



**Weatherford®**

**COMPACT WELL SHUTTLE  
TRIPLE COMBO SPECTRAL GAMMA**

COMPANY			WHITTING OIL & GAS CORP.		
WELL			HORSETAIL 30G-3139		
FIELD			REDTAIL		
PROVINCE/COUNTY			WELD		
COUNTRY/STATE			U.S.A./COLORADO		
LOCATION			2376' FNL & 2160' FEL		
SEC 30	TWP 10N	RGE 57W	Other Services		
Latitude	40.810528		MICRO IMAGER		
Longitude	-103.792342				
API Number	05-123-43032-60				
Permanent Datum :Ground Level, Elevation 4738 feet					
Log Measured From KB, 21.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	12-JAN-2017			Elevations:	
Run Number	ONE			KB	feet
Service Order	5839-171207600			DF	4759.00
Depth Driller	13980.00			GL	4738.00
Depth Logger	13982.00				
First Reading	13961.95				
Last Reading	5000.00				
Casing Driller	2050.00				
Casing Logger	---				
Bit Size	8.500				
Hole Fluid Type	WATER BASED				
Density / Viscosity	10.50 lb/USg		22.00 CP		
PH / Fluid Loss	8.90		6.70 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.612 @ 81.5			ohm-m	
Rmf @ Measured Temp	1.248 @ 81.5			ohm-m	
Rmc @ Measured Temp	2.14 @ 81.5			ohm-m	
Source Rmf / Rmc	FILTER		PRESS		
Rm @ BHT	0.677 @199.0		ohm-m		
Time Since Circulation	0 HOURS				
Max Recorded Temp	200.70			deg F	
Equipment / Base	13173		CSPR		
Recorded By	A. TAYLOR				
Witnessed By	C. BLODGETT/K. MOSELEY				
Circulation Stop	12:27:56 AM-12Jan2017				

BOREHOLE RECORD				Last Edited: 12-JAN-2017 17:03
Bit Size inches	Depth From feet		Depth To feet	
13.500	0.00		2050.00	
8.500	2050.01		13980.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
Surface	9.625	0.00	2050.00	36.00

REMARKS	
SOFTWARE/COMMUNICATIONS: MSU 285 VIA WLS v.16.03.1458 (FURTHER PROCESSING WITH 16.05.4955)	
TOOLS: PLEASE REFER TO TOOLSTRING DIAGRAM	
HARDWARE: MPD: 4 INCH PROFILE PLATE MPD/MDN: MVC POWERED DECENTRALIZER BELOW MPD/MDN COMBINATION MDN: DUAL BOWSPRING ECCENTRILIZER ABOVE MDN MFE: MIS-E STANDOFF MAI: MIS-E STANDOFF WITH ISA	
MATRIX DENSITY CONSTANT FOR DENSITY POROSITY PROCESSING: 2.68 g/cc.	
ROTATED PIPE AND PUMPED BHA IN-HOLE FROM APPROX. 9000FT TO TOTAL DEPTH.	
TOTAL HOLE VOLUME FROM TD - 5000FT = 3240 CU FT ANNULAR HOLE VOLME CALCULATED FOR 5.50 INCH PRODUCTION CASING TD - 5000FT = 1780 CU FT	

LOGGING INTERVAL ENDED PRIOR TO RE-ENTRY INTO CASING SHOE. NO CASING SHOE DEPTH AVAILABLE ON HEADER.

CIRCULATION CONTINUED AFTER DEPLOYING (STARTING) LOGGING INCLUDING CIRCULATION AT THE HEEL OF WELL.

TOOLS FAILED TO FULLY DEPLOY (UNTIL APPROX. 13770FT. PLEASE INTERPRET ACCORDINGLY.

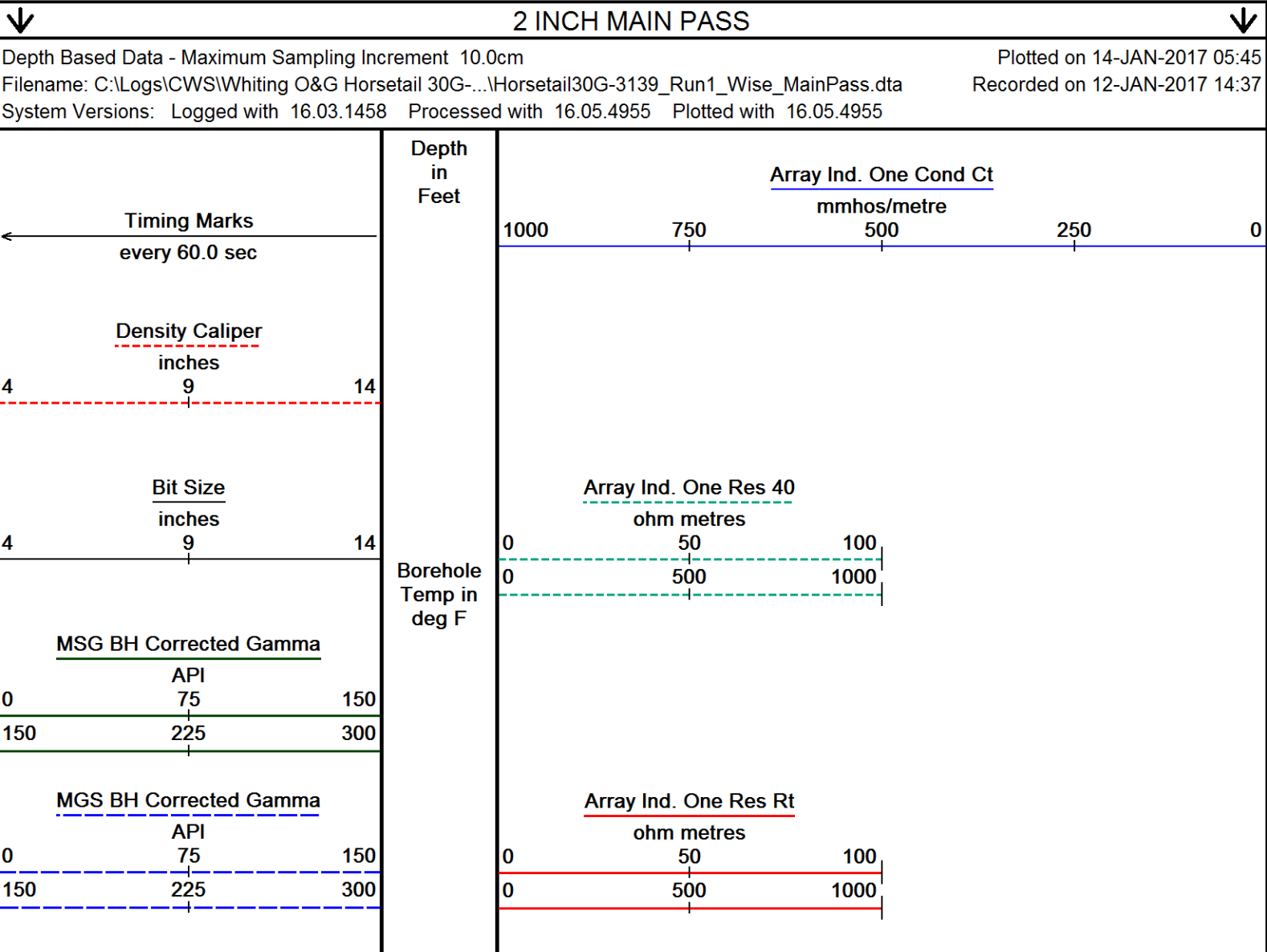
SURFACE LAT/LONG ON HEADER; MAG. DEC. USED IN IMAGER NAVIGATION = 7.39 DEG. EAST (MATCH DIRECTIONAL MAG. DEC.)

UNIT RIG 406

HEADER INFORMATION COLLECTED FROM MULTIPLE PLACES, INCLUDING MUD REPORT (#5; FLUID CONTROL), CLIENT REPRESENTATIVE ON-SITE, MEASUREMENTS AND GEOPROG (WHITING OIL AND GAS CORP.).

CREW:A ALLRED, M DEBBAN, A TAYLOR

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.



Replay  
Scale  
1:600

5000

← MGS BH Corrected Gamma

← MSG BH Corrected Gamma

← Bit Size

Array Ind. One Res Rt

Array Ind. One Res 40

5100

Array Ind. One Cond Ct

← Density Caliper

182°

5200

183°

5300

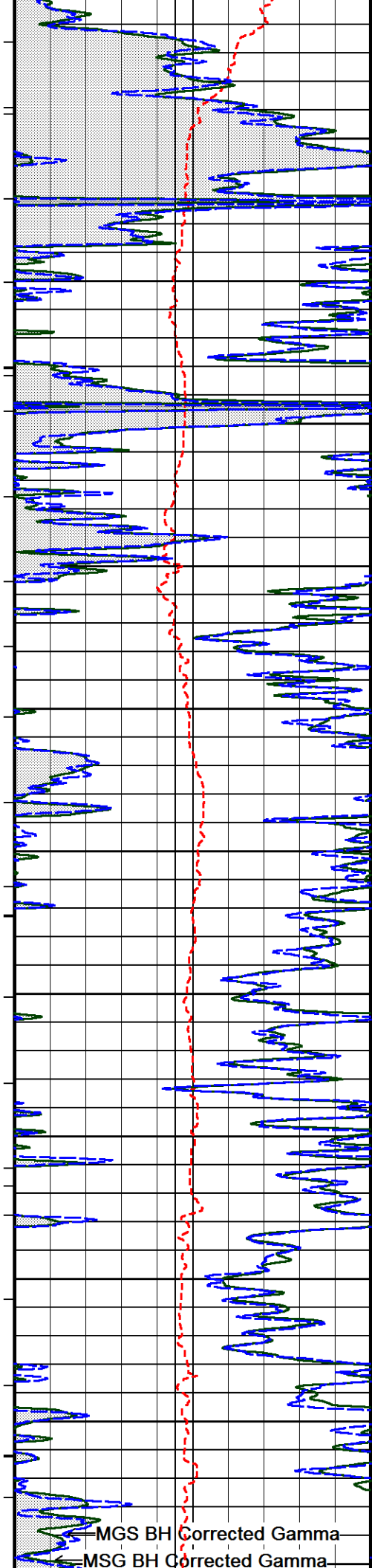
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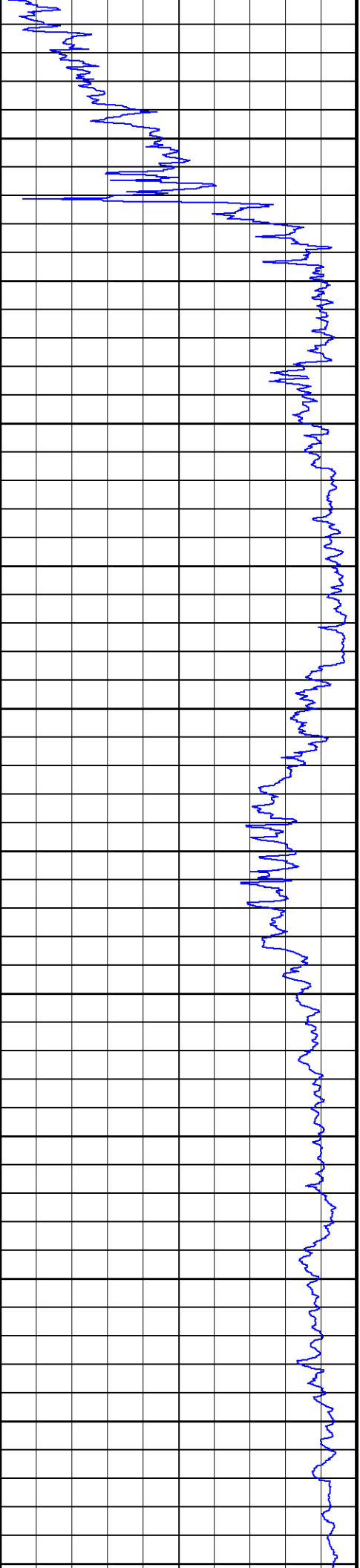
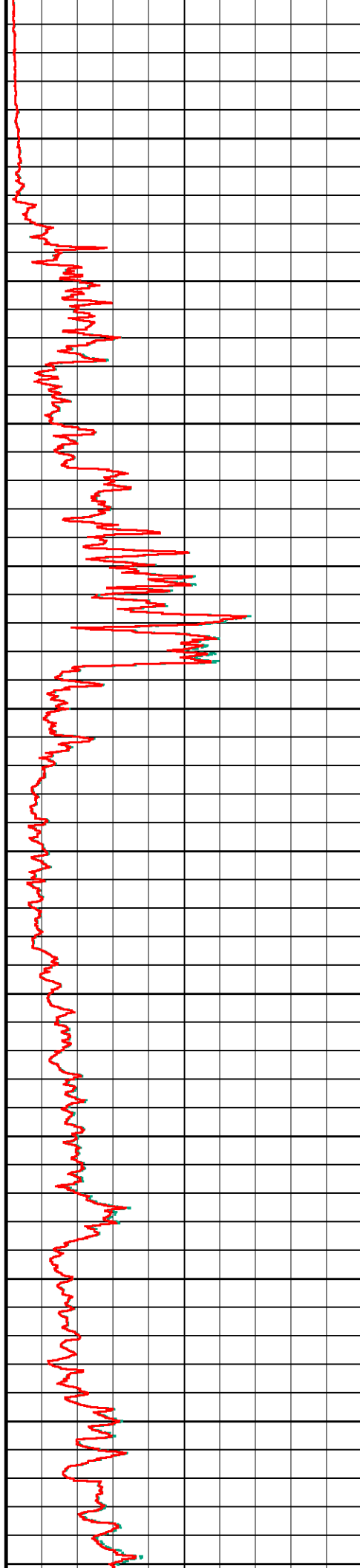
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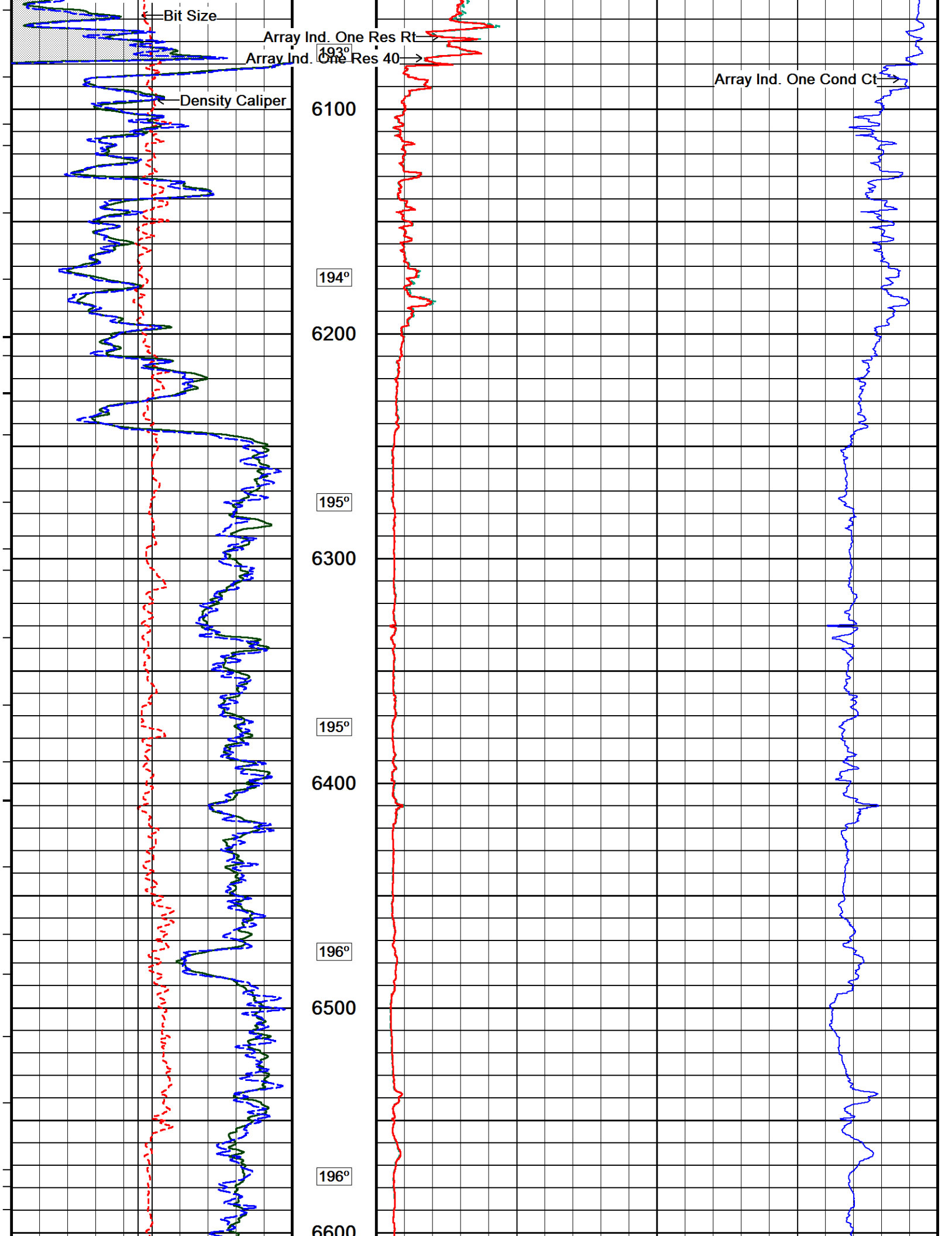
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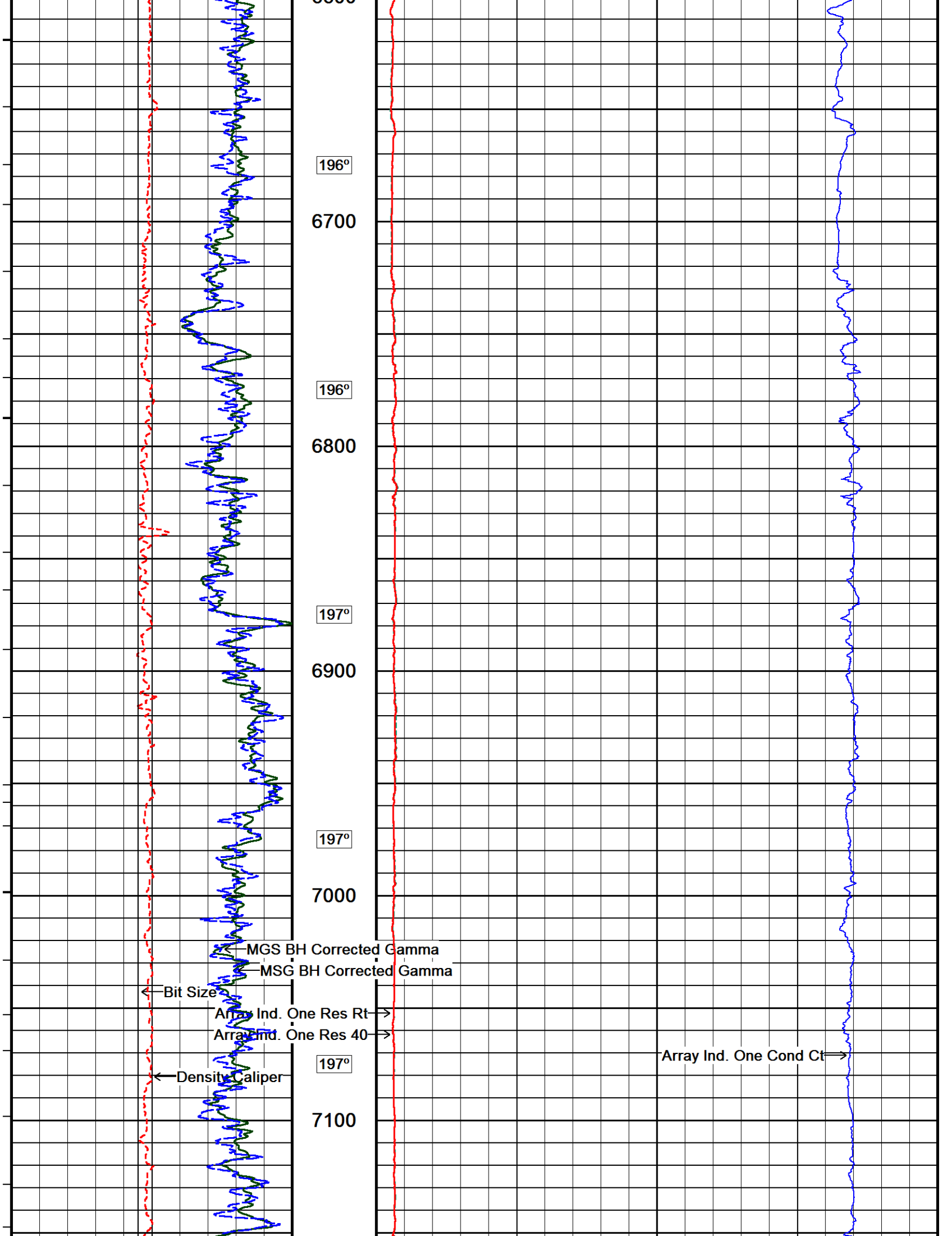


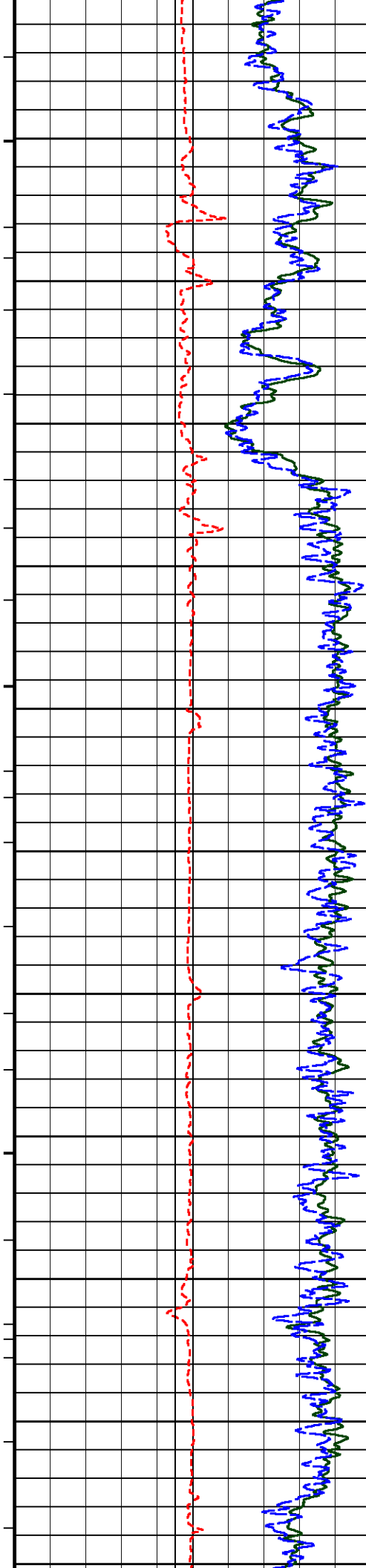
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188°  
5600  
189°  
5700  
190°  
5800  
191°  
5900  
192°  
6000











197°

7200

197°

7300

197°

7400

198°

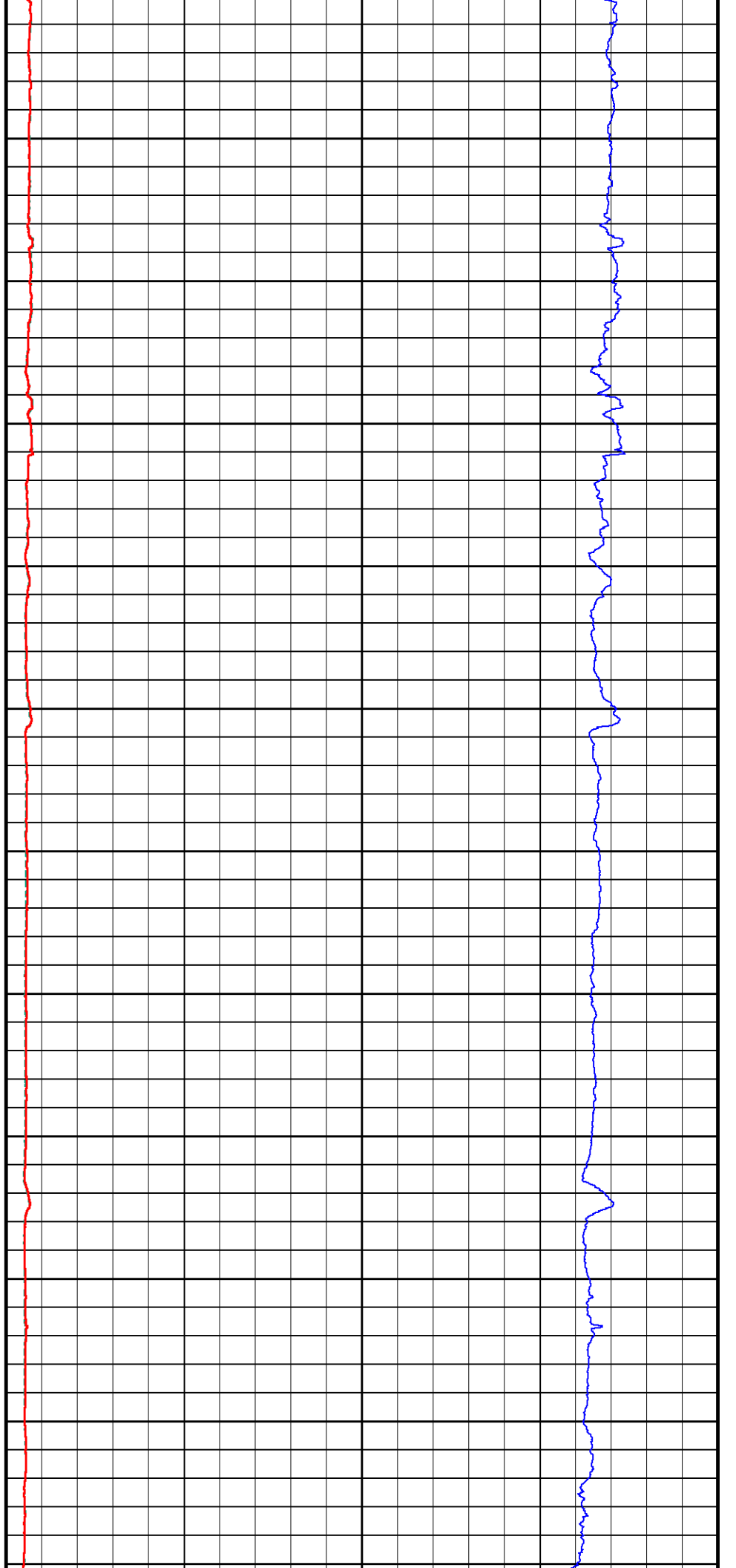
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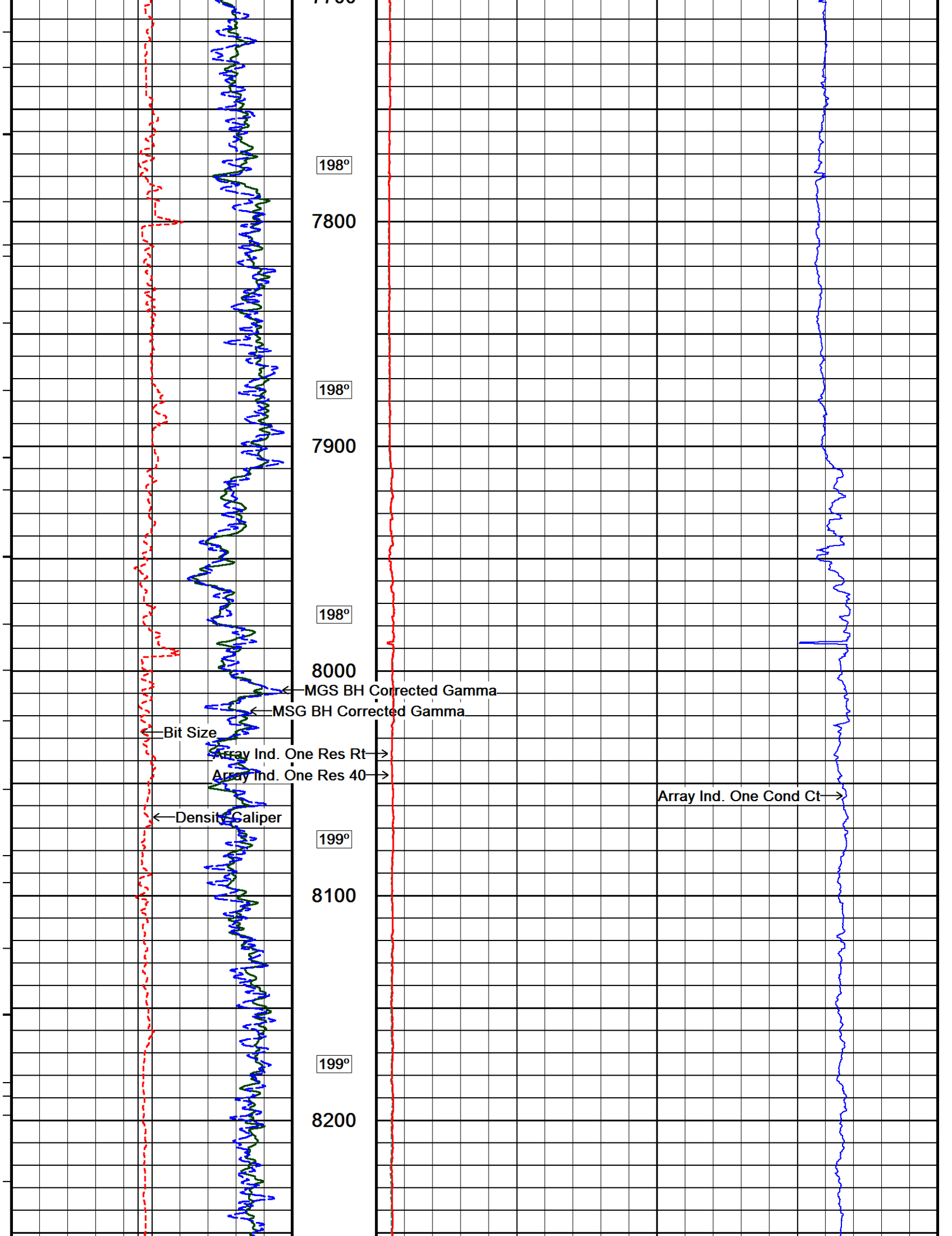
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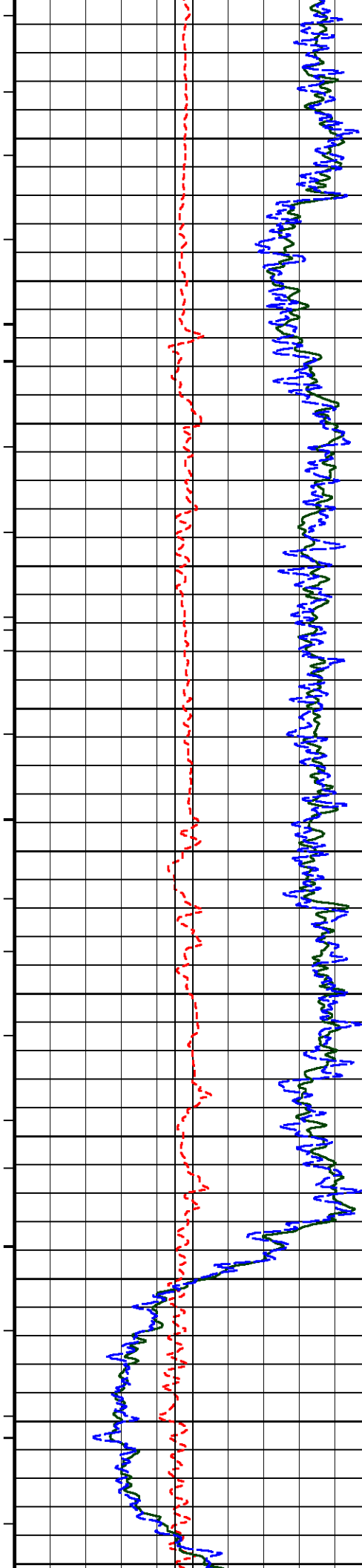
7600

198°

7700







199°

8300

199°

8400

199°

8500

199°

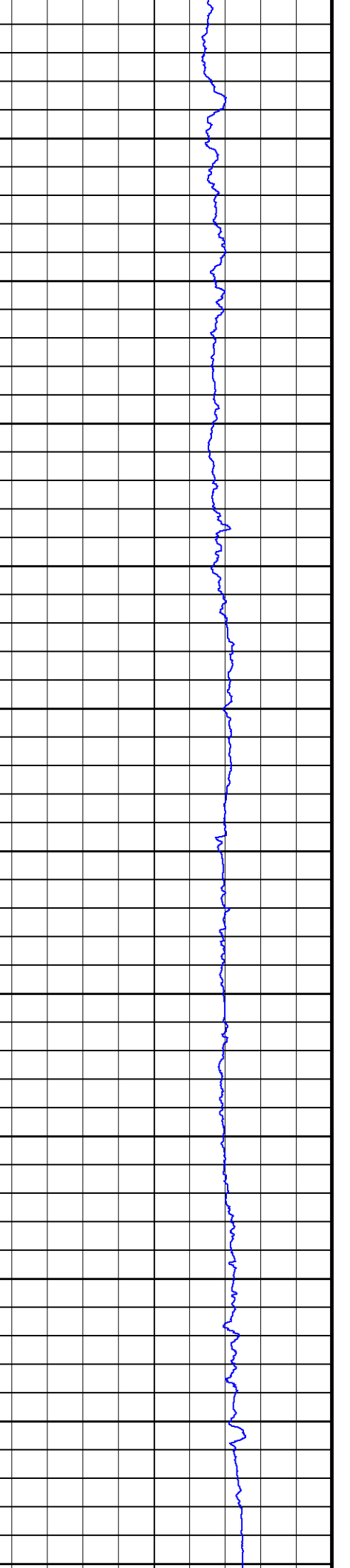
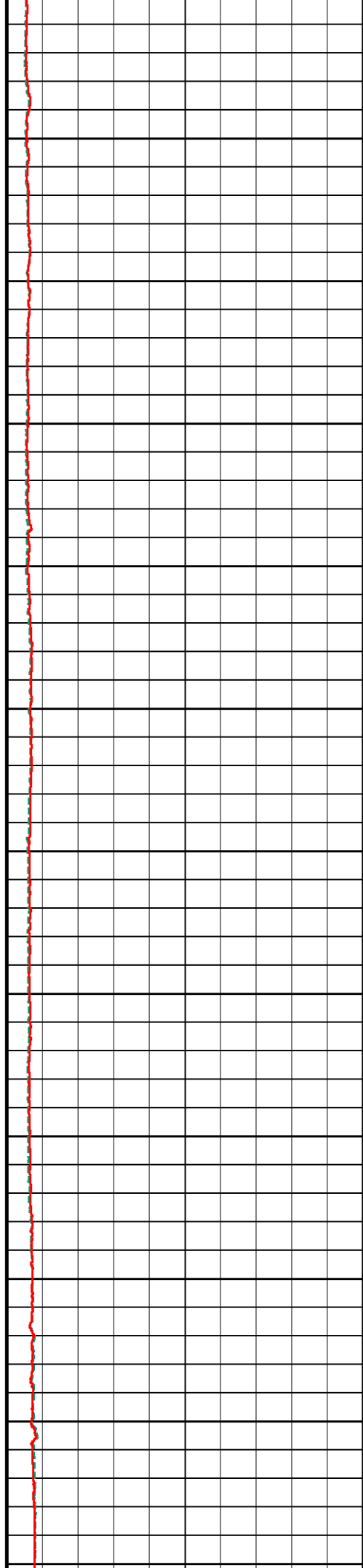
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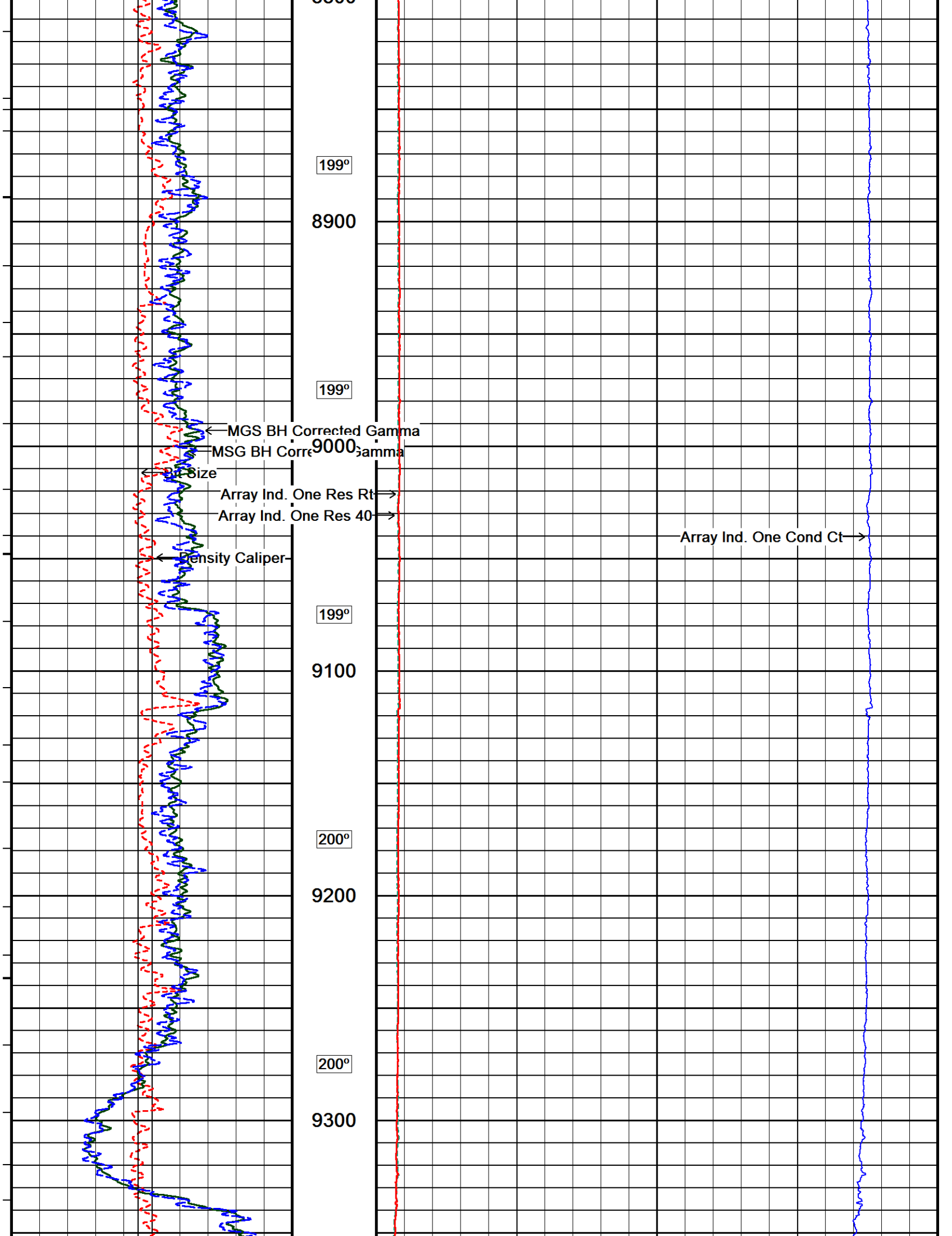
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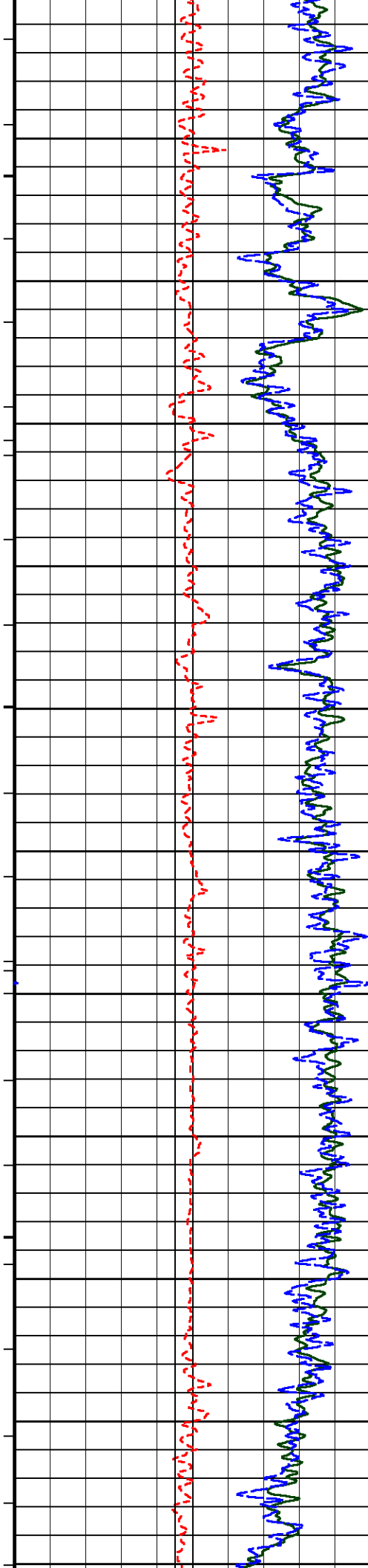
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8800









200°

9400

200°

9500

200°

9600

200°

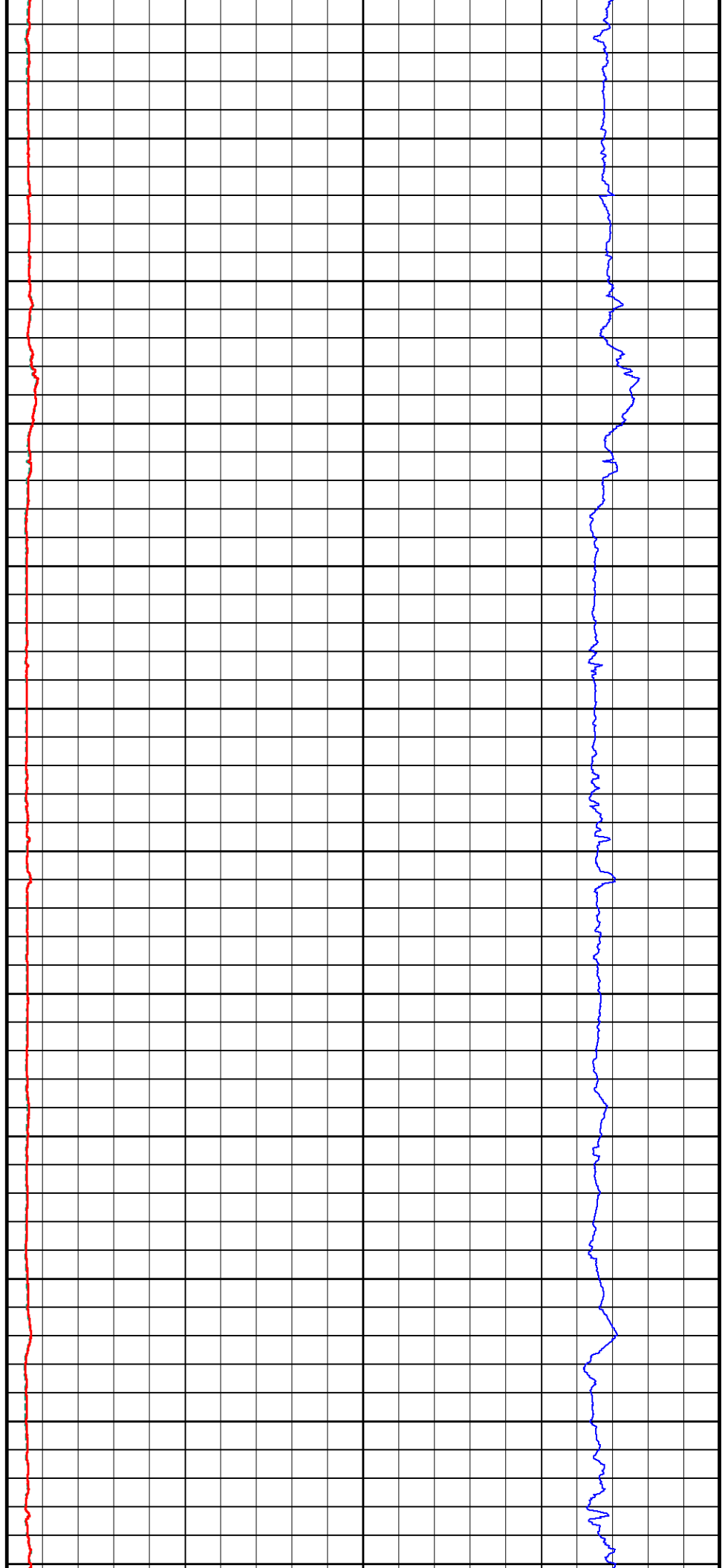
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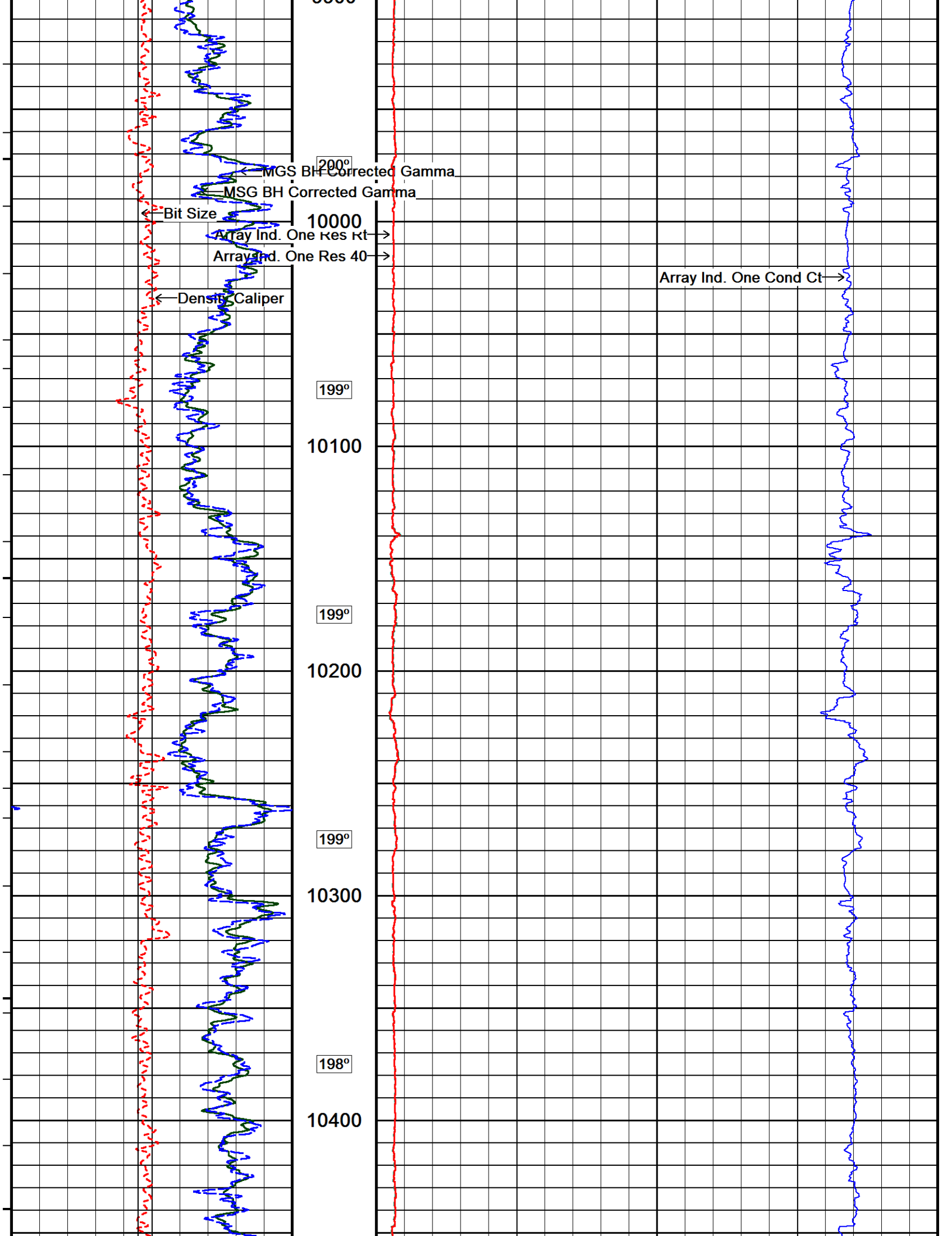
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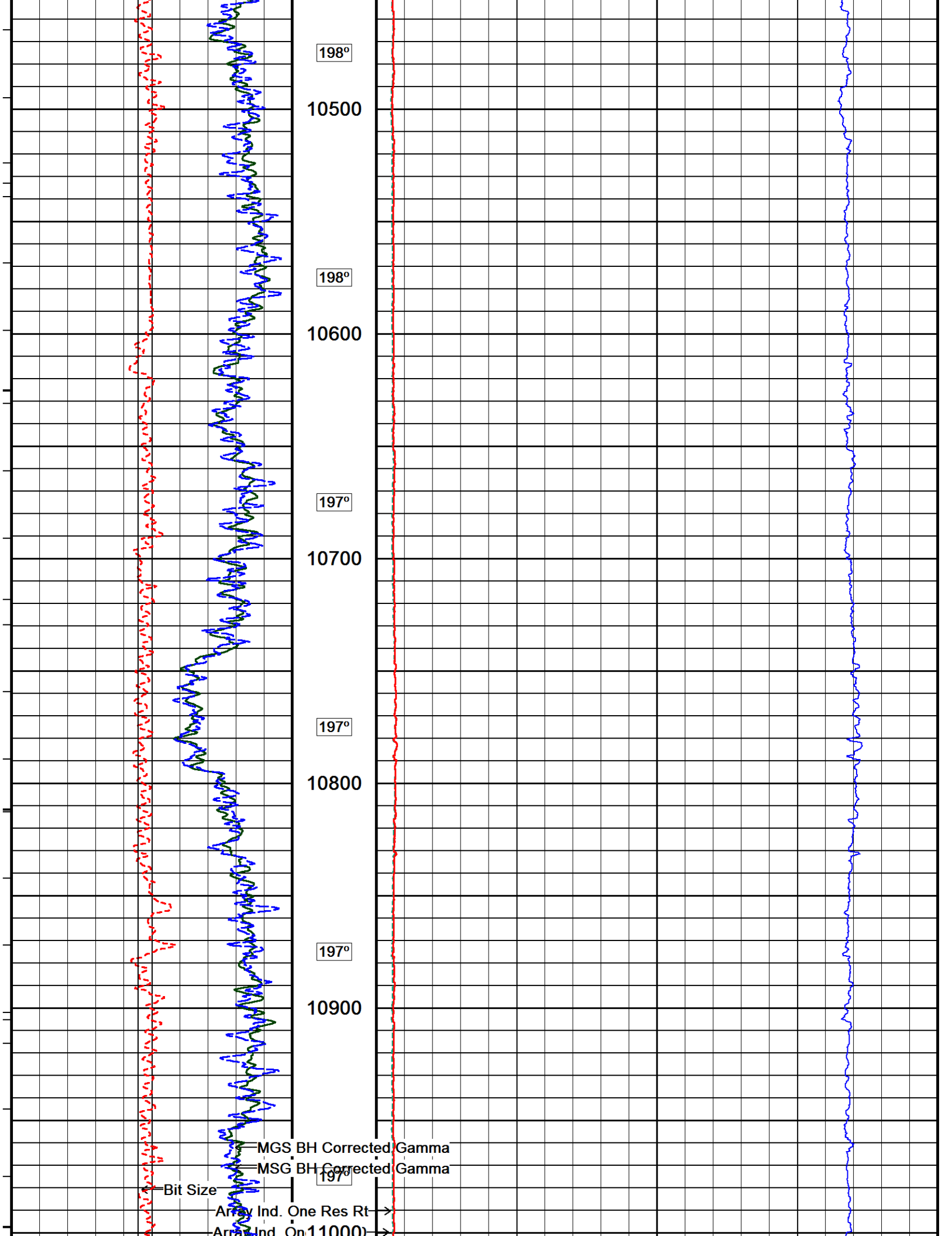
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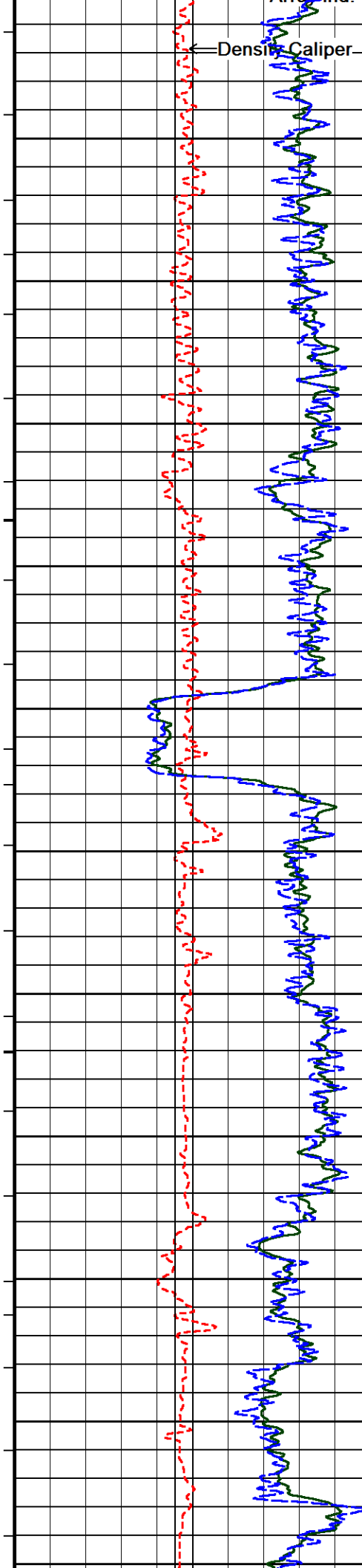
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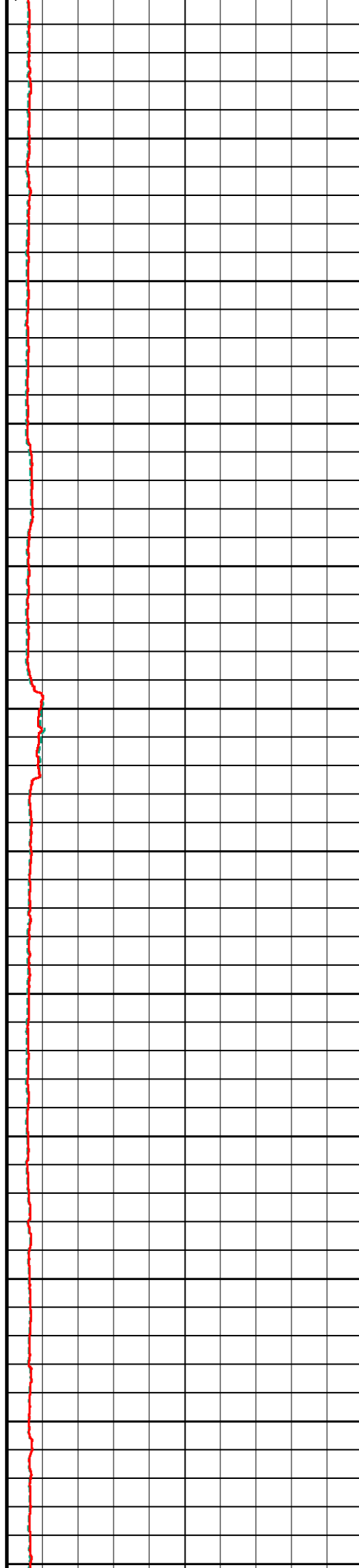




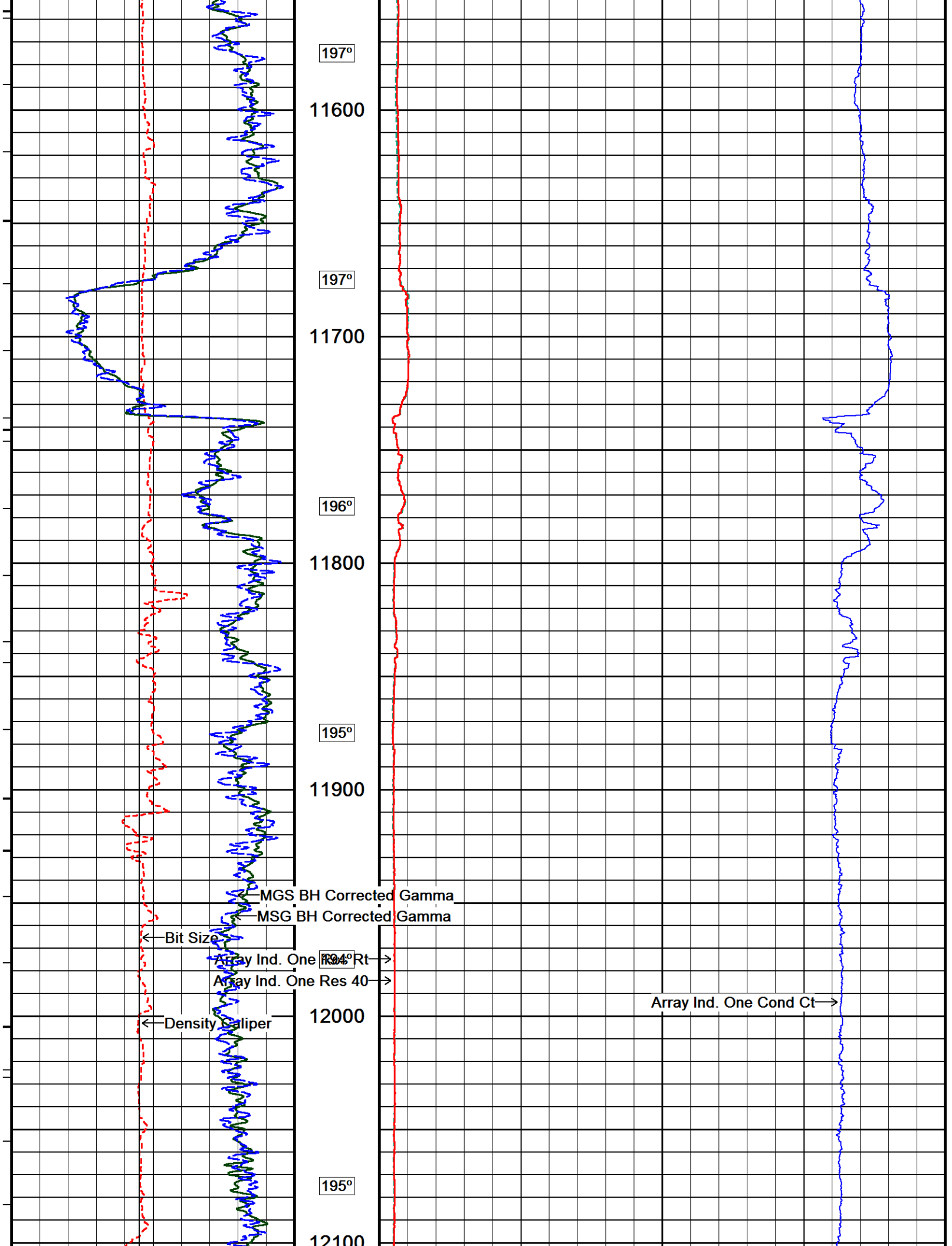


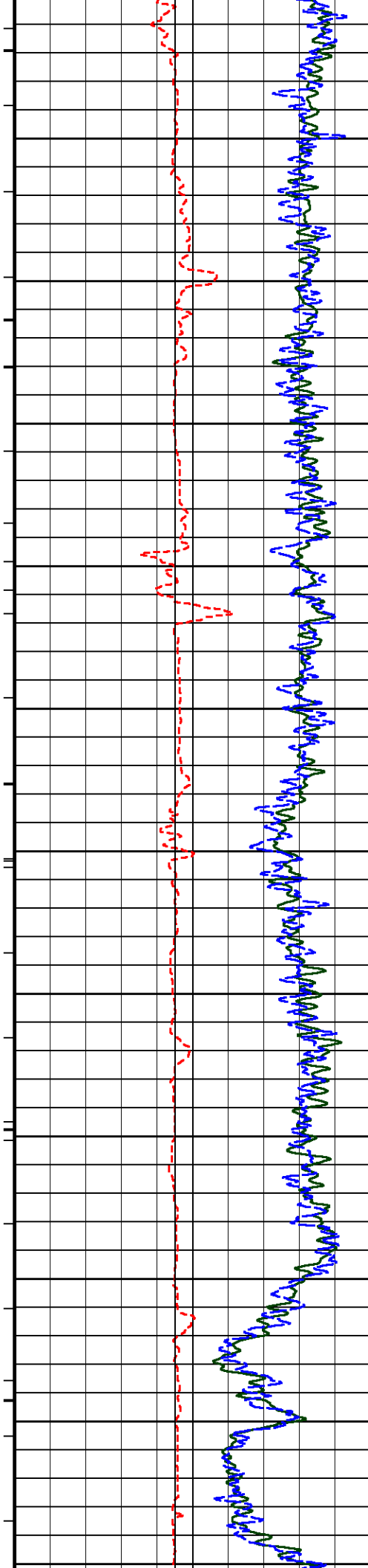


196°  
11100  
196°  
11200  
196°  
11300  
197°  
11400  
198°  
11500

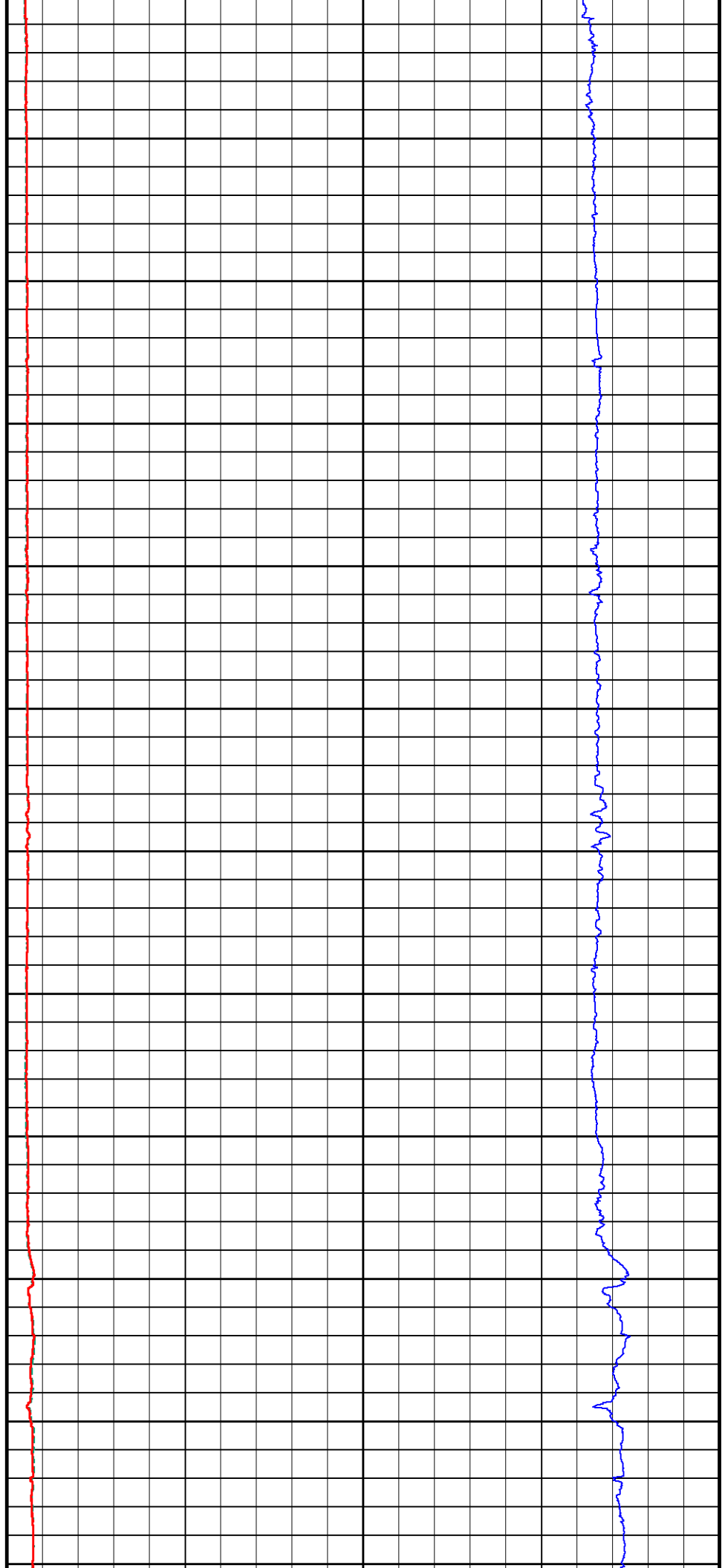


→ Array Ind. One Cond Ct ←

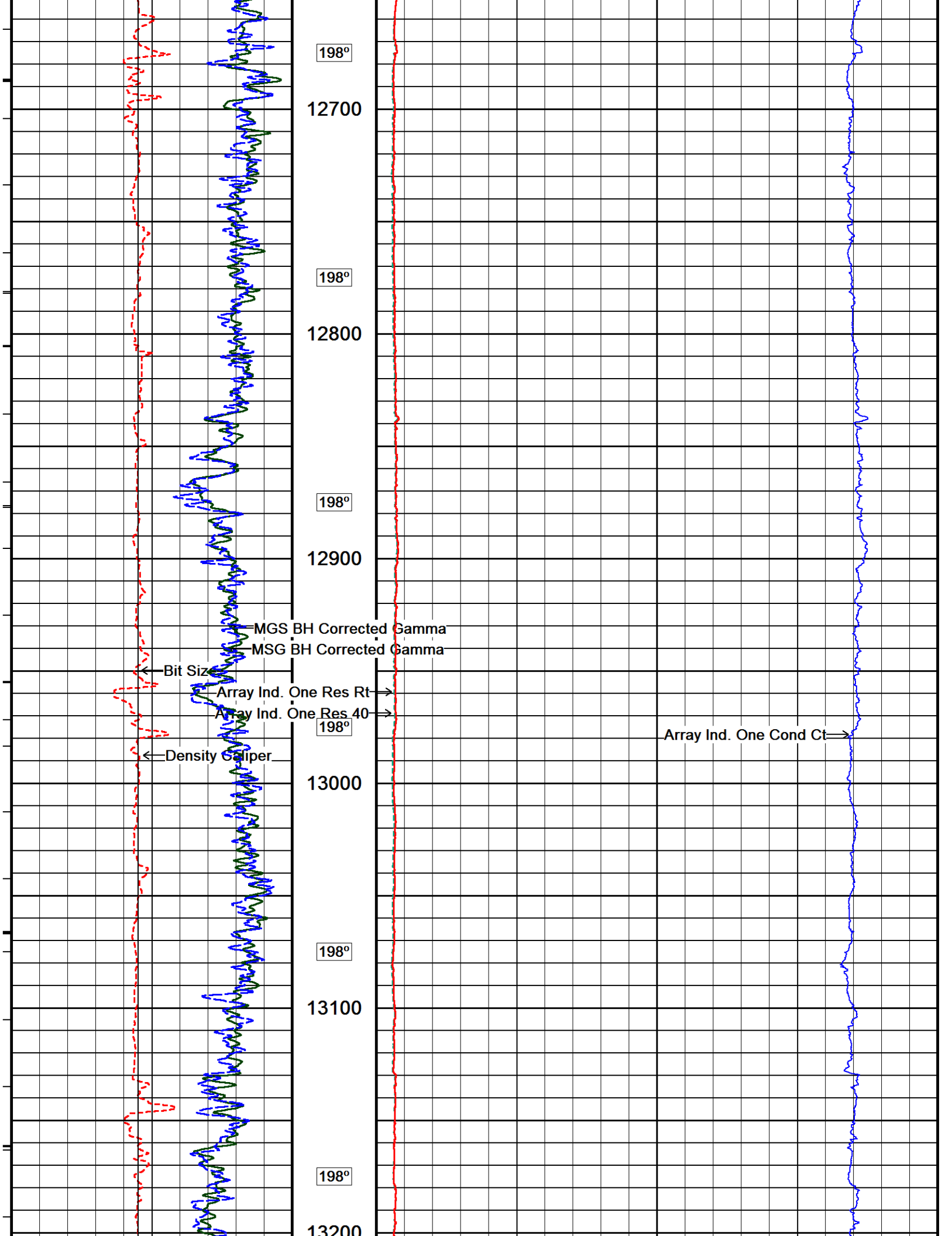


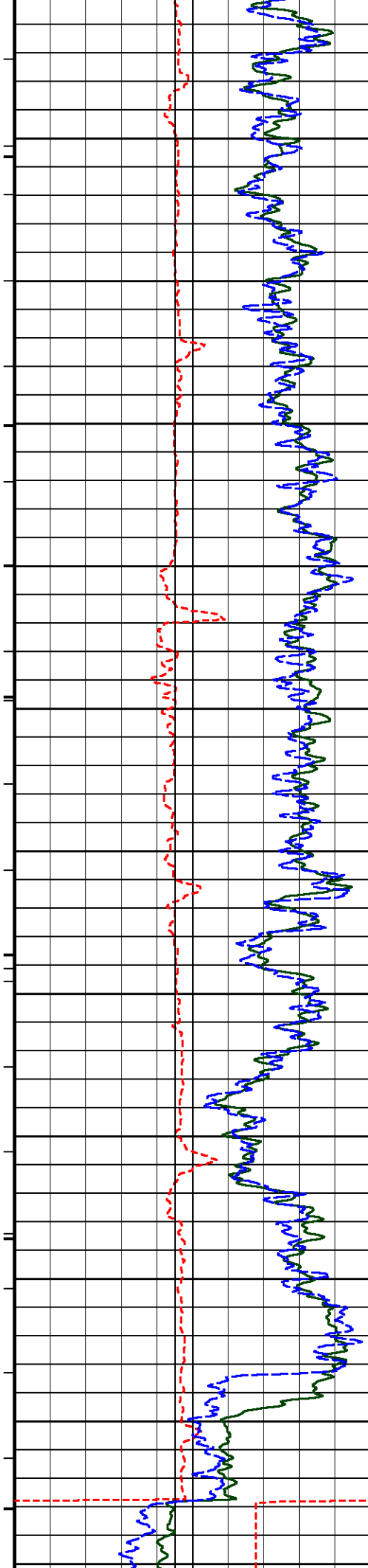


12100  
196°  
12200  
196°  
12300  
196°  
12400  
197°  
12500  
197°  
12600

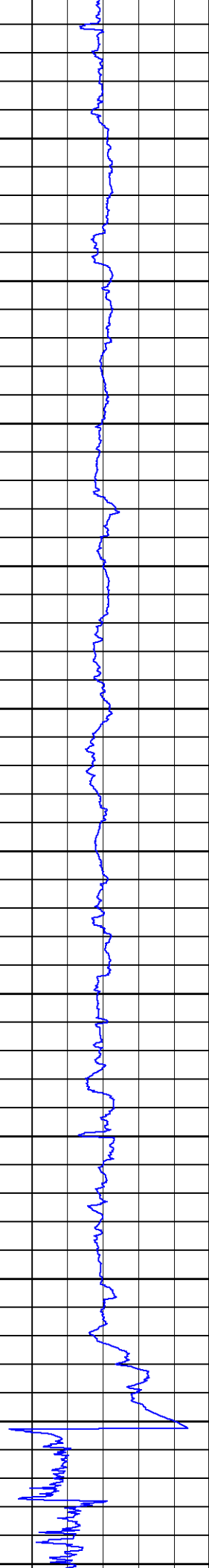
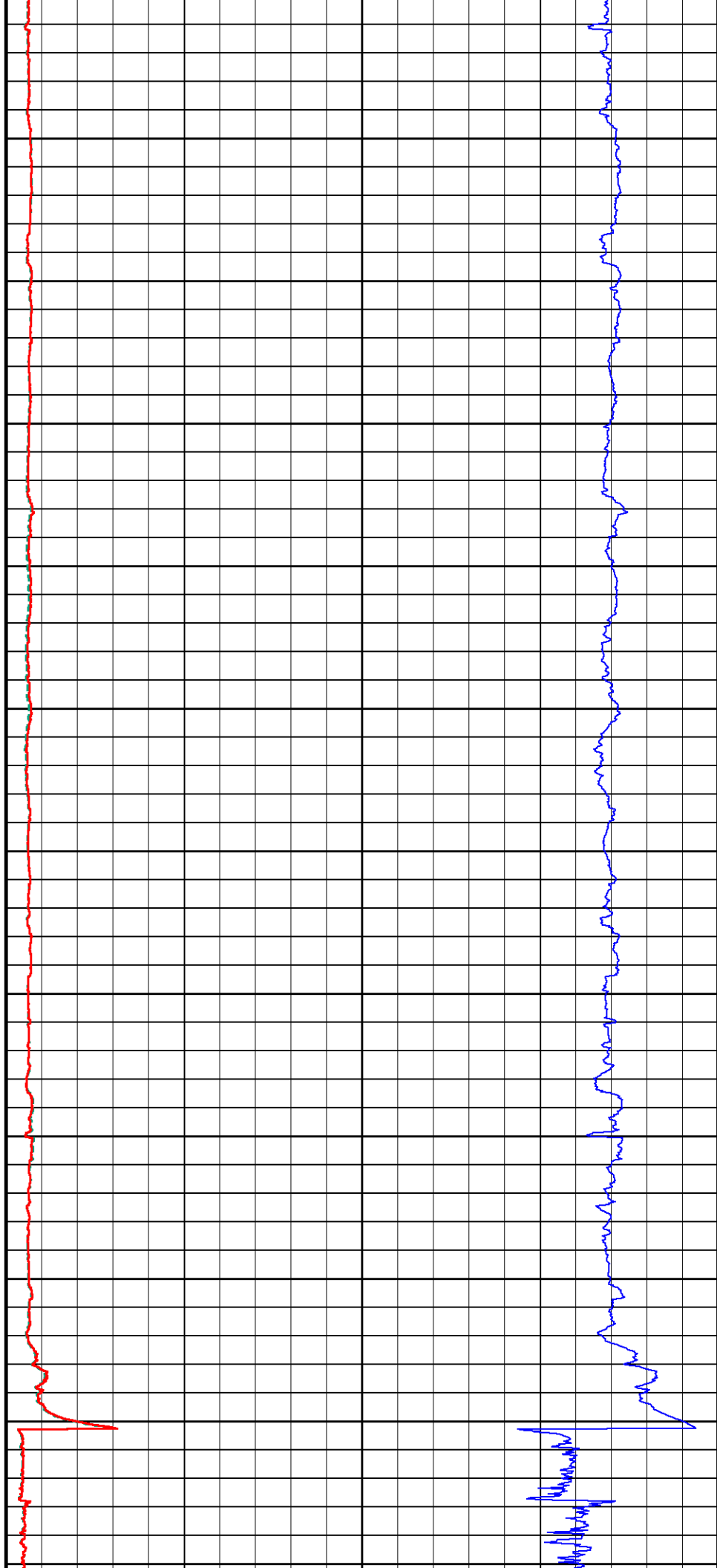


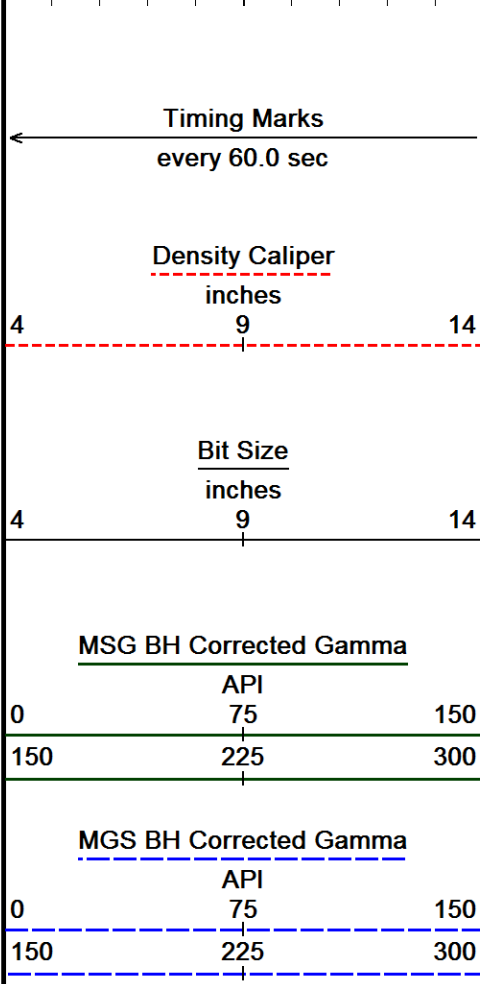
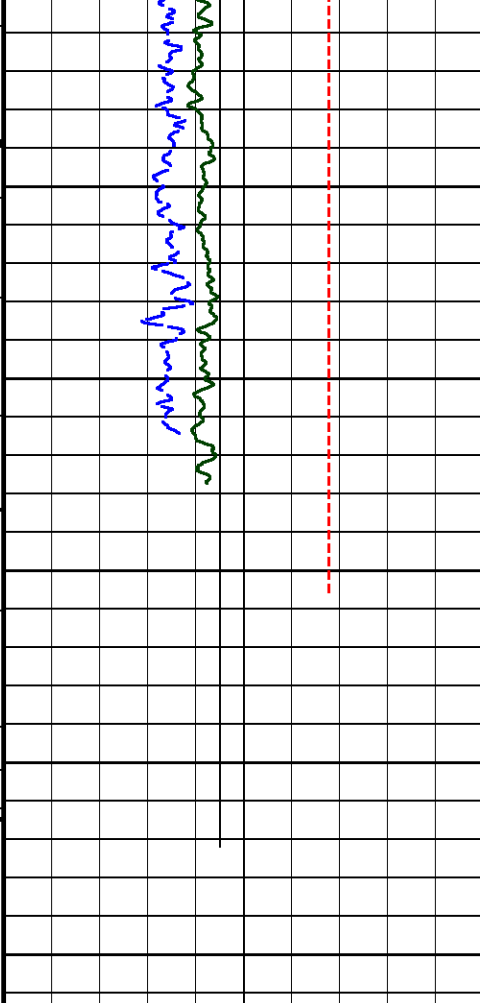






13200  
199°  
13300  
198°  
13400  
198°  
13500  
199°  
13600  
200°  
13700





200°

13800

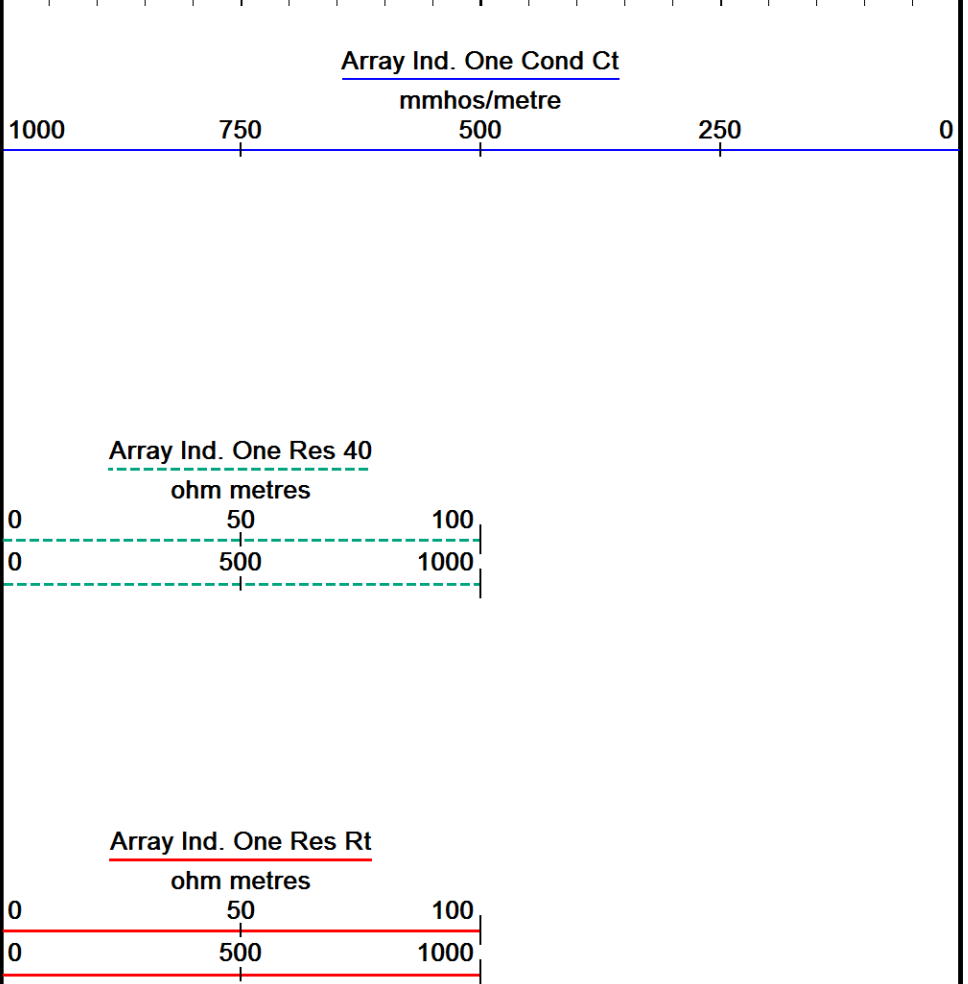
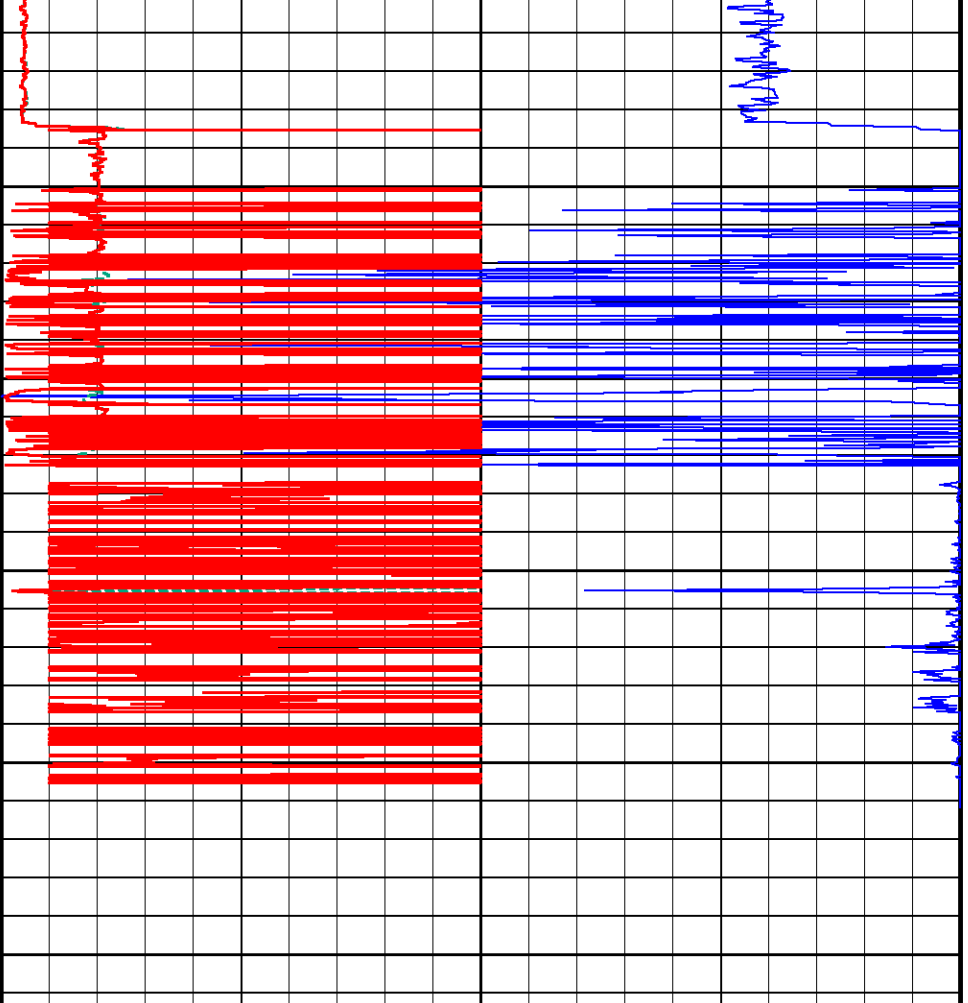
13900

14000

Depth  
in  
Feet

Borehole  
Temp in  
deg F

Replay  
Scale



1:600

Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 14-JAN-2017 05:45

Filename: C:\Logs\CWS\Whiting O&amp;G Horsetail 30G-...\Horsetail30G-3139\_Run1\_Wise\_MainPass.dta

Recorded on 12-JAN-2017 14:37

System Versions: Logged with 16.03.1458 Processed with 16.05.4955 Plotted with 16.05.4955



## 2 INCH MAIN PASS



## 5 INCH MAIN PASS



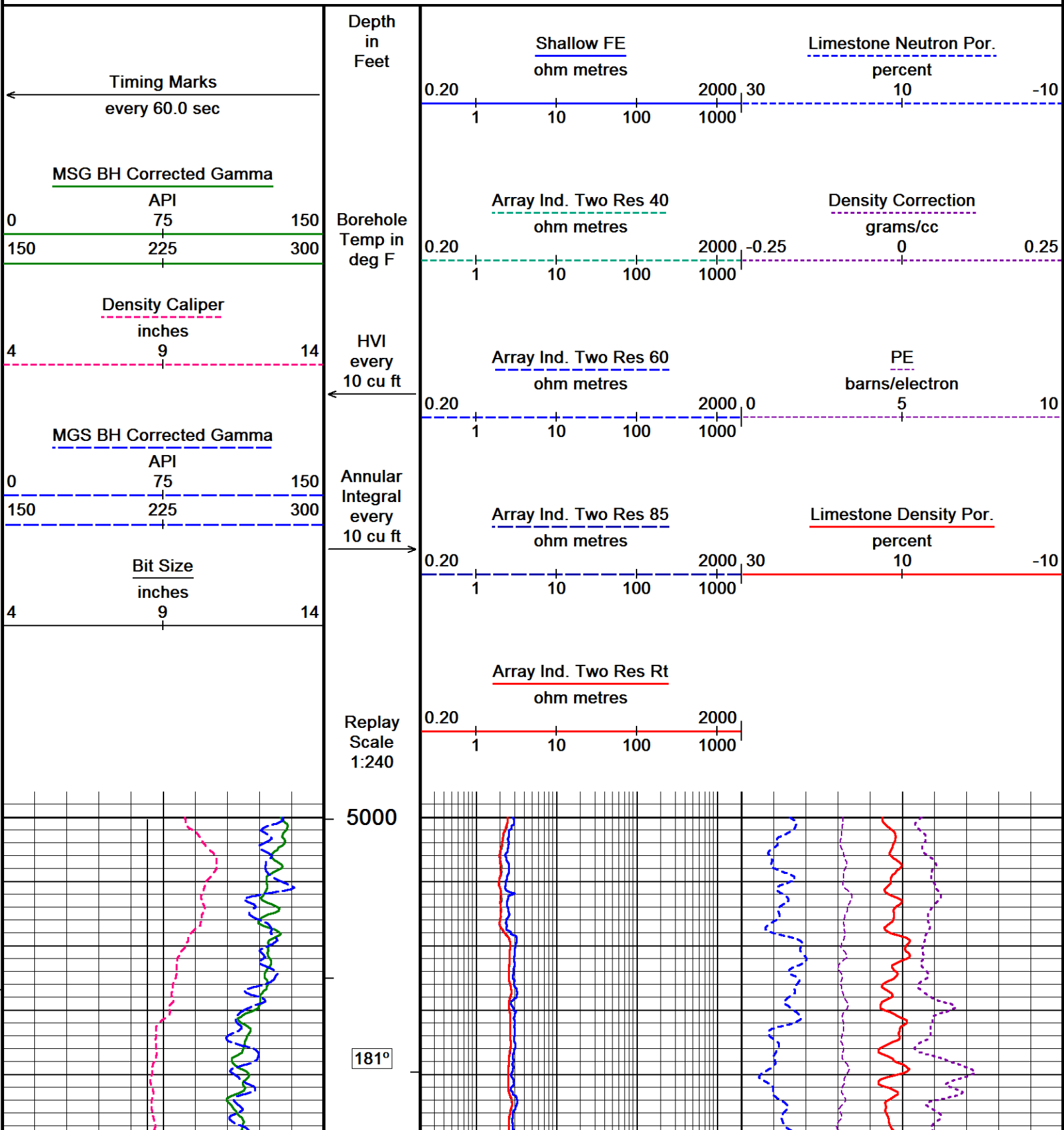
Depth Based Data - Maximum Sampling Increment 10.0cm

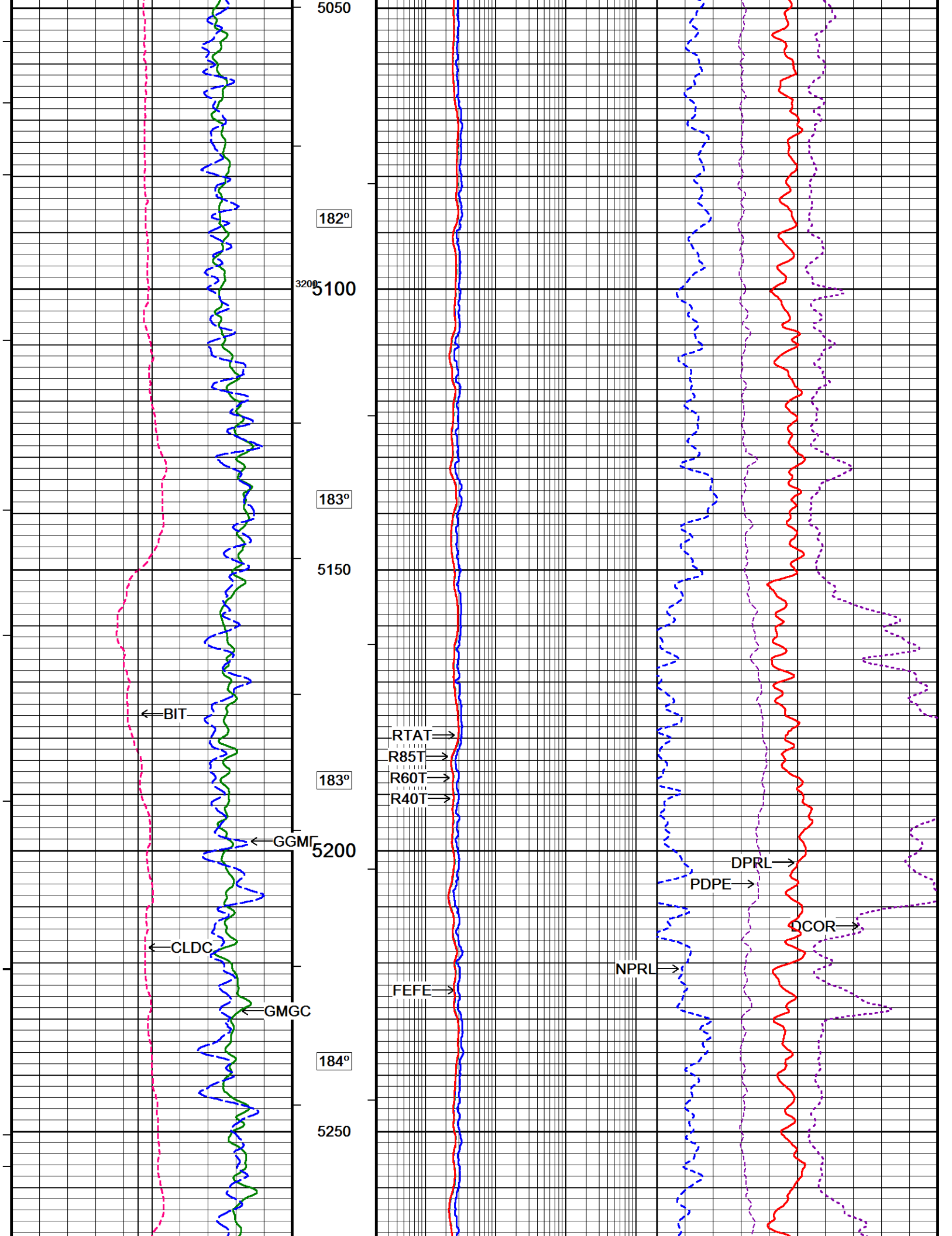
Plotted on 14-JAN-2017 05:45

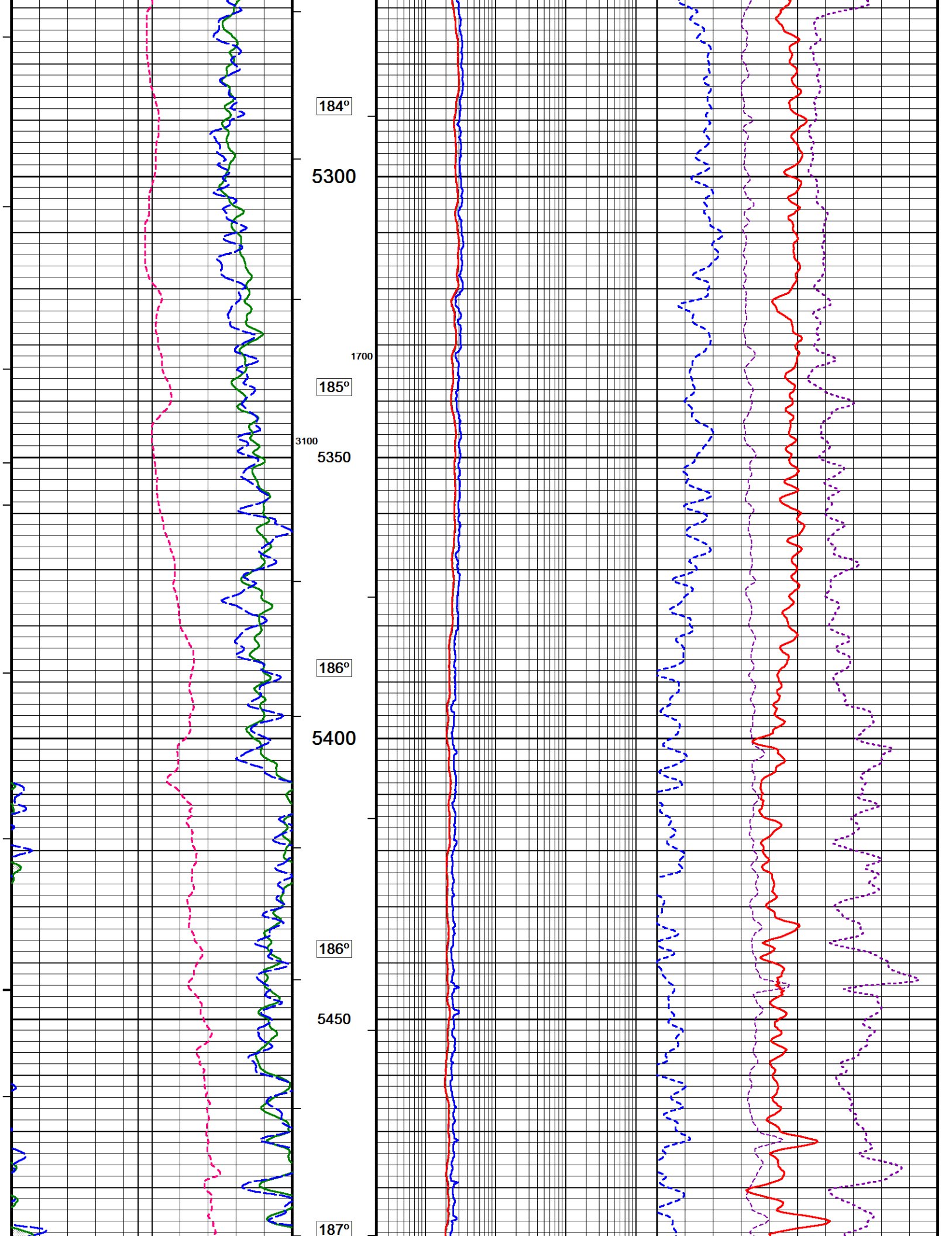
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Recorded on 12-JAN-2017 14:37

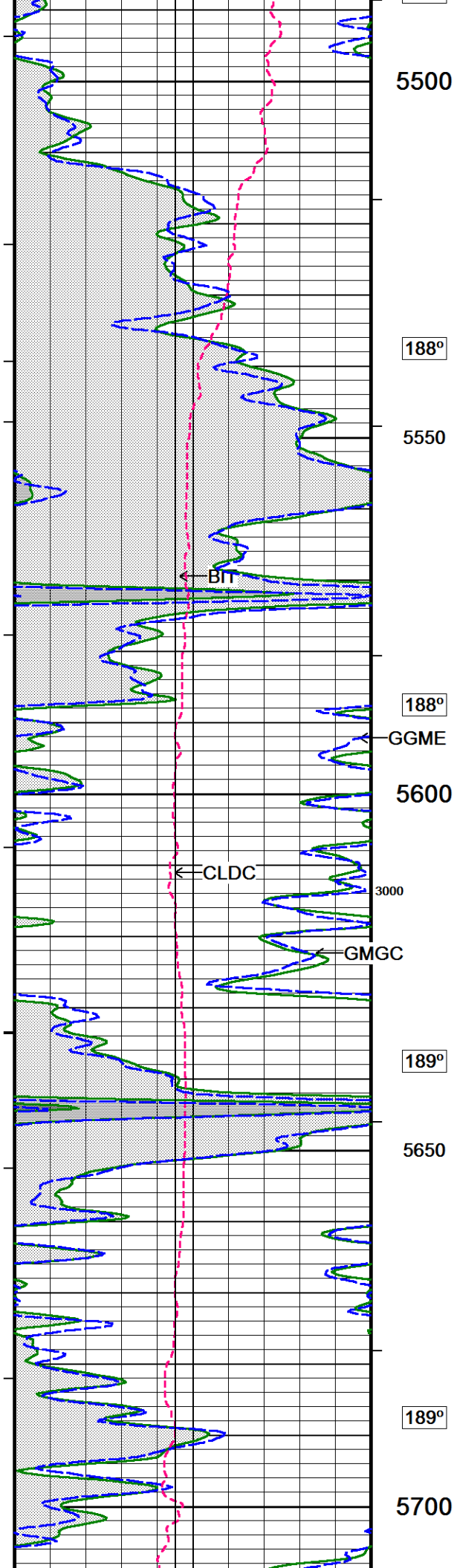
System Versions: Logged with 16.03.1458 Processed with 16.05.4955 Plotted with 16.05.4955











5500

188°

5550

← BIT

188°

GMGE

5600

← CLDC

3000

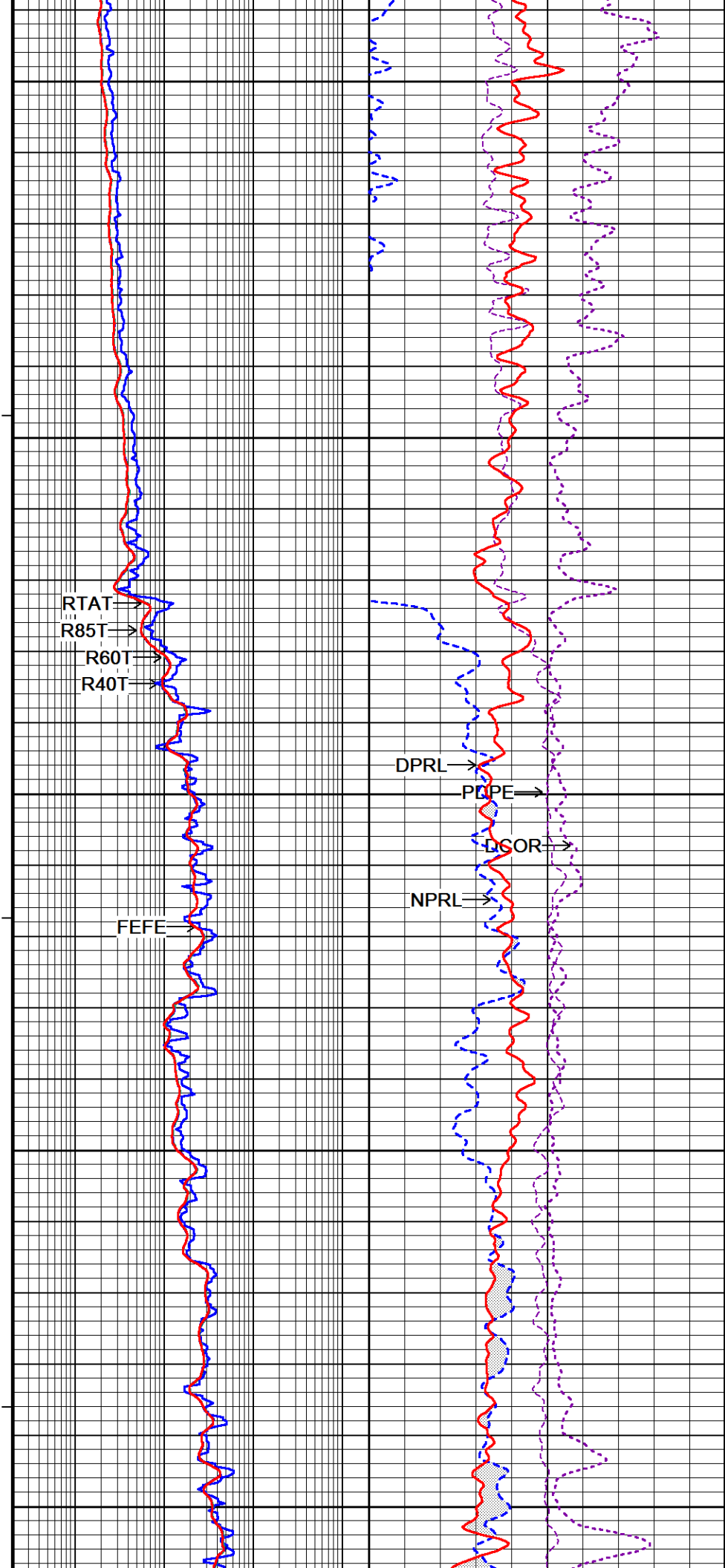
GMGC

189°

5650

189°

5700



RTAT

R85T

R60T

R40T

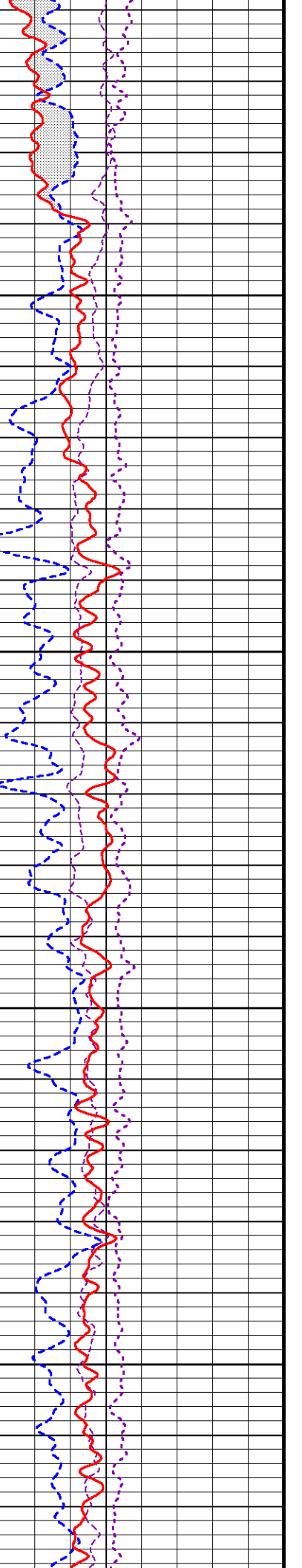
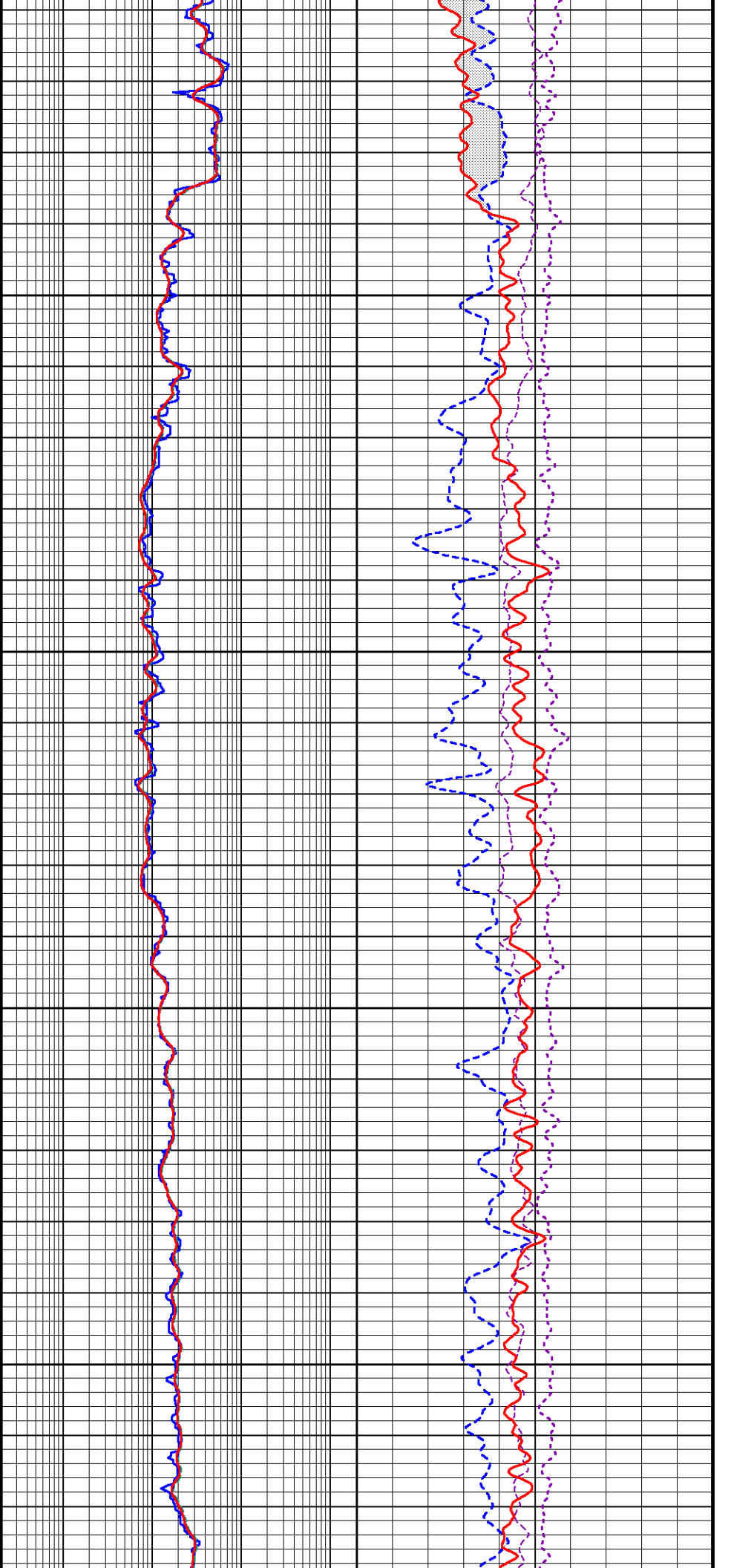
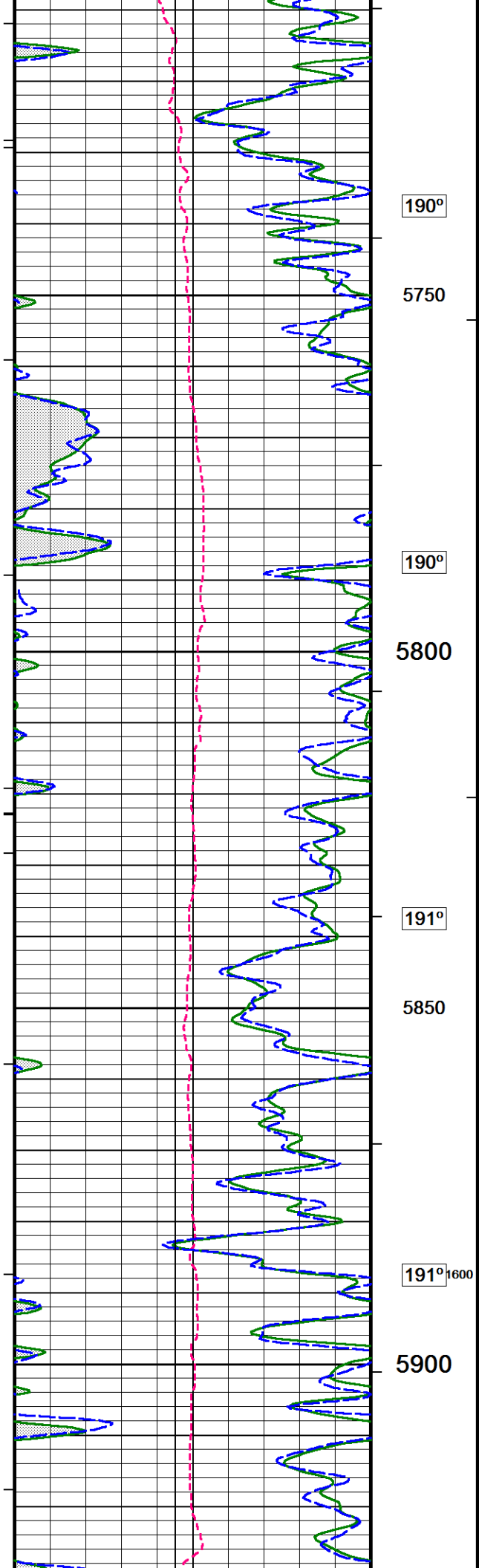
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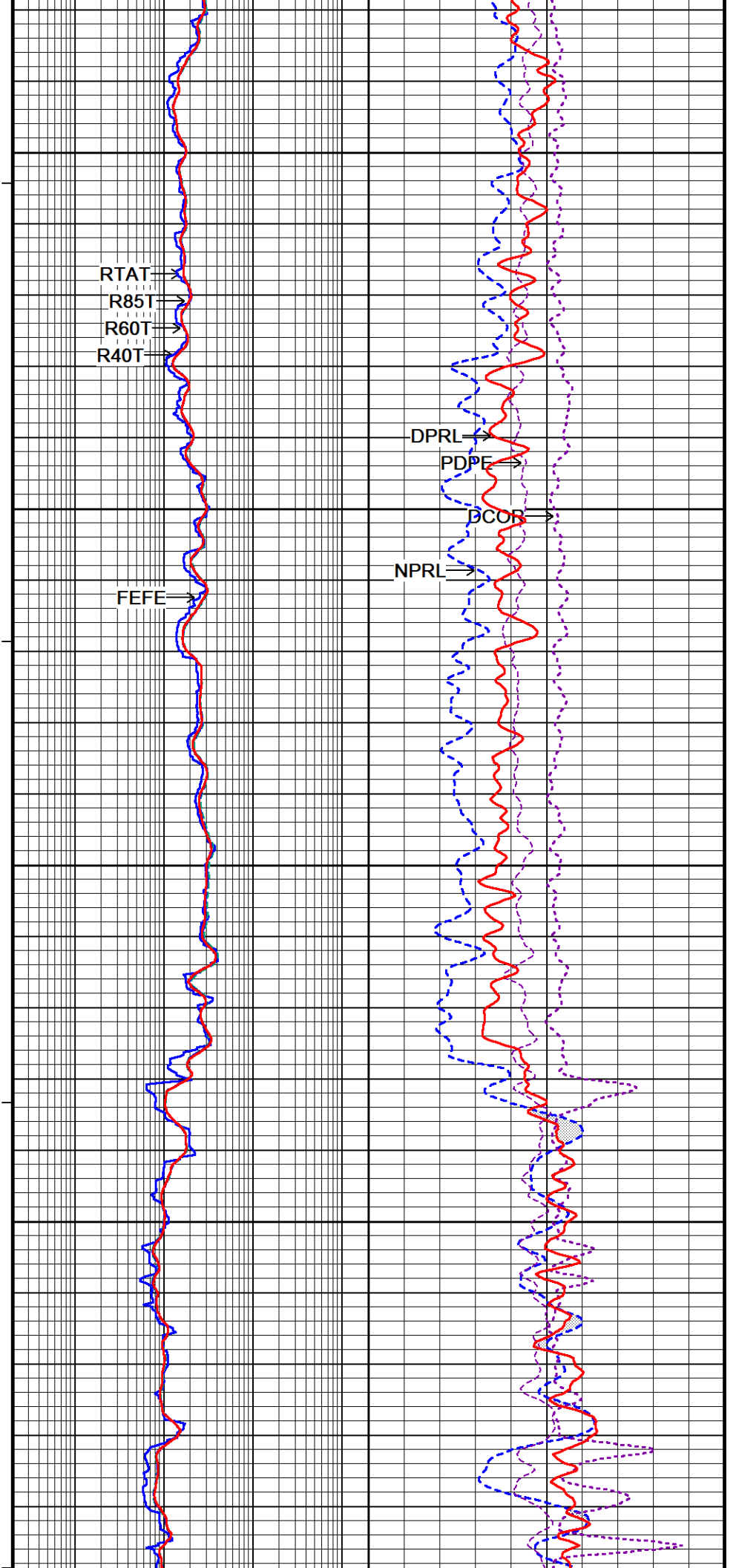
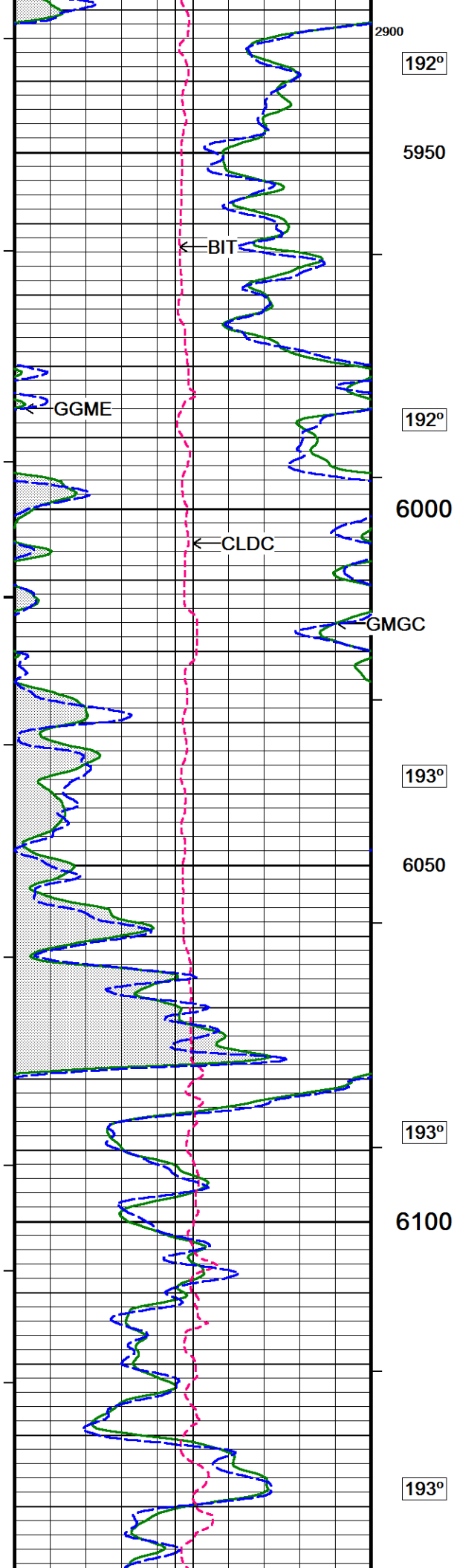
DPRL

