



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY	MID-CON ENERGY OPERATING			
WELL	HRMU 11-13			
FIELD	HARKER RANCH MORROW UNIT			
PROVINCE/COUNTY	CHEYENNE			
COUNTRY/STATE	U.S.A. / COLORADO			
LOCATION	600' FNL & 760' FWL			
SEC 13	TWP 13S	RGE 43W	Other Services	
Latitude				MAI/MFE
Longitude				
API Number	05-017-07793			
Permanent Datum GL, Elevation	4091 feet			Elevations:
Log Measured From KB				KB 4107.60
Drilling Measured From KB @ 16.6				DF 4105.60
				GL 4091.00
Date	19-AUG-2014			
Run Number	ONE			
Service Order	7606-95666857			
Depth Driller	5450.00			feet
Depth Logger	5451.00			feet
First Reading	5431.78			feet
Last Reading	4450.00			feet
Casing Driller	442.00			feet
Casing Logger	442.00			feet
Bit Size	7.875			inches
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg		60.00 CP	
PH / Fluid Loss	8.00		10.40 ml/30Min	
Sample Source	MUDPIT			
Rm @ Measured Temp	1.12 @ 75.0		ohm-m	
Rmf @ Measured Temp	0.89 @ 75.0		ohm-m	
Rmc @ Measured Temp	1.34 @ 75.0		ohm-m	
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.58 @148.0		ohm-m	
Time Since Circulation	4 HOURS			
Max Recorded Temp	148.00		deg F	
Equipment / Base	13057	LIB		
Recorded By	BEN WELDIN			
Witnessed By	CHRIS BEAN			
JOBS#	LB14-243			

BOREHOLE RECORD

Last Edited: 19-AUG-2014 20:56

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	425.00
7.875	425.00	5450.00

CASING RECORD

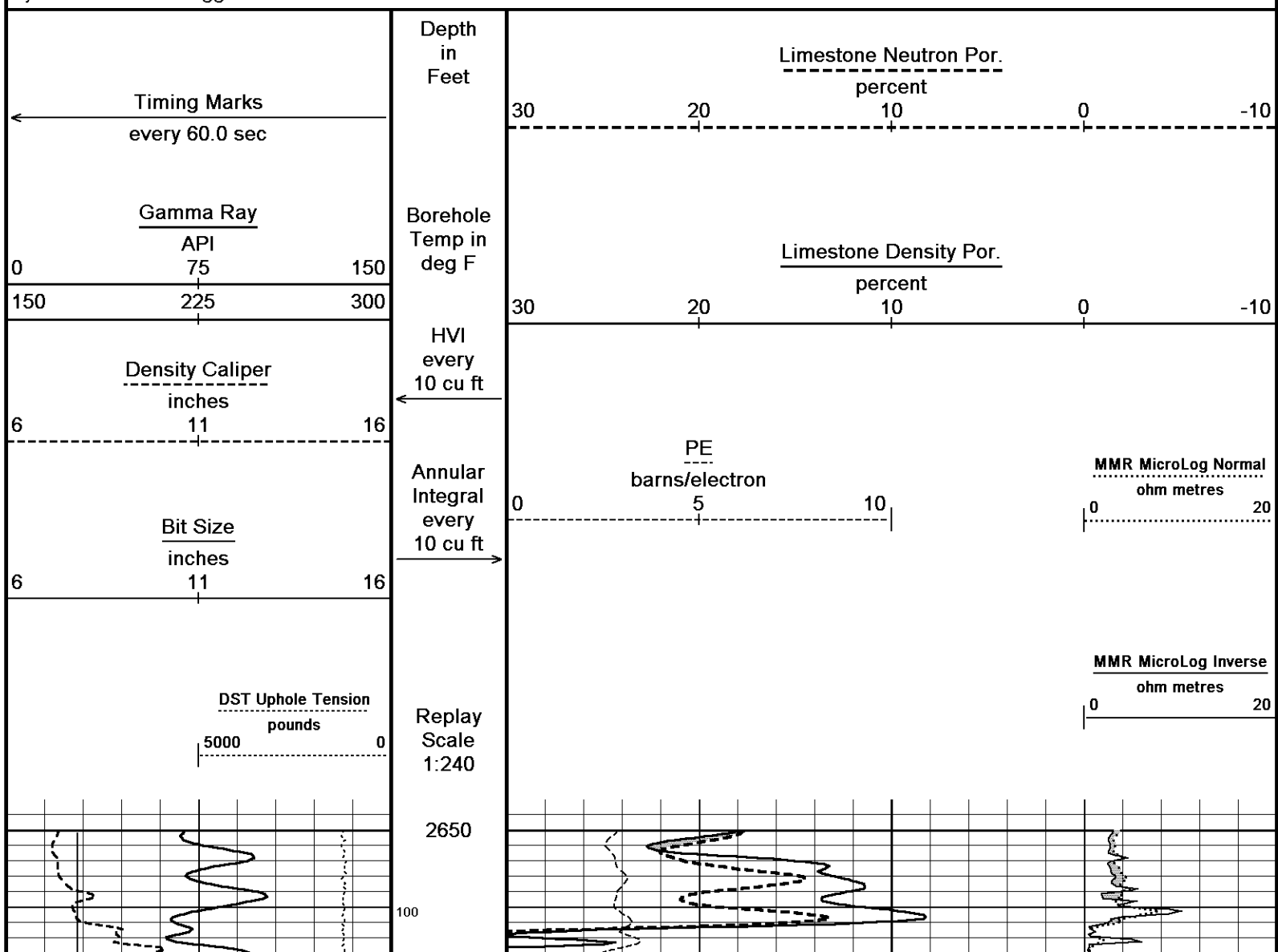
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	425.00	24.00

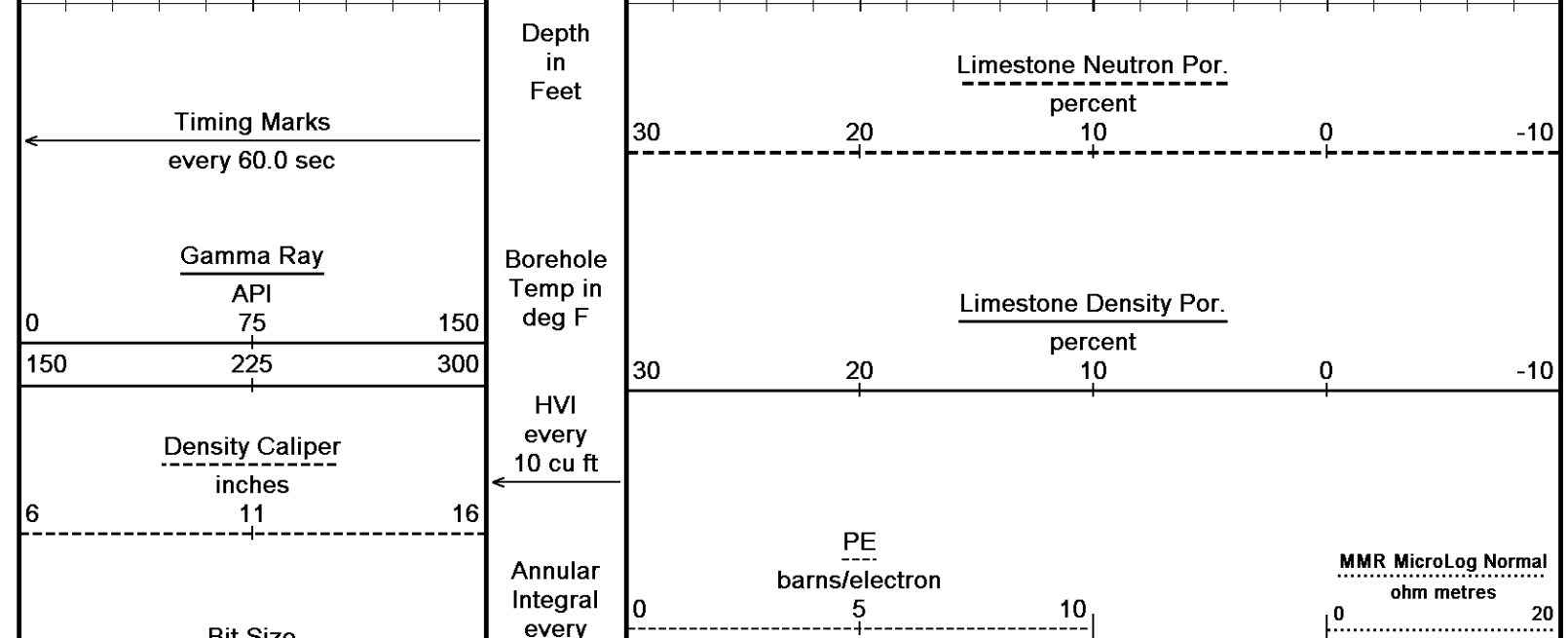
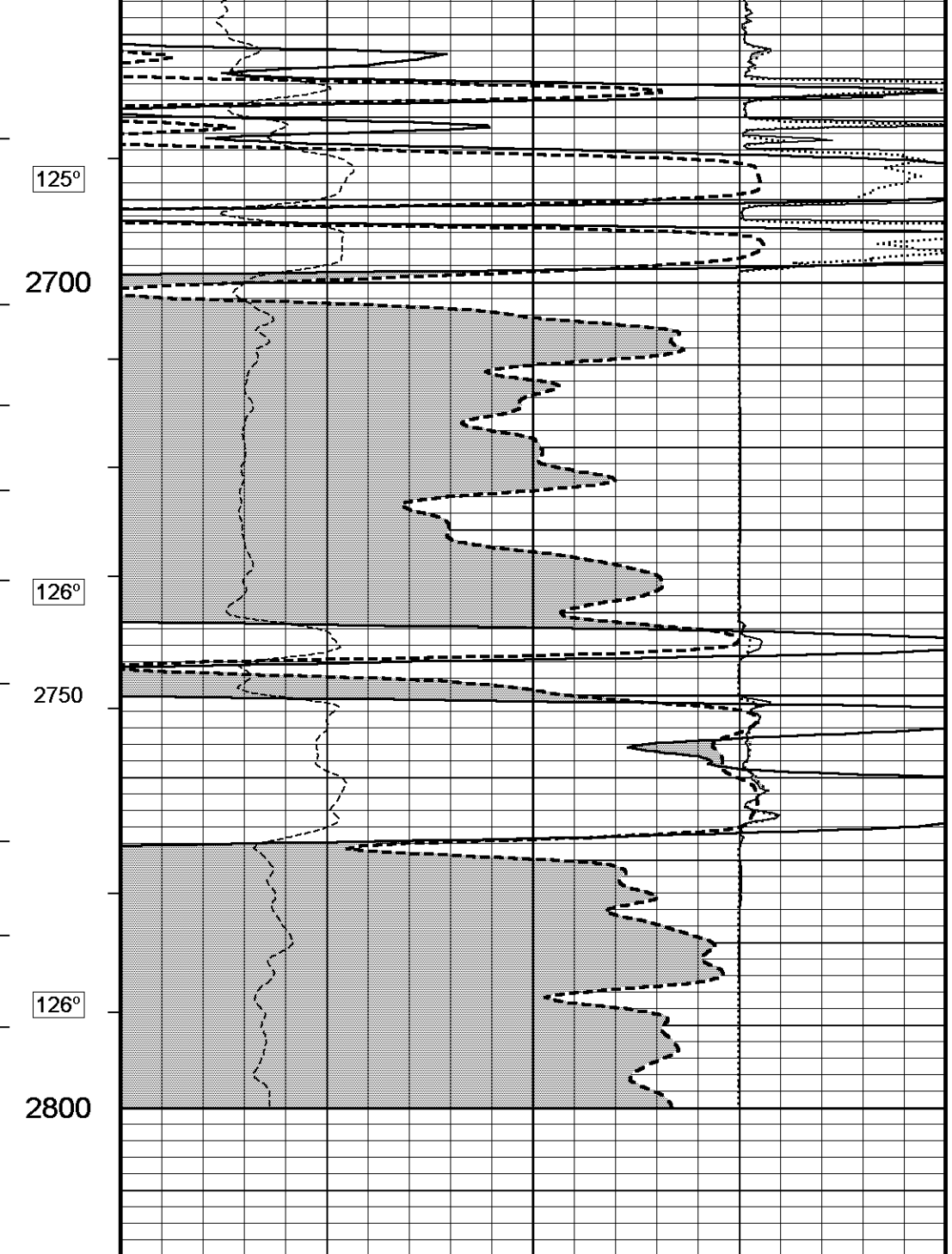
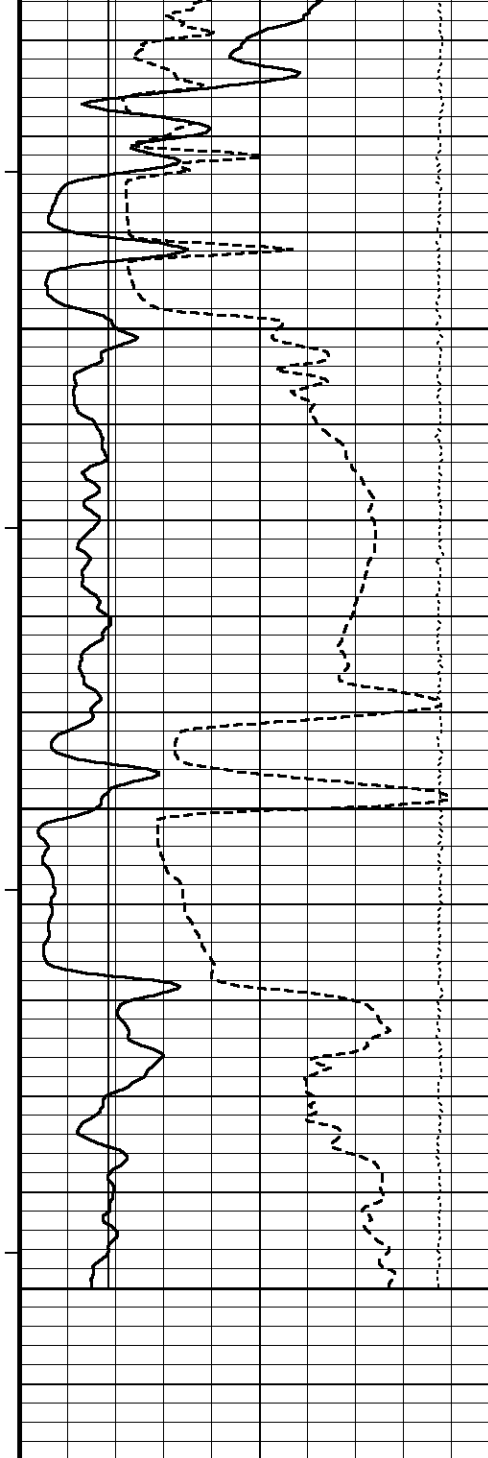
REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION
- HARDWARE:
 - MDN: DUAL BOWSPRING ECCENTRALIZER
 - MFE: 1 X 0.5 INCH STANDOFF
 - MAI: 2 X 0.5 INCH STANDOFF
- 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: 1830 CU. FT.

