



Weatherford[®]

**ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG**

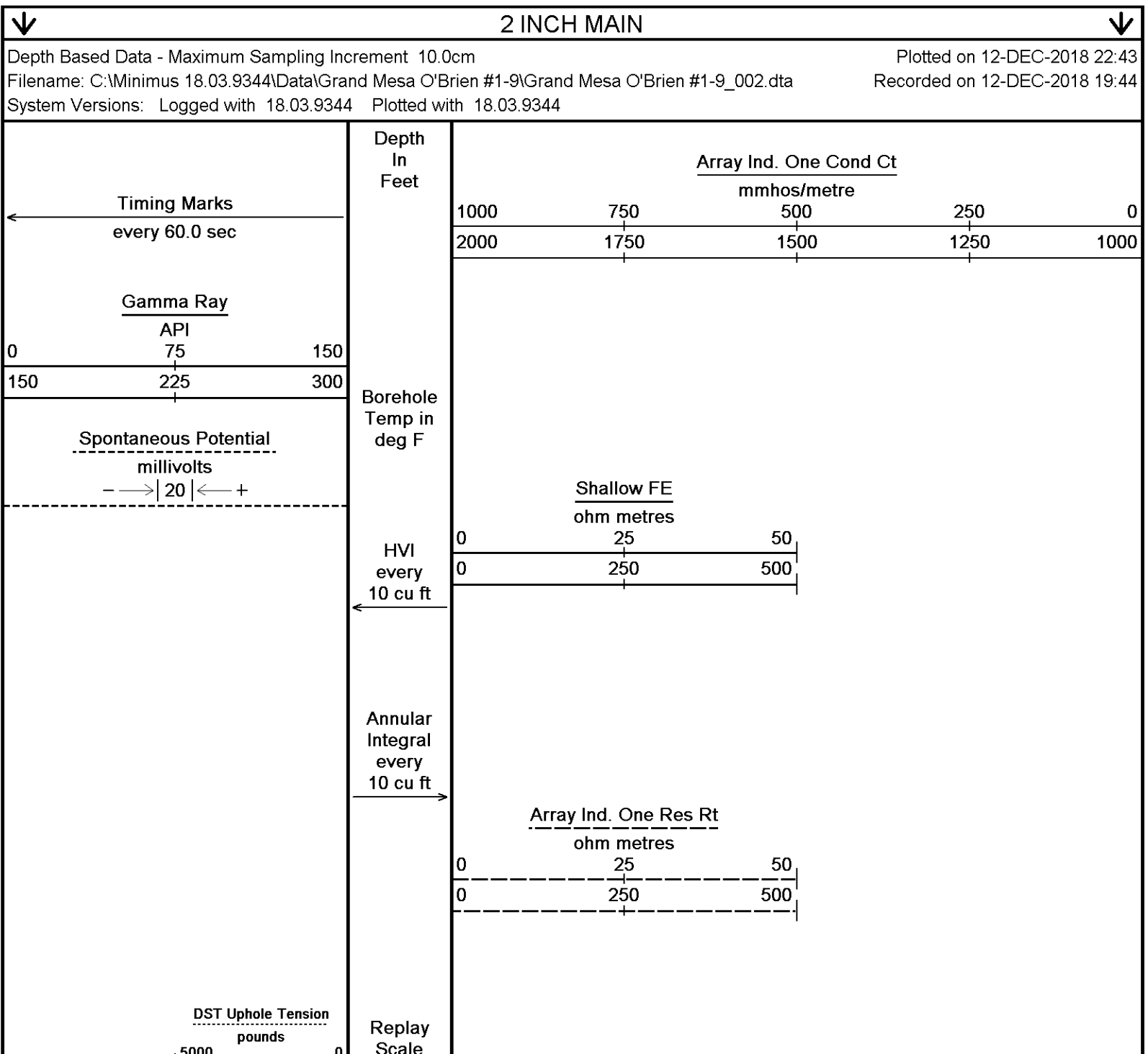
COMPANY	GRAND MESA OPERATING COMPANY				
WELL	OBRIEN #1-9				
FIELD	WILDCAT				
PROVINCE/COUNTY LANE	U.S.A. / KANSAS				
COUNTRY/STATE	2225' FSL & 2305' FEL				
LOCATION					
SEC 9	TWP 16S	RGE 29W	Other Services		
Latitude			MPD/MDN		
Longitude			MSS		
API Number	15-101-22619		MML		
Permanent Datum GL, Elevation 2656 feet					
Log Measured From KB, 5.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	12-DEC-2018		Elevations: KB 2661.00 DF 2659.00 GL 2656.00		
Run Number	ONE				
Service Order	4558-231823318				
Depth Driller	4520.00		feet		
Depth Logger	4521.00		feet		
First Reading	4518.00		feet		
Last Reading	219.00		feet		
Casing Driller	219.00		feet		
Casing Logger	219.00		feet		
Bit Size	7.875		inches		
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.30 lb/USg		52.00 CP		
PH / Fluid Loss	10.00		7.20 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.27 @ 75.0		ohm-m		
Rmf @ Measured Temp	1.02 @ 75.0		ohm-m		
Rmc @ Measured Temp	1.52 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.81 @117.0		ohm-m		
Time Since Circulation	4 HOURS				
Max Recorded Temp	117.00		deg F		
Equipment / Base	13096		LIB		
Recorded By	ADAM SILL				
Witnessed By	GARET DINKEL				

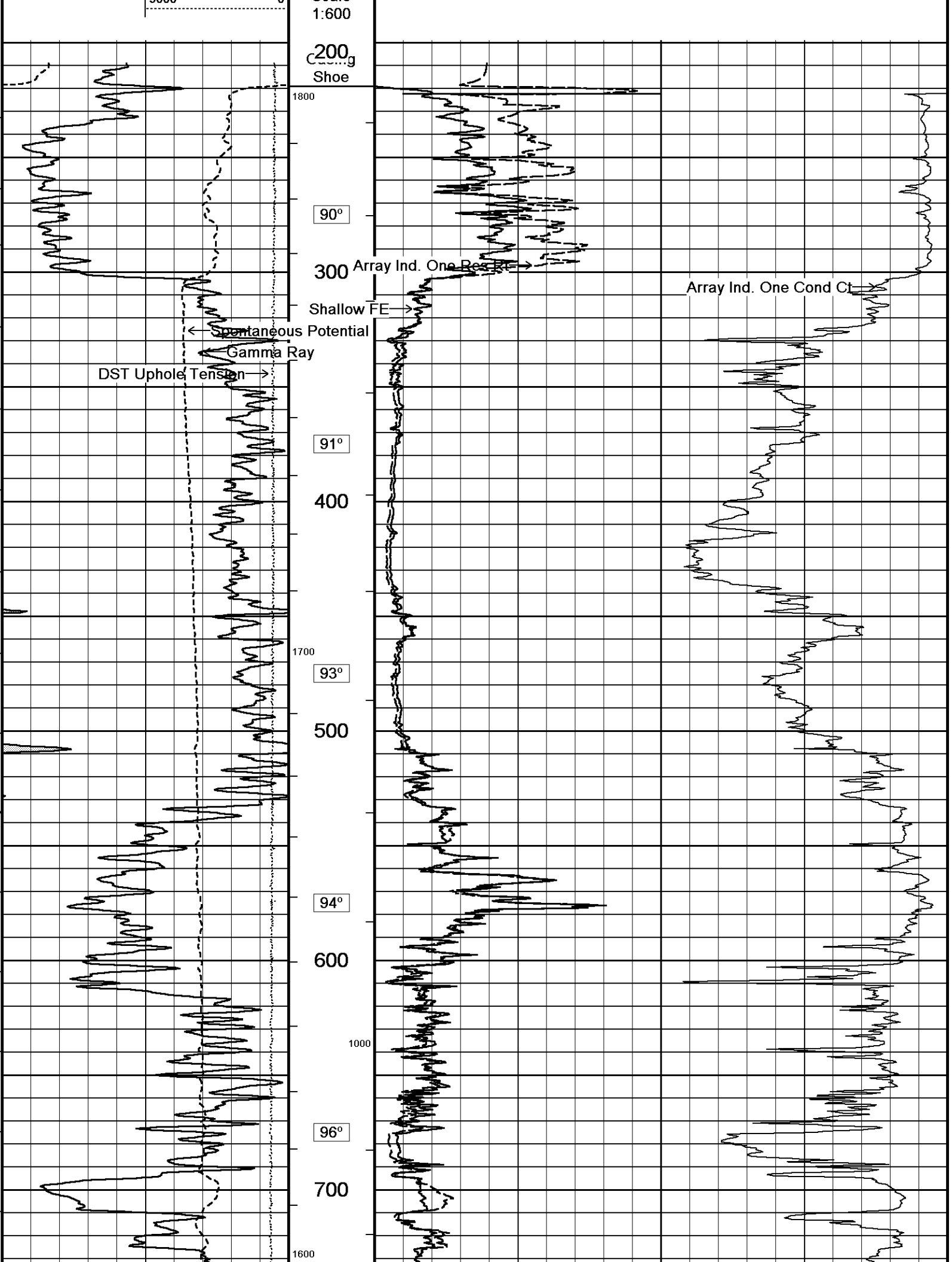
BOREHOLE RECORD					Last Edited: 12-DEC-2018 16:55
Bit Size inches		Depth From feet		Depth To feet	
7.875		219.00		4520.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	219.00	24.00	

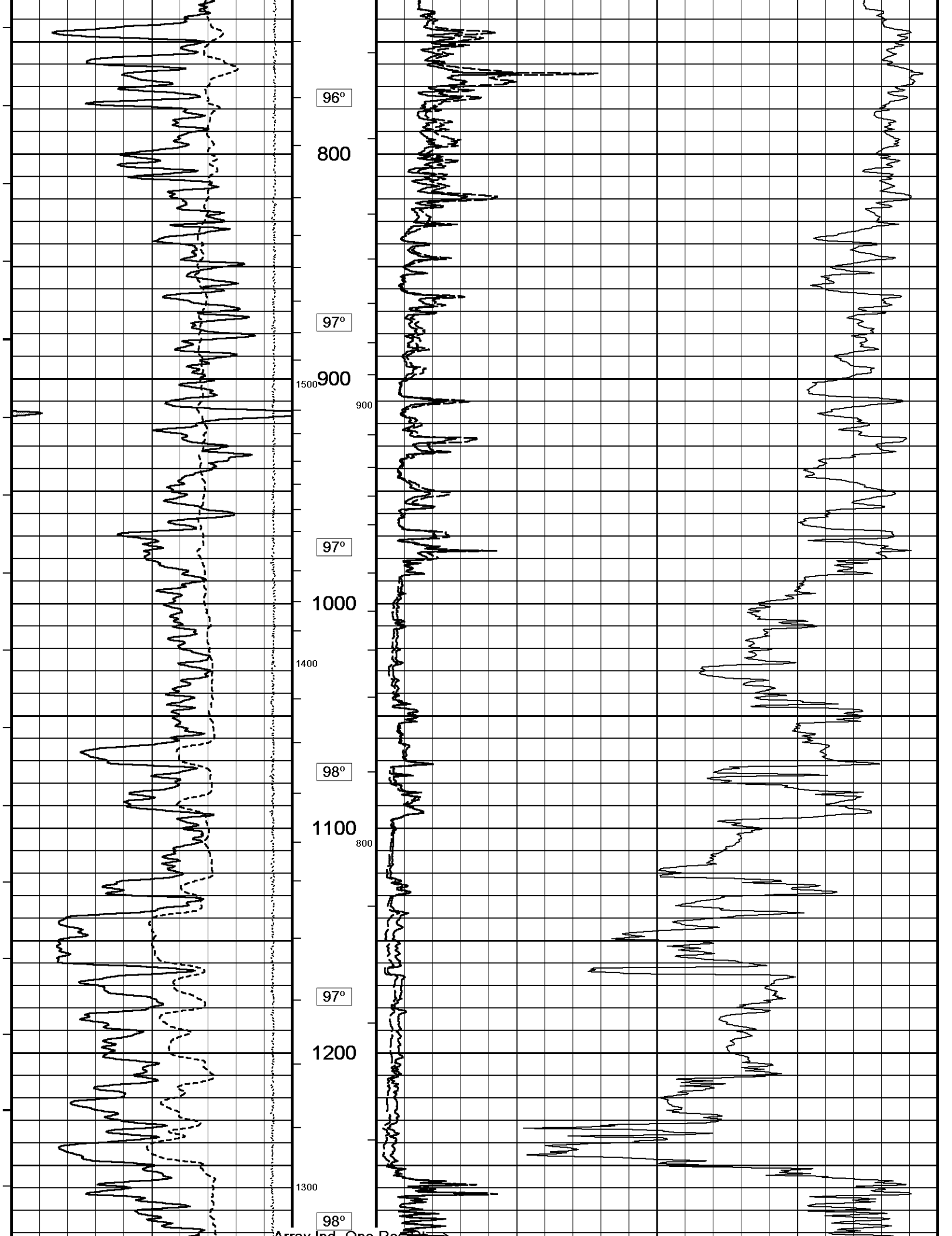
REMARKS
- SOFTWARE ISSUE: WLS 18.03.9344.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 1802 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1096 CU.FT.

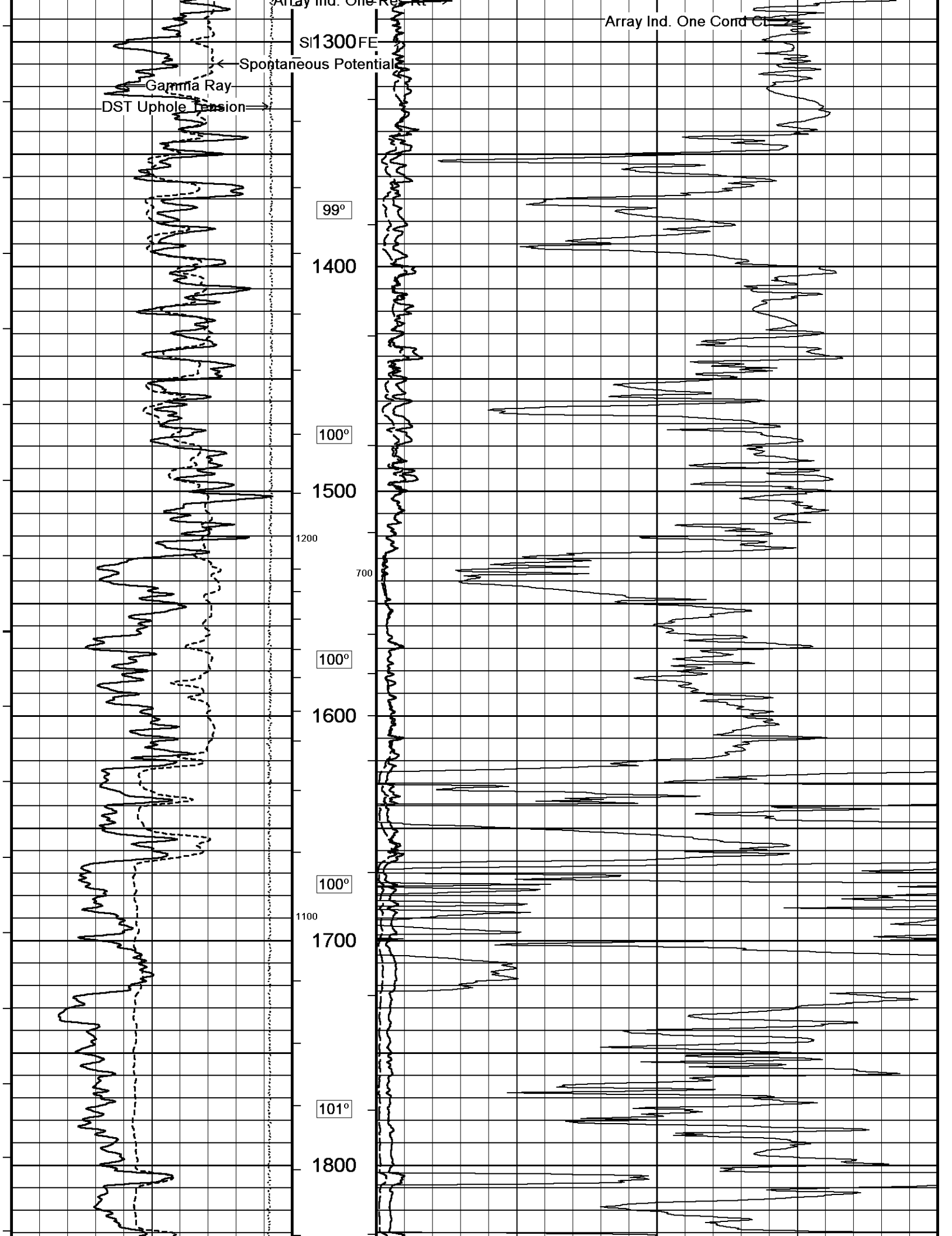
- RIG: WW DRILLING #2.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR, B. COPELAND.

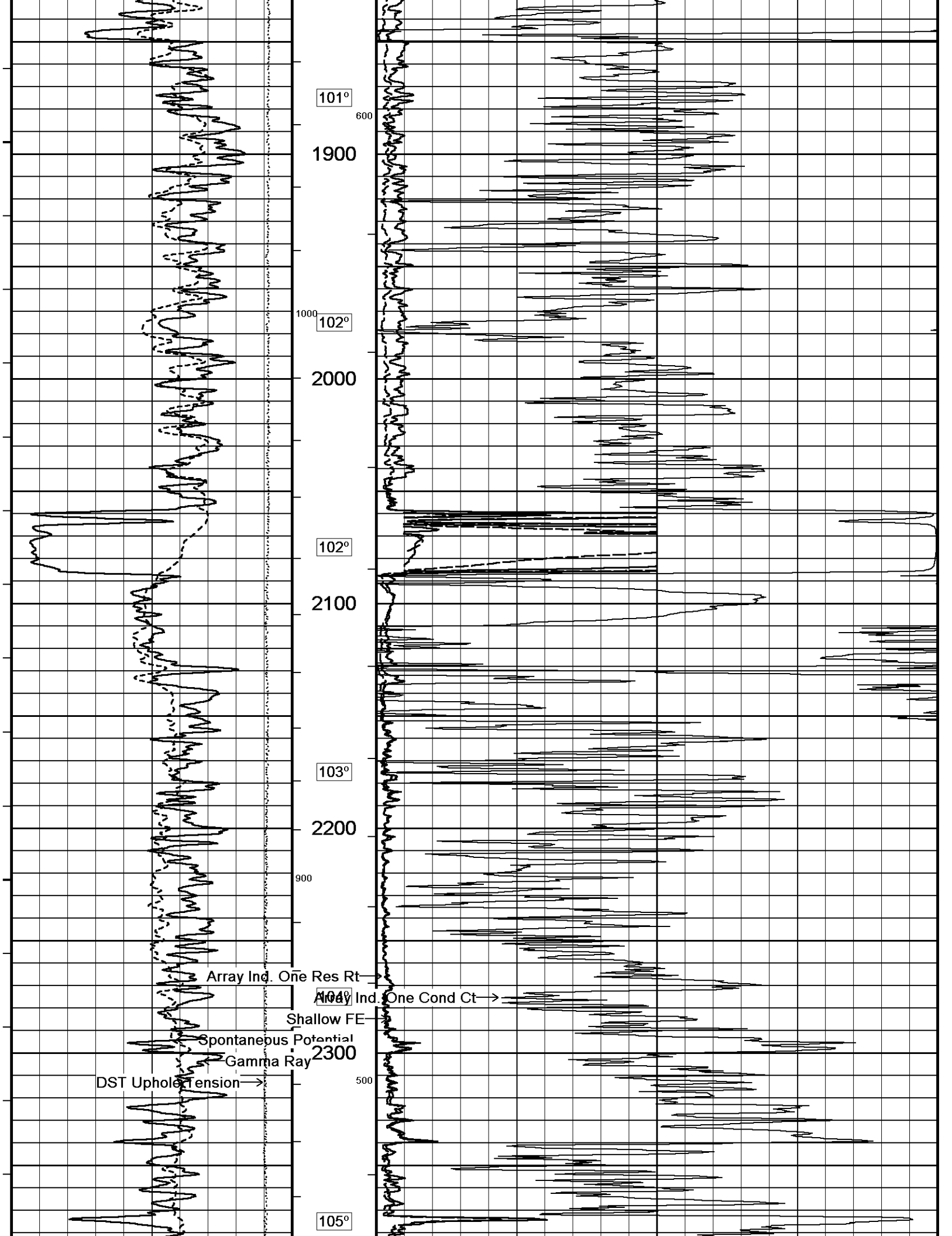
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

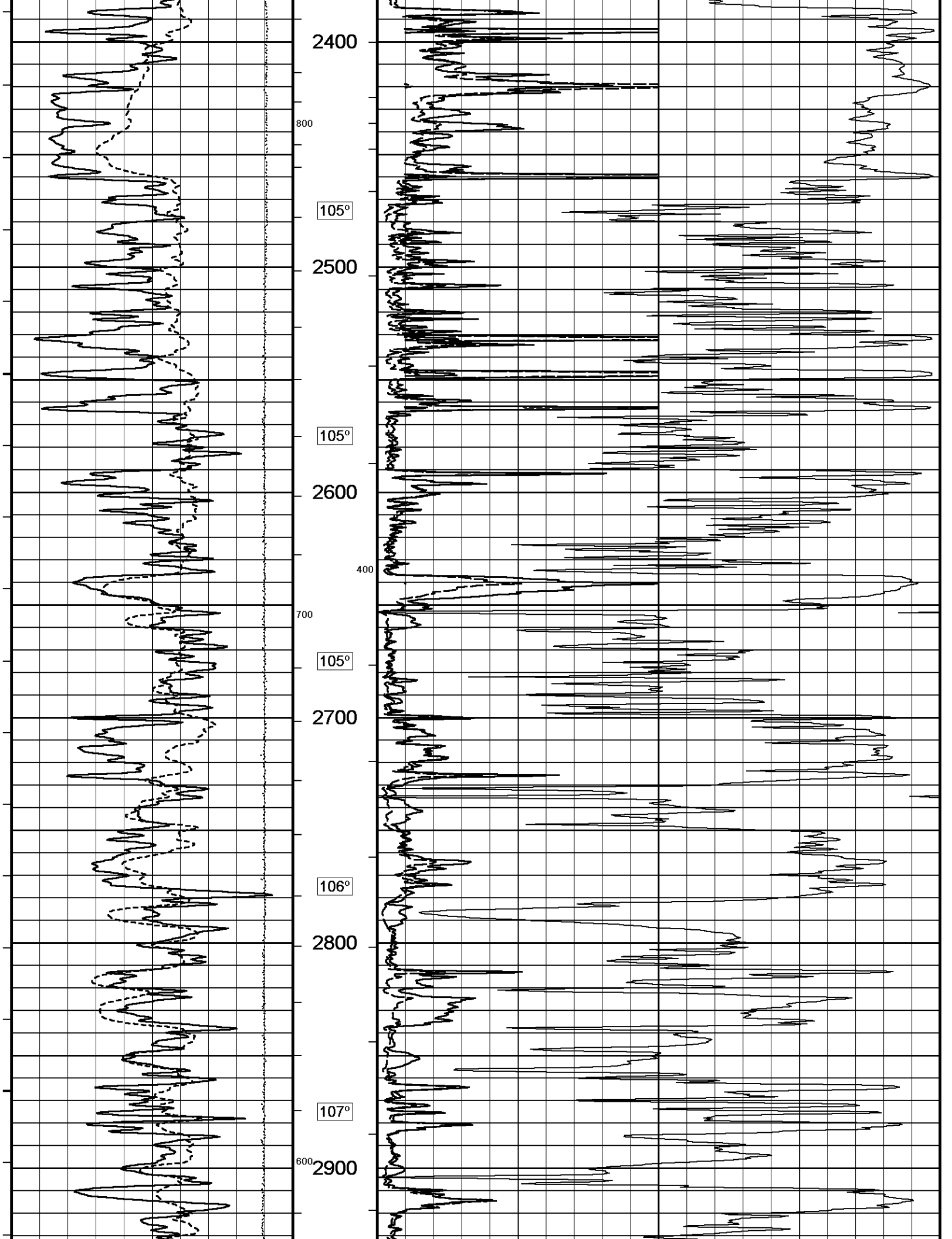


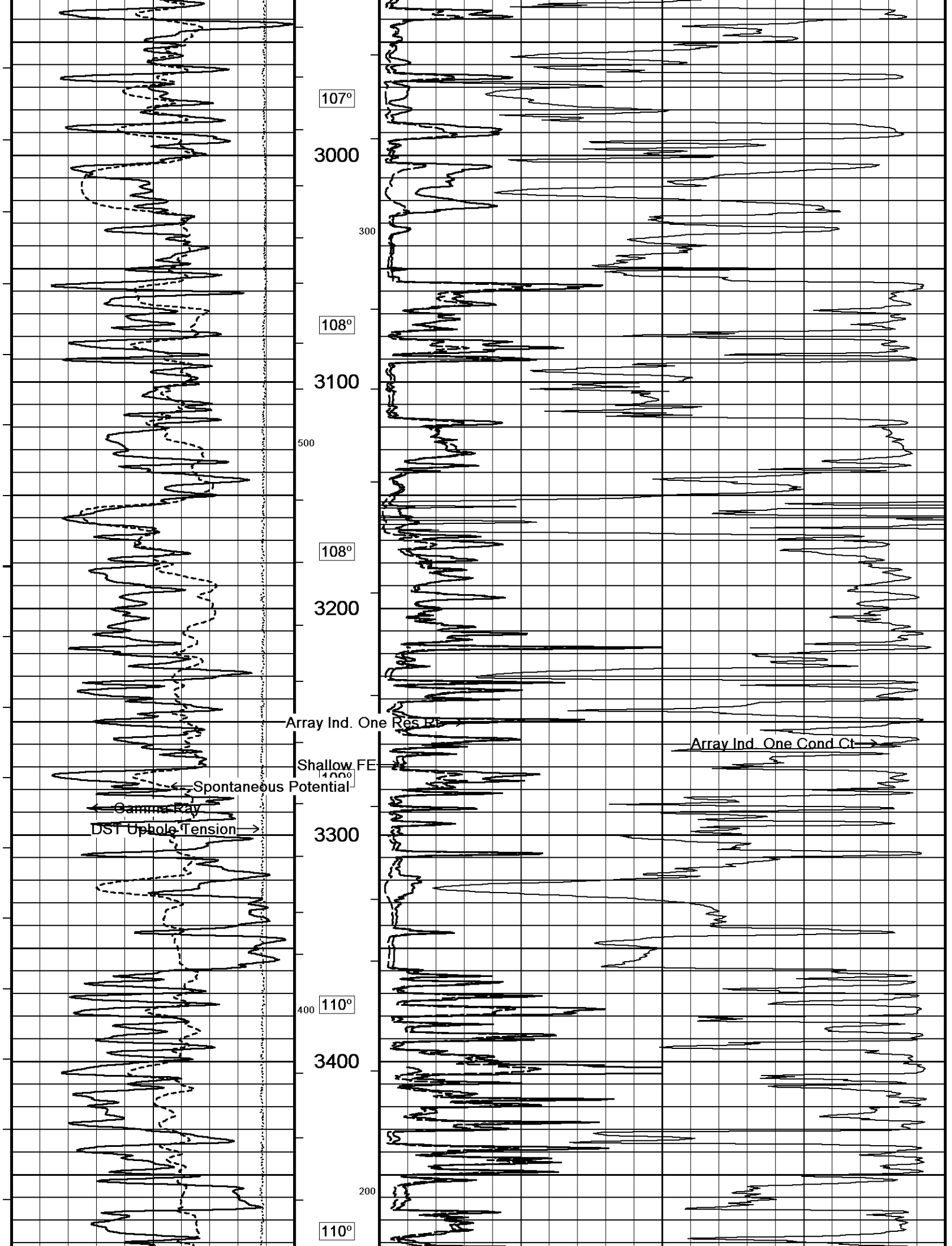


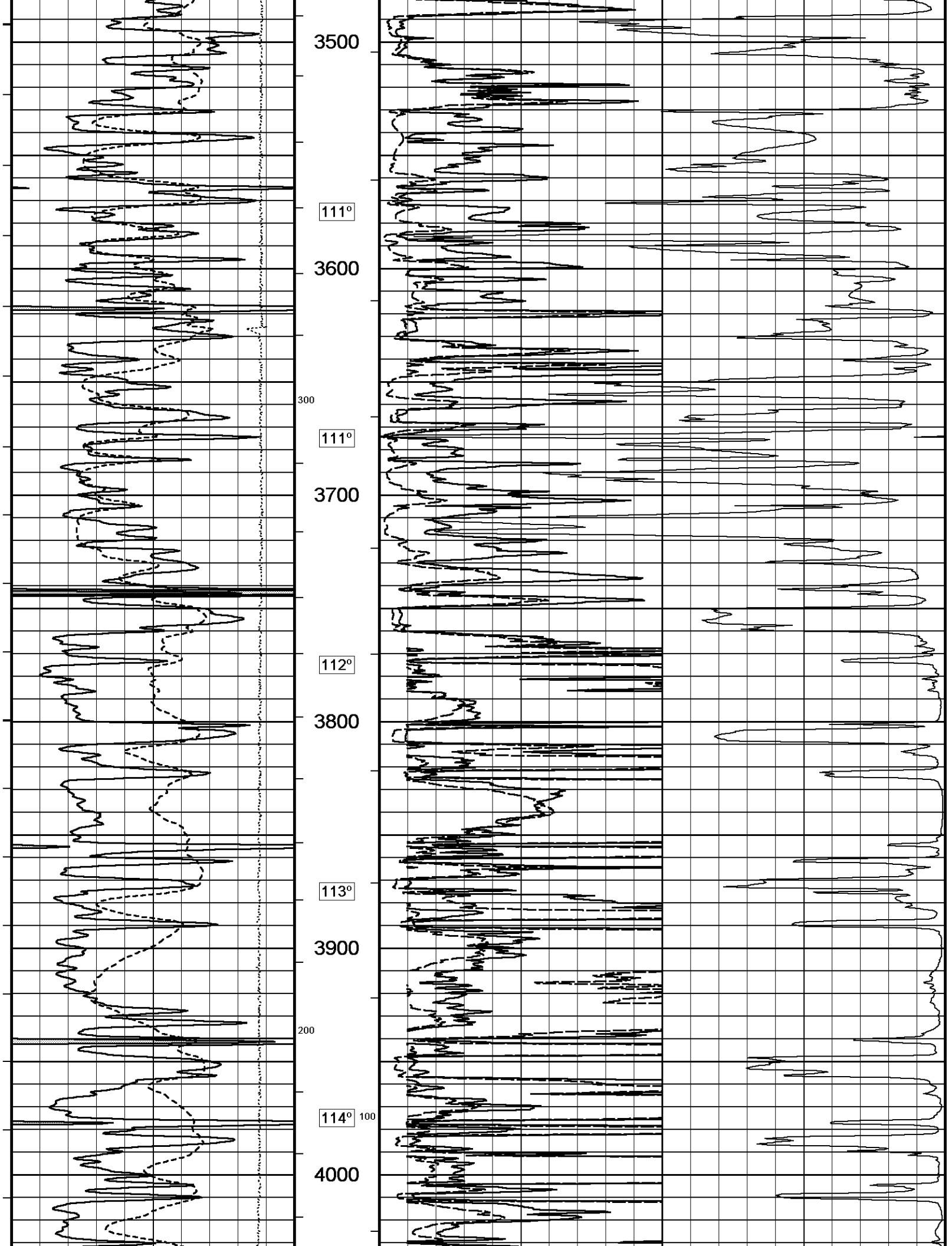


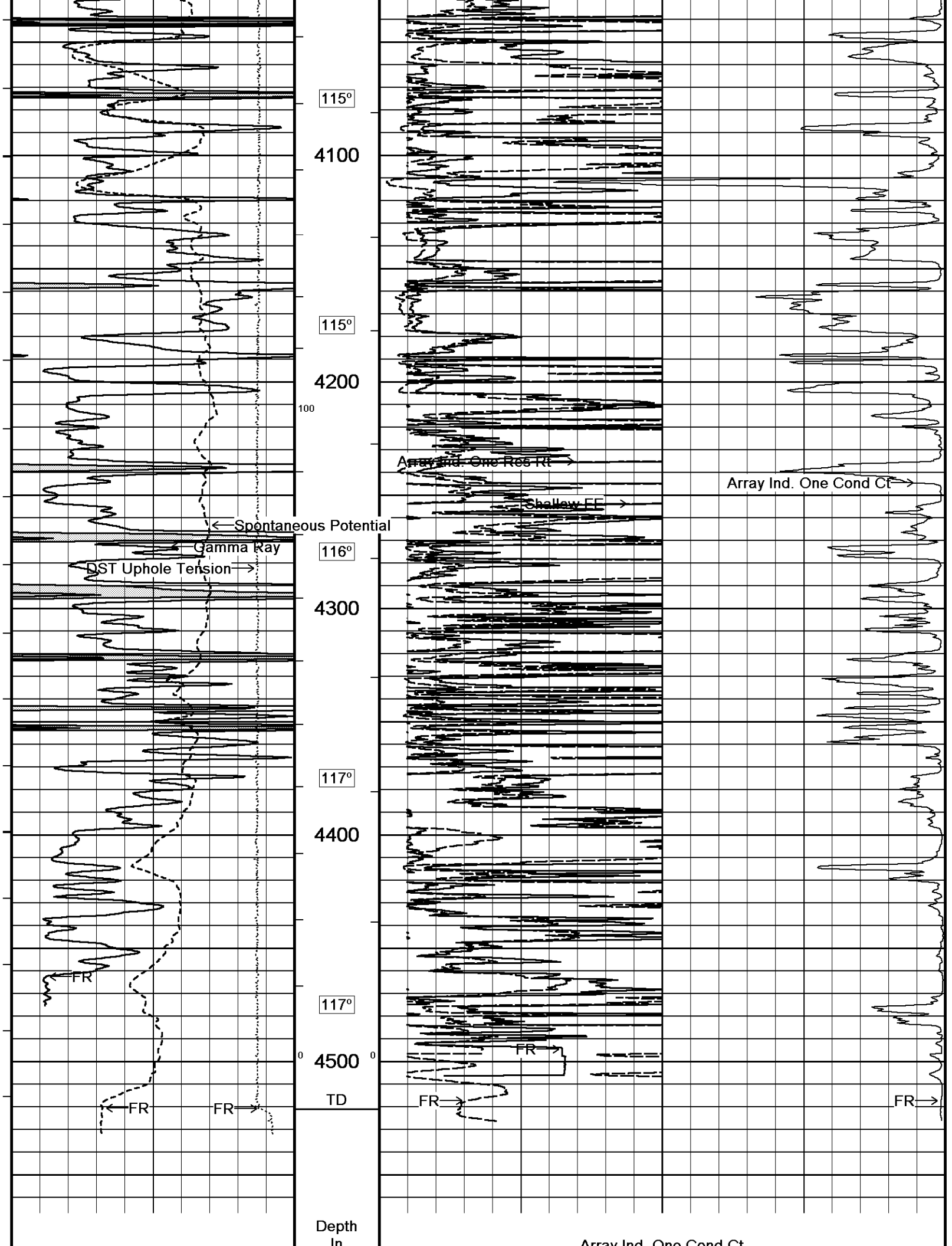


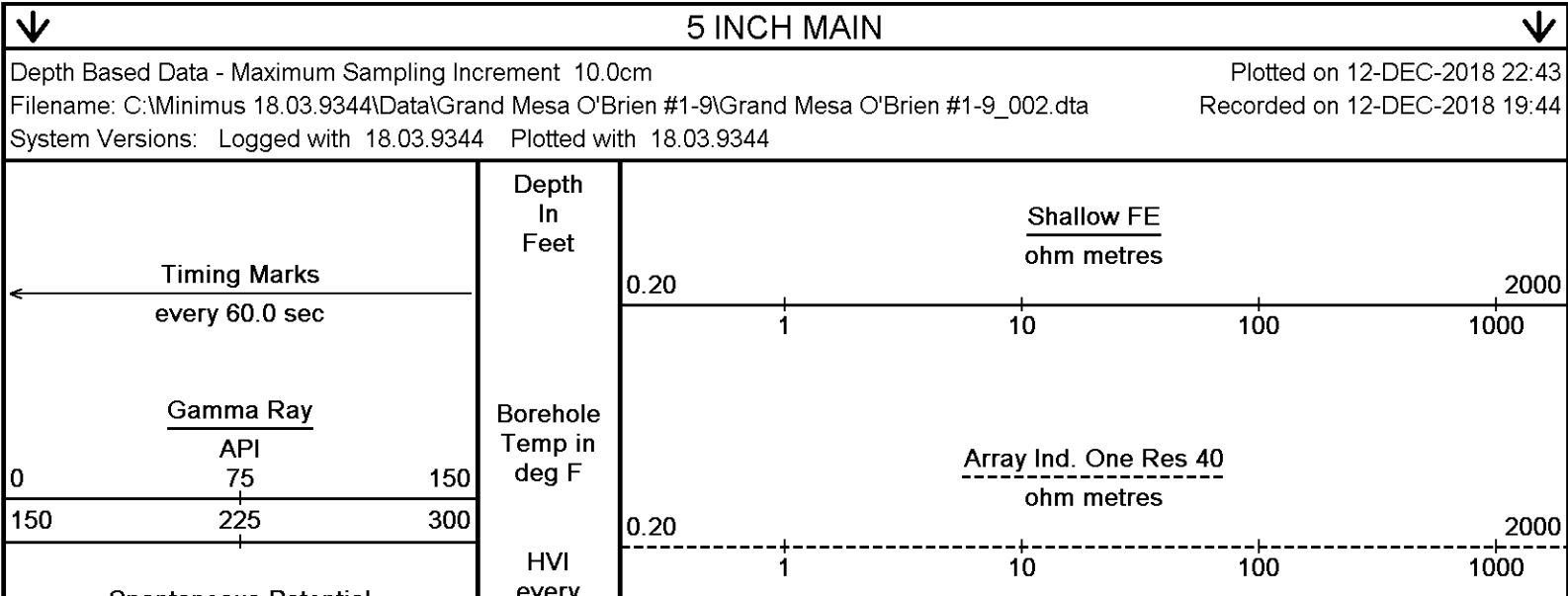
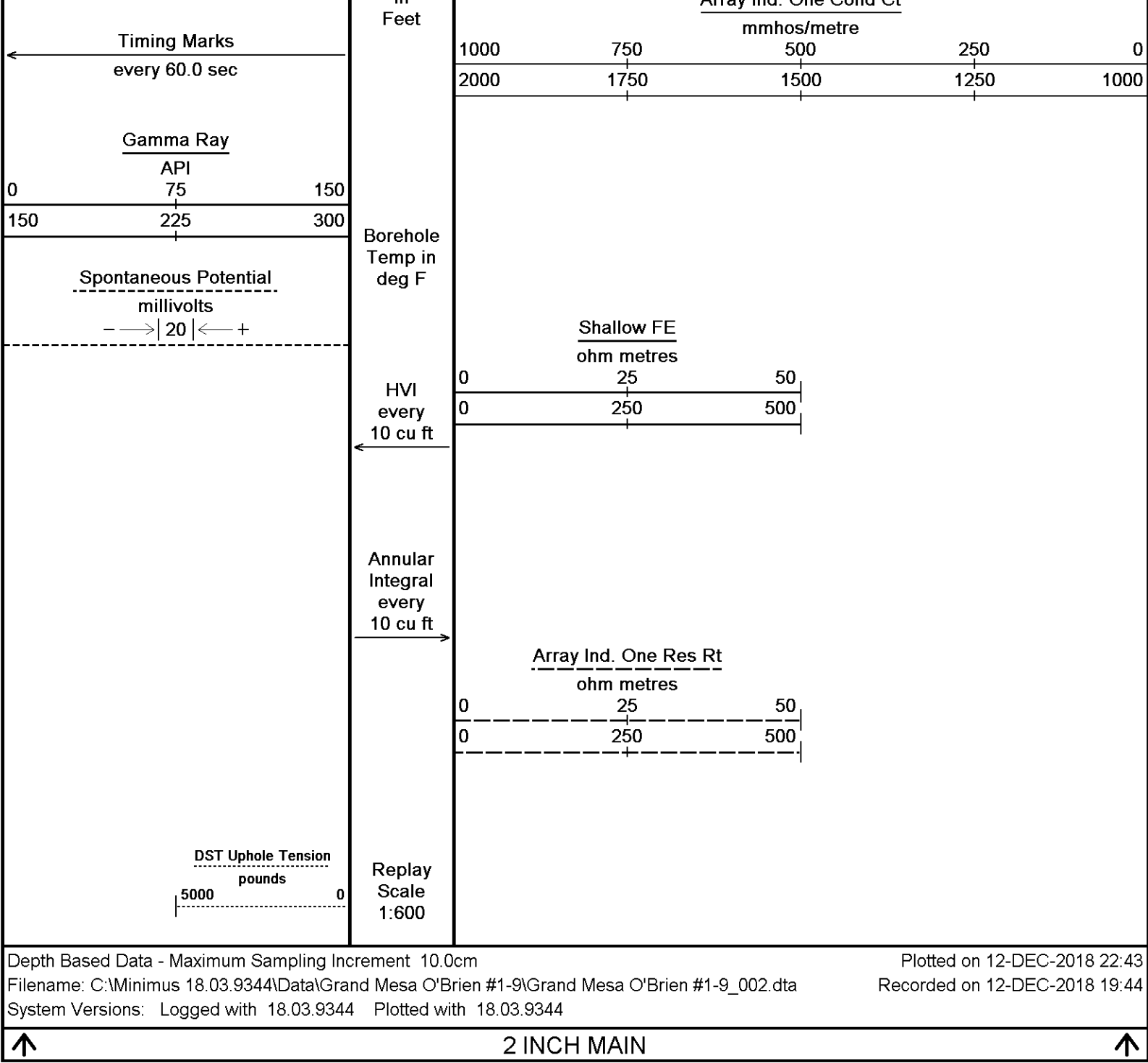


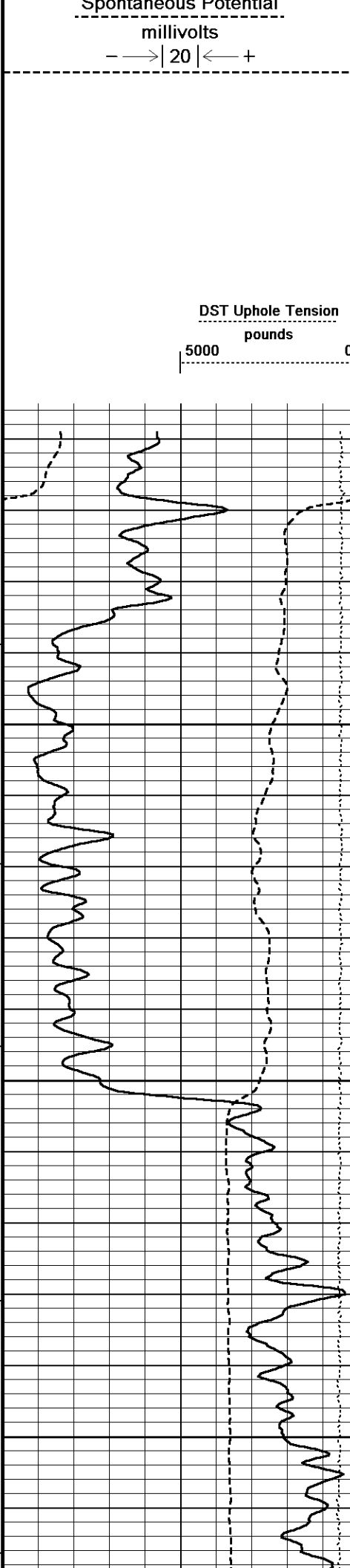












every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240

208

Casing
Shoe

1800

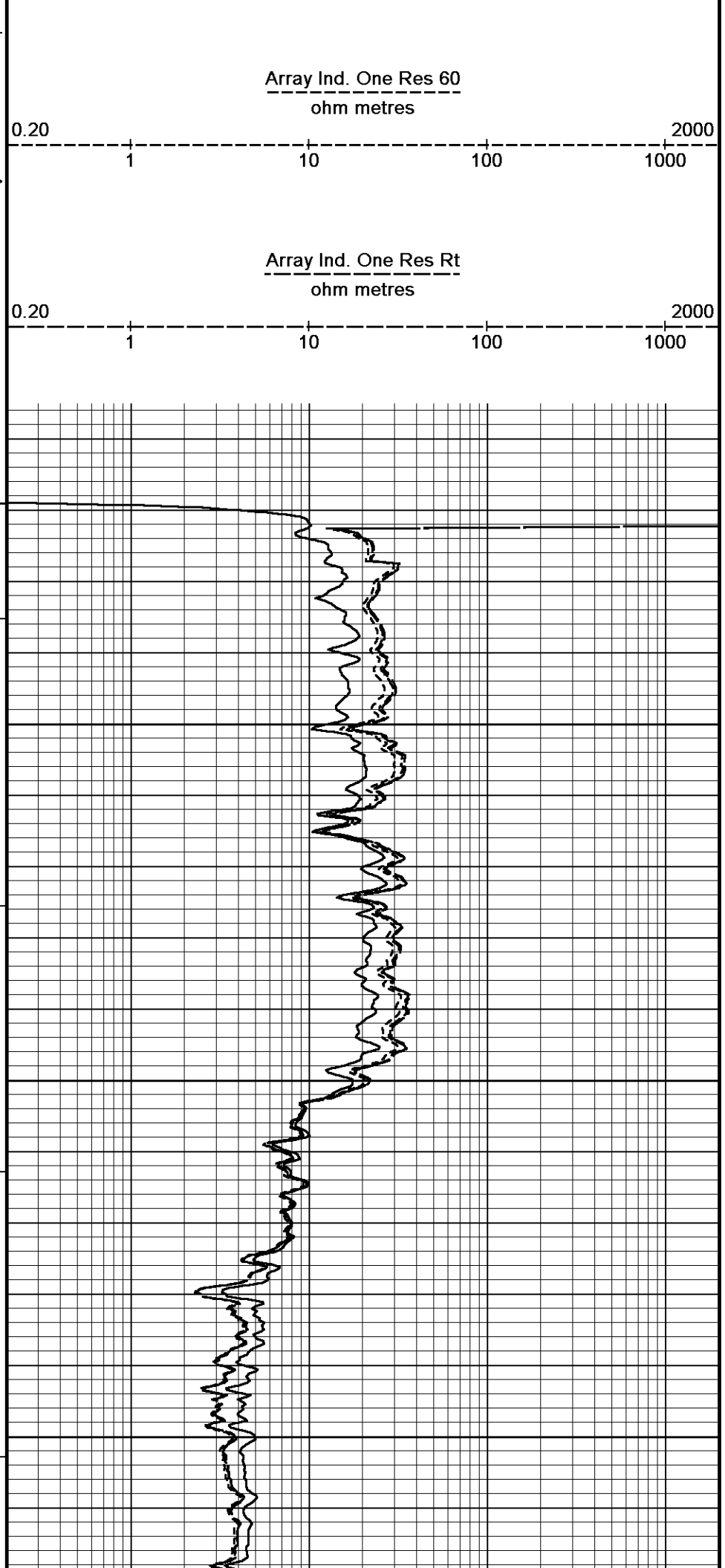
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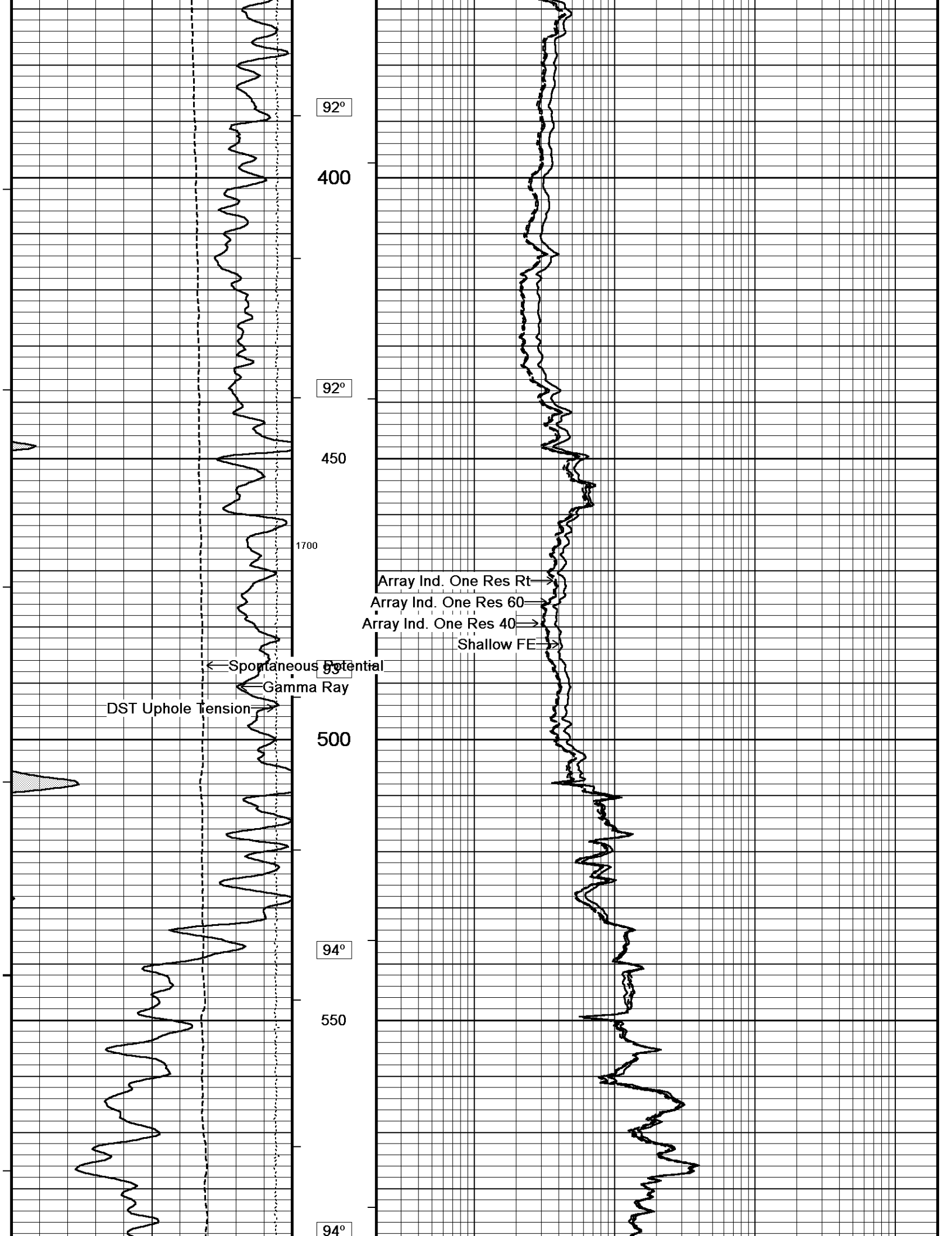
90°

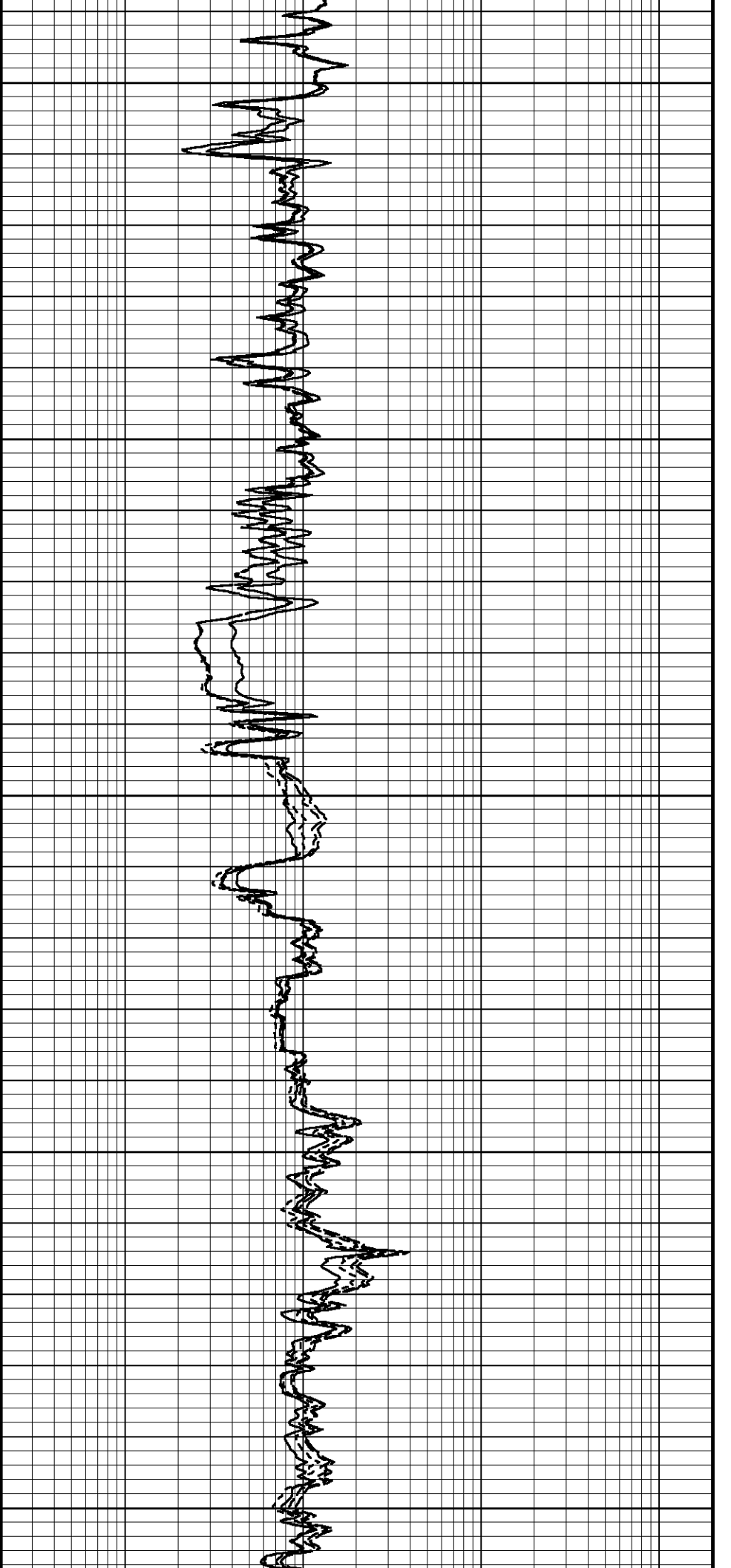
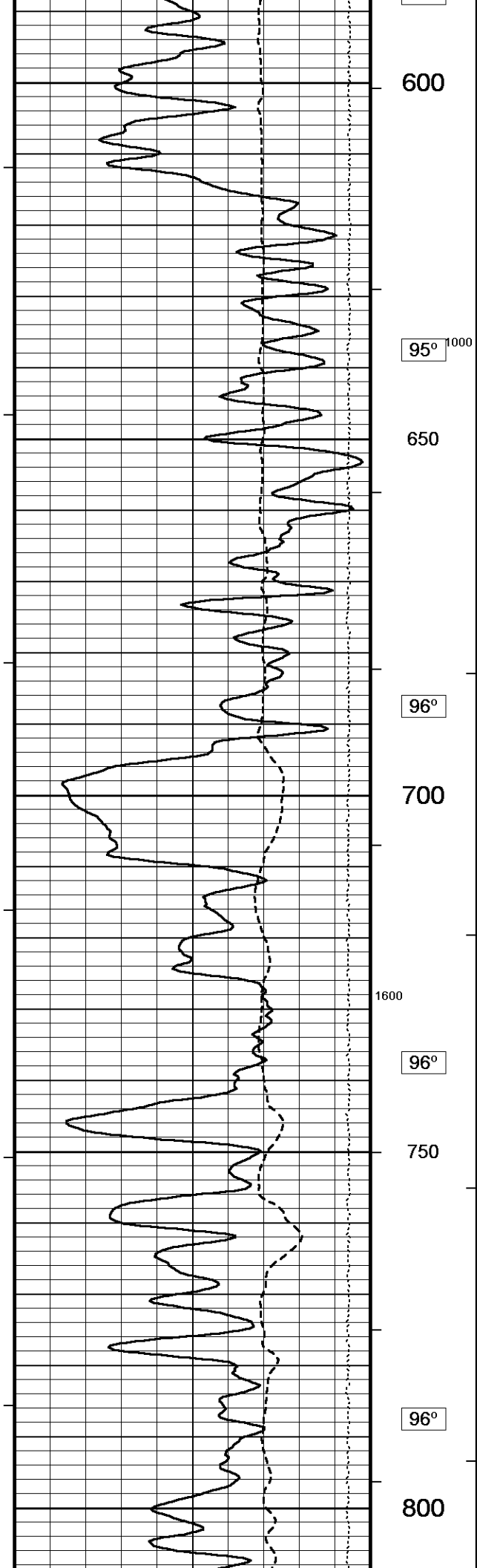
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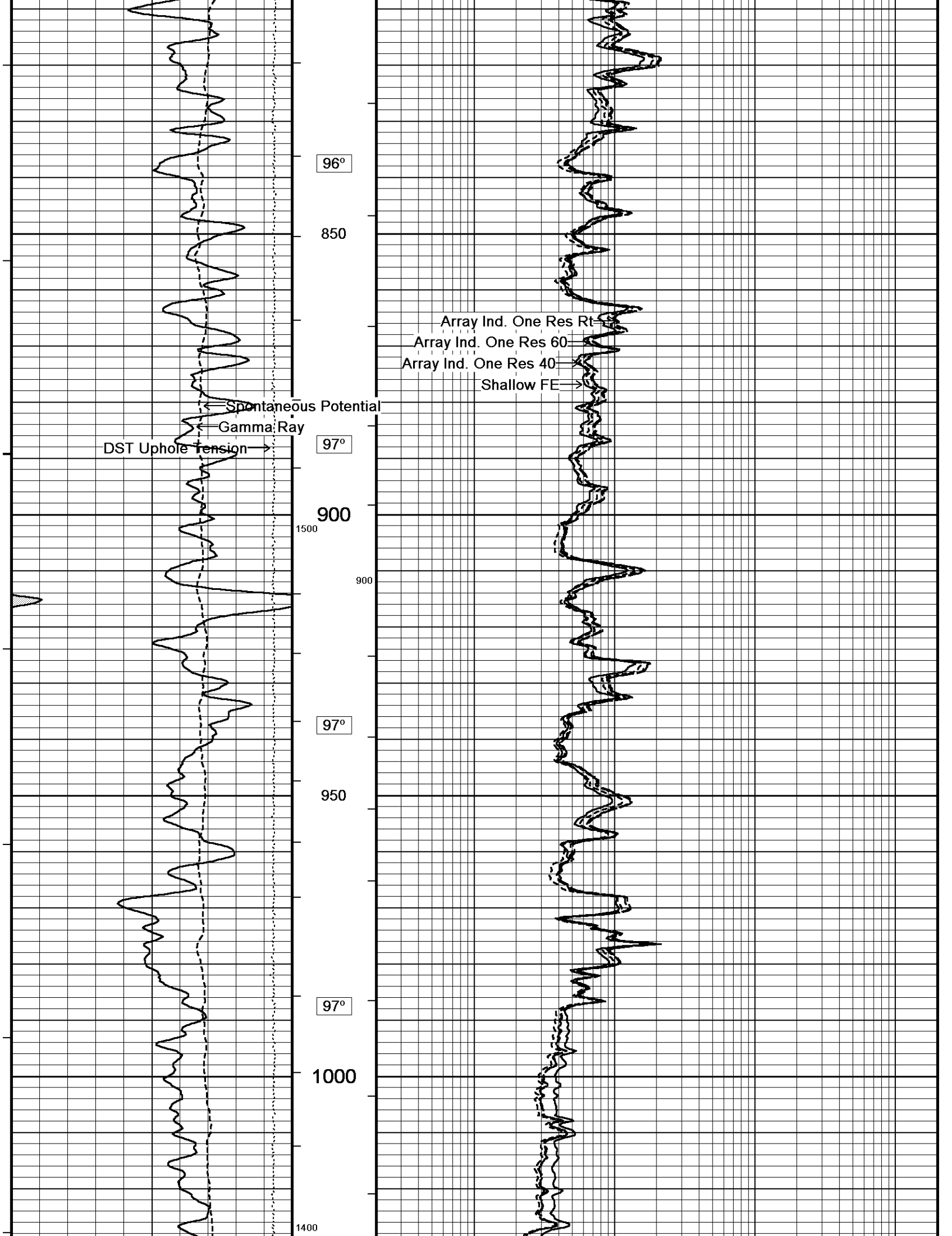
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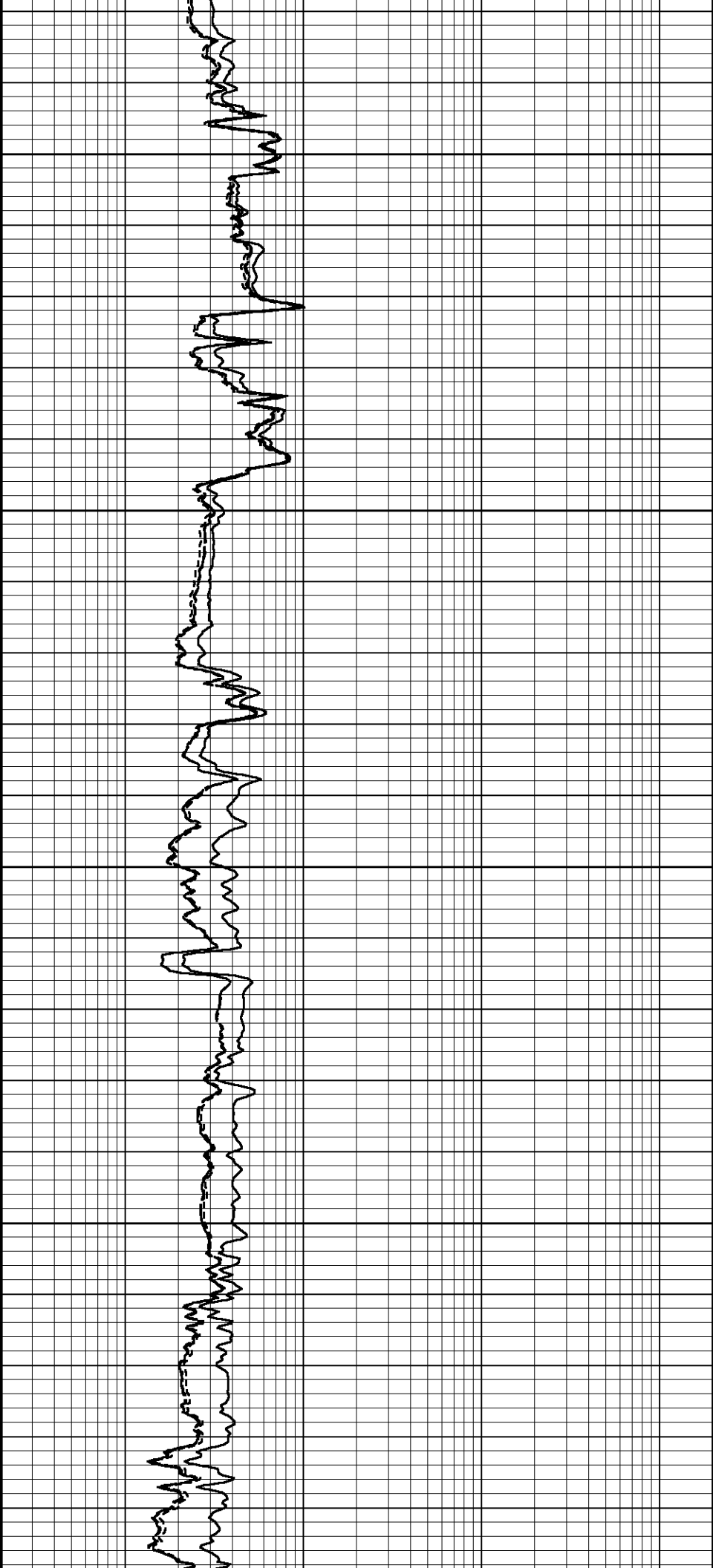
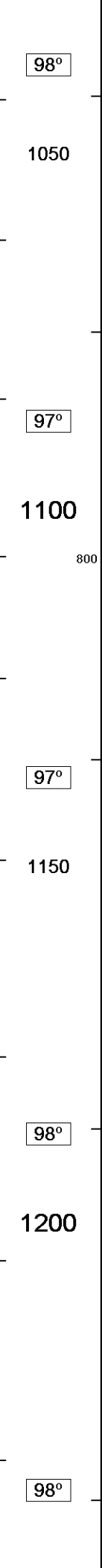
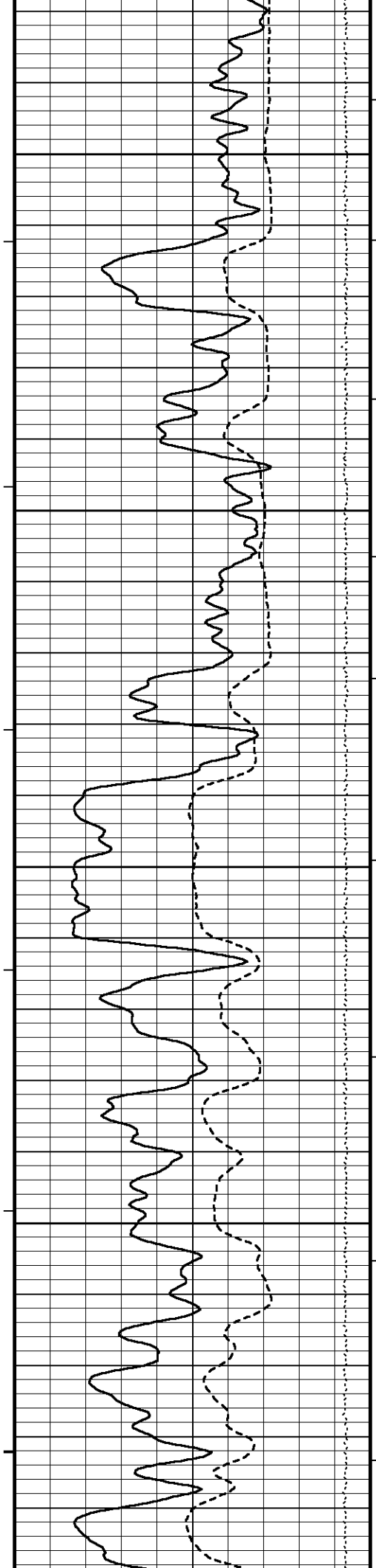
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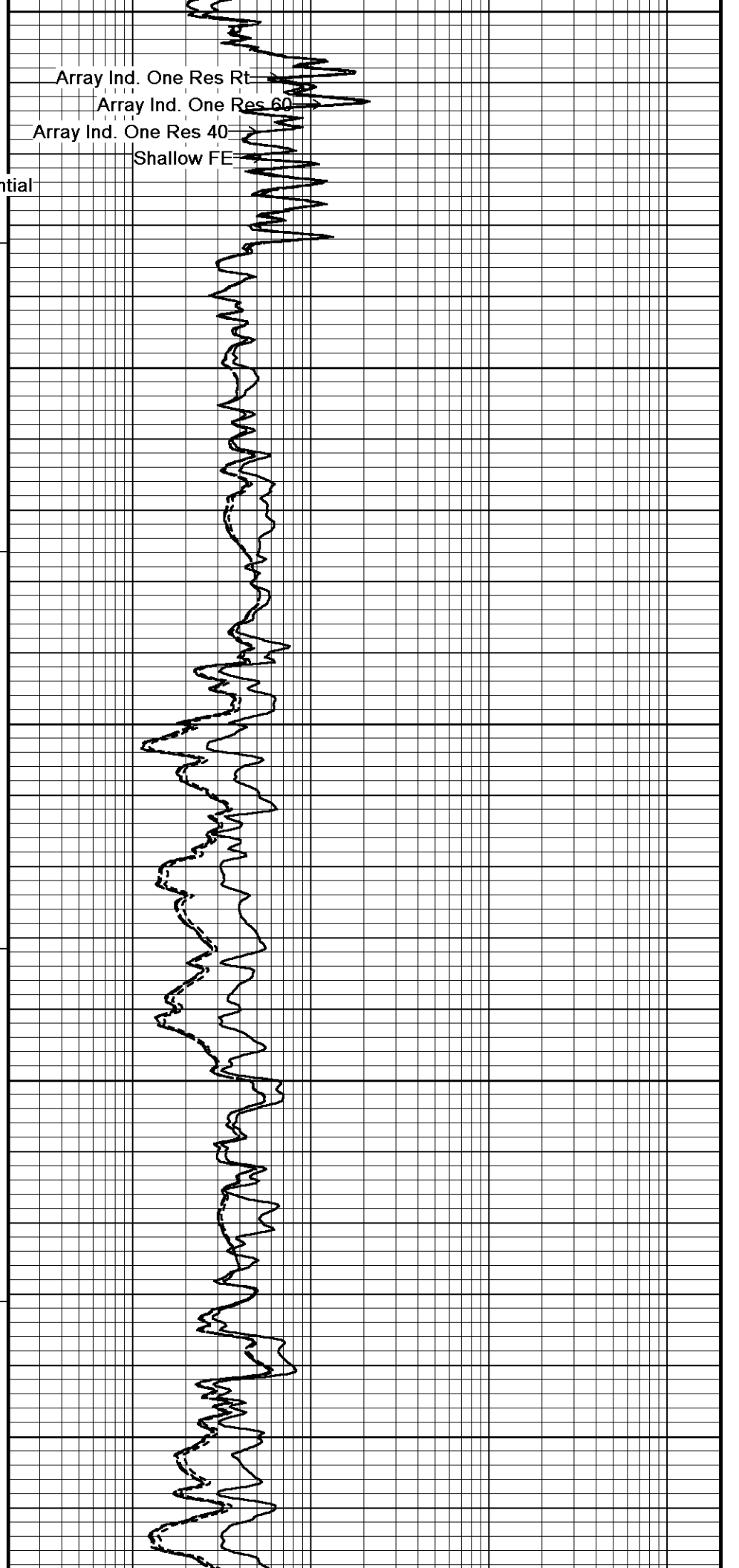
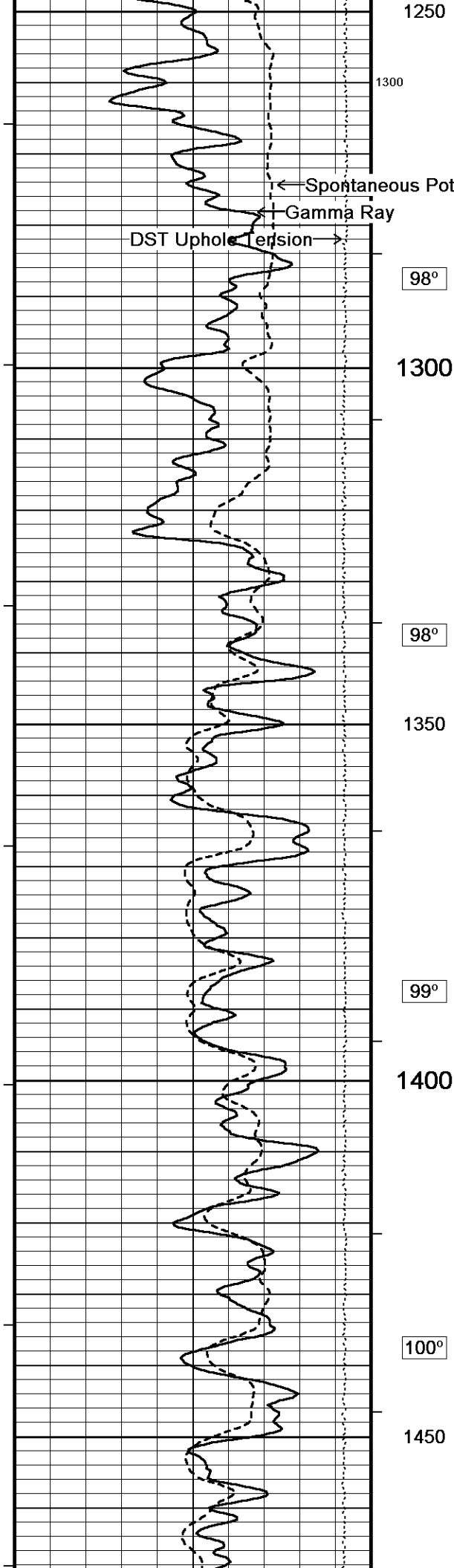


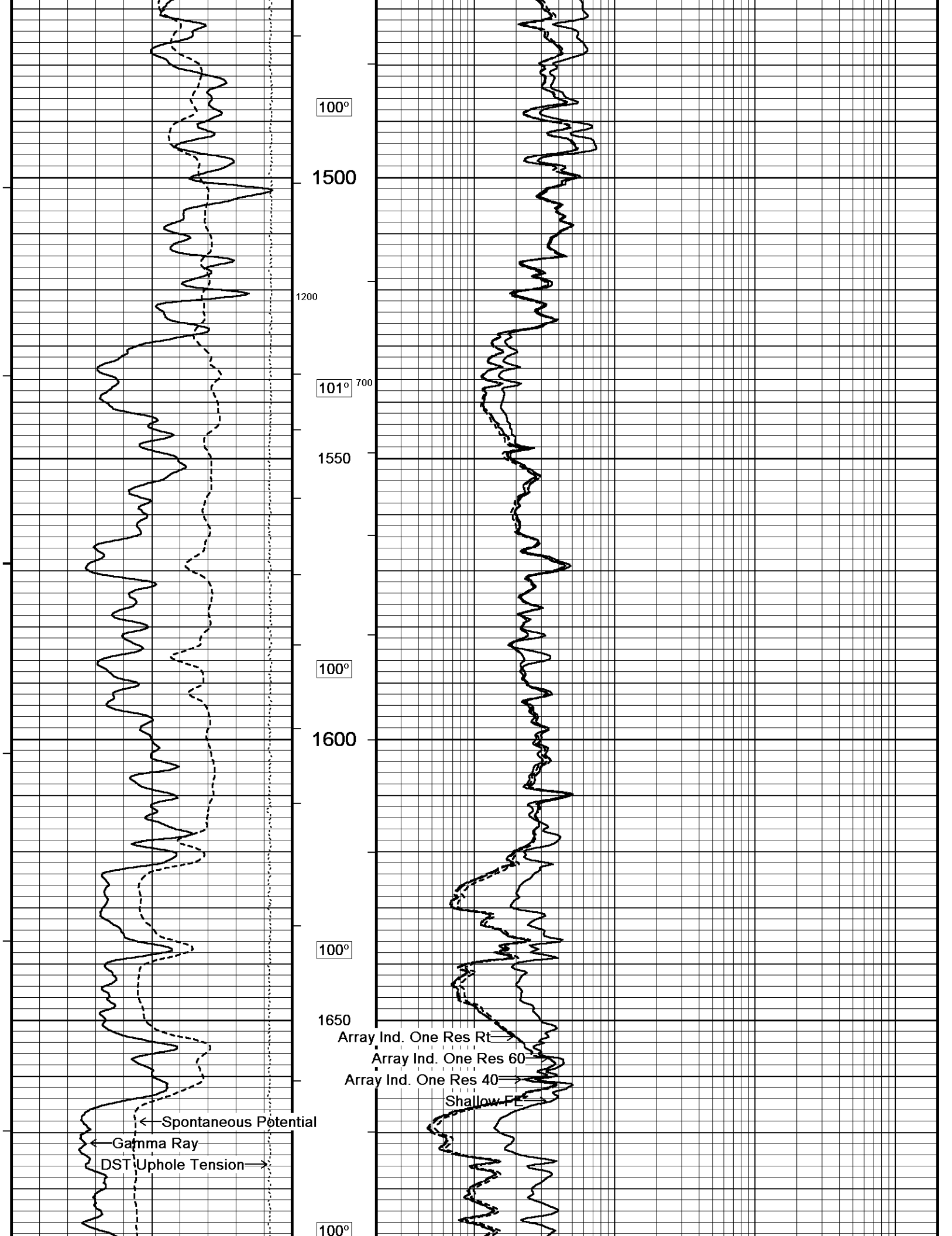


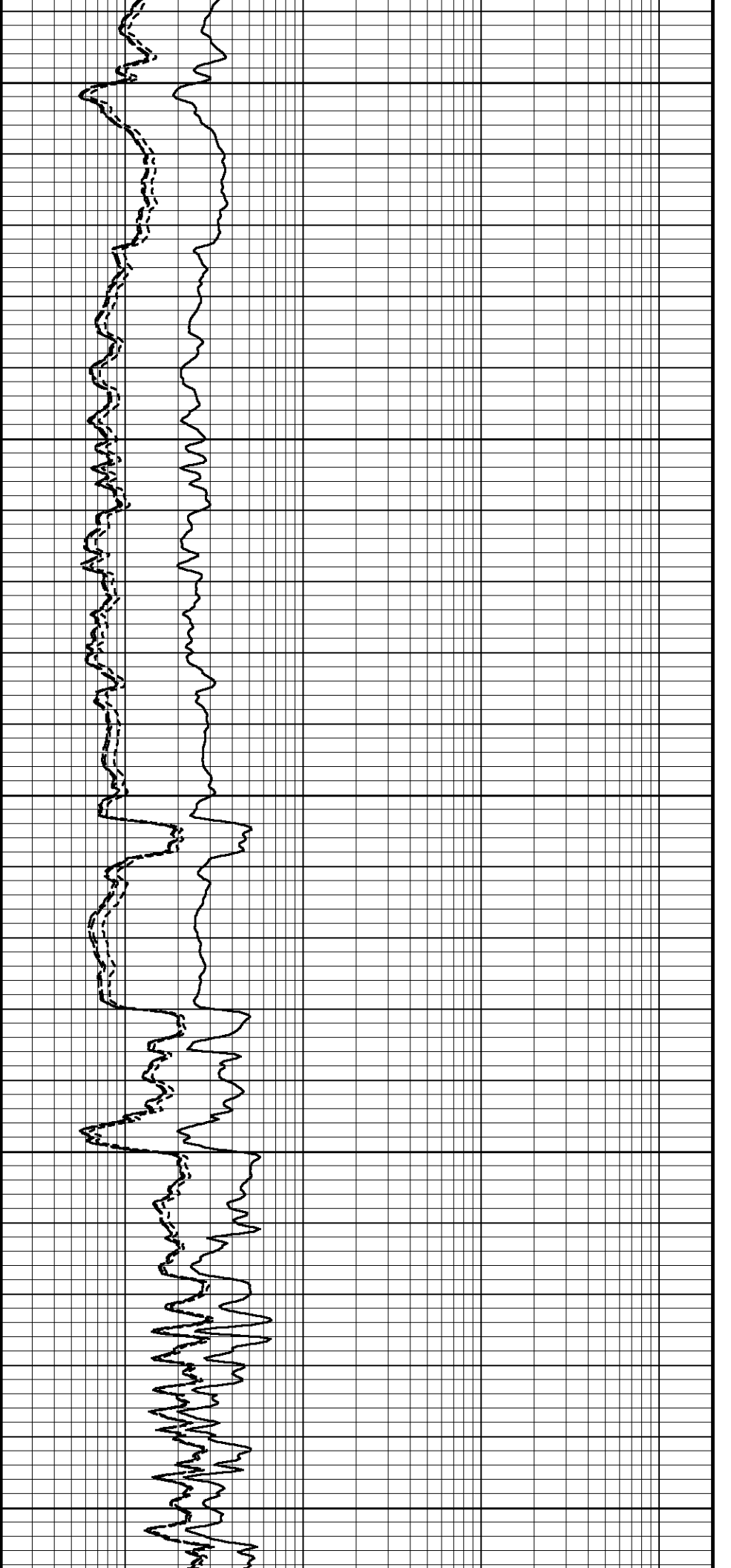
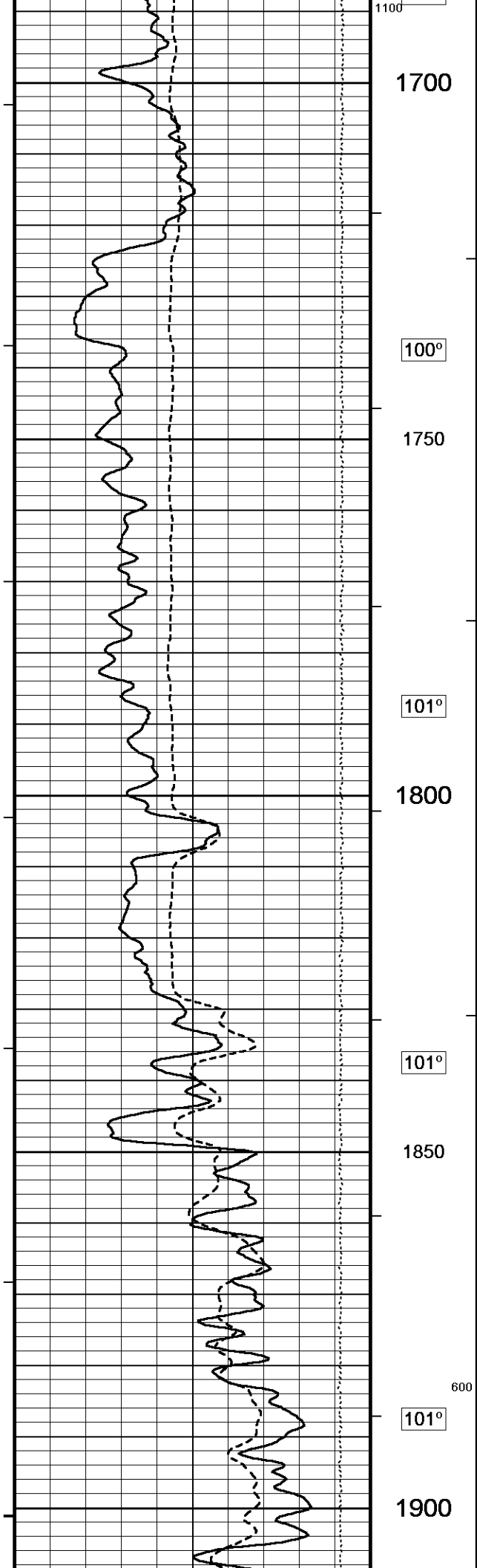


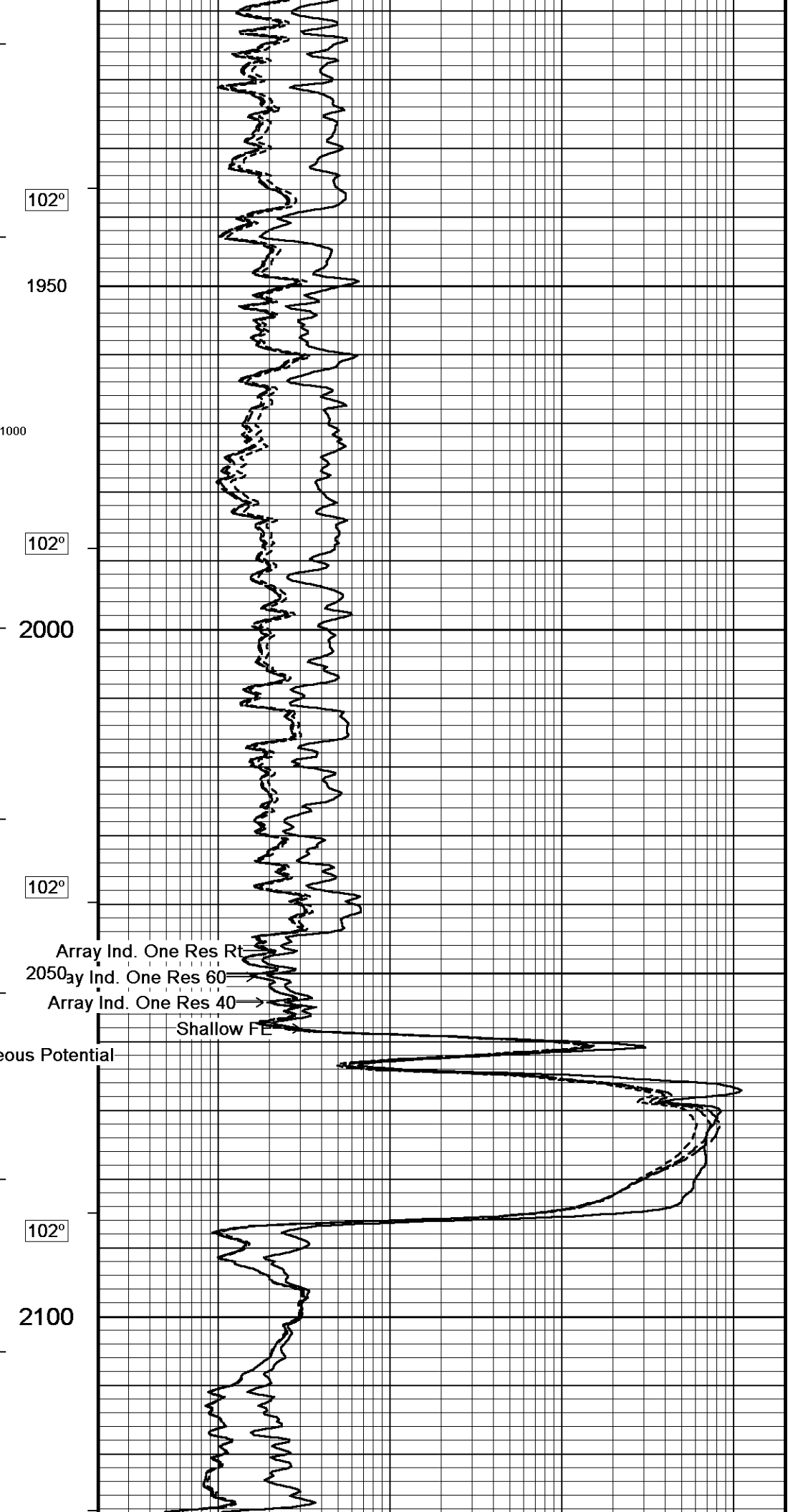
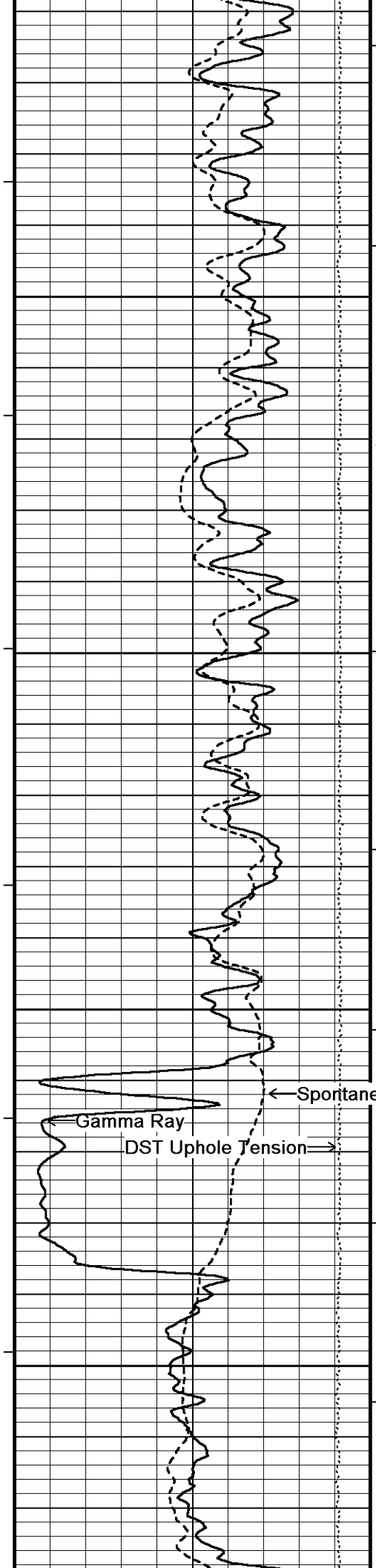


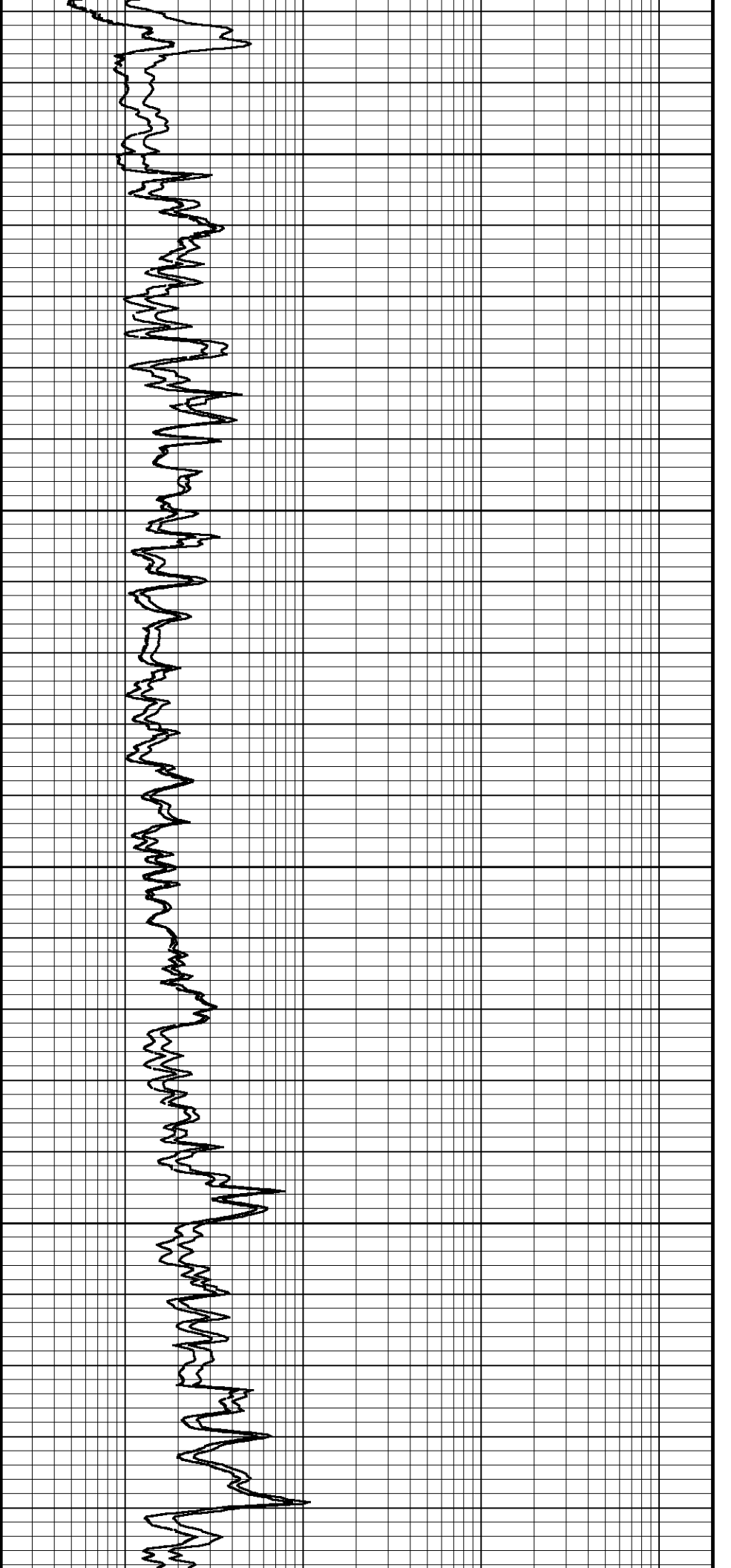
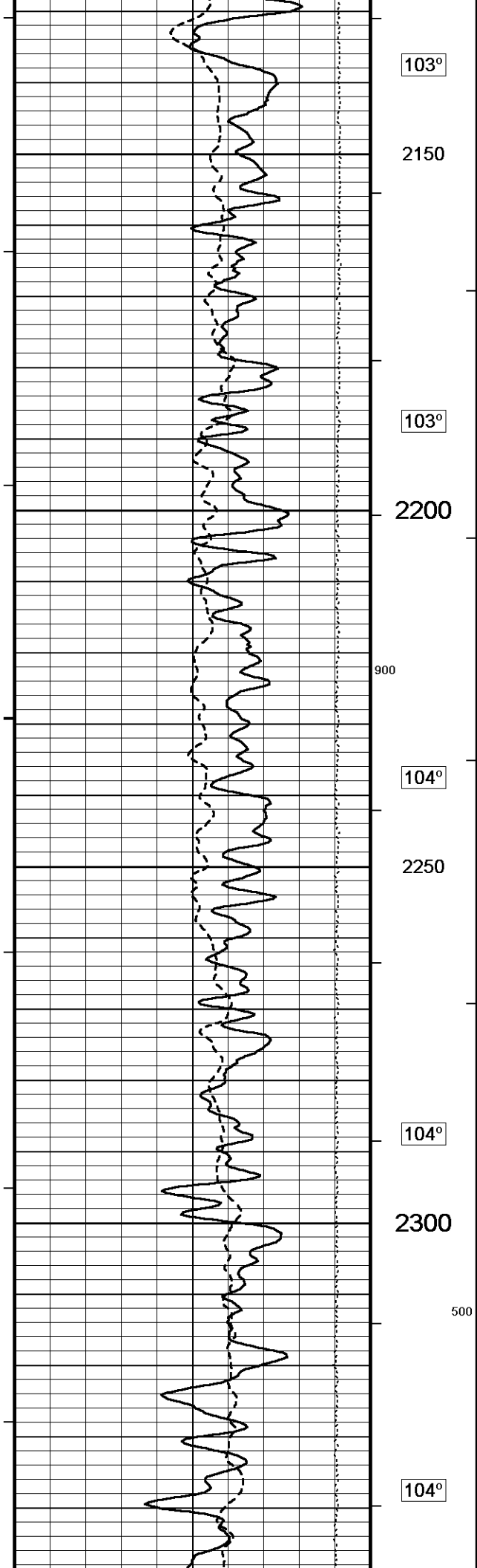


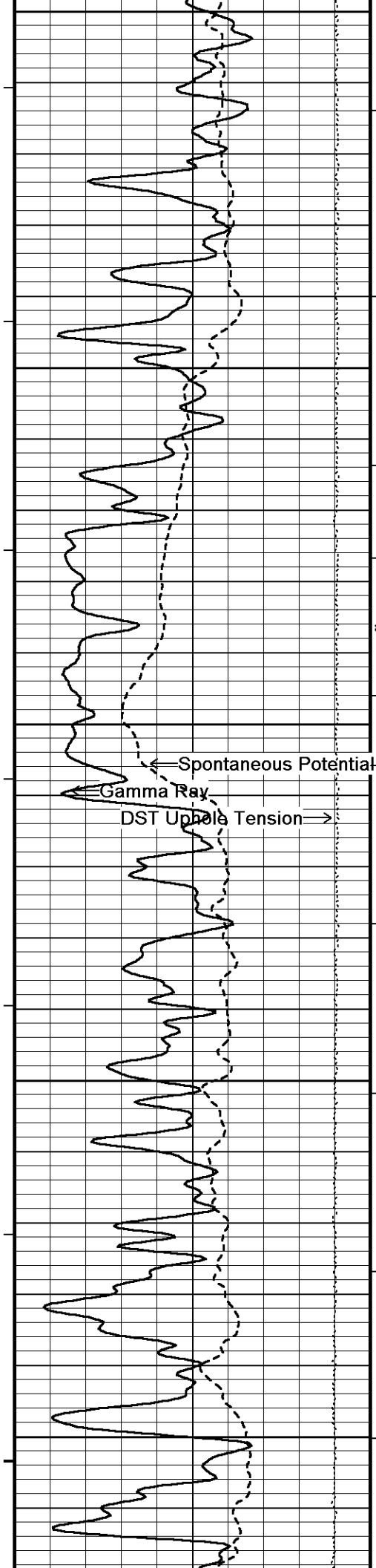




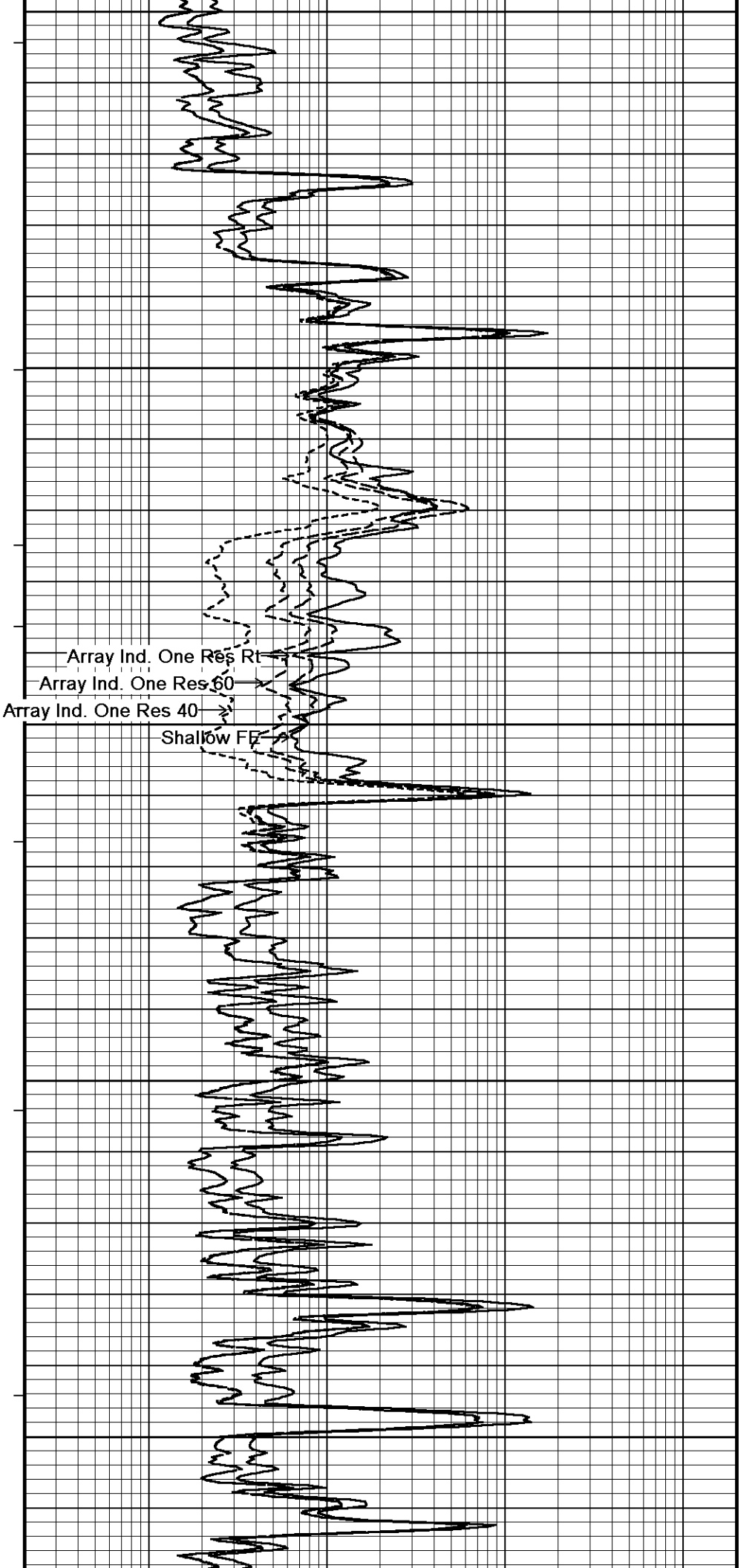




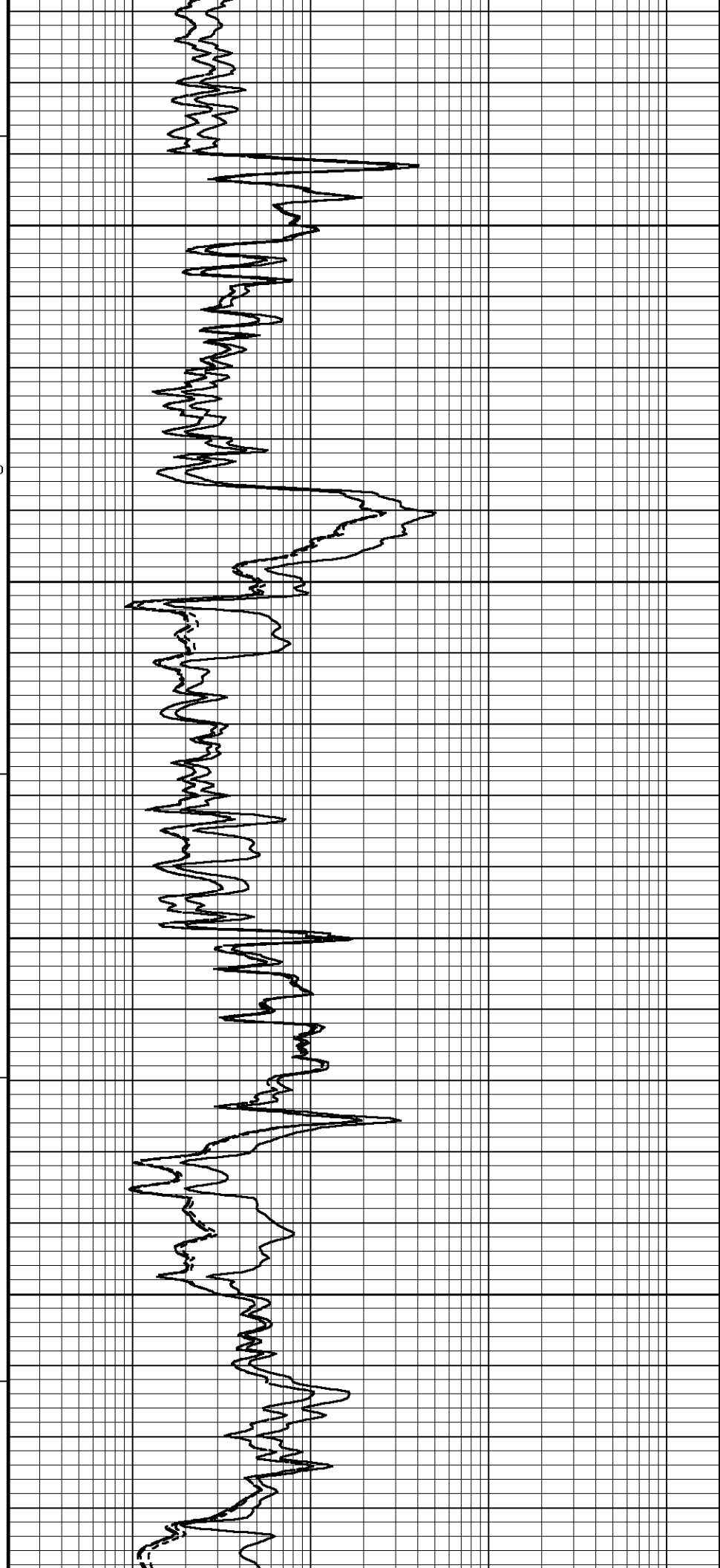
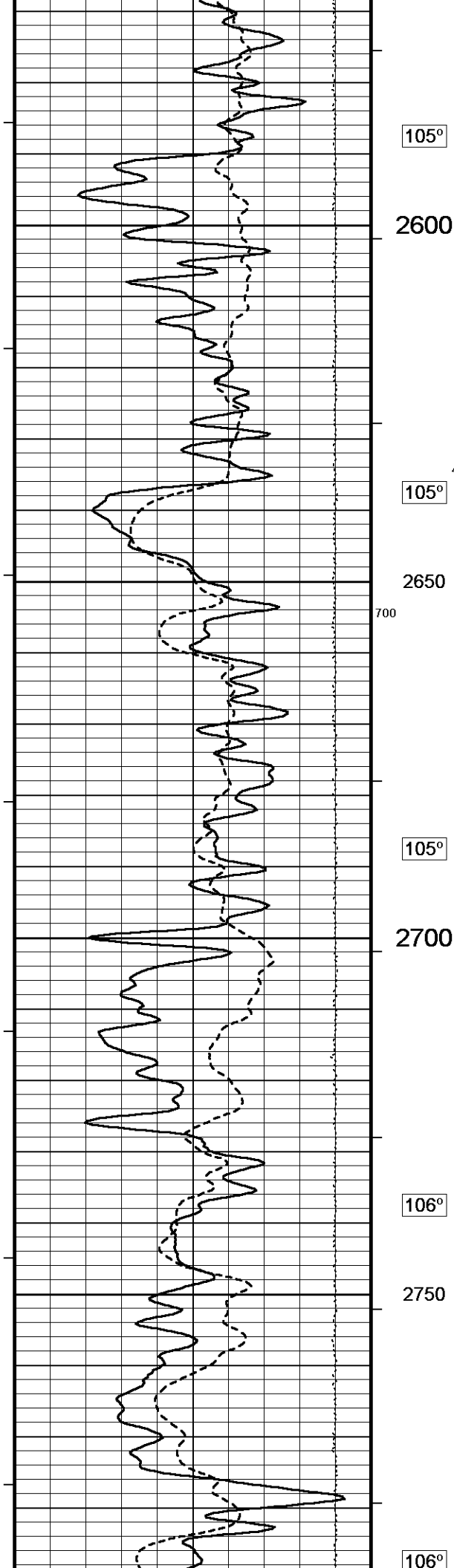


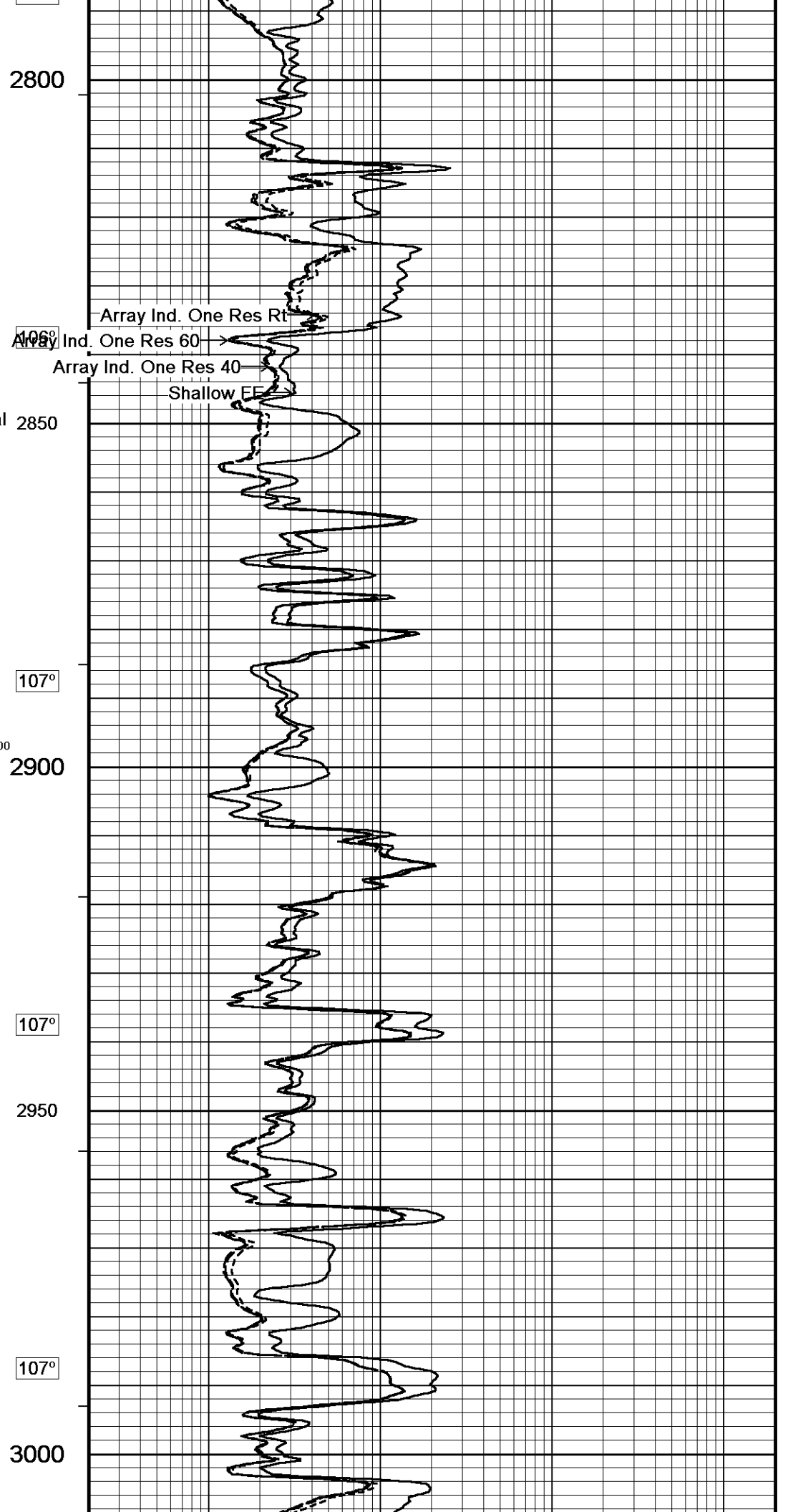
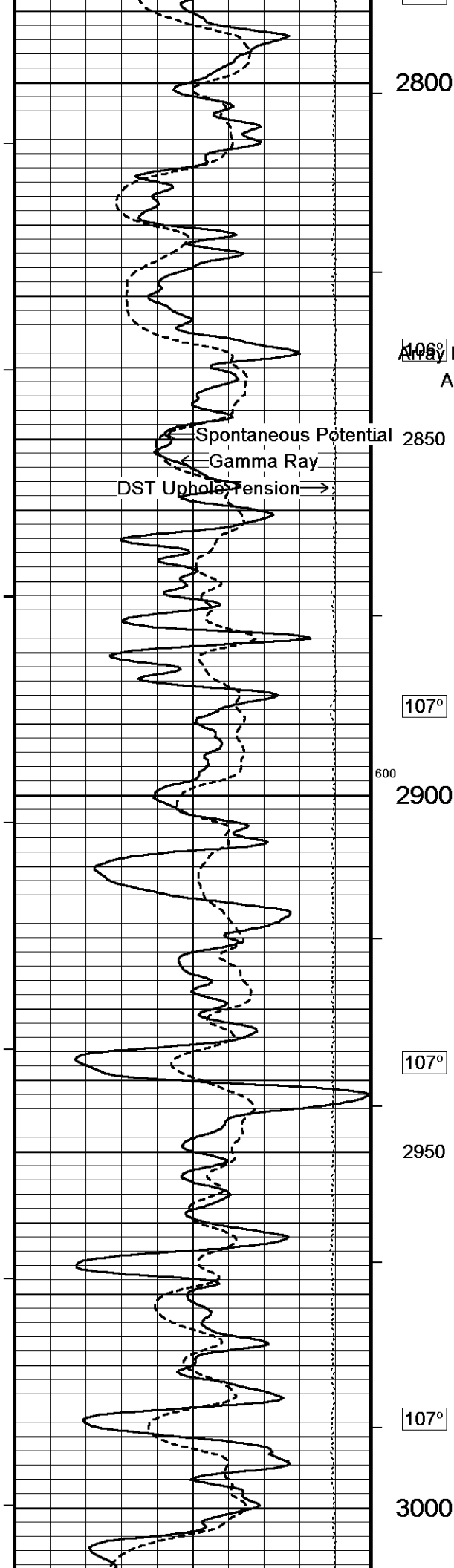


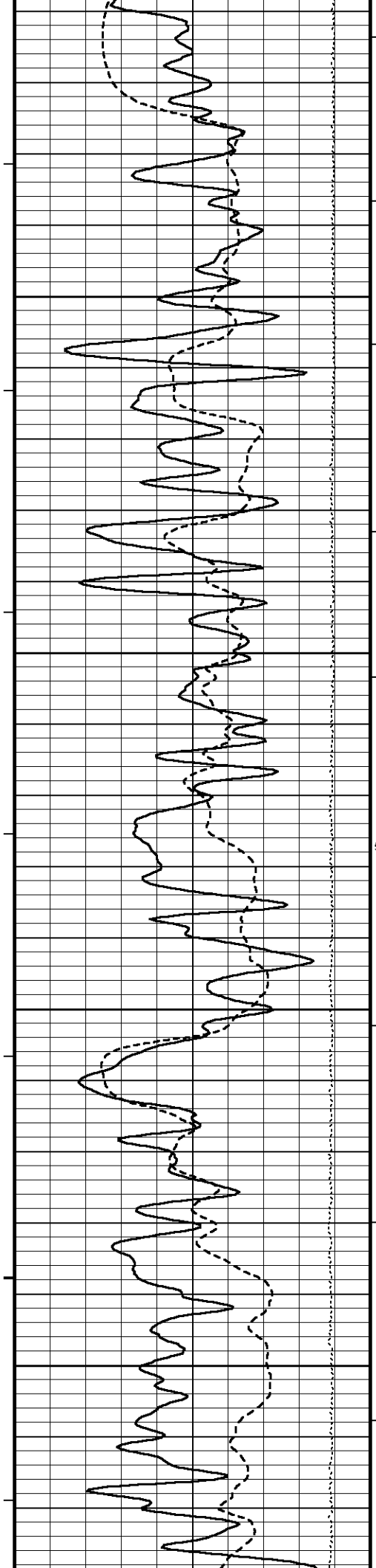
2350
105°
2400
800 105°
2450
105°
2500
105°
2550



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







107°

3050

108°

3100

500

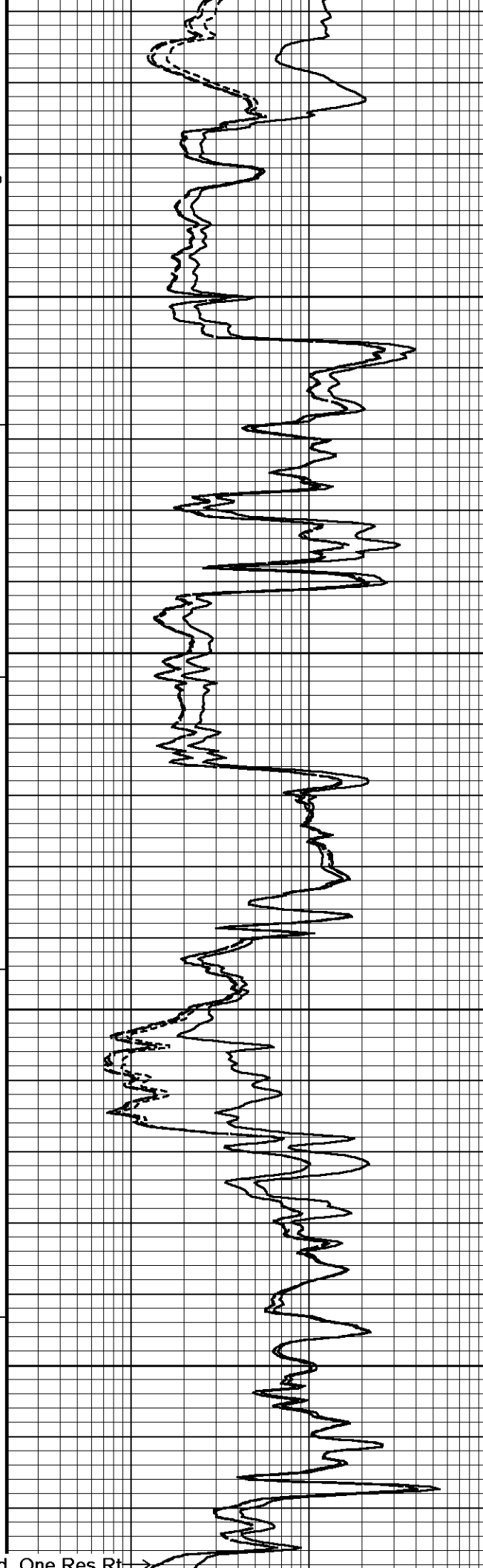
108°

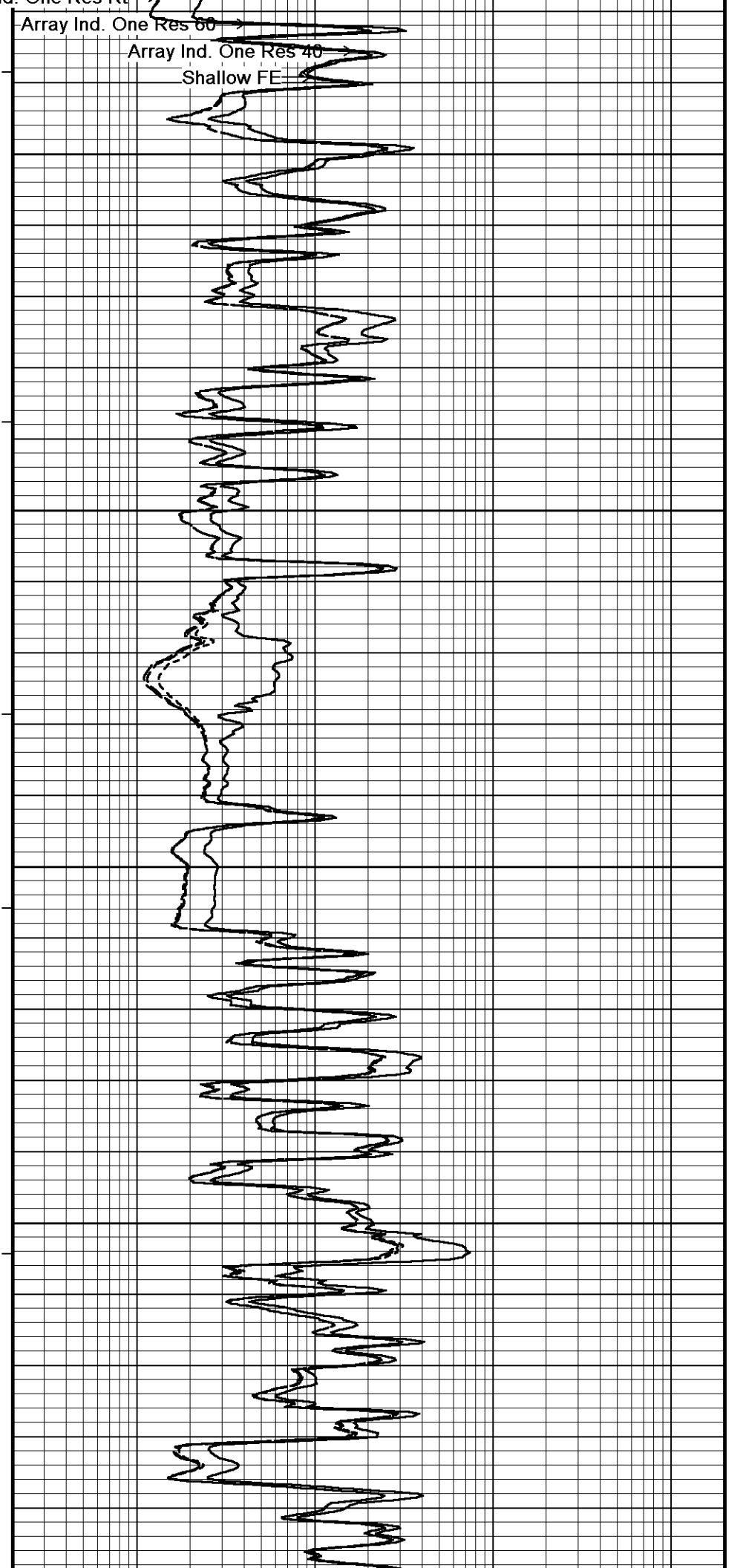
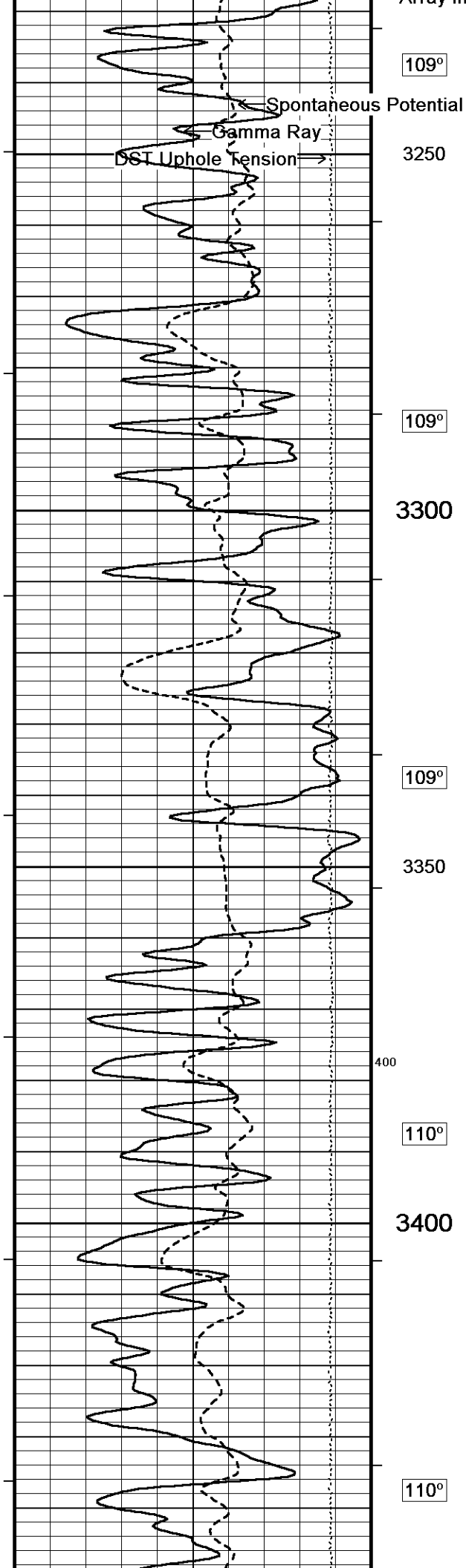
3150

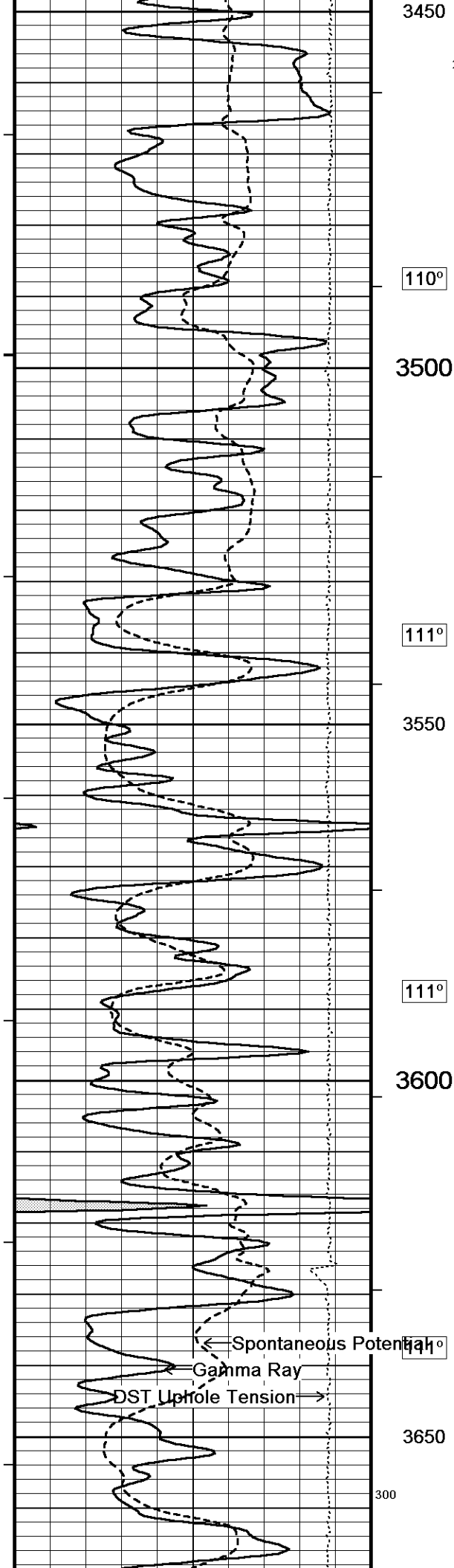
108°

3200

Array Ind. One Res Rt →







3450

110°

3500

111°

3550

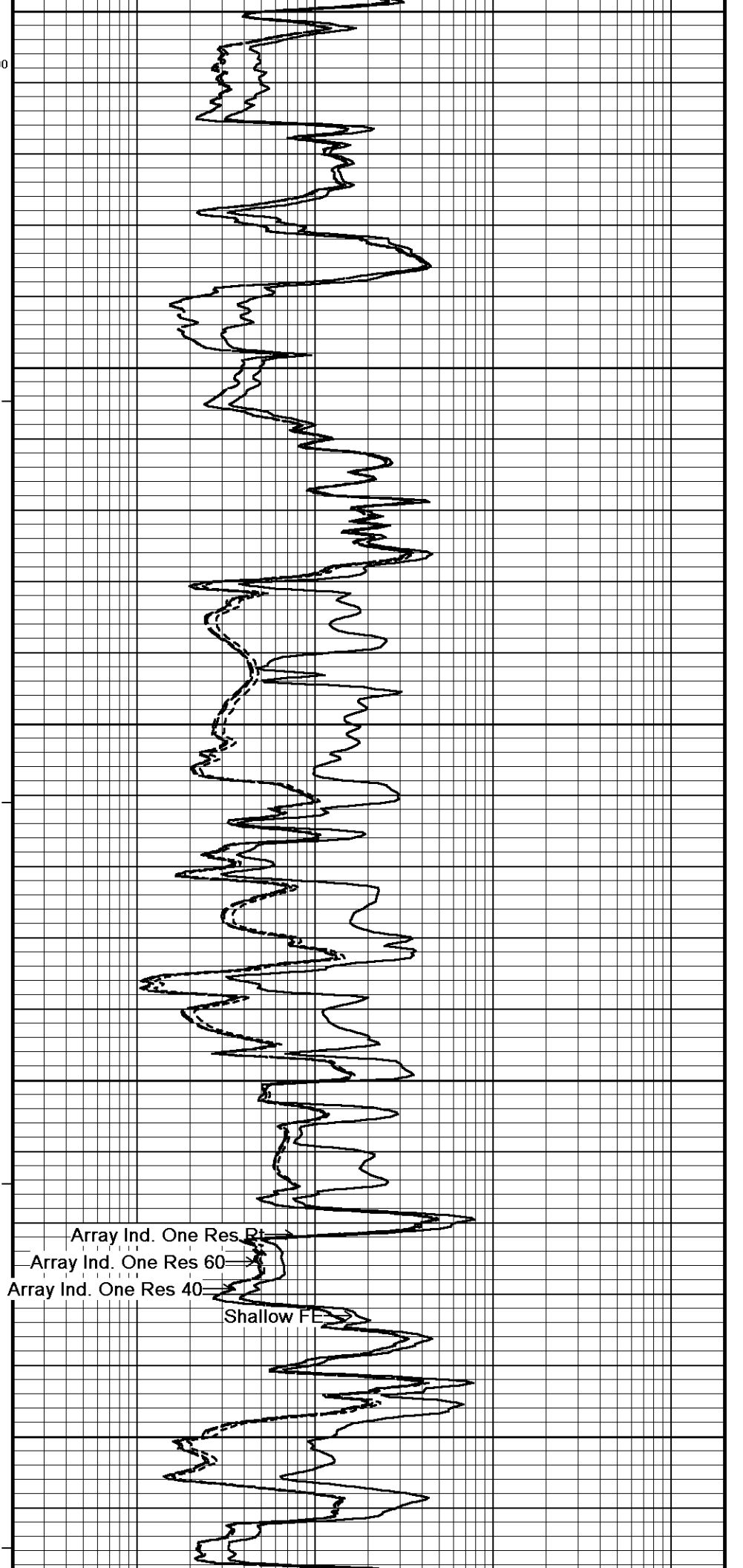
111°

3600

111°

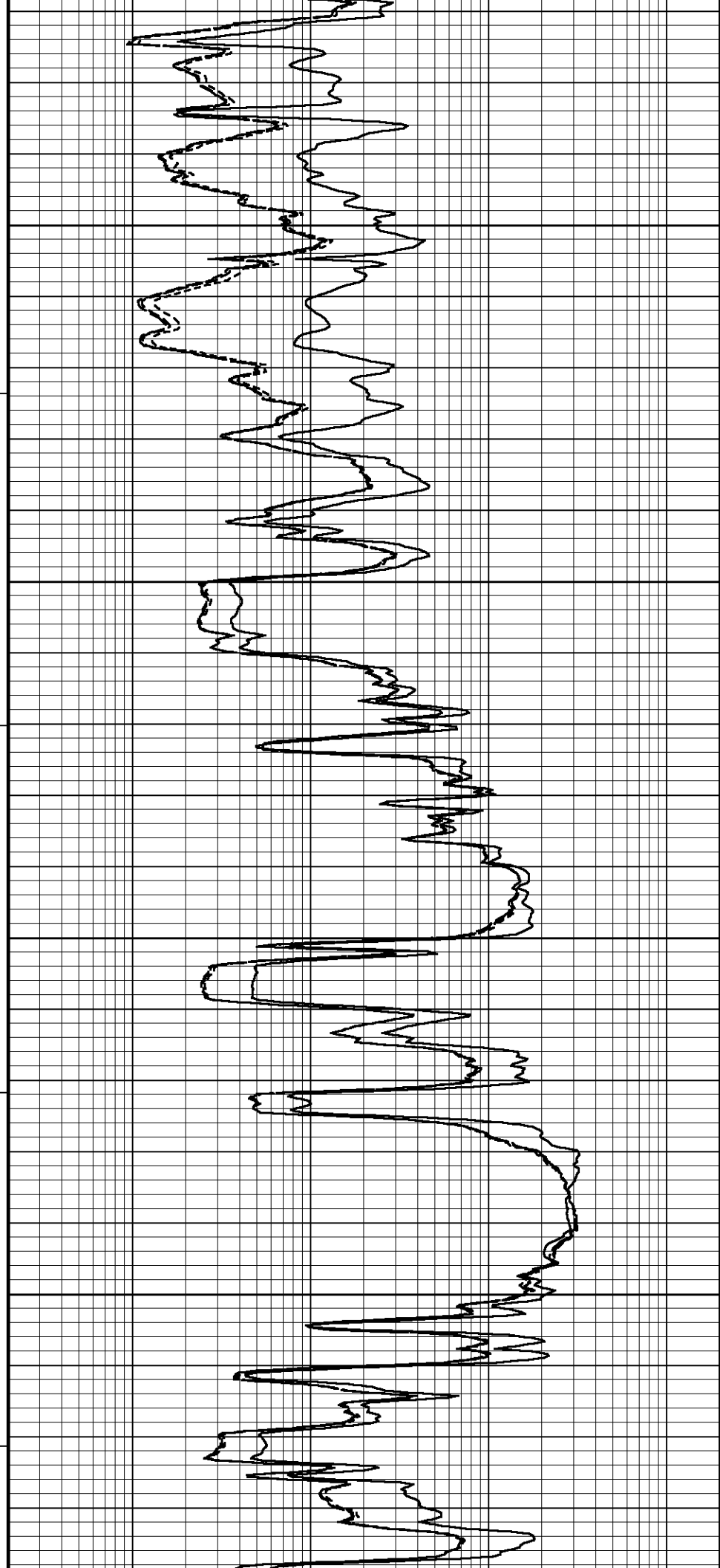
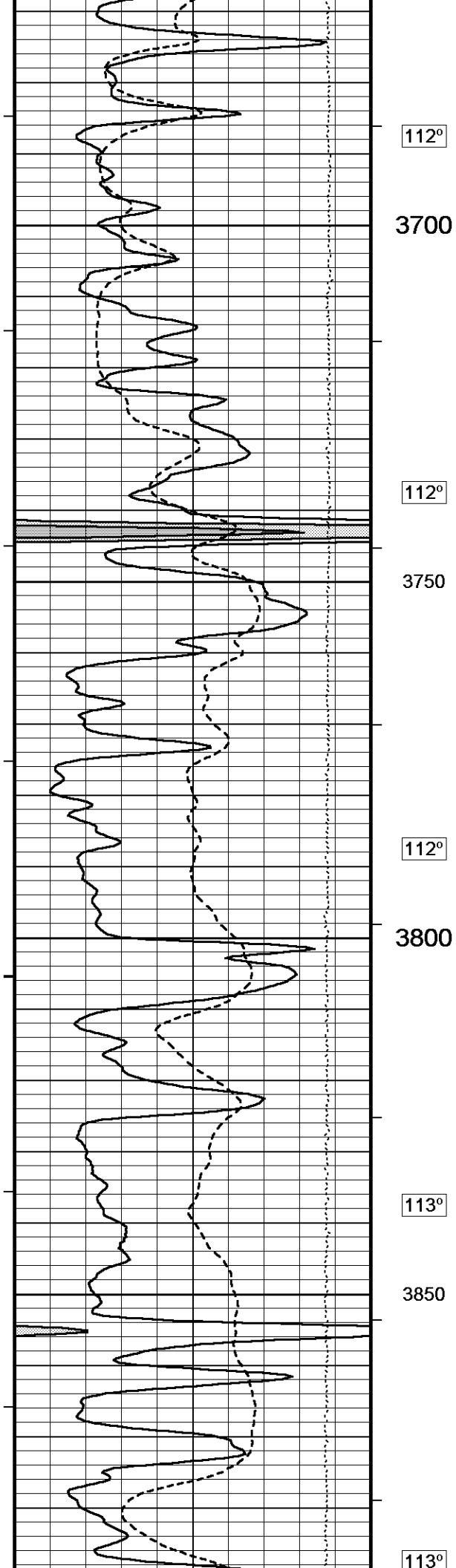
3650

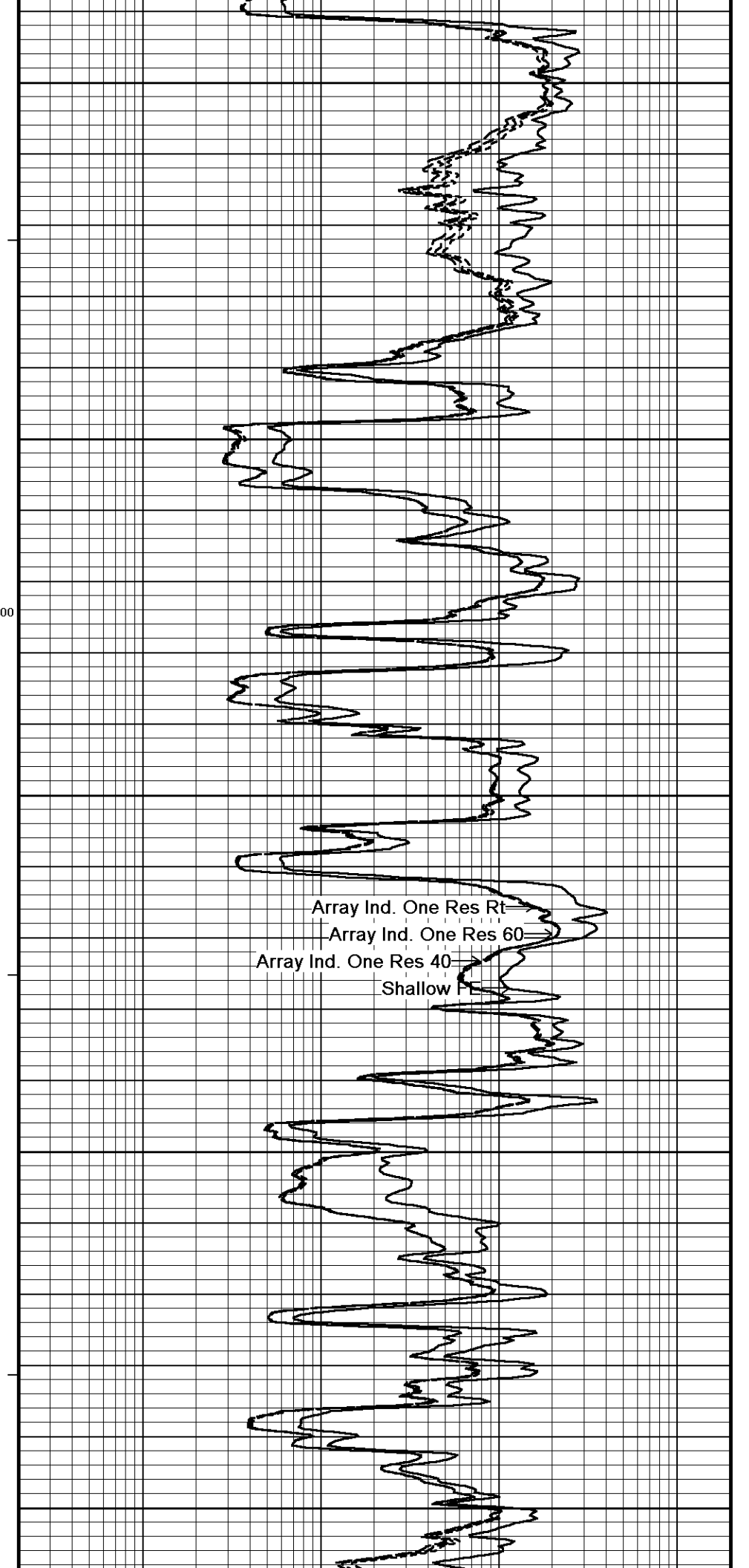
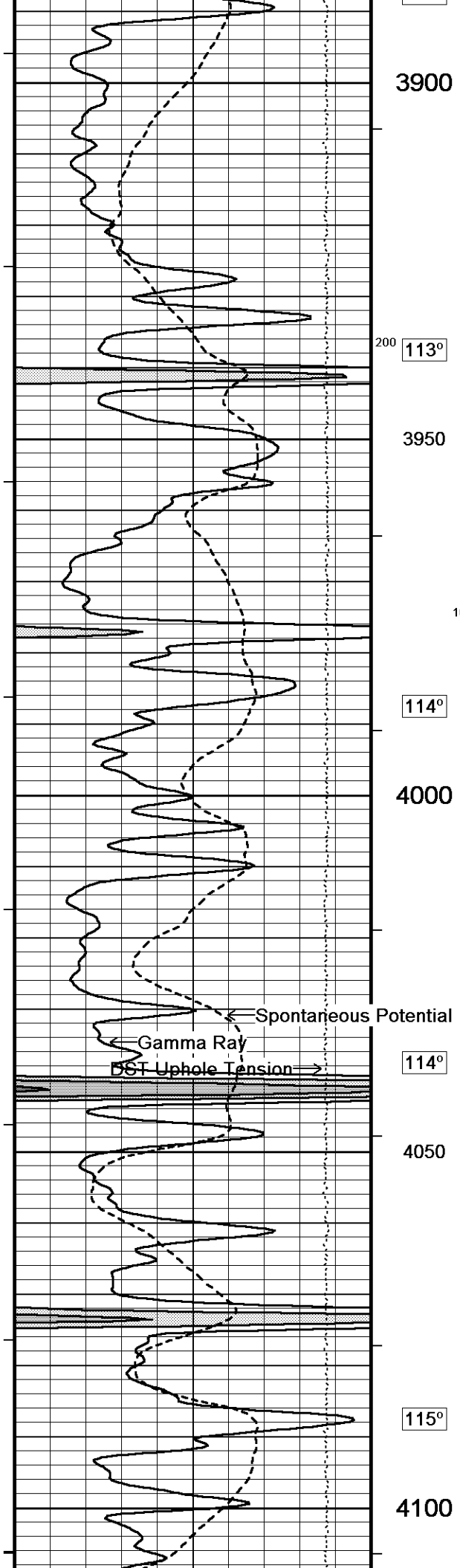
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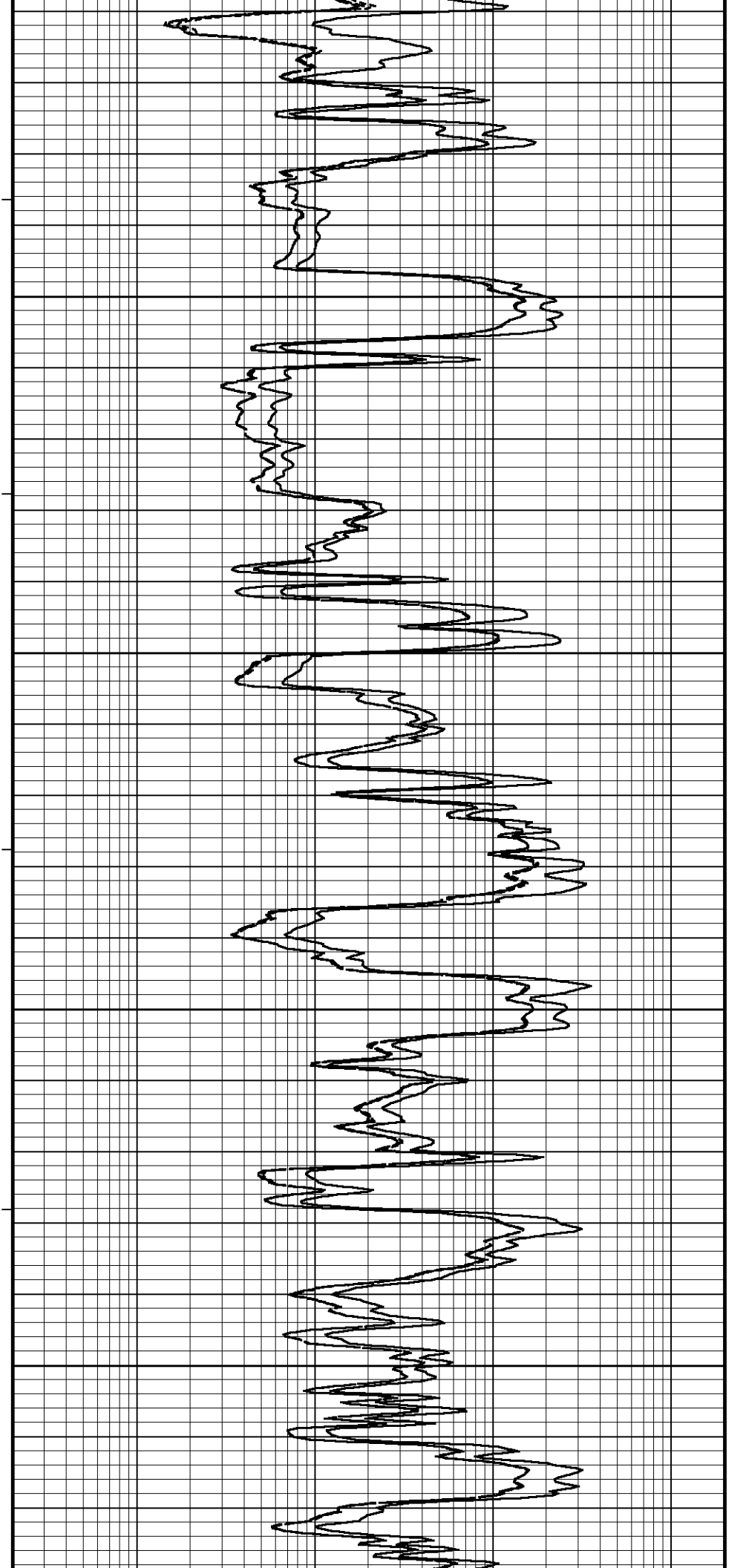
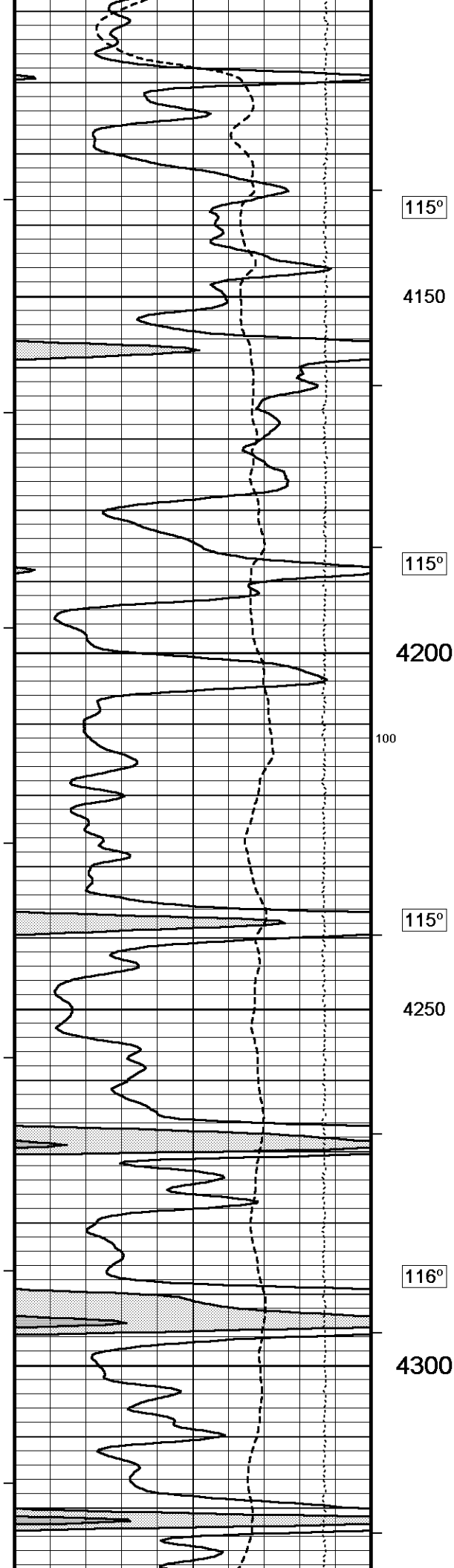


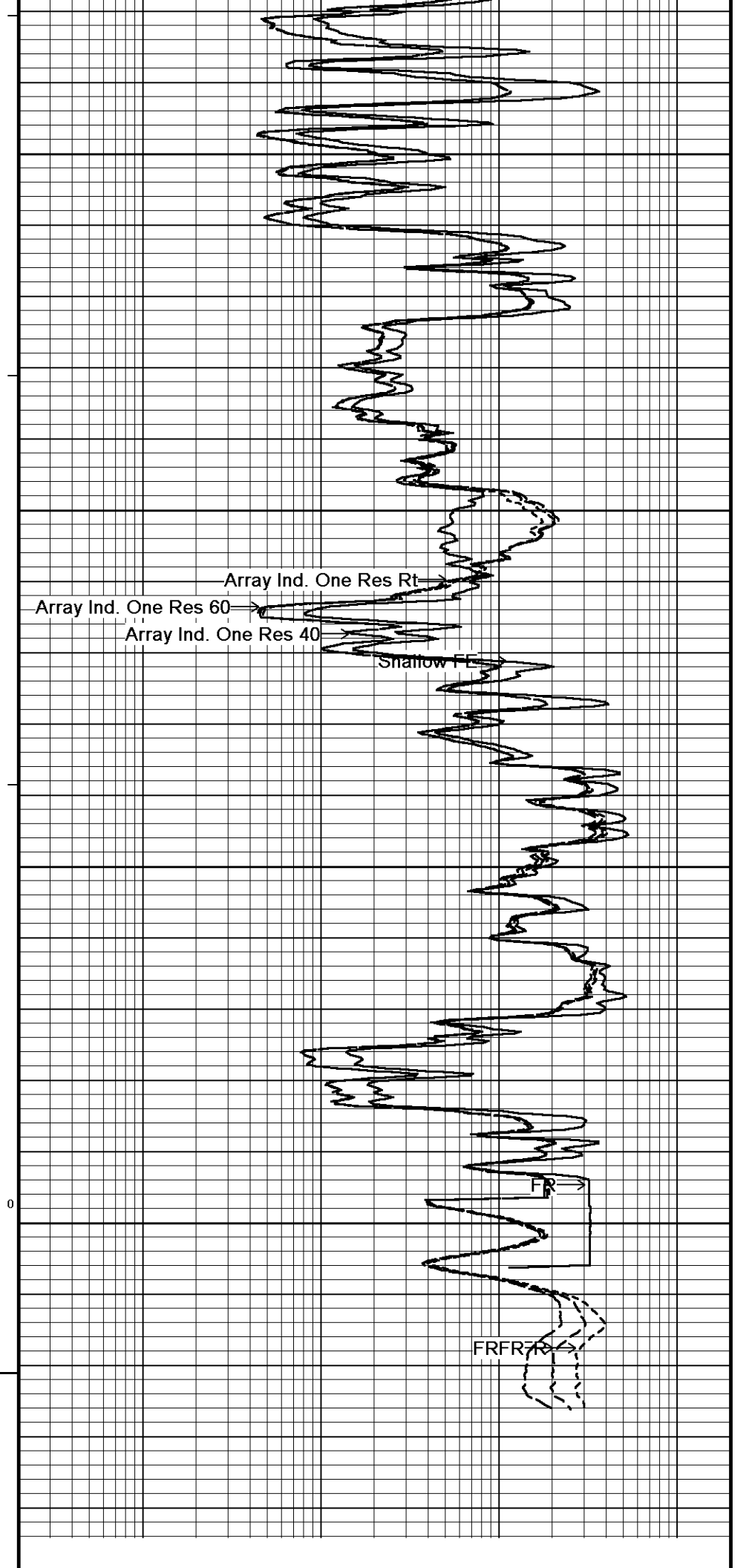
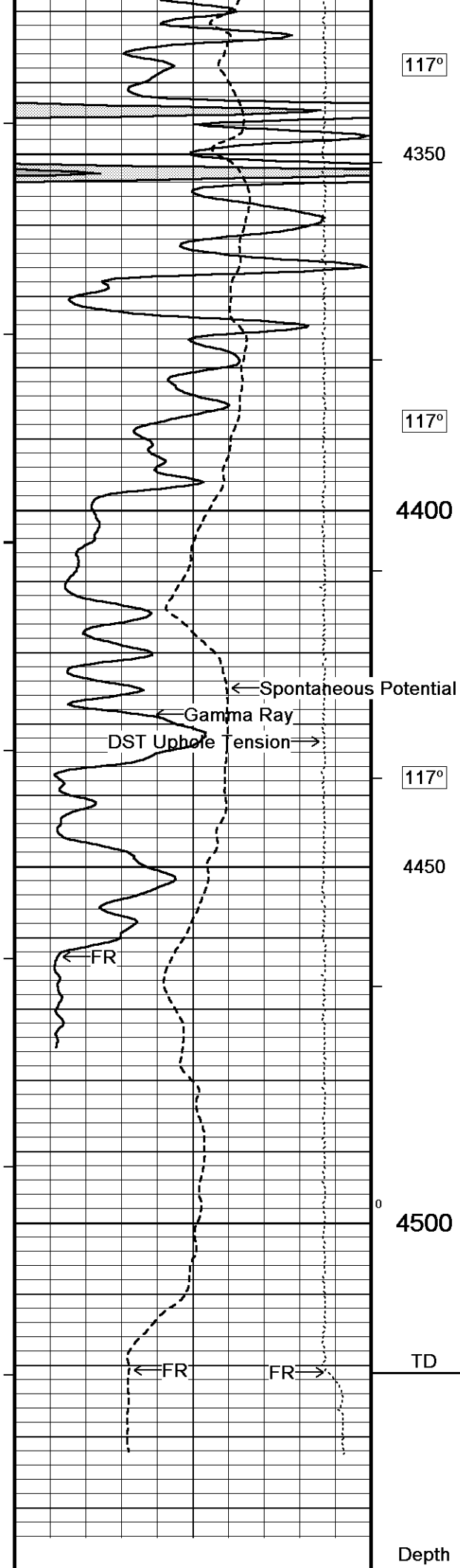
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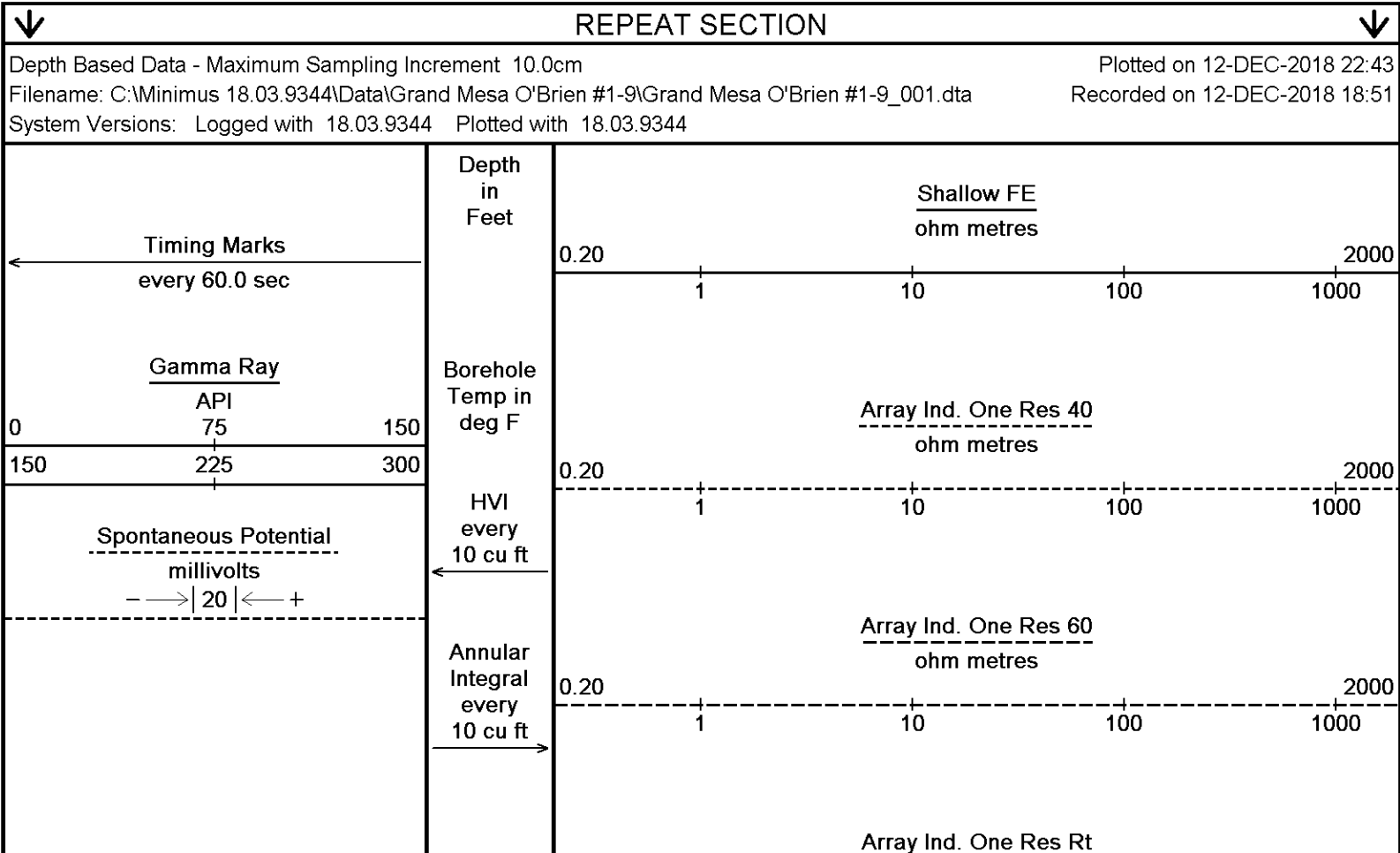
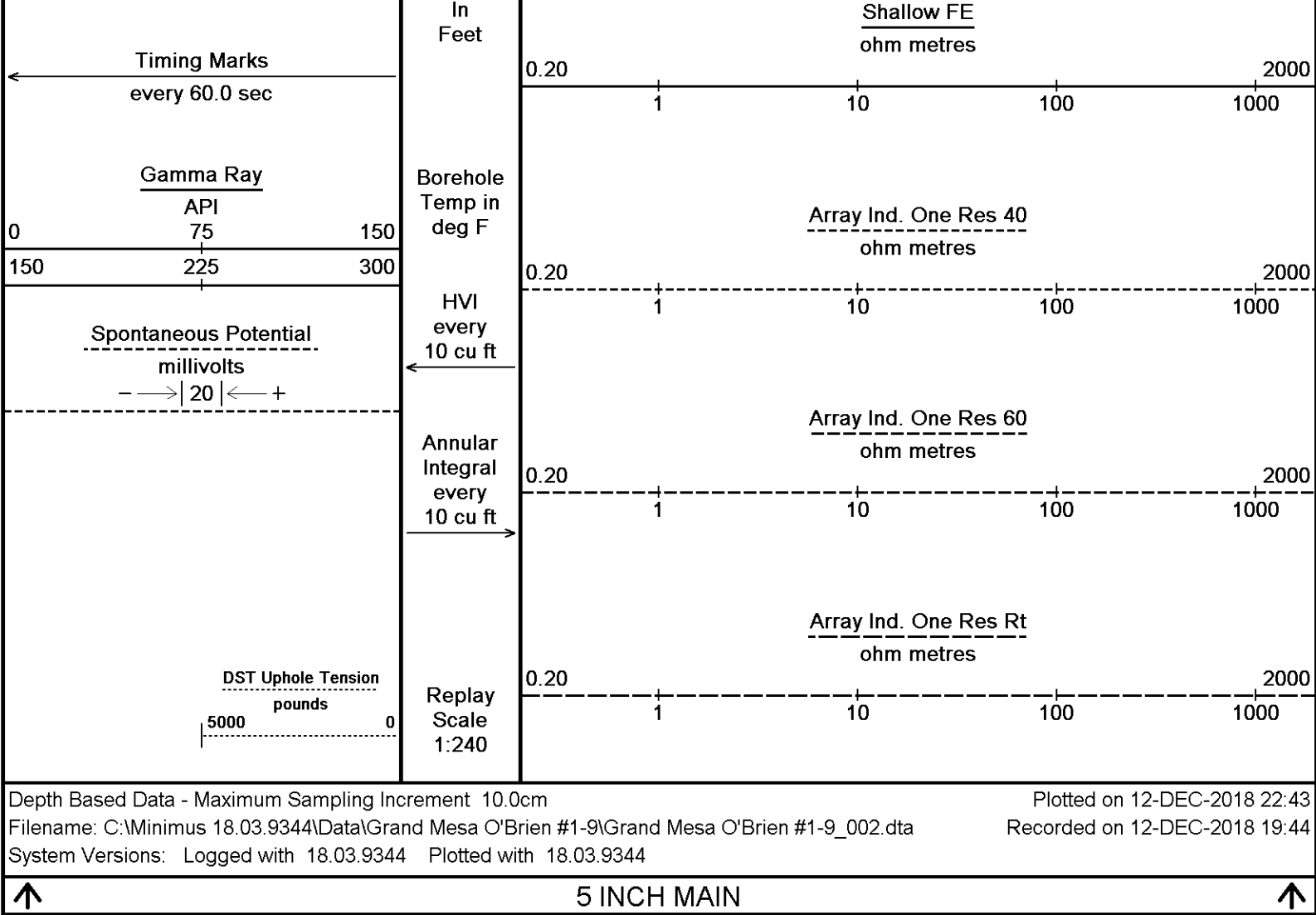
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE







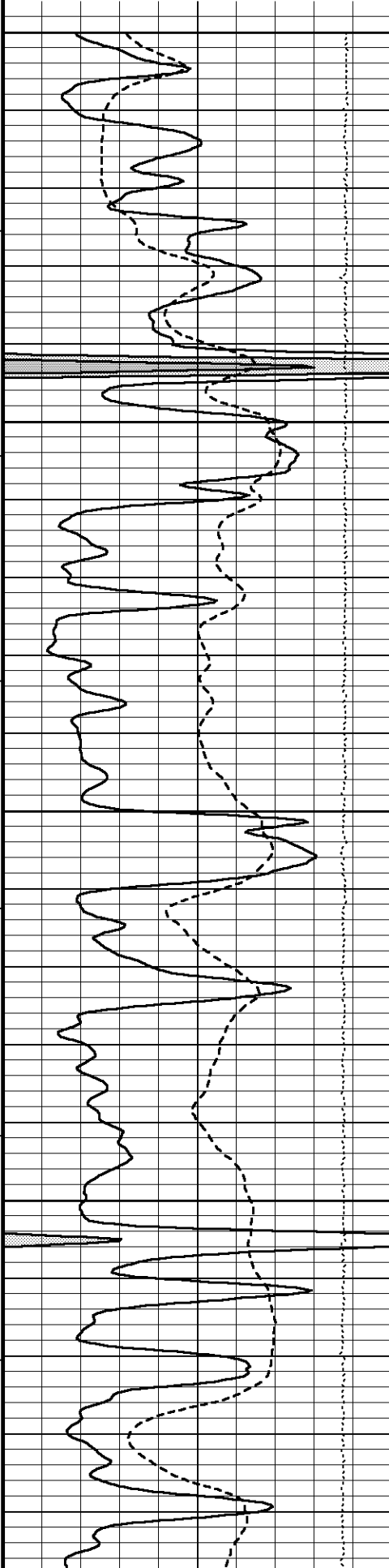




DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

ohm metres
0.20 1 10 100 2000



3700

111°

3750

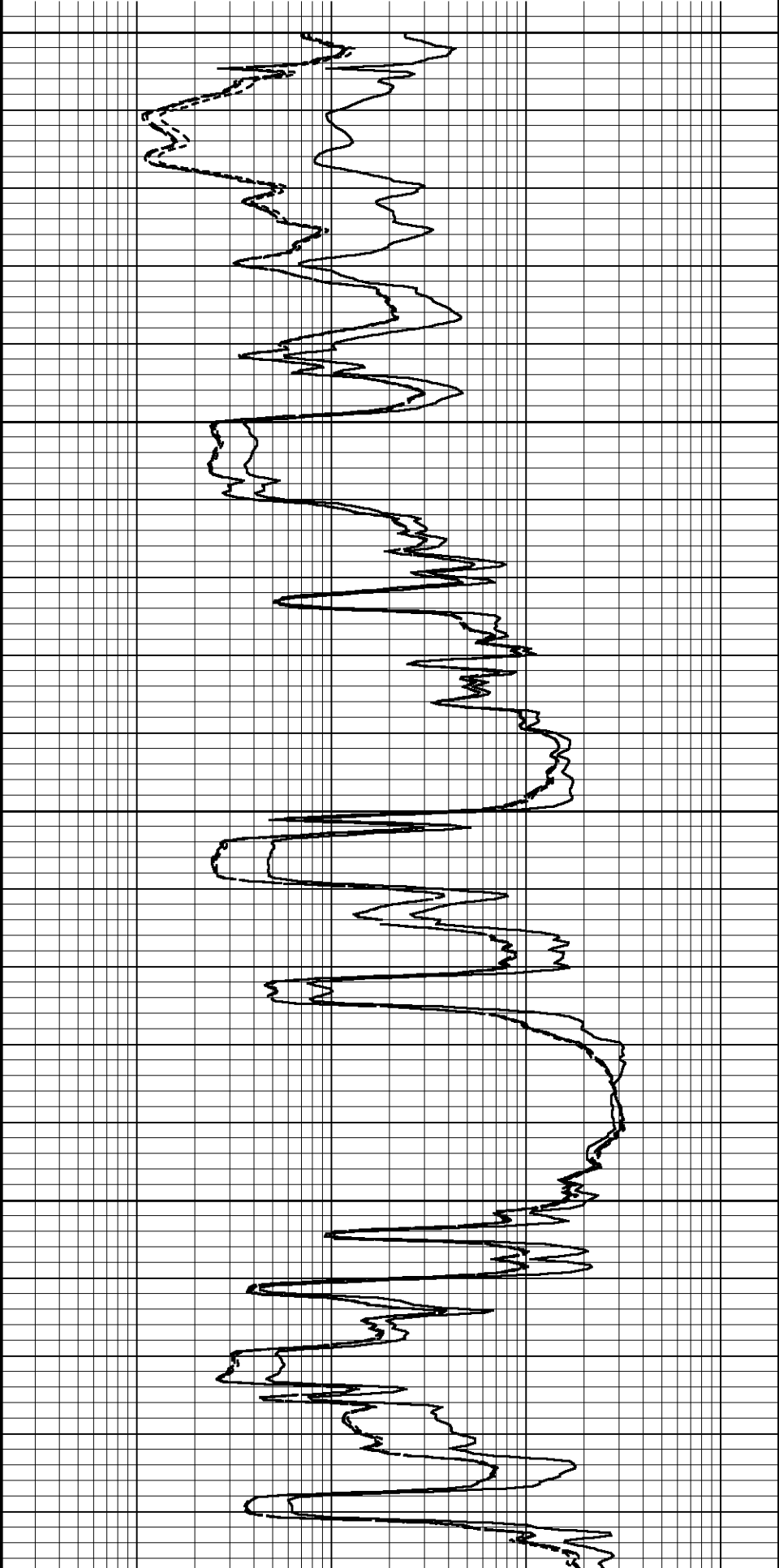
111°

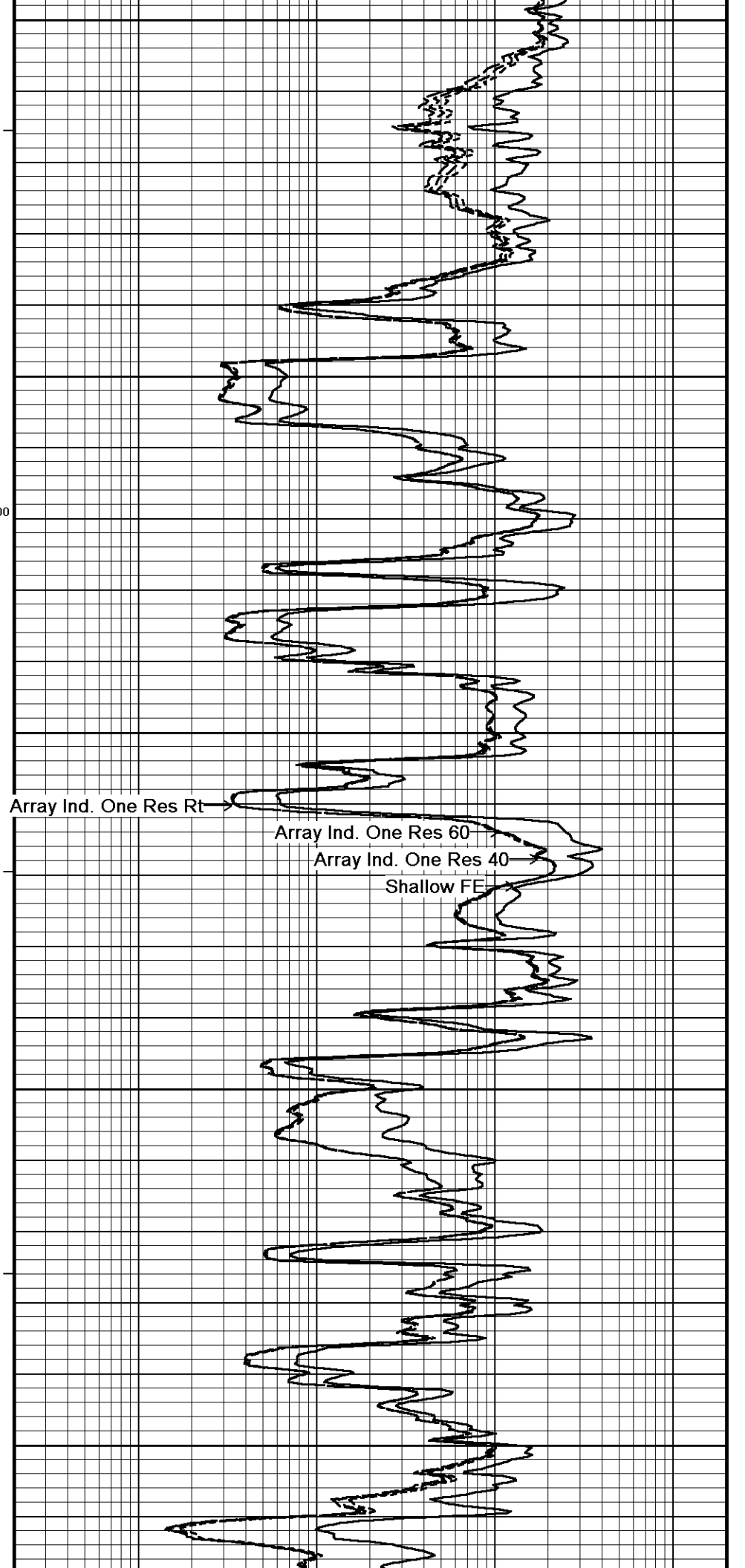
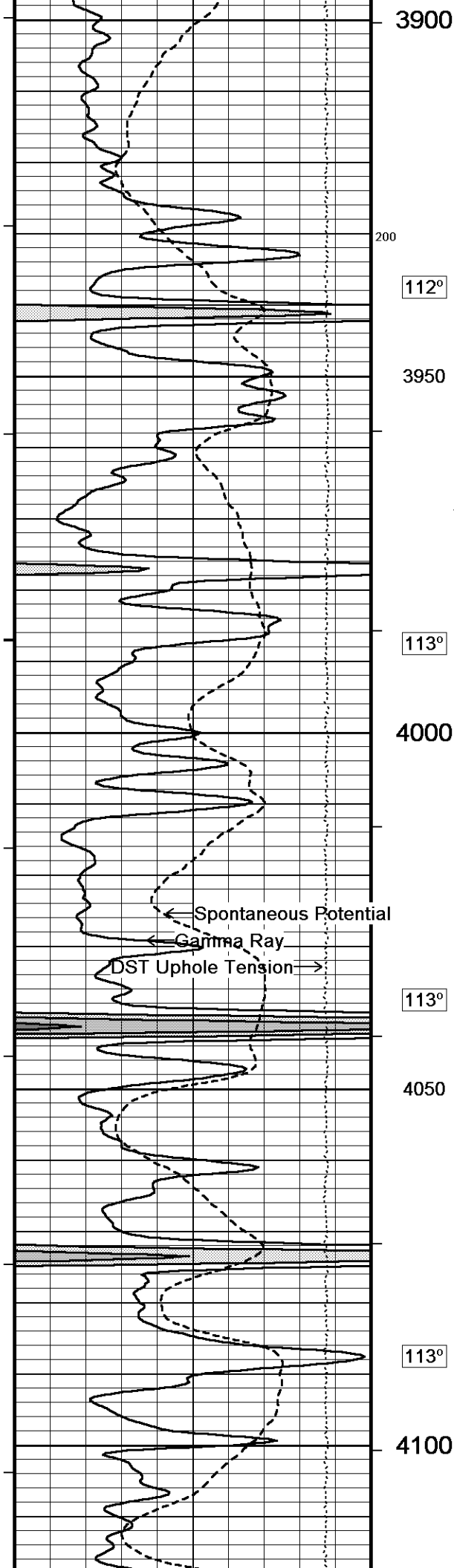
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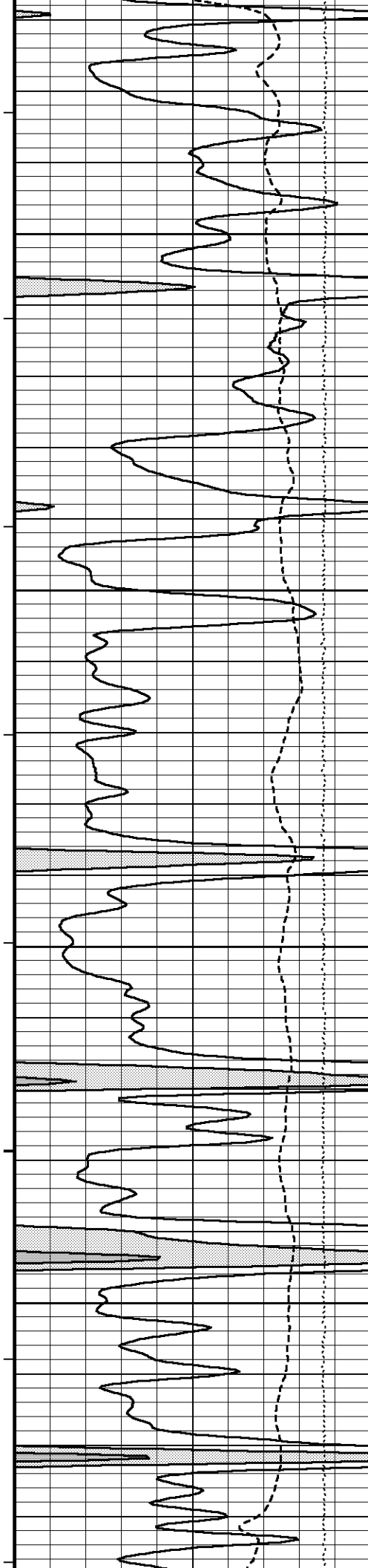
112°

3850

112°







113°

4150

114°

4200

100

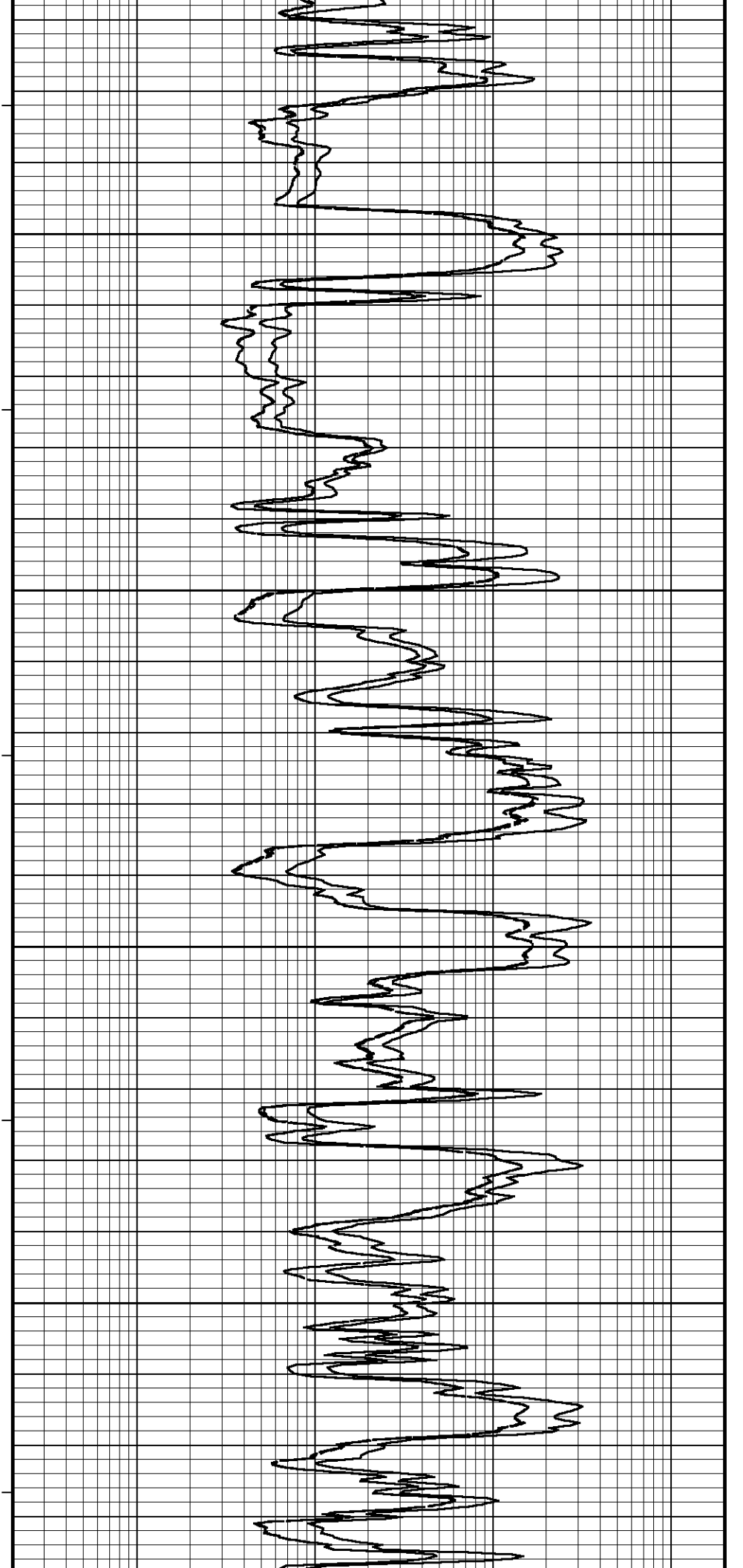
114°

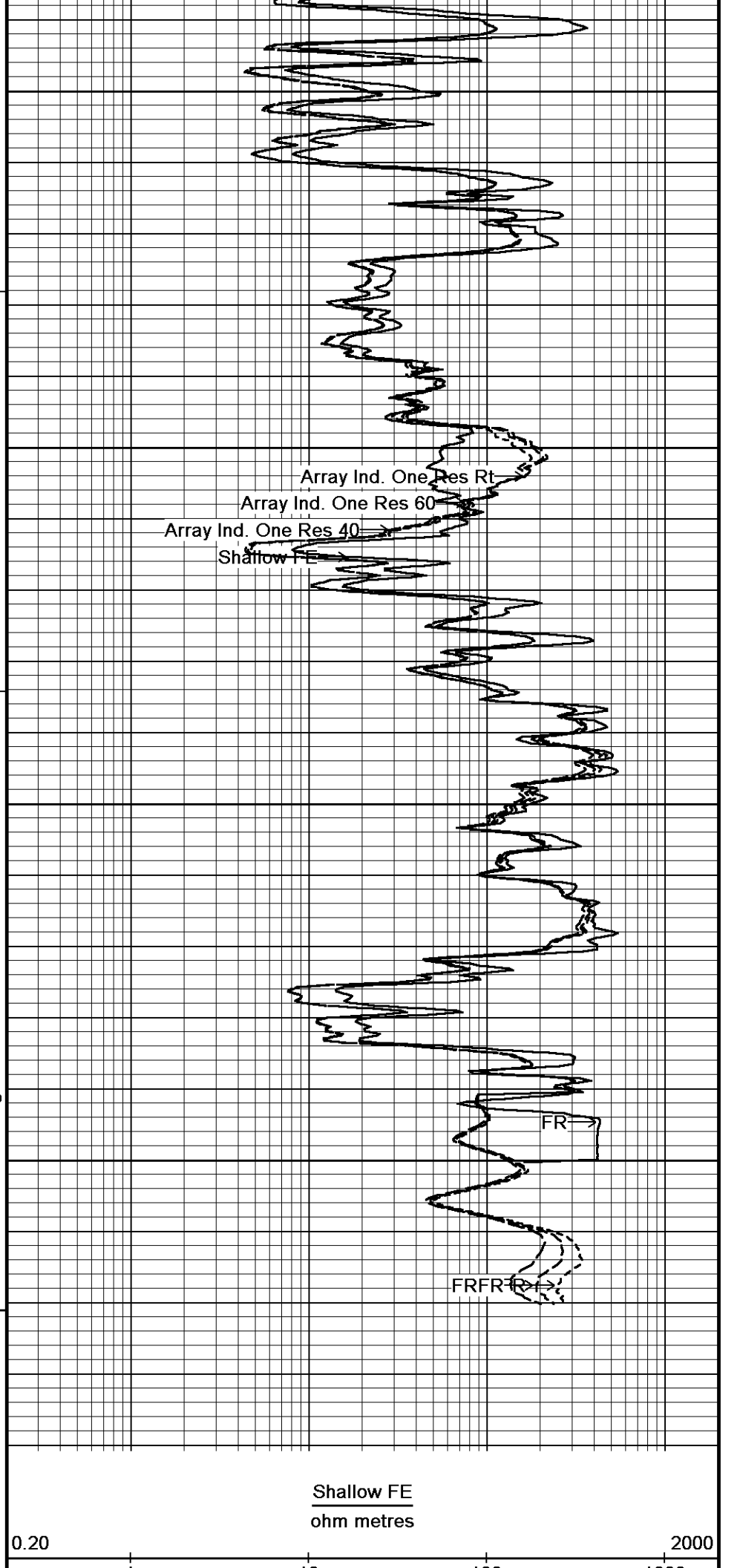
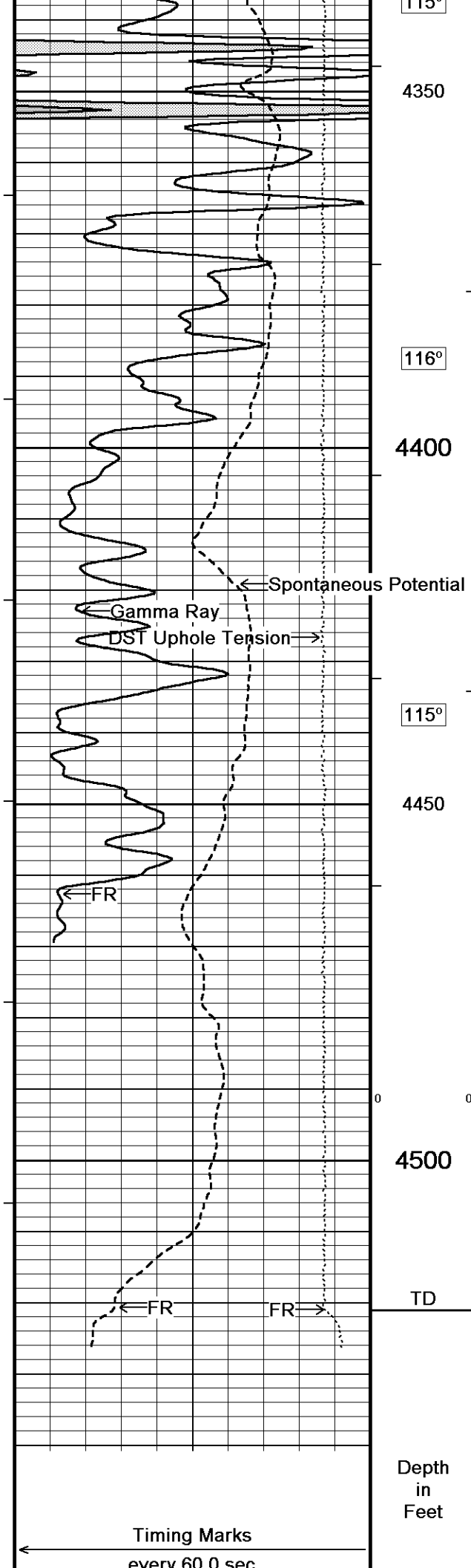
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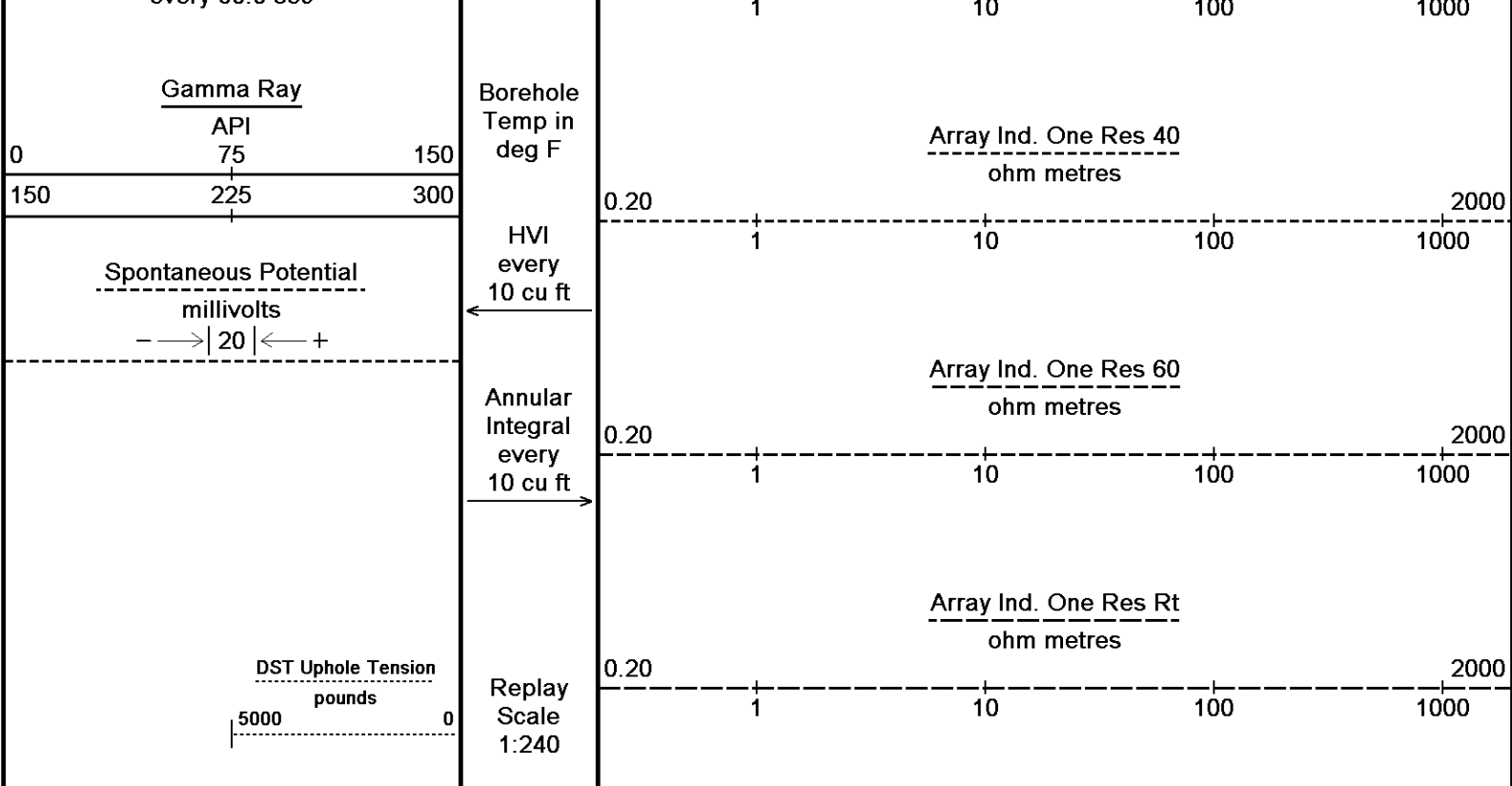
115°

4300

4450







Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

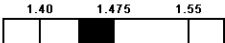
Plotted on 12-DEC-2018 22:43
Recorded on 12-DEC-2018 18:51

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION			
C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta			
General Constants All 000		Last Edited on 12-DEC-2018,18:23	
General Parameters			
Mud Resistivity	1.270	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		
High Resolution Temperature Calibration MCG-D.K 443		Field Calibration on 12-OCT-2018,05:20	
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	212.00	212.00	
High Resolution Temperature Constants MCG-D.K 443		Last Edited on 12-OCT-2018,05:20	
Pre-filter Length	11		
Gamma Calibration MCG-D.K 443		Field Calibration on 12-DEC-2018 18:45	

	Measured	Calibrated (API)
Background	103	72
Calibrator (Gross)	759	528
Calibrator (Net)	656	456

Gamma Calibration Tolerances MCG-D.K 443

Ratio 1.439  Counts/API

The gauge shows a scale from 1.40 to 1.55. The current ratio of 1.439 is indicated by a black bar between 1.40 and 1.475.

Gamma Constants MCG-D.K 443

Last Edited on 12-DEC-2018,16:59

Gamma Calibrator Number MCGGRCC141
 GRC-M Calibrator Jig in Use? NO
 Inactive Background Jig in Use? NO
 Mud Density 1.12 gm/cc
 Caliper Source for Processing Density Caliper
 Tool Position Eccentred
 Potassium Equivalence Chloride
 K Mud Concentration 0.00 %

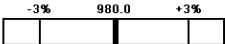
FE Calibration MFE-B.J 352

Base Calibration on 04-DEC-2018 11:51

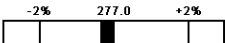
Field Check on 10-DEC-2018 18:20

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0
Base Calibration	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	982.1	126.8
Base Check		276.0
Field Check		275.6

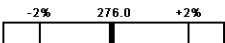
FE Calibration Tolerances MFE-B.J 352

Reference 2 982.1  ohm

The gauge shows a scale from -3% to +3% around 980.0. The current value of 982.1 is within the tolerance range.

Base Check 276.0  ohm-m

The gauge shows a scale from -2% to +2% around 277.0. The current value of 276.0 is within the tolerance range.

Field Check 275.6  ohm-m

The gauge shows a scale from -2% to +2% around 276.0. The current value of 275.6 is within the tolerance range.

FE Constants MFE-B.J 352

Last Edited on 12-DEC-2018,16:58

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-B.J 390

Factory Loop Calibration 10-DEC-2018 18:16

Field Check on 10-DEC-2018 18:19

Factory Loop Calibration

High Conductivity Reference Resistor 3.3 ohm
 Low Conductivity Reference Resistor 333.3 ohm

Array	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
	Low	High	Low	High	Gain	Offset
1 (near)	16.8	458.6	9.3	966.2	2.166	-27.2
2	6.3	377.7	7.6	821.4	2.191	-6.2
3	3.8	258.6	5.2	566.0	2.200	-3.0
4 (far)	1.9	132.3	2.6	279.2	2.121	-1.4
Array Temperature	77.9		Deg F			

Tool Checks

Array	Factory Reference (mmho/m)		Before Survey (mmho/m)	
	Low	High	Low	High

1 (near)	12.1	3958.5	12.1	3958.4
2	28.9	3562.3	29.0	3562.1
3	27.1	3060.6	27.1	3060.6
4 (far)	19.1	2087.5	19.1	2087.5

Array Temperature 63.5 63.6 Deg F

Induction Check Tolerances MAI-B.J 390

Low Array 1	12.1	10.6 12.1 13.6	mmho/m	High Array 1	3958.4	-0.5% 3958.5 +0.5%	mmho/m
Low Array 2	29.0	27.4 28.9 30.4	mmho/m	High Array 2	3562.1	-0.5% 3562.3 +0.5%	mmho/m
Low Array 3	27.1	25.6 27.1 28.6	mmho/m	High Array 3	3060.6	-0.5% 3060.6 +0.5%	mmho/m
Low Array 4	19.1	17.6 19.1 20.6	mmho/m	High Array 4	2087.5	-0.5% 2087.5 +0.5%	mmho/m

Induction Constants MAI-B.J 390

Last Edited on 12-DEC-2018,16:58

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: Constant Temperature		
Temp. for Rm Corr.	N/A		
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 04-DEC-2018 12:24

Field Calibration on 10-DEC-2018 18:22

Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	15599	3.99	
2	24289	5.98	

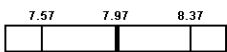
2	24288	8.88
3	32989	7.97
4	41250	9.86
5	50464	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)
7.99

Actual Caliper (in)
7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.99  in

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Grand Mesa O'Brien #1-9\Grand Mesa O'Brien #1-9_001.dta

Cablehead, 11 pin

CBH-CB 264 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.K 443 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-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

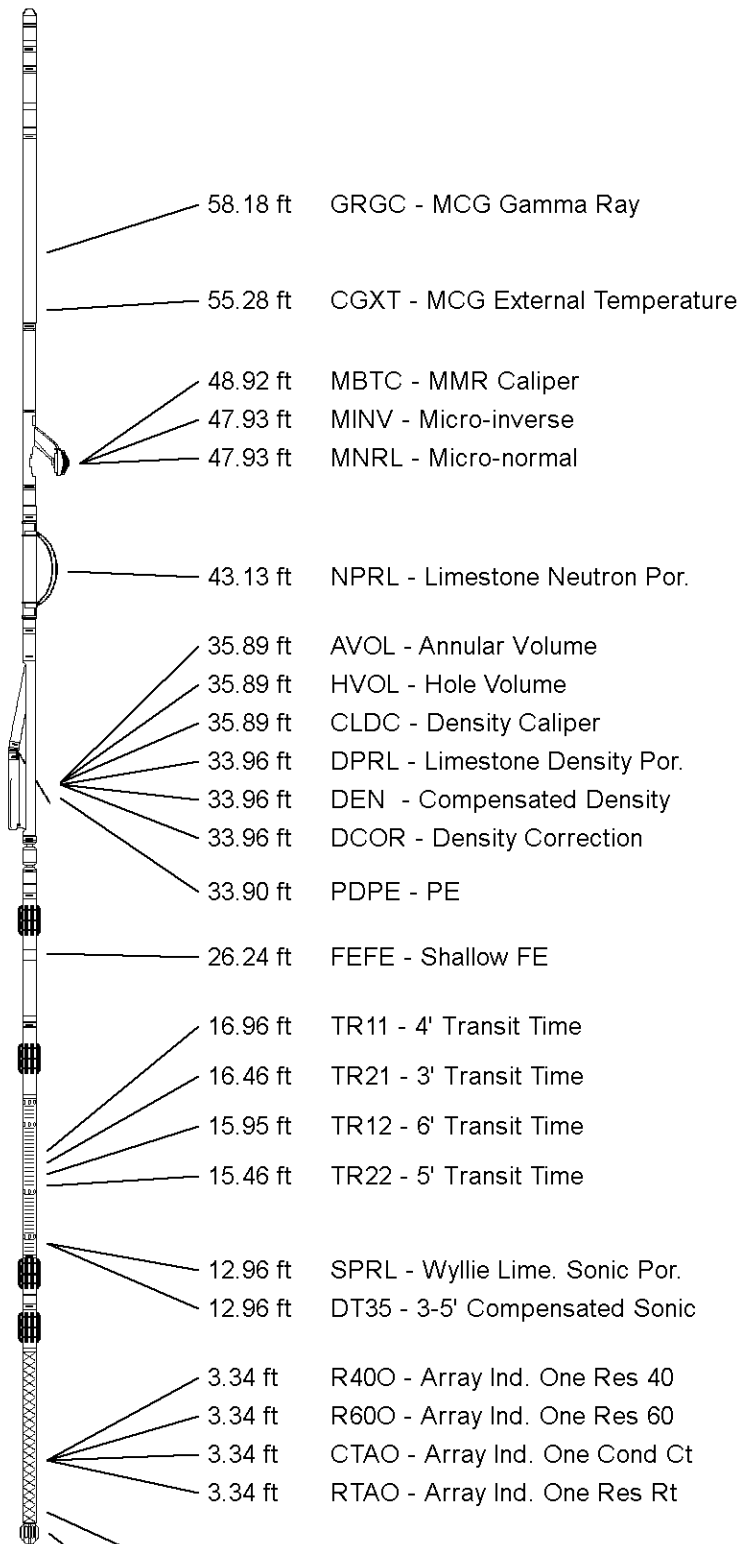
Compact Sonic

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

Compact Induction

MAI-B.J 390 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 68.16 ft Weight: 526.9 lb



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 GRAND MESA OPERATING COMPANY
WELL OBRIEN #1-9
FIELD WILDCAT
PROVINCE/COUNTY LANE
COUNTRY/STATE U.S.A. / KANSAS

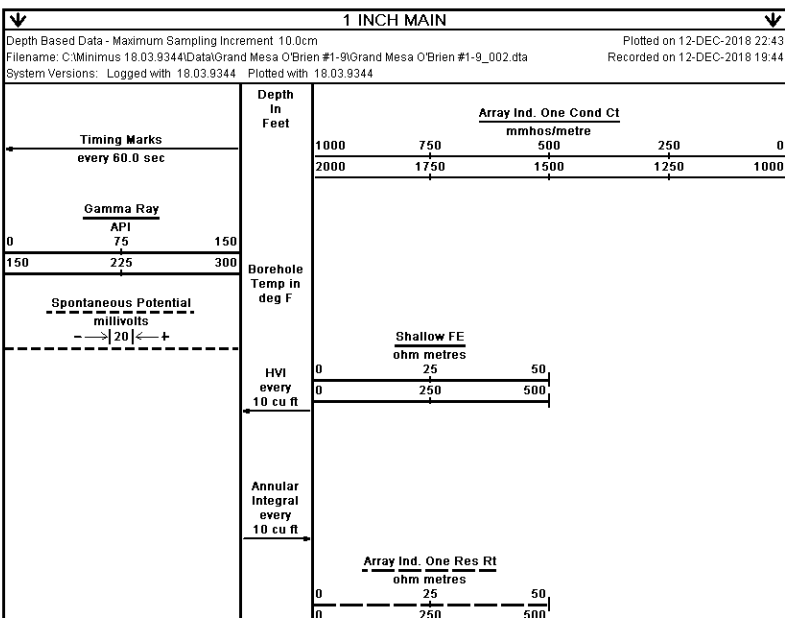
Elevation Kelly Bushing	2661	feet	First Reading	4518.00	feet
Elevation Drill Floor	2659	feet	Depth Driller	4520.00	feet
Elevation Ground Level	2656	feet	Depth Logger	4521.00	feet



ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

Weatherford®

Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY	GRAND MESA OPERATING COMPANY		
WELL	OBRIEN #1-9		
FIELD	WILDCAT		
PROVINCE/COUNTY	LANE		
COUNTRY/STATE	U.S.A. / KANSAS		
LOCATION	22251 FSL & 23051 FEL		
SEC 9	TWP 16S R6E 28W	0102 S. 23051 FSL	
Log Date	15-10-2018		
Log Number	4556-23182318		
Permanent Datum G.L. Elevation	2656 feet		
Log Measured From KB	5.00 feet above Permanent Datum		
Drilling Measured From KB			
Date	12-DEC-2018		
Run Number	ONE		
Service Order	4556-23182318		
Depth Driller	4520.00	feet	
Depth Logger	4521.00	feet	
First Reading	4518.00	feet	
Last Reading	219.00	feet	
Casing Driller	219.00	feet	
Casing Logger	219.00	feet	
Bit Size	7 8/15	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.30 lb/USg	52.00 CP	
PH / Fluid Loss	10.00	7.20 ml/cm/min	
Sample Source			
Rm @ Measured Temp	1.27 @ 15.0	ohm-m	
Rm @ Measured Temp	1.02 @ 15.0	ohm-m	
Rm @ Measured Temp	1.32 @ 15.0	ohm-m	
Source Rm / Rm	CALC	CALC	
Rm @ BHT	0.81 @ 117.0	ohm-m	
Time Since Circulation	4 HOURS		
Max Recorded Temp	117.00	deg F	
Equipment / Base	13096	LIB	
Witnessed By	ADAM SILL		
Witnessed By	GARET DINKEL		



DST Uphole Tension
pounds

5000 0

Replay
Scale
1:600

200g
Shoe

90°

300

One Res Rt

Shallow FE

Spontaneous Potential

Gamma Ray

DST Uphole Tension

Array Ind. One Cond Ct

93°

500

94°

600

96°

700

96°

800

97°

900

97°

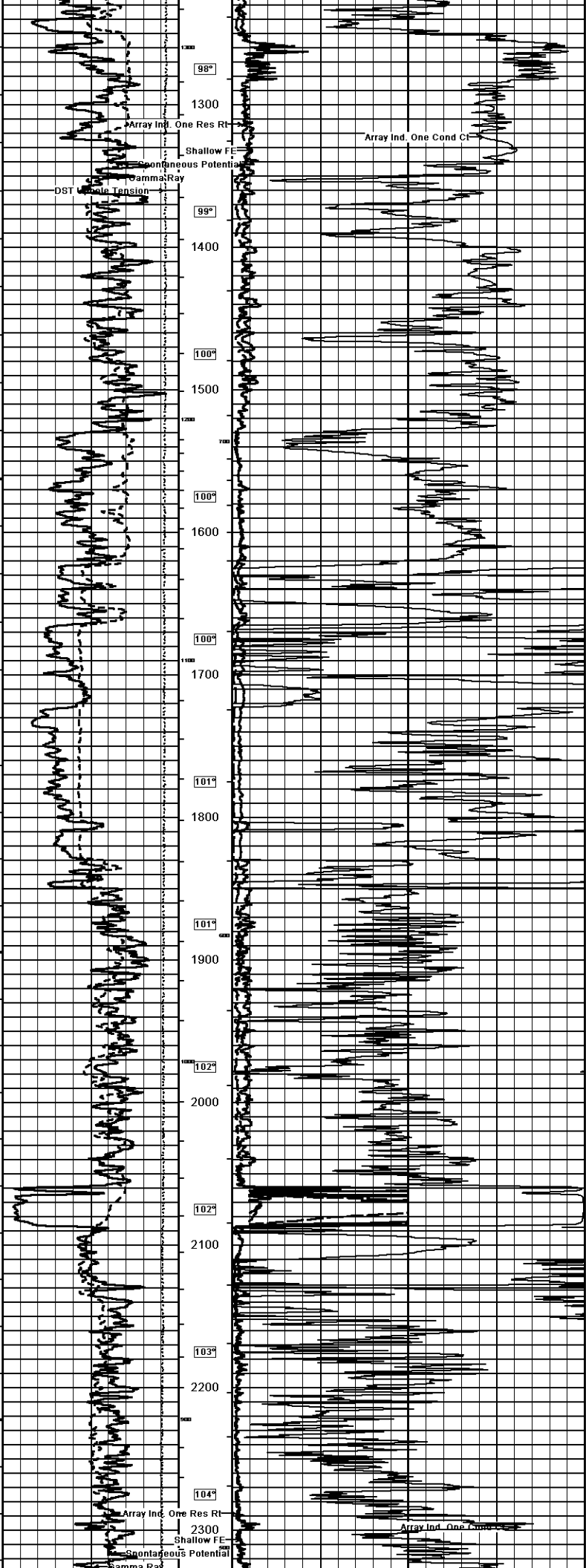
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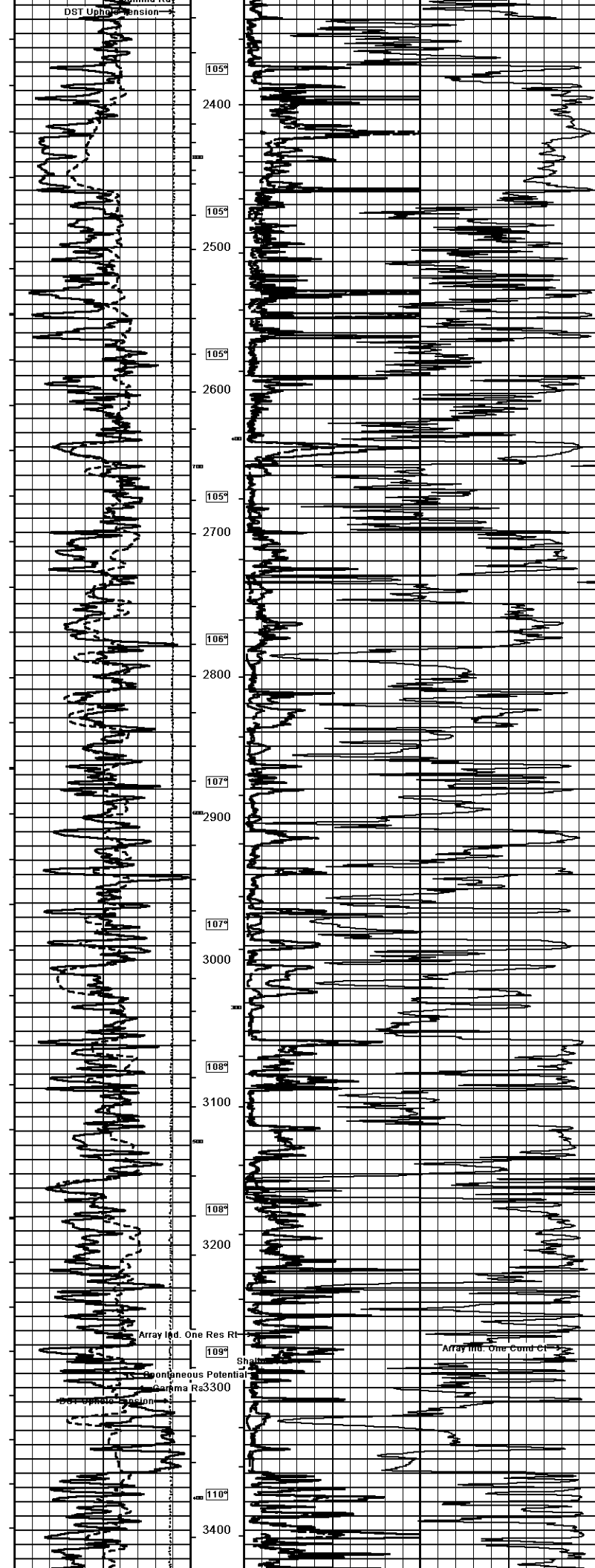
98°

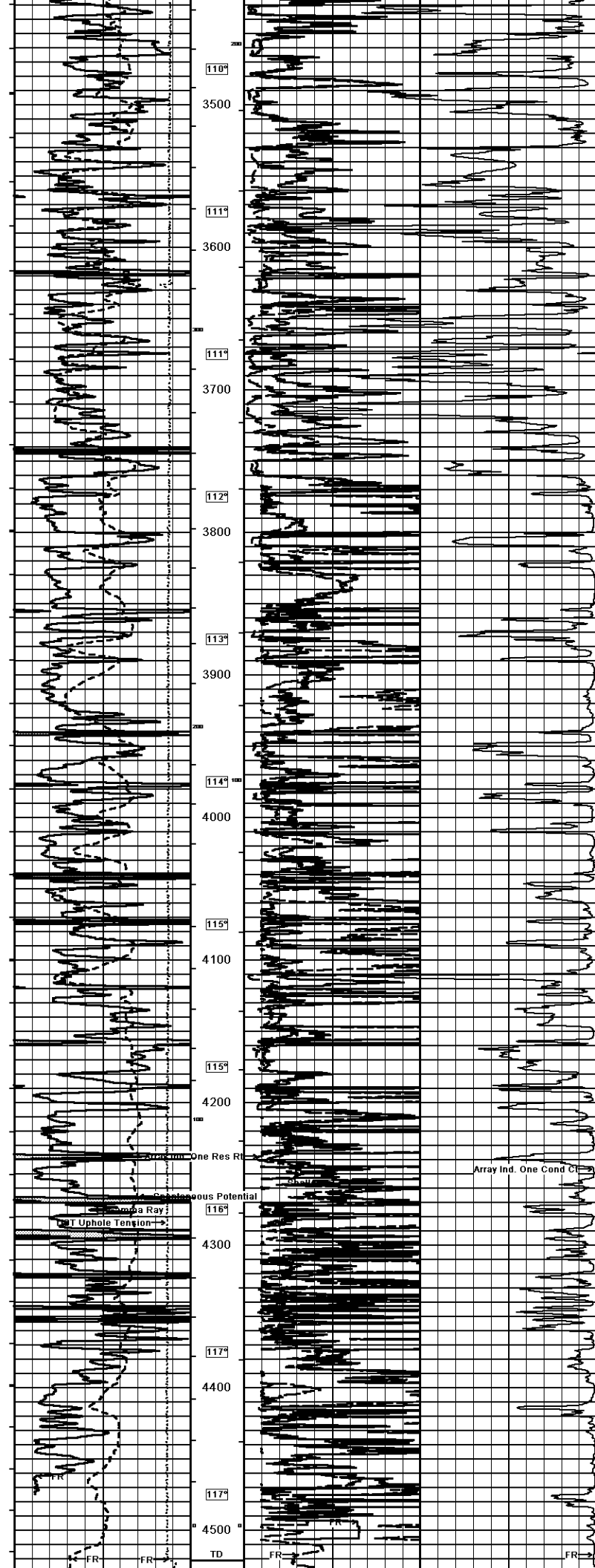
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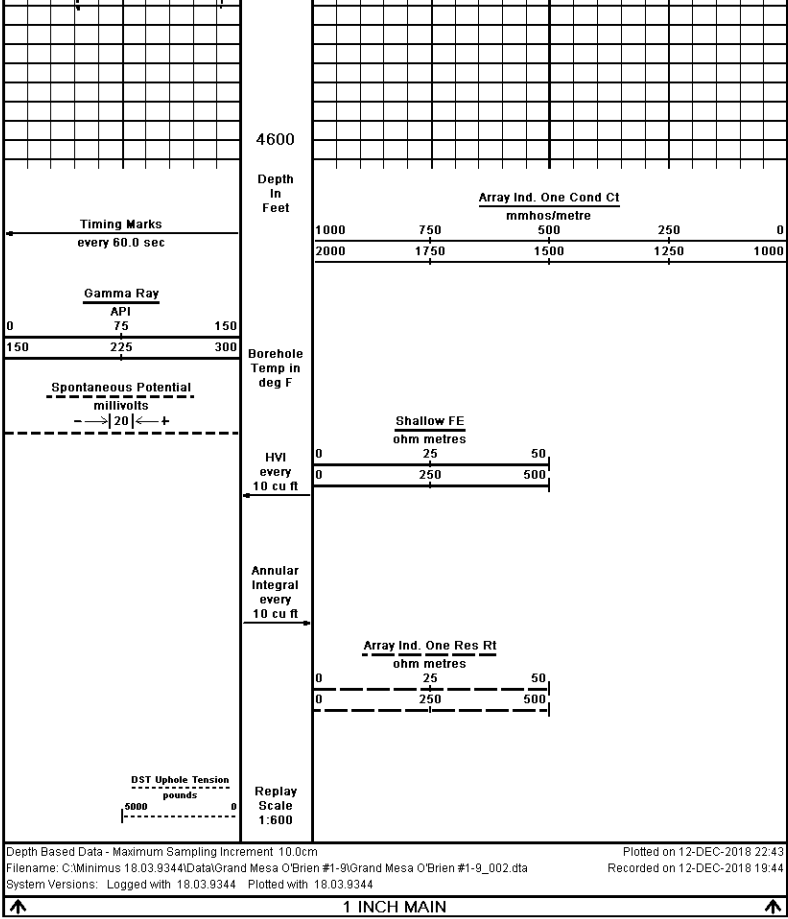
97°

1200









COMPANY		GRAND MESA OPERATING COMPANY			
WELL		OBRIEN #1-9			
FIELD		WILDCAT			
PROVINCE/COUNTY		LANE			
COUNTRY/STATE		U.S.A. / KANSAS			
Elevation Kelly Bushing	2661	feet	First Reading	4518.00	feet
Elevation Drill Floor	2659	feet	Depth Driller	4520.00	feet
Elevation Ground Level	2656	feet	Depth Logger	4521.00	feet
		ARRAY INDUCTION			
Weatherford		SHALLOW FOCUSED			
		ELECTRIC LOG			