



**Weatherford®**

## COMPOSITE LOG

COMPANY			WAULCO RESOURCES LLC		
WELL			MILLICAN #1-7		
FIELD			WILDCAT		
PROVINCE/COUNTY			BACA		
COUNTRY/STATE			USA / COLORADO		
LOCATION			1077' FNL & 211' FEL NE/NE		
SEC 7	TWP 32S	RGE 47W	Other Services		
Latitude	37.276360		CXD		
Longitude	-102.743010		MBN		
API Number	05-009-06684				
Permanent Datum GL, Elevation 4626 feet					
Log Measured From KB, 18.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	03-SEP-2019				
Run Number	ONE				
Service Order	7055-254641548				
Depth Driller	6857.00		feet		
Depth Logger	6837.00		feet		
First Reading	6834.00		feet		
Last Reading	544.00		feet		
Casing Driller	545.00		feet		
Casing Logger	544.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	WBM				
Density / Viscosity	9.00	lb/USg	41.00	sec/qt	
PH / Fluid Loss	9.00		6.80	ml/30Min	
Sample Source	MUD TANK				
Rm @ Measured Temp	1.87 @ 93.0		ohm-m		
Rmf @ Measured Temp	1.50 @ 93.0		ohm-m		
Rmc @ Measured Temp	2.24 @ 93.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	1.38 @127.0		ohm-m		
Time Since Circulation	6 HOURS				
Max Recorded Temp	128.00		deg F		
Equipment / Base	13057		ELRENO		
Recorded By	JUSTIN HICKS				
Witnessed By	JIM WEIR		CHUCK WILSON		

### BOREHOLE RECORD

Last Edited: 03-SEP-2019 03:56

Bit Size inches	Depth From feet	Depth To feet
7.875	545.00	6857.00

### CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	545.00	24.00

### REMARKS

RUN 1: MCB, SHA, MCG, MMR, MDN, MPD, SKJ, MFE, MAI.  
RUN 2: MCB, SHA, MCG, MBN, MDM, MRD, MTD.

#### HARDWARE RUN 1:

MAI: TWO 0.5 INCH STANDOFFS.  
MFE: ONE 0.5 INCH STANDOFF.  
MDN: DUAL BOWSPRING ECCENTRALIZER.  
MPD: 8 INCH PROFILE PLATE.

#### HARDWARE RUN 2:

CXD: OVERBODY CENTRALIZER ON MDM AND MTD.  
MCG: OVERBODY CENTRALIZER.

2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY.  
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 2410 CU FT

ANNUAL HOLE VOLUME FROM TD TO SURFACE CASING = 2710 CU.FT.  
ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = 1373 CU.FT.

FIELD TICKET NUMBER: 7055-254641548

RIG: WW DRILLING, RIG 20

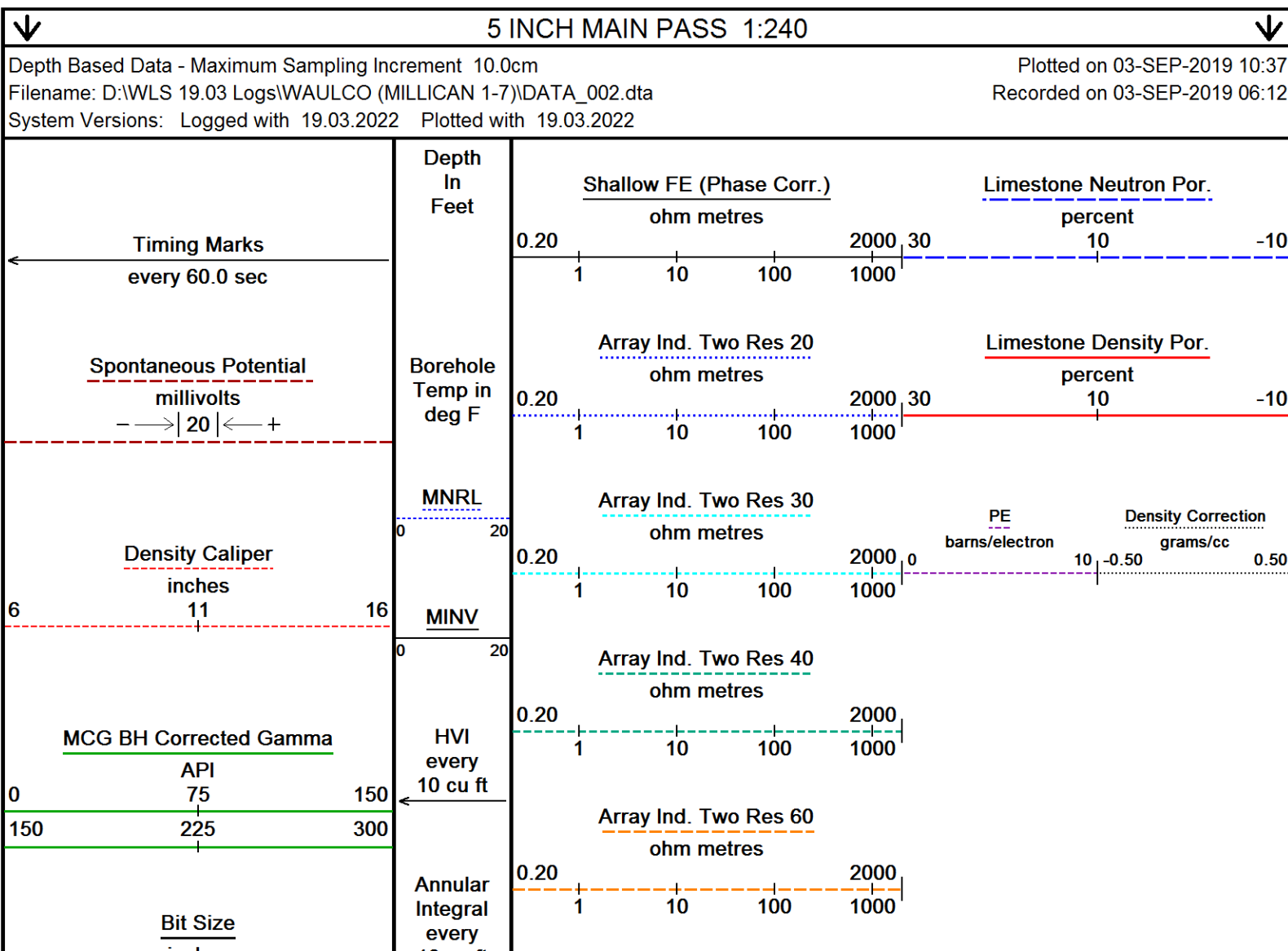
OPERATOR(S): D. STEELE

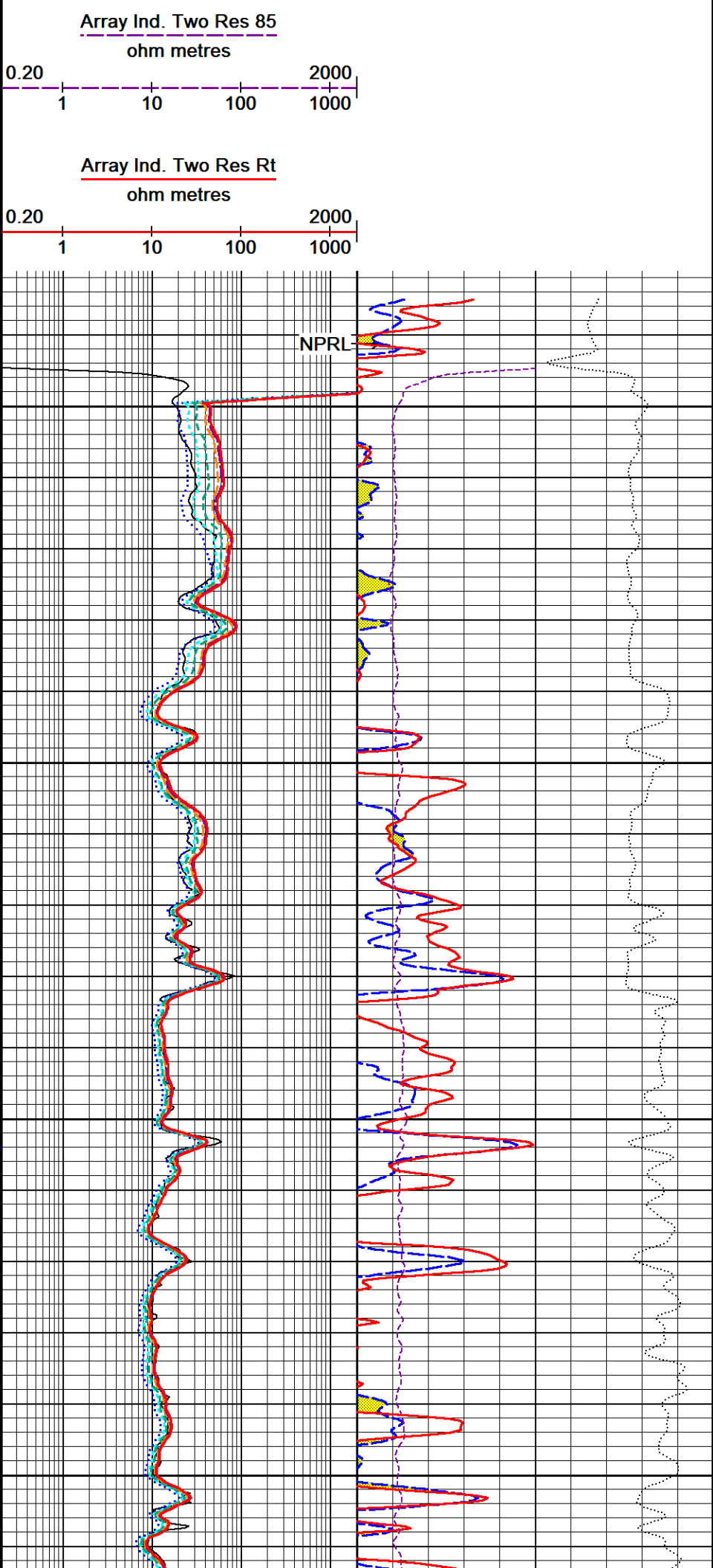
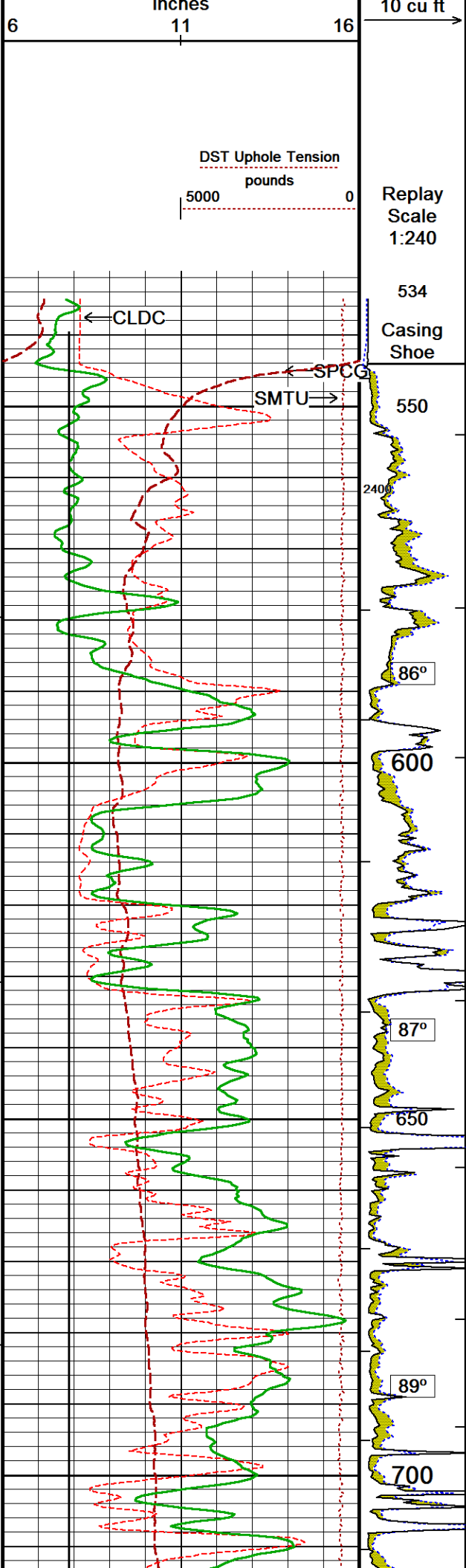
MUD PROPERTIES:  
CHLORIDES: 500 MG/L

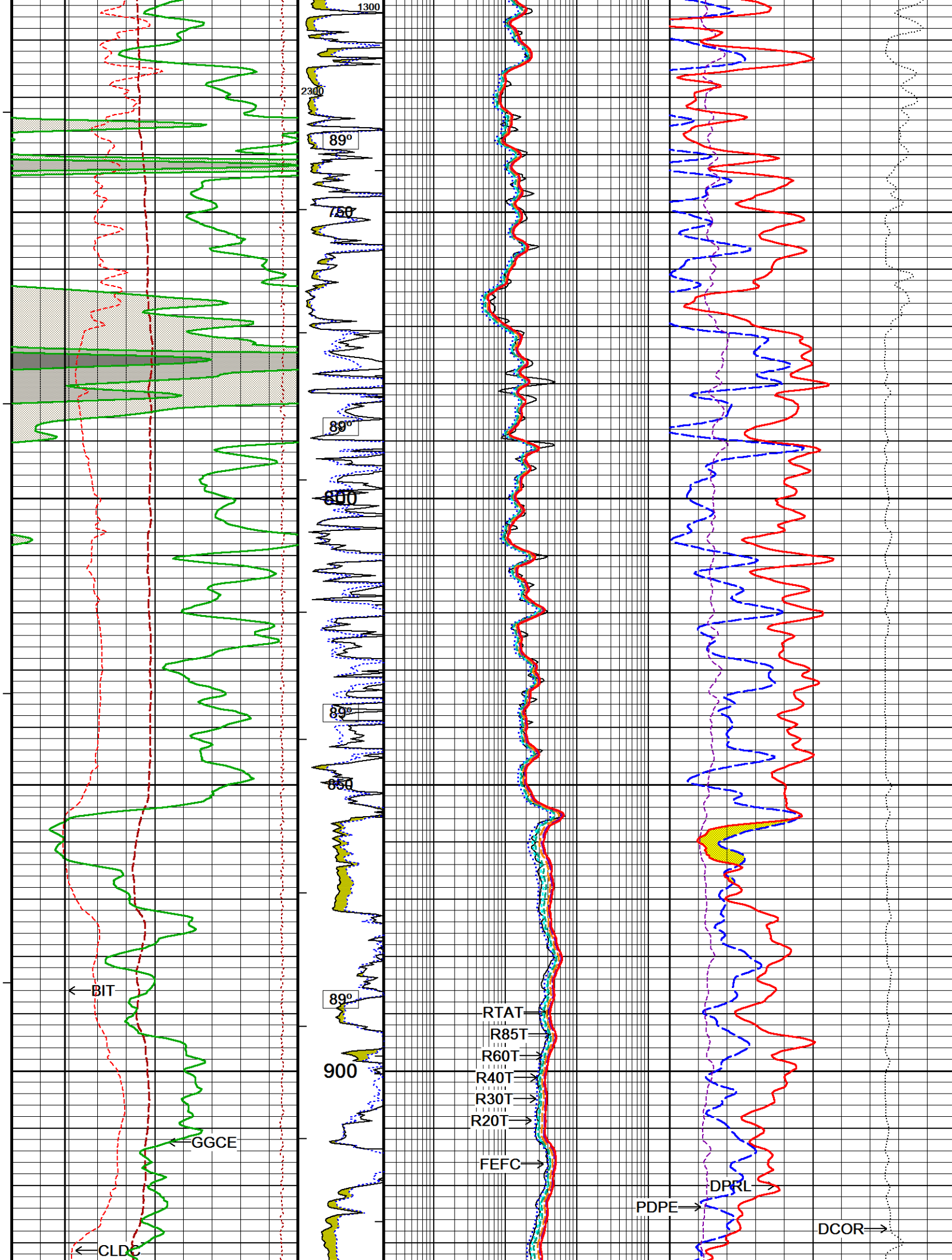
\*ENCOUNTERED TIGHT SPOT AROUND 5950'. THIS WAS ALSO FELT ON THE WAY DOWN WHILE RUNNING IN HOLE.\*

\*HOLE WASHOUTS AND RUGOSITY WILL AFFECT LOG QUALITY AND REPEATABILITY.\*

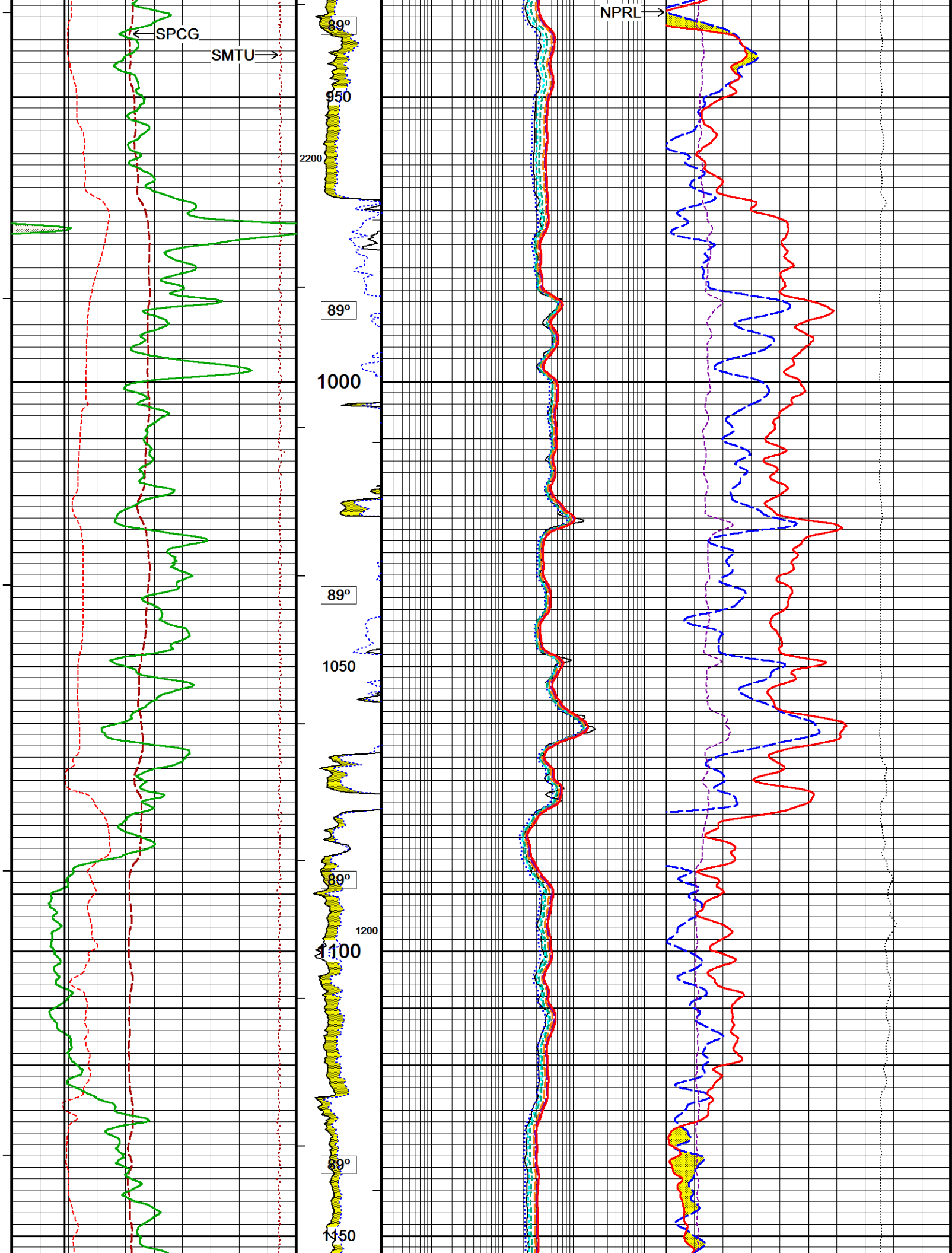
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

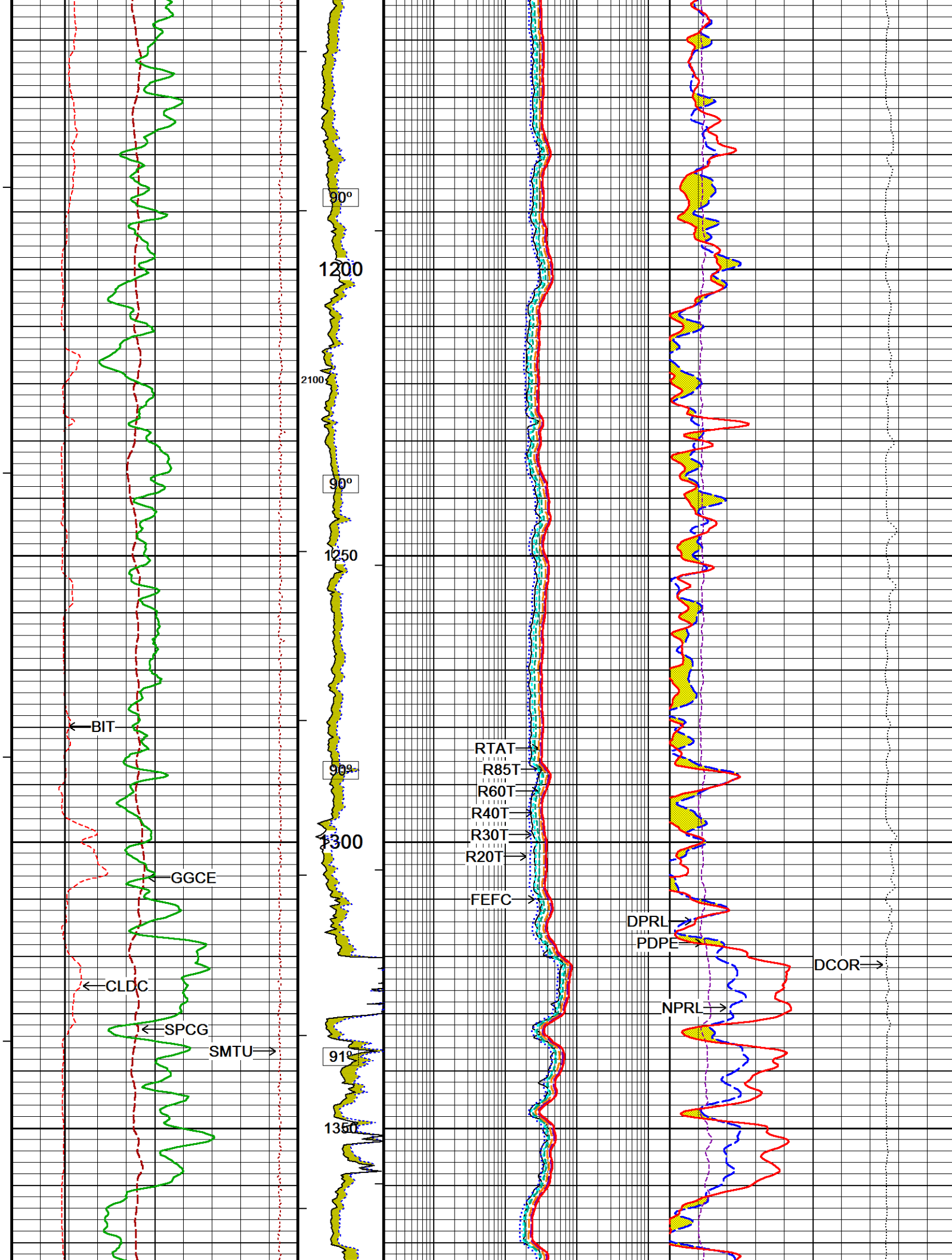


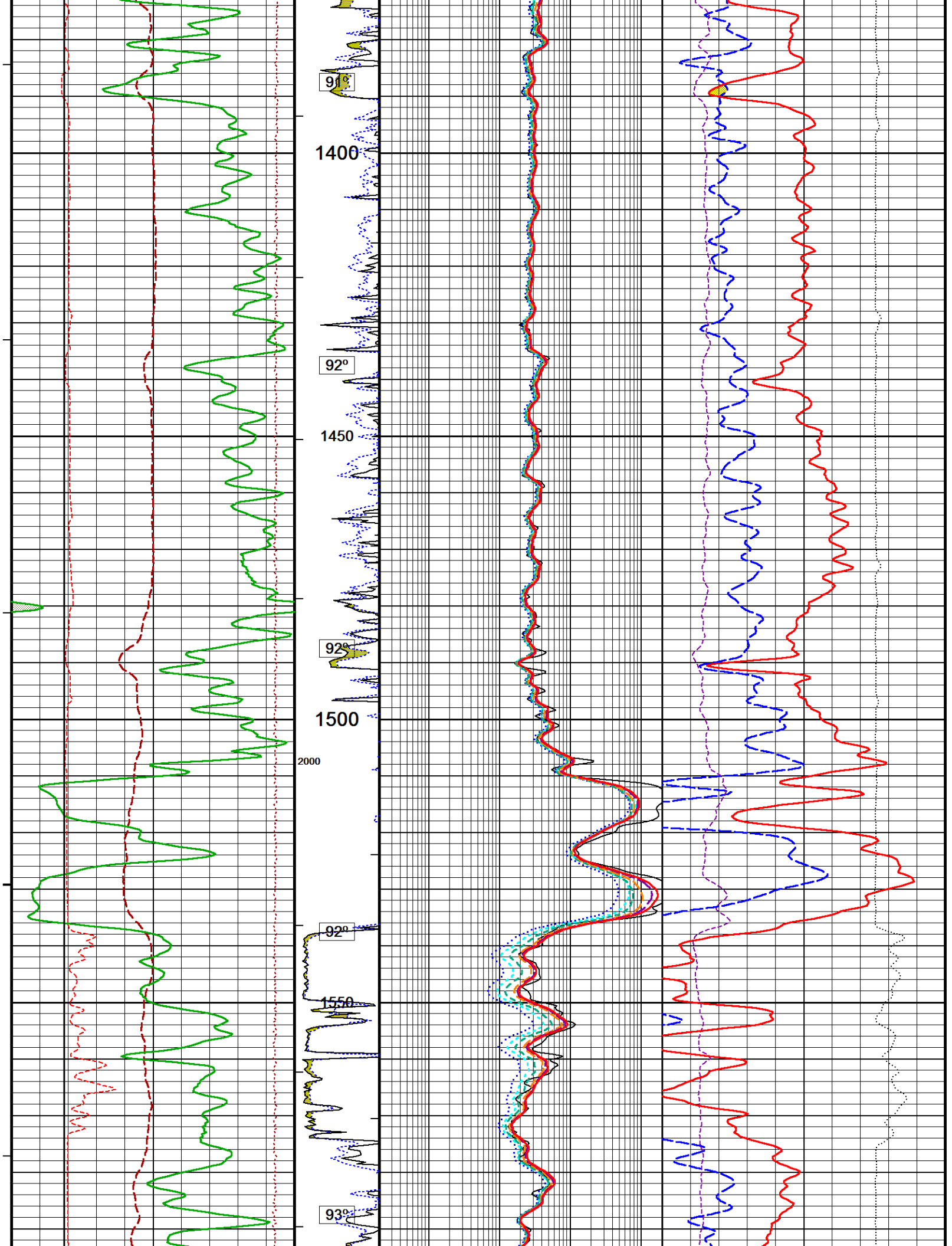


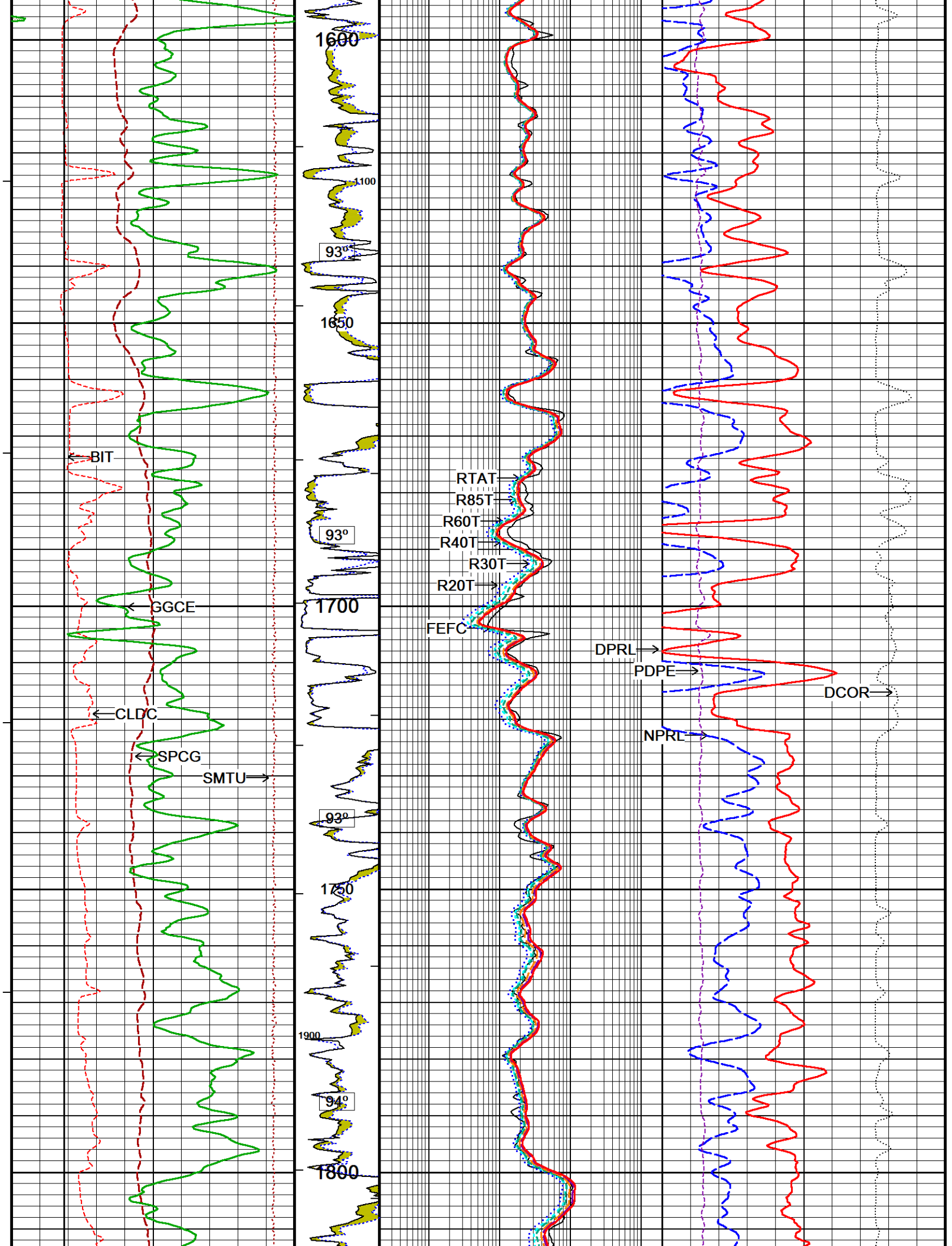


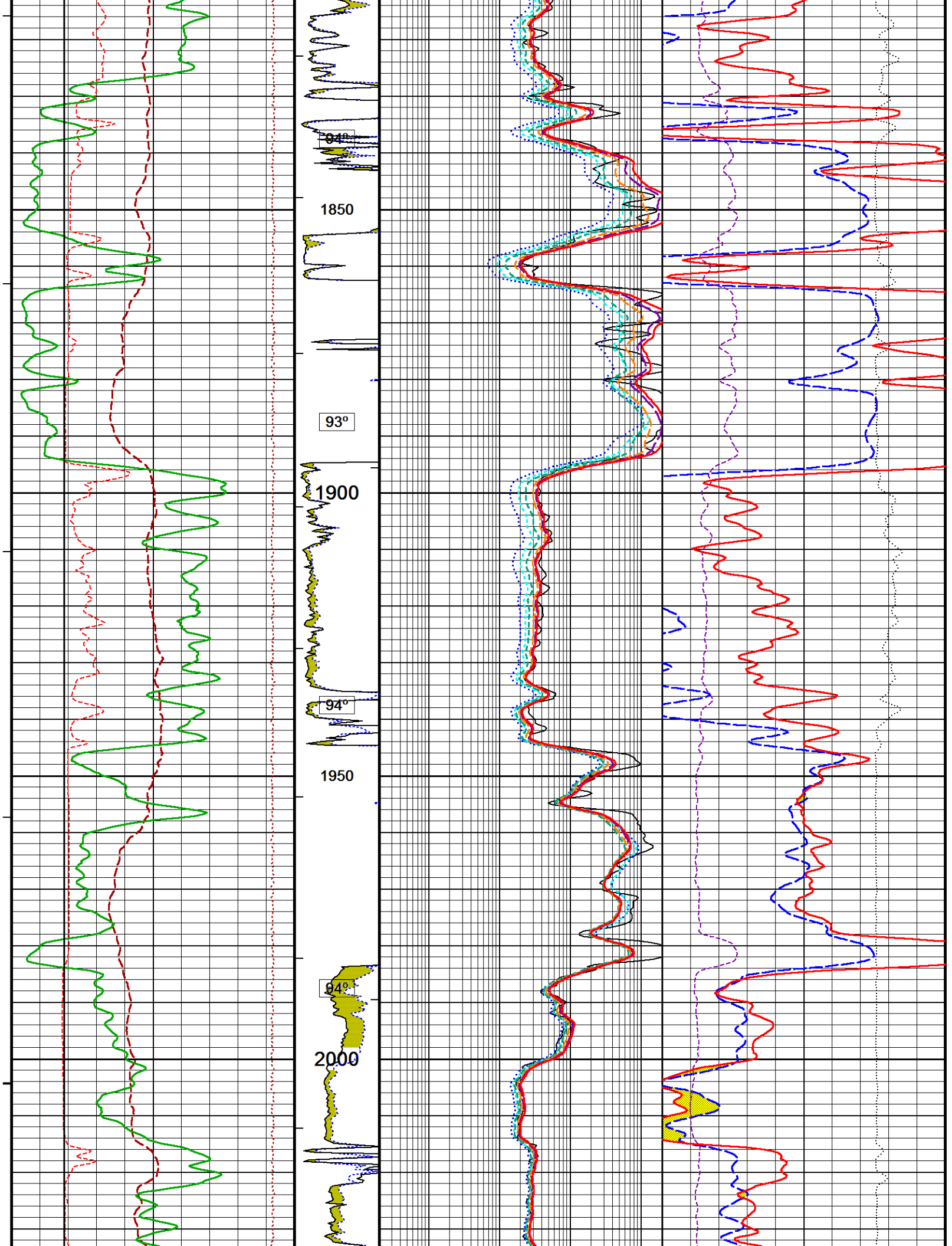




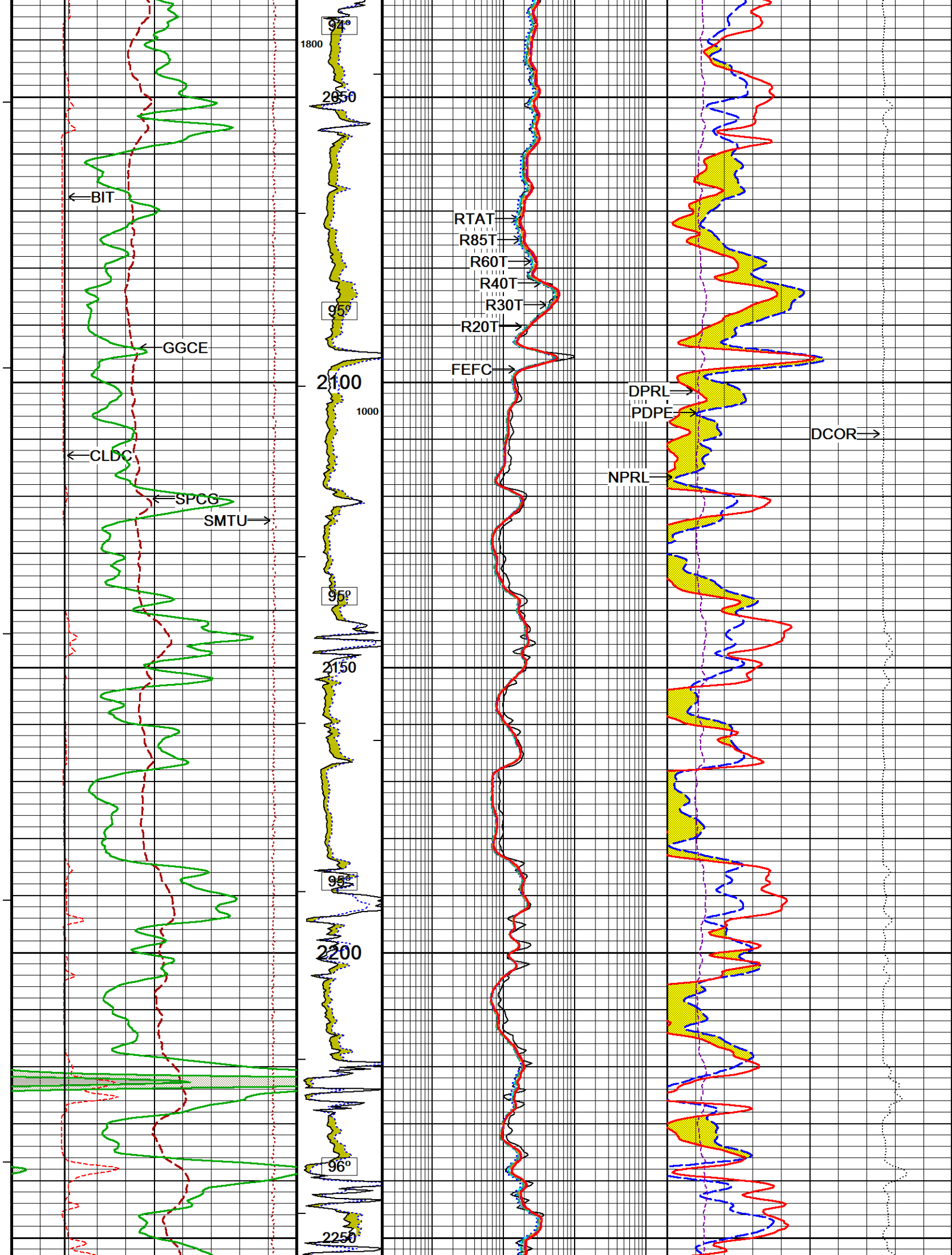


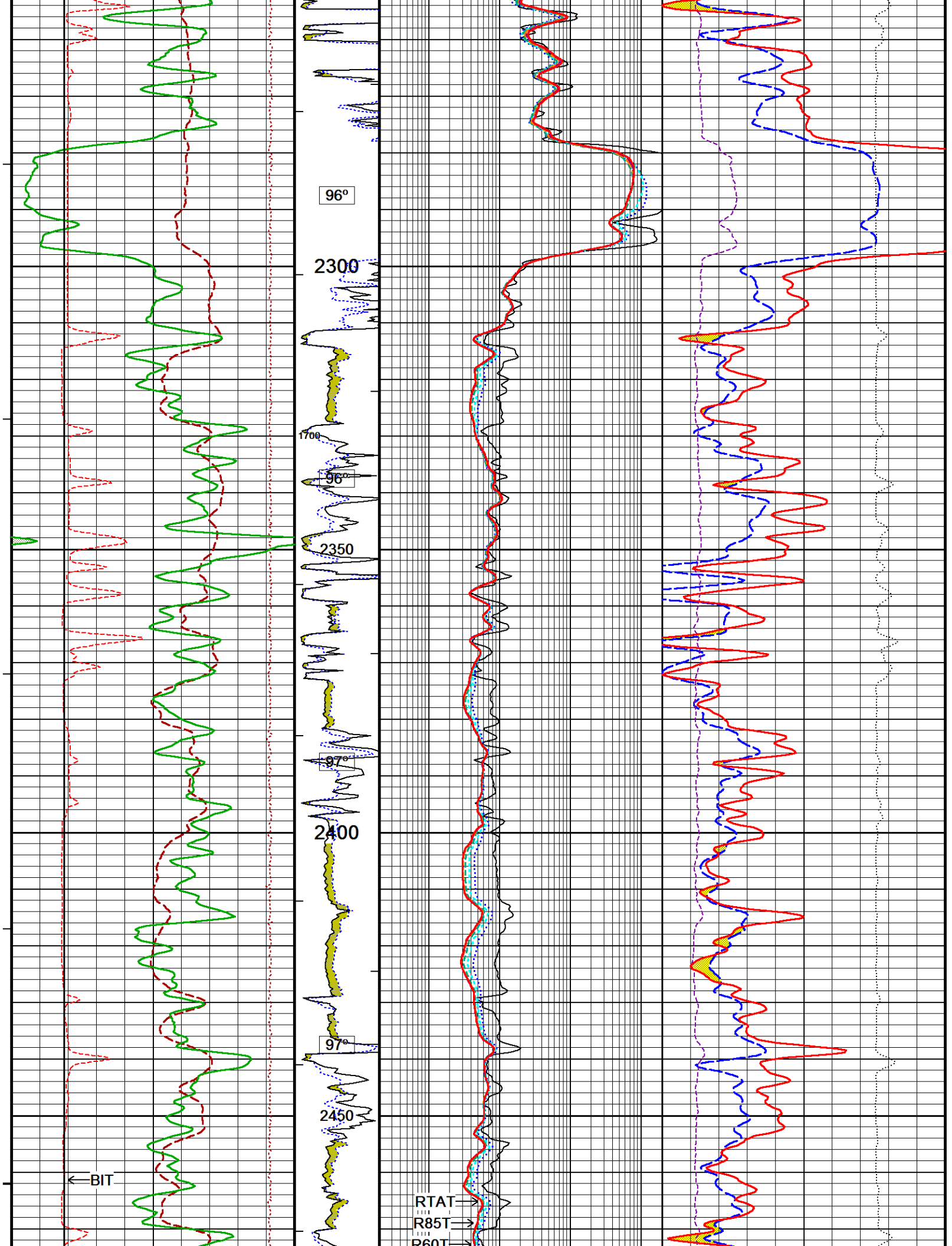


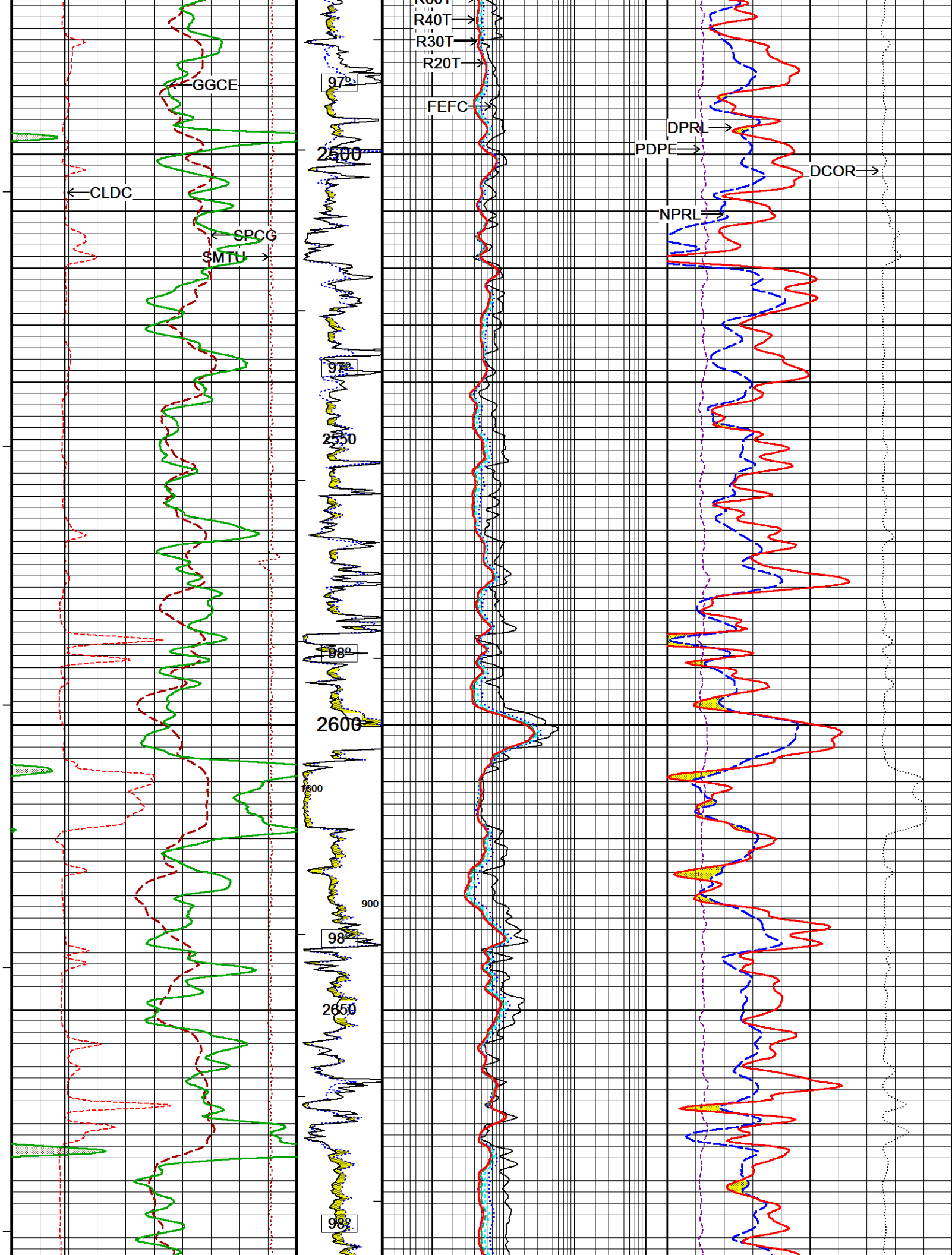


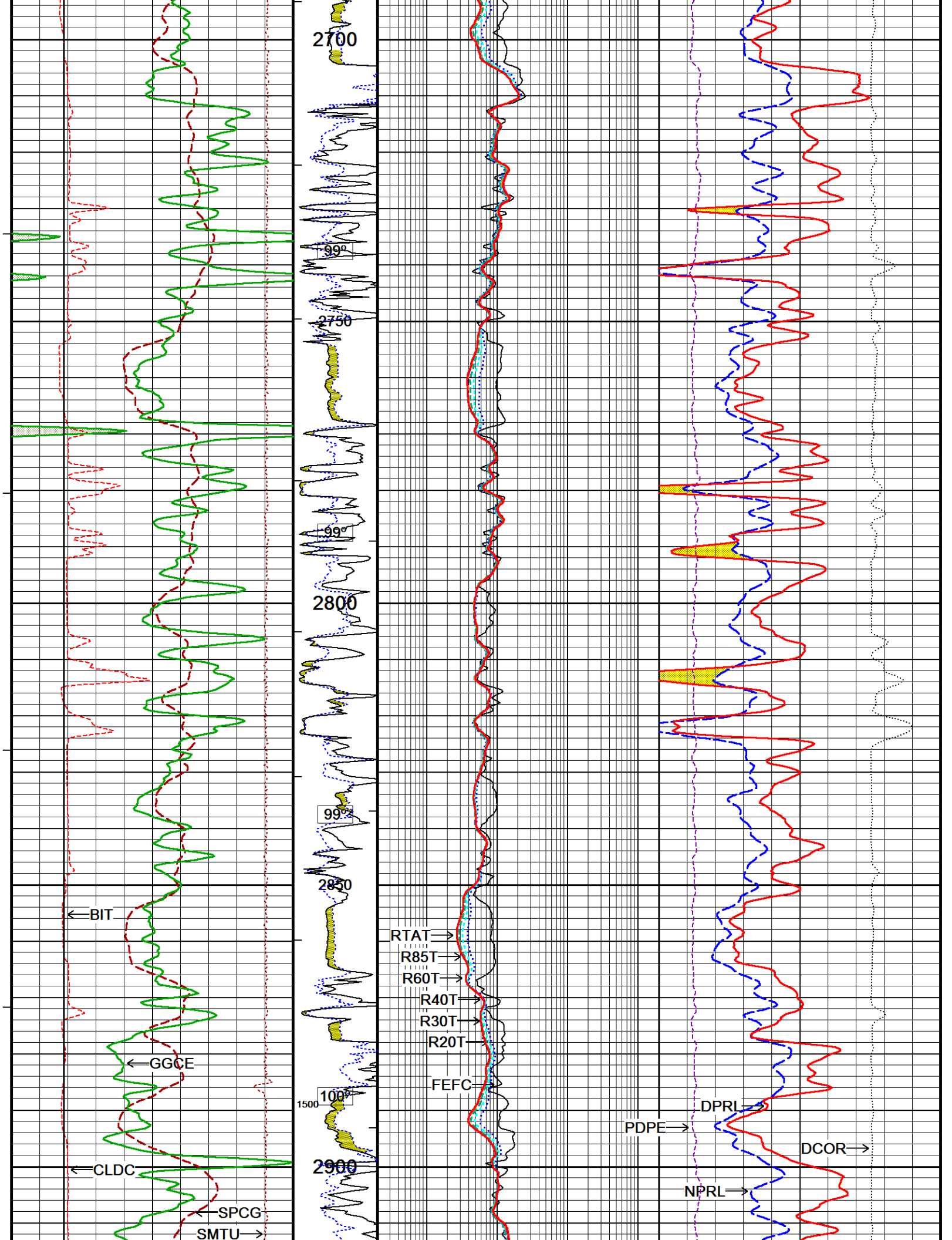


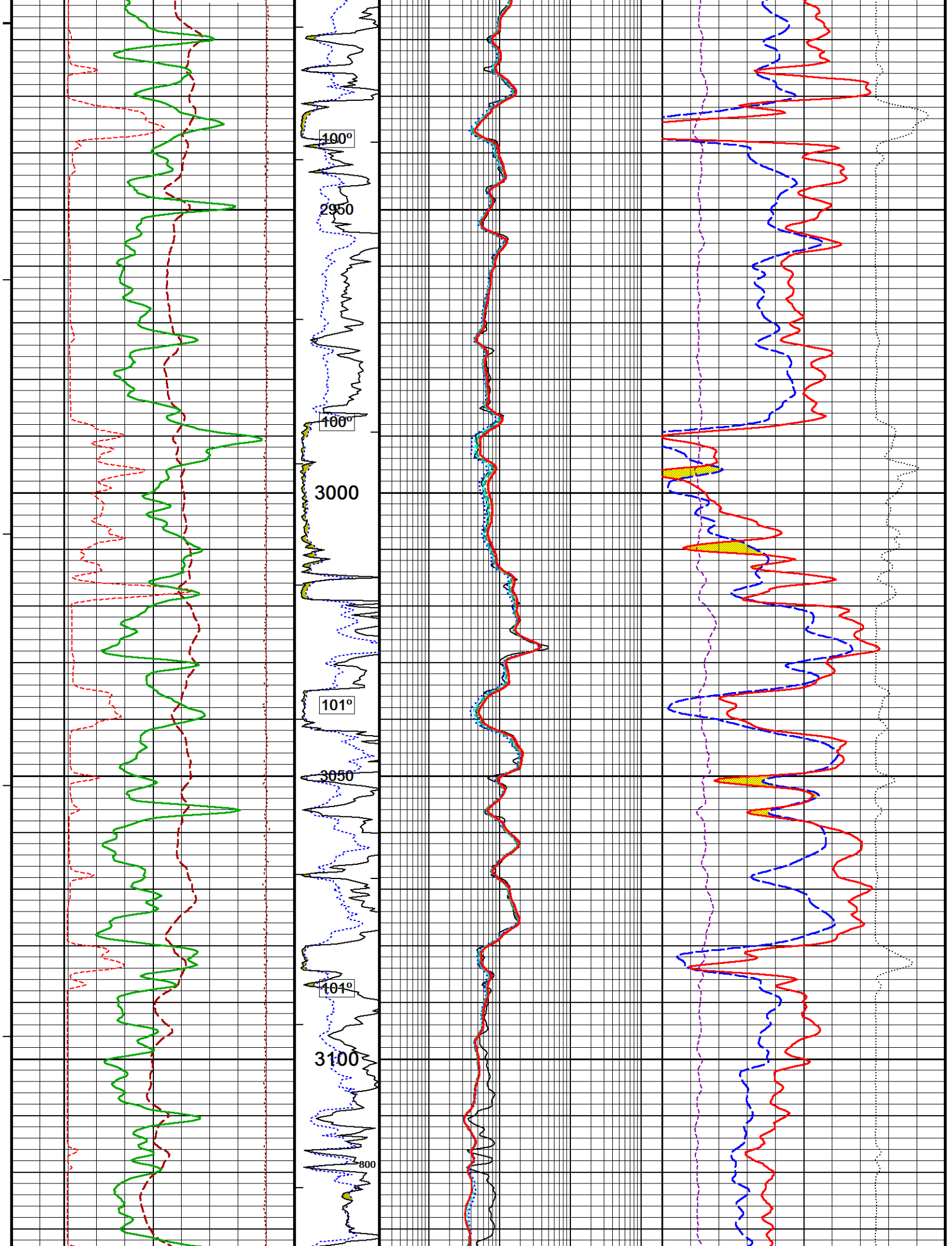




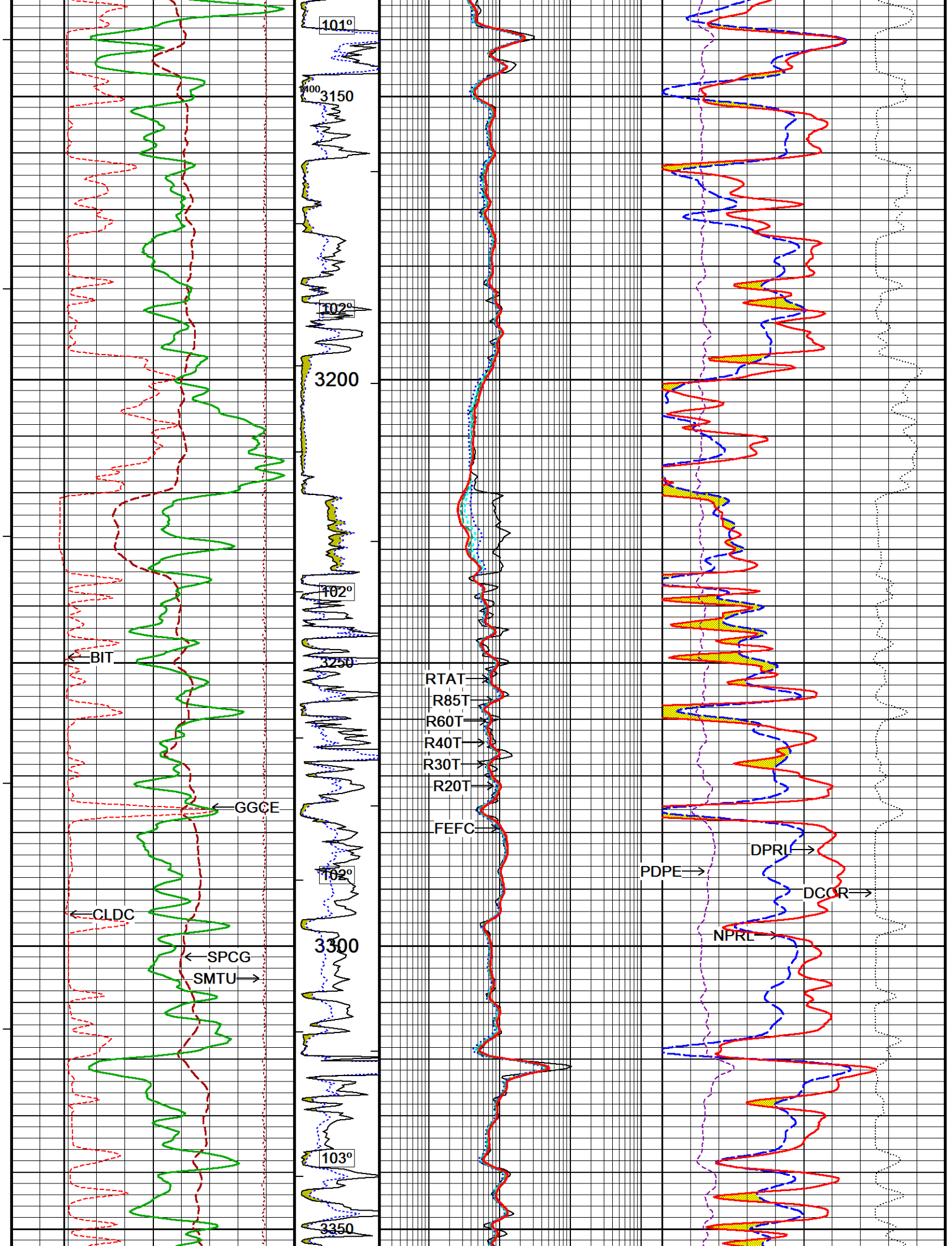


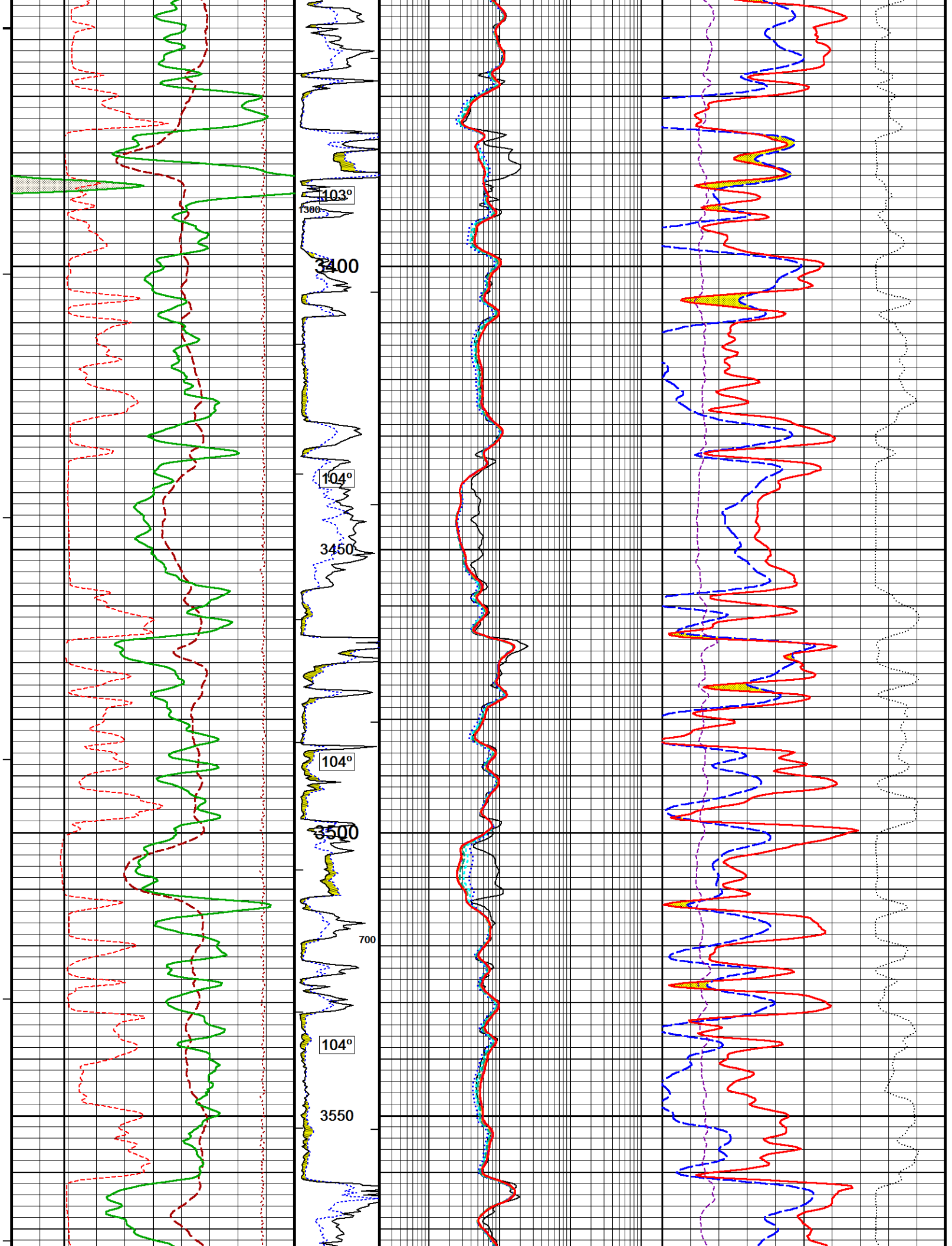


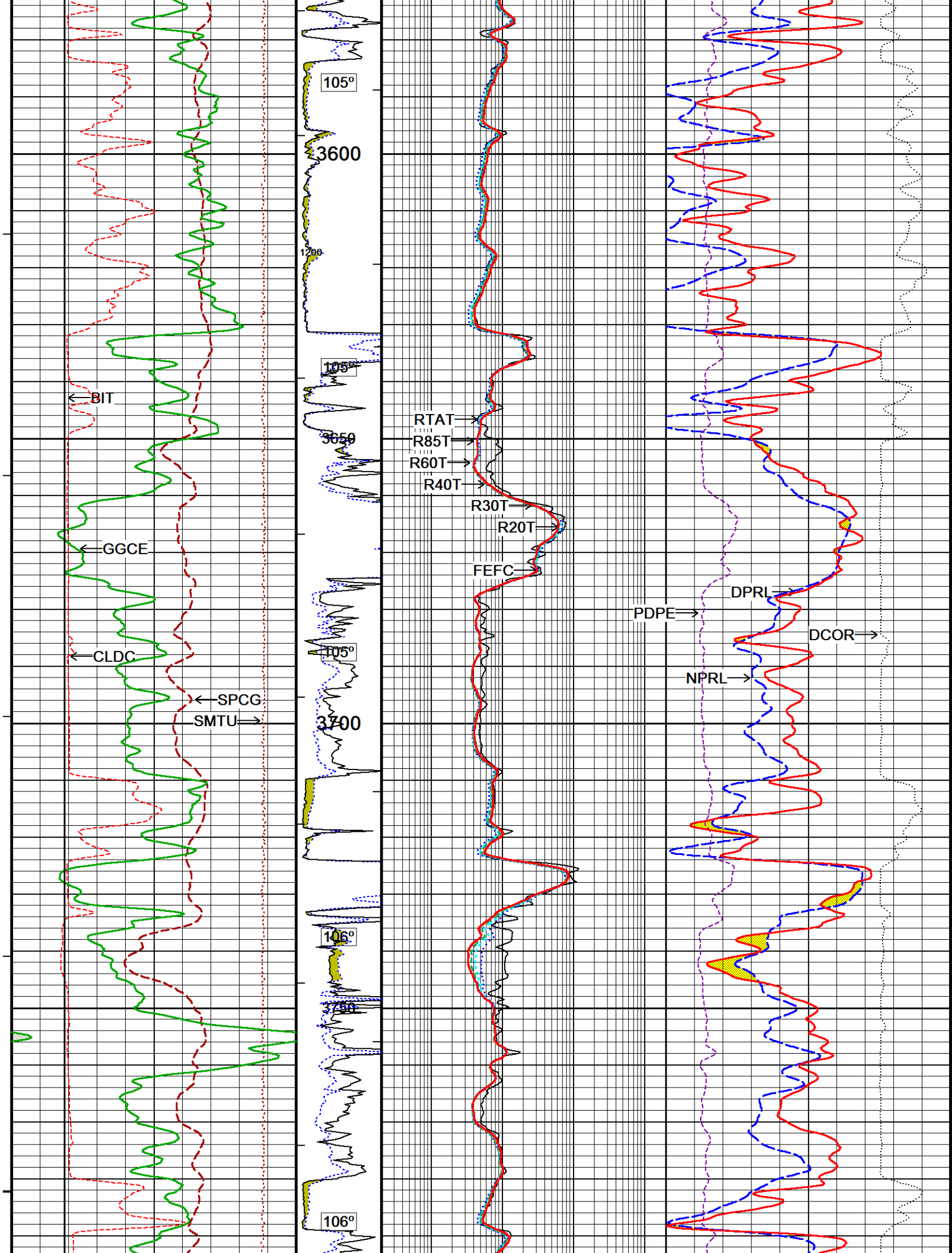


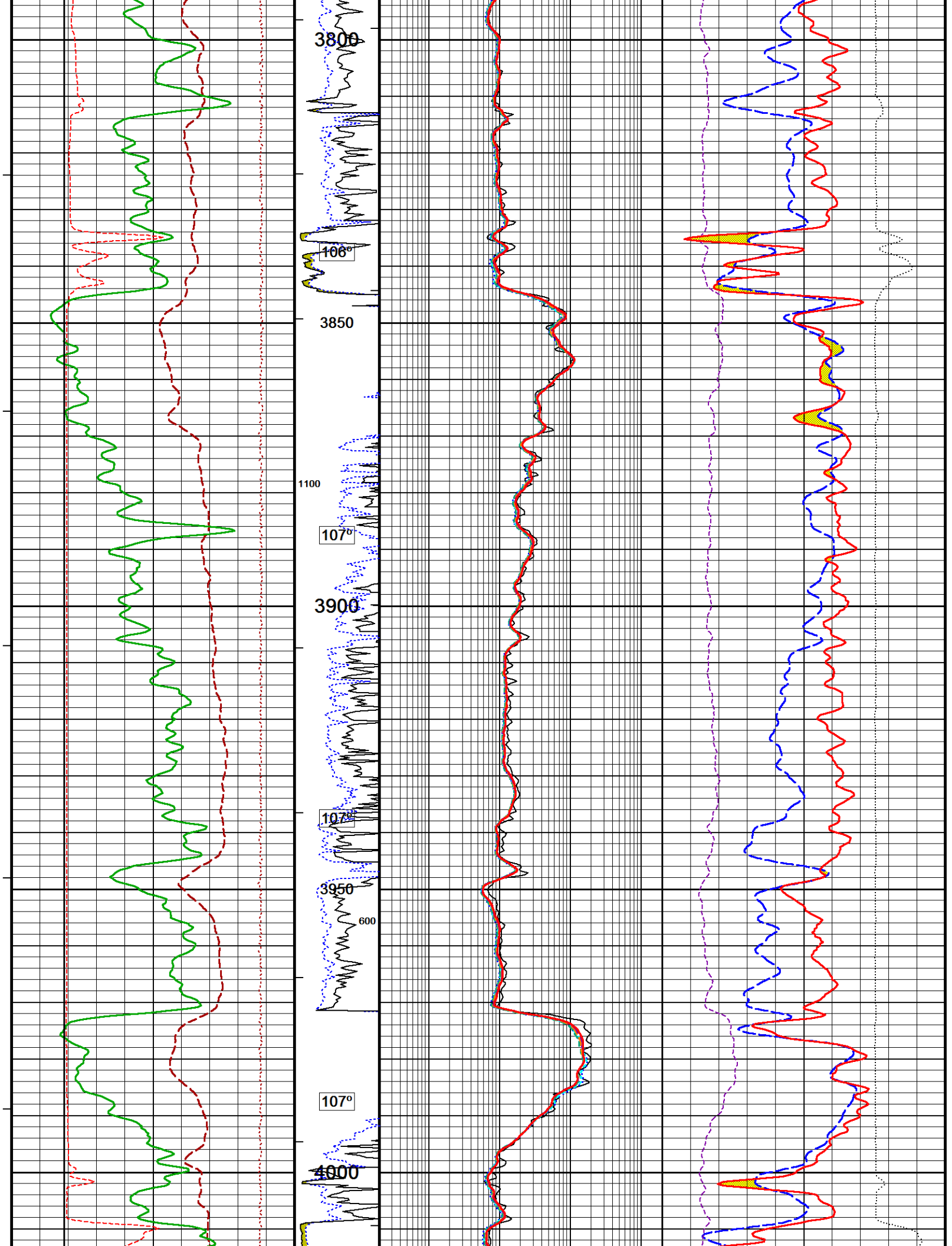


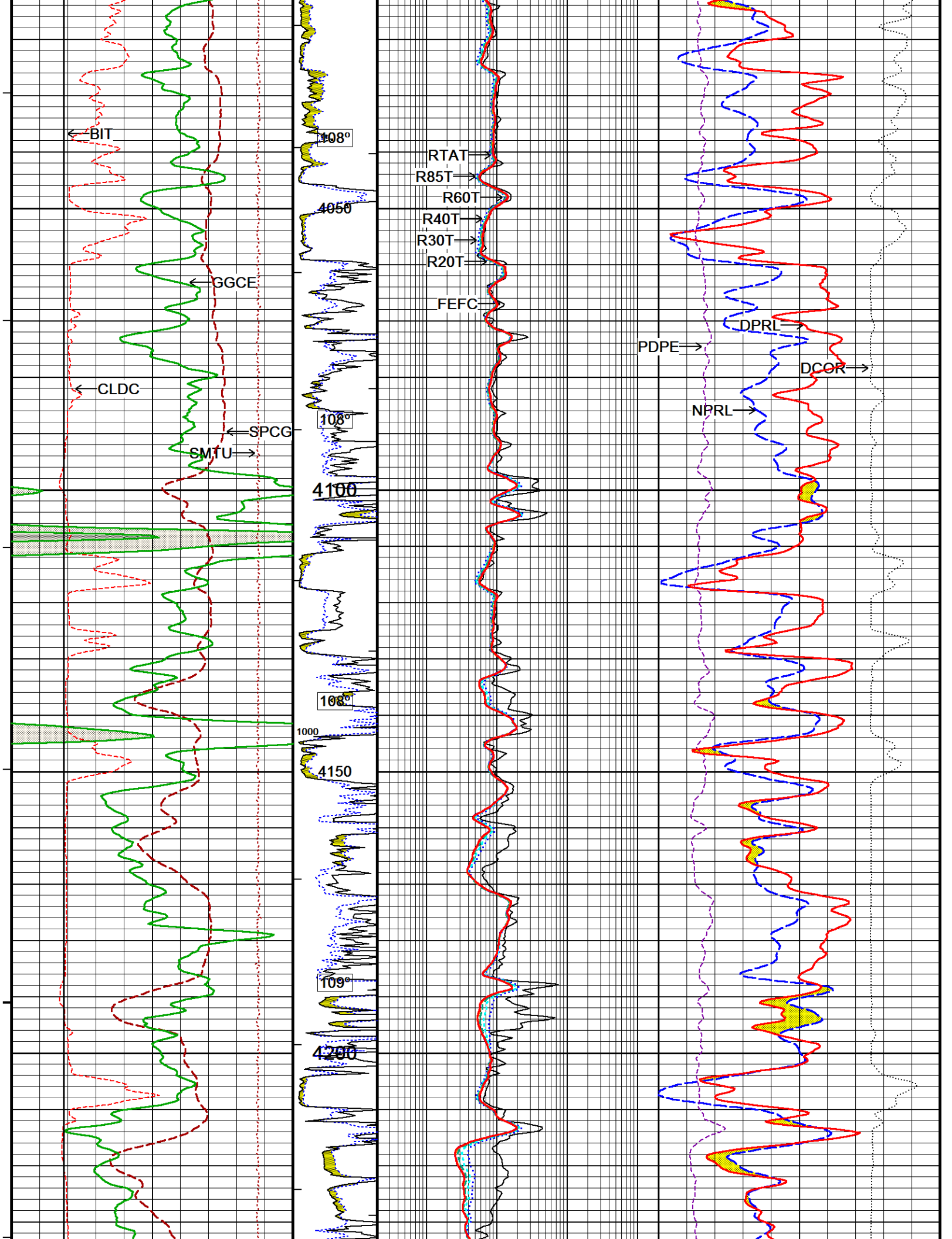




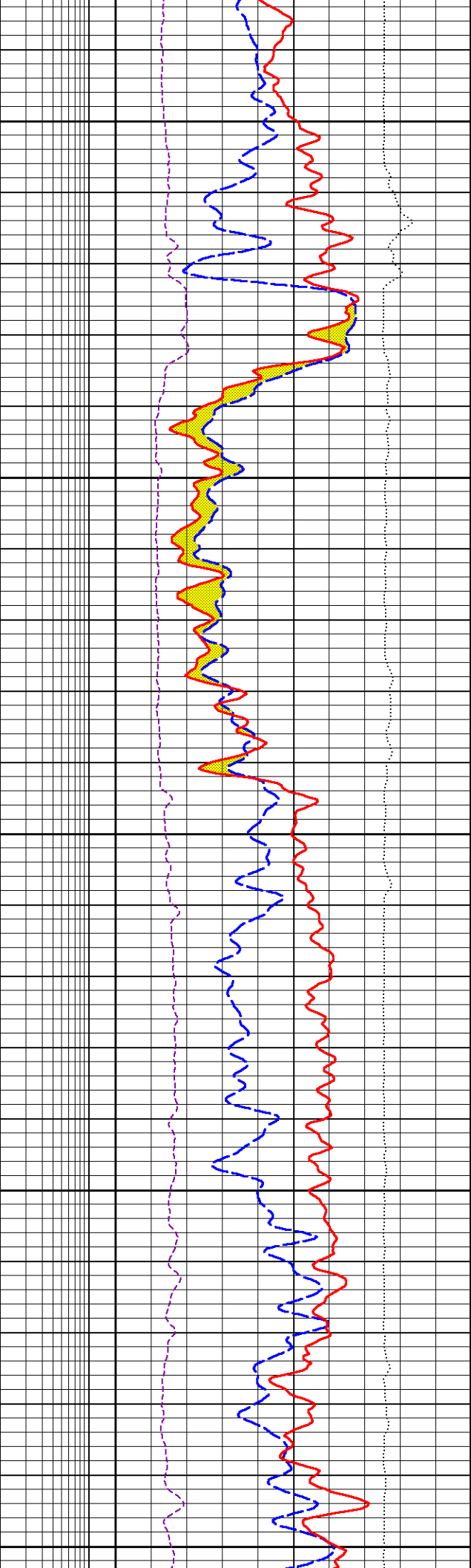
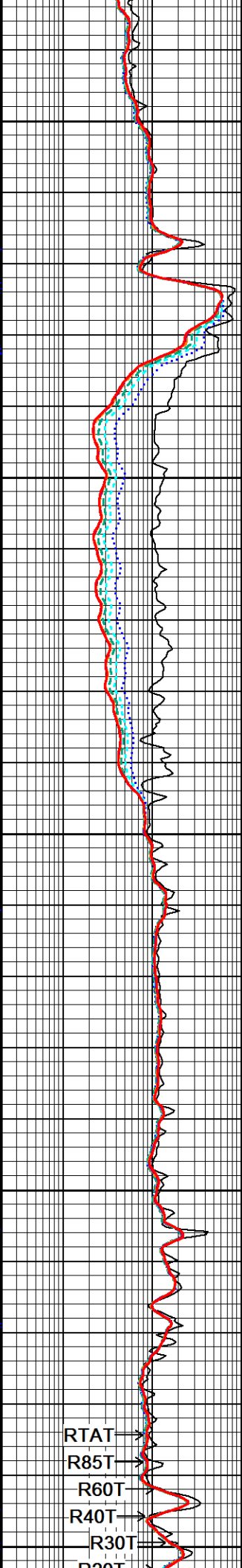
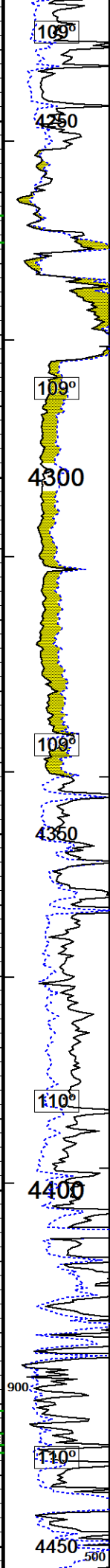
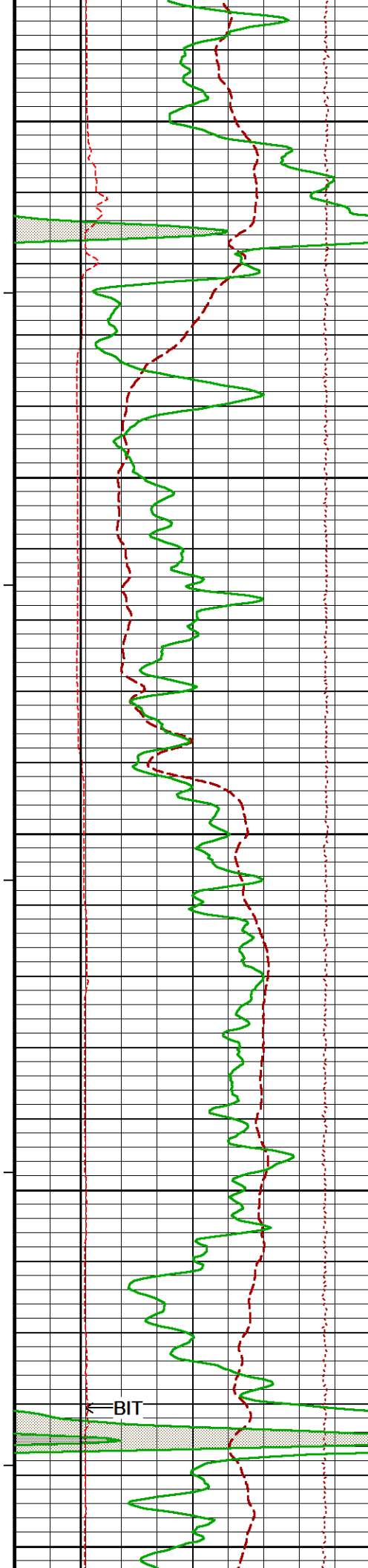




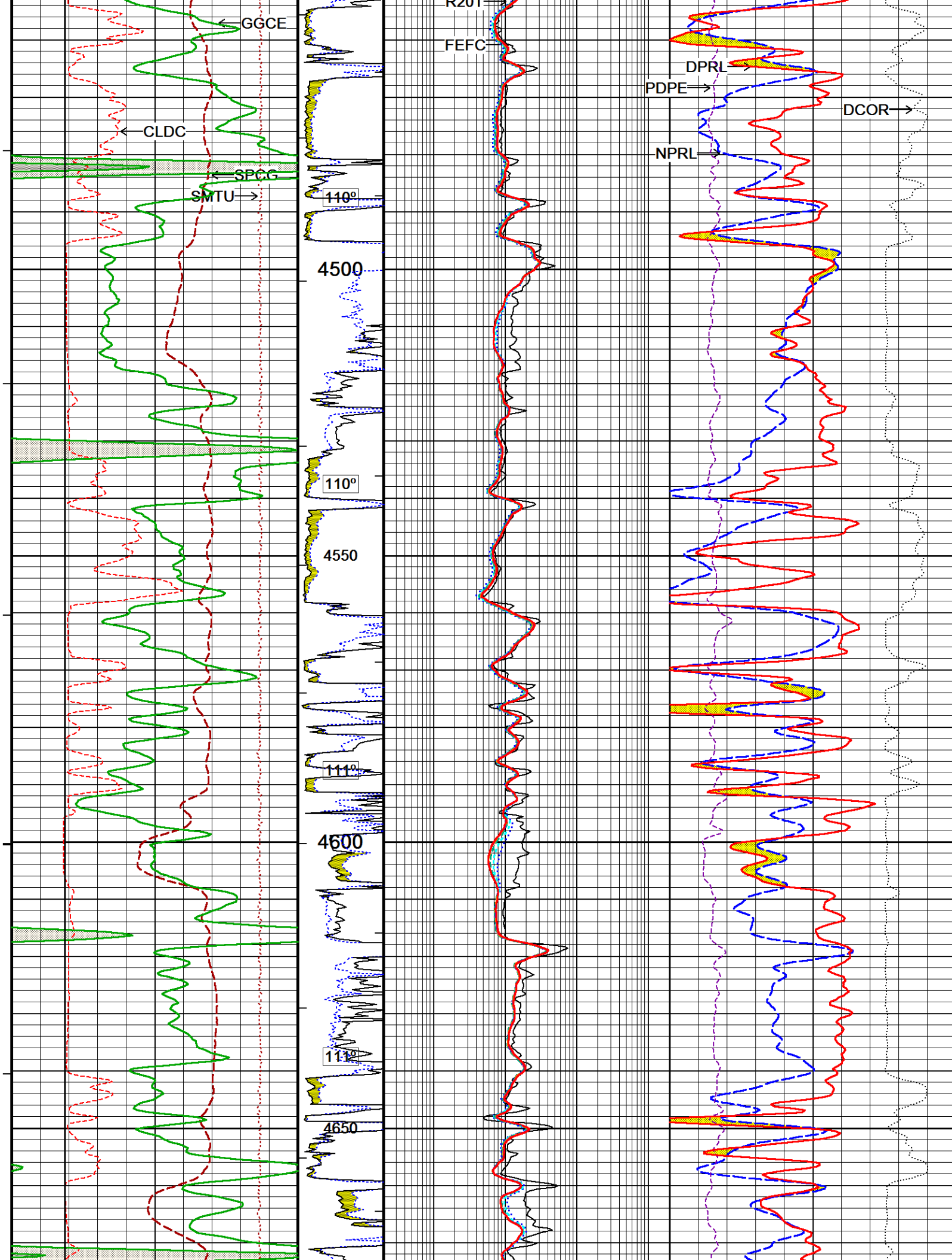


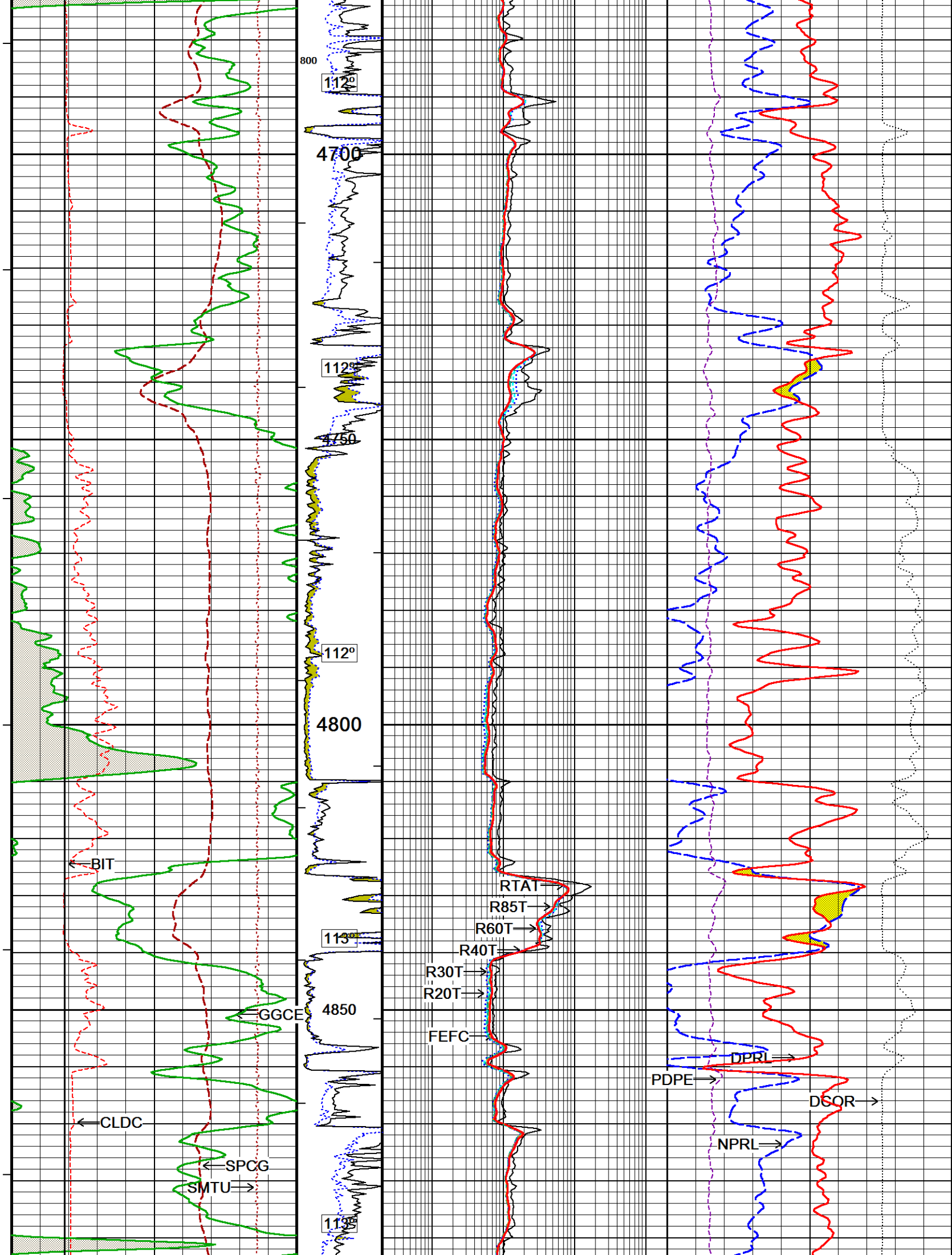


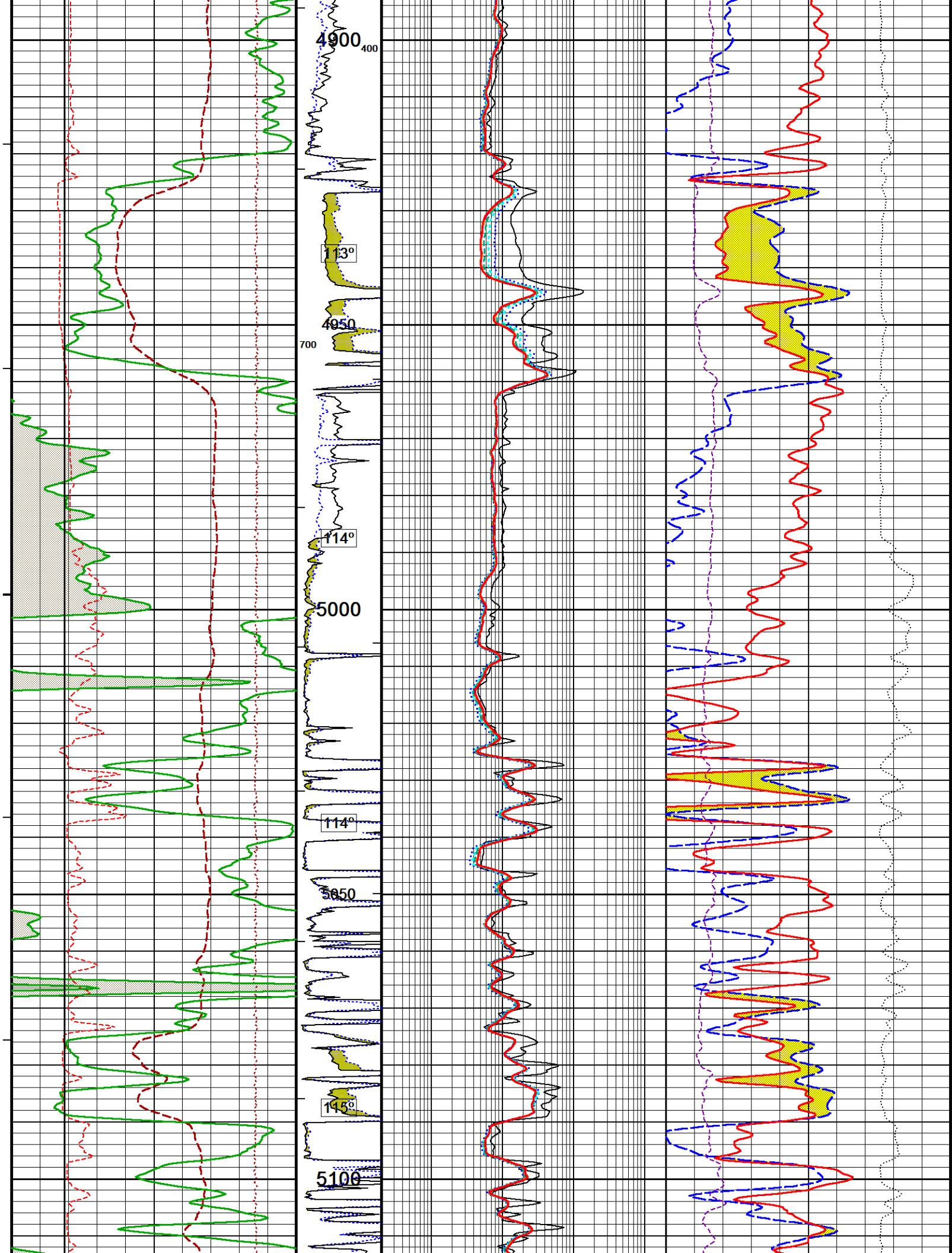


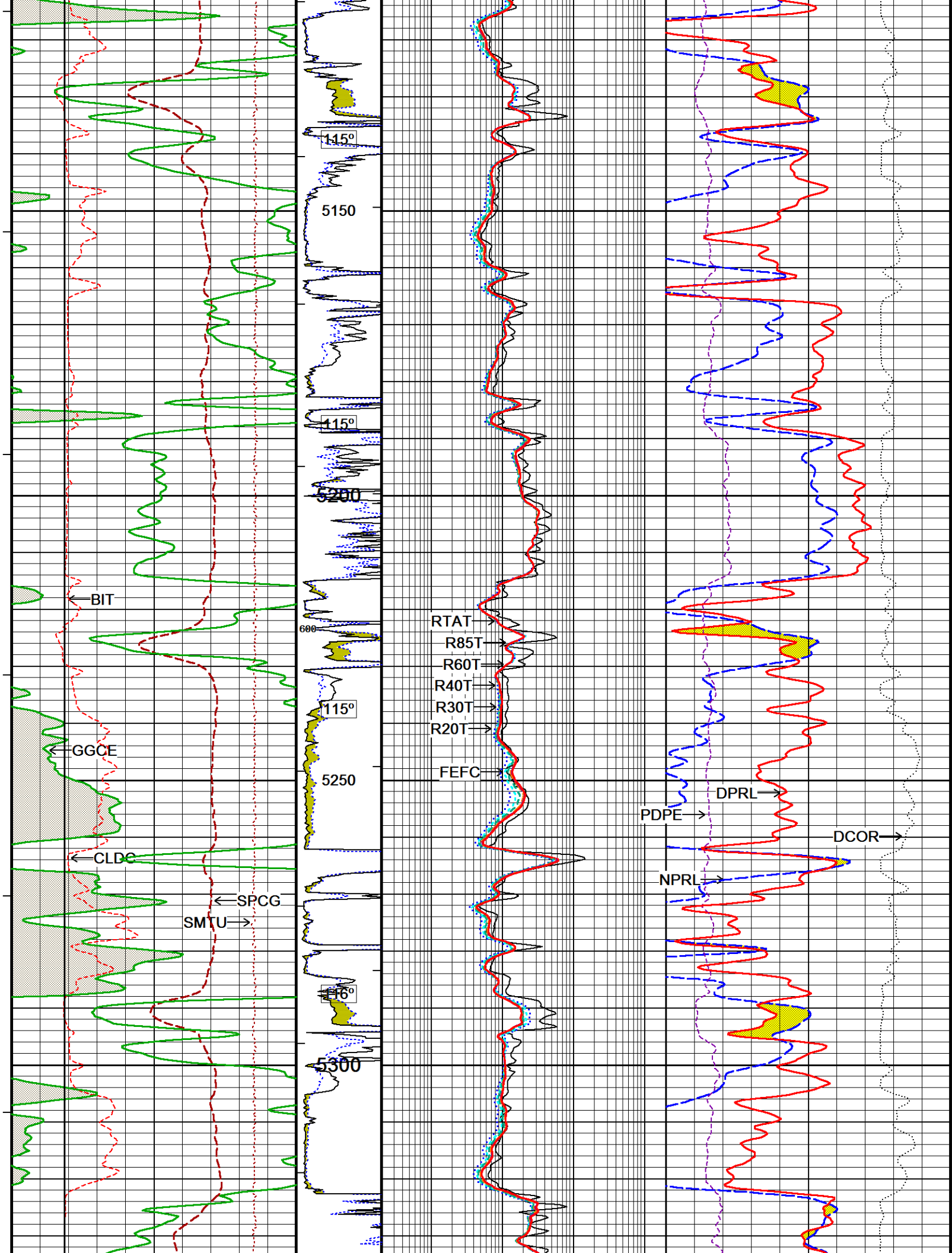


RTAT →  
R85T →  
R60T →  
R40T →  
R30T →  
R20T →

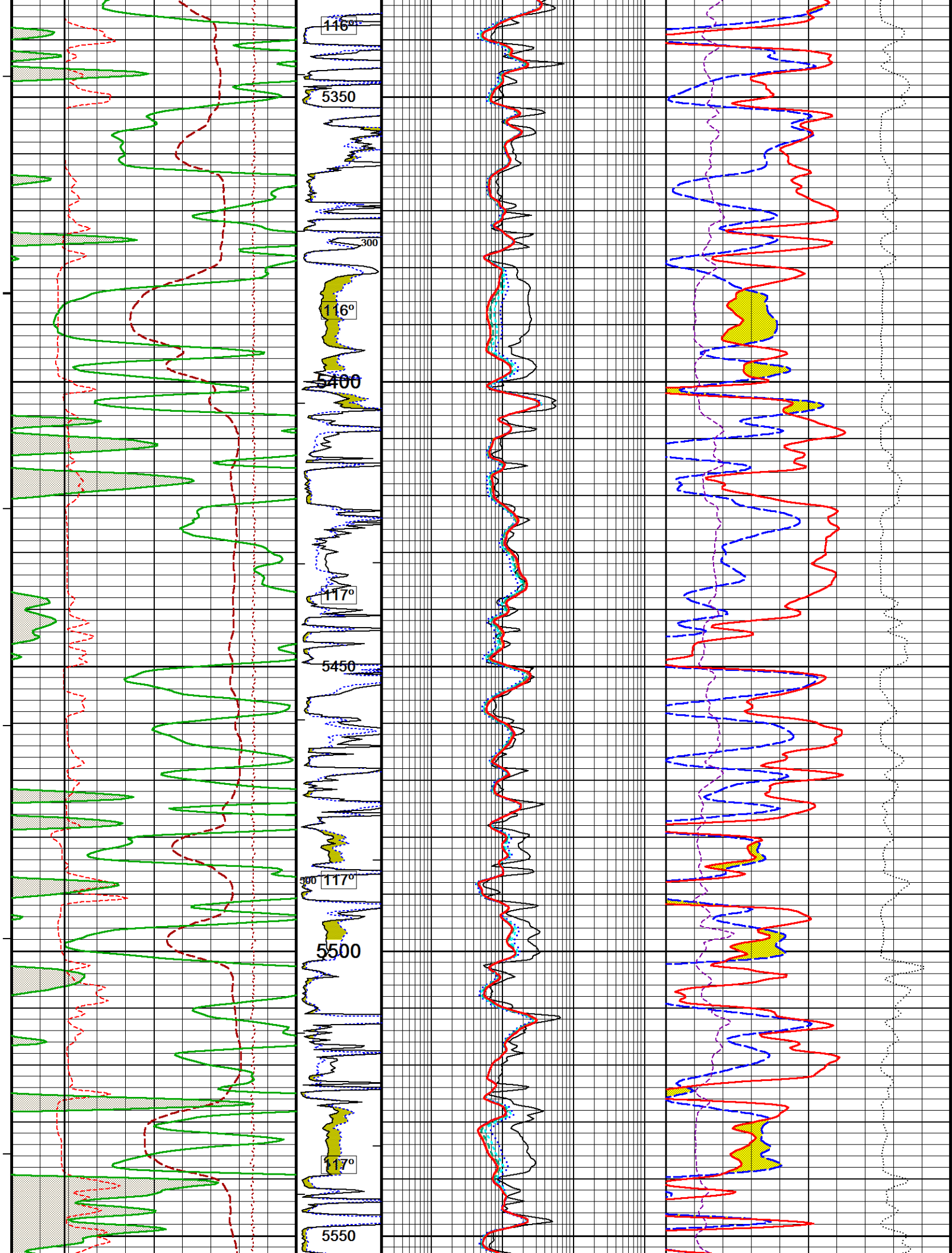


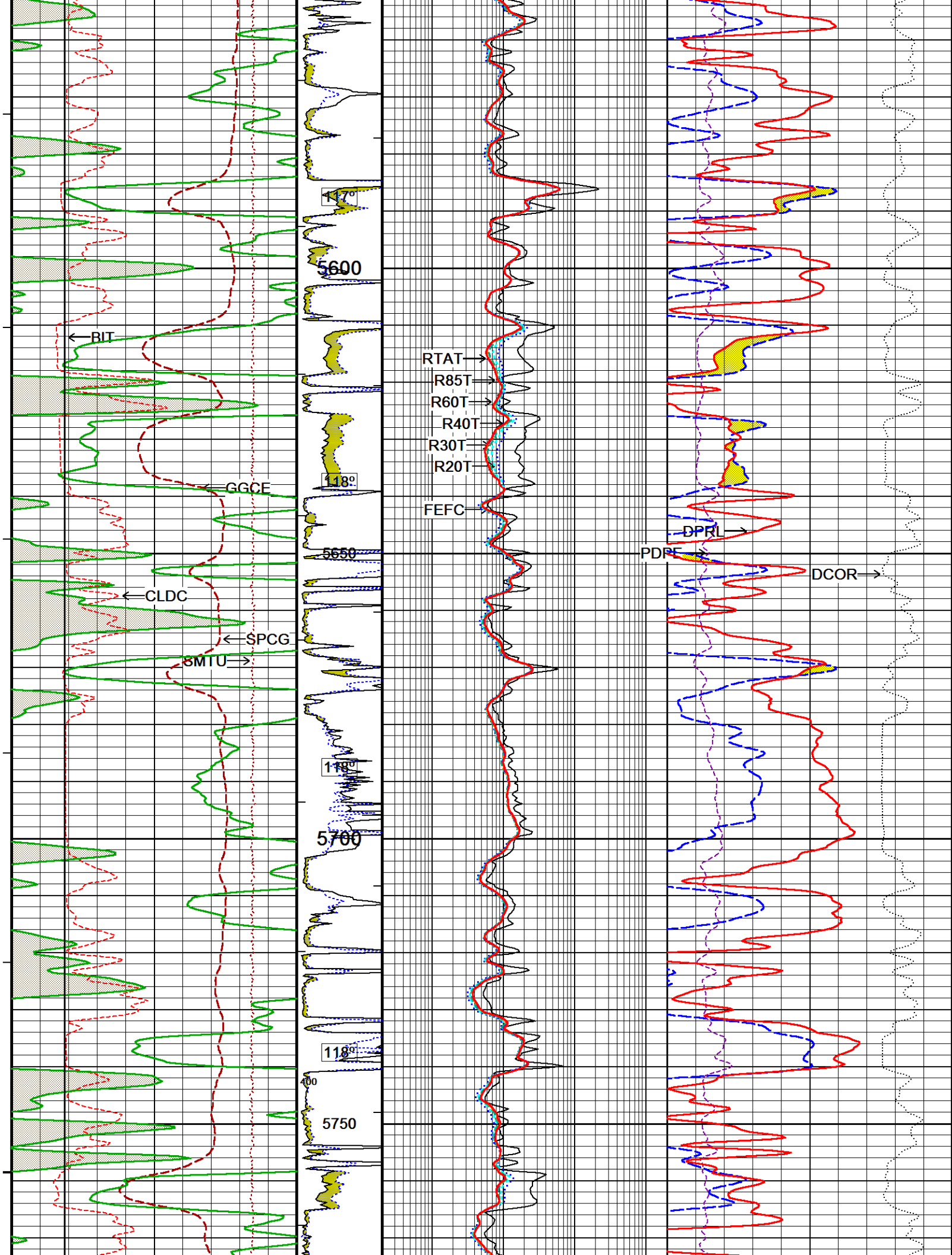


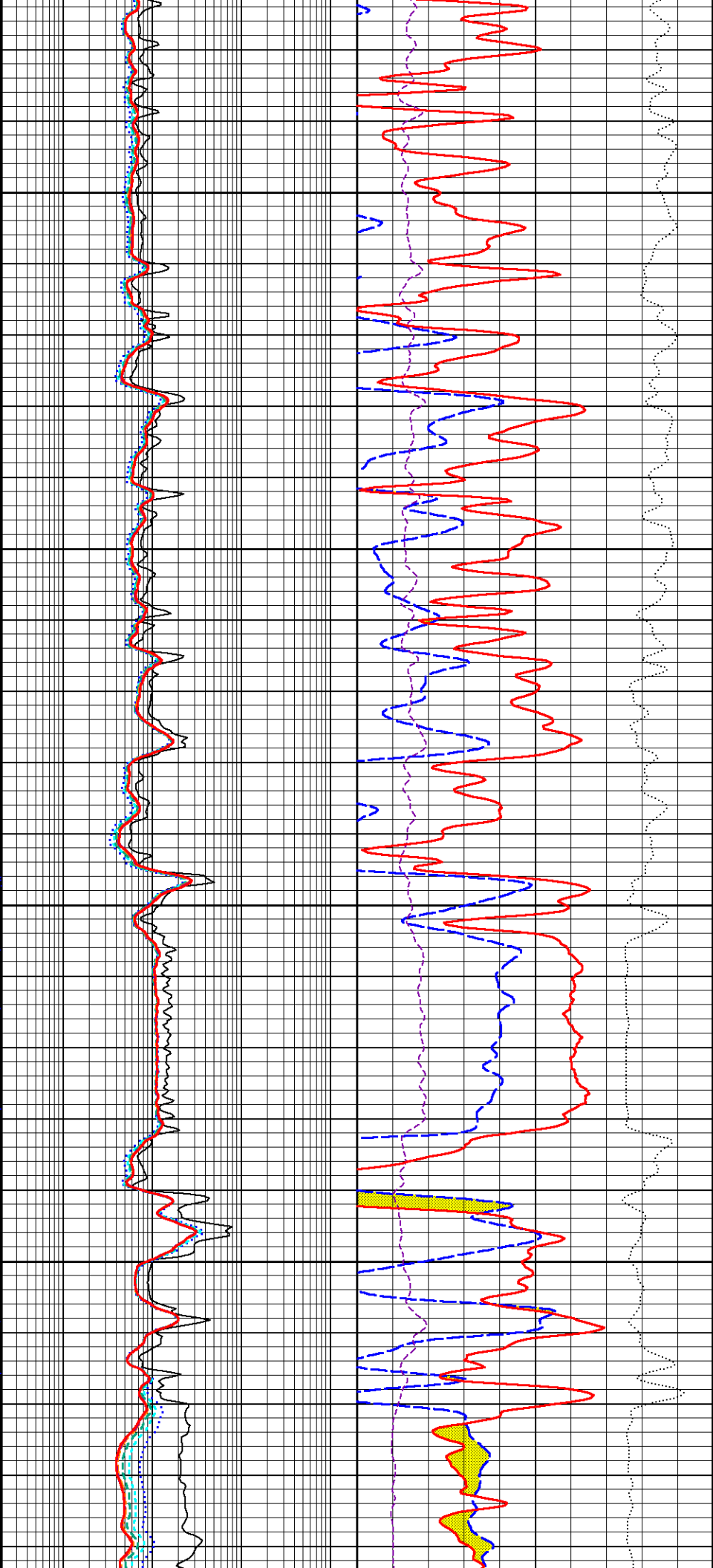
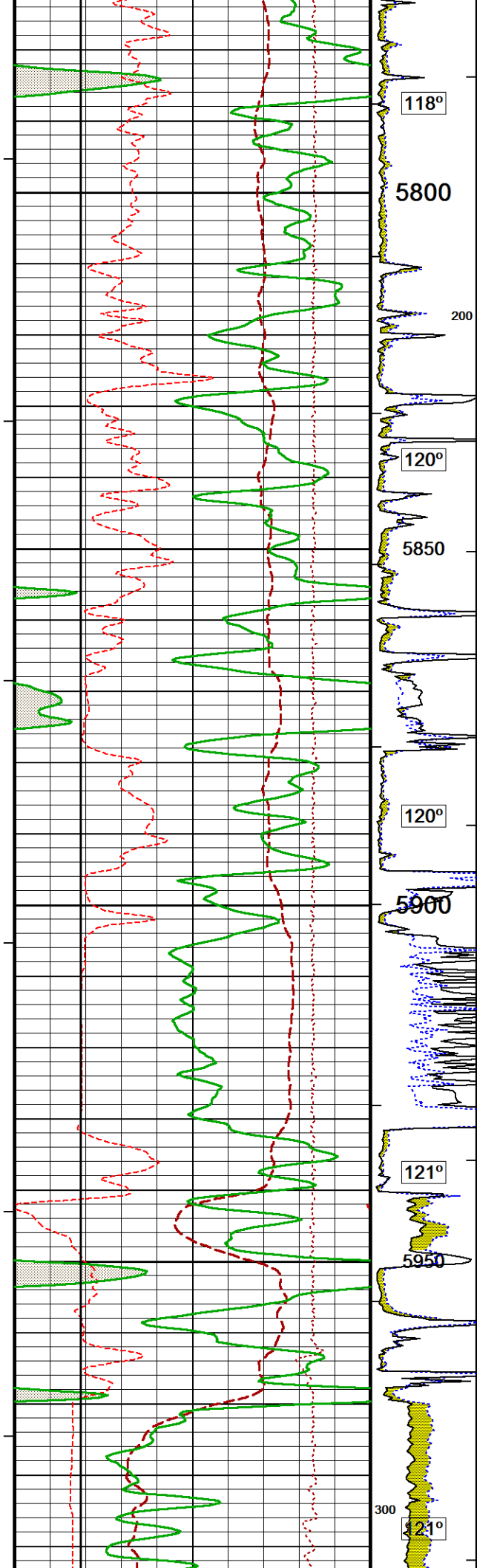


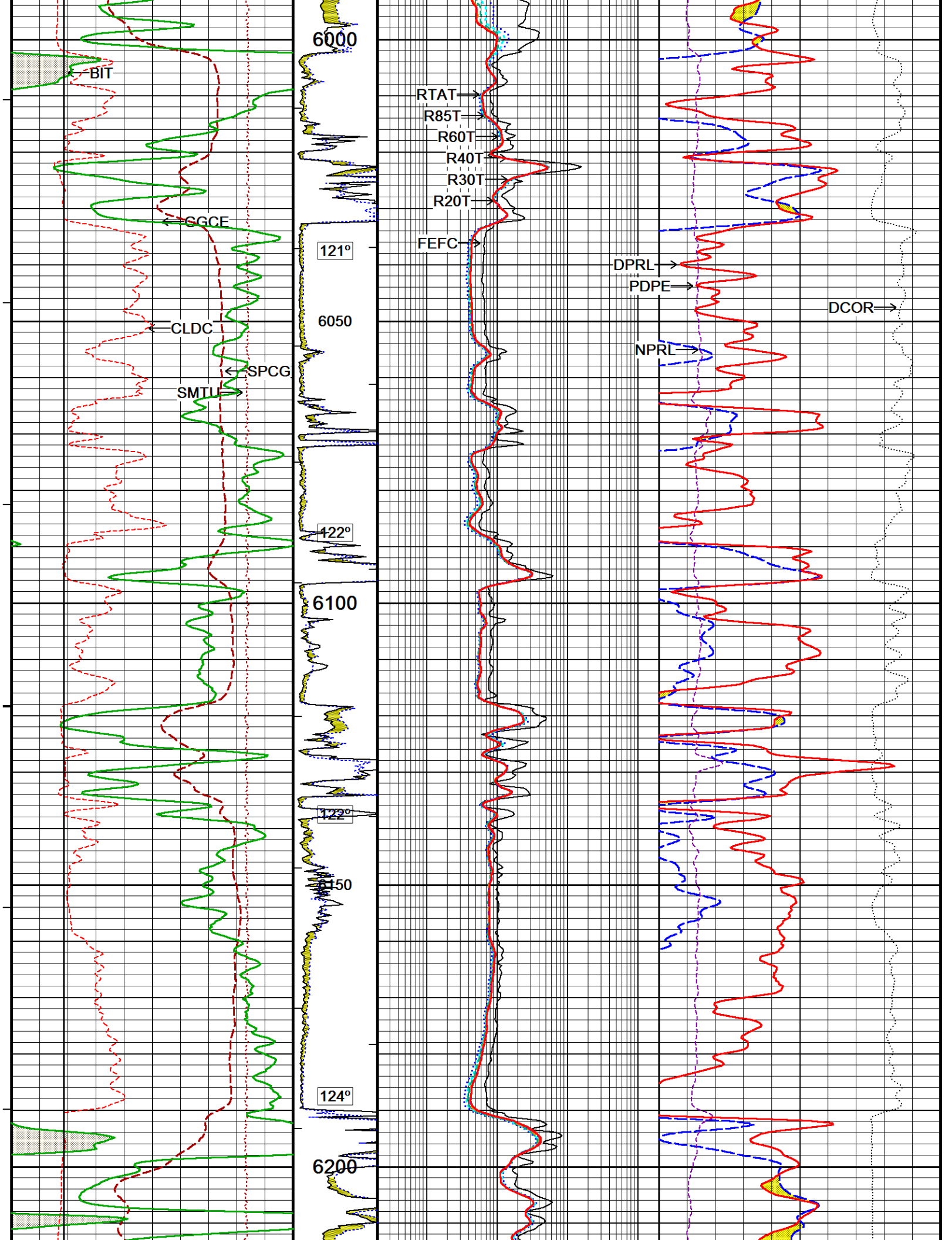


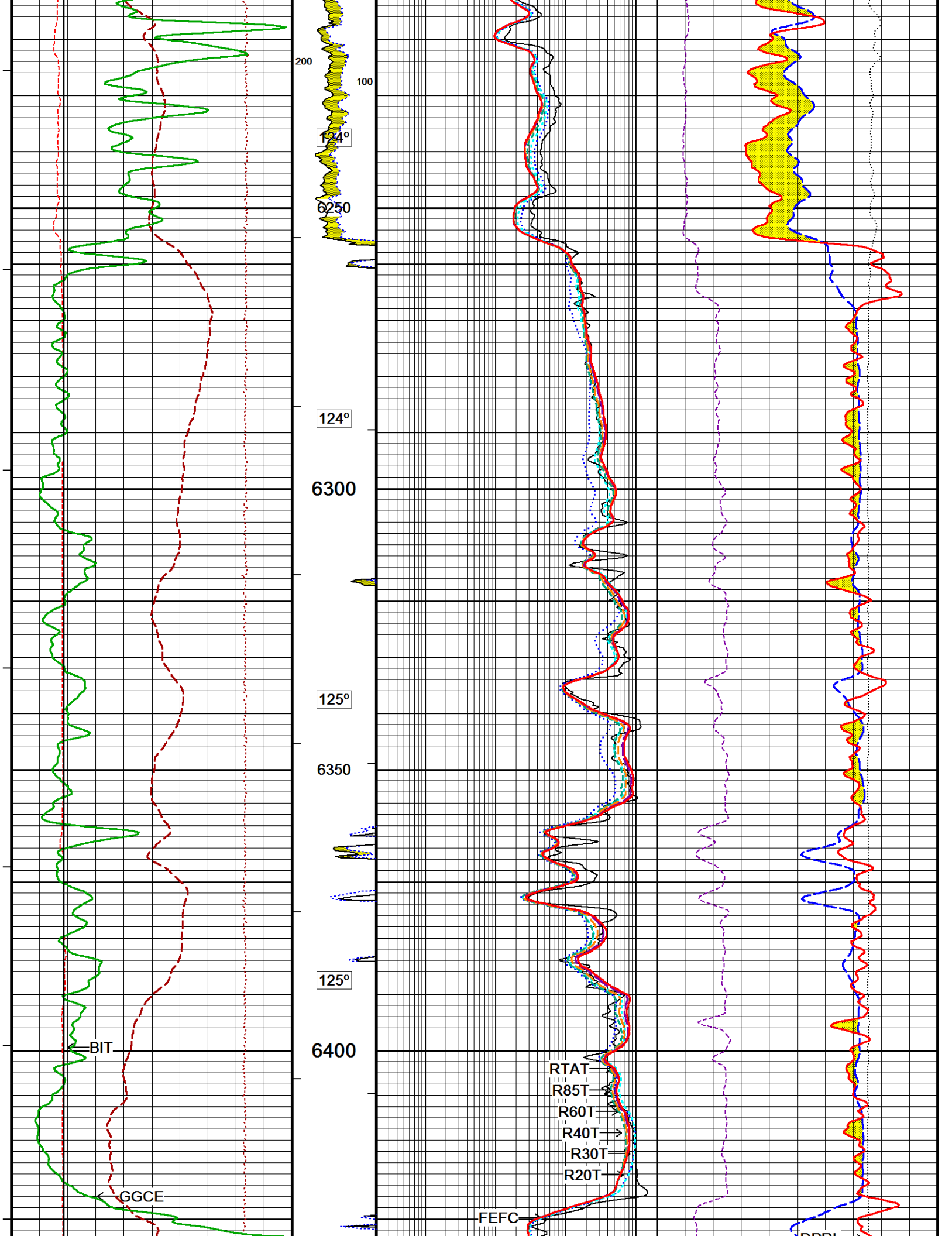




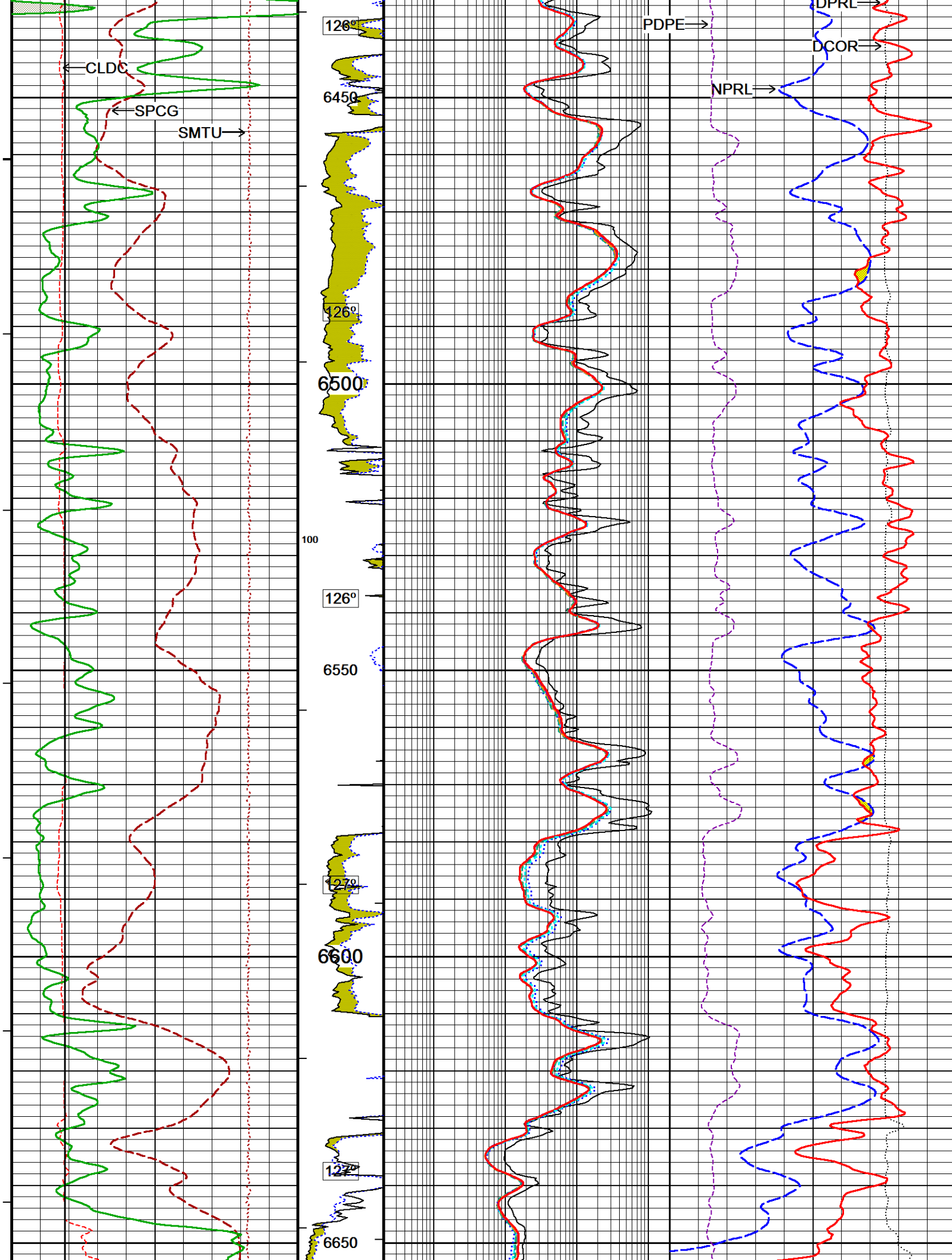




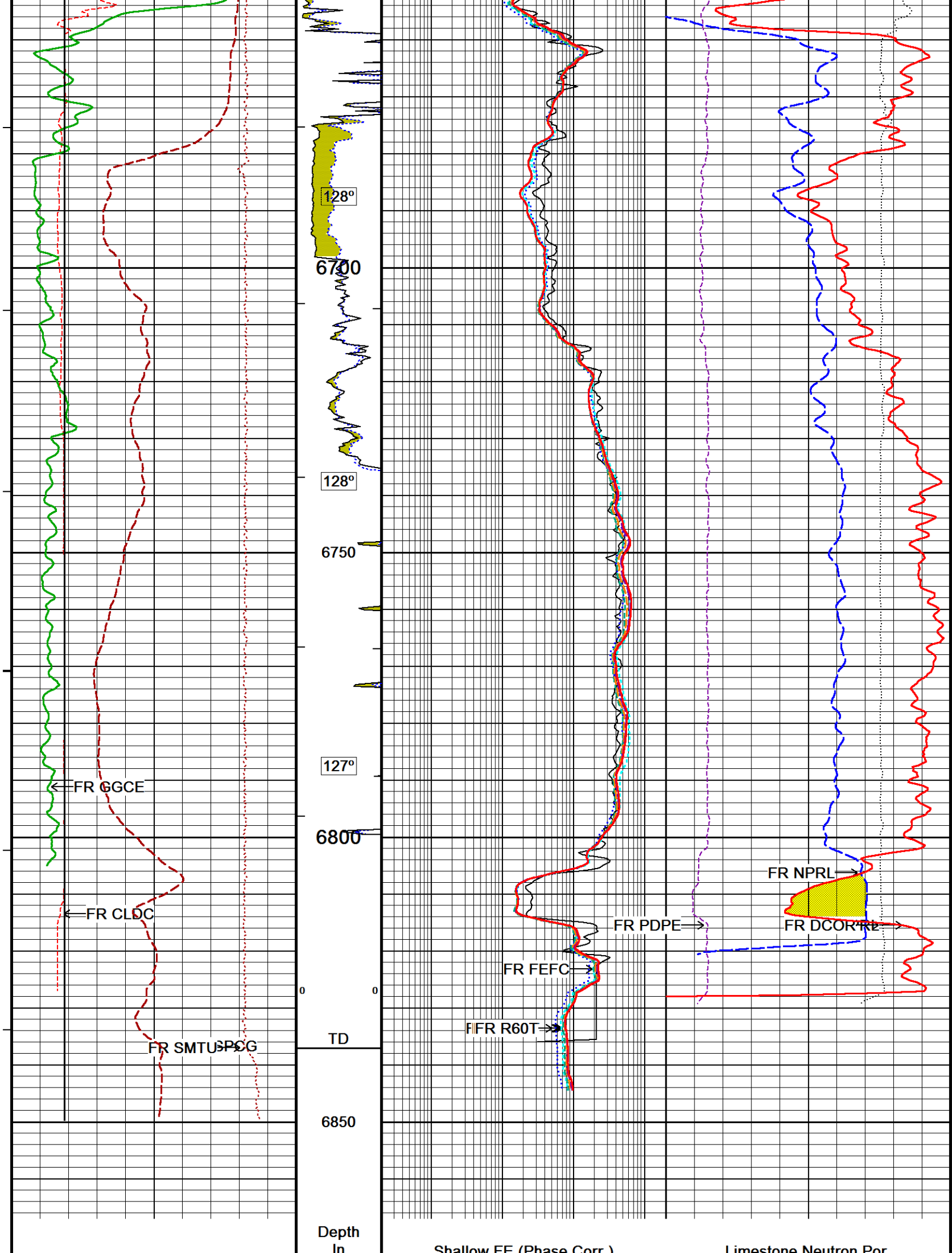


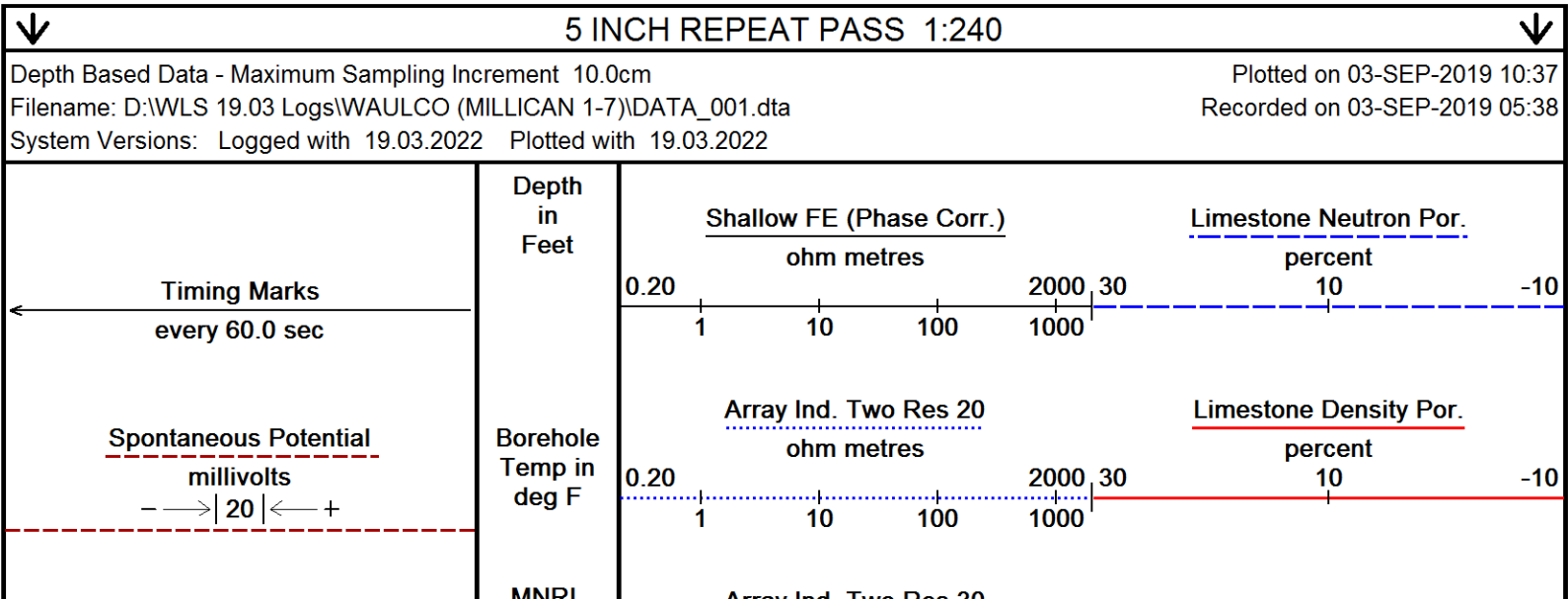
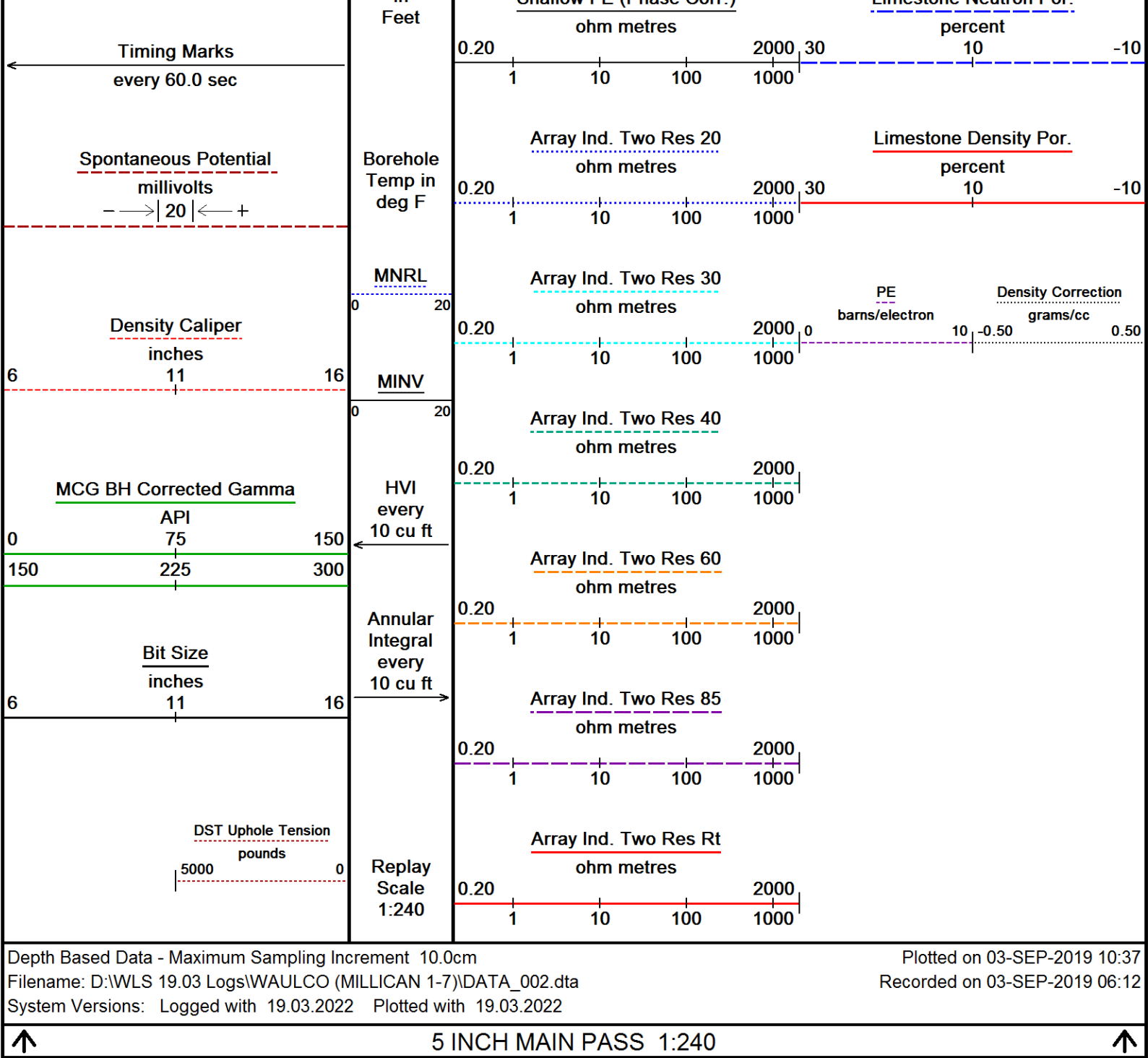


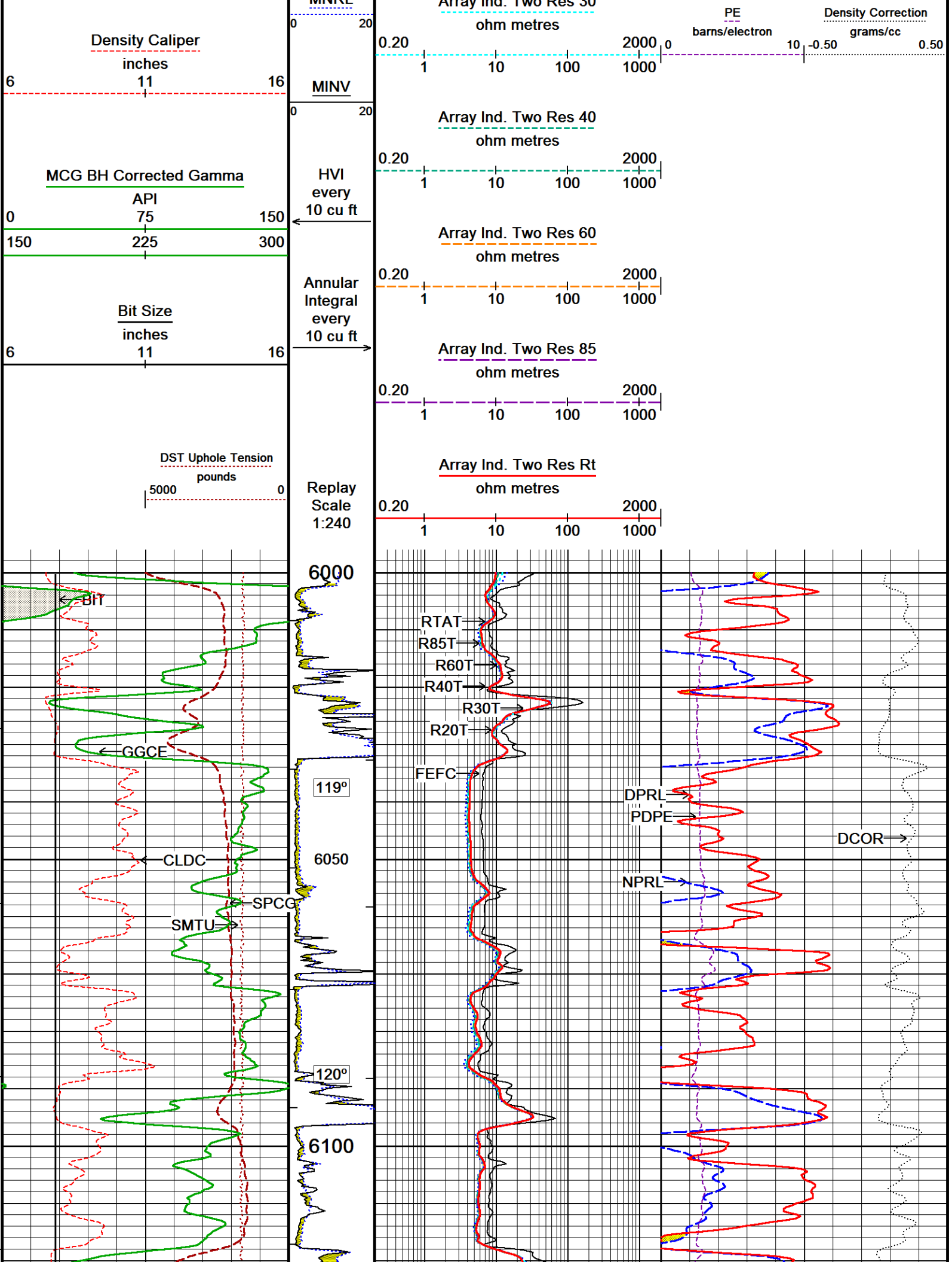


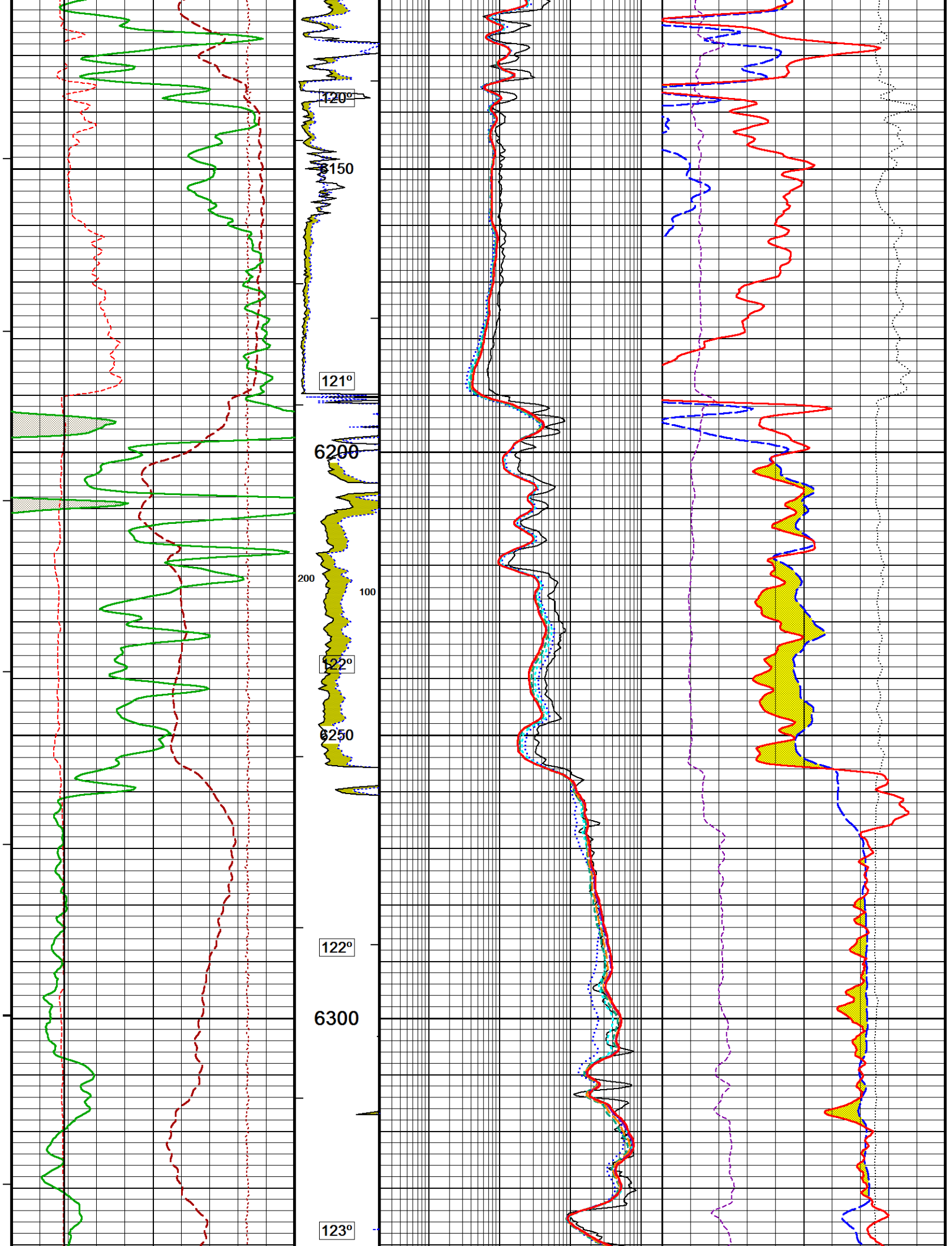


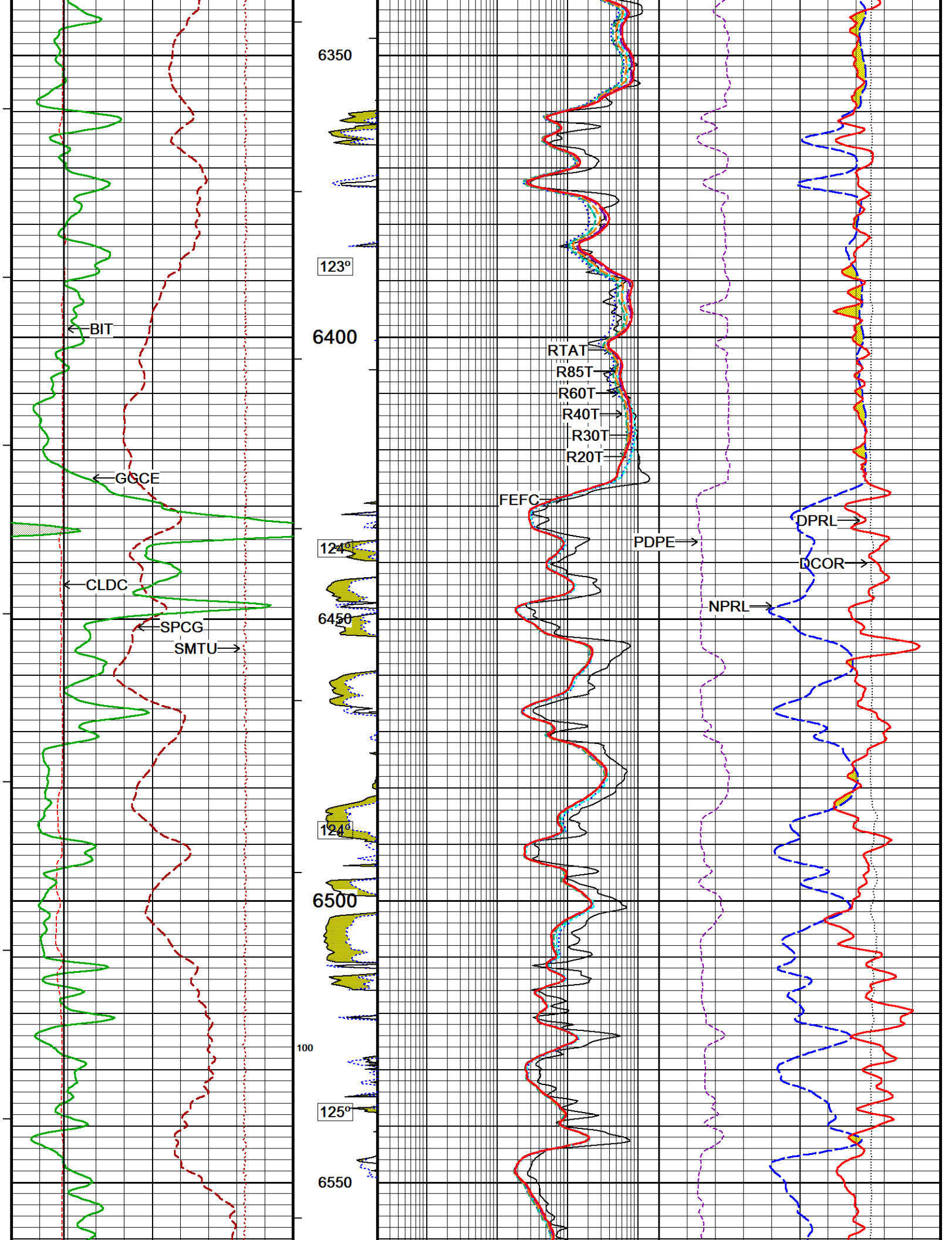




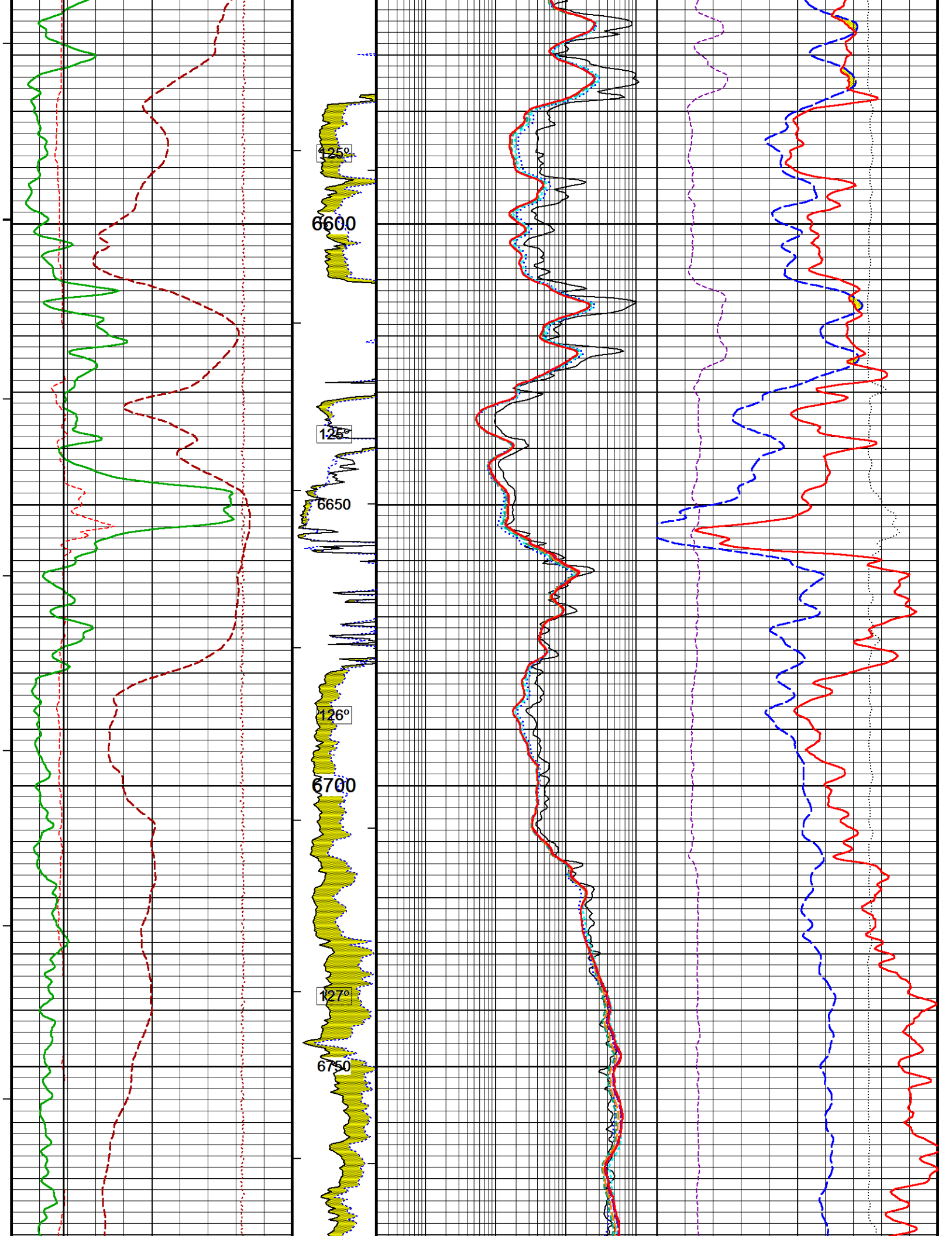


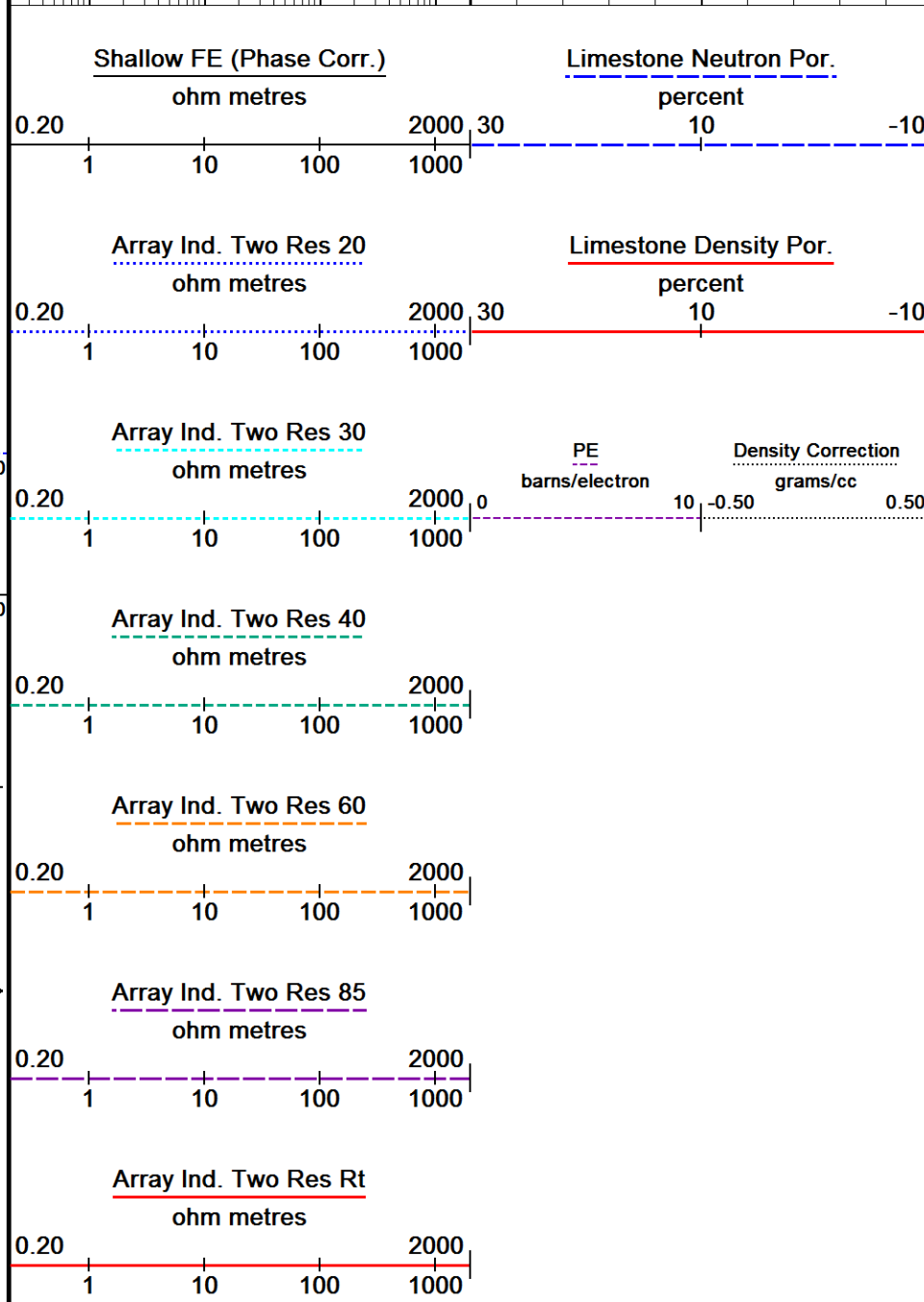
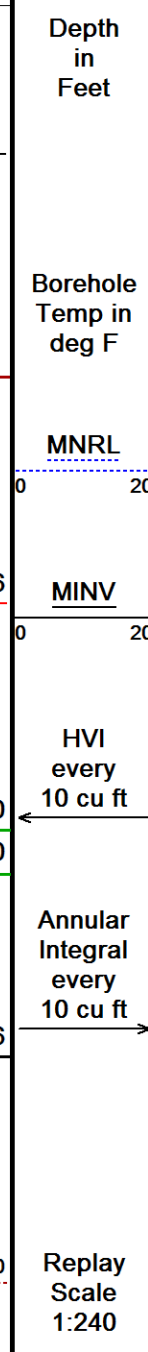
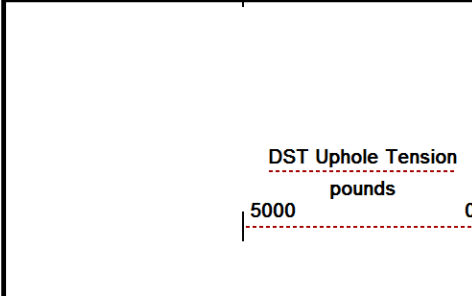
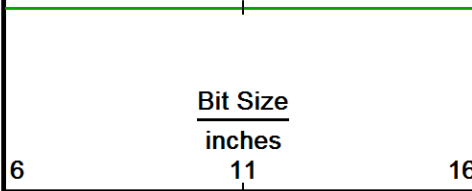
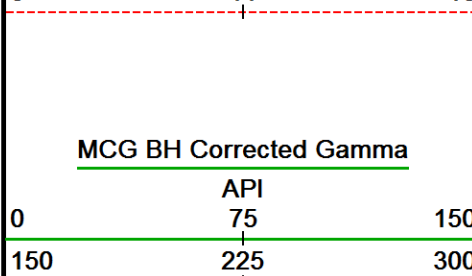
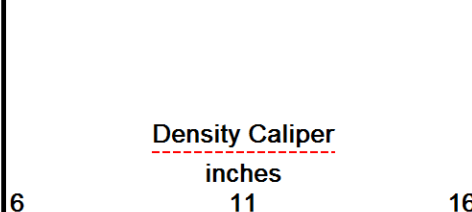
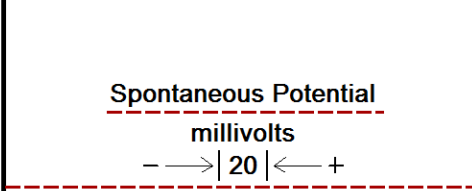
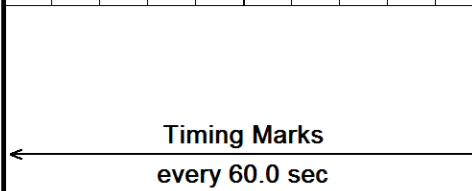
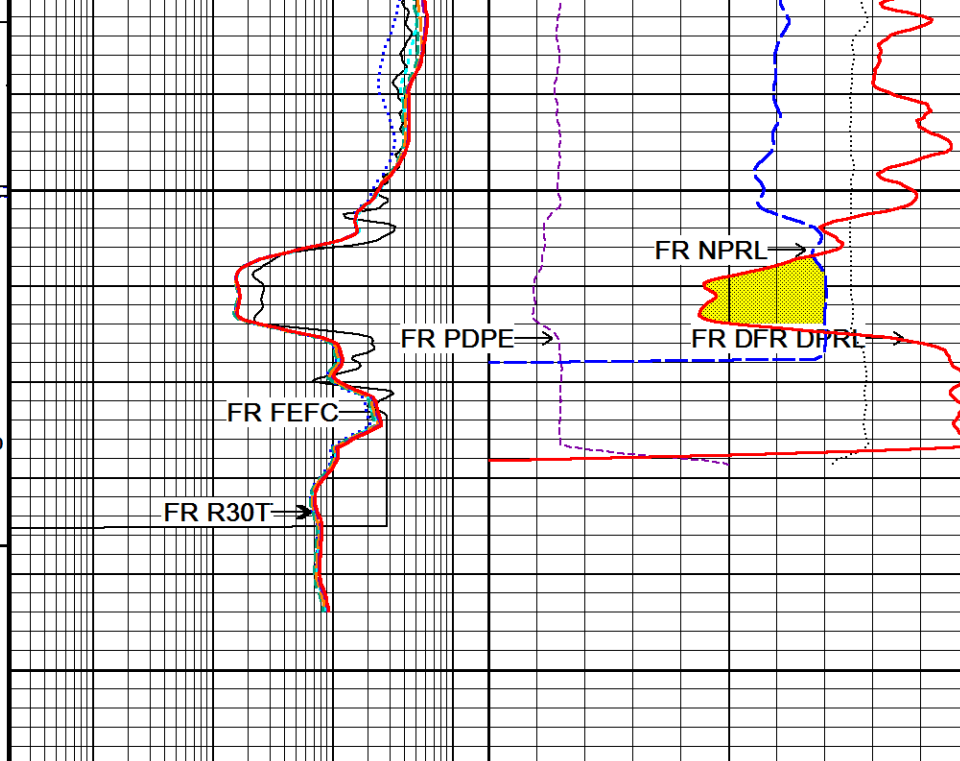
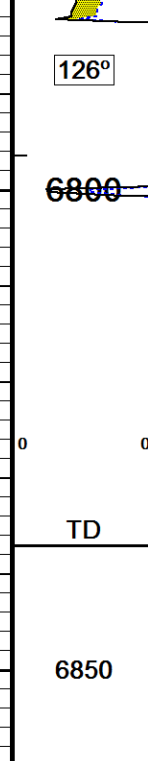
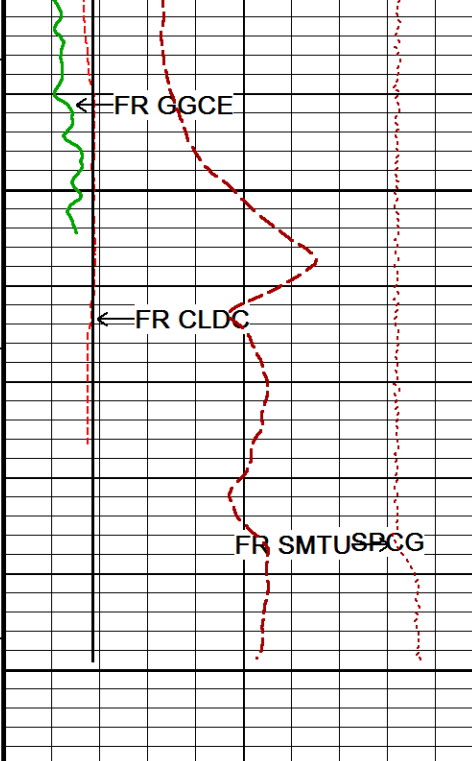












BEFORE SURVEY CALIBRATION

D:\WLS 19.03 Logs\WAULCO (MILLICAN 1-7)\DATA\_001.dta

General Constants All 000			Last Edited on 03-SEP-2019,03:56	
General Parameters				
Mud Resistivity	1.870	ohm-metres		
Mud Resistivity Temperature	93.000	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	Limestone Density Por.			
Resistivity used	Array Ind. Two Res Rt			
RWA Constant A	0.620			
RWA Constant M	2.150			
SW/APOR Tool Source	0.000			

High Resolution Temperature Calibration MCG-D.K 443		Field Calibration on 03-SEP-2019,00:18	
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	200.00	200.00	

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

Gamma Calibration MCG-D.K 443		Field Calibration on 03-SEP-2019 00:18	
	Measured	Calibrated (API)	
Background	31	21	
Calibrator (Gross)	1873	1282	
Calibrator (Net)	1842	1261	

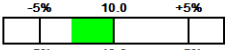
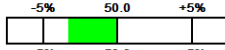
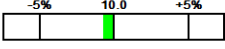
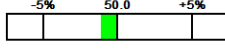
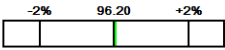
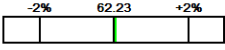
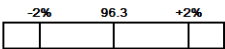
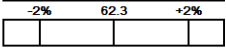
Gamma Calibration Tolerances MCG-D.K 443			
Ratio	1.461	<div> <div>1.40</div> <div>1.475</div> <div>1.55</div> </div>	Counts/API

Gamma Constants MCG-D.K 443			Last Edited on 03-SEP-2019,03:56		
Gamma Calibrator Number		GRC-C 046			
GRC-M Calibrator Jig in Use?		NO			
Inactive Background Jig in Use?		NO			
Mud Density		1.08		gm/cc	
Caliper Source for Processing		Density Caliper			
Tool Position		Eccentred			
Potassium Equivalence		Chloride			
K Mud Concentration		0.00		%	

Micro Normal and Micro Inverse Calibration MMR-A 32		Base Calibration on 19-AUG-2019 09:20	
	Resistor 1 (ohm)	Resistor 2 (ohm)	
	10.0	50.0	
Base Calibration			
	Measured	Calibrated (ohm-m)	
Micro Normal	9.7 48.3	5.1100 25.5500	
Micro Inverse	9.9 49.4	3.3800 16.9000	

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	96.3	96.3
Micro Inverse	62.3	62.3

### Micro Normal & Micro Inverse Calibration Tolerance MMR-A 32

Micro Normal Res. 1	9.7		ohm	Micro Normal Res. 2	48.3		ohm
Micro Inverse Res. 1	9.9		ohm	Micro Inverse Res. 2	49.4		ohm
Micro Normal Base Check	96.3		ohm-m				
Micro Inverse Base Check	62.3		ohm-m				
Micro Normal Field Check	96.3		ohm-m				
Micro Inverse Field Check	62.3		ohm-m				

### Micro Normal and Micro Inverse Constants MMR-A 32

Last Edited on 19-AUG-2019,09:01

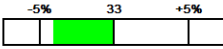
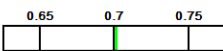
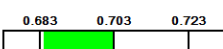
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159		
Micro Normal K Factor	0.5110		
Micro Inverse K Factor	0.3380		
Standoff Offset	0.0000	inches	

### Neutron Calibration MDN-B.A 295

Base Calibration on 27-AUG-2019 22:41  
Field Check on 03-SEP-2019 00:35

Base Calibration	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2820	89	3714	110
Ratio	31.636		33.764	
Field Calibrator at Base			Calibrated (cps)	
			1299	1849
Ratio			0.703	
Field Check			Calibrated (cps)	
			1290	1887
Ratio			0.683	

### Neutron Calibration Tolerances MDN-B.A 295

Ratio	31.636	
Base Check	0.703	
Field Check	0.683	

### Neutron Constants MDN-B.A 295

Last Edited on 03-SEP-2019,00:40

Neutron Source Id	N1207		
Neutron Jig Number	NEC13		
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	4.26	cu	
Dolomite Sigma	4.70	cu	
Formation Pressure Source	None		
Formation Pressure	N/A	kpsi	
Temperature Source	Constant Value		
Temperature	68.00	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		

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	967.9	126.8
Base Check		279.4
Field Check		279.9

## FE Calibration Tolerances MFE-B.J 352

Reference 2	967.9	<div><div></div><div></div><div></div><div></div></div> <div>-3% 967.9 +3%</div>	ohm
Base Check	279.4	<div><div></div><div></div><div></div><div></div></div> <div>-2% 277.0 +2%</div>	ohm-m
Field Check	279.9	<div><div></div><div></div><div></div><div></div></div> <div>-2% 279.4 +2%</div>	ohm-m

## FE Constants MFE-B.J 352

Last Edited on 03-SEP-2019,00:35

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.	MCG External Temperature

## Induction Calibration MAI-B.J 389

Factory Loop Calibration 27-AUG-2019 22:24

Field Check on 03-SEP-2019 00:19

## Factory Loop Calibration

High Conductivity Reference Resistor	3.3 ohm
Low Conductivity Reference Resistor	333.3 ohm

Array	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
	Low	High	Low	High	Gain	Offset
1 (near)	16.7	465.5	9.3	966.2	2.132	-26.3
2	6.4	384.0	7.6	821.4	2.155	-6.2
3	3.1	258.9	5.2	566.0	2.192	-1.5
4 (far)	1.8	133.7	2.6	279.2	2.097	-1.1
Array Temperature	78.1		Deg F			

## Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)		
	Low	High	Low	High	
1 (near)	10.8	3901.1	10.8	3901.6	
2	27.1	3510.3	27.1	3510.2	
3	27.4	3051.8	27.4	3051.7	
4 (far)	18.4	2065.0	18.4	2064.7	
Array Temperature	77.9		78.0		Deg F

## Induction Check Tolerances MAI-B.J 389

Low Array 1	10.8	<div><div></div><div></div><div></div><div></div></div> <div>9.3 10.8 12.3</div>	mmho/m	High Array 1	3901.6	<div><div></div><div></div><div></div><div></div></div> <div>-0.5% 3901.1 +0.5%</div>	mmho/m
Low Array 2	27.1	<div><div></div><div></div><div></div><div></div></div> <div>25.6 27.1 28.6</div>	mmho/m	High Array 2	3510.2	<div><div></div><div></div><div></div><div></div></div> <div>-0.5% 3510.3 +0.5%</div>	mmho/m
Low Array 3	27.4	<div><div></div><div></div><div></div><div></div></div> <div>25.9 27.4 28.9</div>	mmho/m	High Array 3	3051.7	<div><div></div><div></div><div></div><div></div></div> <div>-0.5% 3051.8 +0.5%</div>	mmho/m
Low Array 4	18.4	<div><div></div><div></div><div></div><div></div></div> <div>16.9 18.4 19.9</div>	mmho/m	High Array 4	2064.7	<div><div></div><div></div><div></div><div></div></div> <div>-0.5% 2065.0 +0.5%</div>	mmho/m

## Induction Constants MAI-B.J 389

Last Edited on 03-SEP-2019,00:40

Induction Model RtAP-WBM

Borehole Correction Constants



## Borehole Correction Constants

Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
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
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	
Borehole Correction Method	Default	

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	

## Caliper Calibration MPD-D.A 479

Base Calibration on 19-AUG-2019 02:44  
Field Calibration on 27-AUG-2019 23:01

## Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16485	4.01
2	24962	5.96
3	33787	7.98
4	42015	9.86
5	51143	11.88
6	N/A	N/A

## Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.98	7.98

## Caliper Calibration Tolerances MPD-D.A 479

Short Arm Field Cal.	7.98	<div style="display: inline-block; width: 100px; height: 15px; border: 1px solid black; position: relative;"> <div style="position: absolute; top: -5px; left: 20px;">7.78</div> <div style="position: absolute; top: -5px; left: 40px;">7.98</div> <div style="position: absolute; top: -5px; left: 60px;">8.18</div> </div>	in
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## Photo Density Calibration MPD-D.A 479

Base Calibration on 19-AUG-2019 01:01  
Field Check on 03-SEP-2019 00:19

## Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1088	1316		
Reference 1	52285	26210	50404	20754

Reference 1	53385	26210	59494	30754
Reference 2	21888	2527	24557	2522

Field Check at Base

1088.1      1315.8

Field Check

1090.9      1316.1

PE Calibration

Base Calibration

Measured

Calibrated

WS

WH

Ratio

Ratio

Background

212

974

Reference 1

24225

53203

0.460

0.367

Reference 2

7004

21765

0.327

0.271

Field Check at Base

211.6

974.0

Field Check

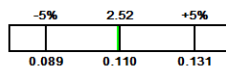
210.8

977.7

### Photo Density Calibration Tolerances MPD-D.A 479

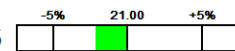
Near Density Ratio

2.51



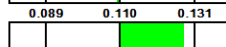
Far Density Ratio

20.55



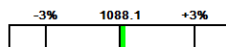
PE Calibration

0.128



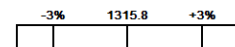
Near Den. Field Check

1090.9



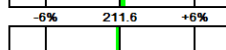
Far Den. Field Check

1316.1



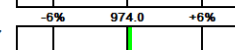
PE WS Field Check

210.8



PE WH Field Check

977.7



### Density Constants MPD-D.A 479

Last Edited on 03-SEP-2019,03:56

Density Source Id

H79956B

Nylon Calibrator Number

766

Aluminium Calibrator Number

633

Density Shoe Profile

8 inch

Caliper Source for Processing

Density Caliper

PE Correction to Density

Not Applied

Mud Density

1.08

gm/cc

Mud Density Type

Mud Filtrate Density

1.00

gm/cc

Dry Hole Mud Filtrate Density

1.00

gm/cc

DNCT

0.00

gm/cc

CRCT

0.00

gm/cc

Density Z/A Correction

Hybrid

Precision Enhanced Density Processing

Not Applied

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

D:\WLS 19.03 Logs\WAULCO (MILLICAN 1-7)\DATA\_001.dta

Cablehead, 11 pin

CBH-CA 175 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor

SHA-J.B 726 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in



45.66 ft GRGC - MCG Gamma Ray

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

Compact Micro-Resistivity  
MMR-A 32 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

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

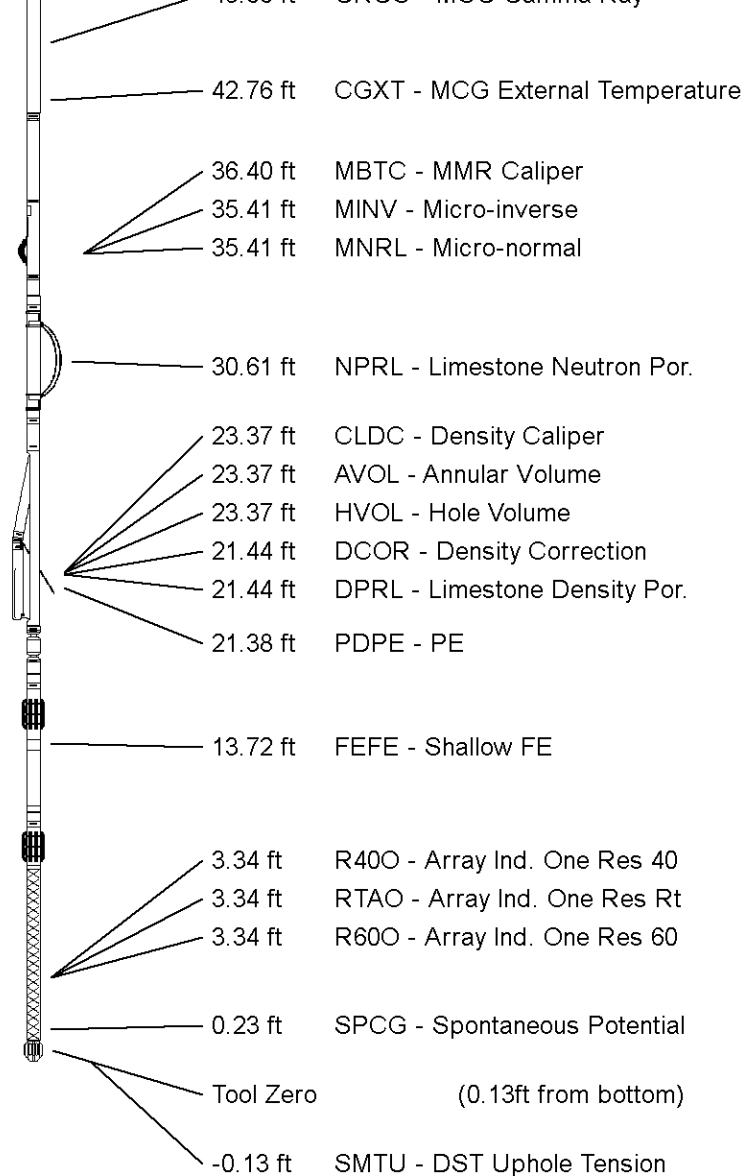
Compact Density/Caliper  
MPD-D.A 479 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Knuckle Joint  
SKJ-E.B 734 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

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

Compact Induction  
MAI-B.J 389 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 55.64 ft Weight: 454.2 lb



All measurements relative to tool zero.

COMPANY	WAULCO RESOURCES LLC
WELL	MILLICAN #1-7
FIELD	WILDCAT
PROVINCE/COUNTY	BACA
COUNTRY/STATE	USA / COLORADO

Elevation Kelly Bushing	4644	feet	First Reading	6834.00	feet
Elevation Drill Floor	4642	feet	Depth Driller	6857.00	feet
Elevation Ground Level	4626	feet	Depth Logger	6837.00	feet



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COMPOSITE LOG

