



Weatherford

**ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG**

COMPANY	RAMSHORN RESOURCES, LLC		
WELL	MARSH 2-27		
FIELD	DEARHEAD		
PROVINCE/COUNTY	BARBER		
COUNTRY/STATE	USA / KANSAS		
LOCATION	2305' FNL & 2073' FEL		
SEC 27	TWP 32S	RGE 15W	Other Services
Latitude	37.231944	MDN/MPD	
Longitude	-98.936944	MMR	
API Number	15-007-24347	MSS	
Permanent Datum GL, Elevation	1896 feet		
Log Measured From KB, 12.00 feet above Permanent Datum			
Drilling Measured From KB			
Date	05-APR-2019		Elevations: feet
Run Number	ONE		KB 1908.00
Service Order	7055-241667929		DF 1906.00
Depth Driller	5300.00	feet	GL 1896.00
Depth Logger	5302.00	feet	
First Reading	5299.00	feet	
Last Reading	496.00	feet	
Casing Driller	496.00	feet	
Casing Logger	496.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	WBM		
Density / Viscosity	9.40 lb/USg	52.00 sec/qt	
PH / Fluid Loss	11.00	8.80 ml/30Min	
Sample Source	MUD TANK		
Rm @ Measured Temp	0.52 @ 92.0	ohm-m	
Rmf @ Measured Temp	0.42 @ 92.0	ohm-m	
Rmc @ Measured Temp	0.62 @ 92.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.38 @129.0	ohm-m	
Time Since Circulation	3 HOURS		
Max Recorded Temp	129.00	deg F	
Equipment / Base	13057	ELRENO	
Recorded By	JUSTIN HICKS		
Witnessed By	CURTIS COVEY		
			JERRY AULD

BOREHOLE RECORD

Last Edited: 05-APR-2019 15:51

Bit Size inches	Depth From feet	Depth To feet
7.875	496.00	5300.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	496.00	24.00

REMARKS

TOOLSTRING: CBH, SHA, MCG, MMR, MDN, MPD, SKJ, MFE, MSS, MAI.

HARDWARE USED:

MAI: TWO 0.5 INCH STANDOFFS.

MFE: ONE 0.5 INCH STANDOFF.

MDN: DUAL BOWSPRING ECCENTRALIZERS.

MPD: 8 INCH PROFILE PLATE.

MSS: THREE 0.5 INCH STANDOFFS.

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 3300' = 690 CU.FT.

ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3300' = 360 CU.FT.

RIG: DUKE DRILLING, RIG 1

OPERATOR(S): J. JOHNSON, J. CASE

MUD PROPERTIES:
 CHLORIDES: 6000 PPM
 LCM: 4 PPB

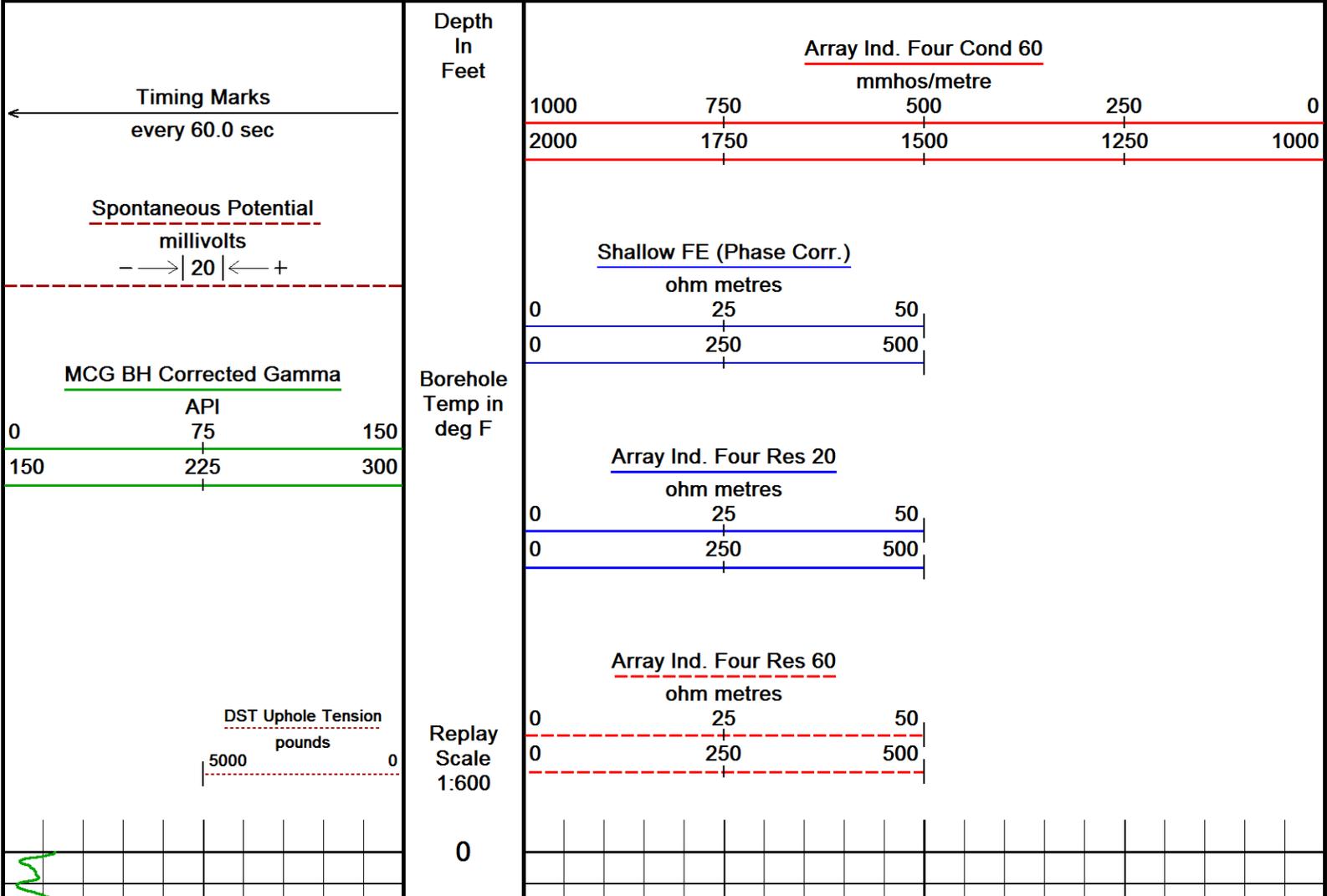
CALIPER: TD - 3300'
 DENSITY/NEUTRON/MICROLOG: TD - SURFACE CASING.
 INDUCTION: TD - SURFACE CASING.
 SONIC: TD - SURFACE CASING.
 GAMMA: TD - GROUND LEVEL.

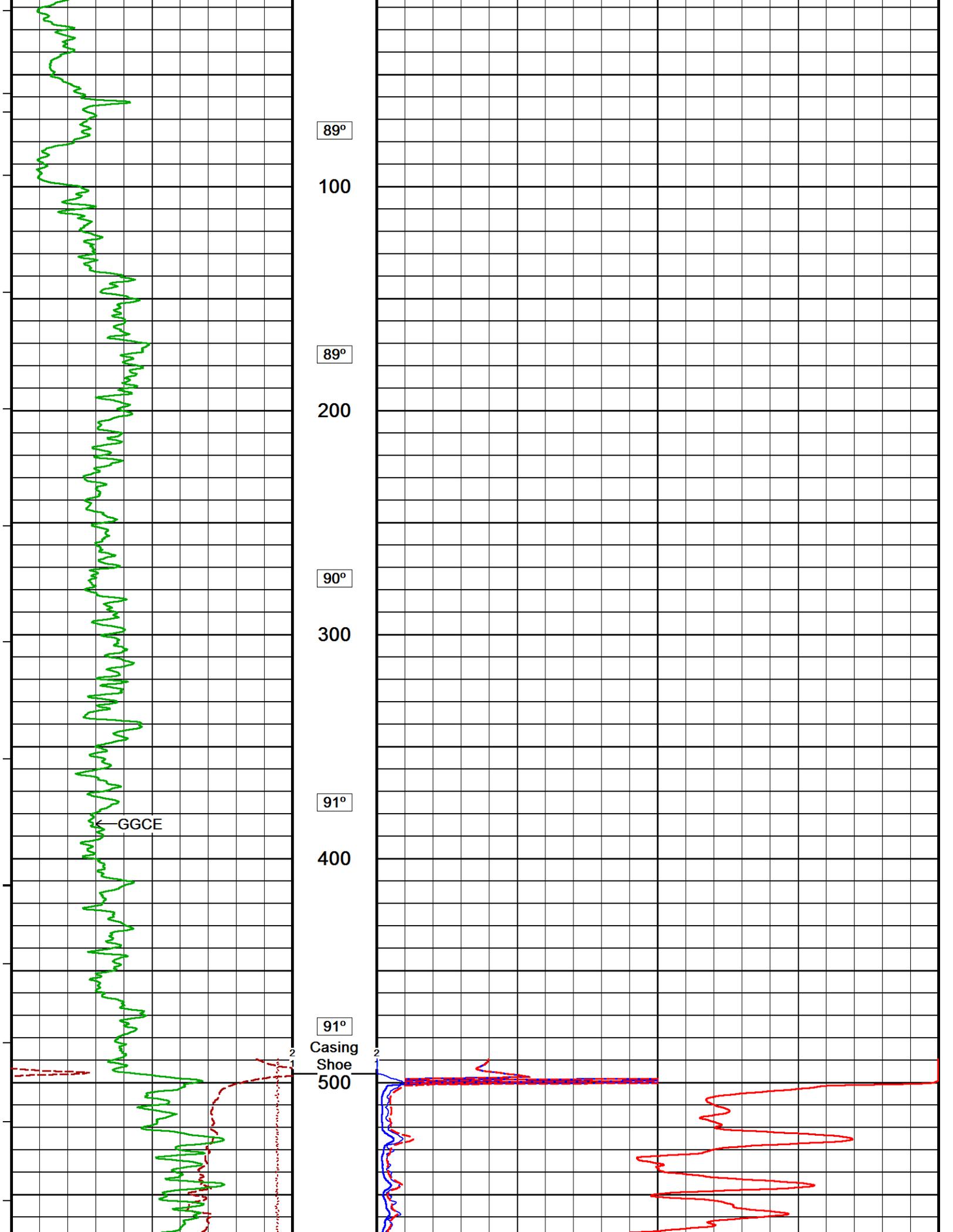
HOLE WASHOUTS AND RUGOSITY WILL AFFECT LOG QUALITY AND REPEATABILITY.

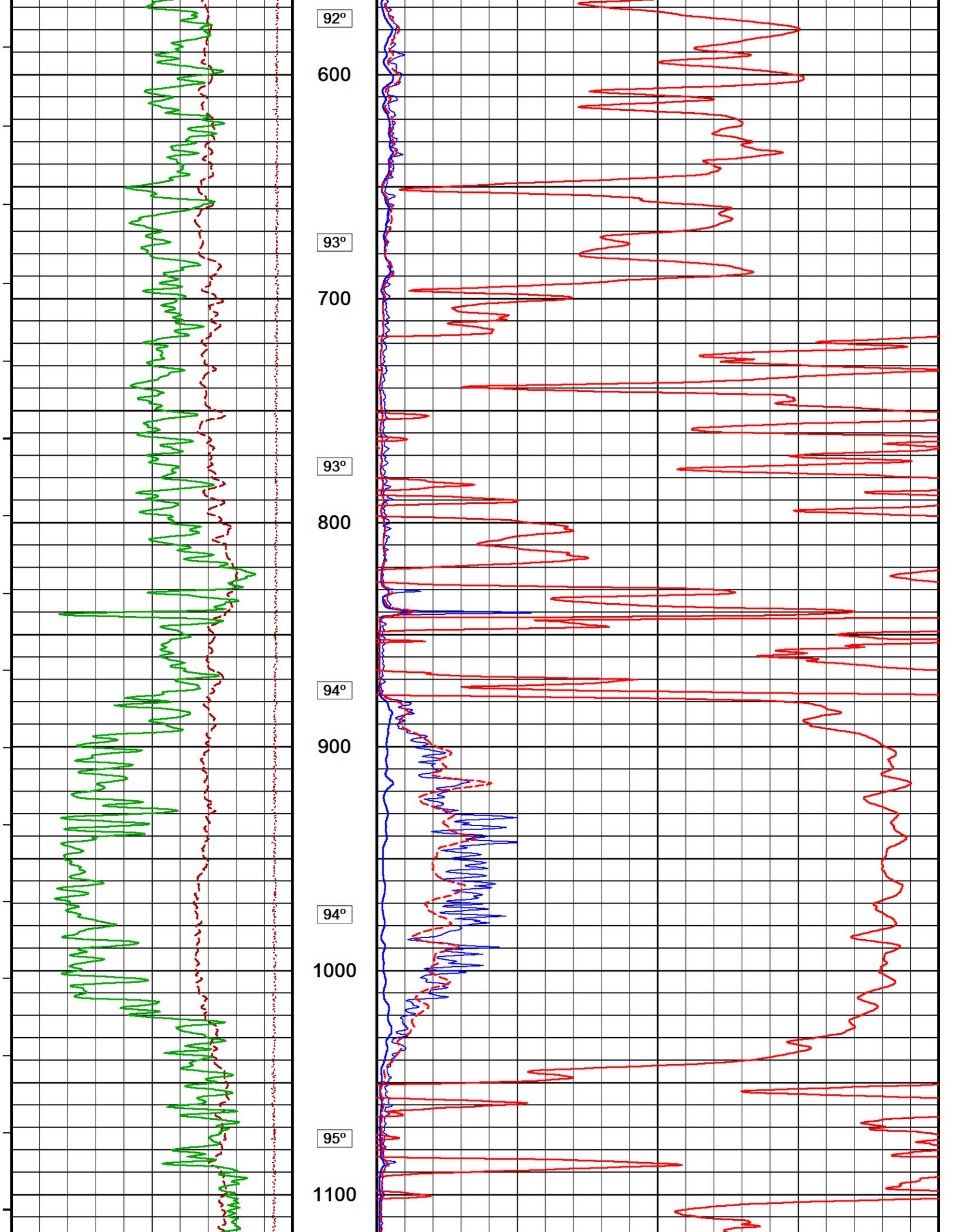
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

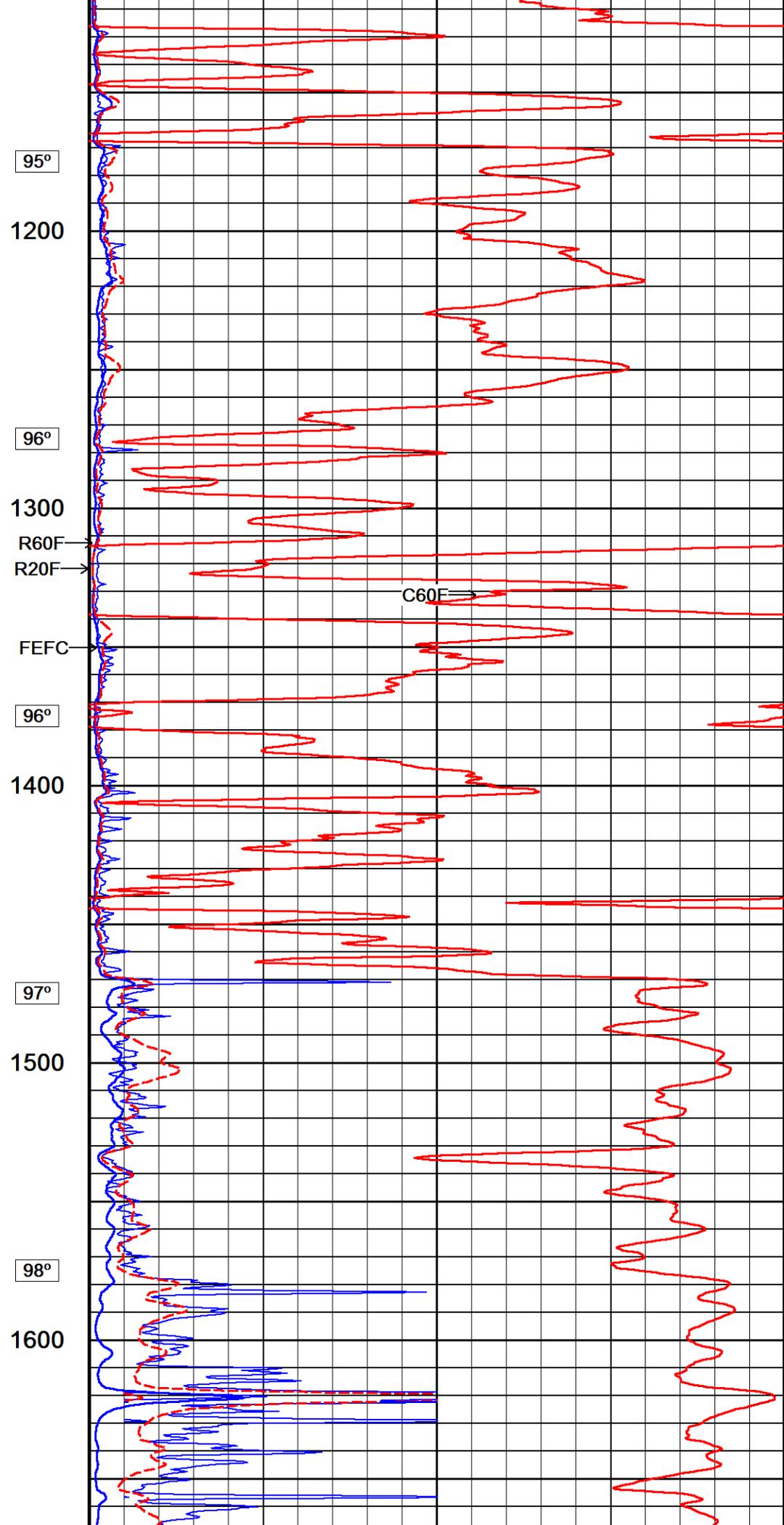
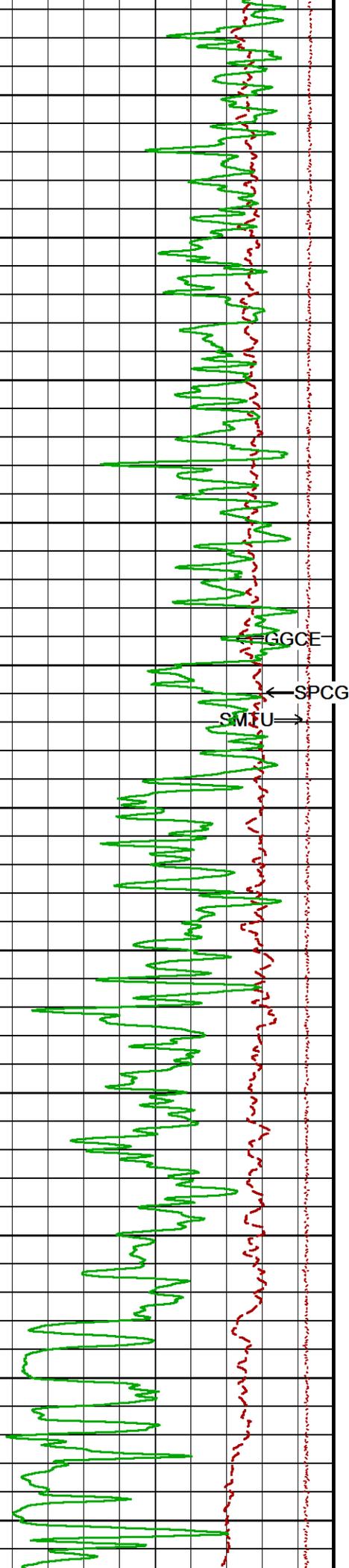
2 INCH MAIN PASS 1:600

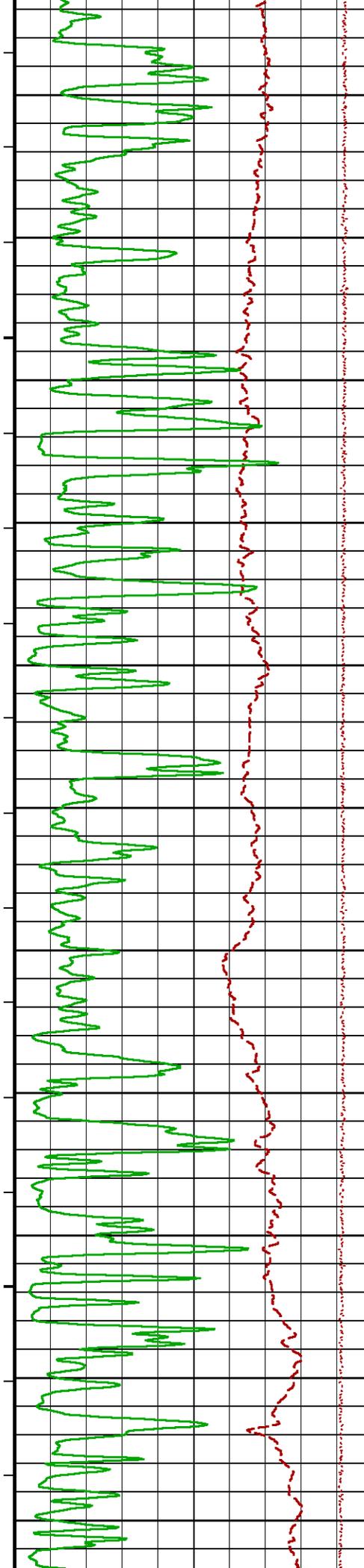
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 System Versions: Logged with 18.03.8633 Processed with 18.03.8633 Plotted with 17.01.6537











98°

1700

98°

1800

99°

1900

99°

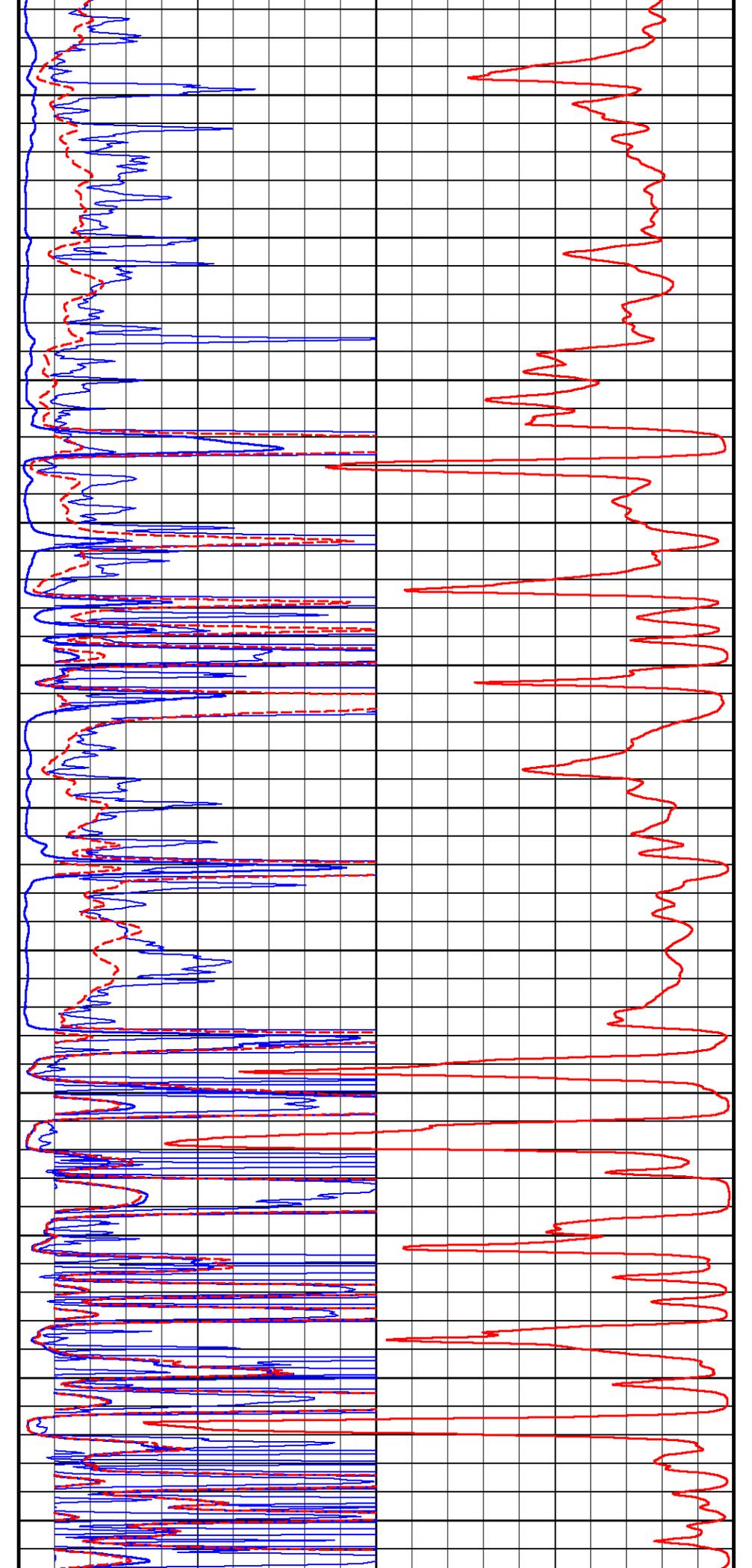
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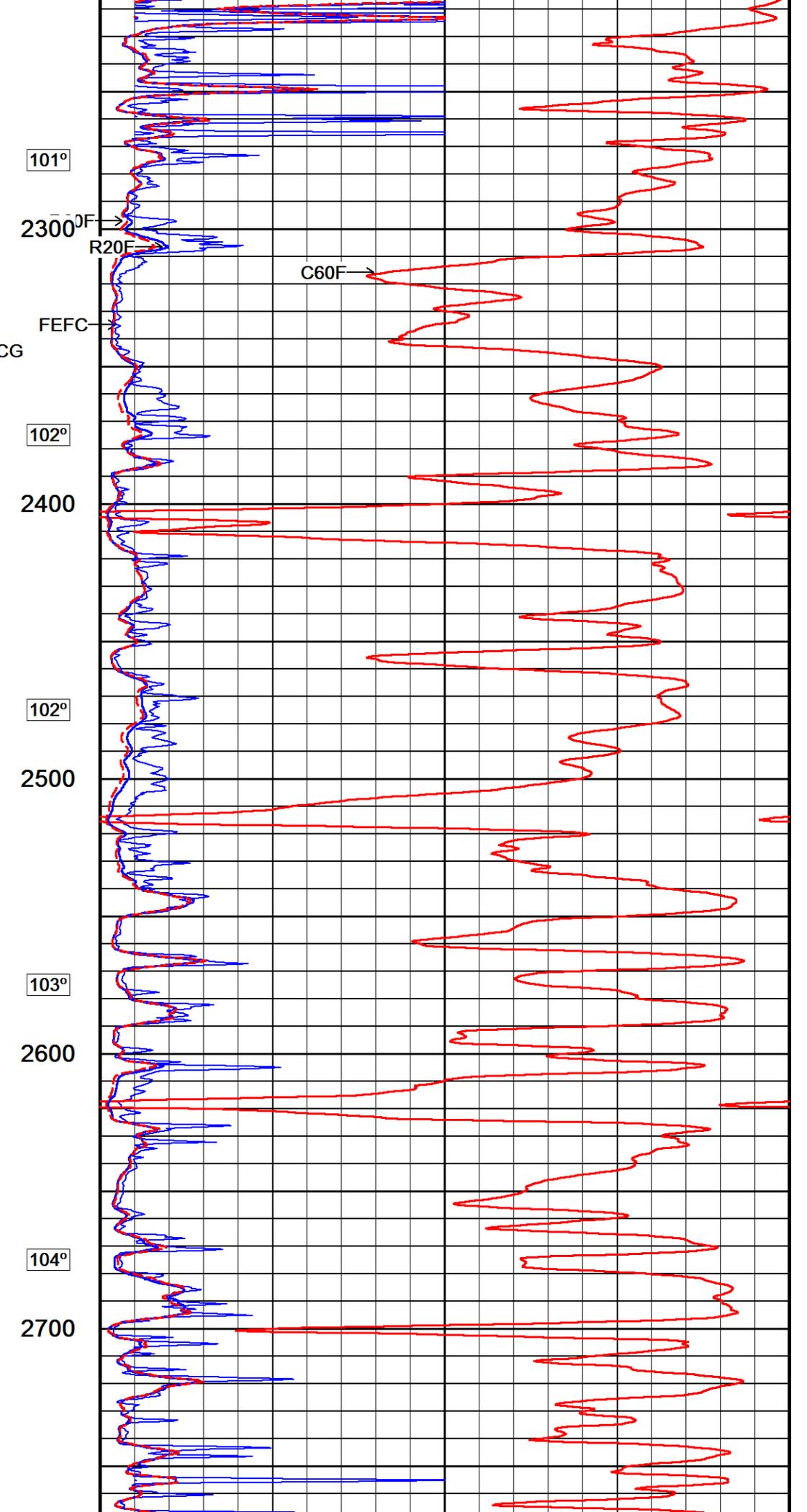
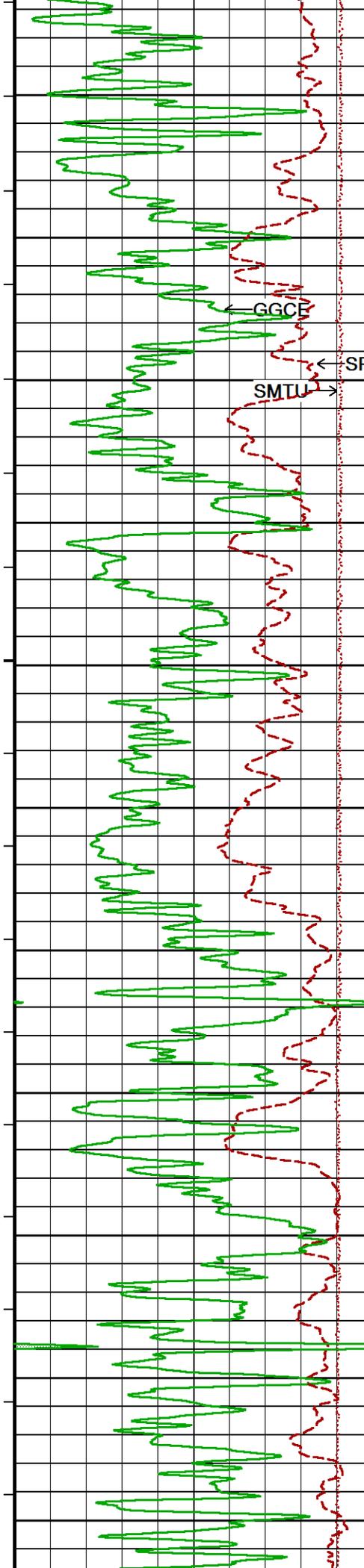
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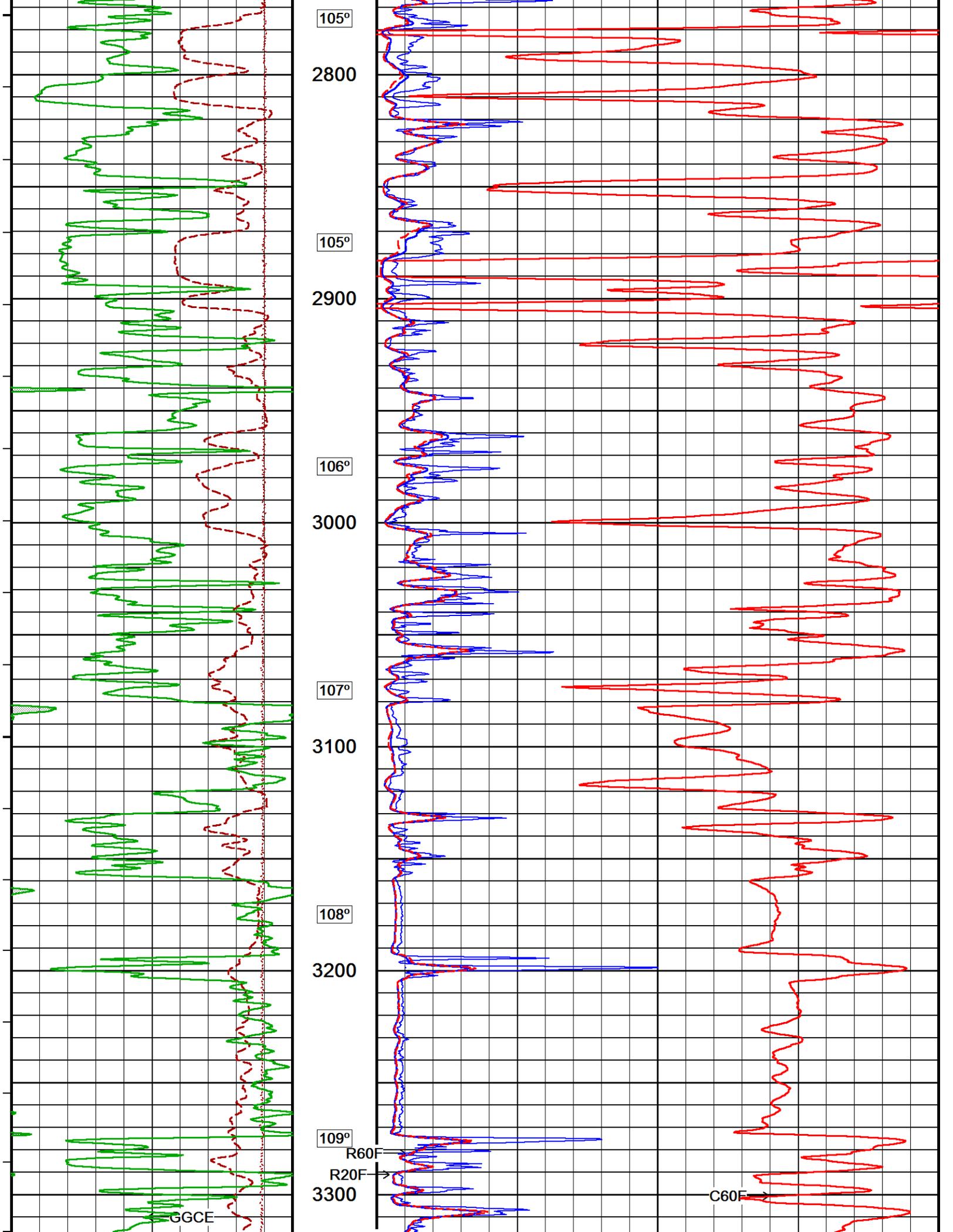
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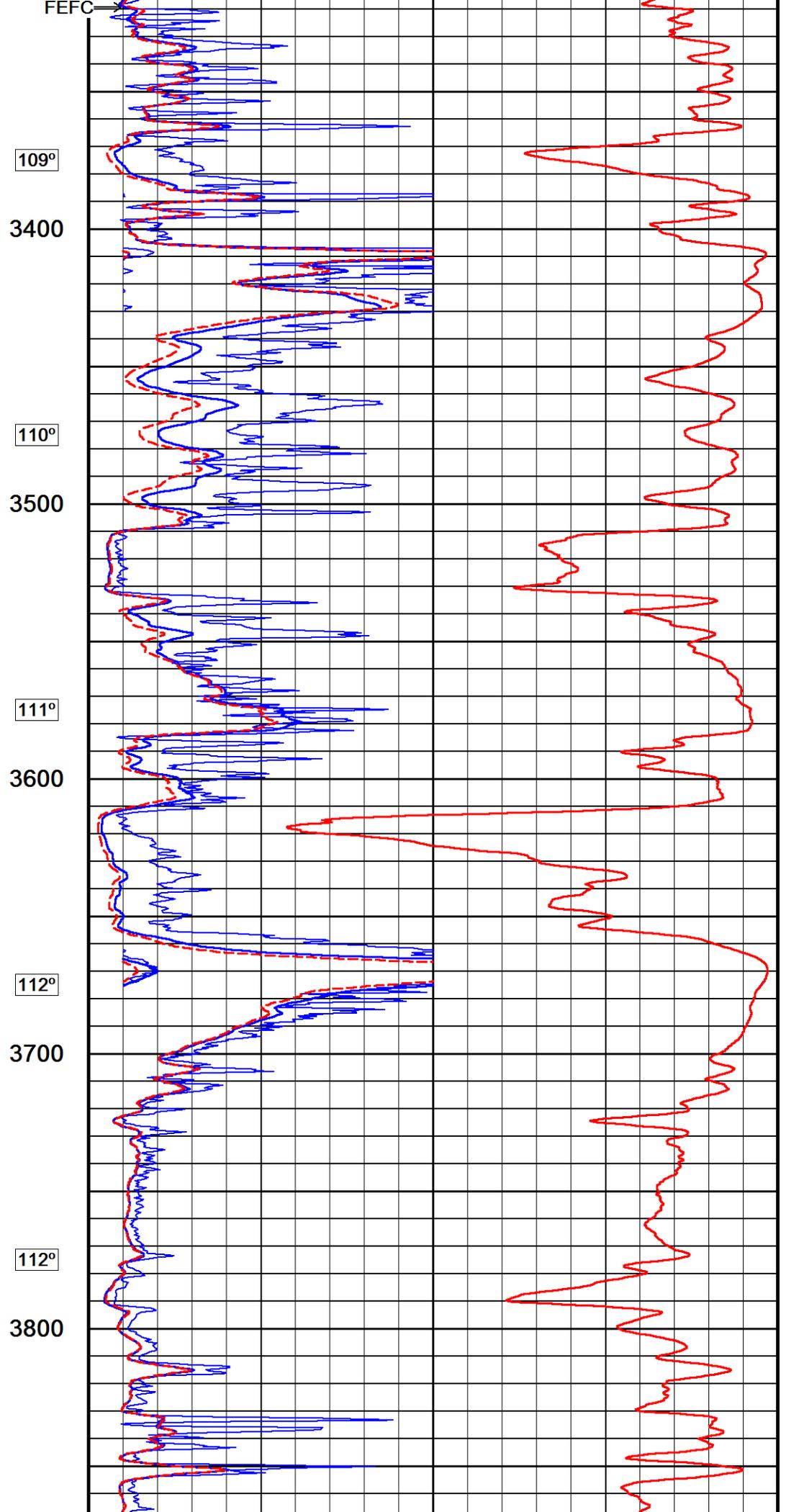
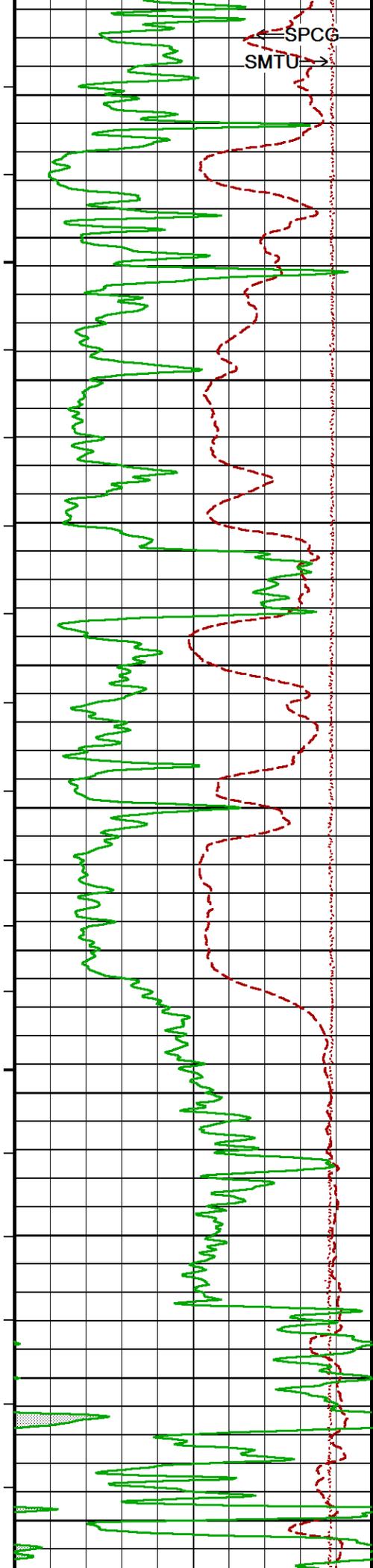
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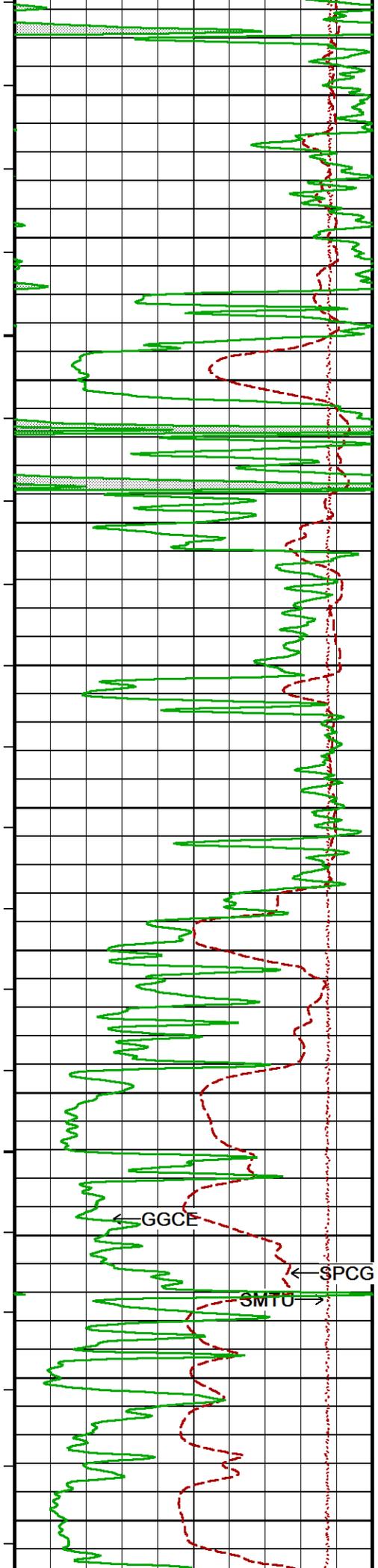
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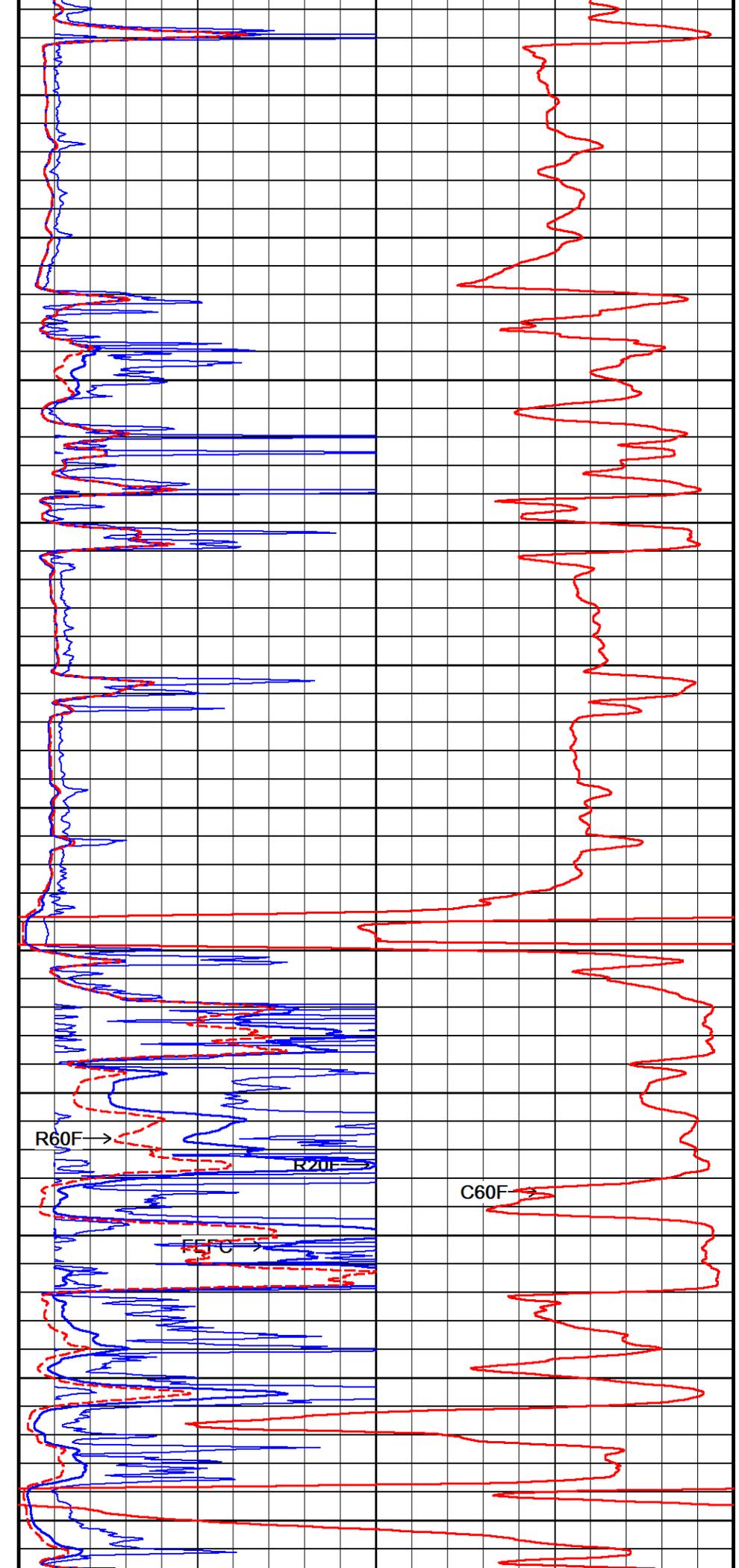


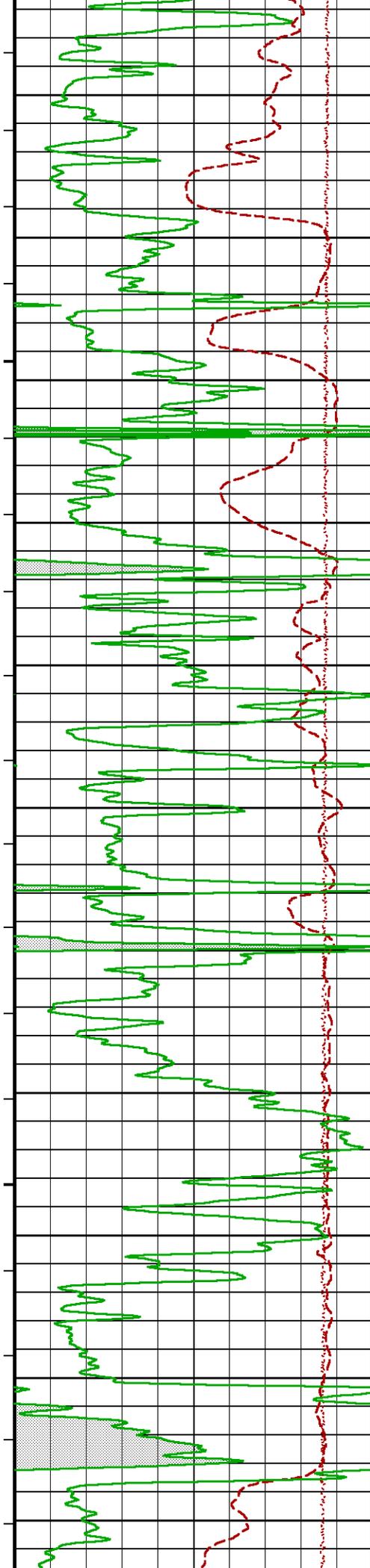






114°
3900
114°
4000
115°
4100
116°
4200
117°
4300
117°
4400





118°

4500

118°

4600

119°

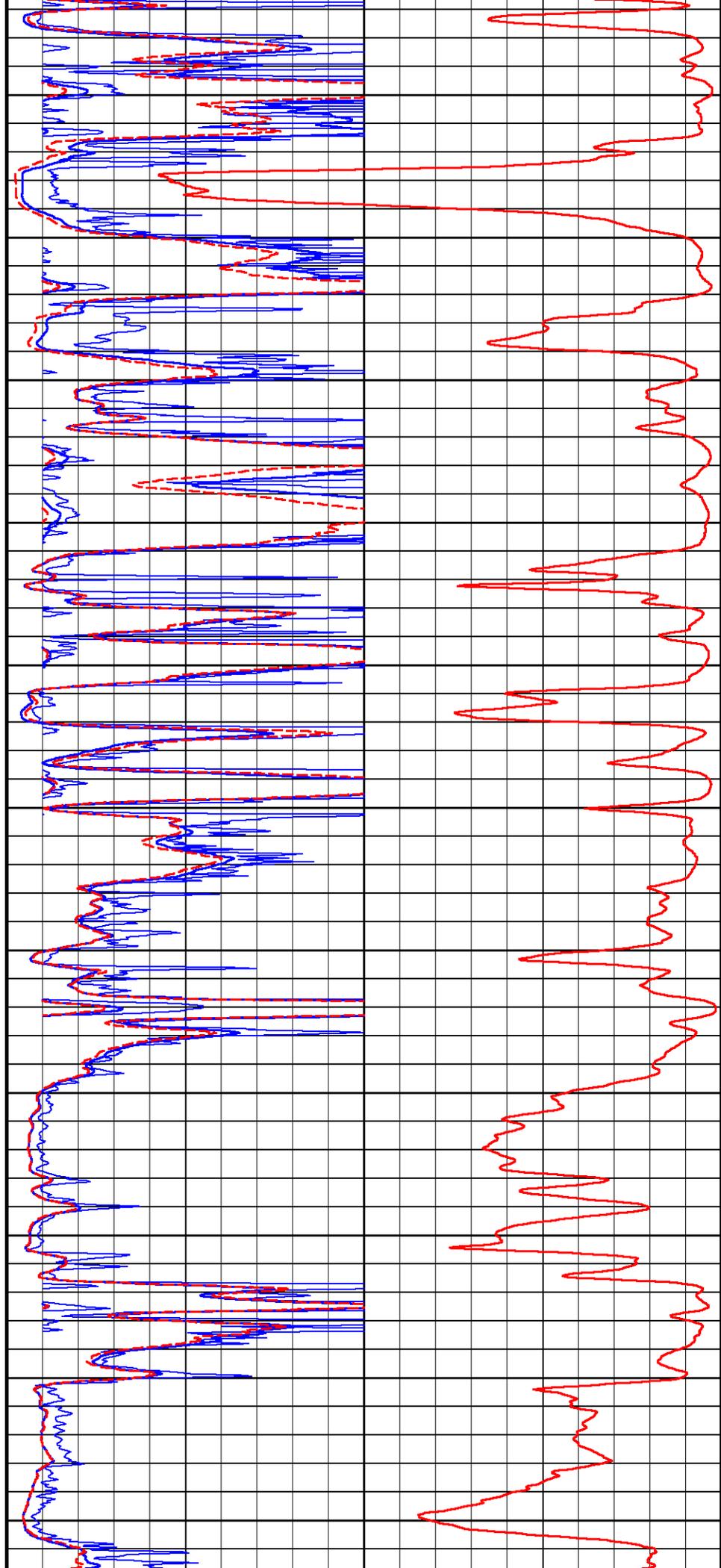
4700

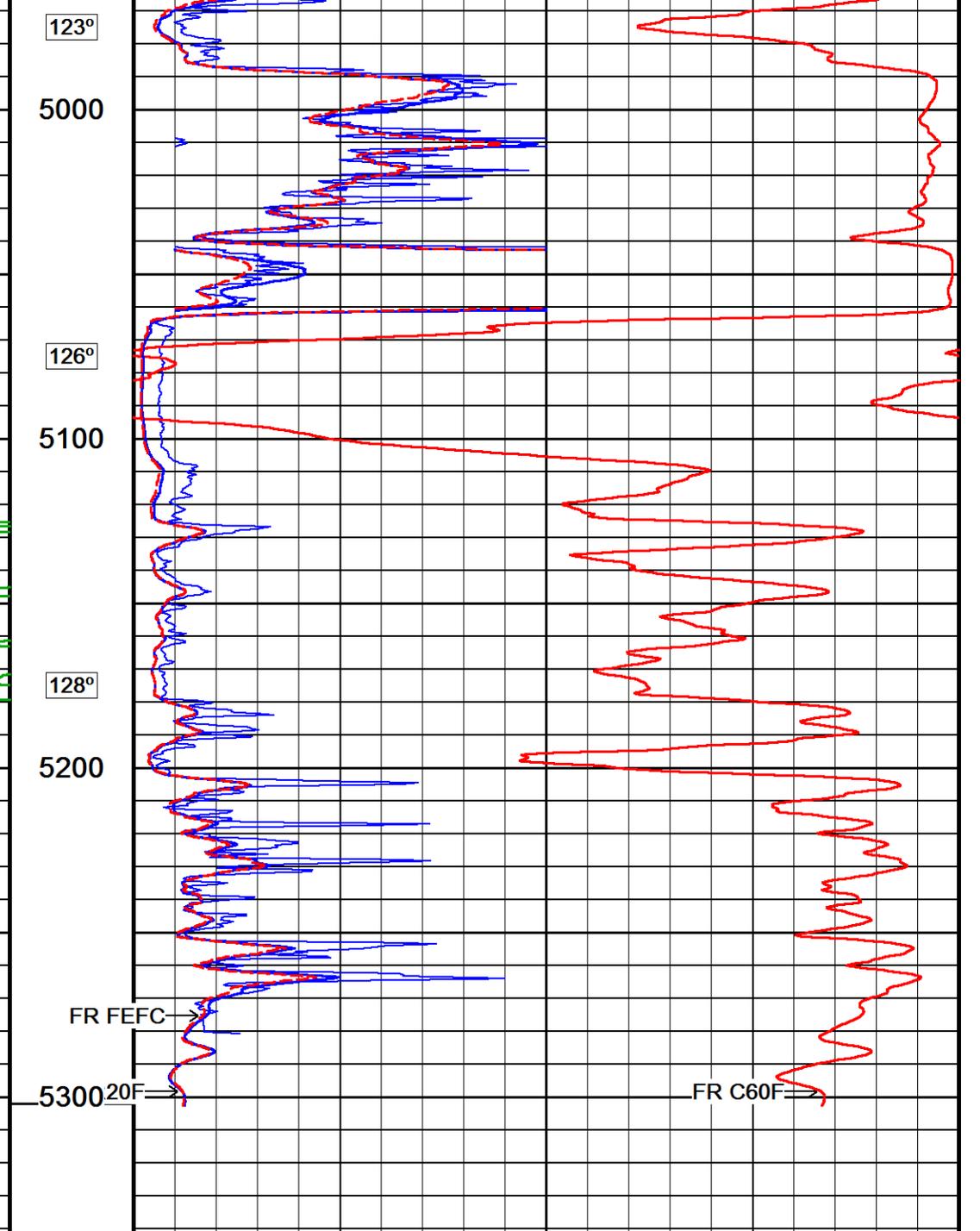
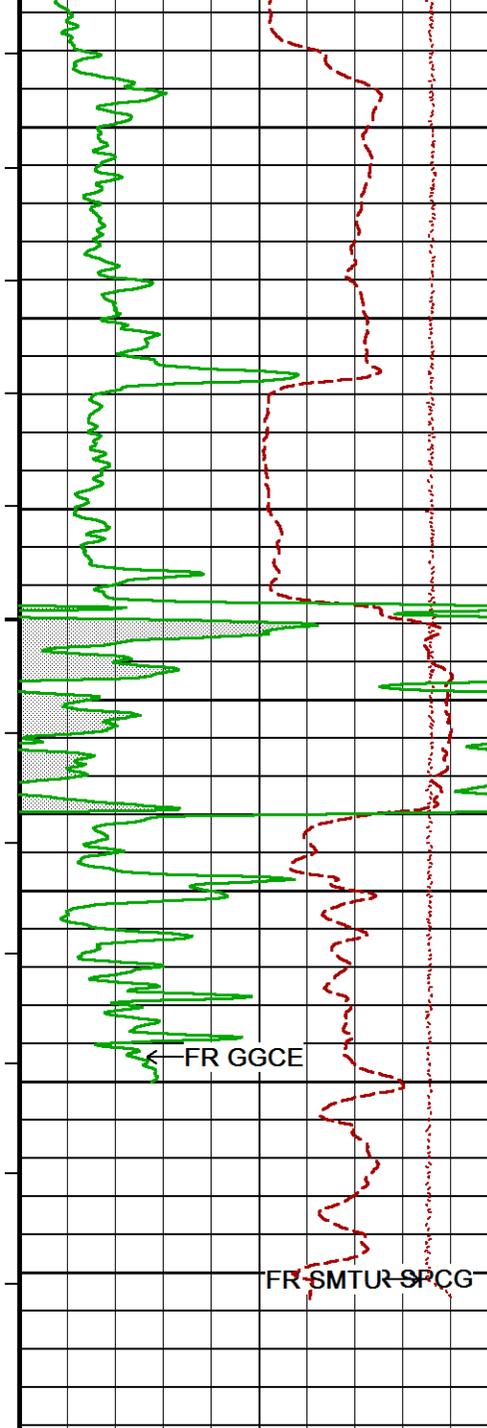
121°

4800

121°

4900





← Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
- - -> | 20 | <- +

MCG BH Corrected Gamma
API
0 75 150
150 225 300

Depth
In
Feet

Array Ind. Four Cond 60
mmhos/metre

1000 750 500 250 0
2000 1750 1500 1250 1000

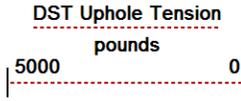
Shallow FE (Phase Corr.)
ohm metres

0 25 50
0 250 500

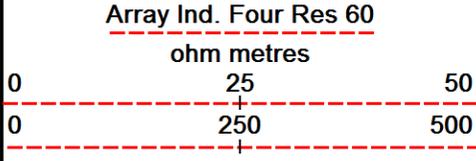
Borehole
Temp in
deg F

Array Ind. Four Res 20
ohm metres

0 25 50
0 250 500



Replay
Scale
1:600

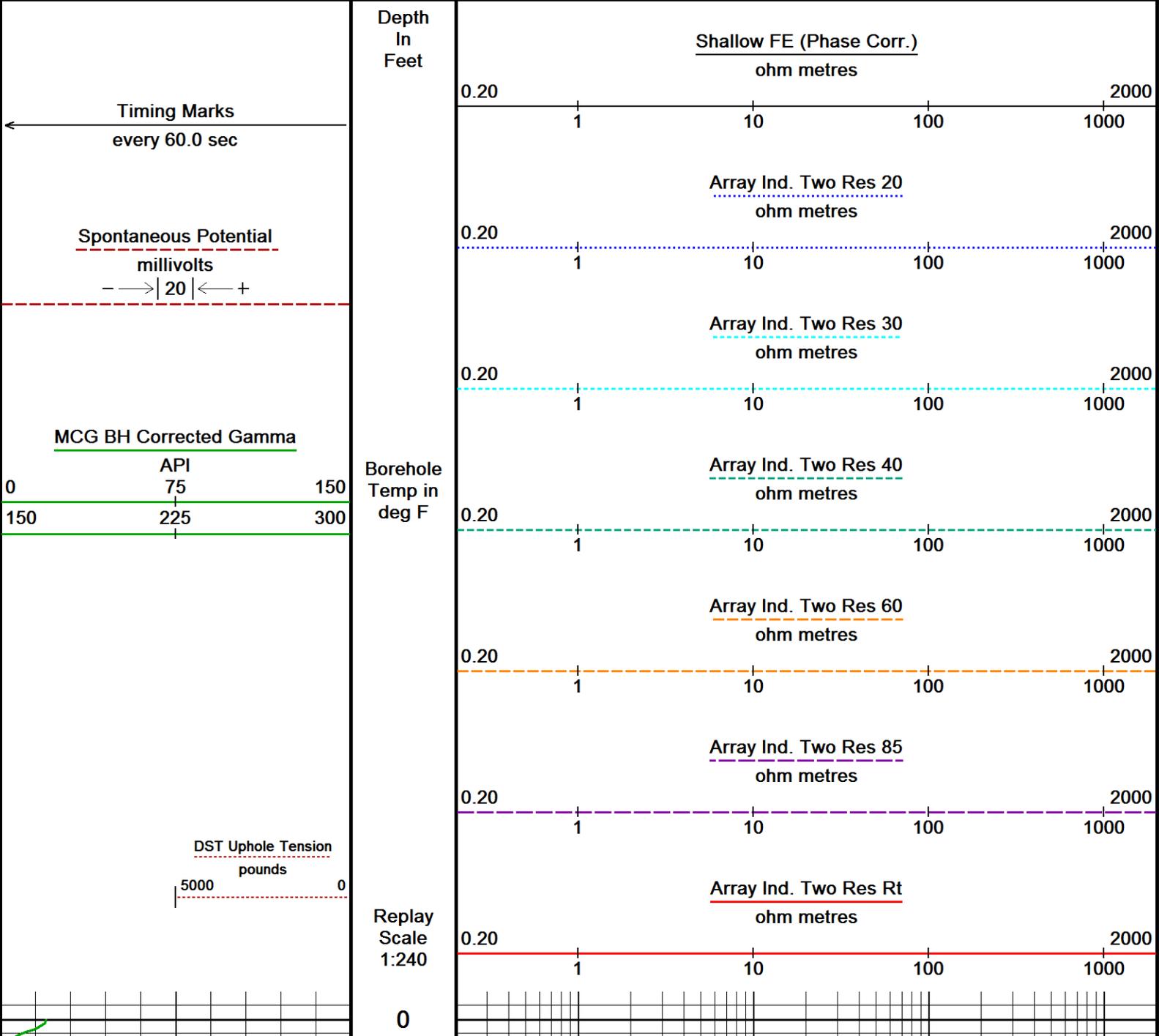


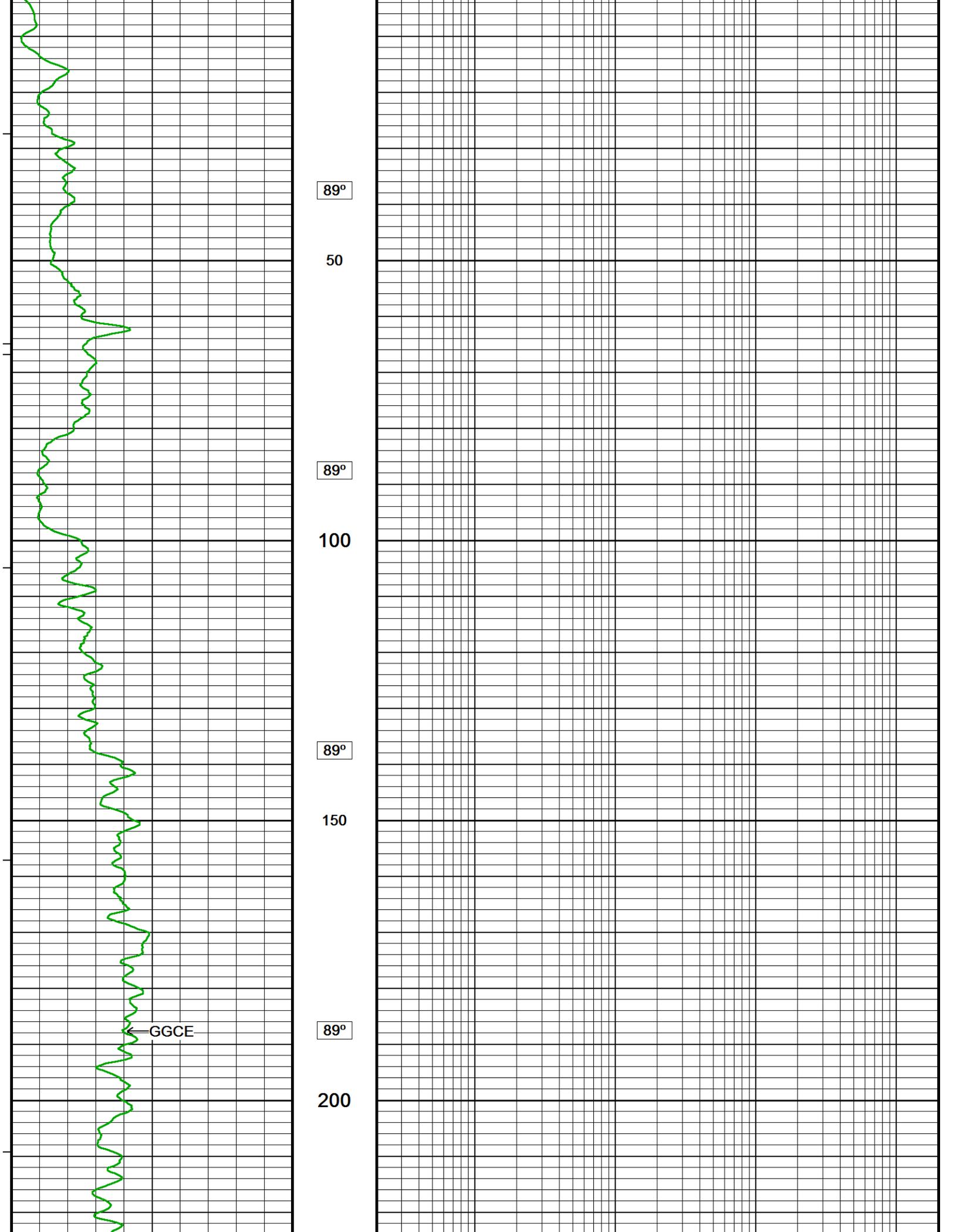
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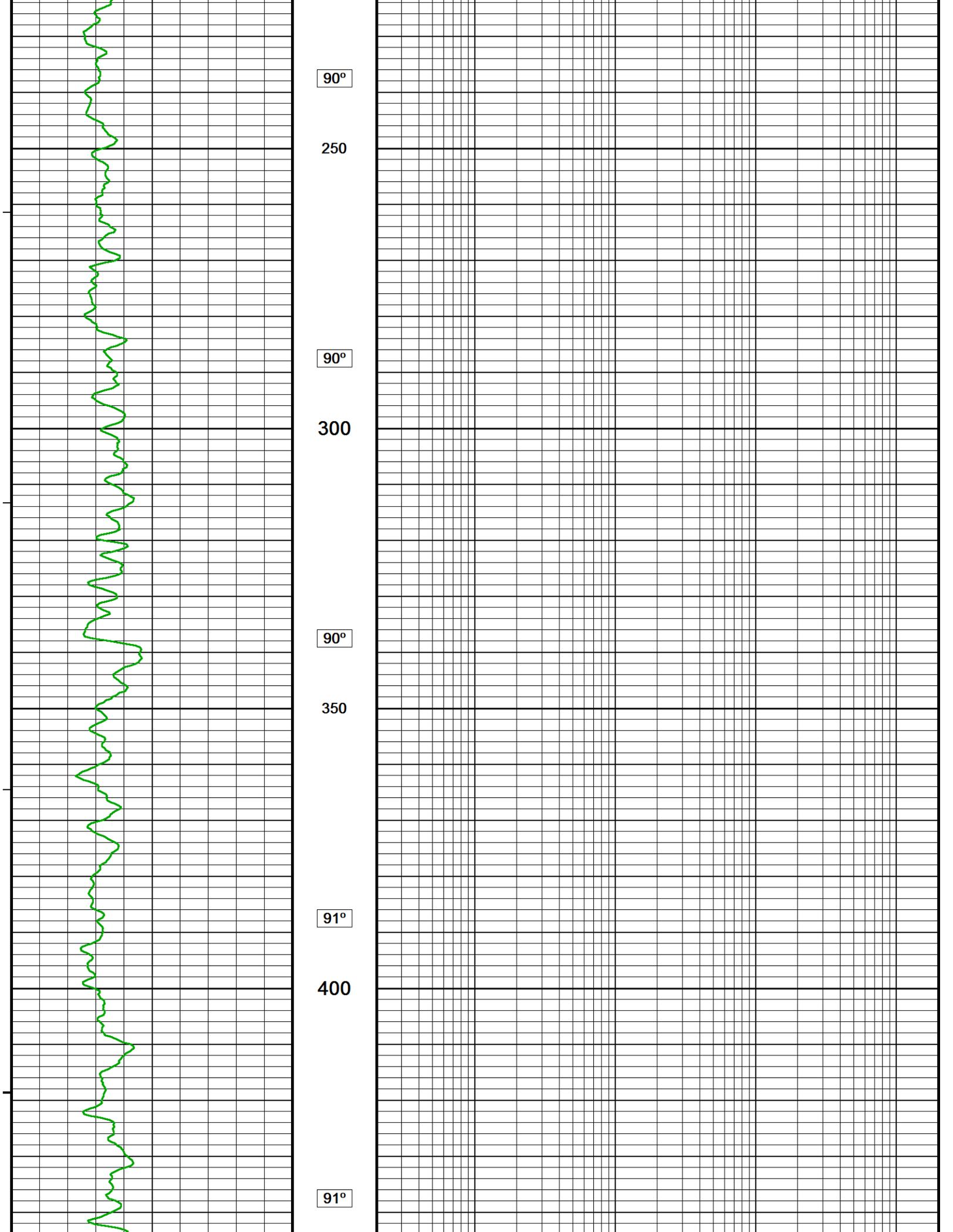
↑ 2 INCH MAIN PASS 1:600 ↑

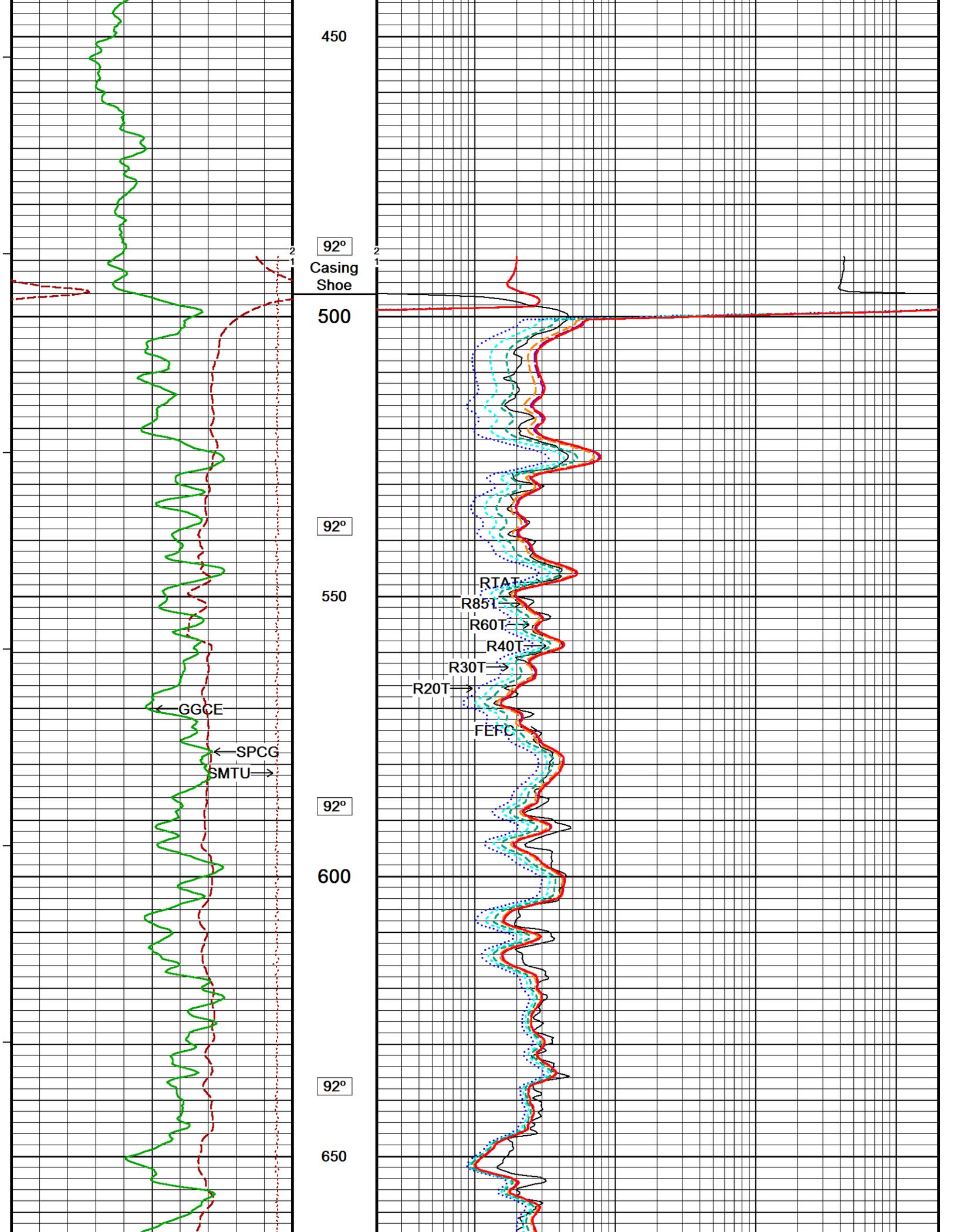
↓ 5 INCH MAIN PASS 1:240 ↓

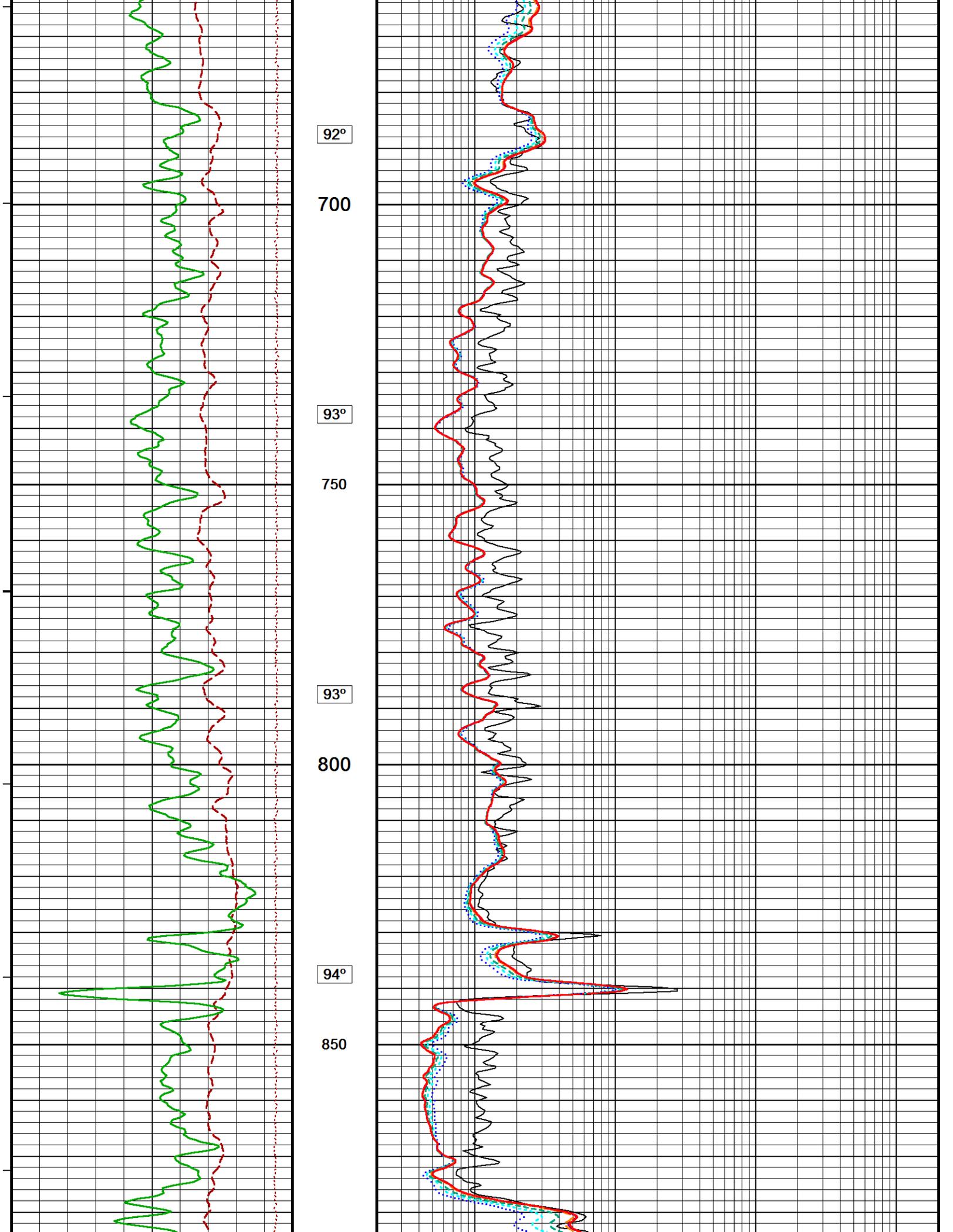
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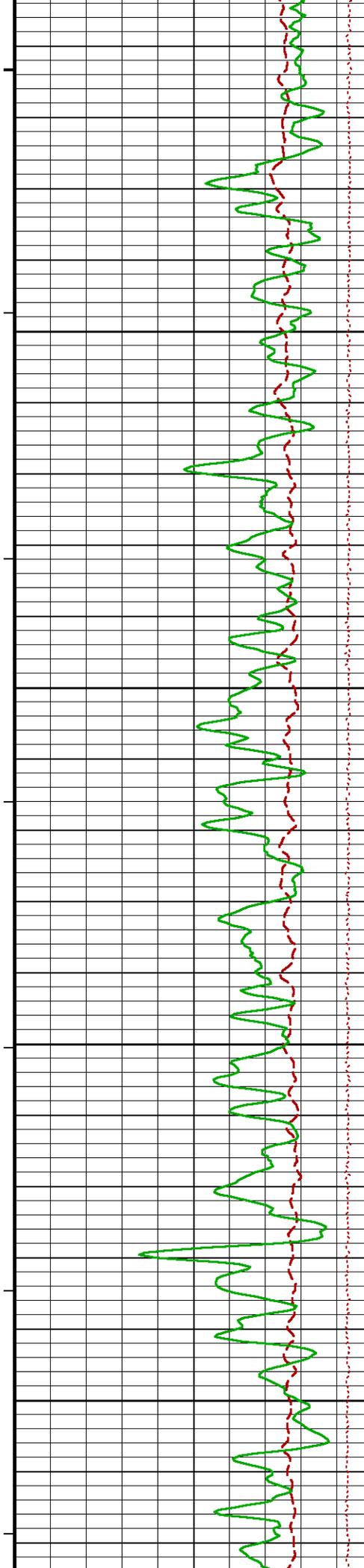












95°

1150

95°

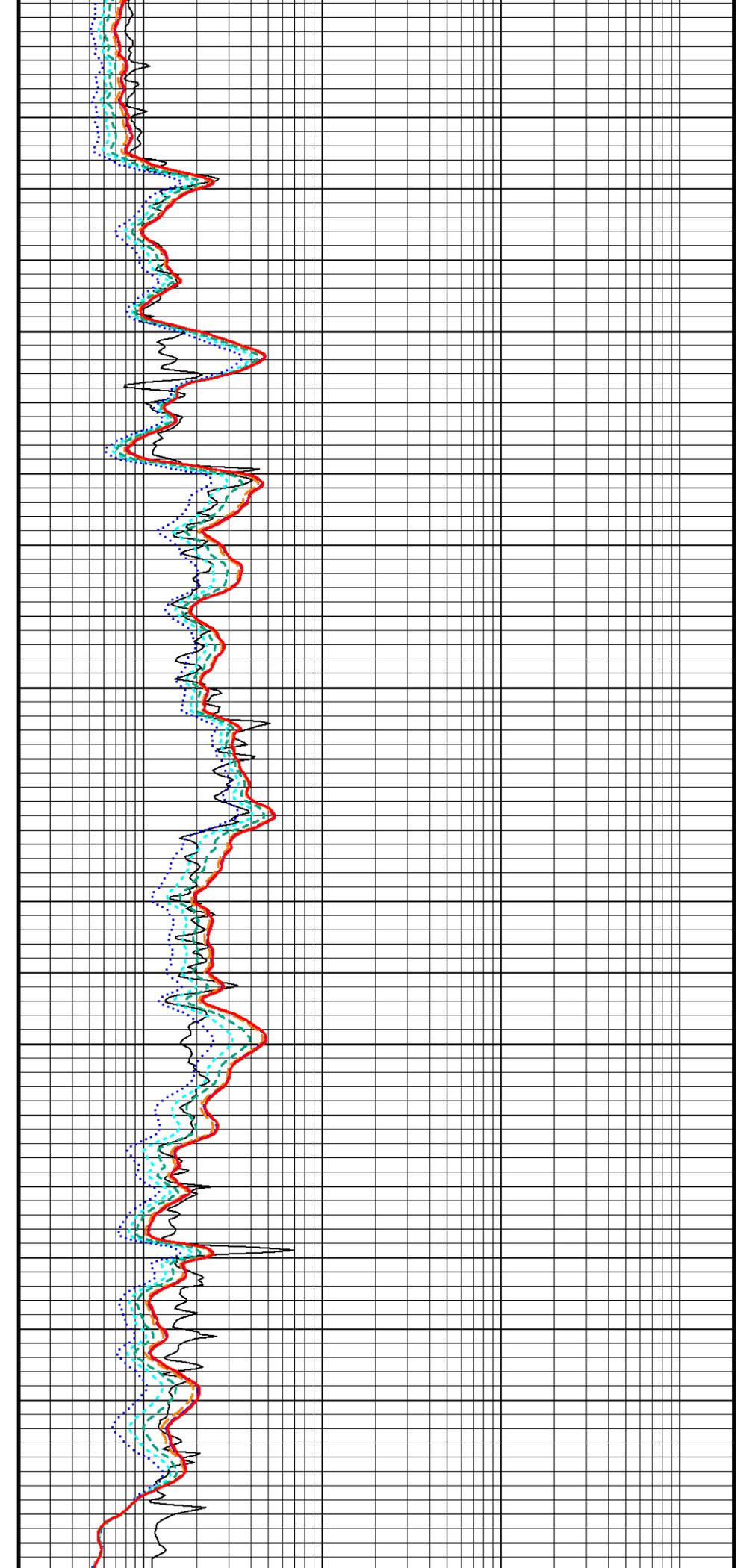
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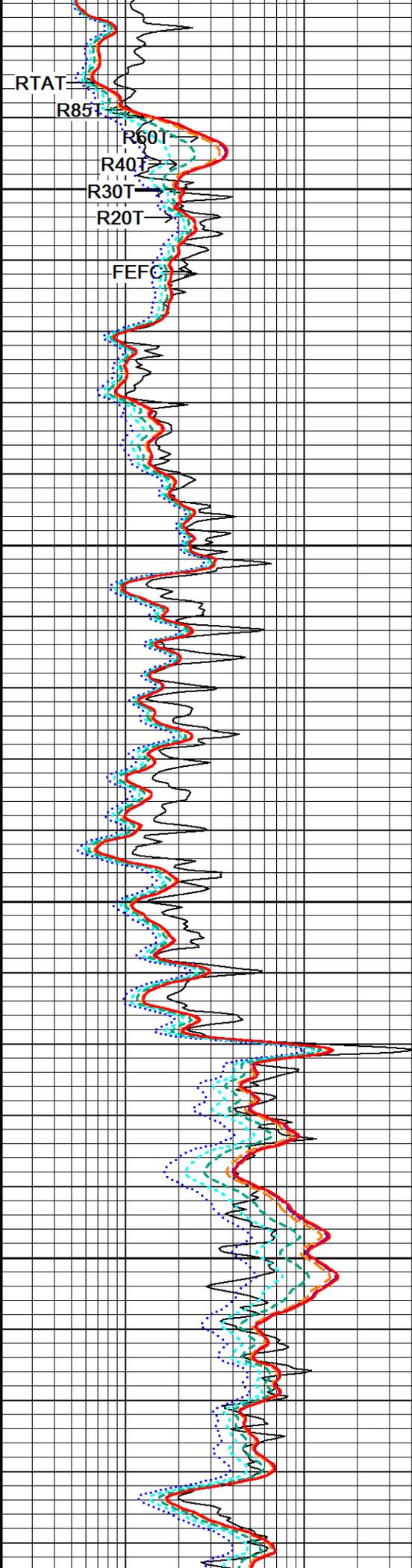
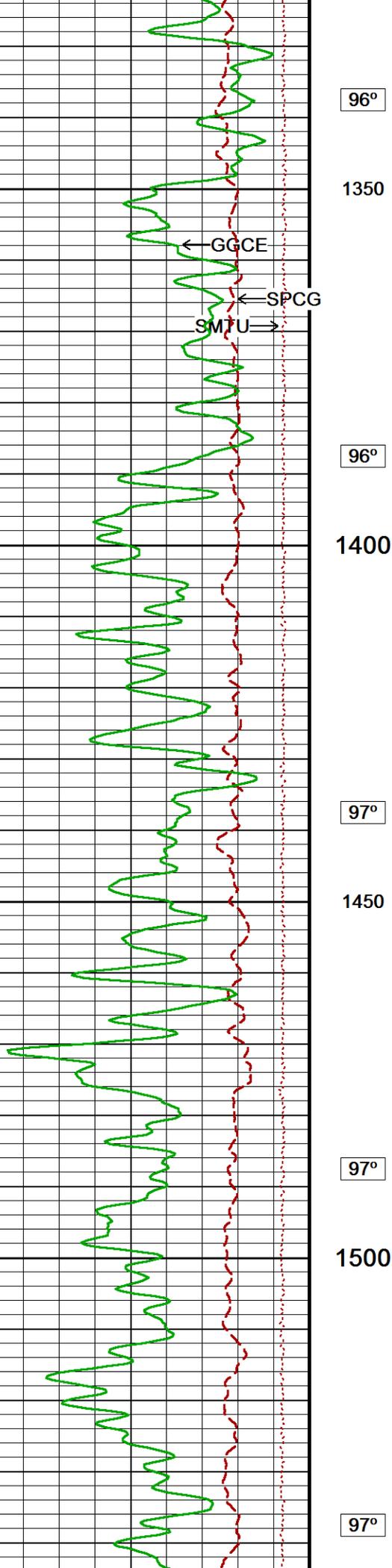
96°

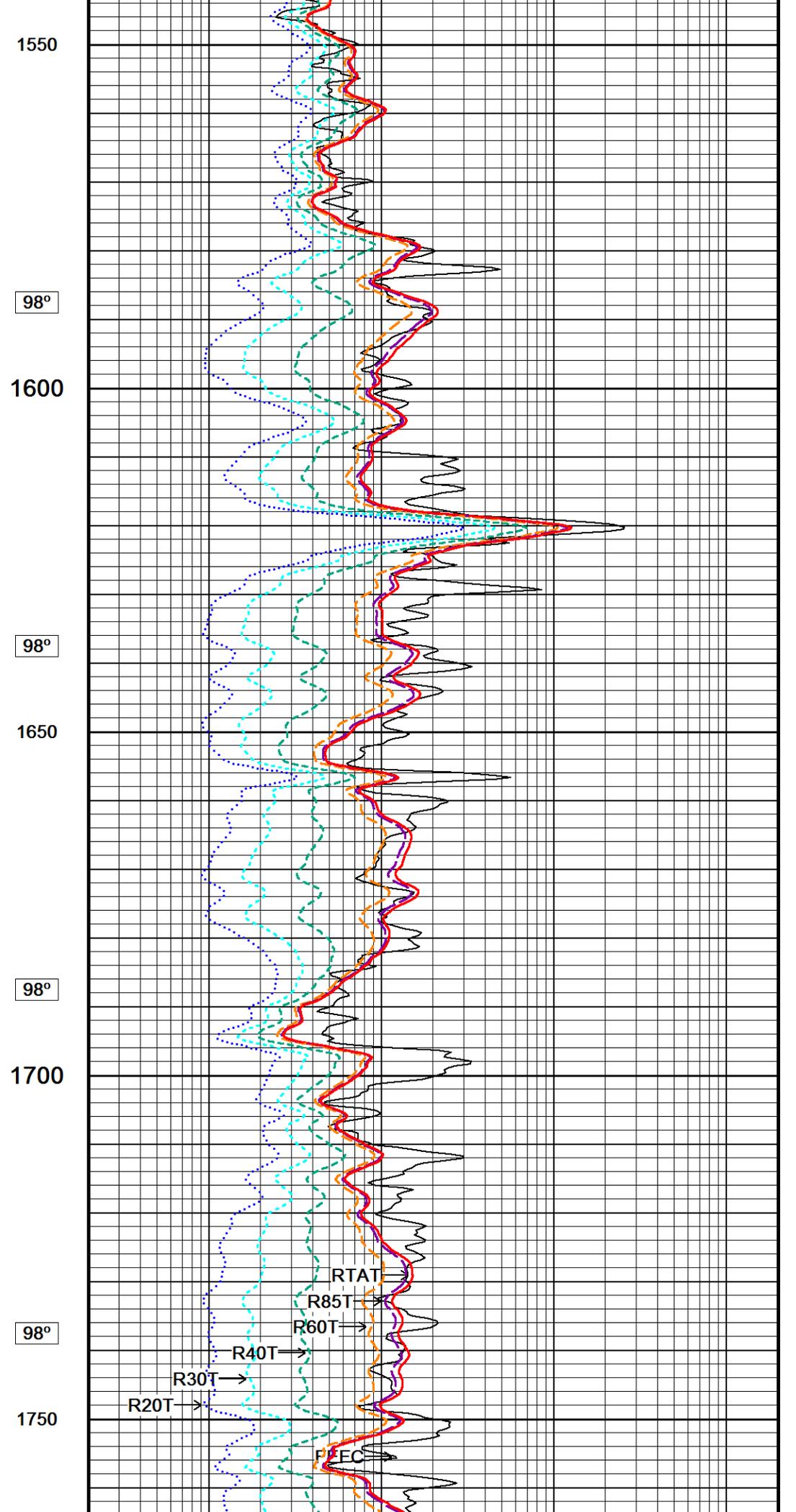
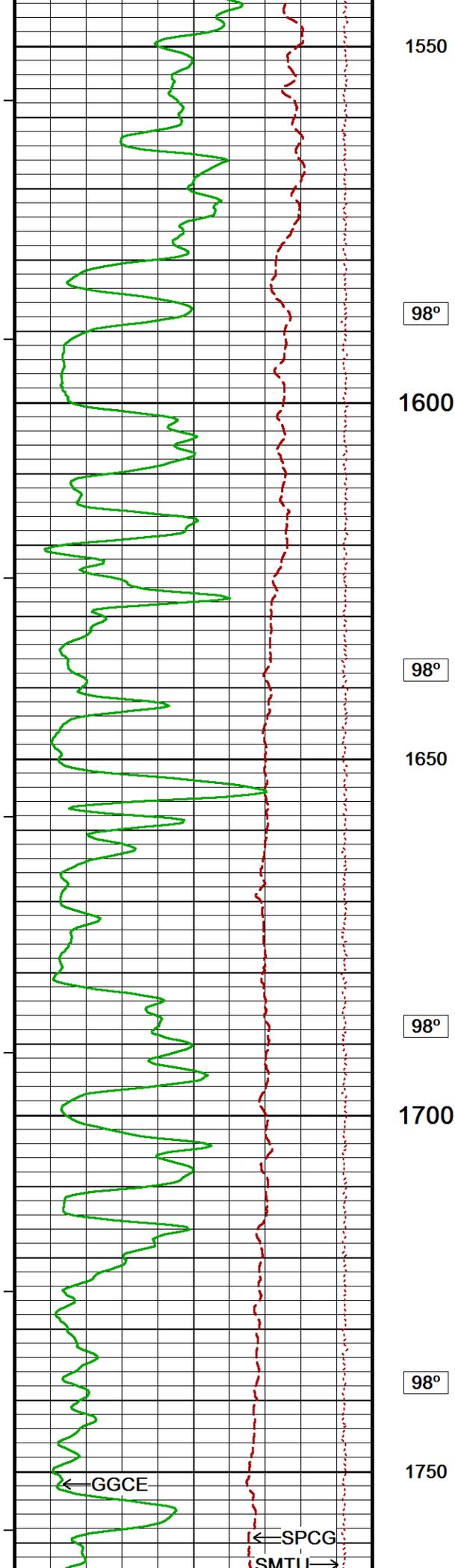
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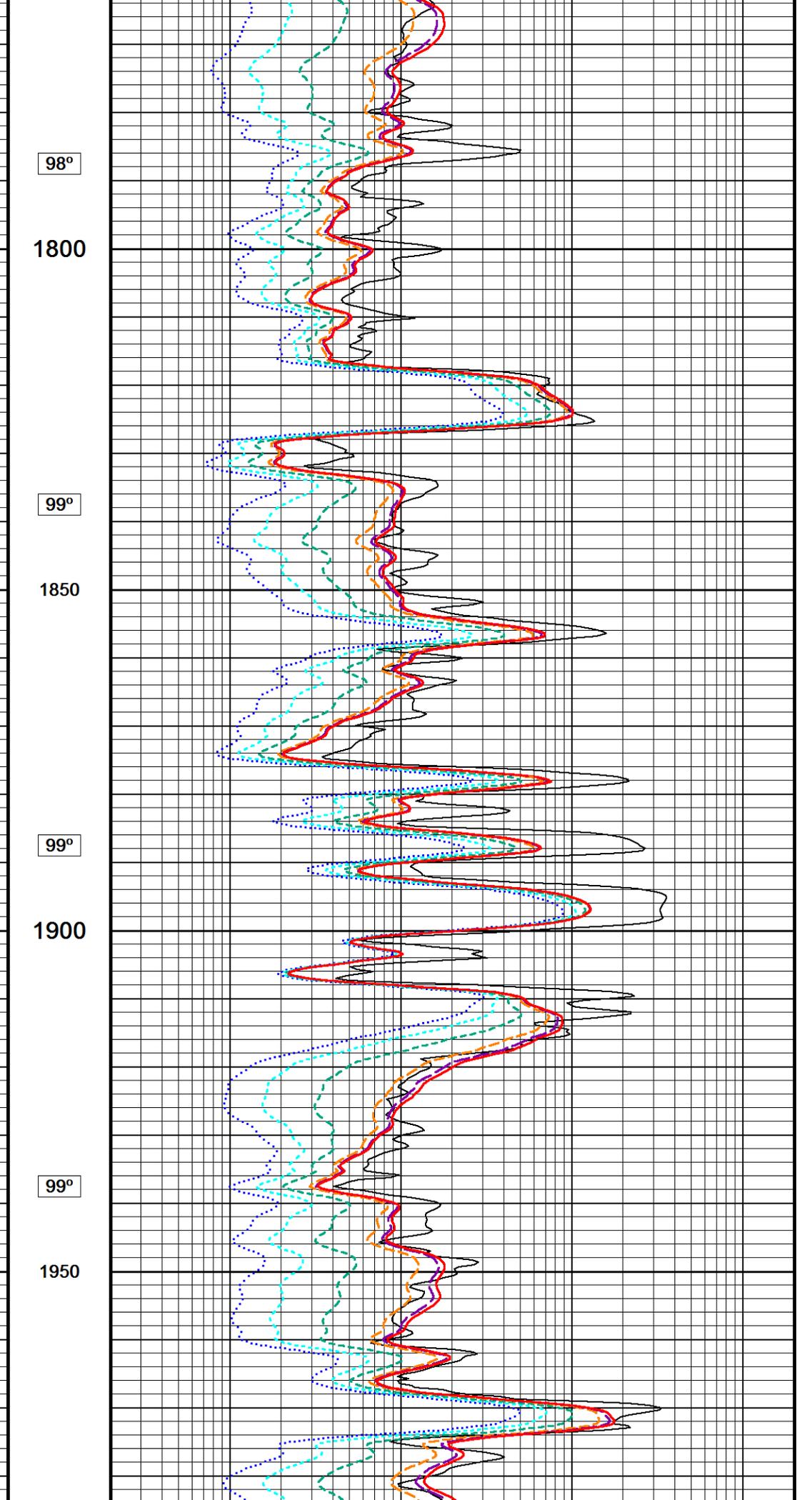
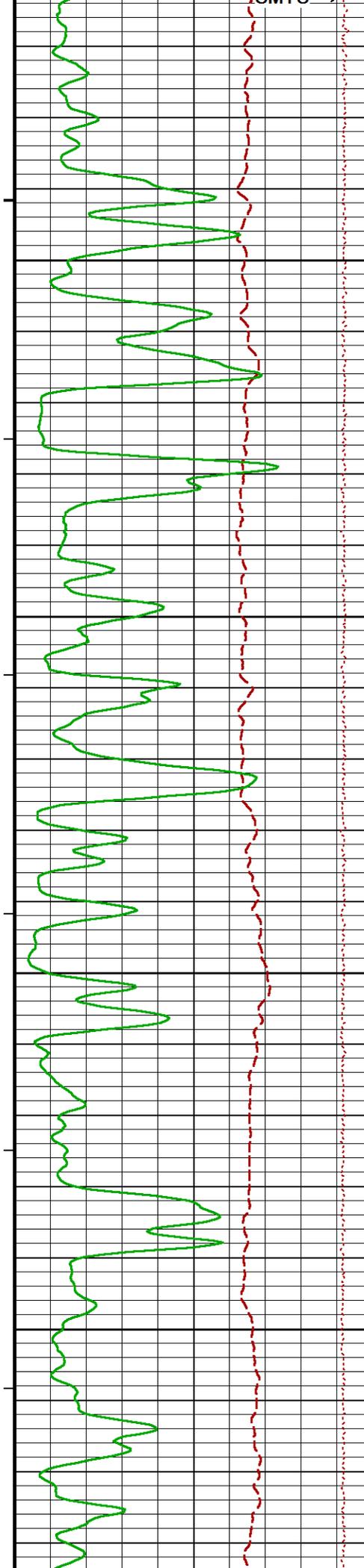
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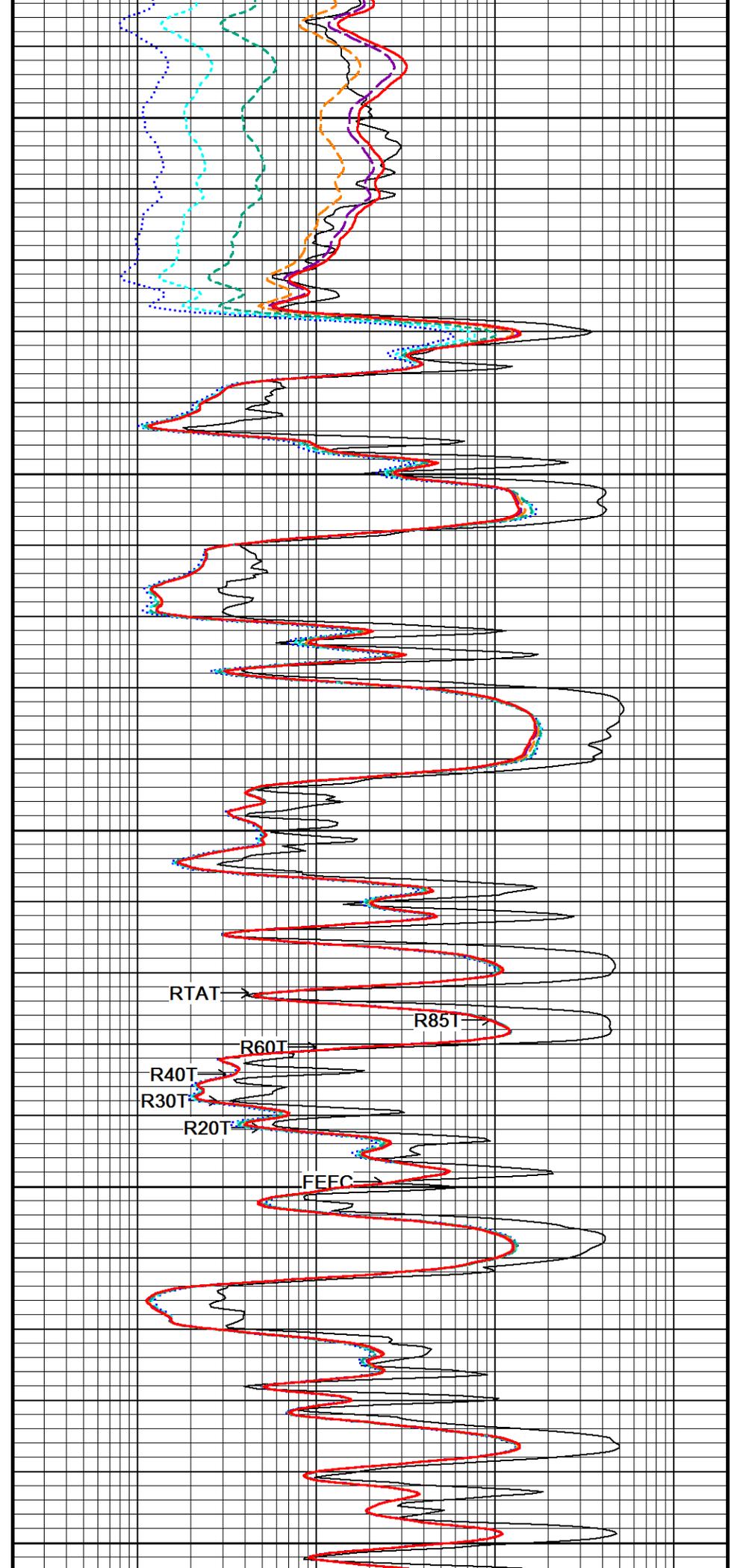
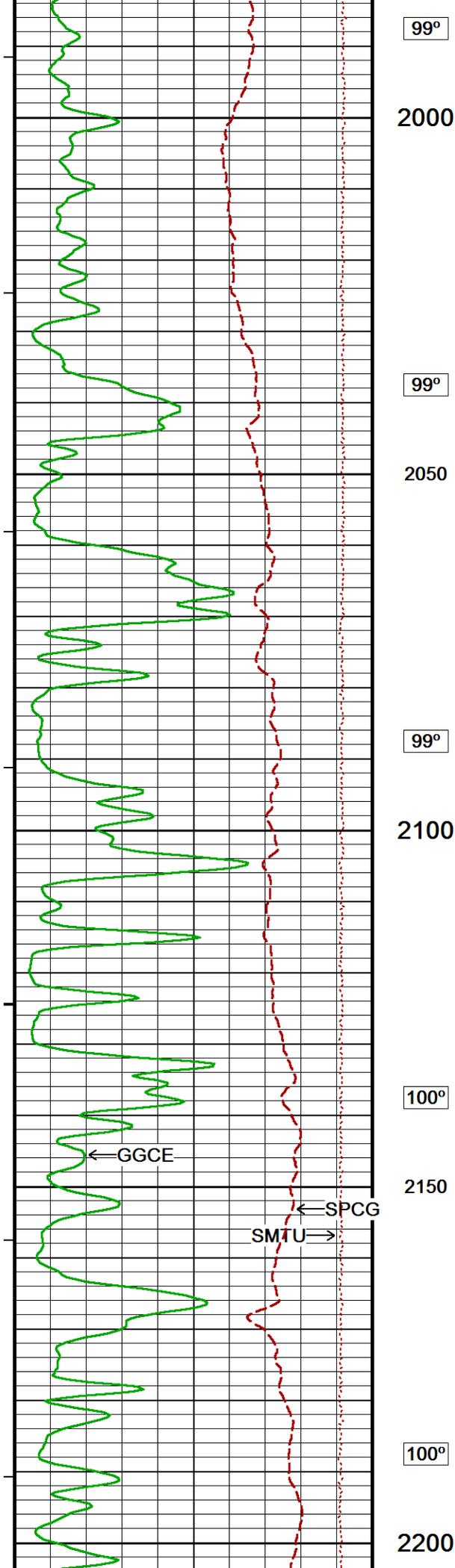
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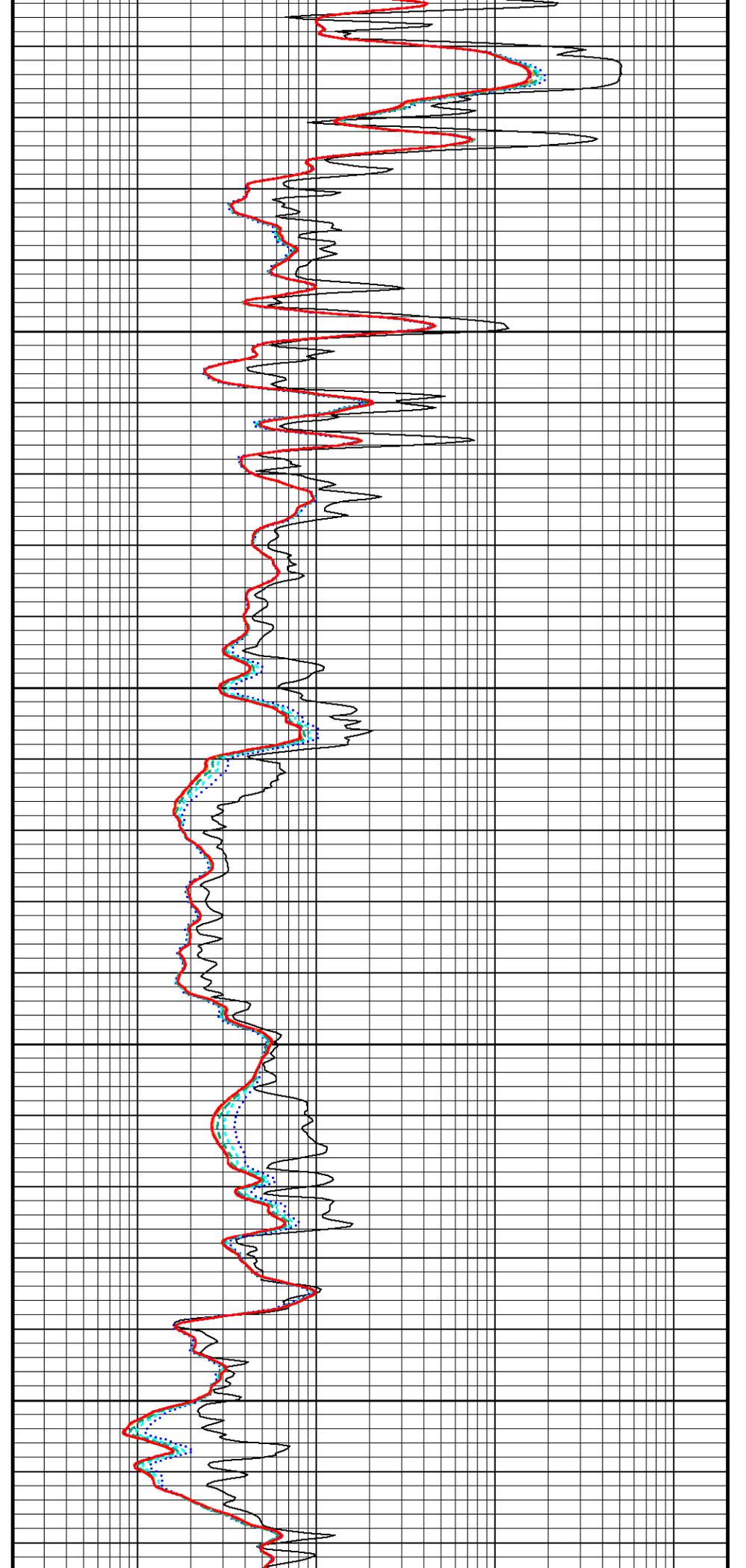
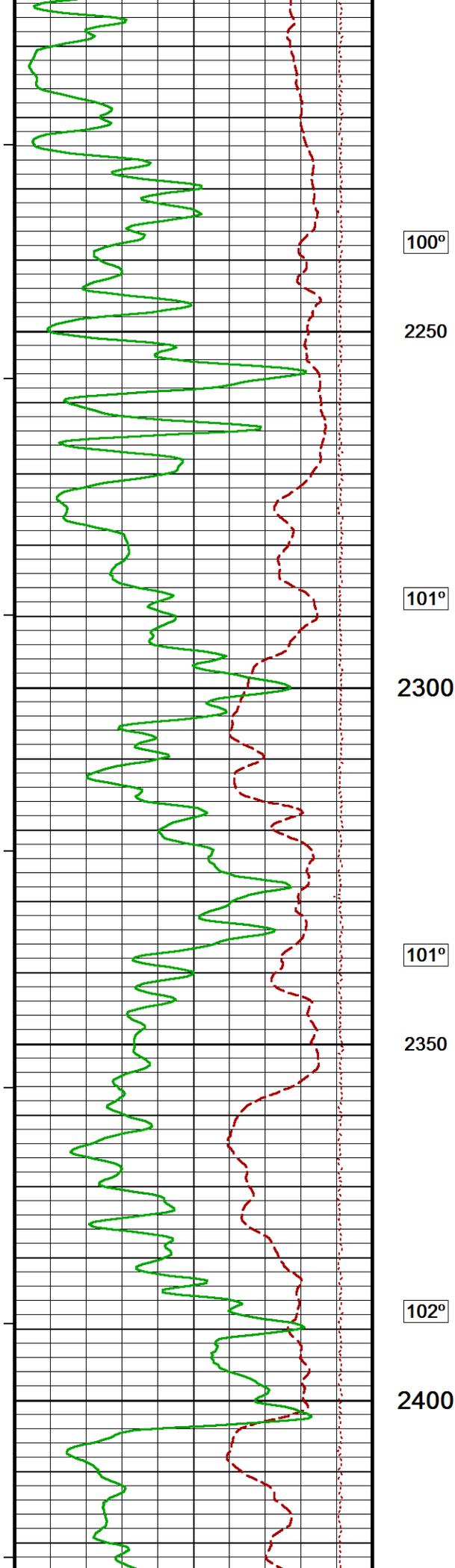


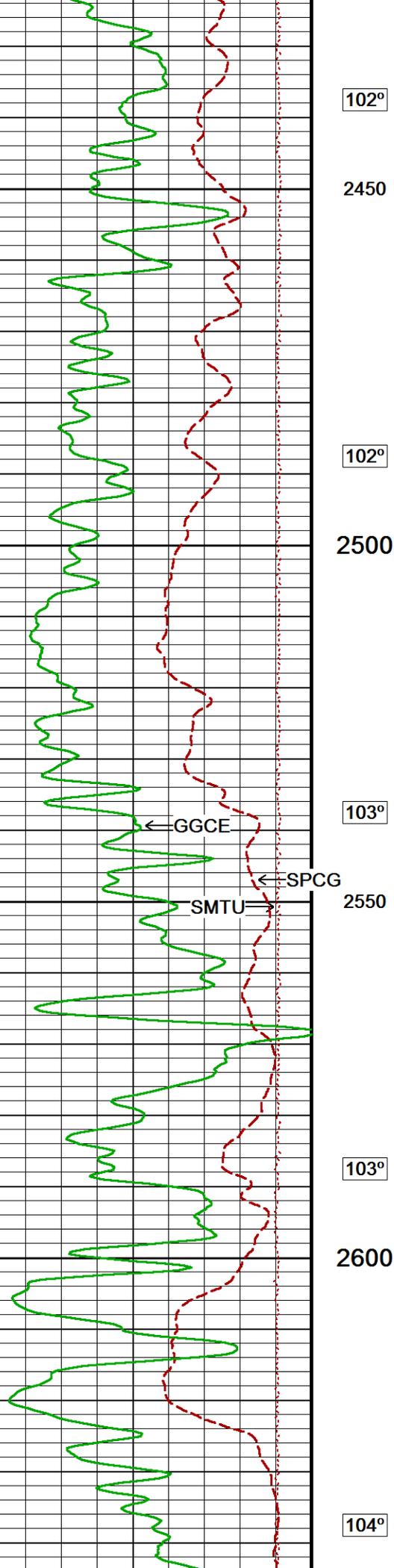




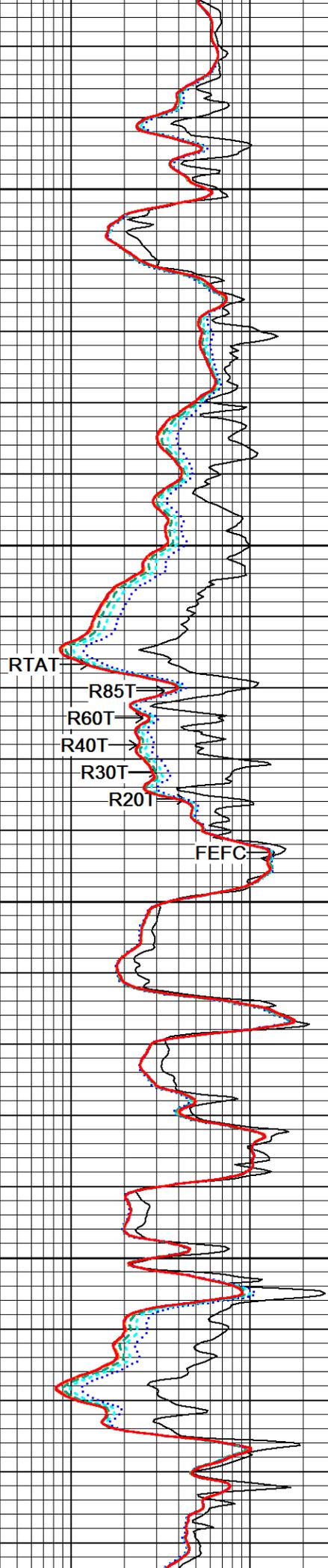




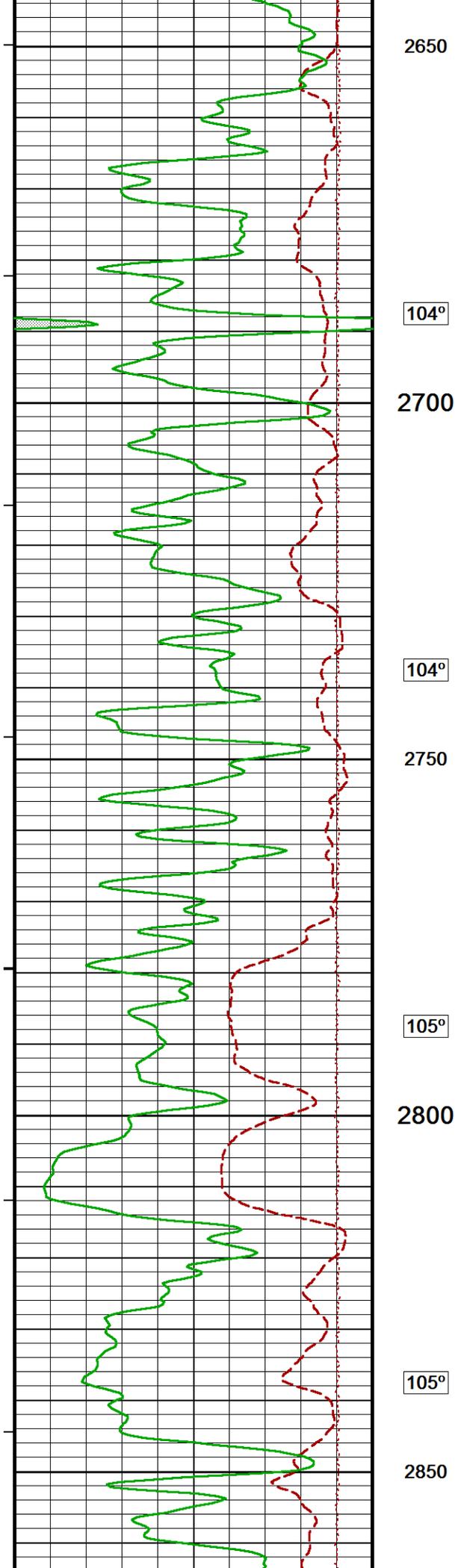




102°
2450
102°
2500
103°
2550
103°
2600
104°



RTAT
R85T
R60T
R40T
R30T
R20T
FEFC



2650

104°

2700

104°

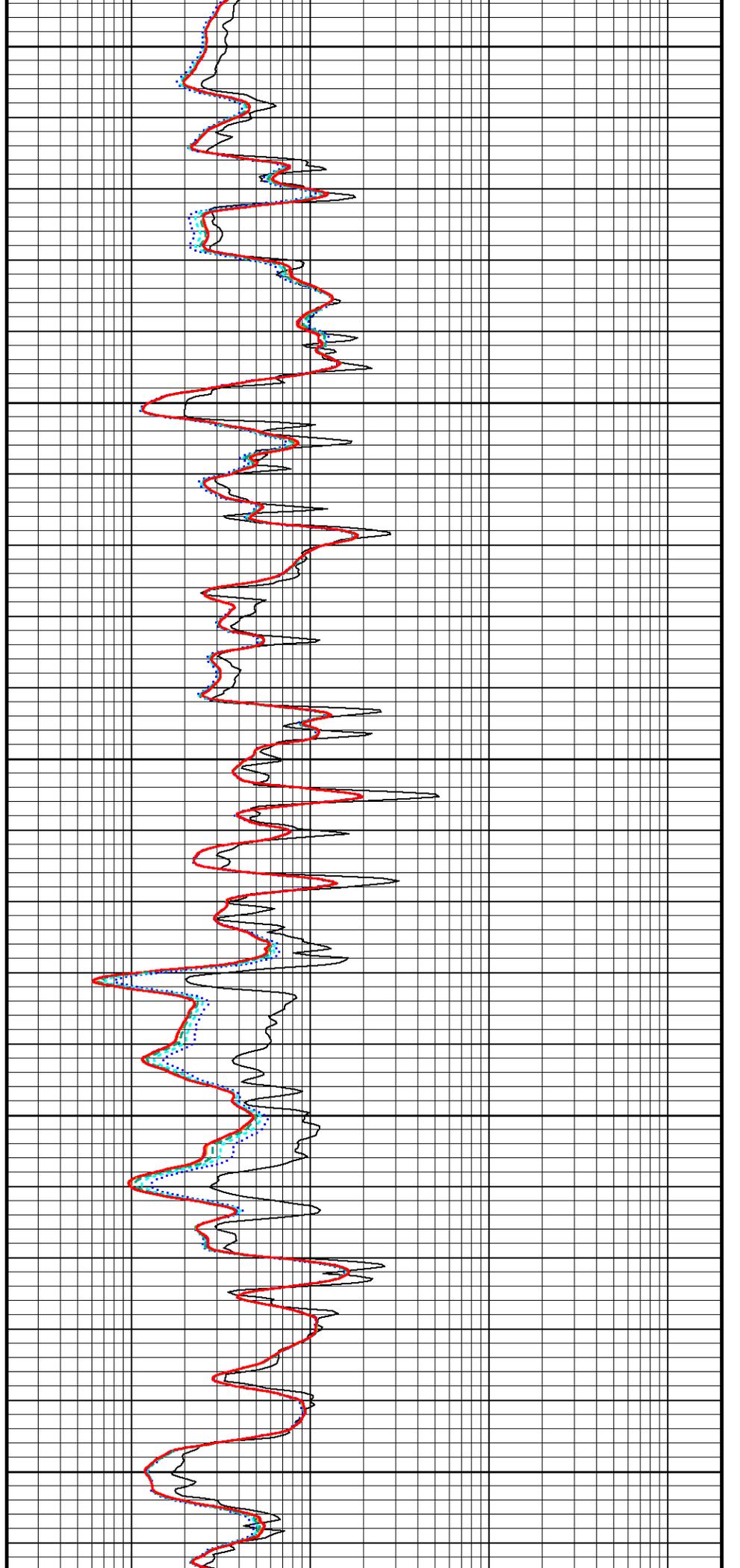
2750

105°

2800

105°

2850



2650

104°

2700

104°

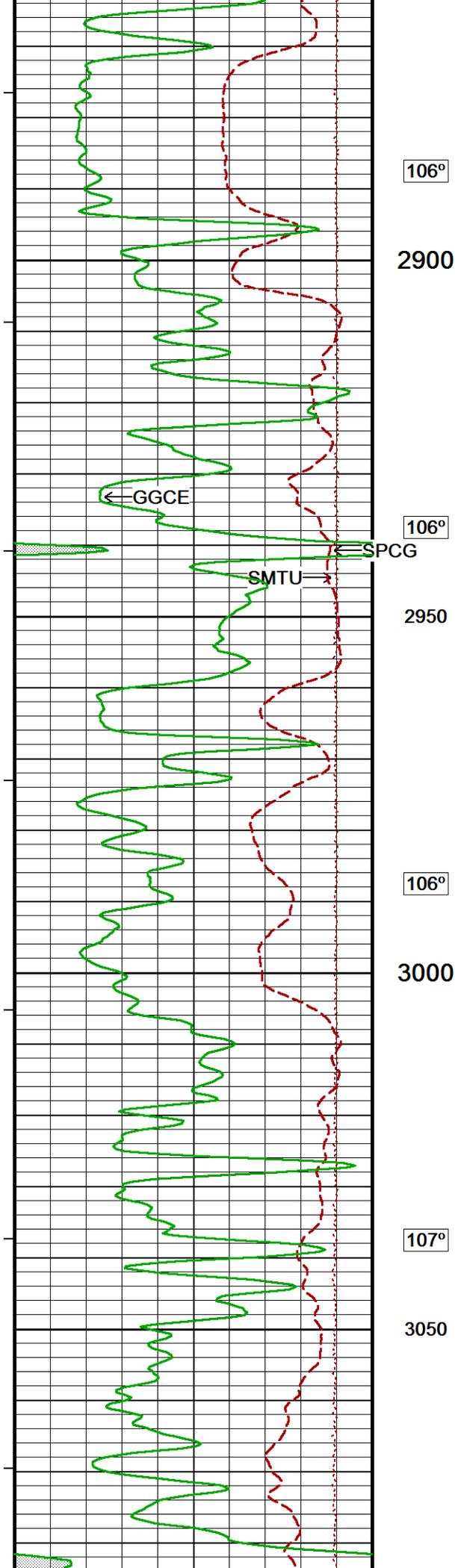
2750

105°

2800

105°

2850



106°

2900

106°

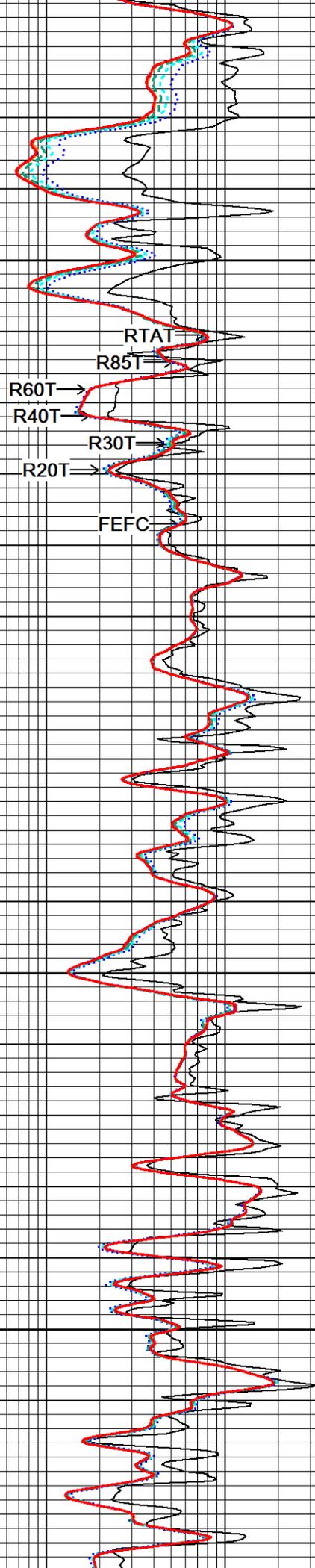
2950

106°

3000

107°

3050



RTA1

R85T

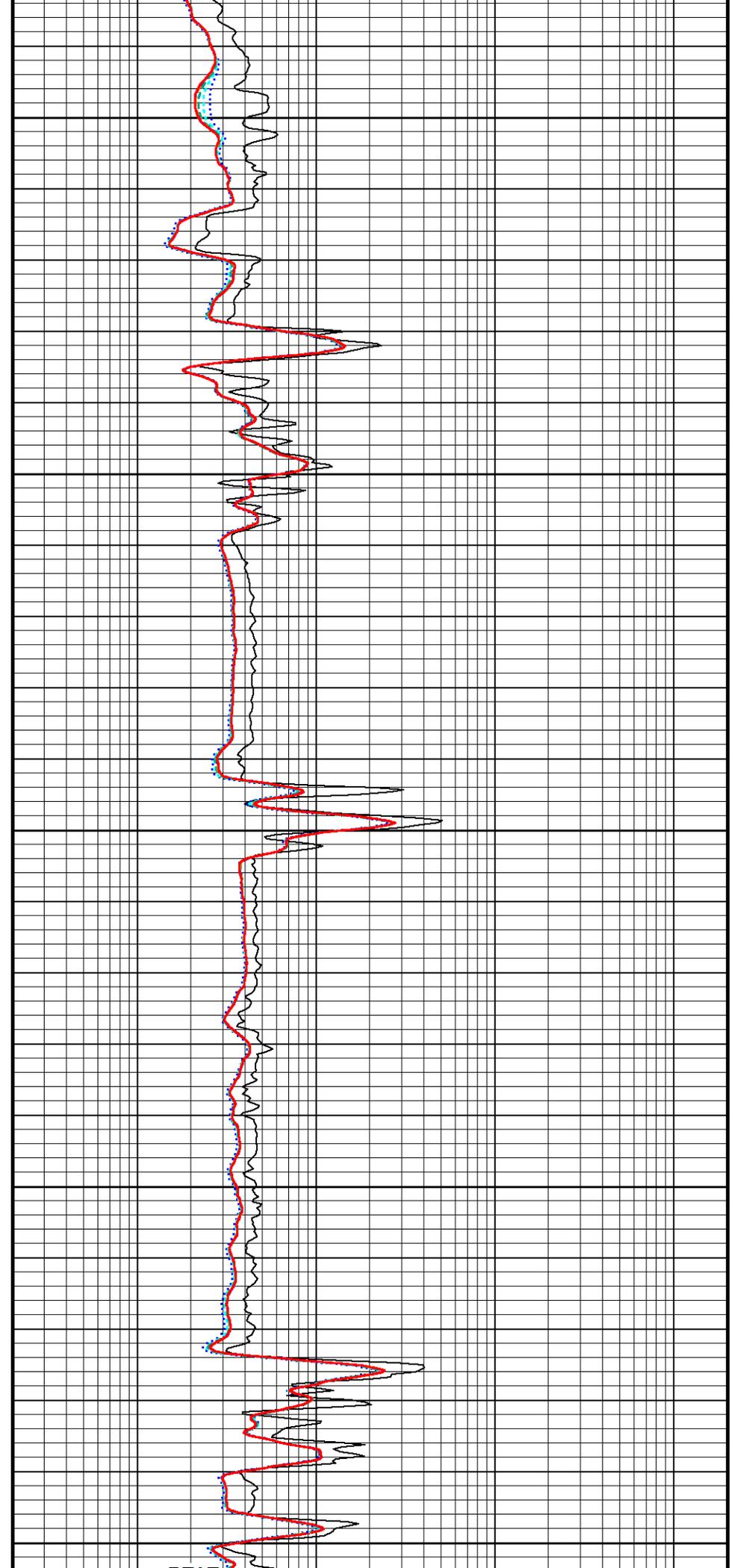
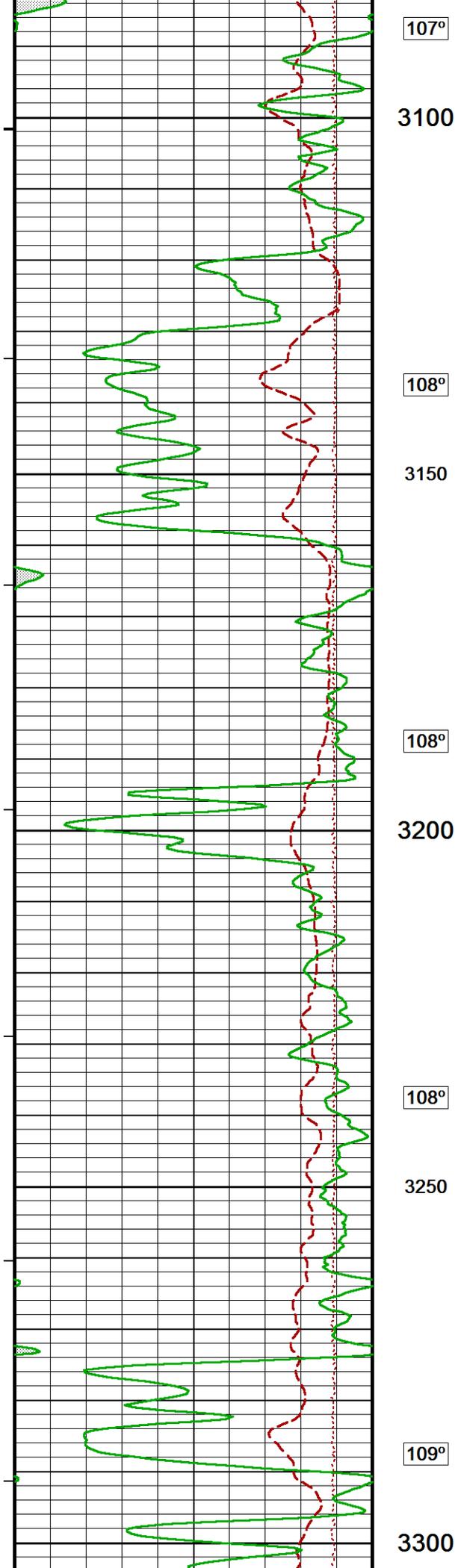
R60T

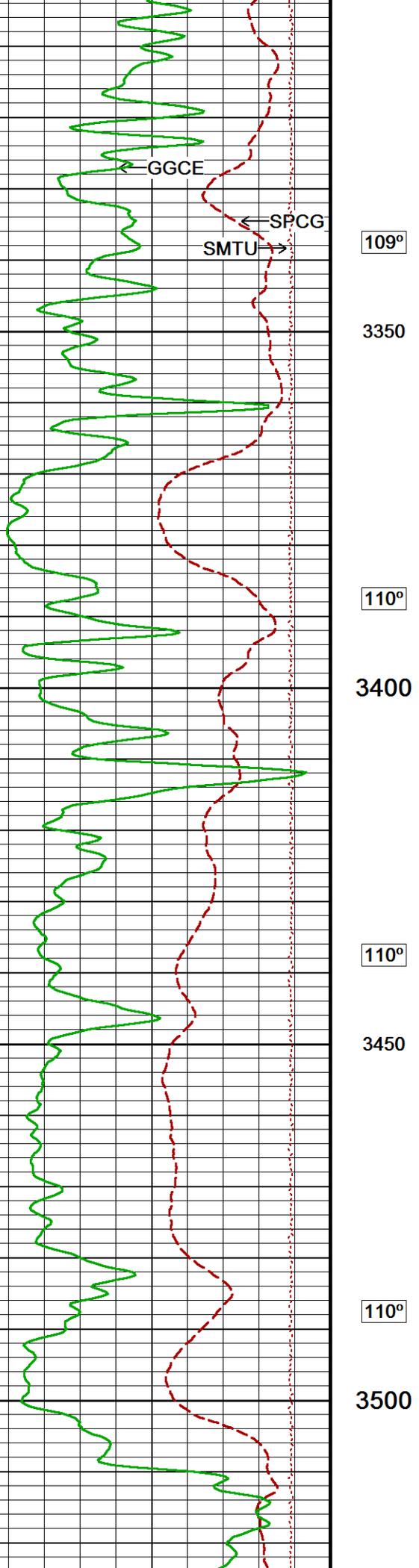
R40T

R30T

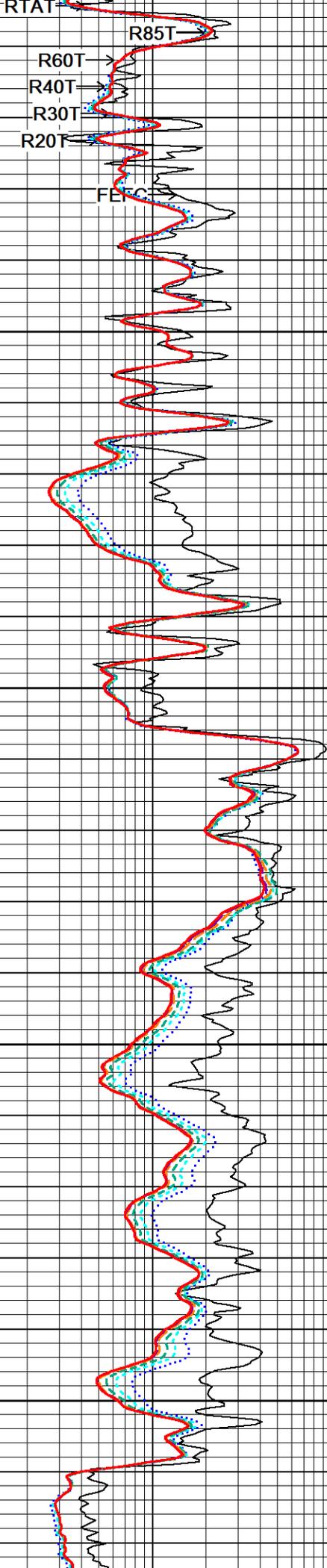
R20T

FEFC

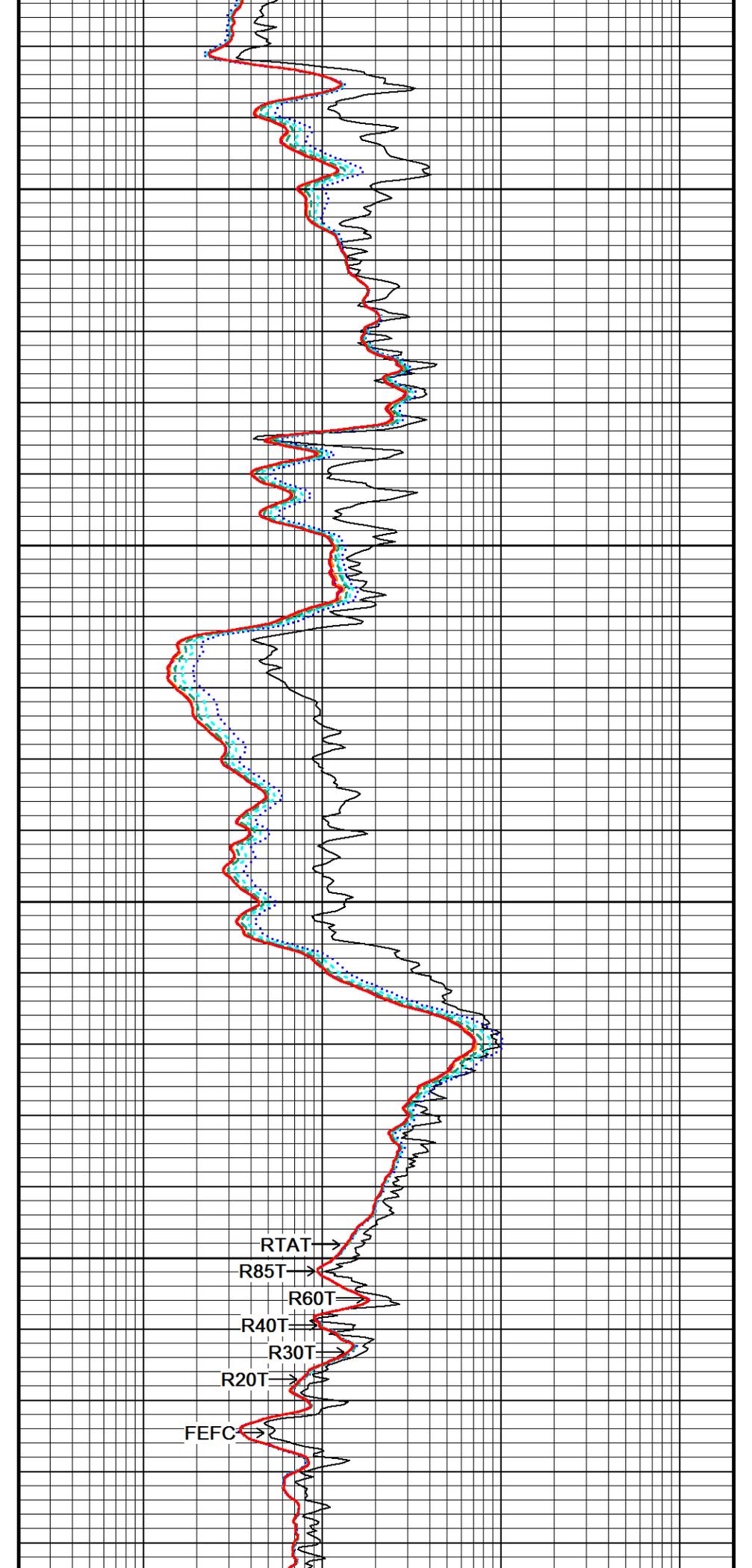
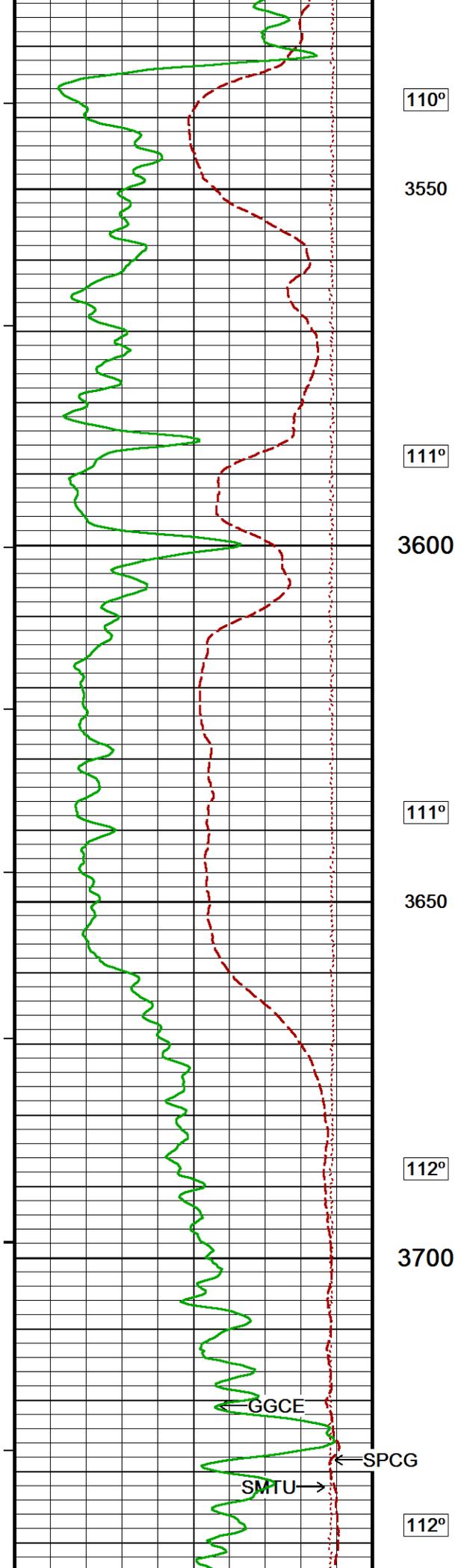


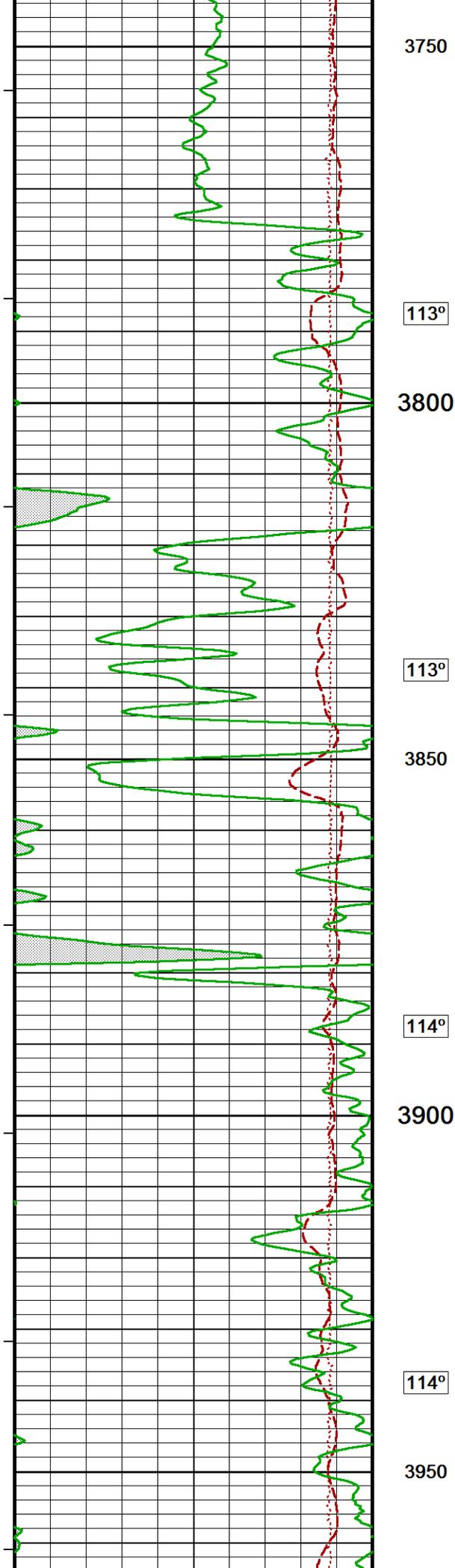


109°
3350
110°
3400
110°
3450
110°
3500



RTAT
R85T
R60T
R40T
R30T
R20T
FELC





3750

113°

3800

113°

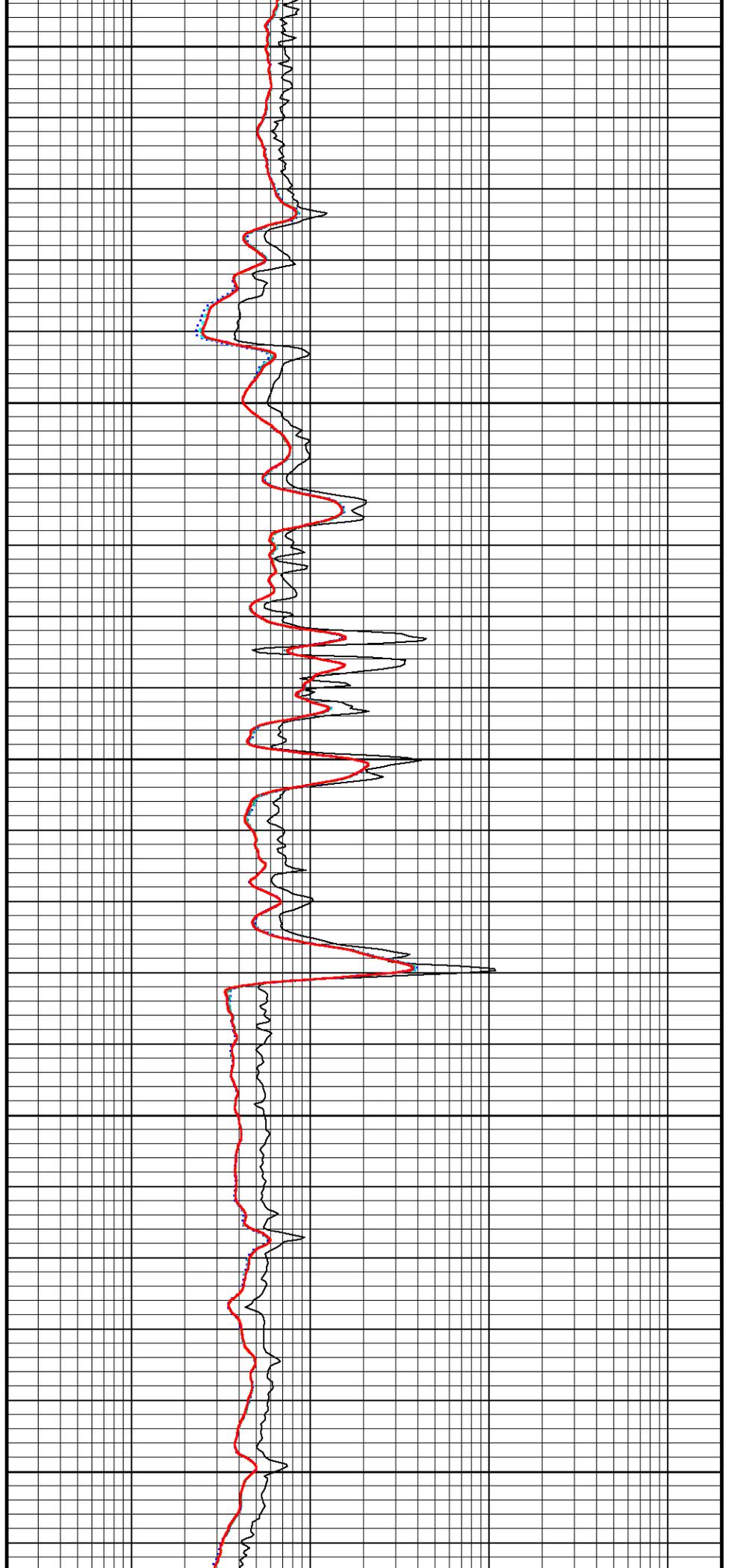
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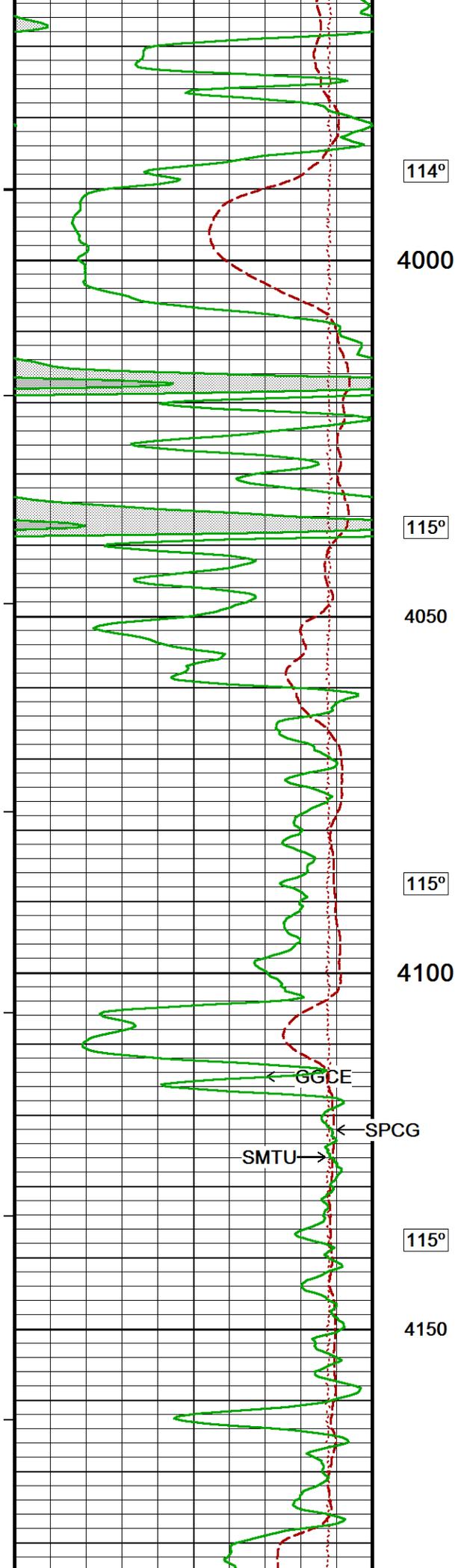
114°

3900

114°

3950





114°

4000

115°

4050

115°

4100

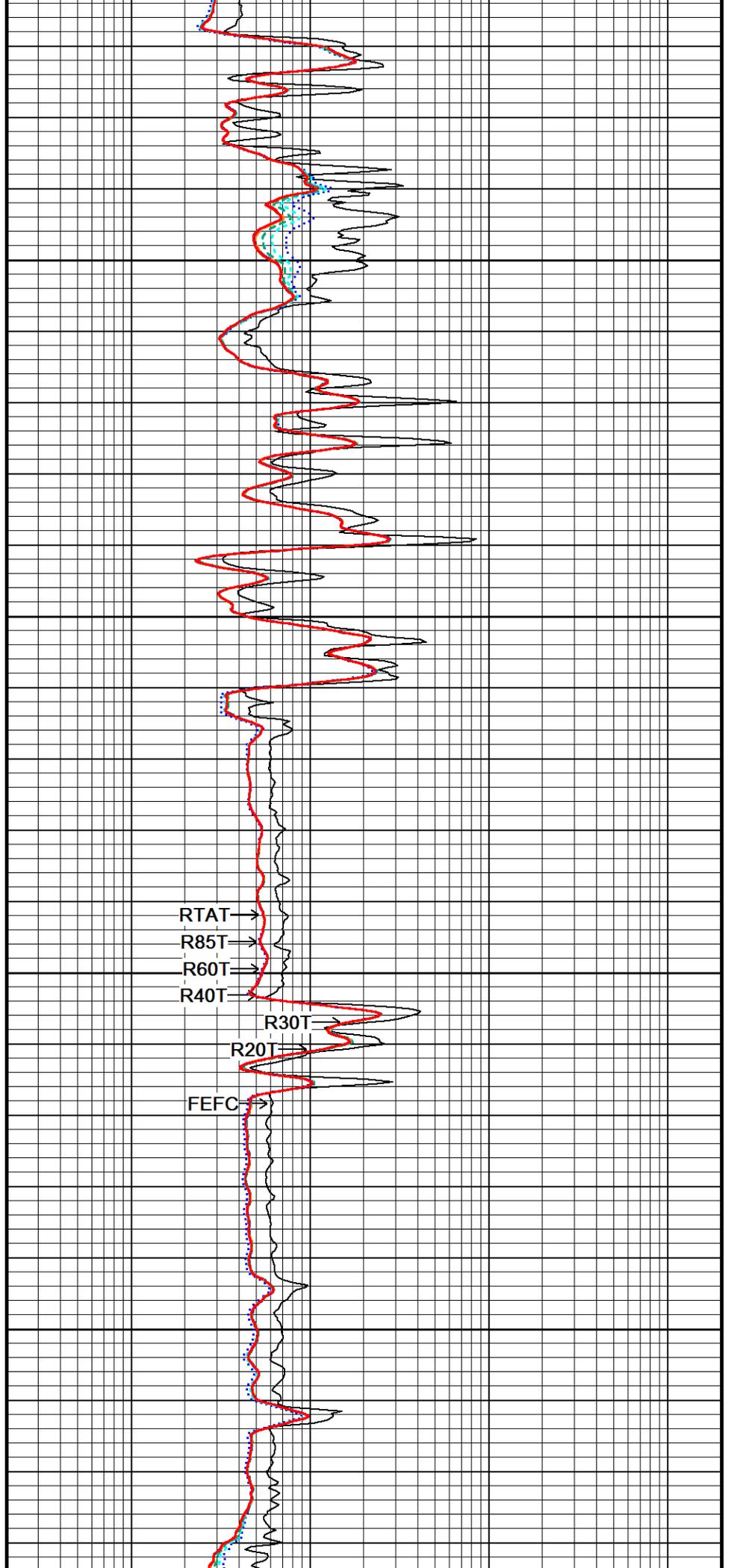
← GGCE

← SPCG

SMTU →

115°

4150



RTAT →

R85T →

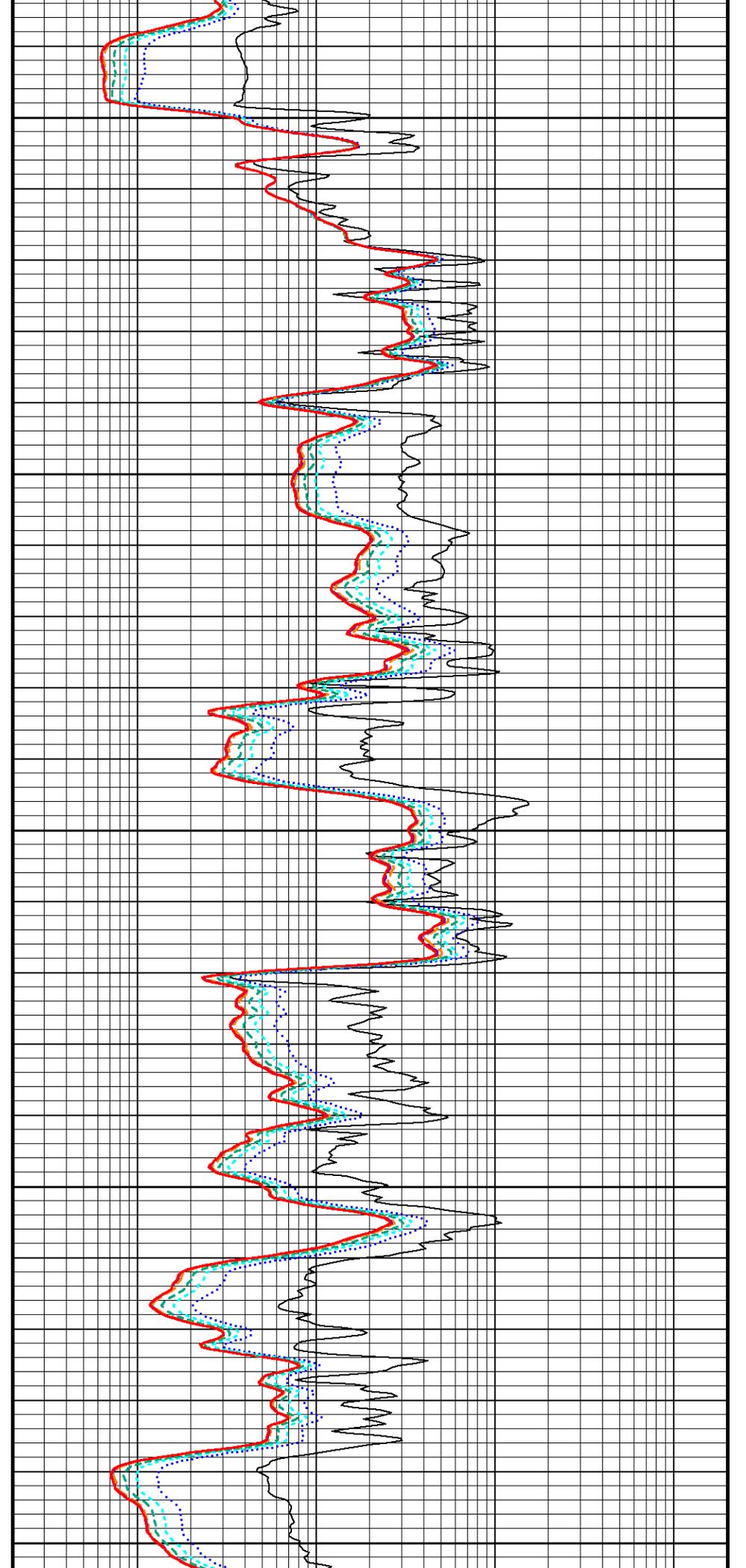
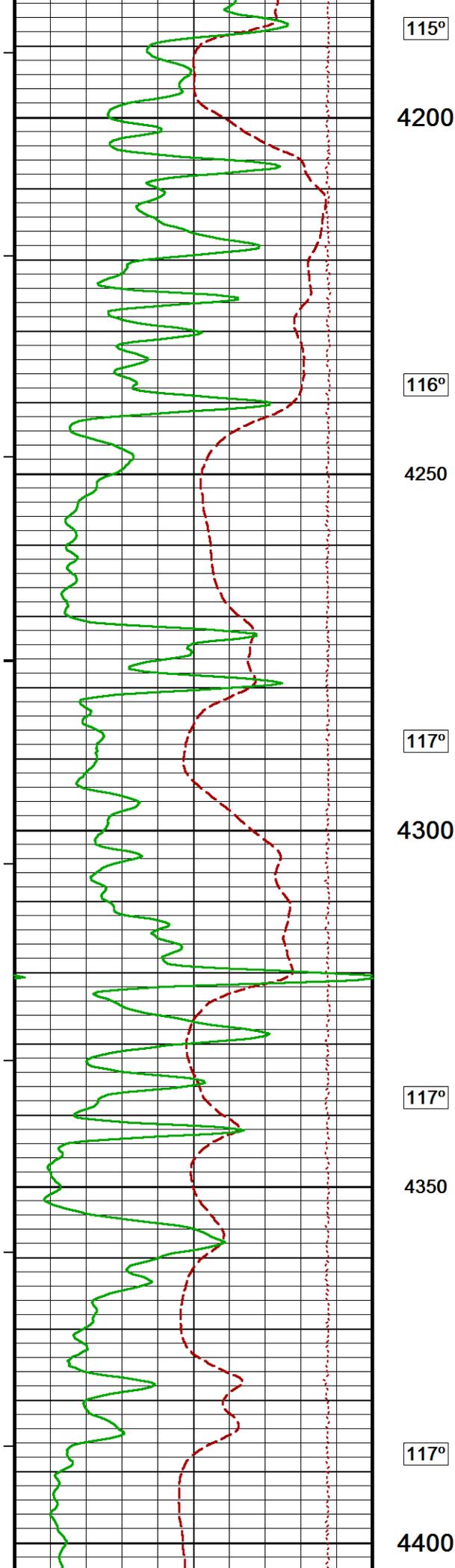
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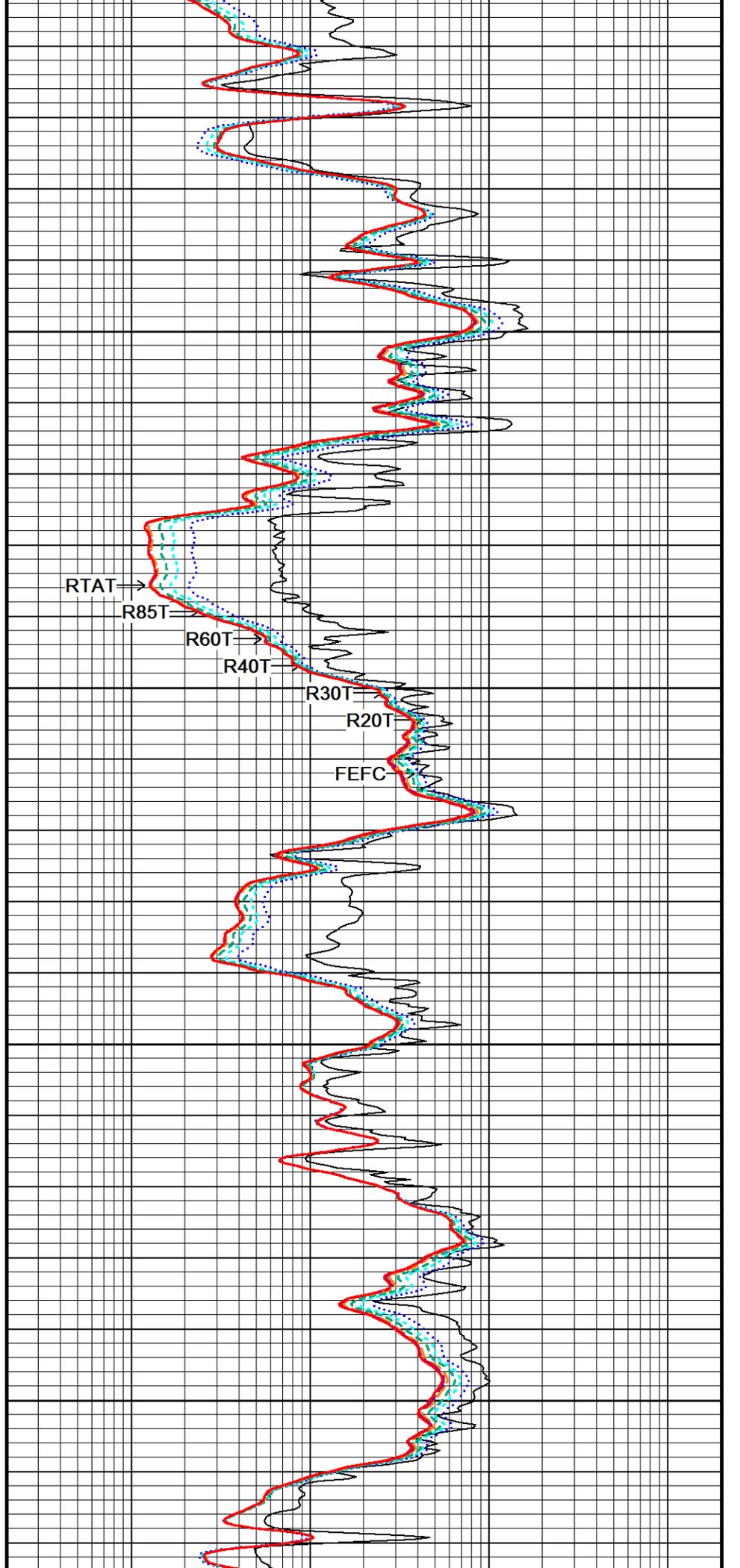
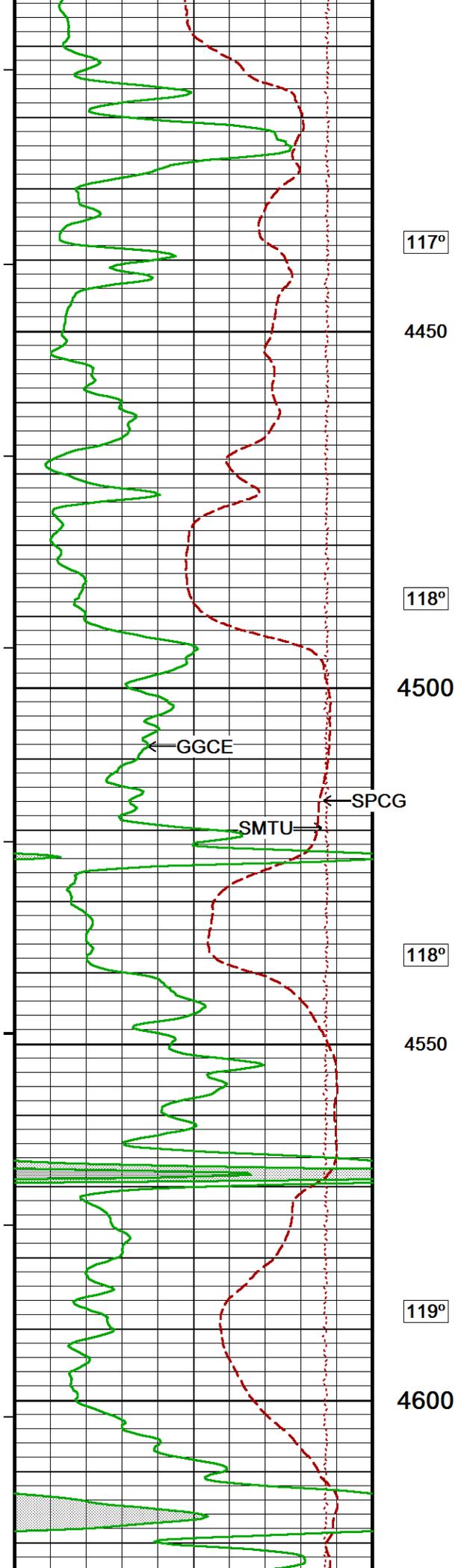
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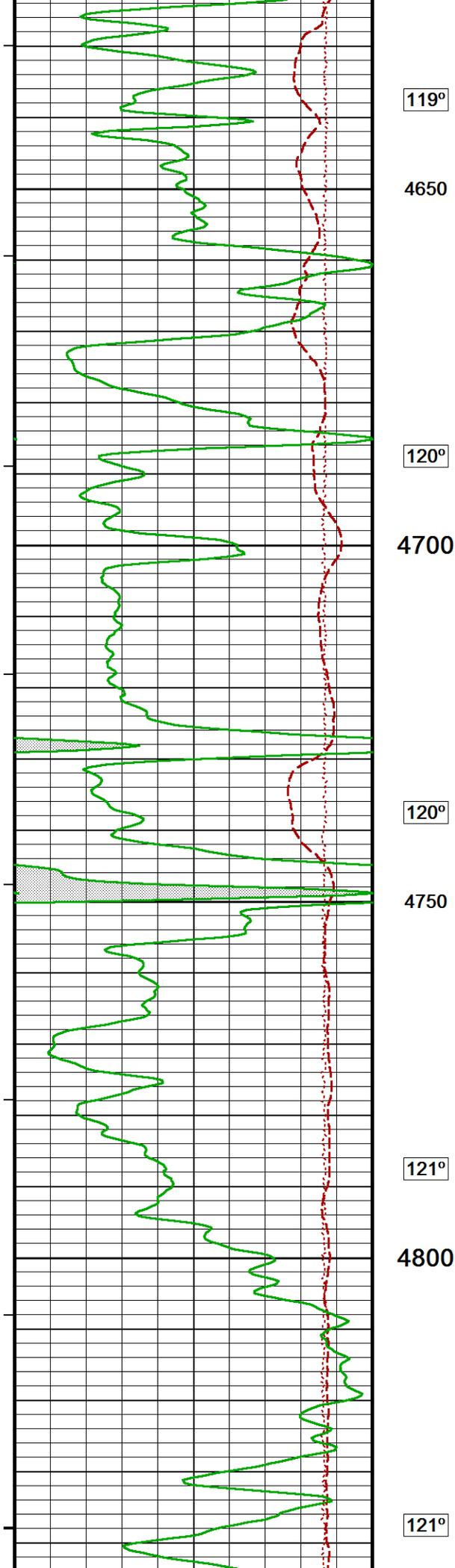
R30T →

R20T →

FEFC →







119°

4650

120°

4700

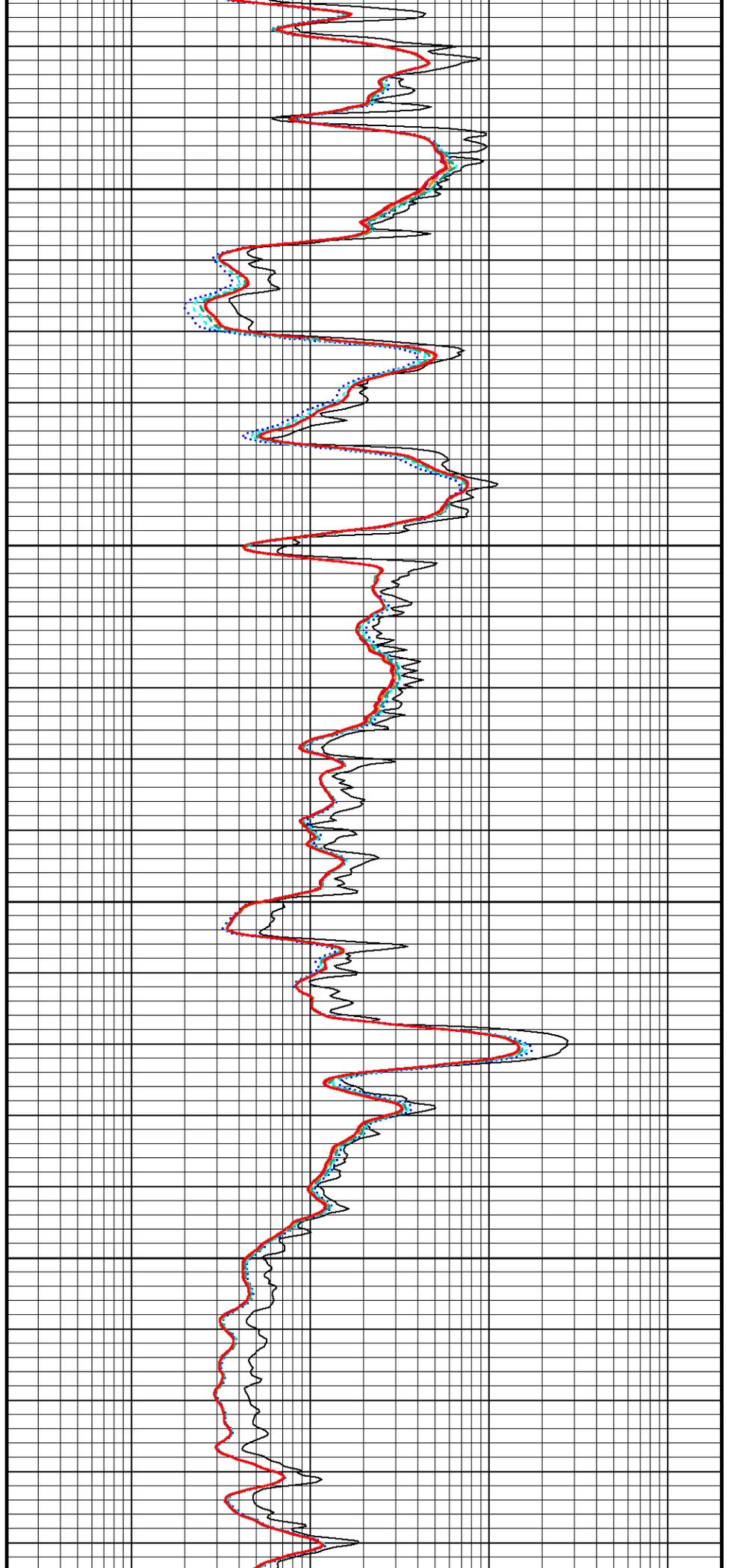
120°

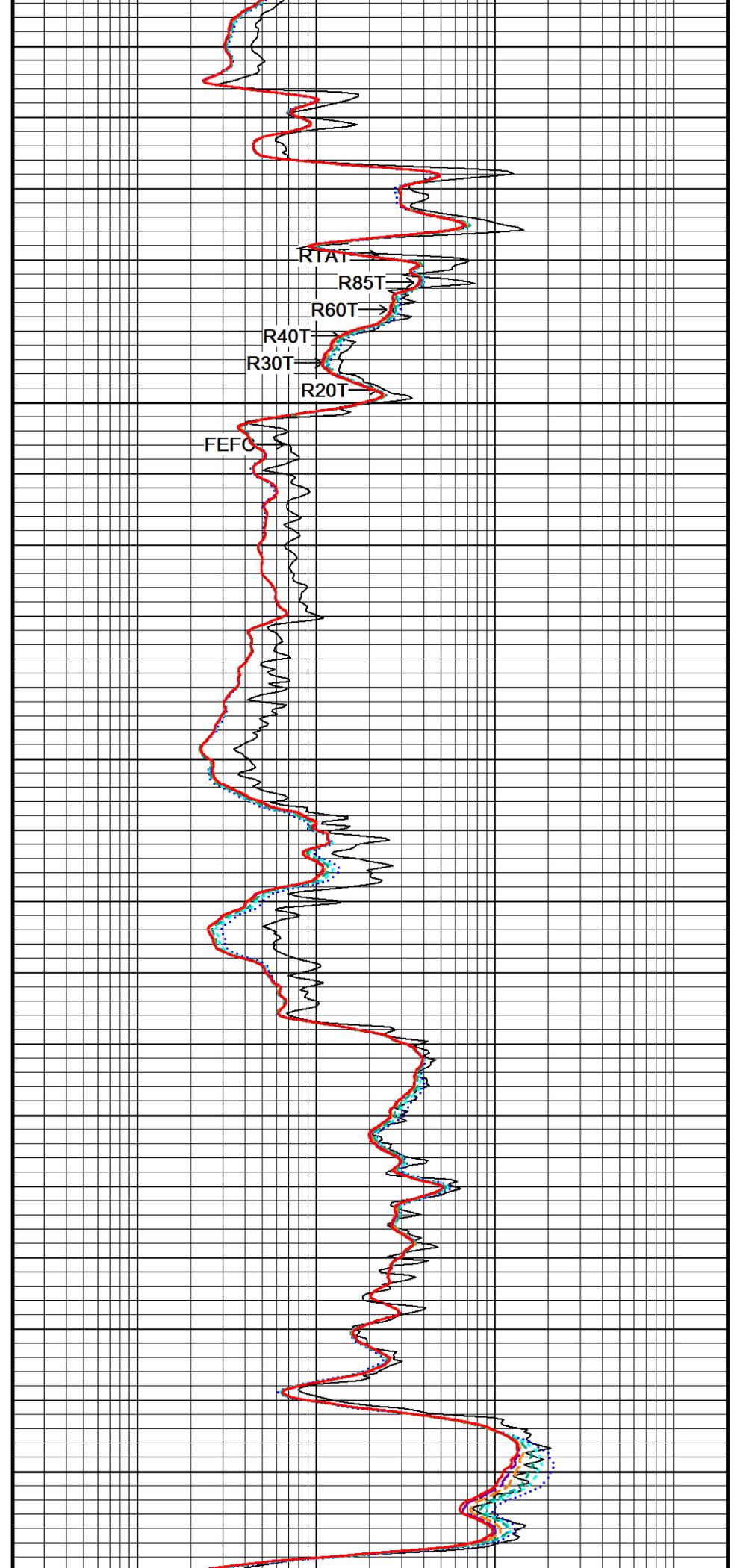
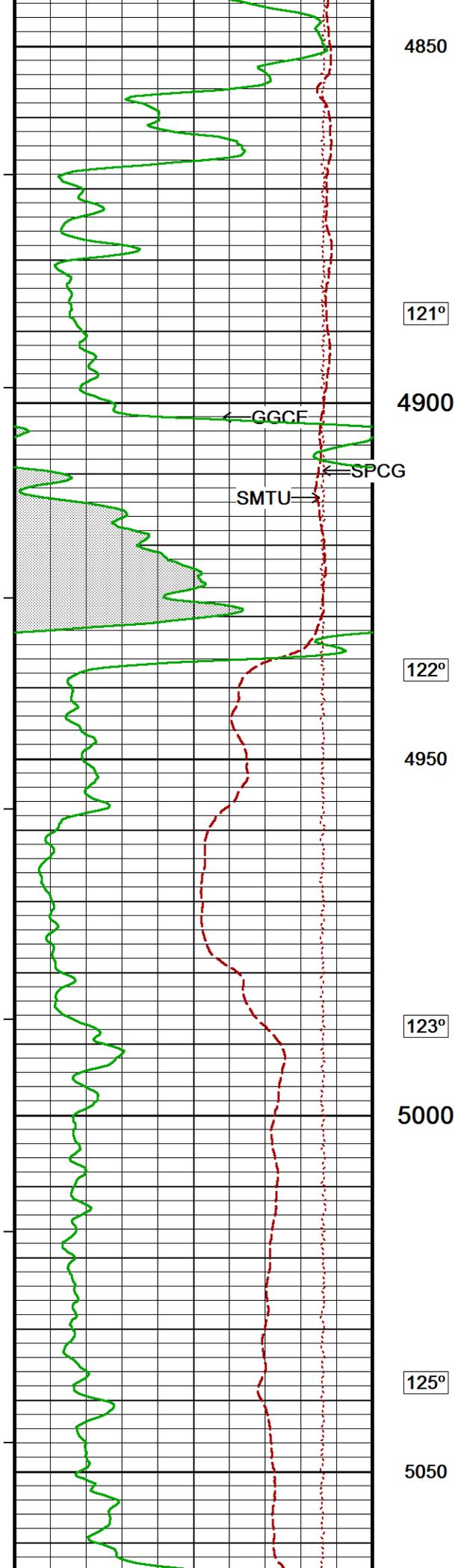
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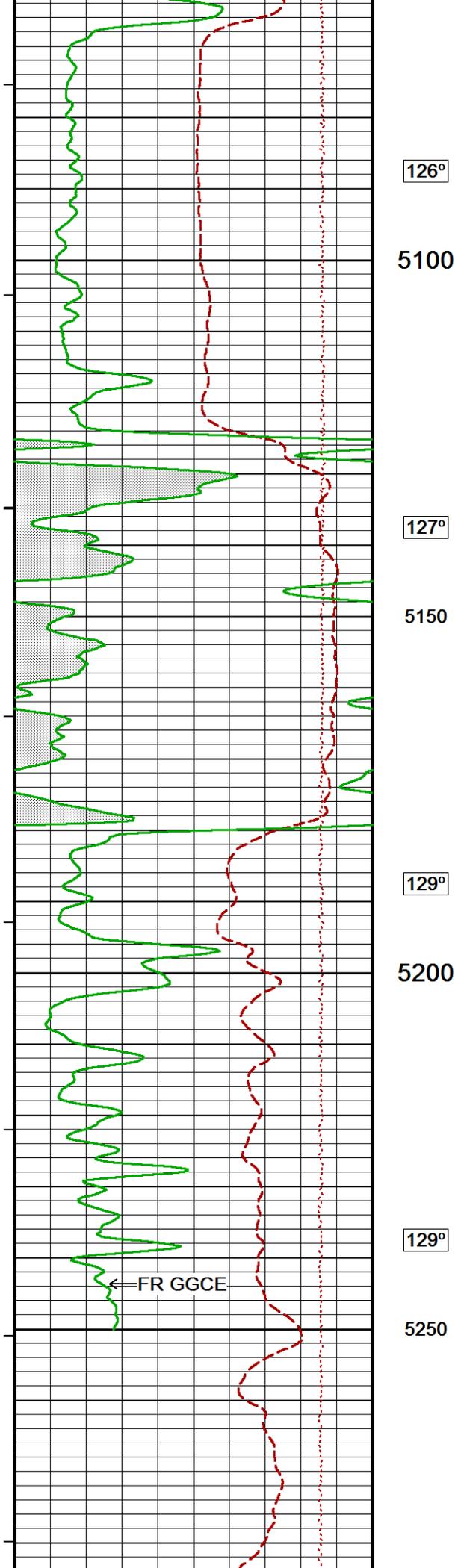
121°

4800

121°







126°

5100

127°

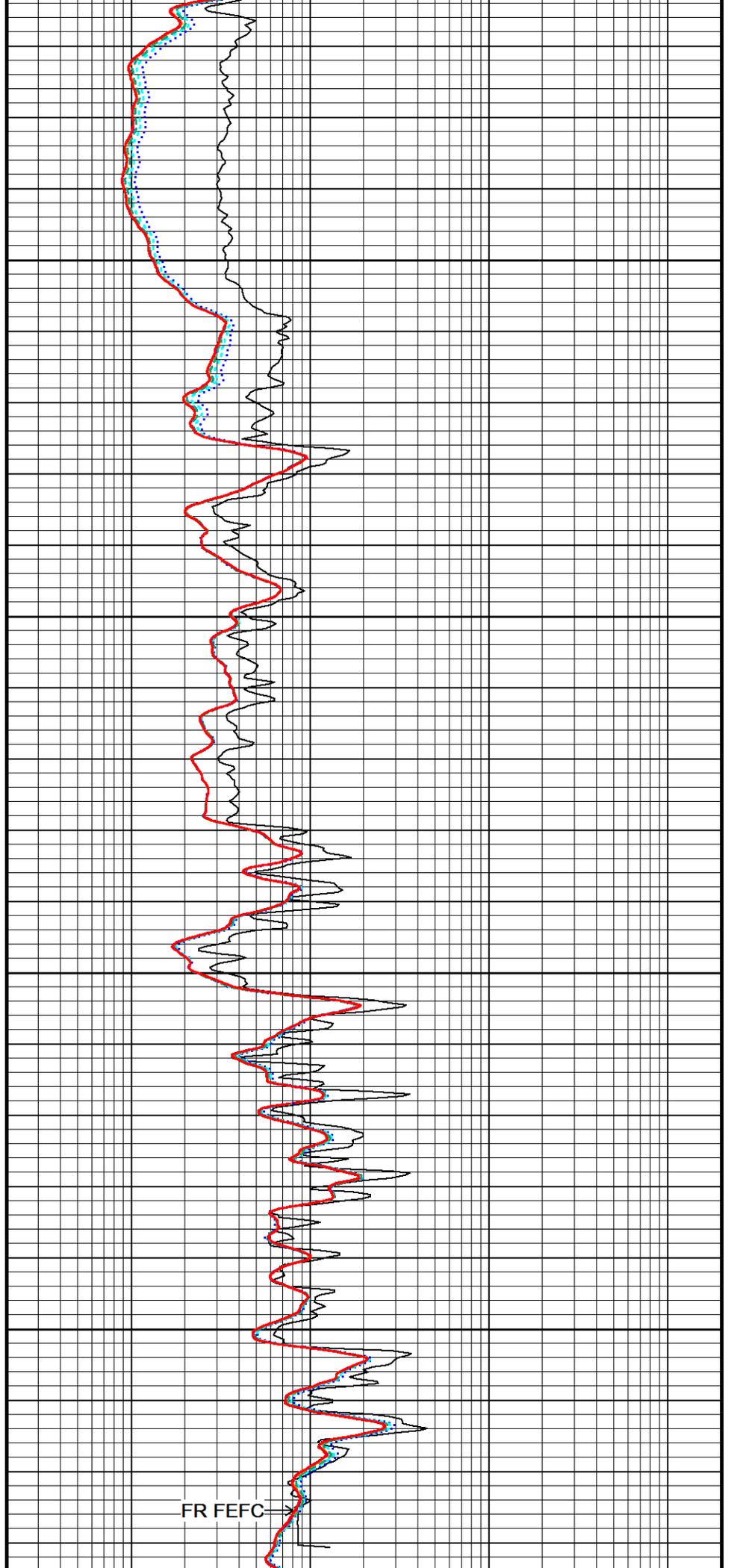
5150

129°

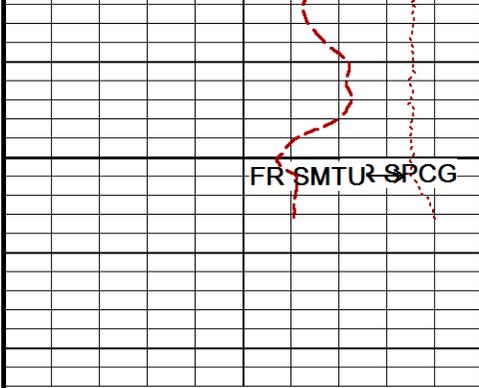
5200

129°

5250



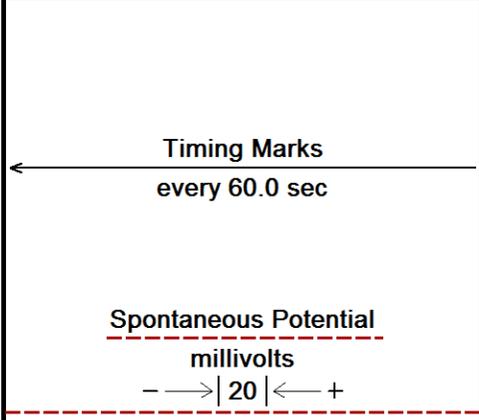
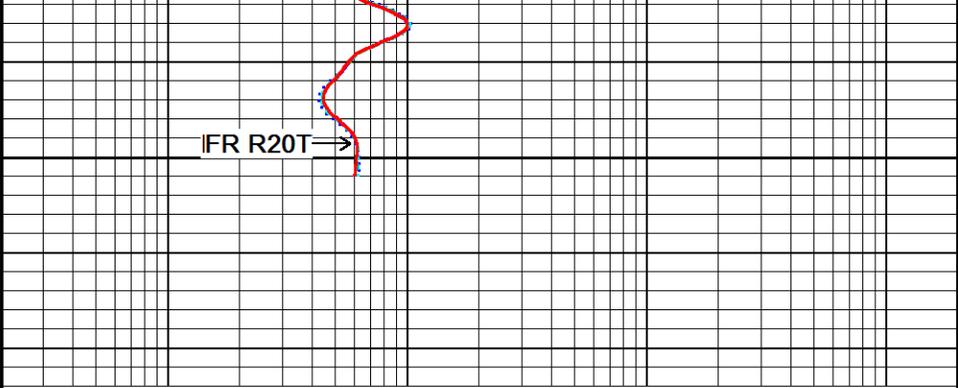
FR FEFC →



FR SMTUR-SPCG

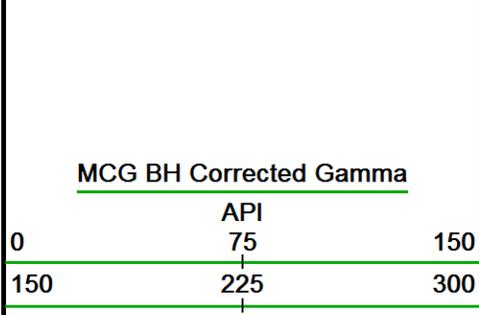
5300

IFR R20T →



Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
- → | 20 | ← +



MCG BH Corrected Gamma

API
75

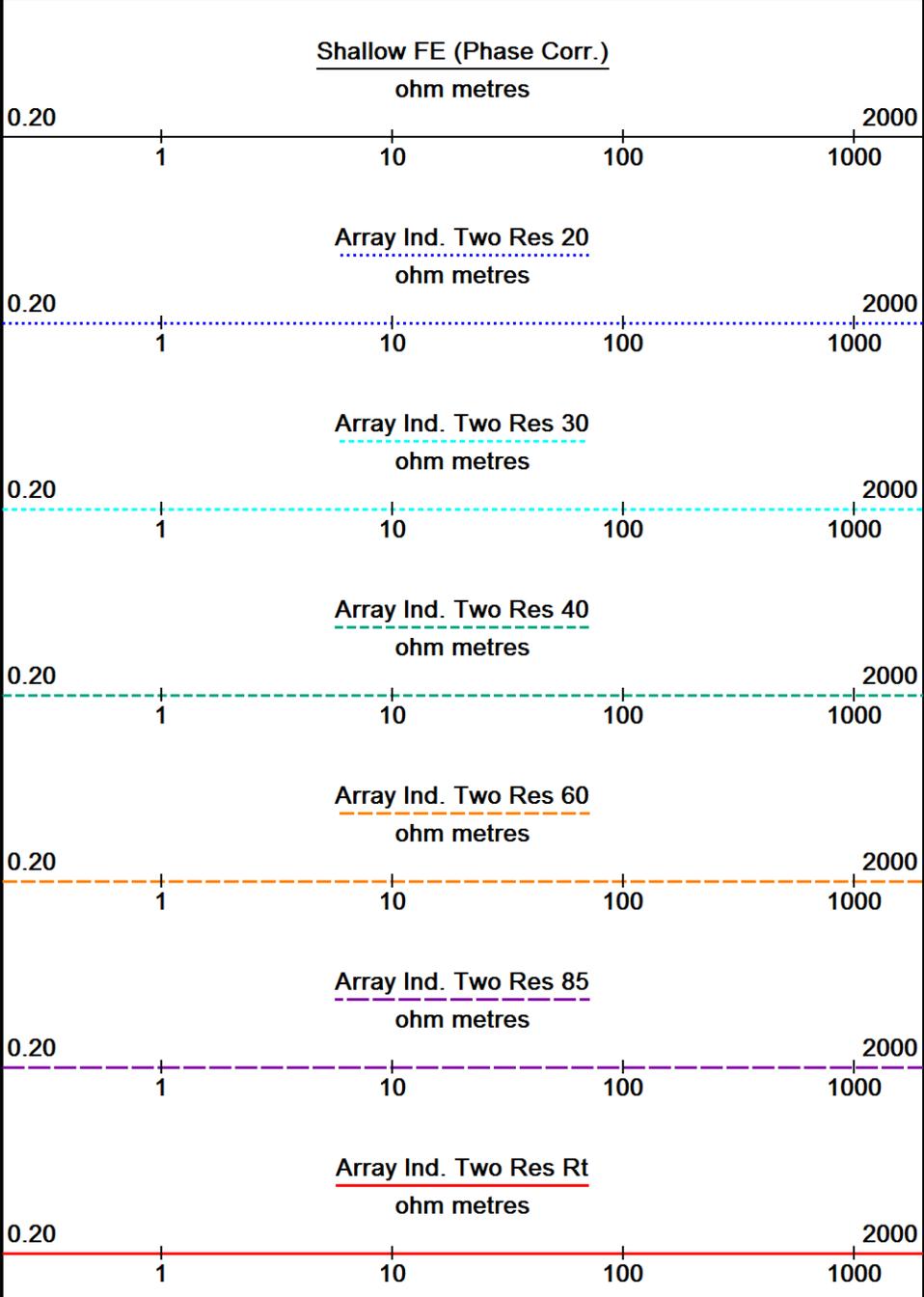
0 150

150 225 300

Depth
In
Feet

Borehole
Temp in
deg F

Replay
Scale
1:240

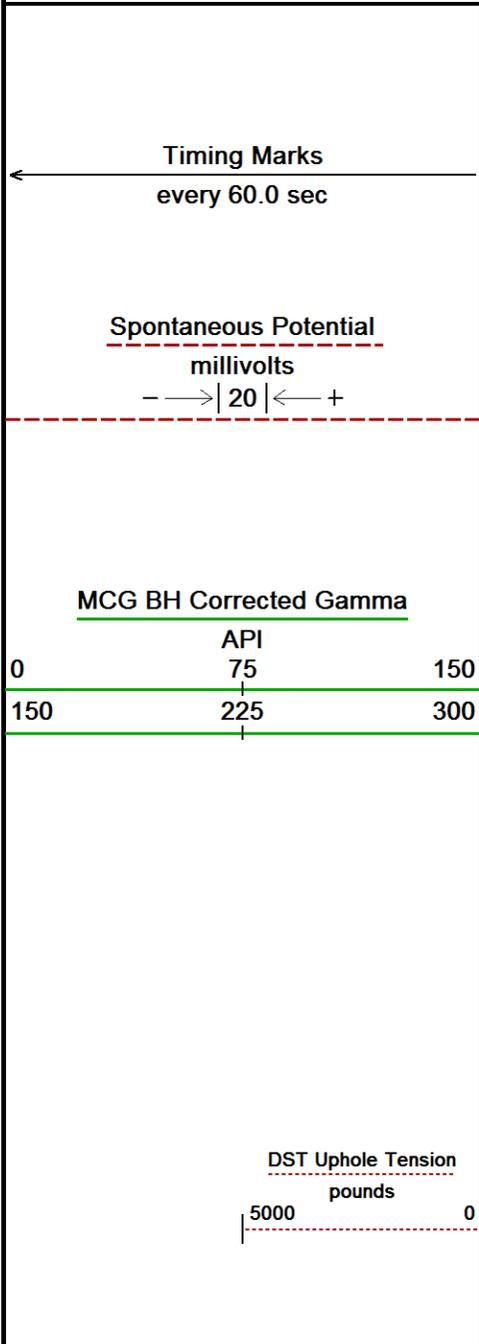


Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-APR-2019 22:40
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 System Versions: Logged with 18.03.8633 Processed with 18.03.8633 Plotted with 17.01.6537

↑ 5 INCH MAIN PASS 1:240 ↑

↓ 5 INCH REPEAT PASS 1:240 ↓

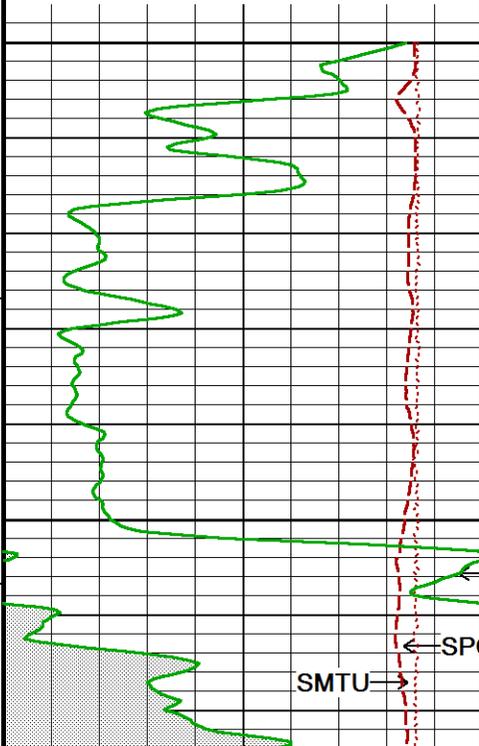
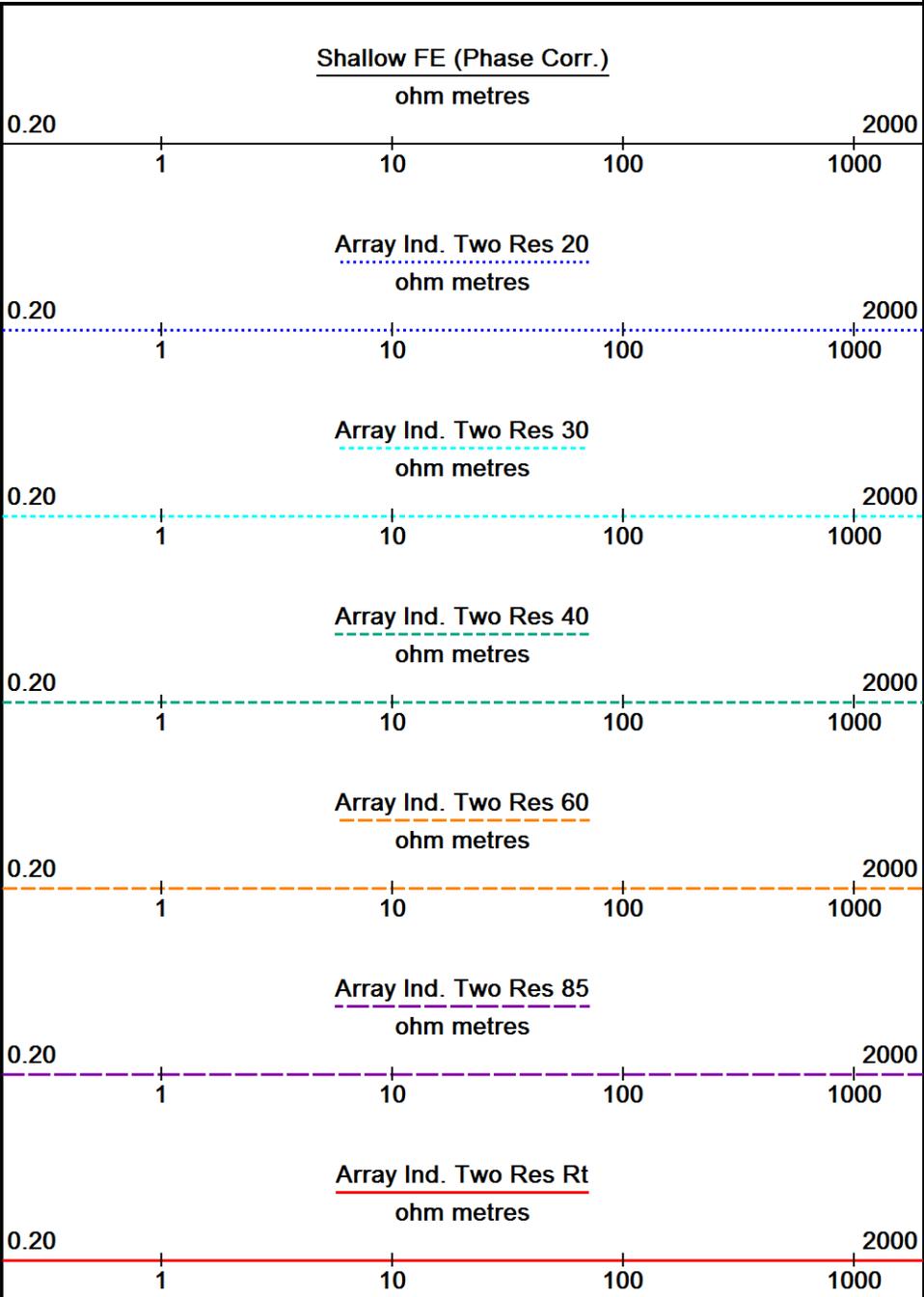
Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-APR-2019 22:40
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 System Versions: Logged with 19.01.8874 Processed with 18.03.8633 Plotted with 17.01.6537



Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240



4850

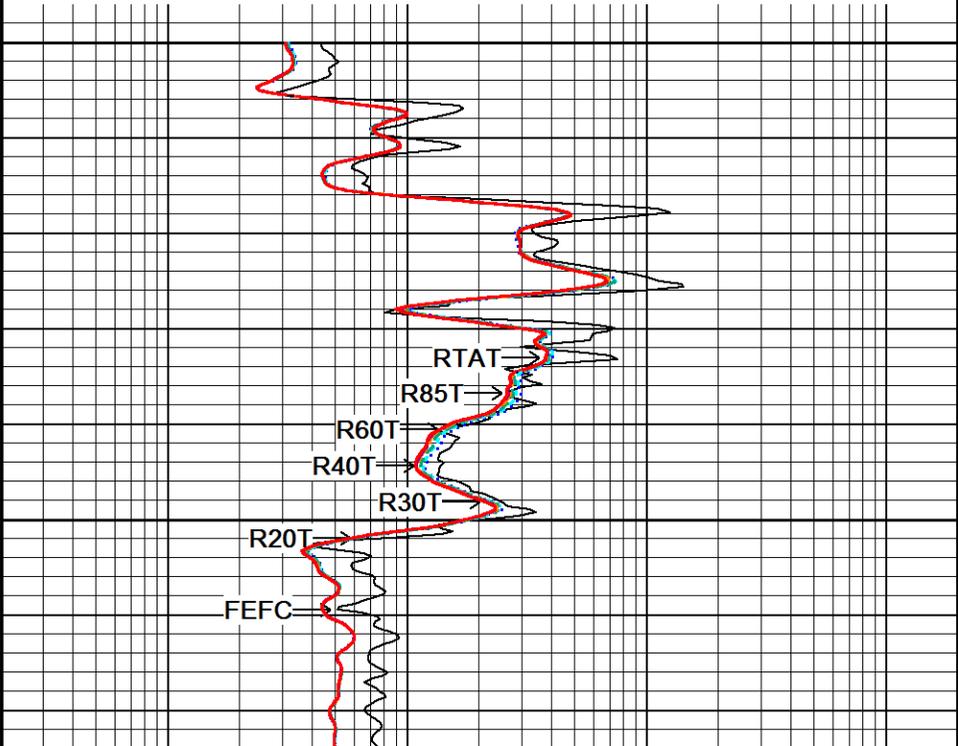
120°

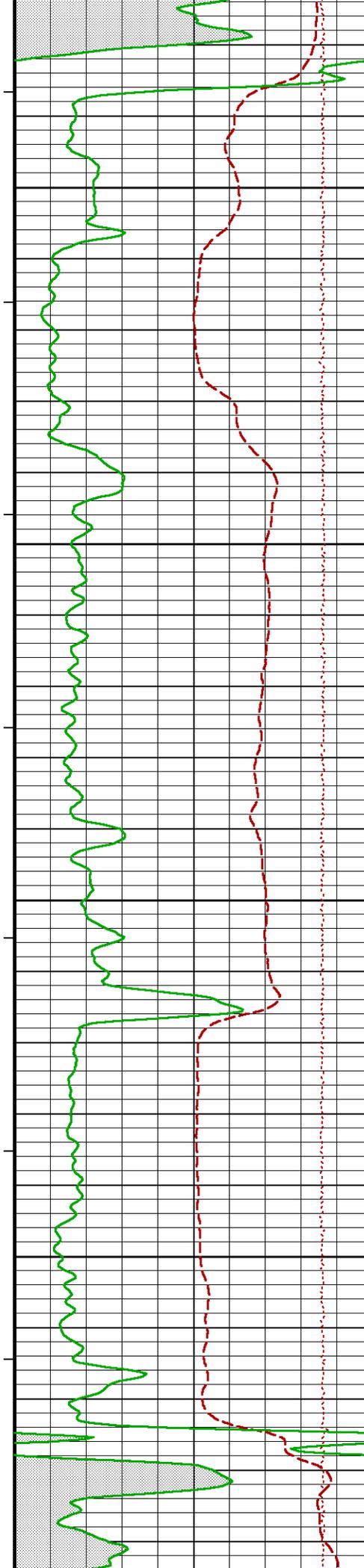
4900

GGCE

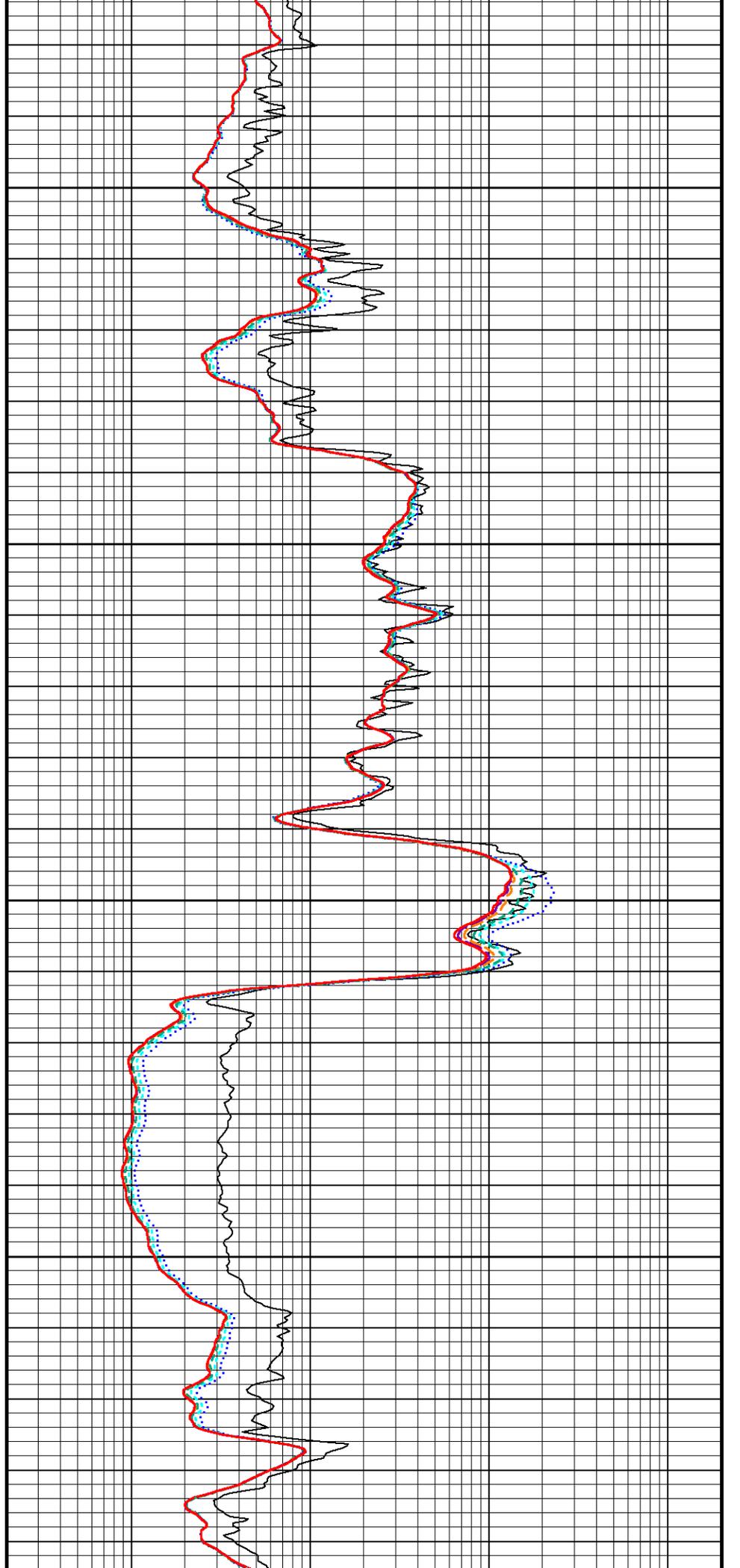
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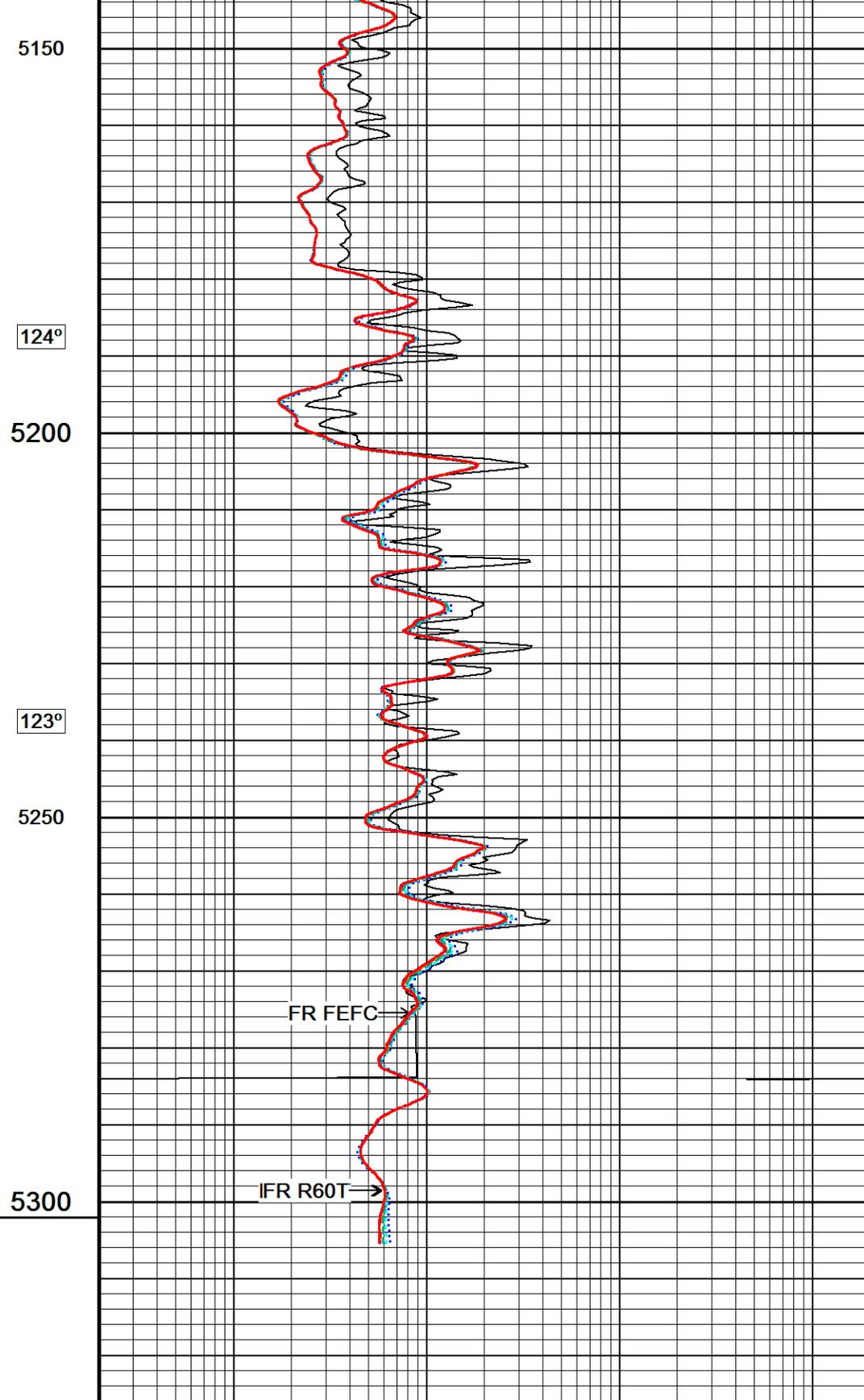
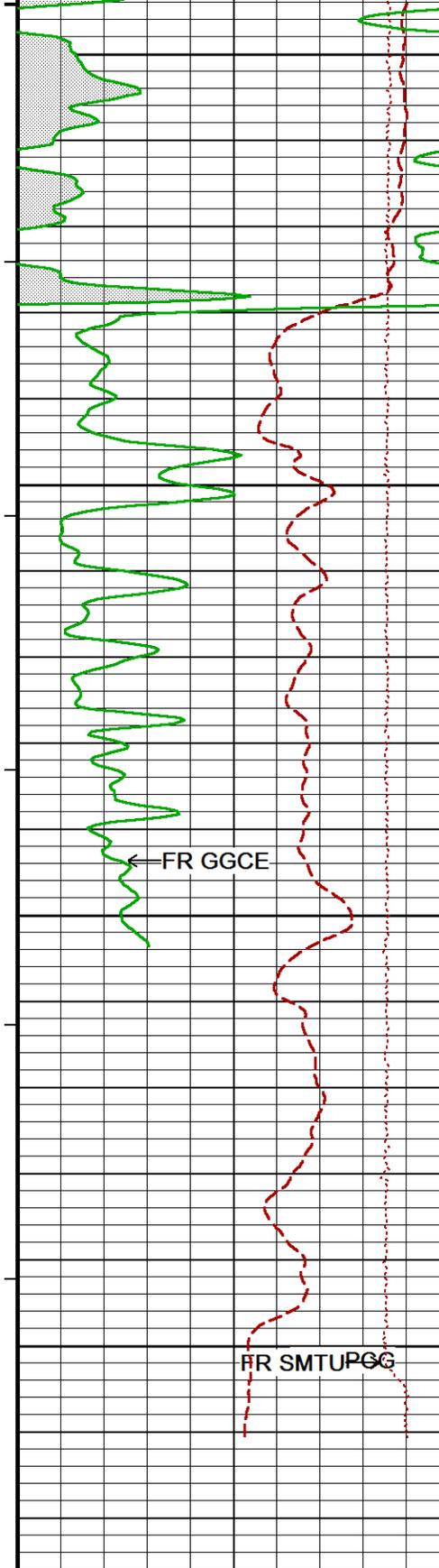
SPCG





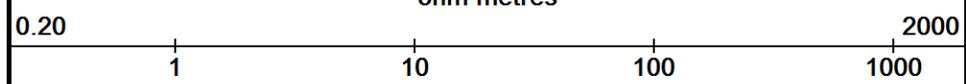
120°
4950
121°
5000
123°
5050
123°
5100
123°



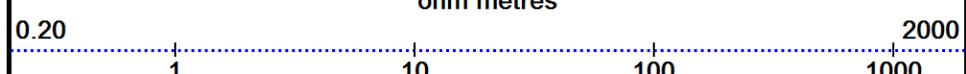


Depth
in
Feet

Shallow FE (Phase Corr.)
ohm metres

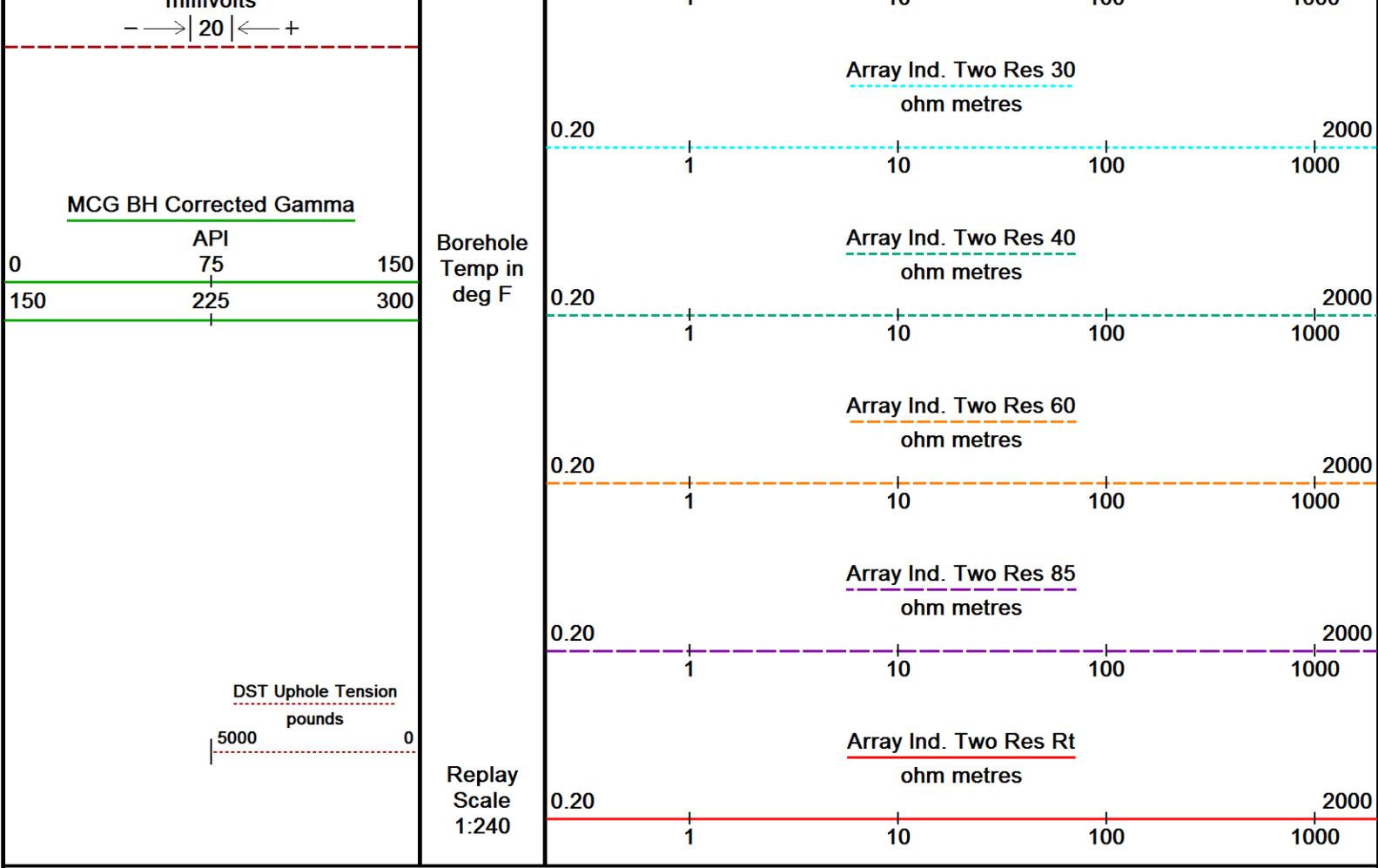


Array Ind. Two Res 20
ohm metres



Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts



Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-APR-2019 22:40
 Filename: C:\Users\E193808\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS.dta Recorded on 05-APR-2019 17:01
 System Versions: Logged with 19.01.8874 Processed with 18.03.8633 Plotted with 17.01.6537

↑ 5 INCH REPEAT PASS 1:240 ↑

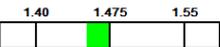
BEFORE SURVEY CALIBRATION
 C:\Users\E193808\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS.dta

General Constants All 000		Last Edited on 05-APR-2019,16:24
General Parameters		
Mud Resistivity	0.520	ohm-metres
Mud Resistivity Temperature	92.000	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	Base Density Porosity	
Resistivity used	Array Ind. Two Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-E.A 571 Field Calibration on 01-APR-2019 10:09

	Measured	Calibrated (API)
Background	55	38
Calibrator (Gross)	1885	1299

Gamma Calibration Tolerances MCG-E.A 571

Ratio 1.451  Counts/API

Gamma Constants MCG-E.A 571

Last Edited on 05-APR-2019,15:56

Gamma Calibrator Number 046
 GRC-M Calibrator Jig in Use? NO
 Inactive Background Jig in Use? NO
 Mud Density 1.13 gm/cc
 Caliper Source for Processing Density Caliper
 Tool Position Eccentred
 Potassium Equivalence Chloride
 K Mud Concentration 0.00 %

High Resolution Temperature Calibration MCG-E.A 571

Field Calibration on 05-APR-2019,16:03

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	200.00	200.00

High Resolution Temperature Constants MCG-E.A 571

Last Edited on 01-FEB-2019,10:33

Pre-filter Length 11

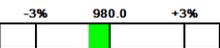
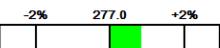
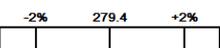
FE Calibration MFE-C.A 413

Base Calibration on 05-MAR-2019 15:07

Field Check on 01-APR-2019 09:43

Base Calibration	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	971.3	126.8
Base Check		279.4
Field Check		279.3

FE Calibration Tolerances MFE-C.A 413

Reference 2 971.3  ohm
 Base Check 279.4  ohm-m
 Field Check 279.3  ohm-m

FE Constants MFE-C.A 413

Last Edited on 01-APR-2019,09:43

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-C.A 492

Base Calibration on 01-APR-2019 09:41

Field Check on 01-APR-2019 09:39

Base Calibration	Test Loop Calibration		Measured		Calibrated (mmho/m)	
	Channel	Low	High	Low	High	
	1	16.2	457.7	9.3	966.2	
	2	6.5	373.4	7.6	821.4	
	3	3.2	252.5	5.2	566.0	
	4	2.7	130.3	2.6	279.2	
Array Temperature			77.2		Deg F	

Test Loop Calibration Verified

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	-5.0	2102.7	-5.0	2102.7
2	12.1	1924.3	12.0	1924.2
3	14.4	1668.1	14.4	1668.1
4	7.8	1136.8	7.8	1136.8
Deep	8.0	1098.3	8.0	1098.3
Medium	24.5	2192.3	24.4	2192.3
Shallow	18.3	2829.7	18.3	2829.6
Array Temperature	56.3		56.2	Deg F

Induction Constants MAI-C.A 492

Last Edited on 01-APR-2019,09:41

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

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	1.00	v/v
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:\Users\E193808\AppData\Local\Temp\Weatherford PreView\0\REPEAT PASS.dta

Cablehead, 11 pin
CBH-CA 204 LG: 2.40 ft WT: 24.3 lb OD: 2.240 in



Compact Swivel Head Adaptor
SHA-J.B 503 LG: 2.30 ft WT: 22.0 lb OD: 2.240 in

Compact Comms Gamma
MCG-E.A 571 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

Compact Micro-Resistivity
MMR-C.A 245 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron
MDN-C.A 515 LG: 5.04 ft WT: 50.7 lb OD: 2.240 in

Compact Density/Caliper
MPD-C.J 394 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

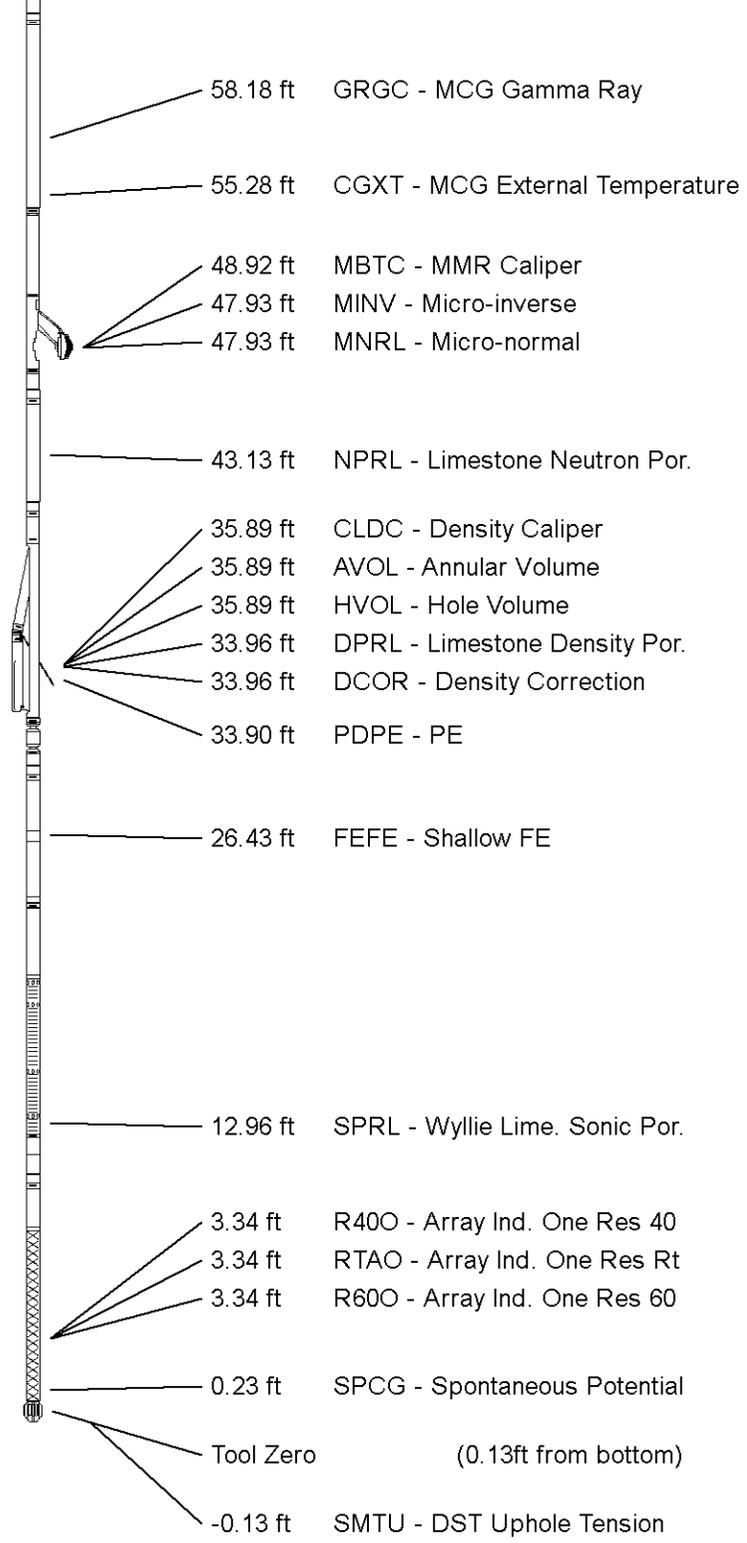
Compact Knuckle Joint
SKJ-E.B 477 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric
MFE-C.A 413 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic
MSS-C.K 368 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction
MAI-C.A 492 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 68.16 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY RAMSHORN RESOURCES, LLC
WELL MARSH 2-27
FIELD DEARHEAD
PROVINCE/COUNTY BARBER
COUNTRY/STATE USA / KANSAS

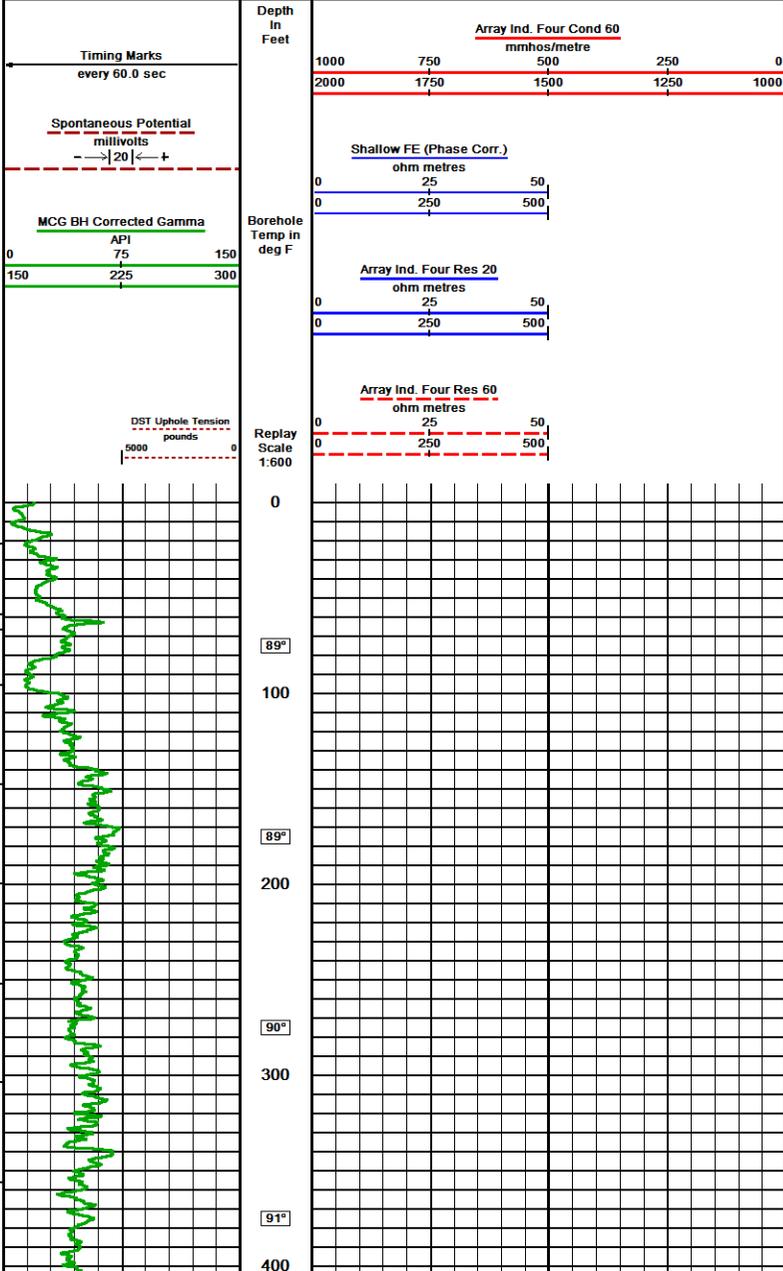
Elevation Kelly Bushing	1908	feet	First Reading	5299.00	feet
Elevation Drill Floor	1906	feet	Depth Driller	5300.00	feet
Elevation Ground Level	1896	feet	Depth Logger	5302.00	feet

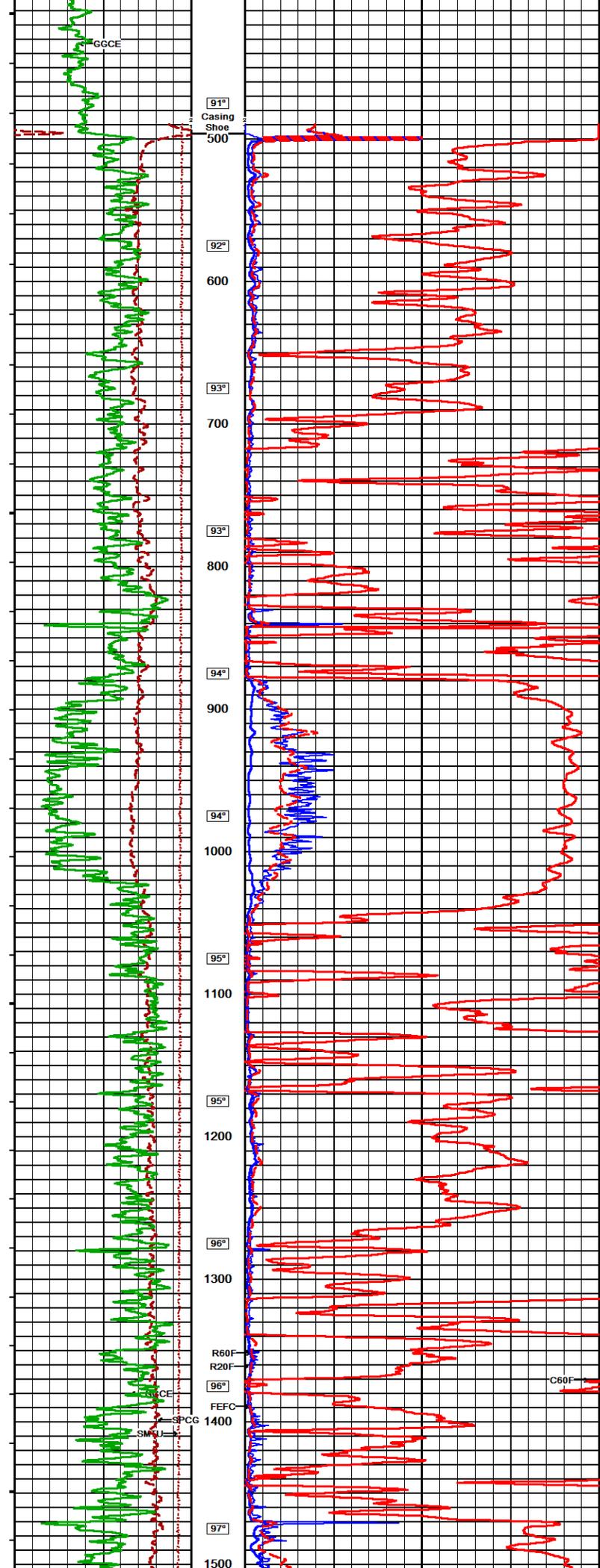


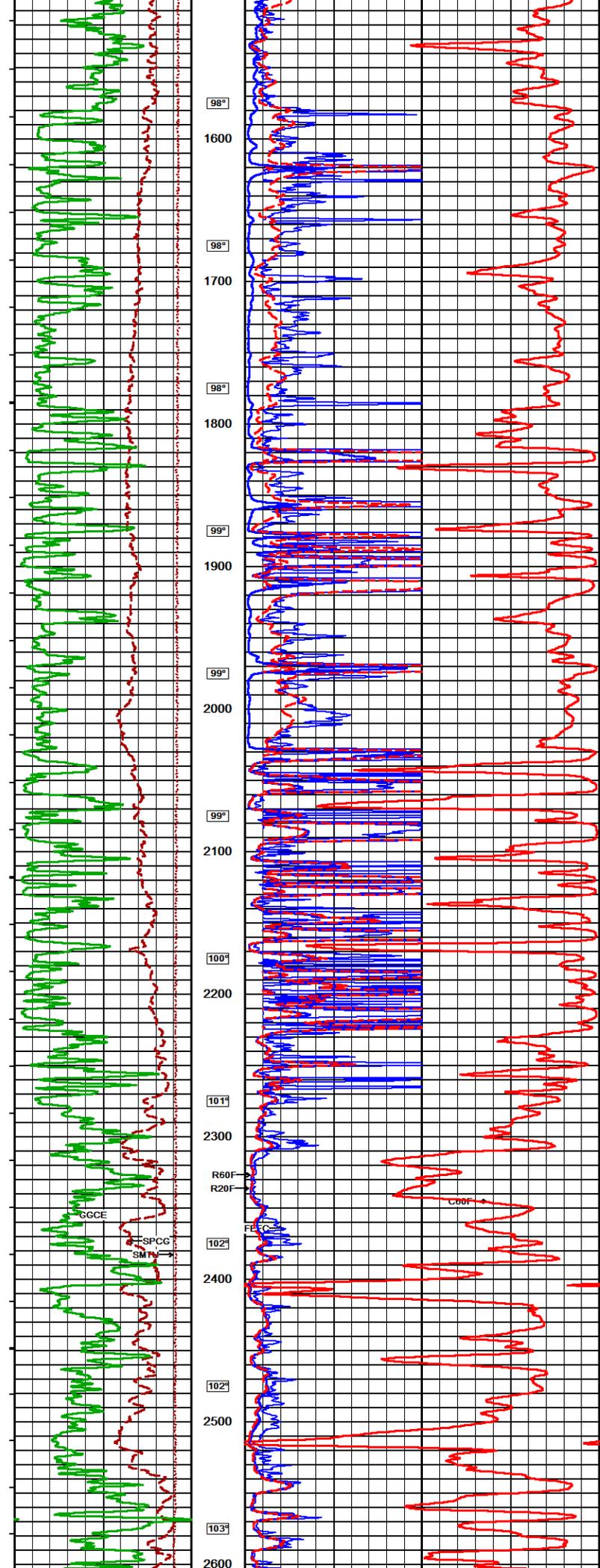
ARRAY INDUCTION

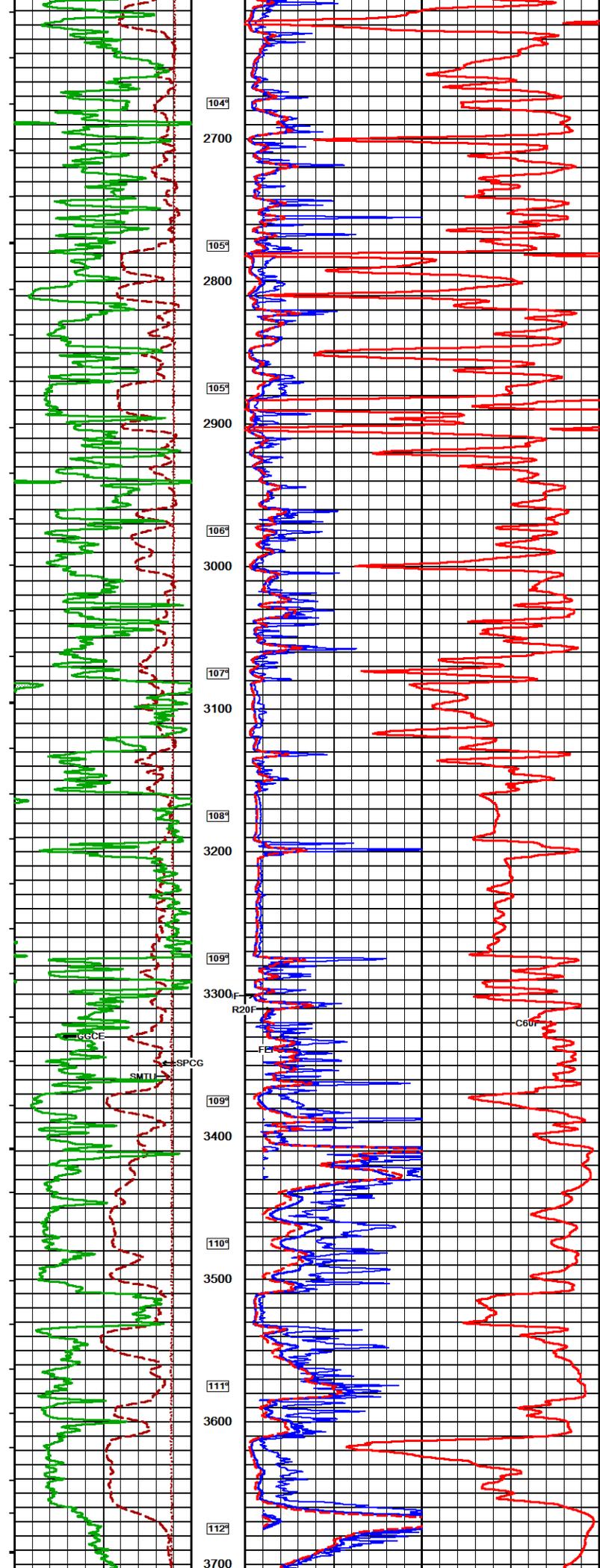
		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY	RAMSHORN RESOURCES, LLC		
WELL	MASSH 2-27		
FIELD	DEARHEAD		
PROVINCE/COUNTY	BARBER		
COUNTRY/STATE	USA / KANSAS		
LOCATION	2305' FINL & 2023' FEL		
SEC 27	TWP 32S	RANGE 15W	ZONE S40E5
Latitude	37.23194	Longitude	-98.33344
UTM Zone	14QUDAPD	UTM Easting	683234.1
UTM Northing	5407243.1	UTM Scale	0.999 999 999
Permanent Datum GL Elevation	1896 feet	Permanent Datum	1896 feet
Log Measured From KB	12.00 feet above Permanent Datum	Log Measured From KB	1896 feet
Drilling Measured From KB		Drilling Measured From KB	1886 feet
Date	05-APR-2019		
Run Number	ONE		
Service Order	7055-241667829		
Depth Driller	5300.00	feet	
Depth Logger	5302.00	feet	
First Reading	5299.00	feet	
Last Reading	496.00	feet	
Casing Driller	496.00	feet	
Casing Logger	496.00	feet	
Bit Size	7.875	inches	
Fluid Type	WBH		
Density/Viscosity	9.40	lb/cu ft	52.00
PH/Fluid Loss	11.00		8.80
Sample Source	MUD TANK		
Rm @ Measured Temp	0.52 @ 92.0	ohm-m	
Rm @ Measured Temp	0.42 @ 92.0	ohm-m	
Rm @ Measured Temp	0.02 @ 92.0	ohm-m	
Source Rm / Rmc	CALC	CALC	
Rm @ BHT	0.38 @ 129.0	ohm-m	
Time Since Circulation	3 HOURS		
Max Recorded Temp	129.00	deg F	
Equipment Base	13067		ELERNO
Recorded By	LUSTIN HICKS		
Witnessed By	CURTIS COLE		JERRY ALLO

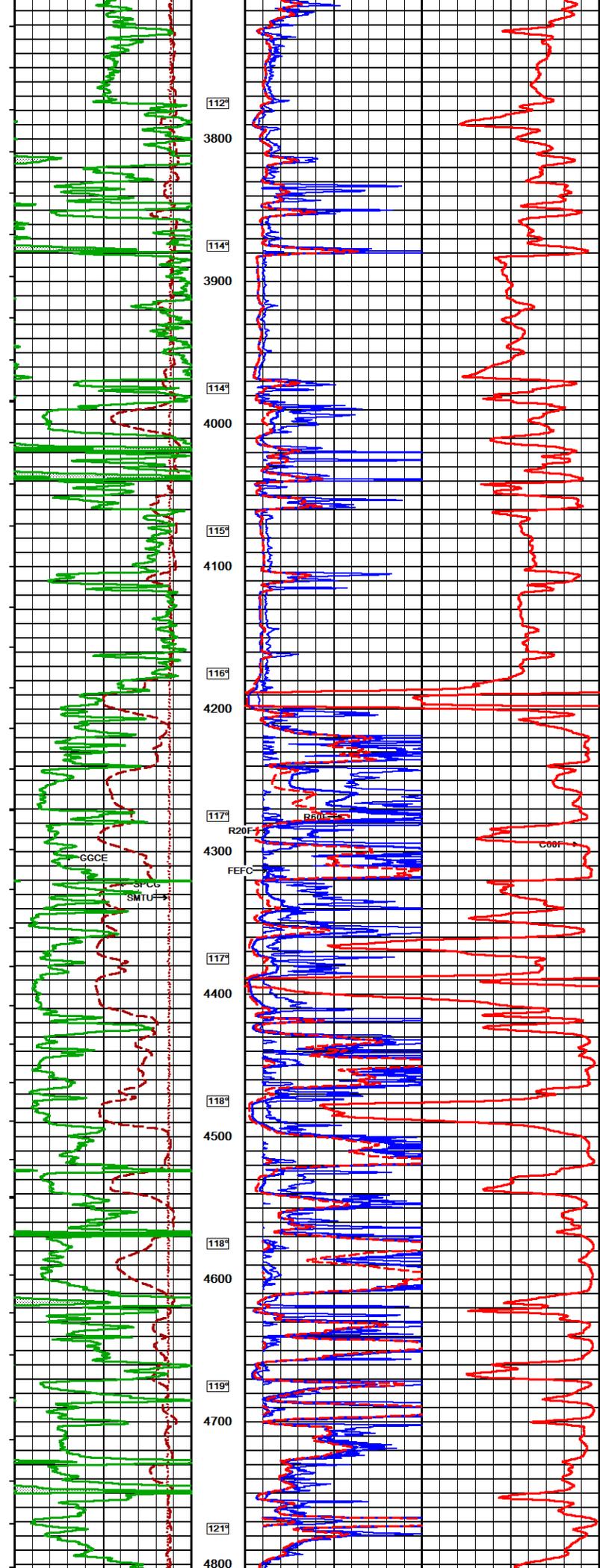
1 INCH MAIN PASS 1:600
 Depth Based Data - Maximum Sampling Increment: 10.0cm
 Plotted on 05-APR-2019 22:40
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 Recorded on 05-APR-2019 18:55
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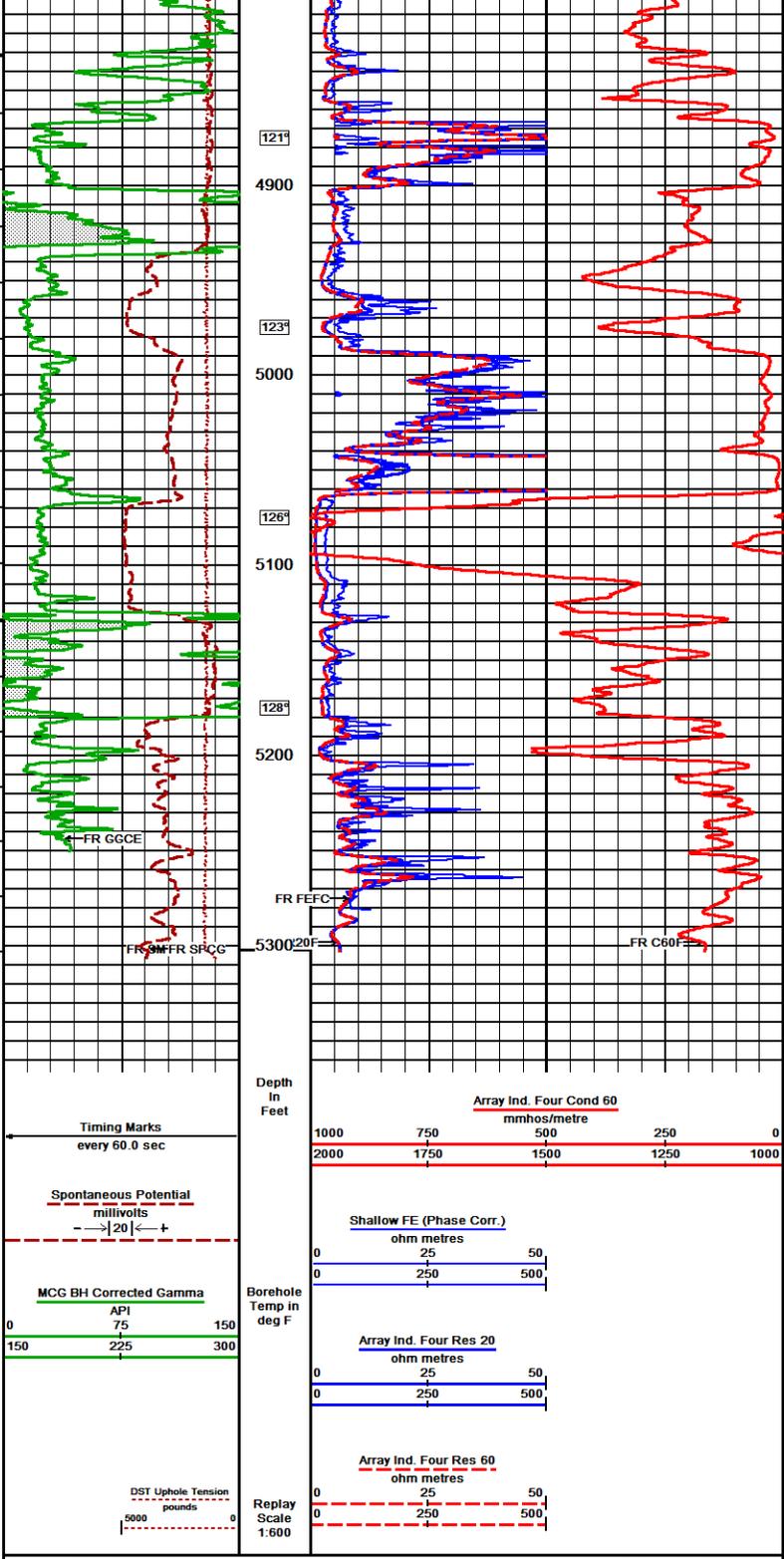












Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 05-APR-2019 22:40
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 System Versions: Logged with 18.03.8633 Processed with 18.03.8633 Plotted with 17.01.6537

1 INCH MAIN PASS 1:600

COMPANY	RAMSHORN RESOURCES, LLC			
WELL	MARSH 2-27			
FIELD	DEARHEAD			
PROVINCE/COUNTY	BARBER			
COUNTRY/STATE	USA / KANSAS			
Elevation Kelly Bushing	1908	feet	First Reading	5299.00 feet
Elevation Drill Floor	1906	feet	Depth Driller	5300.00 feet
Elevation Ground Level	1896	feet	Depth Logger	5302.00 feet



ARRAY INDUCTION
 SHALLOW FOCUSED
 ELECTRIC LOG

