



LOCATION	990' F-SL & 1650' F-EL
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MML

Permanent Datum GL, Elevation 5541 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

Date	16-DEC-2017
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Run Number	ONE
0 : 01	47007 00000 15110

Death Driller	8820 00	foot
Service Order	11331-200024343	

Depth ocean	8819.00	feet
Depth inner	8826.00	feet

First Reading	8816.00	feet
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Last Reading	478.00	feet
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Casing Driller	420.00	feet
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Casing Logger	478.00	feet
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Bit Size	1.815	inch
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Density / Viscosity	0.25	14.113	16.00
Mobile liquid type	WDBM		

Energy recovery	0.00	100.00
PH / Eluid loss	9.00	5.20

Sample Source	FLOWLINE
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Rm @ Measured Temp	0.93 @ 99.0	ohm
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Rmf @ Measured Temp	0.74 @ 99.0	ohm
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Rmc @ Measured Temp	1.12 @ 99.0	ohm
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Source Rmt / Rmc	CALC	CALC
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Time since Circulation	8 HOURS	0111
Kill @ BH1	0.31 @ 180.0	0111

Max Recorded Temp	186.00	deg
Min Recorded Temperature	21.00	deg

Equipment / Base	13057	OKC
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Recorded By	M. MCGLOTHLIN
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Witnessed By	WES HANSEN
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	feet
Elevations:	
KB	5554.00
DF	5552.00
GL	5541.00

Last Edited: 16-DEC-2017 16:40

Depth To
feet

8820.00

Weight
pounds/ft

24.00

CHLORIDES: 720 mg/L
LCM: 9 lb/bbl

LOG RESPONSES EFFECTED BY HOLE RUGOSITY AND WASHOUTS

RESISTIVITY ANOMALY OBSERVED FROM 630 FEET TO CASING SHOE AT 478 FEET.

ANOMALY REPEATED DURING CASING CHECK AND SUBSEQUENT PASSES.

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.

2 INCH MAIN PASS 1:600						
Depth Based Data - Maximum Sampling Increment 10.0cm			Plotted on 16-DEC-2017 19:31			
Filename: C:\Minimus 17.05.5956\Data\MURFIN DRILLING (DAUNTLESS #15-1)\MAIN PASS.dta			Recorded on 16-DEC-2017 13:24			
System Versions: Logged with 17.05.5956 Plotted with 17.05.5956						
<div>Timing Marks every 60.0 sec</div>	Depth In Feet	Array Ind. Four Cond 60				
		mmhos/metre				
		1000	750	500	250	0
		2000	1750	1500	1250	1000
<div>Spontaneous Potential millivolts - —> 20 <— +</div>						
<div>MCG BH Corrected Gamma</div>		<div>Shallow FE</div>				
API		ohm metres				
0	75	0	25	50		
150	225	0	250	500		
Borehole Temp in deg F						

Array Ind. Two Res Rt

ohm metres

0 25 50

0 250 500

DST Uphole Tension

pounds

5000 0

Replay
Scale
1:600

Casing
470
Snore

500

98°

600

100°

700

RTAT →

FEFE →

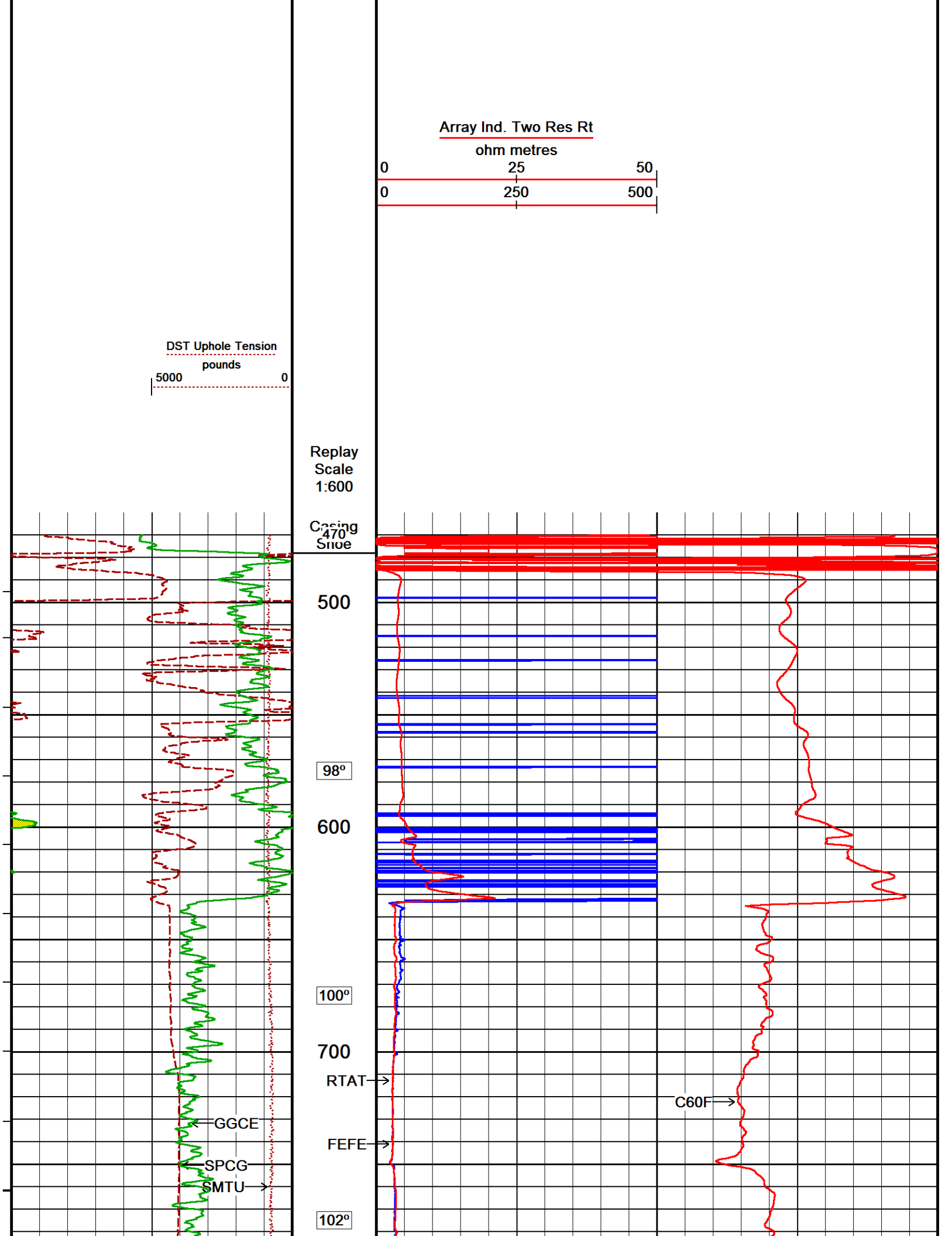
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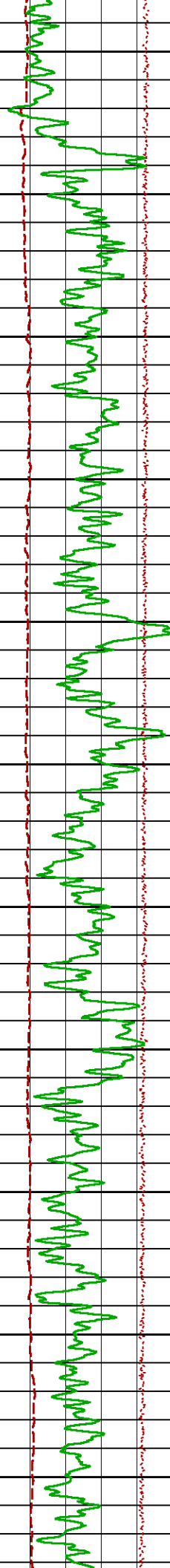
C60F →

GGCE

SPCG

SMTU





800

105°

900

106°

1000

107°

1100

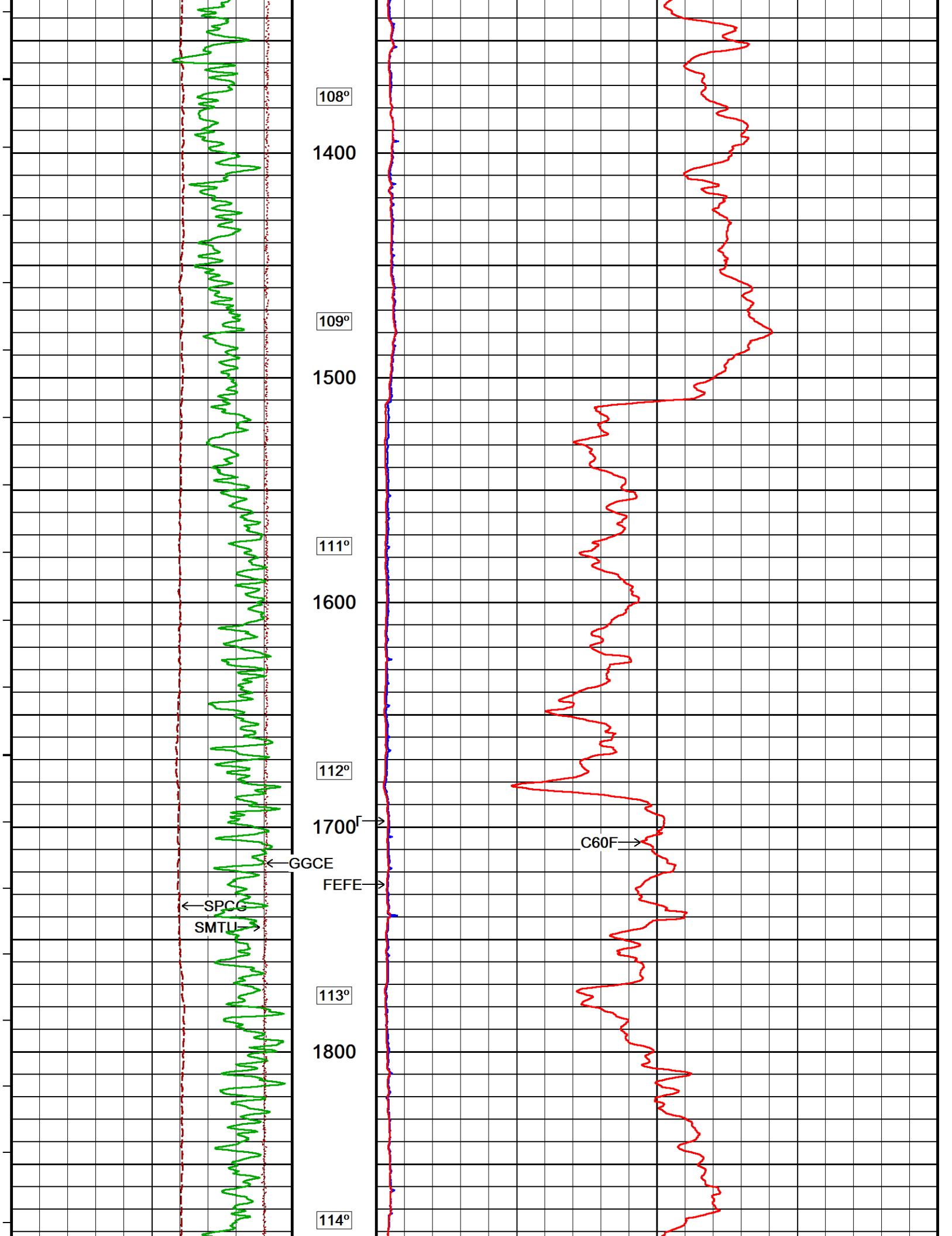
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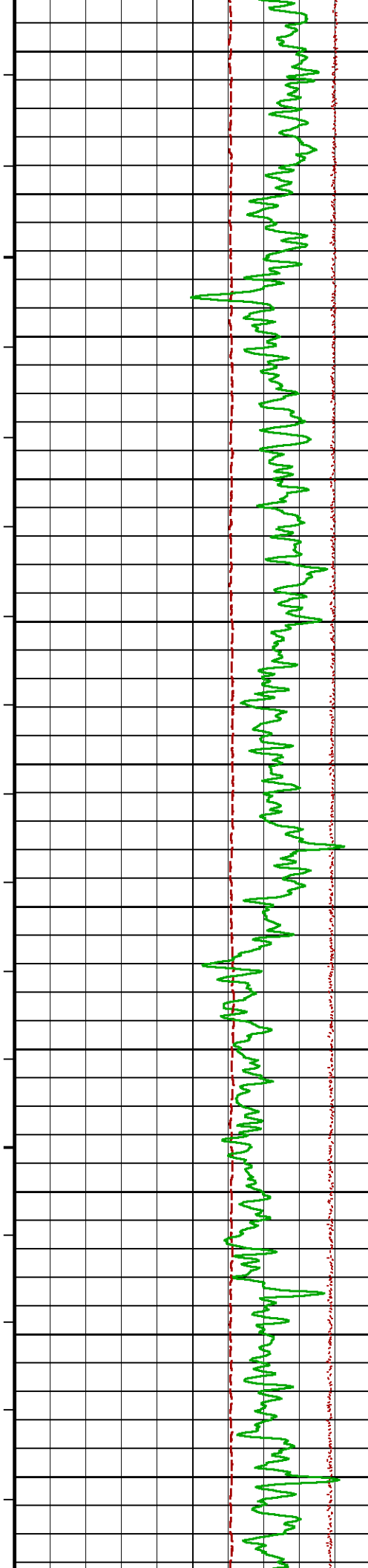
1200

108°

1300







1900

115°

2000

117°

2100

118°

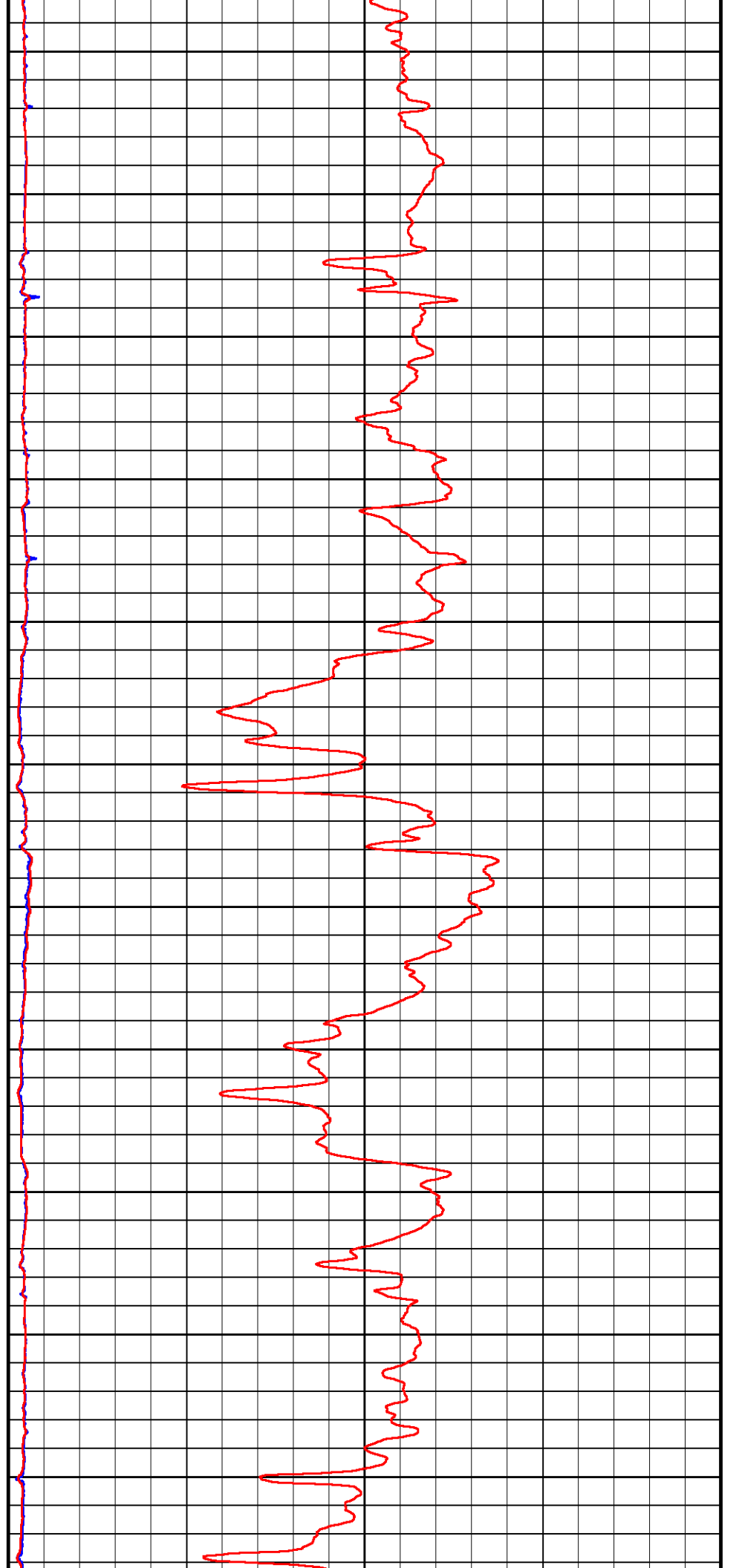
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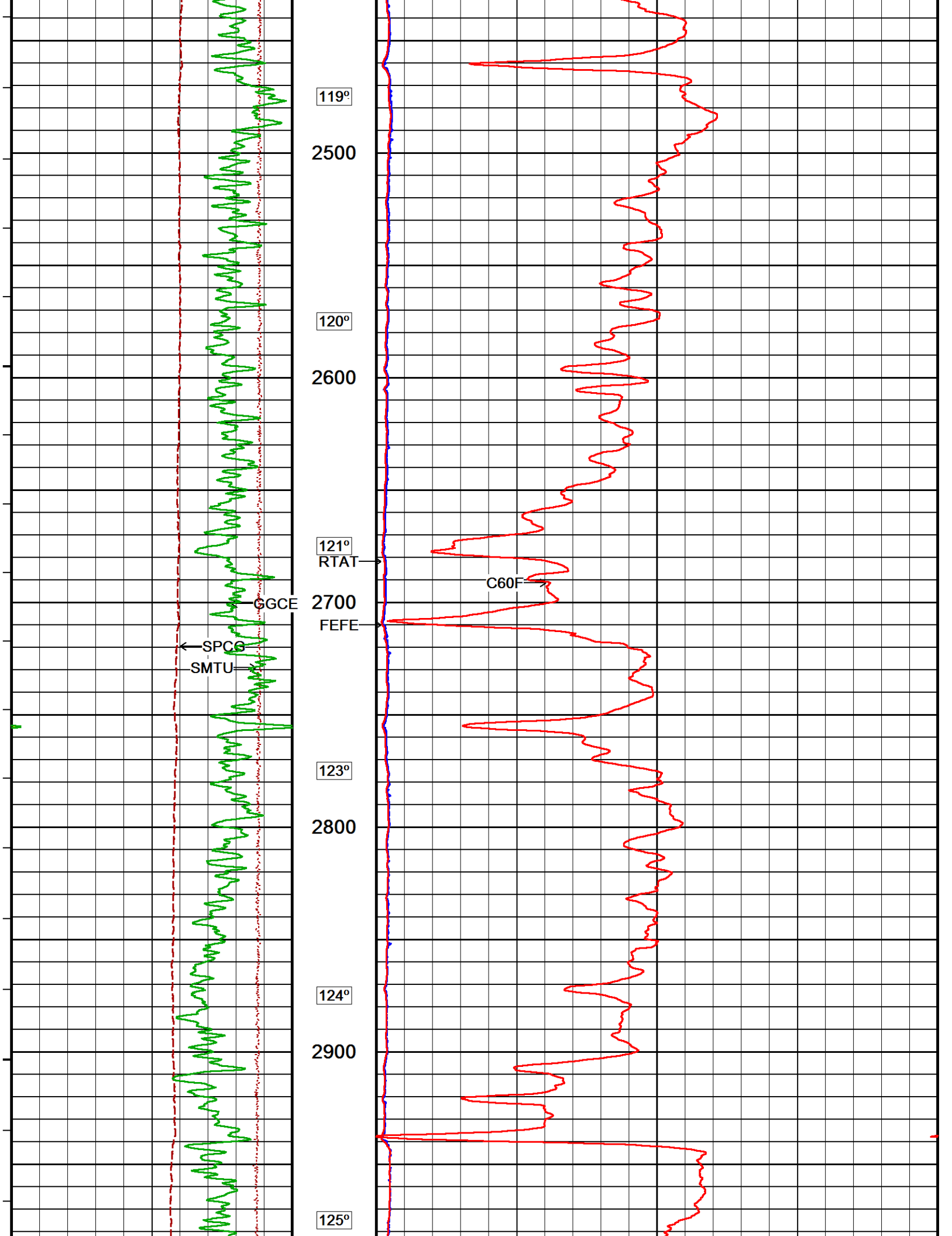
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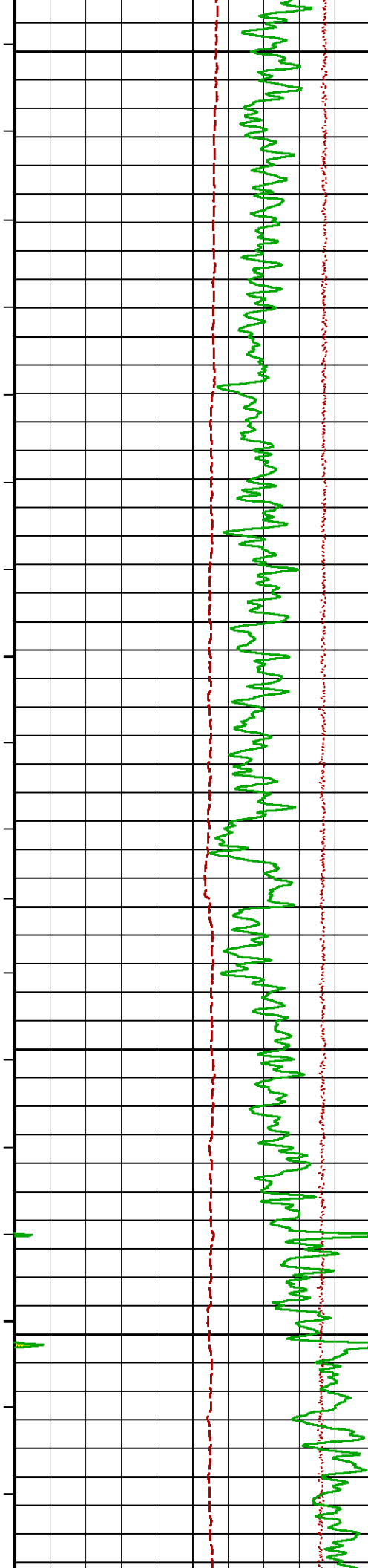
2300

118°

2400







3000

126°

3100

127°

3200

128°

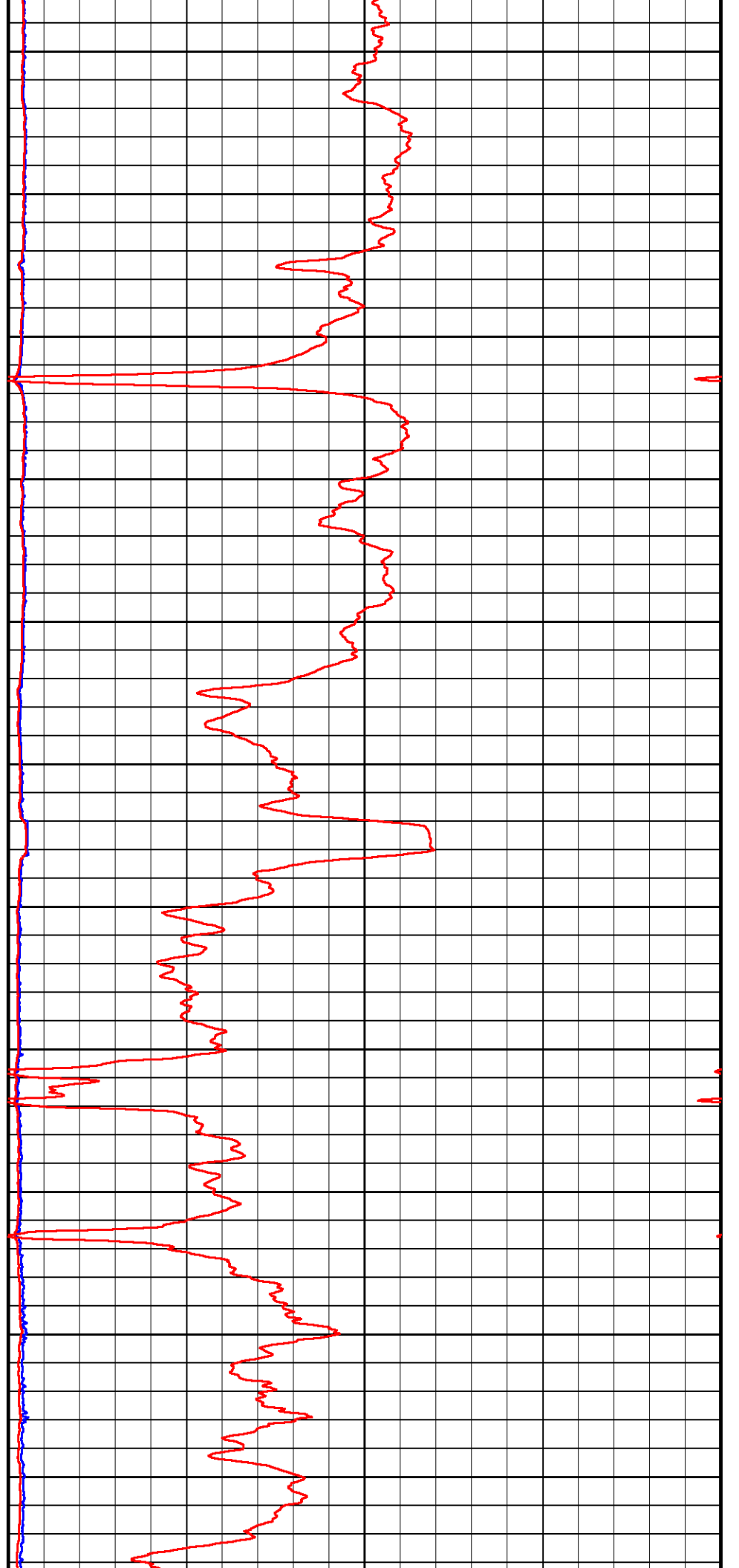
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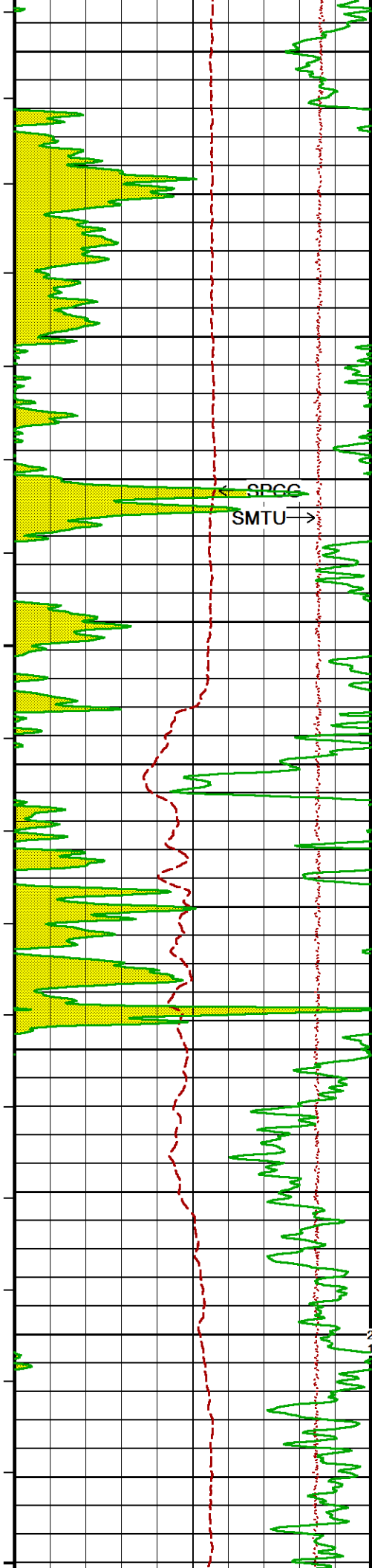
129°

3400

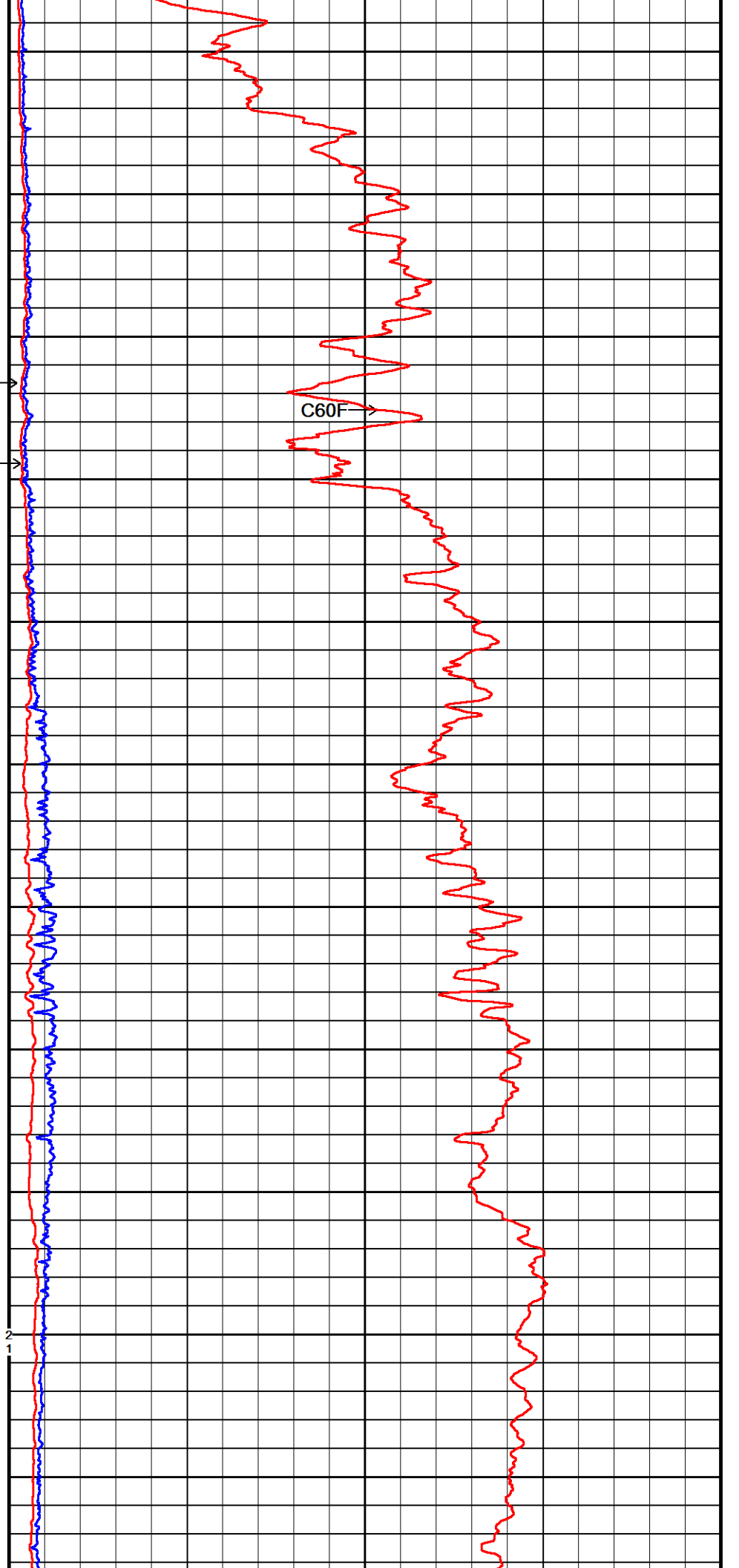
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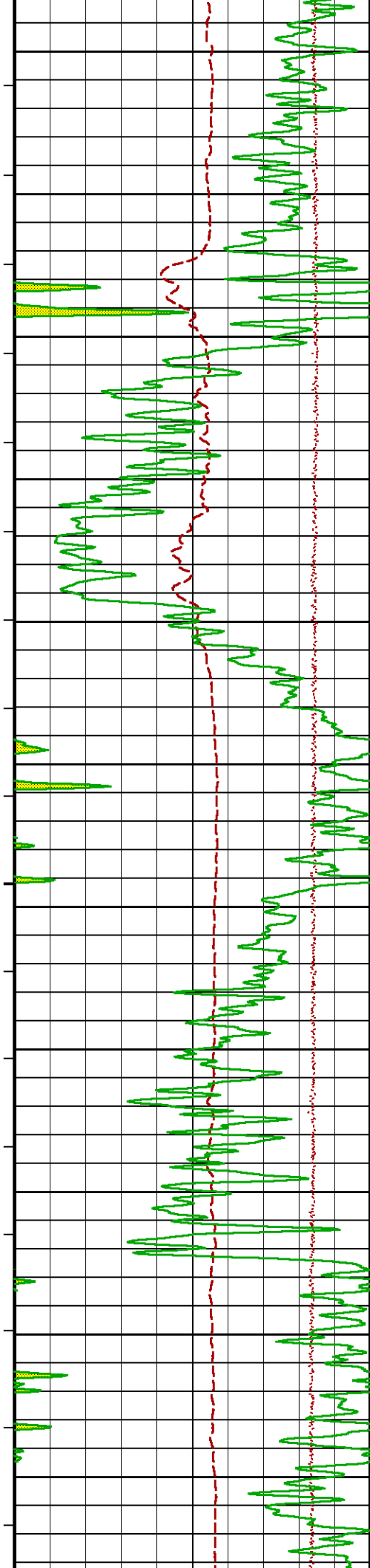
3500



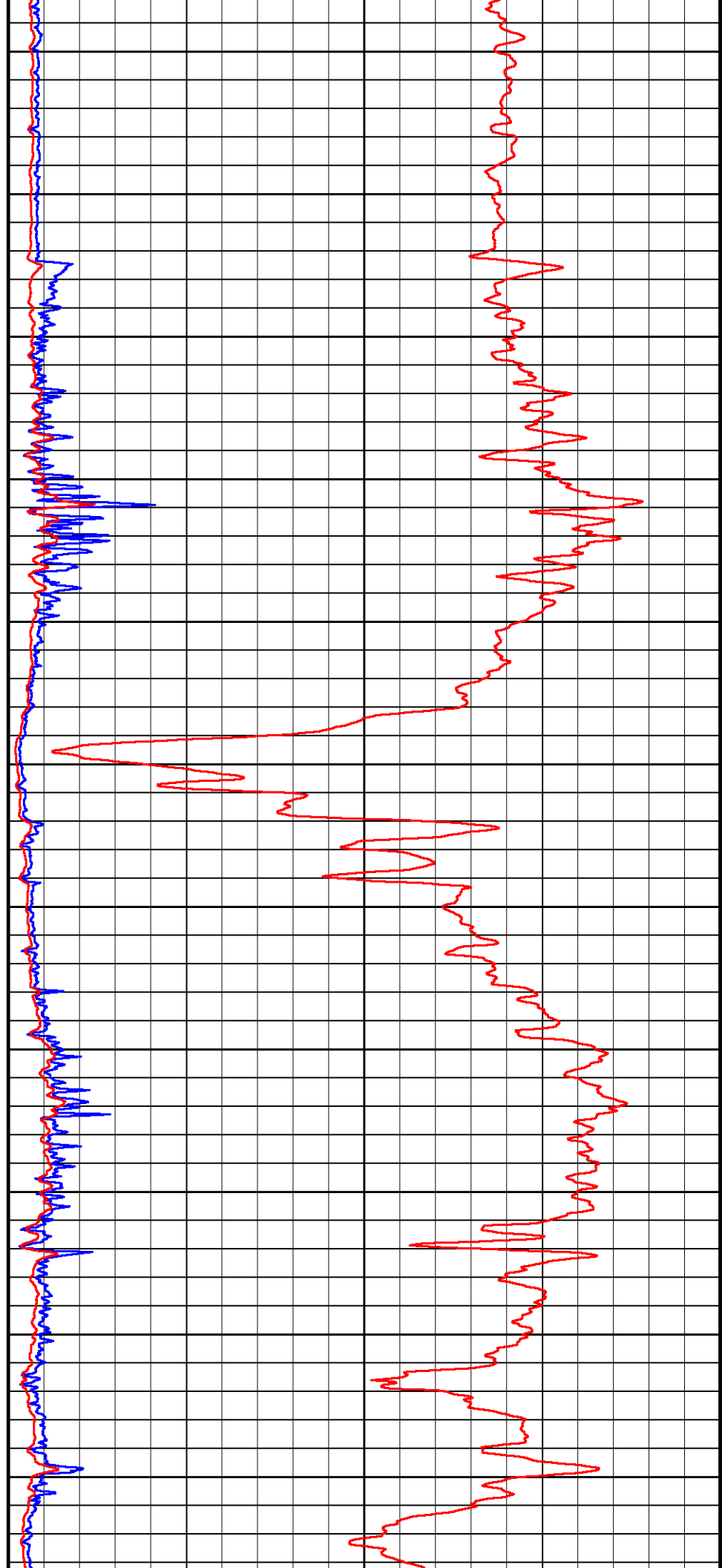


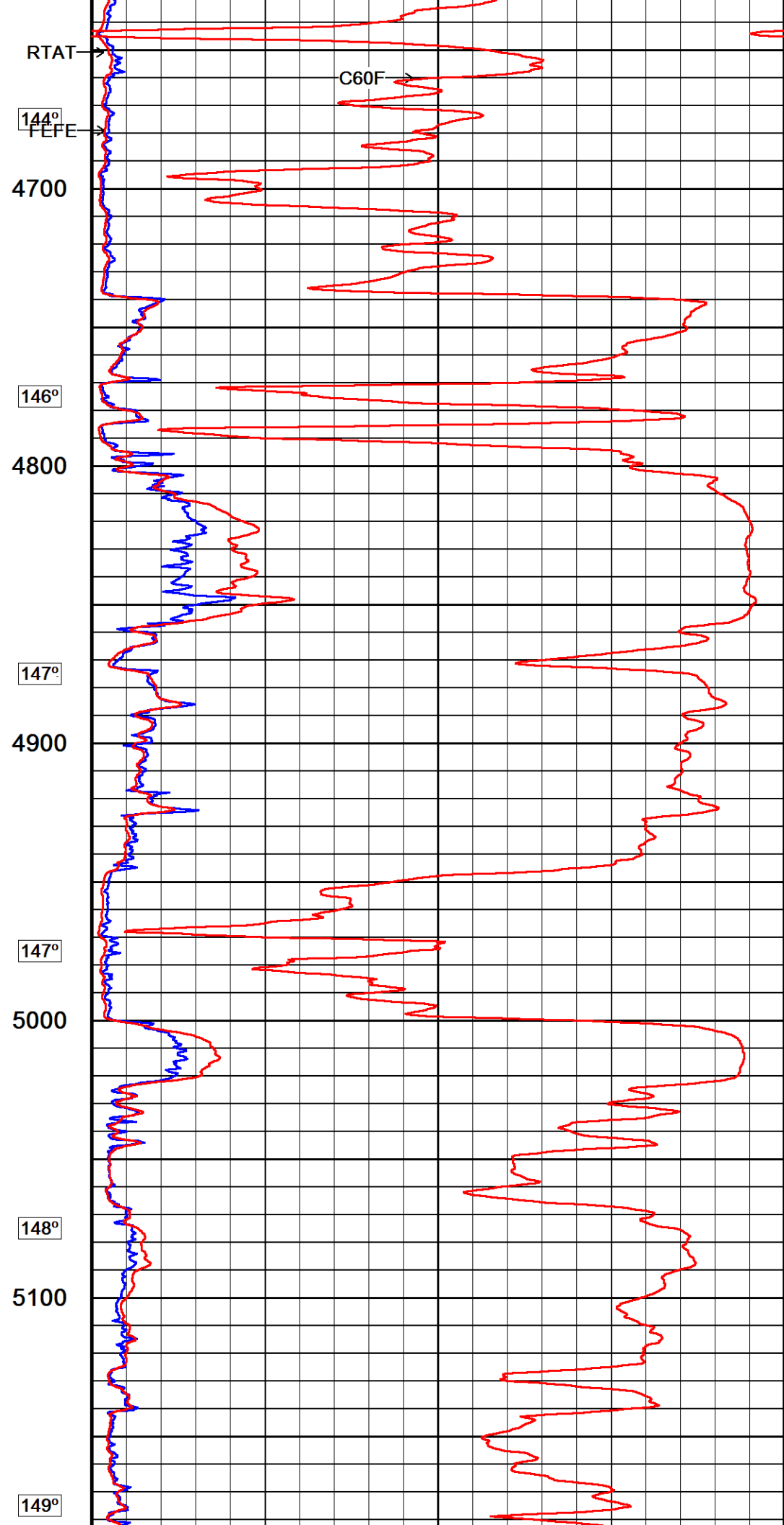
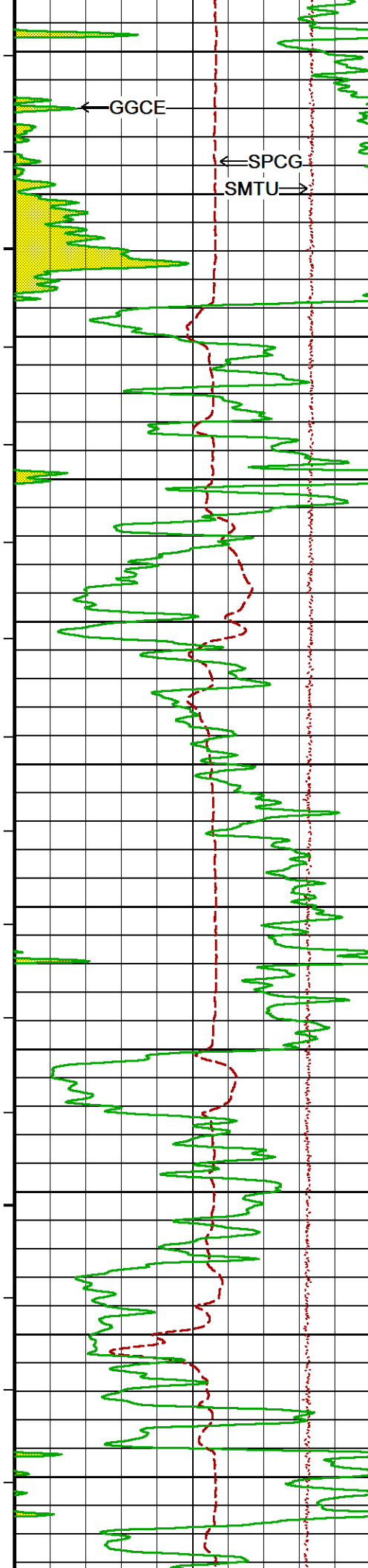
131°
3600
RTAT
133°
GGCE
3700
134°
3800
135°
3900
136°
4000
138°

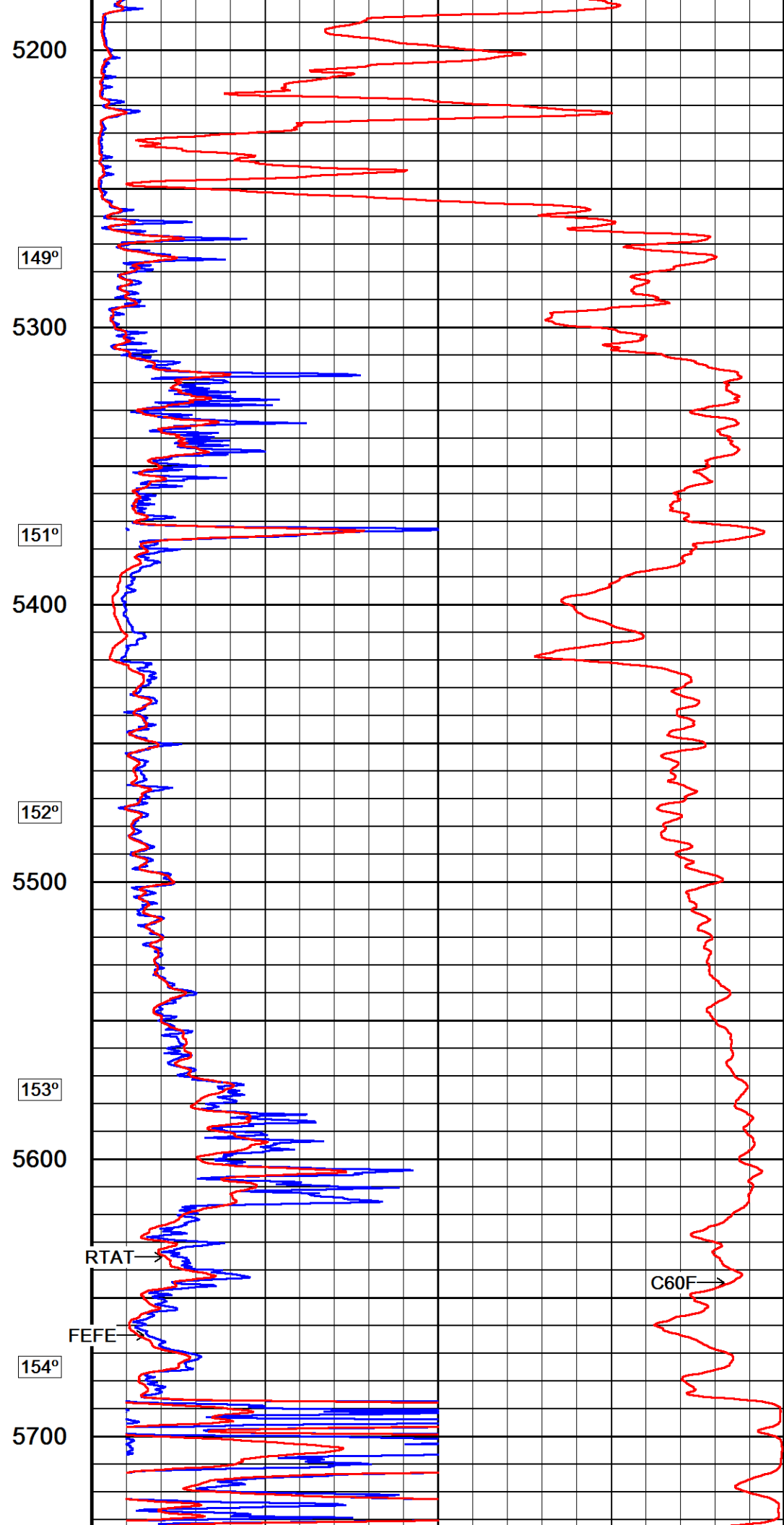
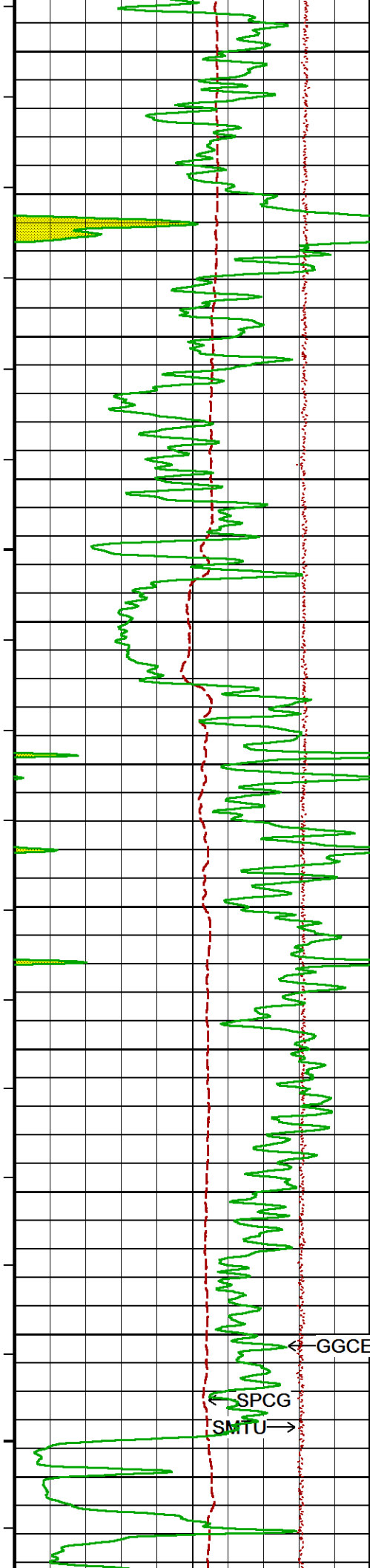


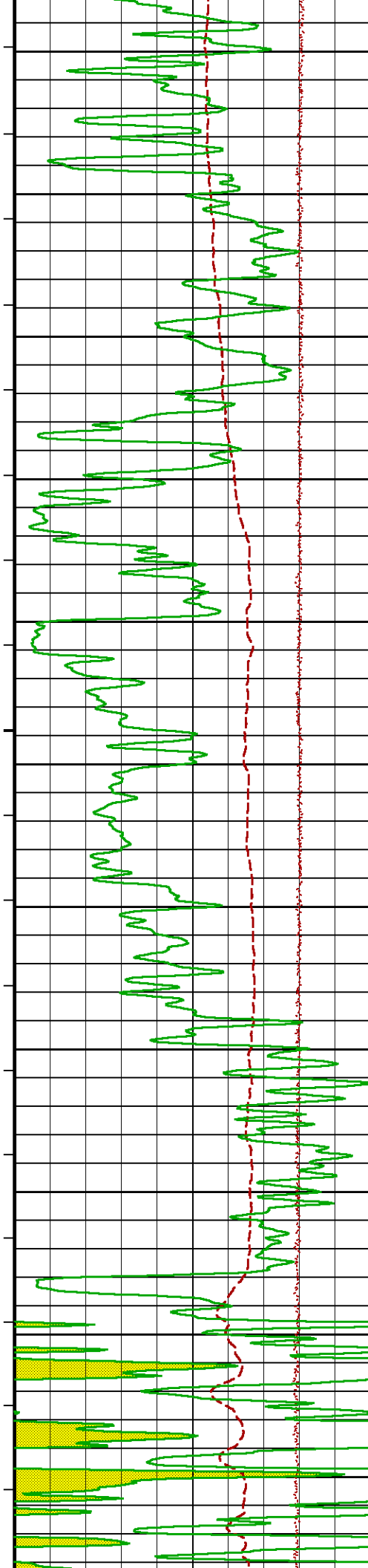


4100
139°
4200
139°
4300
141°
4400
142°
4500
143°
4600









154°

5800

155°

5900

156°

6000

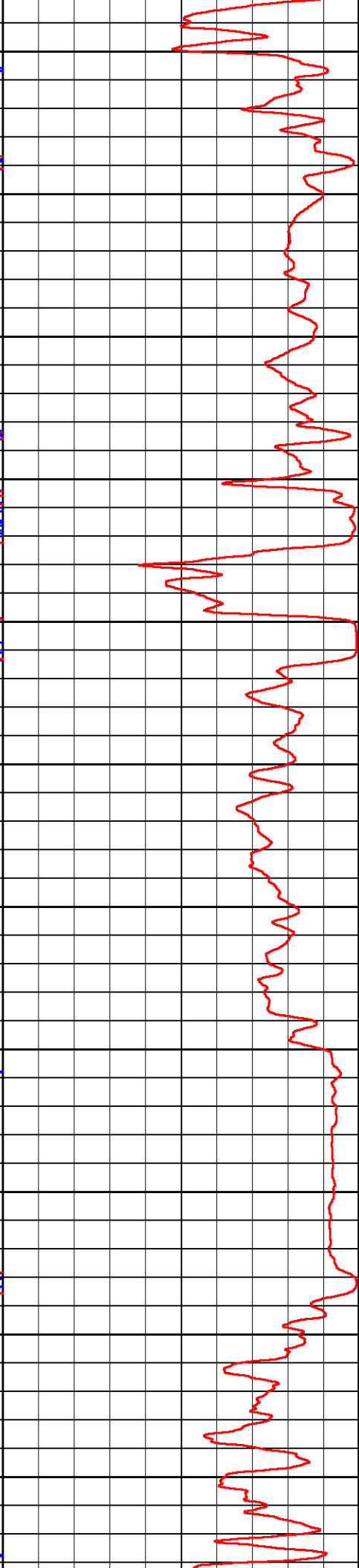
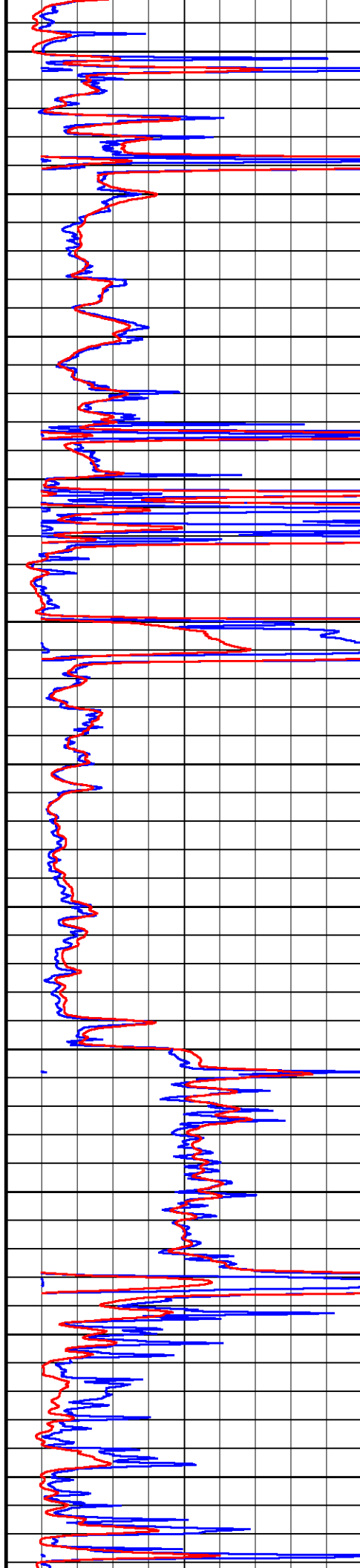
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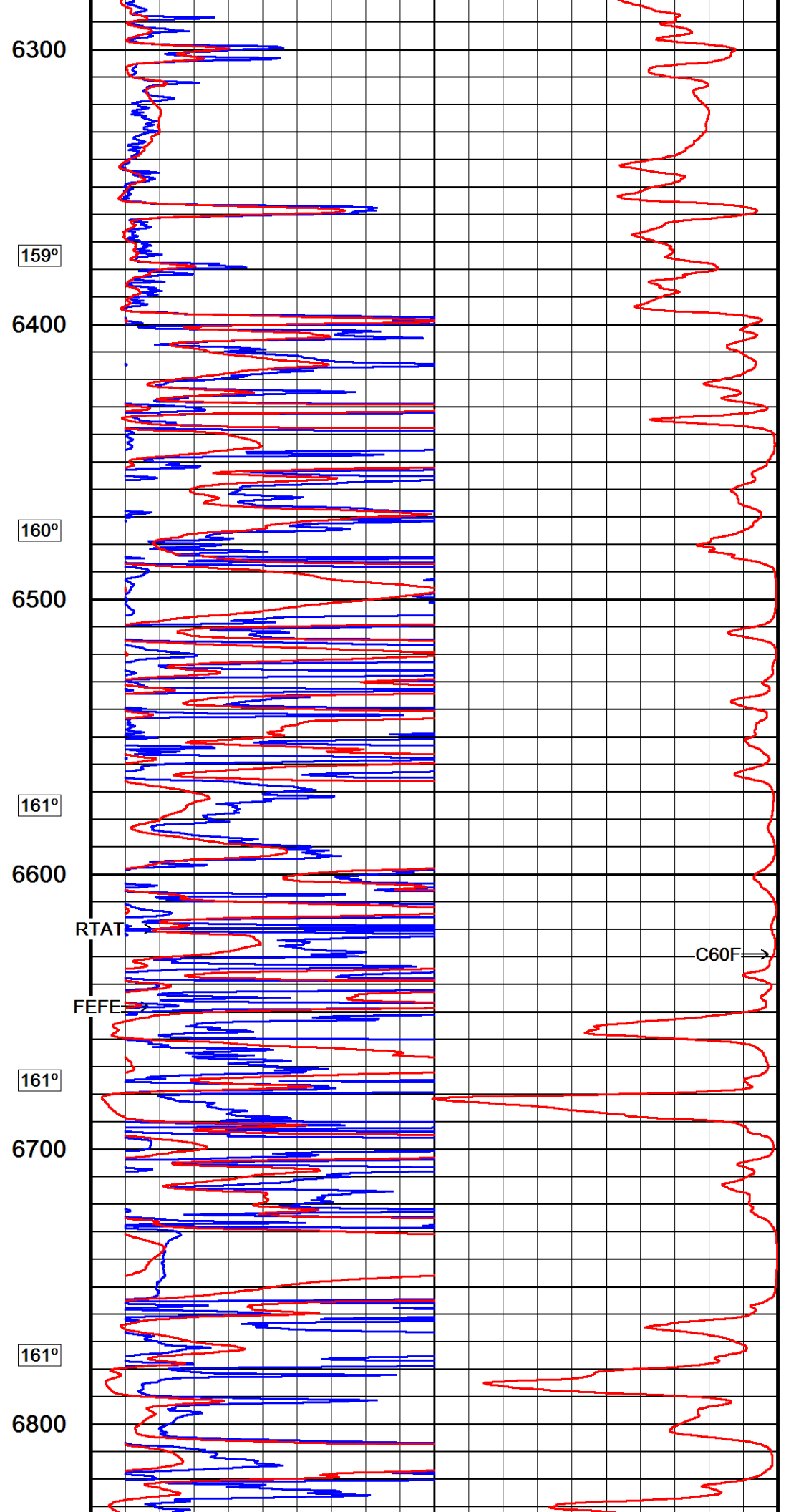
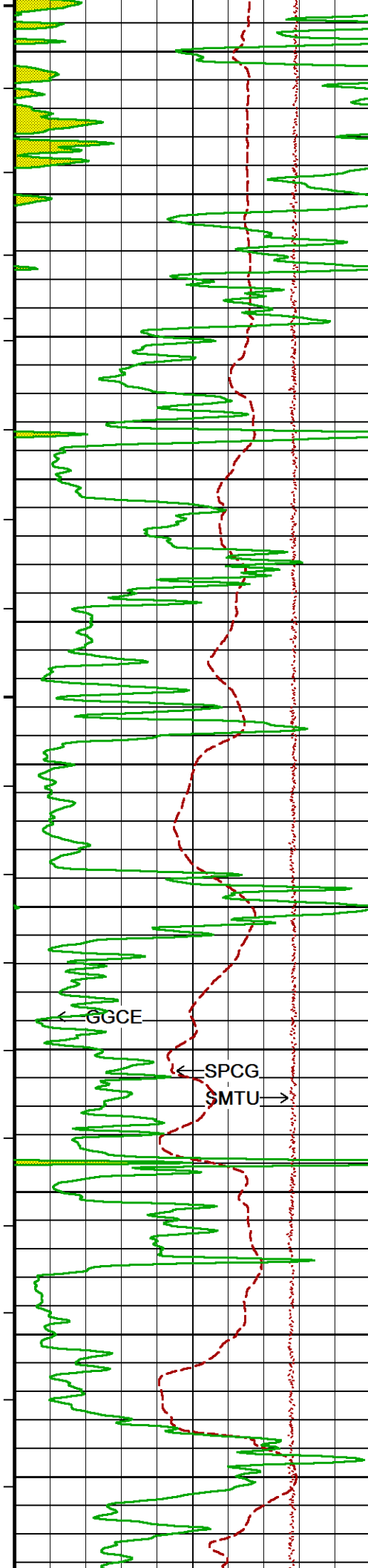
6100

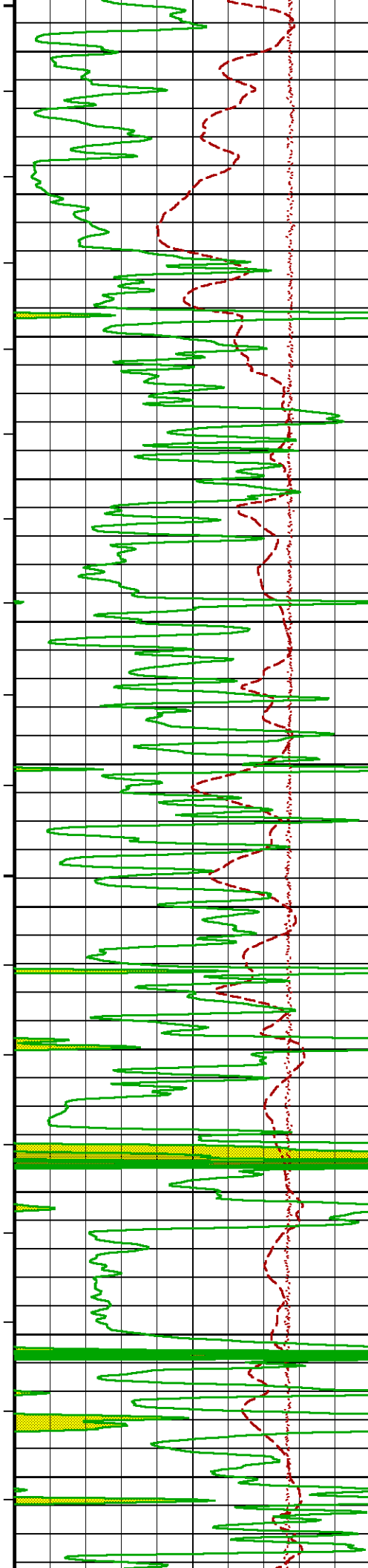
158°

6200

158°







162°

6900

163°

7000

163°

7100

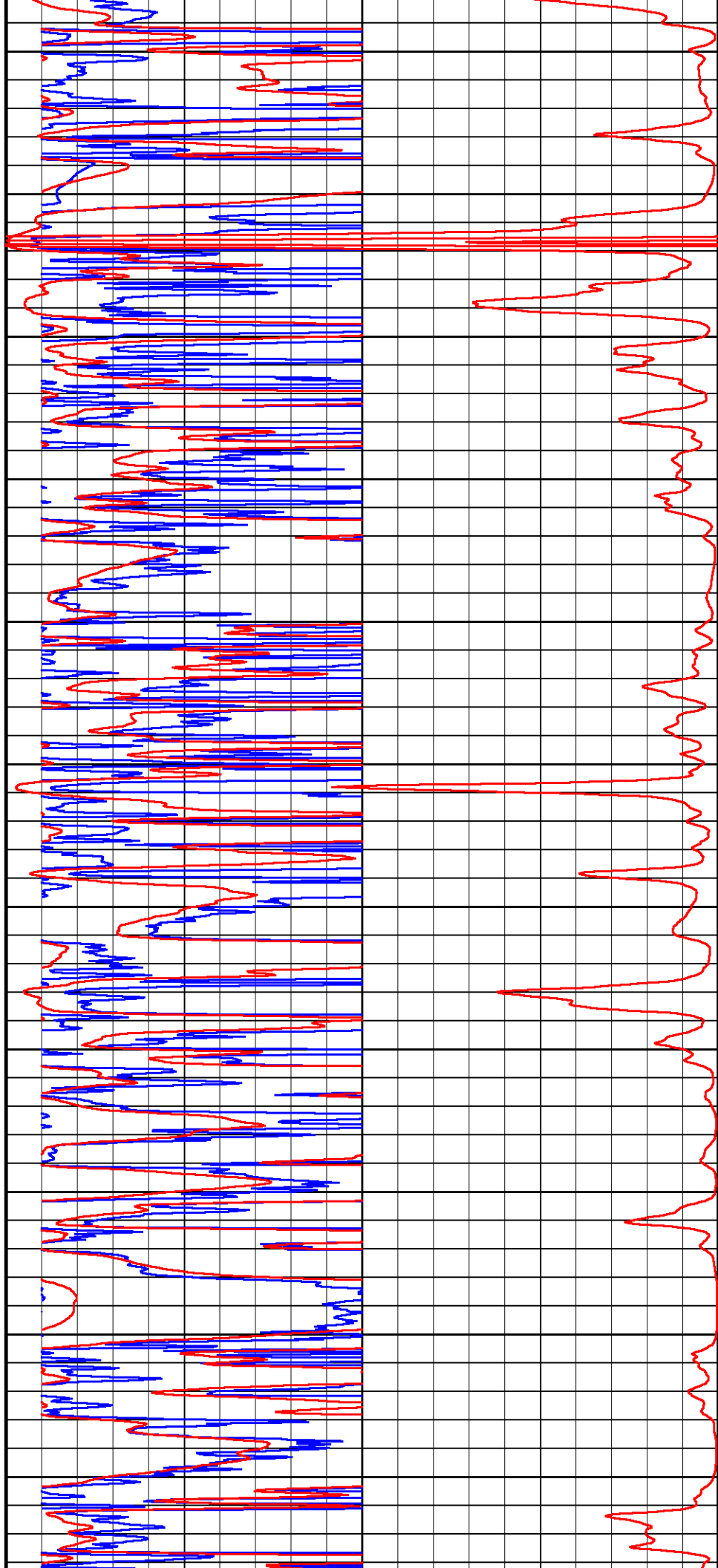
164°

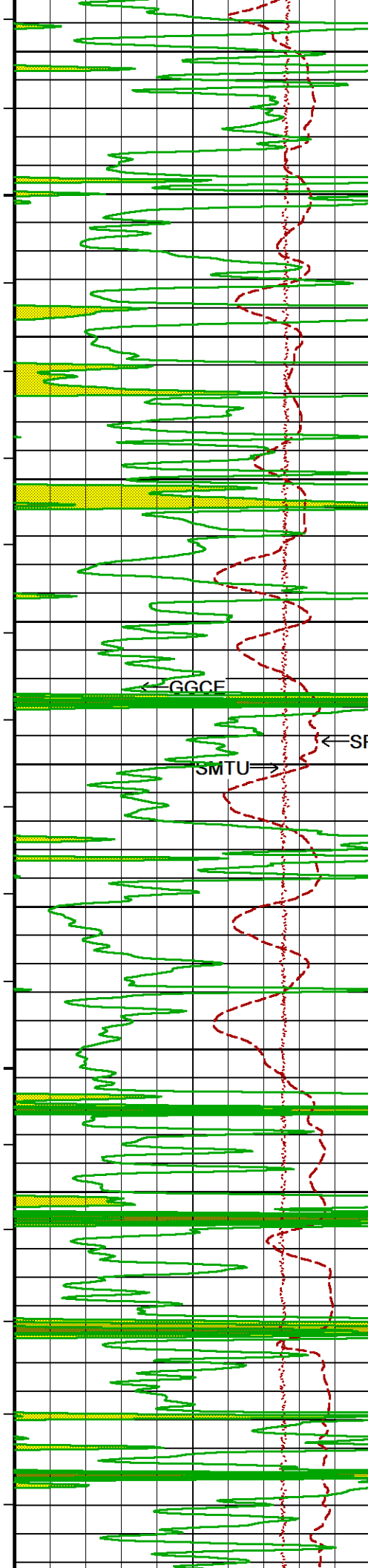
7200

164°

7300

165°





7400

166°

7500

167°

7600

NTAT

FEFE

167°

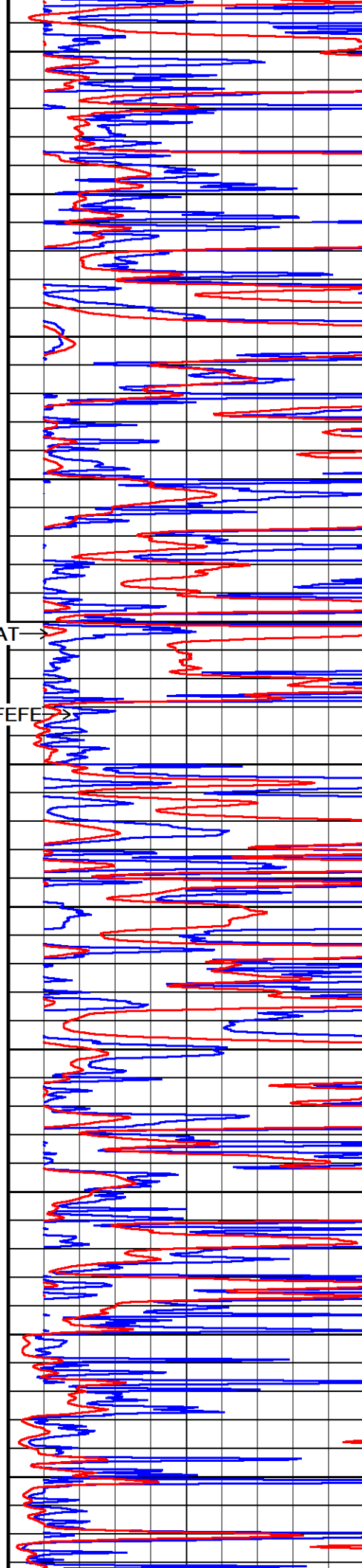
7700

169°

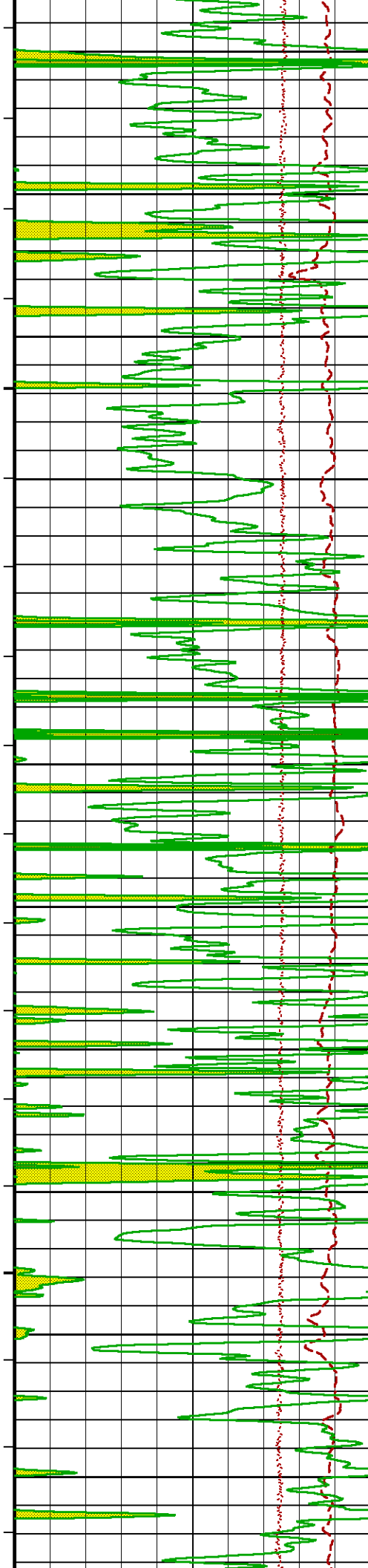
7800

170°

7900



C60F



171°

8000

171°

8100

173°

8200

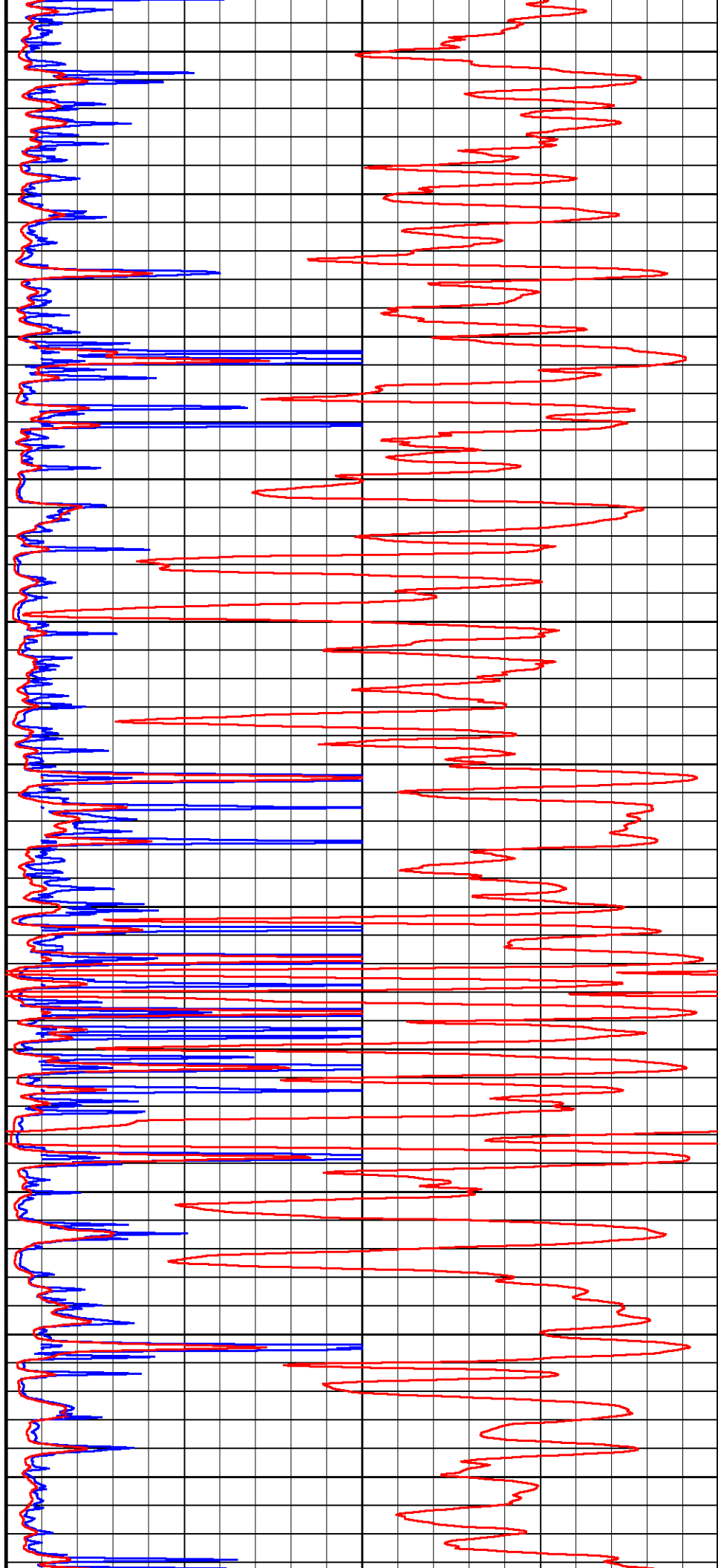
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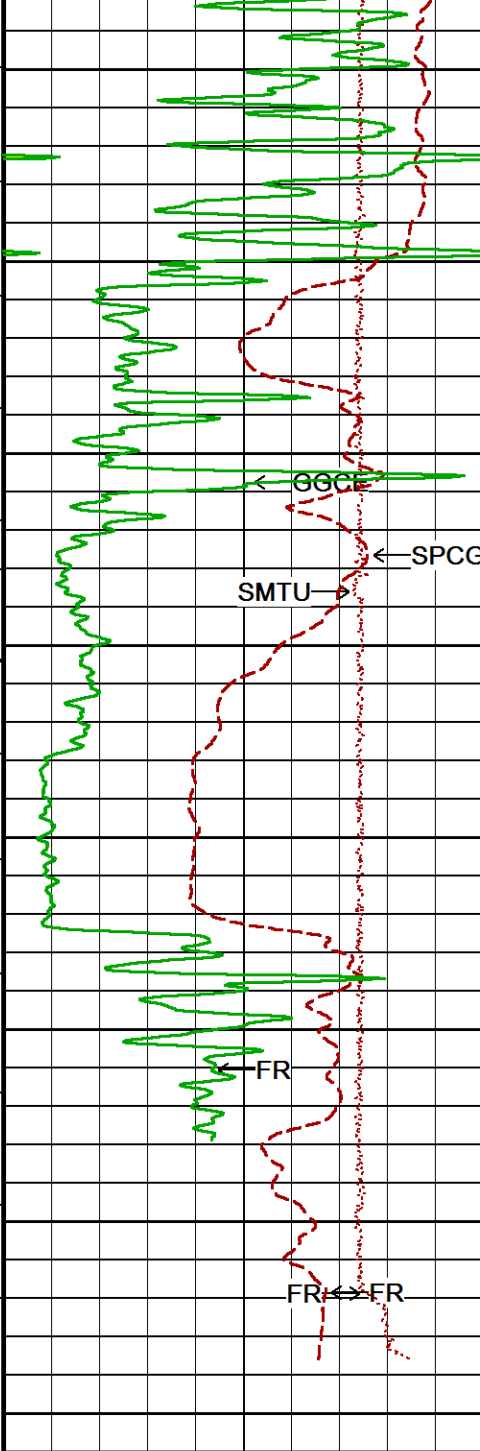
8300

178°

8400

180°





8500

183°

8600

185°

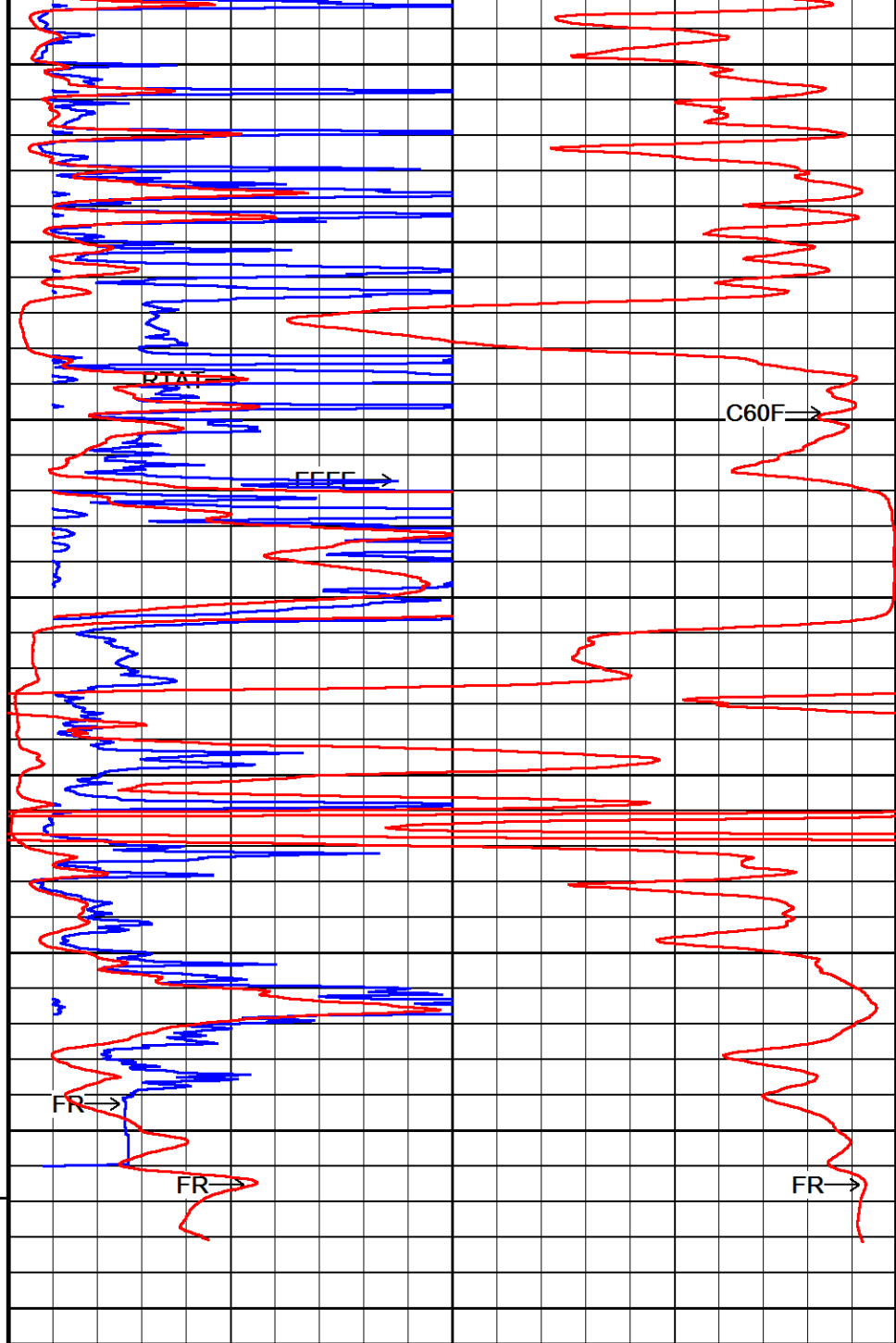
8700

185°

8800

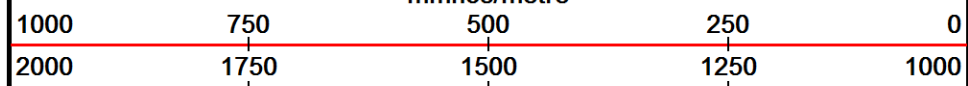
TD

Depth
In
Feet



Array Ind. Four Cond 60

mmhos/metre

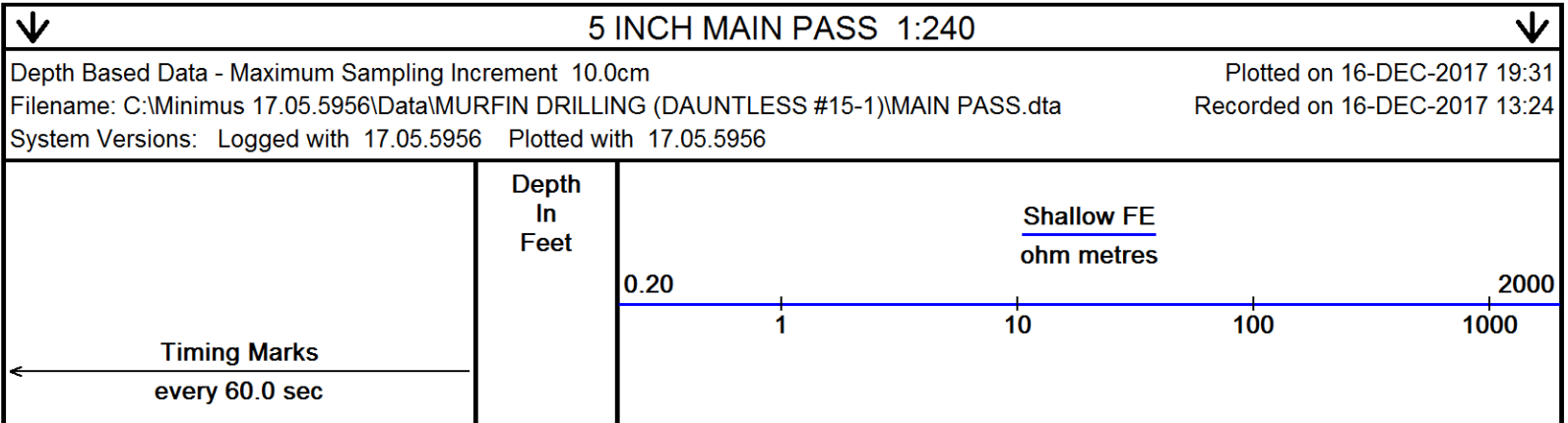
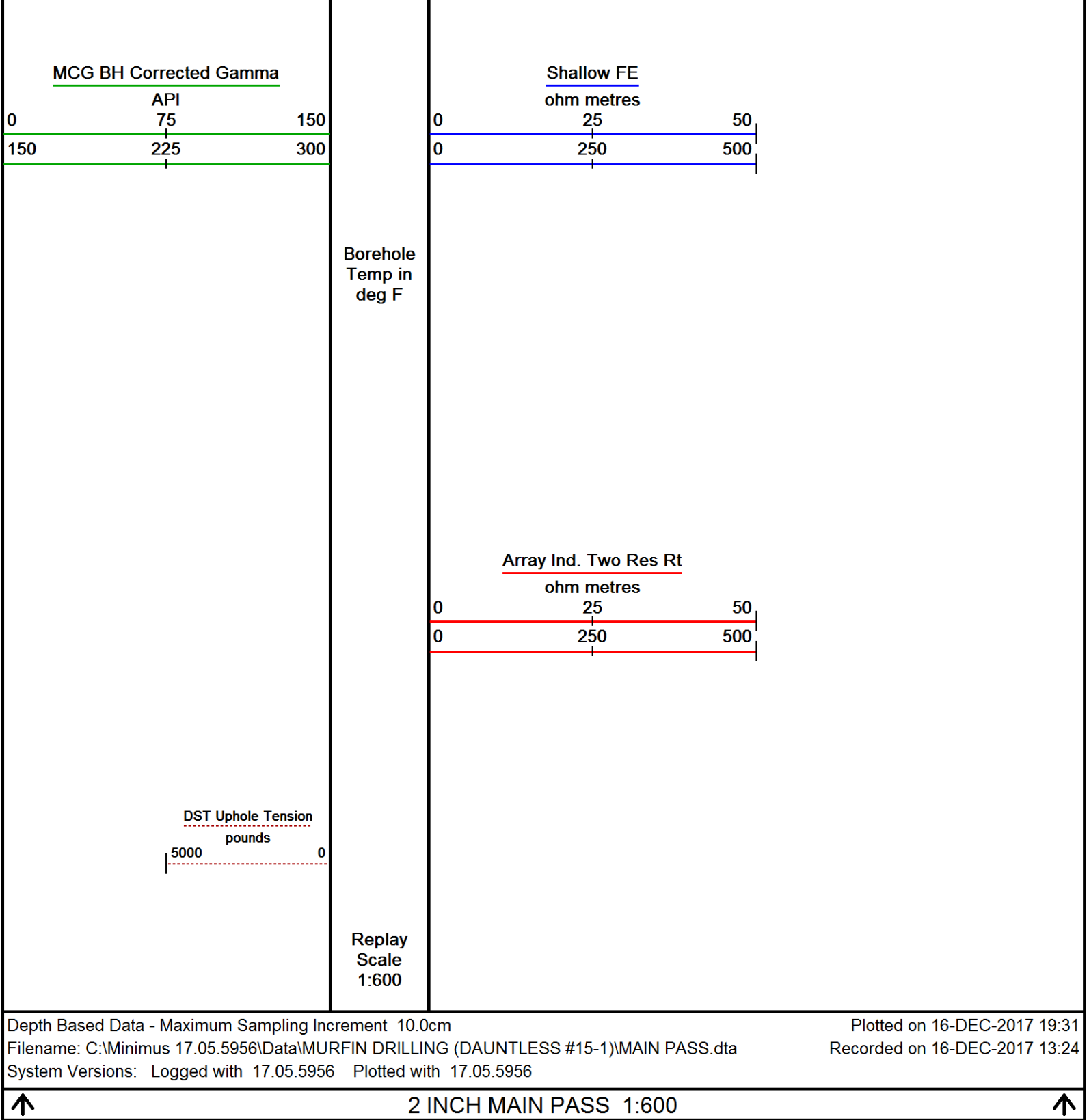


Timing Marks
every 60.0 sec

Spontaneous Potential

millivolts

- -> | 20 | <- +



Spontaneous Potential

millivolts

— —> | 20 | <— +

MCG BH Corrected Gamma

API

0 75 150

150 225 300

DST Uphole Tension

pounds

5000 0

Borehole
Temp in
deg F

Replay
Scale
1:240

468

Casing
Shoe

Array Ind. Two Res 40

ohm metres

0.20 1 10 100 1000 2000

Array Ind. Two Res 60

ohm metres

0.20 1 10 100 1000 2000

Array Ind. Two Res 85

ohm metres

0.20 1 10 100 1000 2000

Array Ind. Two Res Rt

ohm metres

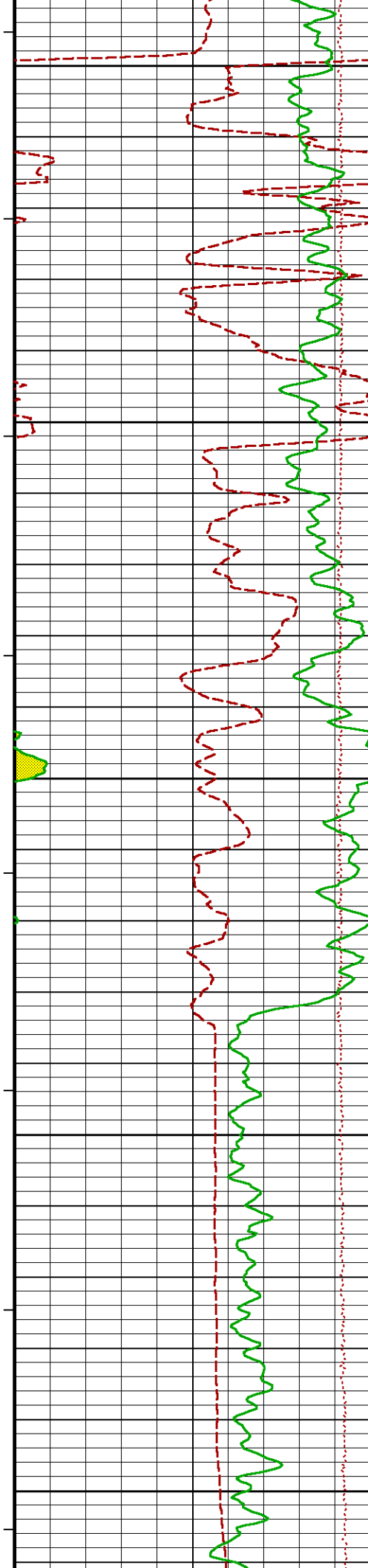
0.20 1 10 100 1000 2000

R40T —>

← GGCE

← SPCG

SMTU —>



500

98°

550

98°

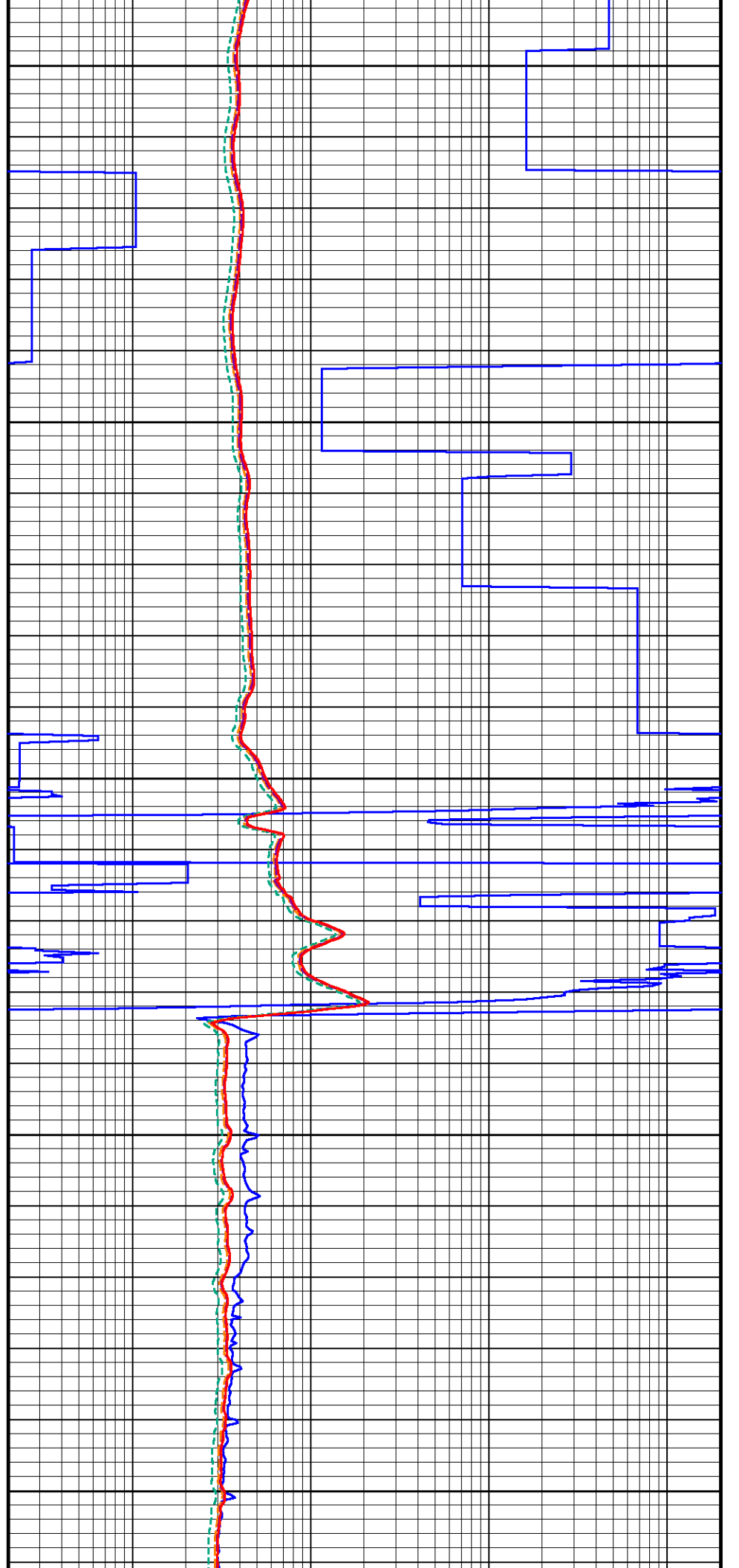
600

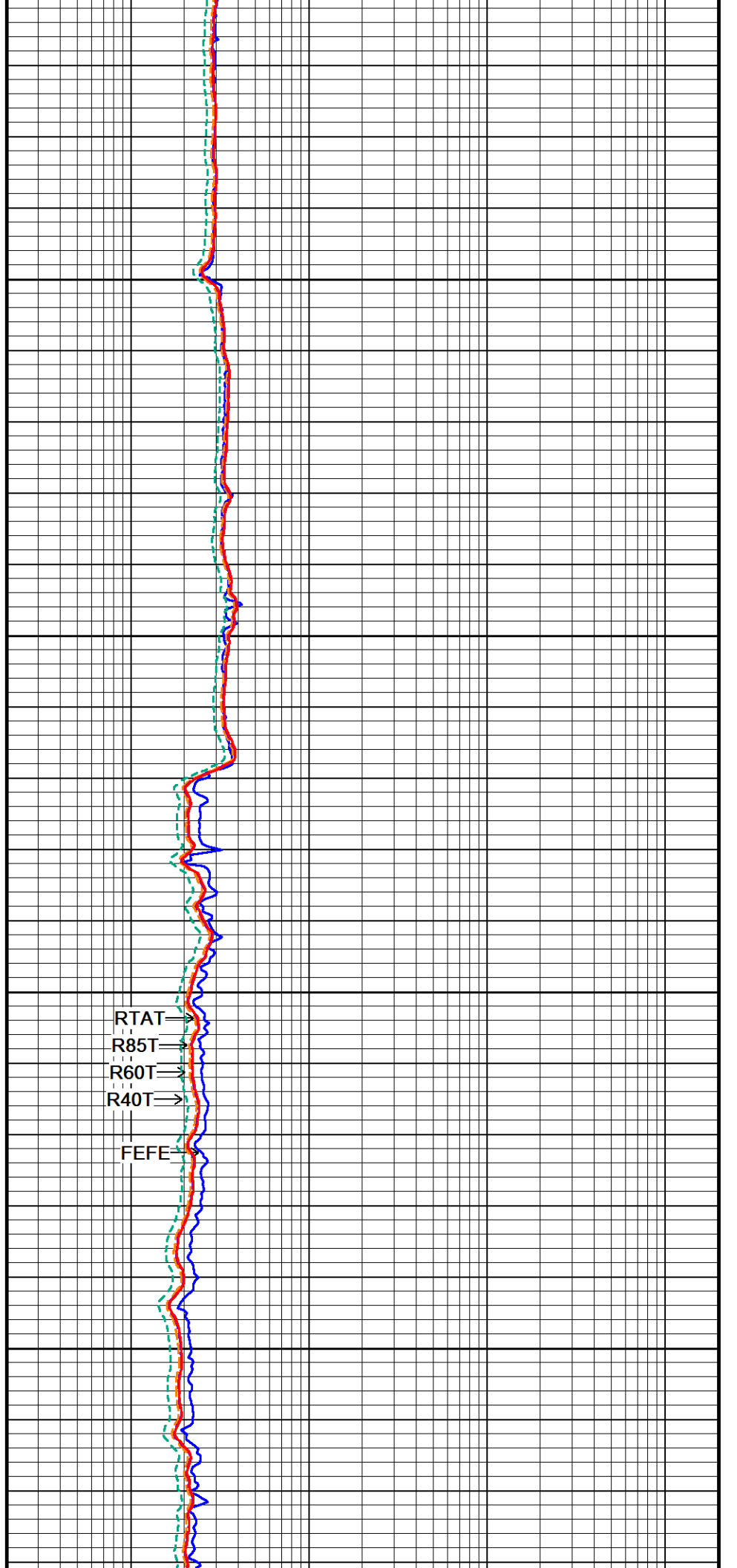
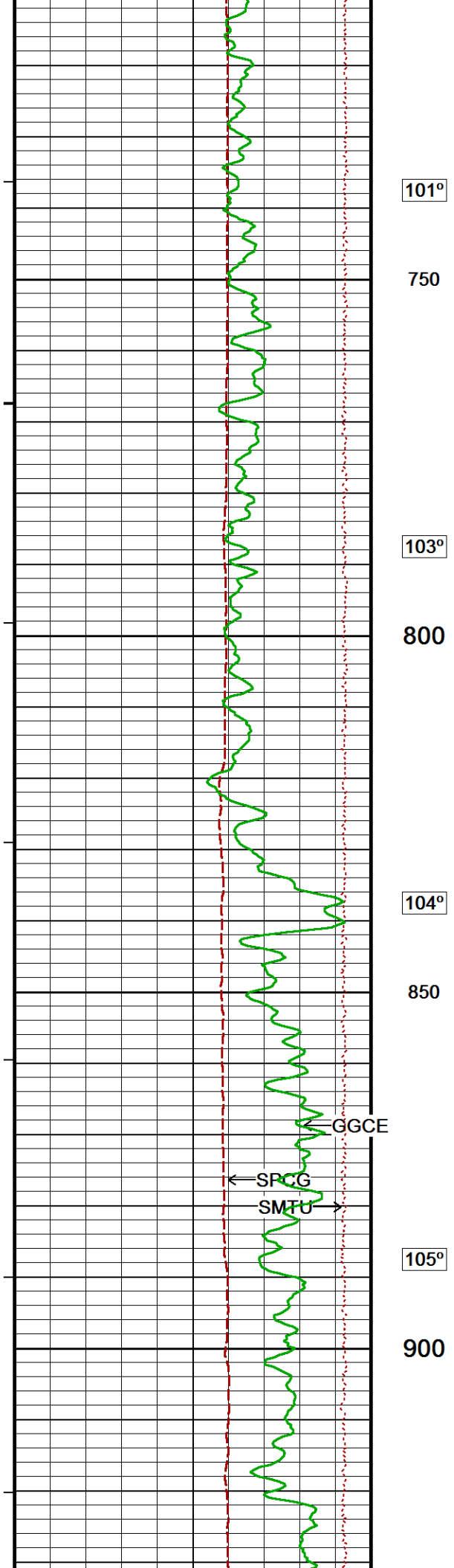
99°

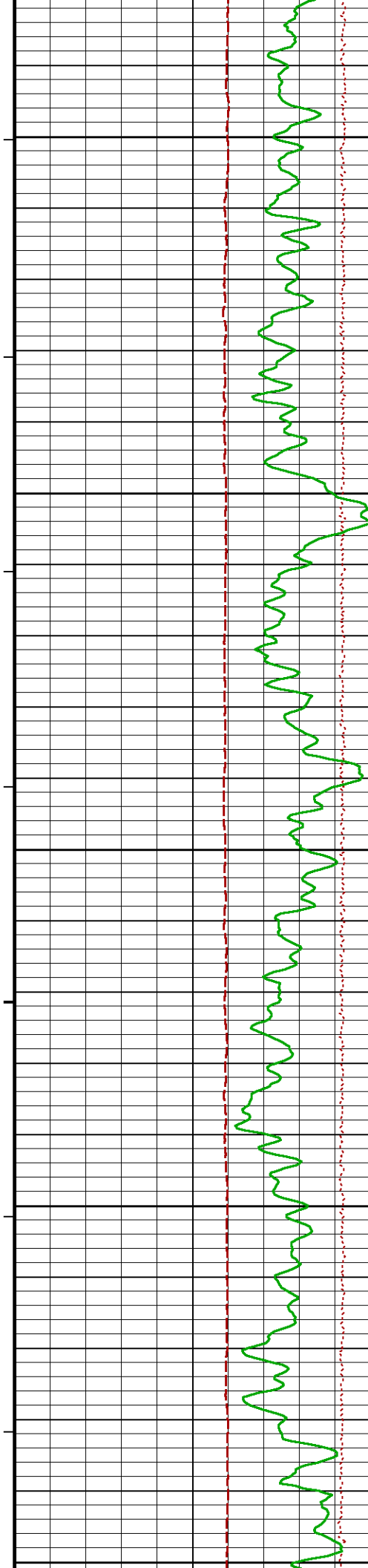
650

100°

700







105°

950

106°

1000

106°

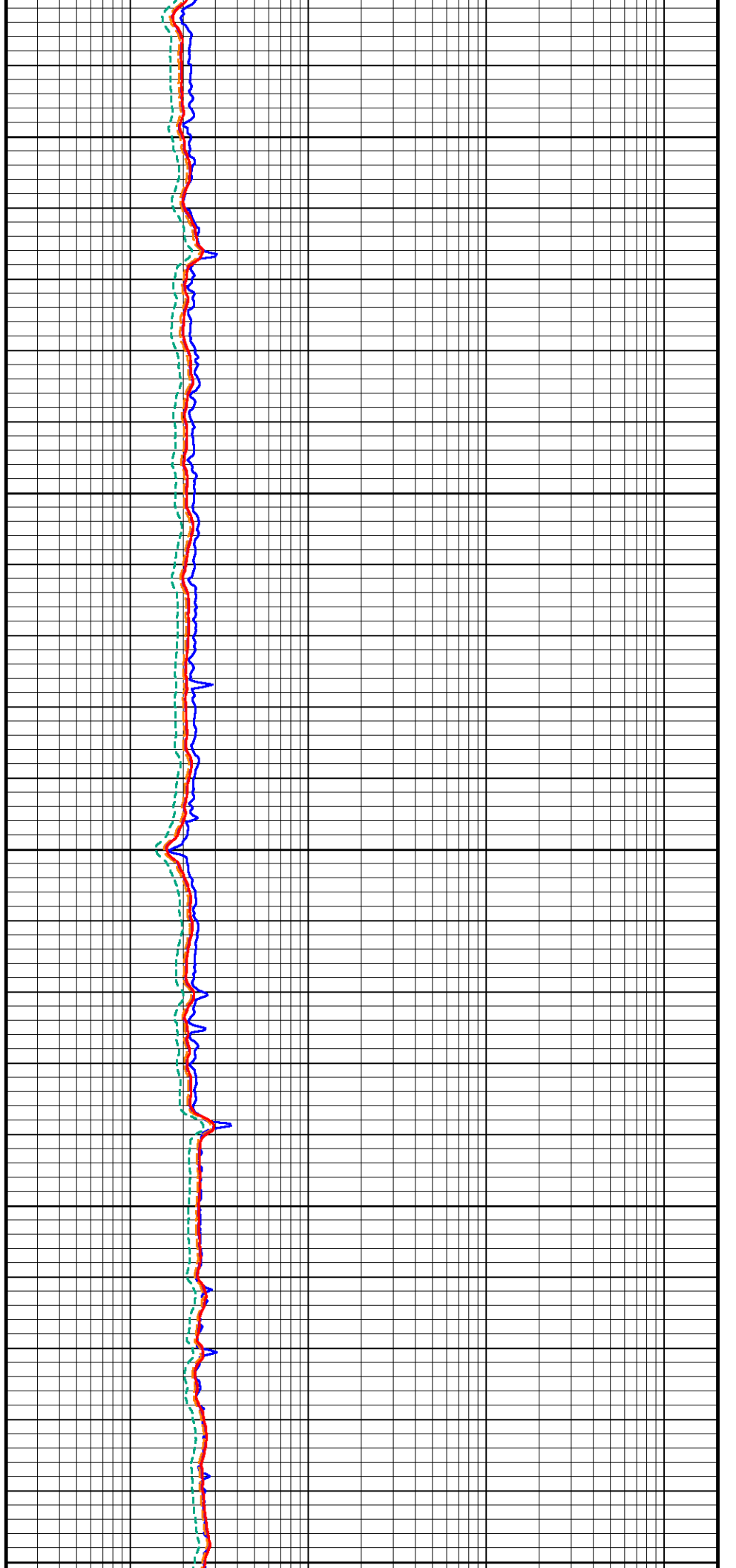
1050

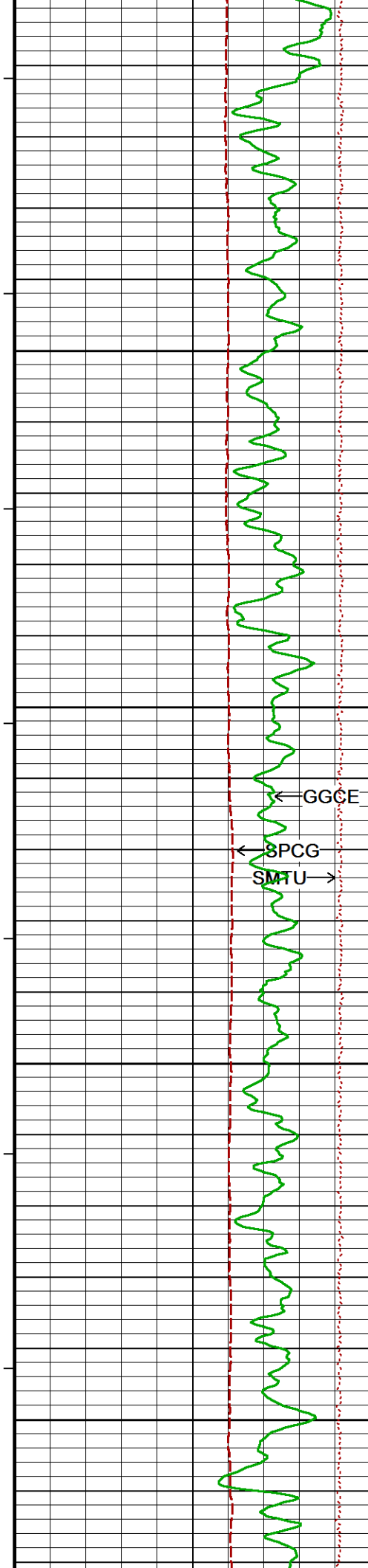
107°

1100

107°

1150





107°

1200

107°

1250

← GGCE

← SPCG

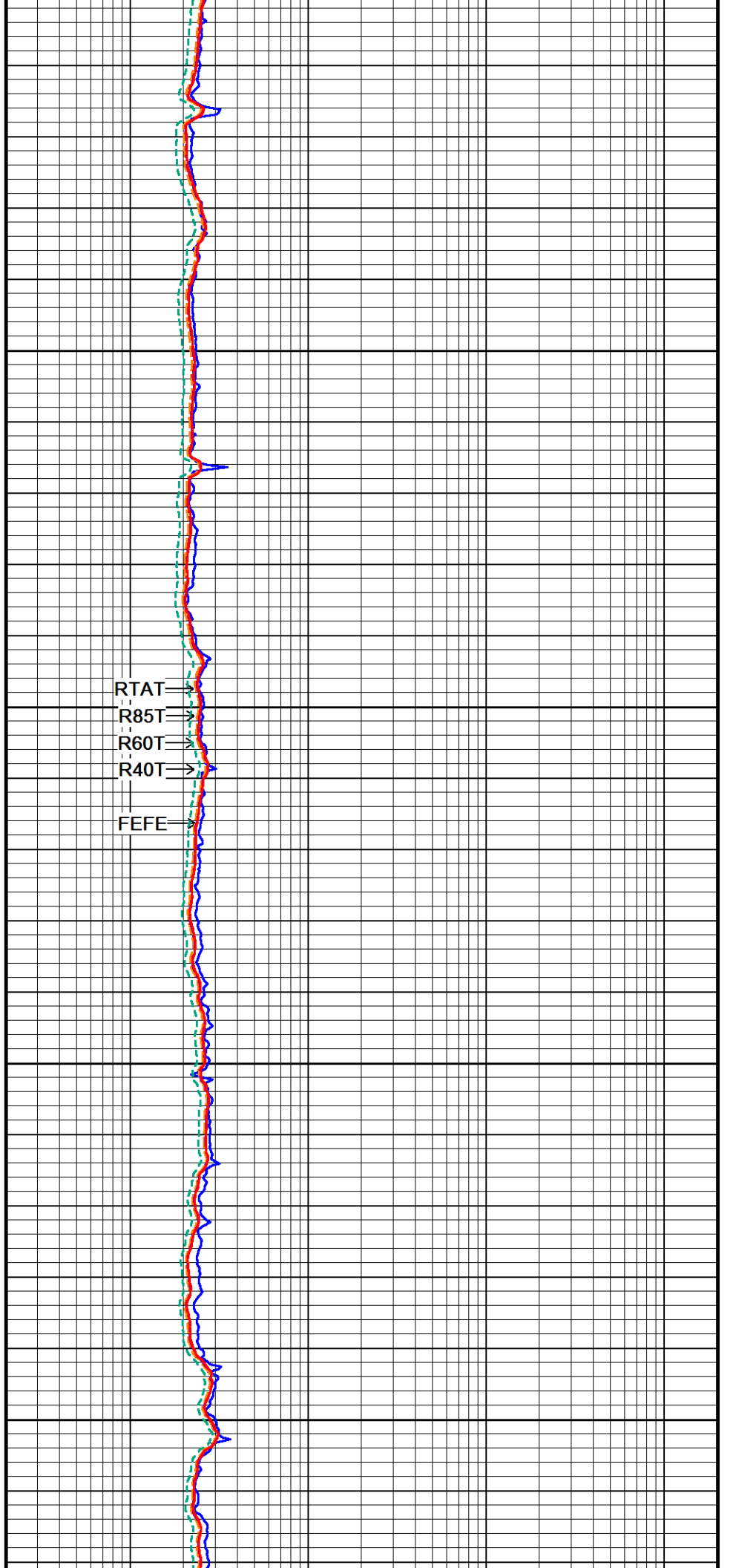
SMTU →

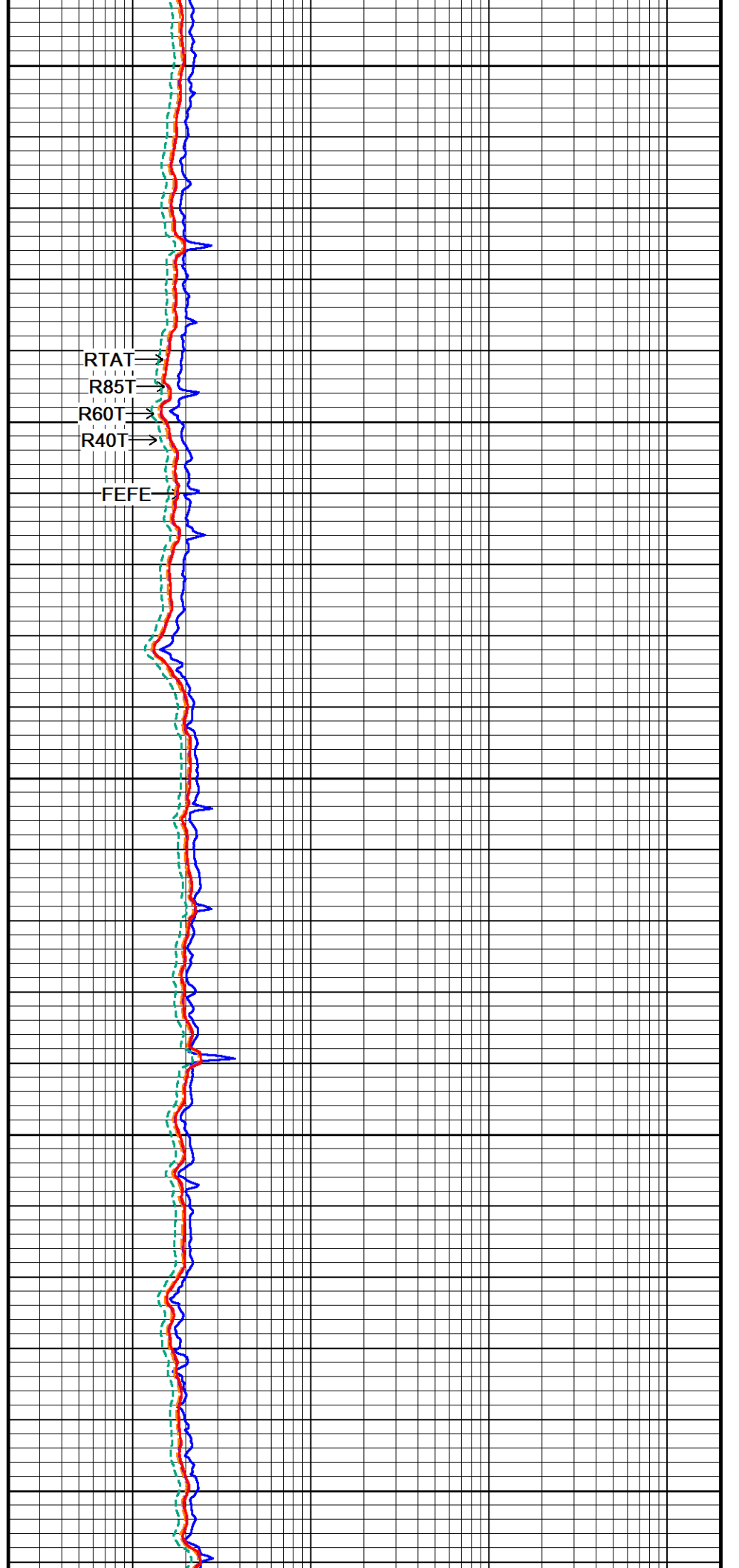
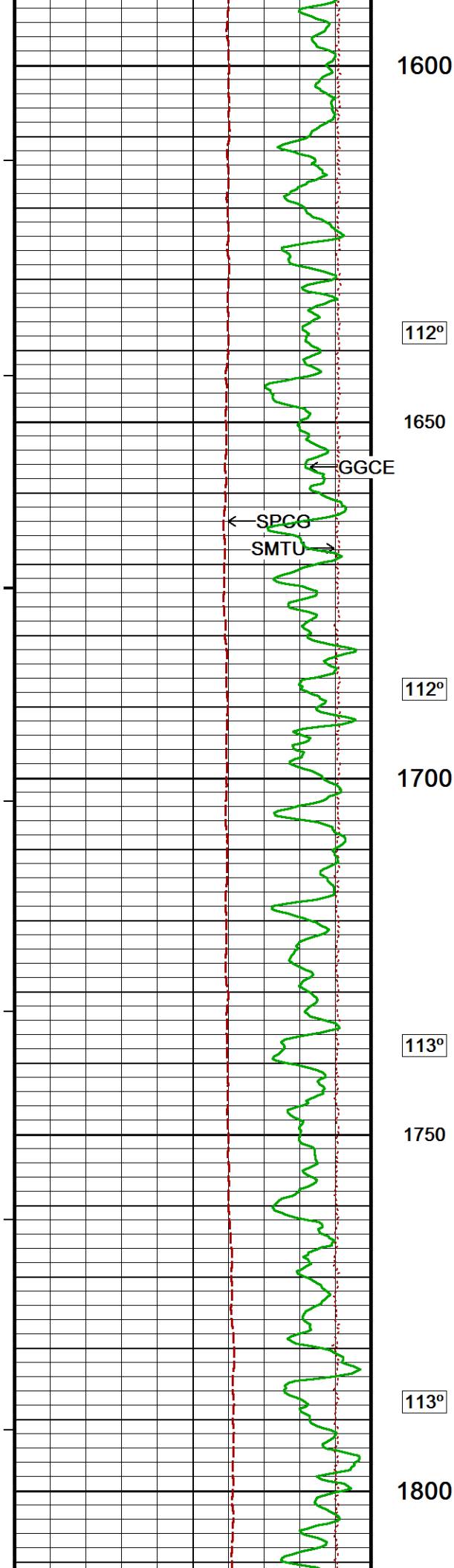
108°

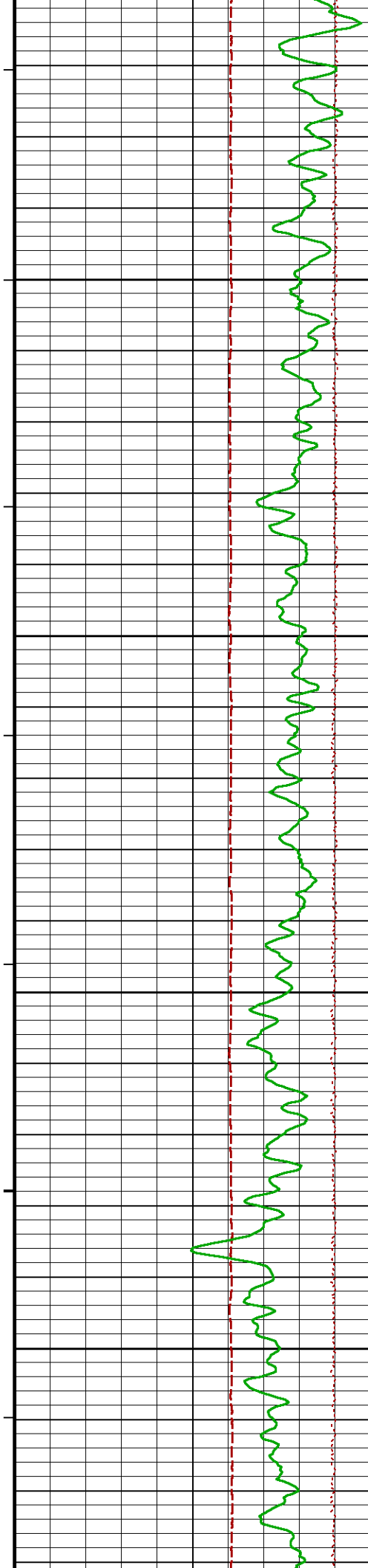
1300

108°

1350







114°

1850

114°

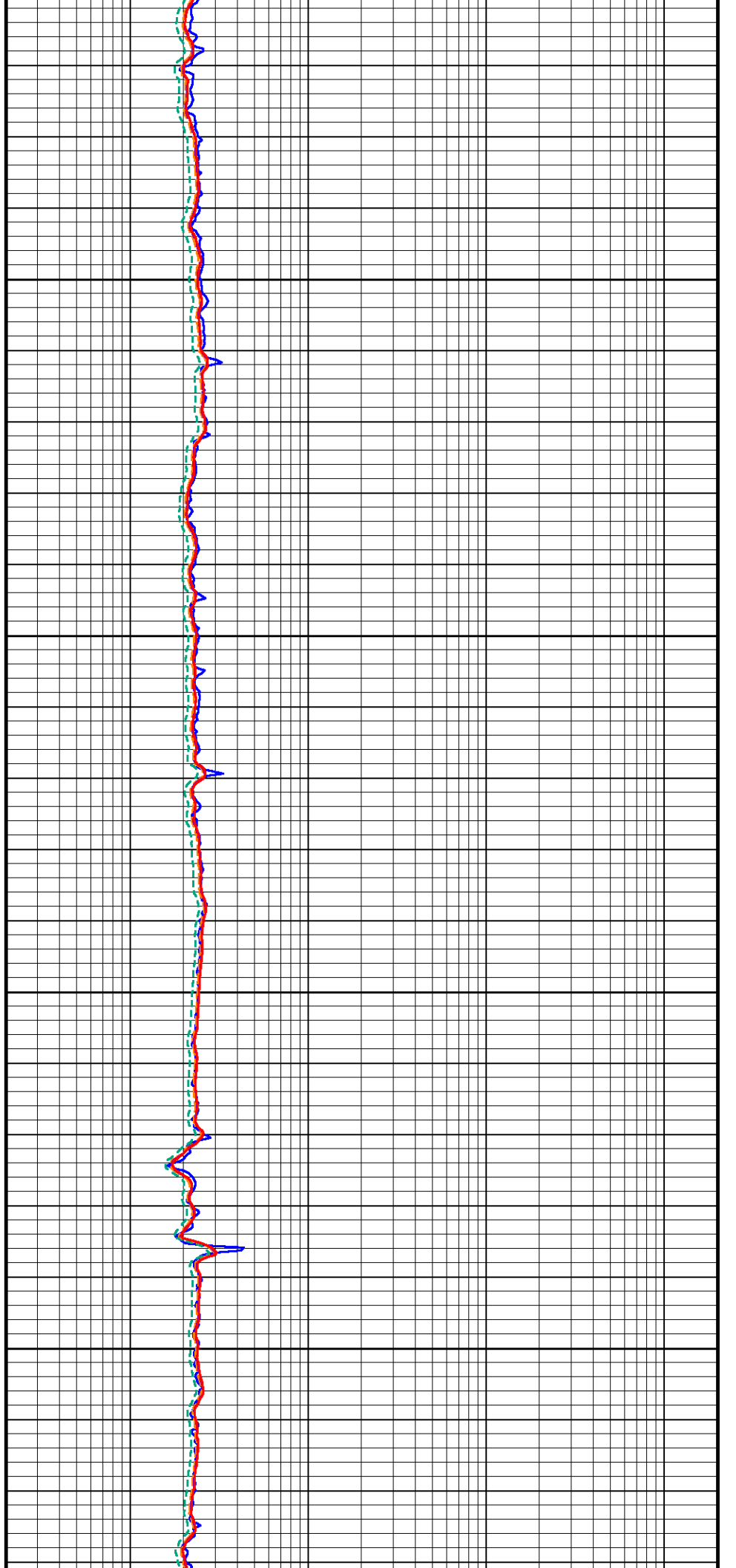
1900

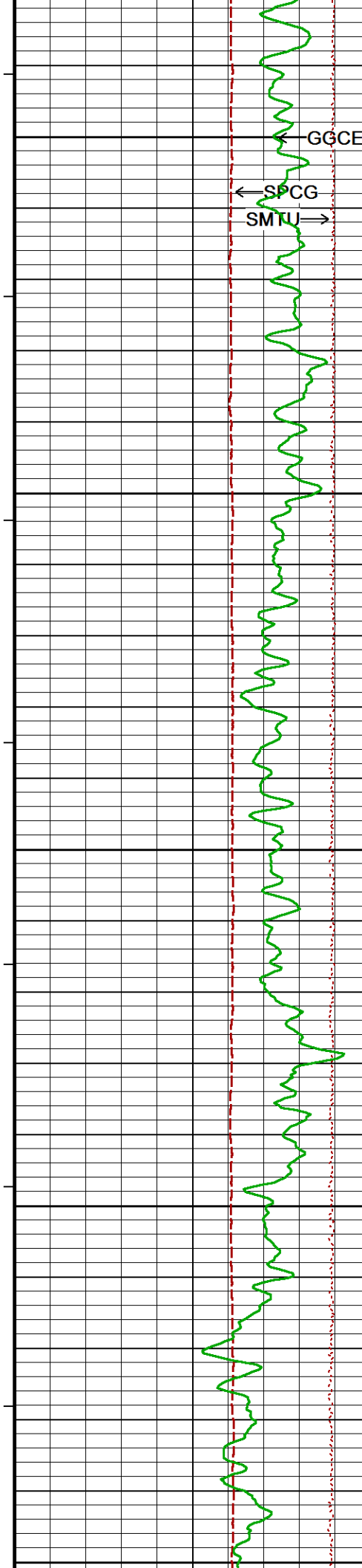
115°

1950

115°

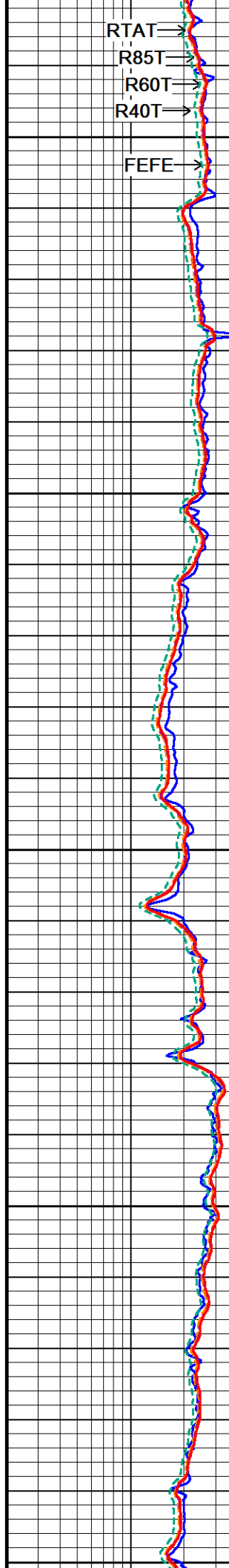
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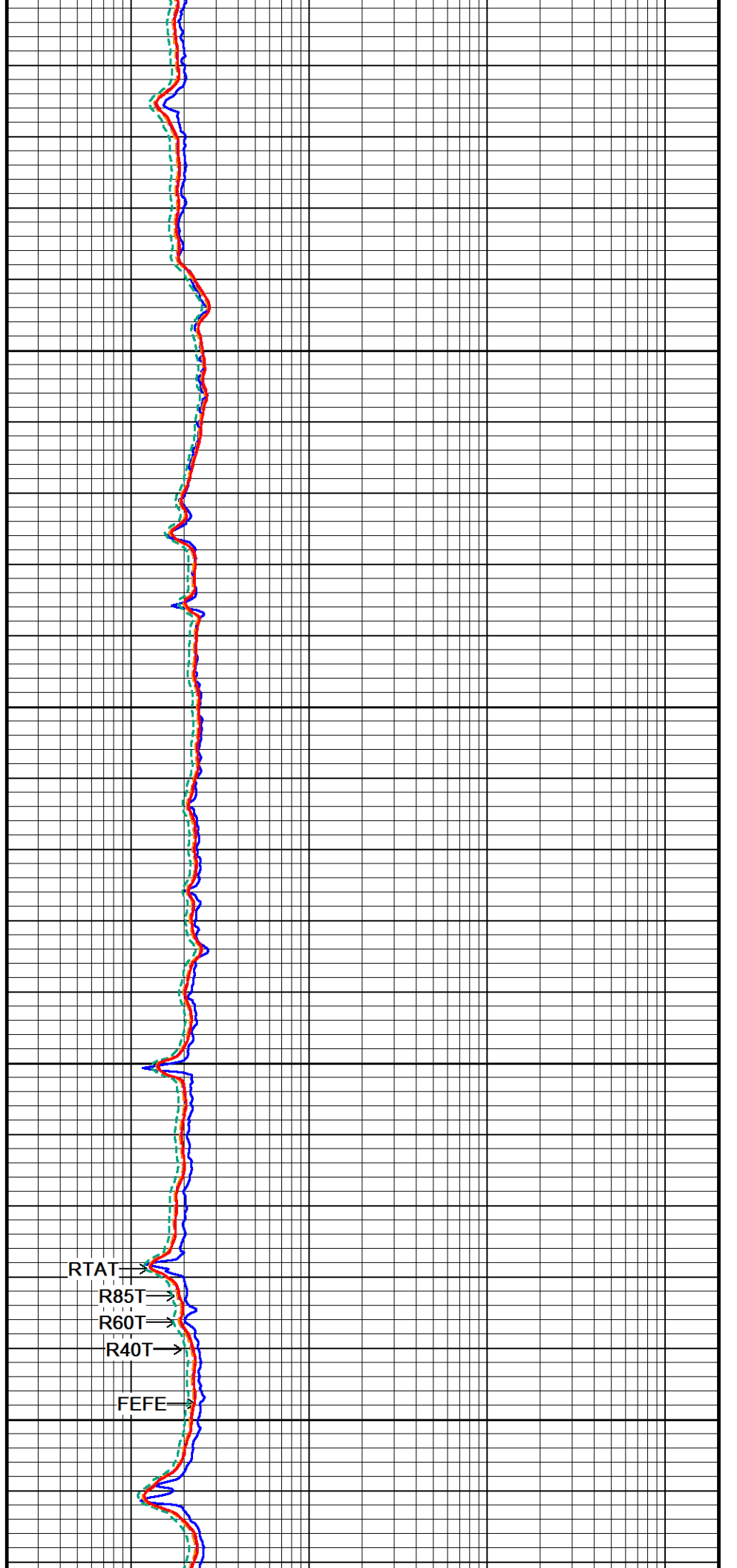
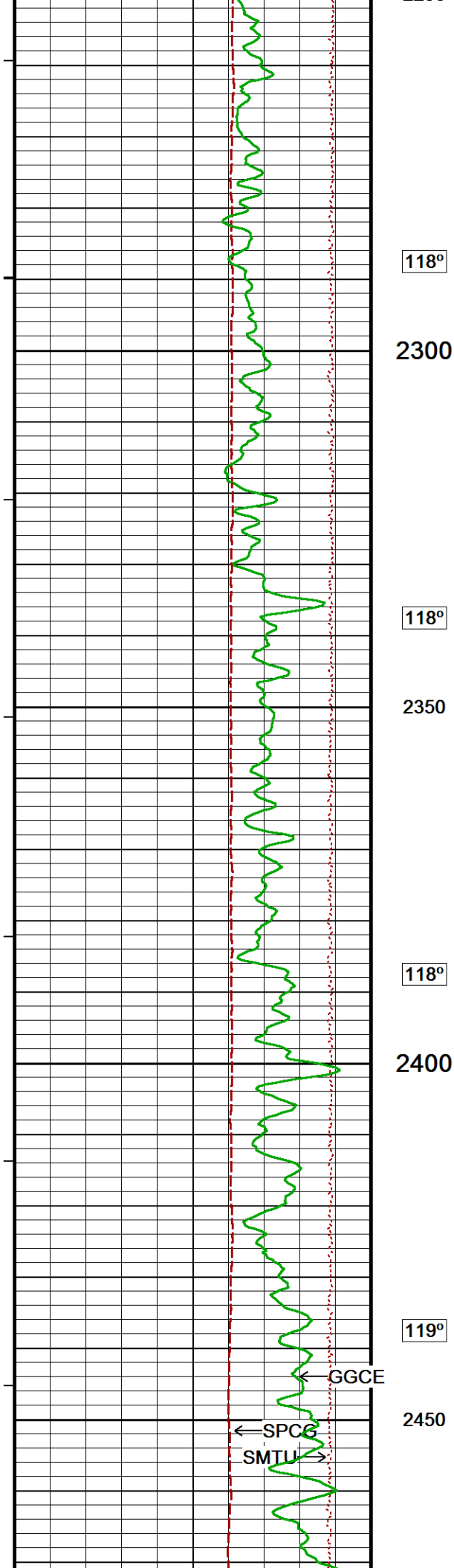


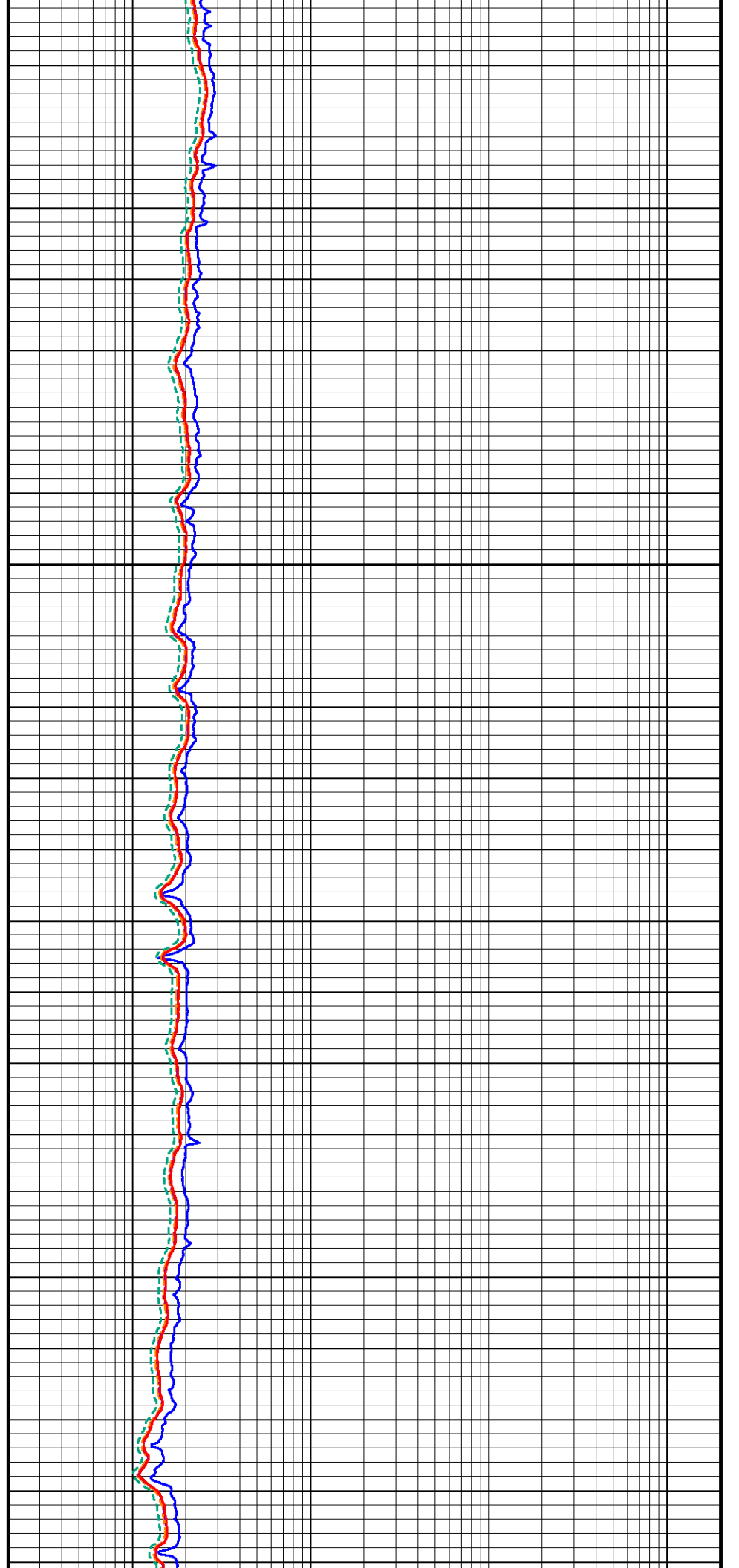
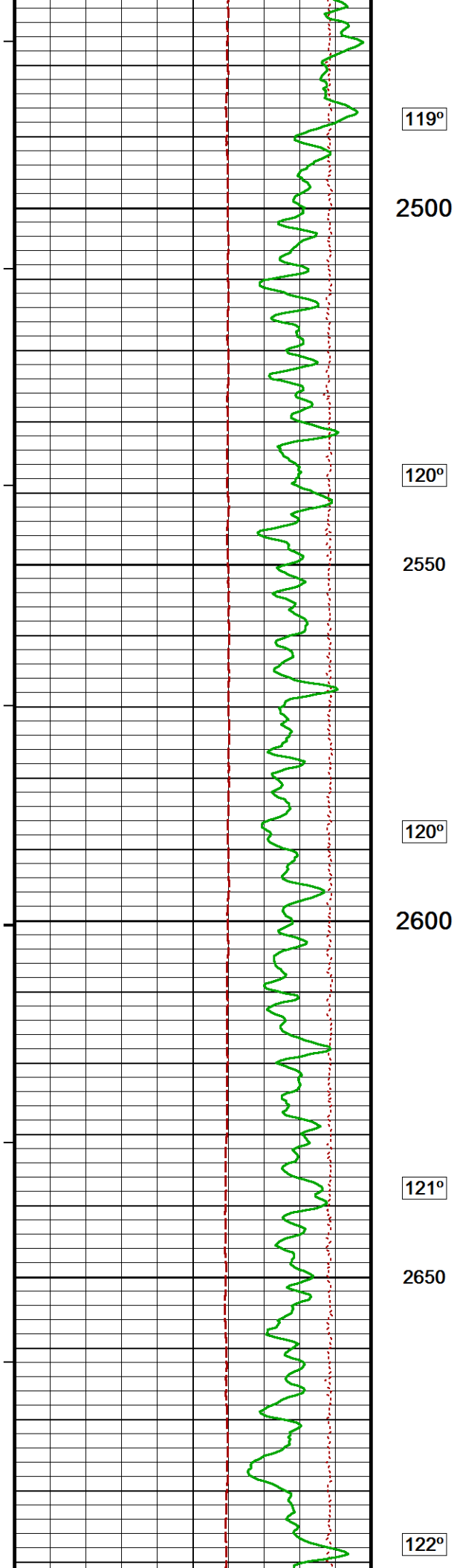
116°
2050
117°
2100
117°
2150
118°
2200
118°
2250

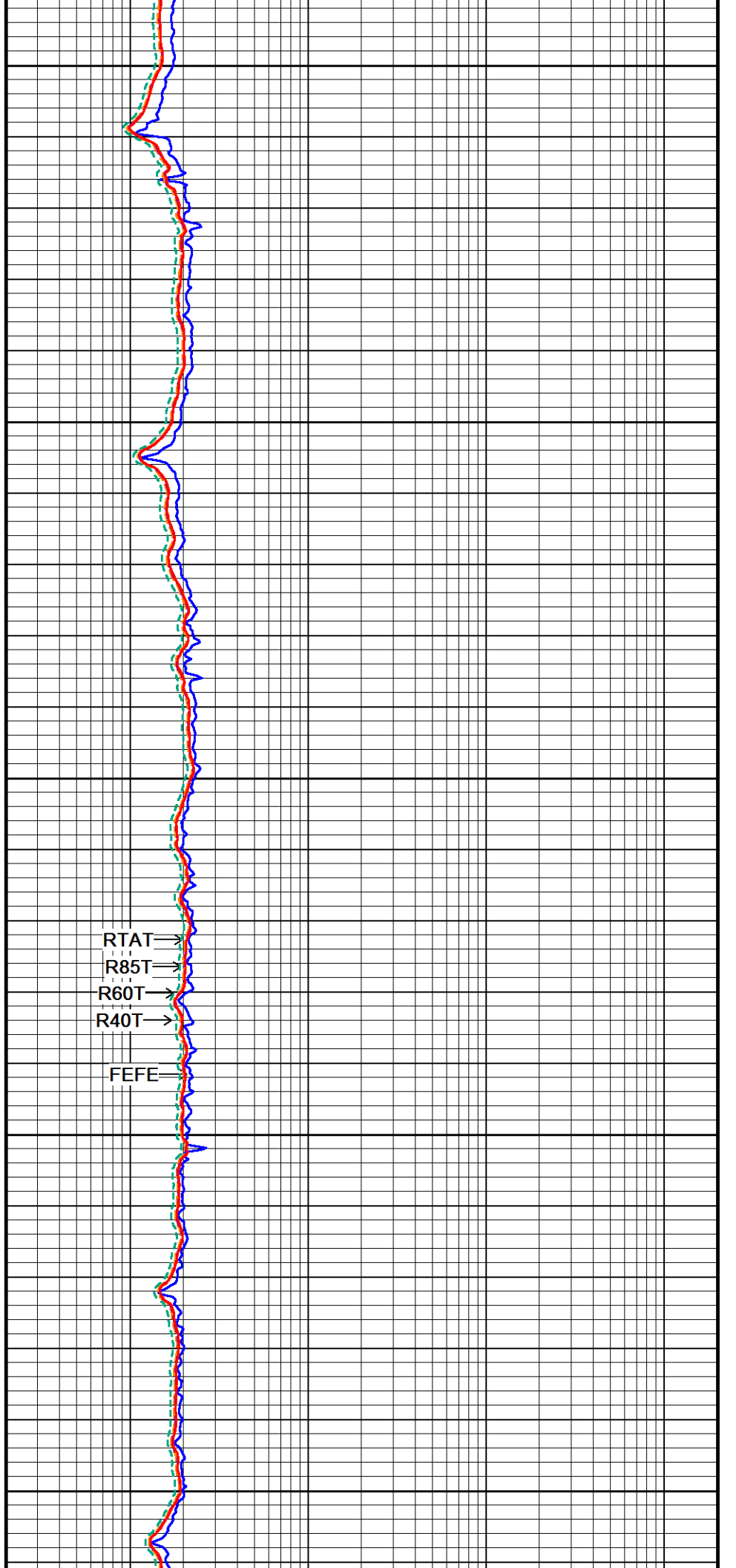
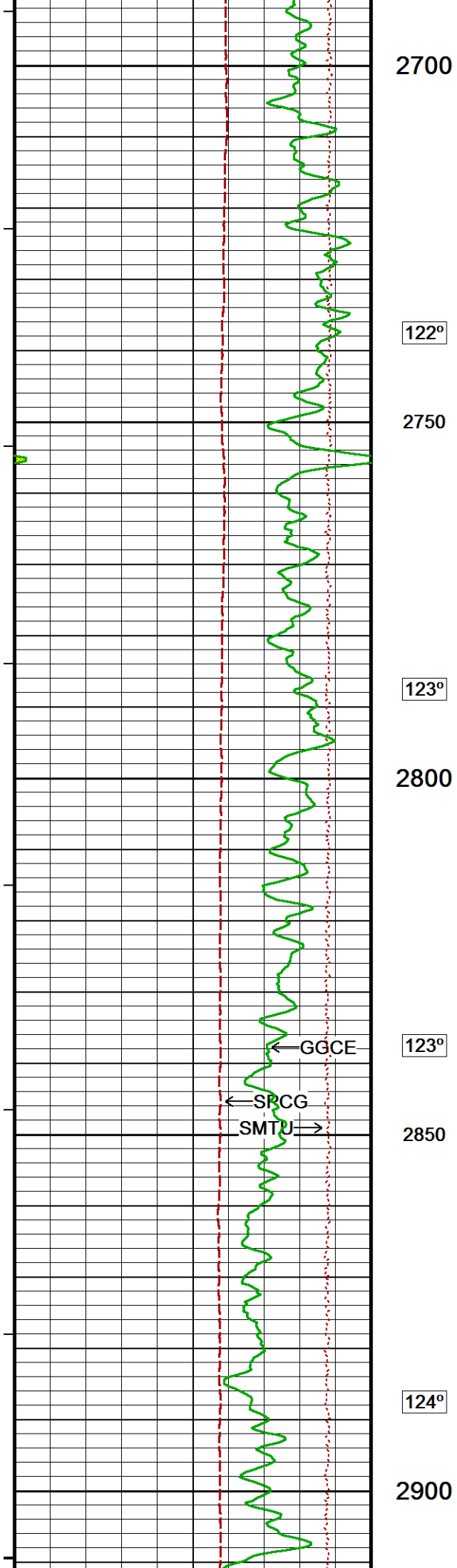
← GGCE
← SPCG
SMTU →

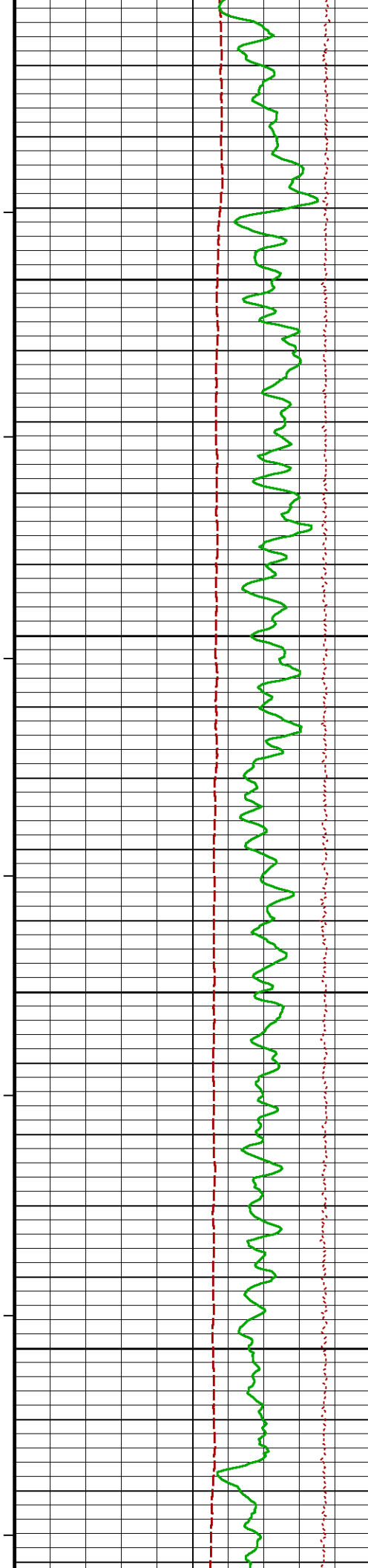


RTAT →
R85T →
R60T →
R40T →
FEFE →









124°

2950

125°

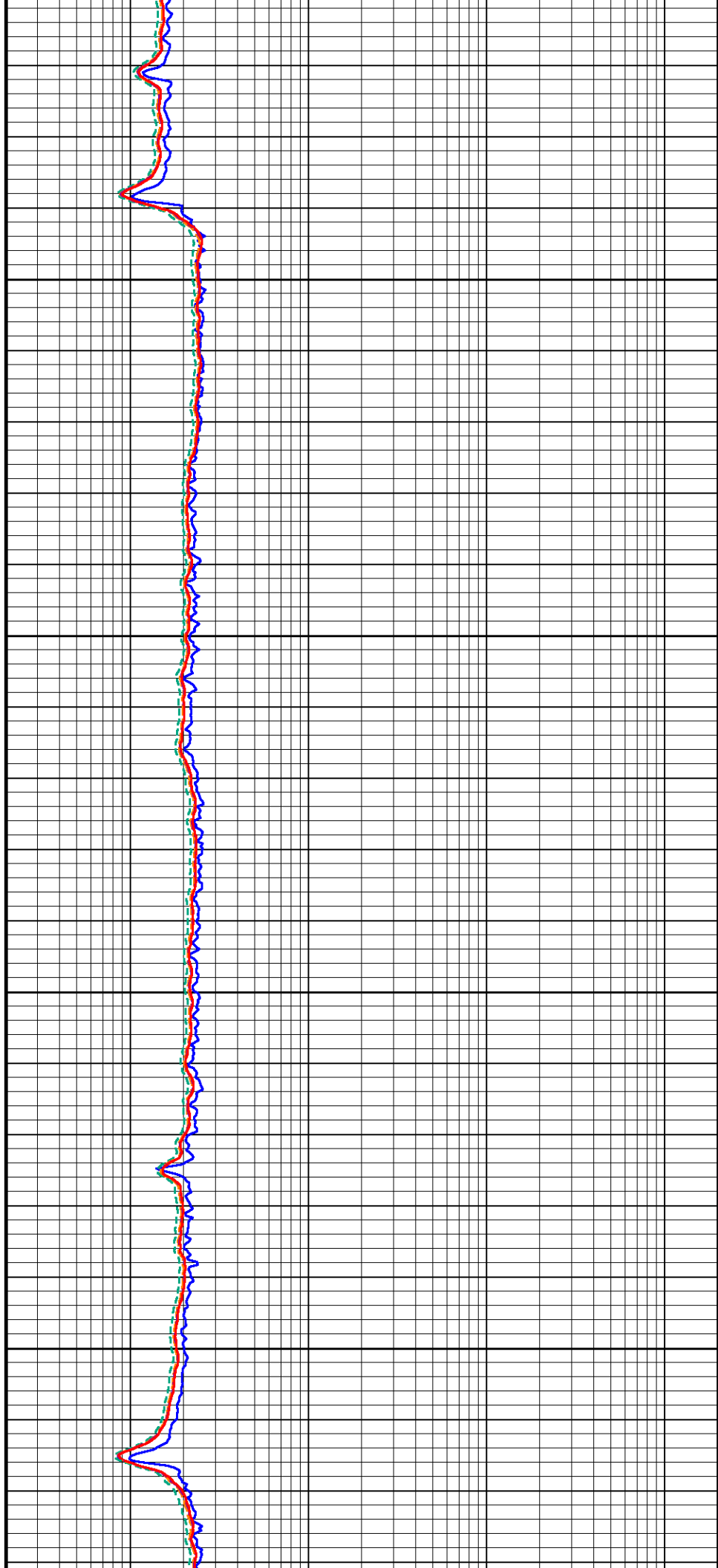
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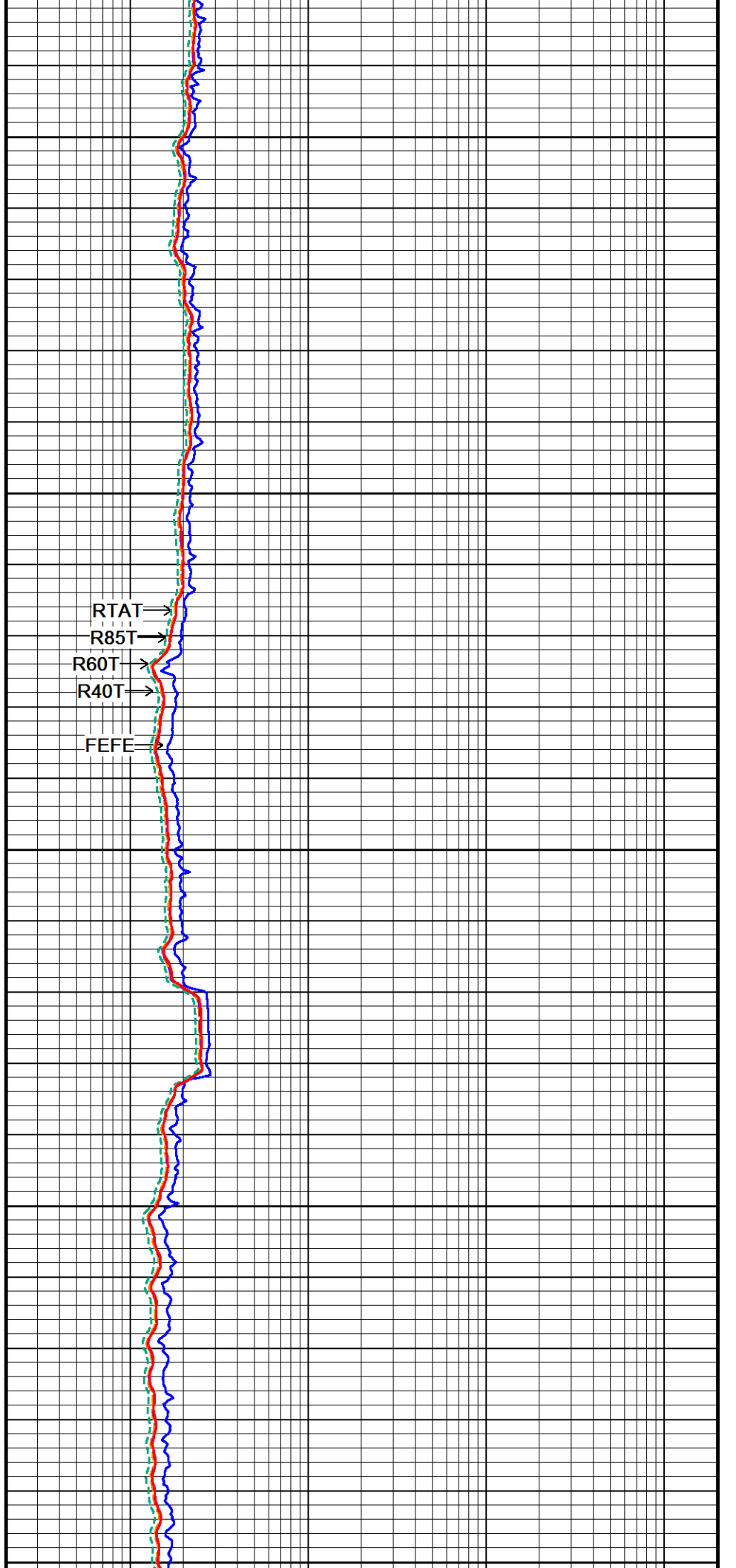
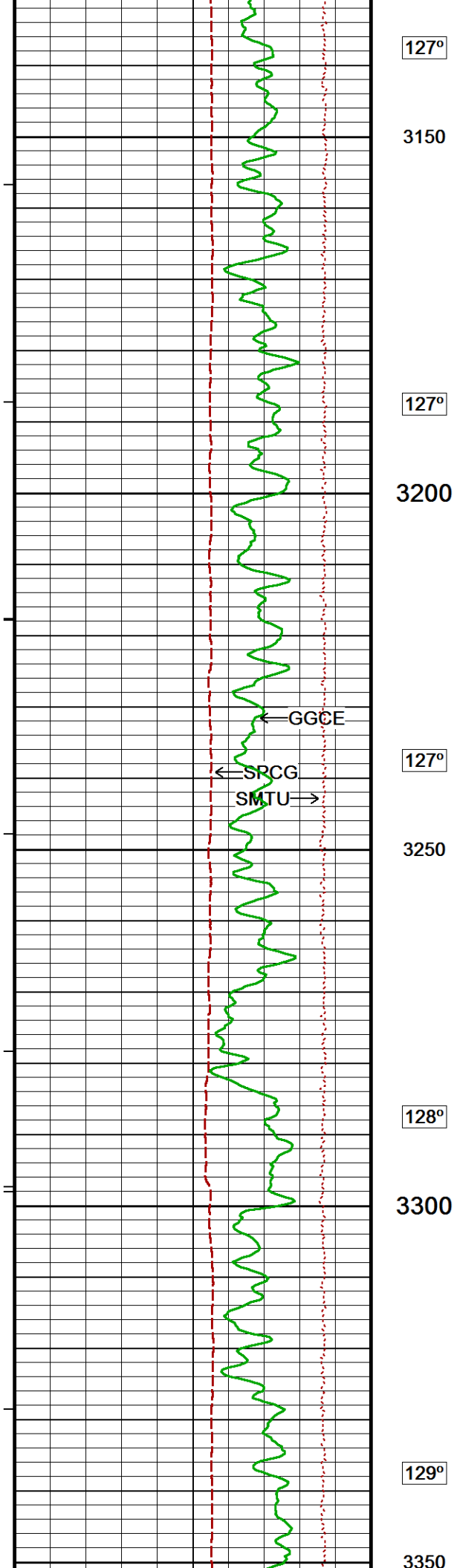
125°

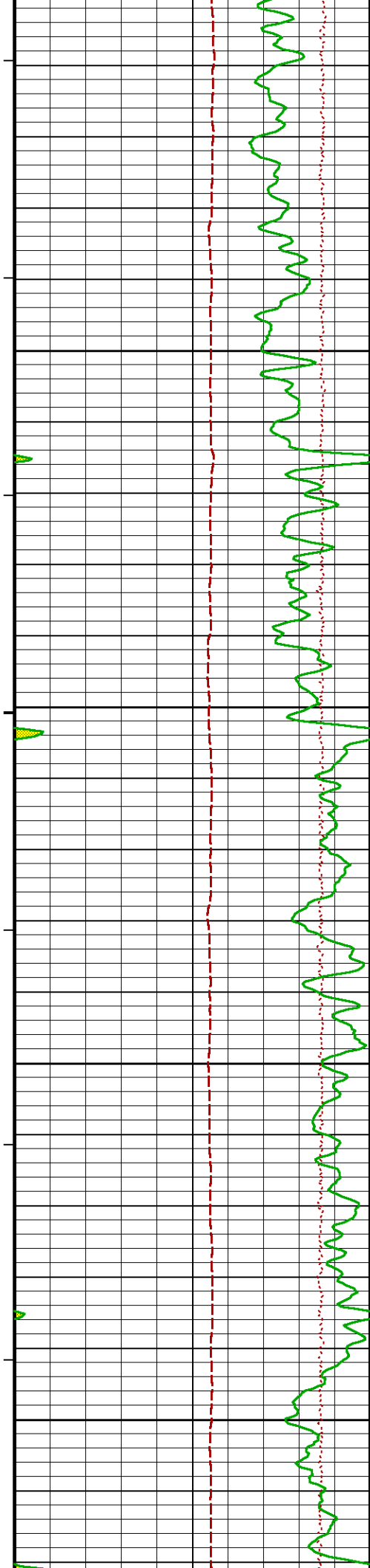
3050

126°

3100







129°

3400

130°

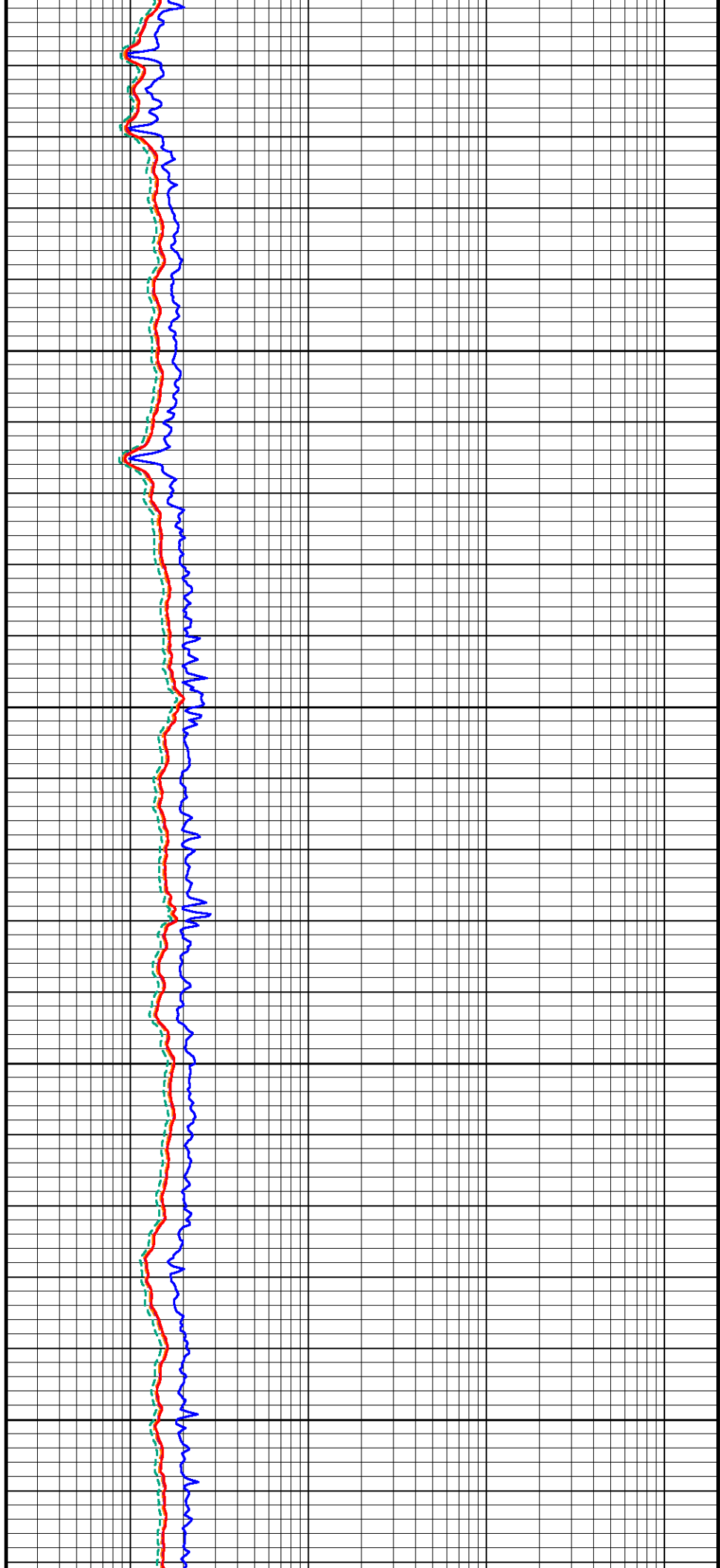
3450

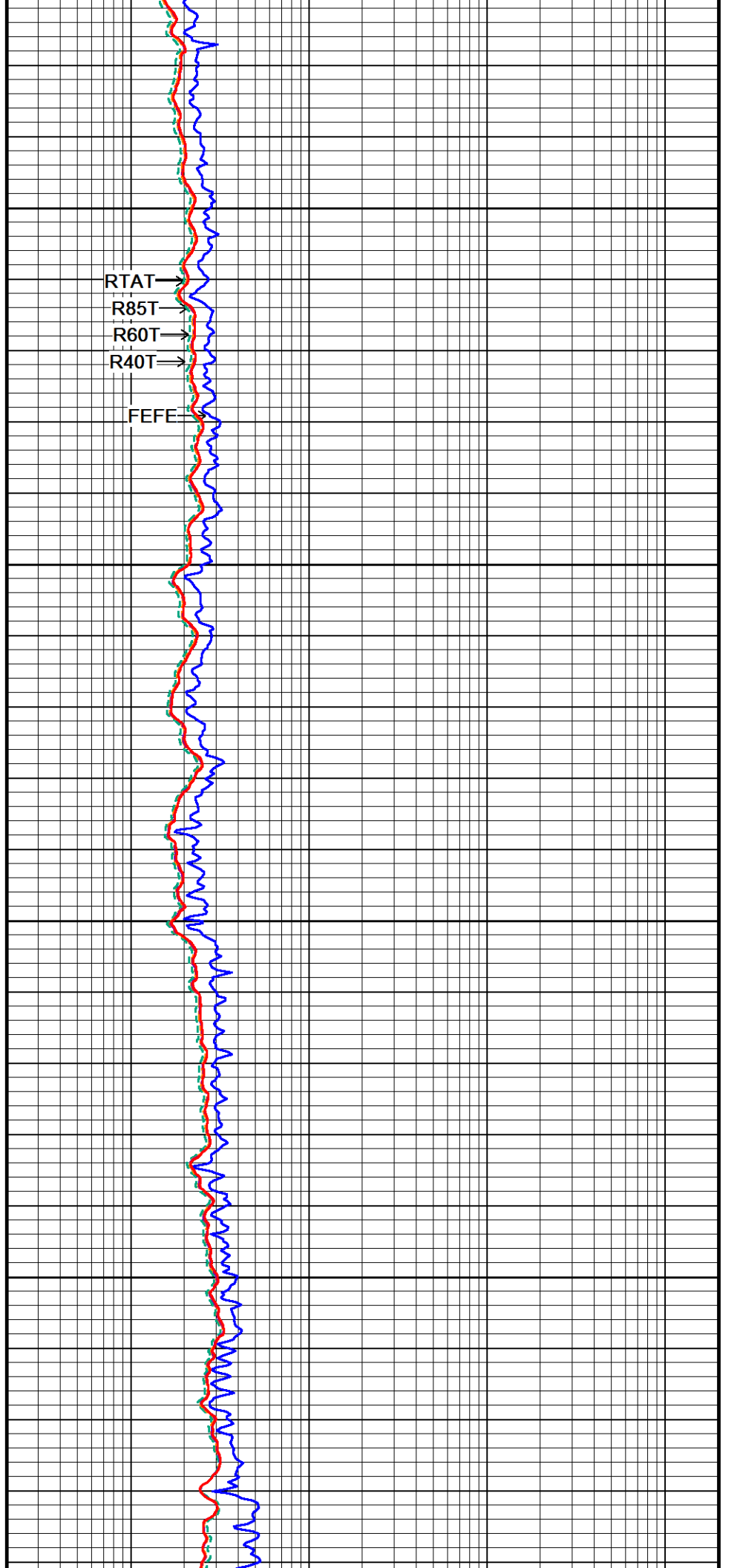
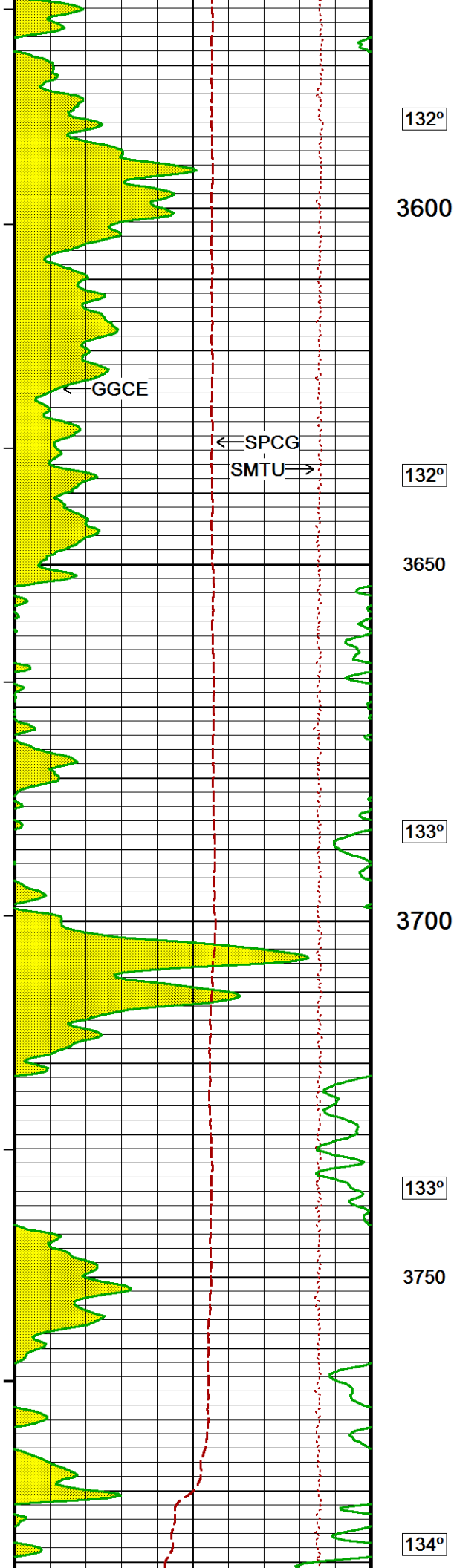
130°

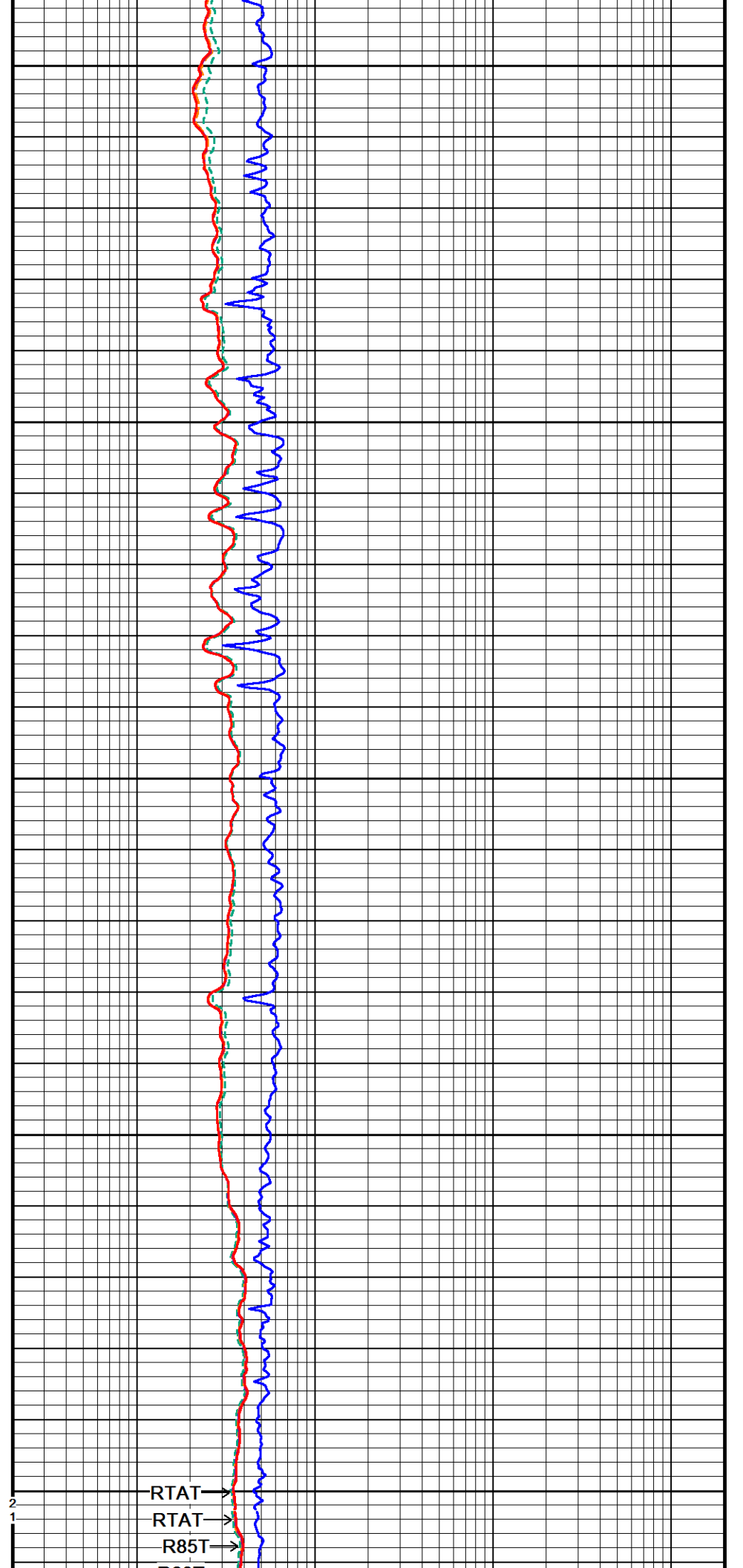
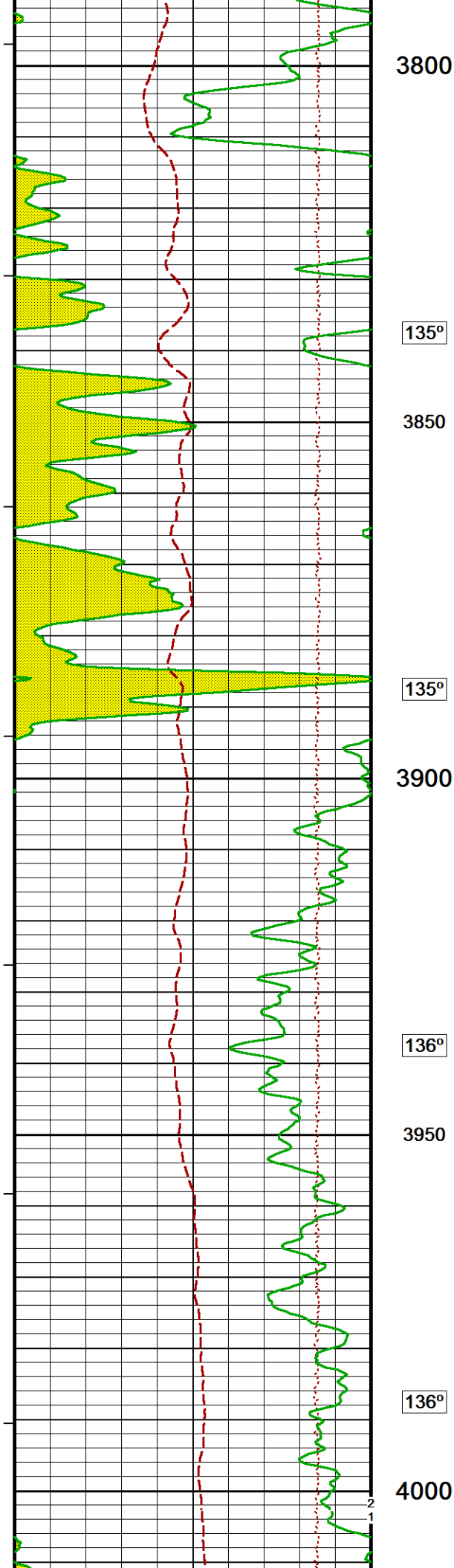
3500

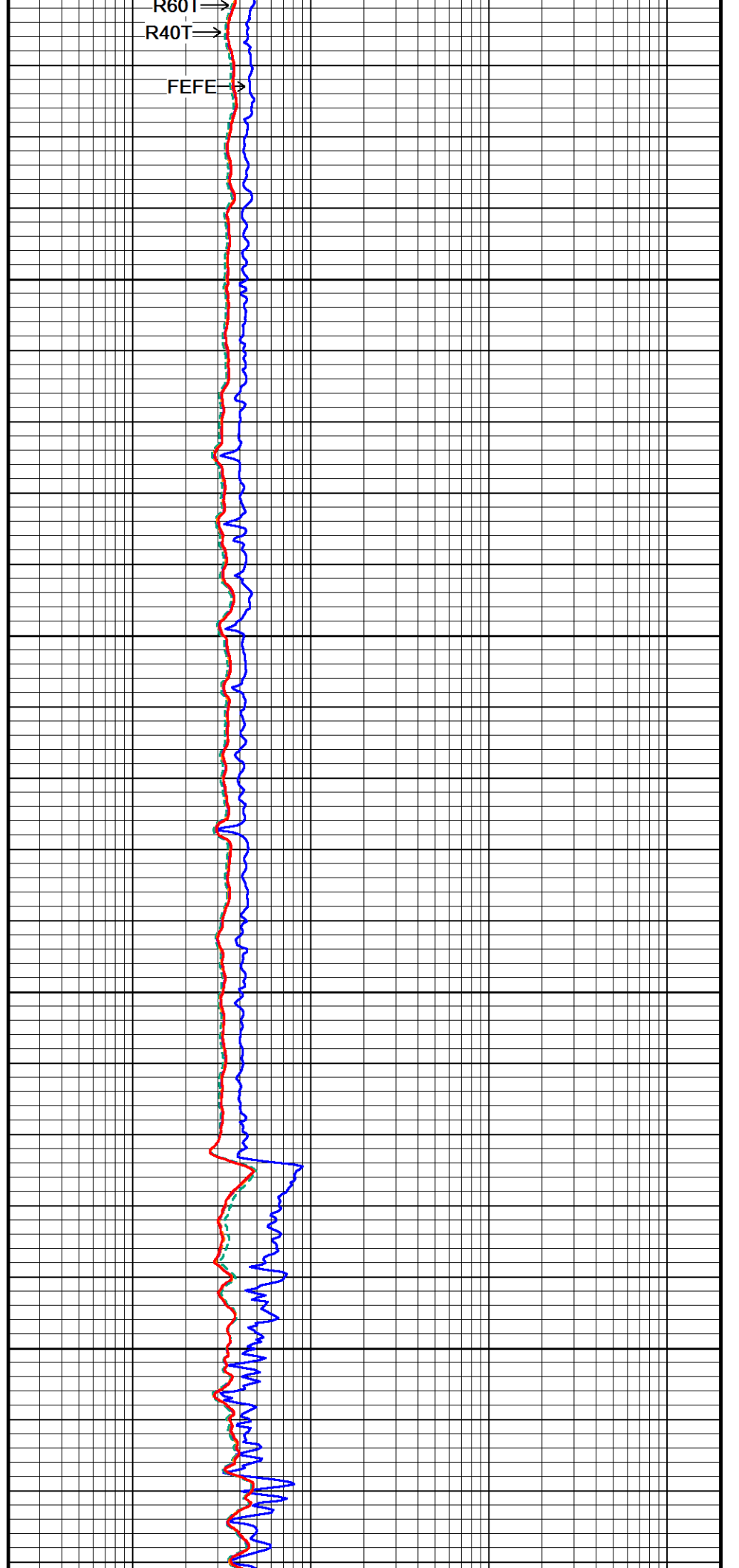
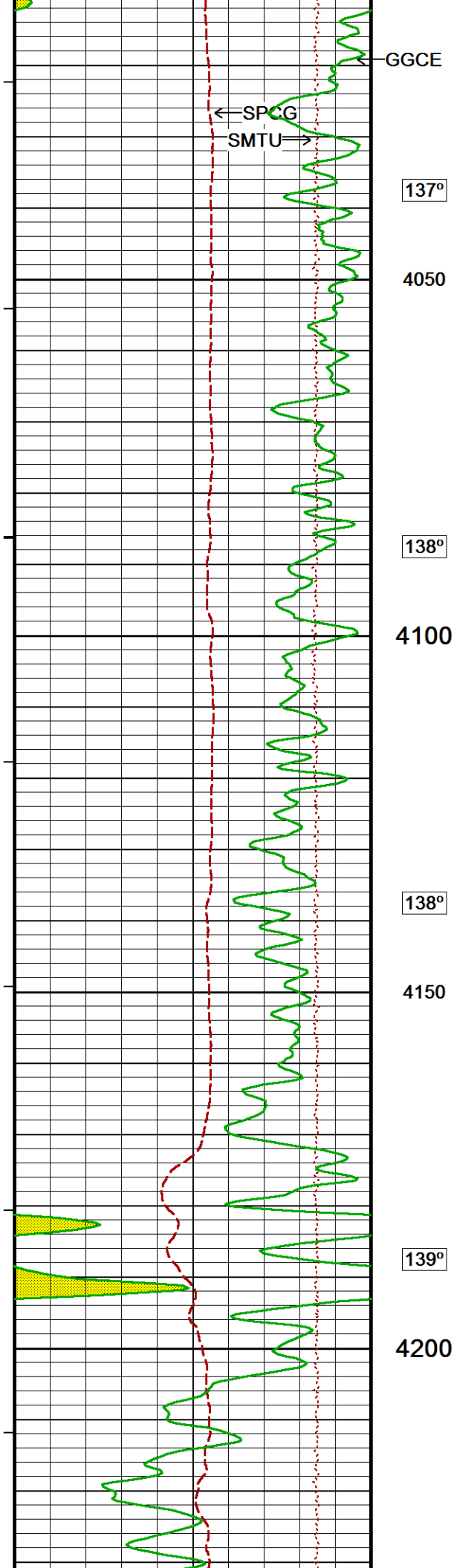
131°

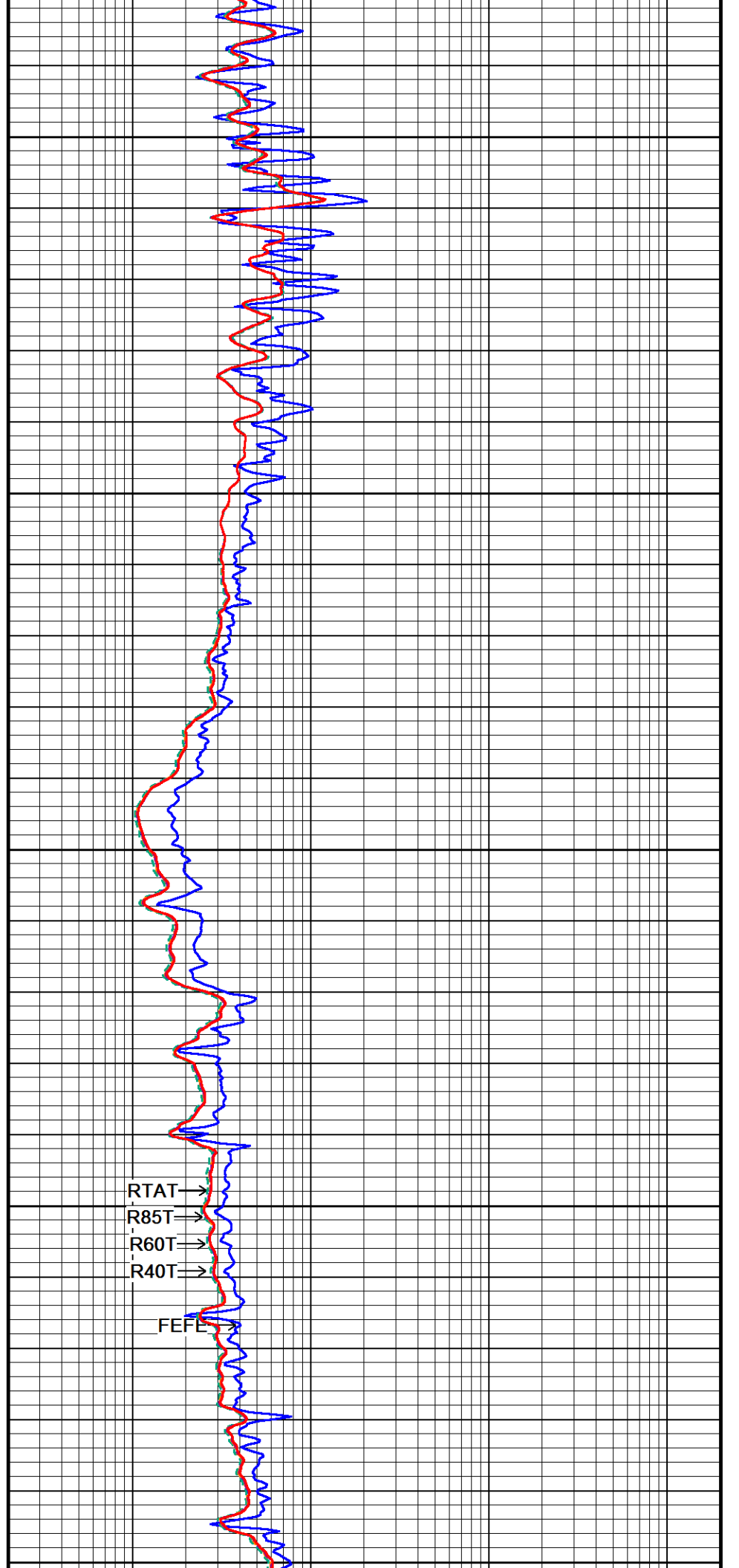
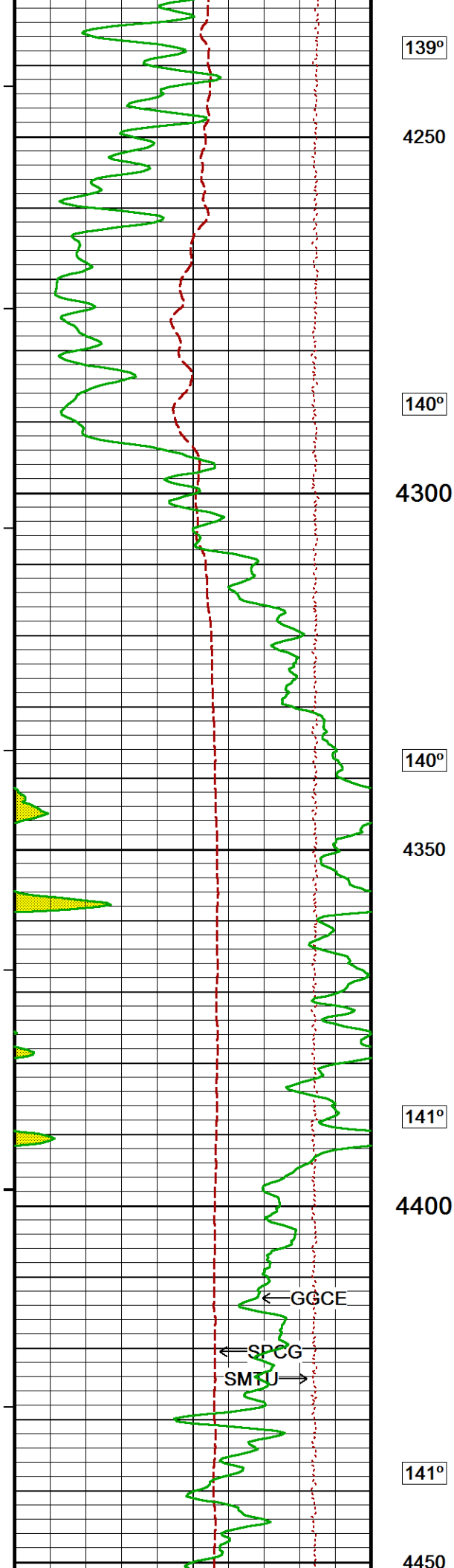
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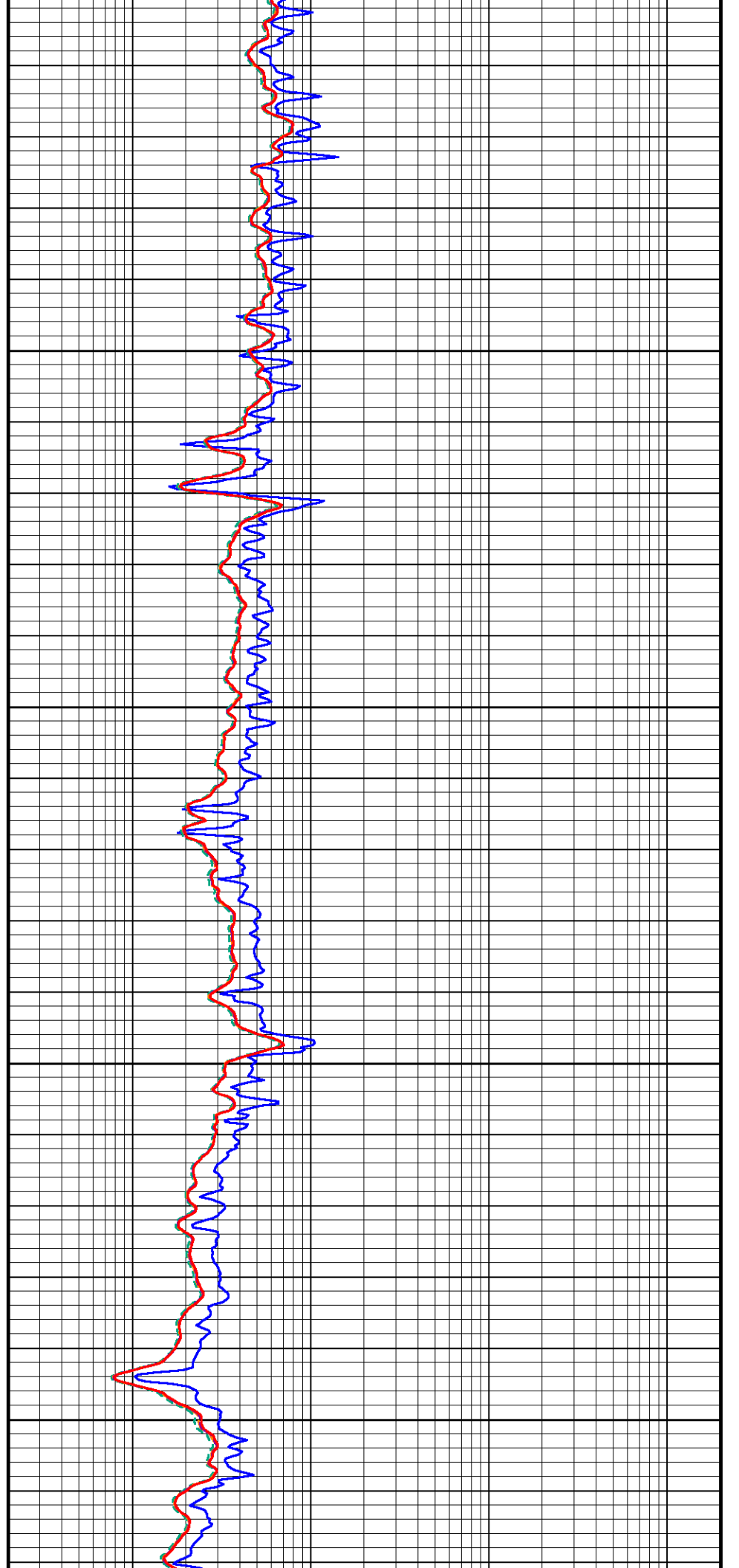
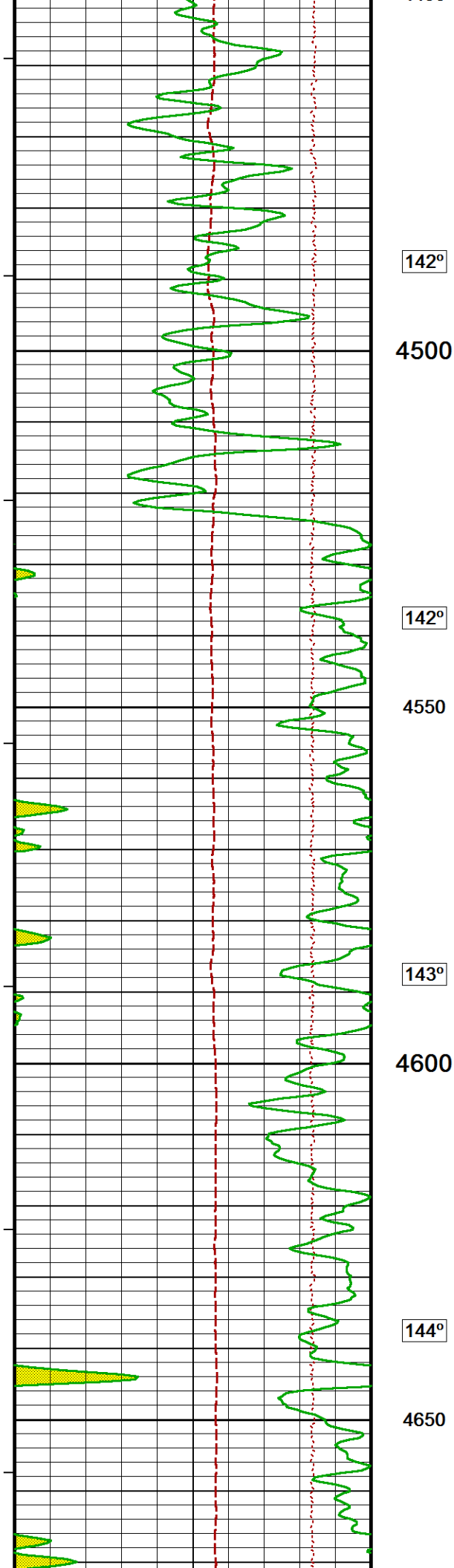


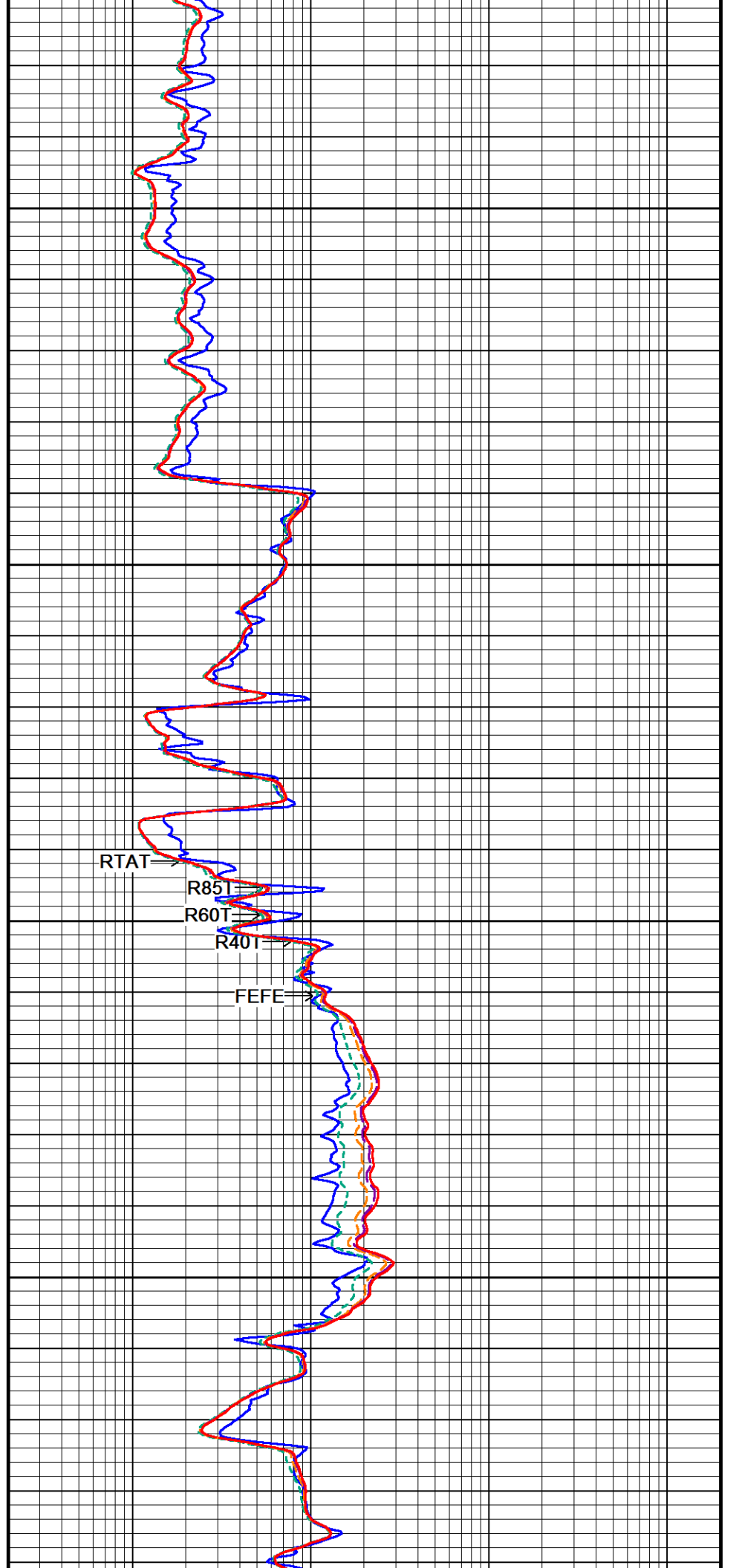
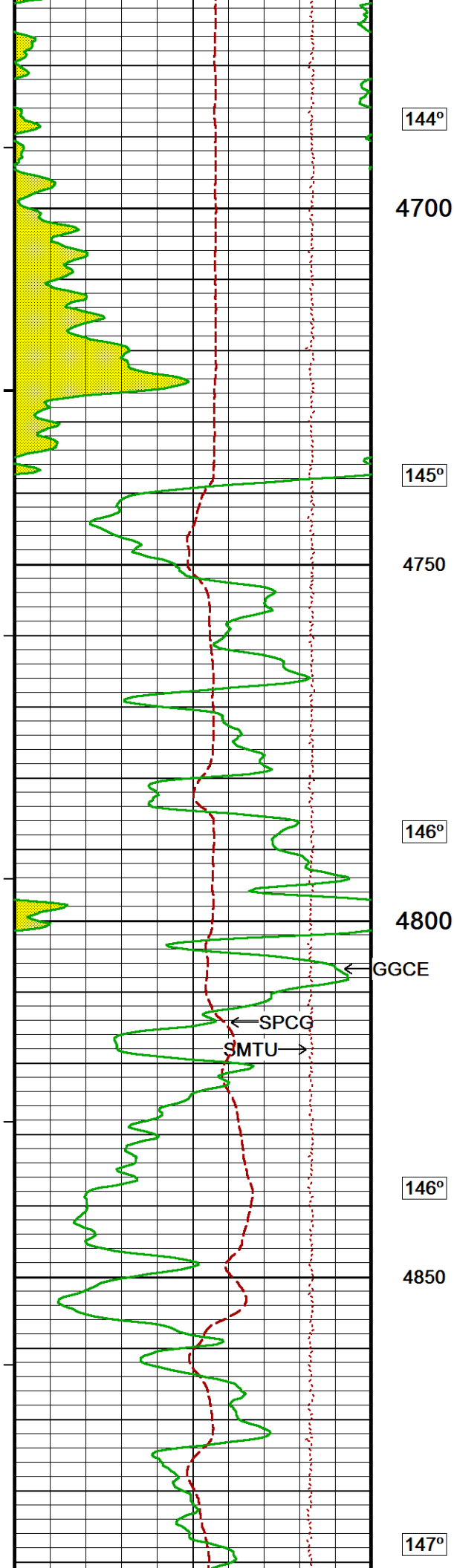


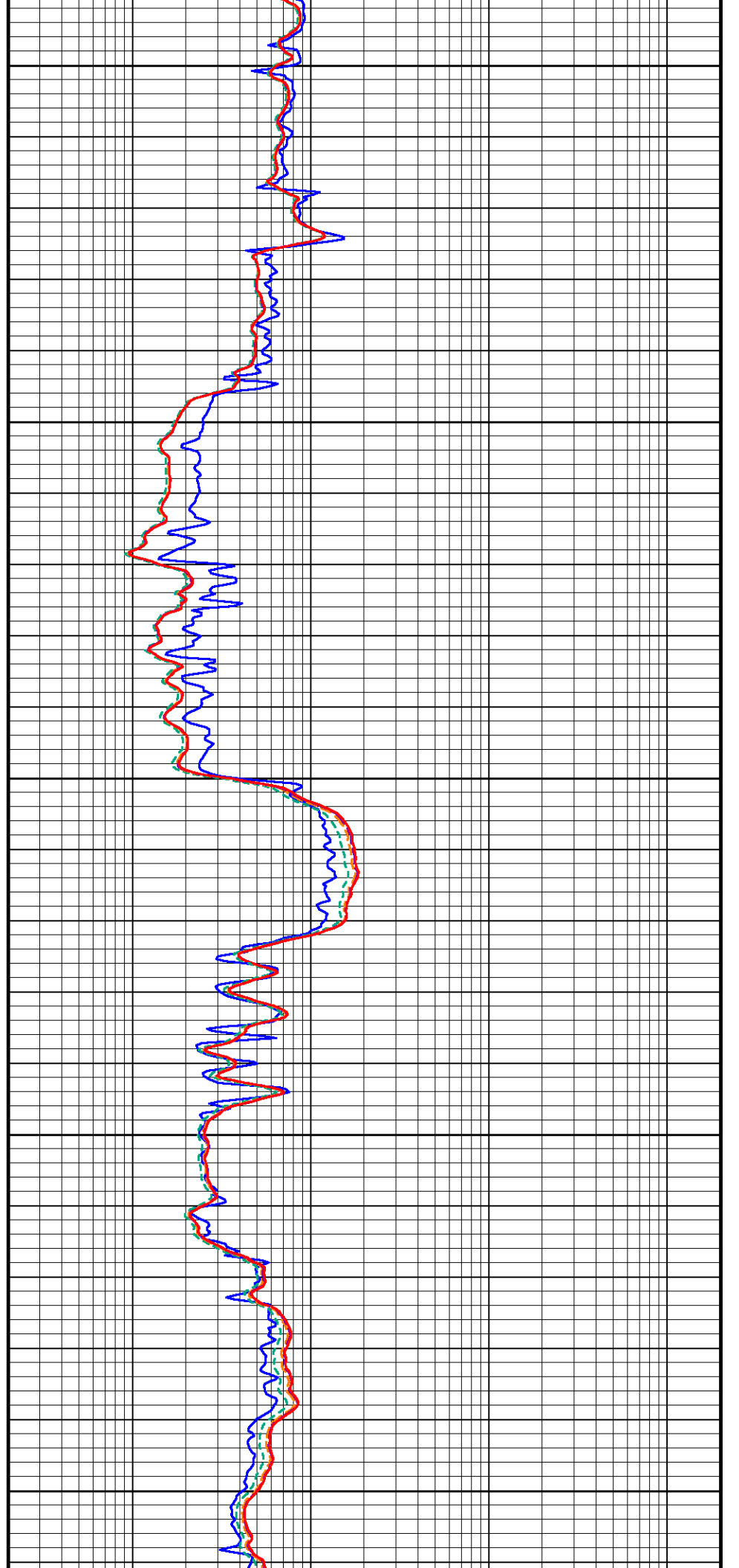
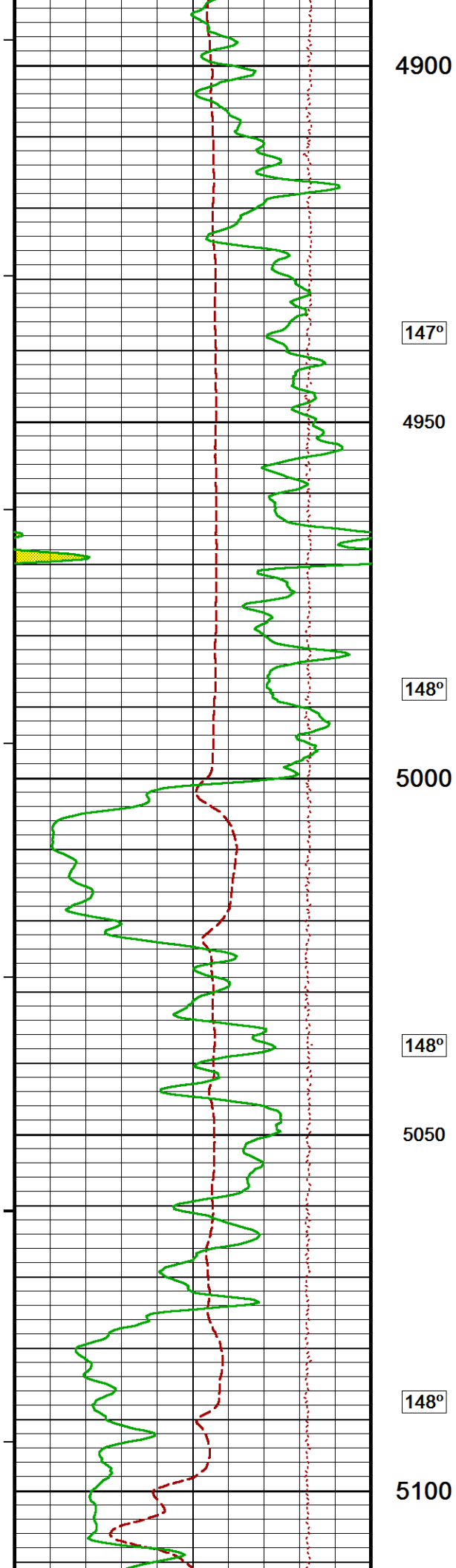


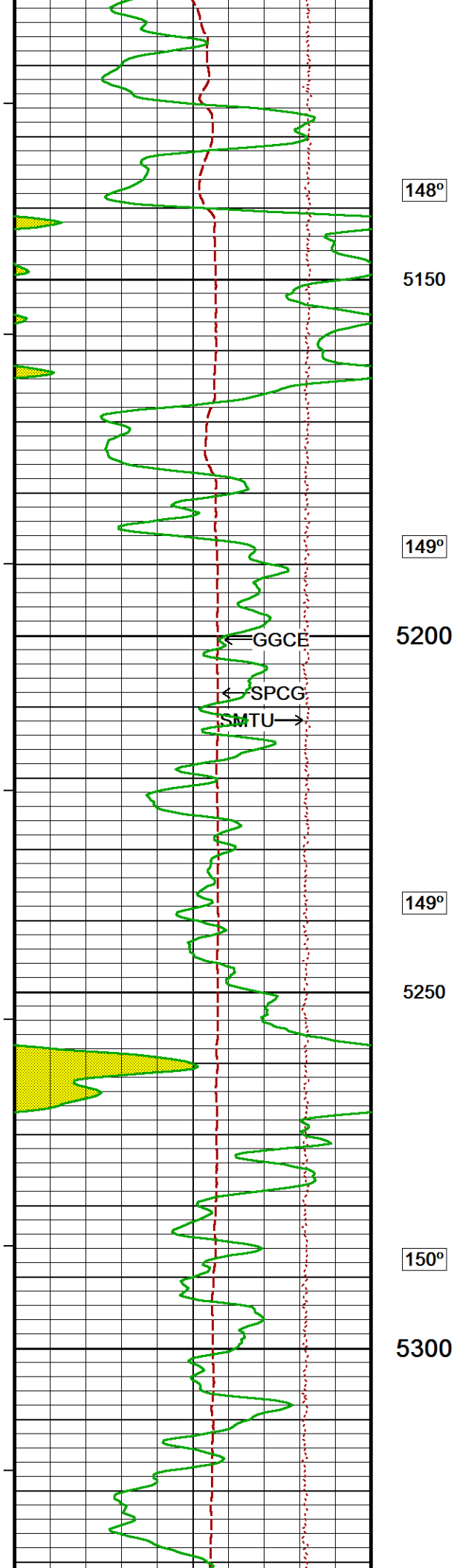












148°

5150

149°

5200

149°

5250

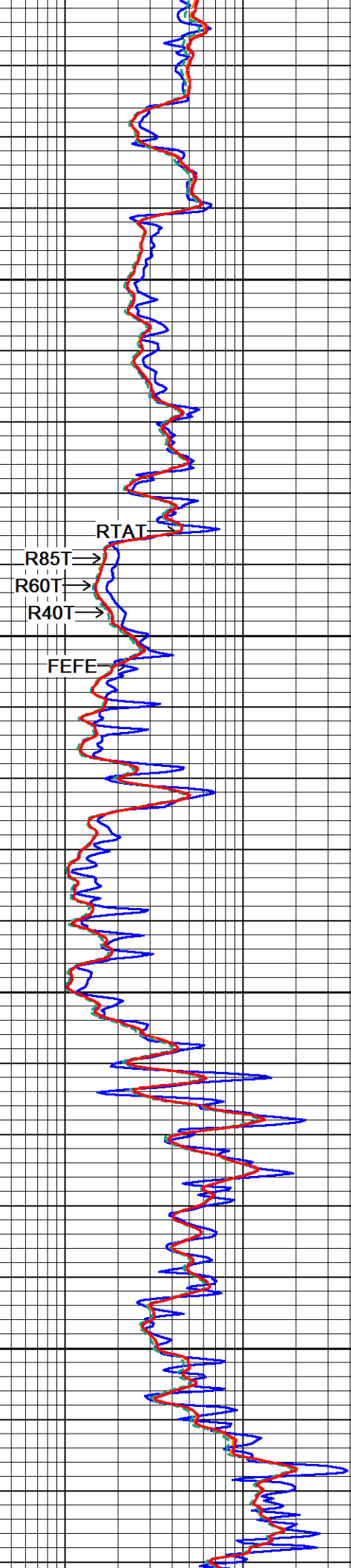
150°

5300

GGCE

SPCG

SMTU



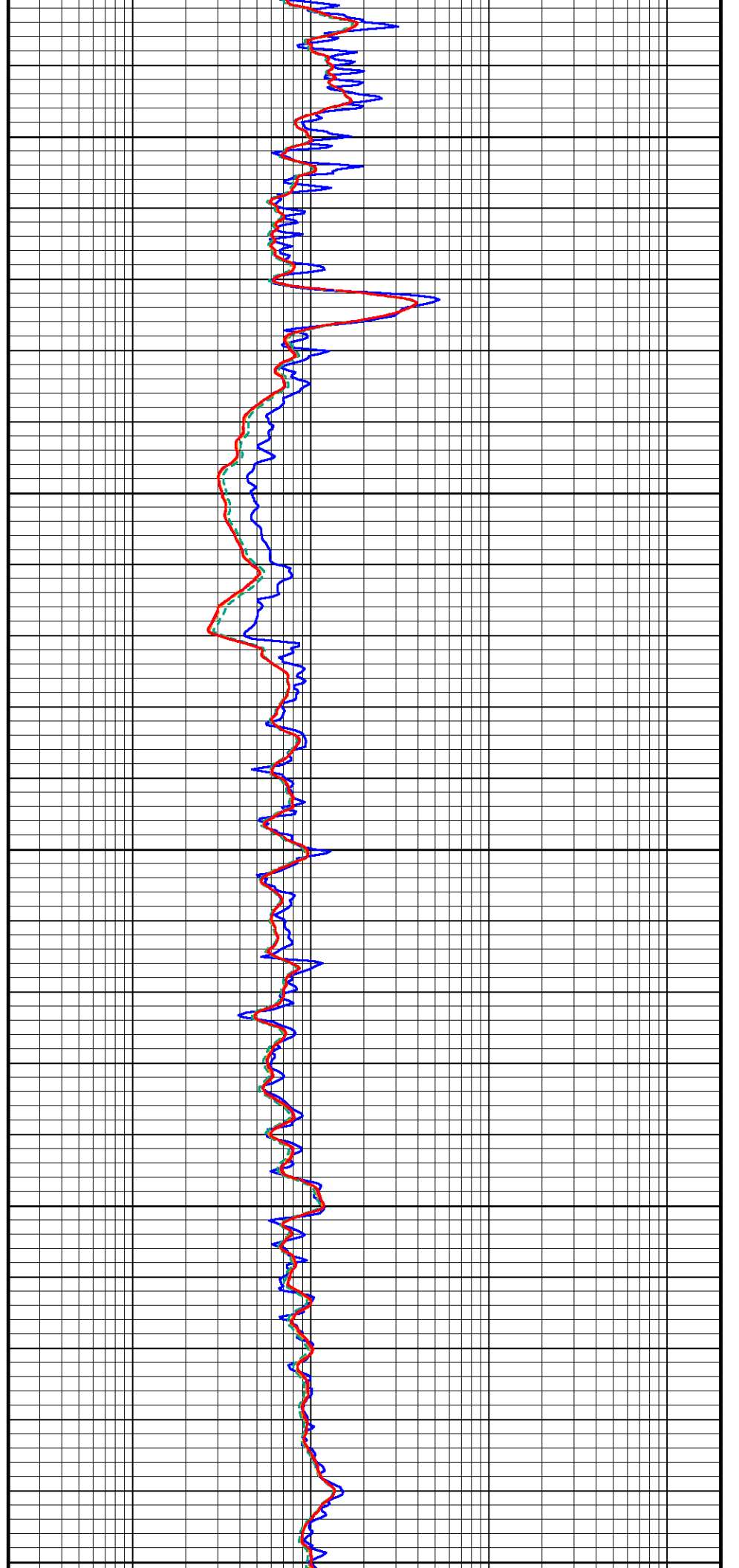
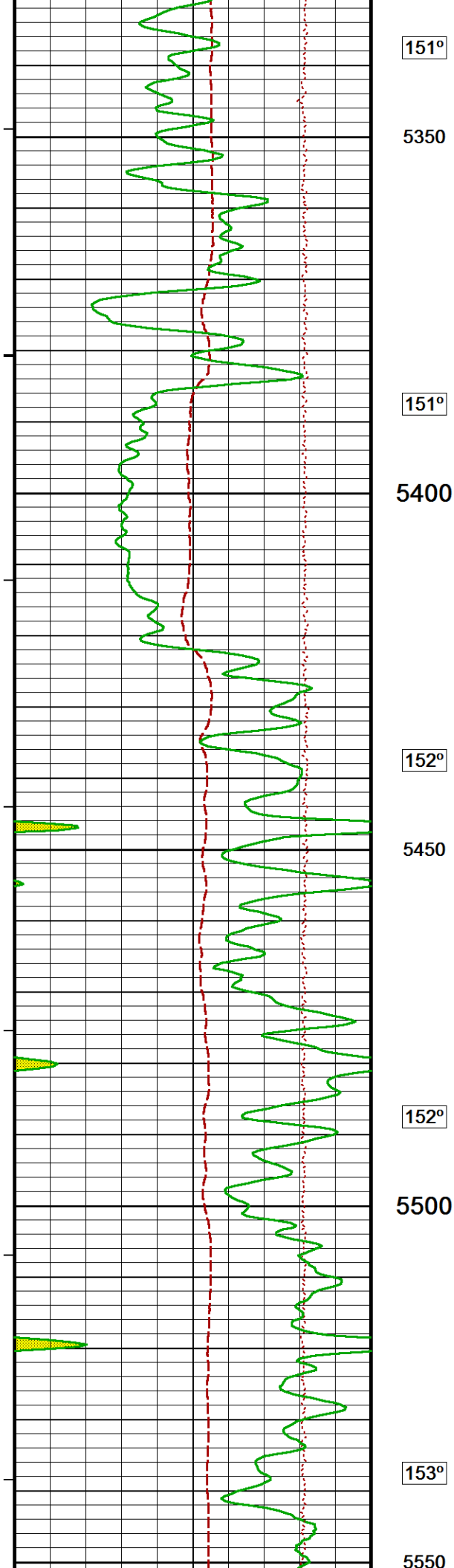
RTAT

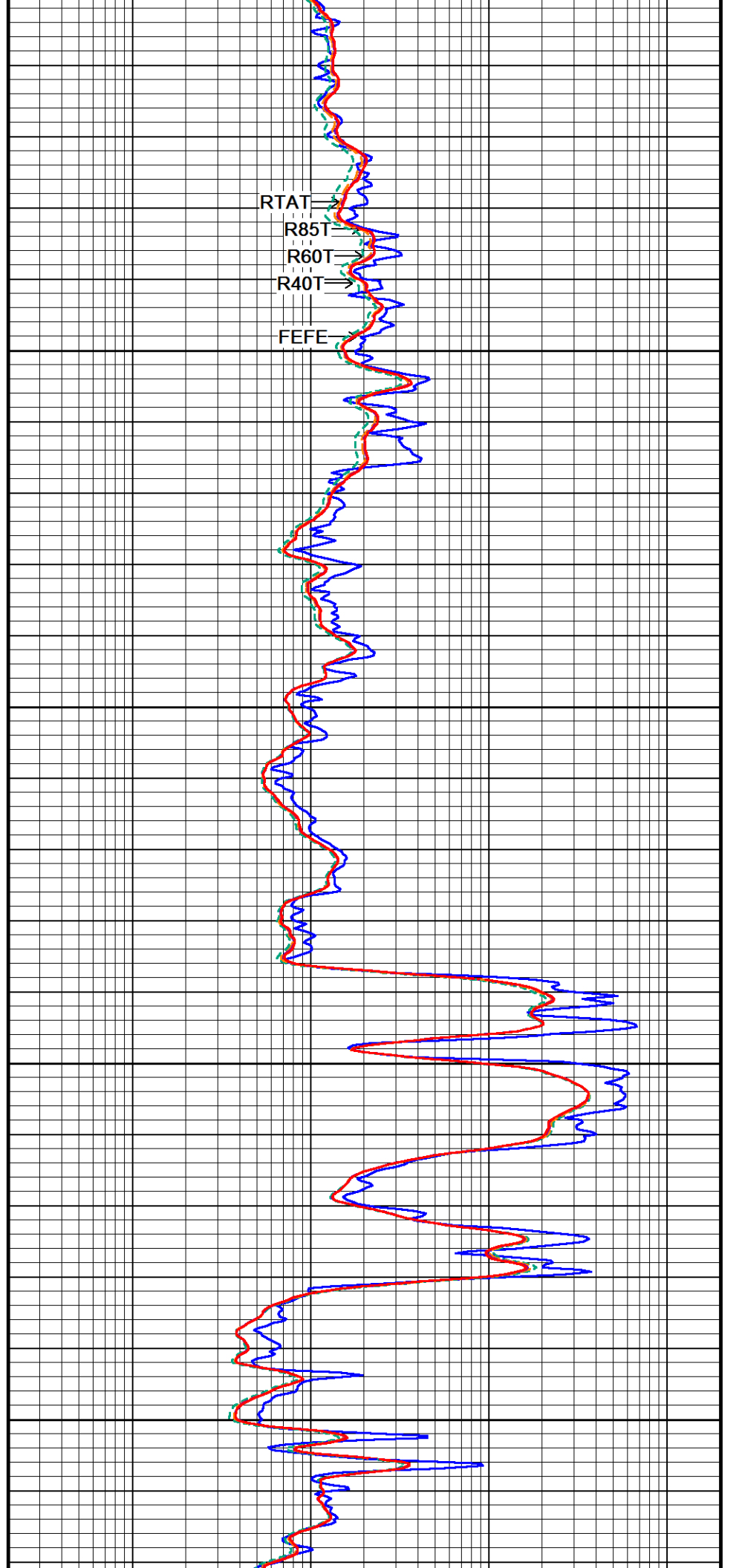
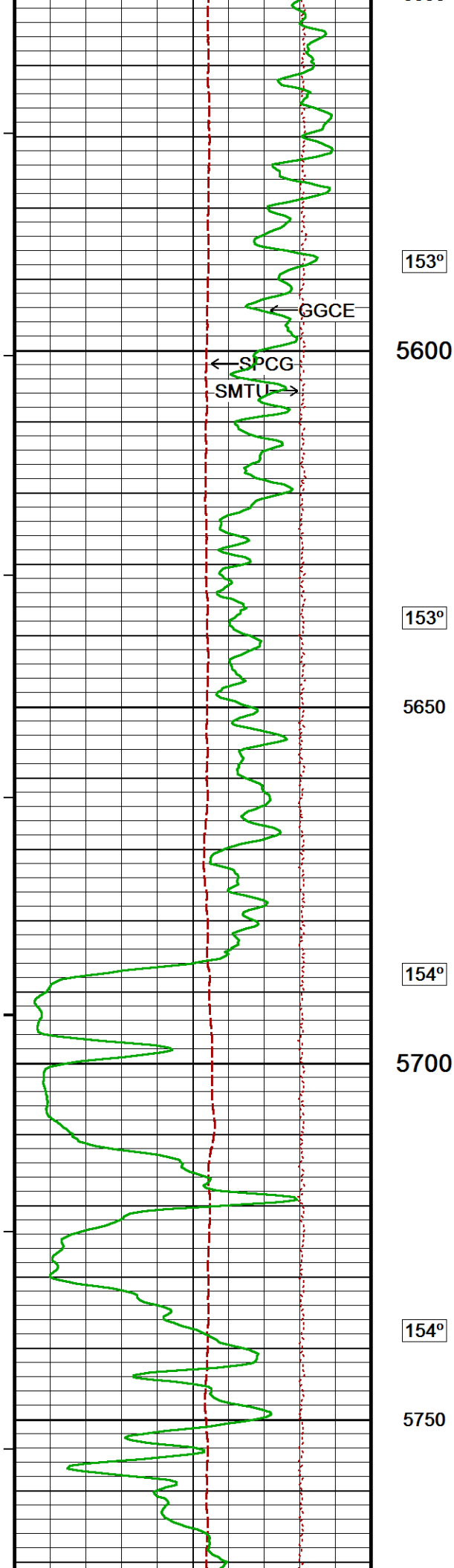
R85T

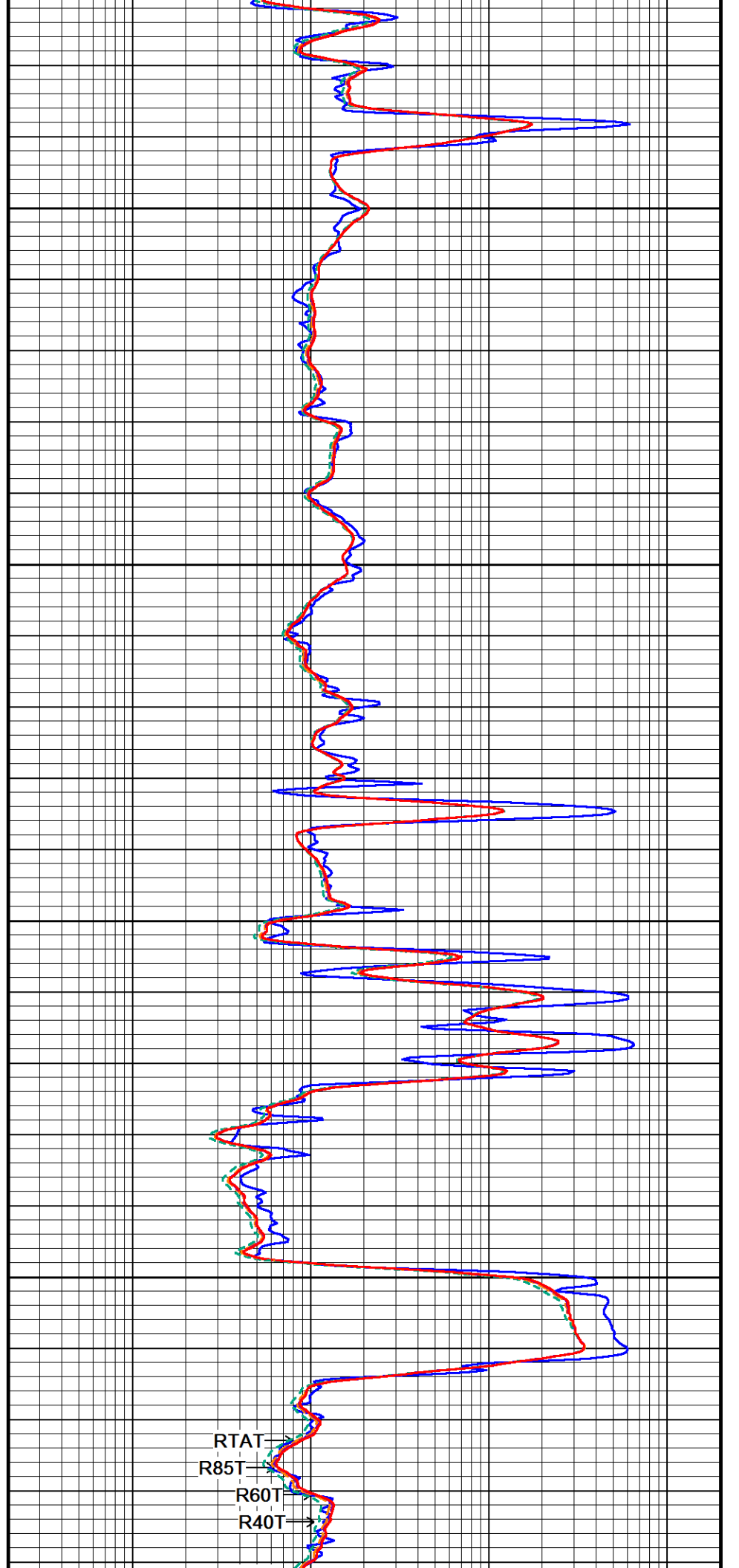
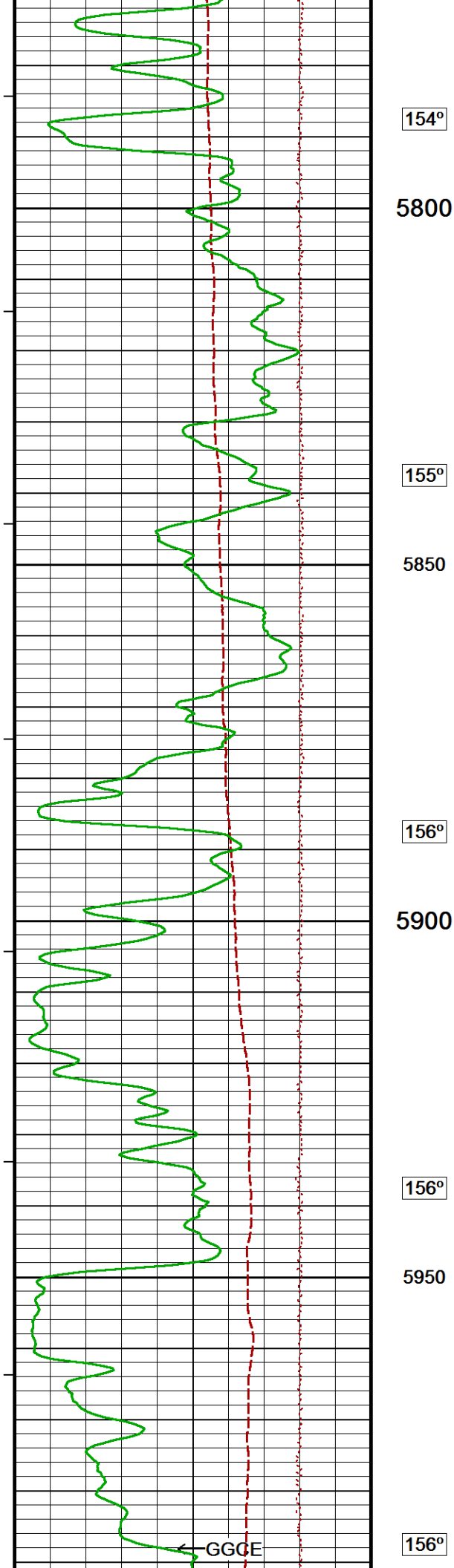
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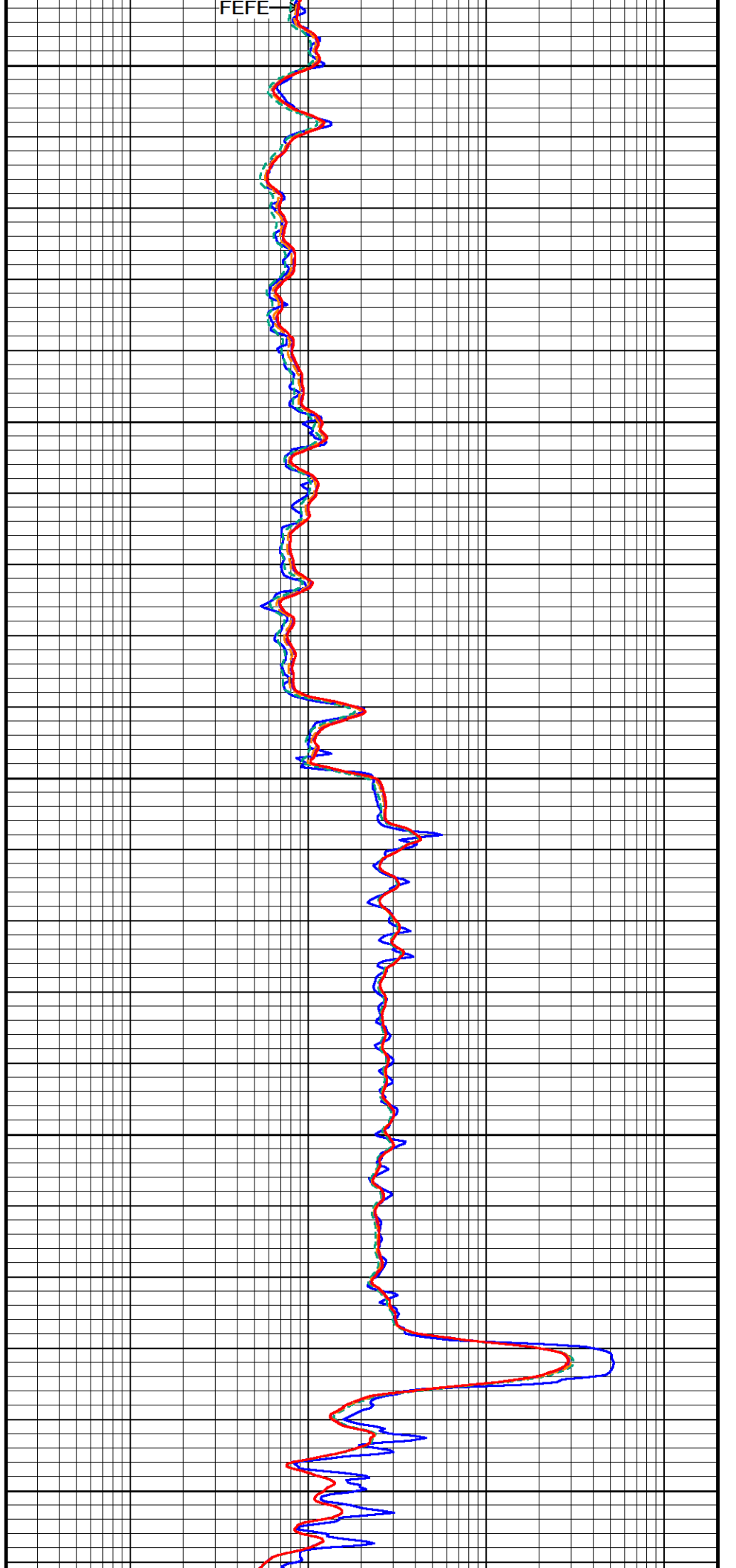
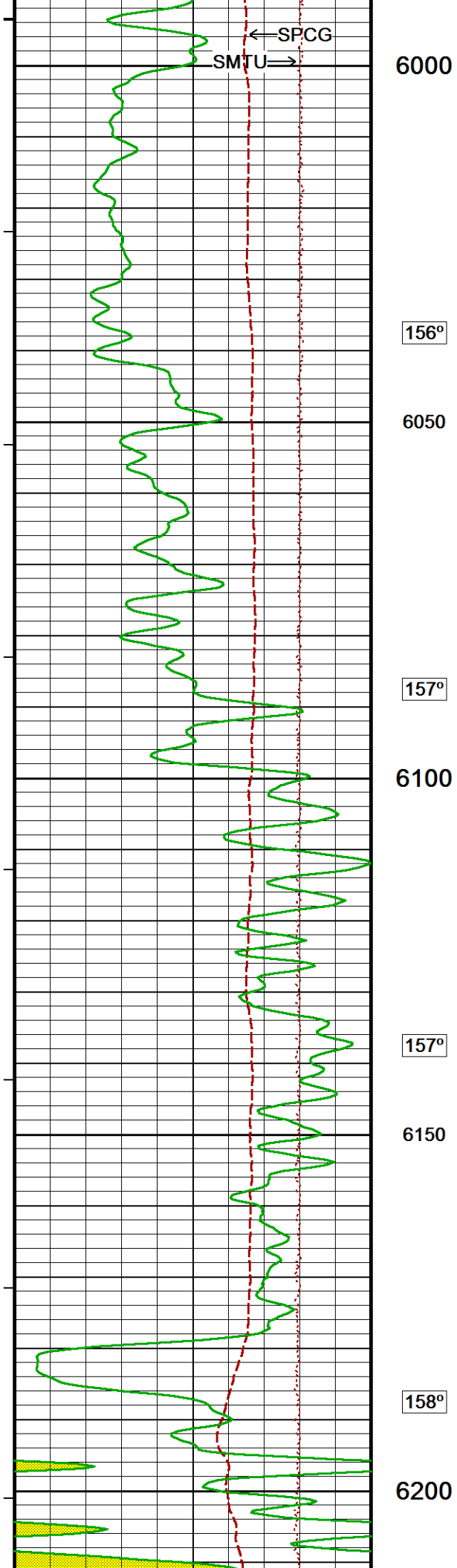
R40T

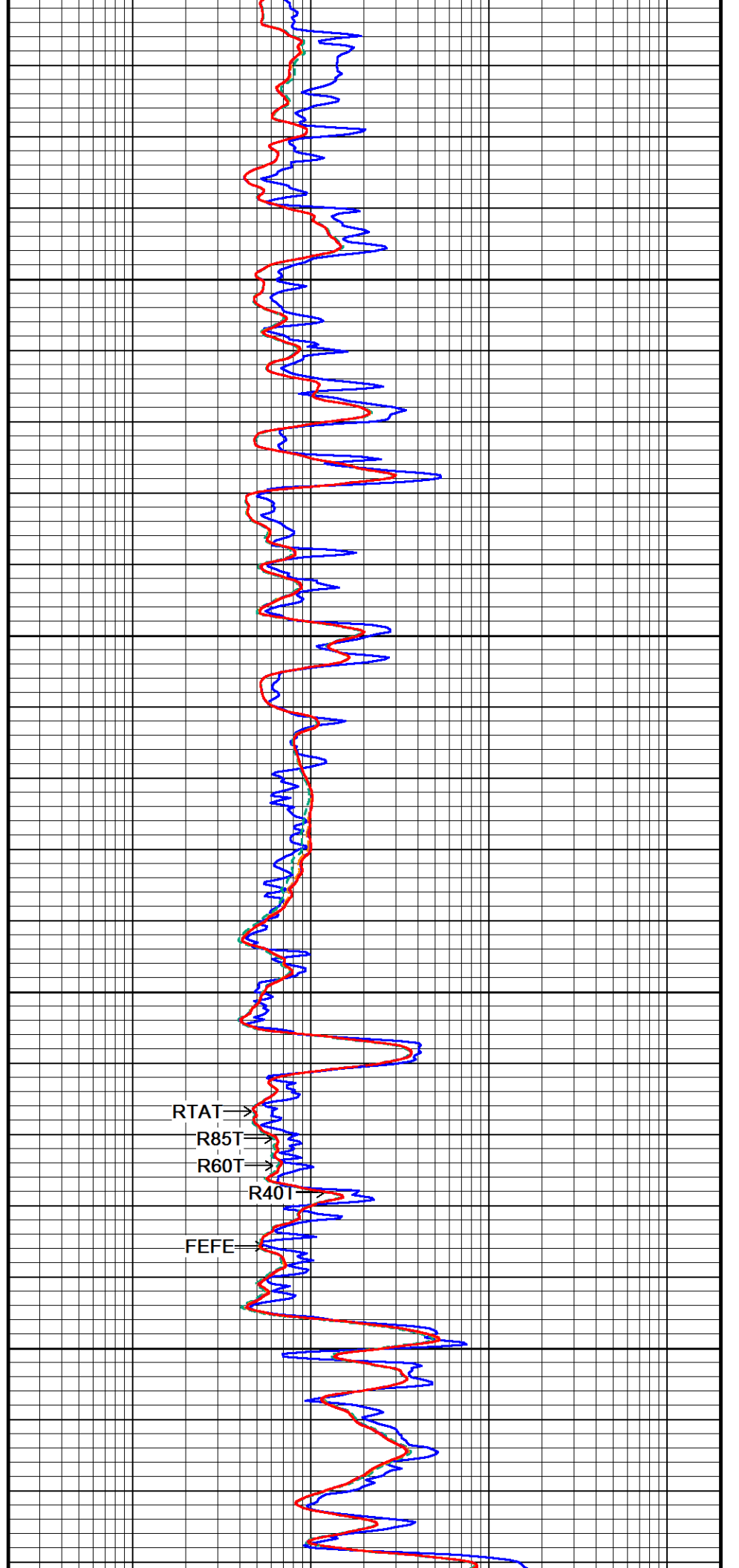
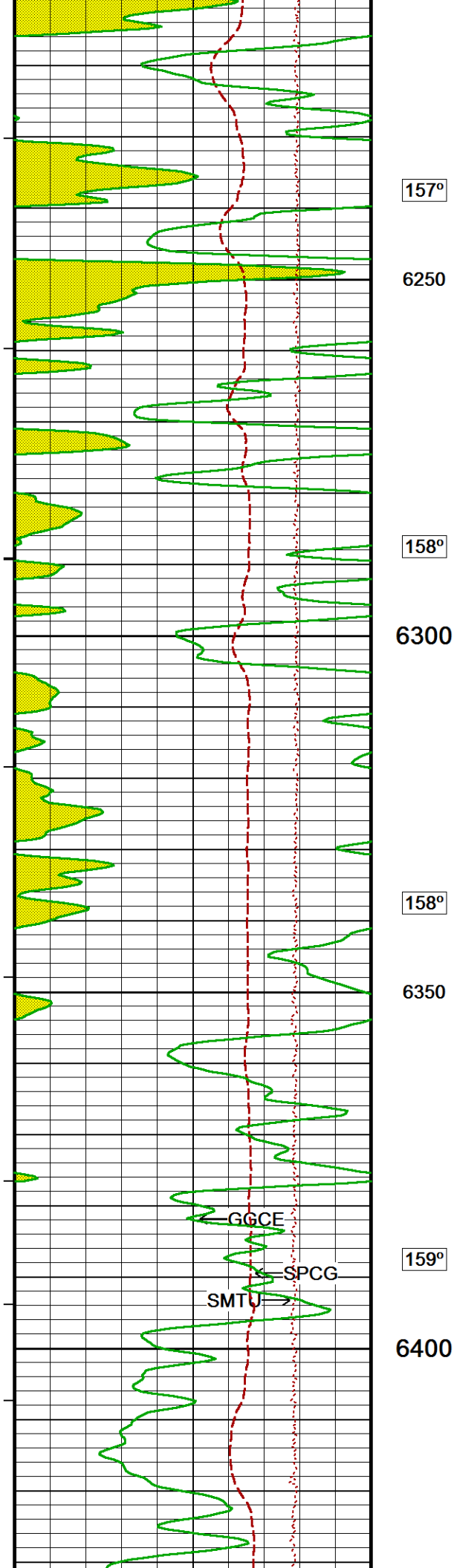
FEFE

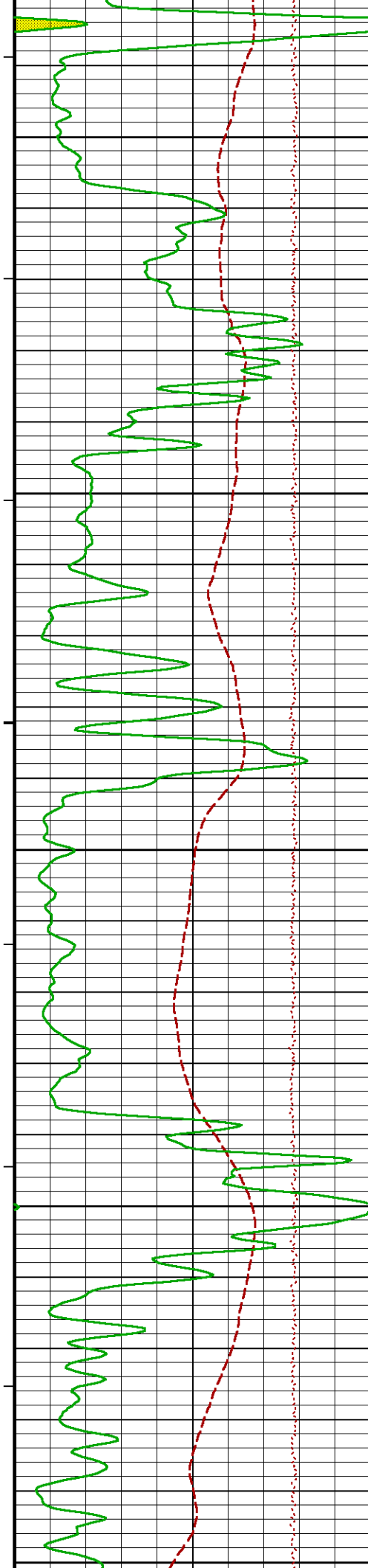












160°

6450

160°

6500

160°

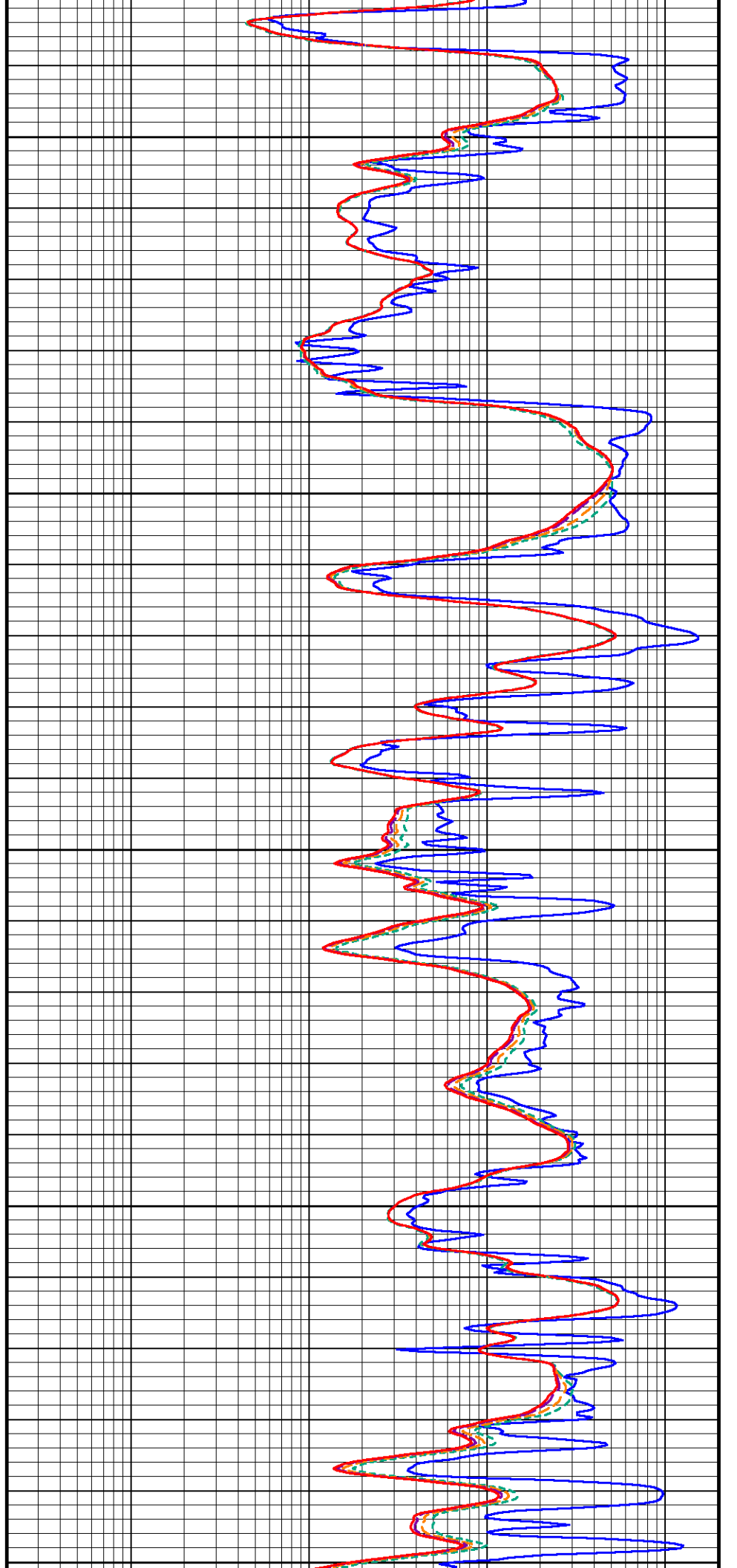
6550

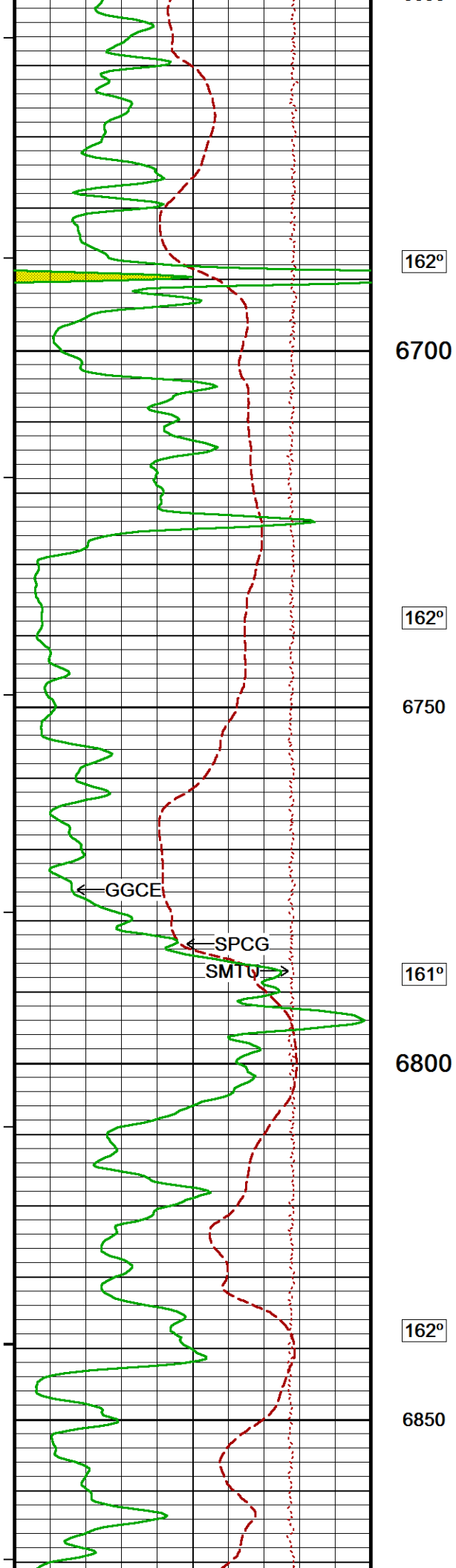
161°

6600

161°

6650





162°

6700

162°

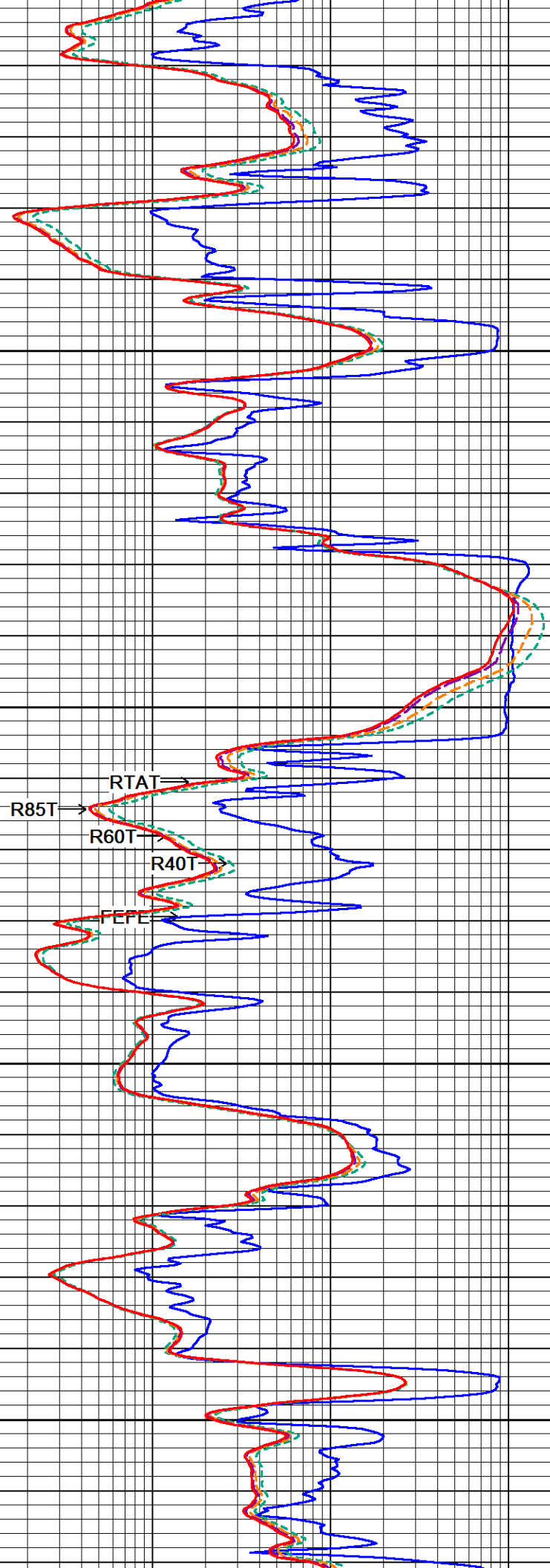
6750

161°

6800

162°

6850



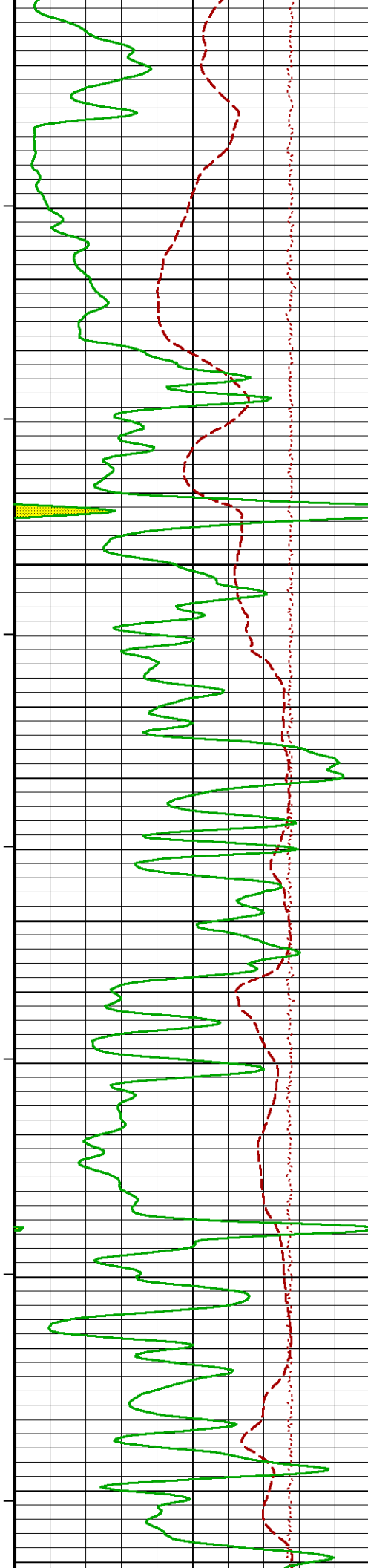
R85T

RTAT

R60T

R40T

FEFE



162°

6900

162°

6950

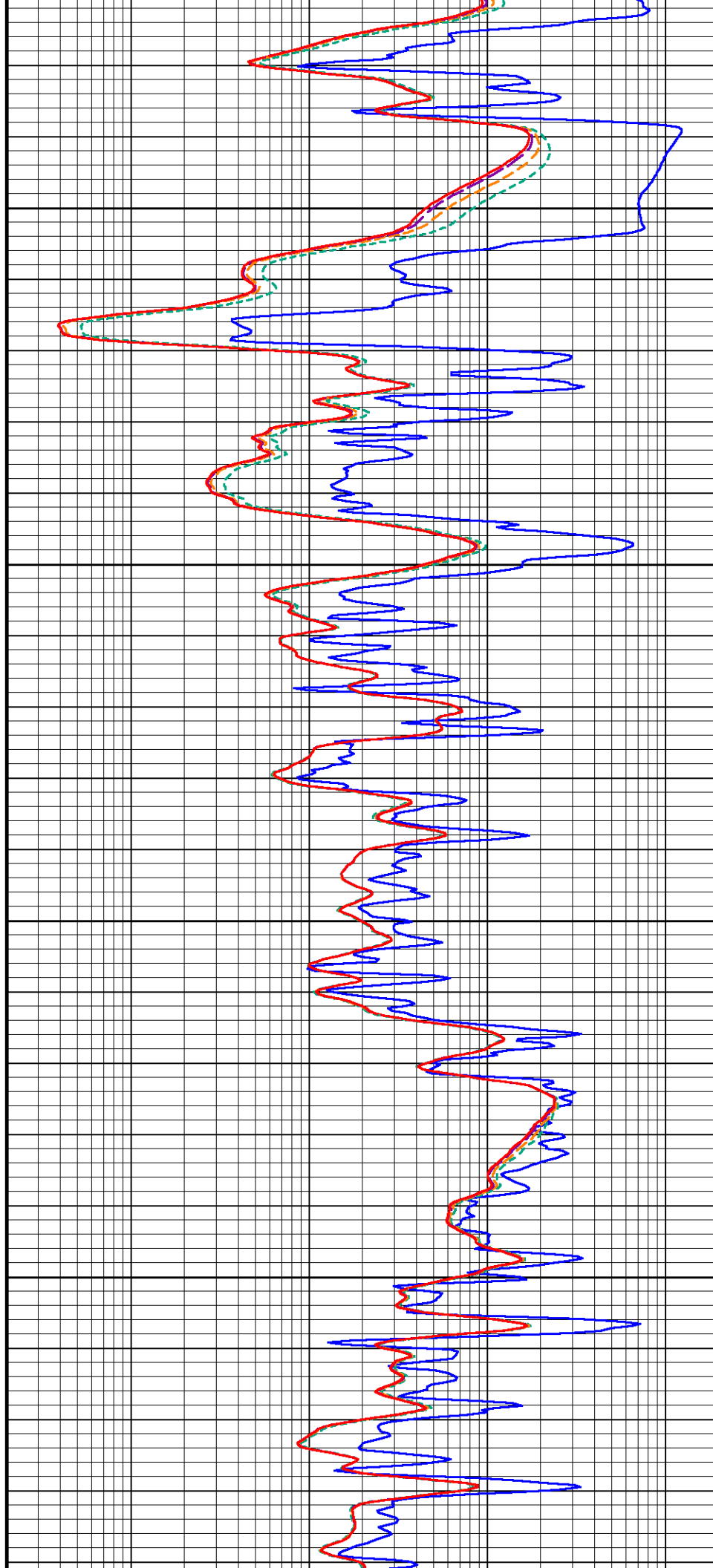
163°

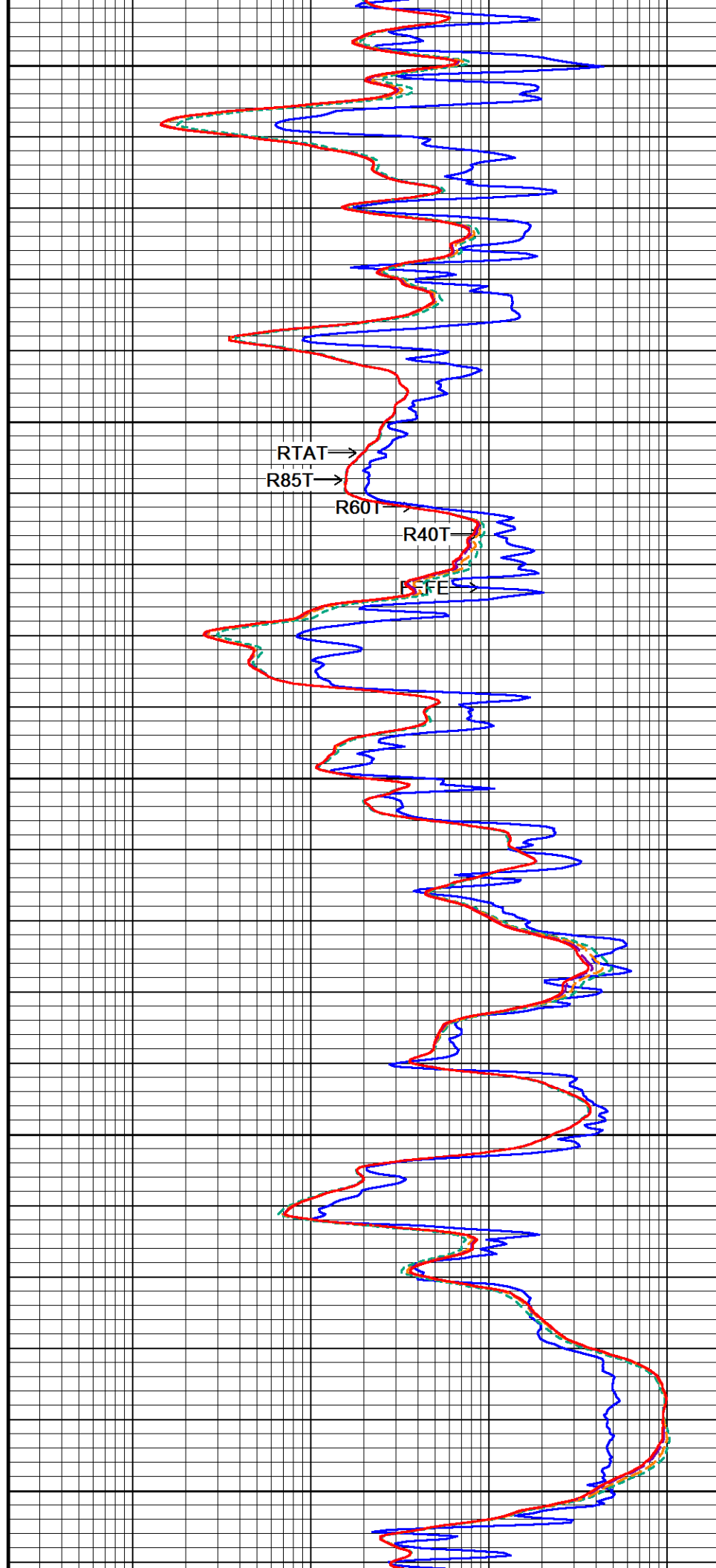
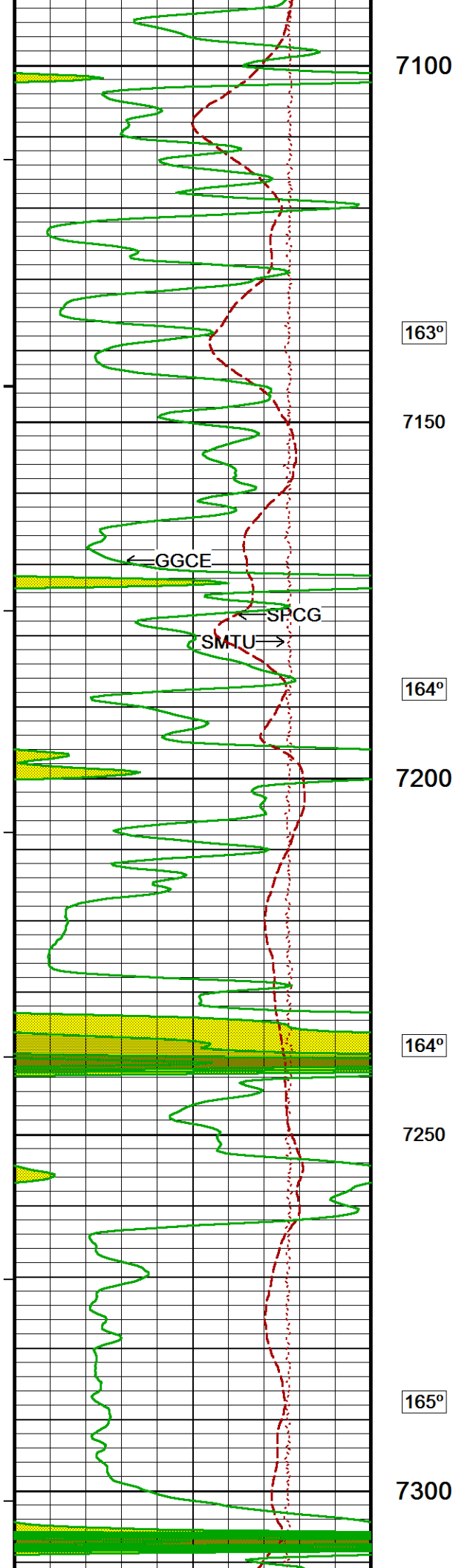
7000

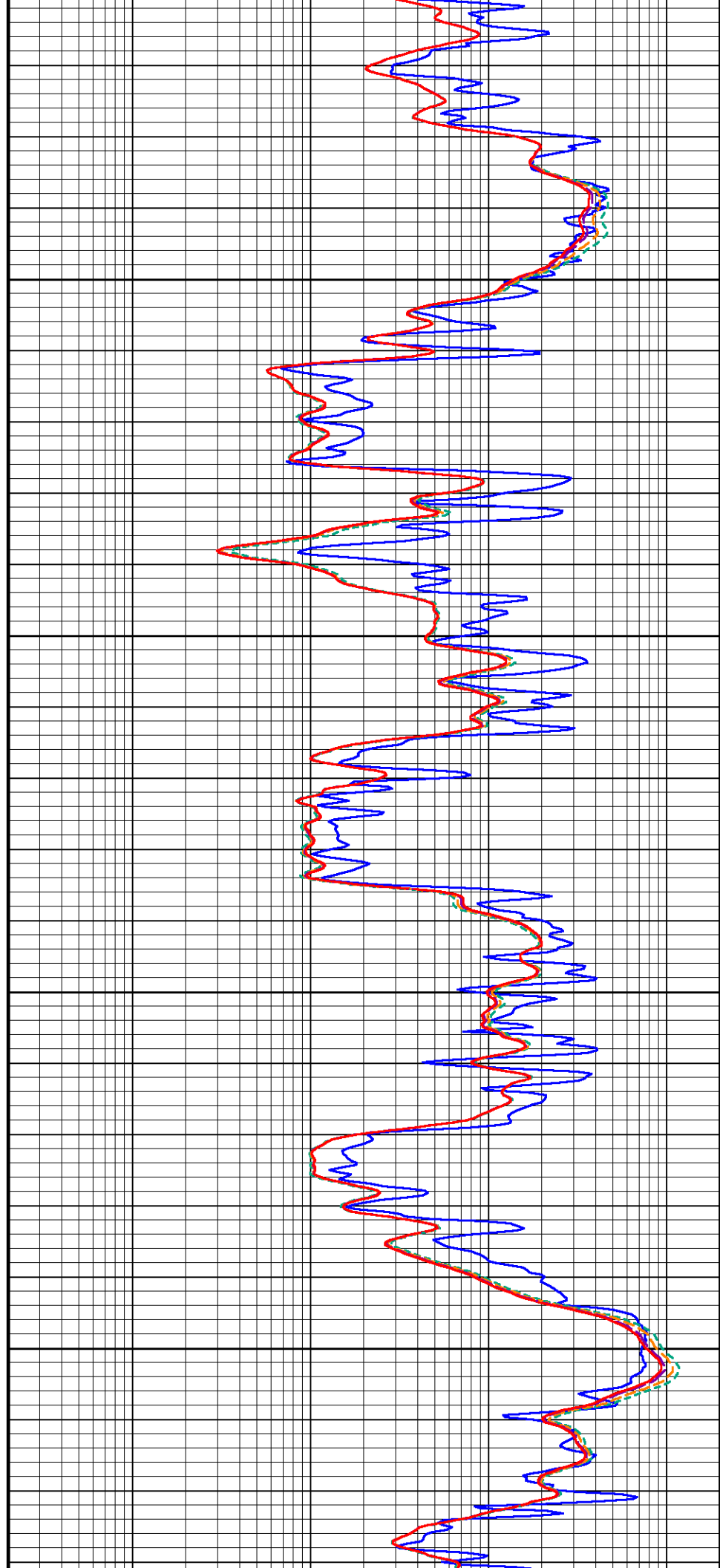
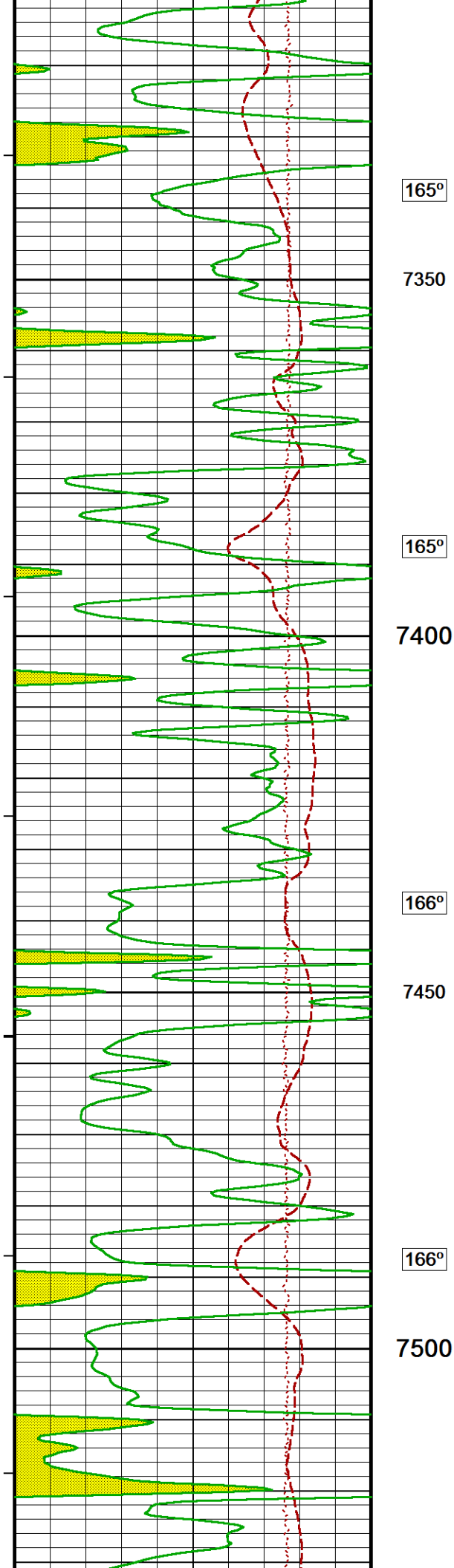
163°

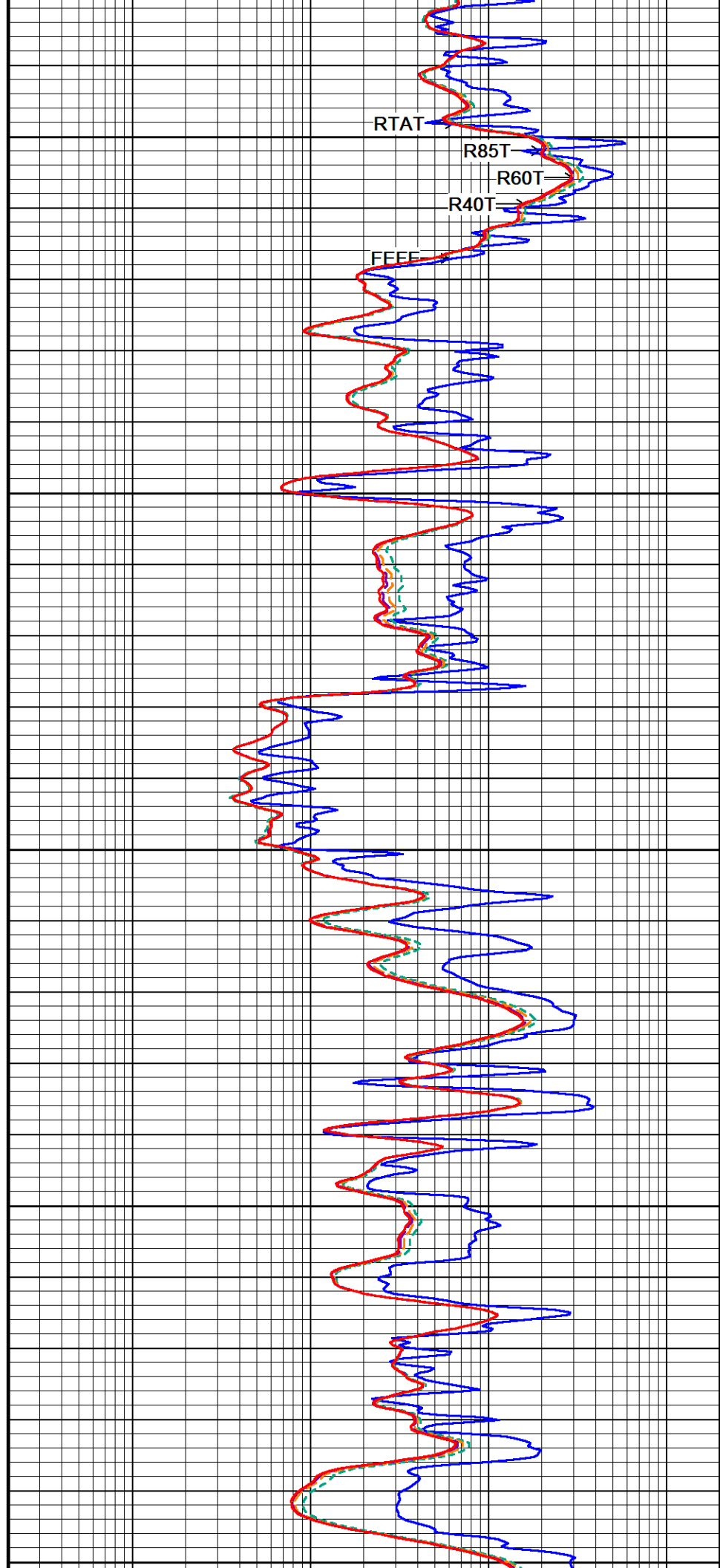
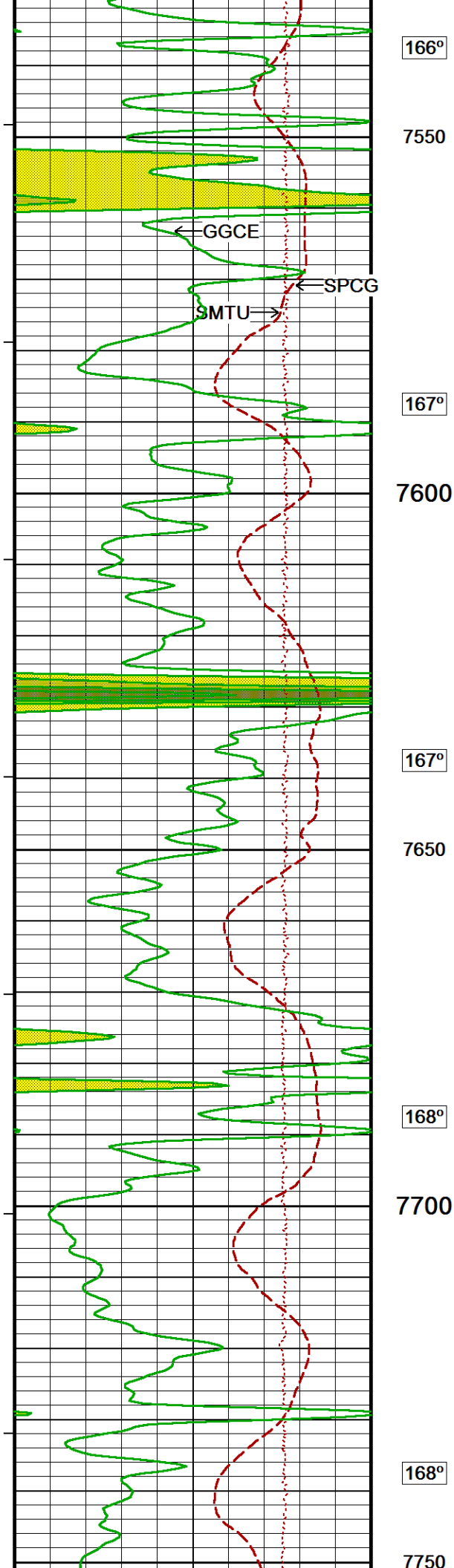
7050

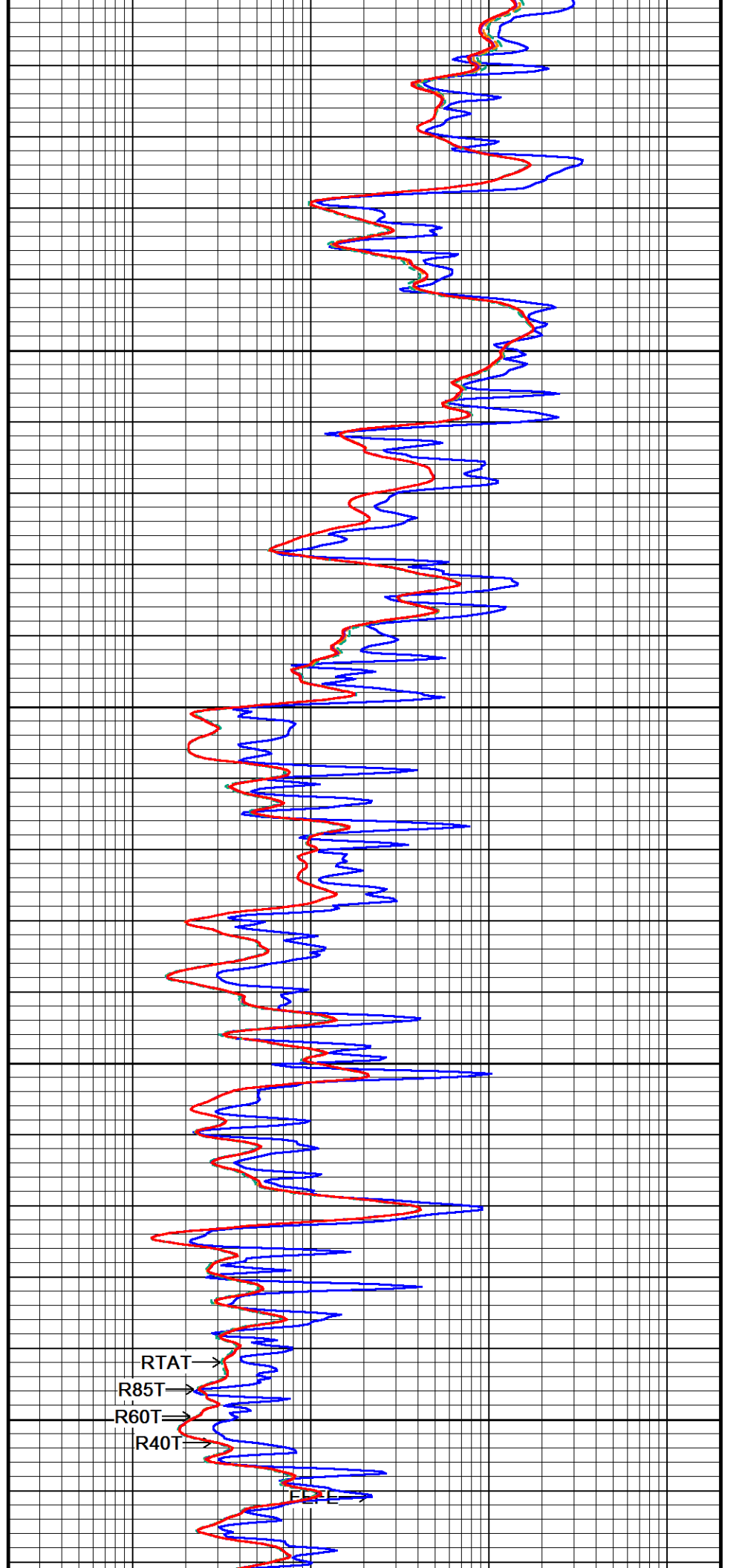
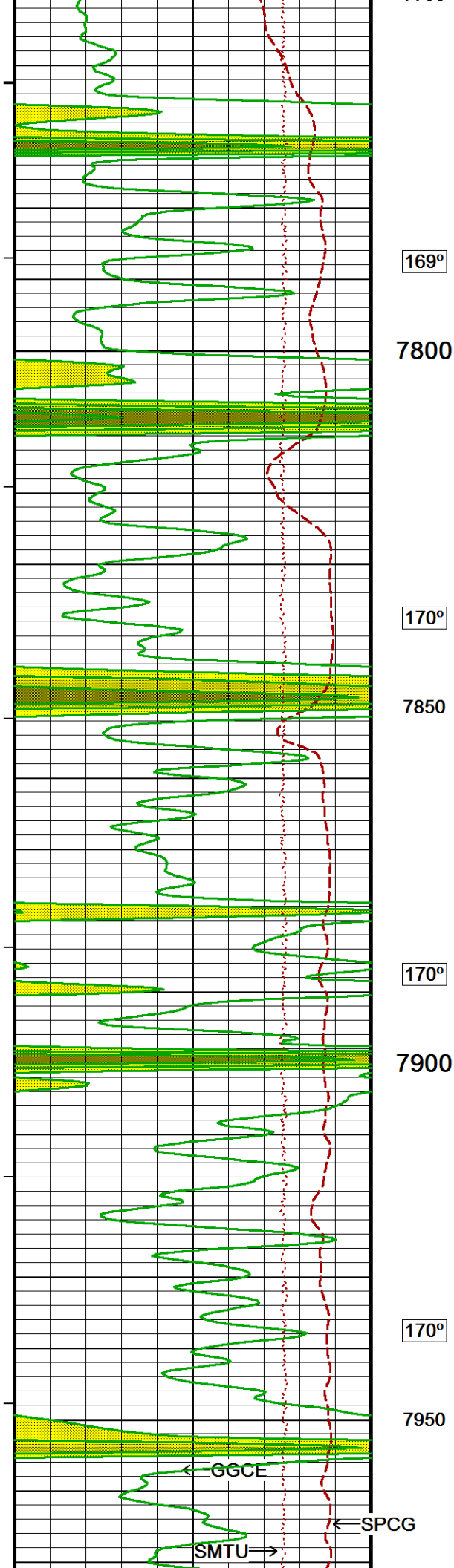
163°

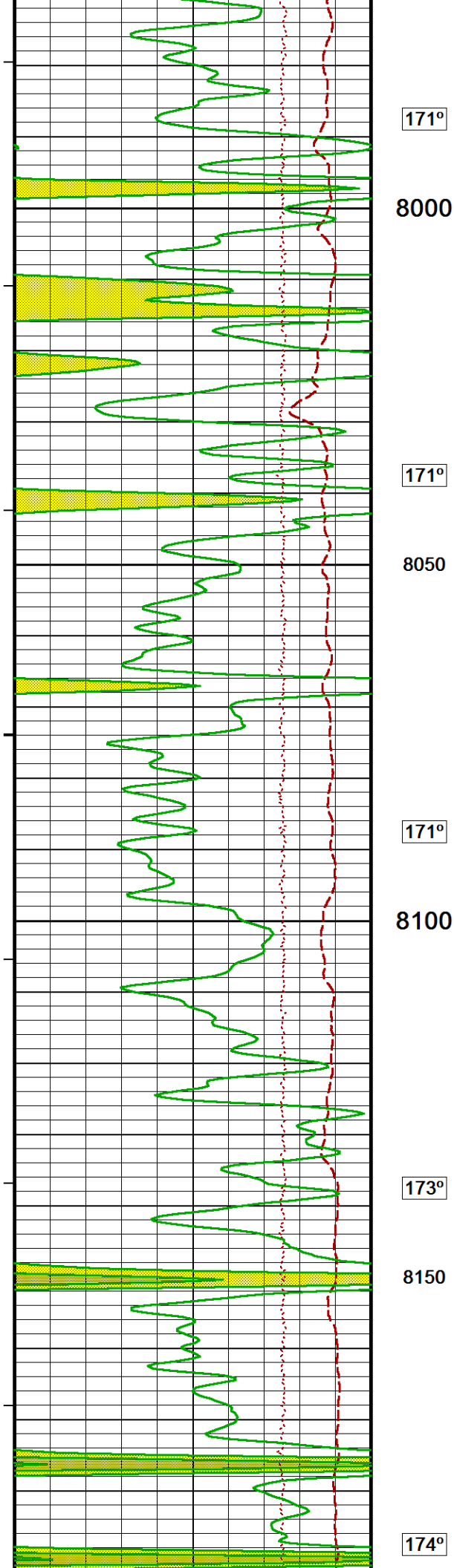












171°

8000

171°

8050

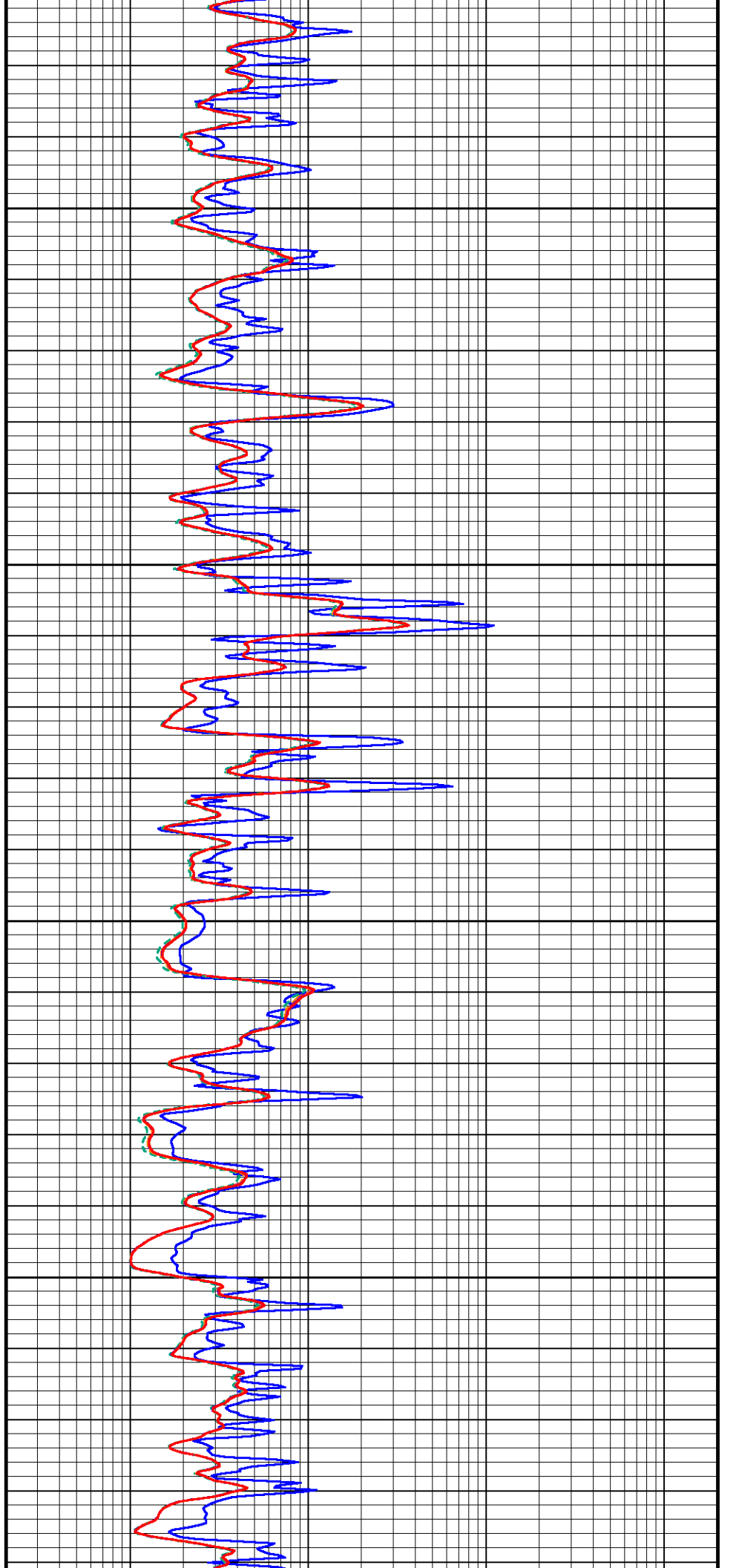
171°

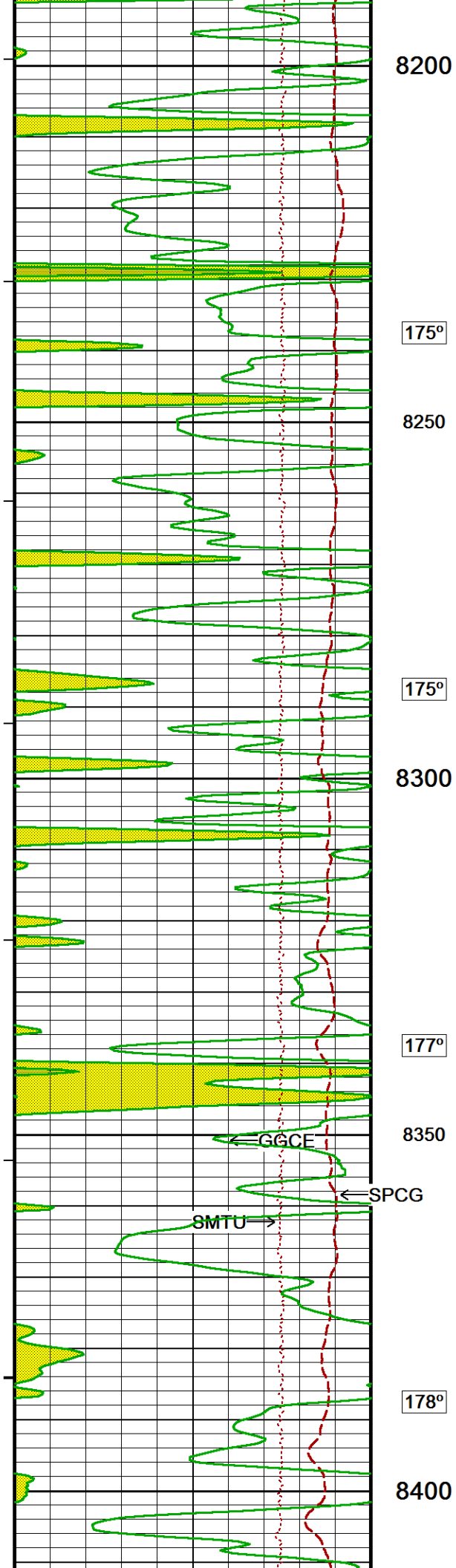
8100

173°

8150

174°





8200

175°

8250

175°

8300

177°

8350

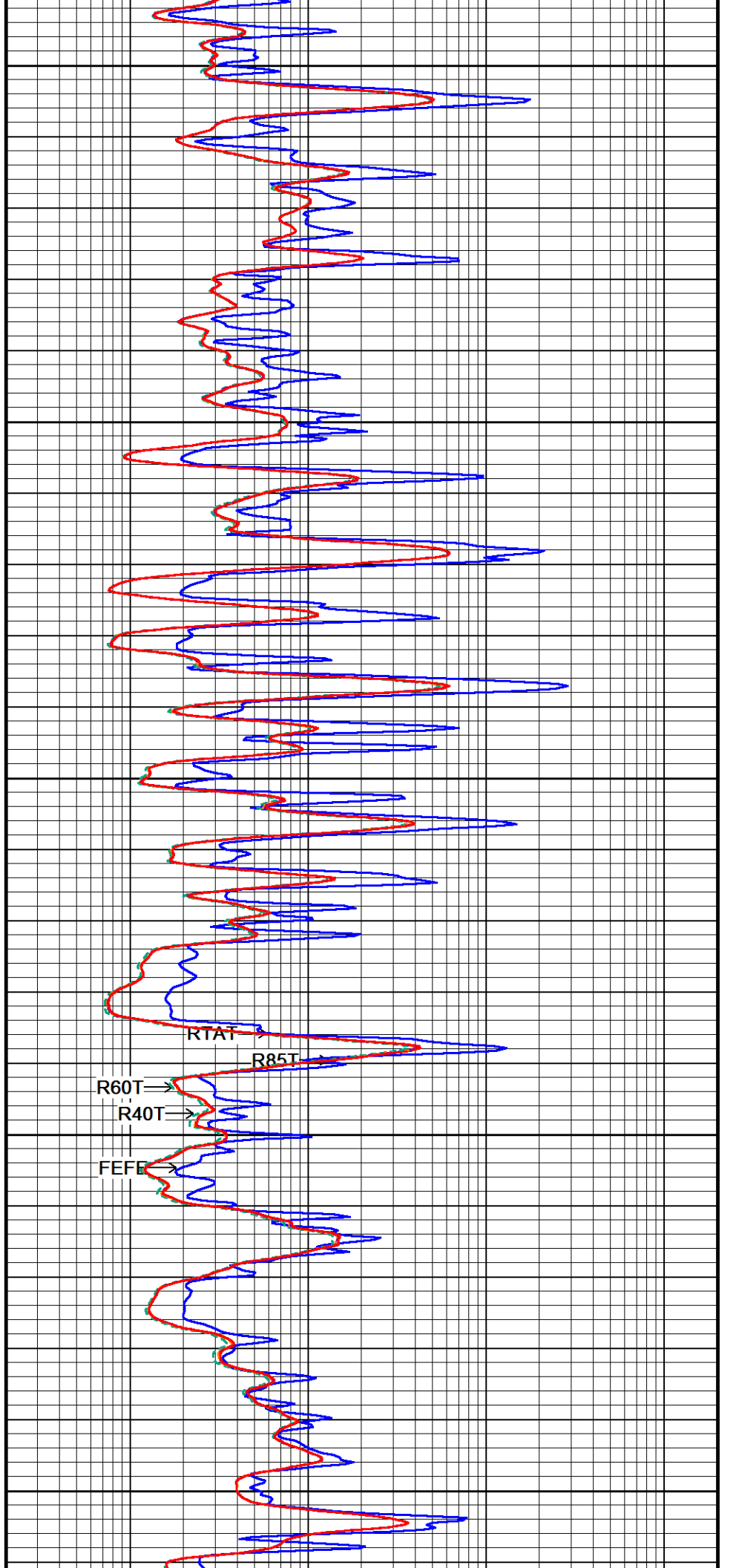
178°

8400

SMTU →

← GGCE

← SPCG



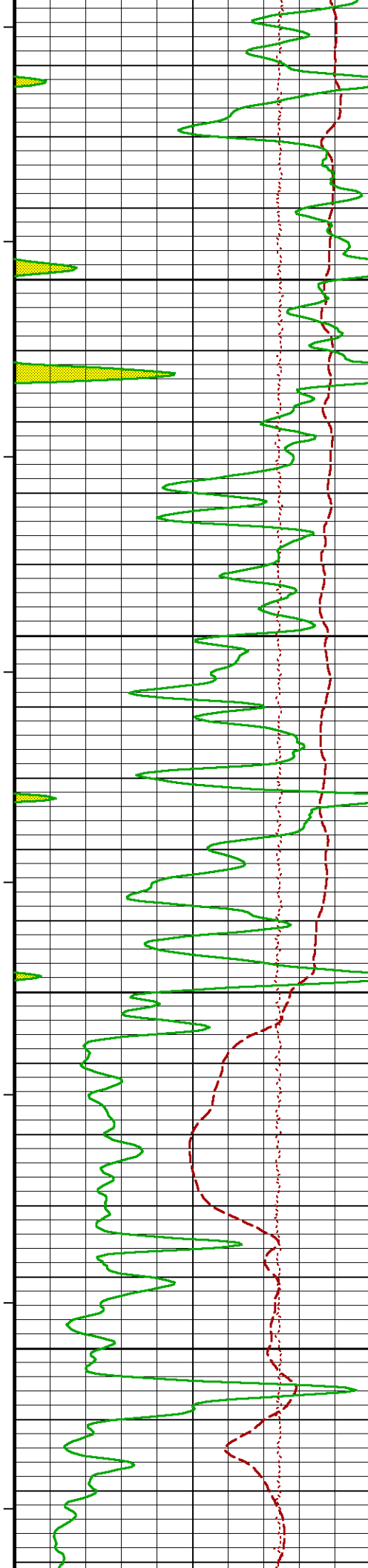
RTAT →

R85T →

R60T →

R40T →

FEFE →



179°

8450

181°

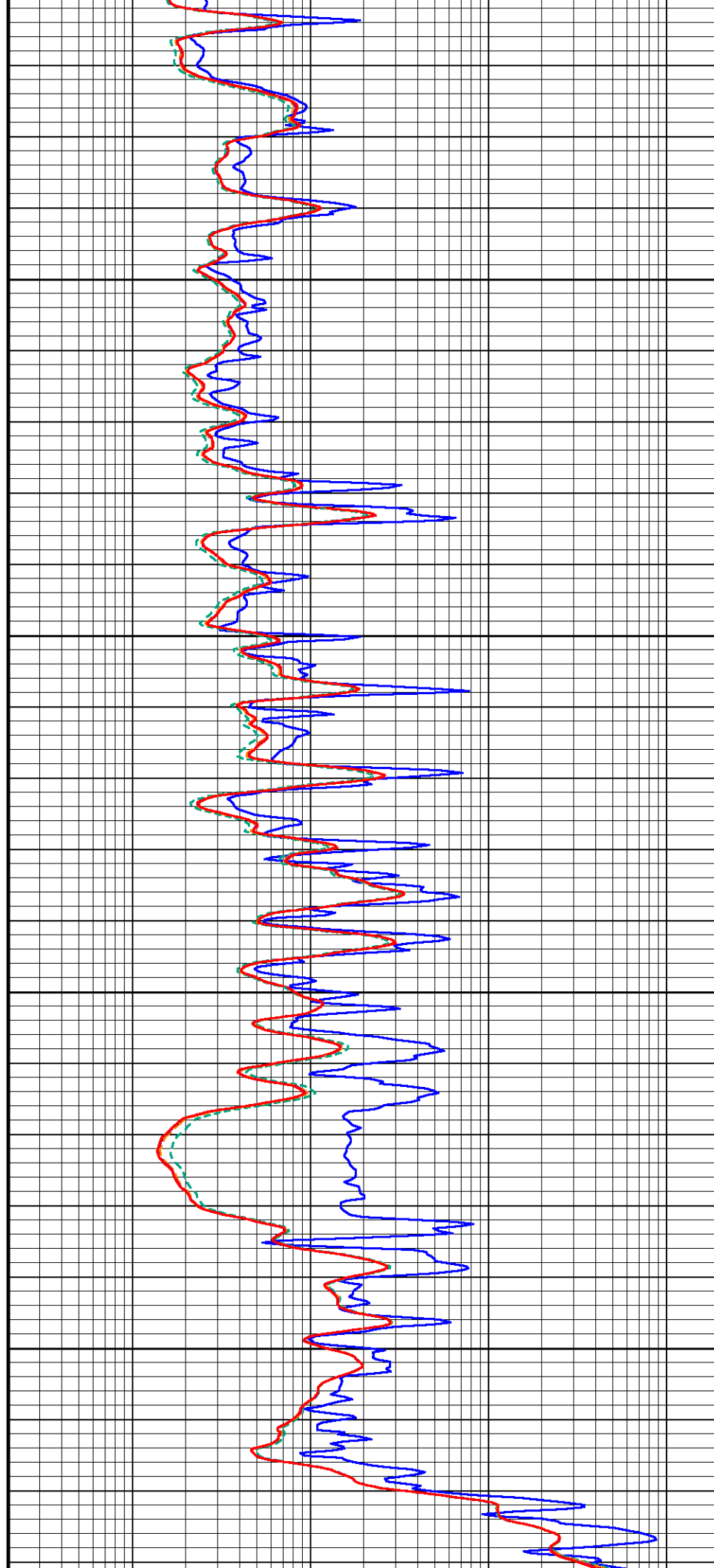
8500

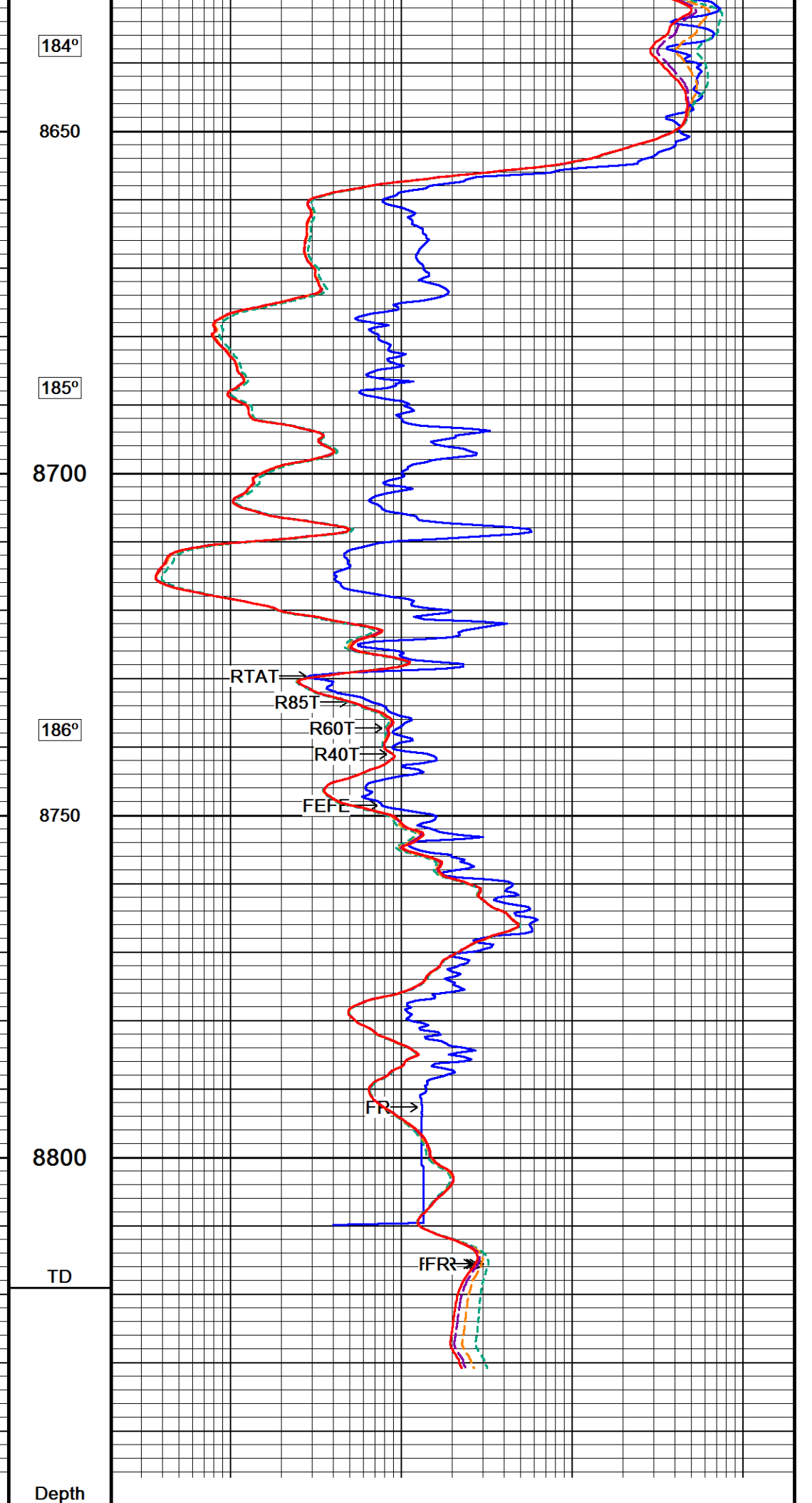
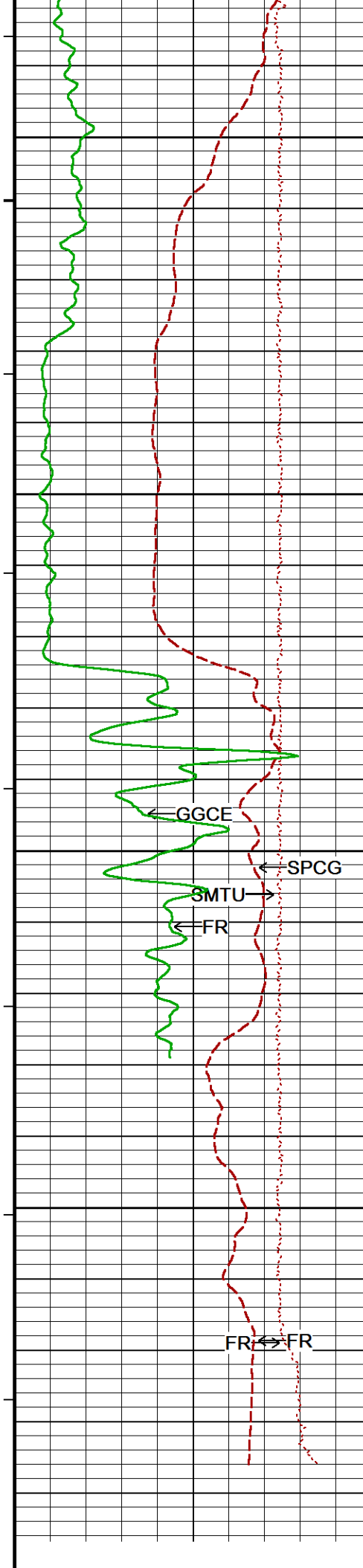
183°

8550

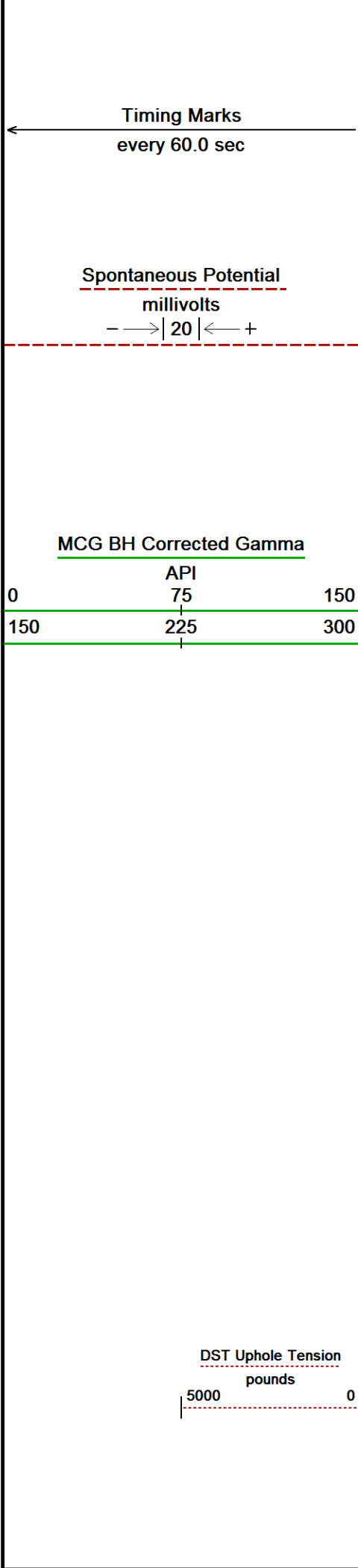
183°

8600





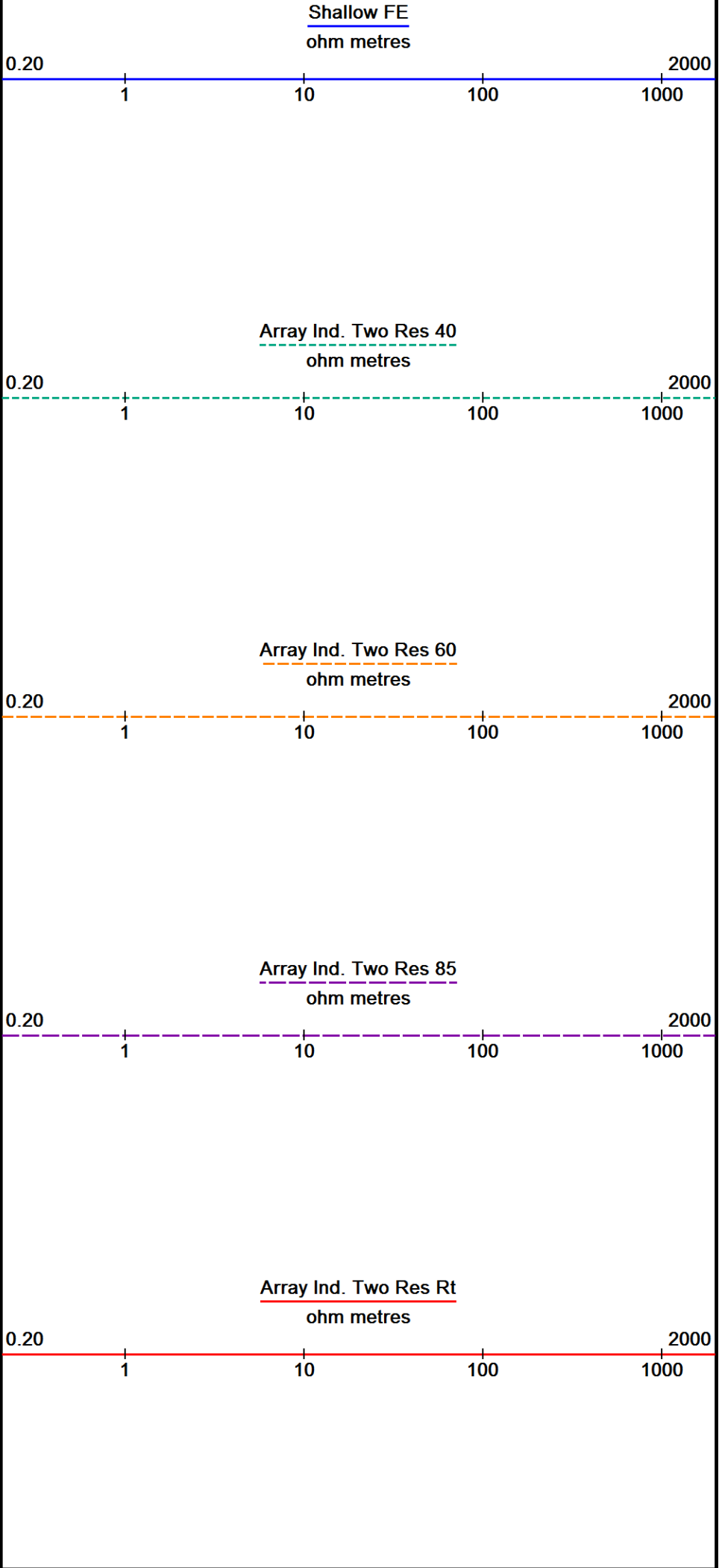
Depth



In
Feet

Borehole
Temp in
deg F

Replay
Scale
1:240



↑

5 INCH MAIN PASS 1:240

↑

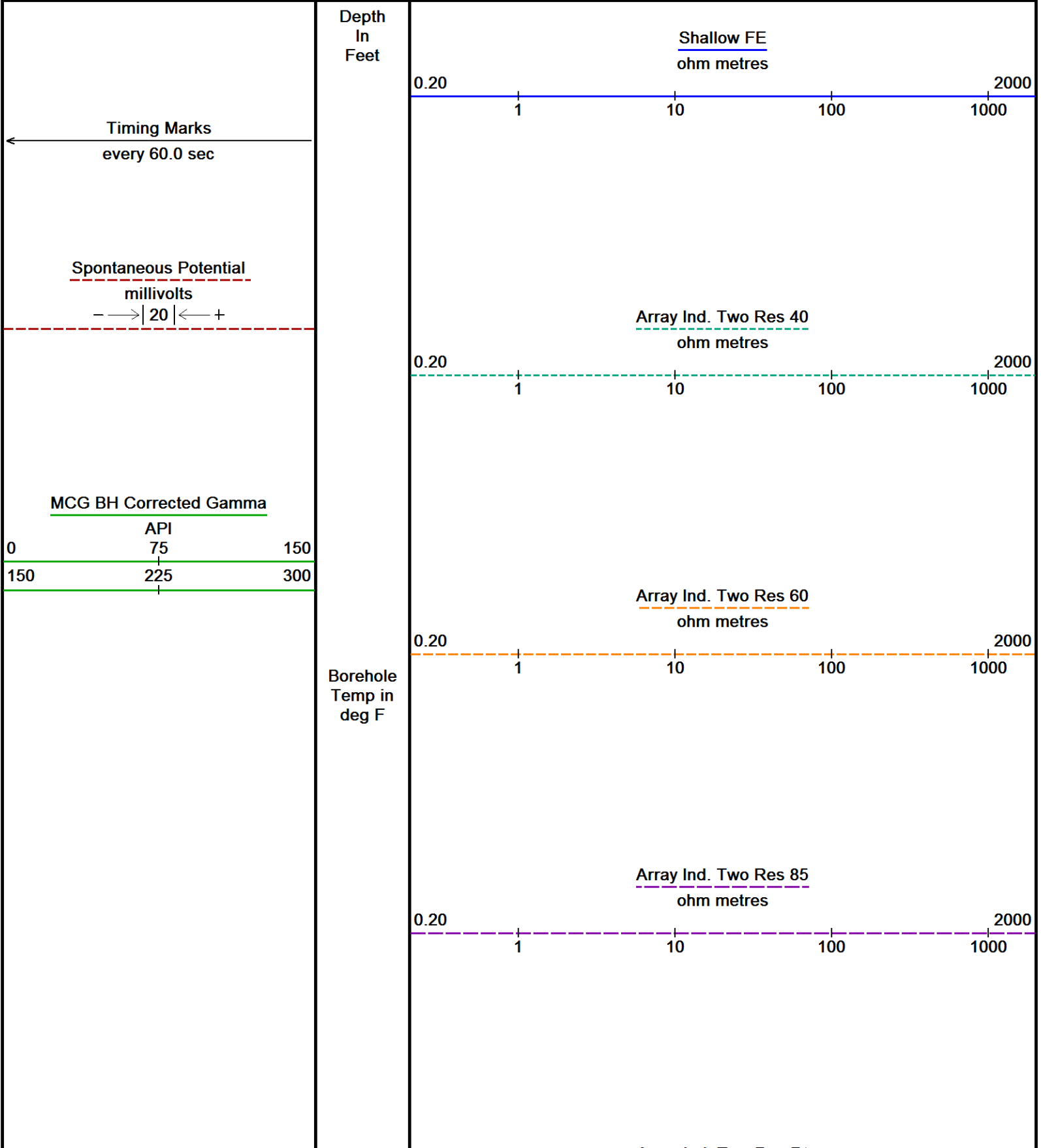
↓

5 INCH REPEAT PASS 1:240

↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 17.05.5956\Data\MURFIN DRILLING (DAUNTLESS #15-1)\REPEAT PASS.dta
System Versions: Logged with 17.05.5956 Plotted with 17.05.5956

Plotted on 16-DEC-2017 19:31
Recorded on 16-DEC-2017 12:47



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

8516

8550

180°

8600

181°

8650

183°

Array Ind. Two Res Rt

ohm metres

0.20

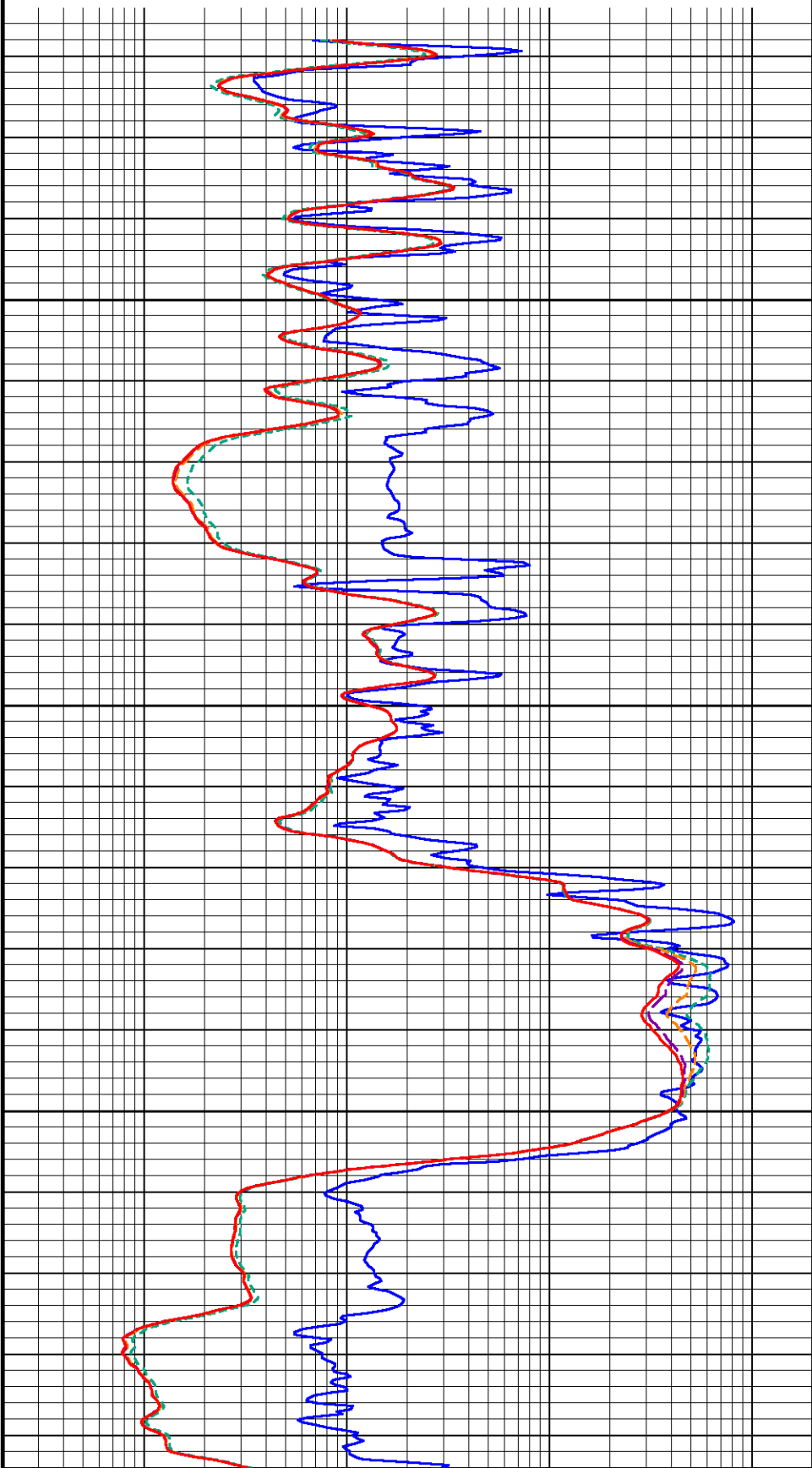
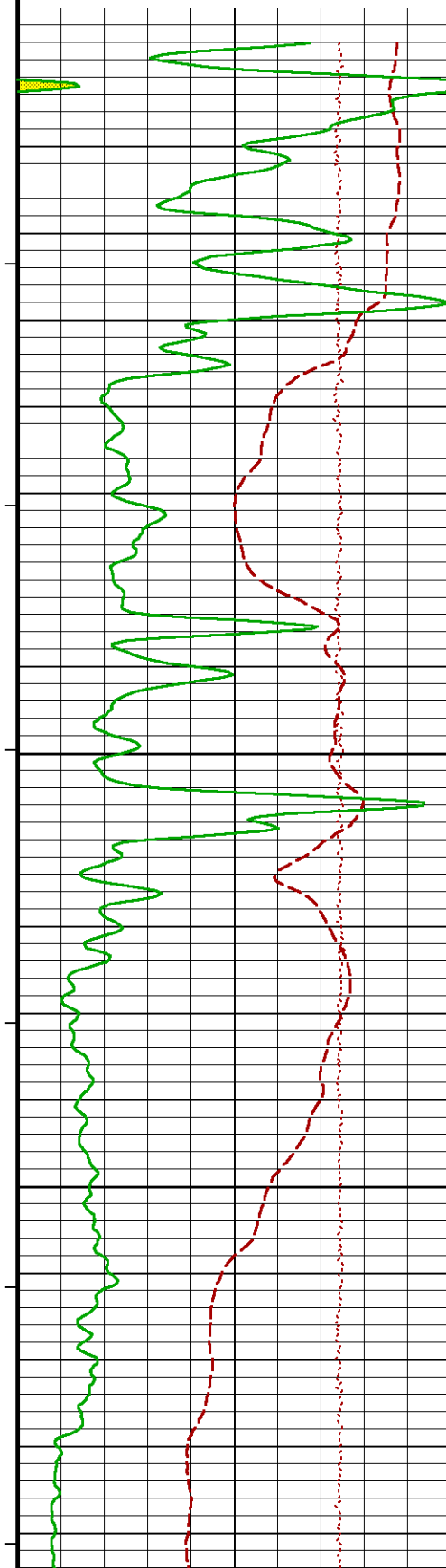
1

10

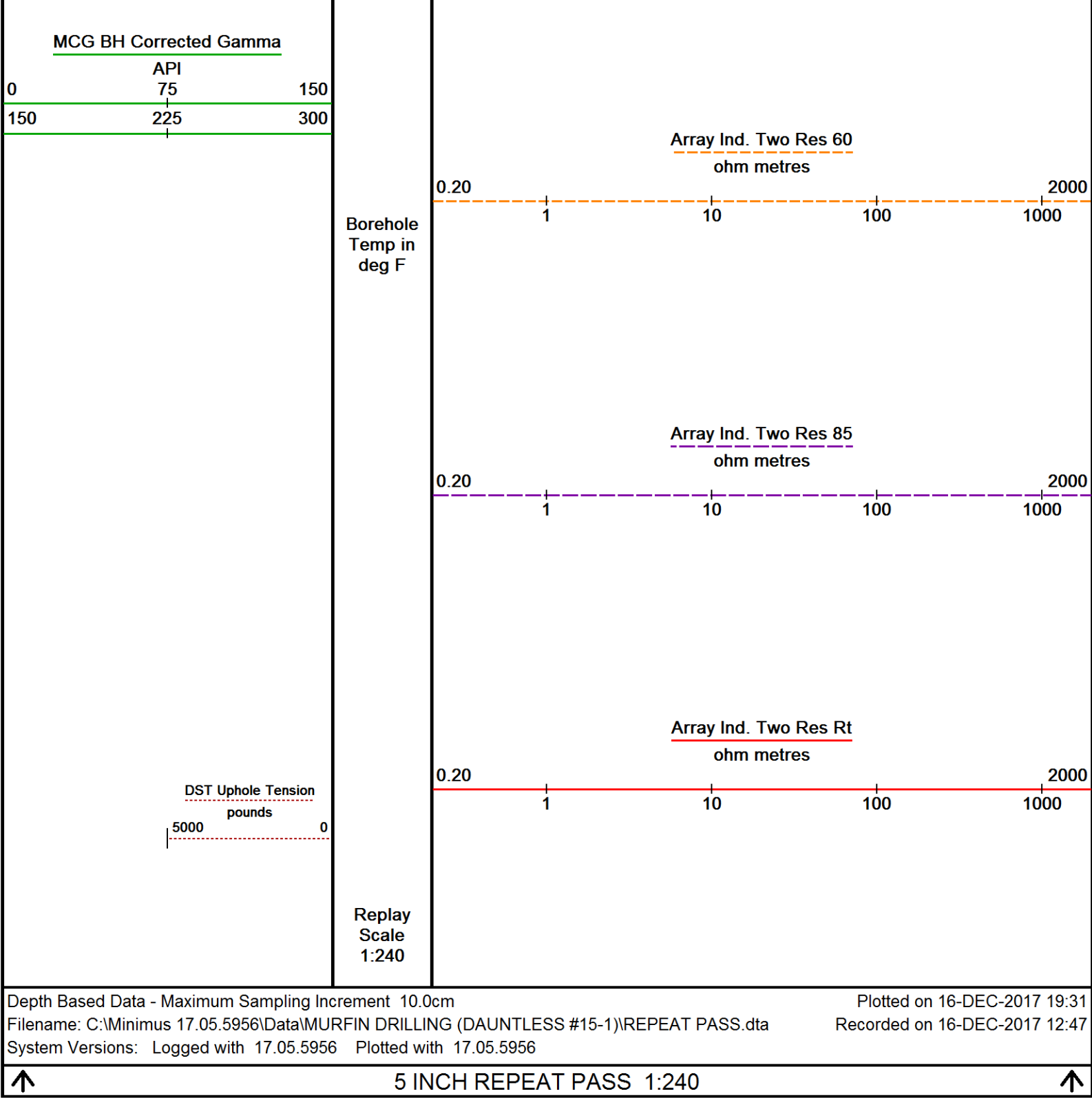
100

1000

2000



$$-\longrightarrow |20| \longleftarrow +$$



BEFORE SURVEY CALIBRATION		
C:\Minimus 17.05.5956\Data\MURFIN DRILLING (DAUNTLESS #15-1)\MAIN PASS.dta		
General Constants All 000		Last Edited on 16-DEC-2017,11:58
General Parameters		
Mud Resistivity	0.930	ohm-metres
Mud Resistivity Temperature	99.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	

Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	
High Resolution Temperature Calibration MCG-D.K 475		
	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	200.00	200.00
High Resolution Temperature Constants MCG-D.K 475		
Pre-filter Length	11	
Gamma Calibration MCG-D.K 475		
	Measured	Calibrated (API)
Background	46	31
Calibrator (Gross)	1905	1292
Calibrator (Net)	1859	1261
Gamma Calibration Tolerances MCG-D.K 475		
Ratio	1.474	Counts/API
	<div> <div>1.40</div> <div>1.475</div> <div>1.55</div> </div>	
Gamma Constants MCG-D.K 475		
Gamma Calibrator Number	GRC.C 46	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%
FE Calibration MFE-B.A 261		
	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	974.4	126.8
Base Check		278.2
Field Check		278.1
FE Calibration Tolerances MFE-B.A 261		
Reference 2	974.4	ohm
	<div> <div>-3%</div> <div>980.0</div> <div>+3%</div> </div>	
Base Check	278.2	ohm-m
	<div> <div>-2%</div> <div>277.0</div> <div>+2%</div> </div>	
Field Check	278.1	ohm-m
	<div> <div>-2%</div> <div>278.2</div> <div>+2%</div> </div>	
FE Constants MFE-B.A 261		
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

Induction Calibration MAI-B.J 426

Factory Loop Calibration 01-DEC-2017,12:00
Field Check on 14-DEC-2017 14:46

Factory Loop Calibration

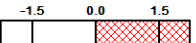
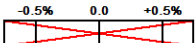
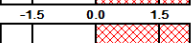
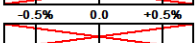
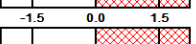
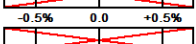
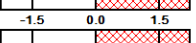
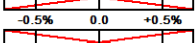
High Conductivity Reference Resistor 3.3 ohm
Low Conductivity Reference Resistor 333.3 ohm

Array	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
	Low	High	Low	High	Gain	Offset
1 (near)	15.9	452.0	9.3	966.2	2.195	-25.7
2	5.1	359.5	7.6	821.4	2.297	-4.2
3	3.0	246.4	5.2	566.0	2.303	-1.6
4 (far)	2.1	128.2	2.6	279.2	2.193	-2.0
Array Temperature	74.8		Deg F			

Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)		
	Low	High	Low	High	
1 (near)			14.7	4015.5	
2			33.4	3745.5	
3			30.5	3208.4	
4 (far)			19.7	2158.7	
Array Temperature	0.0		66.5		Deg F

Induction Check Tolerances MAI-B.J 426

Low Array 1	14.7		mmho/m	High Array 1	4015.5		mmho/m
Low Array 2	33.4		mmho/m	High Array 2	3745.5		mmho/m
Low Array 3	30.5		mmho/m	High Array 3	3208.4		mmho/m
Low Array 4	19.7		mmho/m	High Array 4	2158.7		mmho/m

Induction Constants MAI-B.J 426

Last Edited on 16-DEC-2017,09:20

Induction Model RtAP-WBM

Borehole Correction Constants

Tool Centred No
Hole Size Source Density Caliper
Hole Size Constant Value N/A inches
Stand-off Type Pineapple
Stand-off 0.49 inches
Number of Fins on Stand-off 5.0000
Stand-off Fin Angle 72.00 degrees
Stand-off Fin Width 1.3878 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	

DOWNHOLE EQUIPMENT

C:\Minimus 17.05.5956\Data\MURFIN DRILLING (DAUNTLESS #15-1)\MAIN PASS.dta

11B Tension Cablehead

MCB-A.A 2 LG: 2.40 ft WT: 19.8 lb OD: 2.244 in

Compact Swivel Head Adaptor

SHA-J.A 438 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma

MCG-D.K 475 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity

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

Compact Neutron

MDN-B.J 388 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

MPD-B 120 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Knuckle Joint

SKJ-E.A 166 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric

MFE-B.A 261 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

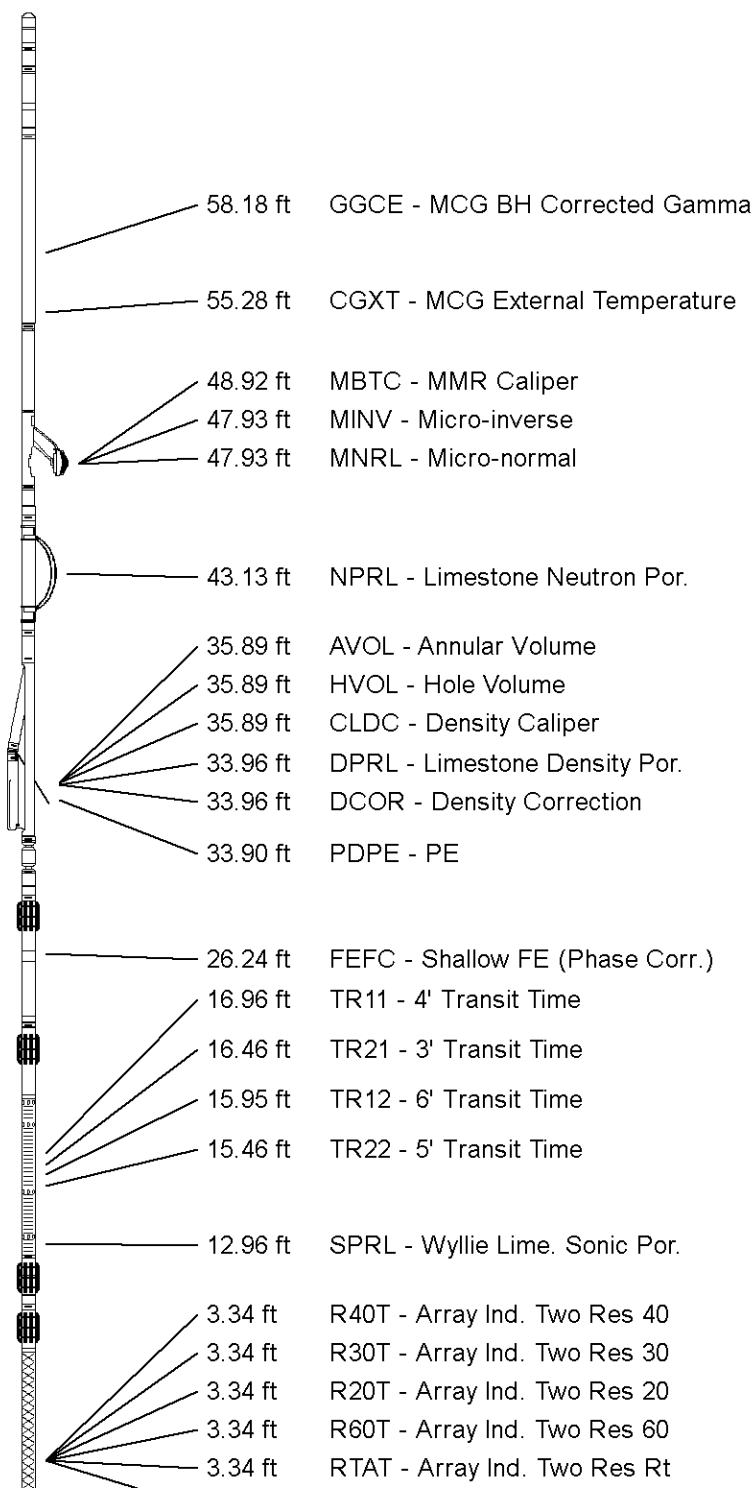
Compact Sonic

MSS-C.A 147 LG: 12.52 ft WT: 72.8 lb OD: 2.240 in

Compact Induction

MAI-B.J 426 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 68.16 ft Weight: 522.5 lb





All measurements relative to tool zero.

COMPANY MURFIN DRILLING COMPANY, INC.
WELL DAUNTLESS #15-1
FIELD WILDCAT
PROVINCE/COUNTY LINCOLN
COUNTRY/STATE U.S.A. / COLORADO

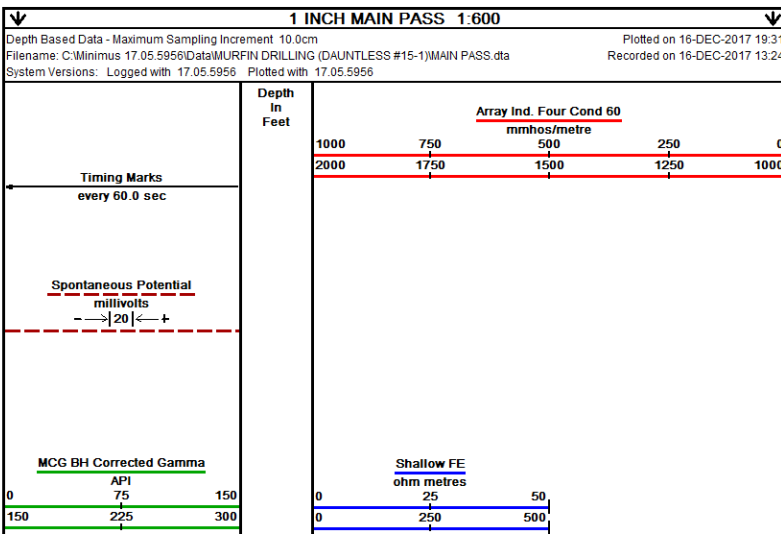
Elevation Kelly Bushing	5554	feet	First Reading	8816.00	feet
Elevation Drill Floor	5552	feet	Depth Driller	8820.00	feet
Elevation Ground Level	5541	feet	Depth Logger	8819.00	feet



ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

Weatherford®

Weatherford®		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY	MURFIN DRILLING COMPANY, INC.	WELL	DAUNTLESS #15-1
FIELD	WILDCAT	PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO	LOCATION	990' FSU & 1650' FEL
SEC 1	TWP 3S	R85T	50M
Latitude	39.280150	Longitude	-103.083510
UTM Zone	18Q	UTM Easting	554100
UTM Northing	554100	UTM Scale	1.0
Permanent Datum GL Elevation	5541 feet	Log Measured From KB	13.00 feet above Permanent Datum
Drilling Measured From KB			
Date	16-DEC-2017		
Run Number	ONE		
Service Order	17337-200624549		
Depth Driller	8820.00	feet	
Depth Logger	8819.00	feet	
First Reading	8816.00	feet	
Last Reading	476.00	feet	
Casing Driller	420.00	feet	
Casing Logger	476.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	WBM		
Density / Viscosity	9.35 lb/USg	46.00 sec/cf	
PH / Fluid Loss	9.00	5.20 ml/30min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.93 @ 99.0	ohm-m	
Rm @ Measured Temp	0.74 @ 99.0	ohm-m	
Rm @ Measured Temp	1.12 @ 99.0	ohm-m	
Source Rm / Rmc	CALC	CALC	
Rm @ BHT	0.51 @ 186.0	ohm-m	
Time Since Circulation	8 HOURS		
Max Recorded Temp	186.00	deg F	
Equipment / Base	13057	DKC	
Recorded By	M. MCGLATHLIN		
Witnessed By	MES. HANSEN		
		H. LEJEUNE	
		SCOTT ROBINSON	



Borehole
Temp in
deg F

Array Ind. Two Res Rt
ohm metres

0 25 50
0 250 500

DST Uphole Tension
pounds

5000 0

Replay
Scale
1:600

Casing
478
Shale

500

98°

600

100°

700

102°

800

FEFE

105°

900

106°

1000

107°

1100

107°

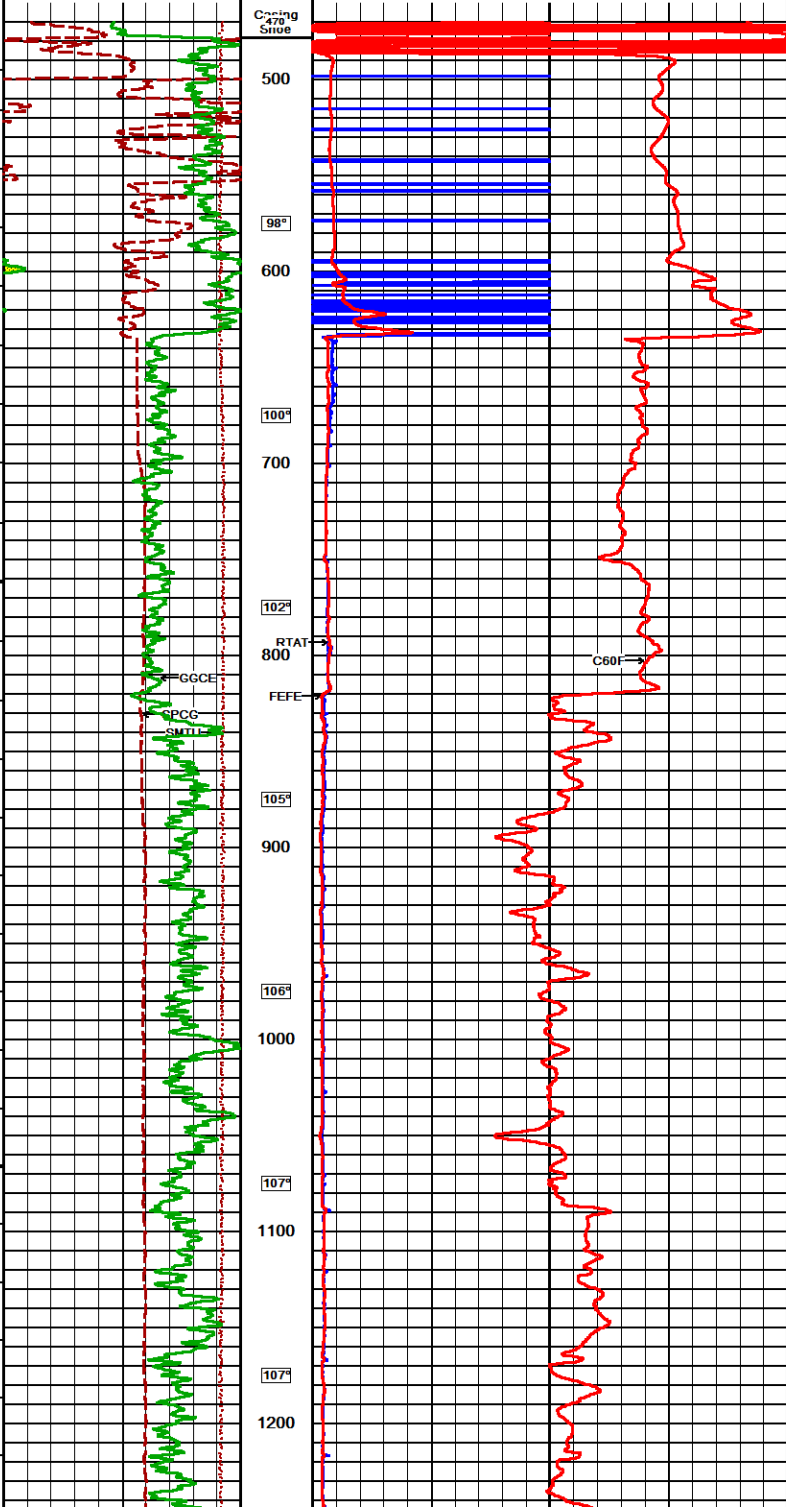
1200

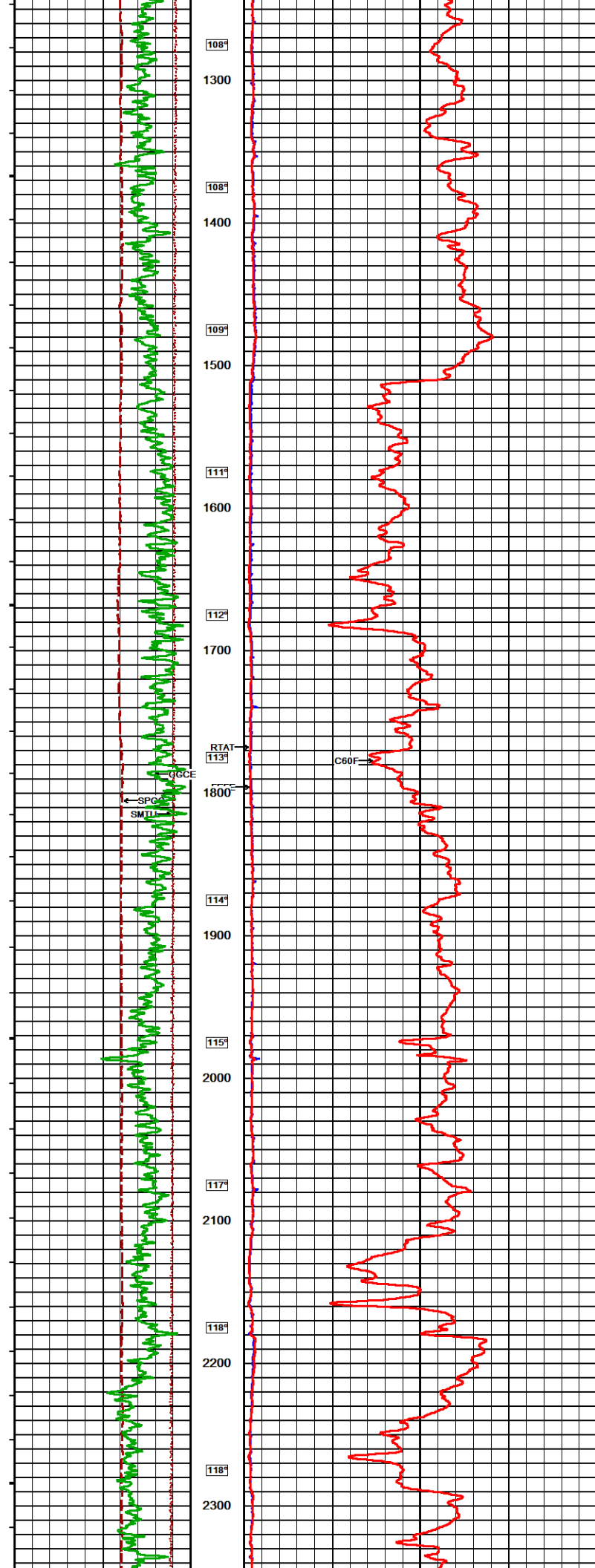
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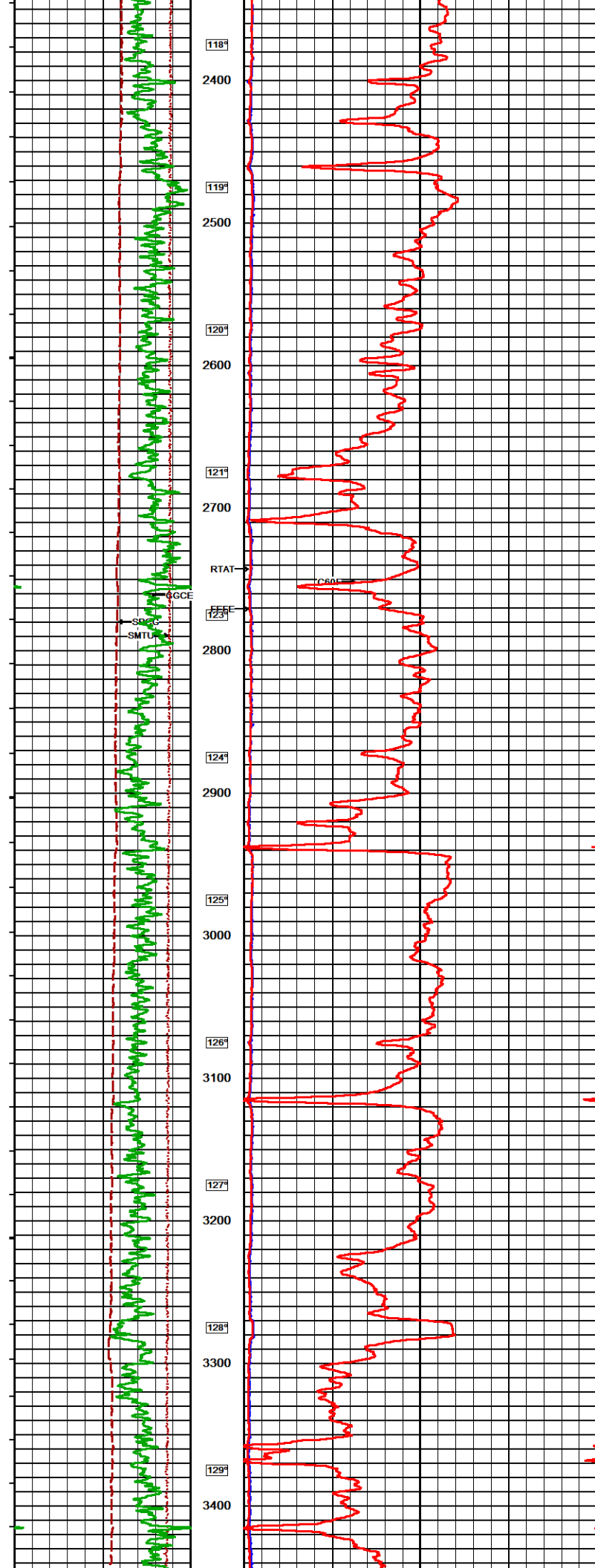
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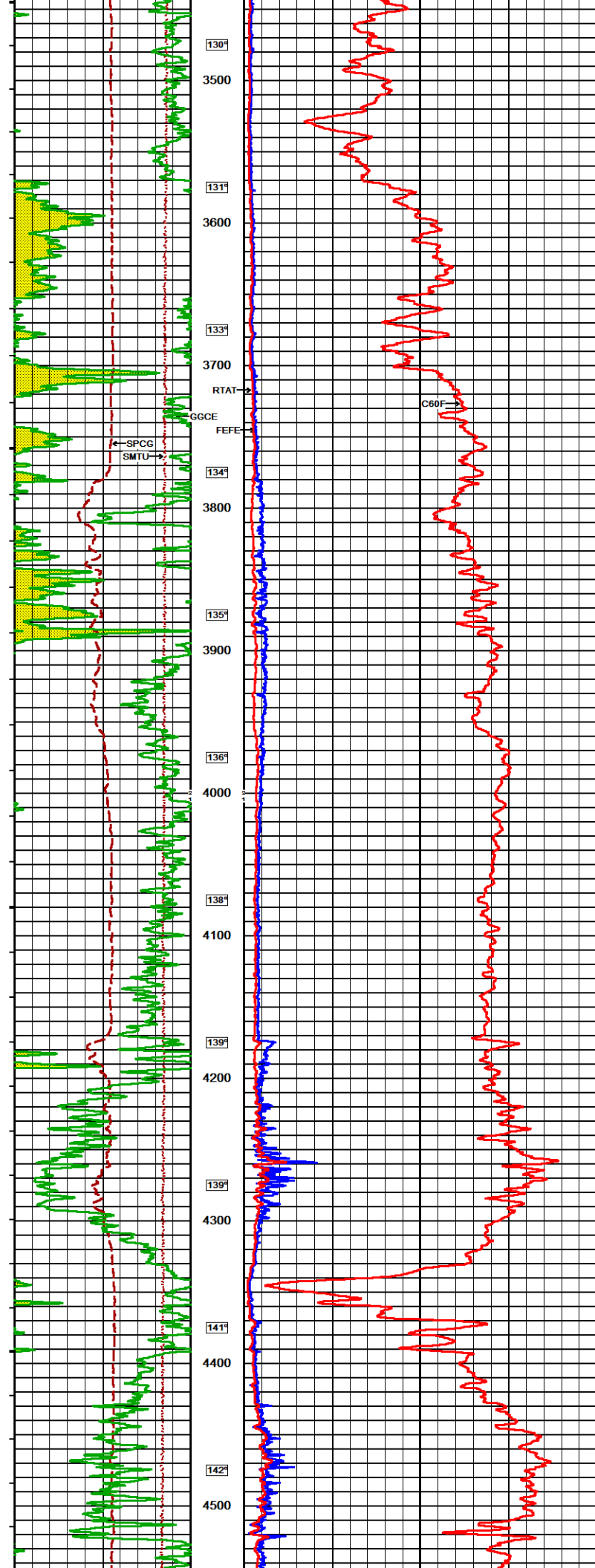
SMIT

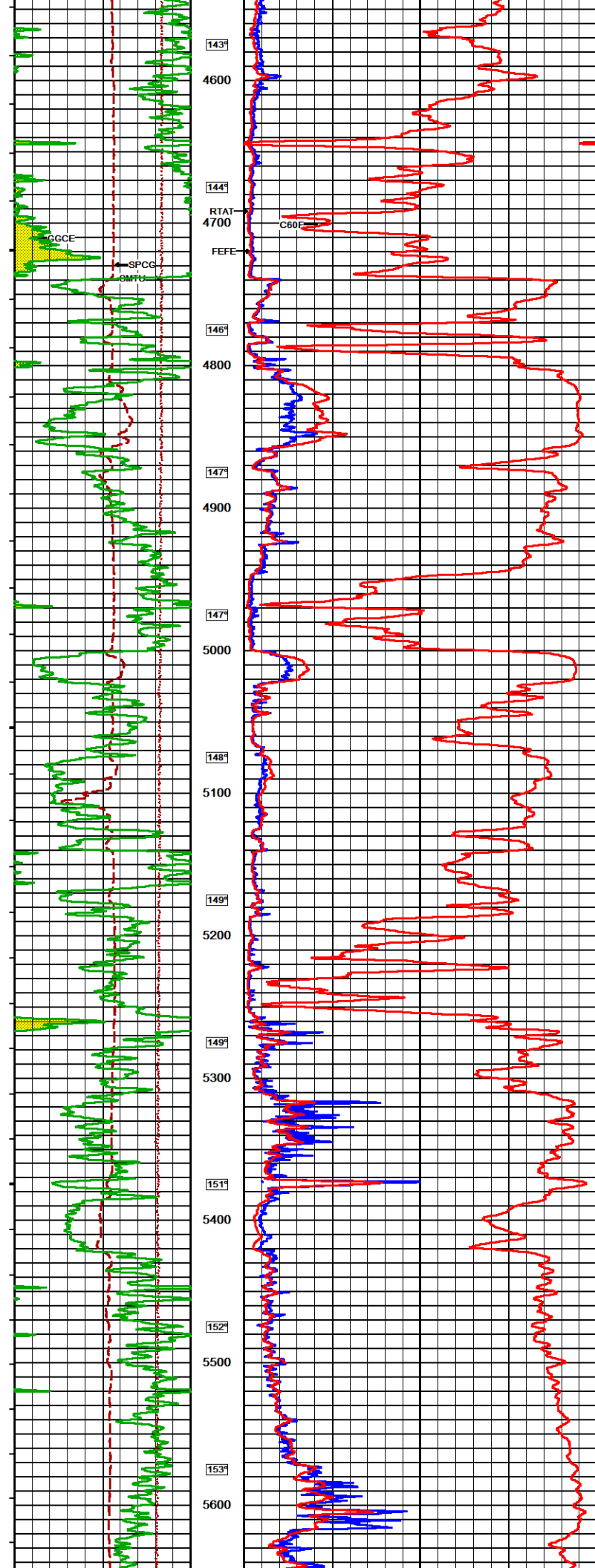
C60F

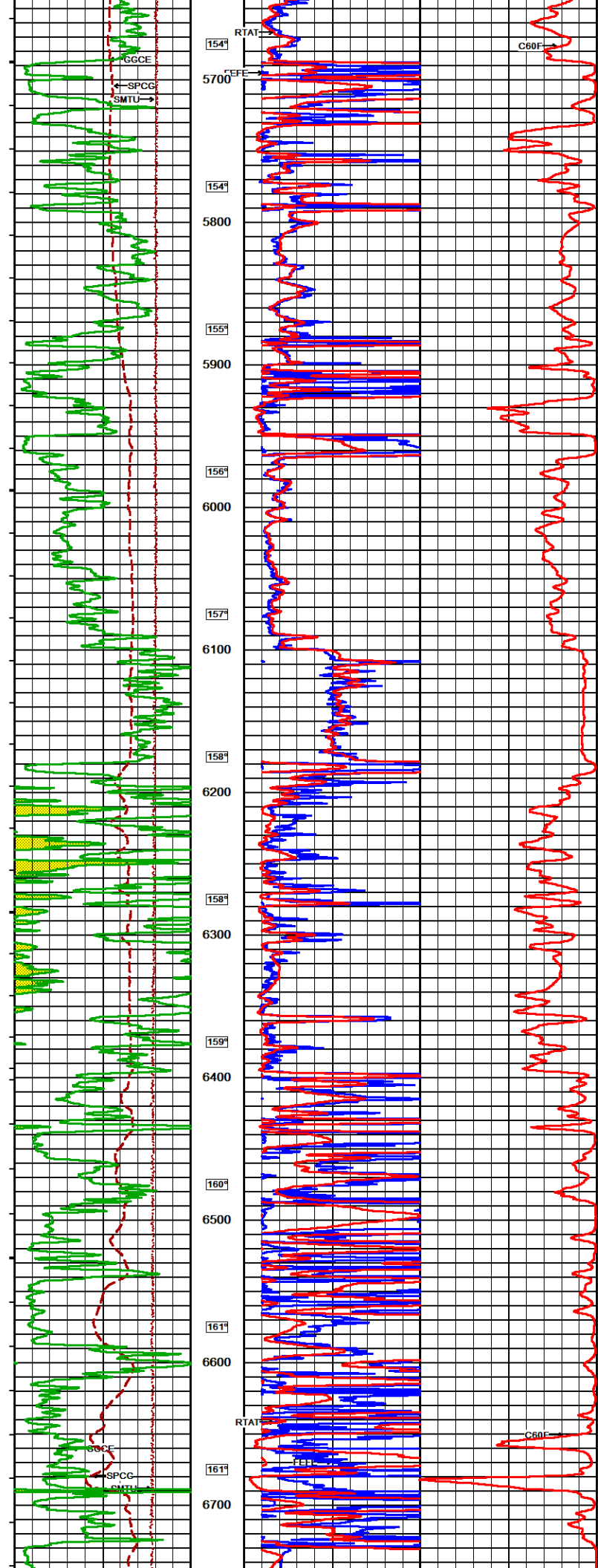


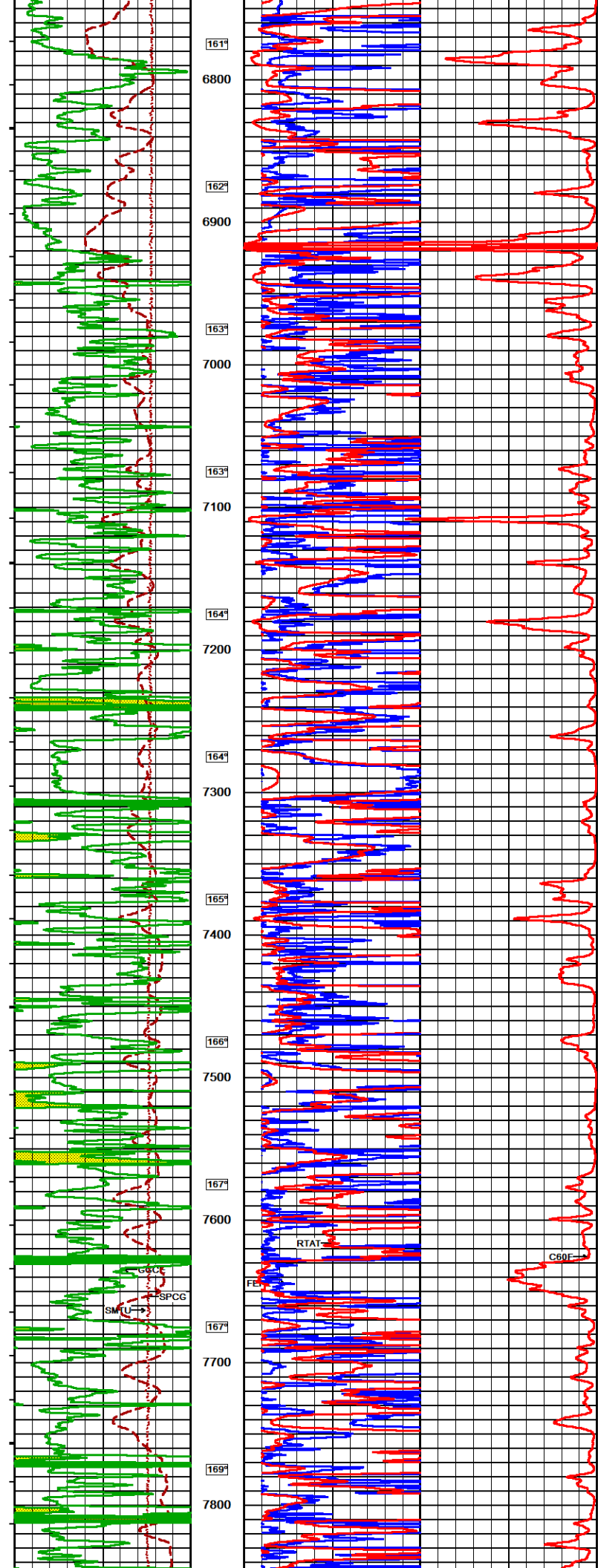


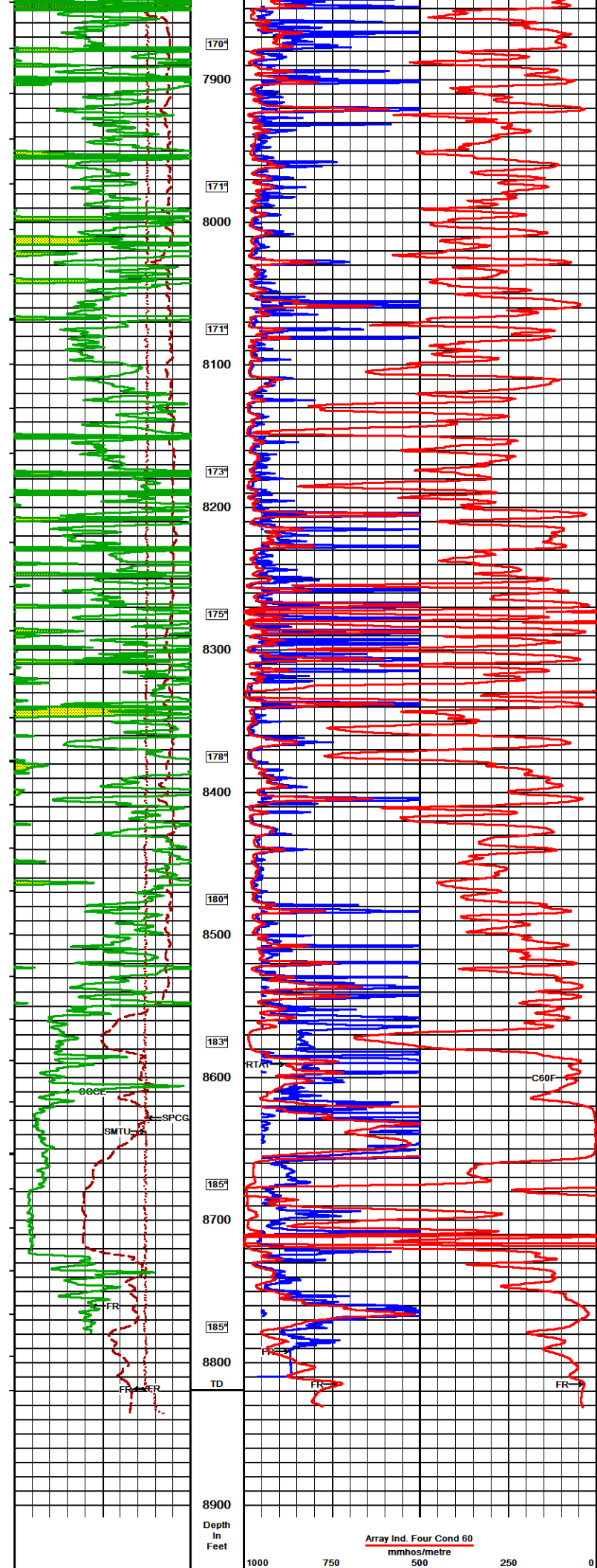


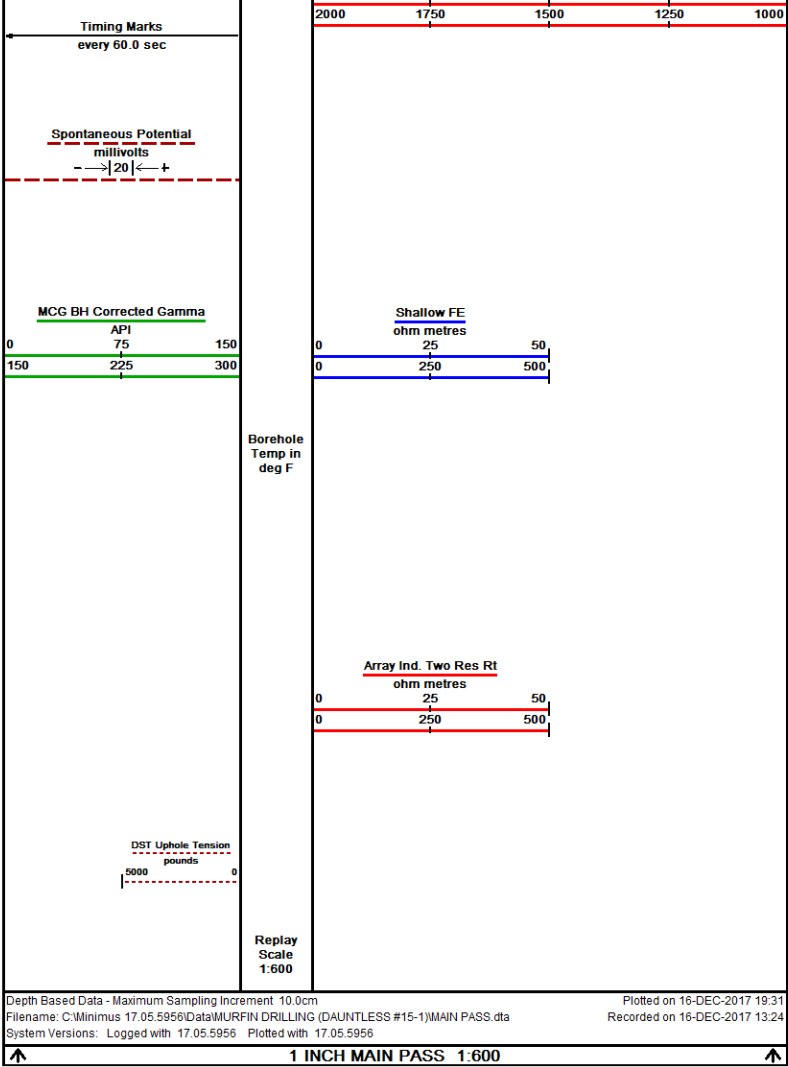













COMPANY		MURFIN DRILLING COMPANY, INC.			
WELL		DAUNTLESS #15-1			
FIELD		WILDCAT			
PROVINCE/COUNTY		LINCOLN			
COUNTRY/STATE		U.S.A. / COLORADO			
Elevation Kelly Bushing	5554	feet	First Reading	8816.00	feet
Elevation Drill Floor	5552	feet	Depth Driller	8820.00	feet
Elevation Ground Level	5541	feet	Depth Logger	8819.00	feet
		ARRAY INDUCTION			
Weatherford		SHALLOW FOCUSED			
		ELECTRIC LOG			