

 Weatherford®				COMPACT PHOTO-DENSITY DUAL SPACED NEUTRON MICRO-RESISTIVITY LOG			
COMPANY		O'BRIEN ENERGY RESOURCES CORP					
WELL		KEYSTONE #5-4					
FIELD		KEYSTONE					
PROVINCE/COUNTY		MEADE					
COUNTRY/STATE		U.S.A. / KANSAS					
LOCATION		S2 S2 N2 SW 1350' FSL & 1320' FWL					
SEC 4	TWP 33	RGE 29W	Other Services				
Latitude	37.202613		MDN/MPD				
Longitude	-100.484790		MML				
API Number	15-119-21435						
Permanent Datum GL, Elevation 2634 feet							Elevations:
Log Measured From KB, 12.00 feet above Permanent Datum							KB
Drilling Measured From KB							DF
Date	21-JUN-2019						GL
Run Number	ONE						
Service Order	17937-248222596						
Depth Driller	6250.00						feet
Depth Logger	6250.00						feet
First Reading	6229.00						feet
Last Reading	4000.00						feet
Casing Driller	1567.00						feet
Casing Logger	1567.00						feet
Bit Size	7.875						inches
Hole Fluid Type	WATER-BASED						
Density / Viscosity	8.90 lb/USg		50.00 sec/qt				
PH / Fluid Loss	10.00		8.00 ml/30Min				
Sample Source	FLOWLINE						
Rm @ Measured Temp	0.88 @ 96.0						ohm-m
Rmf @ Measured Temp	0.70 @ 96.0						ohm-m
Rmc @ Measured Temp	1.06 @ 96.0						ohm-m
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	0.70 @122.0		ohm-m				
Time Since Circulation	3 HOURS						
Max Recorded Temp	122.00		deg F				
Equipment / Base	13057		ELRENO				
Recorded By	M. MCGLOTHLIN						
Witnessed By	P. DEBENHAM						D. GREATHOUSE

BOREHOLE RECORD					Last Edited: 21-JUN-2019 00:31
Bit Size inches		Depth From feet		Depth To feet	
7.875		1567.00		6250.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	1567.00	24.00	

REMARKS
SOFTWARE: WLS 19.01.8879 - TOOLSTRING: RUN 1: CBH, SHA, MCG, MML, MDN, MPD, SKJ, MFE, MAI LOGGED IN COMBINATION. - HARDWARE USED: MAI: TWO 0.5 INCH STANDOFFS WITH HOLE FINDER. MFE: ONE 0.5 INCH STANDOFF. MDN: DUAL BOWSPRING. MPD: 8 INCH PROFILE PLATE. - DENSITY MATRICES: 2.71 G/CC DENSITY MATRIX USED TO CALCULATE LIMESTONE POROSITY. 2.65 G/CC DENSITY MATRIX USED TO CALCULATE SANDSTONE POROSITY. 2.87 G/CC DENSITY MATRIX USED TO CALCULATE DOLOMITE POROSITY. - LOGGING INTERVAL REQUESTED: INDUCTION LOGGING (20' - 10' CASING SHOE)

INDUCTION / GAMMA / SP = TD - CASING SHOE.

DENSITY / NEUTRON / MICRO-RESISTIVITY / CALIPER = TD - 4000 FT.

- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 1400 CU.FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = 630 CU.FT.

- CREW: B. TOVAR, B. COPELAND, C. BAKER.

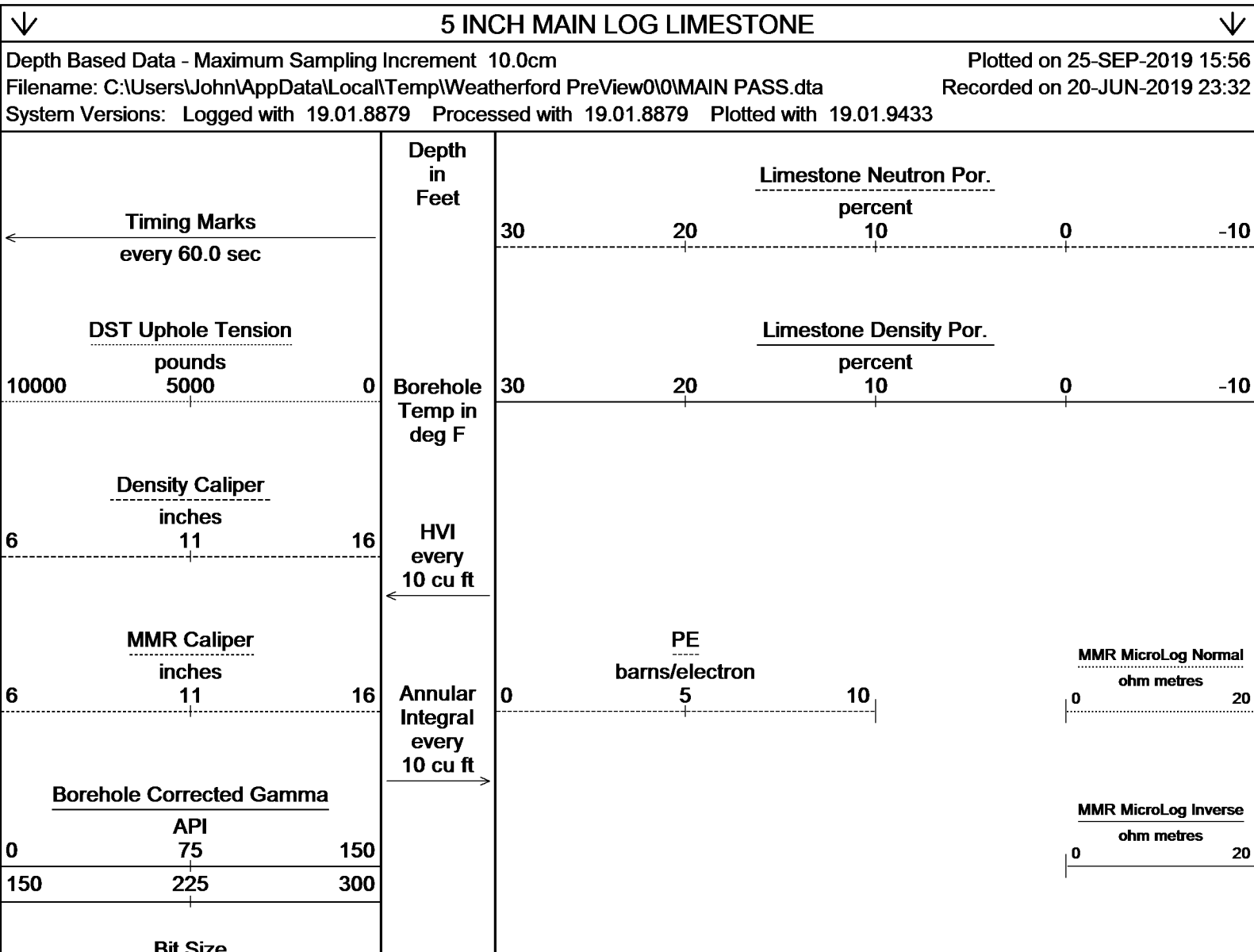
- MUD PROPERTIES:

CHLORIDES: 4000 PPM.

LCM: 5 #/BBL.

TOOLS BRIDGED OFF AT 4742', MADE IT TO TD AFTER WIPER TRIP

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.



Bit Size

inches

11

6

16

Replay
Scale
1:240

4000

600

106°

4050

107°

4100

107°

4150

108°

4200

← Bit Size

← Borehole Corrected Gamma

← MMR Caliper

← Density Caliper

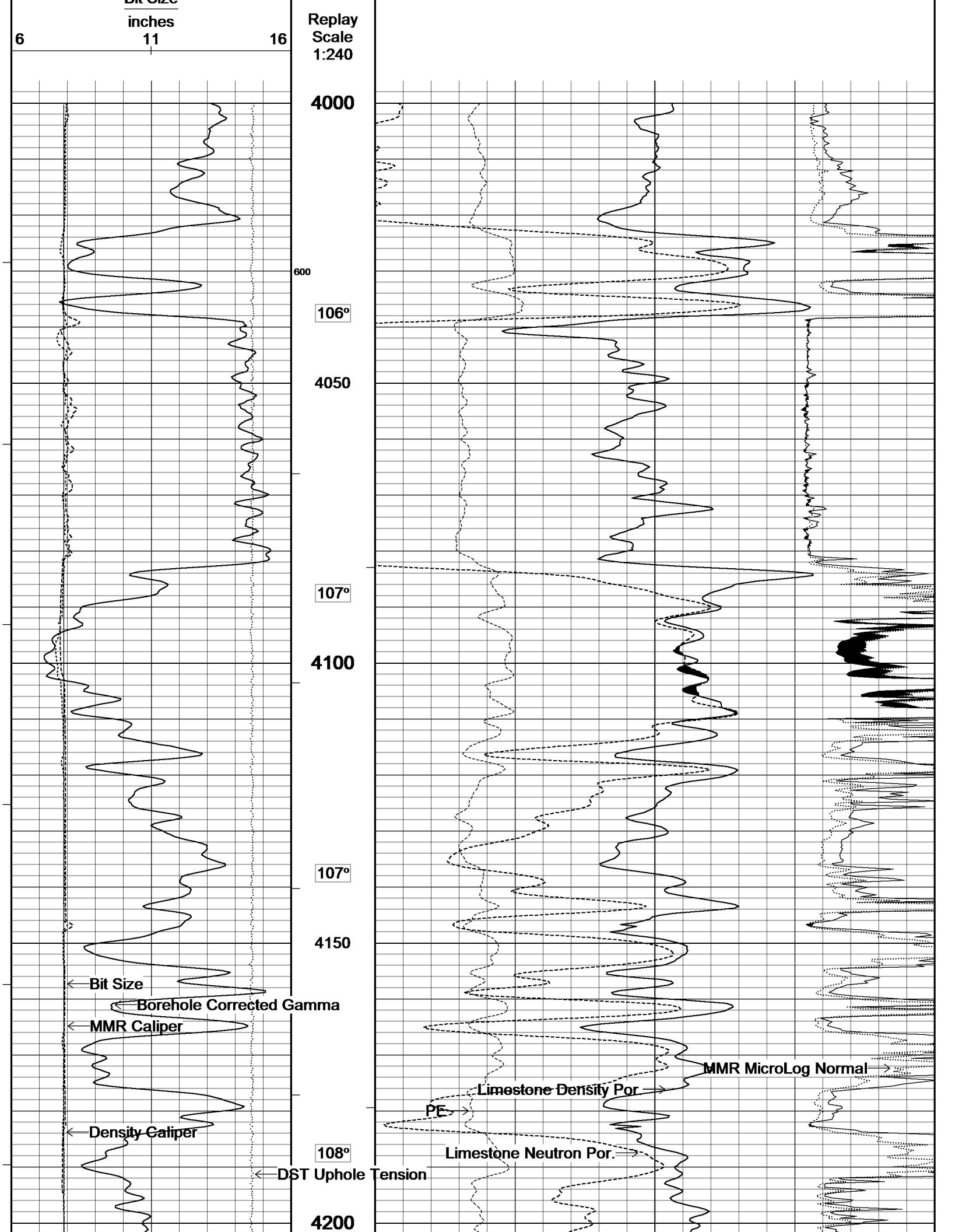
← DST Uphole Tension

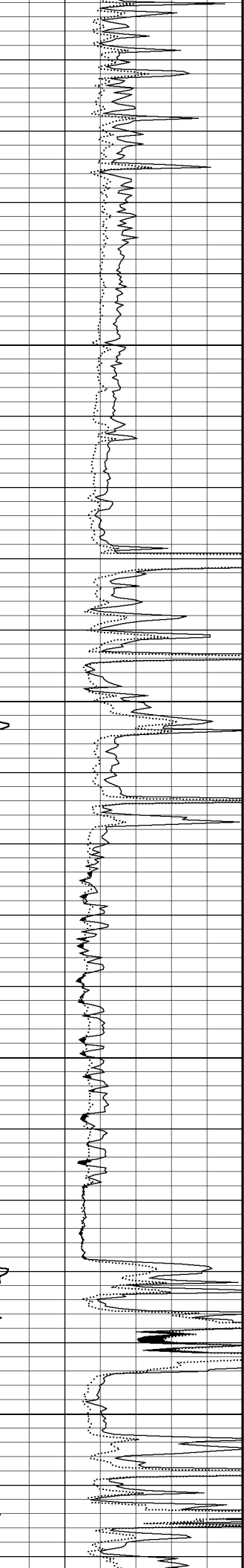
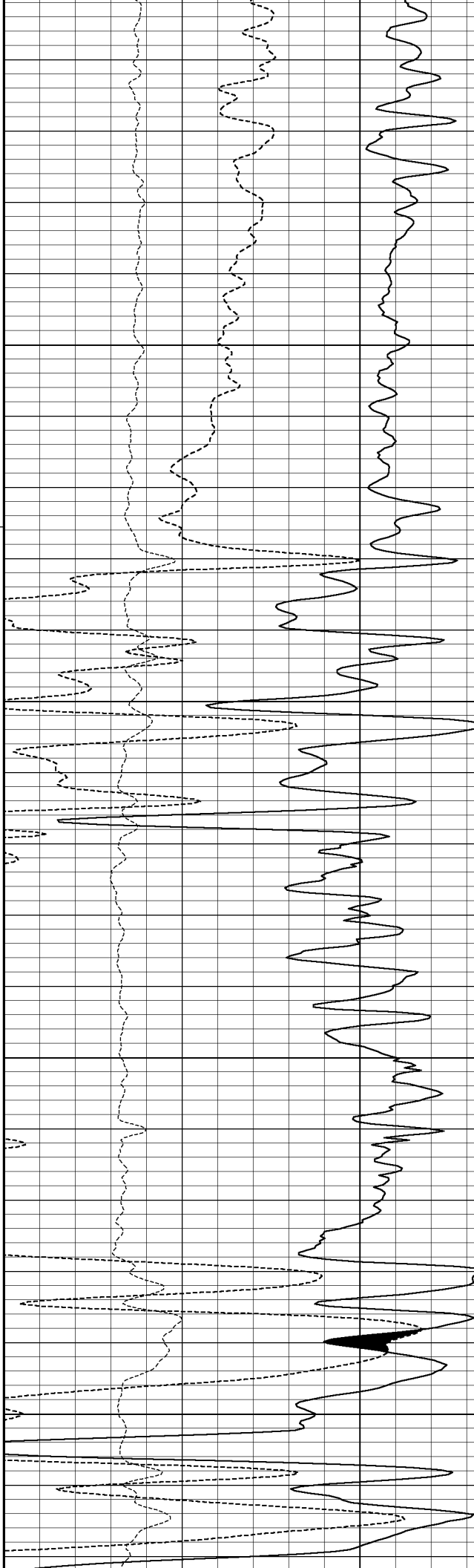
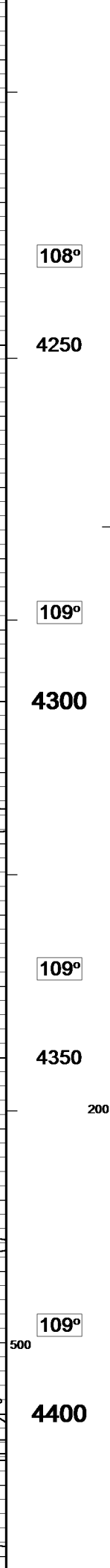
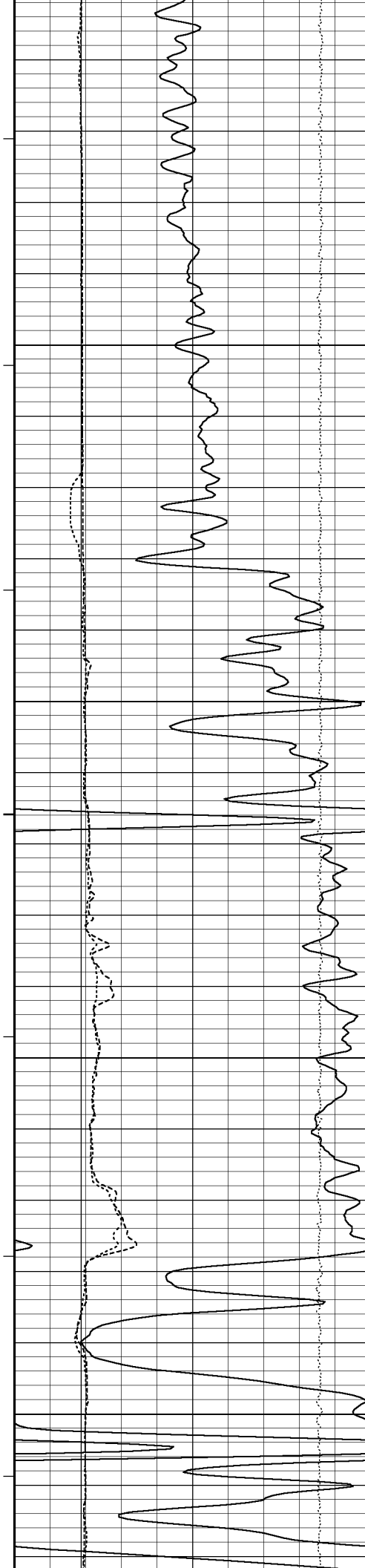
← Limestone Density Por

PE →

← Limestone Neutron Por.