- RIG: WILDCAT DRILLING RIG #1
- SERVICE ORDER #: 7606-95666847
- ENGINEER: BEN WELDIN
- OPERATOR: KEN RINEHART

↓	5 INCH LIMESTONE MAIN - ANHYDRITE SECTION	↓
Depth Based Data - Maximum Sampling Increment 10.0cm		Plotted on 20-AUG-2014 03:51
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta		Recorded on 20-AUG-2014 00:21
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113		







Depth Based Data - Maximum Sampling Increment 10.0cm

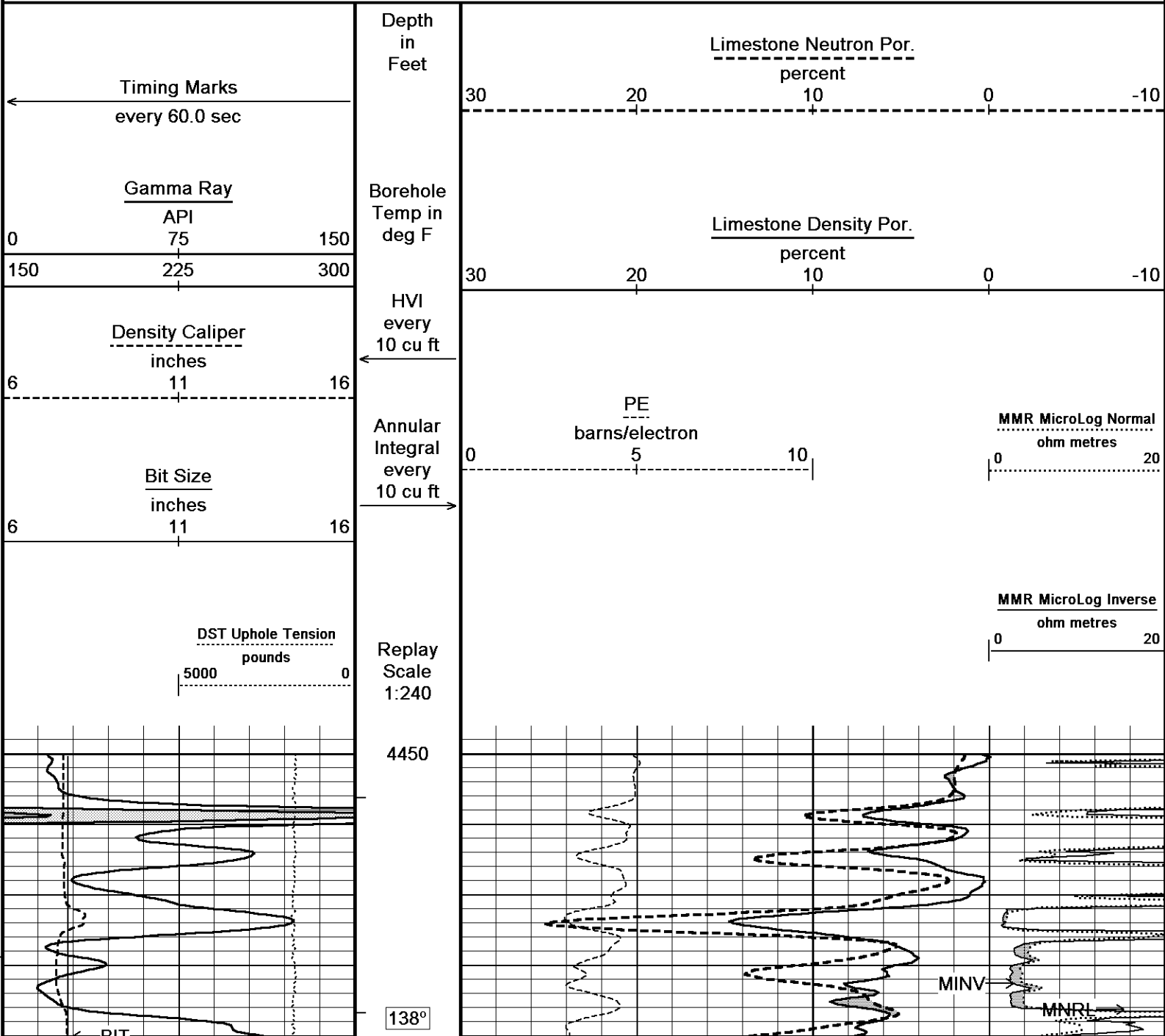
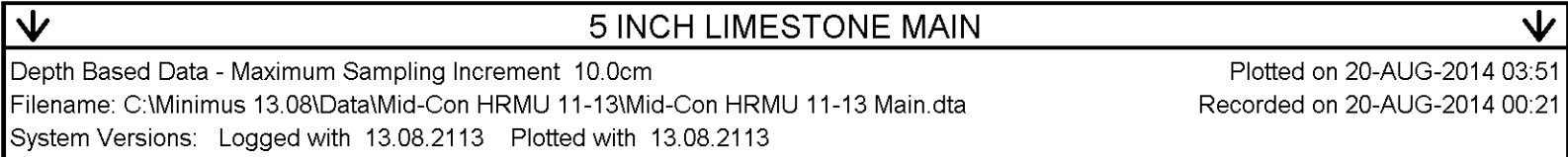
Plotted on 20-AUG-2014 03:51

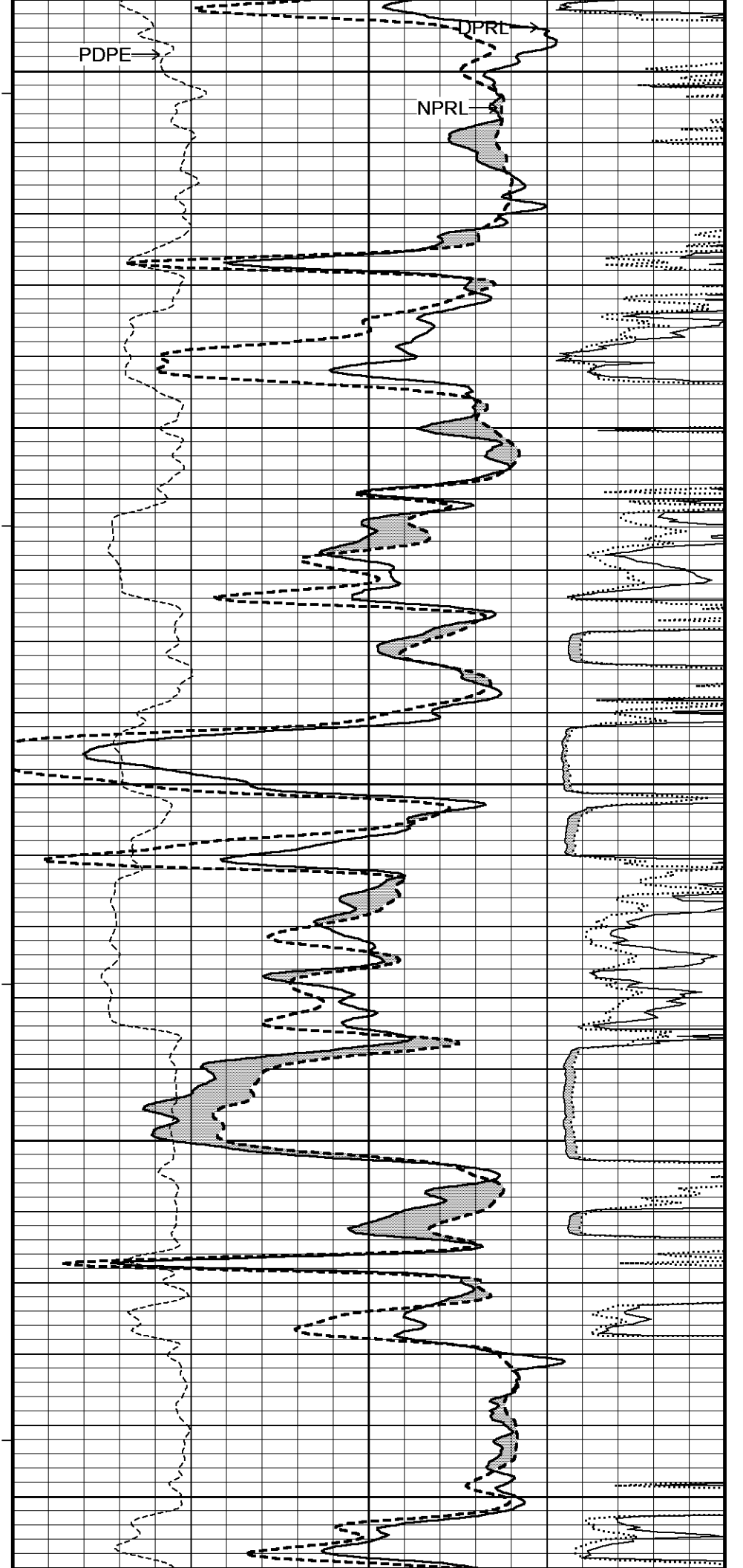
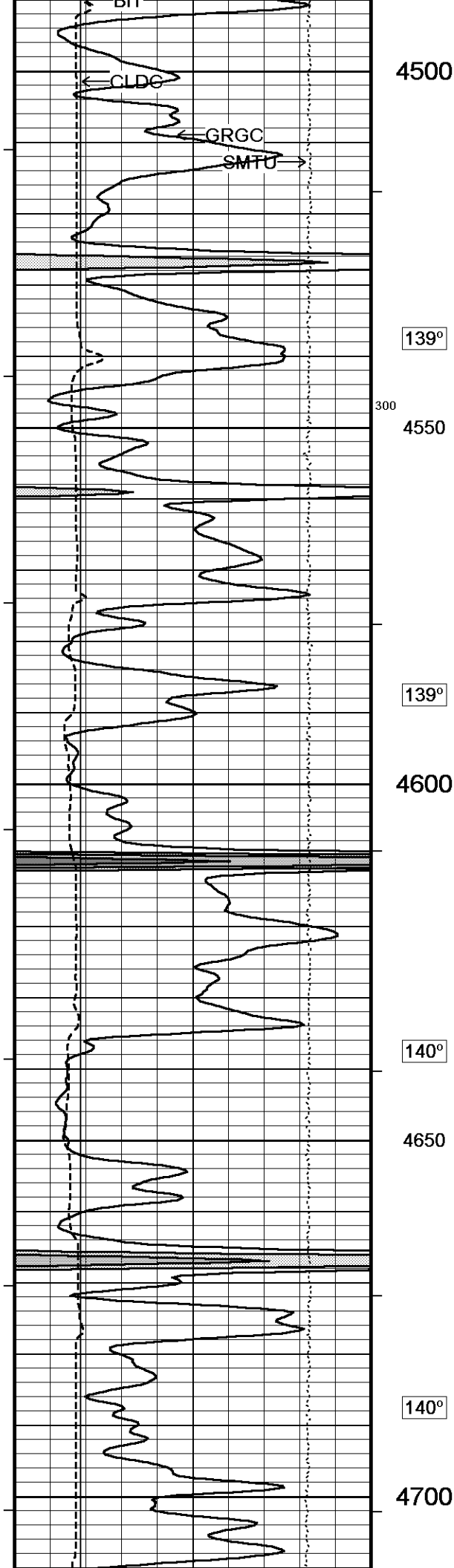
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

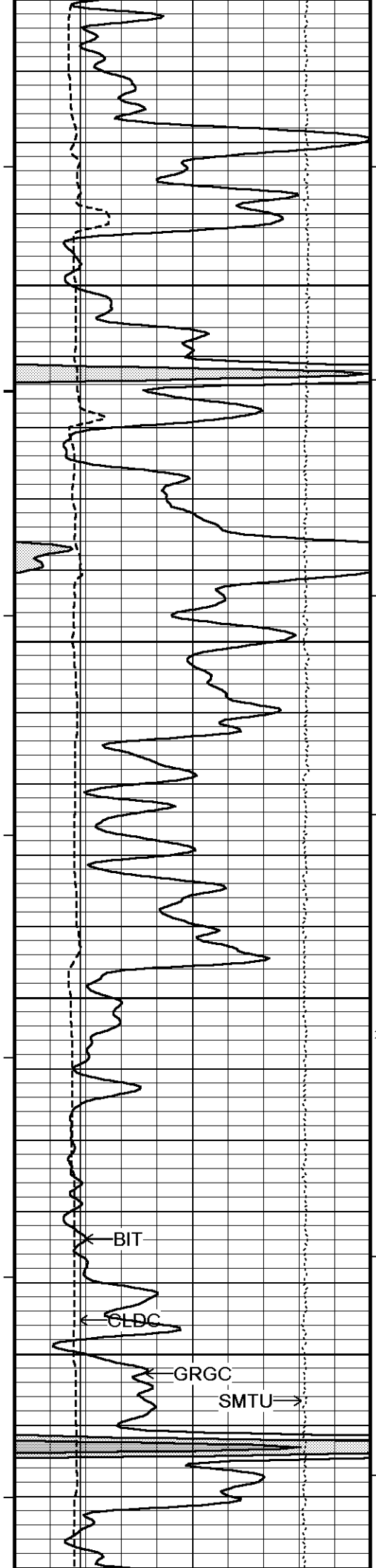
Recorded on 20-AUG-2014 00:21

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH LIMESTONE MAIN - ANHYDRITE SECTION







