MICRORESISTIVITY LOG

COMPANY	GRAND MESA OPERATING CO.
WELL	RIO LOBO 1-30
FIELD	WILDCAT
PROVINCE/COUNTY	WASHINGTON
COUNTRY/STATE	U.S.A. / COLORADO
LOCATION	SHL: 2474' FNL & 610' FWL

SEC 30	TWP 5S	RGE 53W
Latitude		39.586820
Longitude		-103.366370
API Number		05-121-11065

Other Services
ARRAY INDUCTION
COMPENSATED SONIC
DUAL SPACED NEUTRON
PHOTO DENSITY

Permanent Datum GL, Elevation 5138 feet
Log Measured From KB, 19.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	5157.00
DF	5157.00
GL	5138.00

Date	04-JUL-2017			
Run Number	ONE			
Service Order	8367-186414219			
Depth Driller	8099.00	feet		
Depth Logger	8095.00	feet		
First Reading	8036.00	feet		
Last Reading	376.00	feet		
Casing Driller	386.00	feet		
Casing Logger	386.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg		76.00 CP	
PH / Fluid Loss	---		---	
Sample Source	FLOWLINE			
Rm @ Measured Temp	1.20 @ 50.0	ohm-m		
Rmf @ Measured Temp	0.96 @ 50.0	ohm-m		
Rmc @ Measured Temp	1.44 @ 50.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.347 @183.0	ohm-m		
Time Since Circulation	12 HOURS			
Max Recorded Temp	183.00	deg F		
Equipment / Base	13174		CASPER	
Recorded By	ANDREW EASTAUGHFFE			
Witnessed By	KENT MATSON			

BOREHOLE RECORD

Last Edited: 05-JUL-2017 02:23

Bit Size inches	Depth From feet	Depth To feet
7.875	386.00	8099.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	386.00	24.00

REMARKS

- SOFTWARE: LOGGED WITH WLS 17.01.7206

- RUN ONE: MAI, MFE, MSS, SKJ, MISE, SKJ, MISD, MPD, MDN, MMR(MML), MCG, SHA, MTA, CBH RUN IN COMBINATION.
  - HARDWARE: MDN: DUAL BOWSPRING ECCENTRALIZER
  MPD: 8 INCH PROFILE PLATE
  MFE: 1 X 0.5 INCH STANDOFF
  MSS: 3 X 0.5 INCH STANDOFFS
  MAI 1 X 0.5 INCH STANDOFF AT TOP, 1 X 0.5 INCH PINEAPPLE STANDOFF AT BOTTOM.

- RUN TWO: HFS, MISD, MIE, MIM, MCG, SHA, MTA, CBH RUN IN COMBINATION.
  HARDWARE: MIM: OVERBODY CENTRALIZER BASKET
  MIE: PROTECTIVE STANDOFF AT BASE

- 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: 3440 CU.FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 2190 CU.FT.

- LATITUDE: 39.586820

- LONGITUDE: -103.366370

- MAG DEC FROM NOAA WEBSITE: 7.38 DEG EAST

- RIG: WW DRILLING #20.

- ENGINEER: A. A. EASTAUGHFFE

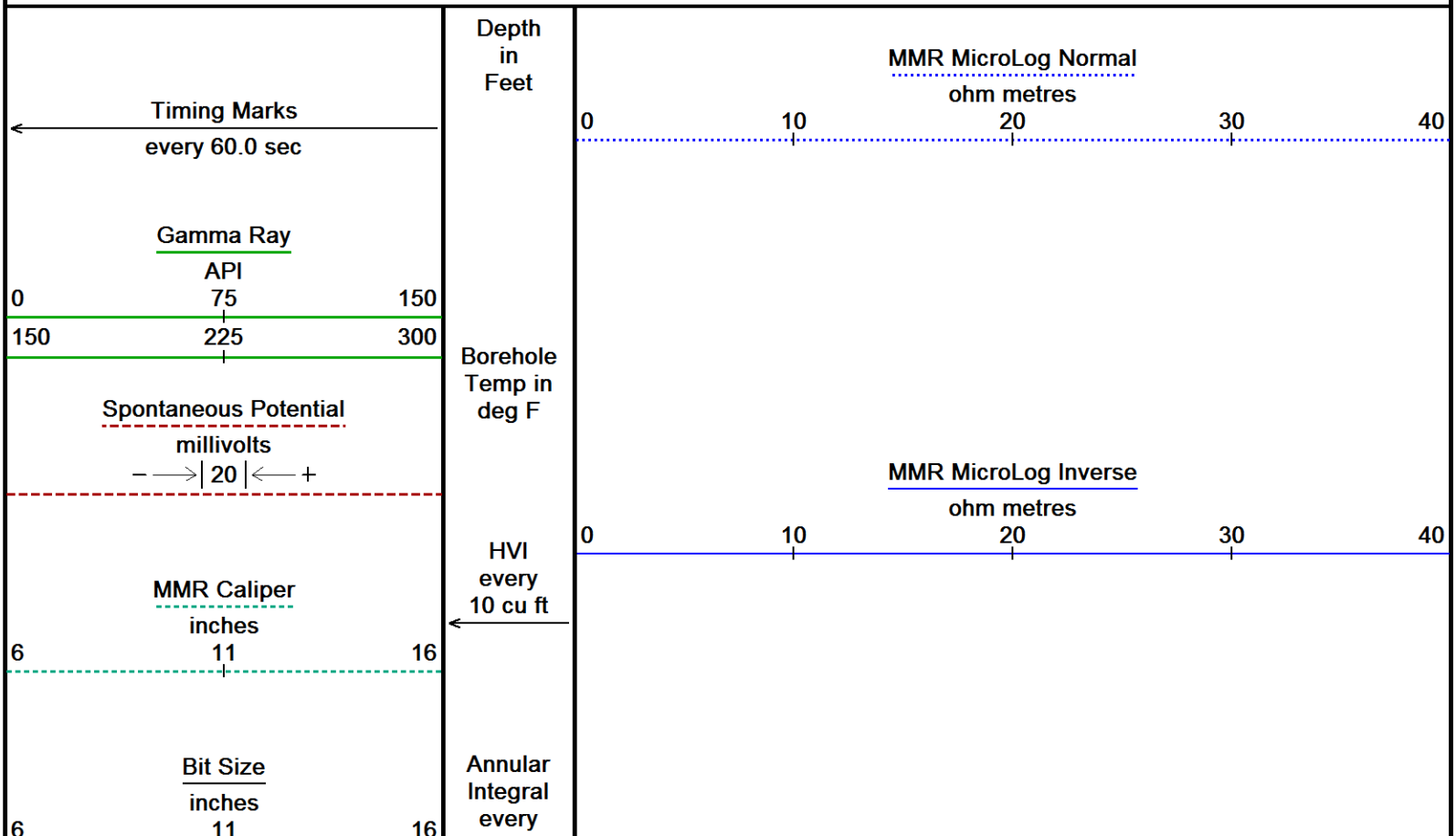
- OPERATOR: P. B. MEYER

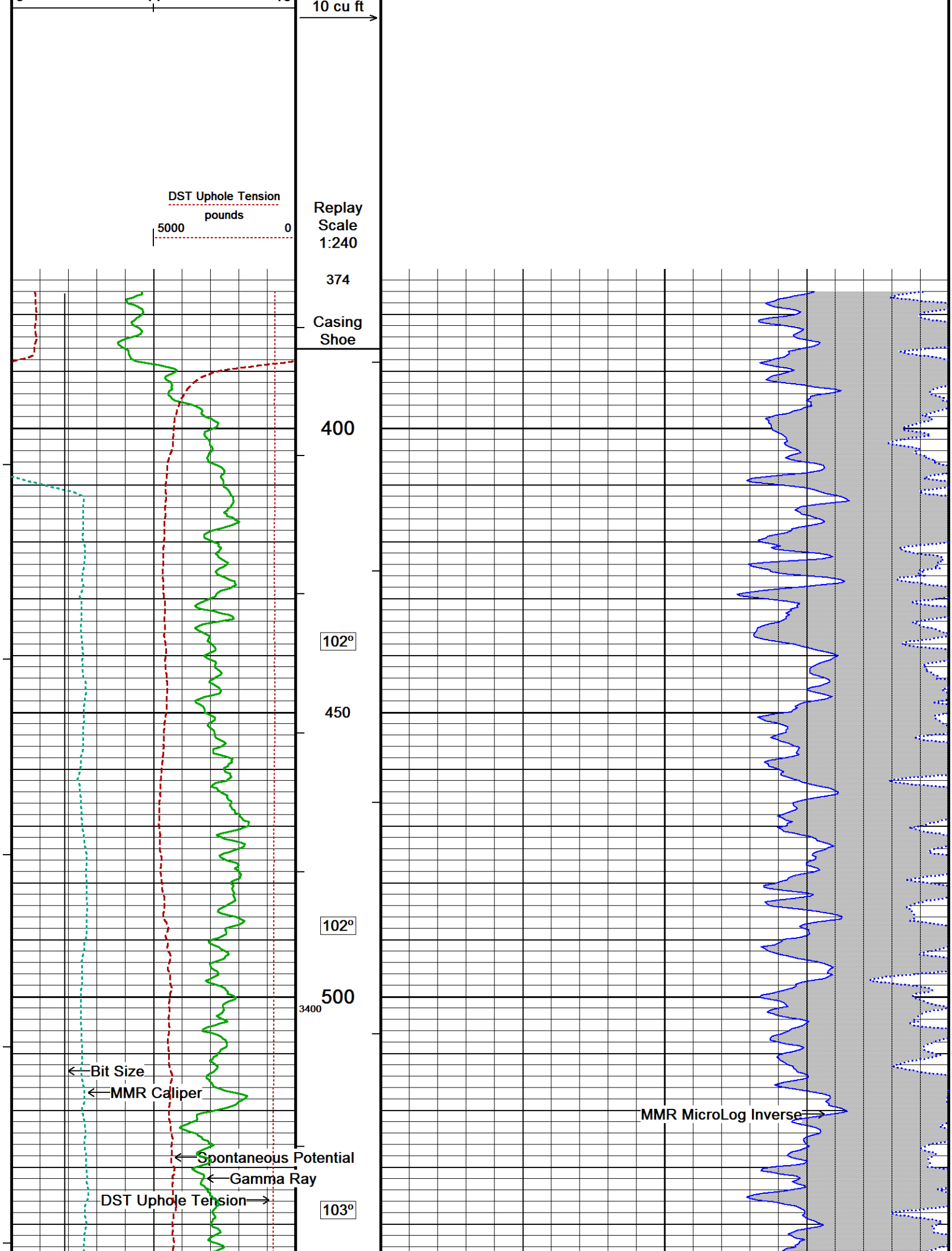
5 INCH MAIN

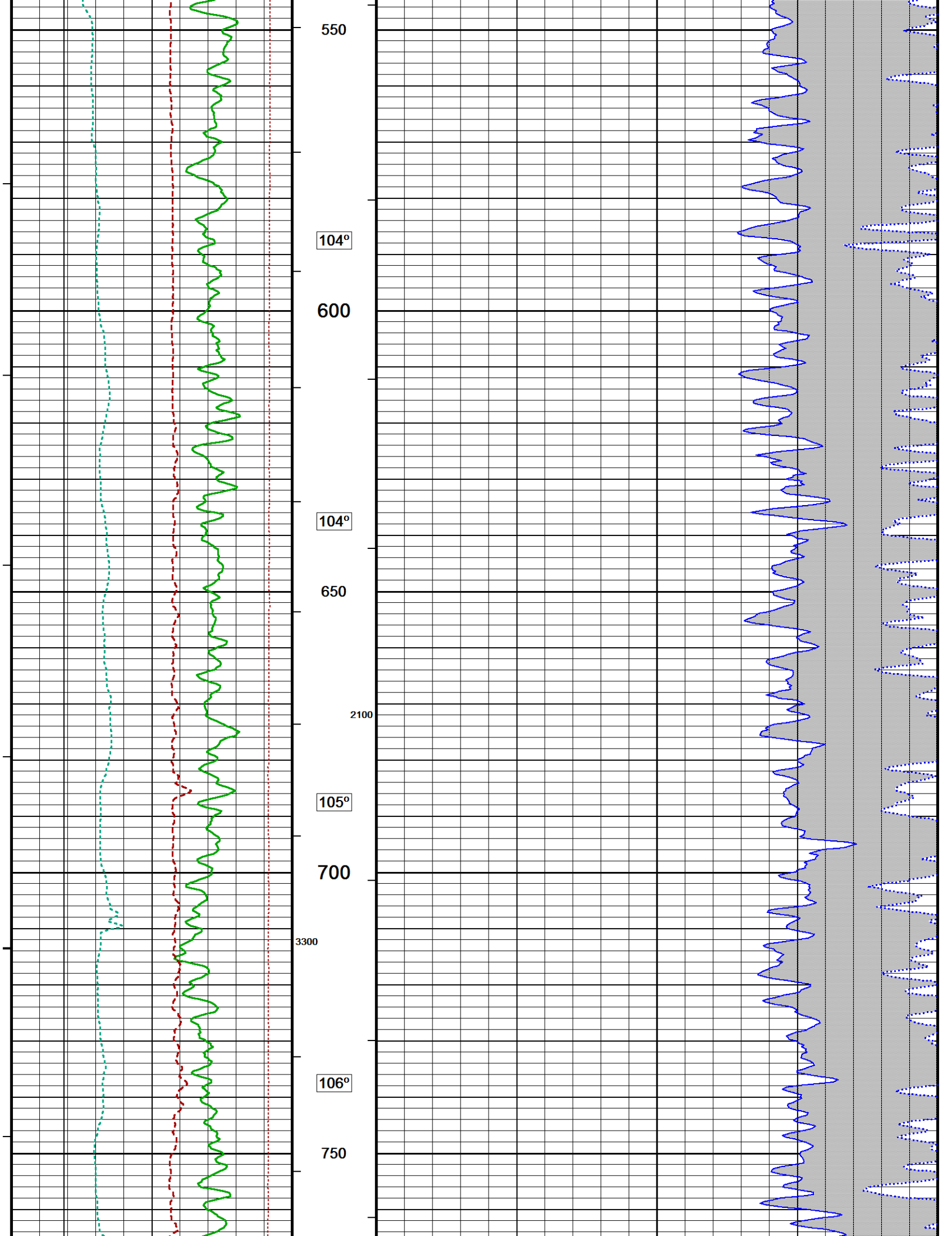
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-JUL-2017 13:26

Filename: C:\Logs\GRAND MESA OPERATING\RIO LOB...\MAIN PASS QUAD COMBO SPLICED.dta — Recorded on 05-JUL-2017 02:31

System Versions: Processed with 17.01.7206 Plotted with 17.01.7206




10 cu ft
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
374
Casing
Shoe
400
102°
450
102°
500
3400
Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
103°
MMR MicroLog Inverse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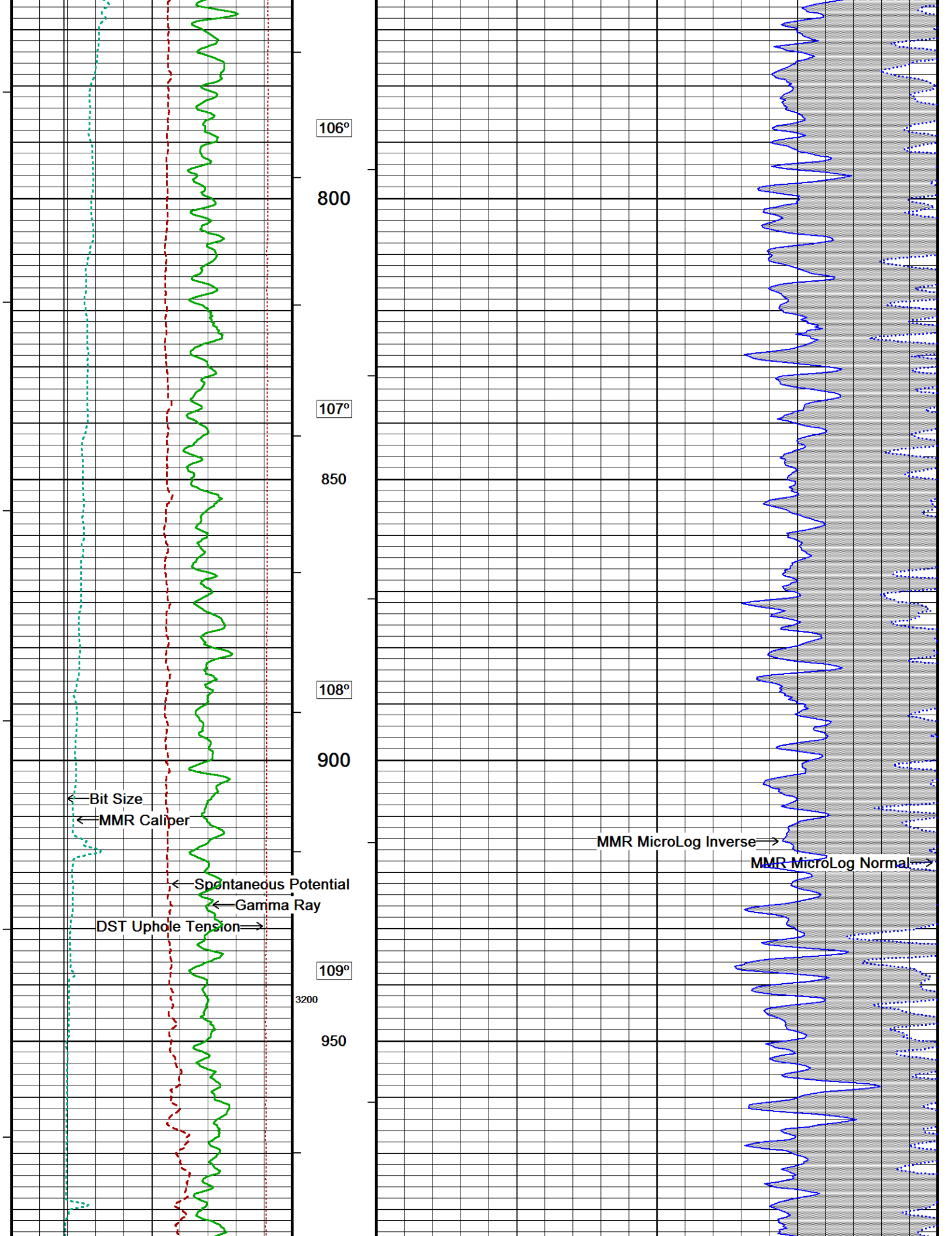
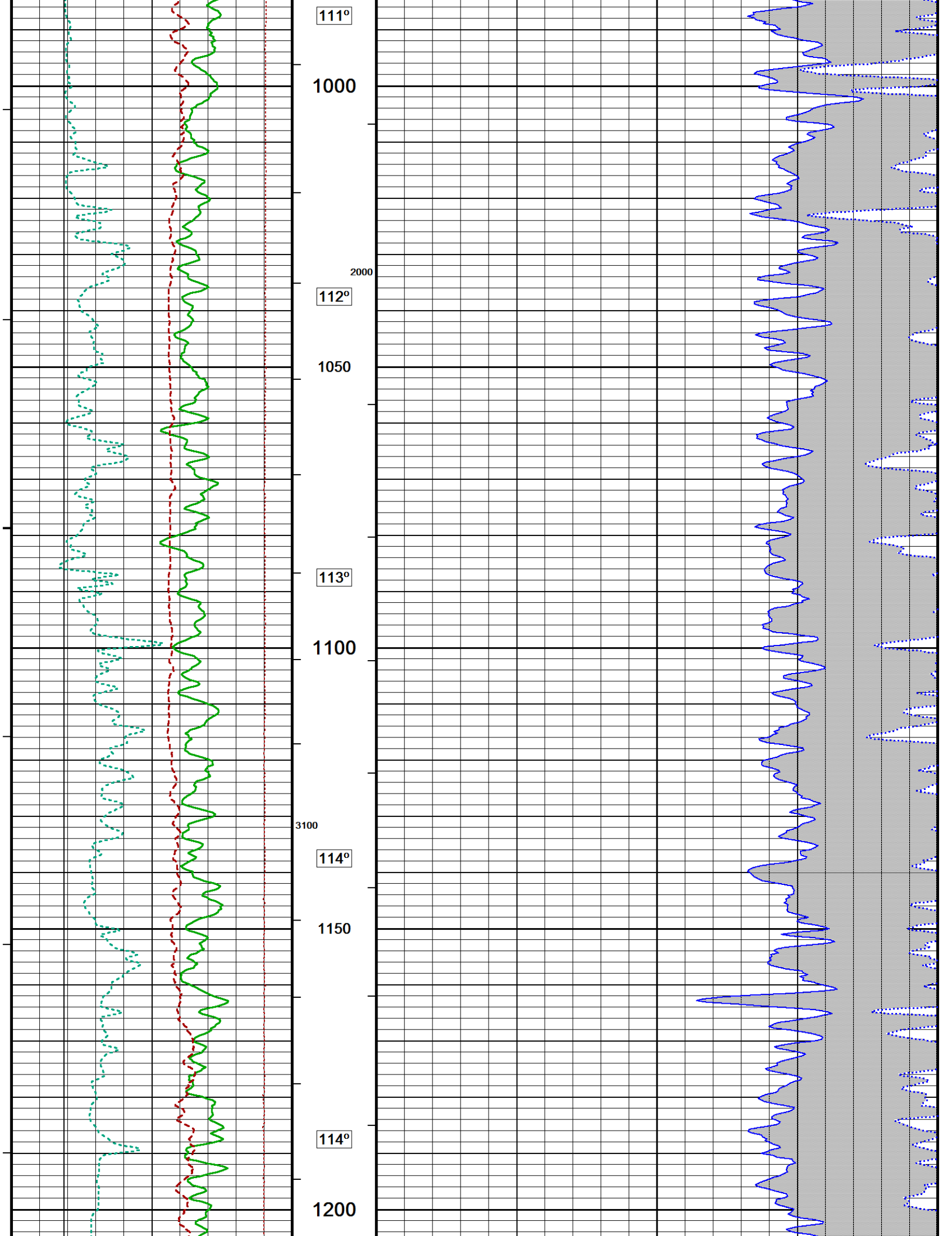
600
104°
650
2100
105°
700
3300
106°
750


106°
800
107°
850
108°
900
109°
3200
950
Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal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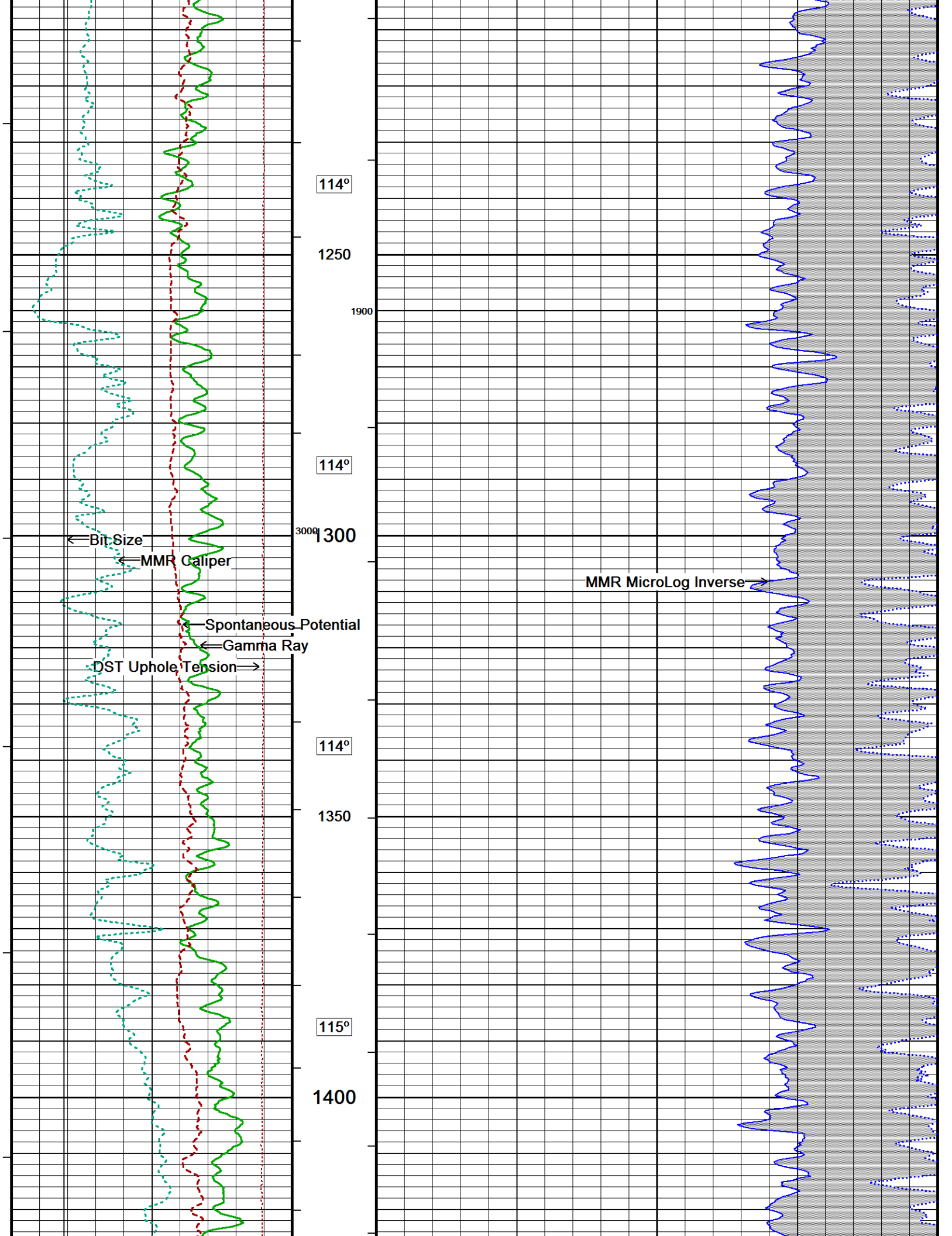
1000
2000
112º
1050
113º
1100
3100
114º
1150
114º
1200


114°
1250
1900
114°
3000
1300
Bit Size
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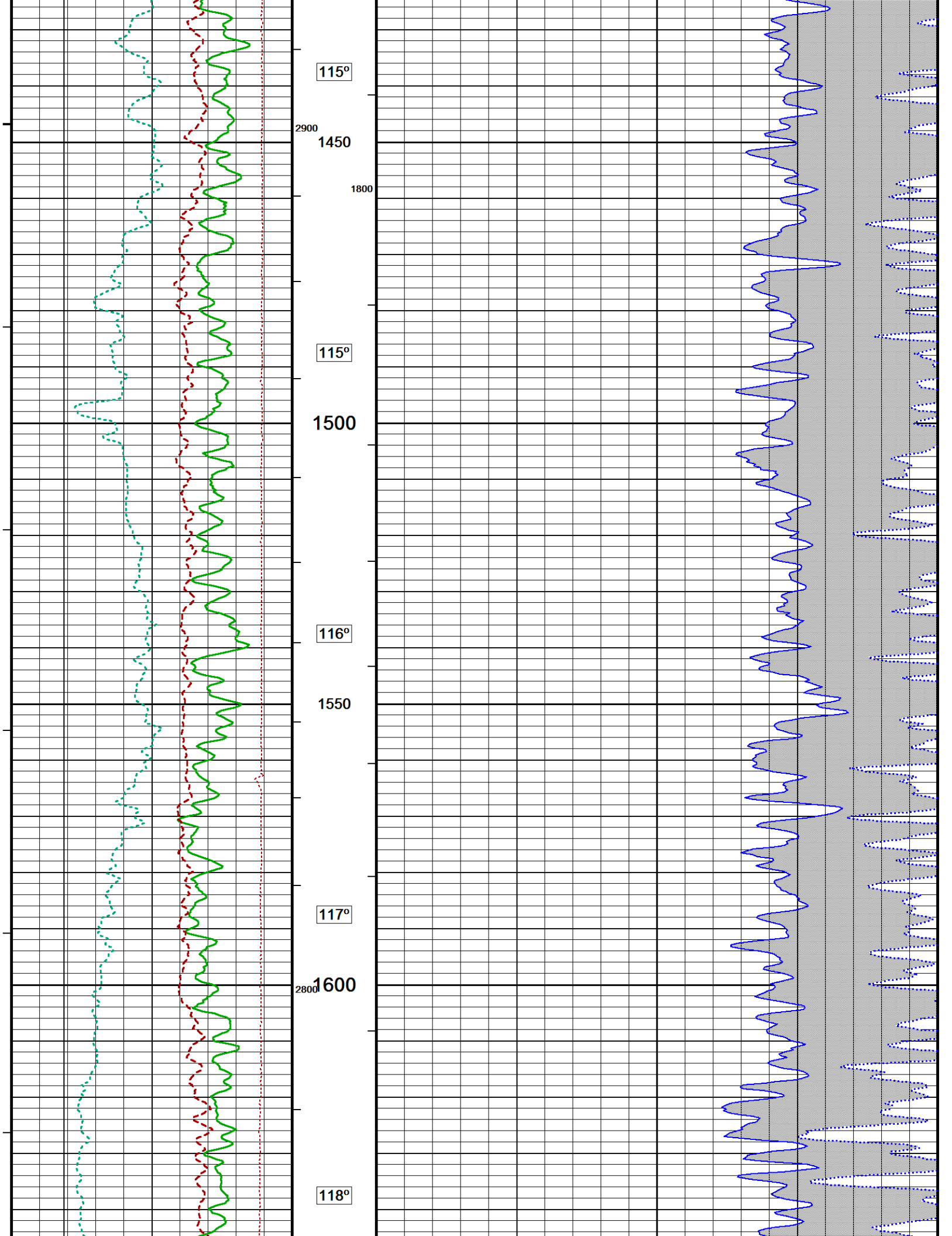
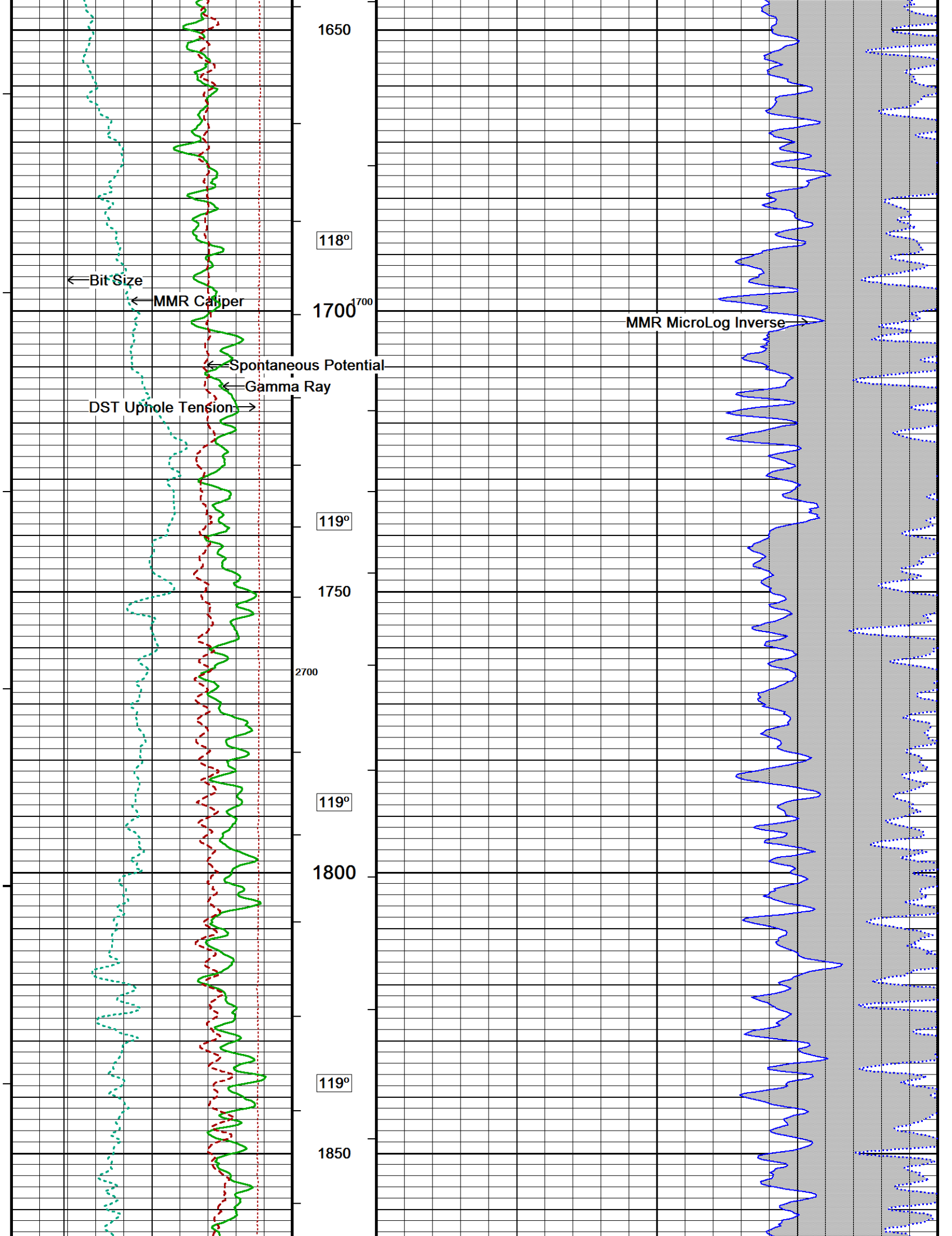
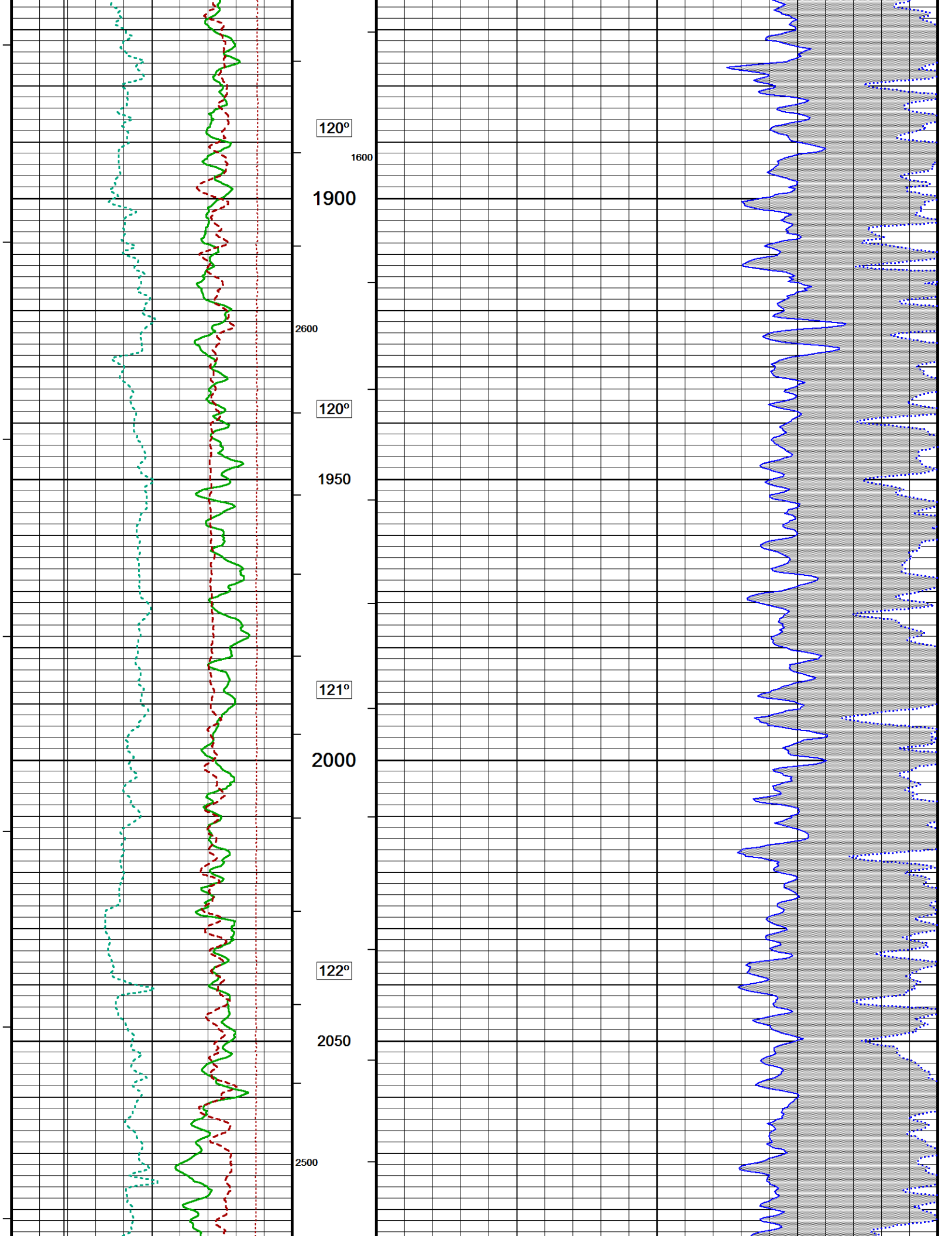
MMR MicroLog Inverse
Spontaneous Potential
Gamma Ray
DST Uphole Tension
114°
1350
115°
1400


115°
2900
1450
1800
115°
1500
116°
1550
117°
2800
1600
118°


1650
118°
Bit Size
MMR Caliper
1700
1700
MMR MicroLog Inverse
Spontaneous Potential
Gamma Ray
DST Uphole Tension
119°
1750
2700
119°
1800
119°
1850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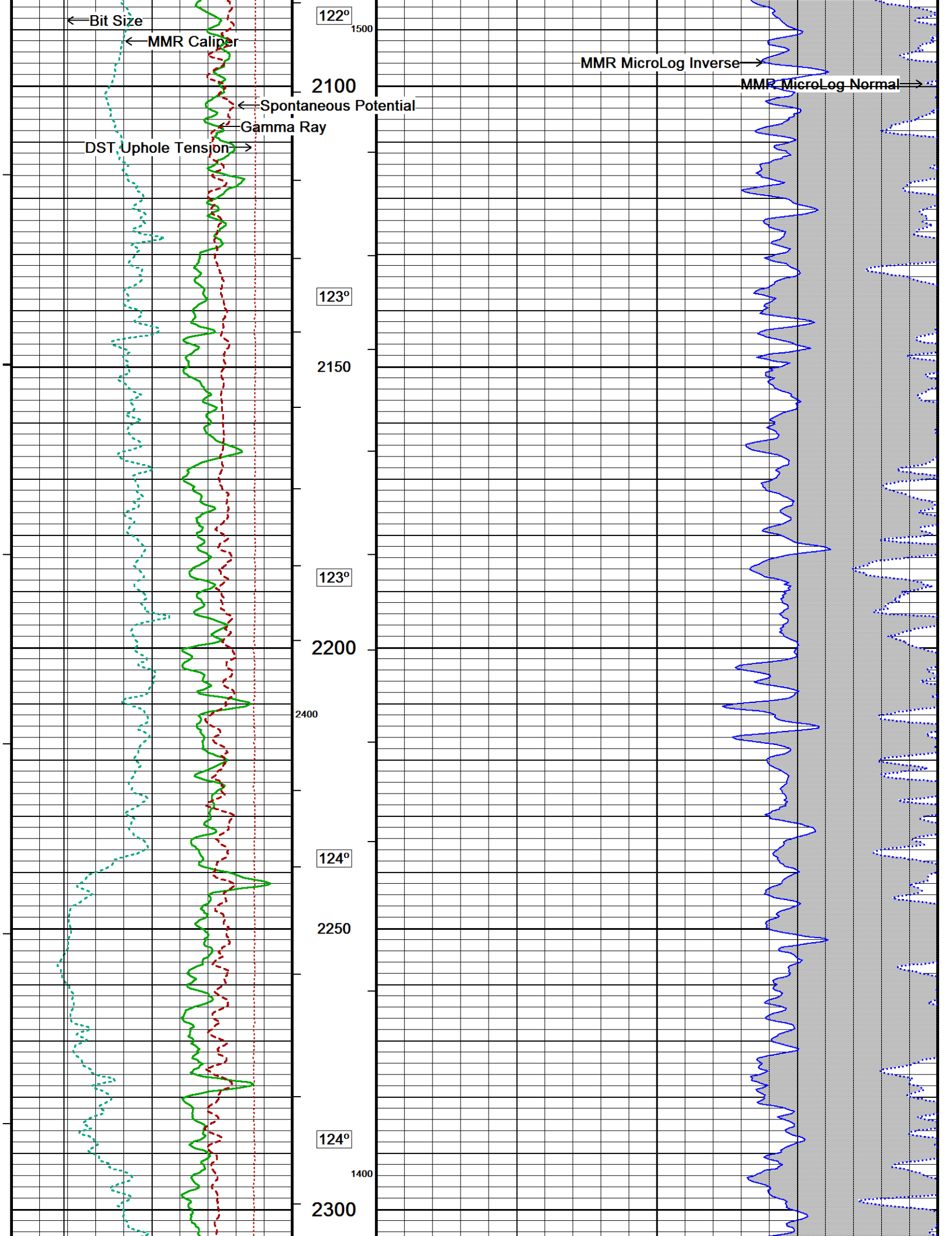
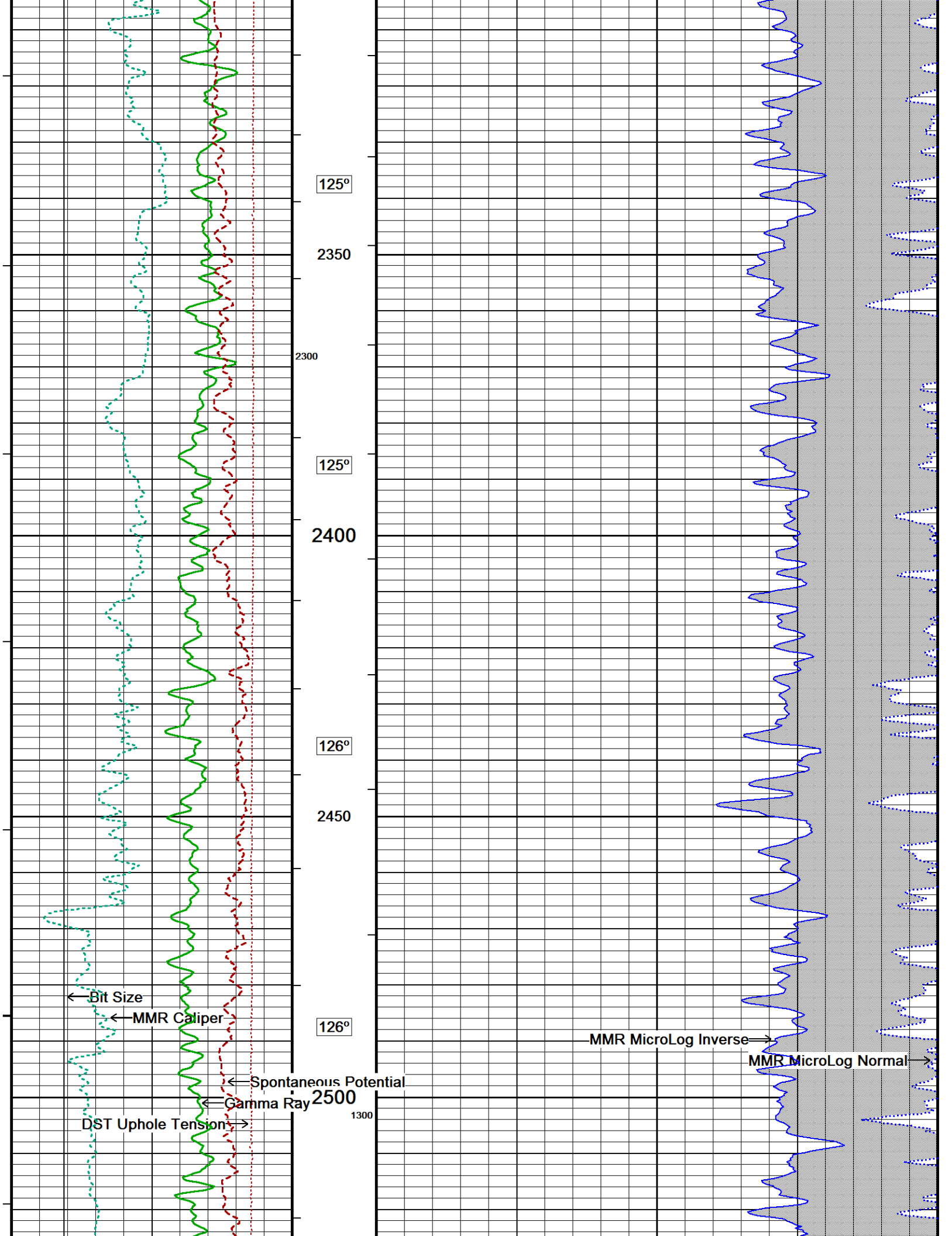
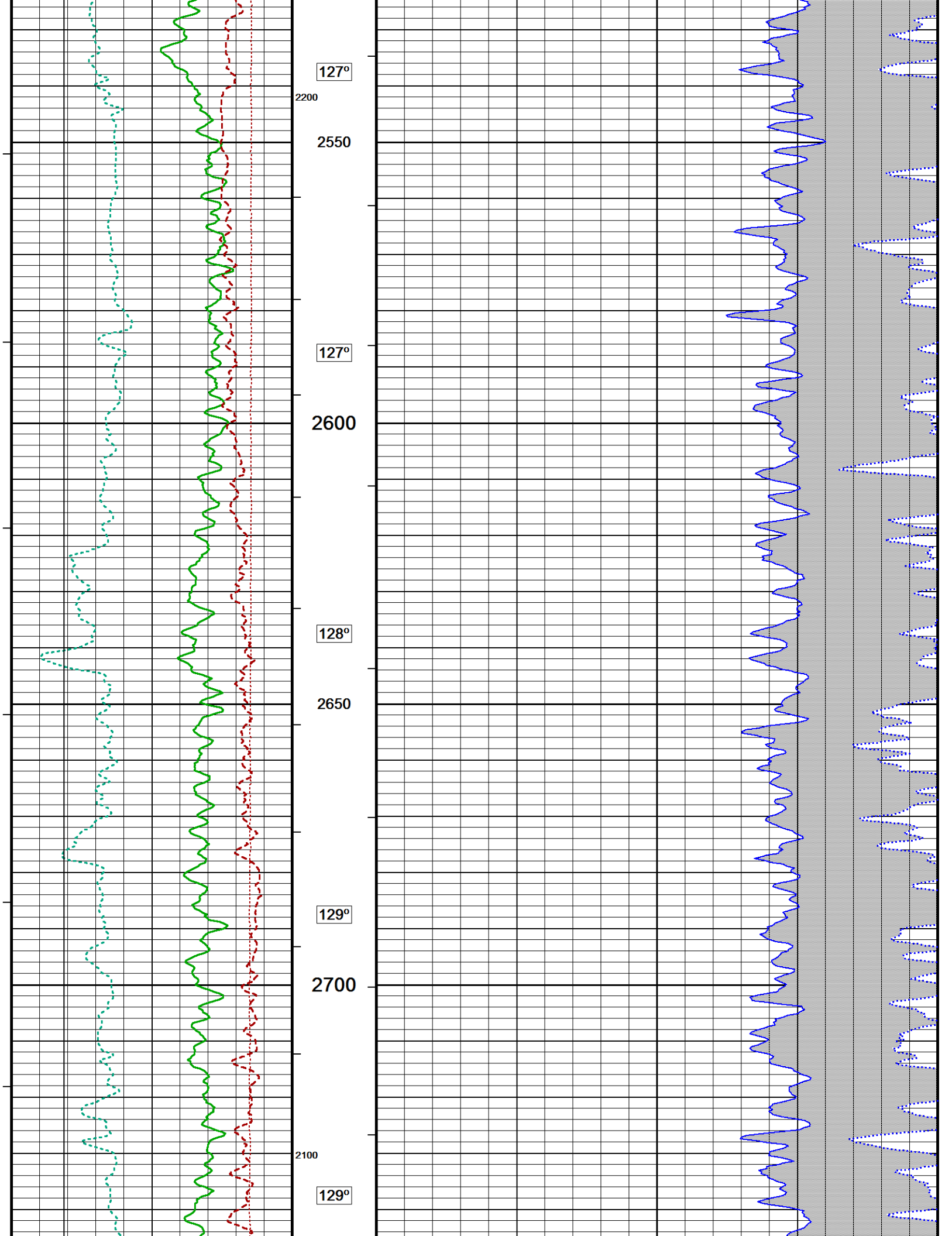
1600
1900
2600
120°
1950
121°
2000
122°
2050
2500


Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal
122°
1500
2100
123°
2150
123°
2200
2400
124°
2250
124°
1400
2300


125°
2350
2300
125°
2400
126°
2450
126°
2500
1300
Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal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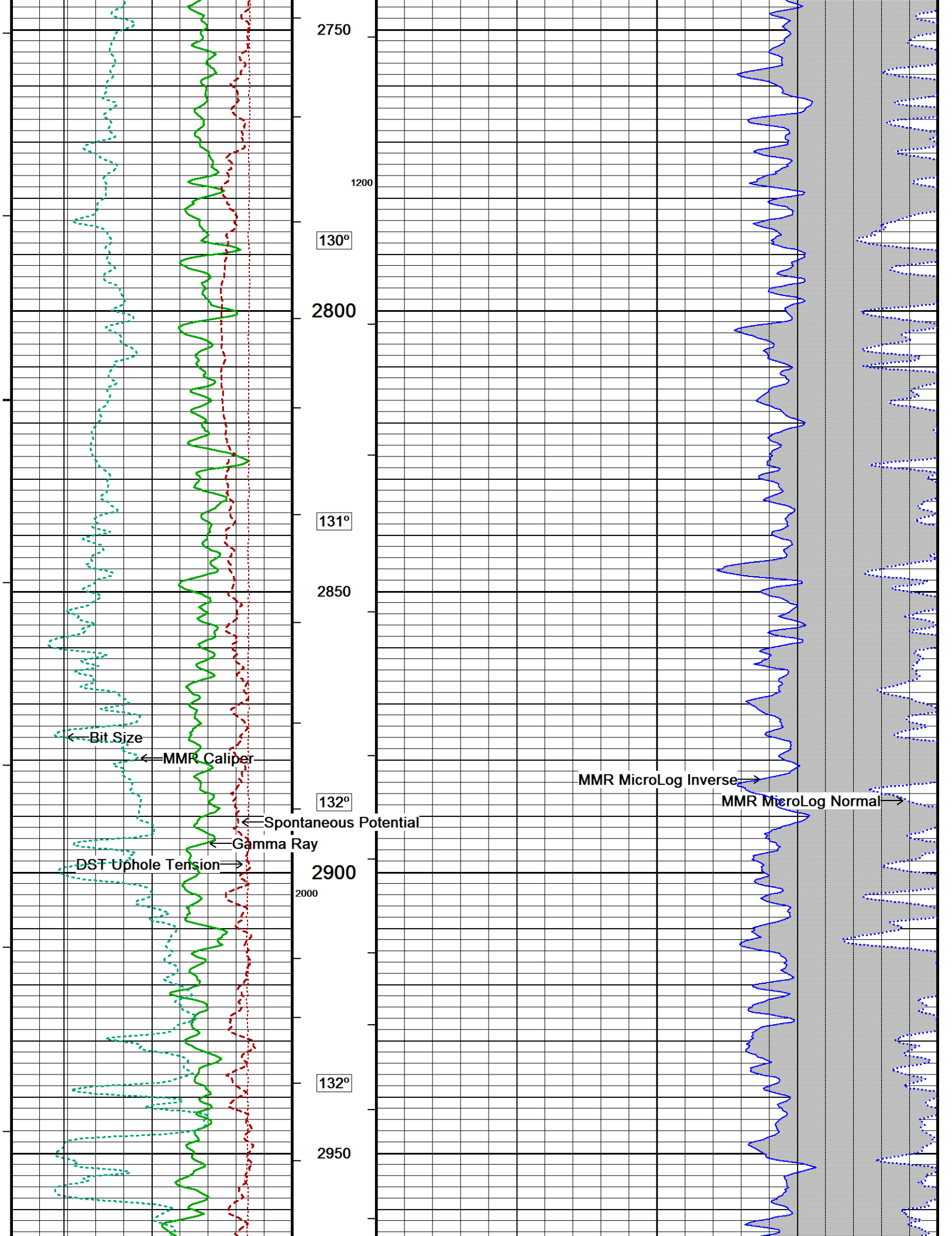
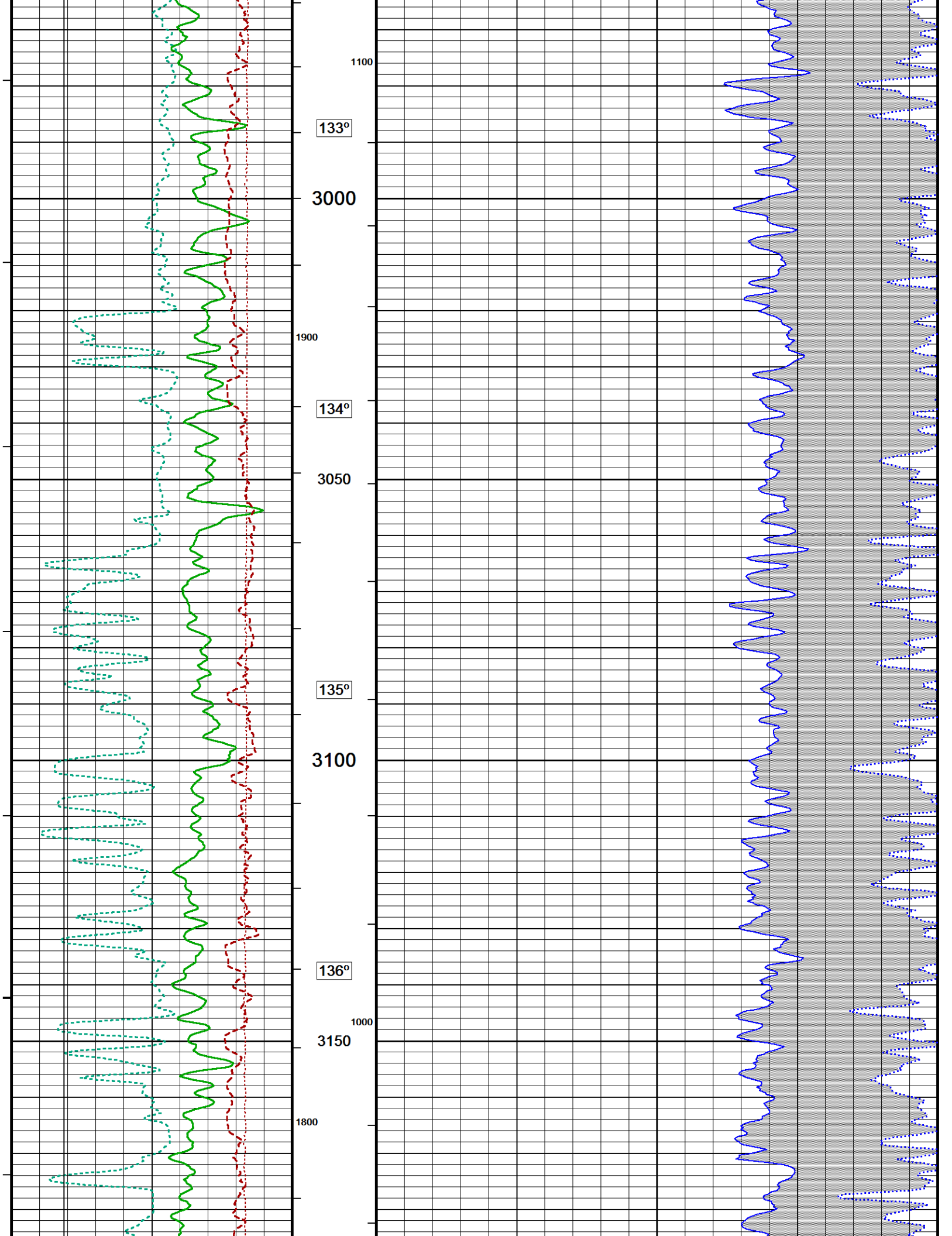
2200
2550
127°
2600
128°
2650
129°
2700
2100
129°


2750
1200
130°
2800
131°
2850
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
132°
Spontaneous Potential
Gamma Ray
DST Uphole Tension
2900
2000
132°
2950


1100
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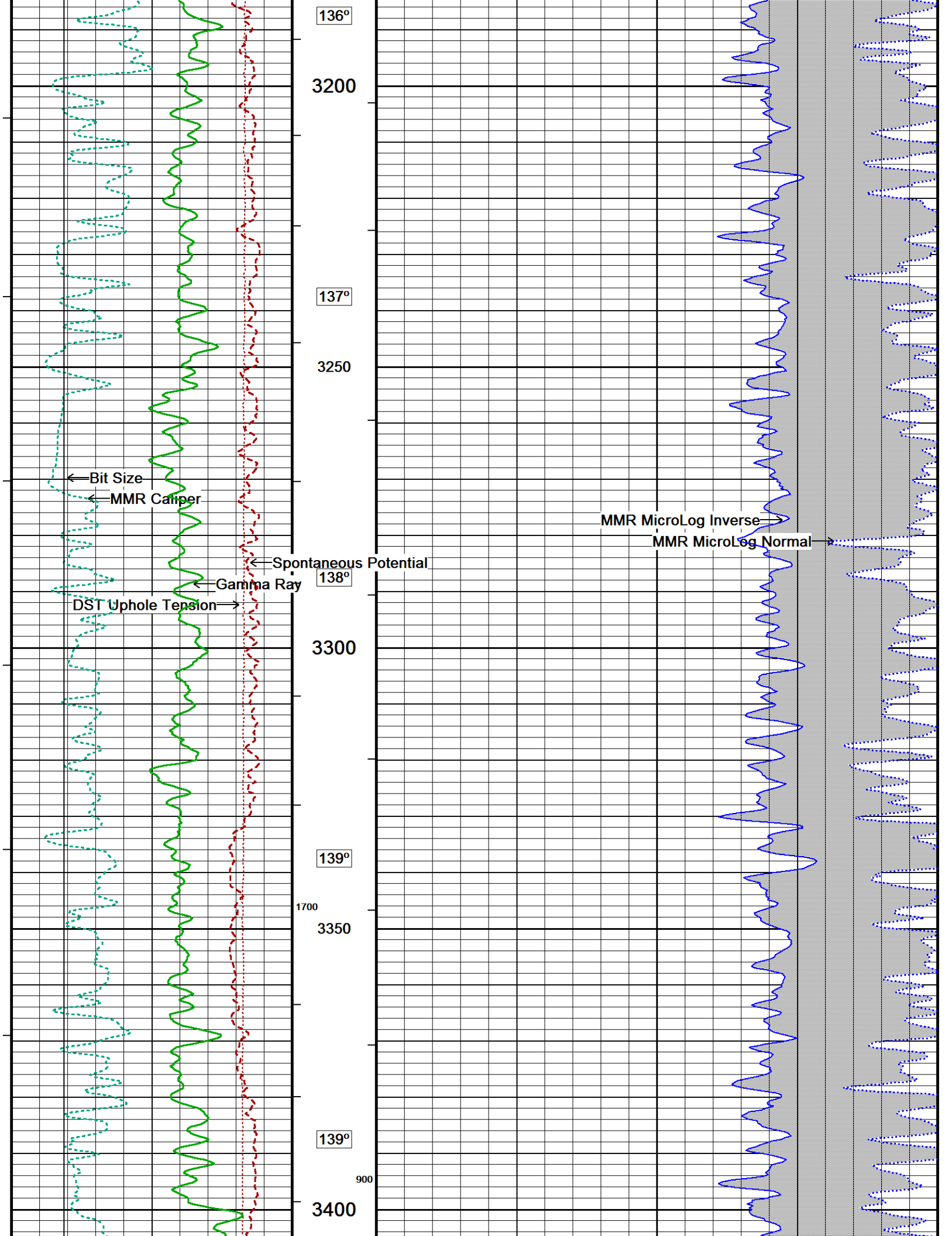
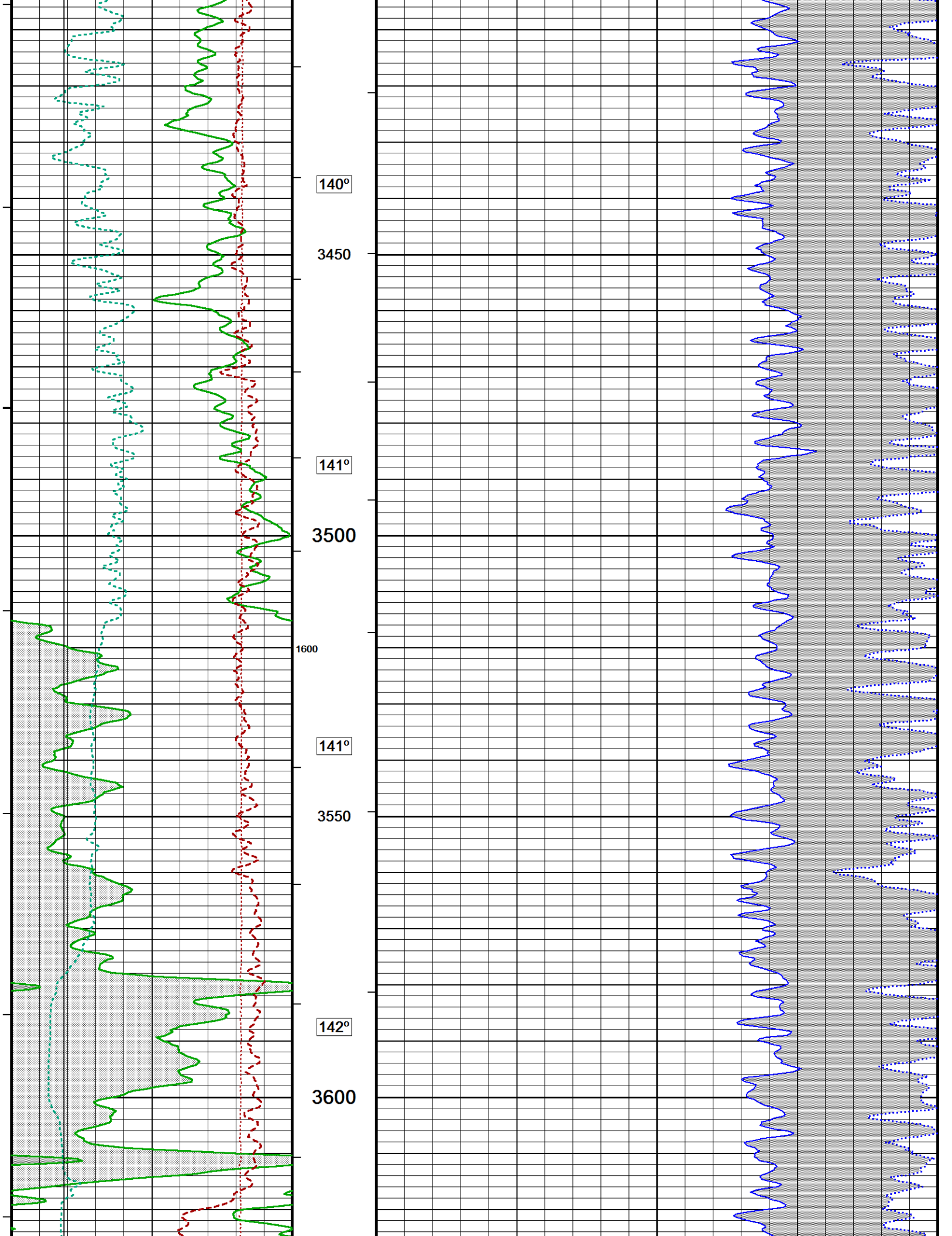
3000
1900
134°
3050
135°
3100
136°
1000
3150
1800


136°
3200
137°
3250
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
138°
Gamma Ray
DST Uphole Tension
3300
139°
1700
3350
139°
900
3400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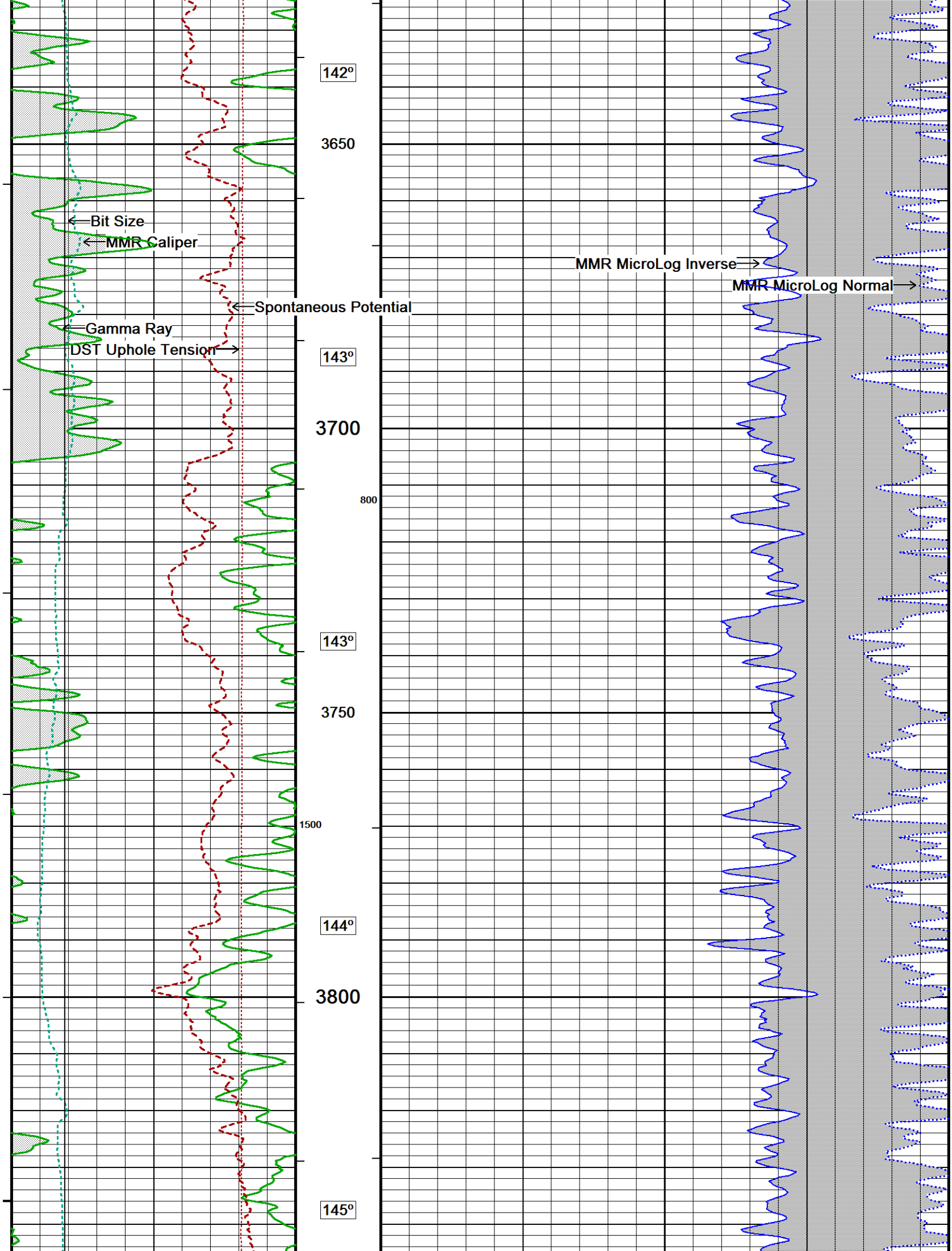
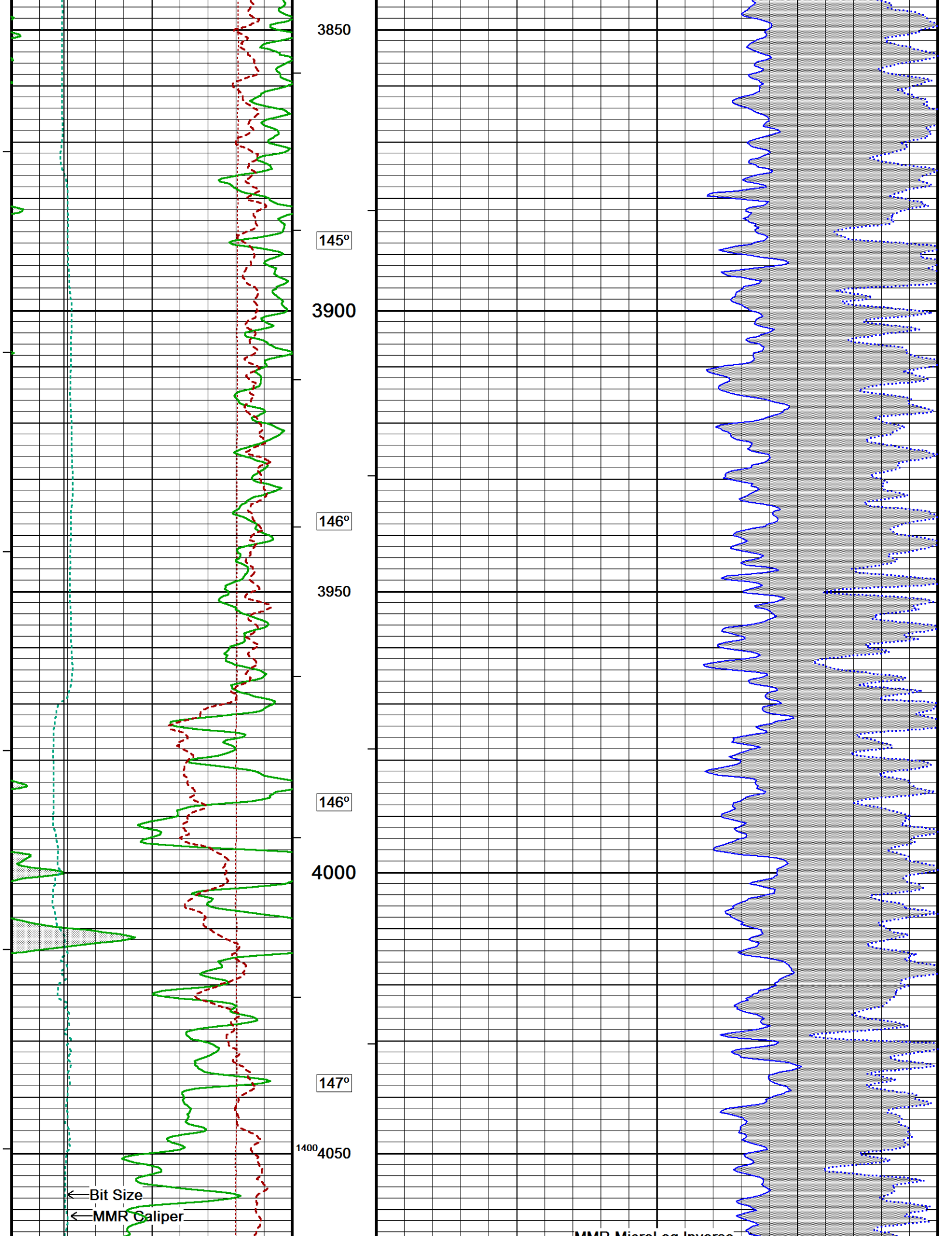
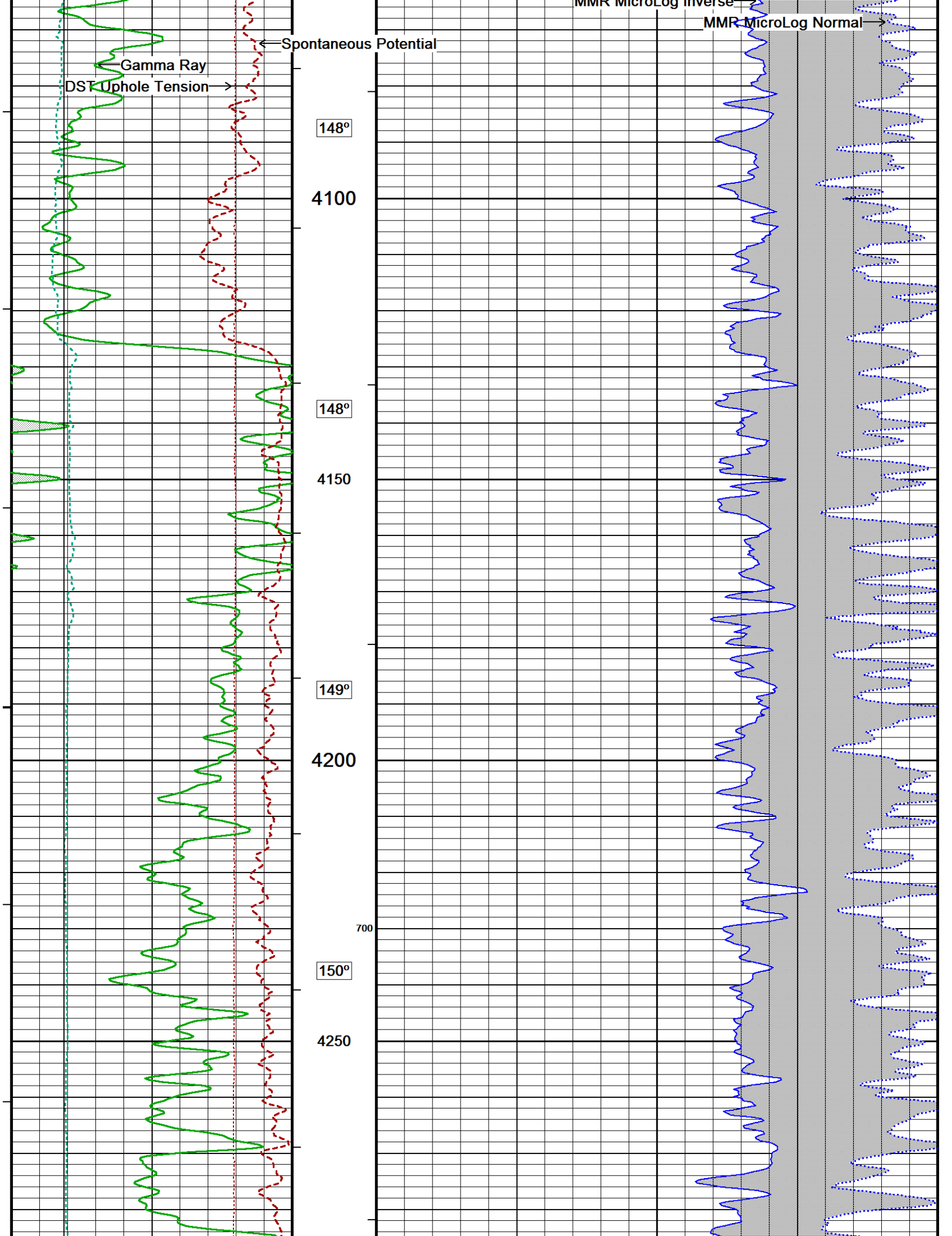
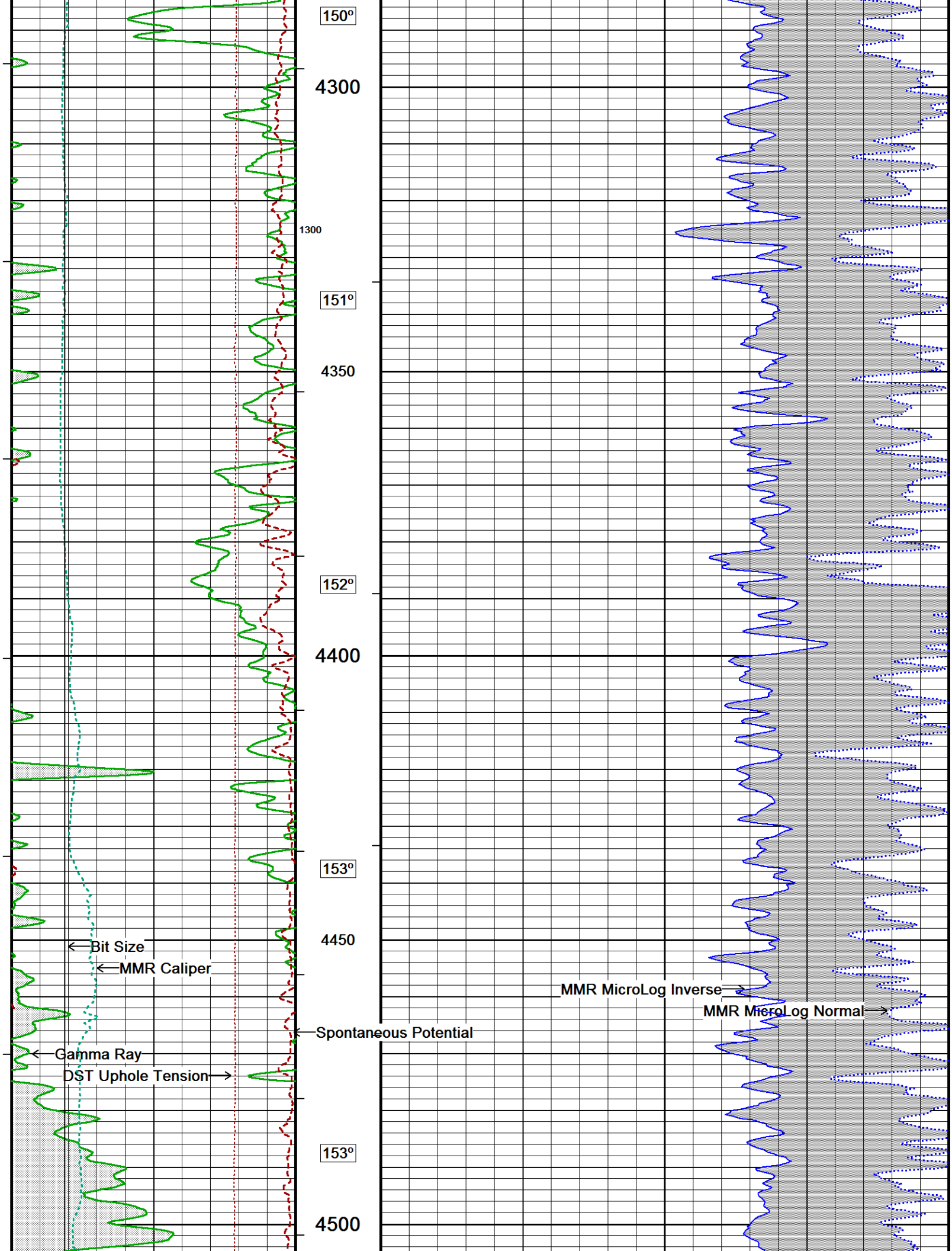
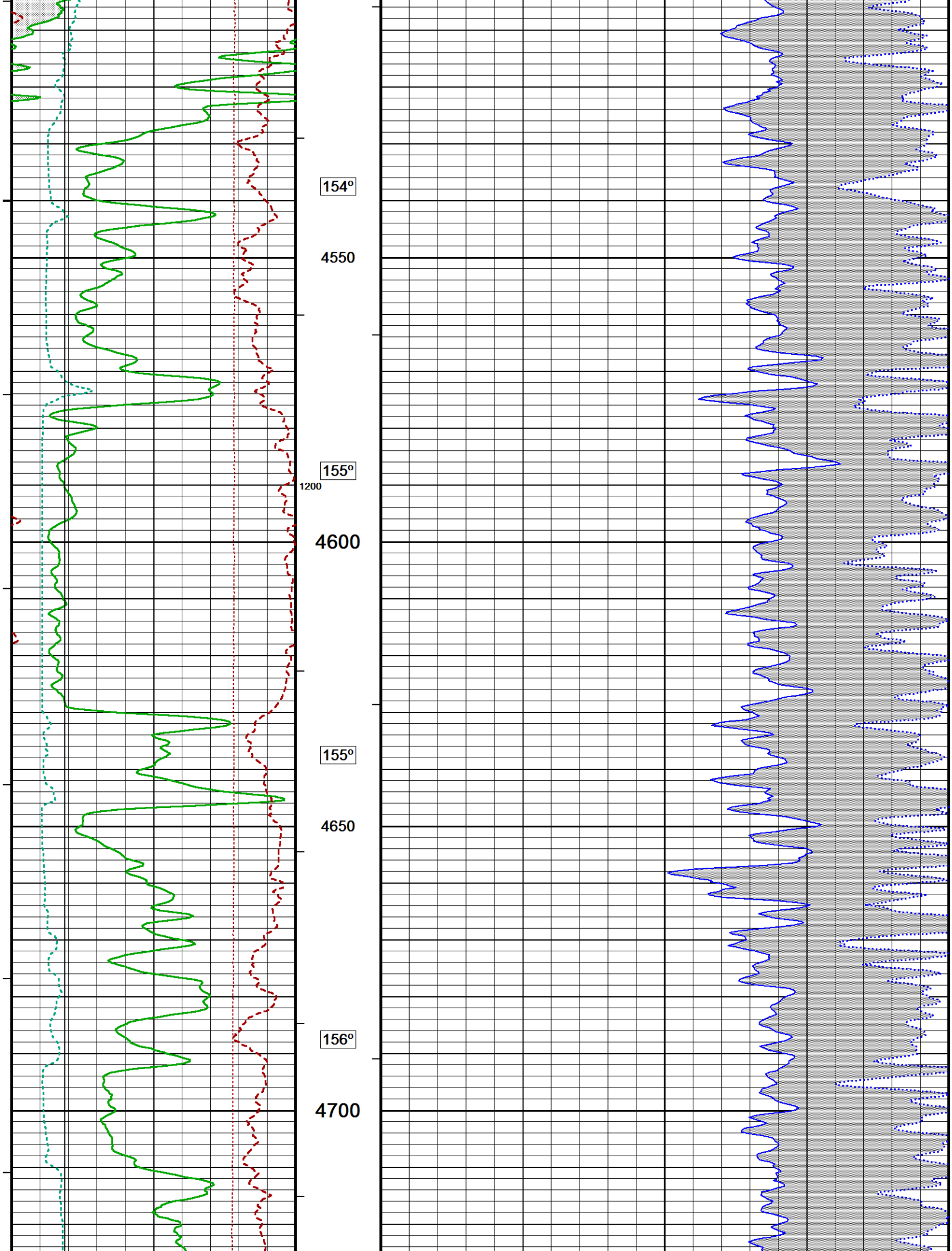
141°
3500
1600
141°
3550
142°
3600

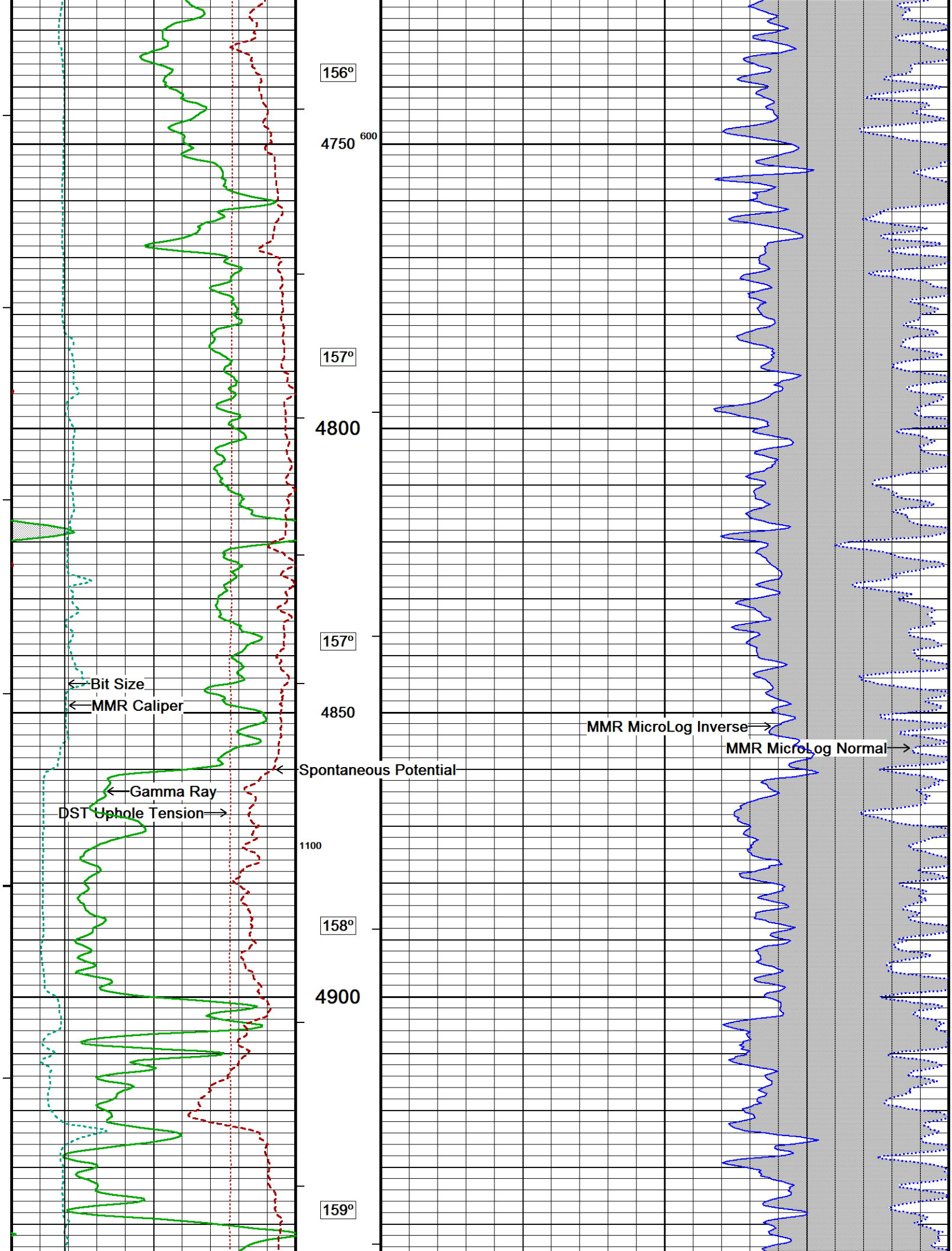

142°
3650
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
143°
3700
800
143°
3750
1500
144°
3800
145°

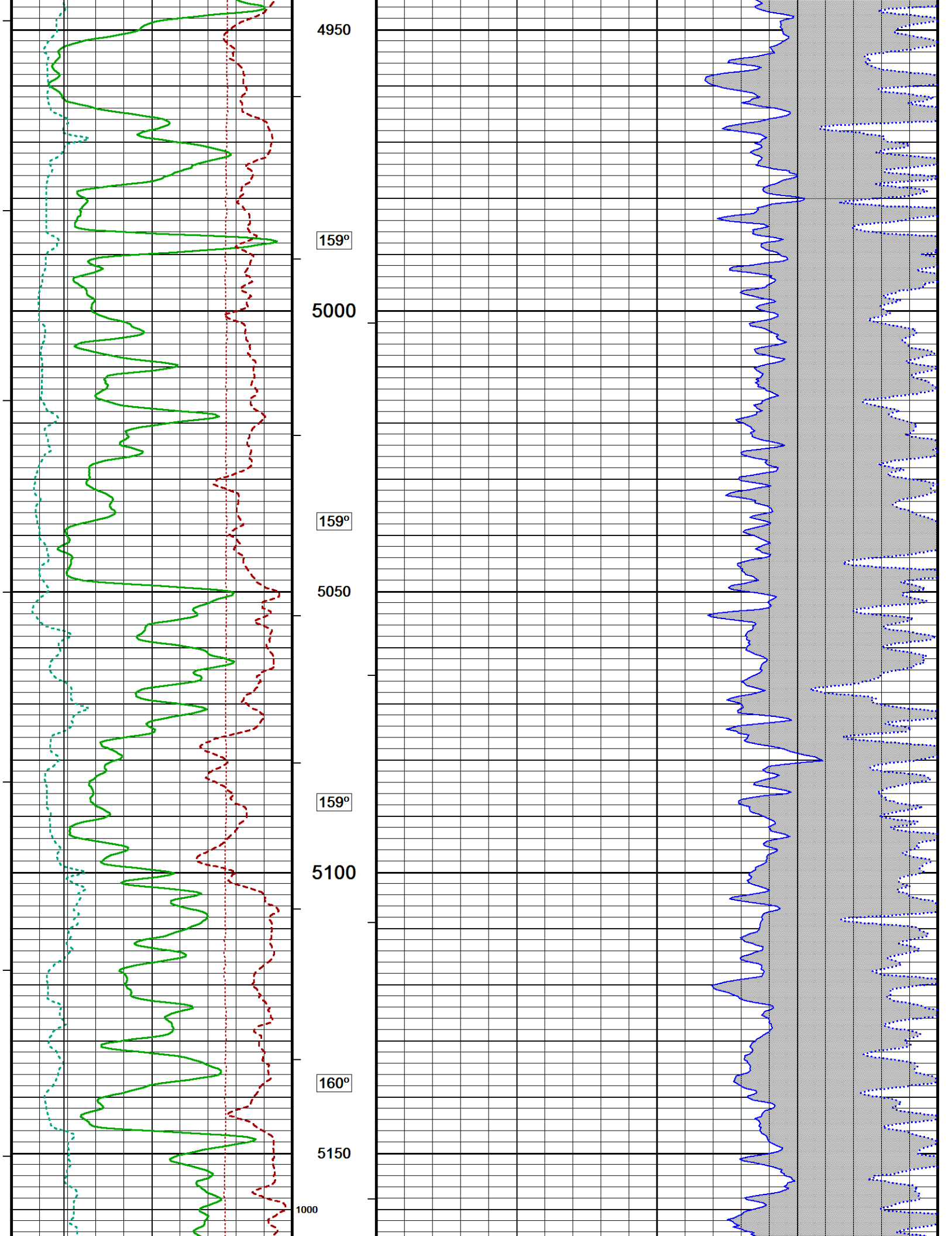

3850
145°
3900
146°
3950
146°
4000
147°
1400
4050
←Bit Size
←MMR Caliper


MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
148°
4100
148°
4150
149°
4200
700
150°
4250


150°
4300
1300
151°
4350
152°
4400
153°
4450
153°
4500
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension


154°
4550
155°
1200
4600
155°
4650
156°
4700


156°
4750
600
157°
4800
157°
Bit Size
MMR Caliper
4850
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
1100
158°
4900
159°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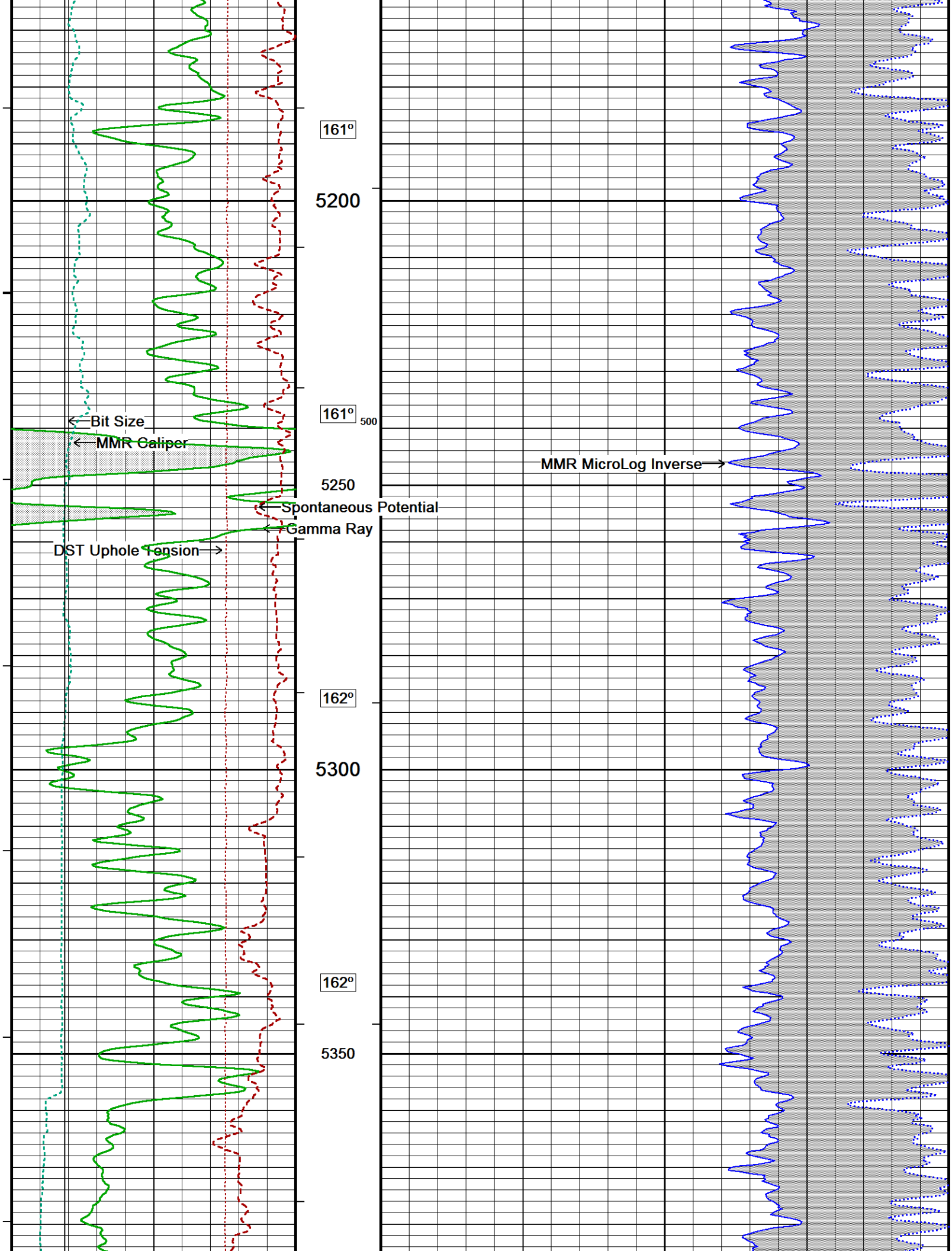
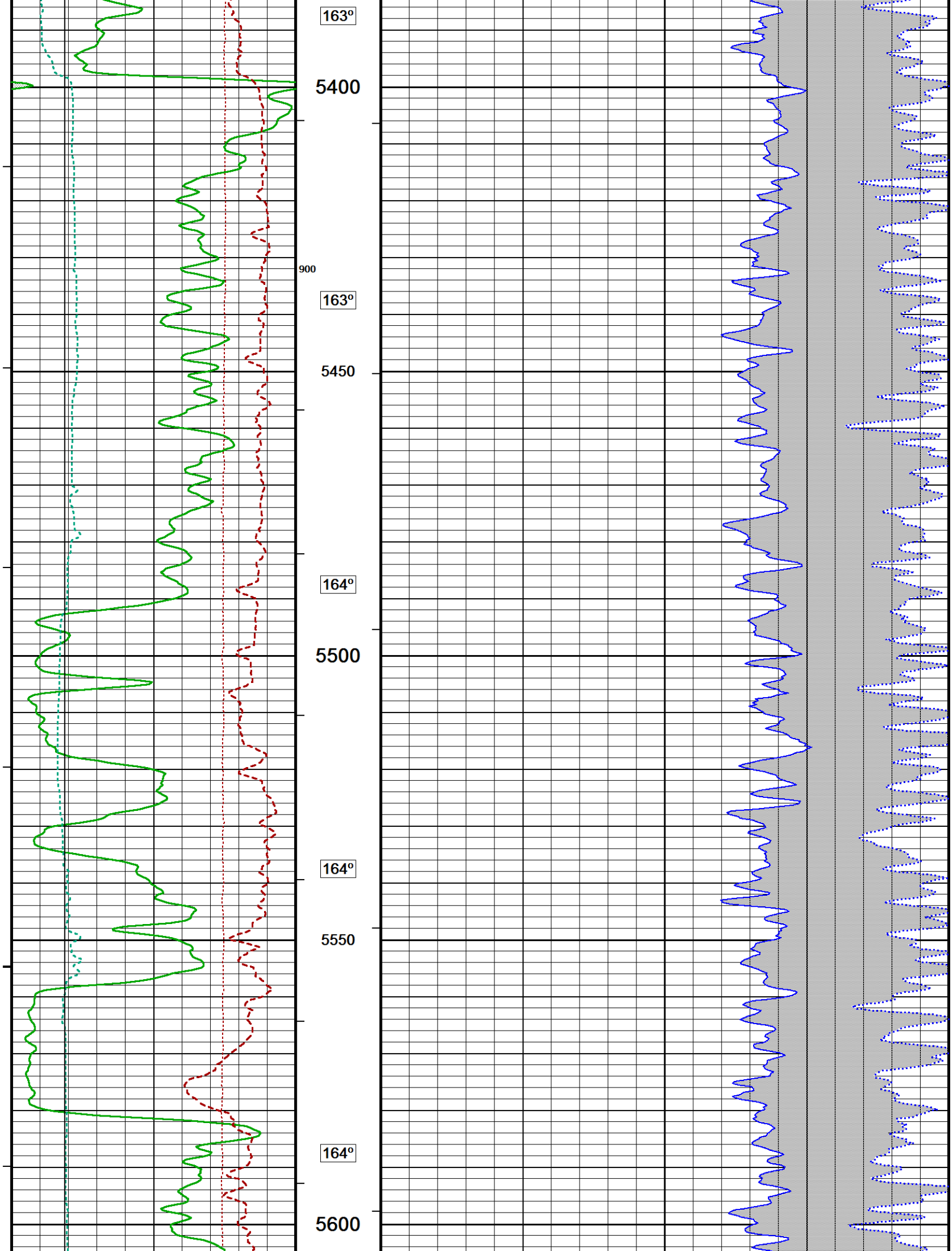
159°
5000
159°
5050
159°
5100
160°
5150
1000


161°
5200
161°
500
Bit Size
MMR Caliper
MMR MicroLog Inverse
5250
Spontaneous Potential
Gamma Ray
DST Uphole Tension
162°
5300
162°
5350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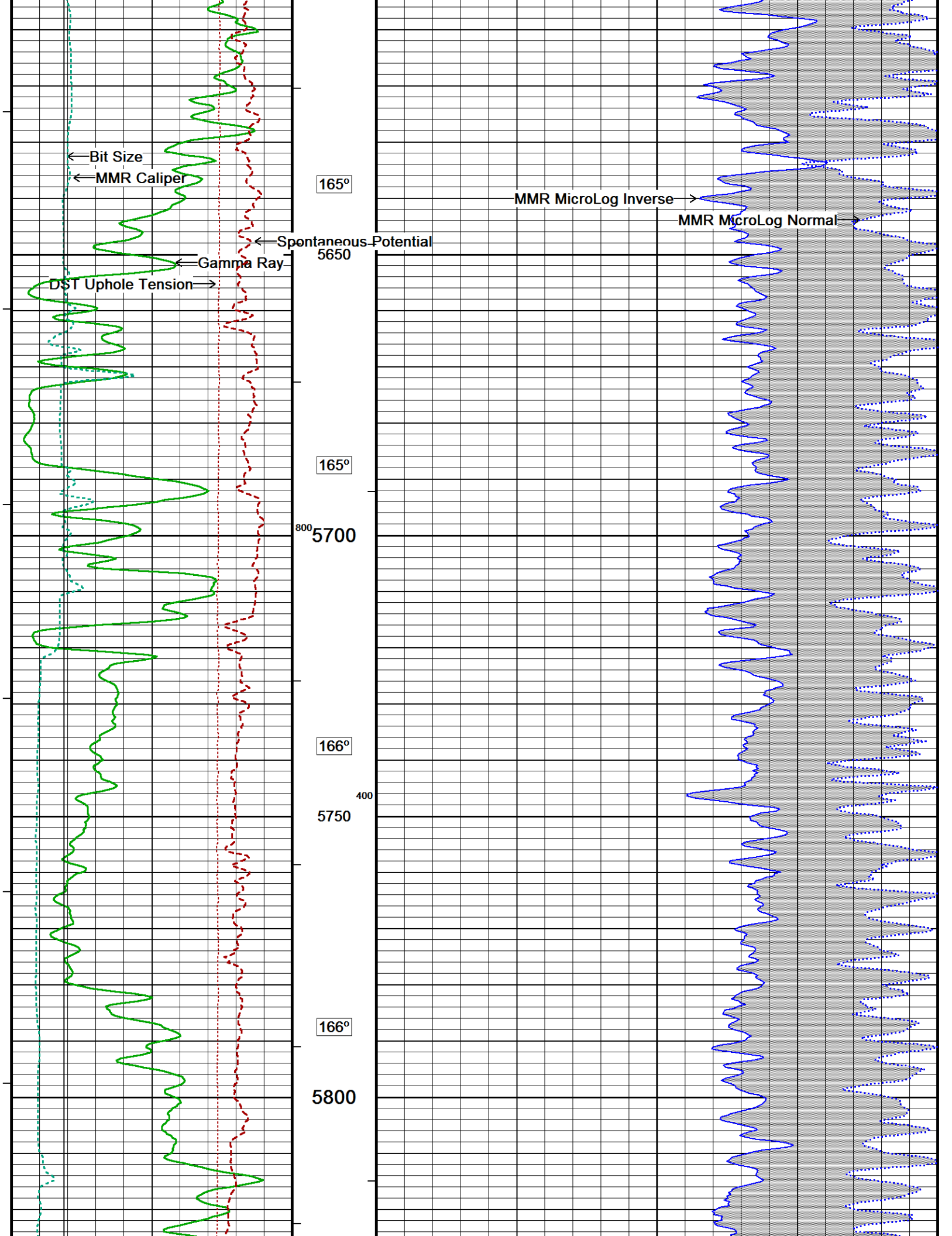
5400
900
163°
5450
164°
5500
164°
5550
164°
5600


Bit Size
MMR Caliper
165°
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
5650
Gamma Ray
DST Uphole Tension
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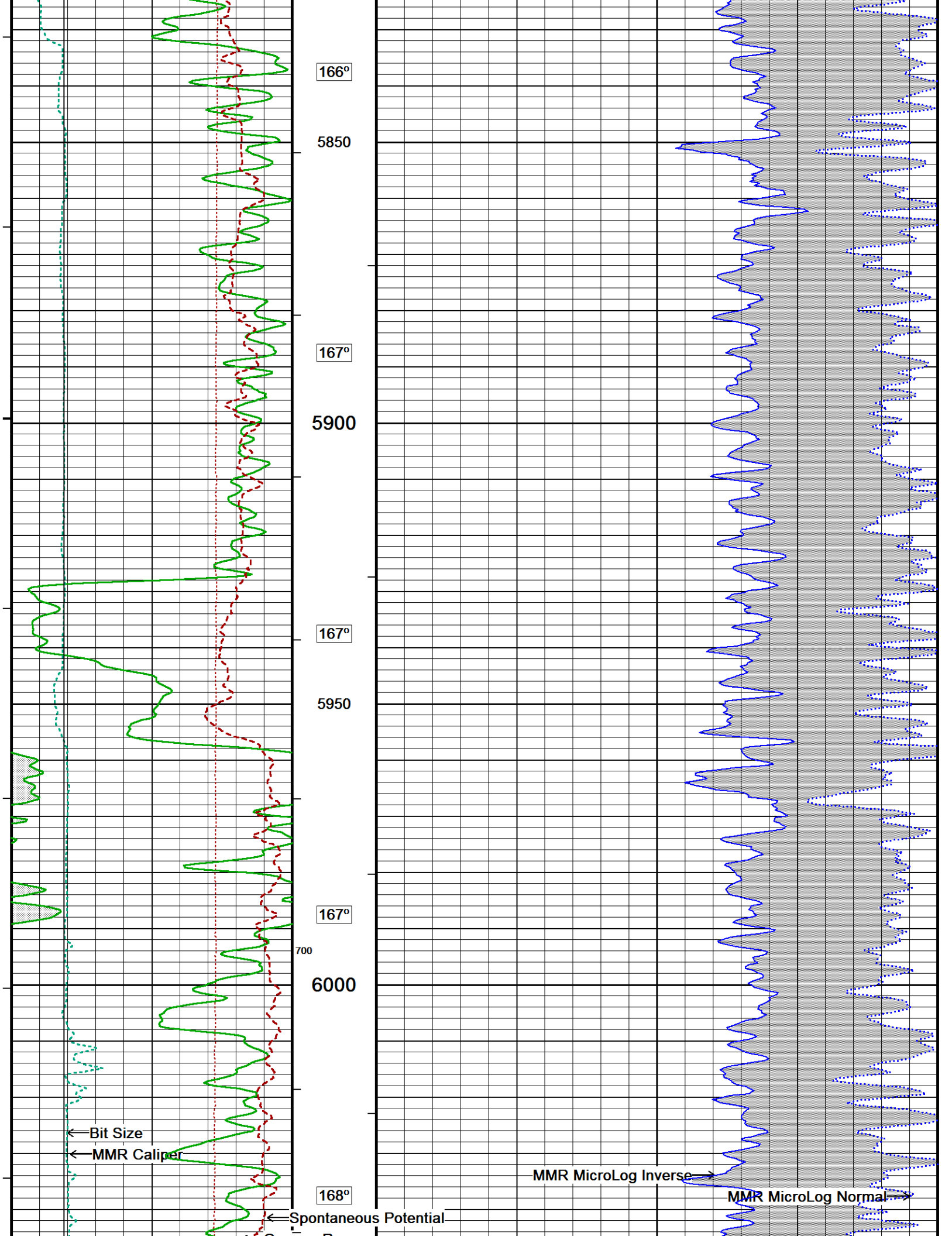
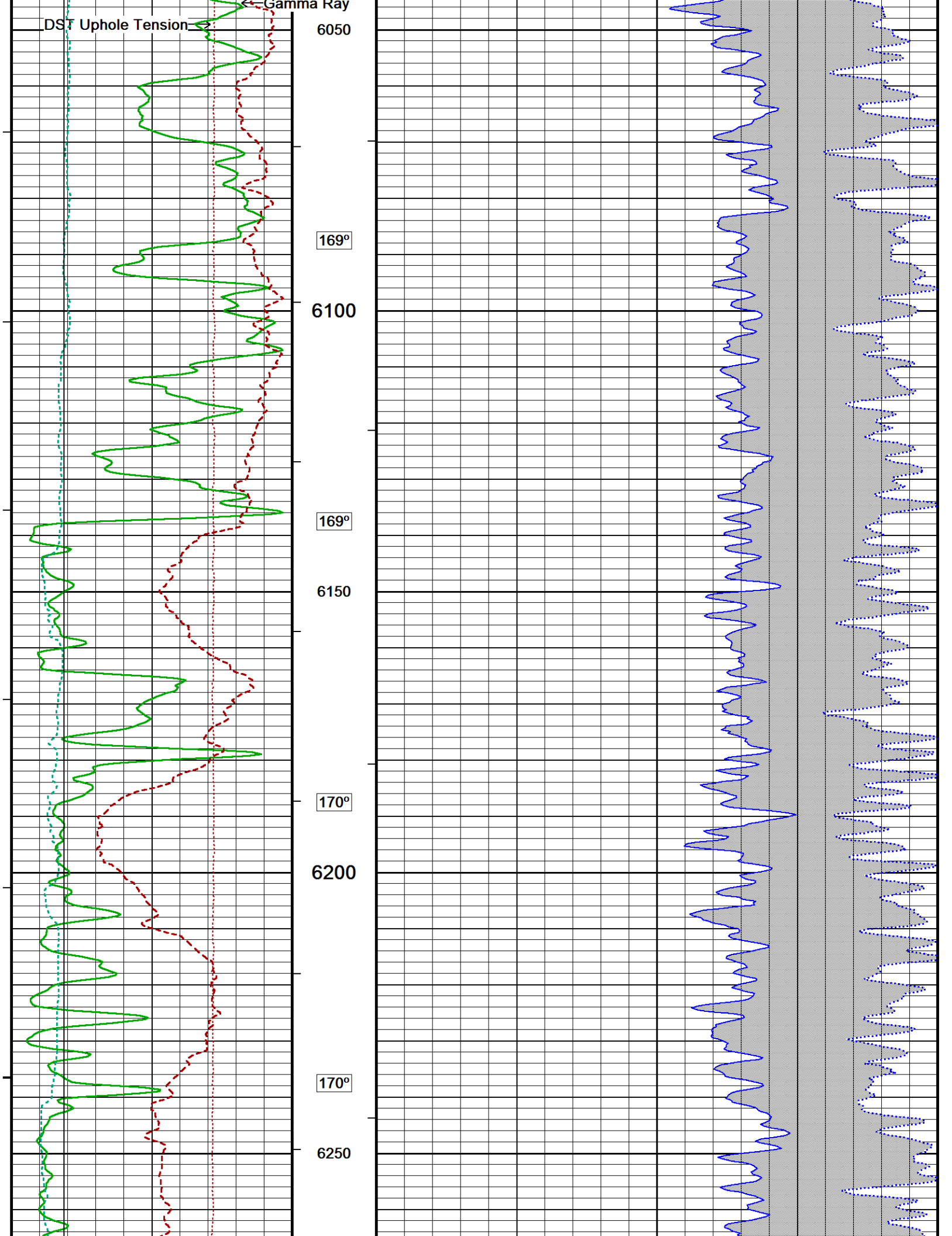
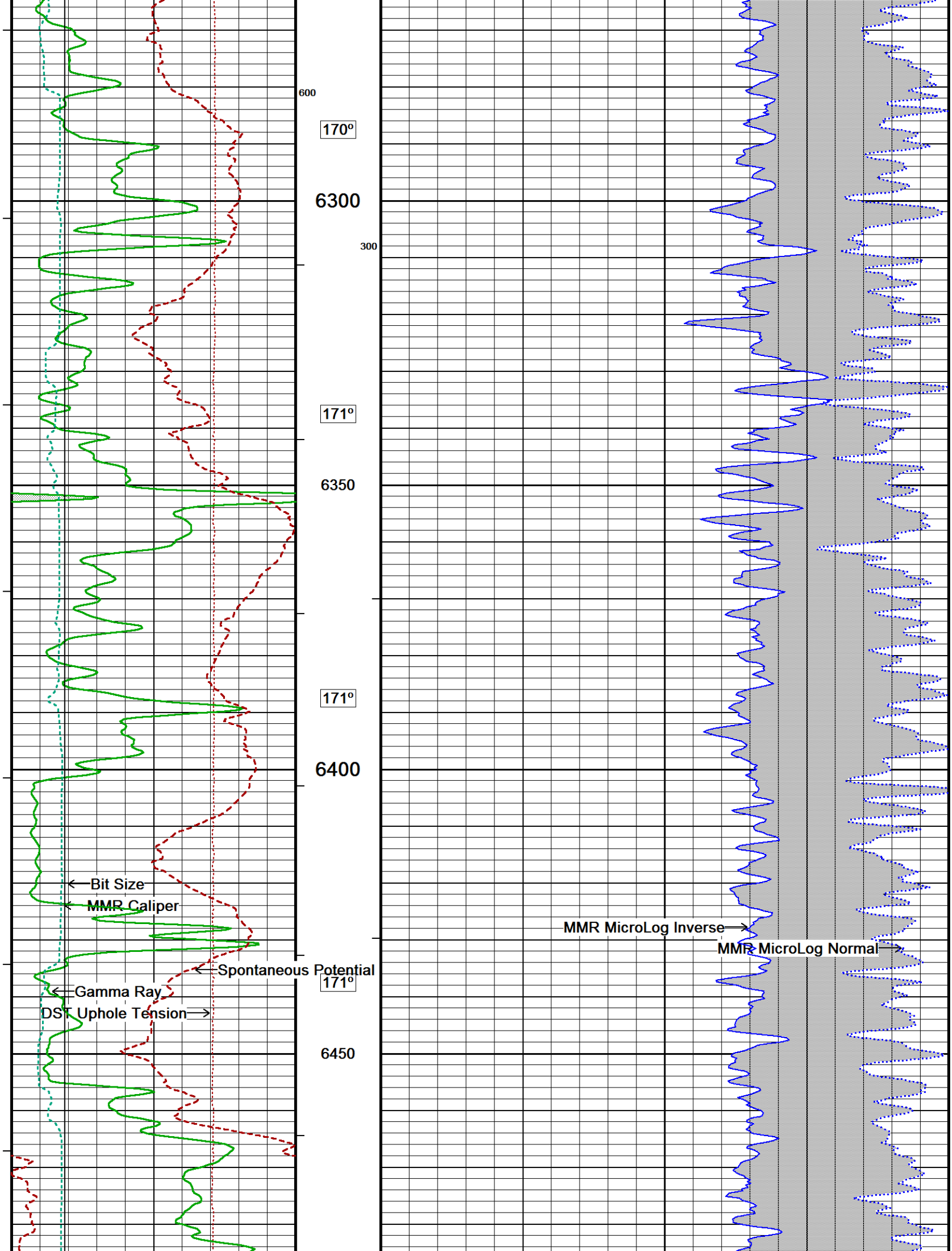
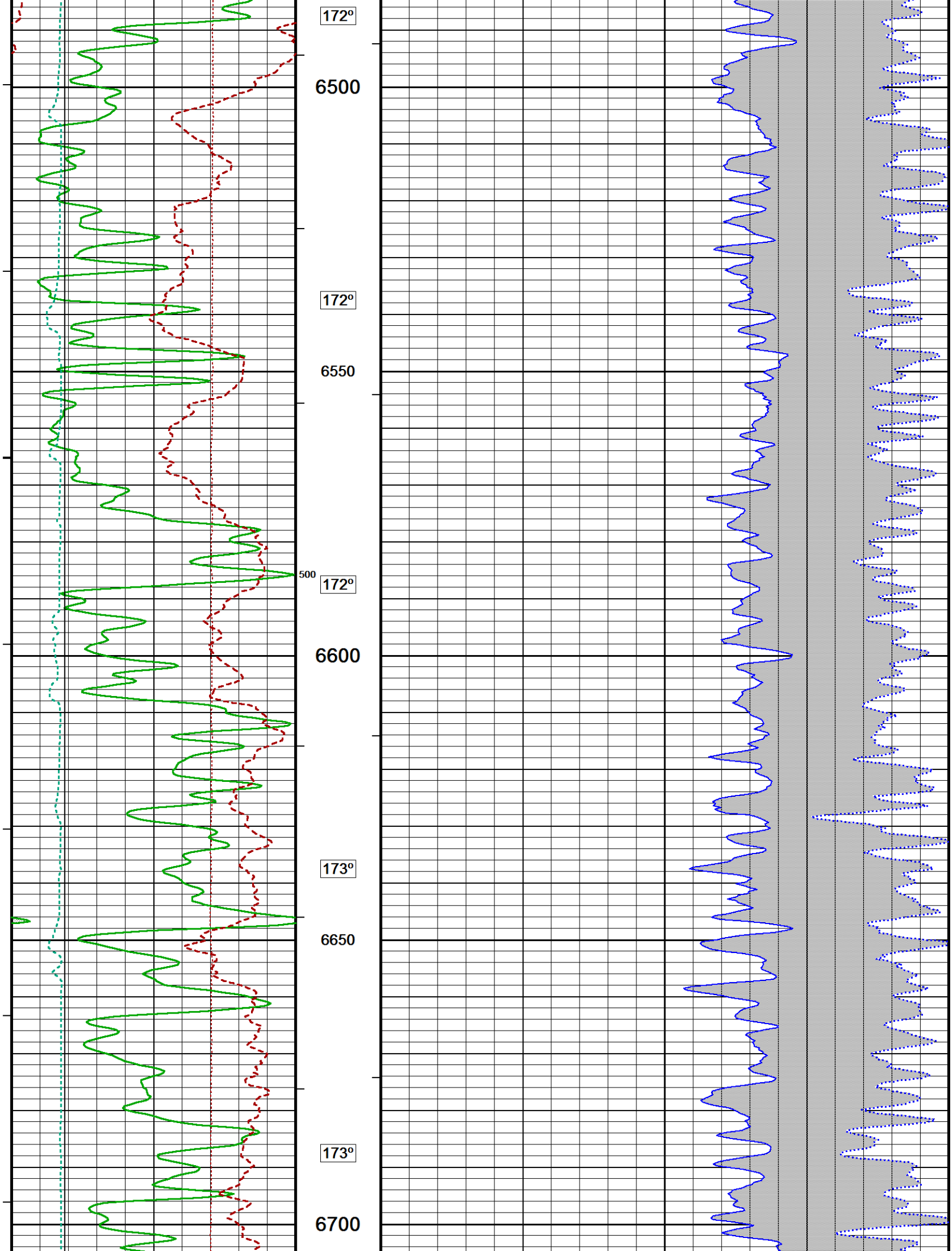
800
5700
166°
400
5750
166°
5800


166º
5850
167º
5900
167º
5950
167º
700
6000
168º
←Bit Size
←MMR Caliper
←Spontaneous Potential
MMR MicroLog Inverse→
MMR MicroLog Normal→


Gamma Ray
DST Uphole Tension
6050
169°
6100
169°
6150
170°
6200
170°
6250


600
170°
6300
300
171°
6350
171°
6400
Bit Size
MMR Caliper
Spontaneous Potential
171°
Gamma Ray
DST Uphole Tension
6450
MMR MicroLog Inverse
MMR MicroLog Normal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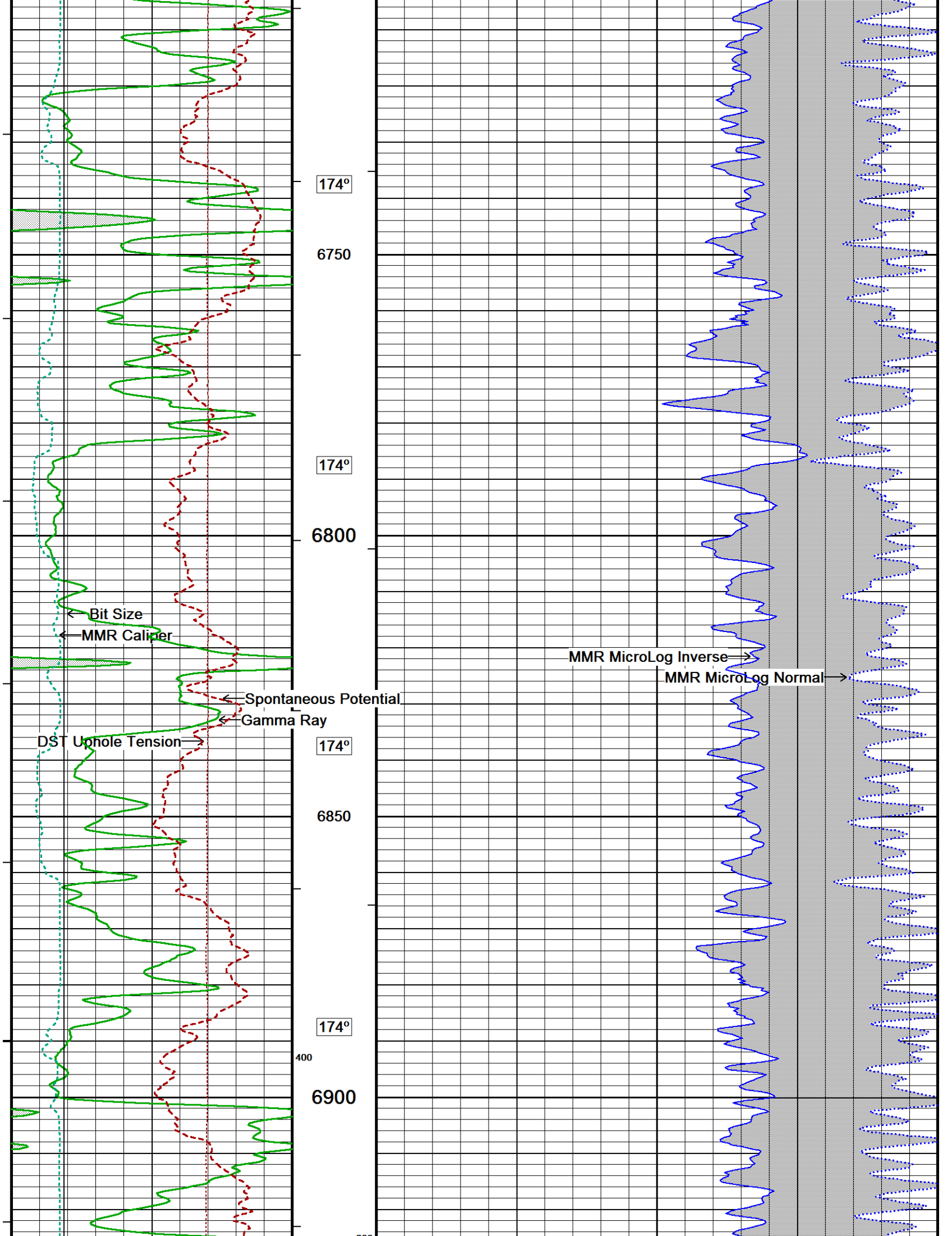
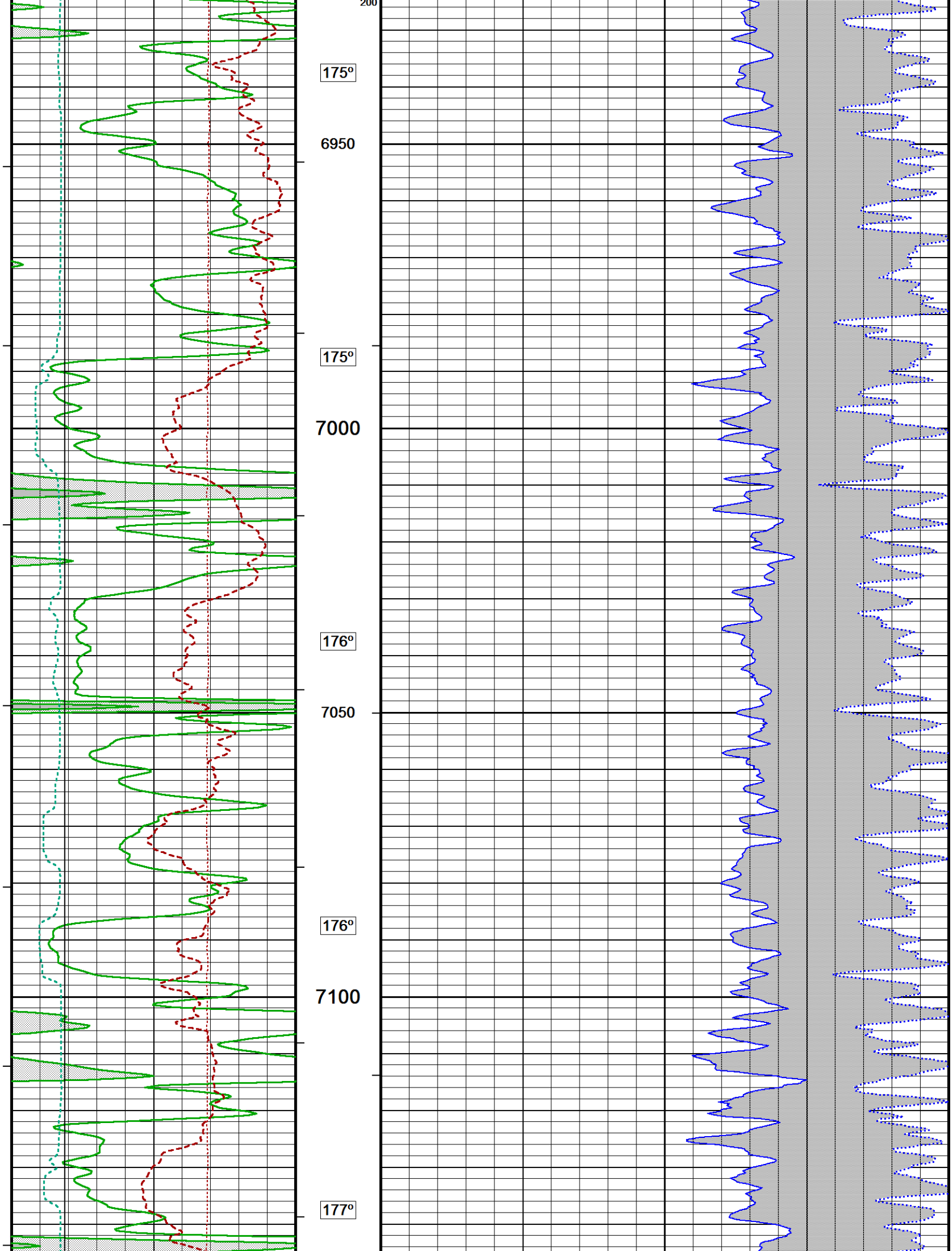
6500
172°
6550
500
172°
6600
173°
6650
173°
6700


174°
6750
174°
6800
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
174°
6850
174°
400
6900


200
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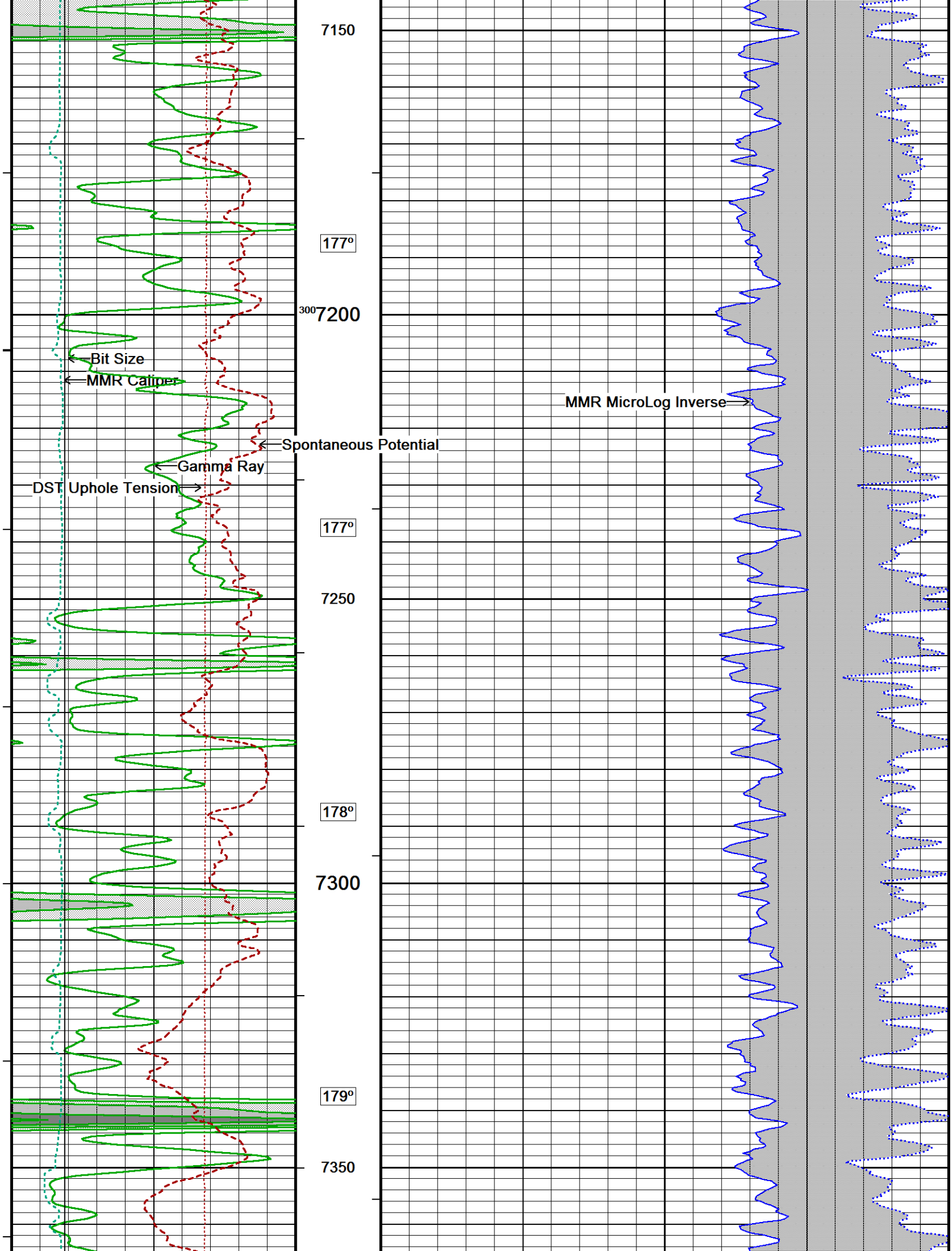
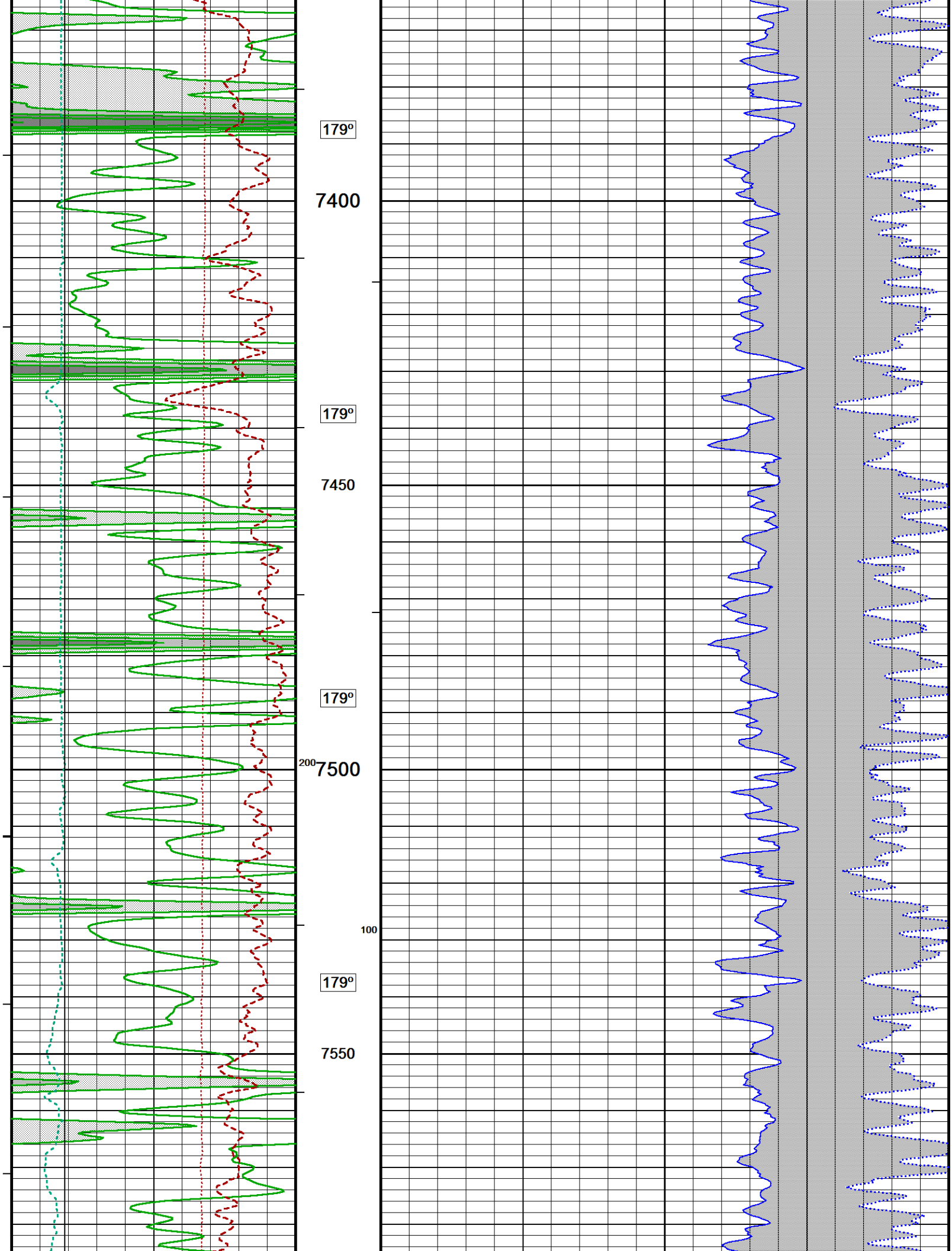
6950
175°
7000
176°
7050
176°
7100
177°


7150
177°
300
7200
Bit Size
MMR Caliper
MMR MicroLog Inverse
Spontaneous Potential
Gamma Ray
DST Uphole Tension
177°
7250
178°
7300
179°
7350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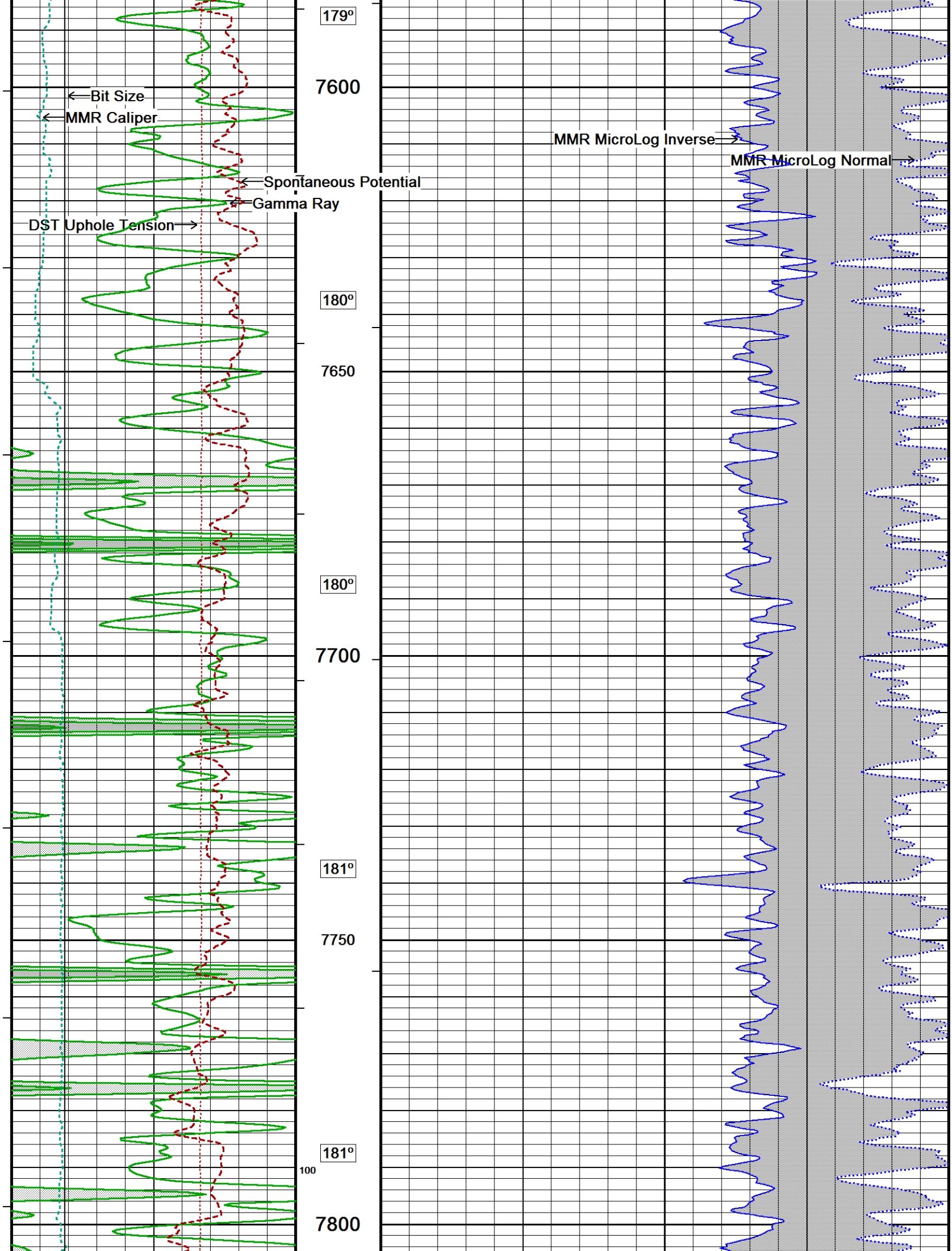
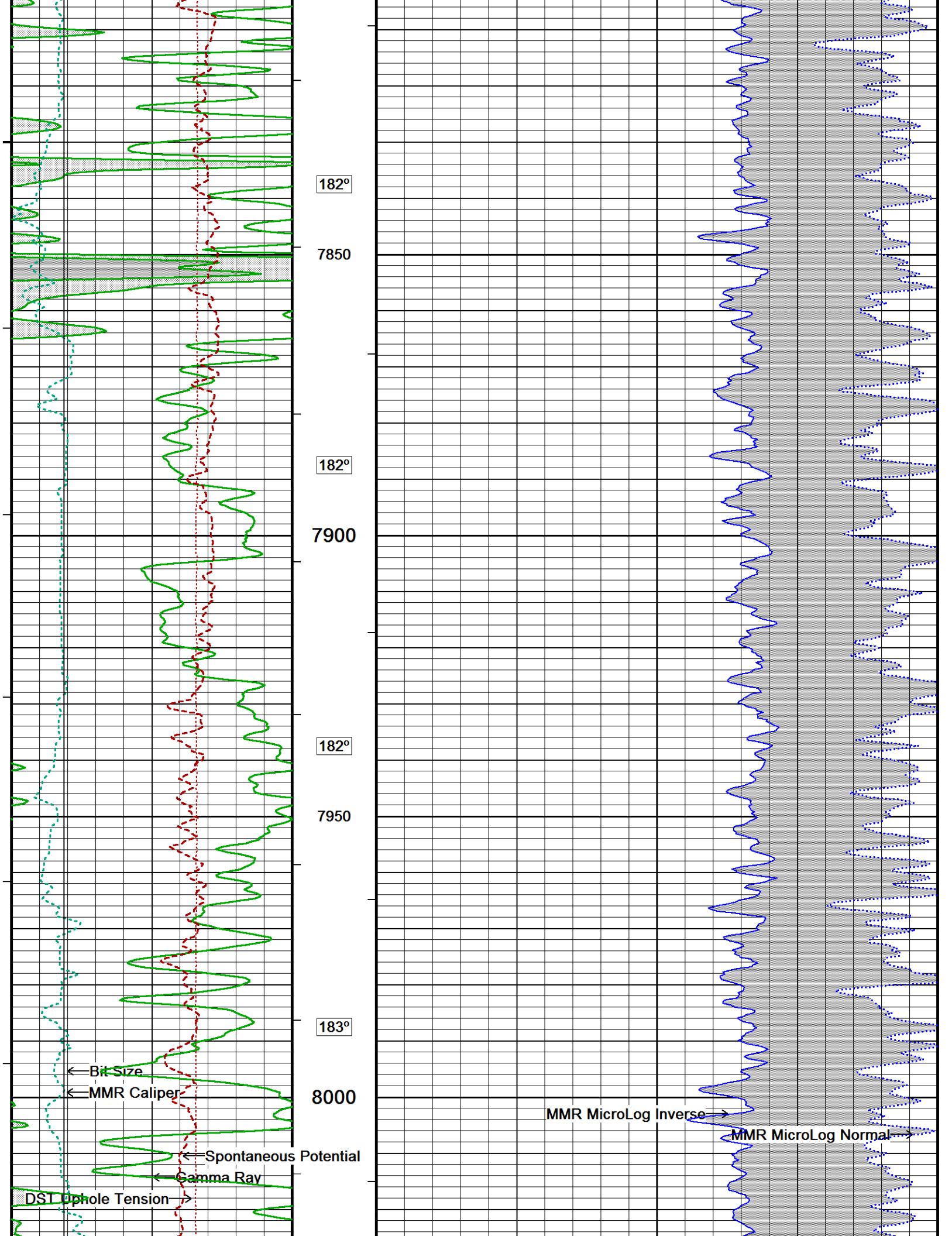
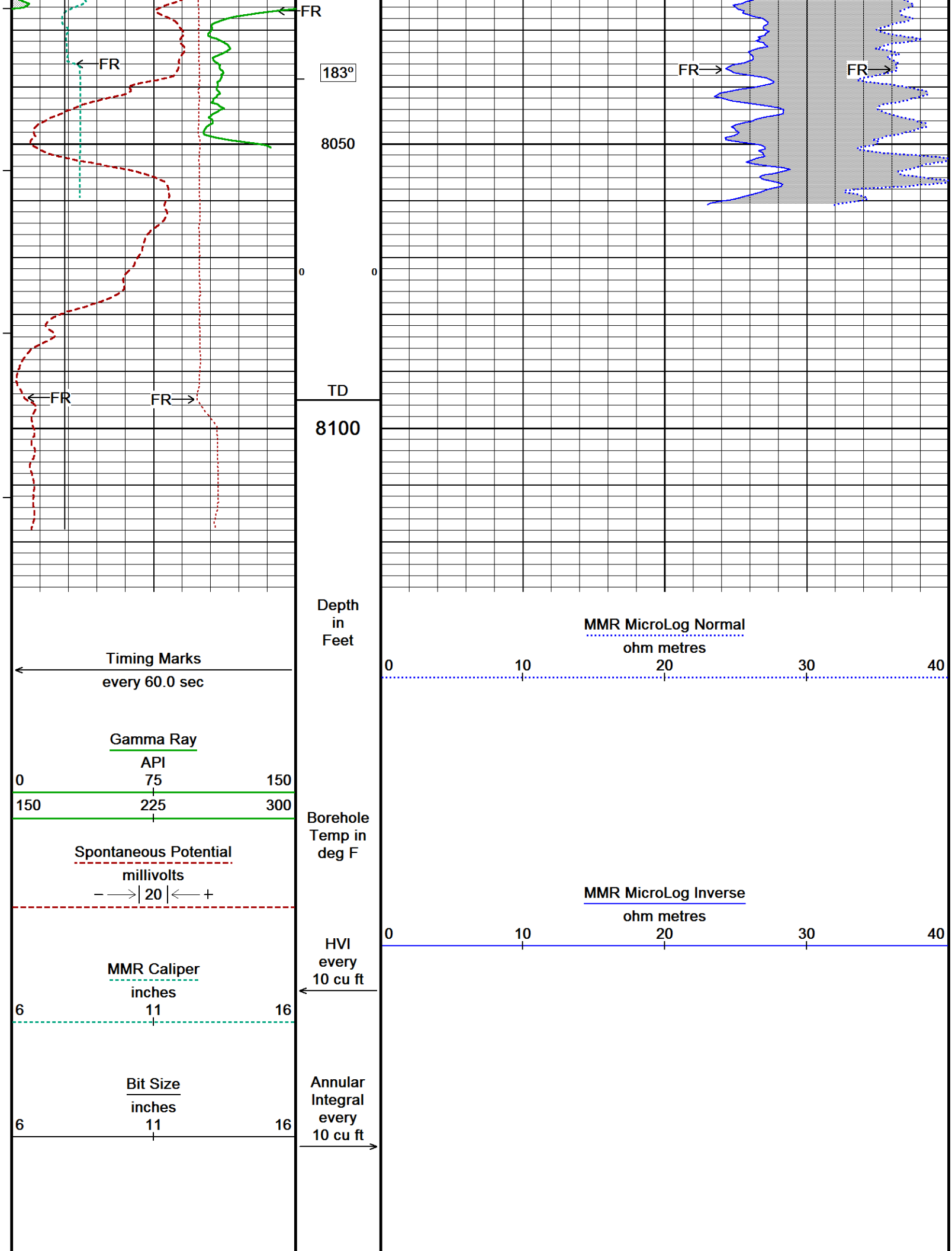
7400
179°
7450
179°
200
7500
100
179°
7550


179°
7600
Bit Size
MMR Caliper
MMR MicroLog Inverse
MMR MicroLog Normal
Spontaneous Potential
Gamma Ray
DST Uphole Tension
180°
7650
180°
7700
181°
7750
181°
100
7800


182°
7850
182°
7900
182°
7950
183°
8000
Bit Size
MMR Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
MMR MicroLog Inverse
MMR MicroLog Normal


FR
FR
183°
8050
0
0
FR
FR
TD
8100
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
150
225
300
Borehole
Temp in
deg F
Spontaneous Potential
millivolts
– 20 +
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
HVI
every
10 cu ft
MMR Caliper
inches
6
11
16
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-JUL-2017 13:26
Filename: C:\Logs\GRAND MESA OPERATING\RIO LOB...\MAIN PASS QUAD COMBO SPLICED.dta — Recorded on 05-JUL-2017 02:31
System Versions: Processed with 17.01.7206 Plotted with 17.01.7206

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-JUL-2017 13:26
Filename: C:\Logs\GRAND MESA OPERATING\RIO LOB...\MAIN PASS QUAD COMBO SPLICED.dta — Recorded on 05-JUL-2017 02:31
Filename: C:\Logs\GRAND MESA OPERATIN...\RIO LOBO 1-30_QUAD COMBO_REPEAT PASS.dta — Recorded on 04-JUL-2017 22:36
System Versions: Processed with 17.01.7206 Plotted with 17.01.7206

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

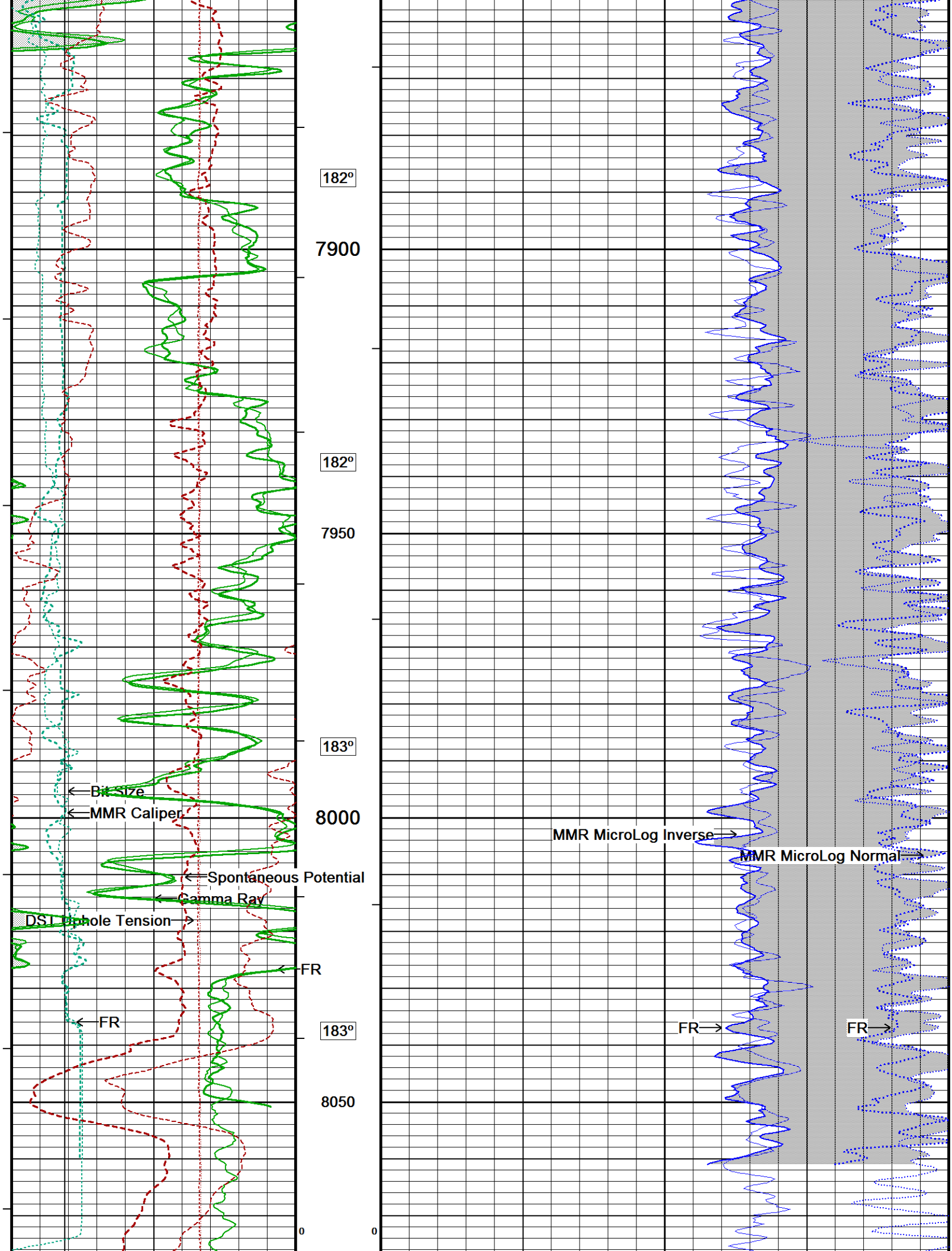
Annular
Integral
every
10 cu ft

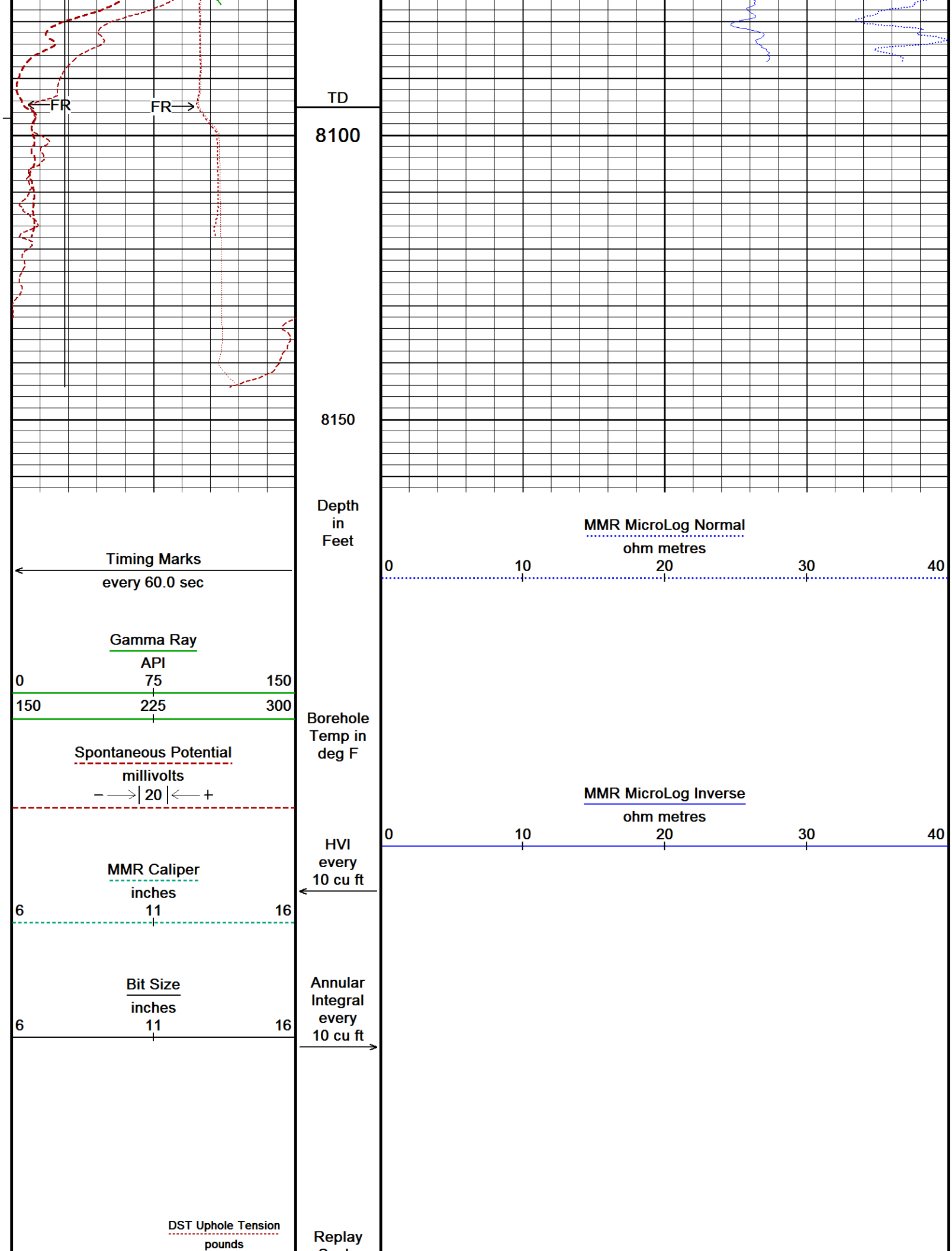
Replay
Scale
1:240

7850

MMR MicroLog Normal
ohm metres
0 10 20 30 40

MMR MicroLog Inverse
ohm metres
0 10 20 30 40


182°
7900
182°
7950
183°
Bit Size
MMR Caliper
8000
Spontaneous Potential
Gamma Ray
DSL Wbhole Tension
FR
FR
183°
8050
0
0
MMR MicroLog Inverse
MMR MicroLog Normal
FR
FR


FR
FR
TD
8100
8150
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
150
225
300
Borehole
Temp in
deg F
Spontaneous Potential
millivolts
20
MMR MicroLog Inverse
ohm metres
0
10
20
30
40
HVI
every
10 cu ft
MMR Caliper
inches
6
11
16
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft
DST Uphole Tension
pounds
Replay

Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-JUL-2017 13:26
Filename: C:\Logs\GRAND MESA OPERATING\RIO LOB...\MAIN PASS QUAD COMBO SPLICED.dta — Recorded on 05-JUL-2017 02:31
Filename: C:\Logs\GRAND MESA OPERATIN...\RIO LOBO 1-30_QUAD COMBO_REPEAT PASS.dta — Recorded on 04-JUL-2017 22:36
System Versions: Processed with 17.01.7206 Plotted with 17.01.7206

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Logs\GRAND MESA OPERATING\RIO LOBO 1-30\RUN_1\8367-186414219\MAIN PASS QUAD COMBO SPLICED.dta

Caliper Calibration MPD-C.A 310

Base Calibration on 28-JUN-2017 12:55
Field Calibration on 30-JUN-2017 14:33

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14863	3.99
2	23472	5.96
3	32082	7.96
4	40369	9.85
5	49632	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.93	7.96

Caliper Calibration Tolerances MPD-C.A 310

Long Arm Field Cal.	7.93	7.56	7.96	8.36	in

Photo Density Calibration MPD-C.A 310

Base Calibration on 29-JUN-2017 16:53
Field Check on 30-JUN-2017 14:39

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	1089	1384		
Reference 1	52195	25389	59443	30683
Reference 2	20921	2506	24540	2525

Field Check at Base

Near	Far
1088.9	1383.8

Field Check

Near	Far
1091.4	1397.8

PE Calibration

Base Calibration	Measured WS	Measured WH	Ratio	Calibrated Ratio
Background	202	980		
Reference 1	21840	52024	0.424	0.372
Reference 2	6003	20806	0.293	0.271

Field Check at Base

WS	WH
202.3	979.7

Field Check

WS	WH
205.3	982.8

Photo Density Calibration Tolerances MPD-C.A 310

Near Density Ratio	2.58	-5%	2.52	+5%	Far Density Ratio	21.39	-5% 21.00 +5%
PE Calibration	0.120	0.089	0.110	0.131			
Near Den. Field Check	1091.4	-3%	1088.9	+3%	Far Den. Field Check	1397.8	-3% 1383.8 +3%
PE WS Field Check	205.3	-6%	202.3	+6%	PE WH Field Check	982.8	-6% 979.7 +6%

Density Constants MPD-C.A 310

Last Edited on 04-JUL-2017,21:40

Density Source Id	P50562B	
Nylon Calibrator Number	DNC.E.652	
Aluminium Calibrator Number	DACD631	
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 Type		
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	
Precision Enhanced Density Processing	Not Applied	

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

High Resolution Temperature Calibration MAI-B.J 363

Field Calibration on 19-JUN-2017,16:22

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

High Resolution Temperature Constants MAI-B.J 363

Last Edited on 19-JUN-2017,16:22

Pre-filter Length	11

Induction Calibration MAI-B.J 363

Base Calibration on 19-JUN-2017,16:57
Field Check on 30-JUN-2017 14:44

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	17.8	467.2	9.3	966.2
2	6.3	374.8	7.6	821.4
3	3.8	260.7	5.2	566.0
4	2.0	132.4	2.6	279.2

Array Temperature	69.4	Deg F

Test Loop Calibration Verified

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	13.2	3898.1
2	0.0	0.0	30.7	3604.8
3	0.0	0.0	28.1	3043.1
4	0.0	0.0	19.6	2093.7
Deep	0.0	0.0	16.5	1946.5
Medium	0.0	0.0	41.2	4012.2
Shallow	0.0	0.0	46.9	5394.3
Array Temperature	0.0		89.9	Deg F

Induction Calibration Tolerances MAI-B.J 363

Low Conductivity 1	17.8	13.0 / 17.0 / 21.0	mmho/m	High Conductivity 1	467.2	430.0 / 475.0 / 520.0	mmho/m
Low Conductivity 2	6.3	4.5 / 6.0 / 7.5	mmho/m	High Conductivity 2	374.8	345.0 / 385.0 / 425.0	mmho/m
Low Conductivity 3	3.8	1.0 / 3.5 / 6.0	mmho/m	High Conductivity 3	260.7	240.0 / 260.0 / 280.0	mmho/m
Low Conductivity 4	2.0	0.0 / 2.0 / 4.0	mmho/m	High Conductivity 4	132.4	120.0 / 135.0 / 150.0	mmho/m
Background Vx 1	0.0	-110.0 / -32.5 / 45.0	mmho/m	Phase Check Loop 1	0.0	-2.0 / 0.0 / 2.0	%
		-35.0 / 20.0 / 75.0				-2.0 / 0.0 / 2.0	

Background Vx 2	0.0	-60.0 2.5 65.0	mmho/m Phase Check Loop 2	0.0	-2.0 0.0 2.0 %
Background Vx 3	0.0	-50.0 -17.5 15.0	mmho/m Phase Check Loop 3	0.0	-2.0 0.0 2.0 %
Background Vx 4	0.0		mmho/m Phase Check Loop 4	0.0	%

Induction Constants MAI-B.J 363

Last Edited on 04-JUL-2017,20:42

Induction Model	RtAP-WBM	
Borehole Correction Constants		
Tool Centred	Yes	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Stand-off Type	N/A	
Stand-off	N/A	inches
Number of Fins on Stand-off	N/A	
Stand-off Fin Angle	N/A	degrees
Stand-off Fin Width	N/A	inches
Rm Source	Global Value: Temperature Corrected	
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
Symmetrised Receiver Gains		
Receiver 1	1.00	
Receiver 2	1.00	
Receiver 3	1.00	
Receiver 4	1.00	
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	

FE Calibration MFE-C.A 417

Base Calibration on 09-MAY-2017 12:36
Field Check on 10-JUN-2017 03:57

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.4	126.8
Base Check		281.5
Field Check		281.6

FE Calibration Tolerances MFE-C.A 417

Reference 2	962.4	-3% 980.0 +3%	ohm
Base Check	281.5	-2% 277.0 +2%	ohm-m

Field Check	281.6	-2%	281.5	+2%	ohm-m

FE Constants MFE-C.A 417

Last Edited on 04-JUL-2017,20:42

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Borehole Correction Constants		
Sonde Position	0.5	inches
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	

Sonic Constants MSS-D.A 387

Last Edited on 16-JUN-2017,09:44

Maximum Boundary Contrast	70.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	0.00	micro-sec
MX3FT	1500.00	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft
Sonde Mode	Compensated	
Hole Type	Open Hole	

Sonde Parameters

	Measured	Calibrated
Offset	0.0000	0.0000
Free Pipe	0.0000	

Peak Amplitude Source

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)
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	0.00
0.00	0.00	0.00	

Full Waveform Parameters

Use 3' Waveform to derive TR	No	
Use 4' Waveform to derive TR	No	
Use 5' Waveform to derive TR	No	
Use 6' Waveform to derive TR	No	
3' Waveform Discriminator Level	0.30	mV
4' Waveform Discriminator Level	0.30	mV
5' Waveform Discriminator Level	0.15	mV
6' Waveform Discriminator Level	0.15	mV
Waveform Discriminator Filter	Not Applied	
Semblance Window Width	150.00	micro-sec
Sonic Despiker		

Neutron Calibration MDN-C.A 464

Base Calibration on 28-JUN-2017 15:50
Field Check on 30-JUN-2017 14:30

Base Calibration

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3028	93	3714	110
Ratio	32.626		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1393	2071
Ratio	0.673	

Field Check

	Calibrated (cps)	
	1399	2063
Ratio	0.678	

Neutron Calibration Tolerances MDN-C.A 464

Ratio	32.626	-5% 33 +5%
Base Check	0.673	0.65 0.7 0.75
Field Check	0.678	0.653 0.673 0.693

Neutron Constants MDN-C.A 464

Last Edited on 30-JUN-2017,16:18

Neutron Source Id	N-1057	
Neutron Jig Number	5922NE	
Air Hole Processing	Modified Ratio	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	7.00	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	Constant Value	
Formation Pressure	0.00	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

Micro Normal and Micro Inverse Calibration MMR-C.A 229

Base Calibration on 25-MAY-2017 02:03
Field Check on 04-JUL-2017 18:58

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	10.0	49.5	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	93.9	93.9
Micro Inverse	62.2	62.2

Micro Normal & Micro Inverse Calibration Tolerance MMR-C.A 229

Micro Normal Res. 1	9.9	-5% 10.0 +5%	ohm	Micro Normal Res. 2	49.5 -5% 50.0 +5% ohm
Micro Inverse Res. 1	10.0	-5% 10.0 +5%	ohm	Micro Inverse Res. 2	49.5 -5% 50.0 +5% ohm
Micro Normal Base Check	93.9	-2% 93.86 +2%	ohm-m		
Micro Inverse Base Check	62.2	-2% 62.11 +2%	ohm-m		
Micro Normal Field Check	93.9	-2% 93.9 +2%	ohm-m		
Micro Inverse Field Check	62.2	-2% 62.2 +2%	ohm-m		

Micro Normal and Micro Inverse Constants MMR-C.A 229

Last Edited on 25-MAY-2017,01:53

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

Micro Laterolog Calibration MMR-C.A 229

Base Calibration on 23-MAY-2017,23:57
Field Check on 23-MAY-2017,23:57

Base Calibration

Measured		Calibrated (ohm-m)	
Ref 1	Ref 2	Ref 1	Ref 2
0.0	9911.7	0.0	128.0

Base Check (ohm-m)	Field Check (ohm-m)
5.2	5.2

Micro Laterolog Calibration Tolerances MMR-C.A 229

Ref 2	9911.7	-3% 9900.00 +3%	ohm
Base Check	5.2	-2% 5.2 +2%	ohm-m
Field Check	5.2	-2% 5.2 +2%	ohm-m

Micro Laterolog Constants MMR-C.A 229

Last Edited on 24-MAY-2017,12:42

Pad Type	6 in Solid Nylon B23059	
Micro Laterolog K Factor	0.0128	
Standoff Offset	0.0000	inches

Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper	N/A	
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	68.00	Deg F
Mud Cake Resistivity Source	Constant Value	
Temp. for Rmc Corr.	N/A	

Caliper Calibration MMR-C.A 229

Base Calibration on 04-JUL-2017 18:55
Field Calibration on 04-JUL-2017 18:57

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13741	5.96
2	16951	7.96
3	20207	9.85
4	24130	11.88
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.98	7.96

Caliper Calibration Tolerances MMR-C.A 229

Short Arm Field Cal.	7.98	7.76 7.96 8.16	in

Micro-Resistivity Caliper Constants MMR-C.A 229

Last Edited on

Sonde Configuration	Resistivity Mode

High Resolution Temperature Calibration MCG-D.K 483

Field Calibration on 05-MAY-2017,11:02

	Measured	Calibrated(Deg F)
Lower	66.00	66.00
Upper	209.00	209.00

High Resolution Temperature Constants MCG-D.K 483

Last Edited on 28-APR-2017,13:18

Pre-filter Length	11

SP Calibration MCG-D.K 483

Field Calibration on 16-MAY-2017 09:09

	Measured	Calibrated (mV)
Reference 1	100.8	100.0
Reference 2	-97.0	-97.0

Gamma Calibration MCG-D.K 483

Field Calibration on 30-JUN-2017 14:25

	Measured	Calibrated (API)
Background	208	142
Calibrator (Gross)	1551	1054
Calibrator (Net)	1343	912

Gamma Calibration Tolerances MCG-D.K 483

Ratio	1.472	1.40 1.475 1.55	Counts/API

Gamma Constants MCG-D.K 483

Last Edited on 01-JUL-2017,10:32

Gamma Calibrator Number	GRC.C.072	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

General Constants All 000

Last Edited on 04-JUL-2017,22:51

General Parameters		
Mud Resistivity	1.200	ohm-metres
Mud Resistivity Temperature	50.000	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	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	

DOWNHOLE EQUIPMENT

C:\Logs\GRAND MESA OPERATING\RIO LOBO 1-30\RUN_1\8367-186414219\MAIN PASS QUAD COMBO SPLICED.dta

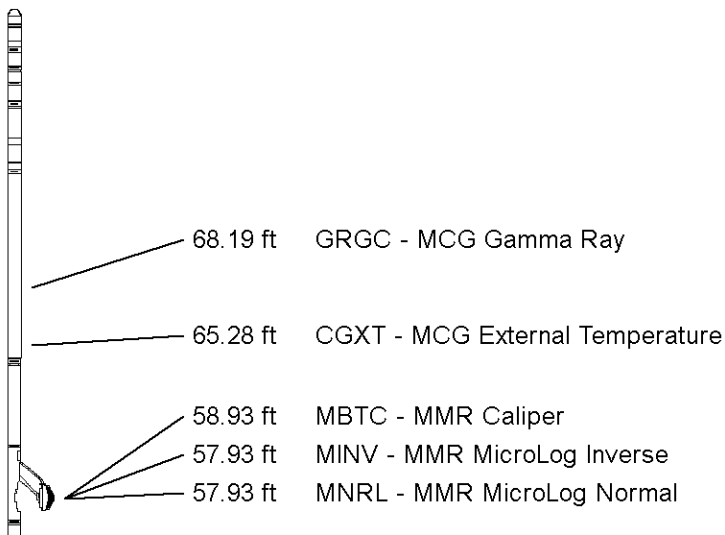
Cablehead, 11 pin
CBH-CA 121 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

11C-11B Compact Tool Adaptor
MTA-K.A 164 LG: 1.53 ft WT: 13.2 lb OD: 2.240 in

Compact Swivel Head Adaptor
SHA-J.B 588 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 483 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-C.A 229 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in



Compact Neutron
MDN-C.A 464 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-C.A 310 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Inline Bowspring sub
MIS-D.B 823 LG: 5.70 ft WT: 33.1 lb OD: 2.244 in

Compact Knuckle Joint
SKJ-E.B 533 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Inline Standoff sub
MIS-E.B 784 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

Compact Knuckle Joint
SKJ-E.A 244 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Sonic
MSS-D.A 387 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Focussed Electric
MFE-C.A 417 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-B.J 363 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 79.69 ft Weight: 612.9 lb

53.14 ft	NPRL - Limestone Neutron Por.
45.90 ft	AVOL - Annular Volume
45.90 ft	HVOL - Hole Volume
45.90 ft	CLDC - Density Caliper
43.97 ft	DPRL - Limestone Density Por.
43.97 ft	DEN - Compensated Density
43.97 ft	DCOR - Density Correction
43.90 ft	PDPE - PE
23.01 ft	TR11 - 4' Transit Time
22.51 ft	TR21 - 3' Transit Time
22.01 ft	TR12 - 6' Transit Time
21.51 ft	TR22 - 5' Transit Time
19.01 ft	DT35 - 3-5' Compensated Sonic
19.01 ft	SPRL - Wyllie Lime. Sonic Por.
13.91 ft	FEFE - Shallow FE
2.58 ft	R40O - Array Ind. One Res 40
2.58 ft	R60O - Array Ind. One Res 60
2.58 ft	CTAO - Array Ind. One Cond Ct
2.58 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	GRAND MESA OPERATING CO.
WELL	RIO LOBO 1-30
FIELD	WILDCAT
PROVINCE/COUNTY	WASHINGTON
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5157	feet	First Reading	8036.00	feet
Elevation Drill Floor	5157	feet	Depth Driller	8099.00	feet
Elevation Ground Level	5138	feet	Depth Logger	8095.00	feet

Weatherford®

MICRORESISTIVITY LOG