



Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

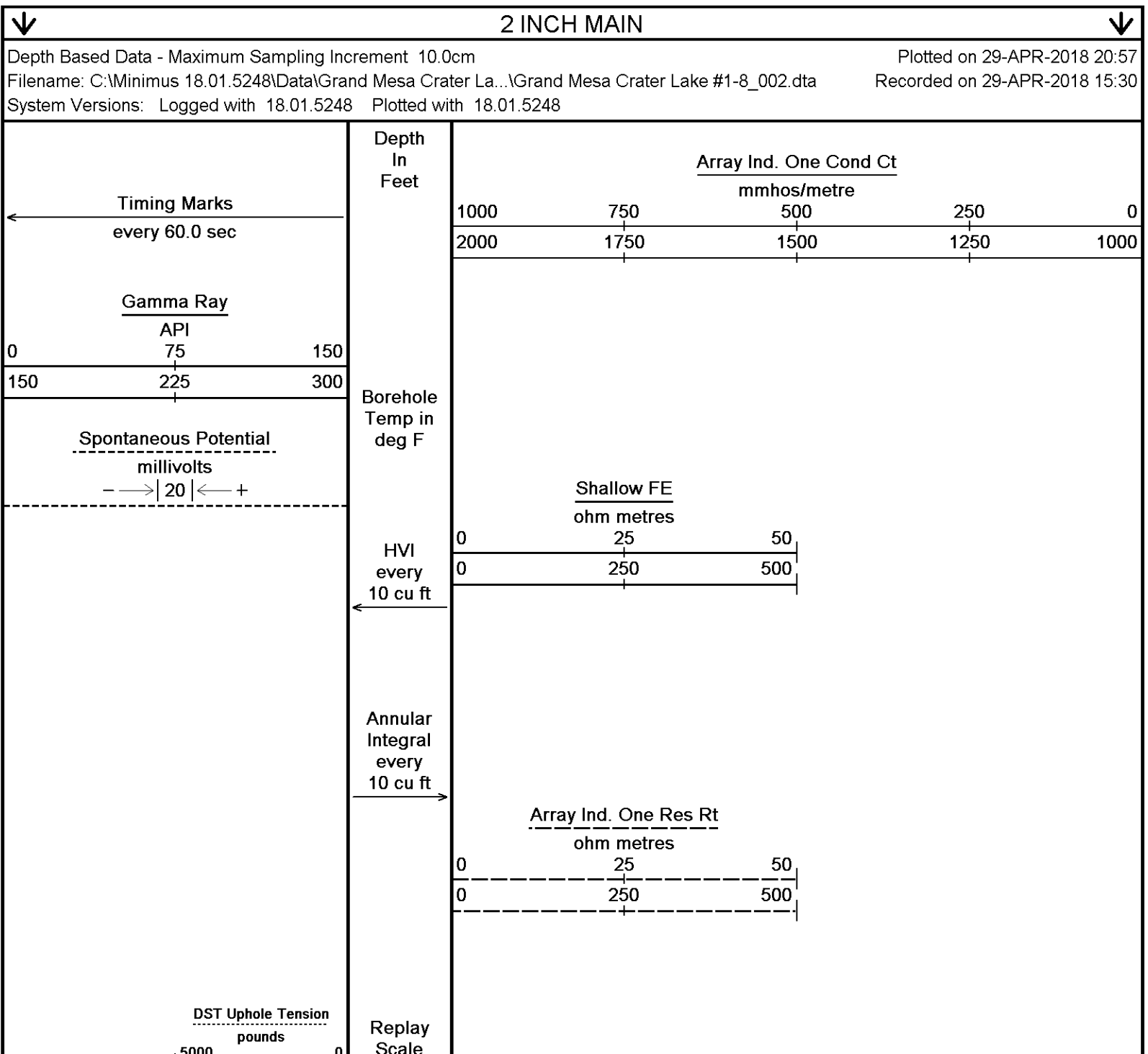
COMPANY			GRAND MESA OPERATING COMPANY			
WELL			CRATER LAKE #1-8			
FIELD			WILDCAT			
PROVINCE/COUNTY			LINCOLN			
COUNTRY/STATE			U.S.A. / COLORADO			
LOCATION			1145' FNL & 1934' FEL			
SEC 8	TWP 8S	RGE 54W	Other Services		MML	
Latitude		MPD/MDN				
Longitude		MSS				
API Number		05-073-06738				
Permanent Datum GL, Elevation 5404 feet					Elevations: KB 5423.00 DF 5421.00 GL 5404.00	
Log Measured From KB, 19.00 feet above Permanent Datum						
Drilling Measured From KB						
Date	29-APR-2018					
Run Number	ONE					
Service Order	4558-212189226					
Depth Driller	8495.00		feet			
Depth Logger	8496.00		feet			
First Reading	8493.00		feet			
Last Reading	441.00		feet			
Casing Driller	441.00		feet			
Casing Logger	441.00		feet			
Bit Size	7.875		inches			
Hole Fluid Type	CHEMICAL					
Density / Viscosity	9.40 lb/USg	91.00 CP				
PH / Fluid Loss	11.00	7.20 ml/30Min				
Sample Source	FLOWLINE					
Rm @ Measured Temp	0.94 @ 75.0		ohm-m			
Rmf @ Measured Temp	0.75 @ 75.0		ohm-m			
Rmc @ Measured Temp	1.13 @ 75.0		ohm-m			
Source Rmf / Rmc	CALC	CALC				
Rm @ BHT	0.37 @189.0		ohm-m			
Time Since Circulation	6 HOURS					
Max Recorded Temp	189.00		deg F			
Equipment / Base	13096	LIB				
Recorded By	ADAM SILL					
Witnessed By	KENT MATSON					

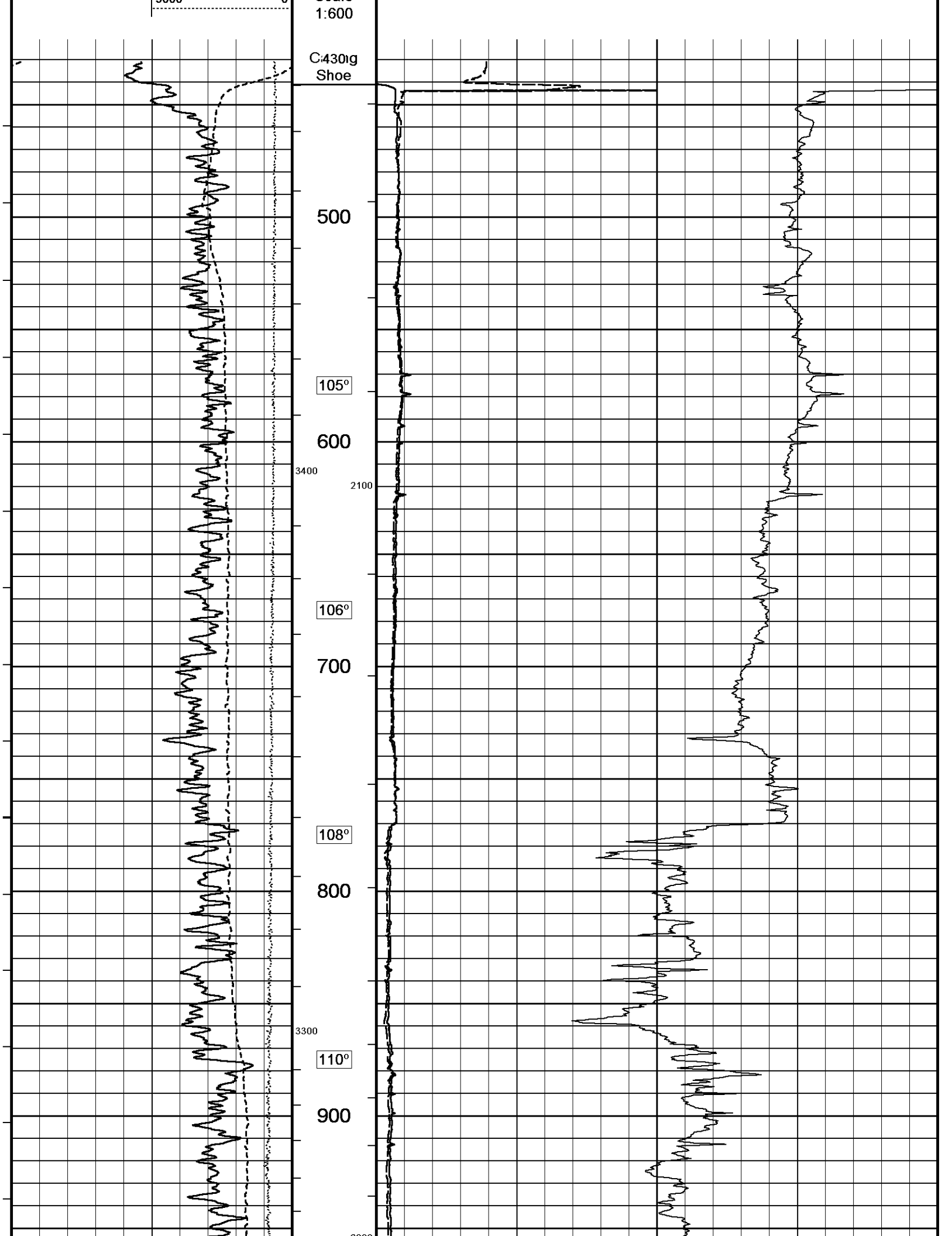
BOREHOLE RECORD					Last Edited: 29-APR-2018 12:41
Bit Size inches		Depth From feet		Depth To feet	
7.875		441.00		8495.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	441.00	24.00	