140°

4750

141°

4800

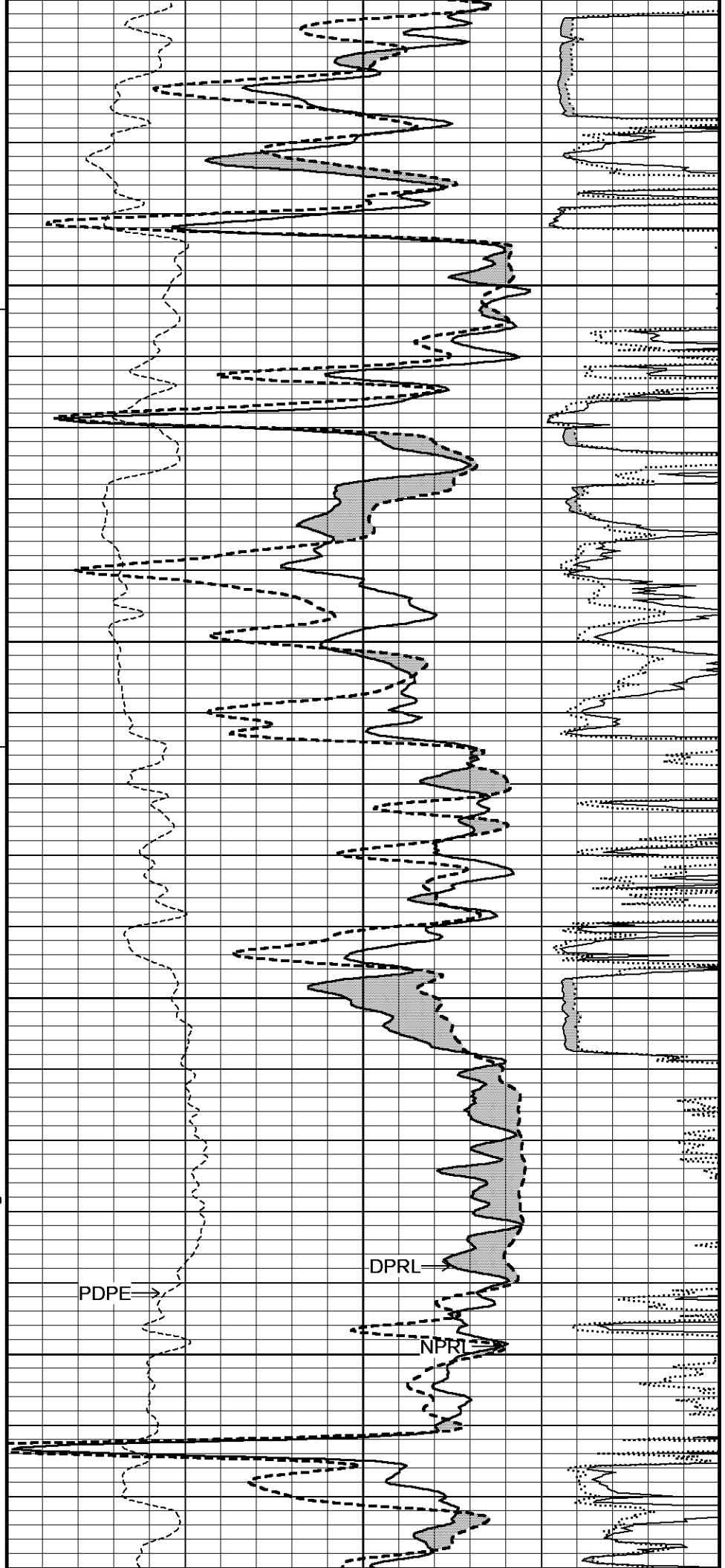
141°

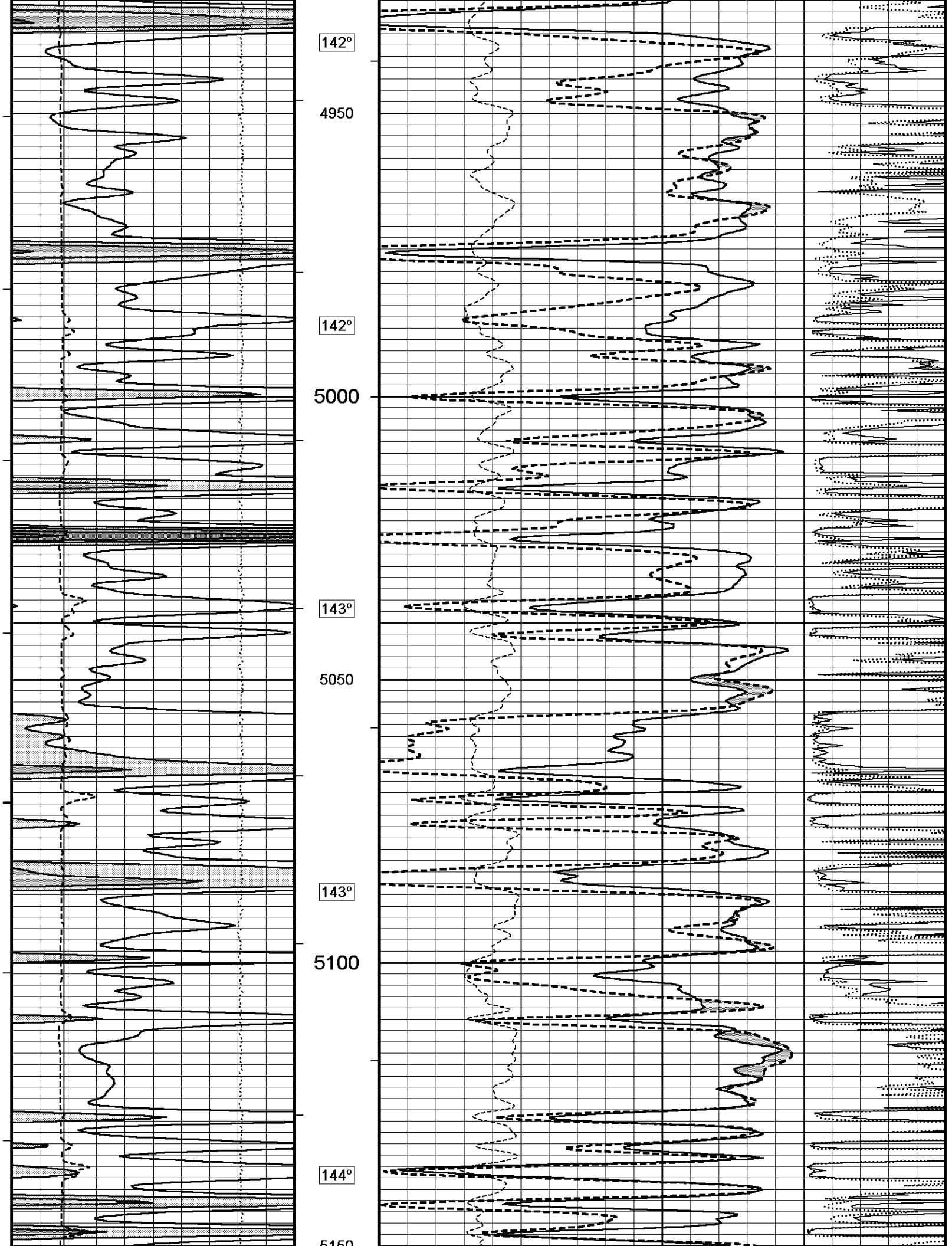
4850

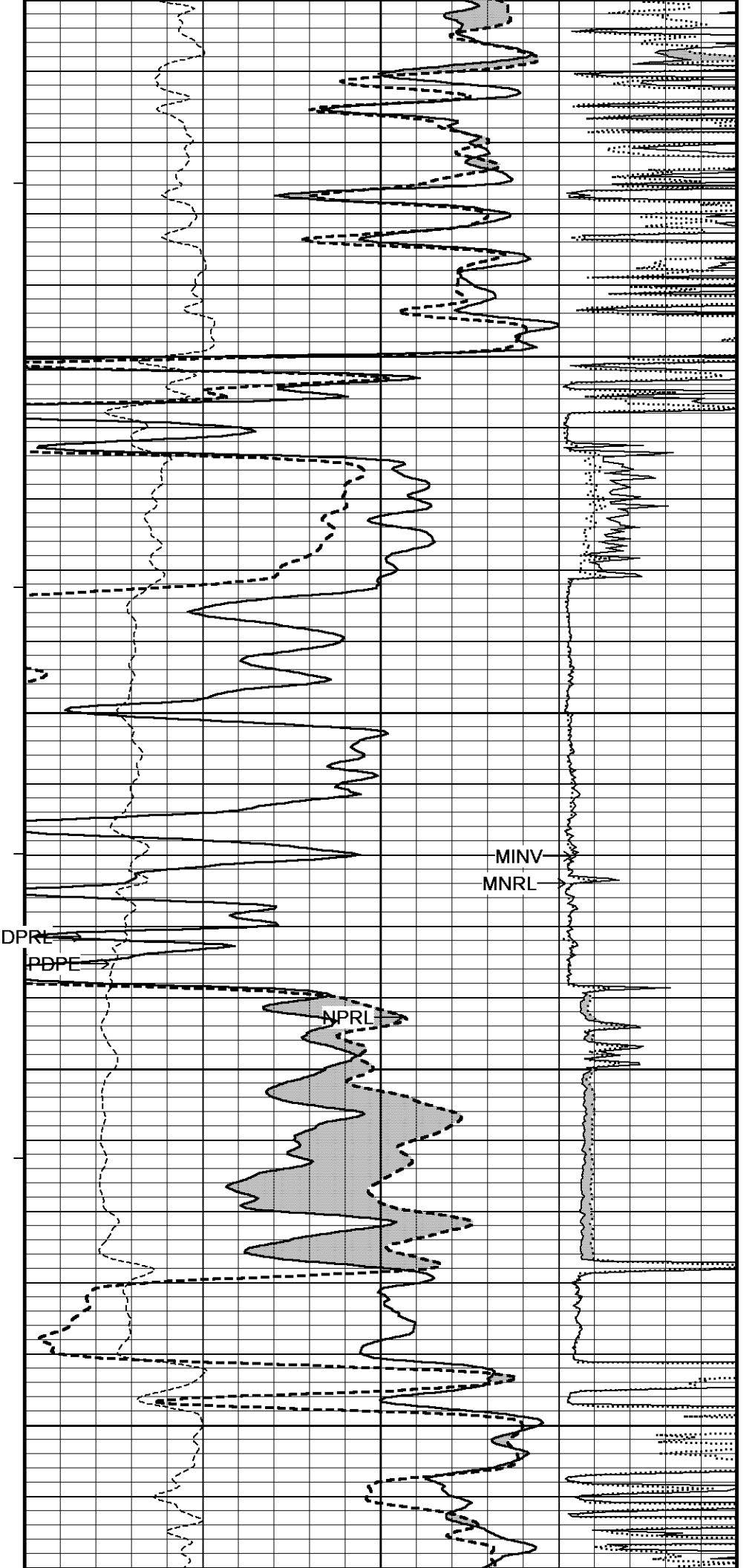
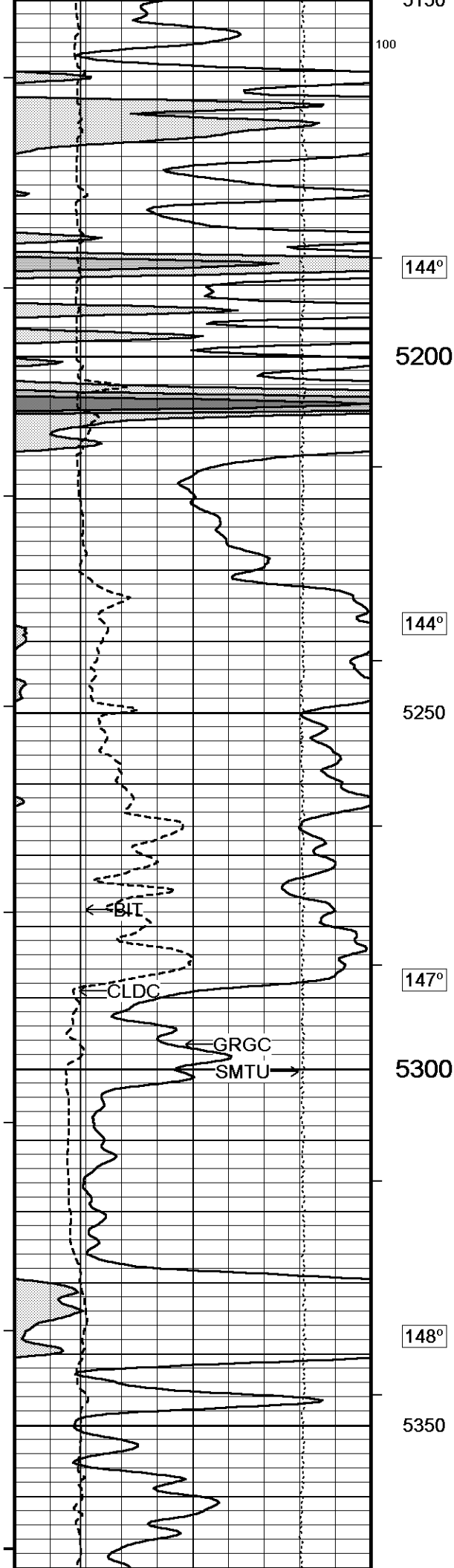
200

142°

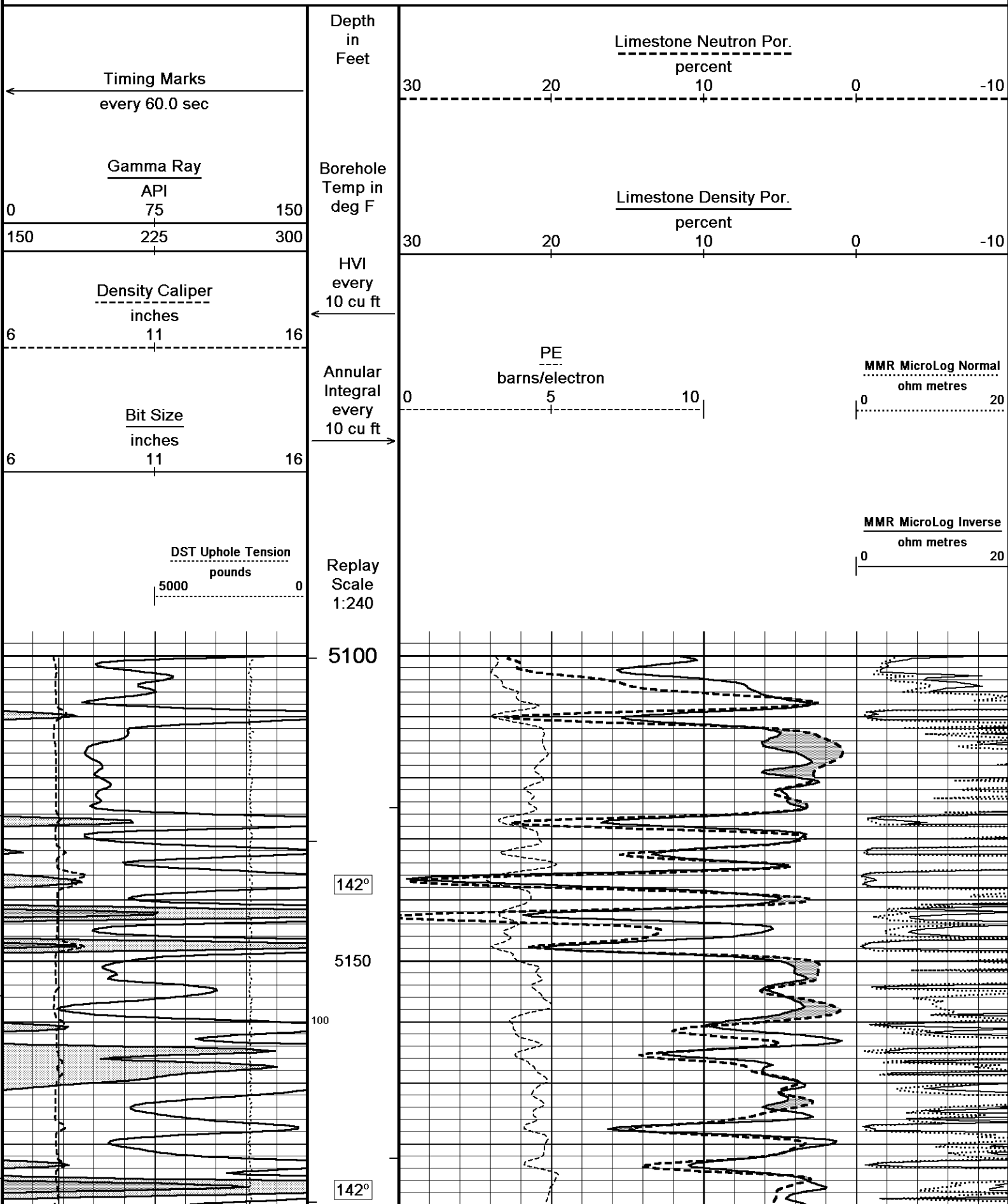
4900

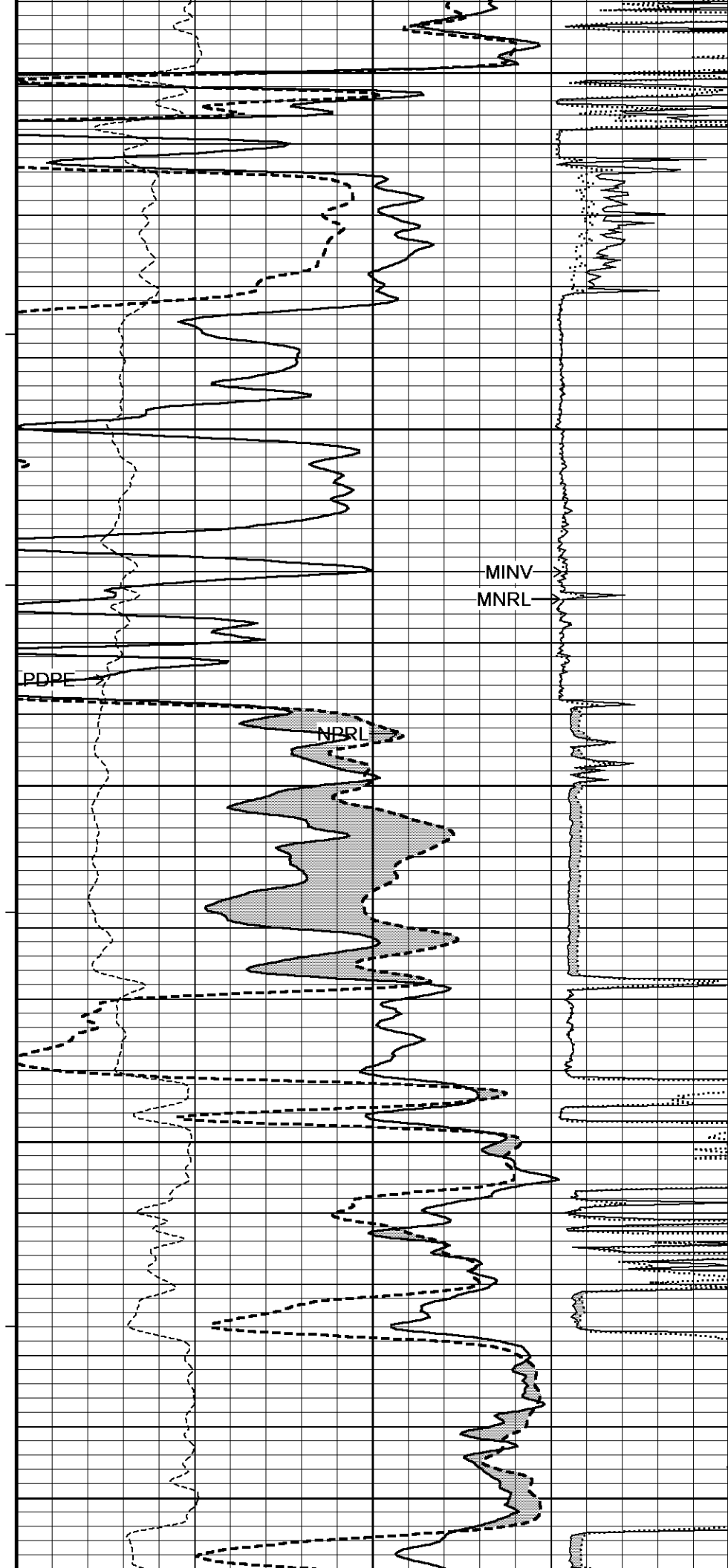
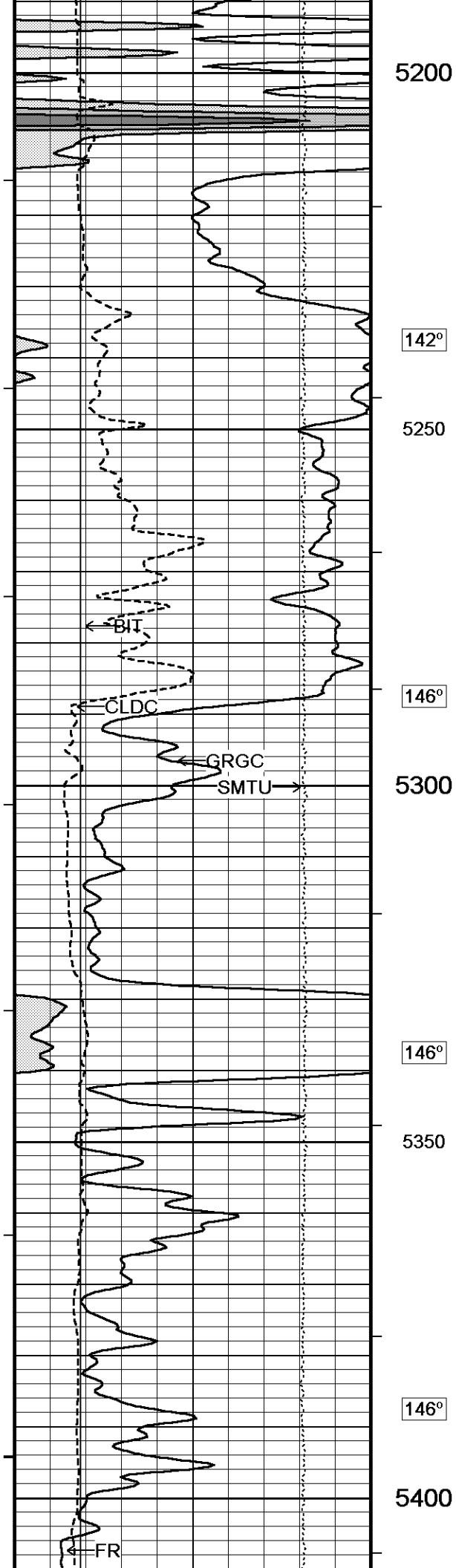


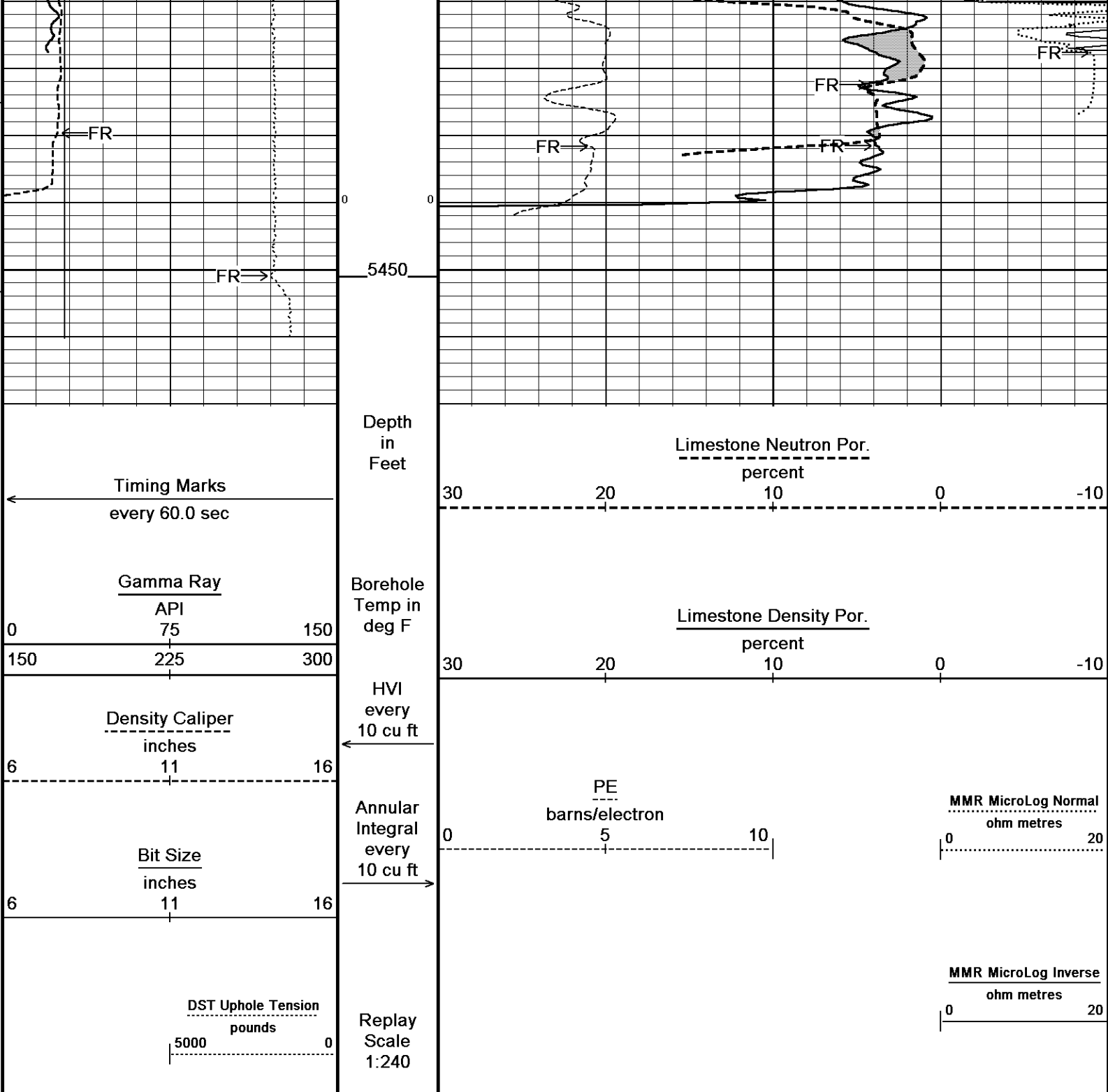




<div style="text-align: center;">↓</div> <h2 style="margin: 0;">REPEAT SECTION</h2> <div style="text-align: center;">↓</div>	<div>Depth Based Data - Maximum Sampling Increment 10.0cm</div> <div>Plotted on 20-AUG-2014 03:51</div> <div>Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Repeat.dta</div> <div>Recorded on 19-AUG-2014 23:43</div> <div>System Versions: Logged with 13.08.2113 Plotted with 13.08.2113</div>
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Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Repeat.dta
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

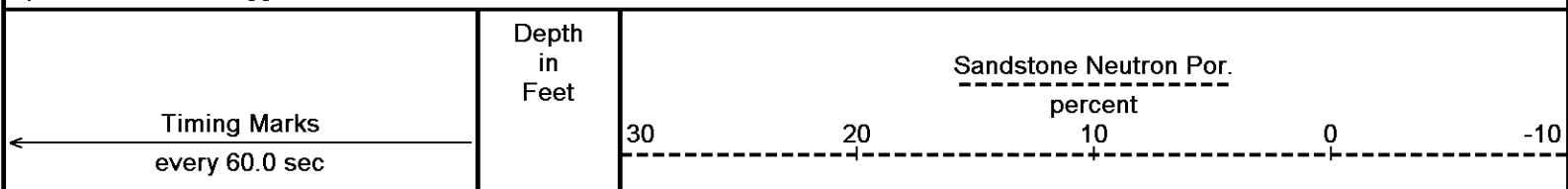
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Recorded on 19-AUG-2014 23:43

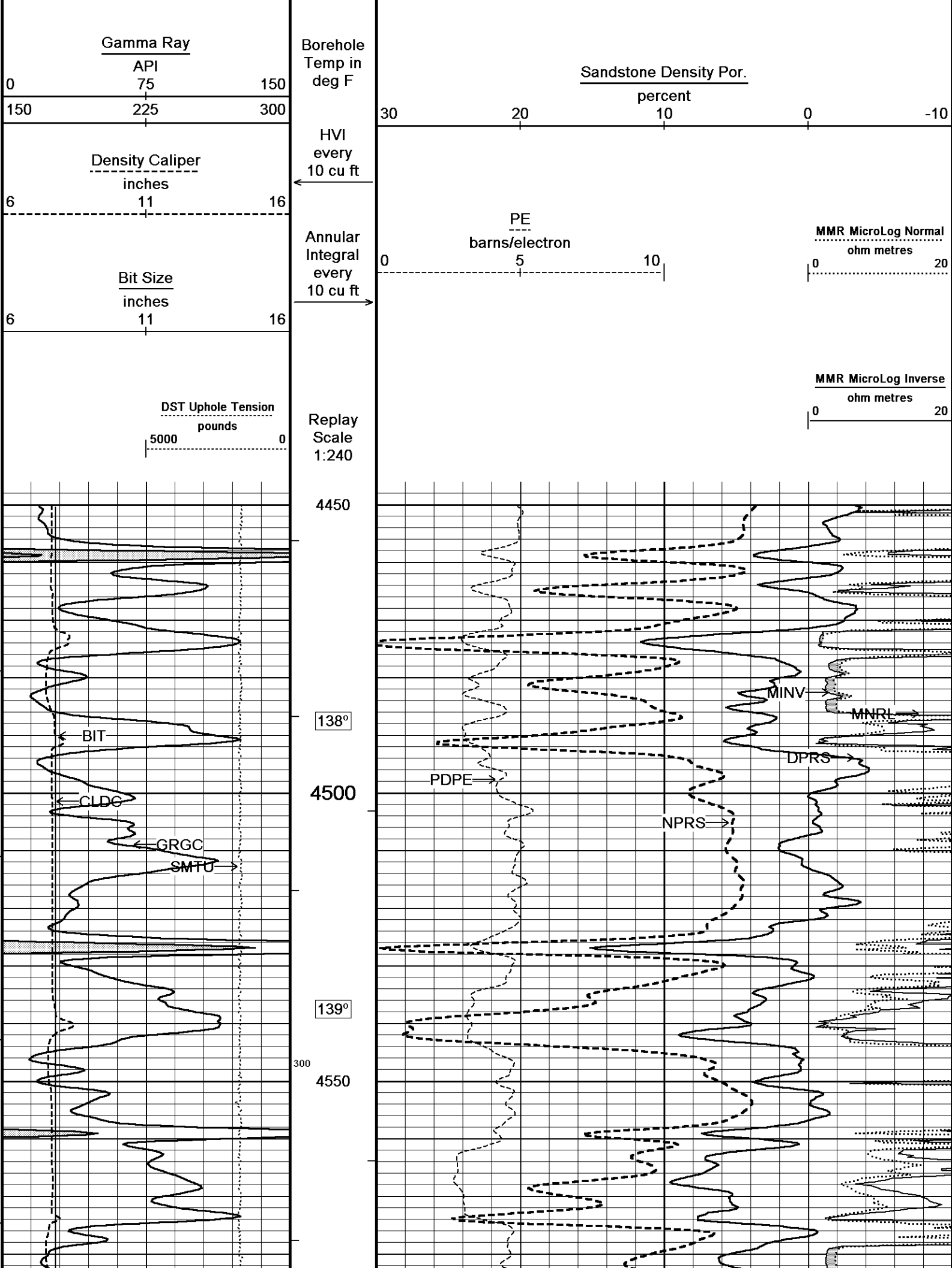
↑ REPEAT SECTION ↑

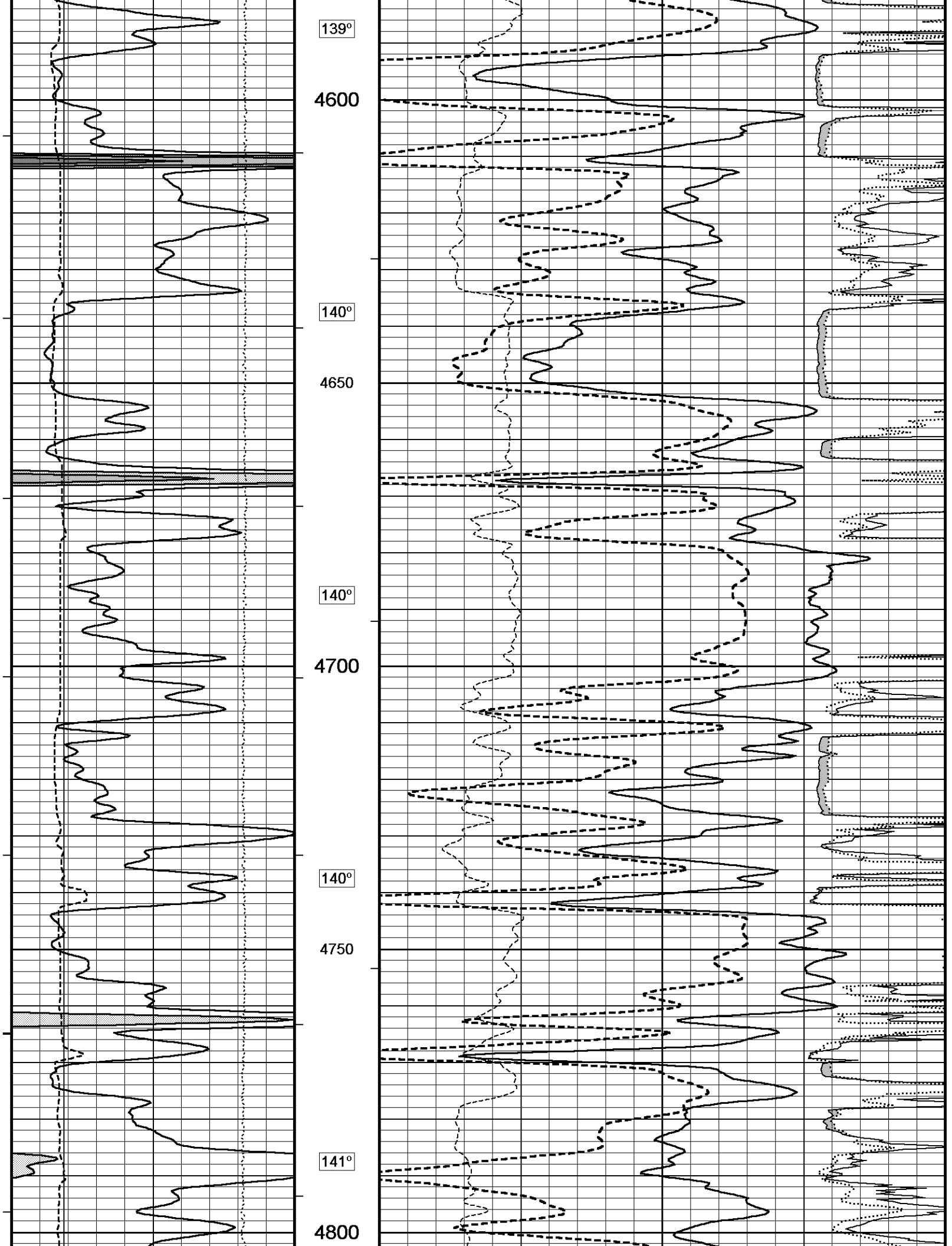
↓ 5 INCH SANDSTONE MAIN ↓

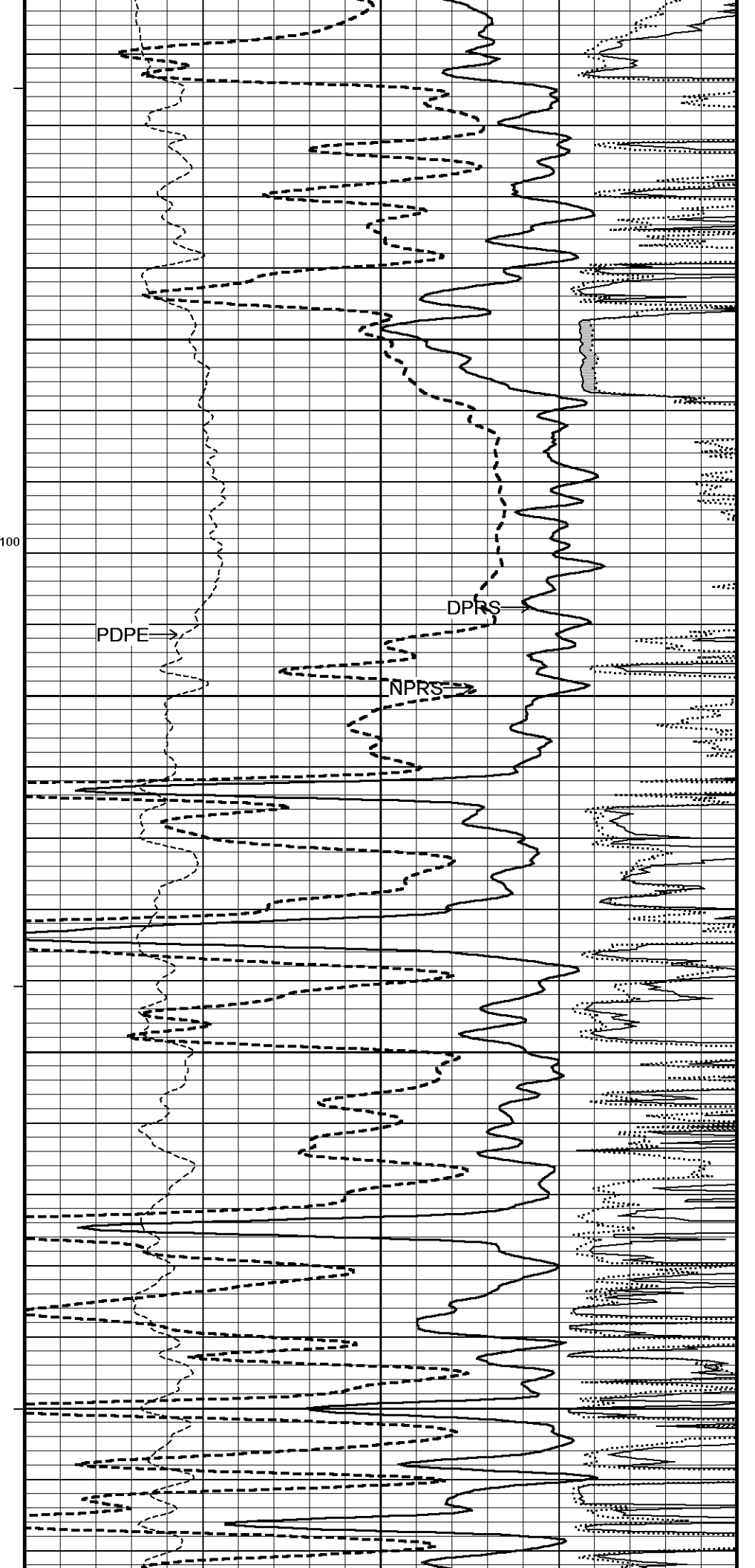
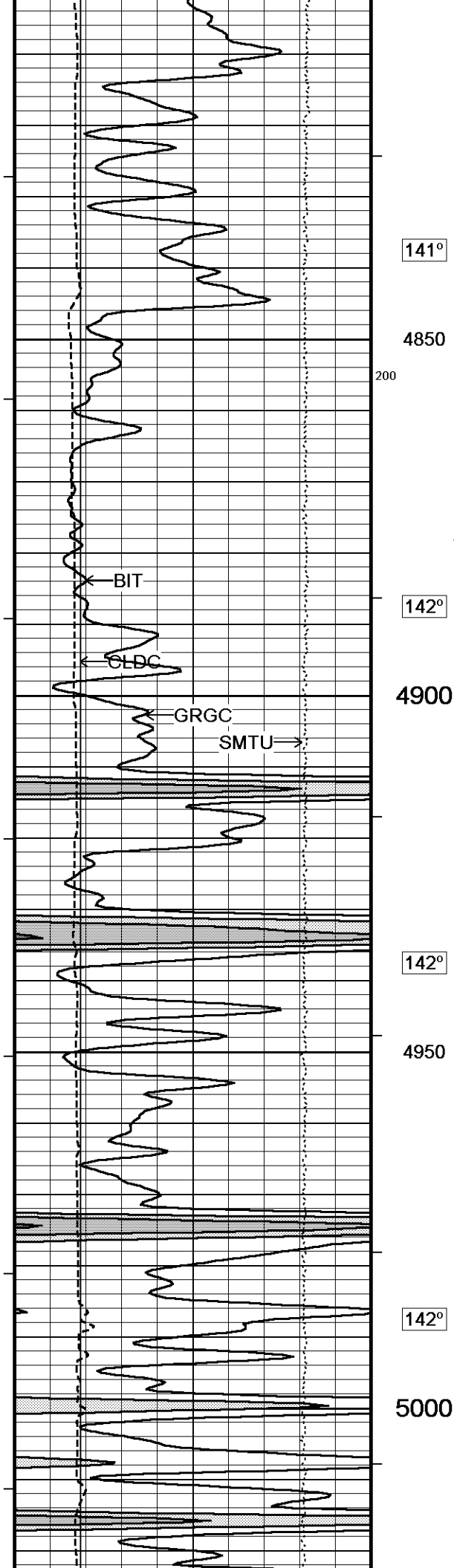
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

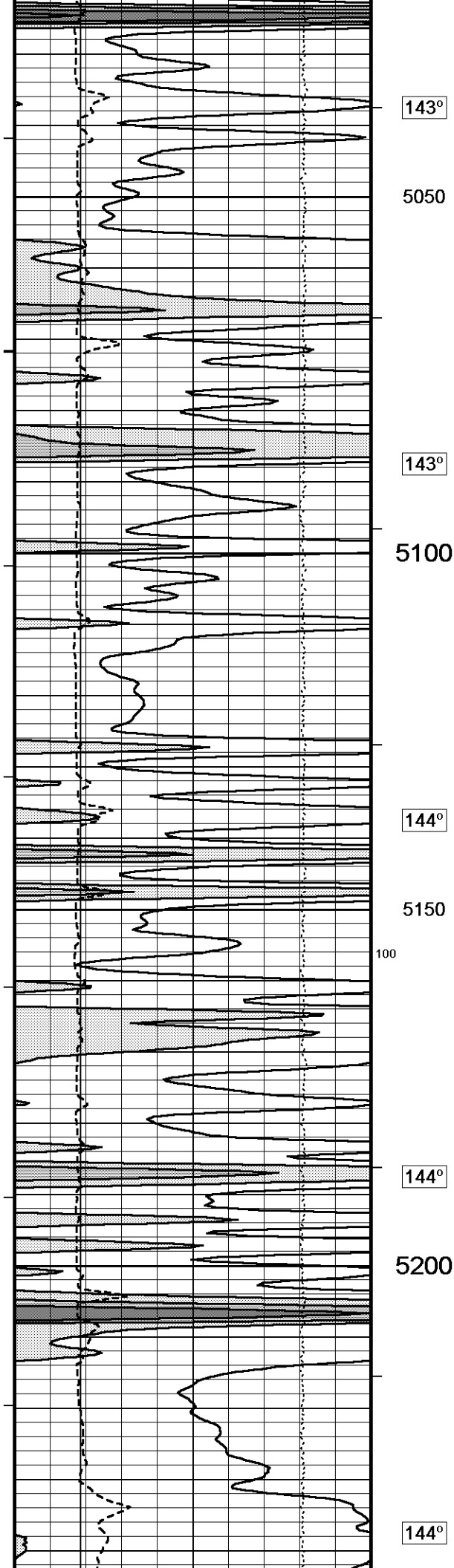
Plotted on 20-AUG-2014 03:51
Recorded on 20-AUG-2014 00:21











143°

5050

143°

5100

144°

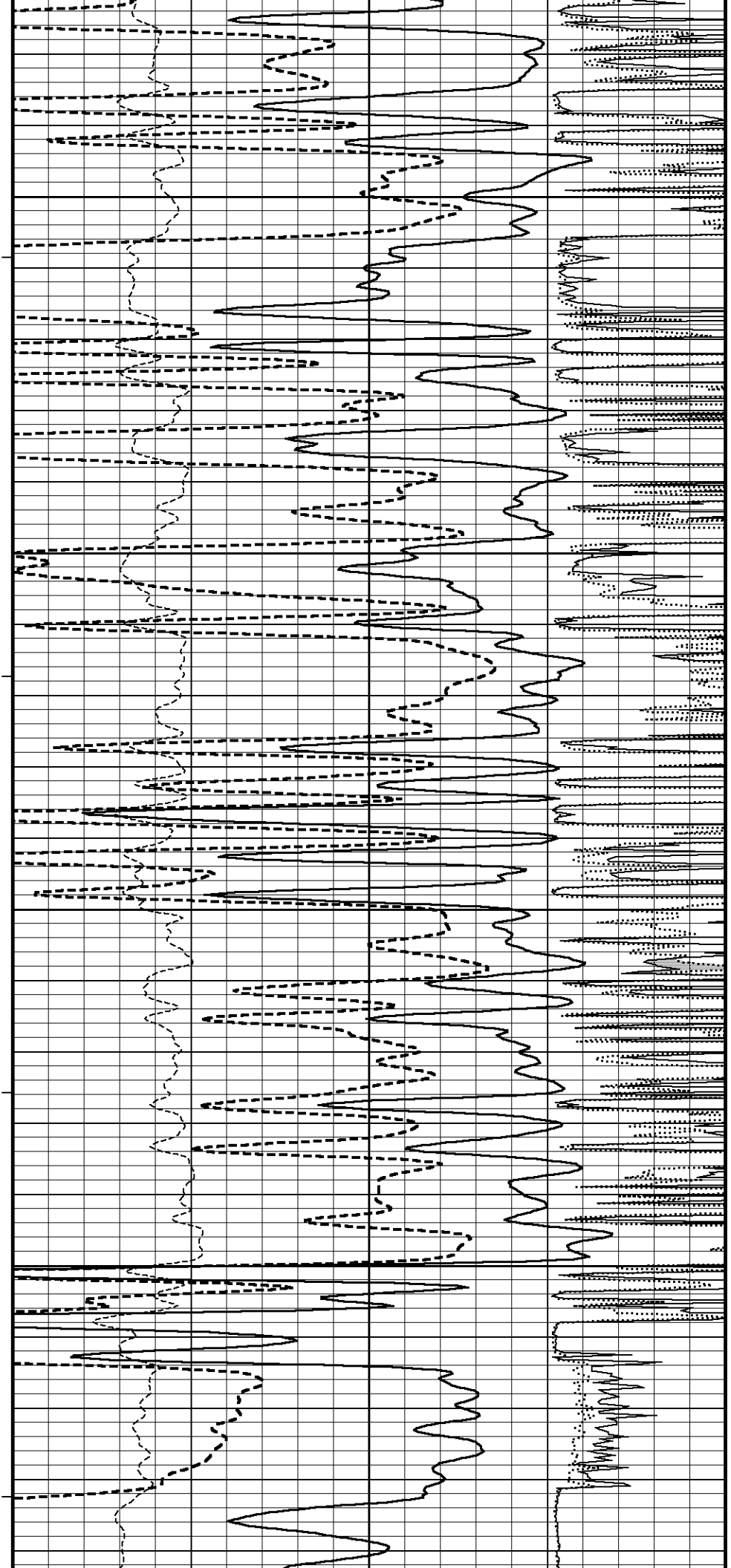
5150

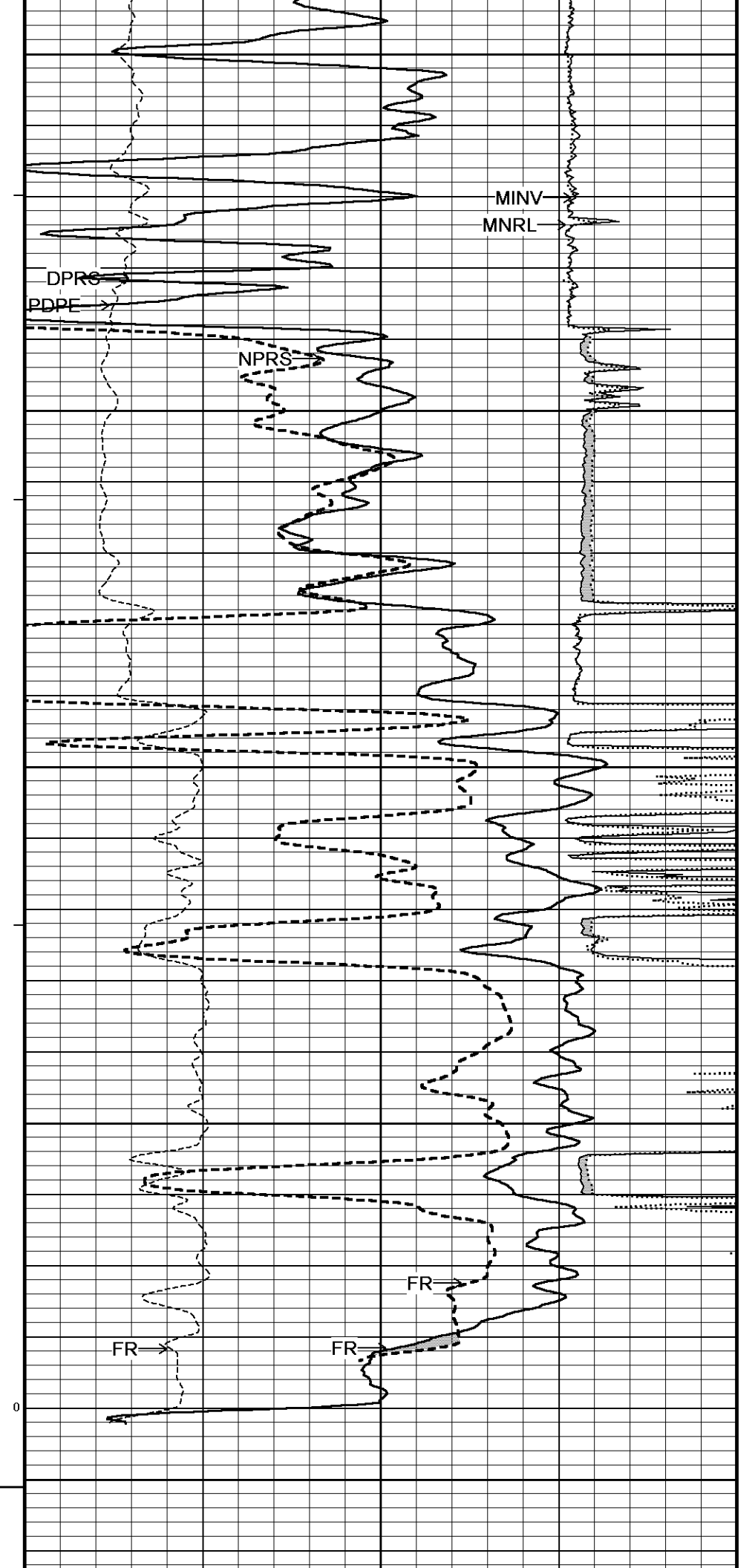
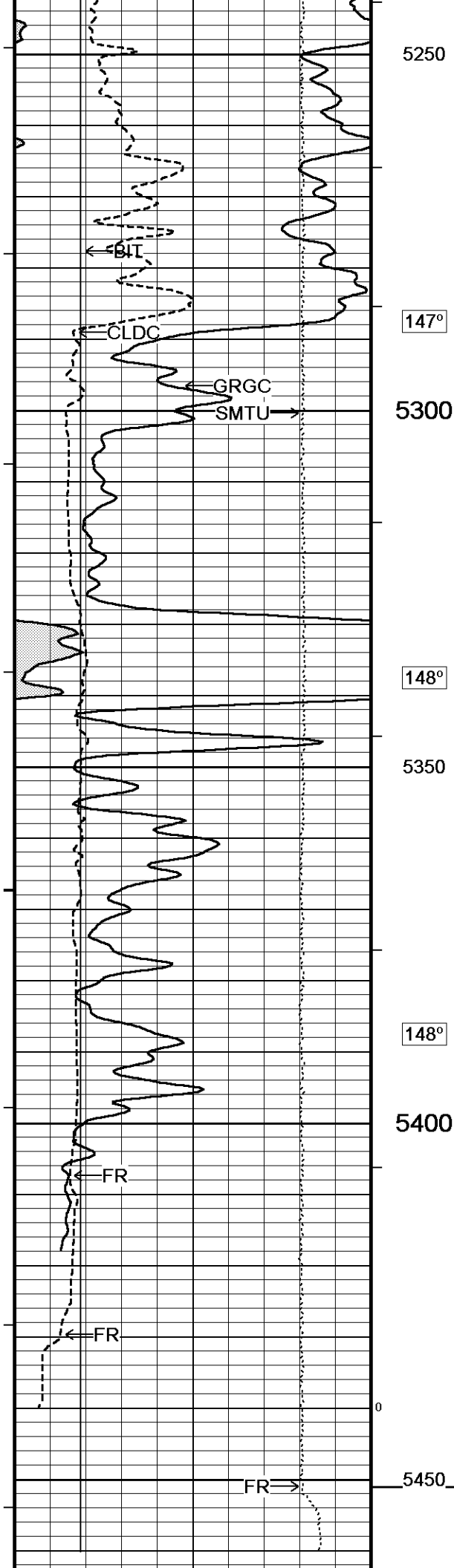
100

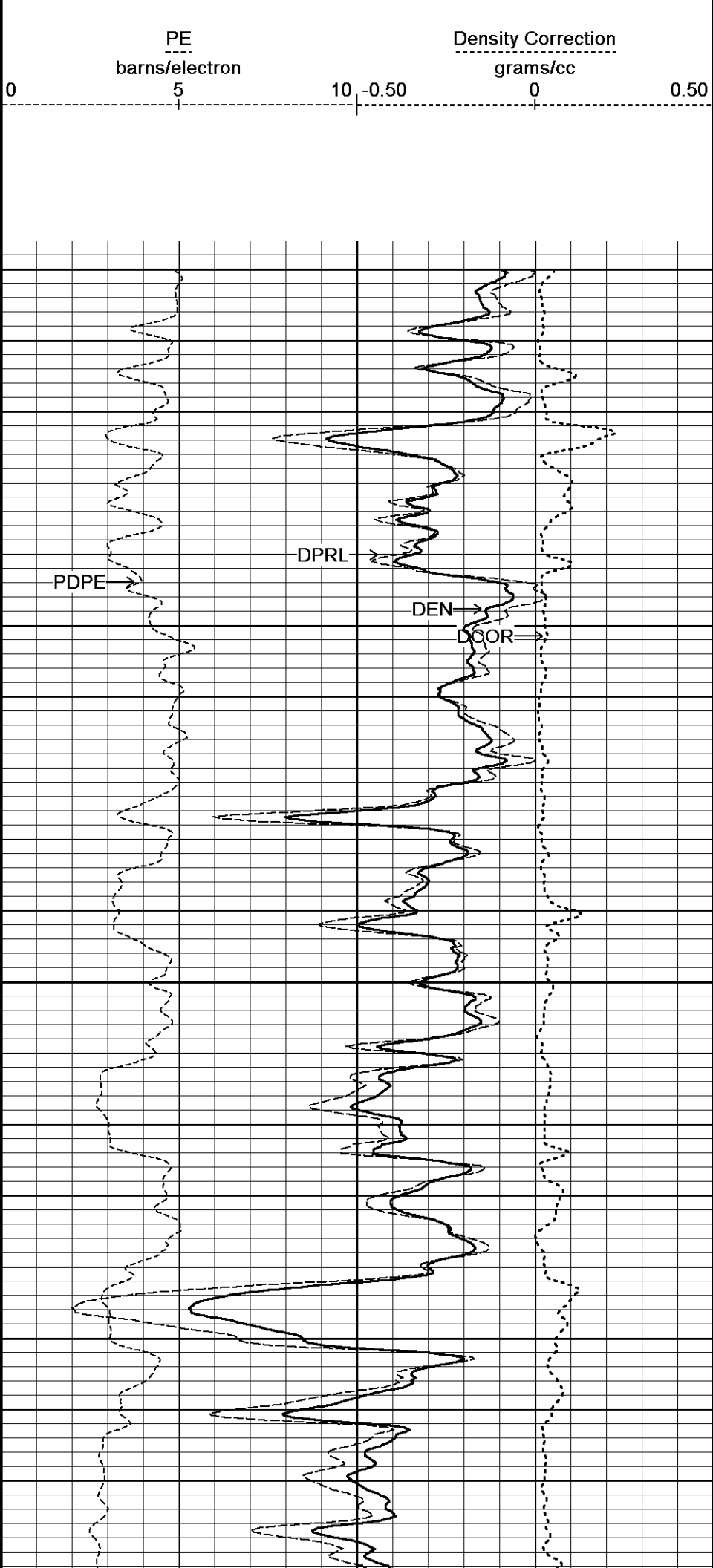
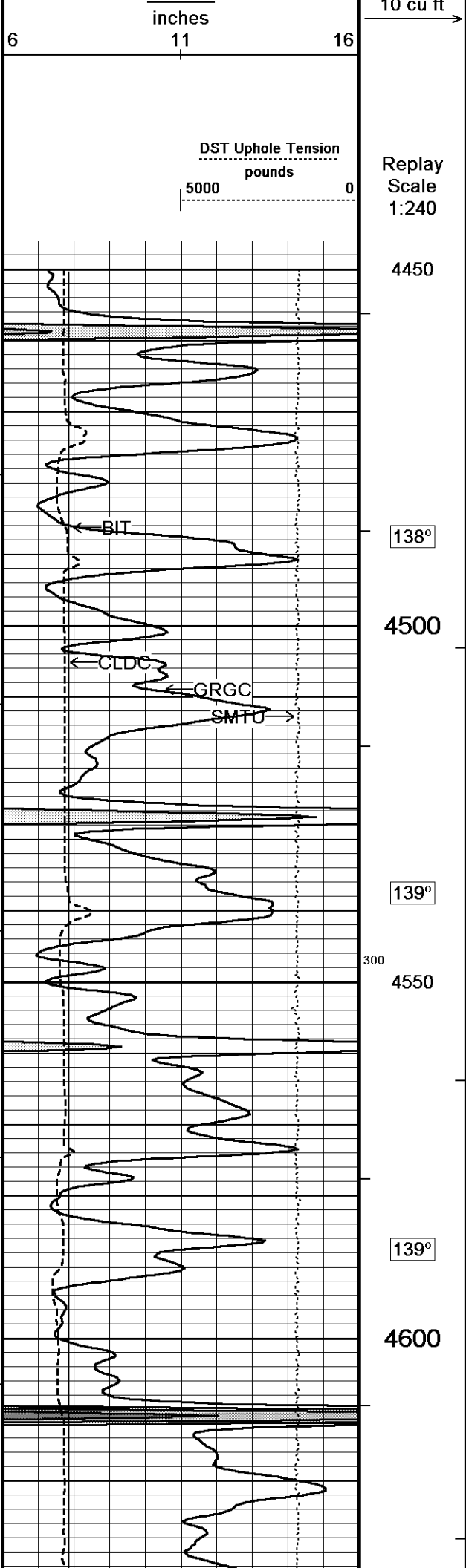
144°

