MICRORESISTIVITY LOG

COMPANY	O'BRIEN RESOURCES, LLC
WELL	HARPER 35 #1
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1185' FNL & 875' FEL
PERMIT NUMBER	SE SW NE NE

SEC 35	TWP 16S	RGE 30W	Other Services
Latitude			MAI/MFE MPD/MDN
Longitude			
API Number	15-101-22516		

Permanent Datum GL, Elevation 2846 feet
Log Measured From KB
Drilling Measured From KB @ 8 FEET

Elevations:	feet
KB	2854.00
DF	2852.00
GL	2846.00

Date	18-AUG-2014			
Run Number	ONE			
Service Order	4558-95560163			
Depth Driller	4675.00	feet		
Depth Logger	4678.00	feet		
First Reading	4645.00	feet		
Last Reading	3700.00	feet		
Casing Driller	258.00	feet		
Casing Logger	263.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.20 lb/USg		39.00 CP	
PH / Fluid Loss	11.00		8.00 ml/30Min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	1.24 @ 90.0	ohm-m		
Rmf @ Measured Temp	0.99 @ 90.0	ohm-m		
Rmc @ Measured Temp	1.49 @ 90.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.97 @115.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	115.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	ADAM SILL			
Witnessed By	KURT TALBOTT			
JOB #	LB14-240			

BOREHOLE RECORD

Last Edited: 18-AUG-2014 08:43

Bit Size inches	Depth From feet	Depth To feet
7.875	258.00	4675.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	258.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
  - HARDWARE: DUAL BOWSPRING USED ON MDN.
  0.5 INCH STANDOFF USED ON MFE.
  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: 1991 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 3700 FEET: 268 CU.FT.
- RIG: LANDMARK #5

- RIG: LANDMARK #3.

- ENGINEER: A. SILL.

- OPERATOR: J. DUNLAP.

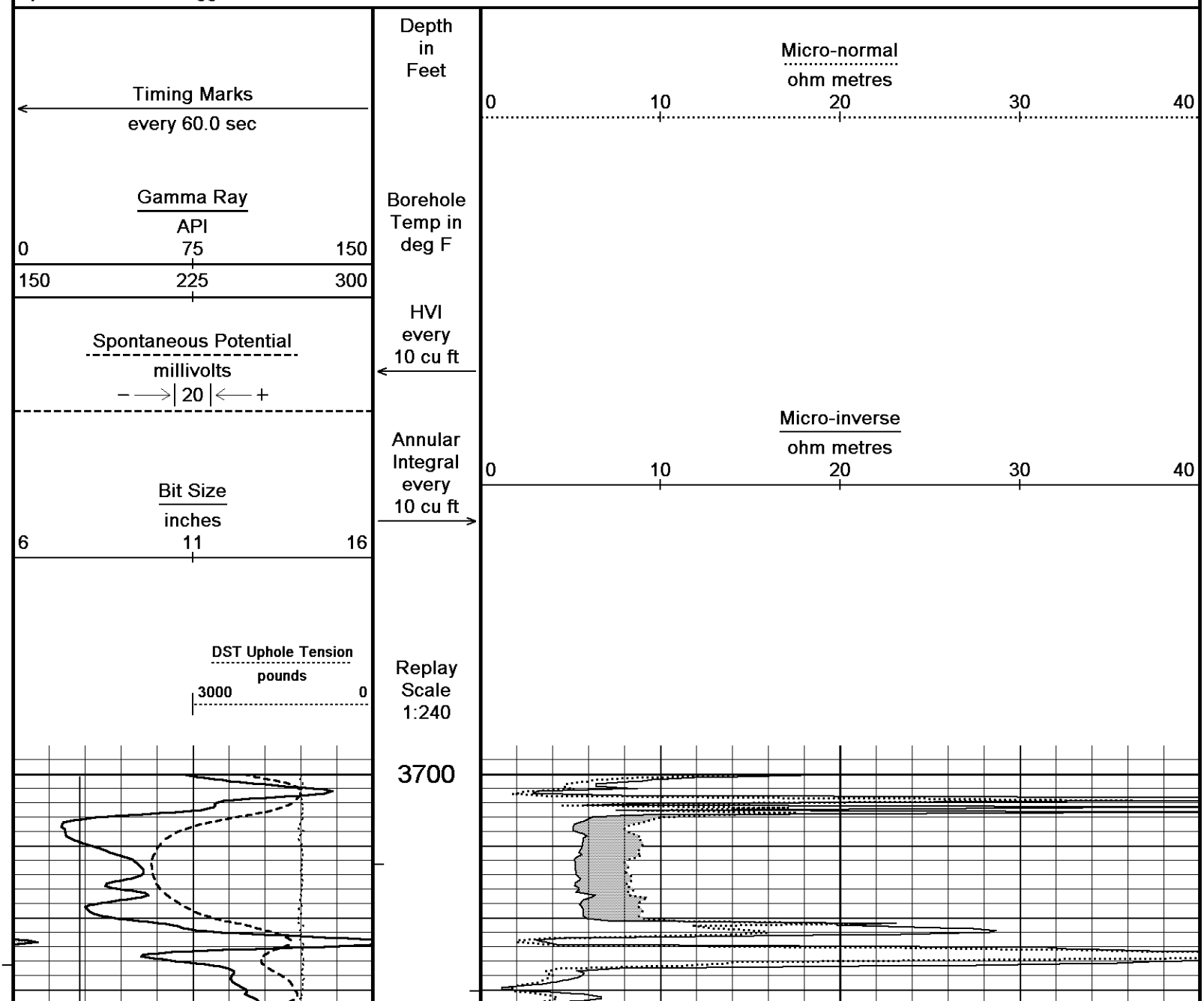
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

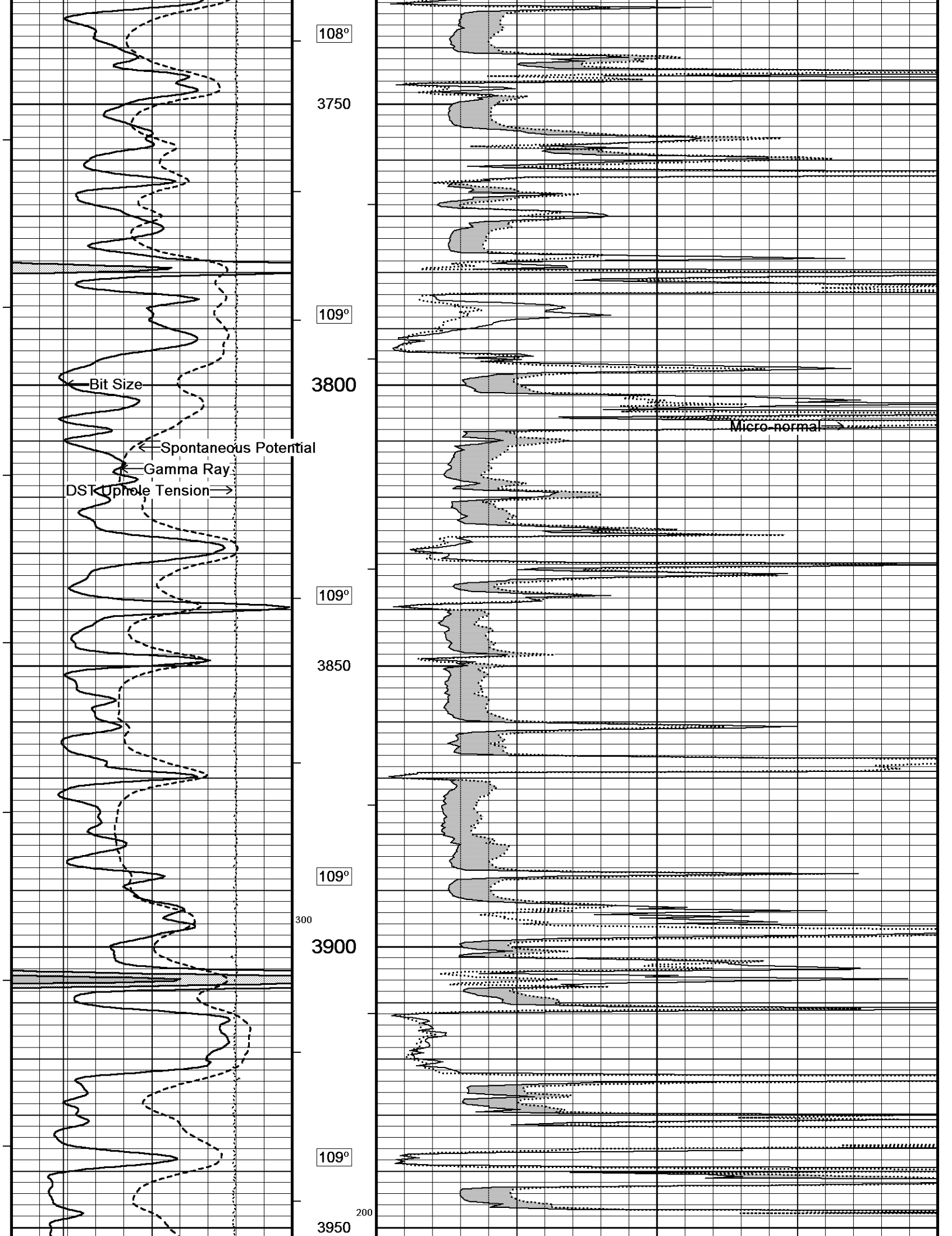
5 INCH MAIN

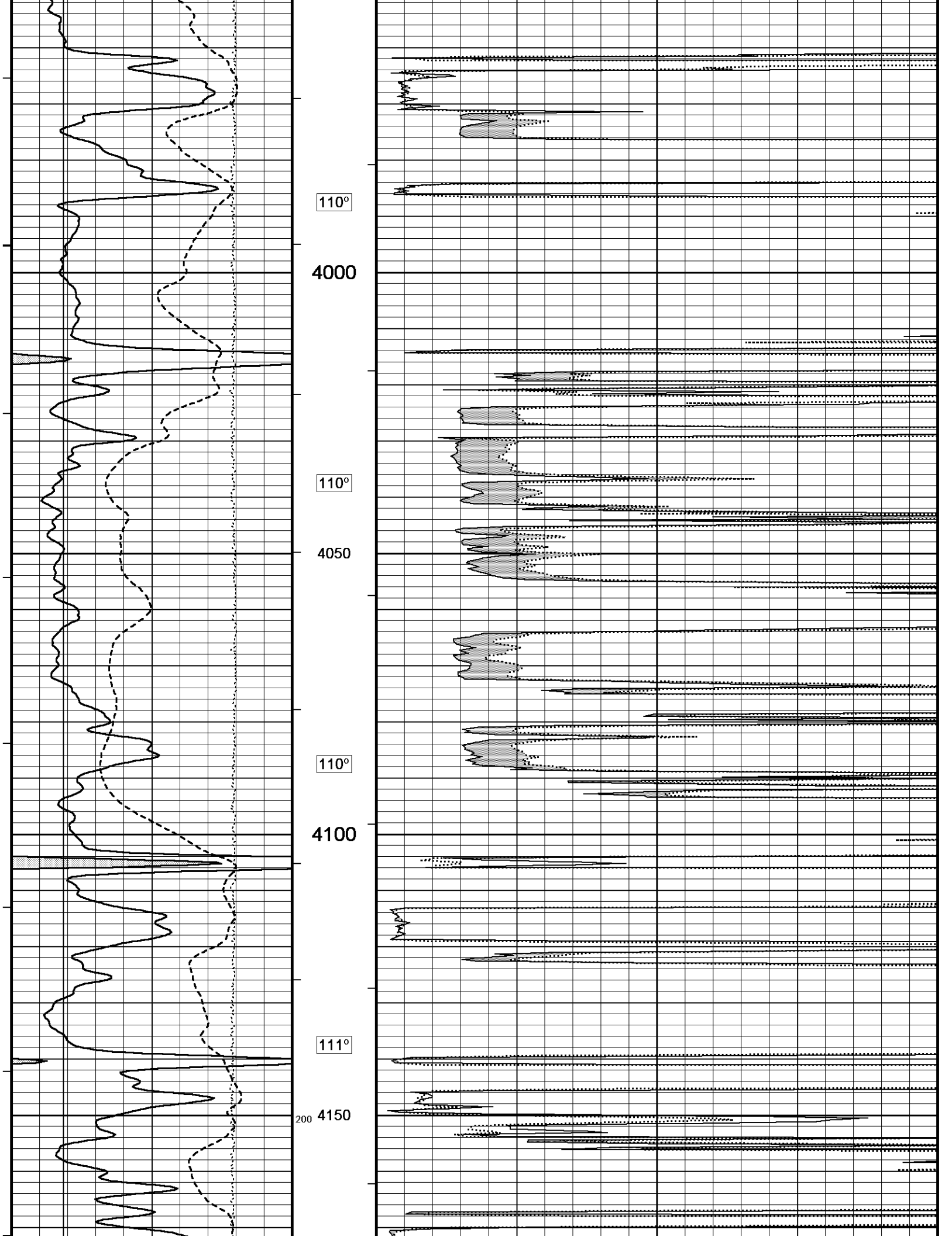
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 18-AUG-2014 14:53

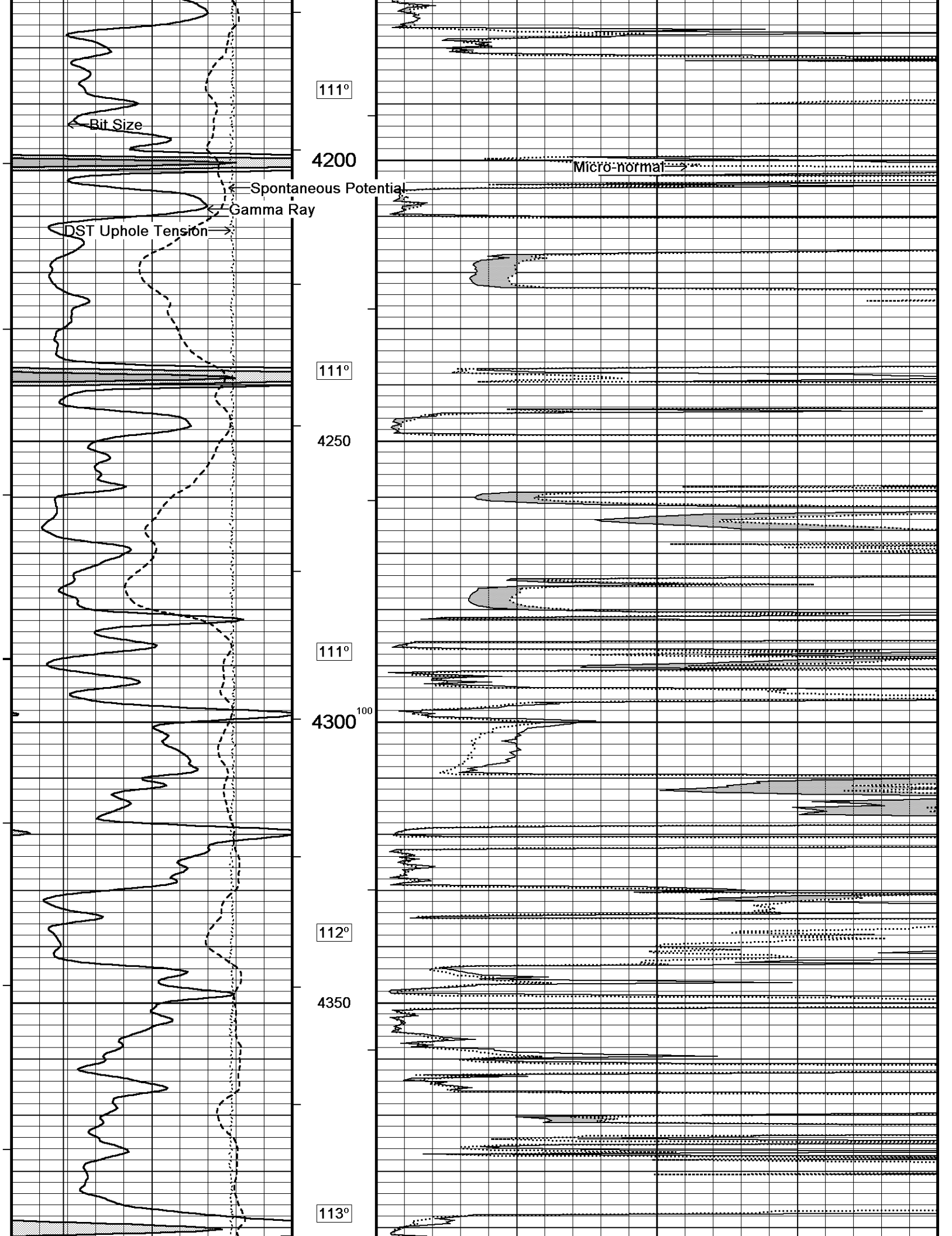
Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...\O'Brien (LA) Harper 35 #1_002.dta — Recorded on 18-AUG-2014 12:24

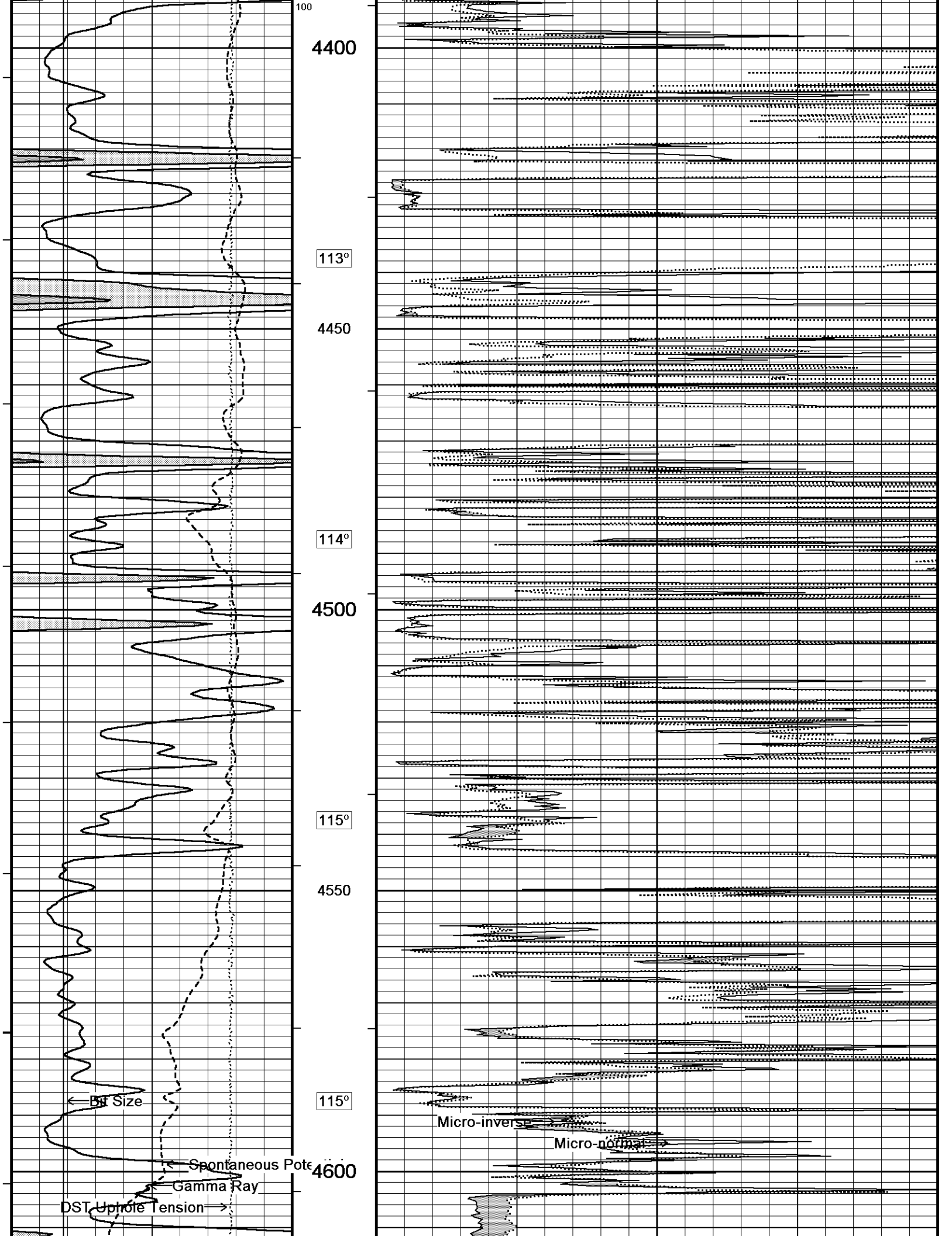
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

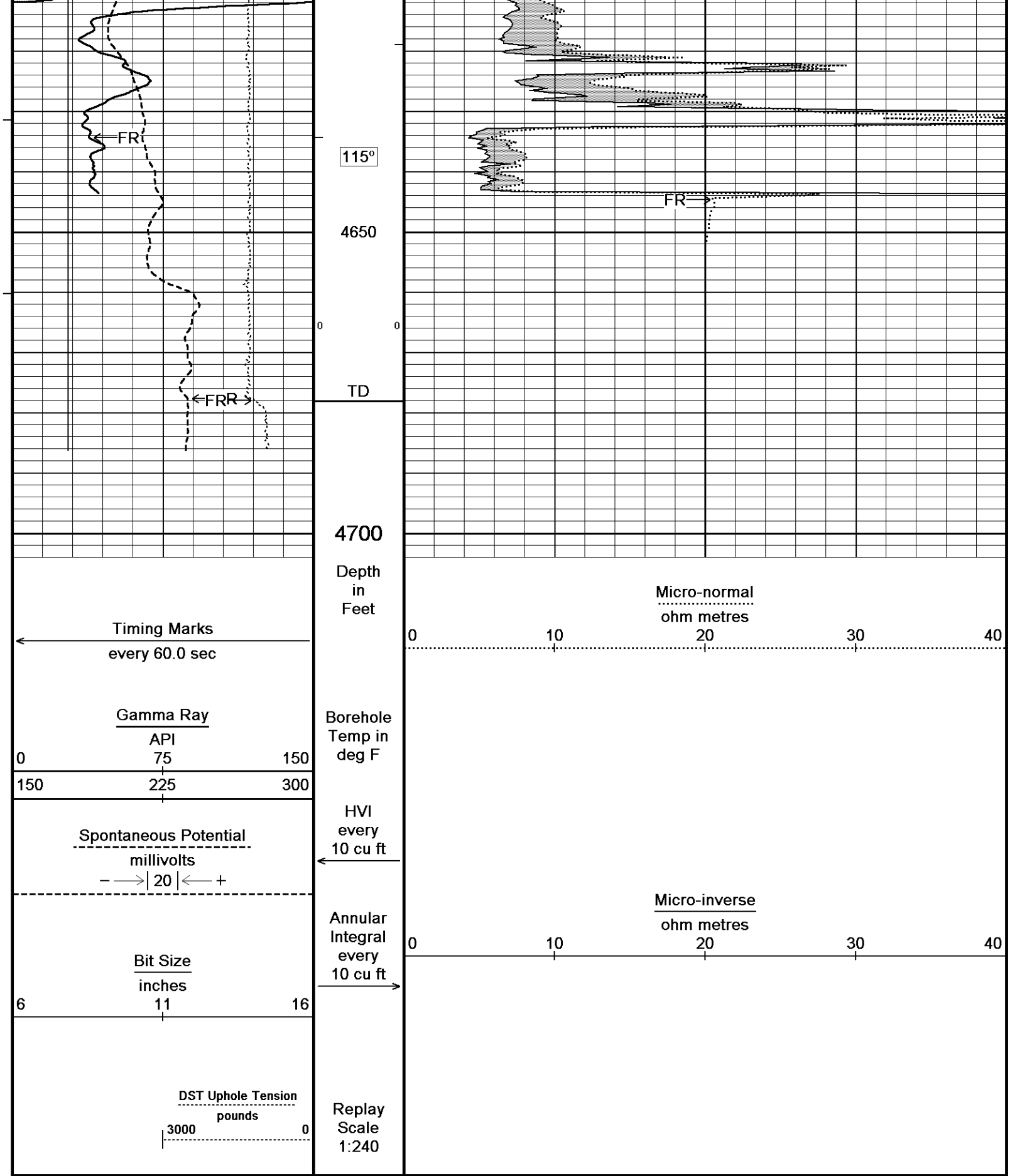



108°
3750
109°
Bit Size
3800
Micro-normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
109°
3850
109°
300
3900
109°
200
3950


110°
4000
110°
4050
110°
4100
111°
200
4150


111°
Bit Size
4200
Micro-normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
111°
4250
111°
4300
100
112°
4350
113°


100
4400
113°
4450
114°
4500
115°
4550
115°
4600
Bit Size
Spontaneous Pote
Gamma Ray
DST Uphole Tension
Micro-inverse
Micro-normal



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 18-AUG-2014 14:53
Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...\O'Brien (LA) Harper 35 #1_002.dta
Recorded on 18-AUG-2014 12:24
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 18-AUG-2014 14:53
Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...\O'Brien (LA) Harper 35 #1_001.dta
Recorded on 18-AUG-2014 12:04
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

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

DST Uphole Tension
pounds
3000 0

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

Micro-normal
ohm metres
0 10 20 30 40

Micro-inverse
ohm metres
0 10 20 30 40

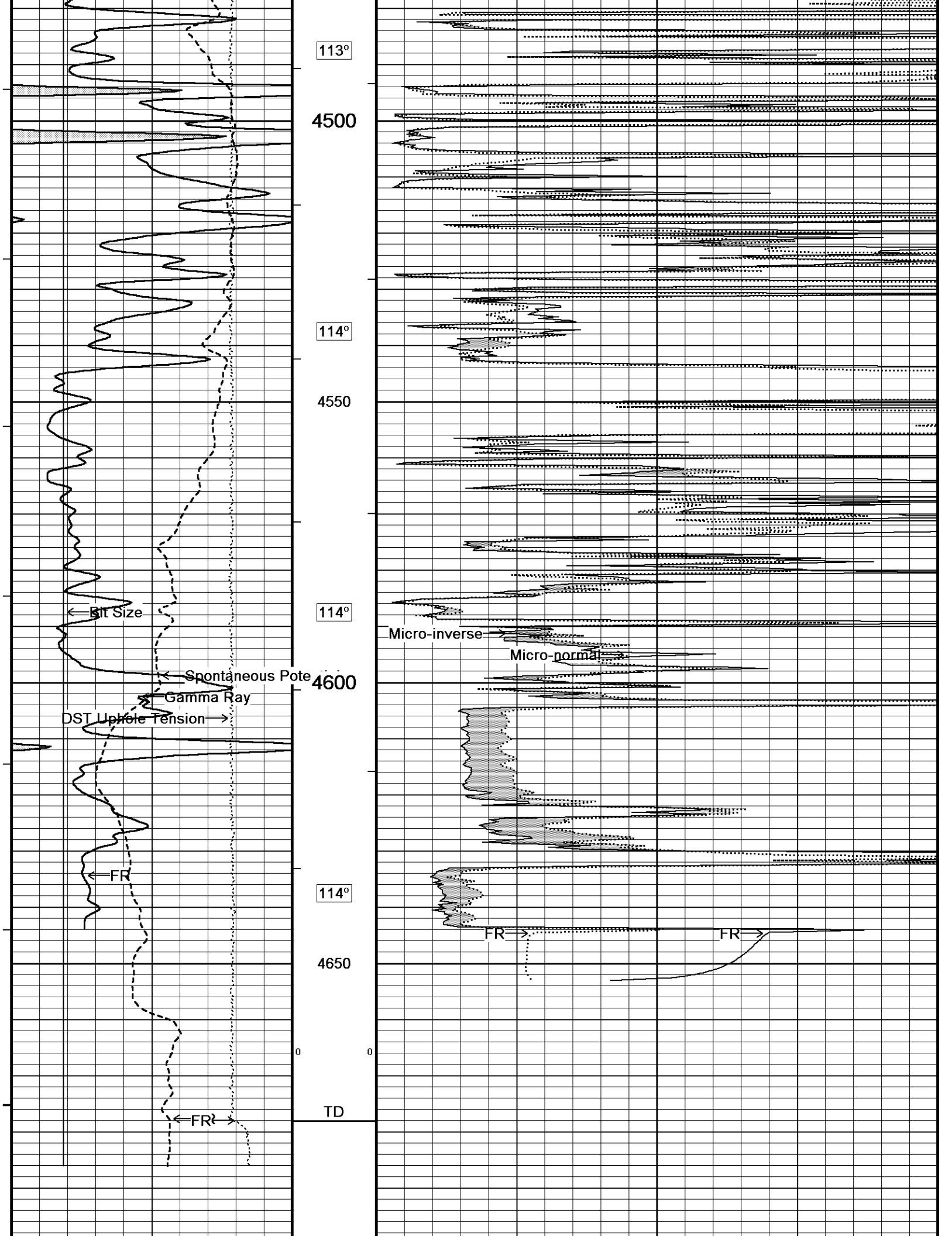
4376

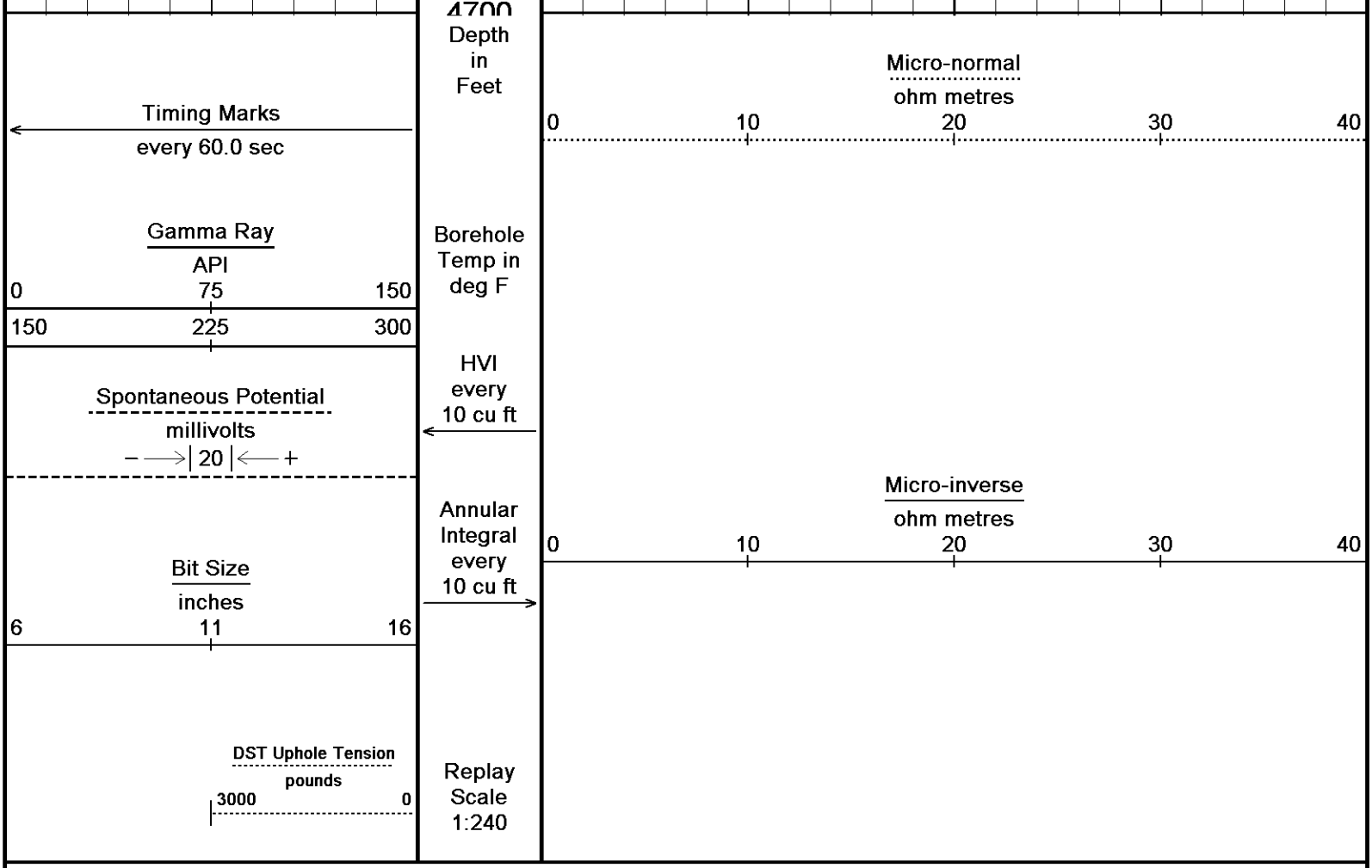
100

4400

112°

4450


113°
4500
114°
4550
114°
Bit Size
Micro-inverse
Micro-normal
Spontaneous Pote
4600
Gamma Ray
DST Uphole Tension
FR
114°
FR
FR
4650
0
0
TD
FR?



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 18-AUG-2014 14:53

Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...\O'Brien (LA) Harper 35 #1_001.dta — Recorded on 18-AUG-2014 12:04

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 35 #1\O'Brien (LA) Harper 35 #1_001.dta

General Constants All 000

Last Edited on 18-AUG-2014,10:15

General Parameters		
Mud Resistivity	1.240	ohm-metres
Mud Resistivity Temperature	90.000	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	4.500	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	

Down-hole Tension Calibration SMS 0

Field Calibration on 13-AUG-2014 23:32

Reading No	Measured	Calibrated (lbs)
1	15257.38	0.00
2	16219.48	580.00

Gamma Calibration MCG-D.K 469

Field Calibration on 13-AUG-2014 17:12

	Measured	Calibrated (API)
Background	68	45
Calibrator (Gross)	1159	770
Calibrator (Net)	1091	725

Gamma Constants MCG-D.K 469

Last Edited on 17-AUG-2014,14:12

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	%

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

SP Calibration MCG-D.K 469

Field Calibration on 12-AUG-2014 12:46

	Measured	Calibrated (mV)
Reference 1	98.8	100.0
Reference 2	-100.9	-100.1

Caliper Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:44
Field Calibration on 12-AUG-2014 12:43

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13622	5.96
2	17090	7.98
3	20281	9.85
4	24282	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

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

Micro Normal and Micro Inverse Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:56
Field Check on 12-AUG-2014 12:41

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.2	49.8	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	93.8	93.8
Micro Inverse	62.3	62.3

Micro Normal and Micro Inverse Constants MMR-B.A 98

Last Edited on 05-AUG-2014,14:47

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-A.B 66

Base Calibration on 04-AUG-2014 14:27
Field Check on 13-AUG-2014 17:16

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3244	101	3714	110

Ratio	32.136	33.764

Field Calibrator at Base	Calibrated (cps)	
	1595	2291
Ratio	0.696	

Field Check	Calibrated (cps)	
	1606	2301
Ratio	0.698	

Neutron Constants MDN-A.B 66

Last Edited on 18-AUG-2014,08:56

Neutron Source Id	P0204NN	
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 135

Base Calibration on 05-AUG-2014 14:10
Field Check on 13-AUG-2014 16:34

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.8	126.8
Base Check		281.1
Field Check		281.3

FE Constants MFE-A.A 135

Last Edited on 18-AUG-2014,08:44

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

Induction Calibration MAI-A.A 111

Base Calibration on 26-MAY-2010,08:56
Field Check on 13-AUG-2014 16:30

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	17.6	473.6	9.3	966.2
2	6.4	385.9	7.6	821.4
3	3.2	264.0	5.2	566.0
4	2.1	135.5	2.6	279.2