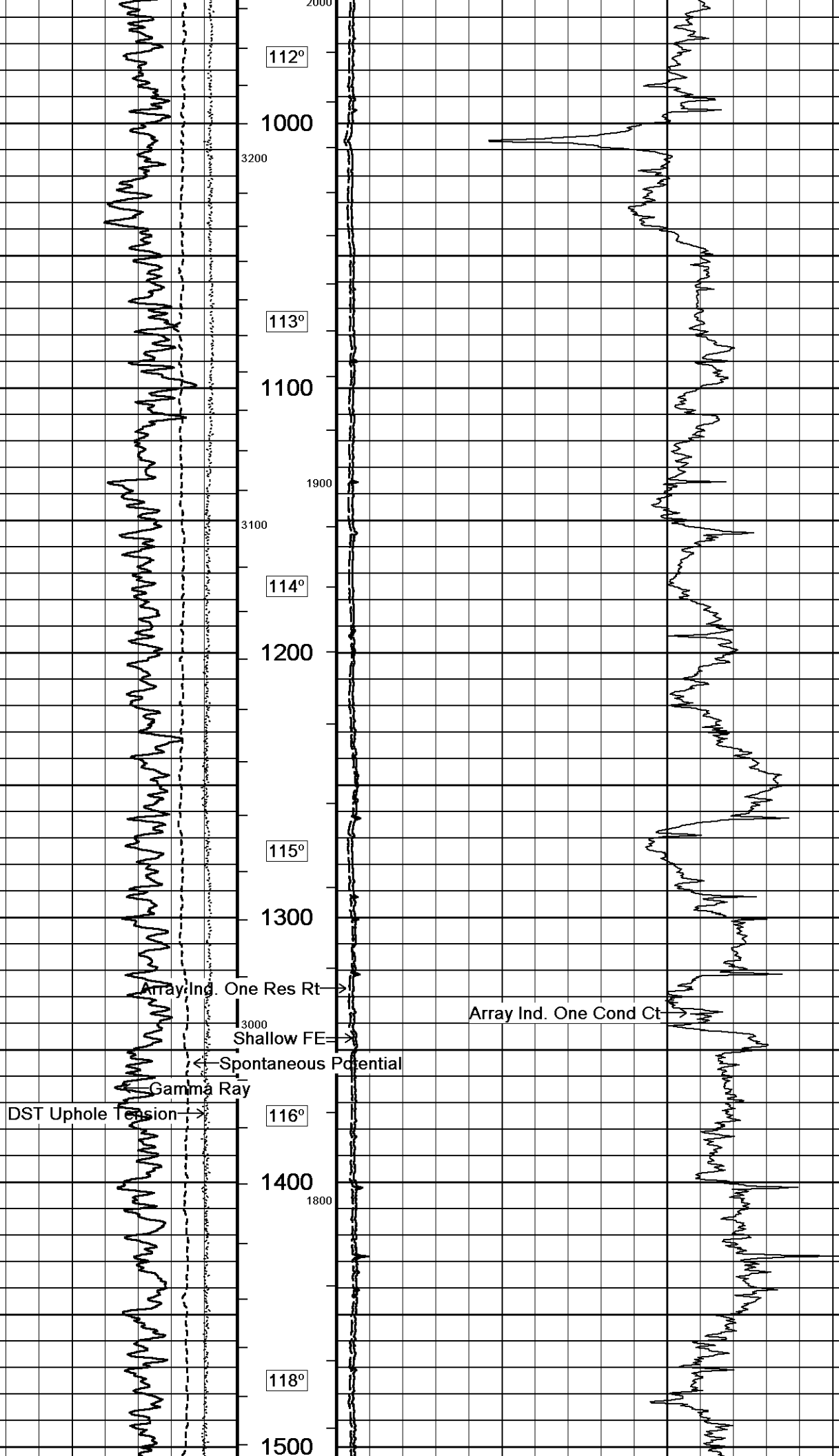
REMARKS
- SOFTWARE ISSUE: WLS 18.01.5248.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 3470 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 2142 CU.FT.

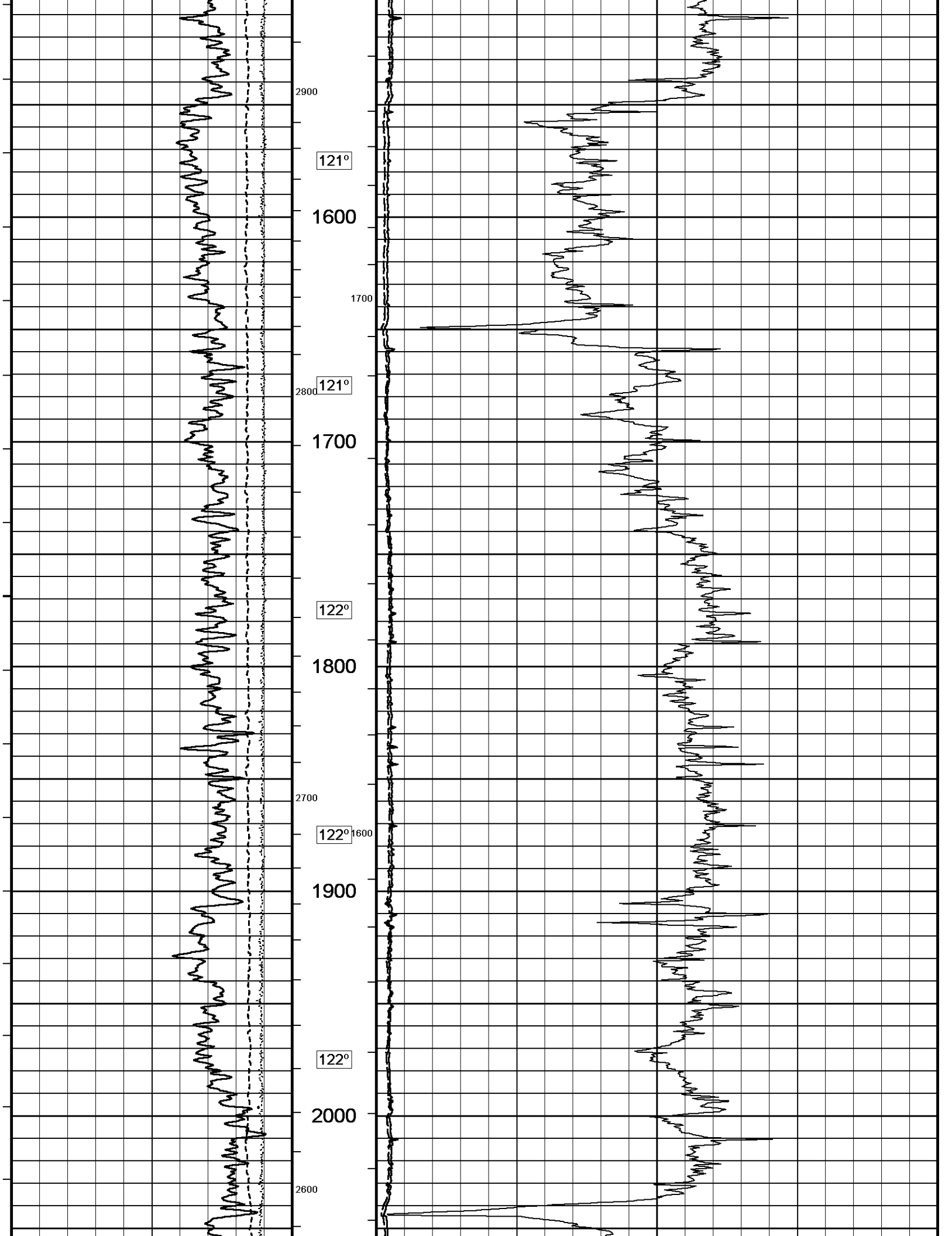
- RIG: WW DRILLING #20.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR, J. FOWLER.

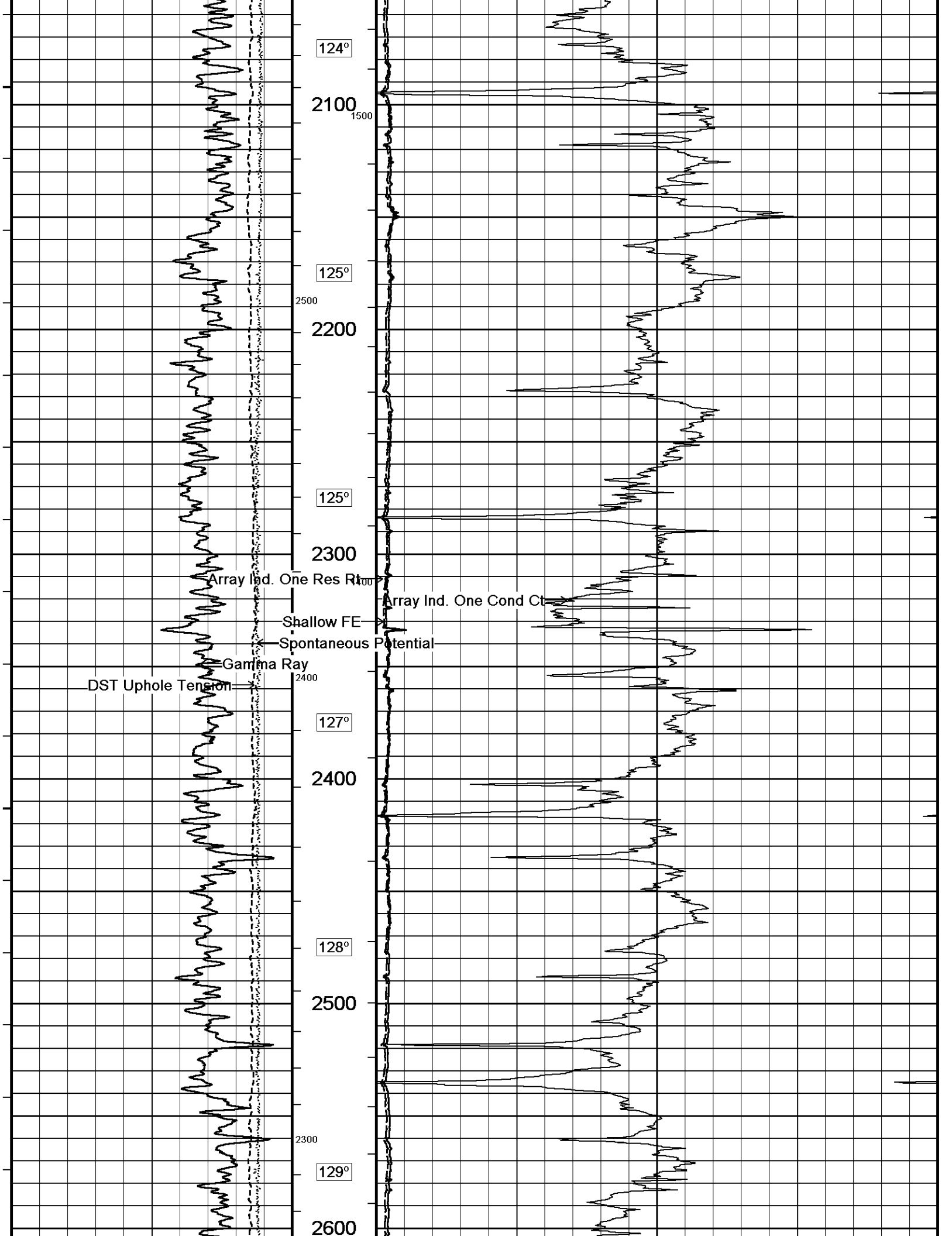
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

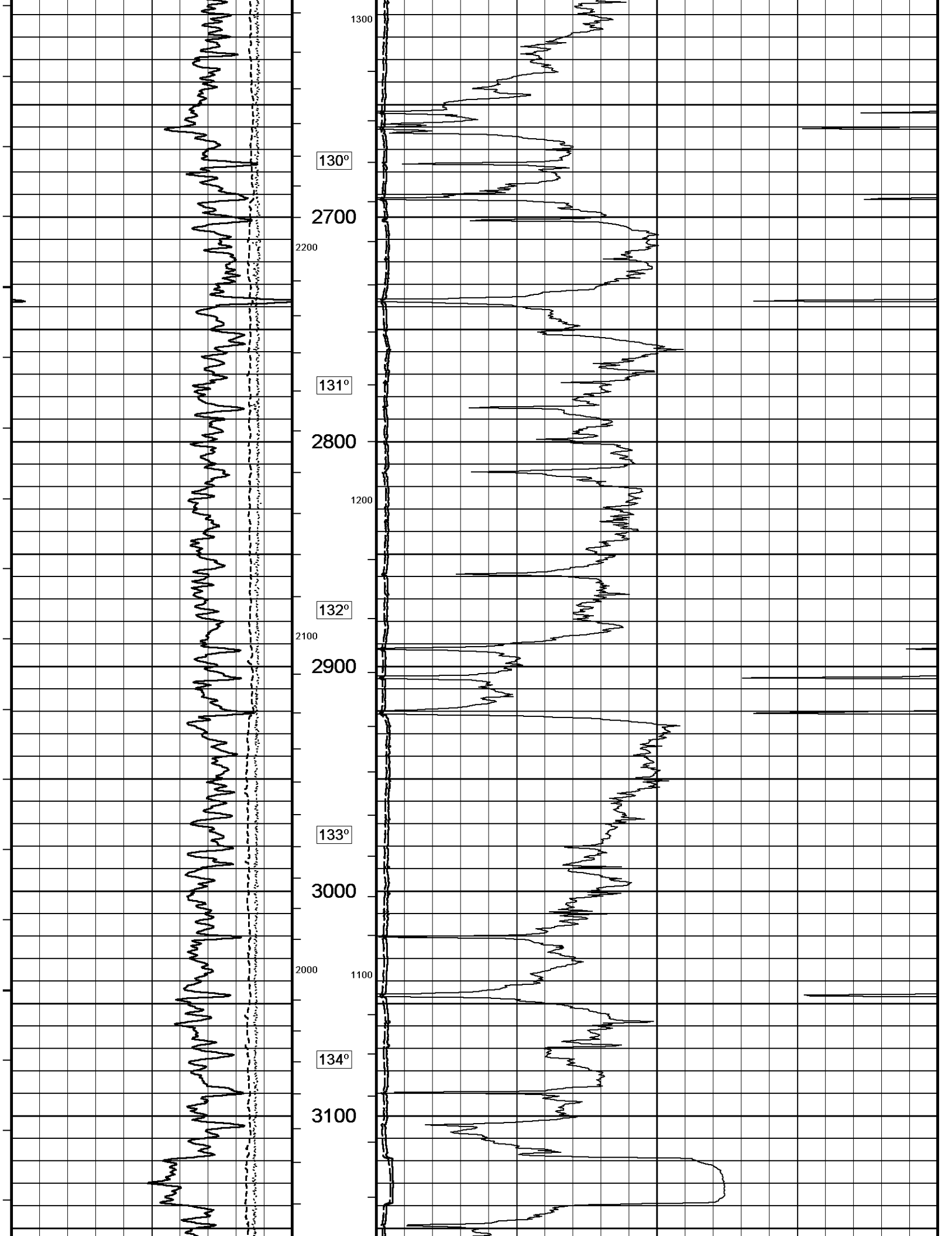


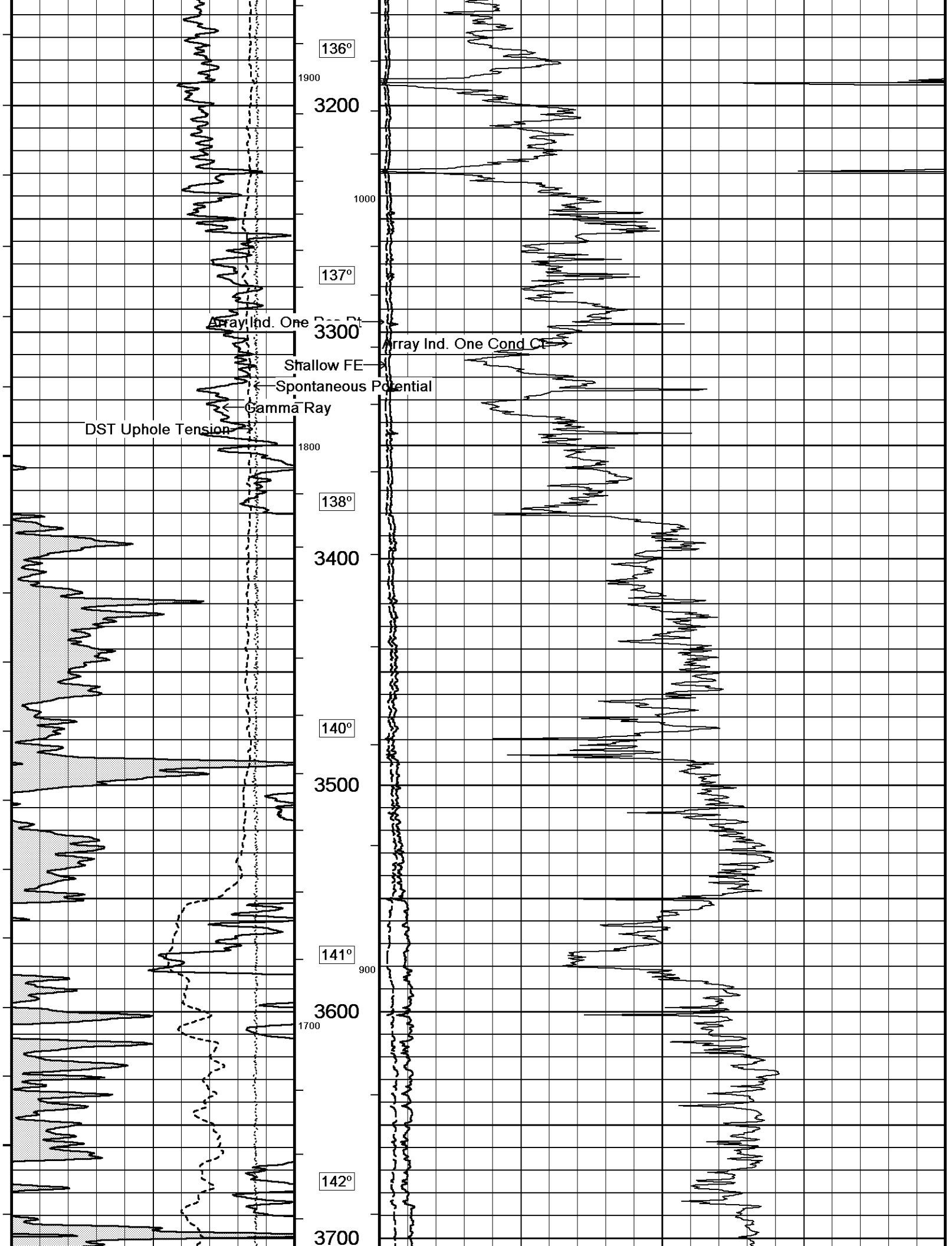


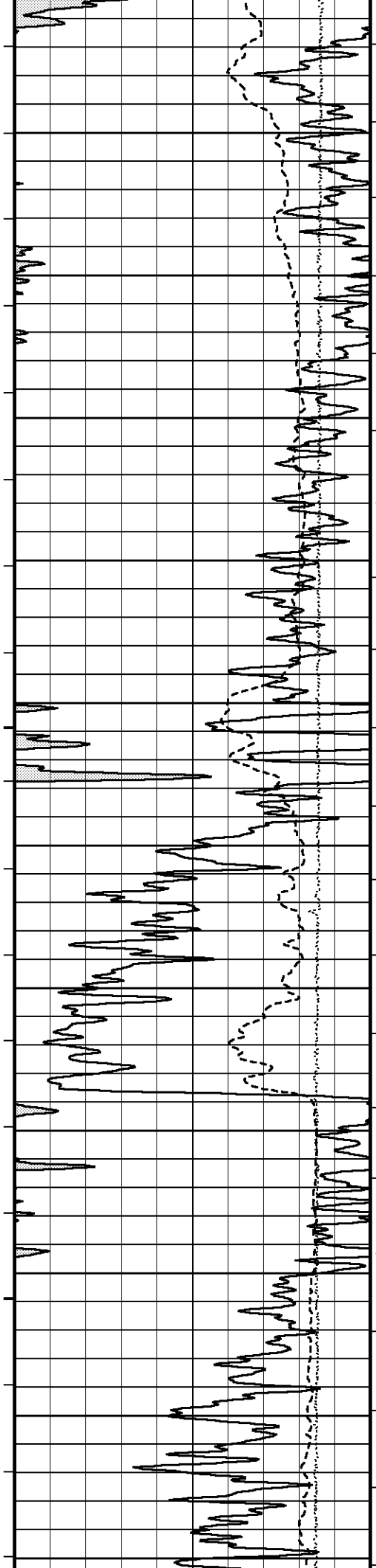




