



Weatherford

MICRORESISTIVITY LOG

COMPANY			SHAKESPEARE OIL COMPANY, INC.		
WELL			OTTELEY #6-14		
FIELD			CHALK BUTTES		
PROVINCE/COUNTY			LOGAN		
COUNTRY/STATE			U.S.A. / KANSAS		
LOCATION			1920' FNL & 1600' FEL		
SEC 14	TWP 14S	RGE 32W	Other Services		MAI/MFE
Latitude		MPD/MDN			
Longitude					
API Number		15-109-21305			
Permanent Datum GL, Elevation 2809 feet					
Log Measured From KB					Elevations:
Drilling Measured From KB @ 10 feet					KB 2819.00
Date	17-JUL-2014				DF 2817.00
Run Number	ONE				GL 2809.00
Service Order	7577-92797338				
Depth Driller	4530.00	feet			
Depth Logger	4527.00	feet			
First Reading	4494.00	feet			
Last Reading	3600.00	feet			
Casing Driller	264.00	feet			
Casing Logger	265.00	feet			
Bit Size	7.875	inches			
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.40 lb/USg	56.00	CP		
PH / Fluid Loss	9.50	11.20	ml/30Min		
Sample Source	MUD PIT				
Rm @ Measured Temp	0.72 @ 80.0	ohm-m			
Rmf @ Measured Temp	0.58 @ 80.0	ohm-m			
Rmc @ Measured Temp	0.86 @ 80.0	ohm-m			
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	0.53 @110.0	ohm-m			
Time Since Circulation	4 HOURS				
Max Recorded Temp	110.00	deg F			
Equipment / Base	13244	LIB			
Recorded By	JEFFREY RANDLE				ADAM SILL
Witnessed By	TIM PRIEST				
JOB #	LB14-213				

BOREHOLE RECORD					Last Edited: 17-JUL-2014 11:28
Bit Size inches		Depth From feet		Depth To feet	
7.875		264.00		4530.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	264.00	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: 2065 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3600 FEET: 190 CU.FT.
- RIG: H-D DRILLING #2

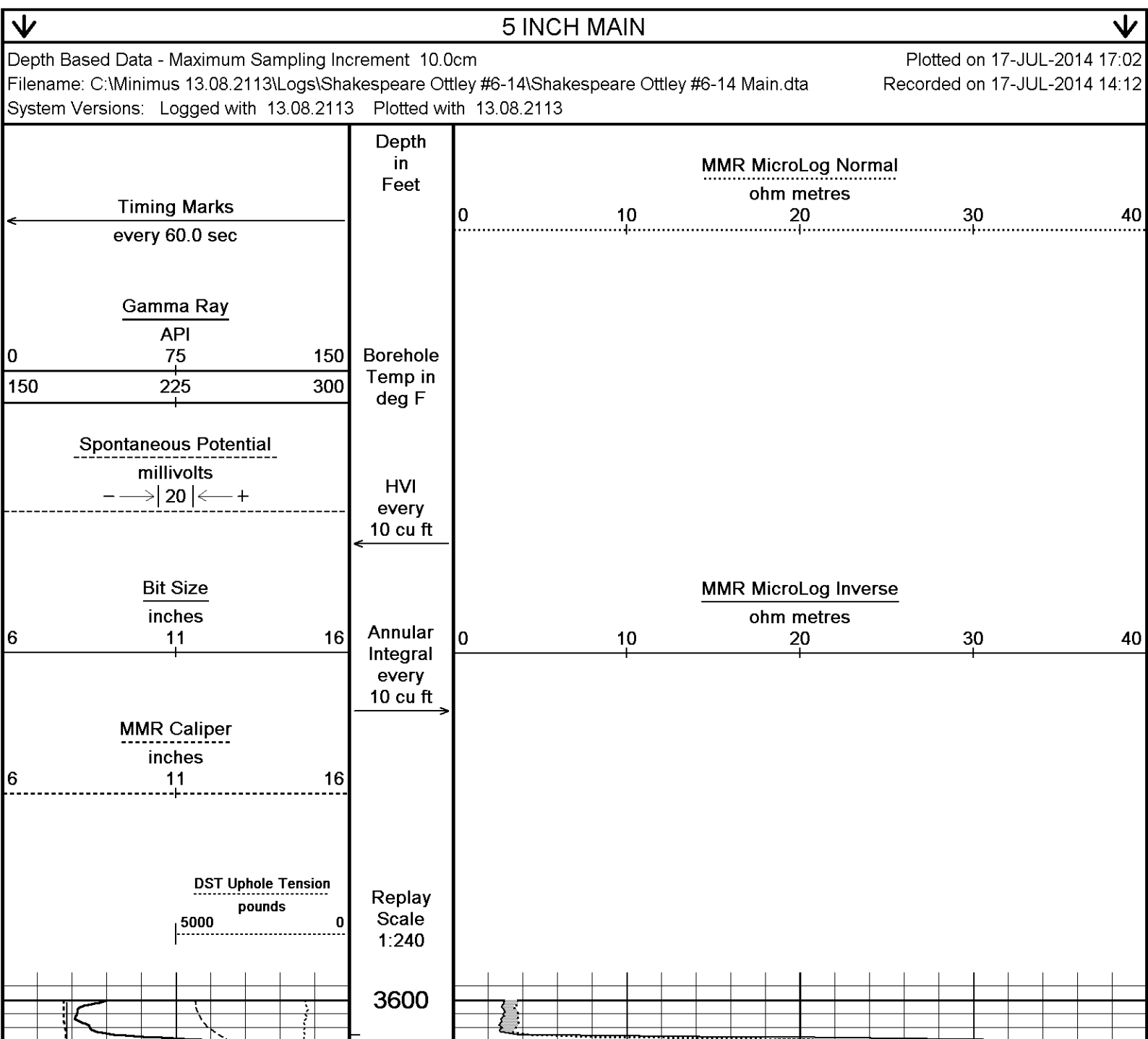
RIG: TFD DRILLING #2.

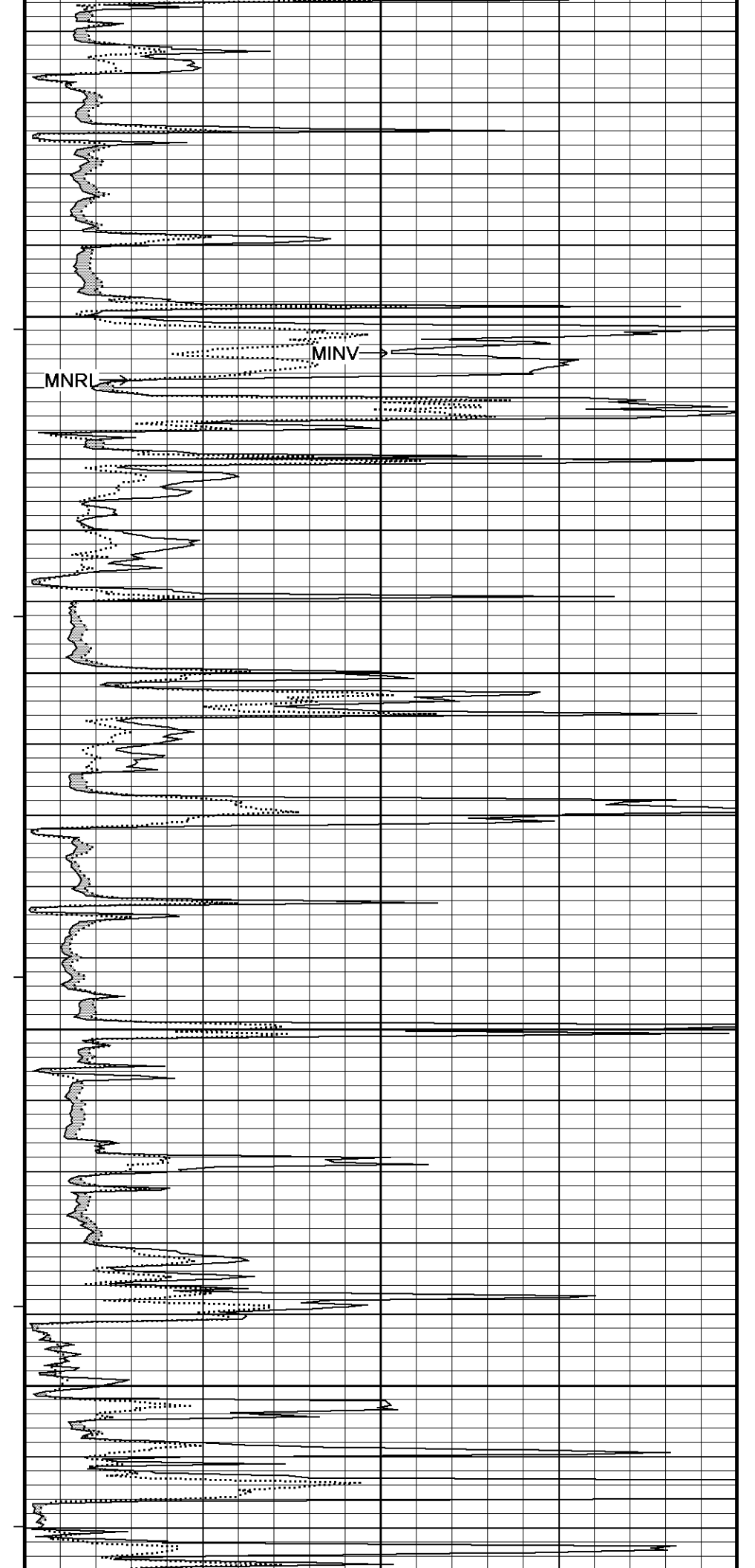
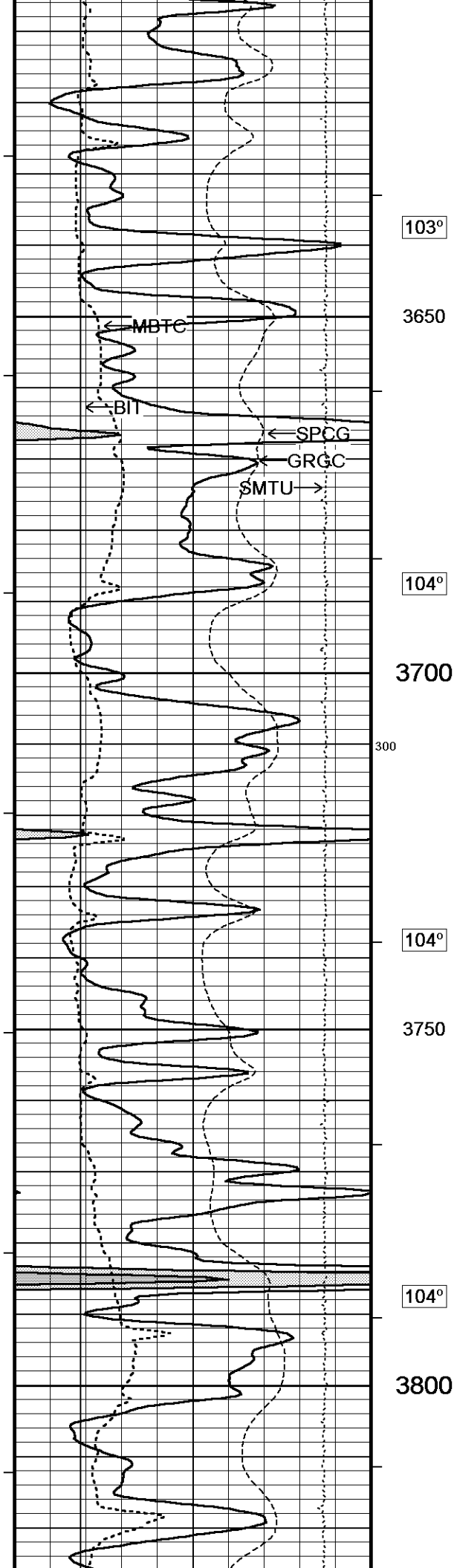
- ENGINEER: A. SILL.

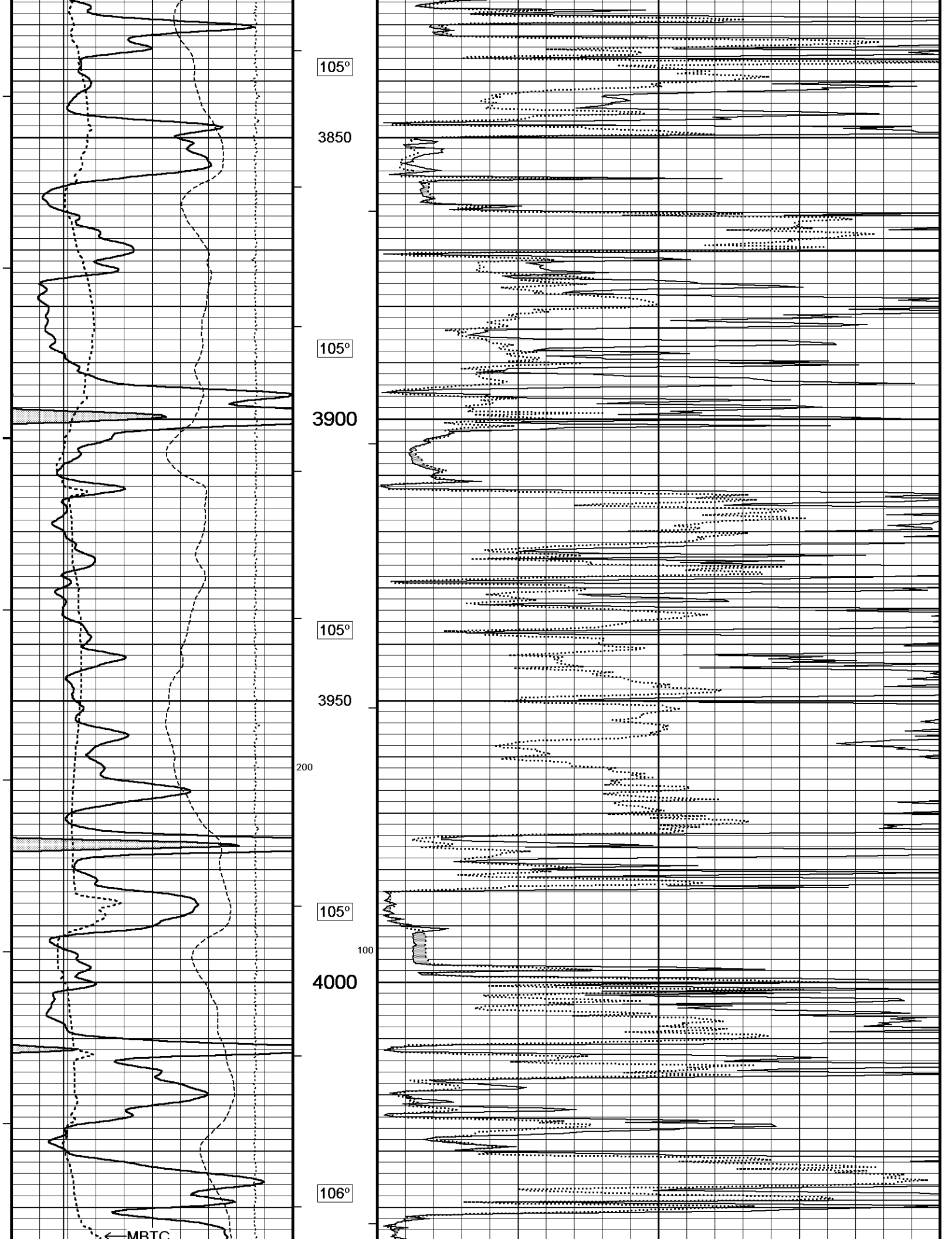
- OPERATOR: N. ADAME, J. DUNLAP.

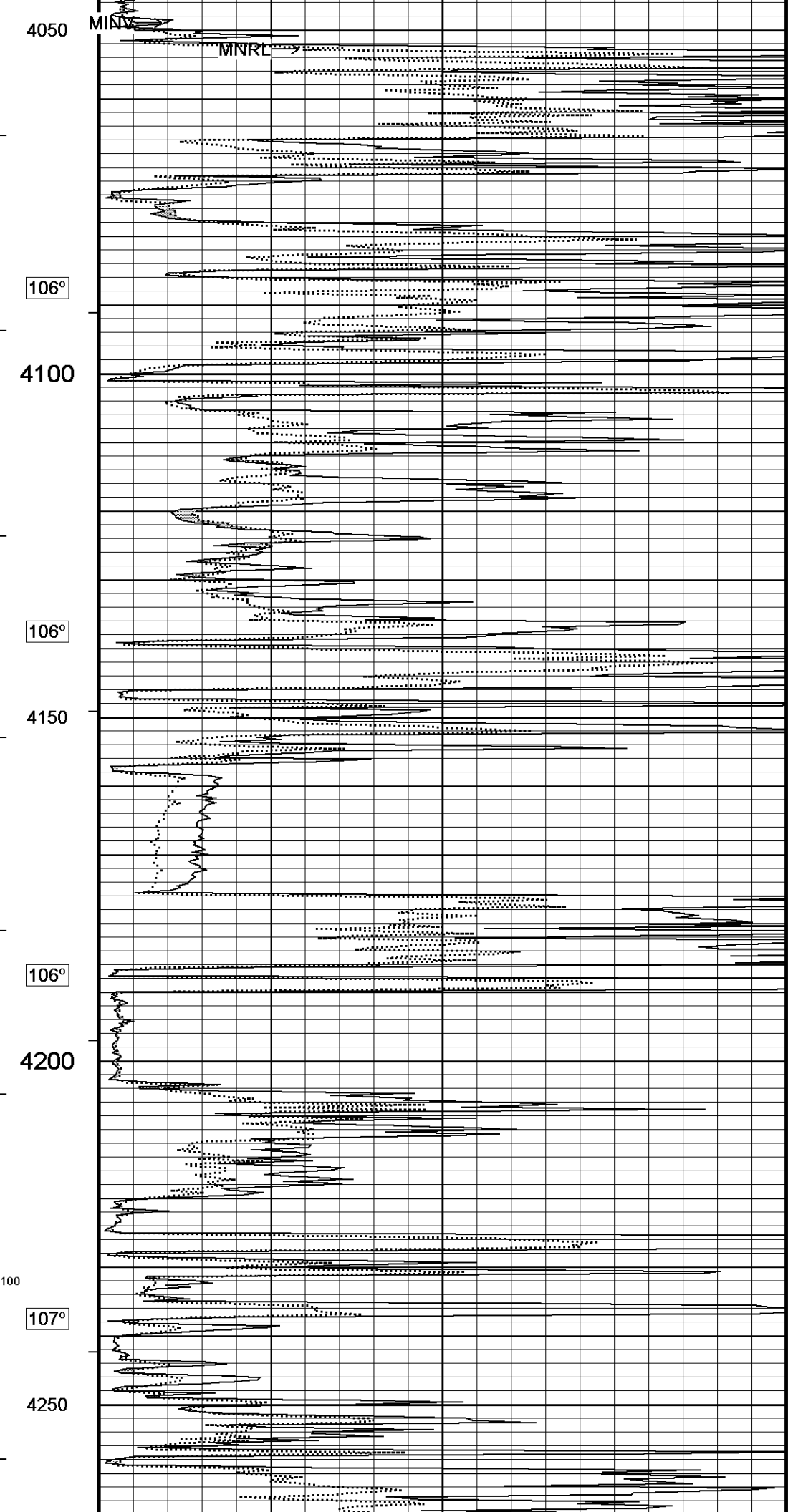
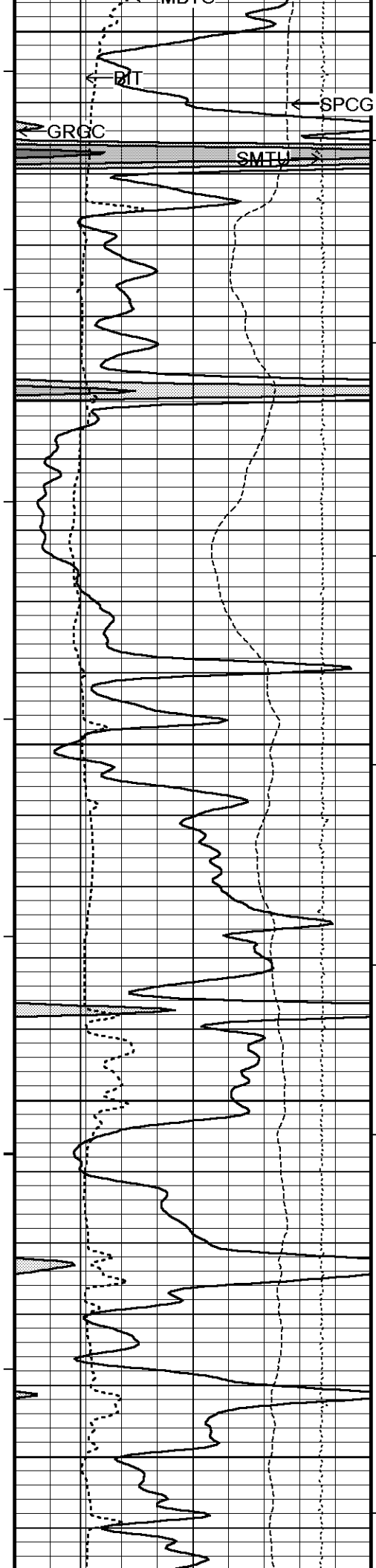
- JUNIOR FIELD ENGINEER: J. RANDLE.

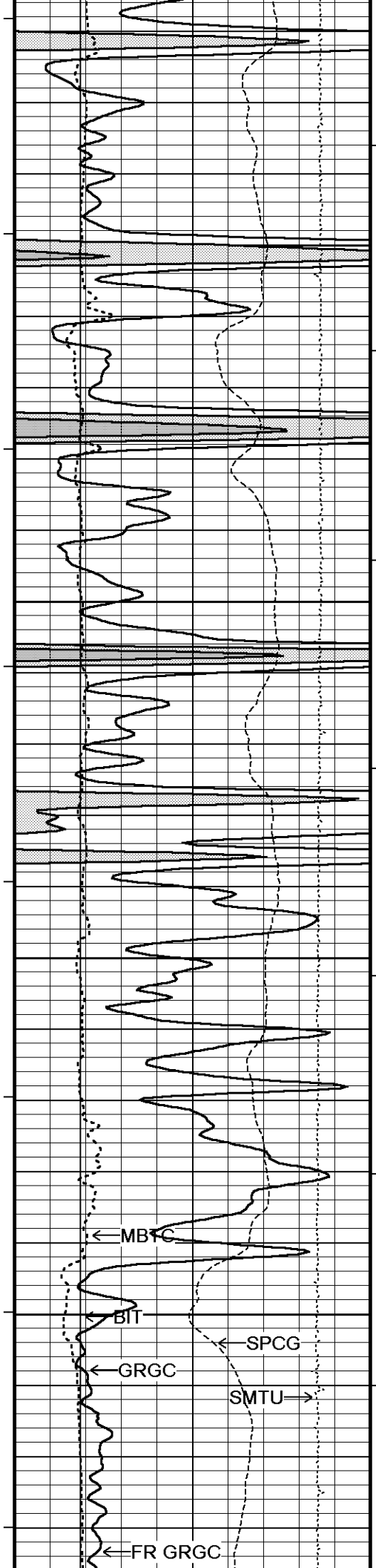
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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











107°

4300

108°

4350

109°

4400

110°

4450

← MBTC

← BIT

← GRGC

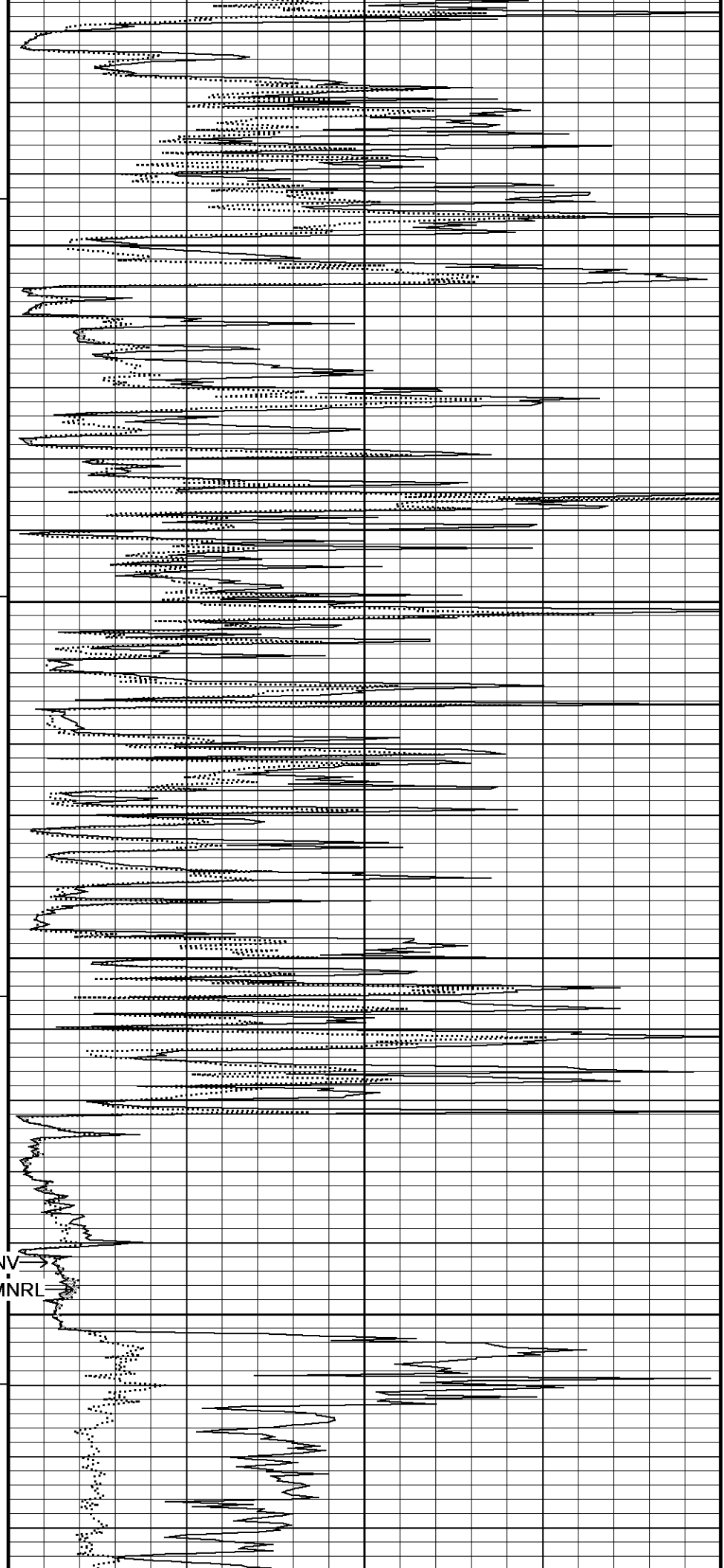
← FR GRGC

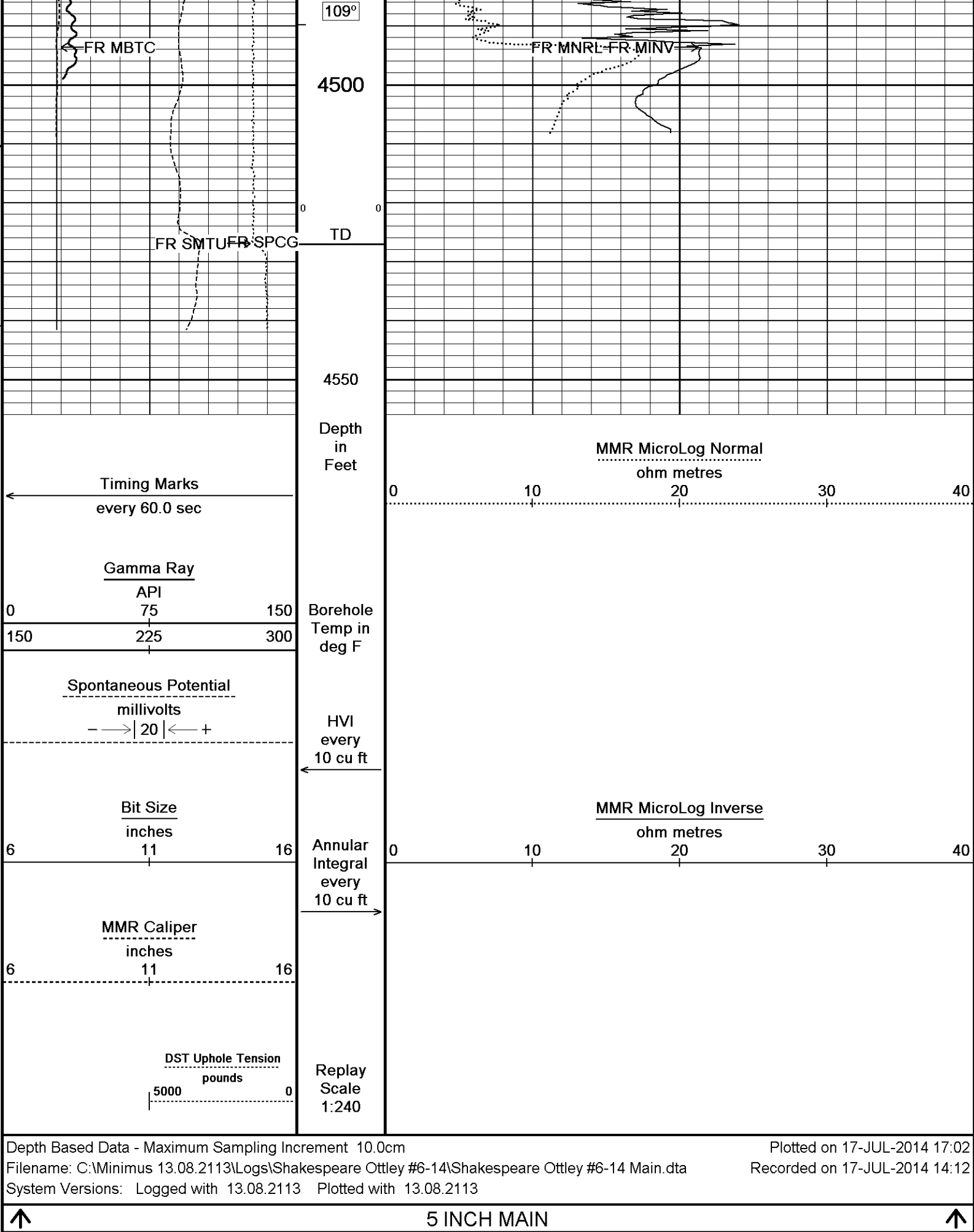
← SPCG

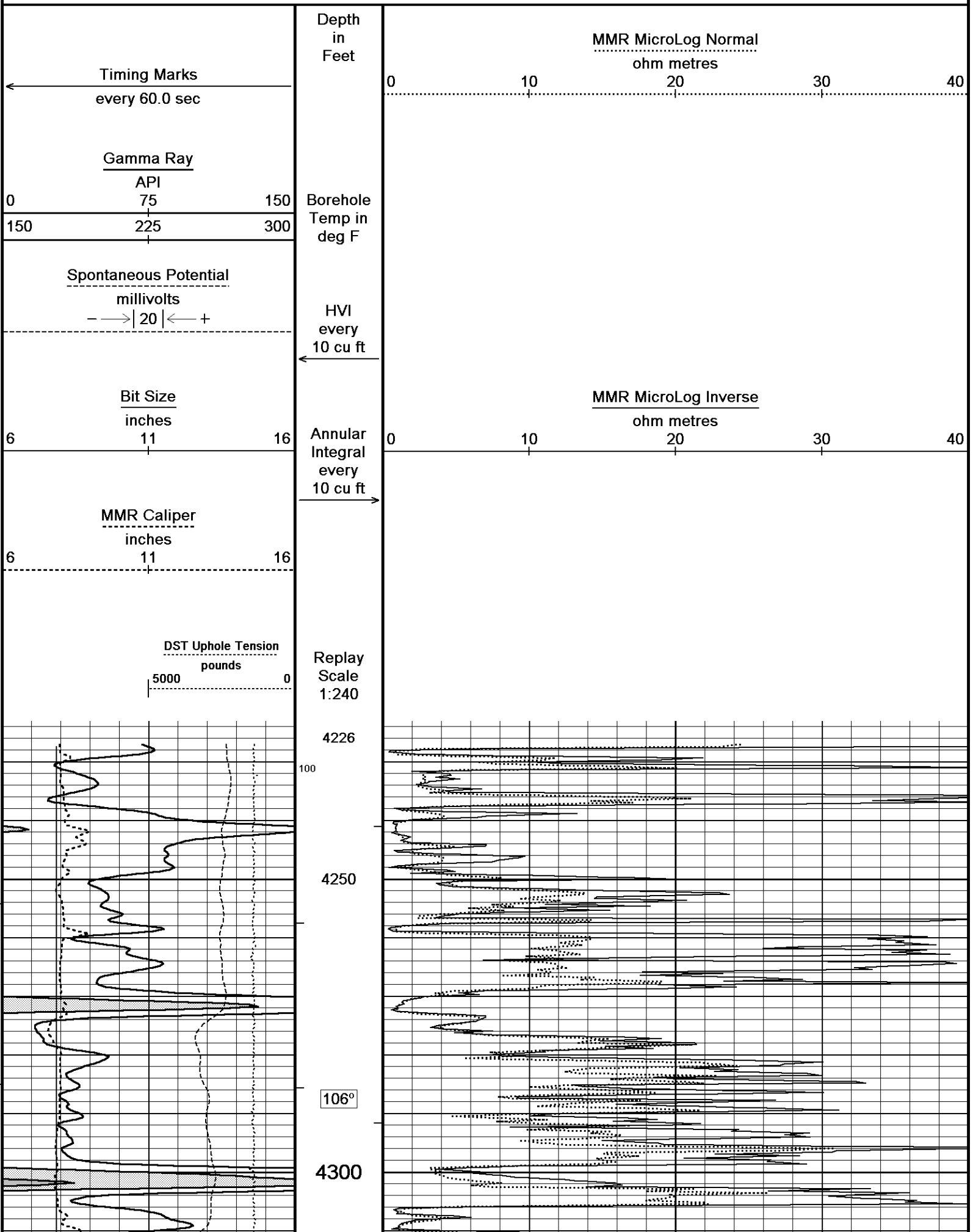
SMTU →

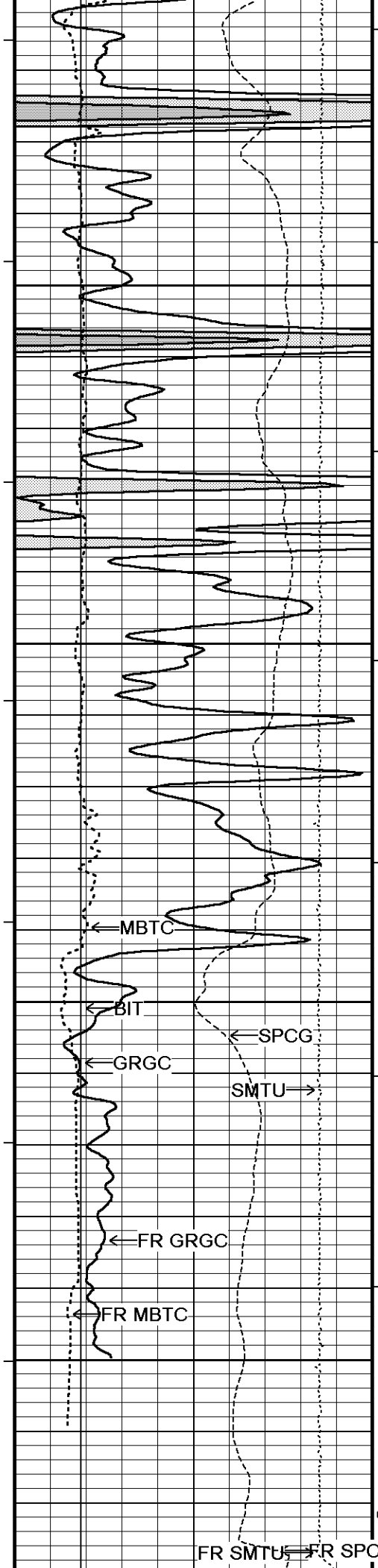
MINV

MNRL









107°

4350

108°

4400

109°

4450

109°

4500

0

TD

FR SMTU → FR SPCG

← MBTC

← BIT

← GRGC

← SPCG

SMTU →

← FR GRGC

← FR MBTC

MINV

MNRL

IFR MNRL →

Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	
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 17-JUL-2014 13:03
Reading No	Measured	Calibrated (lbs)	
1	14537.26	0.00	
2	15240.93	407.90	

Gamma Calibration MCG-D.K 442			Field Calibration on 13-JUL-2014 16:43
	Measured	Calibrated (API)	
Background	69	46	
Calibrator (Gross)	1158	771	
Calibrator (Net)	1089	725	

Gamma Constants MCG-D.K 442			Last Edited on 17-JUL-2014,11:25
Gamma Calibrator Number	GRC038		
Mud Density	1.13	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 442			Field Calibration on 10-MAY-2014,10:22
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-D.K 442			Last Edited on 10-MAY-2014,10:22
Pre-filter Length	11		

SP Calibration MCG-D.K 442			Field Calibration on 06-JUL-2014 15:10
	Measured	Calibrated (mV)	
Reference 1	99.0	99.0	
Reference 2	-98.7	-98.8	

Caliper Calibration MMR-C.A 248			Base Calibration on 20-JUN-2014 09:22 Field Calibration on 13-JUL-2014 16:30
Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	13560	5.98	
2	16725	7.97	
3	19859	9.86	
4	23840	11.92	
5	0	0.00	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	8.01	7.97	

Micro Normal and Micro Inverse Calibration MMR-C.A 248			Base Calibration on 20-JUN-2014 09:12 Field Check on 13-JUL-2014 16:31
Base Calibration			
	Measured	Calibrated (ohm-m)	
Channel	Resistor 1 Resistor 2	Resistor 1 Resistor 2	
Micro Normal	9.9 49.5	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	22.2	22.2	
Micro Inverse	22.2	22.2	

Micro Normal	93.9	93.9
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 26-JUN-2014 11:21 Field Check on 13-JUL-2014 16:49
Base Calibration		
	Measured	Calibrated (cps)
	Near Far	Near Far
	2997 92	3714 110
Ratio	32.443	33.764
Field Calibrator at Base		
		Calibrated (cps)
		1677 2452
Ratio		0.684
Field Check		
		Calibrated (cps)
		1684 2457
Ratio		0.682
Neutron Constants MDN-B.J 387		Last Edited on 16-JUL-2014,03:38
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 20-JUN-2014 09:41 Field Check on 13-JUL-2014 16:23
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	950.7	126.8
Base Check		281.7
Field Check		281.7
FE Constants MFE-A.A 55		Last Edited on 16-JUL-2014,03:38
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 5		Base Calibration on 21-JAN-2014,09:50 Field Check on 13-JUL-2014 16:22
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			15.9	3862.5
2			31.9	3589.9
3			29.8	2970.7
4			20.7	2125.6
Deep			18.5	1911.7
Medium			42.9	3860.1
Shallow			47.4	5371.3

Array Temperature 89.7 Deg F

Induction Constants MAI-A.A 5

Last Edited on 16-JUL-2014,03:41

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 27-JUN-2014,14:12

Pre-filter Length 11

Caliper Calibration MPD-D.A 480

Base Calibration on 26-JUN-2014 09:45

Field Calibration on 13-JUL-2014 16:24

Base Calibration

Position Name Measured Length Calibrated Length

Reading No	Measured	Calibrator Size (in)
1	18085	3.99
2	28066	5.98
3	38193	7.97
4	47934	9.86
5	58962	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

Photo Density Calibration MPD-D.A 480

Base Calibration on 14-JUL-2014 16:16
Field Check on 14-JUL-2014 16:24

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1272	1466		
Reference 1	57253	26627	59556	30836
Reference 2	23358	2650	24941	2541

Field Check at Base

1271.6 1465.6

Field Check

1268.7 1468.0

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	239	1138		
Reference 1	24028	57044	0.426	0.371
Reference 2	6966	23210	0.305	0.272

Field Check at Base

238.9 1137.7

Field Check

239.3 1131.3

Density Constants MPD-D.A 480

Last Edited on 17-JUL-2014,11:26

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	1.13 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\Logs\Shakespeare Ottley #6-14\Shakespeare Ottley #6-14 Repeat.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-D.K 442 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

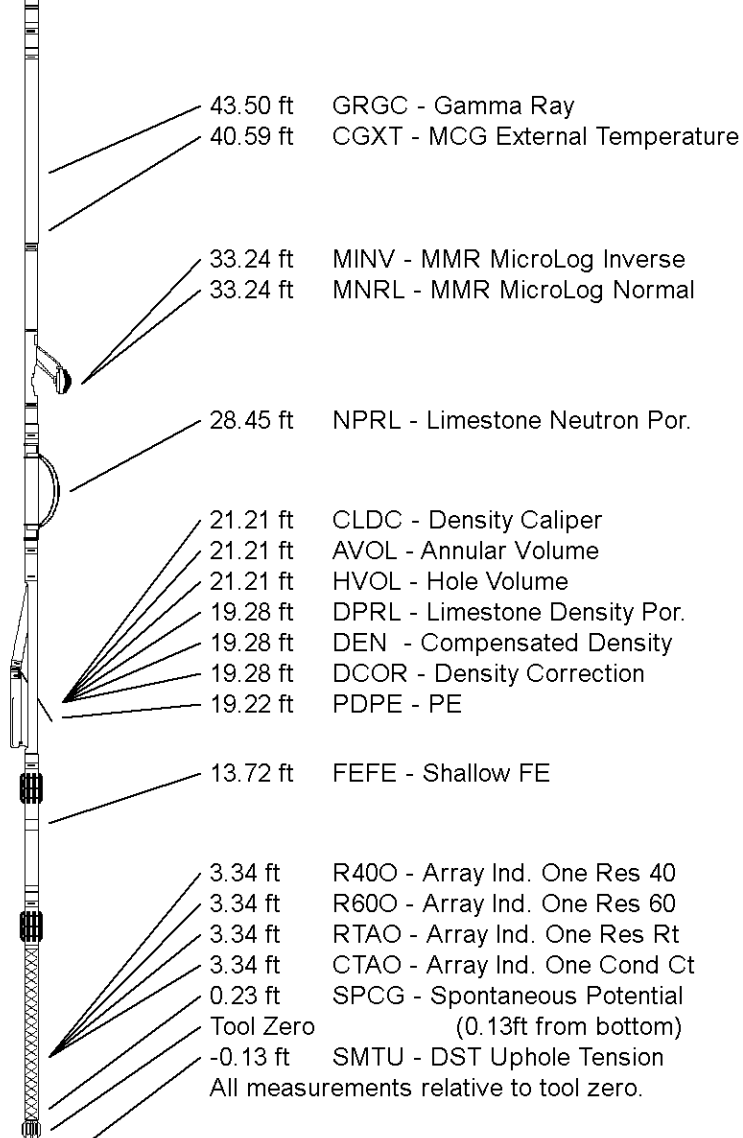
Compact Neutron
MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

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 Induction
MAI-A.A 5 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 51.18 ft Weight: 407.9 lb



COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	OTTLEY #6-14
FIELD	CHALK BUTTES
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2819.00	feet	First Reading	4494.00	feet
Elevation Drill Floor	2817.00	feet	Depth Driller	4530.00	feet
Elevation Ground Level	2809.00	feet	Depth Logger	4527.00	feet



Weatherford®

MICRORESISTIVITY LOG