MMR MicroLog Normal →





108°

4250

109°

4300

109°

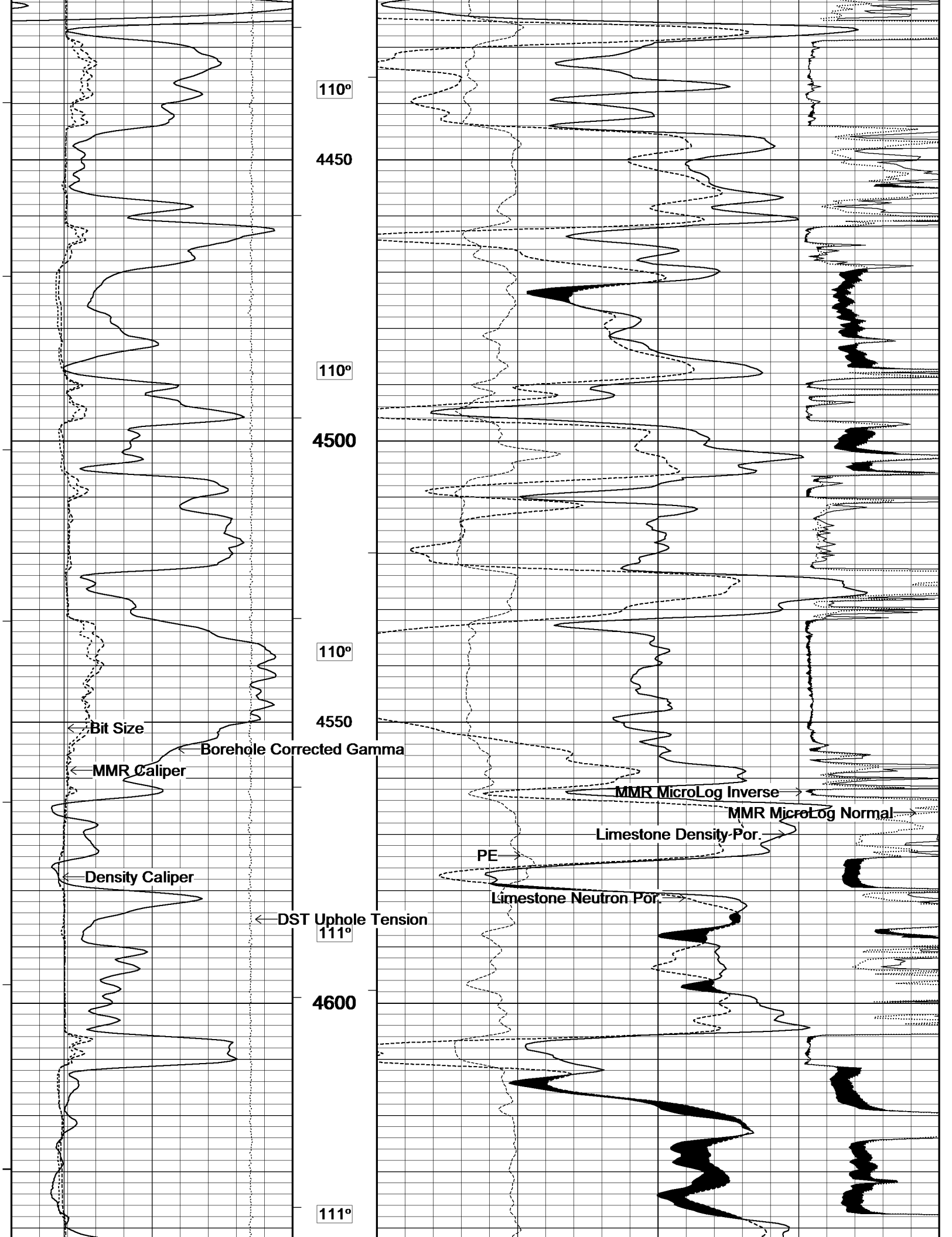
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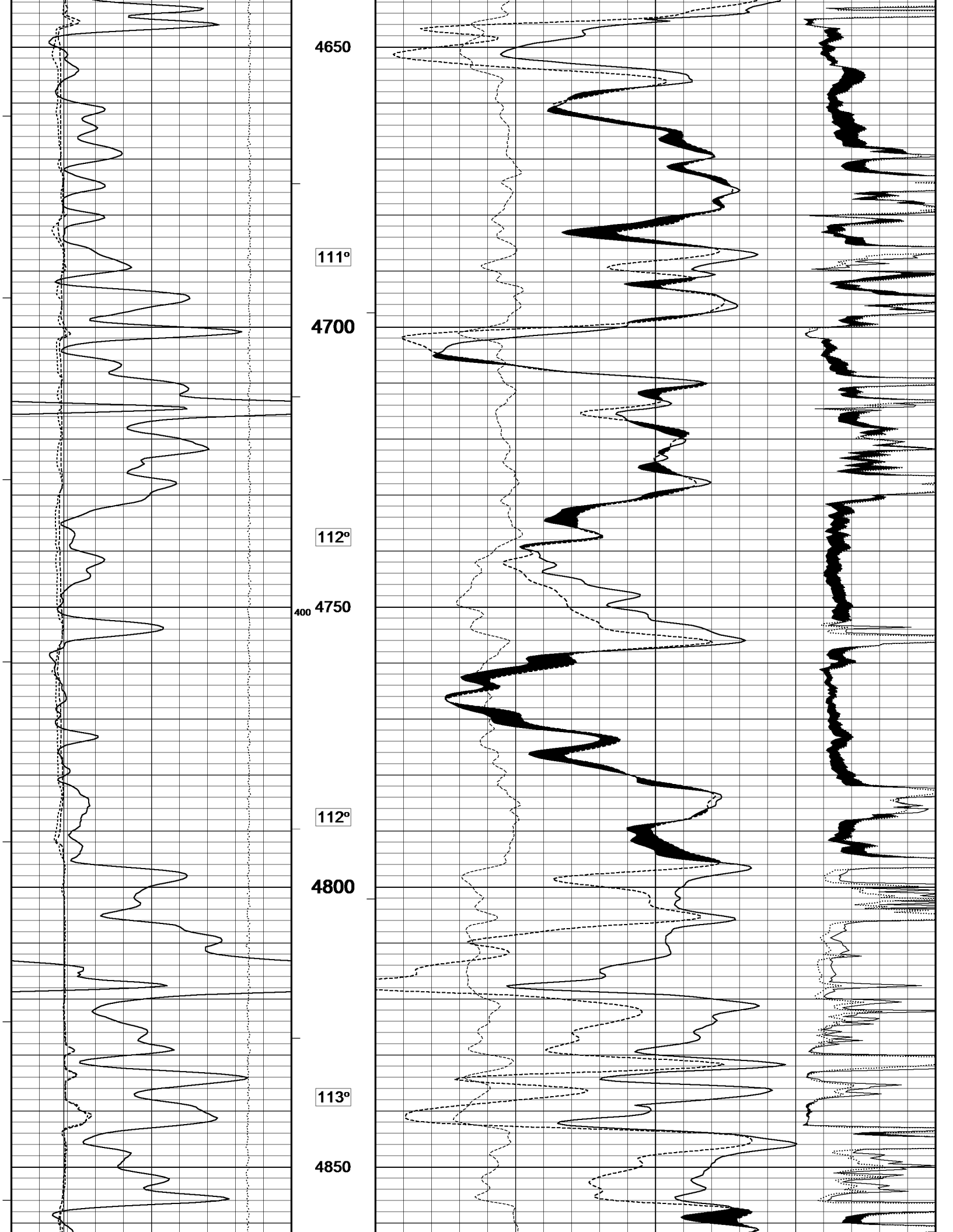
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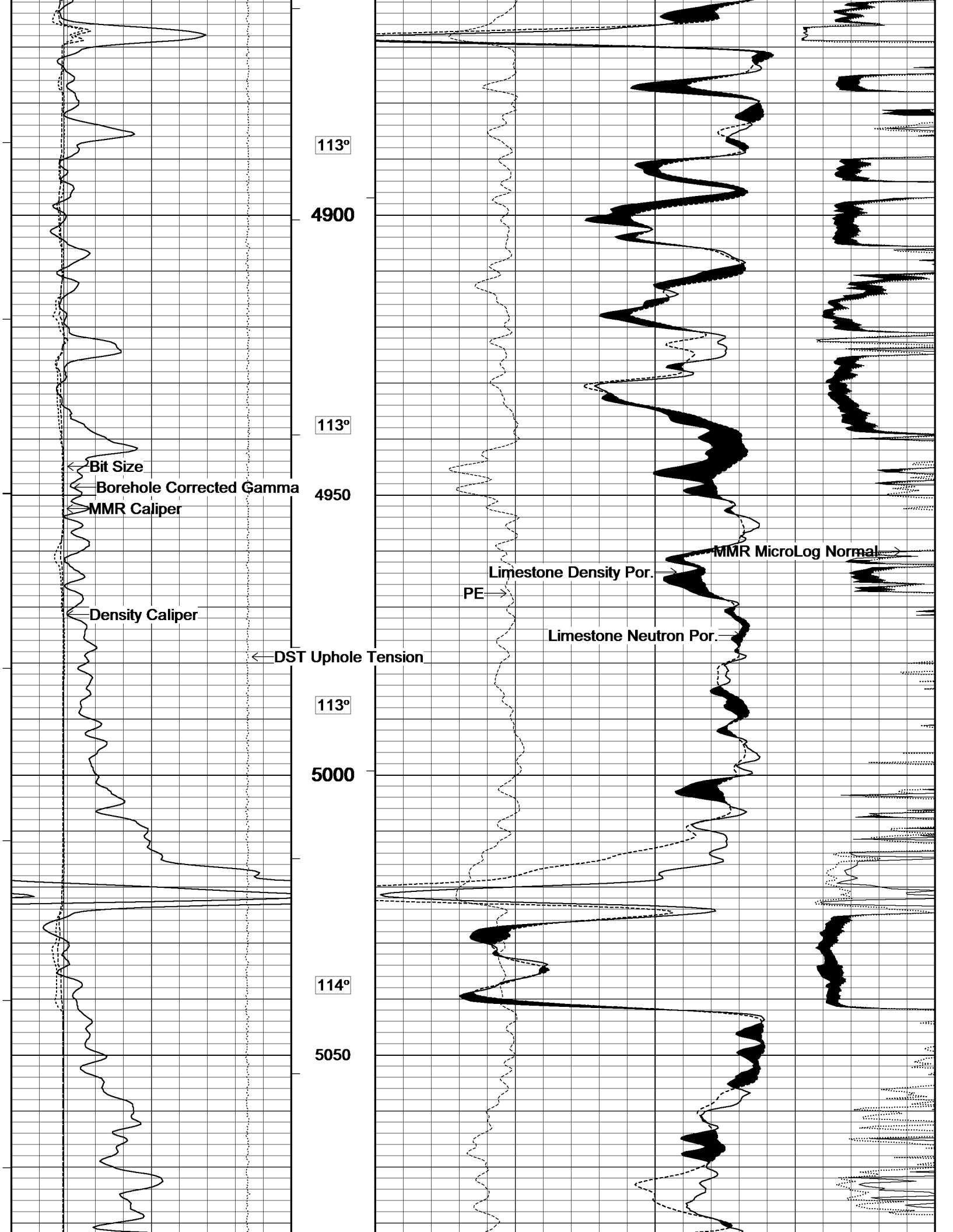
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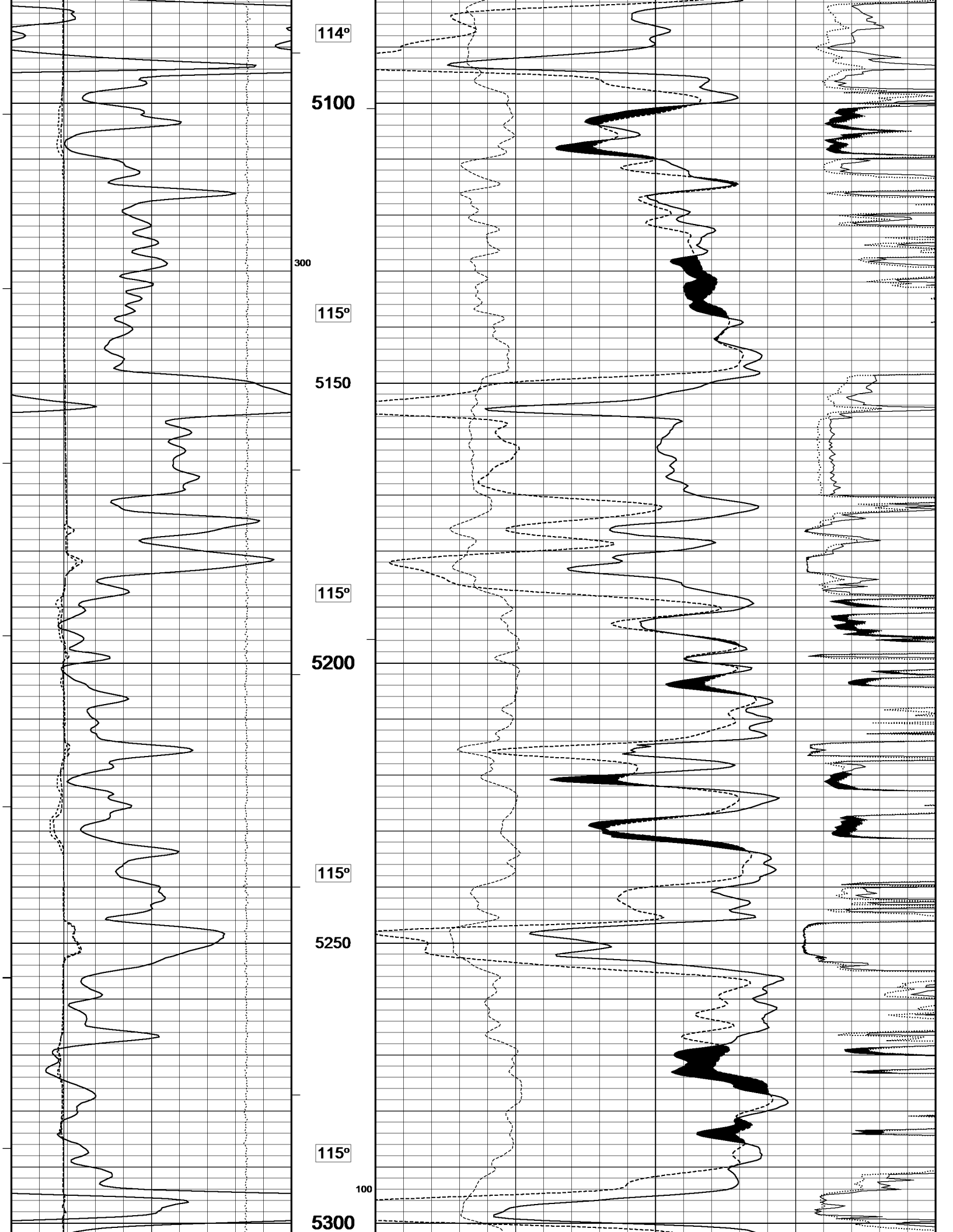
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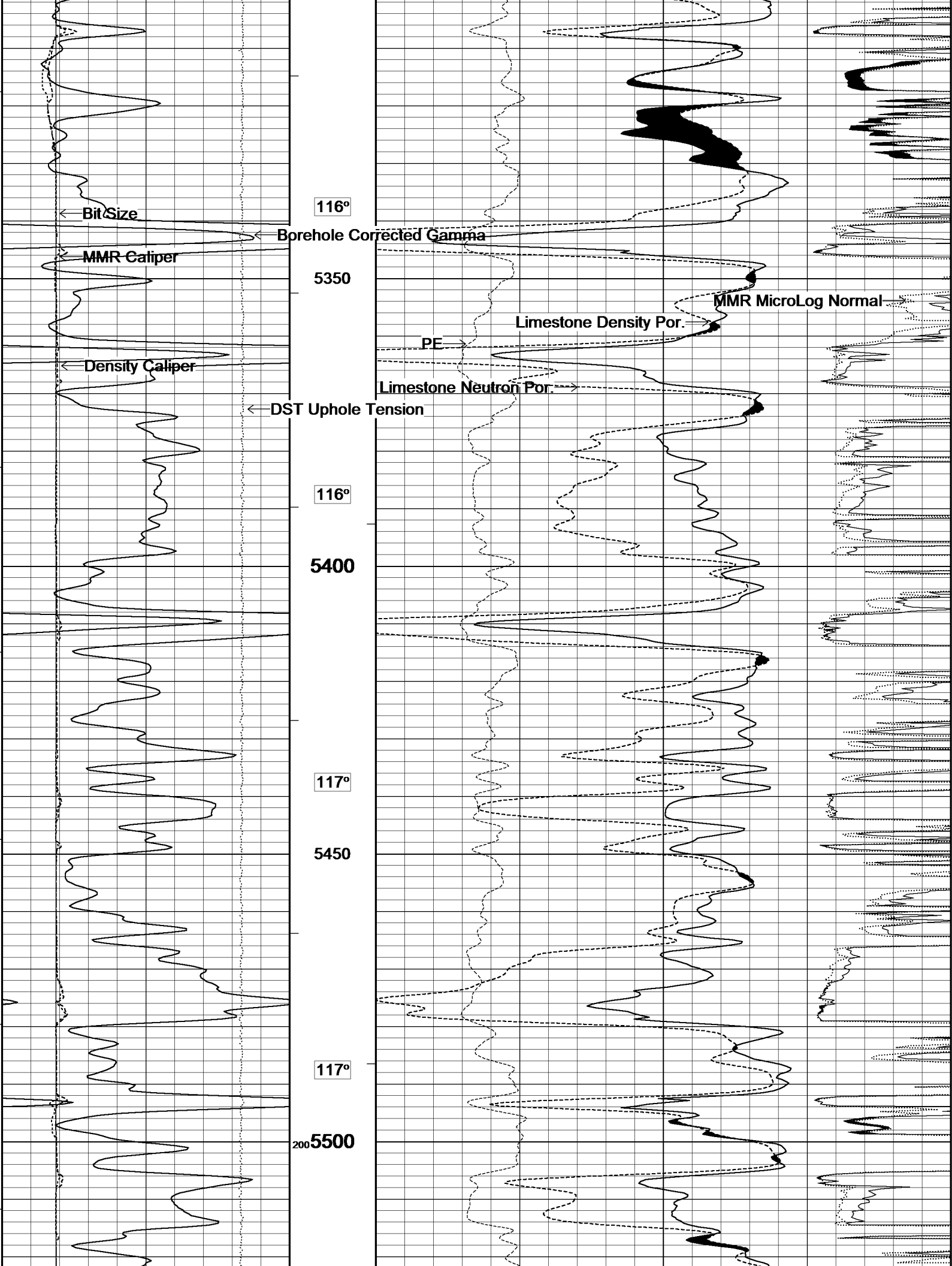
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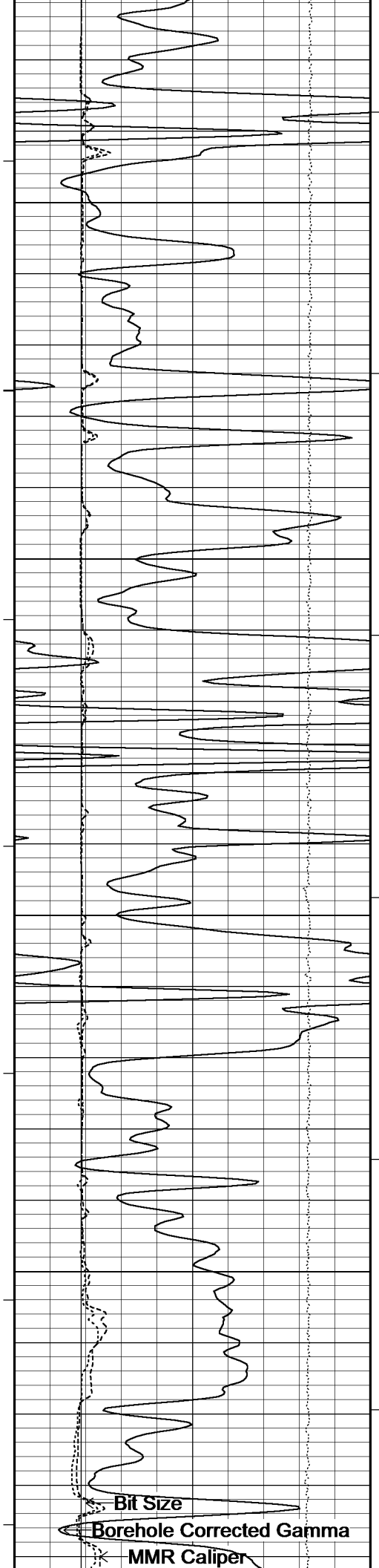












117°

5550

118°

5600

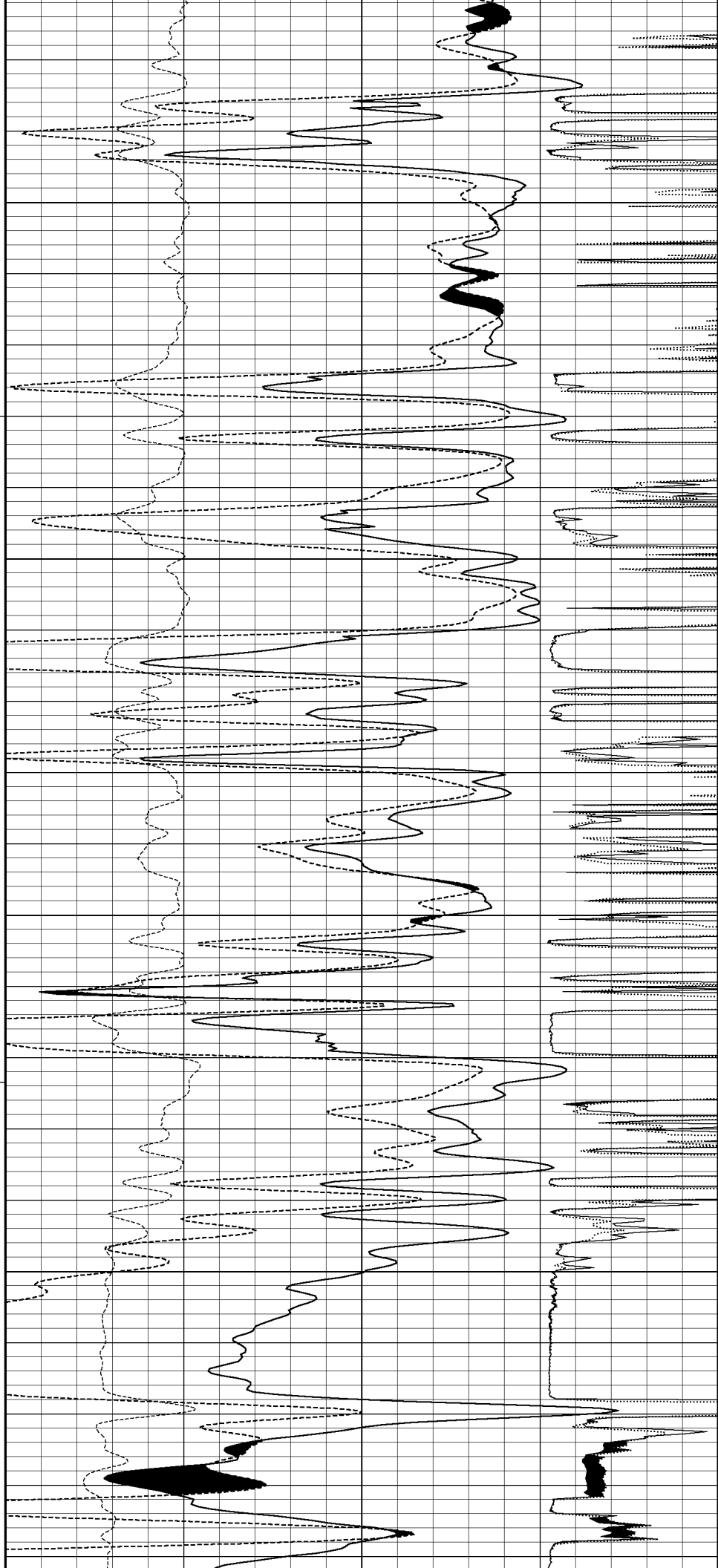
118°

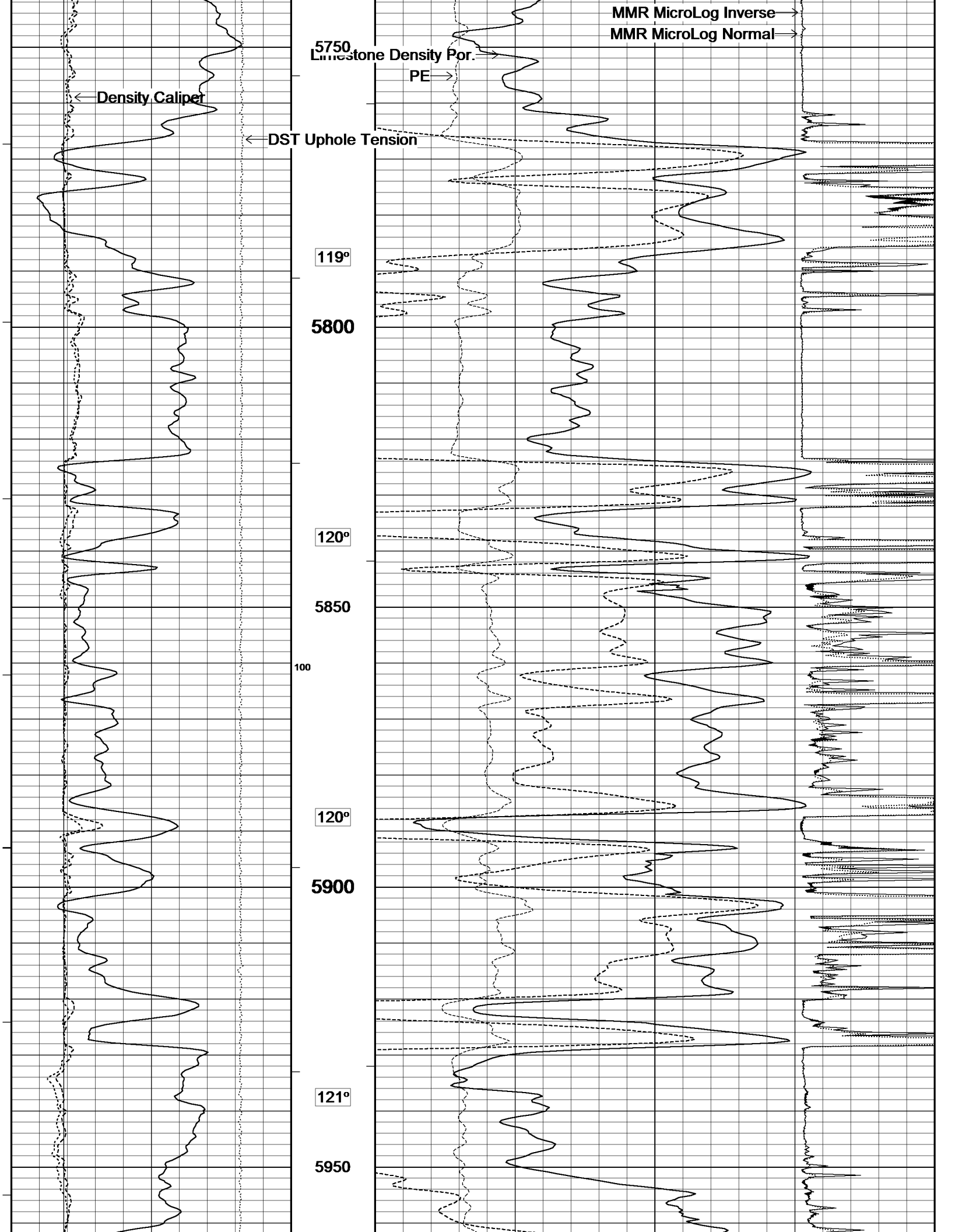
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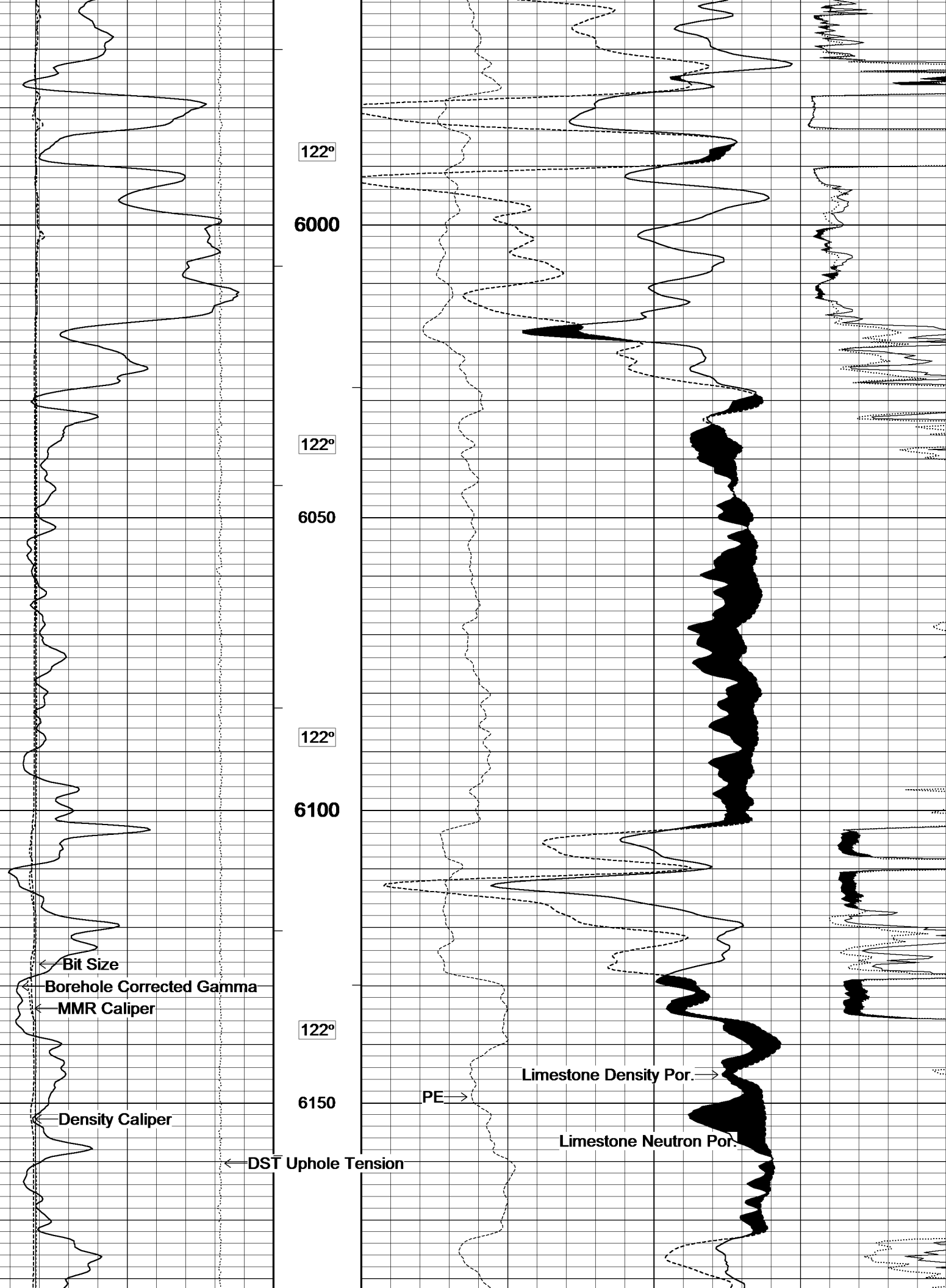
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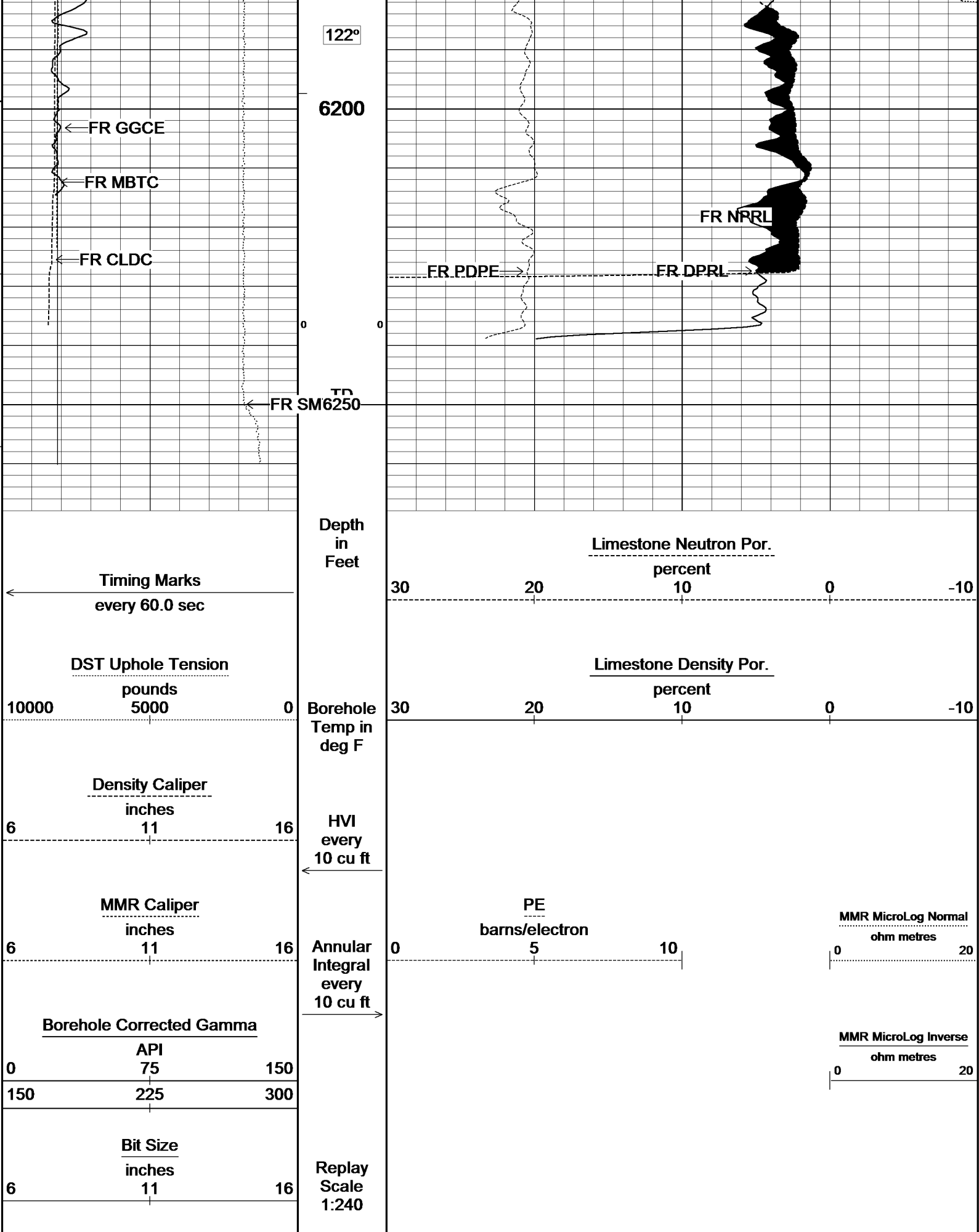
5700

