



Weatherford

MICRORESISTIVITY 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				MPD/MDN			
Latitude			MAI/MFE							
Longitude										
API Number	15-093-21925									
Permanent Datum GL, Elevation 3063 feet										
Log Measured From KB										
Drilling Measured From KB @ 12 FEET										
Date	23-AUG-2014									
Run Number	ONE									
Service Order	7960-95982809									
Depth Driller	4970.00					feet				
Depth Logger	4966.00					feet				
First Reading	4932.76					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

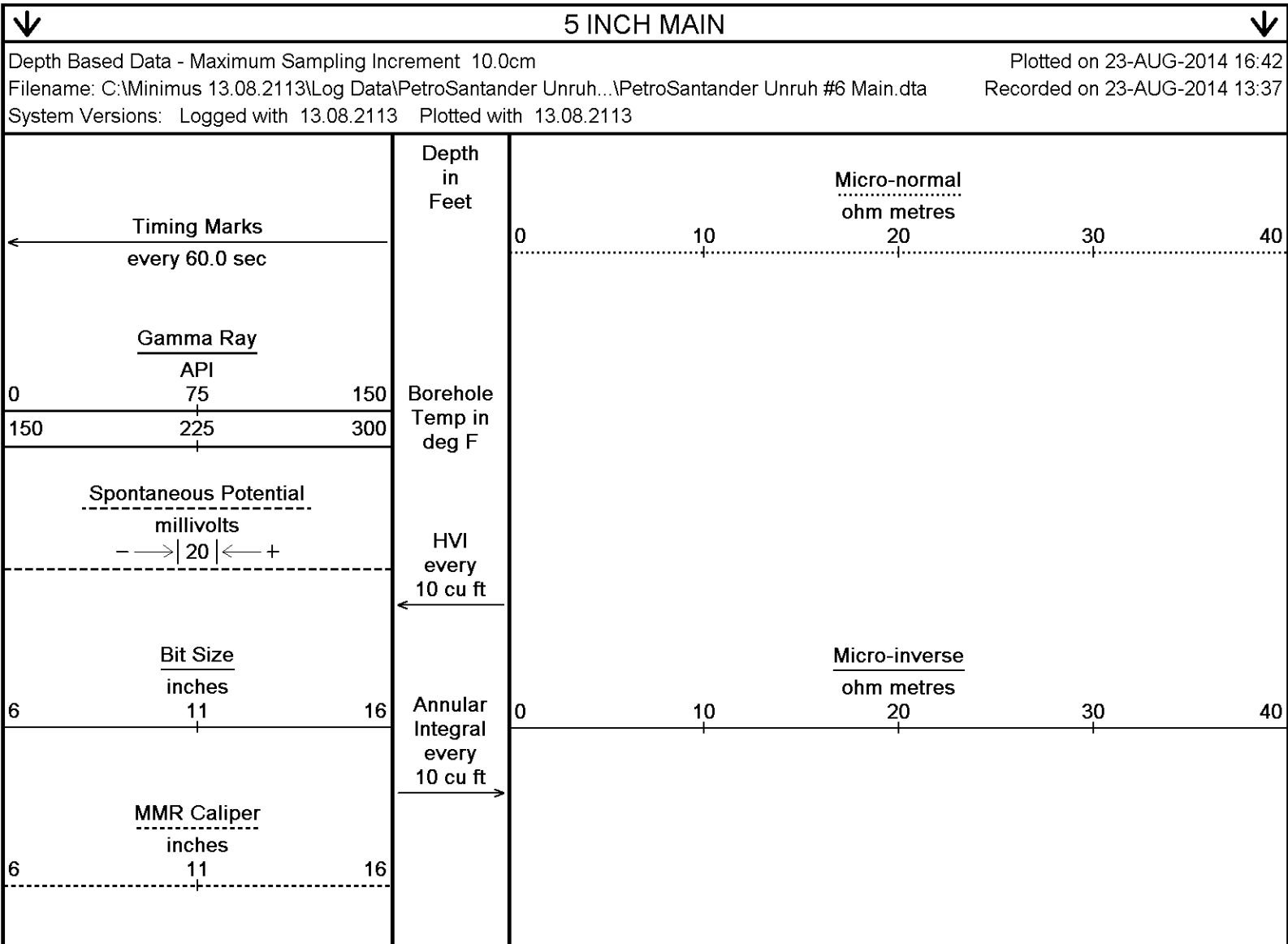
- JUNIOR FIELD ENGINEER: JAKE HINES

- 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.



DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

508

Casing
Shoe

MINV
MNRL

550

2000

102°

600

103°

650

103°

700

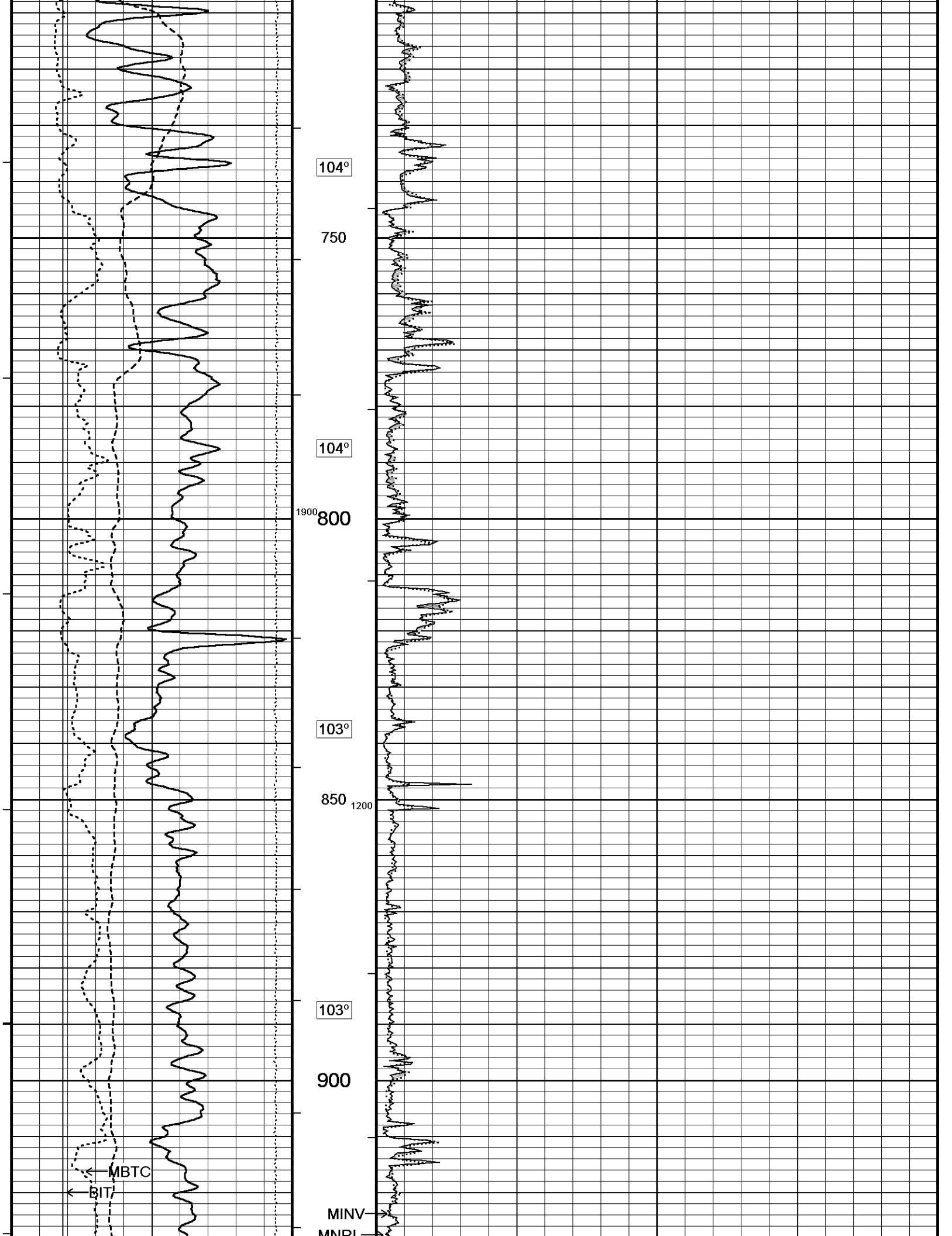
MBTC

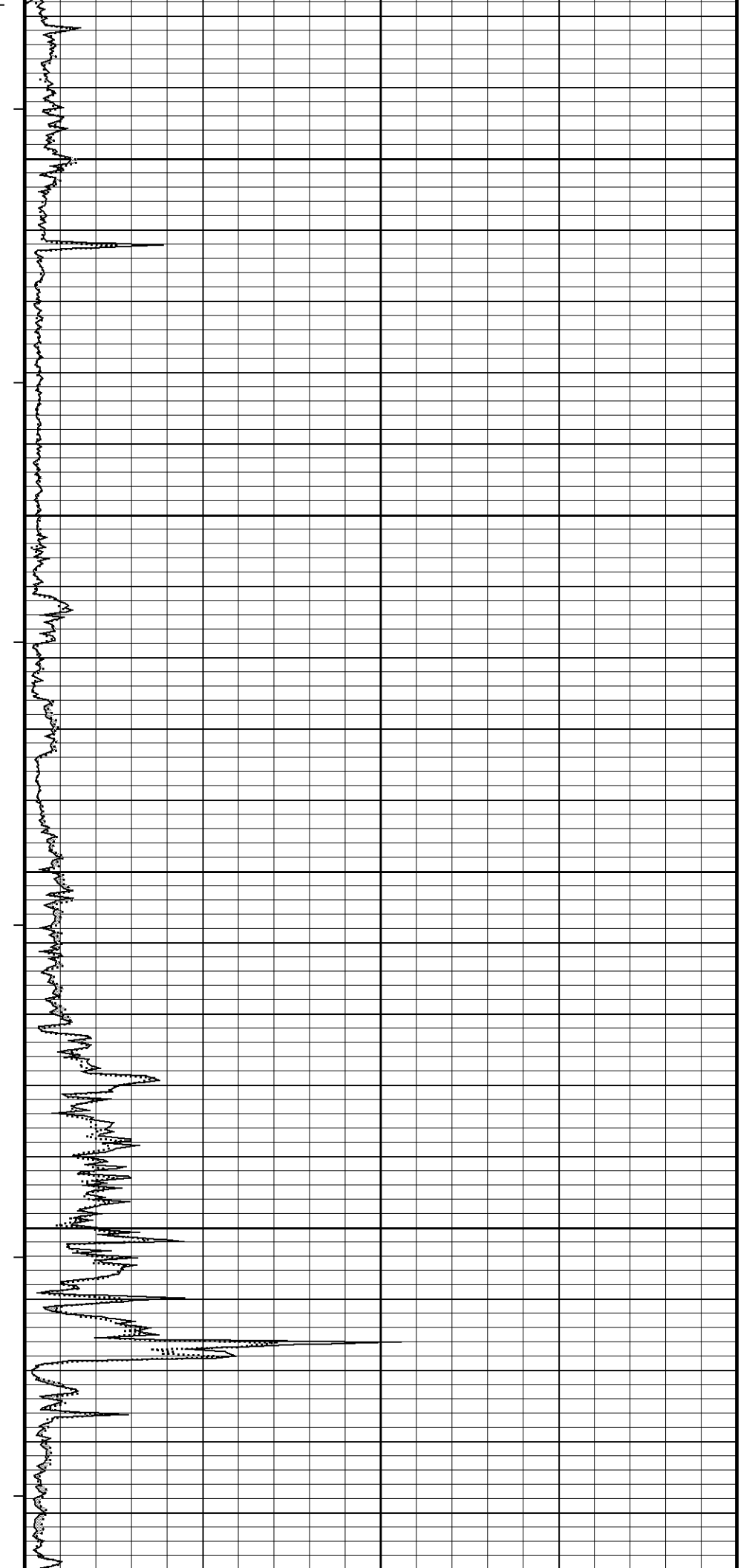
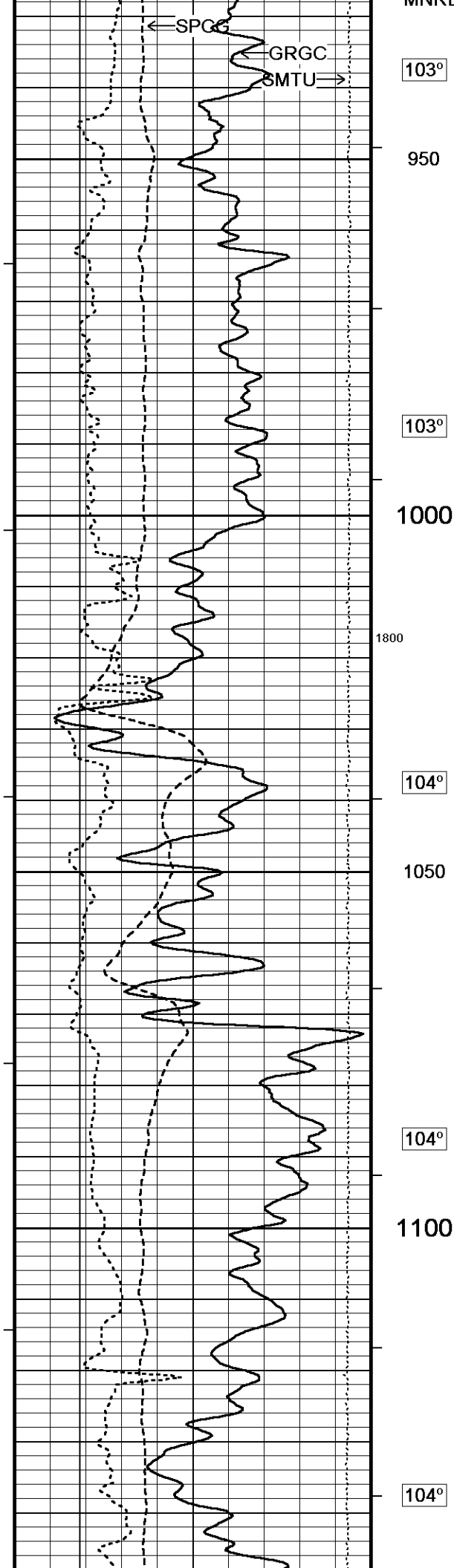
BIT

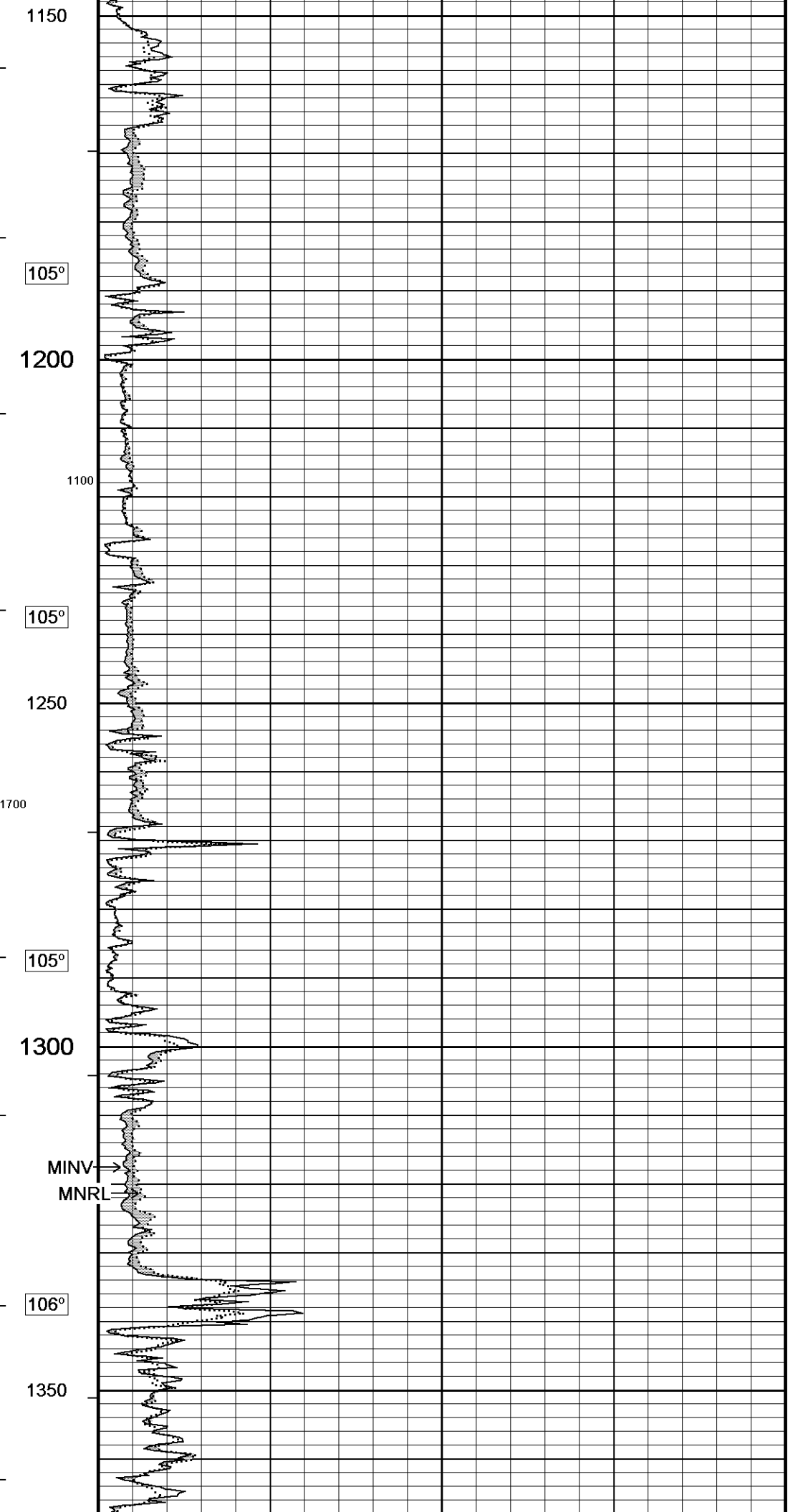
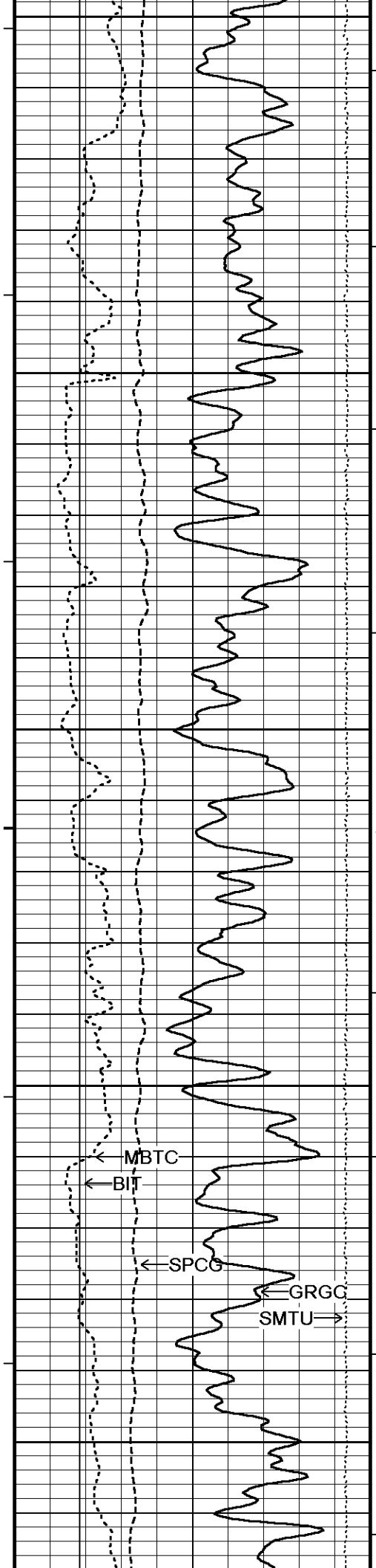
SPCG

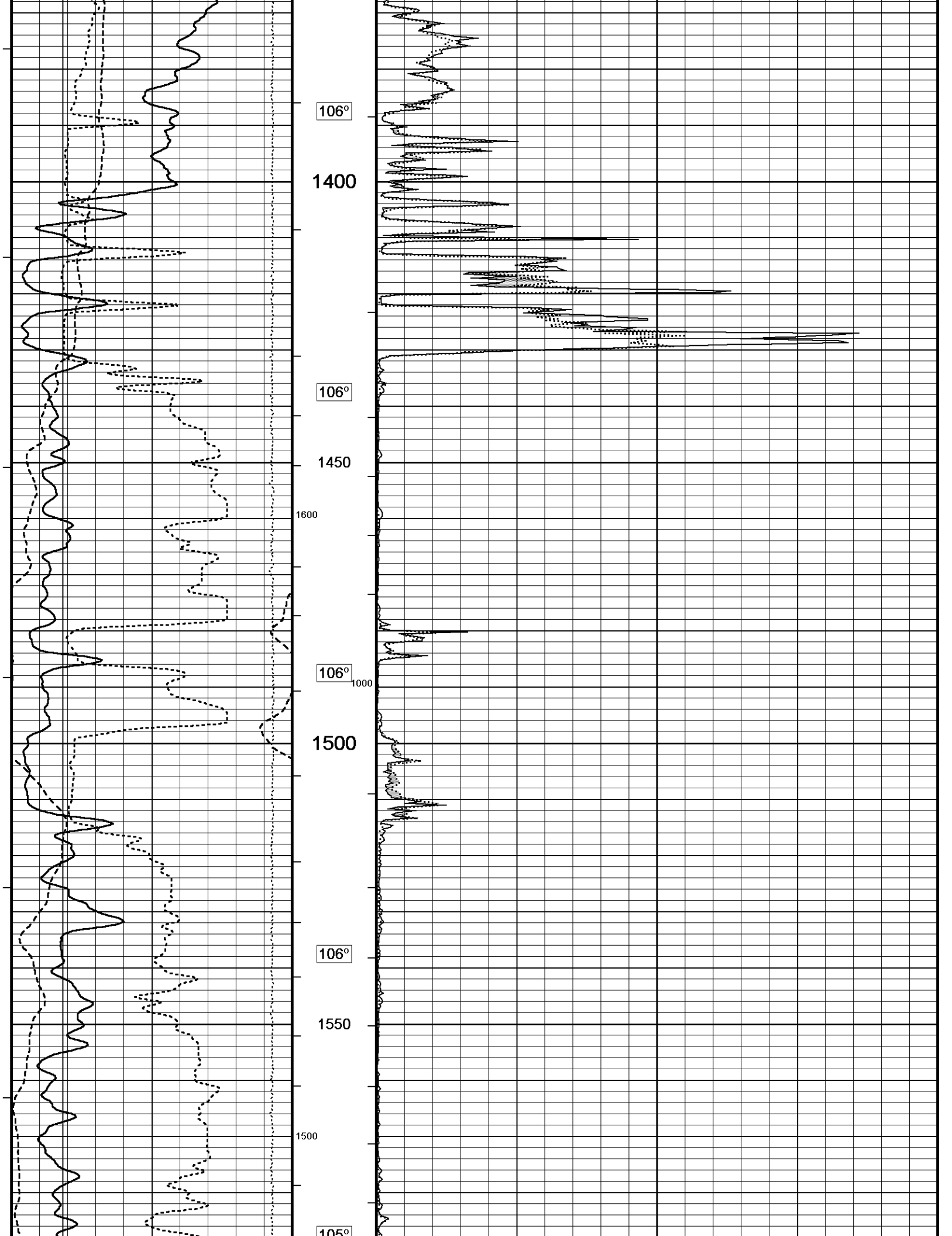
GRGC

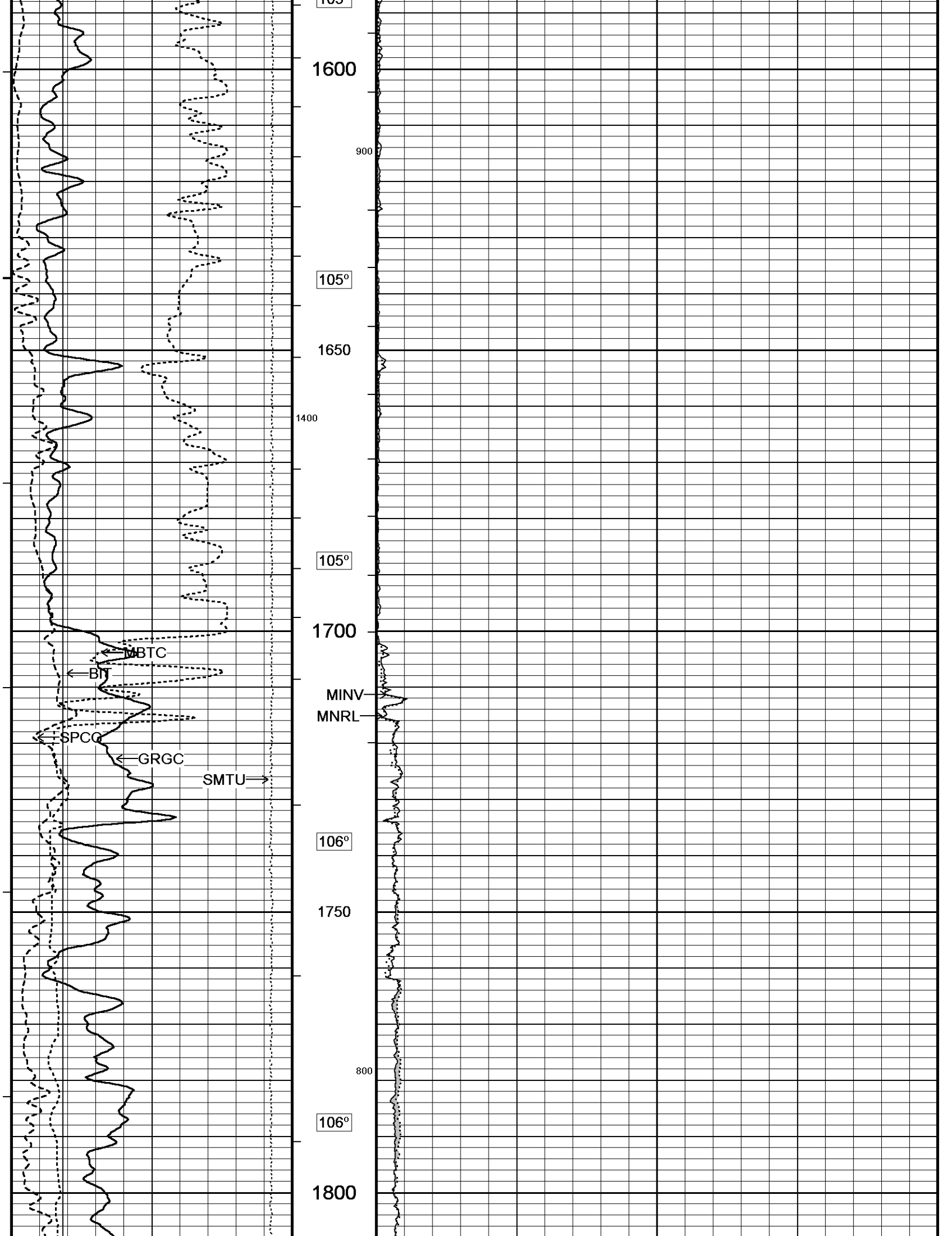
SMTU

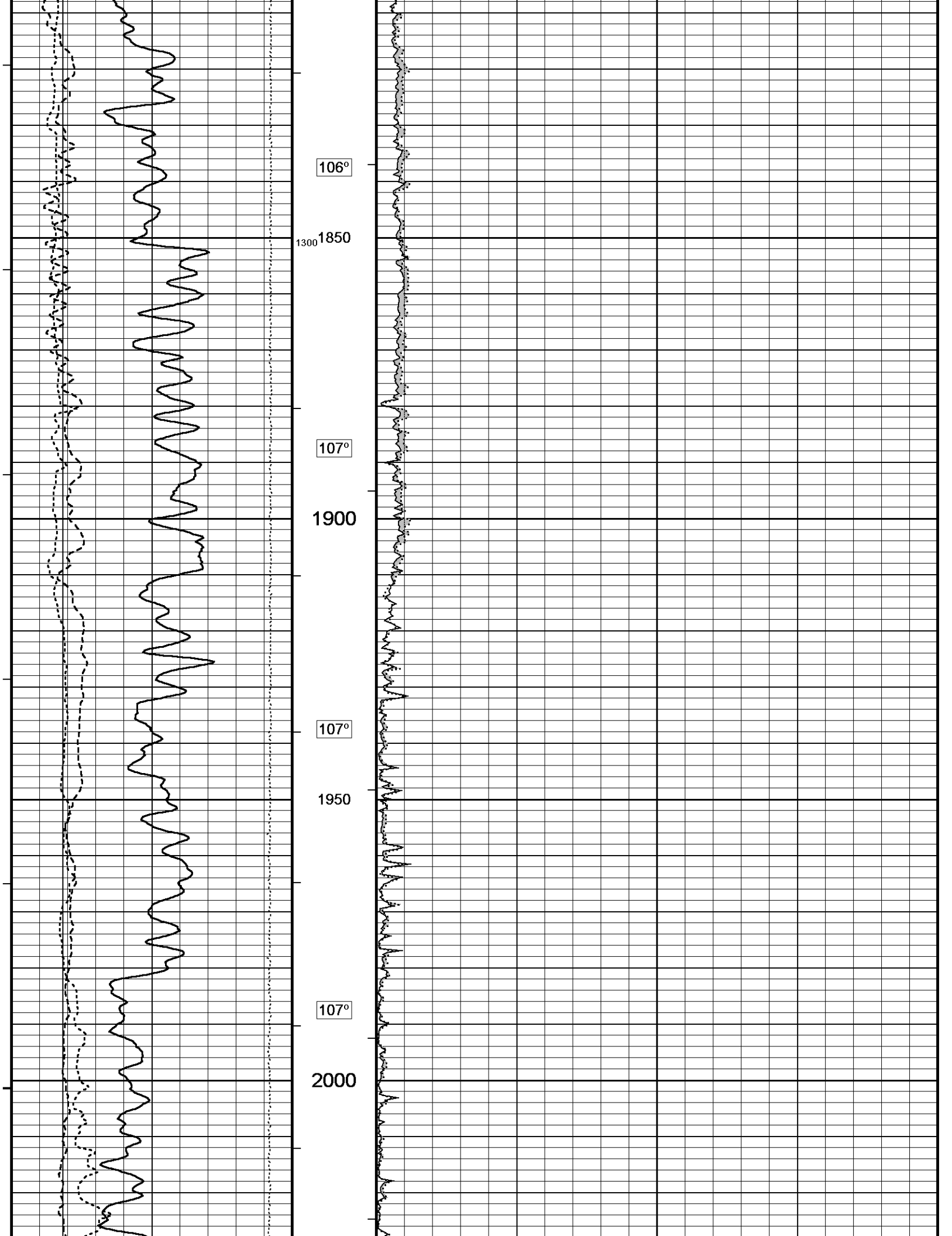


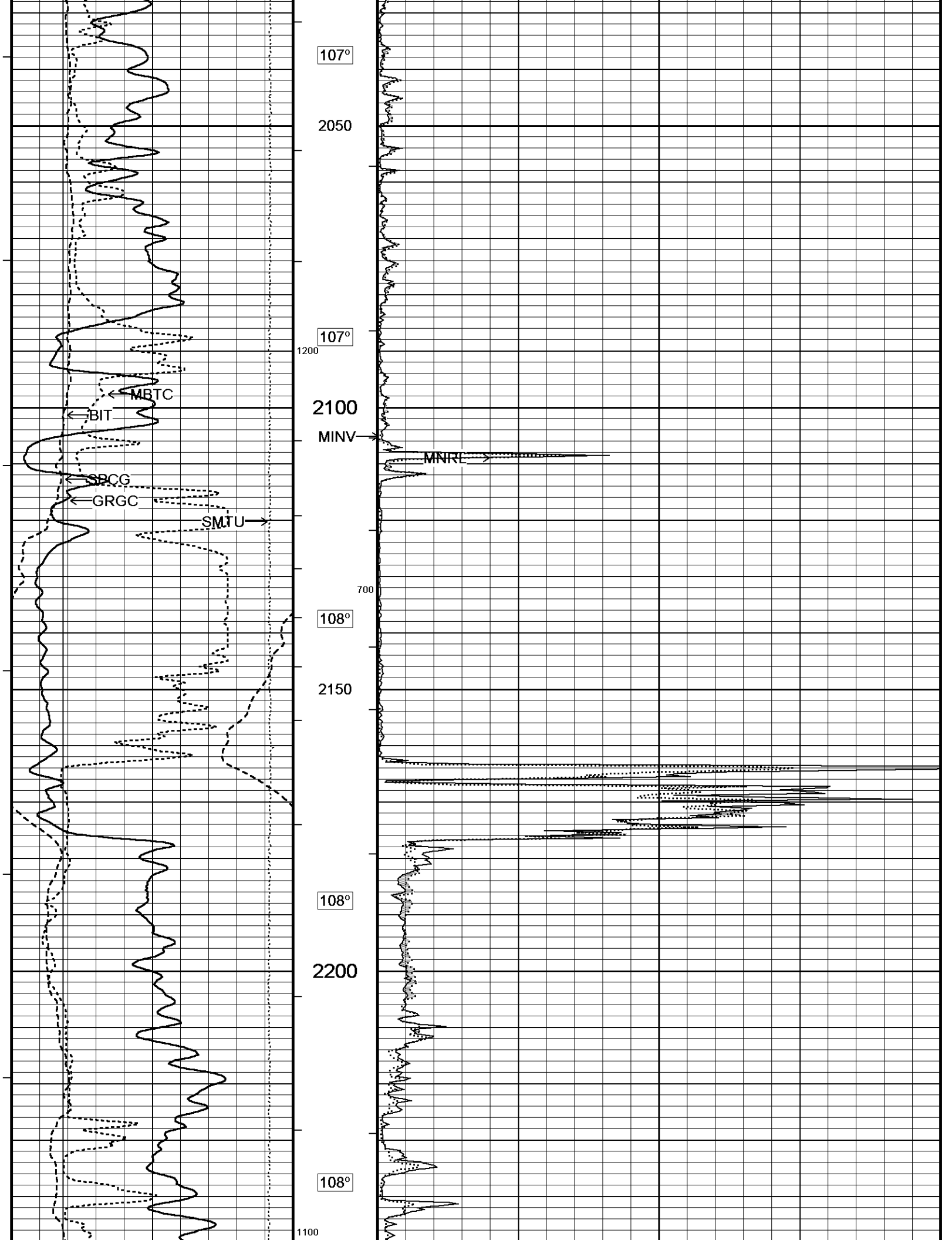


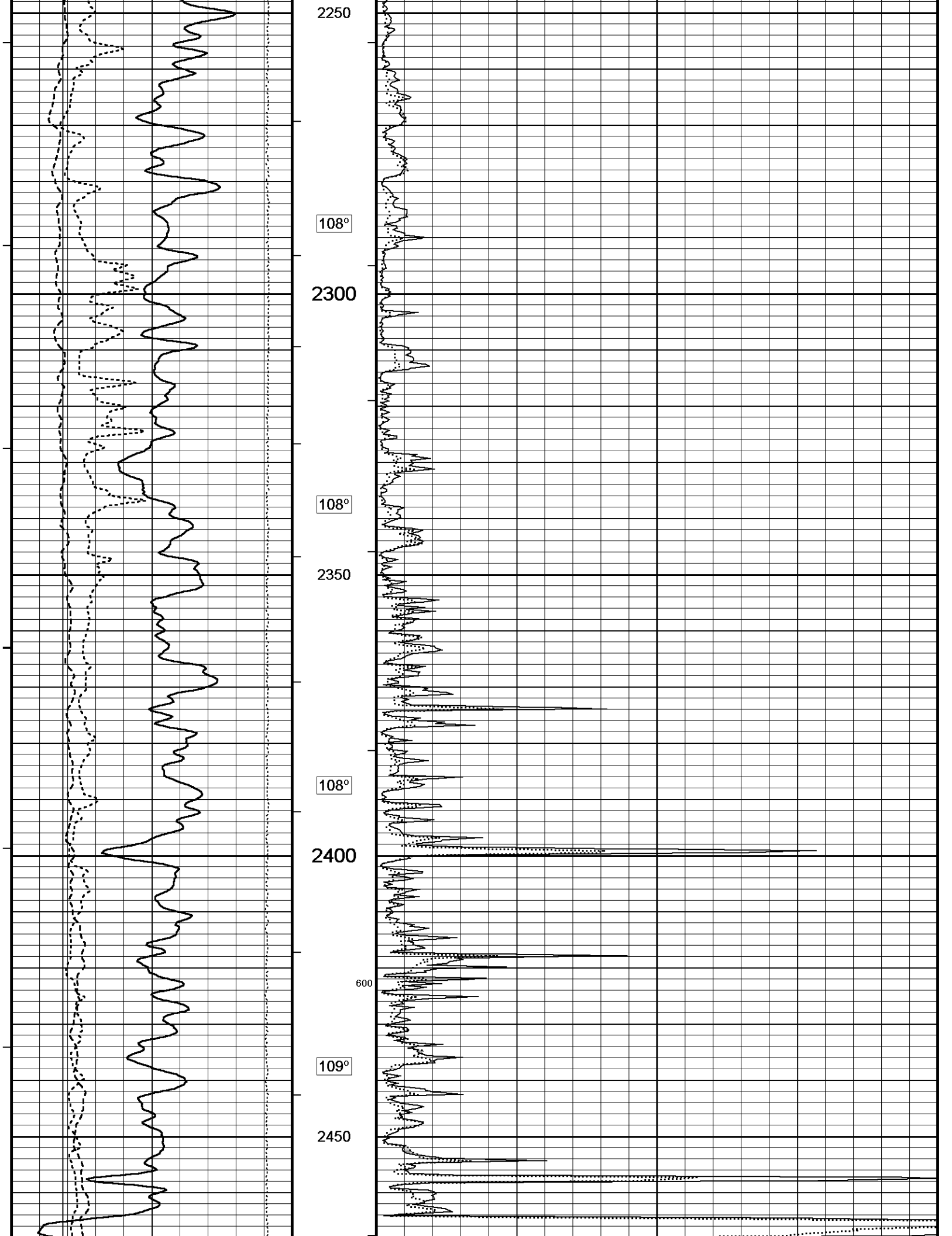


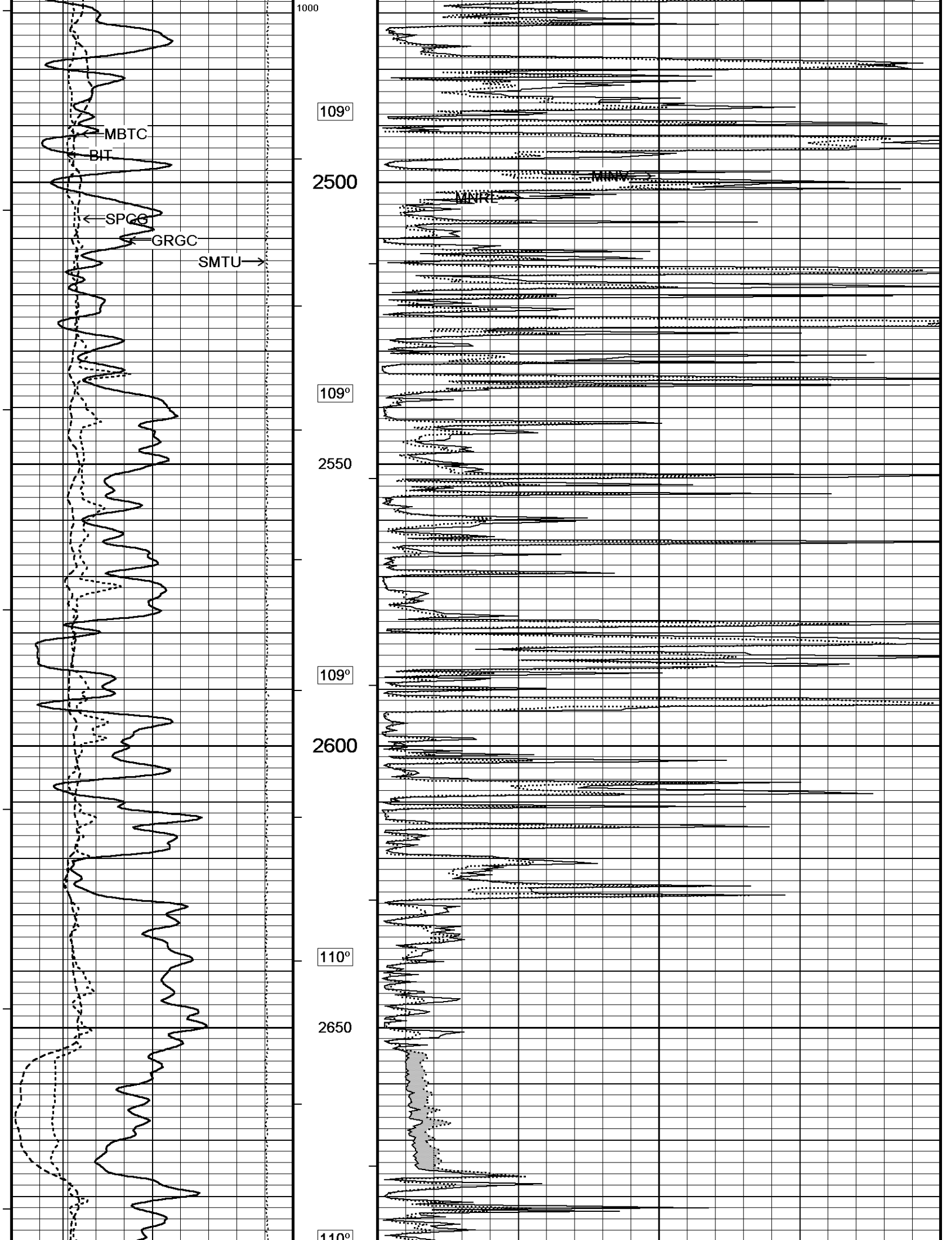


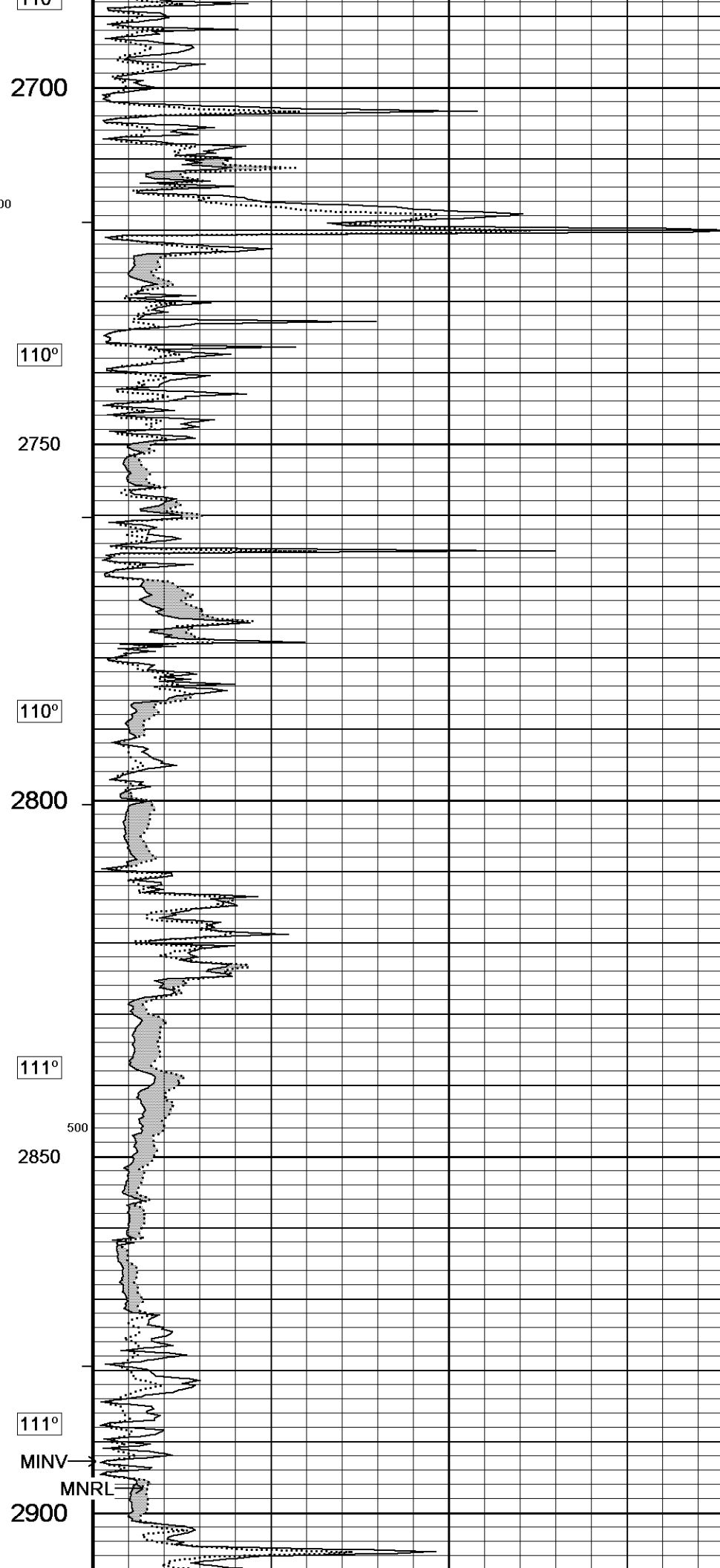
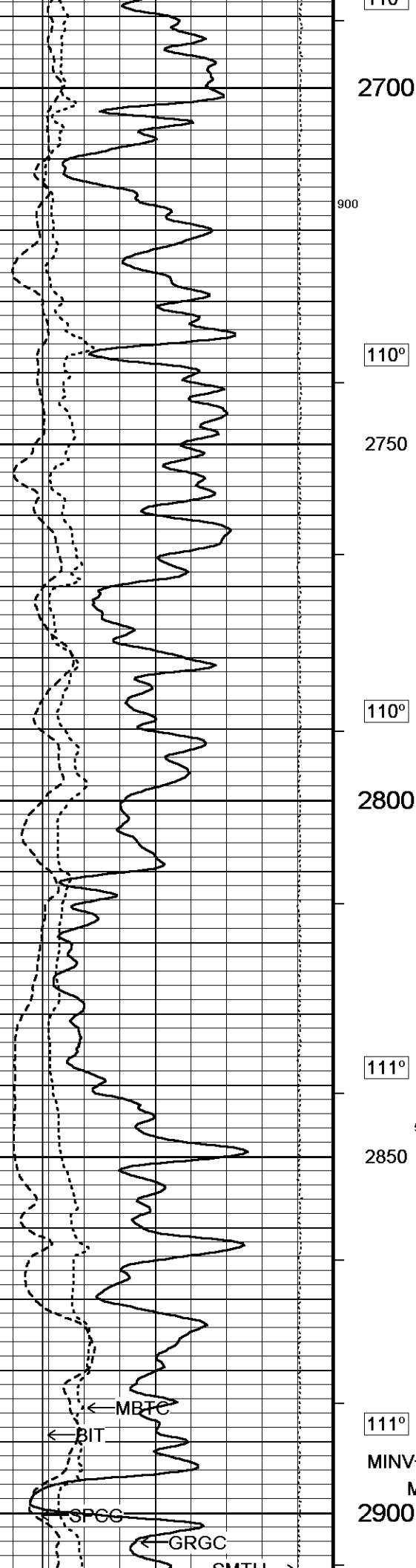


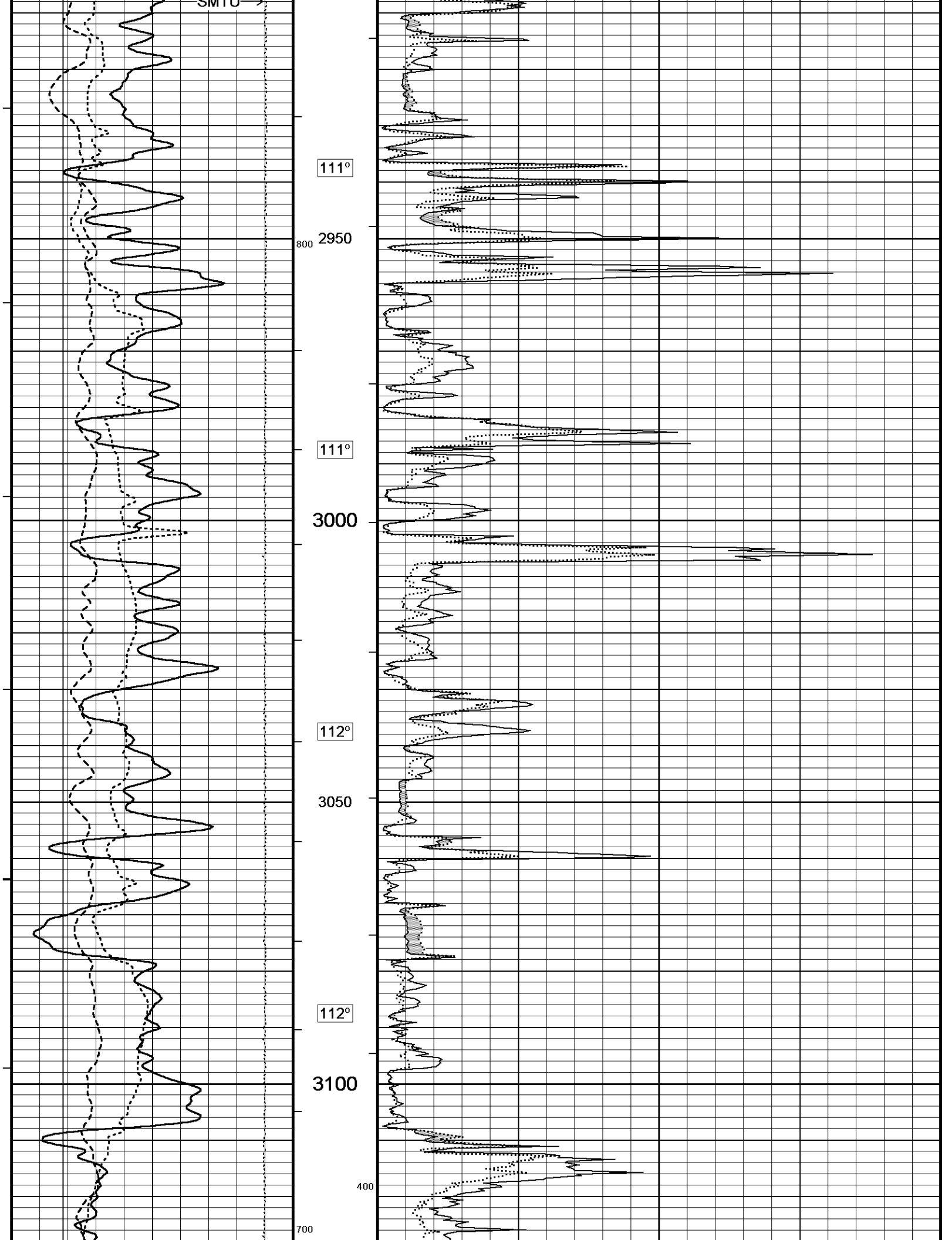


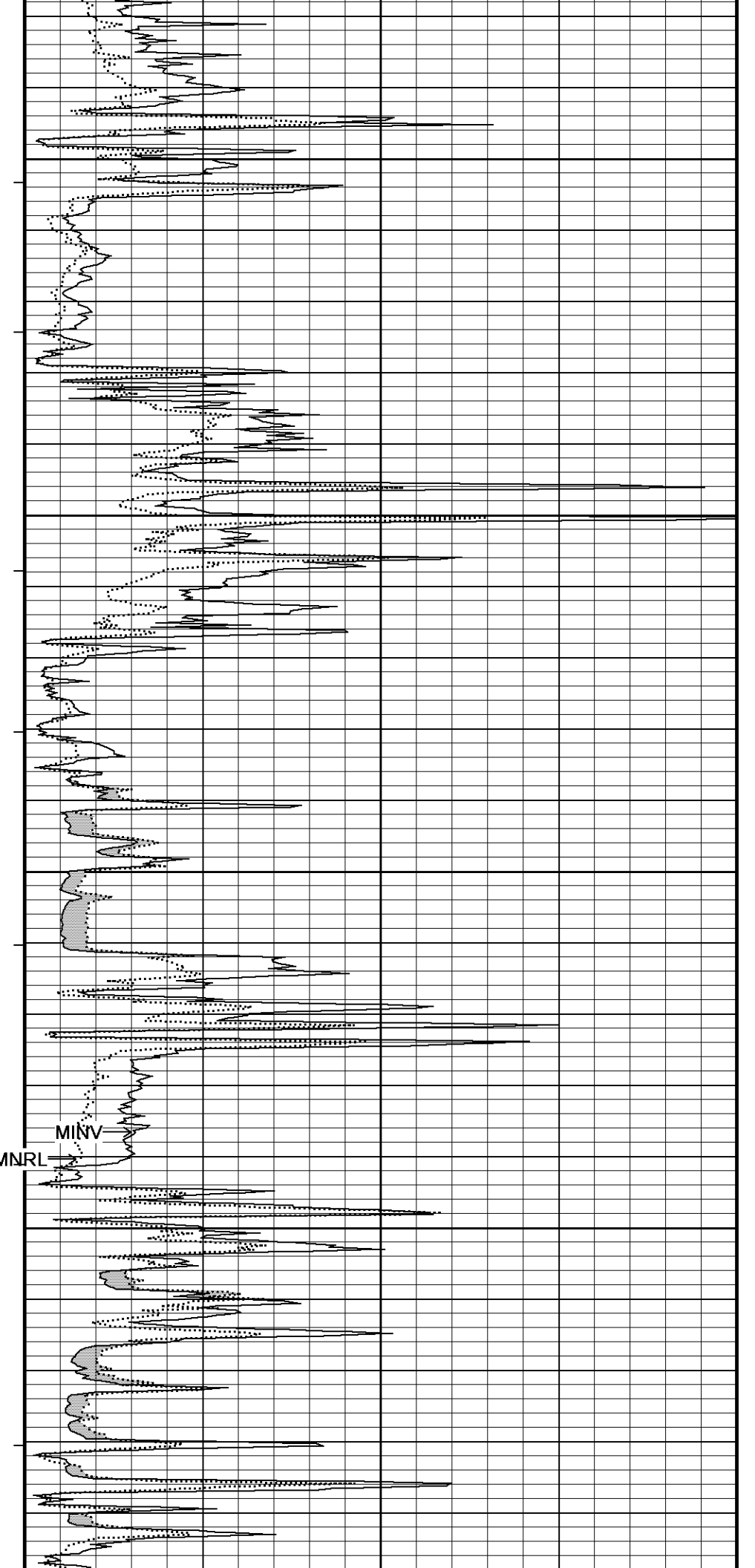
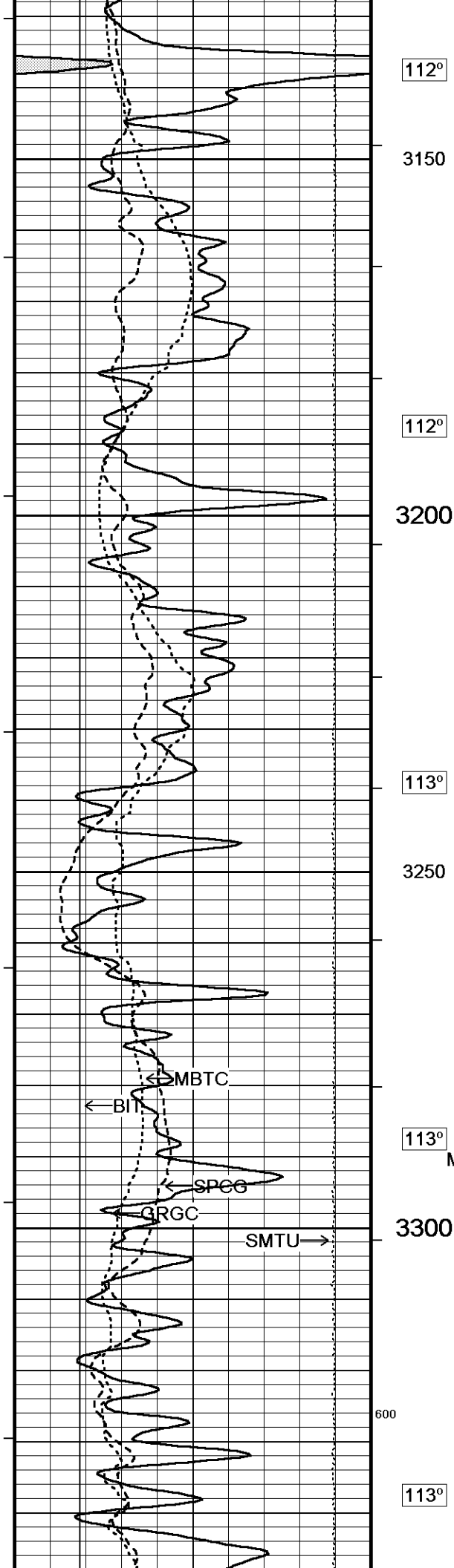


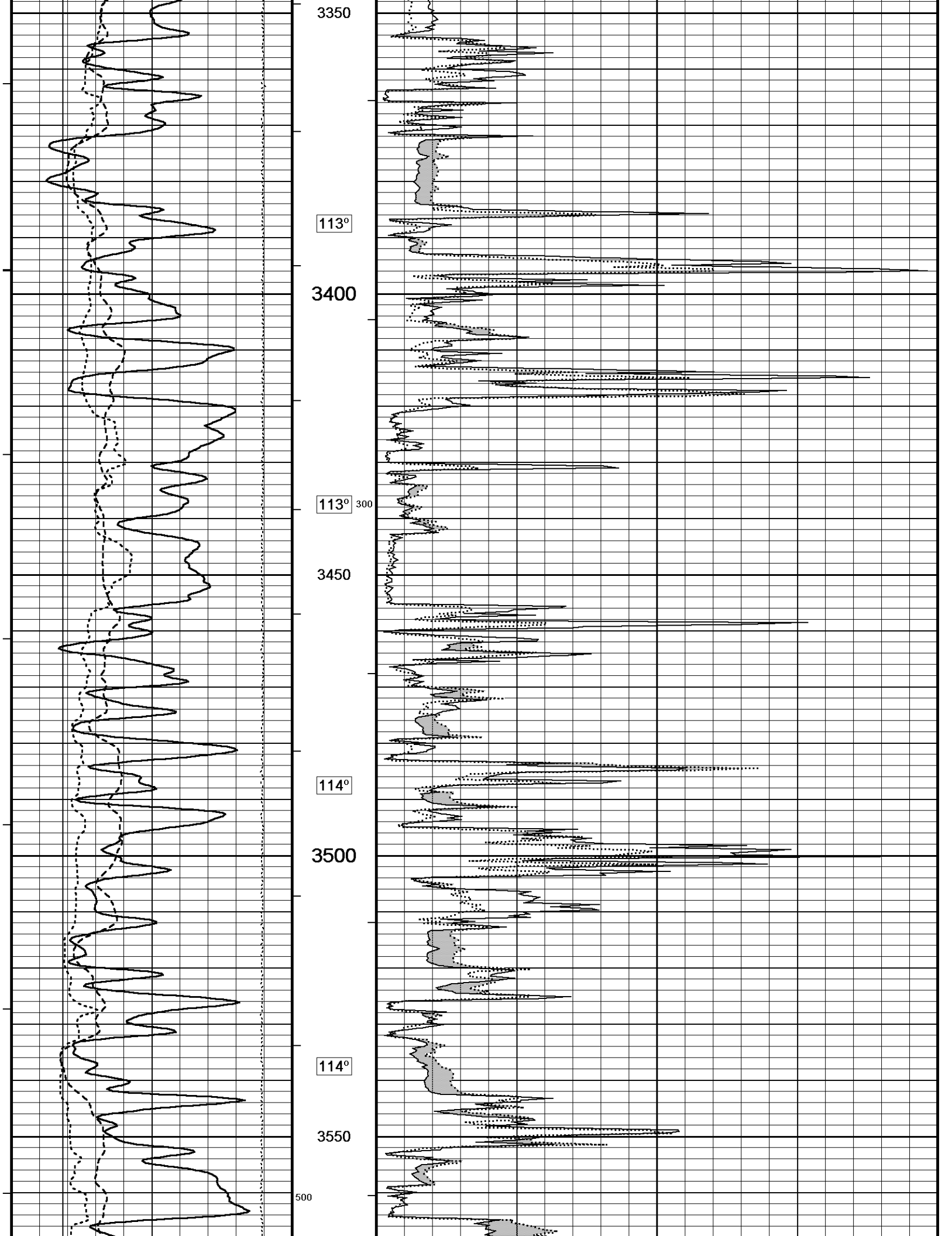


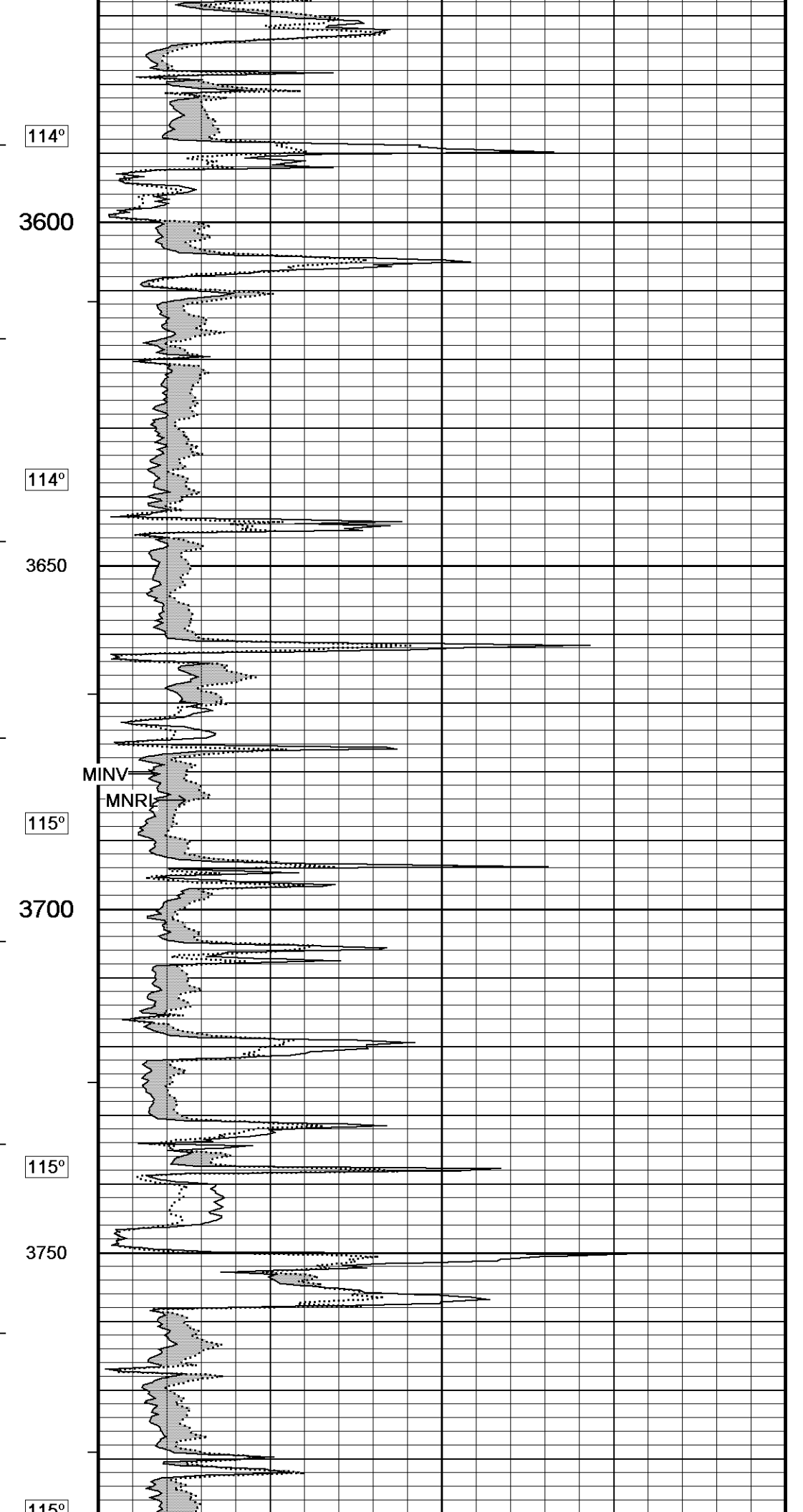
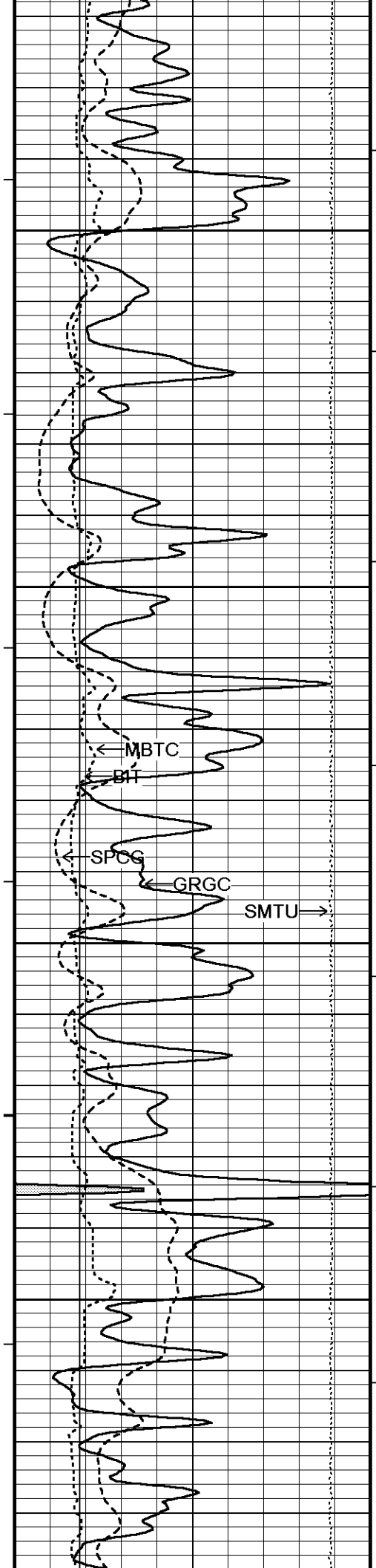


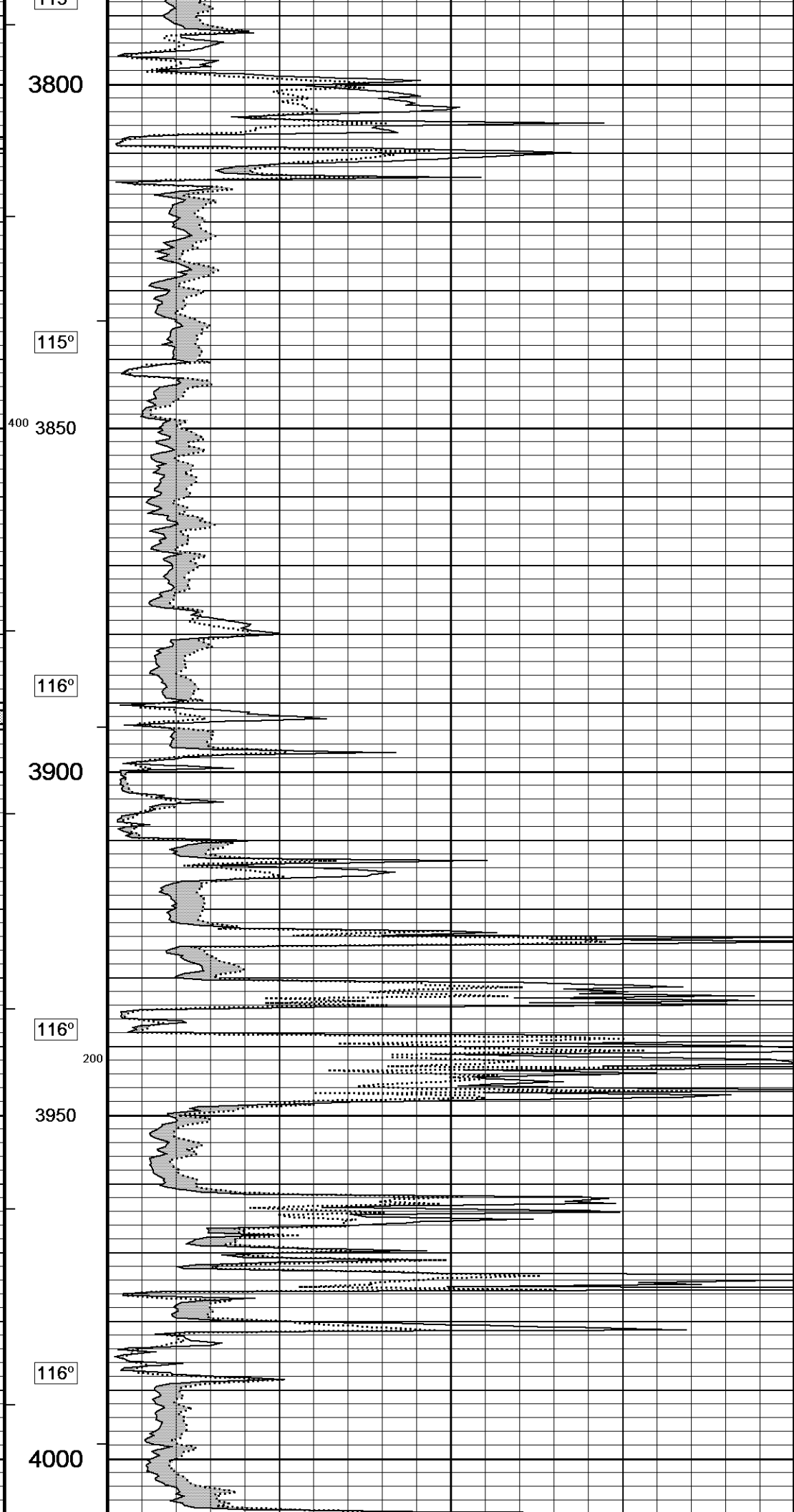
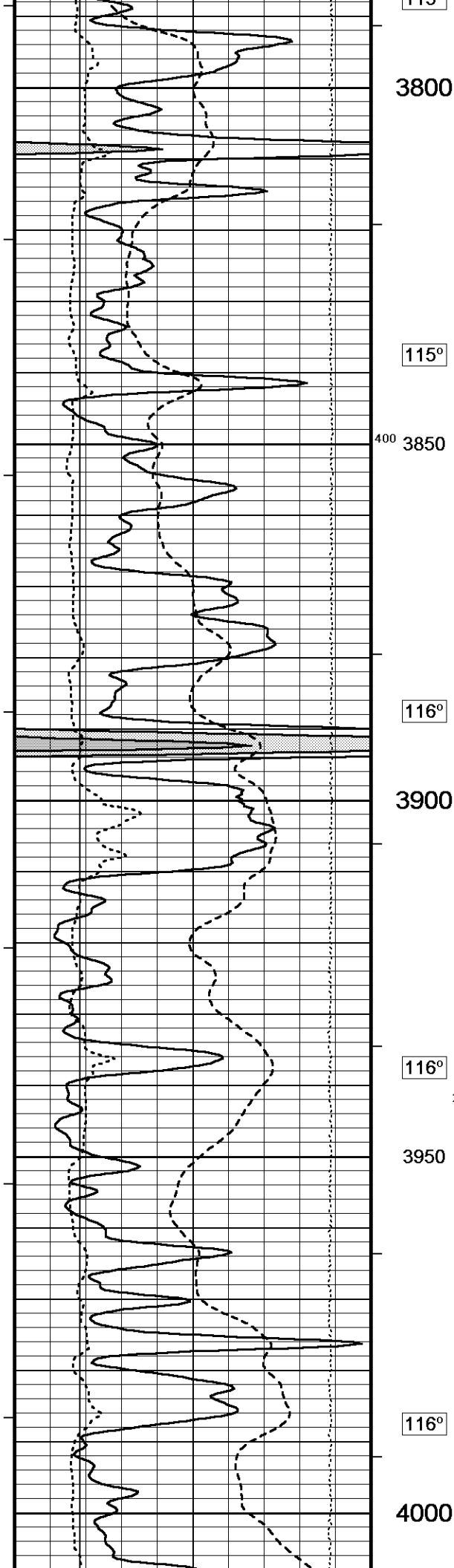


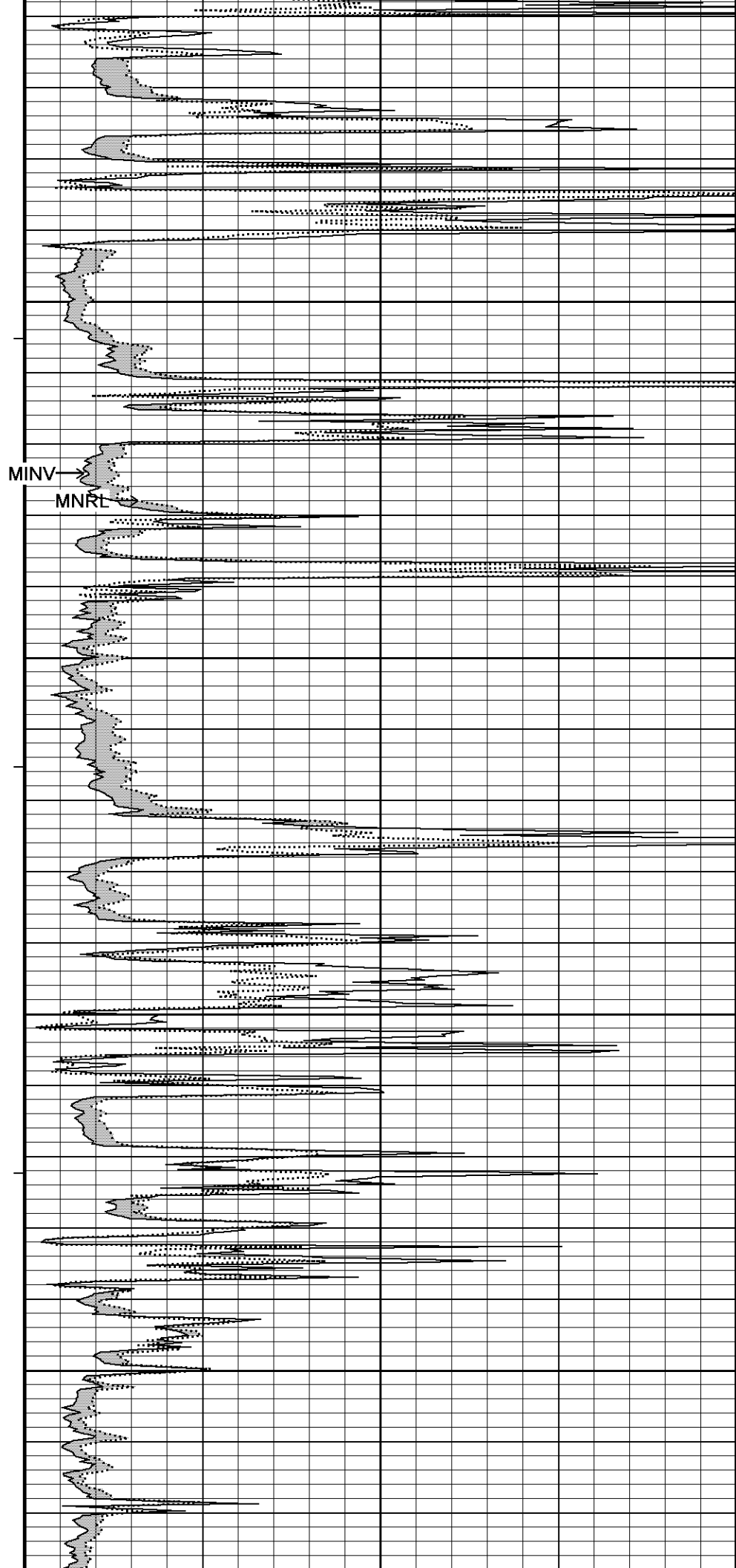
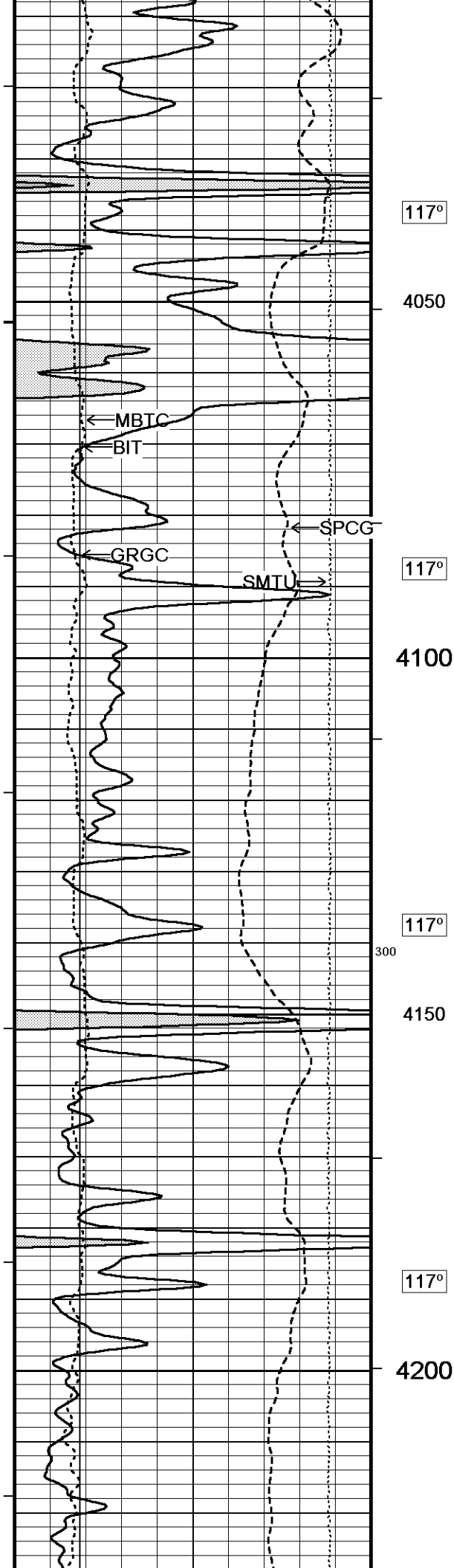


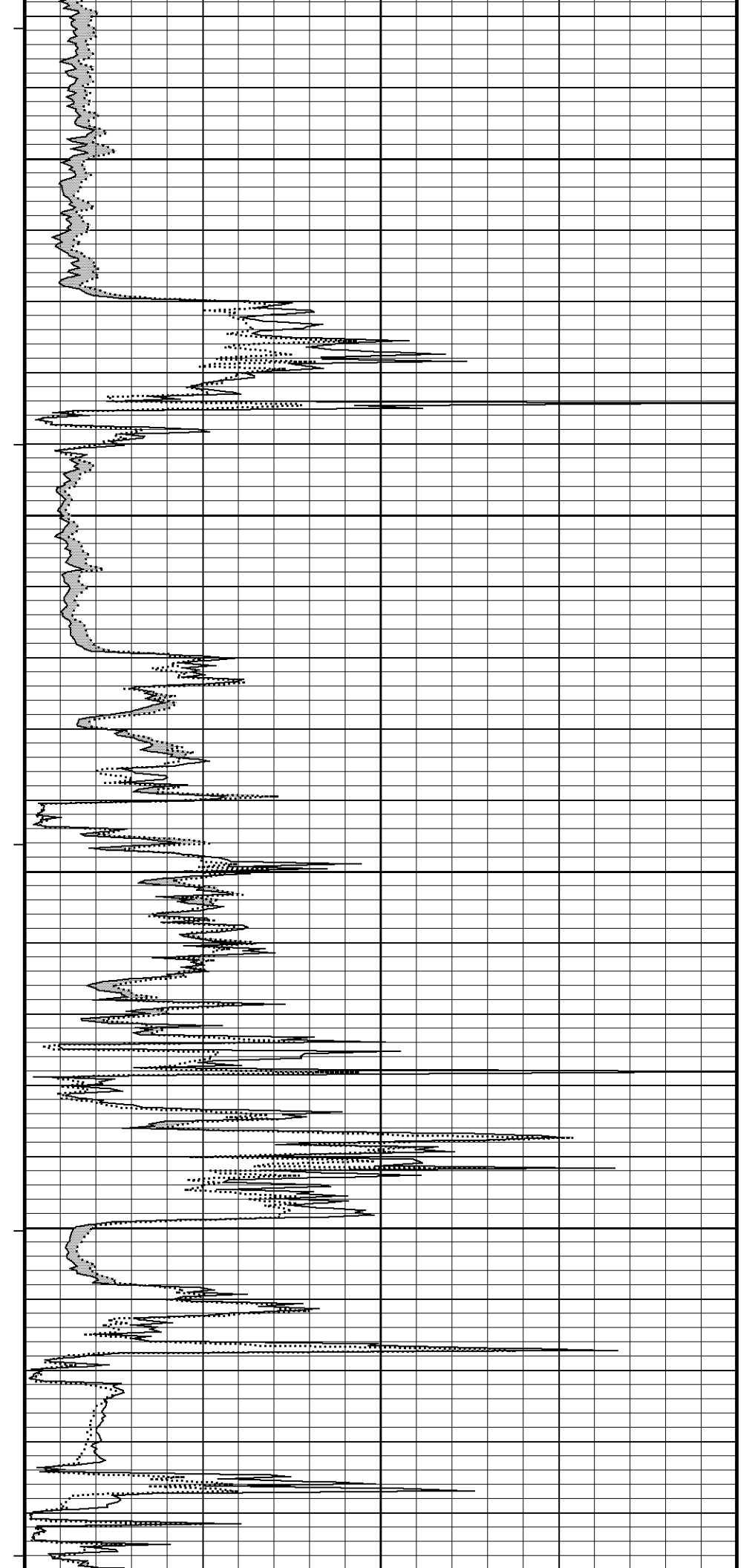
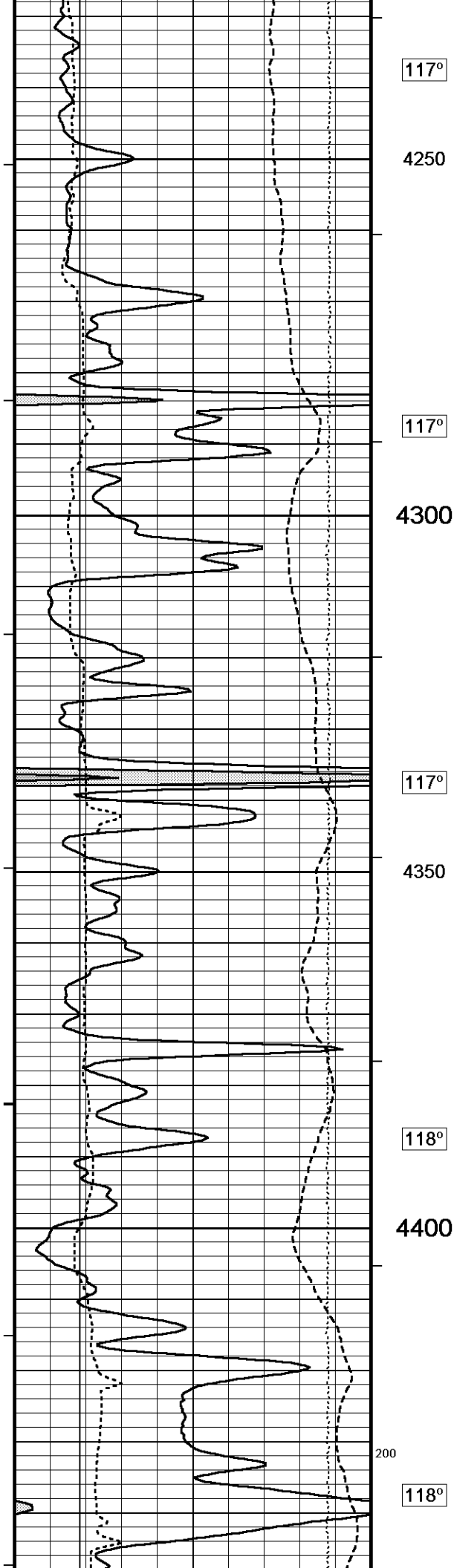


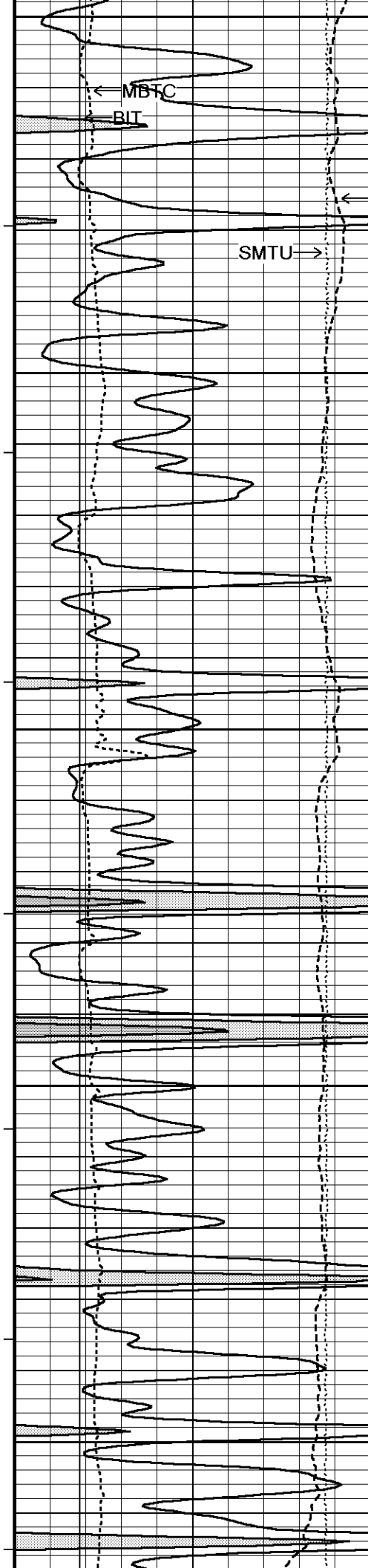












4450

SPCG

GRGC

119°

4500

119°

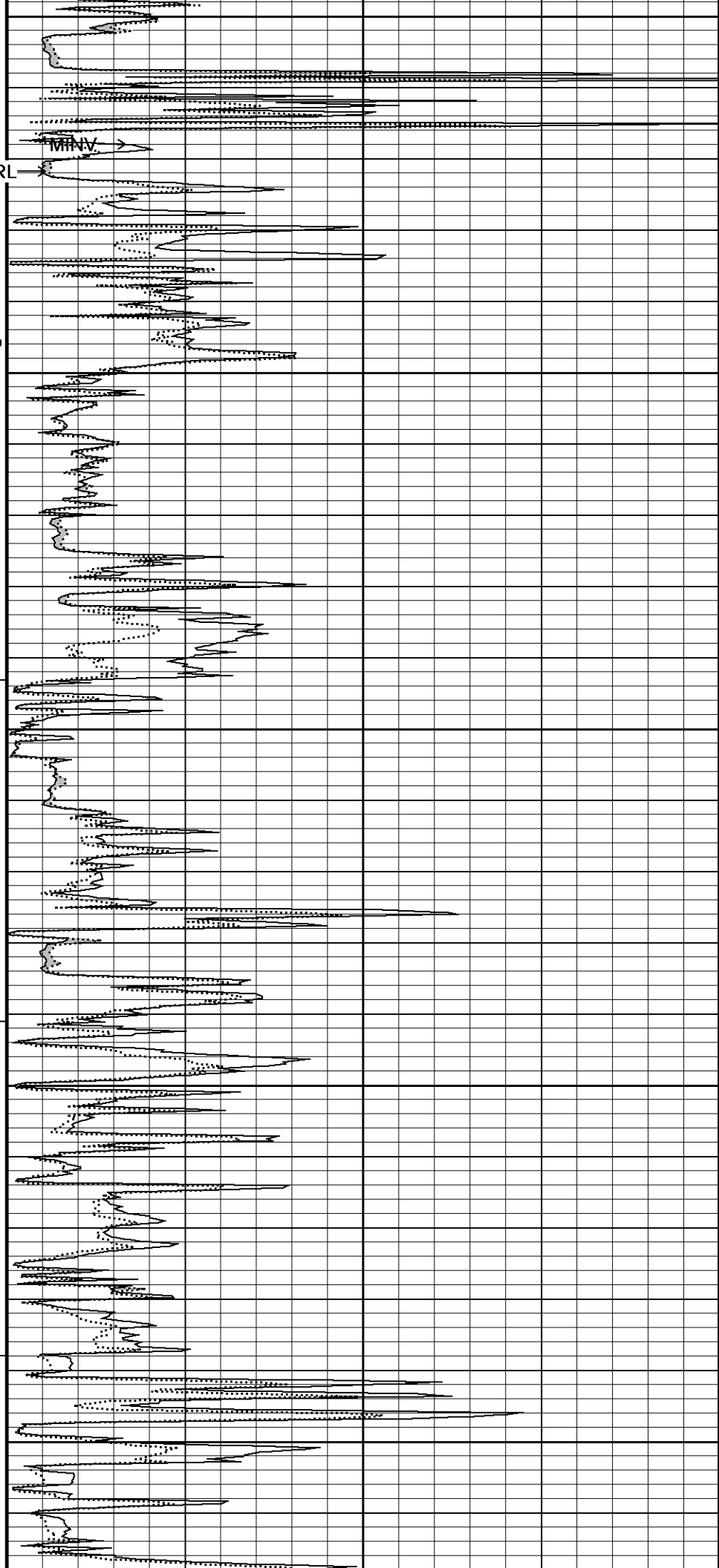
4550

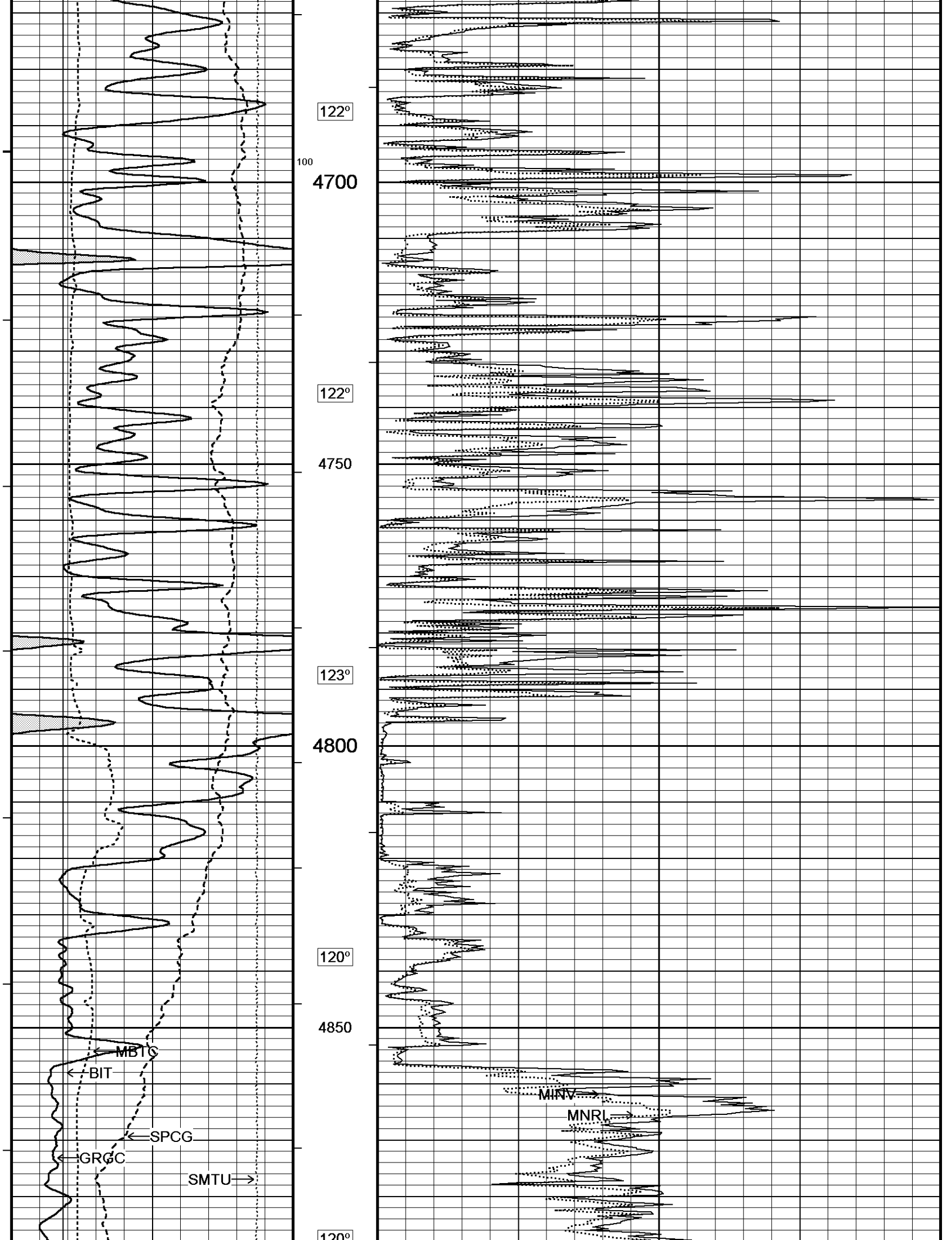
120°

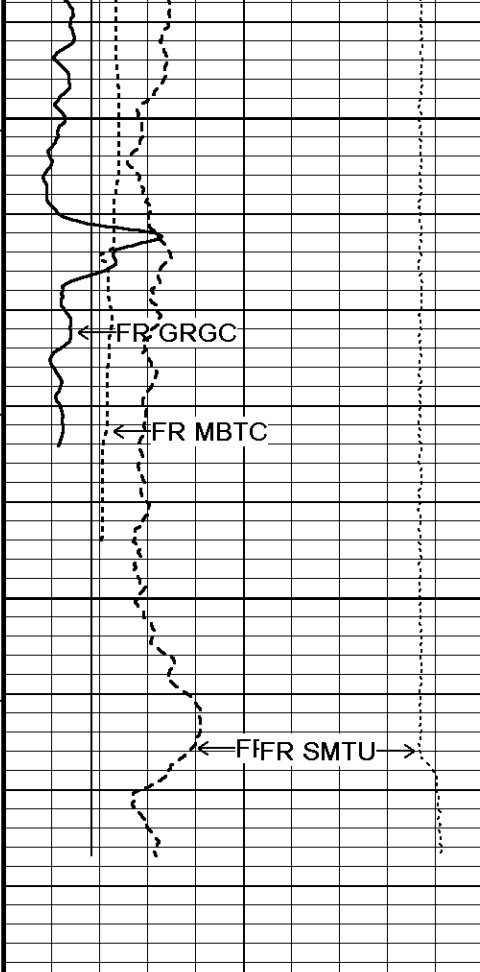
4600

121°

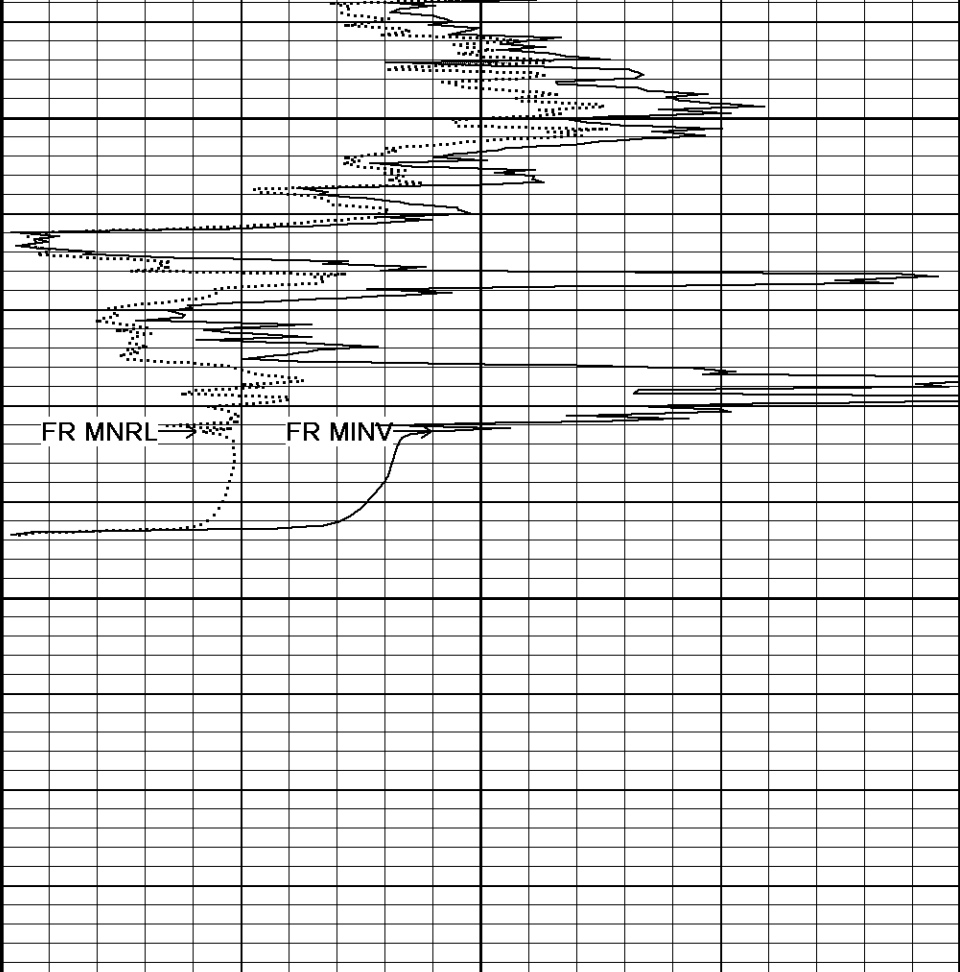
4650







120
4900
4950
0
TD



Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

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

Bit Size
inches
6 11 16

MMR Caliper
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth
in
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240

Micro-normal
ohm metres
0 10 20 30 40

Micro-inverse
ohm metres
0 10 20 30 40

↑

5 INCH MAIN

↑

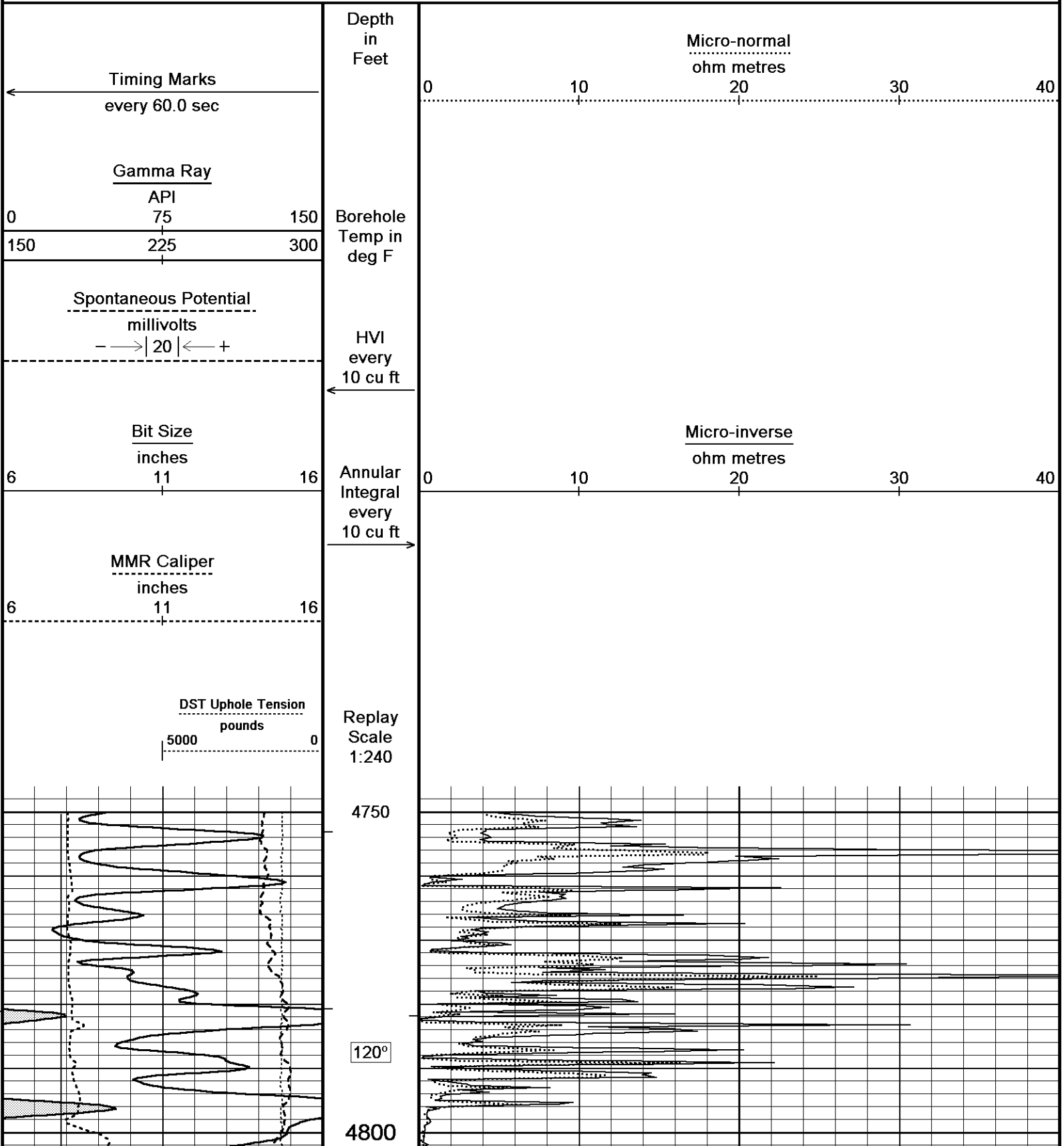
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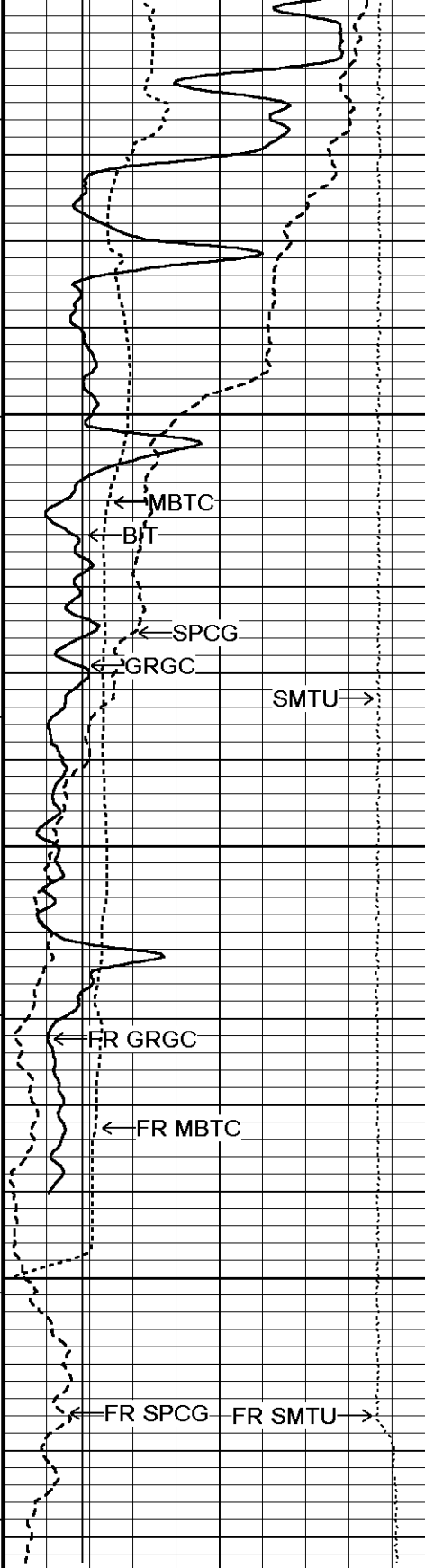
REPEAT SECTION

↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh...\PetroSantander Unruh #6 Repeat.dta
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Plotted on 23-AUG-2014 16:42
Recorded on 23-AUG-2014 13:22





120°

4850

120°

4900

120°

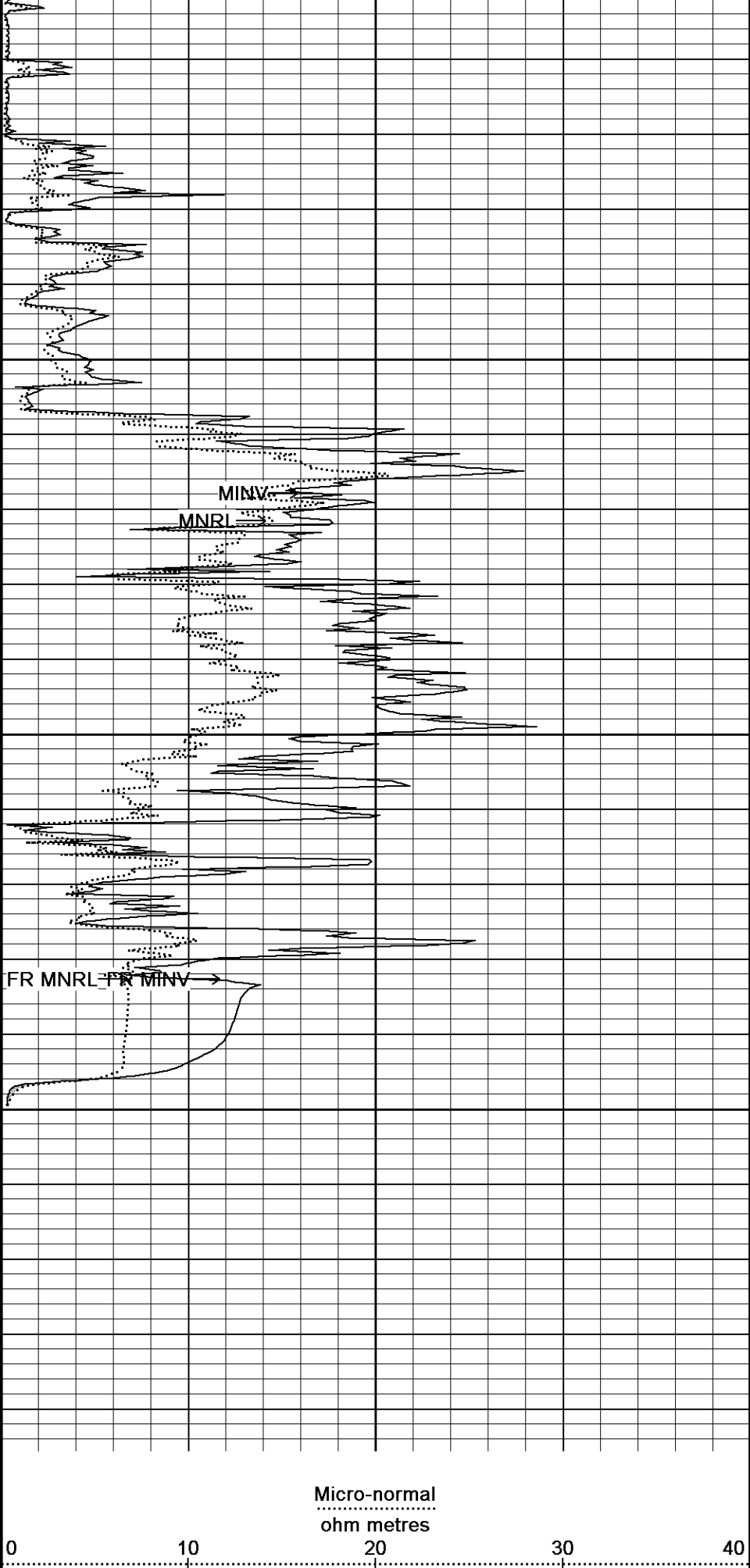
4950

0 TD

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray



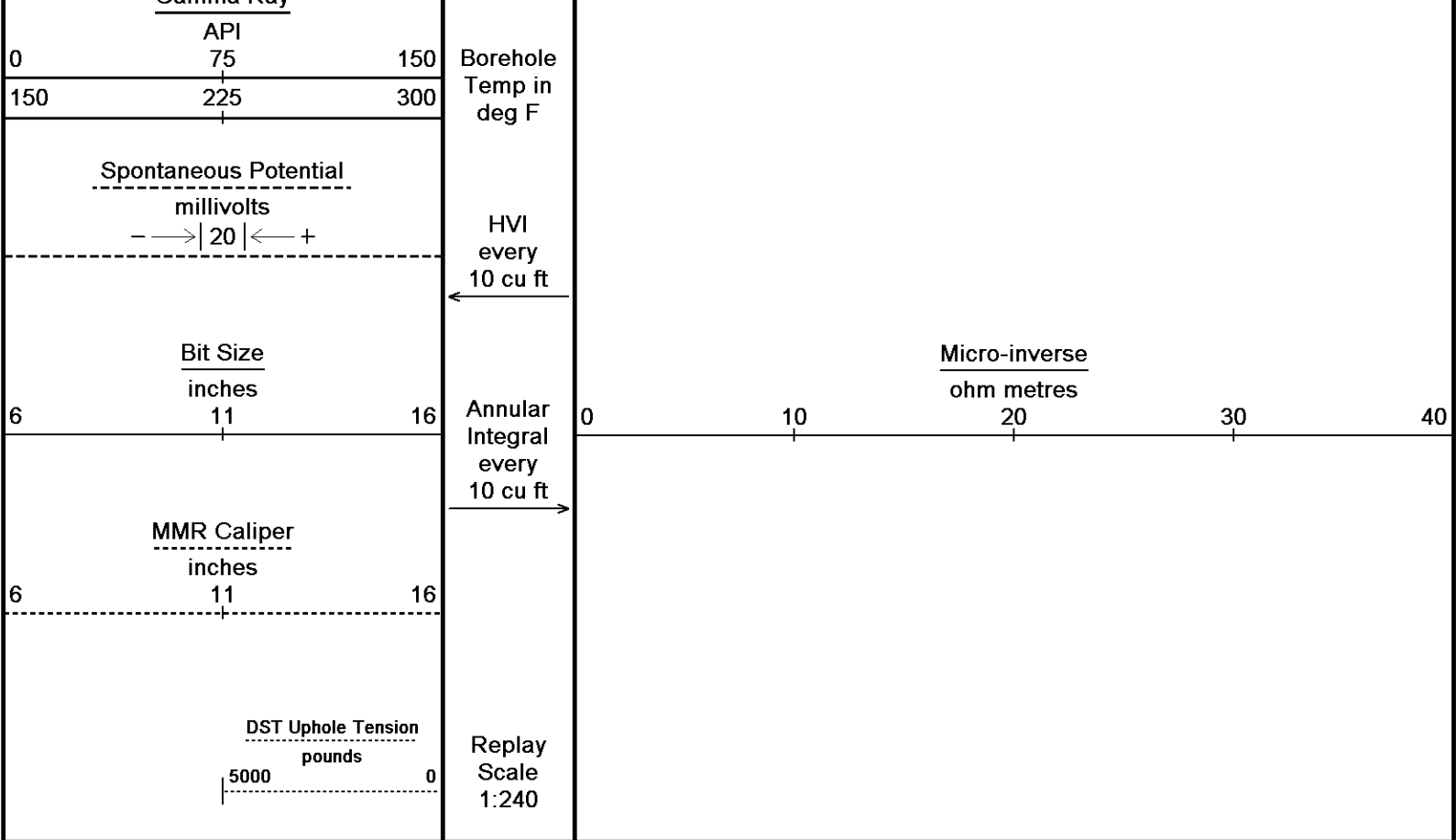
MINV

MNRL

FR MNRL FR MINV

Micro-normal
ohm metres

0 10 20 30 40



Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 23-AUG-2014 16:42
 Filename: C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh #6 Repeat.dta Recorded on 23-AUG-2014 13:22
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION			
C:\Minimus 13.08.2113\Log Data\PetroSantander Unruh #6\PetroSantander Unruh #6 Main.dta			
General Constants All 000		Last Edited on 19-AUG-2014,14:47	
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 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

Caliper Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:44

Field Calibration on 23-AUG-2014 07:34

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	13622	5.96
2	17090	7.98
3	20281	9.85
4	24282	11.92
5	0	0.00
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	8.03	7.97

Micro Normal and Micro Inverse Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:56

Field Check on 23-AUG-2014 07:32

Base Calibration				
		Measured	Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.2	49.8	5.1	25.6
Micro Inverse	9.9	49.4	3.4	16.9
Channel	Base Check (ohm-m)		Field Check (ohm-m)	
Micro Normal	93.8		93.8	
Micro Inverse	62.3		62.3	

Micro Normal and Micro Inverse Constants MMR-B.A 98

Last Edited on 05-AUG-2014,14:47

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

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

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	7.94	7.97

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

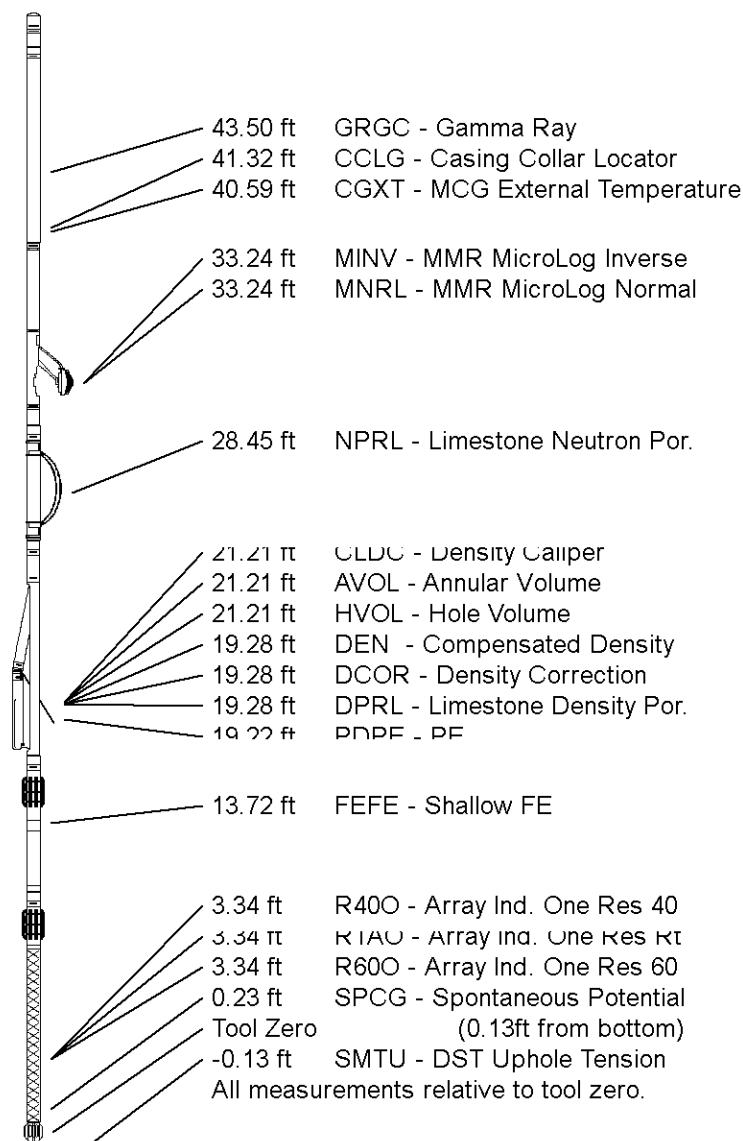
Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

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	4932.76	feet
Elevation Drill Floor	3073.00	feet	Depth Driller	4970.00	feet
Elevation Ground Level	3063.00	feet	Depth Logger	4966.00	feet



Weatherford®

MICRORESISTIVITY LOG