ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

Weatherford

COMPANY	UNIT PETROLEUM COMPANY
WELL	JAMES #1-2
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	USA / COLORADO
LOCATION	1980' FNL & 1980' FWL SE-NW

SEC 2	TWP 15S	RGE 55W	Other Services
Latitude		38.772690	
Longitude		-103.527090	
API Number		05-073-06713	

Permanent Datum GL, Elevation 5123 feet
Log Measured From KB
Drilling Measured From KB

Elevations:	feet
KB	5138.00
DF	5136.00
GL	5123.00

Date	07-DEC-2015				
Run Number	ONE				
Service Order	7055-137049030				
Depth Driller	7635.00	feet			
Depth Logger	7629.00	feet			
First Reading	---				
Last Reading	---				
Casing Driller	490.00	feet			
Casing Logger	488.00	feet			
Bit Size	7.875	inches			
Hole Fluid Type	WBM				
Density / Viscosity	9.40	lb/USg	55.00	sec/qt	
PH / Fluid Loss	8.60		5.20	ml/30Min	
Sample Source	MUD TANK				
Rm @ Measured Temp	1.92 @ 56.0	ohm-m			
Rmf @ Measured Temp	1.536 @ 56.0	ohm-m			
Rmc @ Measured Temp	2.304 @ 56.0	ohm-m			
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.62 @181.0	ohm-m			
Time Since Circulation	4 HOURS				
Max Recorded Temp	181.00	deg F			
Equipment / Base	14343		OKC		
Recorded By	JUSTIN HICKS				
Witnessed By	RICH BACON		LARRY MILLER		

BOREHOLE RECORD

Last Edited: 12-DEC-2015 04:56

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	490.00
7.875	490.00	7635.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	490.00	32.00

REMARKS

TOOLS RAN:
RUN 1: CBH, MTA, SHA, MCG, MDN, MPD, MFE, MAI.
RUN 2: CBH, MTA, SHA, MCG, MBN, MDM, MRD, MTD.

HARDWARE USED:
MAI: TWO 0.5 INCH STANDOFFS.
MFE: ONE 0.5 INCH STANDOFF.
MDN: DUAL NEUTRON BOWSPRING.
MPD: 8 INCH PROFILE PLATE.
MDM: ONE CENTRALIZER.
MRD: FOUR 0.5 INCH STANDOFFS.
MTD: THREE 0.5 INCH STANDOFFS AND ONE 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 = XXXX CU FT

TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = XXXX CU.FT.
ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = XXXX CU.FT.

FIELD TICKET NUMBER: 7055-137049030

RIG: EXTREME DRILLING, RIG #11

OPERATOR(S): R. BRADSHAW, C. COUSINS

MUD PROPERTIES:
CHLORIDES: 1400 MG/L
LCM: 11%

HOLE WASHOUTS AND RUGOSITY WILL AFFECT LOG QUALITY AND REPEATABILITY.

2 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Data\Unit James 1-8\James 1-8 Main.dta
System Versions: Plotted with 15.03.5939

Plotted on 12-DEC-2015 23:07
Recorded on 5 Inch Main Pass

Timing Marks
every 60.0 sec

Gamma Ray
API
0 | 75 | 150
150 | 225 | 300

Spontaneous Potential
millivolts
− → | 20 | ← +

DST Uphole Tension
pounds
5000 | 0

Depth In Feet

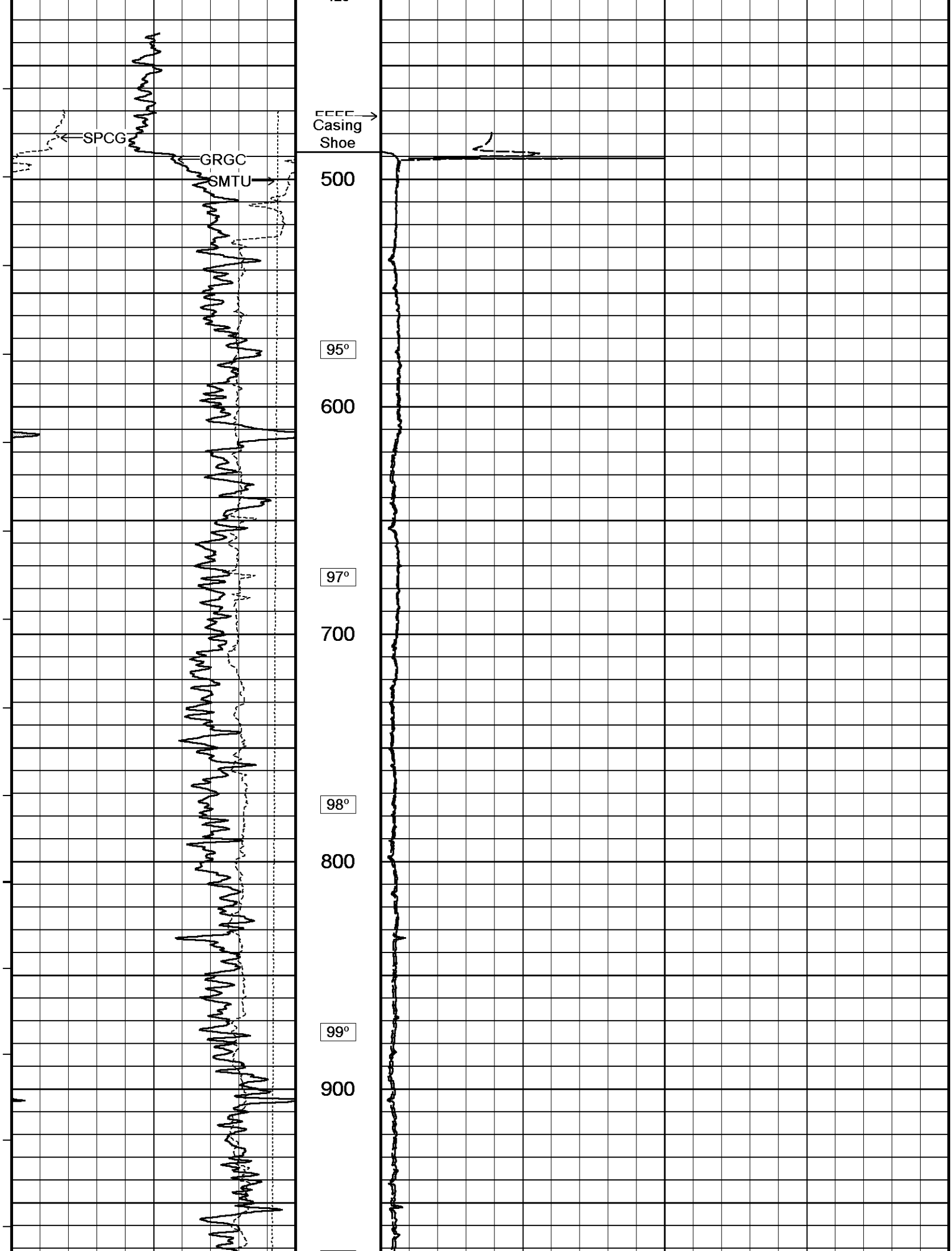
Borehole Temp in deg F

Replay Scale 1:600

Shallow FE
ohm metres
0 | 25 | 50
0 | 250 | 500

Array Ind. One Res Rt
ohm metres
0 | 25 | 50
0 | 250 | 500

420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SMTU
Casing
Shoe
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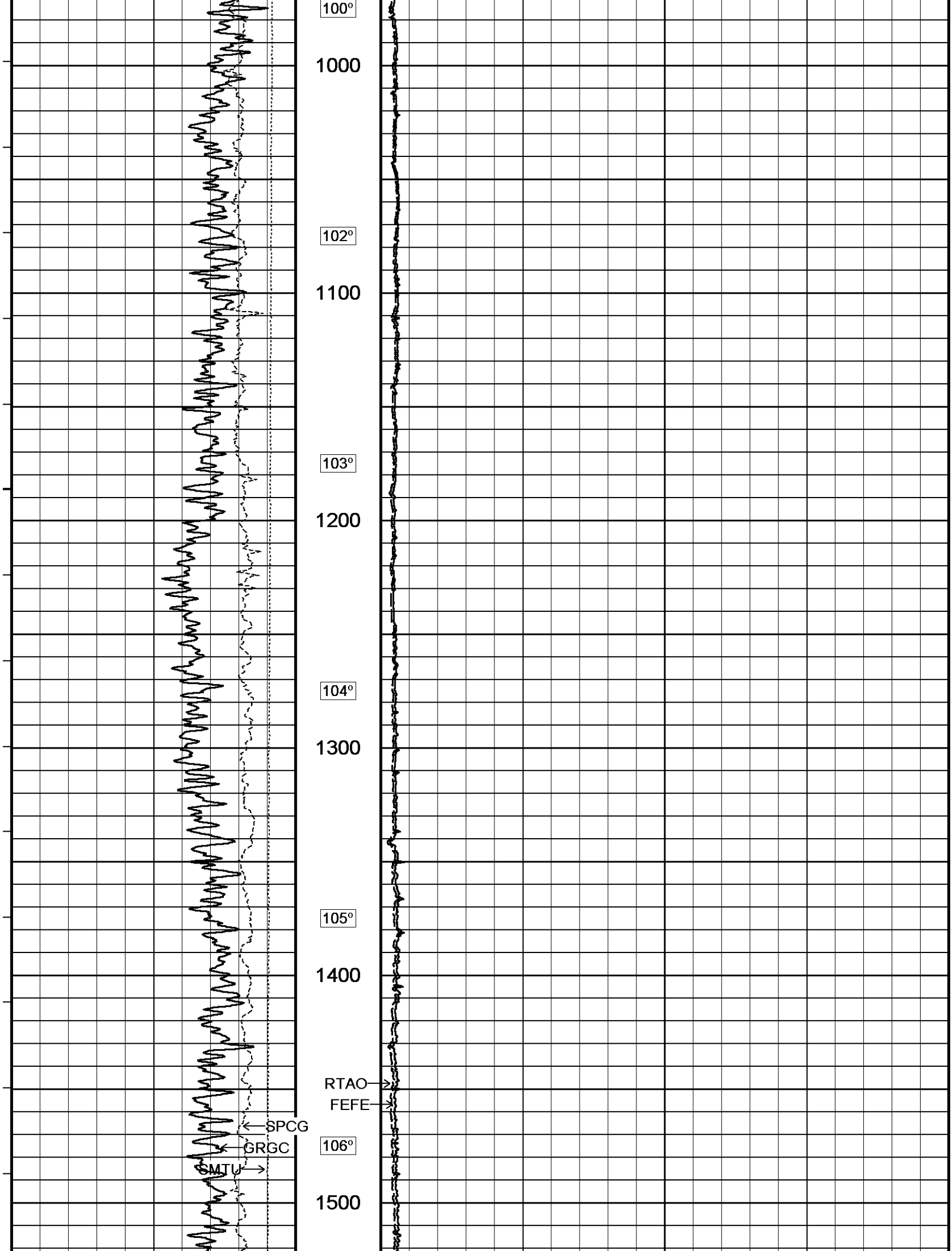
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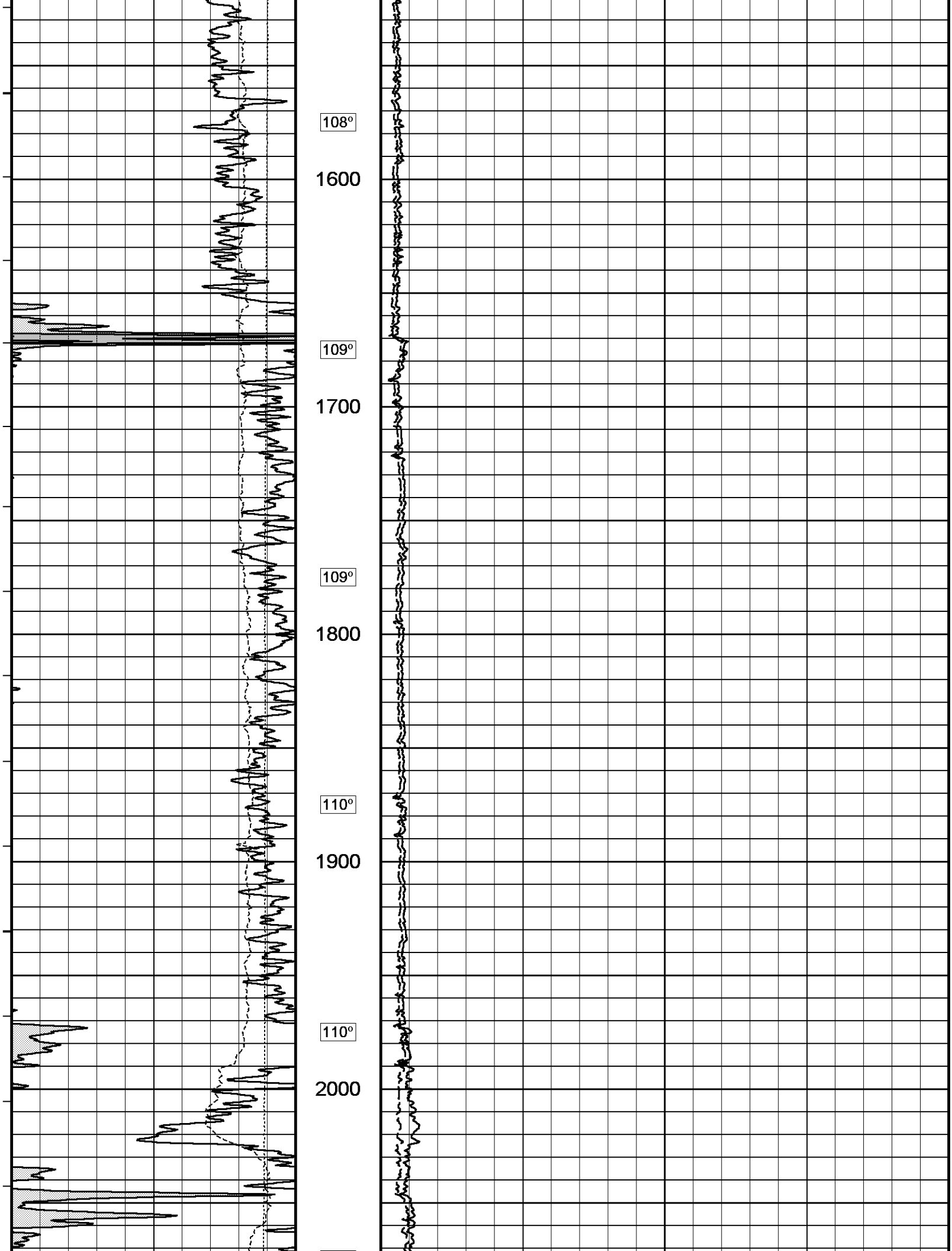
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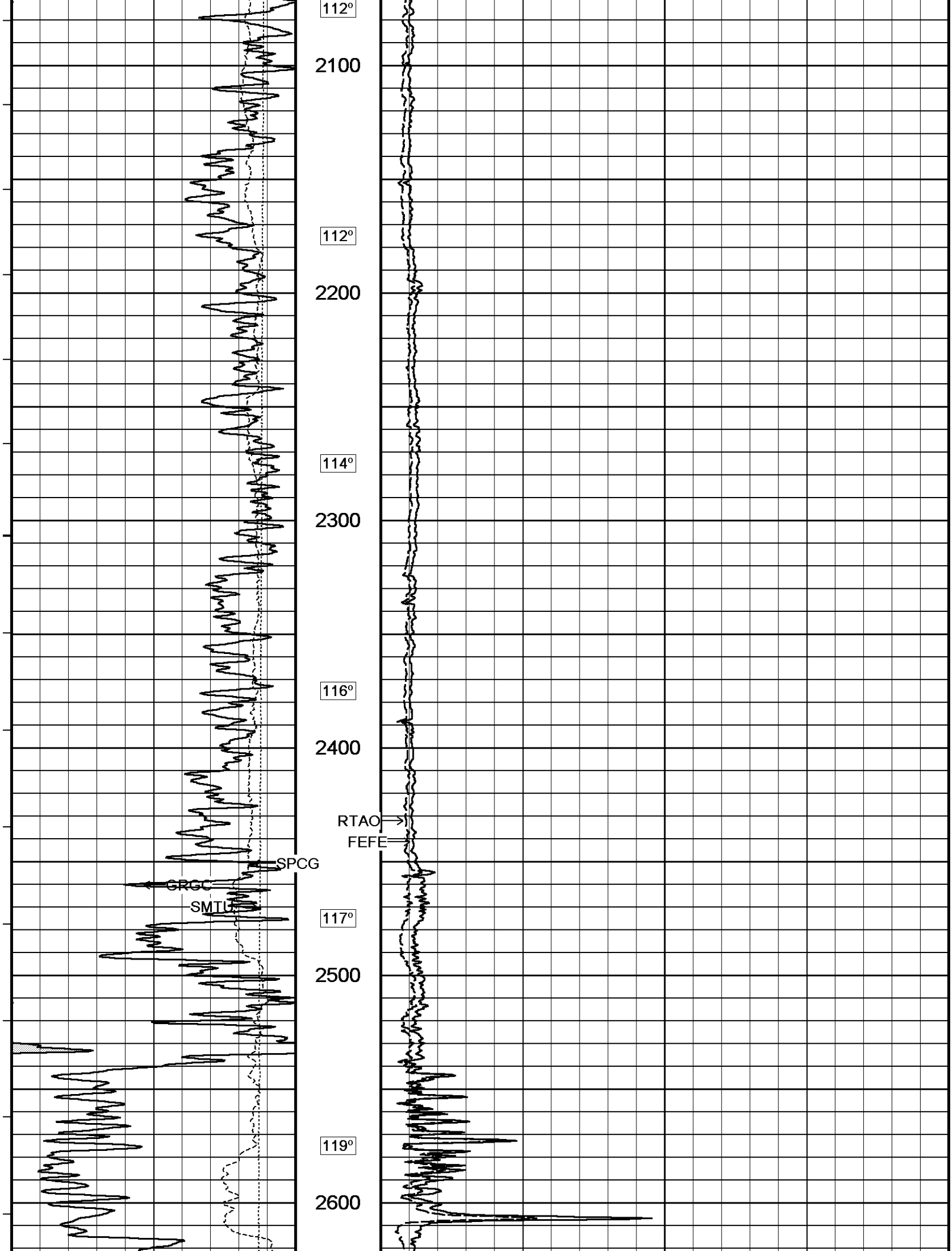
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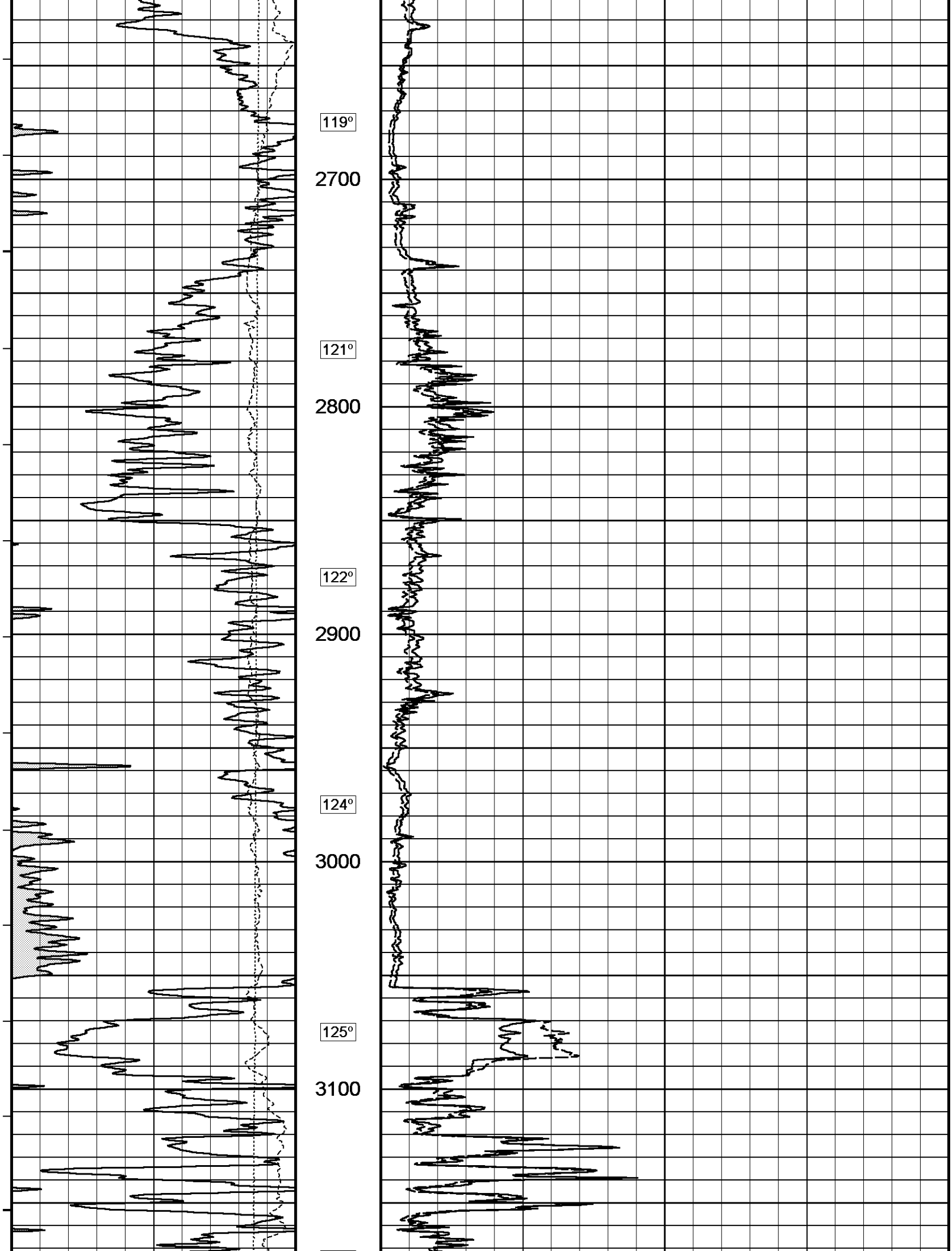
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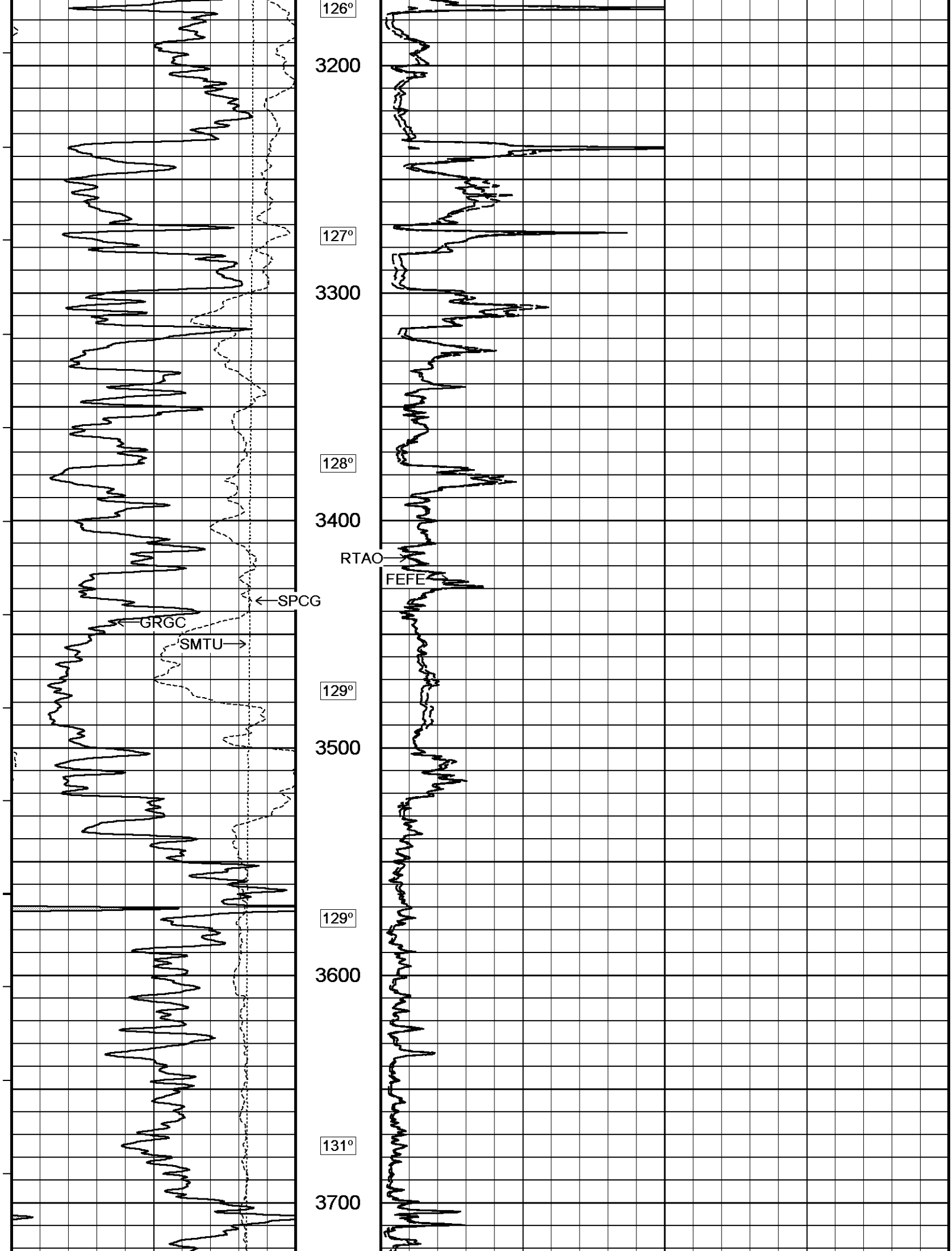
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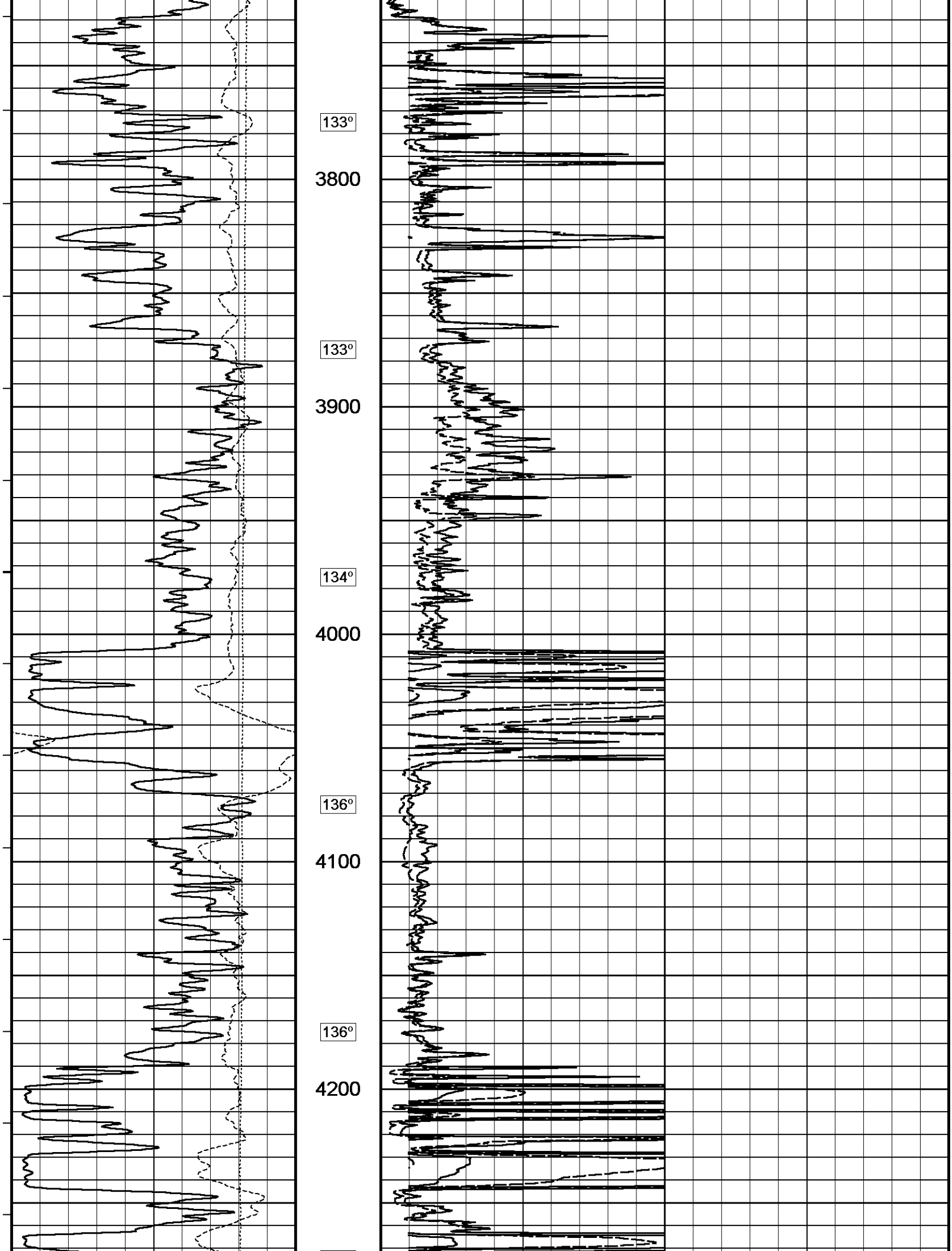
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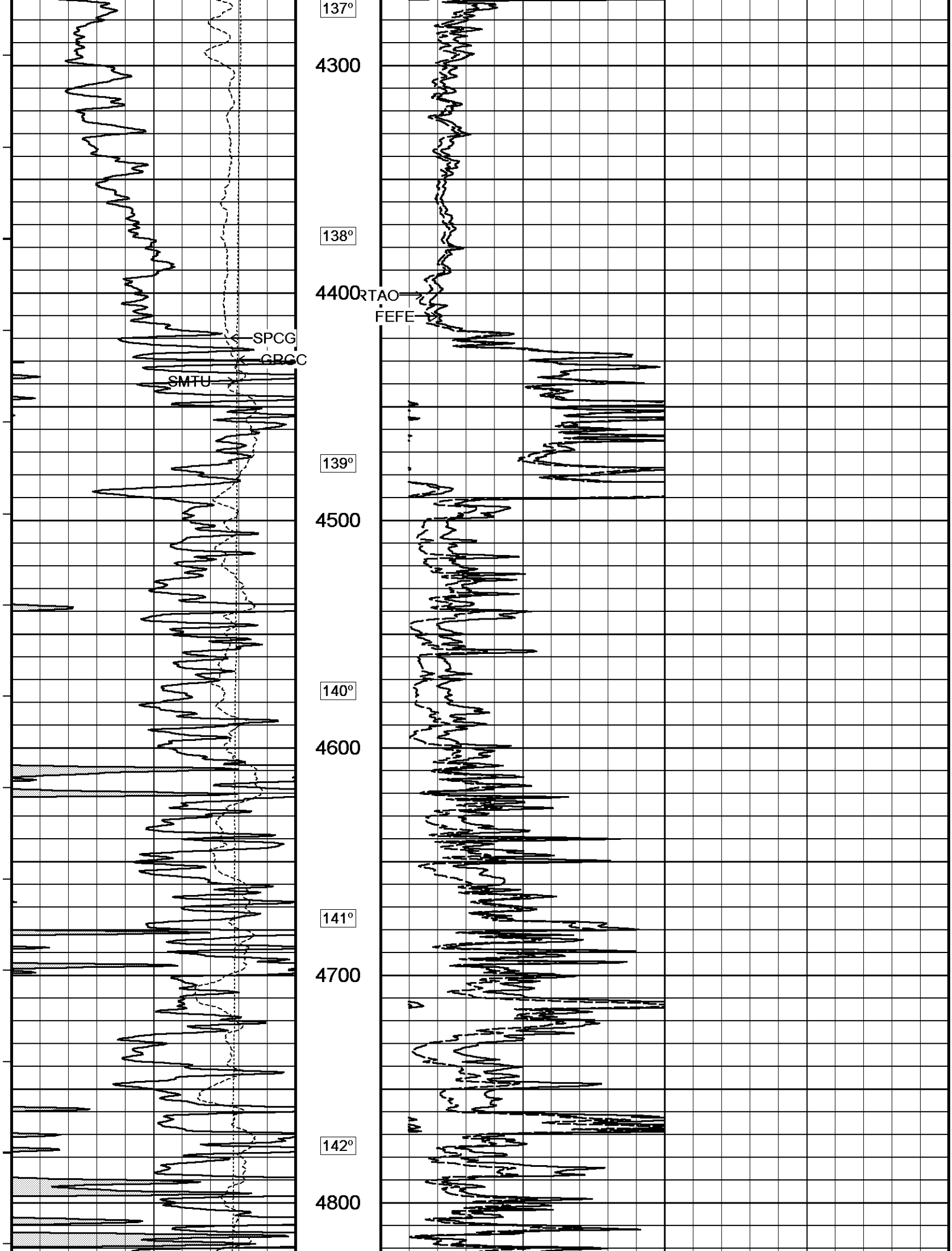
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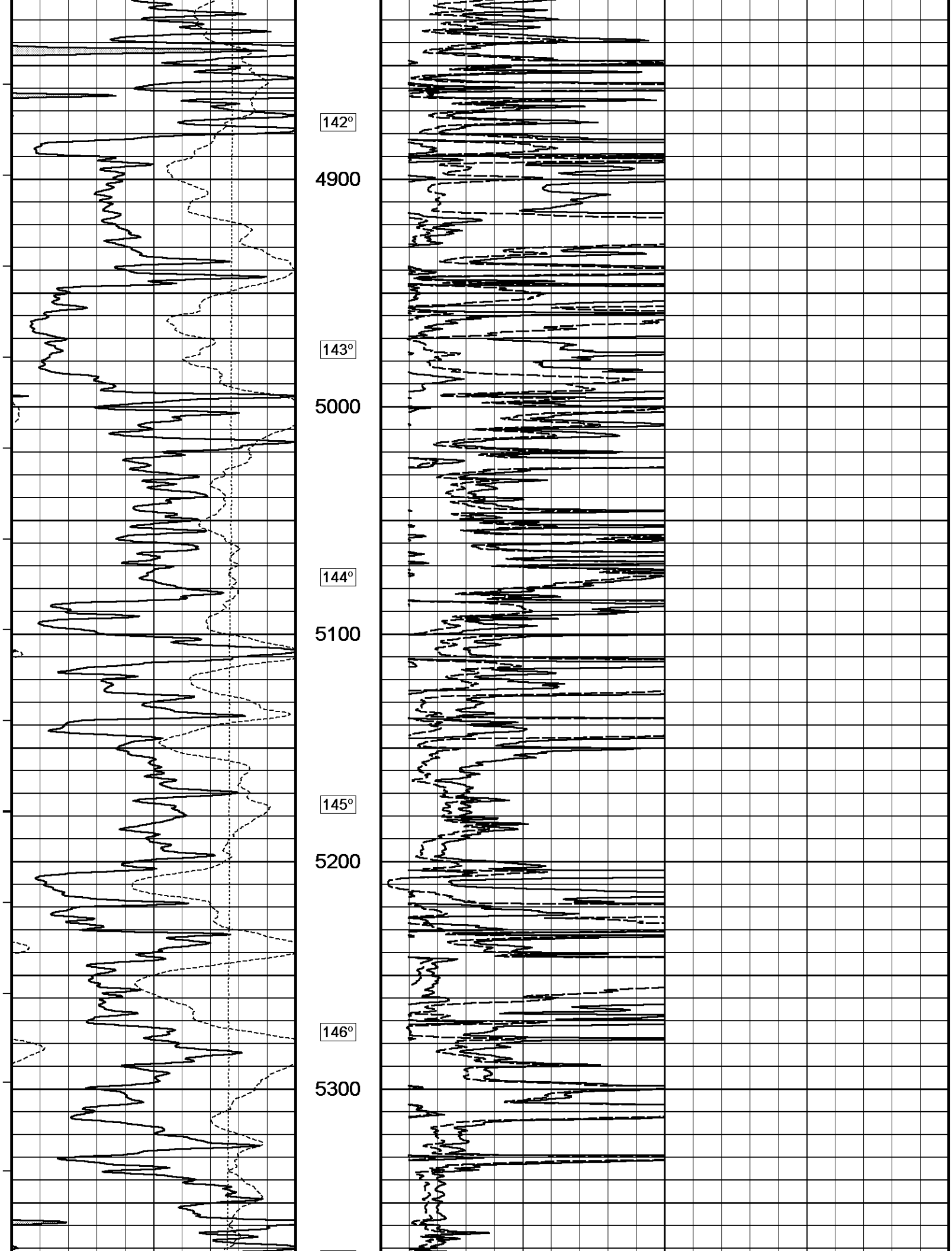
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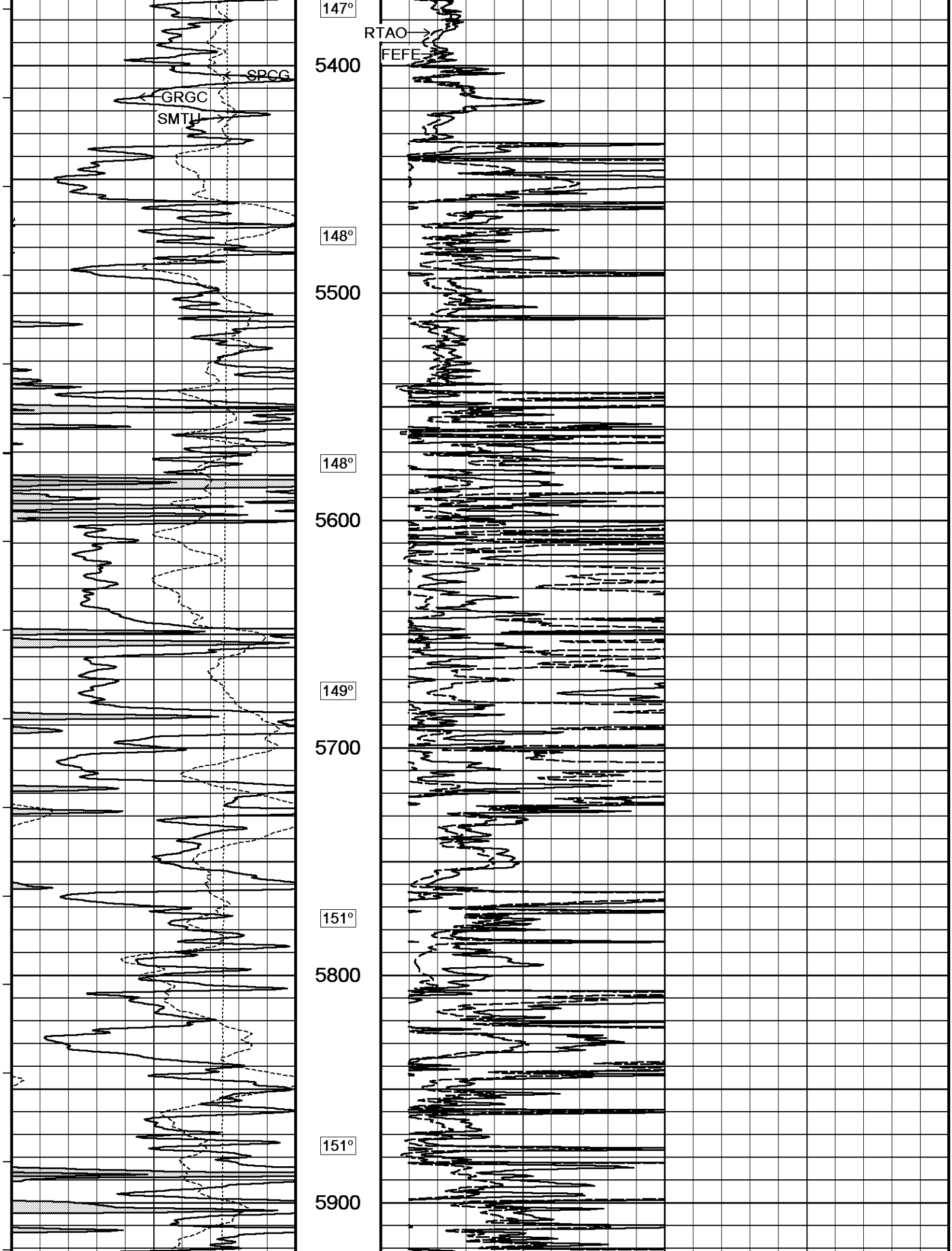
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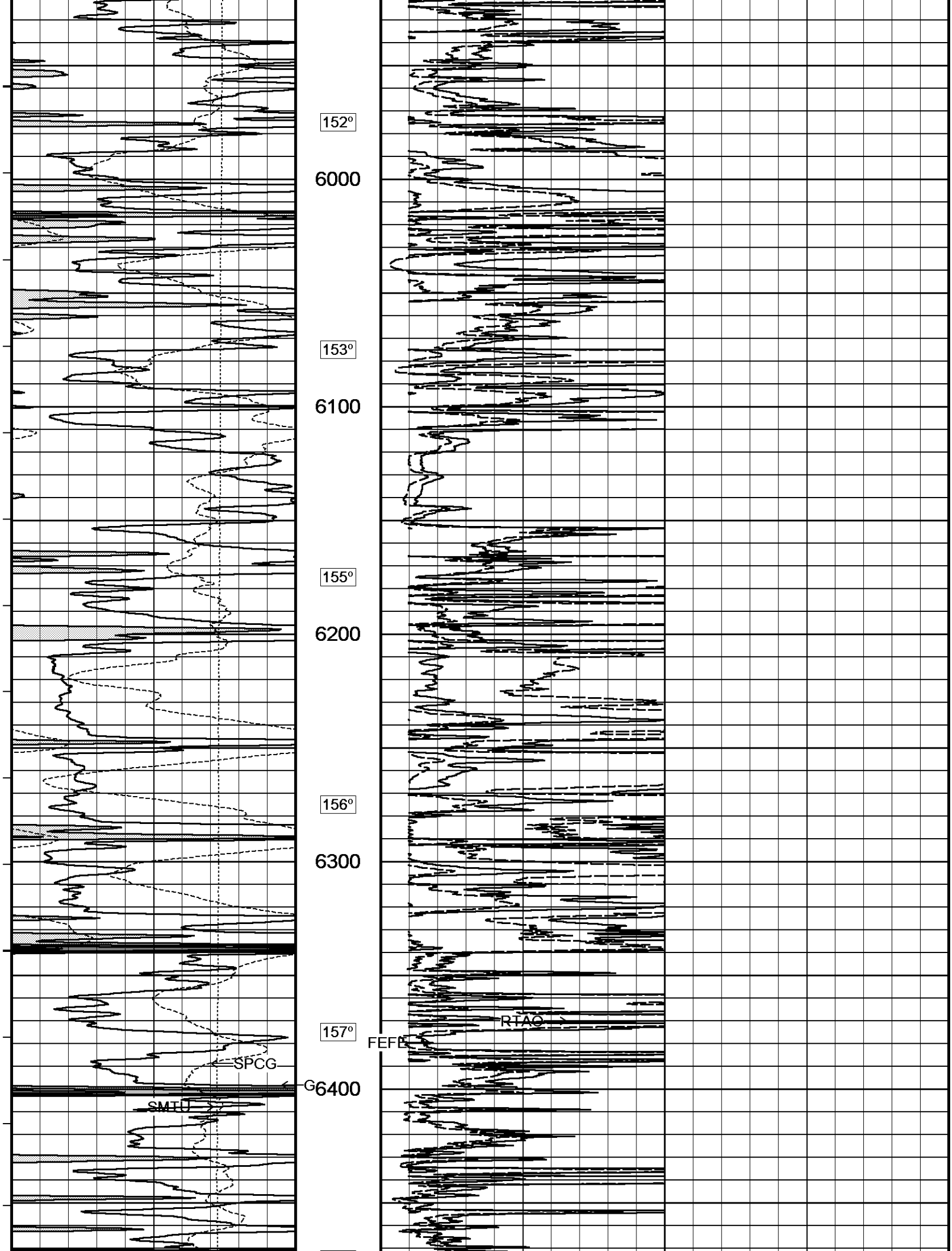
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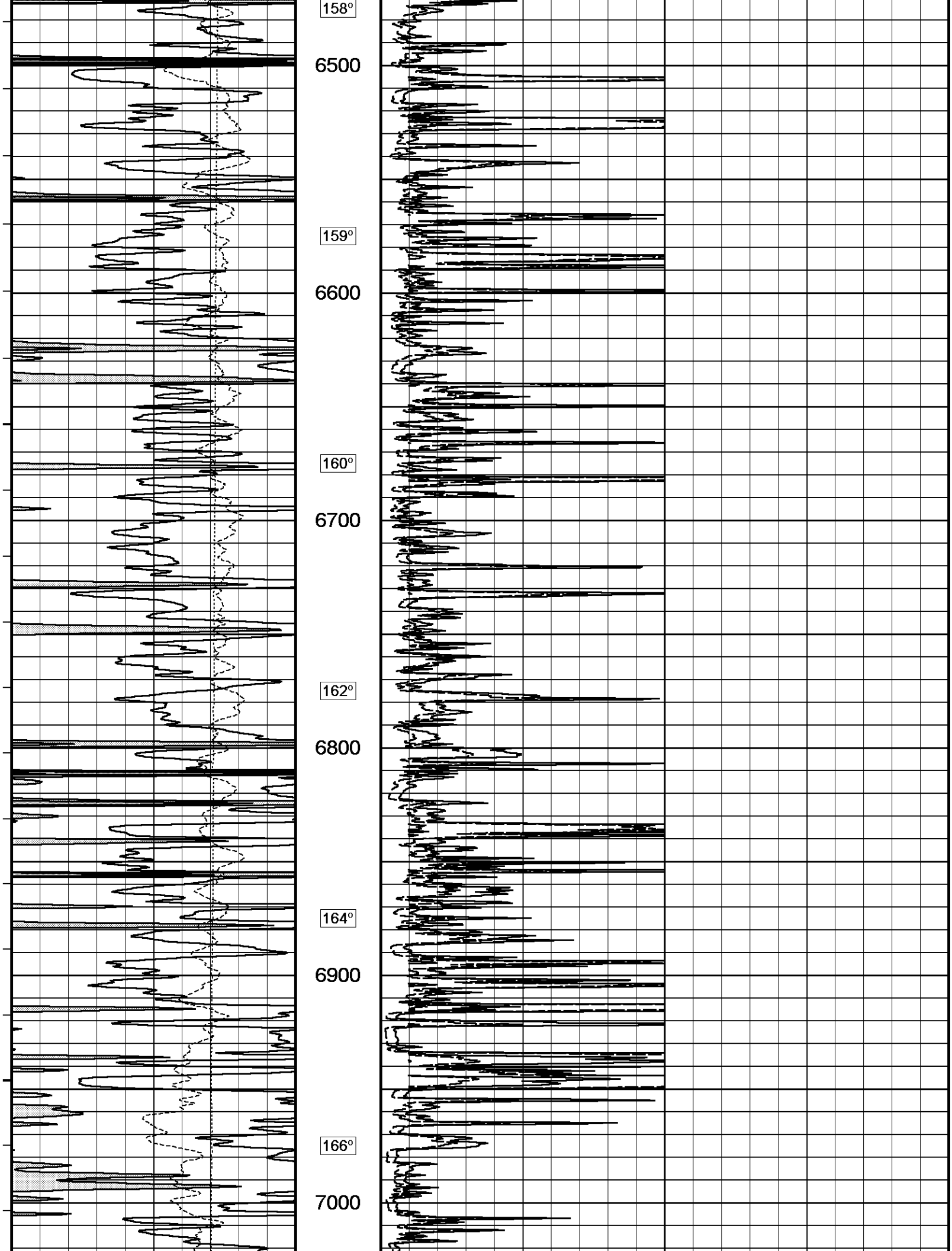
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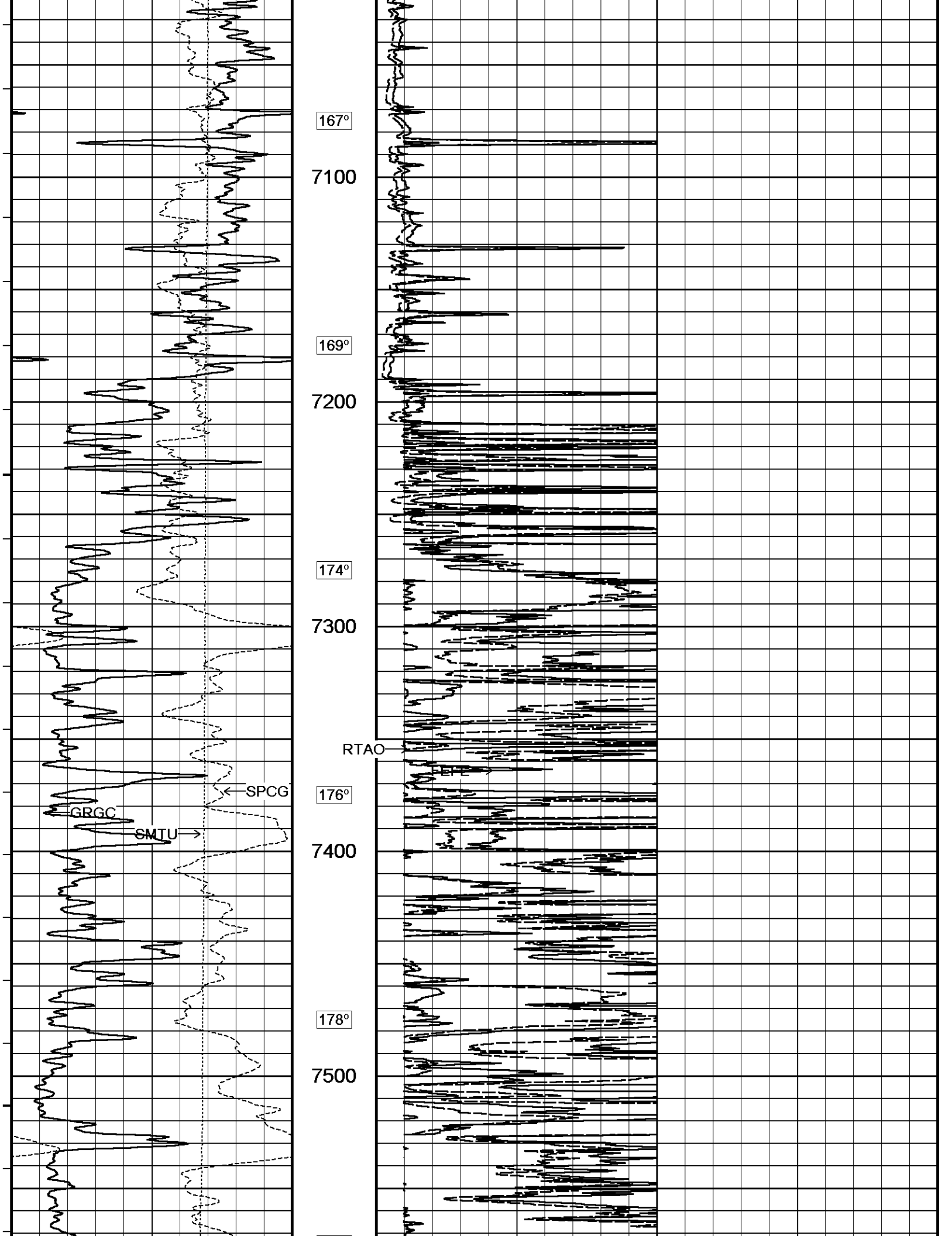
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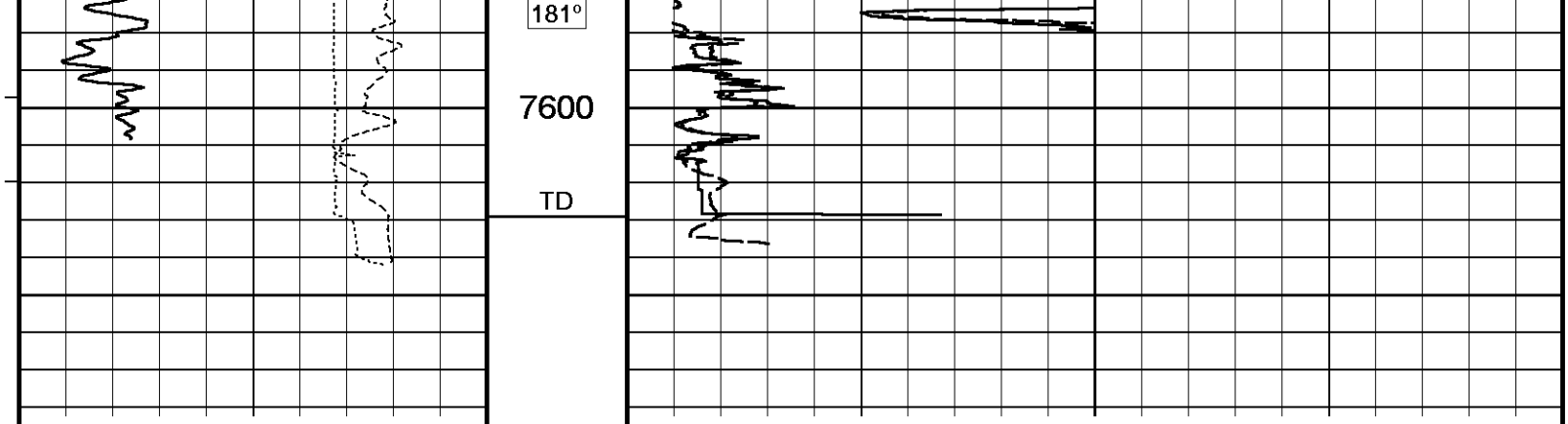


Depth In Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
− → | 20 | ← +

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

Replay Scale 1:600

Shallow FE
ohm metres
0 25 50
0 250 500

Array Ind. One Res Rt
ohm metres
0 25 50
0 250 500

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Data\Unit James 1-8\James 1-8 Main.dta
System Versions: Plotted with 15.03.5939

Plotted on 12-DEC-2015 23:07
Recorded on 5 Inch Main Pass

2 INCH MAIN

5 INCH MAIN - ANHYDRITE SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Data\Unit James 1-8\James 1-8 Main.dta
System Versions: Plotted with 15.03.5939

Plotted on 12-DEC-2015 23:07
Recorded on 5 Inch Main Pass

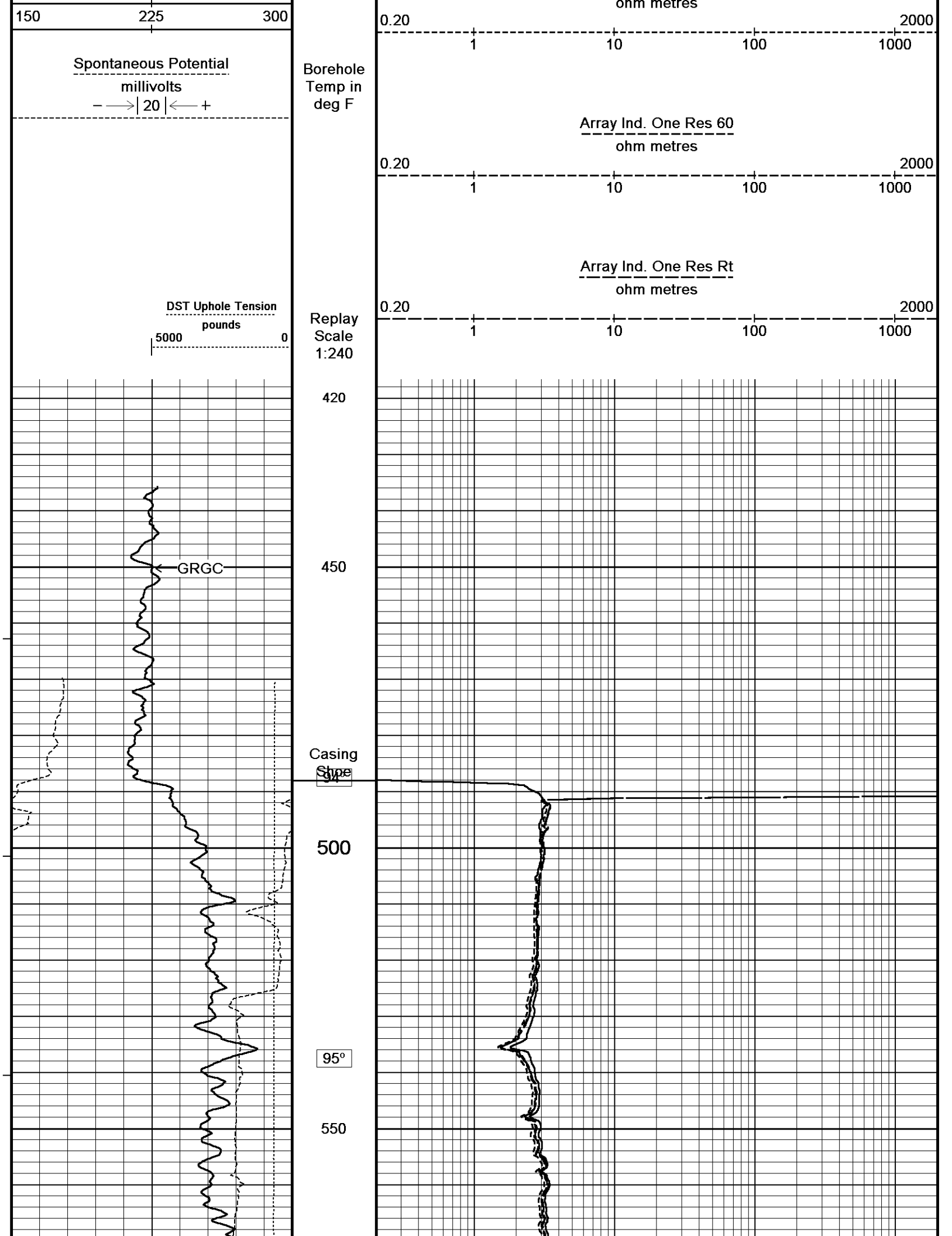
Depth In Feet

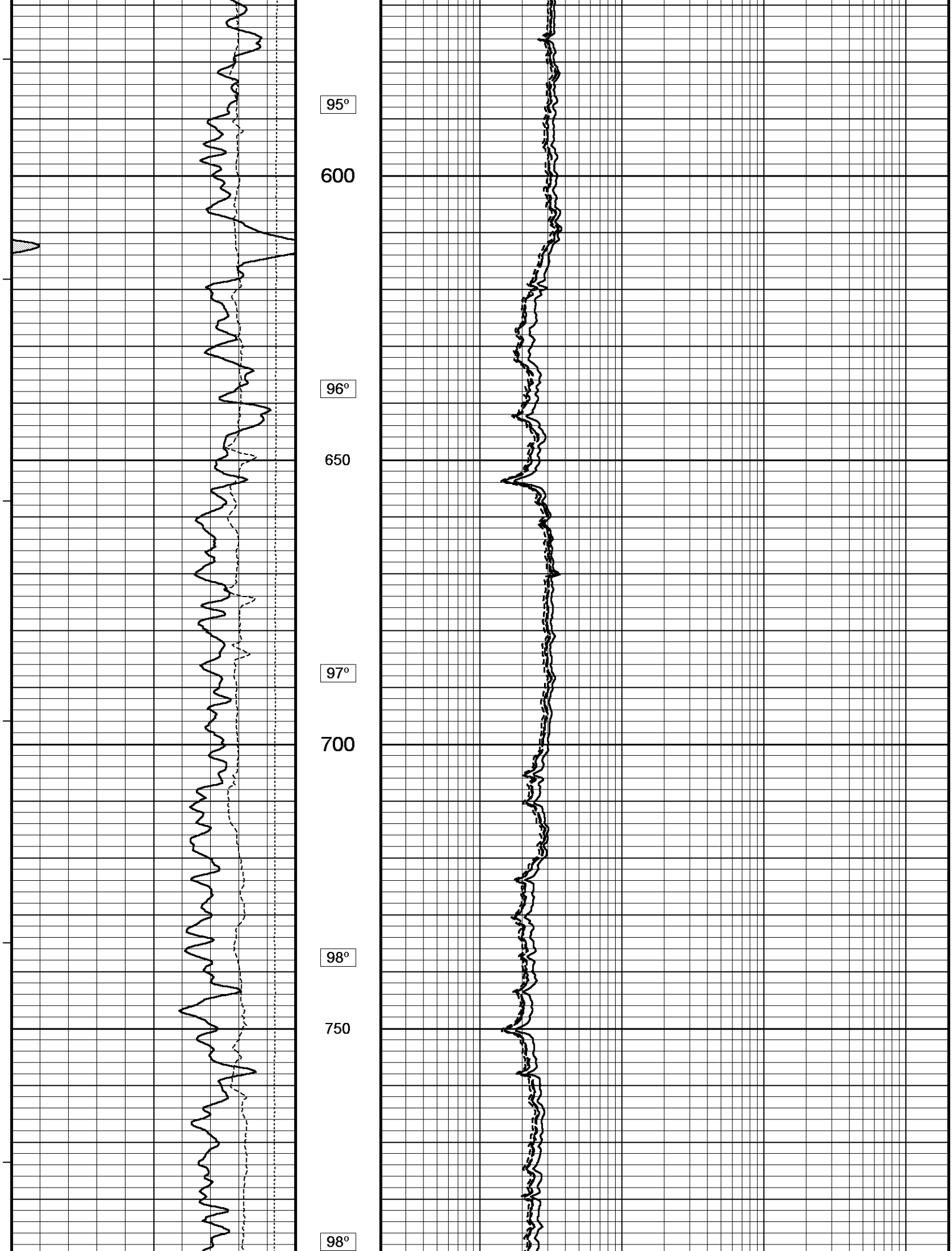
Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150

Shallow FE
ohm metres
0.20 1 10 100 1000 2000

Array Ind. One Res 40


150
225
300
Spontaneous Potential
millivolts
20
Borehole Temp in deg F
ohm metres
0.20
2000
1
10
100
1000
Array Ind. One Res 60
ohm metres
Array Ind. One Res Rt
ohm metres
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
420
450
GRGC
Casing Shoe
94'
500
95°
550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650
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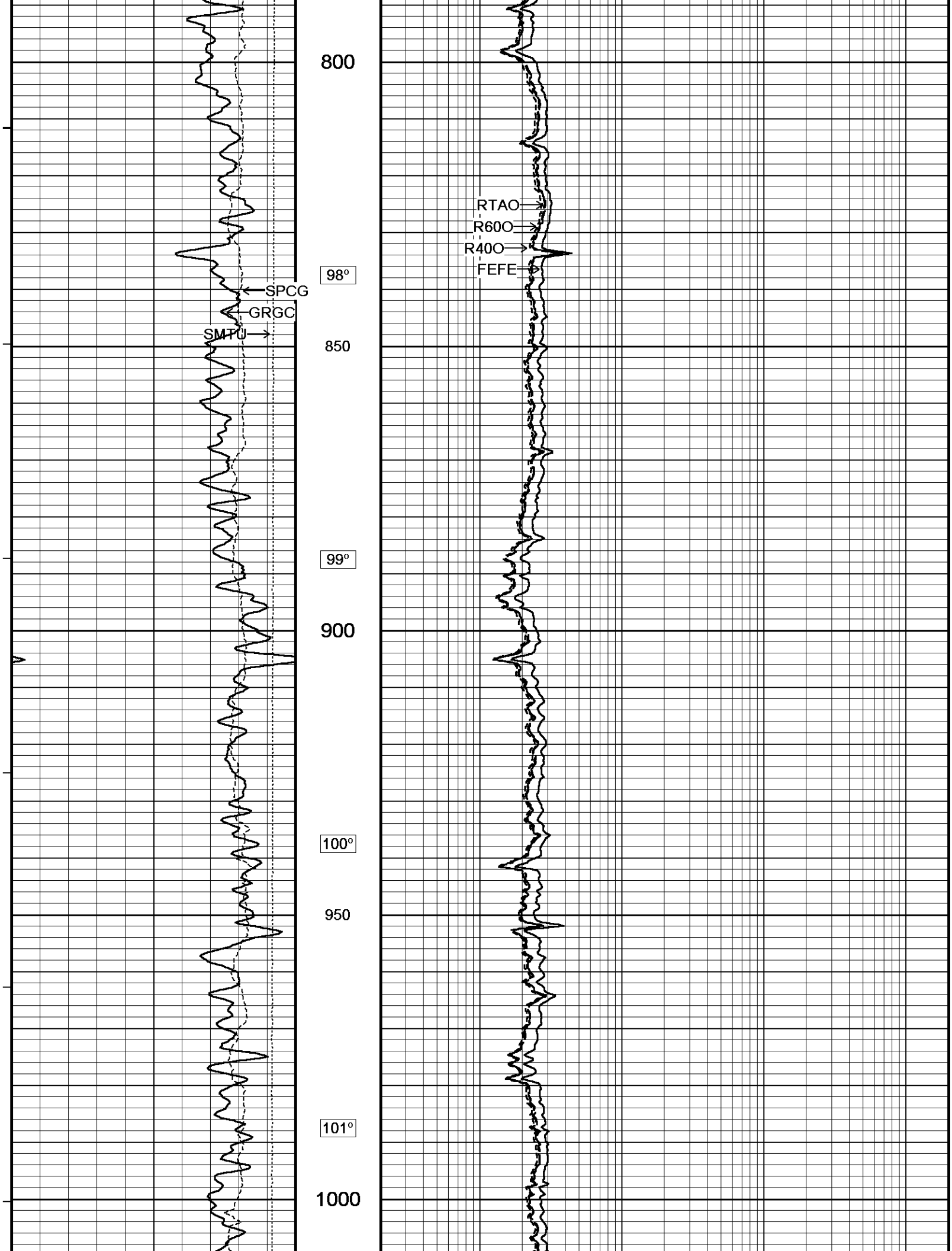
750
98°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R40O
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SMTU
850
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900
100°
950
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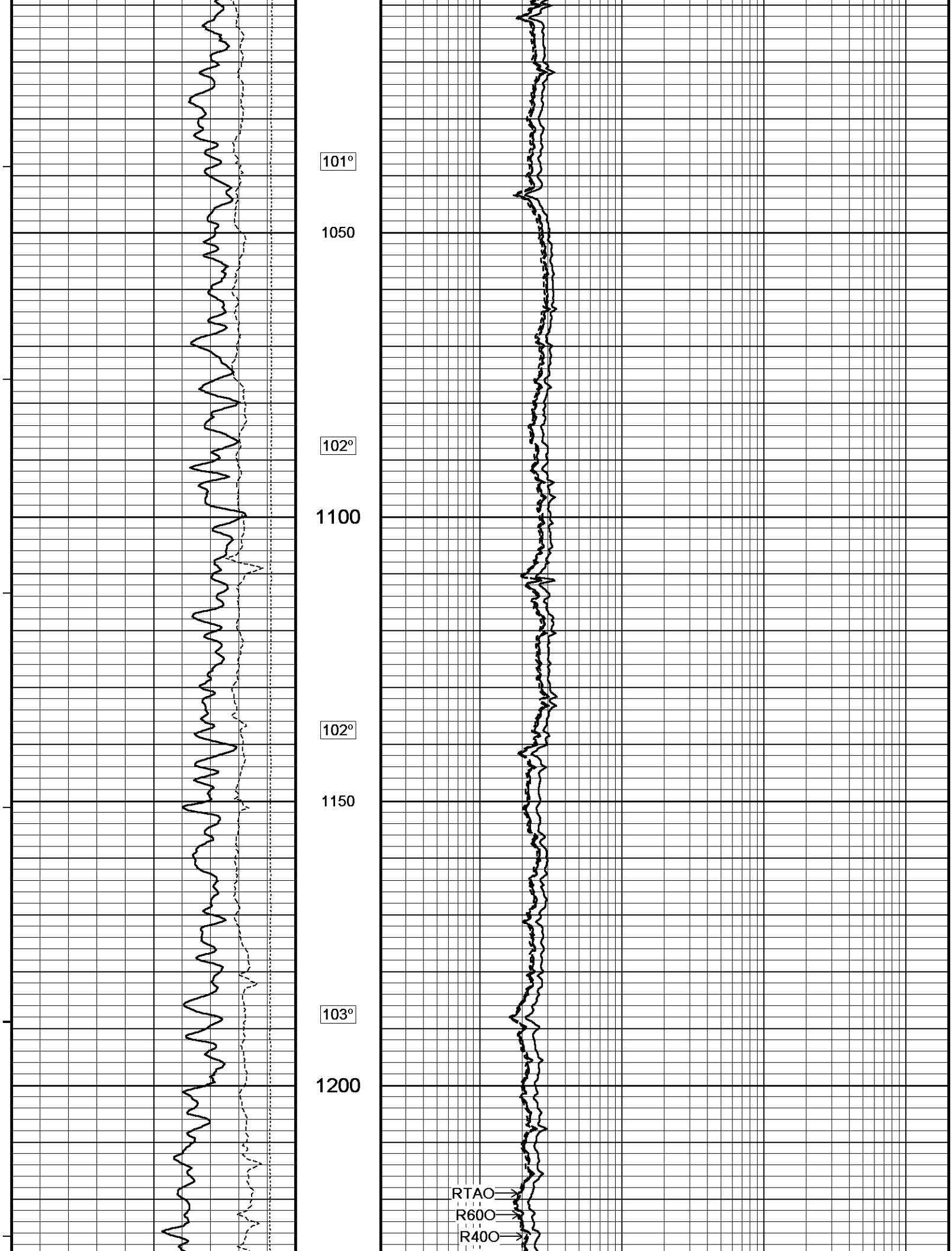
1000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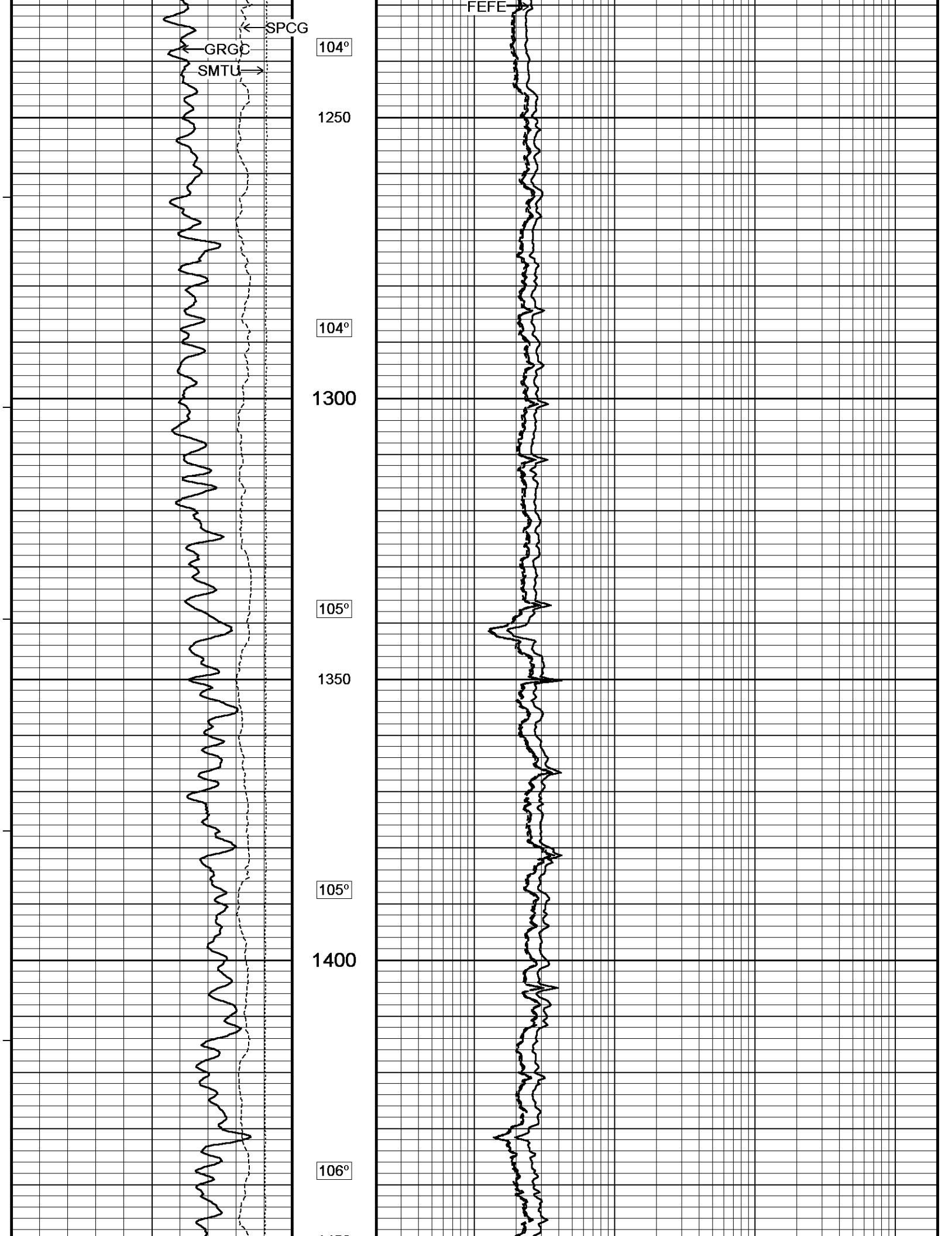
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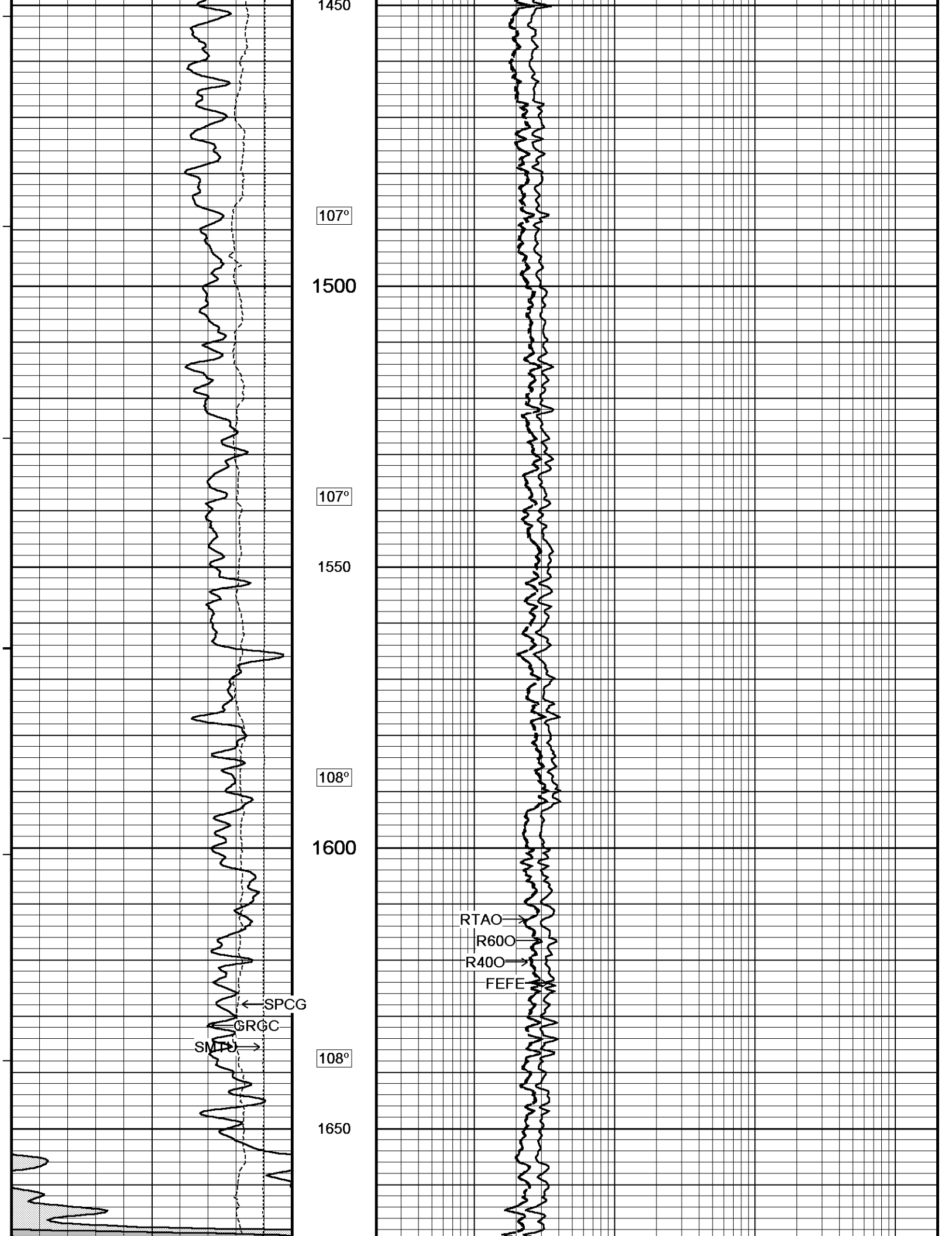
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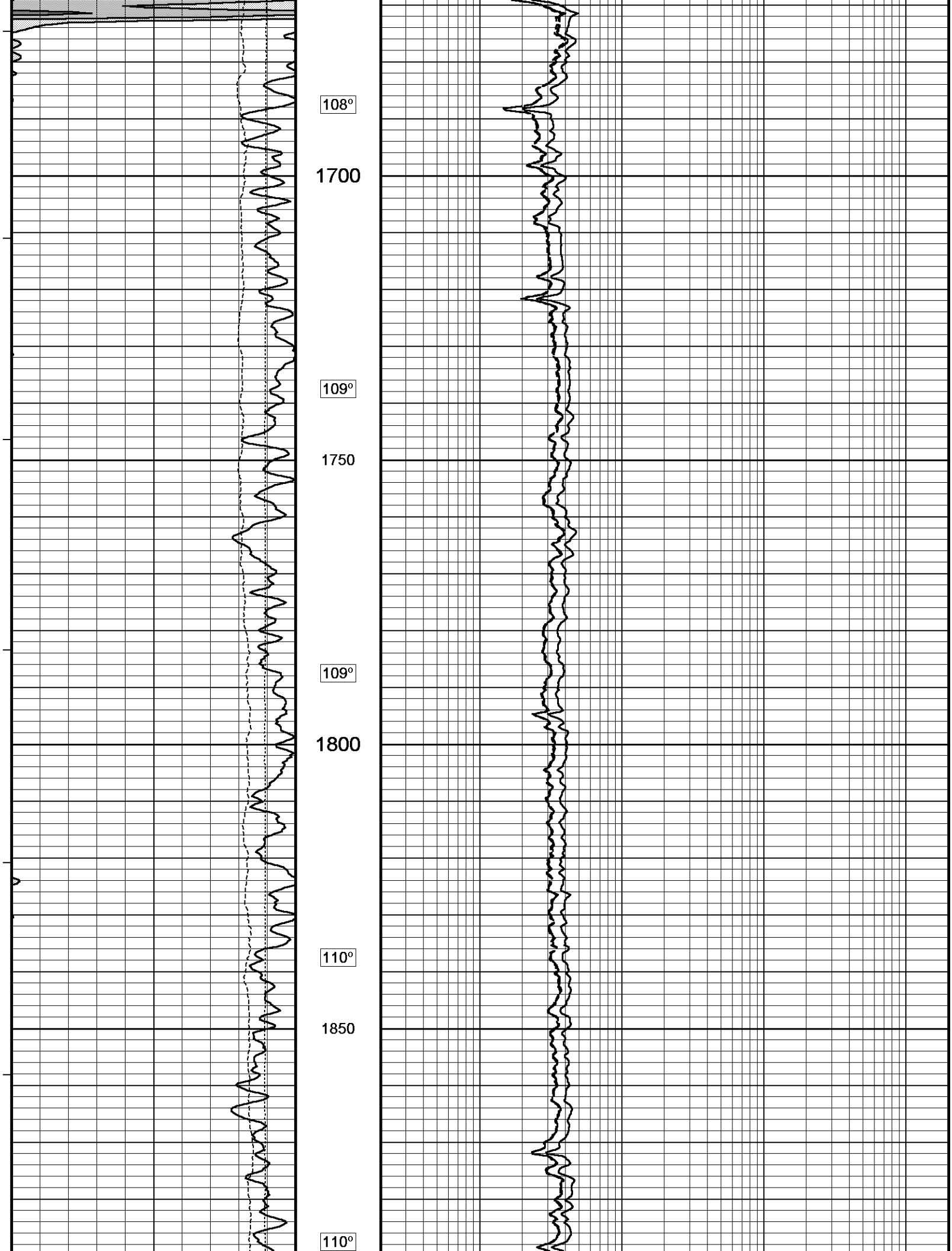
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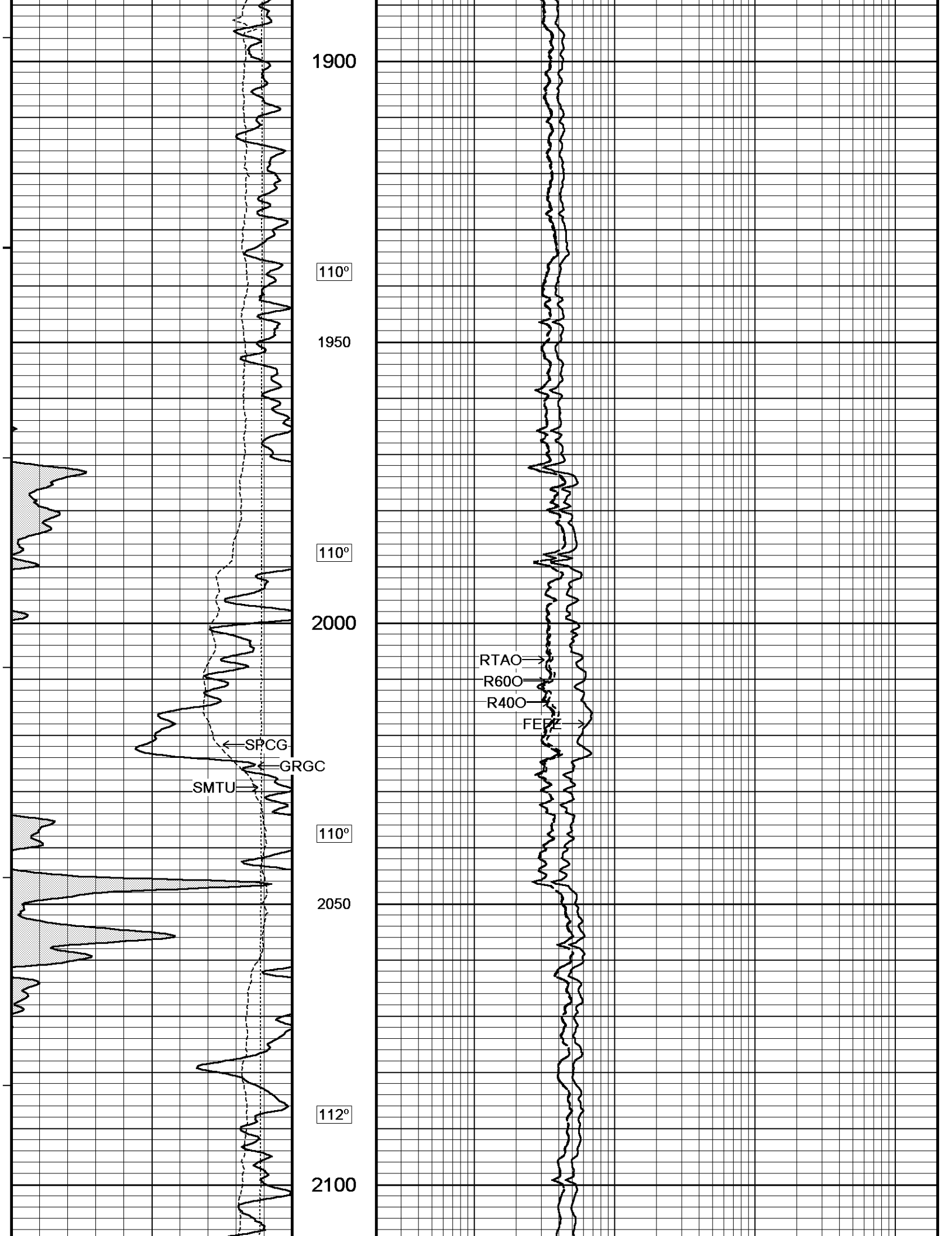
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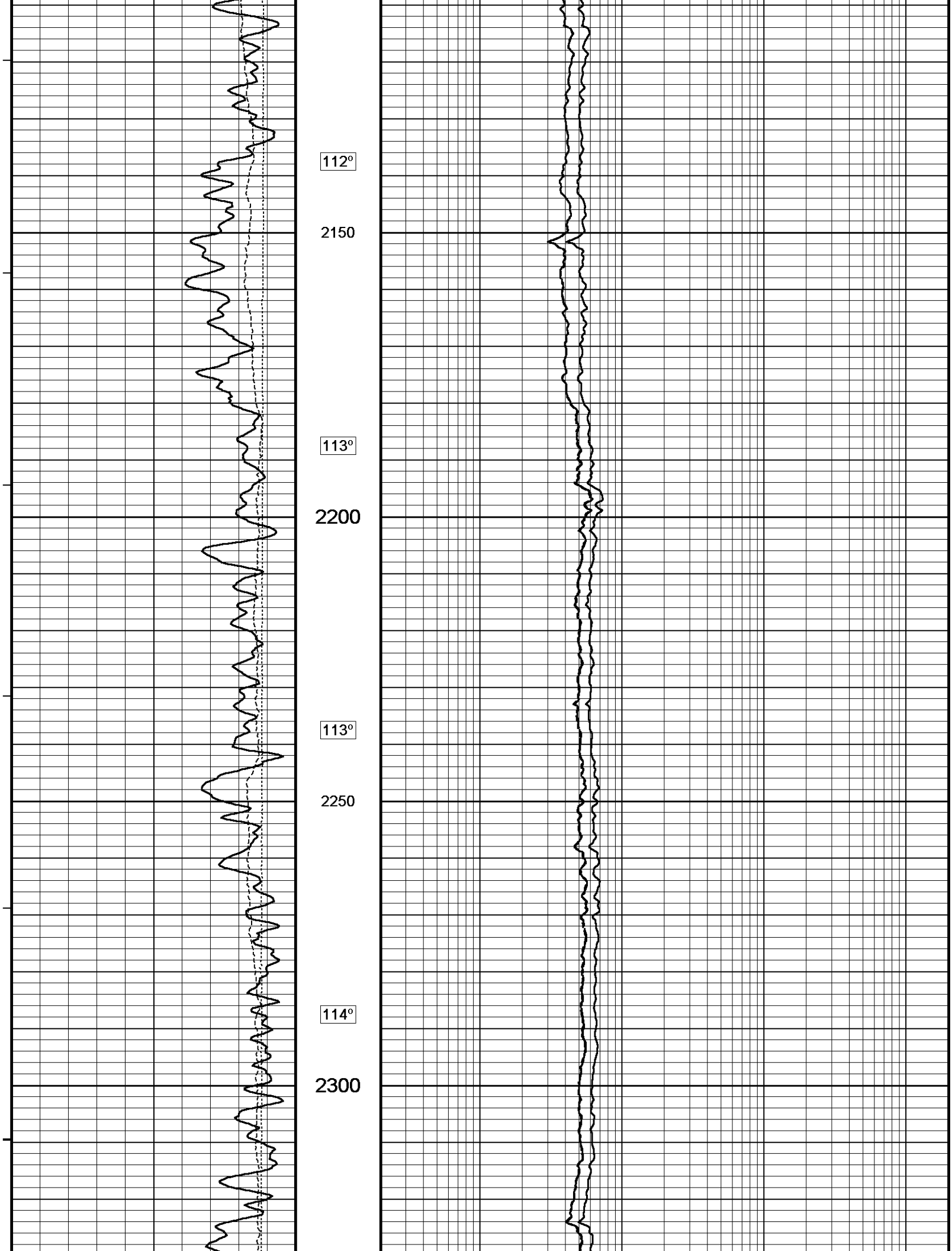
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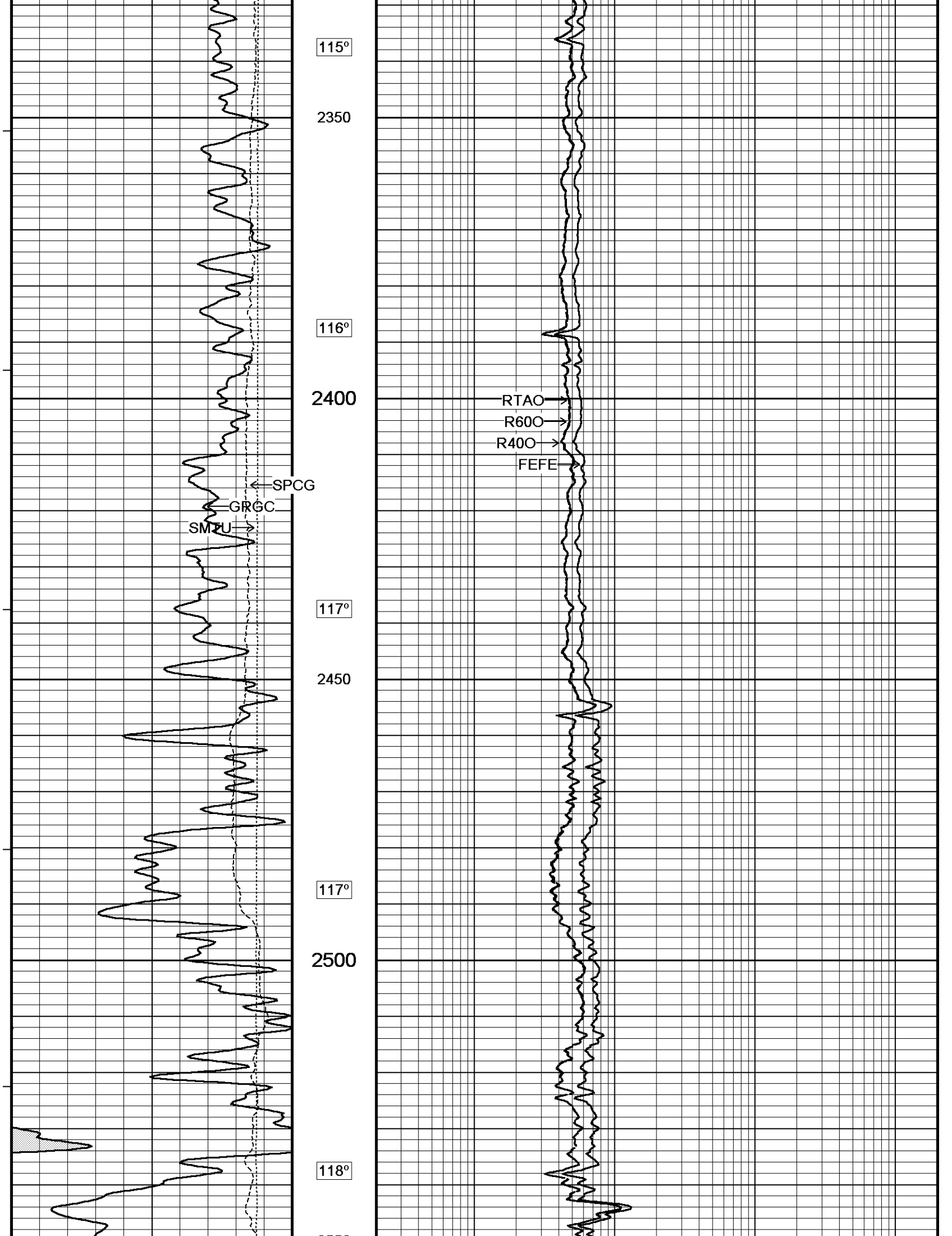
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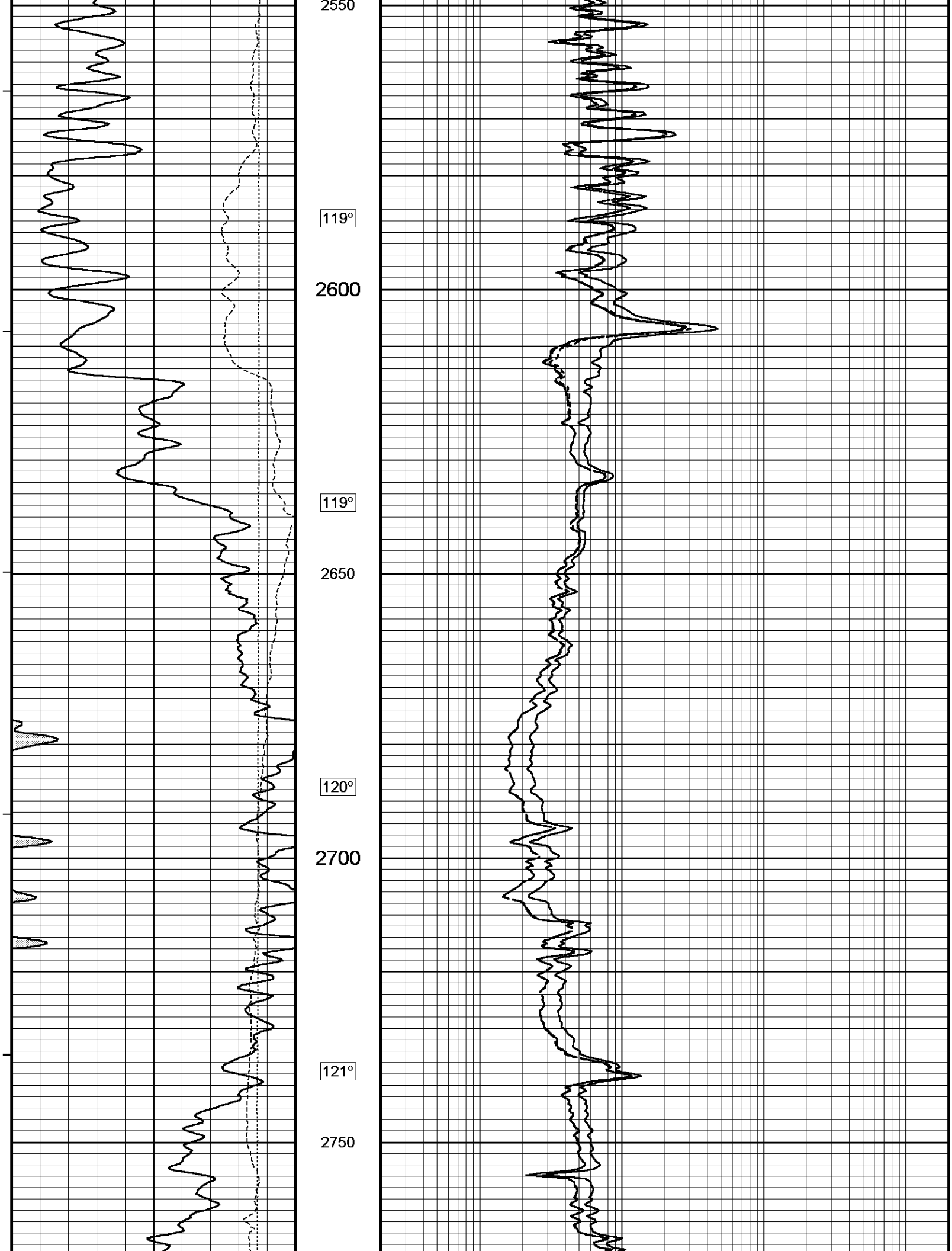
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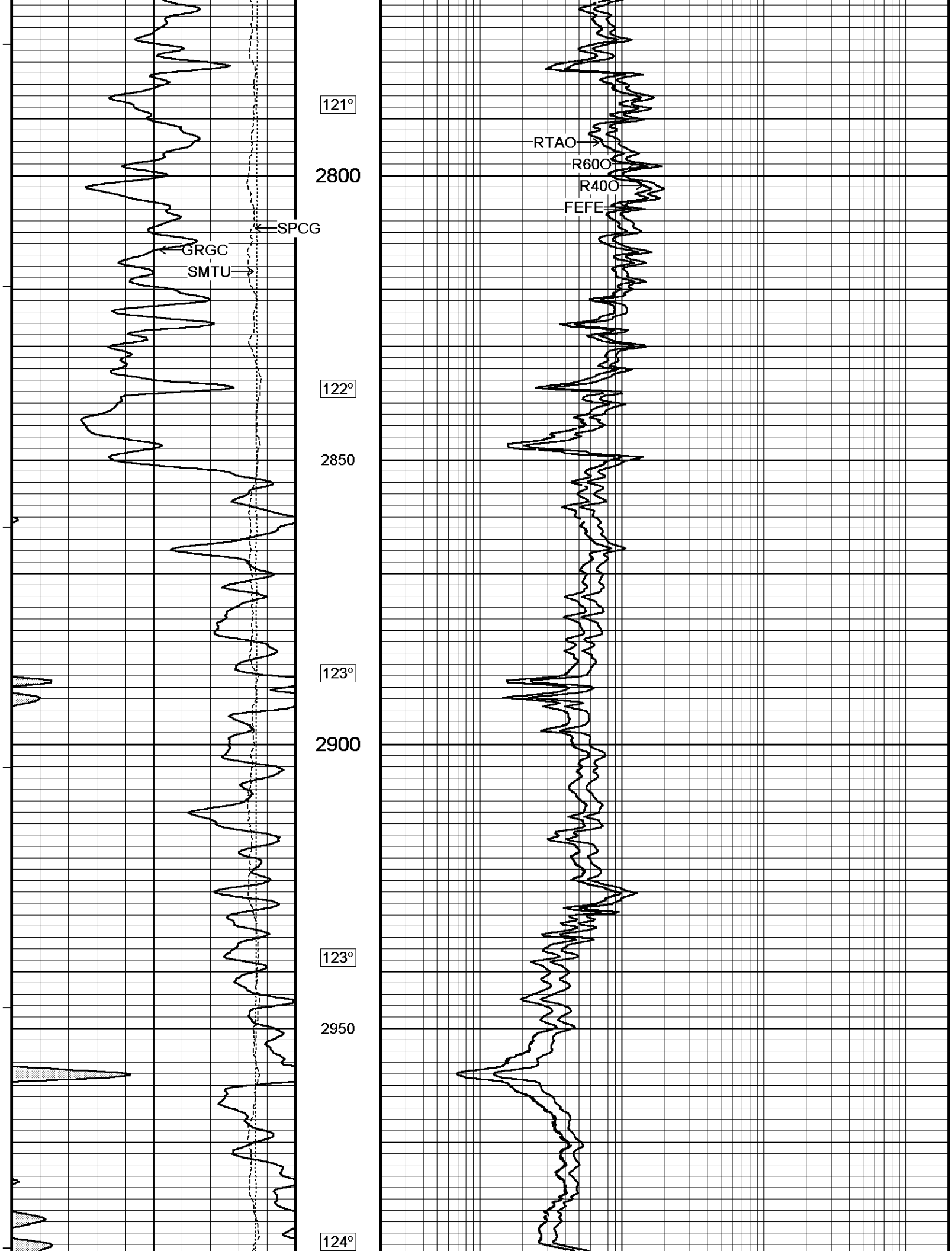
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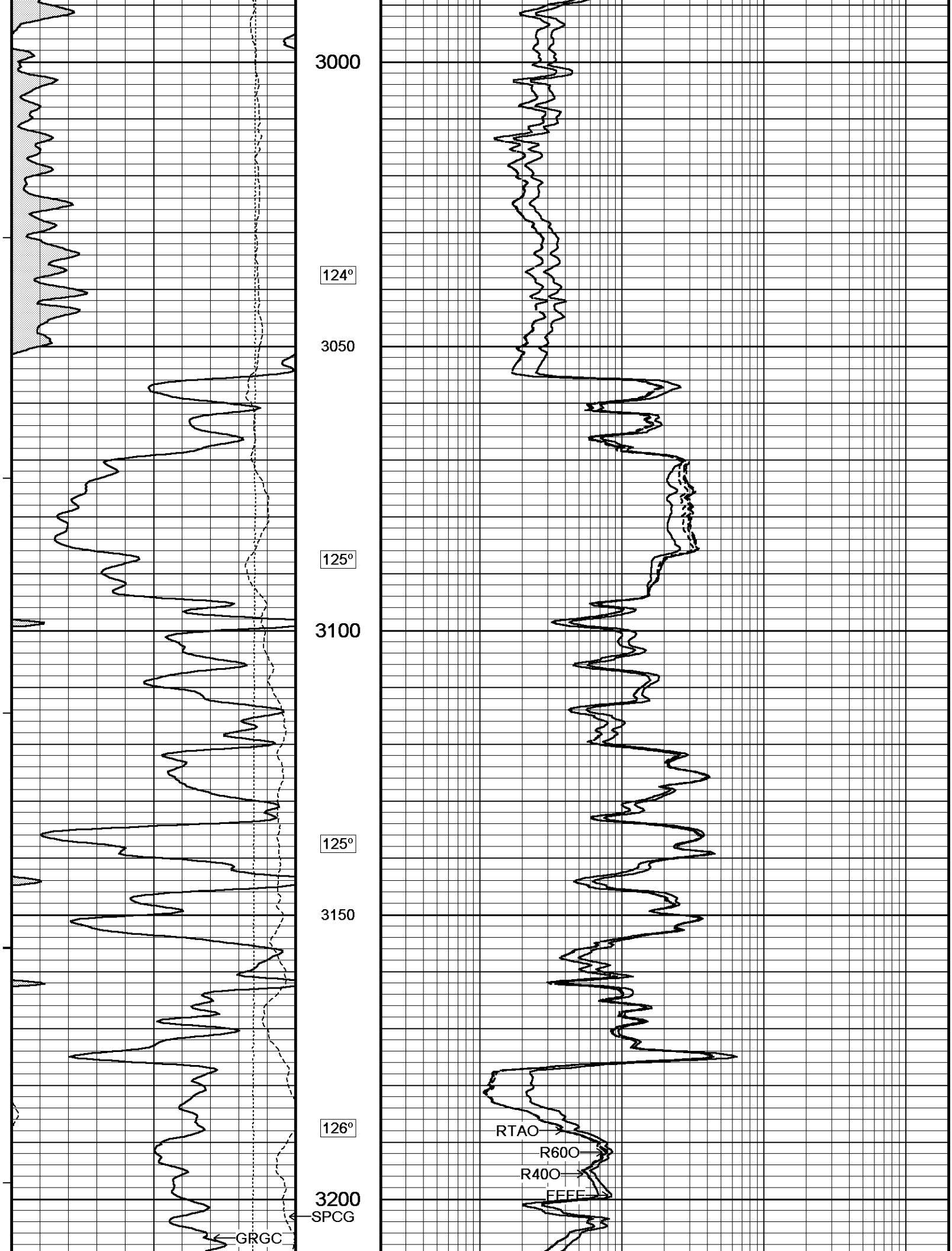
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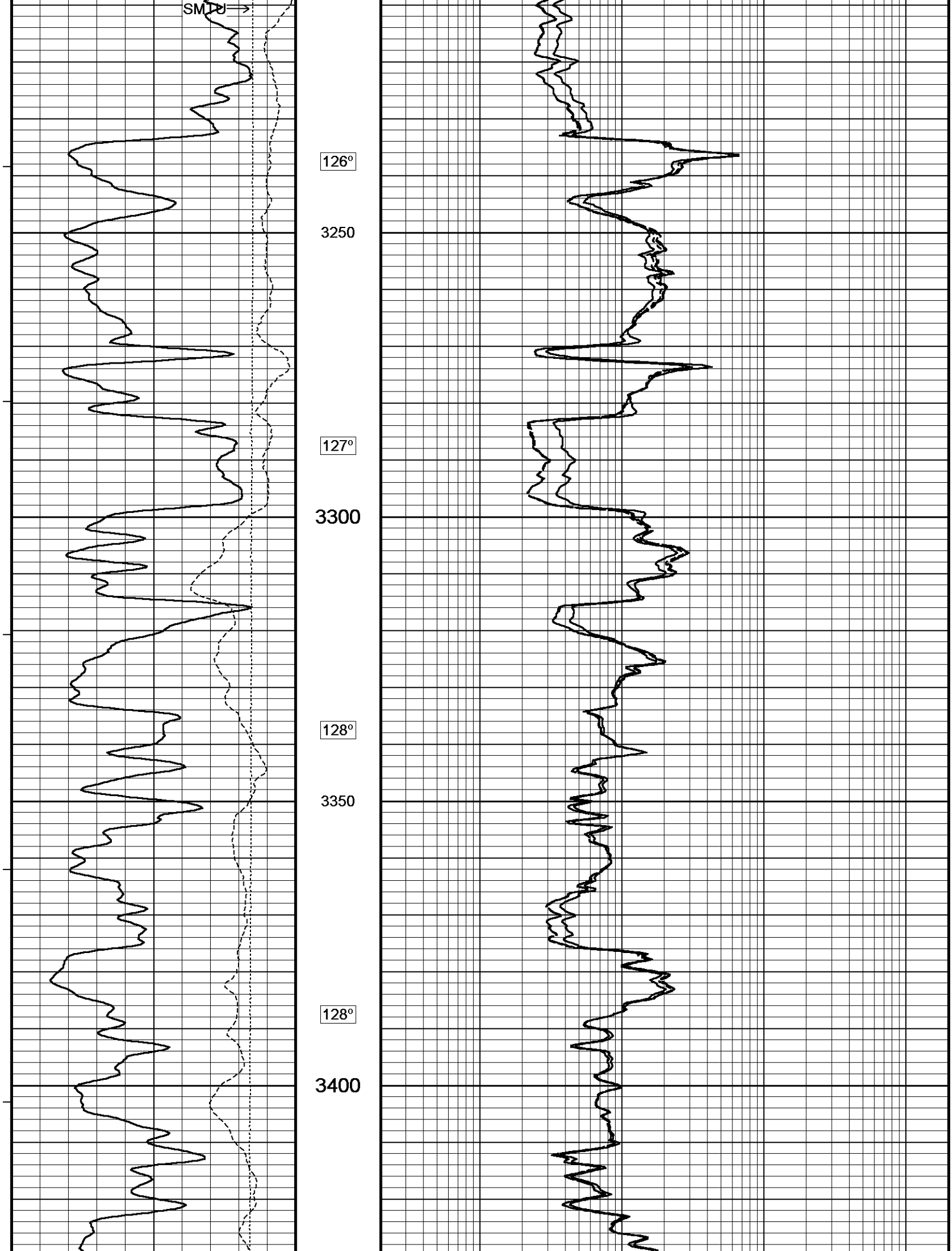
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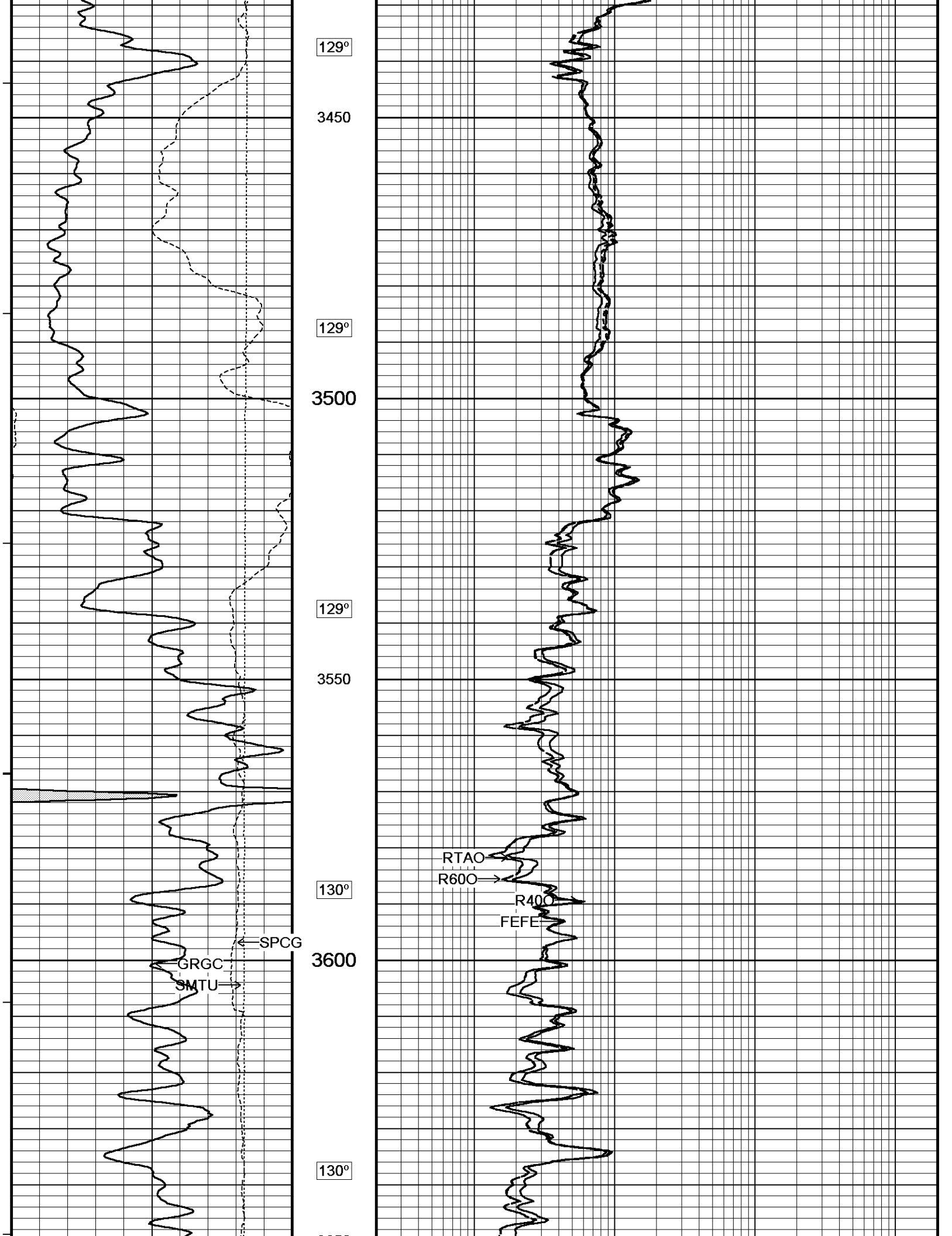
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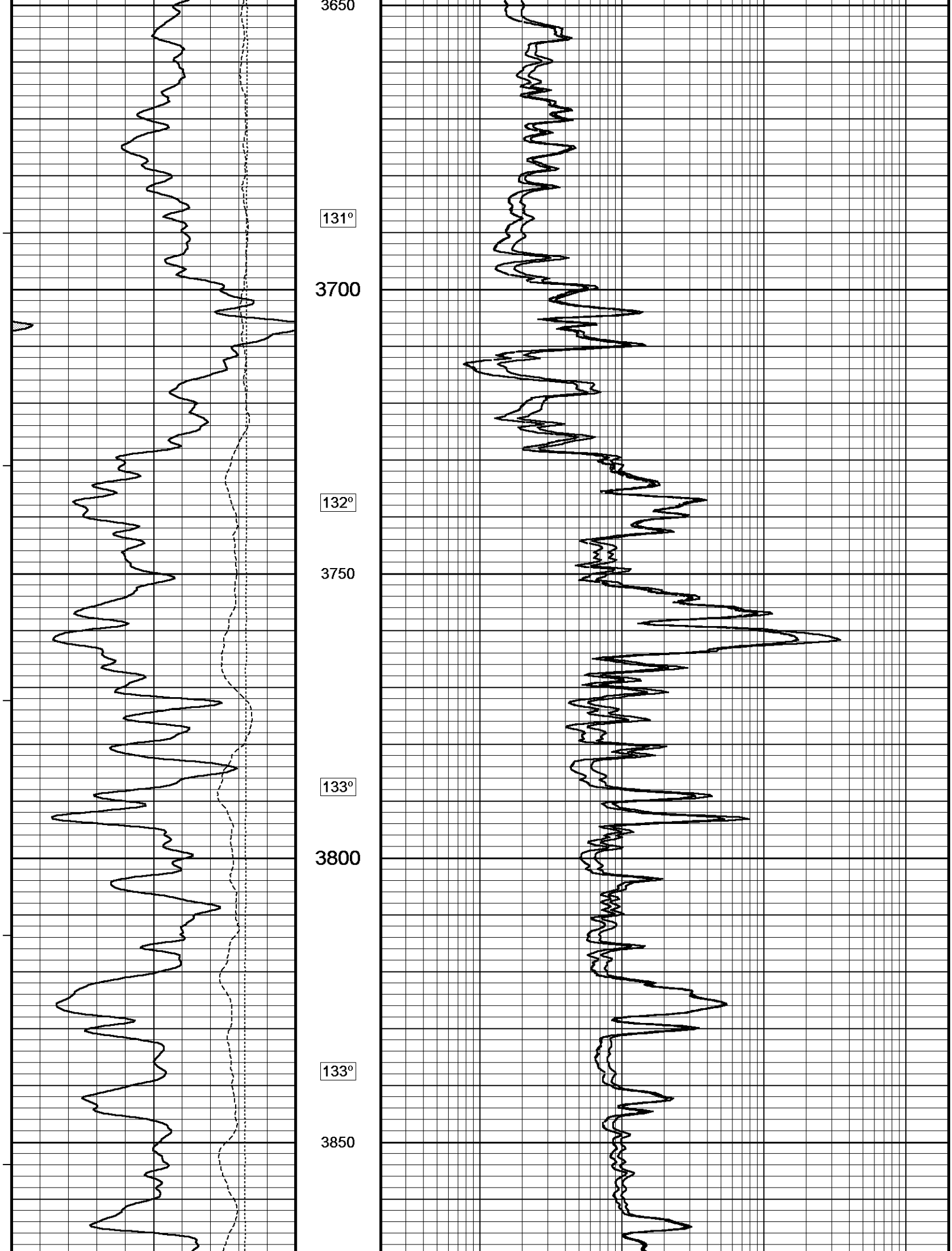
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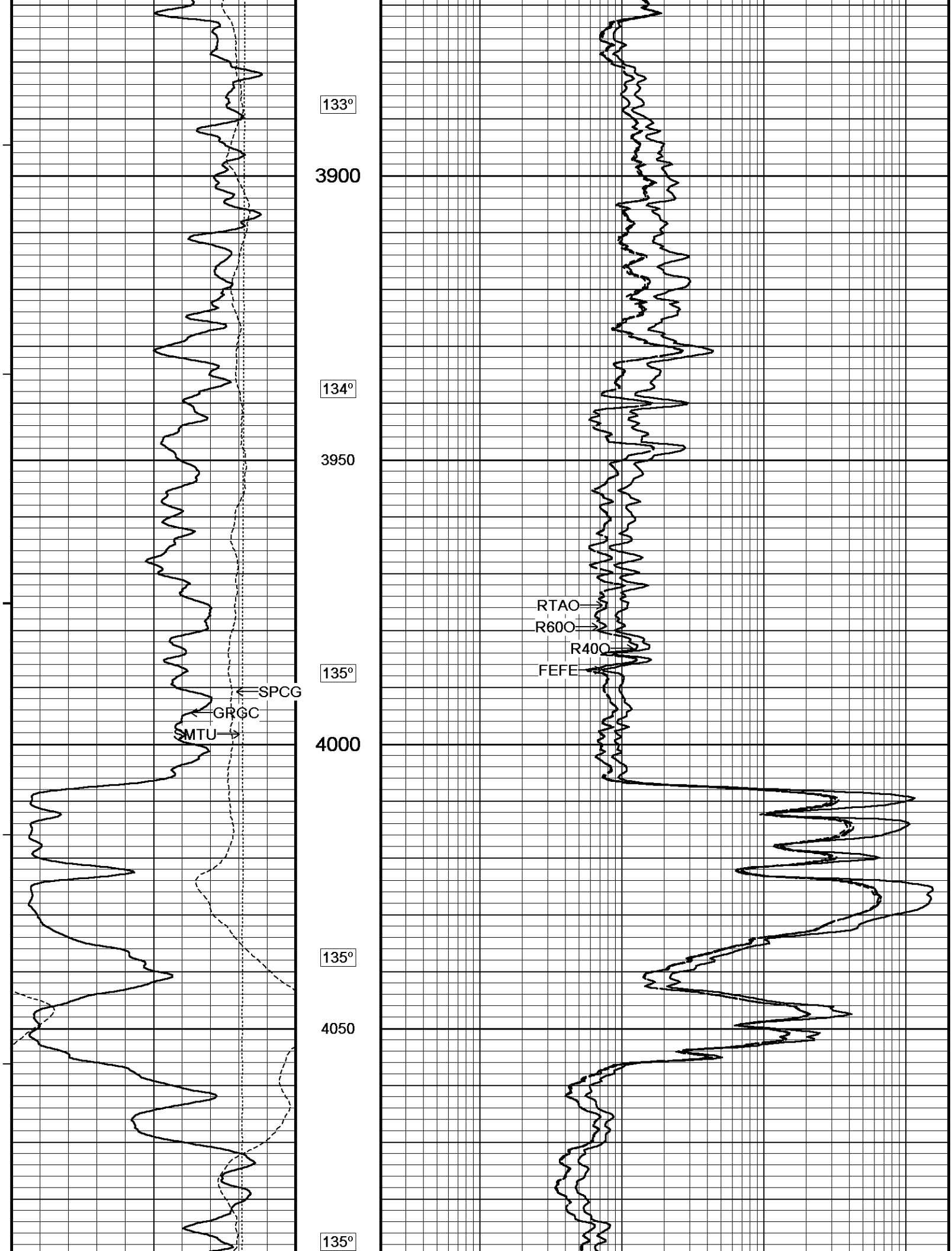
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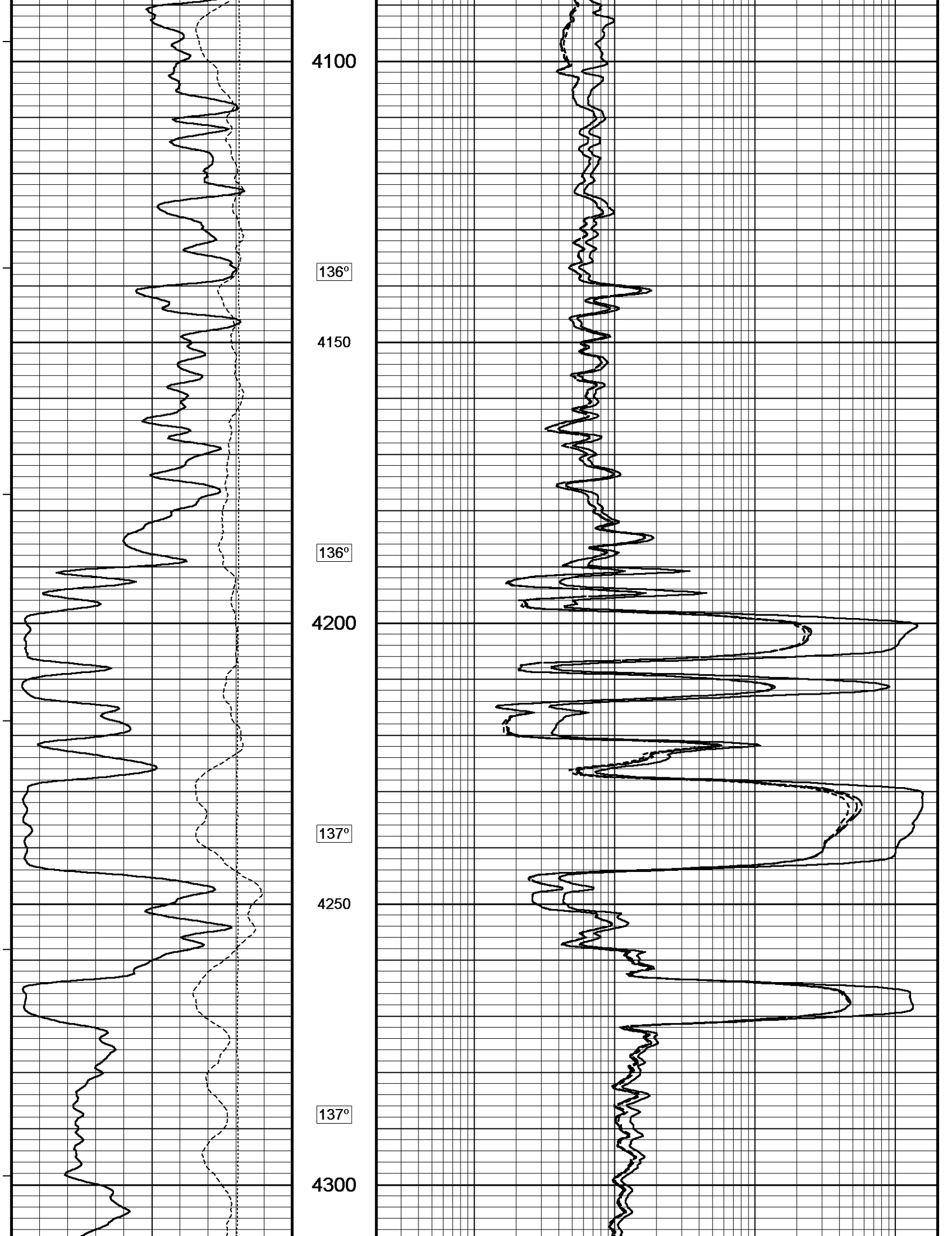
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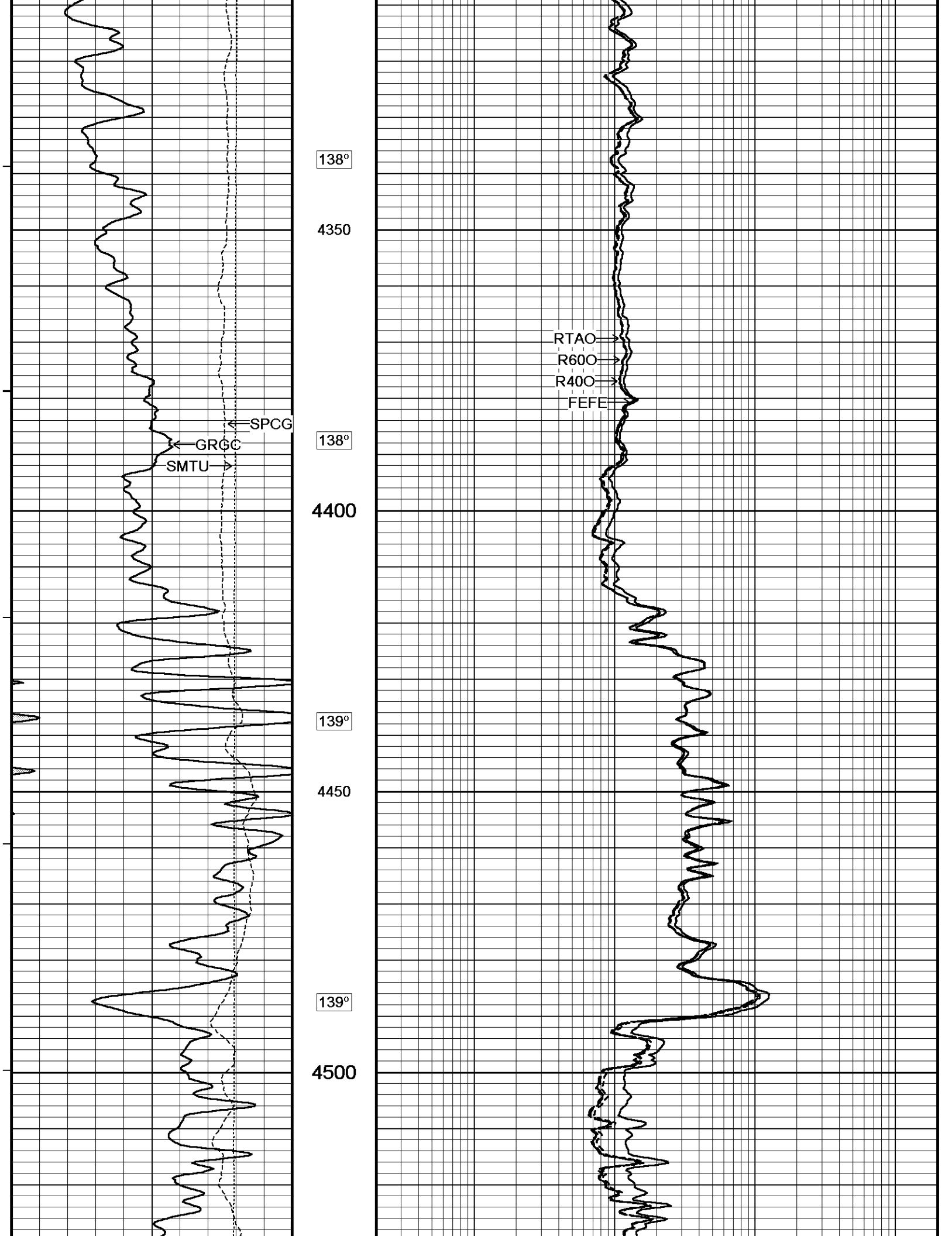
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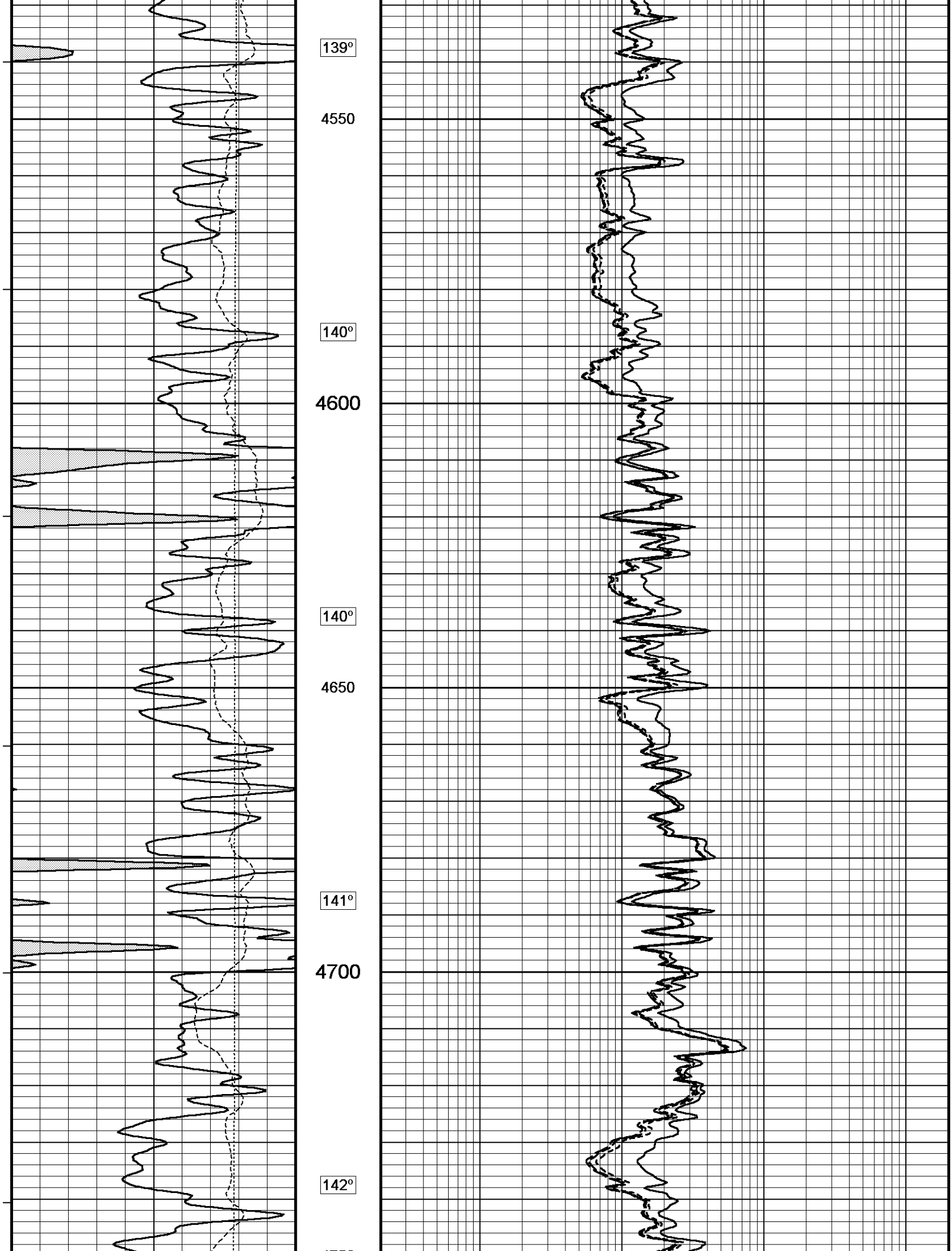
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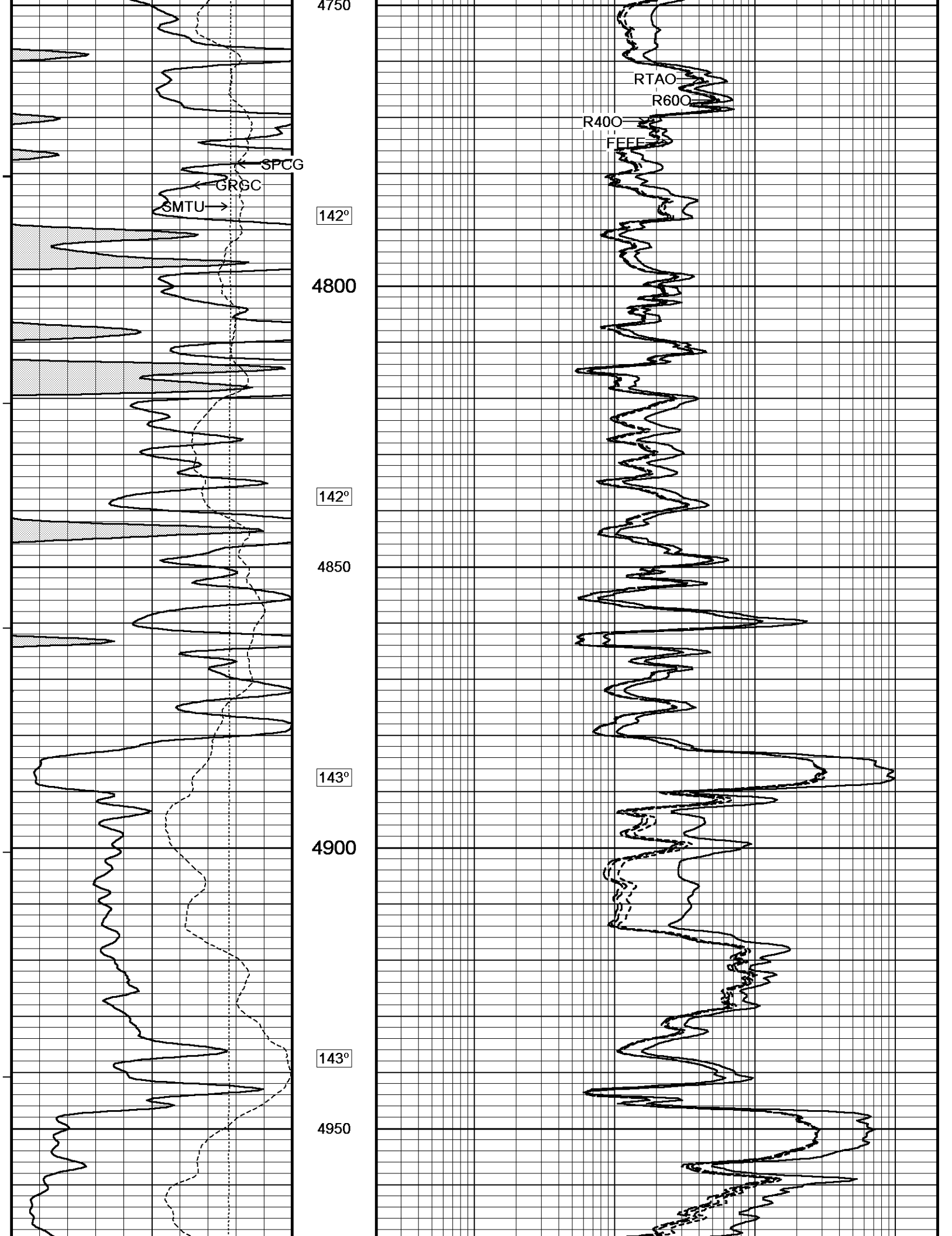
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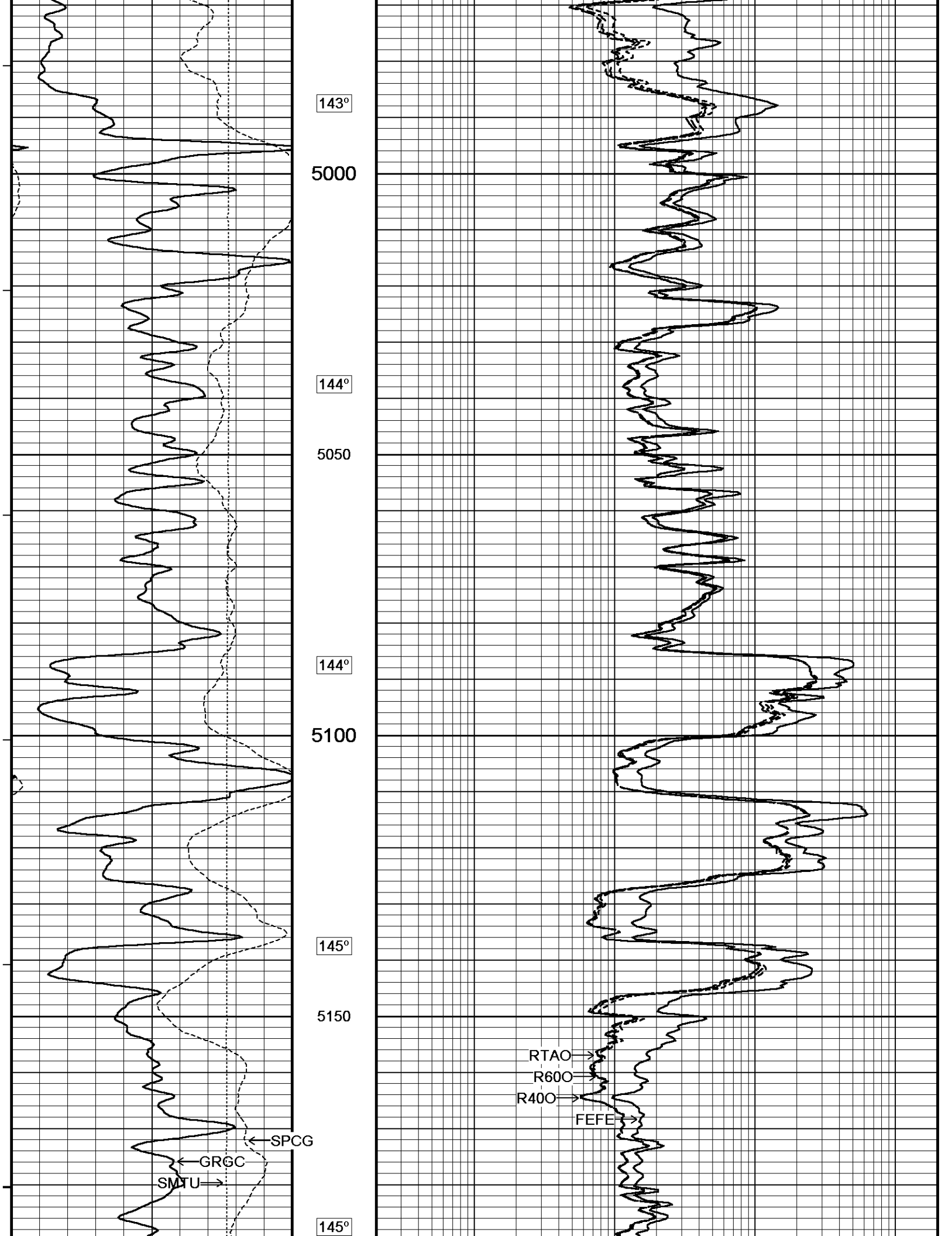
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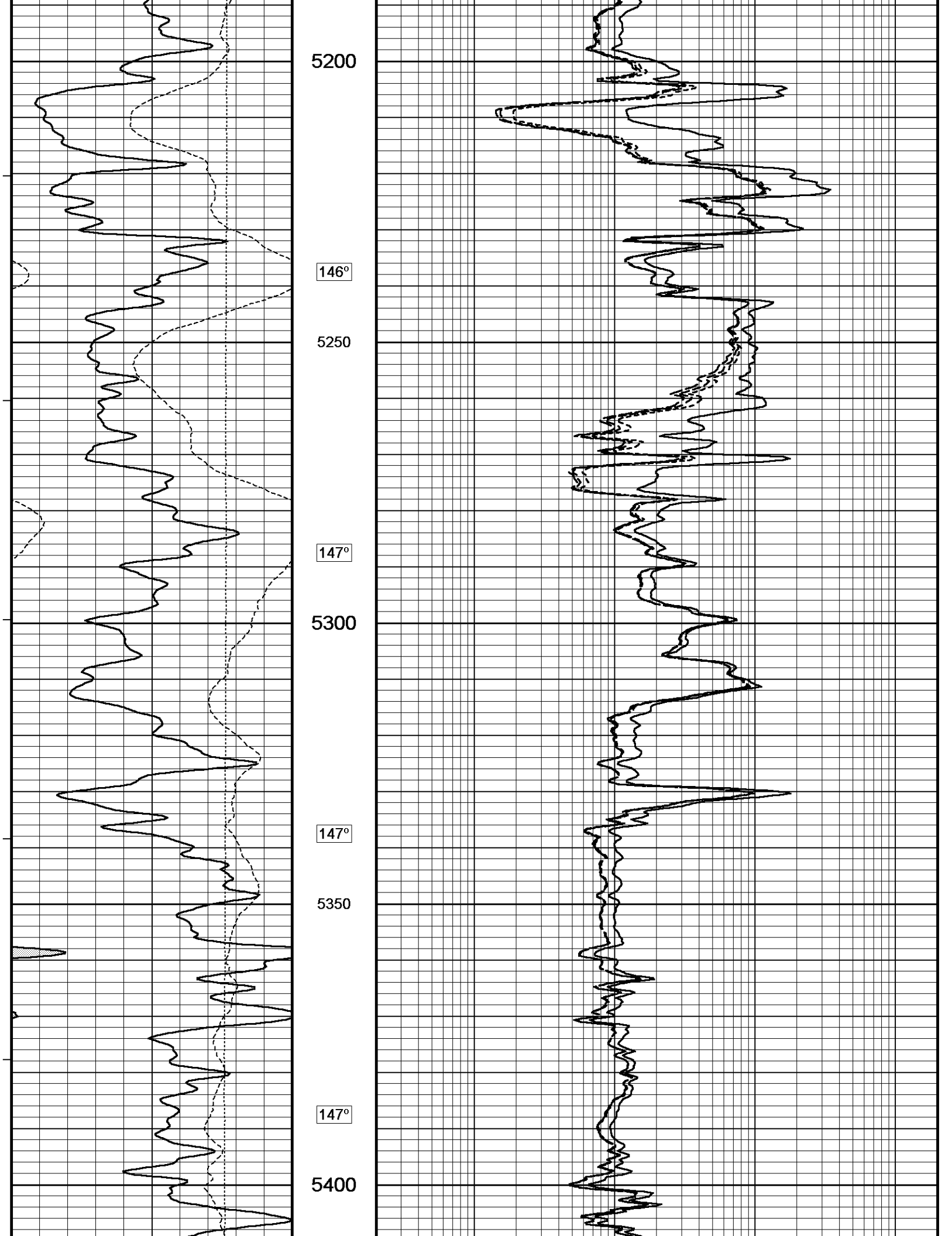
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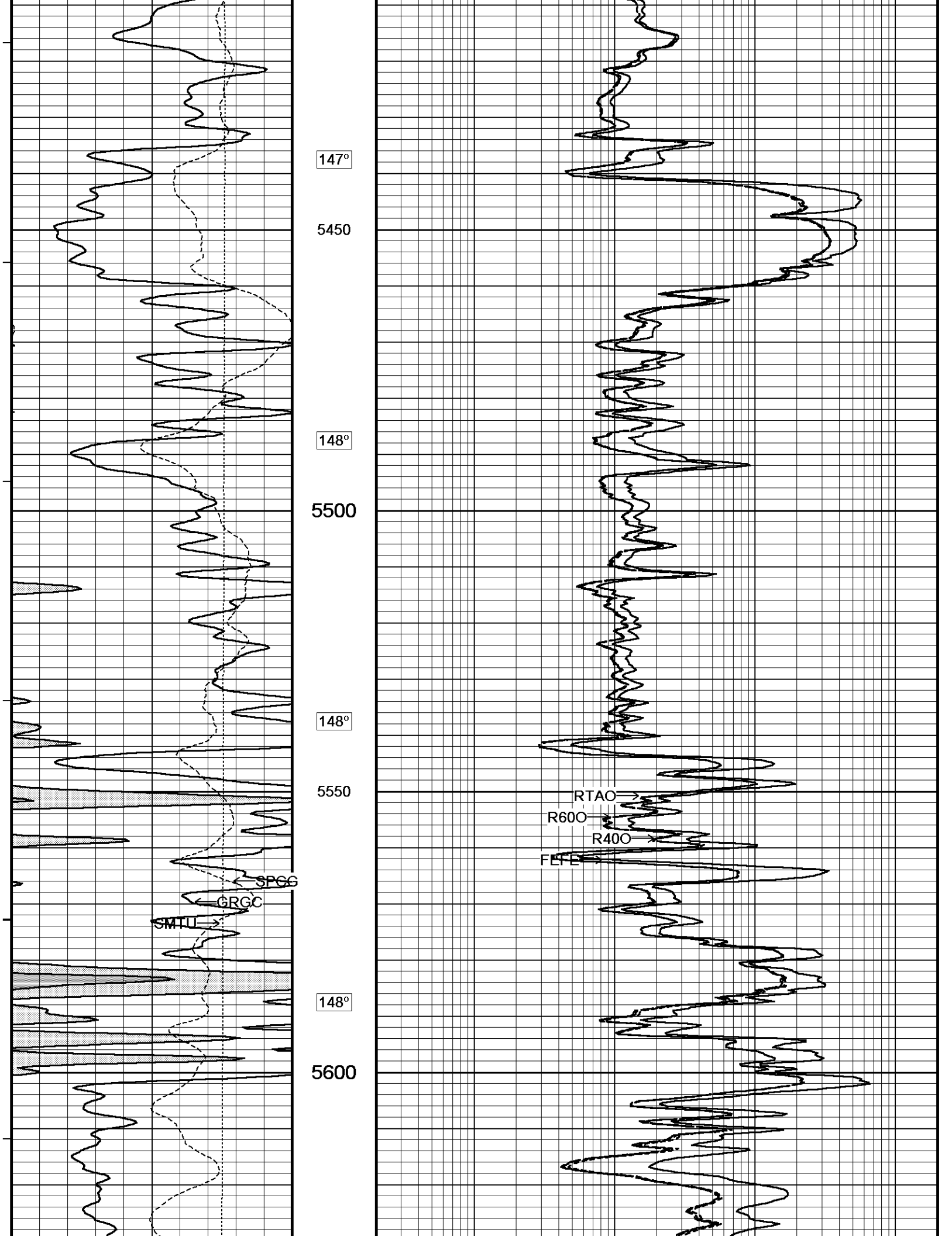
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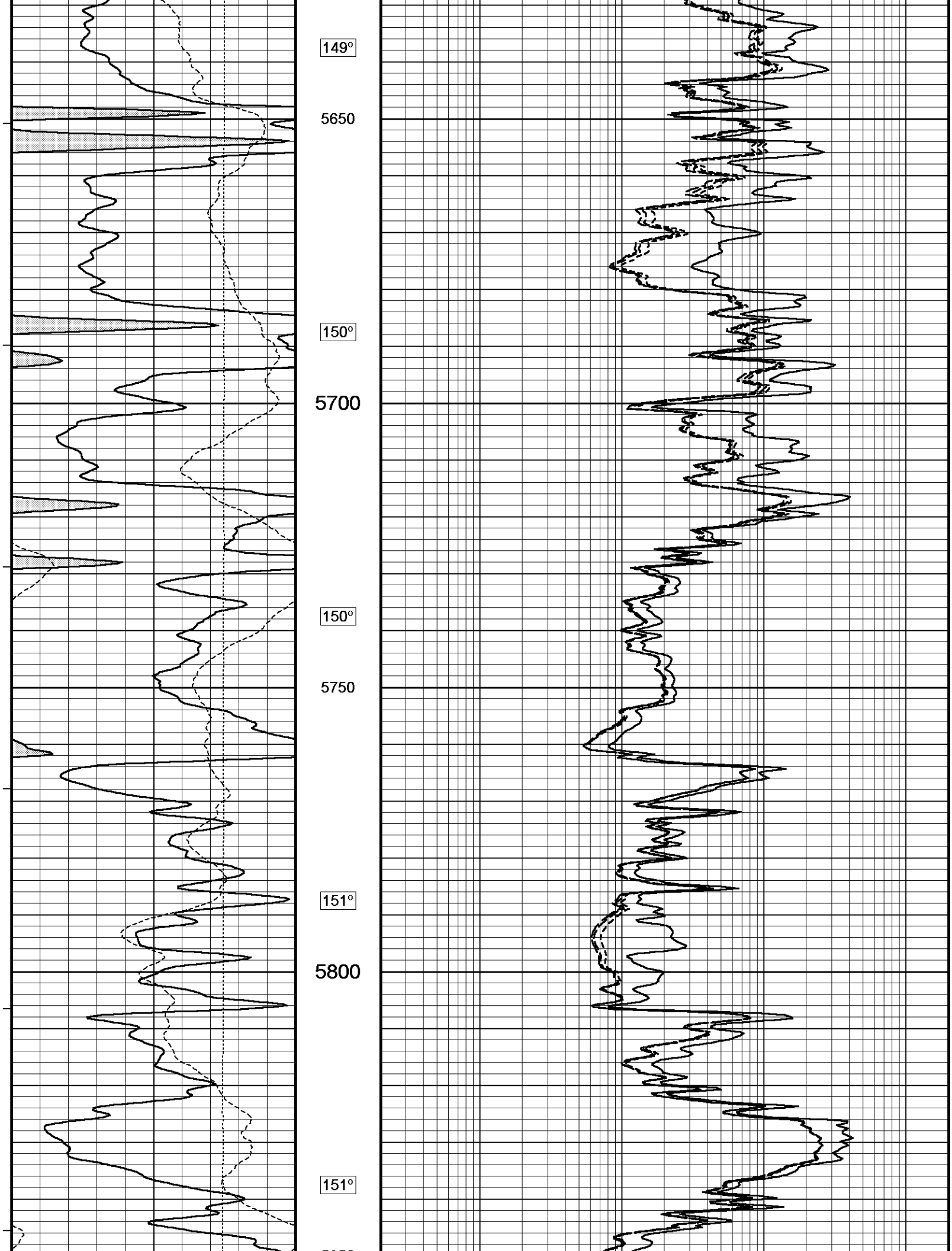
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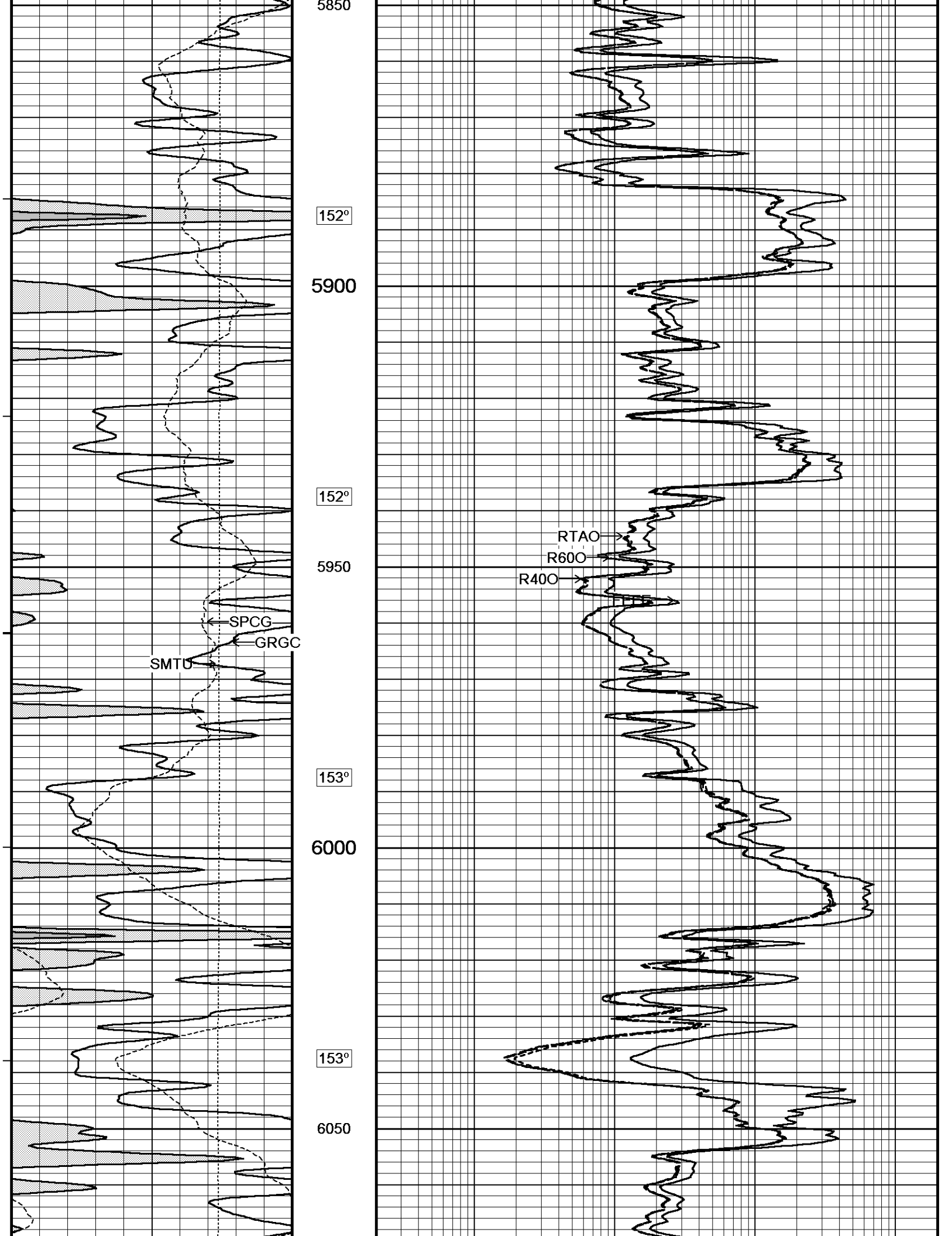
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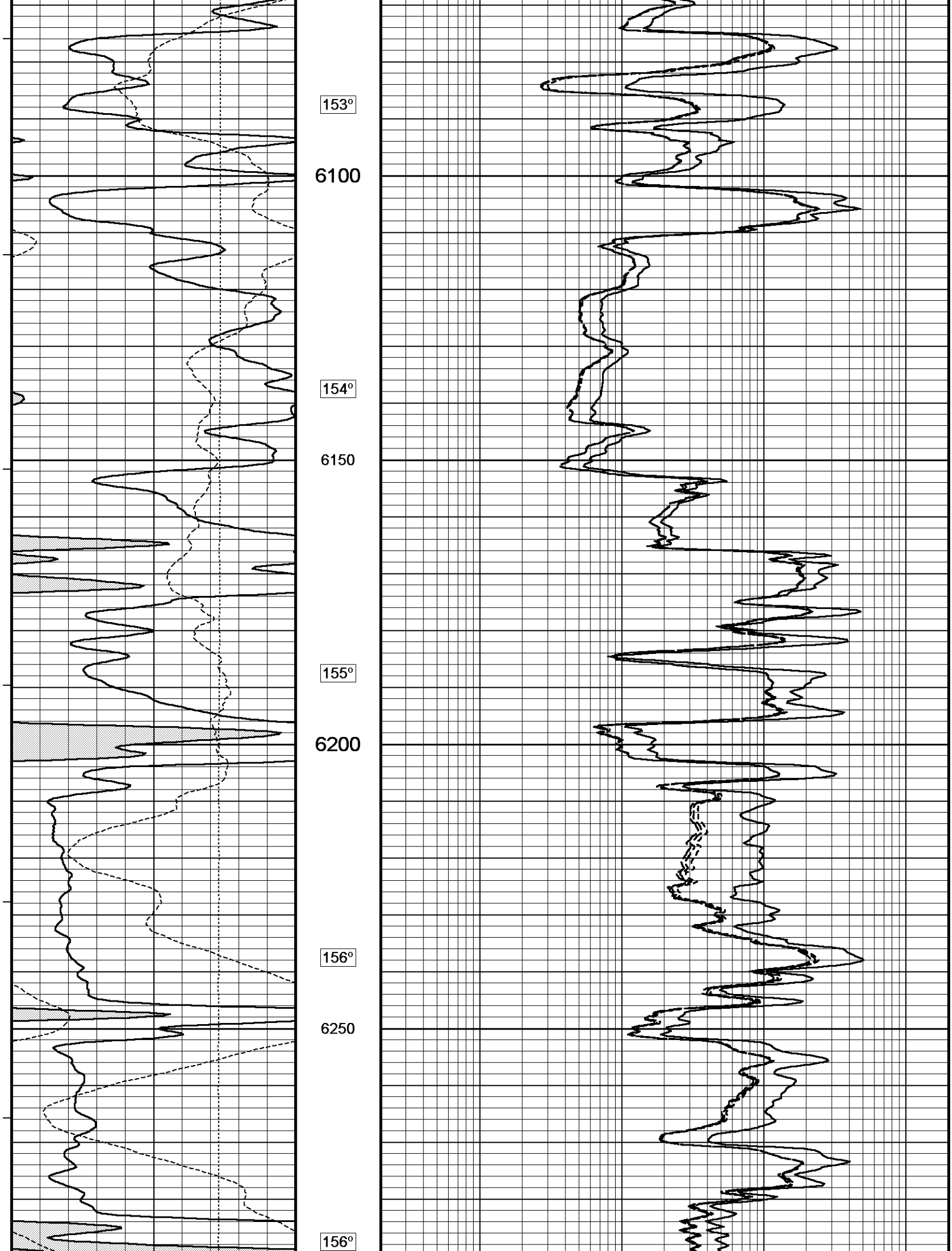
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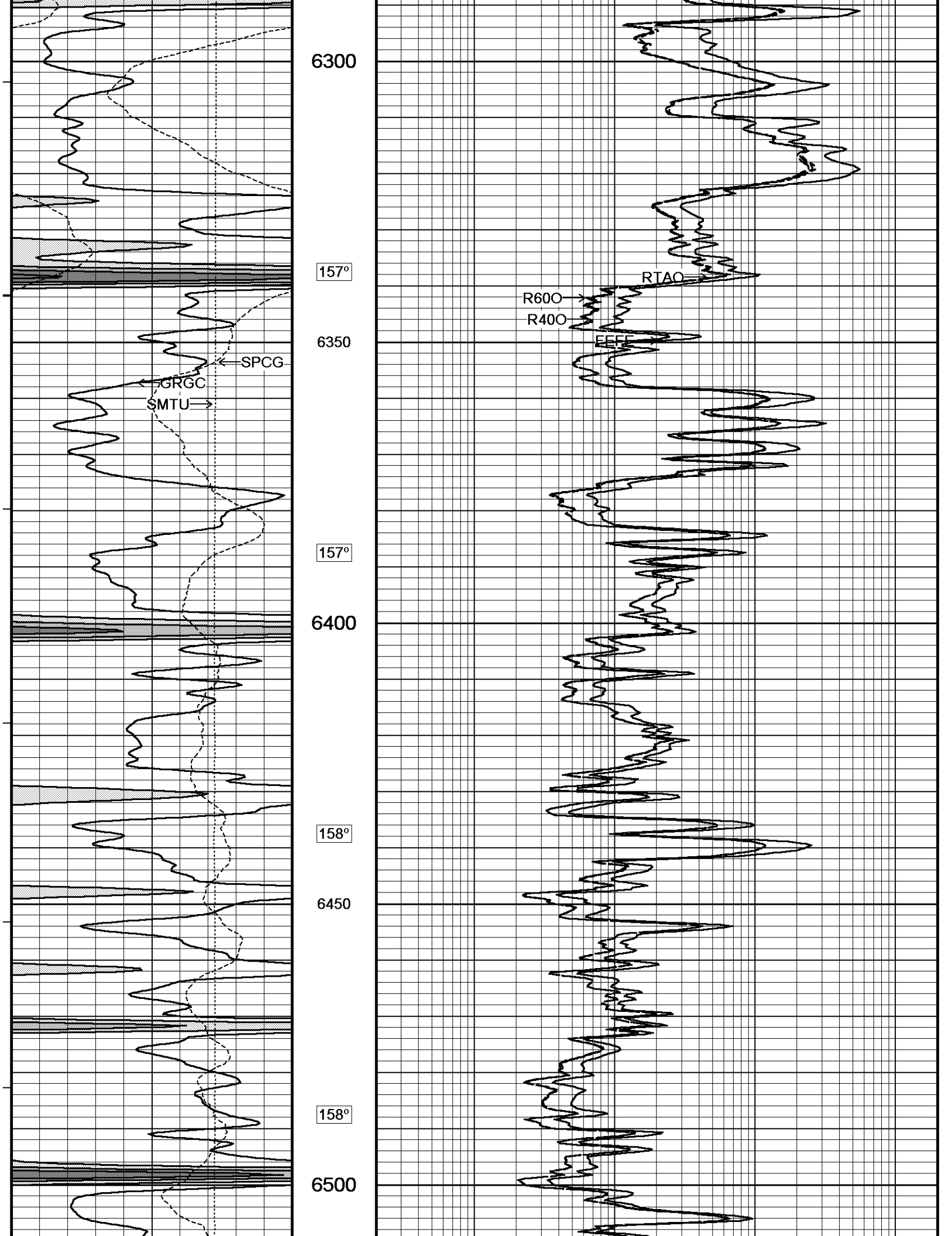
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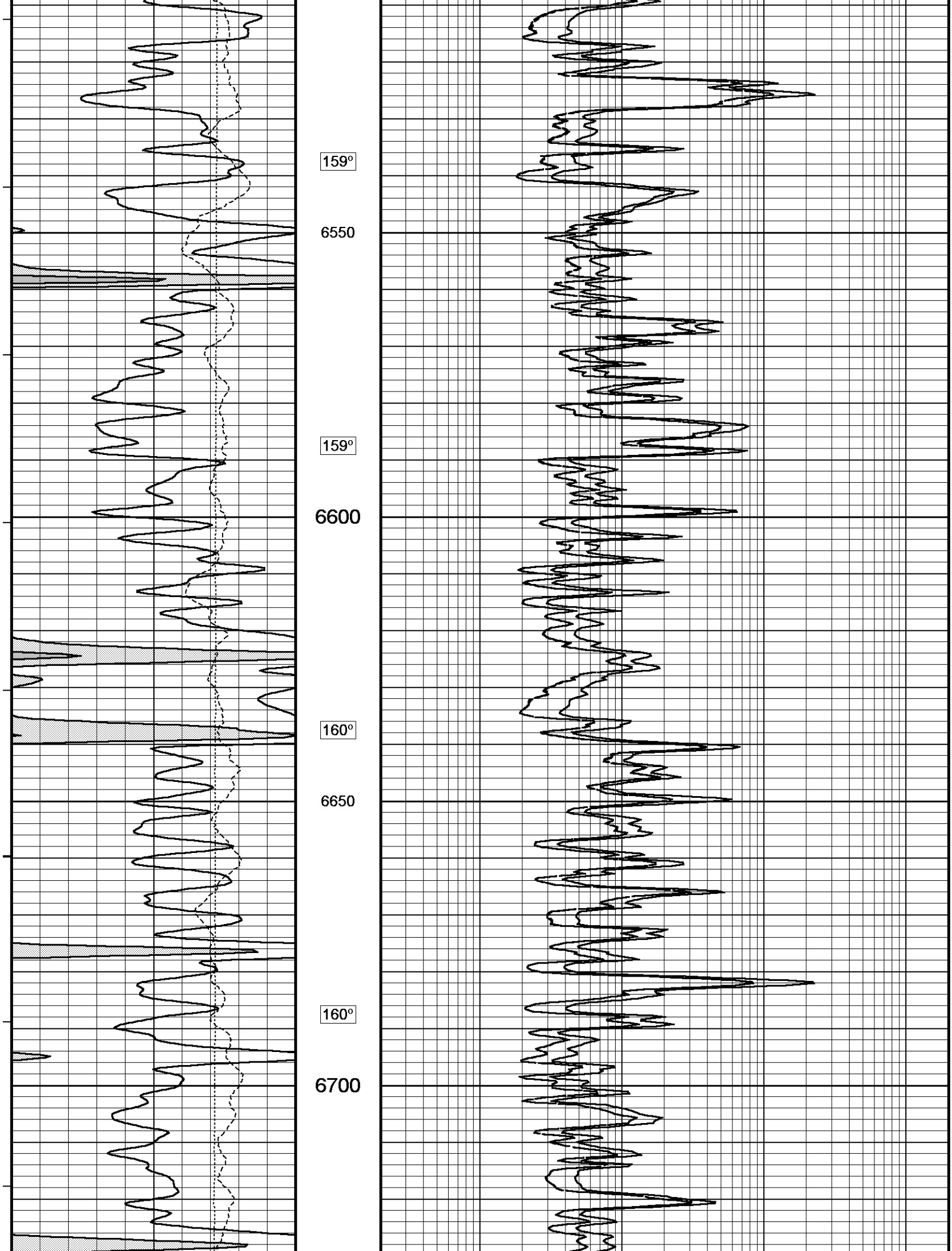
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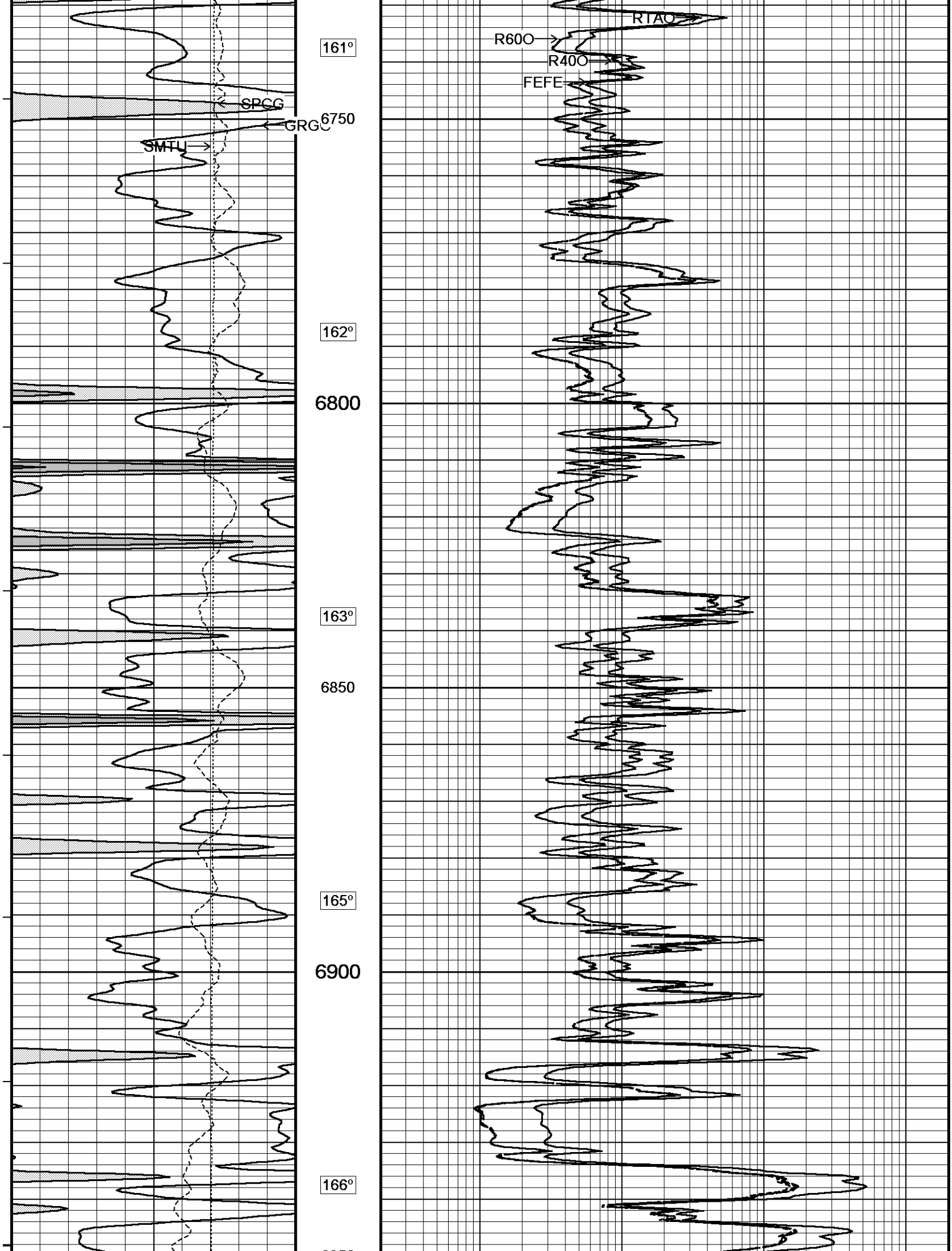
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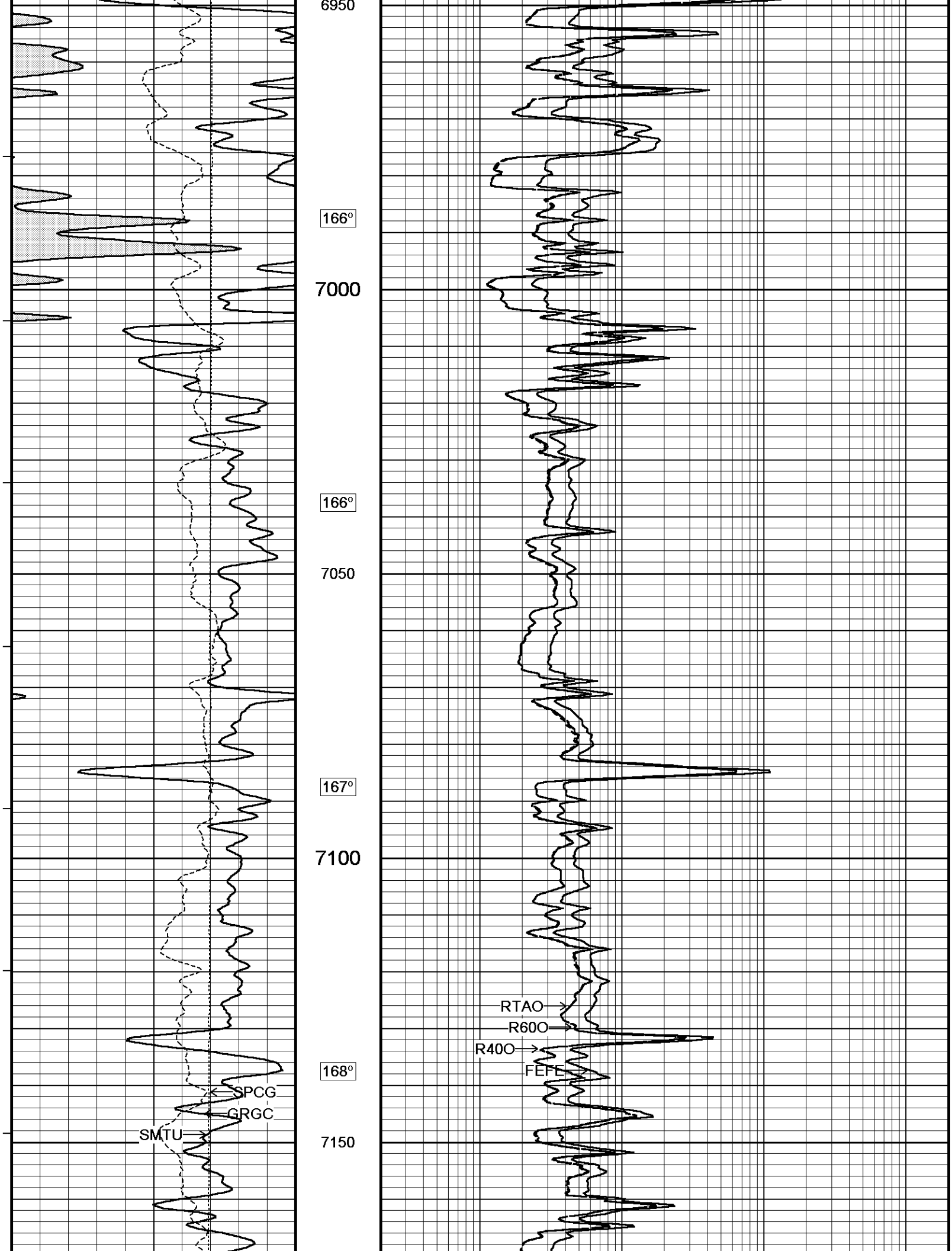
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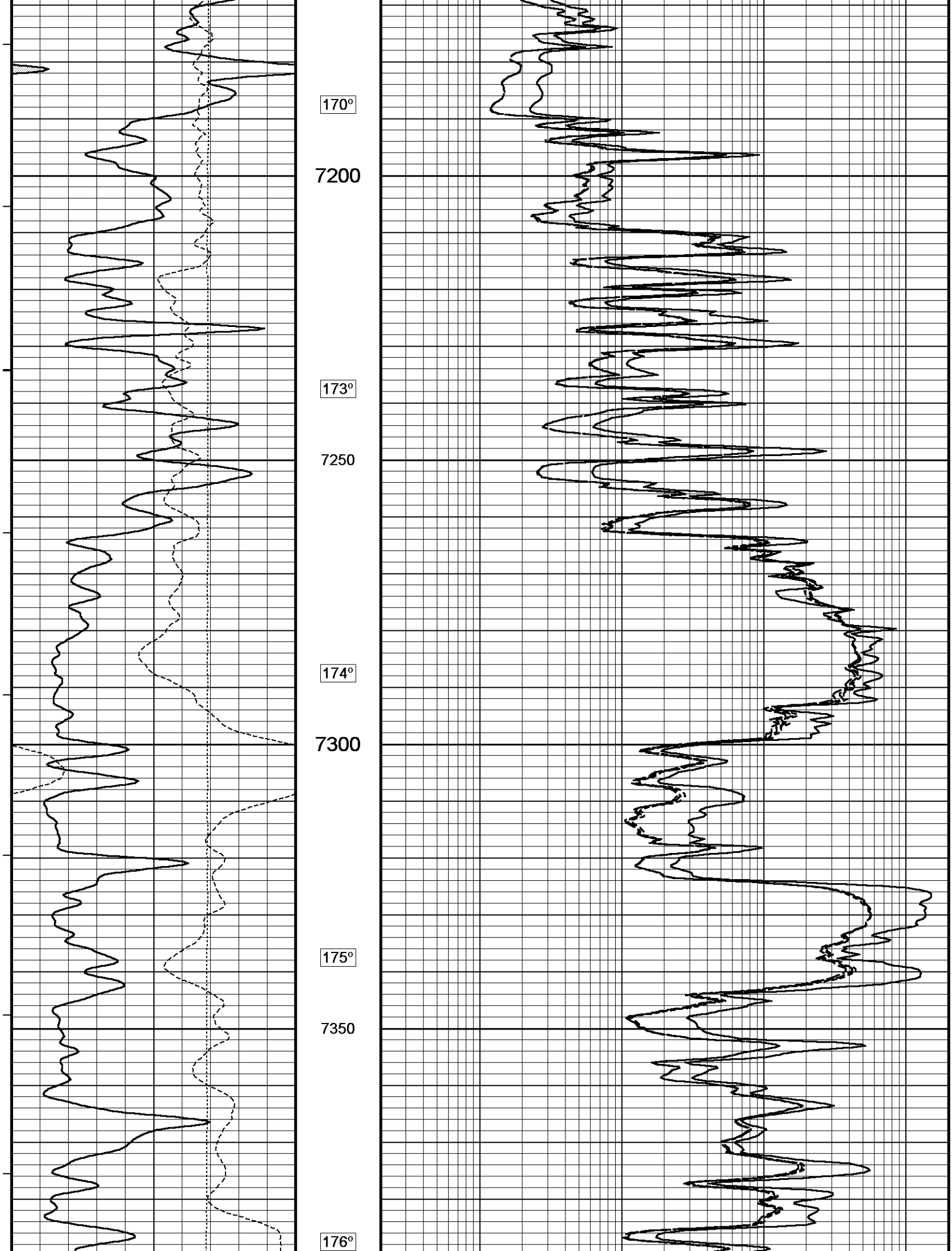
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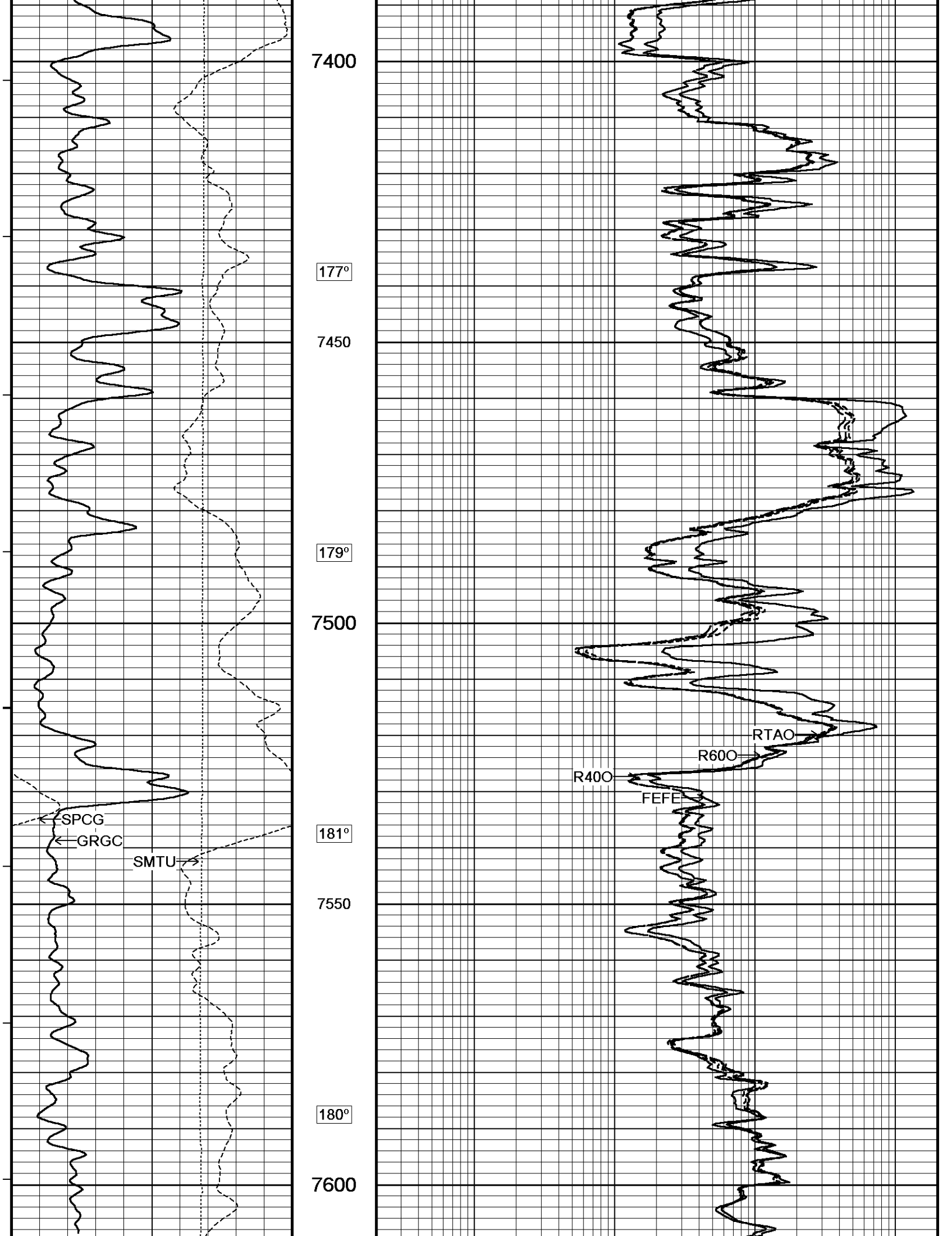
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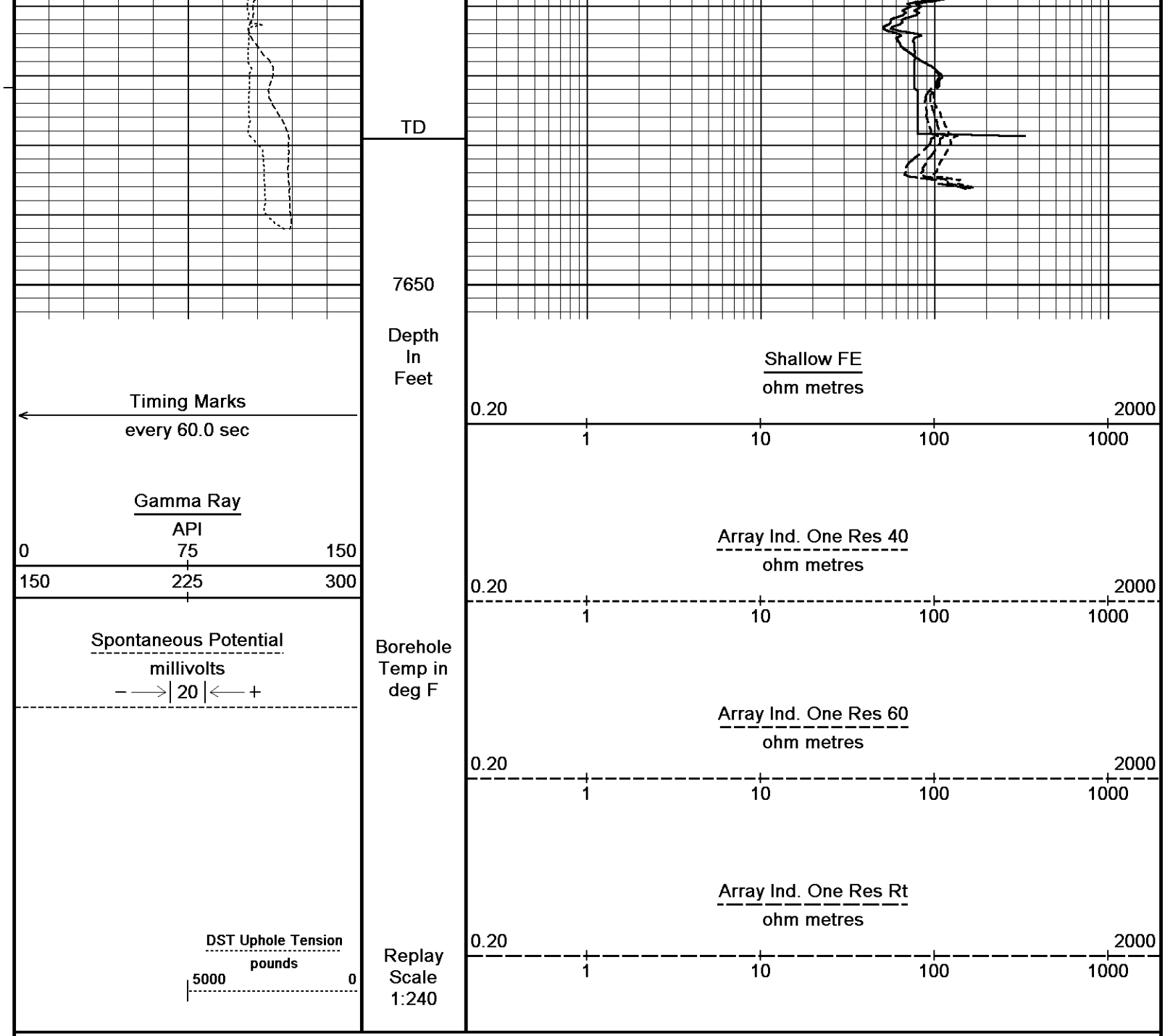


Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 12-DEC-2015 23:07
Filename: C:\Data\Unit James 1-8\James 1-8 Main.dta
Recorded on 5 Inch Main Pass
System Versions: Plotted with 15.03.5939

5 INCH MAIN - ANHYDRITE SECTION

BEFORE SURVEY CALIBRATION

C:\Data\Unit James 1-8\James 1-8 Main.dta

General Constants All 000

Last Edited on 12-DEC-2015,10:57

General Parameters		
Mud Resistivity	1.920	ohm-metres
Mud Resistivity Temperature	56.000	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	None	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches

Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	None	

Rwa Parameters

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

Gamma Calibration MCG-D.K 431

Field Calibration on 08-DEC-2015,11:44

	Measured	Calibrated (API)
Background	98	65
Calibrator (Gross)	1135	761
Calibrator (Net)	1037	696

Gamma Calibration Tolerances MCG-D.K 431

Ratio	1.490	1.40 1.475 1.55	Counts/API

Gamma Constants MCG-D.K 431

Last Edited on 12-DEC-2015,04:33

Gamma Calibrator Number	696	
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-D.K 431

Field Calibration on 08-DEC-2015,11:34

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 431

Last Edited on 31-JUL-2014,11:55

Pre-filter Length	11

FE Calibration MFE-C.A 396

Base Calibration on 08-DEC-2015 10:23
Field Check on 08-DEC-2015 10:31

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	971.8	126.8
Base Check		278.8
Field Check		278.8

FE Calibration Tolerances MFE-C.A 396

Reference 2	971.8	-3% 980.0 +3%	ohm
Base Check	278.8	-2% 277.0 +2%	ohm-m
Field Check	278.8	-2% 278.8 +2%	ohm-m

FE Constants MFE-C.A 396

Last Edited on 12-DEC-2015,04:39

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 455

Base Calibration on 08-DEC-2015,10:15
Field Check on 08-DEC-2015 10:16

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	15.6	443.7	9.3	966.2
2	5.7	362.1	7.6	821.4
3	4.0	249.3	5.2	566.0
4	1.5	129.4	2.6	279.2
Array Temperature		73.8	Deg F	

Test Loop Calibration Verified

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High	
1			-3.5	2178.1	
2			14.6	1989.0	
3			13.1	1699.4	
4			10.9	1140.0	
Deep			7.2	1085.5	
Medium			20.2	2255.9	
Shallow			22.9	2973.8	
Array Temperature		0.0		54.6	Deg F

Induction Calibration Tolerances MAI-C.A 455

Low Conductivity 1	15.6	13.0 17.0 21.0	mmho/m	High Conductivity 1	443.7	430.0 475.0 520.0	mmho/m
Low Conductivity 2	5.7	4.5 6.0 7.5	mmho/m	High Conductivity 2	362.1	345.0 385.0 425.0	mmho/m
Low Conductivity 3	4.0	1.0 3.5 6.0	mmho/m	High Conductivity 3	249.3	240.0 260.0 280.0	mmho/m
Low Conductivity 4	1.5	0.0 2.0 4.0	mmho/m	High Conductivity 4	129.4	120.0 135.0 150.0	mmho/m
Background Vx 1	0.0	-110.0 -32.5 45.0	mmho/m	Phase Check Loop 1	0.0	-2.0 0.0 2.0	%
Background Vx 2	0.0	-35.0 20.0 75.0	mmho/m	Phase Check Loop 2	0.0	-2.0 0.0 2.0	%
Background Vx 3	0.0	-60.0 2.5 65.0	mmho/m	Phase Check Loop 3	0.0	-2.0 0.0 2.0	%
Background Vx 4	0.0	-50.0 -17.5 15.0	mmho/m	Phase Check Loop 4	0.0	-2.0 0.0 2.0	%

Induction Constants MAI-C.A 455

Last Edited on 08-DEC-2015,10:17

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	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	0.7500	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	
Squasher Start	0.0050	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:\Data\Unit James 1-8\James 1-8 Main.dta

Cablehead, 11 pin
CBH-C 217 LG: 2.40 ft WT: 24.3 lb OD: 2.240 in

11C-11B Compact Tool Adaptor
MTA-K.A 189 LG: 1.53 ft WT: 13.2 lb OD: 2.240 in

Compact Swivel Head Adaptor
SHA-J.A 450 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 431 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Neutron
MDN-C.A 480 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-C.J 434 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-C.A 396 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-C.A 455 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 46.41 ft Weight: 361.6 lb

Tool Zero (0.13ft from bottom)

All measurements relative to tool zero.

COMPANY	UNIT PETROLEUM COMPANY
WELL	JAMES #1-2
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN

PROVINCE/COUNTY	LINCOLN	
COUNTRY/STATE	USA / COLORADO	

Elevation Kelly Bushing	5138.00	feet	First Reading		feet
Elevation Drill Floor	5136.00	feet	Depth Driller	7635.00	feet
Elevation Ground Level	5123.00	feet	Depth Logger	7629.00	feet

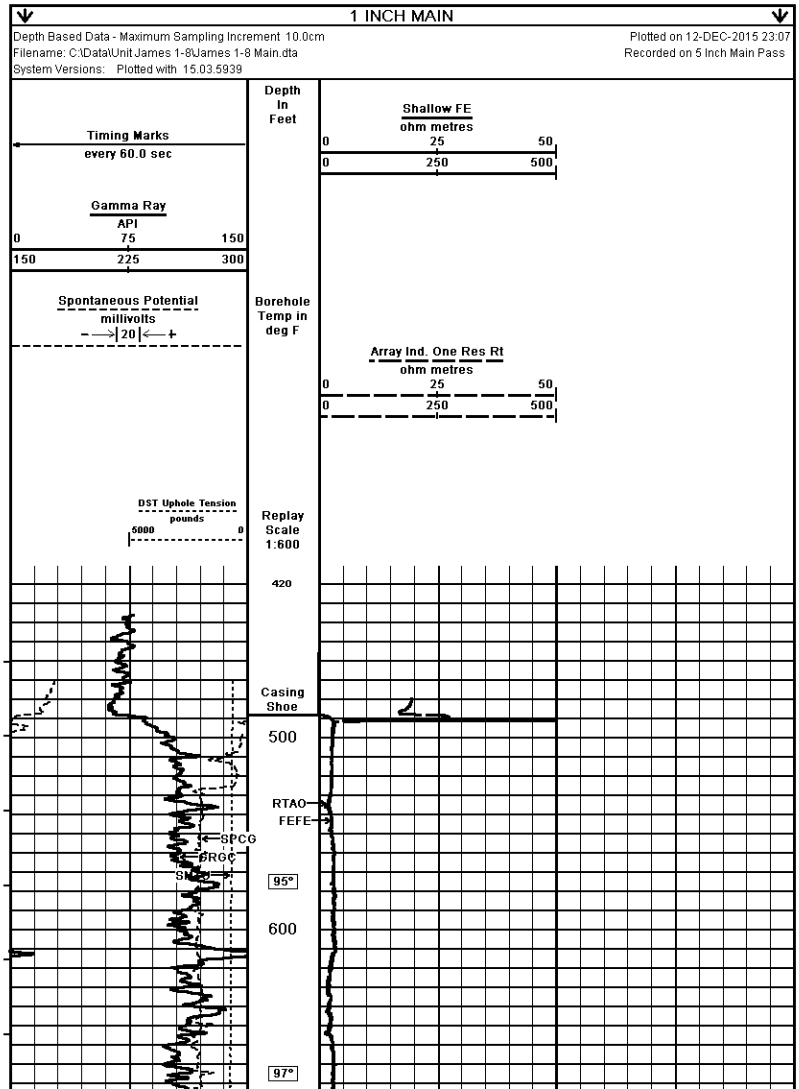
Weatherford®

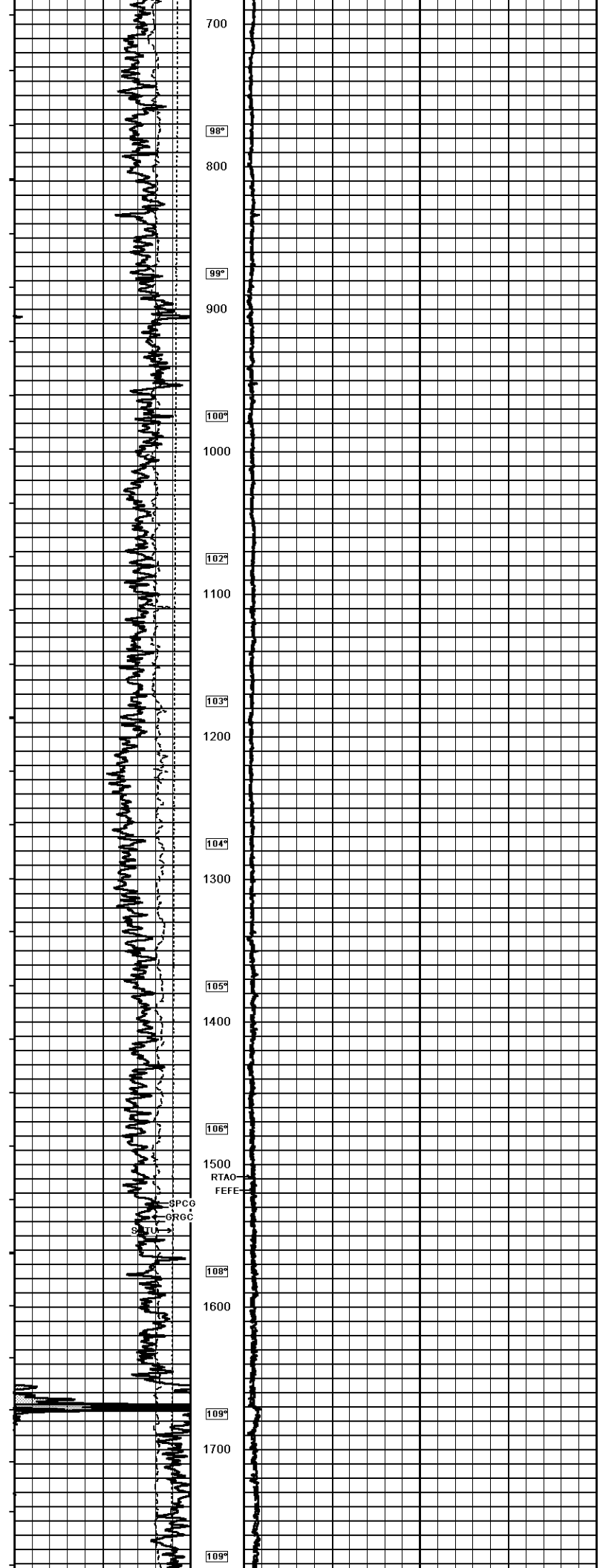
ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY	UNIT PETROLEUM COMPANY
WELL	JAMES #1-2
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	USA / COLORADO
LOCATION	1980' FNL & 1980' FWL SE-NW
SEC 2 TWP 15S RGE 55W	Other Services
Latitude	38.772690
Longitude	-103.527090
API Number	05-073-06713
Permanent Datum GL, Elevation 5123 feet	Elevations: feet
Log Measured From KB	KB 5138.00
Drilling Measured From KB	DF 5136.00
	GL 5123.00
Date	07-DEC-2015
Run Number	ONE
Service Order	7055-137049030
Depth Driller	7635.00 feet
Depth Logger	7629.00 feet
First Reading	---
Last Reading	---
Casing Driller	490.00 feet
Casing Logger	488.00 feet
Bit Size	7.875 inches
Hole Fluid Type	WBM
Density/Viscosity	9.40 lb/USg 55.00 sec/qt
PH/Fluid Loss	8.60 5.20 ml/30Min
Sample Source	MUD TANK
Rm @ Measured Temp	1.92 @ 56.0 ohm-m
Rmf @ Measured Temp	1.536 @ 56.0 ohm-m
Rmc @ Measured Temp	2.304 @ 56.0 ohm-m
Source Rmf/Rmc	CALC CALC
Rm @ BHT	0.62 @181.0 ohm-m
Time Since Circulation	4 HOURS
Max Recorded Temp	181.00 deg F
Equipment/ Base	14343 OKC
Recorded By	JUSTIN HICKS
Witnessed By	RICH BACON

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

LARRY MILLER

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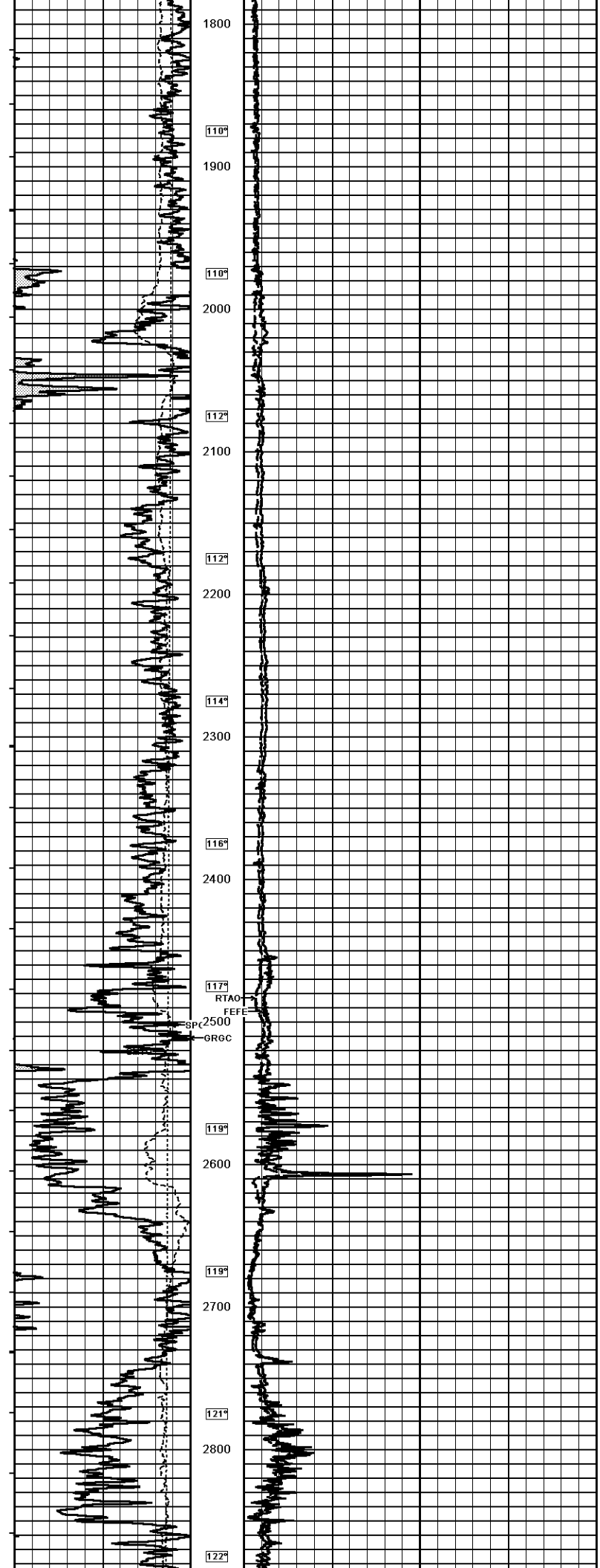
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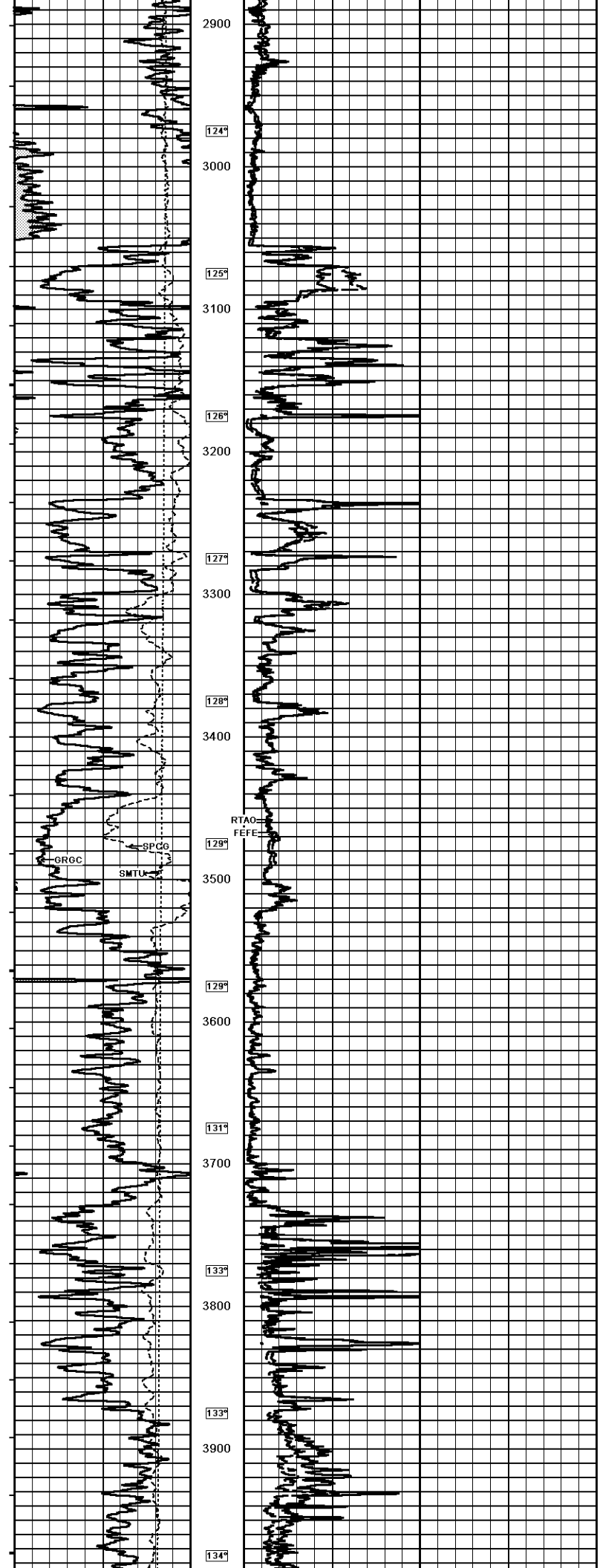
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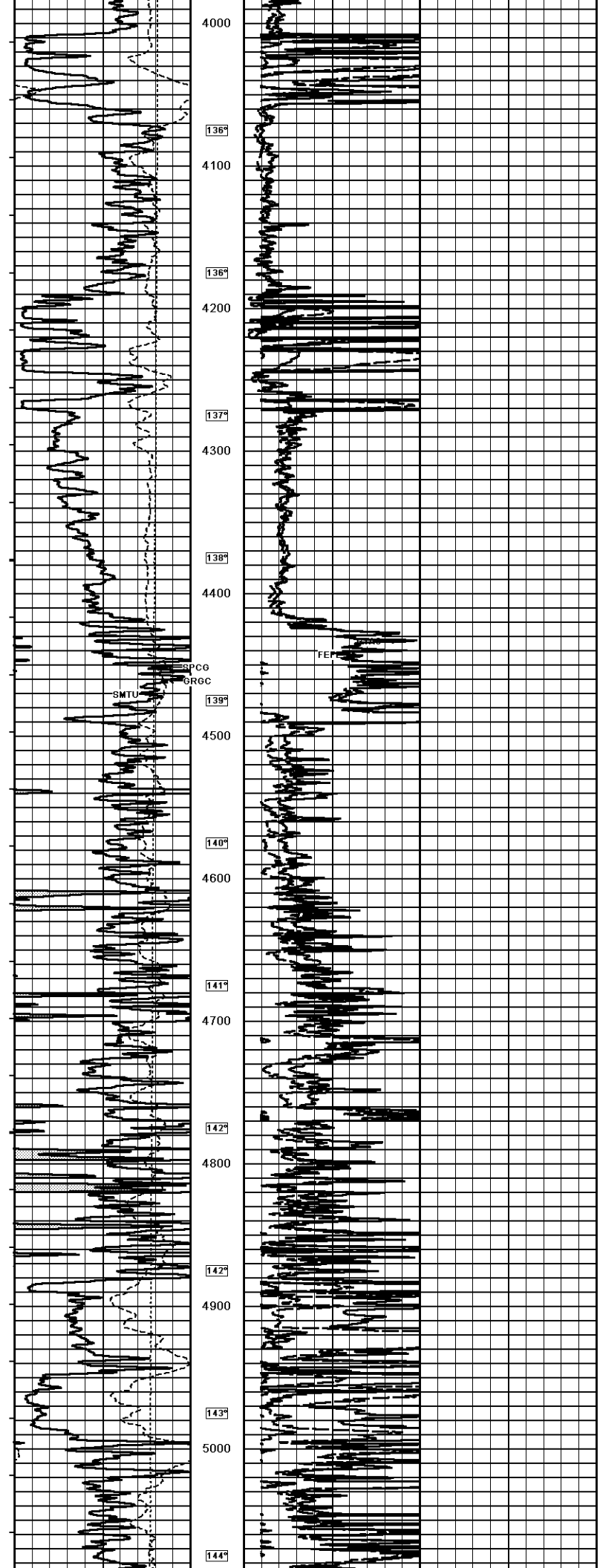
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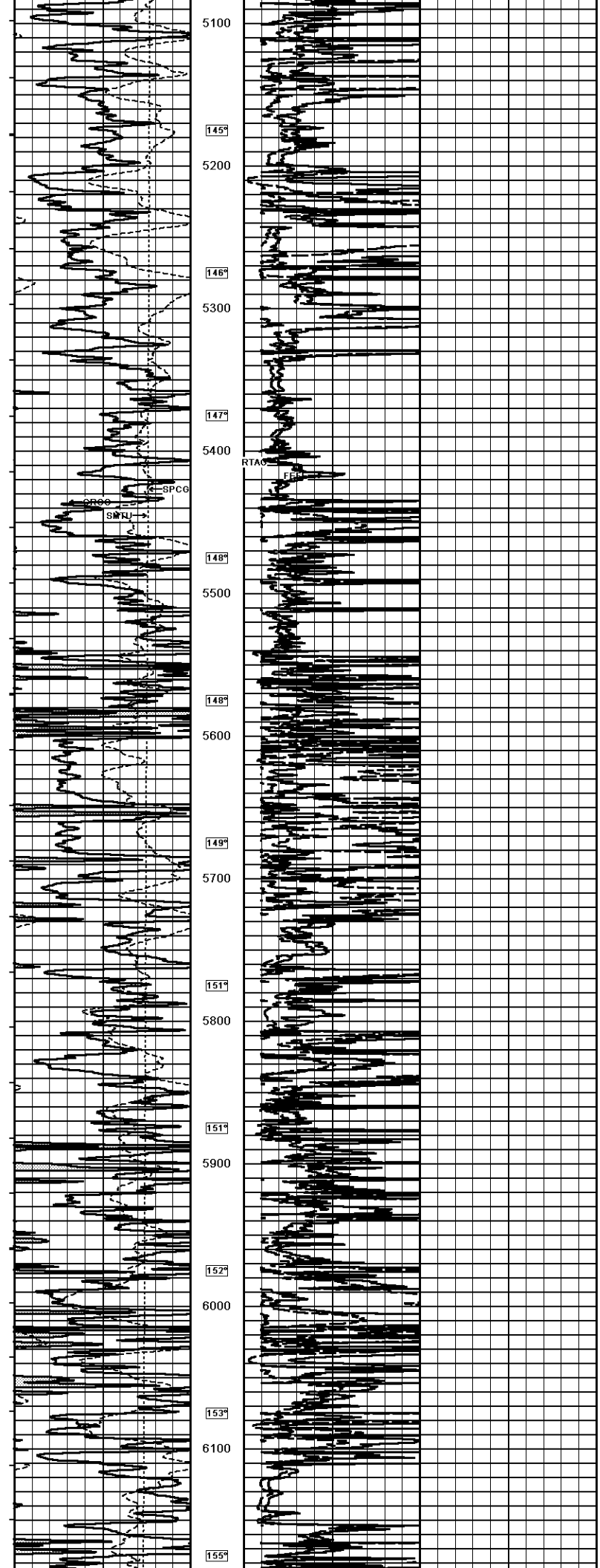
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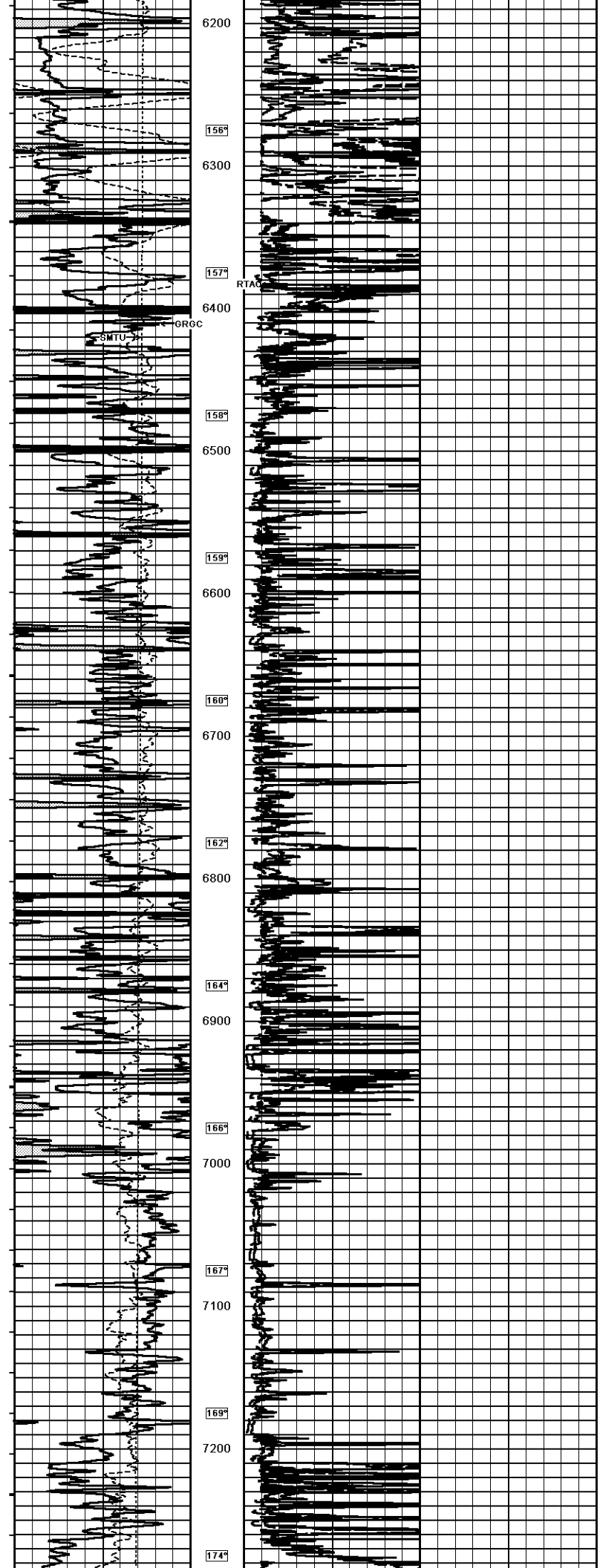
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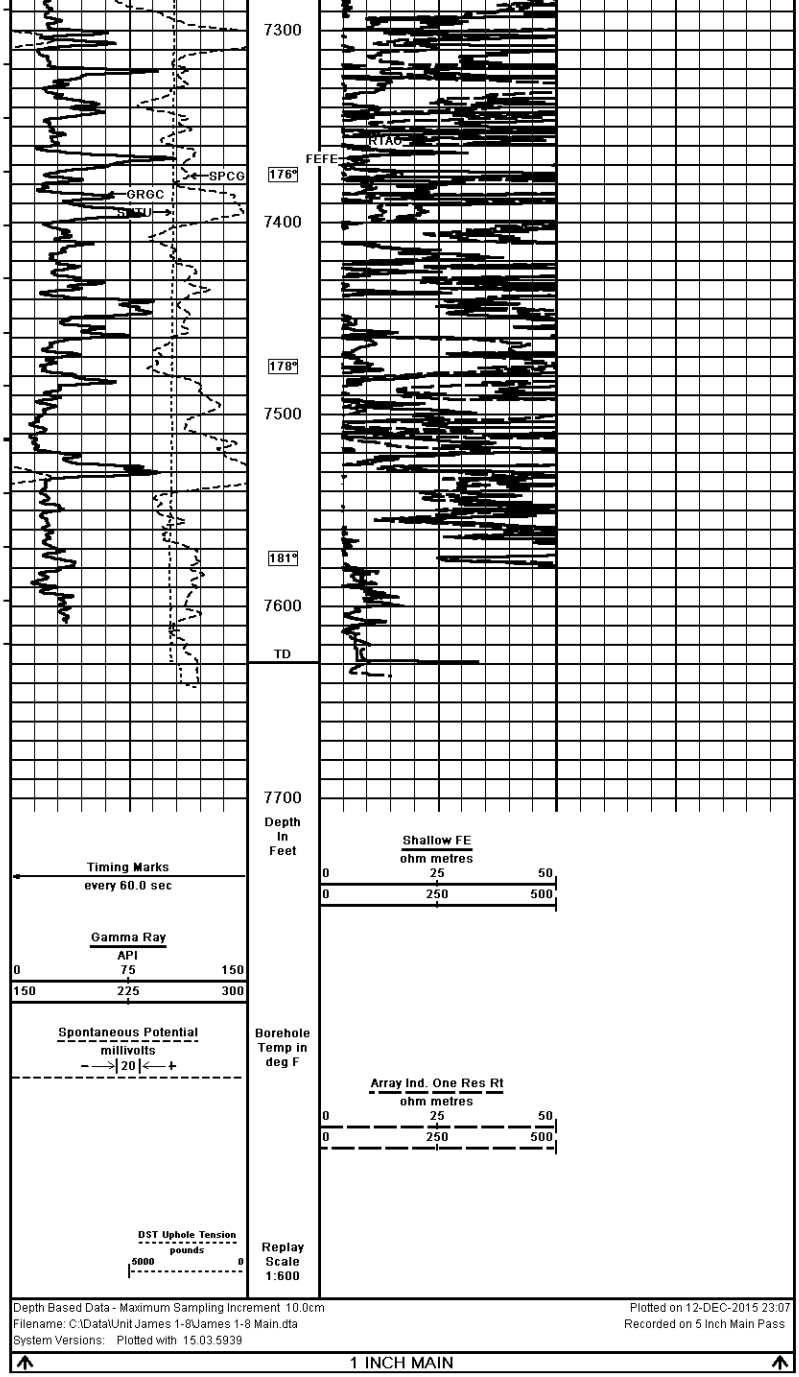

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Data\Unit James 1-8\James 1-8 Main.dta
System Versions: Plotted with 15.03.5939

Plotted on 12-DEC-2015 23:07
Recorded on 5 Inch Main Pass

1 INCH MAIN

COMPANY	UNIT PETROLEUM COMPANY
WELL	JAMES #1-2
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	USA / COLORADO

Elevation Kelly Bushing	5138.00	feet	First Reading		feet
Elevation Drill Floor	5136.00	feet	Depth Driller	7635.00	feet
Elevation Ground Level	5123.00	feet	Depth Logger	7629.00	feet

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