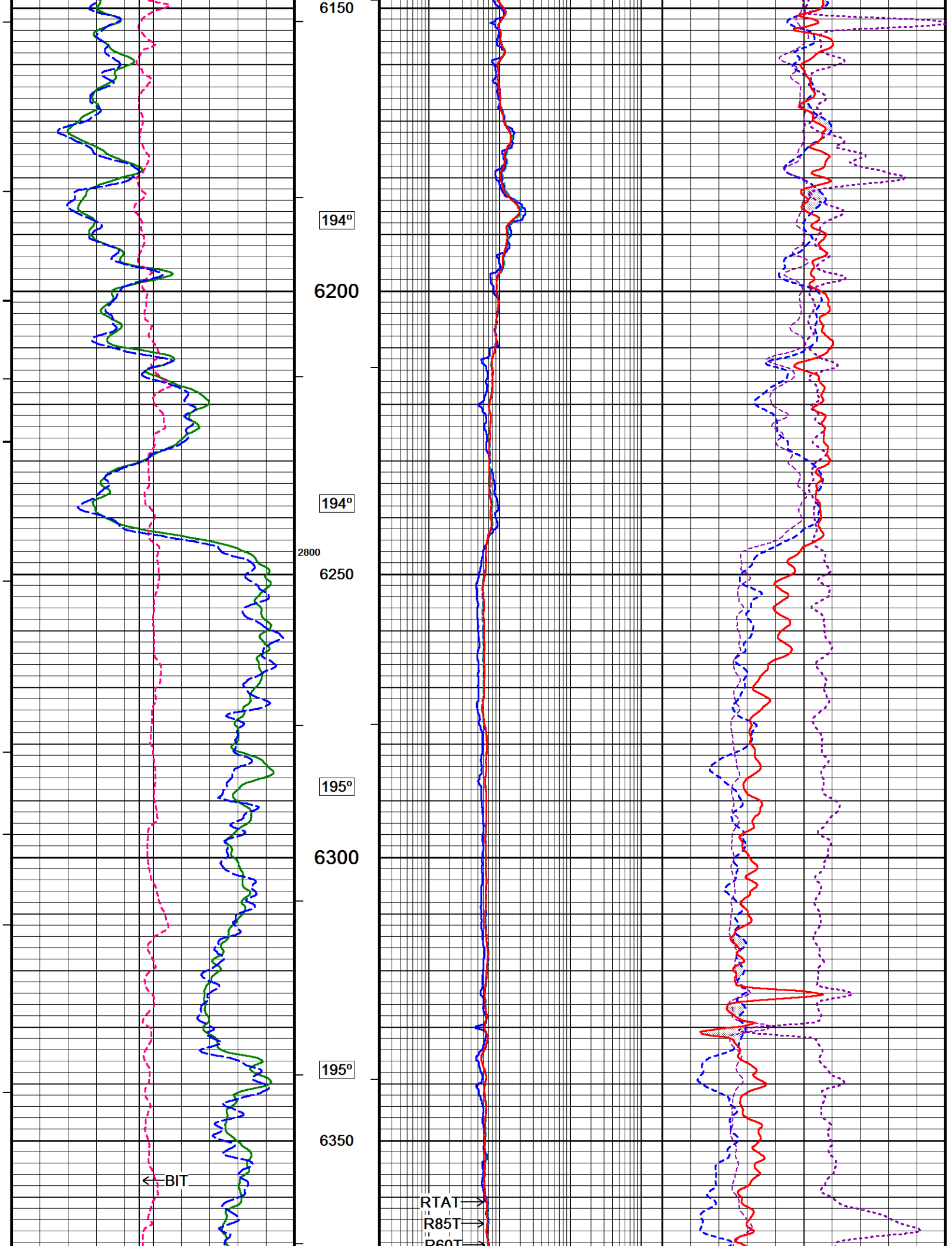
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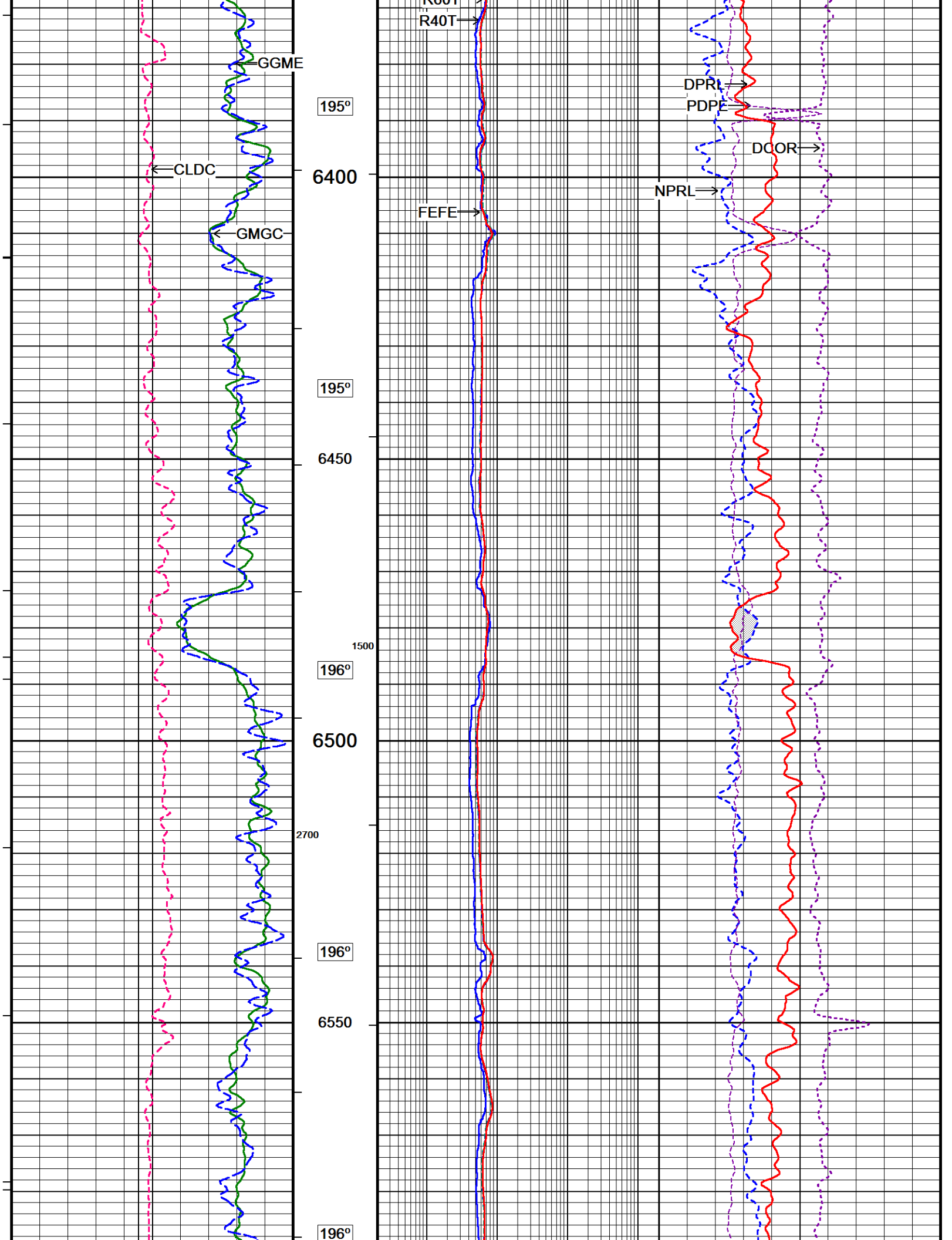
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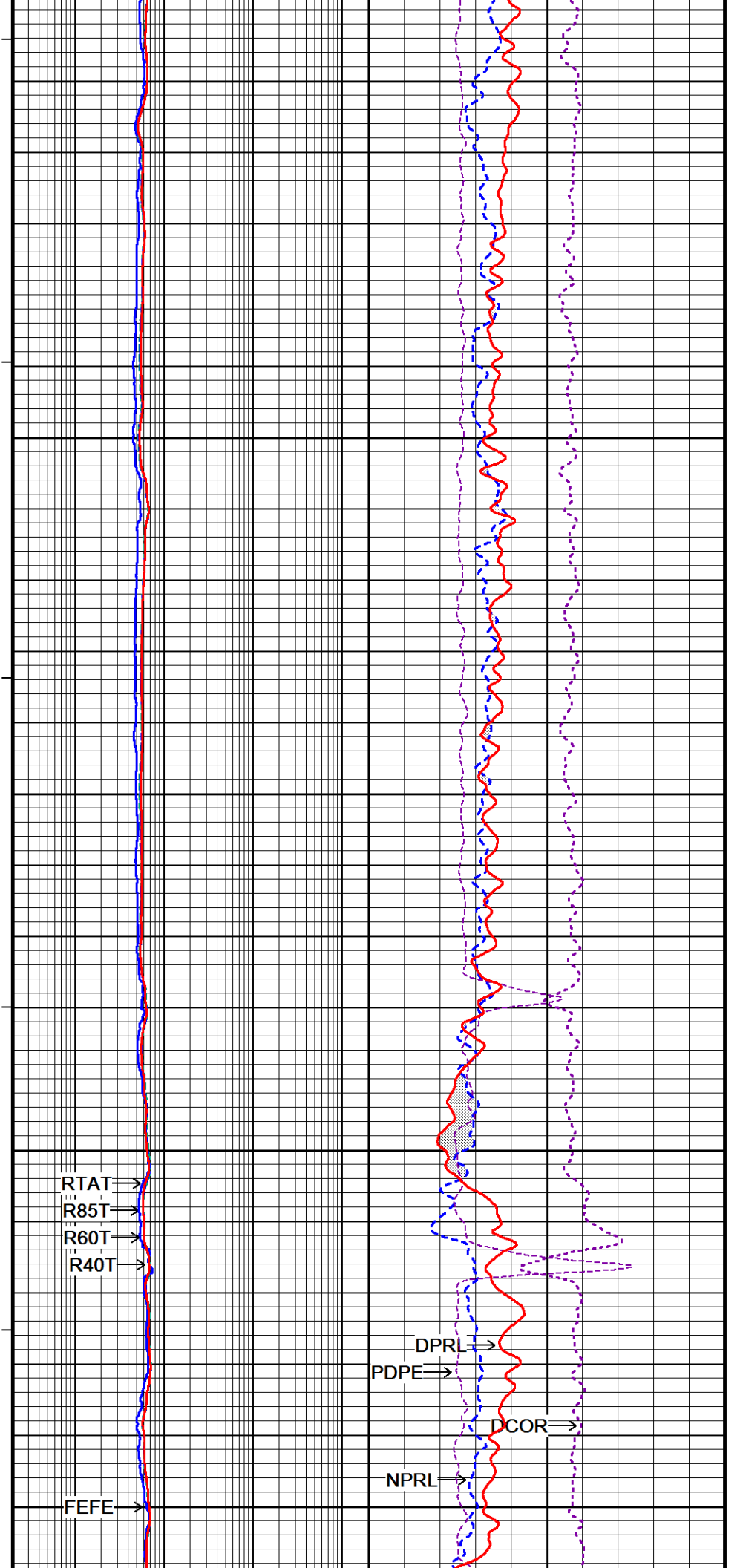
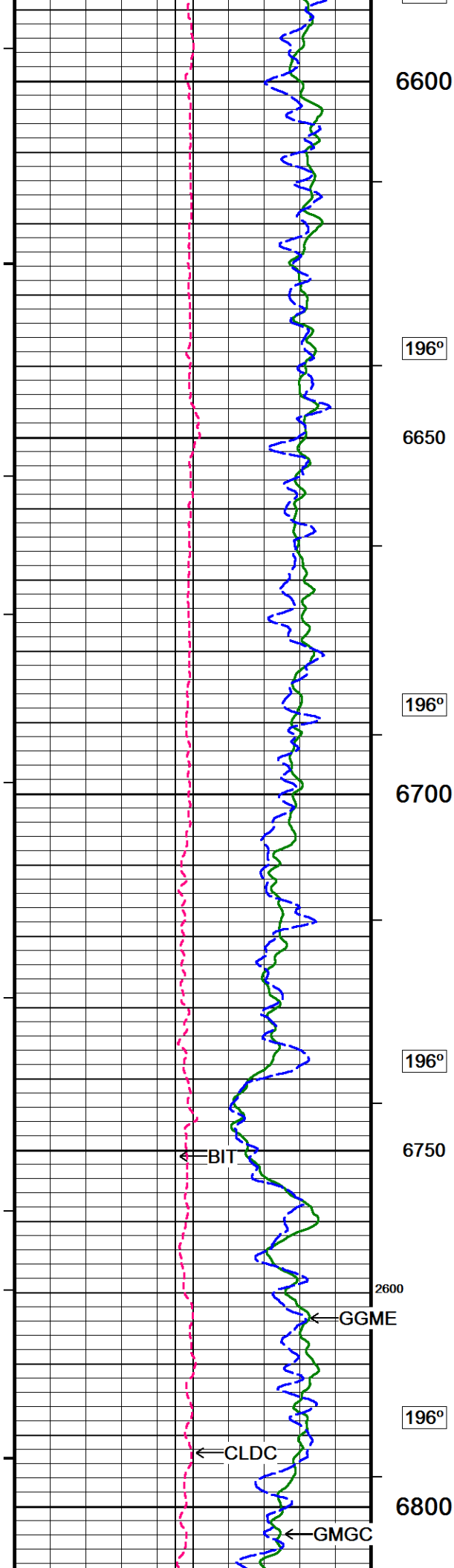
NPRL



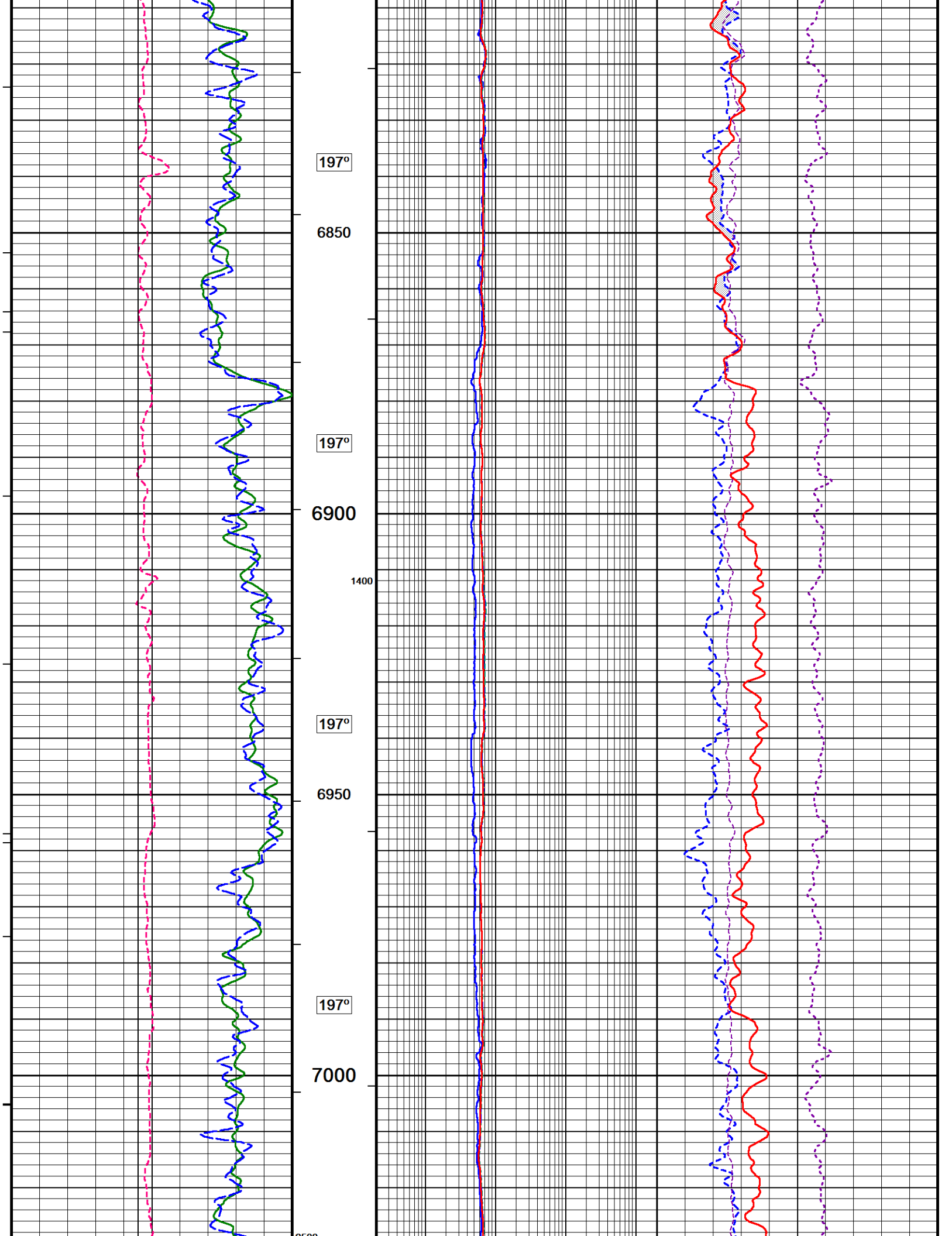


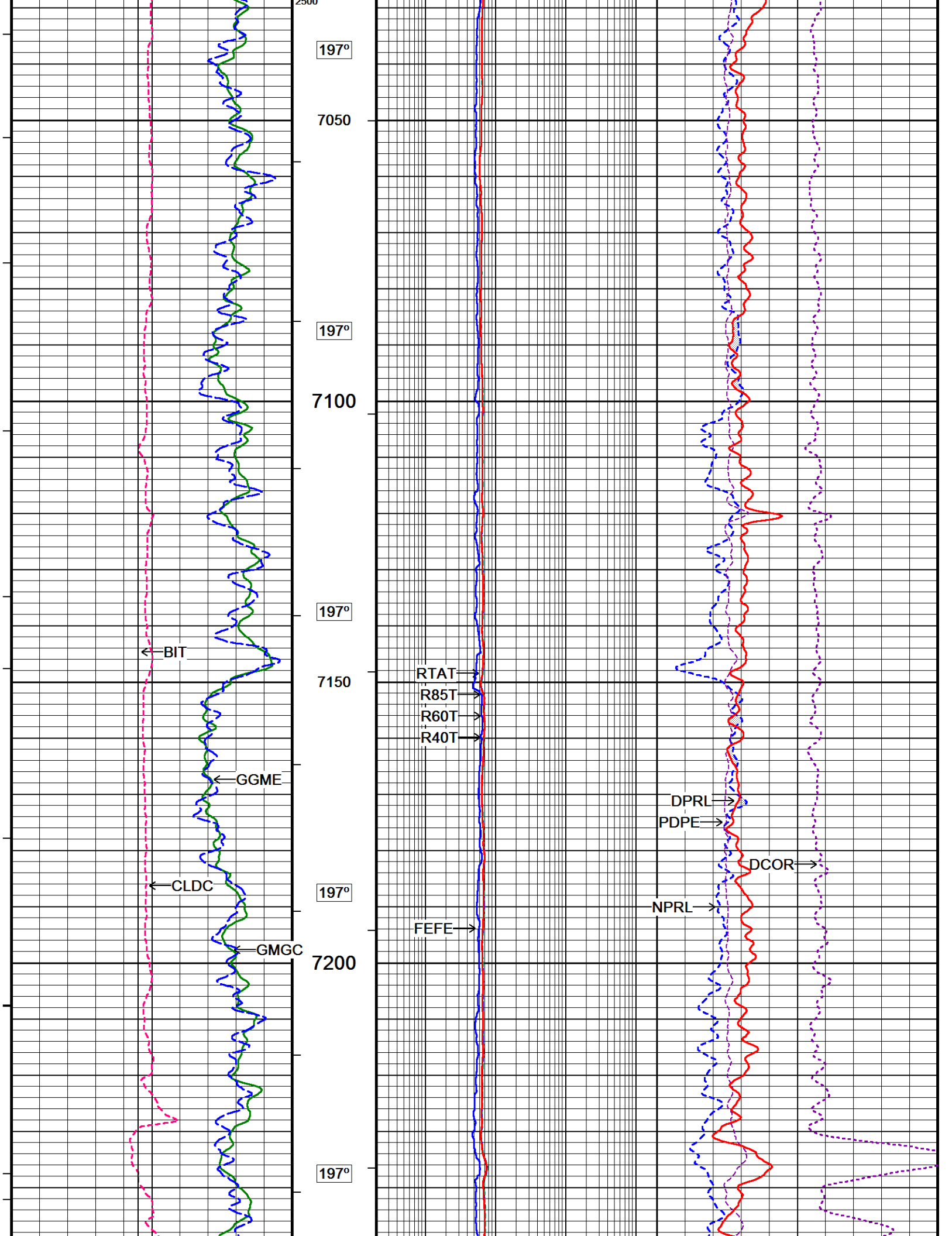


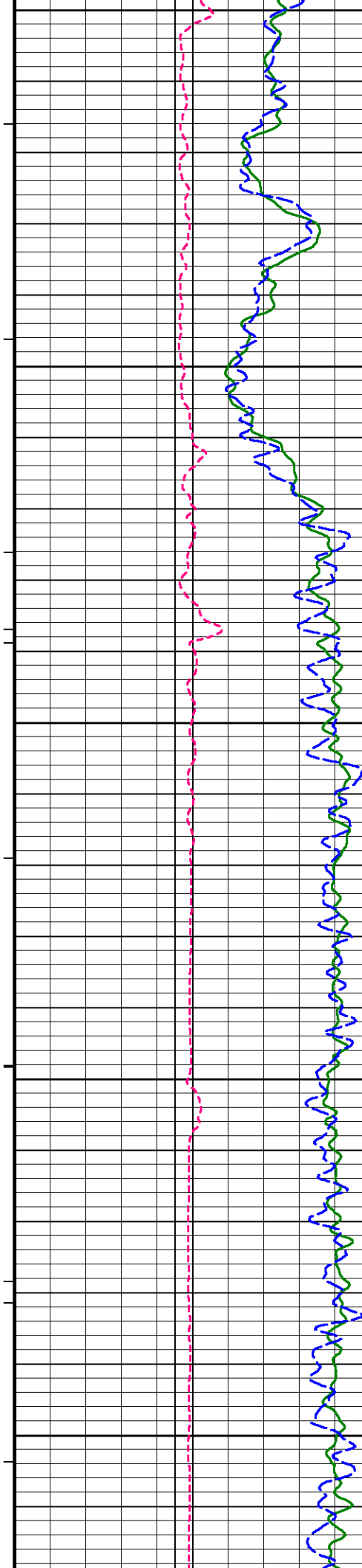




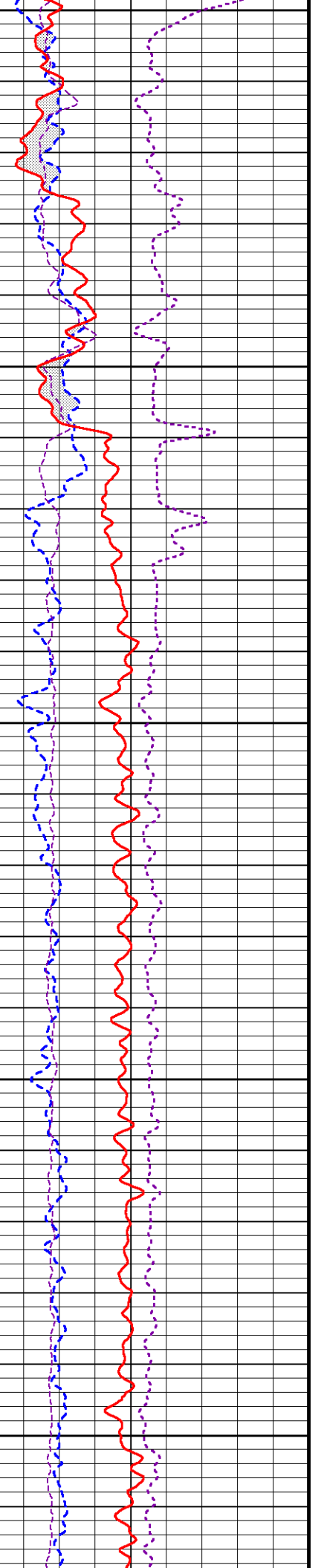
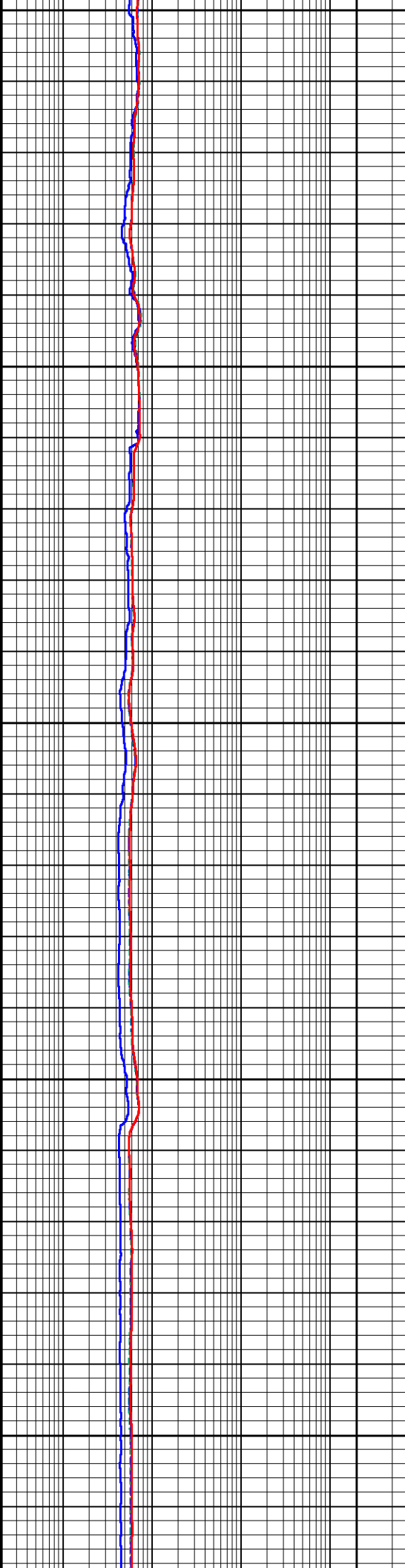


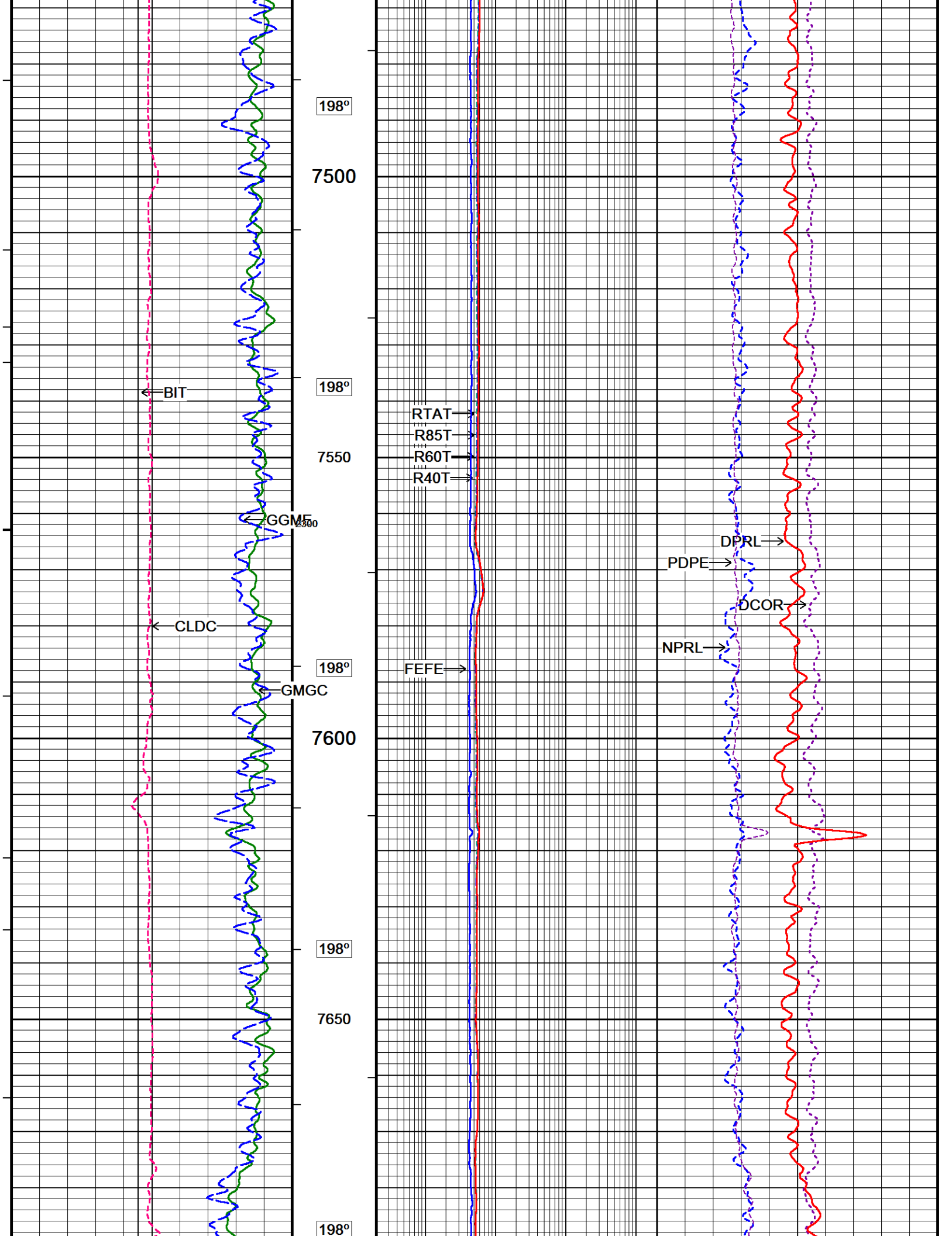


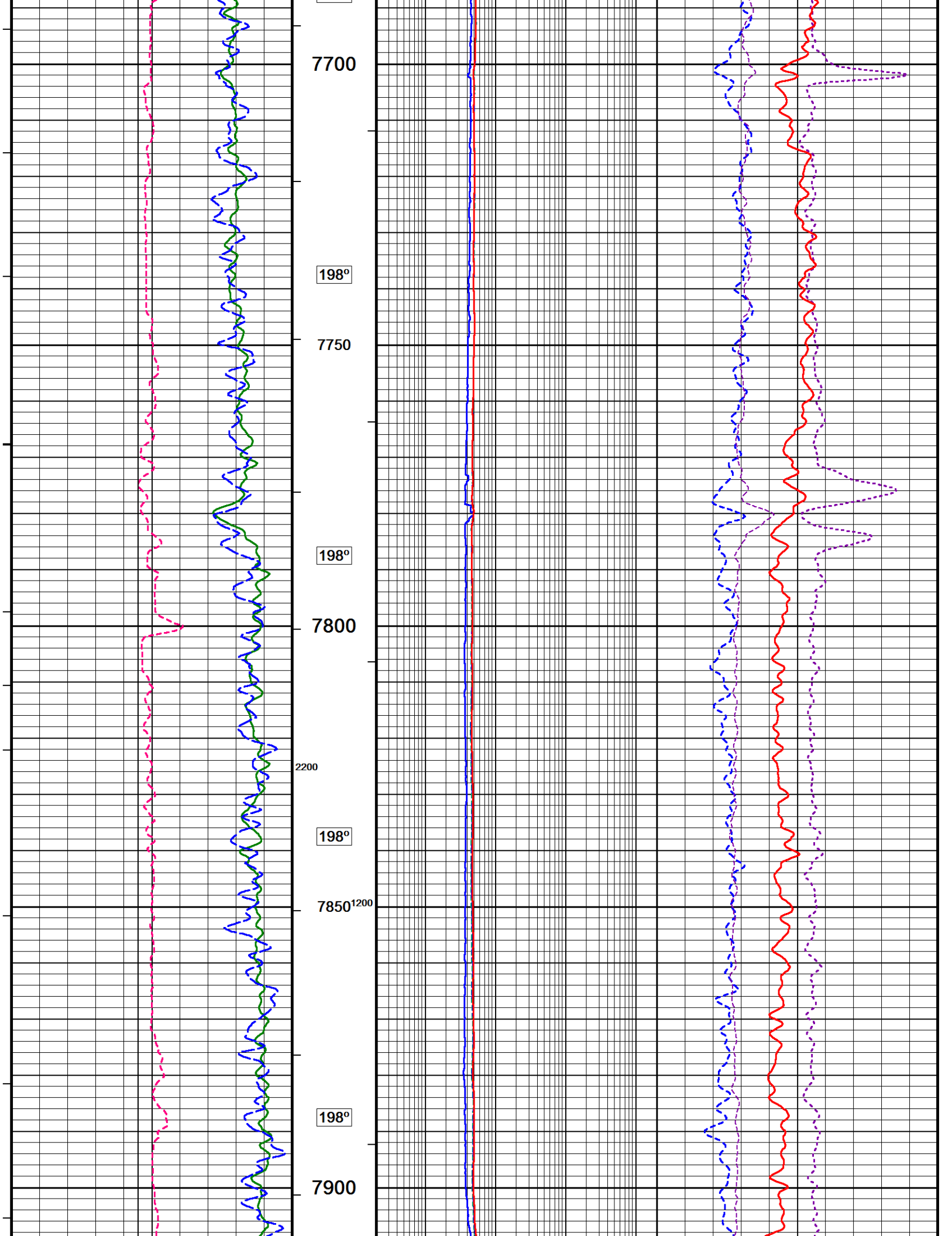


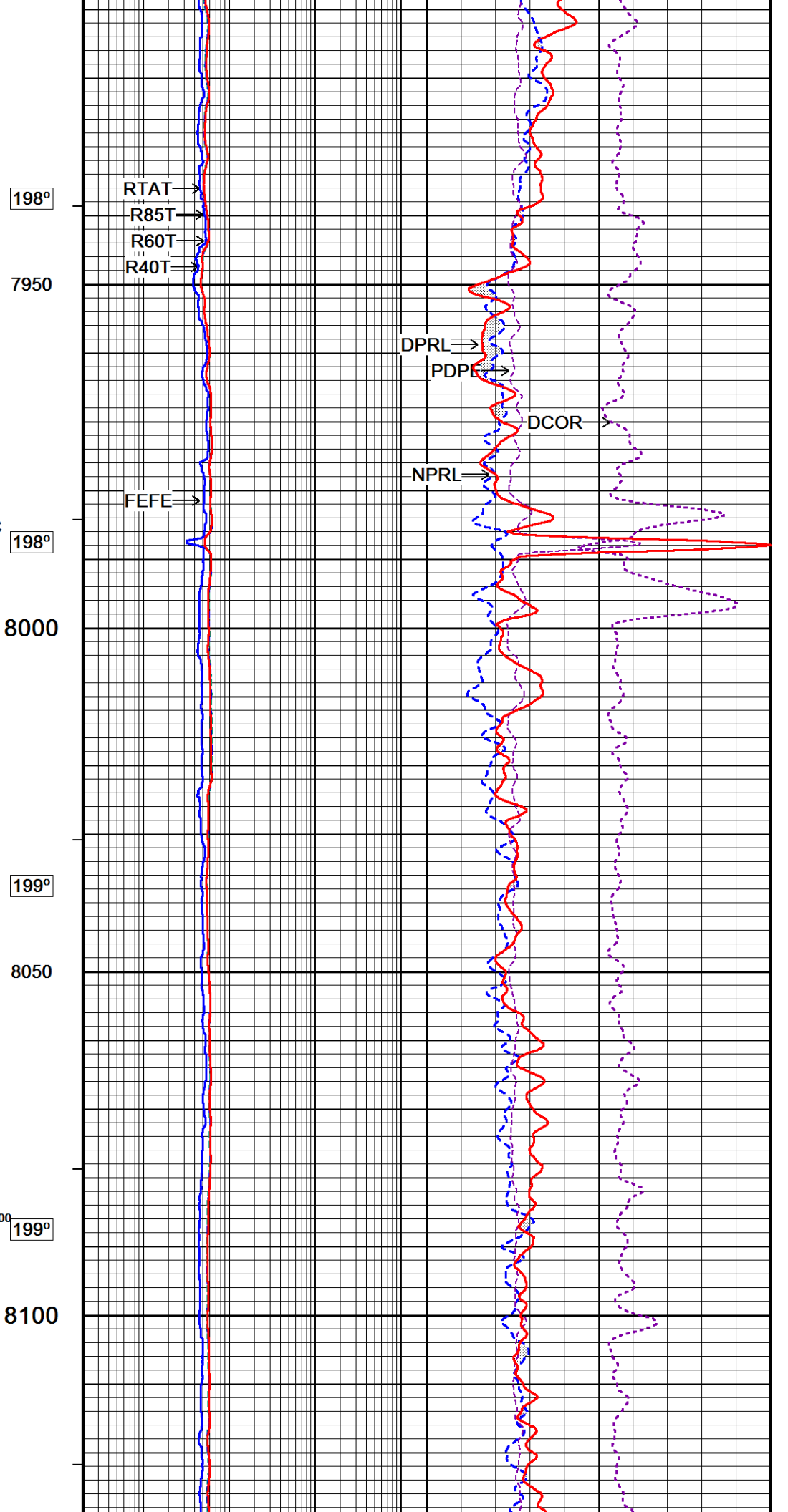
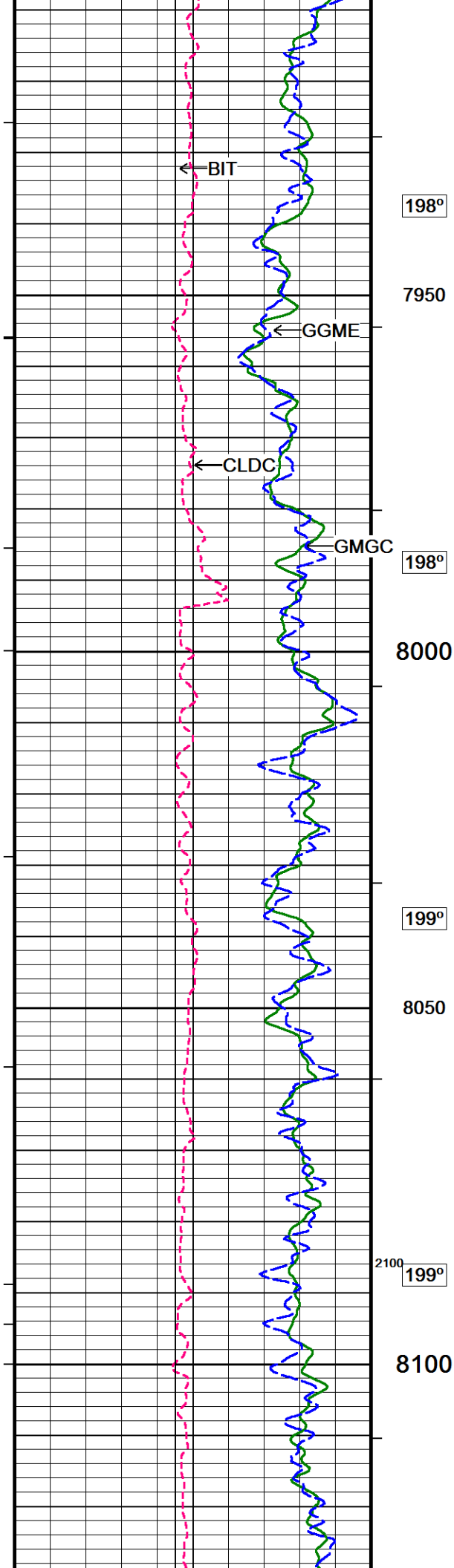


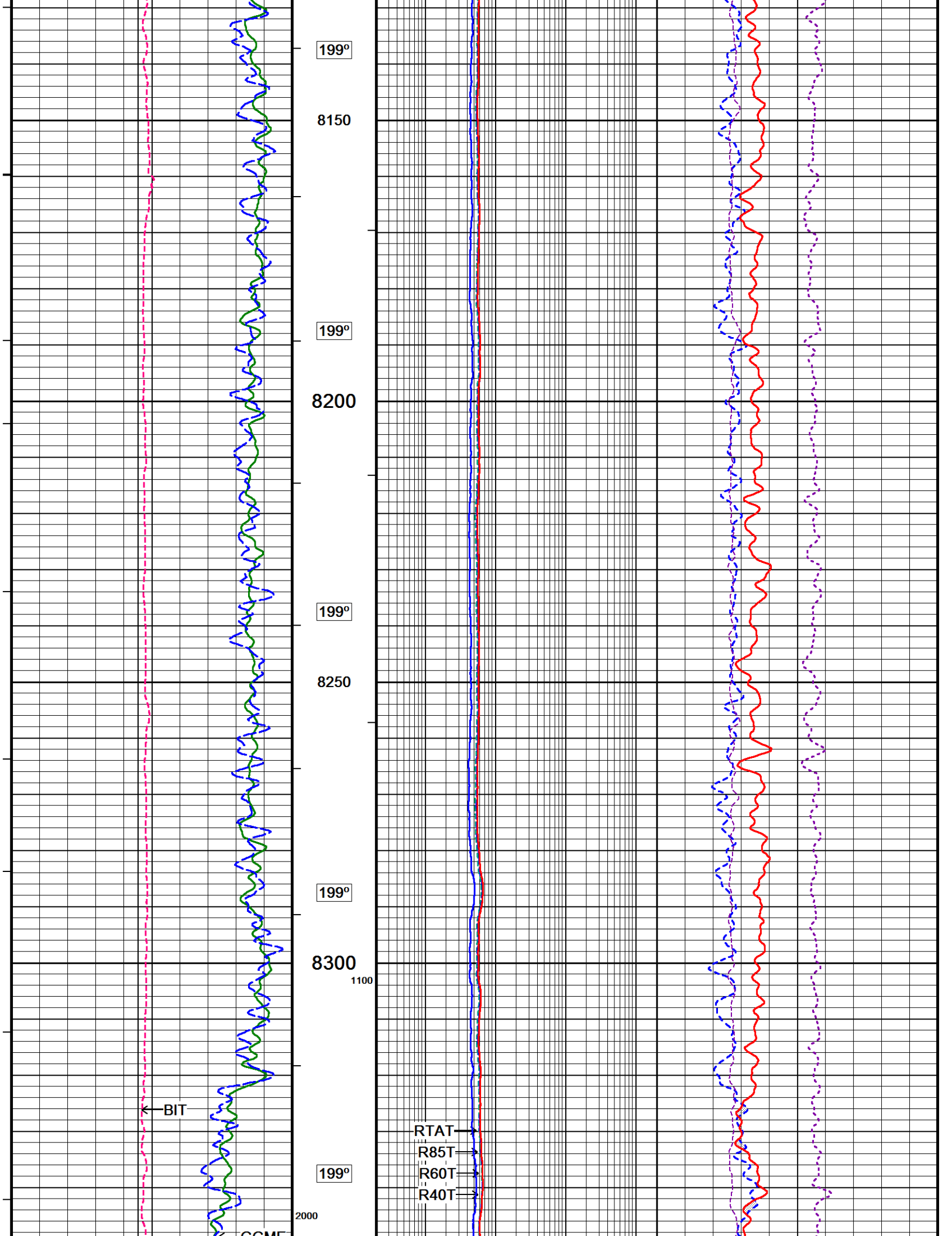
7250  
197°  
2400  
7300  
197°  
7350  
1300  
197°  
7400  
198°  
7450

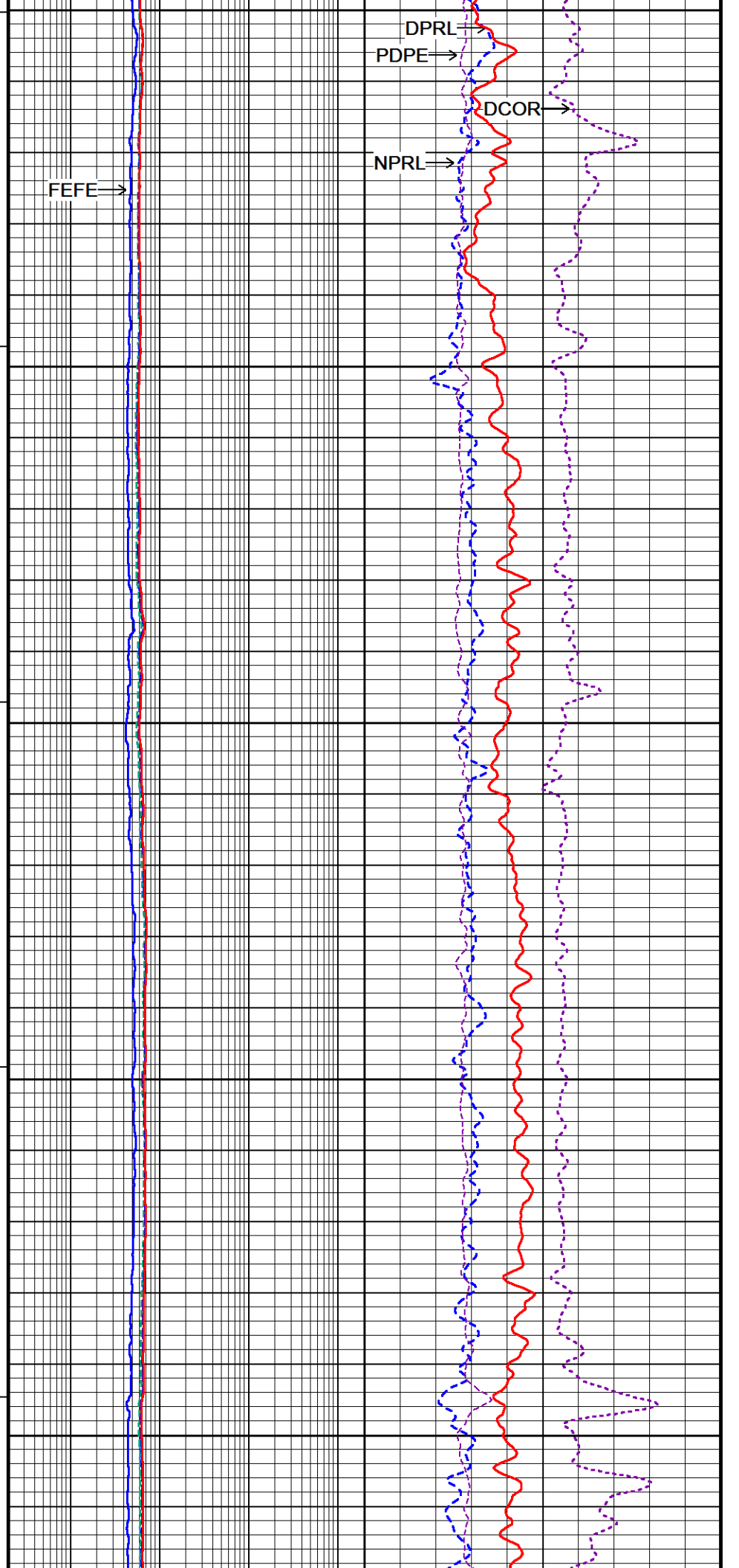
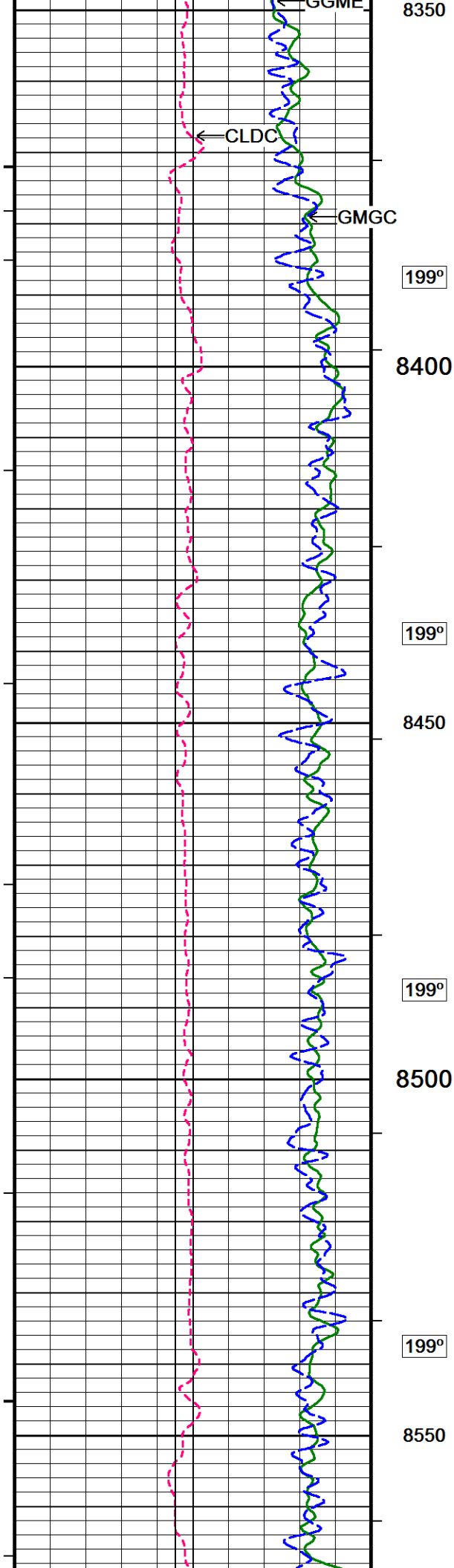




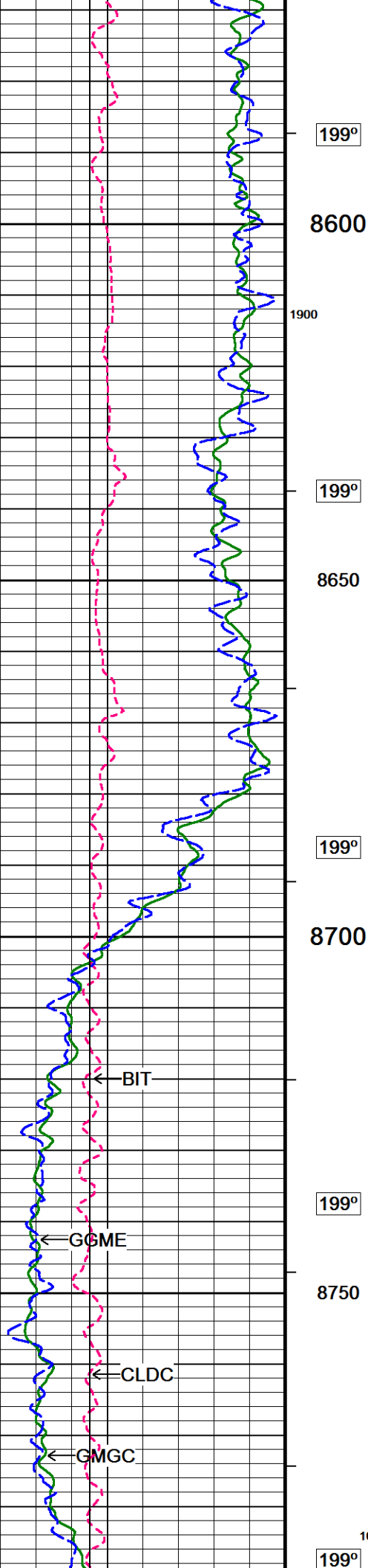








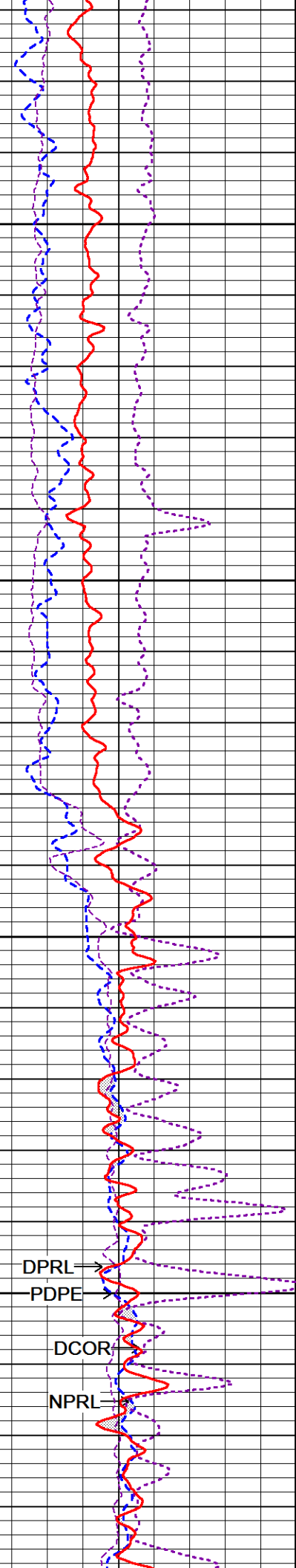


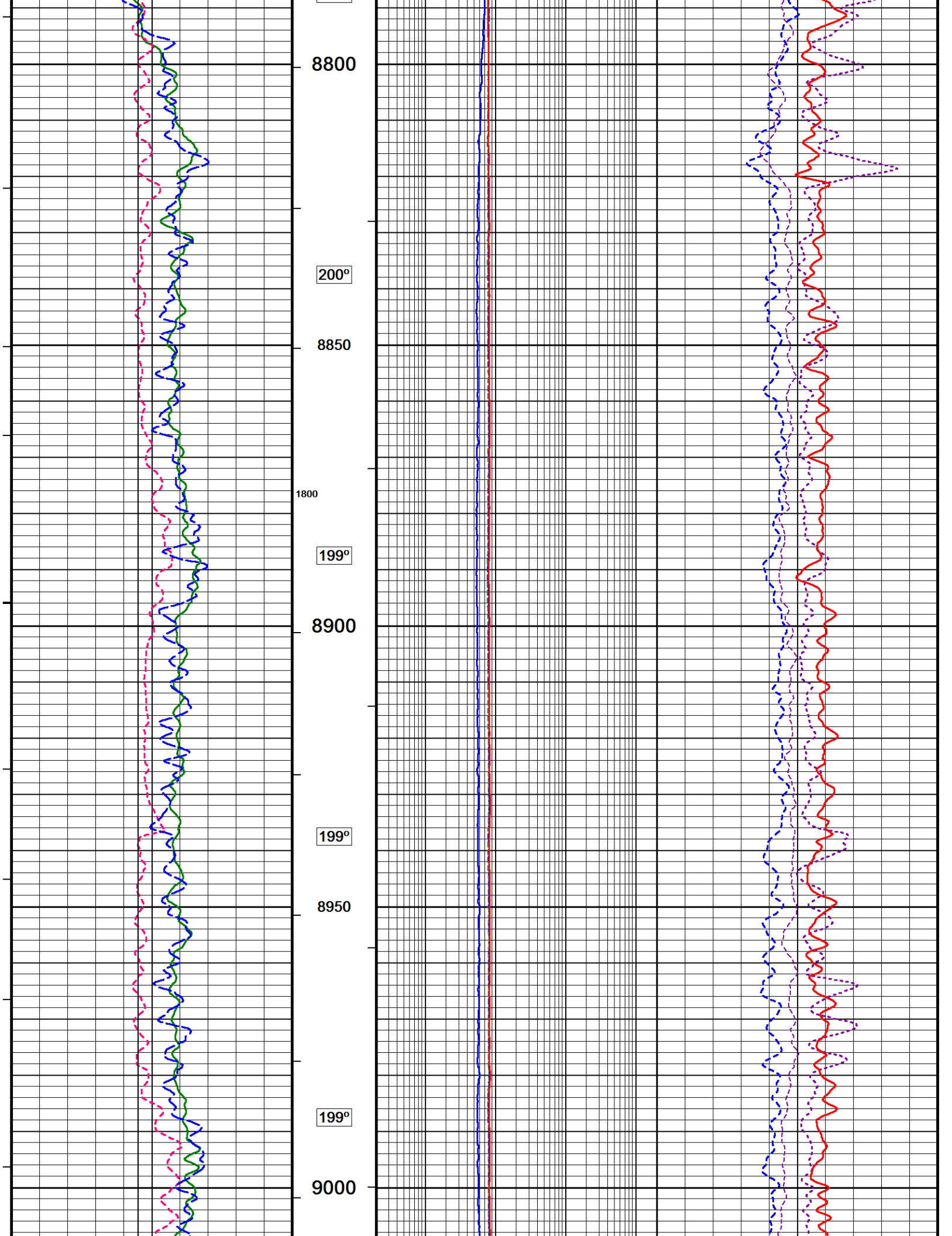


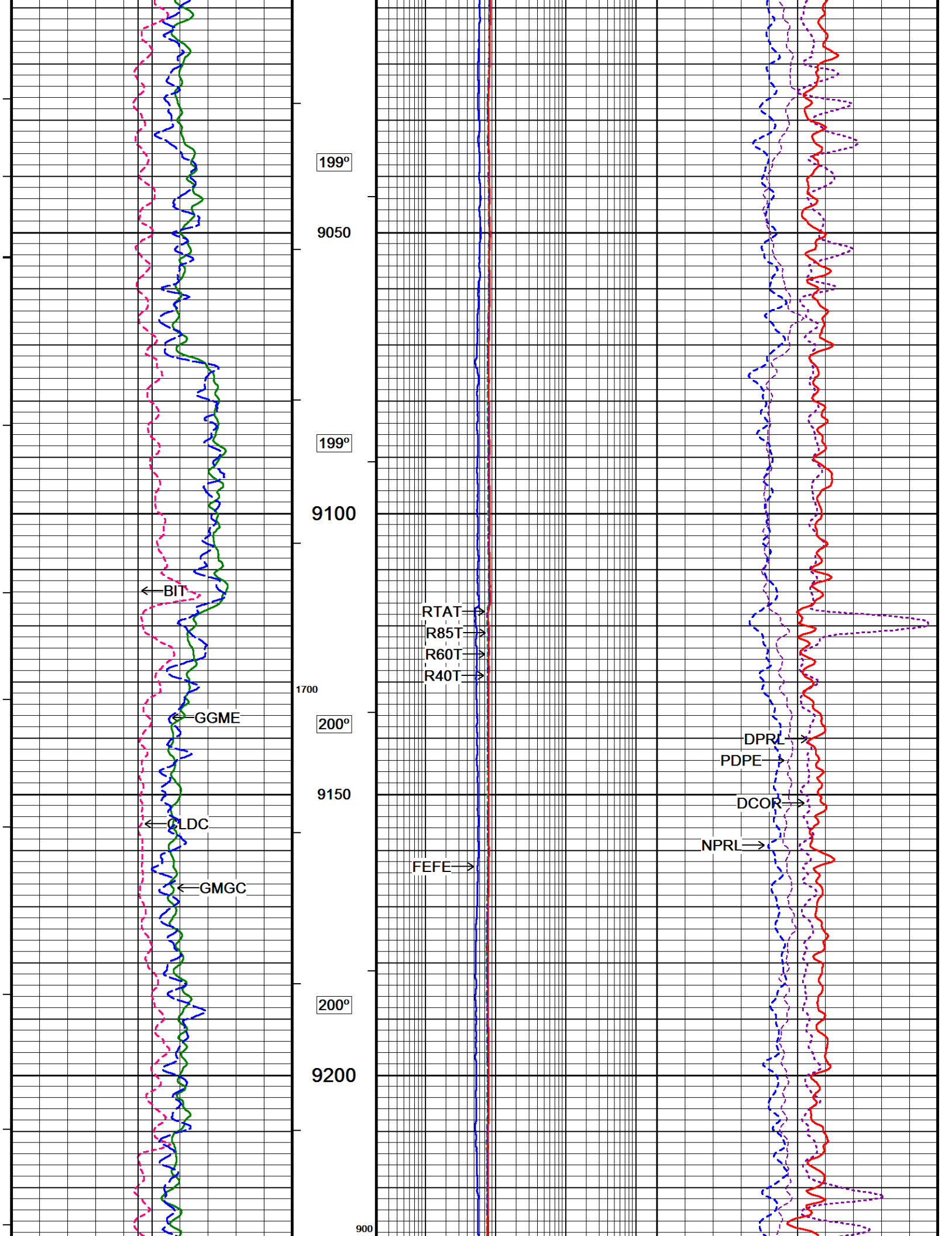
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8600  
1900  
199°  
8650  
199°  
8700  
199°  
8750  
1000  
199°

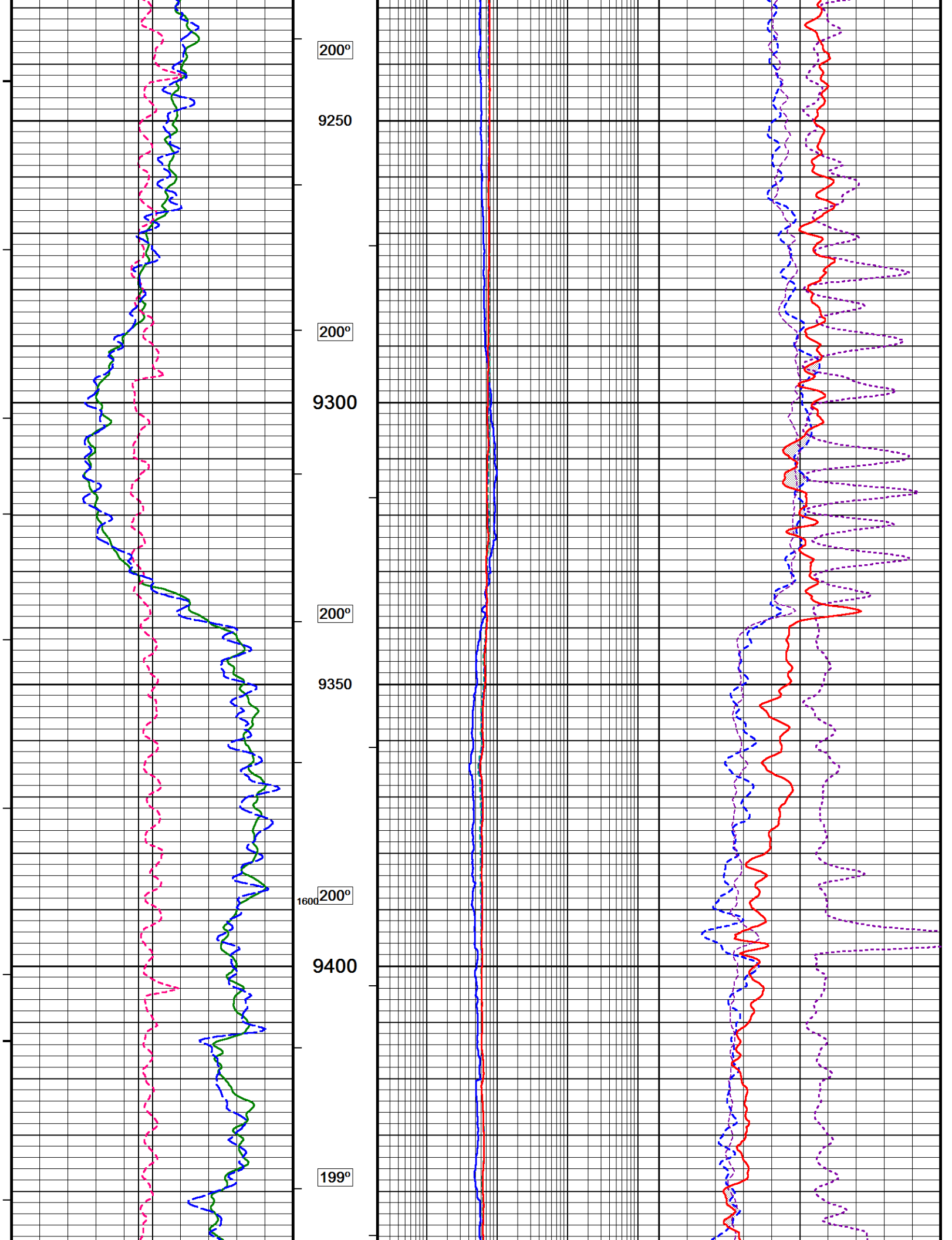
RTAT →  
R85T →  
R60T →  
R40T →  
FEFE →

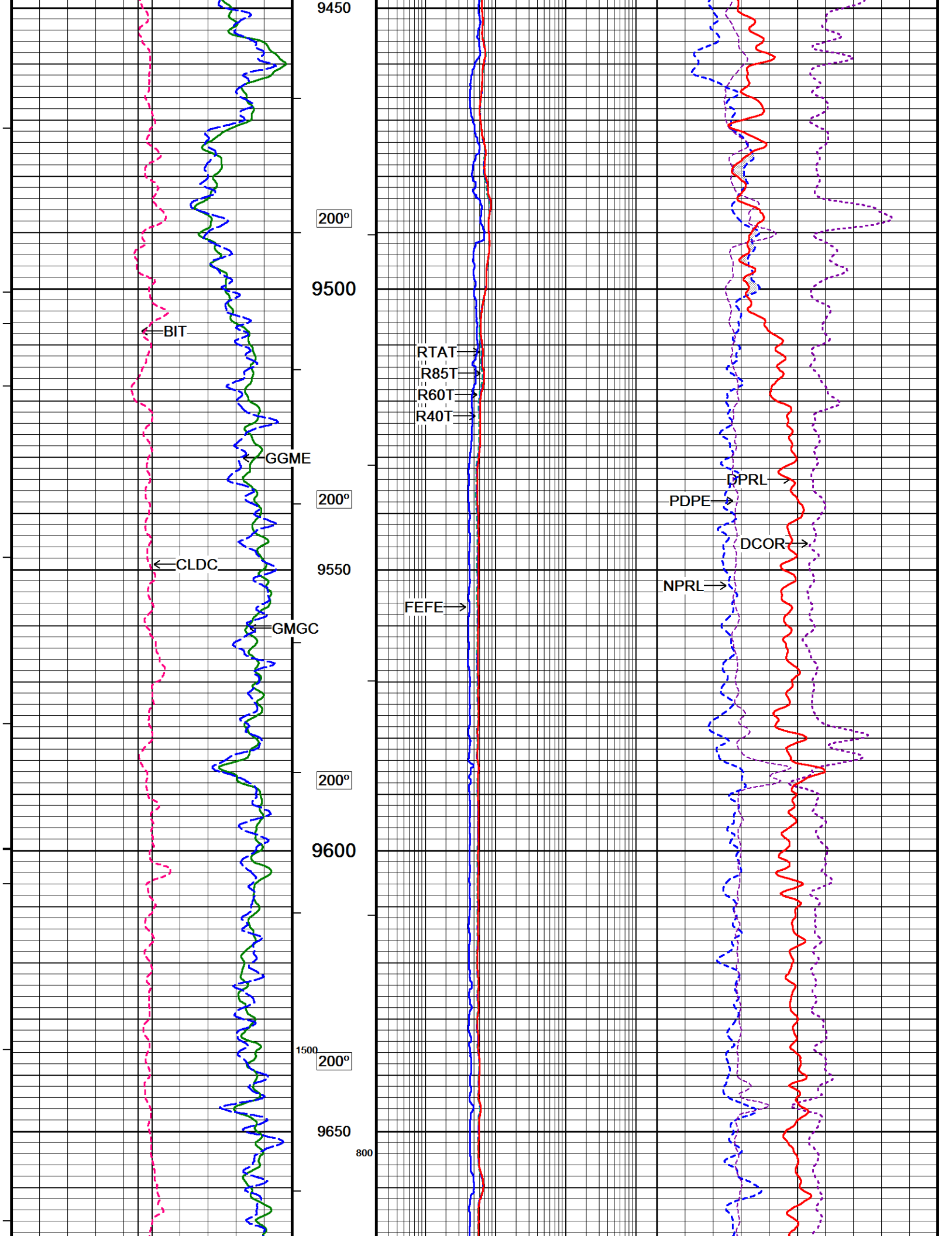
DPRL →  
PDPE →  
DCOR →  
NPRL →

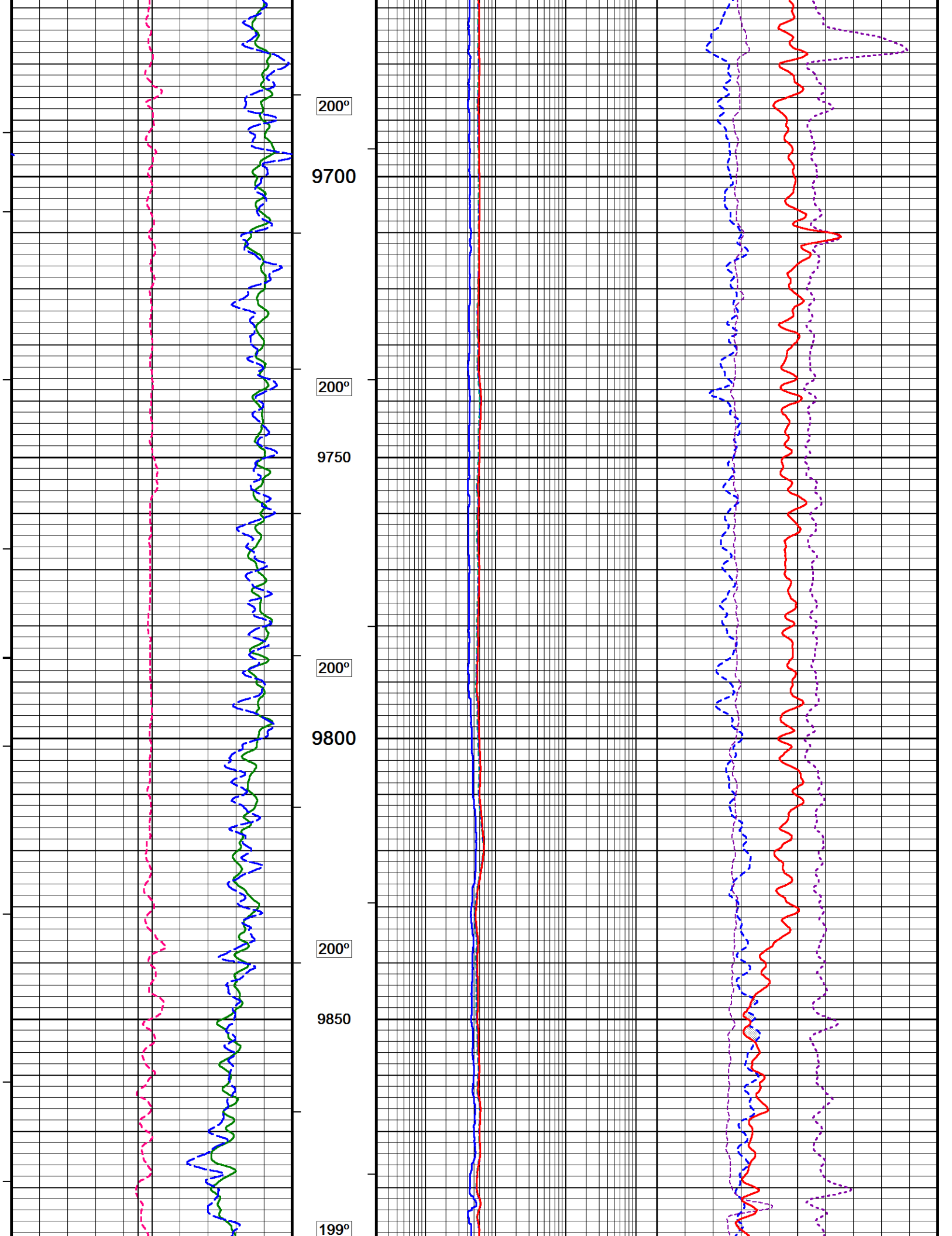


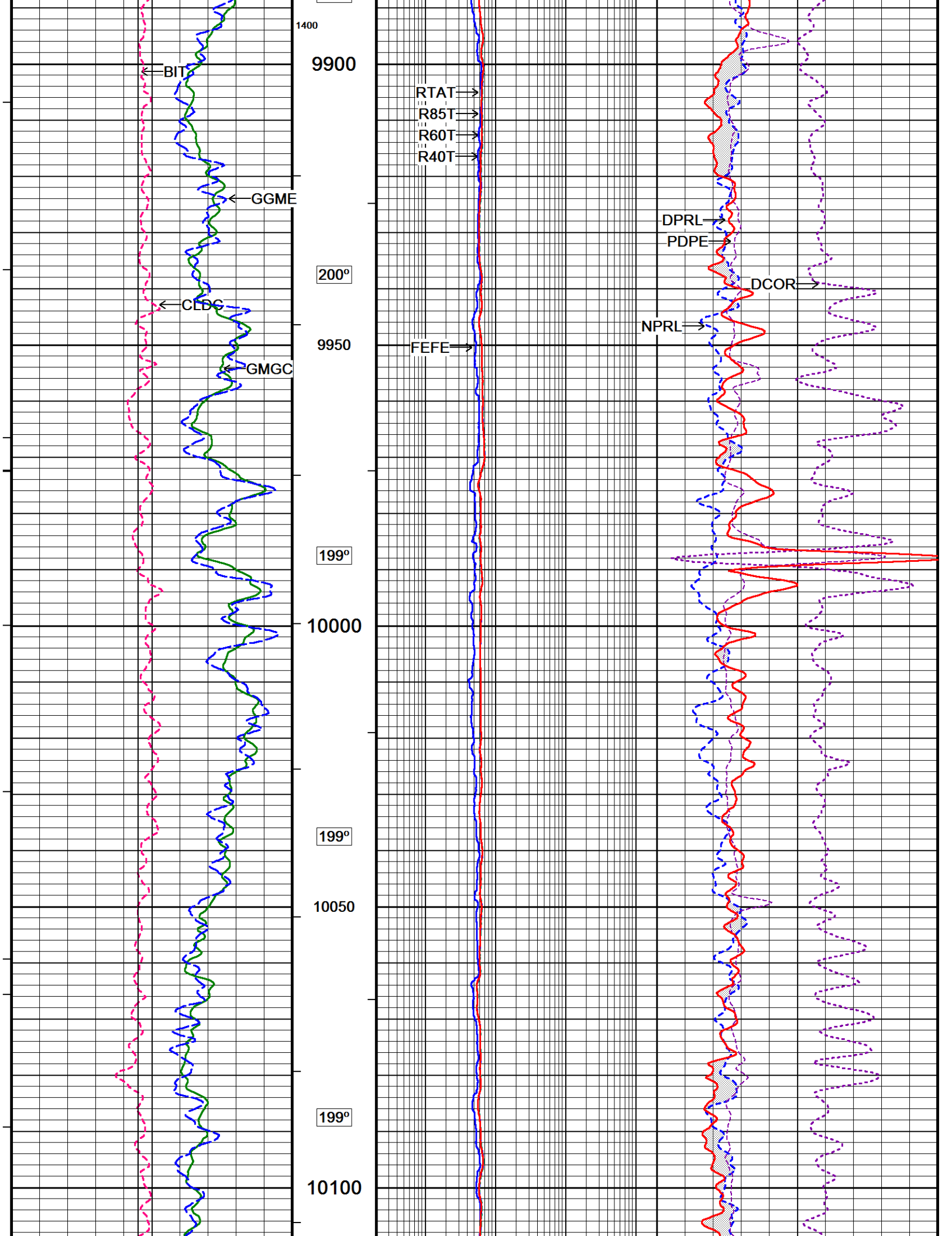


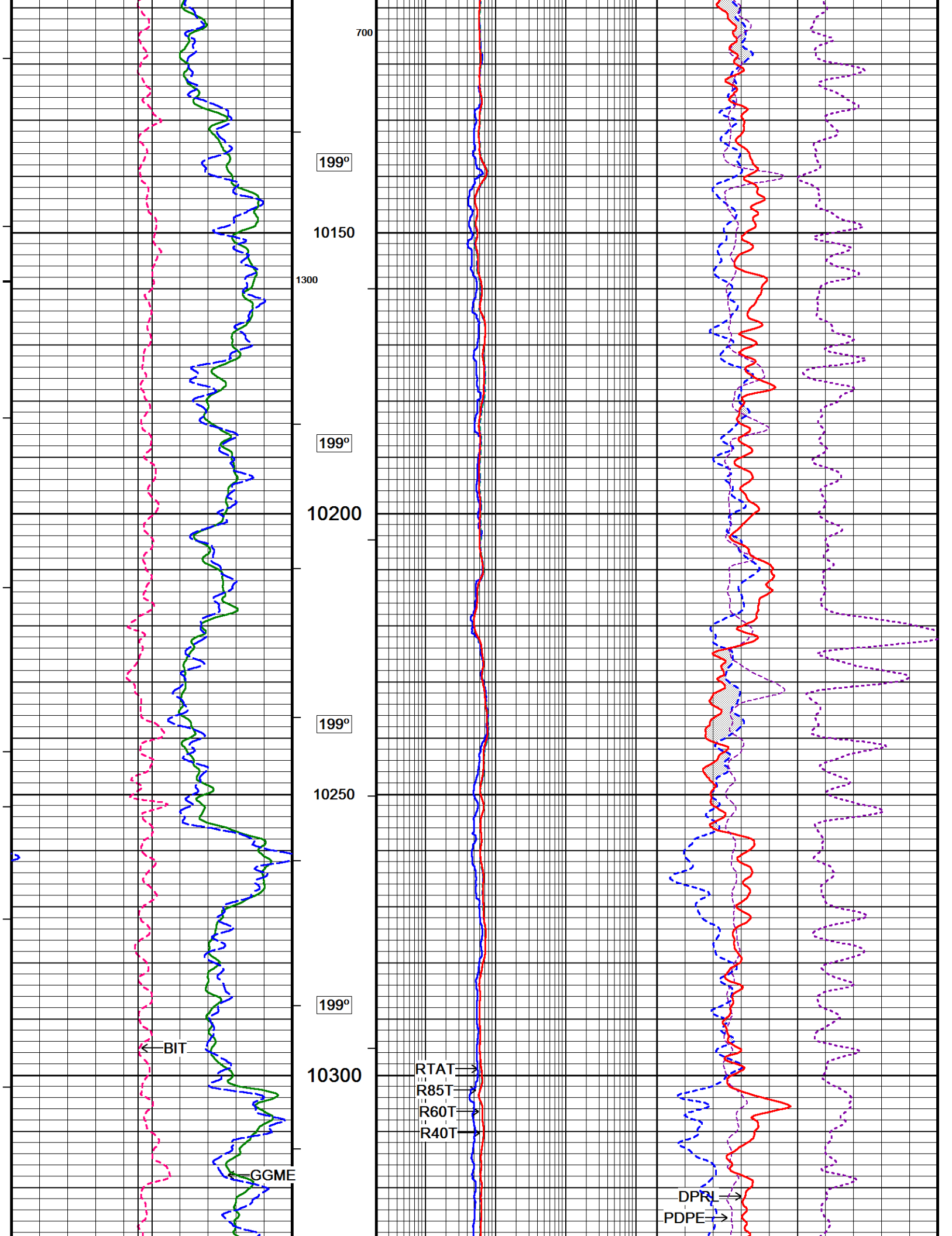




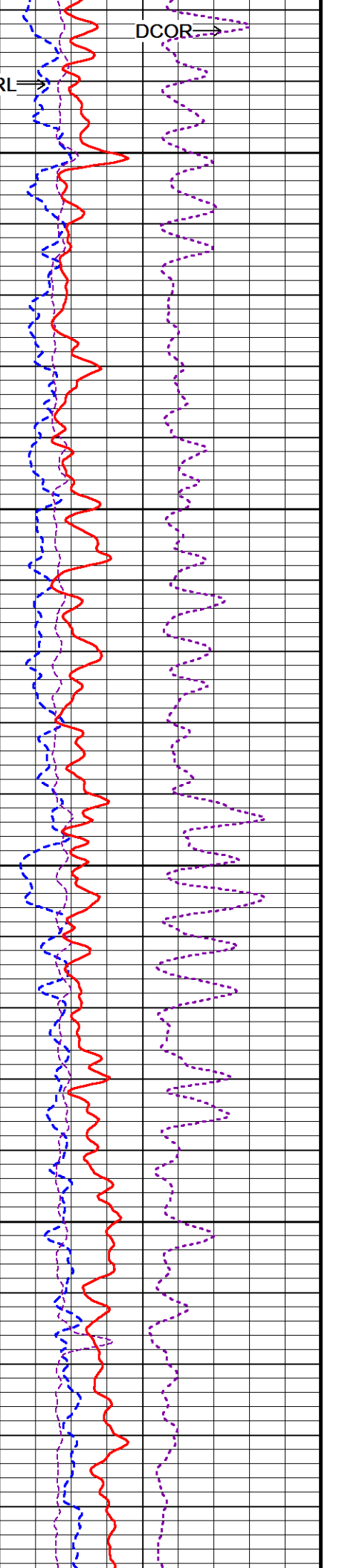
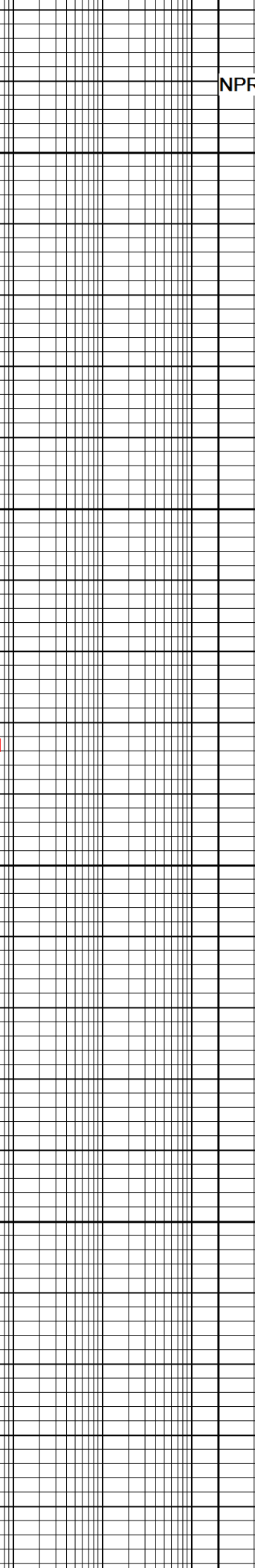
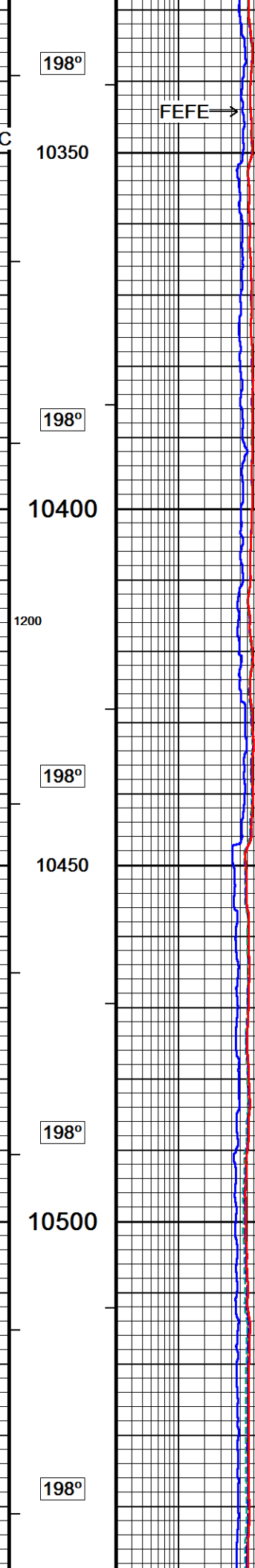
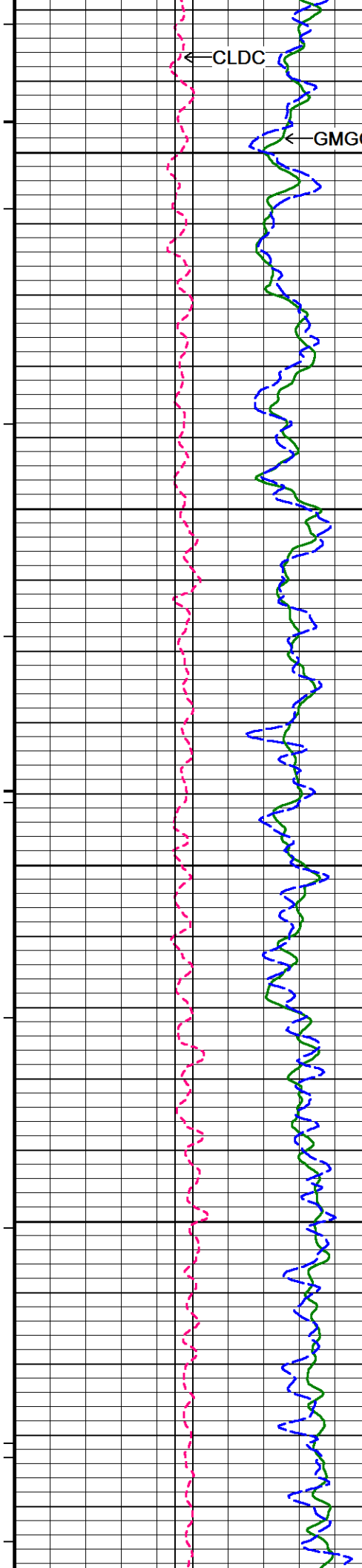


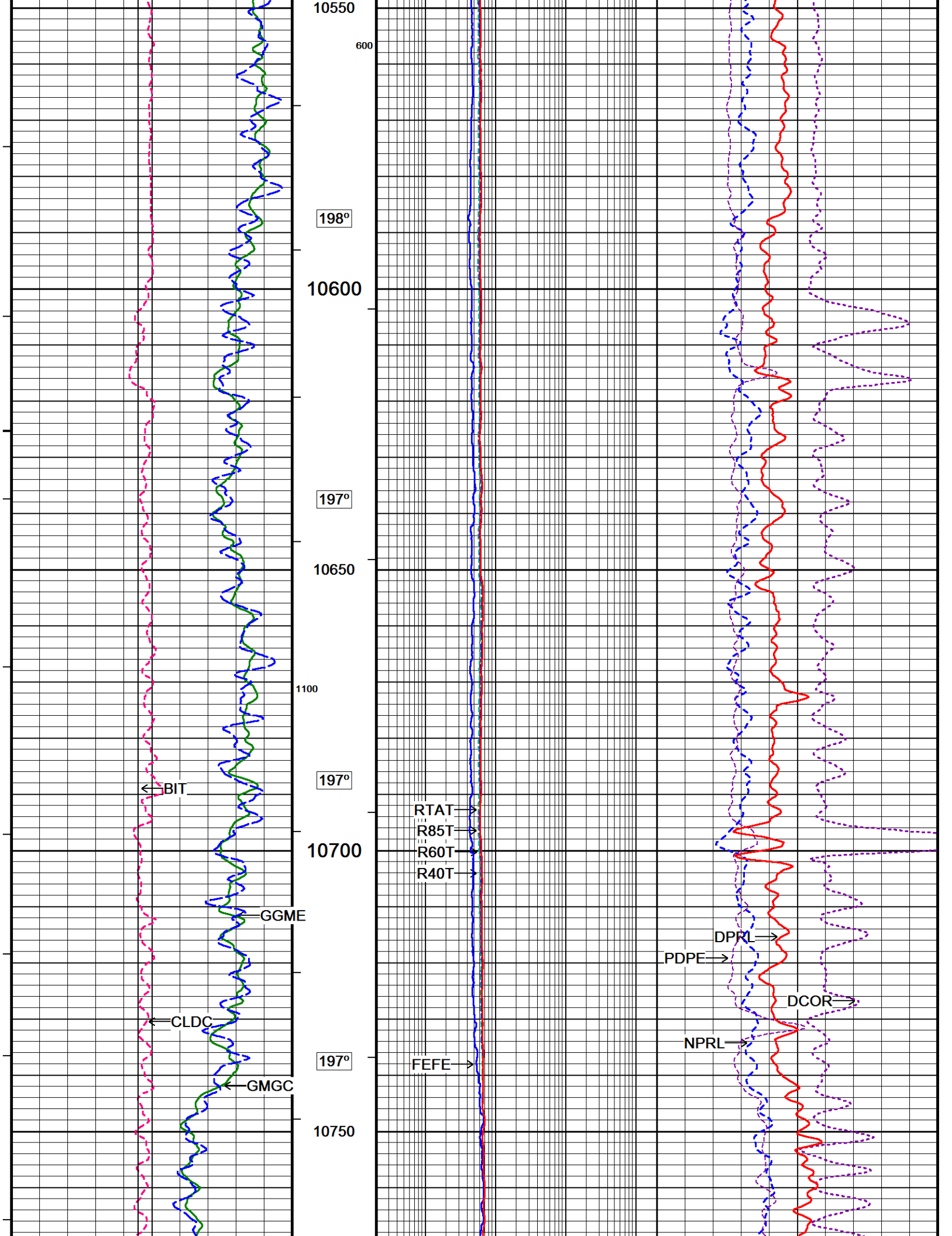


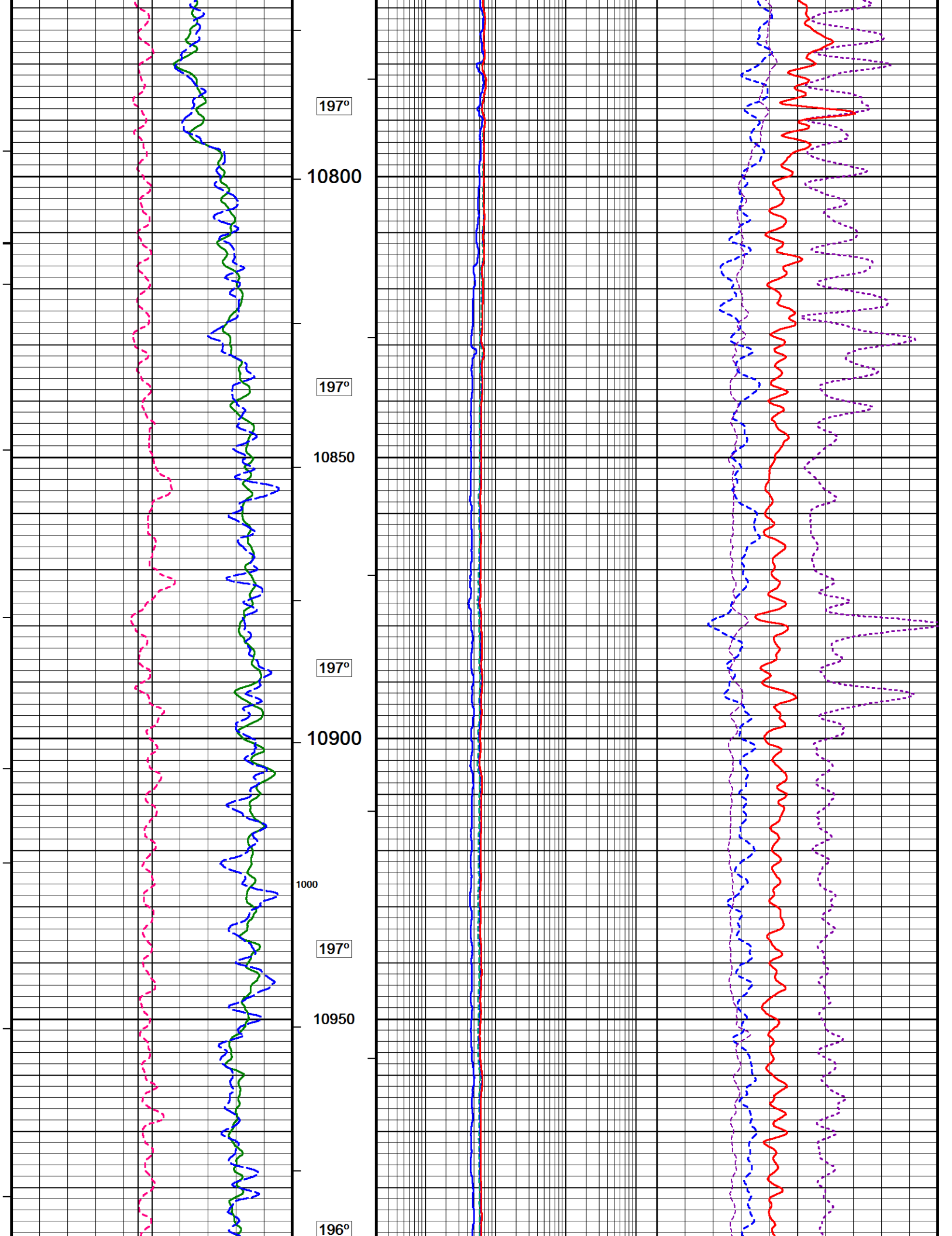


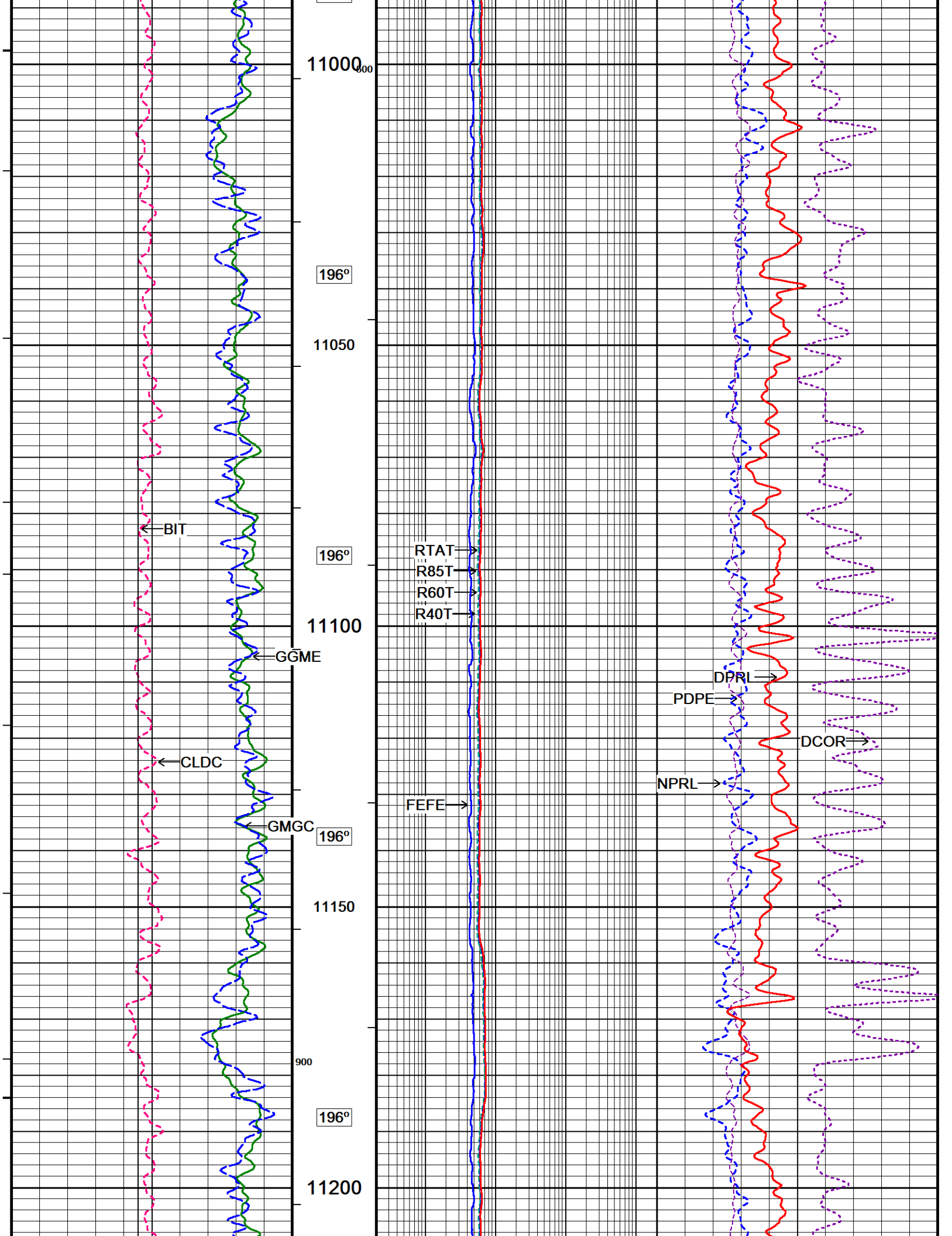


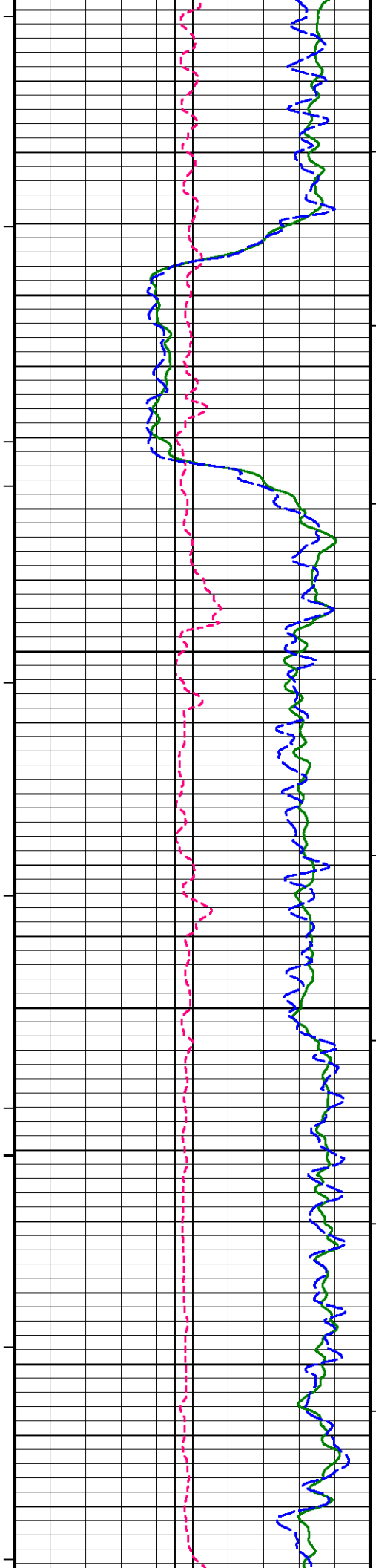






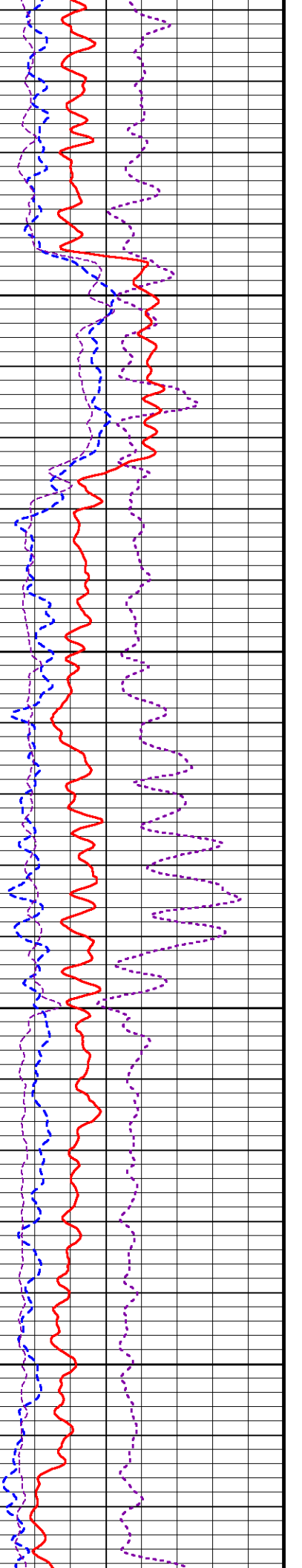
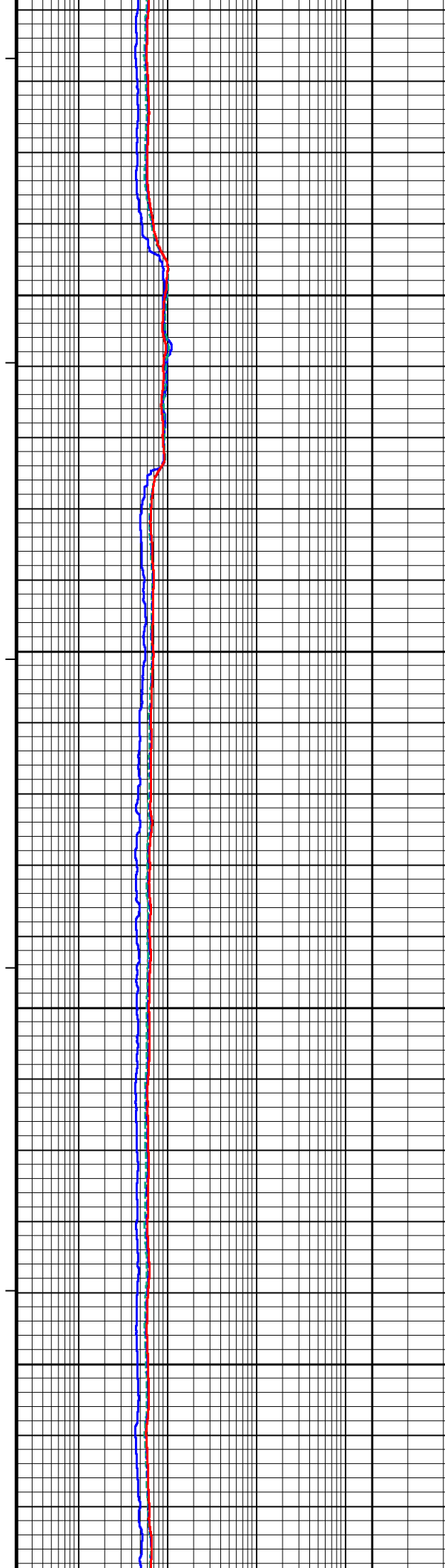


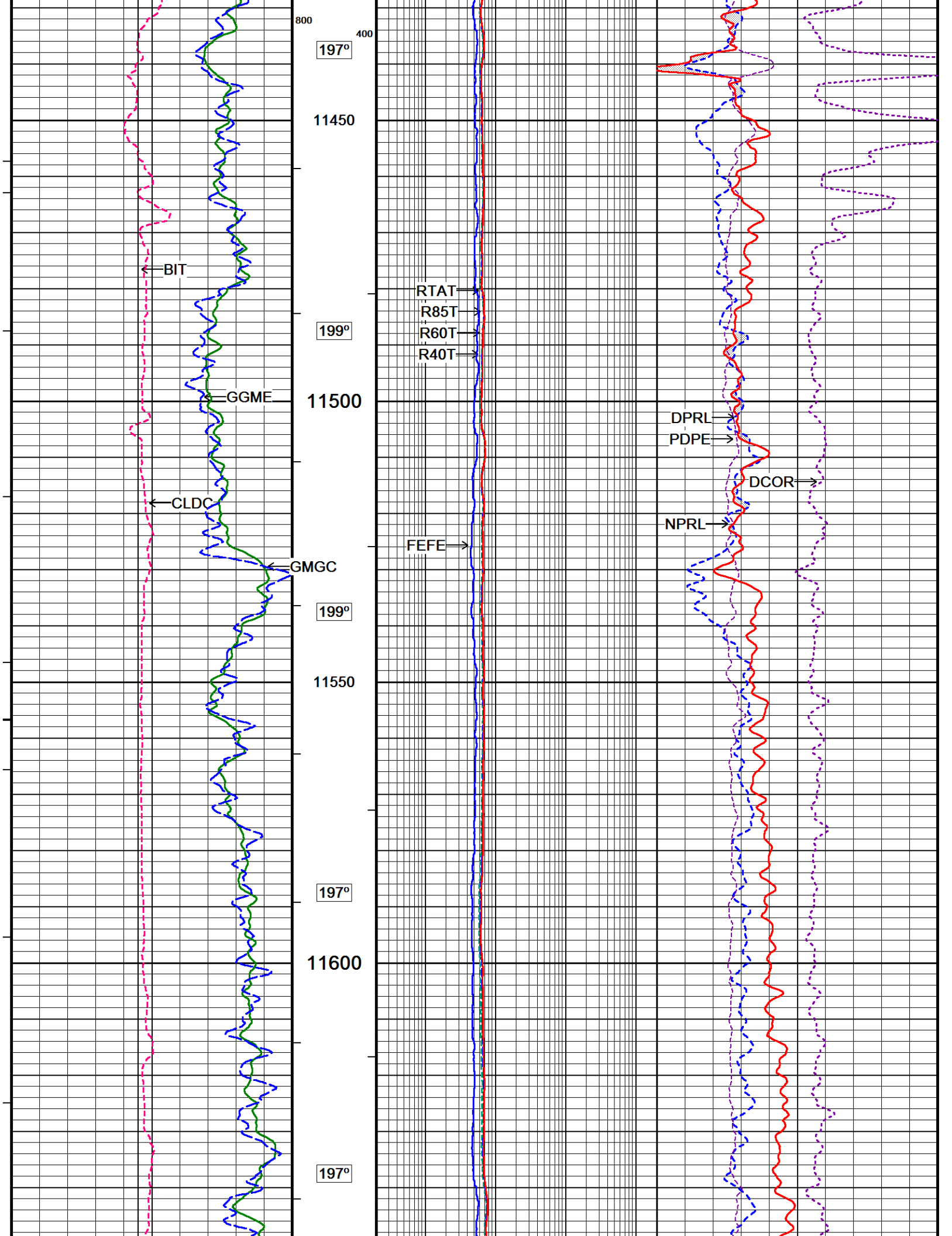


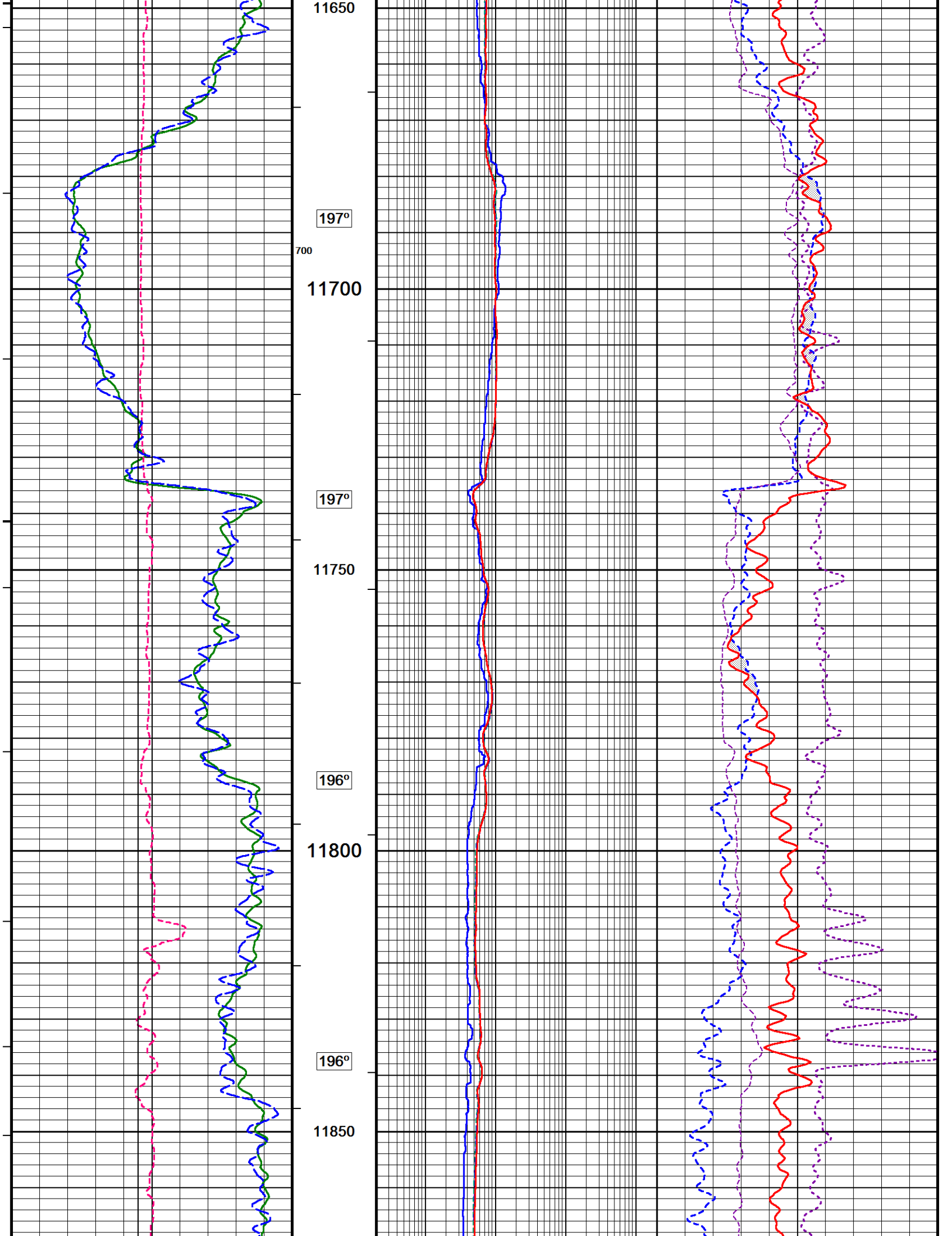


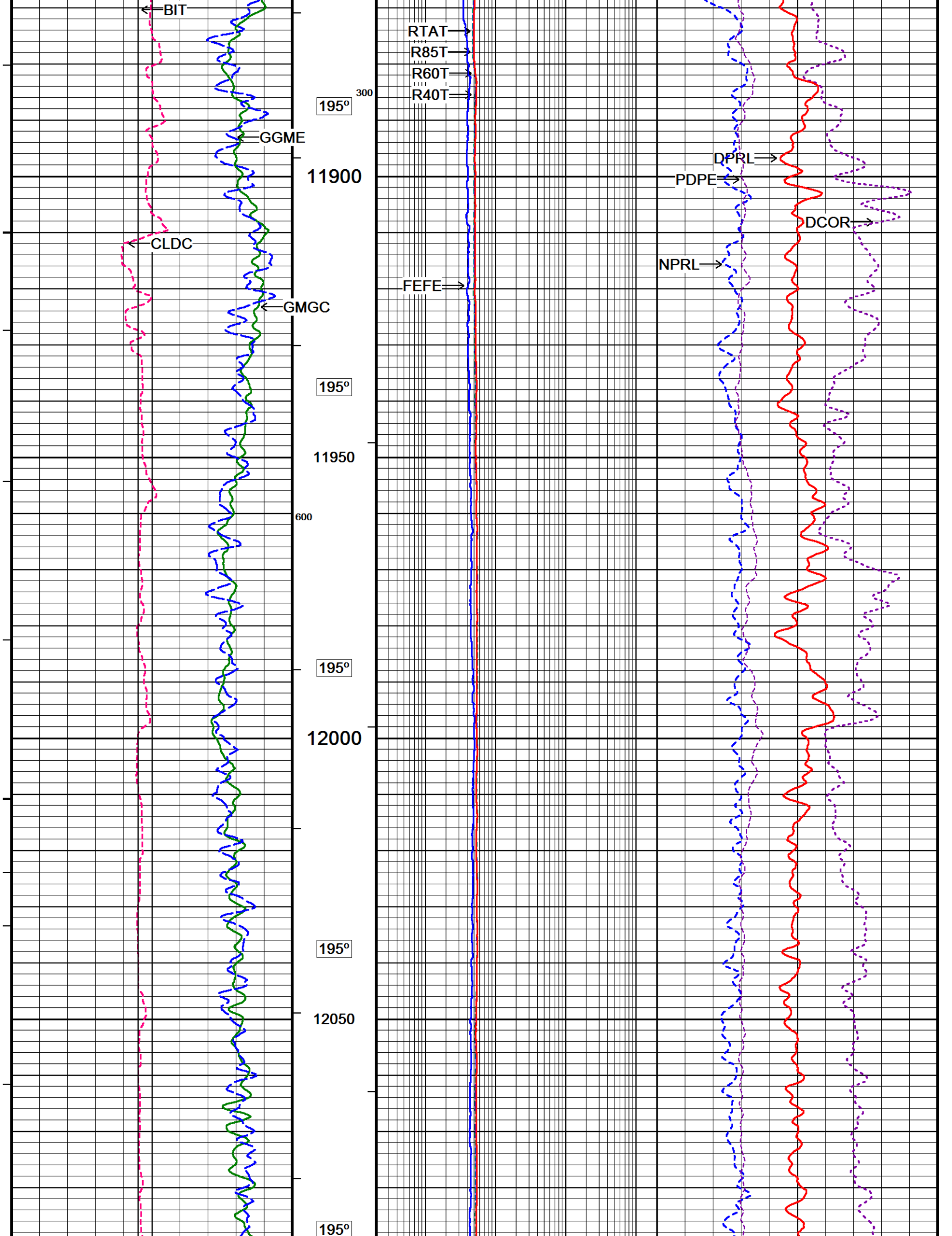
11250  
11300  
11350  
11400

196°  
196°  
196°  
197°

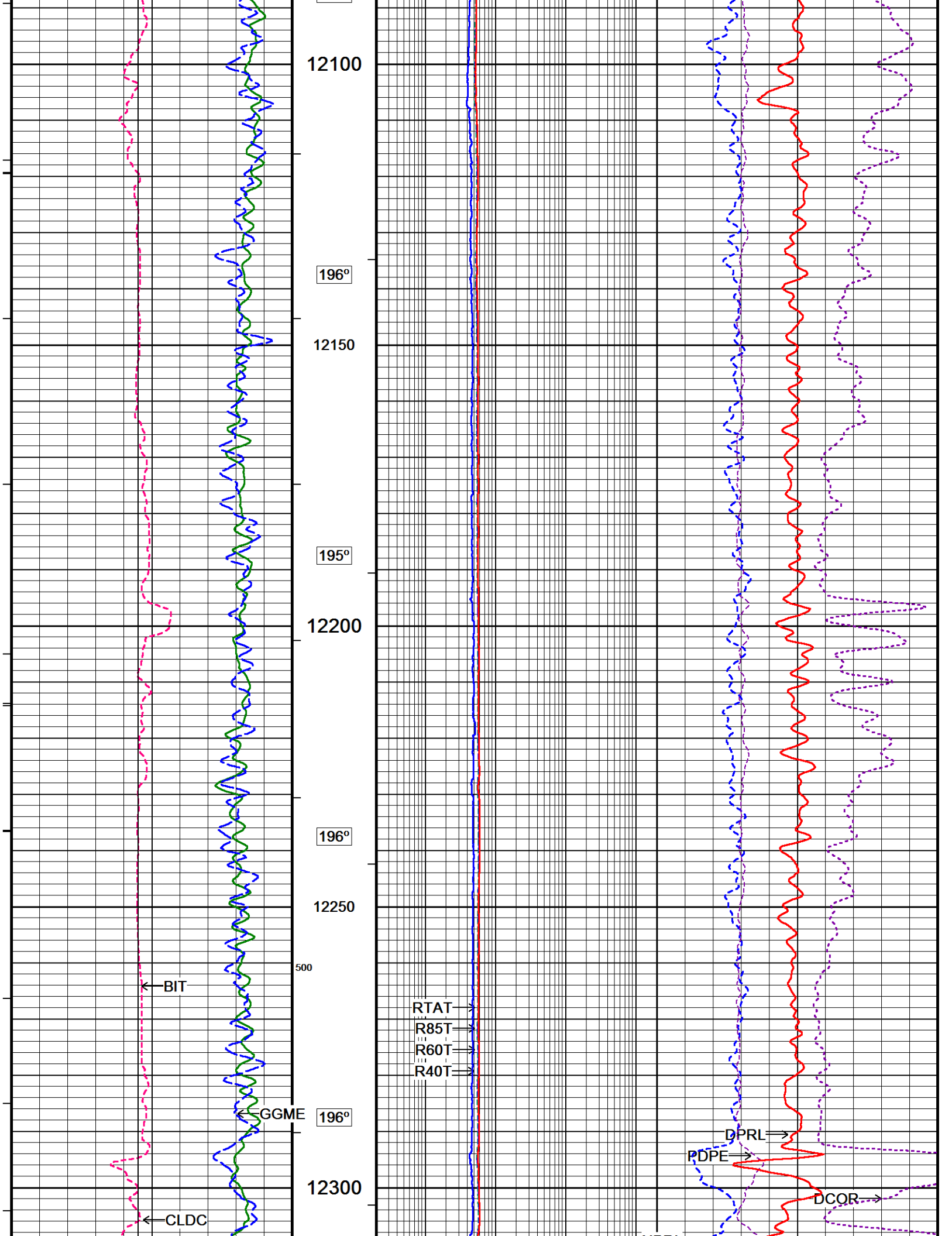


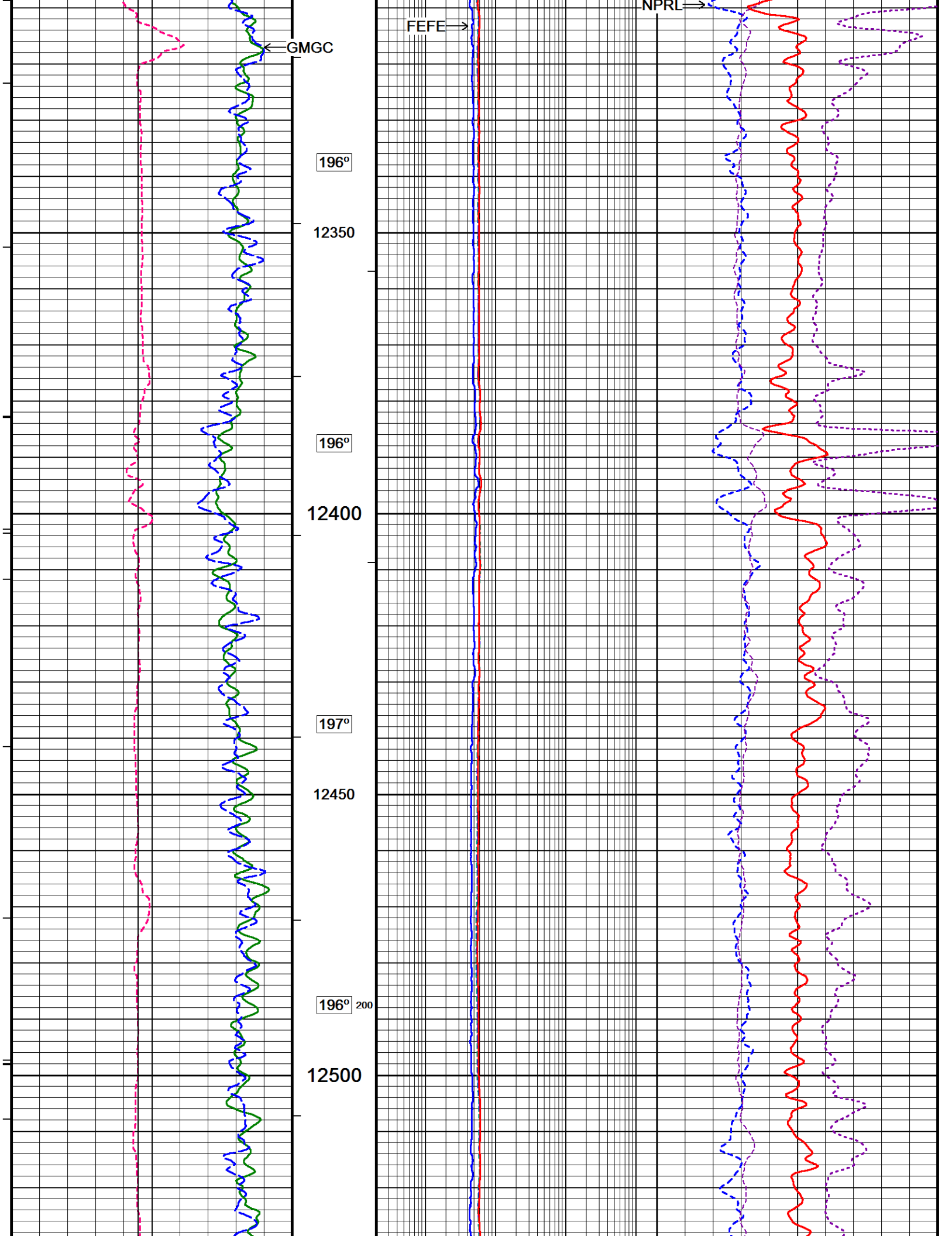


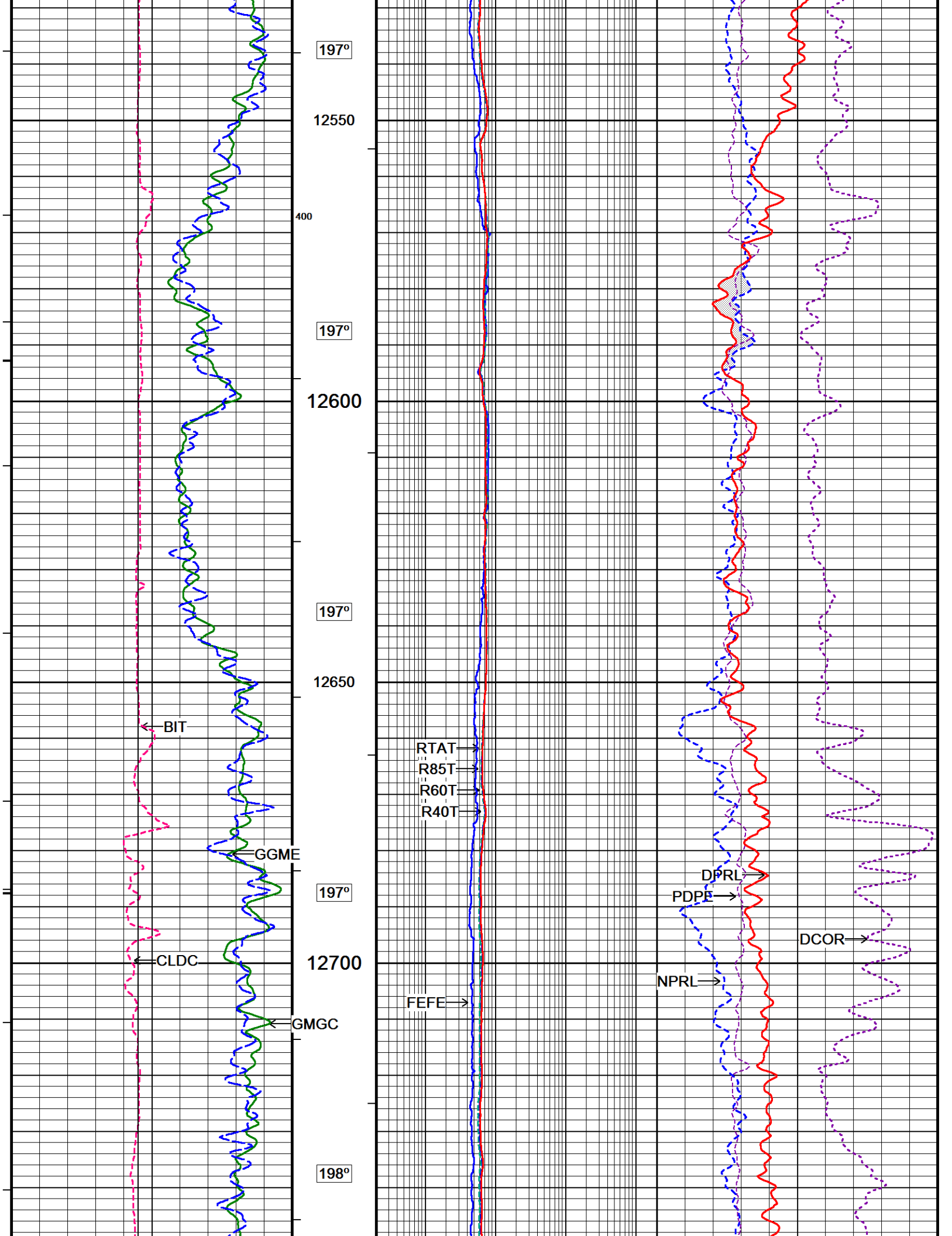


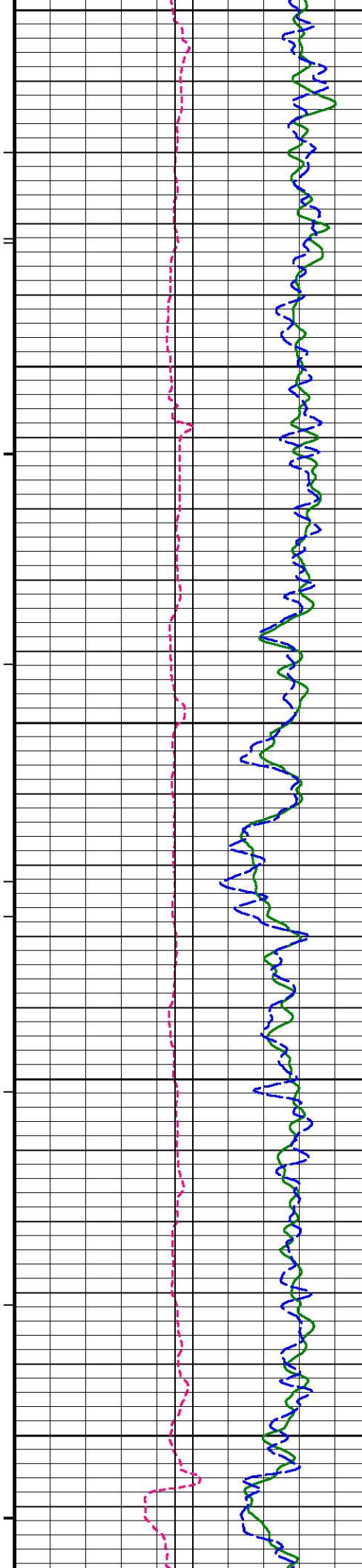




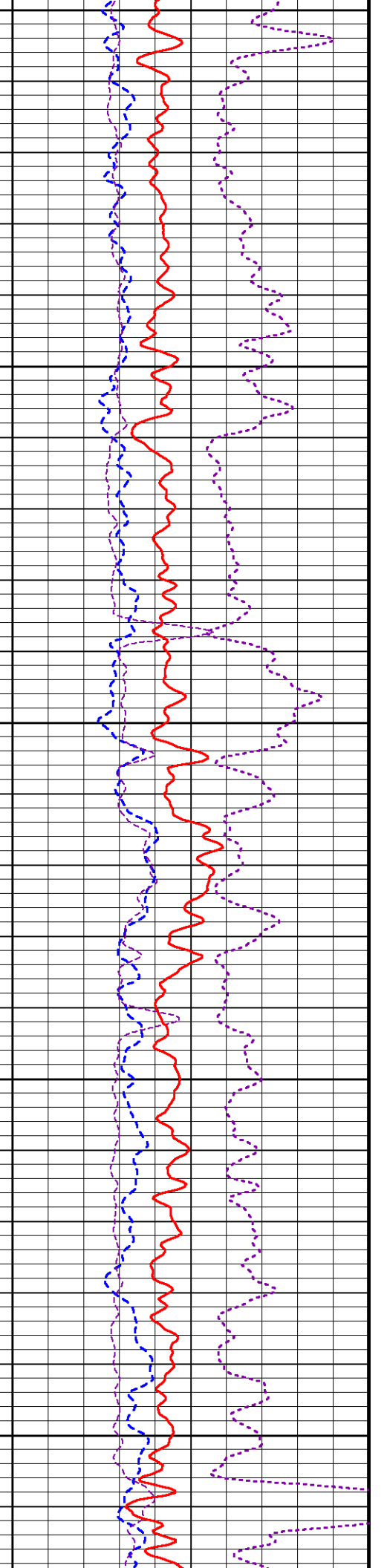
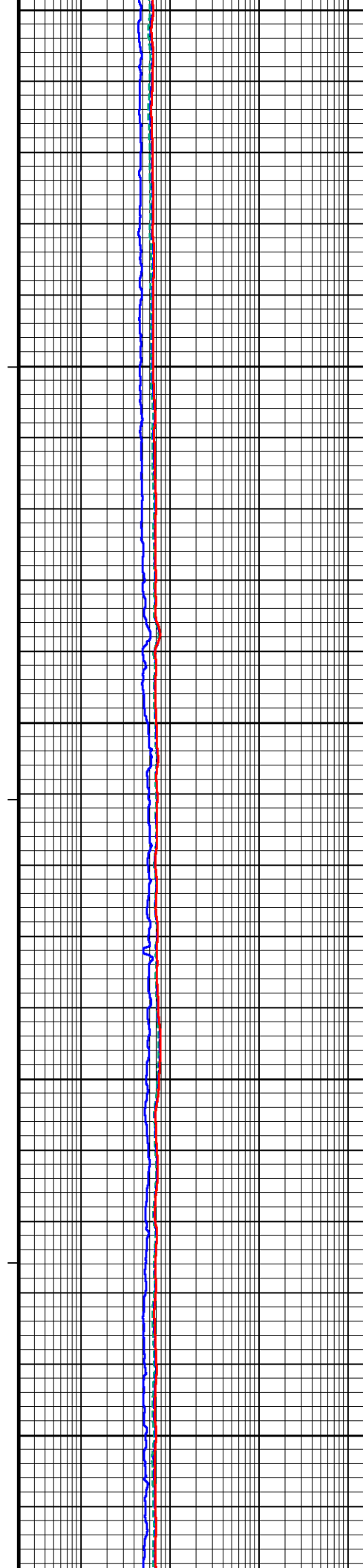


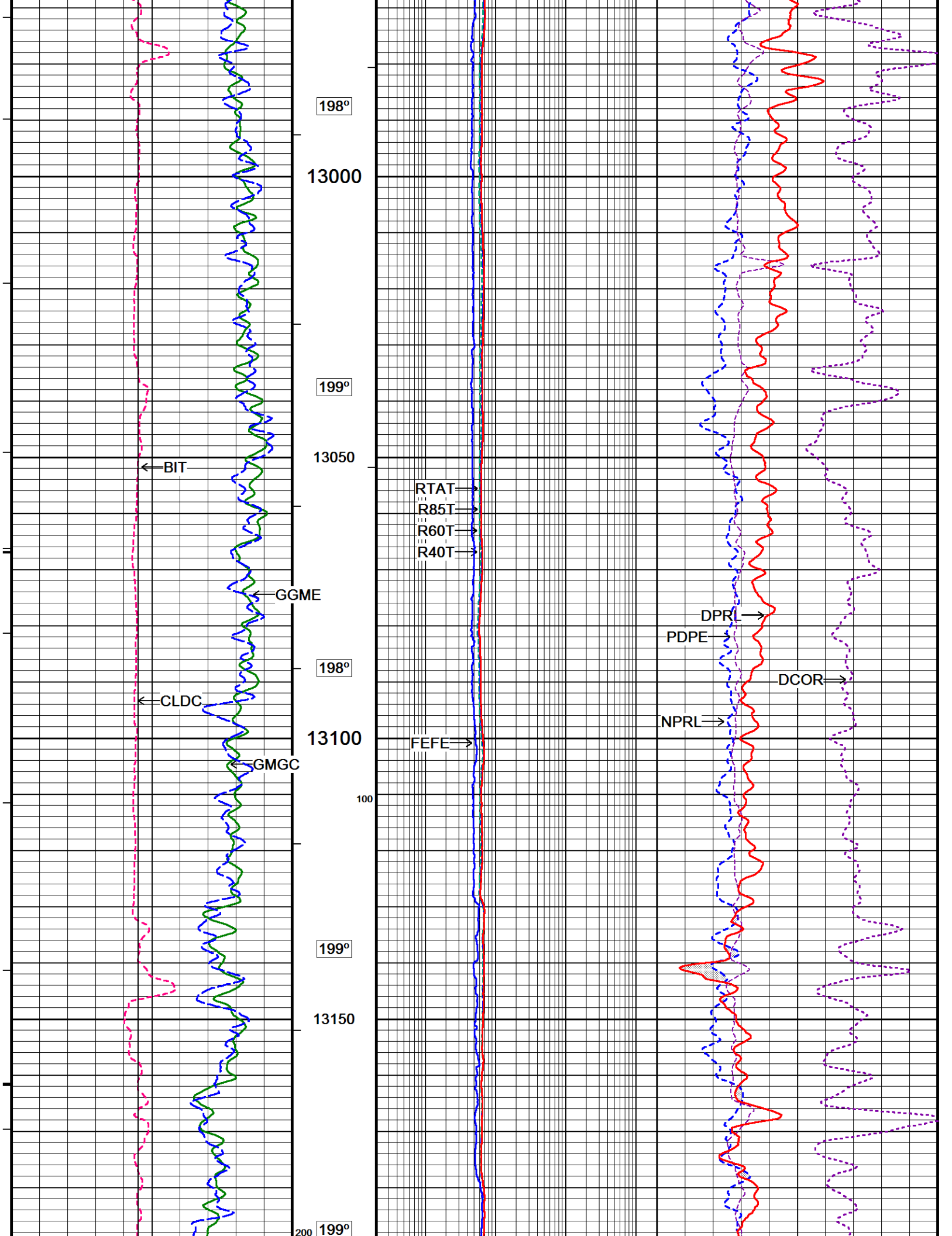


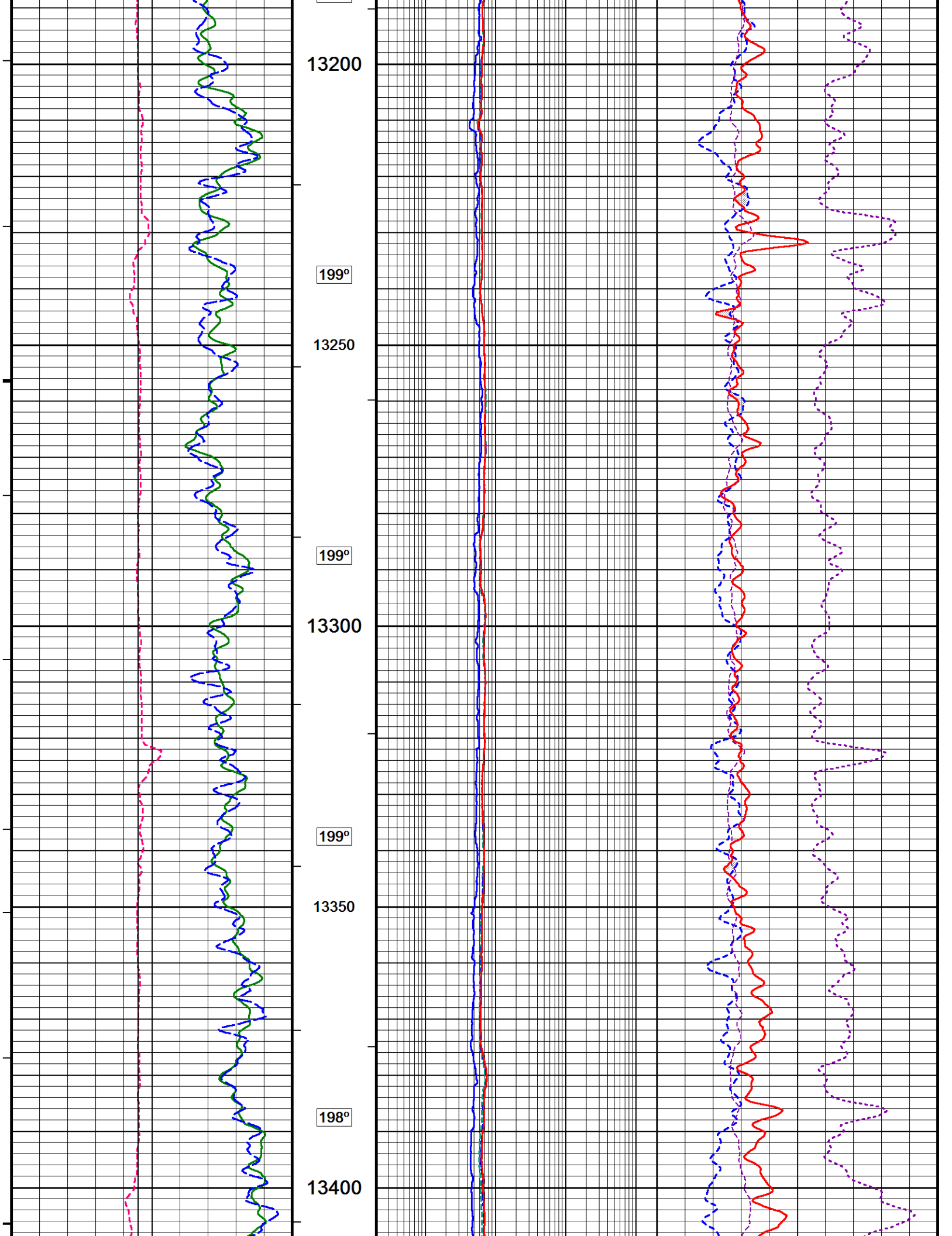


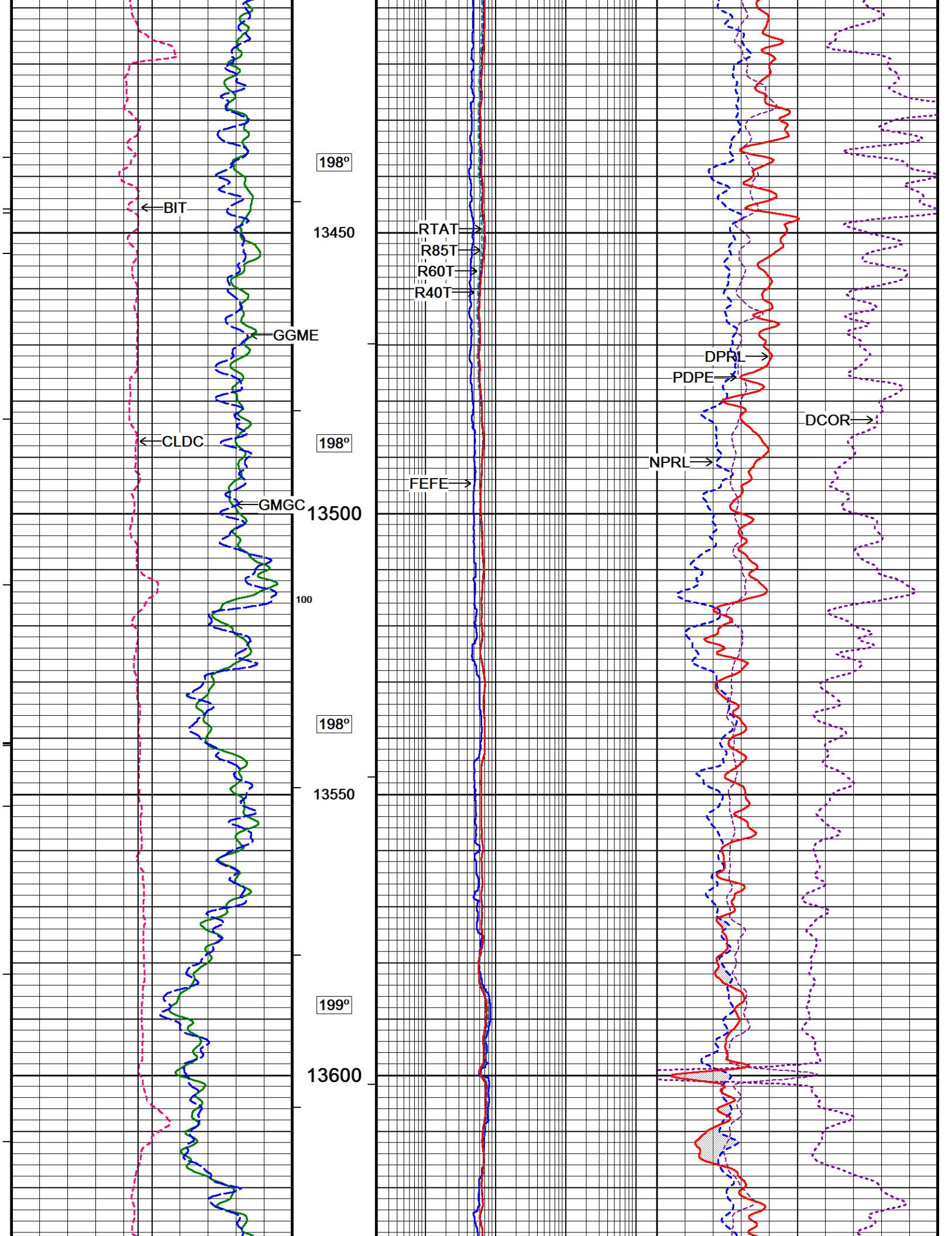


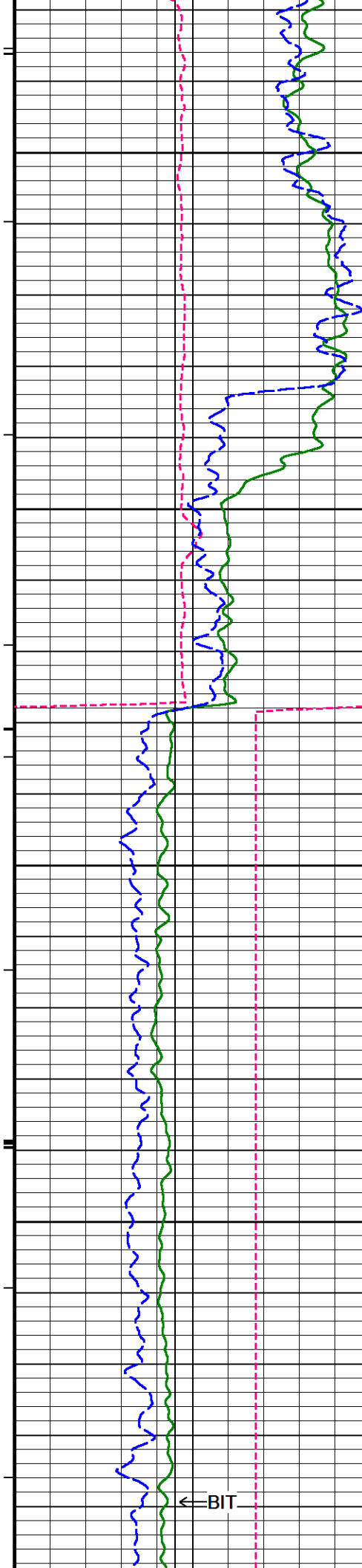
12750  
198°  
12800  
198°  
12850  
300  
198°  
12900  
198°  
12950



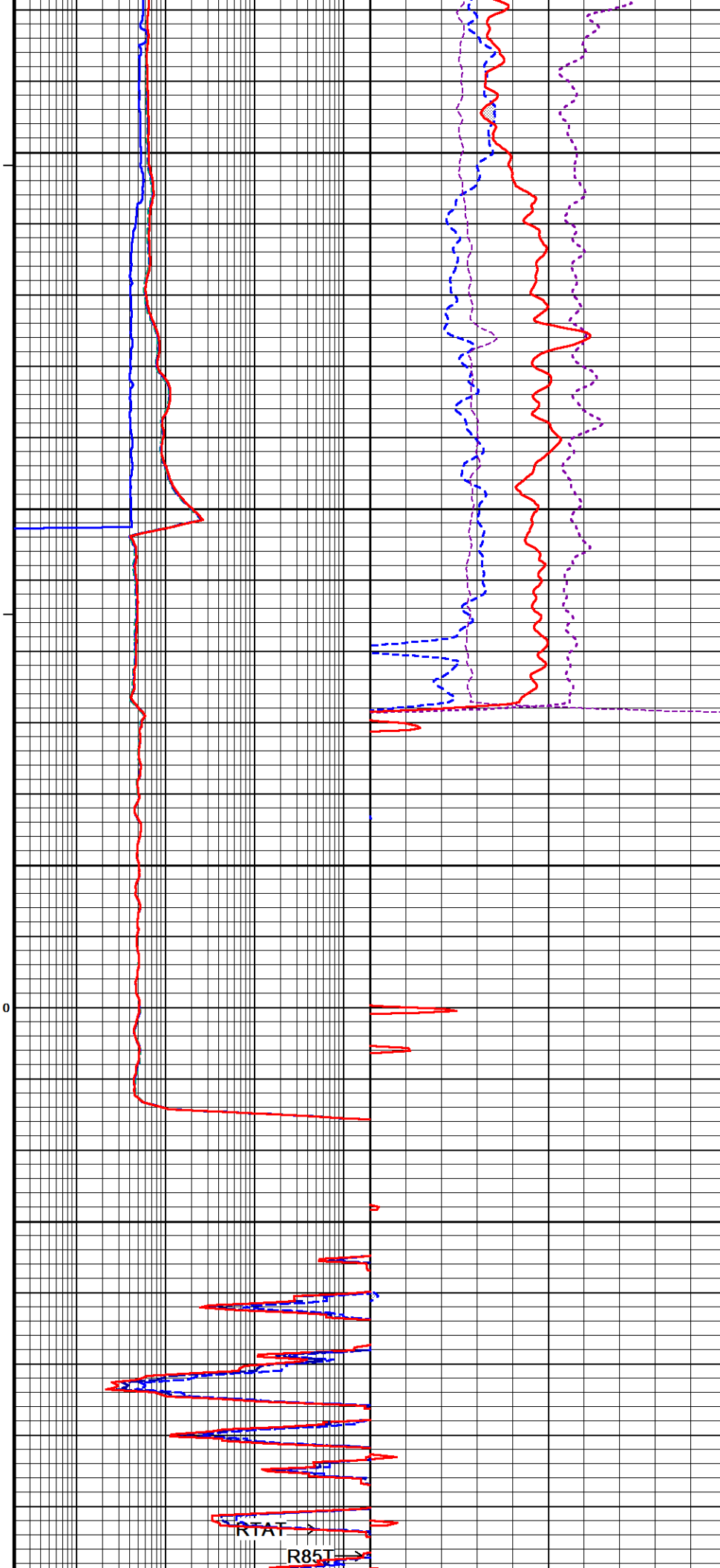




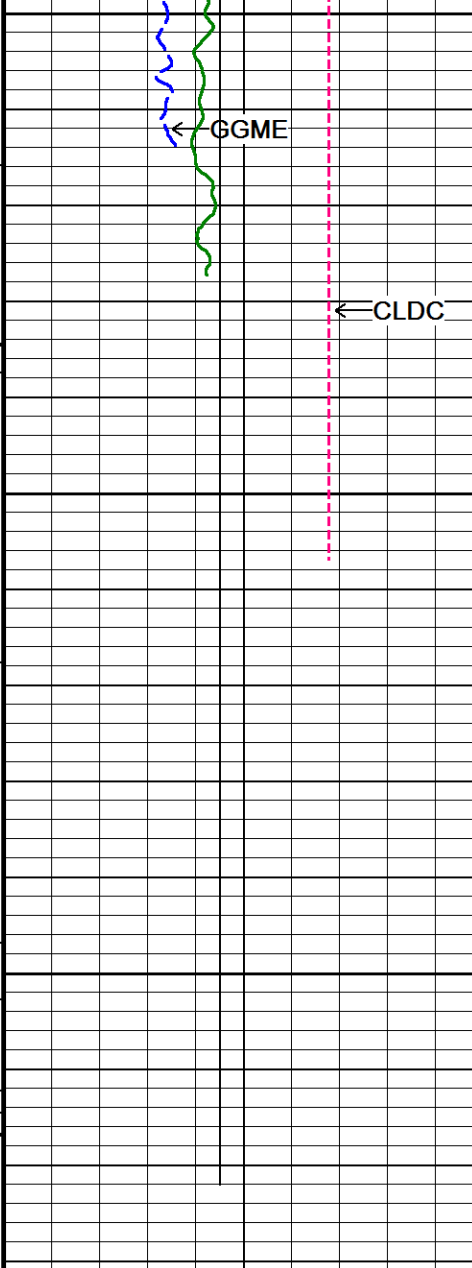




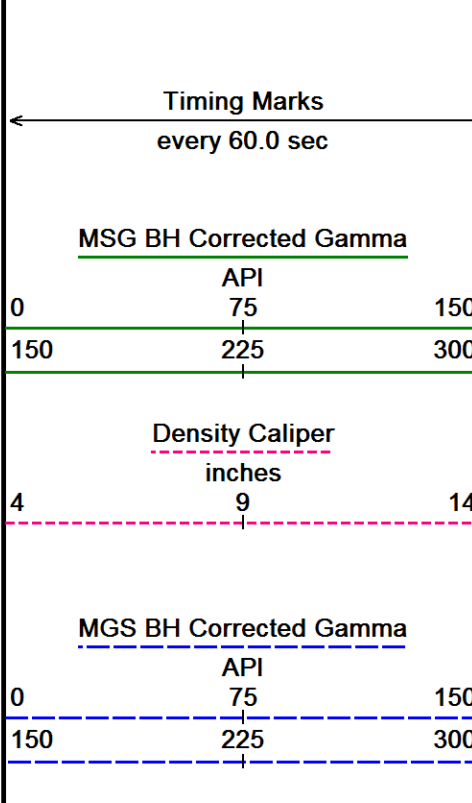
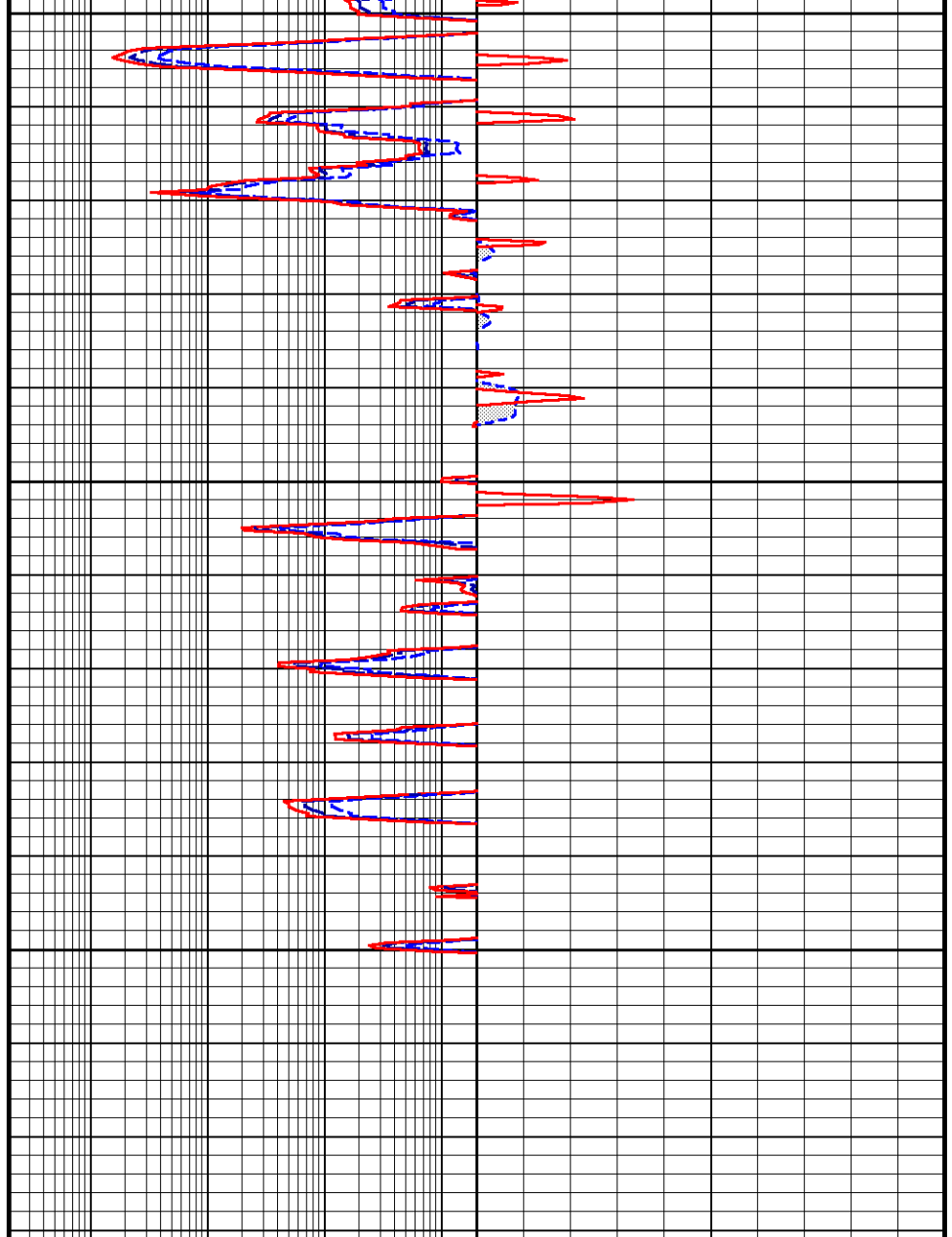
200°  
13650  
199°  
13700  
200°  
13750  
199°  
13800  
199°



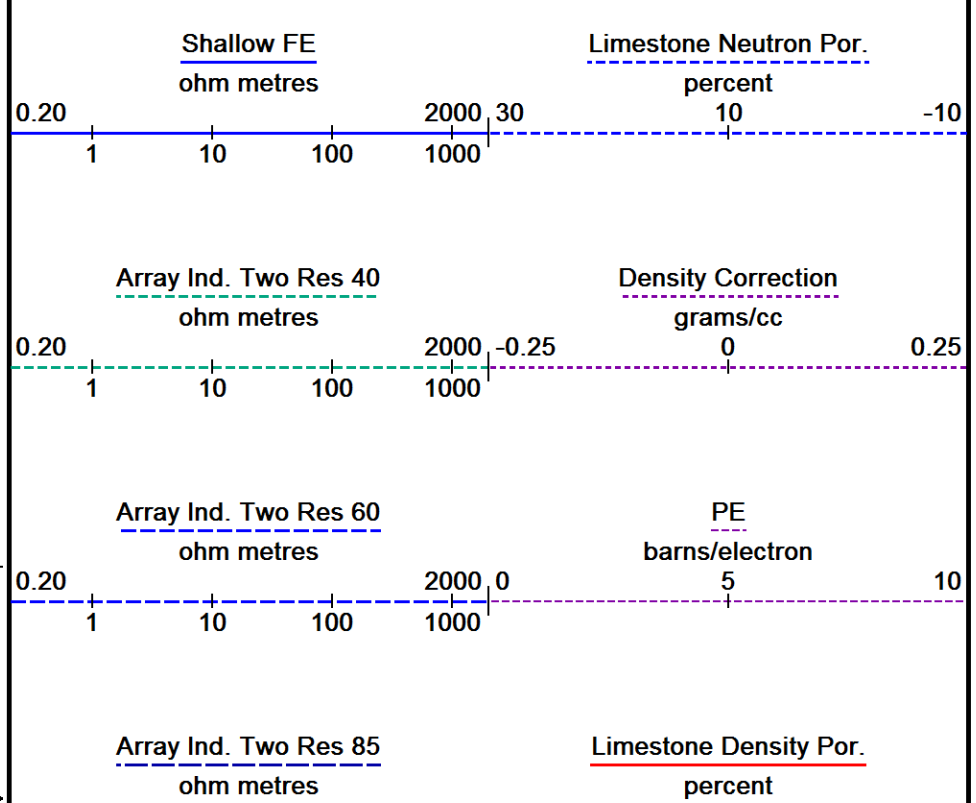


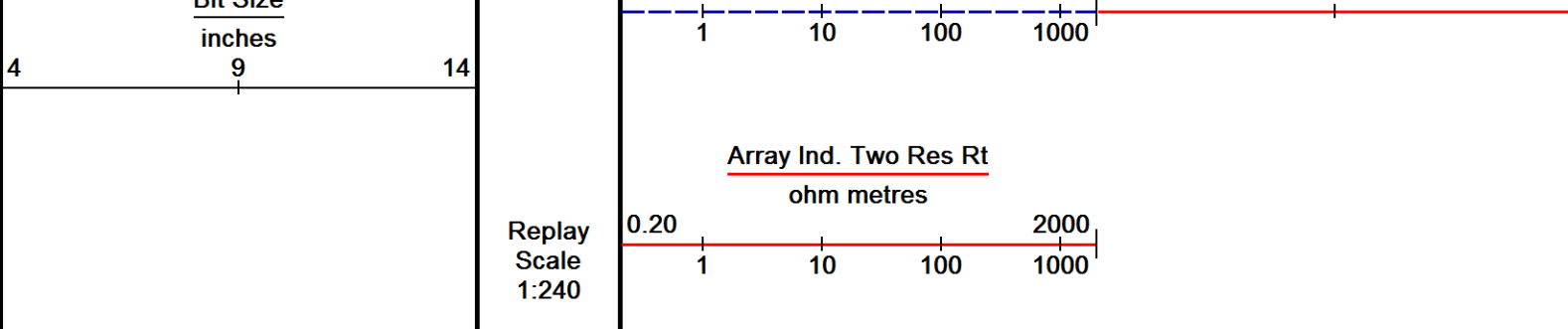


13850  
13900  
13950  
Depth in Feet



13980  
Borehole  
Temp in  
deg F





Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 14-JAN-2017 05:45  
 Filename: C:\Logs\CWS\Whiting O&G Horsetail 30G-...\Horsetail30G-3139\_Run1\_Wise\_MainPass.dta  
 Recorded on 12-JAN-2017 14:37  
 System Versions: Logged with 16.03.1458 Processed with 16.05.4955 Plotted with 16.05.4955

↑ 5 INCH MAIN PASS ↑

## BEFORE SURVEY CALIBRATION

C:\Logs\CWS\Whiting O&G Horsetail 30G-3139 Unit 406\WISELogging\Horsetail30G-3139\_Run1\_Wise\_MainPass.dta

General Constants All 000

Last Edited on 12-JAN-2017,12:13

### General Parameters

Mud Resistivity	1.612	ohm-metres
Mud Resistivity Temperature	81.500	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	

### Hole/Annular Volume and Differential Caliper Parameters

HVOL Method	XY Caliper	
HVOL Caliper 1	MIE Diam. 2-6 Armswing	
HVOL Caliper 2	MIE Diam. 4-8 Armswing	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	

### Rwa Parameters

Porosity used	Base Density Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	0.610
RWA Constant M	2.150
SW/APOR Tool Source	0.000

MMS Parameters MMS-F.A 214

Last Edited on 11-JAN-2017 05:51

### Logging Parameters

Firmware Version	2v65	
Caliper Open On	MAI	
Caliper Open Delay		minutes
Caliper Closed On	Unknown	
Caliper Closed Delay	N/A	minutes
Sample Rate	1.00	seconds
Use Deep Sleep	Yes	
Delay Deep Sleep	No	
Deep Sleep Wake Time	720.0	minutes
Deep Sleep Wake on Temperature	No	
Deep Sleep Wake Temperature	N/A	degrees C
Deep Sleep Wake on Pressure	No	
Deep Sleep Wake Pressure	N/A	psi
MMI Pad Pressure	8.0	

### Release Parameters

Pulse Duration Base Level	5.0	seconds
Pulse Duration Transition Time	30.0	seconds
Pulse Duration Status Pulse From	10.0	seconds
Pulse Duration Caliper Close From	72.0	seconds
Pulse Duration Caliper Open From	75.0	seconds
Pulse Duration Release Pulse From	107.0	seconds
Pulse Duration Release Pulse To	140.0	seconds

Pulse Release Duration	120.0	seconds
Pulse Discriminator Pressure Band	96.0	seconds
Pulse Pressure Discriminator	213.0	seconds
Use Negative Pulsing	No	
Good Status Reply Open Hole	65535.0	seconds
Good Status Reply Cased Hole	10.0	seconds
Bad Status Reply	30.0	seconds
Status Pulse To	40.0	seconds
Caliper Close To		seconds
Caliper Open To	105.0	seconds

#### Configuration

MMS,MGS,MSG,MSG,MSG,MFE,MDN,MPD,MPD,MVC,MIM,MIE,MAI

#### Gamma Calibration MGS-C.J 139

Field Calibration on 10-JAN-2017,17:46

	Measured	Calibrated (API)
Background	60	42
Calibrator (Gross)	1360	954
Calibrator (Net)	1300	912

#### Gamma Calibration Tolerances MGS-C.J 139

Ratio	1.425	<div> <div>1.40</div> <div>1.475</div> <div>1.55</div> </div>	Counts/API
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#### Gamma Constants MGS-C.J 139

Last Edited on 12-JAN-2017,12:14

Gamma Calibrator Number	072	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.26	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

#### High Resolution Temperature Calibration MGS-C.J 139

Field Calibration on 16-NOV-2016,12:35

	Measured	Calibrated(Deg F)
Lower	32.00	32.00
Upper	212.00	212.00

#### High Resolution Temperature Constants MGS-C.J 139

Last Edited on 01-SEP-2016,10:16

Pre-filter Length	11
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#### FE Calibration MFE-C.A 417

Base Calibration on 28-DEC-2016 09:33

Field Check on 10-JAN-2017 23:15

##### Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.6	126.8
Base Check		281.1
Field Check		281.2

#### FE Calibration Tolerances MFE-C.A 417

Reference 2	963.6	<div> <div>-3%</div> <div>980.0</div> <div>+3%</div> </div>	ohm
Base Check	281.1	<div> <div>-2%</div> <div>277.0</div> <div>+2%</div> </div>	ohm-m
Field Check	281.2	<div> <div>-2%</div> <div>281.1</div> <div>+2%</div> </div>	ohm-m

#### FE Constants MFE-C.A 417

Last Edited on 12-JAN-2017,12:17

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.	MGS External Temperature		

# Neutron Calibration MDN-C.A 463

Base Calibration on 28-DEC-2016 14:46  
Field Check on 10-JAN-2017 23:41

## Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3210	97	3714	110
Ratio	33.065		33.764	

## Field Calibrator at Base

	Calibrated (cps)
	1206 1806
Ratio	0.668

## Field Check

	Calibrated (cps)
	1227 1833
Ratio	0.669

# Neutron Calibration Tolerances MDN-C.A 463

Ratio	33.065	<div><div></div><div></div><div></div><div></div><div></div></div>
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Base Check	0.668	<div><div></div><div></div><div></div><div></div><div></div></div>
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Field Check	0.669	<div><div></div><div></div><div></div><div></div><div></div></div>
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# Neutron Constants MDN-C.A 463

Last Edited on 12-JAN-2017,12:18

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	None	
Formation Pressure	N/A	kpsi
Temperature Source	None	
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	

# Caliper Calibration MIE-E.B 295

Base Calibration on 10-JAN-2017,23:51  
Field Calibration on 11-JAN-2017 00:04

## Base Calibration

Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)
1	27303	26931	5.96
2	37511	37055	7.97
3	47237	46626	9.84
4	59069	58323	11.91
5	0	0	0.00

Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	25499	24524	24559	24422	5.96
2	34133	33143	33398	33183	7.97
3	42500	41191	41494	41417	9.84
4	52671	51185	51199	51209	11.91
5	0	0	0	0	0.00

## Field Calibration

Measured	Measured	Actual
Pads 1-5 Caliper(in)	Pads 3-7 Caliper(in)	Caliper(in)

Accelerometer Constants MIE-E.B 295		Last Edited on 05-JUL-2016,13:48			
Accelerometer Calibrator Number		000			
Accelerometer Temperature Characterisation					
X Accelerometer					
Serial Number		1405			
Calibration Date		14-Mar-2014			
	B0	B1	B2	B3	
Bias(g)	0.00000e+000	1.66163e-005	-3.06549e-009	7.43311e-011	
	SF0	SF1	SF2	SF3	
Scale Factor(mA/g)	3.00000e+000	2.81522e-004	2.27019e-007	9.98143e-010	
Y Accelerometer					
Serial Number		1402			
Calibration Date		03-Feb-2014			
	B0	B1	B2	B3	
Bias(g)	0.00000e+000	9.90066e-006	-3.82380e-008	3.03634e-010	
	SF0	SF1	SF2	SF3	
Scale Factor(mA/g)	3.00000e+000	2.84328e-004	2.74294e-007	8.70508e-010	
Z Accelerometer					

Serial Number	1412			
Calibration Date	19-Mar-2014			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	-5.26750e-007	6.42785e-009	1.20224e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.64759e-004	3.27972e-007	1.24296e-009

Magnetometer Parameters MIE-E.B 295				
Date Of Last Magnetometer Calibration	1-SEP-2016,10:03			
	X Magnetometer	Y Magnetometer	Z Magnetometer	
Slope	-1.000000	-0.999308	-0.994724	
Offset	0.020740	-0.019203	0.022417	

Magnetometer Constants MIE-E.B 295	Last Edited on			
Magnetometer Calibrator Number	000			

Induction Calibration MAI-B.J 374				Base Calibration on 25-JAN-2016,08:57	
				Field Check on 10-JAN-2017 23:50	
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	16.0	476.0	9.3	966.2	
2	5.4	382.2	7.6	821.4	
3	3.7	260.5	5.2	566.0	
4	1.8	133.4	2.6	279.2	
Array Temperature		71.2	Deg F		
Test Loop Calibration Verified		28-DEC-2016 09:58			
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	14.4	3785.1	12.2	3782.7	
2	31.2	3500.6	30.9	3500.0	
3	27.7	3021.8	27.5	3021.4	
4	19.6	2057.1	19.6	2056.9	
Deep	16.0	1970.6	15.6	1970.1	
Medium	40.4	3986.8	40.6	3986.6	
Shallow	48.1	5174.4	48.0	5173.9	
Array Temperature		61.0	30.1		Deg F

Induction Calibration Tolerances MAI-B.J 374						
Low Conductivity 1	16.0		mmho/m	High Conductivity 1	476.0	mmho/m
Low Conductivity 2	5.4		mmho/m	High Conductivity 2	382.2	mmho/m
Low Conductivity 3	3.7		mmho/m	High Conductivity 3	260.5	mmho/m
Low Conductivity 4	1.8		mmho/m	High Conductivity 4	133.4	mmho/m
Background Vx 1	0.0		mmho/m	Phase Check Loop 1	0.0	%
Background Vx 2	0.0		mmho/m	Phase Check Loop 2	0.0	%
Background Vx 3	0.0		mmho/m	Phase Check Loop 3	0.0	%
Background Vx 4	0.0		mmho/m	Phase Check Loop 4	0.0	%

Induction Constants MAI-B.J 374			Last Edited on 12-JAN-2017,02:44		
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.                      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

**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	

**Compact Spectral Gamma Calibration MSG-A.A 111**

Base Calibration on 23-SEP-2016 16:27

Field Calibration on 12-JAN-2017 19:37

**Base Calibration**

**Gamma Ray**

	Measured	Calibrated (API)
Background	64	28
Calibrator (Gross)	693	299
Calibrator (Net)	629	271

**Mixture Calibrator**

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	51.5	8.5	2.3	0.7	1.1
Calibrator (Gross)	549.0	96.9	29.1	7.8	10.1
Calibrator (Net)	497.5	88.5	26.8	7.1	9.0

	K %	U ppm	Th ppm
Concentrations	5.9	13.6	43.7

**Potassium Calibrator**

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	51.5	8.5	2.3	0.7	1.1
Calibrator (Gross)	131.0	38.2	16.4	0.7	1.1
Calibrator (Net)	79.5	29.7	14.1	0.1	-0.0

	K %	U ppm	Th ppm
Concentrations	5.9	0.0	0.0

**Uranium Calibrator**

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	51.5	8.5	2.3	0.7	1.1
Calibrator (Gross)	337.8	47.1	11.7	6.0	2.7
Calibrator (Net)	286.3	38.6	9.4	5.3	1.6

	K %	U ppm	Th ppm
Concentrations	0.0	13.6	0.0

**Thorium Calibrator**

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	51.5	8.5	2.3	0.7	1.1
Calibrator (Gross)	256.3	37.1	7.7	3.9	9.1
Calibrator (Net)	204.7	28.6	5.4	3.3	8.1

	K %	U ppm	Th ppm
Concentrations	0.0	0.0	43.7

#### Field @ Base Calibration

Calibration Type	SG Jigs
SGB Calibrator Serial Number	440
SGM Calibrator Serial Number	450

#### Gamma Ray

	Measured	Calibrated (API)
Background	64.0	27.6
Calibrator (Gross)	692.9	298.8
Calibrator (Net)	628.8	271.2

#### Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	51.5	8.5	2.3	0.7	1.1
Calibrator (Gross)	549.0	96.9	29.1	7.8	10.1
Calibrator (Net)	497.5	88.5	26.8	7.1	9.0

#### Field Calibration

Calibration Type	SG Jigs
SGB Calibrator Serial Number	440
SGM Calibrator Serial Number	450

#### Gamma Ray

	Measured	Calibrated (API)
Background	114.4	50.0
Calibrator (Gross)	734.5	321.2
Calibrator (Net)	620.1	271.2

#### Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	91.2	16.3	4.5	1.0	1.5
Calibrator (Gross)	582.1	103.7	30.5	7.9	10.3
Calibrator (Net)	490.9	87.4	26.0	6.9	8.9

#### Compact Spectral Gamma Calibration Tolerances MSG-A.A 111

Base Check K	6.19		%	Field @ Base Check K	6.19		%
Base Check U	10.21		ppm	Field @ Base Check U	10.21		ppm
Base Check T	42.54		ppm	Field @ Base Check T	42.54		ppm
Field Check K	6.02		%				
Field Check U	10.09		ppm				
Field Check T	42.12		ppm				

#### Compact Spectral Gamma Constants MSG-A.A 111

Last Edited on 12-JAN-2017,12:23

Background Calibrator Number	440	
Mixture Calibrator Number	450	
Potassium Calibrator Number	500	
Uranium Calibrator Number	506	
Thorium Calibrator Number	503	
Mud Density	1.26	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

#### Photo Density Calibration MPD-C.J 378

Base Calibration on 28-DEC-2016 11:33  
Field Check on 10-JAN-2017 23:22

Density Calibration				
Base Calibration		Measured	Calibrated (sdu)	
	Near	Far	Near	Far



Background	1090	1165		
Reference 1	52648	24279	59443	30683
Reference 2	20907	2252	24540	2525

#### Field Check at Base

1089.9 1165.0

#### Field Check

1091.6 1169.6

#### PE Calibration

##### Base Calibration

	WS	Measured WH	Ratio	Calibrated Ratio
Background	201	982		
Reference 1	21703	52475	0.418	0.372
Reference 2	5947	20791	0.290	0.271

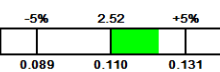
#### Field Check at Base

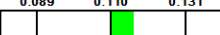
201.1 982.1

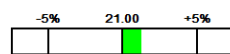
#### Field Check

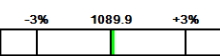
200.2 982.7

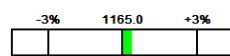
### Photo Density Calibration Tolerances MPD-C.J 378

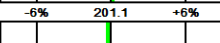
Near Density Ratio 2.60 

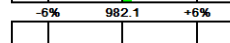
PE Calibration 0.117 

Far Density Ratio 21.27 

Near Den. Field Check 1091.6 

Far Den. Field Check 1169.6 

PE WS Field Check 200.2 

PE WH Field Check 982.7 

### Density Constants MPD-C.J 378

Last Edited on 02-DEC-2016,09:03

Density Source Id	P50562B	
Nylon Calibrator Number	DNC.E.652	
Aluminium Calibrator Number	DAC.C.631	
Density Shoe Profile	4 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.00	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	
Precision Enhanced Density Processing	Not Applied	
Matrix Density (gm/cc)	Depth (ft)	
2.68		
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-C.J 378

Base Calibration on 28-DEC-2016 11:01  
Field Calibration on 10-JAN-2017 23:27

#### Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13808	3.98
2	22128	5.96
3	30464	7.97
4	38544	9.84
5	47968	11.91
6	N/A	N/A

#### Field Calibration

Measured Caliper (in)  
7.89

Actual Caliper (in)  
7.97

## Caliper Calibration Tolerances MPD-C.J 378

Long Arm Field Cal. 7.89 

7.57	7.97	8.37
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 in

## DOWNHOLE EQUIPMENT

C:\Logs\CWS\Whiting O&G Horsetail 30G-3139 Unit 406\WISELogging\Horsetail30G-3139\_Run1\_Wise\_MainPass.dta

Shuttle Running Tool 3.5"

SRT-A.A 34 LG: 5.91 ft WT: 37.5 lb OD: 2.520 in

Compact Linker (MBS-F.A)

MLK-A 1 LG: 14.23 ft WT: 81.6 lb OD: 2.240 in

Compact Linker (MBS-F.A)

MLK-A 2 LG: 14.23 ft WT: 81.6 lb OD: 2.240 in

Compact Knuckle Joint

SKJ-E.B 603 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Linker (MBS-F.A)

MLK-A 3 LG: 8.53 ft WT: 81.6 lb OD: 2.240 in

Compact Swivel Head Adaptor

SHA-J.B 589 LG: 2.30 ft WT: 22.0 lb OD: 2.240 in

Compact Knuckle Joint

SKJ-E.A 245 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

200v Compact Battery Sub

MBS-F.A 119 LG: 17.06 ft WT: 123.5 lb OD: 2.240 in

Compact Memory Sub F.A

MMS-F.A 214 LG: 5.20 ft WT: 37.5 lb OD: 2.240 in

Compact Tool Isolator sub.

MTI-C.A 146 LG: 1.54 ft WT: 13.2 lb OD: 2.240 in

Compact Short Gamma

MGS-C.J 139 LG: 3.41 ft WT: 24.3 lb OD: 2.244 in

Compact Collar Locator

MCL-C.A 128 LG: 3.17 ft WT: 26.5 lb OD: 2.244 in



105.09 ft GGME - MGS BH Corrected Gamma

103.10 ft GSXT - MGS External Temperature

101.08 ft GCSL - MCL C. Collar Locator

Compact Spectral Gamma  
MSG-A.A 111 LG: 10.94 ft WT: 90.4 lb OD: 2.240 in

96.37 ft GGRM - Uranium Stripped Gamma  
96.37 ft GMPO - Potassium Gamma  
96.37 ft GMUR - Uranium Gamma  
96.37 ft GMTH - Thorium Gamma  
96.37 ft GMGC - MSG BH Corrected Gamma

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

85.54 ft FEFE - Shallow FE

Compact Knuckle Joint  
SKJ-E.B 614 LG: 2.17 ft WT: 24.3 lb OD: 2.240 in

Compact Swivel Head Adaptor  
SHA-J.B 573 LG: 2.30 ft WT: 22.0 lb OD: 2.240 in

Compact Inline Bowspring sub  
MIS-D.B 700 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Neutron  
MDN-C.A 463 LG: 5.04 ft WT: 50.7 lb OD: 2.240 in

69.23 ft NPRL - Limestone Neutron Por.

Compact Density/Caliper  
MPD-C.J 378 LG: 9.59 ft WT: 90.4 lb OD: 2.244 in

61.99 ft AVOL - Annular Volume  
61.99 ft HVOL - Hole Volume  
61.99 ft CLDC - Density Caliper  
60.06 ft DPRL - Limestone Density Por.  
60.06 ft DEN - Compensated Density  
60.06 ft DCOR - Density Correction  
60.00 ft PDPE - PE

Compact Vee Arm Caliper  
MVC-A.A 140 LG: 8.06 ft WT: 61.7 lb OD: 2.240 in

52.58 ft VCAD - Vee Arm Caliper A

Compact Swivel Head Adaptor  
SHA-J.B 509 LG: 2.30 ft WT: 22.0 lb OD: 2.240 in

Compact Knuckle Joint  
SKJ-E.A 203 LG: 2.17 ft WT: 24.3 lb OD: 2.240 in

Compact Inline Standoff sub  
MIS-E.A 277 LG: 2.14 ft WT: 15.4 lb OD: 2.240 in

Compact Knuckle Joint  
SKJ-E.B 588 LG: 2.17 ft WT: 24.3 lb OD: 2.240 in

Compact Inline Bowspring sub  
MIS-D.B 735 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

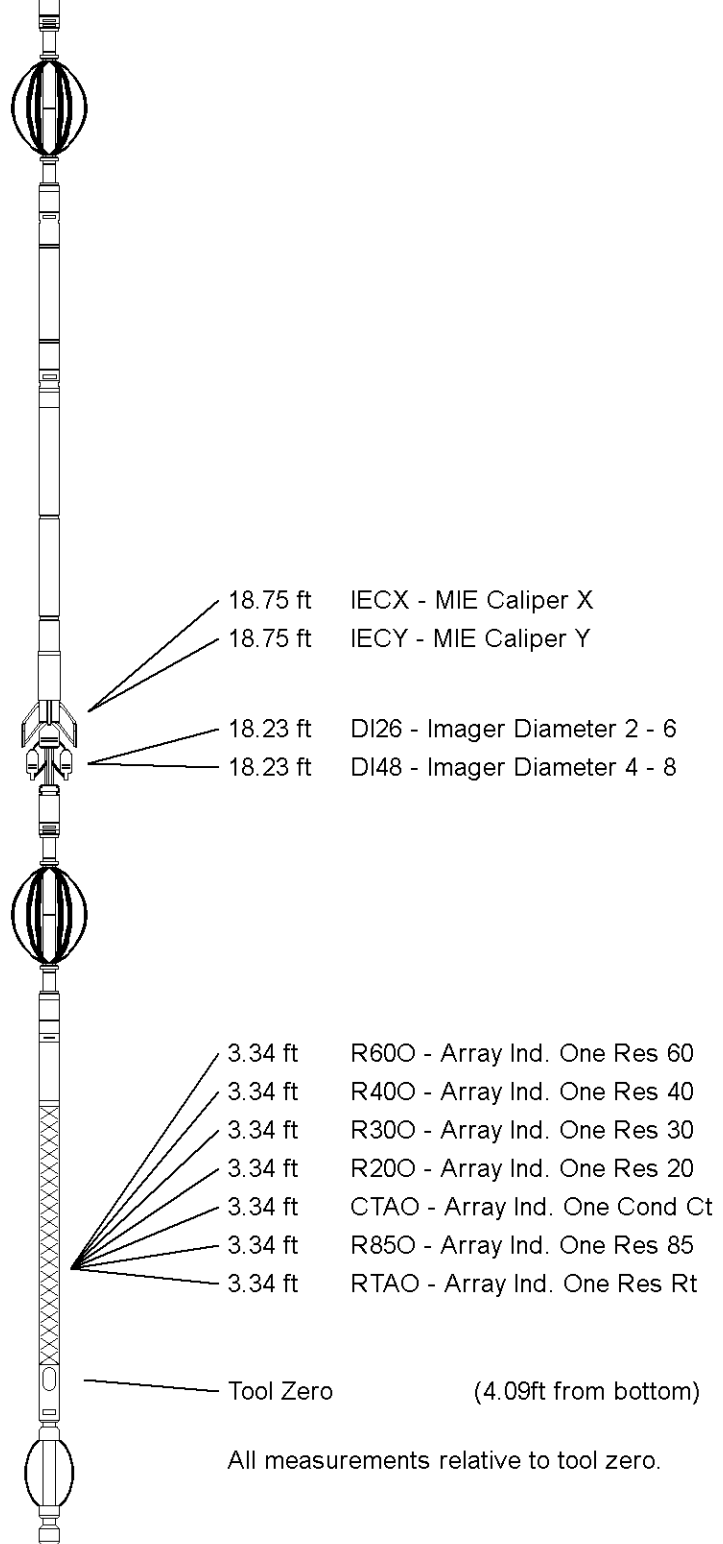
Compact MMI Memory Section (HS)  
MIM-D.A 300 LG: 4.65 ft WT: 26.5 lb OD: 2.240 in

Compact MMI Electrode Section (HS)  
MIE-E.B 295 LG: 13.96 ft WT: 99.2 lb OD: 4.094 in

Compact Inline Bowspring sub  
MIS-D.B 723 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Induction  
MAI-B.J 374 LG: 14.76 ft WT: 48.5 lb OD: 2.240 in

Total Length: 183.30 ft Weight: 1325.0 lb



COMPANY	WHITING OIL & GAS CORP.
WELL	HORSETAIL 30G-3139
FIELD	REDTAIL
PROVINCE/COUNTY	WELD
COUNTRY/STATE	U.S.A./COLORADO

Elevation Kelly Bushing	4759	feet	First Reading		feet
Elevation Drill Floor		feet	Depth Driller	13980.00	feet
Elevation Ground Level	4738	feet	Depth Logger	13982.00	feet



COMPACT WELL SHUTTLE

