



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

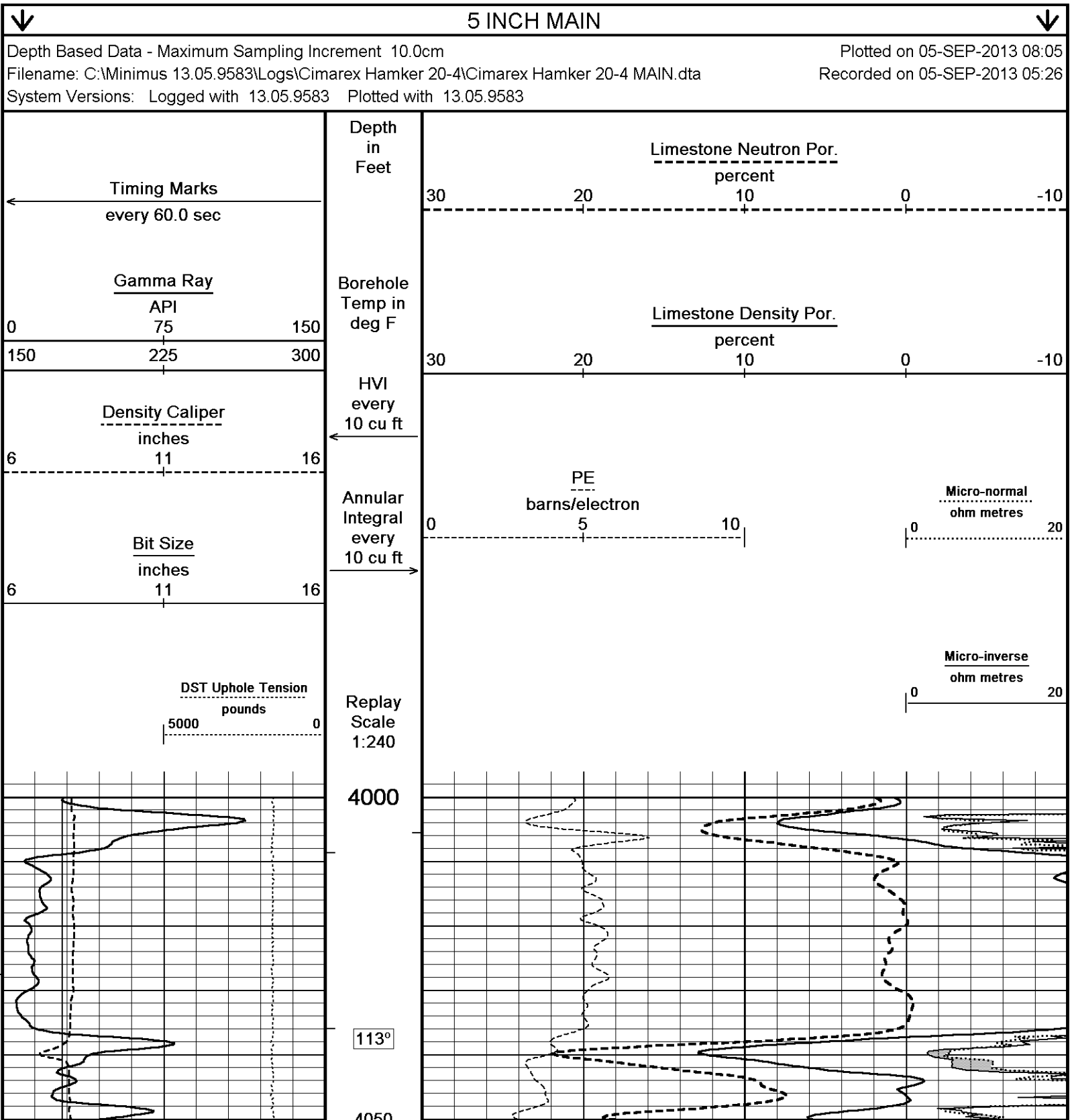
COMPANY				CIMAREX ENERGY CO.			
WELL				HAMKER 20-4			
FIELD				WILDCAT			
PROVINCE/COUNTY				HASKELL			
COUNTRY/STATE				U.S.A. / KANSAS			
LOCATION				330' FSL & 1650' FWL SW SE SW			
SEC	TWP	RGE	Other Services				
30	30S	31W	MAI/MFE				
API Number		15-081-22028	MML				
Permit Number			CMI				
Permanent Datum GL, Elevation 2849 feet							
Log Measured From KB							
Drilling Measured From KB @ 8 FEET							
Date	05-SEP-2013					Elevations:	feet
Run Number	ONE					KB	2857.00
Service Order	3541035					DF	2855.00
Depth Driller	5559.00						2849.00
Depth Logger	5558.00						
First Reading	5516.00						
Last Reading	4000.00						
Casing Driller	1860.00						
Casing Logger	857.00						
Bit Size	7.875						
Hole Fluid Type	GEL						
Density / Viscosity	9.00	lb/USg	65.00	CP			
PH / Fluid Loss	11.80		5.80	ml/30Min			
Sample Source	FLOW LINE						
Rm @ Measured Temp	1.50 @ 60.0						ohm-m
Rmf @ Measured Temp	1.20 @ 60.0						ohm-m
Rmc @ Measured Temp	1.80 @ 60.0						ohm-m
Source Rmf / Rmc	CALC		CALC				
Rm @ BHT	0.70 @ 126.0						ohm-m
Time Since Circulation	5 HRS						
Max Recorded Temp	126.00						deg F
Equipment / Base	13244						KANSAS
Recorded By	D. COLE						
Witnessed By	T. KOLODZIEJ						K. MARTIN
IOB #	LB 13-250						

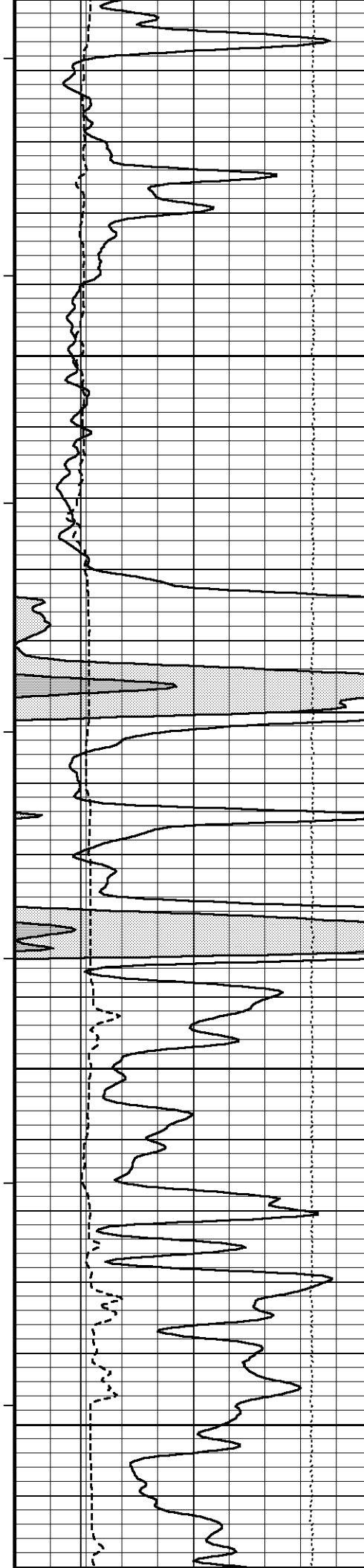
BOREHOLE RECORD					Last Edited: 05-SEP-2013 00:33
Bit Size inches		Depth From feet		Depth To feet	
7.875		1860.00		5559.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet		Weight pounds/ft
SURFACE	8.625	0.00	1860.00		24.00

REMARKS
- SOFTWARE ISSUE: WLS 13.05.9583.
- RUN ONE: MCG, MML, MDN, MPD, MIE, MAI RAN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. TWO 0.5 INCH STANDOFFS USED ON MAI AND MFE.
- 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 4000 FEET: 540 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD 4000 FEET: 290 CU.FT.
- RIG: TOM CAT #4

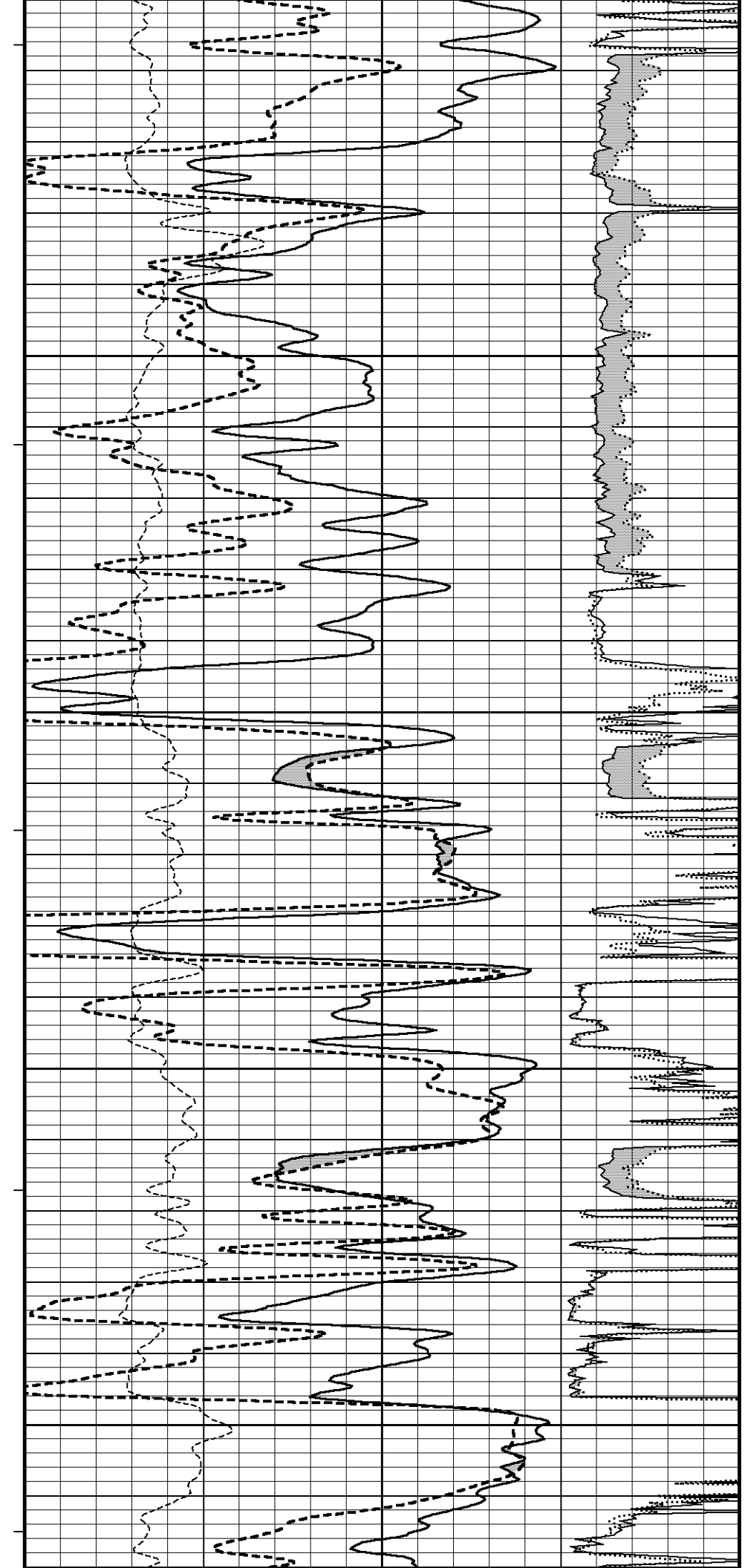
- ENGINEER: D.COLE
- OPERATOR: C. RAMIREZ
- DECLINATION: 6.22
- LAT / LON: 37.41960N -100.75081W

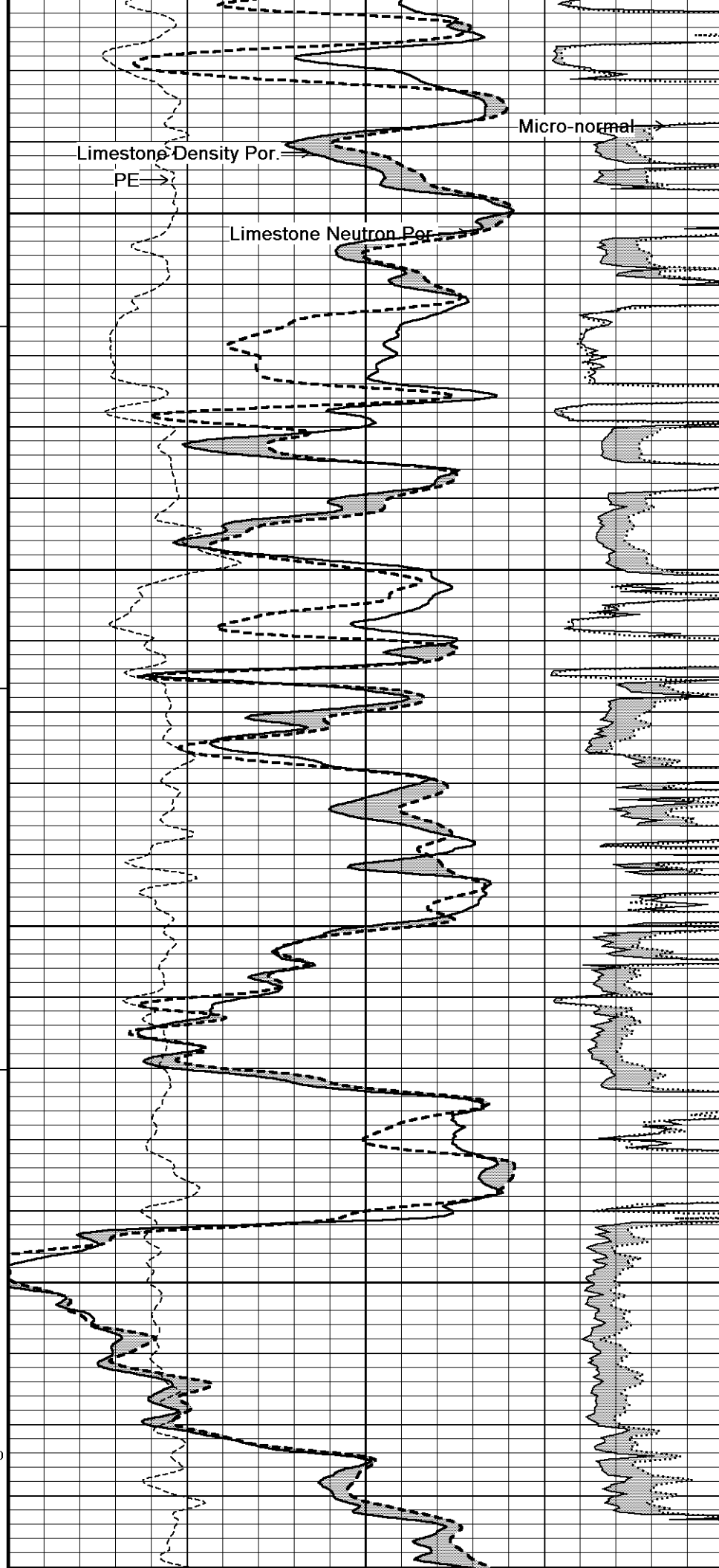
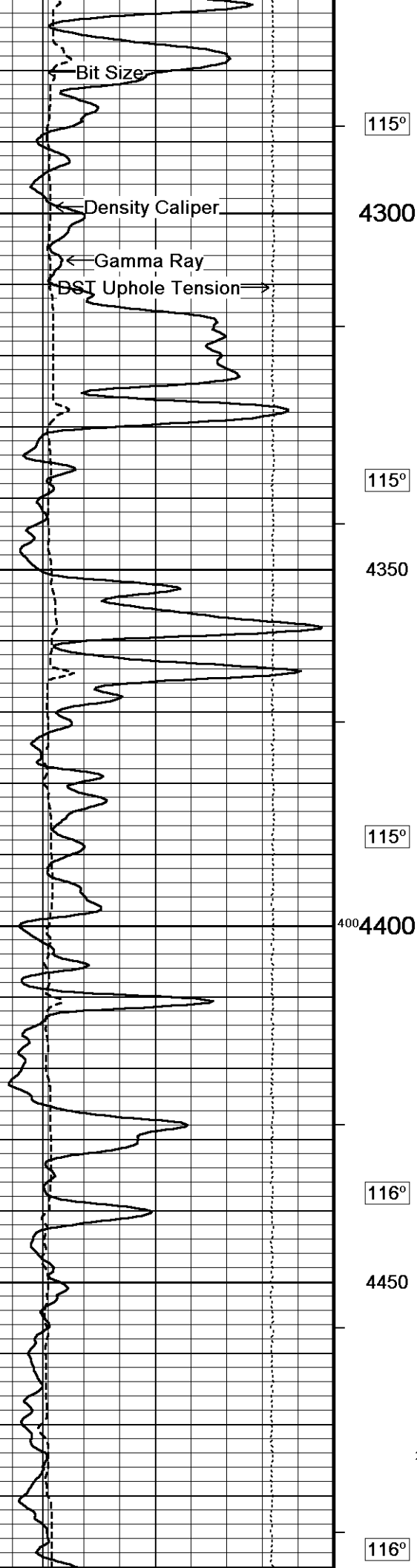
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

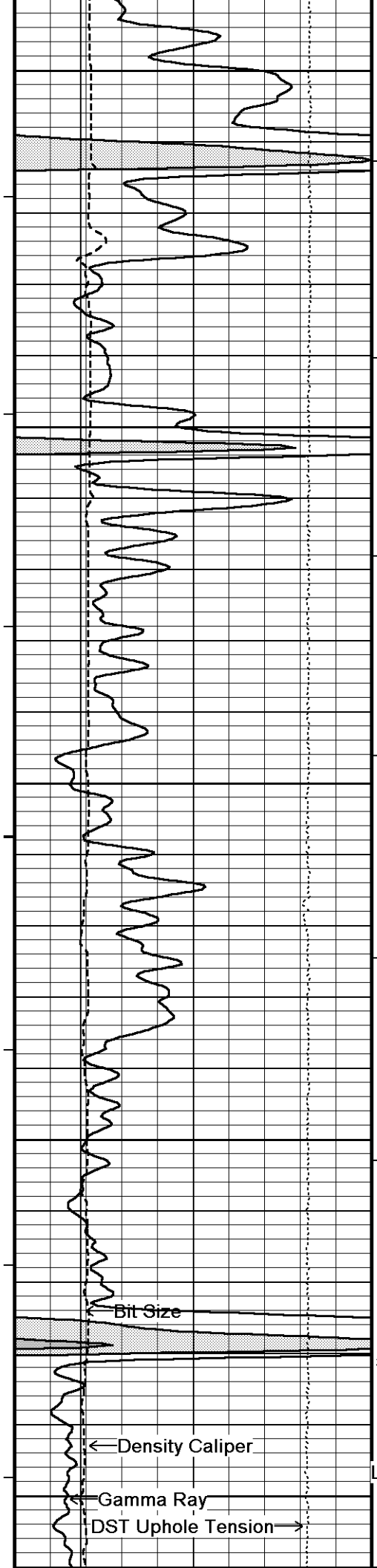




4050
113°
4100
500
113°
4150
114°
4200
114°
4250







4500

117°

4550

117°

4600

118°

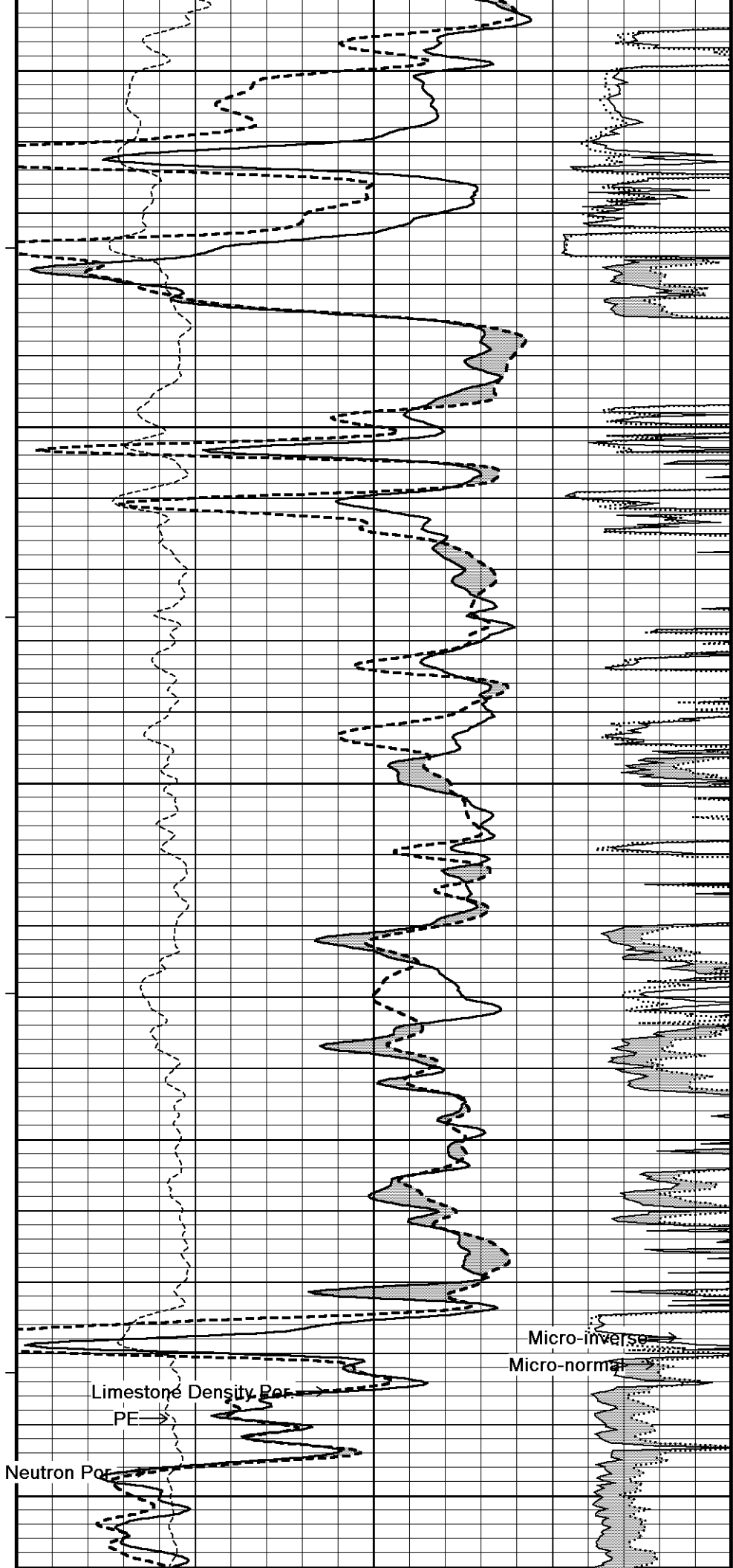
4650

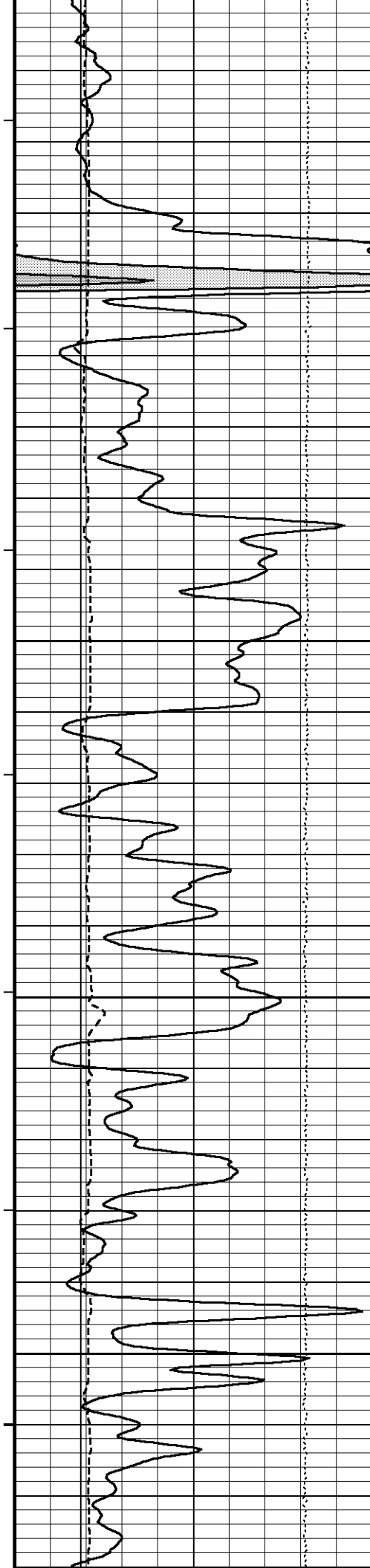
118°

300

118°

4700





118°

4750

119°

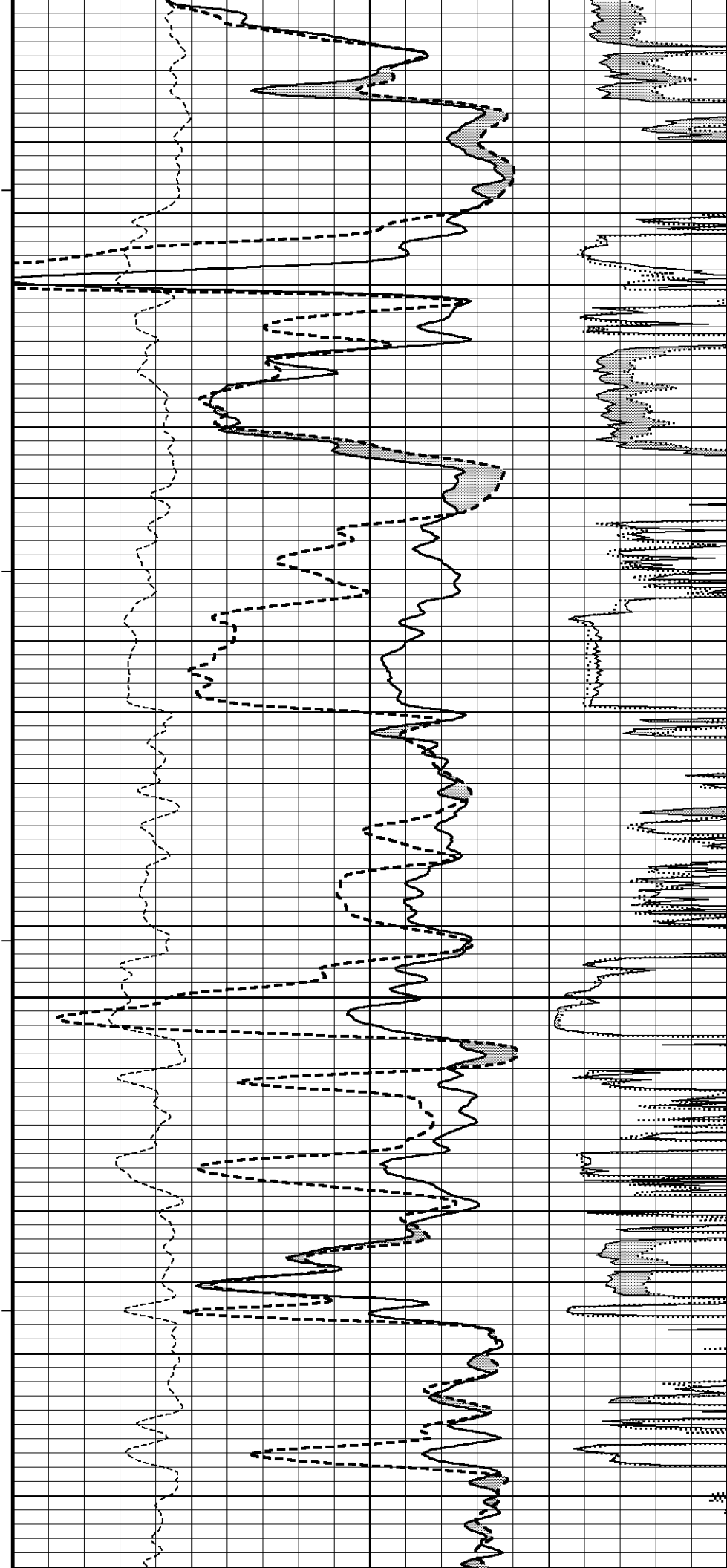
4800

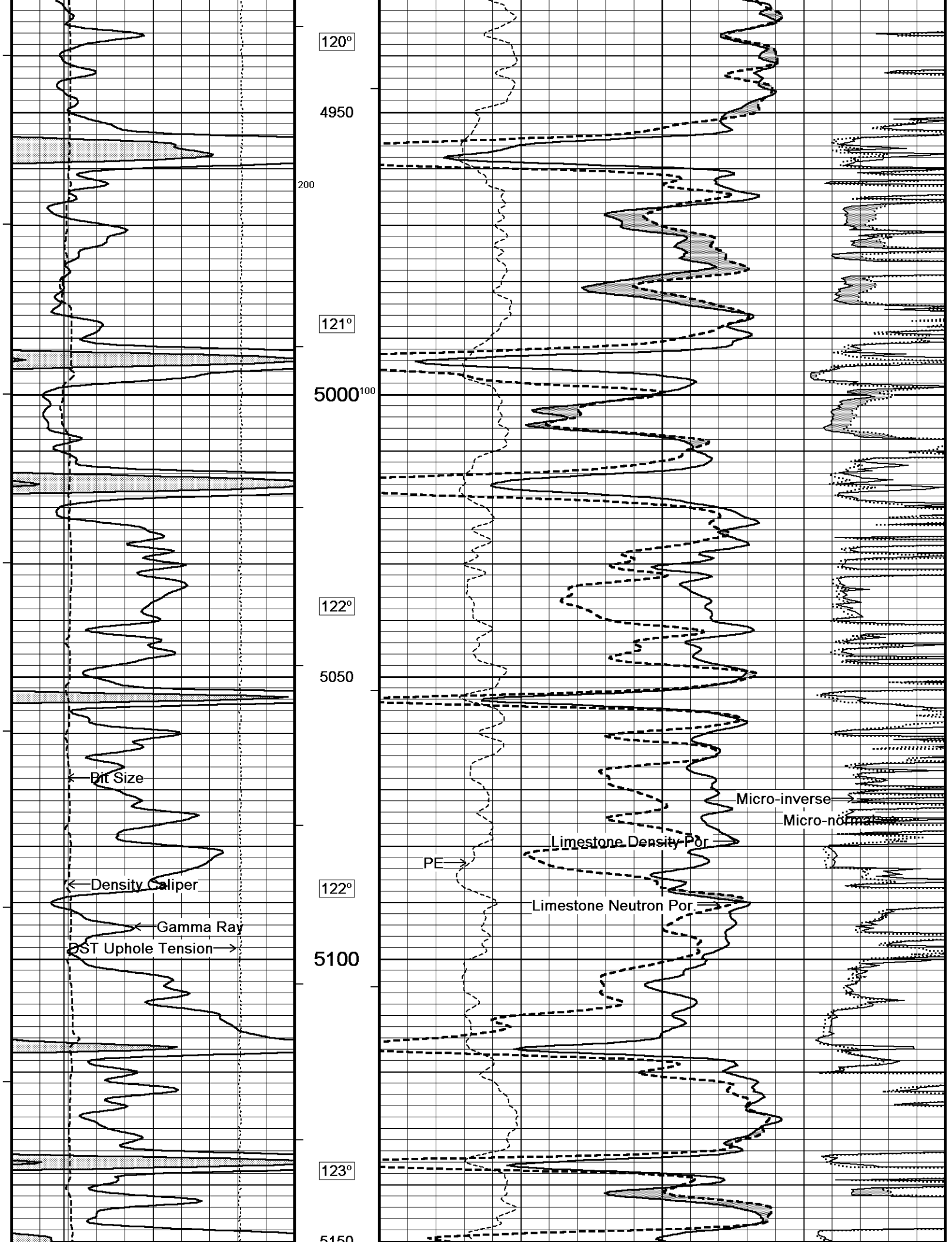
120°

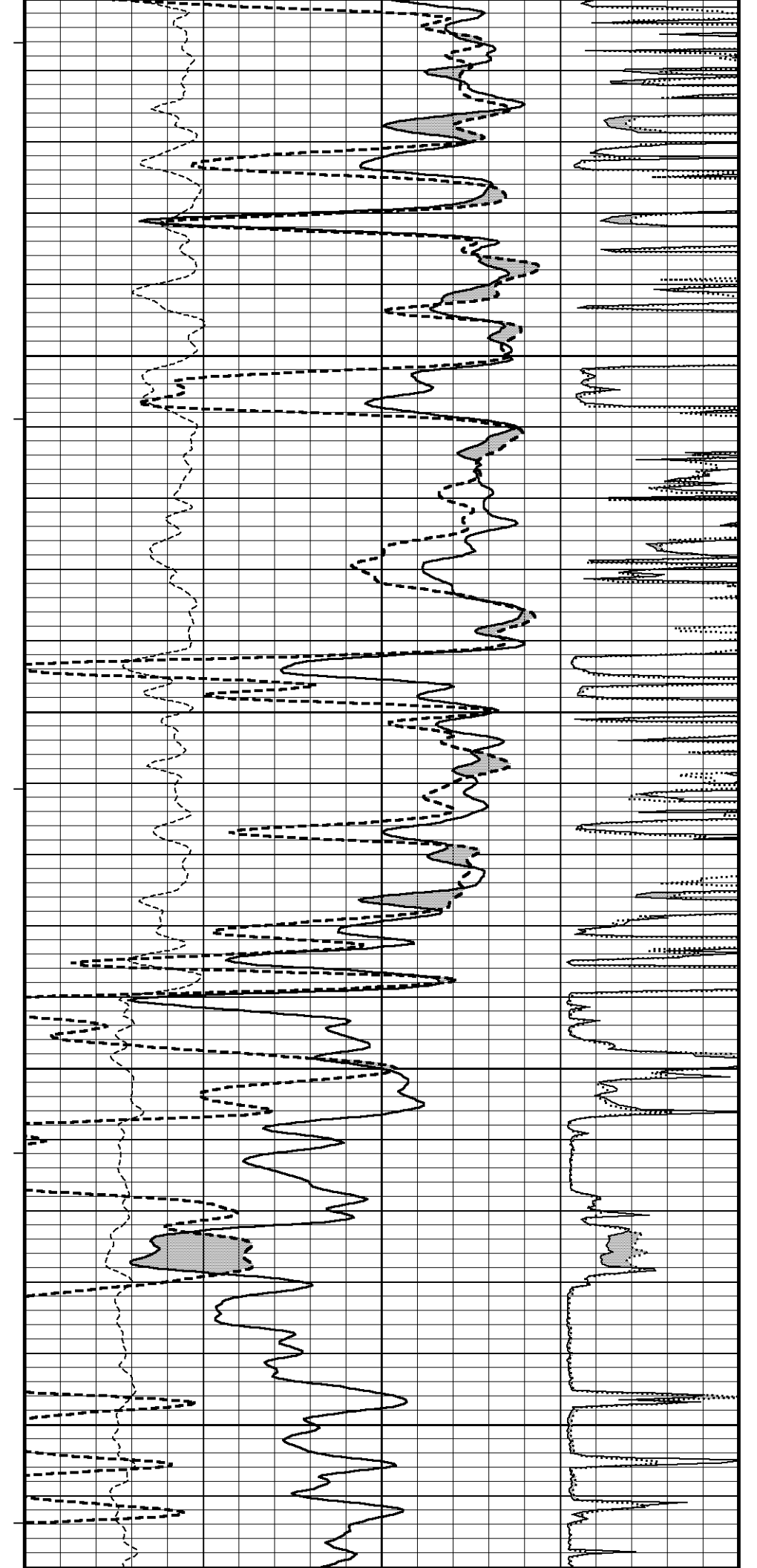
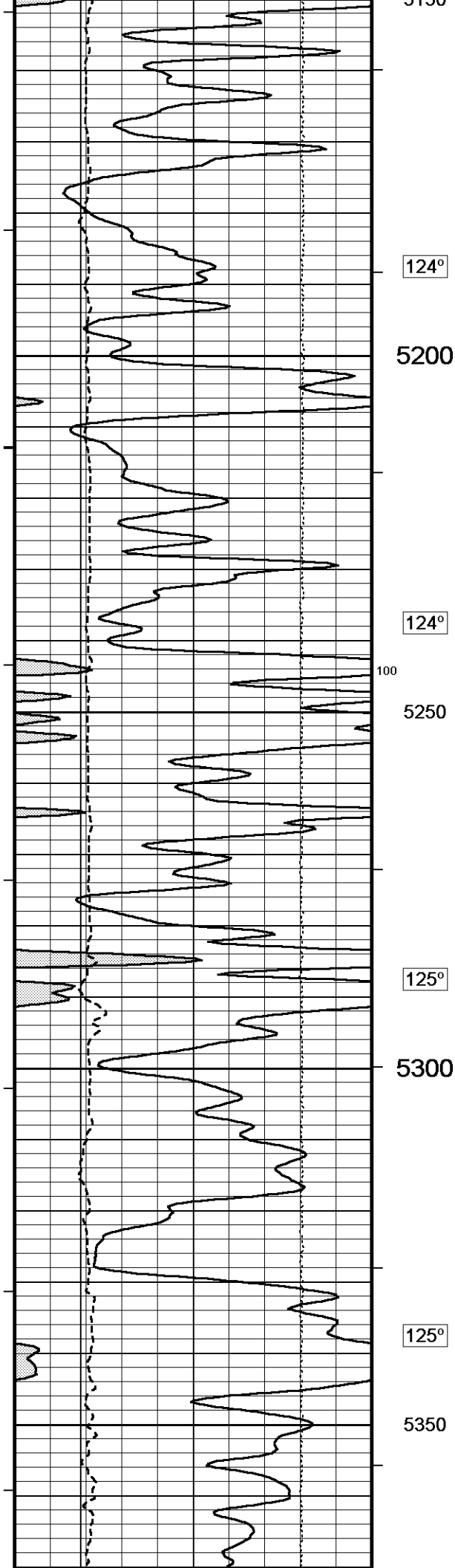
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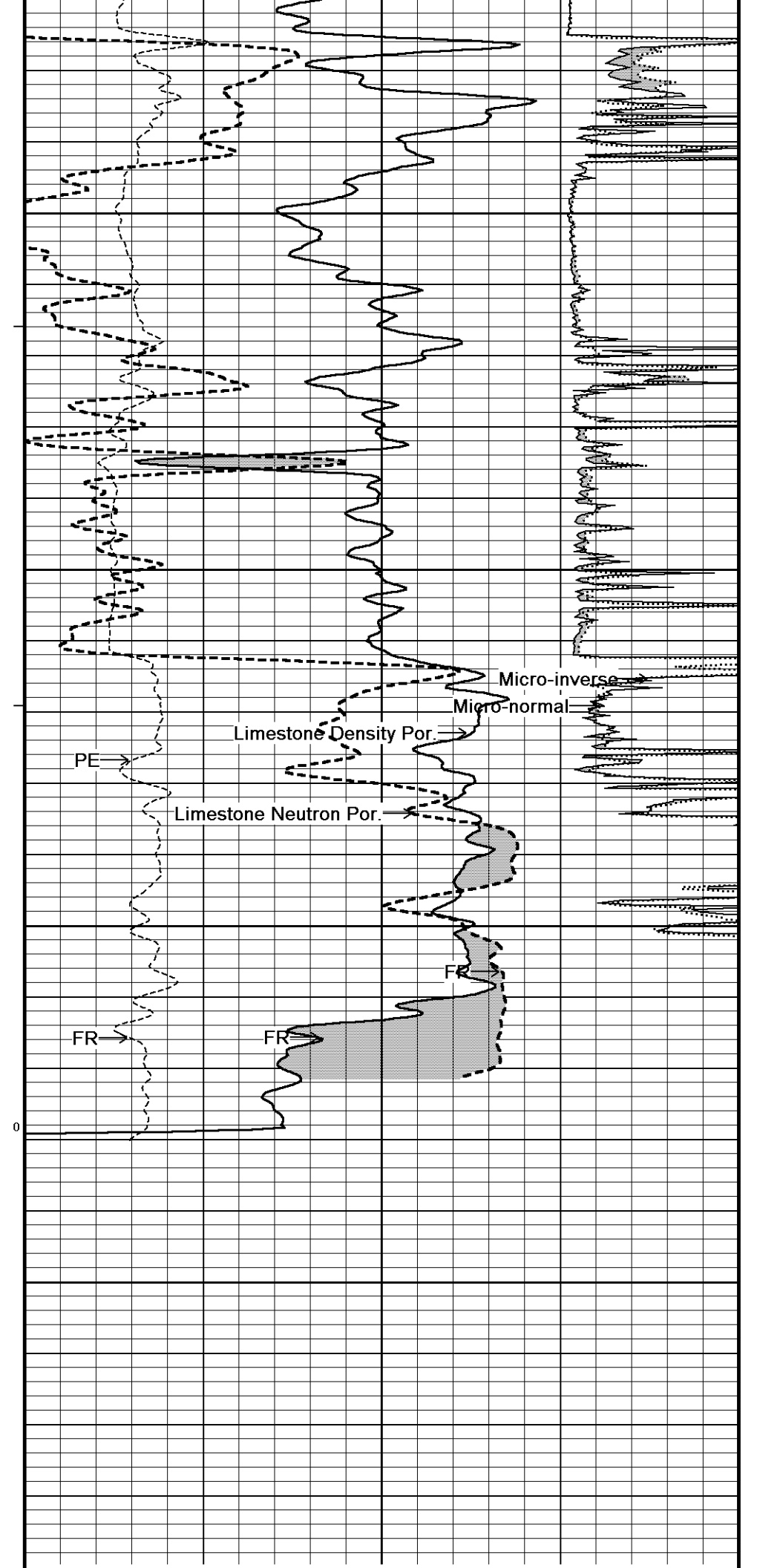
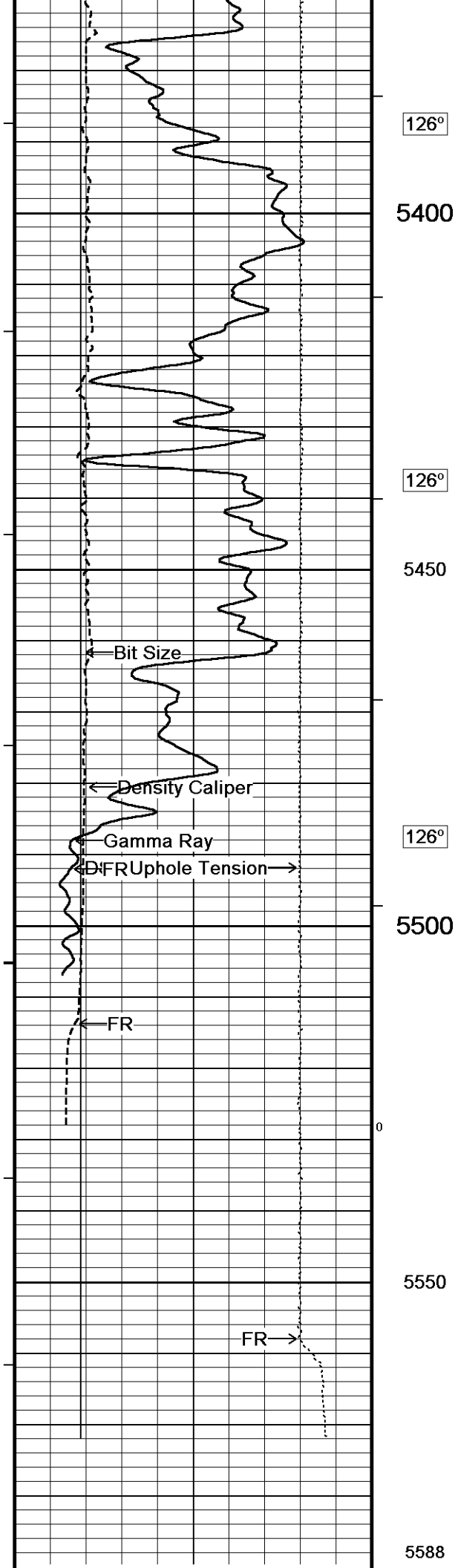
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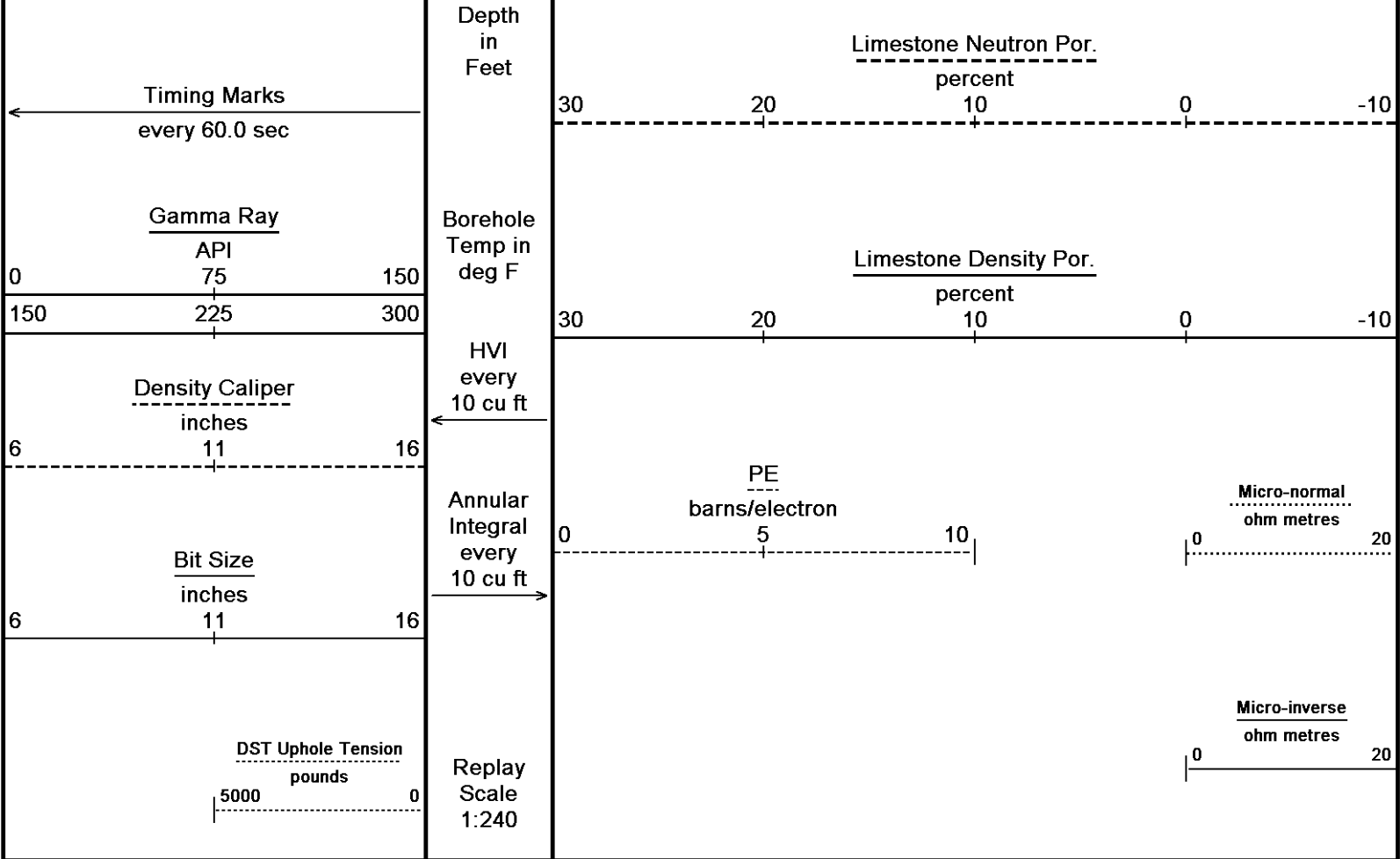
4900









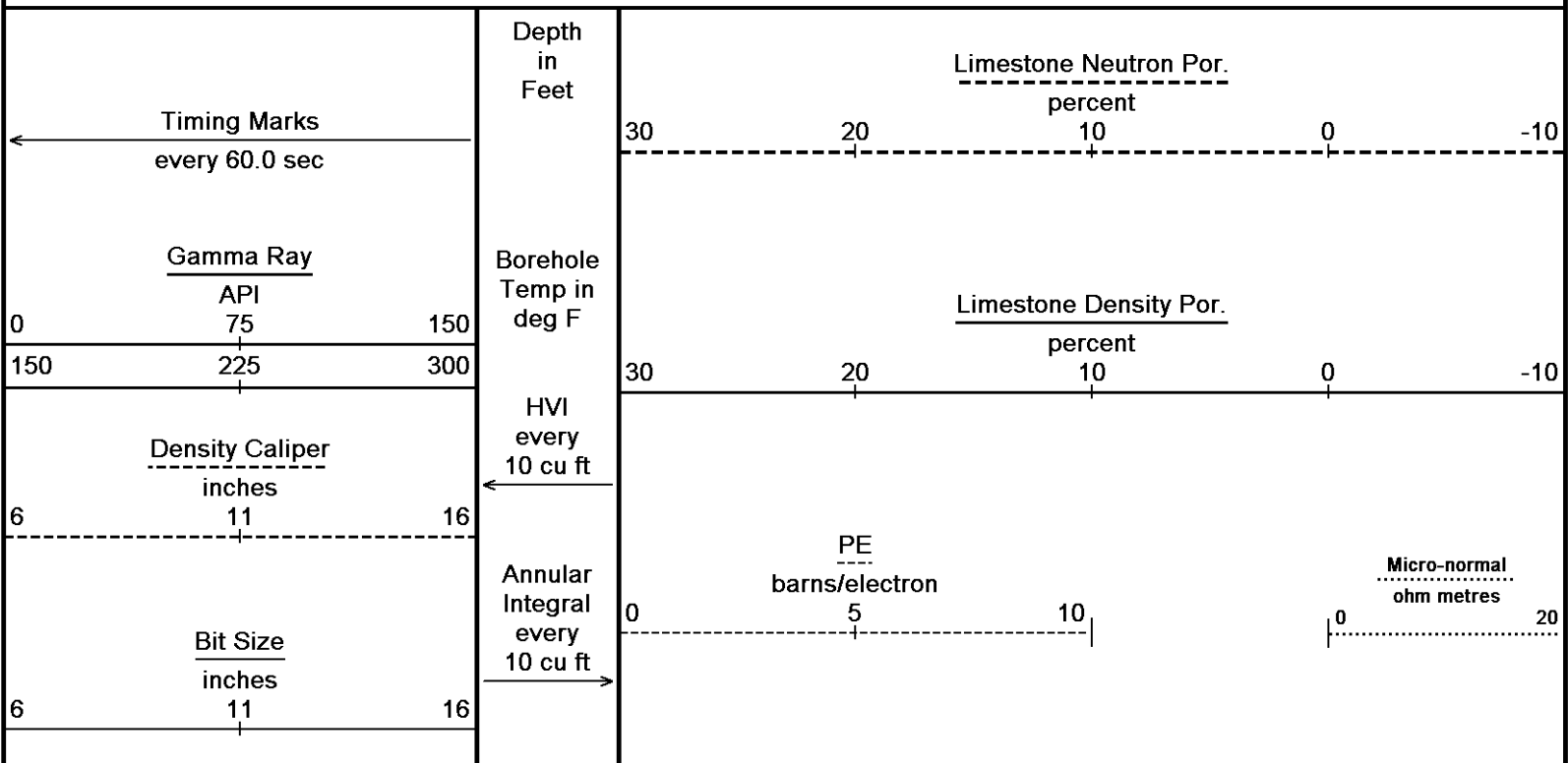


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-SEP-2013 08:05
 Filename: C:\Minimus 13.05.9583\Logs\Cimarex Hamker 20-4\Cimarex Hamker 20-4 MAIN.dta Recorded on 05-SEP-2013 05:26
 System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-SEP-2013 08:05
 Filename: C:\Minimus 13.05.9583\Logs\Cimarex Hamker 20-4\Cimarex Hamker 20-4 REPEAT.dta Recorded on 05-SEP-2013 03:33
 System Versions: Logged with 13.05.9583 Plotted with 13.05.9583

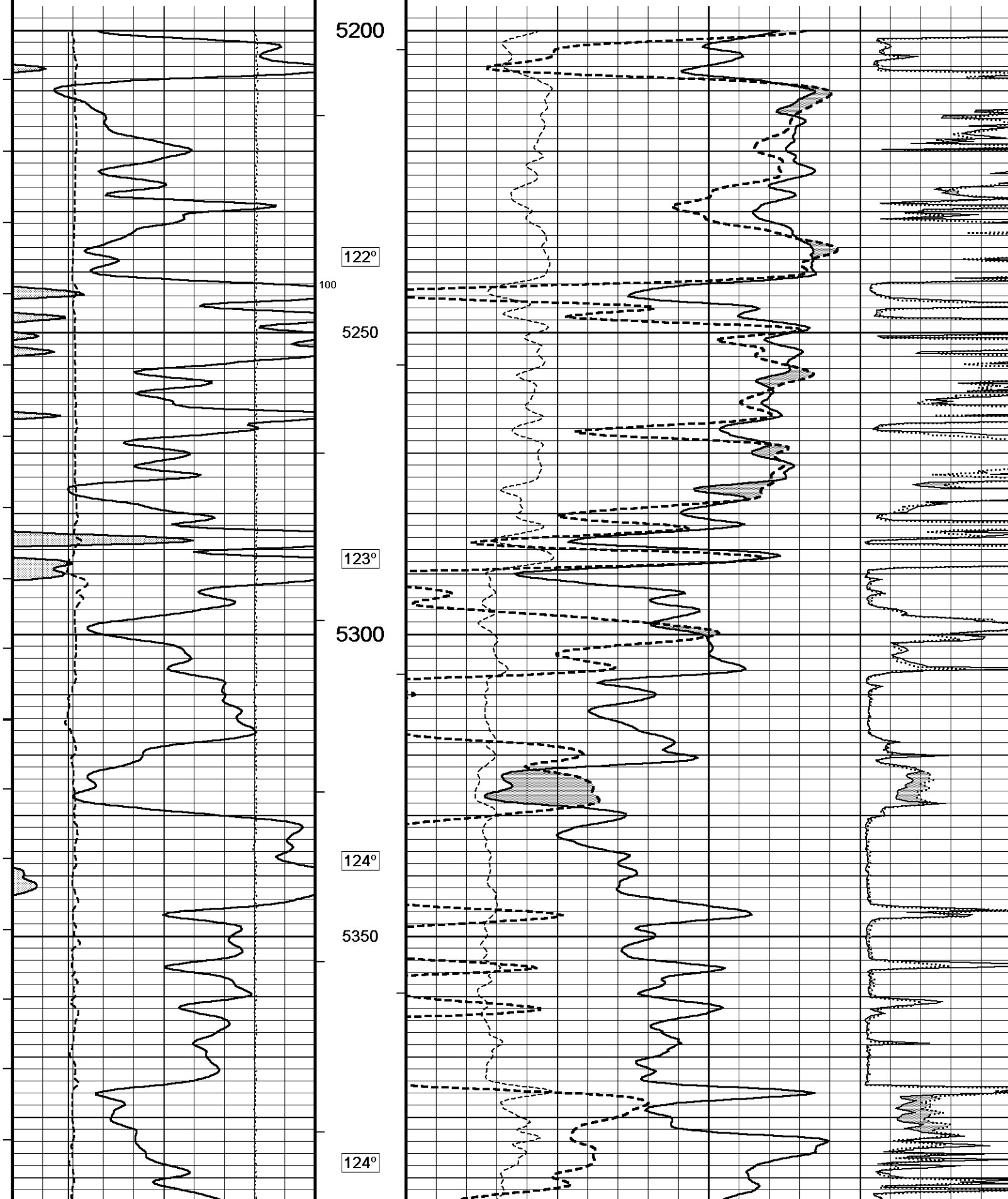


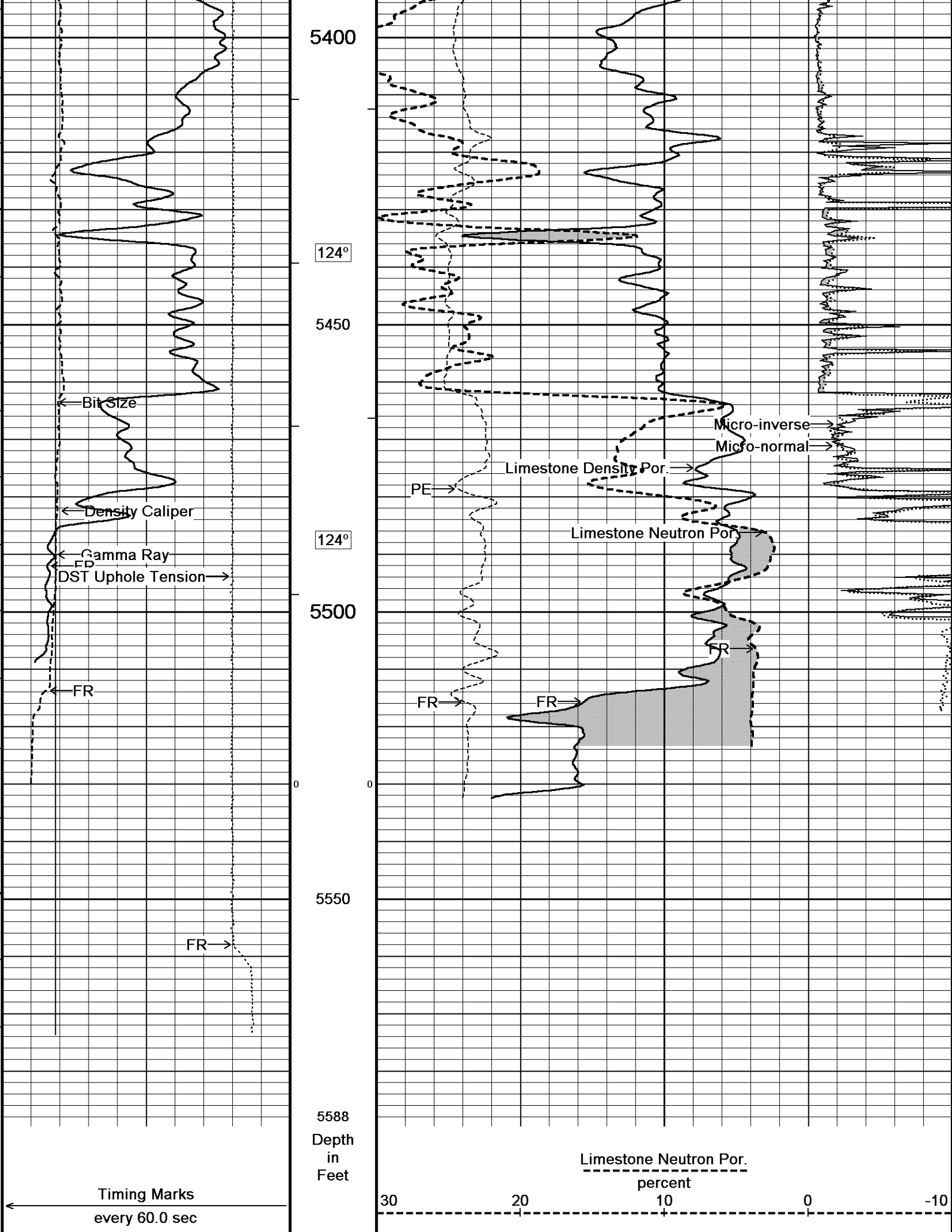
DST Uphole Tension
pounds
5000 0

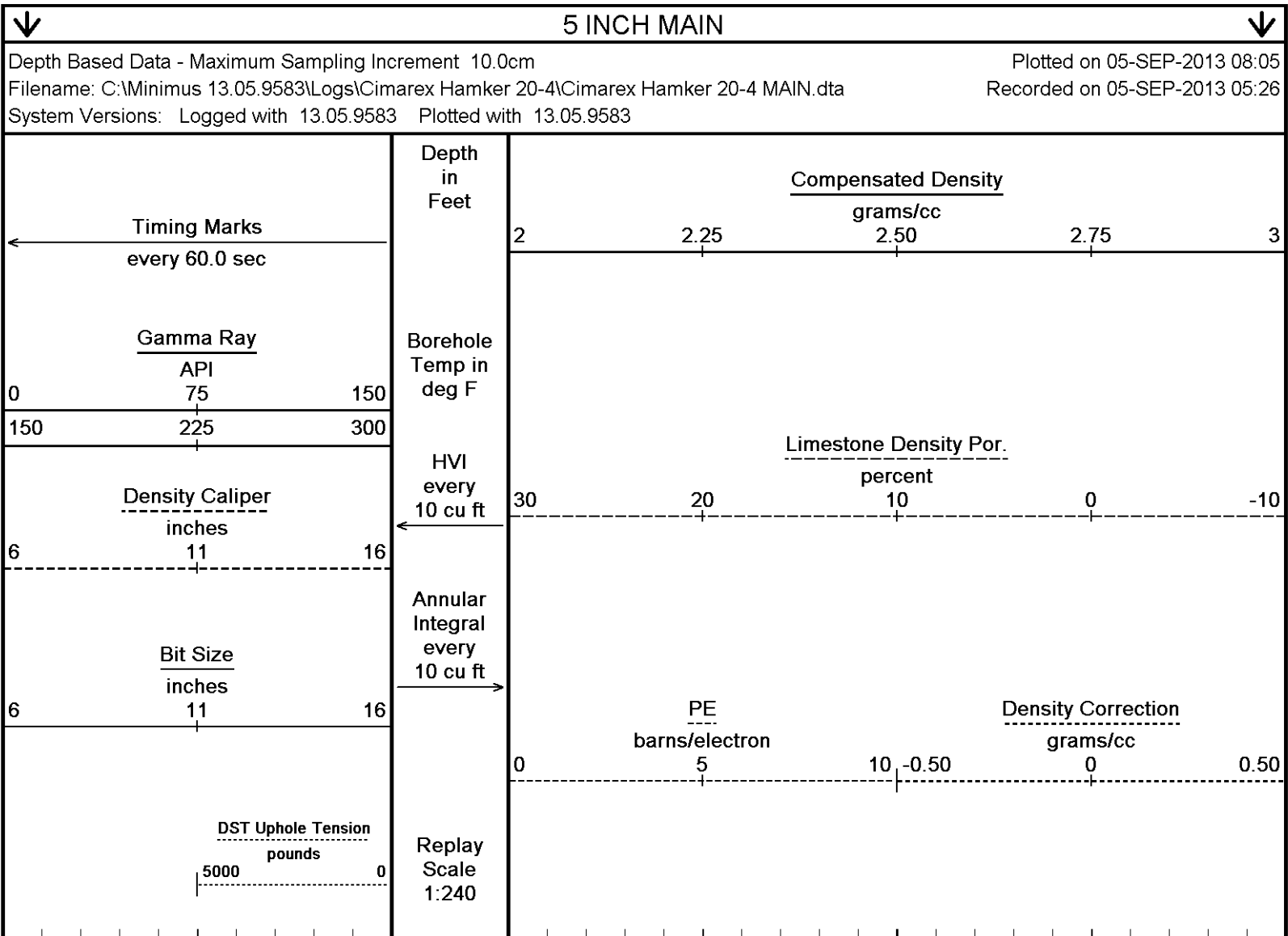
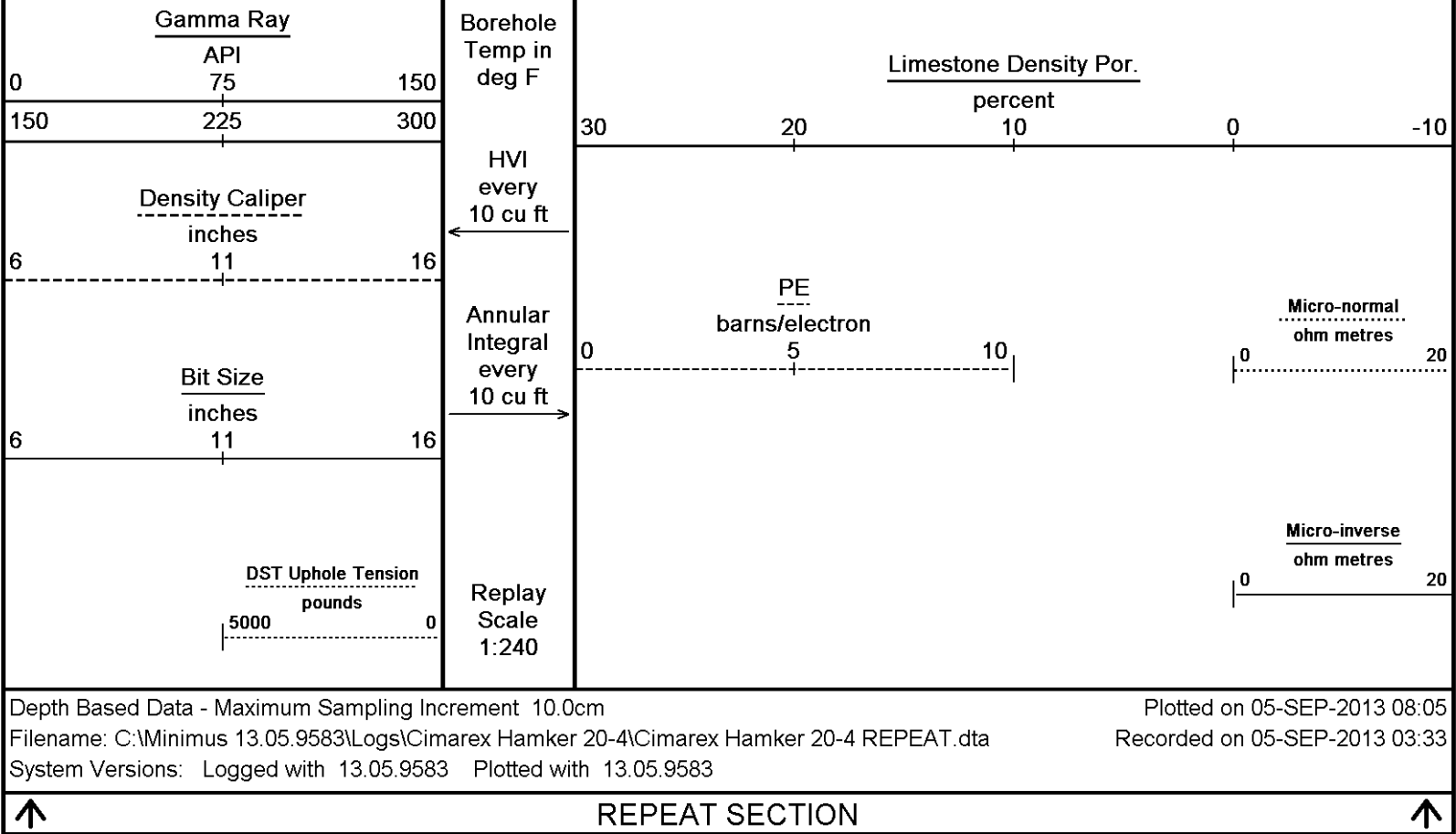
Replay
Scale
1:240

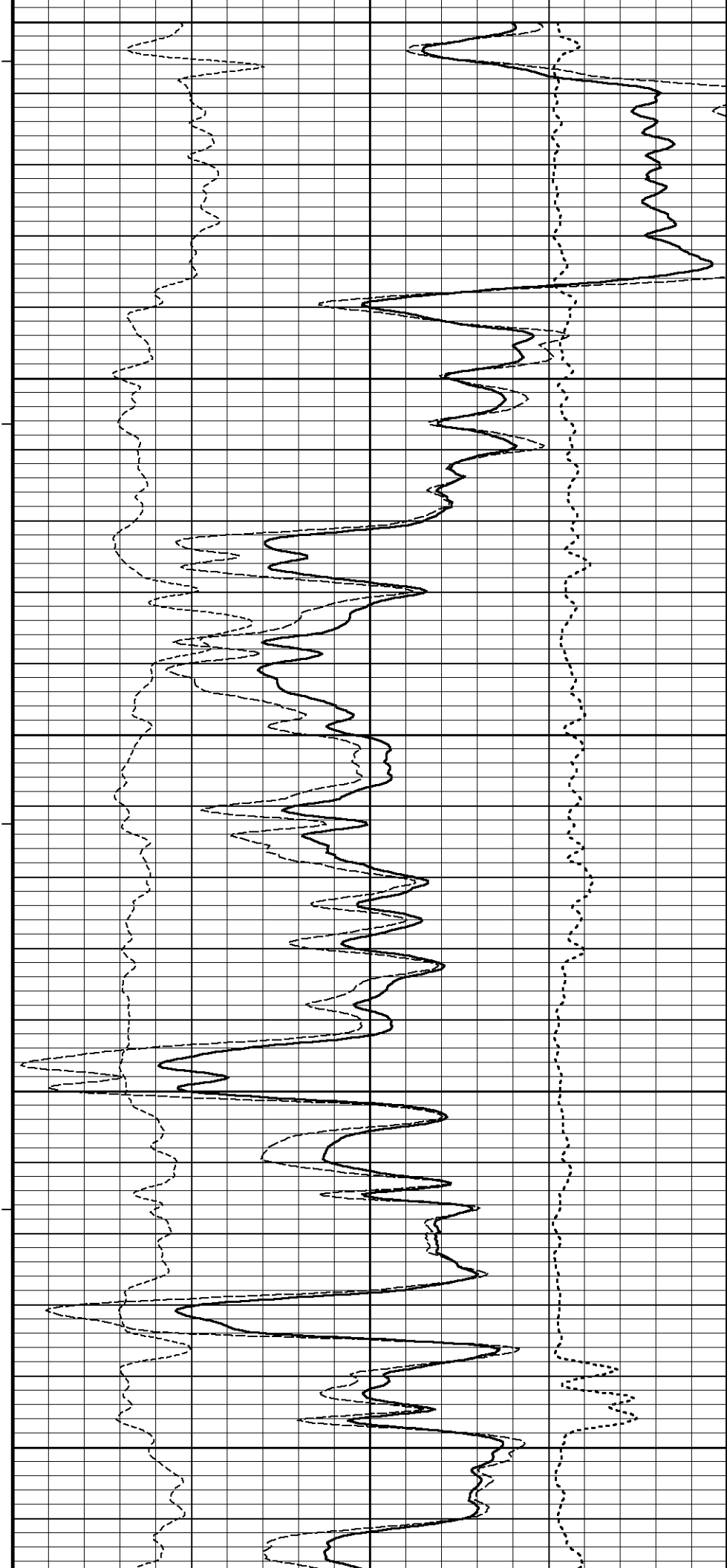
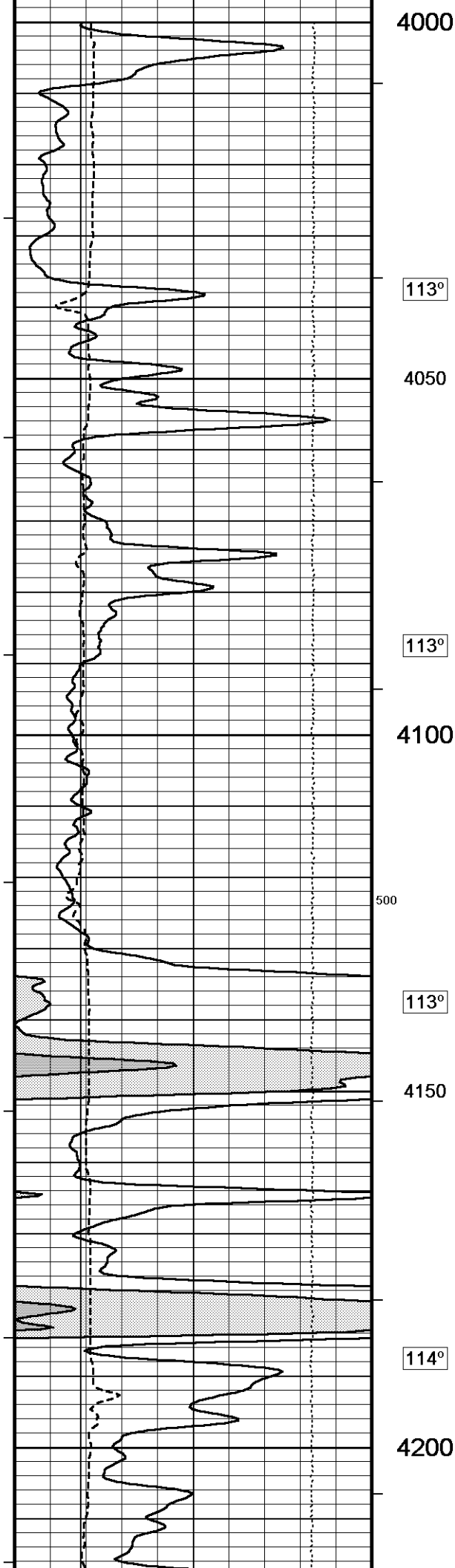
Micro-inverse
ohm metres

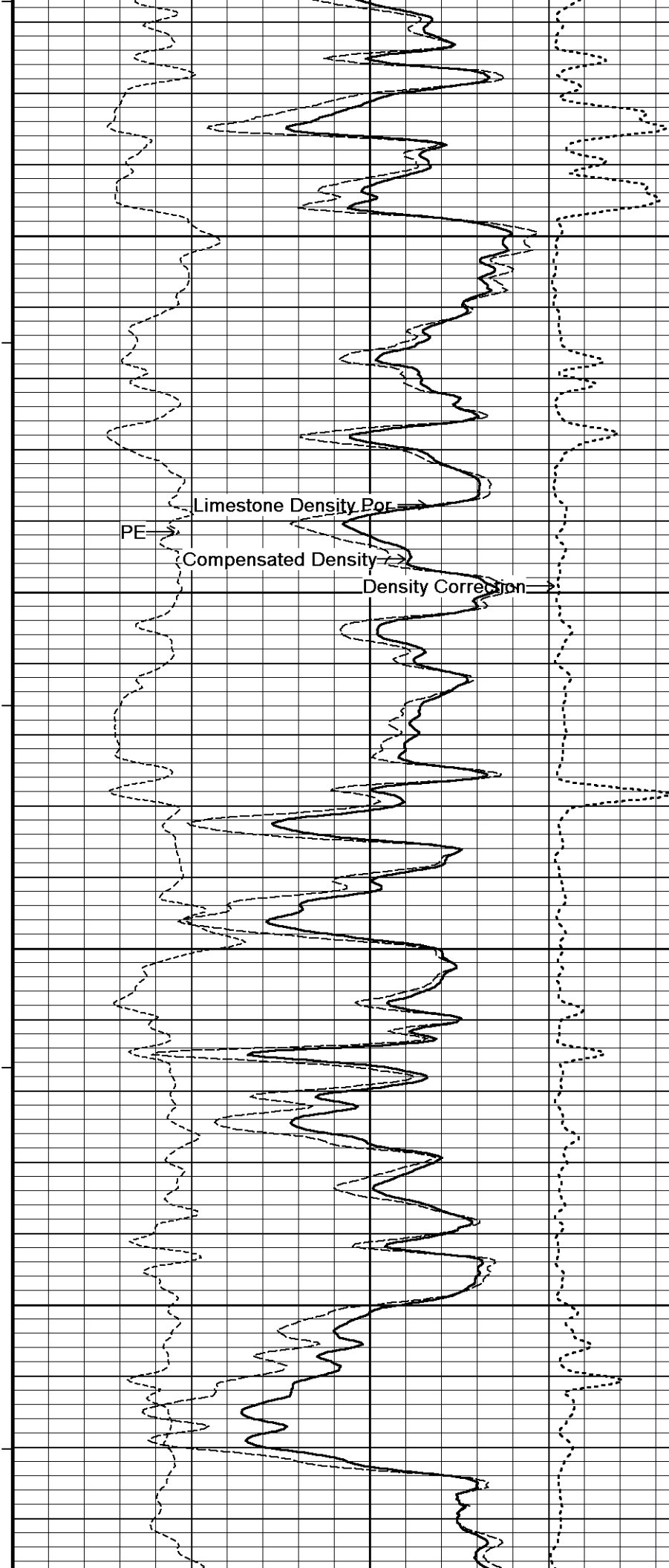
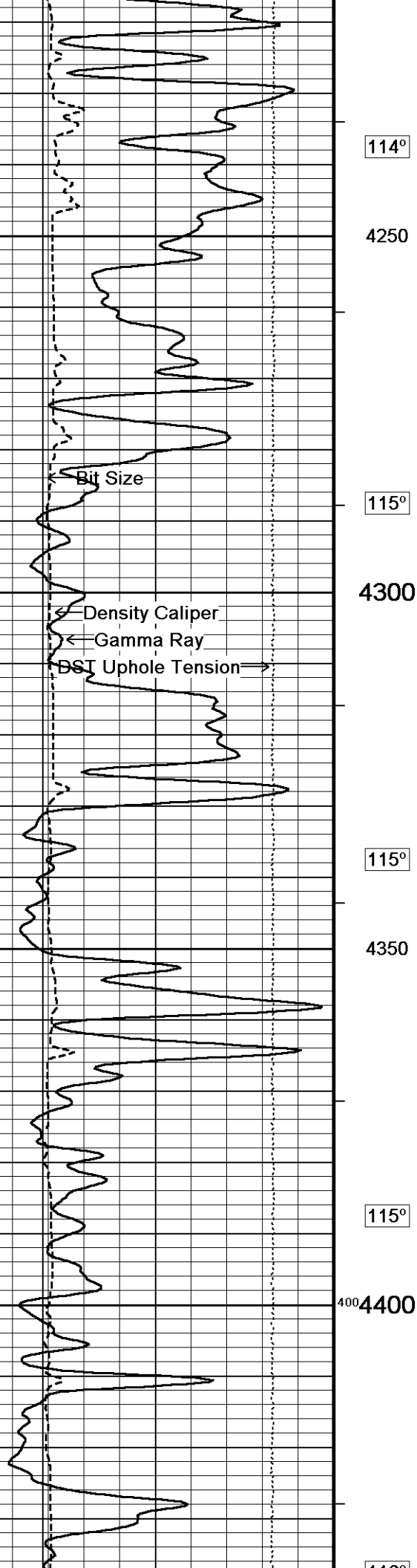
0 20

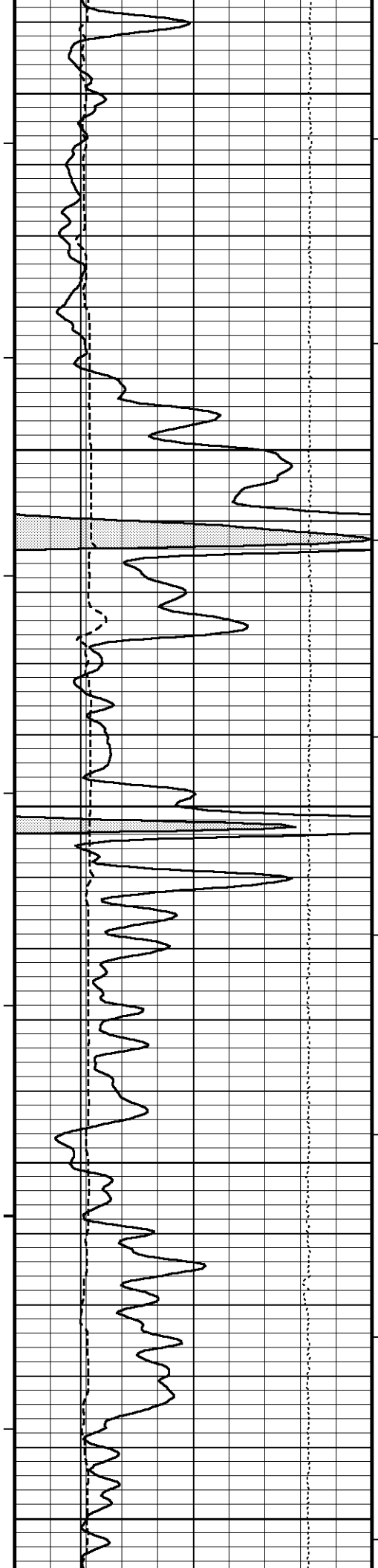












116°

4450

200

116°

4500

117°

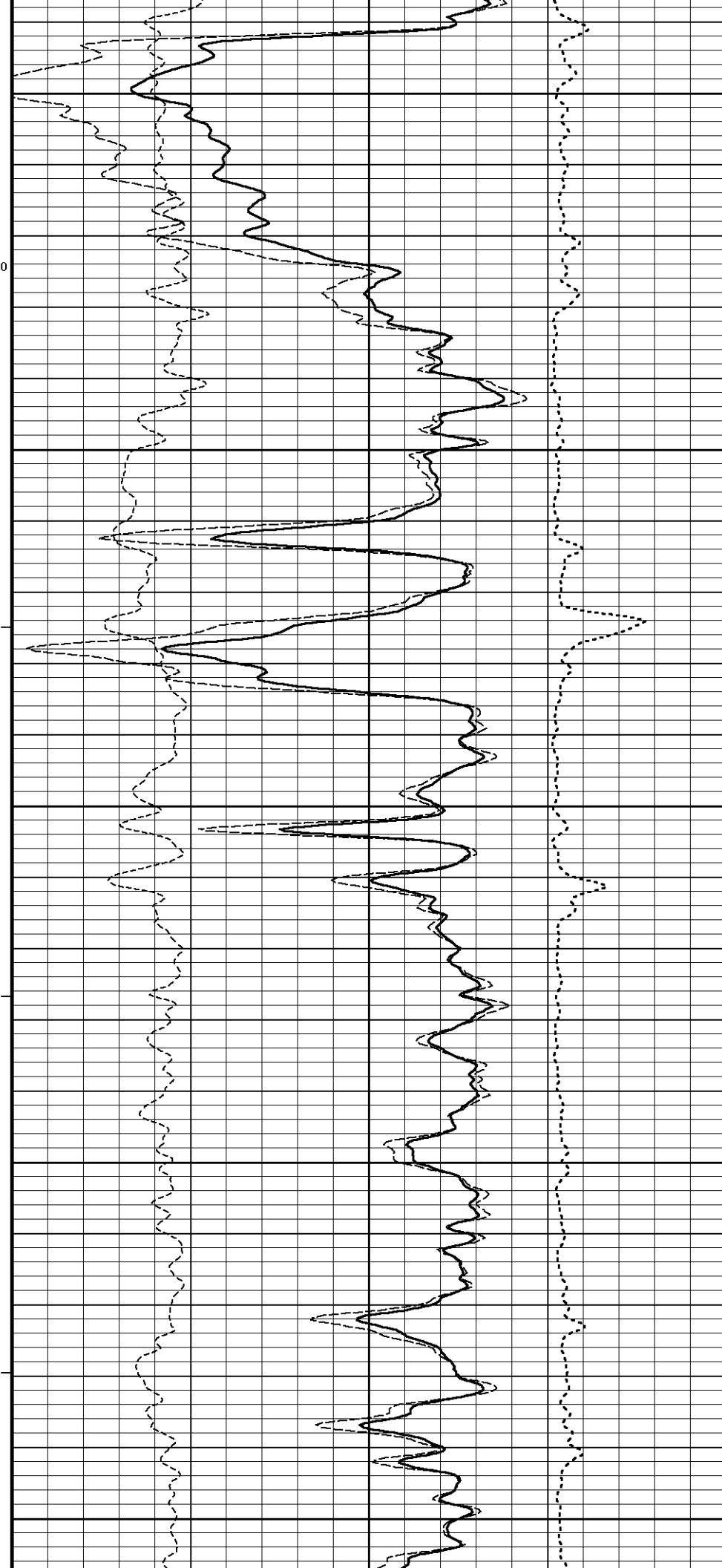
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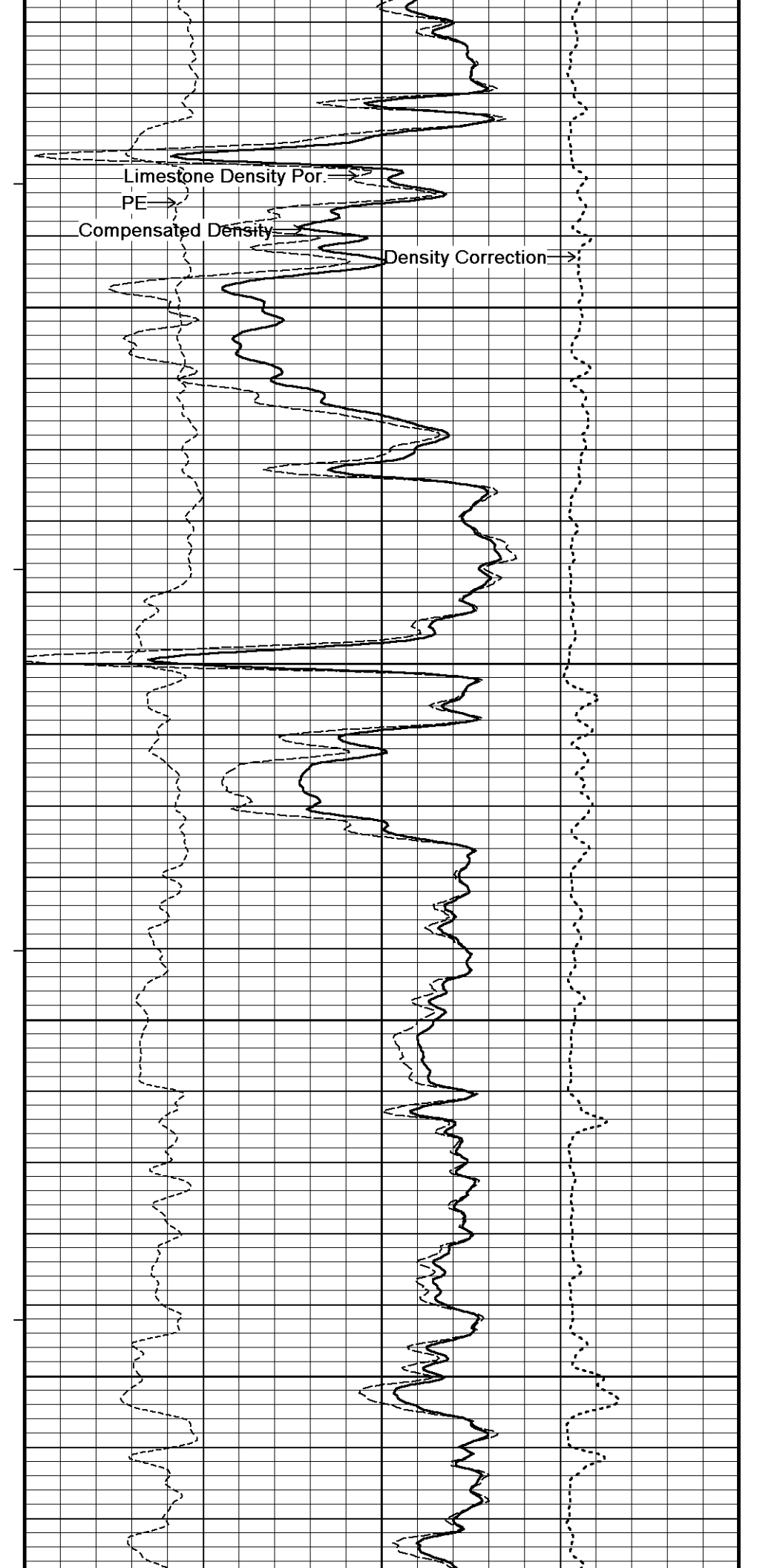
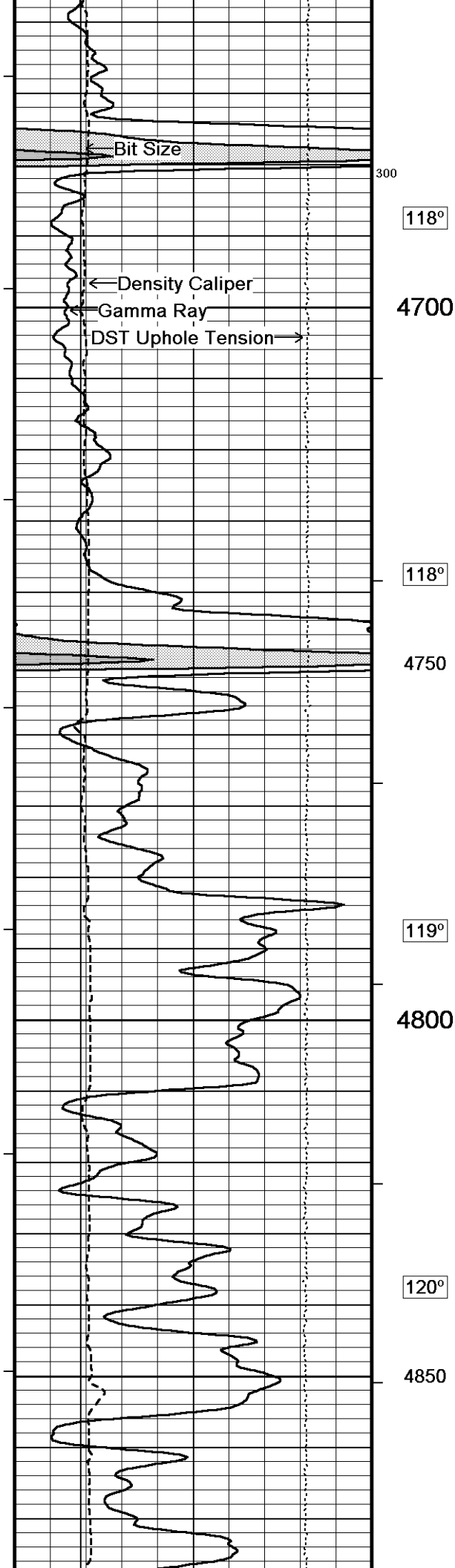
117°

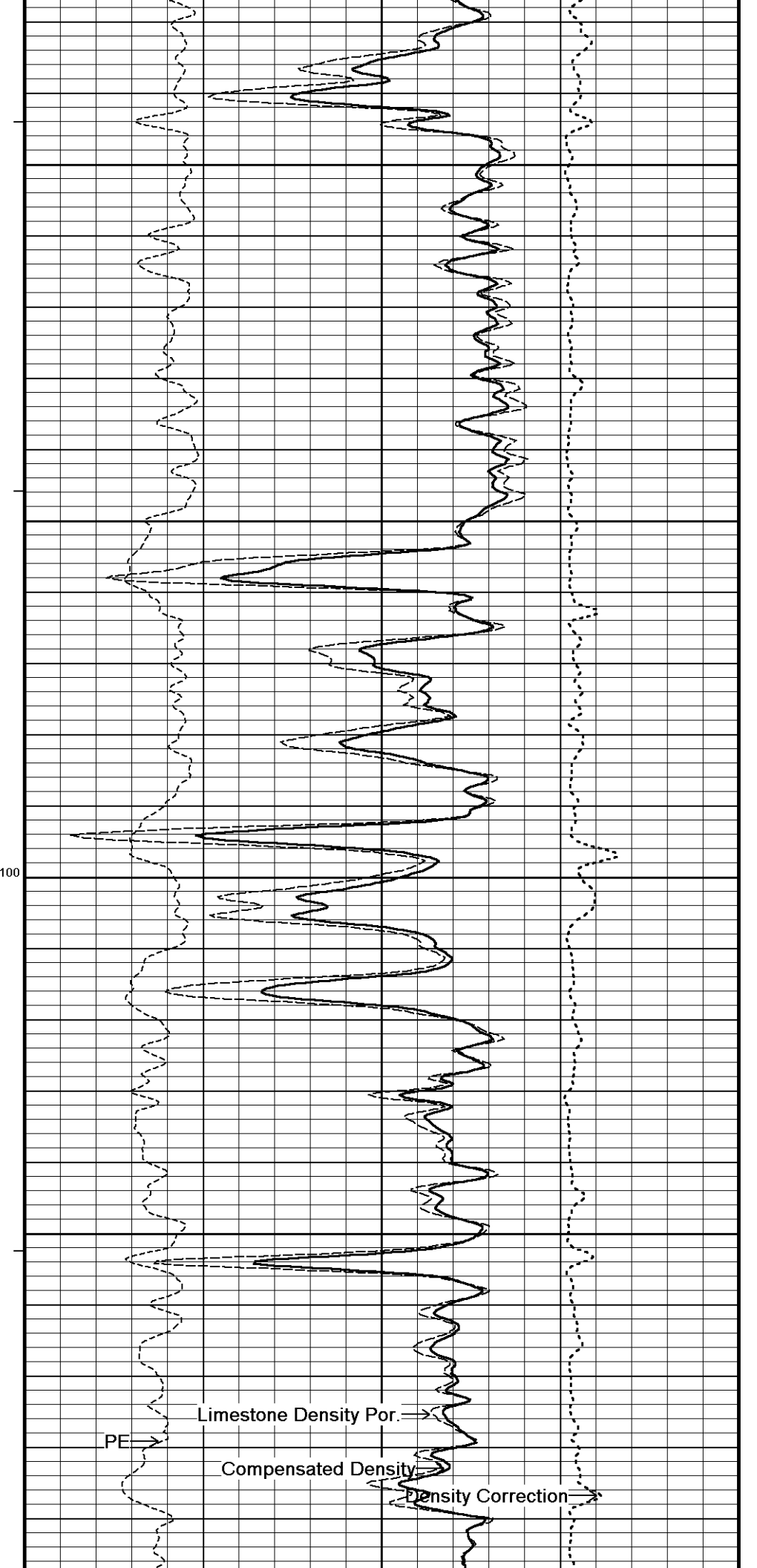
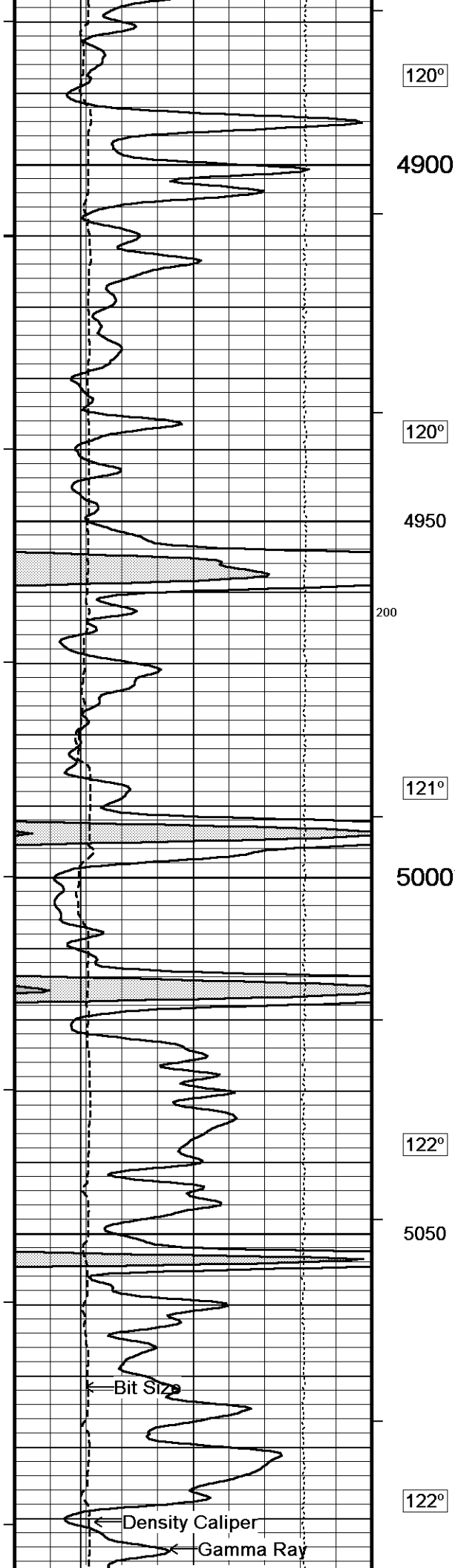
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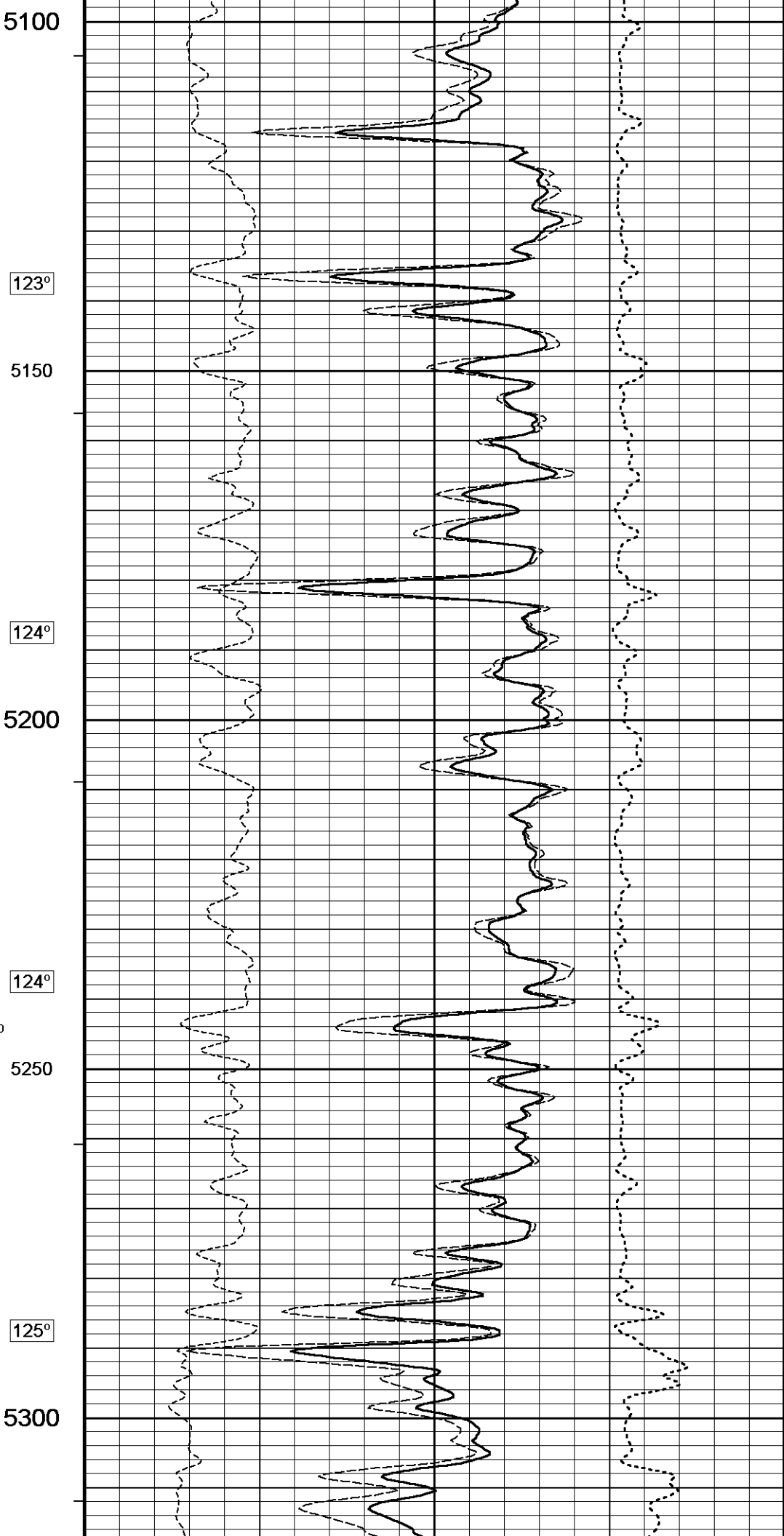
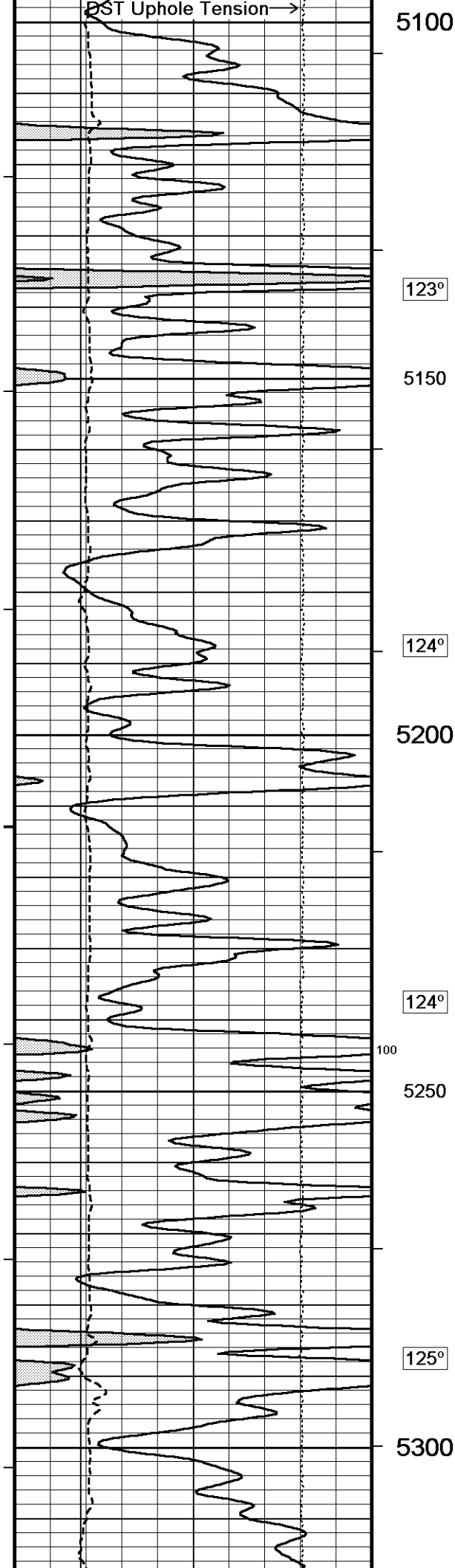
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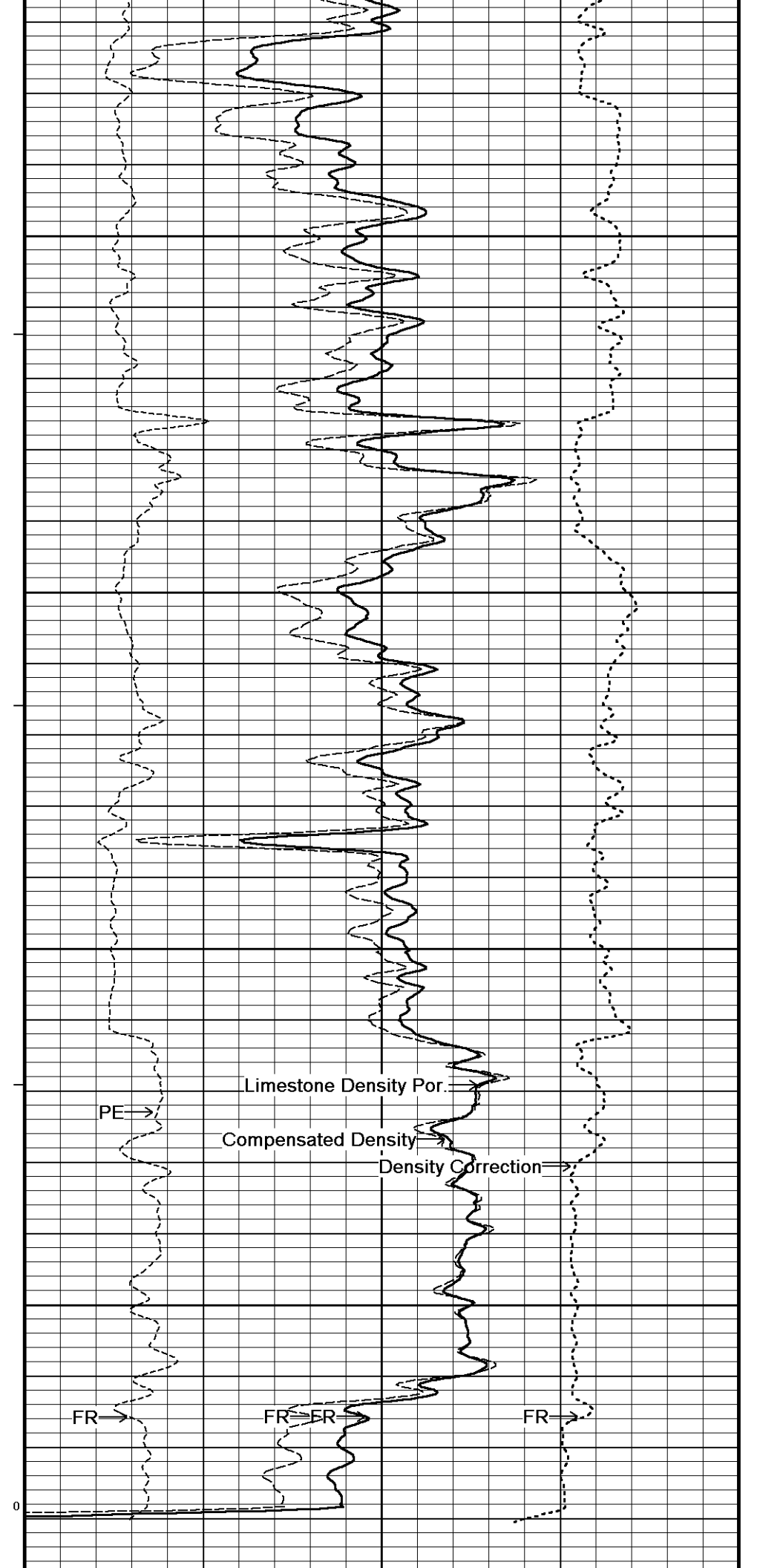
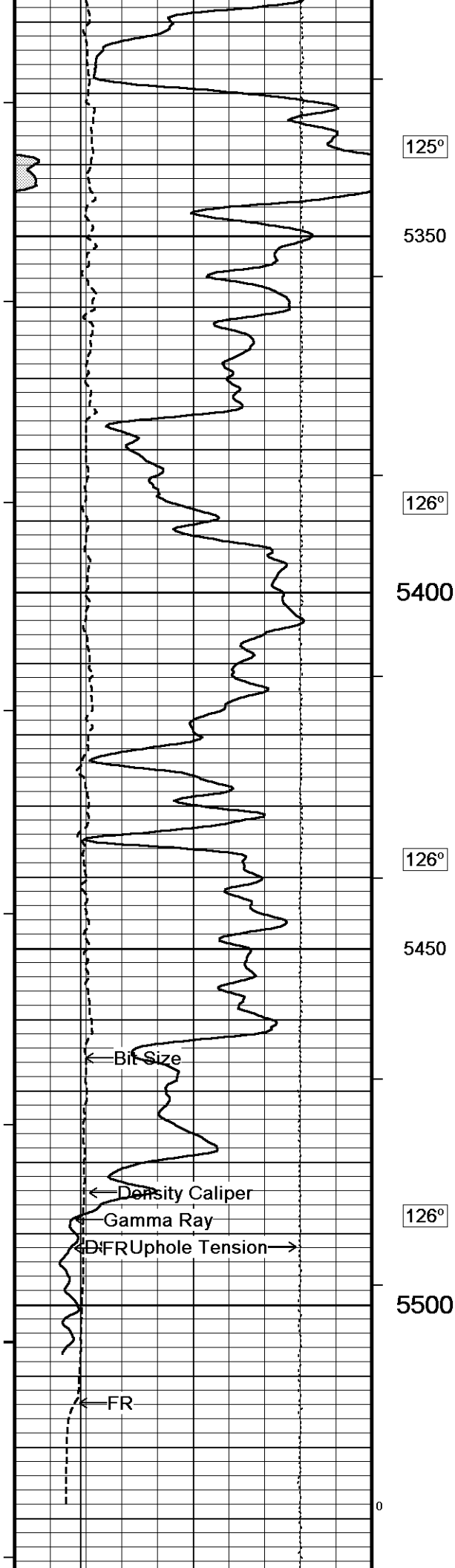
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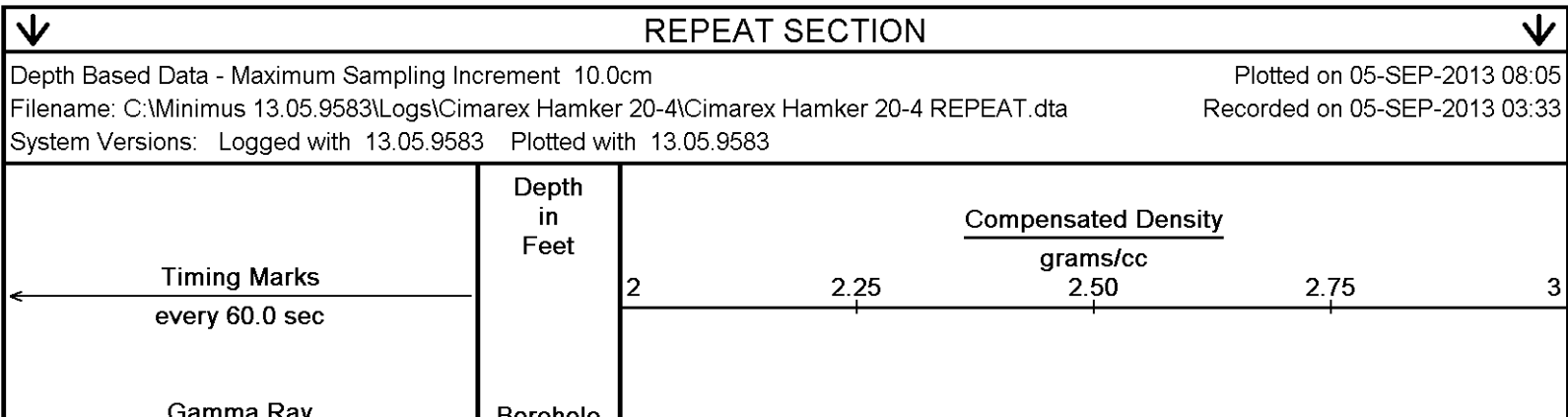
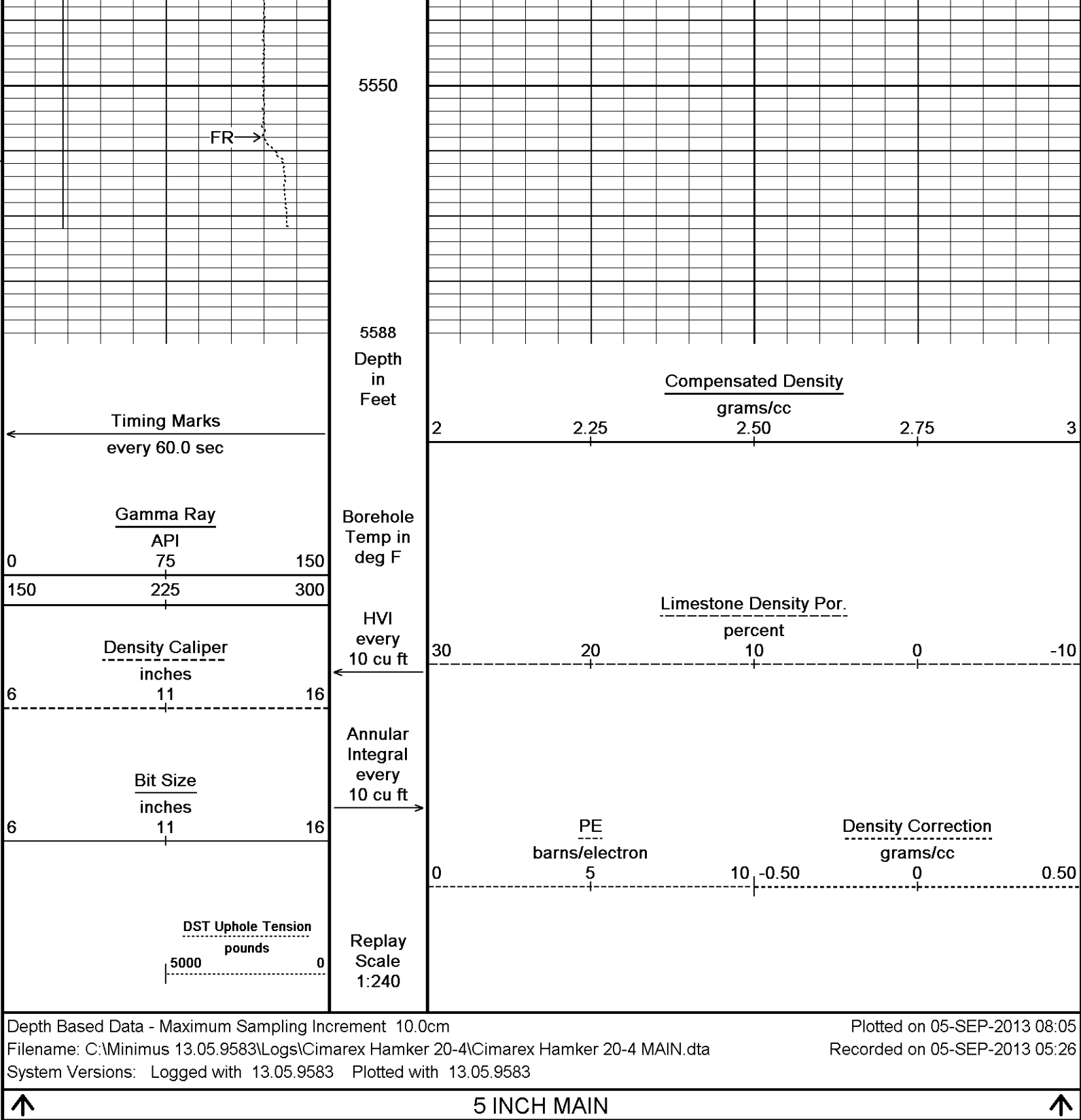


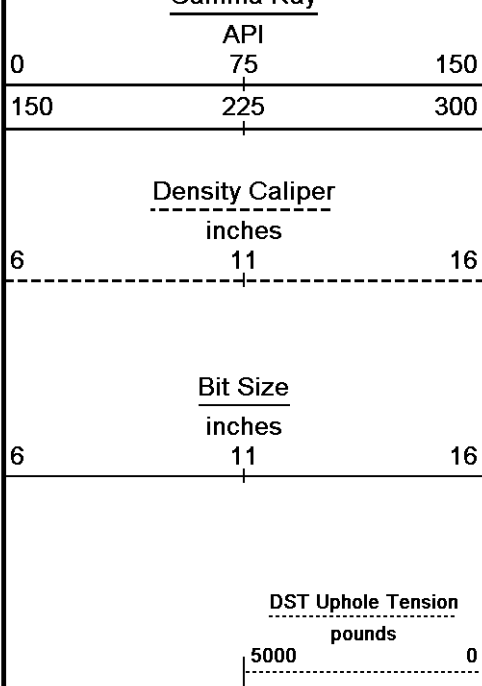










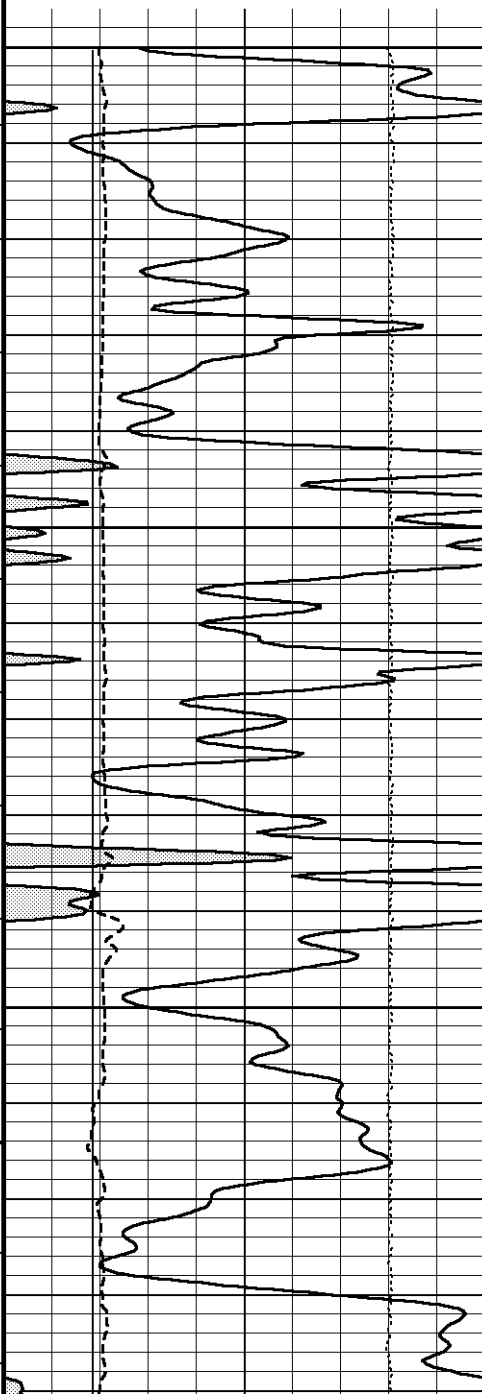
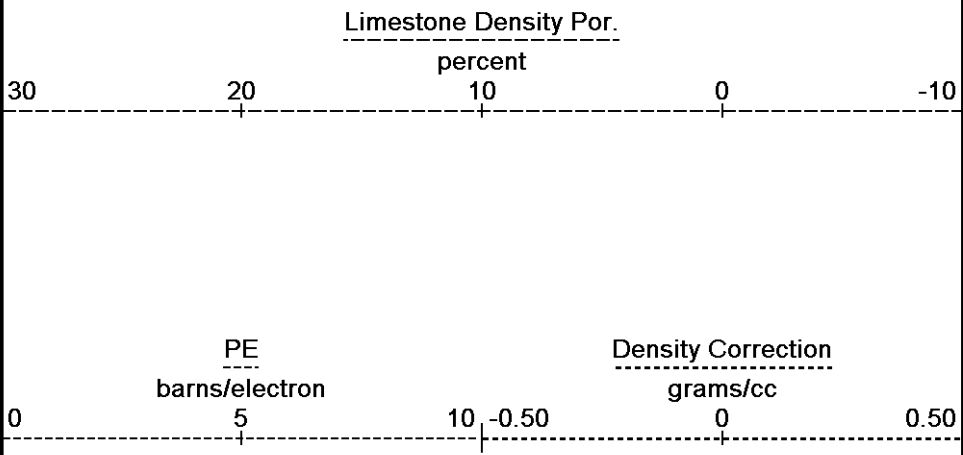


Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240



5200

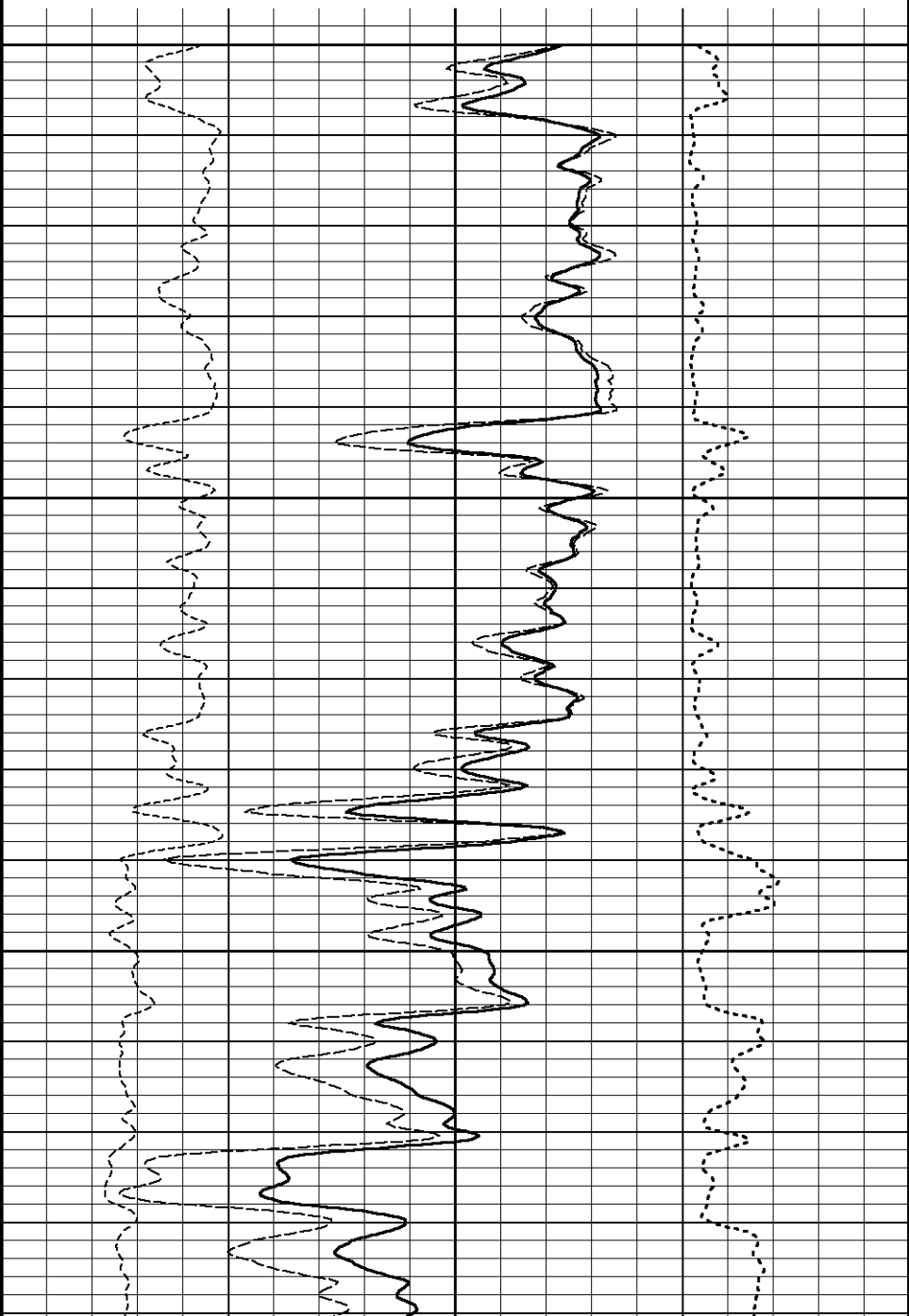
122°

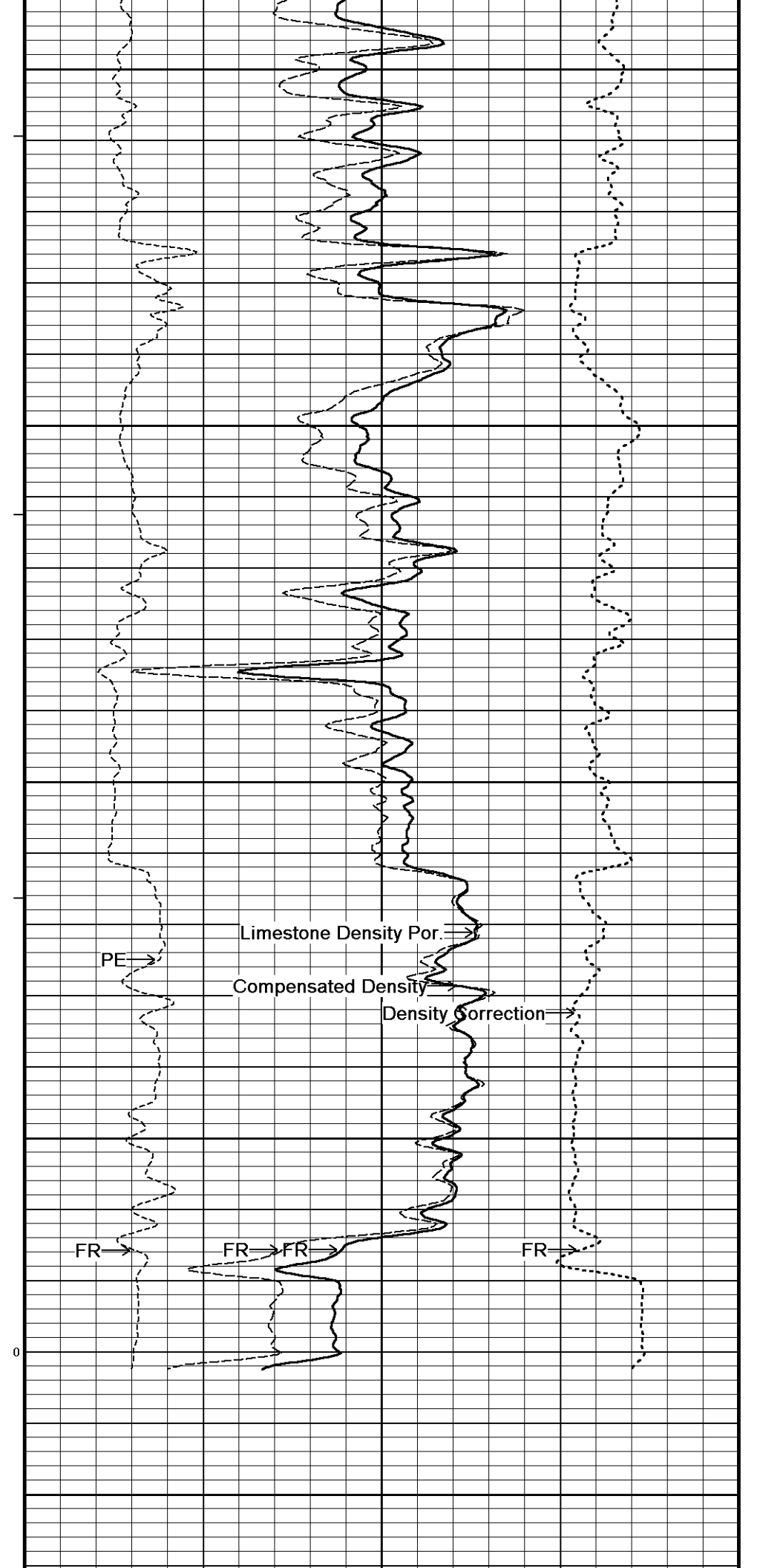
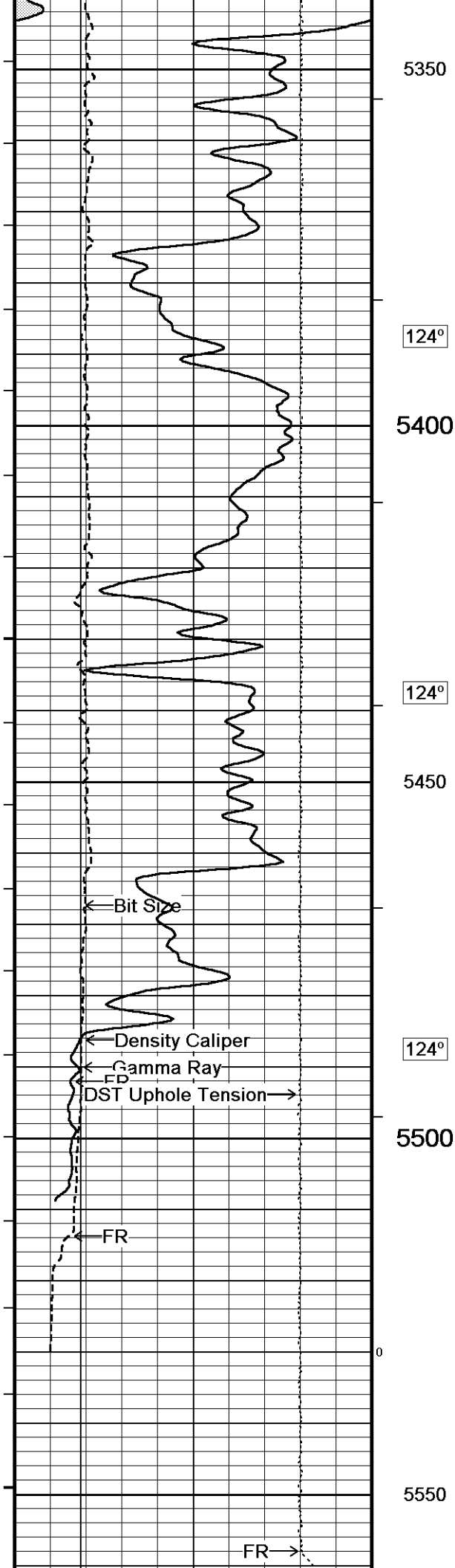
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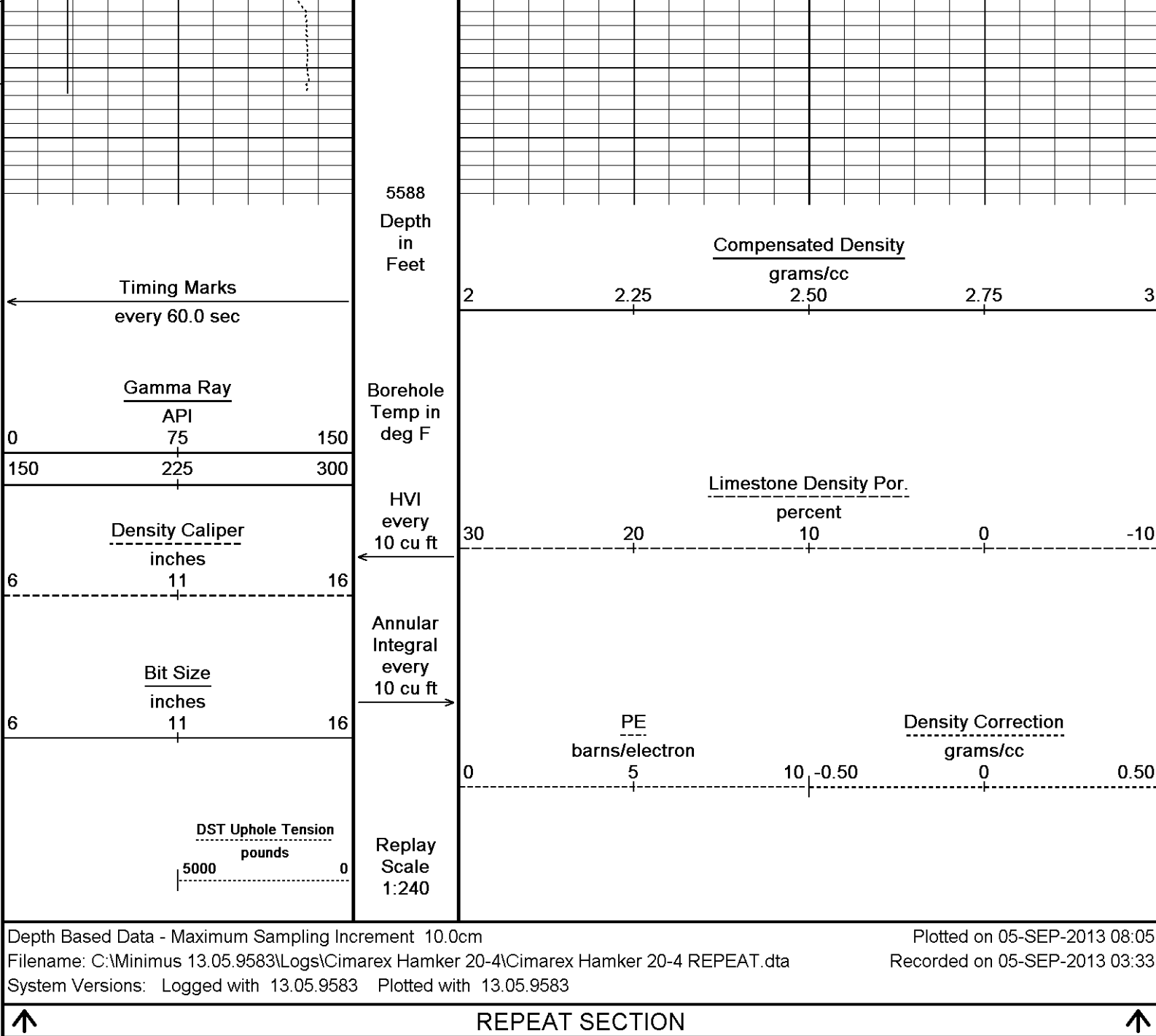
123°

5300

124°







BEFORE SURVEY CALIBRATION		
C:\Minimus 13.05.9583\Logs\Cimarex Hamker 20-4\Cimarex Hamker 20-4 REPEAT.dta		
General Constants All 000		Last Edited on 05-SEP-2013,00:24
General Parameters		
Mud Resistivity	1.500	ohm-metres
Mud Resistivity Temperature	60.000	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	MIE Caliper X	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	

RWA Constant A	1.000			
RWA Constant M	2.000			
SW/APOR Tool Source	0.000			
Gamma Calibration MCG-D.K 443				
	Measured	Calibrated (API)	Field Calibration on 28-AUG-2013 04:17	
Background	53	36		
Calibrator (Gross)	1112	761		
Calibrator (Net)	1059	725		
Gamma Constants MCG-D.K 443				
			Last Edited on 05-SEP-2013,00:25	
Gamma Calibrator Number	GRC38			
Mud Density	1.08	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 443				
	Measured	Calibrated(Deg F)	Field Calibration on 28-AUG-2013,04:08	
Lower	50.00	50.00		
Upper	75.00	75.00		
High Resolution Temperature Constants MCG-D.K 443				
			Last Edited on 28-AUG-2013,04:08	
Pre-filter Length	11			
Accelerometer Parameters MIE-A.A 209				
Date Of Last Accelerometer Calibration	20-FEB-2013,10:48			
	X Accelerometer	Y Accelerometer	Z Accelerometer	
Slope	-1.113935	-1.111537	-1.102344	
Offset	0.004254	0.005471	0.009082	
Accelerometer Constants MIE-A.A 209				
				Last Edited on 18-JUN-2013,10:20
Accelerometer Calibrator Number	000			
Accelerometer Temperature Characterisation				
X Accelerometer				
Serial Number	826			
Calibration Date	18-Mar-2009			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	2.32377e-005	-1.87334e-008	9.07324e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.71389e-004	4.55326e-007	4.58364e-010
Y Accelerometer				
Serial Number	617			
Calibration Date	11-May-2008			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.76675e-005	6.93464e-010	2.98691e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.56882e-004	5.72598e-007	2.37496e-010
Z Accelerometer				
Serial Number	844			
Calibration Date	20-Mar-2009			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	-1.21769e-005	-1.46867e-008	-6.44015e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.73539e-004	4.65657e-007	2.88996e-010
Caliper Calibration MIE-A.A 209				
				Base Calibration on 18-JUN-2013 10:29
				Field Calibration on 25-AUG-2013 20:26
Base Calibration				
Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)	
1	25996	27327	5.98	
2	35112	36609	7.97	
3	42527	44600	9.96	

3	43337	44099	44099	9.86	
4	54458	53758	53758	11.92	
5	0	0	0	0.00	
Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	24866	26950	24809	22742	5.98
2	33198	36237	32734	30154	7.97
3	41719	46122	40442	36719	9.86
4	52107	57802	48995	43412	11.92
5	0	0	0	0	0.00
Field Calibration					
	Measured Pads 1-5 Caliper(in) 6.26	Measured Pads 3-7 Caliper(in) 5.88		Actual Caliper(in) 5.98	
	Measured Pad 2 Caliper(in) 3.08	Measured Pad 4 Caliper(in) 2.85	Measured Pad 6 Caliper(in) 2.94	Measured Pad 8 Caliper(in) 3.22	Actual Caliper(in) 5.98
Caliper Constants MIE-A.A 209				Last Edited on 18-JUN-2013,10:20	
Caliper Difference for BRKT		0.120	inches		
Magnetometer Parameters MIE-A.A 209					
Date Of Last Magnetometer Calibration		20-FEB-2013,13:52			
	X Magnetometer	Y Magnetometer	Z Magnetometer		
Slope	-1.000000	-1.012493	-1.007780		
Offset	0.011941	-0.015960	0.015669		
Magnetometer Constants MIE-A.A 209				Last Edited on	
Magnetometer Calibrator Number		000			
Navigation Constants MIE-A.A 209				Last Edited on 12-AUG-2013,10:56	
Magnetic Declination		6.62	degrees	East	
Compact Micro Imager Constants MIE-A.A 209					
Last Edited on					
Sonde Configuration		Imager Mode			
Arm-Pad Kit		Normal Pads (12.25 in)			
Arm-Pad Kit Serial Number					
Centre Pad 1 Rotational Offset		0.00	degrees		
Image/Borehole Ovality Reference		Azimuth of Pad 1			
Non Active Buttons		Omit			
Search Angle		0.00	degrees		
Correlation Interval		3.28	feet		
Correlation Step		1.64	feet		
Current Offset		0.0000	mAmp		
Squasher Start		0.0500	mAmp		
Image Processing		Enabled			
Photo Density Calibration MPD-B 59				Base Calibration on 23-AUG-2013 11:44 Field Check on 28-AUG-2013 04:02	
Density Calibration					
Base Calibration		Measured	Calibrated (sdu)		
	Near	Far	Near	Far	
Reference 1	58612	28481	59556	30836	
Reference 2	23605	2511	24941	2541	
Field Check at Base					
	1186.0	1254.6			
Field Check					
	1184.1	1248.9			
PE Calibration					
Base Calibration		Measured	Calibrated		
	WS	WH	Ratio	Ratio	
Background	217	1063			
Reference 1	21648	58418	0.374	0.371	
Reference 2	6282	23469	0.271	0.272	

Field Check at Base
216.6 1062.7

Field Check
216.8 1062.3

Density Constants MPD-B 59

Last Edited on 05-SEP-2013,00:26

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 1.08 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 (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-B 59

Base Calibration on 23-AUG-2013 11:17
Field Calibration on 28-AUG-2013 04:05

Base Calibration Reading No	Measured	Calibrator Size (in)
1	16284	3.99
2	23984	5.98
3	31584	7.97
4	39888	9.86
5	49152	11.92
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	7.93	7.97

DOWNHOLE EQUIPMENT

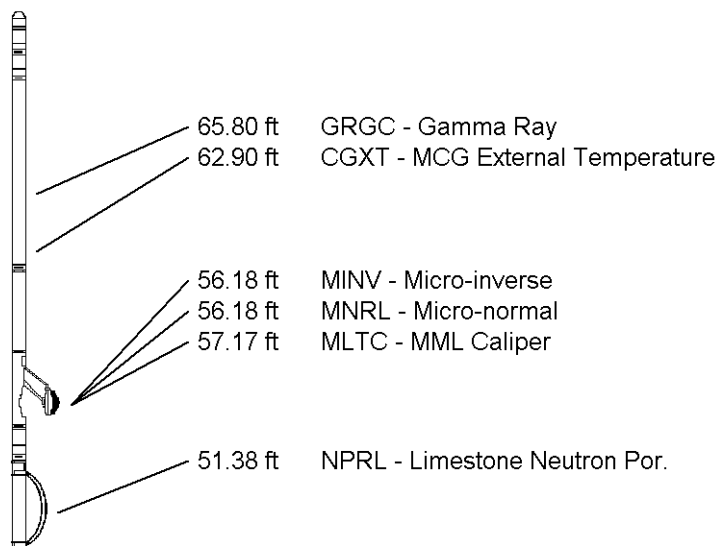
C:\Minimus 13.05.9583\Logs\Cimarex Hamker 20-4\Cimarex Hamker 20-4 REPEAT.dta

CBH-C, Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.24 in

Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
MML-A 16 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

Compact Neutron
MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in



Compact Density/Caliper
MPD-B 59 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

SKJ-D.A Compact Knuckle Joint
SKJ-D.A 36 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint
SKJ-D.A 37 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

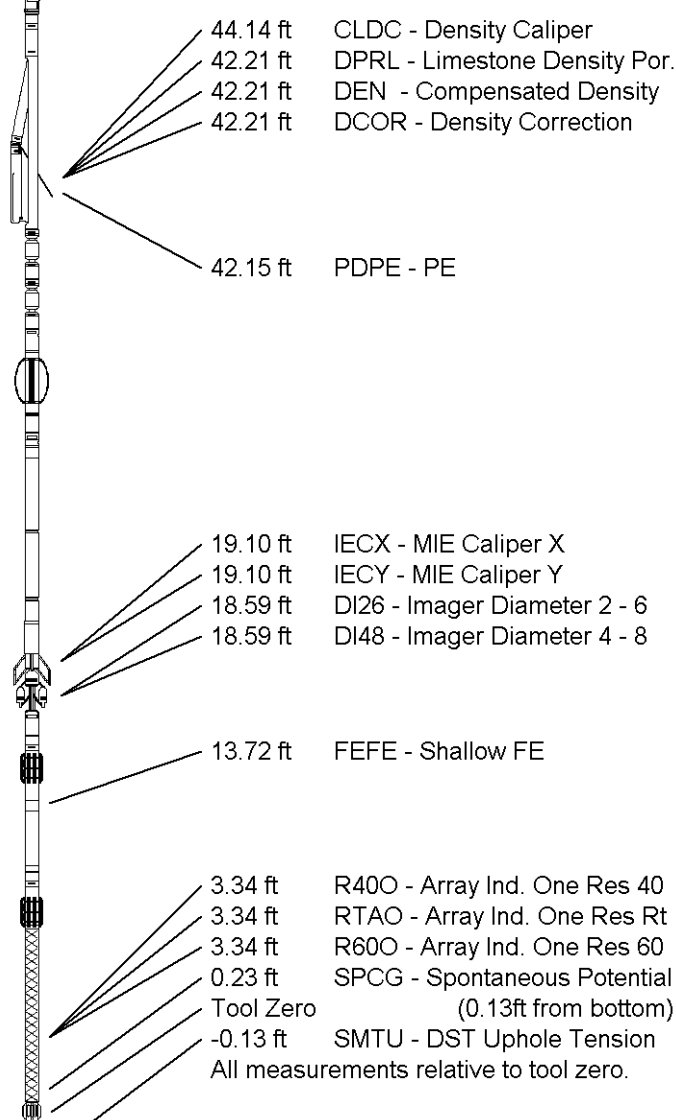
Compact MMI Memory Section
MIM-B.A 251 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

Compact MMI Electrode Section
MIE-A.A 209 LG: 13.96 ft WT: 99.2 lb OD: 4.09 in

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
MAI-A.A 178 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 73.48 ft Weight: 582.0 lb



COMPANY	CIMAREX ENERGY CO.
WELL	HAMKER 20-4
FIELD	WILDCAT
PROVINCE/COUNTY	HASKELL
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2857.00	feet	First Reading	5516.00	feet
Elevation Drill Floor	2855.00	feet	Depth Driller	5559.00	feet
Elevation Ground Level	2849.00	feet	Depth Logger	5558.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG