



Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY

MURFIN DRILLING COMPANY INC.

WELL

ROGUE #10-25

FIELD

WILDCAT

PROVINCE/COUNTY LINCOLN

COUNTRY/STATE

U.S.A. / COLORADO

LOCATION

2299' FSL & 1647' FEL

SEC 25

TWP 9S

RGE 56W

Other Services

Latitude

MPD/MDN

MSS

MML

API Number

05-073-06736

Permanent Datum GL, Elevation 5303 feet

Log Measured From KB, 13.00 feet above Permanent Datum

Drilling Measured From KB

Date

07-FEB-2018

Run Number

ONE

Service Order

4558-205041941

Depth Driller

8187.00

Depth Logger

7776.00

First Reading

7773.00

Last Reading

478.00

Casing Driller

475.00

Casing Logger

478.00

Bit Size

7.875

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.20 lb/USg

80.00 CP

PH / Fluid Loss

8.50

8.50 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

1.39 @ 75.0

ohm-m

Rmf @ Measured Temp

1.11 @ 75.0

ohm-m

Rmc @ Measured Temp

1.67 @ 75.0

ohm-m

Source Rmf / Rmc

CALC

CALC

Rm @ BHT

0.62 @168.0

ohm-m

Time Since Circulation

6 HOURS

Max Recorded Temp

168.00

deg F

Equipment / Base

13244

LIB

Recorded By

ADAM SILL

Witnessed By

GREGG SMITH

Elevations:
KB 5316.00
DF 5314.00
GL 5303.00

BOREHOLE RECORD

Last Edited: 07-FEB-2018 12:40

Bit Size
inches

7.875

Depth From
feet

475.00

Depth To
feet

8187.00

CASING RECORD

Type

Size
inches

8.625

Depth From
feet

0.00

Shoe Depth
feet

475.00

Weight
pounds/ft

24.00

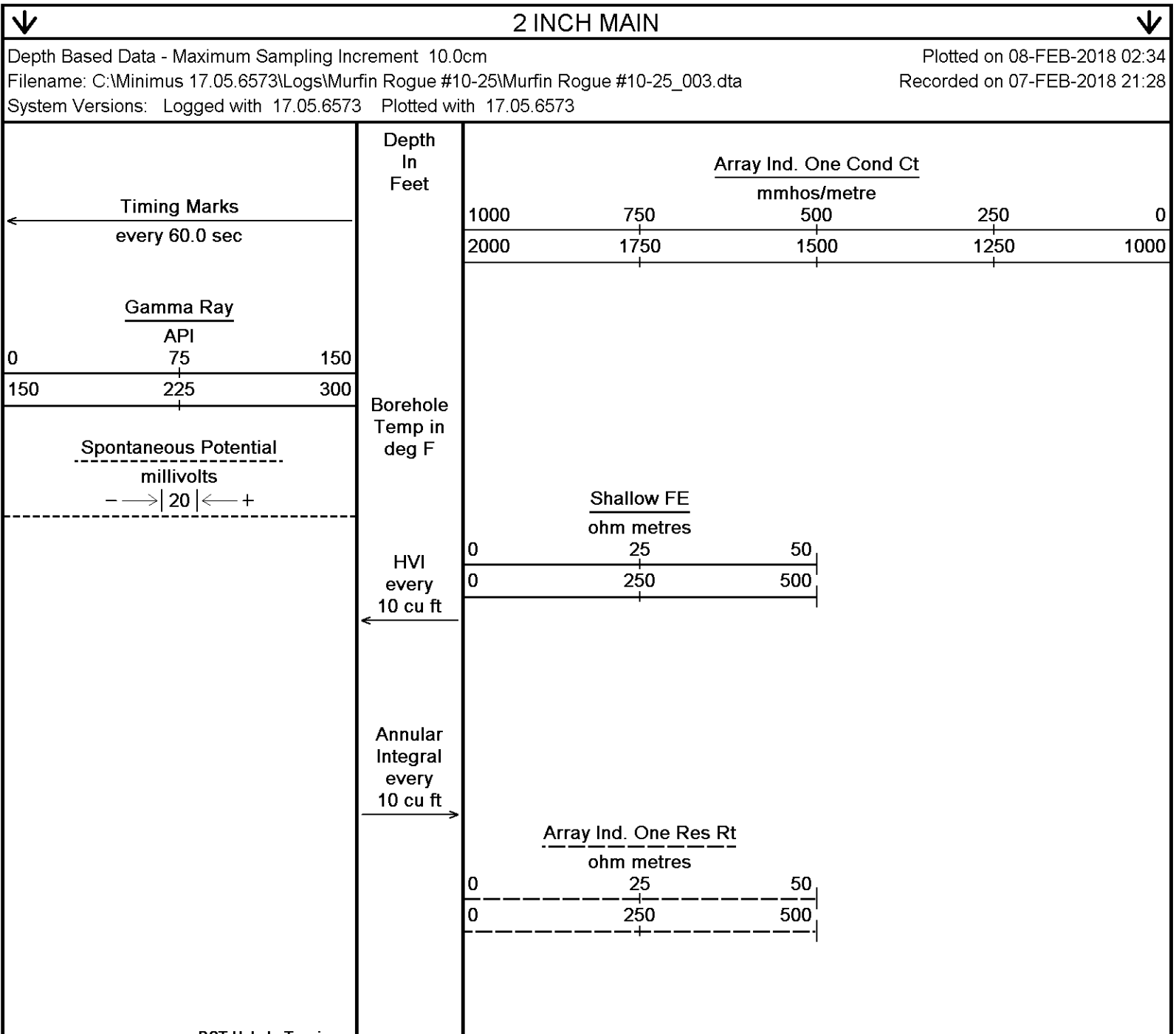
REMARKS

- SOFTWARE ISSUE: WLS 17.05.6573.
- 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: 3682 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 4200 FEET: 685 CU.FT.

- RIG: MURFIN #25.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR.

**** BRIDGED OFF AT 7776 FEET AND WAS INSTRUCTED TO LOG OUT FROM THERE WITHOUT A REPEAT SECTION. ****

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 Up-hole Tension
pounds
5000 0

Replay
Scale
1:600

Casing
470
Shoe

500

72°

3600

Array Ind. One Rt

600

Array Ind. One Cond Ct

Shallow F500

Spontaneous Potential

Gamma-Ray

DST Up-hole Tension

75°

700

3500

2300

78°

800

3400

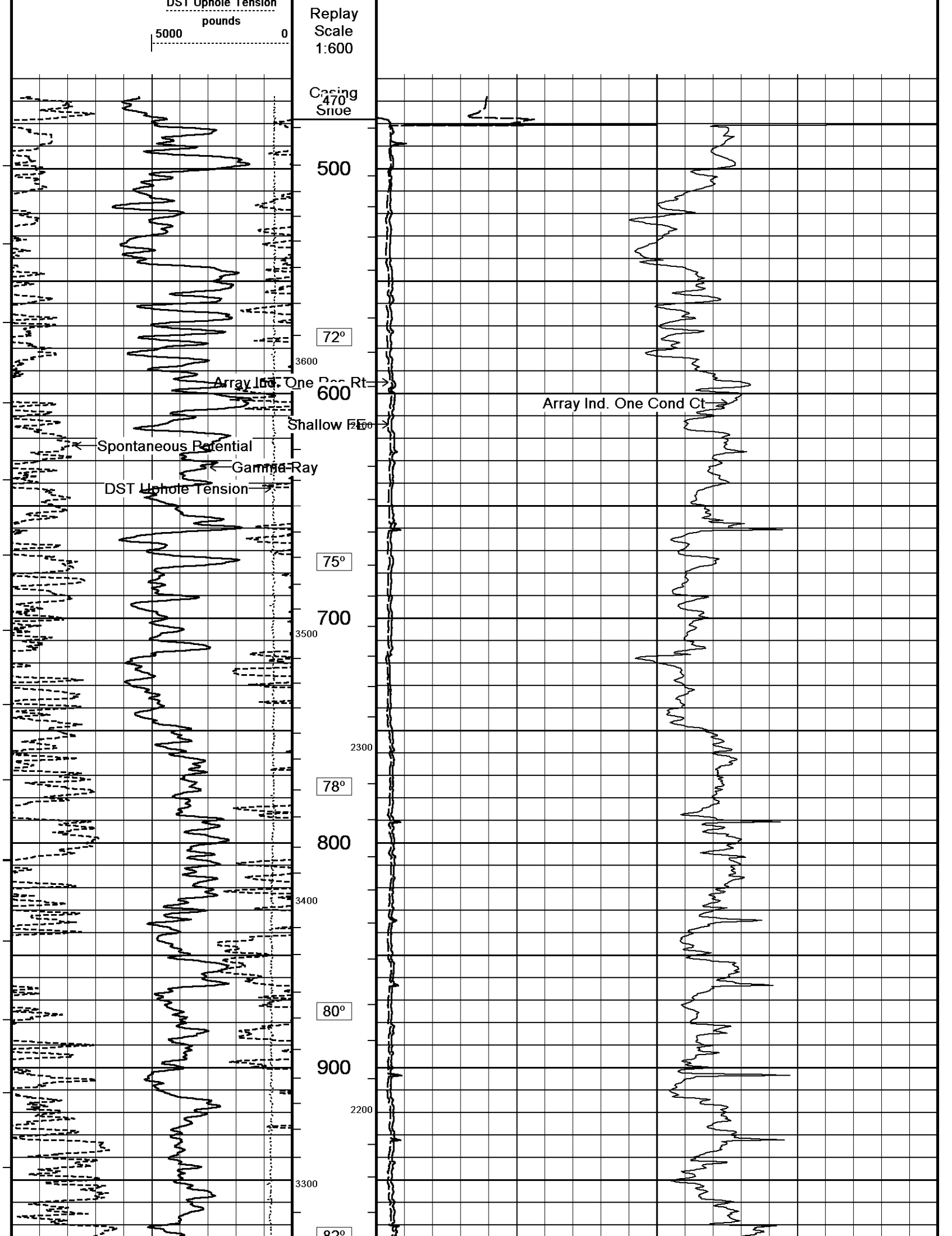
80°

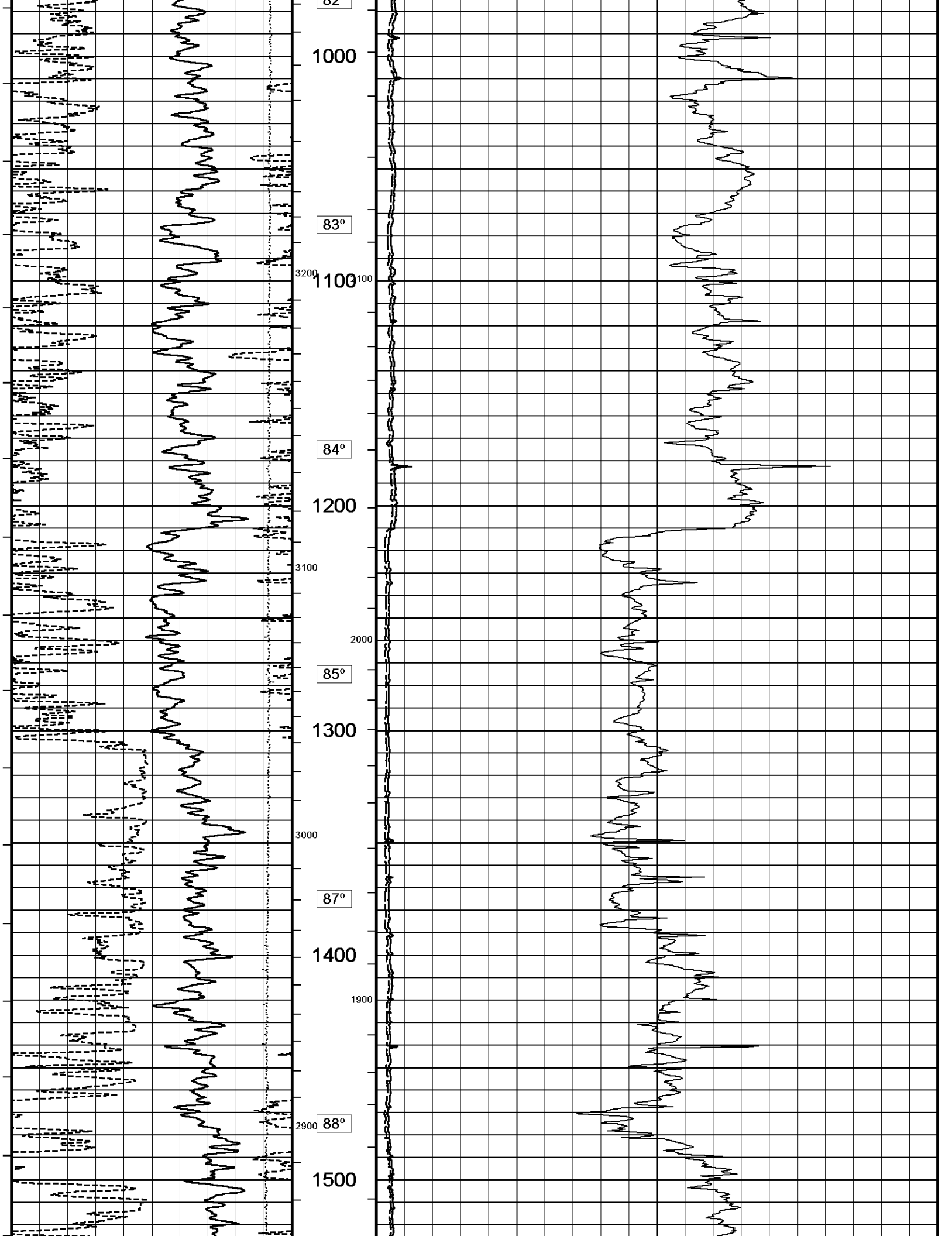
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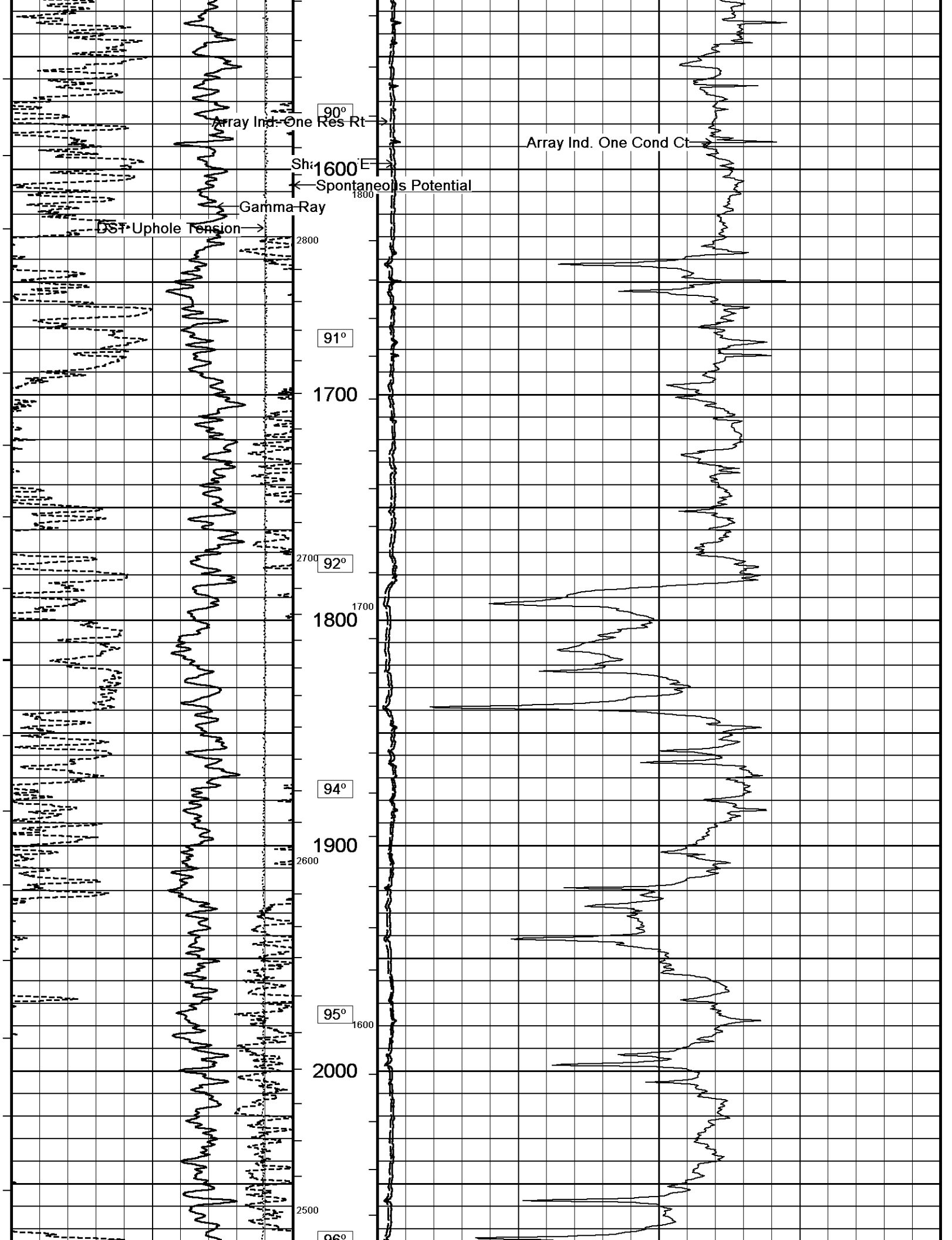
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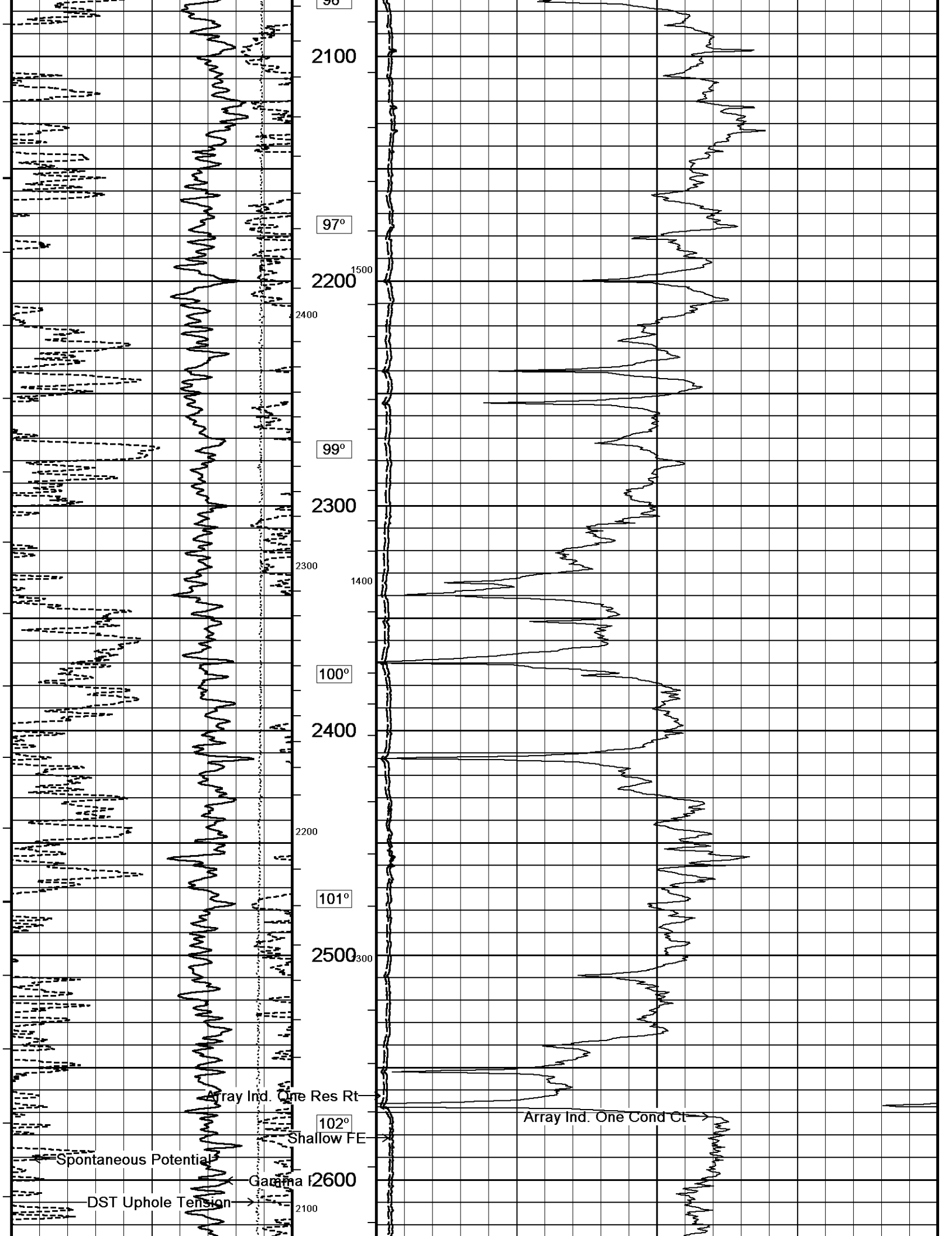
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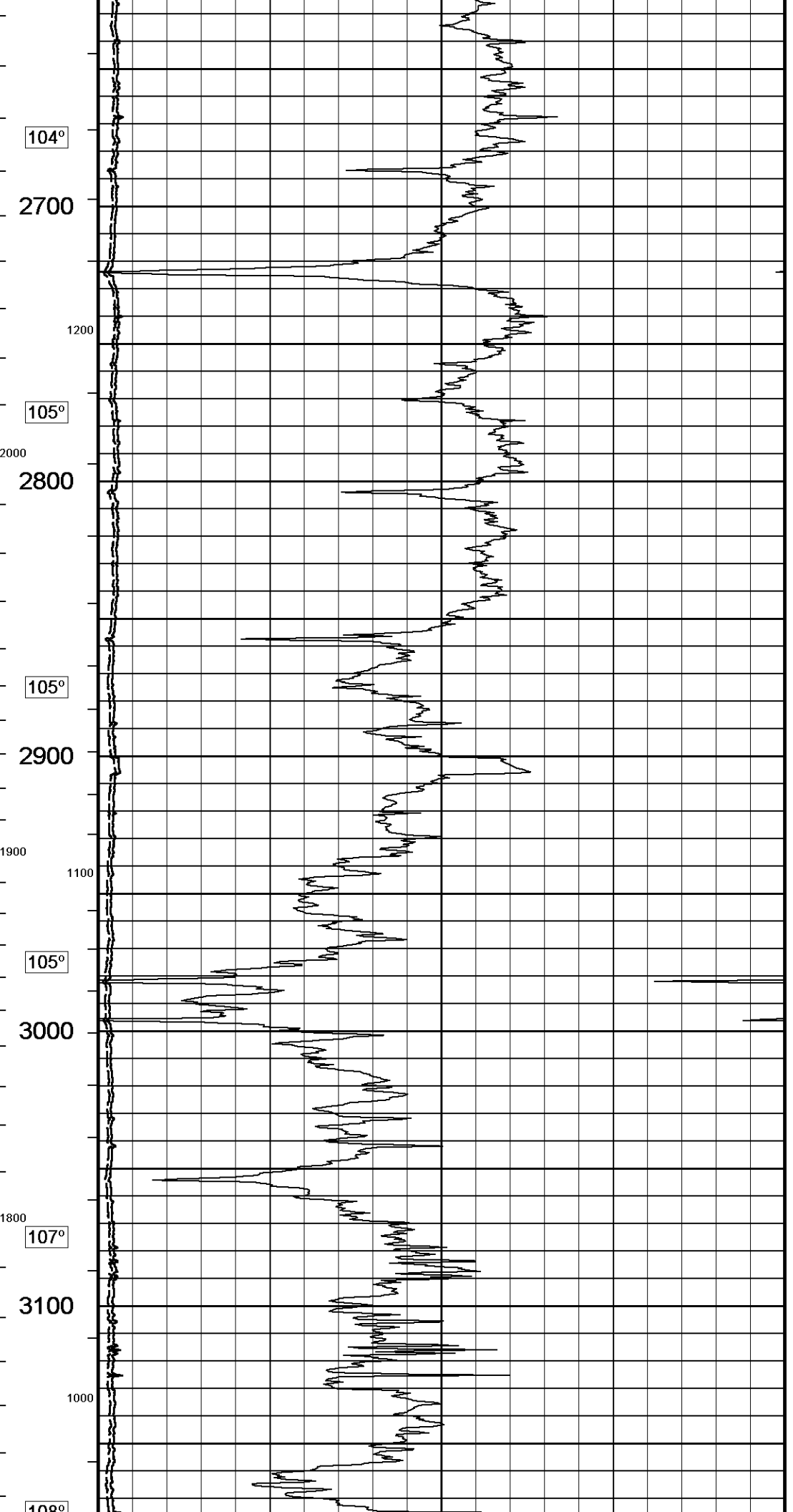
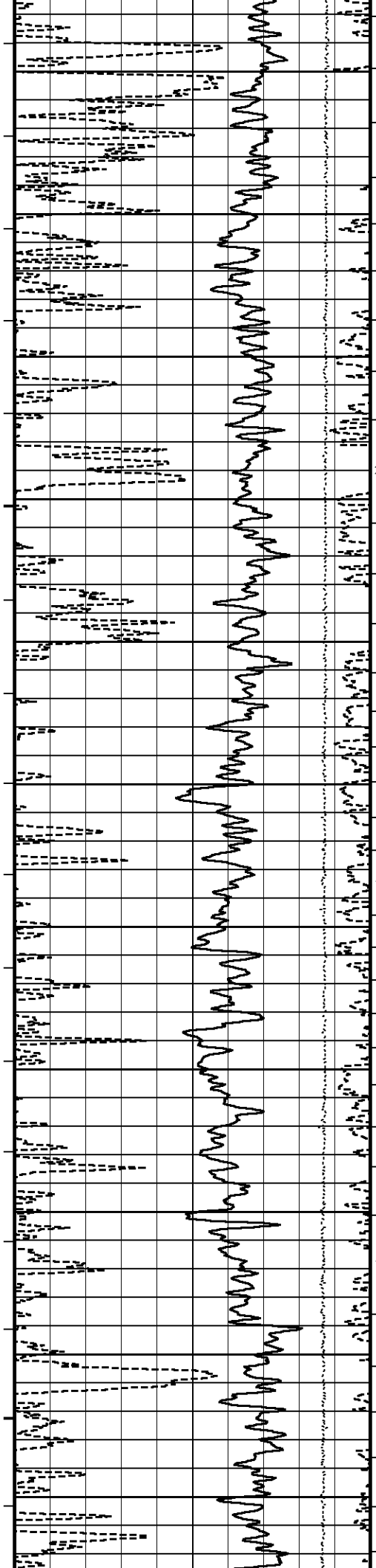
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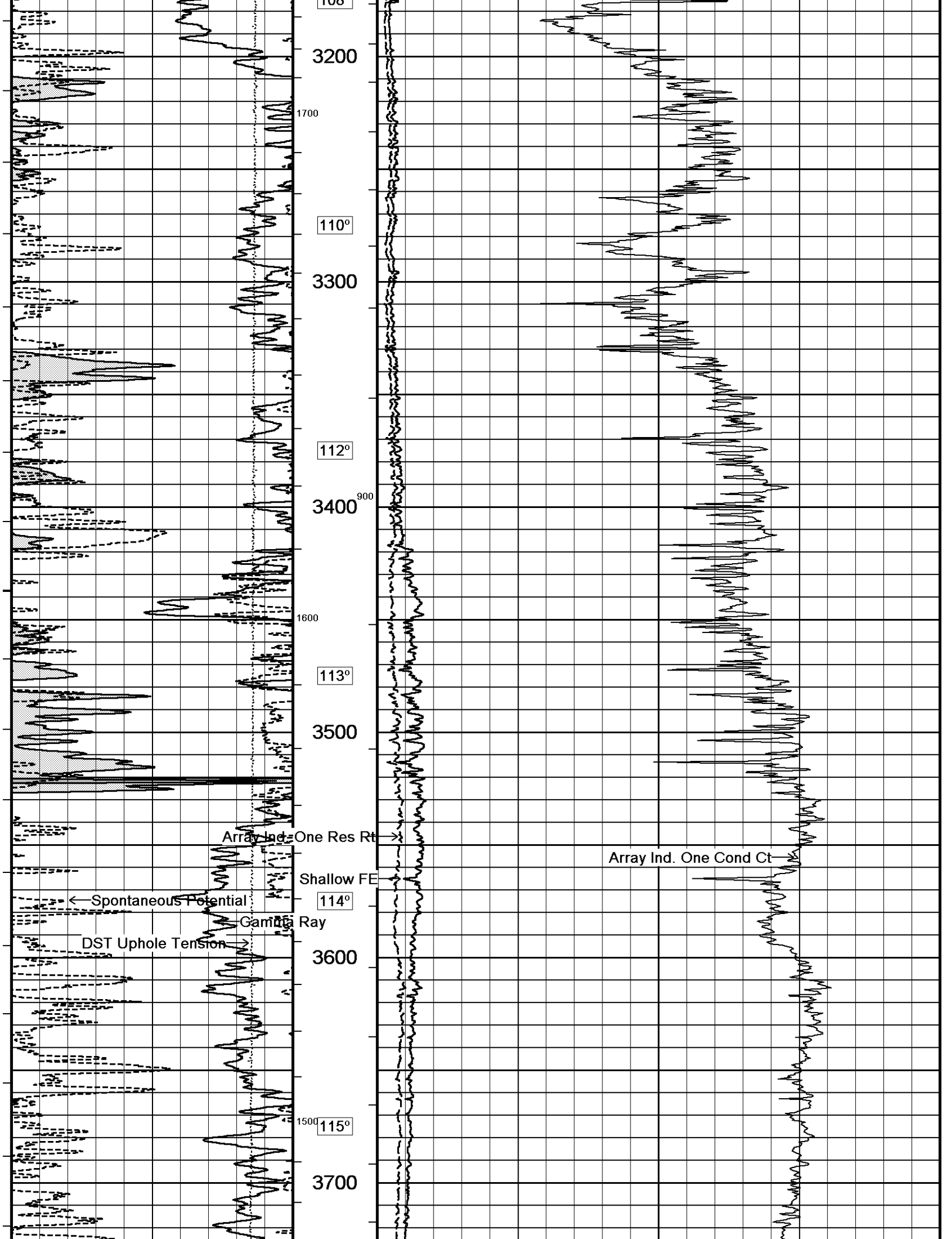


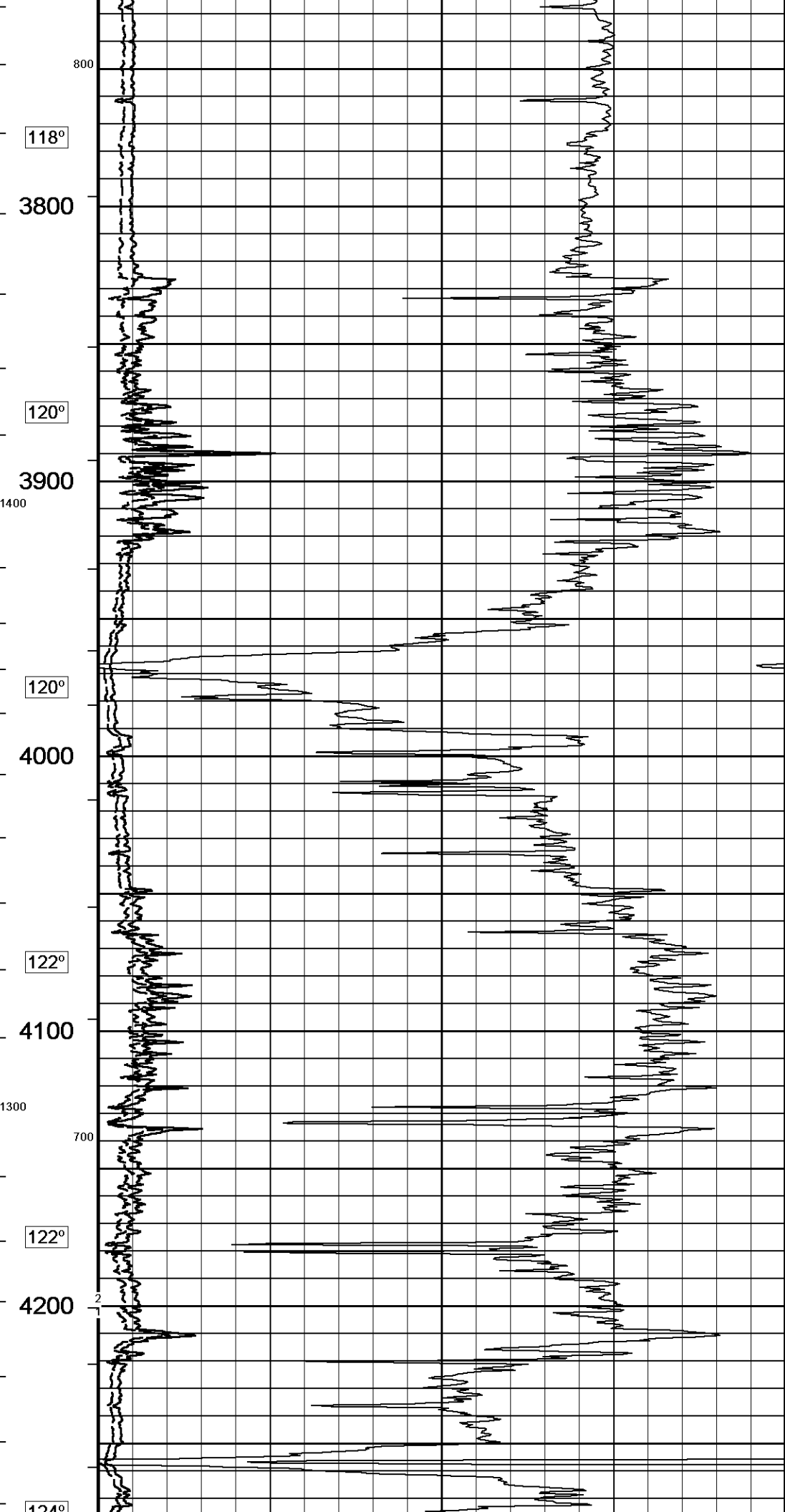
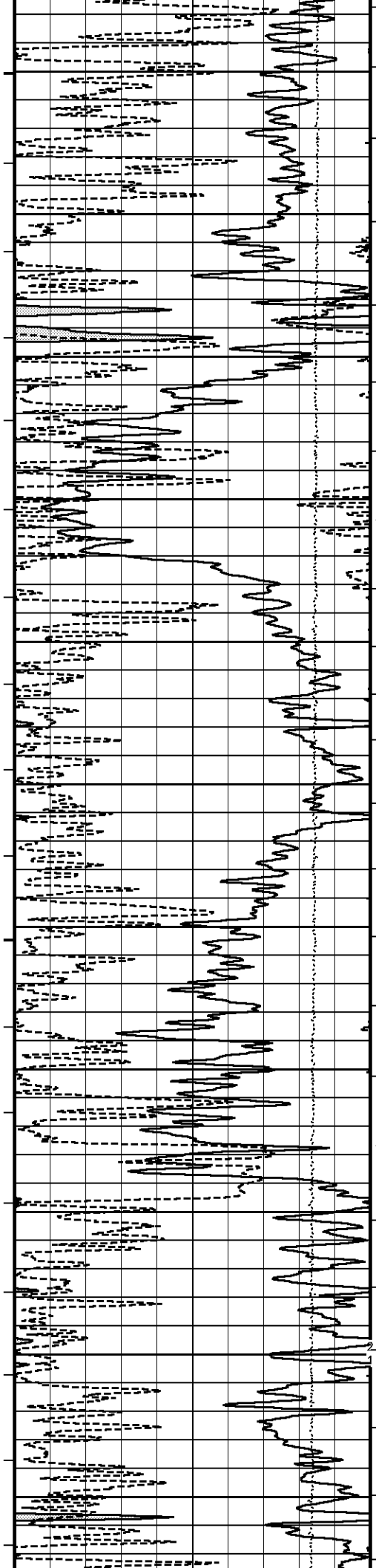


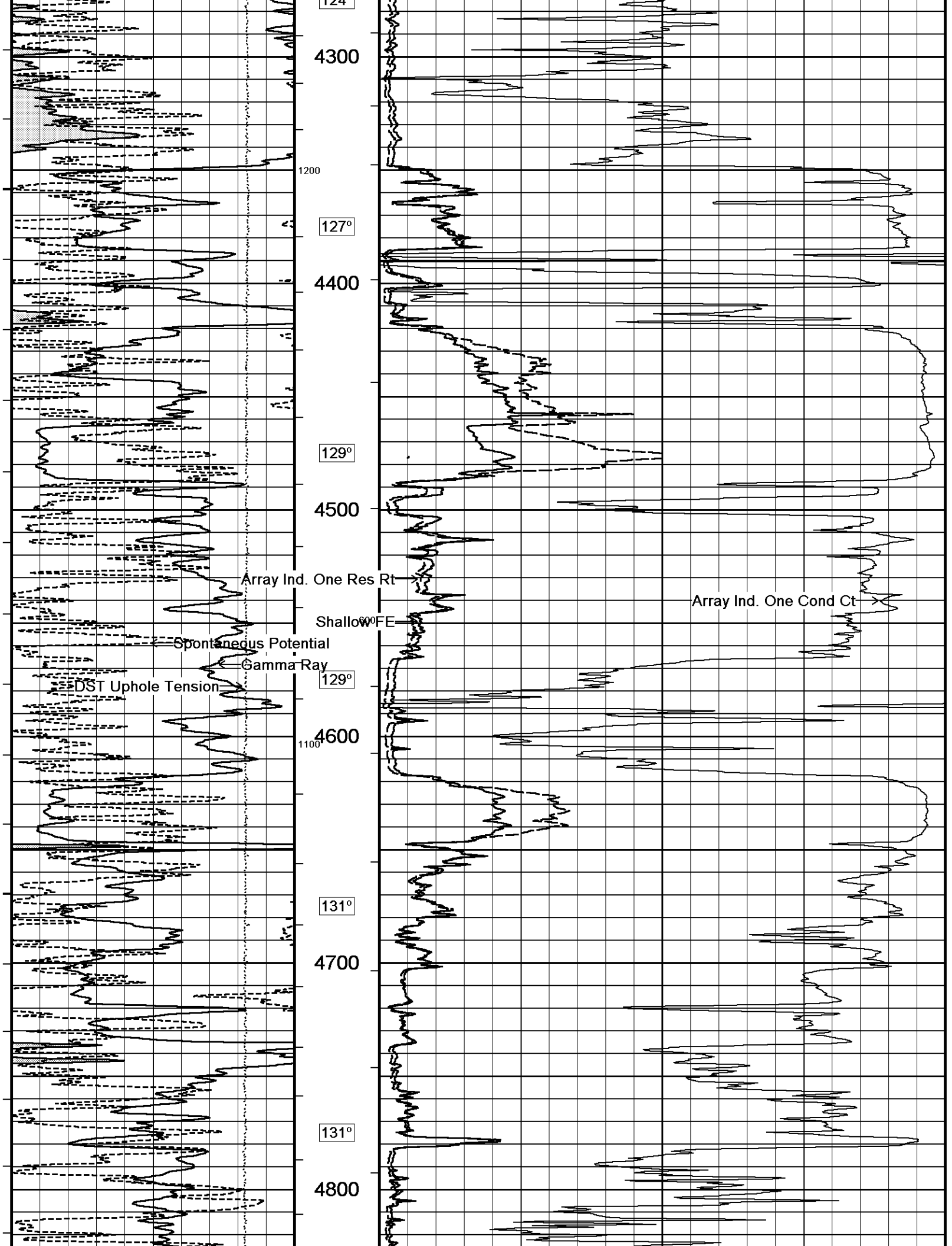


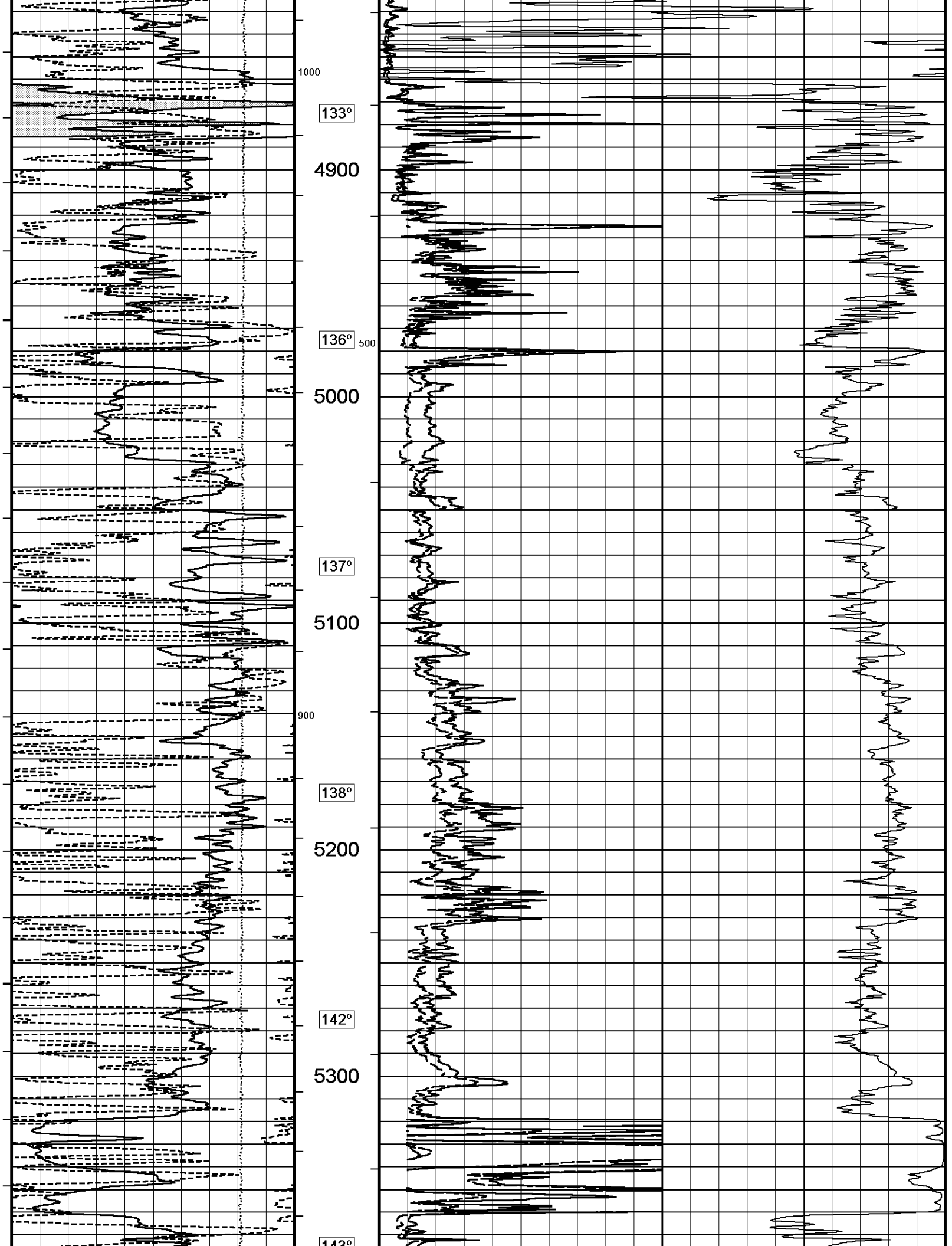


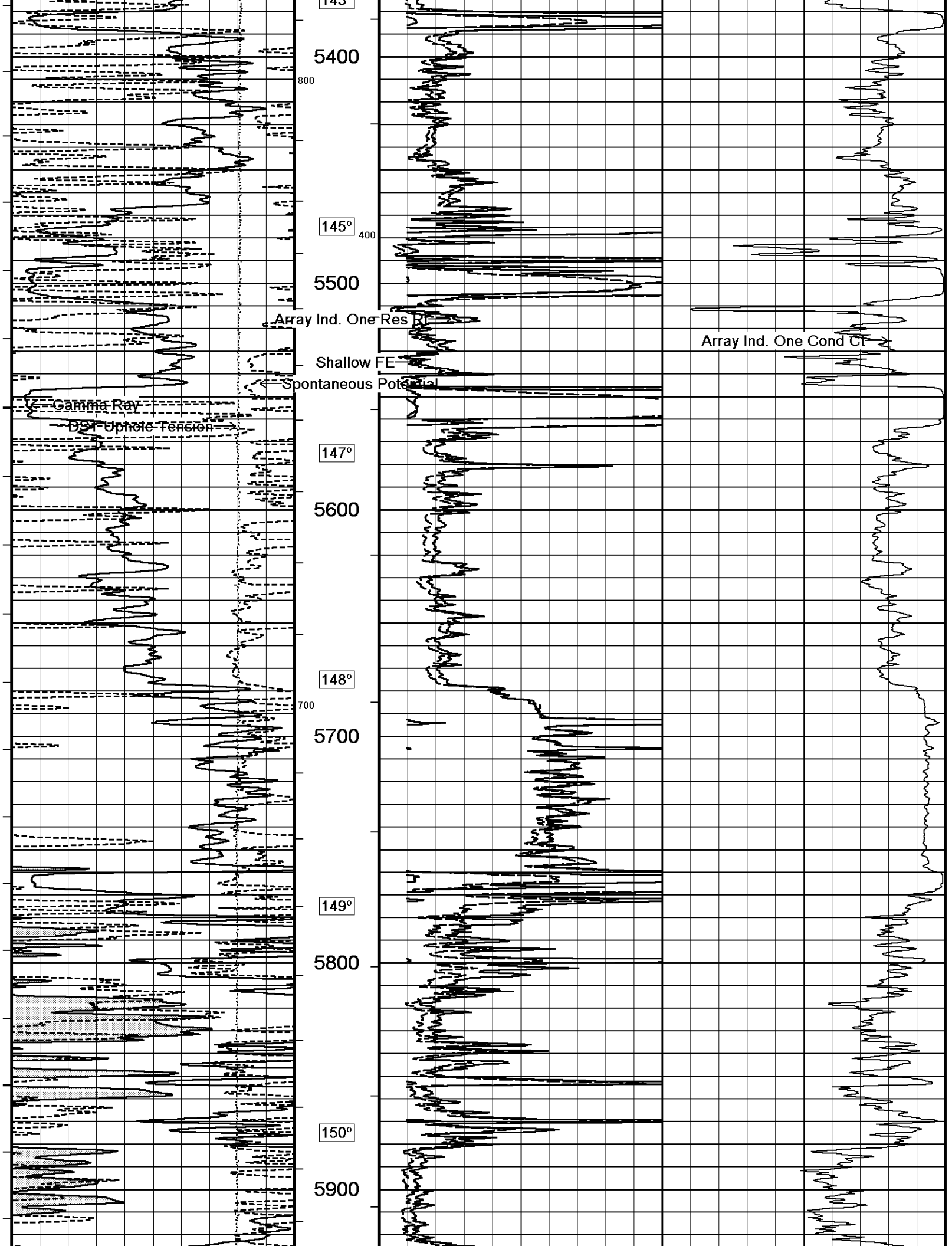


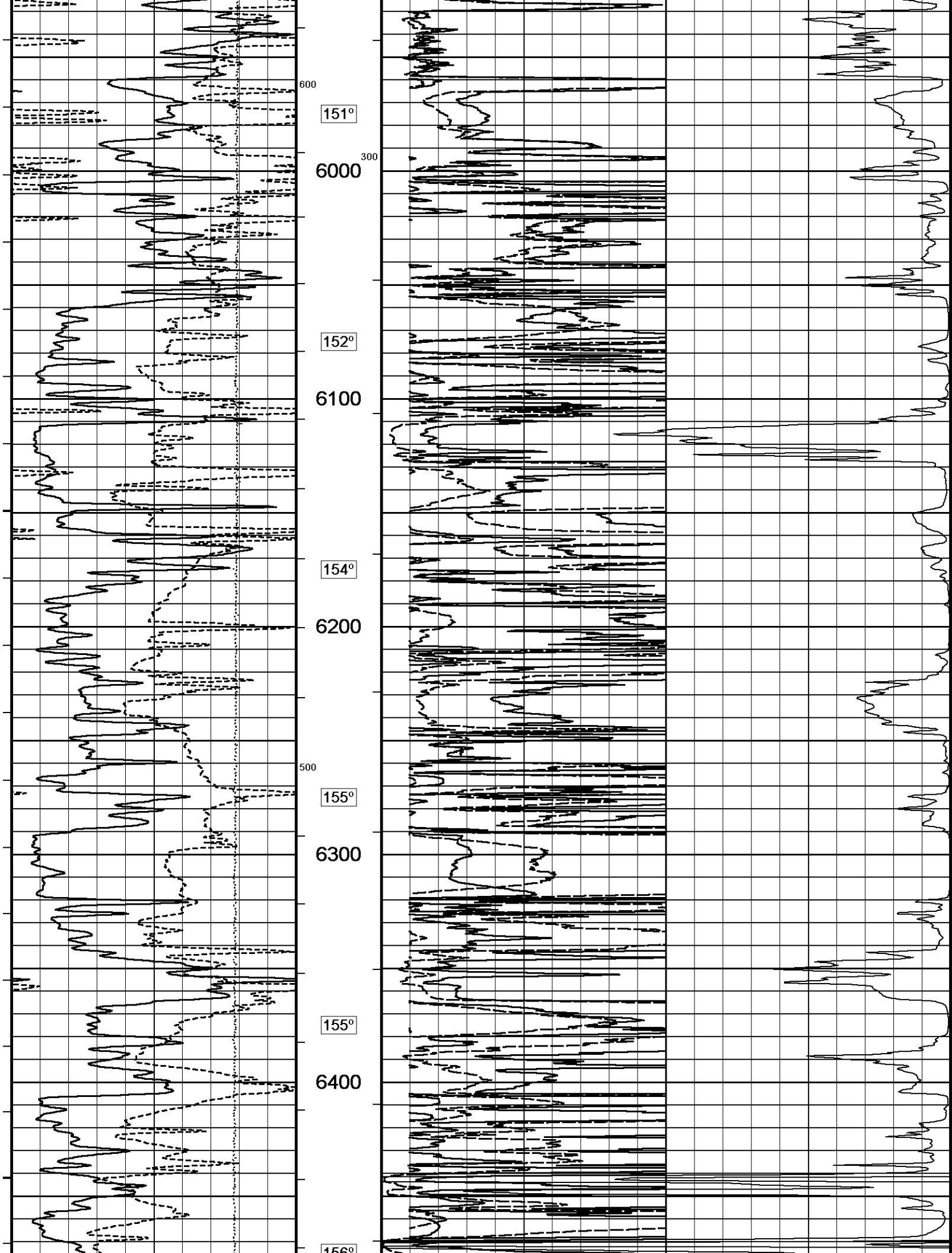


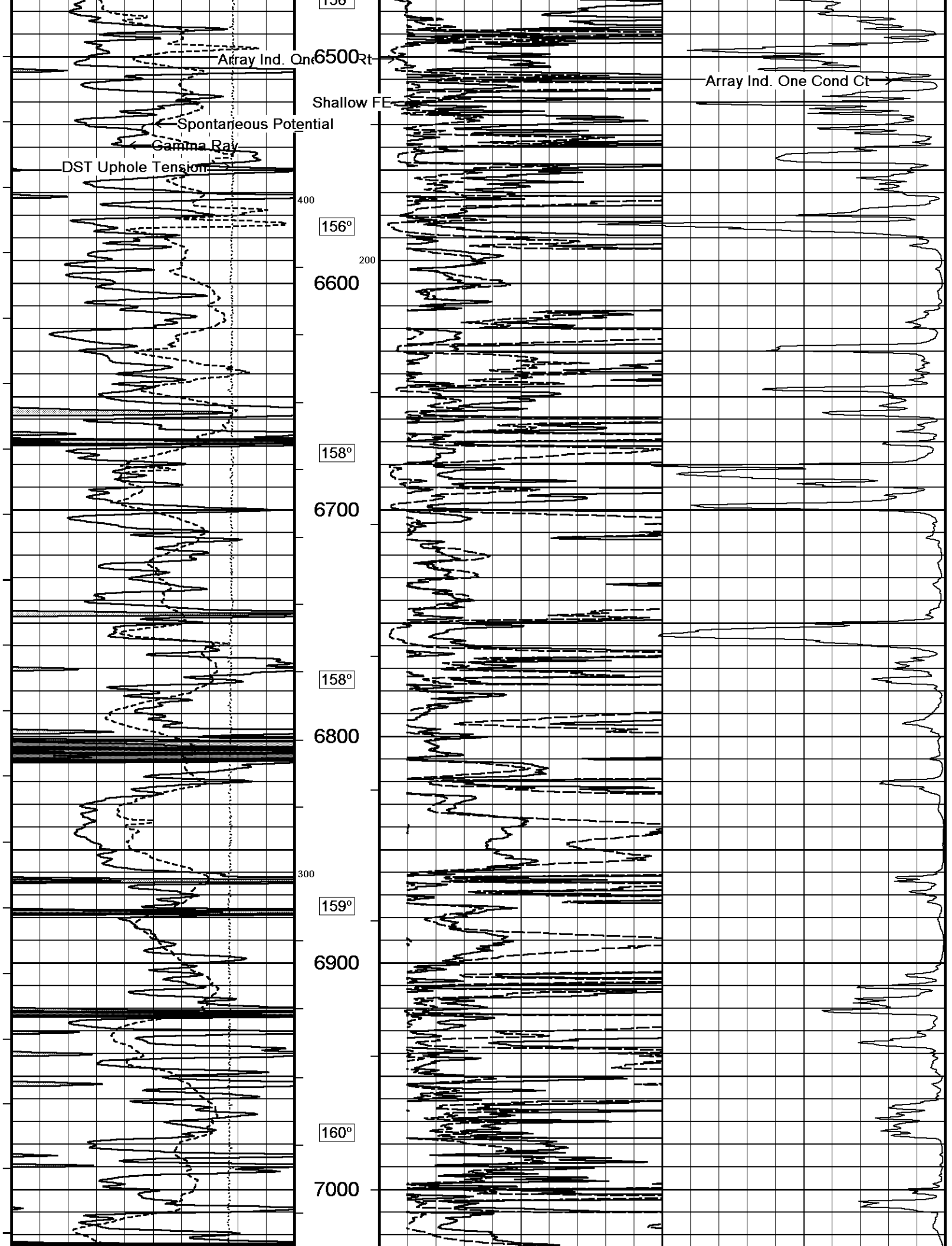


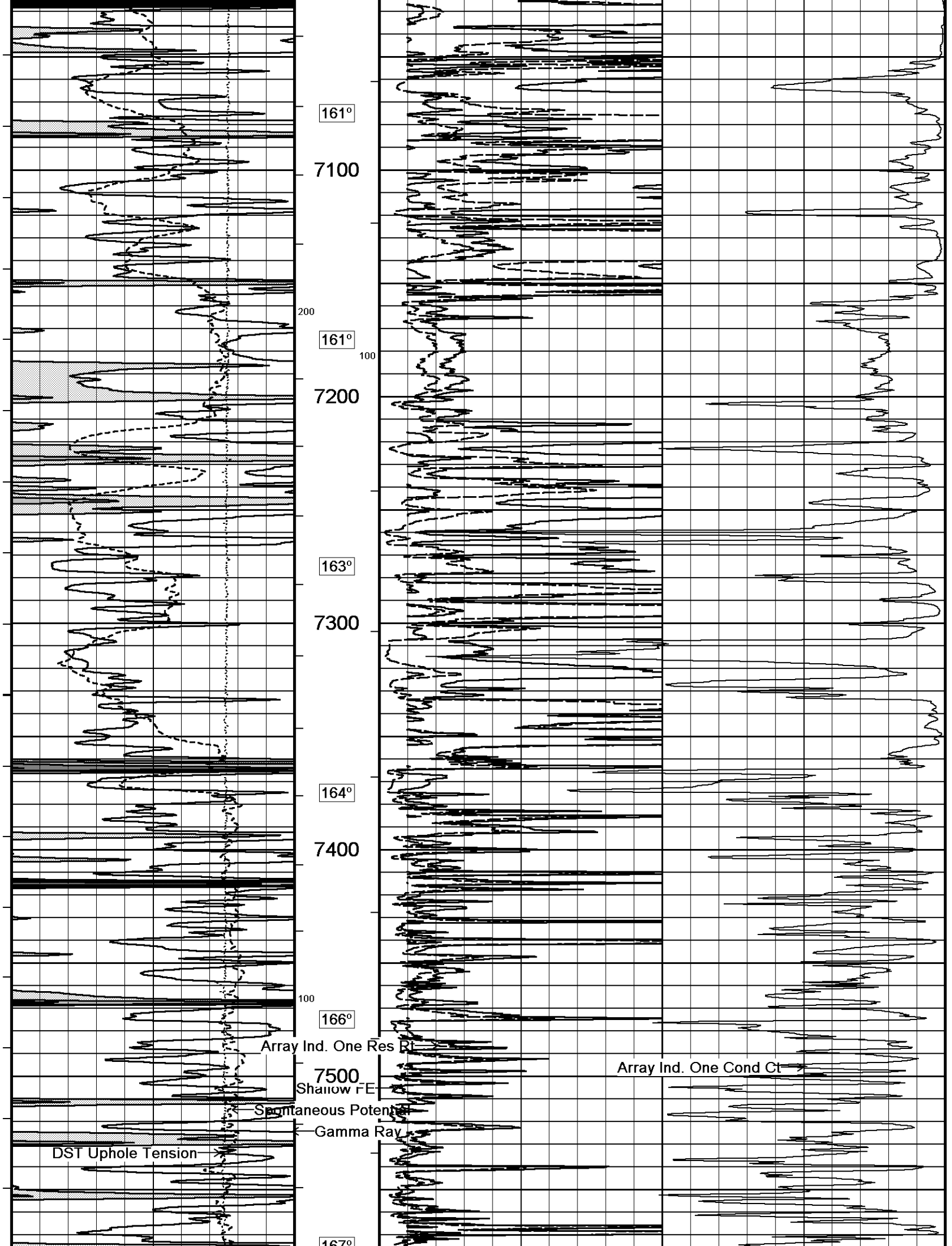


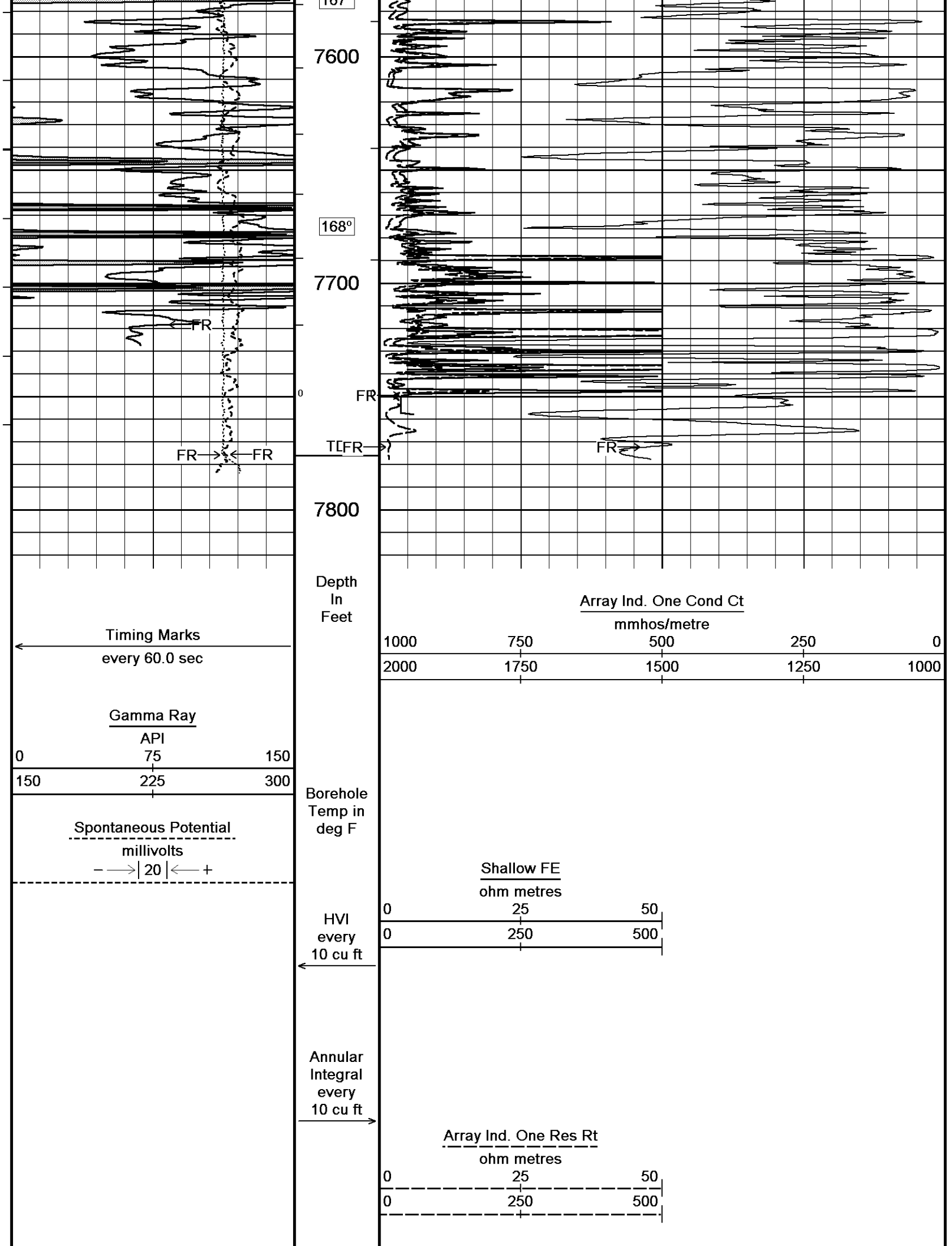












DST Uphole Tension
pounds
50000

Replay
Scale
1:600

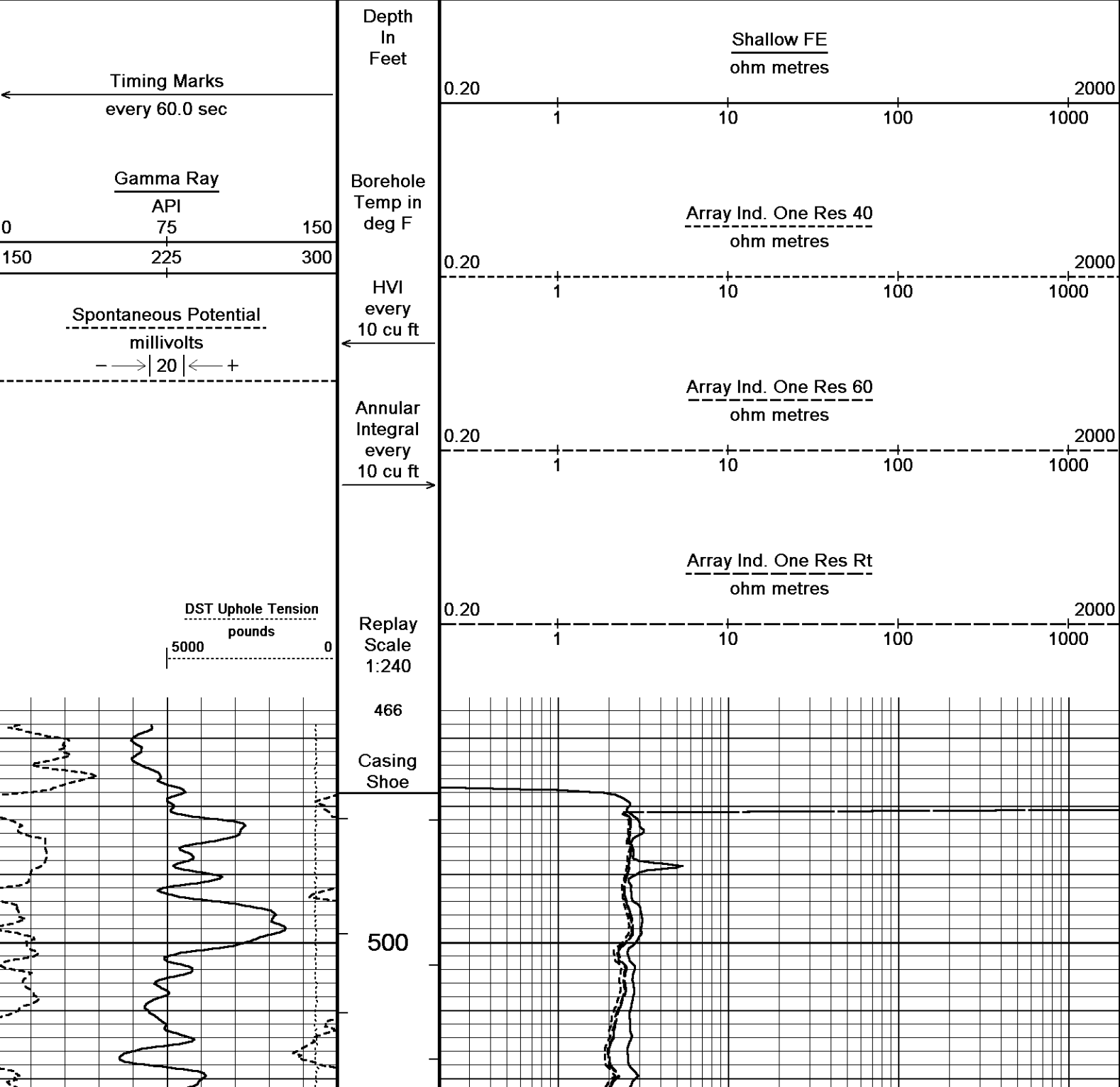
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System Versions: Logged with 17.05.6573 Plotted with 17.05.6573

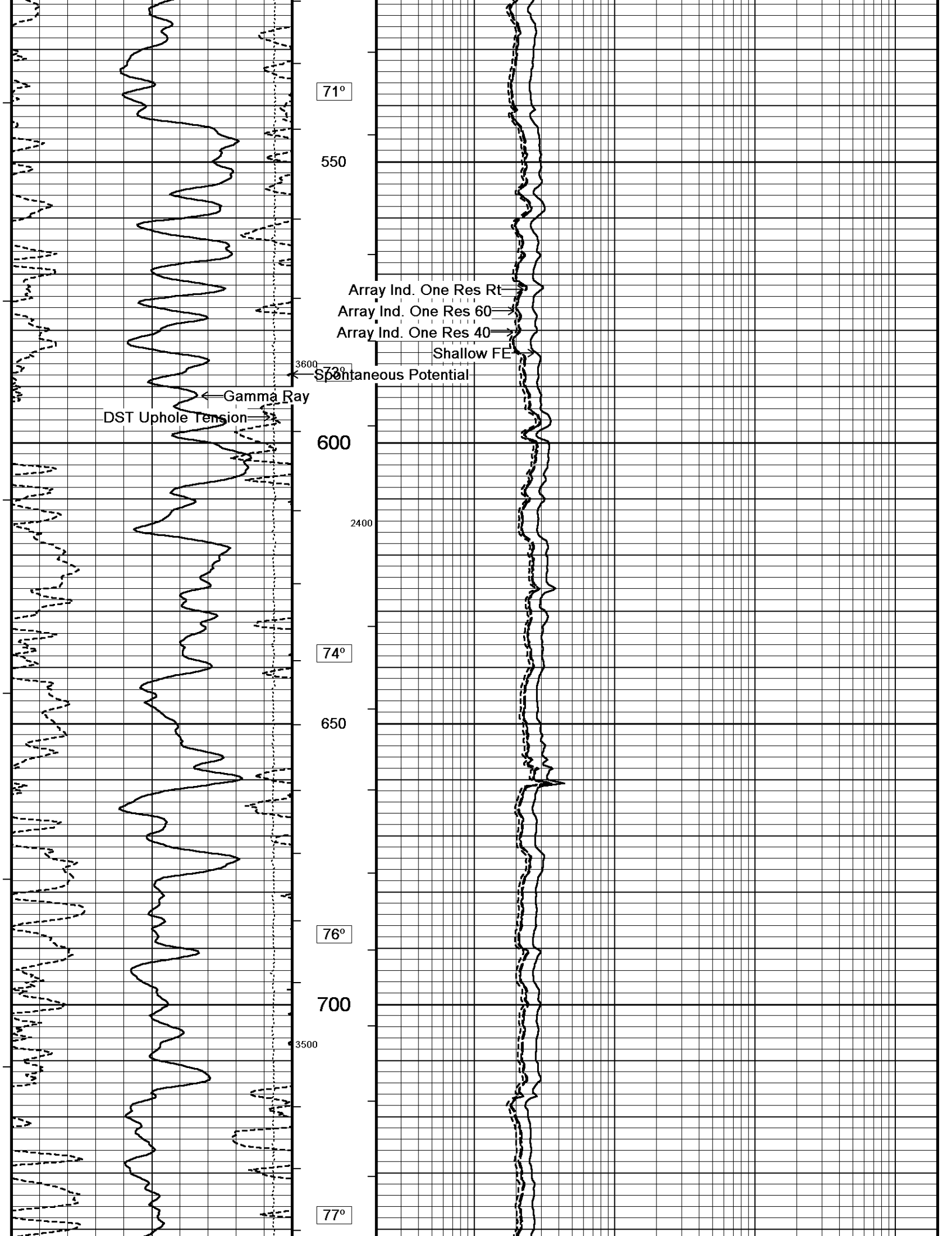
Plotted on 08-FEB-2018 02:34
Recorded on 07-FEB-2018 21:28

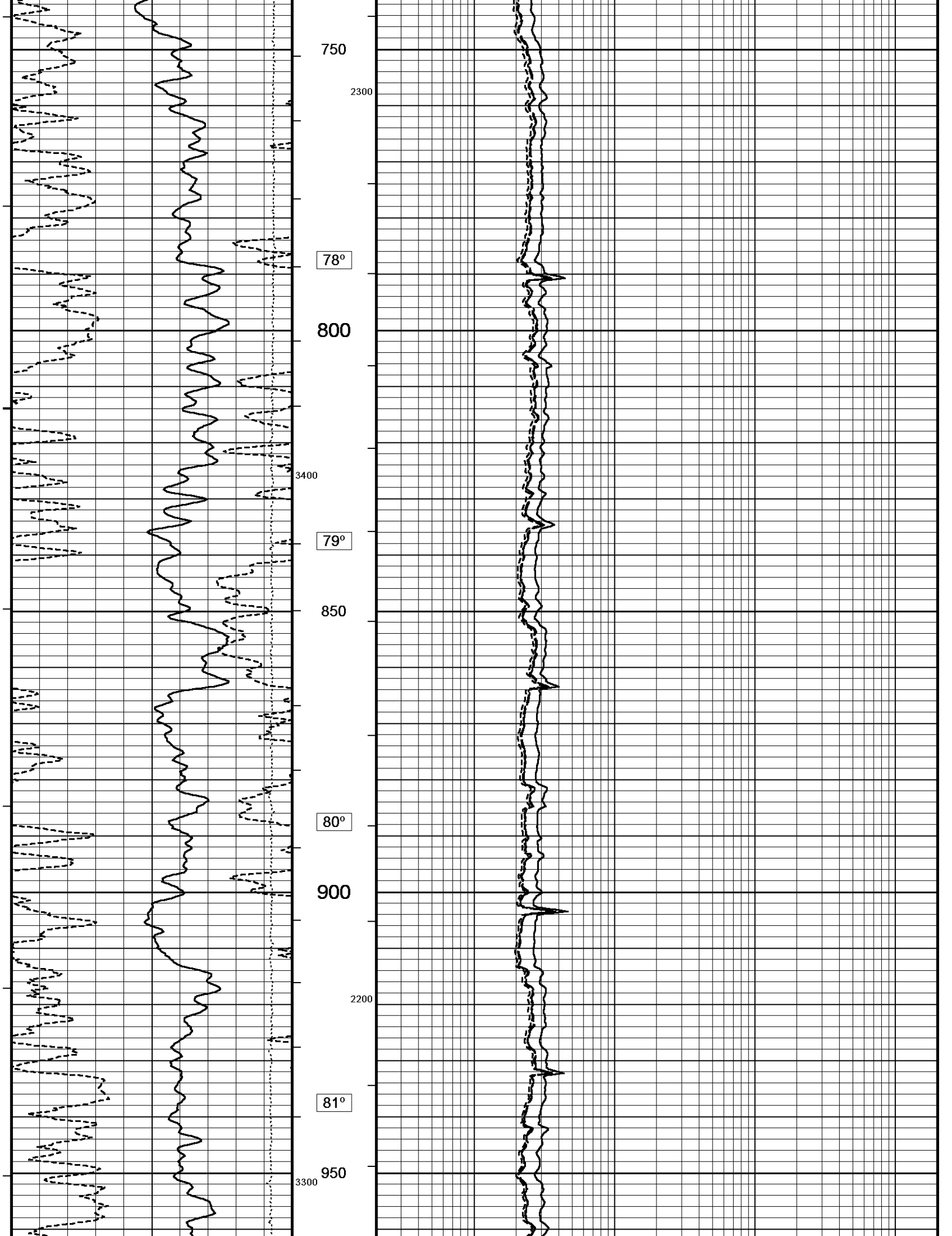
2 INCH MAIN

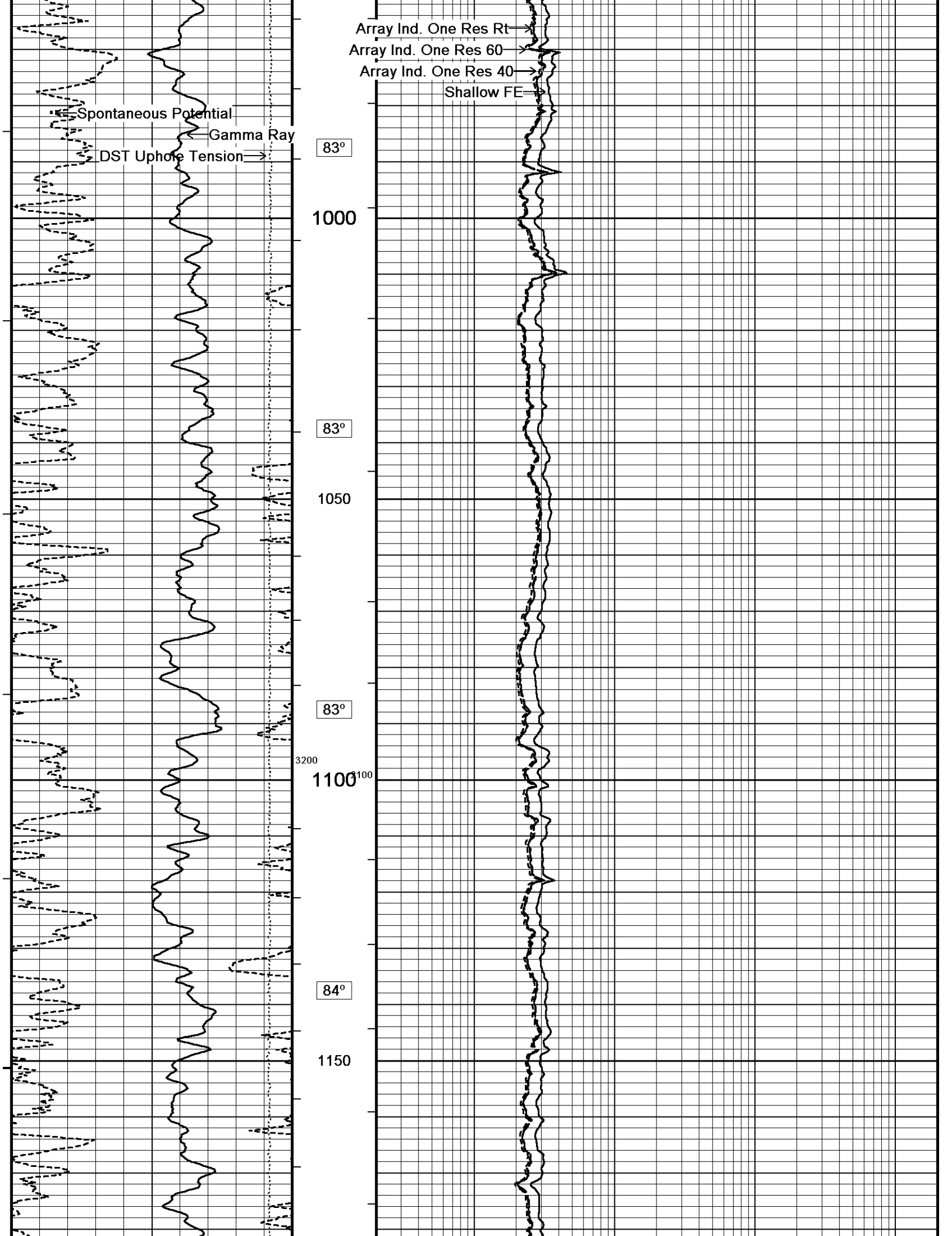
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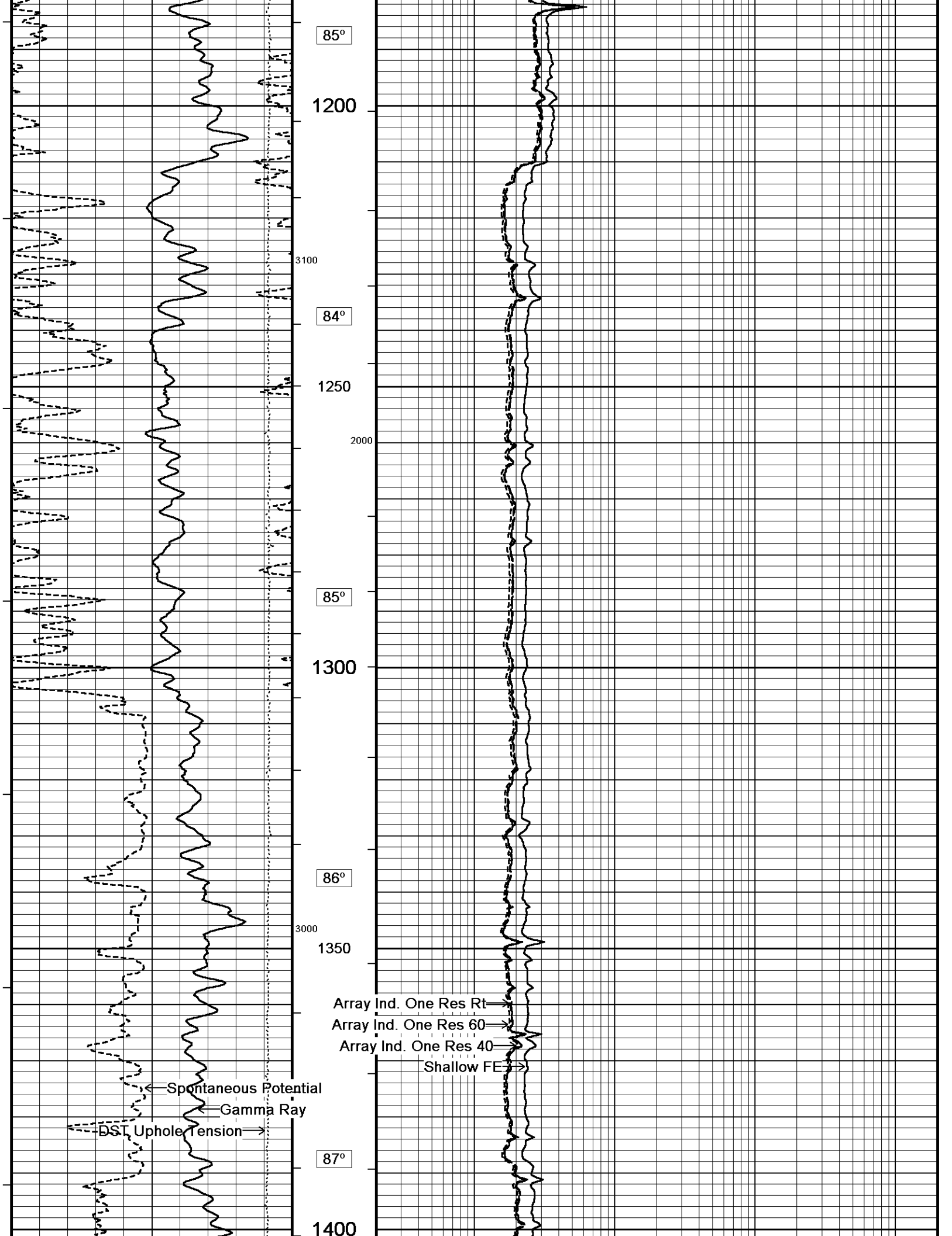
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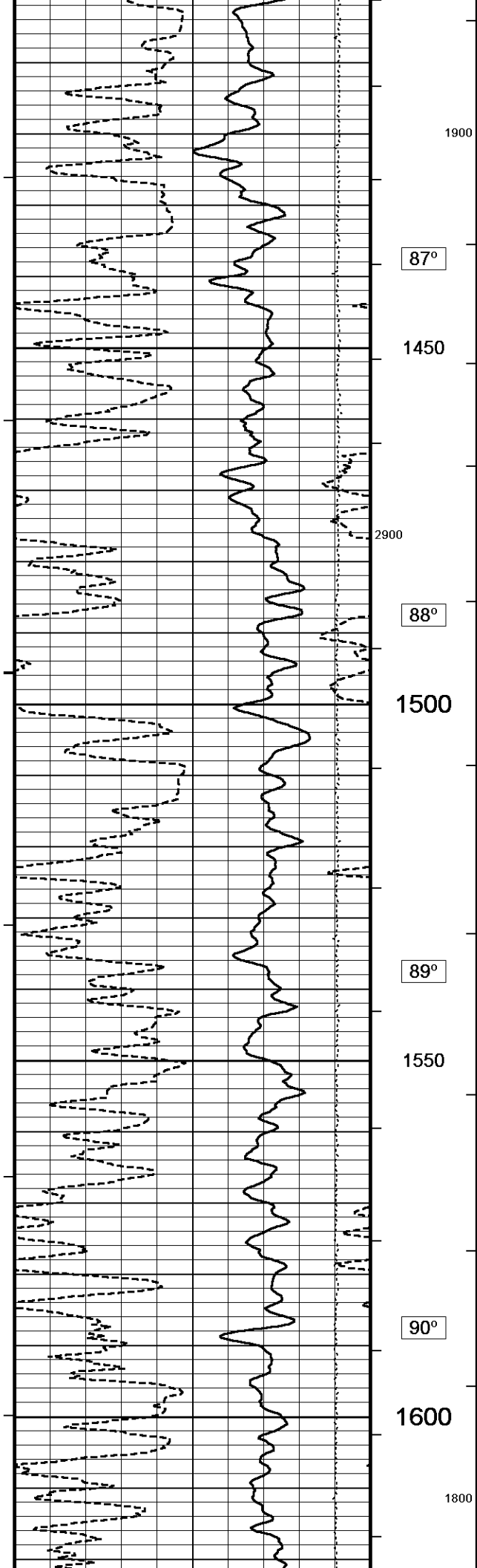












87°

1450

2900

88°

1500

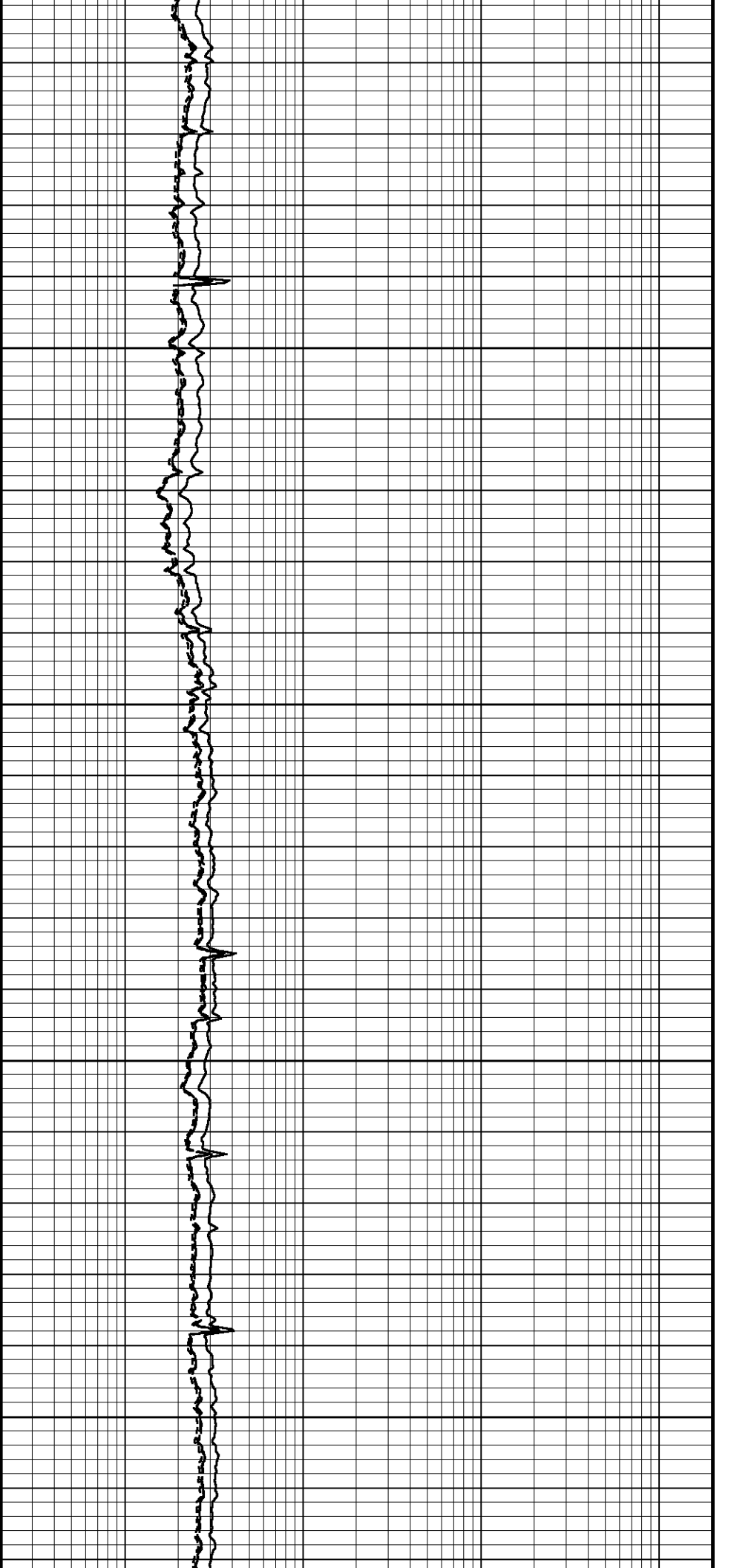
89°

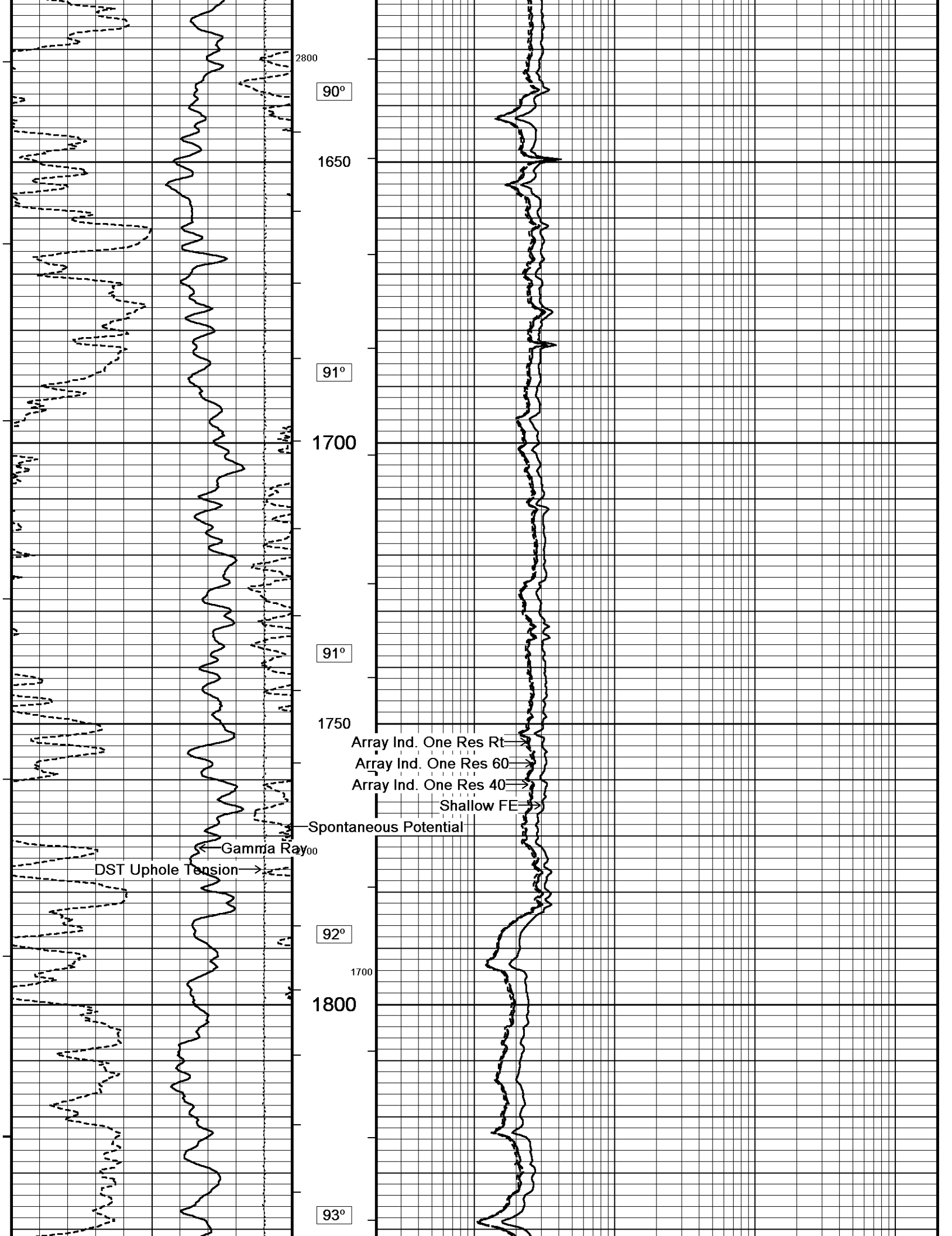
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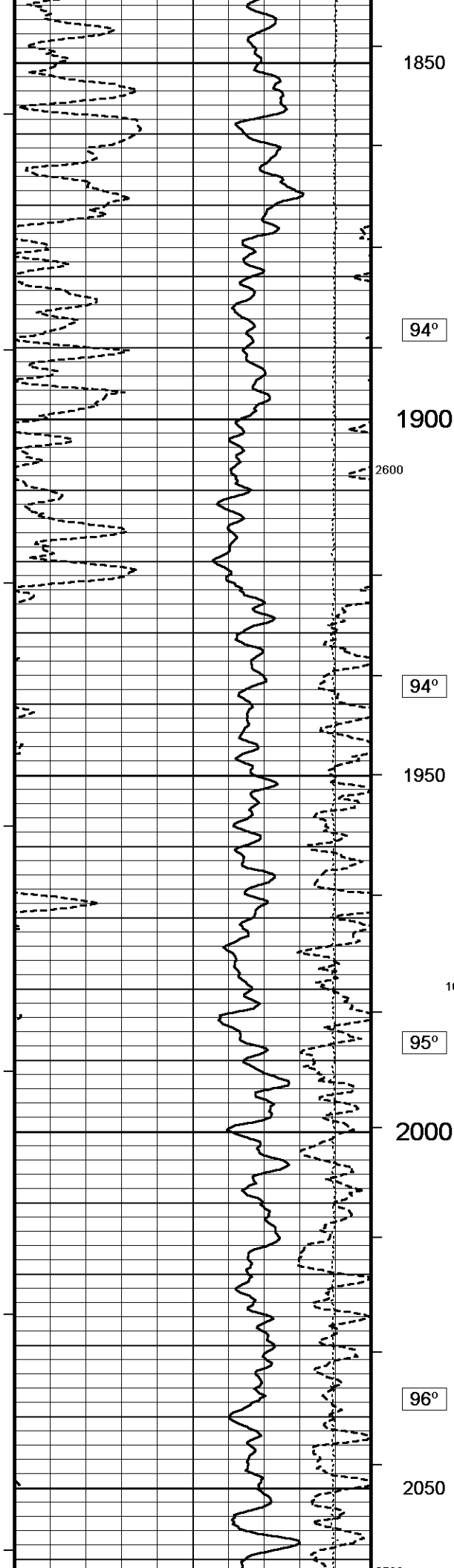
90°

1600

1800







1850

94°

1900

2600

94°

1950

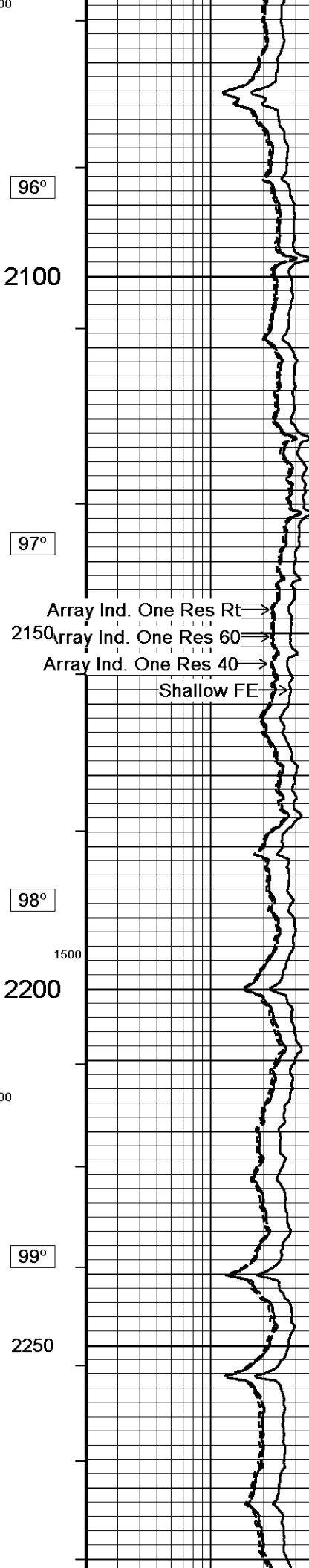
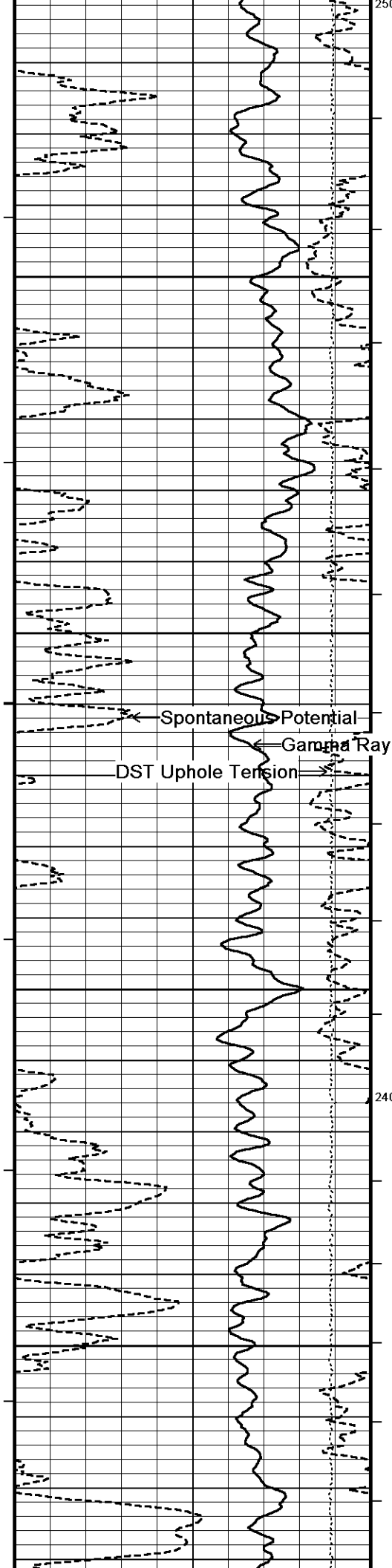
1600

95°

2000

96°

2050



96°

2100

97°

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

Spontaneous Potential

Gamma Ray

DST Uphole Tension

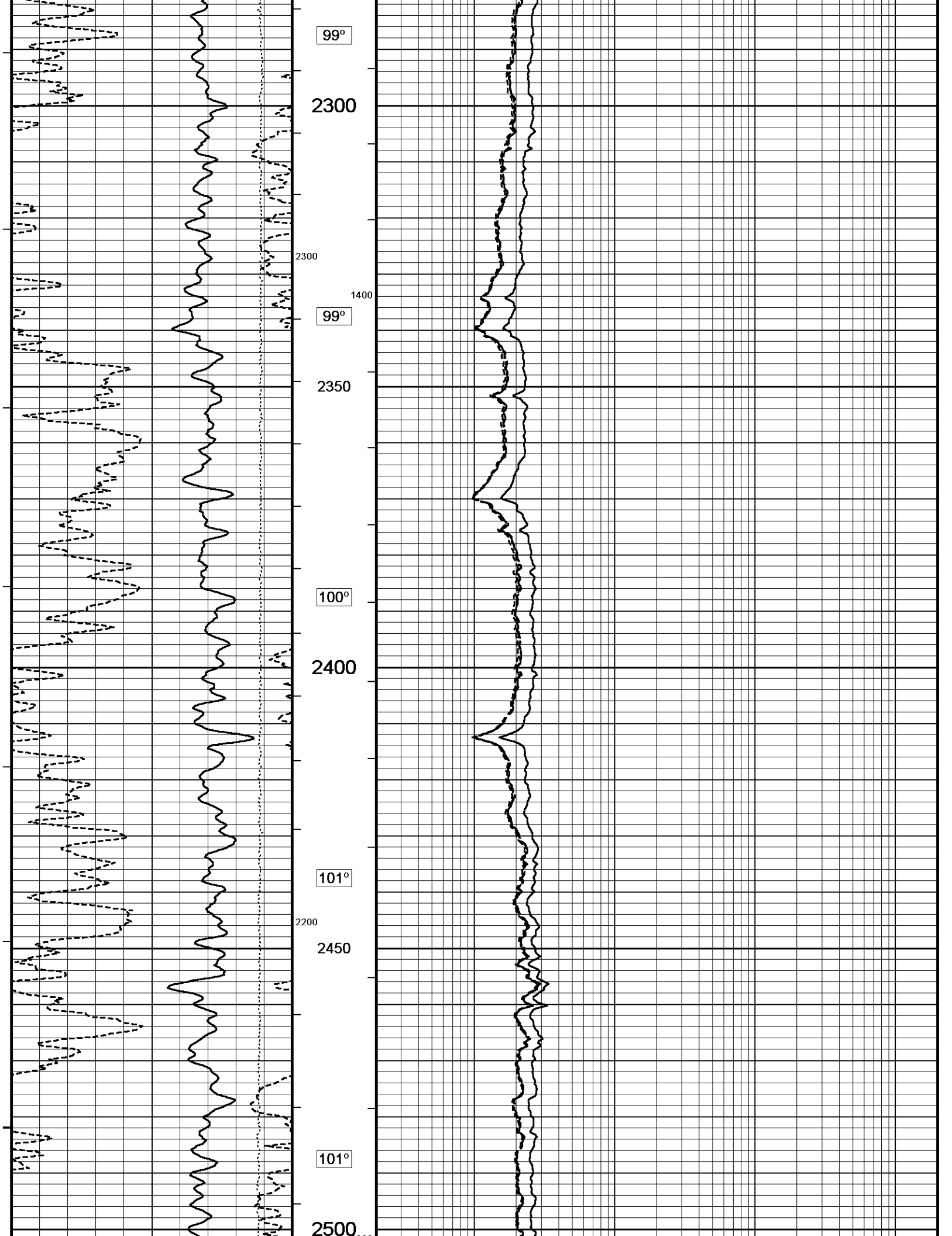
98°

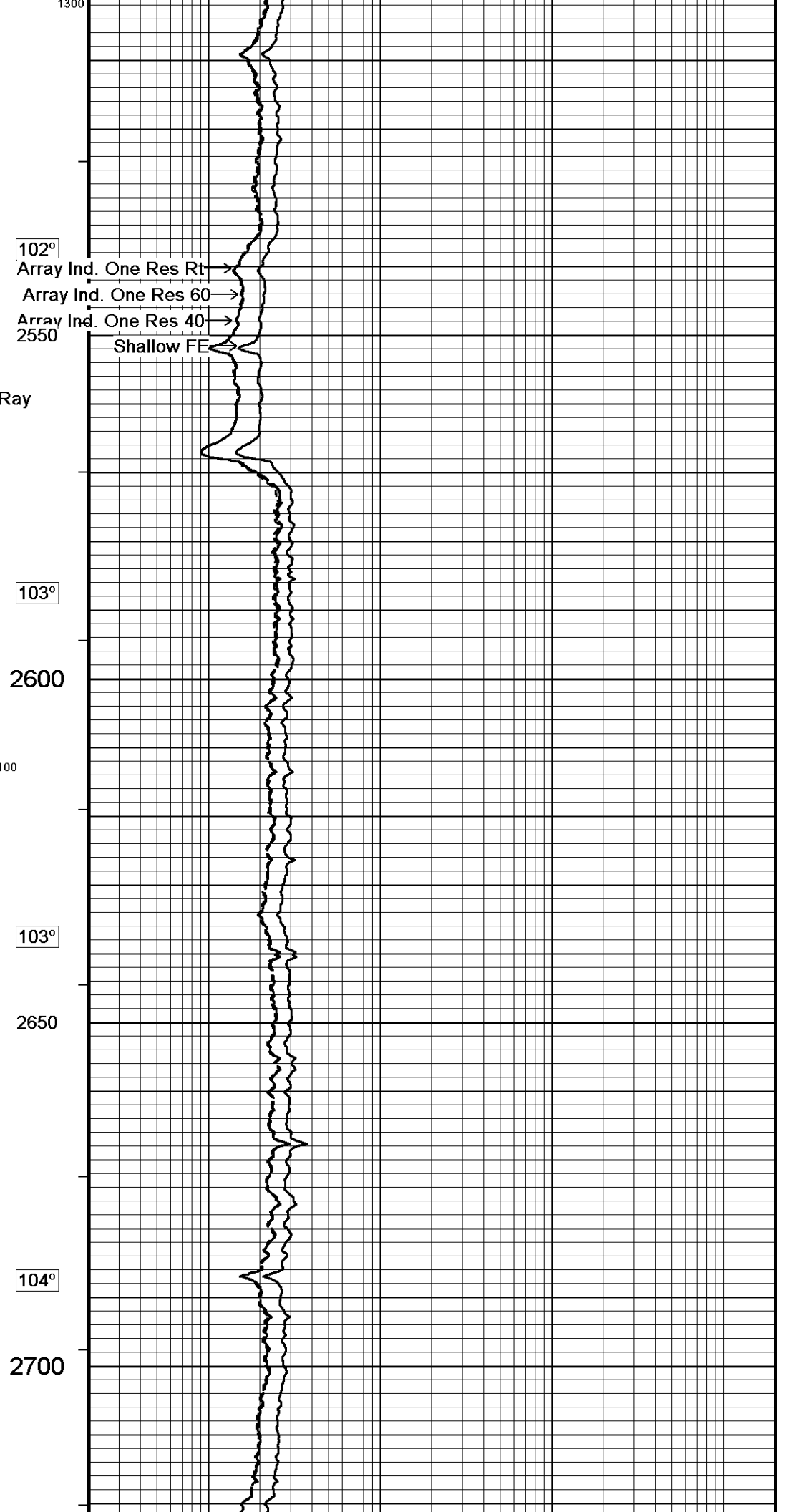
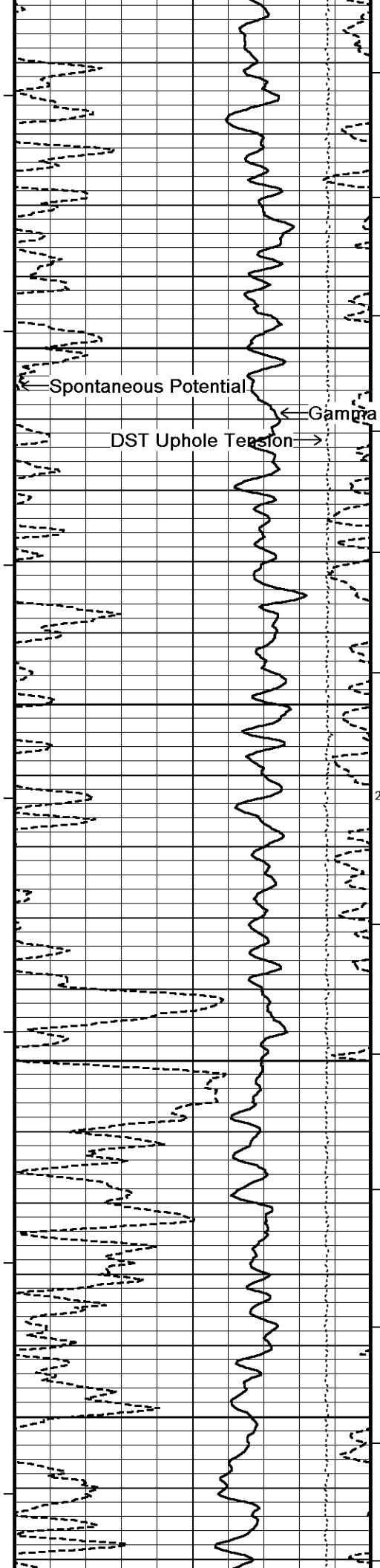
1500
2200

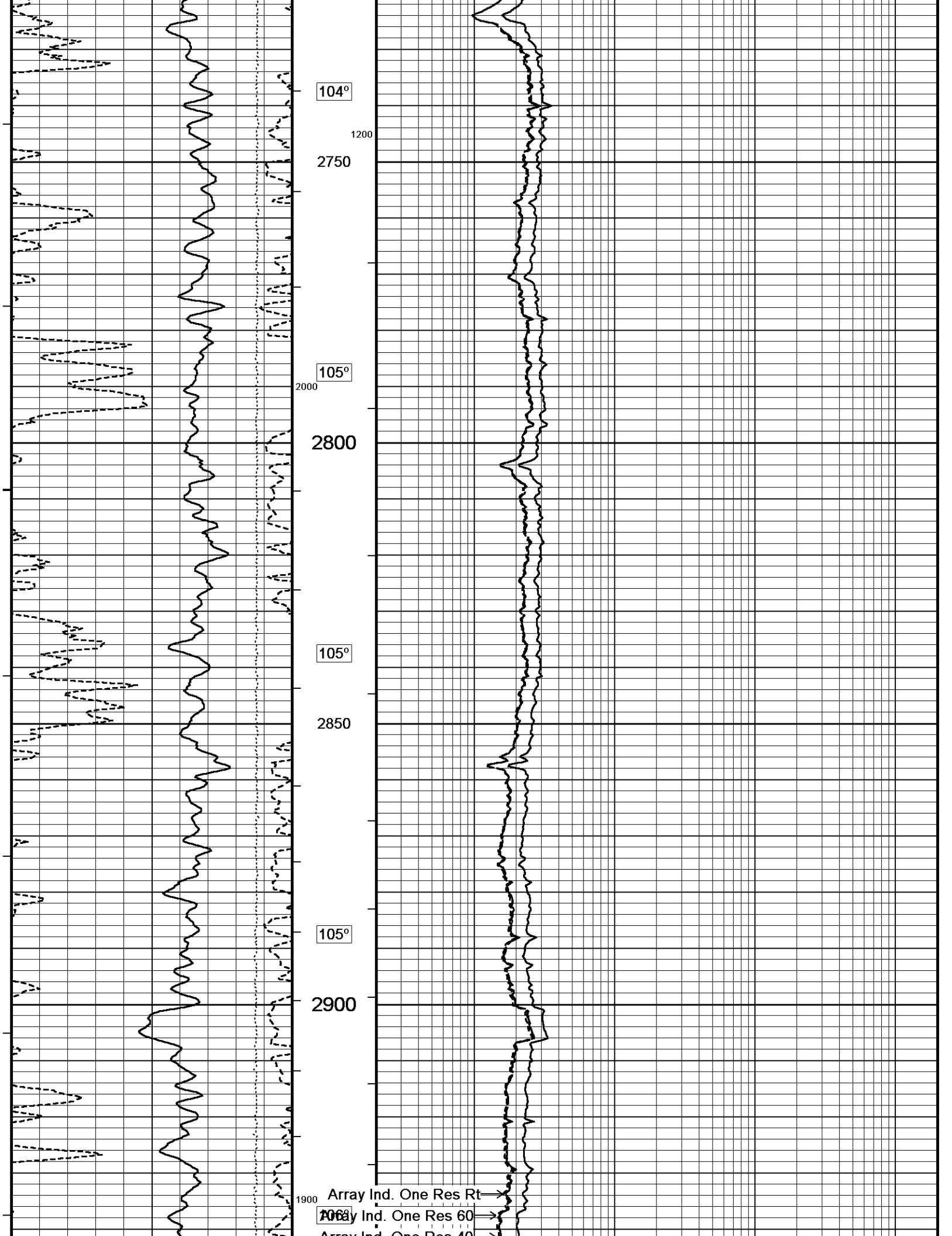
2400

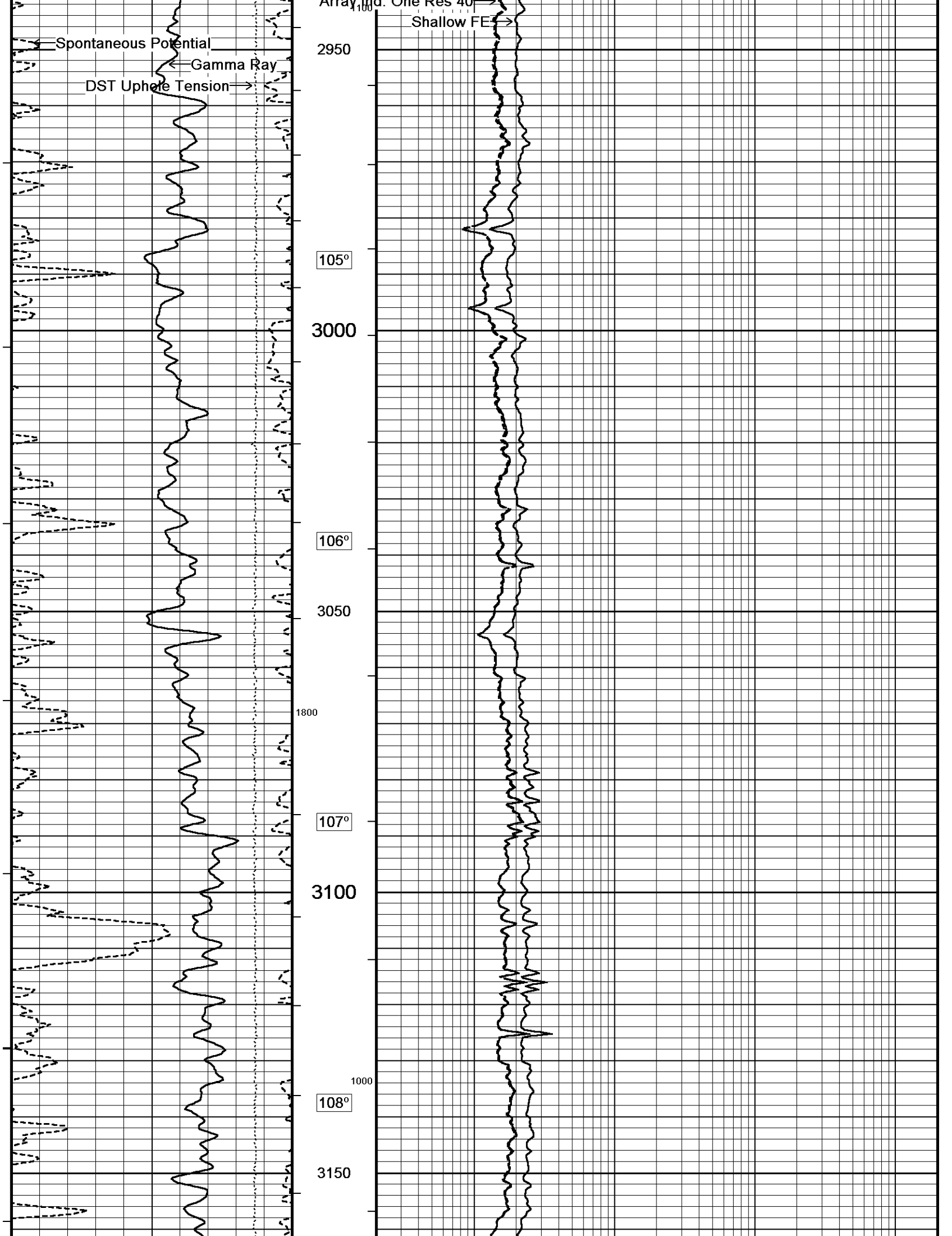
99°

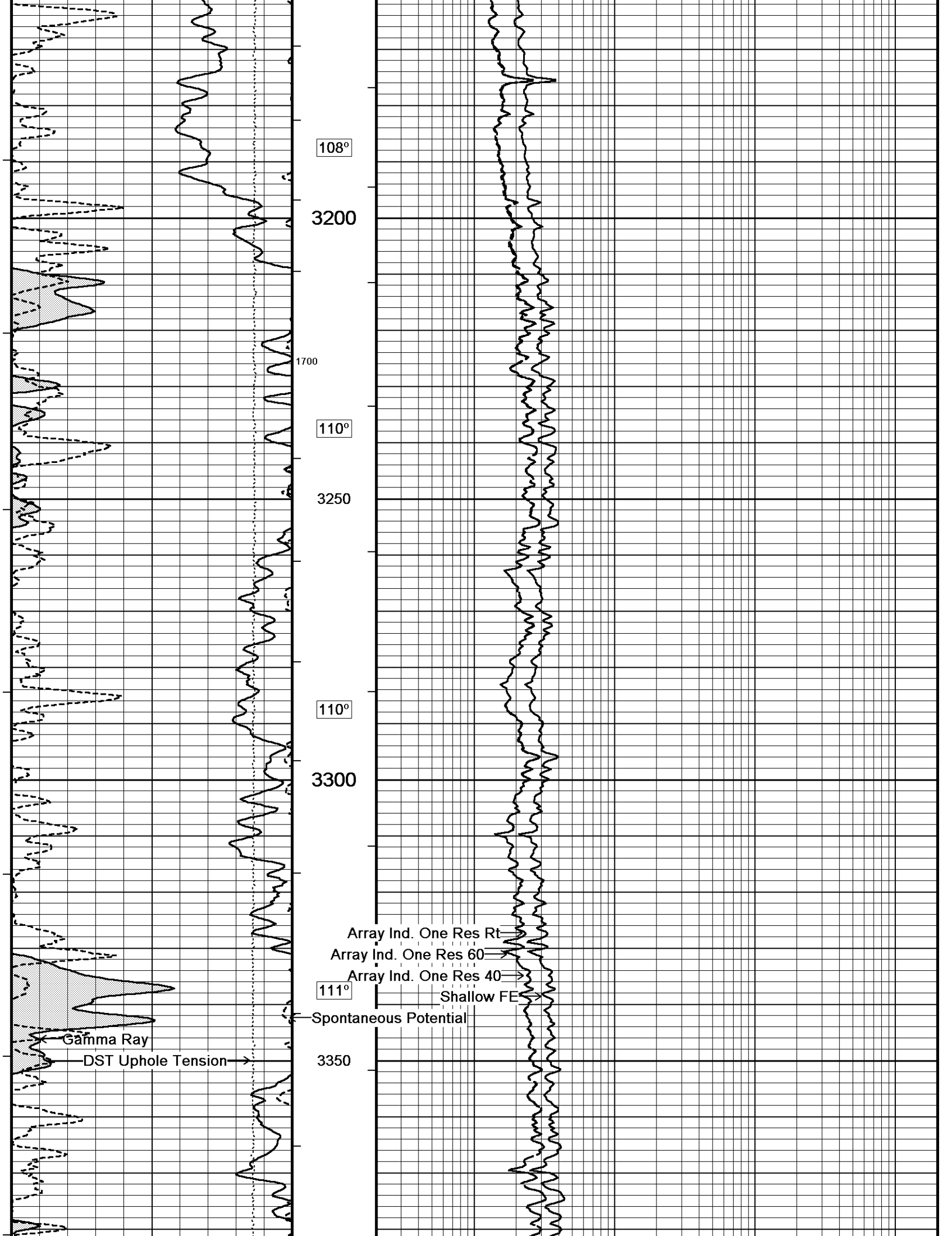
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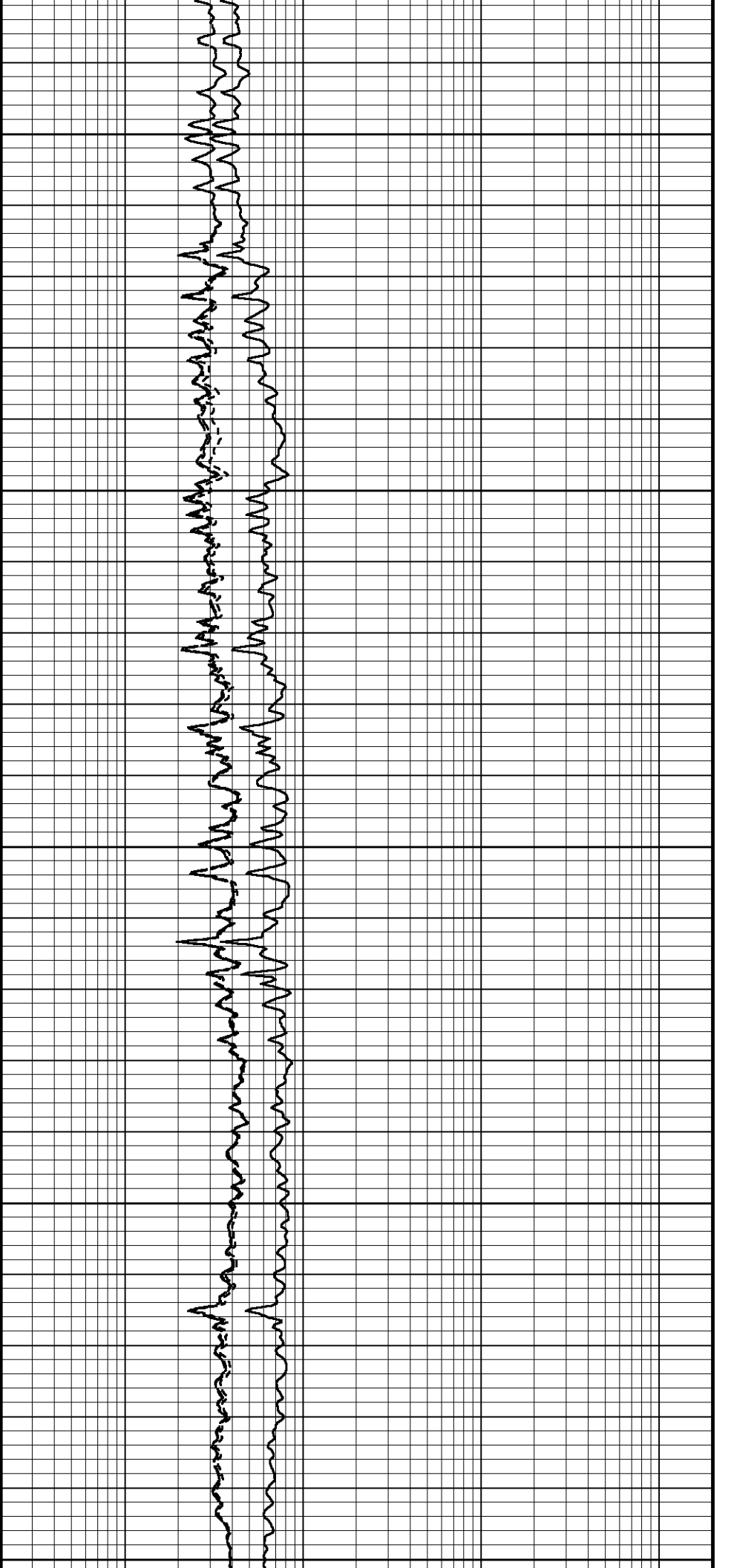
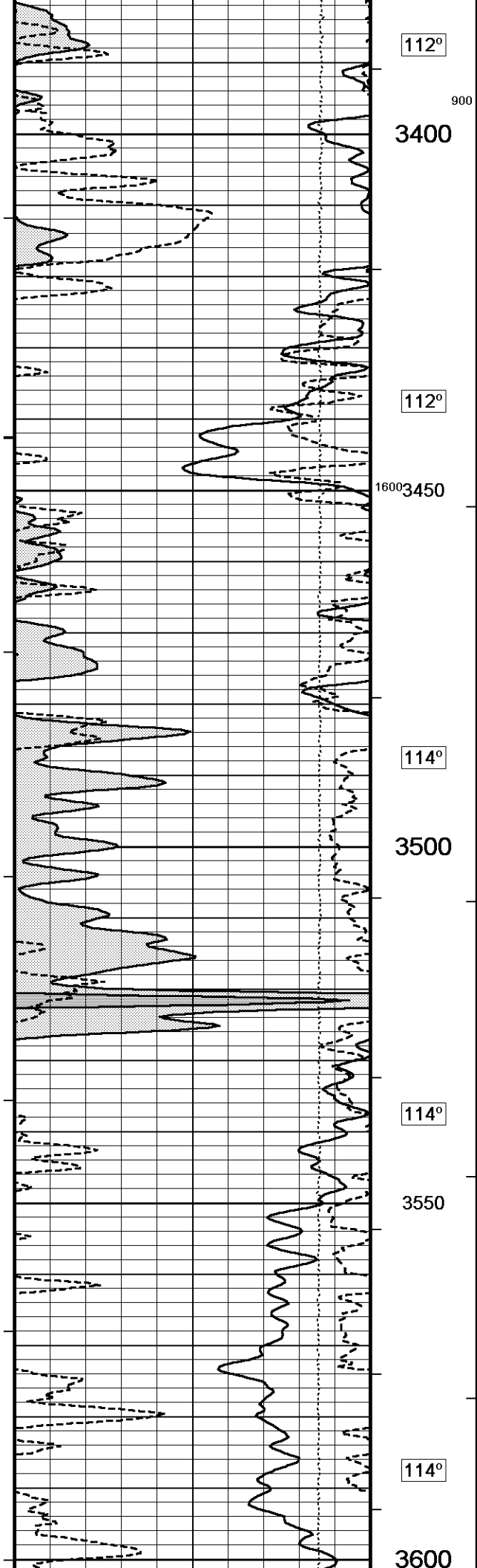


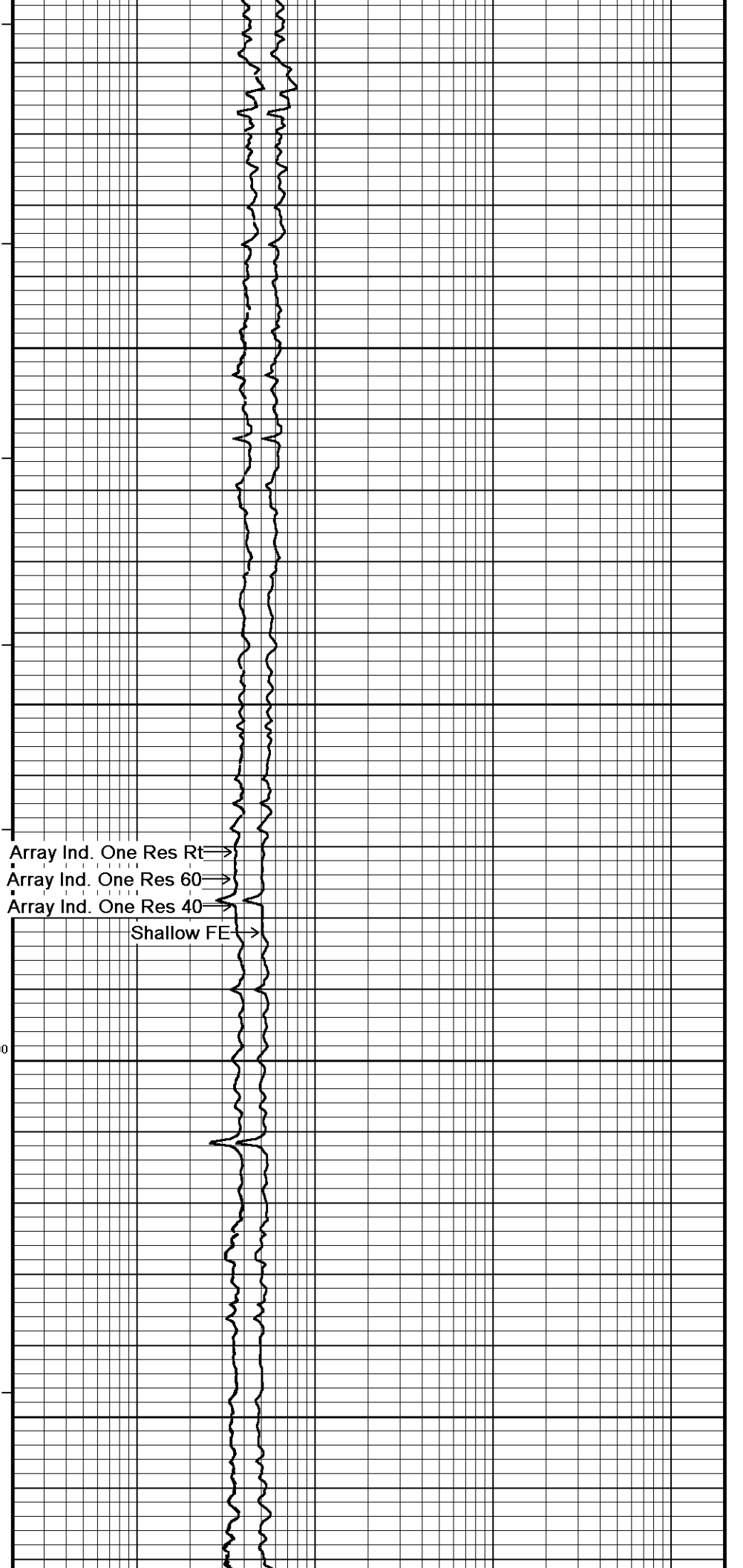
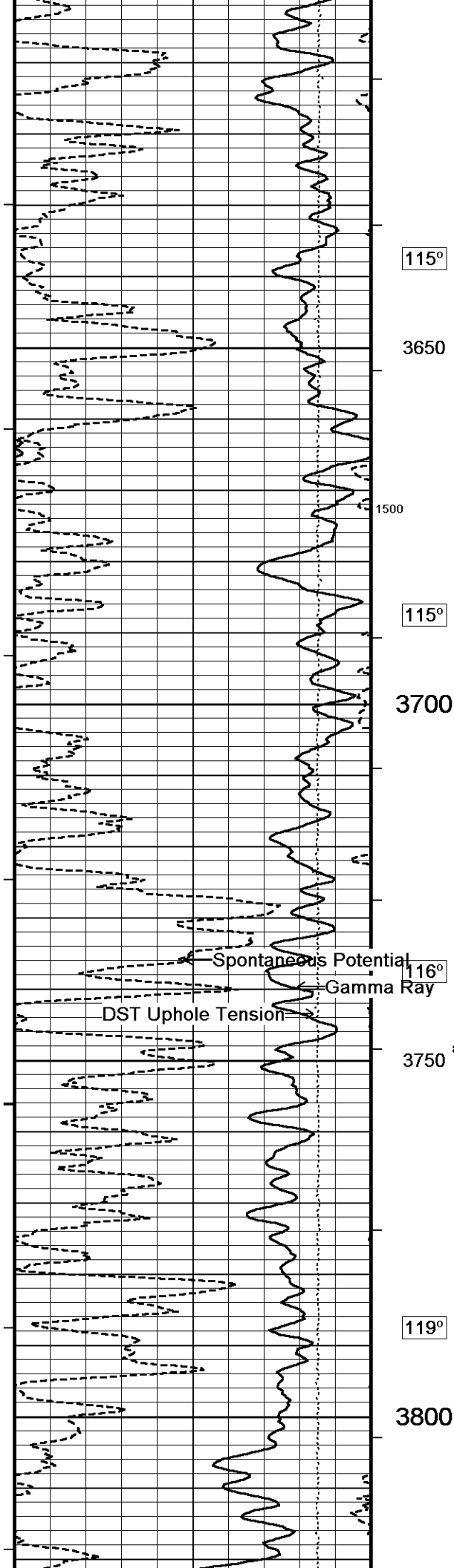


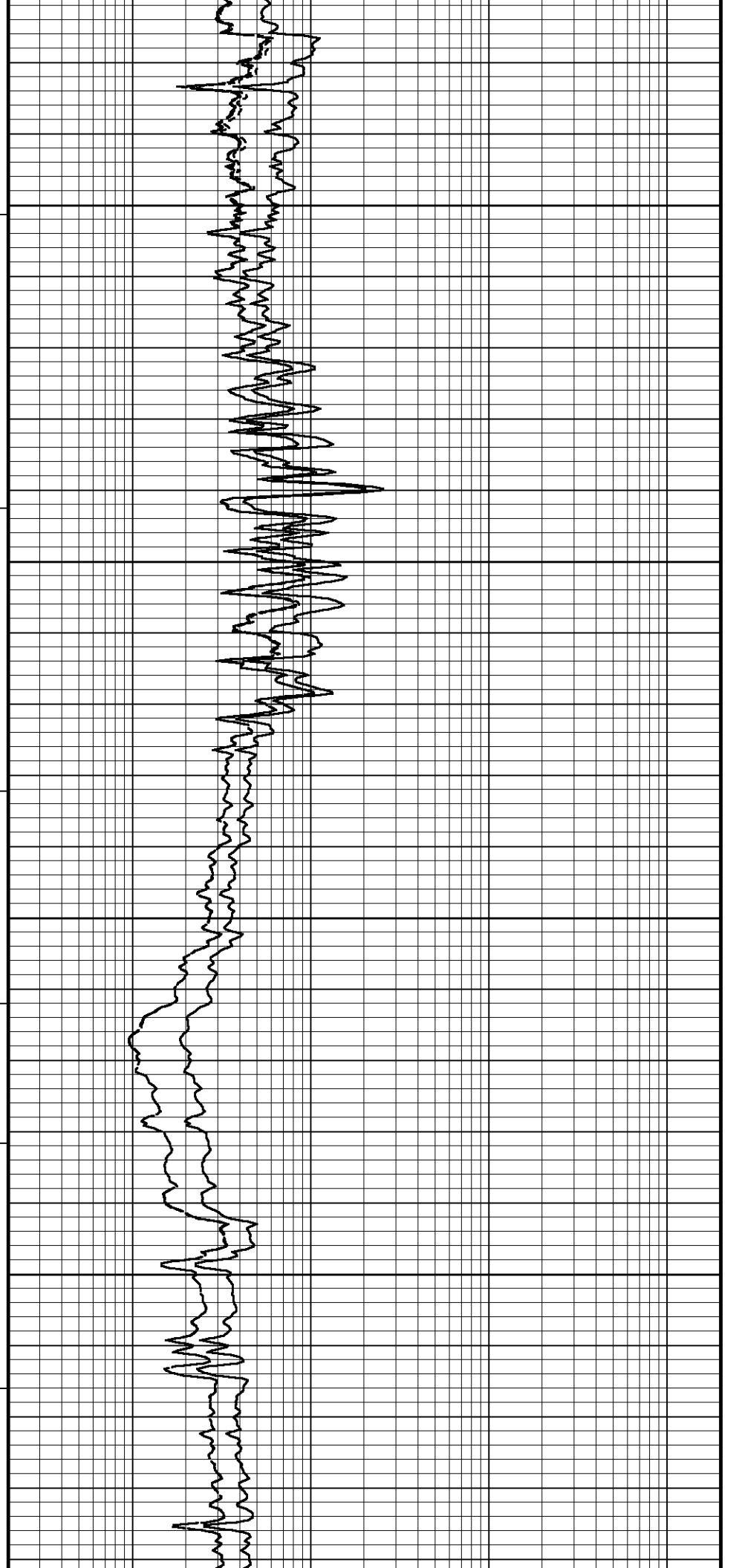
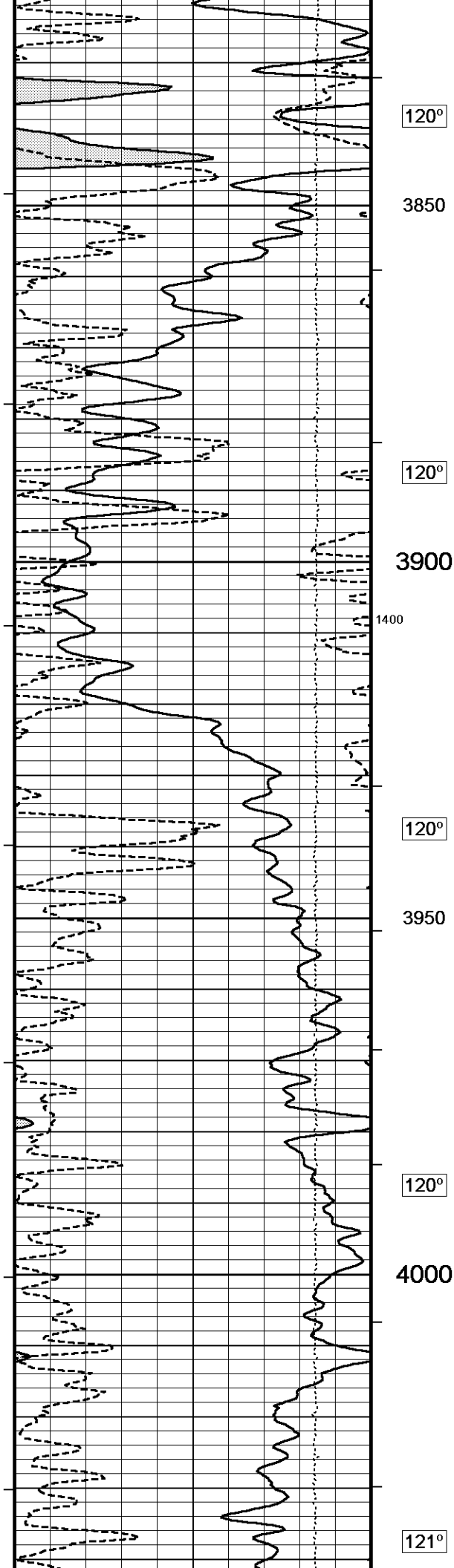


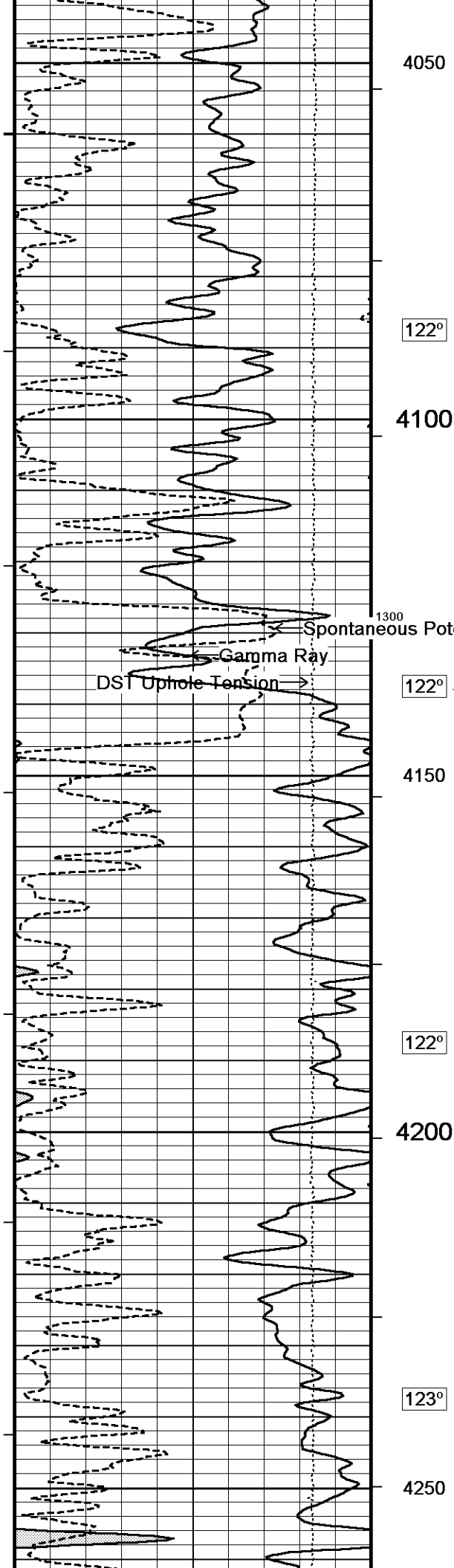












4050

122°

4100

122° 700

4150

122°

4200

123°

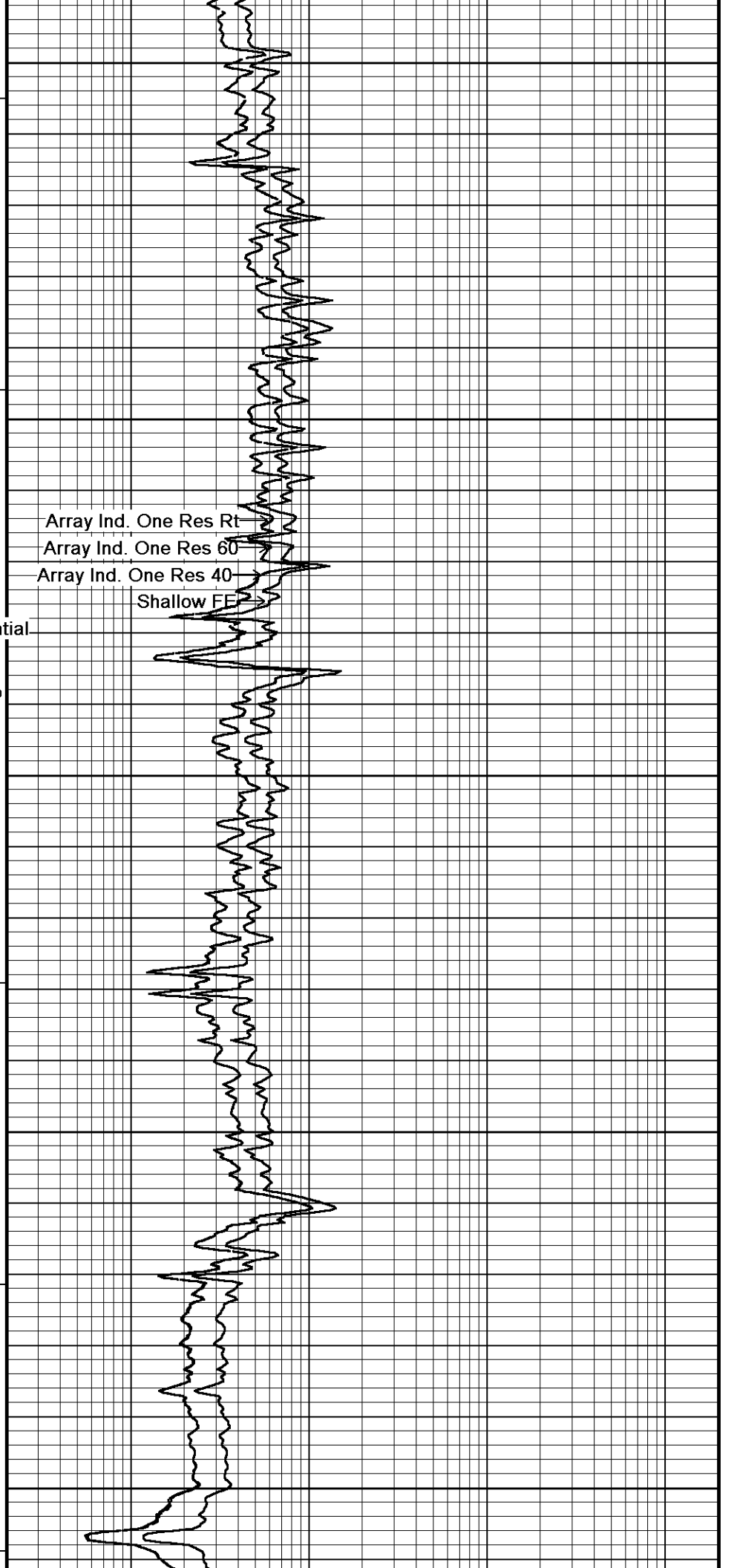
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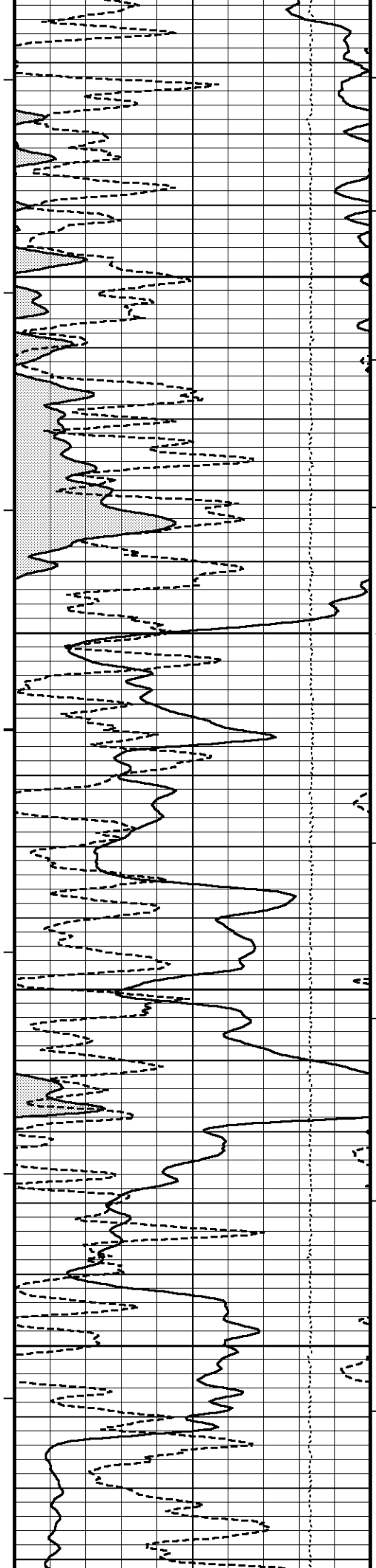
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Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE

Spontaneous Potential

Gamma Ray

DST Uphole Tension





124°

4300

125°

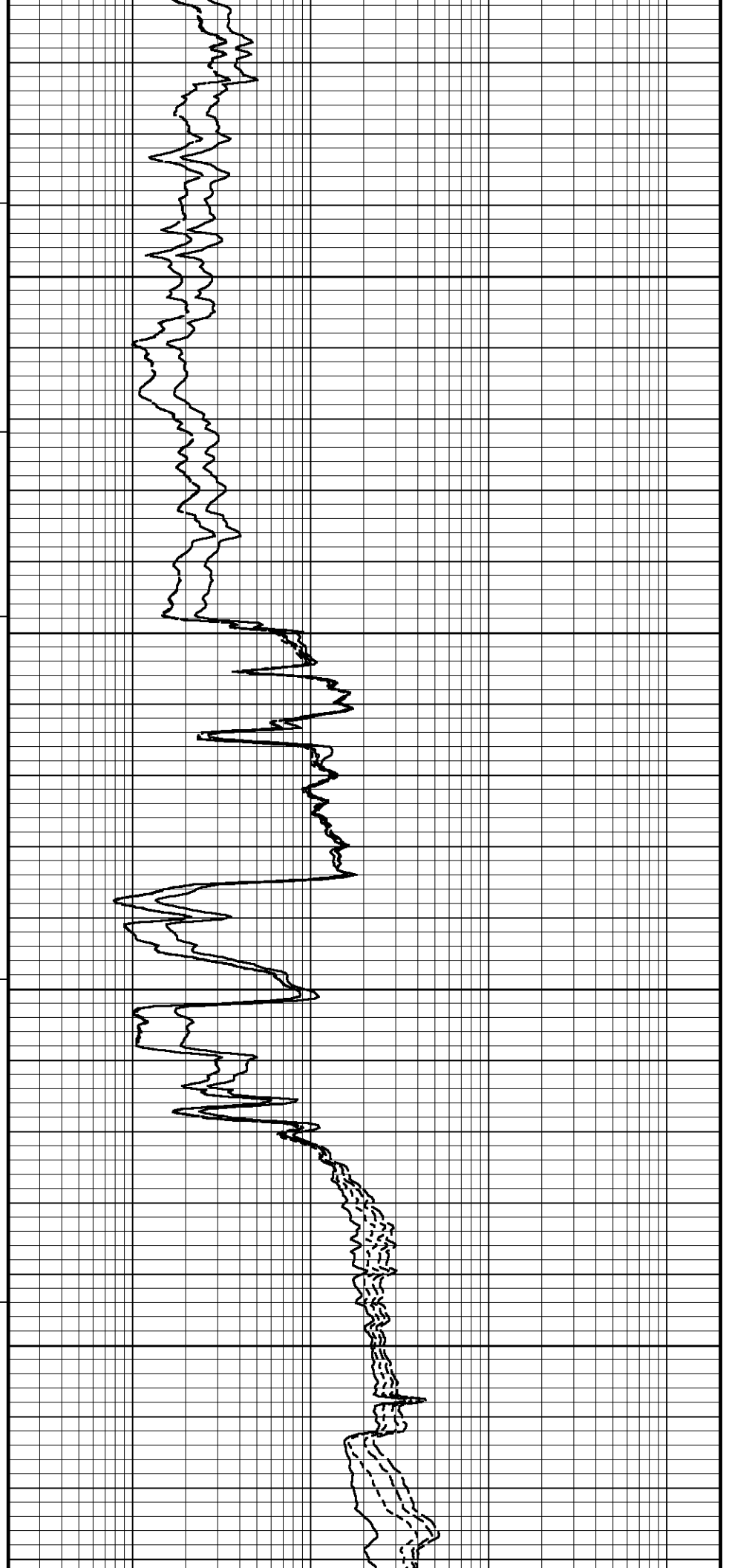
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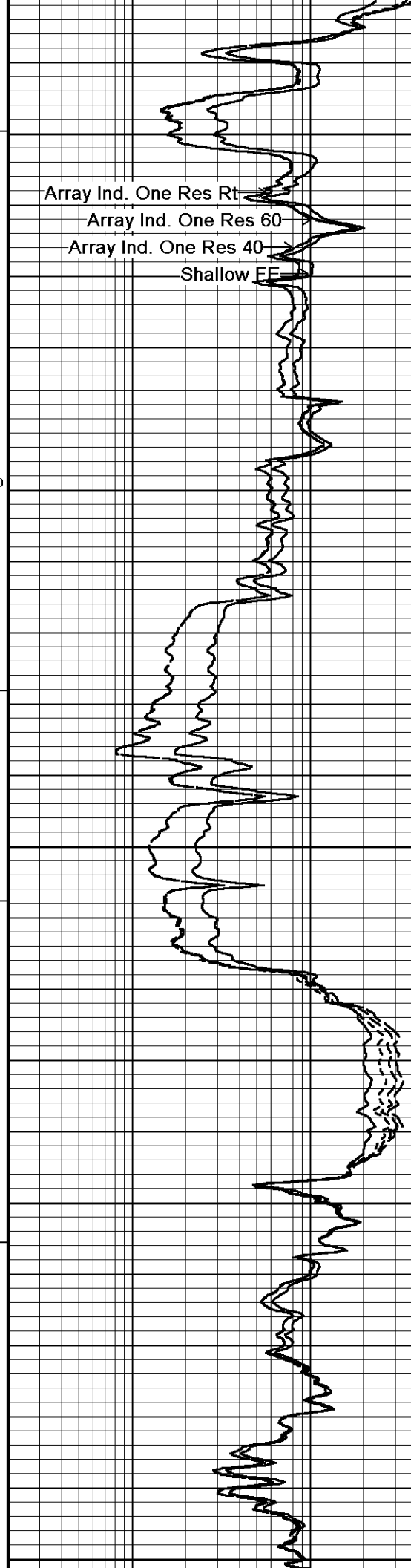
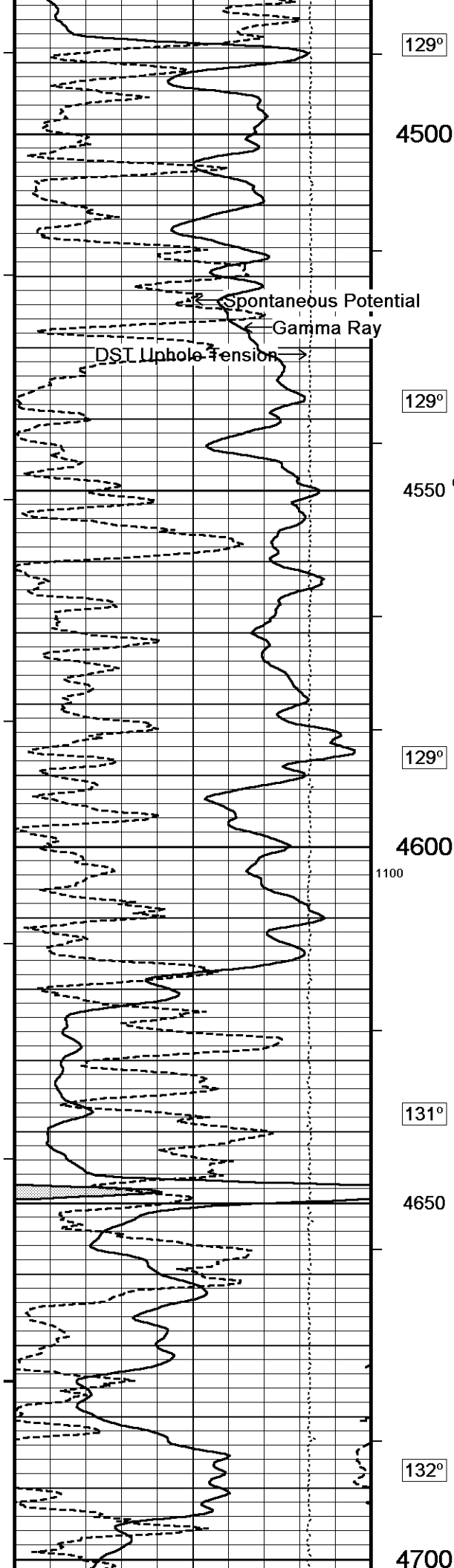
127°

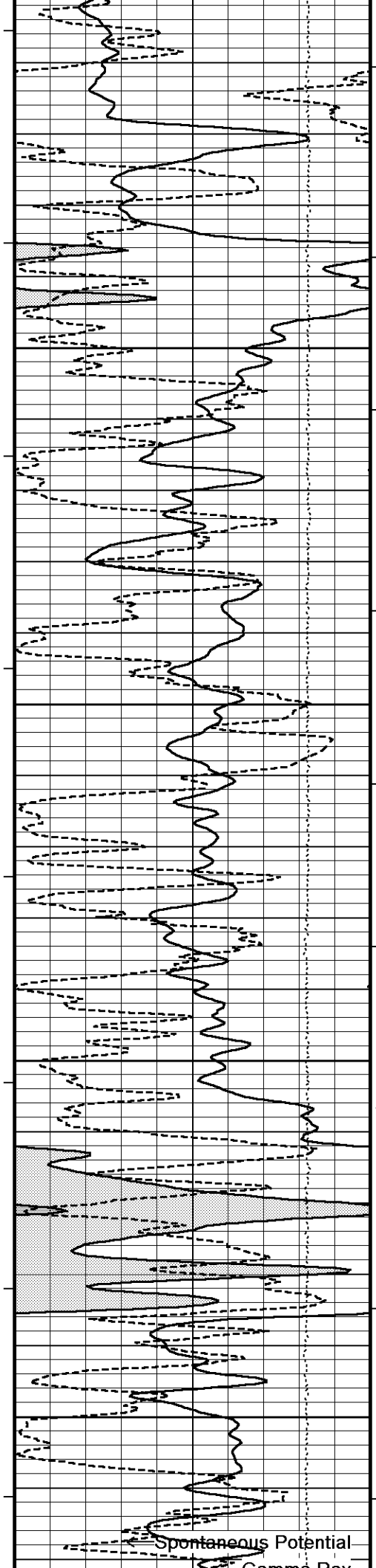
4400

129°

4450







131°

4750

132°

4800

132°

4850

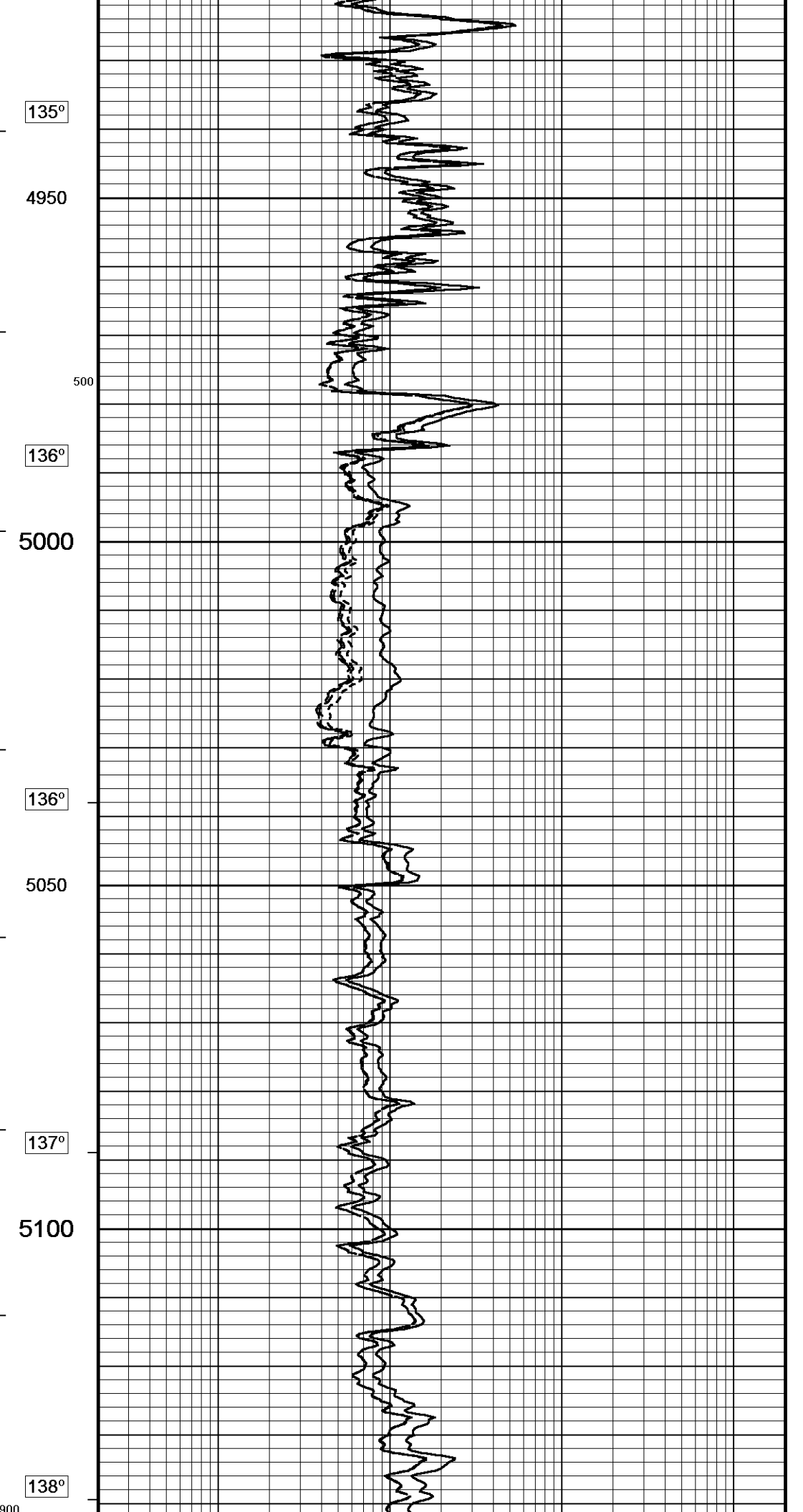
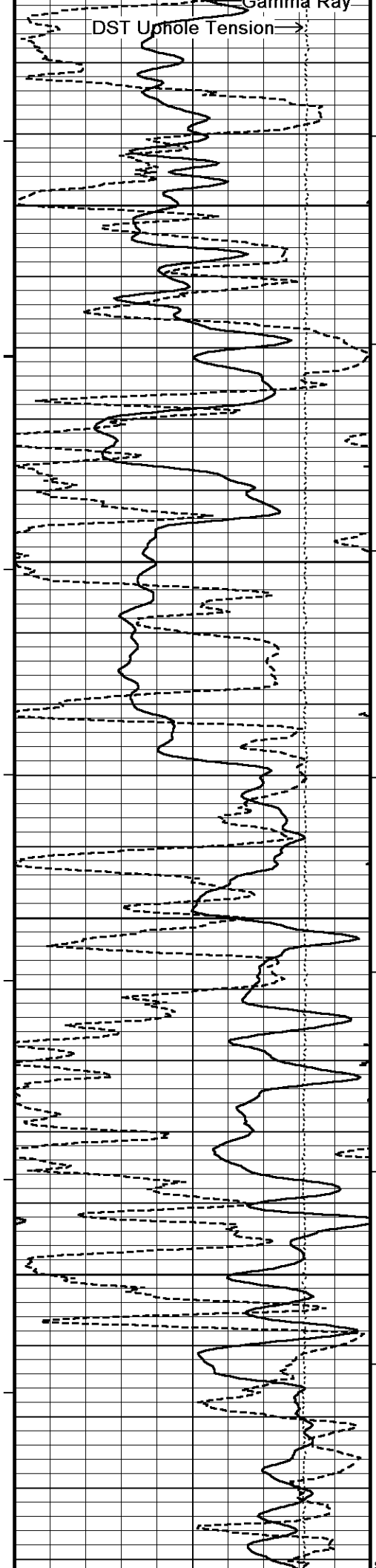
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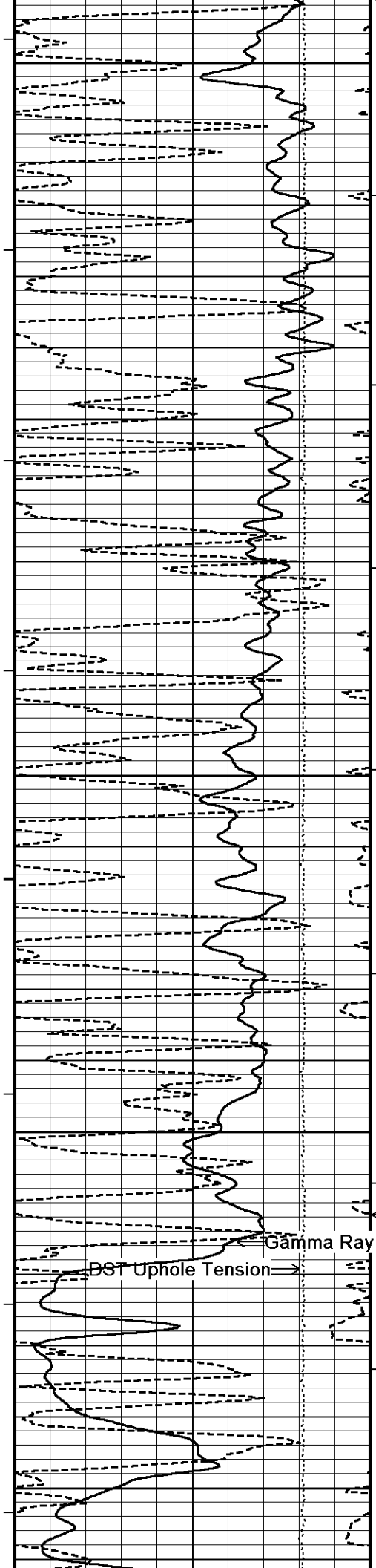
133°

4900

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

Spontaneous Potential





5150

139°

5200

140°

5250

143°

5300

144°

5350

Array Ind. One Res Rt

Array Ind. One Res 60

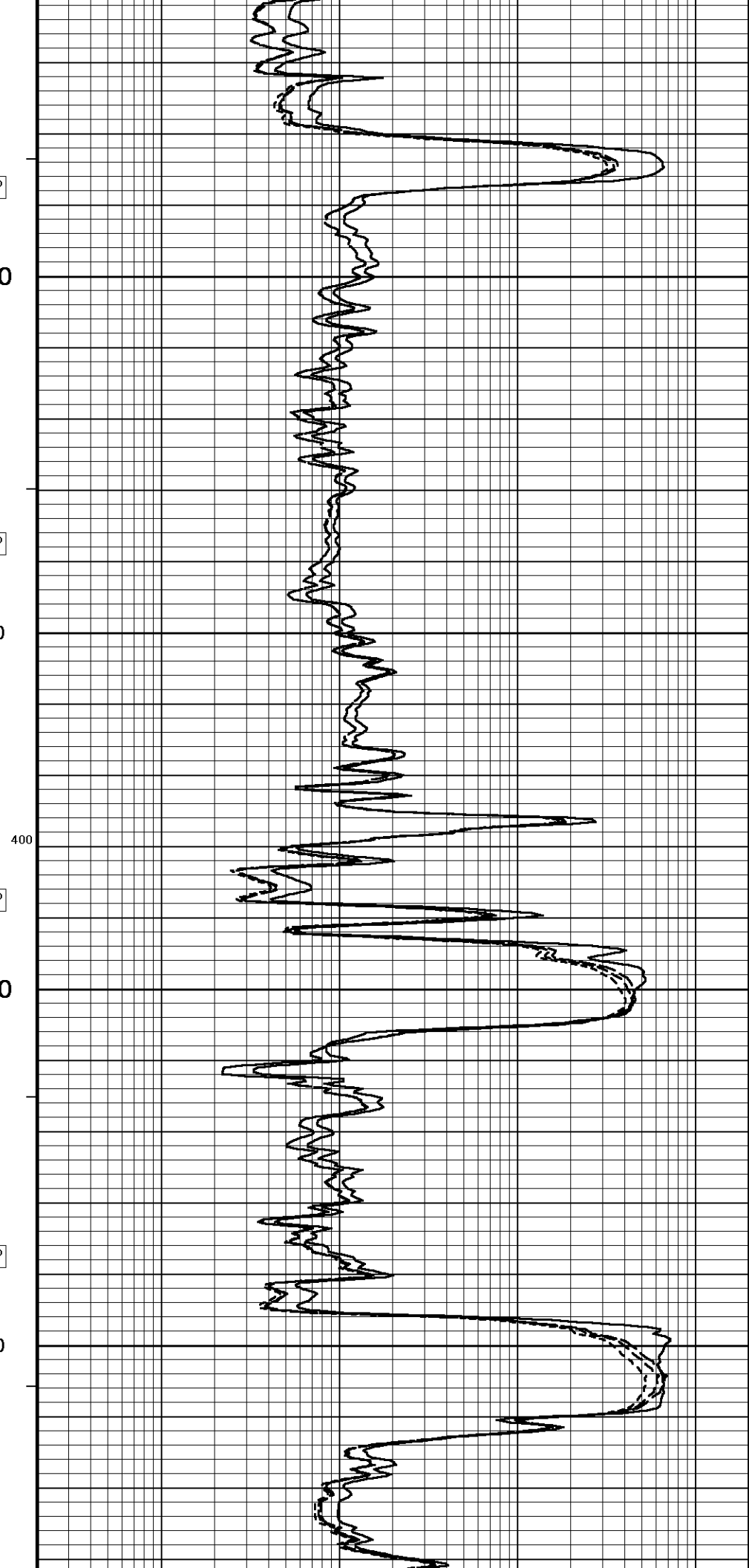
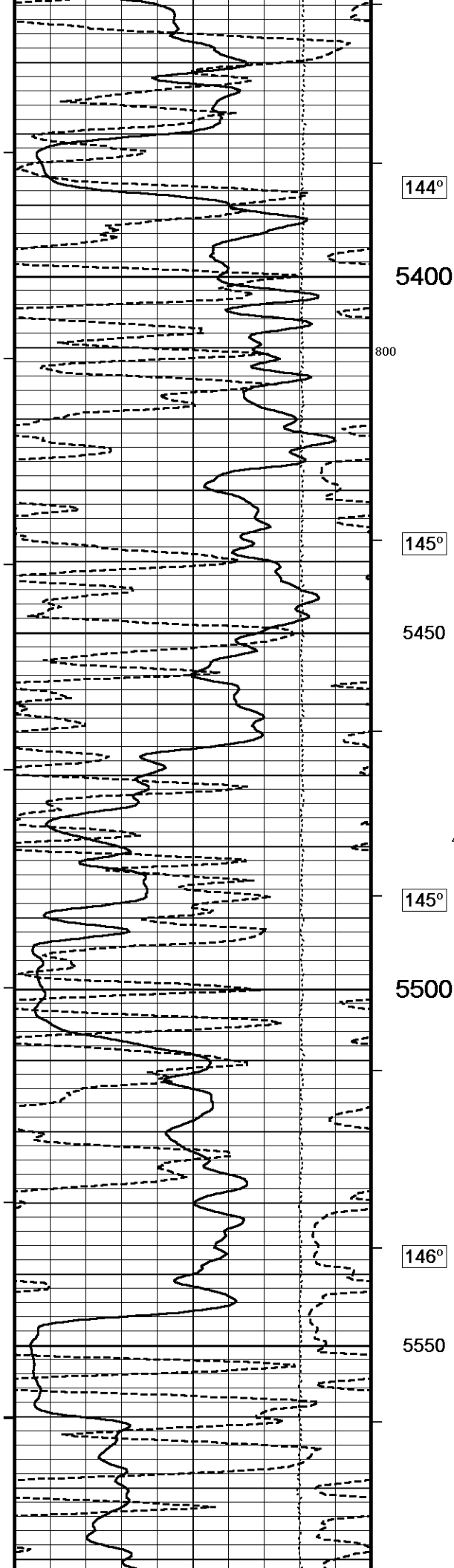
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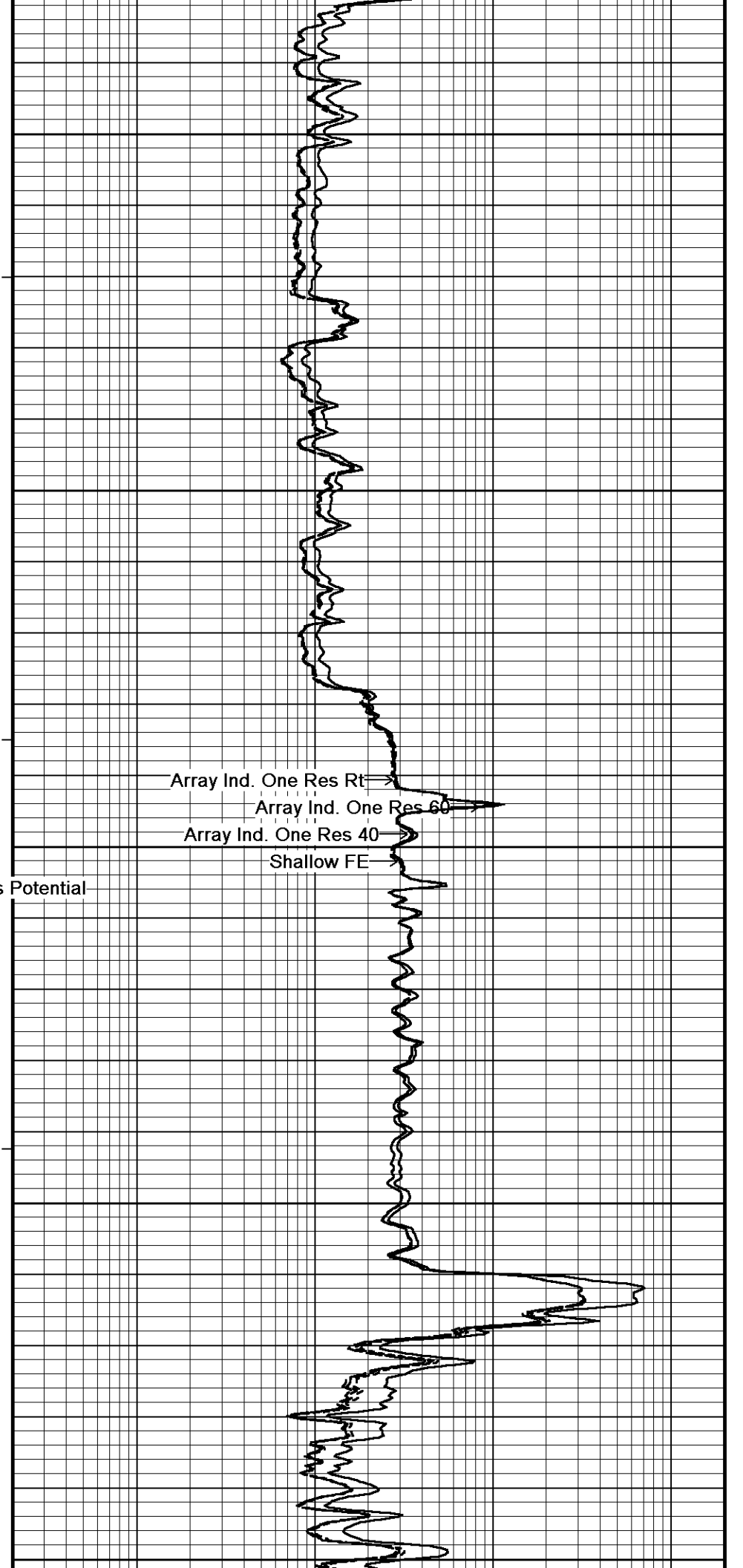
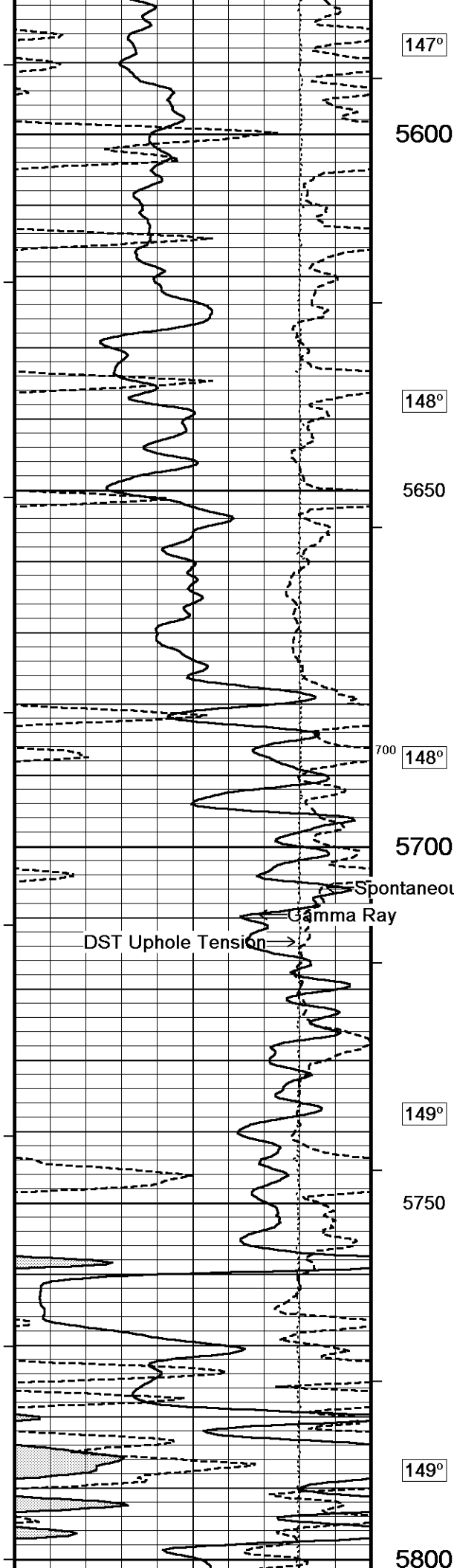
Shallow FE

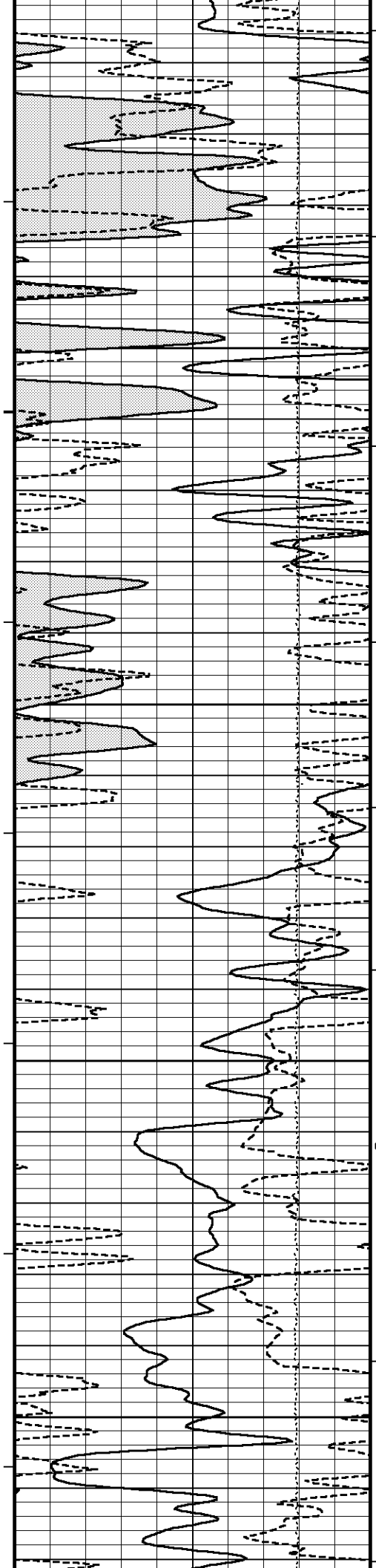
Spontaneous Potential

Gamma Ray

DST Uphole Tension







149°

5850

150°

5900

151°

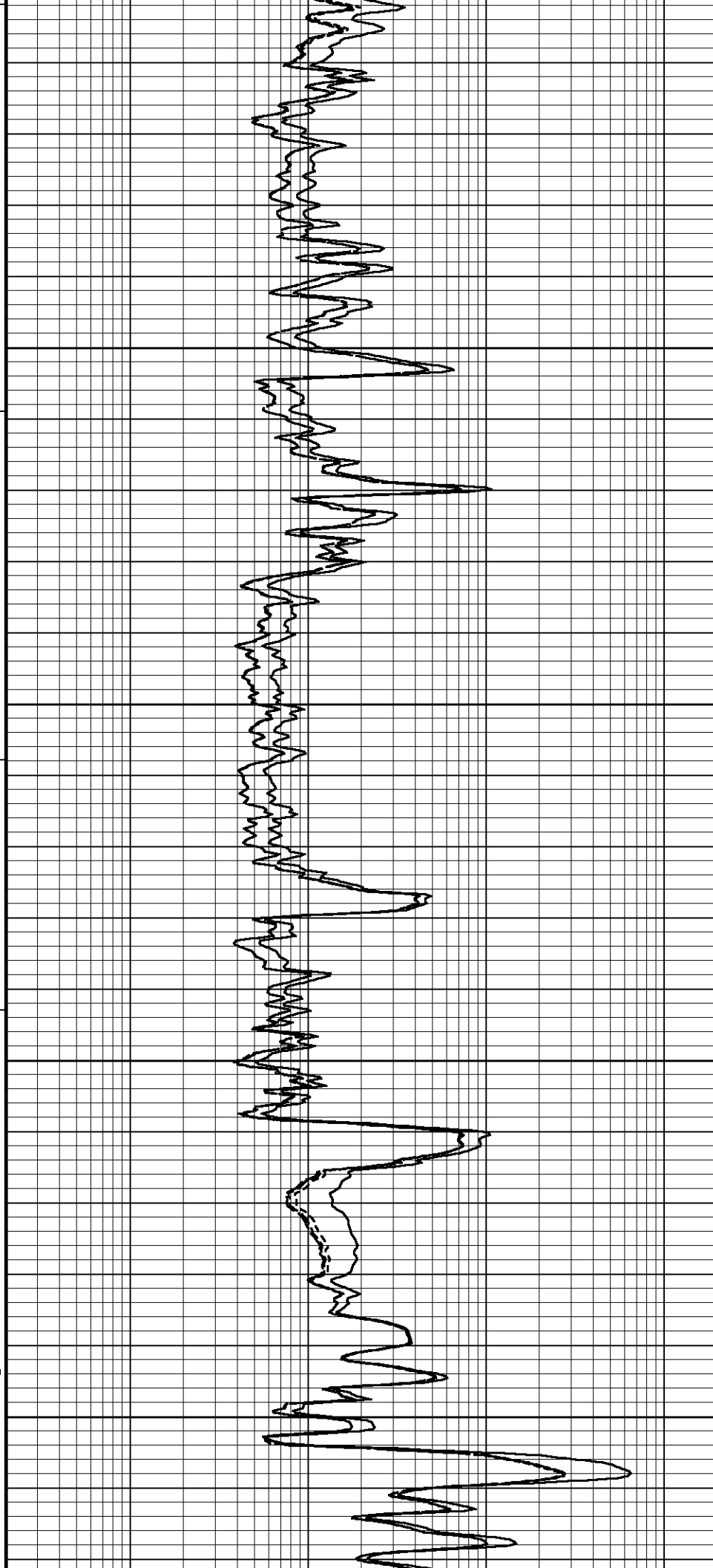
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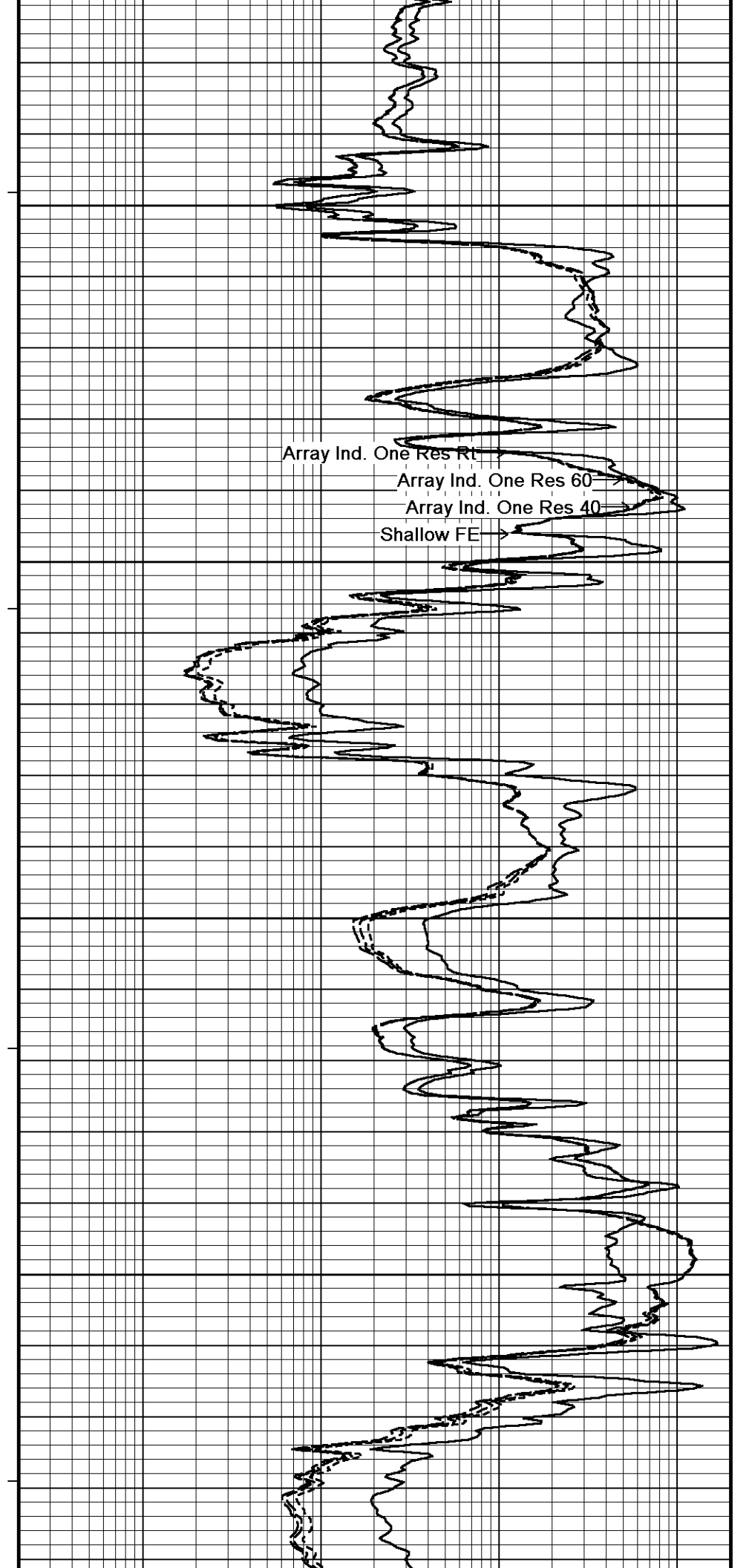
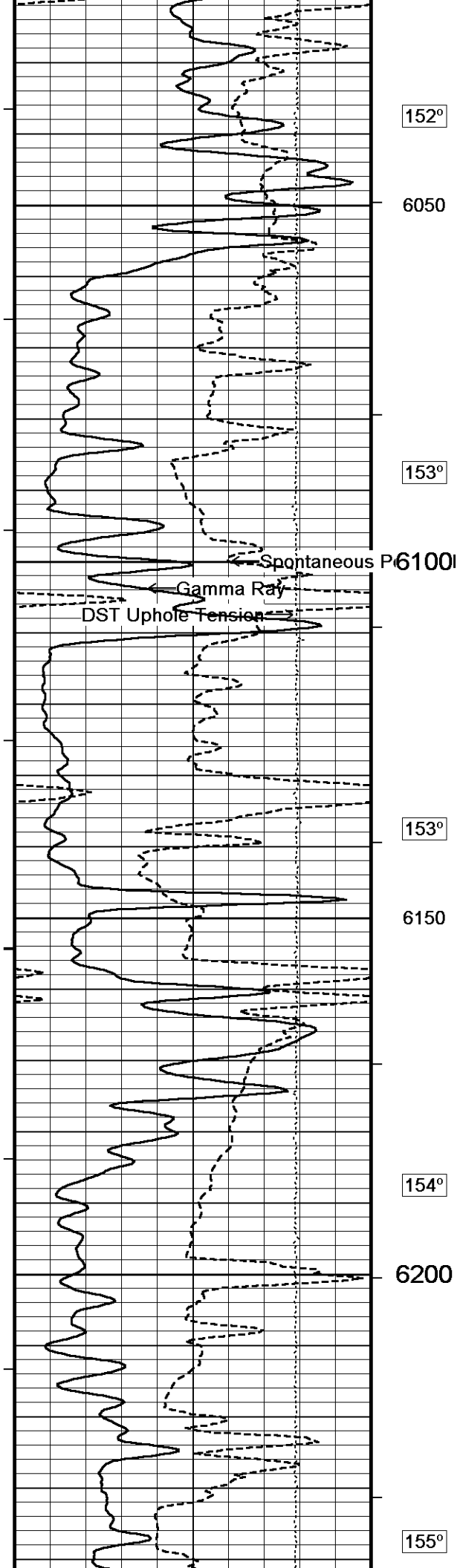
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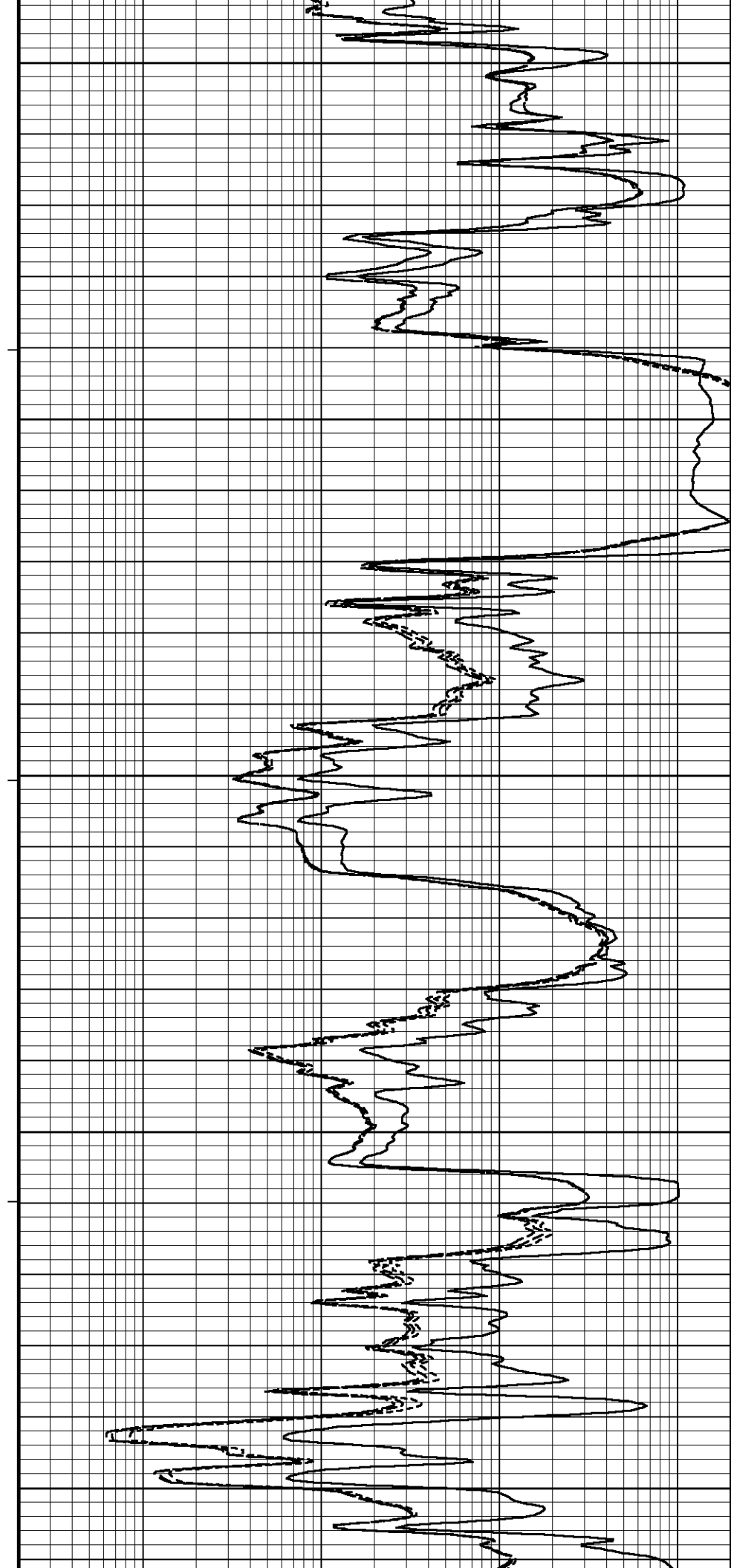
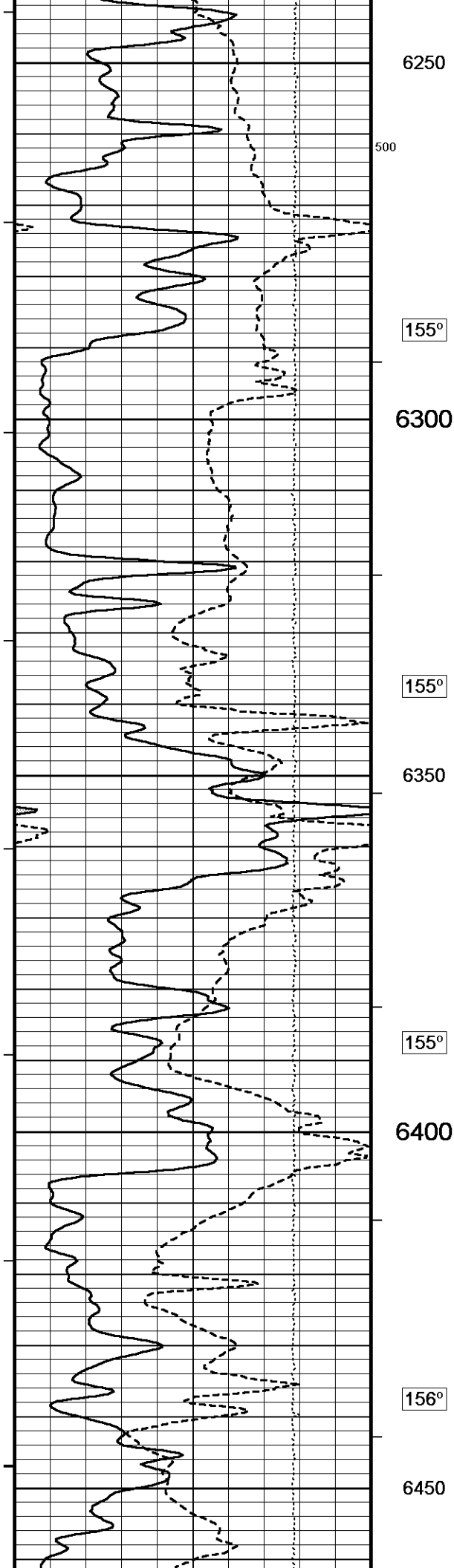
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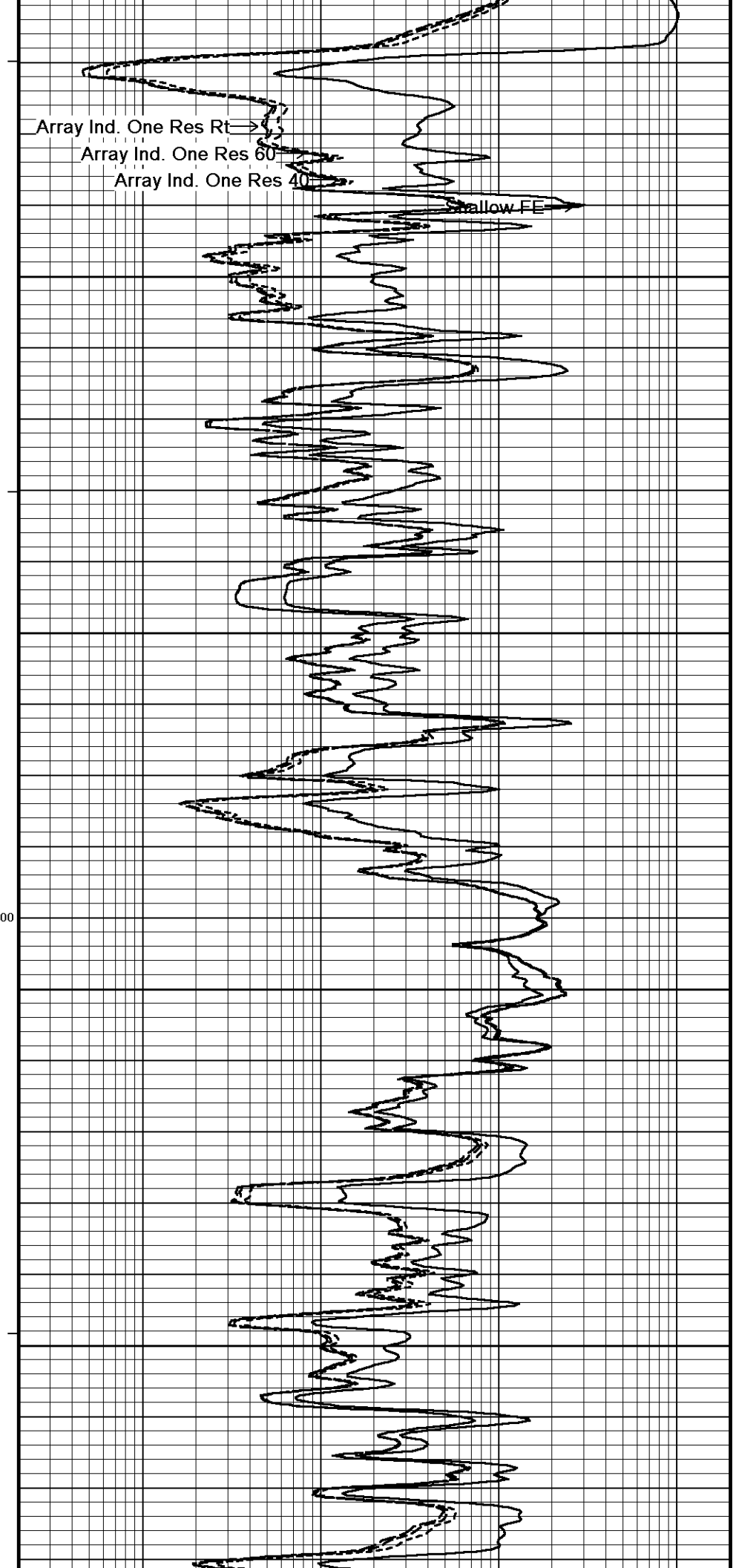
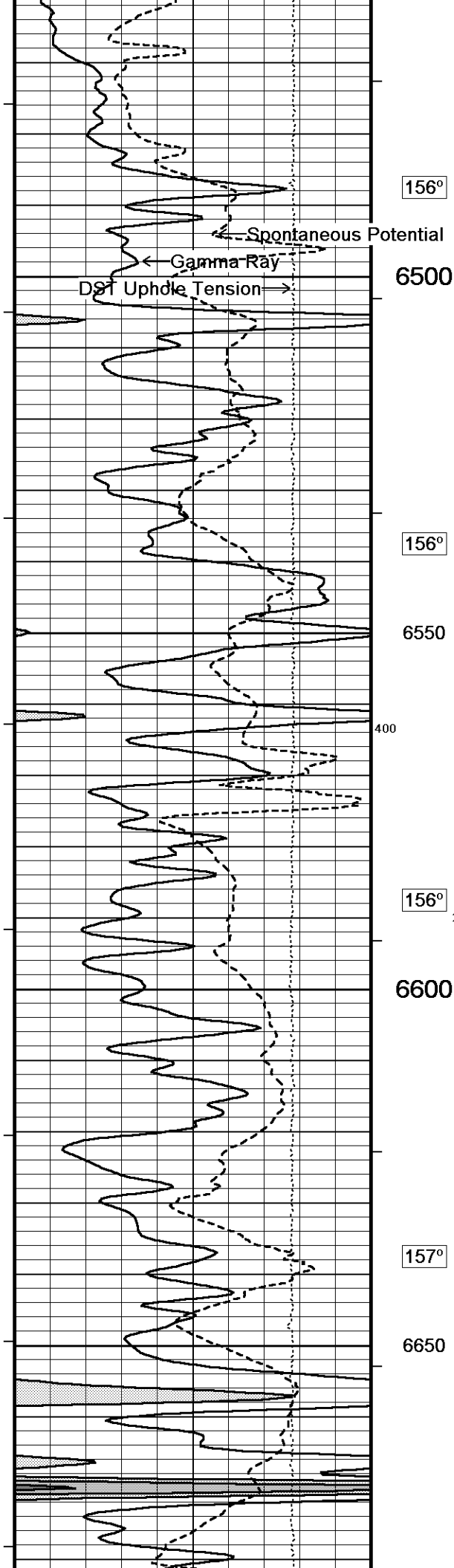
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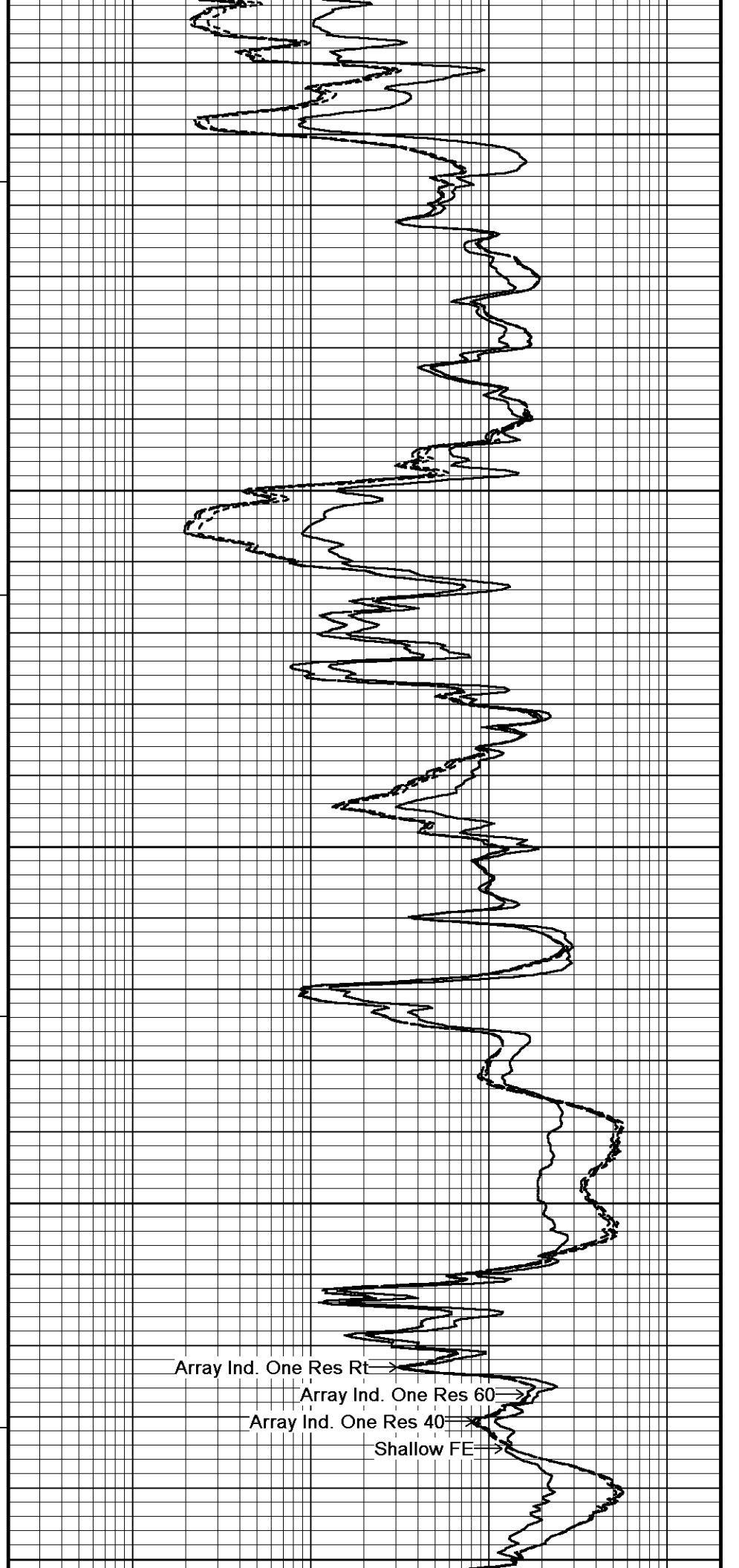
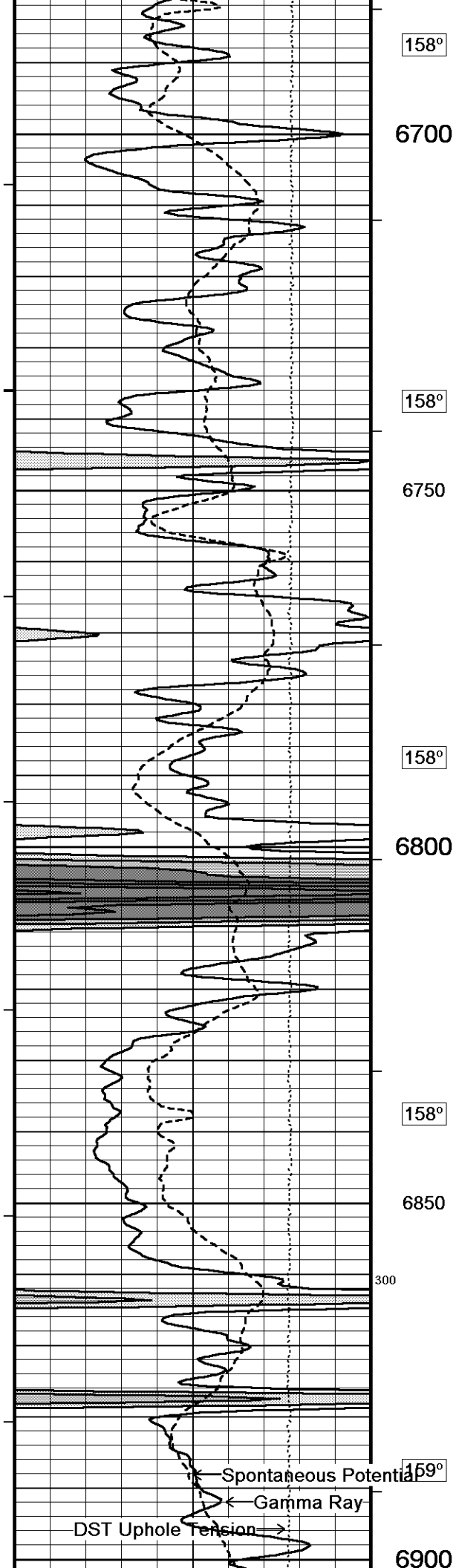
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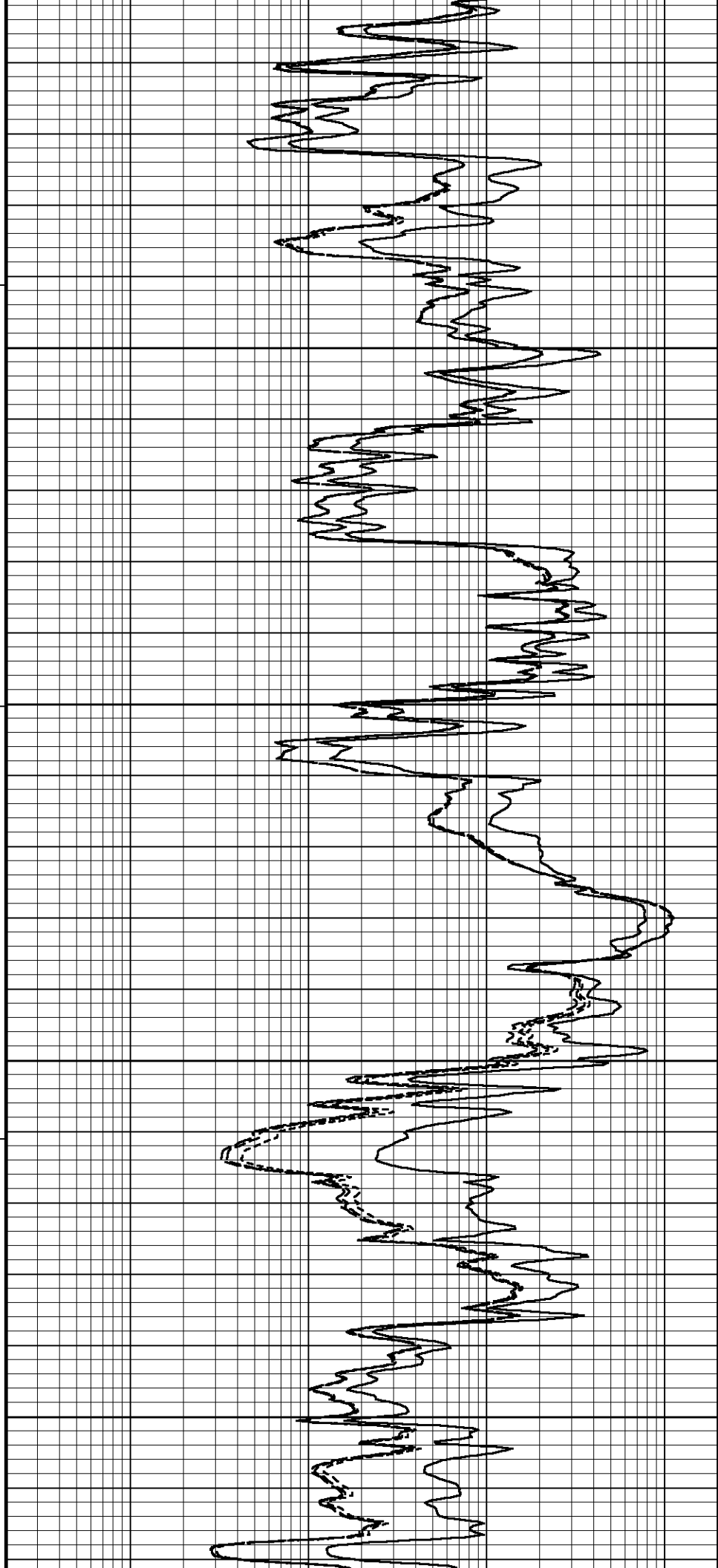
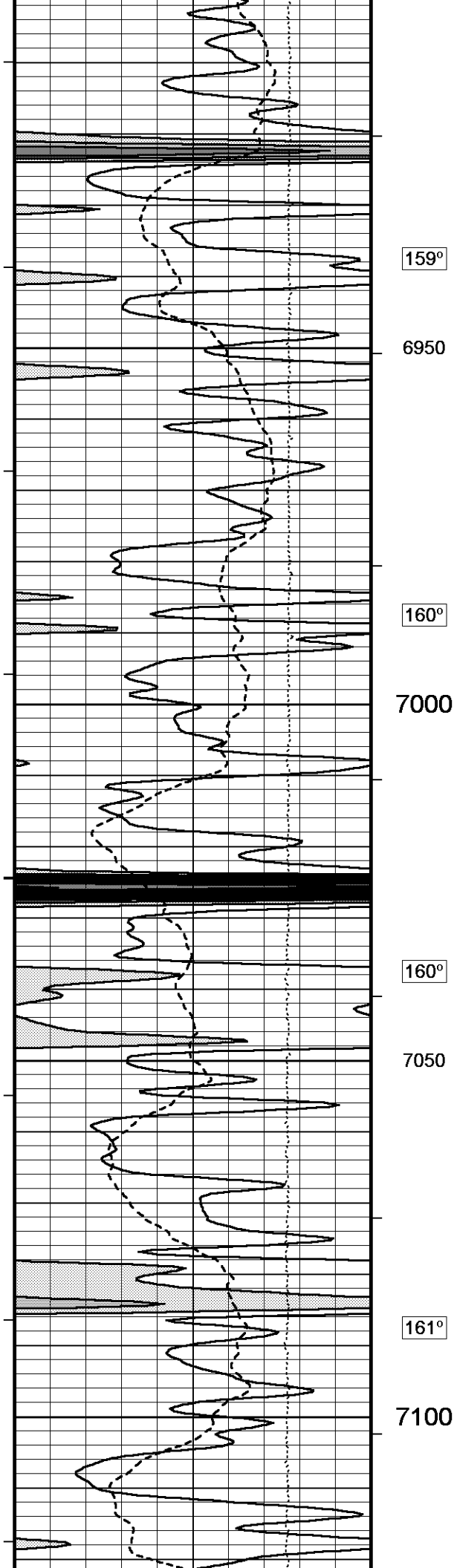


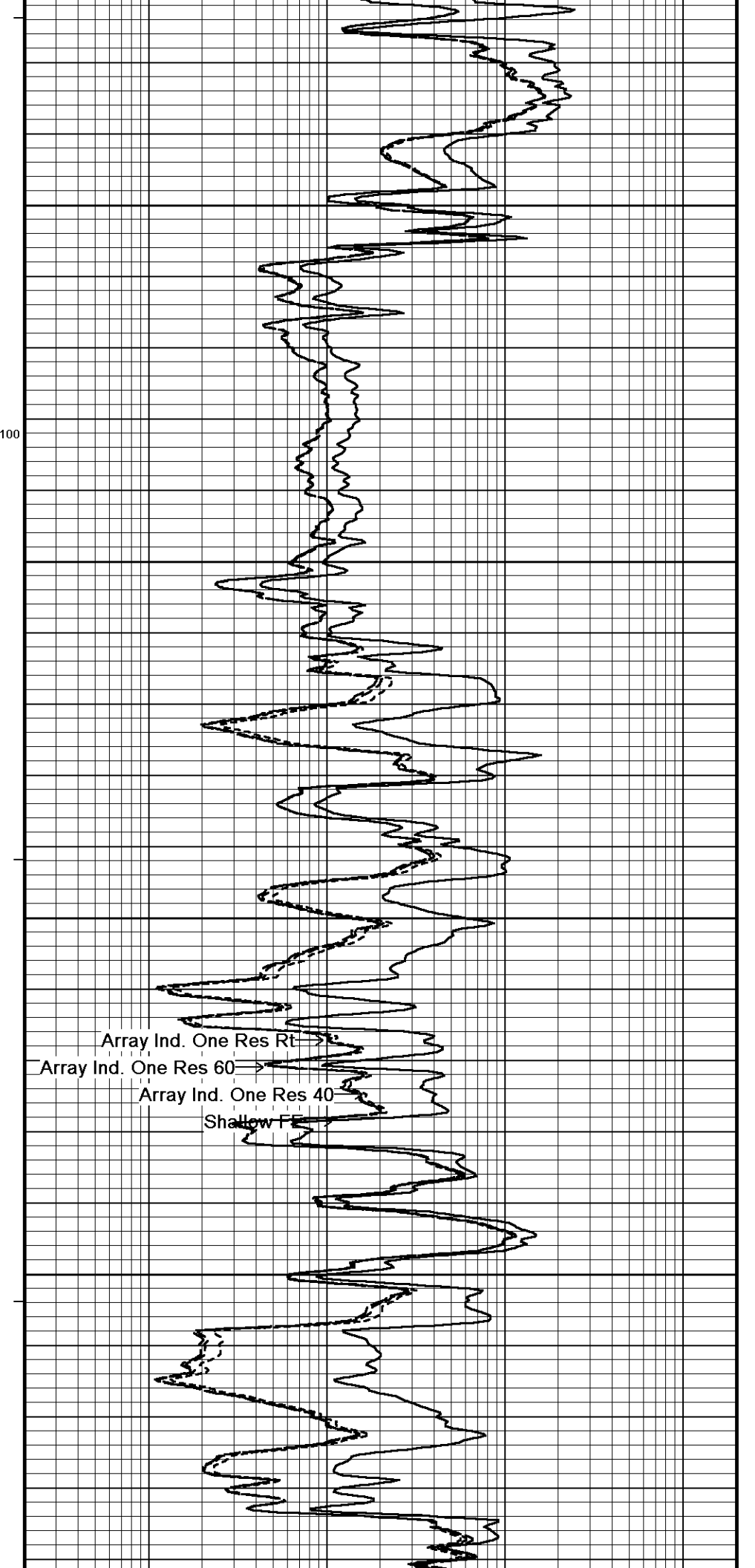
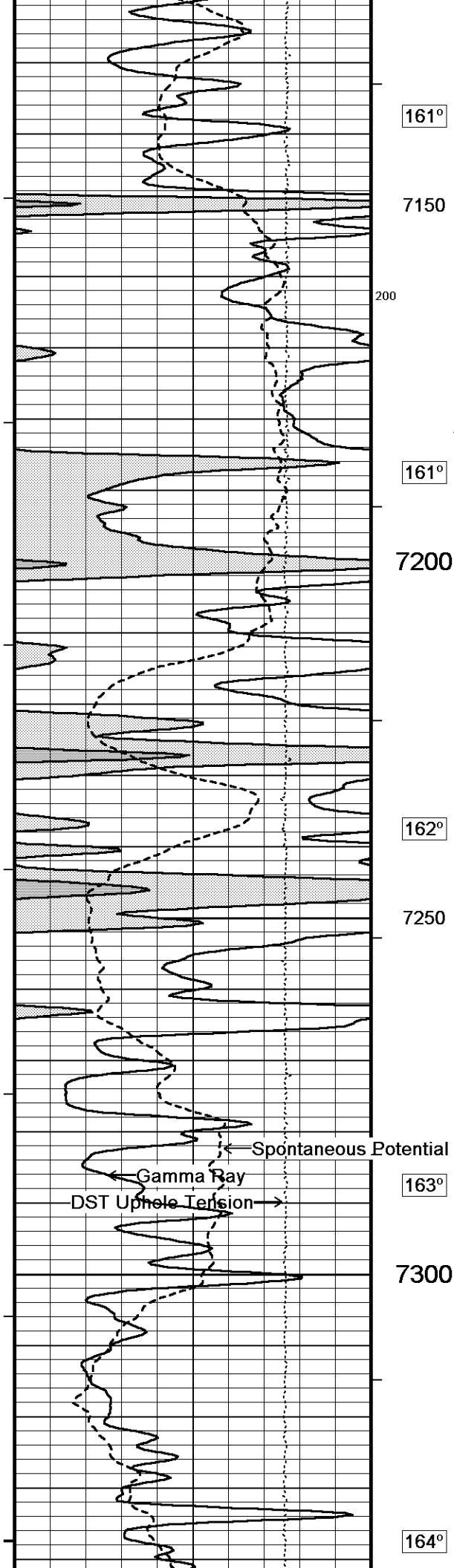


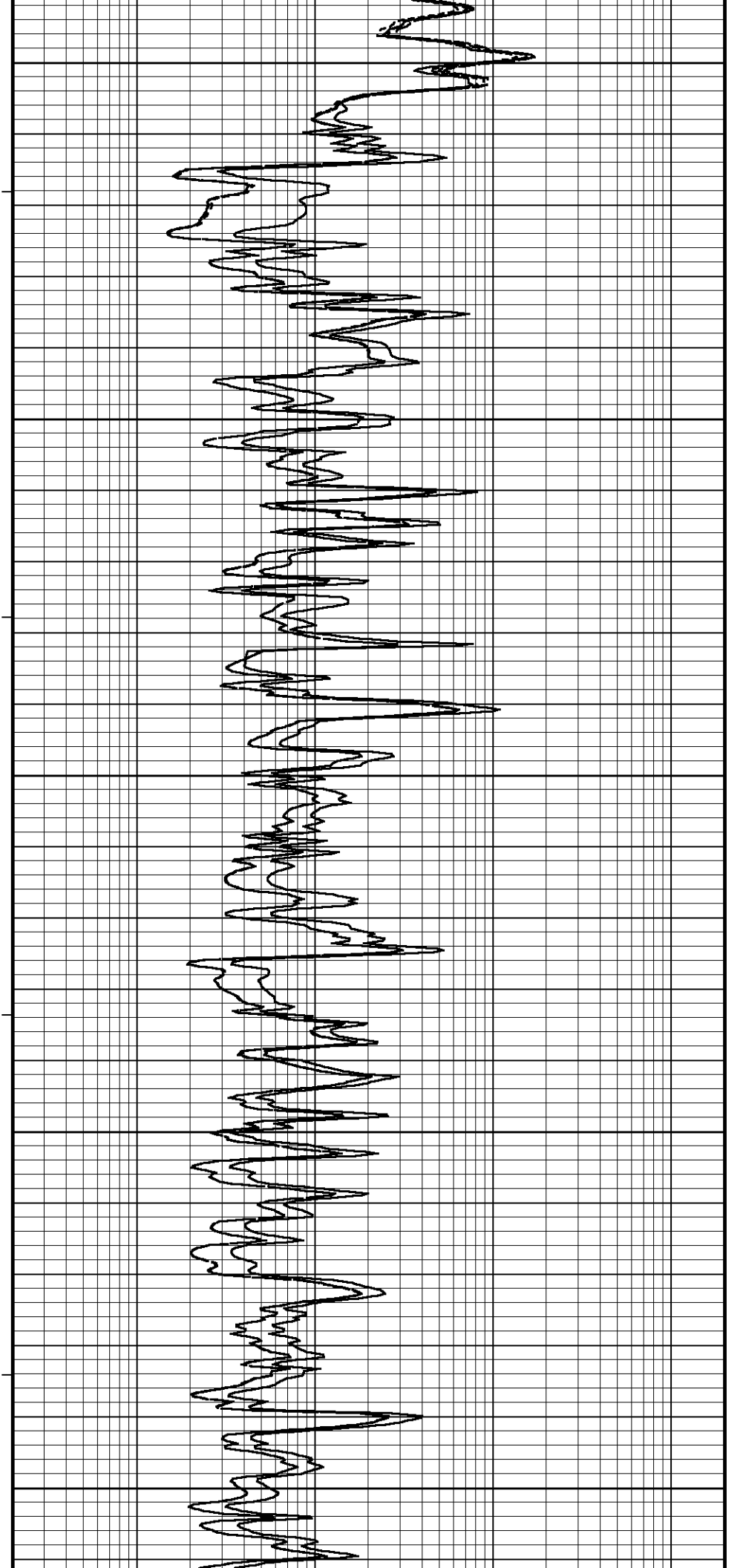
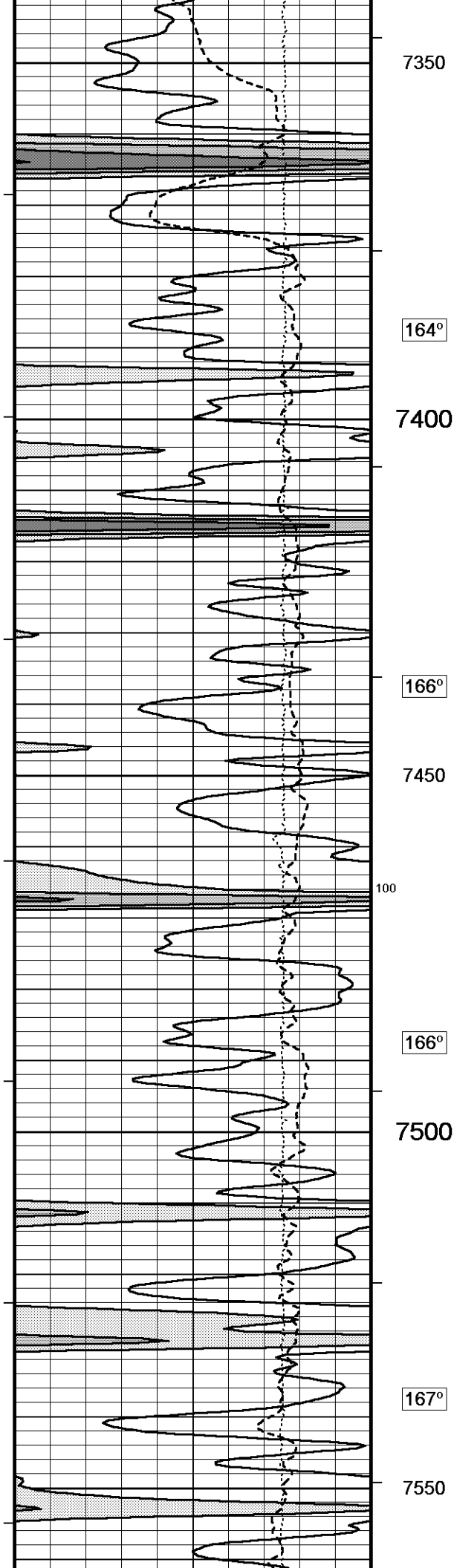


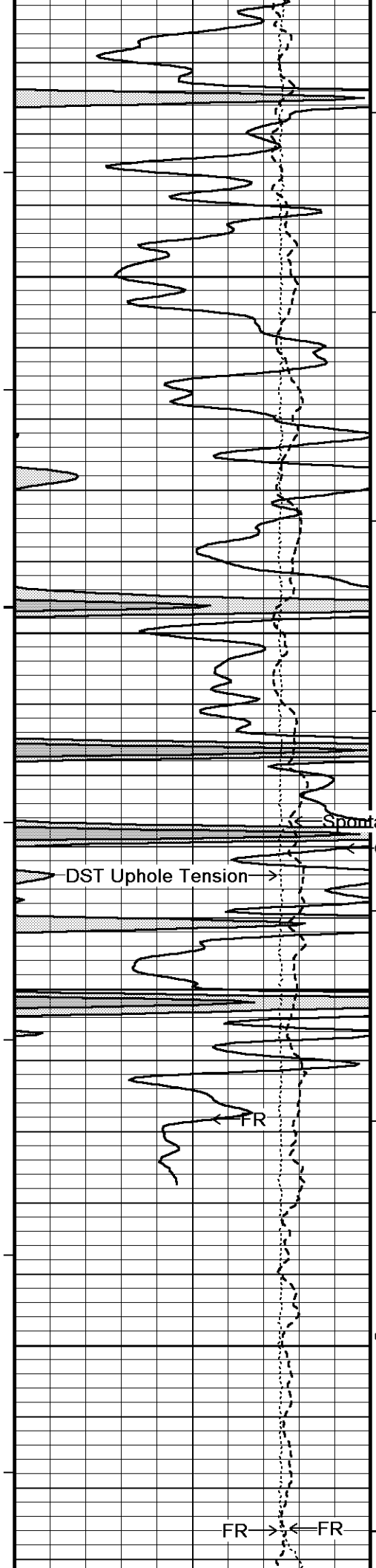




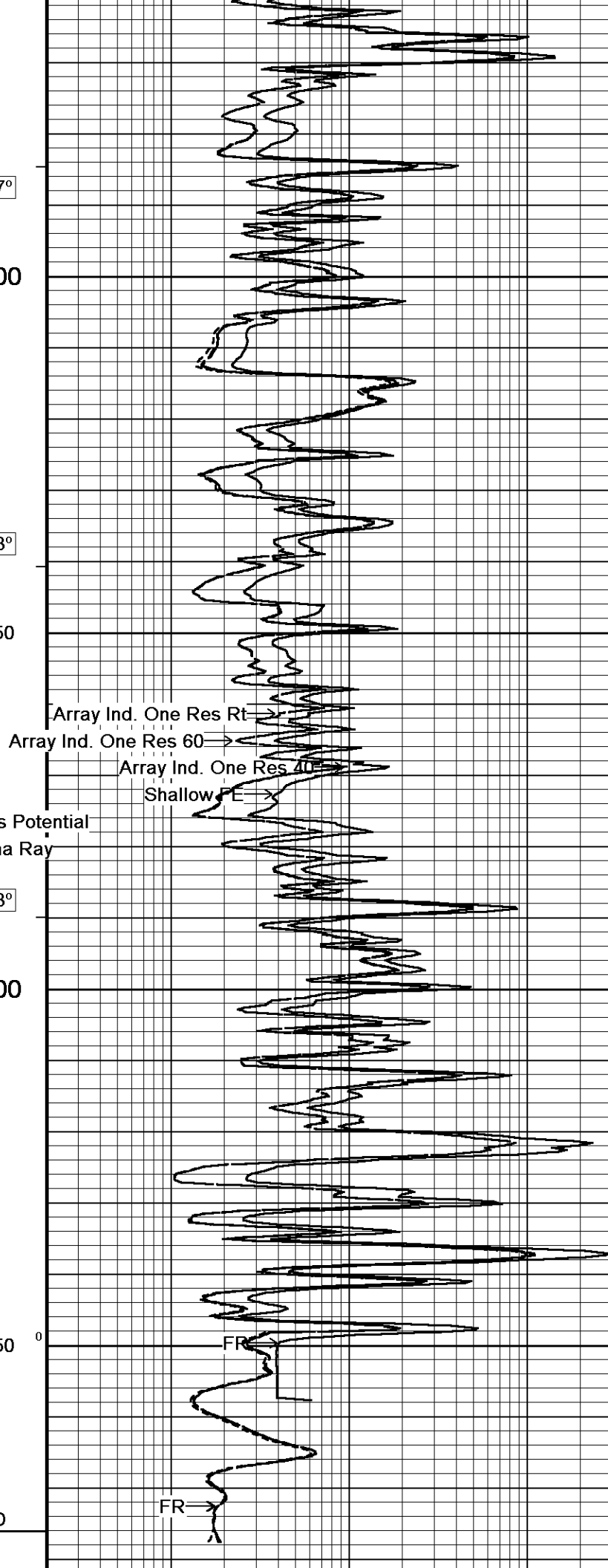








167°
7600
168°
7650
168°
7700
7750
TD



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

Spontaneous Potential
Gamma Ray

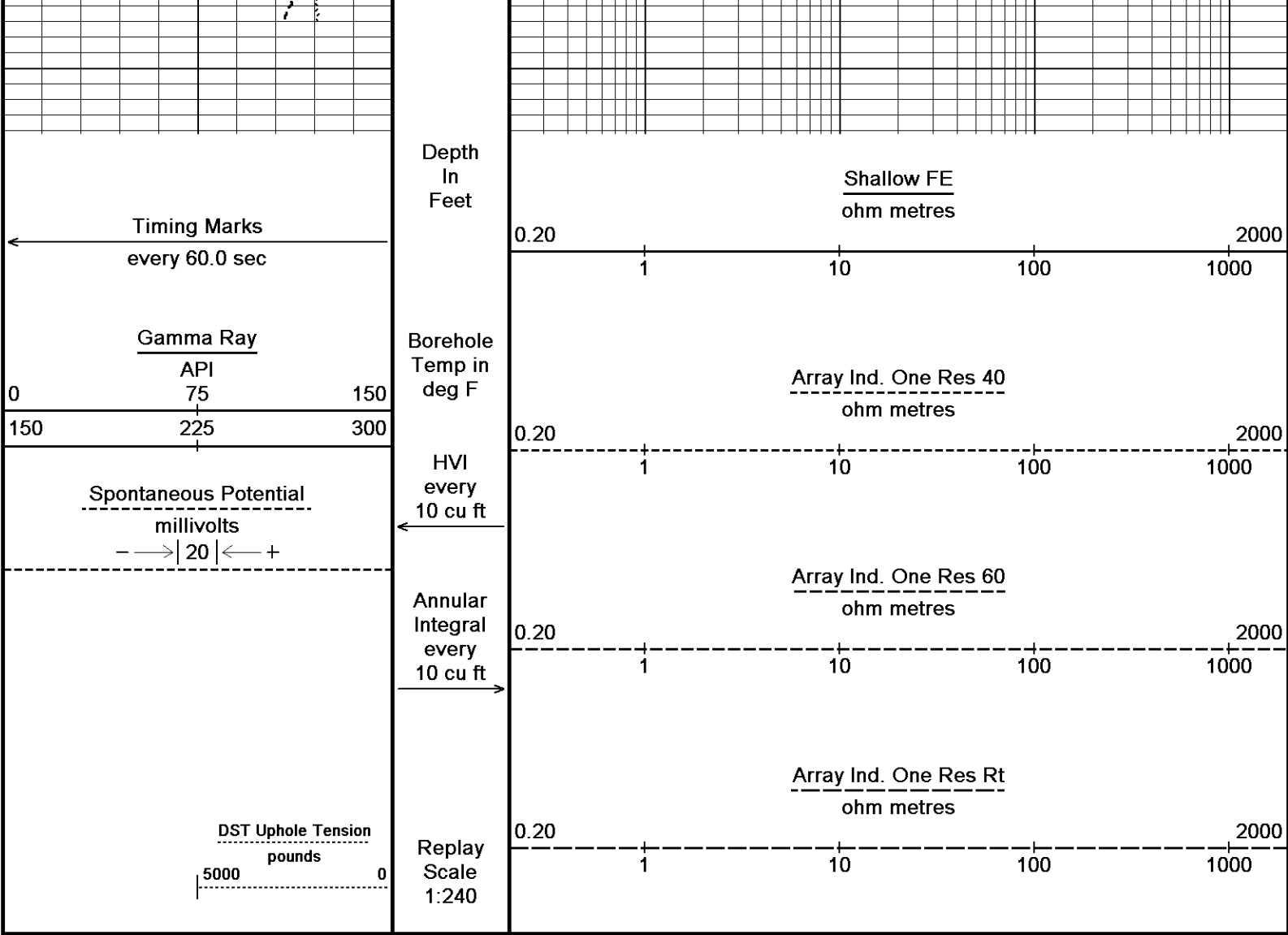
DST Uphole Tension

FR

FR FR

FR

FR



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 17.05.6573\Logs\Murfin Rogue #10-25\Murfin Rogue #10-25_003.dta
System Versions: Logged with 17.05.6573 Plotted with 17.05.6573

5 INCH MAIN

BEFORE SURVEY CALIBRATION		
C:\Minimus 17.05.6573\Logs\Murfin Rogue #10-25\Murfin Rogue #10-25_003.dta		
General Constants All 000		Last Edited on 07-FEB-2018,12:18
General Parameters		
Mud Resistivity	1.390	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	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-C 123

Field Calibration on 06-FEB-2018,21:03

	Measured	Calibrated (API)
Background	90	64
Calibrator (Gross)	737	520
Calibrator (Net)	646	456

Gamma Calibration Tolerances MCG-C 123

Ratio	1.417	<div><div></div><div></div><div></div><div></div><div></div></div>	Counts/API
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Gamma Constants MCG-C 123

Last Edited on 07-FEB-2018,10:21

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-C 123

Field Calibration on 22-JAN-2018,19:40

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

High Resolution Temperature Constants MCG-C 123

Last Edited on 22-SEP-2015,11:43

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

Base Calibration on 22-JAN-2018 18:34

Field Check on 06-FEB-2018 20:49

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.7	126.8
Base Check		281.2
Field Check		281.4

FE Calibration Tolerances MFE-A.A 135

Reference 2	962.7	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm
Base Check	281.2	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m
Field Check	281.4	<div><div></div><div></div><div></div><div></div><div></div></div>	ohm-m

FE Constants MFE-A.A 135

Last Edited on 07-FEB-2018,10:20

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	

Induction Calibration MAI-A.A 45

Factory Loop Calibration 02-FEB-2018 15:02

Field Check on 06-FEB-2018 20:47

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	

Array	Low	High	Low	High	Gain	Offset
1 (near)	14.4	479.3	9.3	966.2	0.000	0.0
2	5.5	375.3	7.6	821.4	0.000	0.0
3	3.2	262.1	5.2	566.0	0.000	0.0
4 (far)	2.3	133.2	2.6	279.2	0.000	0.0

Array Temperature 78.1 Deg F

Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)		
	Low	High	Low	High	
1 (near)	15.9	3773.7	15.9	3772.1	
2	30.0	3592.7	30.0	3591.5	
3	27.3	3017.4	27.3	3017.0	
4 (far)	17.7	2074.2	17.7	2074.0	
Array Temperature	65.8		65.2		Deg F

Induction Check Tolerances MAI-A.A 45

Low Array 1	15.9	14.4 15.9 17.4	mmho/m	High Array 1	3772.1	-0.5% 3773.7 +0.5%	mmho/m
Low Array 2	30.0	28.5 30.0 31.5	mmho/m	High Array 2	3591.5	-0.5% 3592.7 +0.5%	mmho/m
Low Array 3	27.3	25.8 27.3 28.8	mmho/m	High Array 3	3017.0	-0.5% 3017.4 +0.5%	mmho/m
Low Array 4	17.7	16.2 17.7 19.2	mmho/m	High Array 4	2074.0	-0.5% 2074.2 +0.5%	mmho/m

Induction Constants MAI-A.A 45

Last Edited on 07-FEB-2018,10:20

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.	MCG External Temperature		
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 App	100.00	percent

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 271

Base Calibration on 22-JAN-2018 20:14

Field Calibration on 06-FEB-2018 20:57

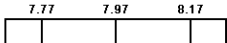
Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13926	3.99
2	23856	5.98
3	33858	7.97
4	43568	9.86
5	54687	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 271

Short Arm Field Cal. 7.97  in

DOWNHOLE EQUIPMENT

C:\Minimus 17.05.6573\Logs\Murfin Rogue #10-25\Murfin Rogue #10-25_003.dta

Cablehead, 11 pin

CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor

SHA-F 48 LG: 2.74 ft WT: 26.5 lb OD: 2.244 in

Compact Comms Gamma

MCG-C 123 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log

MML-A 2 LG: 7.97 ft WT: 81.6 lb OD: 2.244 in

Compact Neutron

MDN-A.B 114 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

MPD-C.A 271 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Knuckle Joint

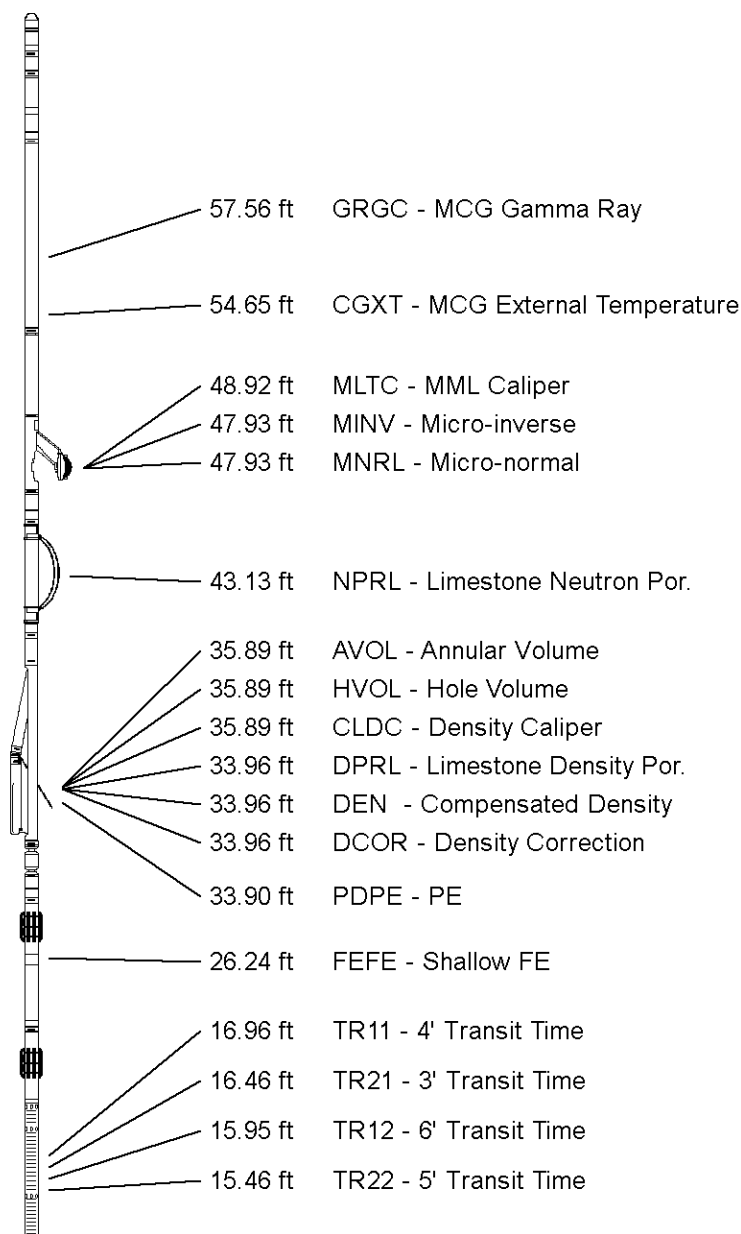
SKJ-E.B 732 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric

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

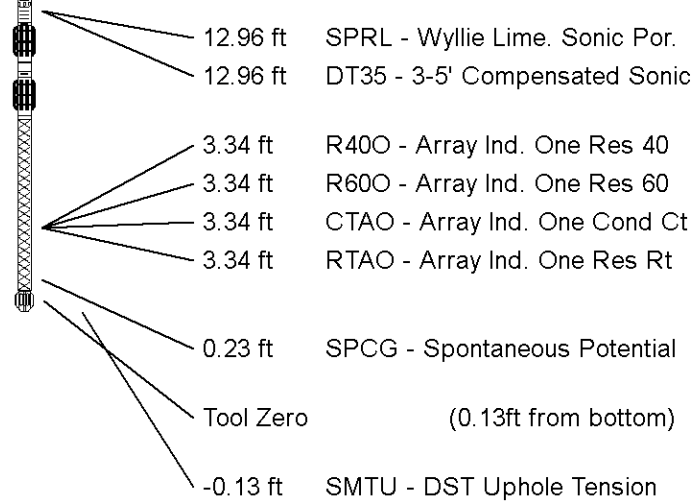
Compact Sonic

MSS-A.A 126 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in



Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 67.98 ft Weight: 531.3 lb



All measurements relative to tool zero.

COMPANY MURFIN DRILLING COMPANY INC.
WELL ROGUE #10-25
FIELD WILDCAT
PROVINCE/COUNTY LINCOLN
COUNTRY/STATE U.S.A. / COLORADO

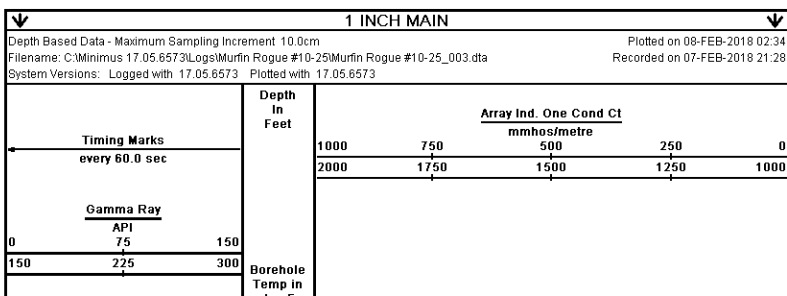
Elevation Kelly Bushing	5316	feet	First Reading	7773.00	feet
Elevation Drill Floor	5314	feet	Depth Driller	8187.00	feet
Elevation Ground Level	5303	feet	Depth Logger	7776.00	feet

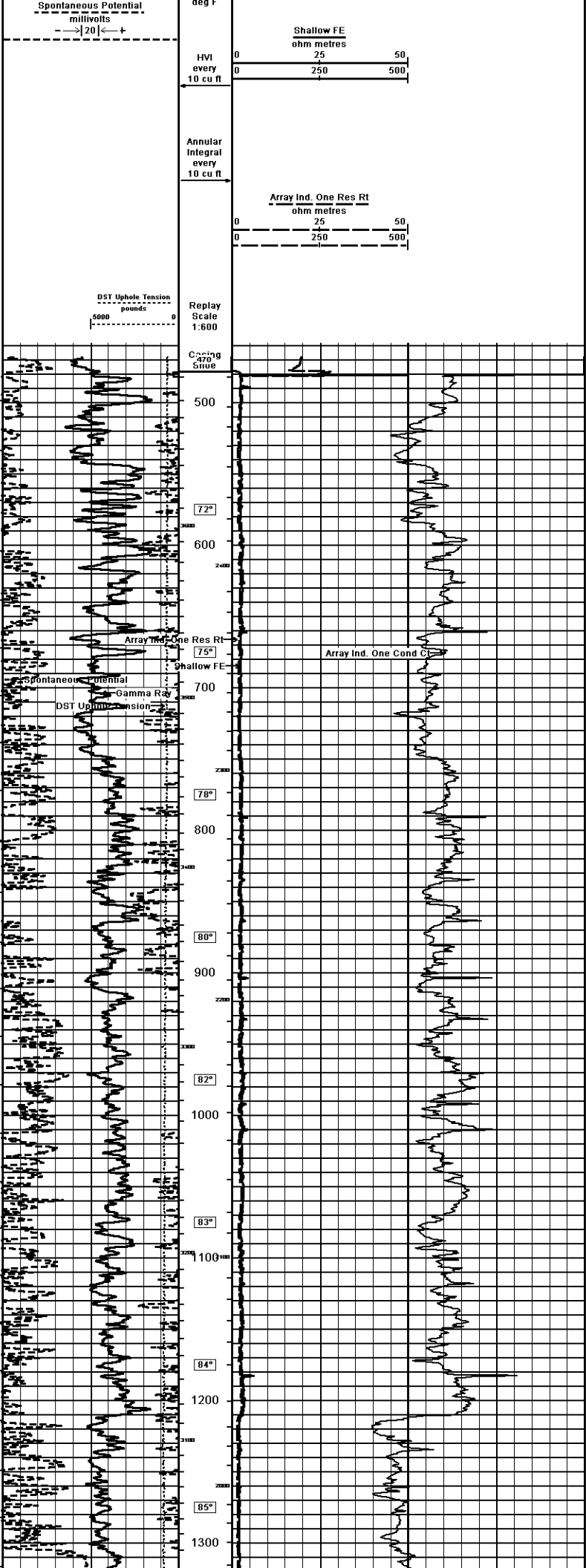


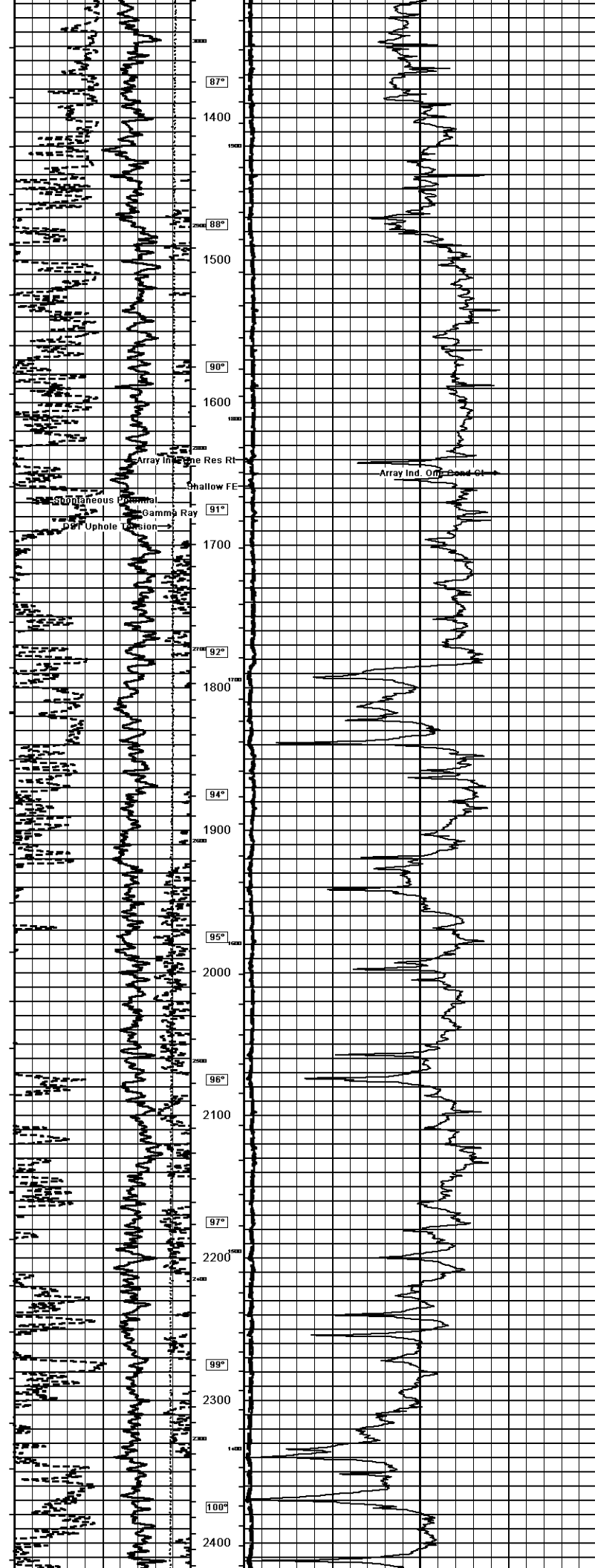
ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

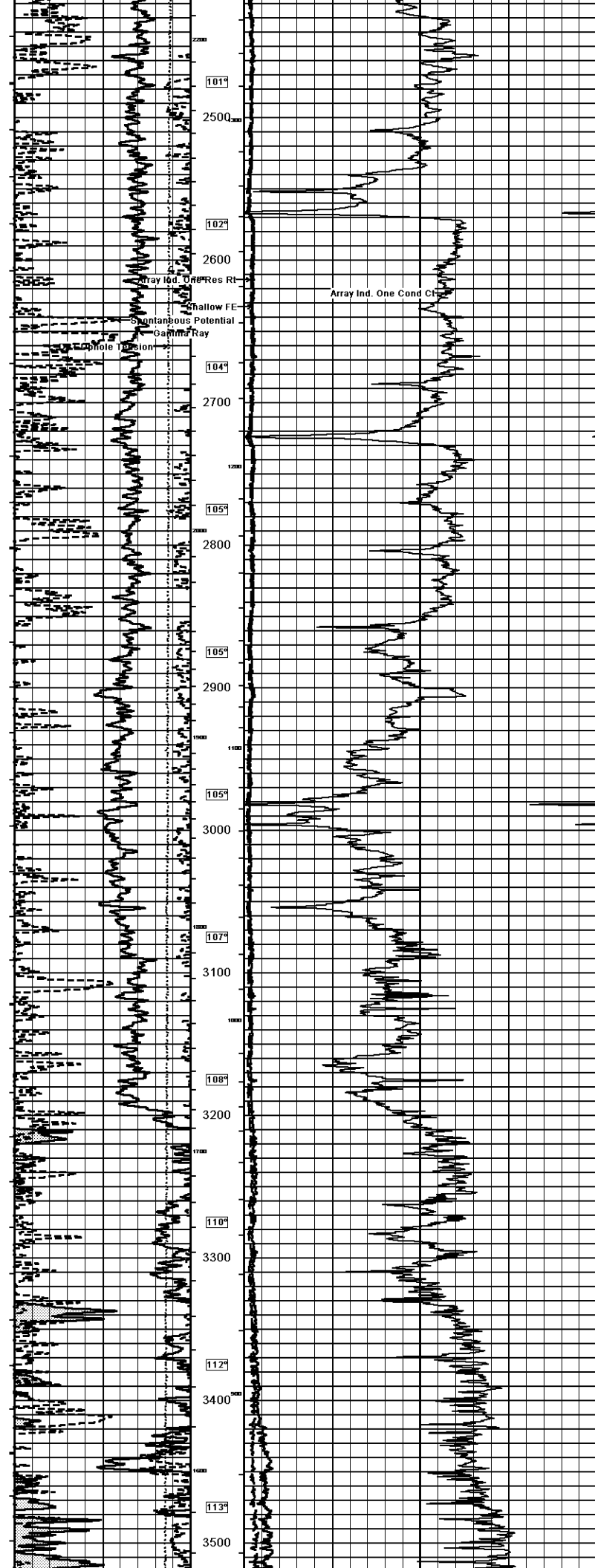
Weatherford

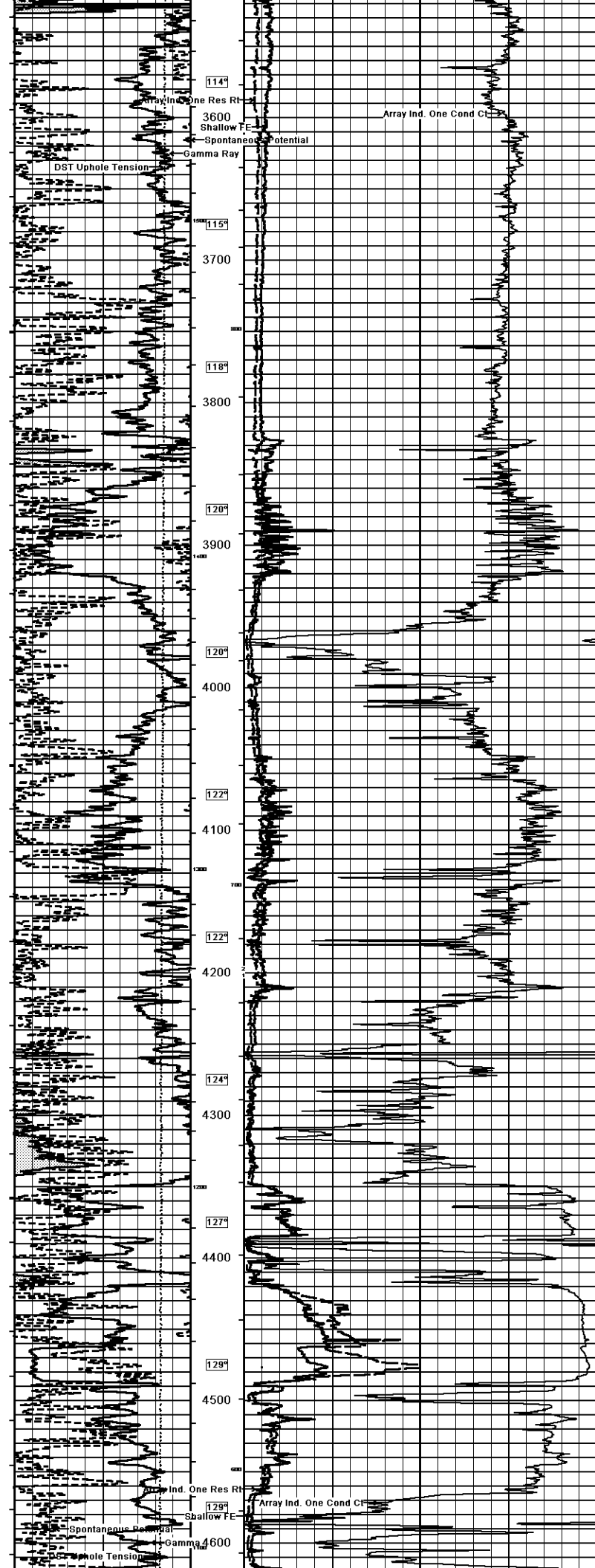
Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY	MURFIN DRILLING COMPANY INC.		
WELL	ROGUE #10-25		
FIELD	WILDCAT		
PROVINCE/COUNTY	LINCOLN		
COUNTRY/STATE	U.S.A. / COLORADO		
LOCATION	2299' ESL & 1647' FEL		
SEC 25	T1P 9S R6E 58W	Operator	MML
Latitude	05-07.56726	INFORMATION	
Longitude	105-07.56726		
Log Number	05-07.56726		
Permanent Datum	Q.L. Elevation 5303 feet		
Log Measured From	KB 13.00 feet above Permanent Datum		
Drilling Measured From	KB	KB	5316.00
		DF	5314.00
		CL	5303.00
Date	07-FEB-2018		
Run Number	ONE		
Service Order	4588-205041941		
Depth Driller	8187.00	feet	
Depth Logger	7776.00	feet	
First Reading	7773.00	feet	
Last Reading	416.00	feet	
Casing Driller	416.00	feet	
Casing Logger	416.00	feet	
Bit Size	7 8/5	inches	
Hole Fluid Type	CHEMICAL		
Density/Viscosity	9.20 lb/USg	80.00 CP	
PH/Fluid Loss	8.50	8.50 ml/30min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	1.39 @ 75.0	ohm-m	
Rm @ Measured Temp	1.11 @ 75.0	ohm-m	
Rm @ Measured Temp	1.67 @ 75.0	ohm-m	
Source Rm1 / Rm2	CALC	CALC	
Rm @ BHT	0.62 @ 88.0	ohm-m	
Time Since Circulation	6 HOURS		
Max Recorded Temp	168.00	deg F	
Equipment / Base	13244	UB	
Recorded By	ADAM SULL		
Witnessed By	GREGG SMITH		

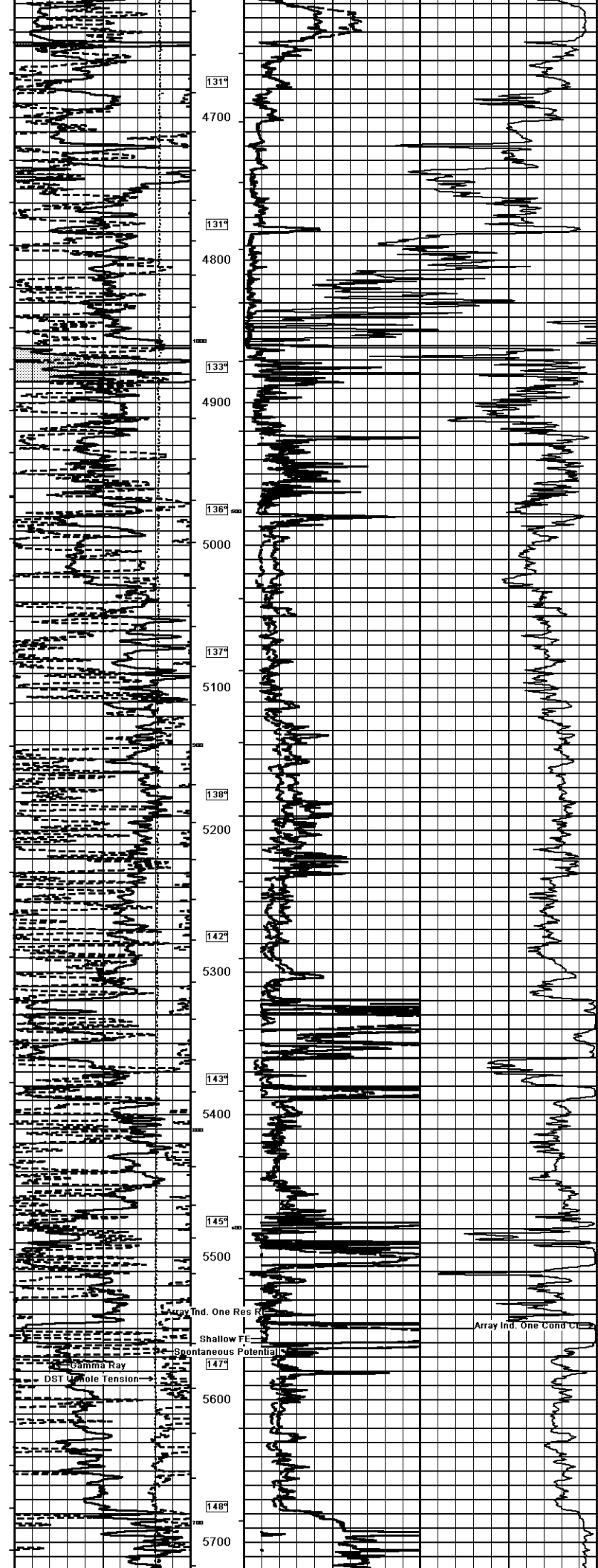


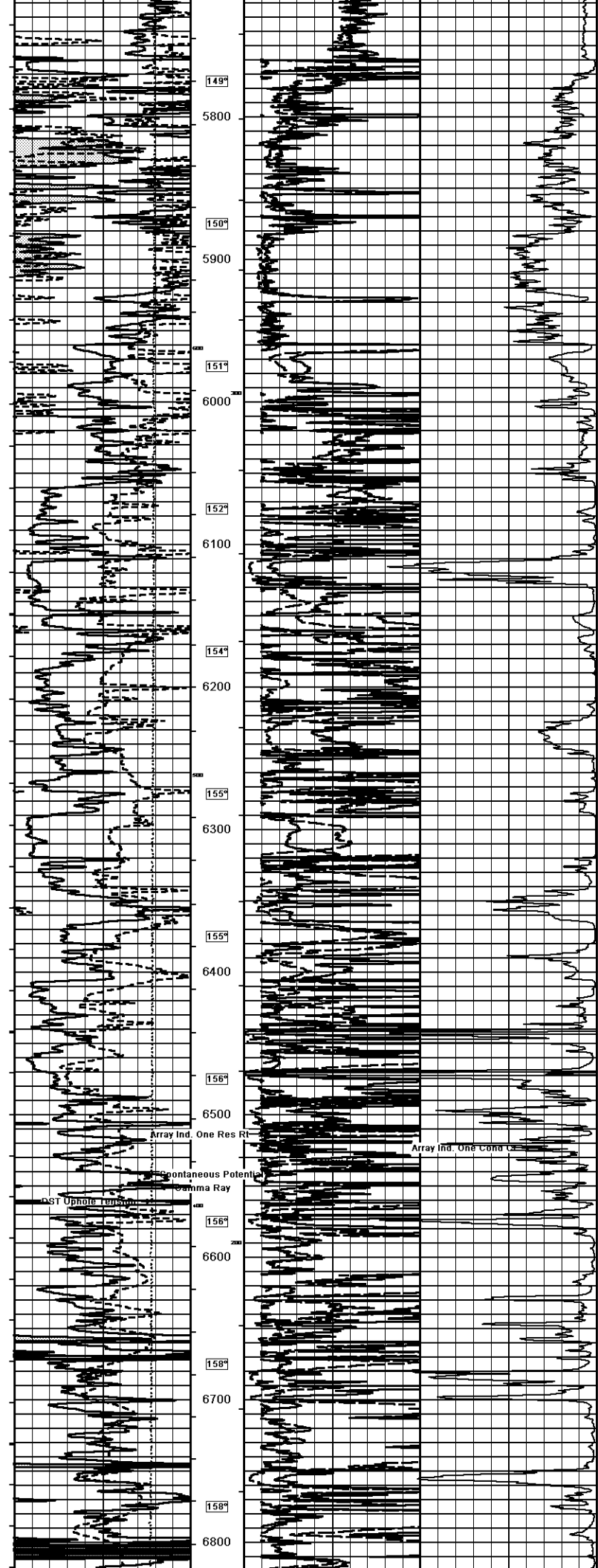


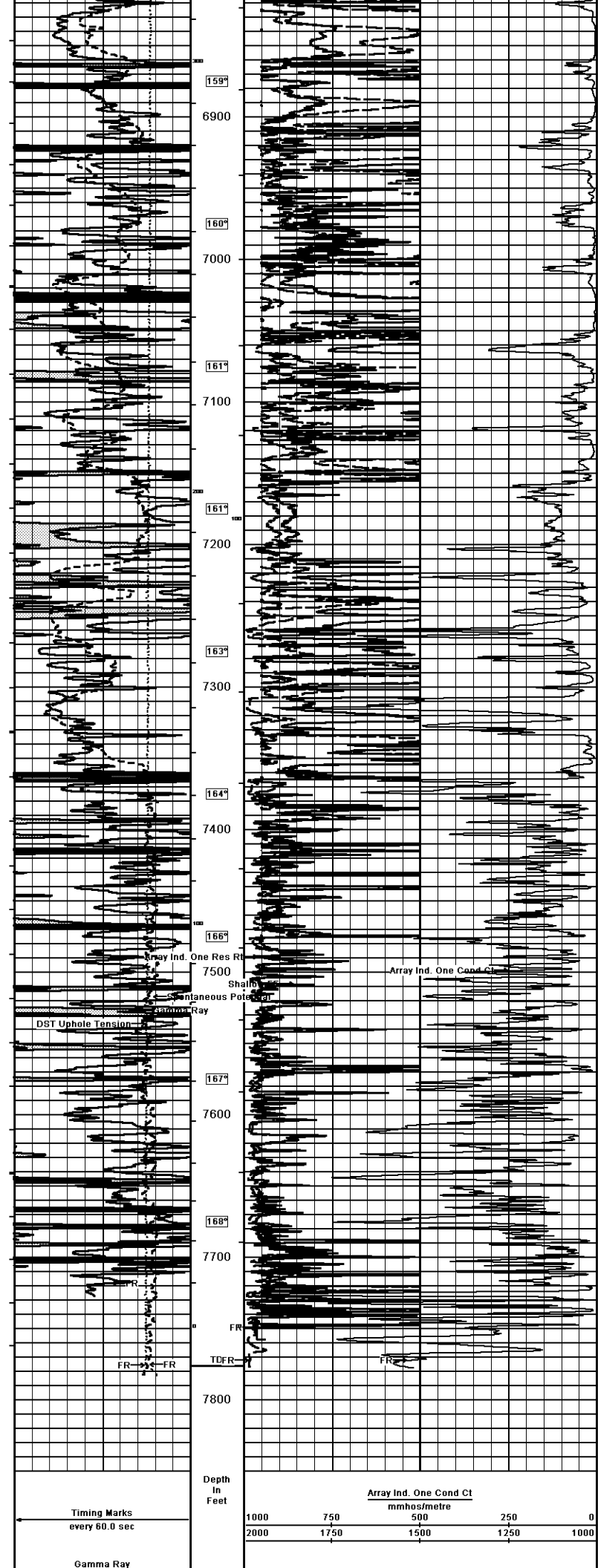













1 INCH MAIN

COMPANY		MURFIN DRILLING COMPANY INC.			
WELL		ROGUE #10-25			
FIELD		WILDCAT			
PROVINCE/COUNTY		LINCOLN			
COUNTRY/STATE		U.S.A. / COLORADO			
Elevation Kelly Bushing	5316	feet	First Reading	7773.00	feet
Elevation Drill Floor	5314	feet	Depth Driller	8187.00	feet
Elevation Ground Level	5303	feet	Depth Logger	7776.00	feet
		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG			