



**Weatherford**

**SHALLOW FOCUSED  
ARRAY INDUCTION  
ELECTRIC LOG**

COMPANY			MID-CON ENERGY OPERATING		
WELL			HRMU 11-13		
FIELD			HARKER RANCH MORROW UNIT		
PROVINCE/COUNTY			CHEYENNE		
COUNTRY/STATE			U.S.A. / COLORADO		
LOCATION			600' FNL & 760' FWL		
SEC 13	TWP 13S	RGE 43W	Other Services		MML
Latitude		MAI/MFE			
Longitude					
API Number		05-017-07793			
Permanent Datum GL, Elevation 4091 feet					Elevations: KB DF GL
Log Measured From KB					
Drilling Measured From KB @ 16.6					
Date	19-AUG-2014				
Run Number	ONE				
Service Order	7606-95666857				
Depth Driller	5450.00			feet	
Depth Logger	5451.00			feet	
First Reading	5447.66			feet	
Last Reading	442.00			feet	
Casing Driller	442.00			feet	
Casing Logger	442.00			feet	
Bit Size	7.875			inches	
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.40 lb/USg		60.00 CP		
PH / Fluid Loss	8.00		10.40 ml/30Min		
Sample Source	MUDPIT				
Rm @ Measured Temp	1.12 @ 75.0		ohm-m		
Rmf @ Measured Temp	0.89 @ 75.0		ohm-m		
Rmc @ Measured Temp	1.34 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	0.58 @148.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	148.00		deg F		
Equipment / Base	13057	LIB			
Recorded By	BEN WELDIN				
Witnessed By	CHRIS BEAN				
JOBS#	LB14-243				

**BOREHOLE RECORD**

Last Edited: 19-AUG-2014 20:56

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	425.00
7.875	425.00	5450.00

**CASING RECORD**

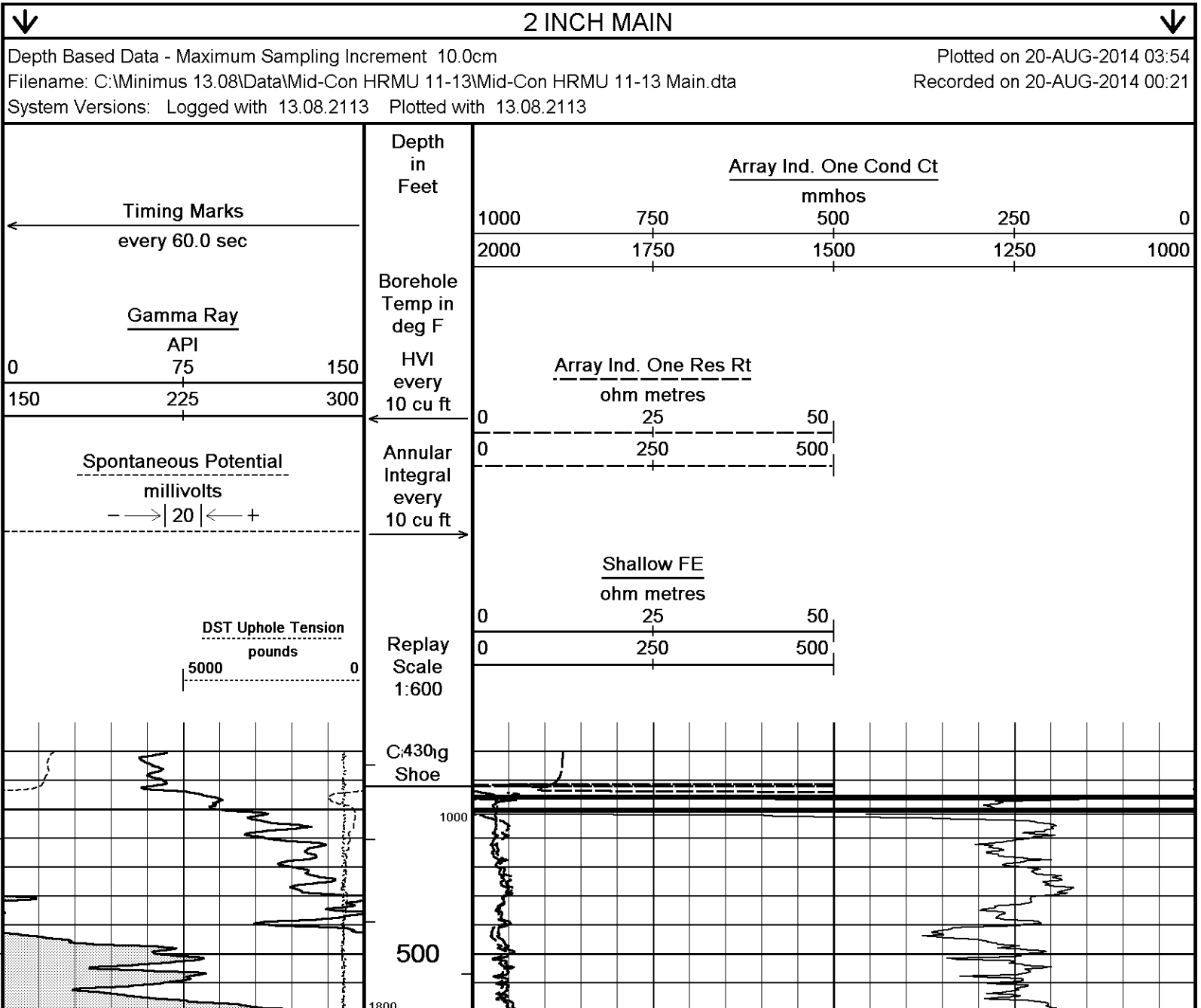
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	425.00	24.00

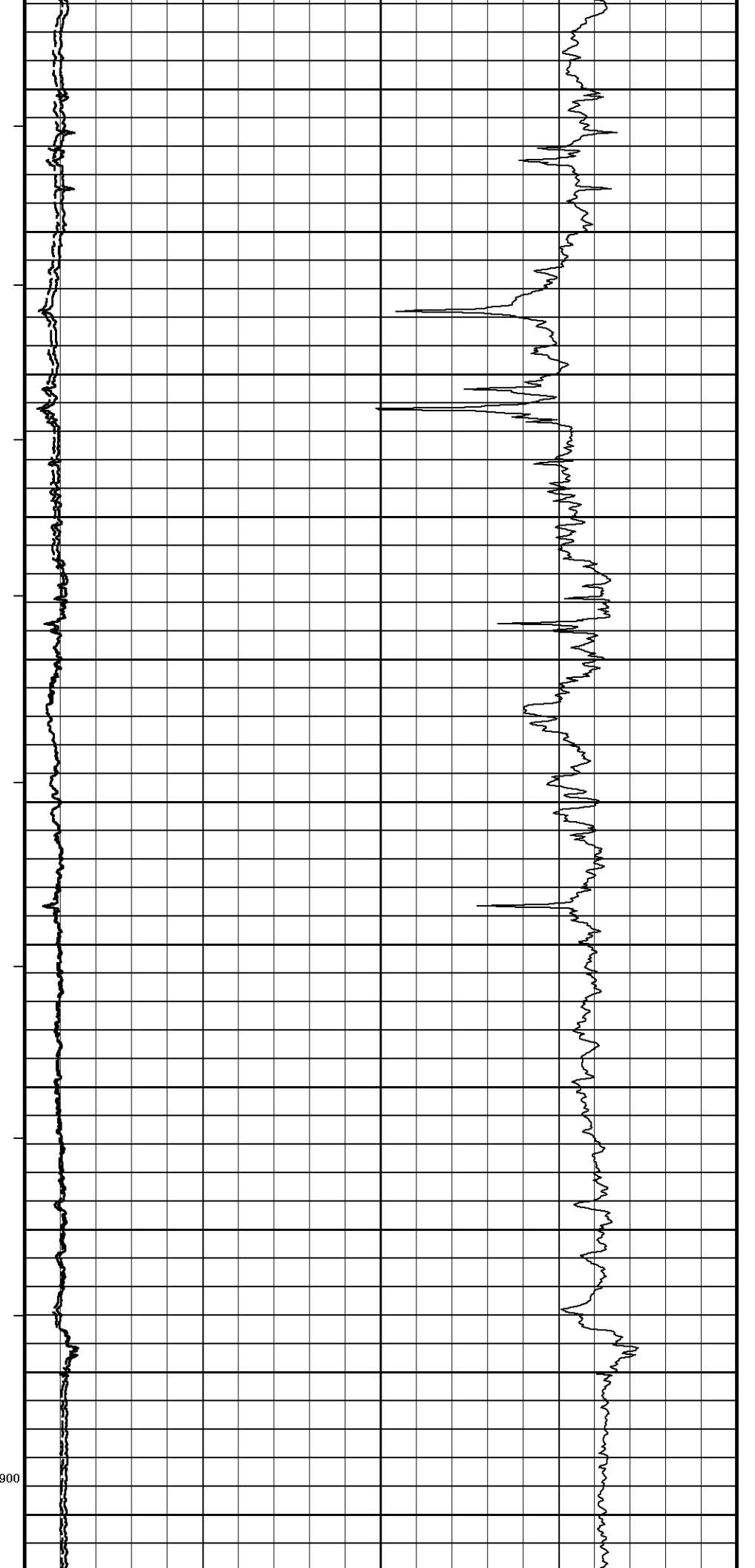
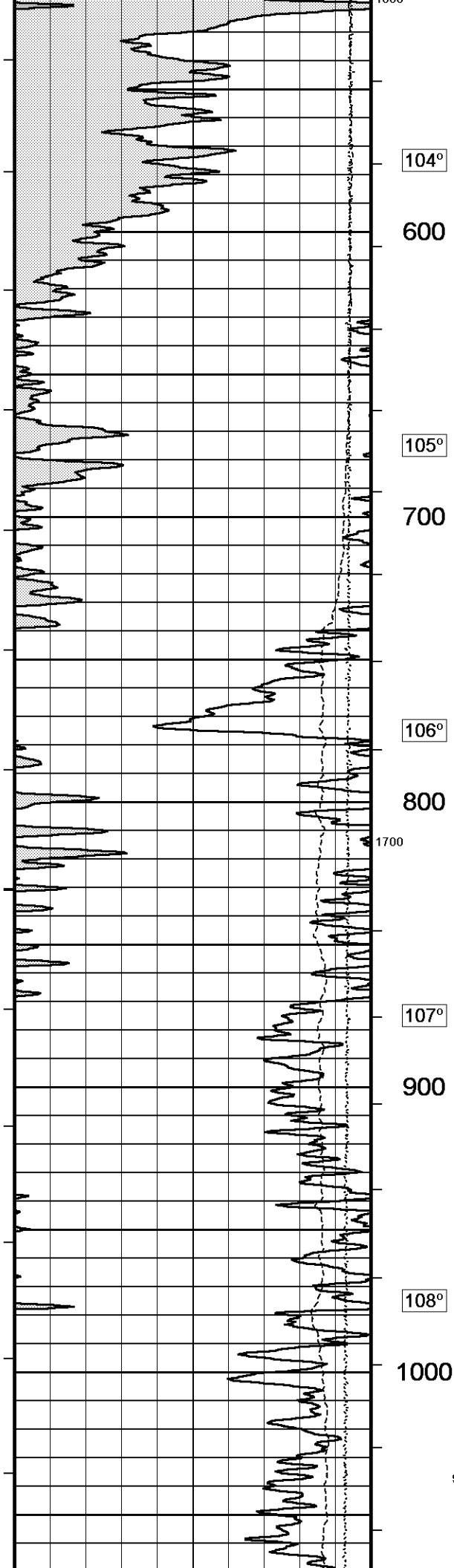
**REMARKS**

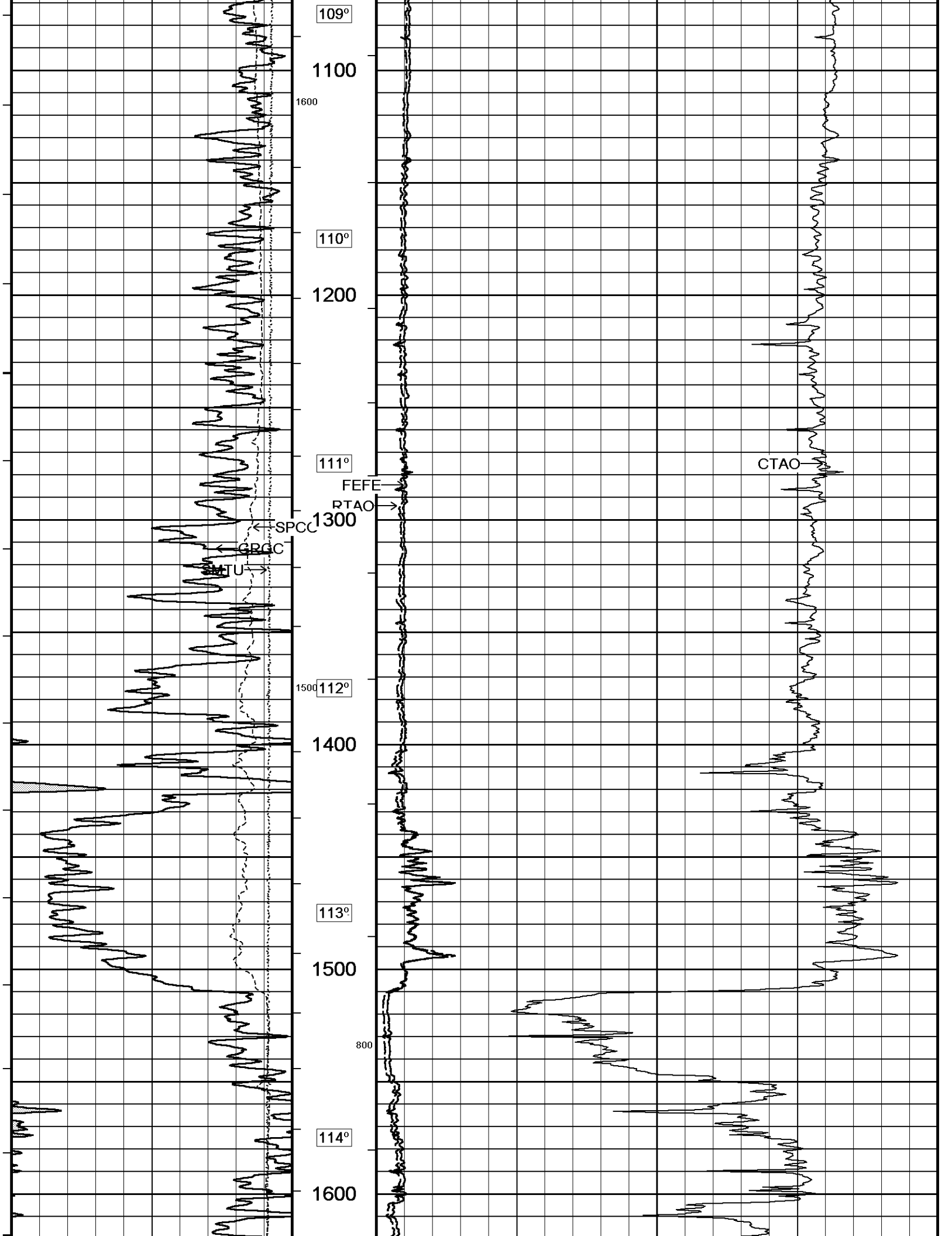
- SOFTWARE ISSUE: WLS 13.08.2113
- TOOL STRING: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - MFE: 1 X 0.5 INCH STANDOFF
  - MAI: 2 X 0.5 INCH STANDOFF
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1830 CU. FT.

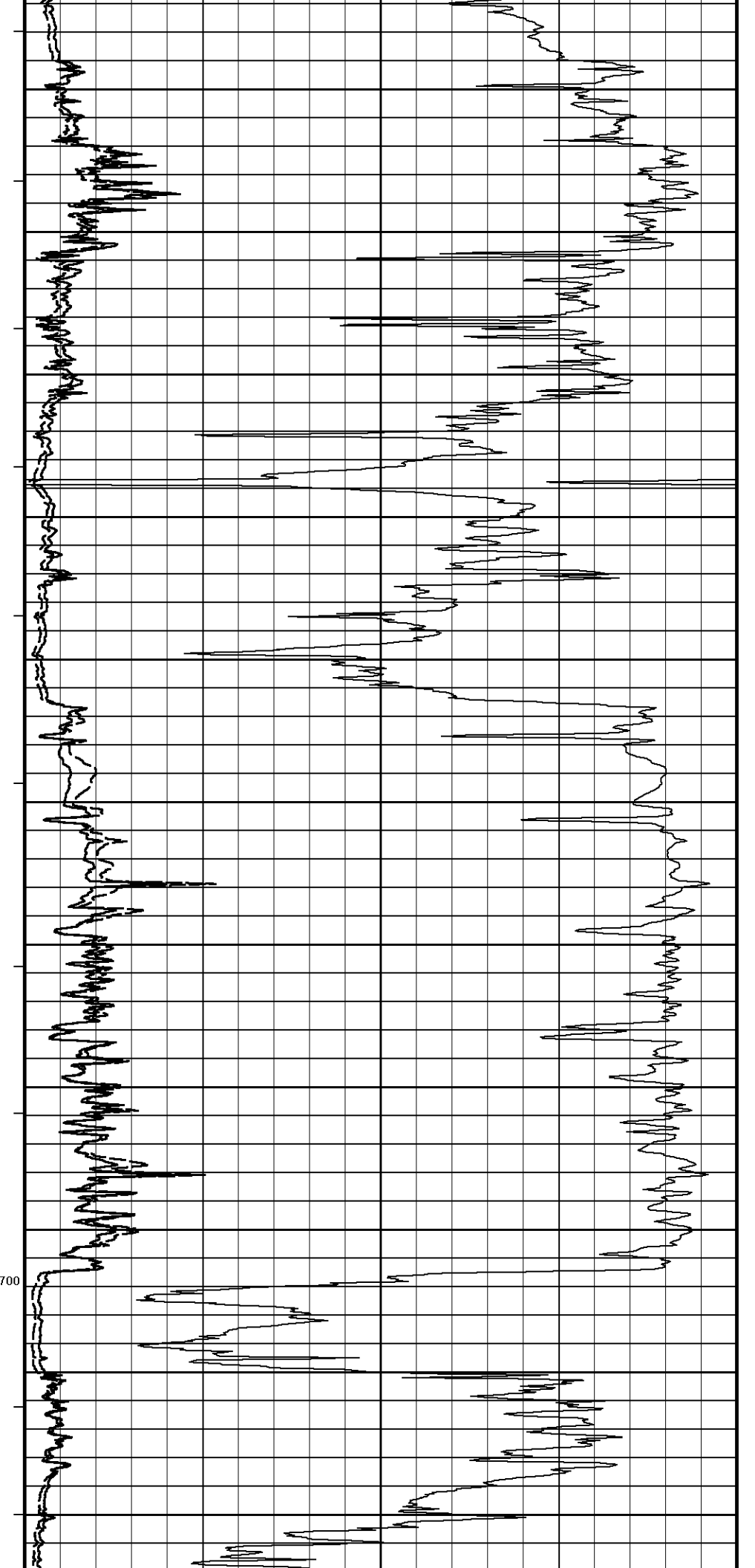
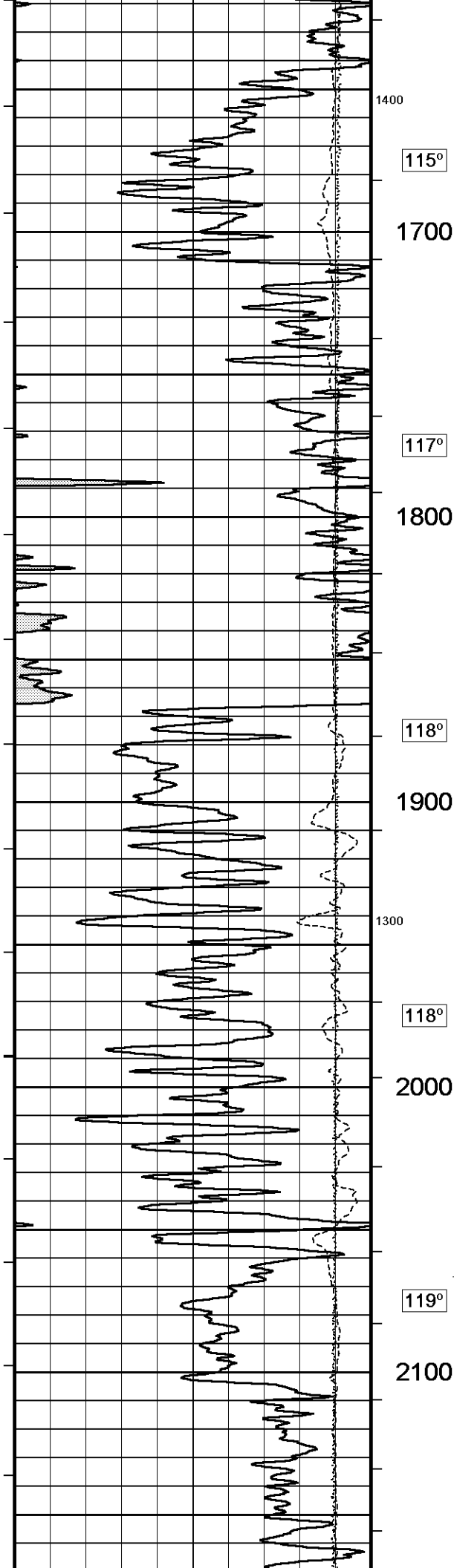
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING FT.: 1000 CU. FT.
- RIG: WILDCAT DRILLING RIG #1
- SERVICE ORDER #: 7606-95666847
- ENGINEER: BEN WELDIN
- OPERATOR: KEN RINEHART

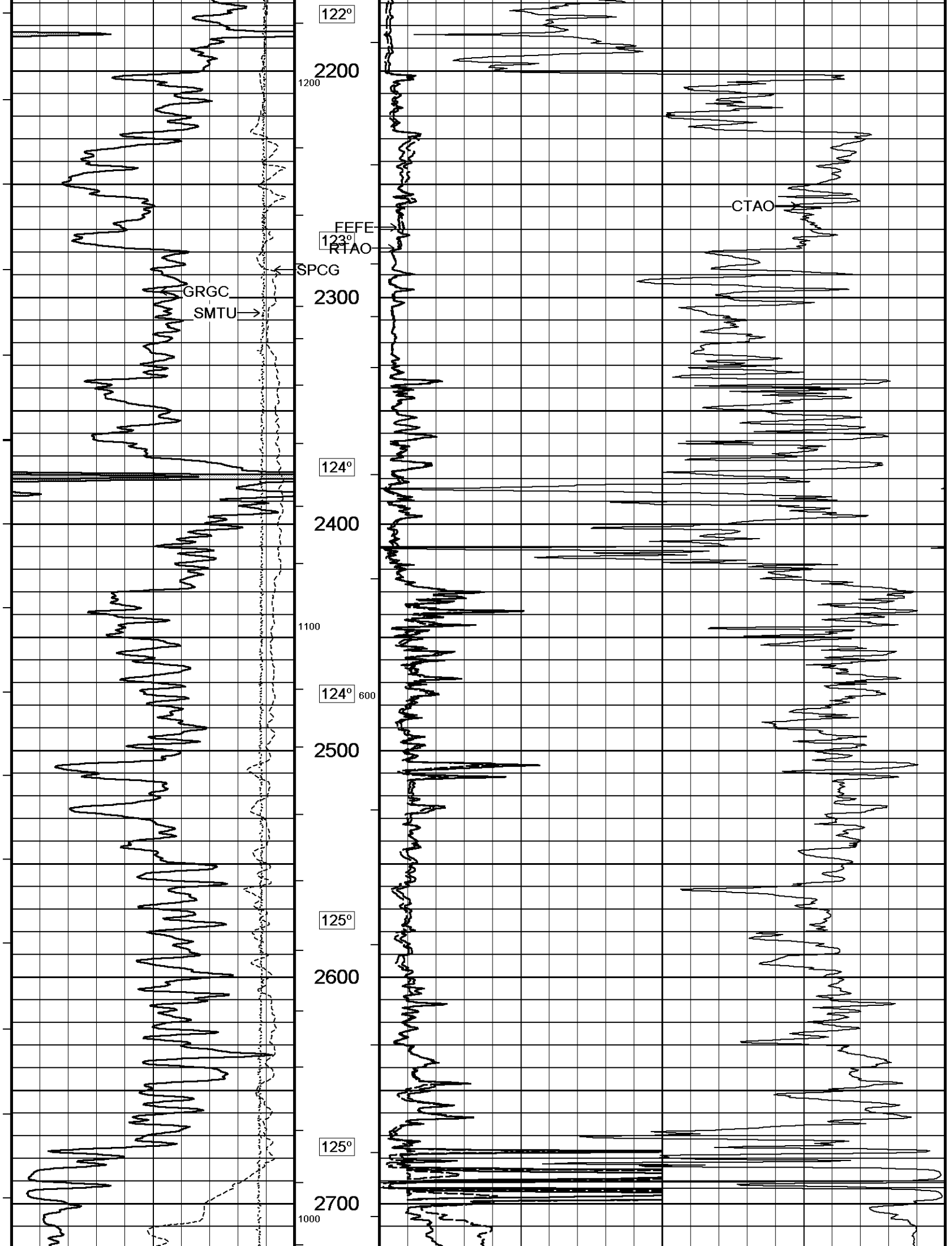
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

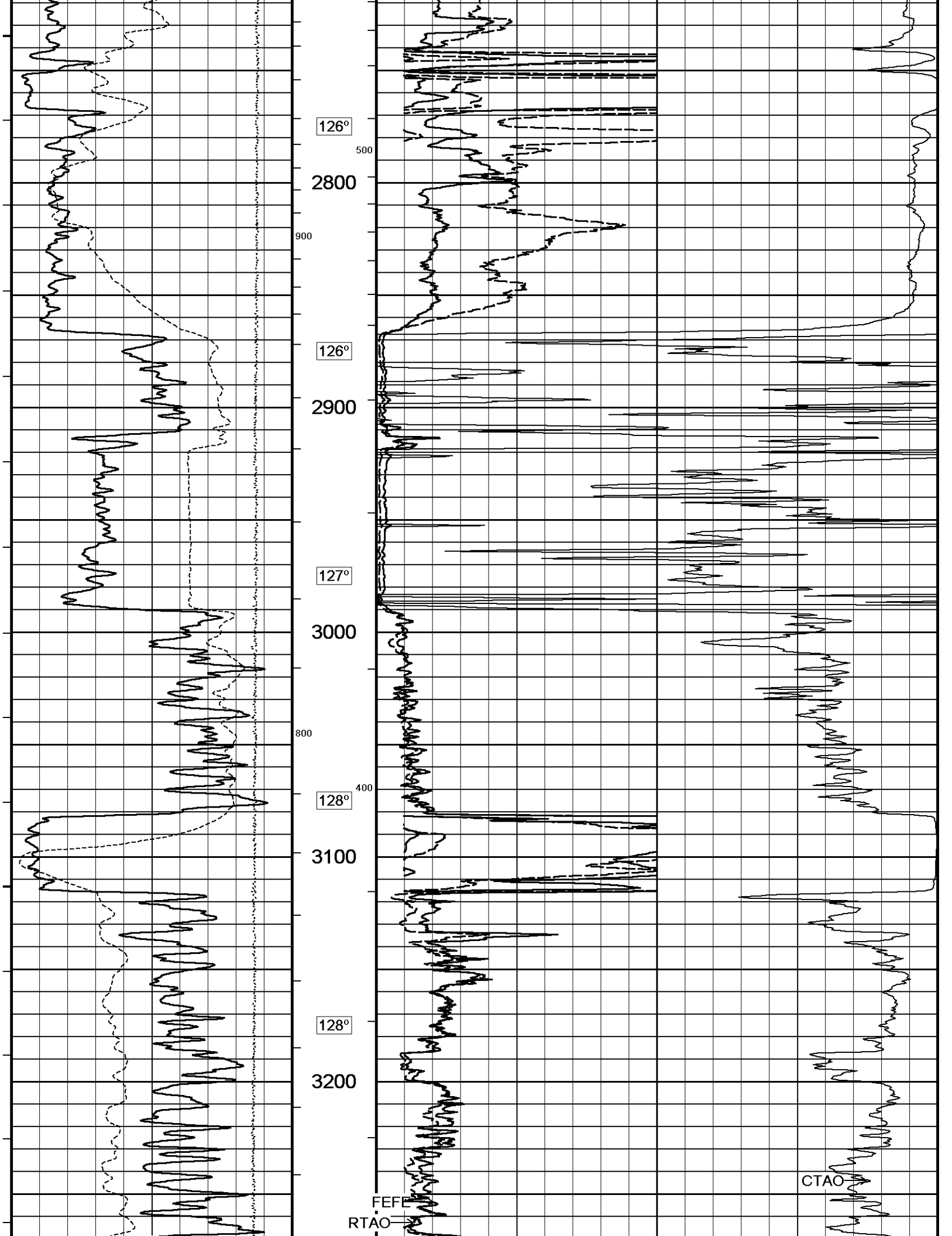


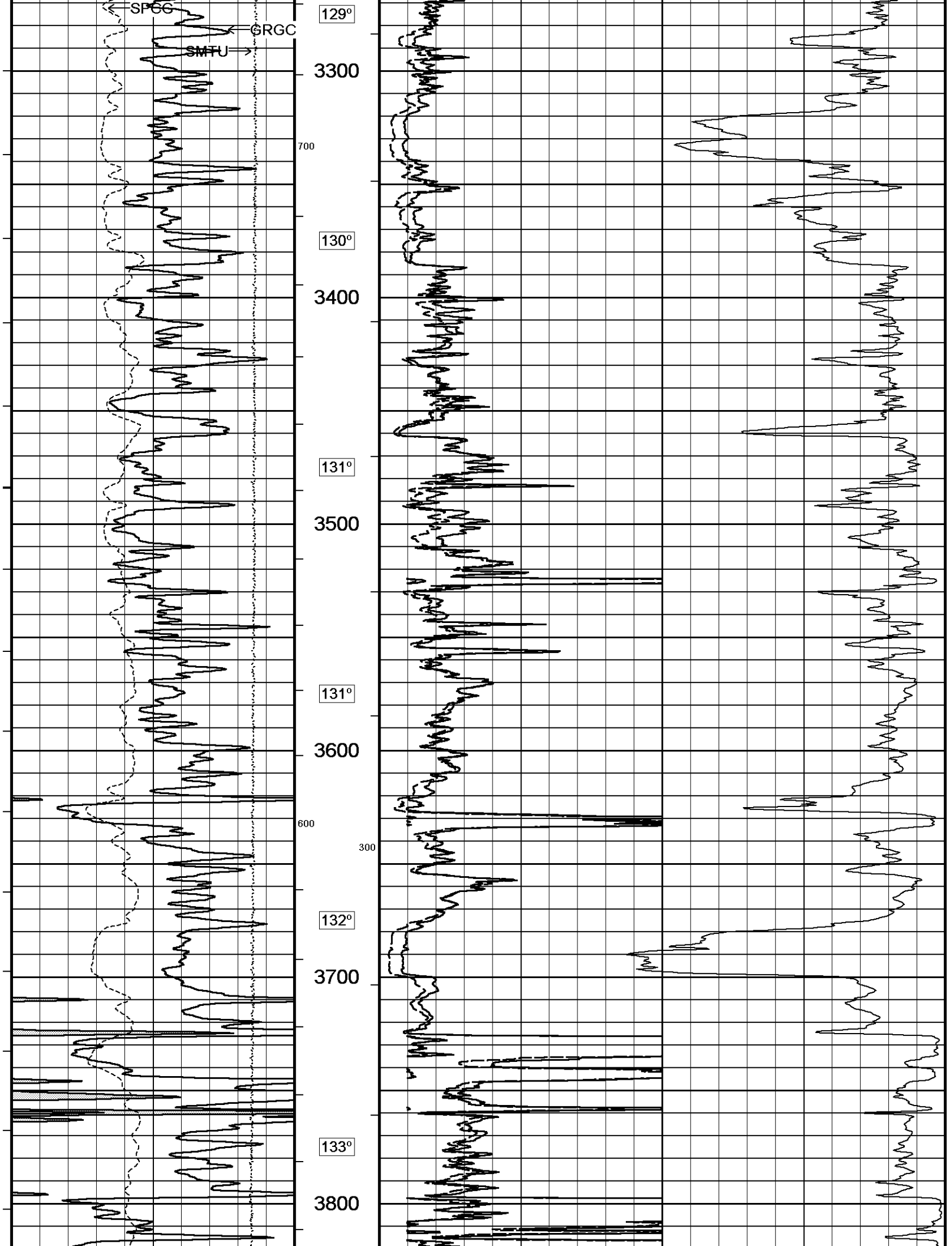




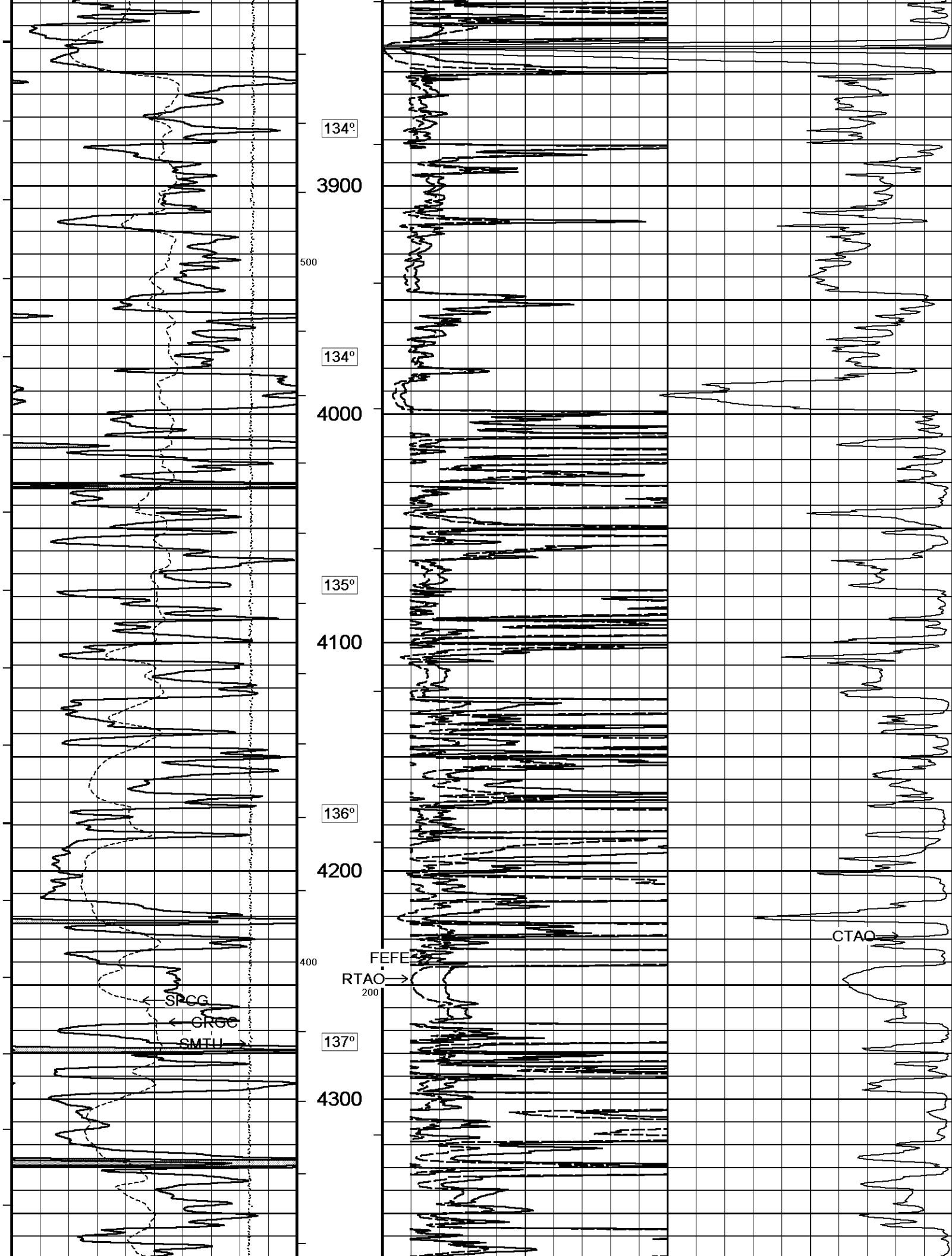


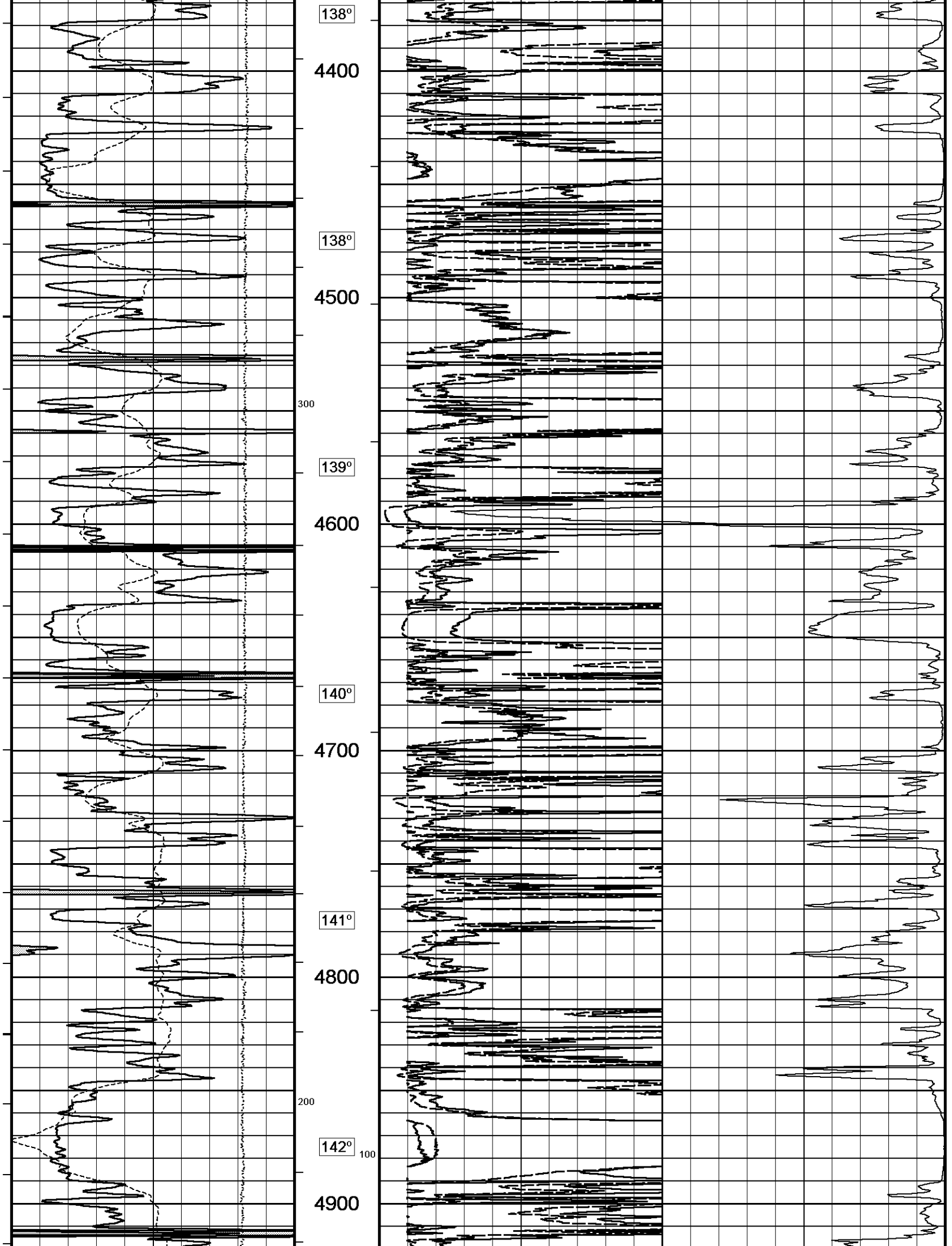


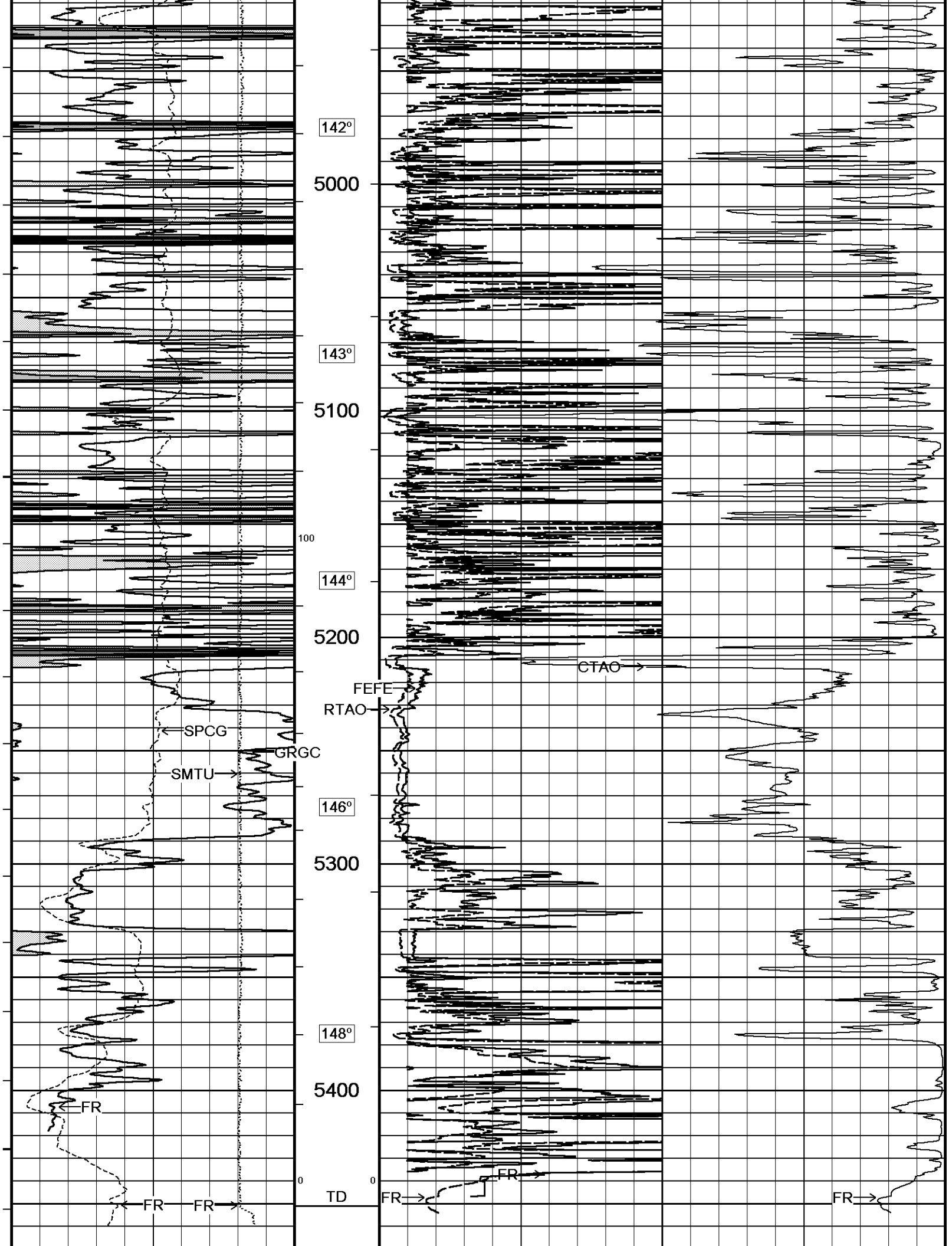


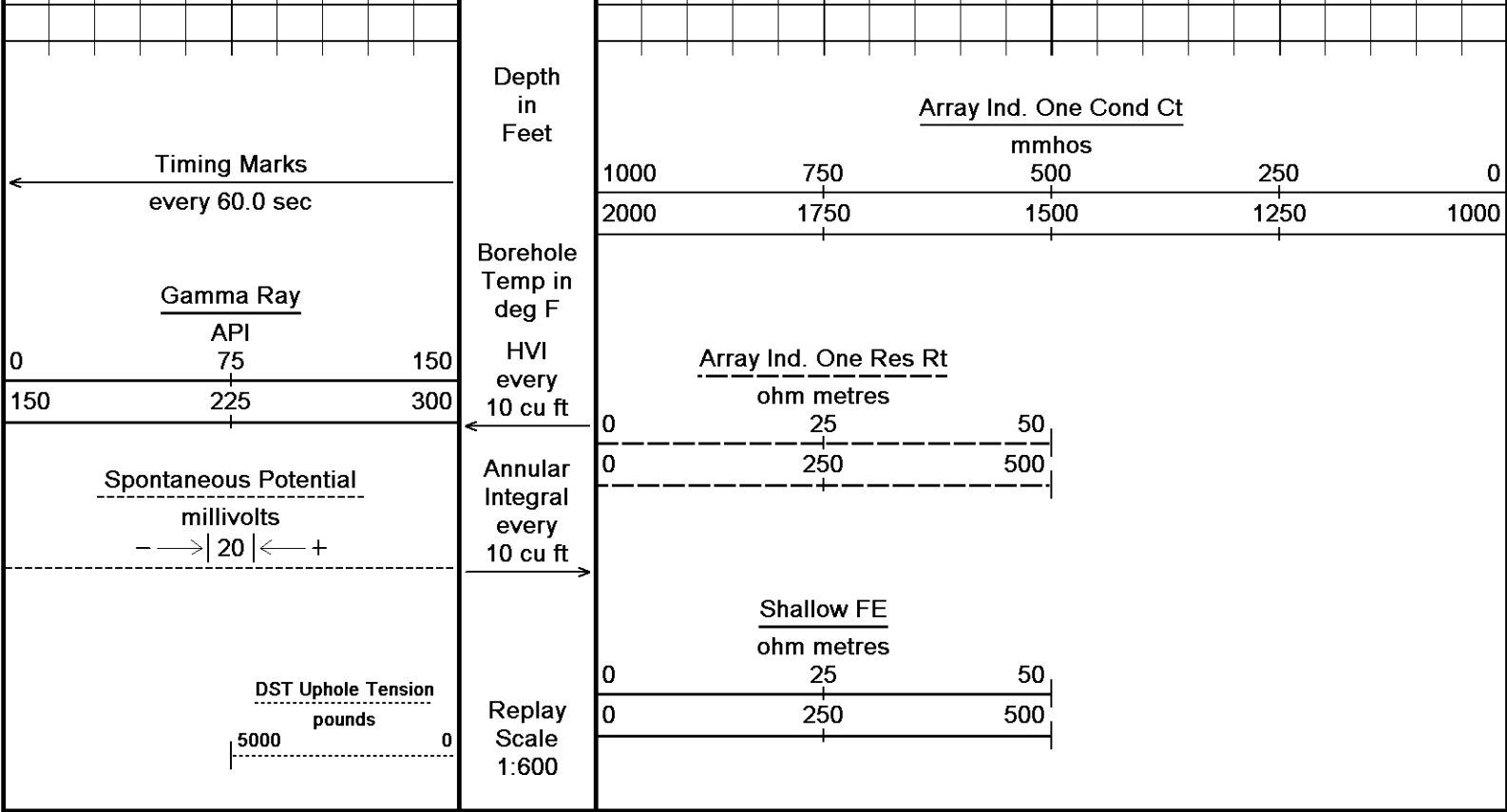












Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta  
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Plotted on 20-AUG-2014 03:54  
Recorded on 20-AUG-2014 00:21

↑

2 INCH MAIN

↑

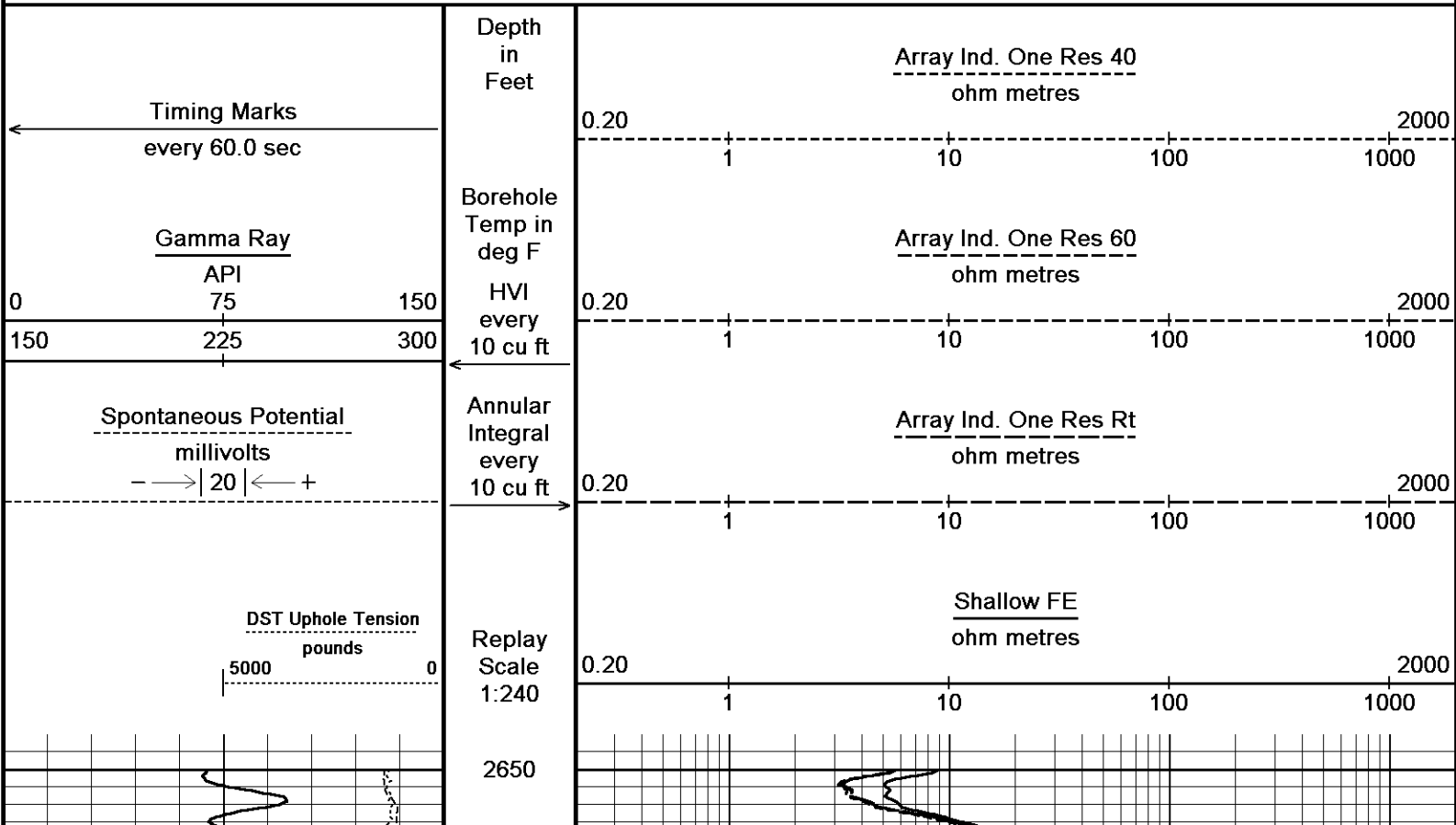
↓

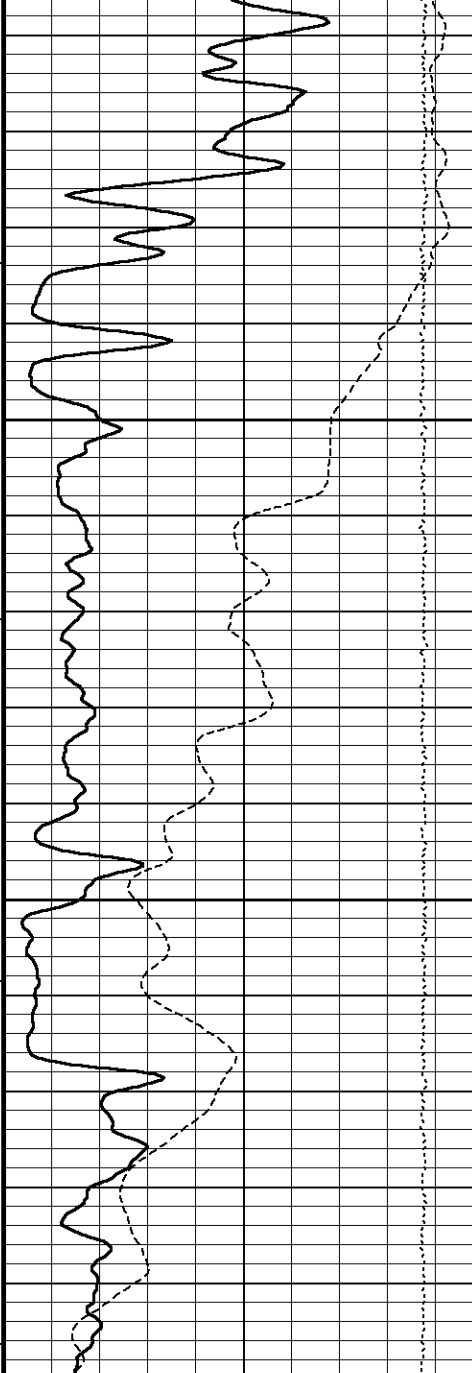
5 INCH MAIN - ANHYDRITE SECTION

↓

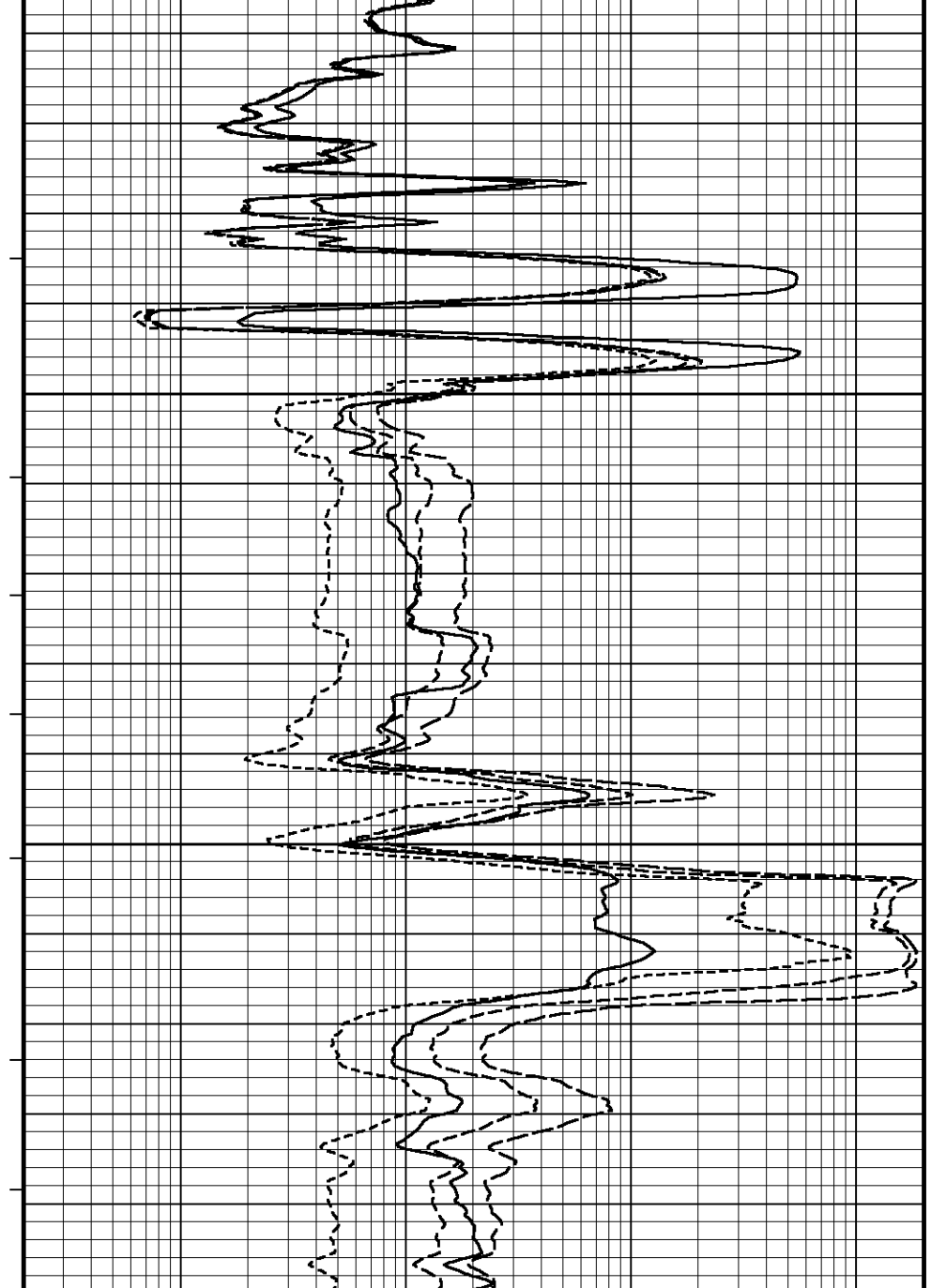
Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta  
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Plotted on 20-AUG-2014 03:54  
Recorded on 20-AUG-2014 00:21





100  
125°  
2700  
126°  
2750  
126°  
2800



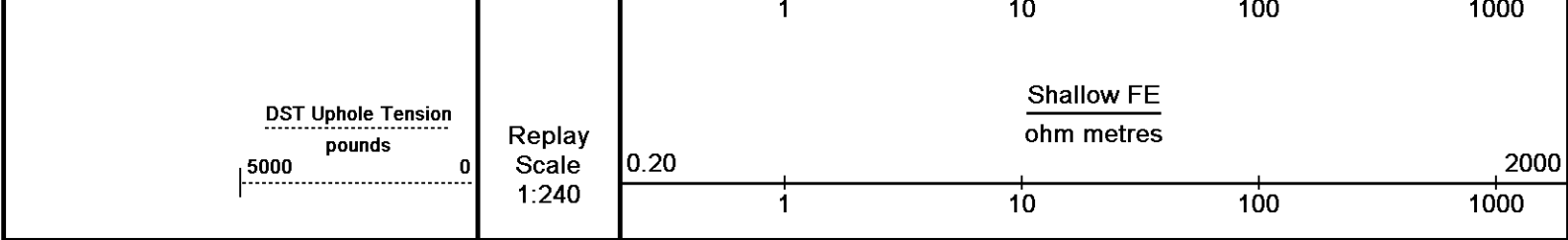
Timing Marks  
every 60.0 sec

Gamma Ray  
API  
0 75 150  
150 225 300

Spontaneous Potential  
millivolts  
- - - - - 20 - - - - - +

Depth  
in  
Feet  
  
Borehole  
Temp in  
deg F  
HVI  
every  
10 cu ft  
  
Annular  
Integral  
every  
10 cu ft

Array Ind. One Res 40  
ohm metres  
0.20 1 10 100 1000 2000  
  
Array Ind. One Res 60  
ohm metres  
0.20 1 10 100 1000 2000  
  
Array Ind. One Res Rt  
ohm metres  
0.20 1 10 100 1000 2000



Depth Based Data - Maximum Sampling Increment 10.0cm

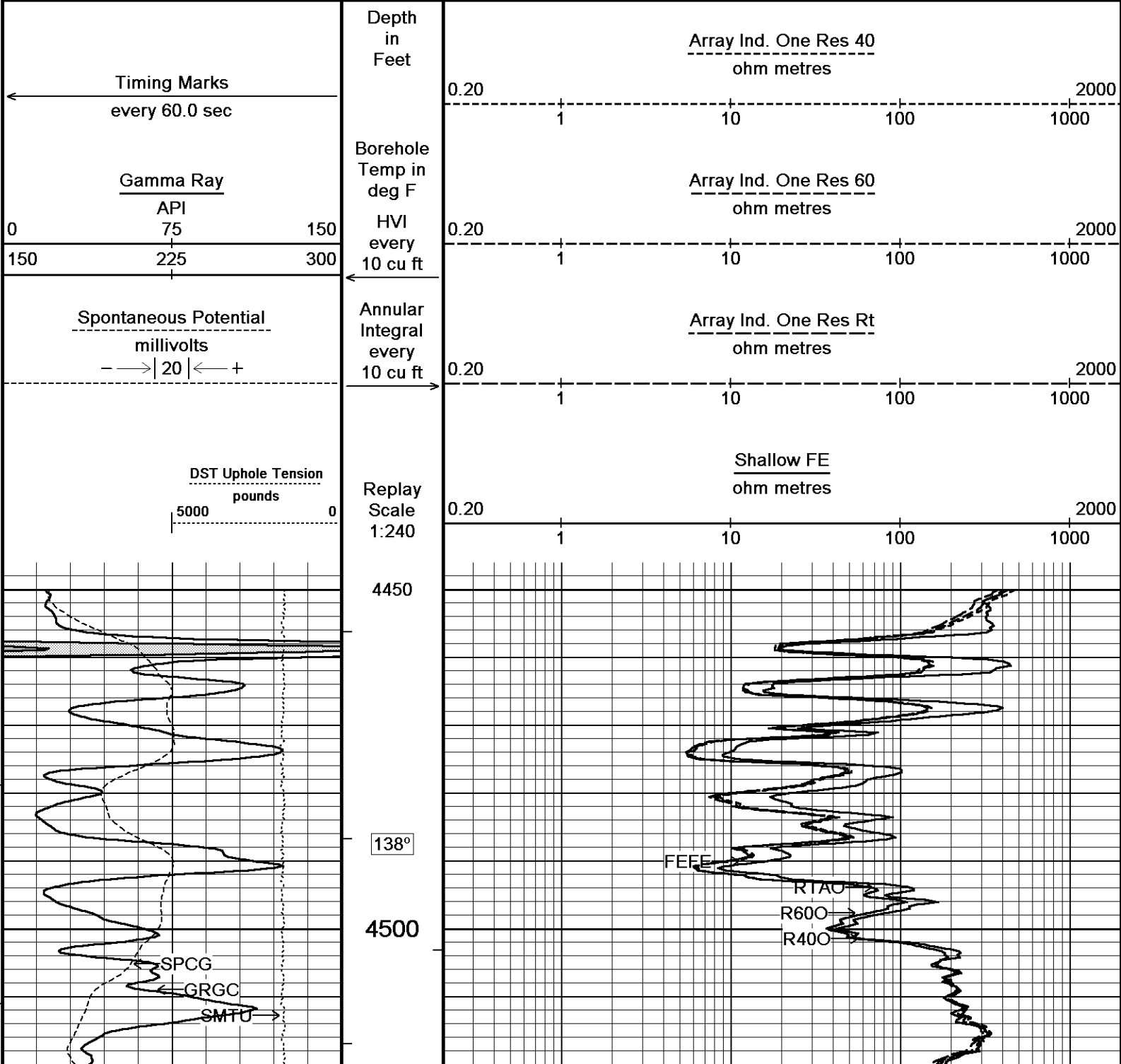
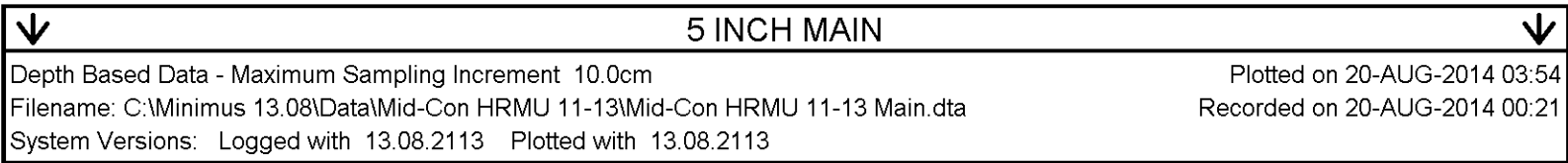
Plotted on 20-AUG-2014 03:54

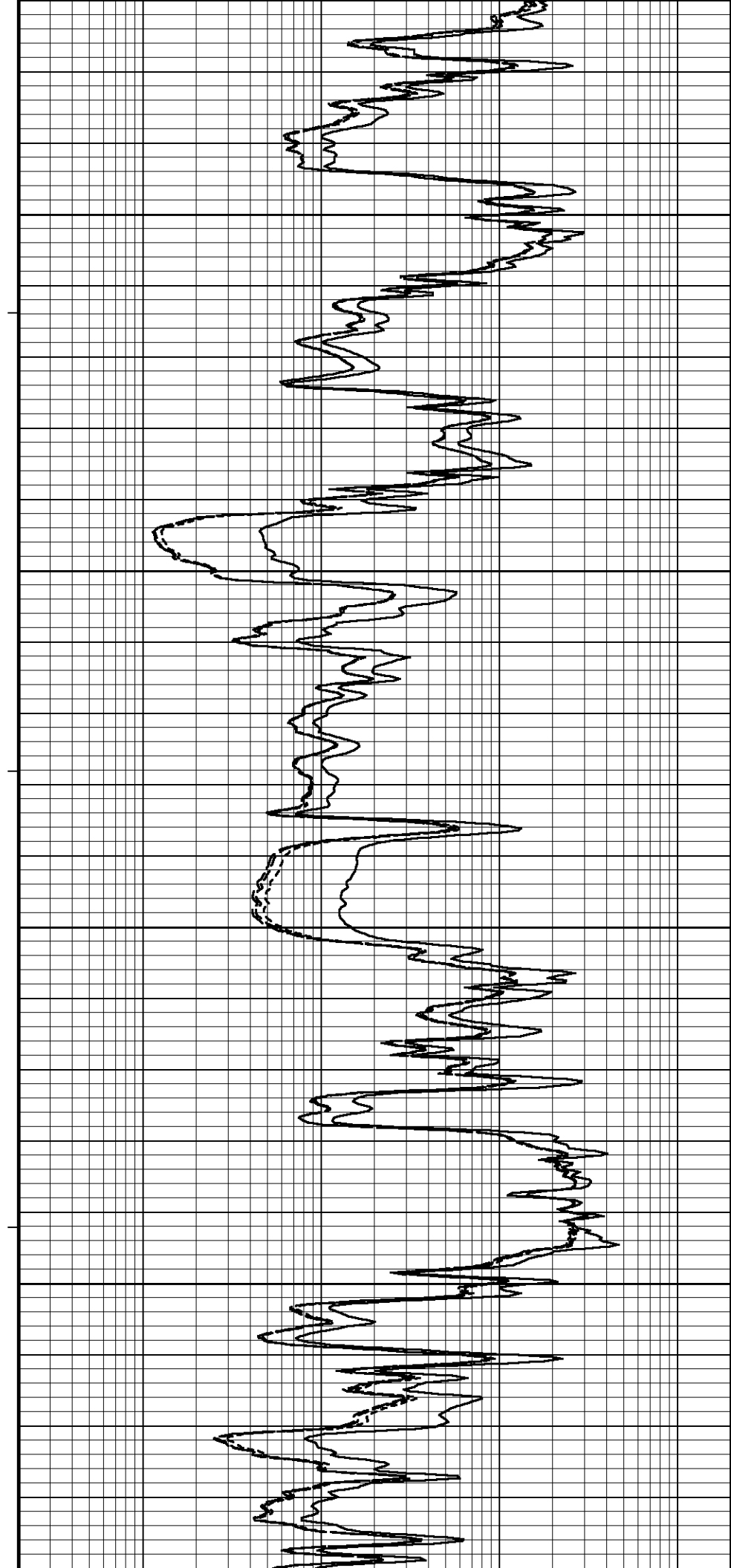
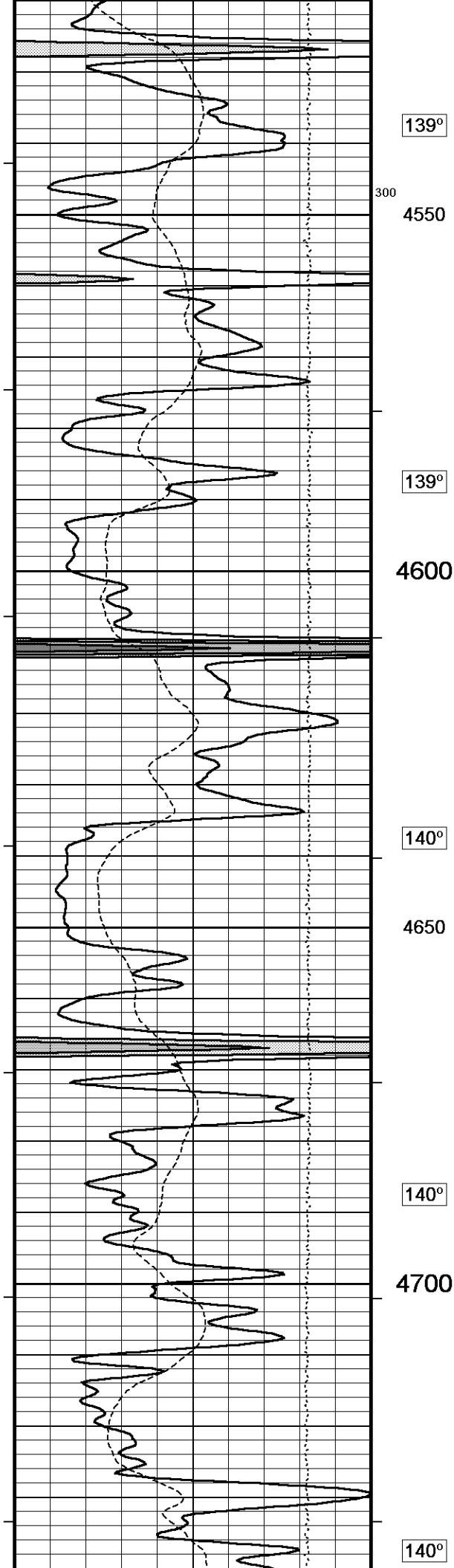
Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

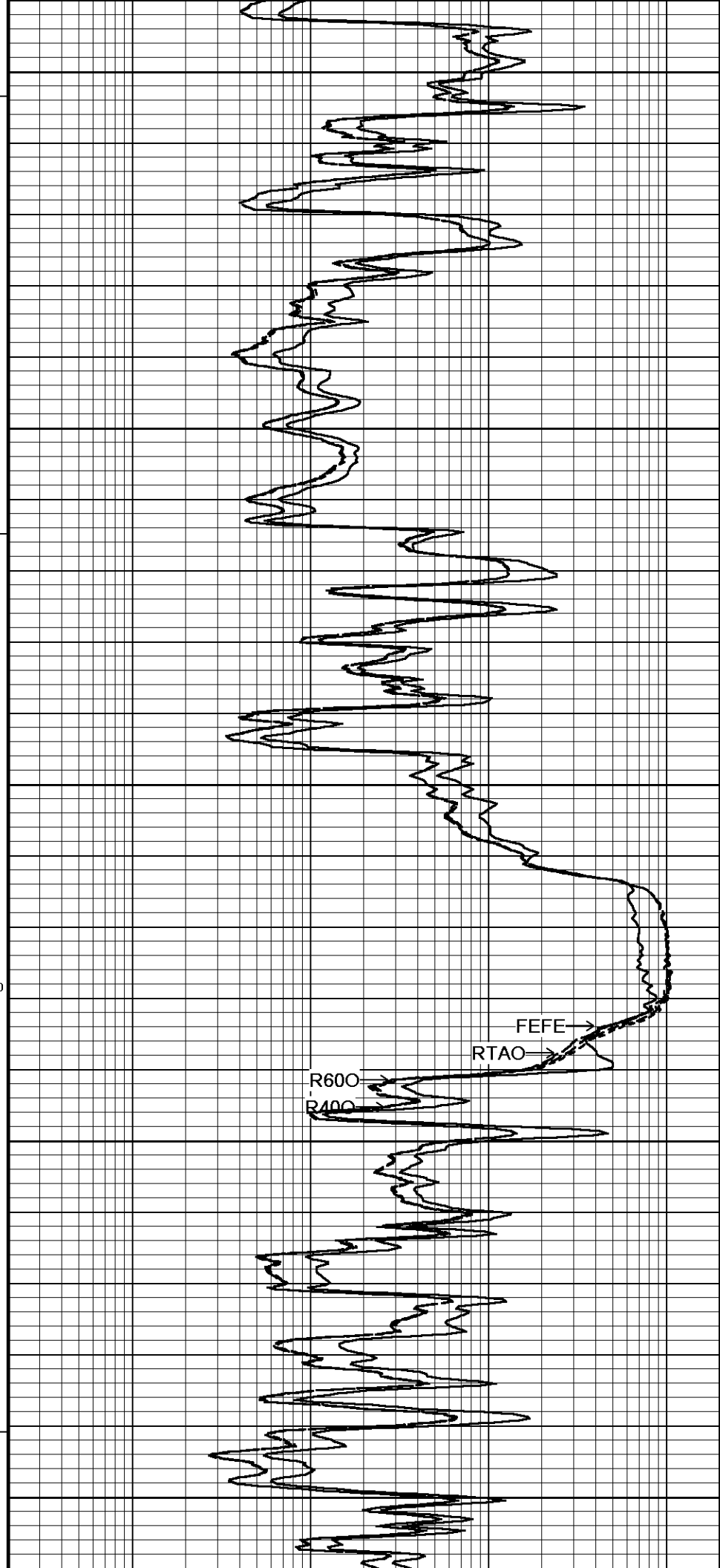
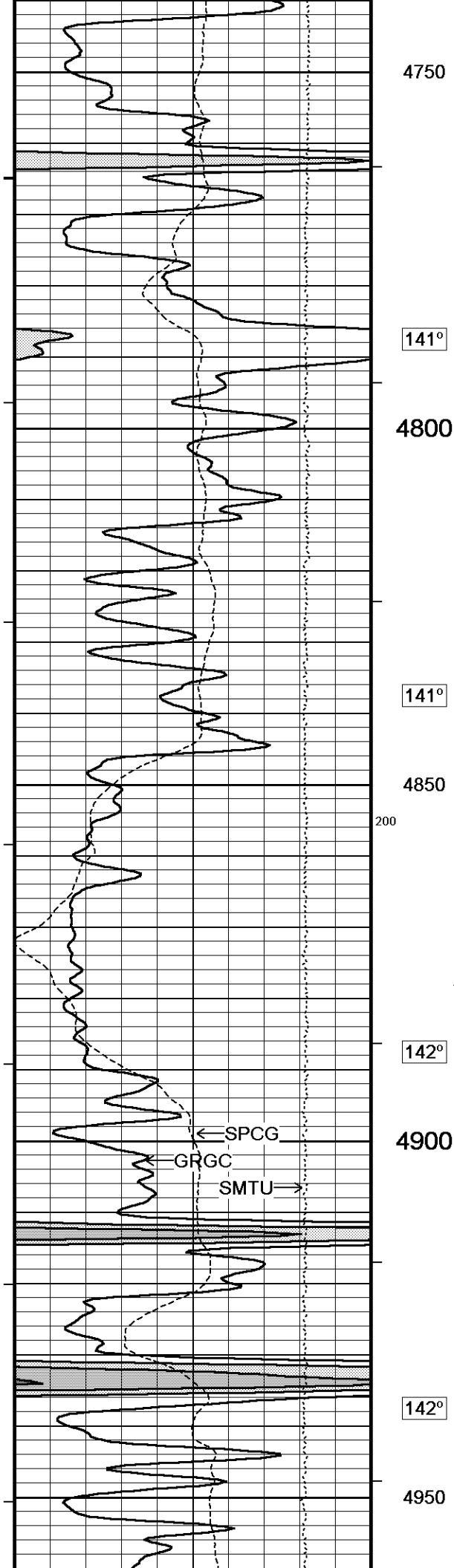
Recorded on 20-AUG-2014 00:21

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

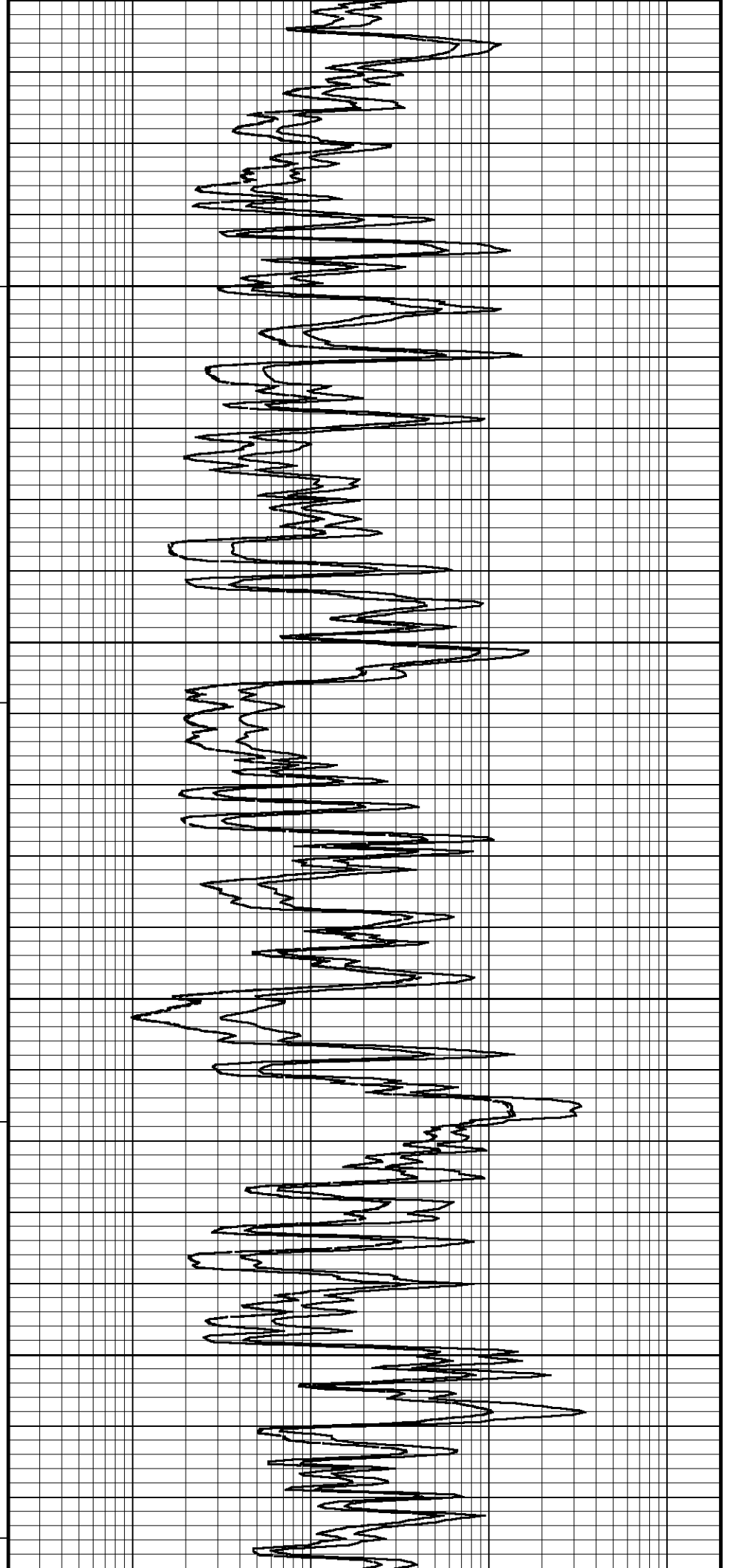
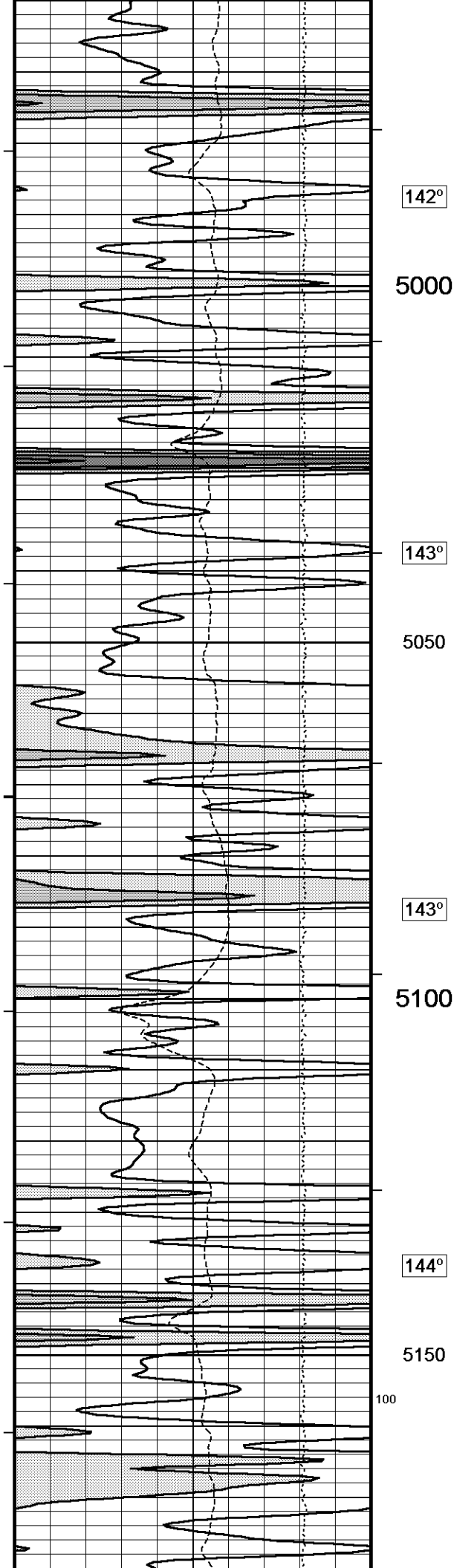
5 INCH MAIN - ANHYDRITE SECTION

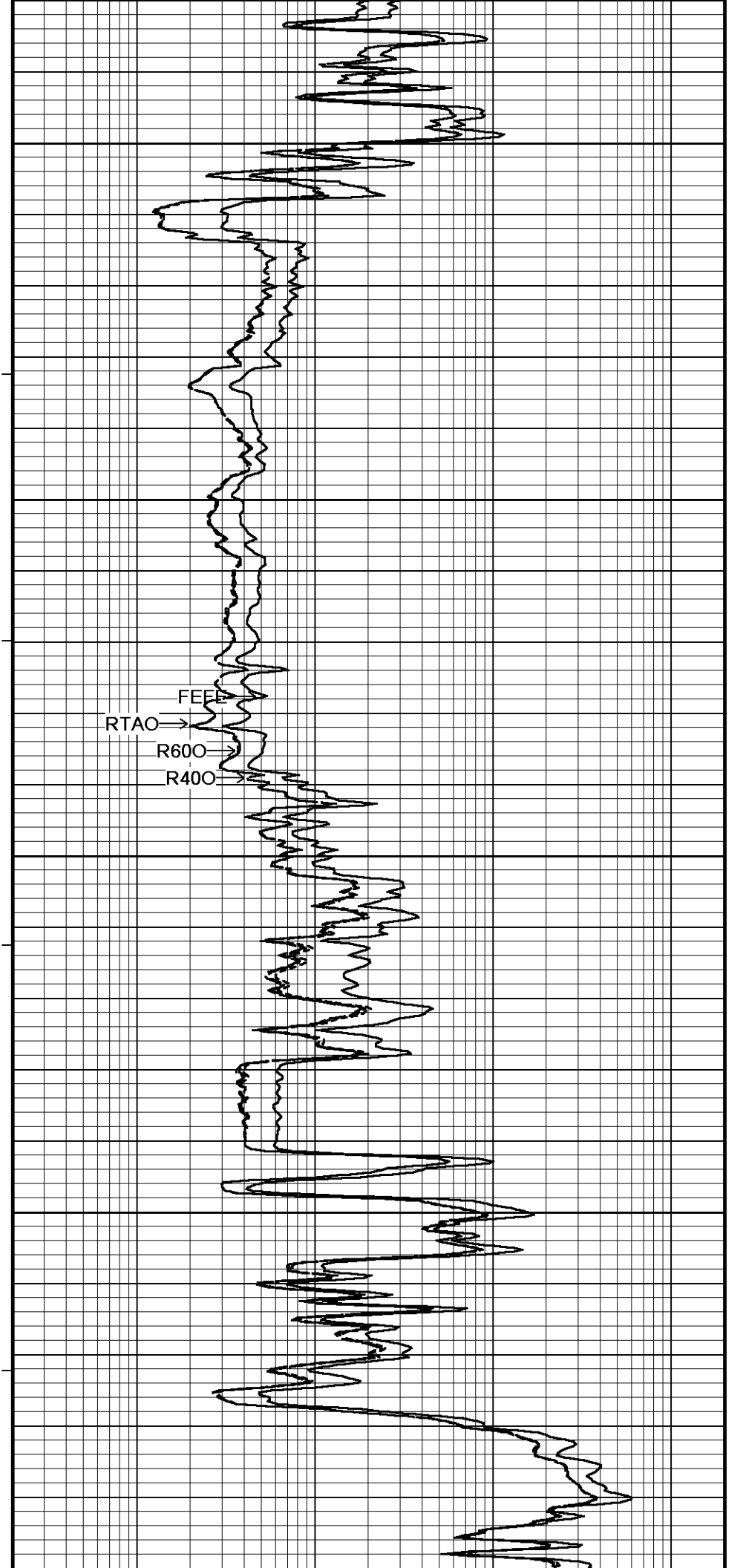
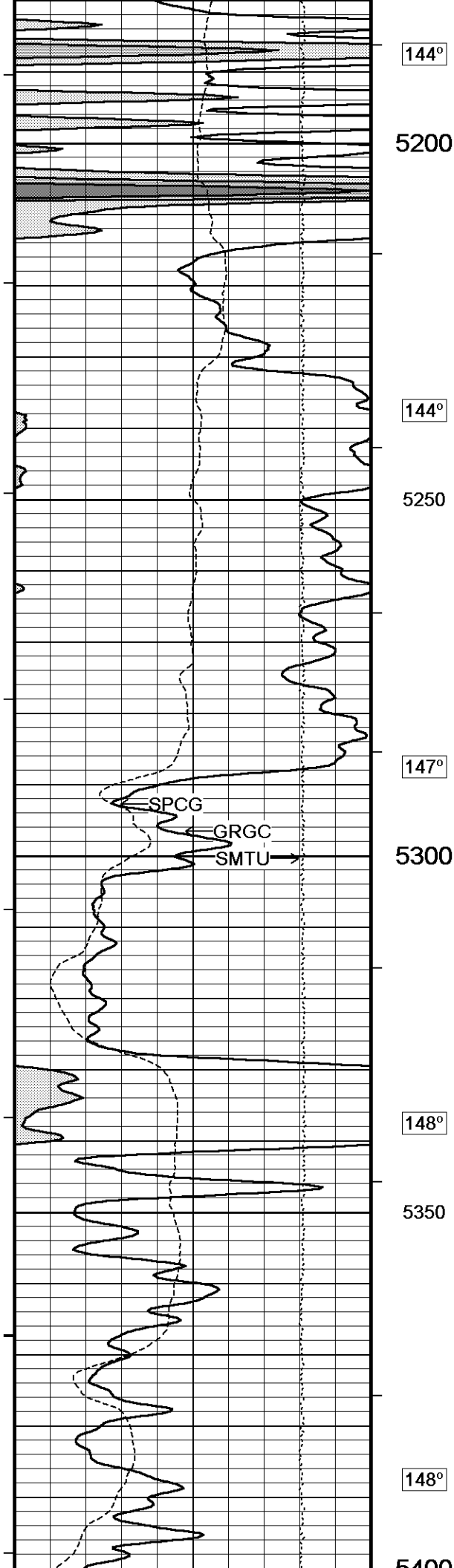


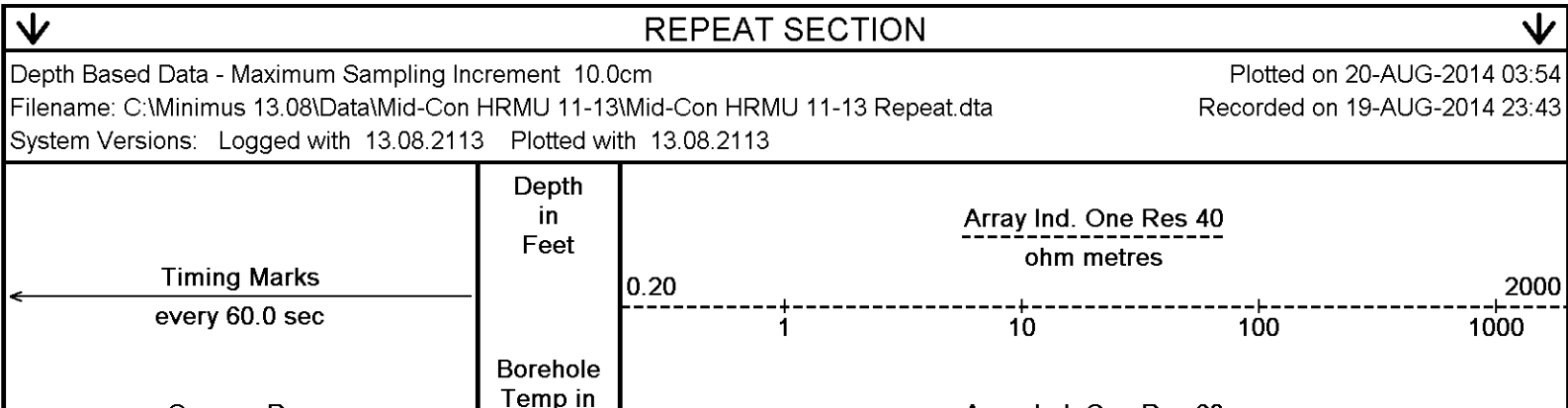
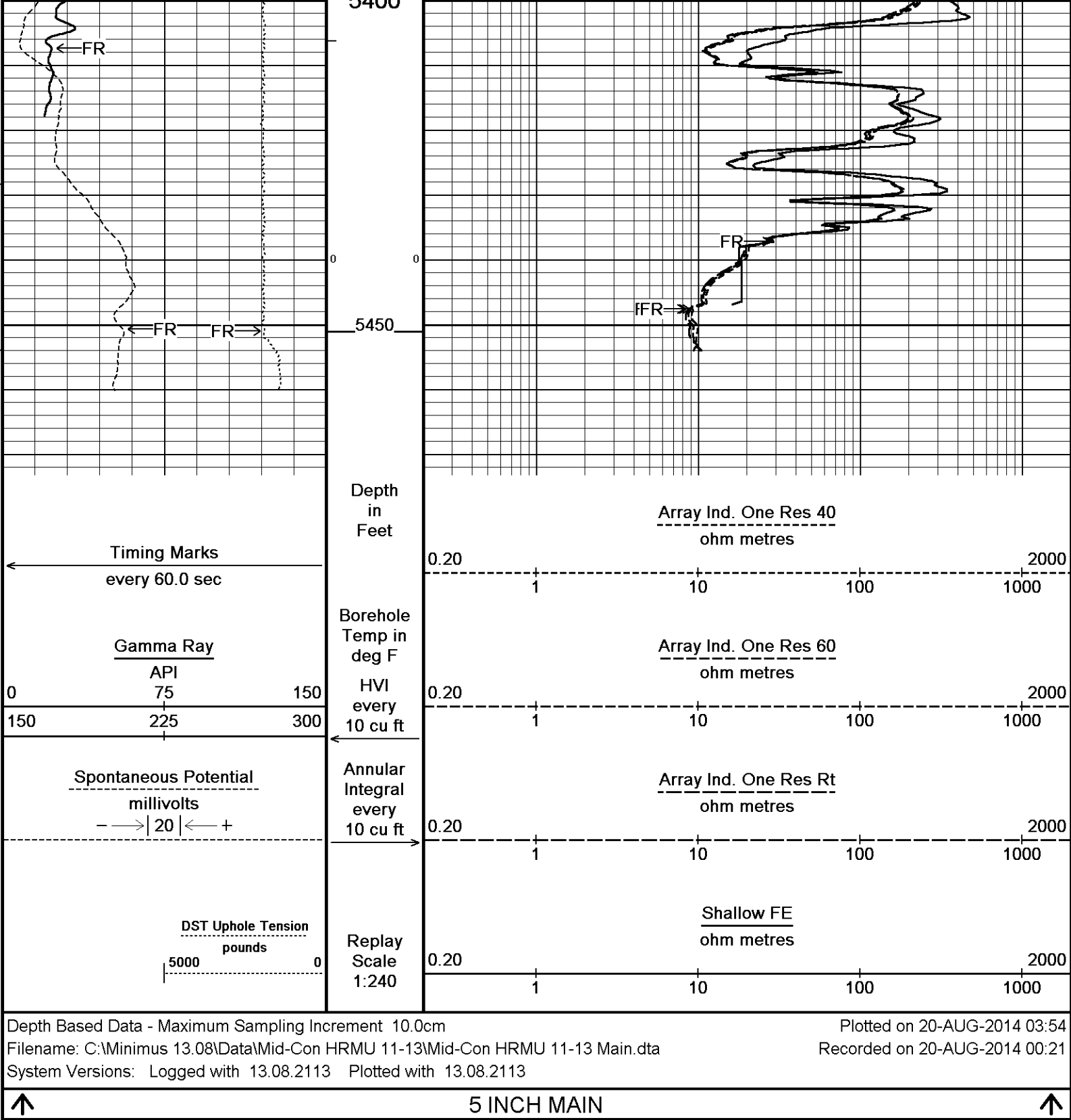


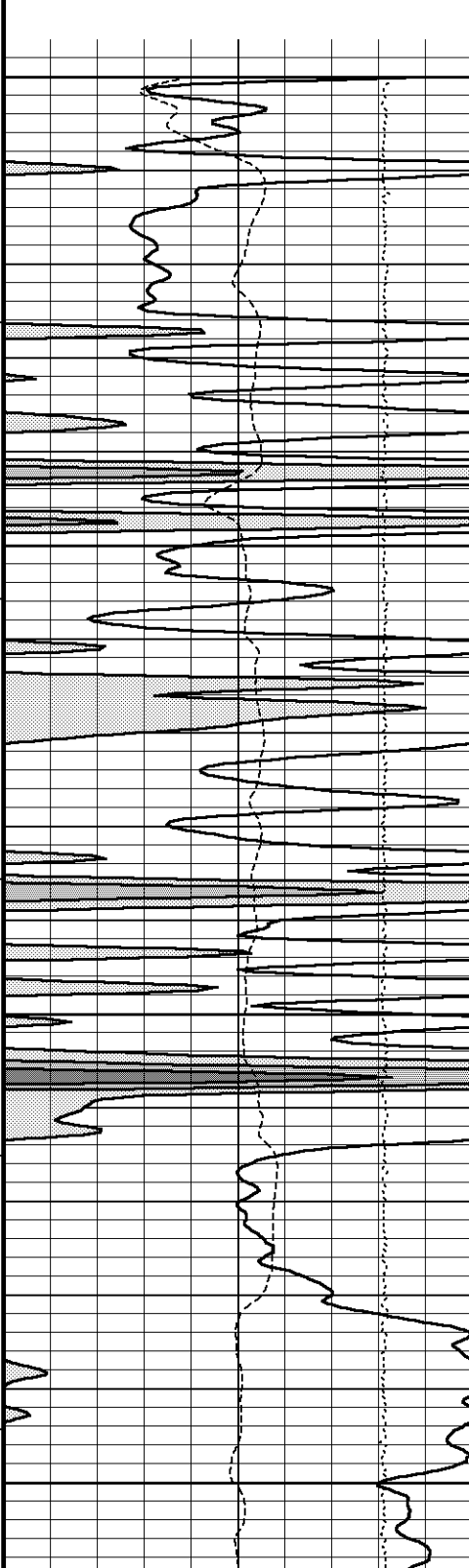
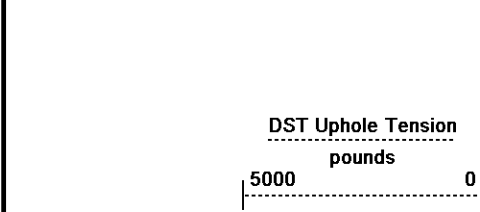
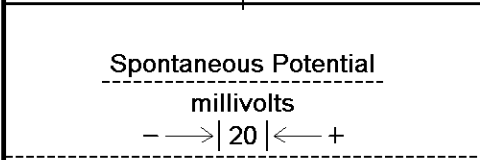
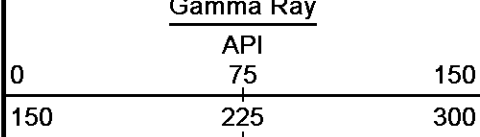












deg F

HVI

every

10 cu ft

Annular

Integral

every

10 cu ft

Replay

Scale

1:240

5100

142°

5150

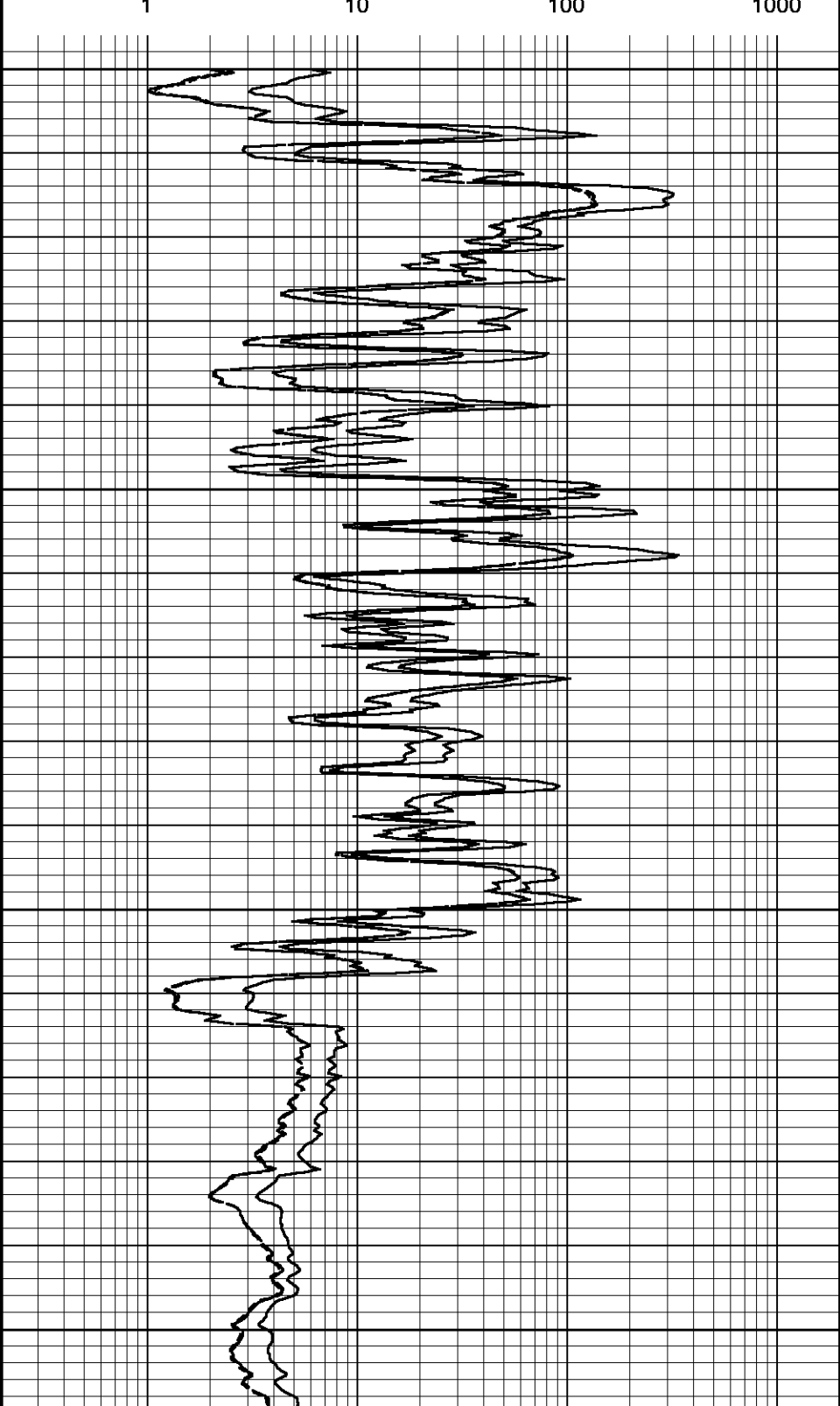
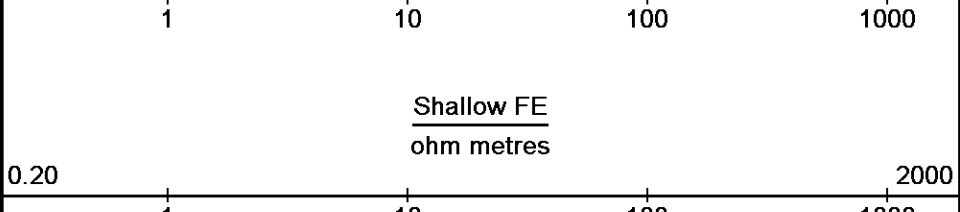
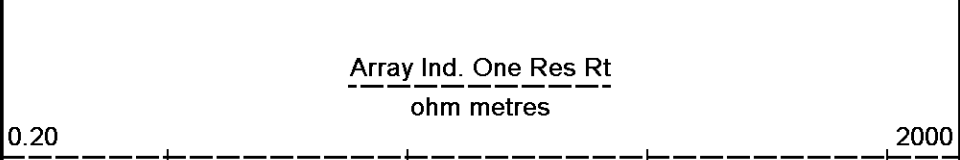
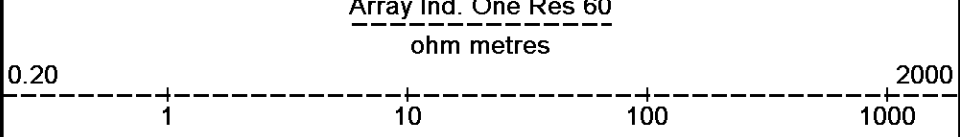
100

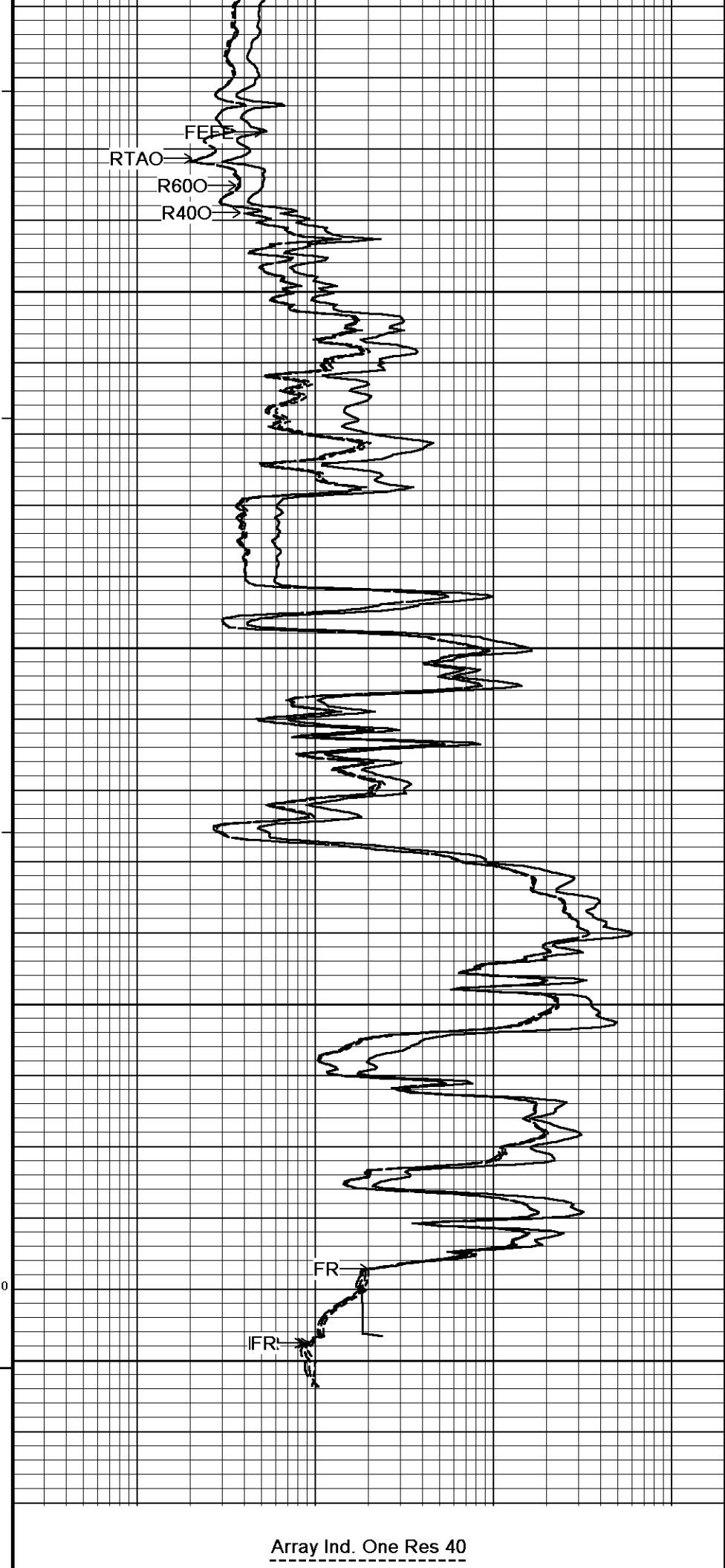
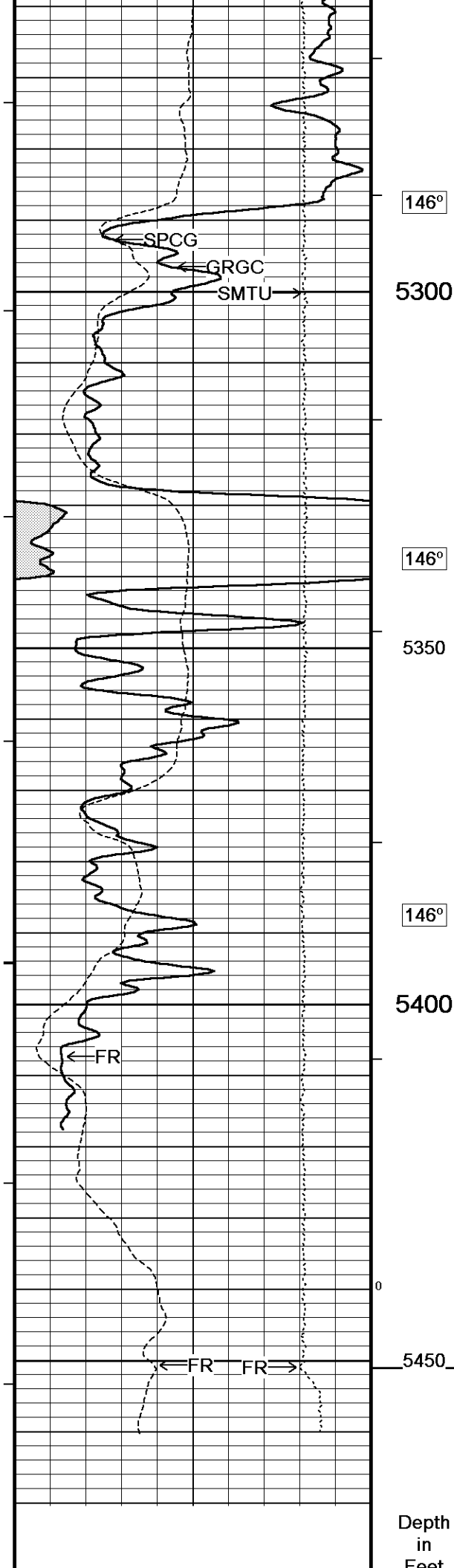
142°

5200

142°

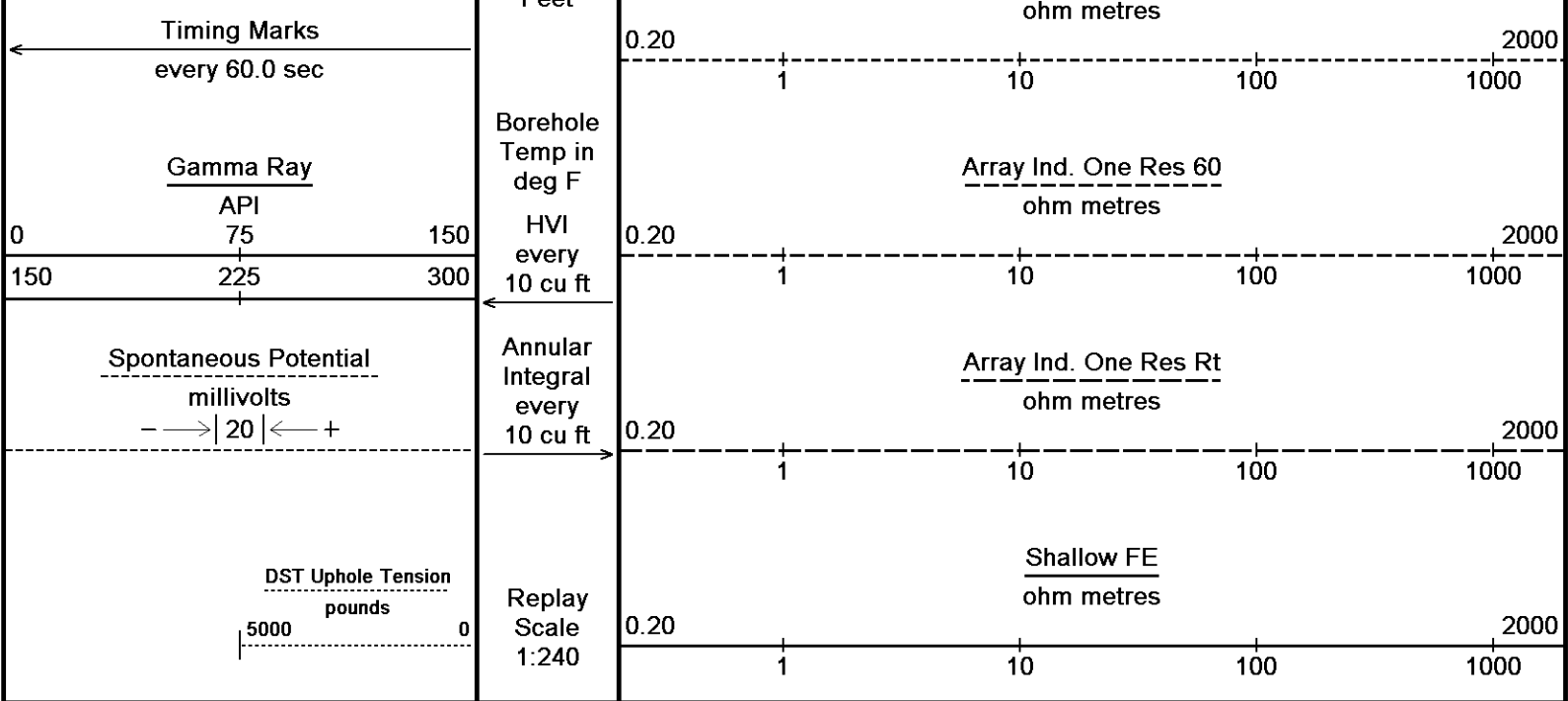
5250





Depth  
in  
Feet

Array Ind. One Res 40



Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 20-AUG-2014 03:54  
 Filename: C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Repeat.dta  
 Recorded on 19-AUG-2014 23:43  
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

↑ REPEAT SECTION ↑

**BEFORE SURVEY CALIBRATION**  
 C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

General Constants All 000			Last Edited on 19-AUG-2014,23:19
General Parameters			
Mud Resistivity	1.120	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	Density Caliper		
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		

High Resolution Temperature Calibration MCG-D.K 443			Field Calibration on 05-MAR-2014,20:50
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-D.K 443		Last Edited on 22-JUL-2014,11:40
Pre-filter Length	11	

Gamma Calibration MCG-D.K 443			Field Calibration on 19-AUG-2014 11:53
	Measured	Calibrated (API)	
Background	70	46	
Calibrator (Gross)	1164	771	
Calibrator (Net)	1094	725	

Gamma Constants MCG-D.K 443		Last Edited on 19-AUG-2014,20:55	
Gamma Calibrator Number	GRC38		
Mud Density	1.13	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Concentration of KCl		kppm	
K Mud Type	Chloride		
K Mud Concentration	0.00	%	

FE Calibration MFE-B.J 352			Base Calibration on 07-AUG-2014 16:12	
			Field Check on 19-AUG-2014 11:32	
Base Calibration				
	Measured		Calibrated (ohm-m)	
Reference 1	0.0		0.0	
Reference 2	962.4		126.8	
Base Check			281.6	
Field Check			281.7	

FE Constants MFE-B.J 352		Last Edited on 19-AUG-2014,20:54	
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 158				Base Calibration on 03-APR-2014,15:01	
				Field Check on 19-AUG-2014 11:31	
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.2	475.3	9.3	966.2	
2	6.1	381.2	7.6	821.4	
3	3.8	265.2	5.2	566.0	
4	2.7	132.2	2.6	279.2	
Array Temperature		22.3	Deg F		
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1			13.5	3812.1	
2			30.3	3527.6	
3			27.3	2978.8	
4			18.1	2095.6	
Deep			15.0	1942.0	
Medium			40.9	3883.8	
Shallow			47.7	5231.9	
Array Temperature			84.1	Deg F	

Induction Constants MAI-A.A 158		Last Edited on 19-AUG-2014,20:54	
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 104

Base Calibration on 12-AUG-2014 21:09

Field Calibration on 19-AUG-2014 11:36

### Base Calibration

Reading No	Measured	Calibrator Size (in)
1	12248	3.99
2	21021	5.98
3	29619	7.97
4	37847	9.86
5	46921	11.92
6	N/A	N/A

### Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.97

## DOWNHOLE EQUIPMENT

C:\Minimus 13.08\Data\Mid-Con HRMU 11-13\Mid-Con HRMU 11-13 Main.dta

### Compact Comms Gamma

MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

### Compact Micro-Resistivity

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

### Compact Neutron

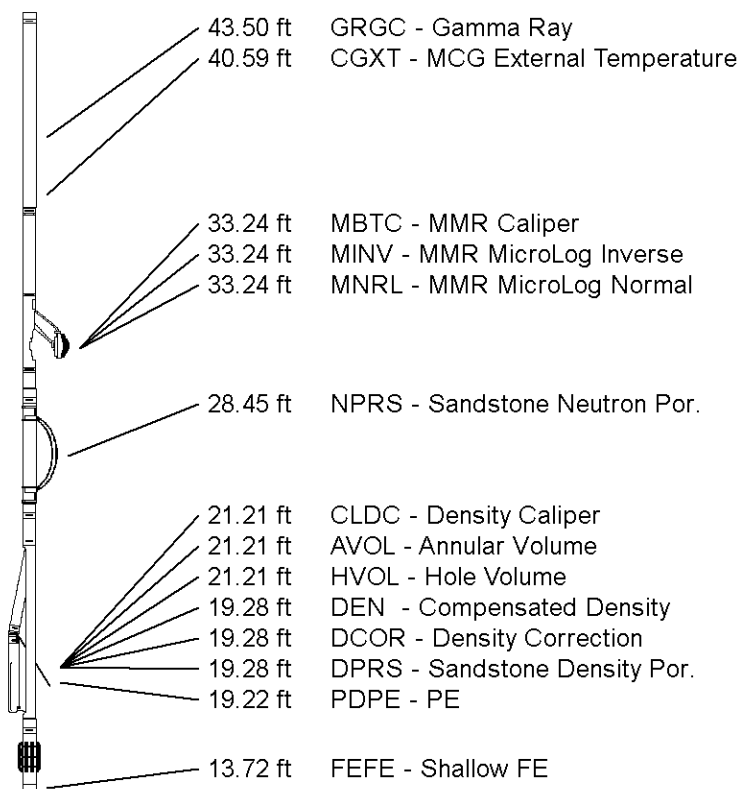
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.240 in

### Compact Density/Caliper

MPD-B 104 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

### Compact Focussed Electric

MFF-B J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.240 in





Compact Induction  
MAI-A.A 158 LG: 10.81 ft WT: 48.5 lb OD: 2.240 in

Total Length: 48.78 ft Weight: 383.6 lb



3.34 ft R400 - Array Ind. One Res 40  
3.34 ft RTAO - Array Ind. One Res Rt  
3.34 ft R600 - Array Ind. One Res 60  
0.23 ft SPCG - Spontaneous Potential  
Tool Zero (0.13ft from bottom)  
-0.13 ft SMTU - DST Uphole Tension  
All measurements relative to tool zero.

COMPANY MID-CON ENERGY OPERATING  
WELL HRMU 11-13  
FIELD HARKER RANCH MORROW UNIT  
PROVINCE/COUNTY CHEYENNE  
COUNTRY/STATE U.S.A. / COLORADO

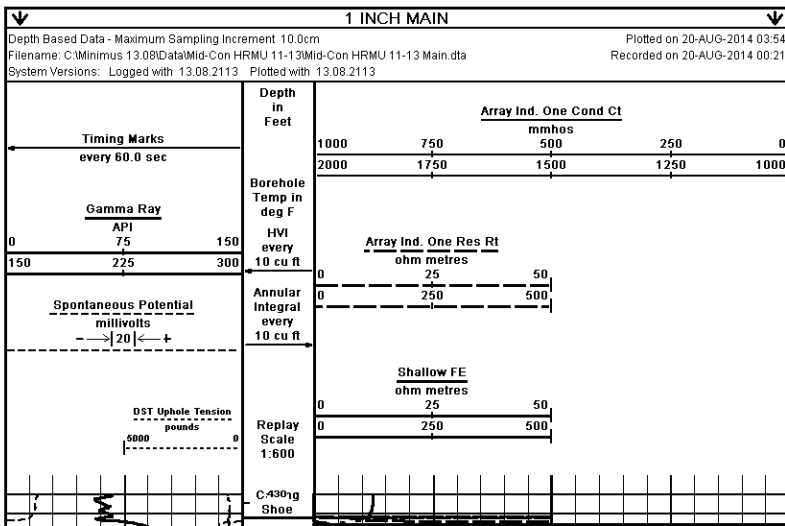
Elevation Kelly Bushing	4107.60	feet	First Reading	5447.66	feet
Elevation Drill Floor	4105.60	feet	Depth Driller	5450.00	feet
Elevation Ground Level	4091.00	feet	Depth Logger	5451.00	feet

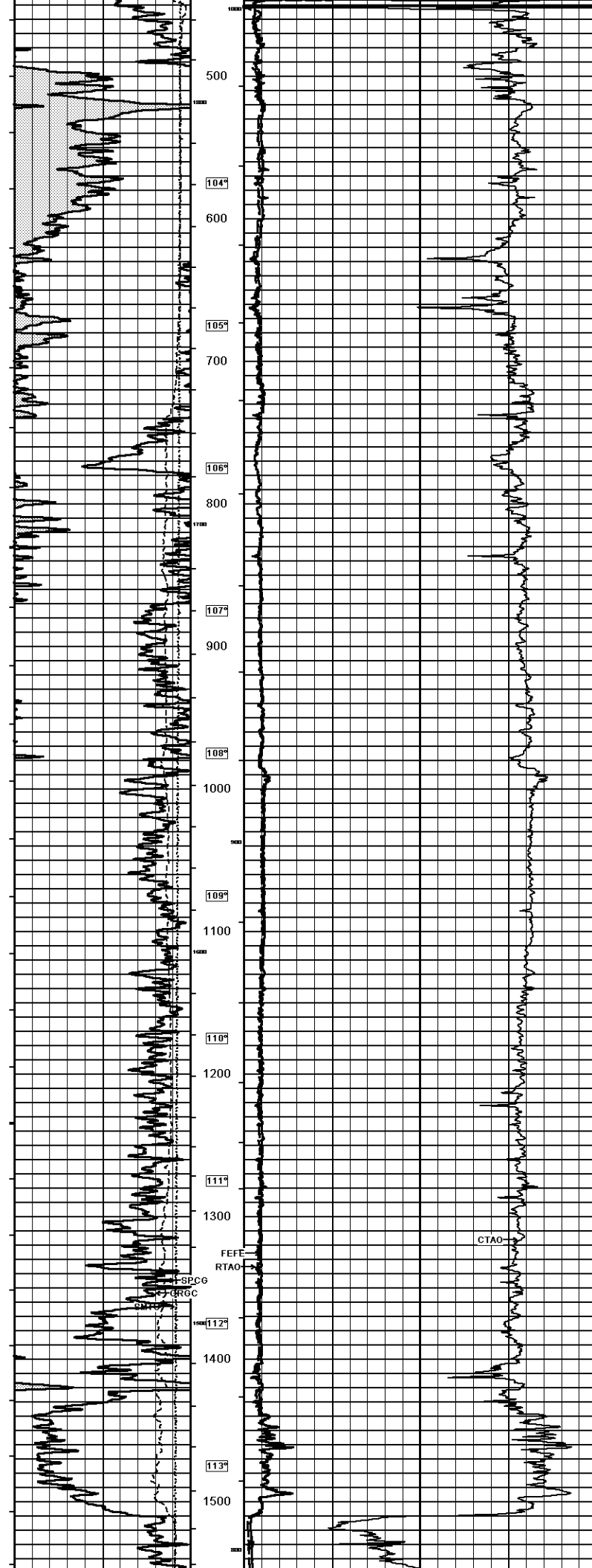


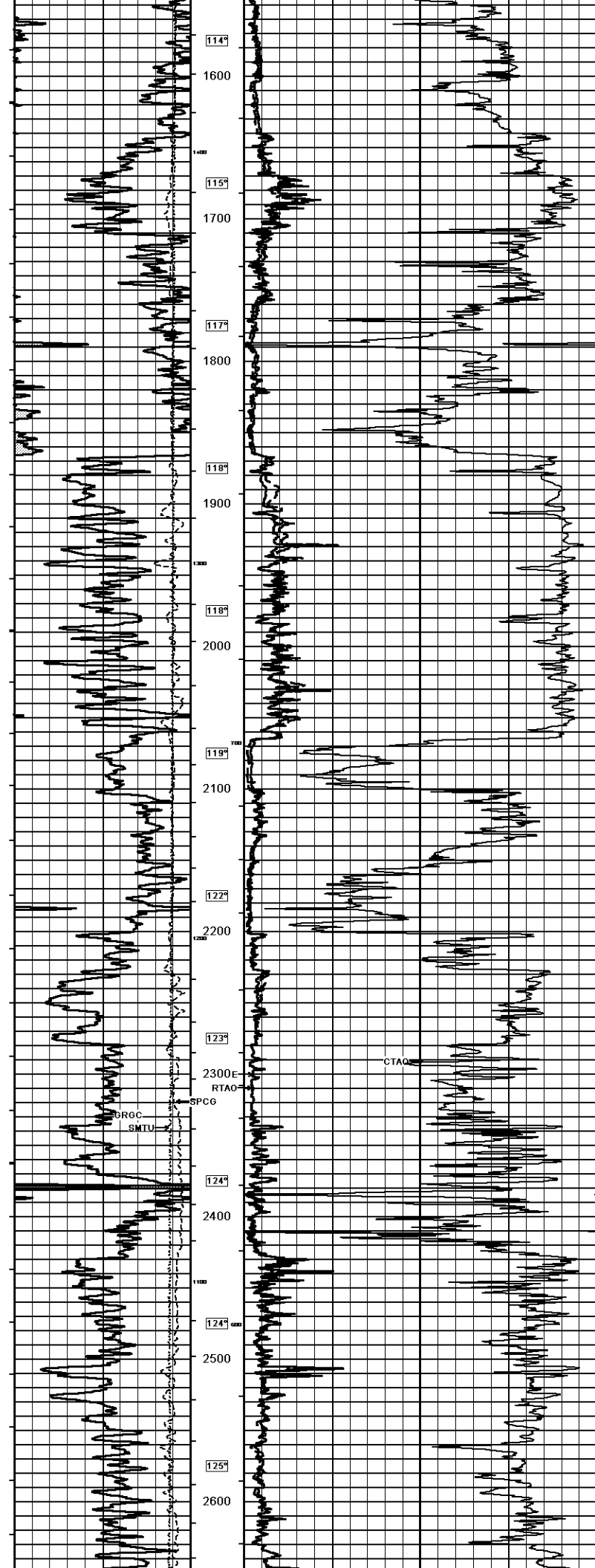
SHALLOW FOCUSED  
ARRAY INDUCTION  
ELECTRIC LOG

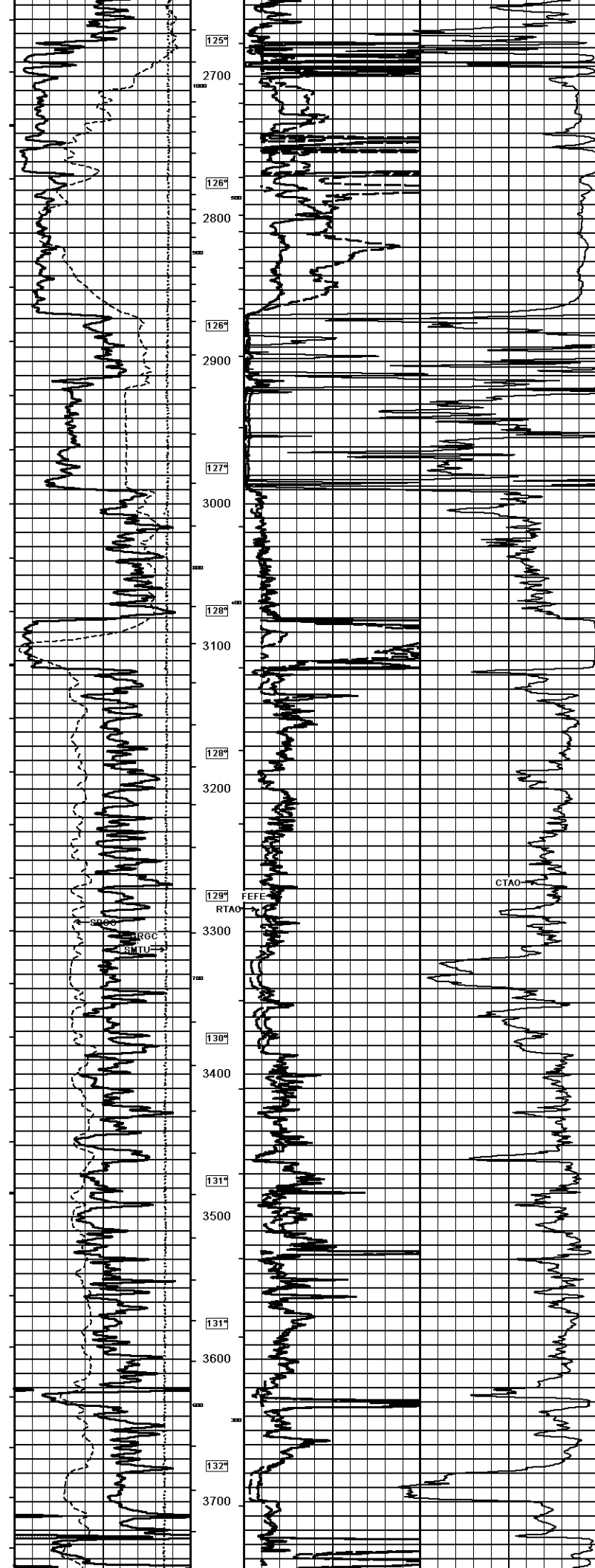
**Weatherford**

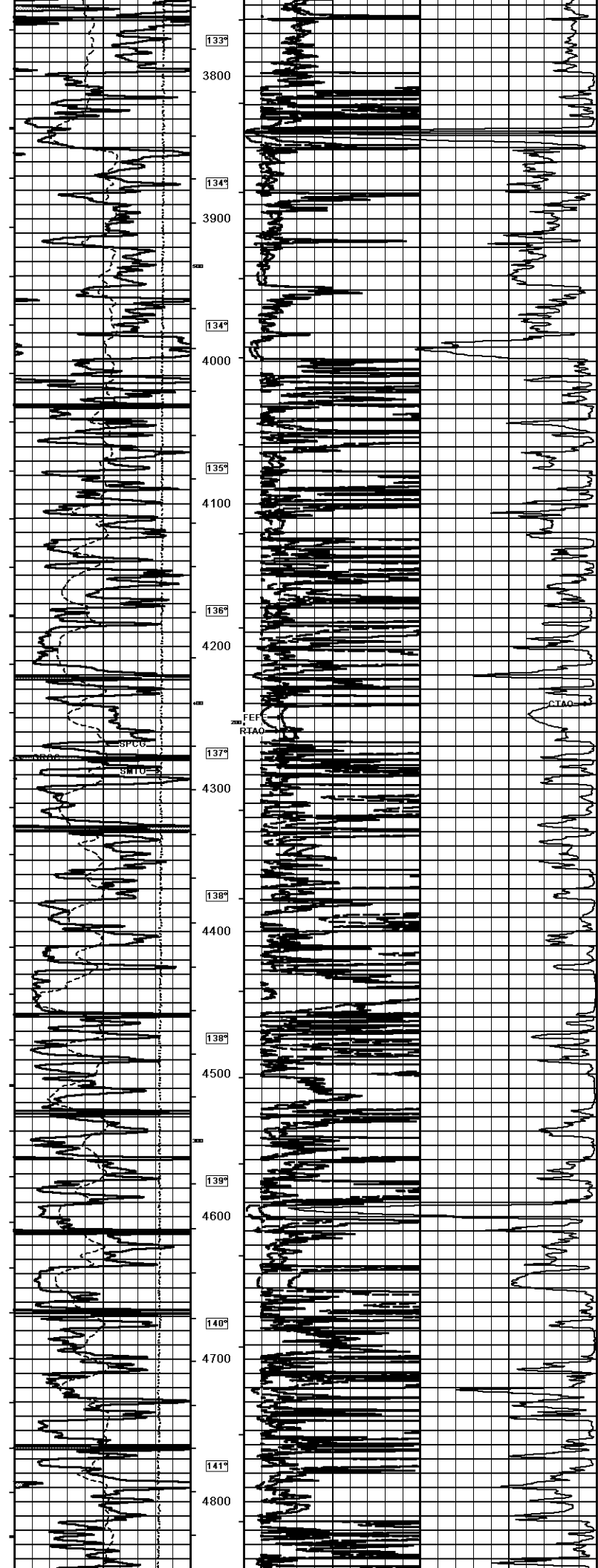
Weatherford		SHALLOW FOCUSED ARRAY INDUCTION ELECTRIC LOG	
COMPANY	MID-CON ENERGY OPERATING	WELL	HRMU 11-13
FIELD	HARKER RANCH MORROW UNIT	PROVINCE/COUNTY	CHEYENNE
COUNTRY/STATE	U.S.A. / COLORADO	LOCATION	6000 ENL & 7800 FWL
SEC 13	TWP 13S	RGE 43W	TIME SERVICES
Latitude	40.517 0739	Longitude	104.016 1111
Log Number	05-017 0739	Log Name	MLL
Permanent Datum Q.L. Elevation	4091 feet	Log Measured From KB	16.6
Drilling Measured From KB	16.6	Run Number	ONE
Date	19-AUG-2014	Service Order	7606-95668657
Depth Driller	5450.00	Depth Logger	5450.00
First Reading	5447.66	First Reading	5447.66
Last Reading	442.00	Last Reading	442.00
Casing Driller	442.00	Casing Driller	442.00
Bit Size	7.875	Bit Size	7.875
Flow Fluid Type	CHEMICAL	Density/Viscosity	9.40 lb/sg
PH/Fluid Loss	8.00	PH/Fluid Loss	8.00
Sample Source	MUDPT	Sample Source	MUDPT
Rm @ Measured Temp	11.2 @ 75.0	Rm @ Measured Temp	11.2 @ 75.0
Rmt @ Measured Temp	0.89 @ 75.0	Rmt @ Measured Temp	0.89 @ 75.0
Source Rmt/Temp	1.34 @ 75.0	Source Rmt/Temp	1.34 @ 75.0
Rm @ BHT	0.58 @ 140.0	Rm @ BHT	0.58 @ 140.0
Time Since Circulation	4 HOURS	Time Since Circulation	4 HOURS
Max Recorded Temp	148.00	Max Recorded Temp	148.00
Equipment/Base	13057	Equipment/Base	13057
Recorded By	BENWELDN	Recorded By	BENWELDN
Witnessed By	CHRIS BEAN	Witnessed By	CHRIS BEAN
DOB#	1811-243	DOB#	1811-243

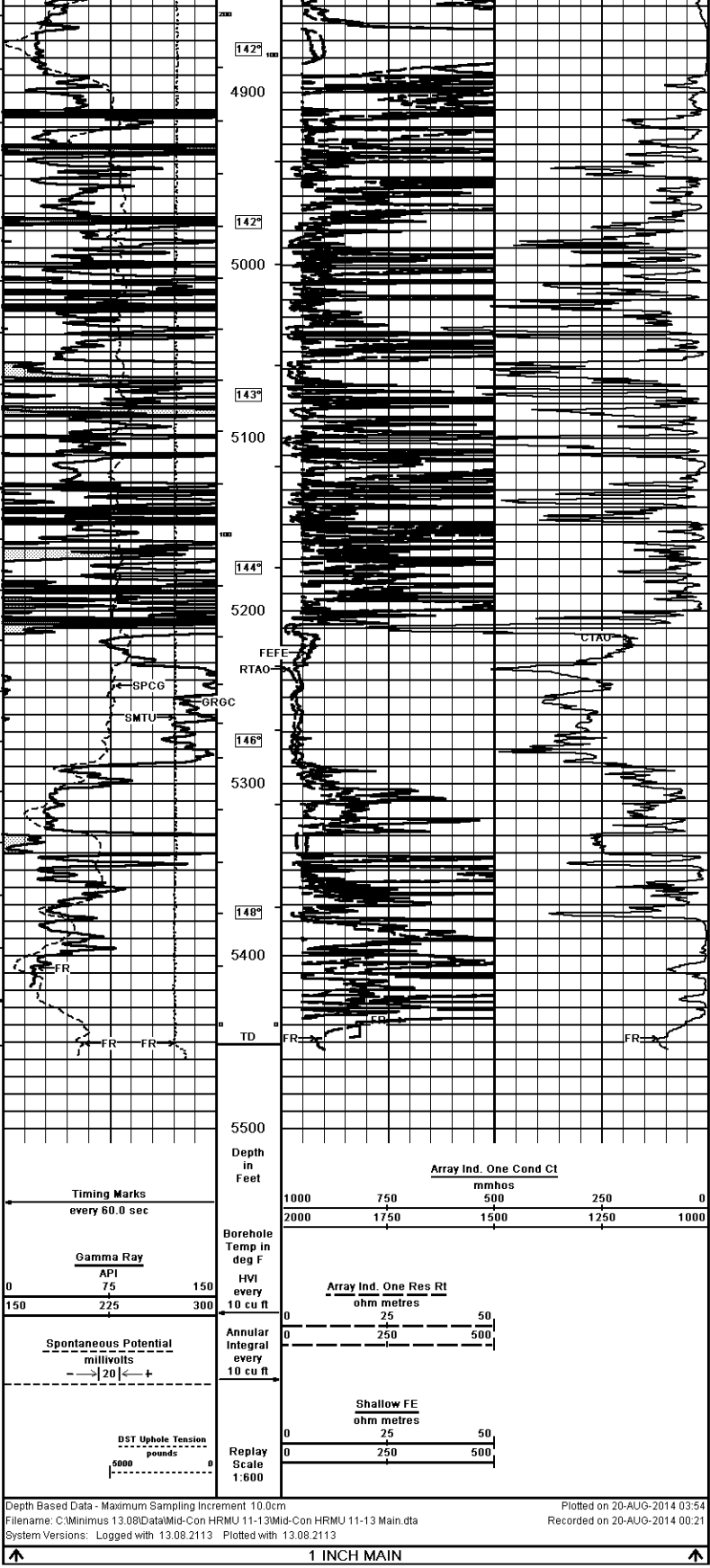













COMPANY		MID-CON ENERGY OPERATING			
WELL		HRMU 11-13			
FIELD		HARKER RANCH MORROW UNIT			
PROVINCE/COUNTY		CHEYENNE			
COUNTRY/STATE		U.S.A. / COLORADO			
Elevation Kelly Bushing	4107.60	feet	First Reading	5447.66	feet
Elevation Drill Floor	4105.60	feet	Depth Driller	5450.00	feet
Elevation Ground Level	4091.00	feet	Depth Logger	5451.00	feet
 <b>Weatherford</b>		SHALLOW FOCUSED			
		ARRAY INDUCTION			
		ELECTRIC LOG			