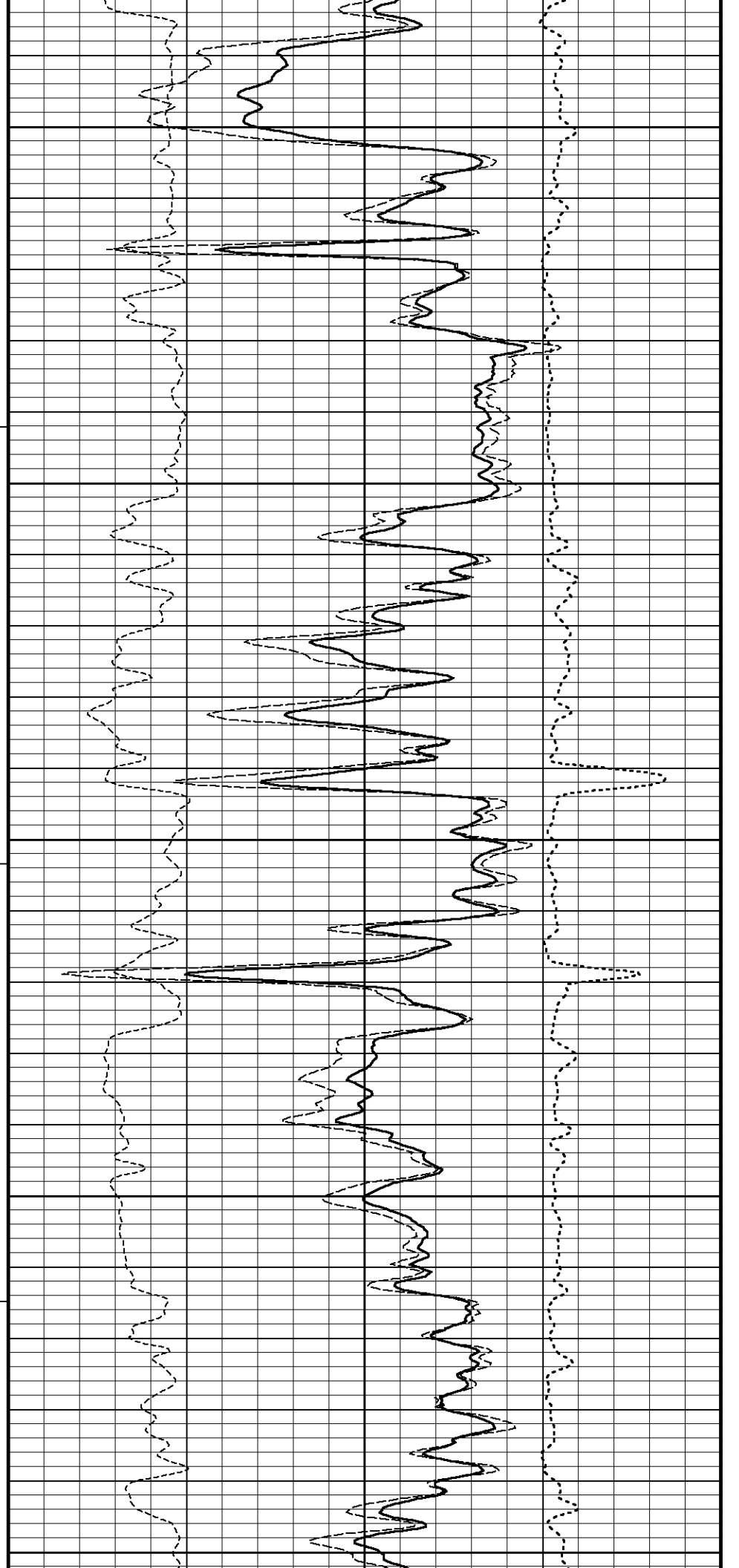
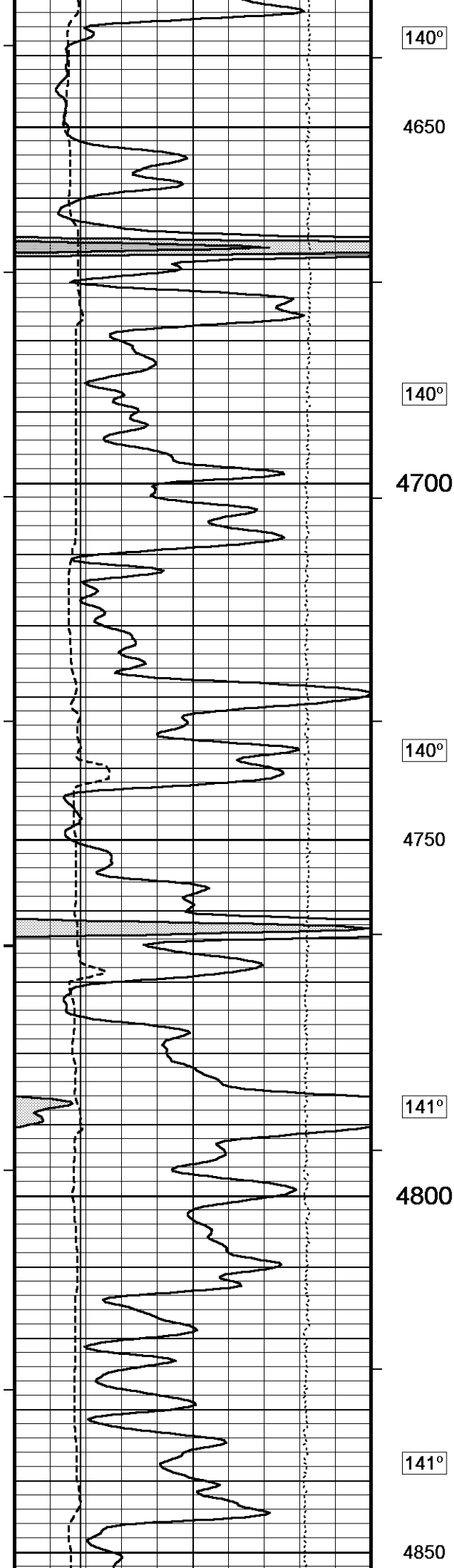
5200

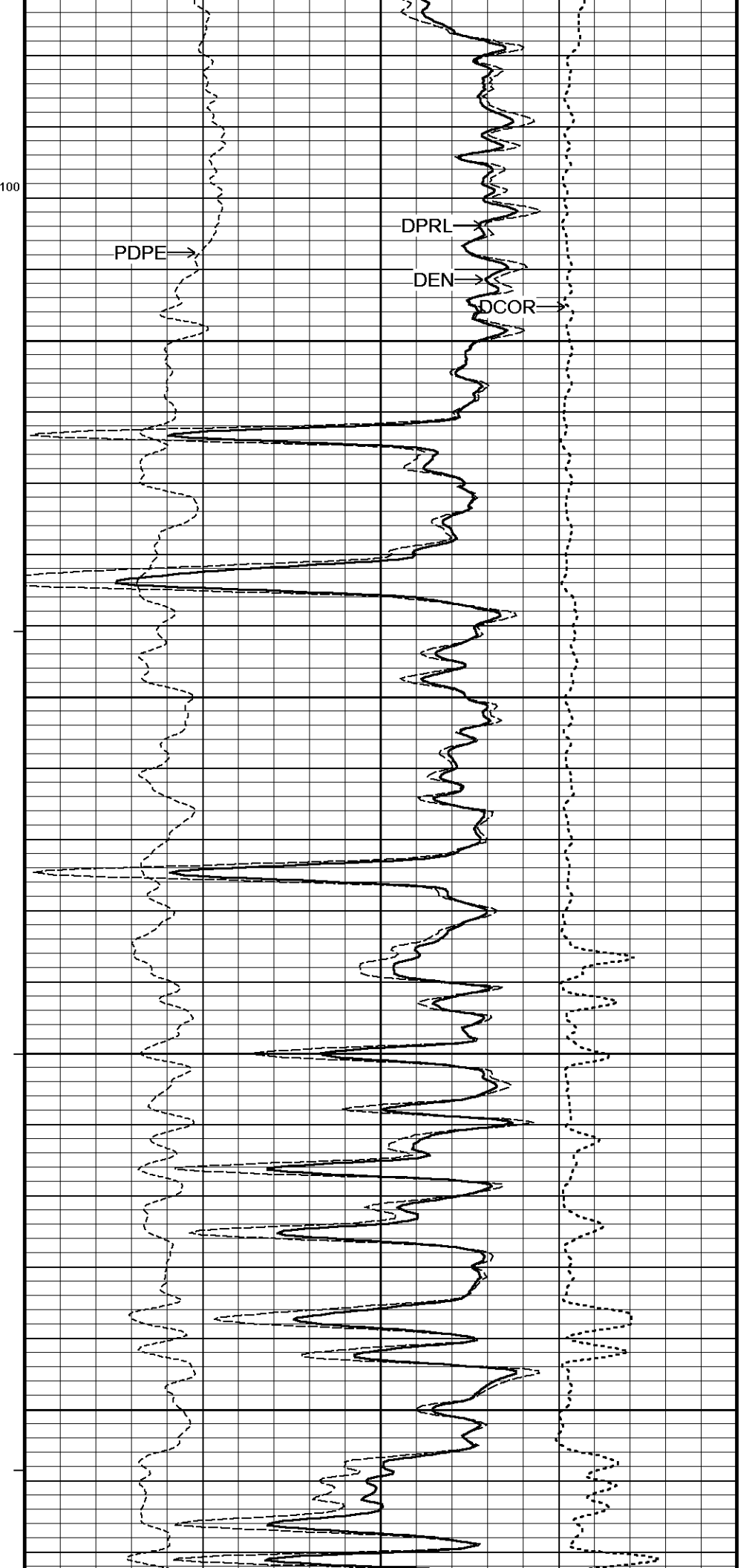
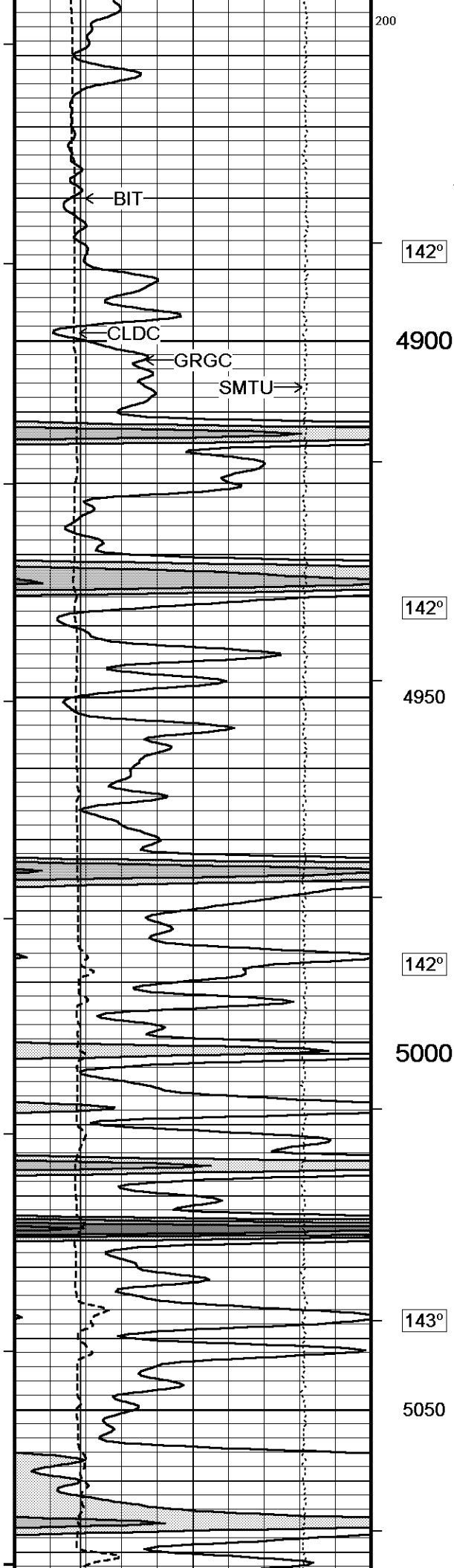
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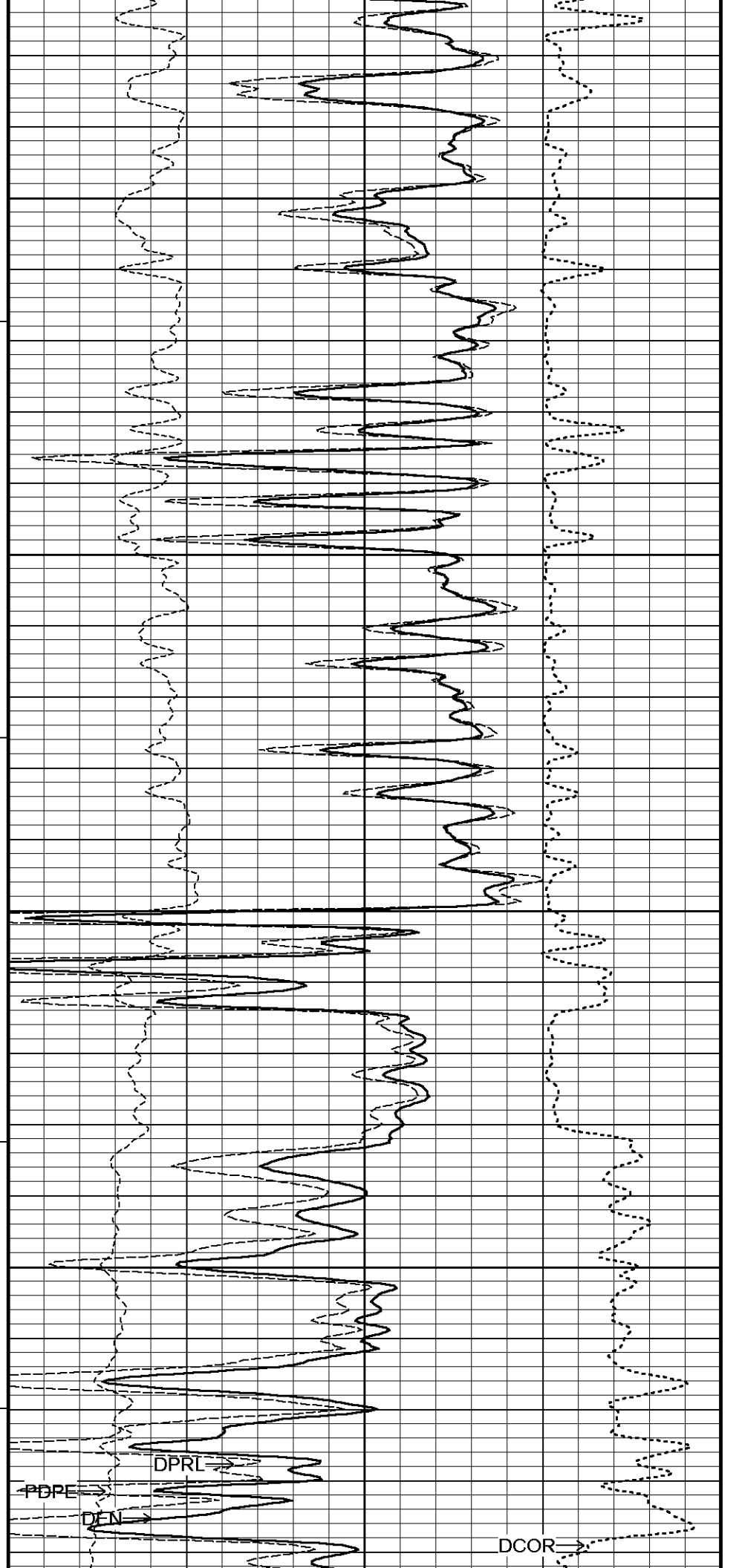
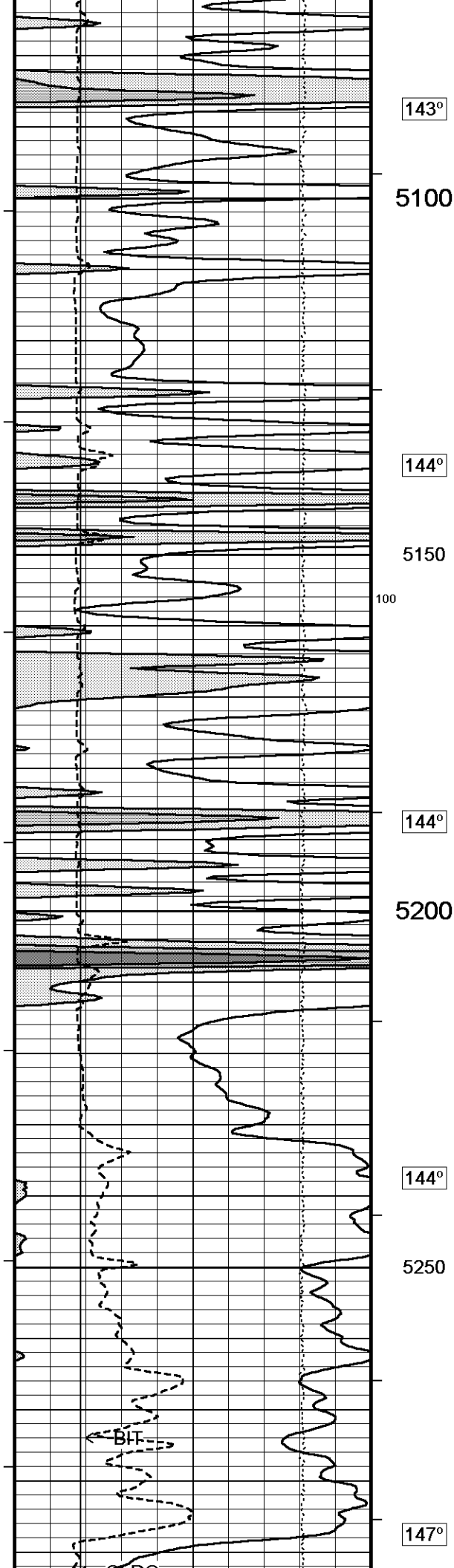


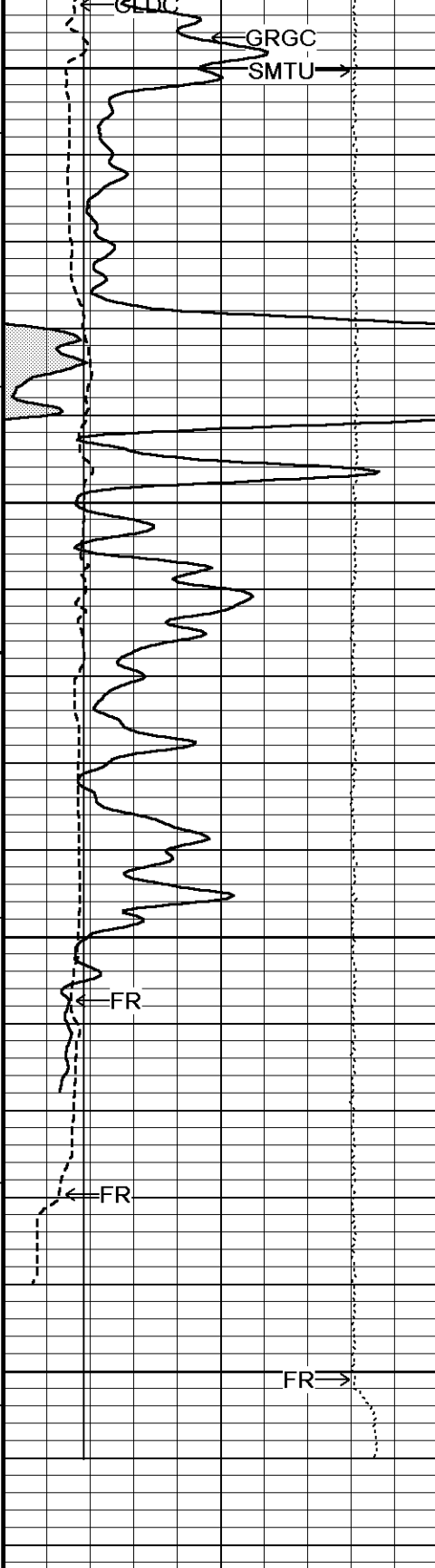












5300

148°

5350

148°

5400

FR

FR

FR

0

5450

Depth
in
Feet

Timing Marks
every 60.0 sec

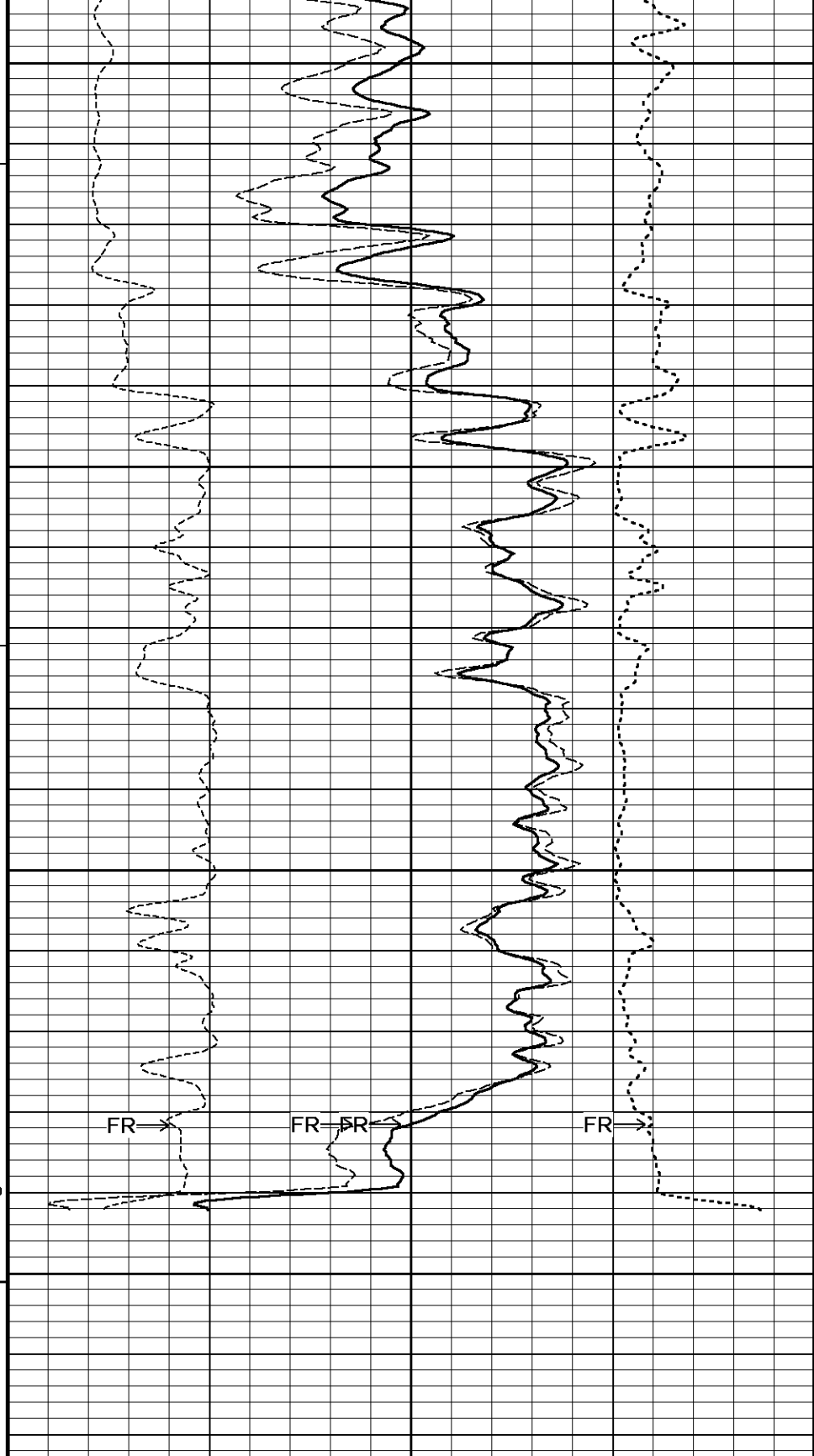
Gamma Ray

API

0 75 150

150 225 300

Borehole
Temp in
deg F



Compensated Density

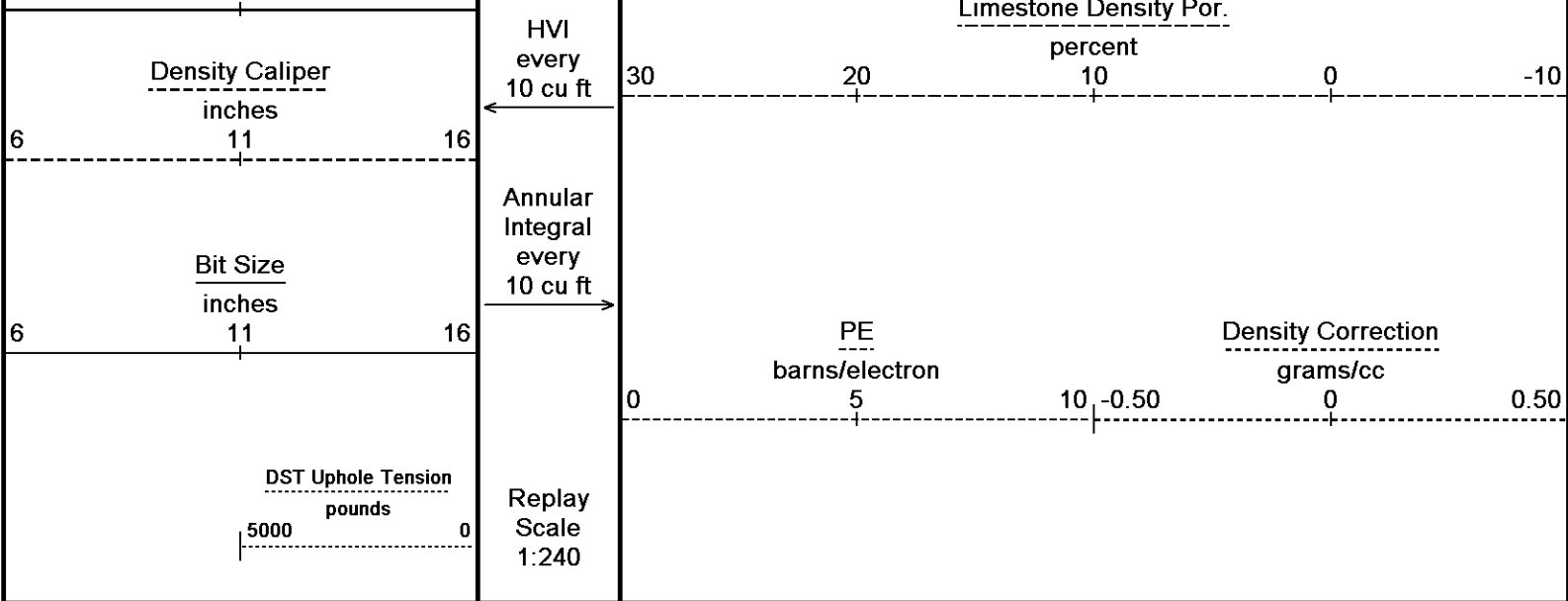
grams/cc

2 2.25 2.50 2.75 3

FR

FR

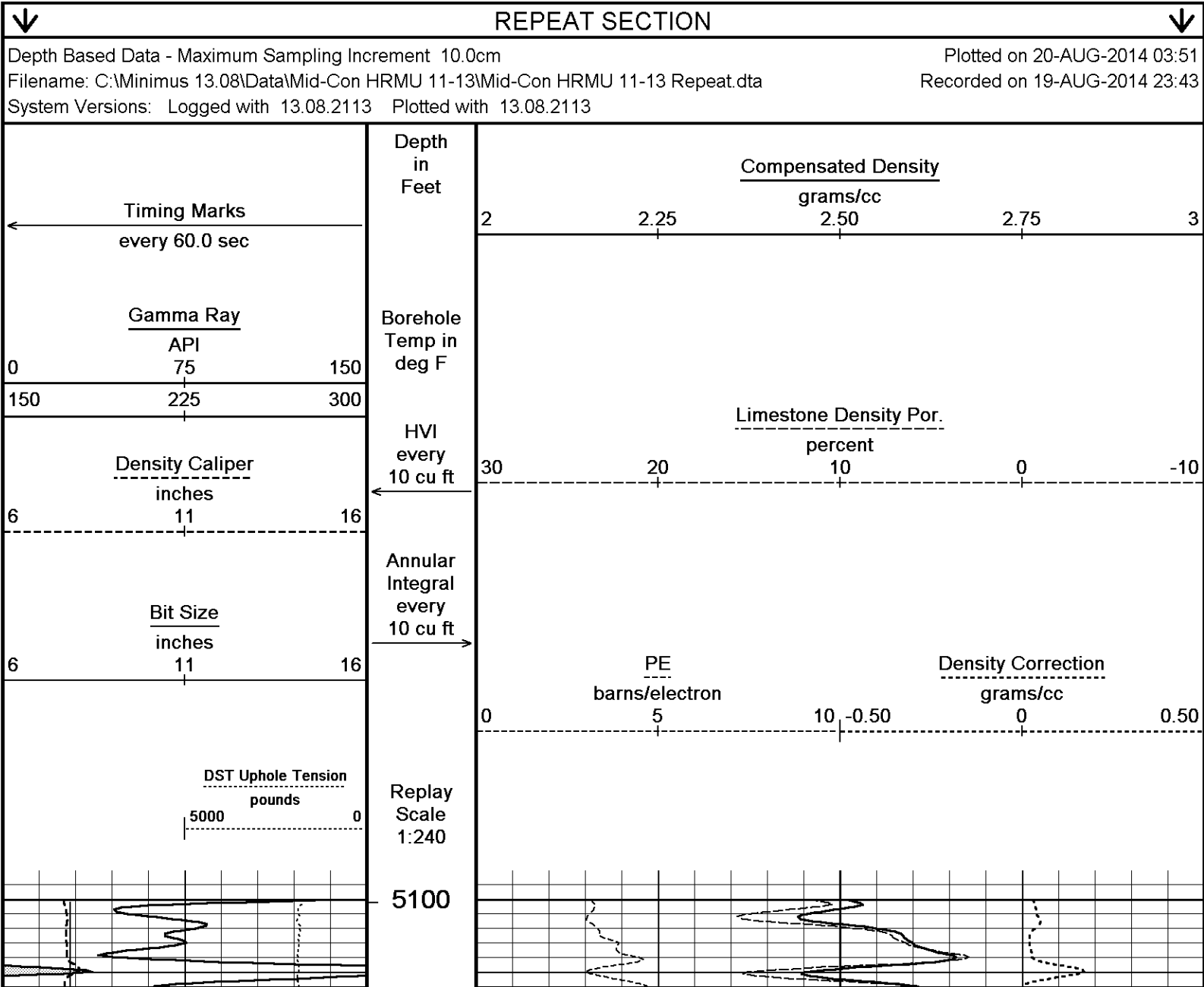
FR

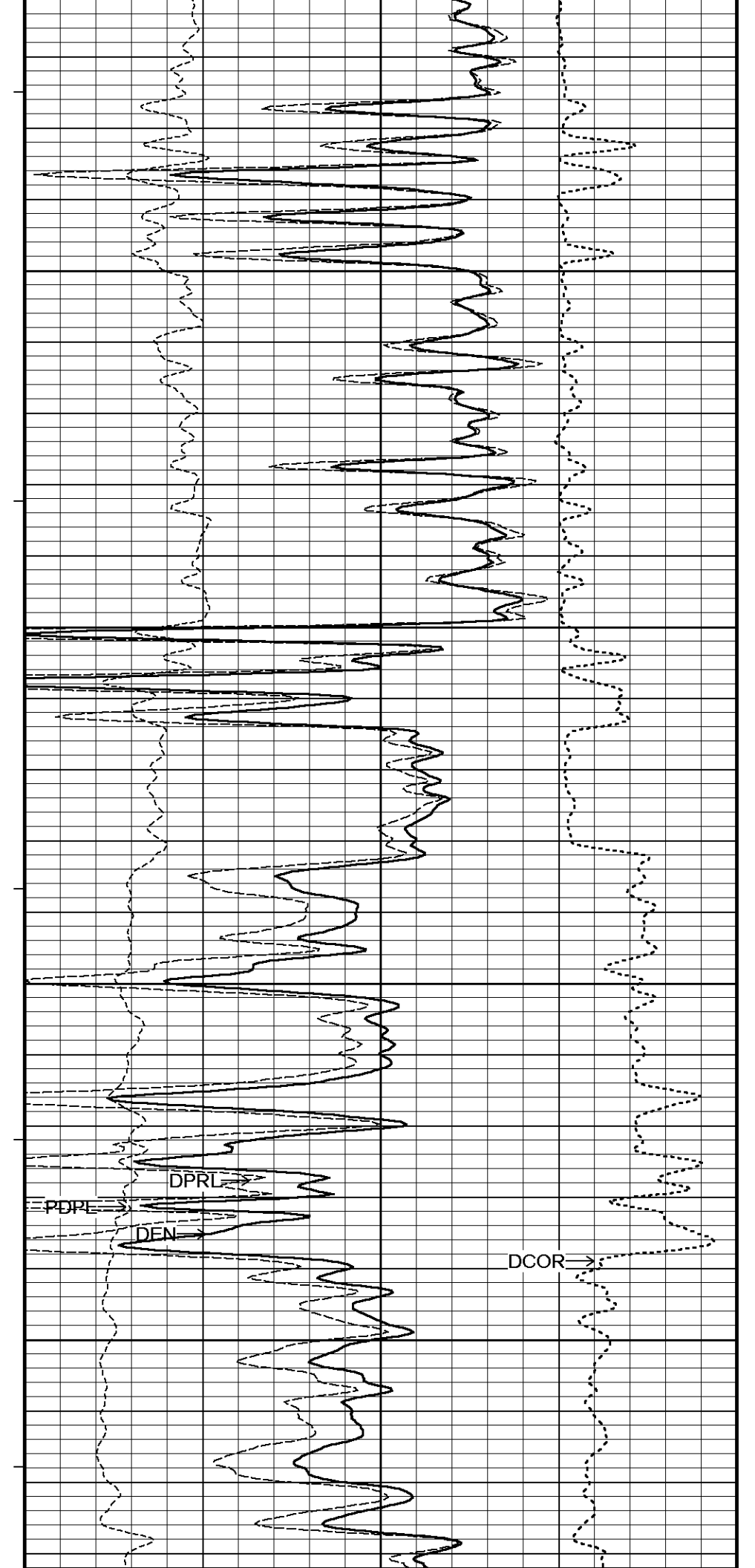
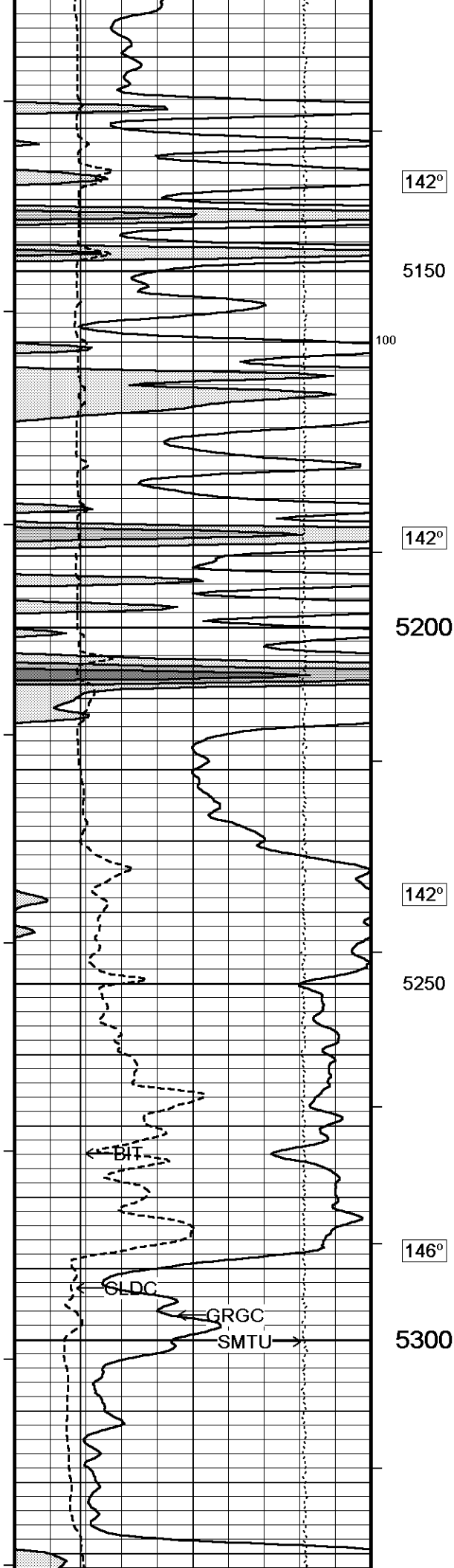


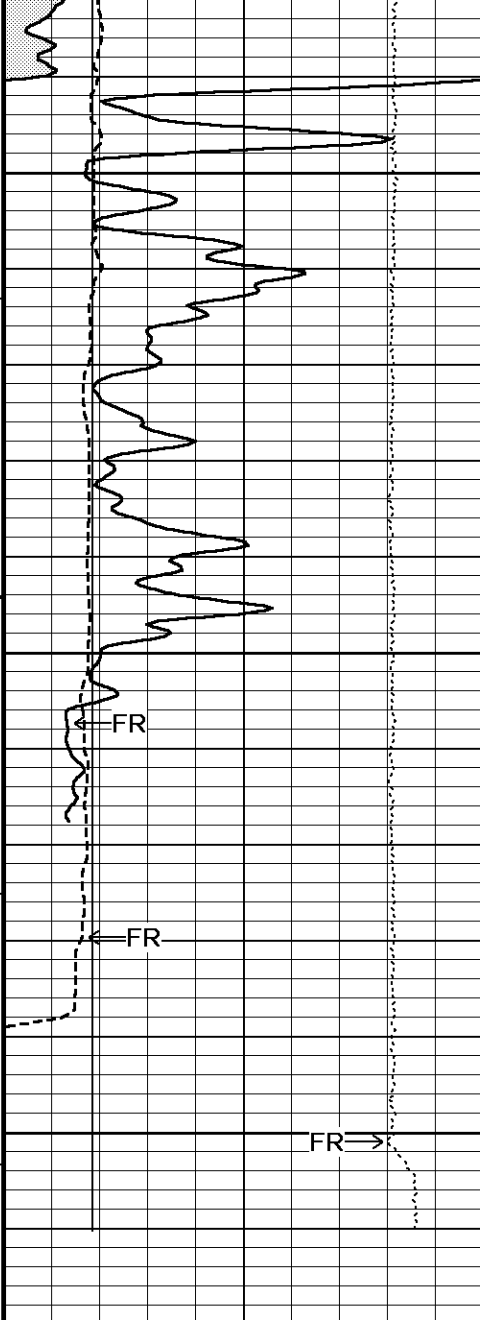
Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Plotted on 20-AUG-2014 03:51
 Recorded on 20-AUG-2014 00:21

↑
5 INCH BULK DENSITY MAIN
↑







146°

5350

146°

5400

FR

FR

FR

5450

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray

API

75

0 150

150 225 300

Borehole
Temp in
deg F

Density Caliper
inches

11

6 16

HVI
every
10 cu ft

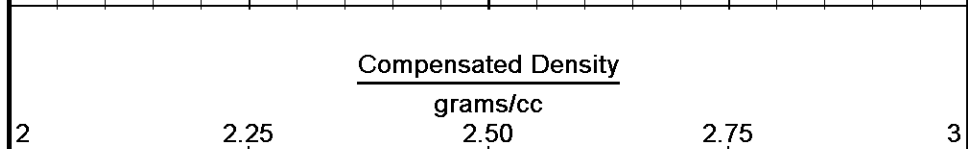
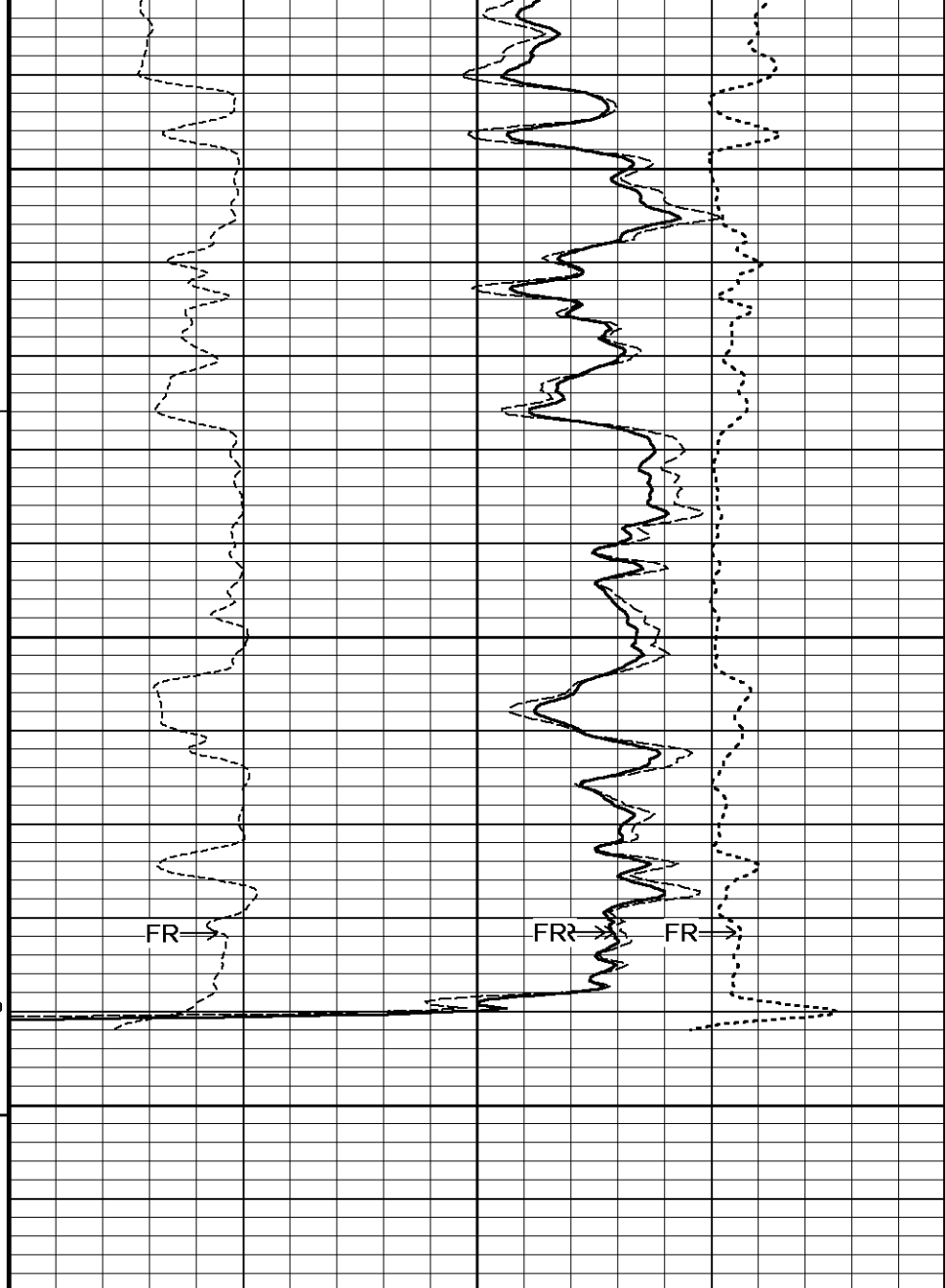
Bit Size

inches

11

6 16

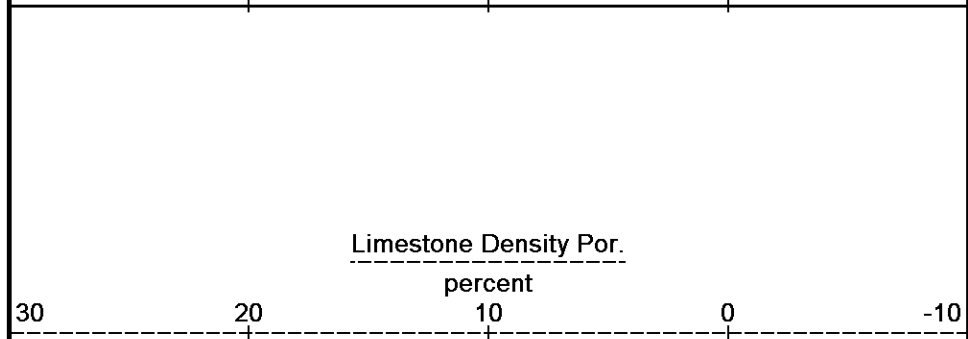
Annular
Integral
every
10 cu ft



Compensated Density

grams/cc

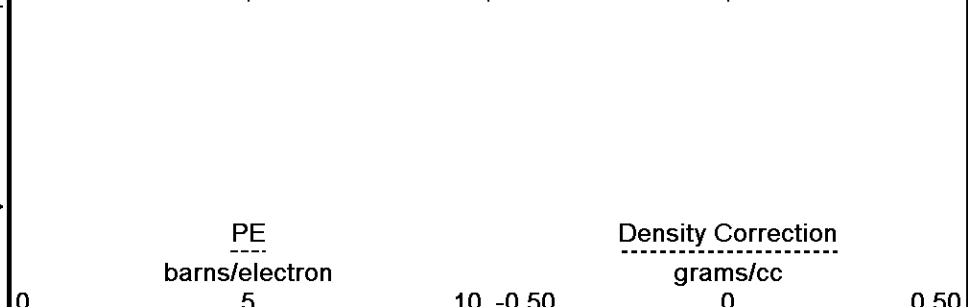
2 2.25 2.50 2.75 3



Limestone Density Por.

percent

30 20 10 0 -10



PE

barns/electron

Density Correction

grams/cc

0 5 10 -0.50 0 0.50

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 20-AUG-2014 03:51

Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Repeat.dta

Recorded on 19-AUG-2014 23:43

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113



REPEAT SECTION



BEFORE SURVEY CALIBRATION

C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

General Constants All 000

Last Edited on 19-AUG-2014,23:19

General Parameters

Mud Resistivity	1.120	ohm-metres
Mud Resistivity Temperature	75.000	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	0.610
RWA Constant M	2.150
SW/APOR Tool Source	0.000

High Resolution Temperature Calibration MCG-D.K 443

Field Calibration on 05-MAR-2014,20:50

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-D.K 443

Last Edited on 22-JUL-2014,11:40

Pre-filter Length	11
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Gamma Calibration MCG-D.K 443

Field Calibration on 19-AUG-2014 11:53

	Measured	Calibrated (API)
Background	70	46
Calibrator (Gross)	1164	771
Calibrator (Net)	1094	725

Gamma Constants MCG-D.K 443

Last Edited on 19-AUG-2014,20:55

Gamma Calibrator Number	GRC38	
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	%

Caliper Calibration MPD-B 104

Base Calibration on 12-AUG-2014 21:09

Field Calibration on 19-AUG-2014 11:36

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	12248	3.99
2	21021	5.98
3	20010	7.07

3	29619	7.97
4	37847	9.86
5	46921	11.92
6	N/A	N/A

Field Calibration

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

Photo Density Calibration MPD-B 104

Base Calibration on 12-AUG-2014 21:27
Field Check on 19-AUG-2014 11:41

Density Calibration

Base Calibration

	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1200	1392		
Reference 1	43233	21553	59556	30836
Reference 2	17877	2370	24941	2541

Field Check at Base

1200.4	1392.3
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Field Check

1195.7	1391.2
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PE Calibration

Base Calibration

	WS	Measured		Calibrated
		WH	Ratio	Ratio
Background	220	1078		
Reference 1	18382	43065	0.433	0.371
Reference 2	5186	17746	0.298	0.272

Field Check at Base

219.8	1078.1
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Field Check

218.0	1072.1
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Density Constants MPD-B 104

Last Edited on 19-AUG-2014,20:55

Density Source Id	254
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\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in



43.50 ft GRGC - Gamma Ray
40.59 ft CGXT - MCG External Temperature

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

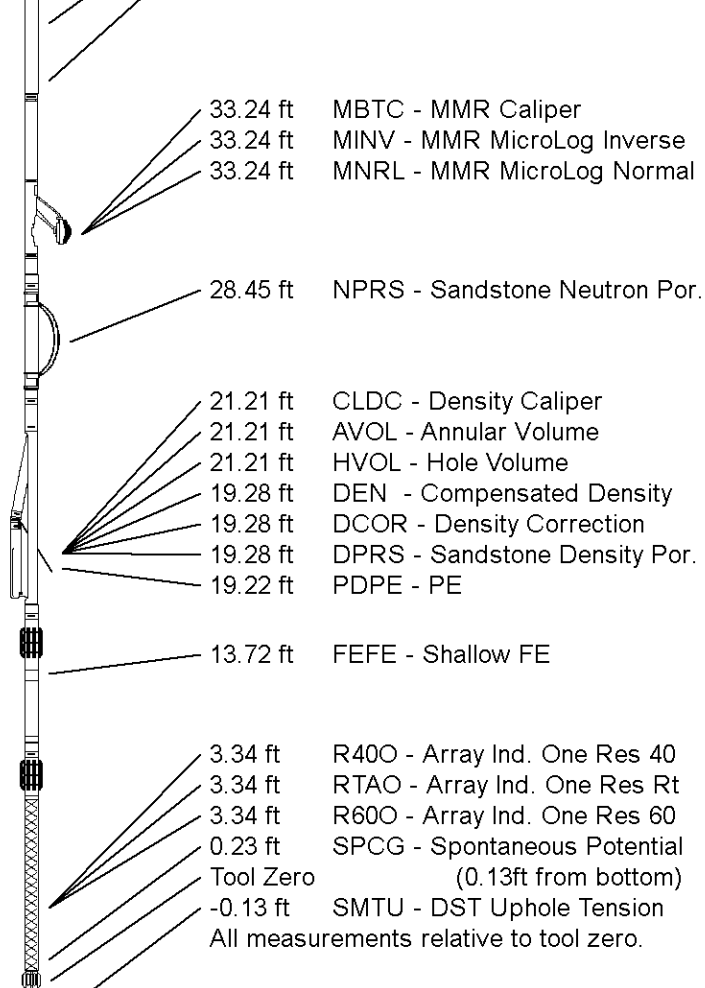
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.240 in

Compact Density/Caliper
MPD-B 104 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.240 in

Compact Induction
MAI-A.A 158 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 48.78 ft Weight: 383.6 lb



COMPANY	MID-CON ENERGY OPERATING
WELL	HRMU 11-13
FIELD	HARKER RANCH MORROW UNIT
PROVINCE/COUNTY	CHEYENNE
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	4107.60	feet	First Reading	5431.78	feet
Elevation Drill Floor	4105.60	feet	Depth Driller	5450.00	feet
Elevation Ground Level	4091.00	feet	Depth Logger	5451.00	feet



Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG