



Weatherford

**CML MESSENGER SHUTTLE
COMPACT PHOTO DENSITY
COMPENSATED NEUTRON LOG**

COMPANY	SANDRIDGE ENERGY		
WELL	LINDSAY 3319 1-21H		
FIELD	COLDWATER SOUTH		
PROVINCE/COUNTY	COMANCHE		
COUNTRY/STATE	USA / OKLAHOMA		
LOCATION	S2 S2 SW SW 200' FSL & 660' FWL		
SEC	TWP 21 33S	RGE 19W	Other Services MAI
API Number	15-033-21698		
Permit Number			
Permanent Datum GL, Elevation 1973 feet			Elevations: KB 1993.00 DF 1993.00 GL 1973.00
Log Measured From KB			
Drilling Measured From KB @ 20' AGL			
Date	03-APR-2013		
Run Number	ONE		
Service Order	3539481		
Depth Driller	9765.00		
Depth Logger	9765.00		
First Reading	9735.00		
Last Reading	5120.00		
Casing Driller	5815.00		
Casing Logger	5803.00		
Bit Size	6.125		
Hole Fluid Type	WBM		
Density / Viscosity	8.80 lb/USg	29.00 CP	
PH / Fluid Loss	10.00		
Sample Source	FLOWLINE		
Rm @ Measured Temp	6.50 @ 75.0	ohm-m	
Rmf @ Measured Temp	5.20 @ 75.0	ohm-m	
Rmc @ Measured Temp	7.50 @ 75.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	3.67 @138.0	ohm-m	
Time Since Circulation	18 HOURS		
Max Recorded Temp	138.00	deg F	
Equipment / Base	18109	OKC	
Recorded By	GUTHMUELLER		
Witnessed By	J HILEMAN		
AFE# DC12765			

BOREHOLE RECORD			Last Edited: 03-APR-2013 21:00	
Bit Size inches	Depth From feet		Depth To feet	
12.250	0.00		910.00	
8.750	910.00		5840.00	
6.125	5840.00		9765.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURF	9.625	0.00	910.00	36.00
INTER	7.000	0.00	5815.00	26.00

REMARKS
LOGGED WITH WLS VER 13.05.9583 SOFTWARE
WELL LOGGED USING MESSENGER METHOD OF DEPLOYMENT, AND MEMORY LOGGING SYSTEM
LOGS RESET TO PIPE STRAP AND COMPARED TO MWD LOGS
HARDWARE: MAI: 0.5" STANDOFF BELOW, 0.5" MIS-B STANDOFF ABOVE MFE: 0.5" STANDOFF ABOVE MPD: 4"PROFILE PLATE, MIS-A SINGLE SPRING DECENTRALIZER BELOW MDN: MISD DOUBLE SPRING DECENTRALIZER RAN ABOVE
2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY ALL INTERVALS LOGGED AND SCALED PER CUSTOMER REQUEST CHLORIDES = 1900 PPM

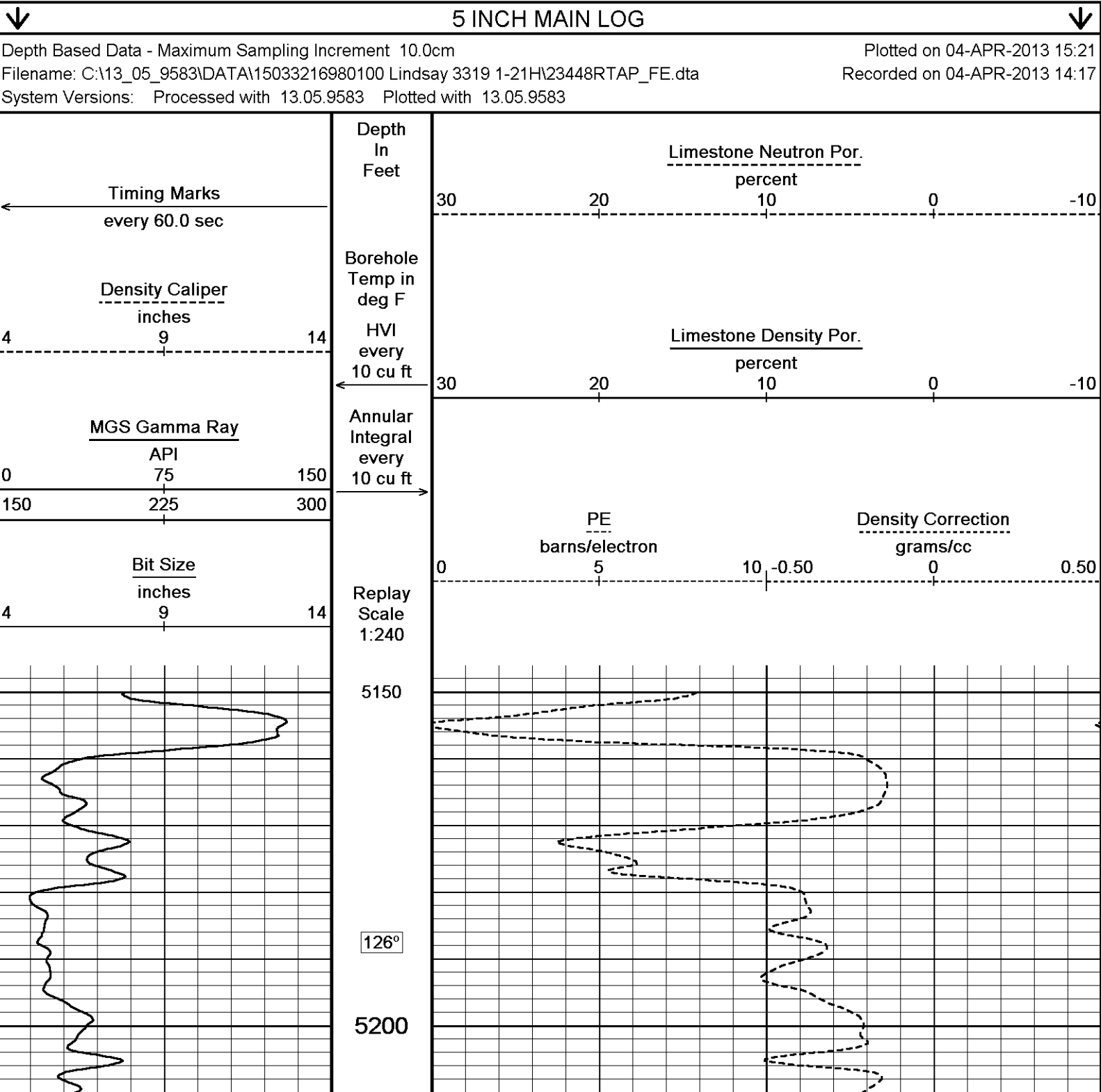
DRILL PIPE DEPTH DURING DEPLOYMENT -
LOGGING TOOL DEPTH AFTER DEPLOYMENT:

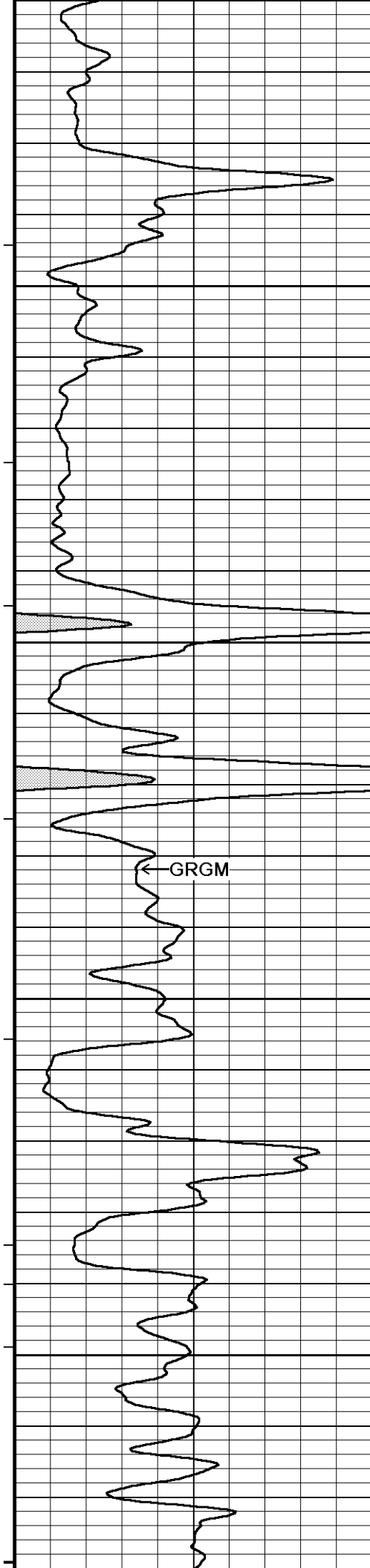
4.5" CASING USED TO CALCULATE AHV

SERVICE ORDER # 3539481
RIG: LARIAT 38

OPERATORS: D TURNER, K CHAFFIN

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.





127°

5250

127°

5300

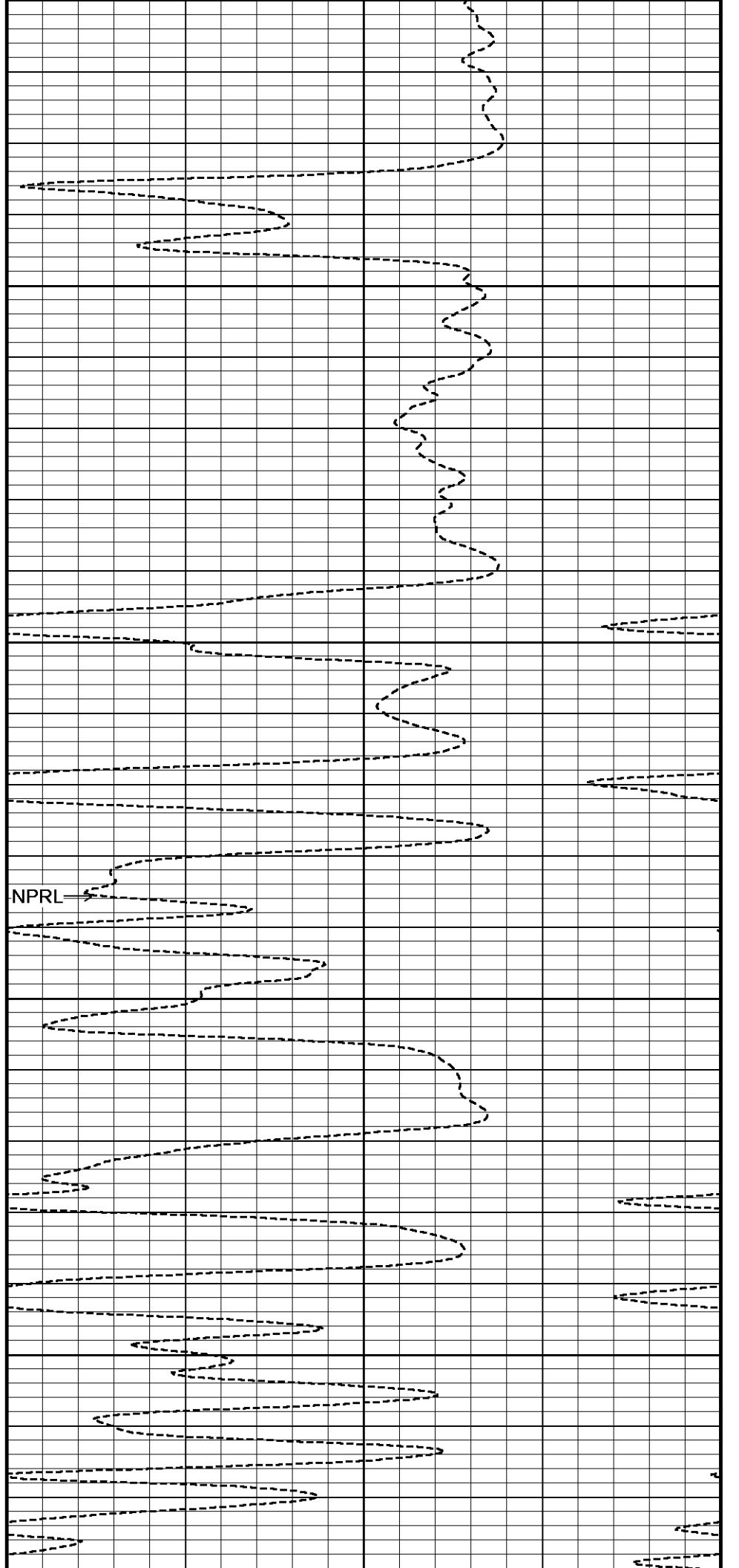
← GRGM

128°

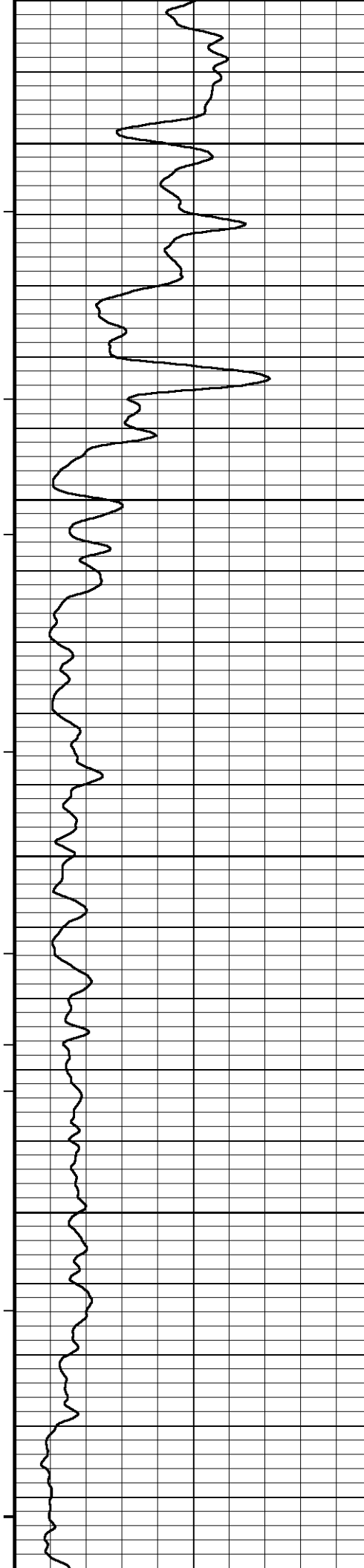
5350

128°

5400



NPRL →



129°

5450

129°

5500

129°

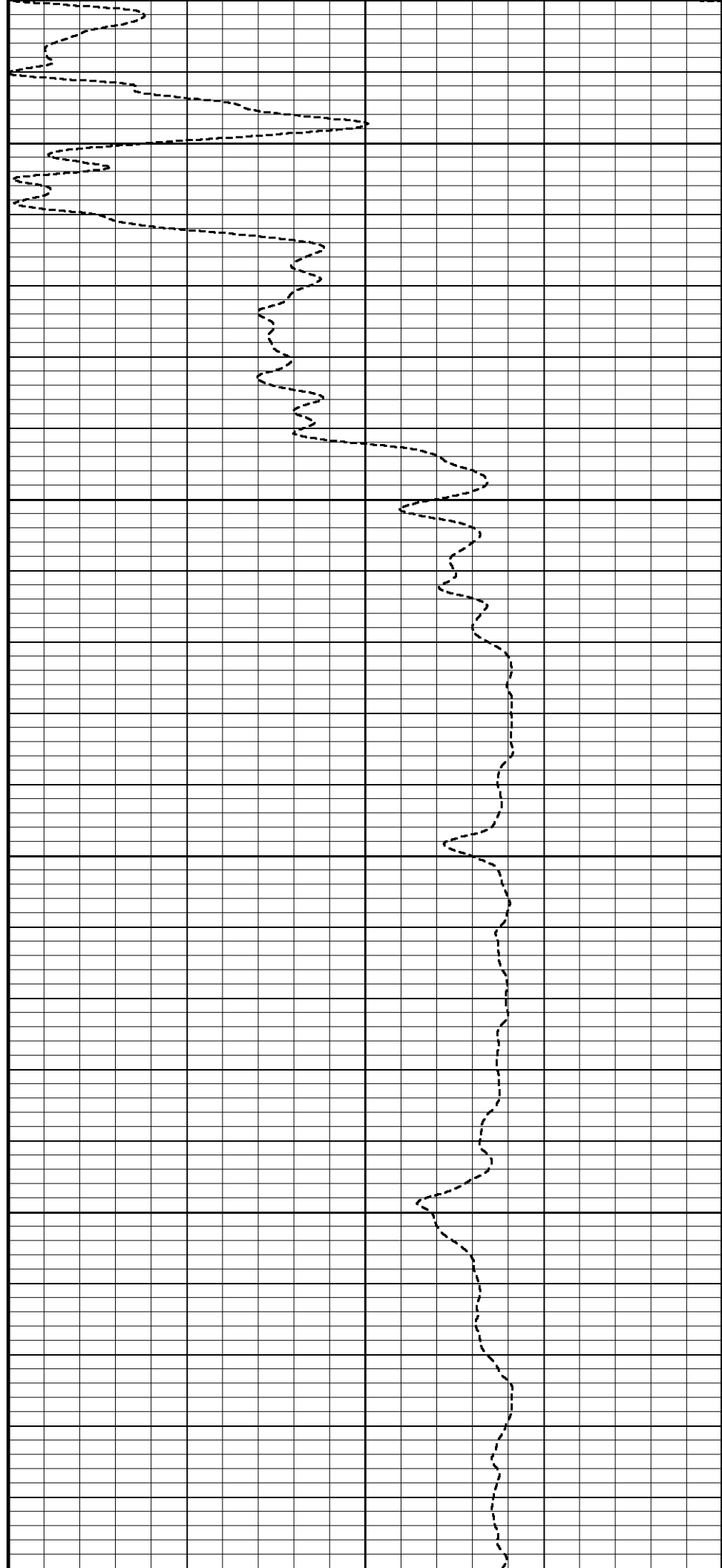
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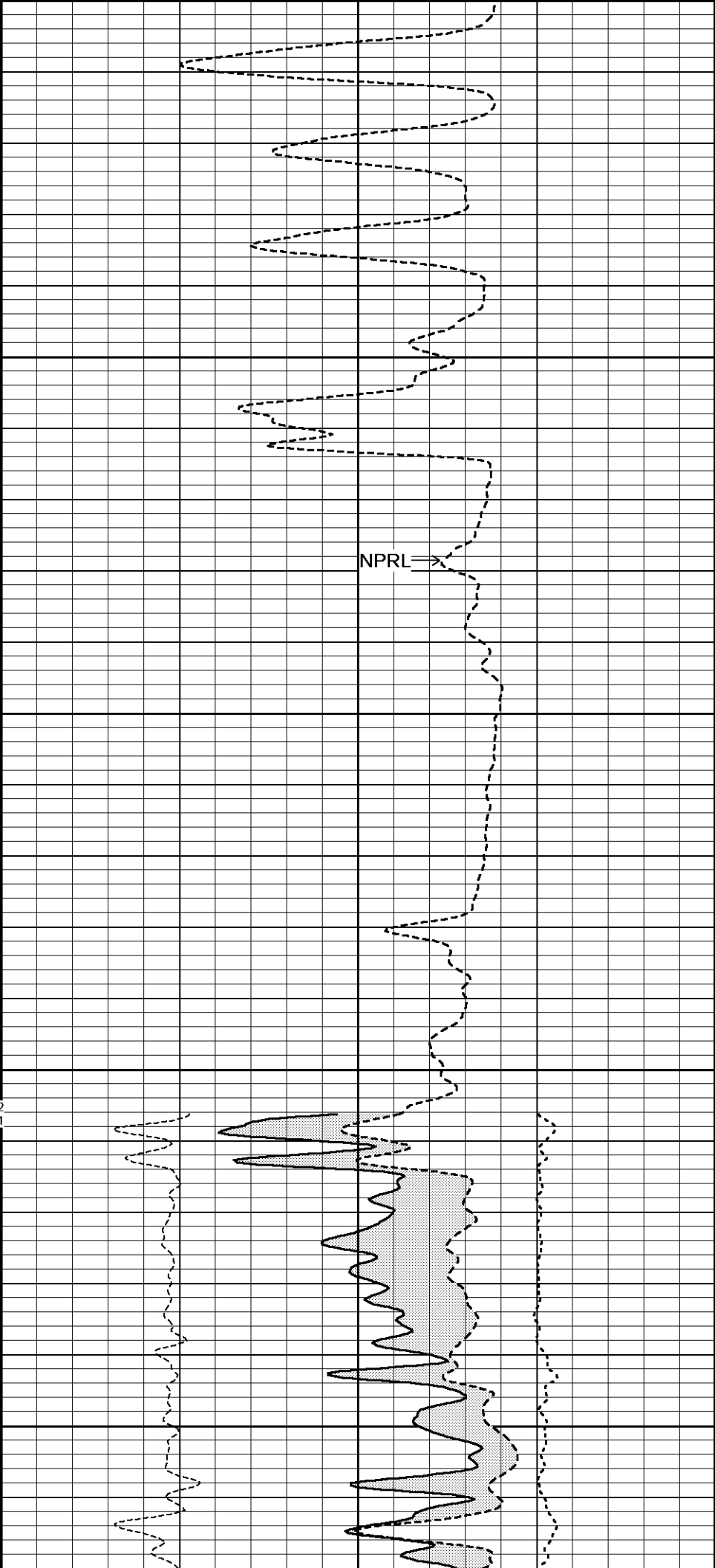
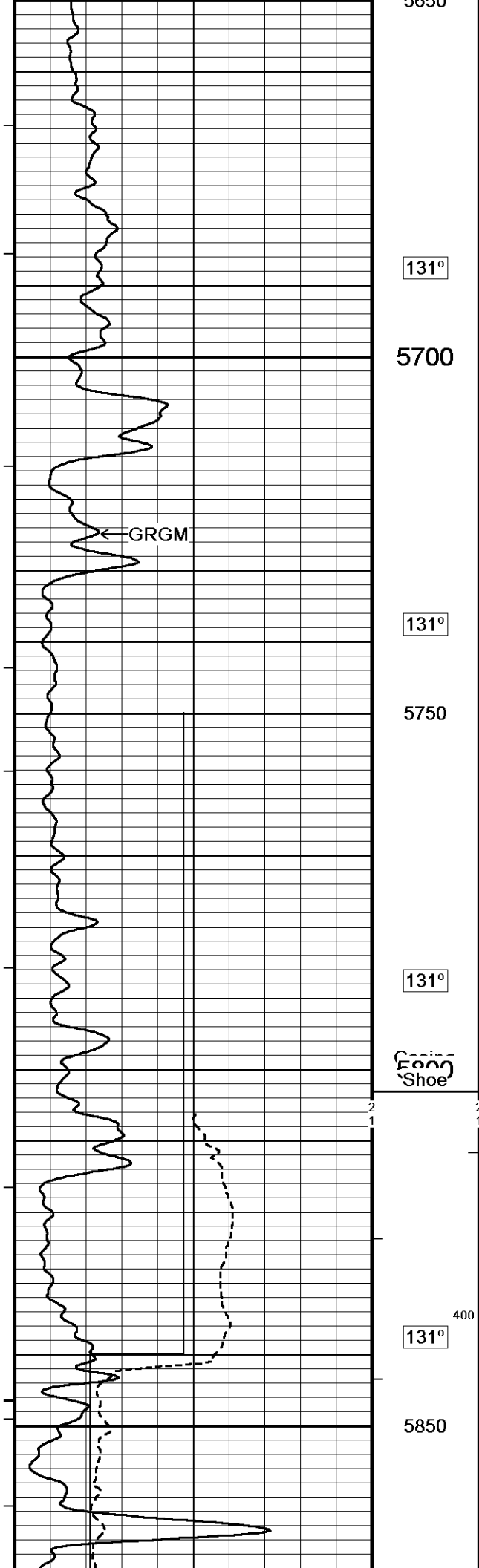
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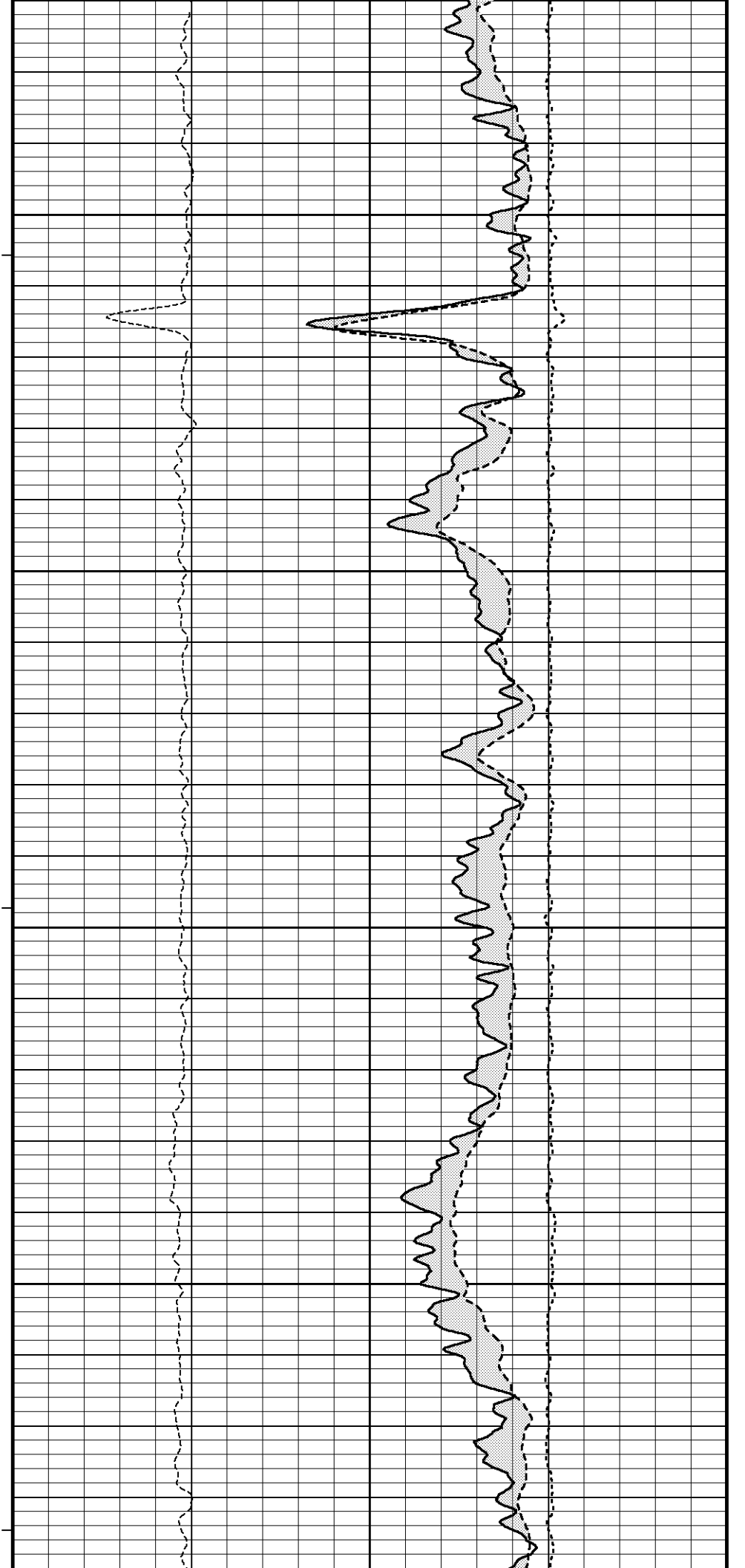
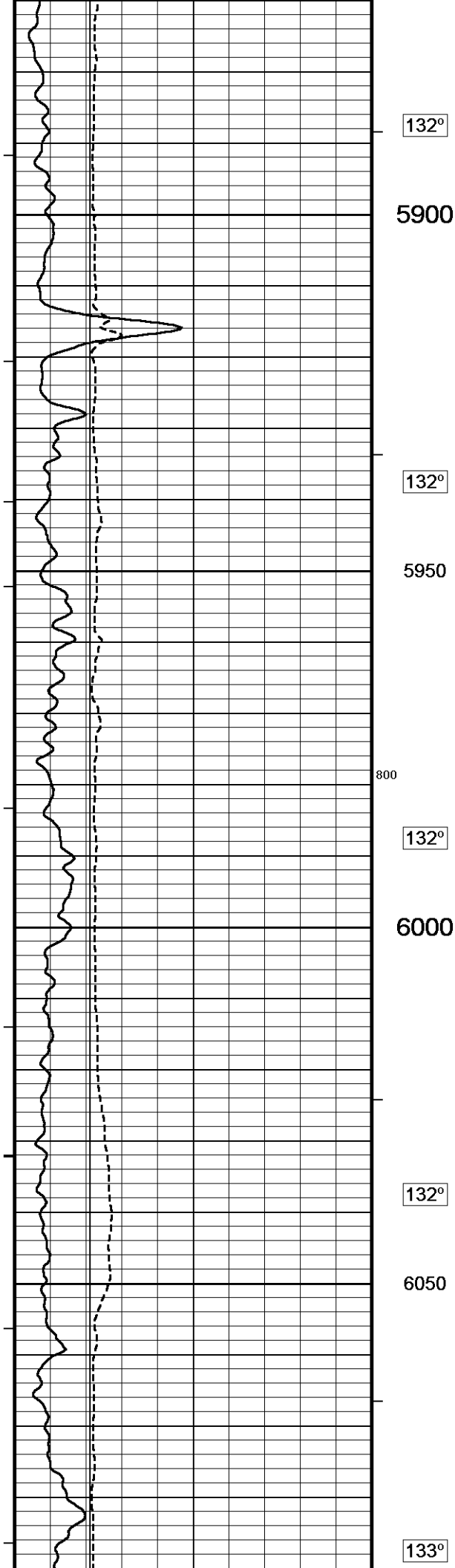
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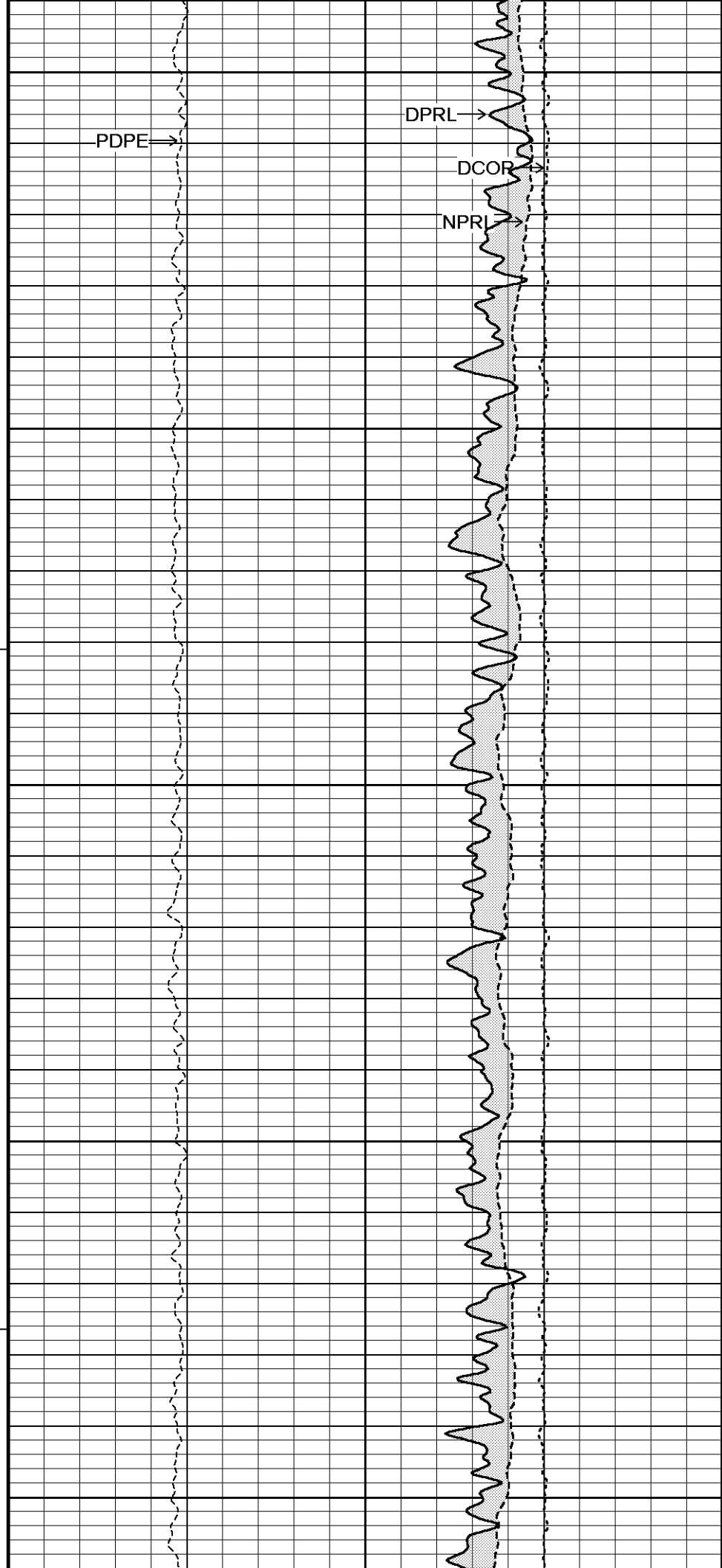
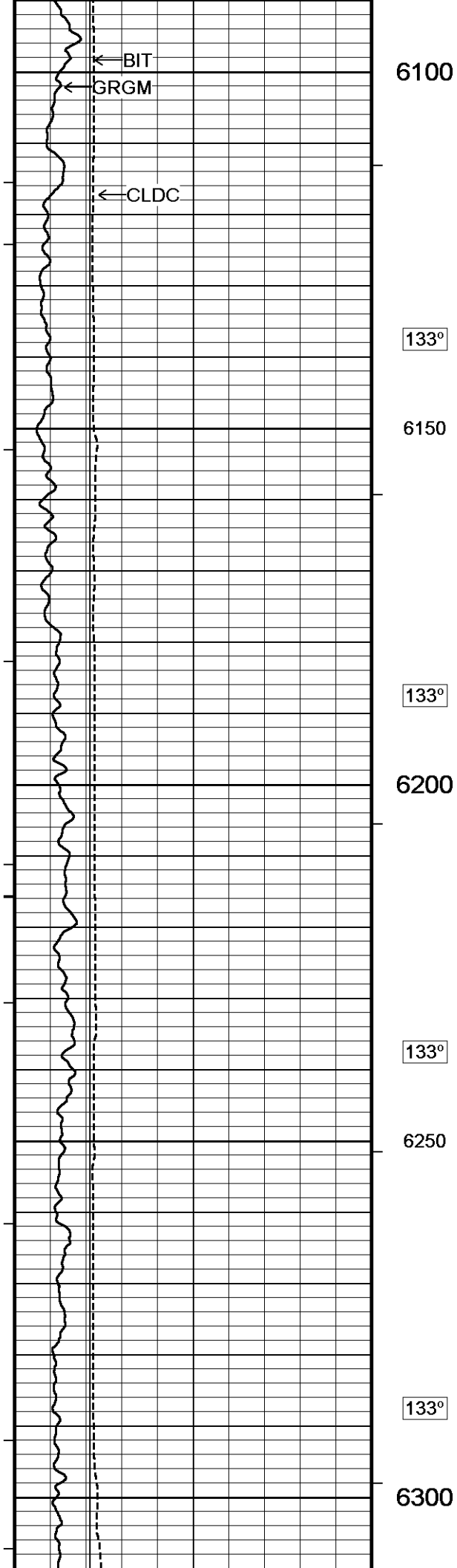
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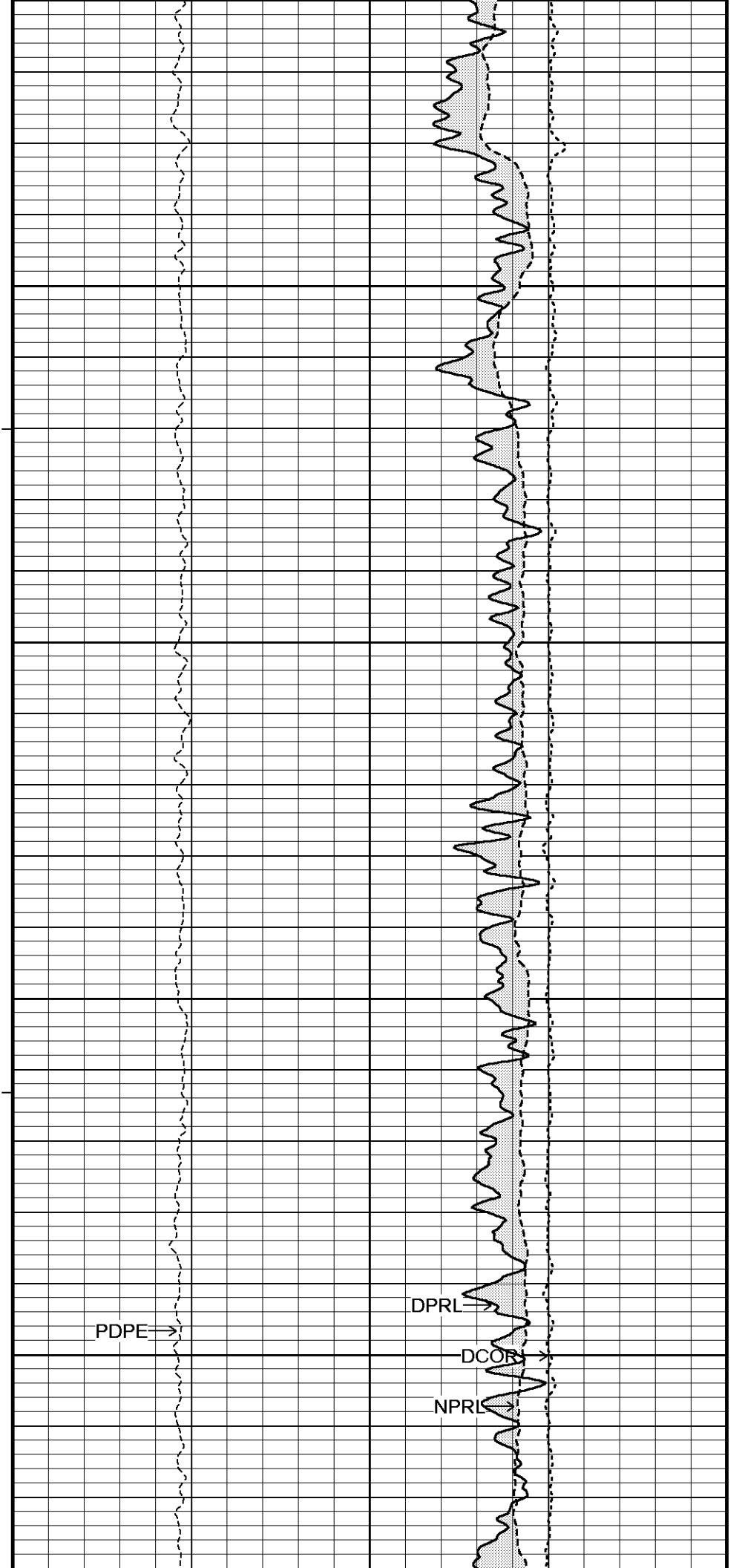
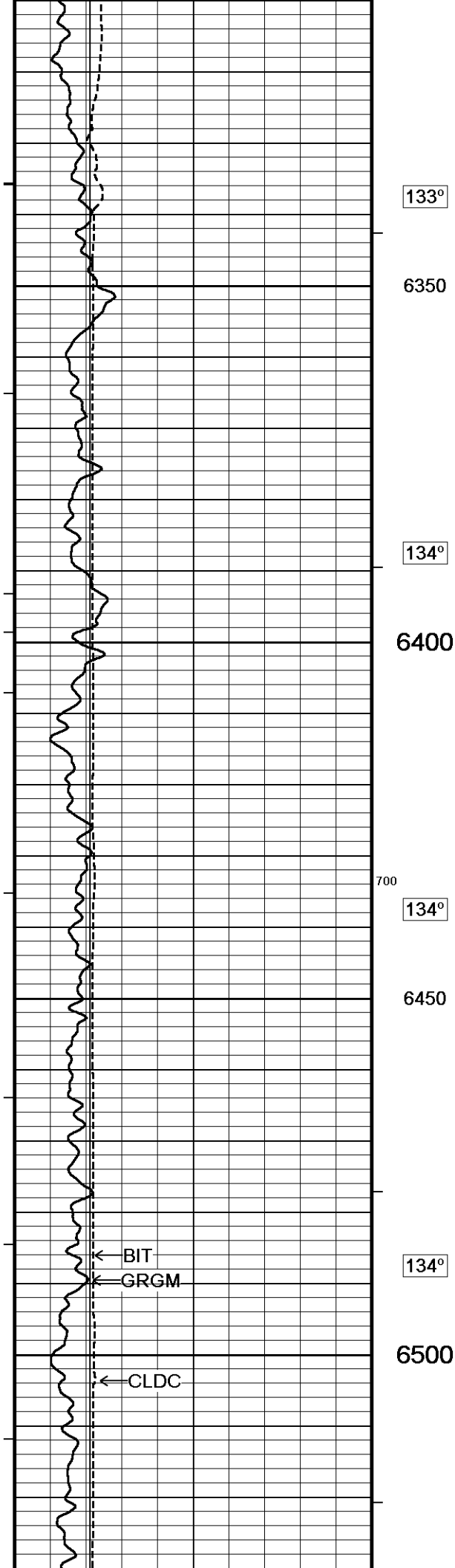
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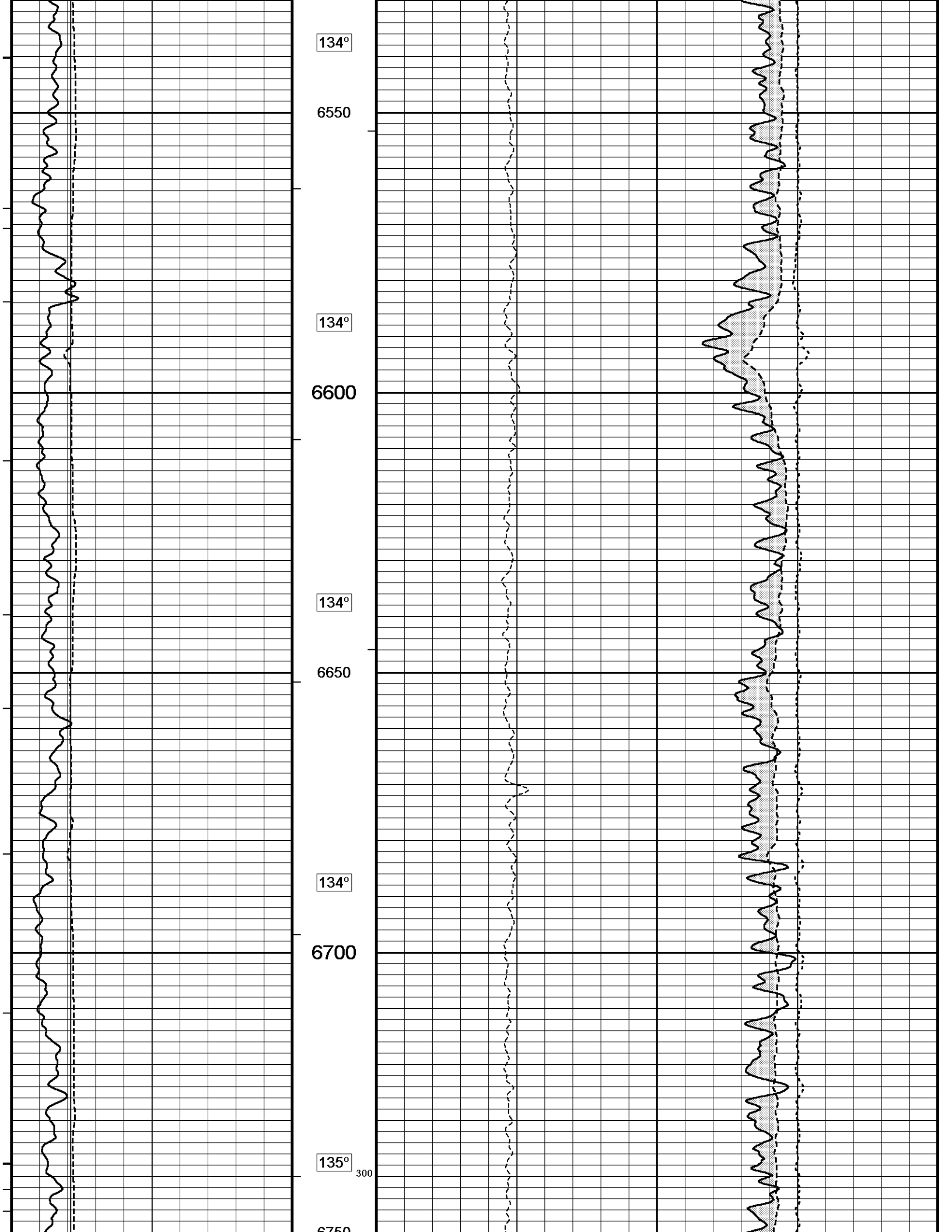


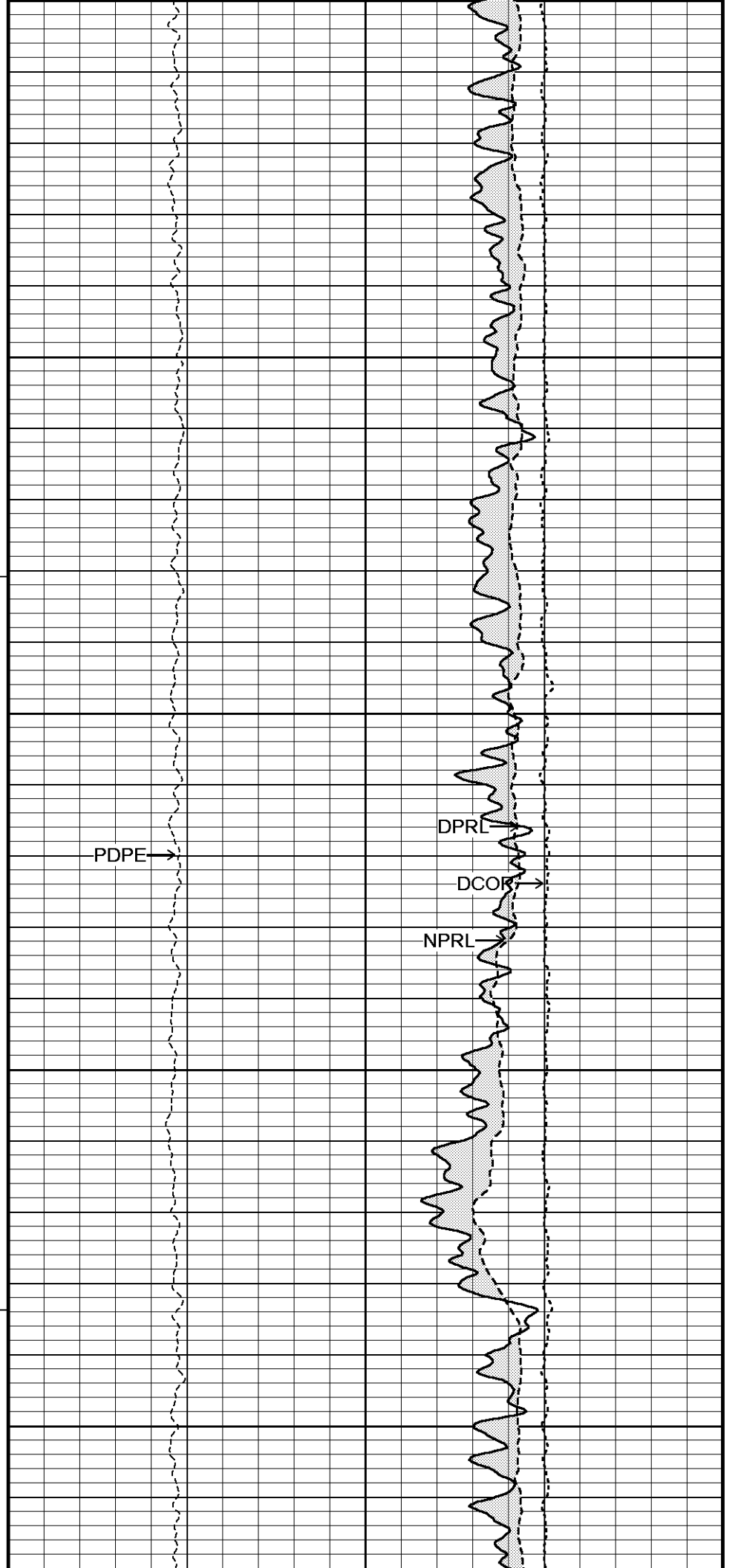
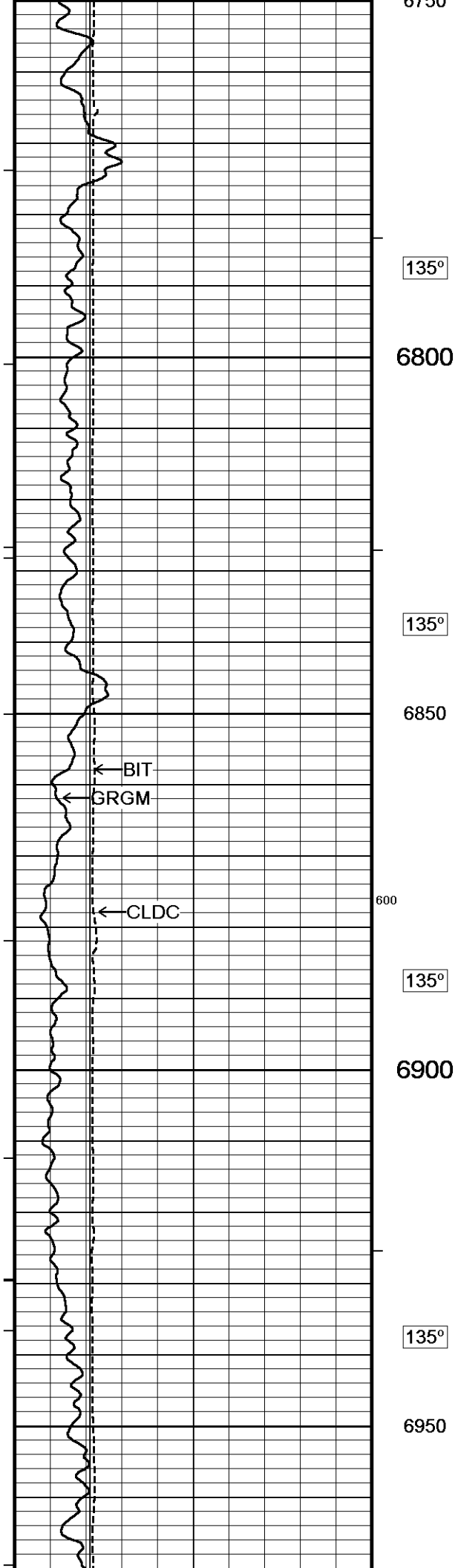


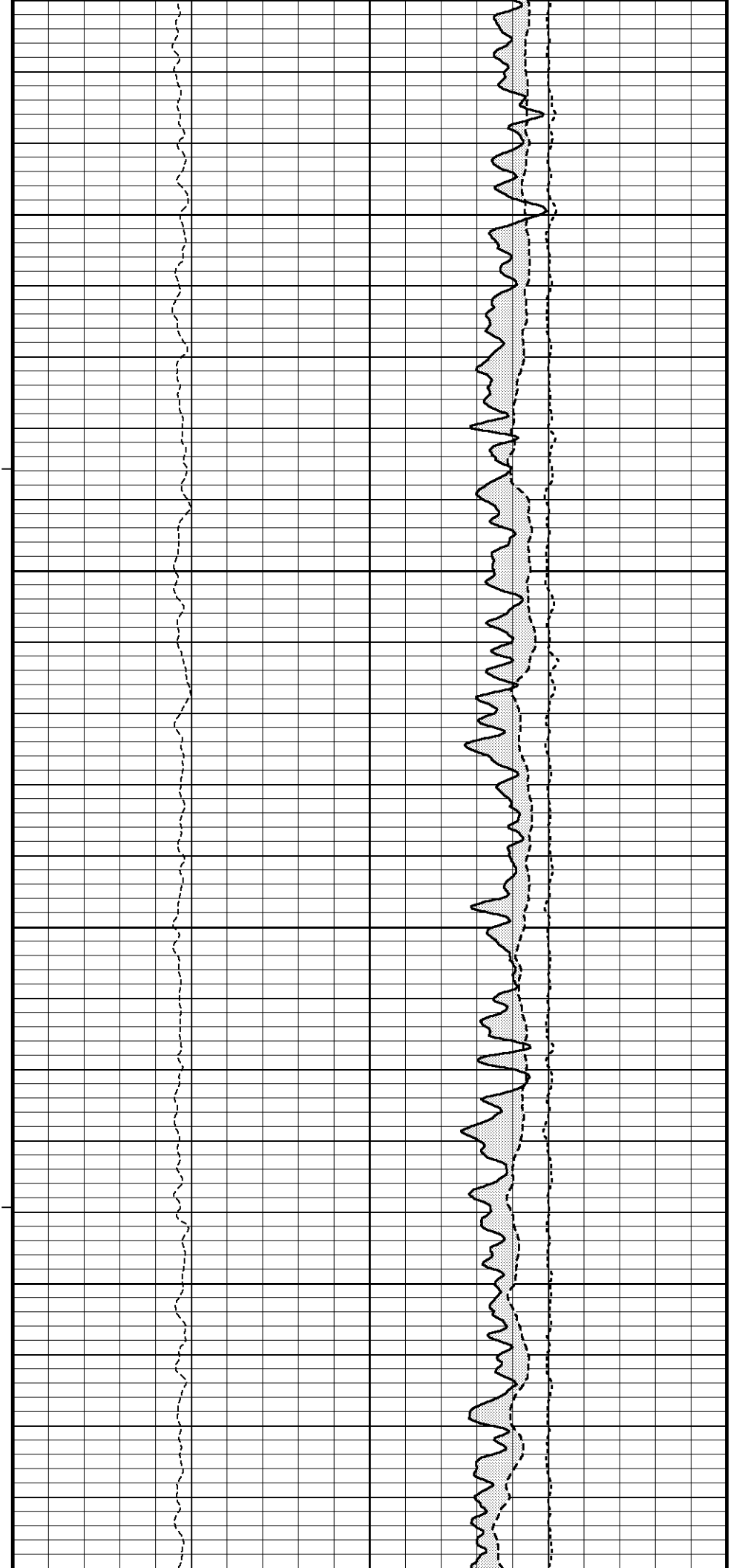
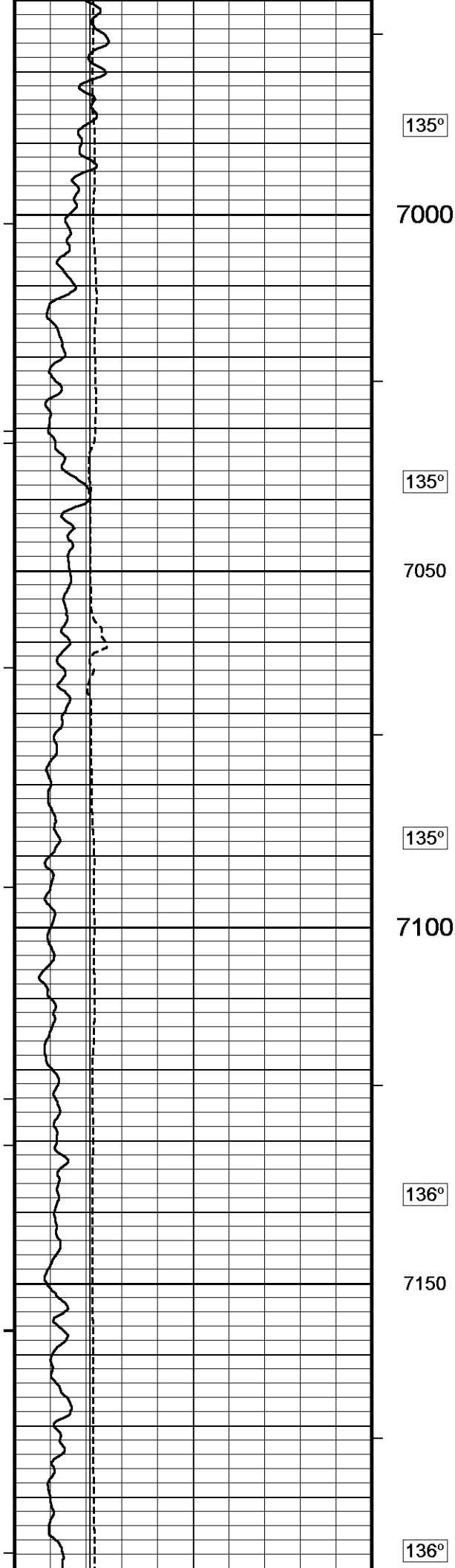


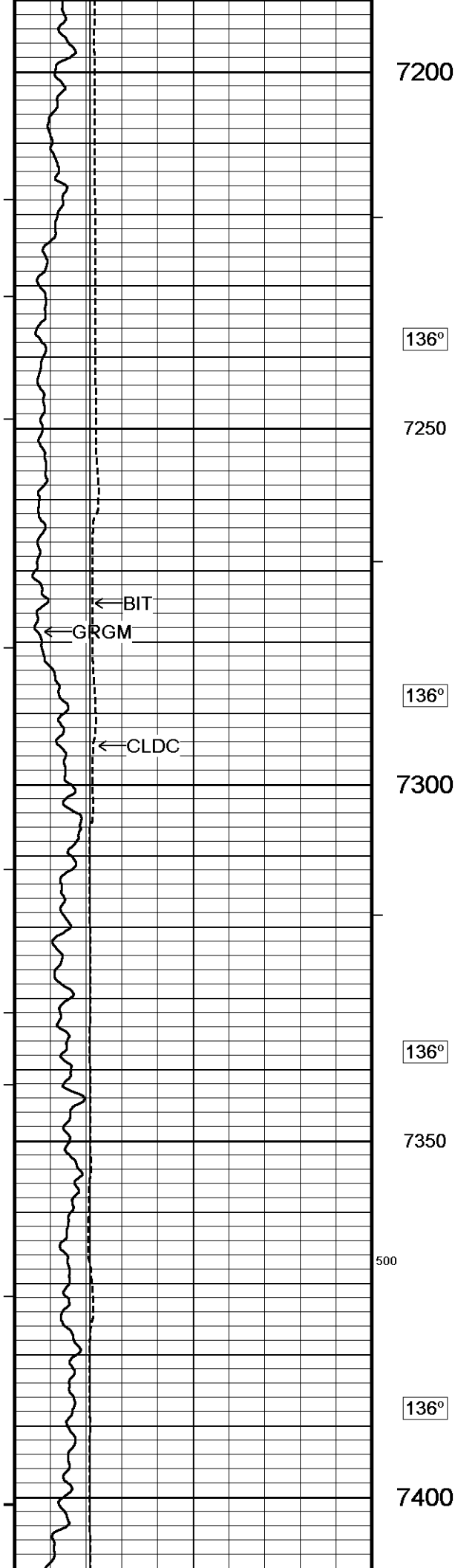












7200

136°

7250

136°

7300

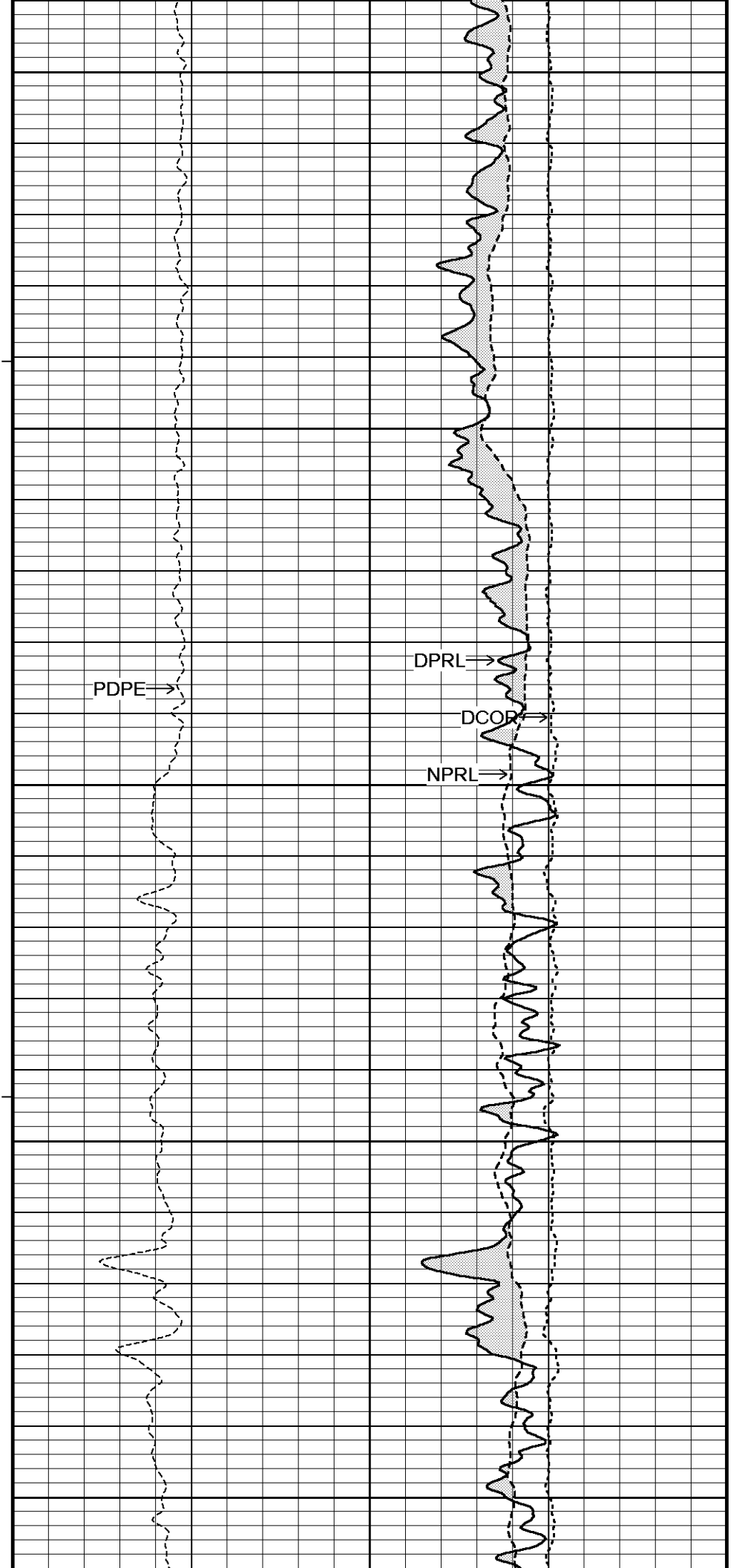
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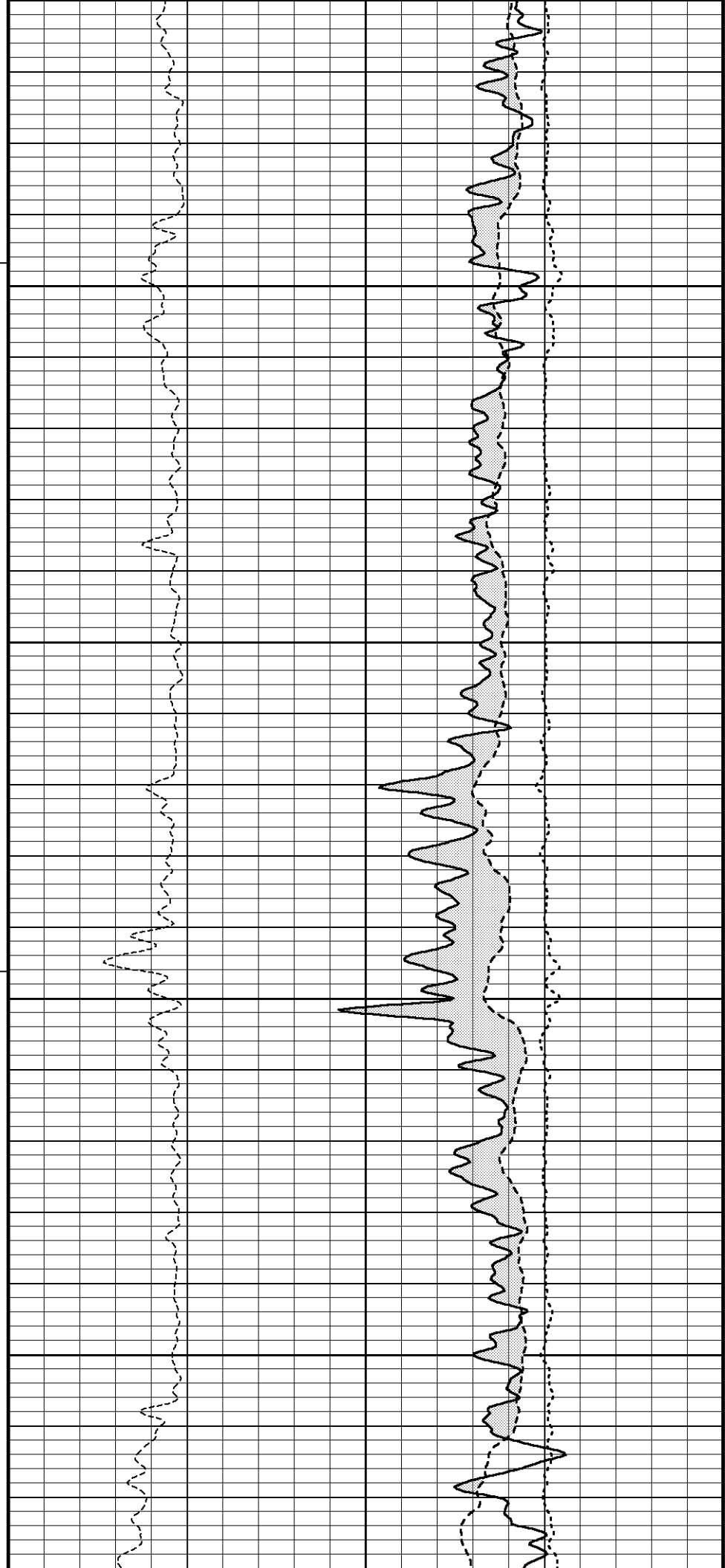
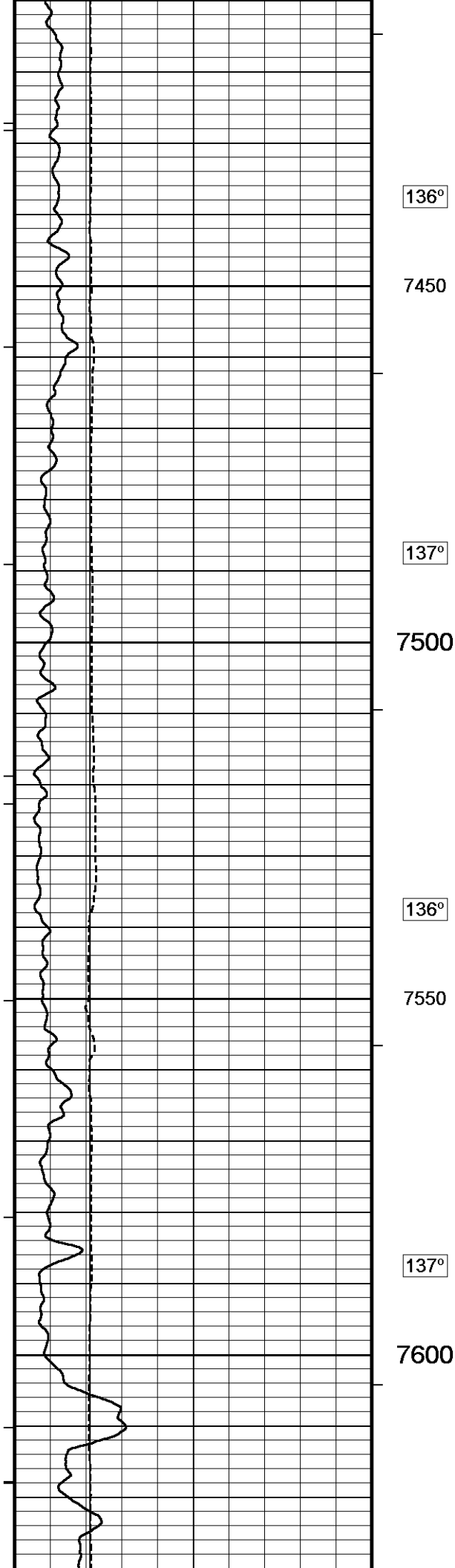
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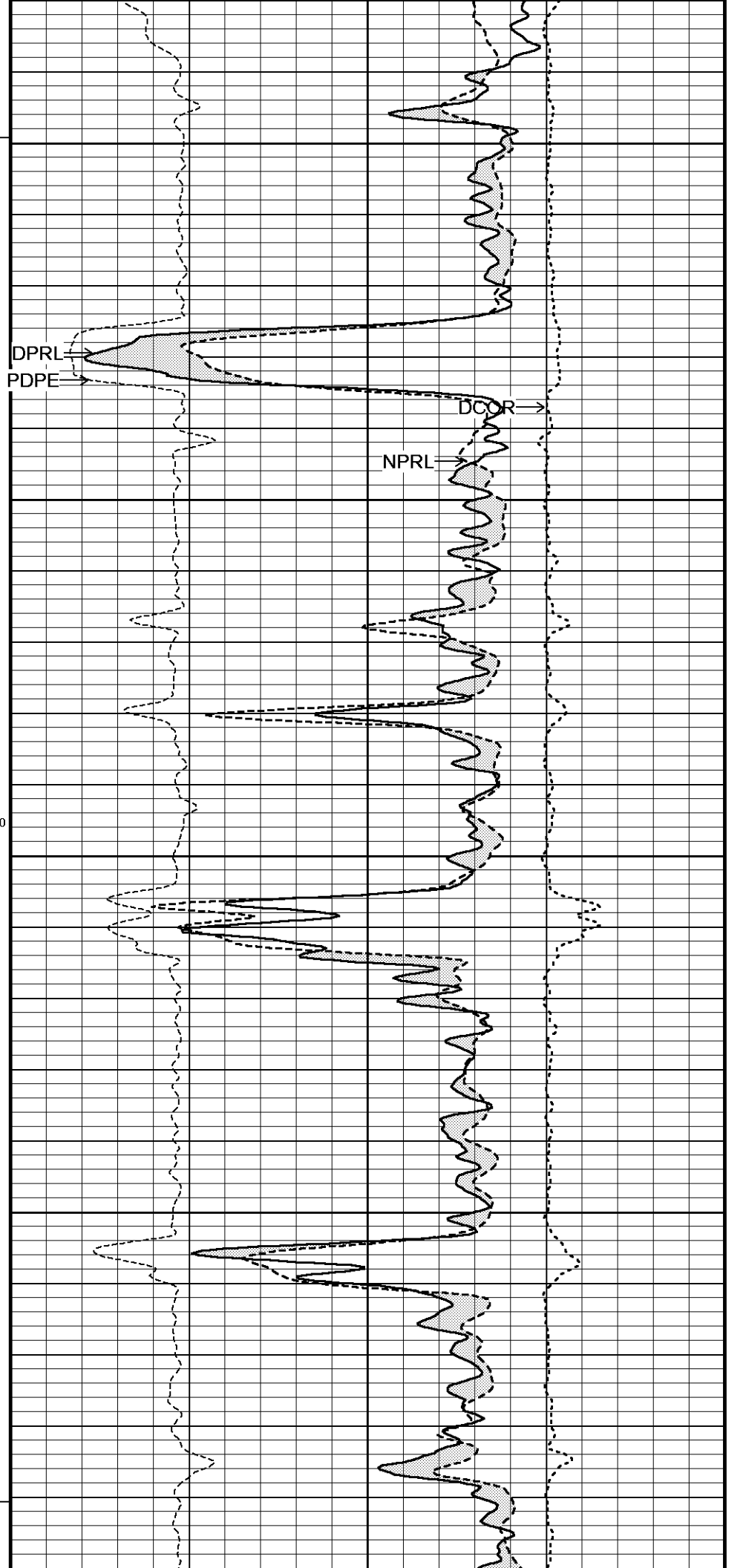
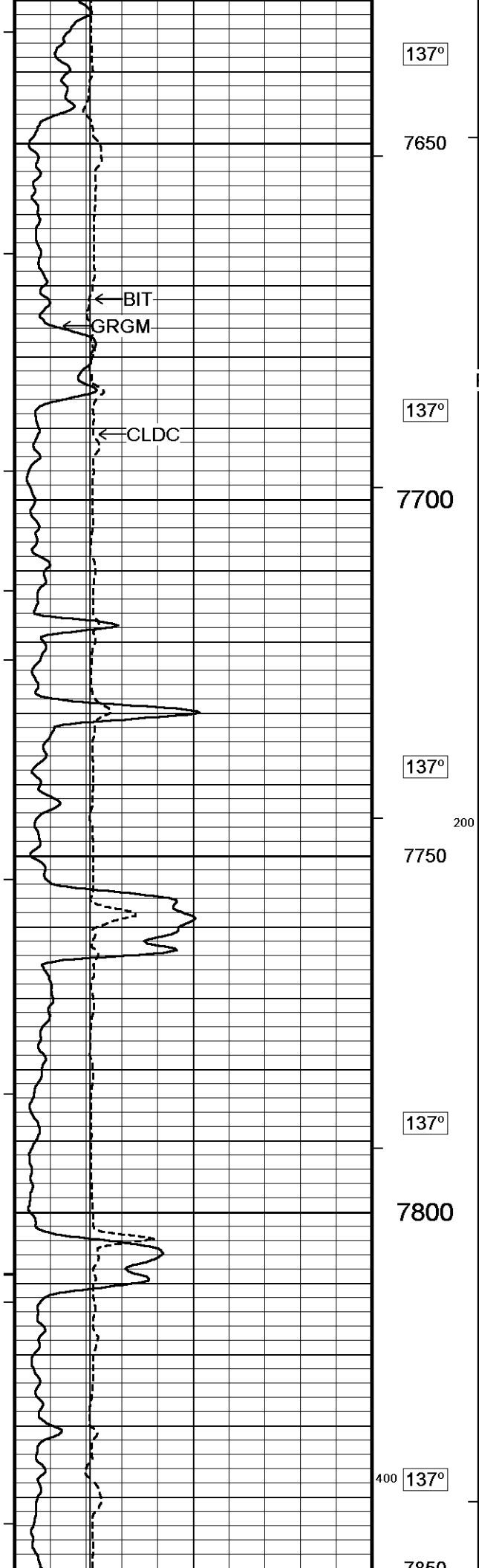
500

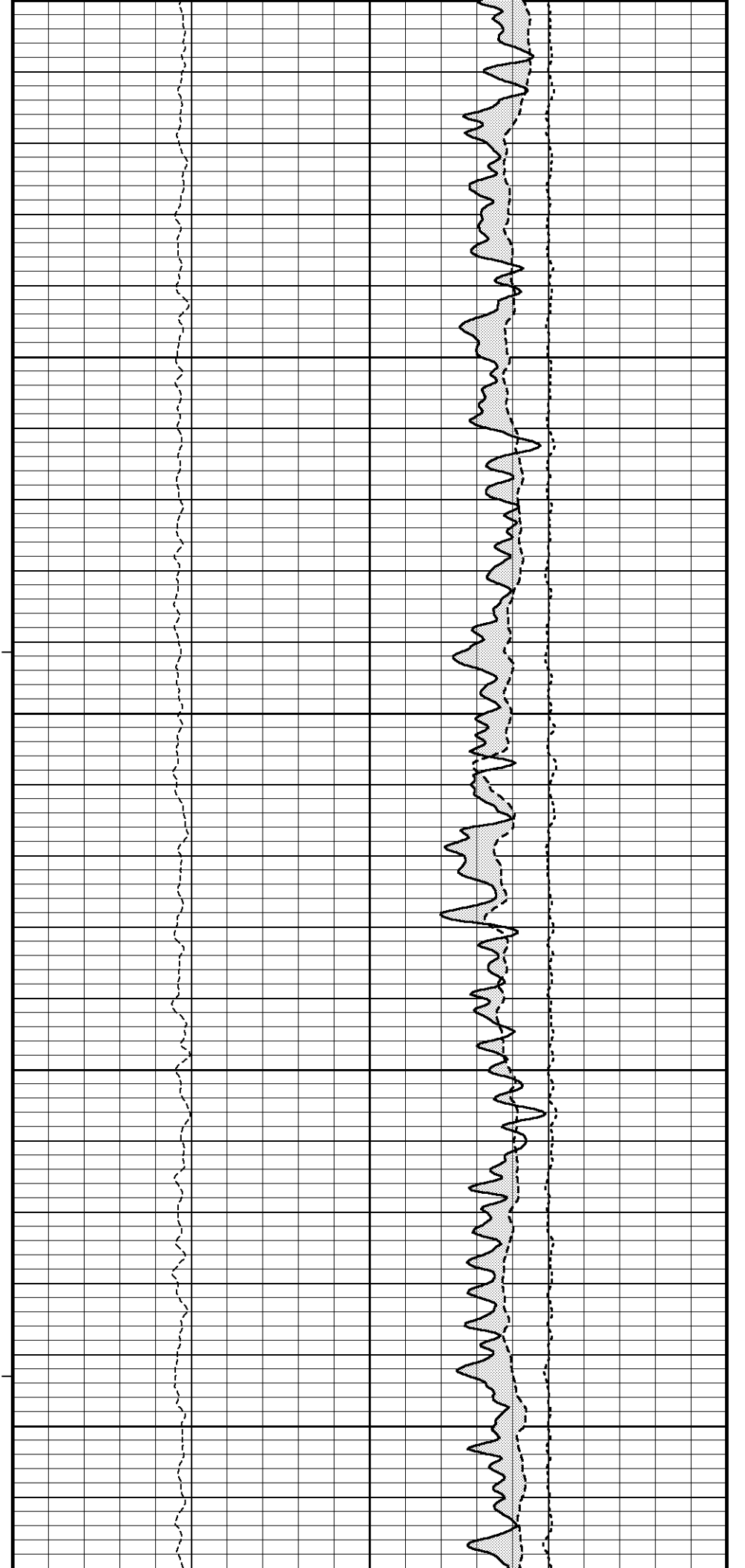
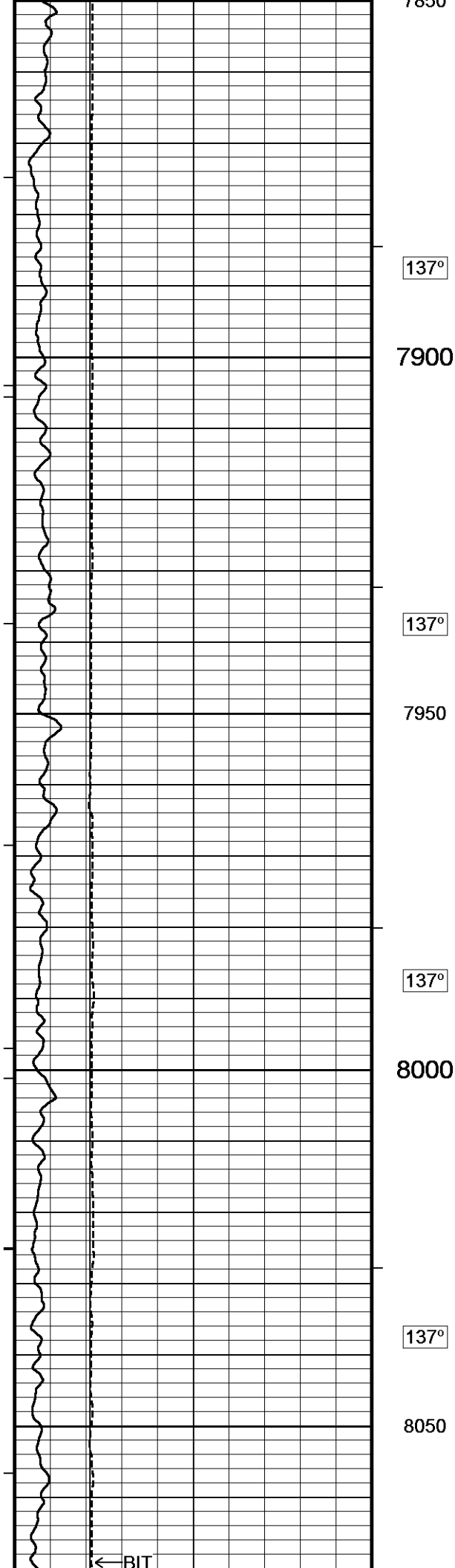
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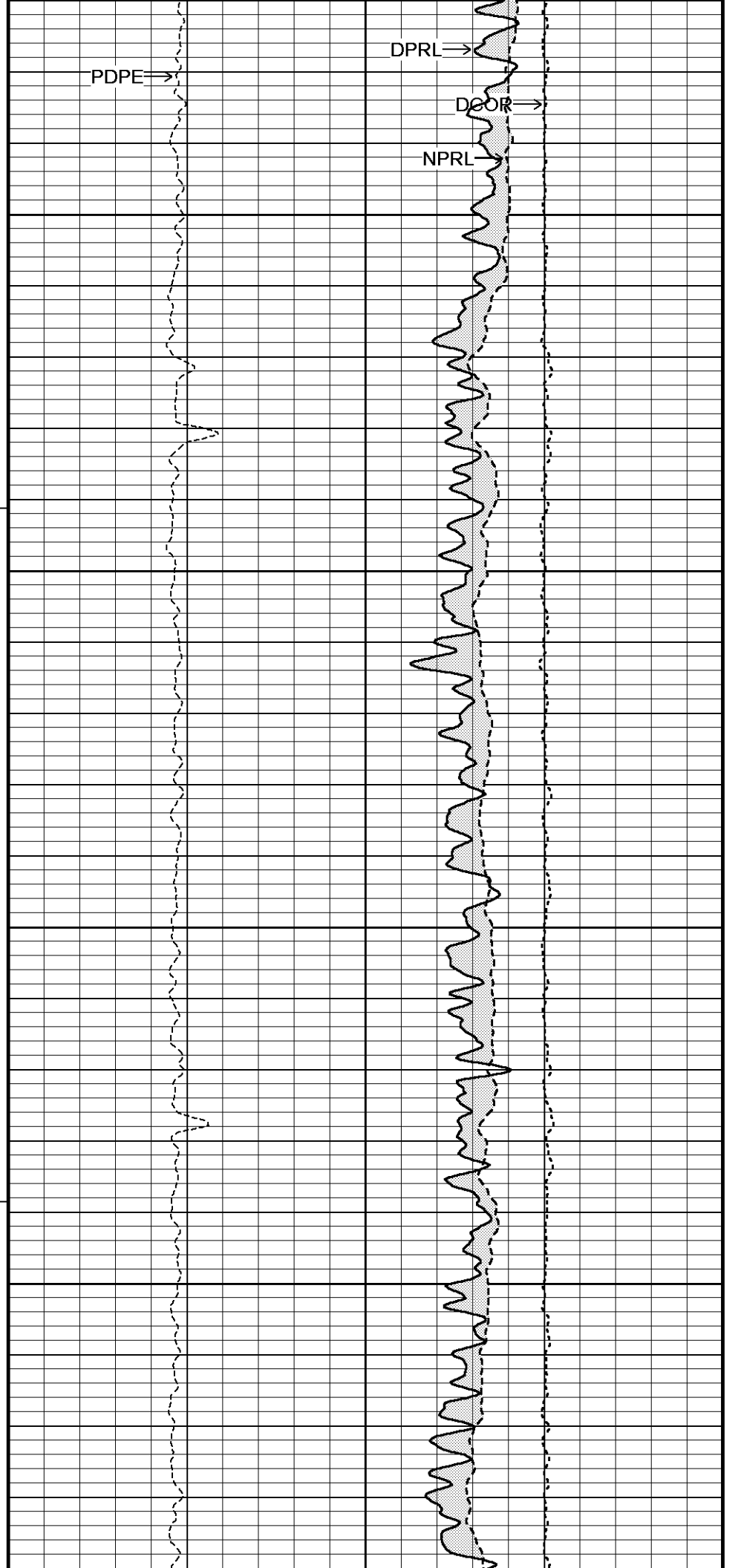
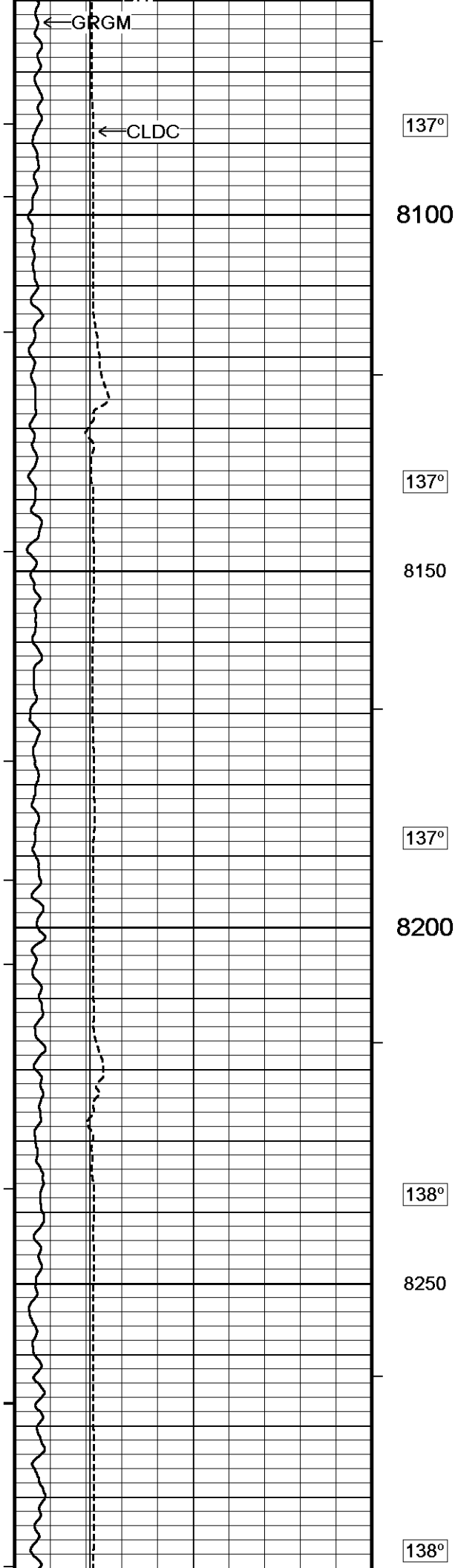
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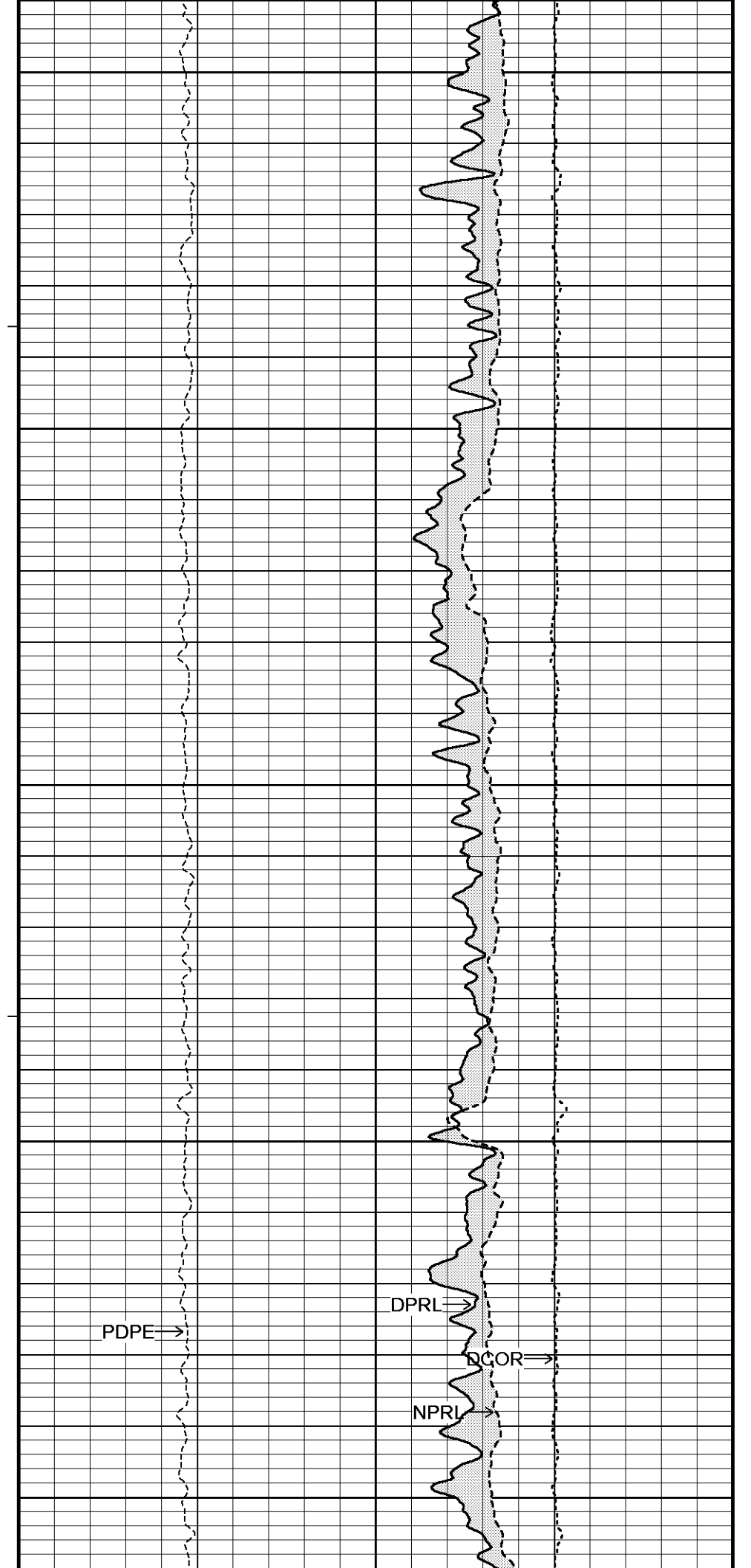
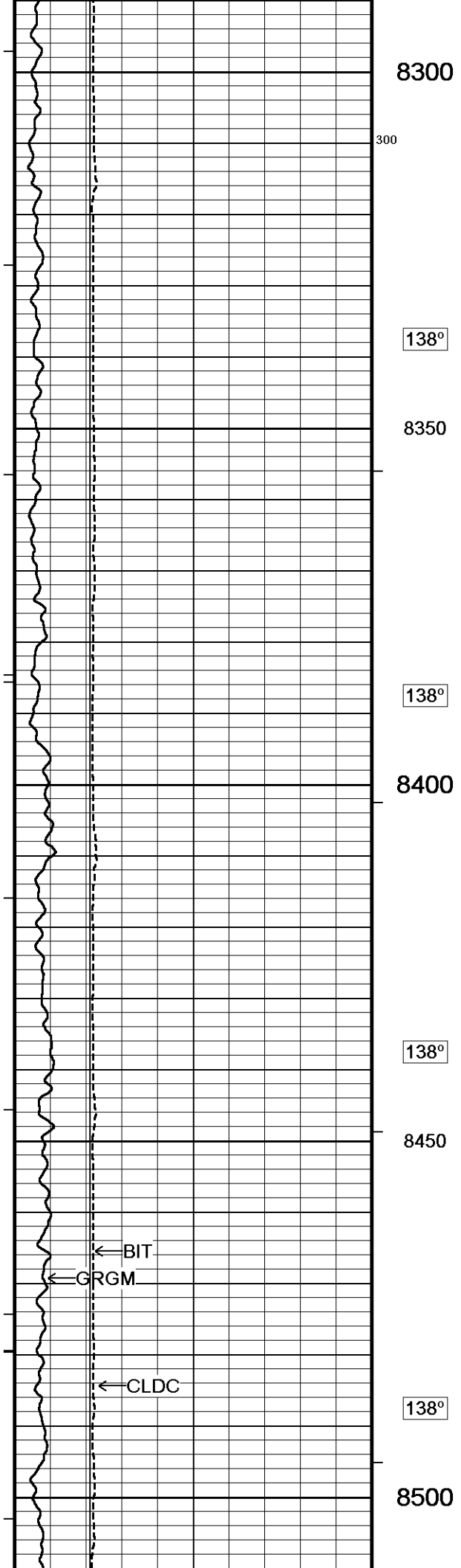


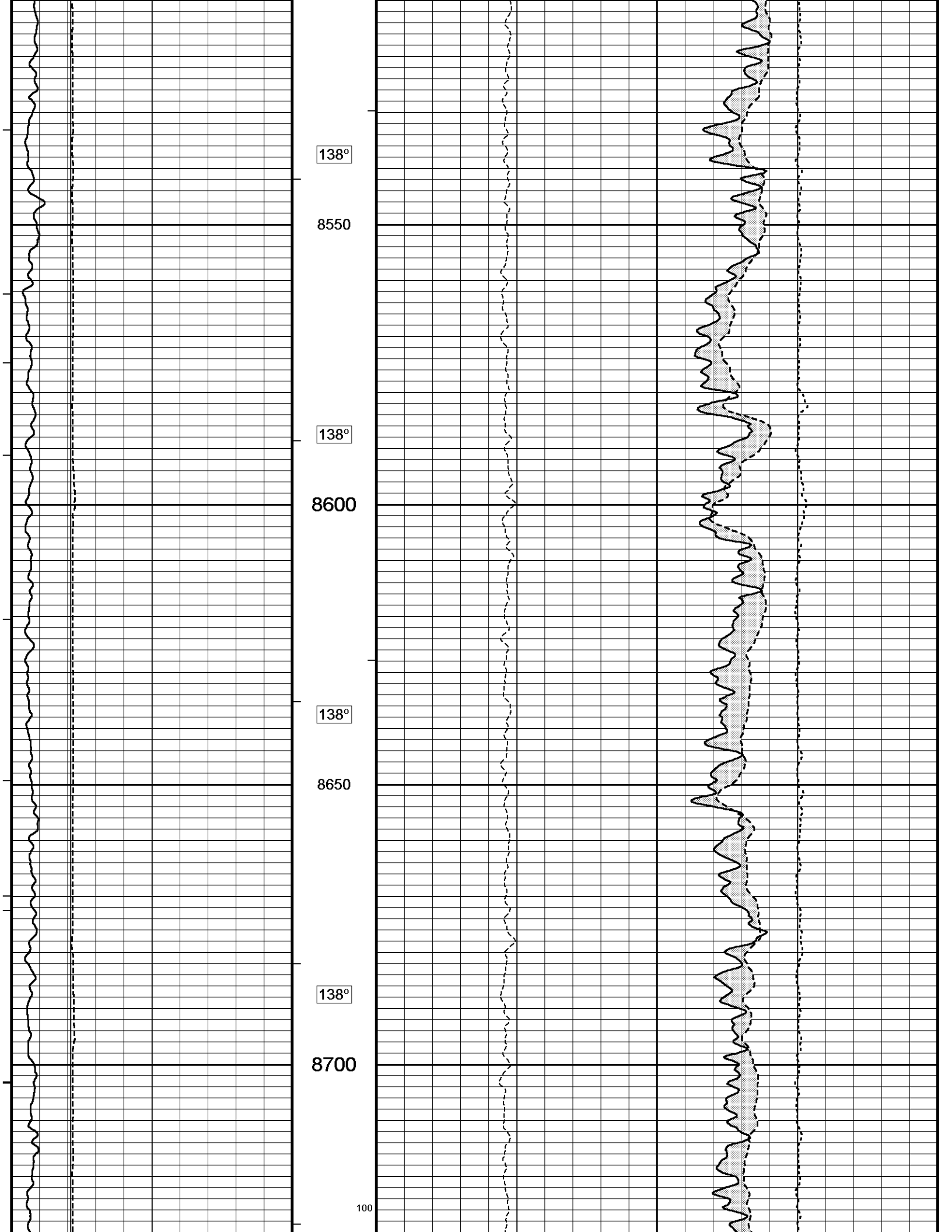


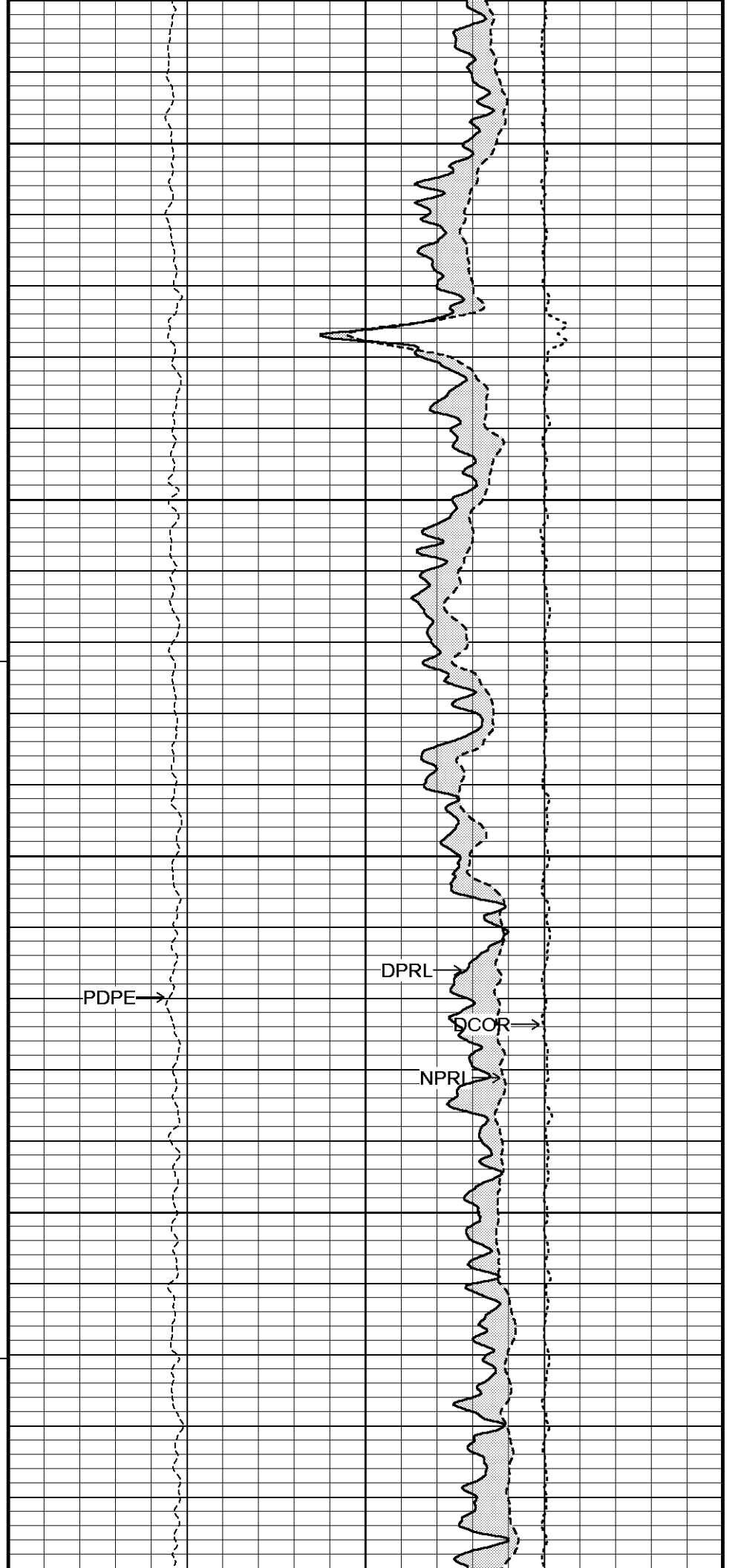
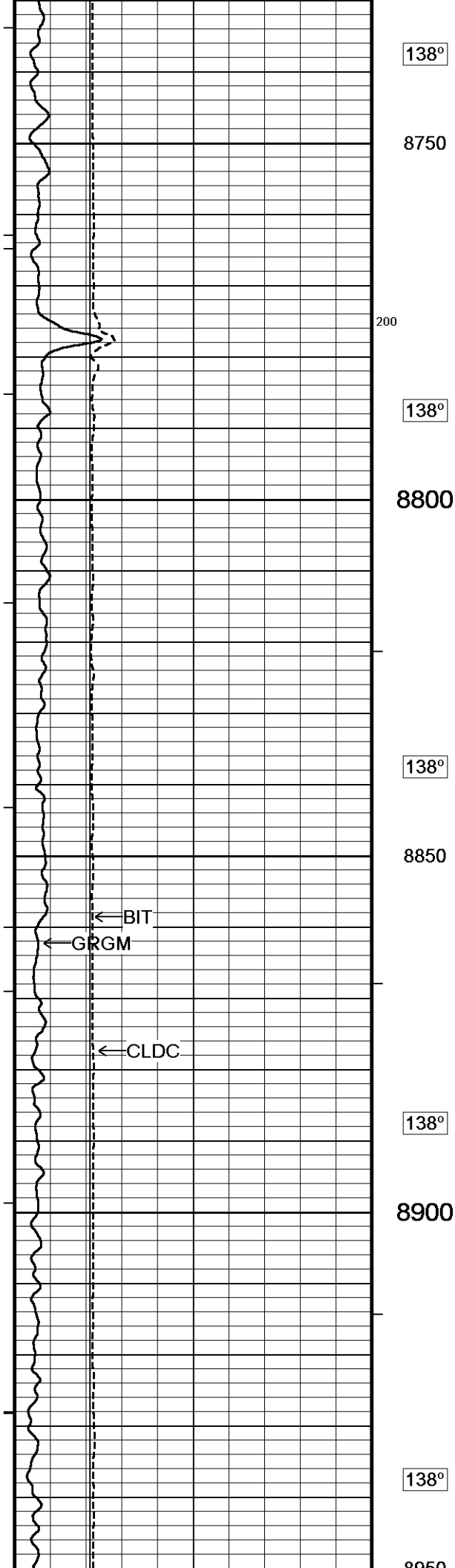


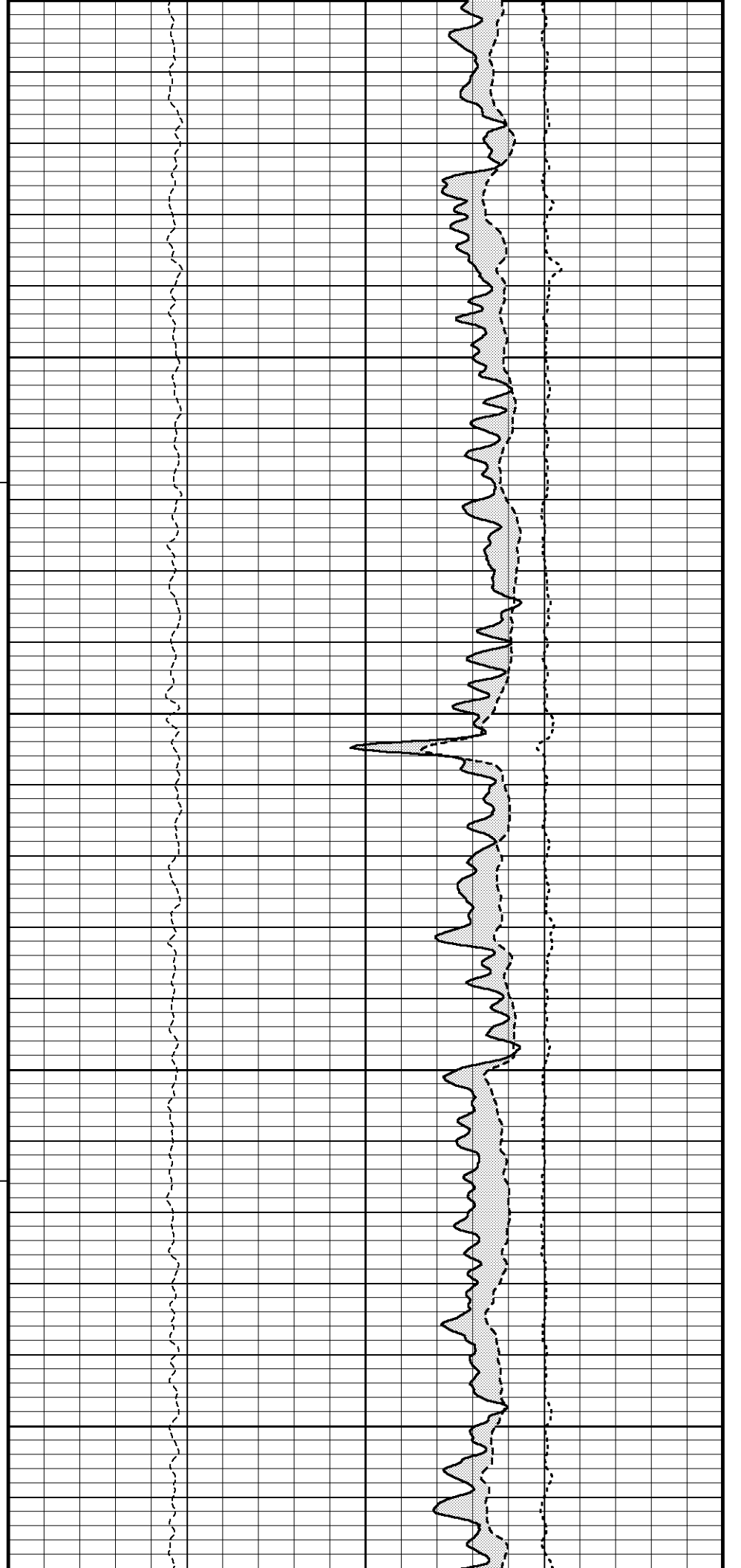
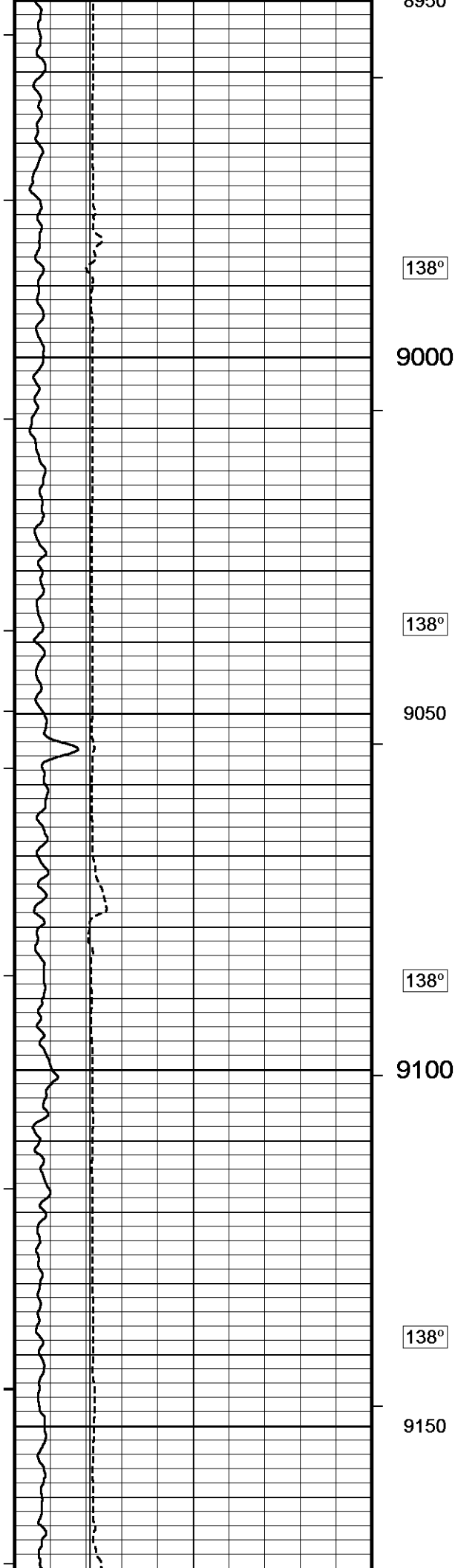


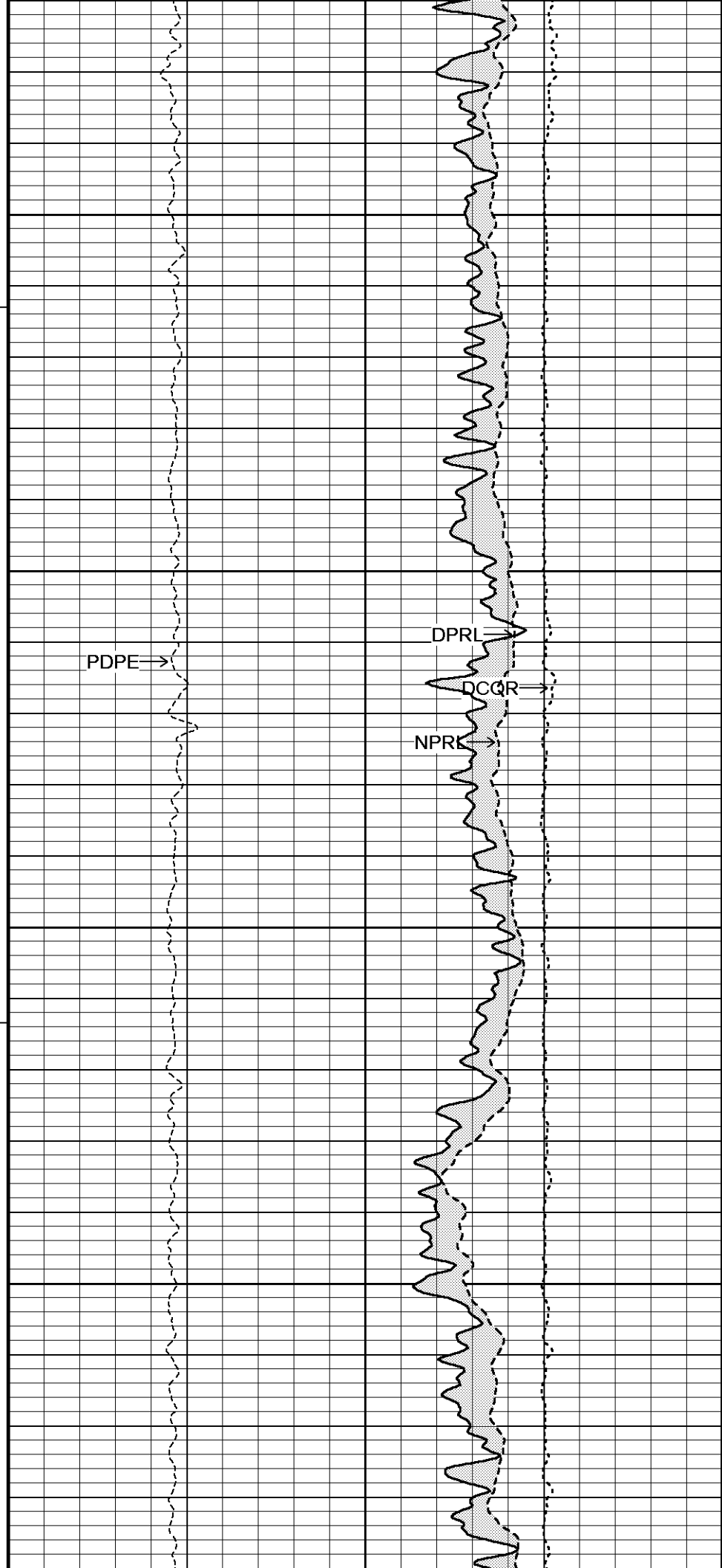
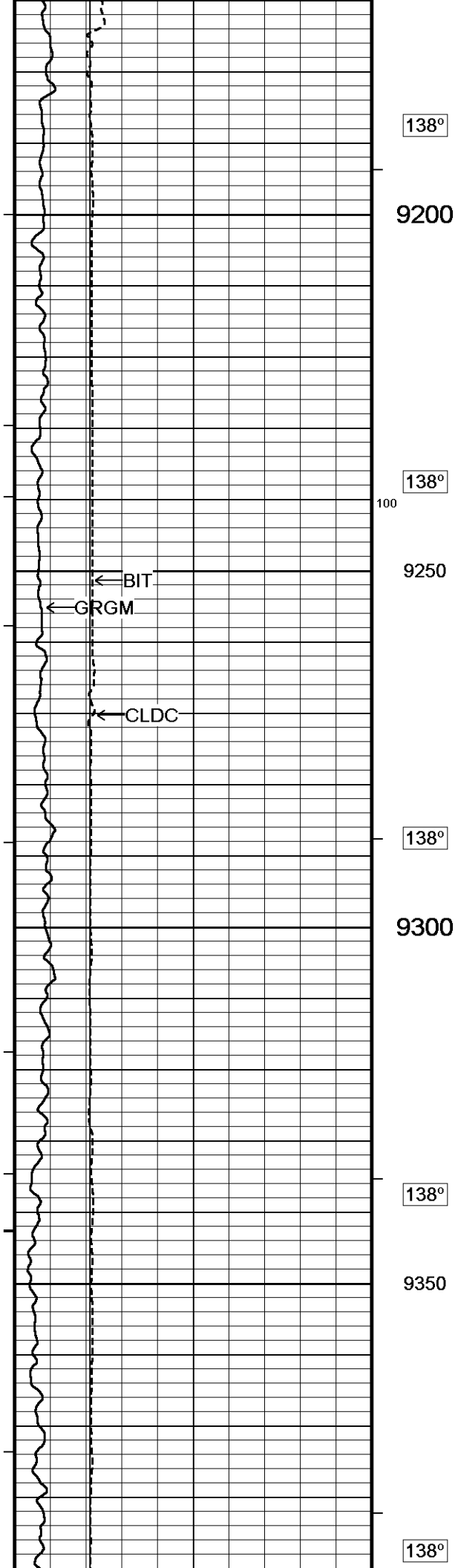


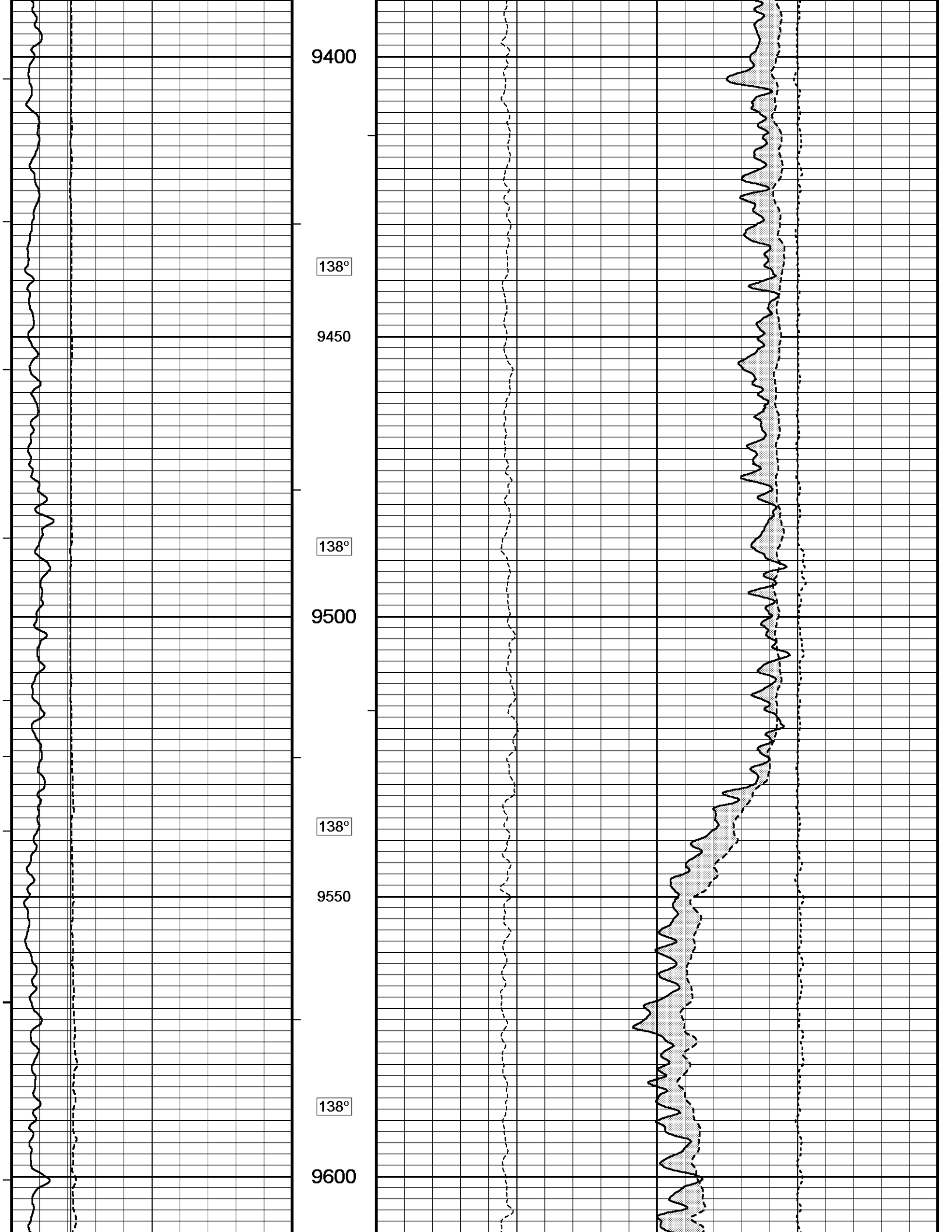


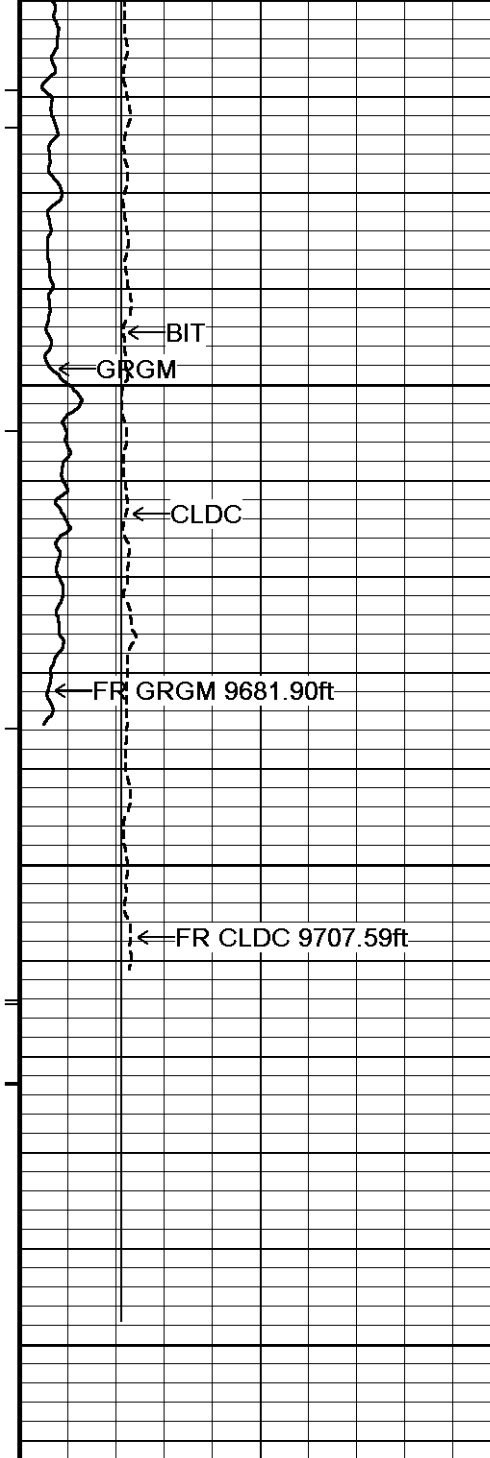












138°

9650

9700

9750

9762

Depth
In
Feet

Timing Marks
every 60.0 sec

Density Caliper
inches

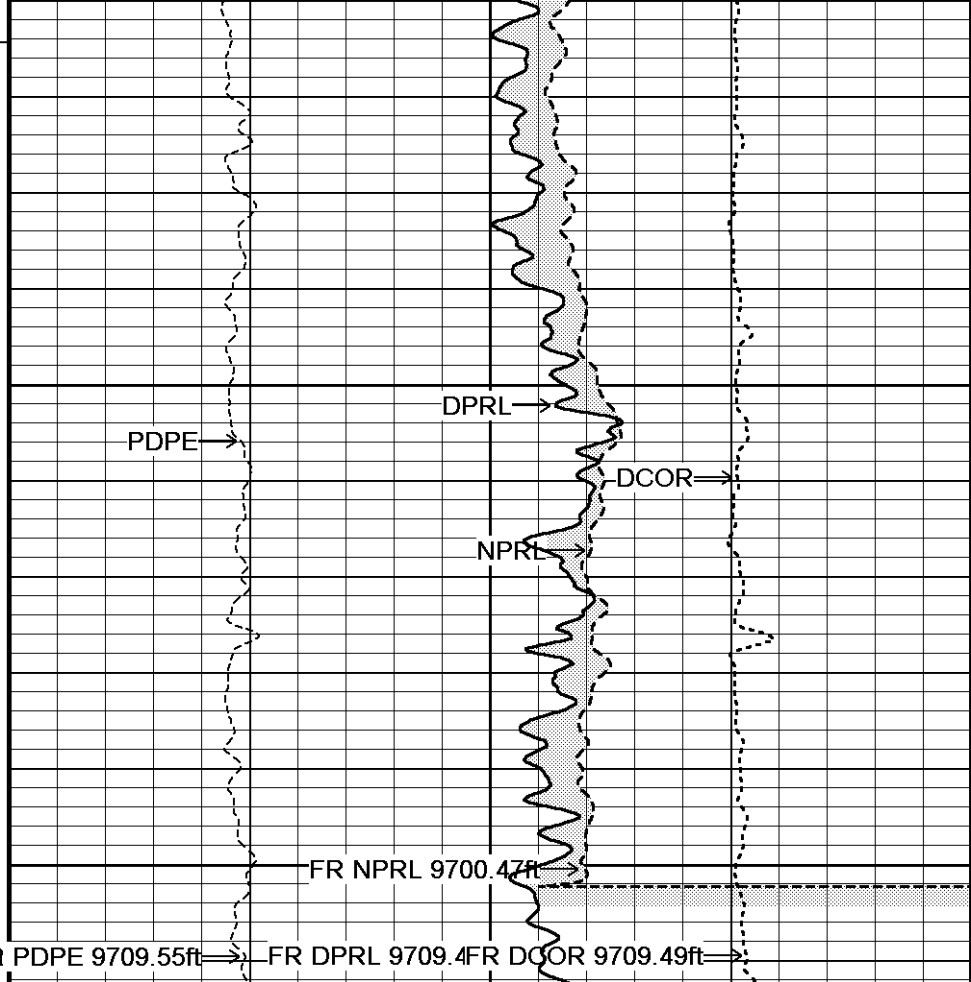
4 9 14

MGS Gamma Ray

0 75 150
150 225 300

Borehole
Temp in
deg F
HVI
every
10 cu ft

Annular
Integral
every
10 cu ft



FR PDPE 9709.55ft FR DPRL 9709.4ft FR NPRL 9700.47ft FR DCOR 9709.49ft

Limestone Neutron Por.
percent

30 20 10 0 -10

Limestone Density Por.
percent

30 20 10 0 -10

PE
barns/electron

Density Correction
grams/cc

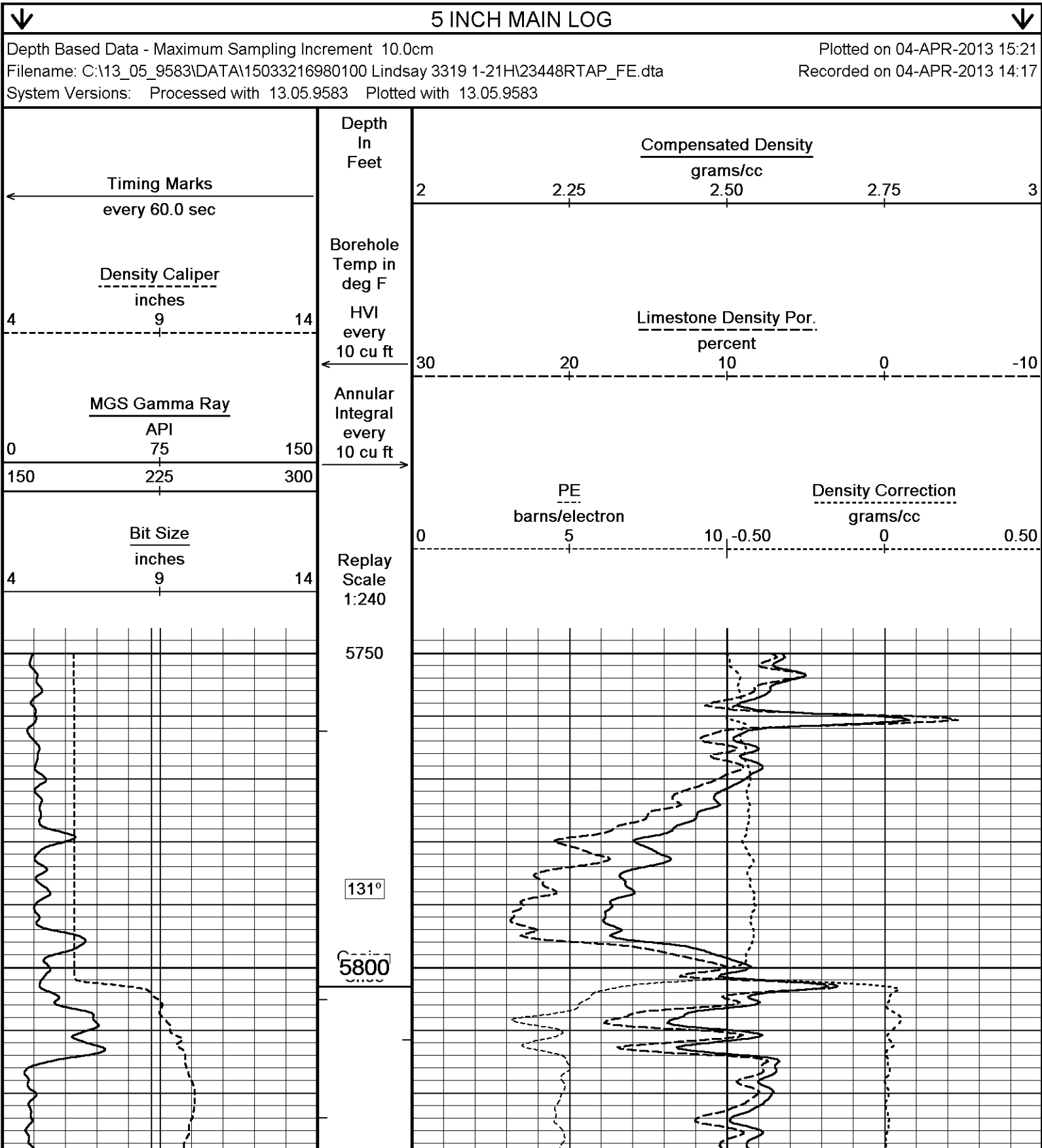
Bit Size
inches
4 9 14

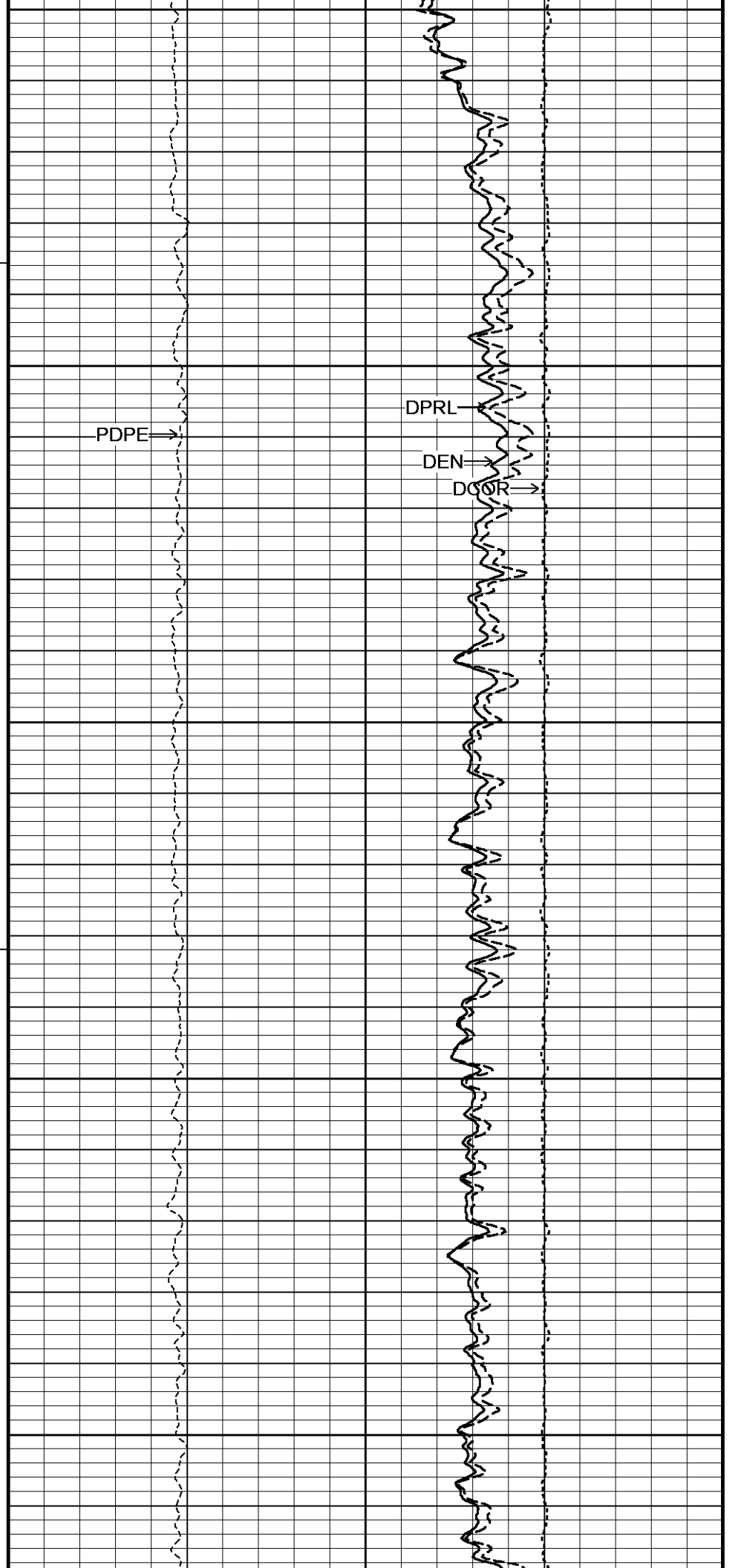
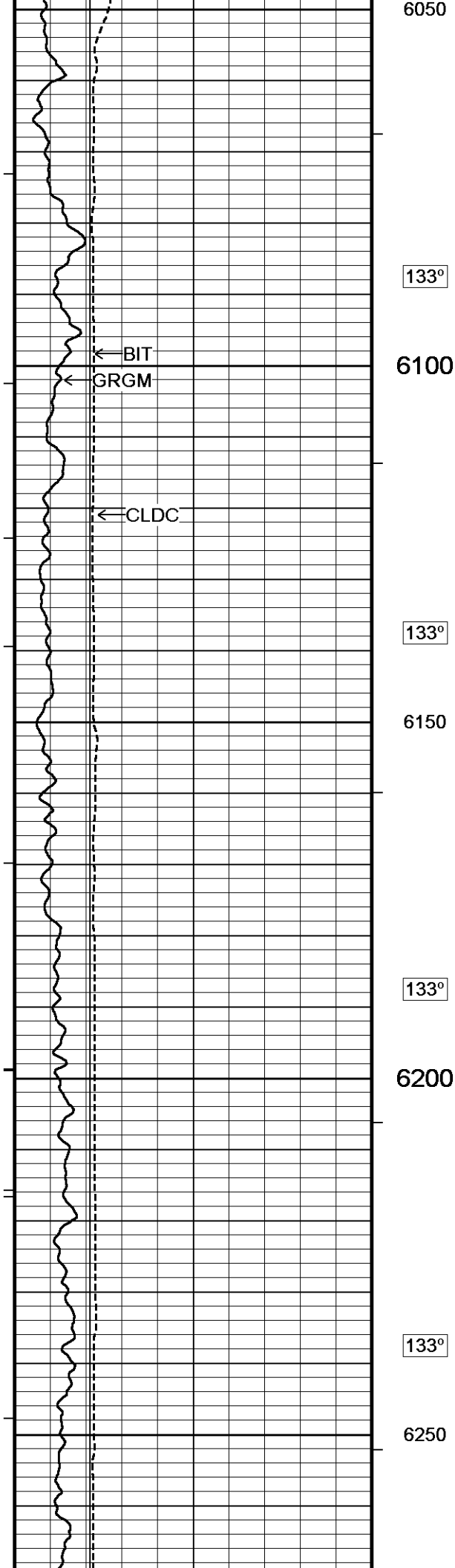
Replay
Scale
1:240

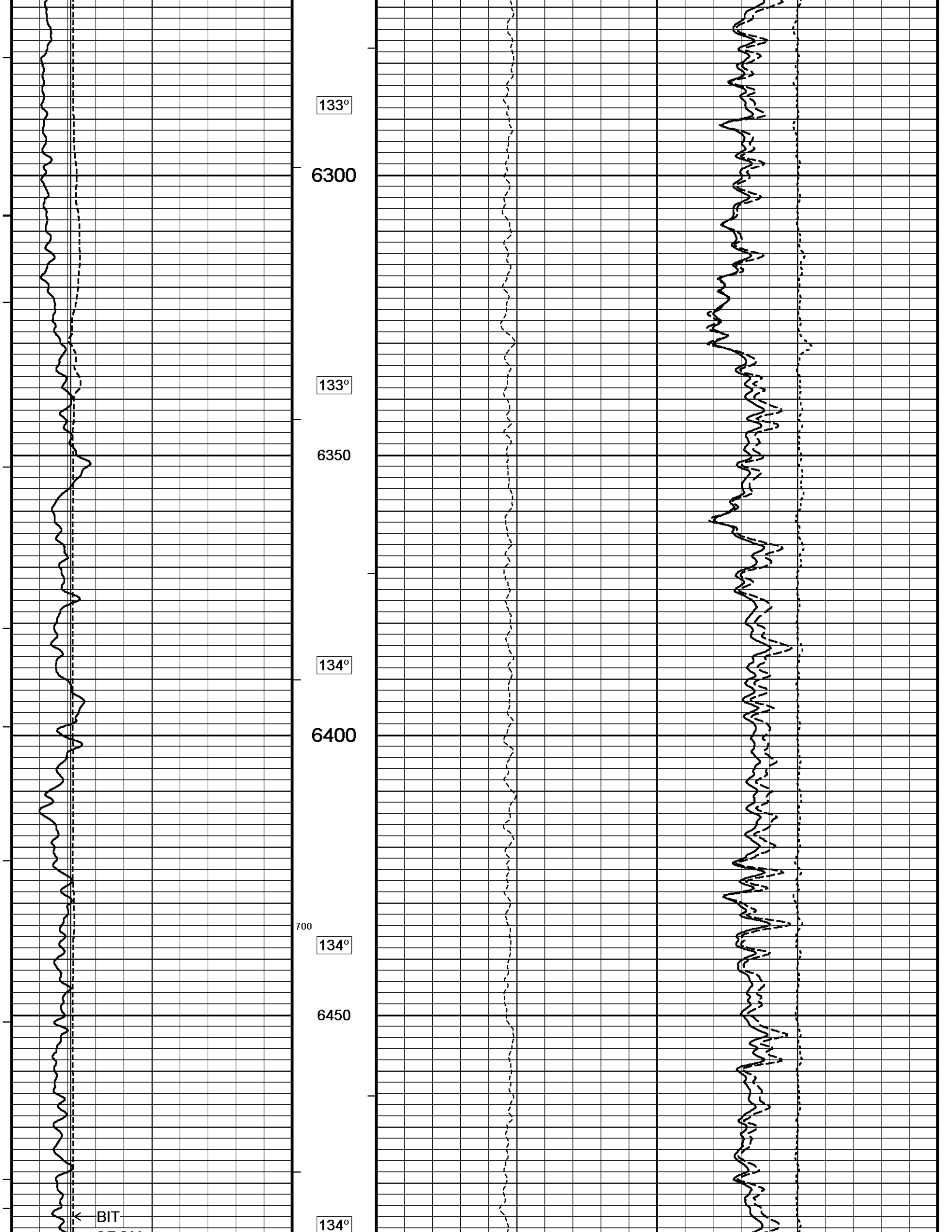
0 5 10 -0.50 0 0.50

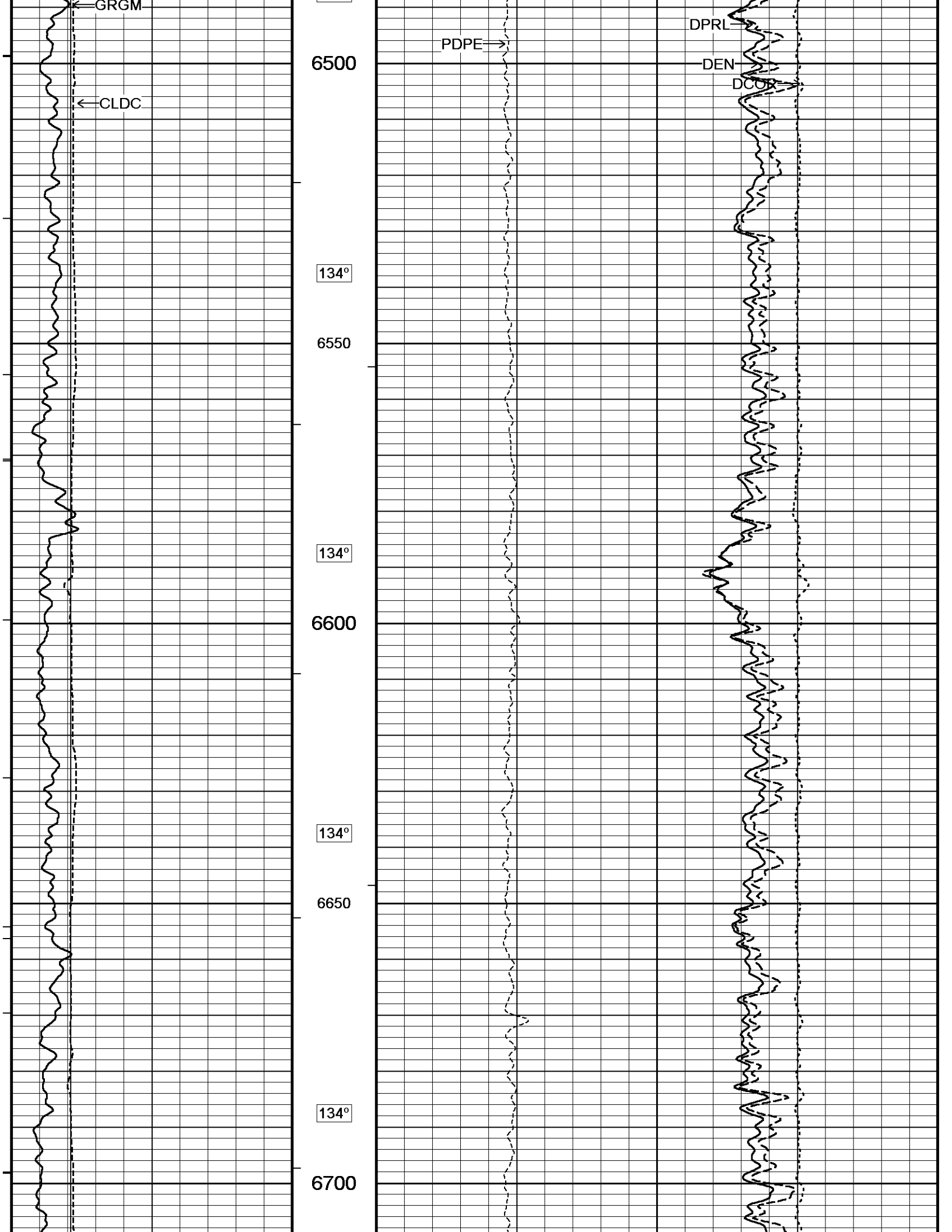
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\13_05_9583\DATA\15033216980100 Lindsay 3319 1-21H\23448RTAP_FE.dta
System Versions: Processed with 13.05.9583 Plotted with 13.05.9583

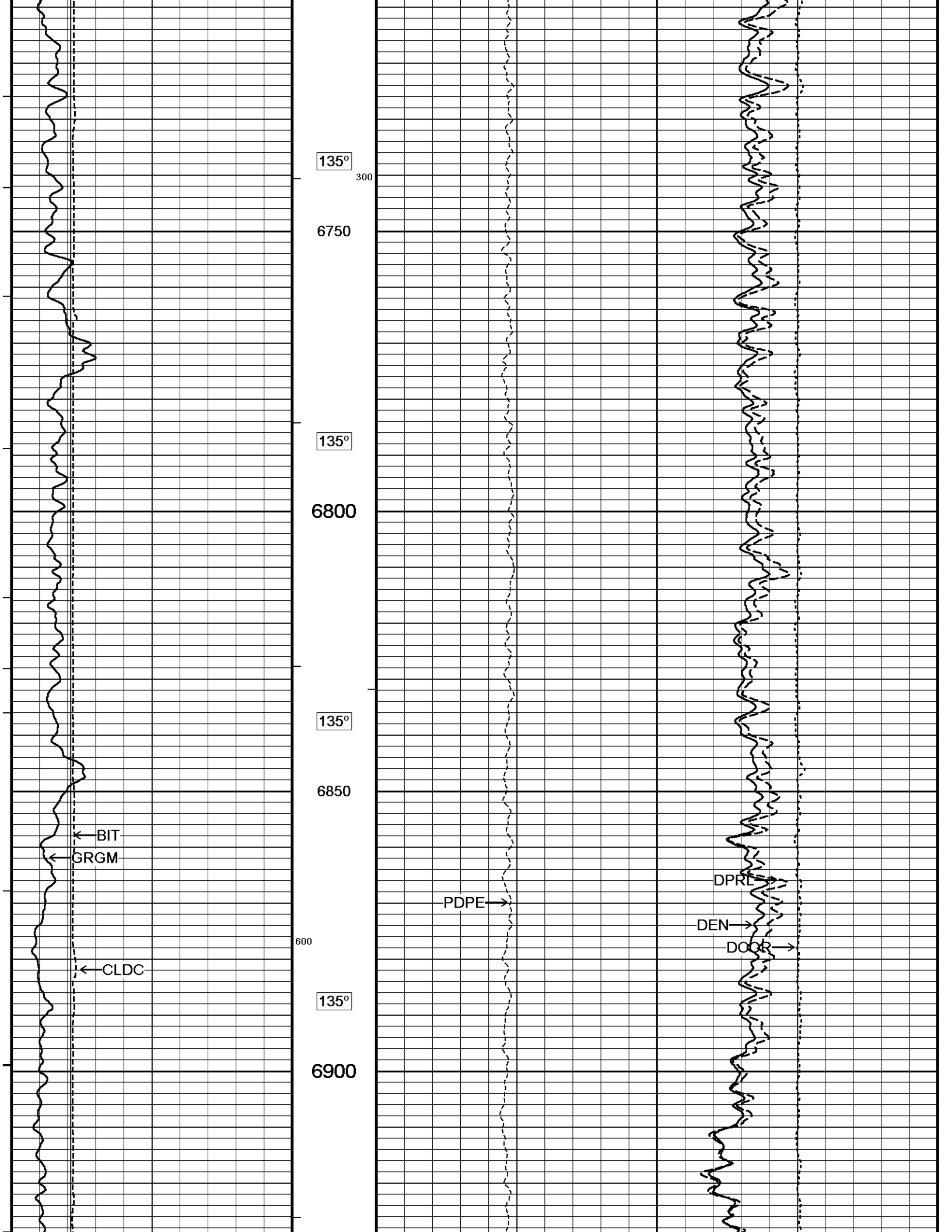
↑ 5 INCH MAIN LOG ↑

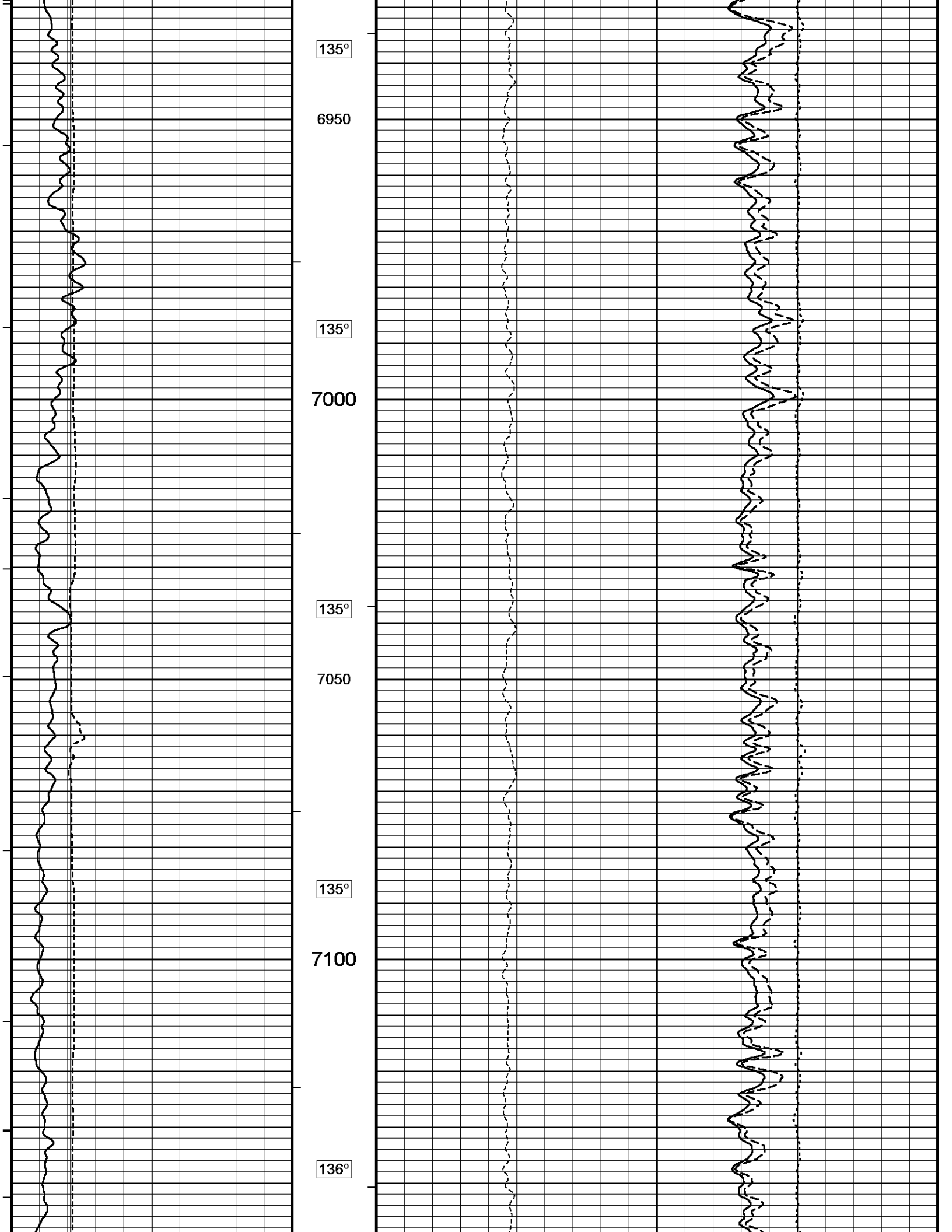


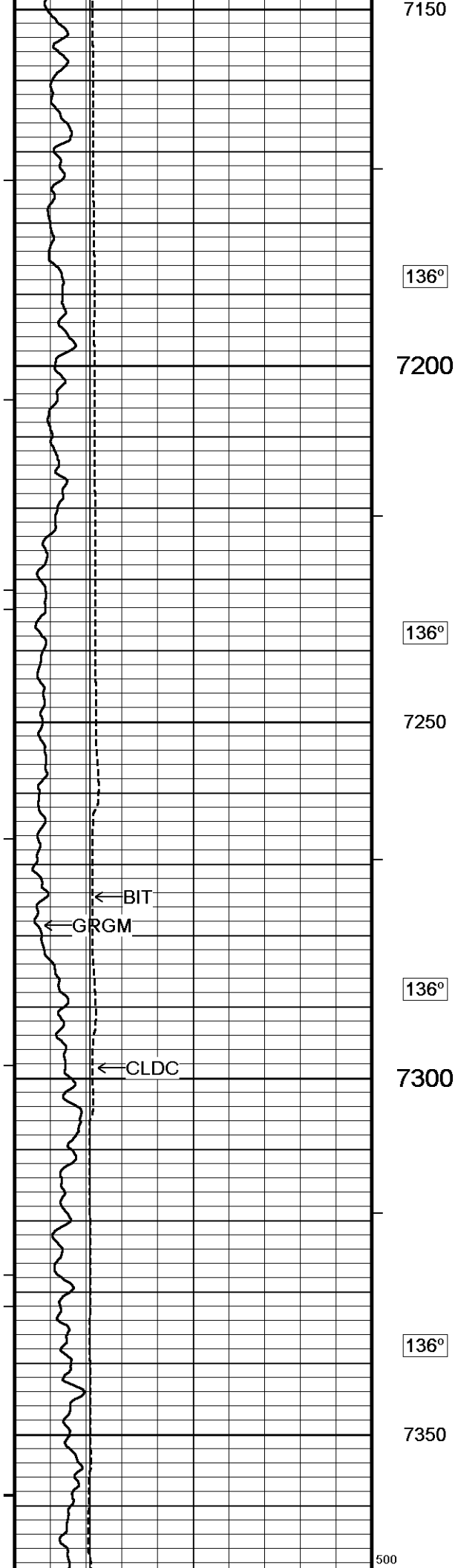




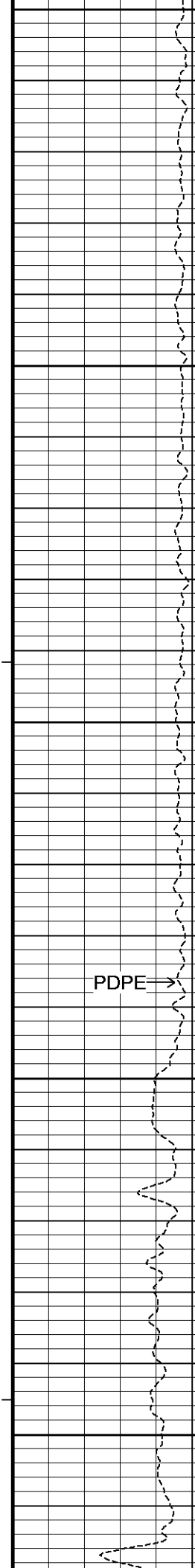




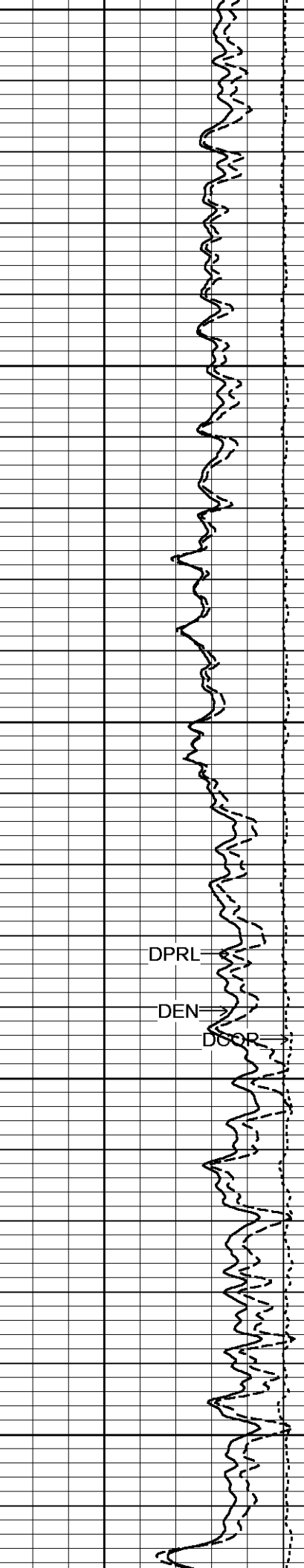




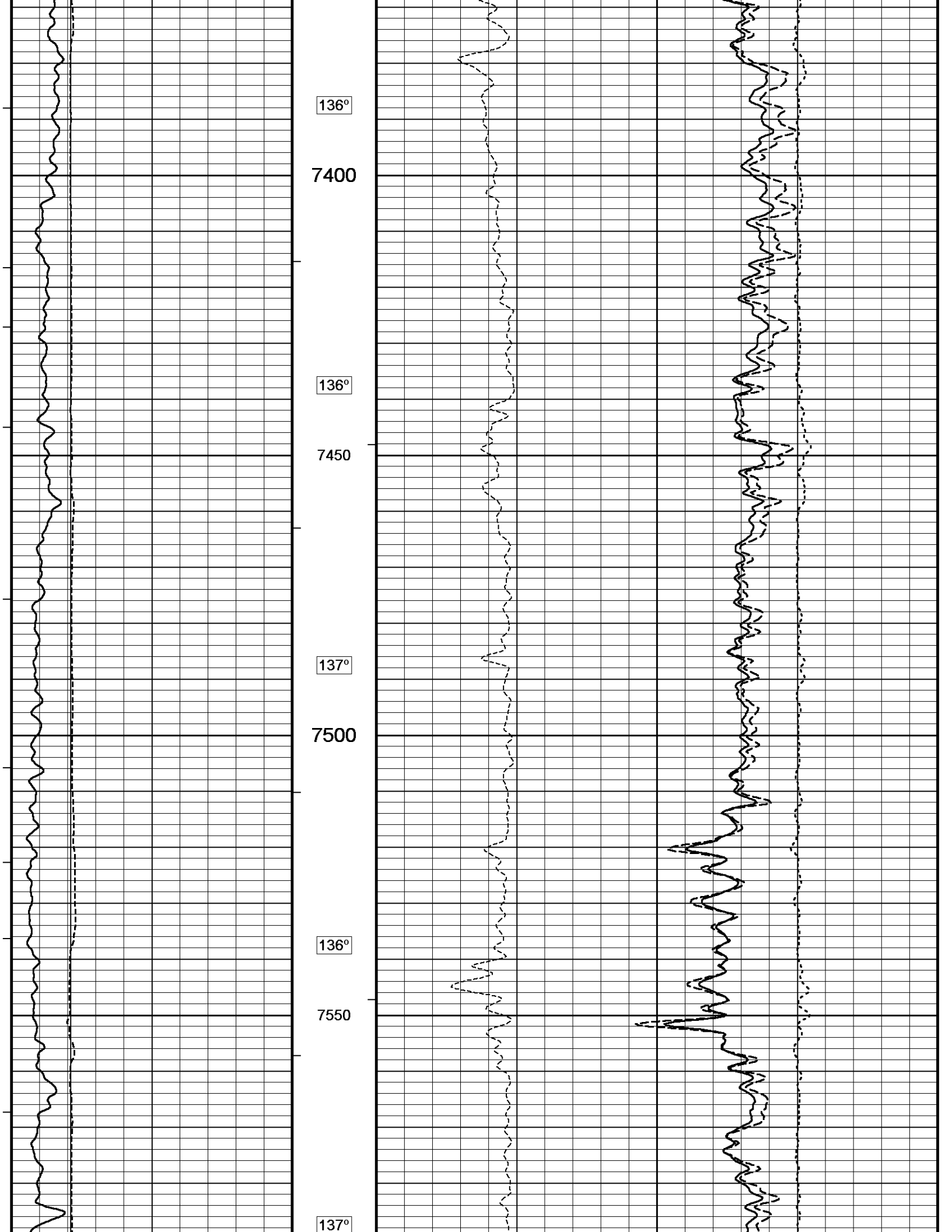
7150
136°
7200
136°
7250
136°
7300
136°
7350

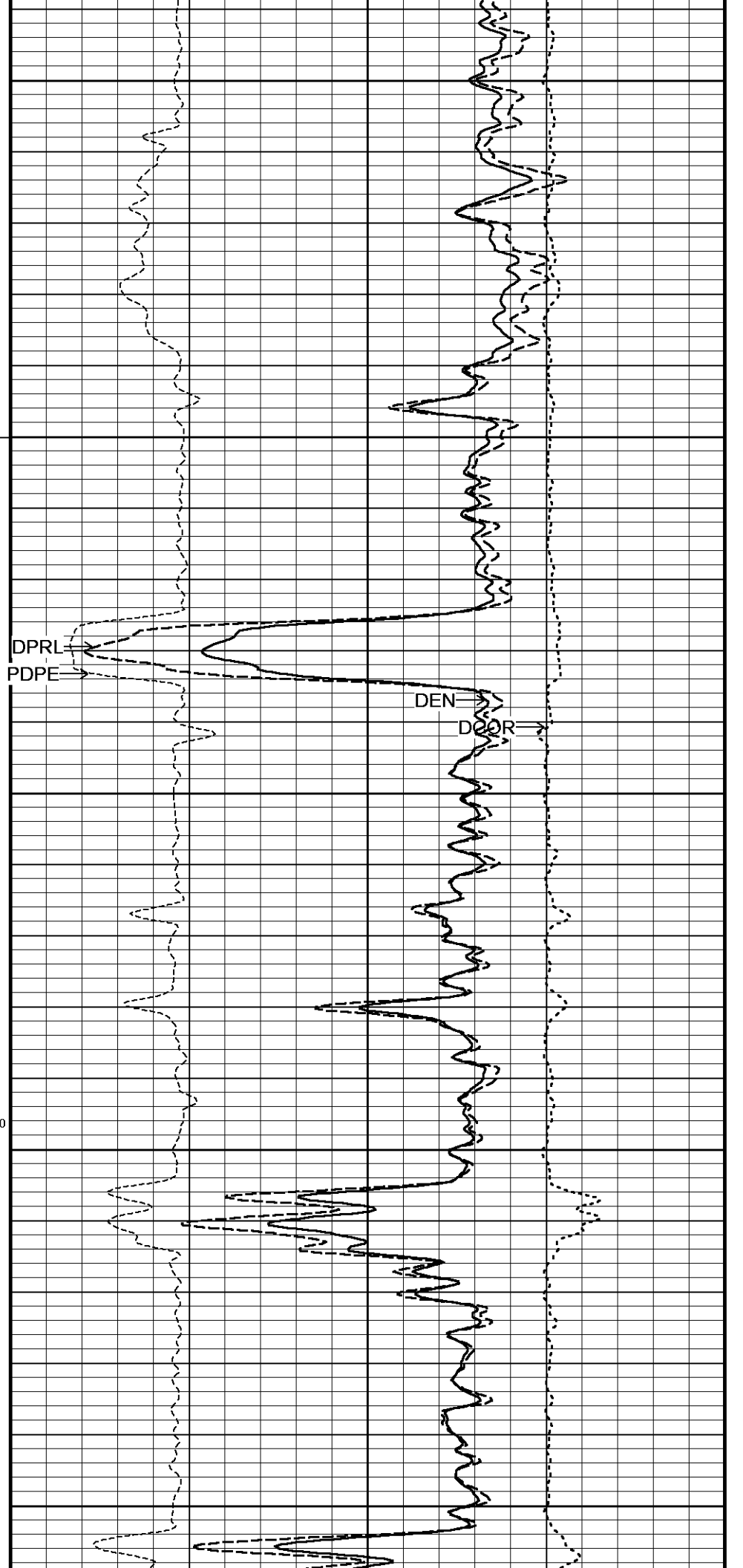
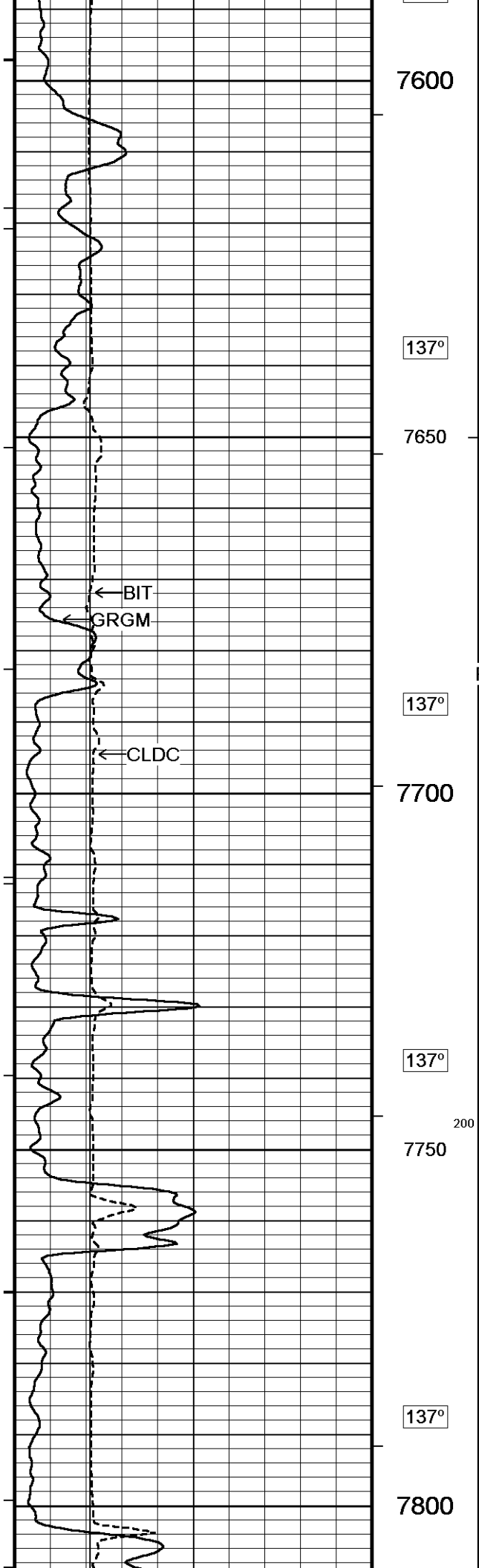


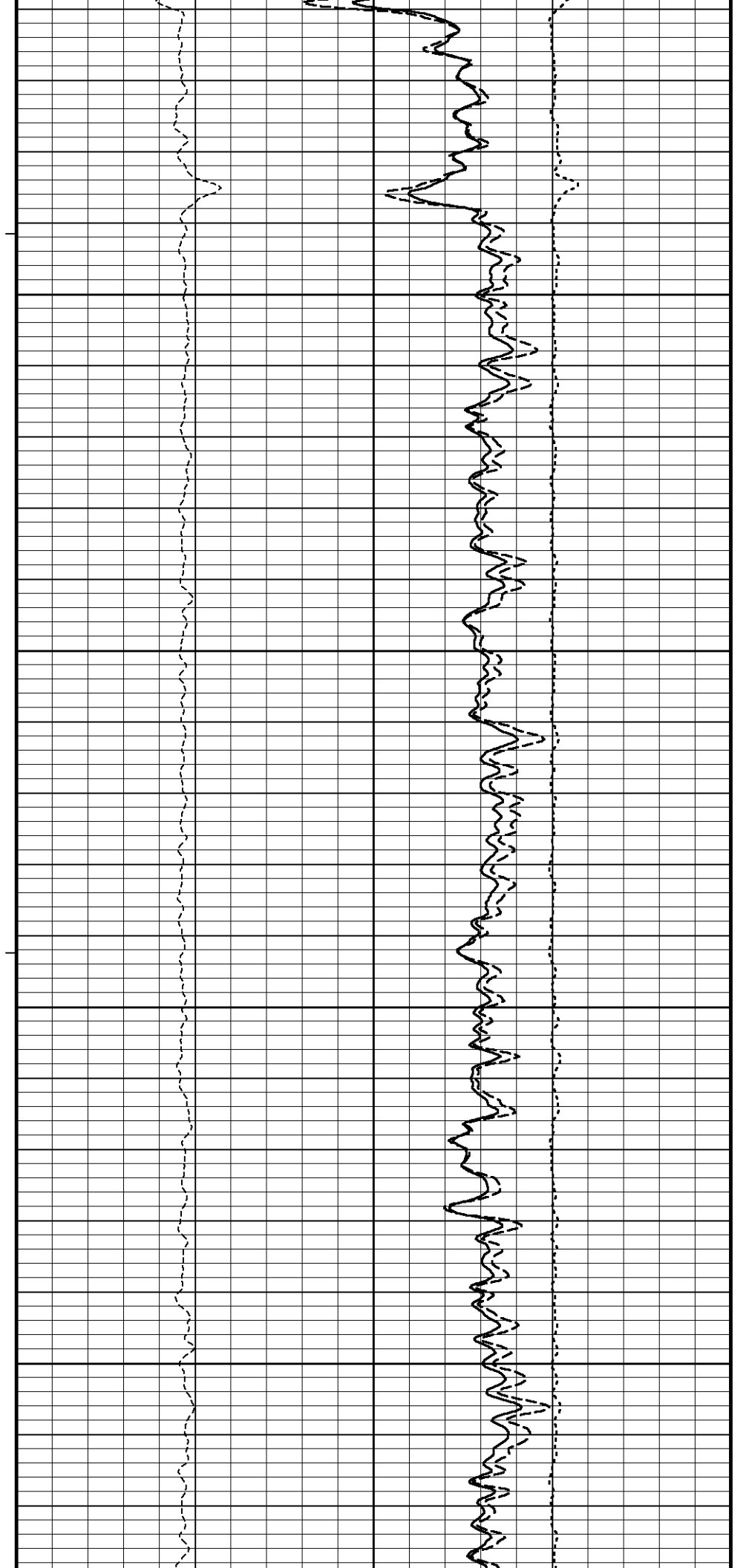
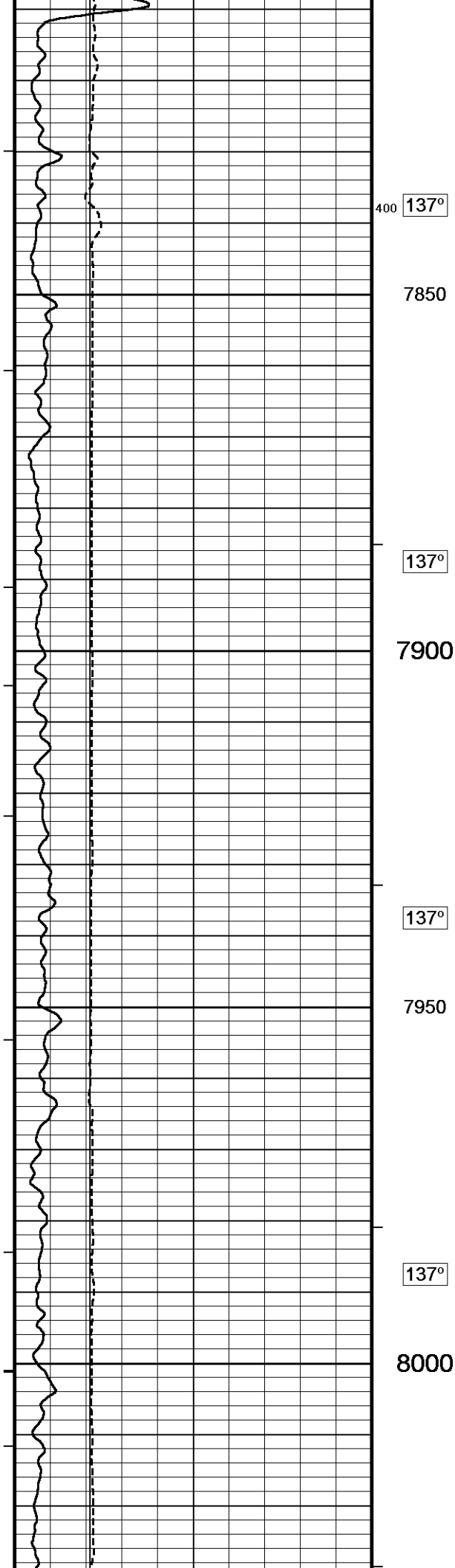
136°
136°
136°
136°

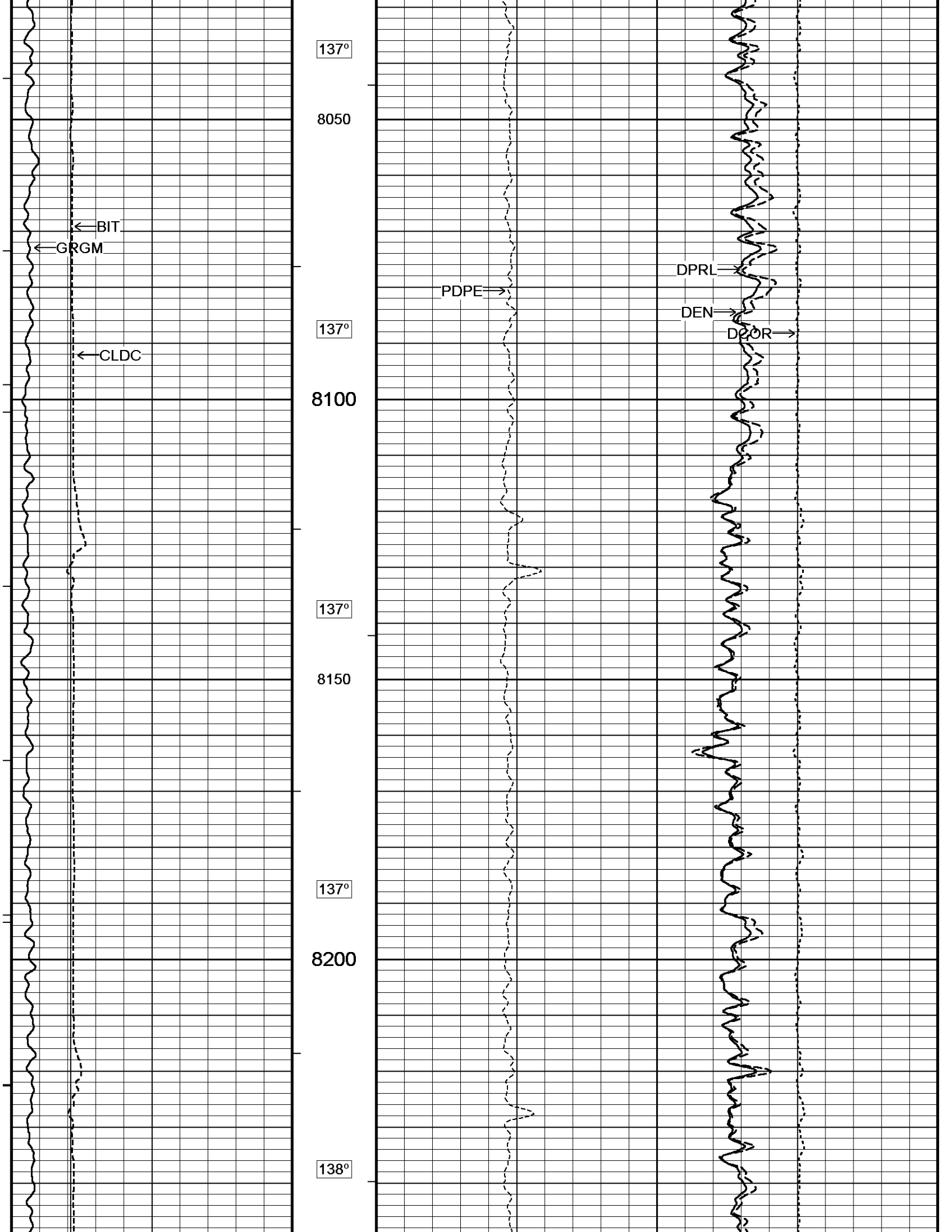


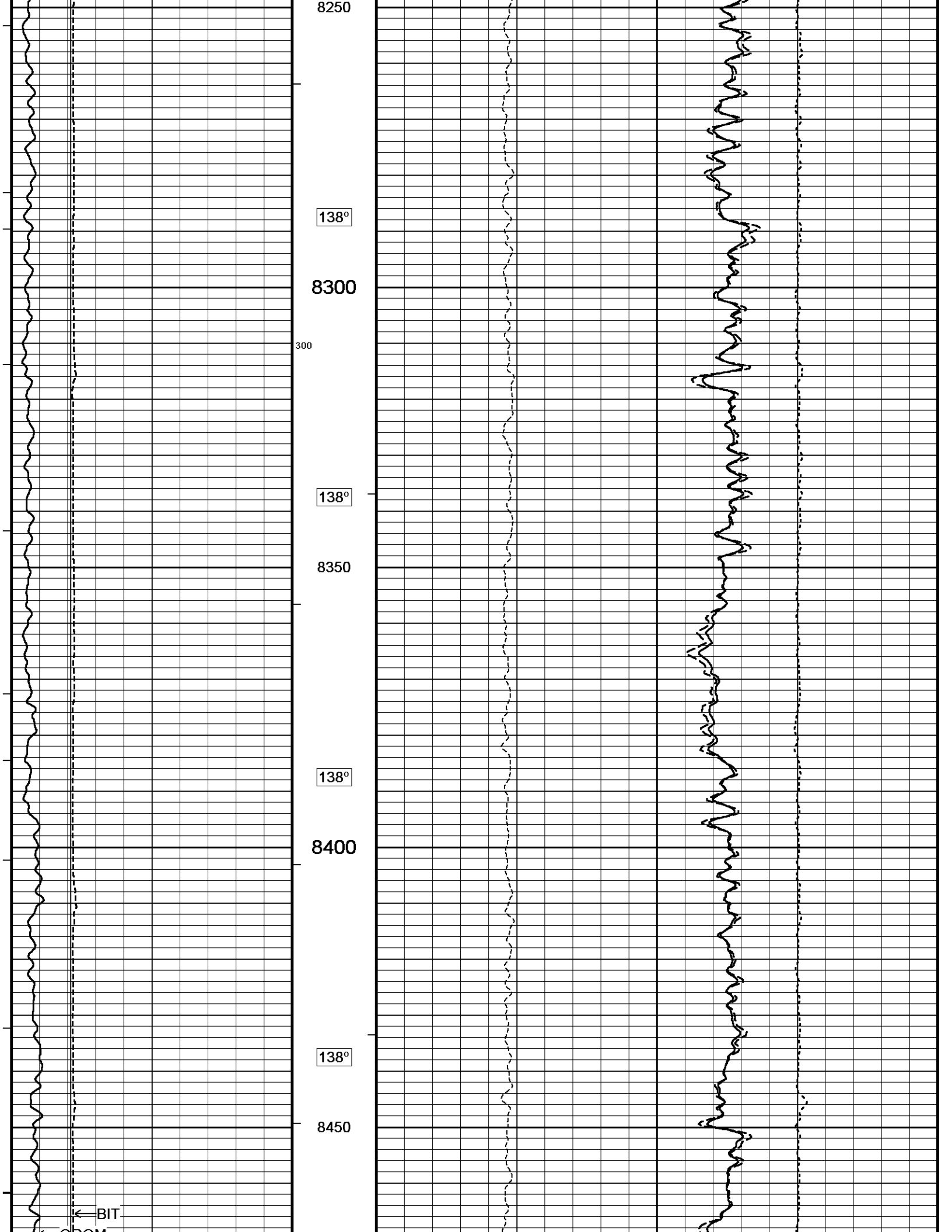
136°
136°
136°
136°

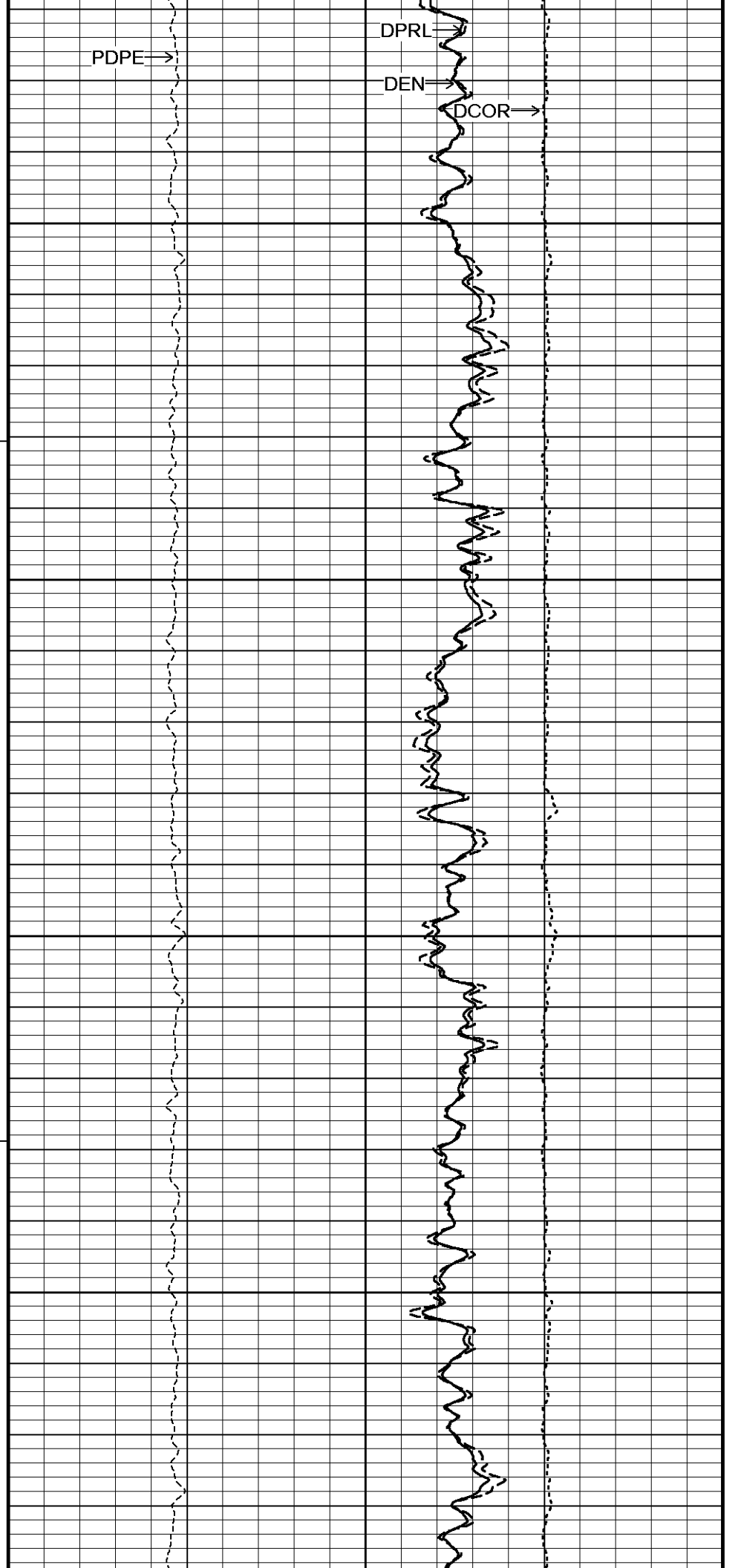
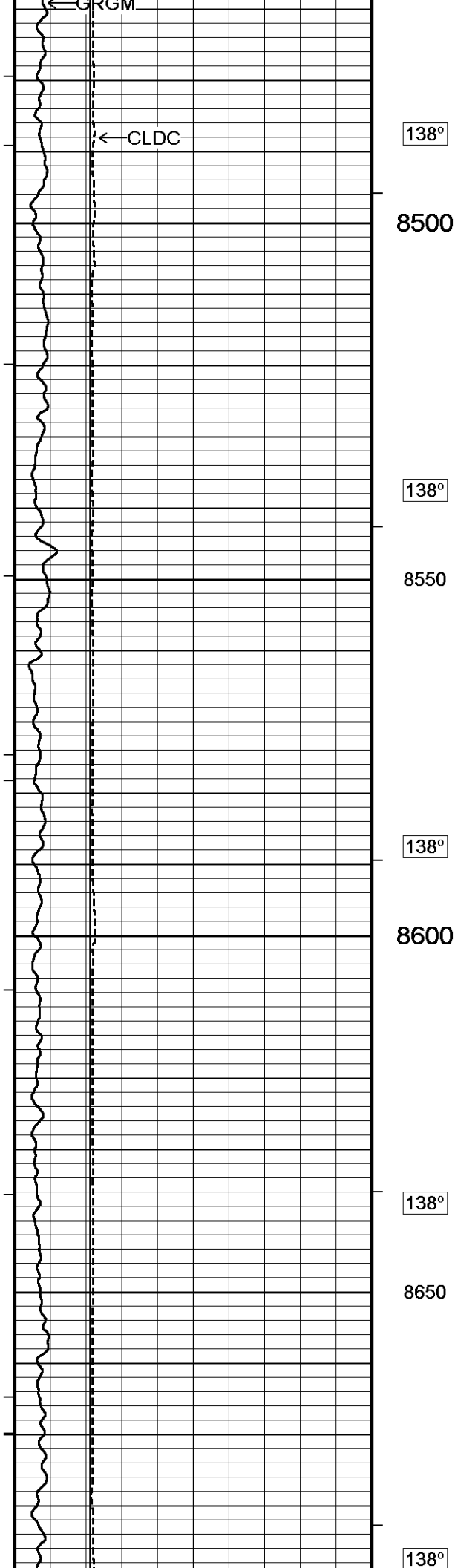


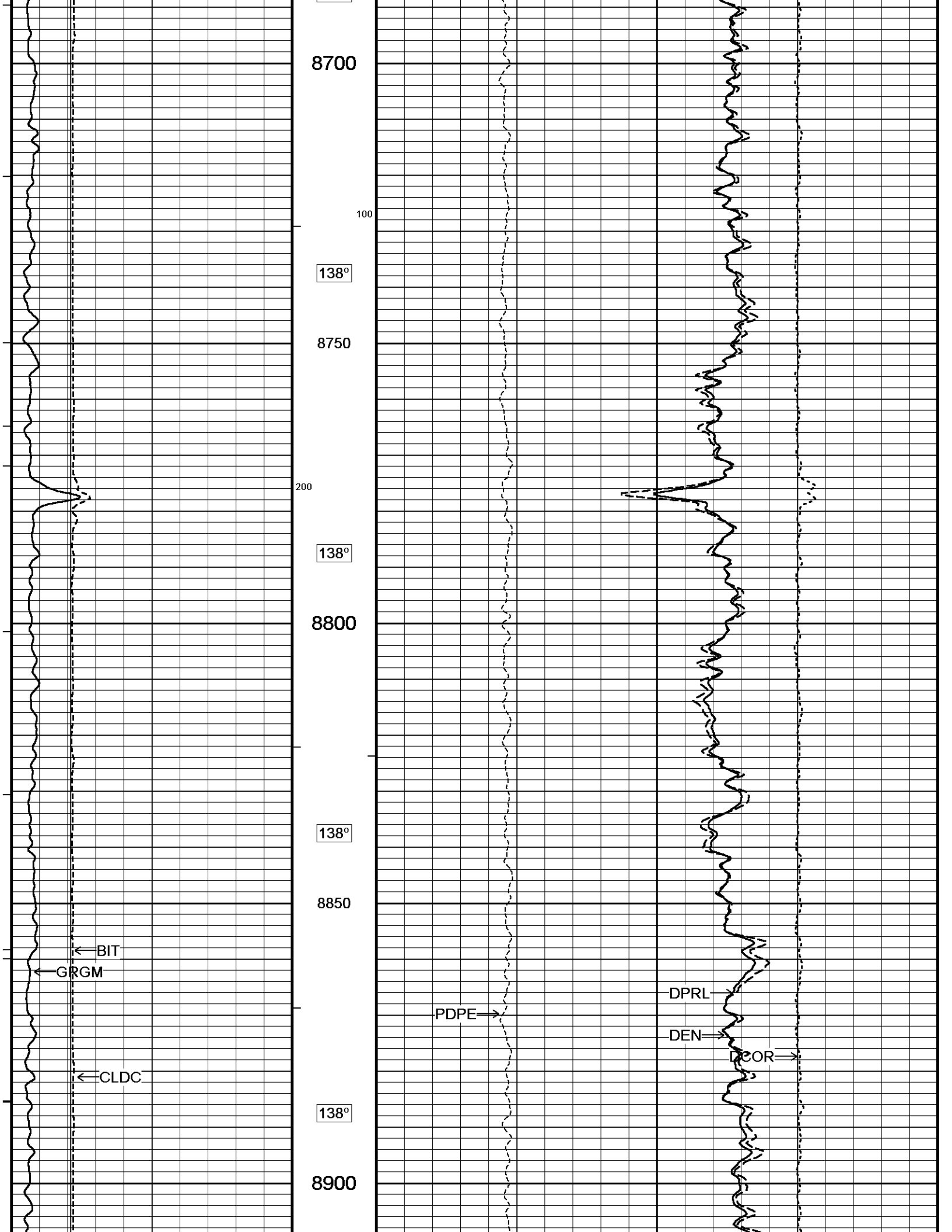


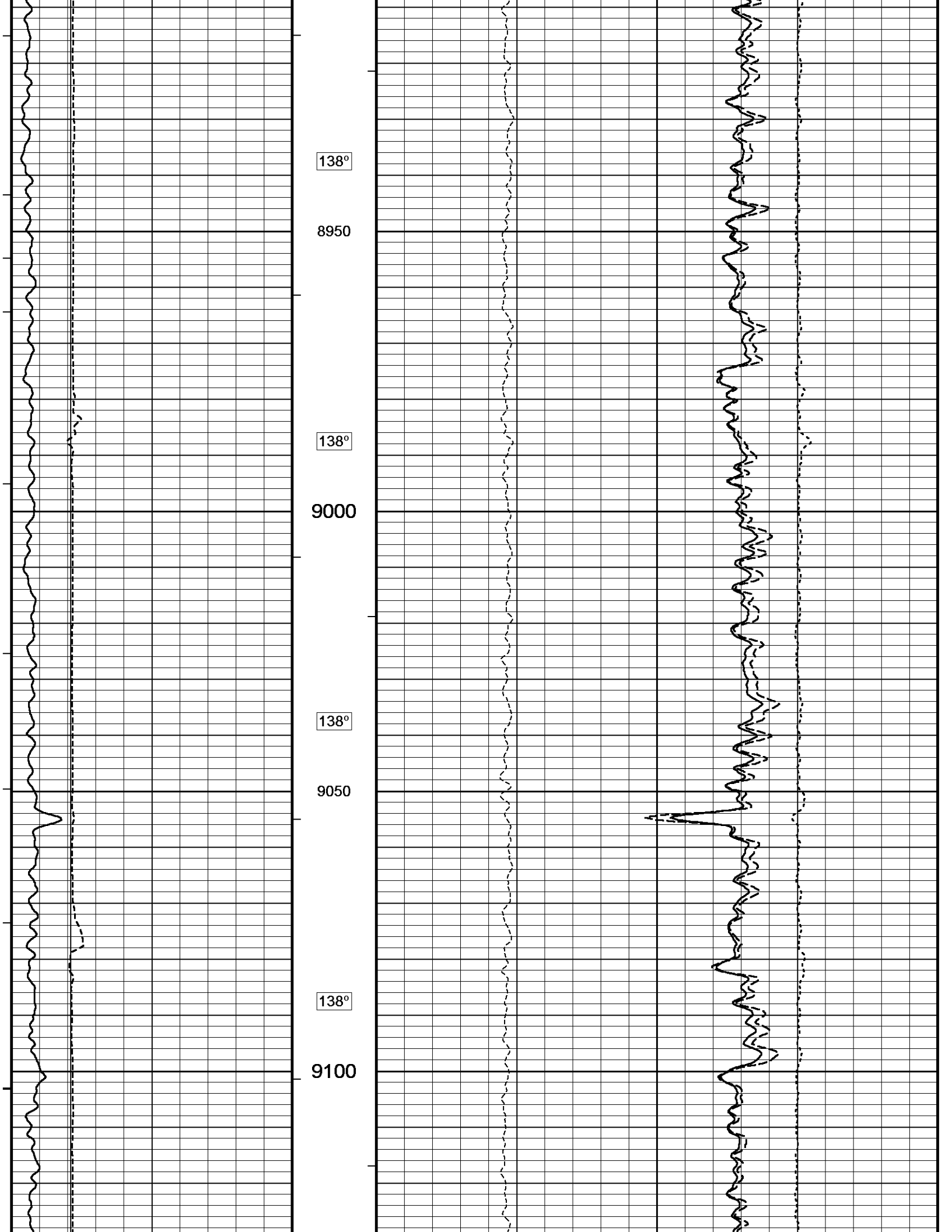


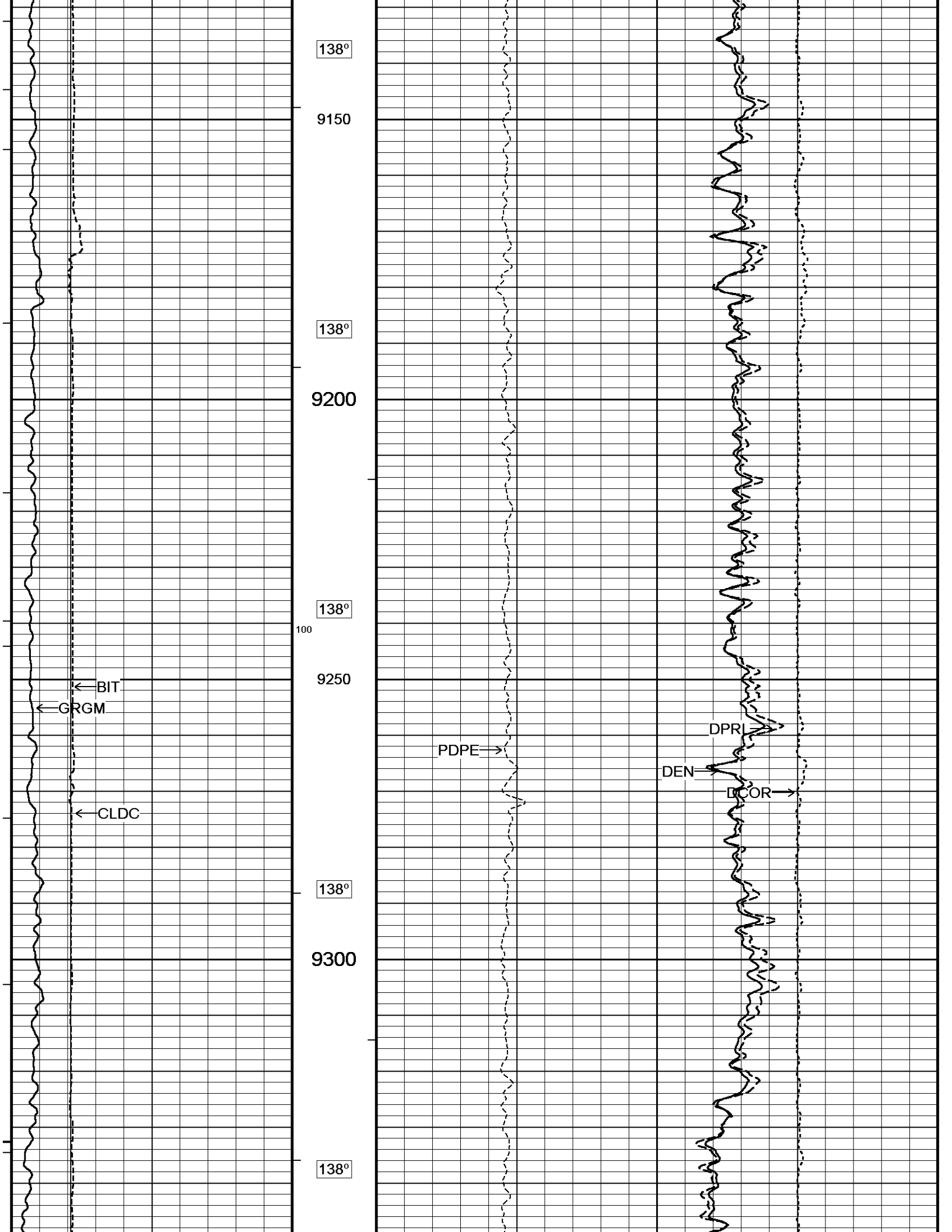


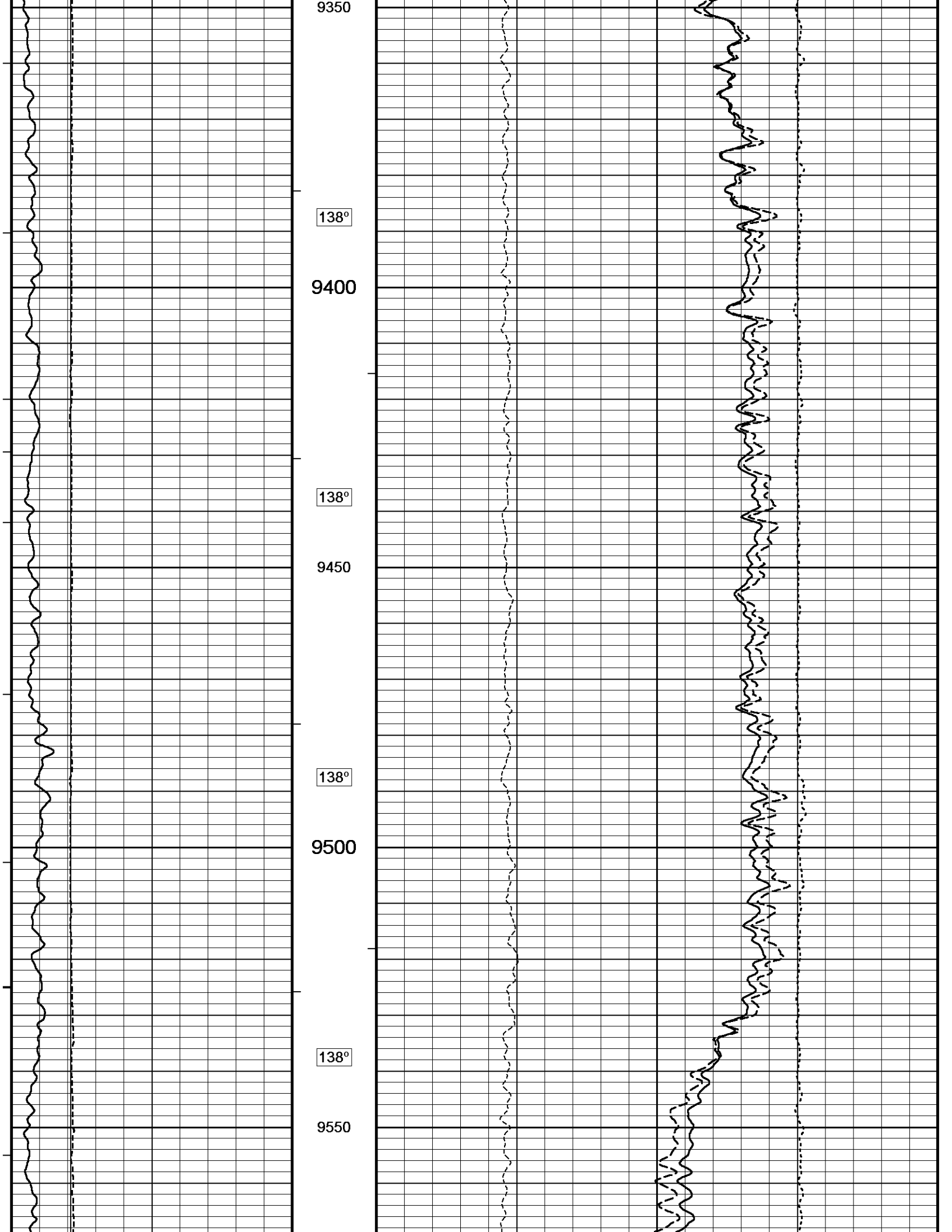


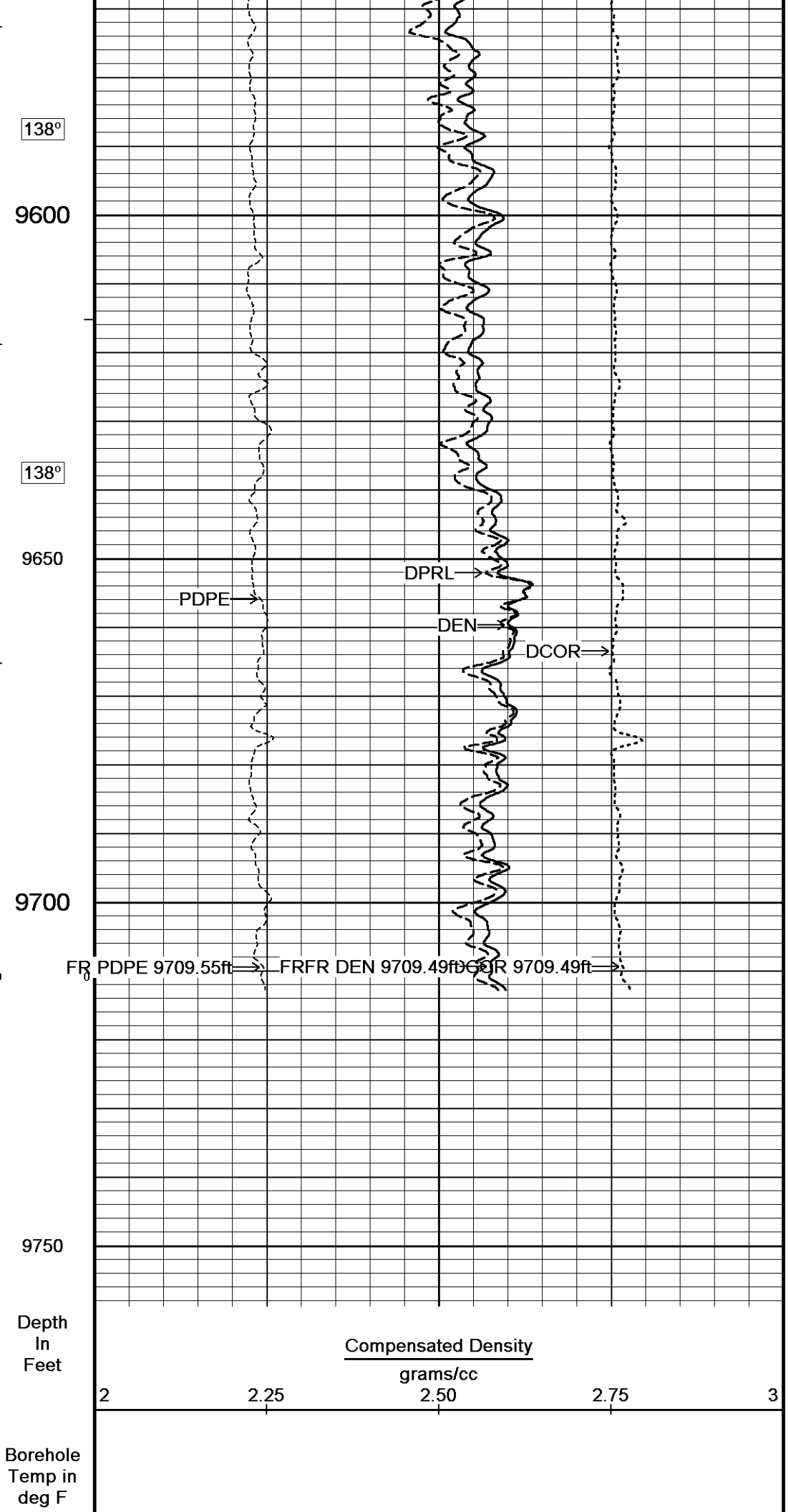
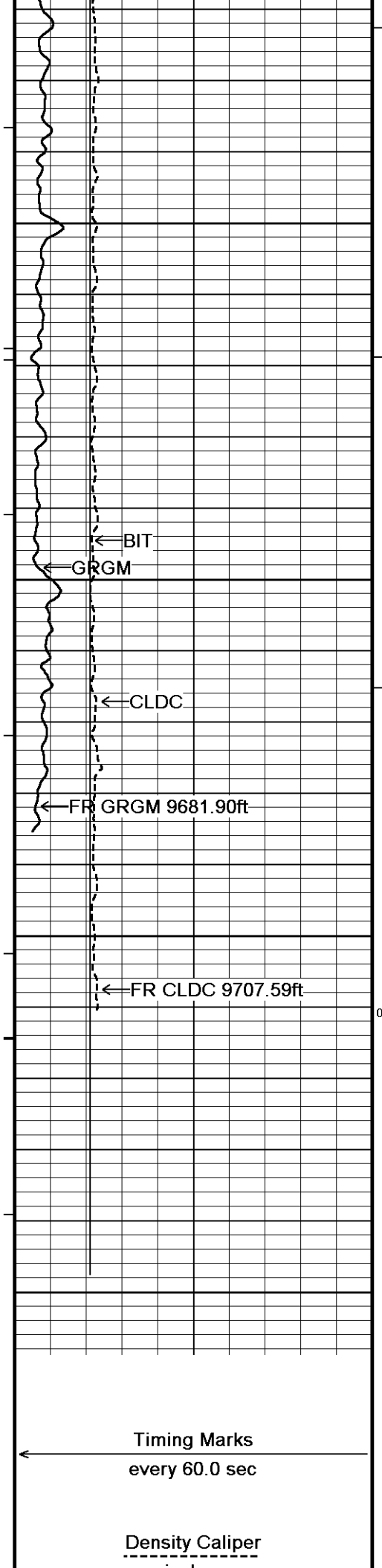


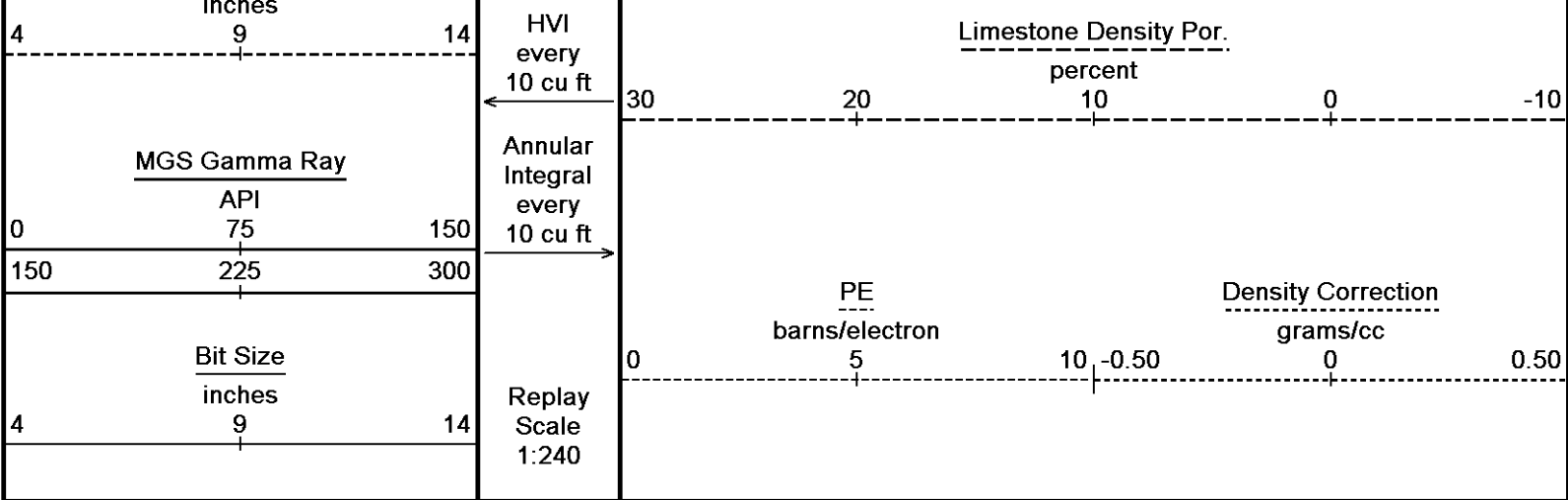












Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\13_05_9583\DATA\15033216980100 Lindsay 3319 1-21H\23448RTAP_FE.dta
System Versions: Processed with 13.05.9583 Plotted with 13.05.9583
Plotted on 04-APR-2013 15:21
Recorded on 04-APR-2013 14:17

5 INCH MAIN LOG

BEFORE SURVEY CALIBRATION
C:\13_05_9583\DATA\15033216980100 Lindsay 3319 1-21H\23448RTAP_FE.dta

General Constants All 000
Last Edited on 04-APR-2013,12:20

General Parameters		
Mud Resistivity	6.500	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	4.500	inches
Caliper for Differential Caliper	None	
Rwa Parameters		
Porosity used	Limestone Density Por.	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0
Field Calibration on 07-FEB-2006 14:19

Reading No	Measured	
1	16292.42	0.00
2	17072.79	420.00

Strain Gauge Constants MMS-E.B 165
Last Edited on 05-MAR-2013,02:14

Atmospheric Pressure		14.70	psi
Serial Number		262778	
Calibration Date		28-Dec-2010	
Base Check Date			
Dead Weight Serial Number		0	
Dead Weight Gravitational Correction		1.0	
Temperature	75.0	150.0	250.0
Pressure psia	Inc.	Dec.	Inc.
0.0	-0.111	-0.111	-0.108
3000.0	5.068	5.069	5.072
6000.0	10.256	10.260	10.261
9000.0	15.454	15.459	15.460
12000.0	20.663	20.666	20.669

15000.0	25.884	25.891	25.893	25.885
Gamma Calibration MGS-C.J 108				
		Measured	Calibrated (API)	Field Calibration on 03-APR-2013 15:04
Background		56	38	
Calibrator (Gross)		1317	895	
Calibrator (Net)		1261	857	

Gamma Constants MGS-C.J 108				
Last Edited on 03-APR-2013,21:07				
Gamma Calibrator Number		GRCG073		
Mud Density		1.07	gm/cc	
Caliper Source for Processing		Density Caliper		
Tool Position		Eccentred		
Concentration of KCl			kppm	
K Mud Type		Chloride		
K Mud Concentration		0.00	%	

SP Calibration MGS-C.J 108				
Field Calibration on 30-MAR-2013,06:00				
		Measured	Calibrated (mV)	
Reference 1		100.0	100.0	
Reference 2		-100.0	-100.0	

High Resolution Temperature Calibration MGS-C.J 108				
Field Calibration on 30-MAR-2013,06:00				
		Measured	Calibrated(Deg F)	
Lower		0.00	0.00	
Upper		0.00	0.00	

High Resolution Temperature Constants MGS-C.J 108				
Last Edited on 03-APR-2013,14:59				
Pre-filter Length		11		

Neutron Calibration MDN-B.J 422				
Base Calibration on 02-APR-2013 09:27 Field Check on 03-APR-2013 15:13				
Base Calibration				
		Measured	Calibrated (cps)	
	Near	Far	Near	Far
	3035	92	3714	110
Ratio		32.903	33.764	
Field Calibrator at Base				
			Calibrated (cps)	
			2275	3356
Ratio			0.678	
Field Check				
			Calibrated (cps)	
Ratio			0.644	

Neutron Constants MDN-B.J 422				
Last Edited on 03-APR-2013,21:07				
Neutron Source Id		HN553		
Neutron Jig Number		N639		
Epithermal Neutron		No		
Caliper Source for Processing		Density Caliper		
Stand-off		0.00	inches	
Mud Density		1.07	gm/cc	
Limestone Sigma		7.10	cu	
Sandstone Sigma		4.26	cu	
Dolomite Sigma		4.70	cu	
Formation Pressure Source		None		
Formation Pressure		N/A	kpsi	
Temperature Source	MGS External Temperature			
Temperature		N/A	degrees F	
Mud Salinity		0.00	kppm	
Salinity Correction		Not Applied		
Formation Fluid Salinity Source		None		
Formation Fluid Salinity		N/A	kppm	
Barite Mud Correction		Not Applied		

FE Calibration MFE-C.A 396				
Base Calibration on 01-APR-2013 12:14 Field Check on 03-APR-2013 14:57				

Base Calibration		Measured	Calibrated (ohm-m)
Reference 1		0.0	0.0
Reference 2		961.7	126.8
Base Check			281.8
Field Check			281.8

FE Constants MFE-C.A 396

Last Edited on 03-APR-2013,14:56

Running Mode	No Sleeve
MFE K Factor	0.1268
Caliper Source for FE correction	Density Caliper
Caliper Value for FE correction	N/A inches
Rm Source for FE correction	Temperature Corr
Temp. for Rm Corr.	MGS External Temperature
Stand-off	0.5 inches

Induction Calibration MAI-B.J 394

Base Calibration on 09-FEB-2013,18:02

Field Check on 03-APR-2013 14:55

Base Calibration		Measured		Calibrated (mmho/m)	
Test Loop Calibration					
Channel	Low	High	Low	High	
1	16.7	473.5	9.3	966.2	
2	5.6	368.9	7.6	821.4	
3	3.3	256.4	5.2	566.0	
4	1.8	133.4	2.6	279.2	

Array Temperature 71.8 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			12.3	3829.9
2			31.7	3651.2
3			28.9	3084.6
4			19.6	2069.7
Deep			16.3	1913.3
Medium			43.3	4145.6
Shallow			49.4	5536.7

Array Temperature 45.3 Deg F

Induction Constants MAI-B.J 394

Last Edited on 04-APR-2013,12:20

Induction Model	RtAP-WBM
Caliper for Borehole Corr.	Density Caliper
Hole Size for Borehole Correction	N/A inches
Tool Centred	No
Stand-off Type	Fins
Stand-off	0.50 inches
Number of Fins on Stand-off	6.0000
Stand-off Fin Angle	60.00 degrees
Stand-off Fin Width	0.5000 inches
Borehole Corr. Rm Source	Temperature Corr
Temp. for Rm Corr.	MGS 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

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	

High Resolution Temperature Calibration MAI-B.J 394

Field Calibration on 03-APR-2013,14:52

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

High Resolution Temperature Constants MAI-B.J 394

Last Edited on 03-APR-2013,14:52

Pre-filter Length	11
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Caliper Calibration MPD-D.A 472

Base Calibration on 01-APR-2013 11:55

Field Calibration on 03-APR-2013 14:58

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18294	4.00
2	27757	5.98
3	37451	7.96
4	47445	9.86
5	58536	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.99	5.98

Photo Density Calibration MPD-D.A 472

Base Calibration on 01-APR-2013 11:33

Field Check on 01-APR-2013 11:46

Density Calibration

Base Calibration	Measured	Calibrated (sdu)
	Near	Far
Reference 1	59828	30798
Reference 2	25544	2871

Field Check at Base	1197.3	1459.7
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Field Check	1198.1	1464.0
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PE Calibration

Base Calibration	Measured	Calibrated
	WH	Ratio
Background	232	1068
Reference 1	26692	59617
Reference 2	8016	25400

Field Check at Base	232.5	1067.8
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Field Check	234.0	1068.7
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Density Constants MPD-D.A 472

Last Edited on 03-APR-2013,21:06

Density Source Id	P74840B
Nylon Calibrator Number	DNCE766
Aluminium Calibrator Number	DHCG856
Density Shoe Profile	4 inch
Caliper Source for Processing	Density Caliper
PE Correction to Density	Not Applied
Mud Density	1.07

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
0.00	0.00

DOWNHOLE EQUIPMENT

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Shuttle Running Tool 3.5"
SRT-A.A 76 LG: 6.62 ft WT: 37.5 lb OD: 2.52 in

MBS-F.A 200v Compact Battery Sub
MBS-F.A 135 LG: 10.61 ft WT: 70.5 lb OD: 2.24 in

Compact Memory Sub E.B
MMS-E.B 165 LG: 5.20 ft WT: 37.5 lb OD: 2.24 in

Compact Tool Isolator sub.
MTI-B.A 68 LG: 1.54 ft WT: 13.2 lb OD: 2.24 in



Compact Short Gamma
MGS-C.J 108 LG: 3.41 ft WT: 24.3 lb OD: 2.24 in

61.76 ft GRGM - MGS Gamma Ray

Compact Collar Locator
MCL-B.J 49 LG: 3.17 ft WT: 26.5 lb OD: 2.24 in

59.77 ft GSXT - MGS External Temperature

SKJ-E.B Compact Knuckle Joint
SKJ-E.B 455 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

57.75 ft GCSL - MCL C. Collar Locator

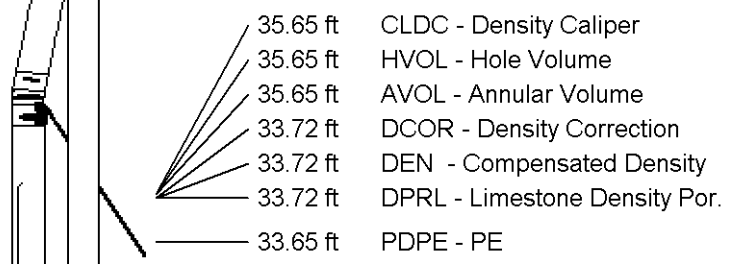
SHA-H Compact Swivel Head Adaptor
SHA-H 185 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub
MIS-D.A 310 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact Neutron
MDN-B.J 422 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

42.89 ft NPRL - Limestone Neutron Por.

Compact Density/Caliper
MPD-D.A 472 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in



MIS-D.B Compact Inline Bowspring sub
 MIS-D.B 733 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SHA-J.B Compact Swivel Head Adaptor
 SHA-J.B 594 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint
 SKJ-D.A 140 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-E.A Compact Inline Standoff sub
 MIS-E.A 202 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

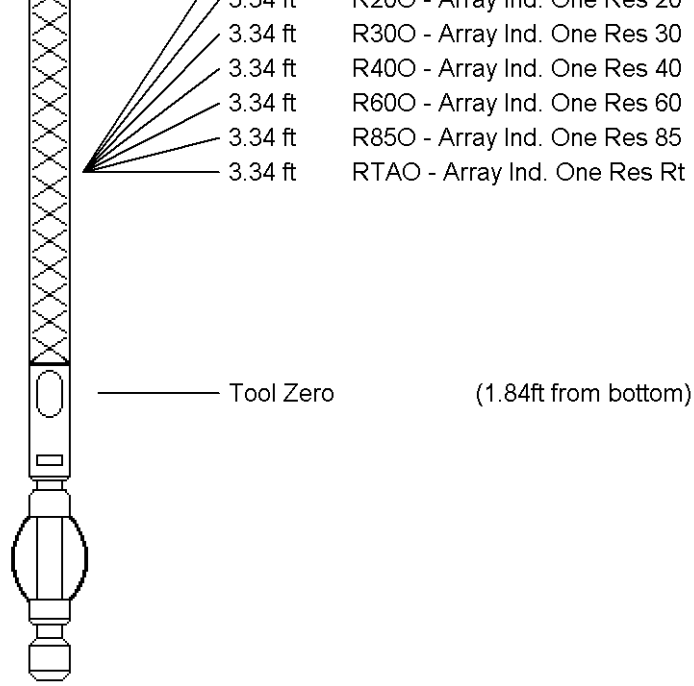
Compact Focussed Electric
 MFE-C.A 396 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

16.05 ft FEFE - Shallow FE

MIS-E.B Compact Inline Standoff sub
 MIS-E.B 595 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

Compact Induction
 MAI-B.J 394 LG: 12.52 ft WT: 48.5 lb OD: 2.24 in

3.34 ft CTAO - Array Ind. One Cond Ct
 3.34 ft P200 - Array Ind. One Res 20



Total Length: 88.36 ft Weight: 637.1 lb All measurements relative to tool zero. (1.84ft from bottom)

COMPANY	SANDRIDGE ENERGY
WELL	LINDSAY 3319 1-21H
FIELD	COLDWATER SOUTH
PROVINCE/COUNTY	COMANCHE
COUNTRY/STATE	USA / OKLAHOMA

Elevation Kelly Bushing	1993.00	feet	First Reading	9735.00	feet
Elevation Drill Floor	1993.00	feet	Depth Driller	9765.00	feet
Elevation Ground Level	1973.00	feet	Depth Logger	9765.00	feet


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CML MESSENGER SHUTTLE
COMPACT PHOTO DENSITY
COMPENSATED NEUTRON LOG