



Weatherford

MICRO RESISTIVITY LOG

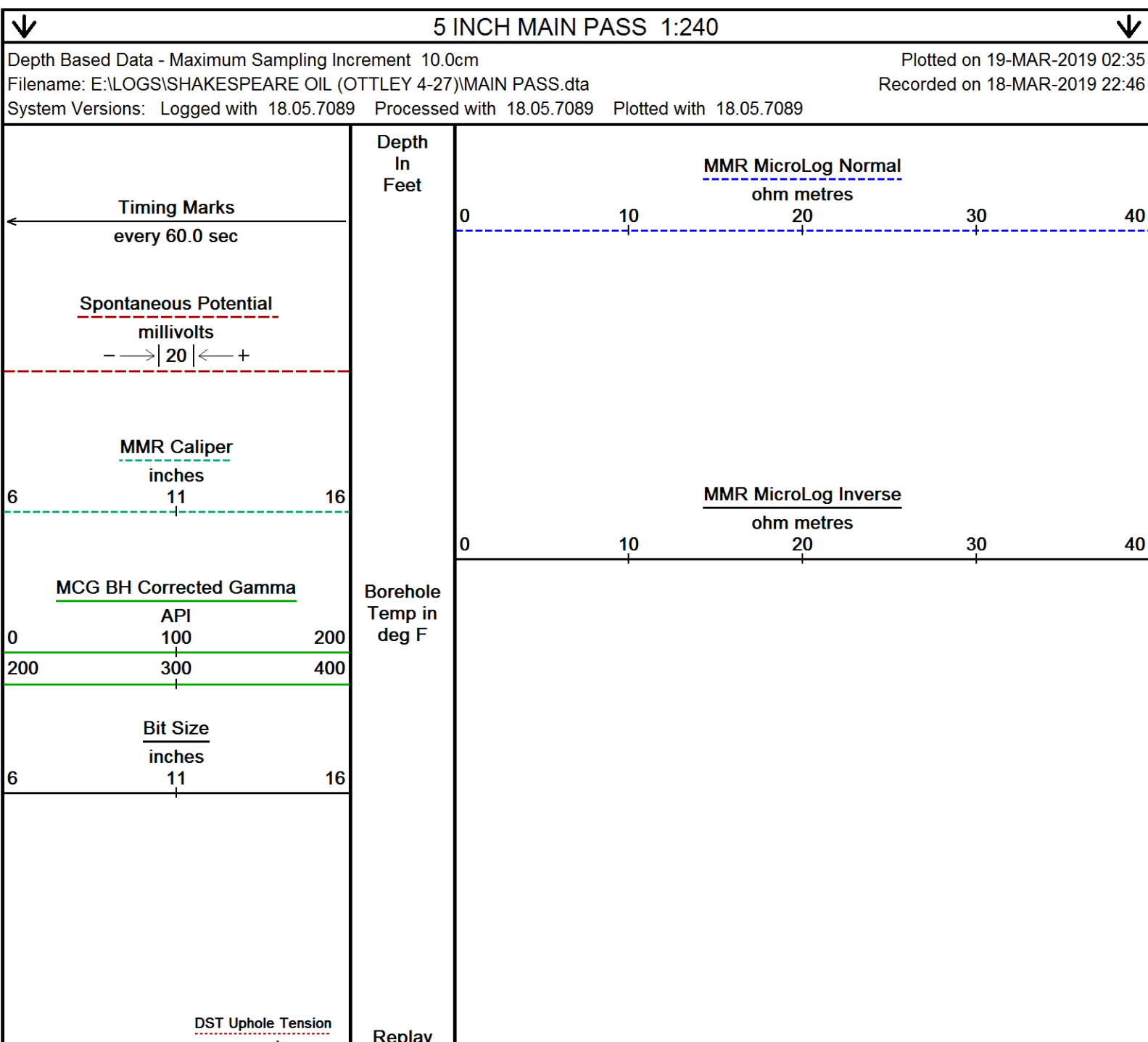
COMPANY			SHAKESPEAR OIL CO., INC.		
WELL			OTTELEY 4-27		
FIELD			SMOKY HILL		
PROVINCE/COUNTY			LOGAN		
COUNTRY/STATE			USA / KANSAS		
LOCATION			NE SW SW NW, 2235' FNL & 520' FWL		
SEC 27	TWP 14S	RGE 32W	Other Services		
Latitude	38.808963764		PHOTO DENSITY		FOCUSED ELECTRIC
Longitude	-100.871232007		DUAL SPACED NEUTRON		
API Number	15-109-21586		ARRAY INDUCTION		
Permanent Datum GL, Elevation 2665 feet					
Log Measured From KB, 8.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	18-MAR-2019				
Run Number	ONE				
Service Order	17876-240109006				
Depth Driller	4400.00		feet		
Depth Logger	4400.00		feet		
First Reading	4364.59		feet		
Last Reading	2050.00		feet		
Casing Driller	264.00		feet		
Casing Logger	264.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	WBM				
Density / Viscosity	9.10	lb/USg	57.00	sec/qt	
PH / Fluid Loss	10.00		8.80	ml/30Min	
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.53 @ 78.0		ohm-m		
Rmf @ Measured Temp	0.39 @ 78.0		ohm-m		
Rmc @ Measured Temp	0.63 @ 78.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.40 @105.0		ohm-m		
Time Since Circulation	3 HOURS				
Max Recorded Temp	105.00		deg F		
Equipment / Base	13379		ELRENO		
Recorded By	BANDAR BINOSFUR				
Witnessed By	TIM LAUER				

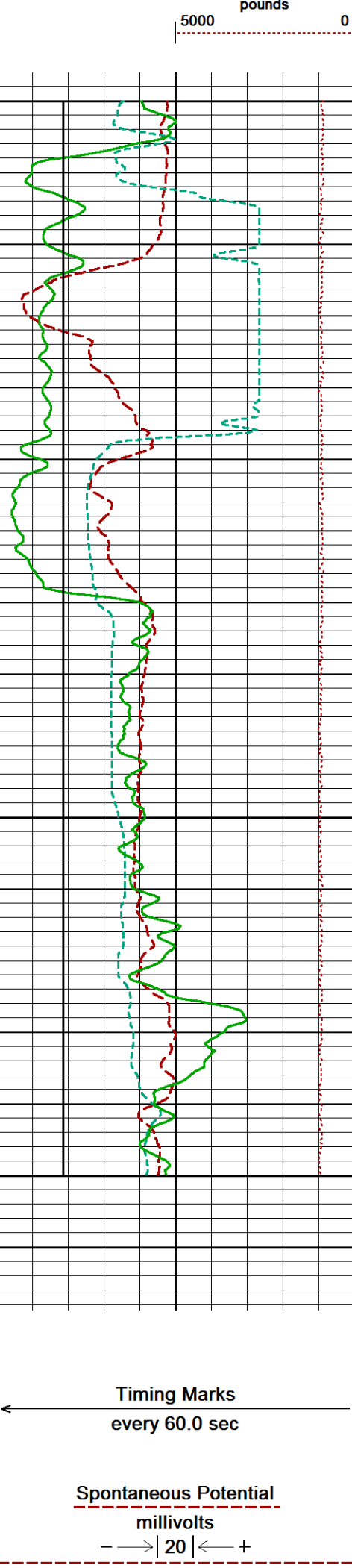
BOREHOLE RECORD					Last Edited: 19-MAR-2019 00:03
Bit Size inches		Depth From feet		Depth To feet	
7.875		264.00		4400.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	264.00	24.00	

REMARKS
- LOGGING SOFTWARE: 18.05.7089
- TOOLSTRING: MCB, SHA, MCG, MMR, MDN, MPD, SKJ, MFE, MAI RAN IN COMBINATION.
- HARDWARE USED: MAI: TOW 0.5 STANDOFFS. MFE: ONE 0.5 STANDOFF MDN: DUAL BOWSPRING MPD: 8 INCH PROFILE PLATE.
2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- MAIN PASS : NEUTRON / DENSITY / MICROLOG = 4400' - 3450' _2200' - 2050' GAMMA / INDUCTION / CALIPER = 4400' - CASING SHOE
- REPEAT PASS :

- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 1980 CU.FT.
 - ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = 1530 CU.FT.
 - OPERATORS: J. JOHNSON, G. FICA

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.





Scale
1:240

2050

92°

2100

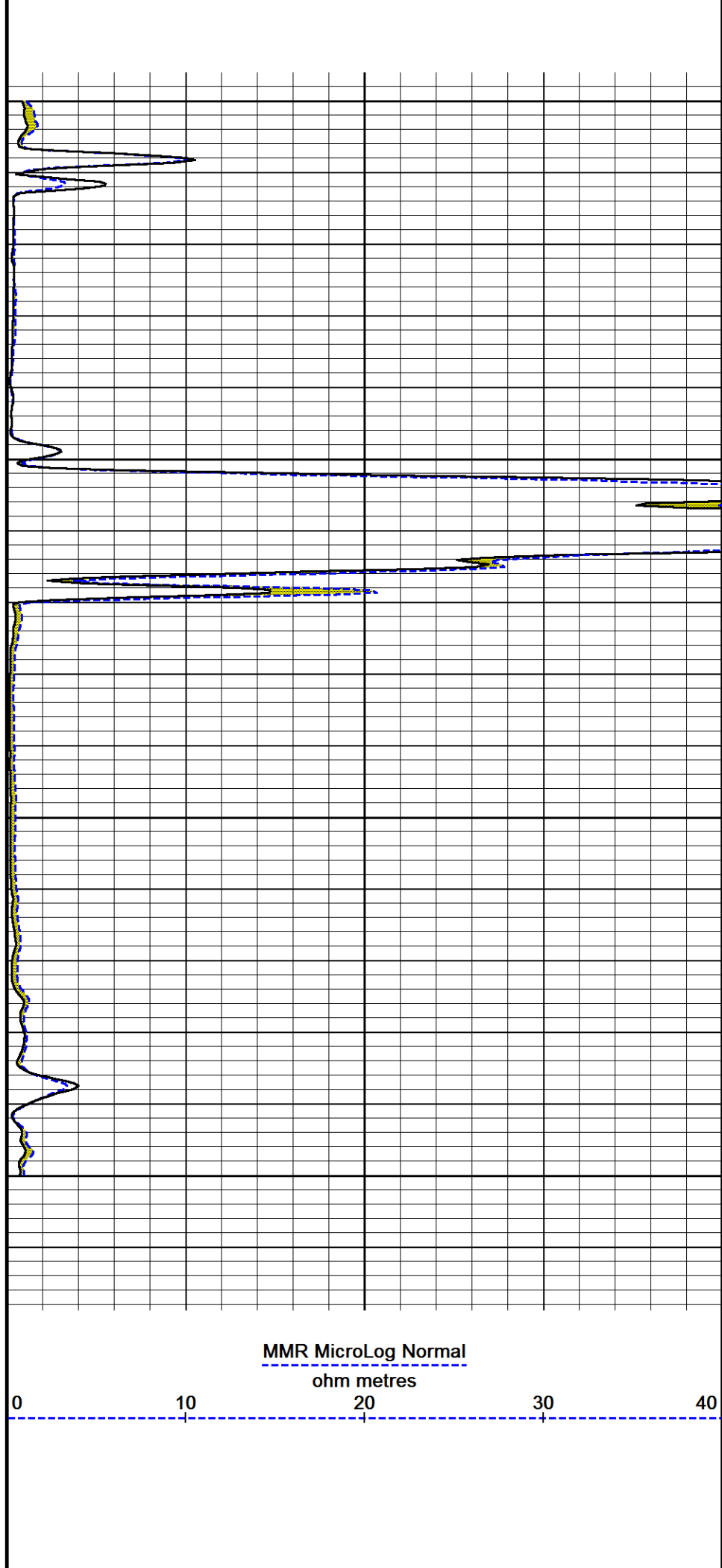
92°

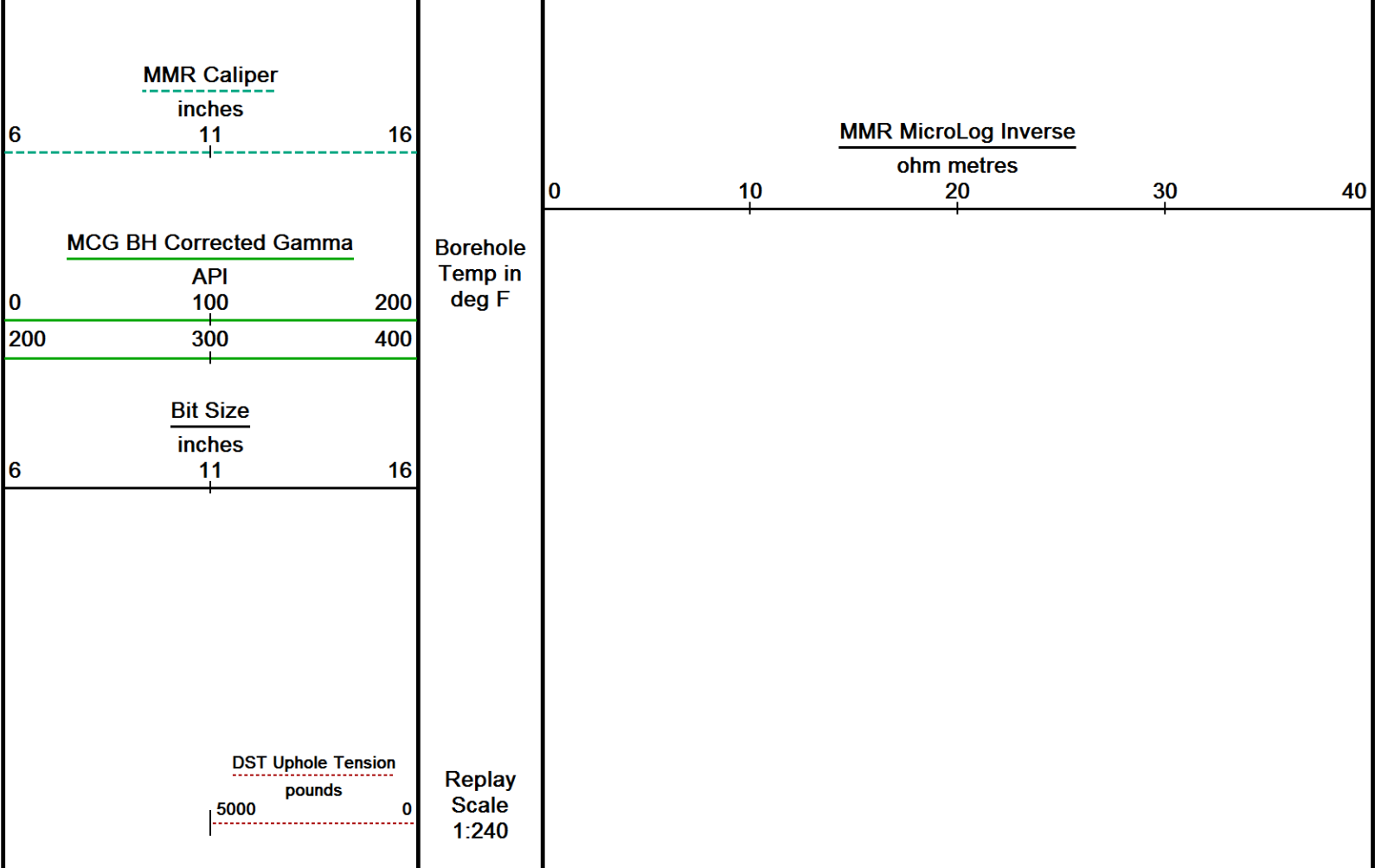
2150

93°

2200

Depth
In
Feet



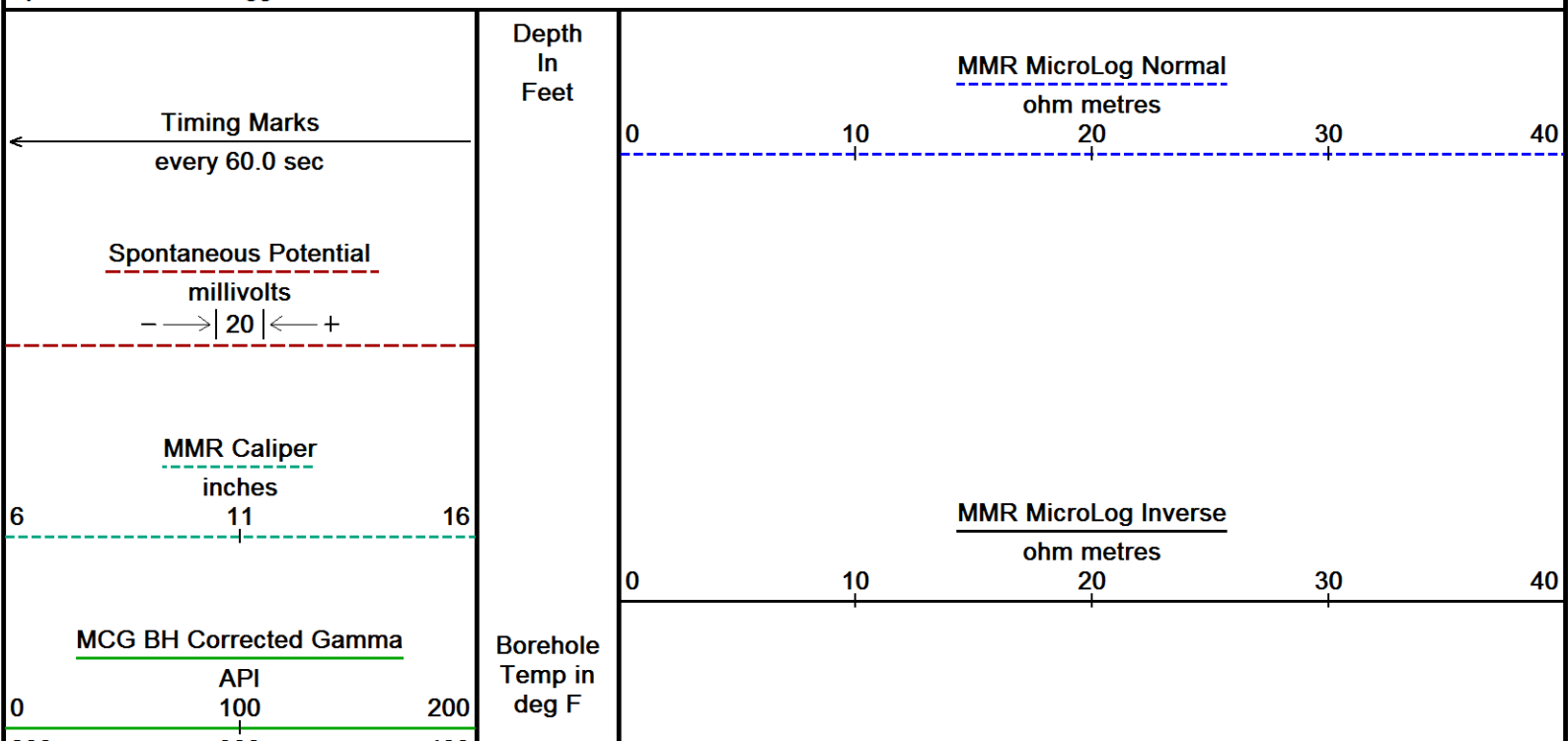


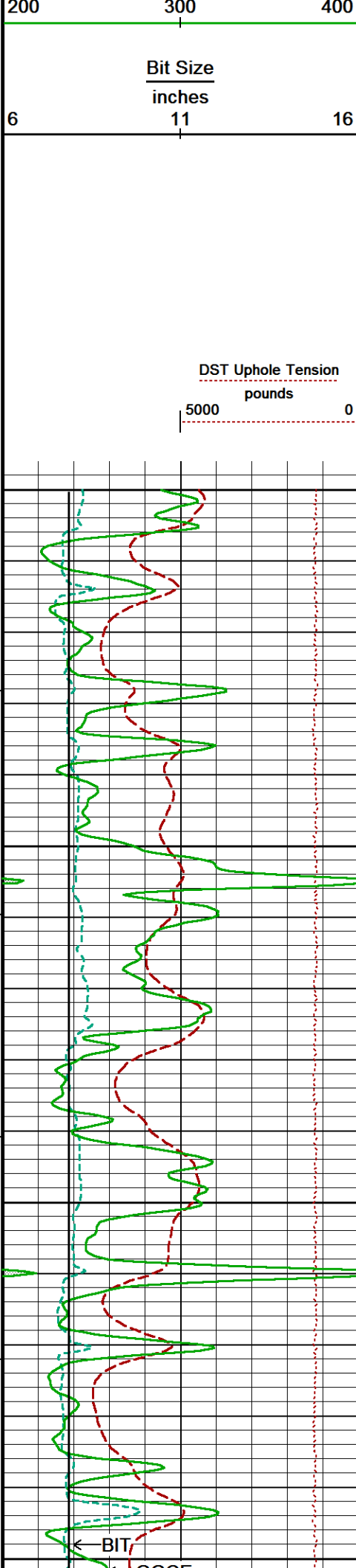
Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 19-MAR-2019 02:35
Filename: E:\LOGS\SHAKESPEARE OIL (OTTLEY 4-27)\MAIN PASS.dta	Recorded on 18-MAR-2019 22:46
System Versions: Logged with 18.05.7089 Processed with 18.05.7089 Plotted with 18.05.7089	

↑	5 INCH MAIN PASS 1:240	↑
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↓	5 INCH MAIN PASS 1:240	↓
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Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 19-MAR-2019 02:35
Filename: E:\LOGS\SHAKESPEARE OIL (OTTLEY 4-27)\MAIN PASS.dta	Recorded on 18-MAR-2019 22:46
System Versions: Logged with 18.05.7089 Processed with 18.05.7089 Plotted with 18.05.7089	





Replay
Scale
1:240

3450

100°

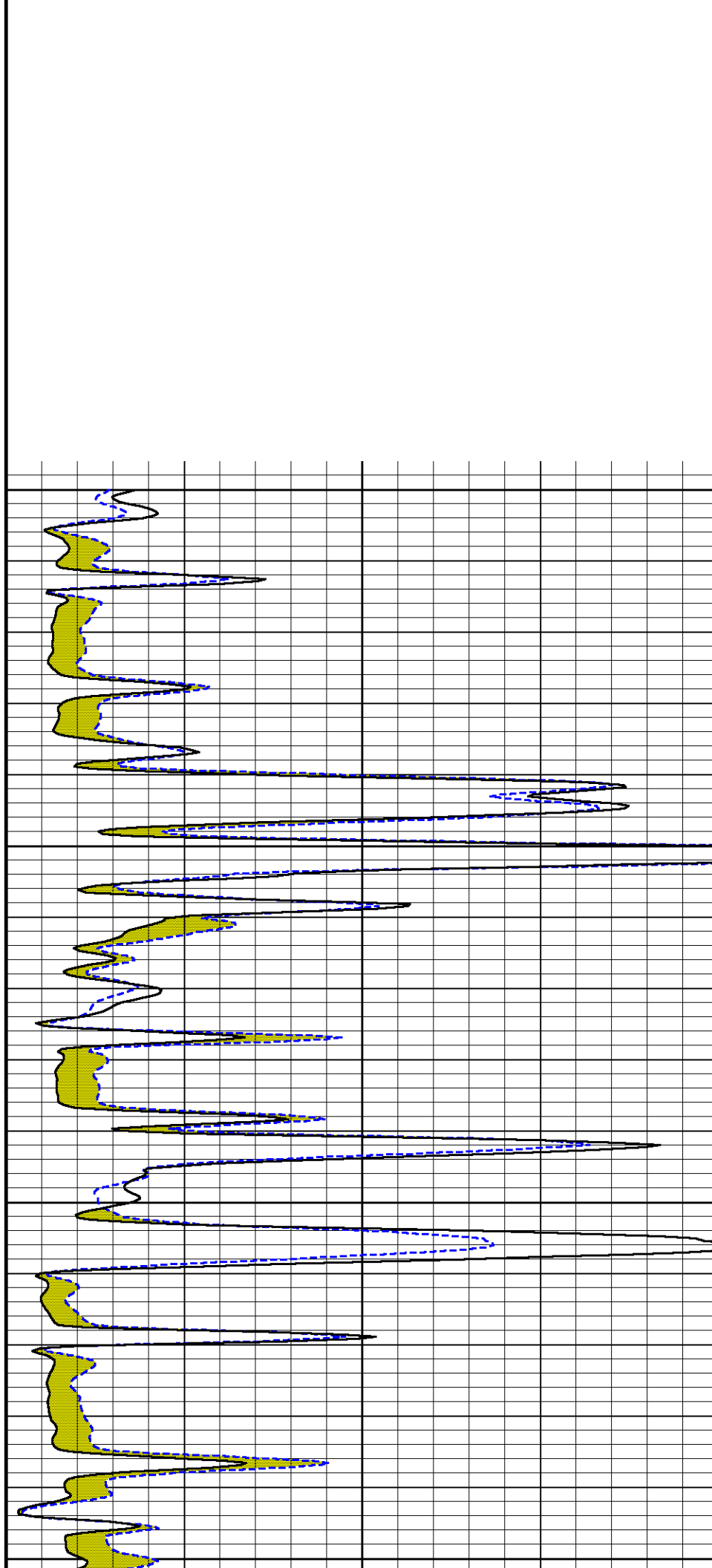
3500

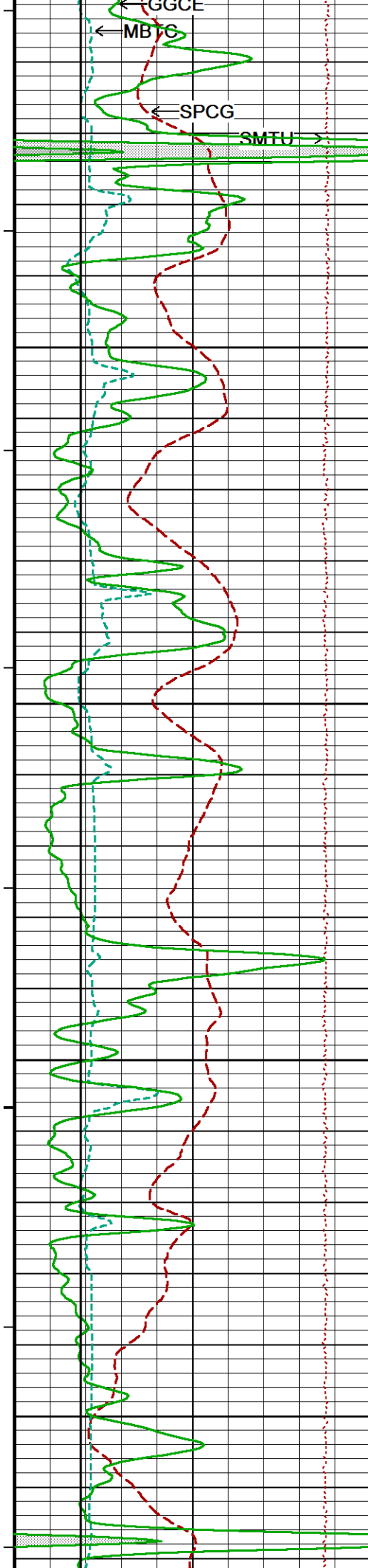
100°

3550

100°

3600





100°

3650

101°

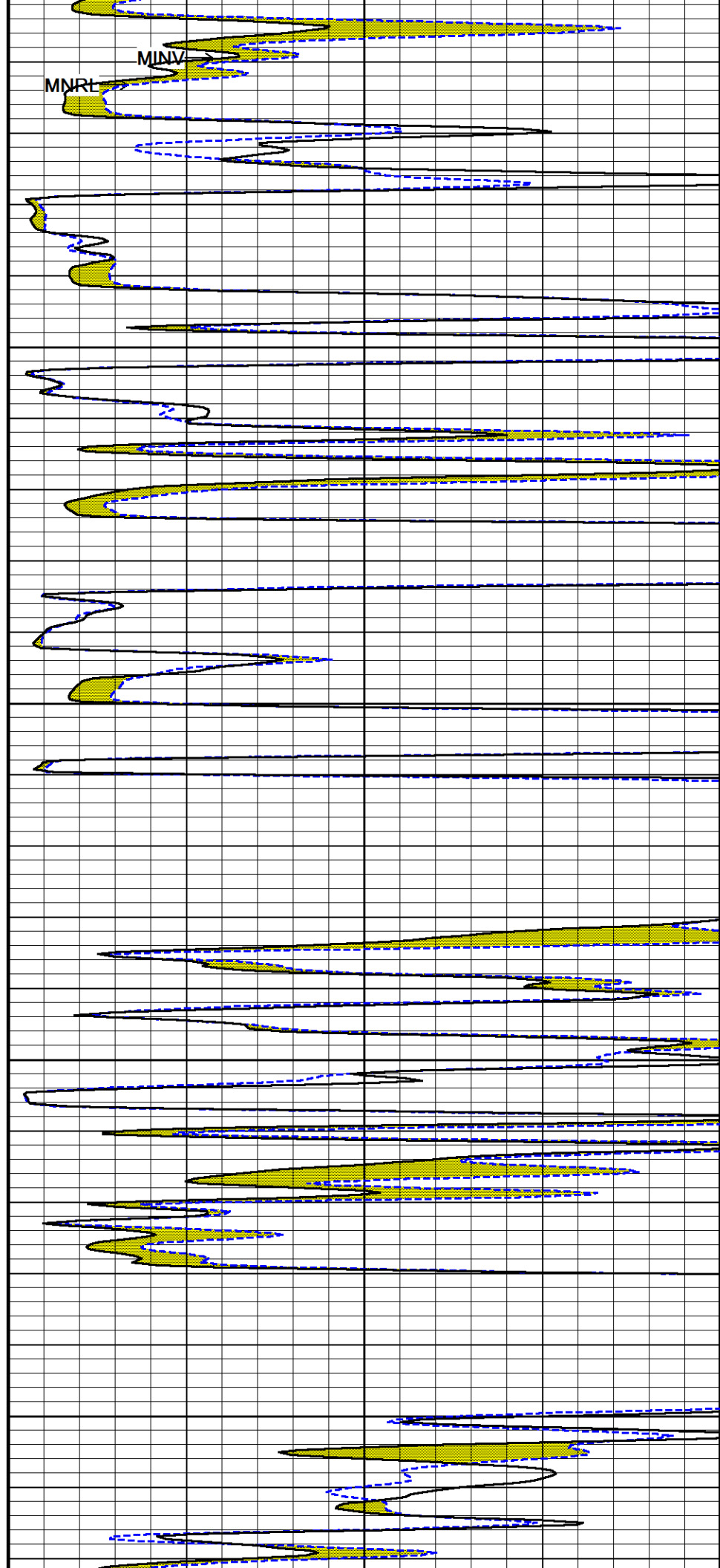
3700

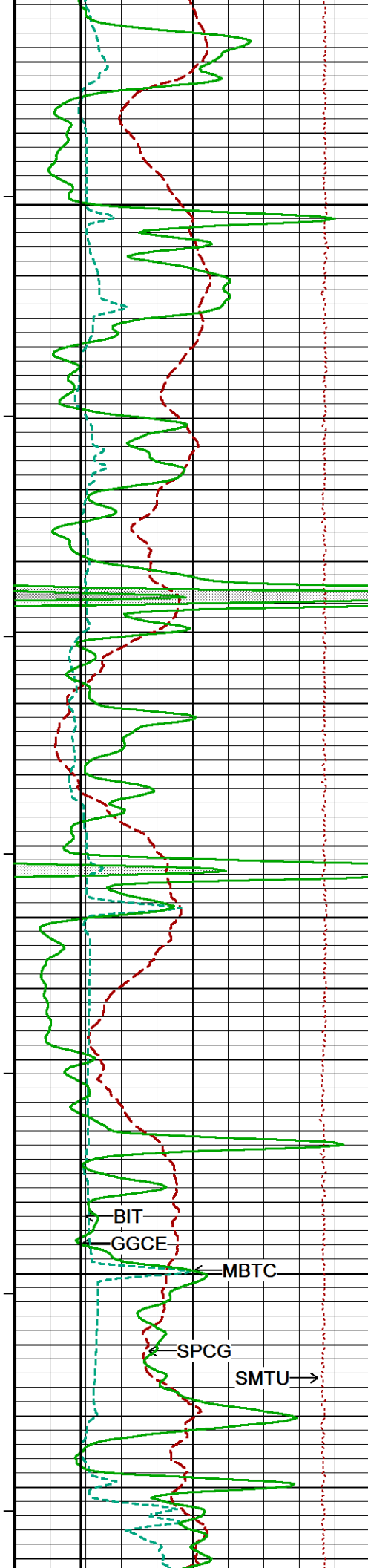
101°

3750

101°

3800





101°

3850

102°

3900

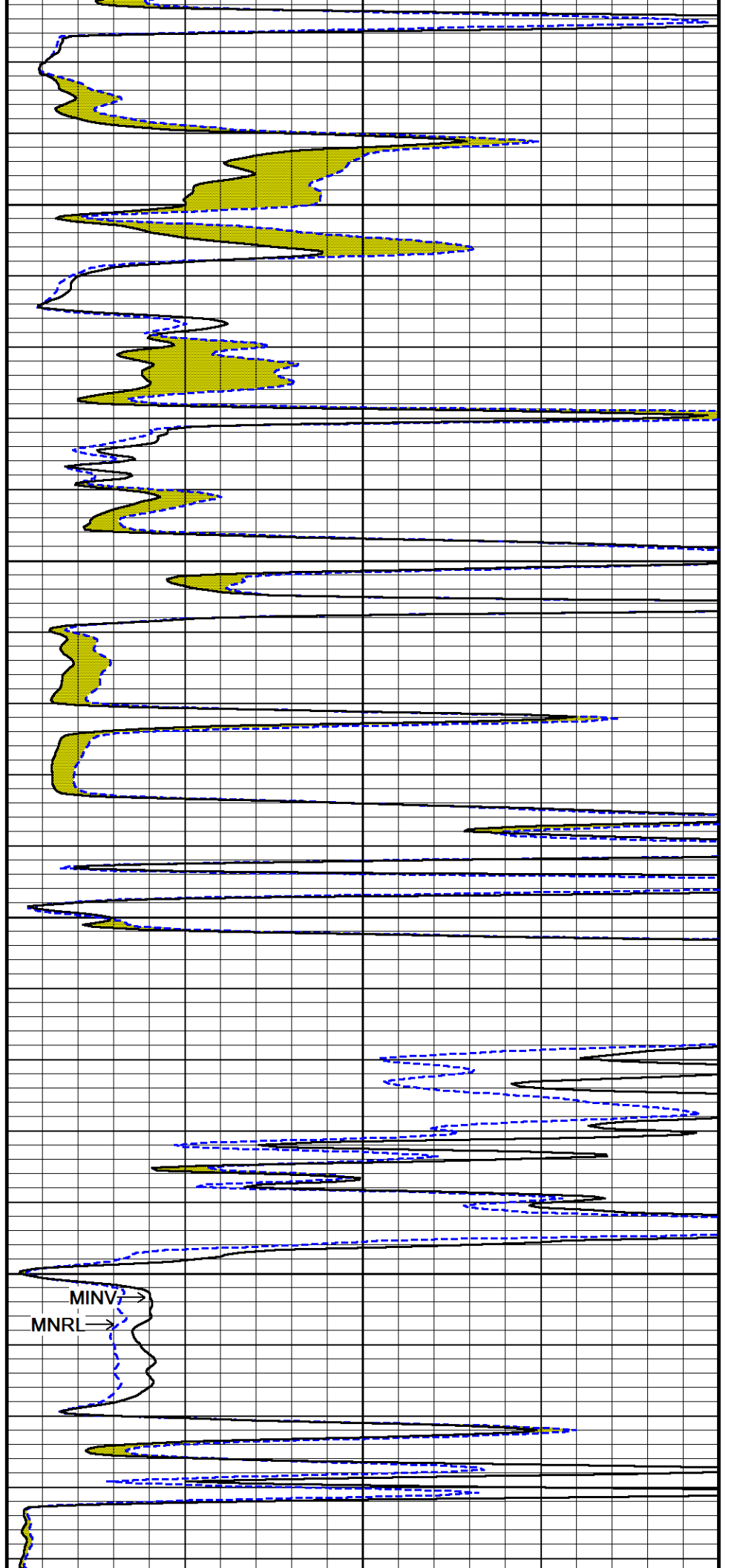
102°

3950

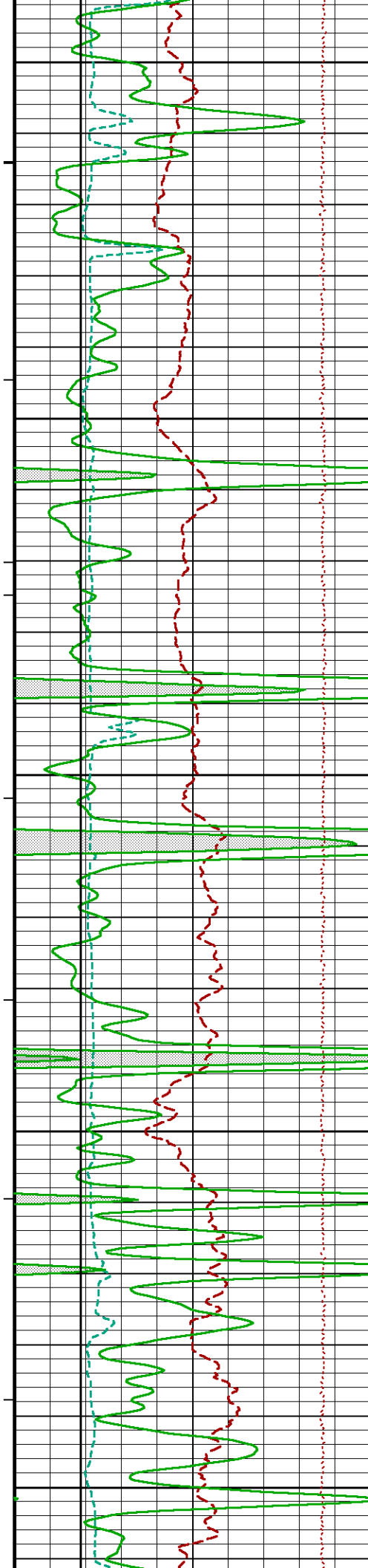
102°

4000

102°



MINV
MNRL



4050

102°

4100

103°

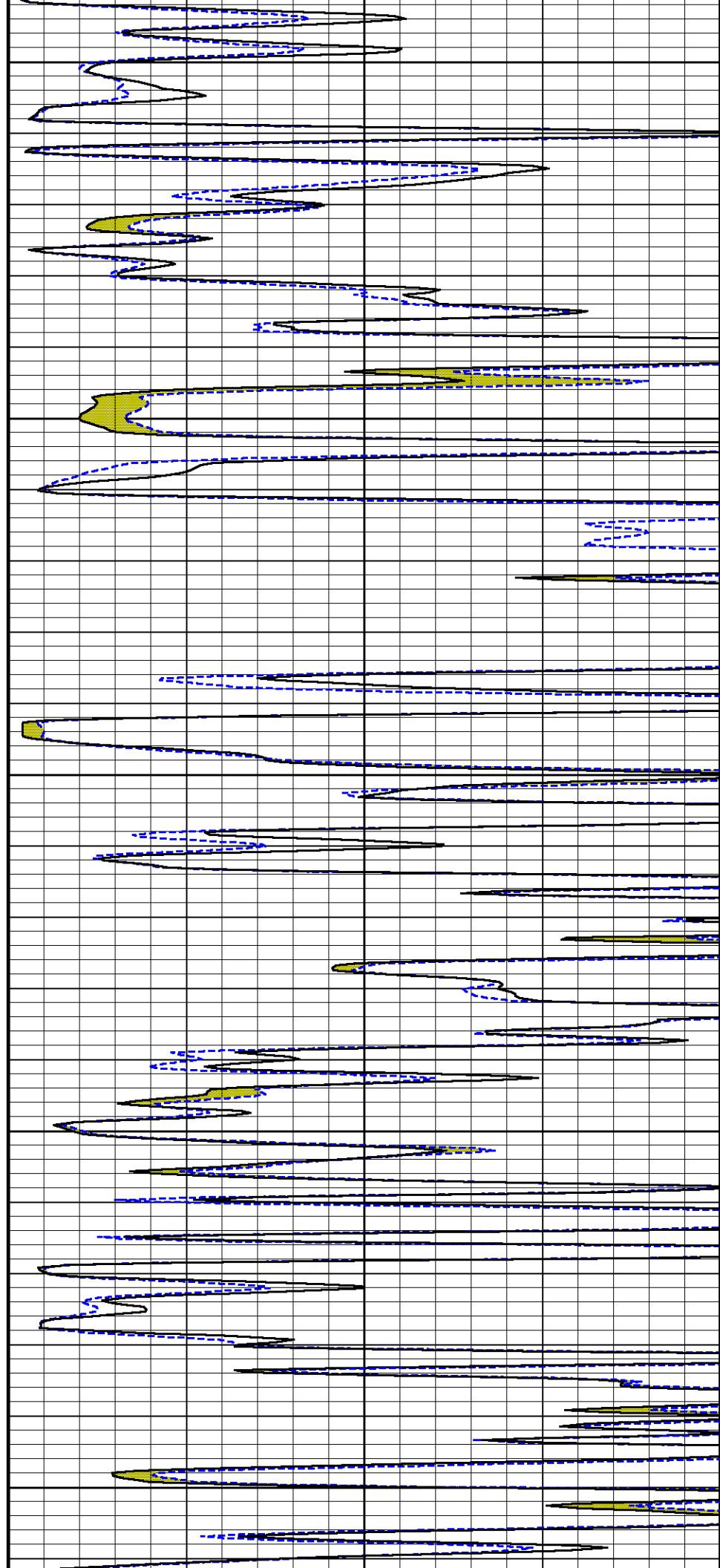
4150

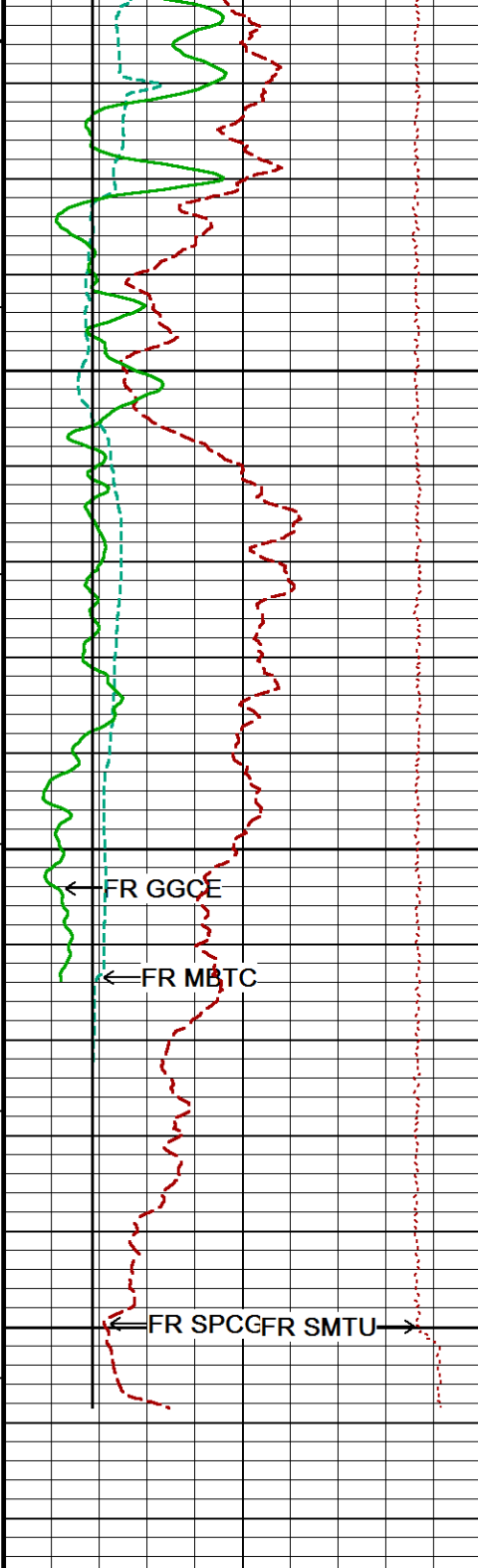
103°

4200

104°

4250





← Timing Marks
every 60.0 sec →

Spontaneous Potential
millivolts
—→ | 20 | ← +

MMR Caliper
inches
6 11 16

105°

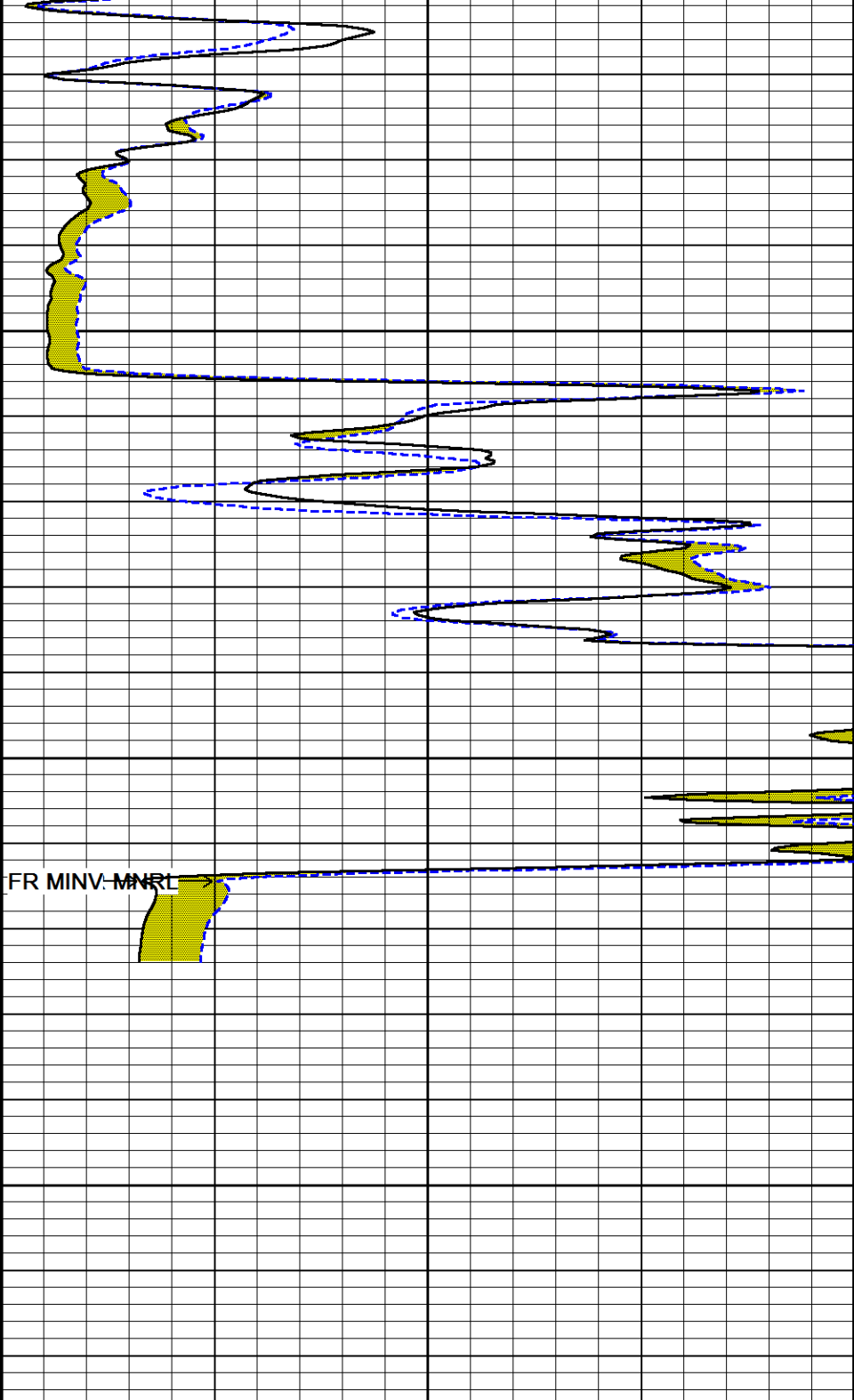
4300

105°

4350

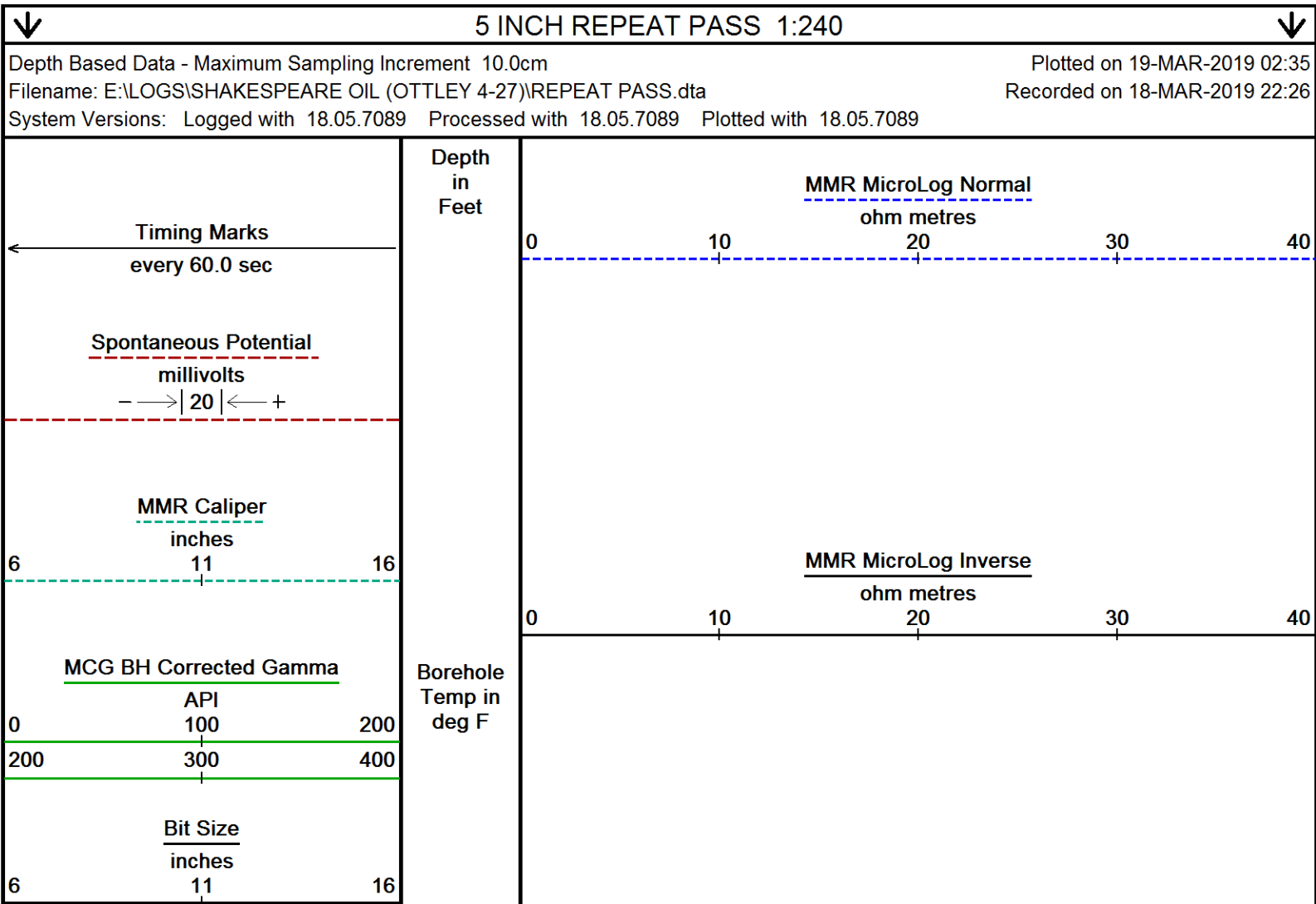
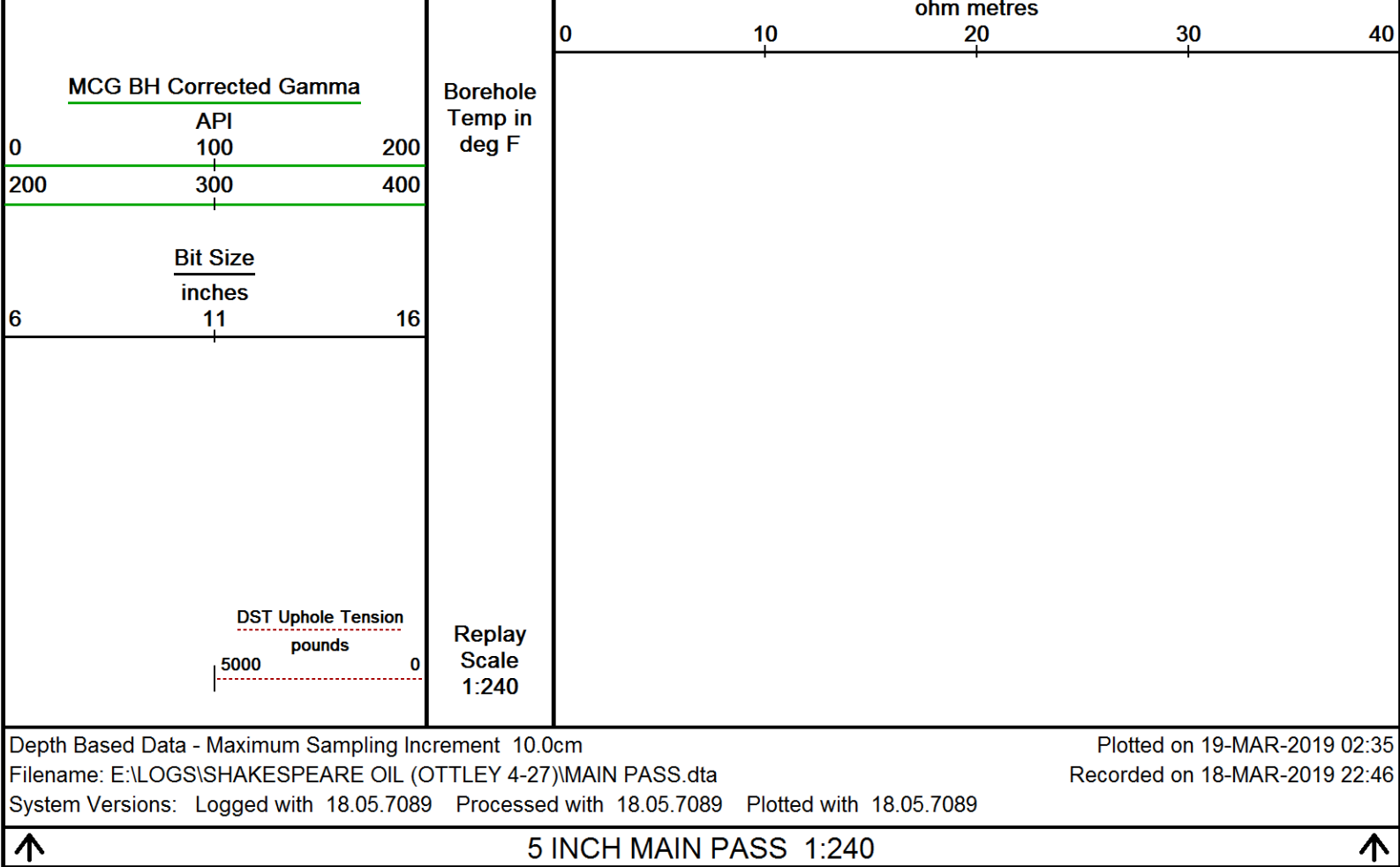
TD
4400

Depth
In
Feet



MMR MicroLog Normal
ohm metres
0 10 20 30 40

MMR MicroLog Inverse



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

4100

102°

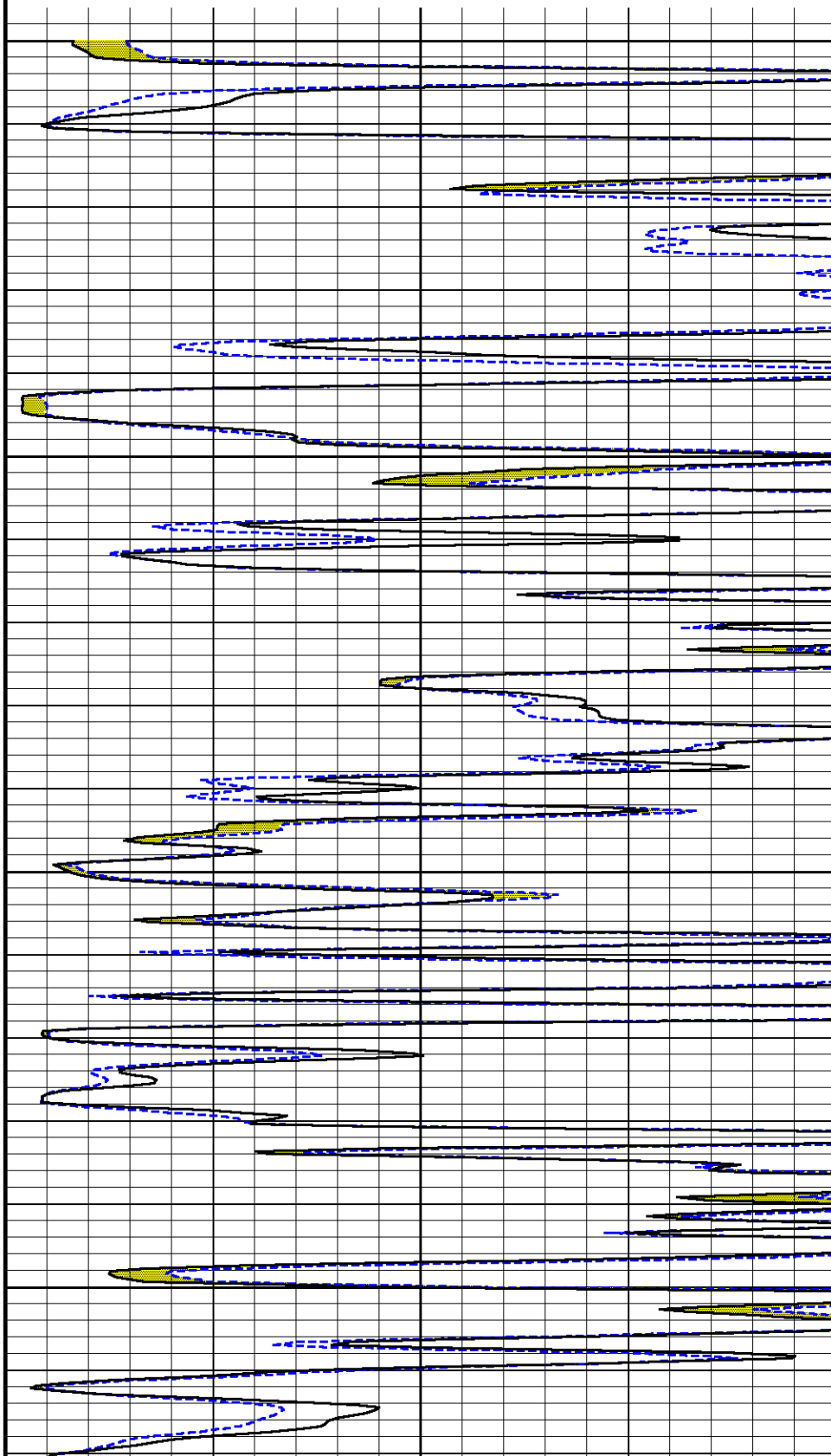
4150

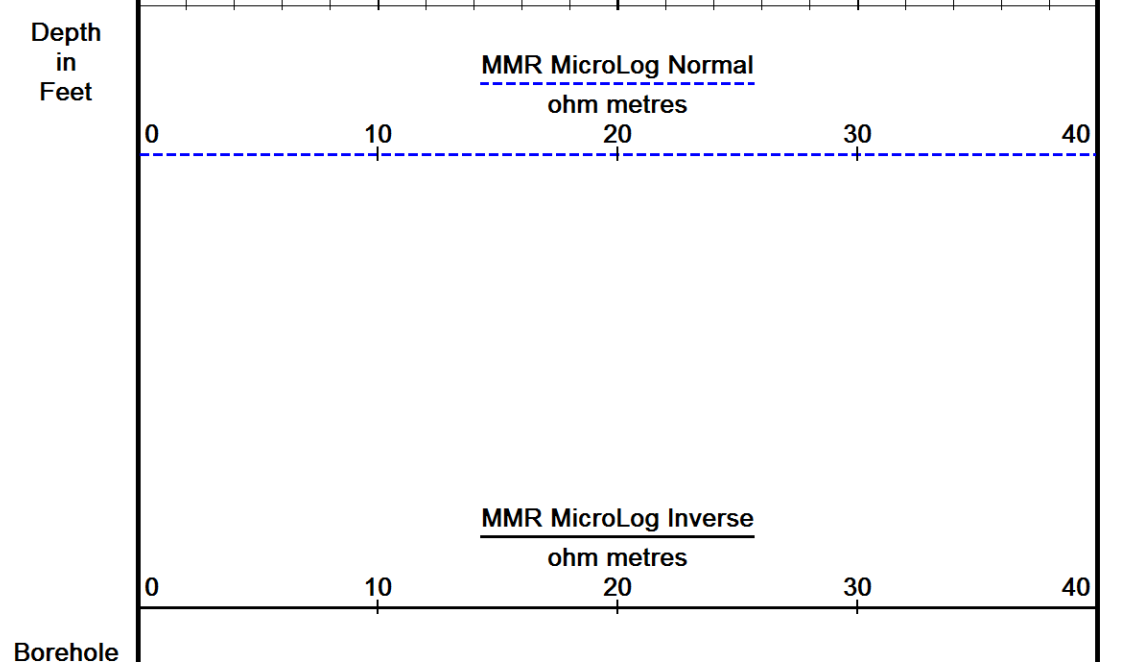
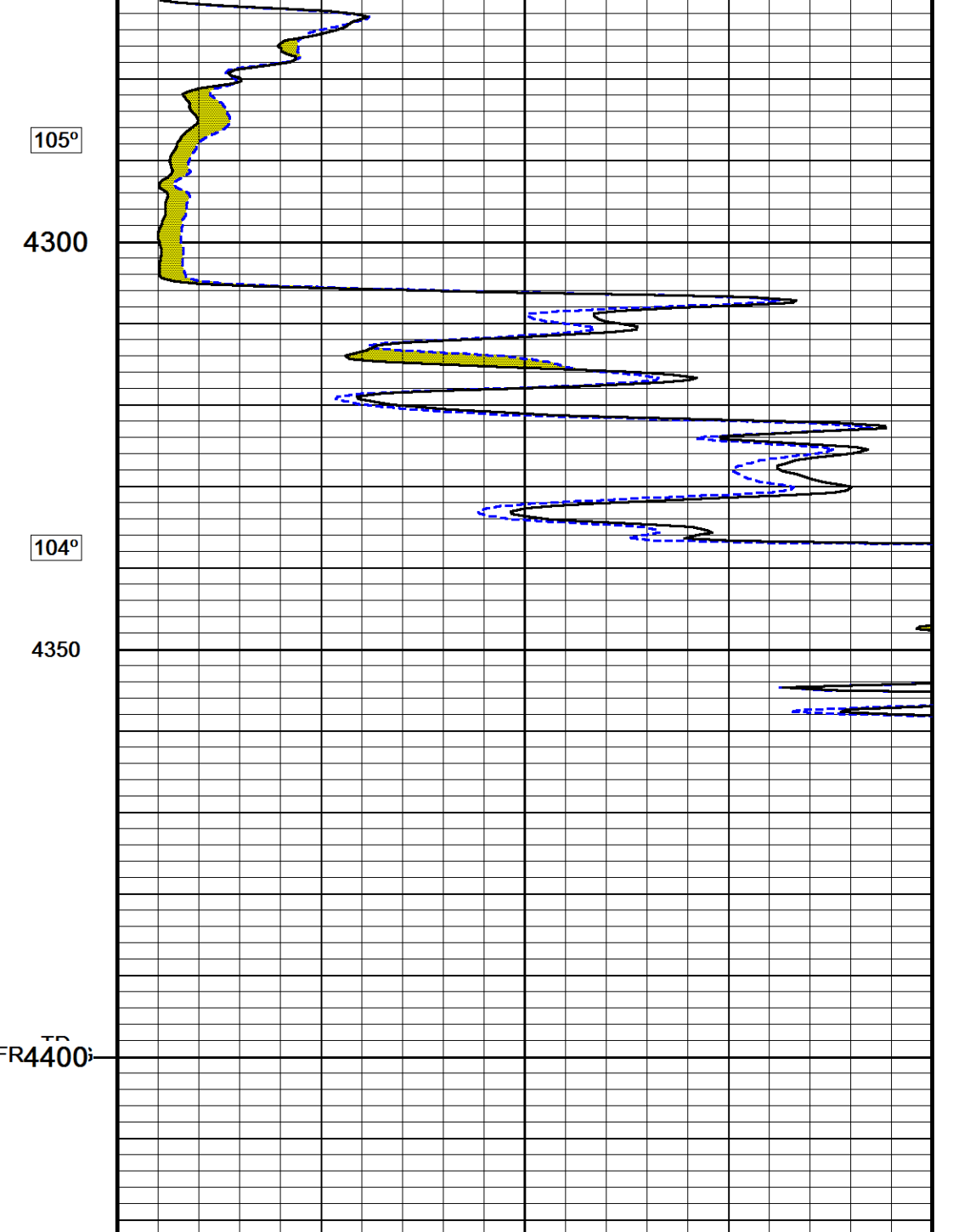
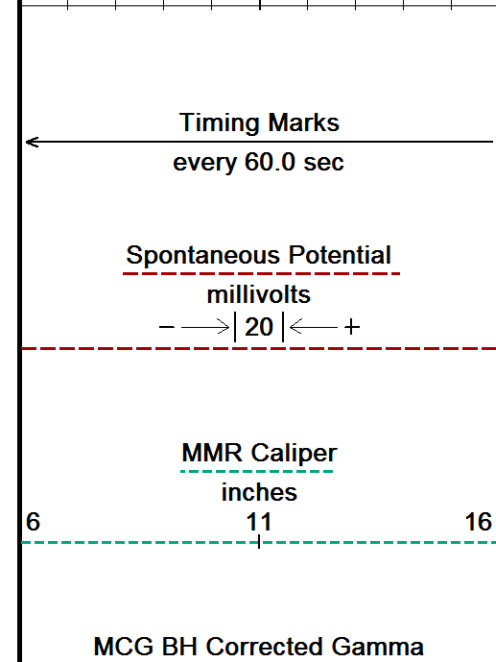
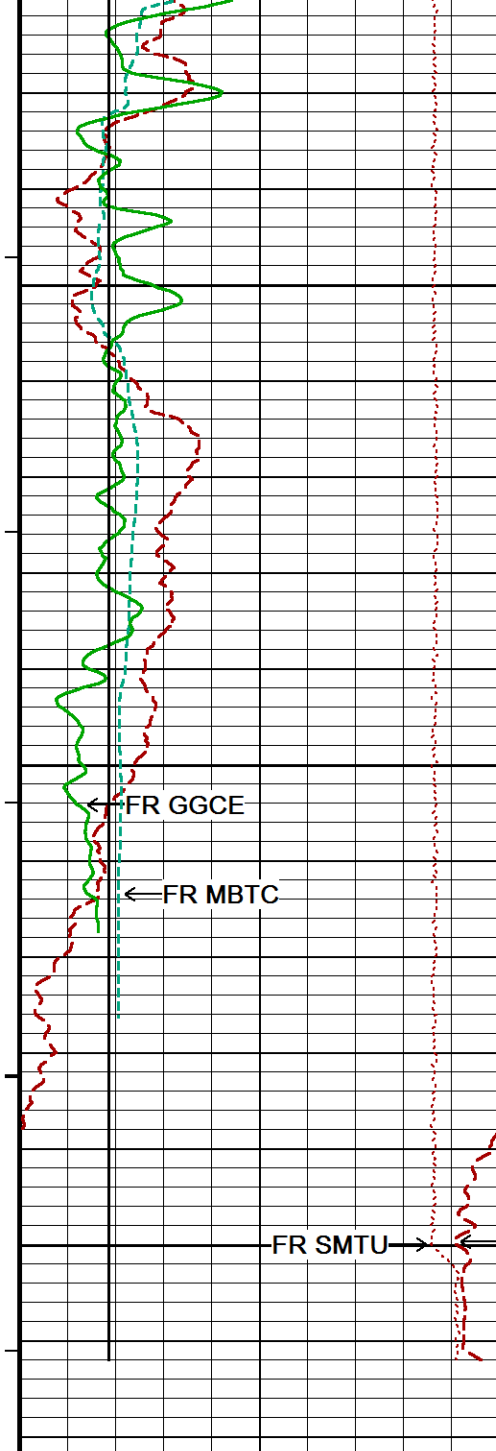
103°

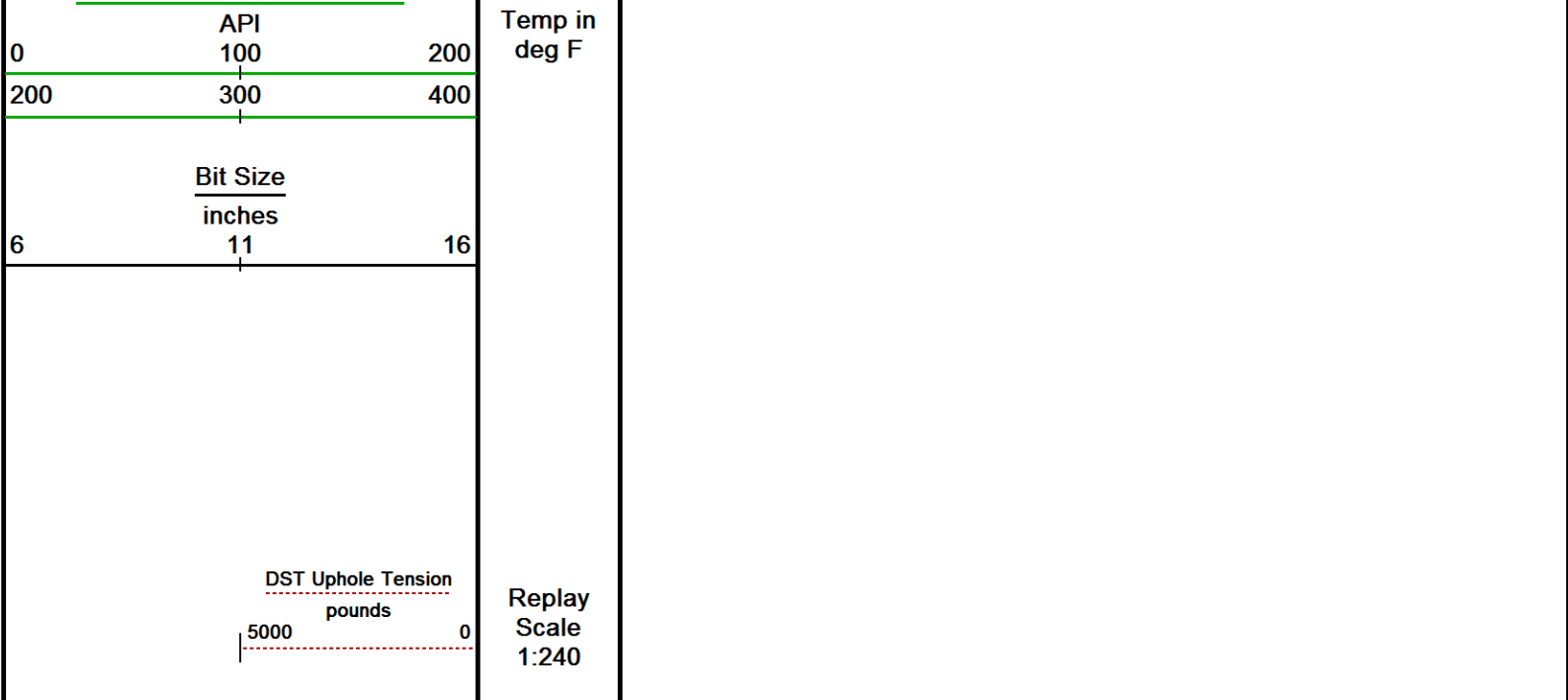
4200

104°

4250







Depth Based Data - Maximum Sampling Increment 10.0cm

Filename: E:\LOGS\SHAKESPEARE OIL (OTTLEY 4-27)\REPEAT PASS.dta

System Versions: Logged with 18.05.7089 Processed with 18.05.7089 Plotted with 18.05.7089

Plotted on 19-MAR-2019 02:35

Recorded on 18-MAR-2019 22:26

↑

5 INCH REPEAT PASS 1:240

↑

BEFORE SURVEY CALIBRATION

E:\LOGS\SHAKESPEARE OIL (OTTLEY 4-27)\MAIN PASS.dta

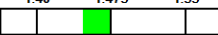
General Constants All 000			Last Edited on 18-MAR-2019,22:43		
General Parameters					
Mud Resistivity	0.530	ohm-metres			
Mud Resistivity Temperature	78.000	degrees F			
Water Level	0.000	feet			
Borehole Fluid Processing	Wet Hole				
Hole/Annular Volume and Differential Caliper Parameters					
HVOL Method	Single Caliper				
HVOL Caliper 1	Density Caliper				
HVOL Caliper 2	N/A				
Annular Volume Diameter	4.500	inches			
Caliper for Differential Caliper	Density Caliper				
Rwa Parameters					
Porosity used	Crossplot Porosity				
Resistivity used	Array Ind. One Res Rt				
RWA Constant A	0.620				
RWA Constant M	2.150				
SW/APOR Tool Source	0.000				

High Resolution Temperature Calibration MCG-D.K 431			Field Calibration on 07-MAR-2019,16:49		
	Measured	Calibrated(Deg F)			
Lower	50.00	50.00			
Upper	200.00	200.00			

High Resolution Temperature Constants MCG-D.K 431		Last Edited on 07-MAR-2018,11:29	
Pre-filter Length	11		

Gamma Calibration MCG-D.K 431			Field Calibration on 13-MAR-2019 09:40		
	Measured	Calibrated (API)			
Background	42	29			
Calibrator (Gross)	1864	1289			
Calibrator (Net)	1822	1260			

Gamma Calibration Tolerances MCG-D.K 431

Ratio 1.446  Counts/API

Gamma Constants MCG-D.K 431

Last Edited on 18-MAR-2019,21:41

Gamma Calibrator Number 046
 GRC-M Calibrator Jig in Use? NO
 Inactive Background Jig in Use? NO
 Mud Density 1.09 gm/cc
 Caliper Source for Processing Density Caliper
 Tool Position Eccentred
 Potassium Equivalence Chloride
 K Mud Concentration 0.00 %

Caliper Calibration MMR-A 30

Base Calibration on 07-MAR-2019 16:24
 Field Calibration on 13-MAR-2019 10:26

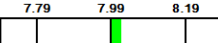
Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14693	5.96
2	17956	7.99
3	21263	9.86
4	25276	11.88
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.02	7.99

Caliper Calibration Tolerances MMR-A 30

Short Arm Field Cal. 8.02  in

Micro Normal and Micro Inverse Calibration MMR-A 30

Base Calibration on 07-MAR-2019 16:16
 Field Check on 13-MAR-2019 09:43

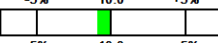
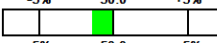
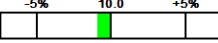
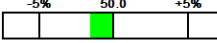
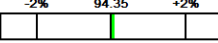
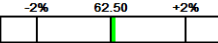
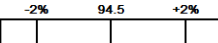
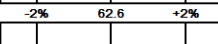
	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0

Base Calibration

	Measured	Calibrated (ohm-m)
Micro Normal	9.9 49.3	5.1 25.6
Micro Inverse	9.9 49.2	3.4 16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	94.5	94.5
Micro Inverse	62.6	62.6

Micro Normal & Micro Inverse Calibration Tolerance MMR-A 30

Micro Normal Res. 1	9.9		ohm	Micro Normal Res. 2	49.3		ohm
Micro Inverse Res. 1	9.9		ohm	Micro Inverse Res. 2	49.2		ohm
Micro Normal Base Check	94.5		ohm-m				
Micro Inverse Base Check	62.6		ohm-m				
Micro Normal Field Check	94.5		ohm-m				
Micro Inverse Field Check	62.6		ohm-m				

Micro Normal and Micro Inverse Constants MMR-A 30

Last Edited on 10-JAN-2019,12:10

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

Cablehead, 11 pin
CBH-CA 177 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor
SHA-J.A 450 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 431 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-A 30 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron
MDN-A.B 152 LG: 5.04 ft WT: 50.7 lb OD: 2.240 in

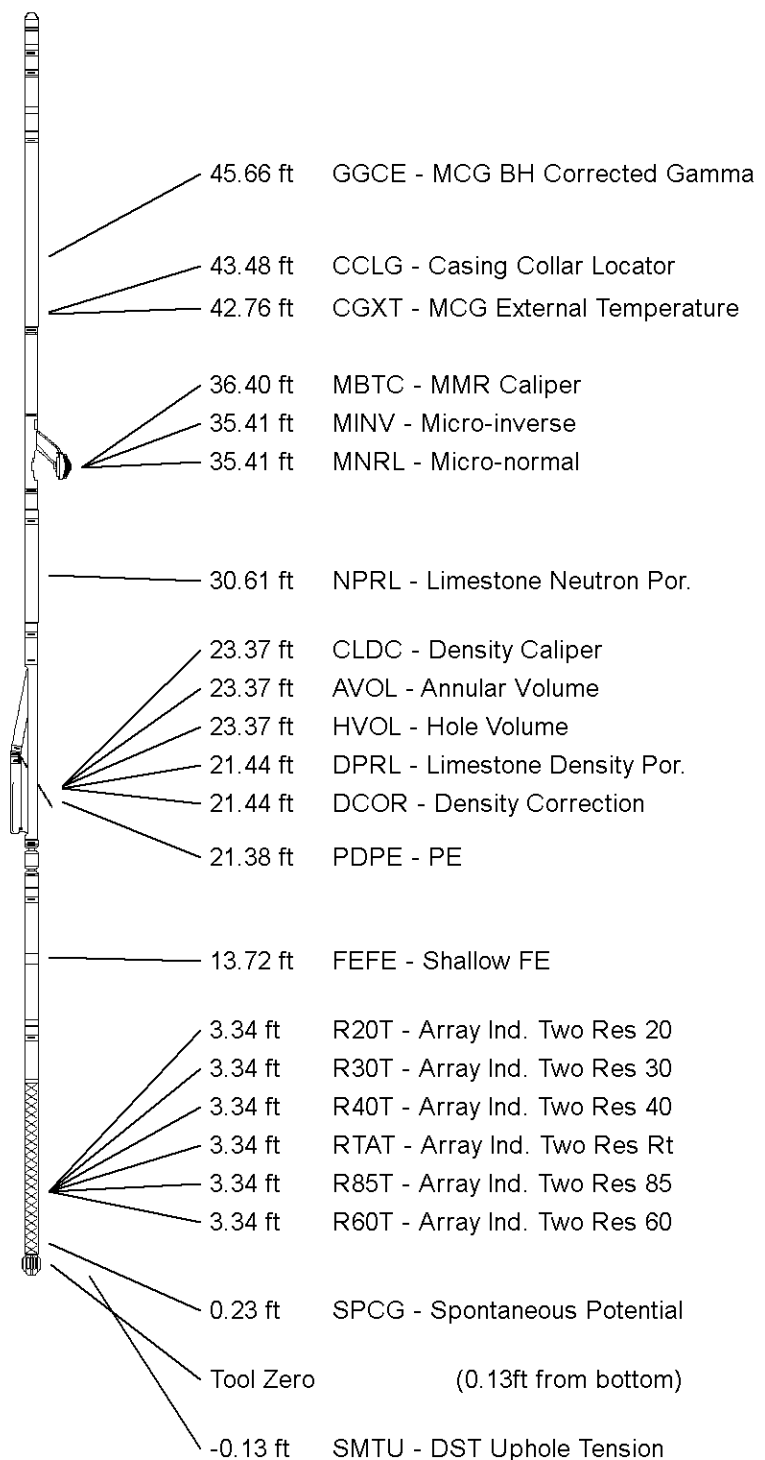
Compact Density/Caliper
MPD-B 166 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Knuckle Joint
SKJ-E.B 474 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric
MFE-B.J 359 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-B.J 375 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 55.64 ft Weight: 454.2 lb



All measurements relative to tool zero.

COMPANY	SHAKESPEAR OIL CO., INC.
WELL	OTTLEY 4-27
FIELD	SMOKY HILL
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	USA / KANSAS

Elevation Kelly Bushing	2673	feet	First Reading	4364.59	feet
Elevation Drill Floor	2671	feet	Depth Driller	4400.00	feet
Elevation Ground Level	2665	feet	Depth Logger	4400.00	feet



