MICRORESISTIVITY LOG

COMPANY	DEUTSCH OIL COMPANY
WELL	BAUMAN #7-4
FIELD	BAUMAN
PROVINCE/COUNTY	PRATT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1656' FNL & 1626' FEL

SEC	TWP	RGE	Other Services
4	26S	11W	

Latitude
Longitude
API Number 15-151-22441

Permanent Datum GL, Elevation 1829 feet
Log Measured From KB
Drilling Measured From KB @ 7 FEET

Elevations:	feet
KB	1836.00
DF	1834.00
GL	1829.00

Date	24-OCT-2014			
Run Number	ONE			
Service Order	7606-101310475			
Depth Driller	4175.00	feet		
Depth Logger	4172.00	feet		
First Reading	4138.76	feet		
Last Reading	3300.00	feet		
Casing Driller	264.00	feet		
Casing Logger	262.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEM			
Density / Viscosity	8.80	lb/USg	53.00 CP	
PH / Fluid Loss	10.00		9.60 ml/30Min	
Sample Source	MUD PIT			
Rm @ Measured Temp	0.31 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.25 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.37 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.21 @114.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	114.00	deg F		
Equipment / Base	13057		LIB	
Recorded By	BEN WELDIN			
Witnessed By	KENT DEUTSCH			
JOB #	LB14-331			

BOREHOLE RECORD

Last Edited: 24-OCT-2014 11:49

Bit Size inches	Depth From feet	Depth To feet
7.875	262.00	4172.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	262.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 14.03.4558
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - 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: 2130 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 1490 CU. FT.

- RIG: PICKRELL DRILLING RIG #10

- ENGINEER: BEN WELDIN

- OPERATOR: KEN RINEHART
JOHN DUNLAP

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 24-OCT-2014 14:00
Filename: C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Main.dta
Recorded on 24-OCT-2014 11:09
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
– → | 20 | ← +

MMR Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

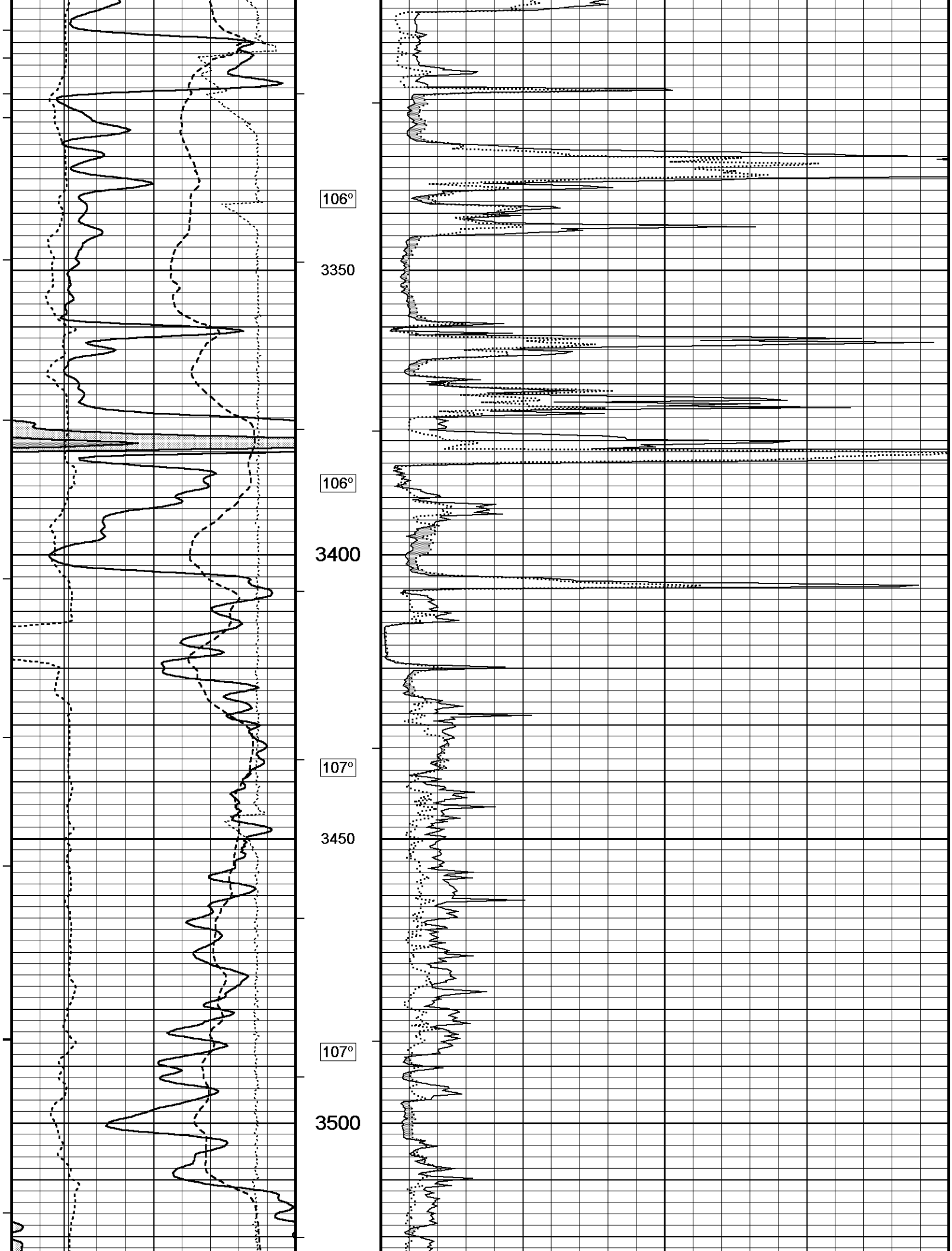
Annular Integral every 10 cu ft

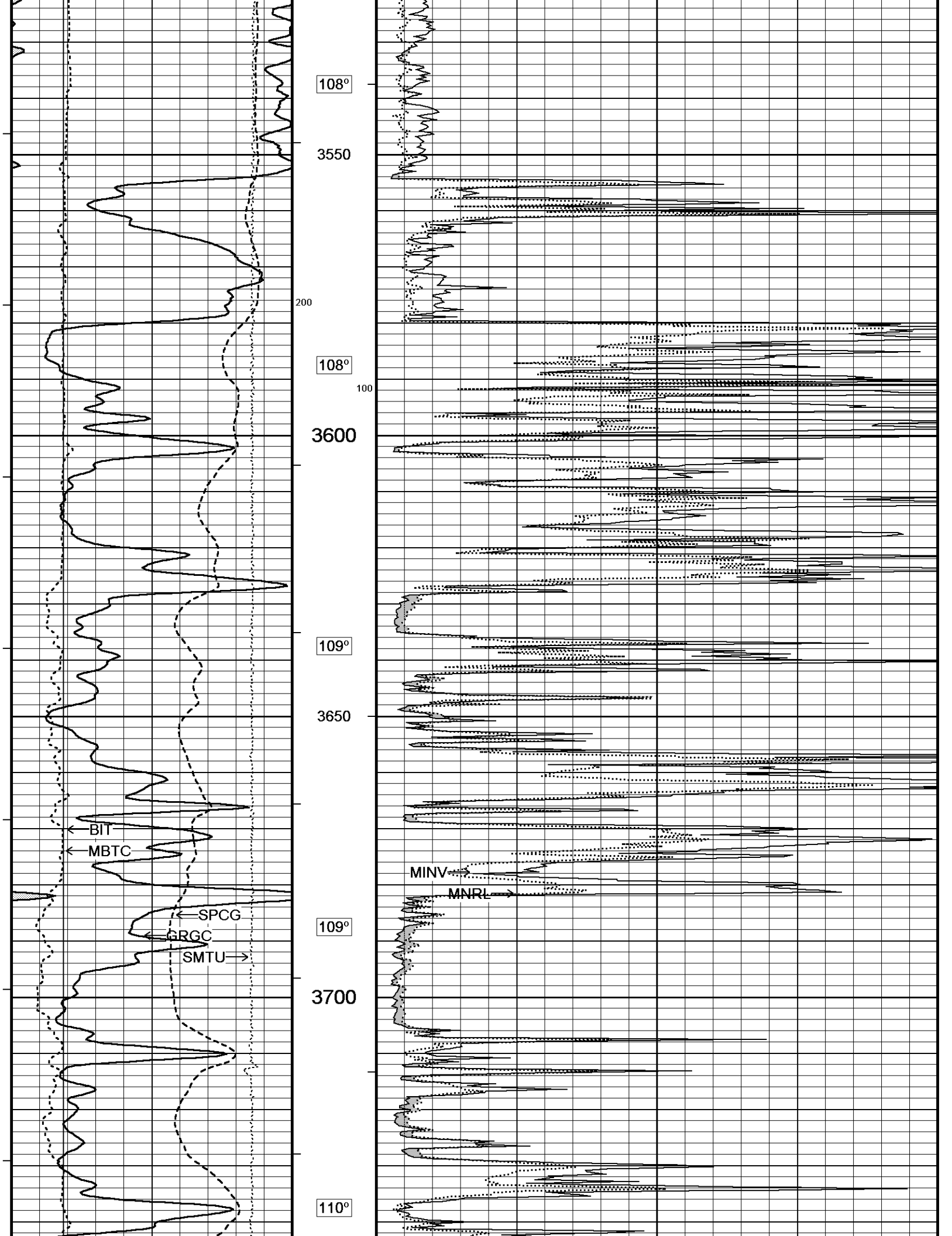
Replay Scale 1:240

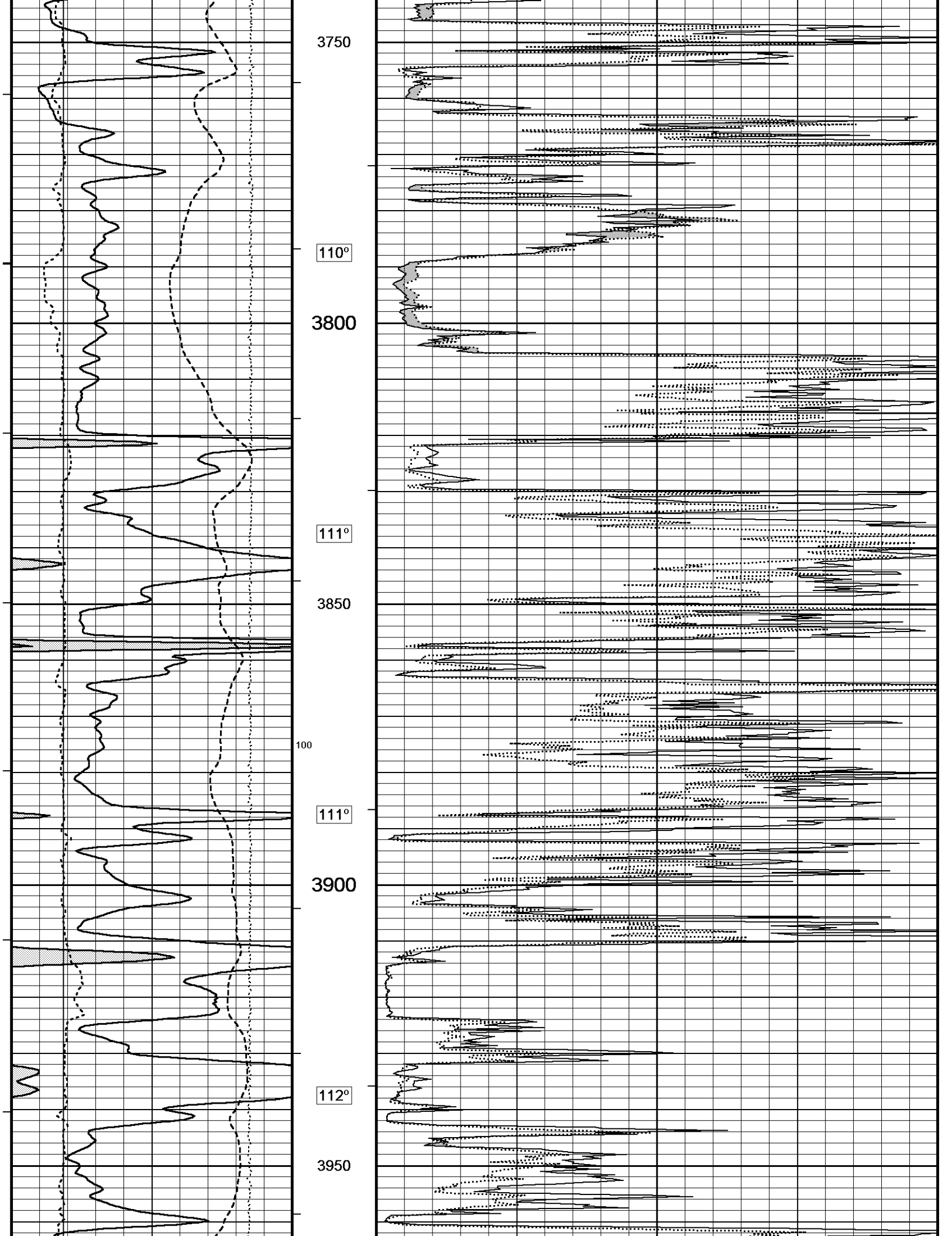
3300

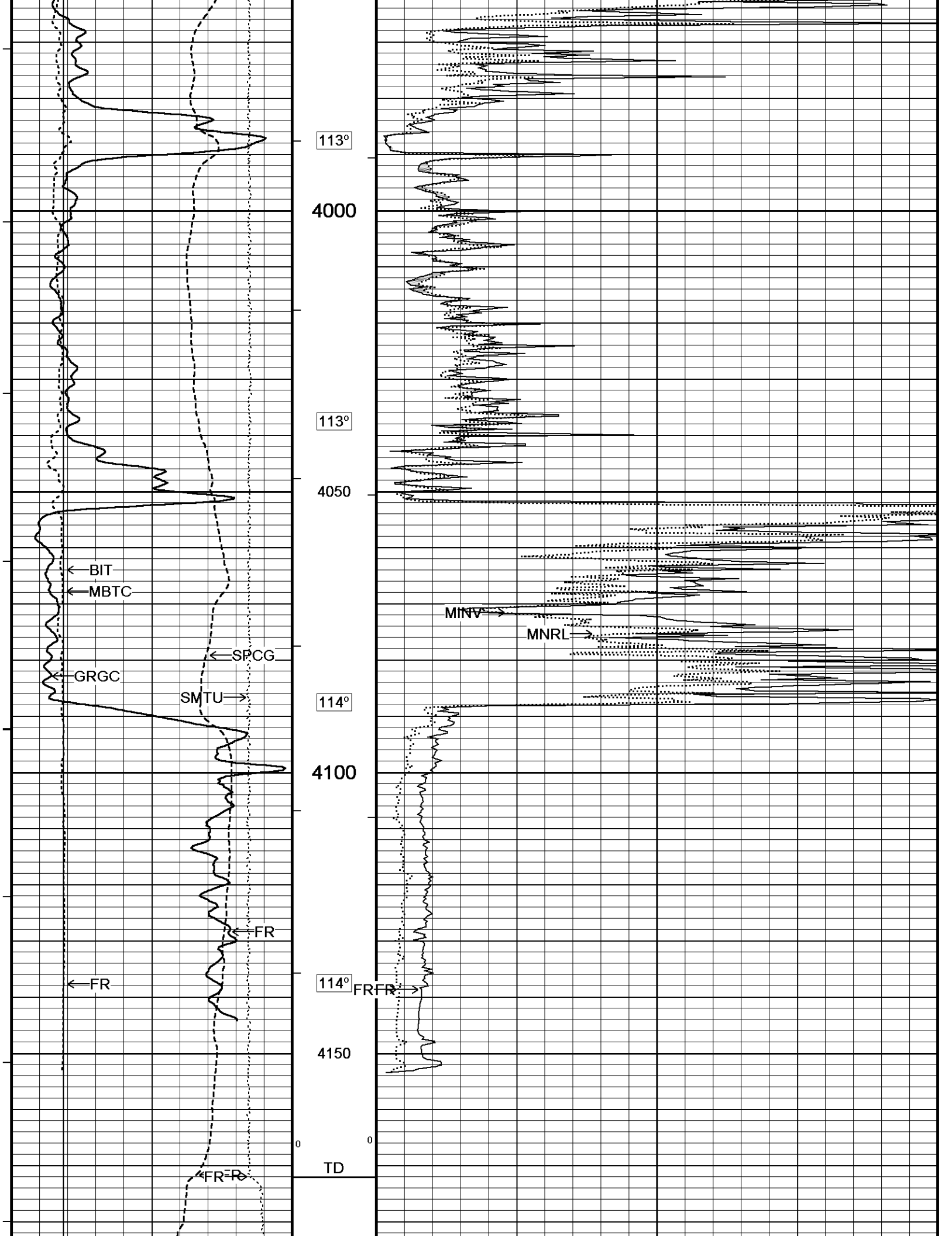
MMR MicroLog Normal
ohm metres
0 10 20 30 40

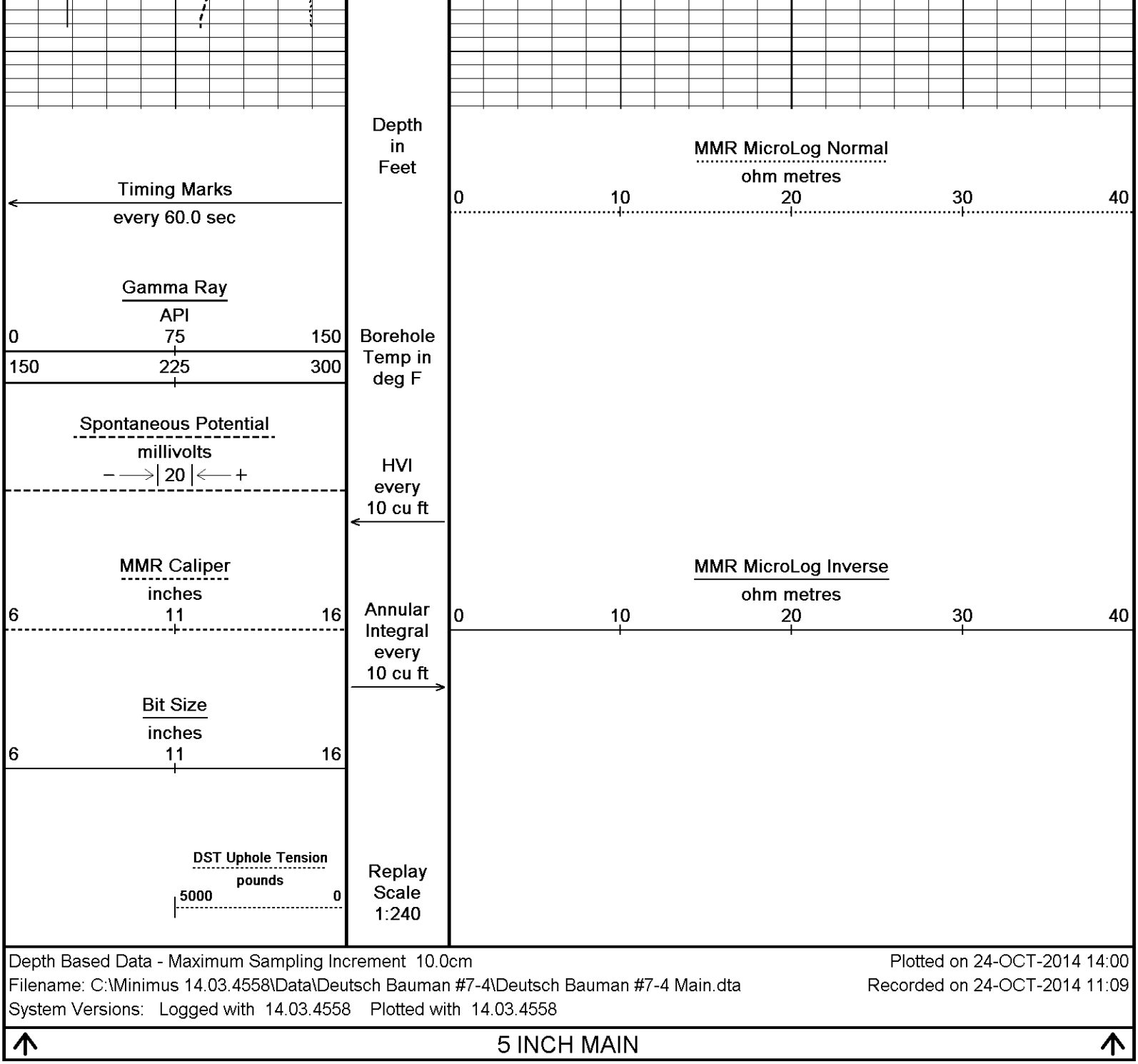
MMR MicroLog Inverse
ohm metres
0 10 20 30 40


106°
3350
106°
3400
107°
3450
107°
3500


108°
3550
200
108°
100
3600
109°
3650
BIT
MBTC
MINV
MNRL
SPCG
GRGC
SMTU
109°
3700
110°


3750
110°
3800
111°
3850
100
111°
3900
112°
3950


113°
4000
113°
4050
BIT
MBTC
MINV
MNRL
SPCG
GRGC
SMTU
114°
4100
FR
FR
114°
FR FR
4150
0
0
TD
FR FR

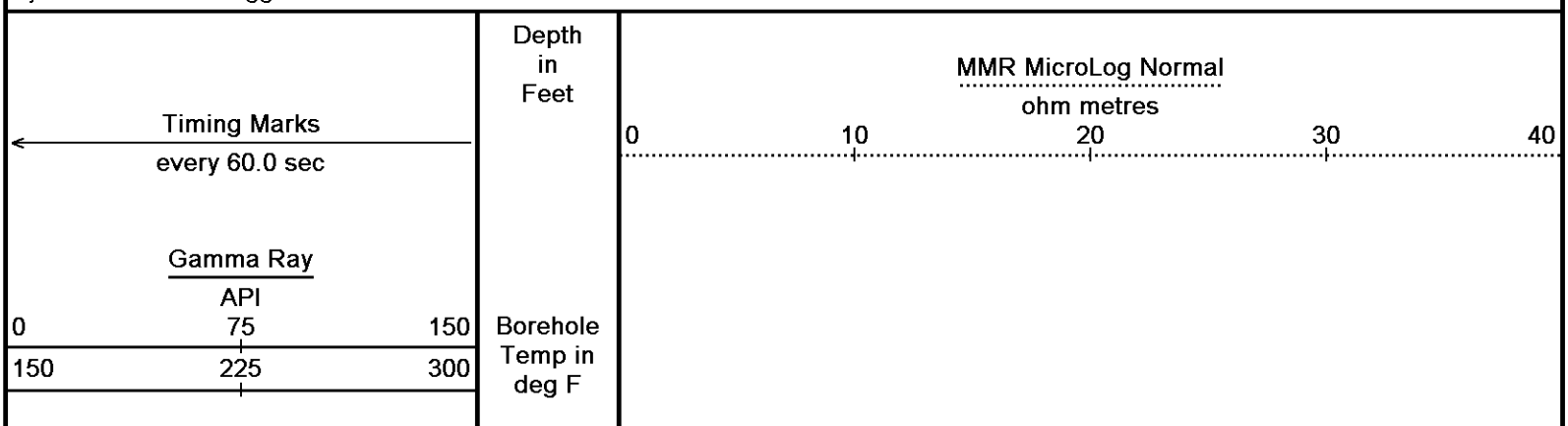


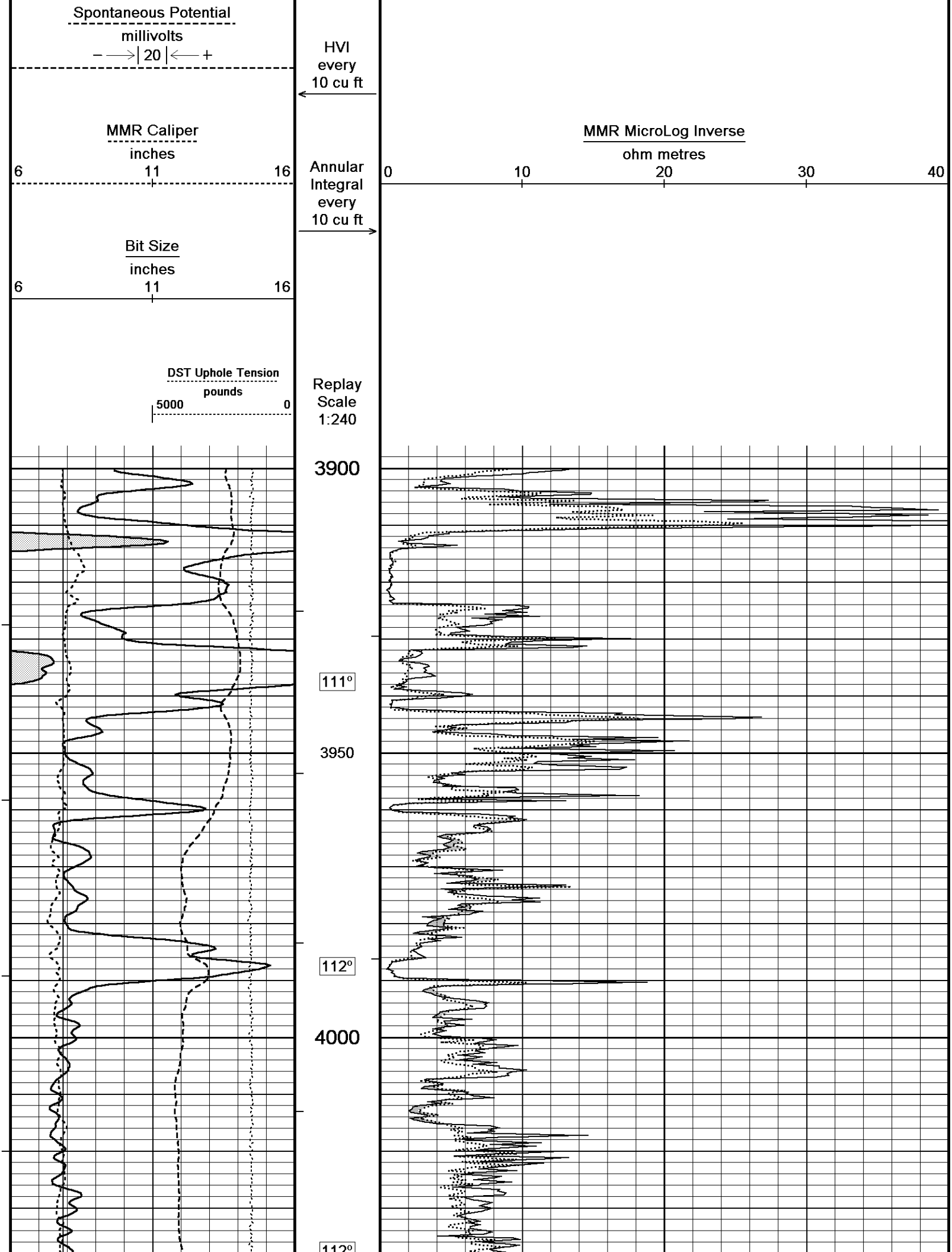
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 24-OCT-2014 14:00
Filename: C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Main.dta
Recorded on 24-OCT-2014 11:09
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

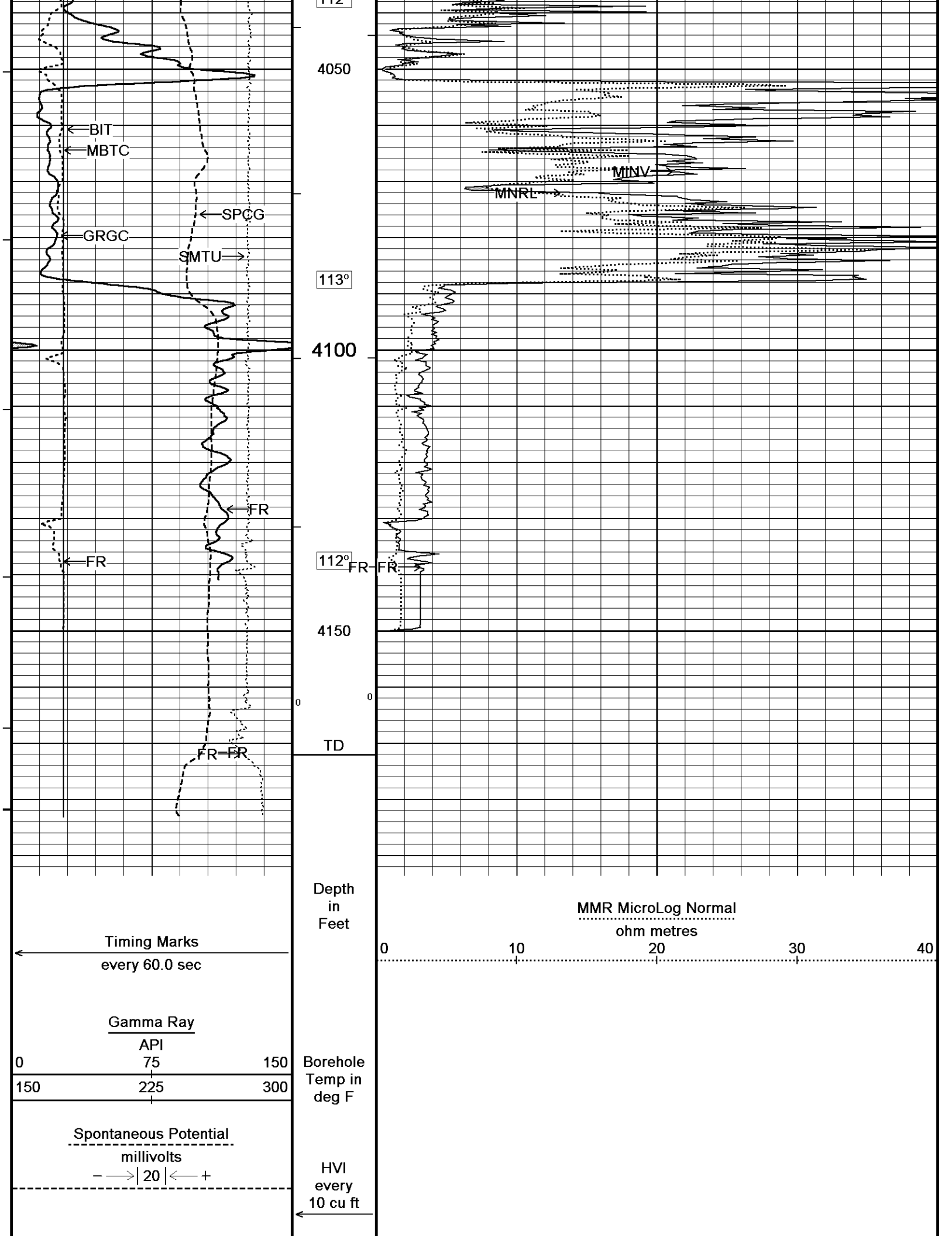
5 INCH MAIN

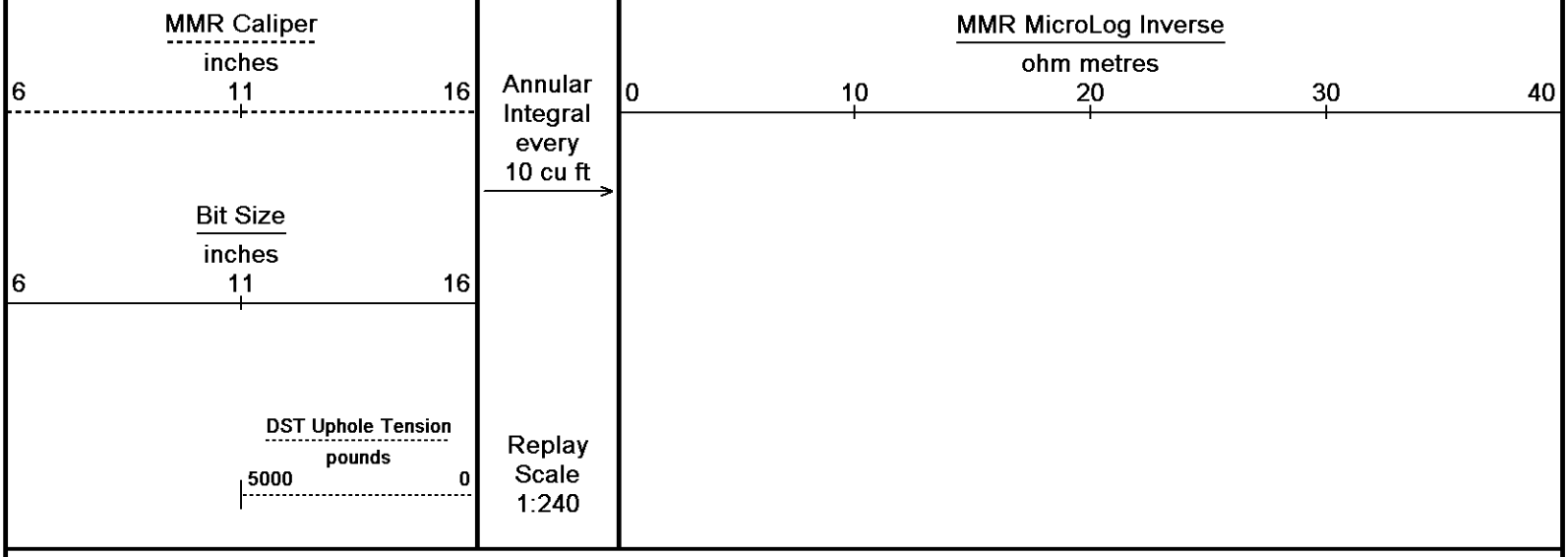
REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 24-OCT-2014 14:00
Filename: C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Repeat.dta
Recorded on 24-OCT-2014 10:48
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558




Spontaneous Potential
millivolts
− 20 +
HVI
every
10 cu ft
MMR Caliper
inches
6
11
16
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
Annular
Integral
every
10 cu ft
Bit Size
inches
6
11
16
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
3900
111°
3950
112°
4000
112°


112
4050
BIT
MBTC
SPCG
GRGC
SMTU
MINV
MNRL
113°
4100
FR
FR
112°
FR–FR
4150
0
0
TD
FR–FR
Depth
in
Feet
MMR MicroLog Normal
ohm metres
0
10
20
30
40
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
Borehole
Temp in
deg F
150
225
300
Spontaneous Potential
millivolts
– 20 +
HVI
every
10 cu ft



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 24-OCT-2014 14:00
Filename: C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Repeat.dta — Recorded on 24-OCT-2014 10:48
System Versions: Logged with 14.03.4558 Plotted with 14.03.4558

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Main.dta

General Constants All 000

Last Edited on 24-OCT-2014,10:14

General Parameters		
Mud Resistivity	0.310	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	

High Resolution Temperature Calibration MCG-C 84

Field Calibration on 22-JUL-2014,11:40

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

High Resolution Temperature Constants MCG-C 84

Last Edited on 09-SEP-2014,02:23

Pre-filter Length	11

Gamma Calibration MCG-C 84

Field Calibration on 23-OCT-2014 23:11

	Measured	Calibrated (API)
Background	69	48
Calibrator (Gross)	1117	773
Calibrator (Net)	1048	725

Gamma Calibration Tolerances MCG-C 84

Ratio 1.445 (1.40 – 1.475 – 1.55) Counts/API

Gamma Constants MCG-C 84

Last Edited on 24-OCT-2014,04:11

Gamma Calibrator Number	GRC038	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.05	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 08-OCT-2014 09:22
Field Check on 23-OCT-2014 22:53

Base Calibration

Channel	Measured Resistor 1	Measured Resistor 2	Calibrated (ohm-m) Resistor 1	Calibrated (ohm-m) Resistor 2
Micro Normal	10.2	49.7	5.1	25.6
Micro Inverse	9.9	49.4	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	94.0	94.0
Micro Inverse	62.4	62.4

Micro Normal & Micro Inverse Calibration Tolerance MMR-A 11

Micro Normal Res. 1 10.2 ohm (-5% 10.0 +5%)
Micro Normal Res. 2 49.7 ohm (-5% 50.0 +5%)
Micro Inverse Res. 1 9.9 ohm (-5% 10.0 +5%)
Micro Inverse Res. 2 49.4 ohm (-5% 50.0 +5%)

Micro Normal Base Check 94.0 ohm-m (-2% 93.54 +2%)
Micro Inverse Base Check 62.4 ohm-m (-2% 62.32 +2%)

Micro Normal Field Check 94.0 ohm-m (-2% 94.0 +2%)
Micro Inverse Field Check 62.4 ohm-m (-2% 62.4 +2%)

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 10-JUL-2014,16:35

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

Caliper Calibration MMR-A 11

Base Calibration on 08-OCT-2014 09:14
Field Calibration on 23-OCT-2014 22:54

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14178	5.98
2	17396	7.97
3	20642	9.86
4	24512	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.00	7.97

Caliper Calibration Tolerances MMR-A 11

Short Arm Field Cal. 8.00 in (7.77 7.97 8.17)

Caliper Calibration MPD-D.A 482

Base Calibration on 14-OCT-2014 00:28
Field Calibration on 23-OCT-2014 22:56

Base Calibration

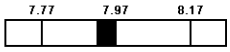
Reading No	Measured	Calibrator Size (in)
1	15681	3.99
2	25747	5.98
3	35898	7.97
4	45735	9.86

5	56738	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.91	7.97

Caliper Calibration Tolerances MPD-D.A 482

Short Arm Field Cal. 7.91 

in

DOWNHOLE EQUIPMENT

C:\Minimus 14.03.4558\Data\Deutsch Bauman #7-4\Deutsch Bauman #7-4 Main.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 84 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

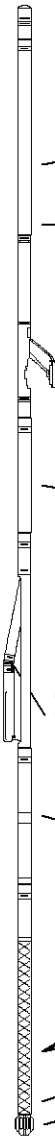
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-D.A 482 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 50.36 ft Weight: 399.0 lb



43.50 ft	GRGC - Gamma Ray
40.59 ft	CGXT - MCG External Temperature
34.24 ft	MBTC - MMR Caliper
33.24 ft	MINV - MMR MicroLog Inverse
33.24 ft	MNRL - MMR MicroLog Normal
28.45 ft	NPRL - Limestone Neutron Por.
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
21.21 ft	CLDC - Density Caliper
19.28 ft	DEN - Compensated Density
19.28 ft	DCOR - Density Correction
19.28 ft	DPRL - Limestone Density Por.
19.22 ft	PDPE - PE
13.72 ft	FEFE - Shallow FE
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	RTAO - Array Ind. One Res Rt
3.34 ft	R60O - Array Ind. One Res 60
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension

COMPANY	DEUTSCH OIL COMPANY
WELL	BAUMAN #7-4
FIELD	BAUMAN
PROVINCE/COUNTY	PRATT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1836.00	feet	First Reading	4138.76	feet
Elevation Drill Floor	1834.00	feet	Depth Driller	4175.00	feet
Elevation Ground Level	1829.00	feet	Depth Logger	4172.00	feet

Weatherford®

MICRORESISTIVITY LOG