



**Weatherford**

ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG

COMPANY										GRAND MESA OPERATING COMPANY									
WELL										BETTY #1-15									
FIELD										WILDCAT									
PROVINCE/COUNTY										LINCOLN									
COUNTRY/STATE										U.S.A. / COLORADO									
LOCATION										263' FSL & 2172' FWL									
SEC 15		TWP 7S		RGE 55W		Other Services				MML									
Latitude						MPD/MDN													
Longitude						MSS													
API Number		05-073-06750																	
Permanent Datum GL, Elevation 5465 feet																			
Log Measured From KB, 19.00 feet above Permanent Datum																			
Drilling Measured From KB																			
Date		06-SEP-2018																	
Run Number		ONE																	
Service Order		4558-22342051																	
Depth Driller		8541.00				feet													
Depth Logger		8526.00				feet													
First Reading		8523.00				feet													
Last Reading		474.00				feet													
Casing Driller		473.00				feet													
Casing Logger		474.00				feet													
Bit Size		7.875				inches													
Hole Fluid Type		CHEMICAL																	
Density / Viscosity		9.40		lb/USg		63.00		CP											
PH / Fluid Loss		9.50				7.20		ml/30Min											
Sample Source		FLOWLINE																	
Rm @ Measured Temp		0.80 @ 75.0				ohm-m													
Rmf @ Measured Temp		0.64 @ 75.0				ohm-m													
Rmc @ Measured Temp		0.96 @ 75.0				ohm-m													
Source Rmf / Rmc		CALC				CALC													
Rm @ BHT		0.32 @190.0				ohm-m													
Time Since Circulation		5 HOURS																	
Max Recorded Temp		190.00				deg F													
Equipment / Base		13096		LIB															
Recorded By		ADAM SILL																	
Witnessed By		GARET DINKEL																	

BOREHOLE RECORD					Last Edited: 06-SEP-2018 13:11
Bit Size inches		Depth From feet		Depth To feet	
7.875		473.00		8541.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	473.00	24.00	

REMARKS
- SOFTWARE ISSUE: WLS 18.01.6830.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 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: 3619 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 2296 CU.FT.

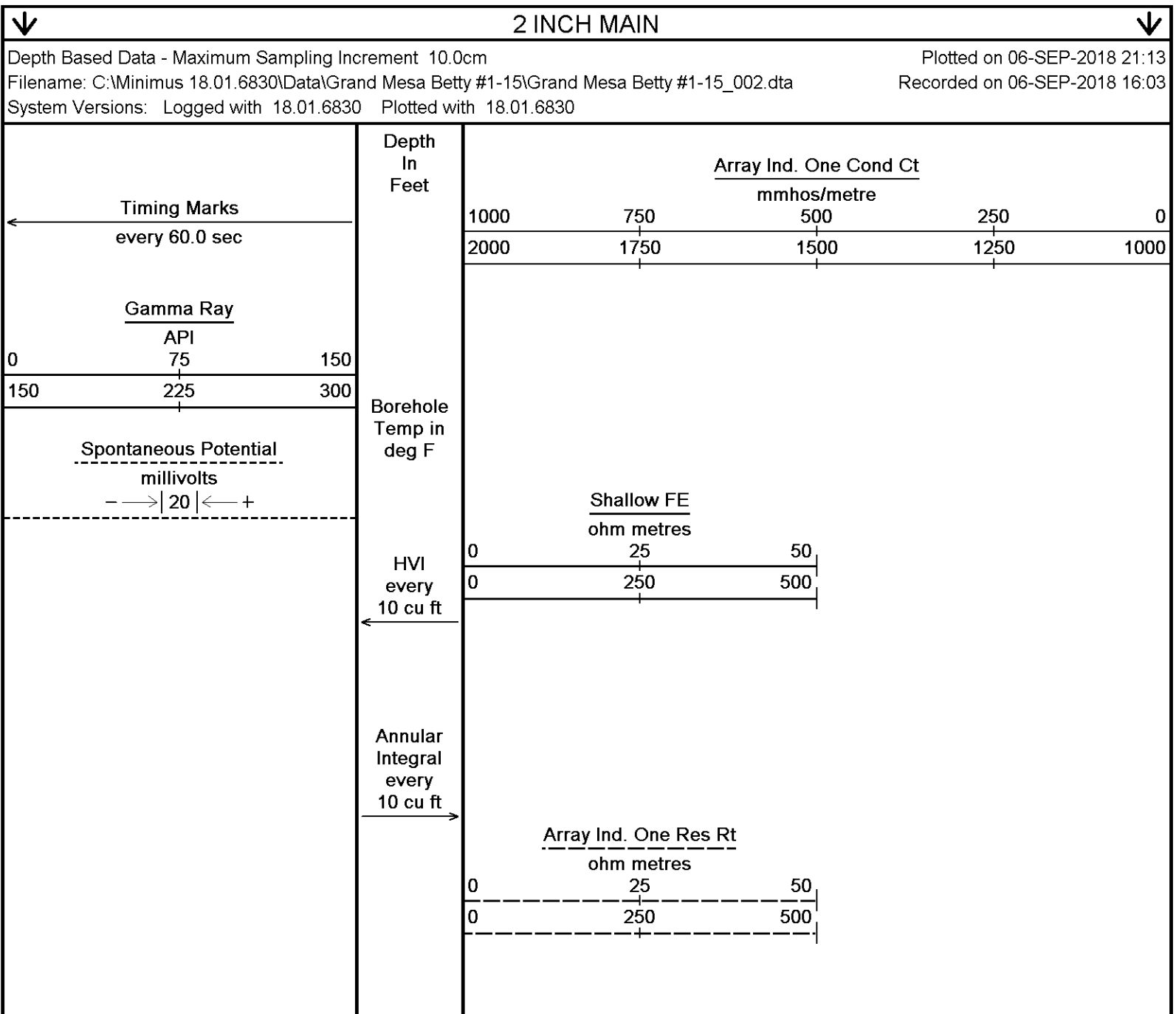
- RIG: WW DRILLING #20.

- ENGINEER: A. SILL.

- OPERATOR: B. TOVAR, B. COPELAND.

\*\*\*\* RIG LOST DRILL BIT IN THE HOLE AT TD, STOPPED WIRELINE 15 FEET ABOVE TD TO AVOID TAGGING DRILL BIT. LOGGED OUT FROM DEEPEST DEPTH REACHED OF 8526 FEET. \*\*\*\*

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  
1:600

460  
Casing  
Shoe

500

3600

102°

600

103°

700

3500

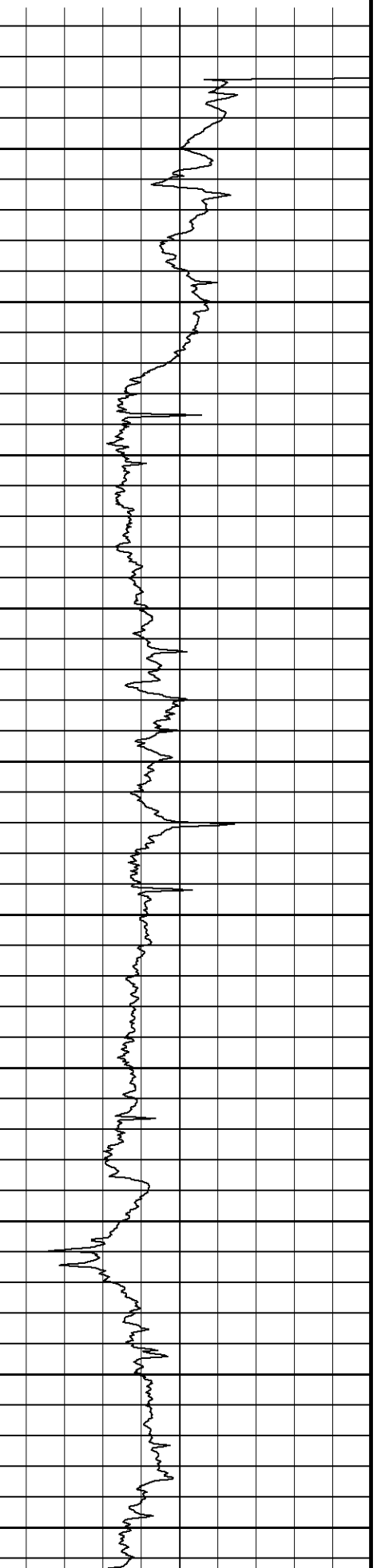
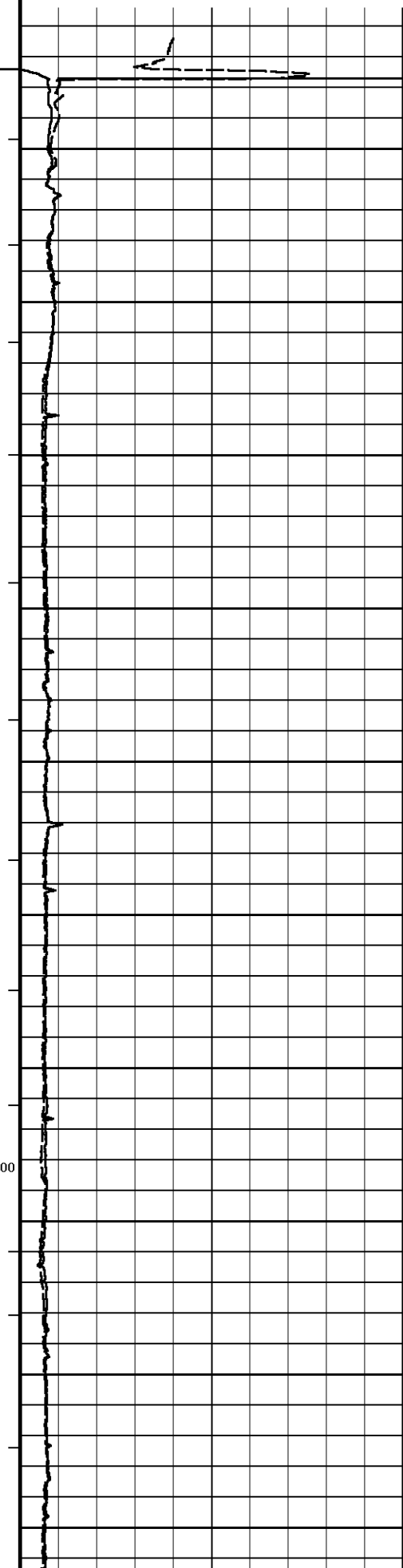
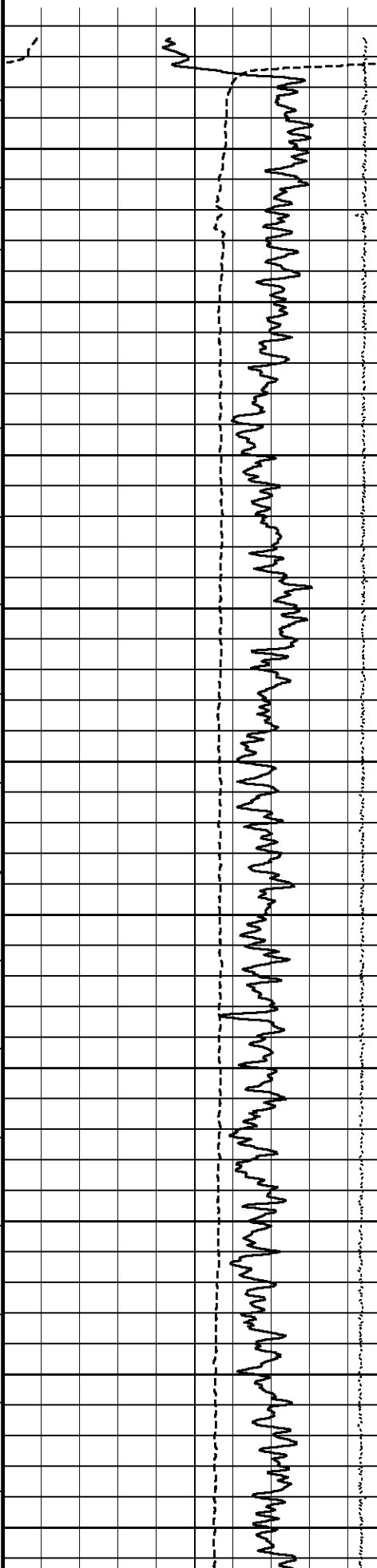
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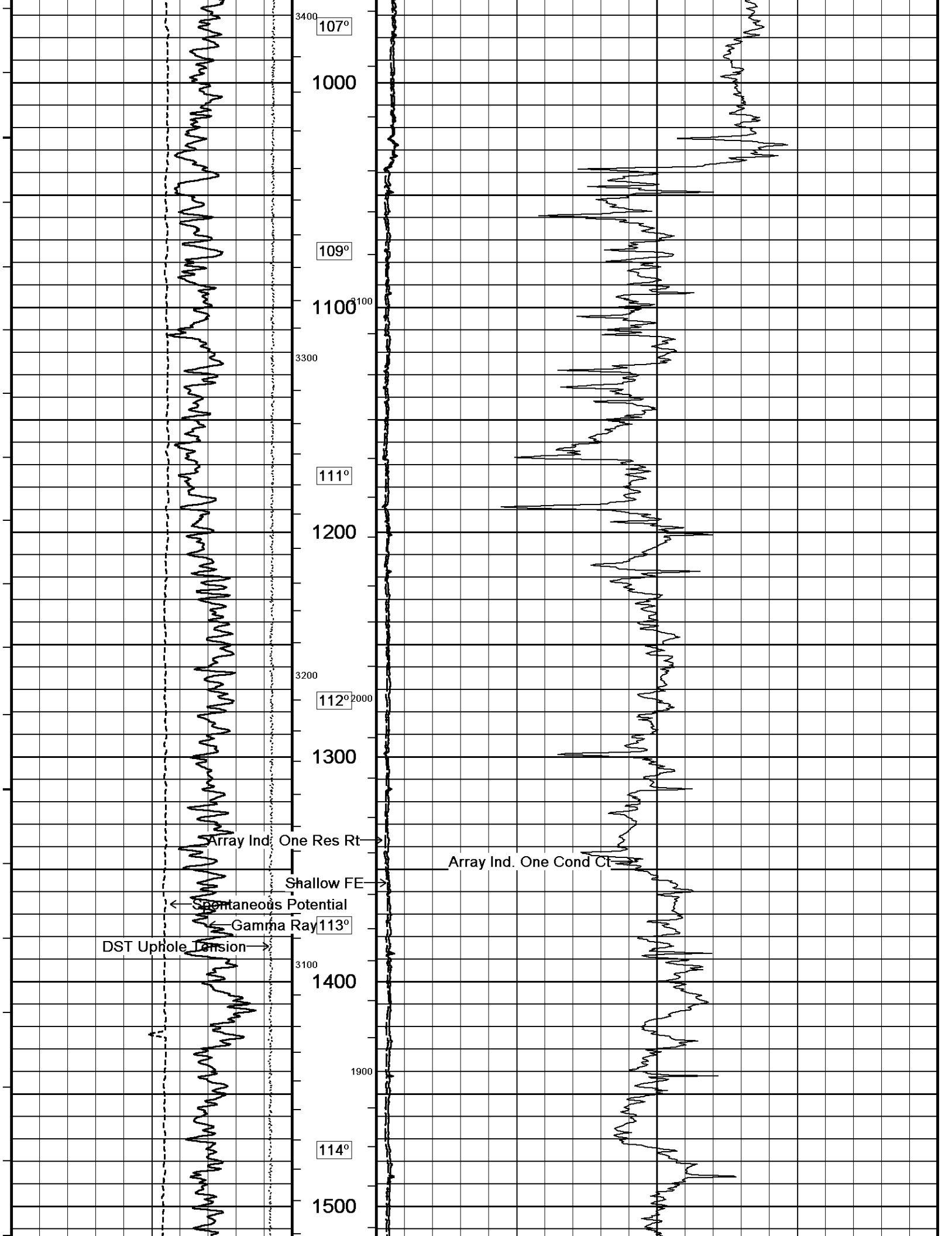
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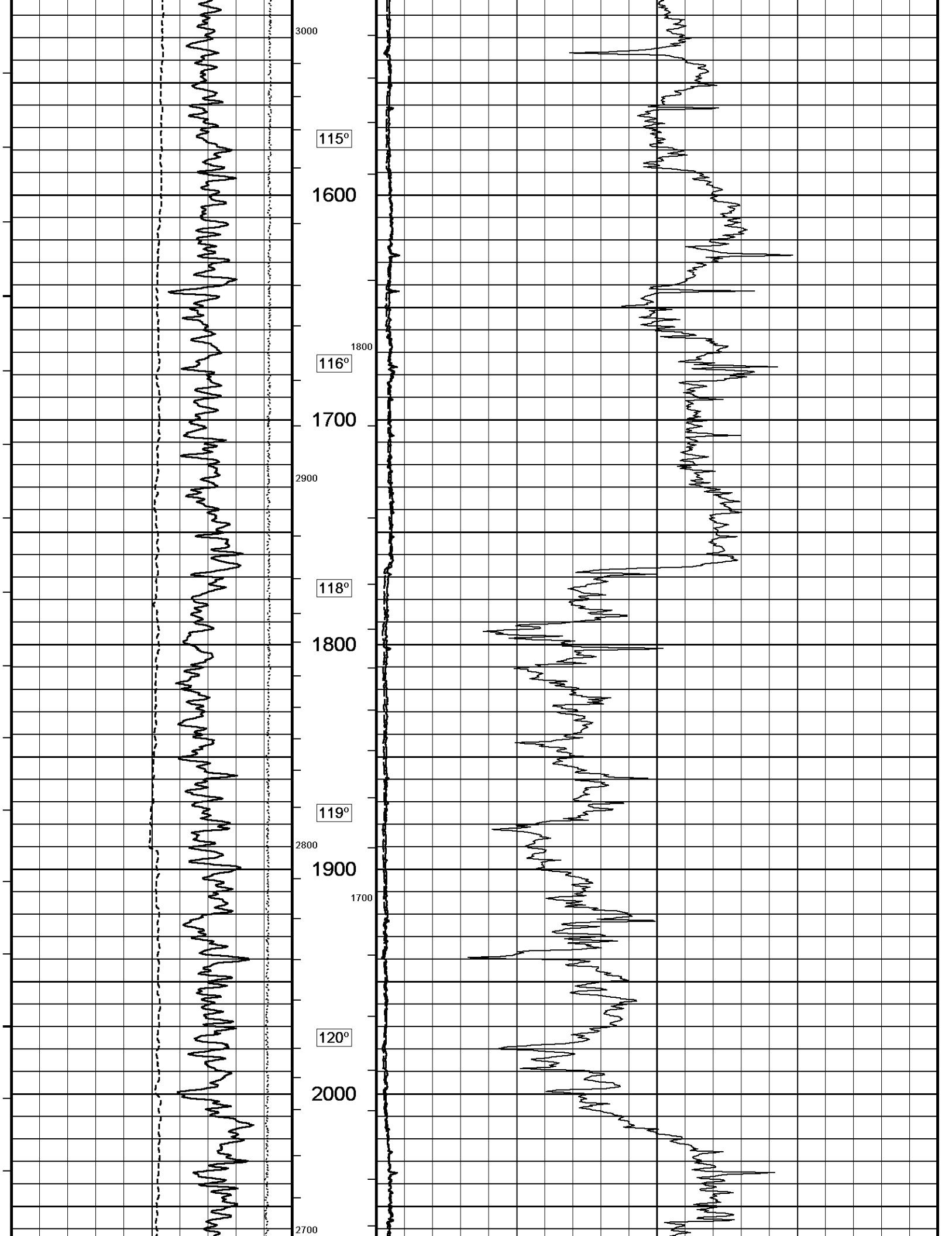
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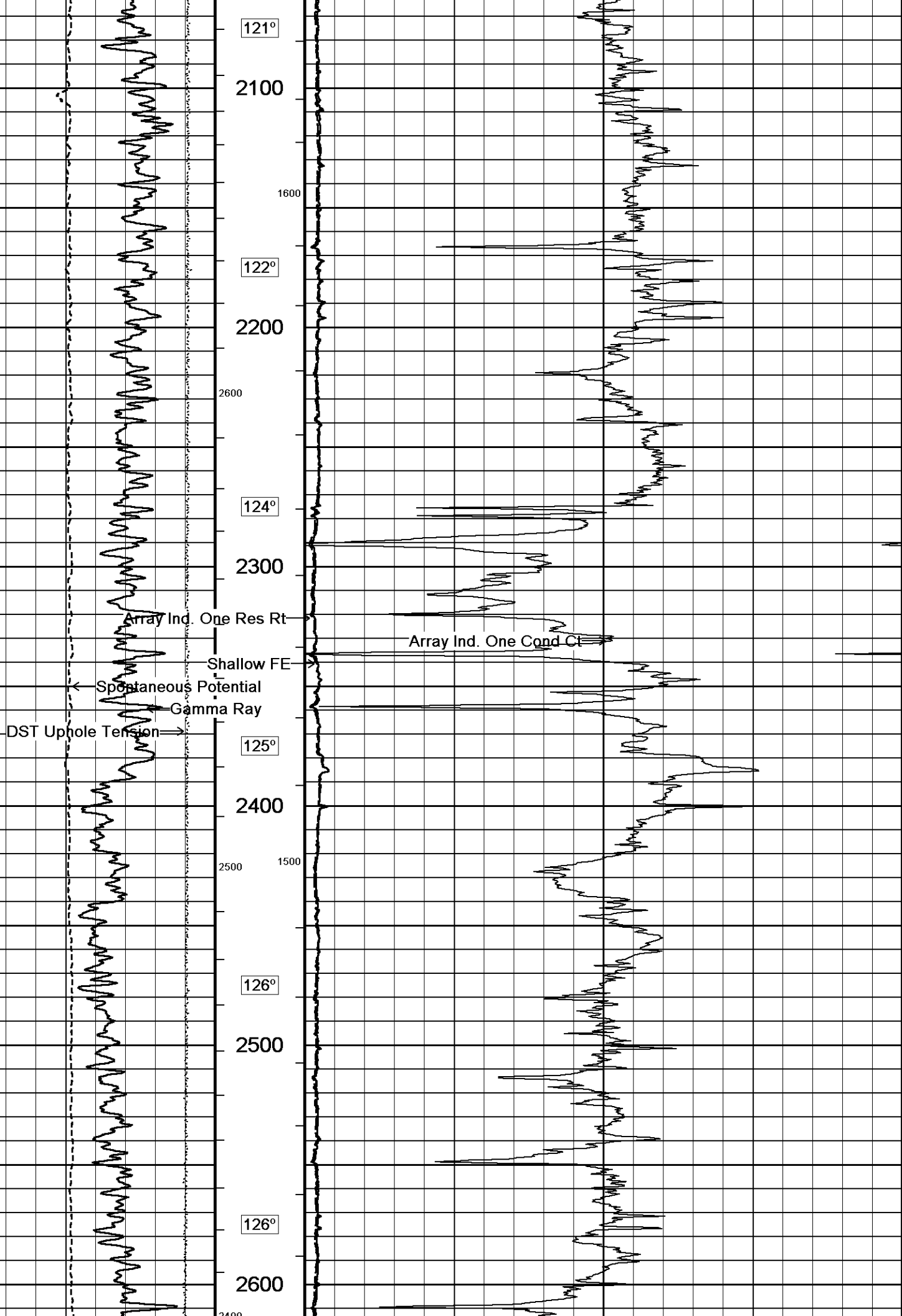
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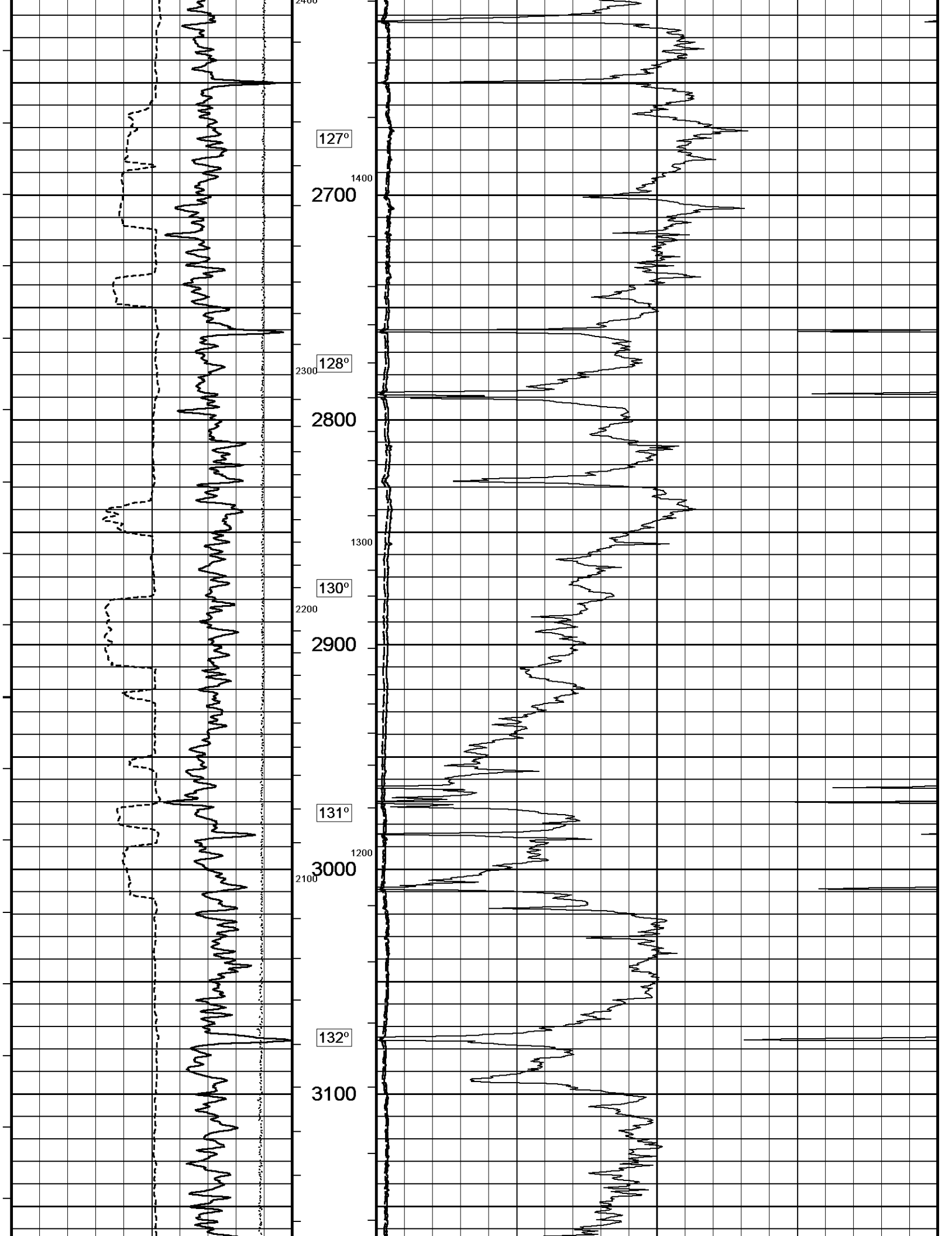
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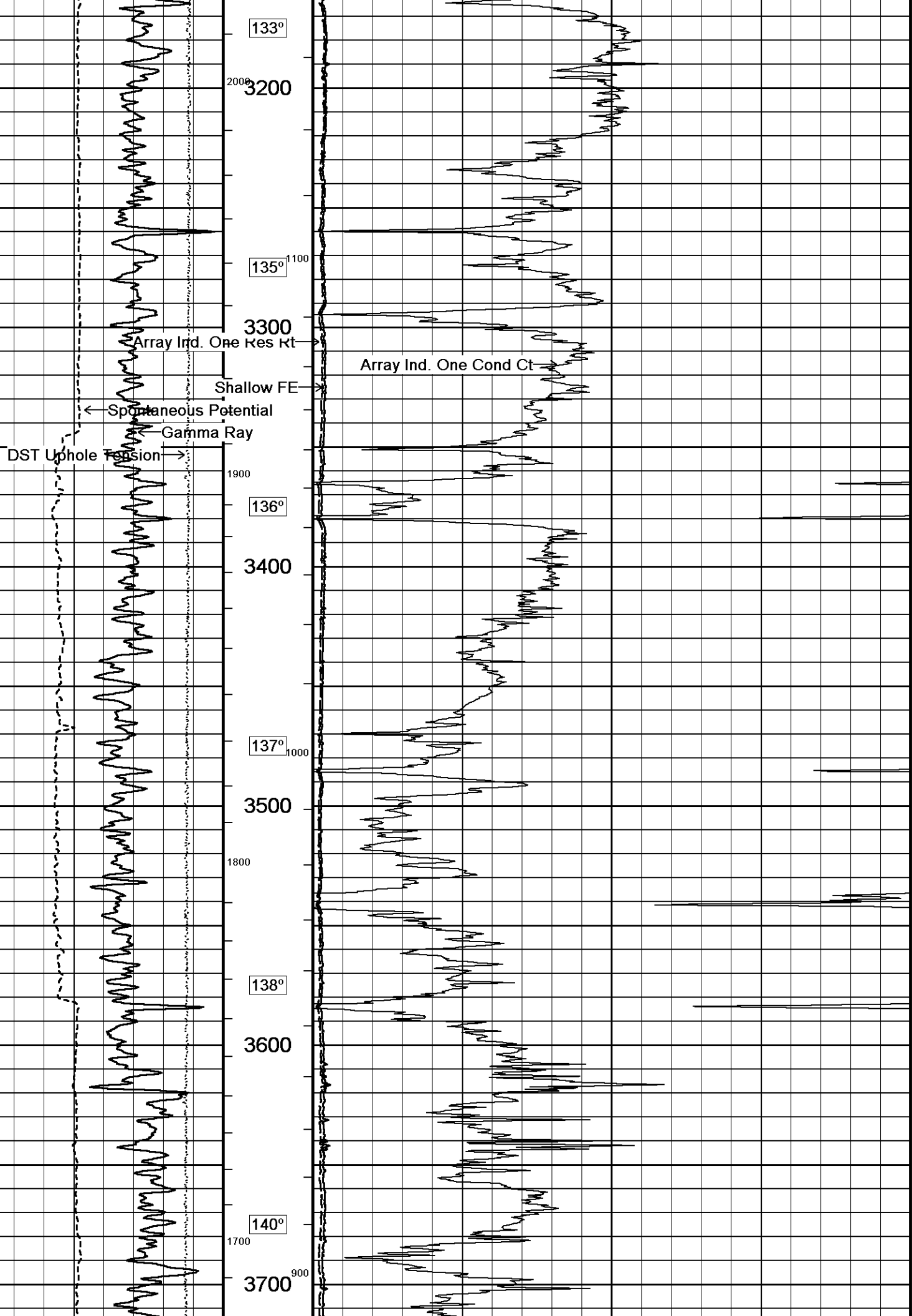




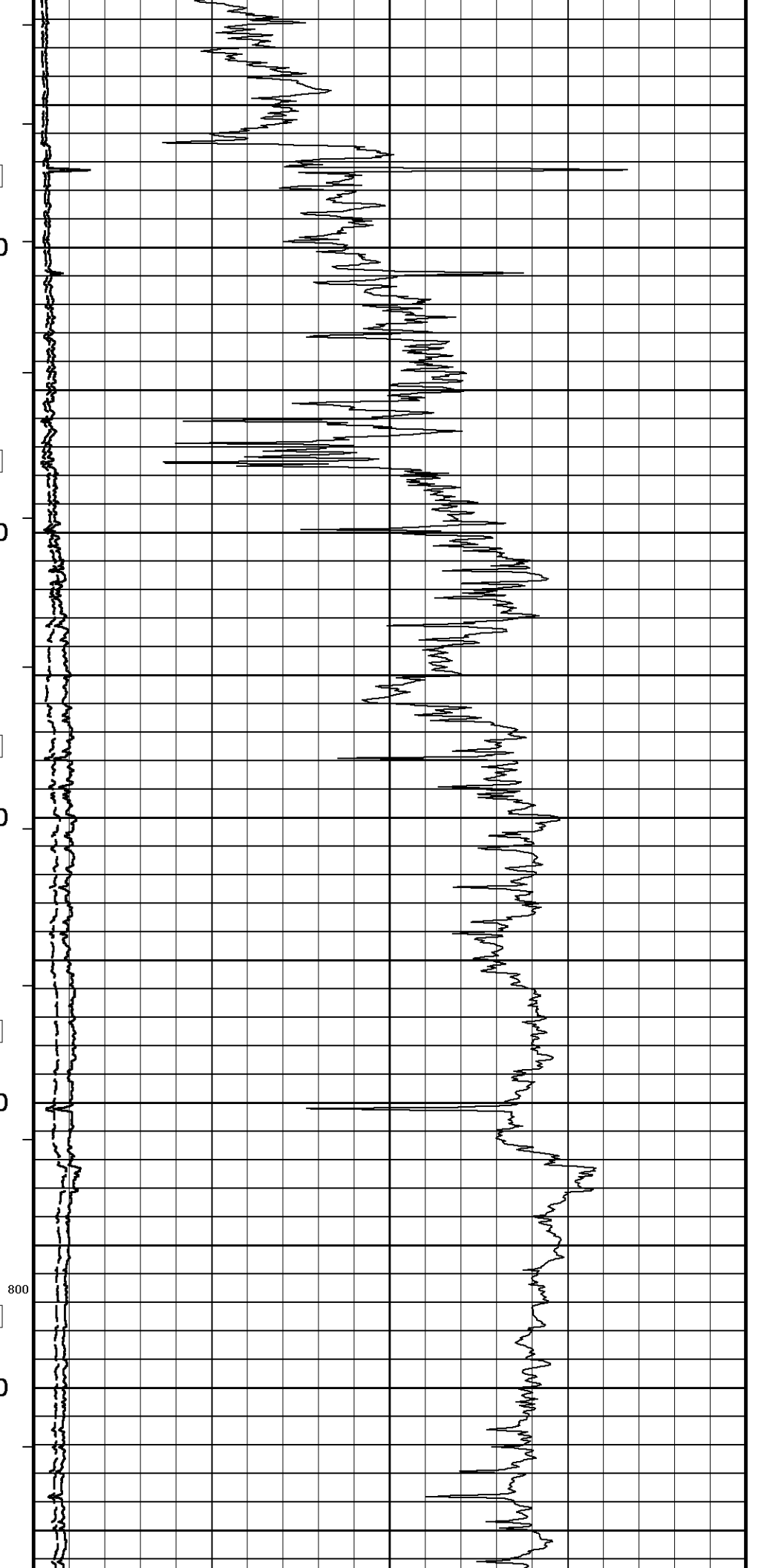
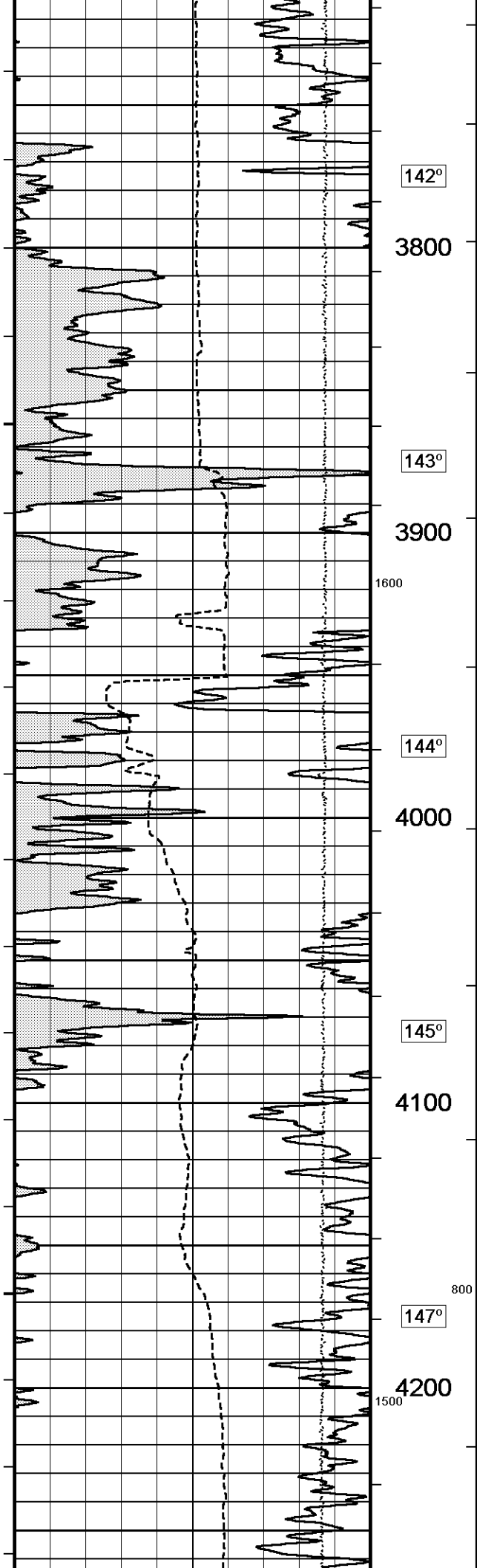


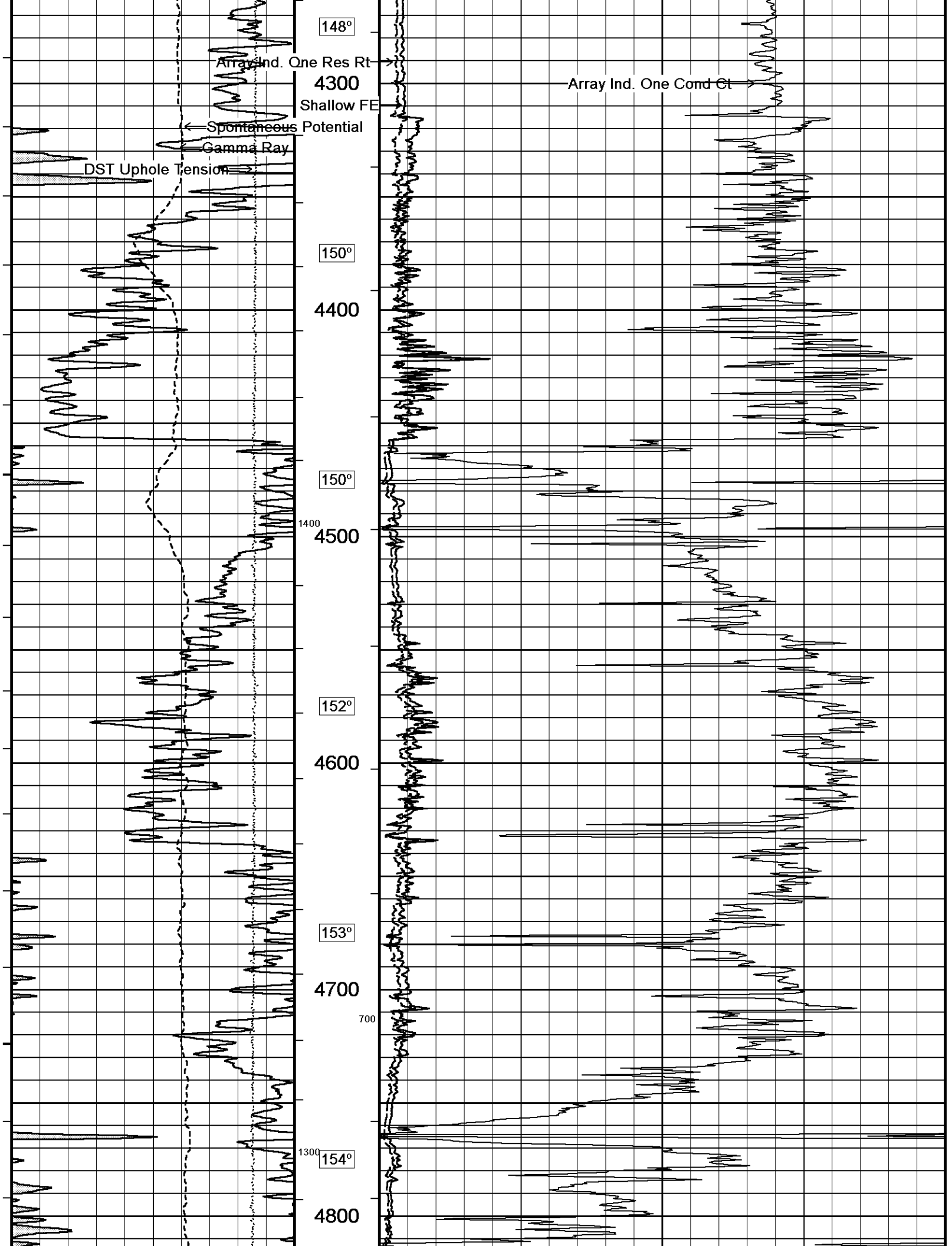


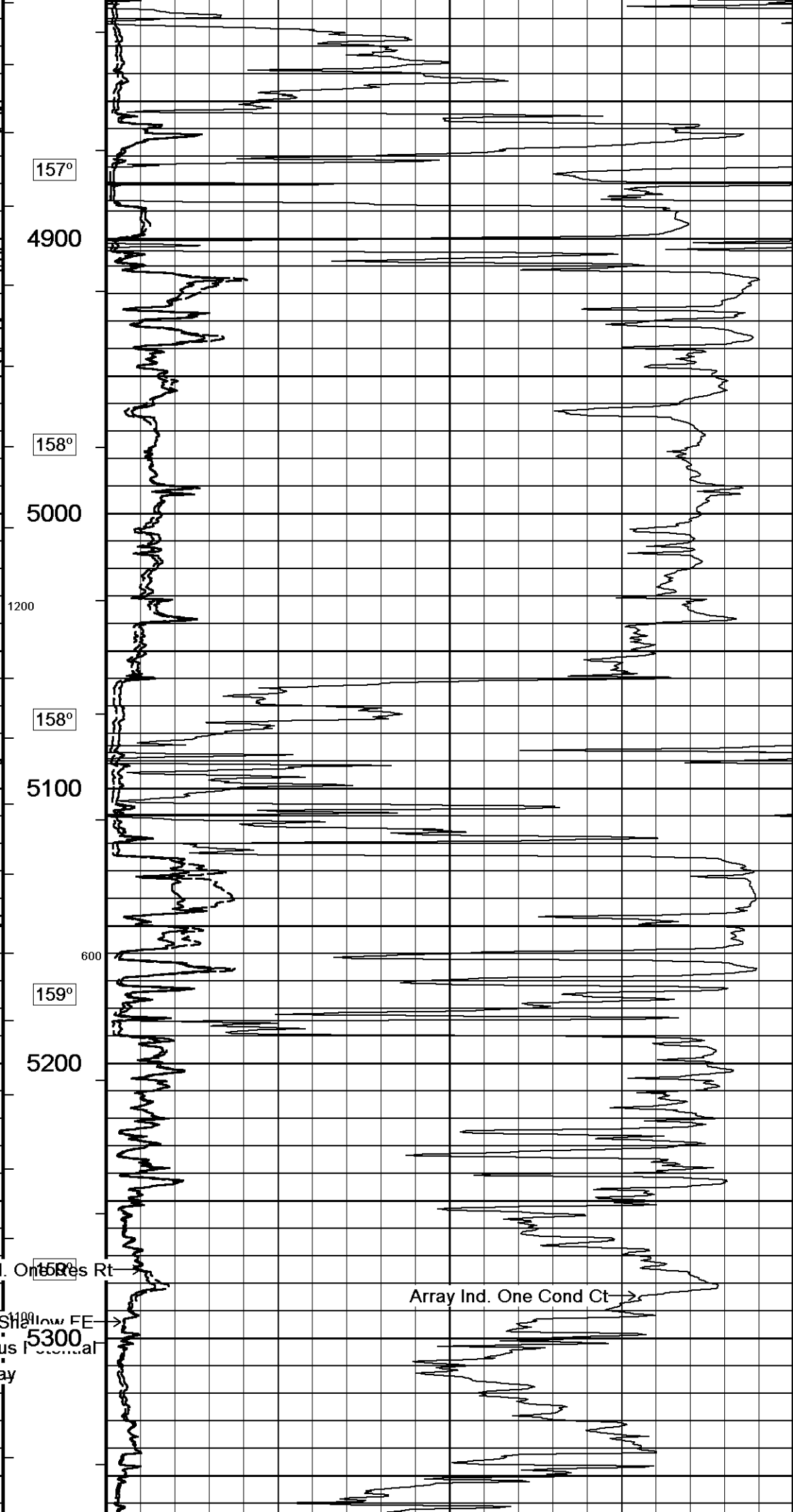
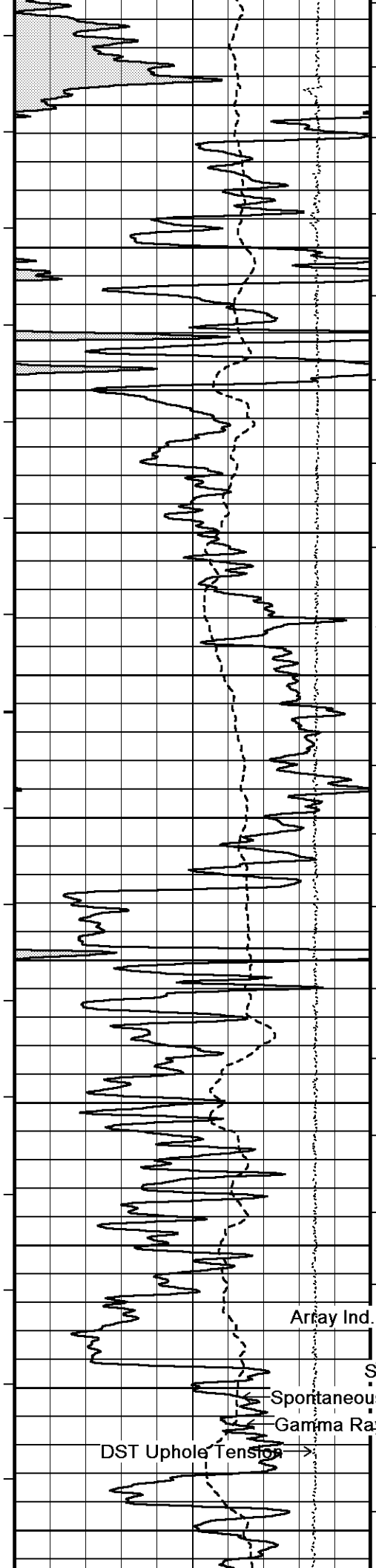


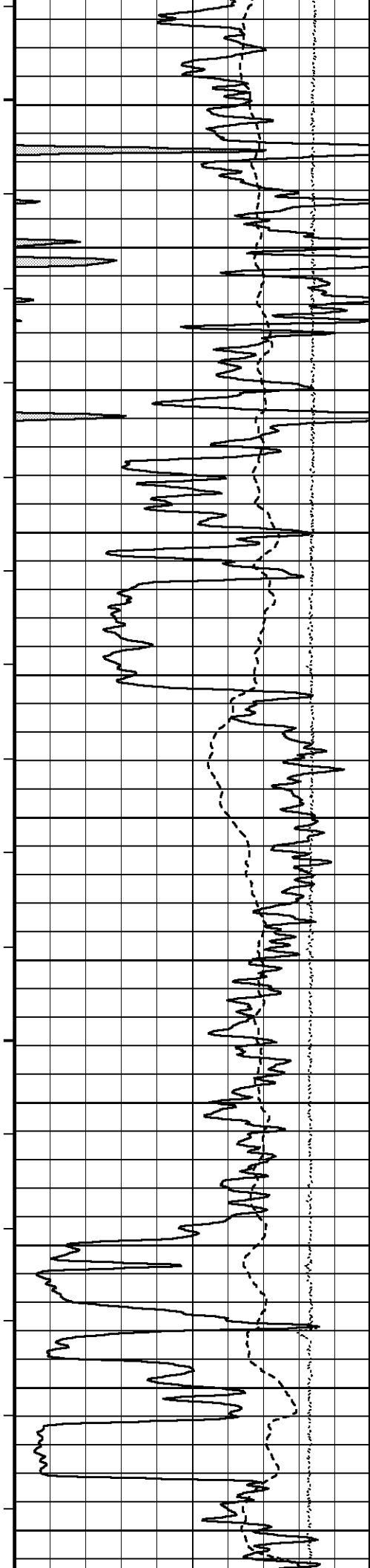




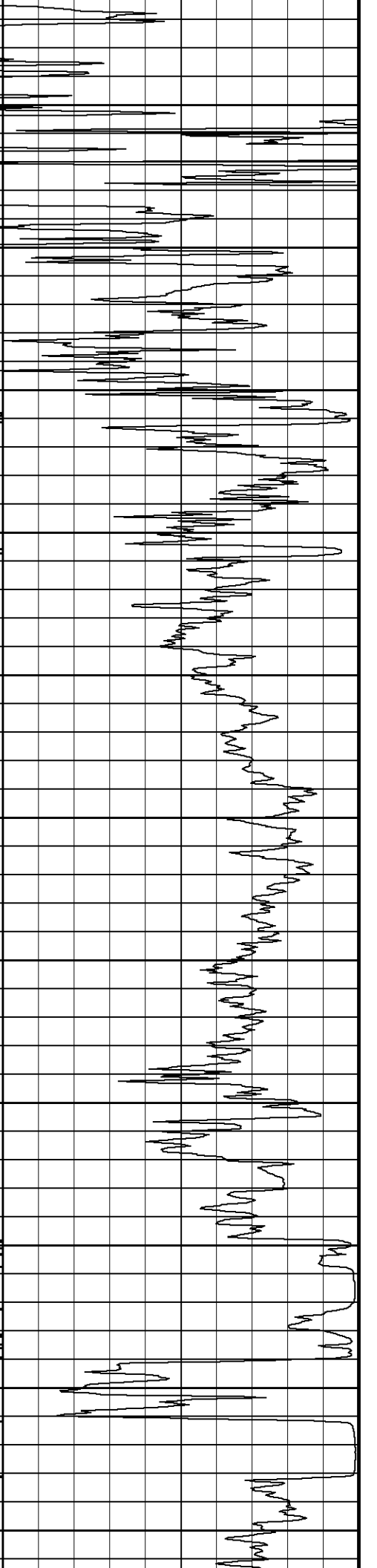
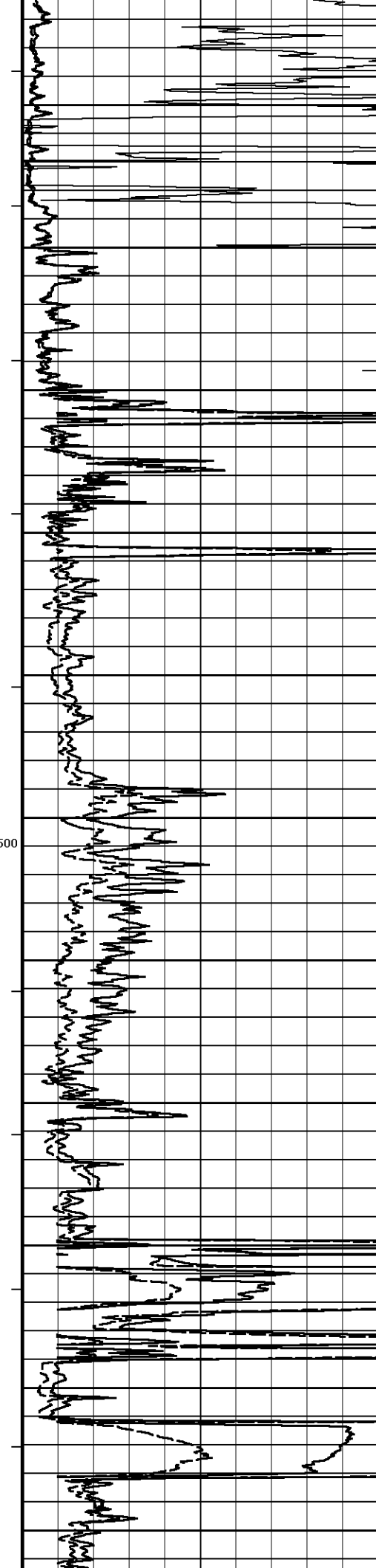


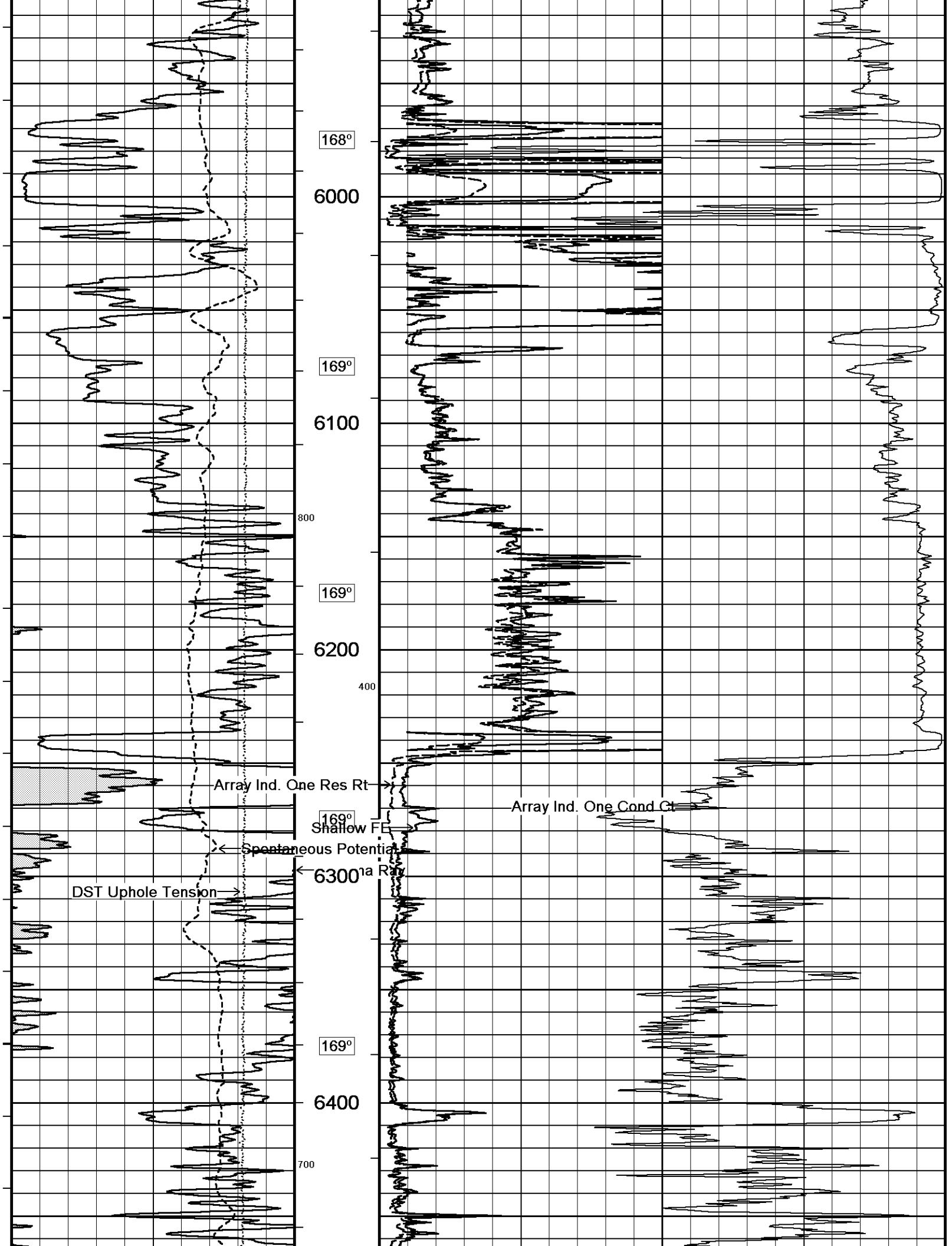


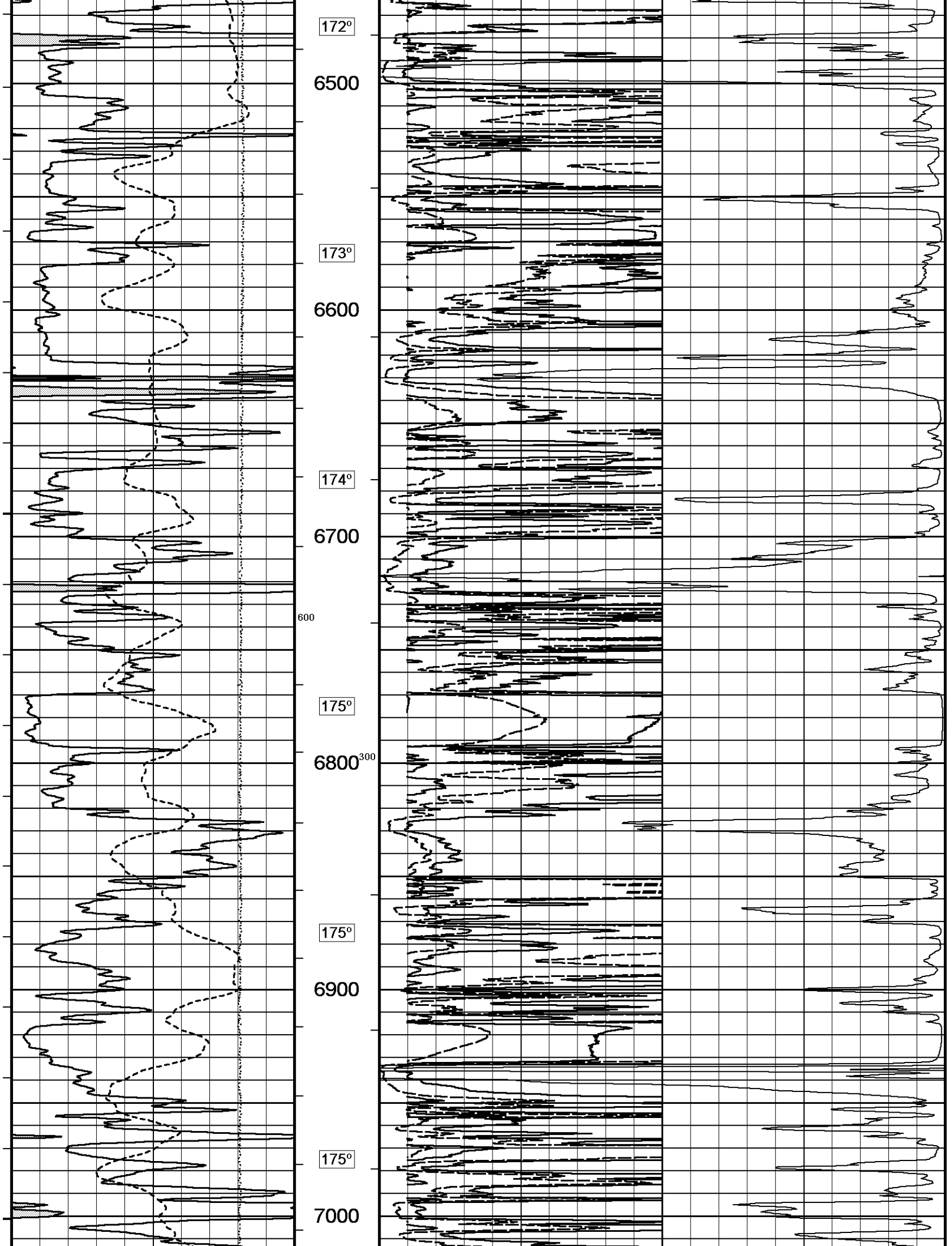


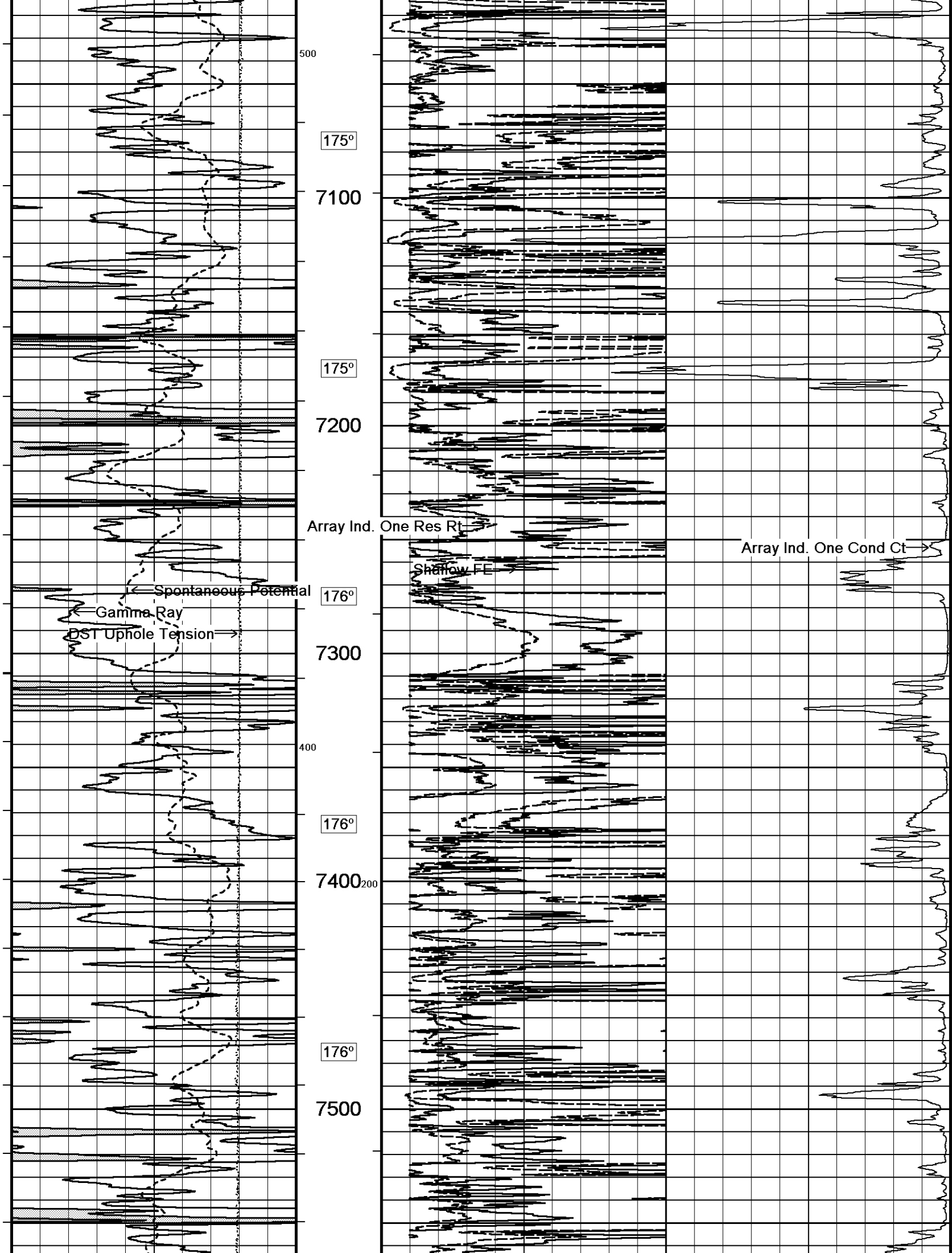


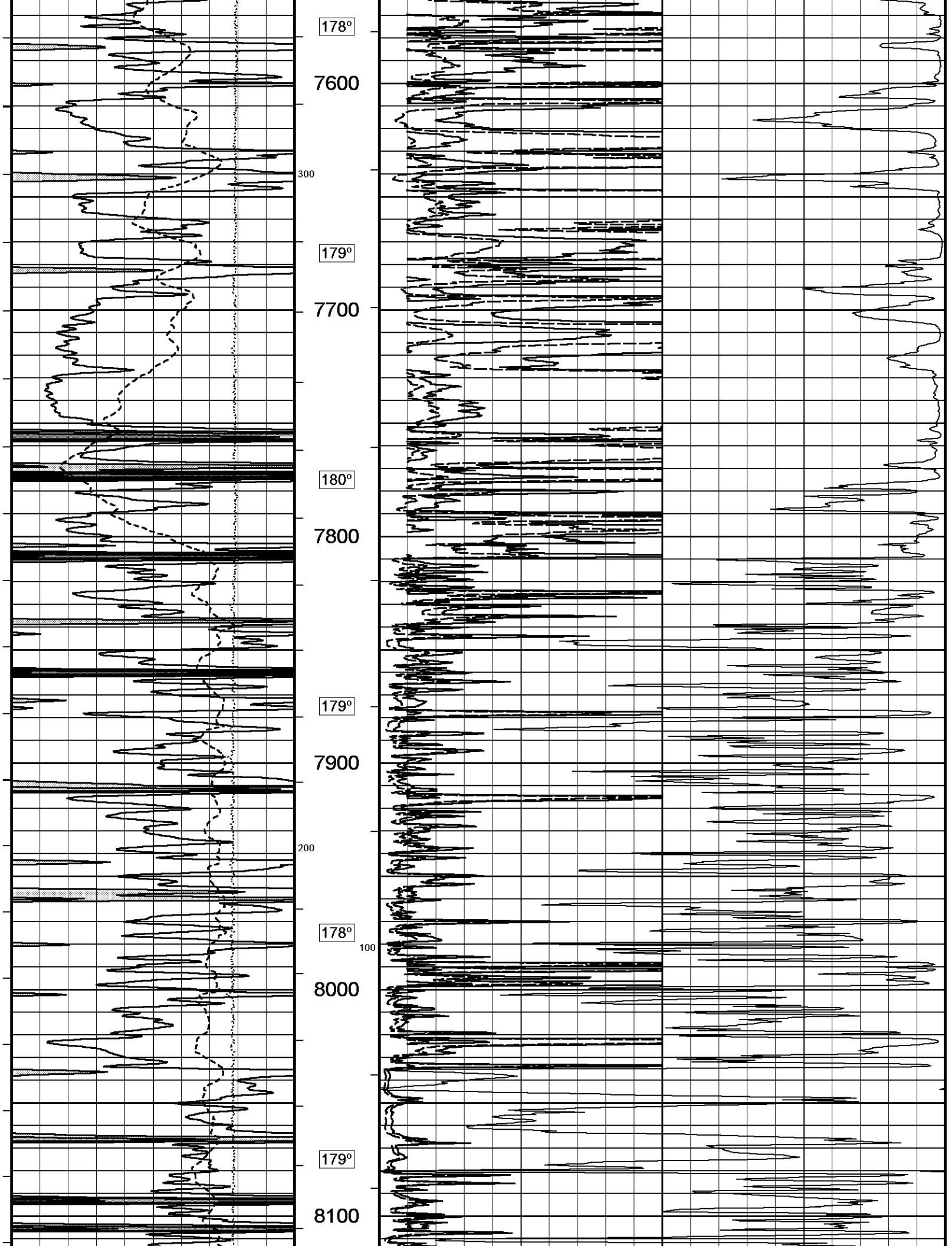
160°  
5400  
163°  
5500  
1000  
164°  
5600  
500  
165°  
5700  
166°  
5800  
900  
167°  
5900



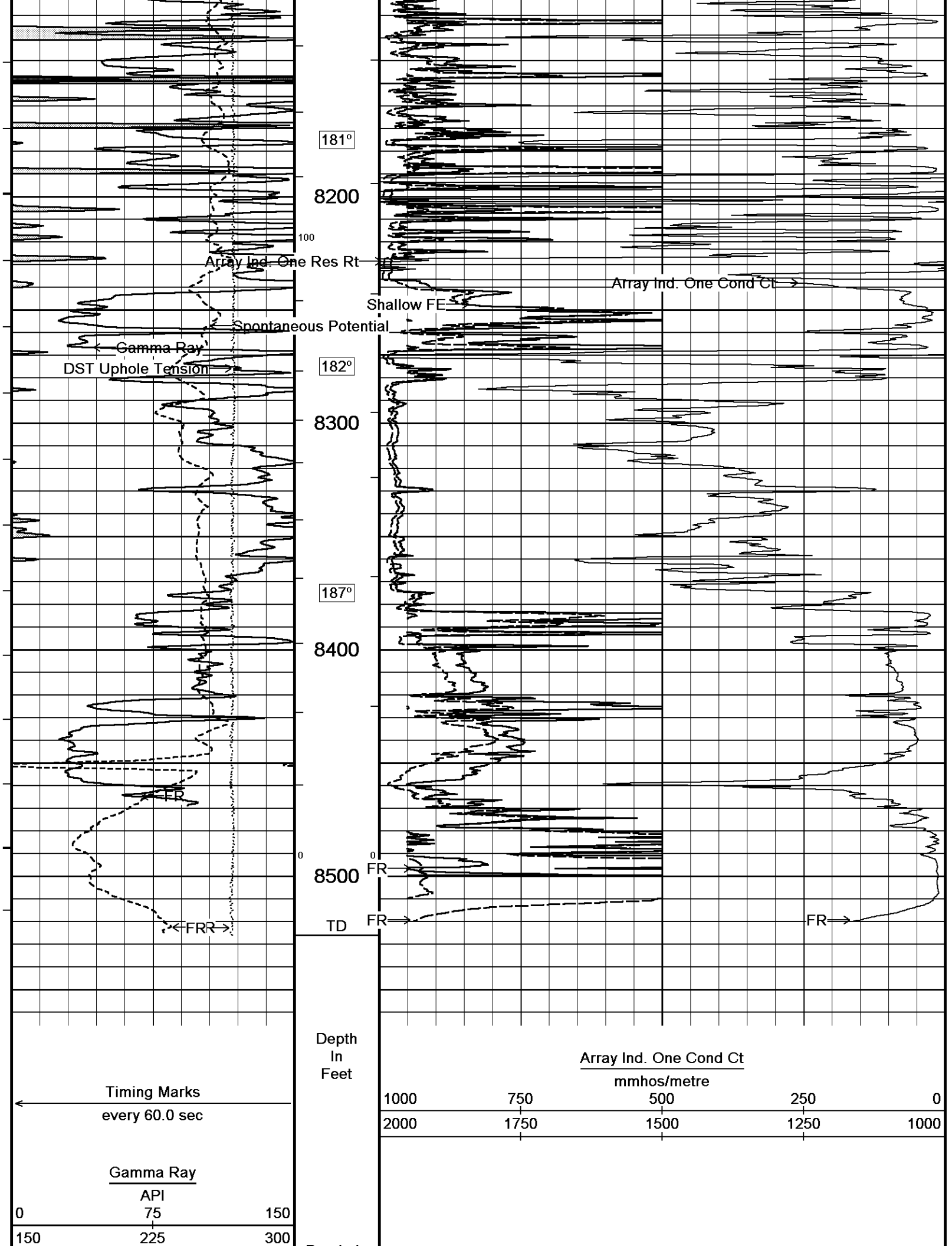


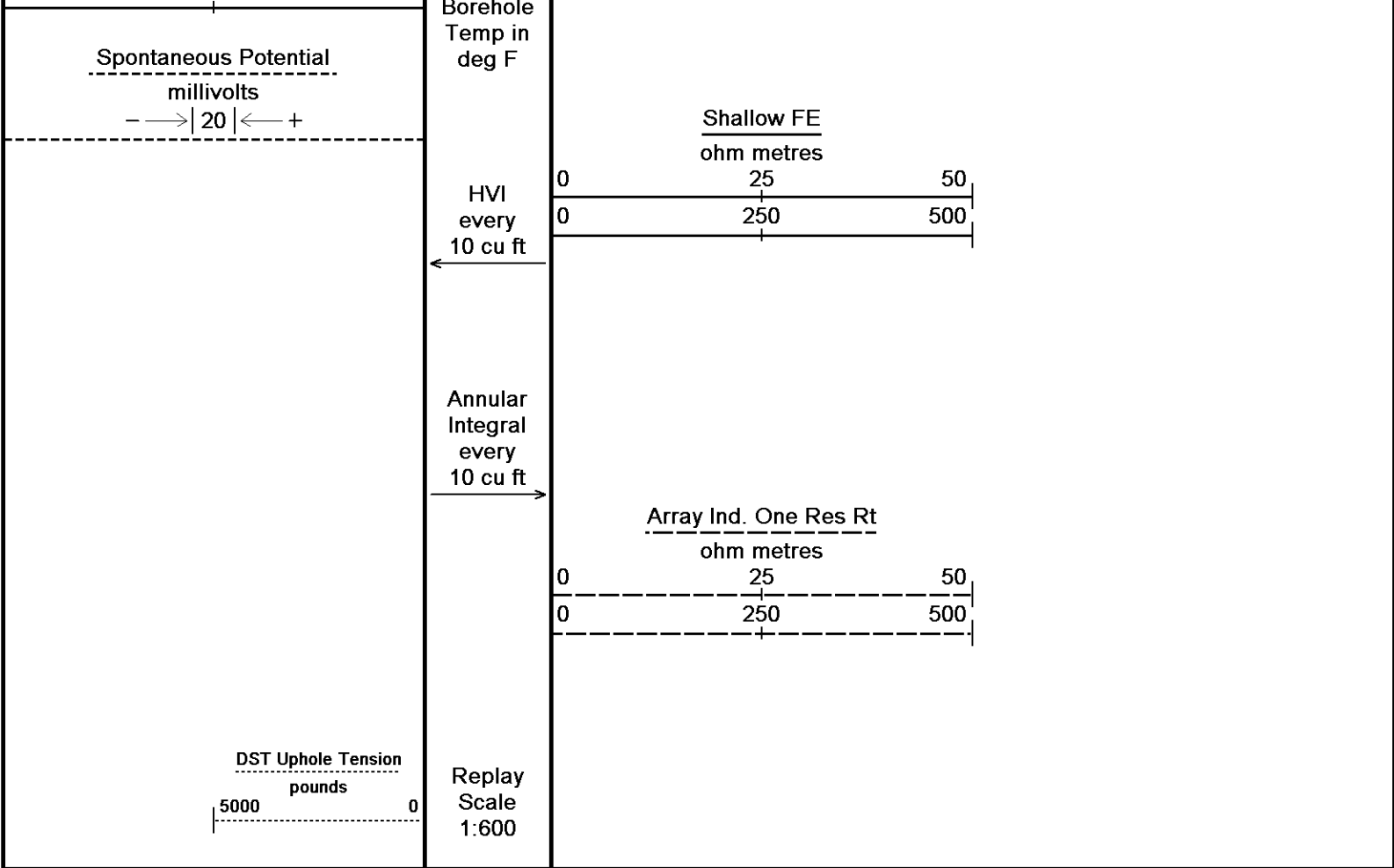












Depth Based Data - Maximum Sampling Increment 10.0cm

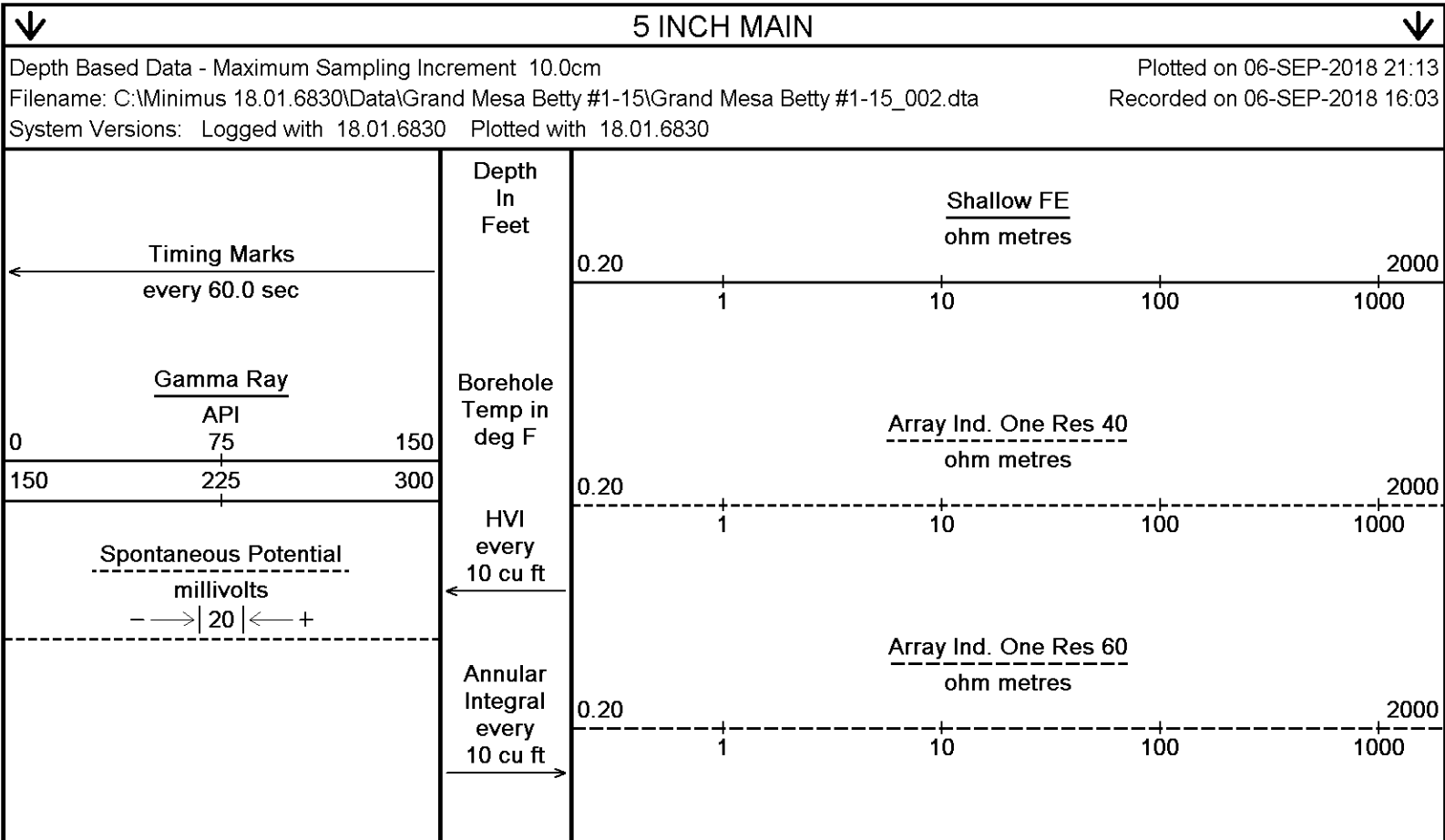
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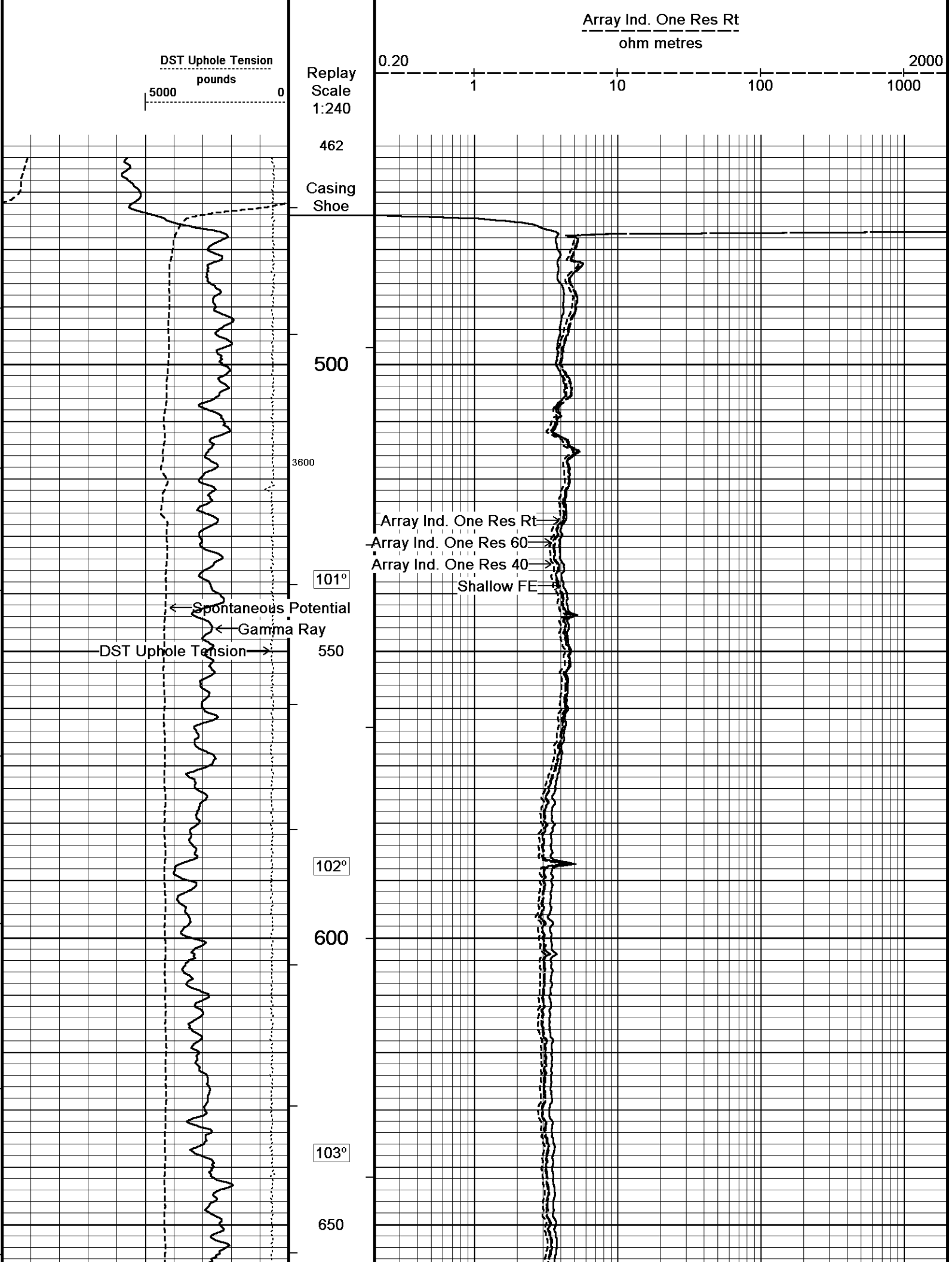
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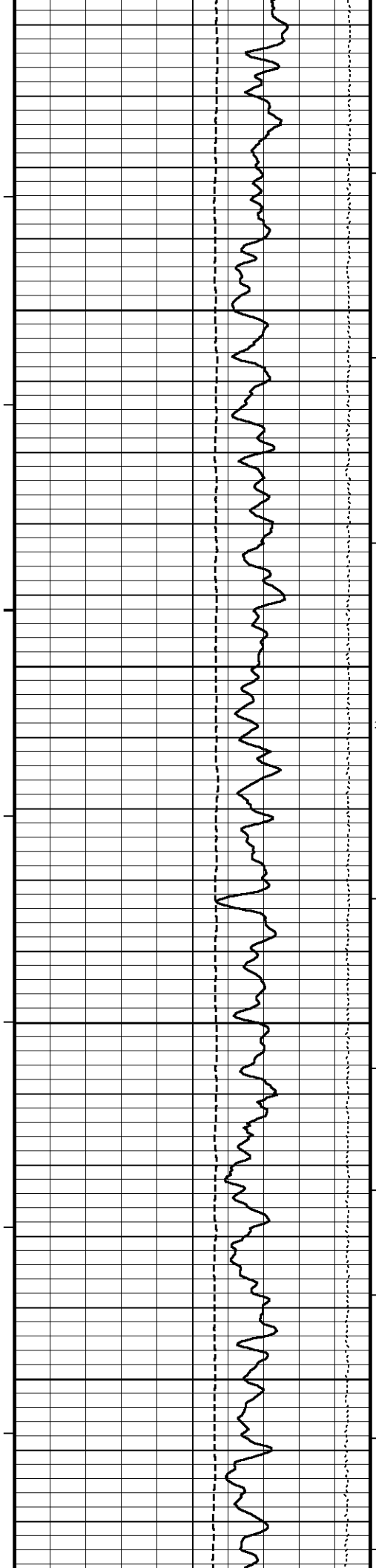
Recorded on 06-SEP-2018 16:03

System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

2 INCH MAIN







103°

700

104°

750

3500

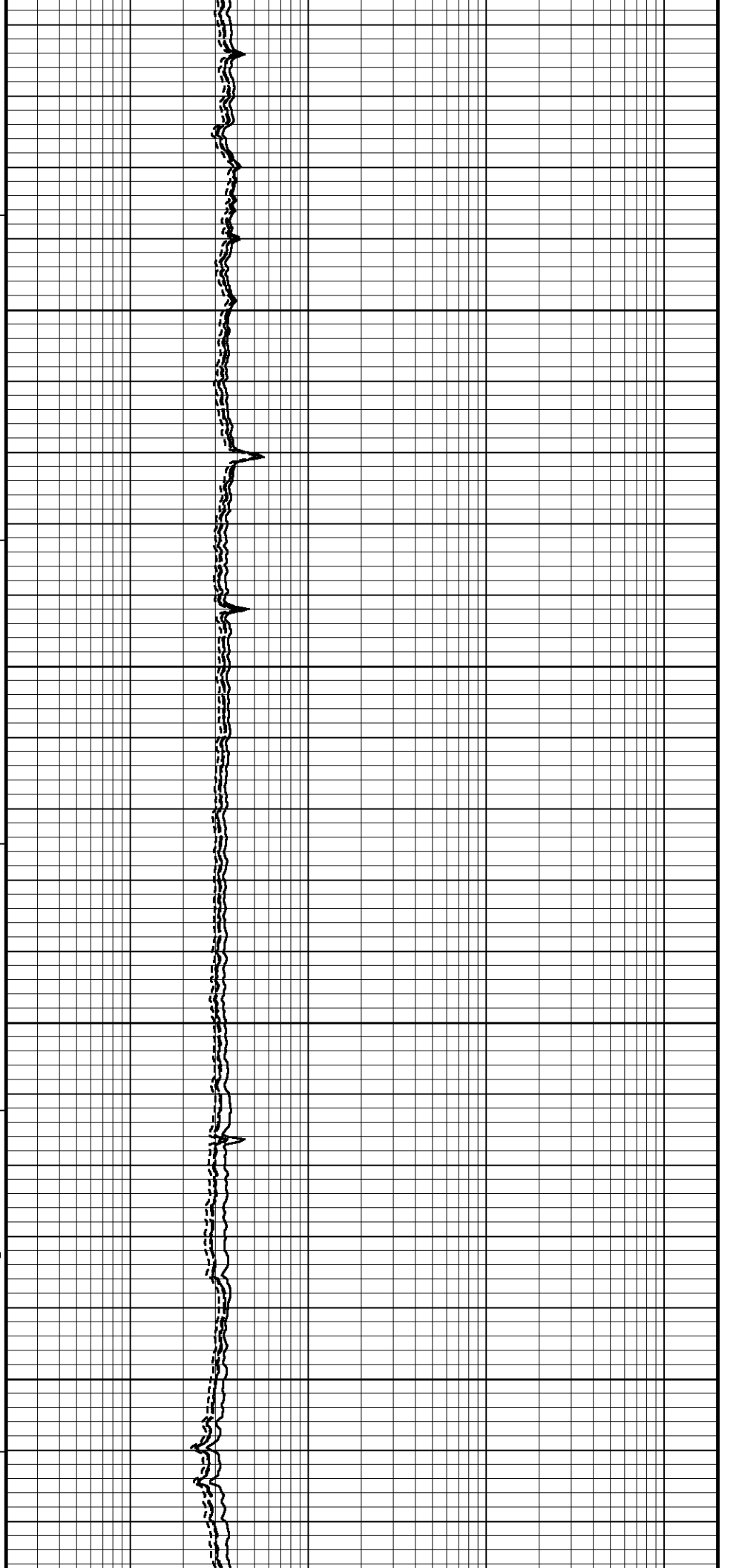
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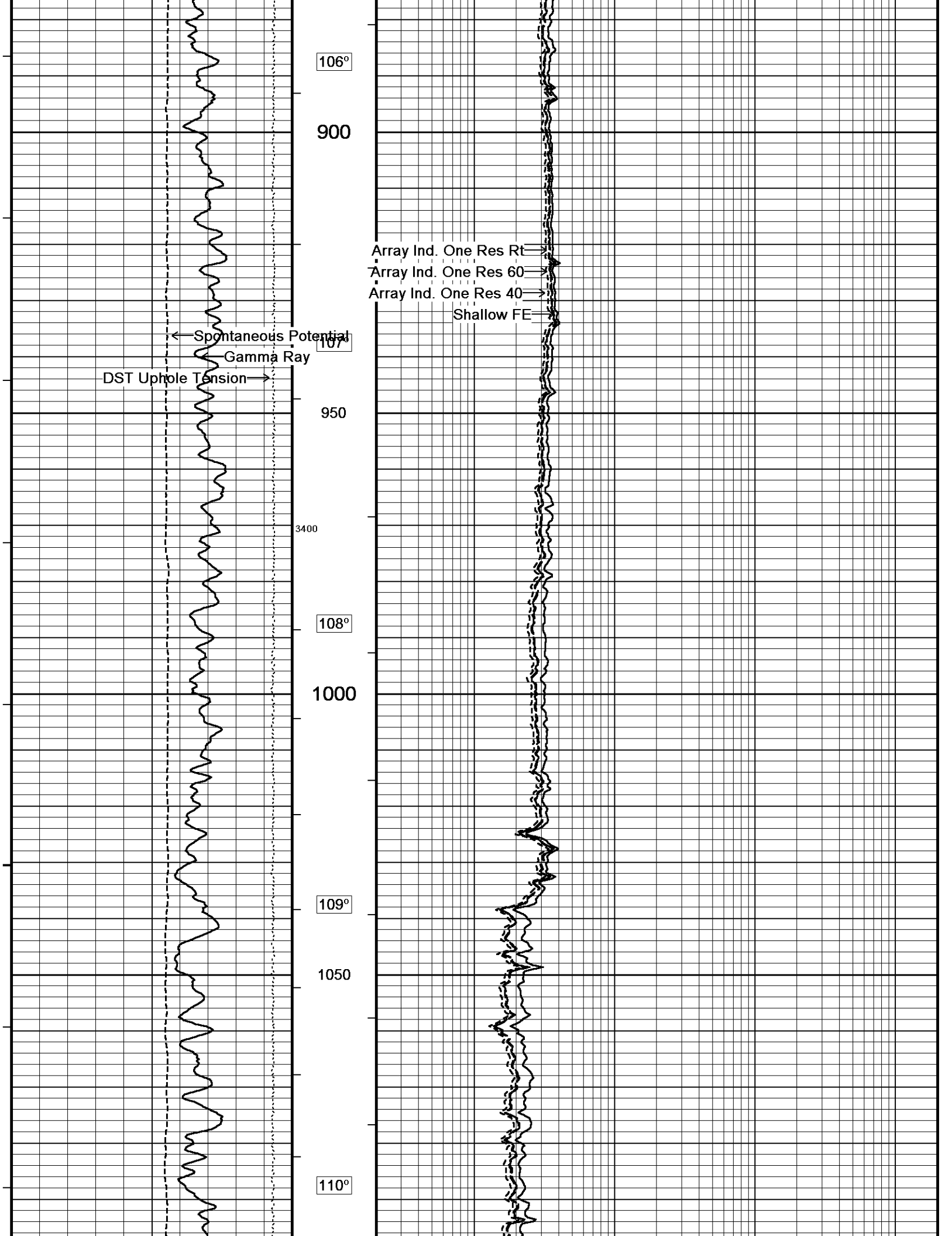
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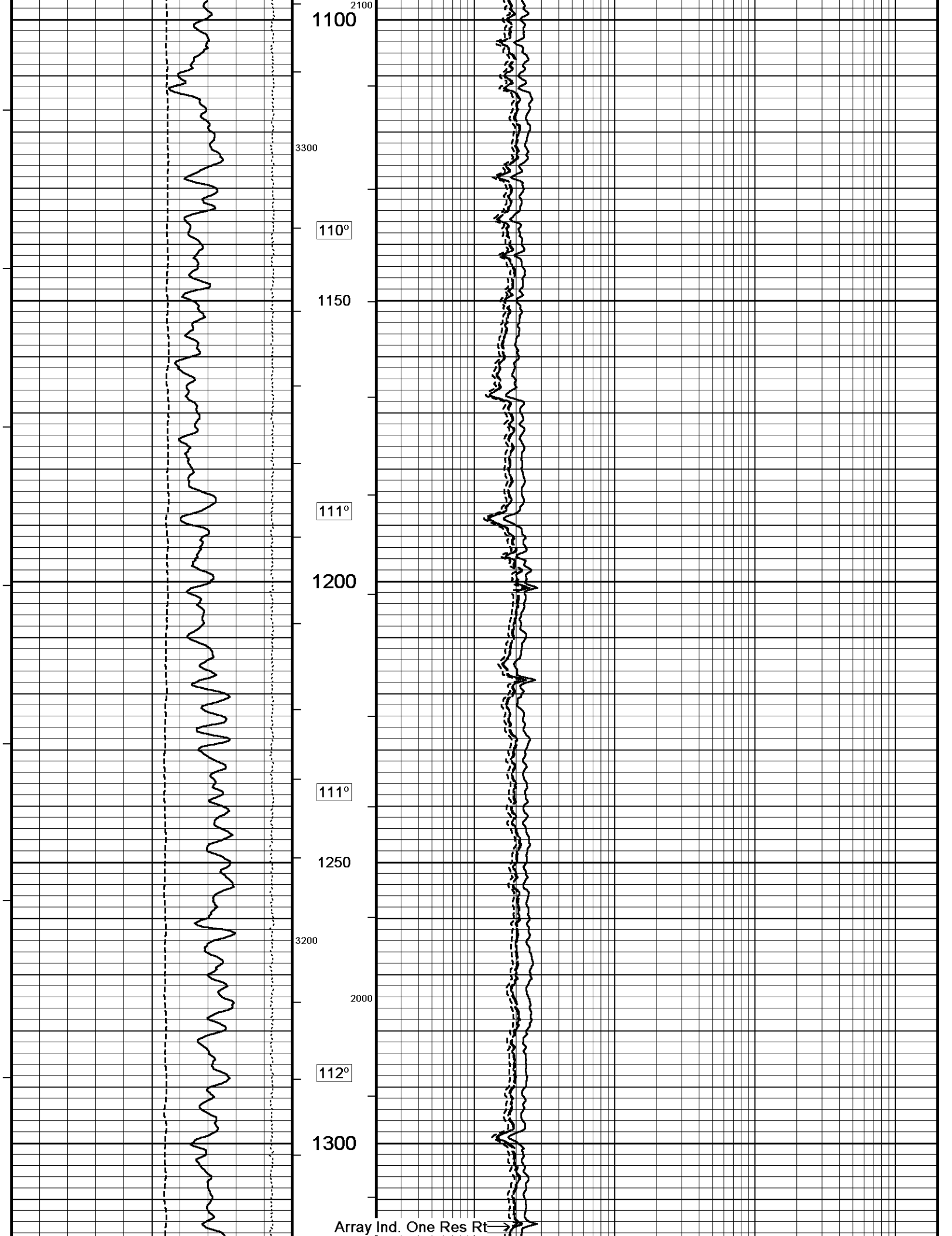
2200

106°

850







← Spontaneous Potential  
← Gamma Ray  
DST Uphole Tension →

Array Ind. One Res 60 →  
Array Ind. One Res 40 →  
Shallow FE →

112°

1350

113°

3100

1400

113°

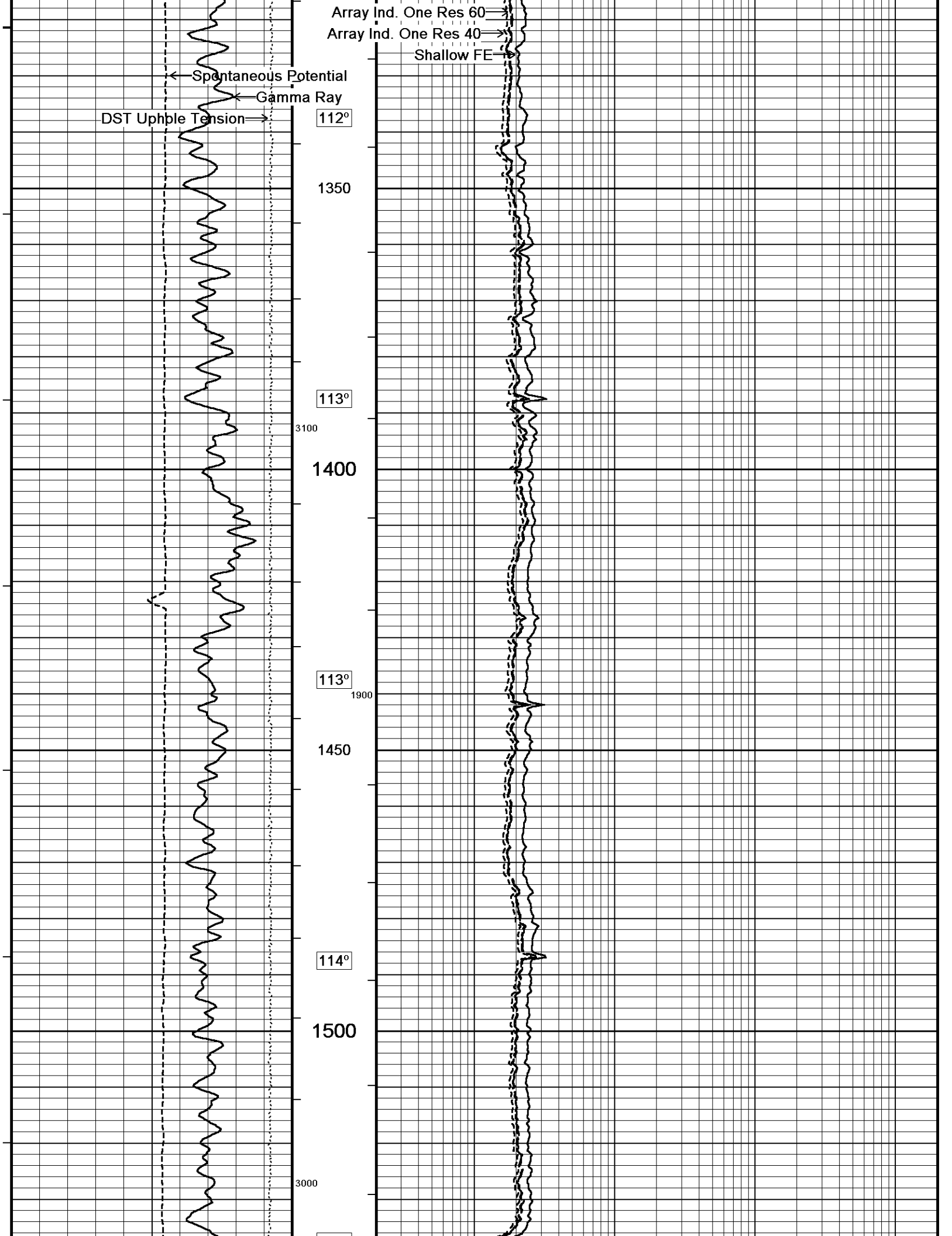
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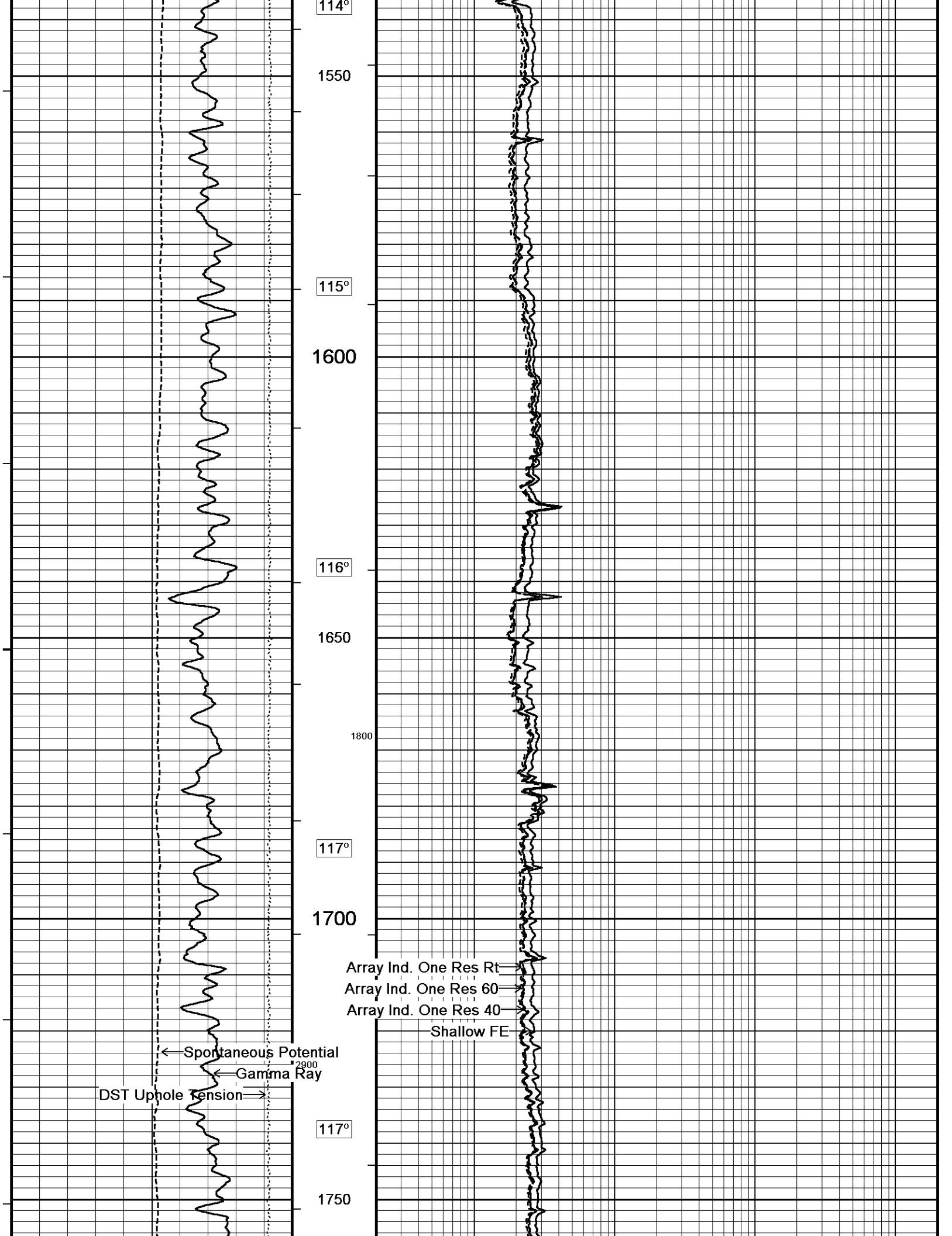
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114°

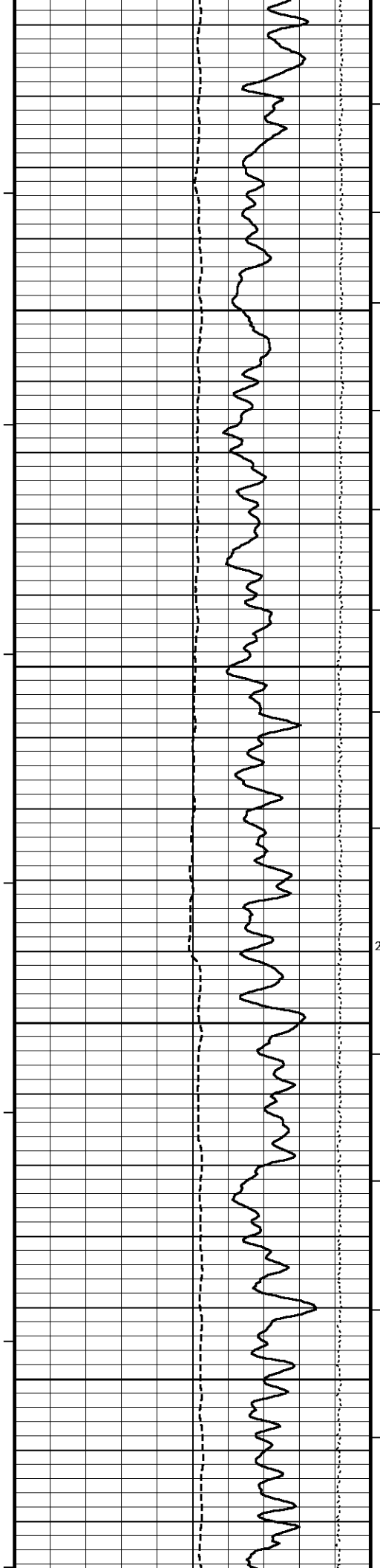
1500

3000









118°

1800

119°

1850

119°

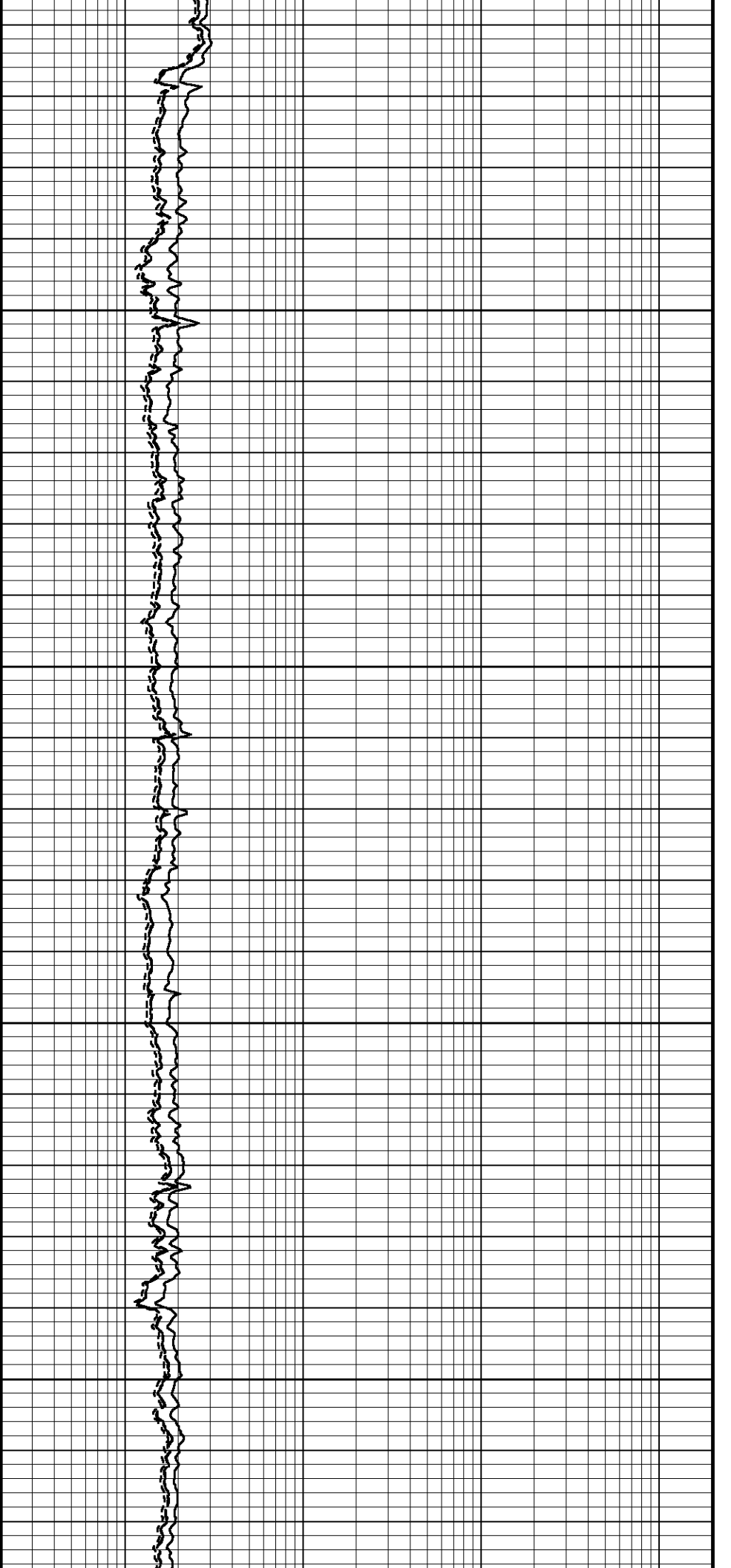
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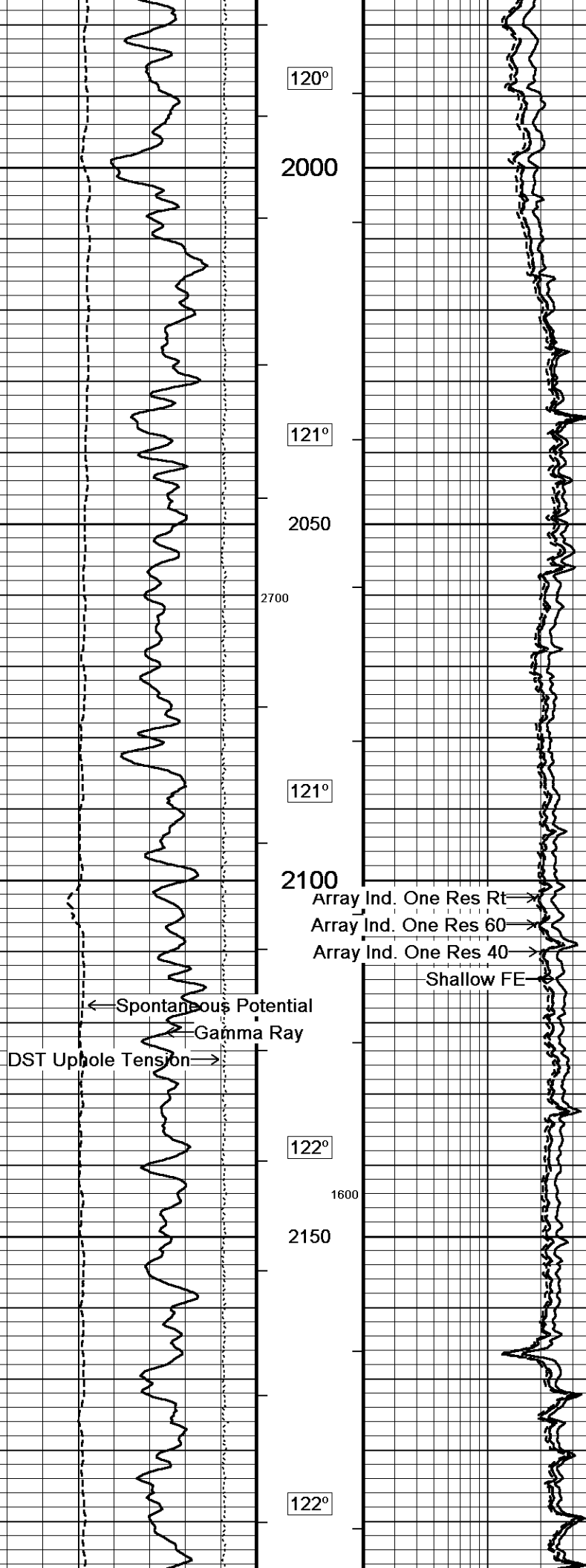
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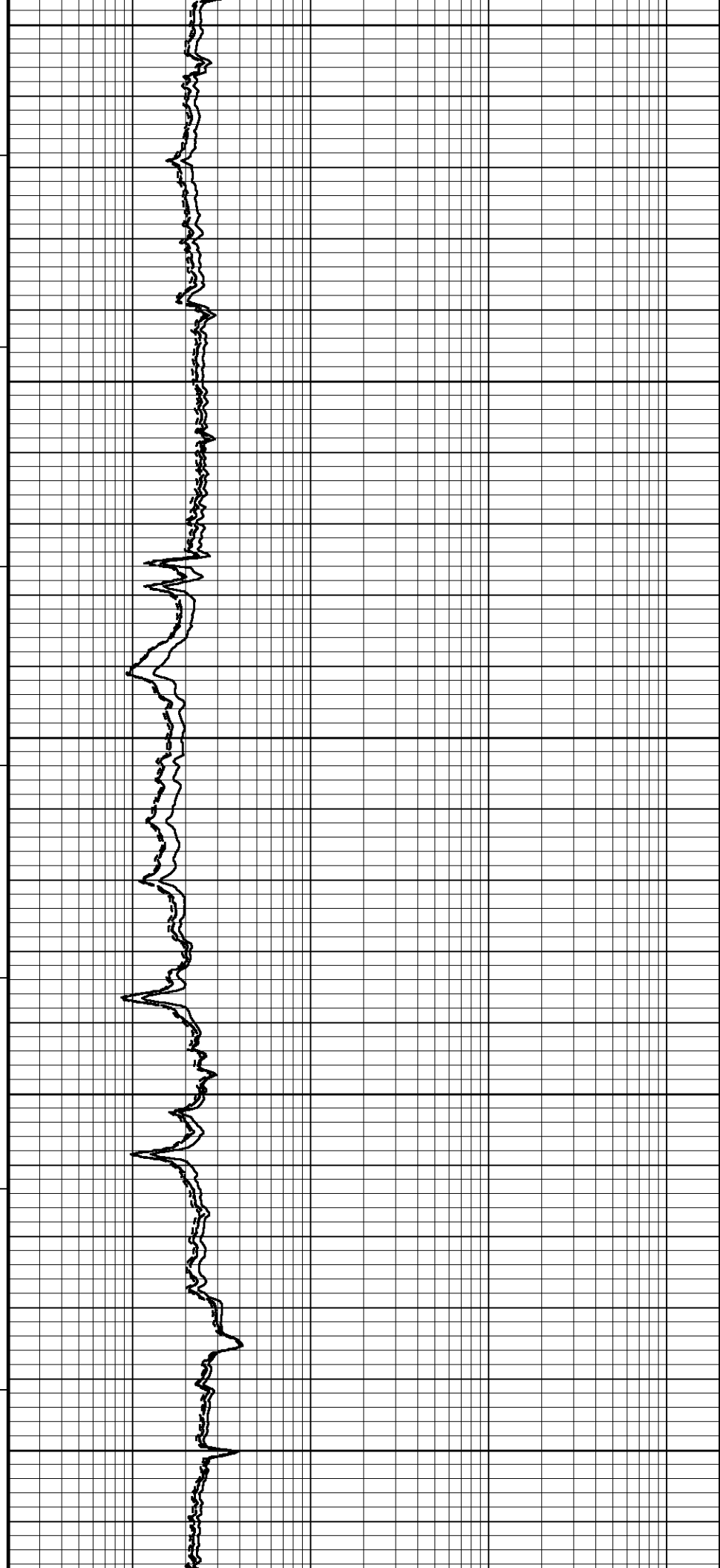
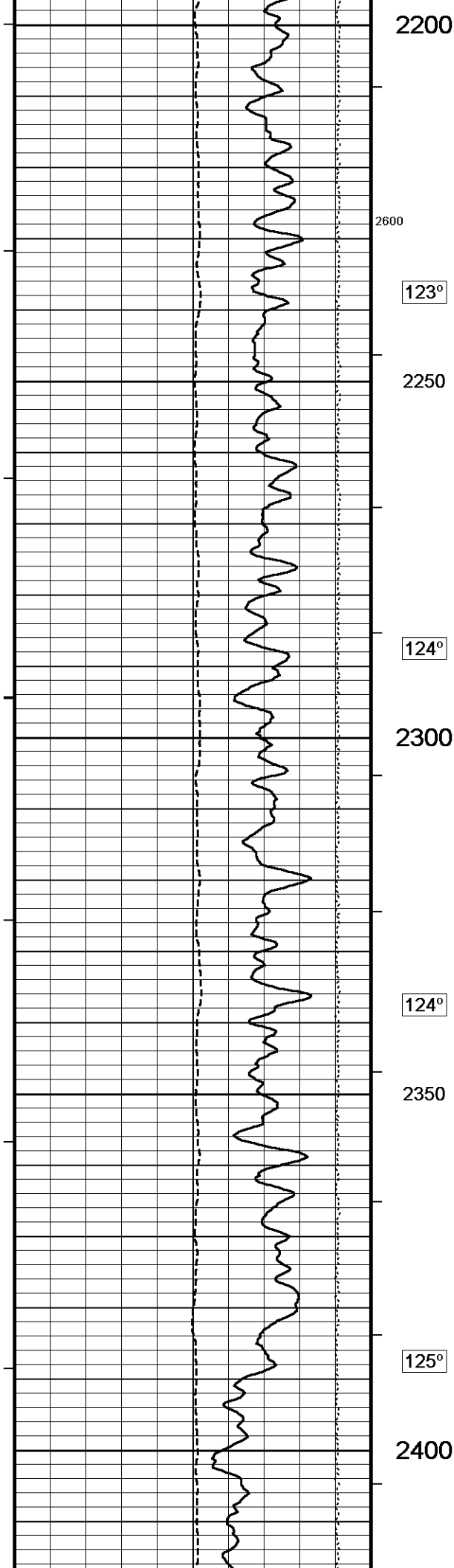
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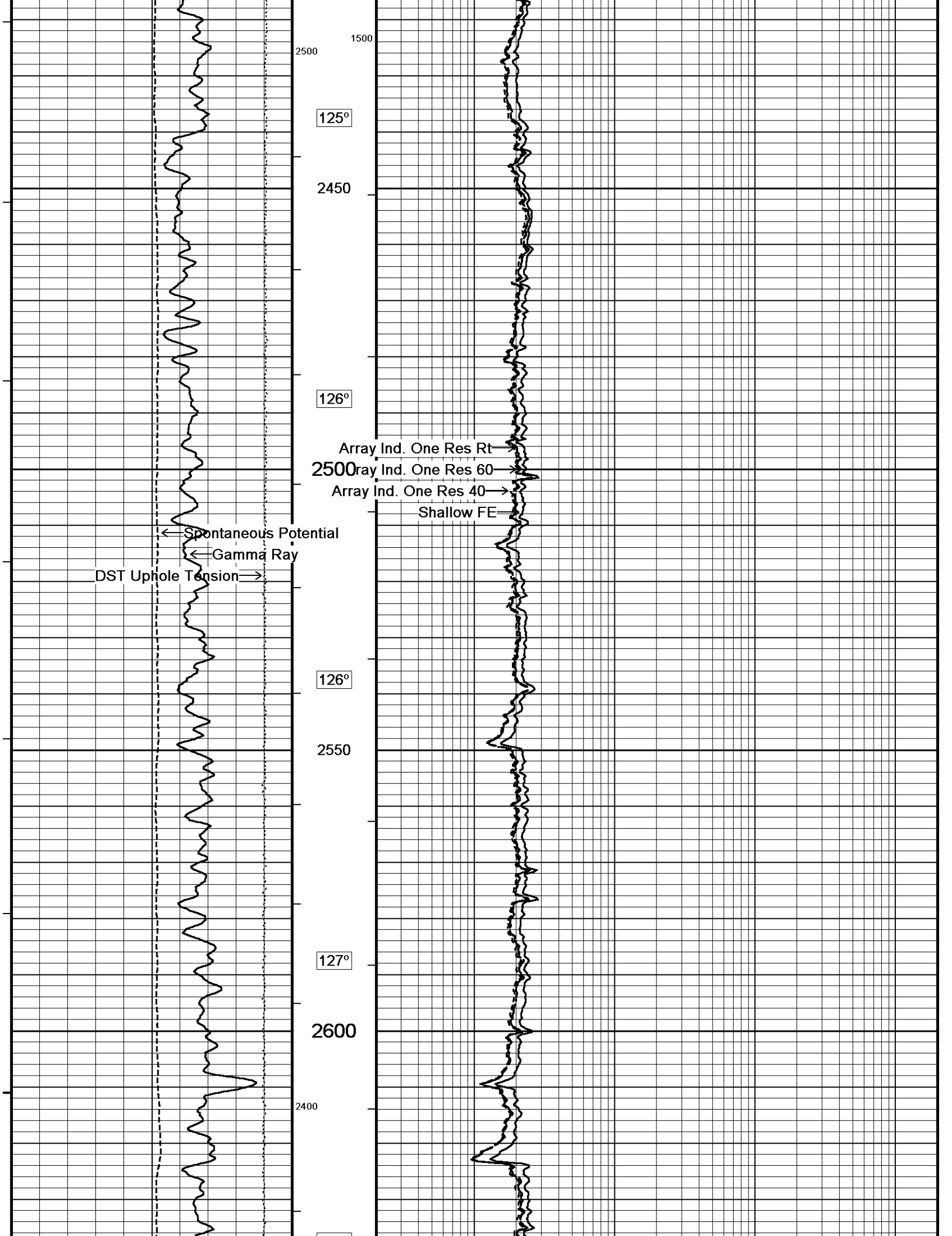
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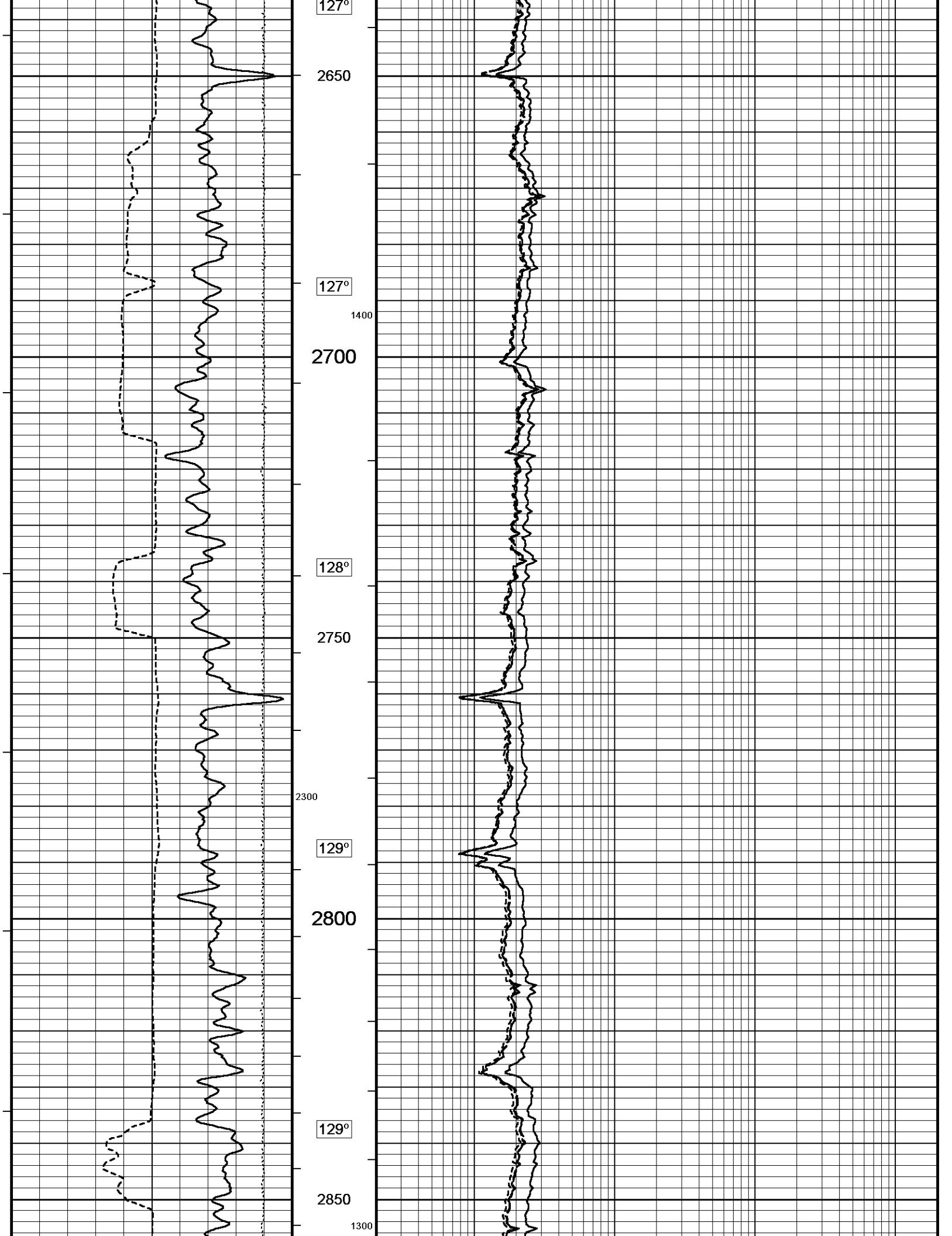
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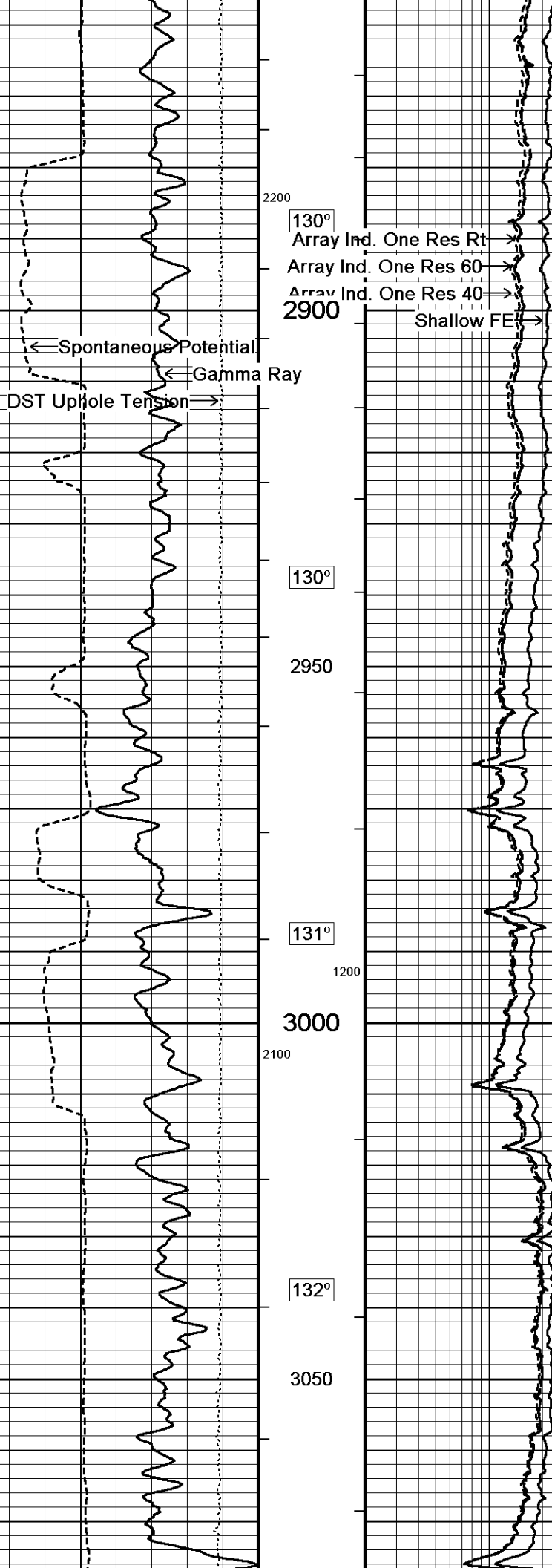


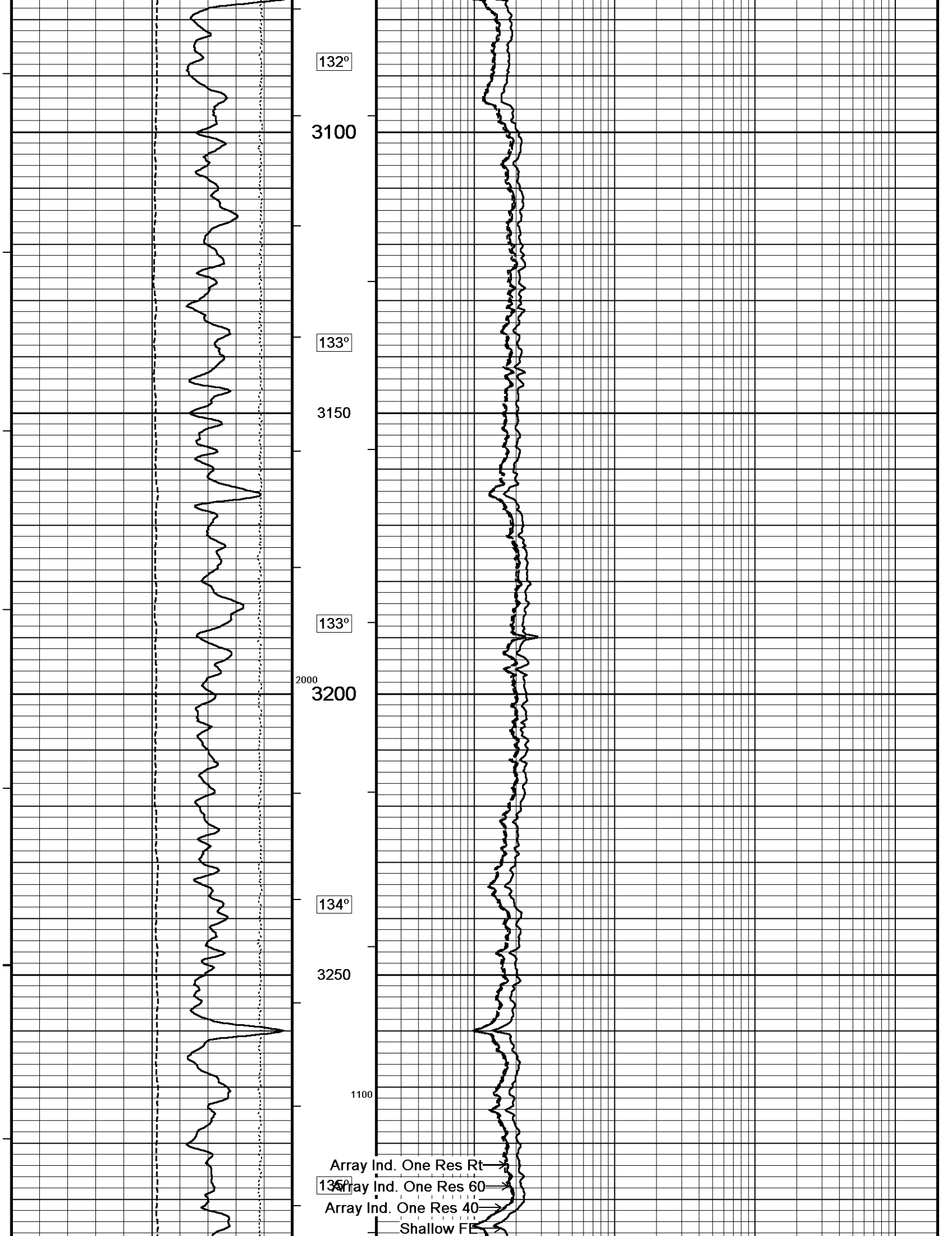


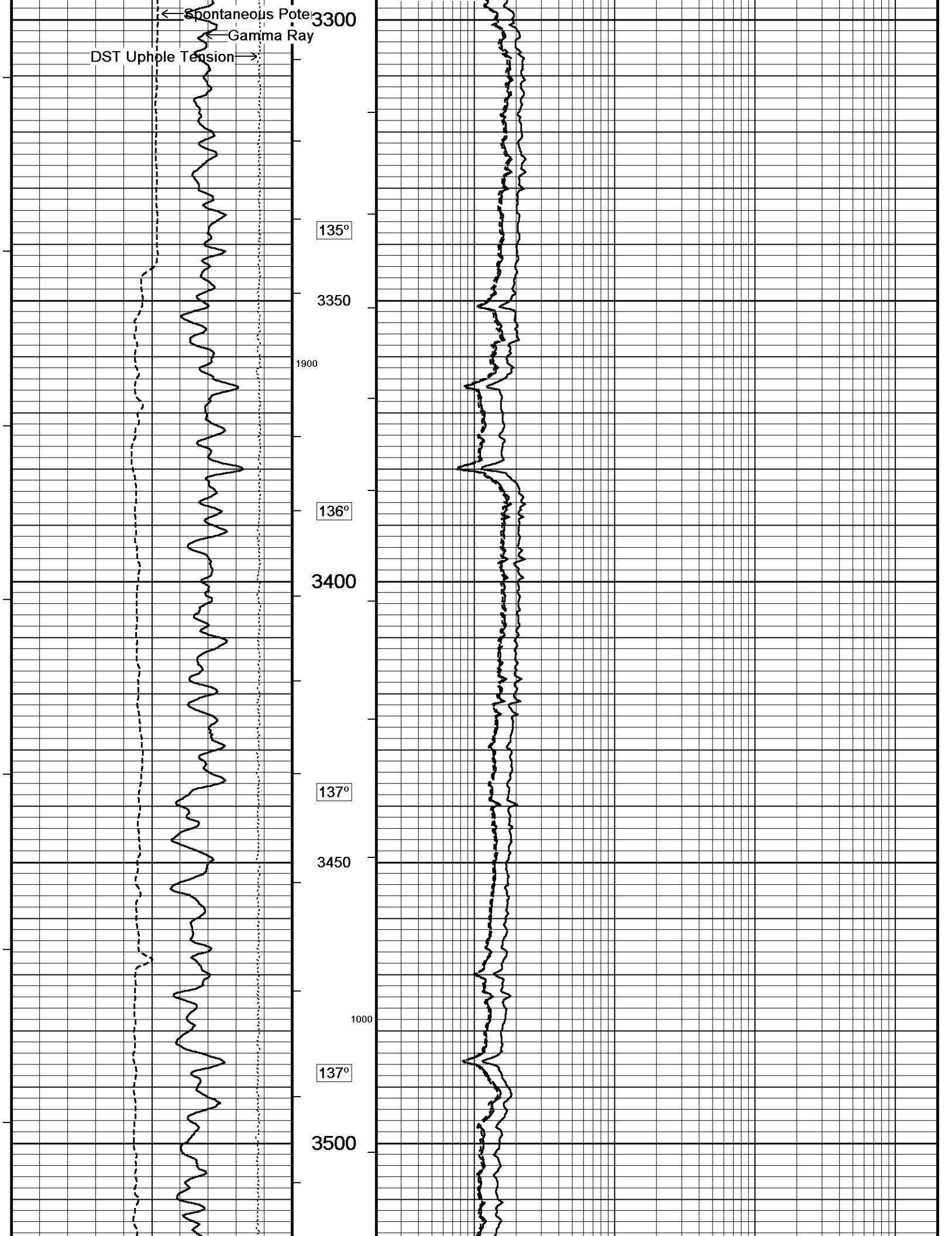




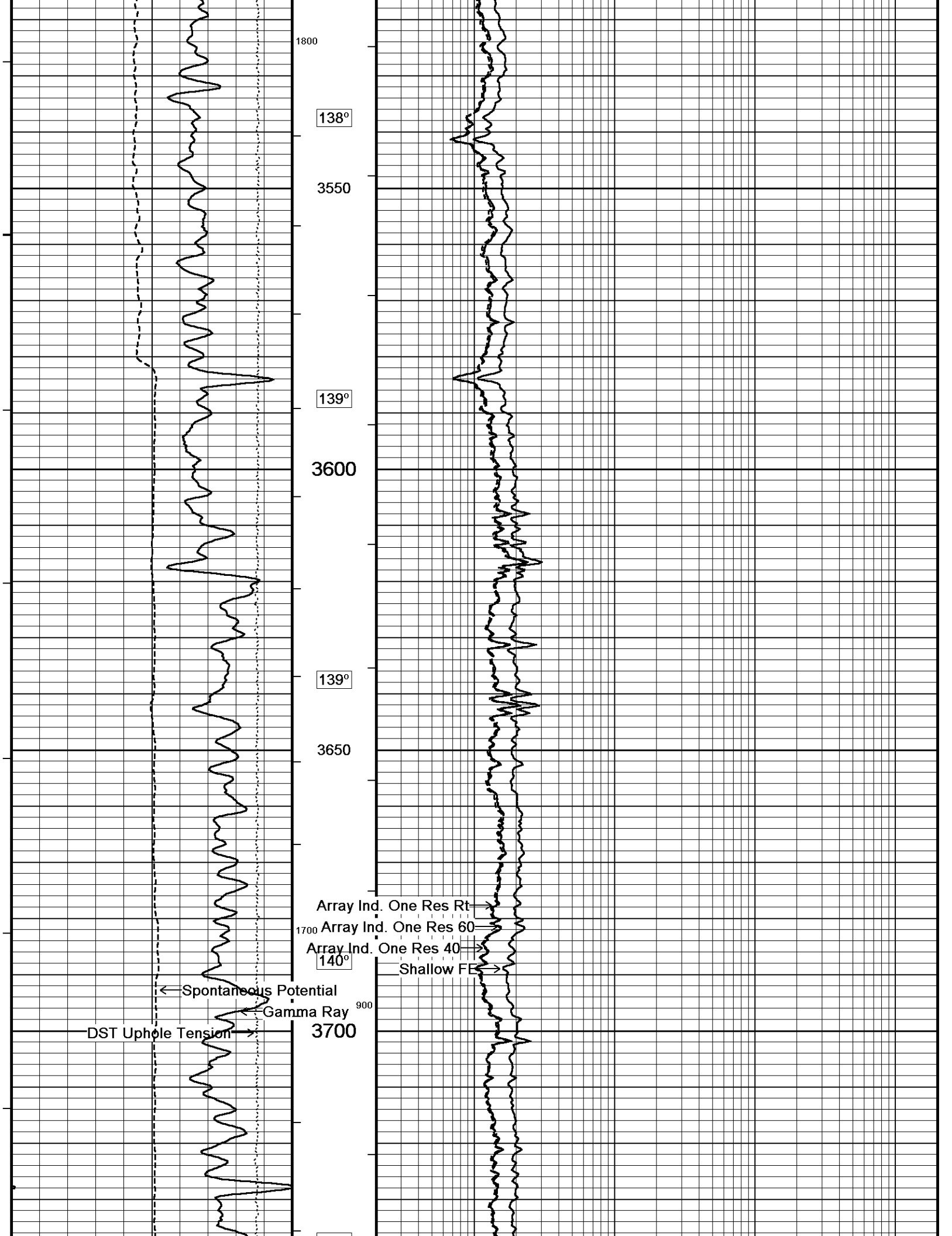


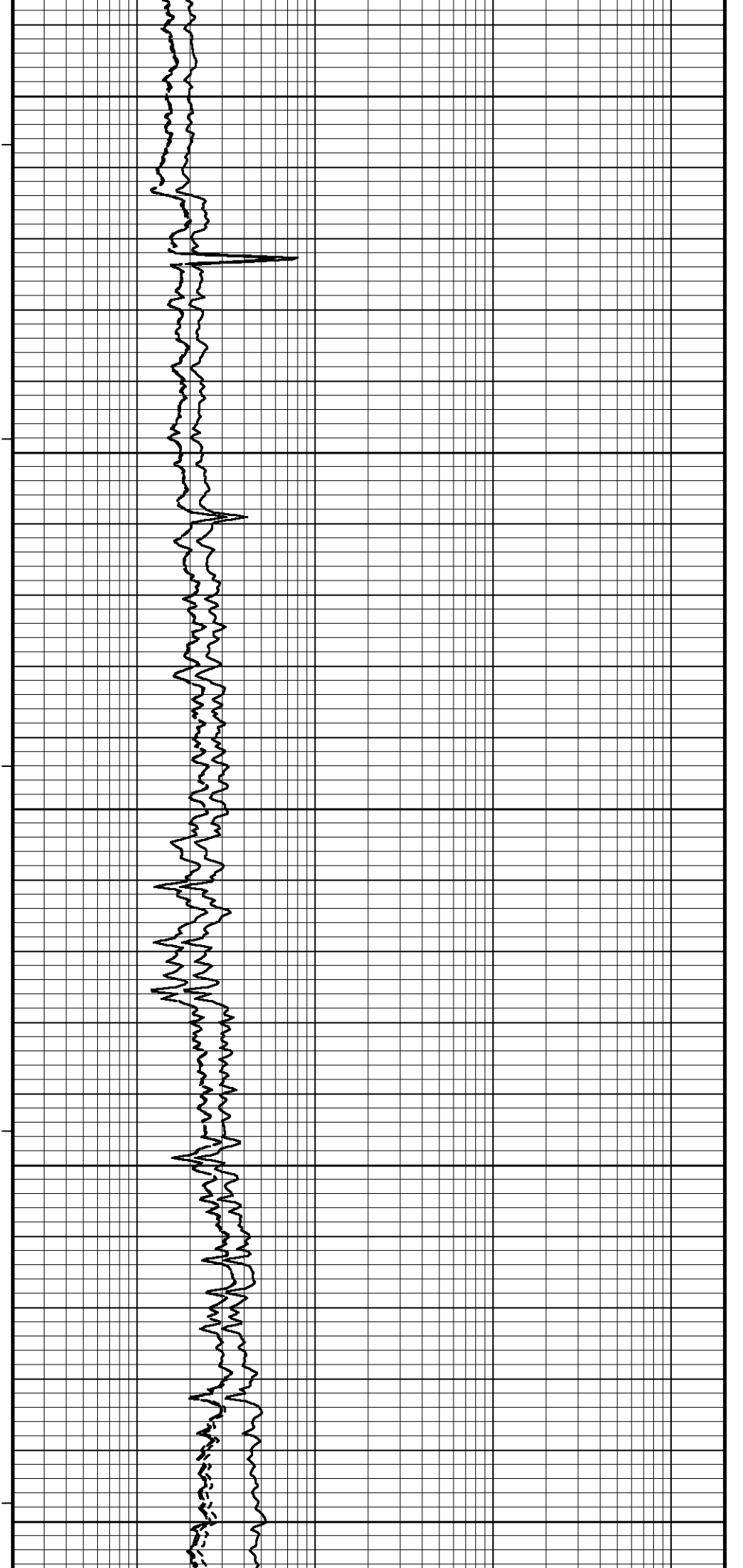
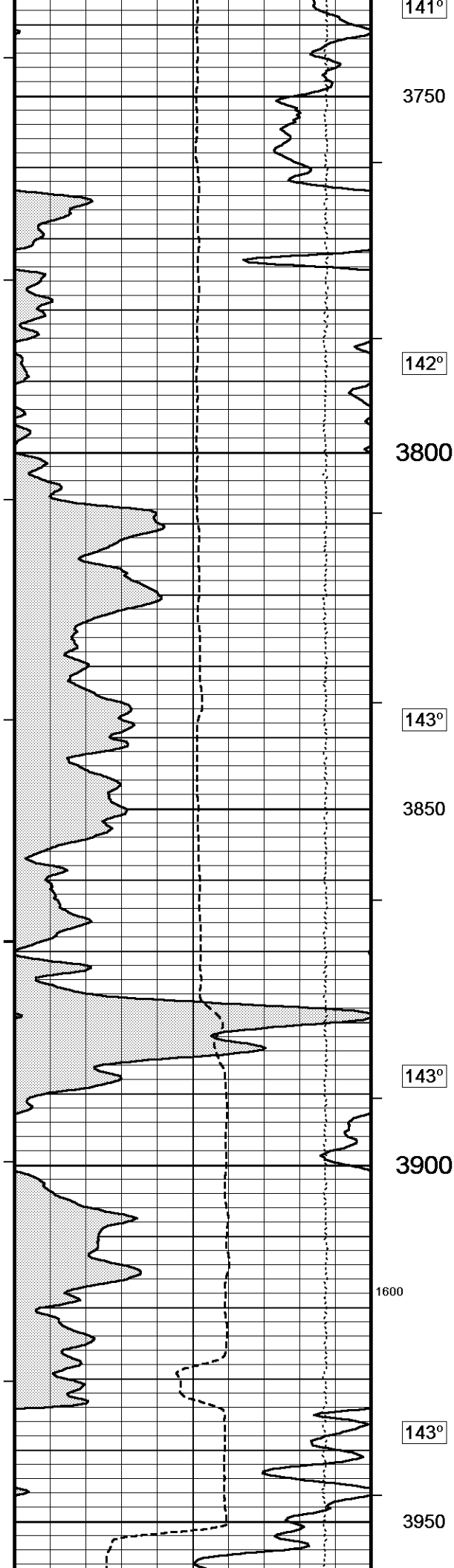


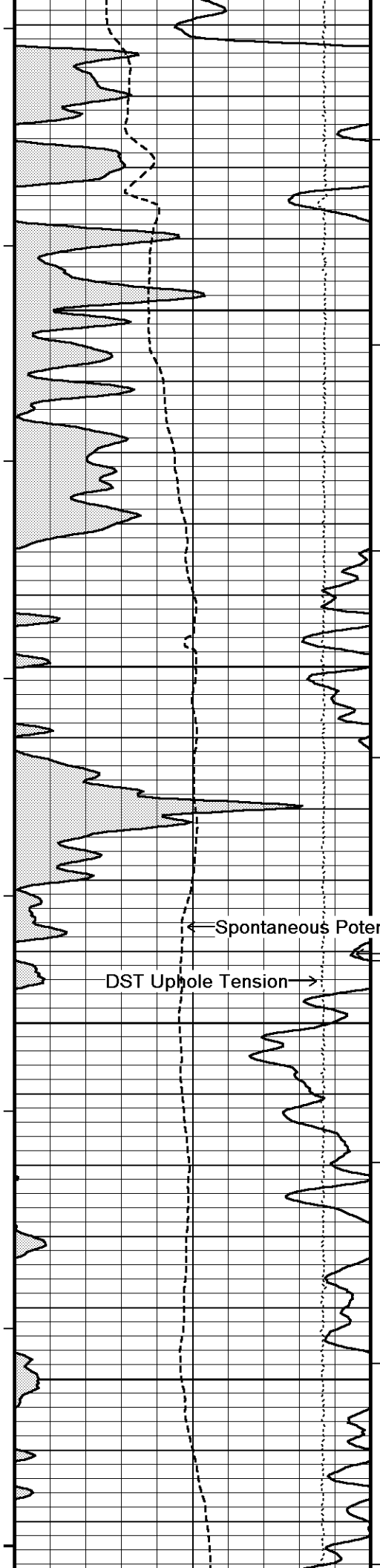












144°

4000

145°

4050

145°

4100

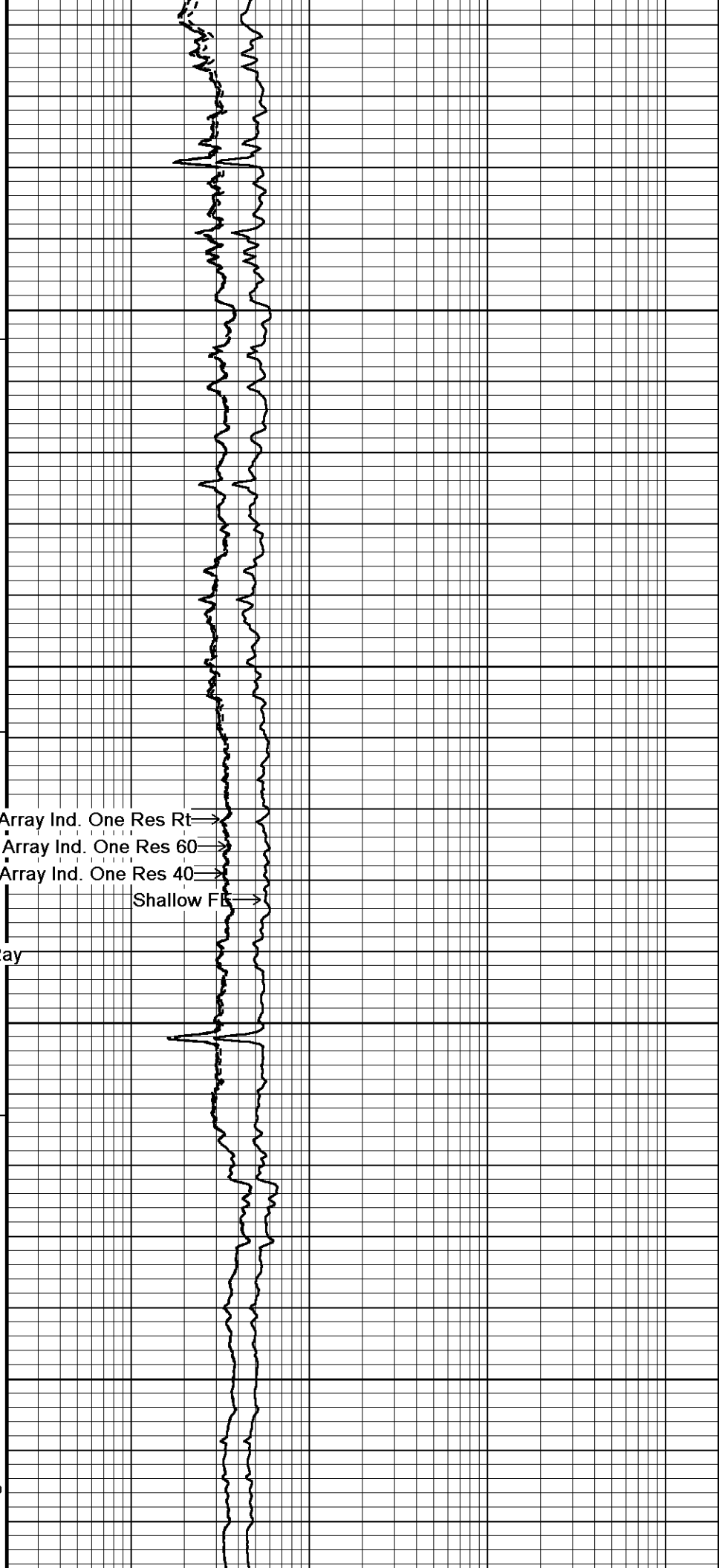
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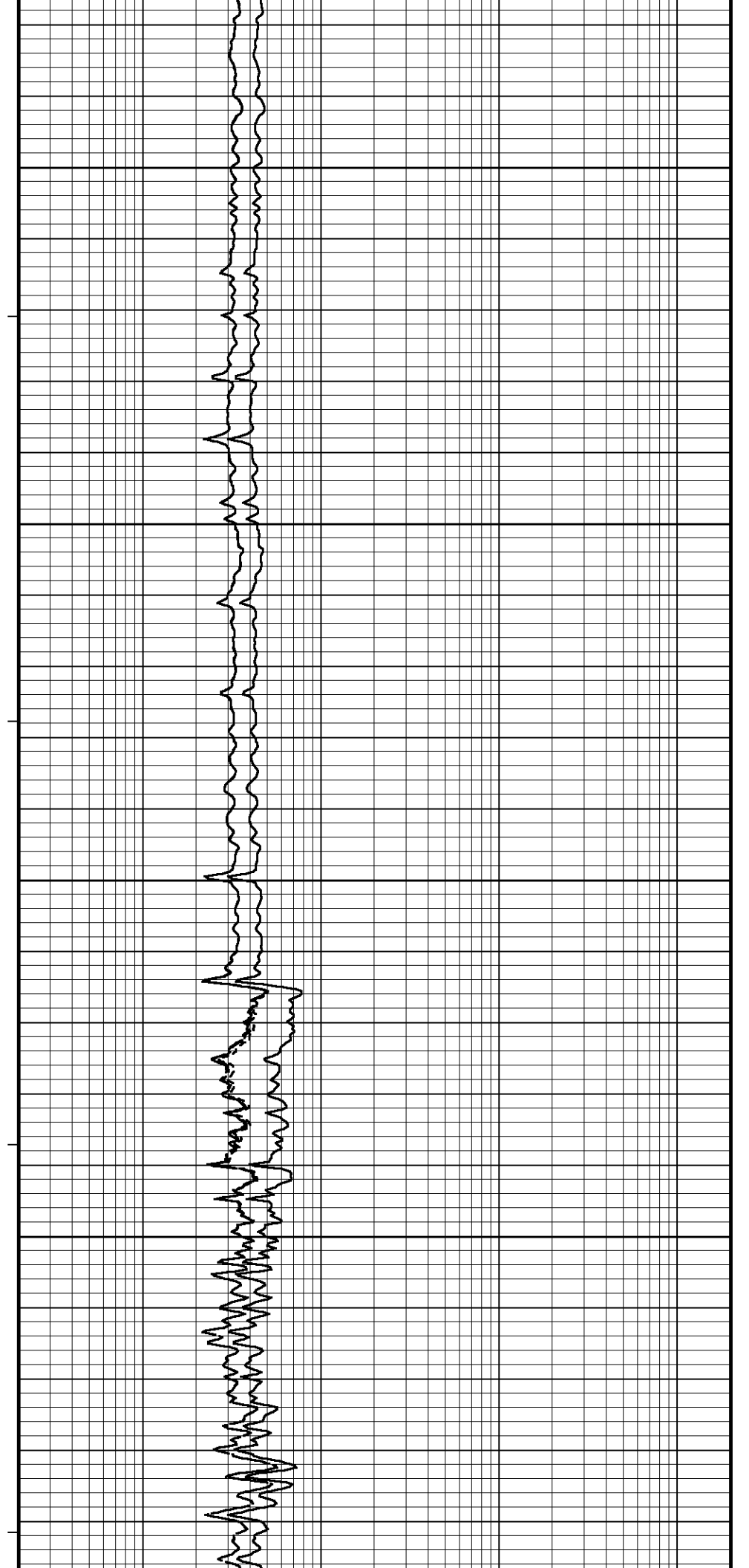
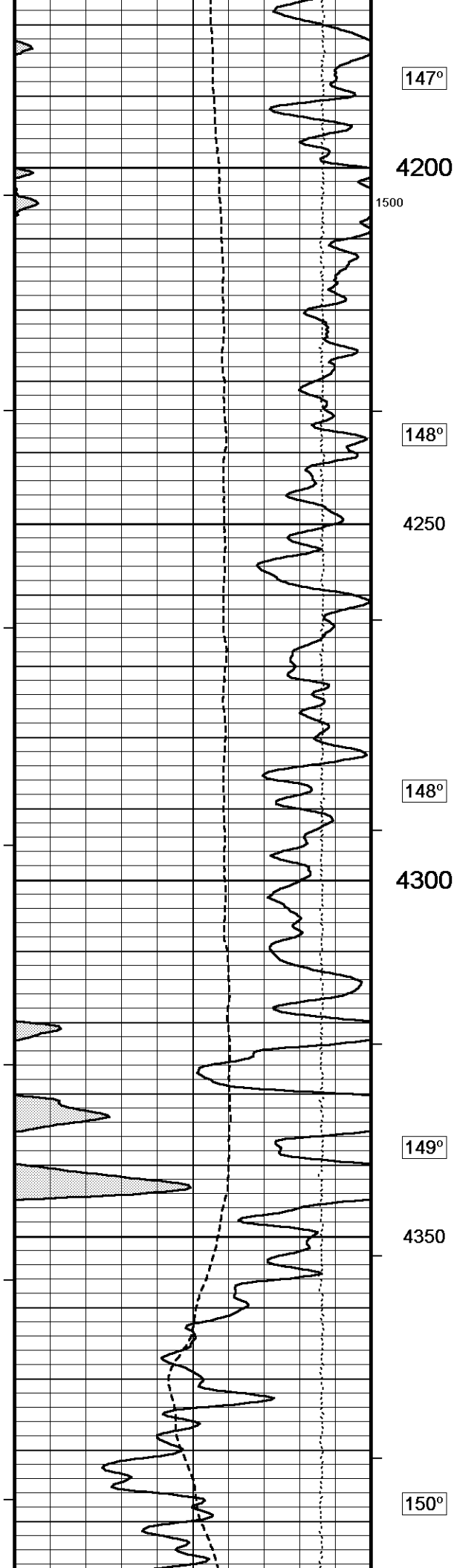
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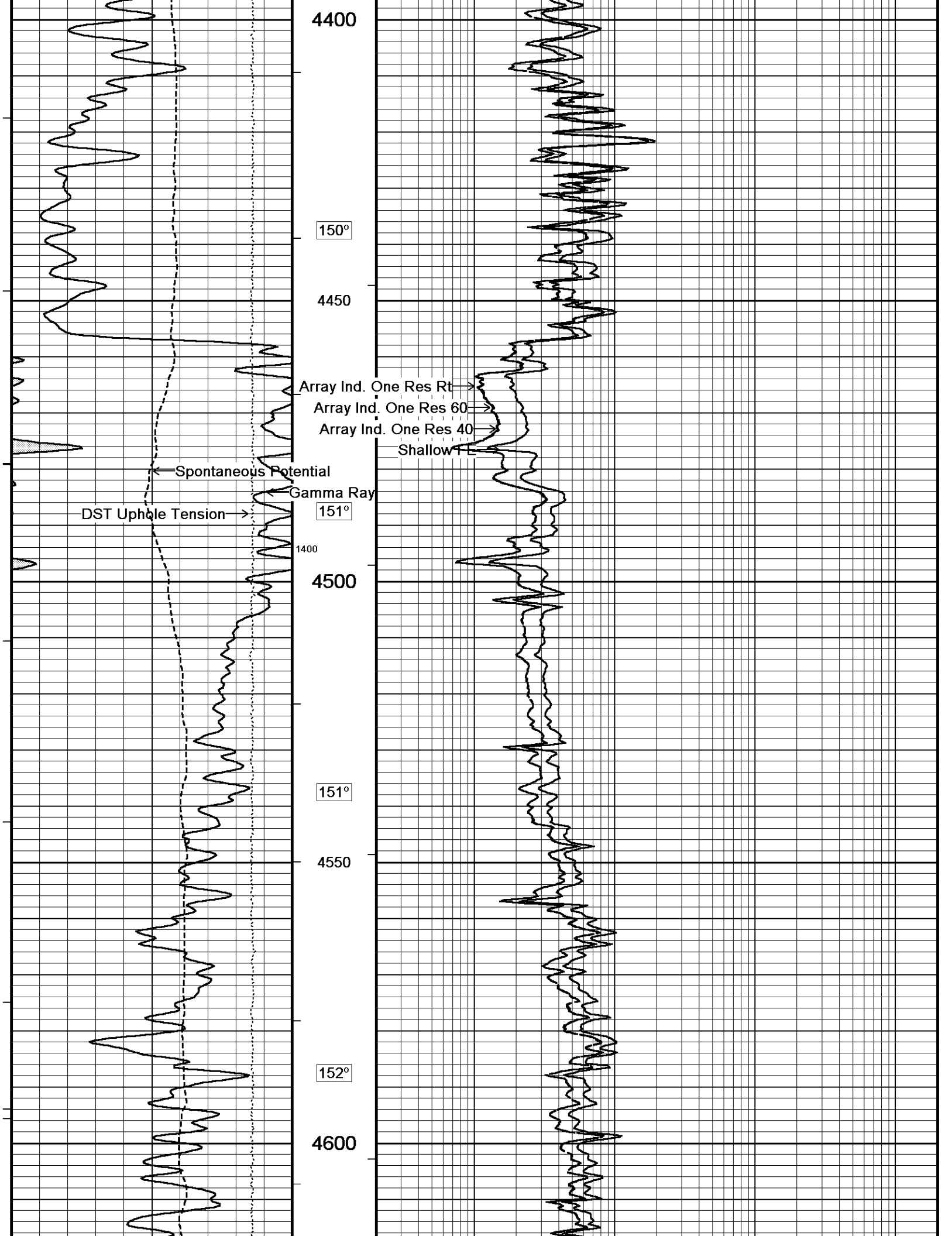
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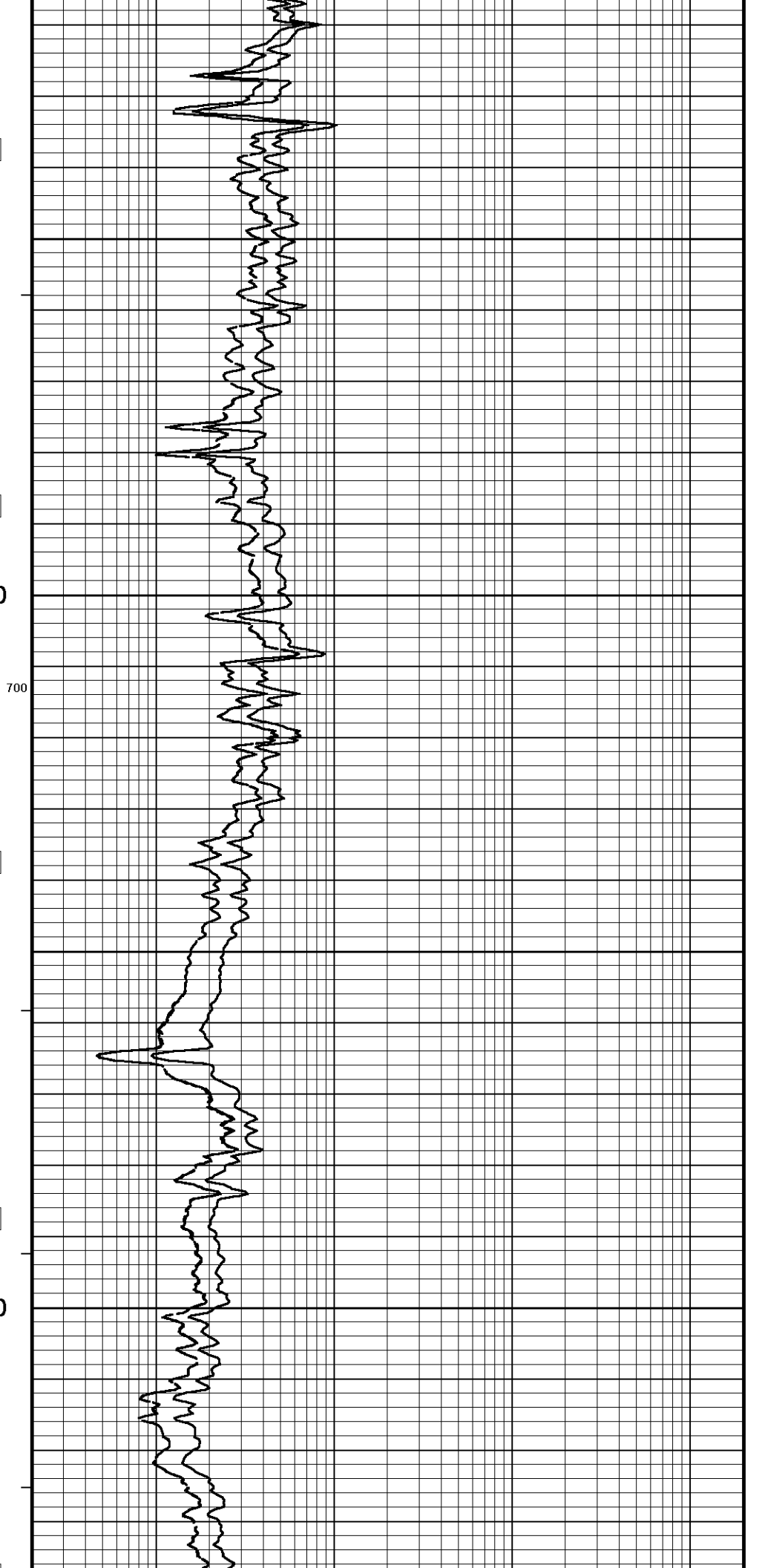
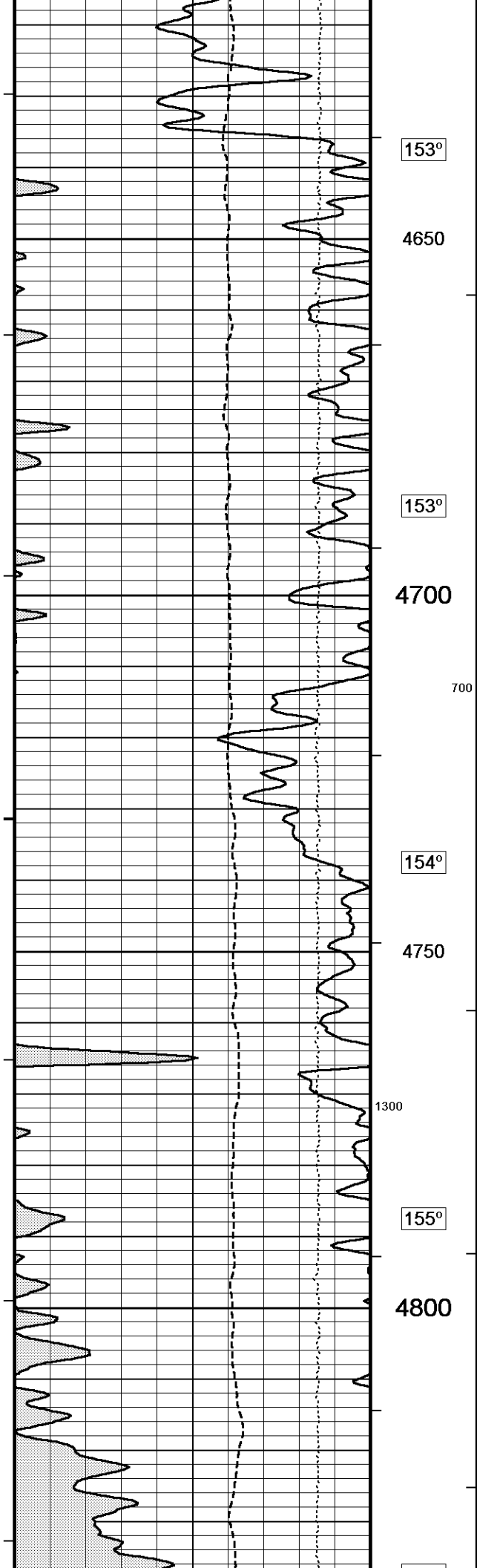
Array Ind. One Res Rt  
Array Ind. One Res 60  
Array Ind. One Res 40  
Shallow FB

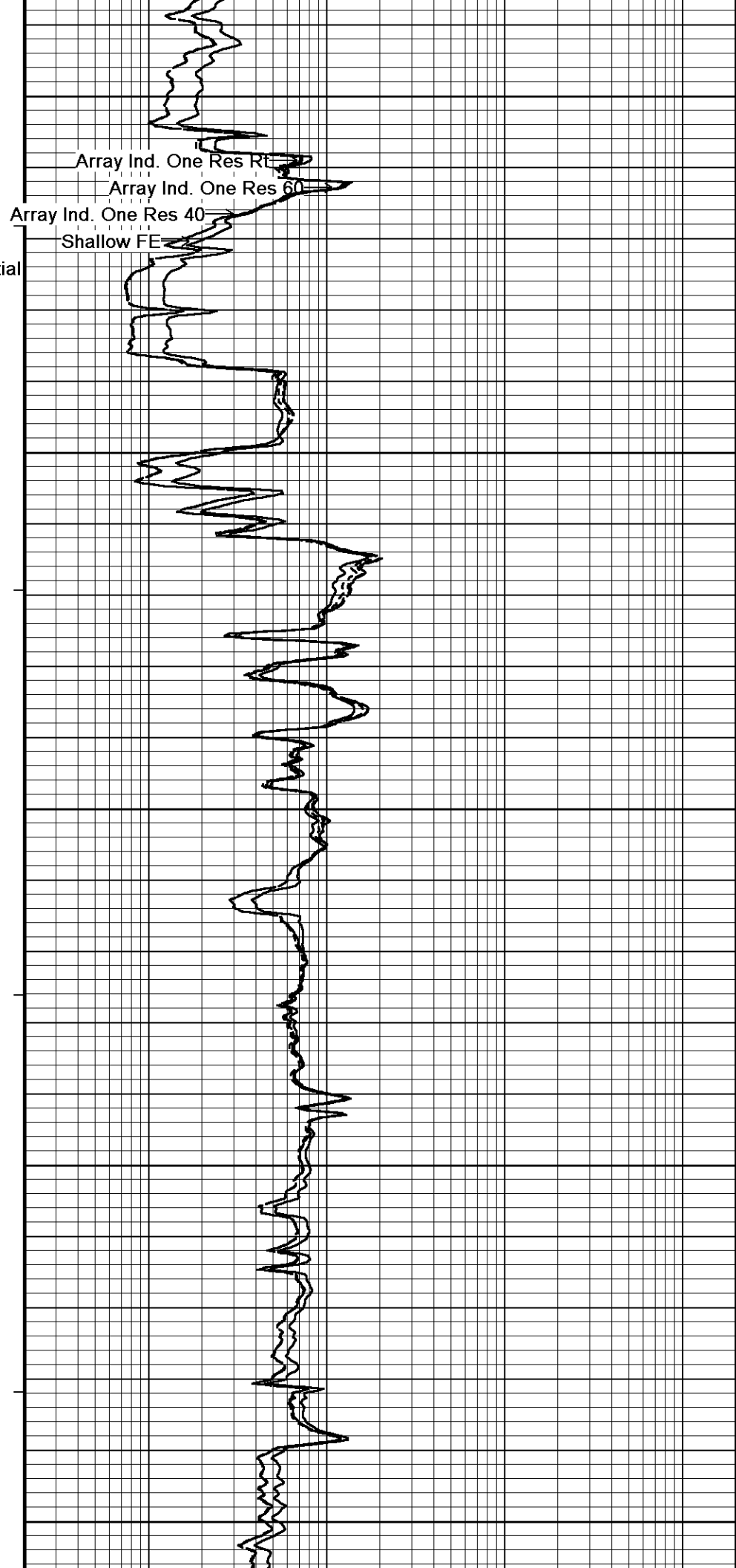
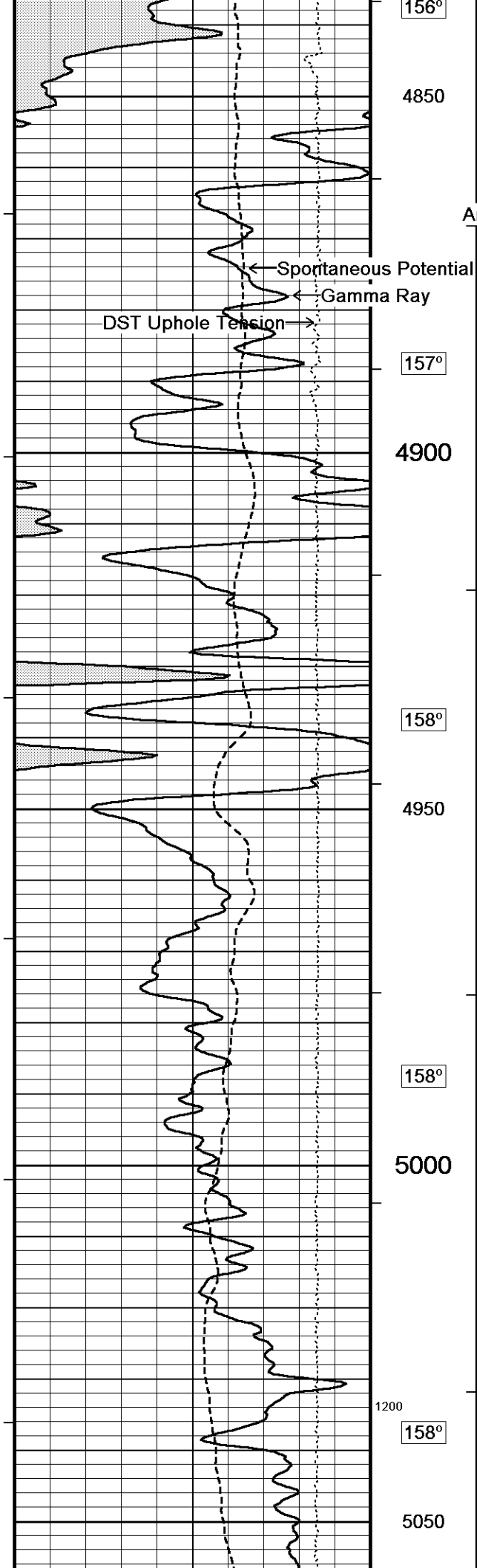
Spontaneous Potential  
DST Uphole Tension  
Gamma Ray

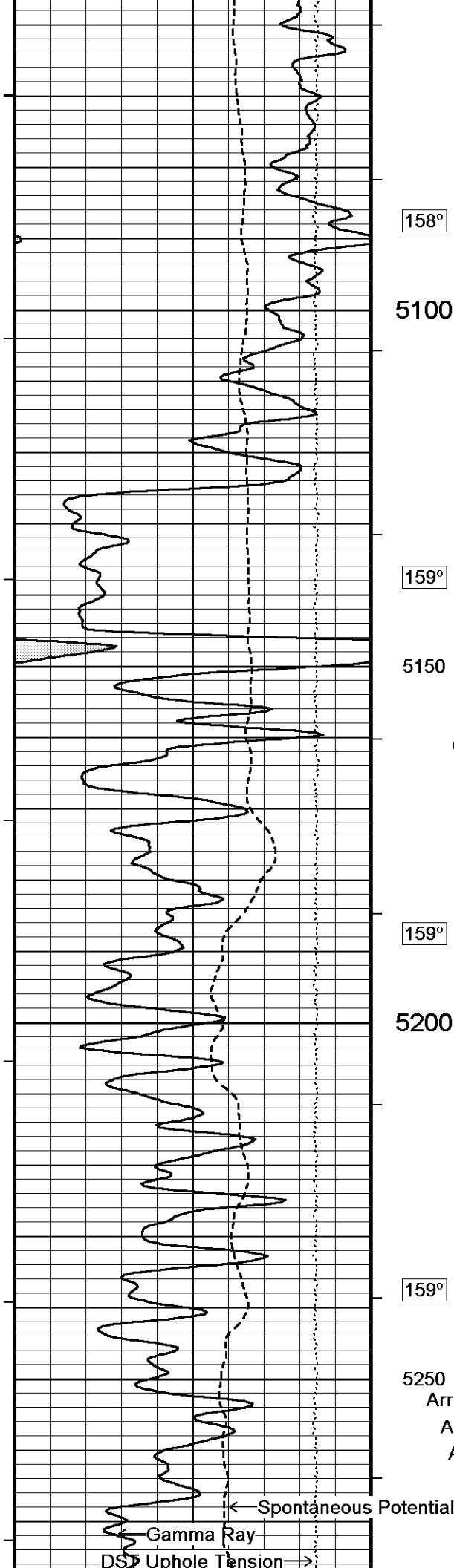












158°

5100

159°

5150

600

159°

5200

159°

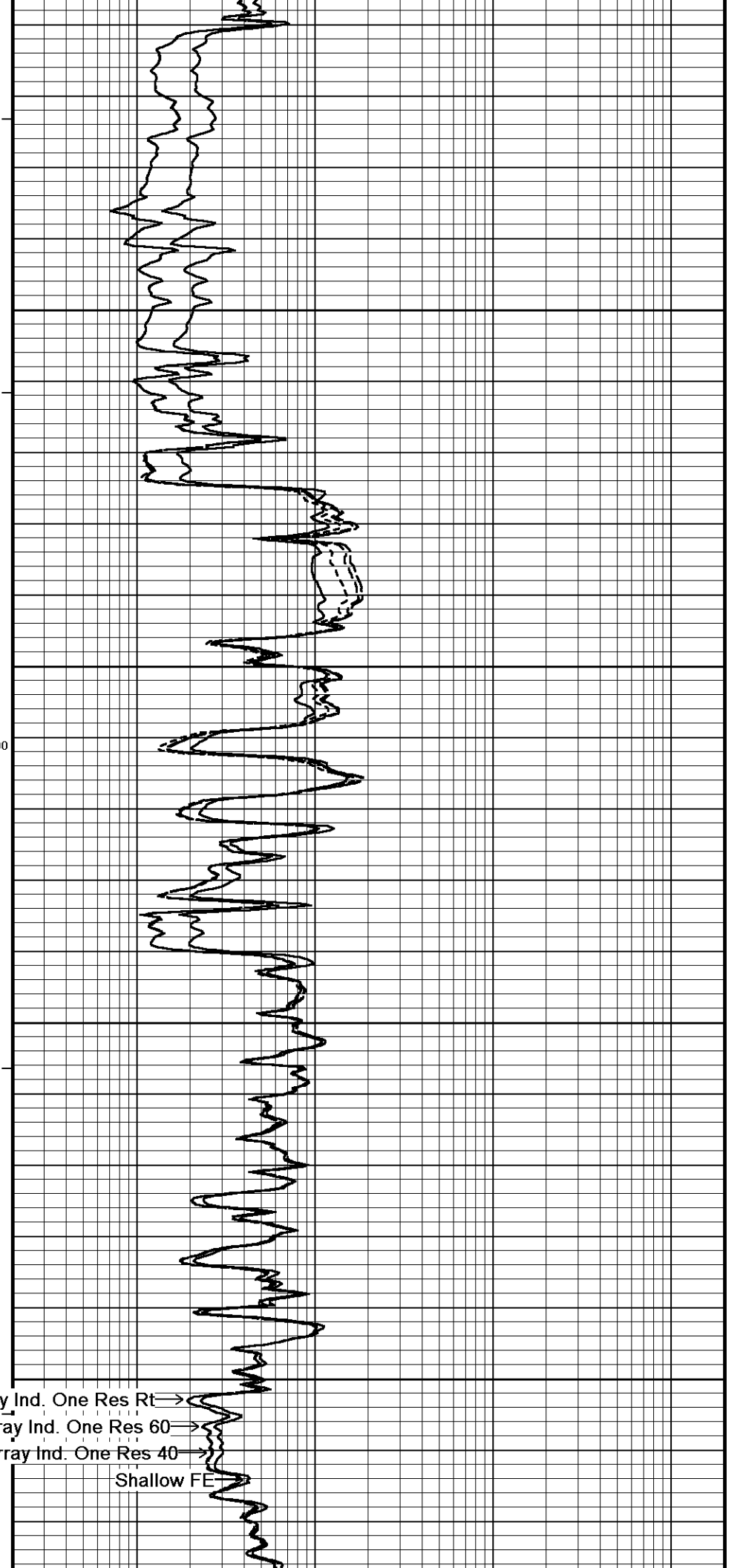
5250

Array Ind. One Res Rt →

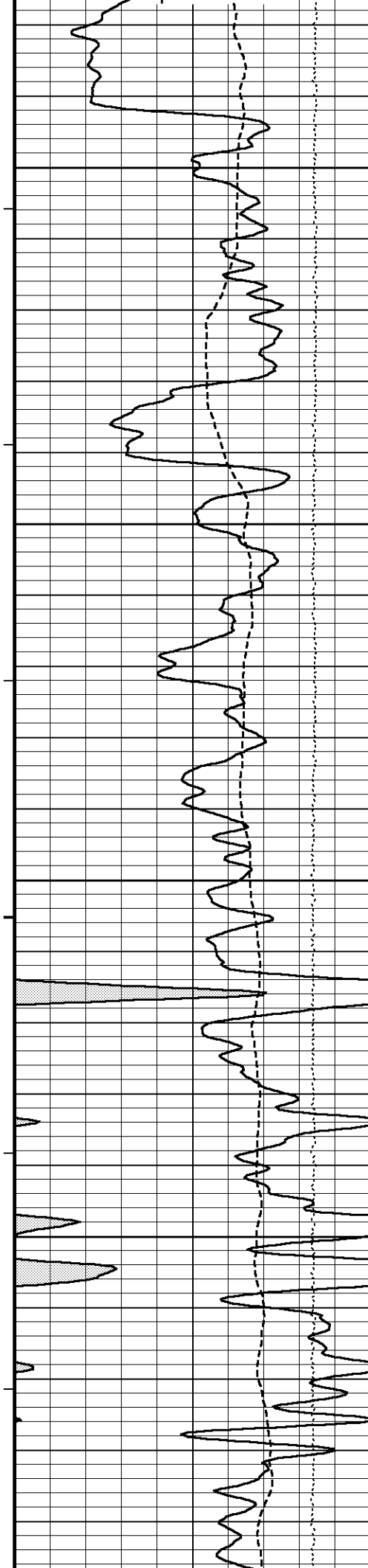
Array Ind. One Res 60 →

Array Ind. One Res 40 →

Shallow FE →







159°

1100

5300

160°

5350

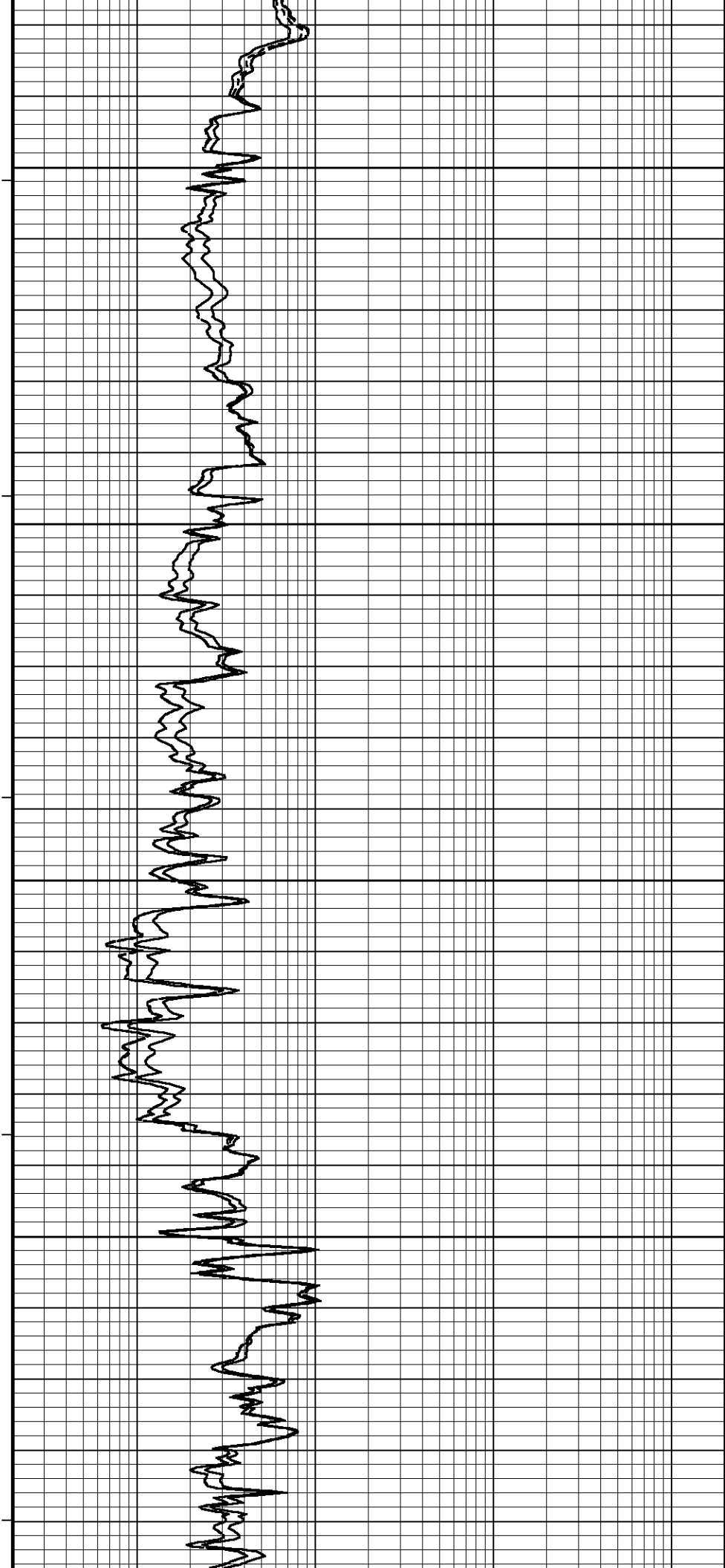
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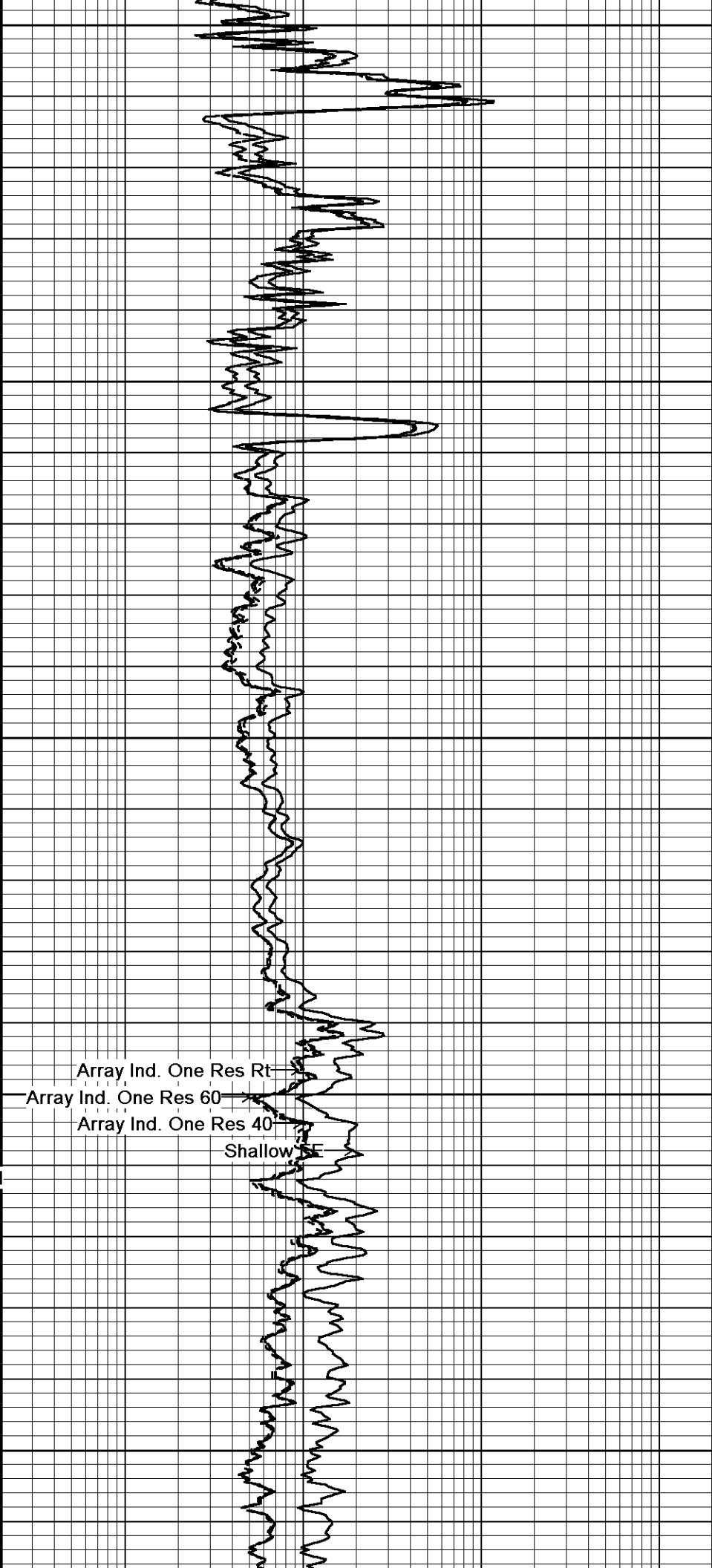
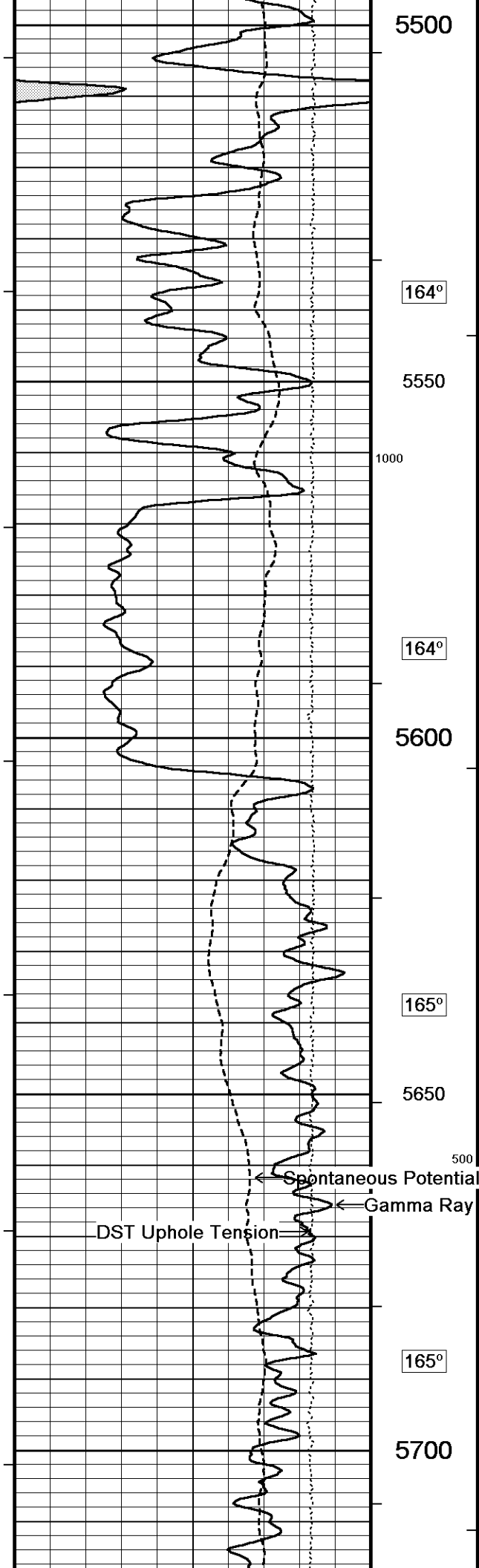
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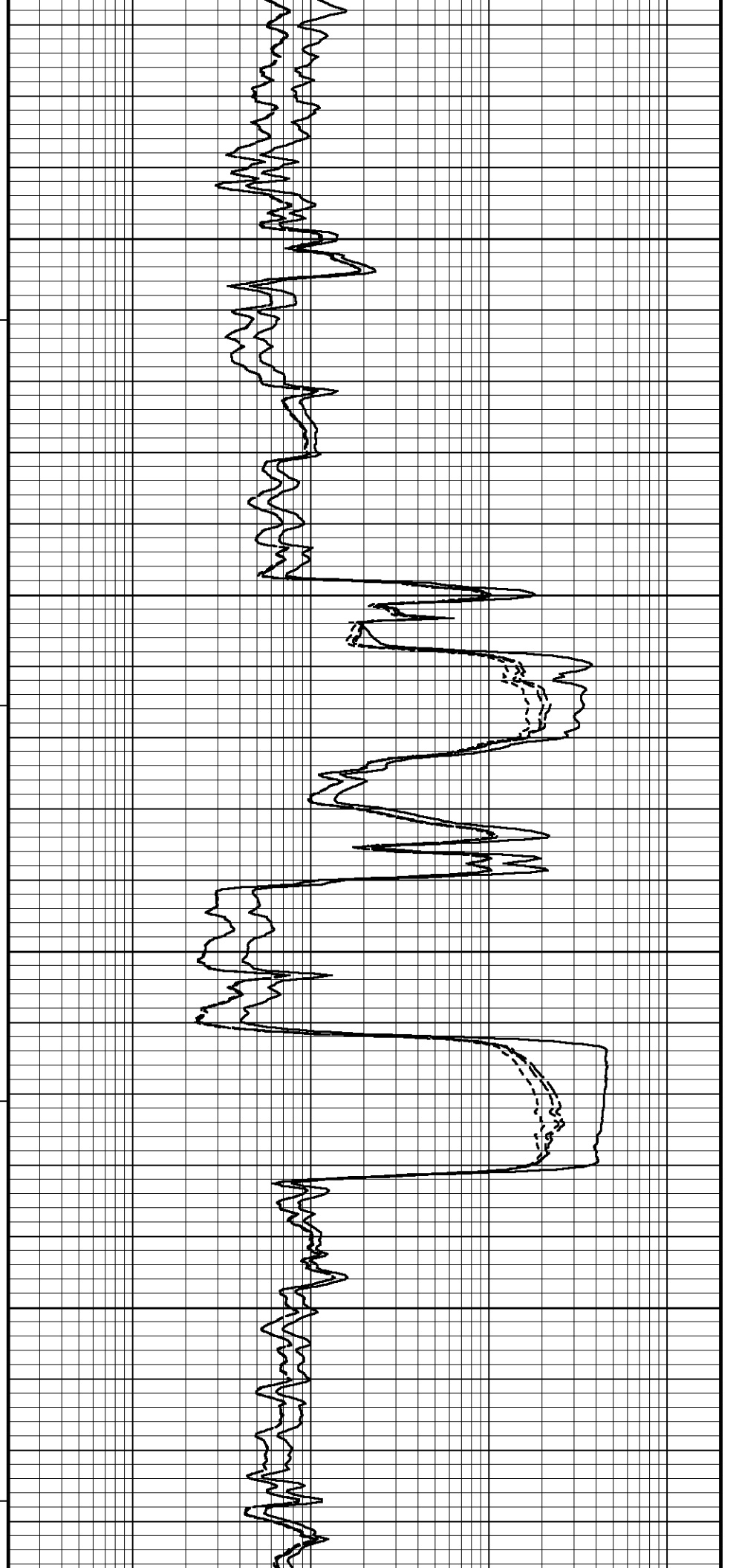
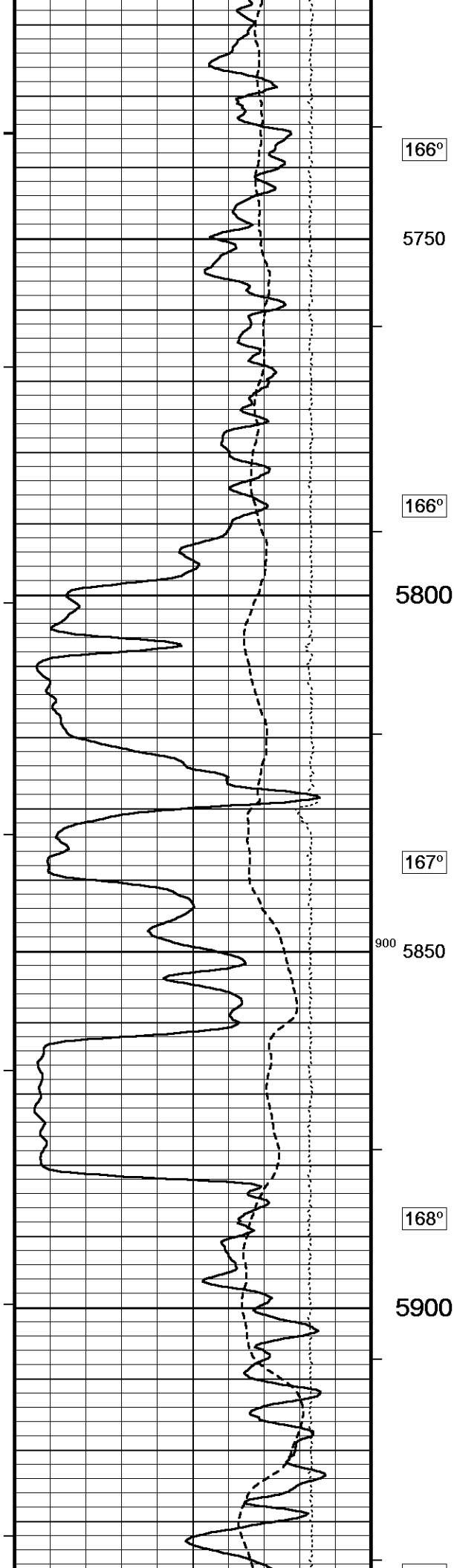
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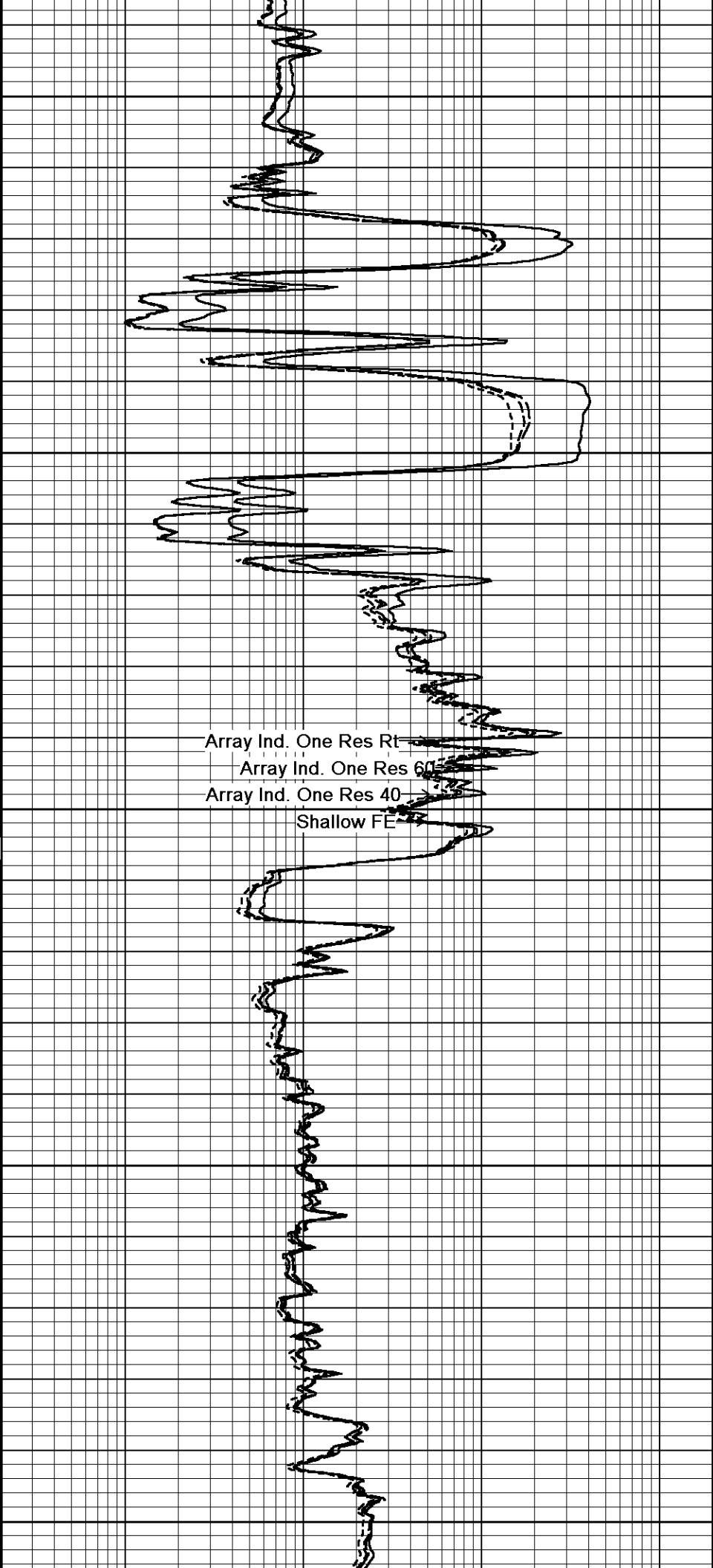
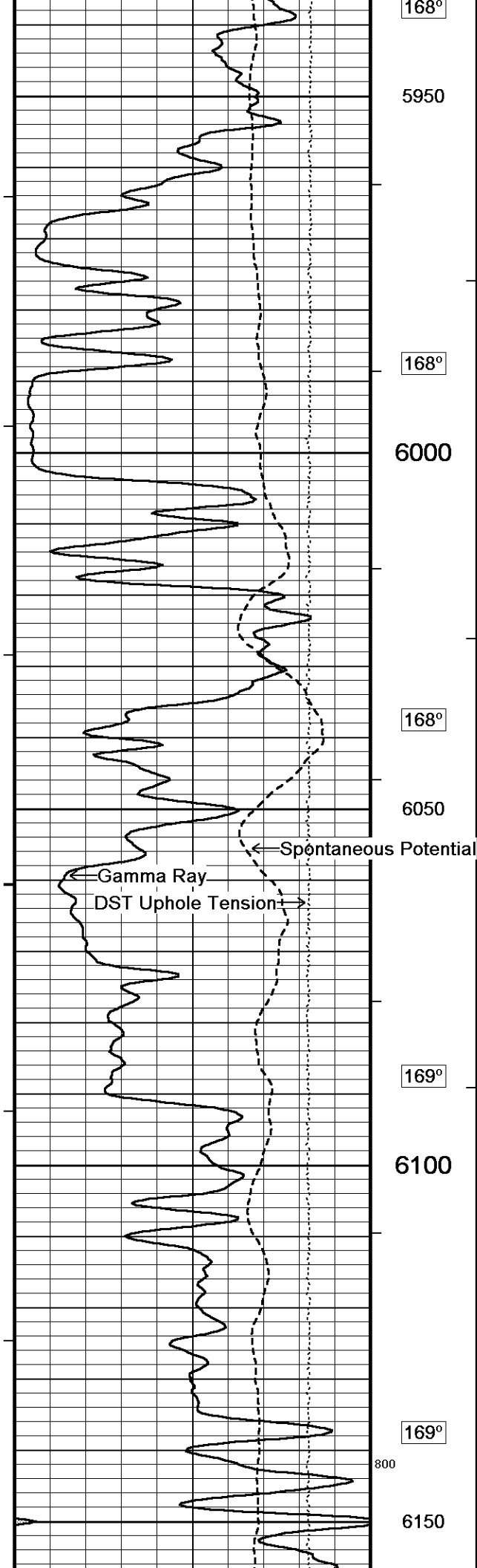
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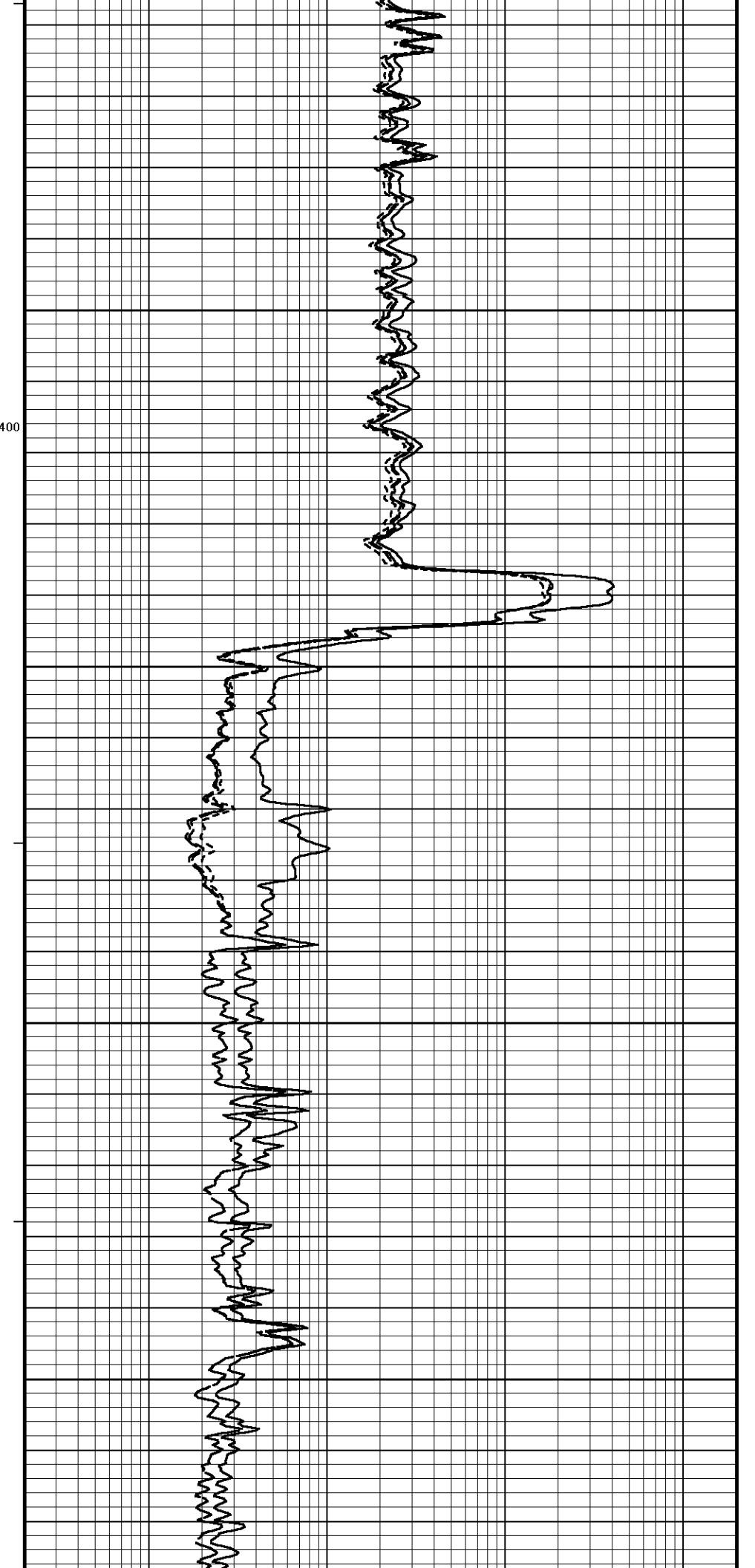
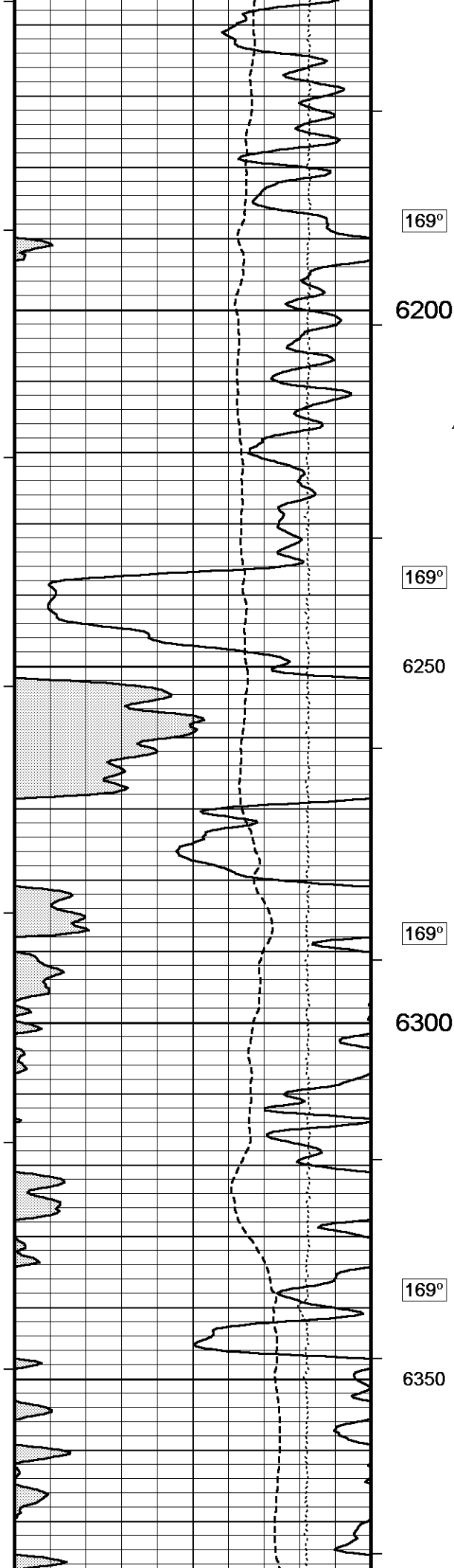
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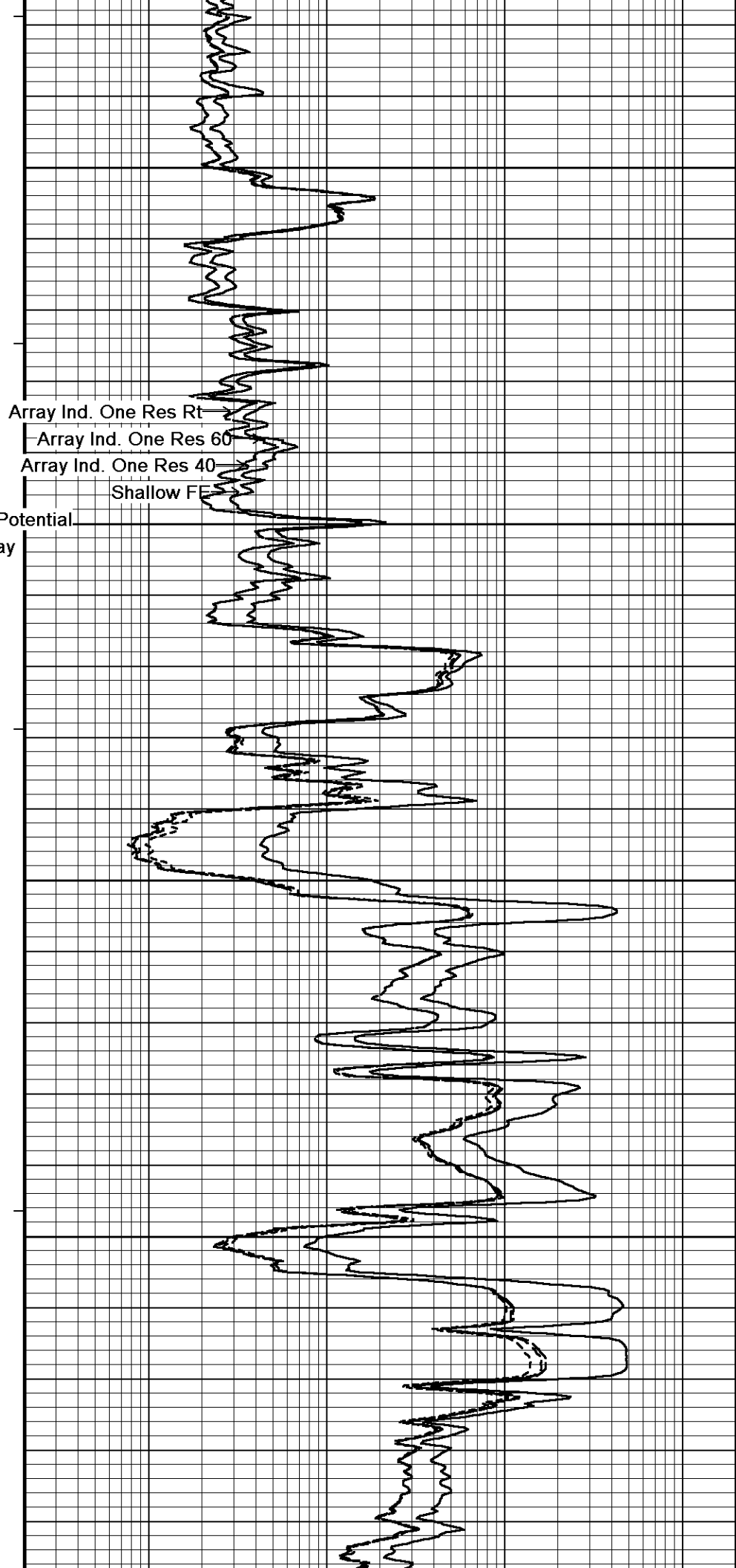
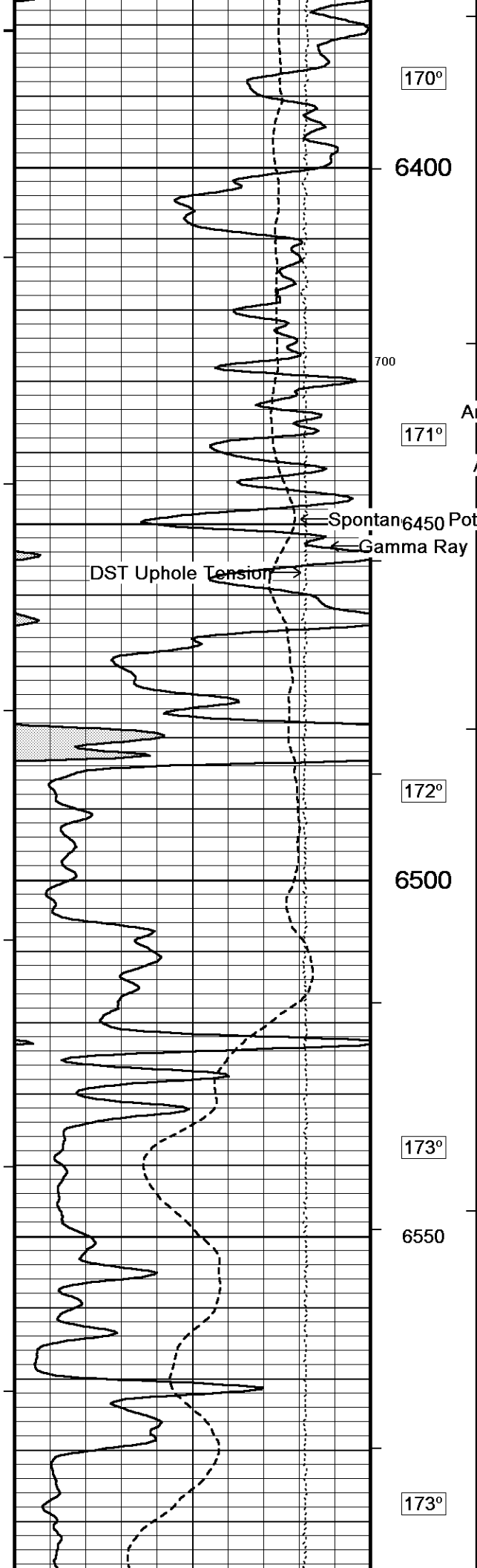


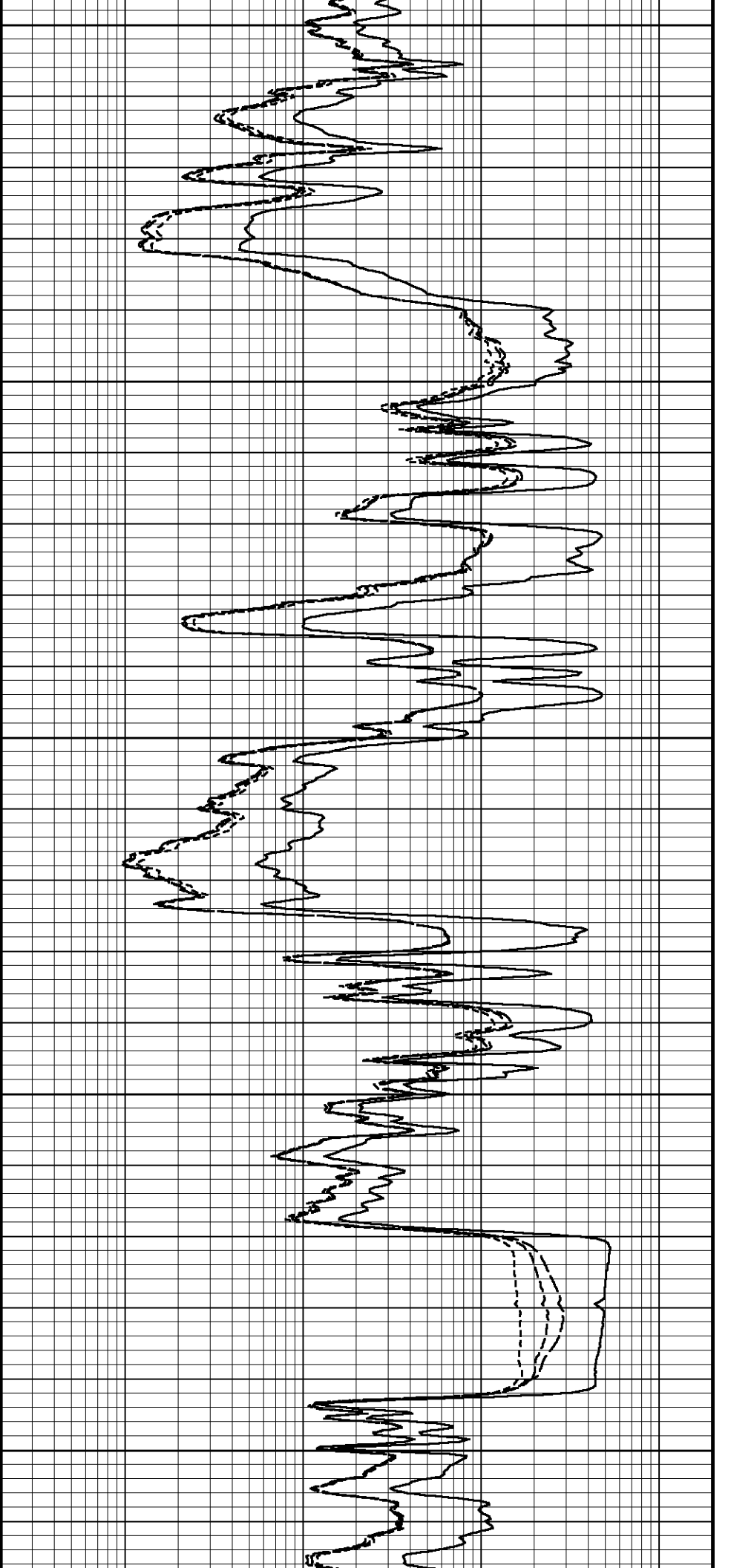
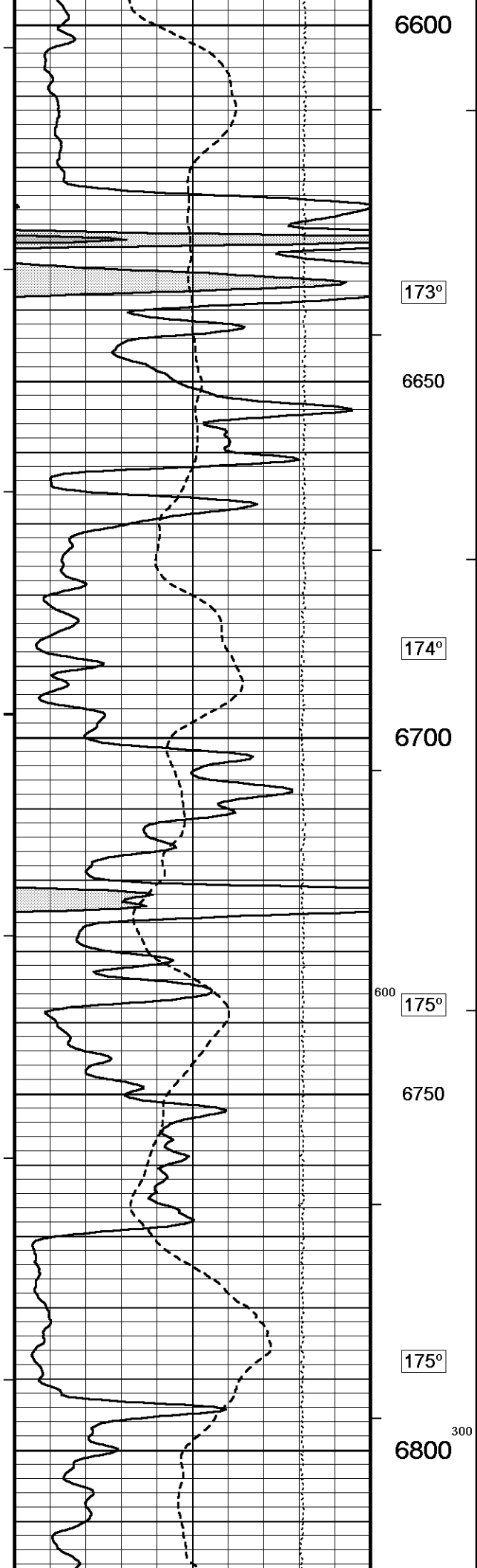


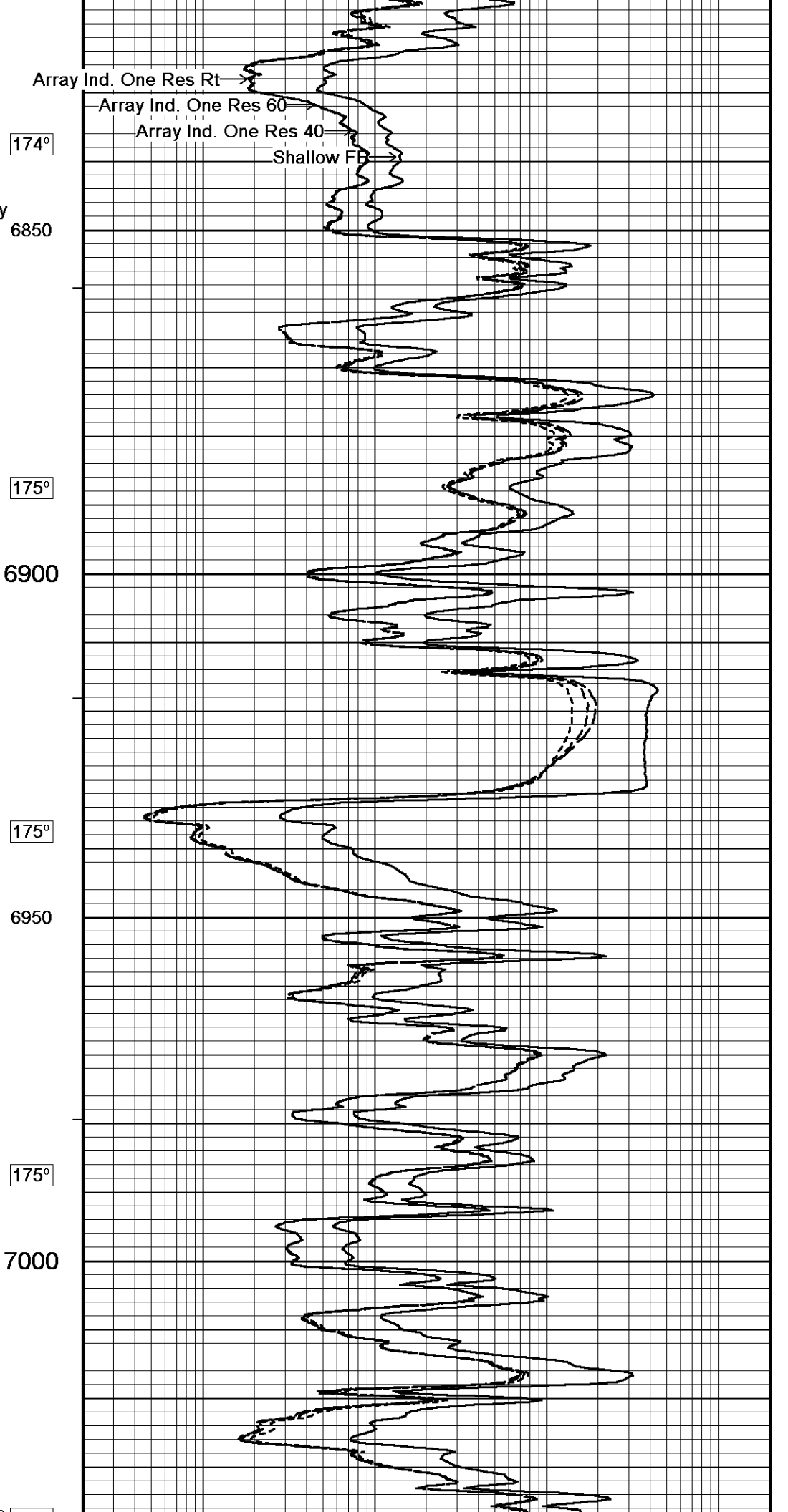
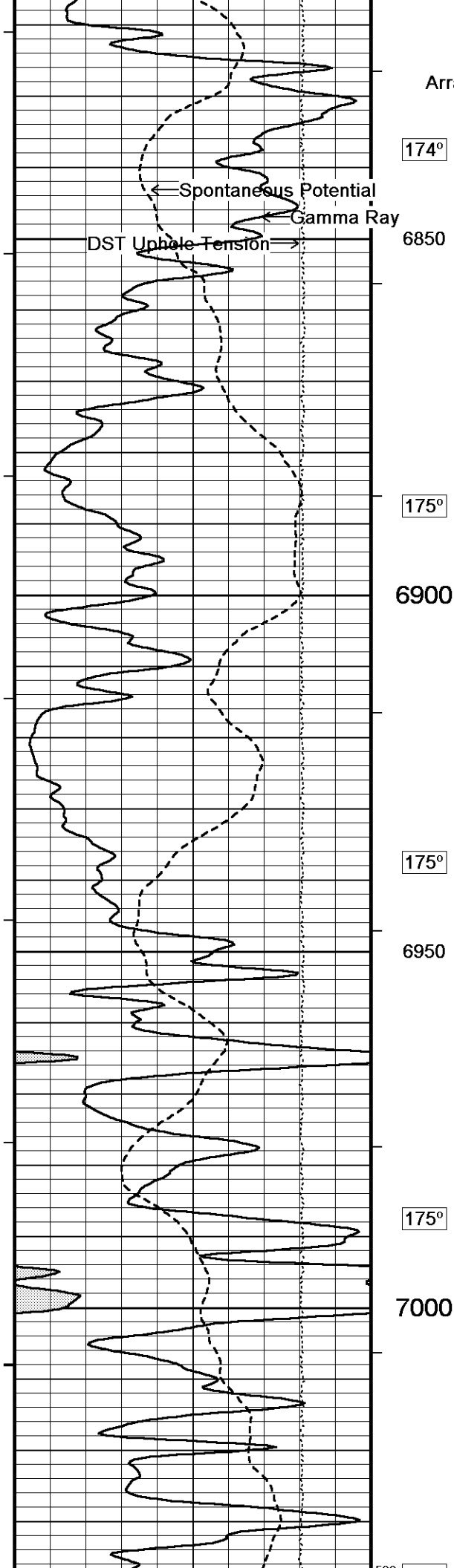




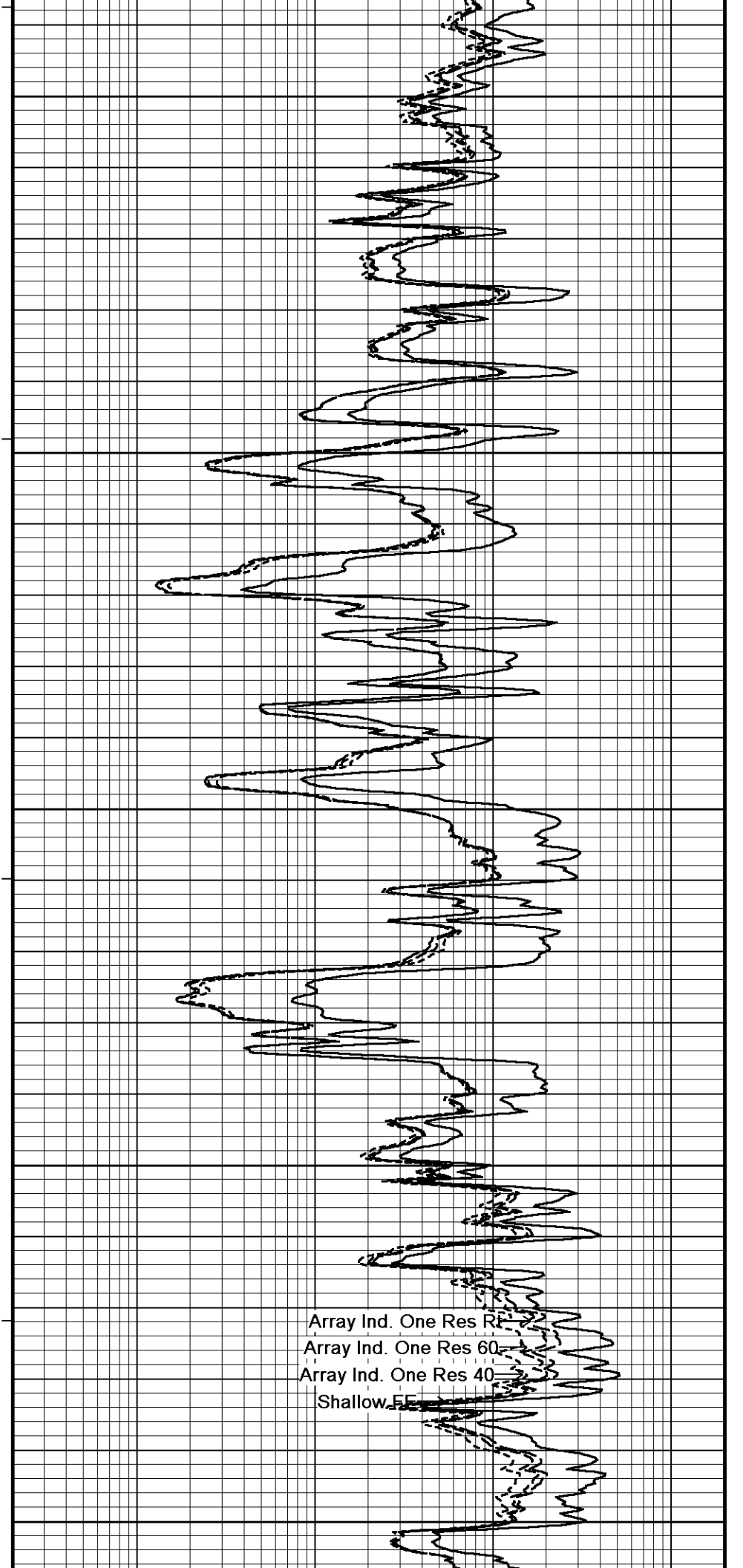
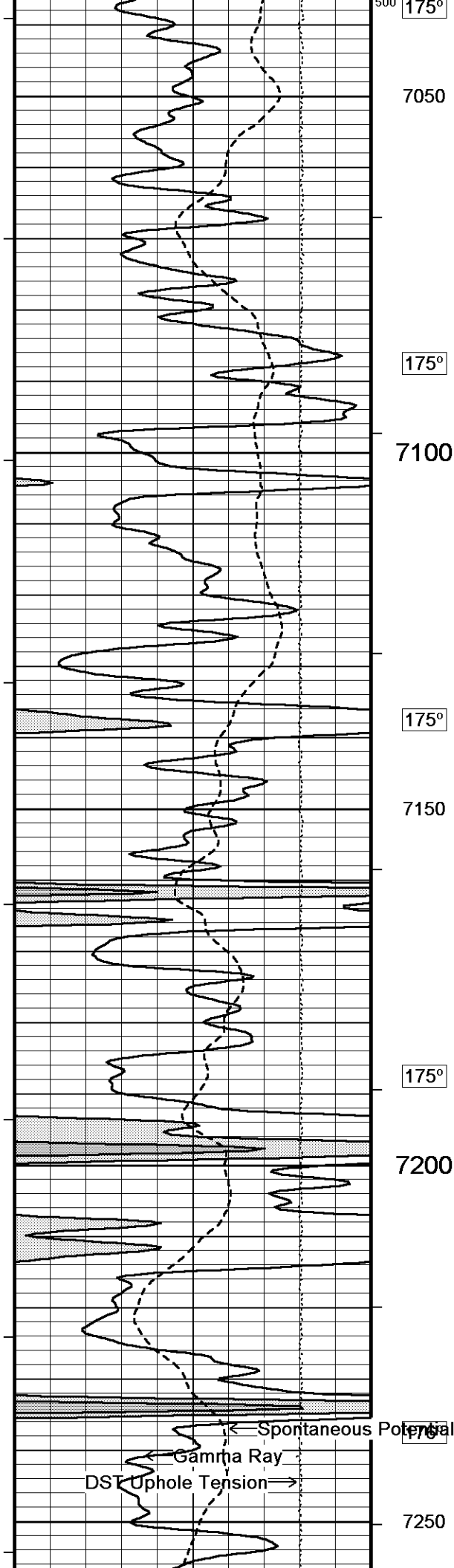


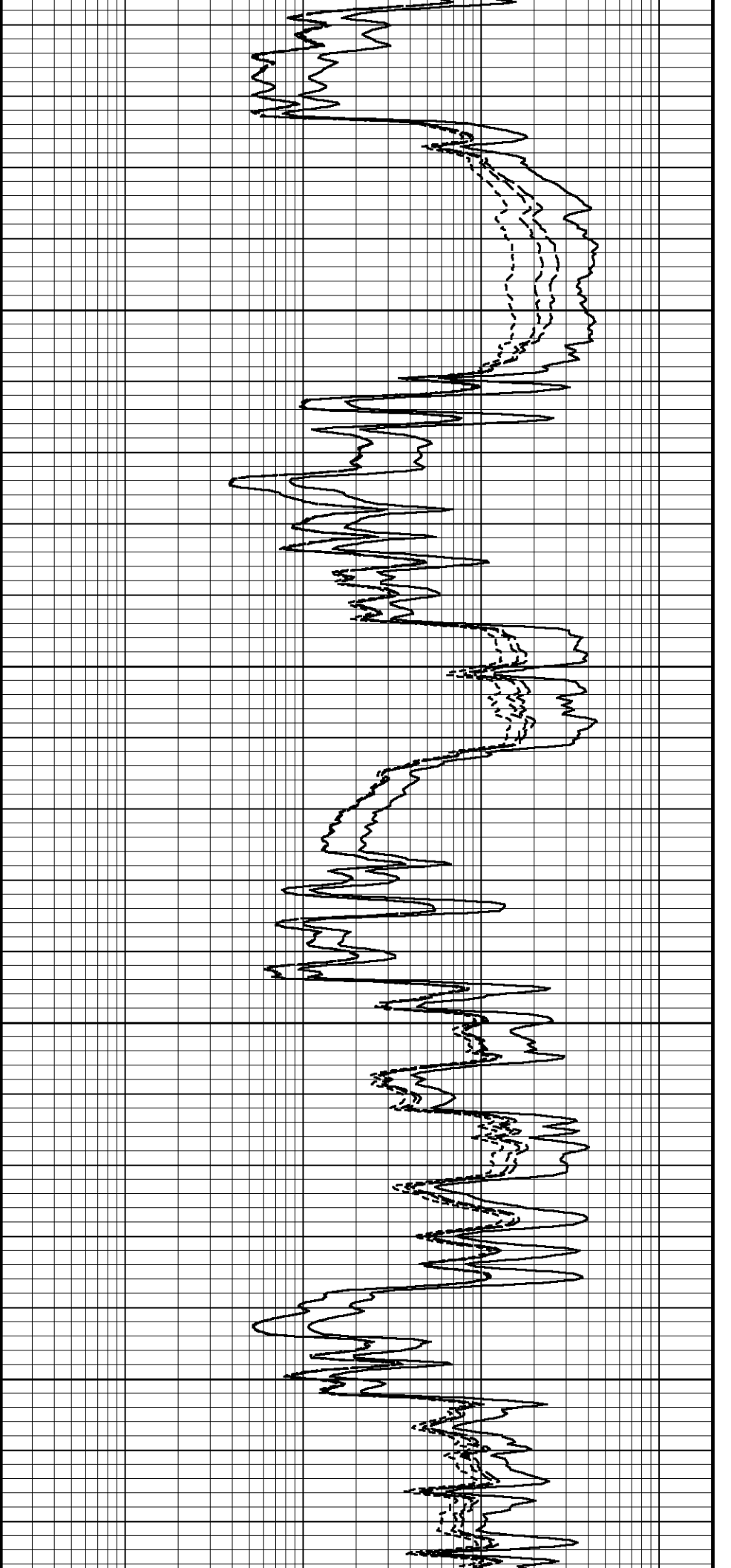
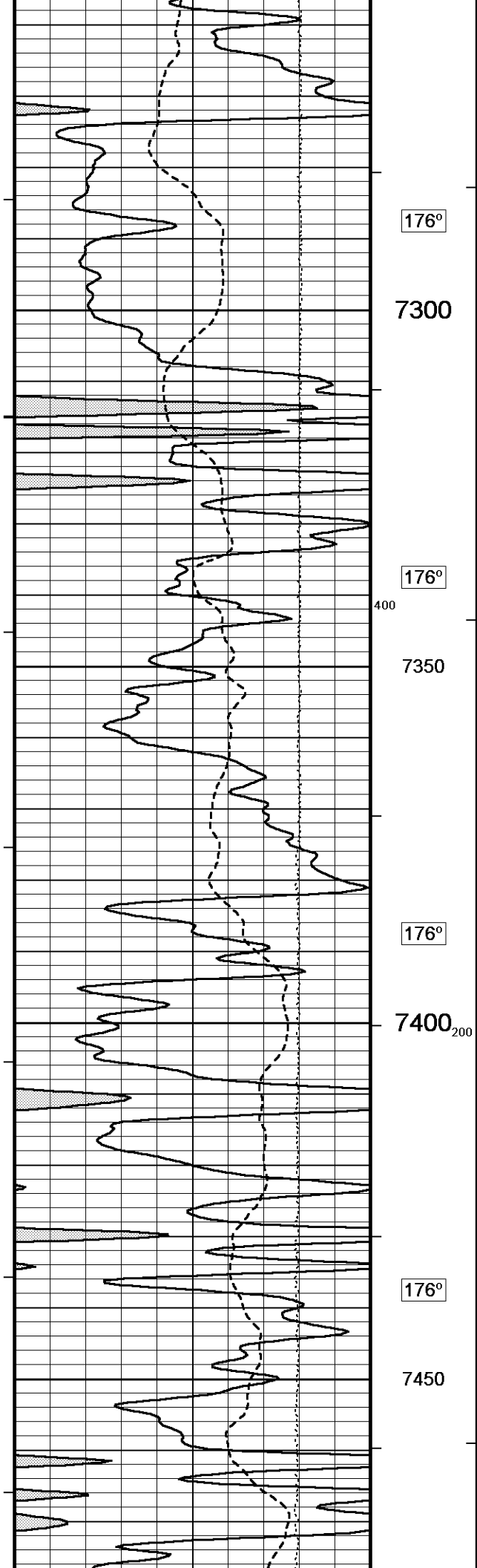


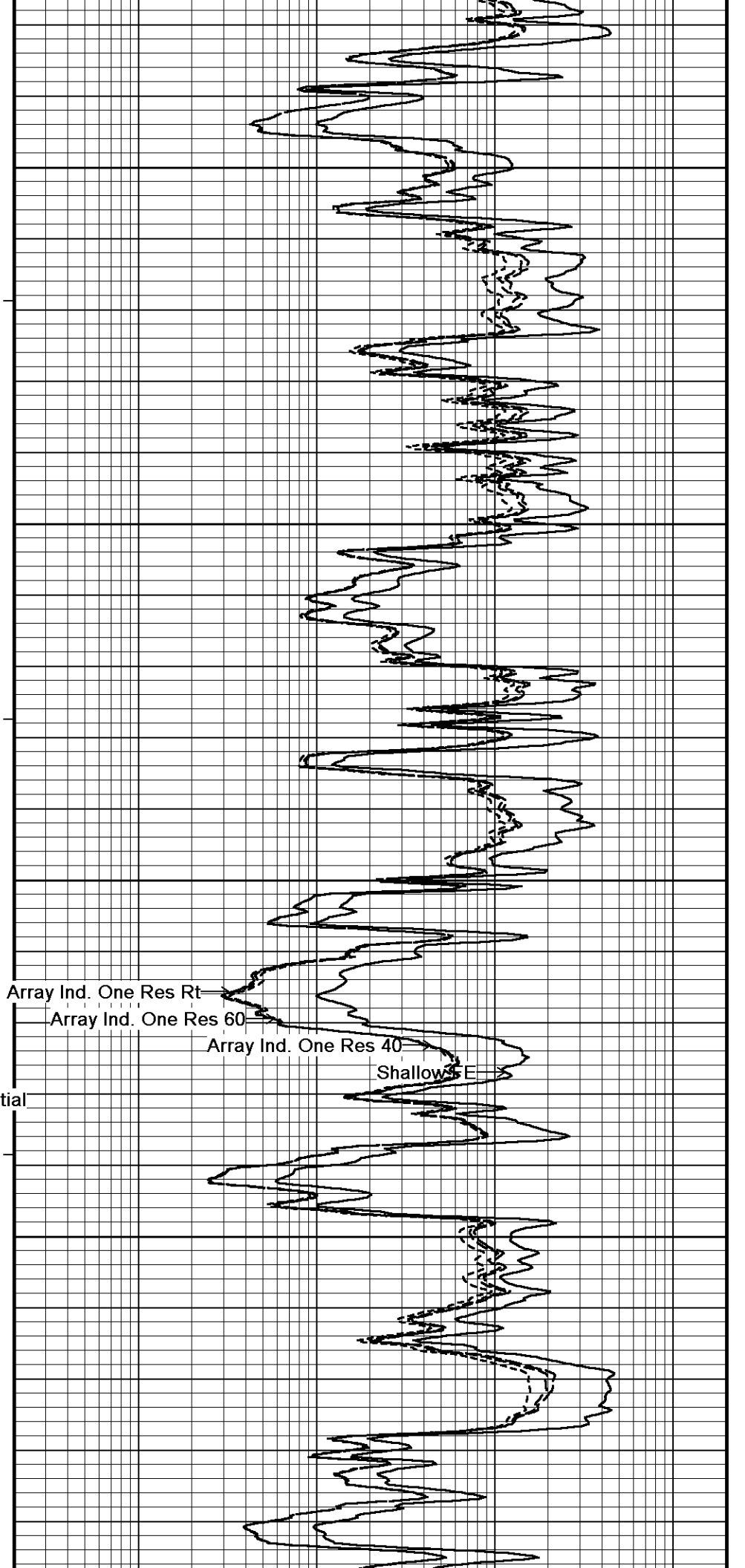
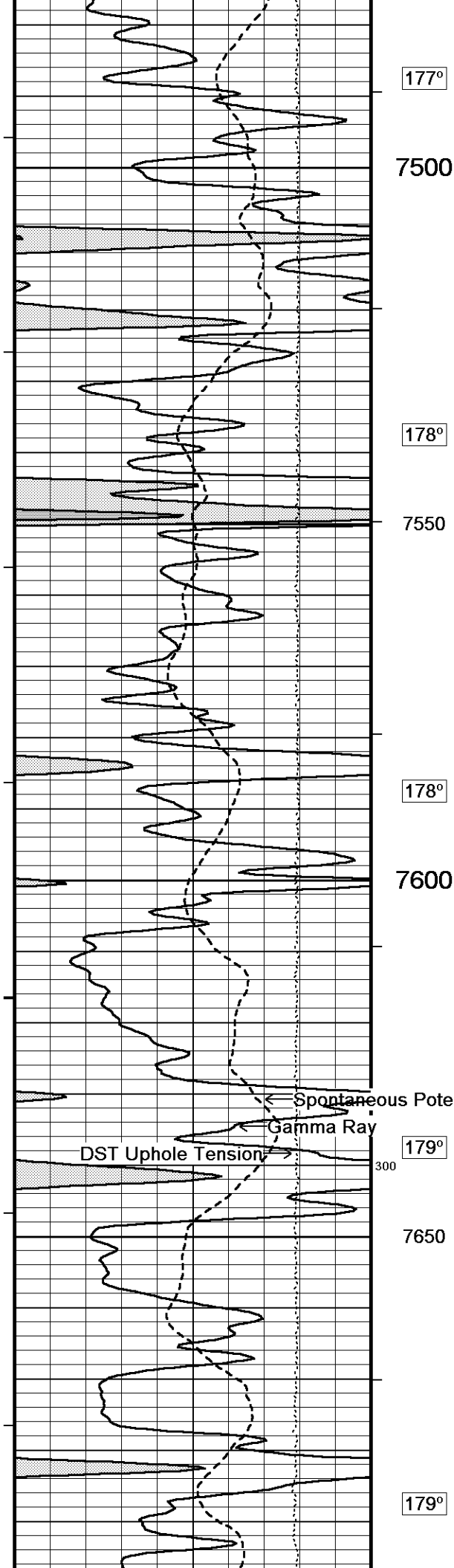


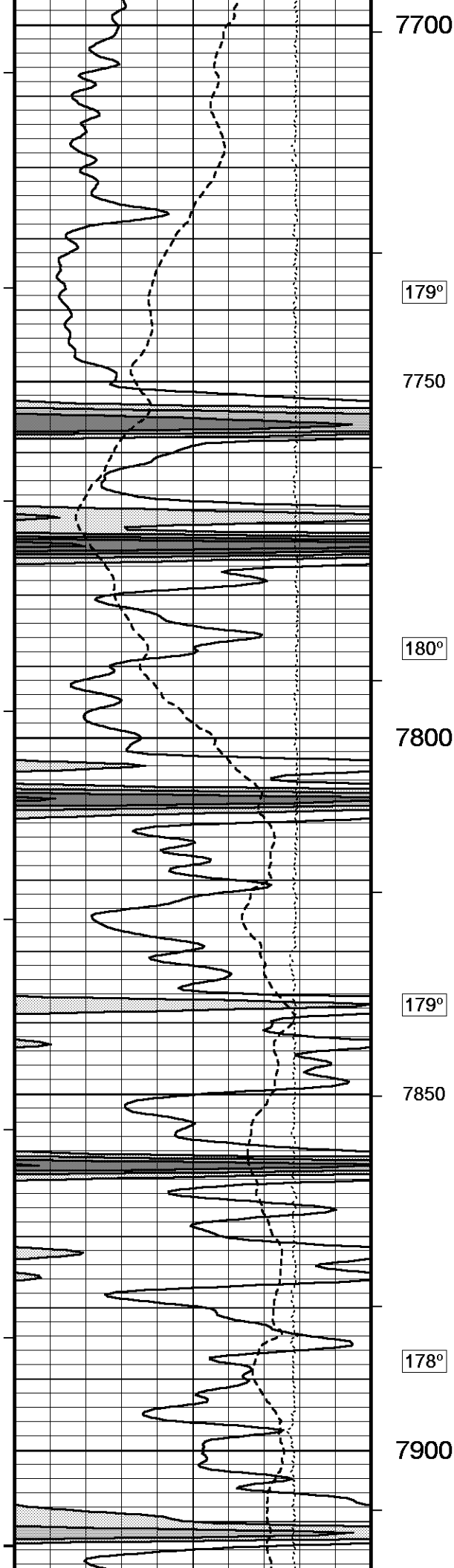












7700

179°

7750

180°

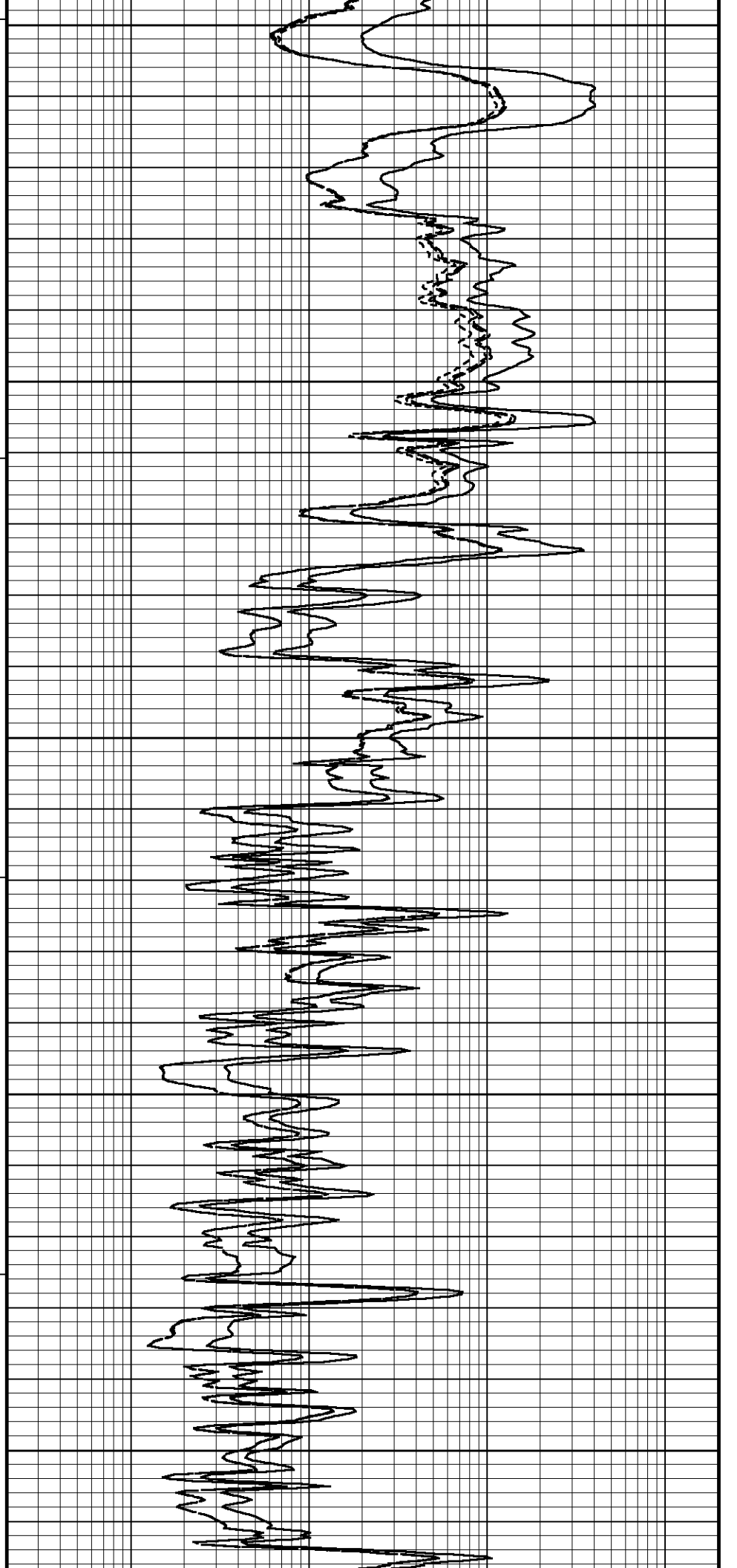
7800

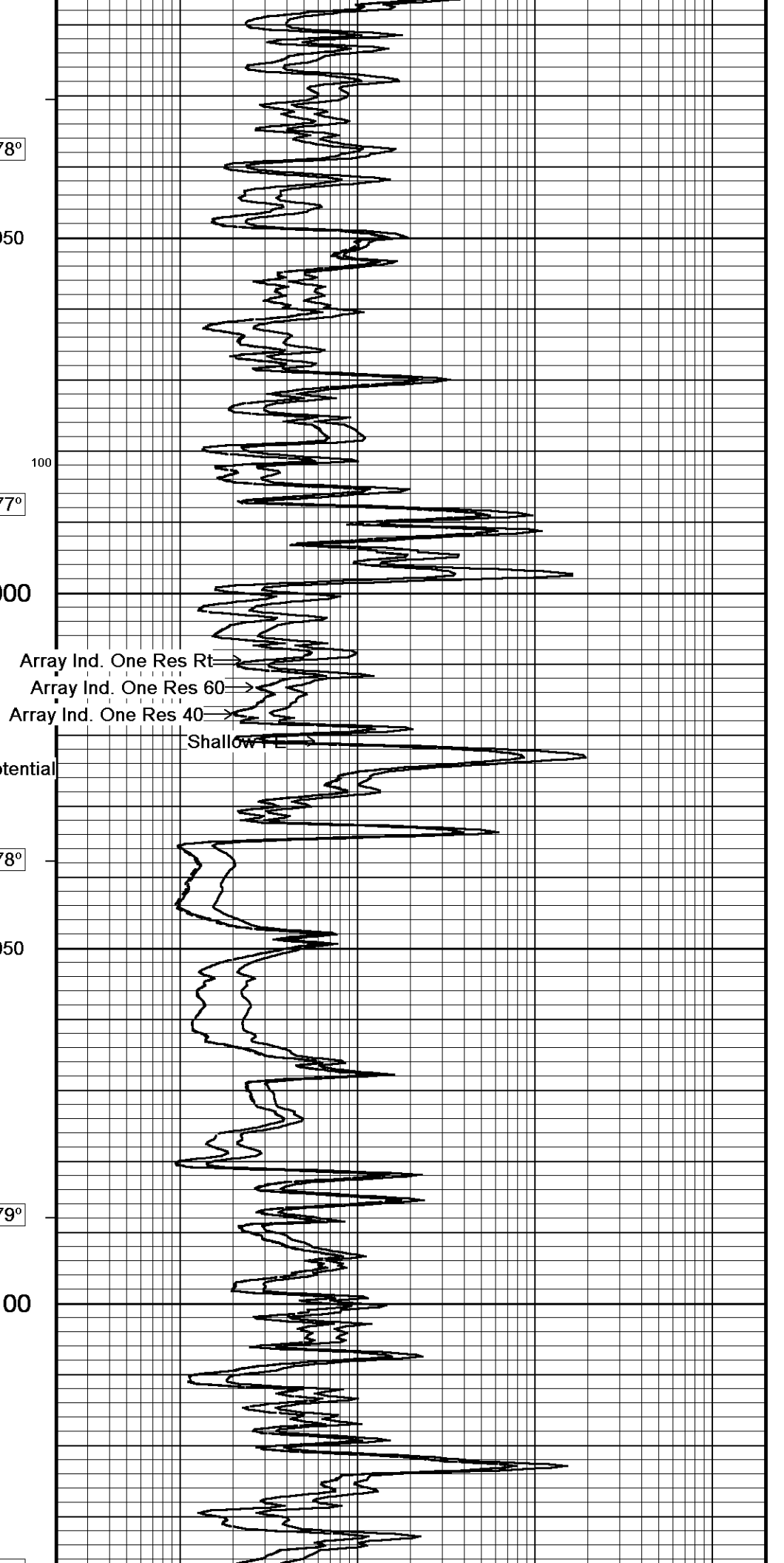
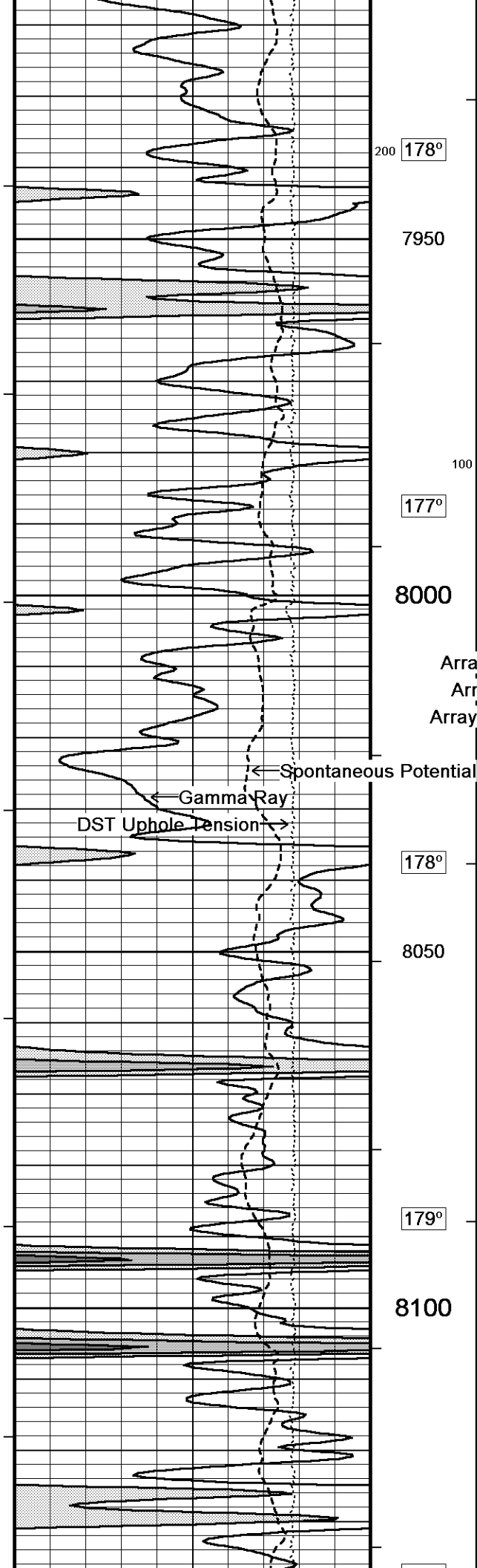
179°

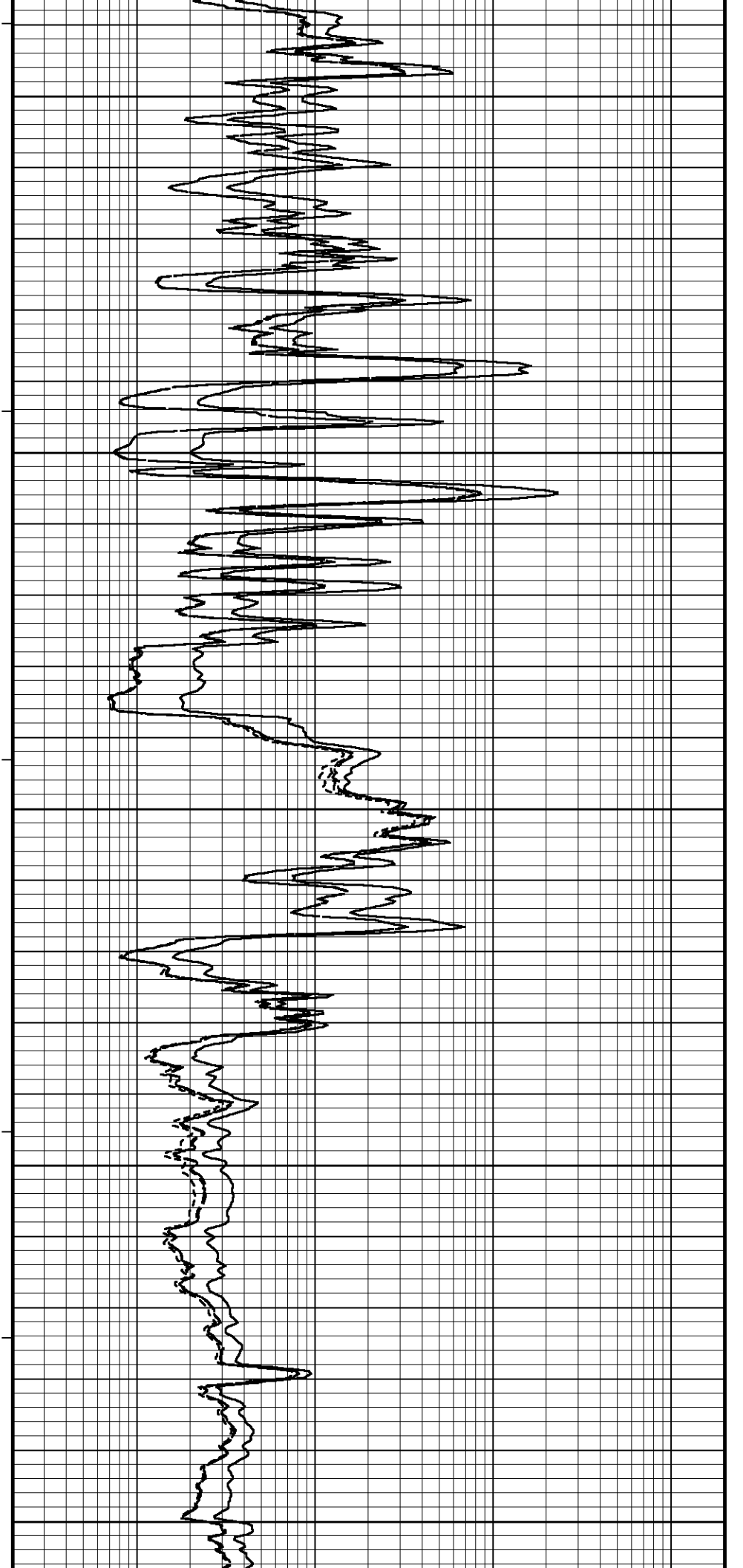
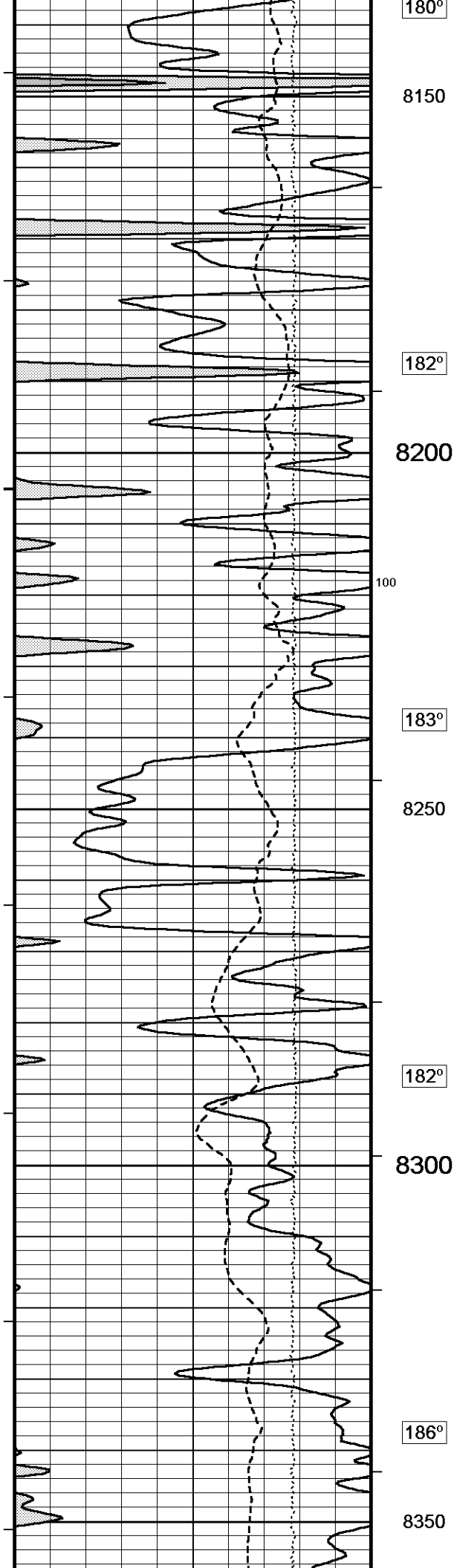
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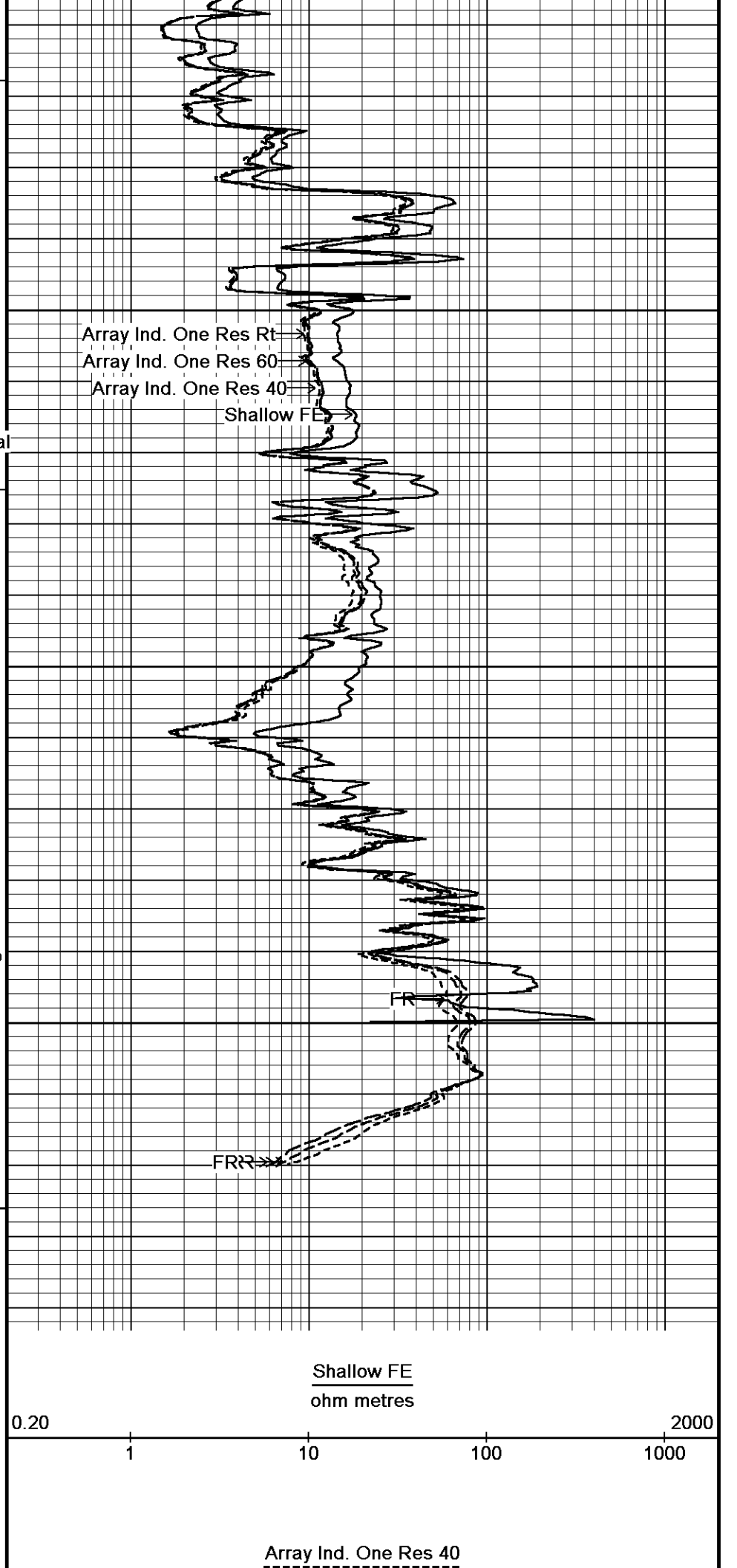
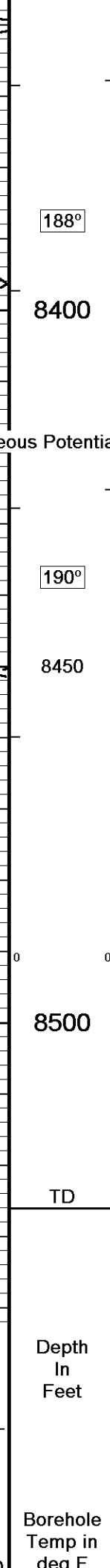
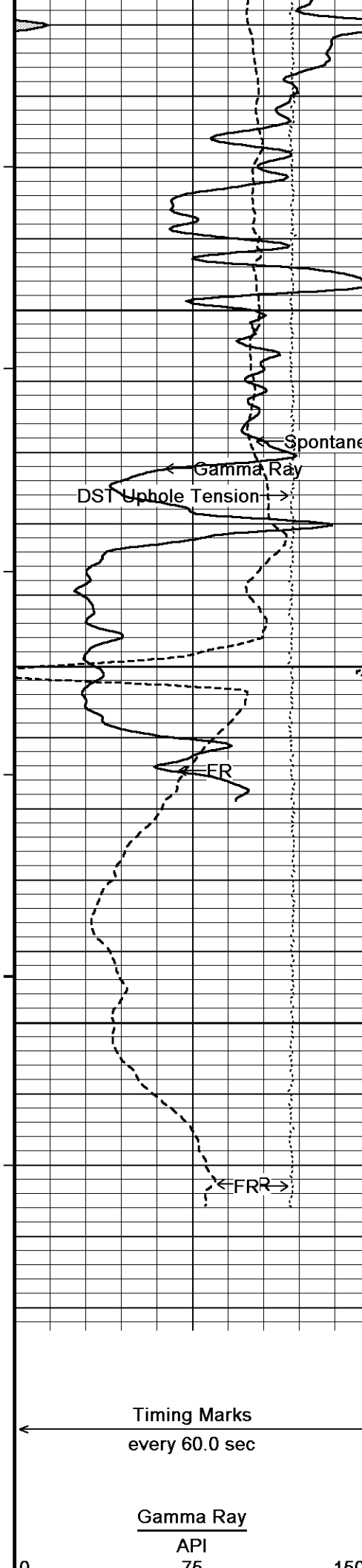
178°

7900









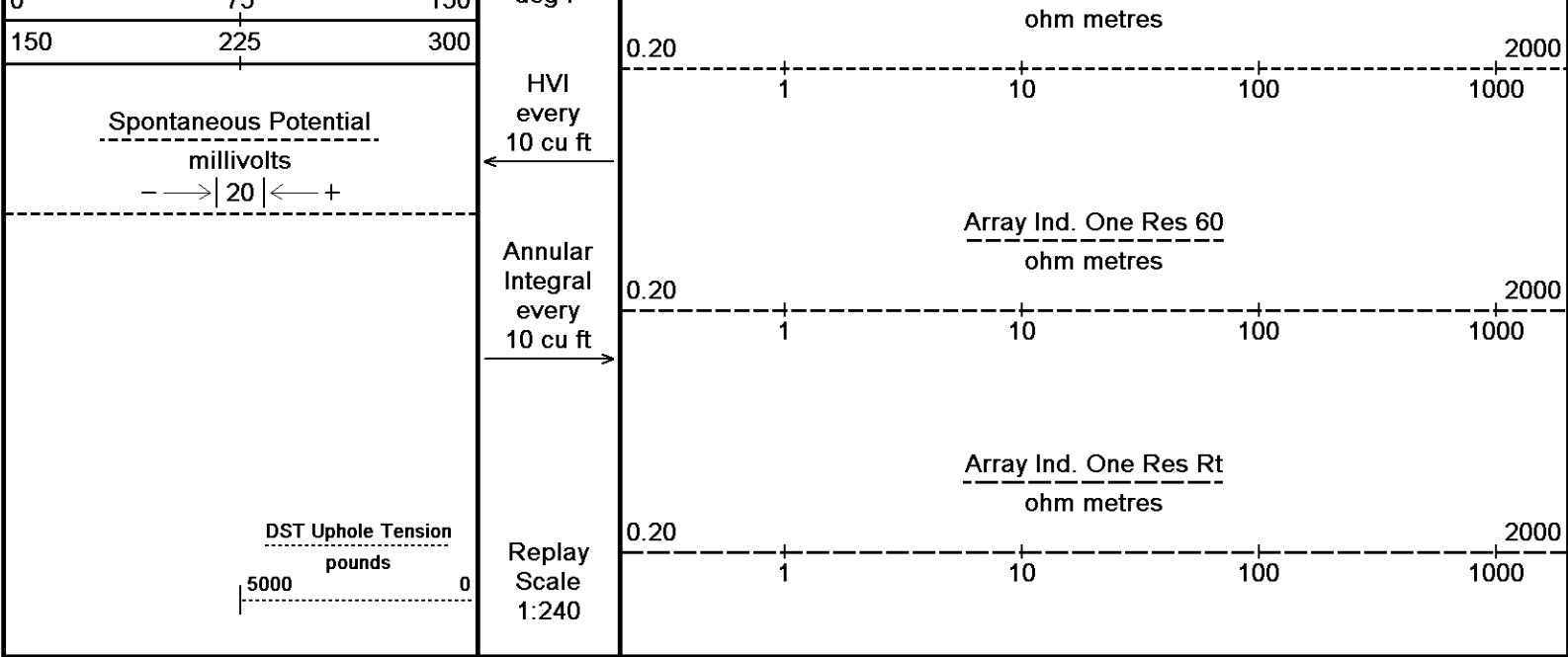
Timing Marks  
every 60.0 sec

Gamma Ray  
API  
75 150

Borehole  
Temp in  
deg F

Shallow FE  
ohm metres

Array Ind. One Res 40



Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15\_002.dta  
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

Plotted on 06-SEP-2018 21:13  
Recorded on 06-SEP-2018 16:03

↑

5 INCH MAIN

↑

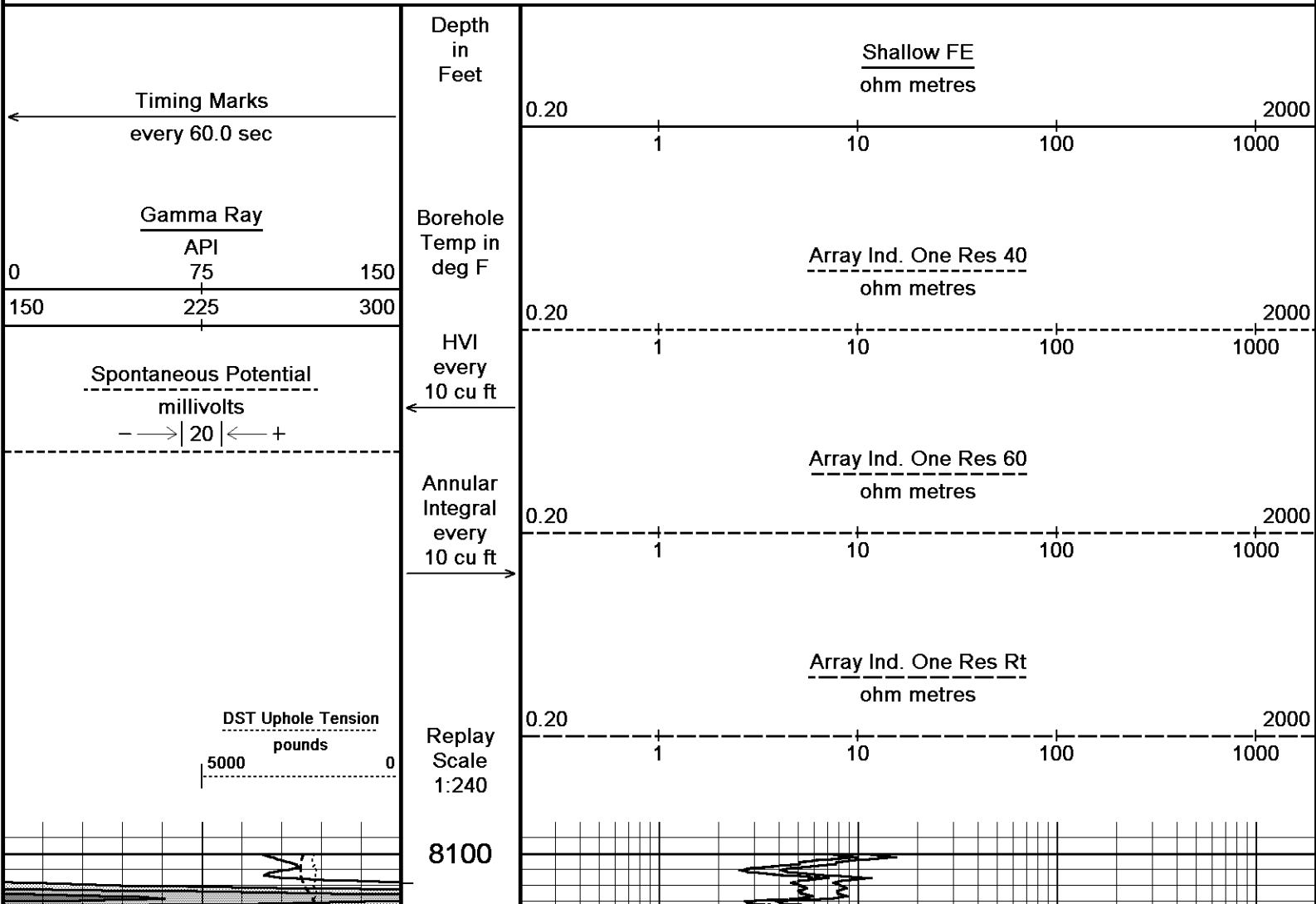
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REPEAT SECTION

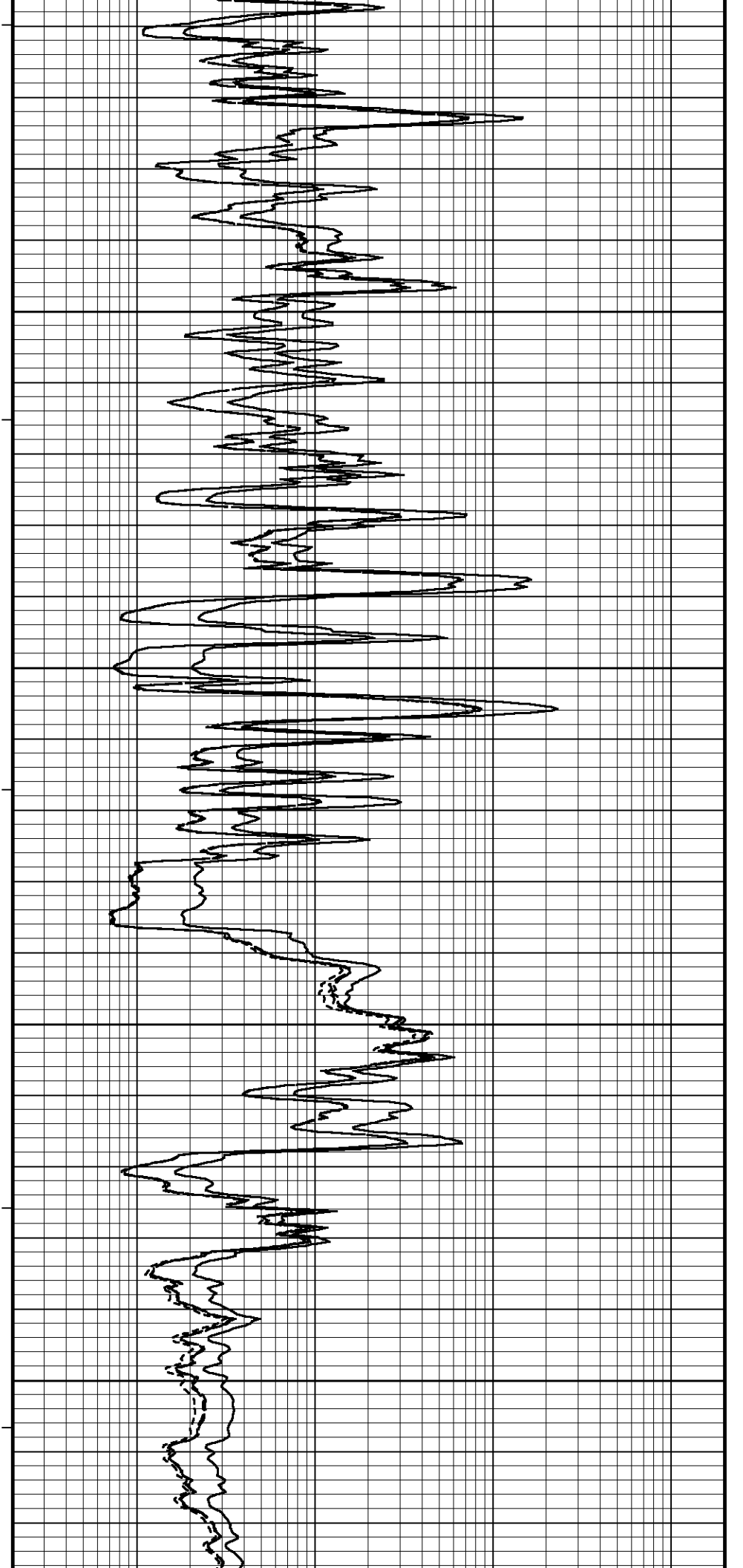
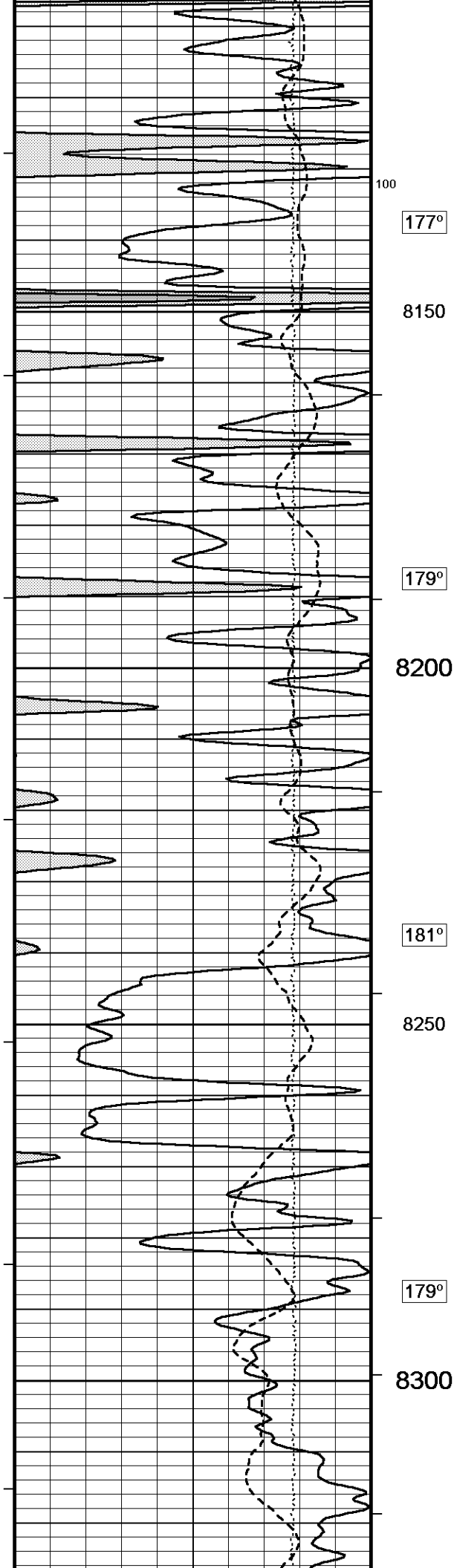
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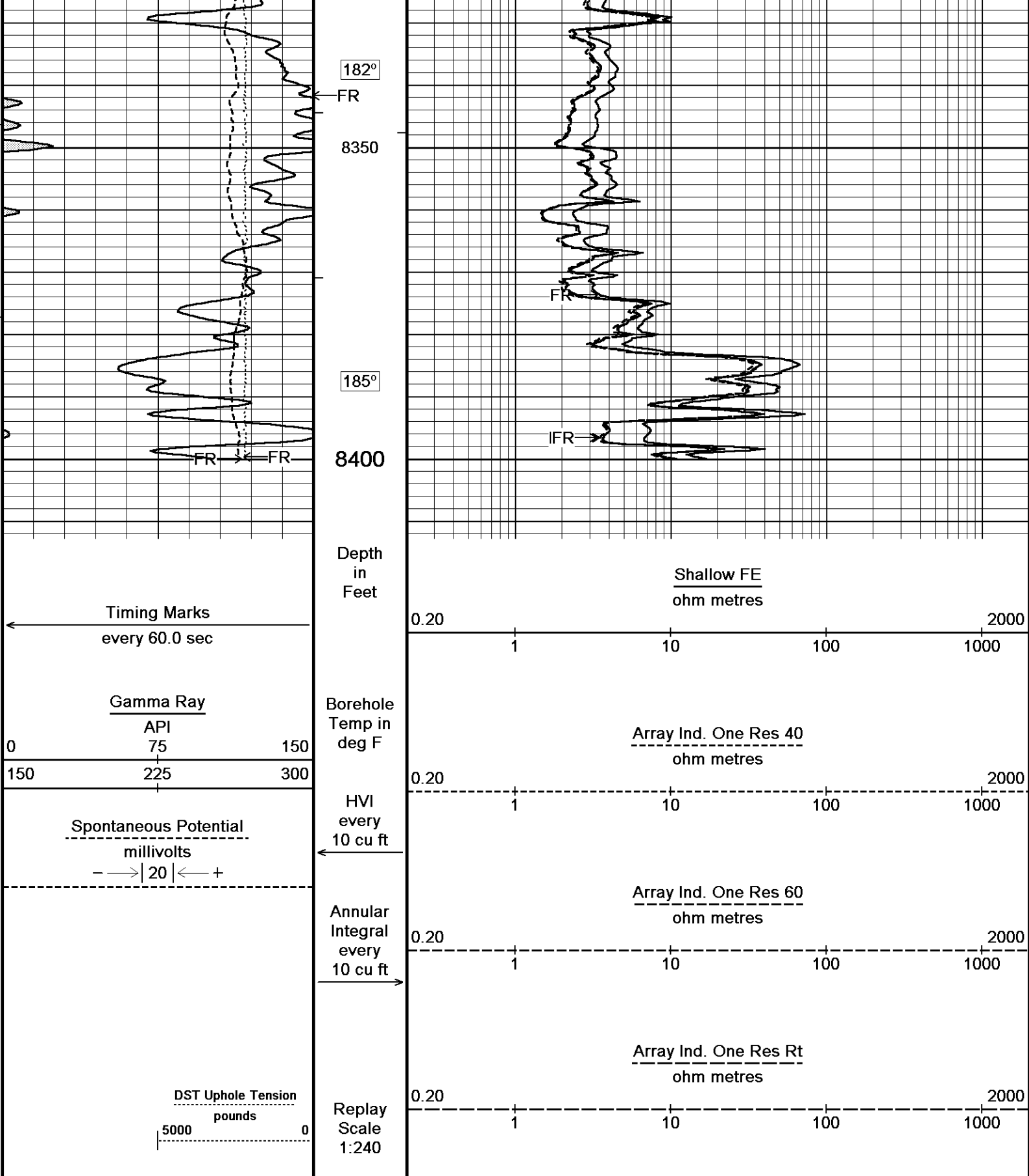
Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15\_001.dta  
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

Plotted on 06-SEP-2018 21:13  
Recorded on 06-SEP-2018 15:38









Depth Based Data - Maximum Sampling Increment 10.0cm  
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15\_001.dta  
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

Plotted on 06-SEP-2018 21:13  
Recorded on 06-SEP-2018 15:38

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION  
C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15\_001.dta

## General Parameters

Mud Resistivity	0.800	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. Two Res Rt
RWA Constant A	0.620
RWA Constant M	2.150
SW/APOR Tool Source	0.000

## Down-hole Tension Calibration SMS 0

Field Calibration on 06-SEP-2018 14:13

Reading No	Measured	Calibrated (lbs)
1	14944.57	0.00
2	15736.14	527.00

## Gamma Calibration MCG-D.A 246

Field Calibration on 06-SEP-2018,04:31

	Measured	Calibrated (API)
Background	107	75
Calibrator (Gross)	763	531
Calibrator (Net)	656	456

## Gamma Calibration Tolerances MCG-D.A 246

Ratio	1.438	<div> <div>1.40</div> <div>1.475</div> <div>1.55</div> </div>	Counts/API
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## Gamma Constants MCG-D.A 246

Last Edited on 06-SEP-2018,13:19

Gamma Calibrator Number	MCGGRCC141	
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.A 246

Field Calibration on 01-AUG-2018,13:29

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	212.00	212.00

## High Resolution Temperature Constants MCG-D.A 246

Last Edited on 07-JUN-2018,10:42

Pre-filter Length	11
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## SP Calibration MCG-D.A 246

Field Calibration on 01-AUG-2018,13:35

	Measured	Calibrated (mV)
Reference 1	103.5	100.0
Reference 2	-96.9	-100.1

## Micro Normal and Micro Inverse Calibration MMR-B.A 91

Base Calibration on 02-SEP-2018,10:16

Field Check on 06-SEP-2018,04:26

	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Micro Normal	10.0 49.5	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	94.2	94.2
Micro Inverse	62.4	62.4

### Micro Normal & Micro Inverse Calibration Tolerance MMR-B.A 91

Micro Normal Res. 1	10.0	<div><div></div><div></div><div></div></div>	ohm	Micro Normal Res. 2	49.5	<div><div></div><div></div><div></div></div>	ohm
Micro Inverse Res. 1	9.9	<div><div></div><div></div><div></div></div>	ohm	Micro Inverse Res. 2	49.4	<div><div></div><div></div><div></div></div>	ohm
Micro Normal Base Check	94.2	<div><div></div><div></div><div></div></div>	ohm-m				
Micro Inverse Base Check	62.4	<div><div></div><div></div><div></div></div>	ohm-m				
Micro Normal Field Check	94.2	<div><div></div><div></div><div></div></div>	ohm-m				
Micro Inverse Field Check	62.4	<div><div></div><div></div><div></div></div>	ohm-m				

### Micro Normal and Micro Inverse Constants MMR-B.A 91

Last Edited on 13-APR-2018,05:04

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 MMR-B.A 91

Base Calibration on 02-SEP-2018,10:13  
Field Calibration on 06-SEP-2018,04:26

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14044	5.98
2	17381	7.97
3	20681	9.86
4	24528	11.92
5	0	0.00
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.99	7.97

### Caliper Calibration Tolerances MMR-B.A 91

Short Arm Field Cal.	7.99	<div><div></div><div></div><div></div></div>	in
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### Micro-Resistivity Caliper Constants MMR-B.A 91

Sonde Configuration	Resistivity Mode
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### Micro Laterolog Calibration MMR-B.A 91

Base Calibration on 31-DEC-1999 00:00  
Field Check on 31-DEC-1999 00:00

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	0.0
Base Calibration	Measured	Calibrated (ohm-m)
	Ref 1    Ref 2	Ref 1    Ref 2
	0.0      0.0	0.0      0.0
	Base Check (ohm-m)	Field Check (ohm-m)
	0.0	0.0

### Micro Laterolog Constants MMR-B.A 91

Pad Type	6 in Solid Nylon B23059
Standoff Offset	0.0000 inches
Micro Laterolog K Factor	0.0128
Micro Laterolog Rm K Factor	N/A

### Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value
Mud Cake Thickness	0.4000 inches
Mud Cake Thickness Caliper	

Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	20.00	Degrees C
Mud Cake Resistivity Source	Constant Value	
Temp. for Rmc Corr.	MCG External Temperature	

## Neutron Calibration MDN-B.A 292

Base Calibration on 02-SEP-2018,10:44  
Field Check on 06-SEP-2018,04:24

### Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2951	93	3714	110
Ratio	31.695		33.764	

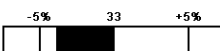
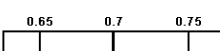
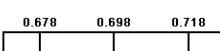
### Field Calibrator at Base

	Calibrated (cps)
	2190 3136
Ratio	0.698

### Field Check

	Calibrated (cps)
	2180 3125
Ratio	0.698

## Neutron Calibration Tolerances MDN-B.A 292

Ratio	31.695	
Base Check	0.698	
Field Check	0.698	

## Neutron Constants MDN-B.A 292

Last Edited on 06-SEP-2018,13:20

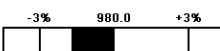
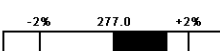
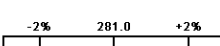
Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Legacy	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

## FE Calibration MFE-A.A 135

Base Calibration on 02-SEP-2018,10:12  
Field Check on 06-SEP-2018,04:16

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.9	126.8
Base Check		281.0
Field Check		281.1

## FE Calibration Tolerances MFE-A.A 135

Reference 2	962.9		ohm
Base Check	281.0		ohm-m
Field Check	281.1		ohm-m

## FE Constants MFE-A.A 135

Last Edited on 06-SEP-2018,13:20

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

## Sonic Constants MSS-C.K 319

Last Edited on 08-JUL-2018,09:57

Maximum Boundary Contrast	70.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	0.00	micro-sec
MX3FT	1500.00	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft

Sonde Mode	Compensated
Hole Type	Open Hole

## Sonde Parameters

	Measured	Calibrated
Offset		0.0000
Free Pipe	0.0000	

## Peak Amplitude Source

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

## Processed Fixed Gate Parameters

Waveform Used For Processing	N/A		
Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00

## Full Waveform Parameters

Use 3' Waveform to derive TR	No
Use 4' Waveform to derive TR	No
Use 5' Waveform to derive TR	No
Use 6' Waveform to derive TR	No
3' Waveform Discriminator Level	0.30 mV
4' Waveform Discriminator Level	0.30 mV
5' Waveform Discriminator Level	0.15 mV
6' Waveform Discriminator Level	0.15 mV

Waveform Discriminator Filter	Not Applied
Semblance Window Width	150.00 micro-sec
Semblance Processing Enabled	Yes
Tracking Boxes Enabled In Processing	Yes

## High Resolution Temperature Calibration MAI-A.A 111


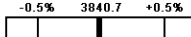
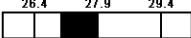
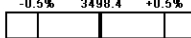
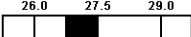
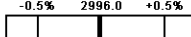
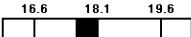
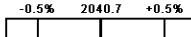
Field Calibration on 01-AUG-2018,13:29

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

High Resolution Temperature Constants MAI-A.A 111	Last Edited on 26-JUN-2014,15:06
Pre-filter Length	11

Induction Calibration MAI-A.A 111				Factory Loop Calibration 09-AUG-2018 16:18			
				Field Check on 06-SEP-2018,04:15			
Factory Loop Calibration							
High Conductivity Reference Resistor		3.3	ohm				
Low Conductivity Reference Resistor		333.3	ohm				
	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration		
Array	Low	High	Low	High	Gain	Offset	
1 (near)	17.6	473.6	9.3	966.2	0.000	0.0	
2	6.4	385.9	7.6	821.4	0.000	0.0	
3	3.2	264.0	5.2	566.0	0.000	0.0	
4 (far)	2.1	135.5	2.6	279.2	0.000	0.0	
Array Temperature		23.0	Deg F				
Tool Checks							
	Factory Reference (mmho/m)		Before Survey (mmho/m)				
Array	Low	High	Low	High			
1 (near)	9.8	3840.7	8.8	3839.2			
2	27.9	3498.4	27.0	3497.5			
3	27.5	2996.0	26.7	2994.9			
4 (far)	18.1	2040.7	17.6	2040.3			
Array Temperature		87.9		85.9	Deg F		

Induction Check Tolerances MAI-A.A 111							
Low Array 1	8.8		mmho/m	High Array 1	3839.2		mmho/m
Low Array 2	27.0		mmho/m	High Array 2	3497.5		mmho/m
Low Array 3	26.7		mmho/m	High Array 3	2994.9		mmho/m
Low Array 4	17.6		mmho/m	High Array 4	2040.3		mmho/m

Induction Constants MAI-A.A 111				Last Edited on 06-SEP-2018,13:20	
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		8.0000			
Stand-off Fin Angle		45.00		degrees	
Stand-off Fin Width		0.5000		inches	
Rm Source		Global Value: Temperature Corrected			
Temp. for Rm Corr.		Borehole Temp. Unfilt.			
Borehole Correction Method		Default			
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	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-C.A 216

Base Calibration on 02-SEP-2018,10:42  
Field Calibration on 06-SEP-2018,04:16

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14688	3.99
2	23495	5.98
3	32176	7.97
4	40480	9.86
5	49713	11.92
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.97	7.97

#### Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	7.97	<div><div>7.57</div><div>7.97</div><div>8.37</div></div>	in
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#### Photo Density Calibration MPD-C.A 216

Base Calibration on 02-SEP-2018,10:27  
Field Check on 06-SEP-2018,04:18


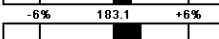
Density Calibration				
Base Calibration		Measured		Calibrated (sdu)
	Near	Far	Near	Far
Background	1002	1196		
Reference 1	49599	24164	59556	30836
Reference 2	19816	2269	24941	2541
Field Check at Base				
	1002.2	1196.2		
Field Check				
	1009.6	1208.8		
PE Calibration				
Base Calibration		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background	183	902		
Reference 1	21103	49447	0.431	0.371
Reference 2	5778	19707	0.298	0.272
Field Check at Base				
	183.1	901.7		
Field Check				
	187.2	908.2		


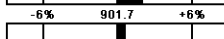
#### Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.58	<div><div>-5%</div><div>2.52</div><div>+5%</div></div>
PE Calibration	0.125	<div><div>0.089</div><div>0.110</div><div>0.131</div></div>

Far Density Ratio	21.41	<div><div>-5%</div><div>21.00</div><div>+5%</div></div>
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Near Den. Field Check 1009.6   
 PE WS Field Check 187.2 

Far Den. Field Check 1208.8   
 PE WH Field Check 908.2 

## Density Constants MPD-C.A 216

Last Edited on 06-SEP-2018,13:20

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.13	gm/cc
Mud Density Type		
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Precision Enhanced Density Processing	Applied	

Matrix Density (gm/cc)	Depth (ft)
2.71	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

## DOWNHOLE EQUIPMENT

C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15\_001.dta

Cablehead, 11 pin  
 CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor  
 SHA-J.B 595 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma  
 MCG-D.A 246 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity  
 MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

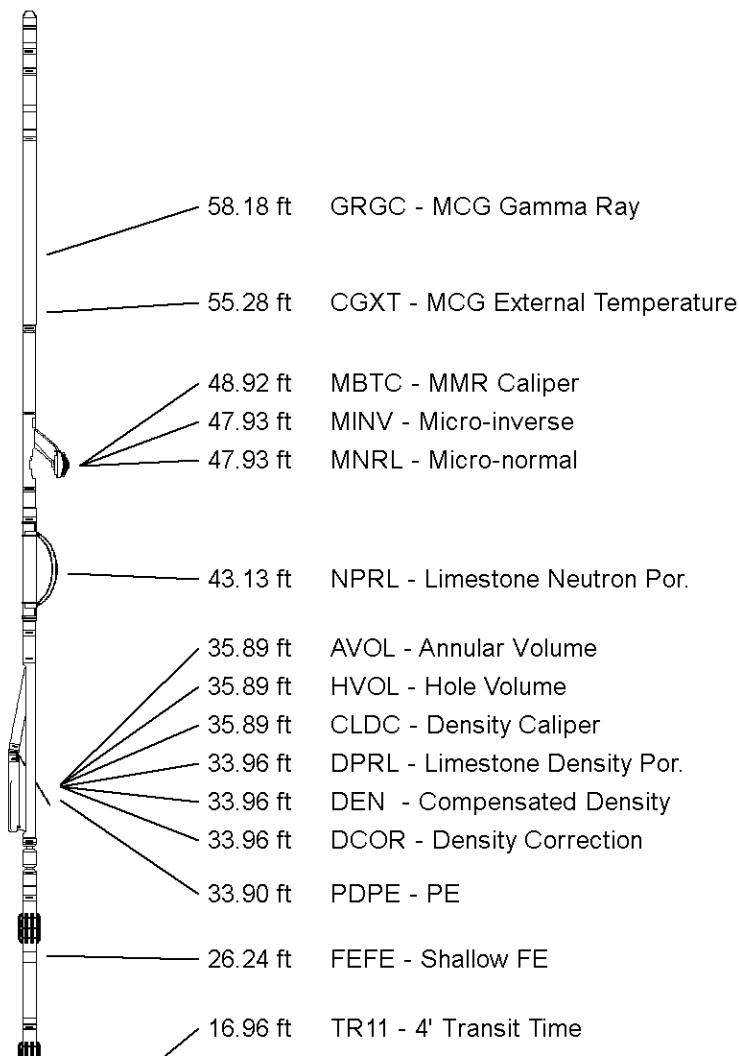
Compact Neutron  
 MDN-B.A 292 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper  
 MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in

Compact Knuckle Joint  
 SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric  
 MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.240 in

Compact Sonic

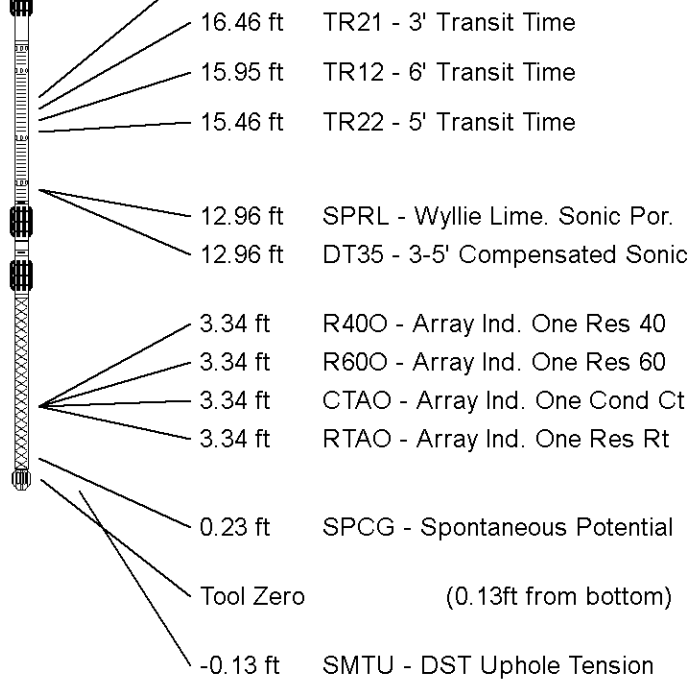


Compact Sonic  
MSS-C.K 319 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction

MAI-A.A 111 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 GRAND MESA OPERATING COMPANY  
WELL BETTY #1-15  
FIELD WILDCAT  
PROVINCE/COUNTY LINCOLN  
COUNTRY/STATE U.S.A. / COLORADO

Elevation Kelly Bushing	5484	feet	First Reading	8523.00	feet
Elevation Drill Floor	5482	feet	Depth Driller	8541.00	feet
Elevation Ground Level	5465	feet	Depth Logger	8526.00	feet



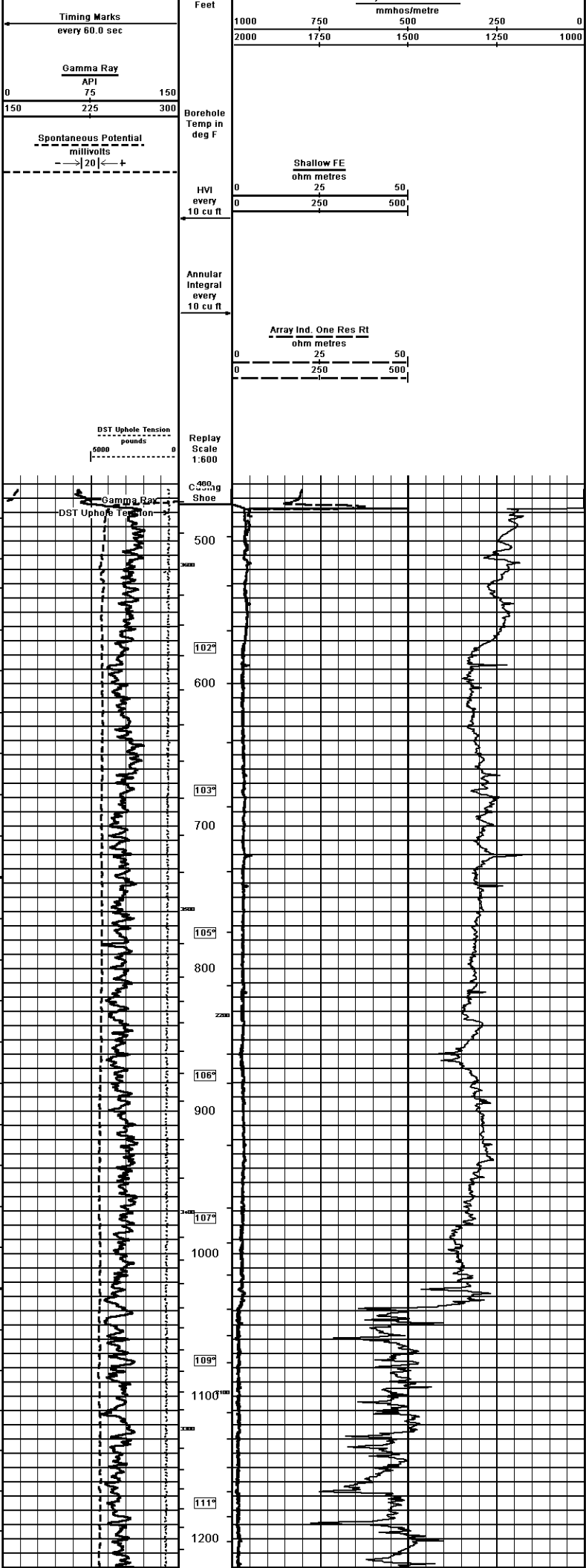
ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG

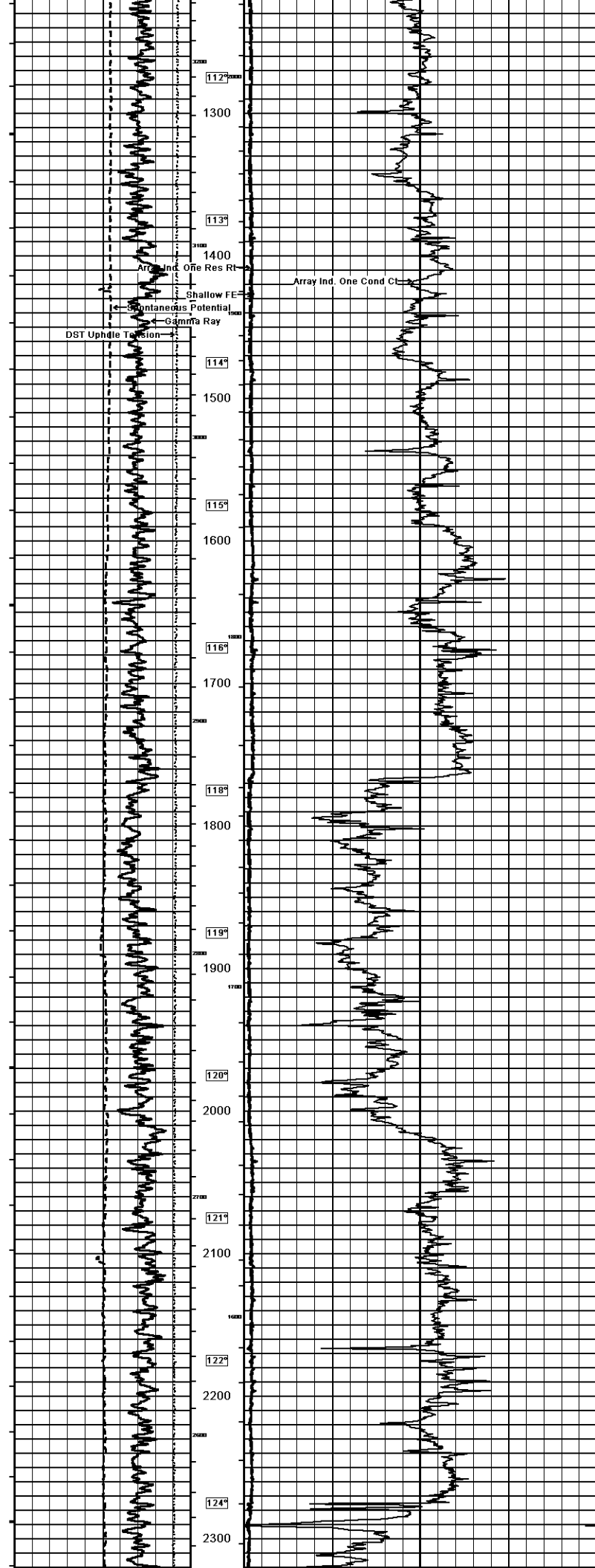
Weatherford®

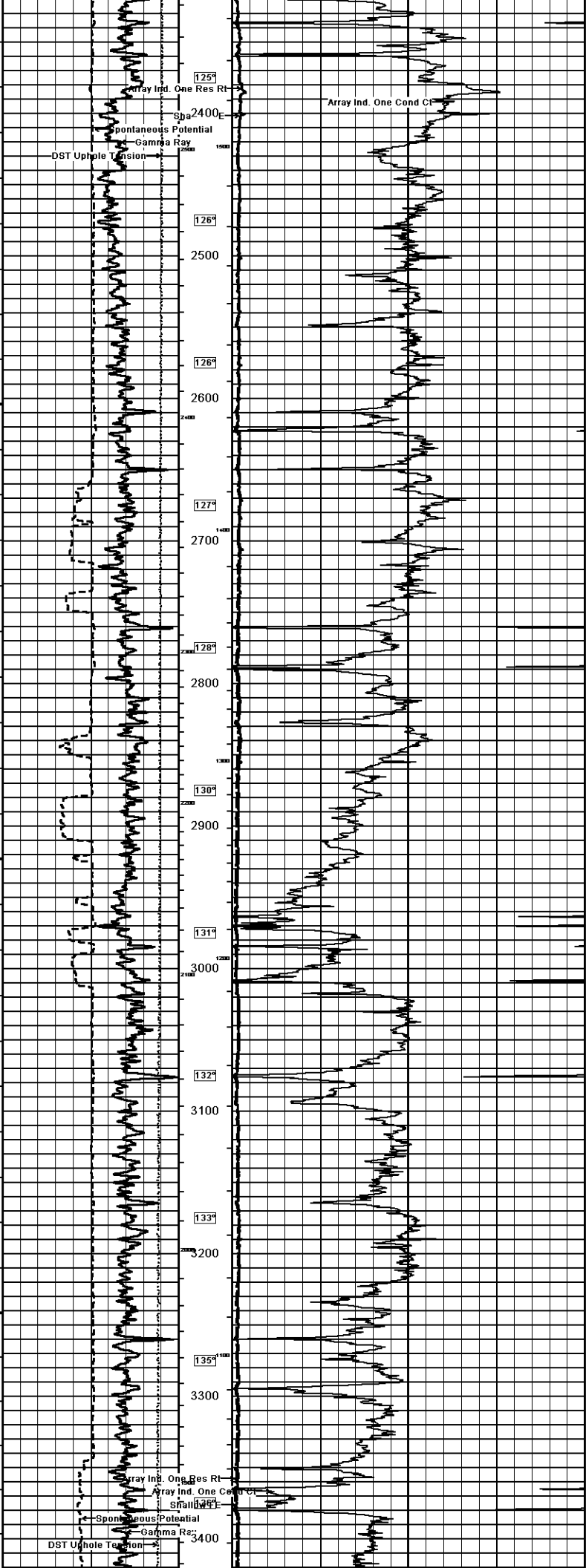
Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY	GRAND MESA OPERATING COMPANY		
WELL	BETTY #1-15		
FIELD	WILDCAT		
PROVINCE/COUNTY	LINCOLN		
COUNTRY/STATE	U.S.A. / COLORADO		
LOCATION	283, ESL & 2172, FWL		
SEC 15	TWP 7S	REC 55W	FORMER SERIES
Latitude	40.9400	Longitude	104.0000
Log Number	06-073-00750	MSS	MML
Permanent Datum G.L. Elevation 5465 feet			
Log Measured From RA, 19.00 feet above Permanent Datum			
Drilling Measured From RA			
Date	06-SEP-2018		
Run Number	ONE		
Service Order	4566-22342051		
Depth Driller	8541.00	feet	
Depth Logger	8526.00	feet	
First Reading	8523.00	feet	
Last Reading	474.00	feet	
Casing Driller	473.00	feet	
Casing Logger	474.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density/Viscosity	9.40 lb/Usq	63.00 CP	
pH/Fund Loss	9.60	7.20 ml/30min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.80 @ 75.0	ohm-m	
Rm @ Measured Temp	0.84 @ 75.0	ohm-m	
Rm @ Measured Temp	0.96 @ 75.0	ohm-m	
Source Rm @ Rm	CALC		
Rm @ BHT	0.32 @ 90.0	ohm-m	
Time Since Circulation	5 HOURS		
Max Recorded Temp	190.00	deg F	
Equipment / Base	13006	LIB	
Recorded By	ADAM STILL		
Witnessed By	GARET DINWEL		

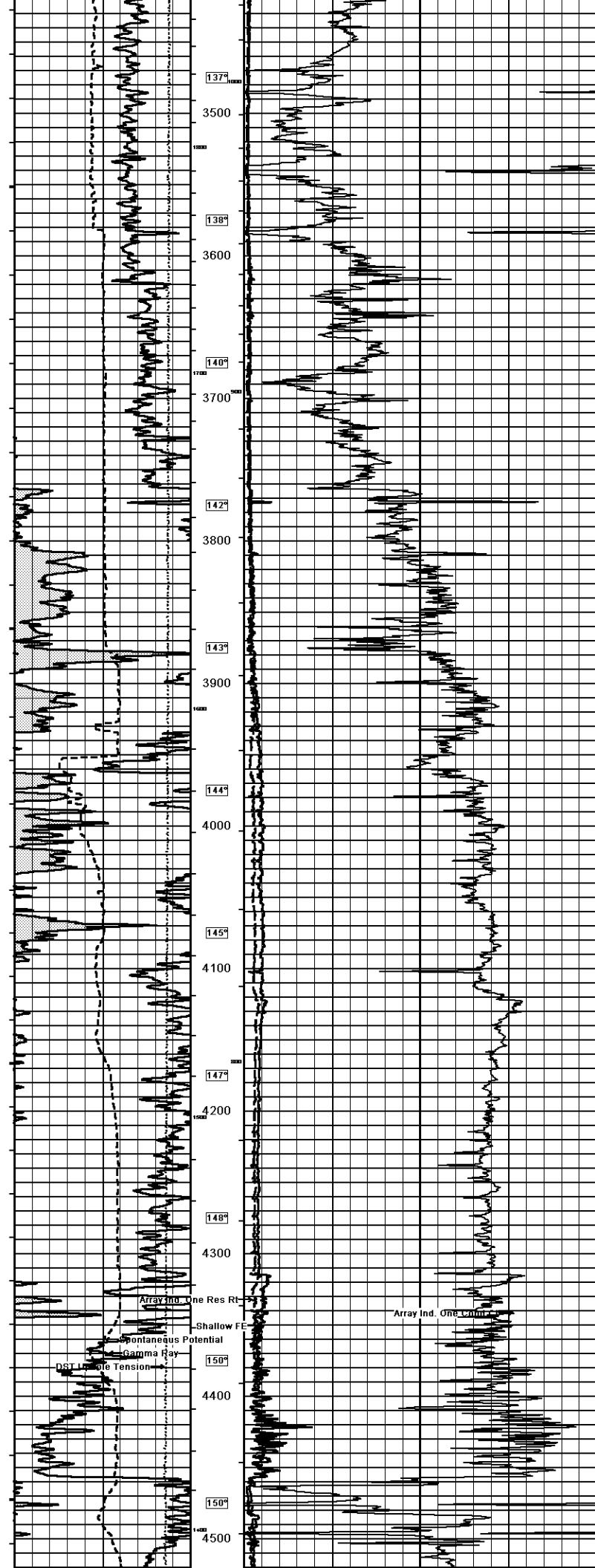
1 INCH MAIN  
Depth Based Data - Maximum Sampling Increment 10.0cm  
Plotted on 06-SEP-2018 21:13  
Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\_002.dta  
Recorded on 06-SEP-2018 16:03  
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

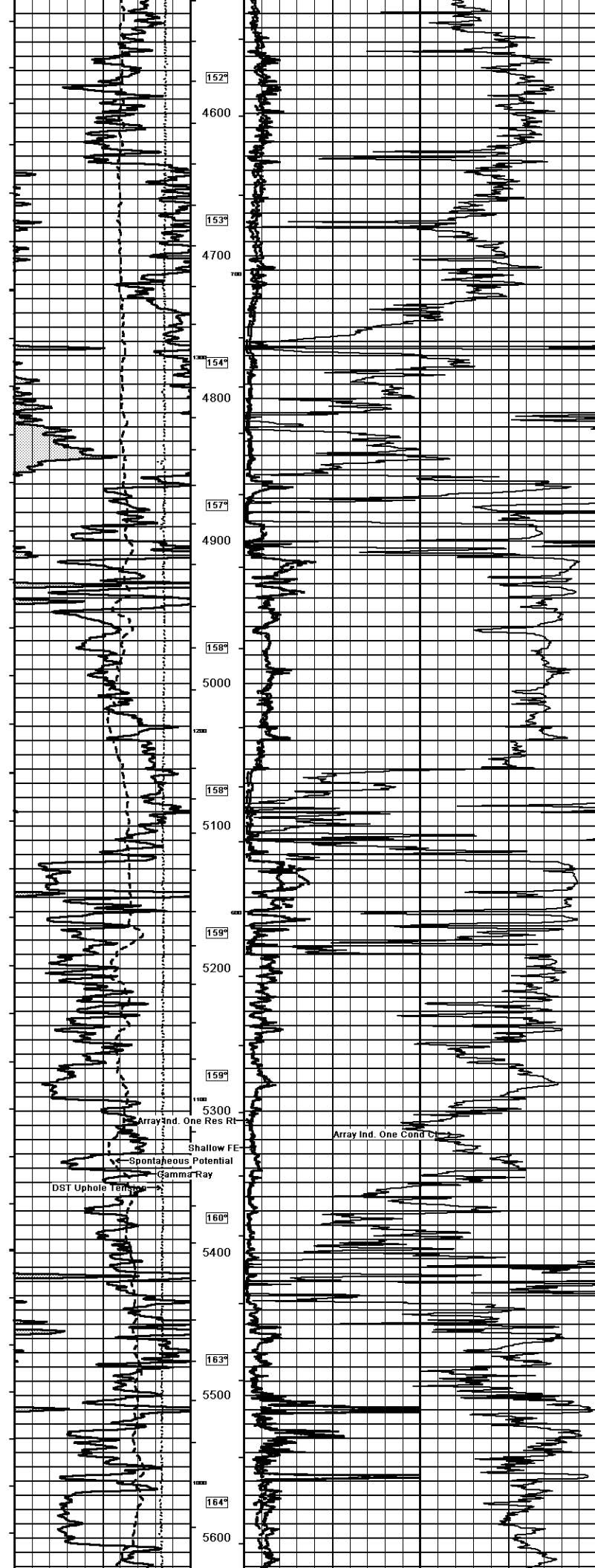
Depth In	Array Ind. One Cond Ct
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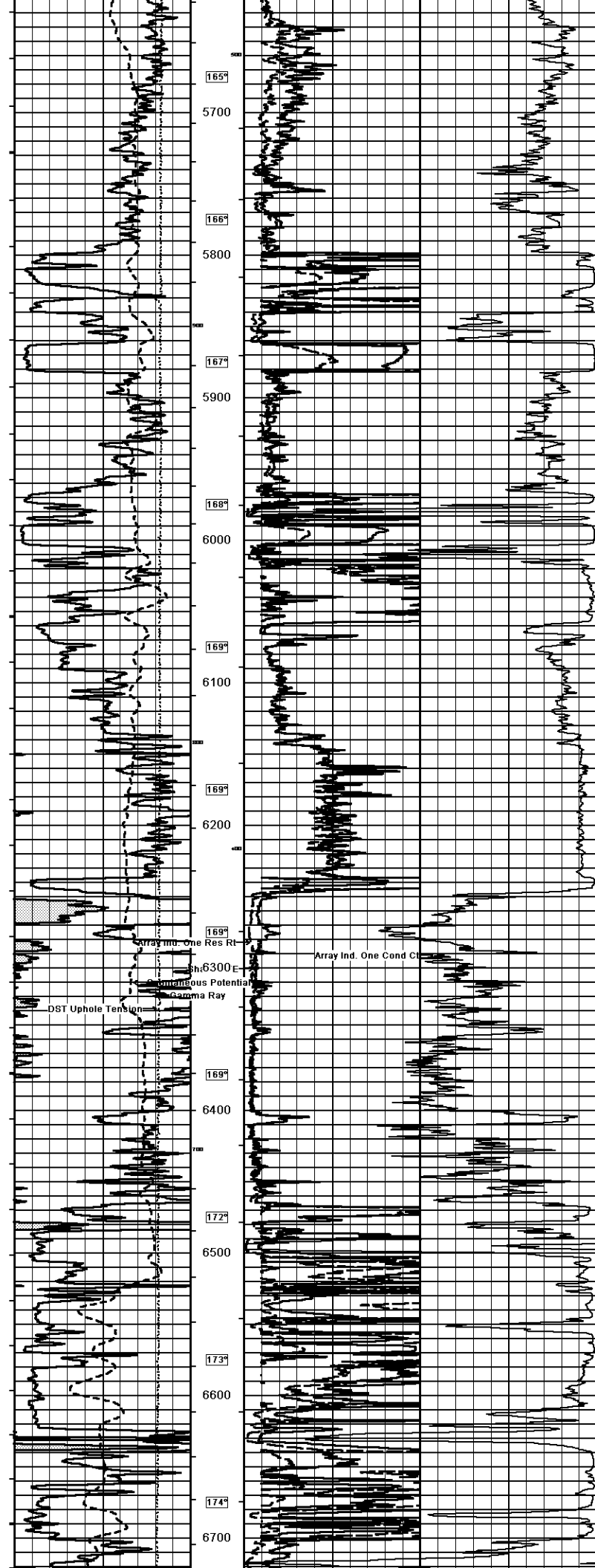




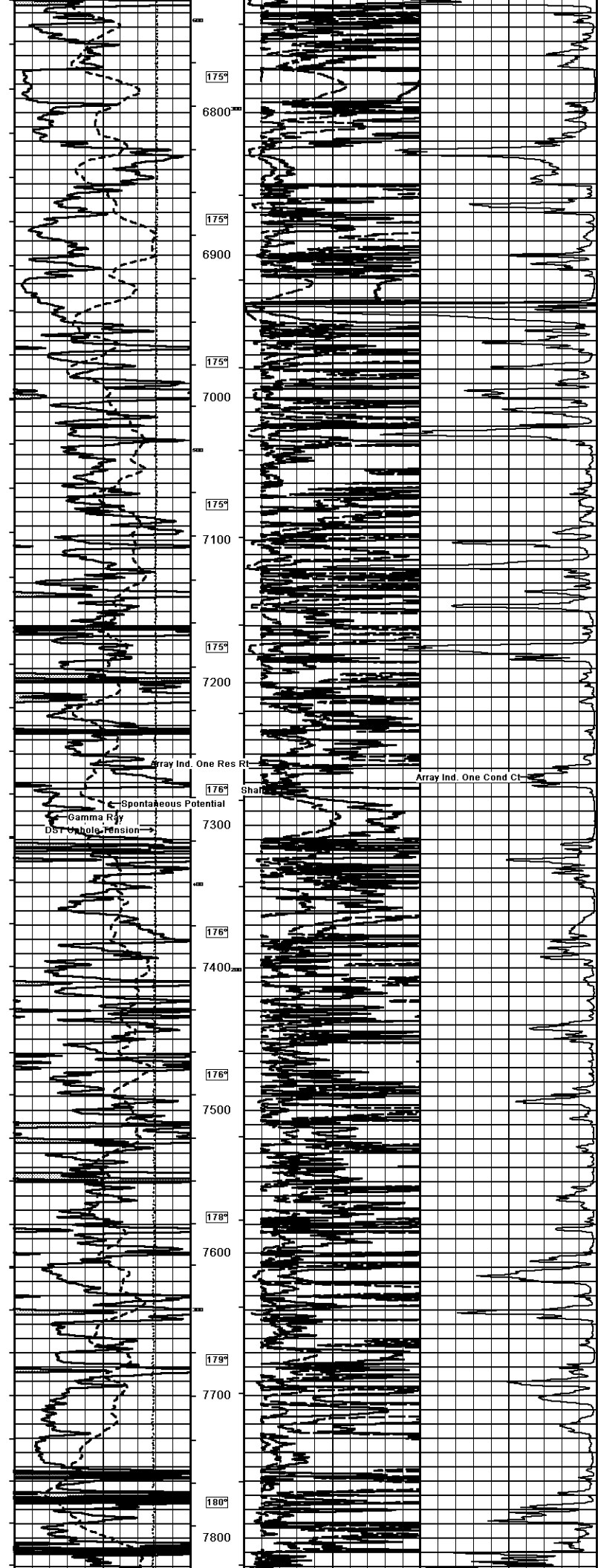


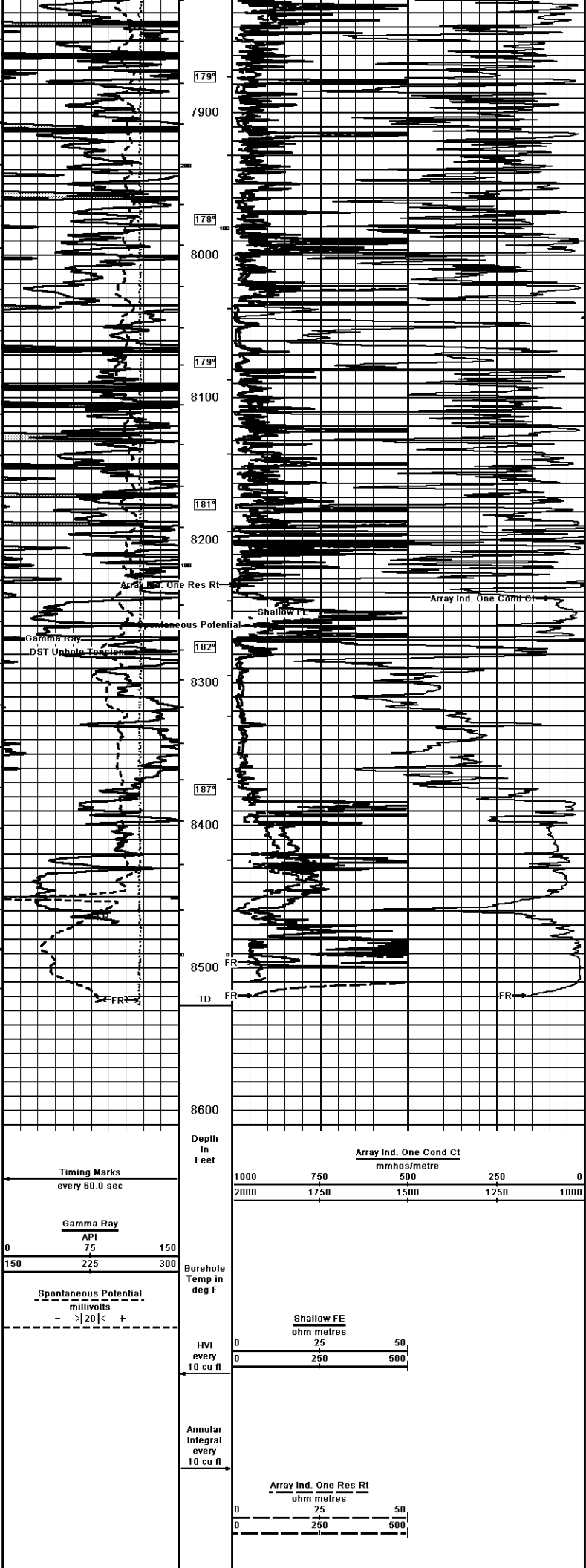













DST Uphole Tension ----- pounds 5000-----0		Replay Scale 1:600				
Depth Based Data - Maximum Sampling Increment: 10.0cm Plotted on 06-SEP-2018 21:13 Filename: C:\Minimus 18.01.6830\Data\Grand Mesa Betty #1-15\Grand Mesa Betty #1-15_002.dta Recorded on 06-SEP-2018 16:03 System Versions: Logged with 18.01.6830 Plotted with 18.01.6830						
1 INCH MAIN						
COMPANY		GRAND MESA OPERATING COMPANY				
WELL		BETTY #1-15				
FIELD		WILDCAT				
PROVINCE/COUNTY		LINCOLN				
COUNTRY/STATE		U.S.A. / COLORADO				
Elevation Kelly Bushing		5484	feet	First Reading	8523.00	feet
Elevation Drill Floor		5482	feet	Depth Driller	8541.00	feet
Elevation Ground Level		5485	feet	Depth Logger	8526.00	feet
		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG				