



Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY		PETROSANTANDER (USA) INC.			
WELL		UNRUH #6			
FIELD		CHRISTABELLE (MORROW)			
PROVINCE/COUNTY		KEARNY			
COUNTRY/STATE		U.S.A. / KANSAS			
LOCATION		1305' FNL & 1285' FEL			
SEC 13	TWP 21S	RGE 35W	Other Services		MML
Latitude		MPD/MDN			
Longitude					
API Number		15-093-21925			
Permanent Datum GL, Elevation 3063 feet					
Log Measured From KB					
Drilling Measured From KB @ 12 FEET					Elevations: KB 3075.00 DF 3073.00 GL 3063.00
Date	23-AUG-2014				
Run Number	ONE				
Service Order	7960-95982809				
Depth Driller	4970.00				feet
Depth Logger	4966.00				feet
First Reading	4962.66				feet
Last Reading	523.00				feet
Casing Driller	520.00				feet
Casing Logger	523.00				feet
Bit Size	7.857				inches
Hole Fluid Type	WBM				
Density / Viscosity	9.30	lb/USg	43.00	CP	
PH / Fluid Loss	8.50		12.00	ml/30Min	
Sample Source	MUDPIT				
Rm @ Measured Temp	0.57 @ 75.0				ohm-m
Rmf @ Measured Temp	0.46 @ 75.0				ohm-m
Rmc @ Measured Temp	0.68 @ 75.0				ohm-m
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.37 @120.0				ohm-m
Time Since Circulation	4 HOURS				
Max Recorded Temp	123.00				deg F
Equipment / Base	13096		LIB		
Recorded By	DEREK CARTER				JAKE HINES
Witnessed By	WES HANSEN				
JOB #	LB14-247				

BOREHOLE RECORD			Last Edited: 23-AUG-2014 11:56	
Bit Size inches	Depth From feet		Depth To feet	
7.857	520.00		4970.00	
CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	520.00	24.00

REMARKS
- SOFTWARE ISSUE: WLS 13.08.2113
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION
- HARDWARE: MDN: DUAL BOWSPRING ECCENTRALIZER MFE: 1 X 0.5 INCH STANDOFF MAI: 2 X 0.5 INCH STANDOFF
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 2010 CU. FT.
- ANNUILLAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 1280 CU. FT.

- SERVICE ORDER #: 7960-95982809

- RIG: VAL #1

- ENGINEER: DEREK CARTER

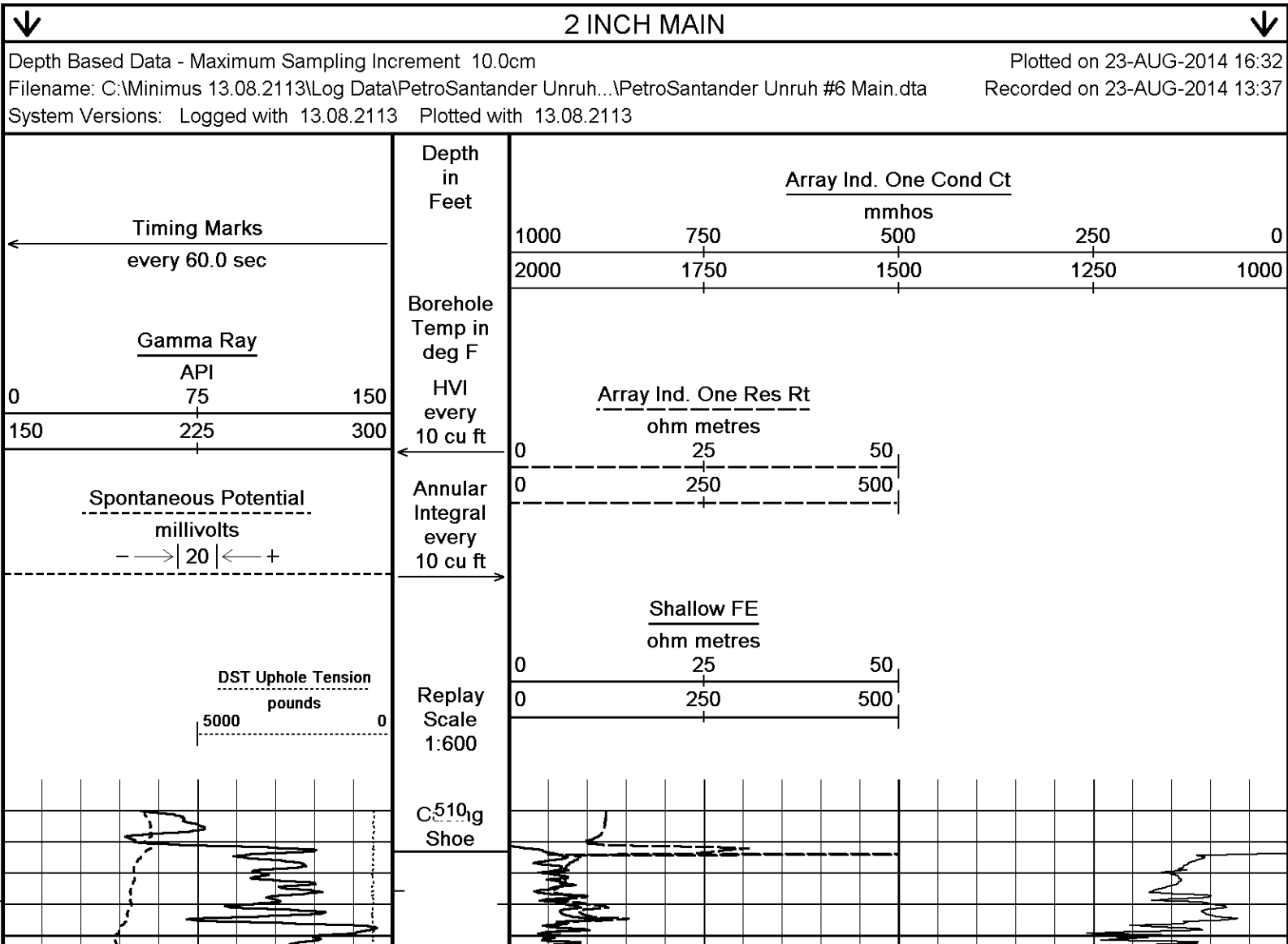
- JUNIOR FIELD ENGINEER: JAKE HINES

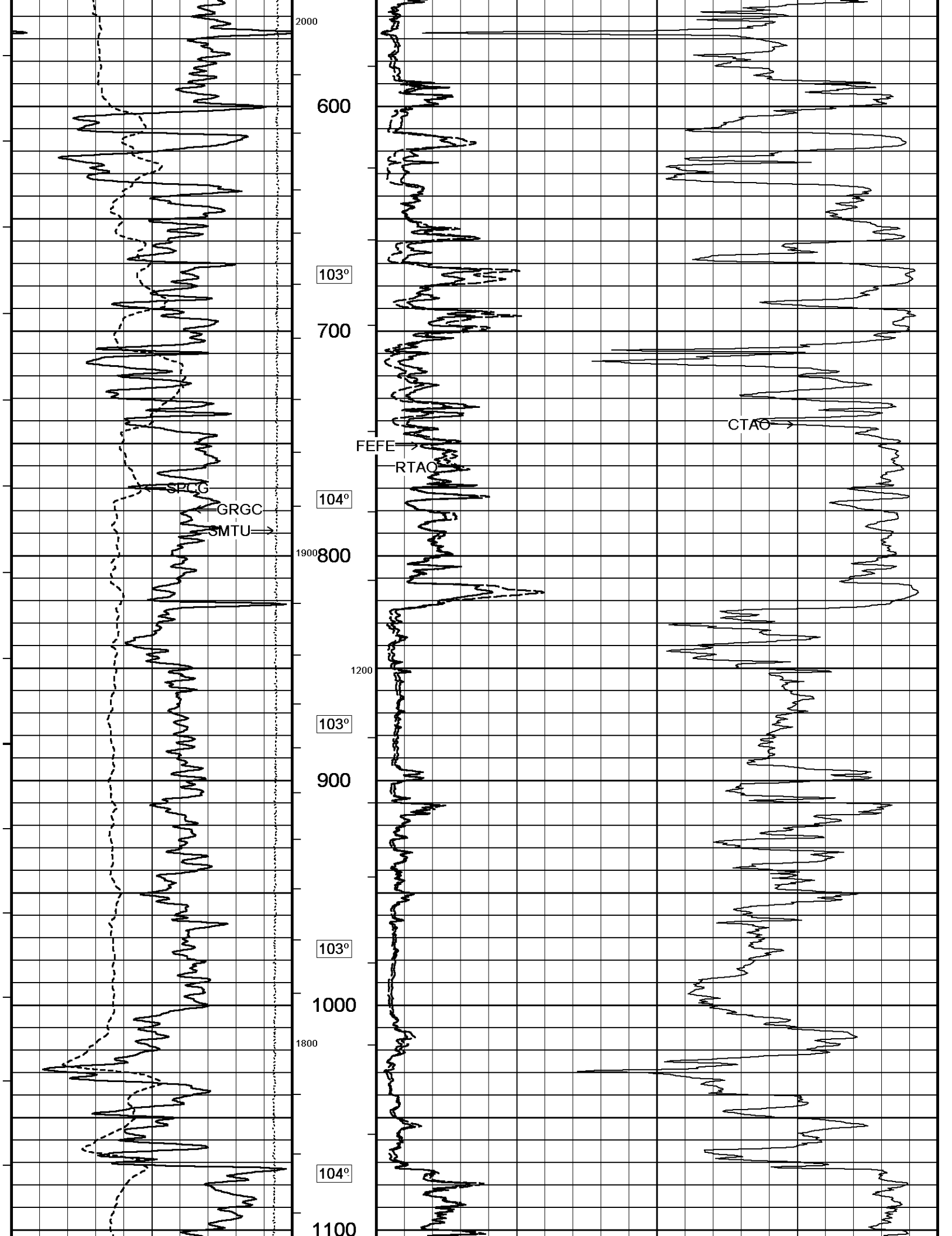
- OPERATOR: CARLOS RAMIREZ

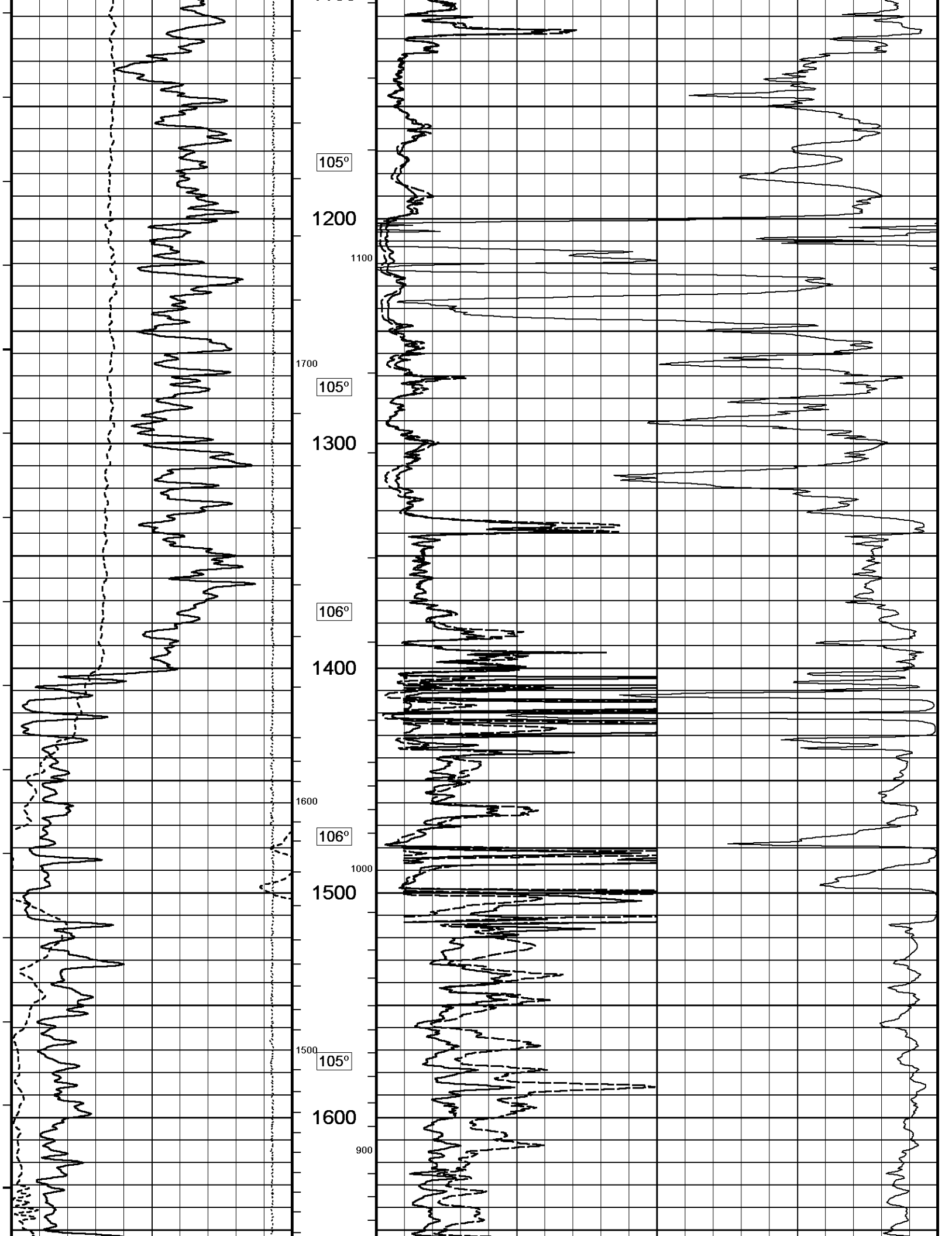
- HIT LEDGE WHILE RIH AT 1481 FT.; PULLED OF AND WORKED PAST WITH NO FURTHER PROBLEMS

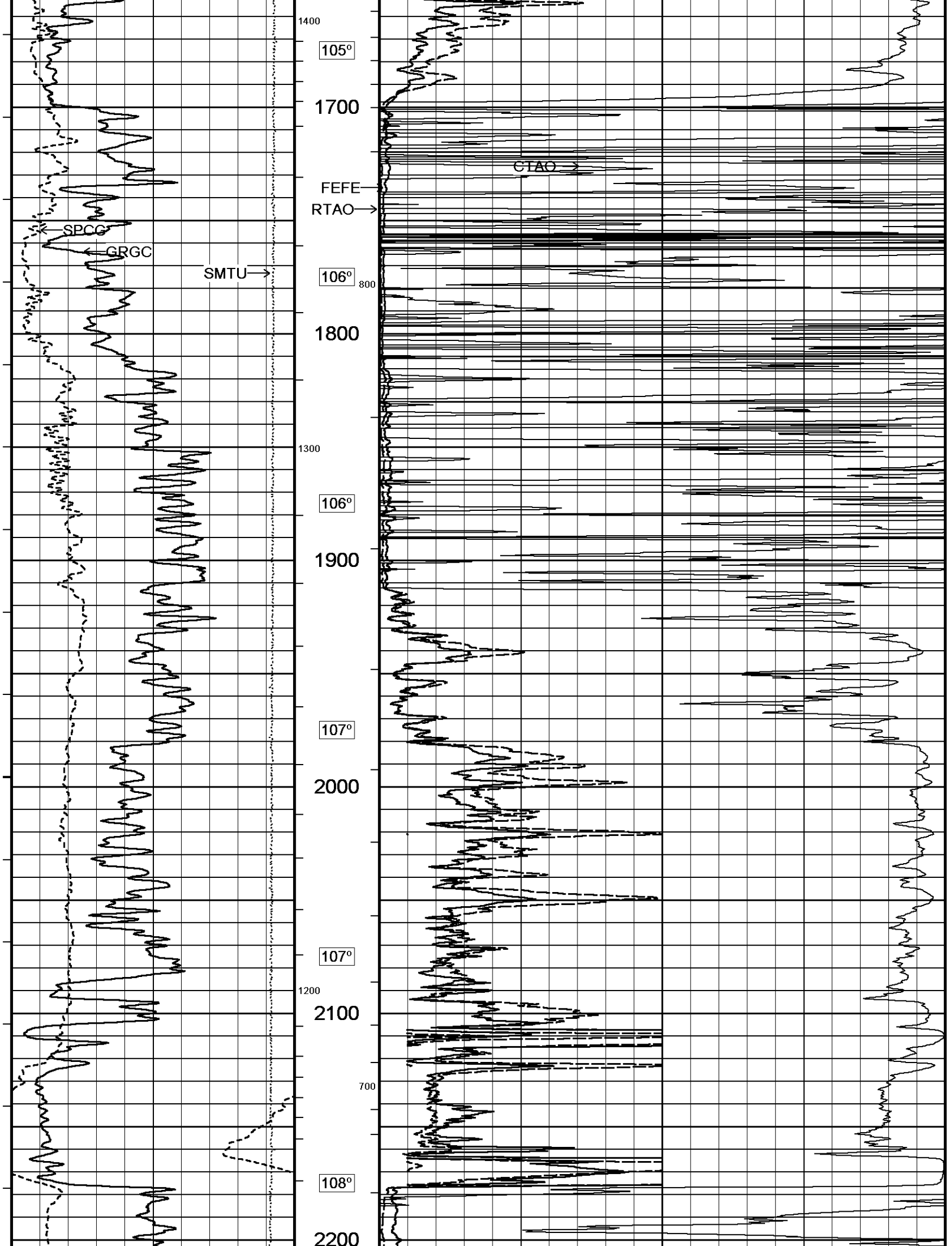
- SP CURVE APPEARS TO HAVE ERRATIC NOISE AT INTERVALS BUT CLEANS UP AT TIMES; LIKELY CAUSE IS DUE TO LARGE AMOUNT OF PRODUCTION MACHINERY NEAR LOCATION

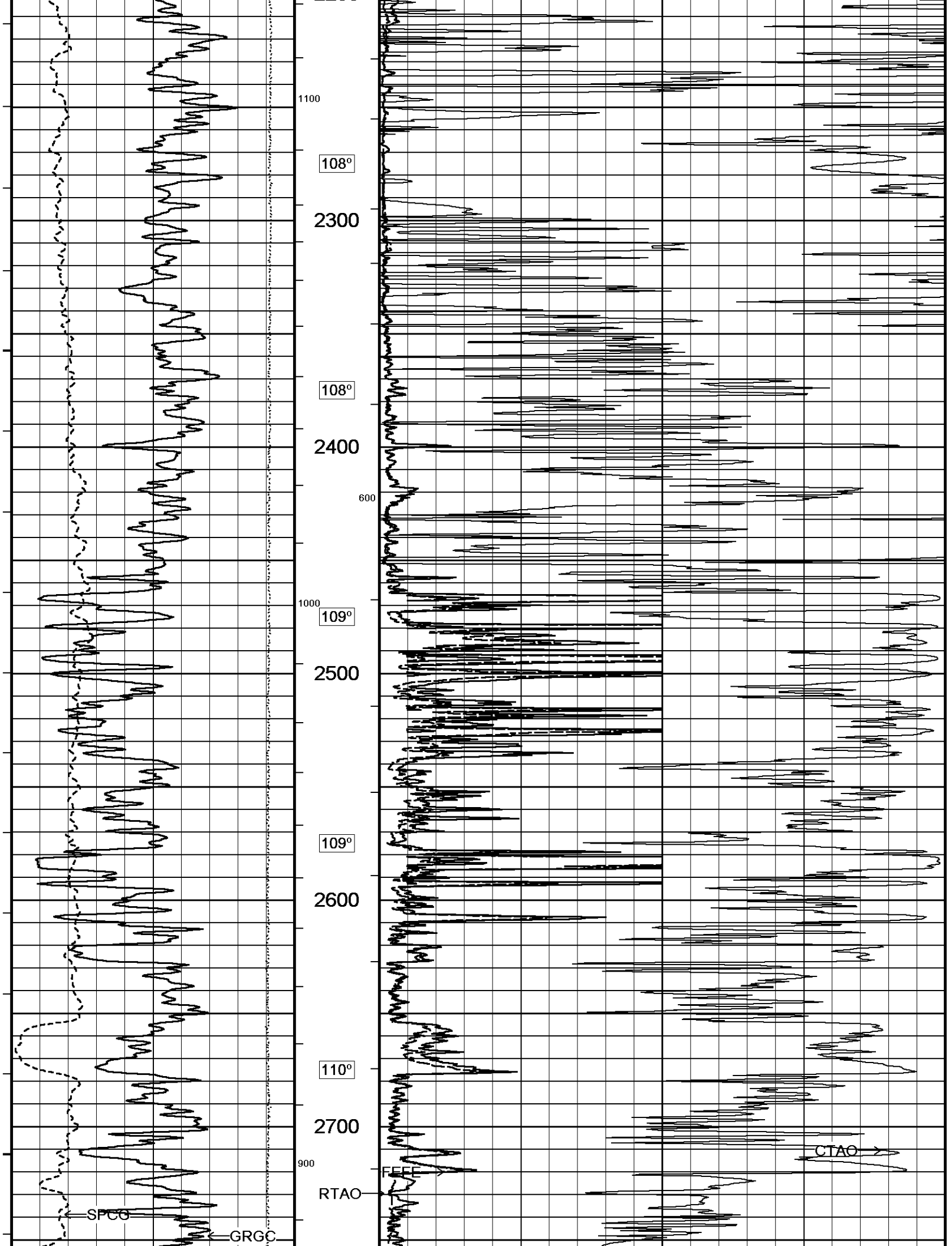
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

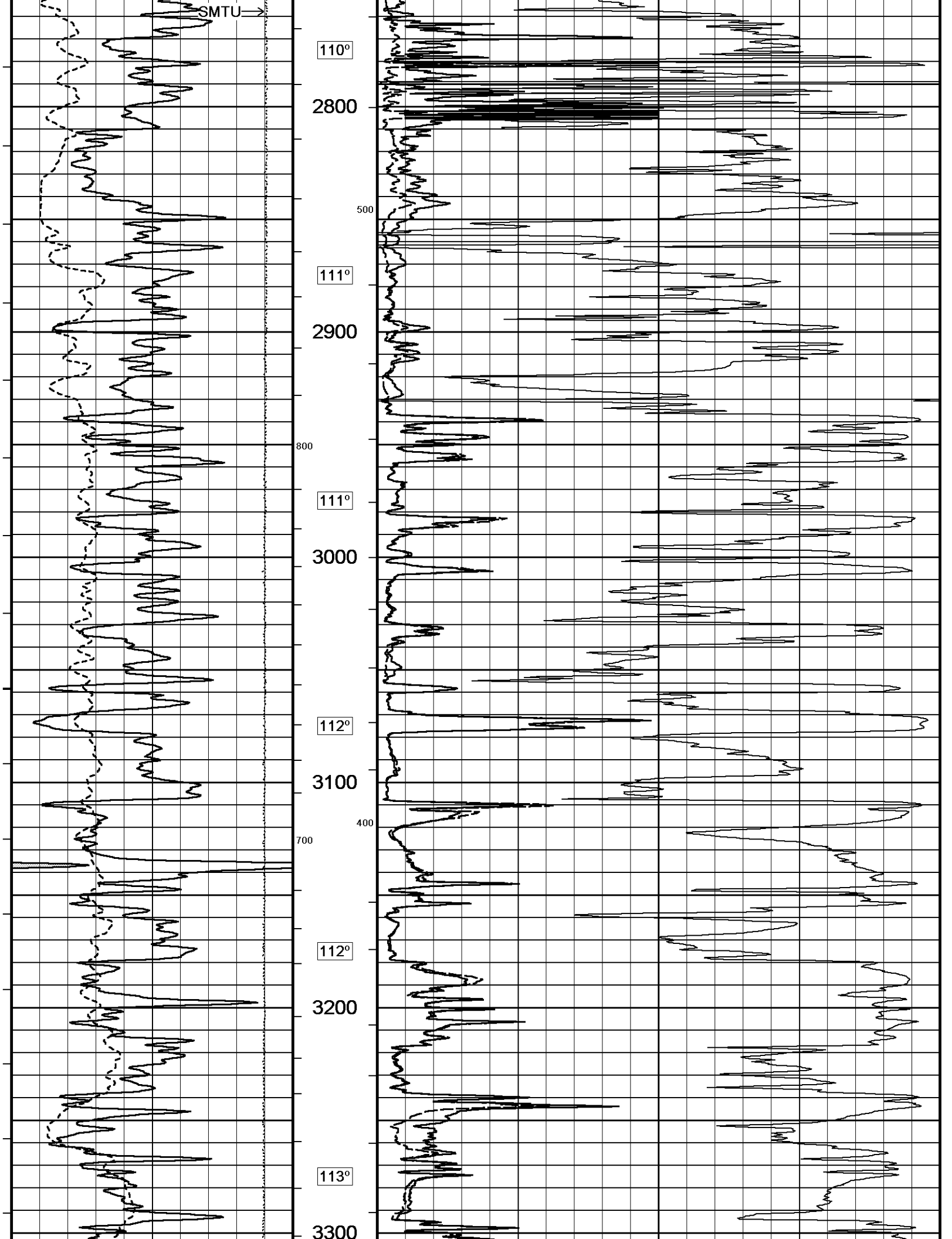


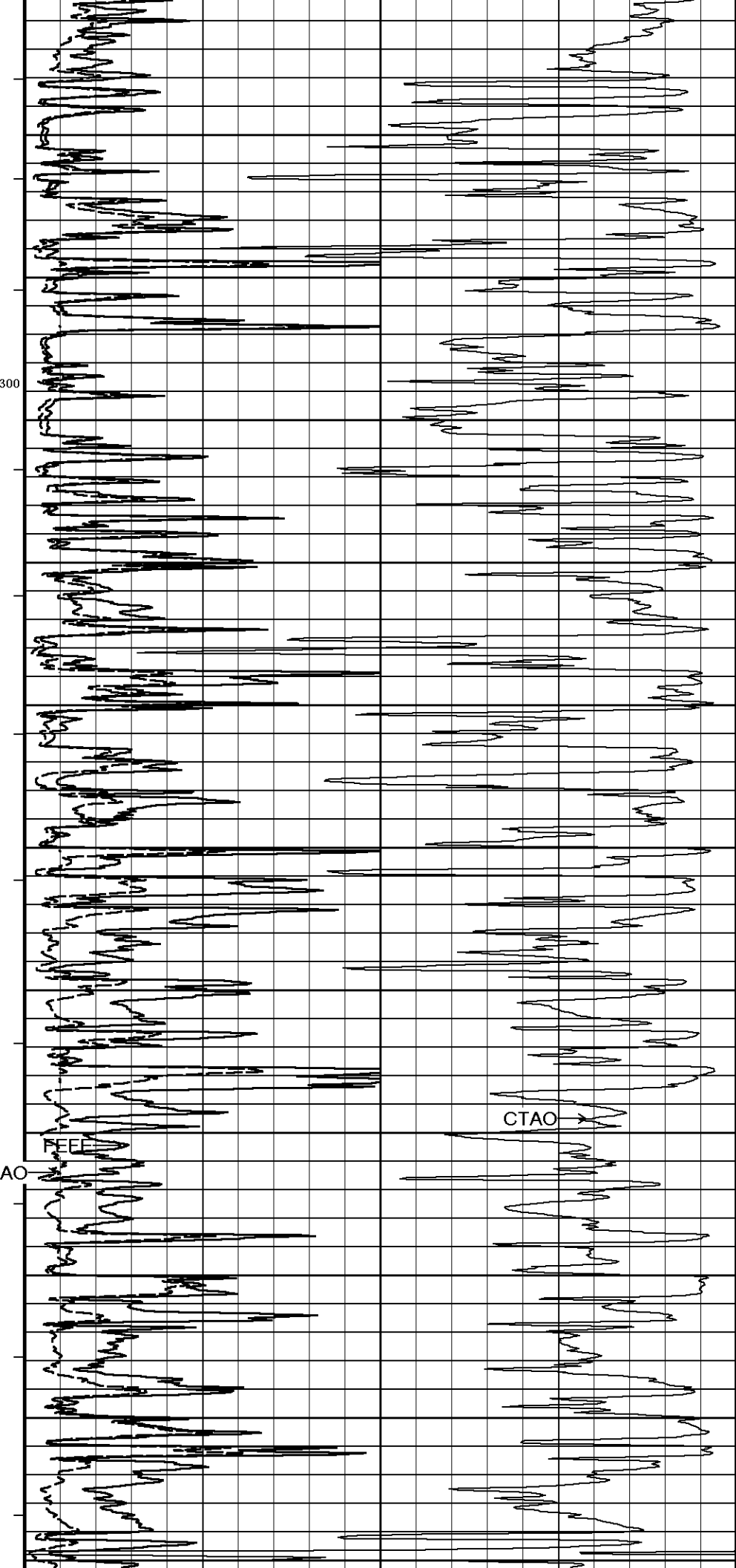
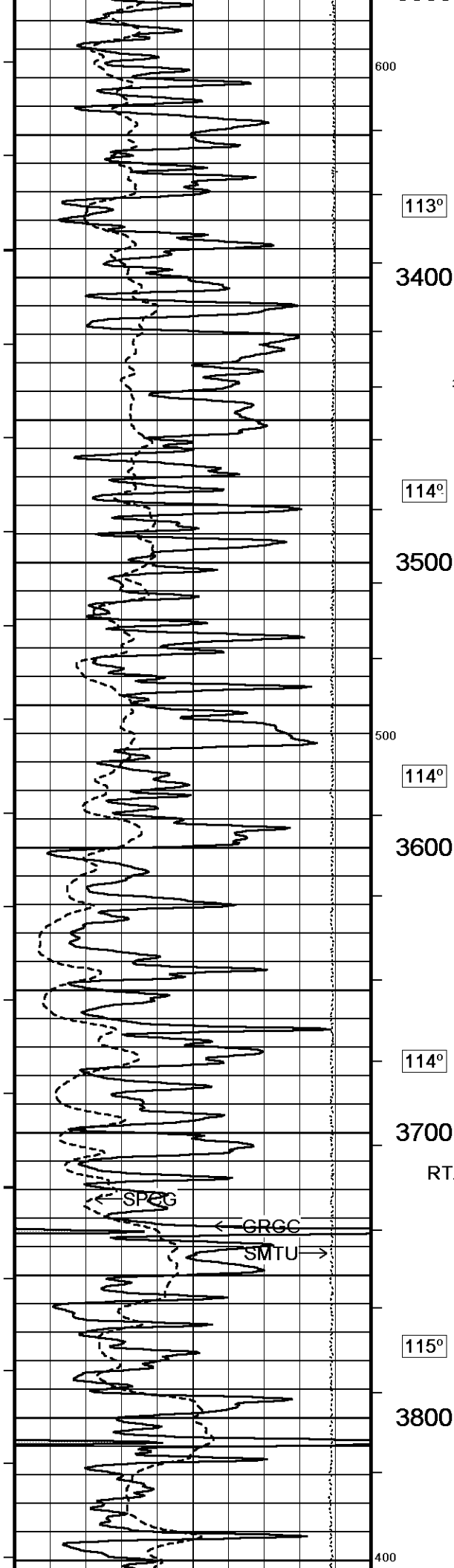


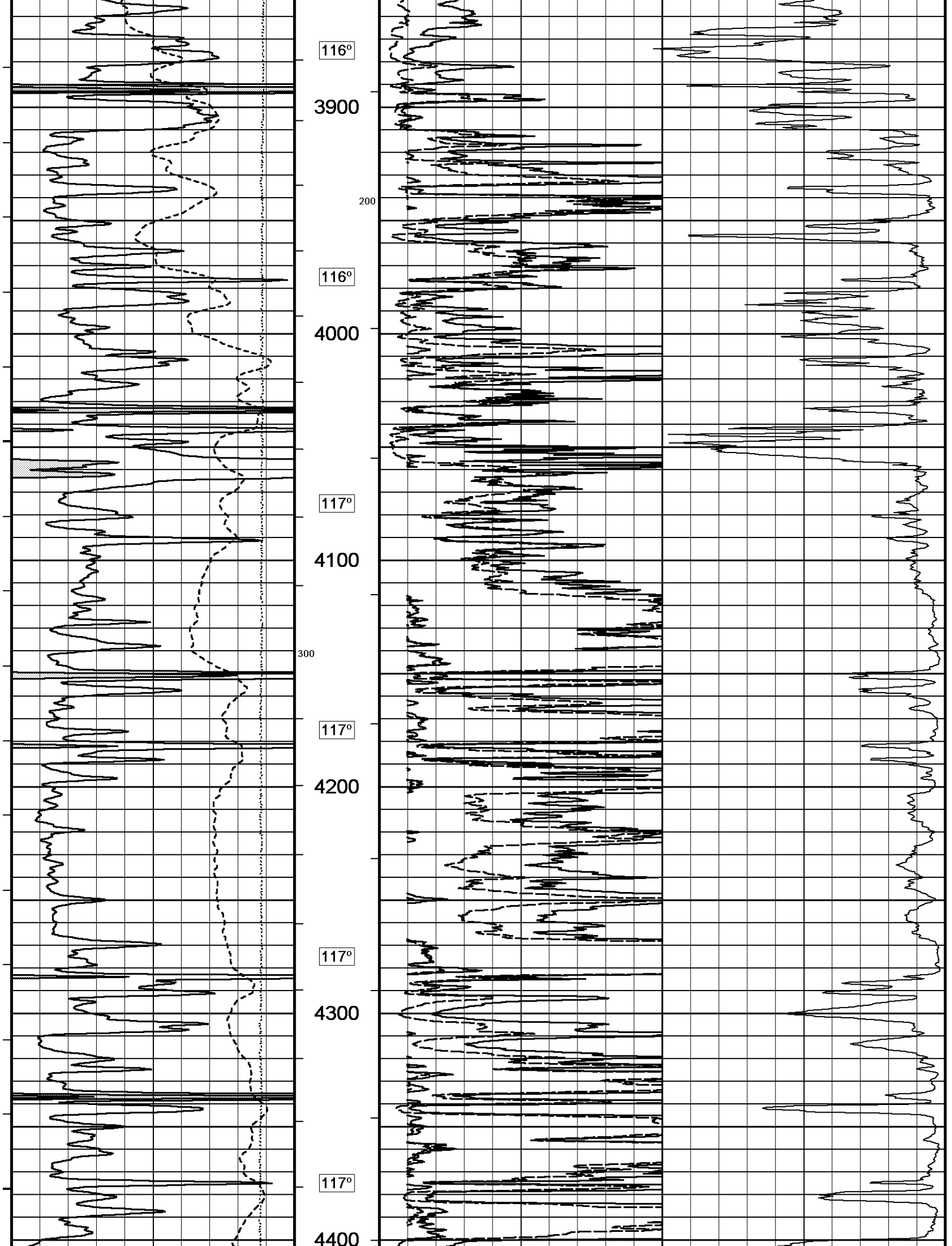


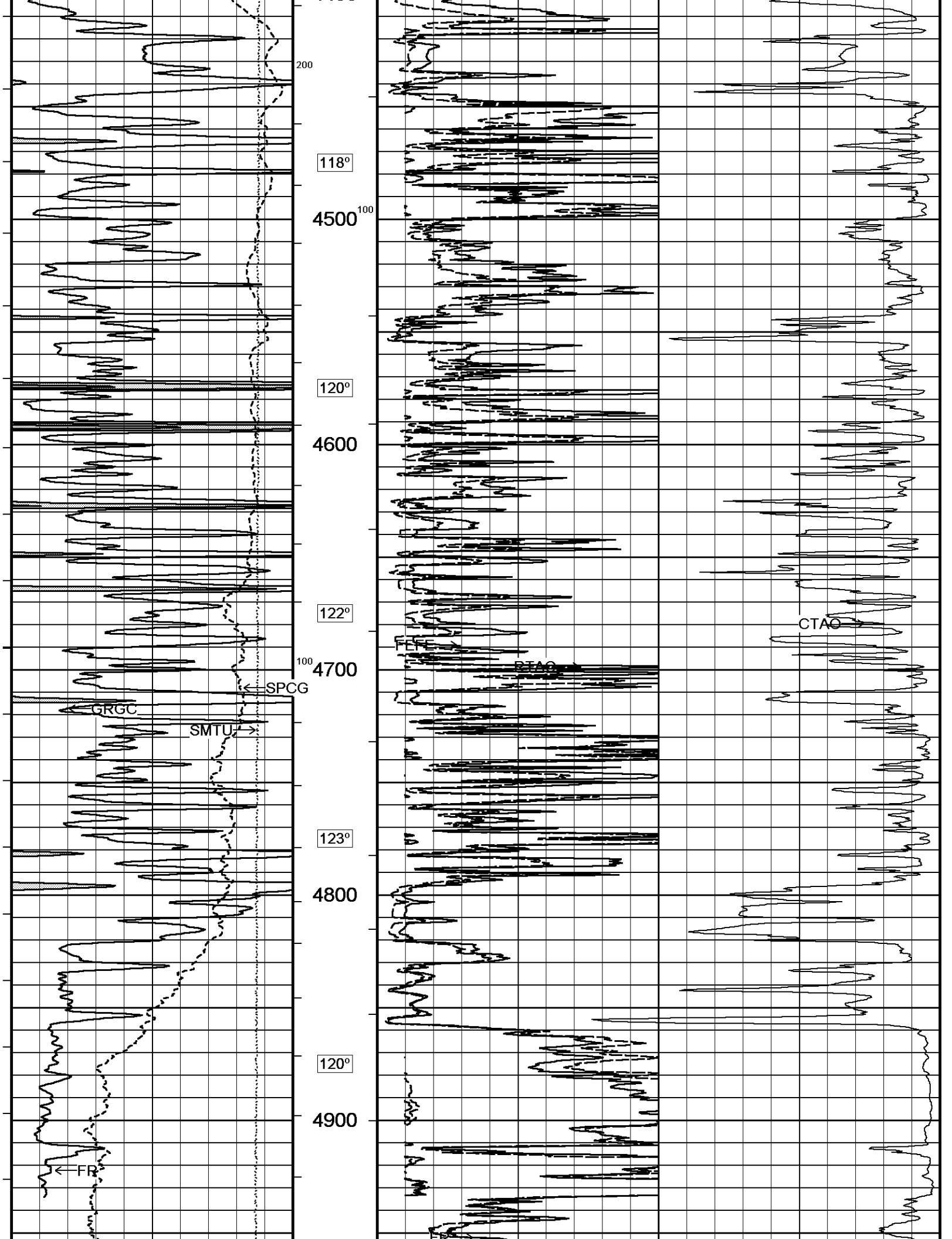


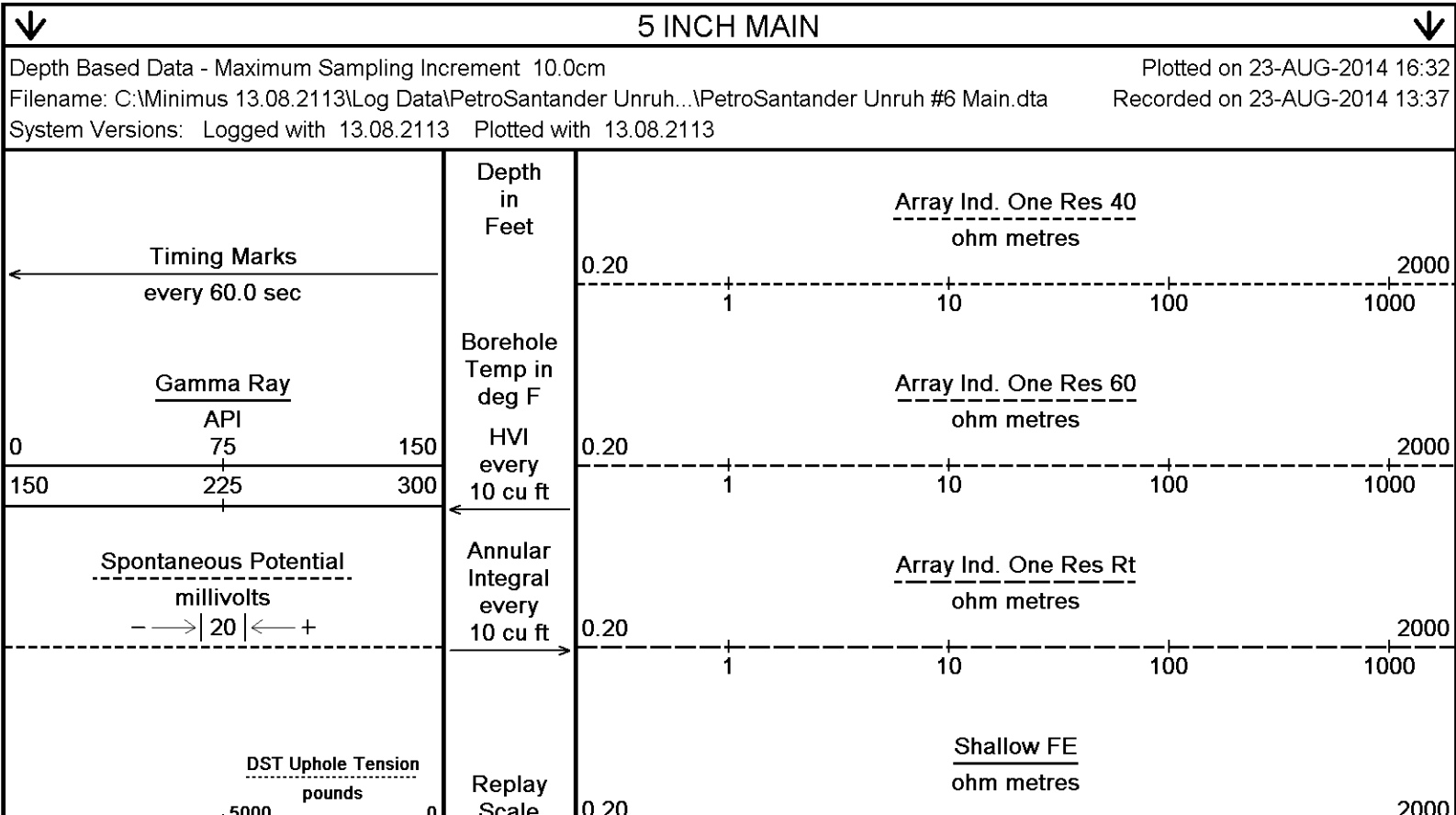
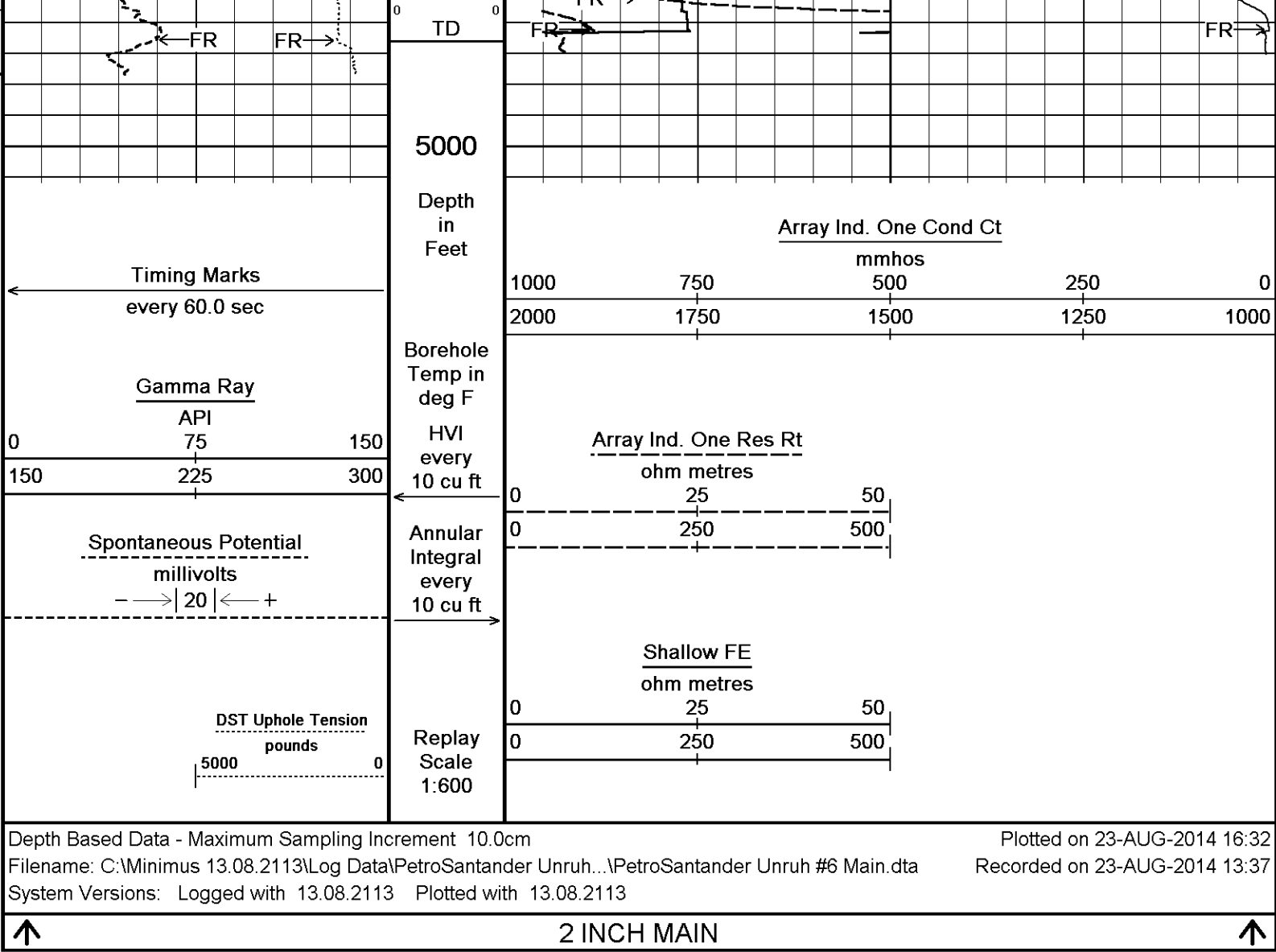












Scale
1:240

508

Casing
Shoe

← SPCG

← GRGC

SMTU →

550

2000

102°

600

103°

650

103°

700

1

10

100

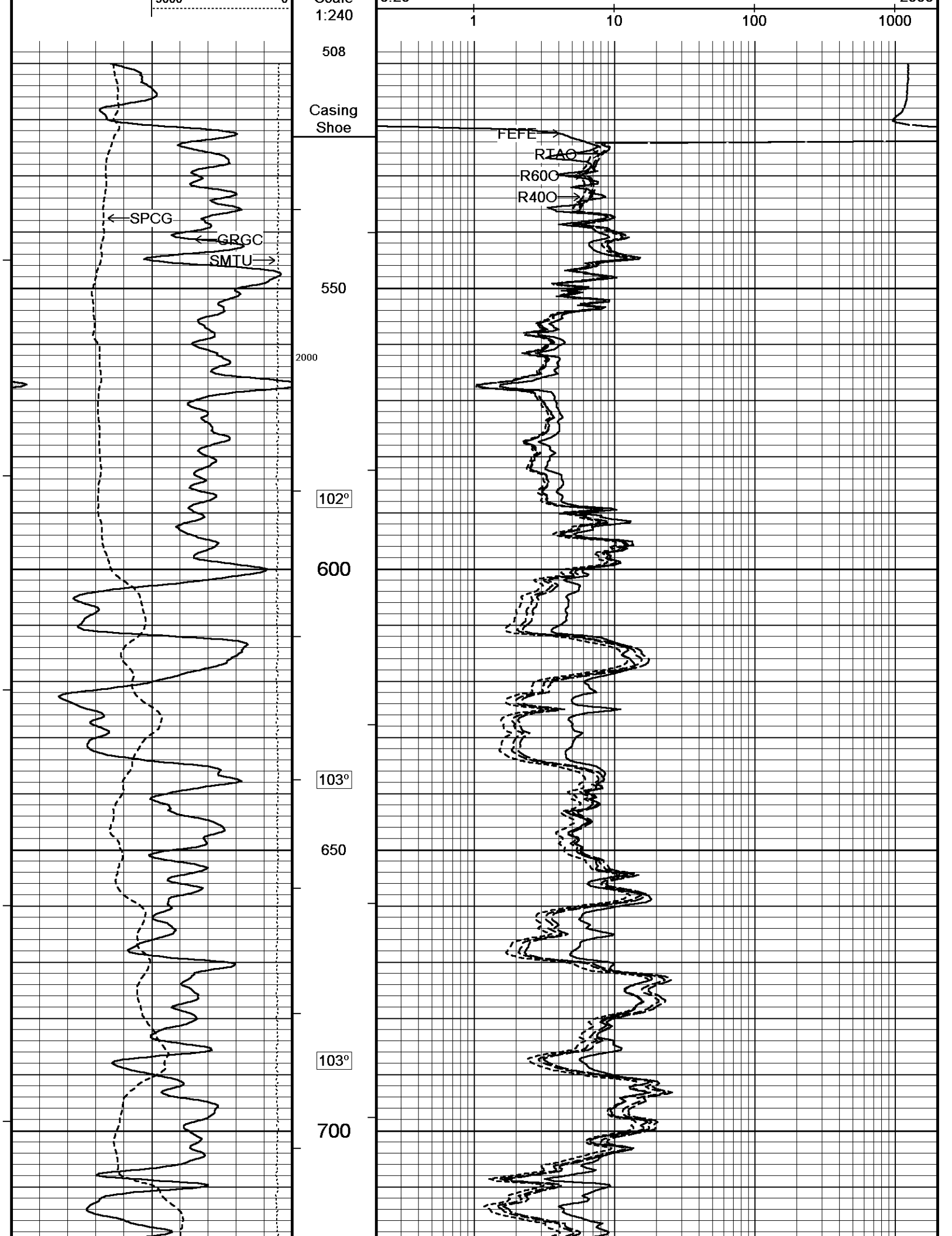
1000

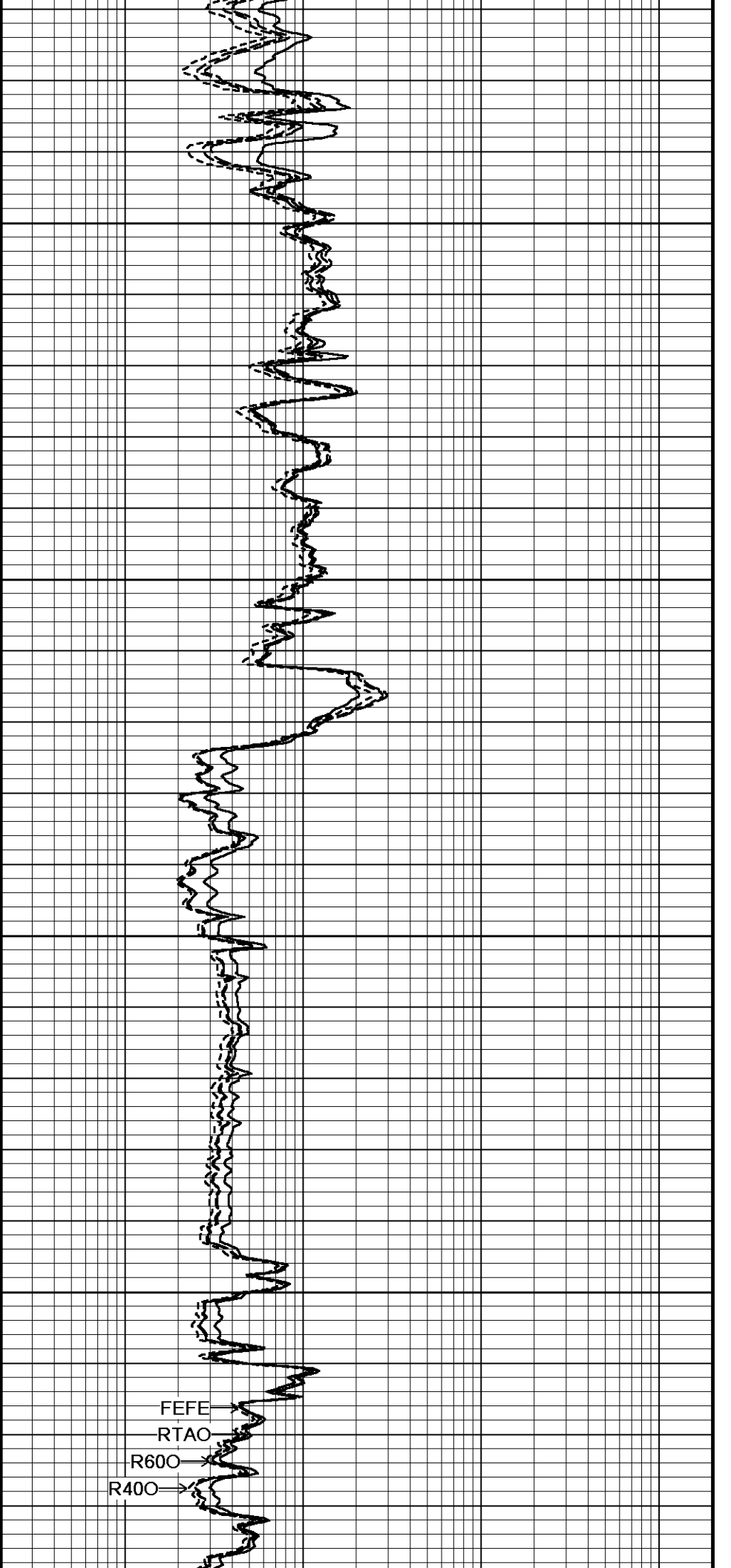
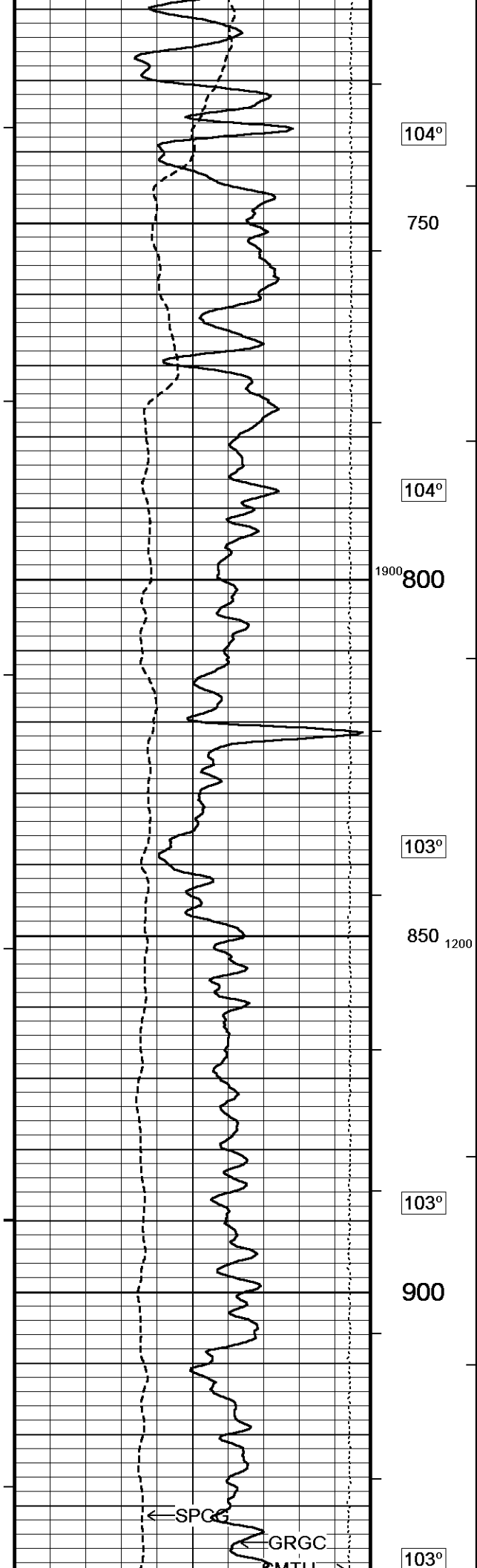
FEFE →

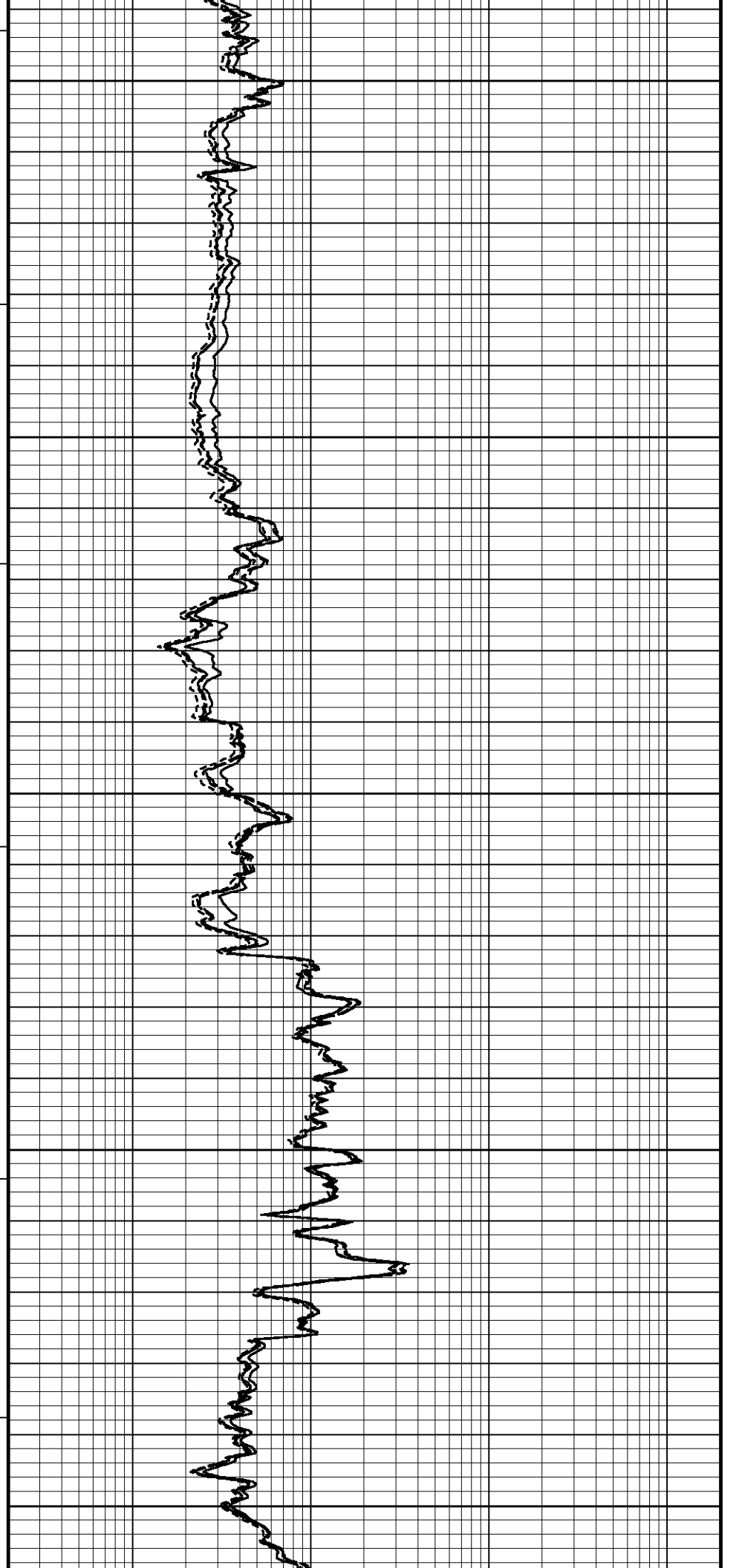
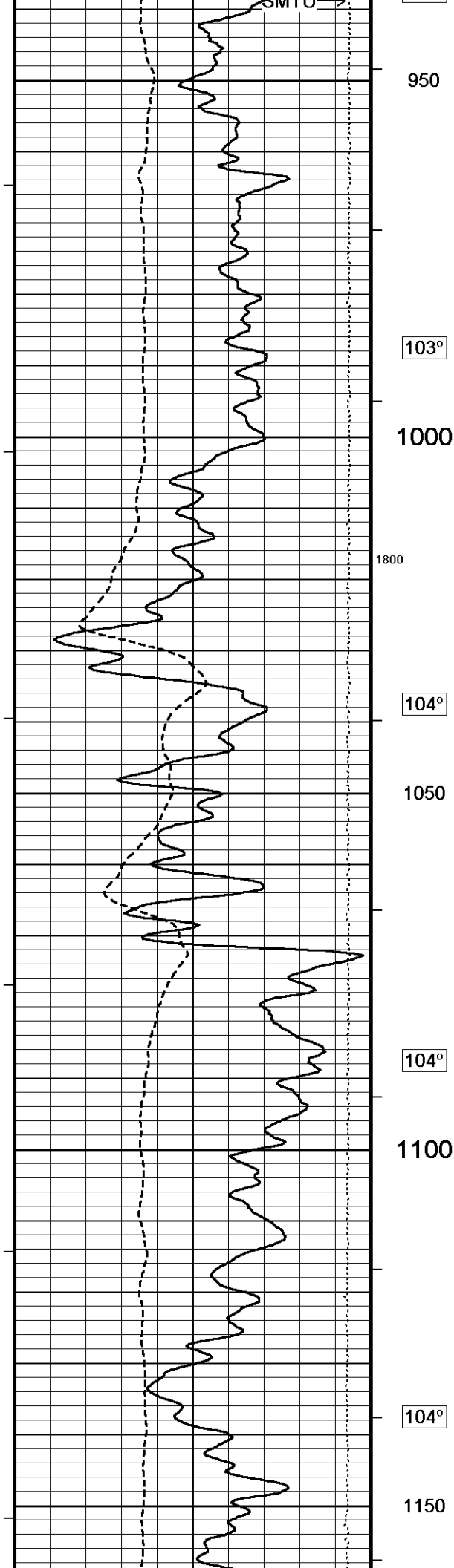
RTAO

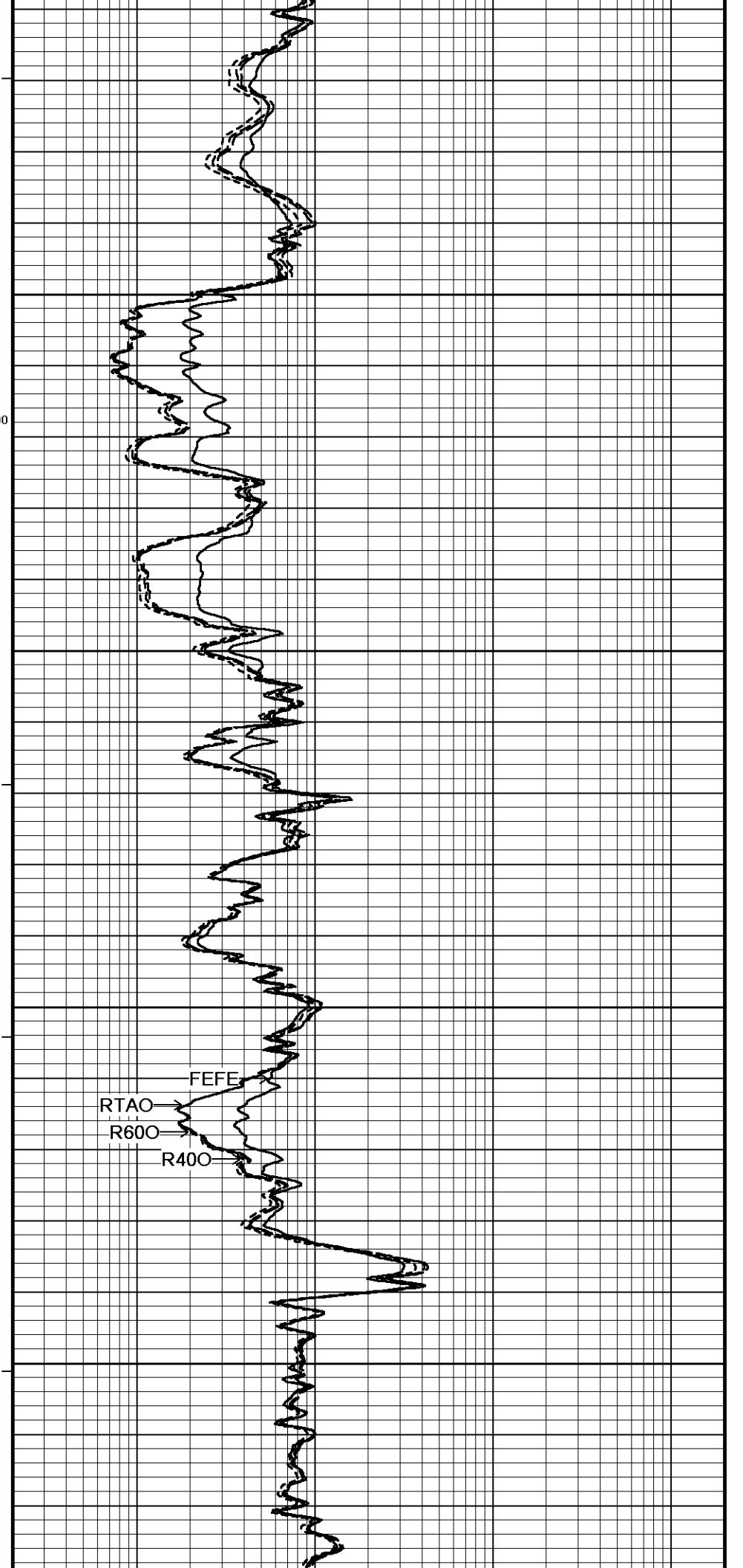
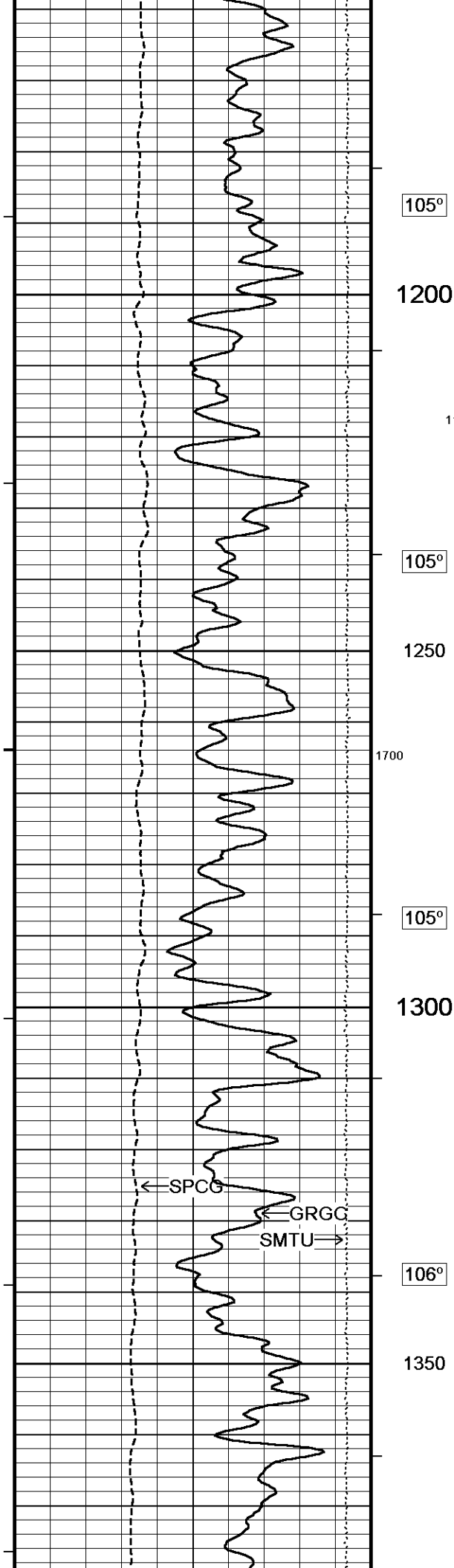
R600

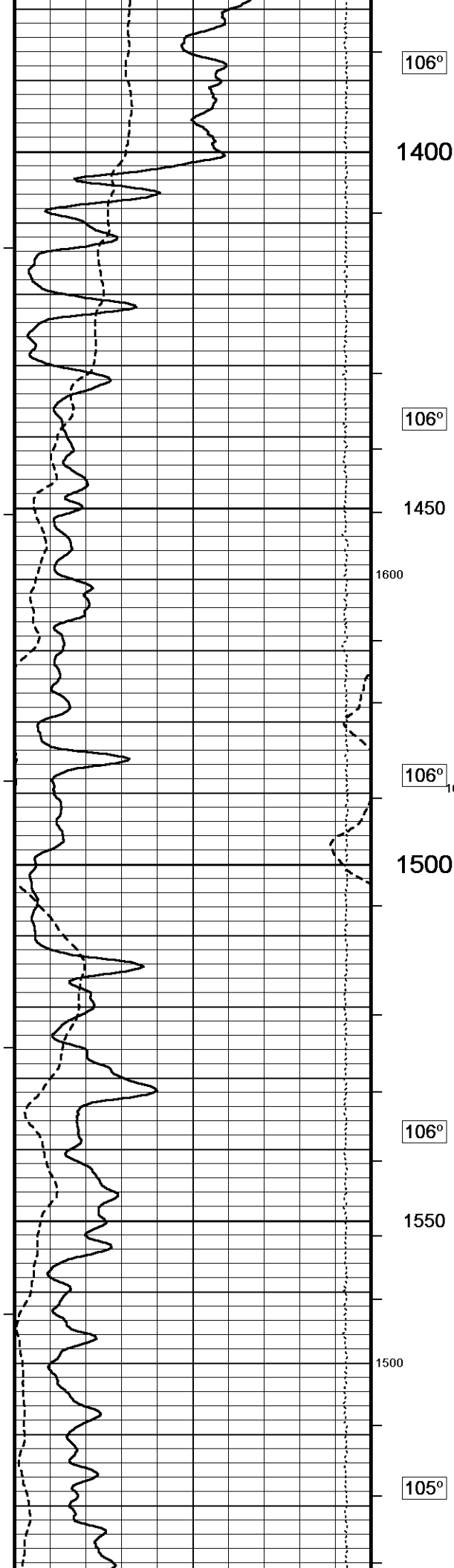
R400 →











106°

1400

106°

1450

1600

106°

1000

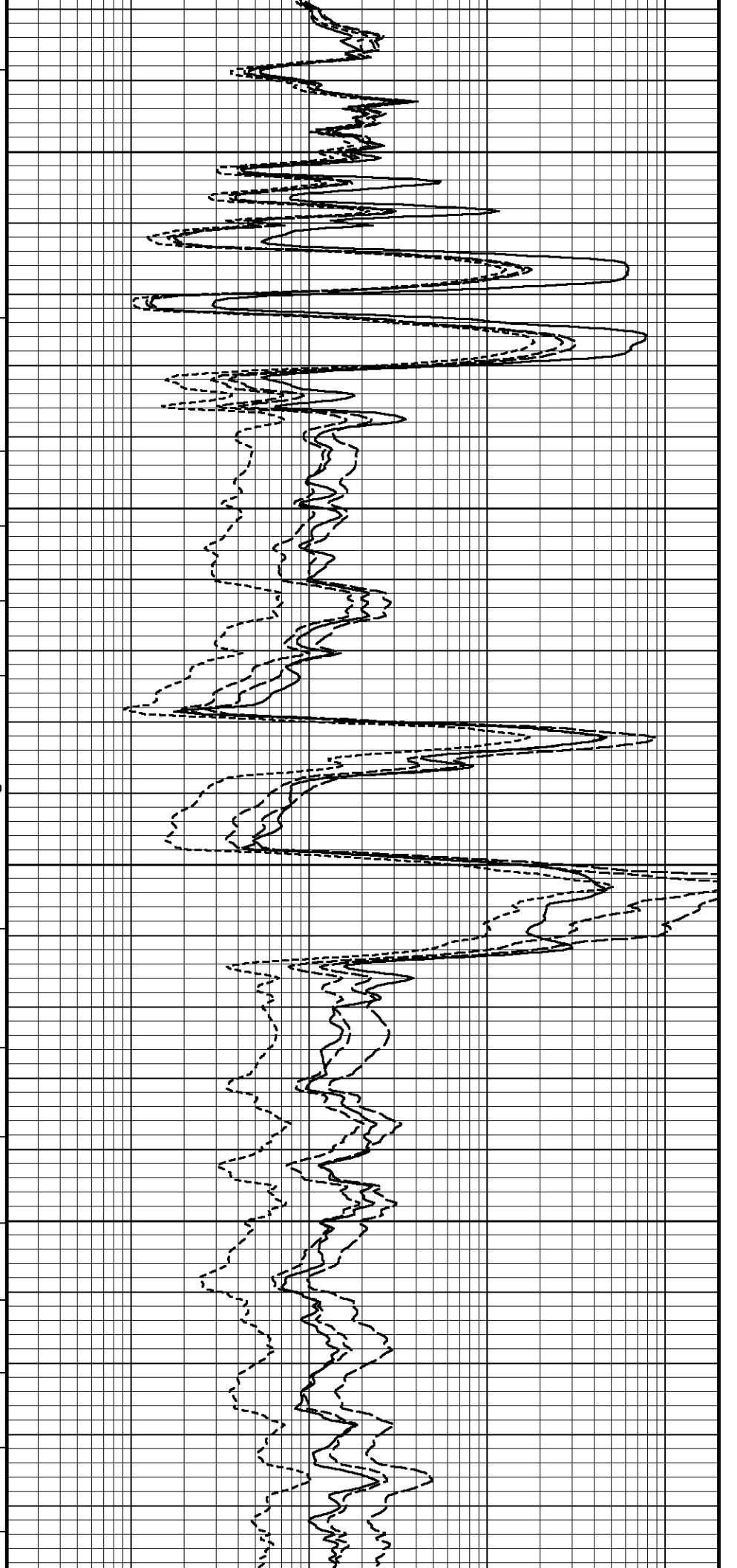
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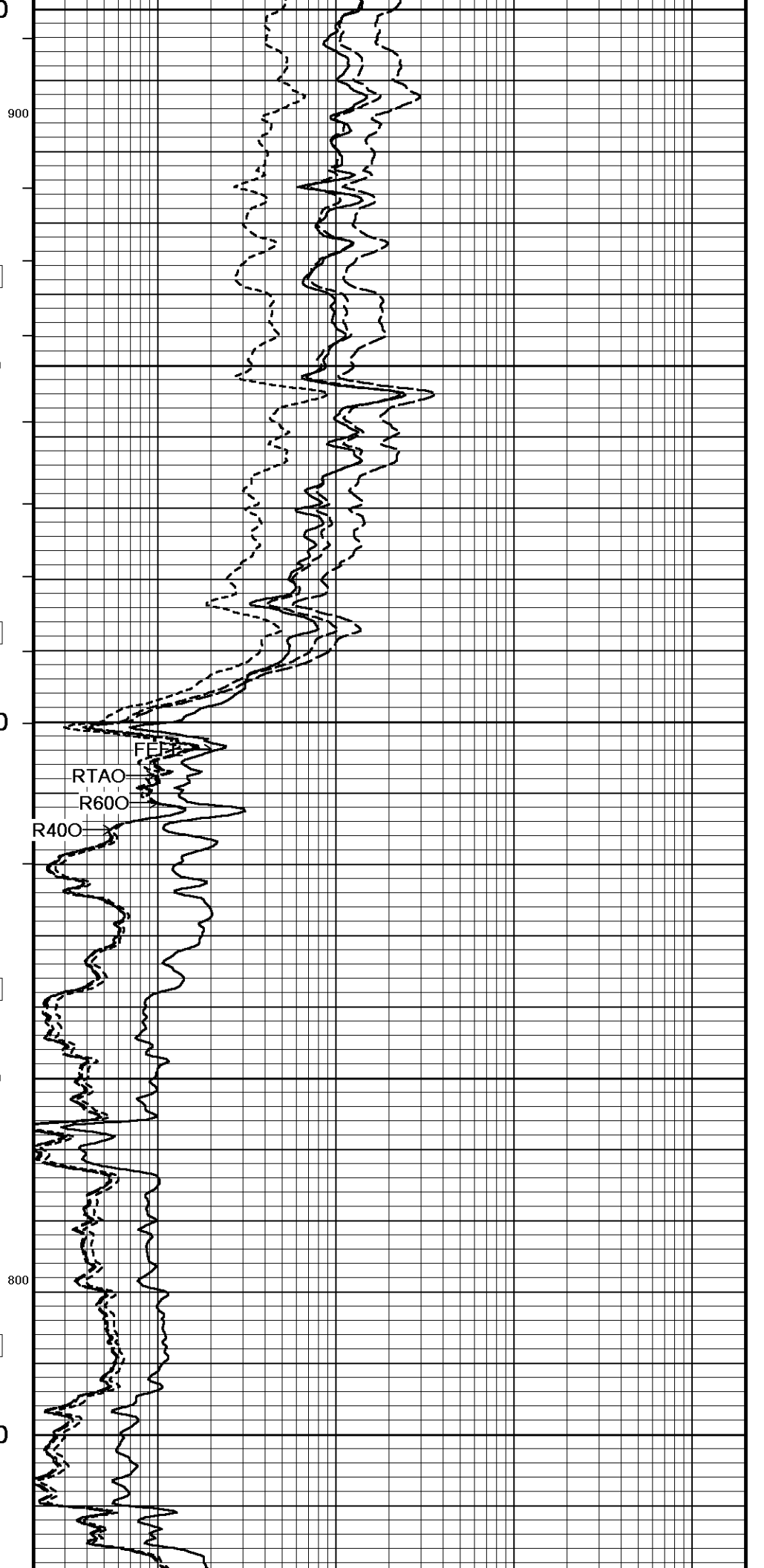
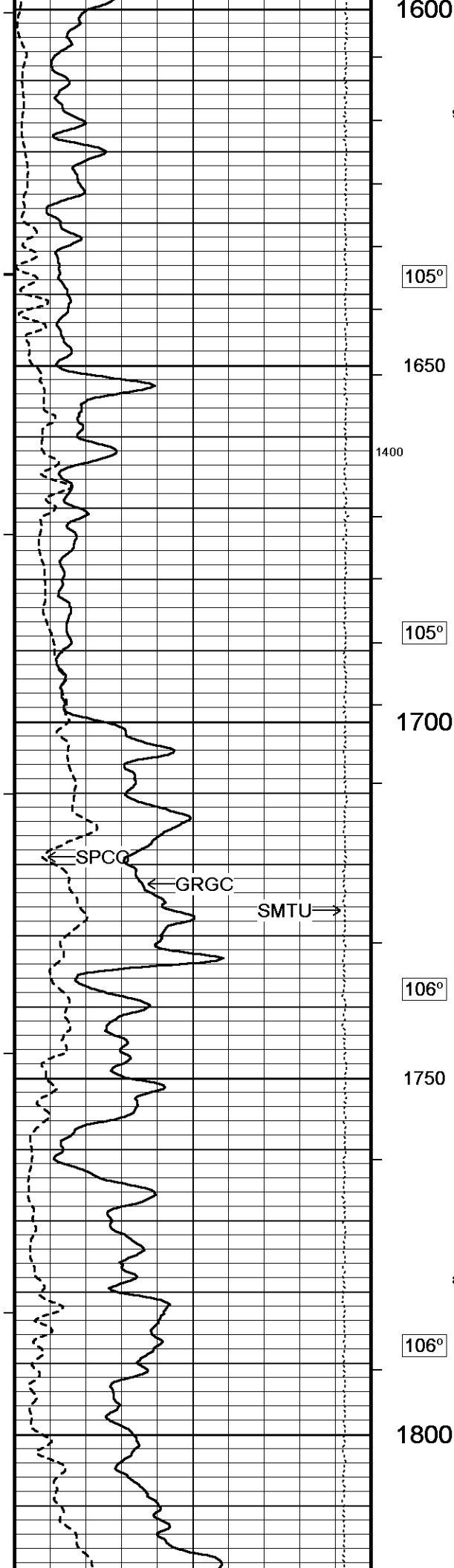
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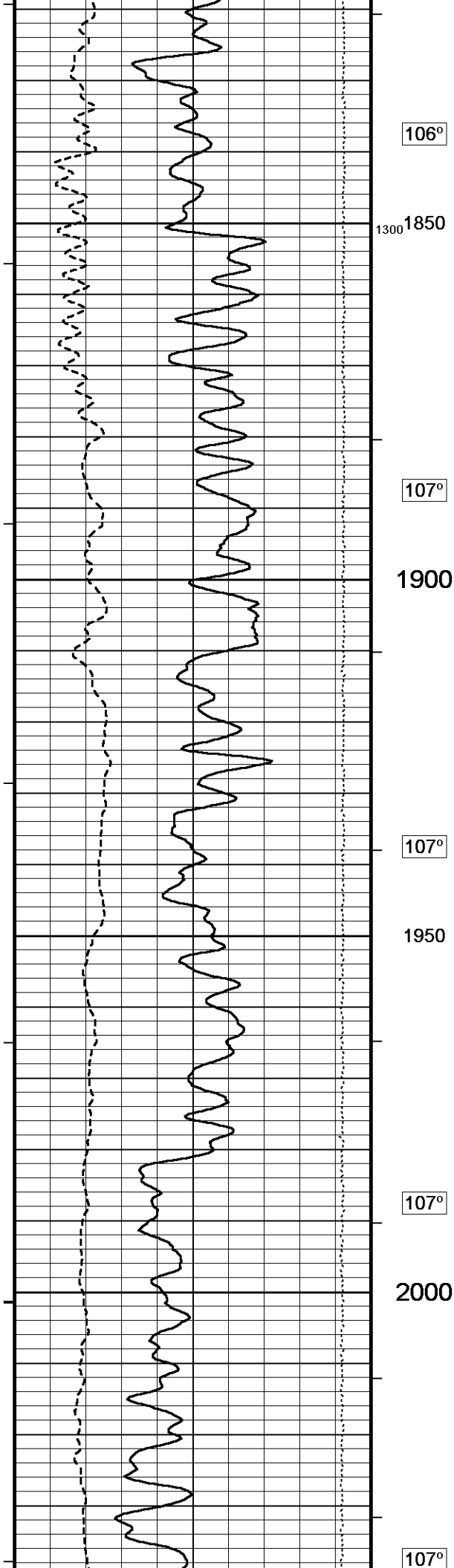
1550

1500

105°







106°

1850

107°

1900

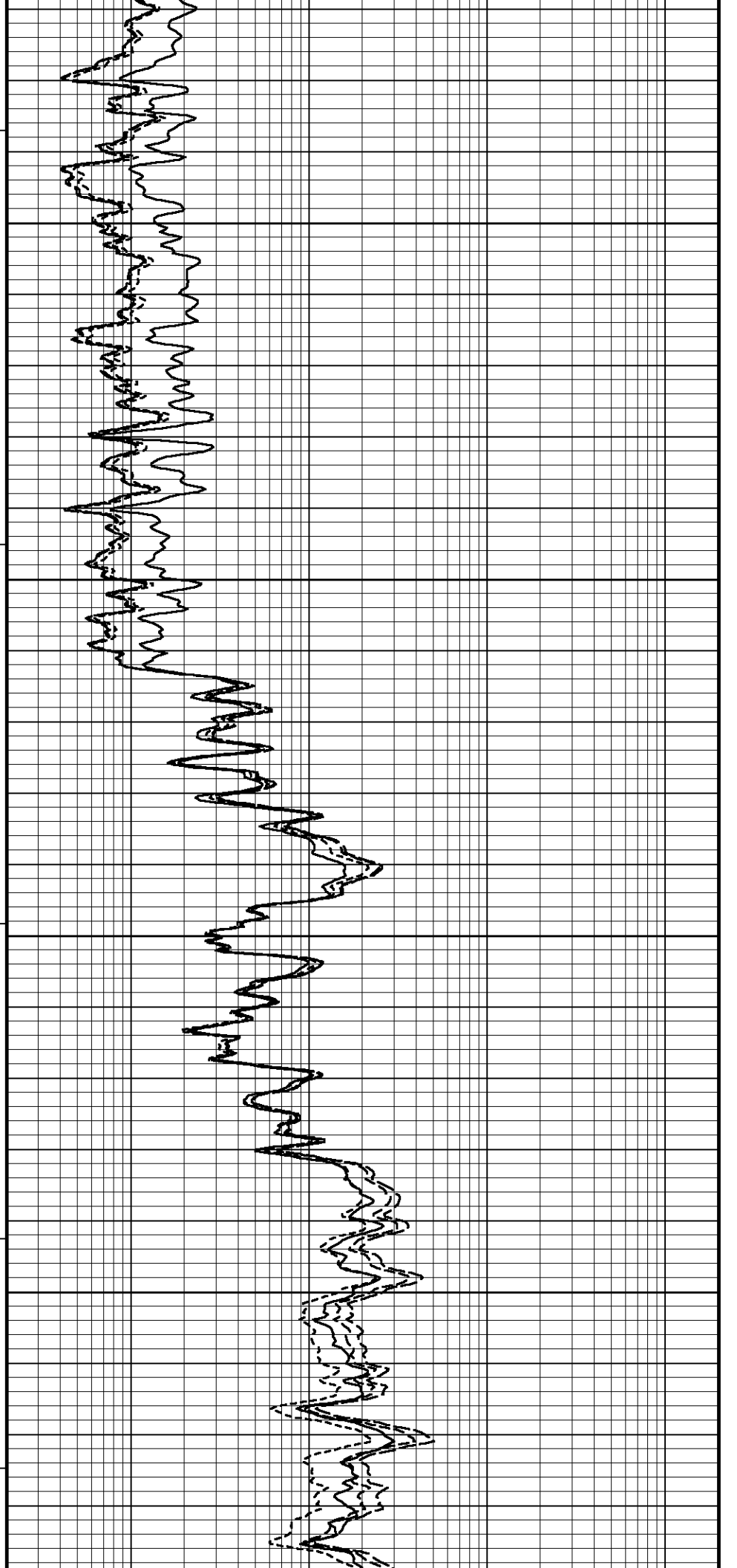
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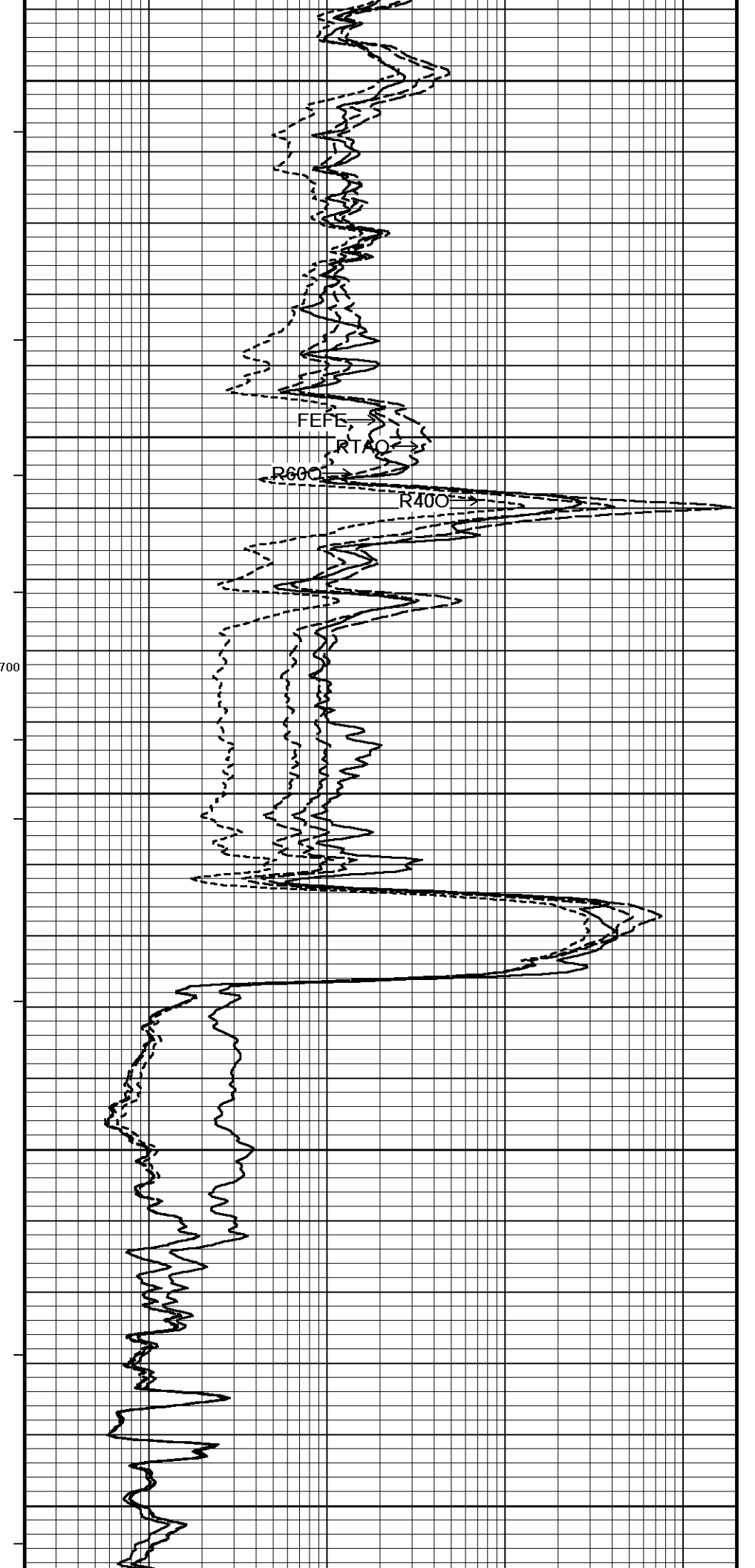
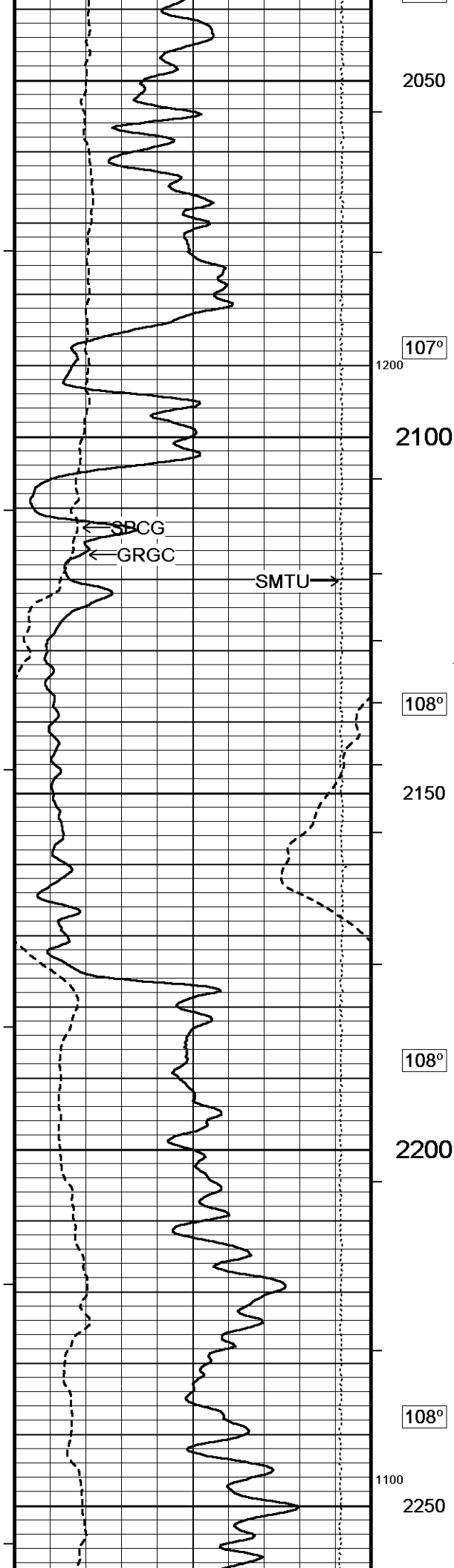
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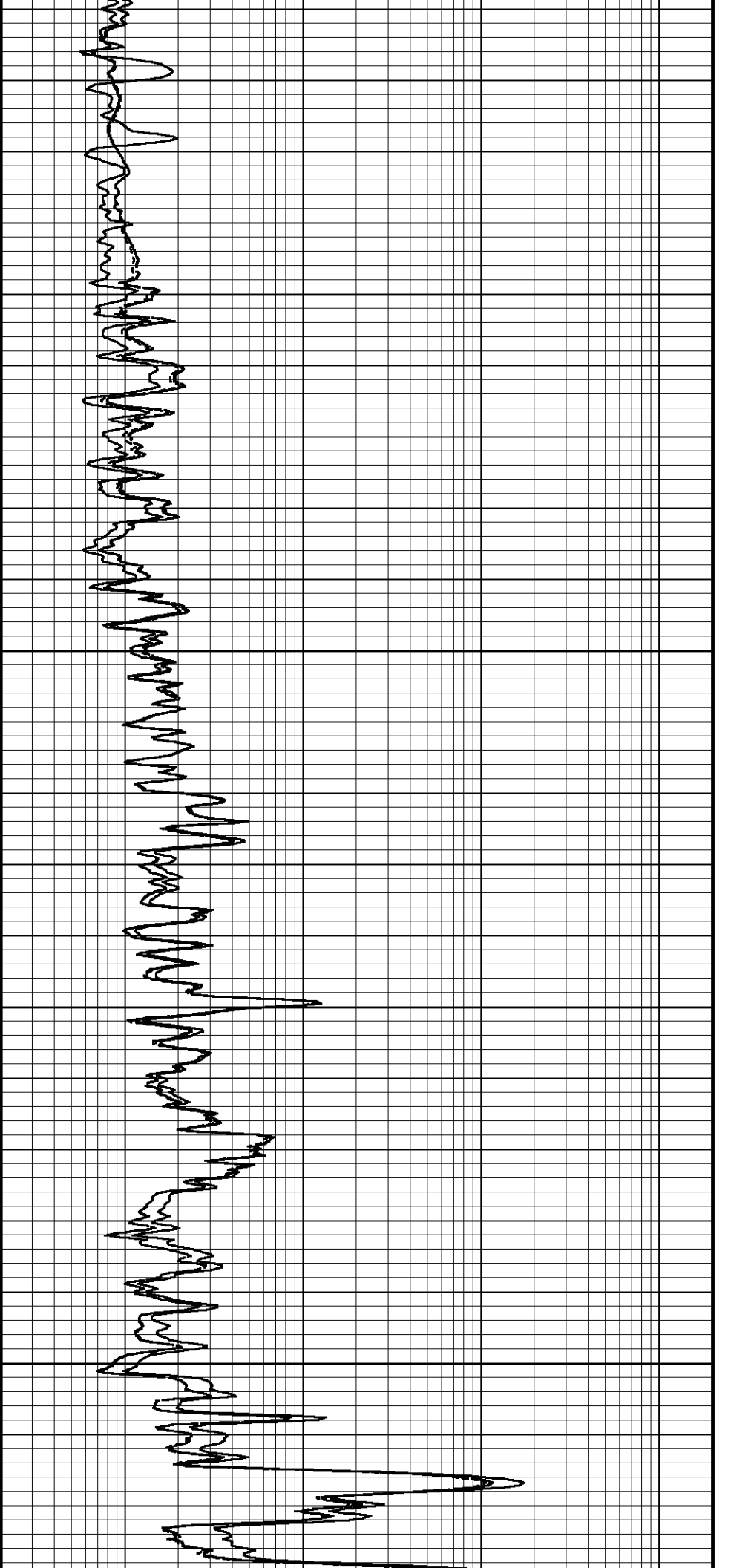
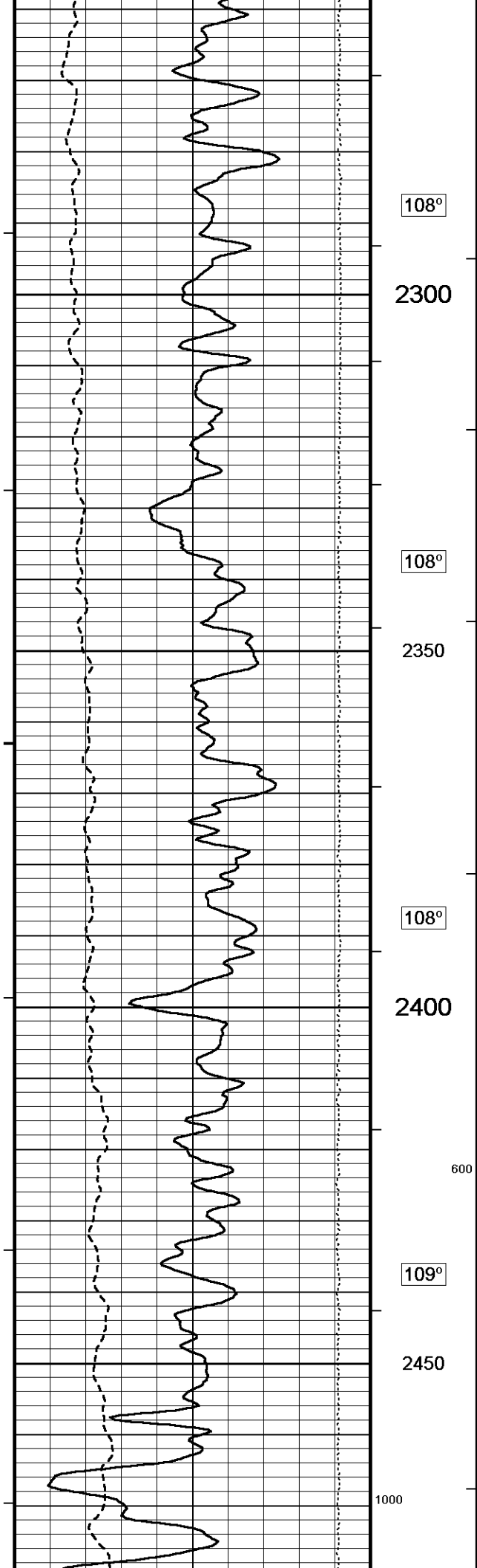
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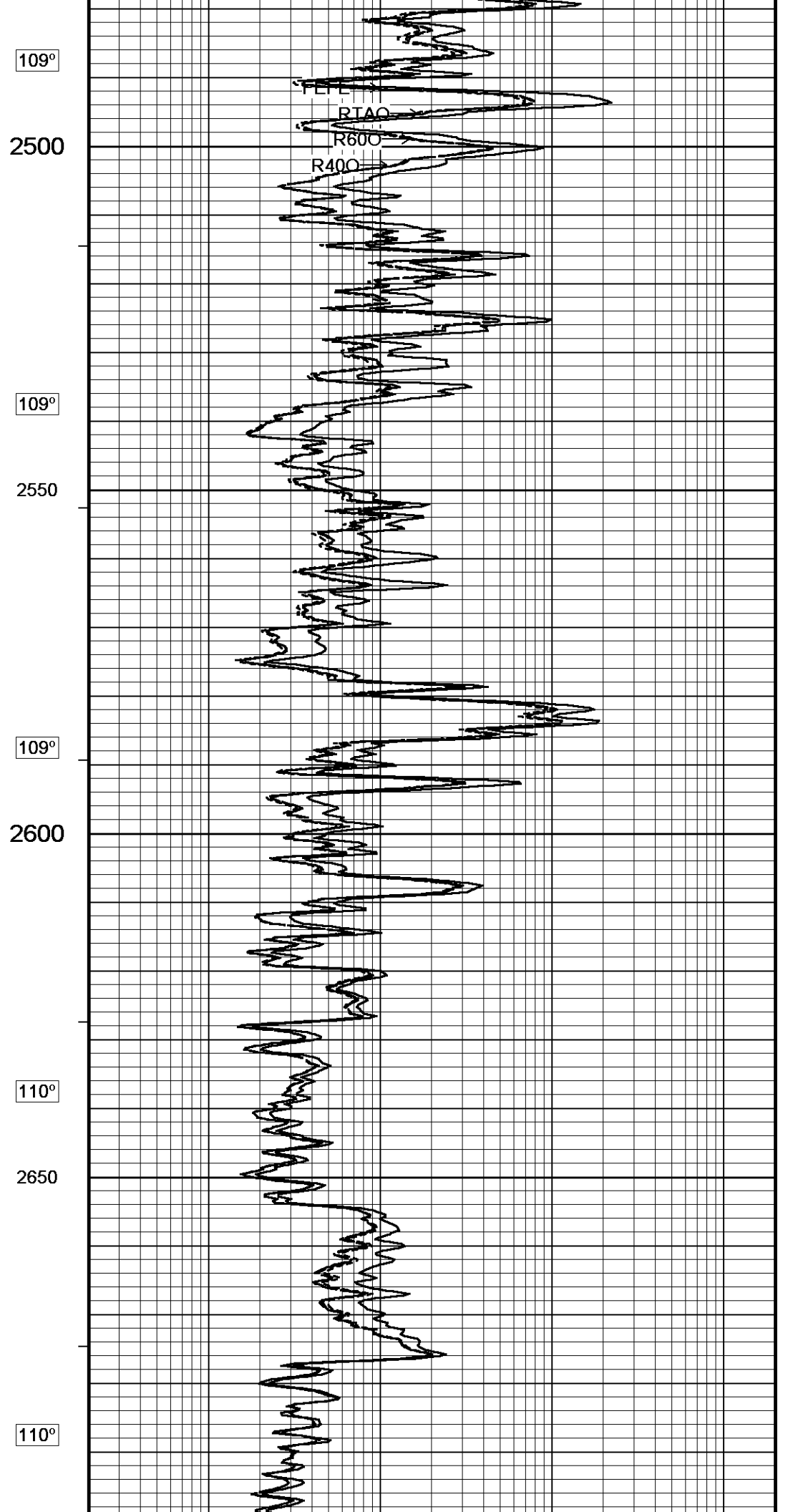
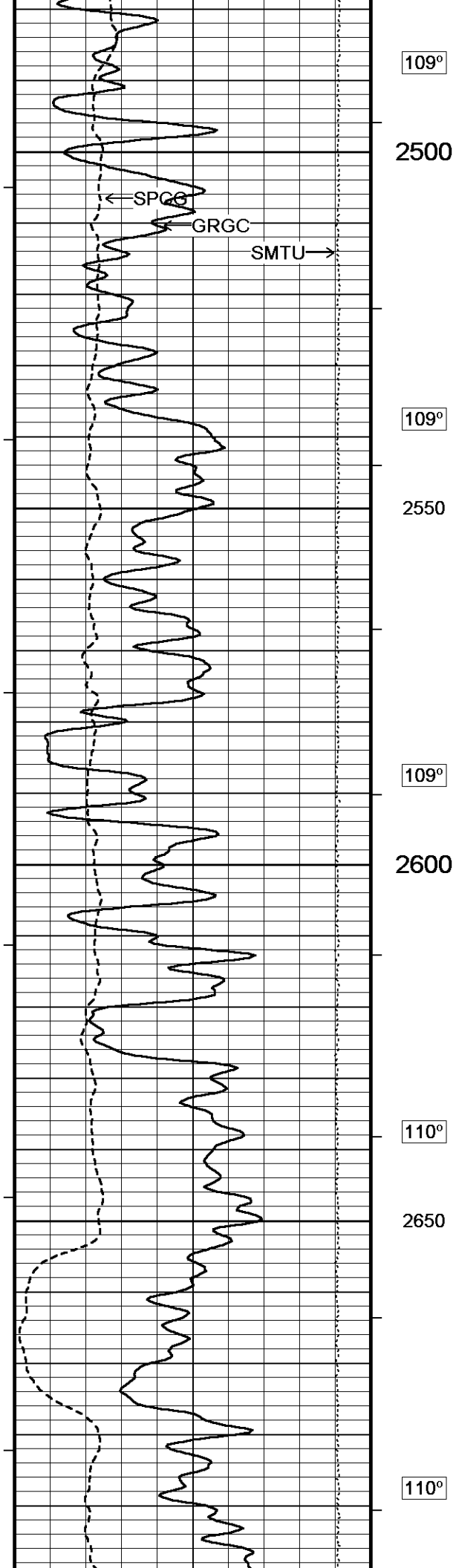
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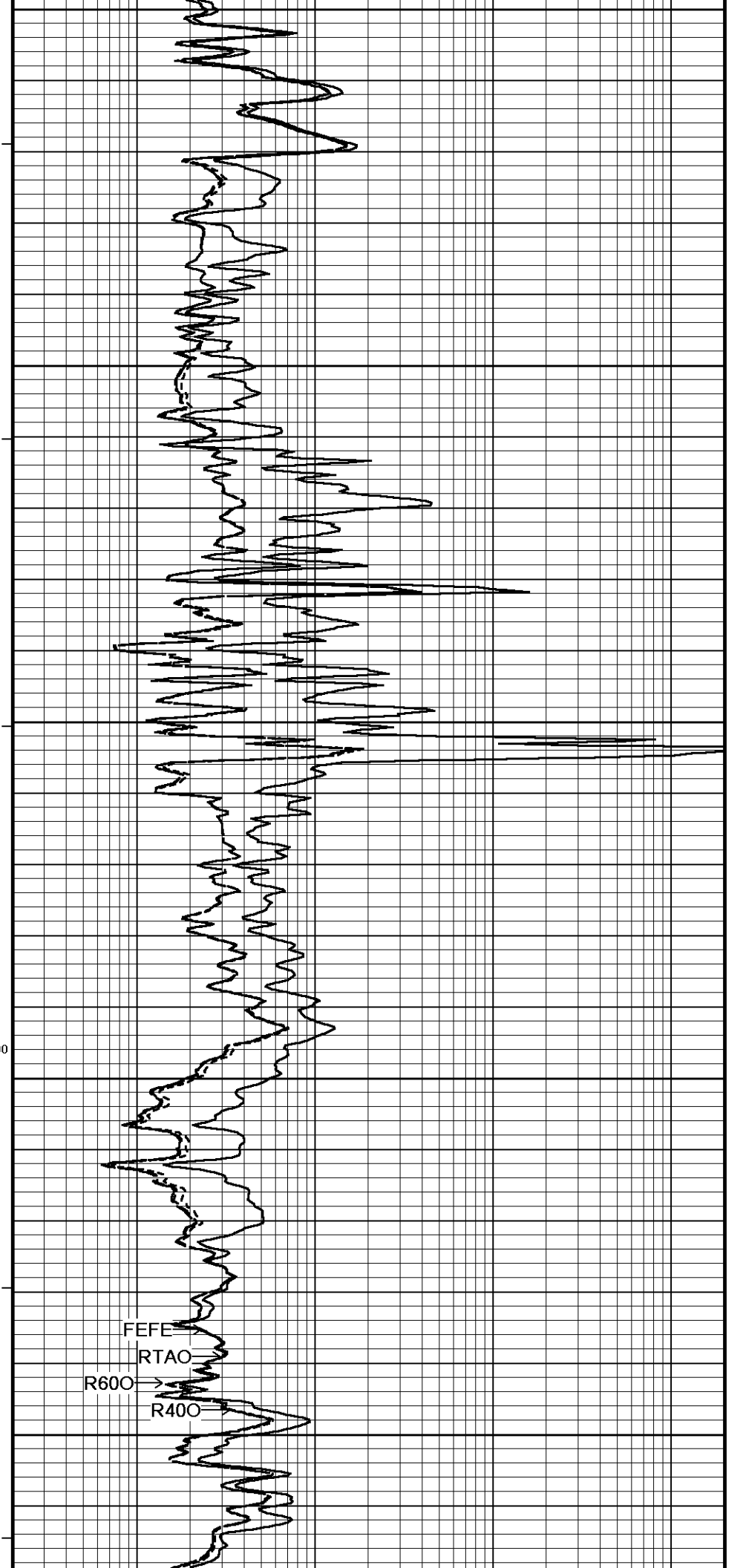
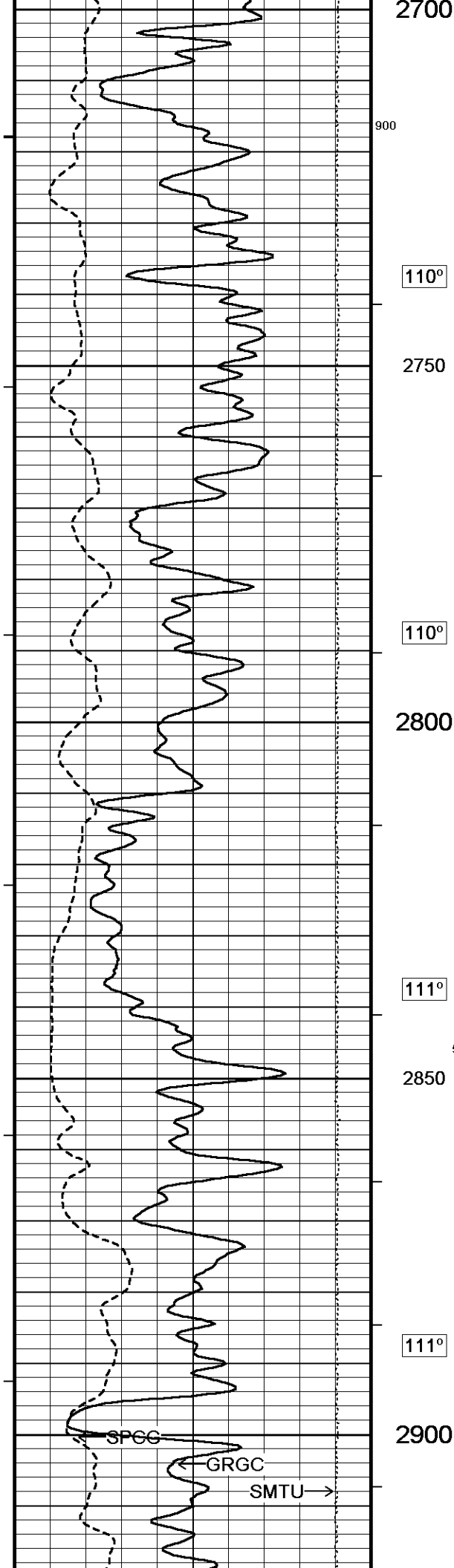
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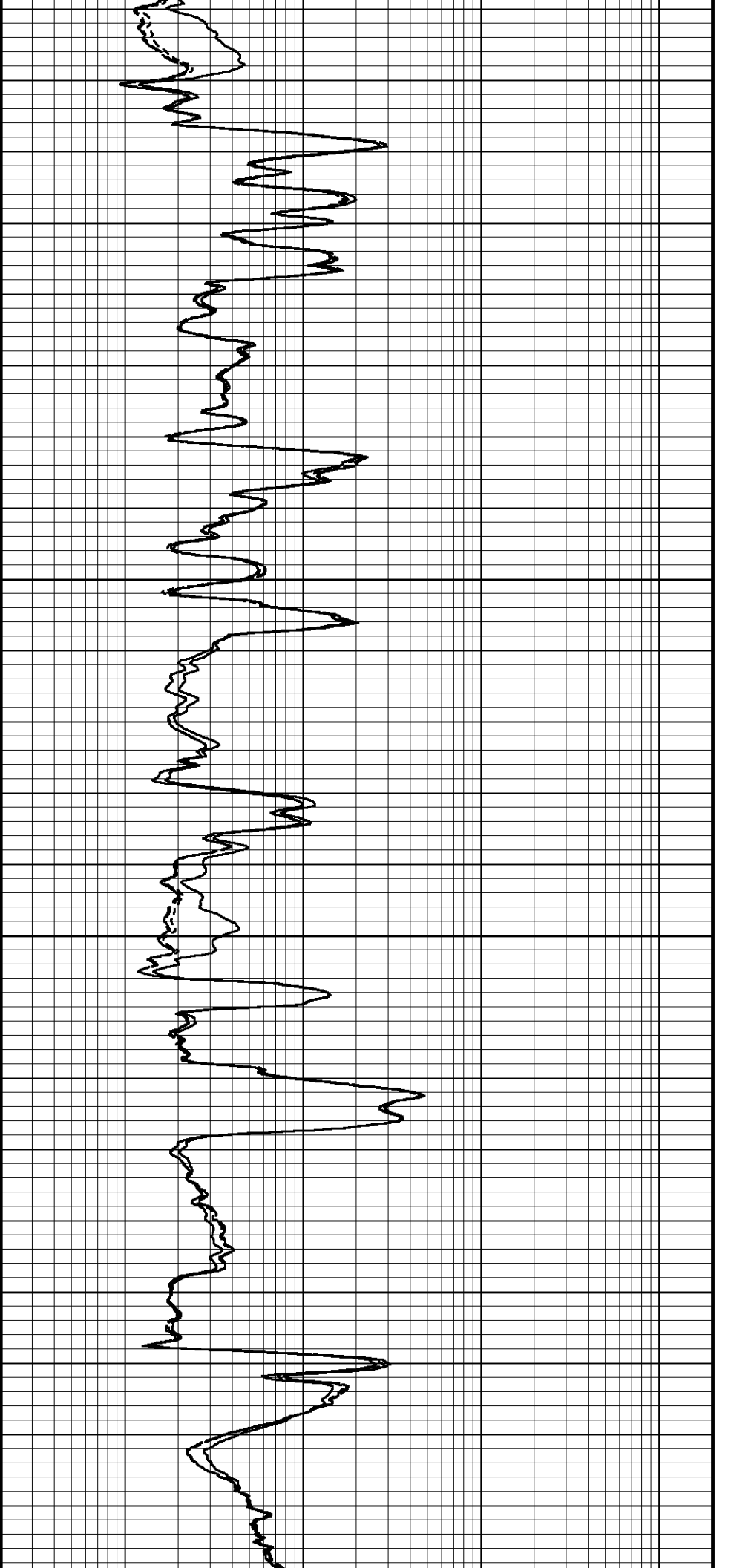
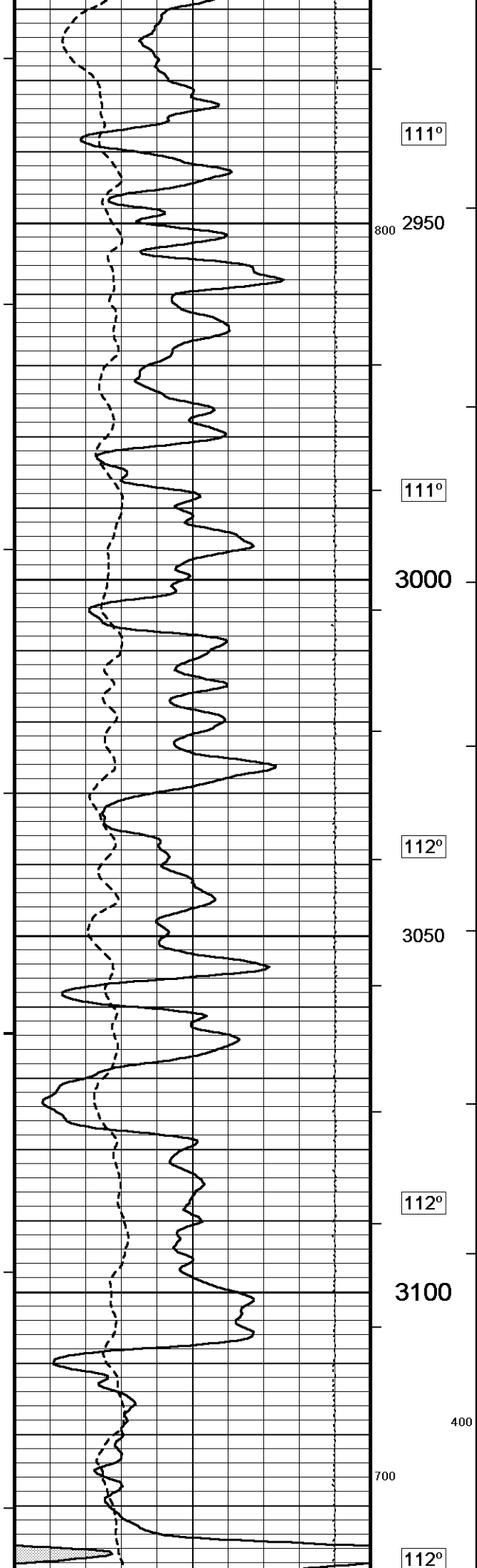


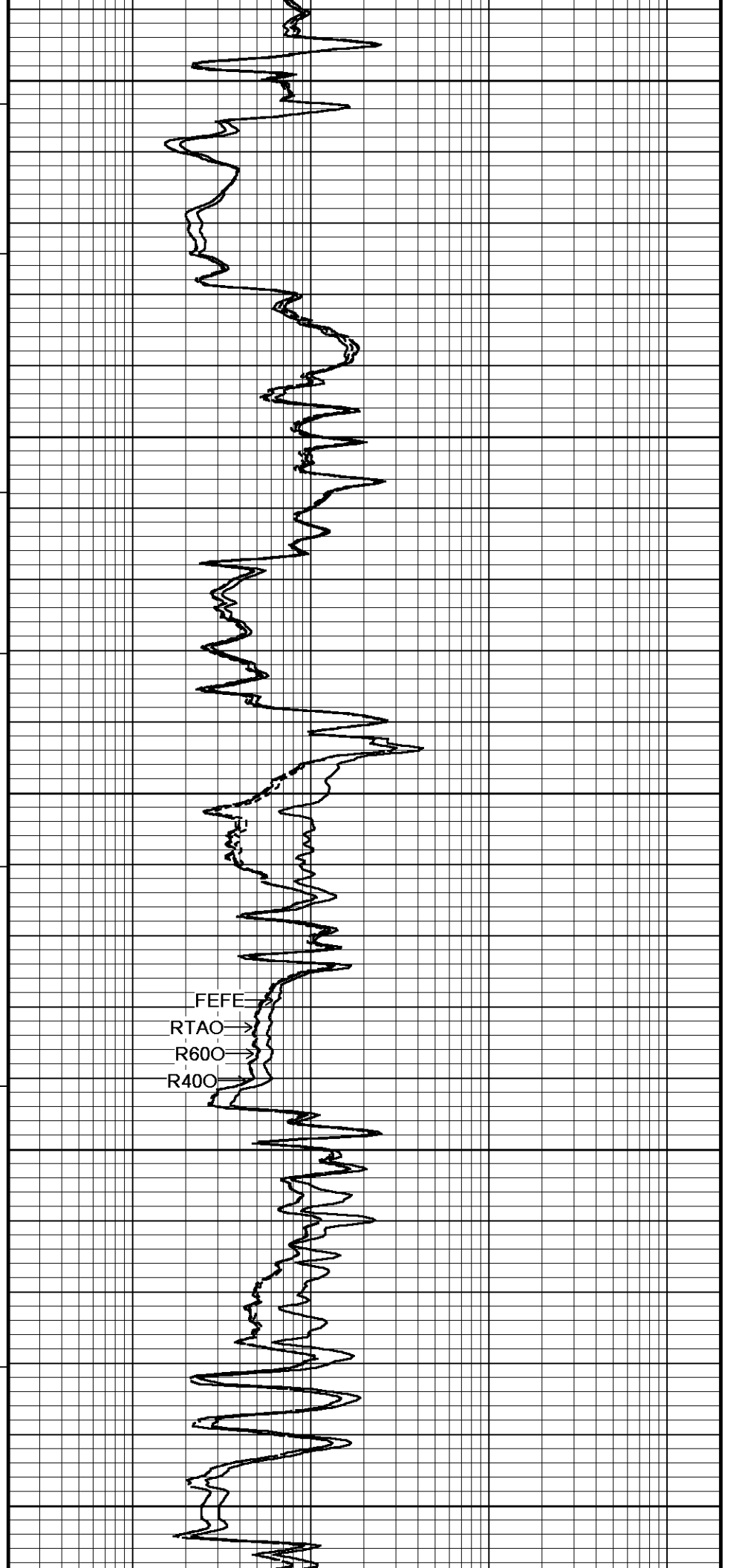
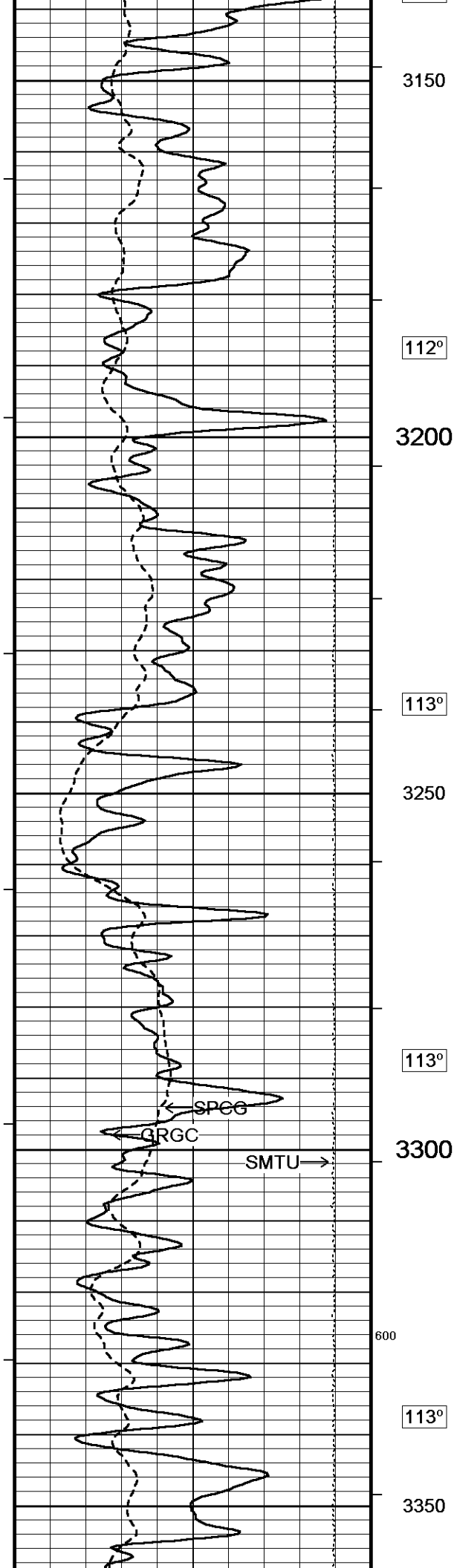


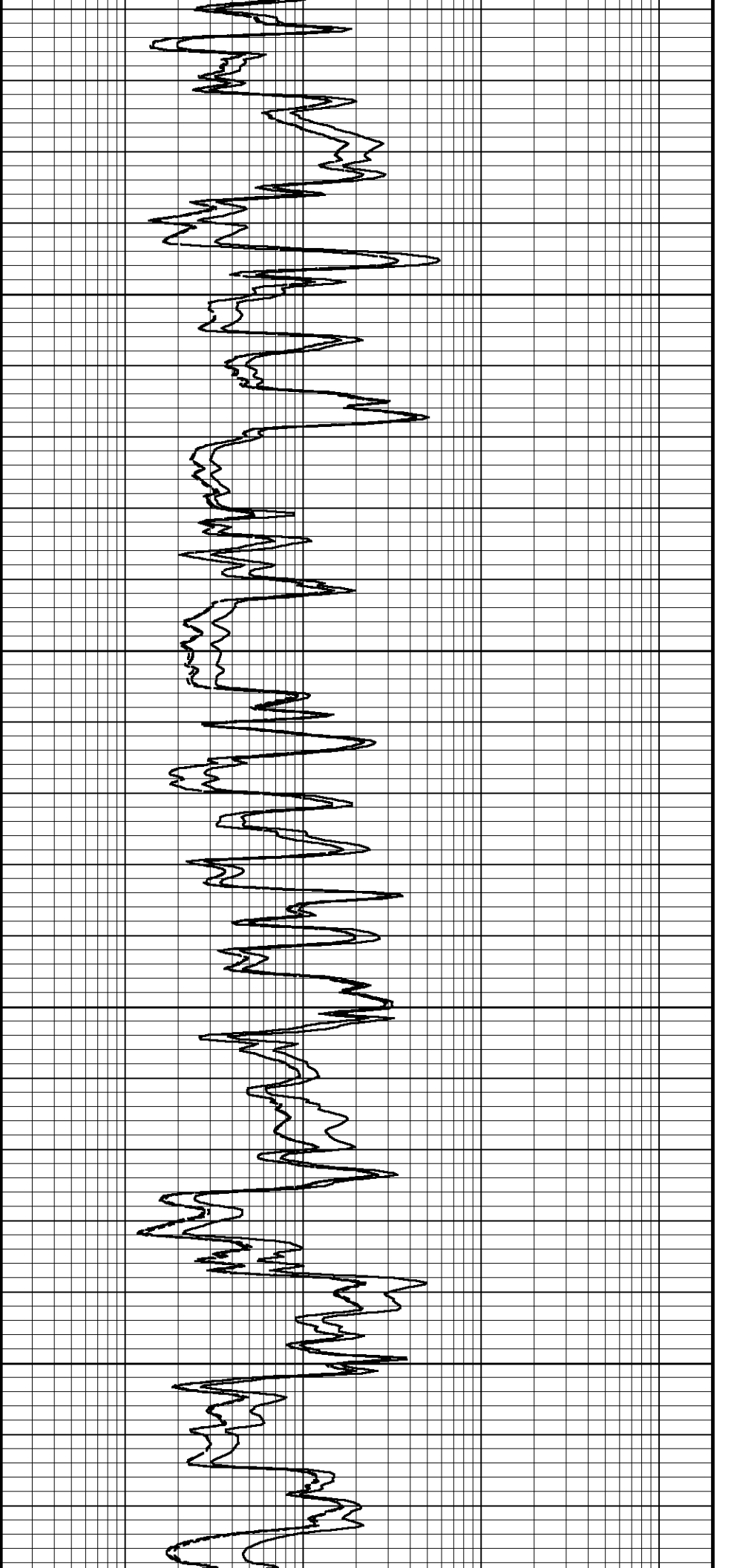
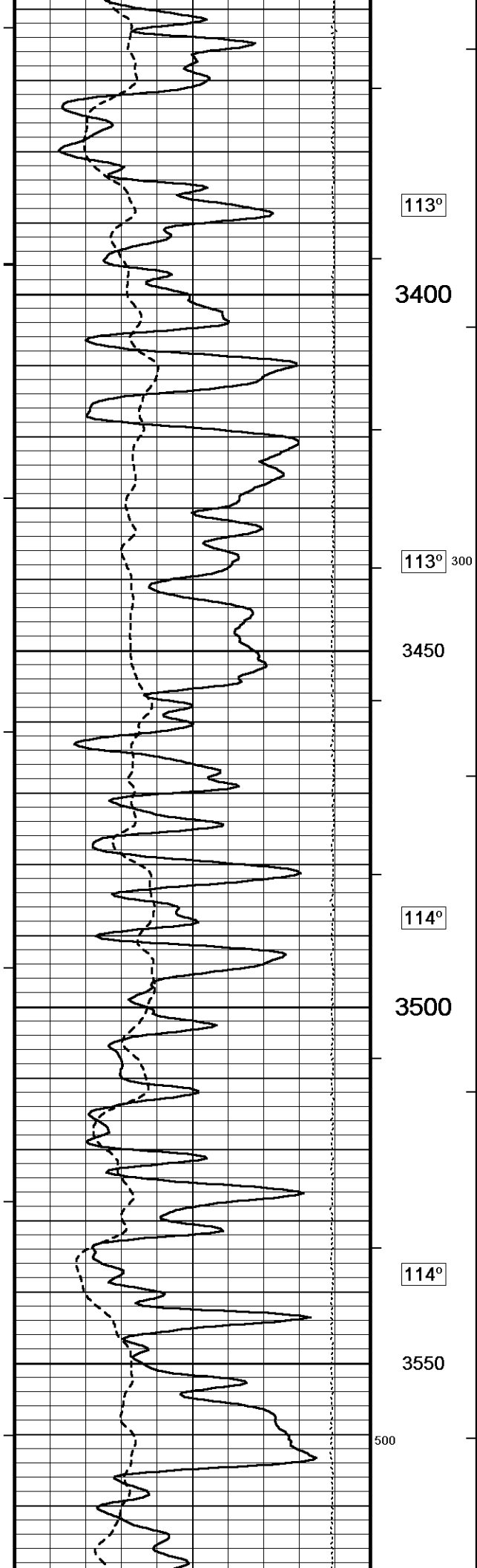


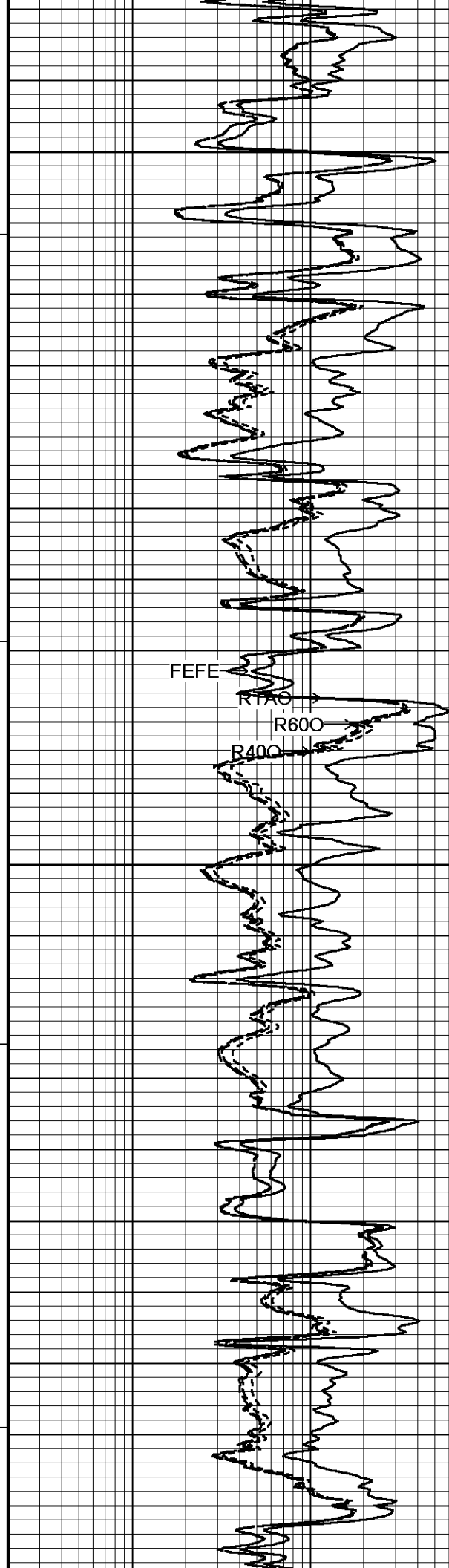
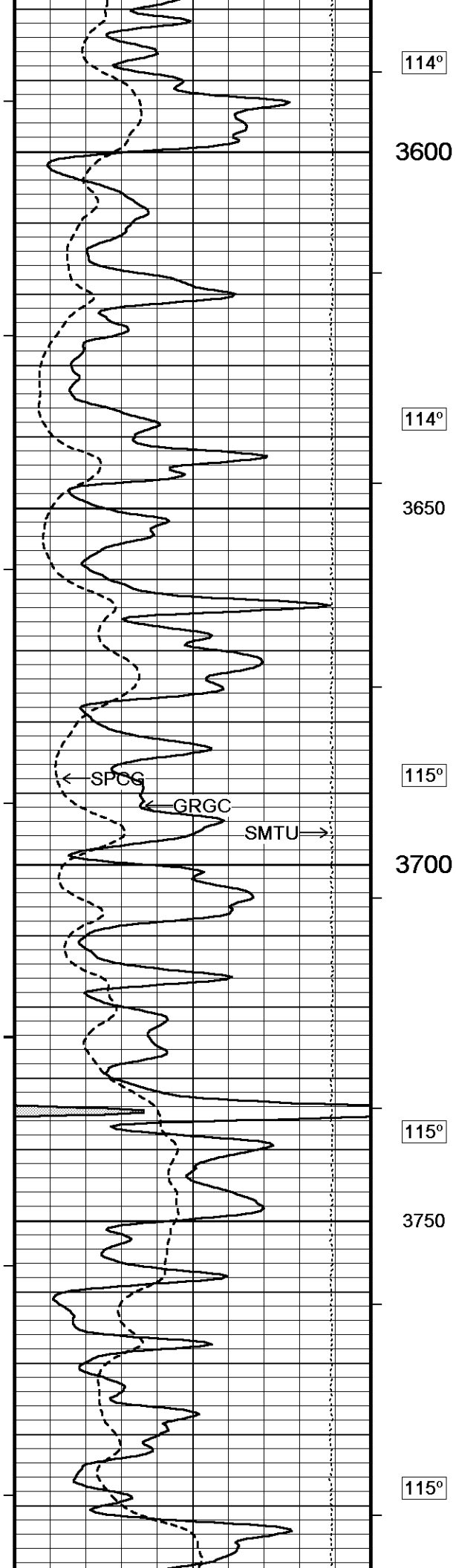


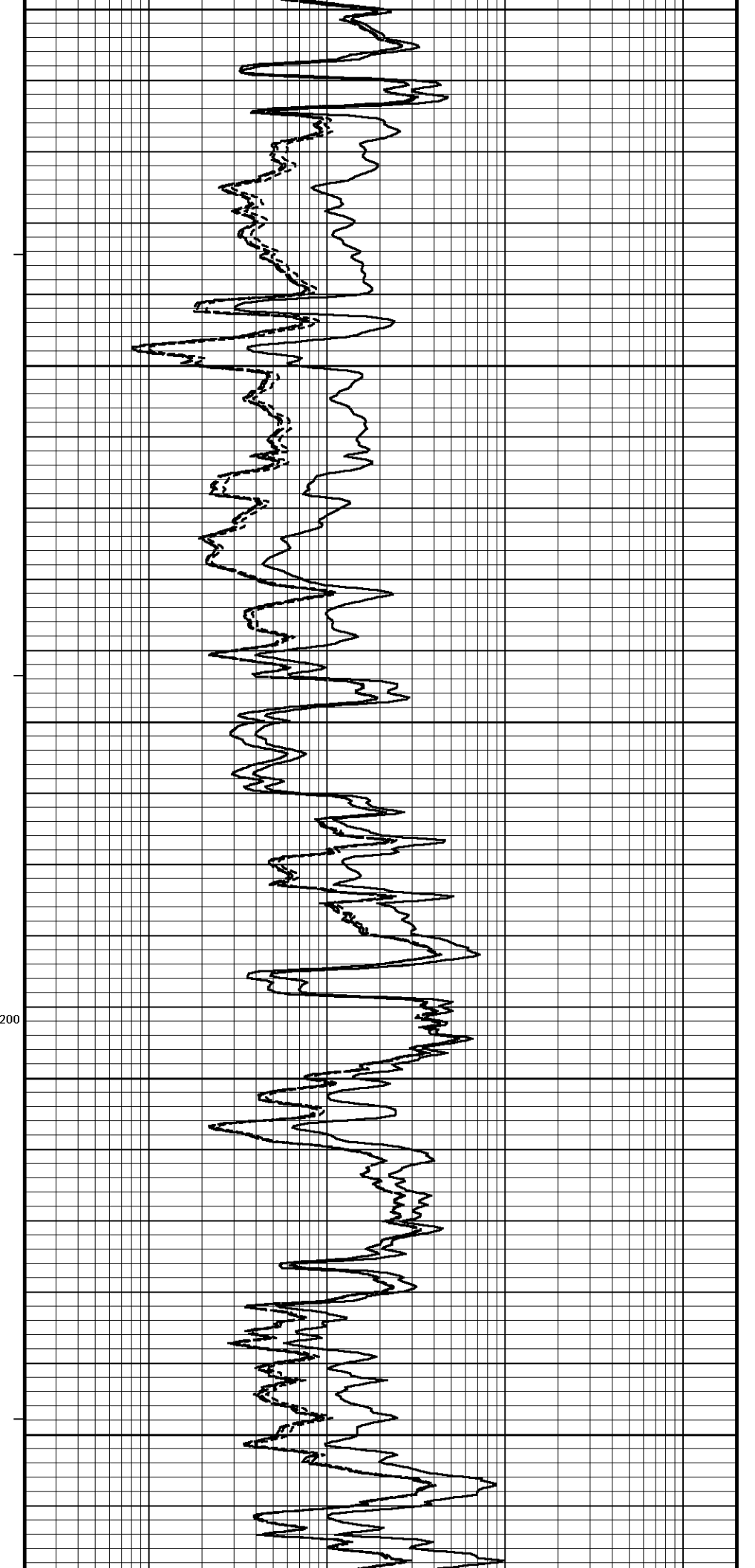
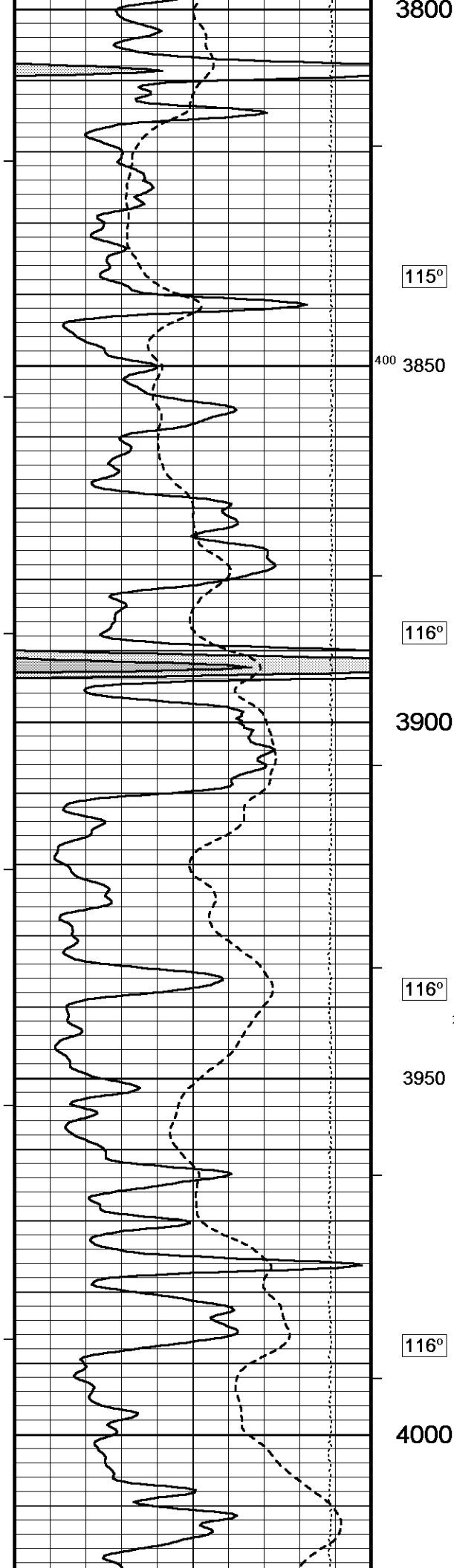


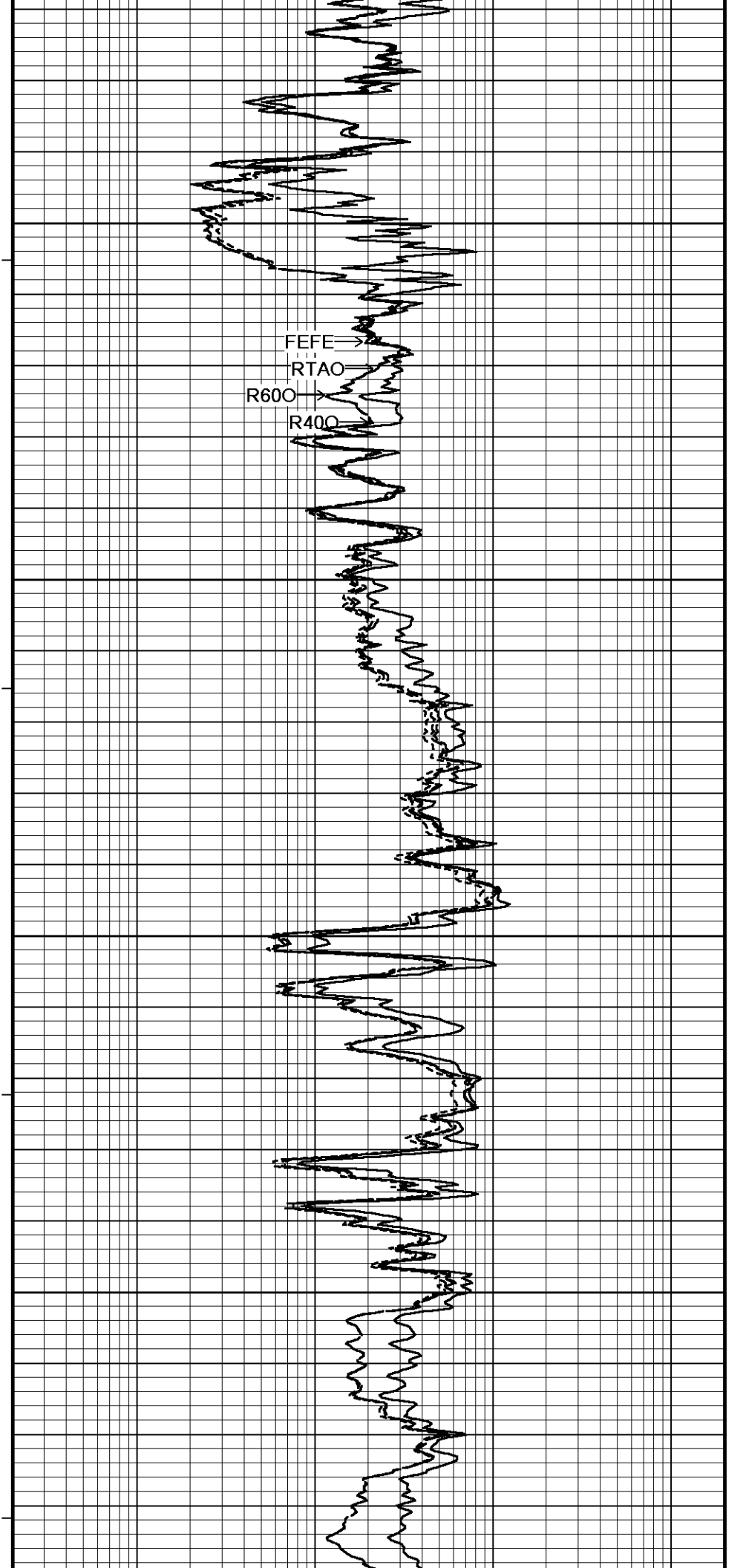
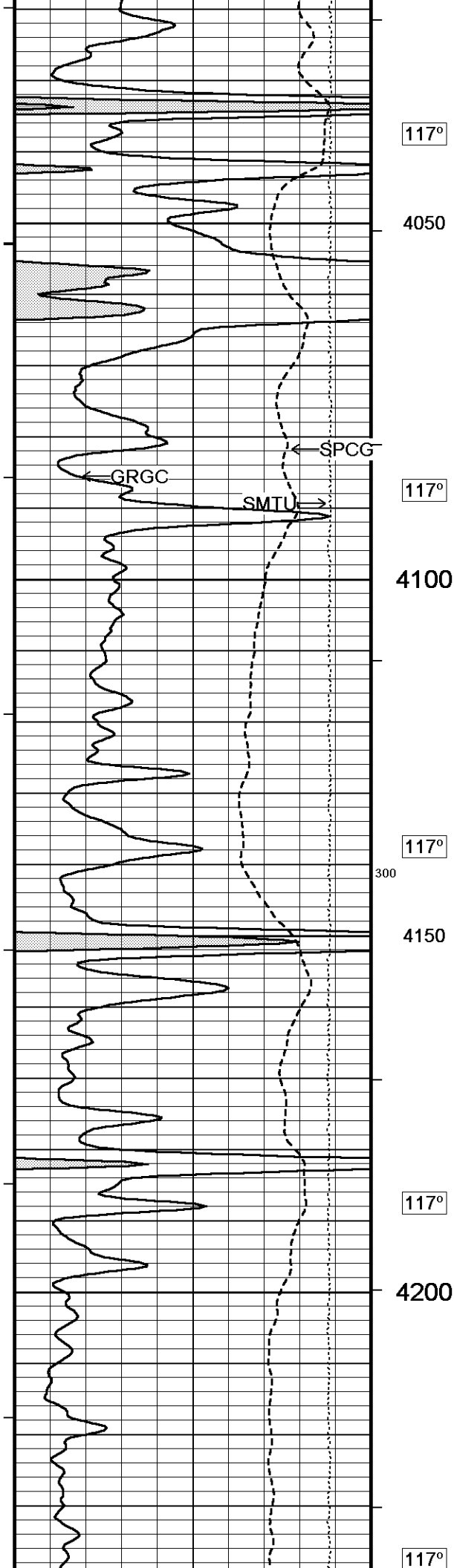


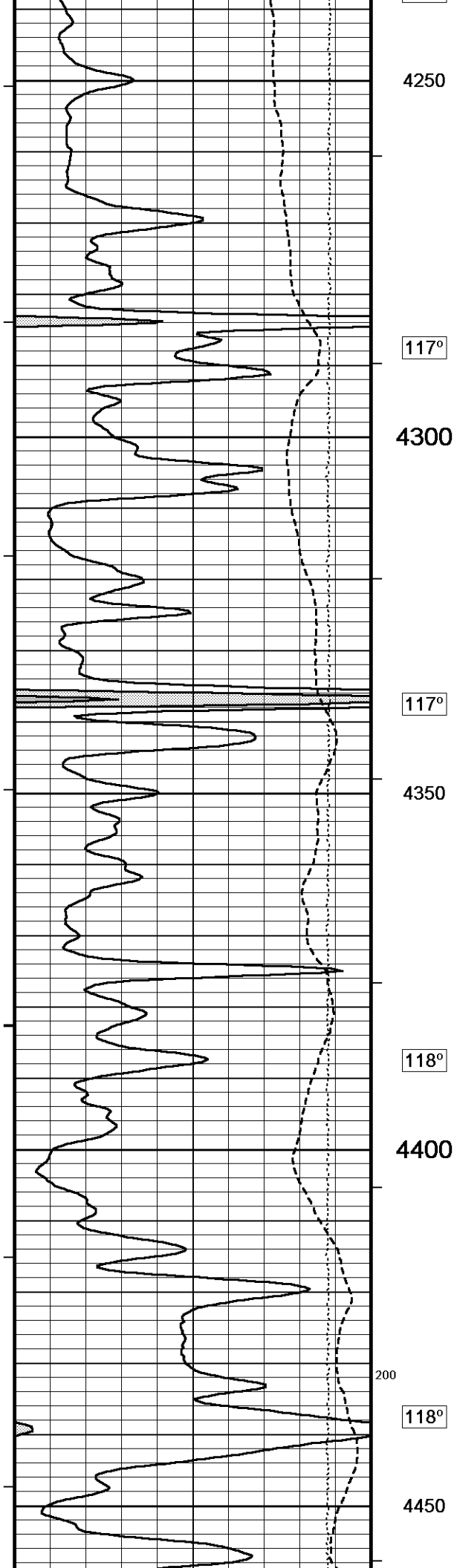










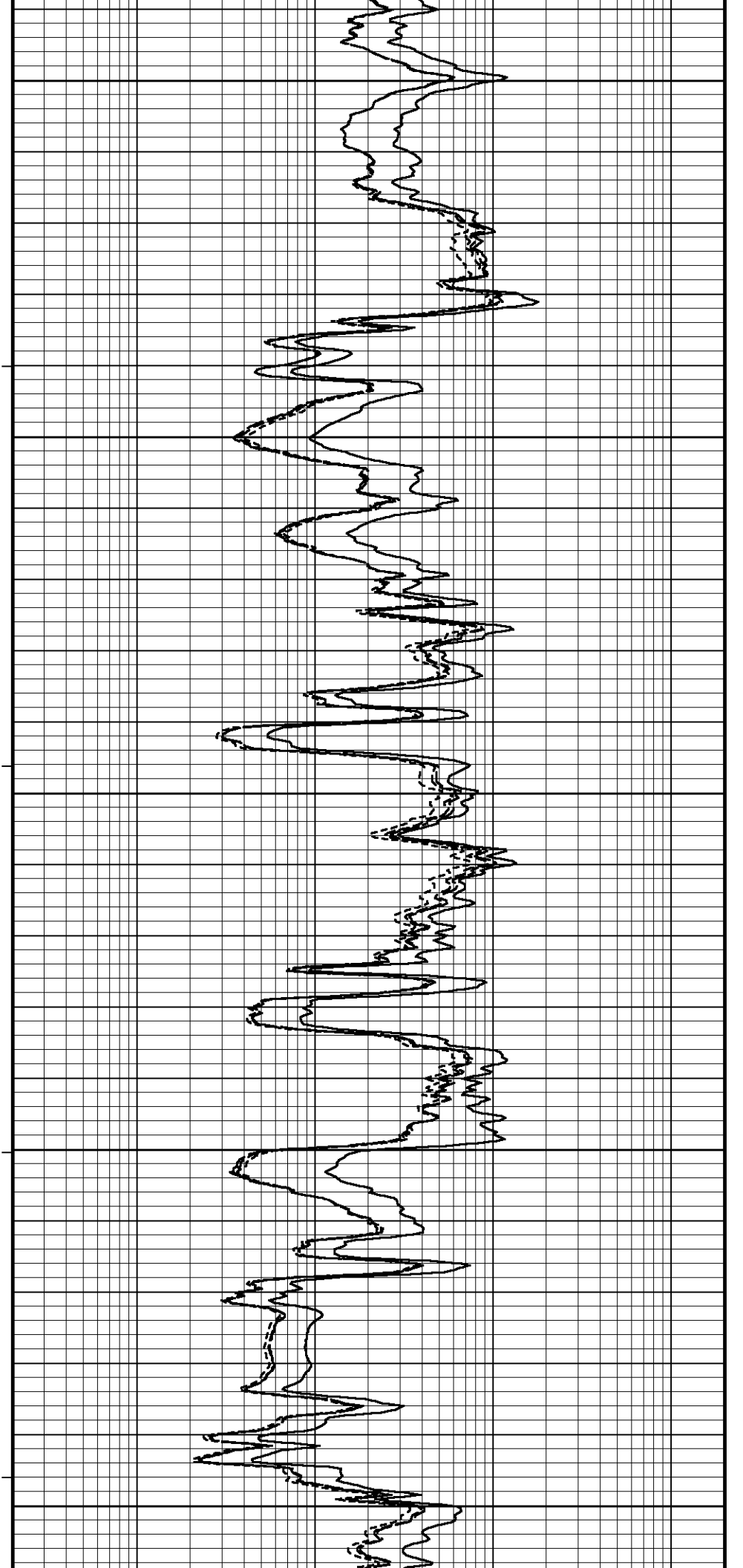


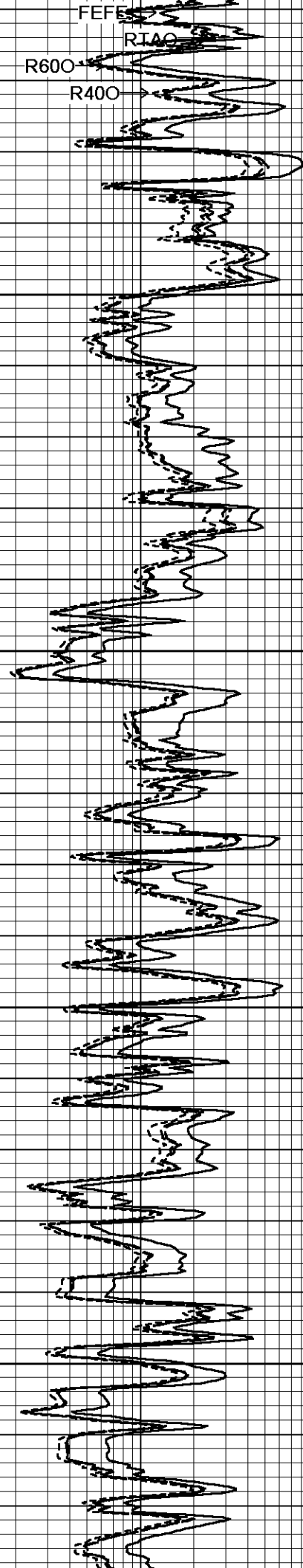
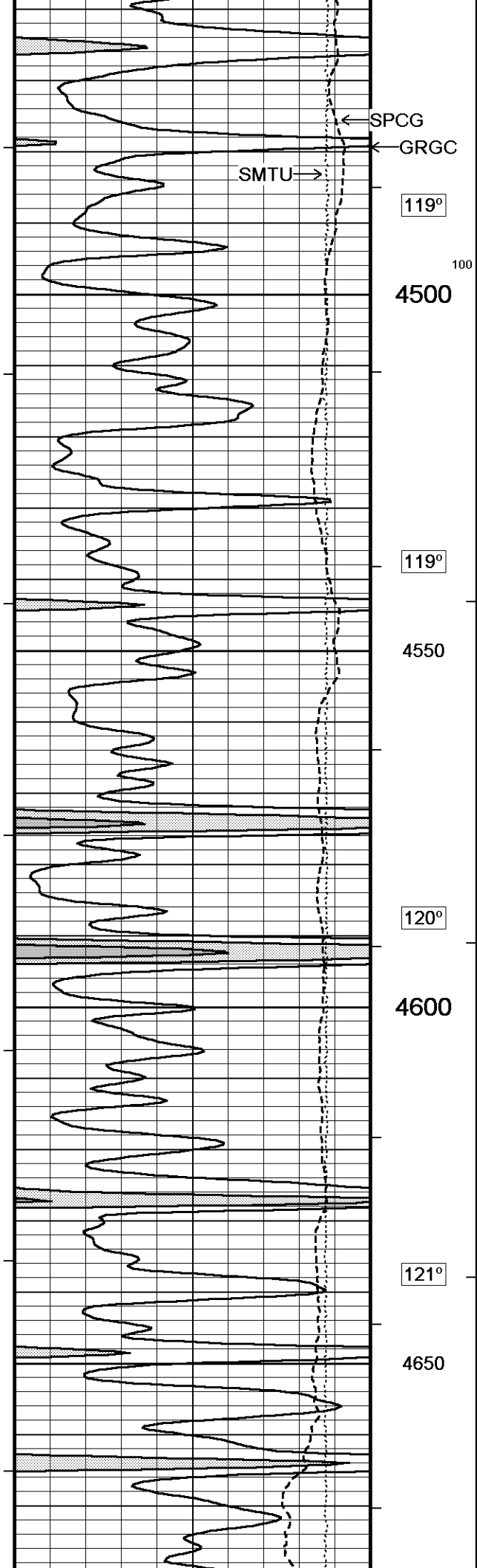
117°

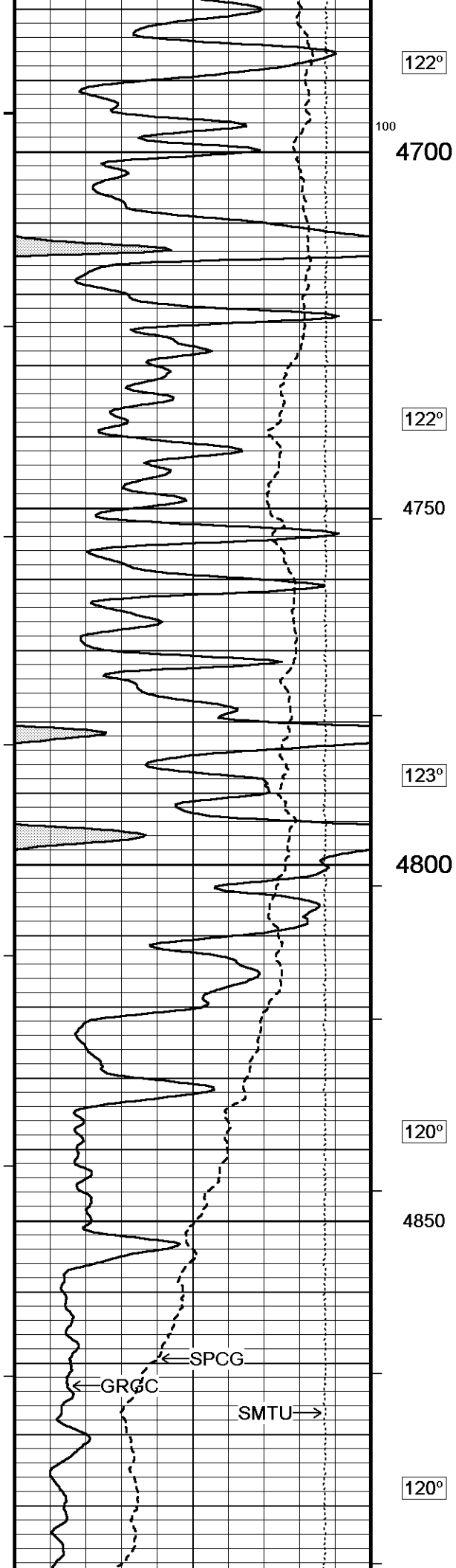
117°

118°

118°







122°

100

4700

122°

4750

123°

4800

120°

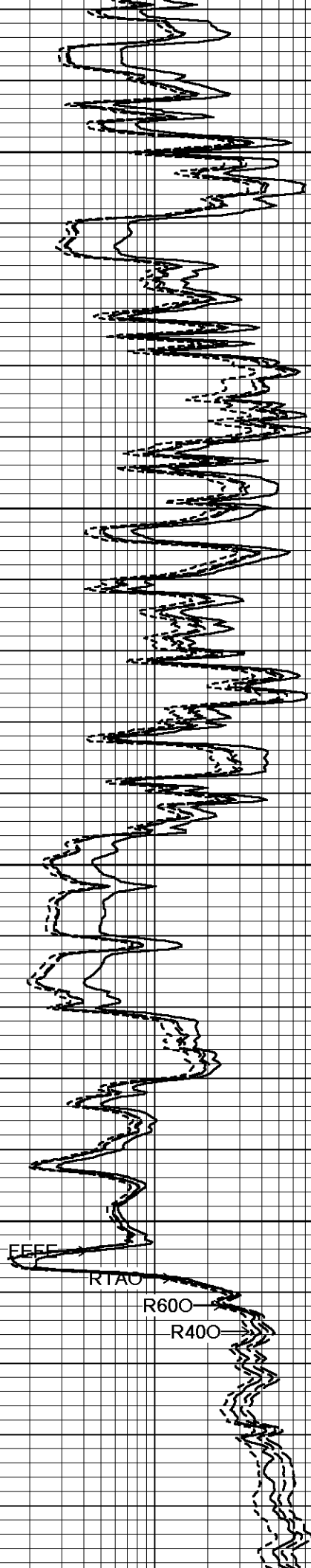
4850

120°

GRGC

SPCG

SMTU

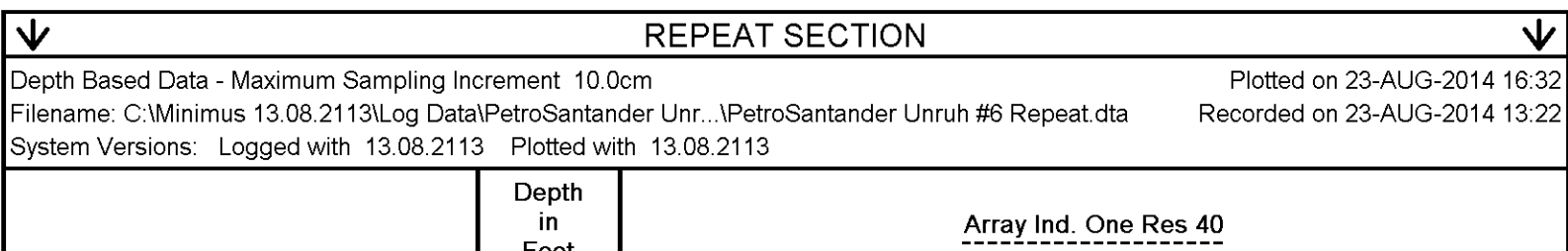
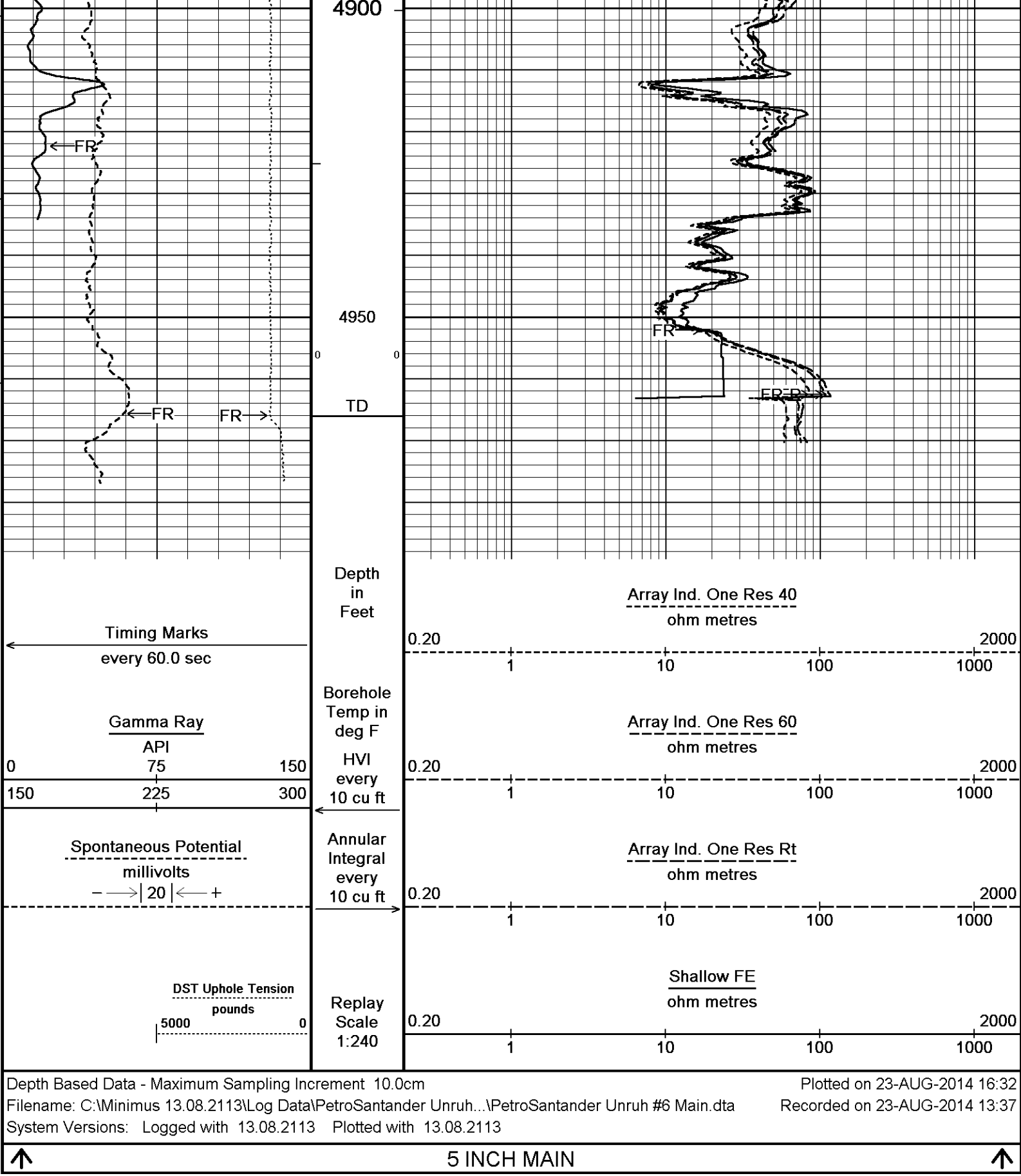


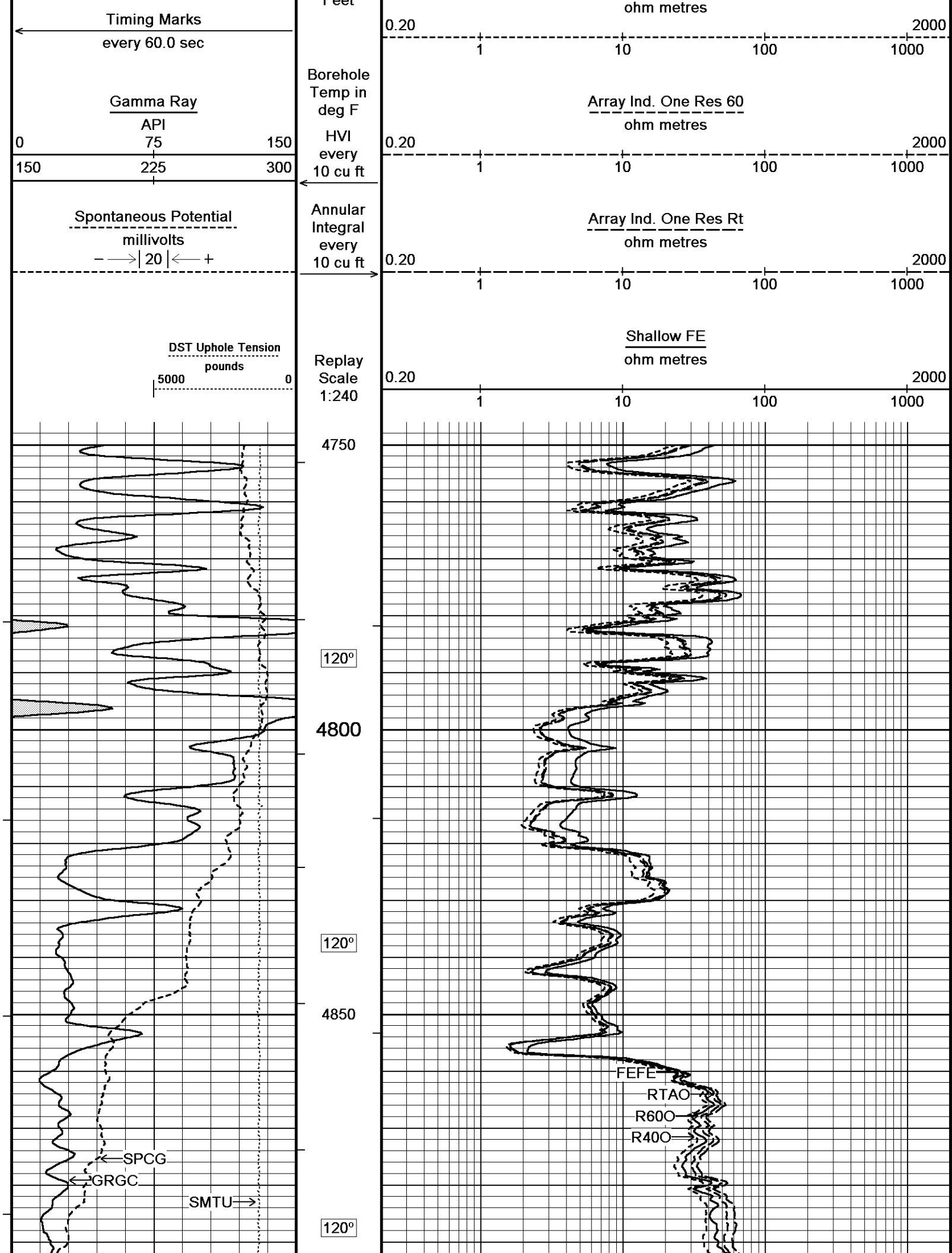
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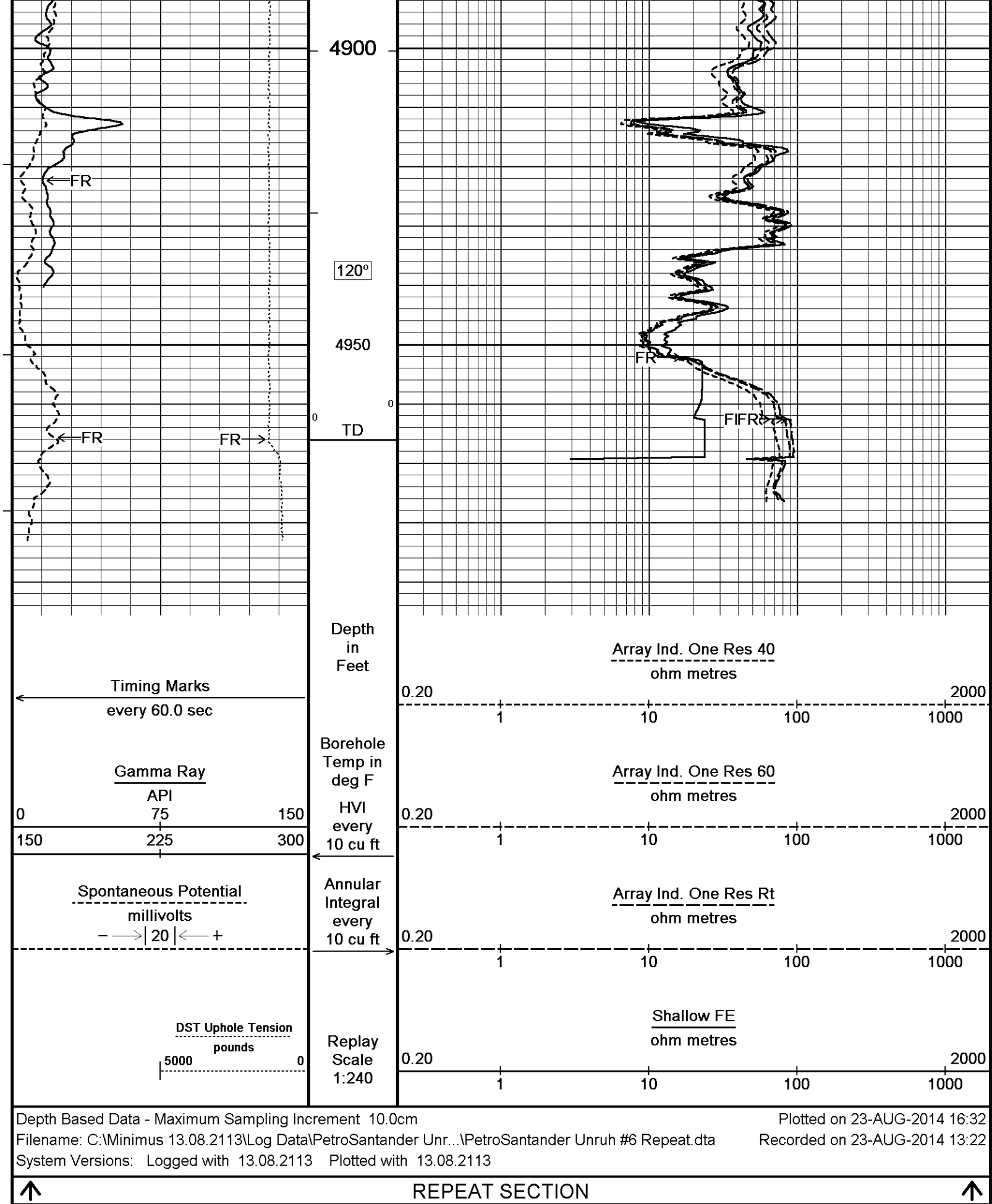
RTAO

R600

R400







BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh #6\PetroSantander Unruh #6 Main.dta

General Parameters

Mud Resistivity	1.480	ohm-metres
Mud Resistivity Temperature	75.000	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	None	

Rwa Parameters

Porosity used	Crossplot 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-B 39

Field Calibration on 23-AUG-2014 08:30

	Measured	Calibrated (API)
Background	67	45
Calibrator (Gross)	1144	770
Calibrator (Net)	1077	725

Gamma Constants MCG-B 39

Last Edited on 23-AUG-2014,12:02

Gamma Calibrator Number	GRC038	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-B 39

Field Calibration on 02-MAY-2014,08:37

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-B 39

Last Edited on 02-MAY-2014,08:36

Pre-filter Length	11
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FE Calibration MFE-A.A 135

Base Calibration on 05-AUG-2014 14:10

Field Check on 23-AUG-2014 07:22

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.8	126.8
Base Check		281.1
Field Check		281.4

FE Constants MFE-A.A 135

Last Edited on 23-AUG-2014,07:21

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Caliper Source for FE correction	Density Caliper	
Caliper Value for FE correction	N/A	inches
Rm Source for FE correction	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	
Stand-off	0.5	inches

Induction Calibration MAI-A.A 111

Base Calibration on 26-MAY-2010,08:56

Field Check on 23-AUG-2014 07:20

Base Calibration

Test Loop Calibration	Measured	Calibrated (mmho/m)
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Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel		Low	High	Low	High
1		17.6	473.6	9.3	966.2
2		6.4	385.9	7.6	821.4
3		3.2	264.0	5.2	566.0
4		2.1	135.5	2.6	279.2
Array Temperature		23.0		Deg F	
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1			13.3	3871.7	
2			30.0	3525.8	
3			29.1	3019.3	
4			19.1	2056.7	
Deep			17.8	1960.6	
Medium			43.0	3974.0	
Shallow			44.7	5229.6	
Array Temperature				78.7	Deg F

Induction Constants MAI-A.A 111				Last Edited on 23-AUG-2014,12:02	
Induction Model		RtAP-WBM			
Caliper for Borehole Corr.		Density Caliper			
Hole Size for Borehole Correction		N/A		inches	
Tool Centred		No			
Stand-off Type		Fins			
Stand-off		0.50		inches	
Number of Fins on Stand-off		8.0000			
Stand-off Fin Angle		45.00		degrees	
Stand-off Fin Width		0.5000		inches	
Borehole Corr. Rm Source		Temperature Corr			
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		
Apparent Porosity and Water Saturation Constants					
Archie Constant (A)	1.00				
Cementation Exponent (M)	2.00				
Saturation Exponent (N)	2.00				
Saturation of Water for Apor	100.00		percent		
Resistivity of Water for Apor and Sw	0.05		ohm-m		
Resistivity of Mud Filtrate for Sw	0.00		ohm-m		
Source for Rt	0.00				
Source for Rxo	0.00				

Caliper Calibration MPD-B 103			Base Calibration on 05-AUG-2014 11:04 Field Calibration on 23-AUG-2014 07:30		
Base Calibration					
Reading No		Measured	Calibrator Size (in)		
1		13922	3.99		
2		22576	5.96		
3		31328	7.98		
4		39552	9.85		
5		48880	11.92		
6		N/A	N/A		

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh #6\PetroSantander Unruh #6 Main.dta

3/8" Triple Cone Cable Head (MCB C A)

MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.244 in

Compact Comms Gamma

MCG-B 39 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity

MMR-B.A 98 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron

MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

MPD-B 103 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

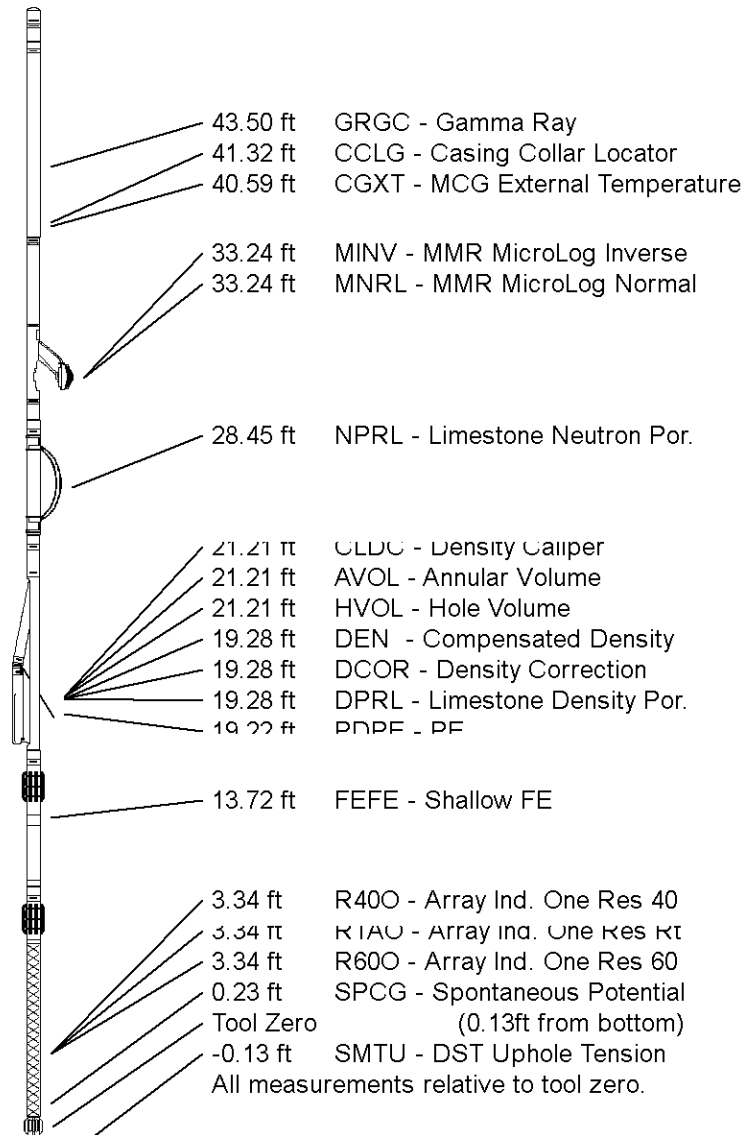
Compact Focussed Electric

MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction

MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 50.36 ft Weight: 399.0 lb



COMPANY PETROSANTANDER (USA) INC.
 WELL UNRUH #6
 FIELD CHRISTABELLE (MORROW)
 PROVINCE/COUNTY KEARNY
 COUNTRY/STATE U.S.A. / KANSAS

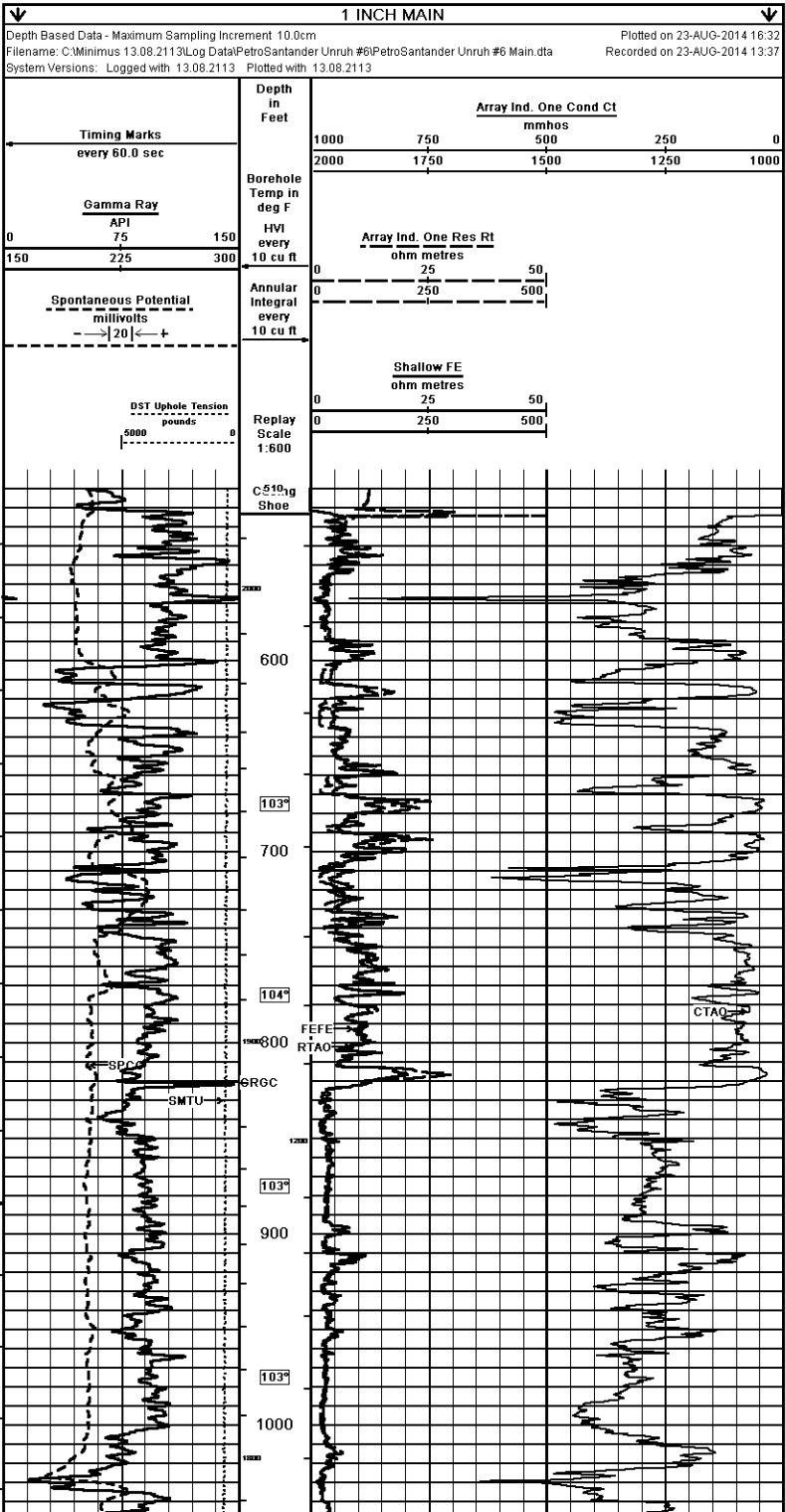
Elevation Kelly Bushing	3075.00	feet	First Reading	4962.66	feet
Elevation Drill Floor	3073.00	feet	Depth Driller	4970.00	feet
Elevation Ground Level	3063.00	feet	Depth Logger	4966.00	feet

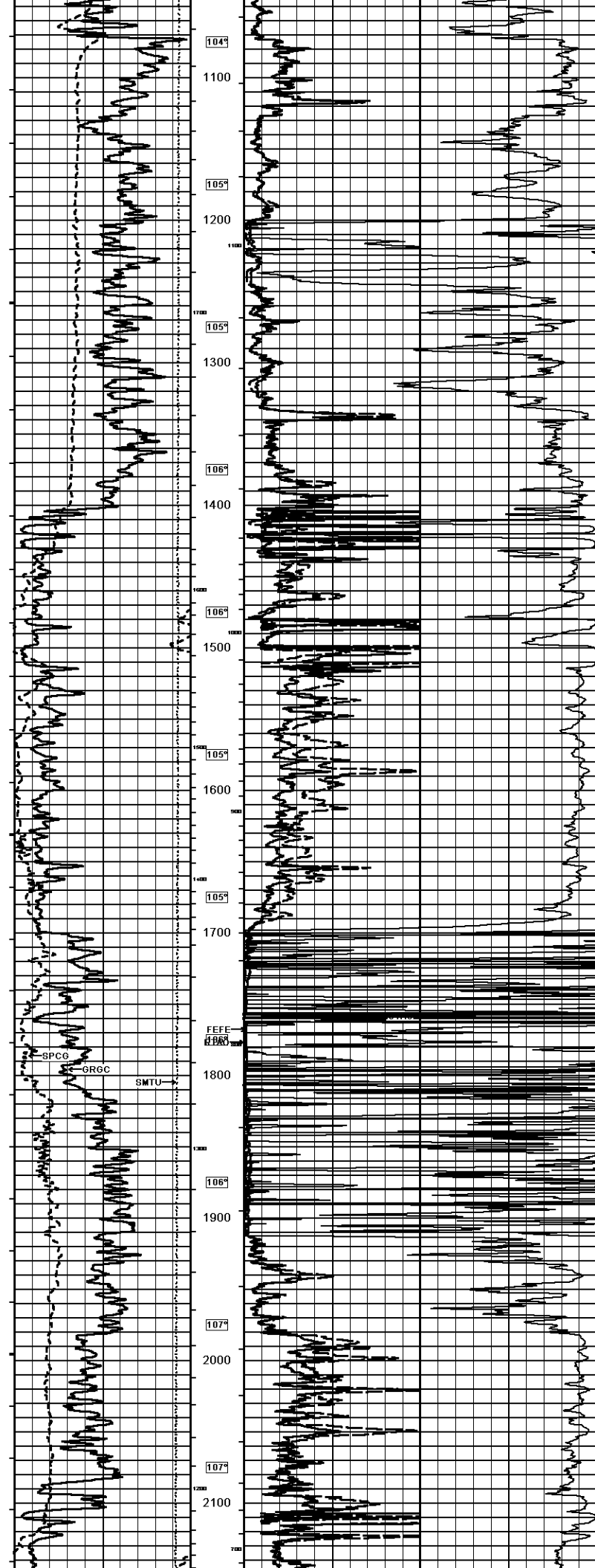


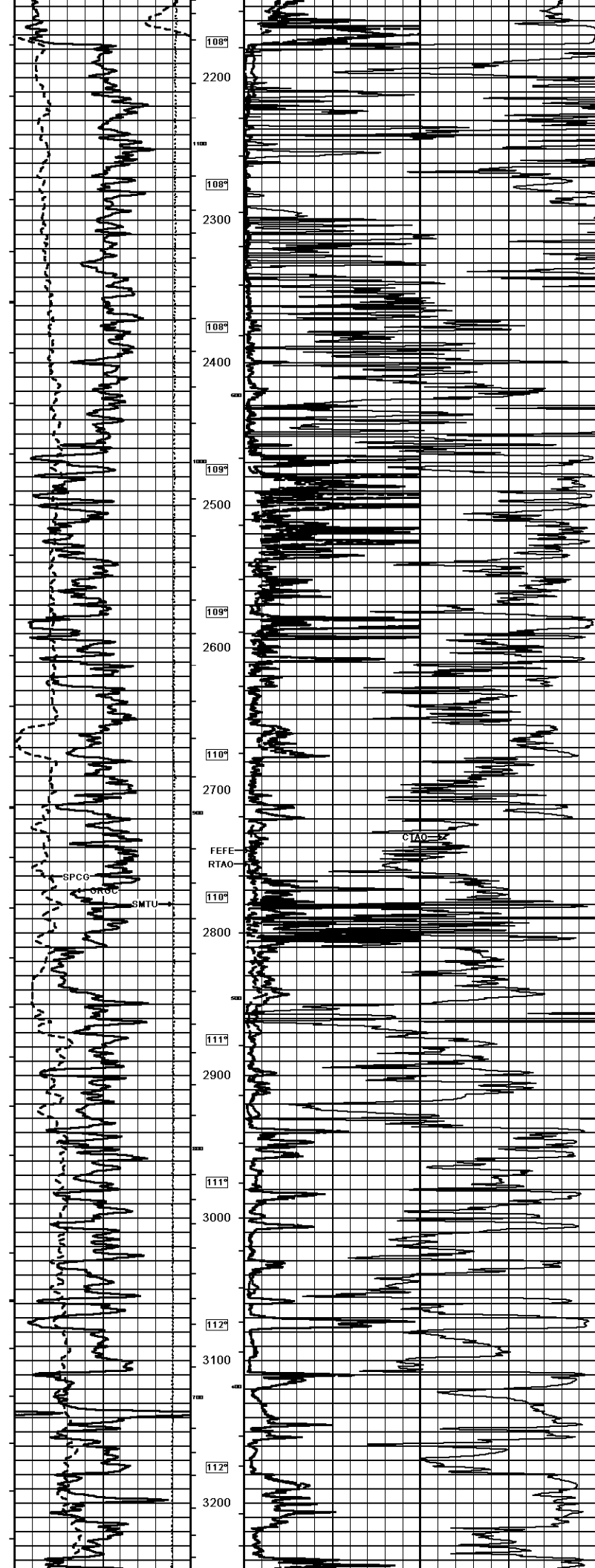
ARRAY INDUCTION
 SHALLOW FOCUSED
 ELECTRIC LOG

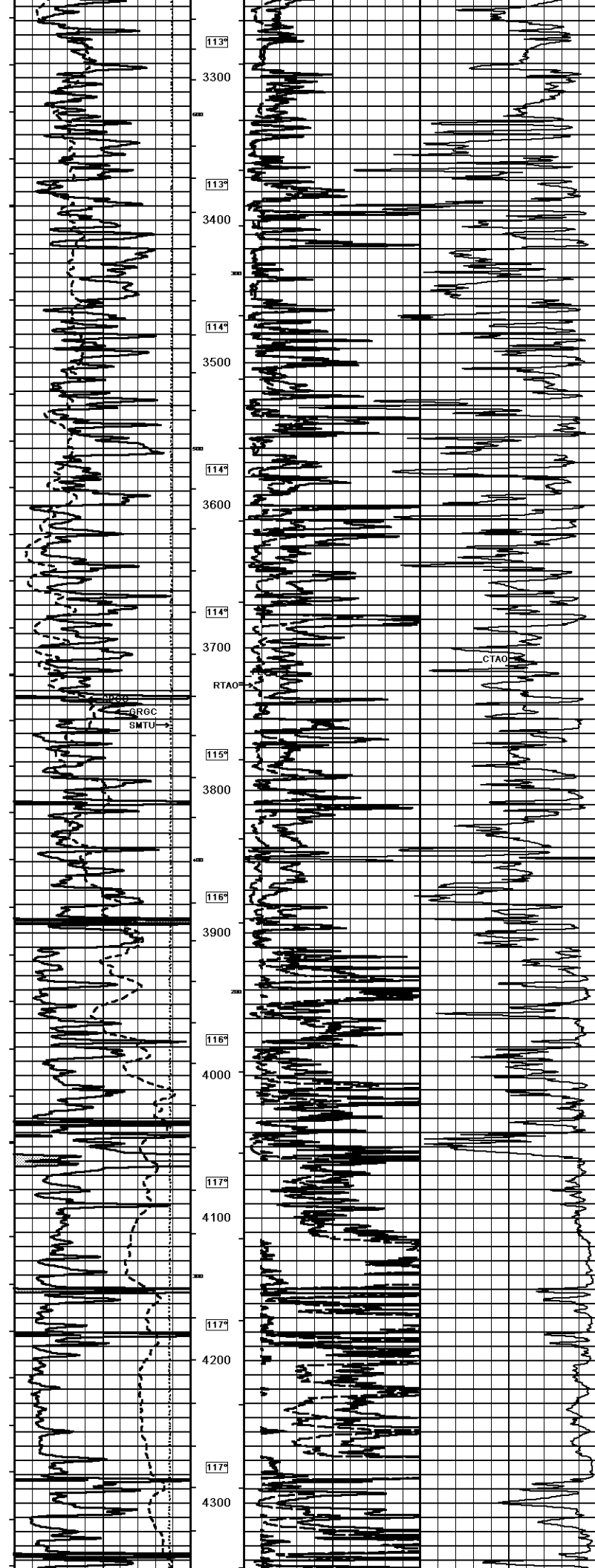
Weatherford®

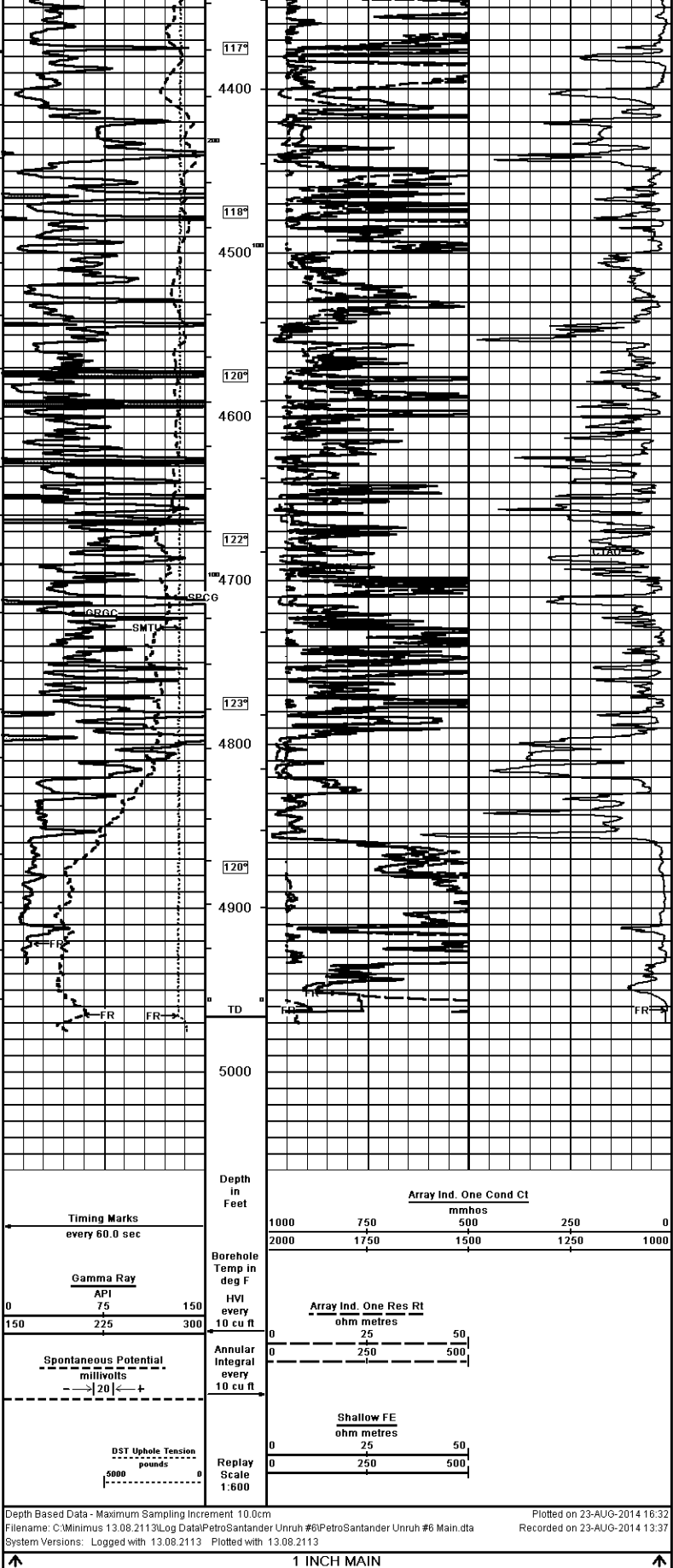
Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY PETROSANTANDER (USA) INC.		UNRUH #6	
WELL CHRISTABELLE (MORROW)		PROVINCE/COUNTY KEARNY	
COUNTRY/STATE U.S.A. / KANSAS		LOCATION 1305 FMI & 1285 FEL	
SEC 13 TWP 21S RGE 35W		MWD/MDN	
Latitude 37.50321925		Longitude -97.75030000	
Elevation 3073.00		MWD/MDN	
Permanent Datum G.L. Elevation 3003 feet		Log Measured From KB @ 12 FEET	
Drilling Measured From KB @ 12 FEET		Standards 1000 3073.00 3073.00	
Date 23-AUG-2014		MWD/MDN	
Run Number ONE		Service Order 7960-95982809	
Depth Driller 4970.00		Depth Logger 4966.00	
First Reading 4962.00		Last Reading 5230.00	
Casing Driller 5230.00		Casing Logger 5230.00	
Bit Size 7.875		Hole Fluid Type WBM	
Density/Viscosity 8.30		BH Fluid Loss NONE	
Sample Source MDPRT		Run @ Measured Temp 0.67 @ 75.0	
Run @ Measured Temp 0.46 @ 75.0		Run @ Measured Temp 0.88 @ 75.0	
Source Rmt / Rmt CALC		Run @ BHT 0.37 @ 20.0	
Time Since Circulation 4 HOURS		Max Recorded Temp 123.00	
Equipment Base 13006		Recorded By DEREK CARTER	
Assessed By WES HANSEN		JAKE HINES	
UNRUH #6		LEH 14 247	











Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-AUG-2014 16:32
Filename: C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh #6\PetroSantander Unruh #6 Main.dta
Recorded on 23-AUG-2014 13:37
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

COMPANY		PETROSANTANDER (USA) INC.			
WELL		UNRUH #6			
FIELD		CHRISTABELLE (MORROW)			
PROVINCE/COUNTY		KEARNY			
COUNTRY/STATE		U.S.A. / KANSAS			
Elevation Kelly Bushing	3075.00	feet	First Reading	4962.66	feet
Elevation Drill Floor	3073.00	feet	Depth Driller	4970.00	feet
Elevation Ground Level	3063.00	feet	Depth Logger	4966.00	feet

