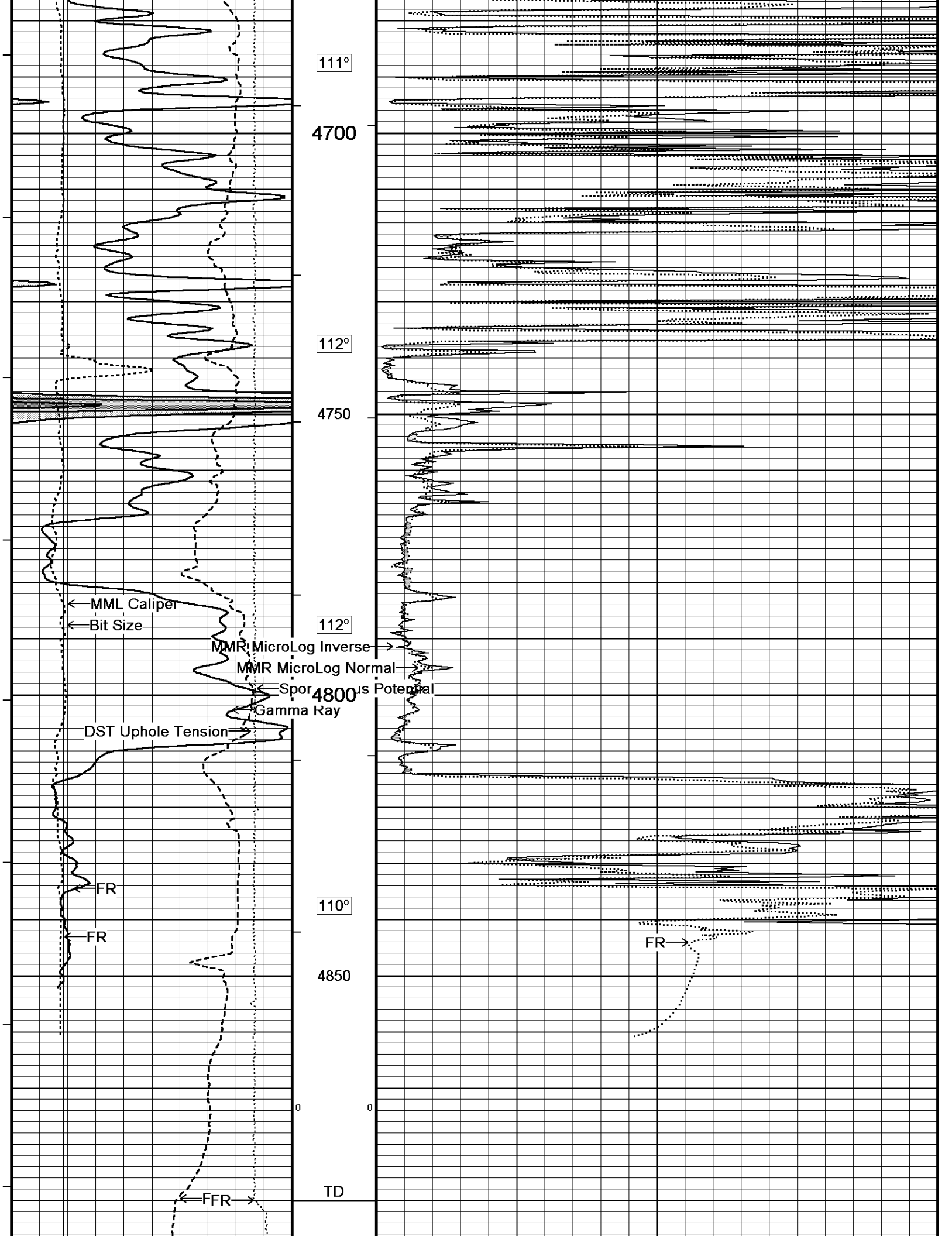


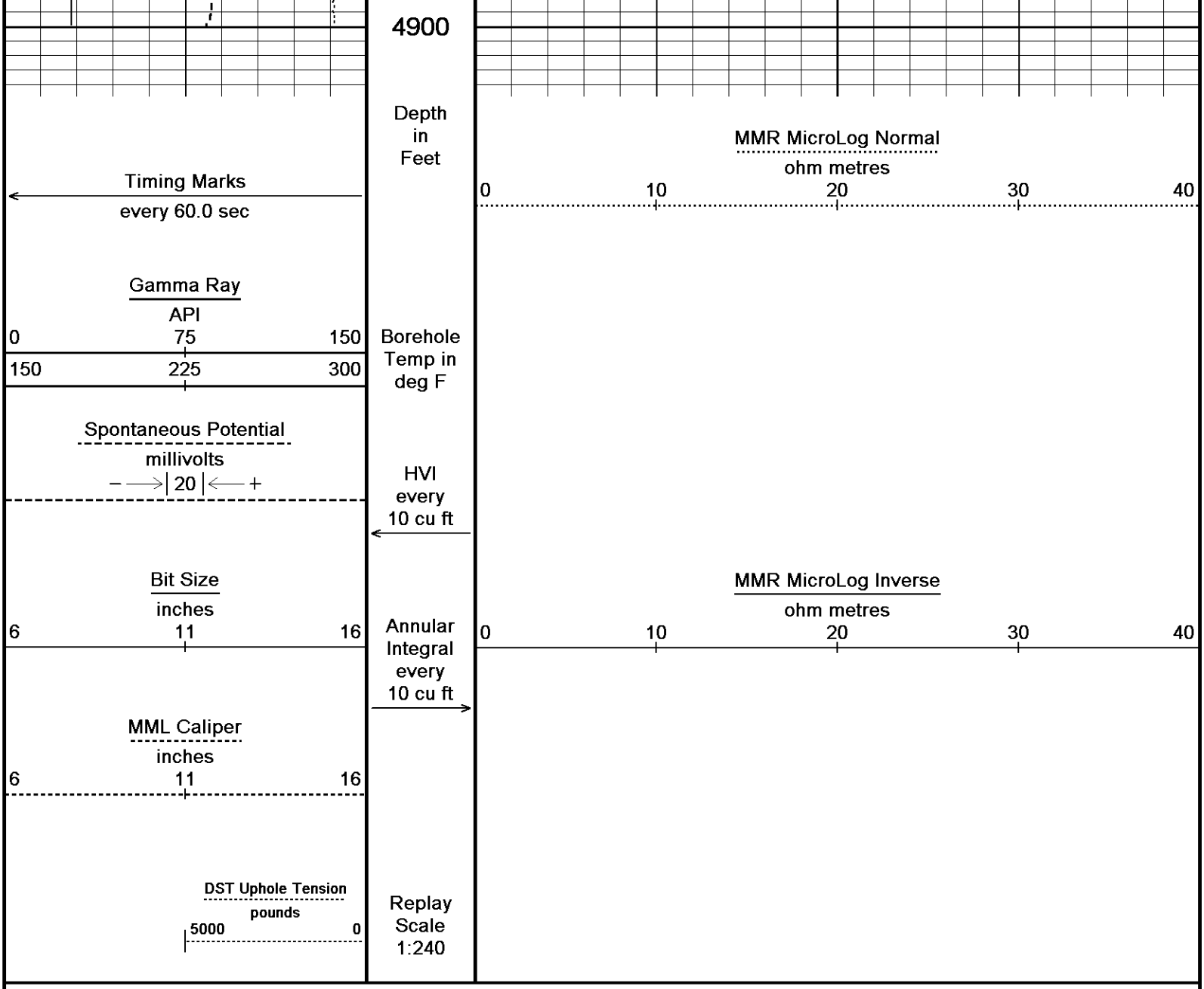

3800
105°
3850
105°
3900
105°
3950
300
105°
4000
MMI Caliper
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray


DST Uphole Tension
106°
4050
106°
4100
106°
4150
107°
4200


107°
4250
200
108°
100
4300
108°
4350
108°
MML Caliper
Bit Size
4400
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
107°
4450


107°
4500
108°
4550
100
109°
4600
110°
4650


111°
4700
112°
4750
MML Caliper
Bit Size
112°
MMR MicroLog Inverse
MMR MicroLog Normal
Spor
s Potential
4800
Gamma Ray
DST Uphole Tension
FR
110°
FR
4850
FR
0
0
TD
FFR

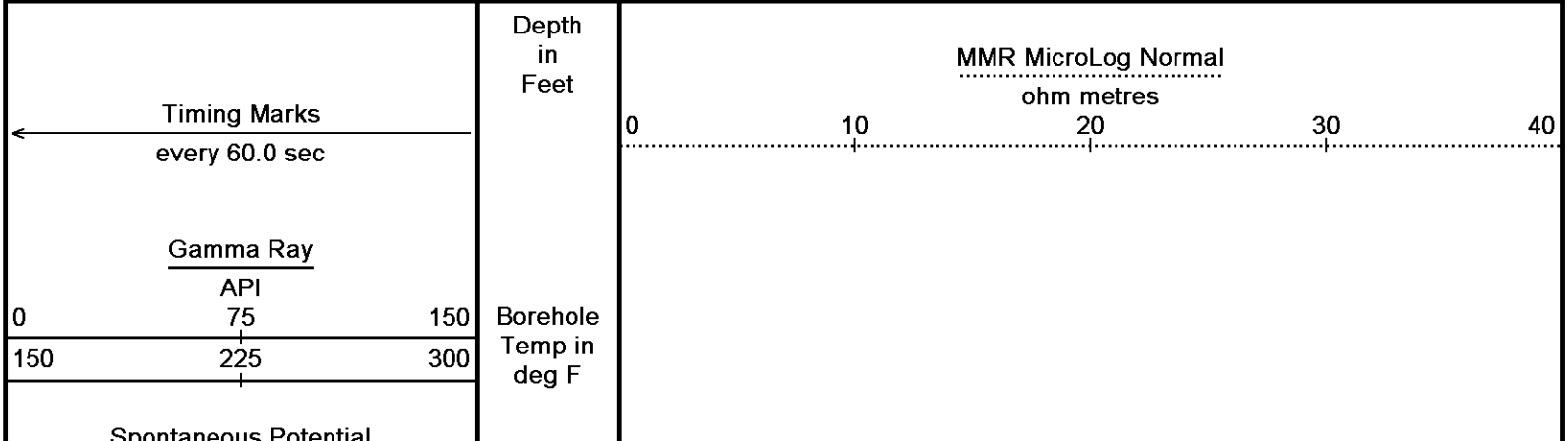


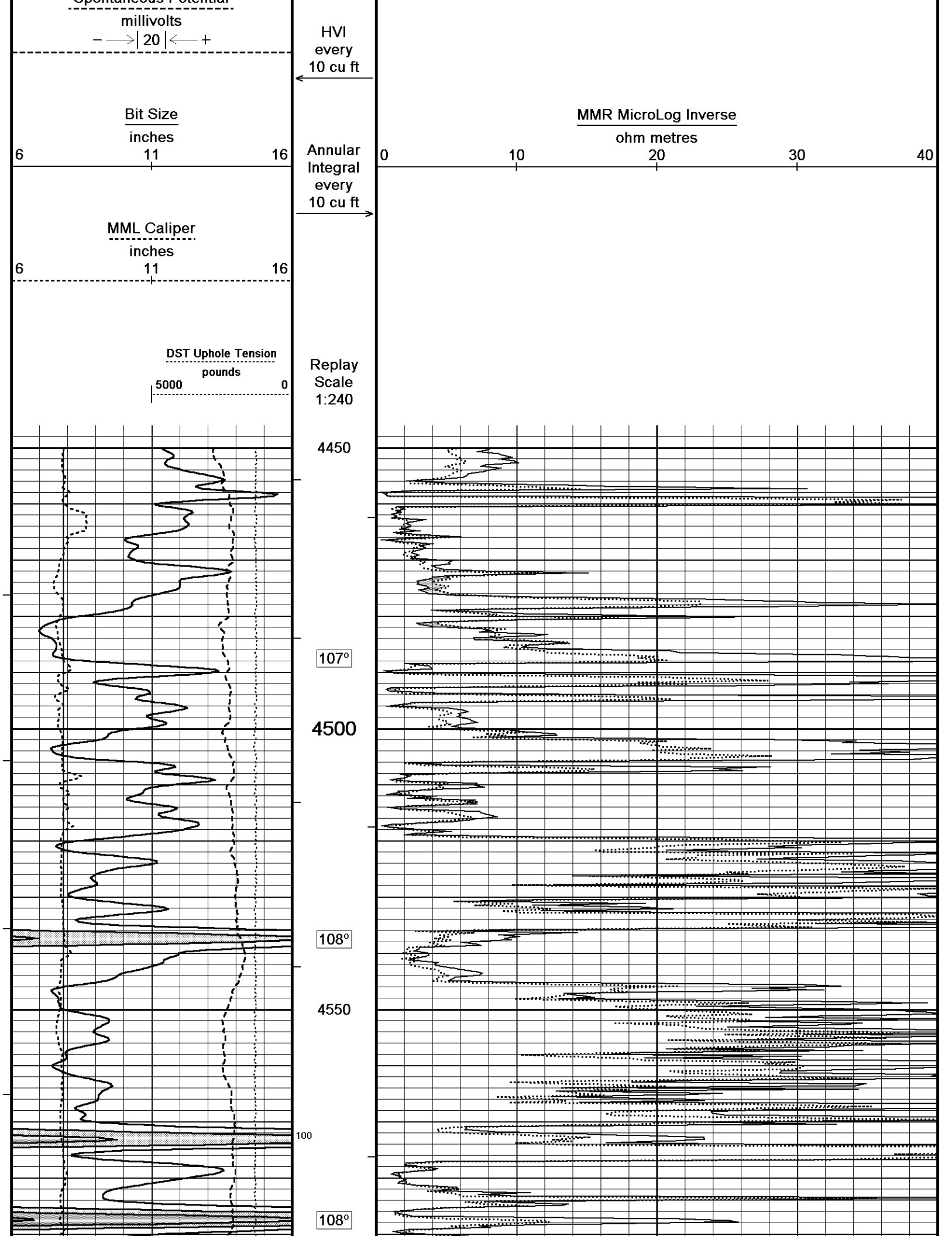
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 15:50
Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare...\Shakespeare Bahm 2-21 Main Anhydrite.dta — Recorded on 02-NOV-2014 15:48
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

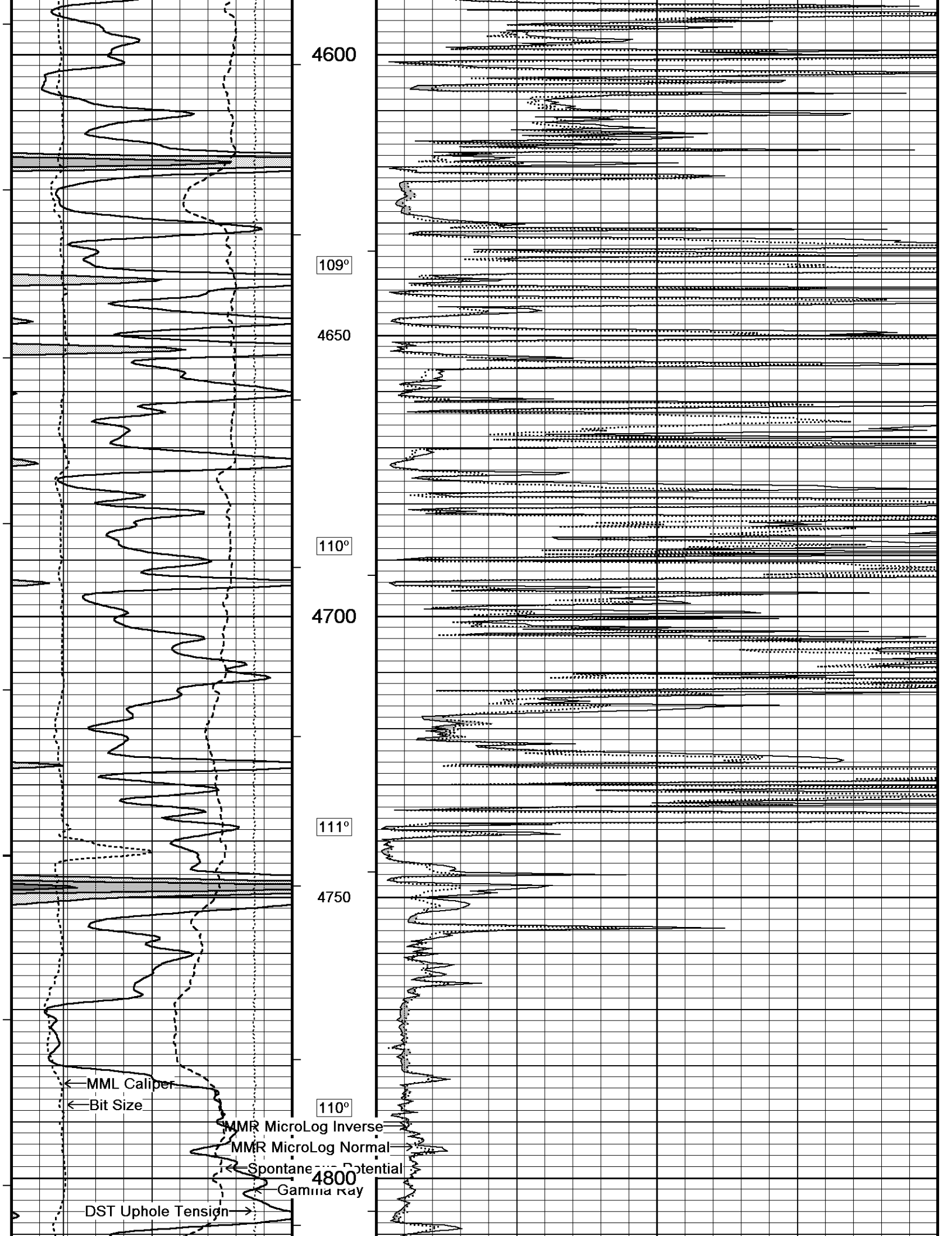
5 INCH MAIN

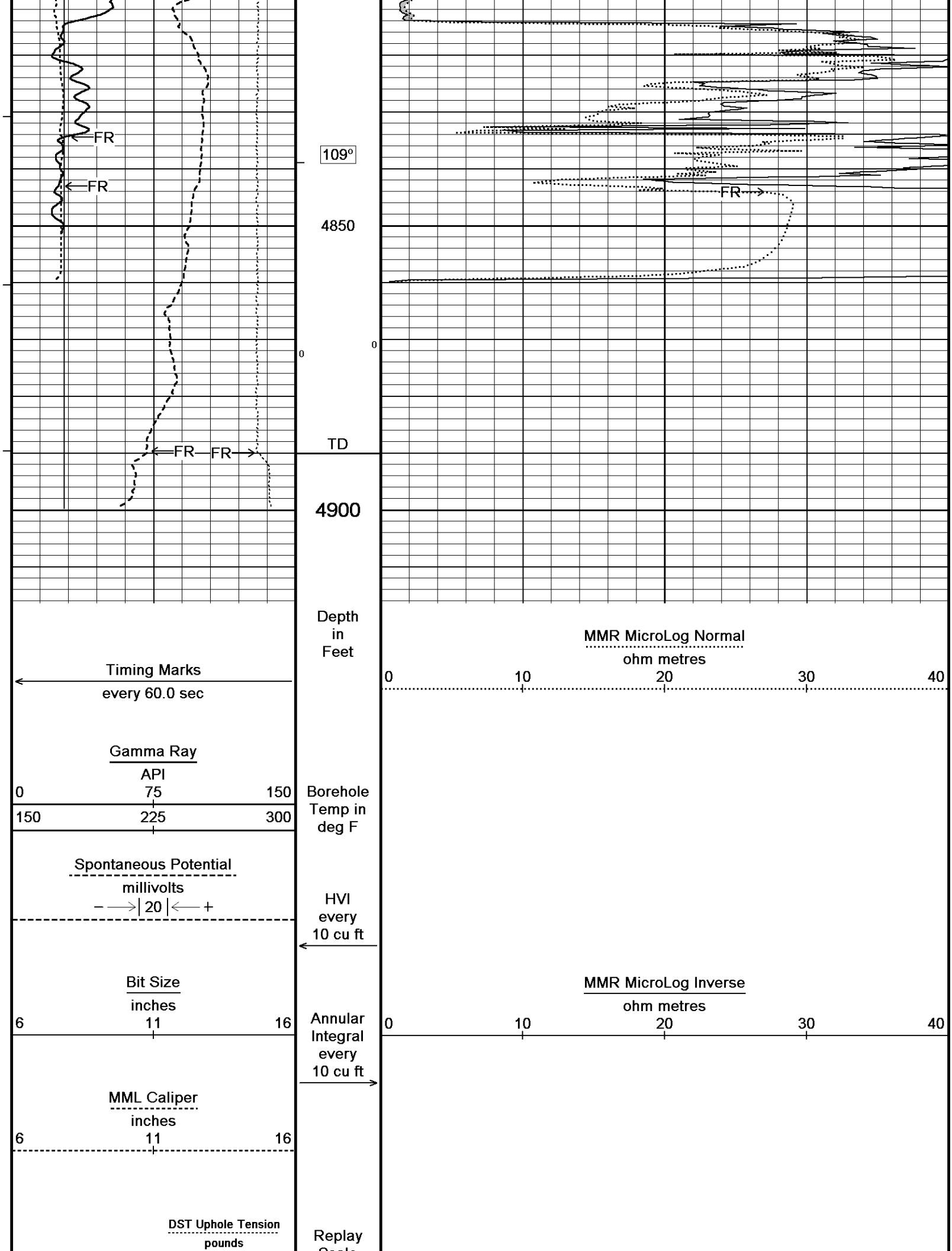
REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 15:50
Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm ...\Shakespeare Bahm 2-21 Repeat.dta — Recorded on 02-NOV-2014 13:55
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558




millivolts
20
HVI
every
10 cu ft
Bit Size
inches
6
11
16
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
Annular
Integral
every
10 cu ft
MML Caliper
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
4450
107°
4500
108°
4550
100
108°


4600
109°
4650
110°
4700
111°
4750
110°
4800
MML Caliper
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension


FR
FR
FR
FR
109°
4850
0
0
TD
4900
Depth
in
Feet
Timing Marks
every 60.0 sec
MMR MicroLog Normal
ohm metres
0
10
20
30
40
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
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
Annular
Integral
every
10 cu ft
MML Caliper
inches
6
11
16
DST Uphole Tension
pounds
Replay

5000 0

Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 02-NOV-2014 15:50
Filename: C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm ...\Shakespeare Bahm 2-21 Repeat.dta — Recorded on 02-NOV-2014 13:55
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm 2-21\Shakespeare Bahm 2-21 Main.dta

General Constants All 000

Last Edited on 02-NOV-2014,13:30

General Parameters		
Mud Resistivity	0.425	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	None	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.K 469

Field Calibration on 28-OCT-2014 13:39

	Measured	Calibrated (API)
Background	68	45
Calibrator (Gross)	1149	770
Calibrator (Net)	1082	725

Gamma Calibration Tolerances MCG-D.K 469

Ratio 1.492 (1.40 | 1.475 | 1.55) Counts/API

Gamma Constants MCG-D.K 469

Last Edited on 02-NOV-2014,12:42

Gamma Calibrator Number	GRC038	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
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	%

High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 12-MAY-2014,02:16

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 13-JUL-2014,14:53

Pre-filter Length	11

Caliper Calibration MML-A 3

Base Calibration on 24-OCT-2014 14:47
Field Calibration on 02-NOV-2014 09:48

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15152	5.00

1	15153	5.98
2	18429	7.97
3	21713	9.86
4	25537	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.92	7.97

Caliper Calibration Tolerances MML-A 3

Short Arm Field Cal. 7.92 in (7.77 | 7.97 | 8.17)

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 24-OCT-2014 15:09
Field Check on 02-NOV-2014 09:45

Base Calibration

Channel	Measured Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1	Calibrated (ohm-m) Resistor 2
Micro Normal	10.0	49.9	5.1	25.6
Micro Inverse	10.0	49.9	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	77.4	77.4
Micro Inverse	51.3	51.3

Micro Normal & Micro Inverse Calibration Tolerance MML-A 3

Micro Normal Res. 1 10.0 ohm (-5% | 10.0 | +5%)
Micro Normal Res. 2 49.9 ohm (-5% | 50.0 | +5%)
Micro Inverse Res. 1 10.0 ohm (-5% | 10.0 | +5%)
Micro Inverse Res. 2 49.9 ohm (-5% | 50.0 | +5%)

Micro Normal Base Check 77.4 ohm-m (-2% | 77.28 | +2%)
Micro Inverse Base Check 51.3 ohm-m (-2% | 51.19 | +2%)

Micro Normal Field Check 77.4 ohm-m (-2% | 77.4 | +2%)
Micro Inverse Field Check 51.3 ohm-m (-2% | 51.3 | +2%)

Micro Normal and Micro Inverse Constants MML-A 3

Last Edited on 02-NOV-2014,09:43

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

Caliper Calibration MPD-C.A 216

Base Calibration on 24-OCT-2014 11:23
Field Calibration on 02-NOV-2014 09:42

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18960	3.99
2	28807	5.98
3	38852	7.97
4	48518	9.86
5	59792	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.95	7.97

Caliper Calibration Tolerances MPD-C.A 216

Short Arm Field Cal. 7.95 in (7.77 | 7.97 | 8.17)

DOWNHOLE EQUIPMENT

C:\Minimus 14.03.4558\Log Data\Shakespeare Bahm 2-21\Shakespeare Bahm 2-21 Main.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 234 LG: 1.58 ft WT: 15.4 lb OD: 2.240 in

Compact Comms Gamma
MCG-D.K 469 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 Neutron
MDN-A.B 152 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

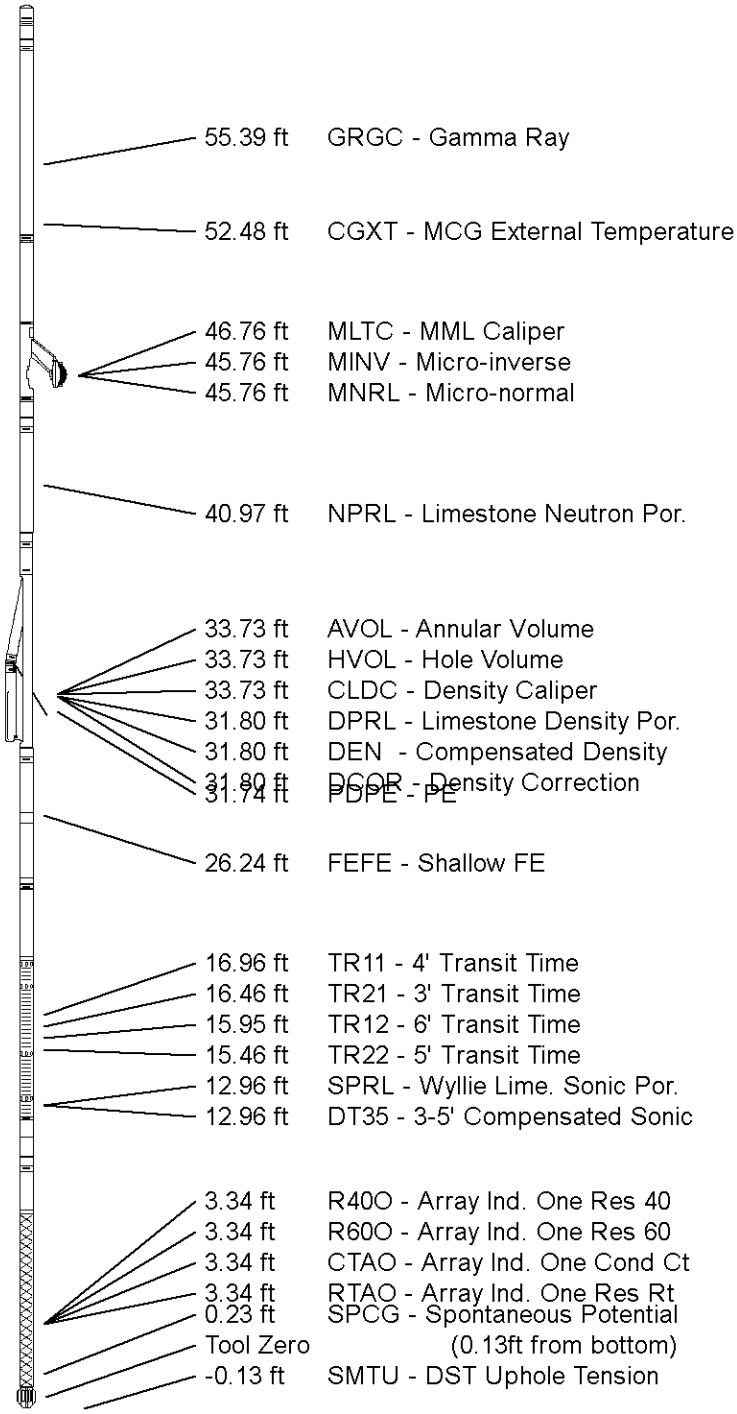
Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic
MSS-A.A 126 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 62.25 ft Weight: 471.8 lb



COMPANY	SHAKESPEARE OIL CO., INC.
WELL	BAHM 2-21
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3145.00	feet	First Reading	4844.24	feet
Elevation Drill Floor	3143.00	feet	Depth Driller	4890.00	feet
Elevation Ground Level	3135.00	feet	Depth Logger	4890.00	feet

Weatherford®

MICRORESISTIVITY LOG