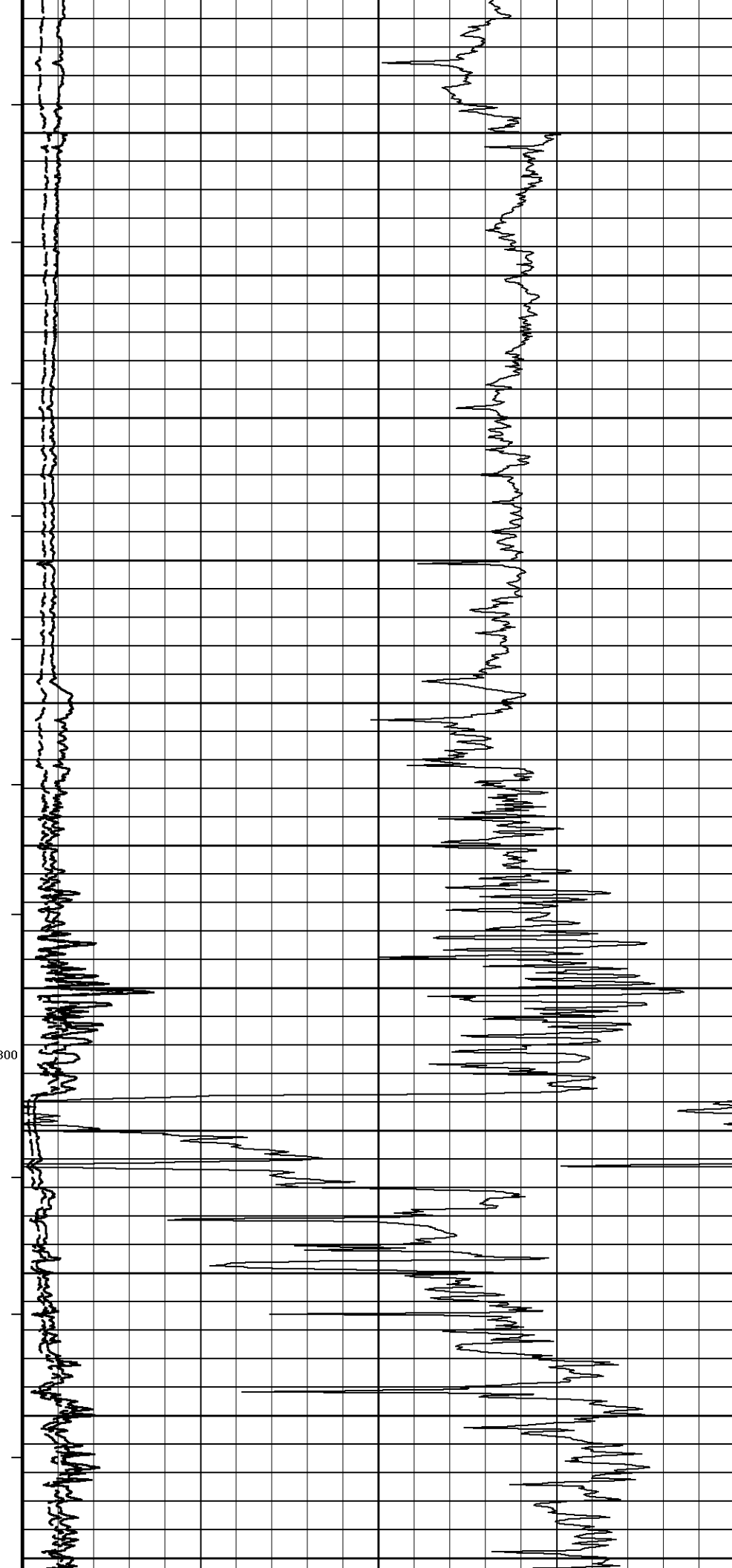


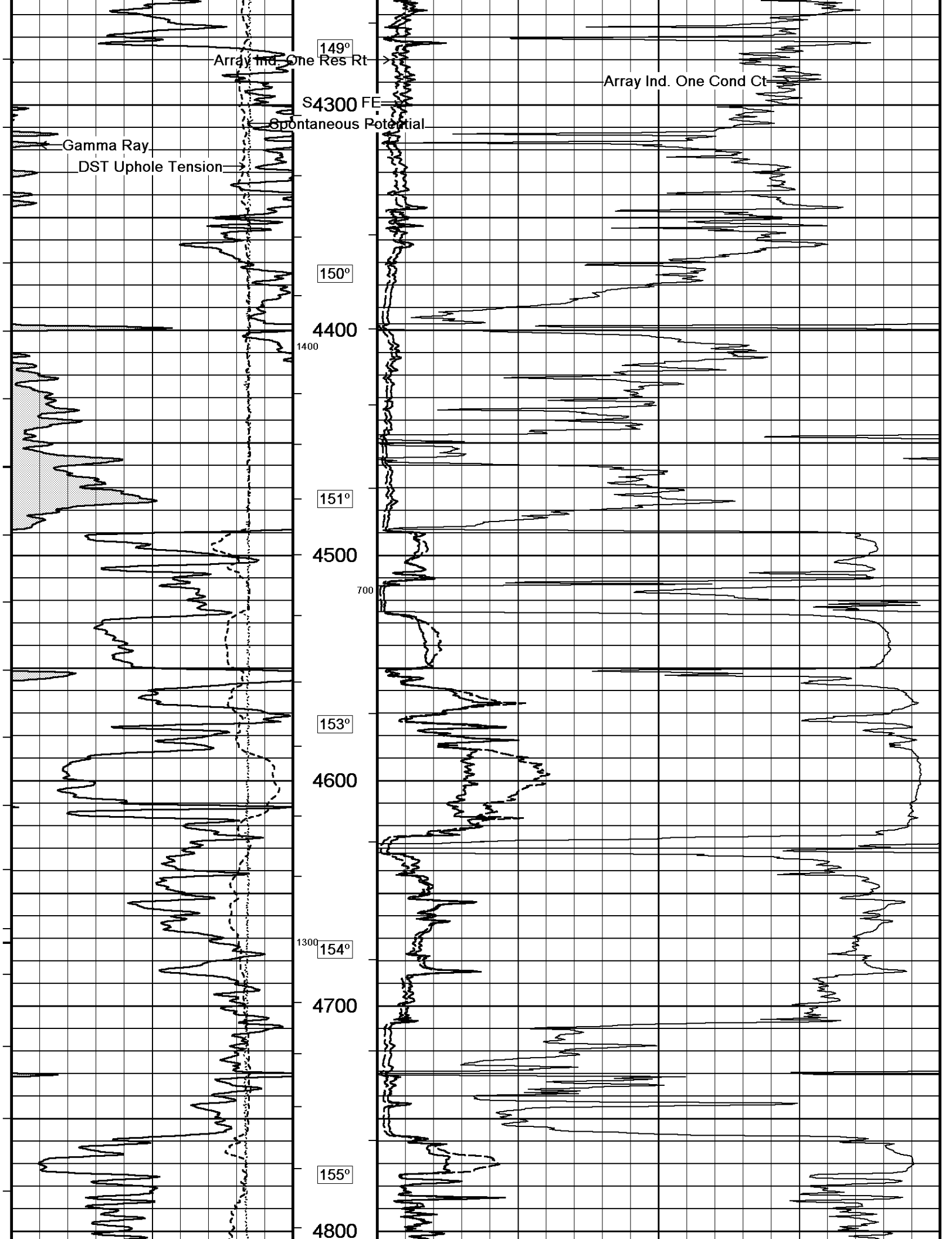


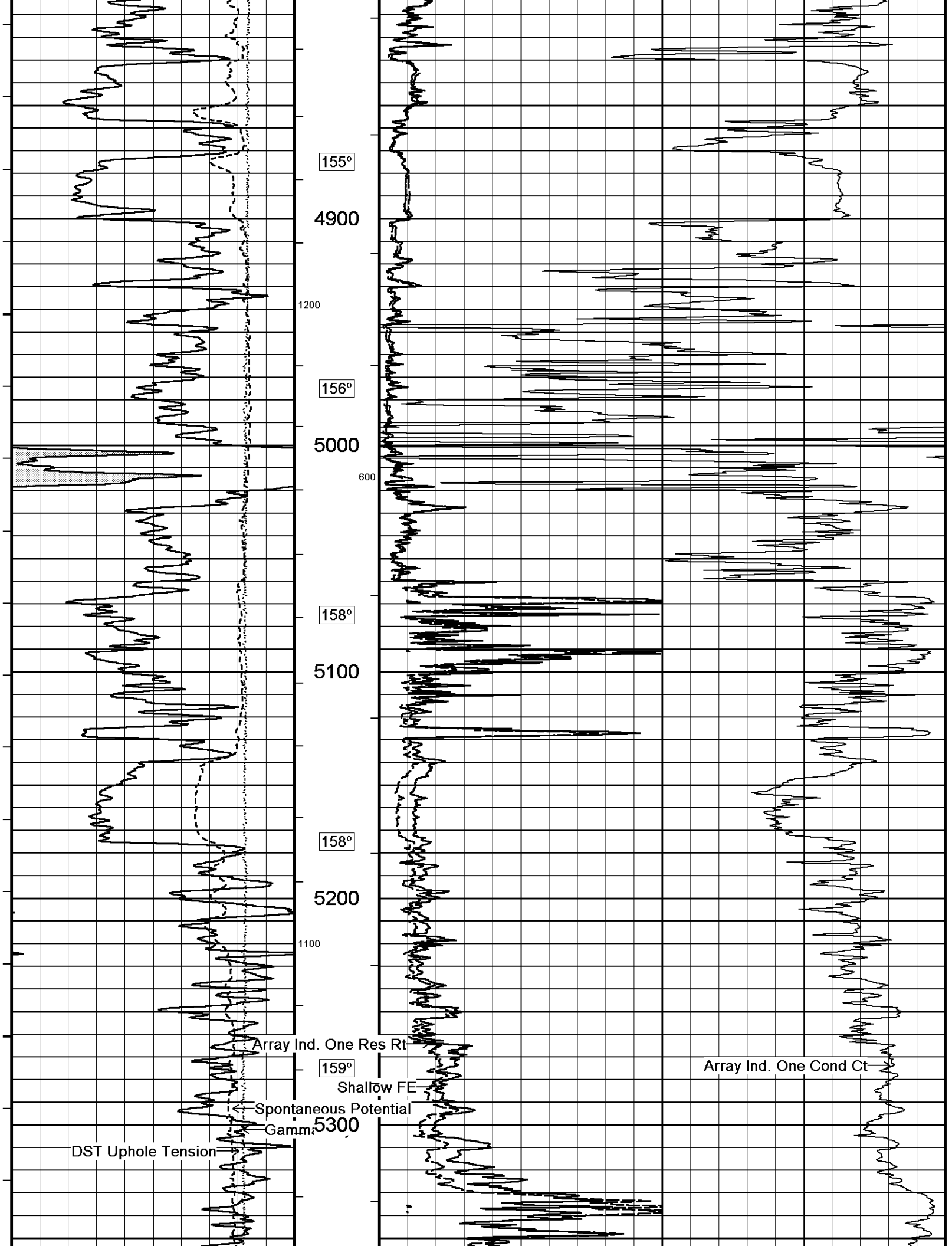


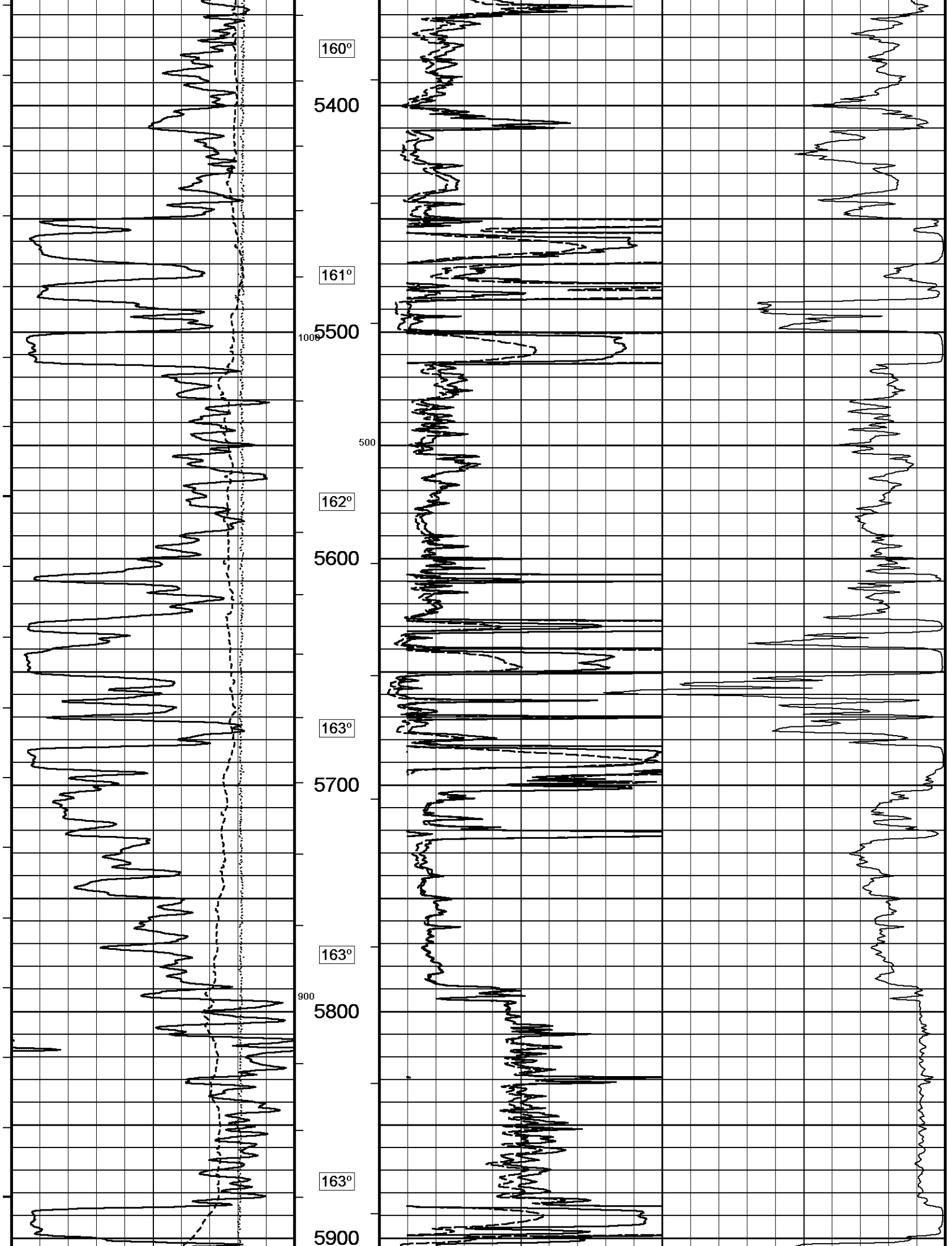


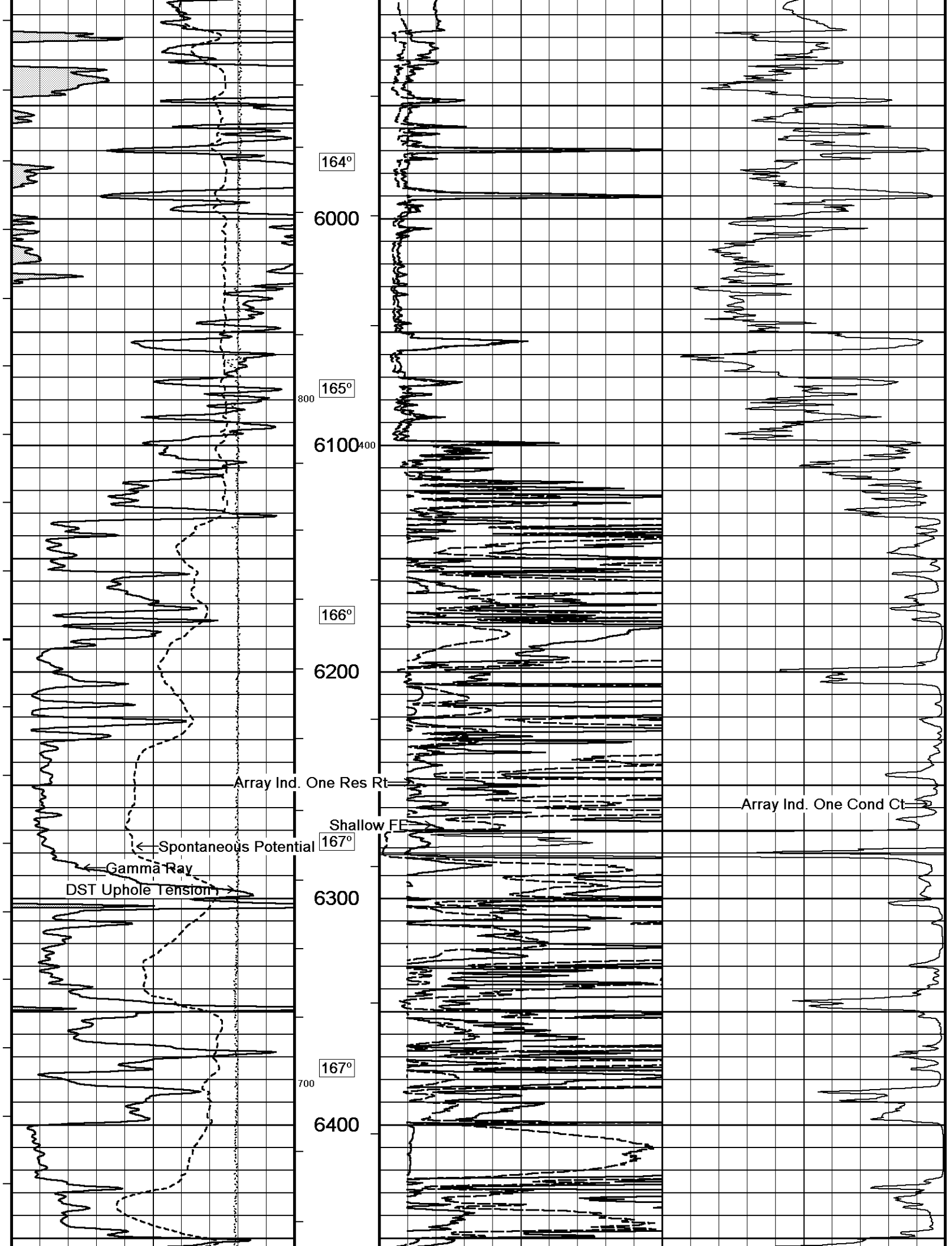
143°
3800
1600
144°
3900
145°
4000
147°
800
4100
1500
148°
4200

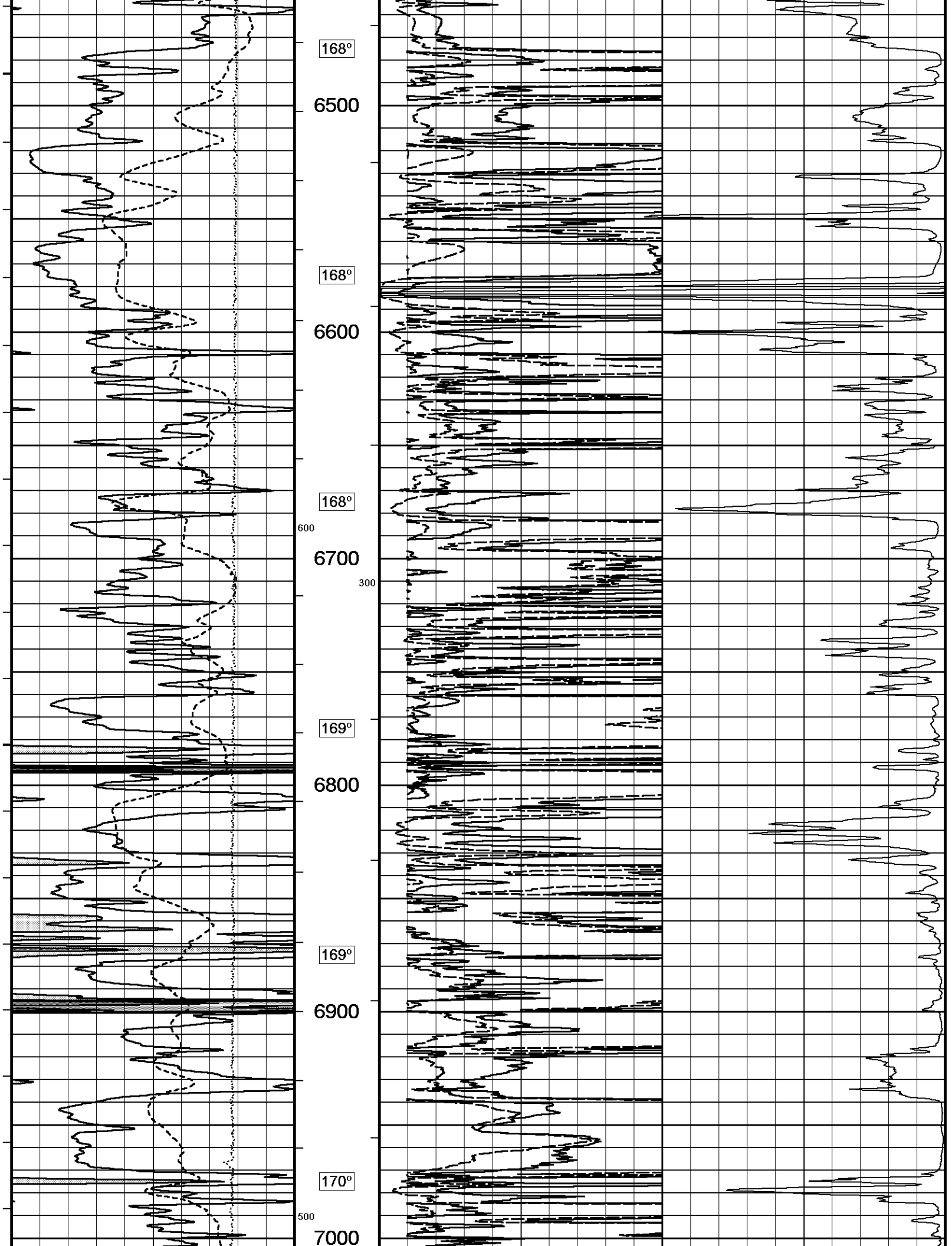


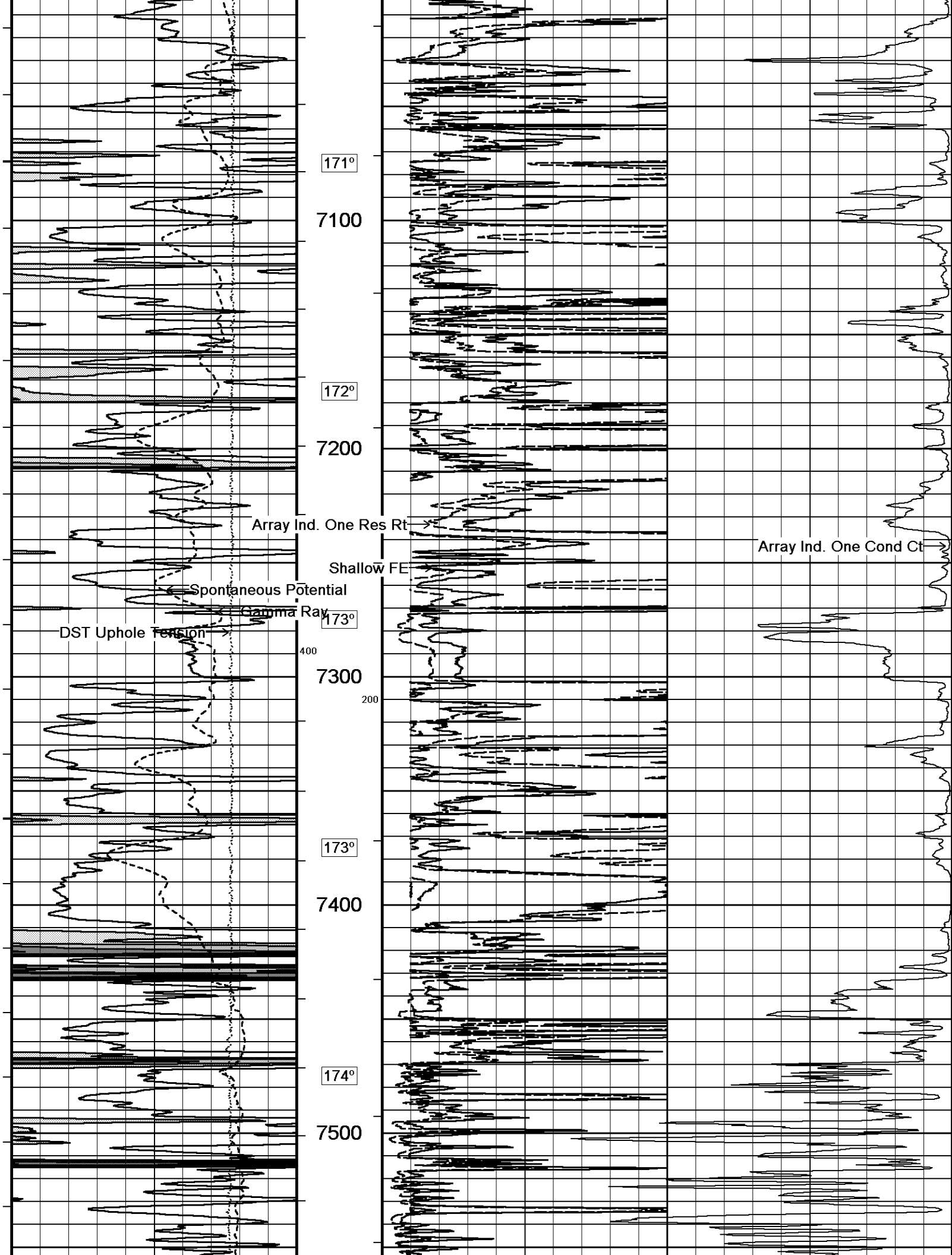


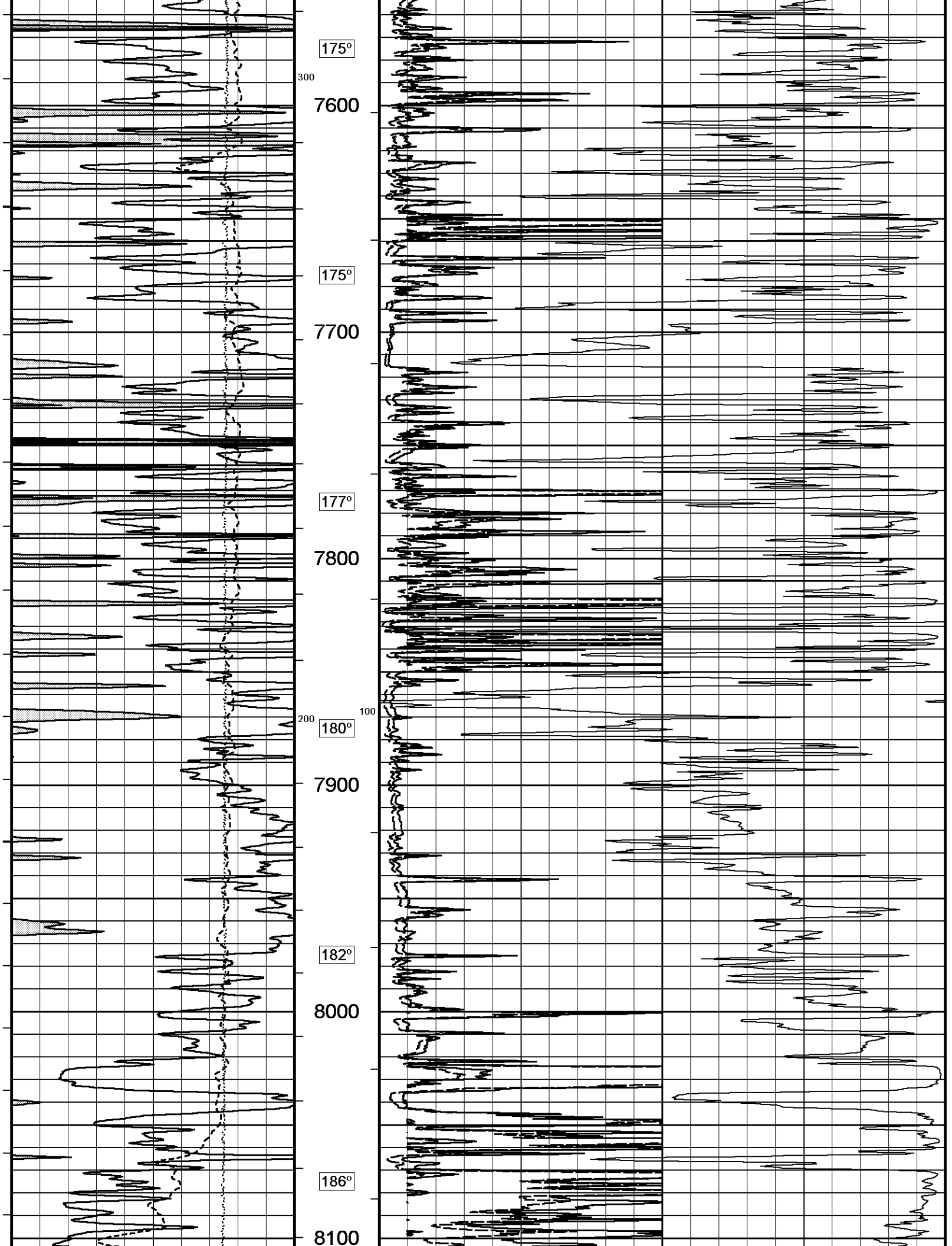


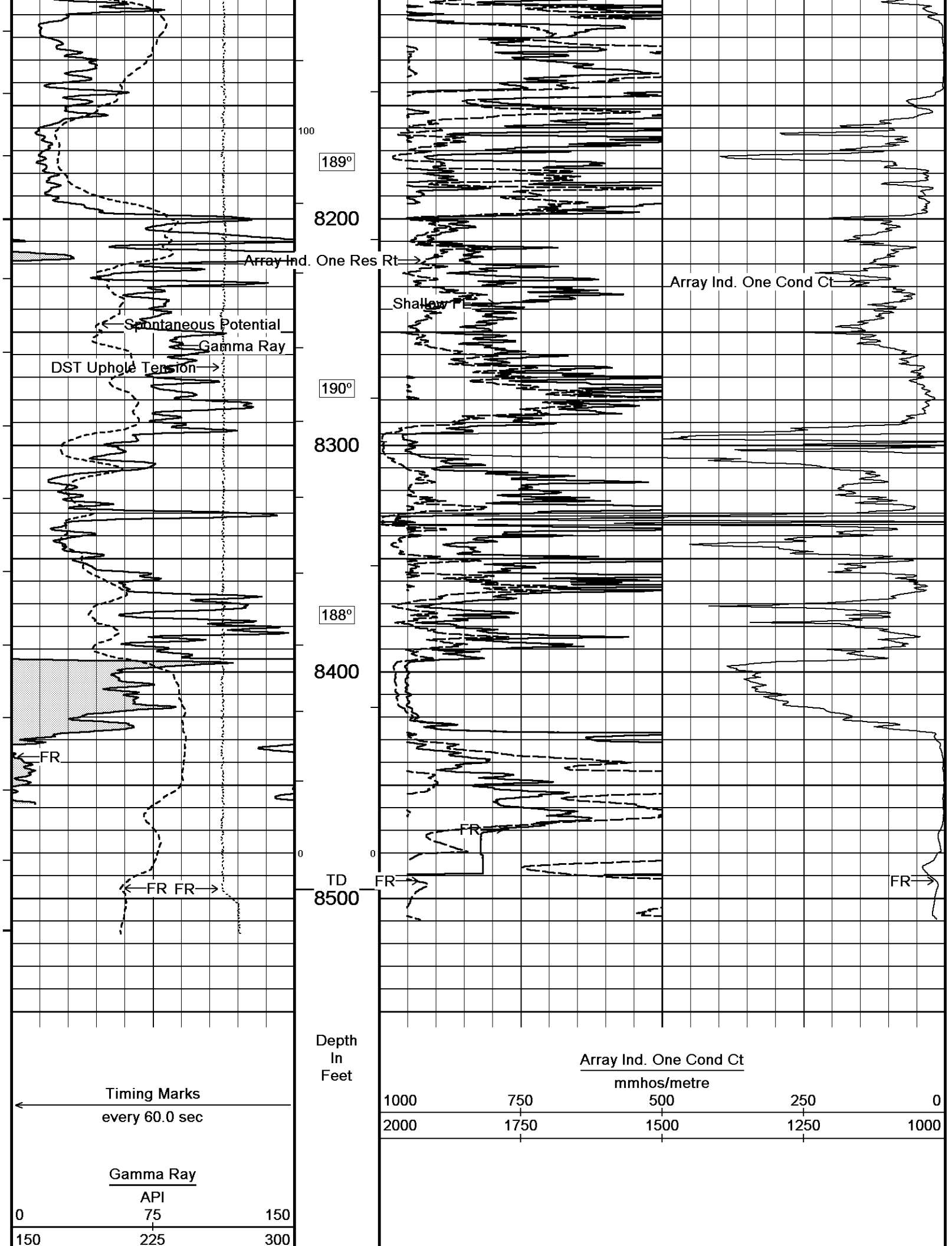


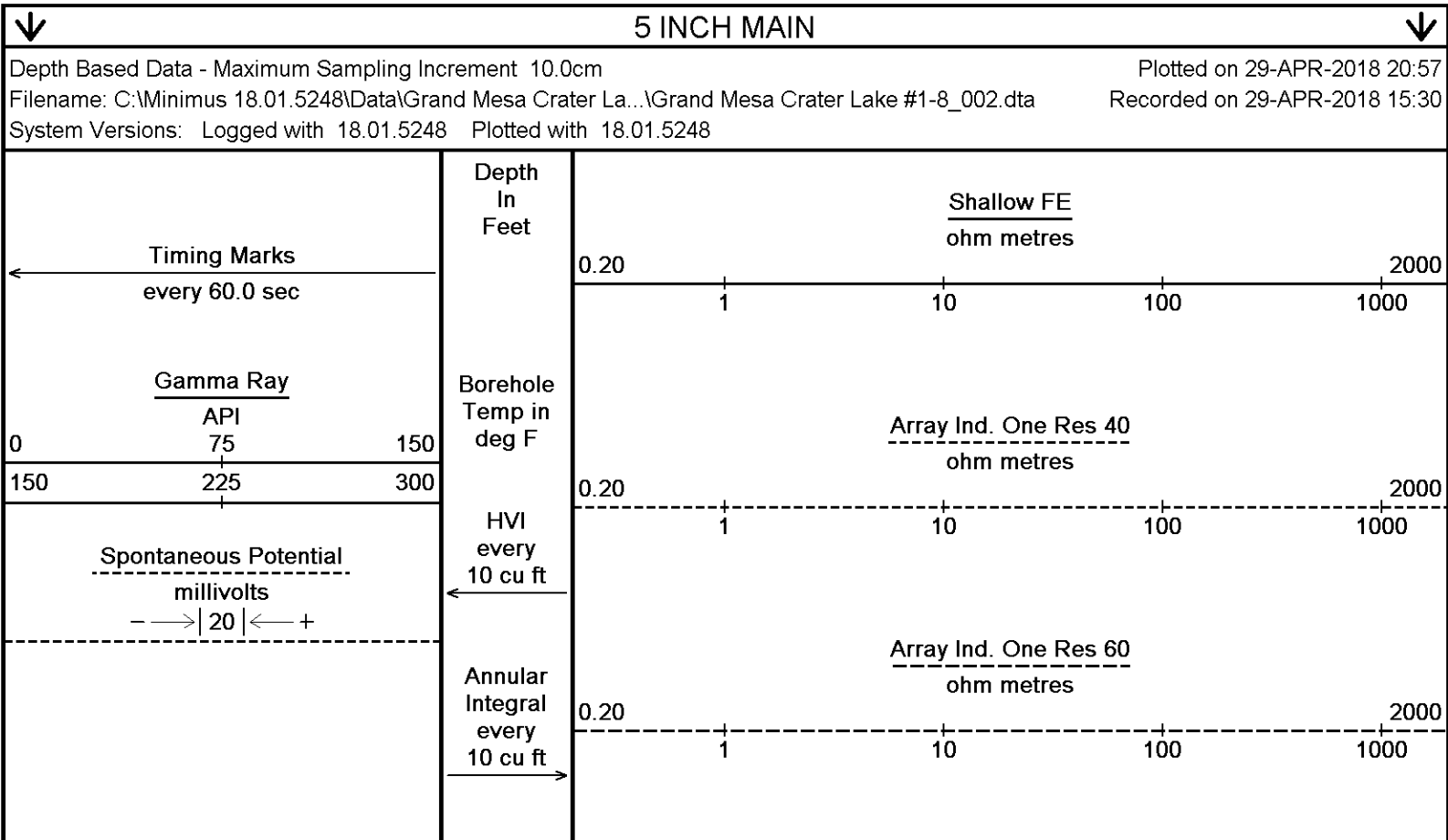
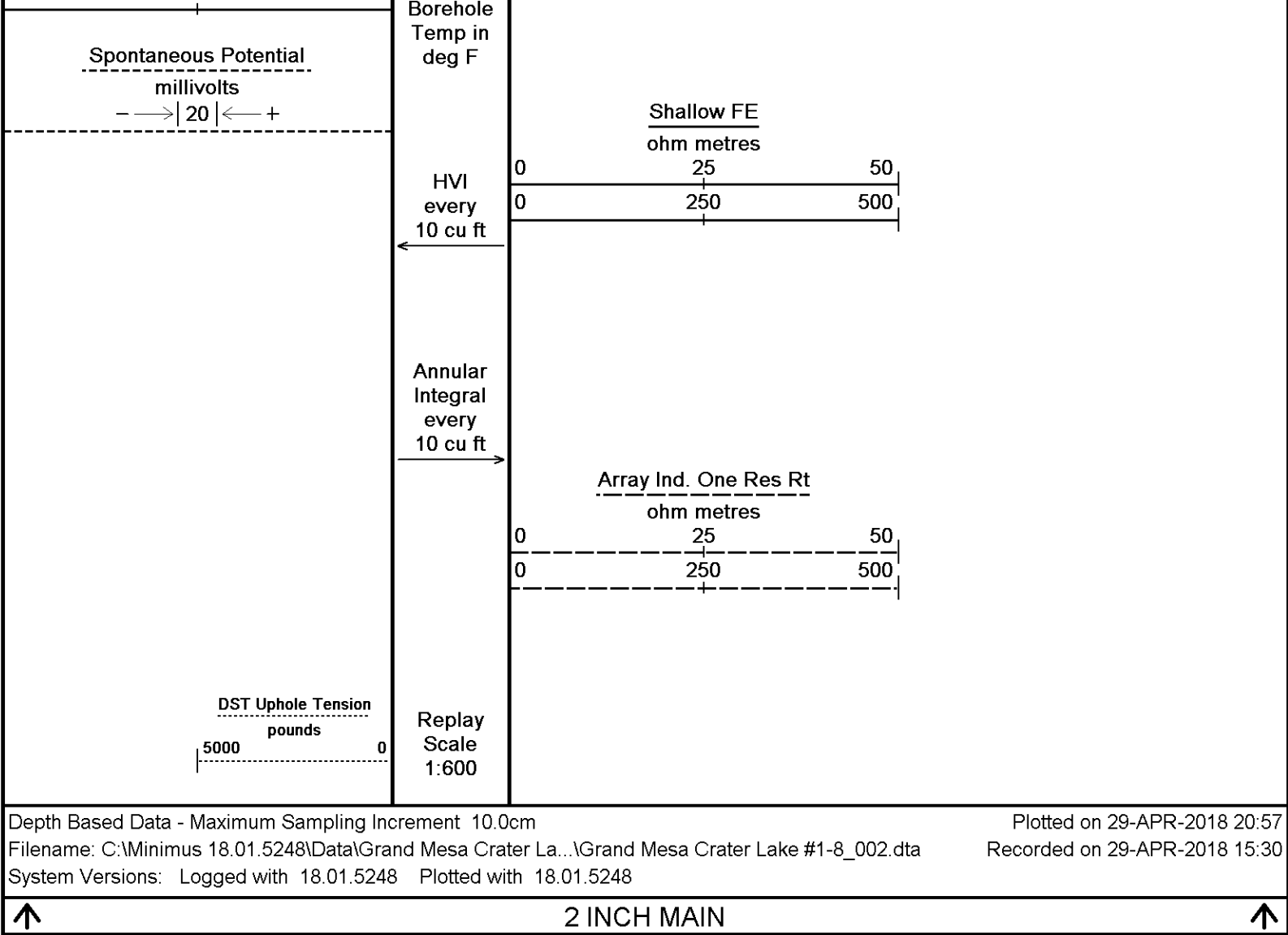