119°









↓

HIGH RESOLUTION LIMESTONE

↓

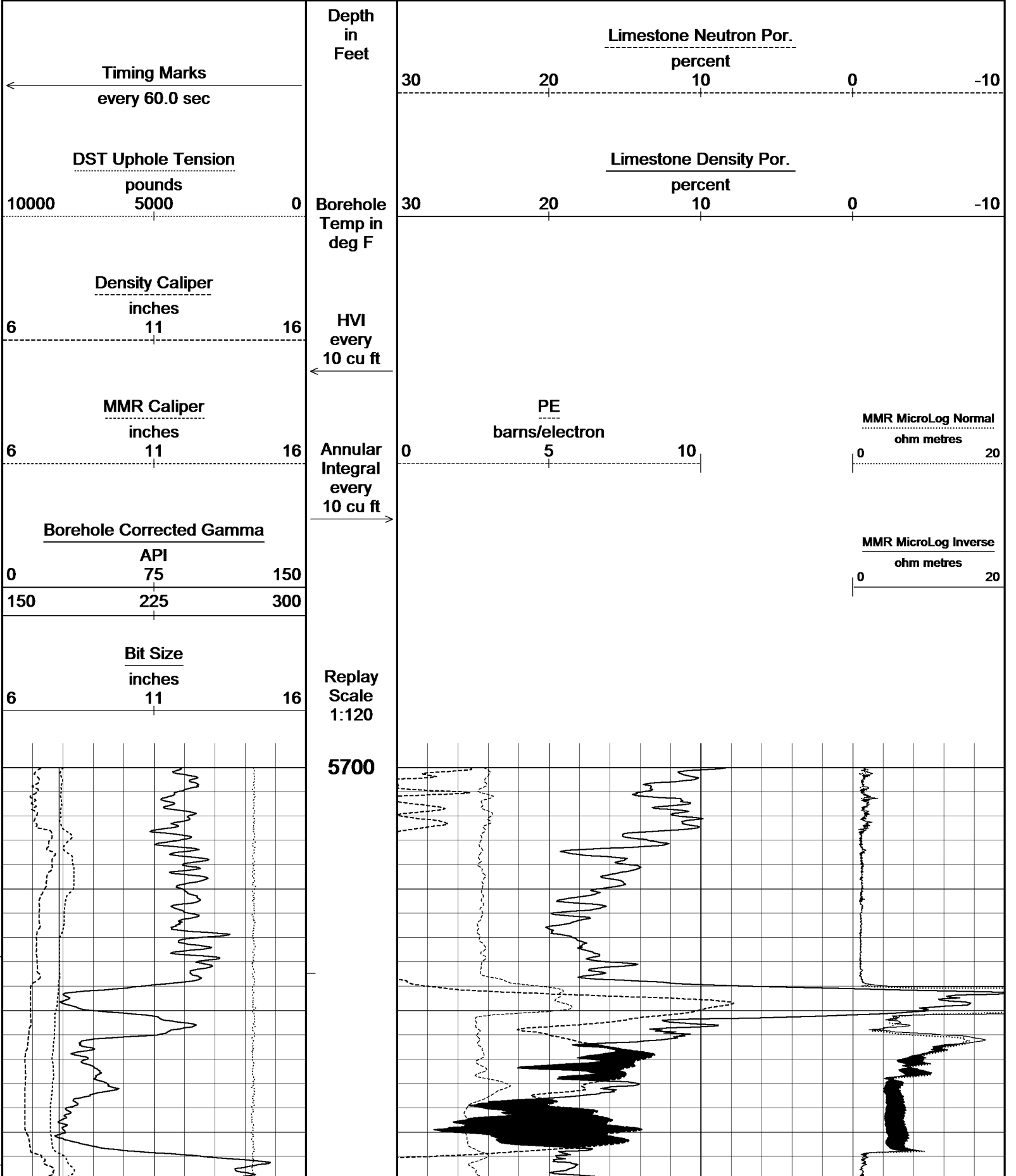
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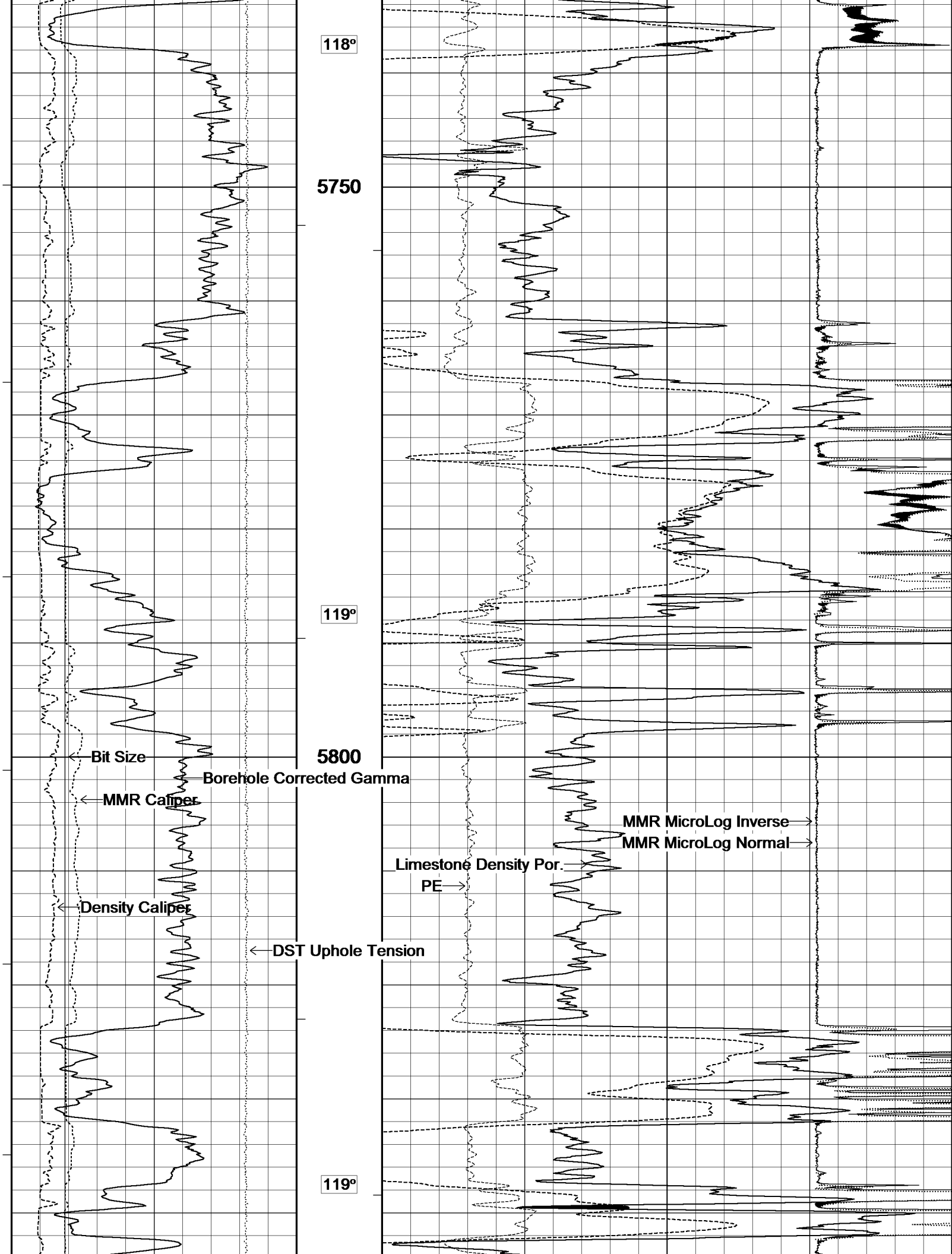
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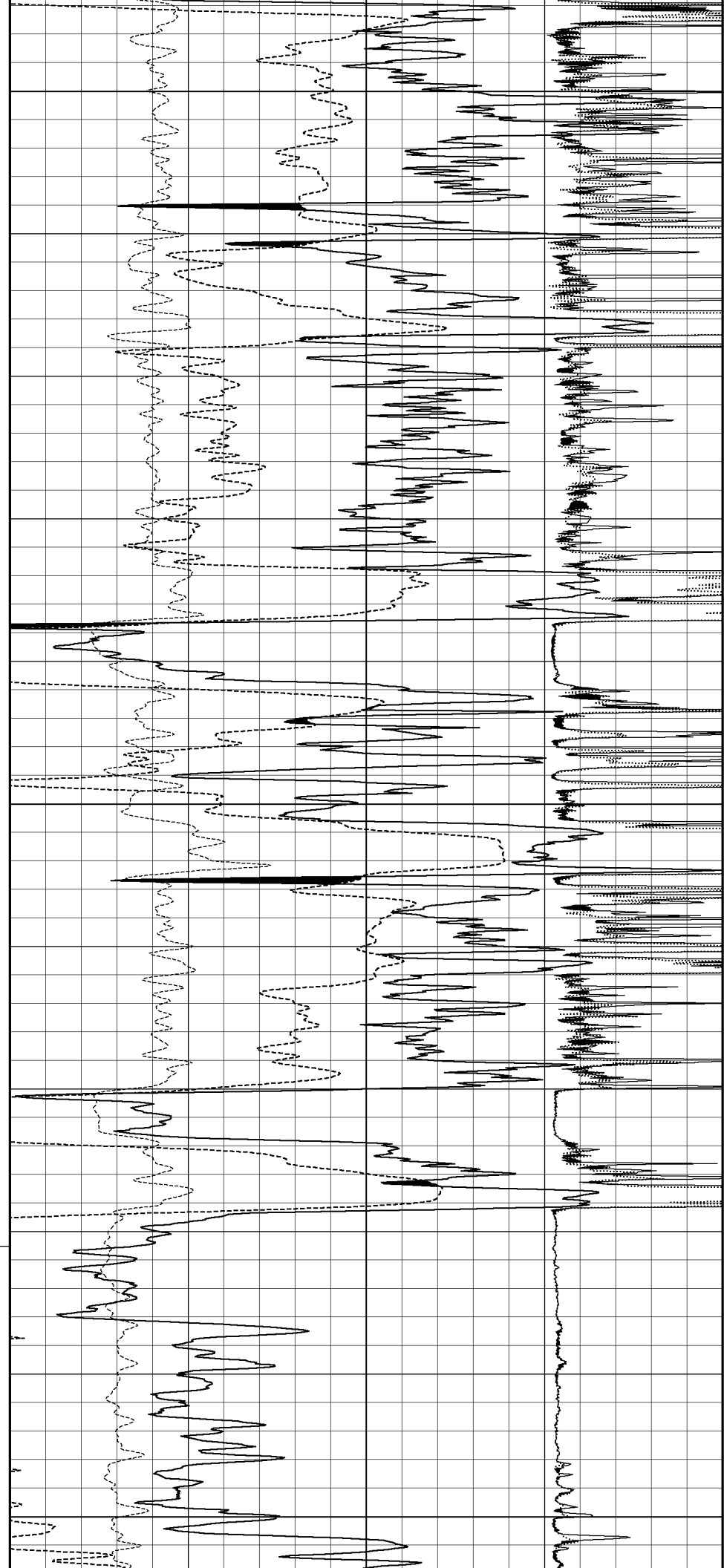
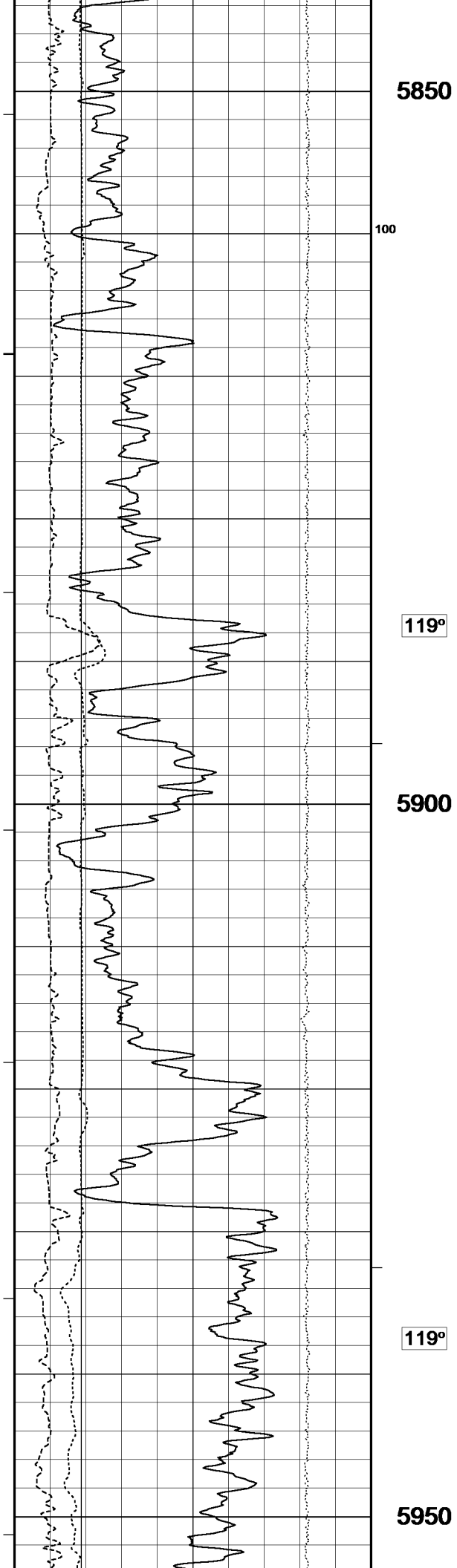
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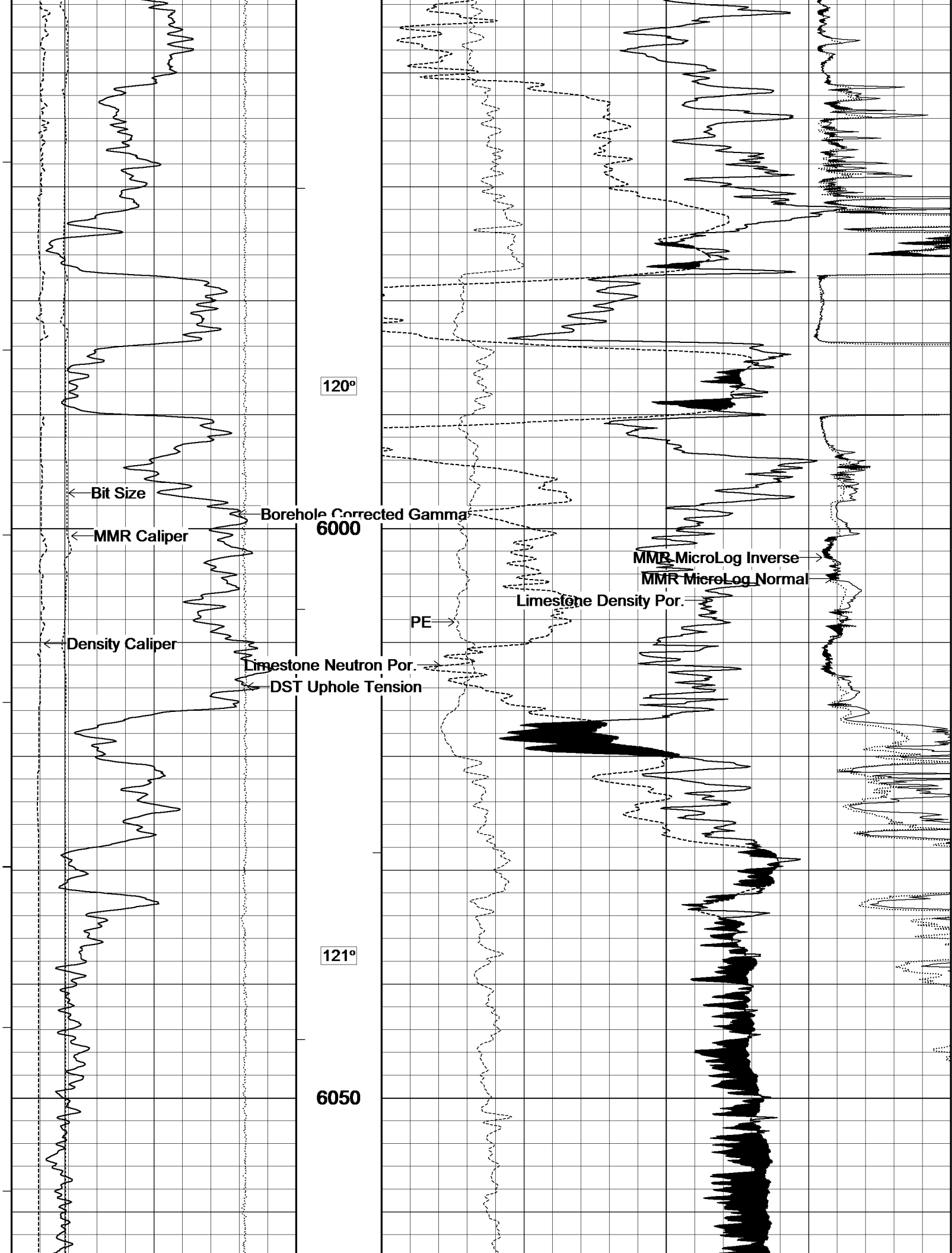
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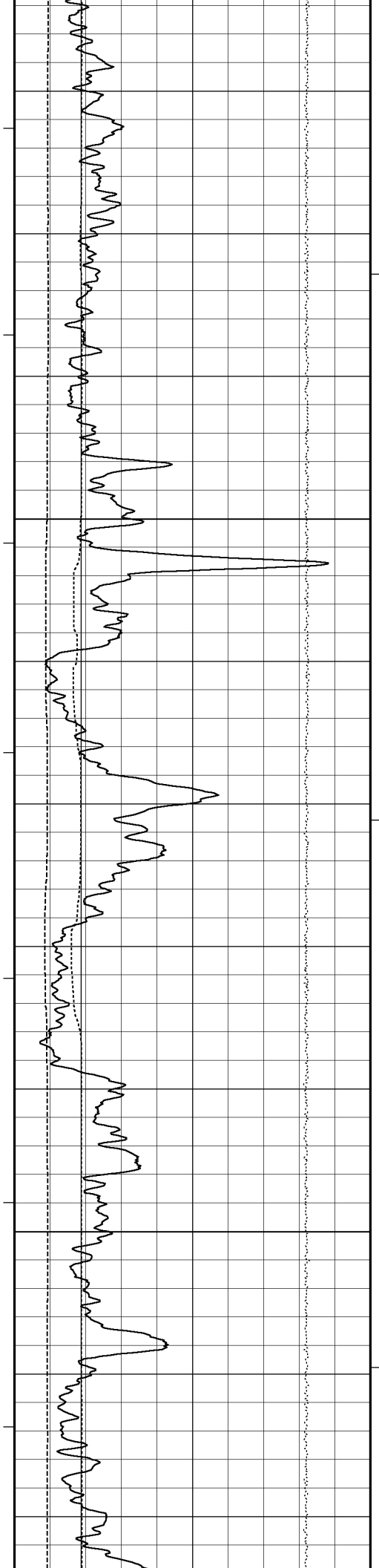
System Versions: Logged with 19.01.8879 Plotted with 19.01.9433









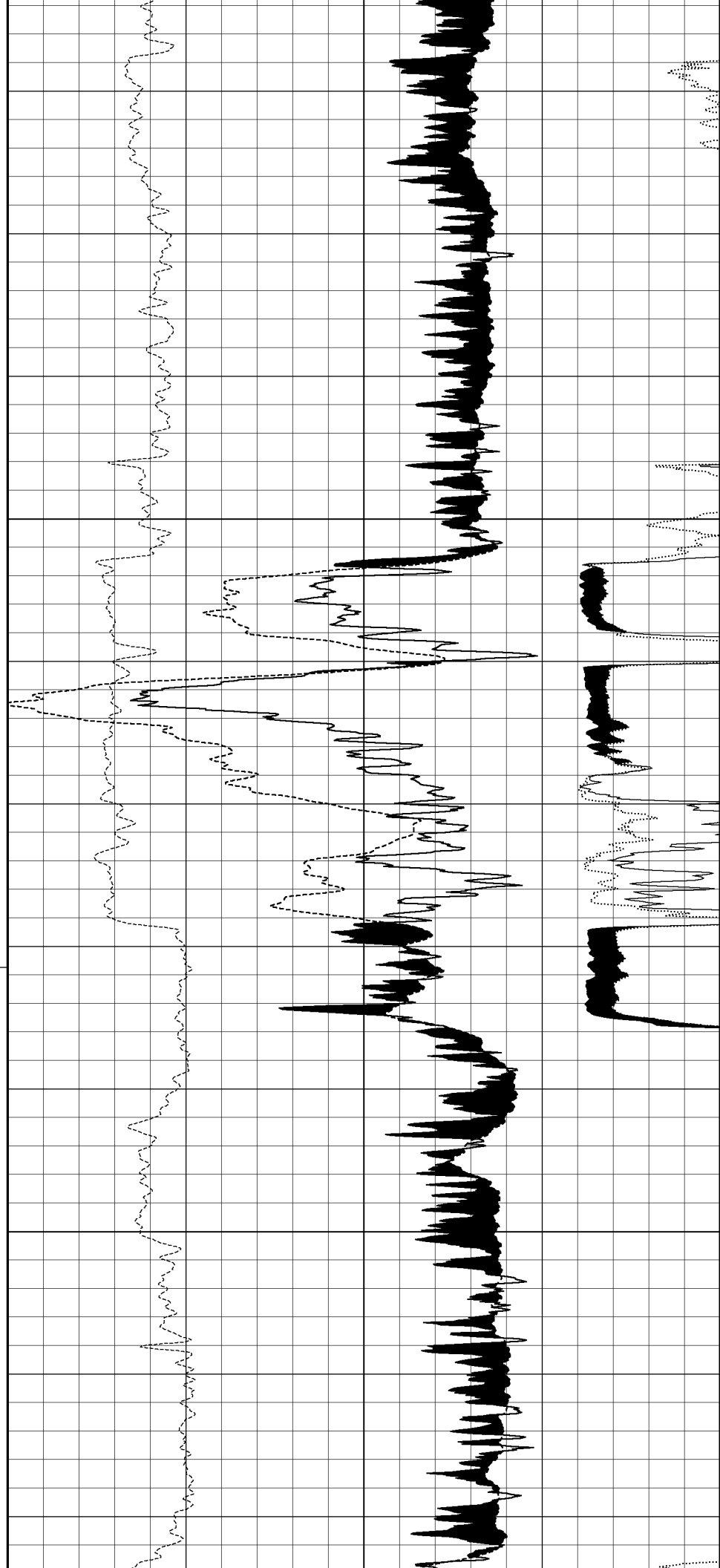


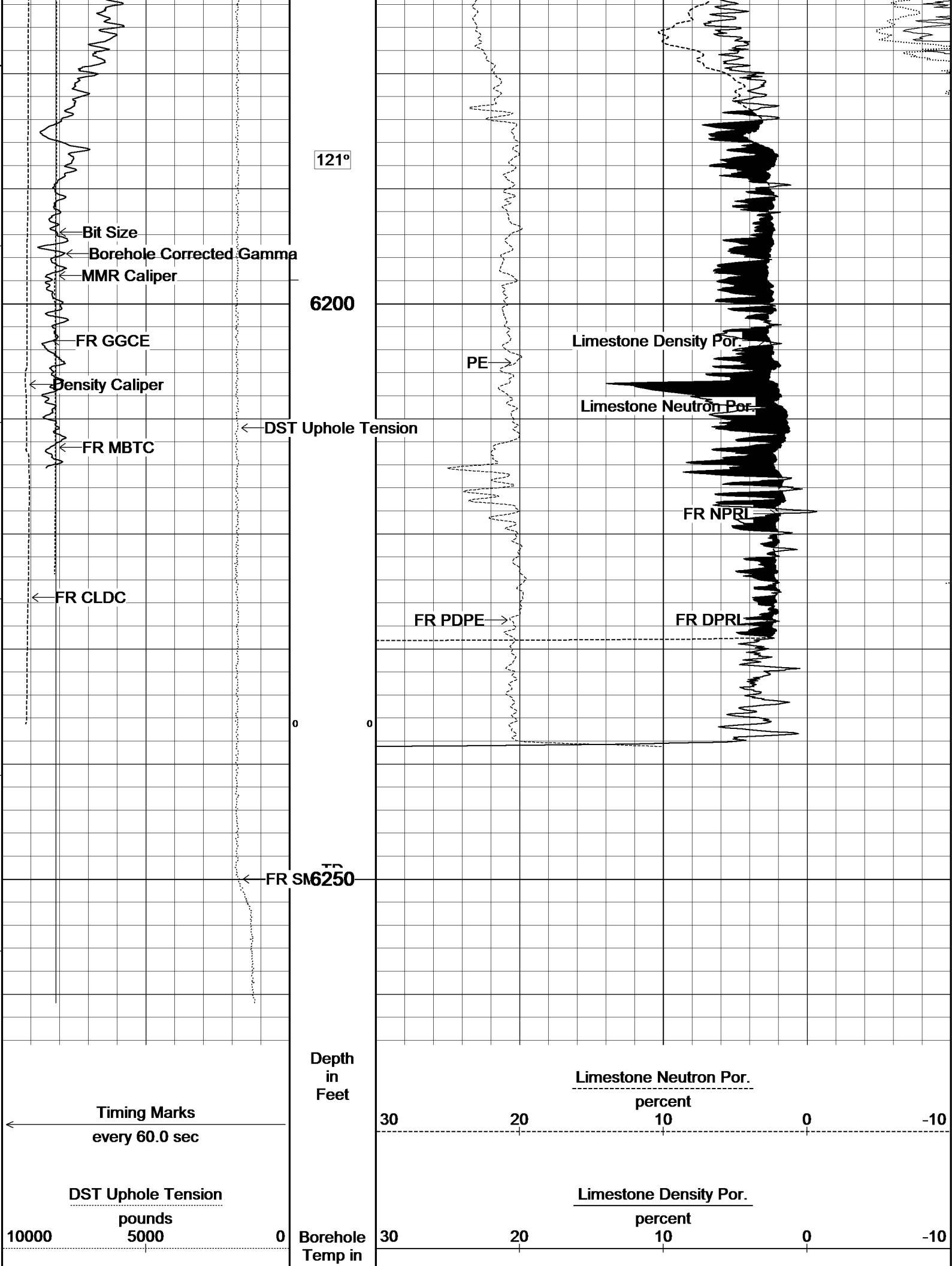
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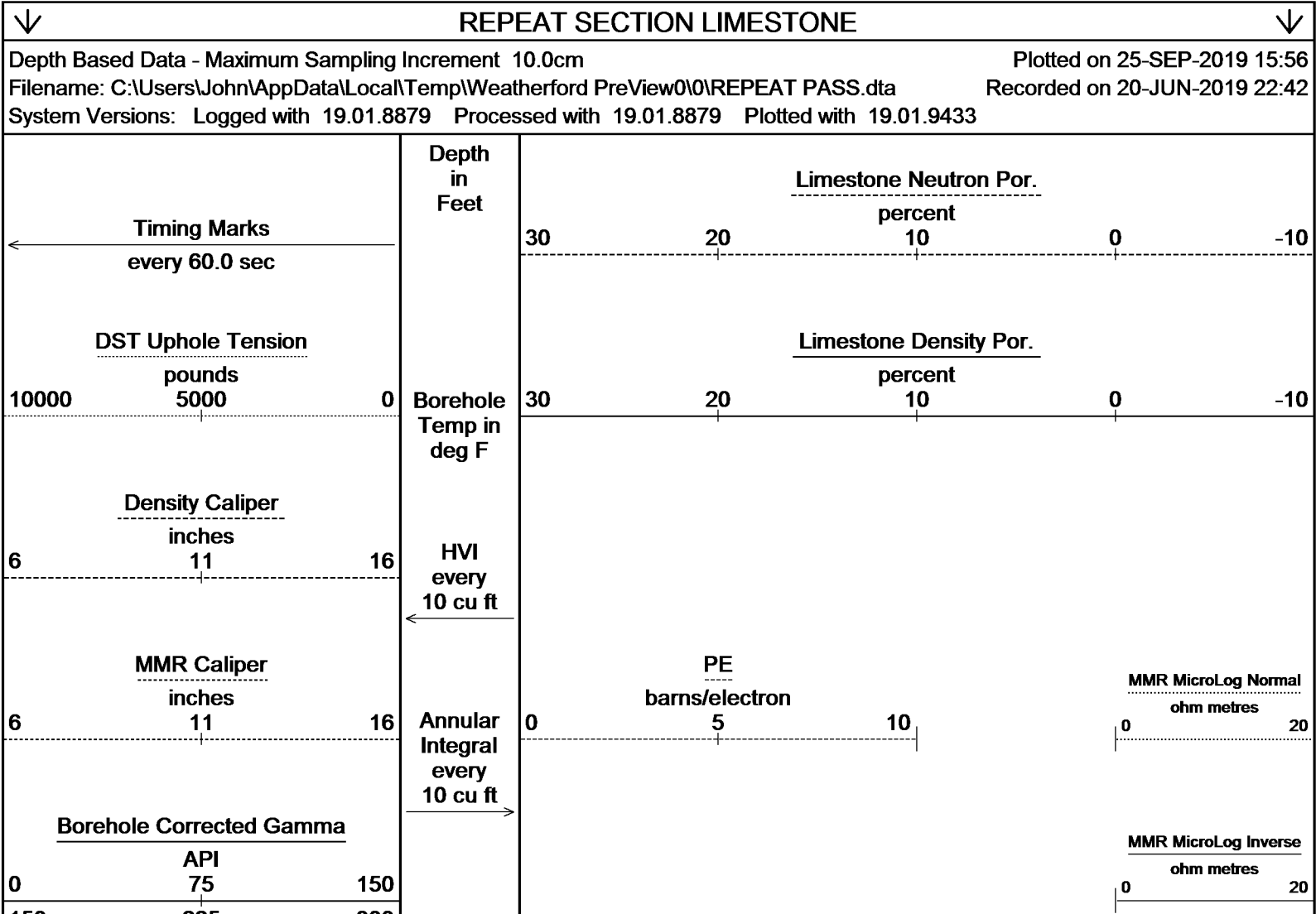
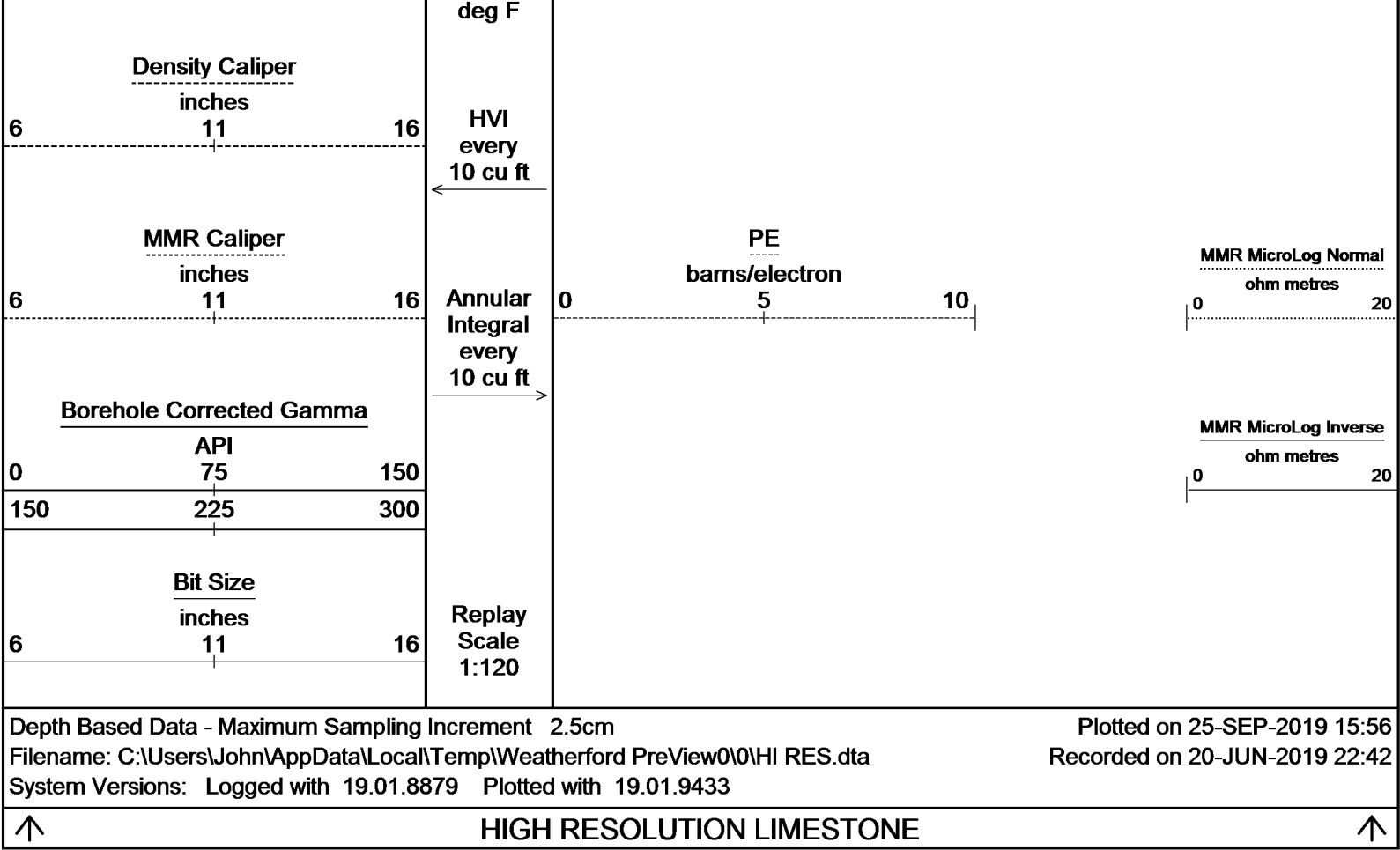
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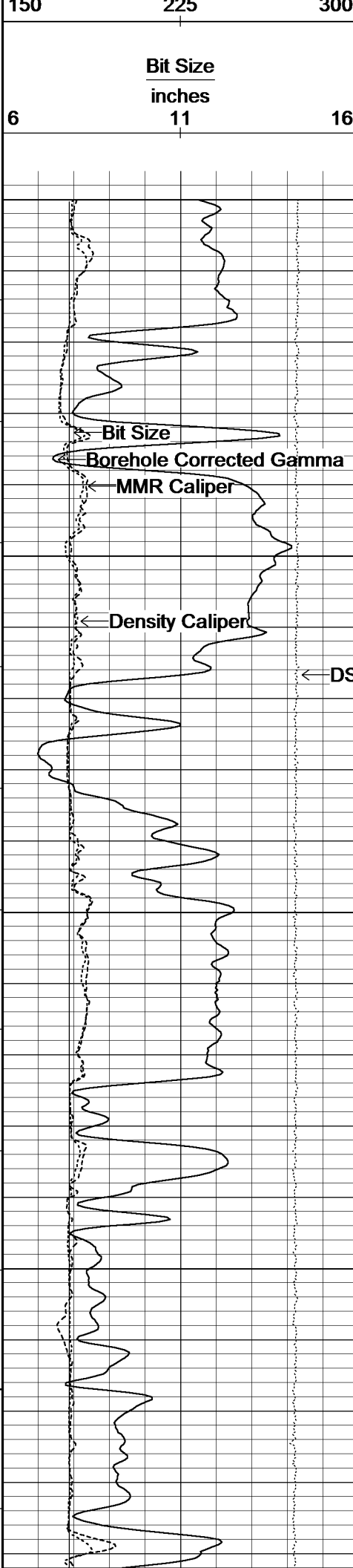
121°

6150









Replay
Scale
1:240

5700

118°

5750

Limestone Density Por.
PE

DST Uphole Tension

118°

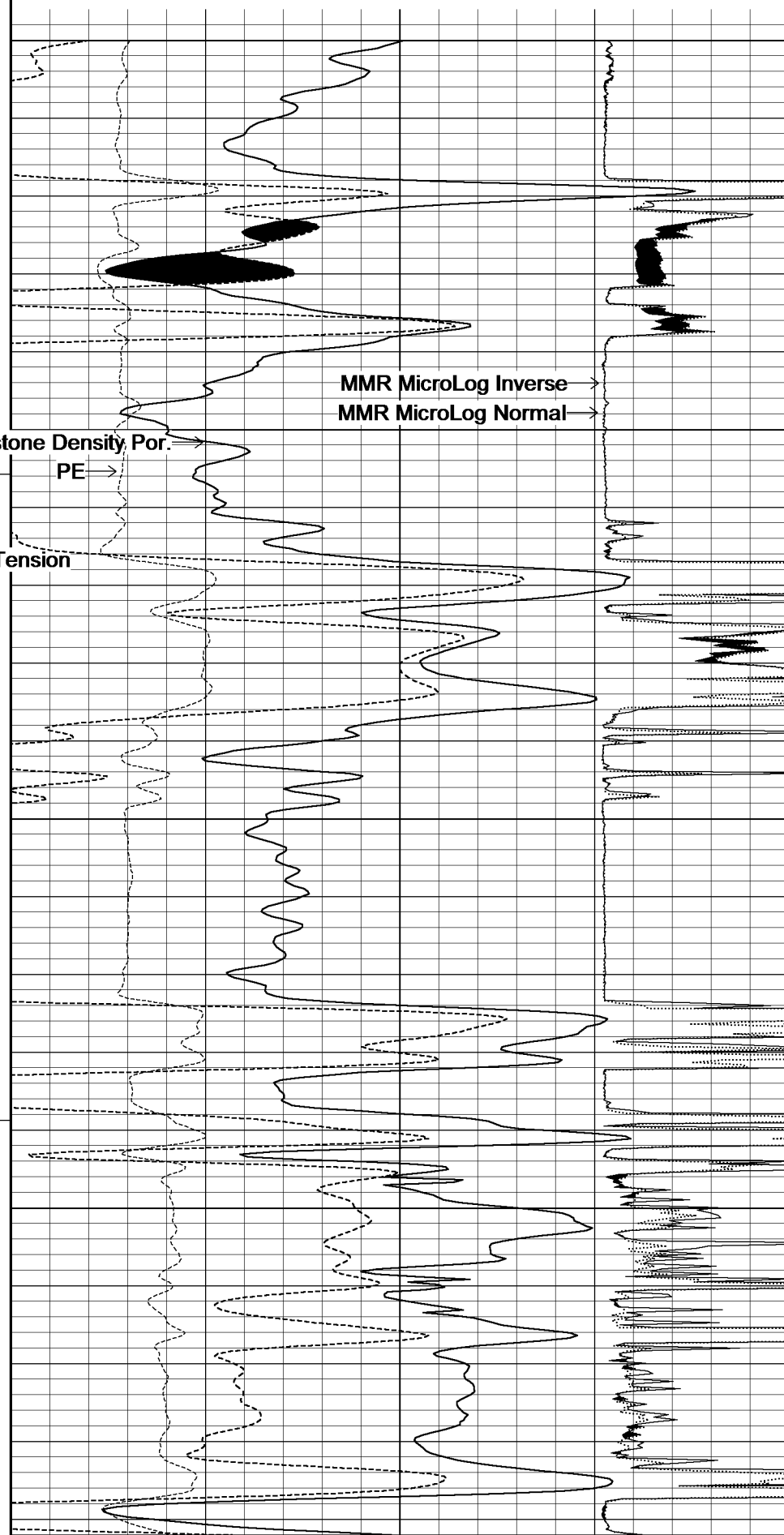
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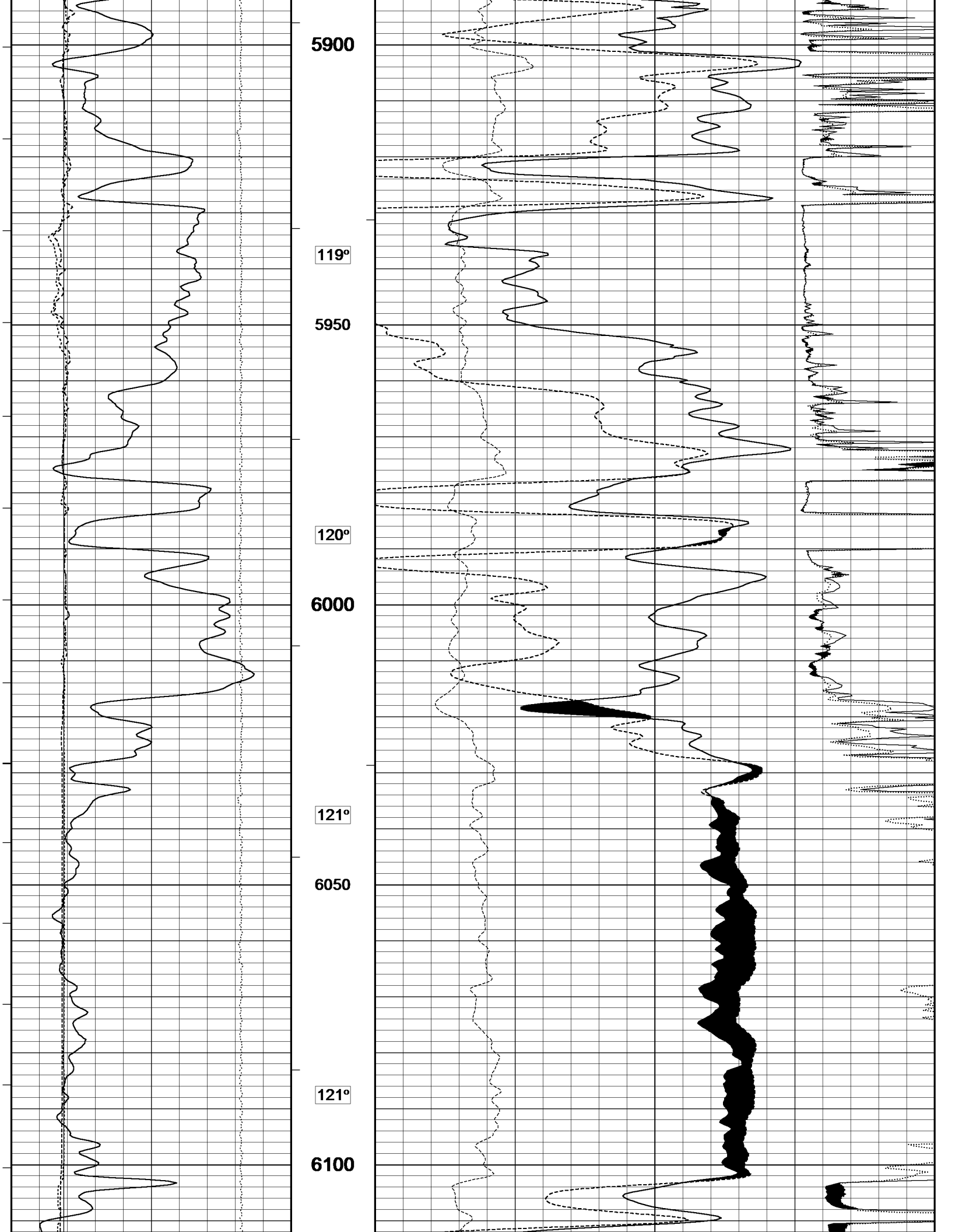
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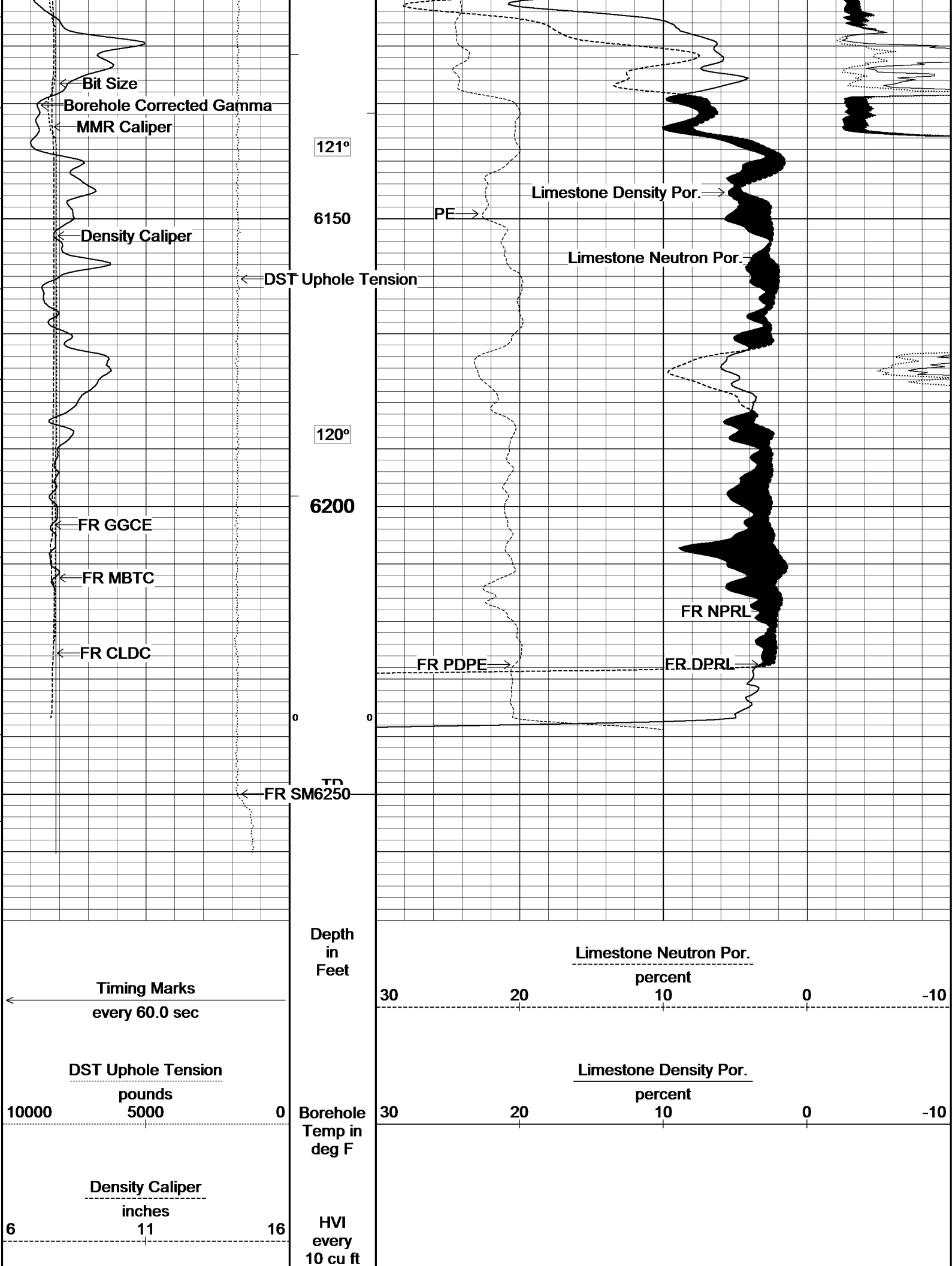
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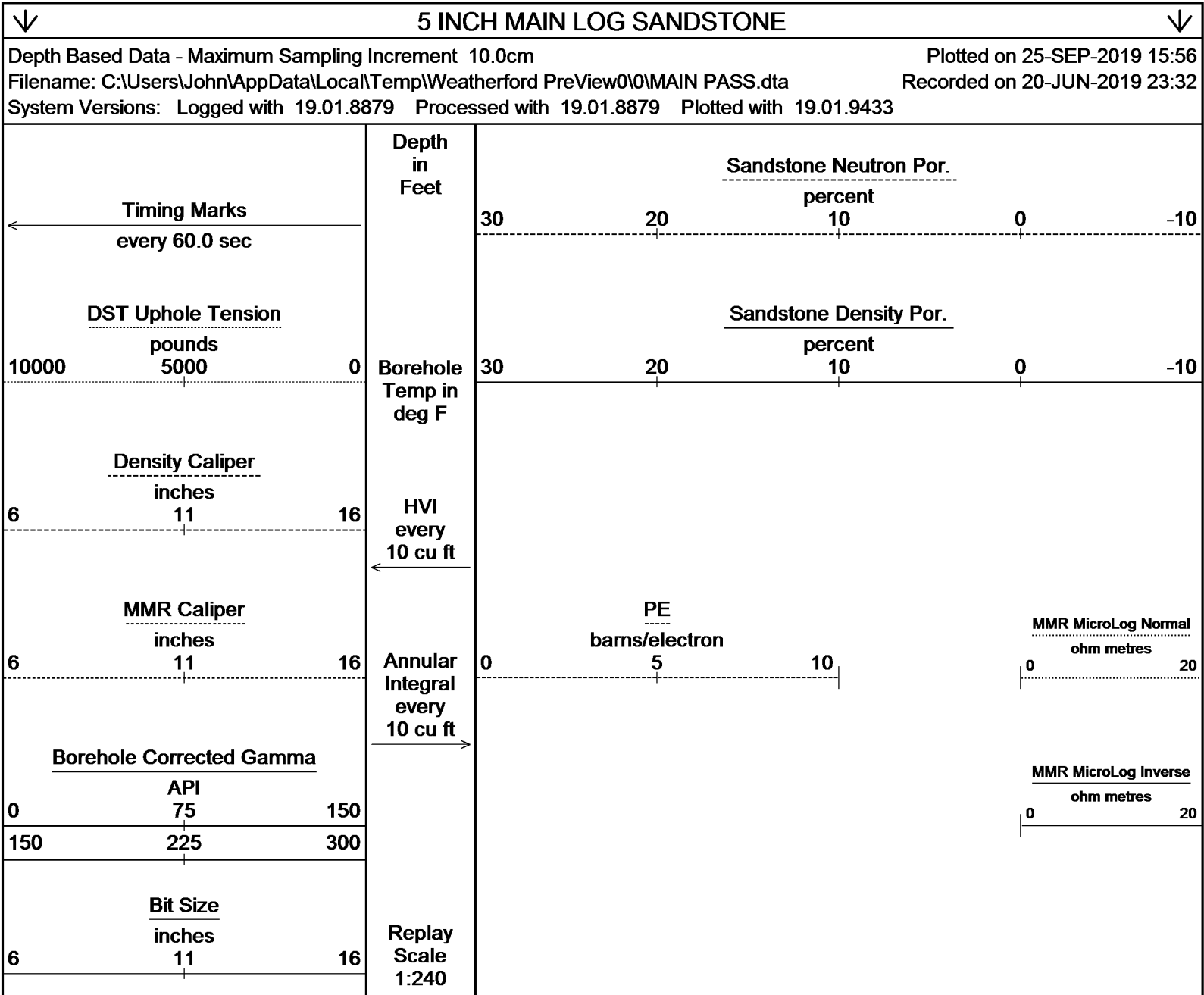
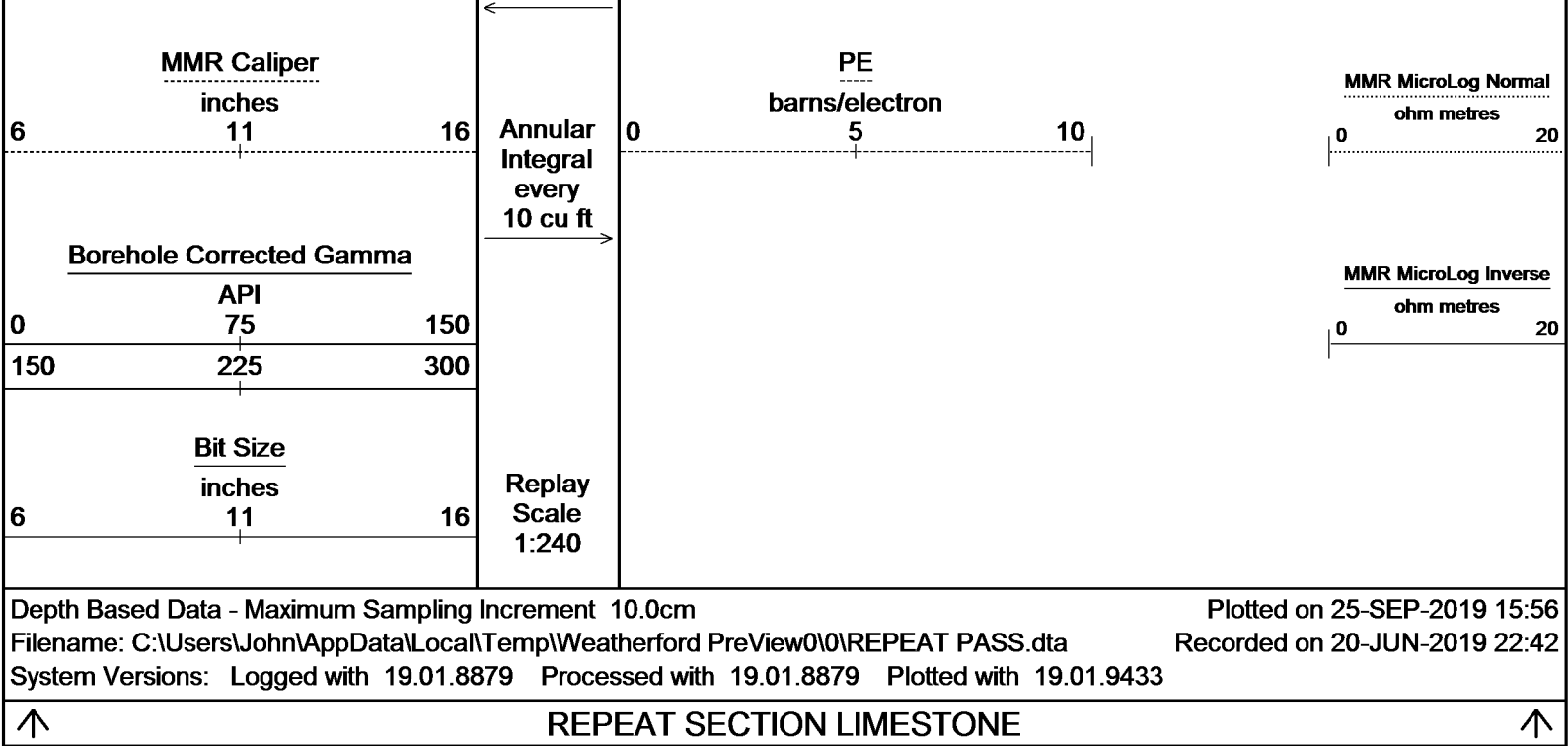
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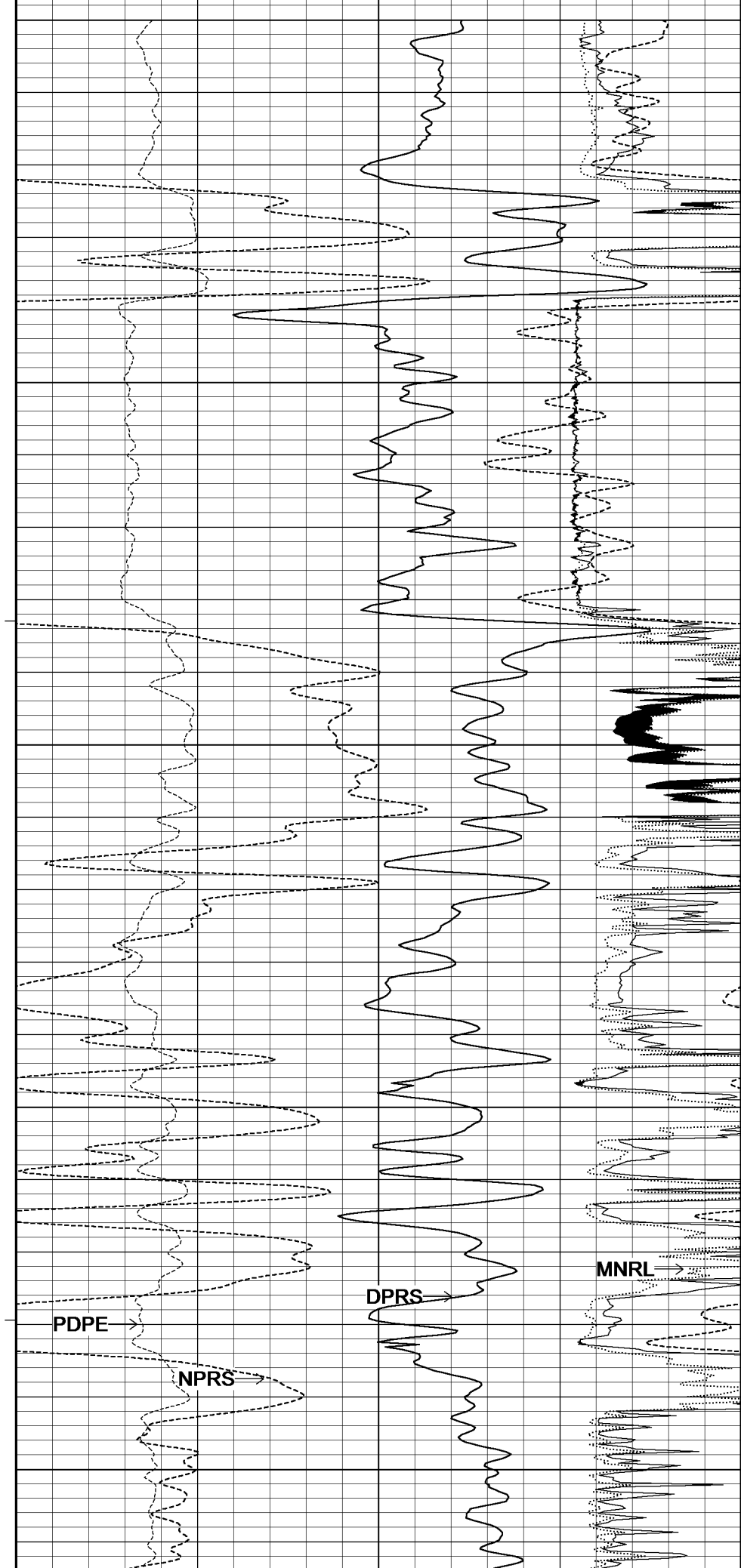
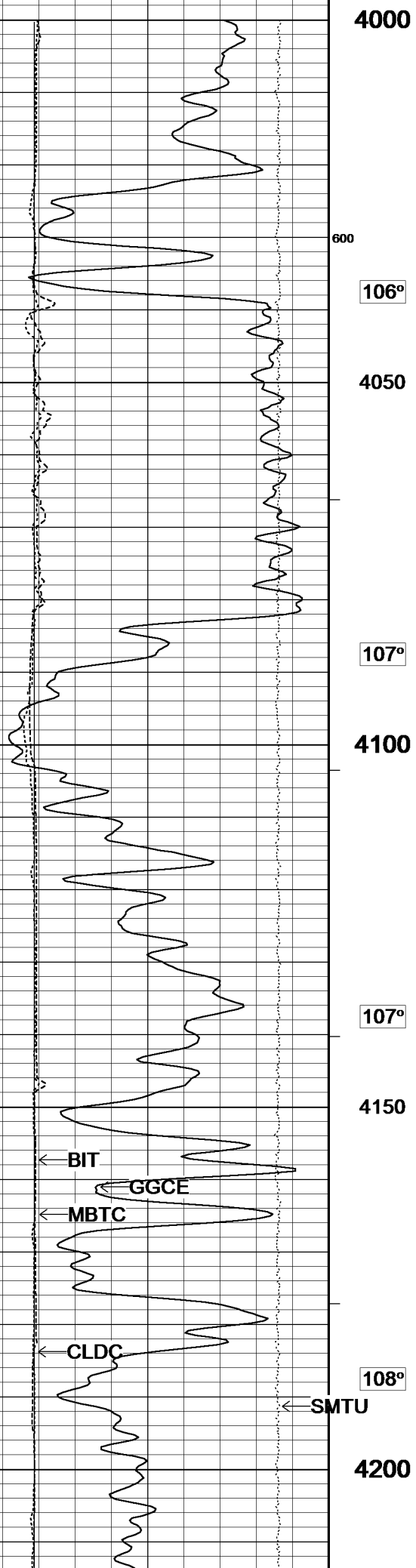
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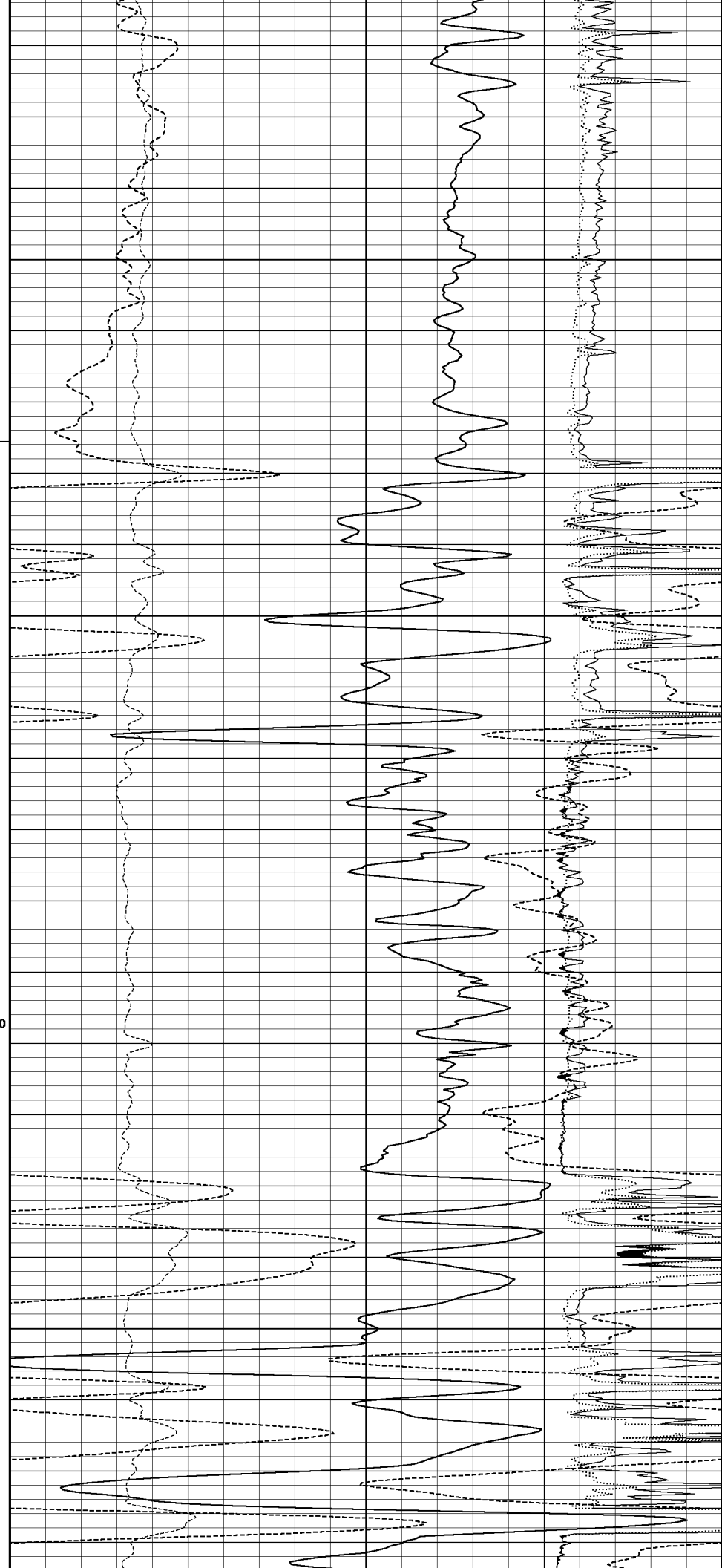
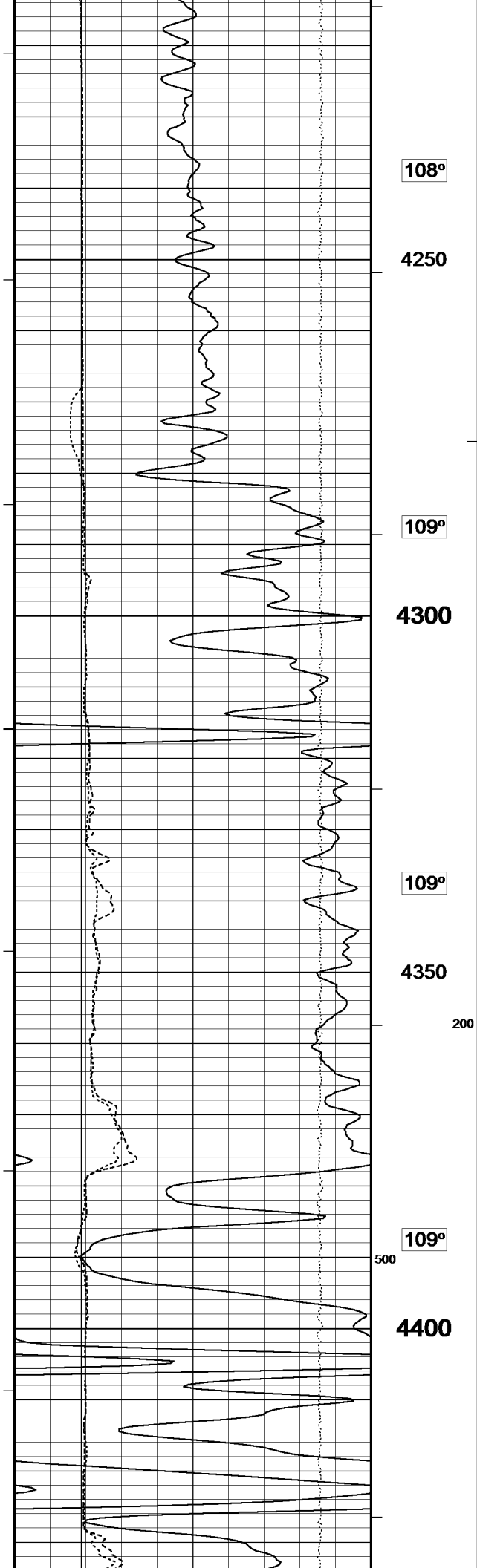


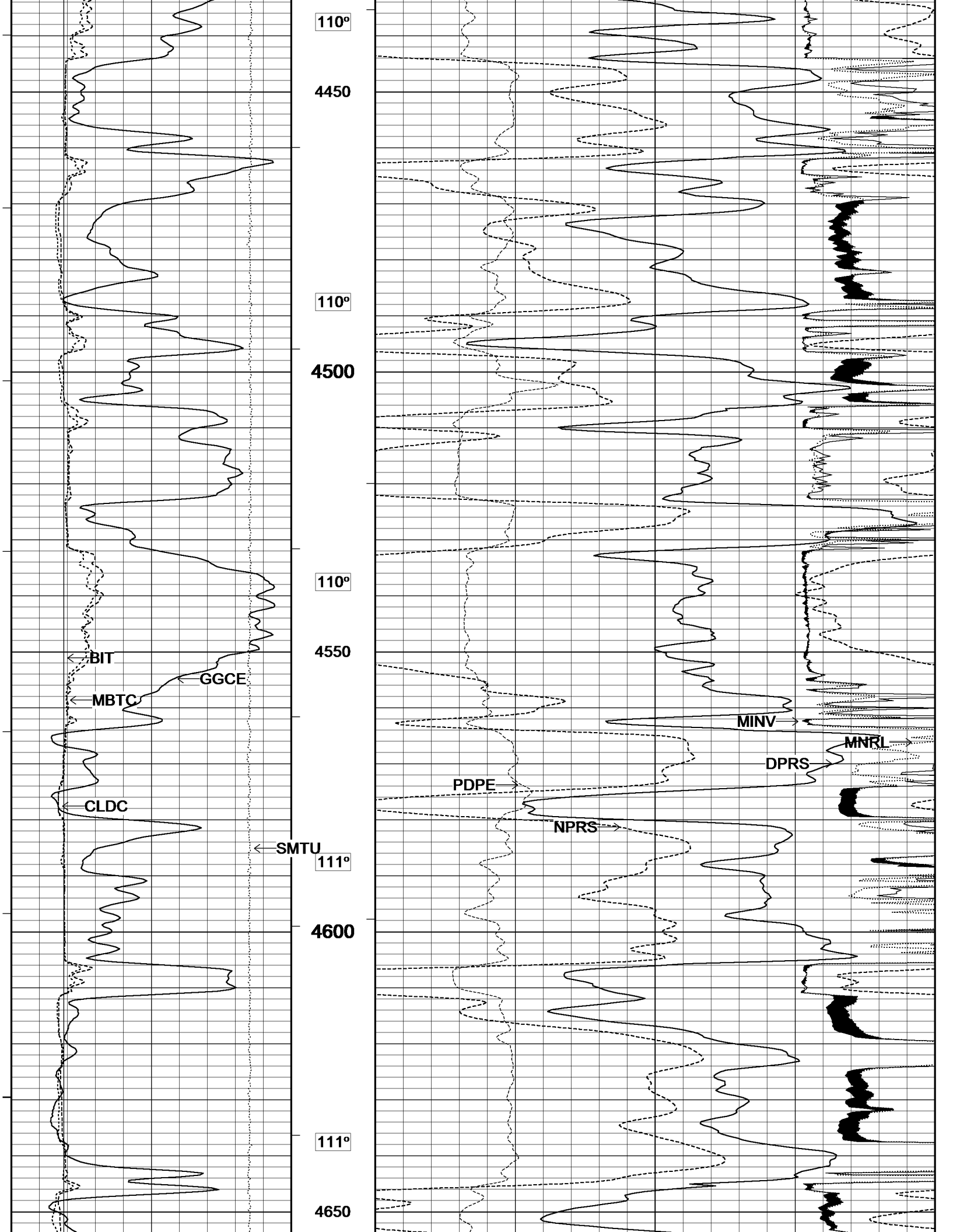


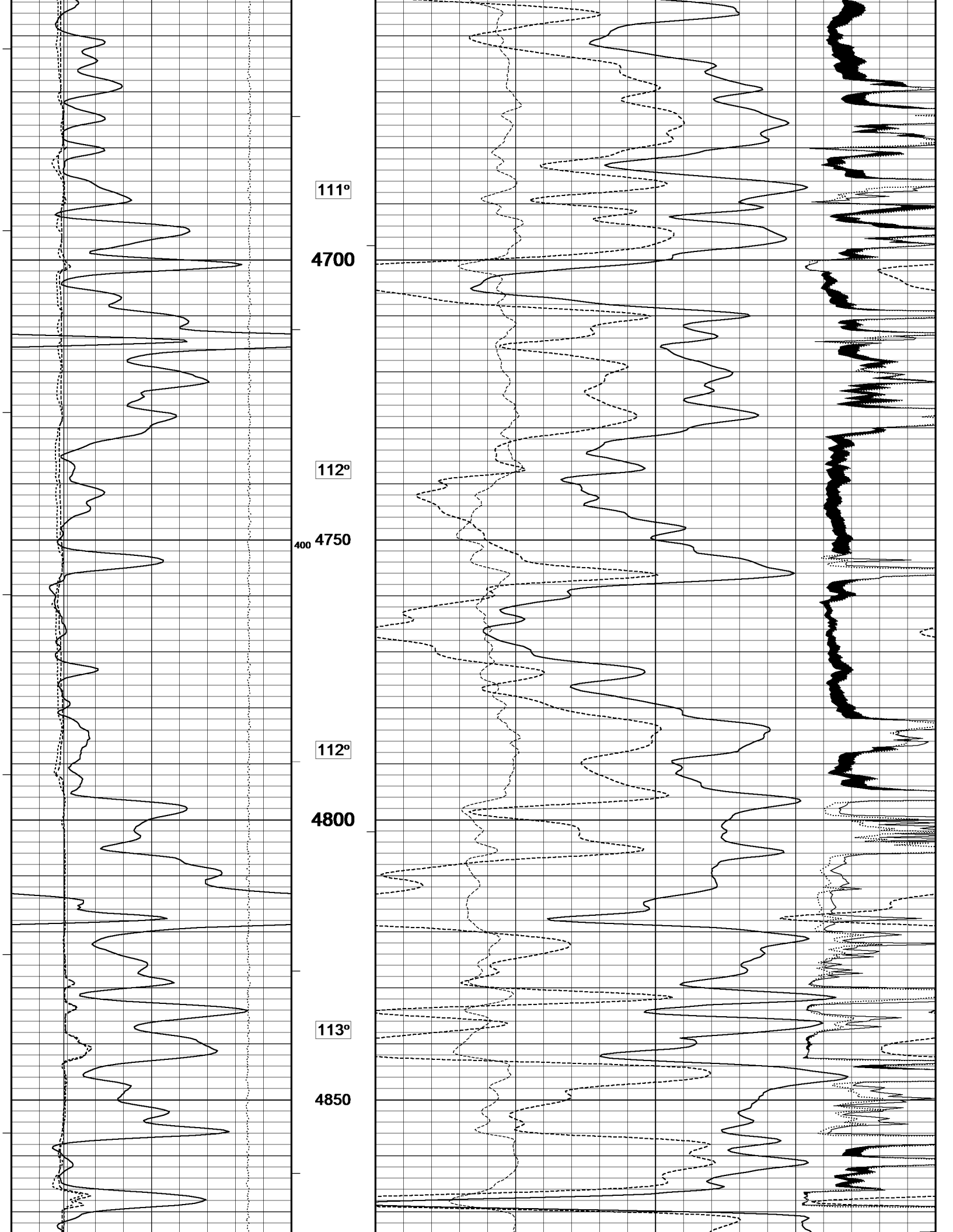


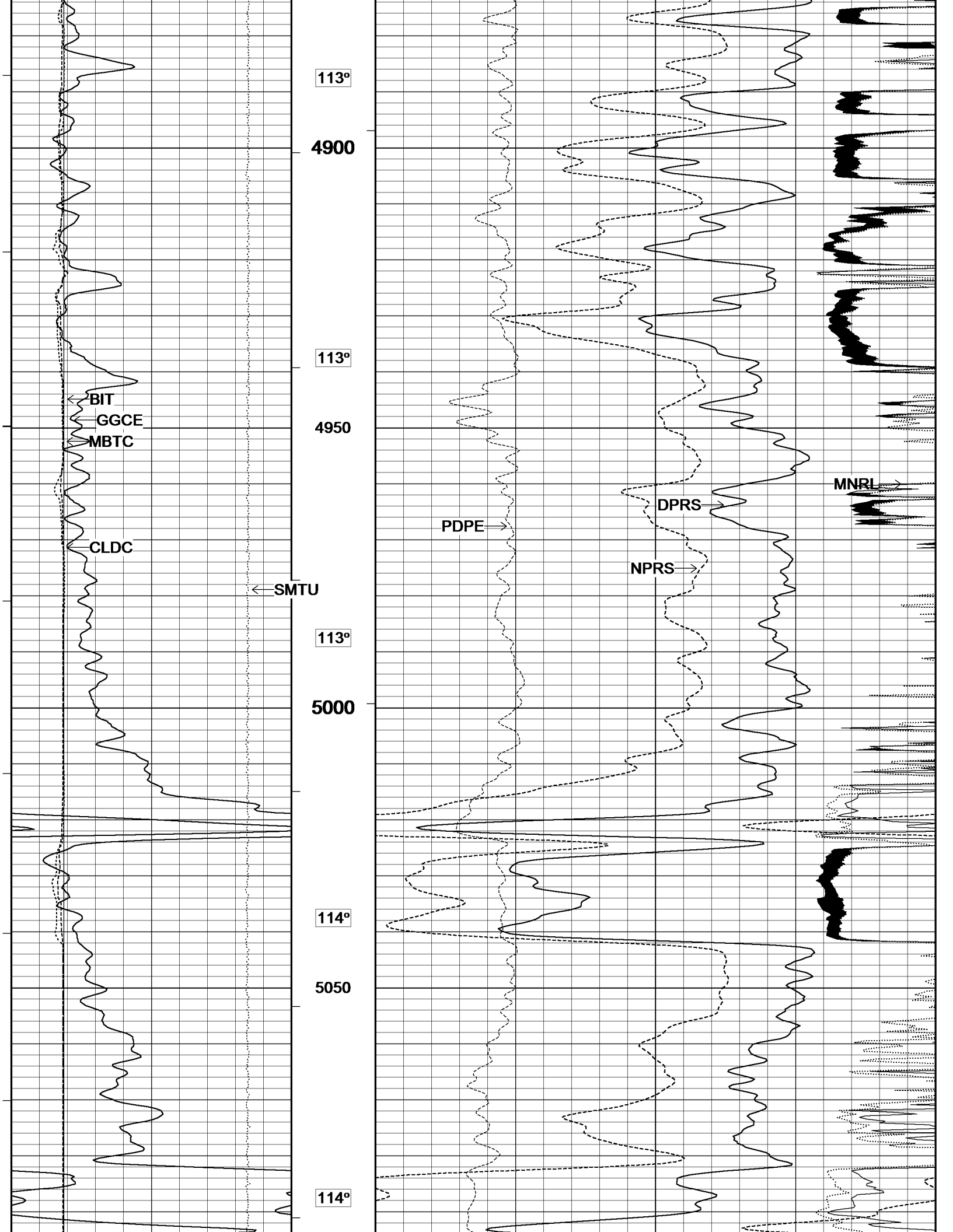


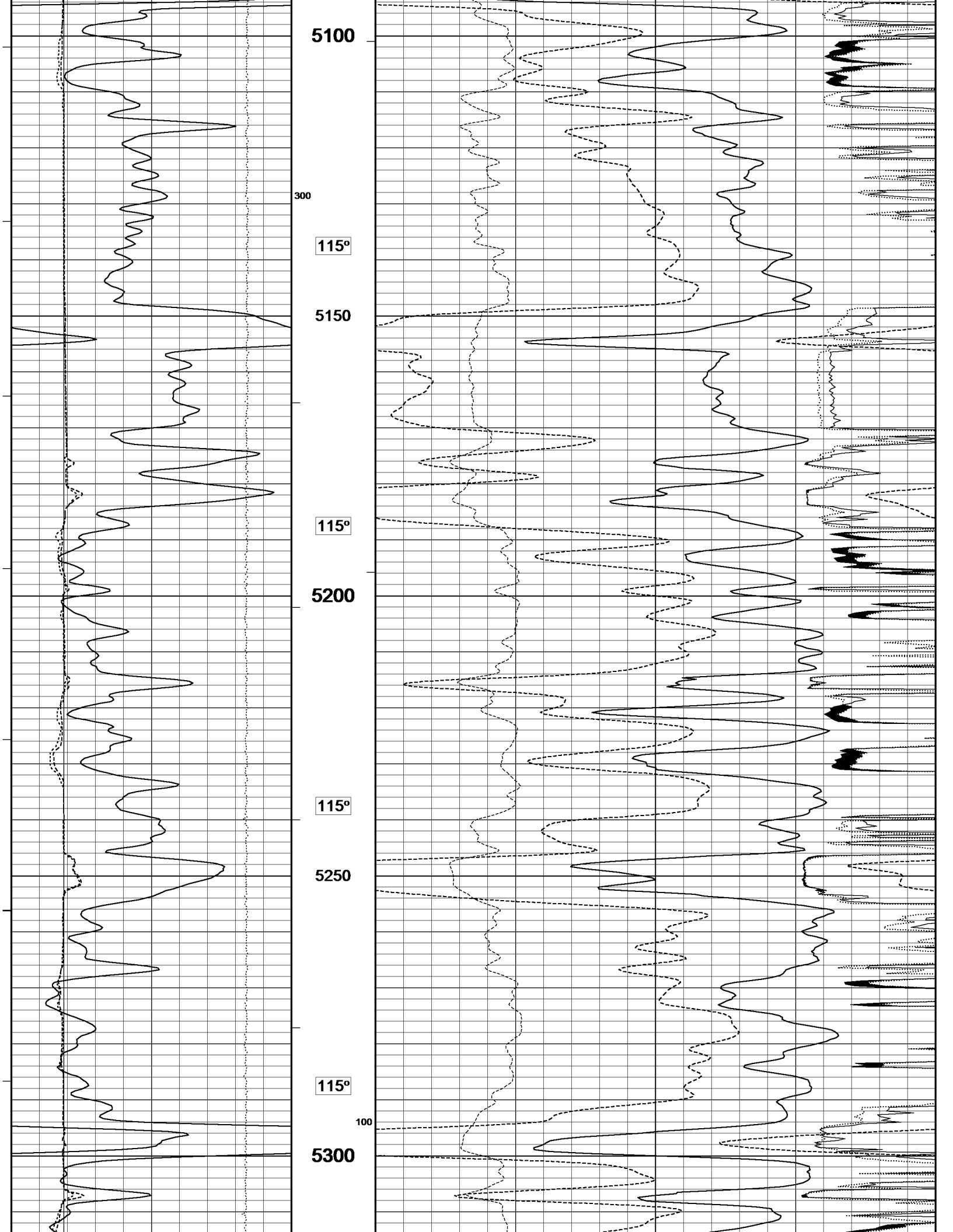


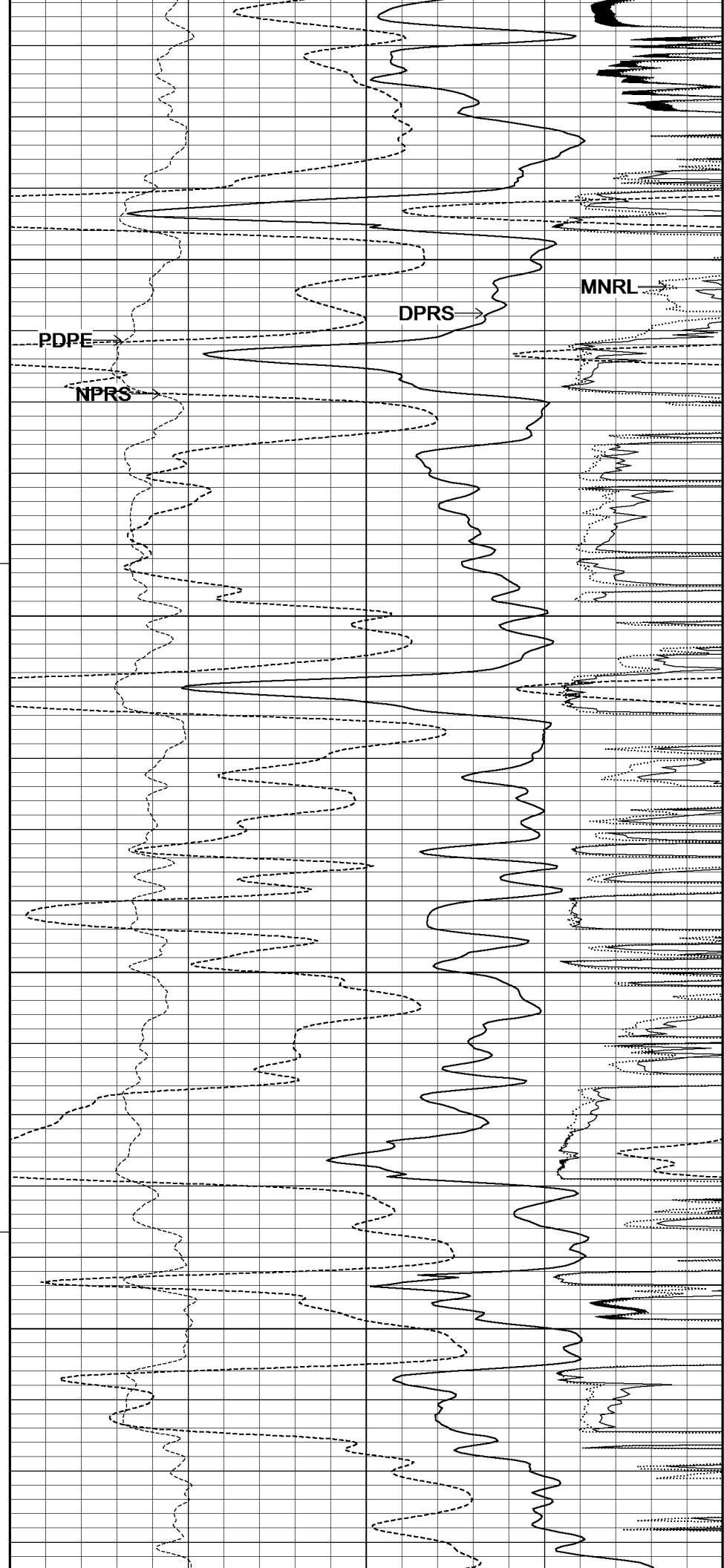
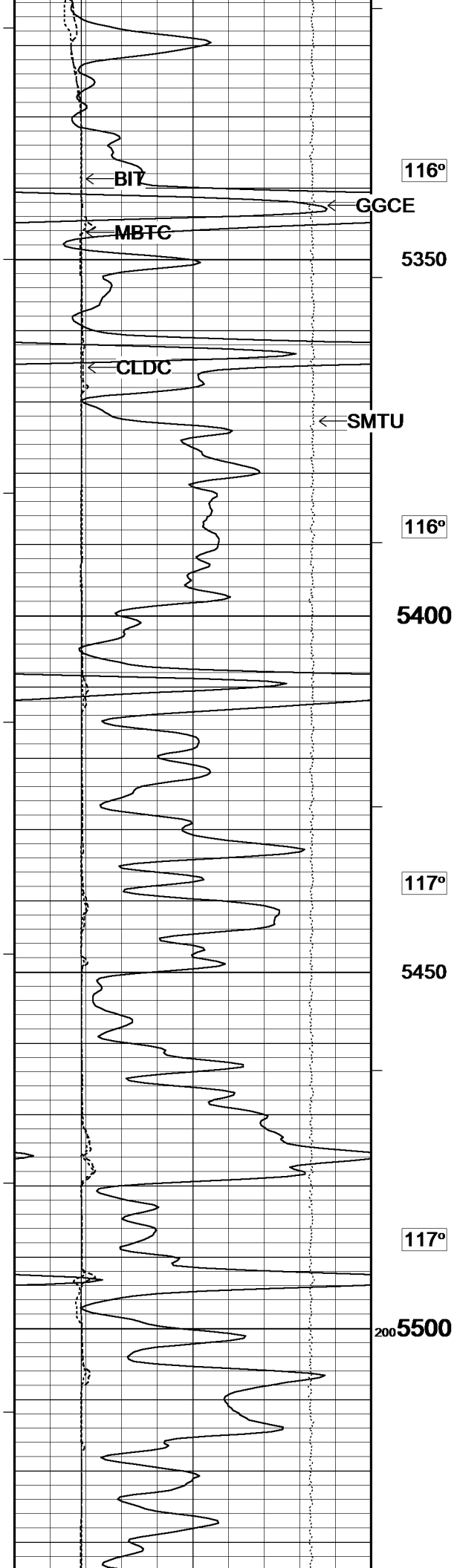


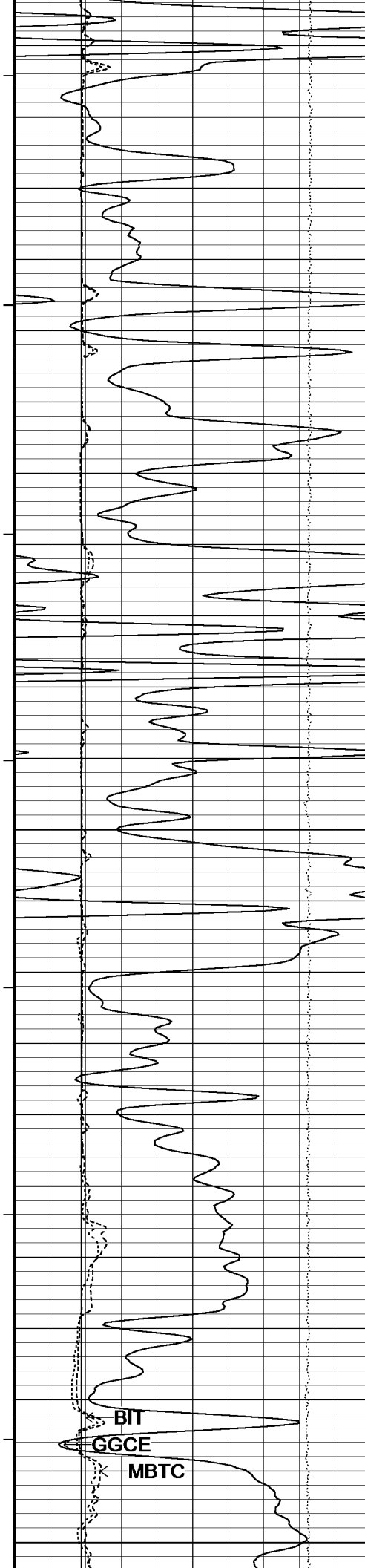












117°

5550

118°

5600

118°

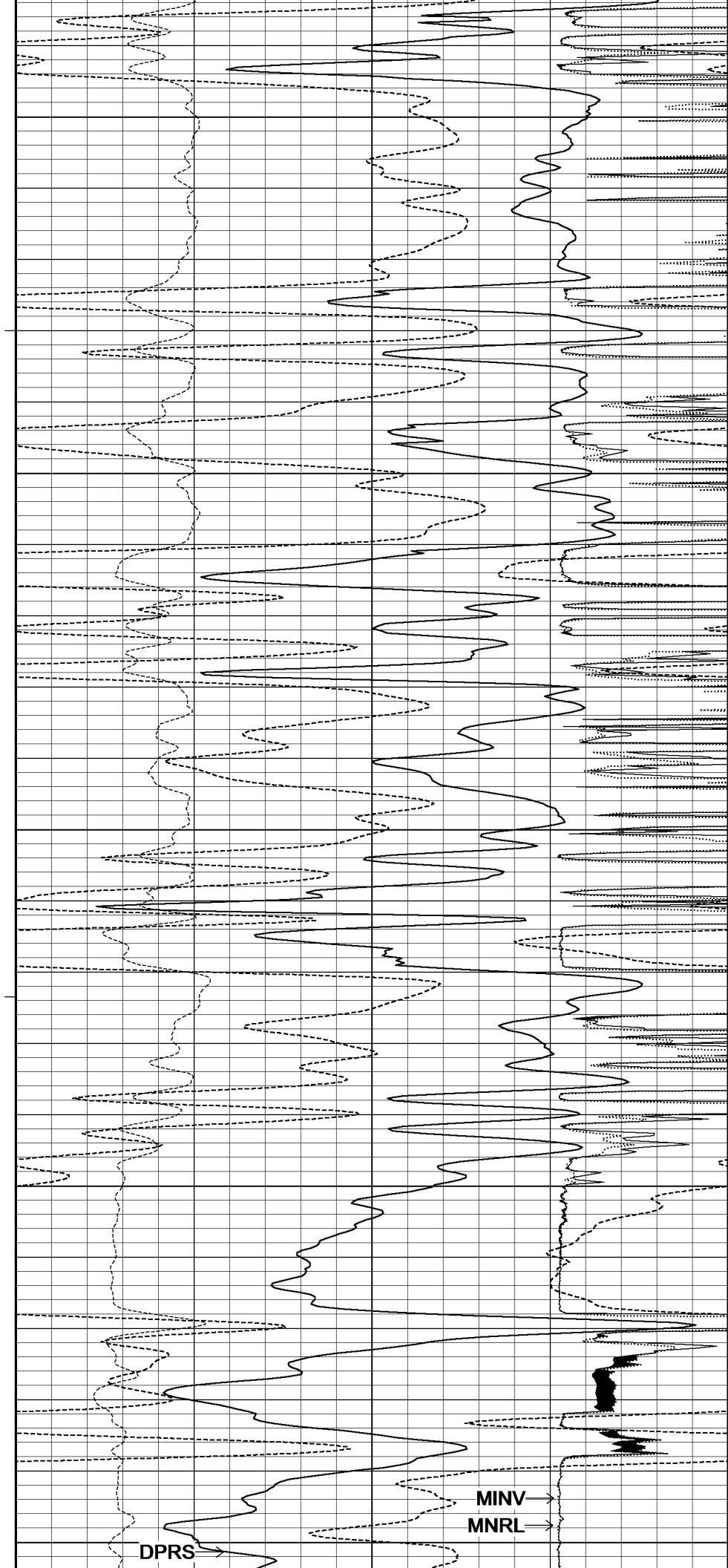
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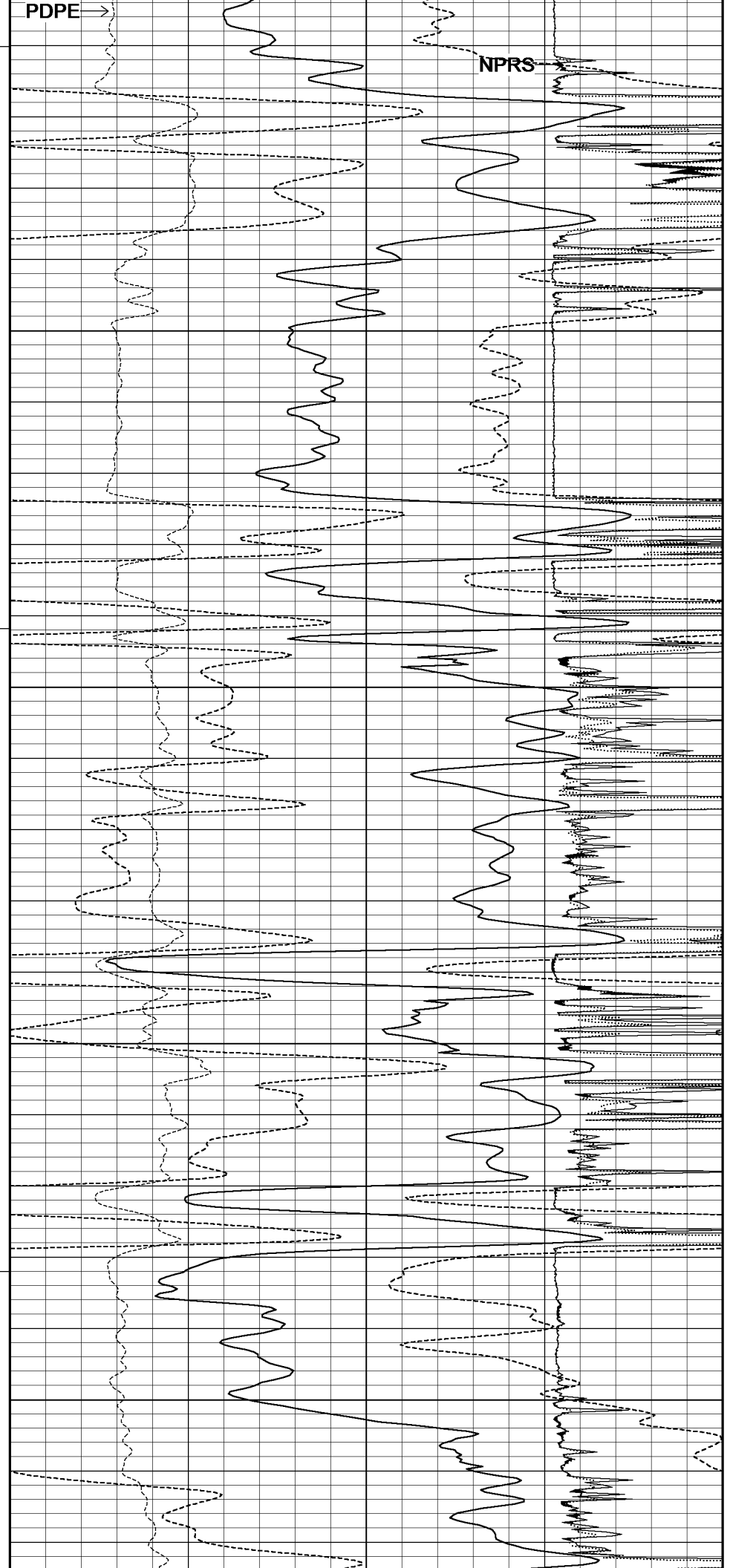
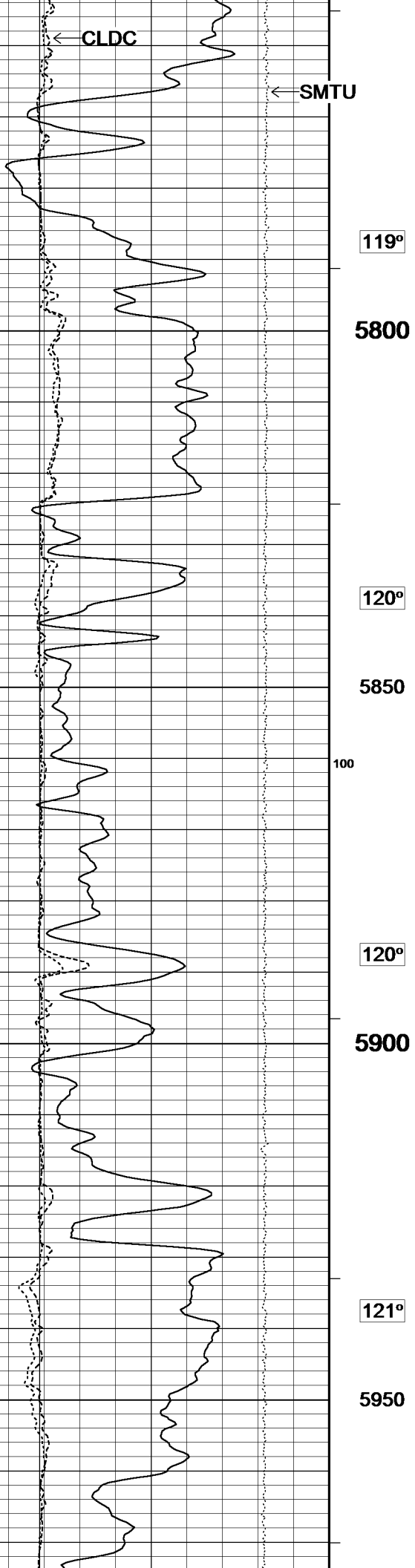
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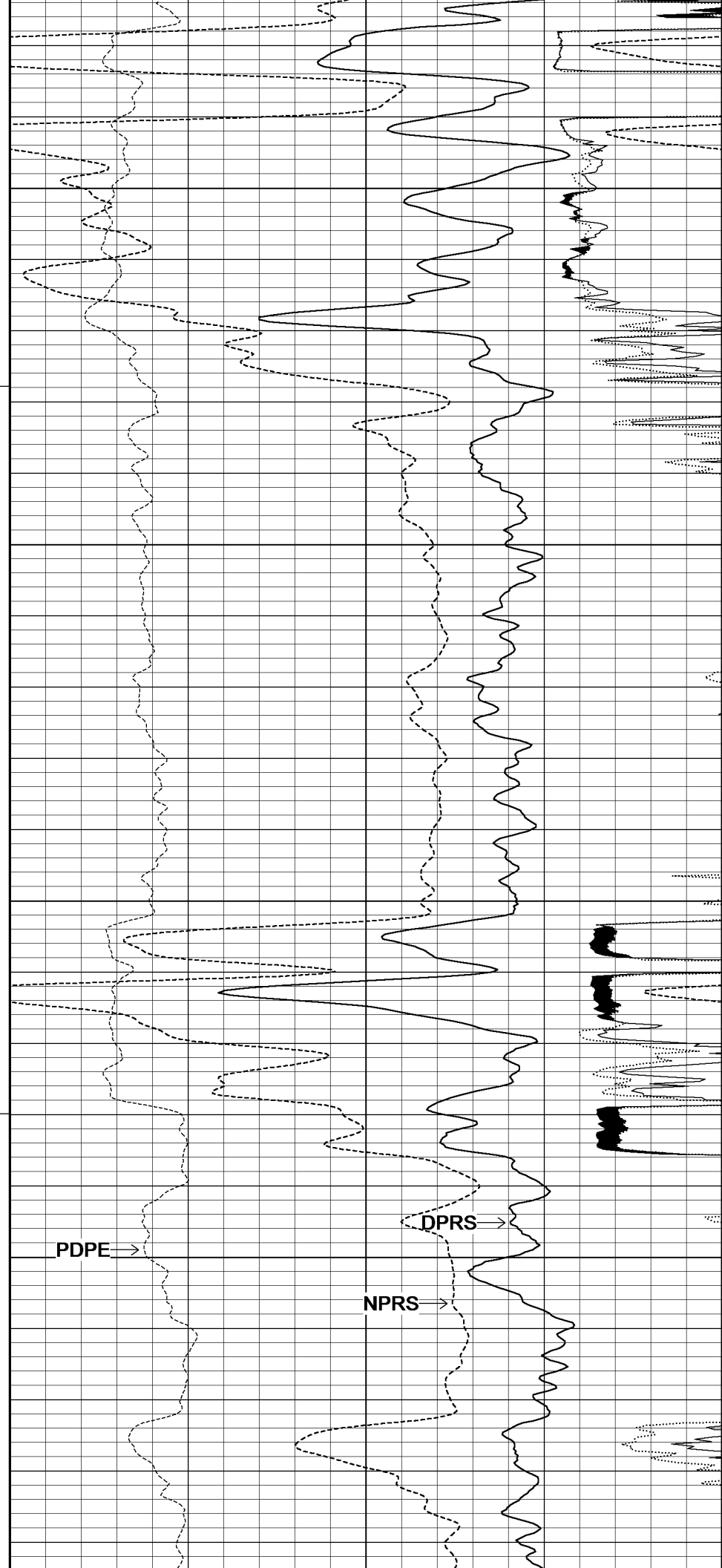
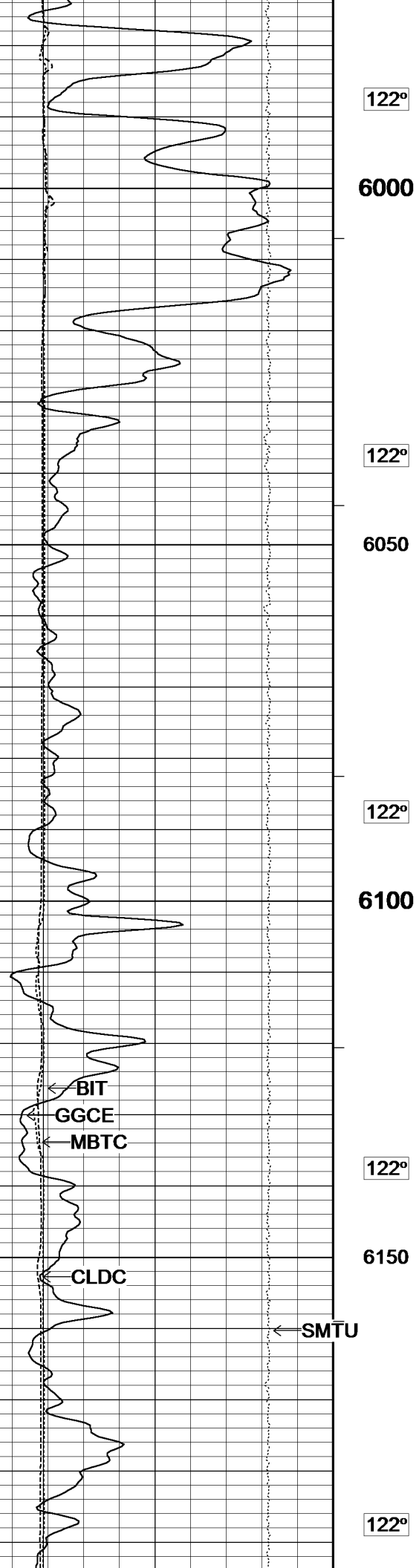
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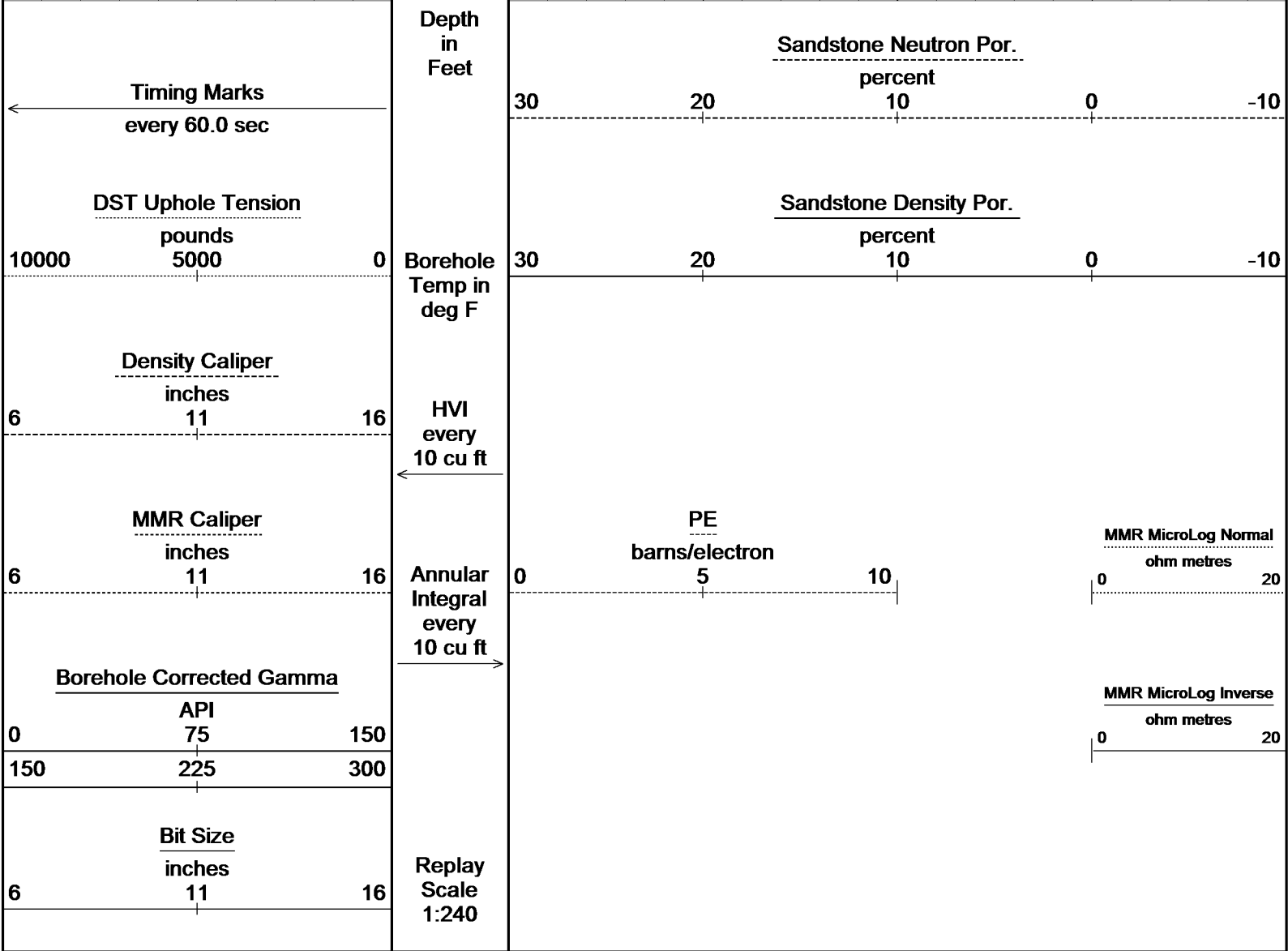
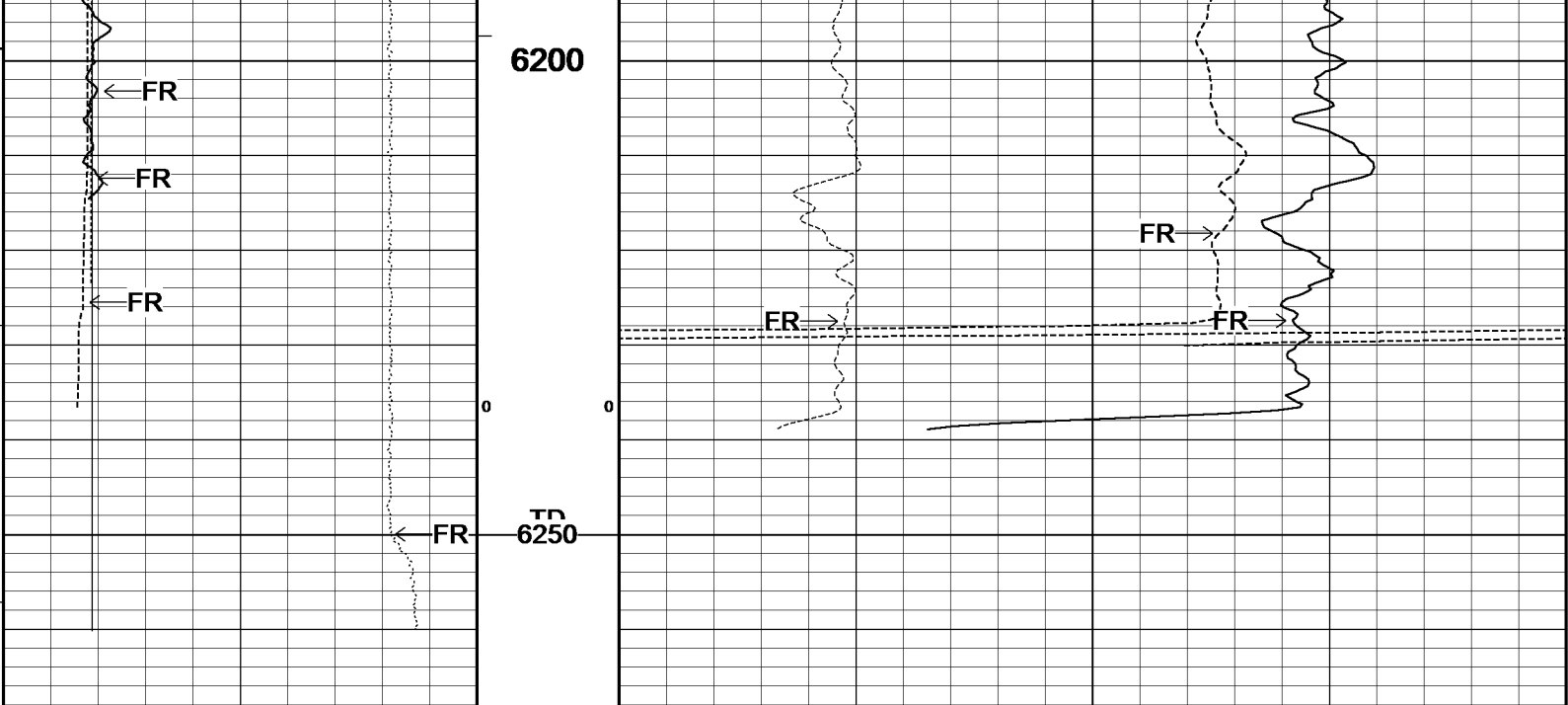
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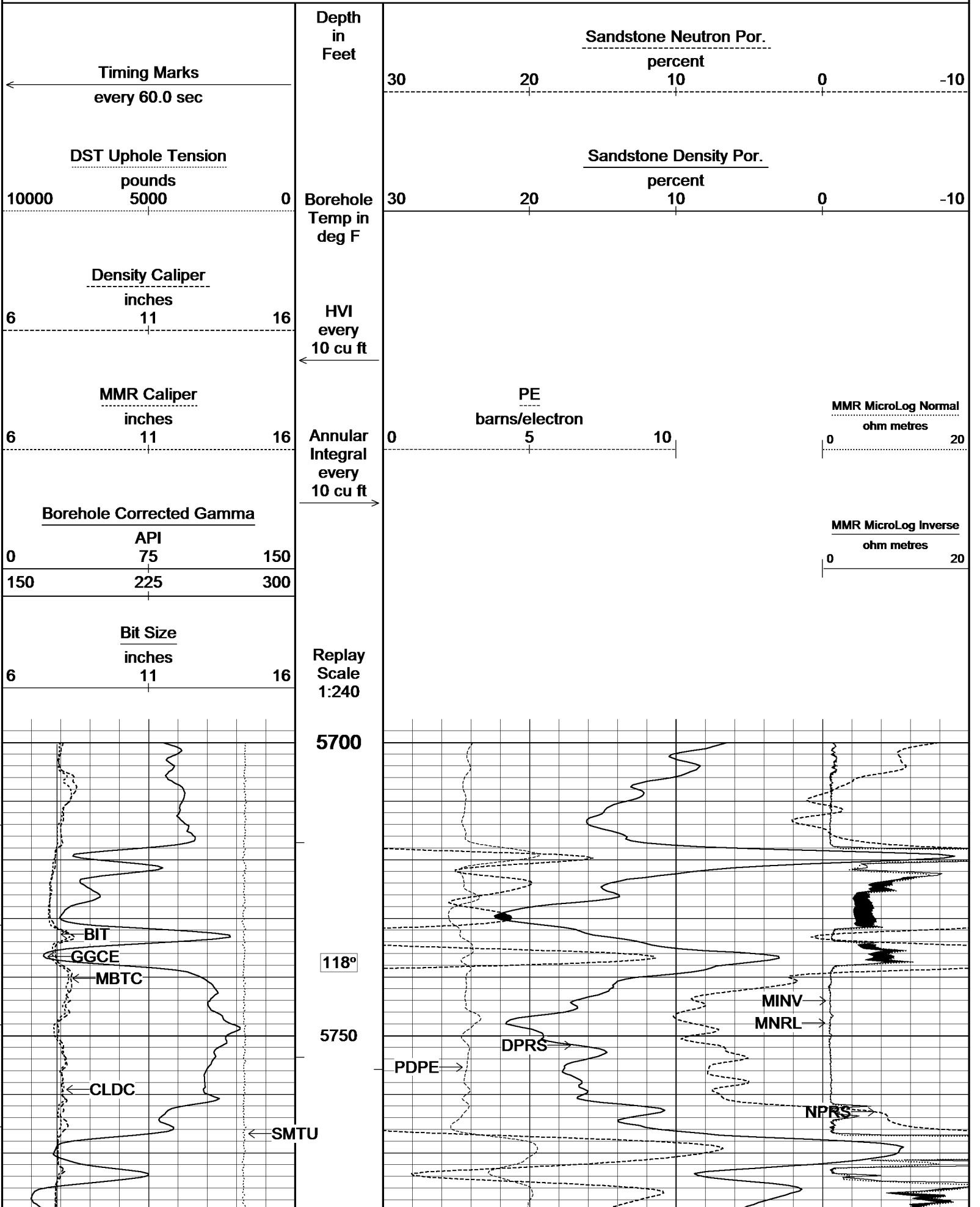
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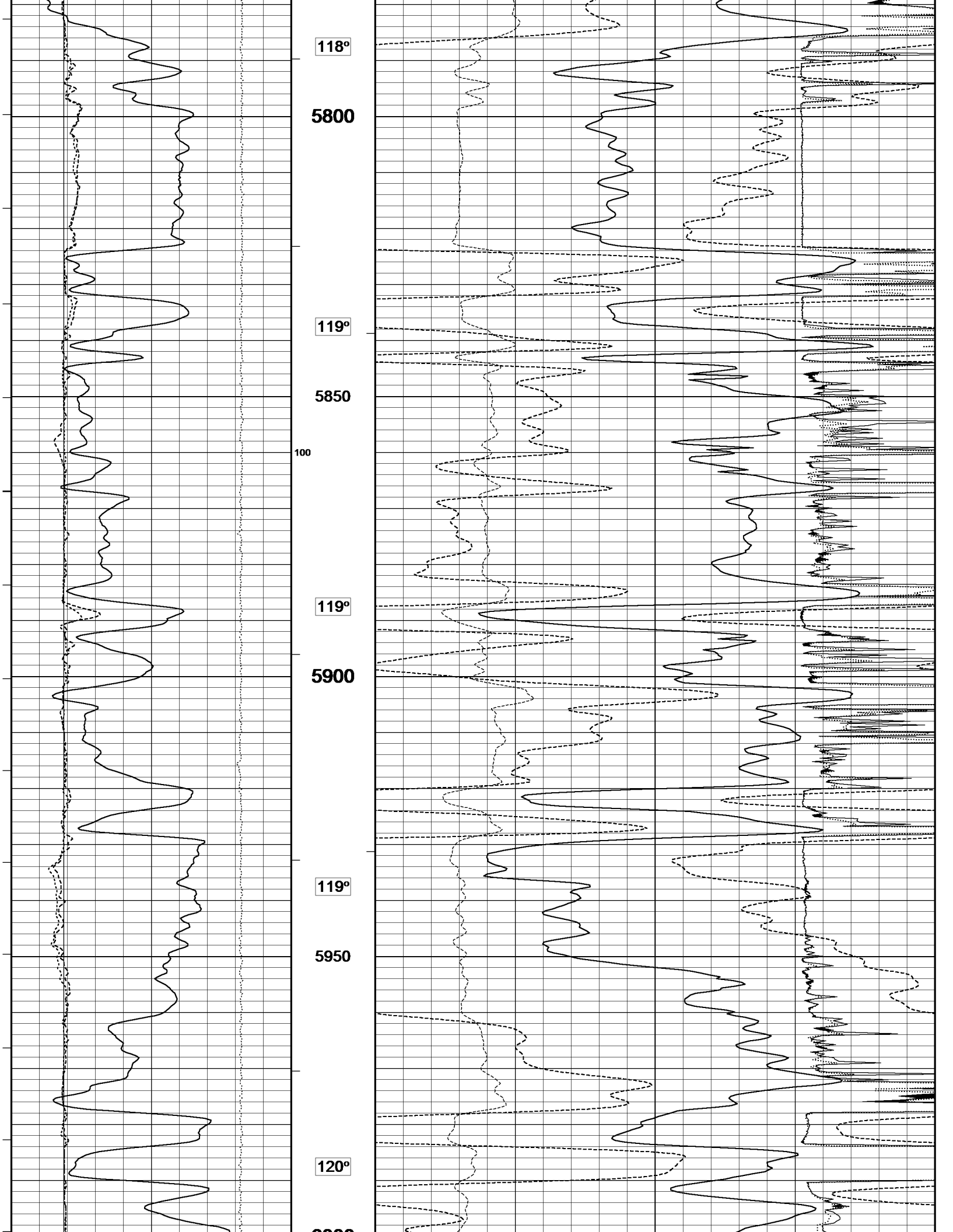












6000

121°

6050

121°

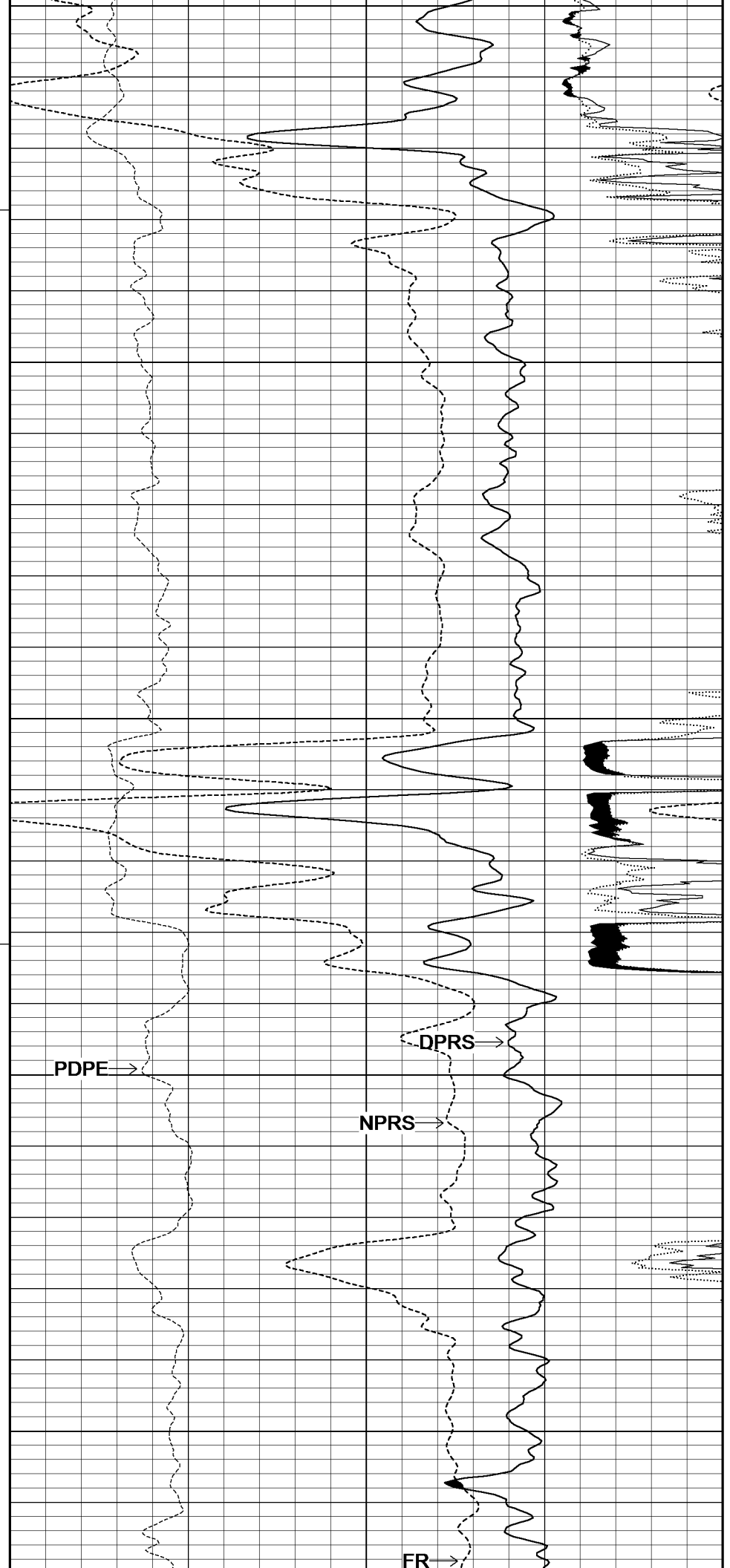
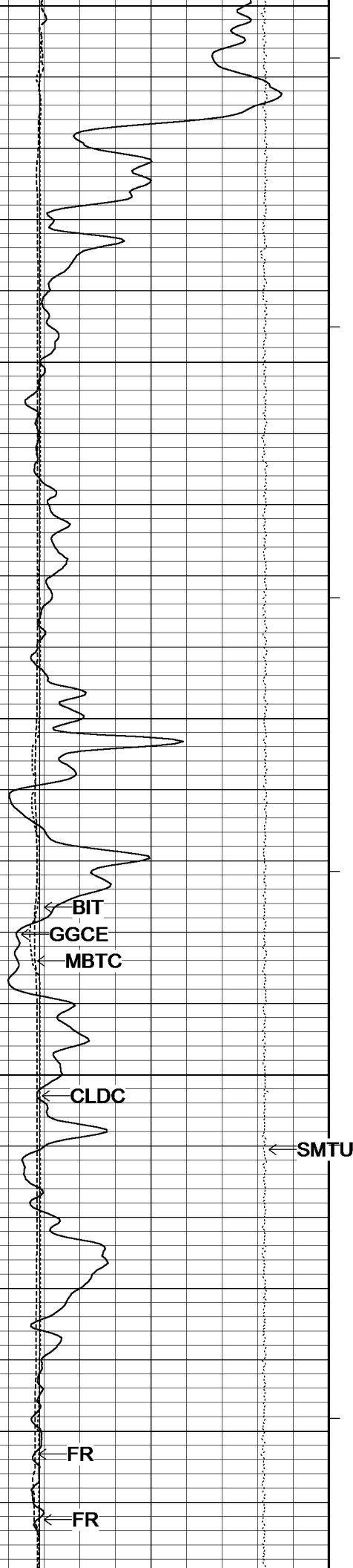
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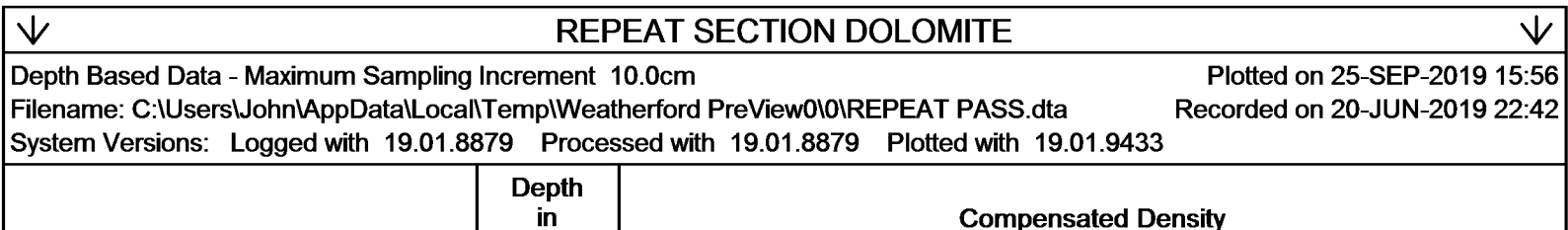
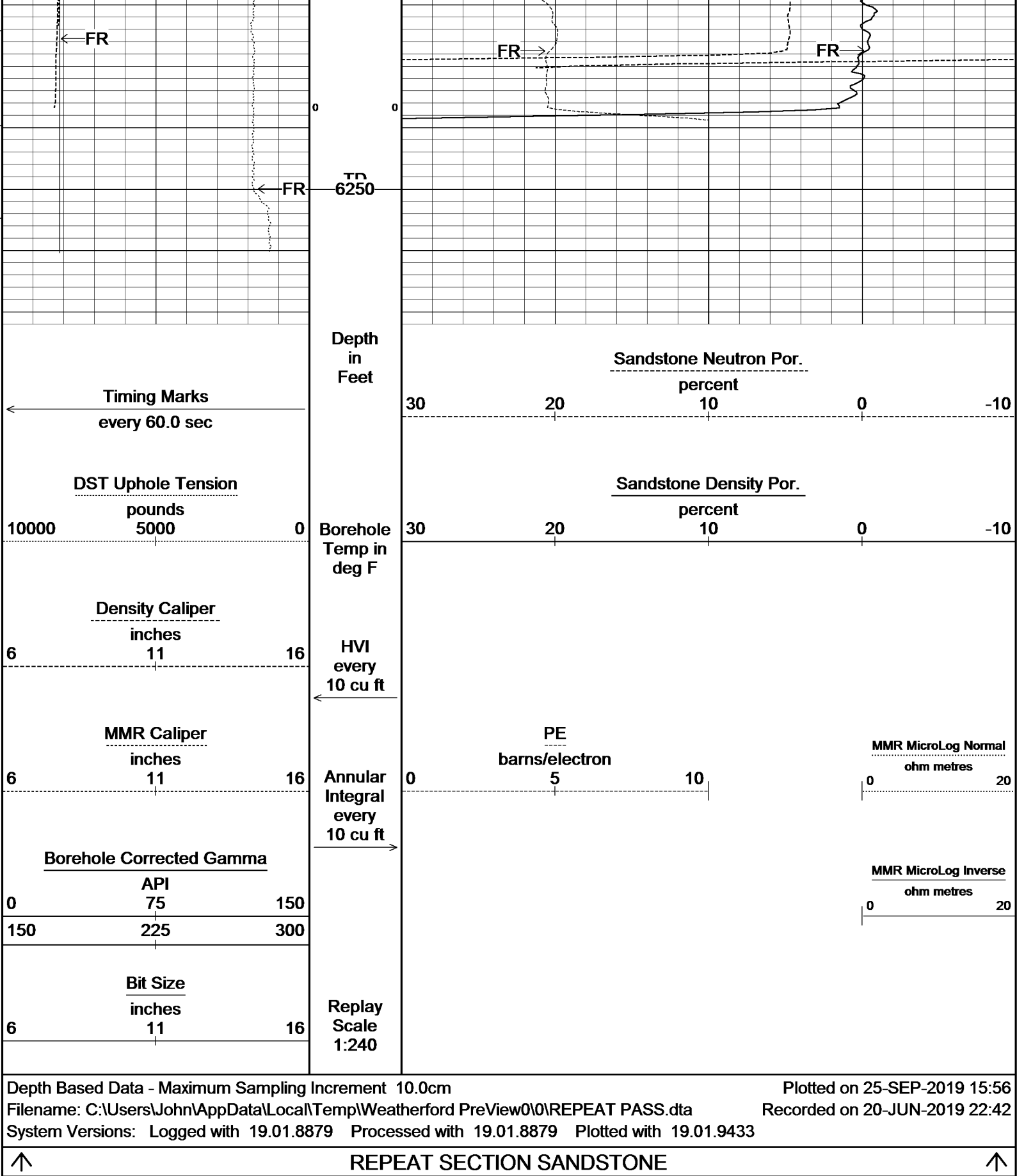
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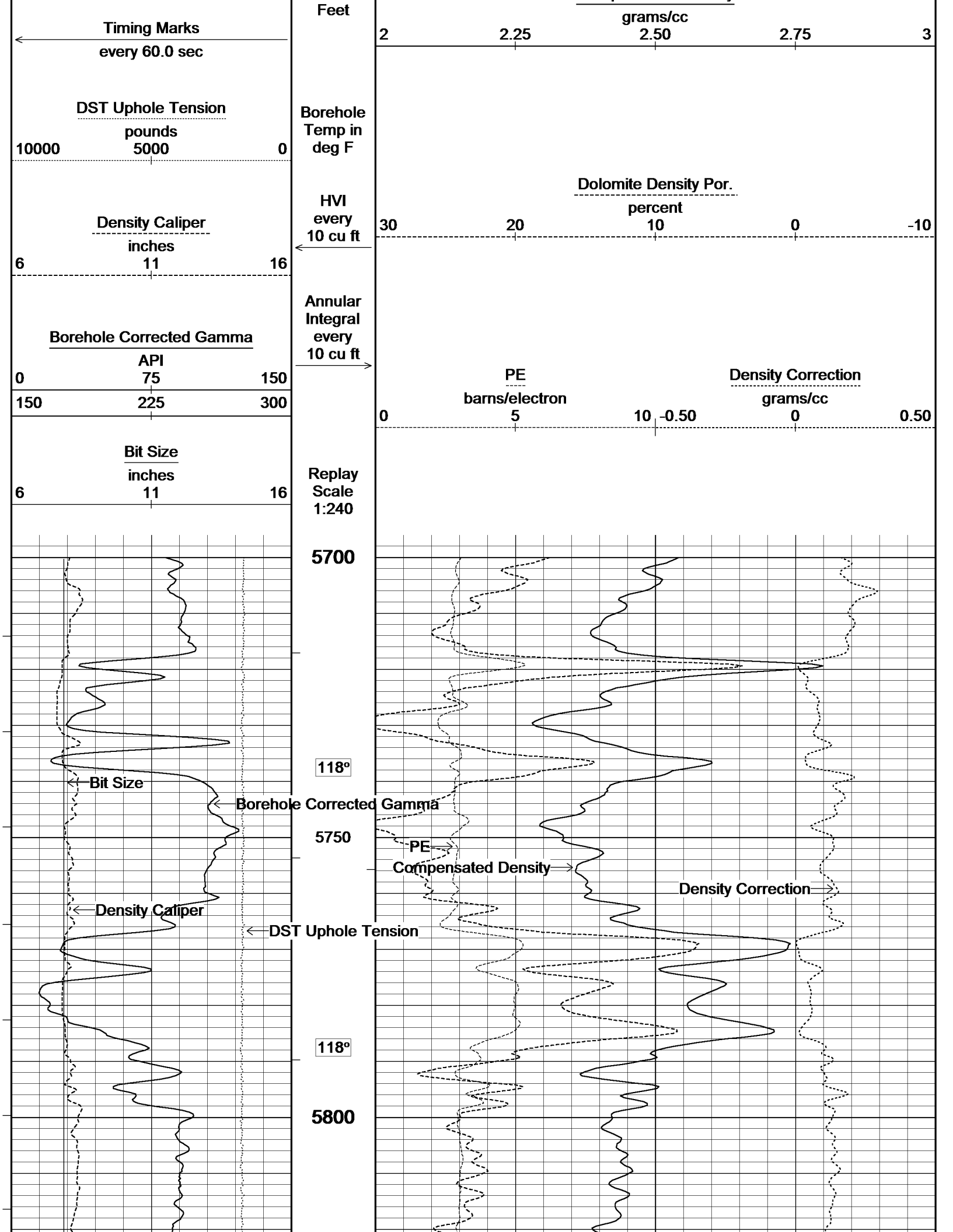
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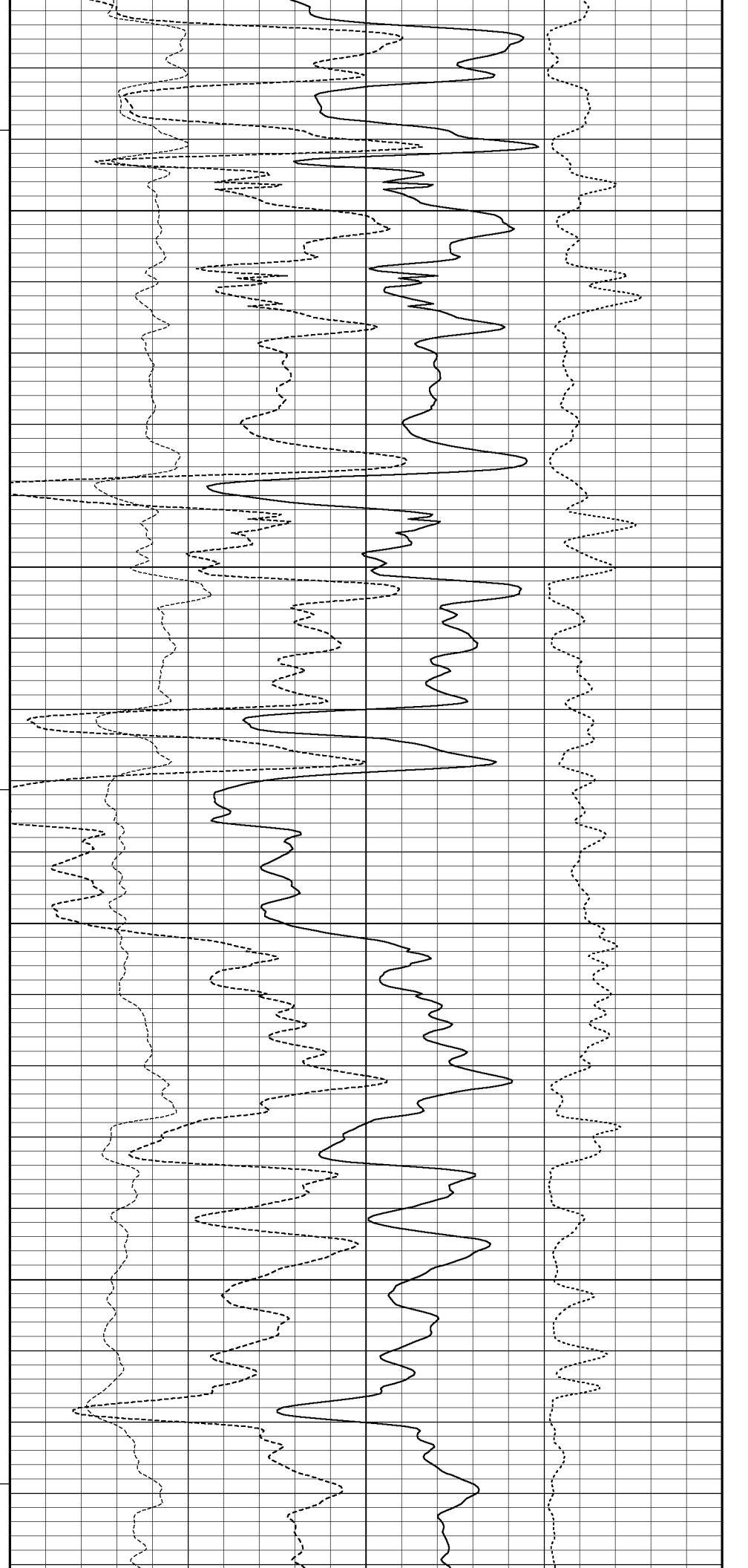
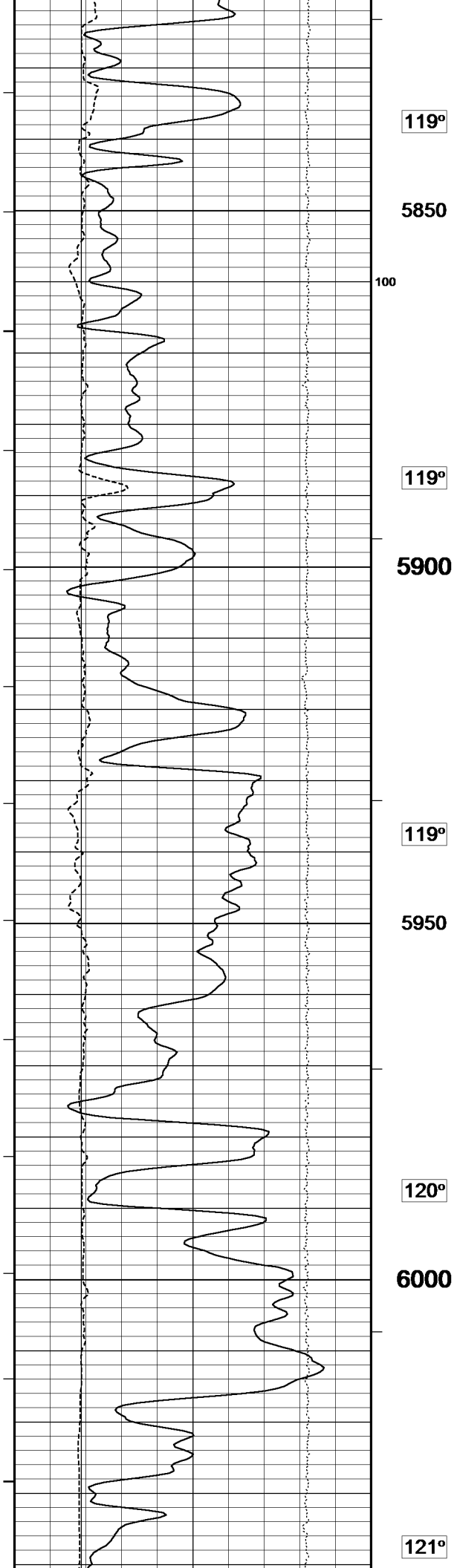
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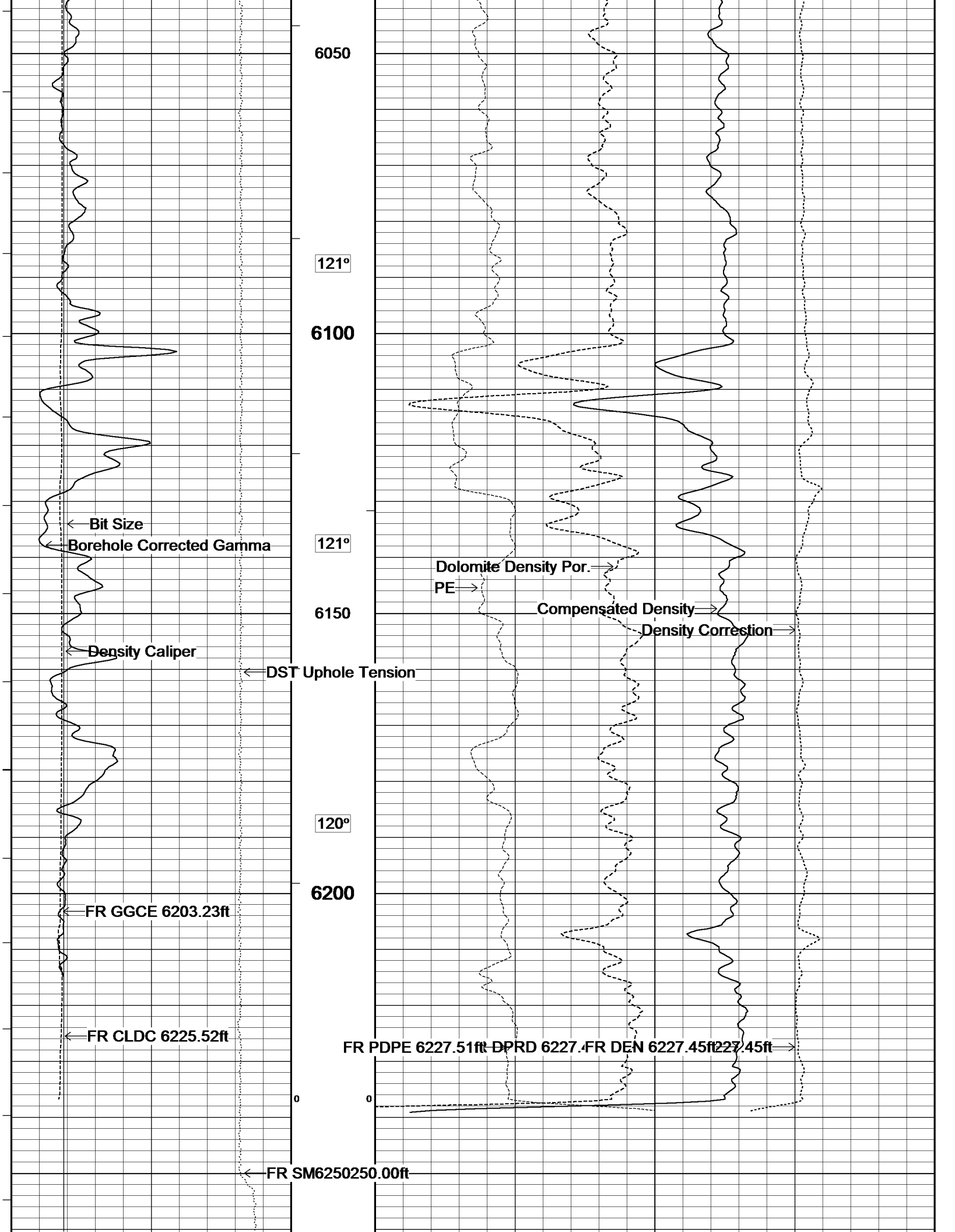
6200











	Measured	Calibrated (API)
Background	82	58
Calibrator (Gross)	791	555
Calibrator (Net)	709	497

Gamma Calibration Tolerances MCG-D.K 443				
Ratio	1.426		Counts/API	

Gamma Constants MCG-D.K 443		Last Edited on 20-JUN-2019,10:19	
Gamma Calibrator Number	GRCC175		
GRC-M Calibrator Jig in Use?	NO		
Inactive Background Jig in Use?	NO		
Mud Density	1.07	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Potassium Equivalence	Chloride		
K Mud Concentration	0.00	%	

High Resolution Temperature Calibration MCG-D.K 443		Field Calibration on 13-JUN-2019,10:18	
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	212.00	212.00	

High Resolution Temperature Constants MCG-D.K 443		Last Edited on 13-JUN-2019,10:18	
Pre-filter Length	11		

Photo Density Calibration MPD-D.A 479		Base Calibration on 13-JUN-2019 17:11	
		Field Check on 13-JUN-2019 17:27	
Density Calibration			
Base Calibration		Measured	Calibrated (sdu)
	Near	Far	Near Far
Background	1093	1316	
Reference 1	51191	25138	59494 30754
Reference 2	21976	2478	26396 2598
Field Check at Base			
	1093.0	1316.1	
Field Check			
	1096.4	1317.7	
PE Calibration			
Base Calibration		Measured	Calibrated
	WS	WH	Ratio
Background	212	979	
Reference 1	23484	51002	0.465 0.367
Reference 2	7048	21833	0.328 0.270
Field Check at Base			
	212.4	979.3	
Field Check			
	213.2	982.1	

Photo Density Calibration Tolerances MPD-D.A 479					
Near Density Ratio	2.40	-5% 2.52 +5%	Far Density Ratio	20.51	-5% 21.00 +5%
PE Calibration	0.131	0.089 0.110 0.131			
Near Den. Field Check	1096.4	-3% 1093.0 +3%	Far Den. Field Check	1317.7	-3% 1316.1 +3%
PE WS Field Check	213.2	-6% 212.4 +6%	PE WH Field Check	982.1	-6% 979.3 +6%

Density Constants MPD-D.A 479		Last Edited on 20-JUN-2019,10:18	
Density Source Id	P50557B		
Nylon Calibrator Number	766		
Aluminium Calibrator Number	856		

Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.07	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	Applied	

Matrix density (gm/cc)	Depth (m)
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
0.00	0.00

Caliper Calibration MPD-D.A 479

Base Calibration on 13-JUN-2019 17:42
Field Calibration on 13-JUN-2019 17:44

Base Calibration	Measured	Calibrator Size (in)
Reading No		
1	16436	4.01
2	25093	5.98
3	33645	7.87
4	41925	9.87
5	51125	11.88
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	7.87	7.87

Caliper Calibration Tolerances MPD-D.A 479

Long Arm Field Cal. 7.87

7.46	7.87	8.27
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 in

DOWNHOLE EQUIPMENT

C:\Users\John\AppData\Local\Temp\Weatherford PreView0\0\MAIN PASS.dta

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

Compact Swivel Head Adaptor
SHA-J.B 719 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in



Compact Micro-Resistivity

MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron

MDN-B.A 295 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

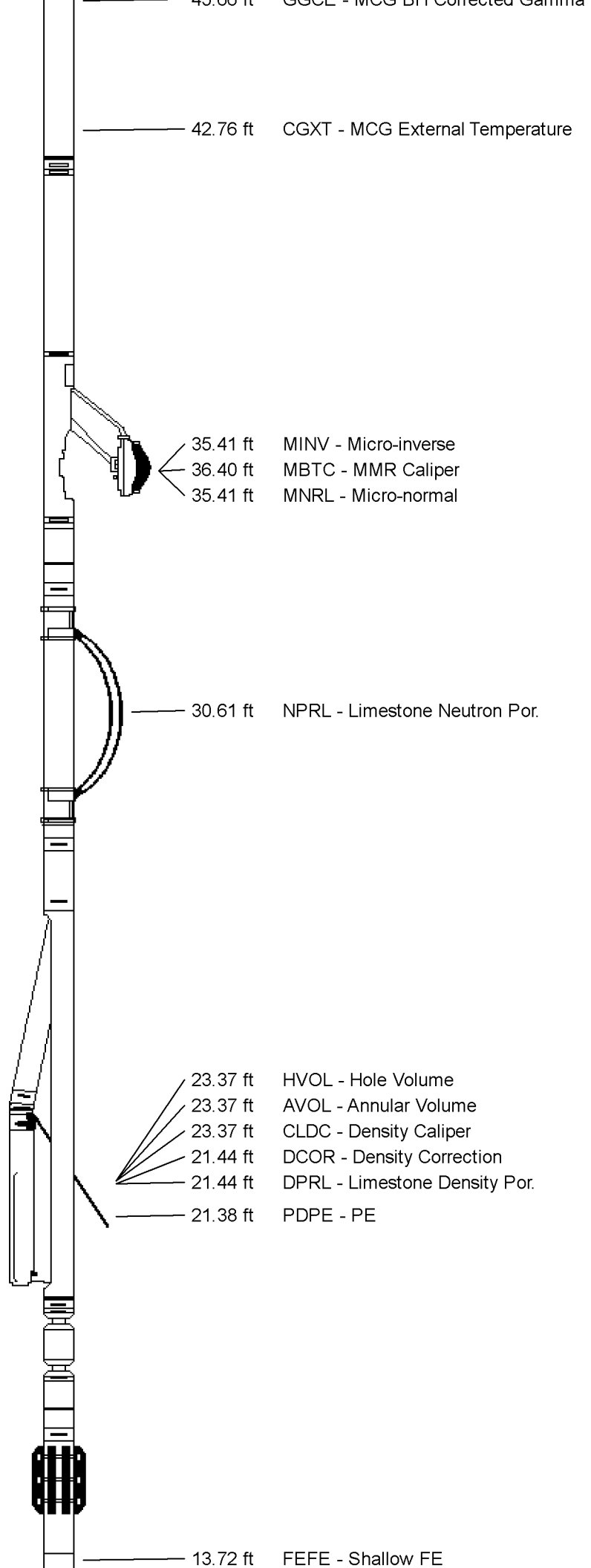
MPD-D.A 479 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Knuckle Joint

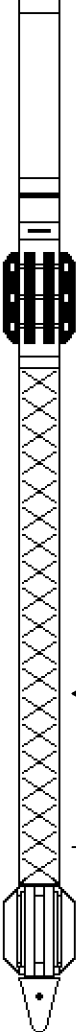
SKJ-E.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric

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



Compact Induction
MAI-B.A 299 LG: 11.00 ft WT: 48.5 lb OD: 2.244 in



3.34 ft R400 - Array Ind. One Res 40
3.34 ft R850 - Array Ind. One Res 85
3.34 ft RTAO - Array Ind. One Res Rt
3.34 ft R600 - Array Ind. One Res 60
3.34 ft R300 - Array Ind. One Res 30

0.23 ft SPCG - Spontaneous Potential

Tool Zero (1.11ft from bottom)

Compact Hole Finder
HFS 1 LG: 0.78 ft WT: 2.2 lb OD: 2.244 in

-1.11 ft SMTU - DST Uphole Tension

Total Length: 56.62 ft Weight: 456.4 lb

All measurements relative to tool zero.

COMPANY	O'BRIEN ENERGY RESOURCES CORP
WELL	KEYSTONE #5-4
FIELD	KEYSTONE
PROVINCE/COUNTY	MEADE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2646	feet	First Reading	6229.00	feet
Elevation Drill Floor	2644	feet	Depth Driller	6250.00	feet
Elevation Ground Level	2634	feet	Depth Logger	6250.00	feet



COMPACT PHOTO-DENSITY
DUAL SPACED NEUTRON
MICRO-RESISTIVITY LOG