Array Temperature 23.0 Deg F

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1	0.0	0.0	14.2	3871.7
2	0.0	0.0	30.2	3525.1
3	0.0	0.0	29.2	3018.5
4	0.0	0.0	19.1	2056.4
Deep			17.9	1960.2
Medium			43.0	3972.4

Shallow		45.0	5228.4	
Array Temperature	0.0		94.4	Deg F

Induction Constants MAI-A.A 111

Last Edited on 18-AUG-2014,08:44

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 111

Field Calibration on 20-JUN-2014,09:22

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

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length	11

Caliper Calibration MPD-B 103

Base Calibration on 05-AUG-2014 11:04
Field Calibration on 13-AUG-2014 16:57

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13922	3.99
2	22576	5.96
3	31328	7.98
4	39552	9.85
5	48880	11.92
6	N/A	N/A

Field Calibration

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

Photo Density Calibration MPD-B 103

Base Calibration on 05-AUG-2014 13:34
Field Check on 13-AUG-2014 16:49

Density Calibration

Base Calibration	Measured	Calibrated (sdu)

Base Calibration	Measured Near	Measured Far	Calibrated (Sdu) Near	Calibrated (Sdu) Far
Background	1057	1213		
Reference 1	58408	29979	59556	30836
Reference 2	24379	2613	24941	2541
Field Check at Base	1056.8	1212.9		
Field Check	1054.5	1207.8		

PE Calibration

Base Calibration	WS	WH	Ratio	Calibrated Ratio
Background	190	946		
Reference 1	23042	58225	0.399	0.371
Reference 2	6677	24258	0.278	0.272
Field Check at Base	189.6	945.6		
Field Check	190.9	944.4		

Density Constants MPD-B 103

Last Edited on 17-AUG-2014,14:11

Density Source Id	18235B	
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 (ft)
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

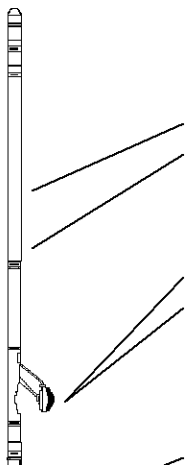
C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 35 #1\O'Brien (LA) Harper 35 #1_001.dta

CBH-C, Cablehead, 11 pin
CBH-CA 170 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

Compact Micro-Resistivity
MMR-B.A 98 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron



43.50 ft GRGC - Gamma Ray
40.59 ft CGXT - MCG External Temperature
33.24 ft MINV - MMR MicroLog Inverse
33.24 ft MNRL - MMR MicroLog Normal
28.45 ft NPRL - Limestone Neutron Por.

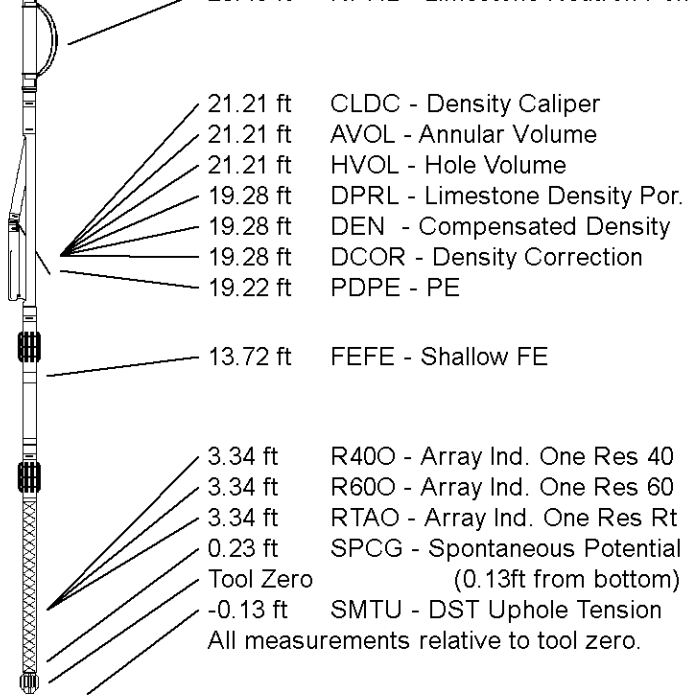
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-B 103 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 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: 51.18 ft Weight: 407.9 lb



21.21 ft	CLDC - Density Caliper
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
19.28 ft	DPRL - Limestone Density Por.
19.28 ft	DEN - Compensated Density
19.28 ft	DCOR - Density Correction
19.22 ft	PDPE - PE
13.72 ft	FEFE - Shallow FE
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	RTAO - Array Ind. One Res Rt
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension

All measurements relative to tool zero.

COMPANY	O'BRIEN RESOURCES, LLC
WELL	HARPER 35 #1
FIELD	WILDCAT
PROVINCE/COUNTY	LANE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2854.00	feet	First Reading	4645.00	feet
Elevation Drill Floor	2852.00	feet	Depth Driller	4675.00	feet
Elevation Ground Level	2846.00	feet	Depth Logger	4678.00	feet

Weatherford®

MICRORESISTIVITY LOG