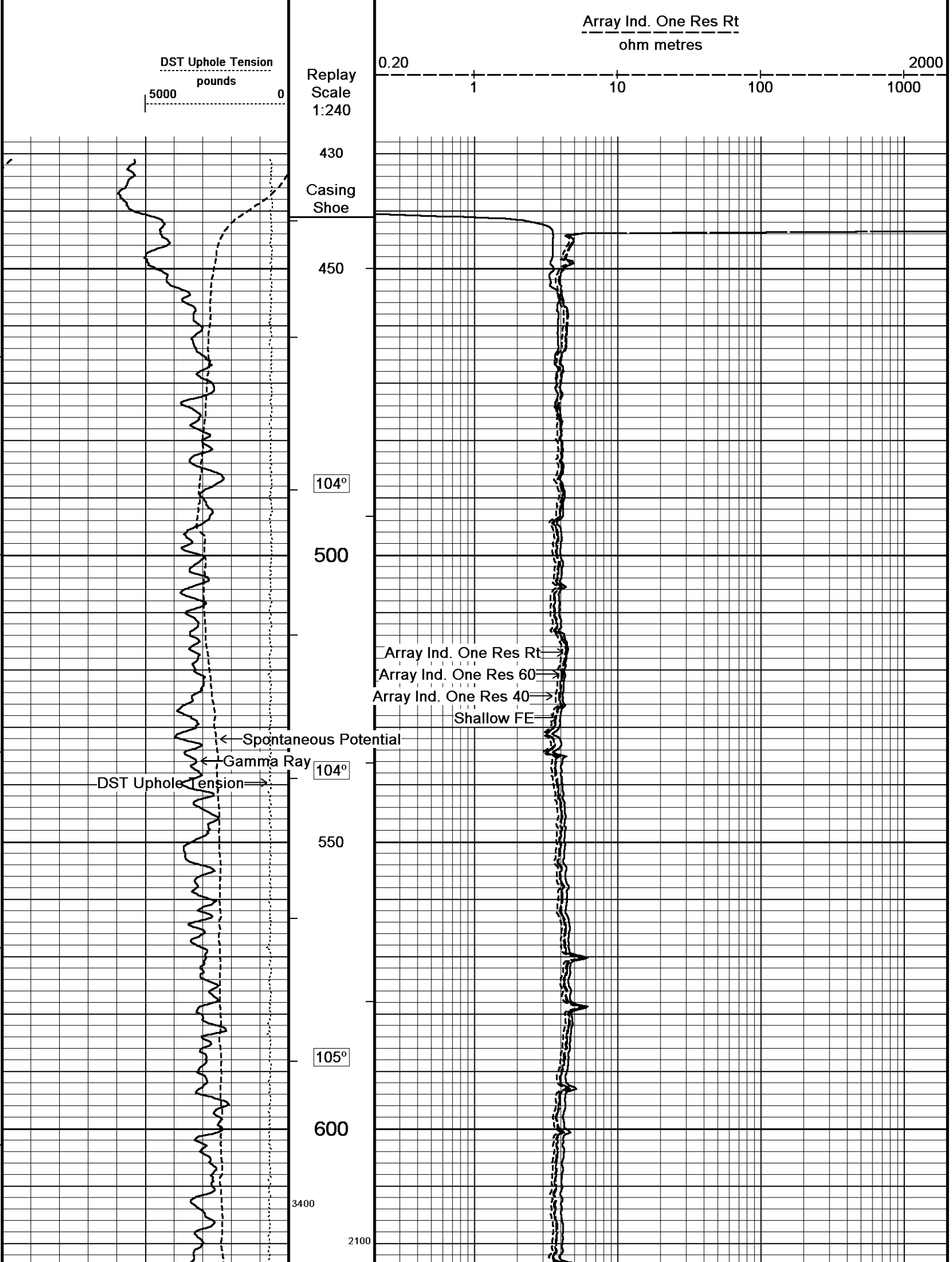


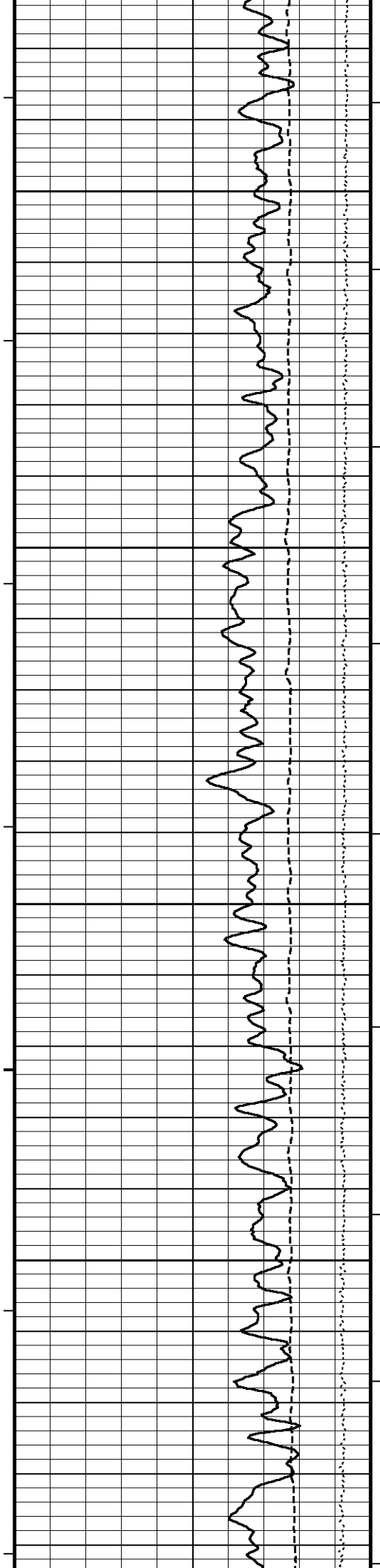












106°

650

107°

700

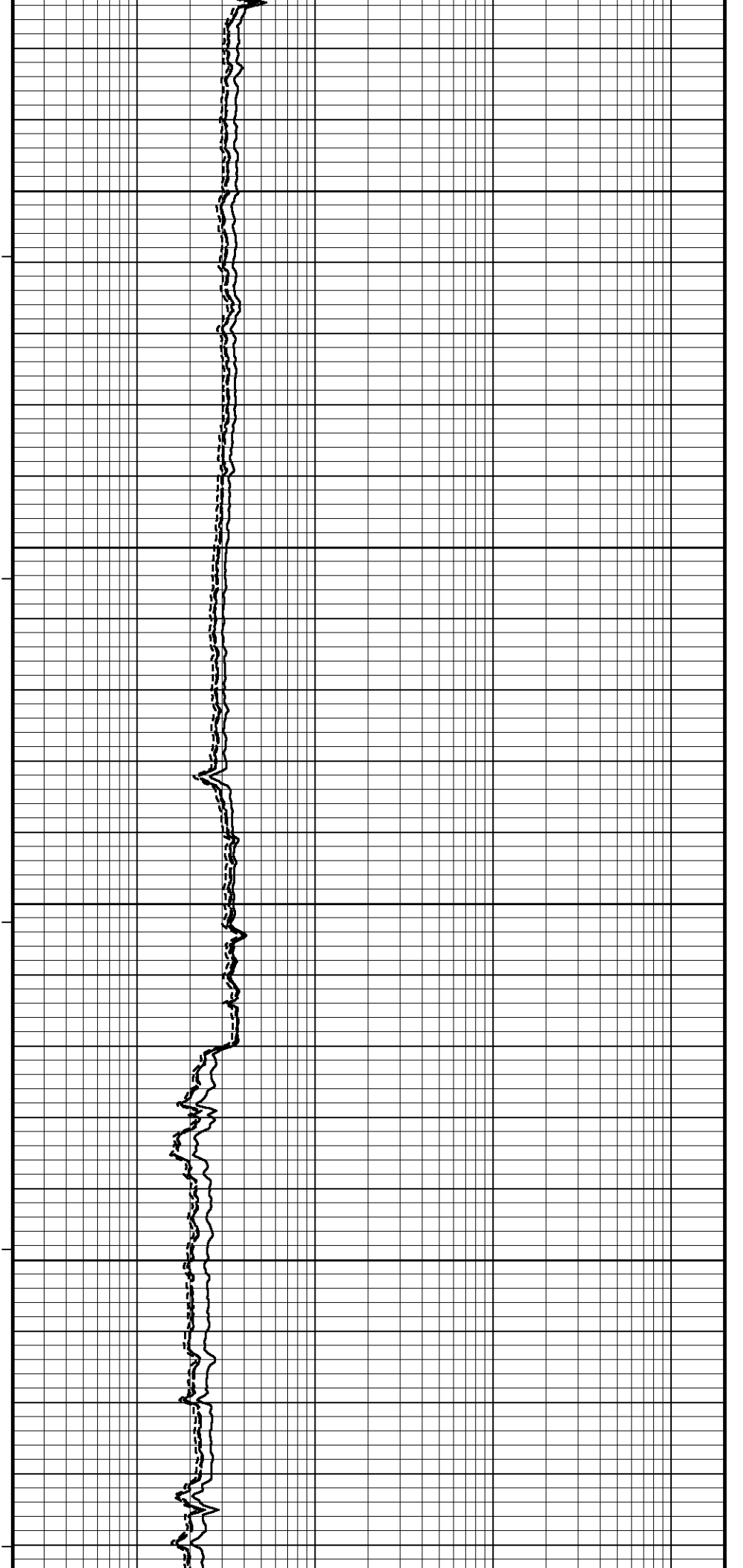
108°

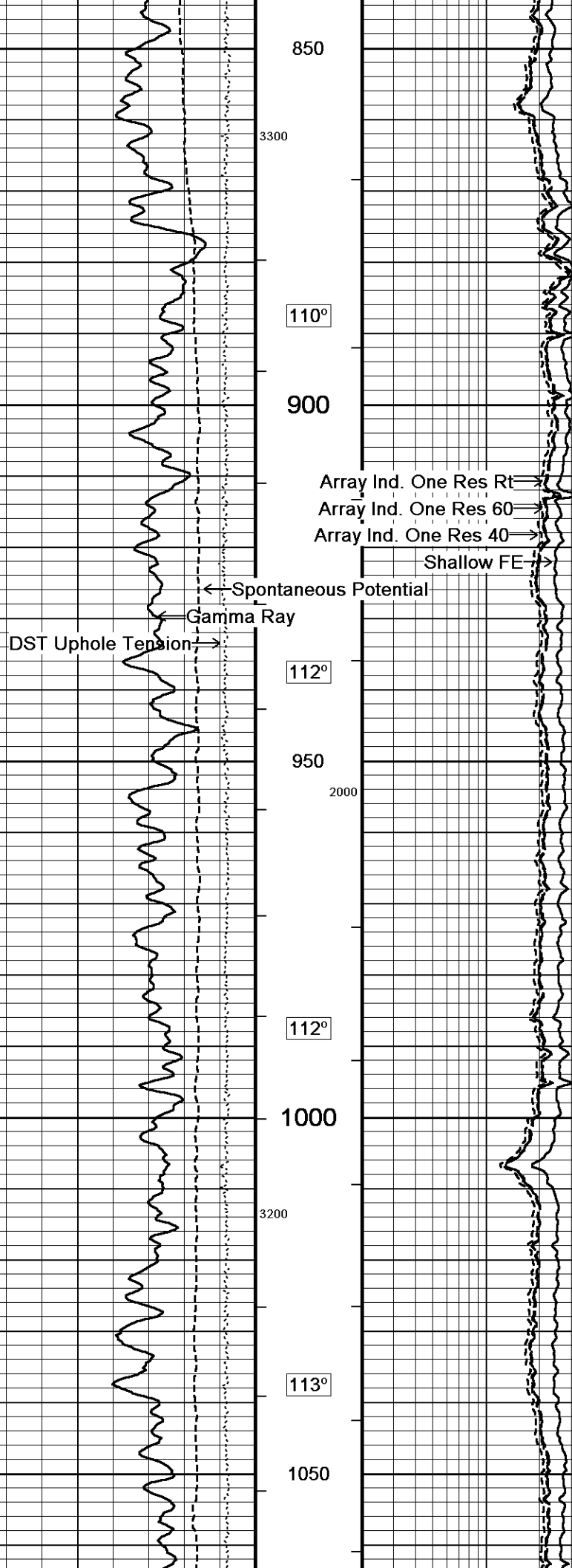
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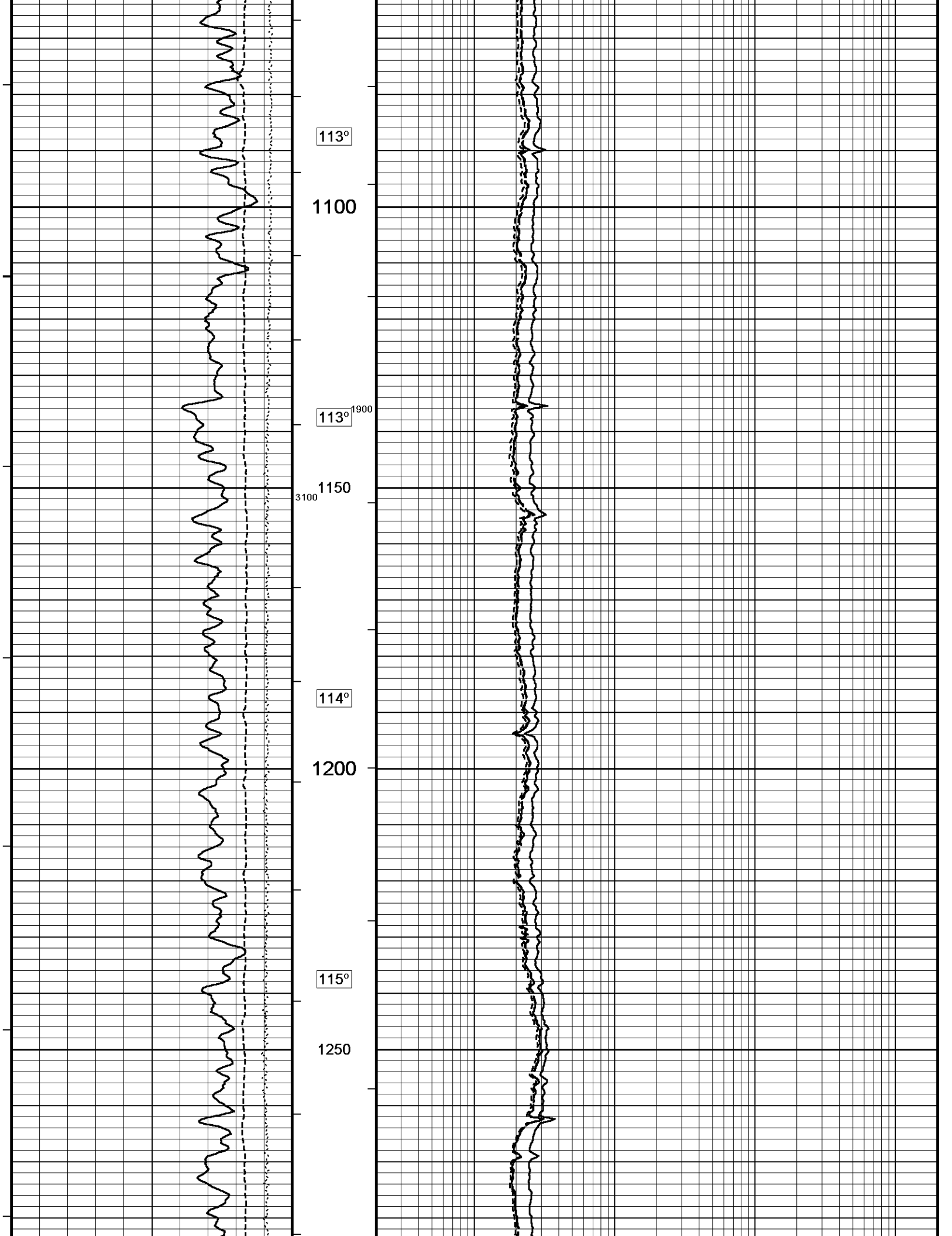
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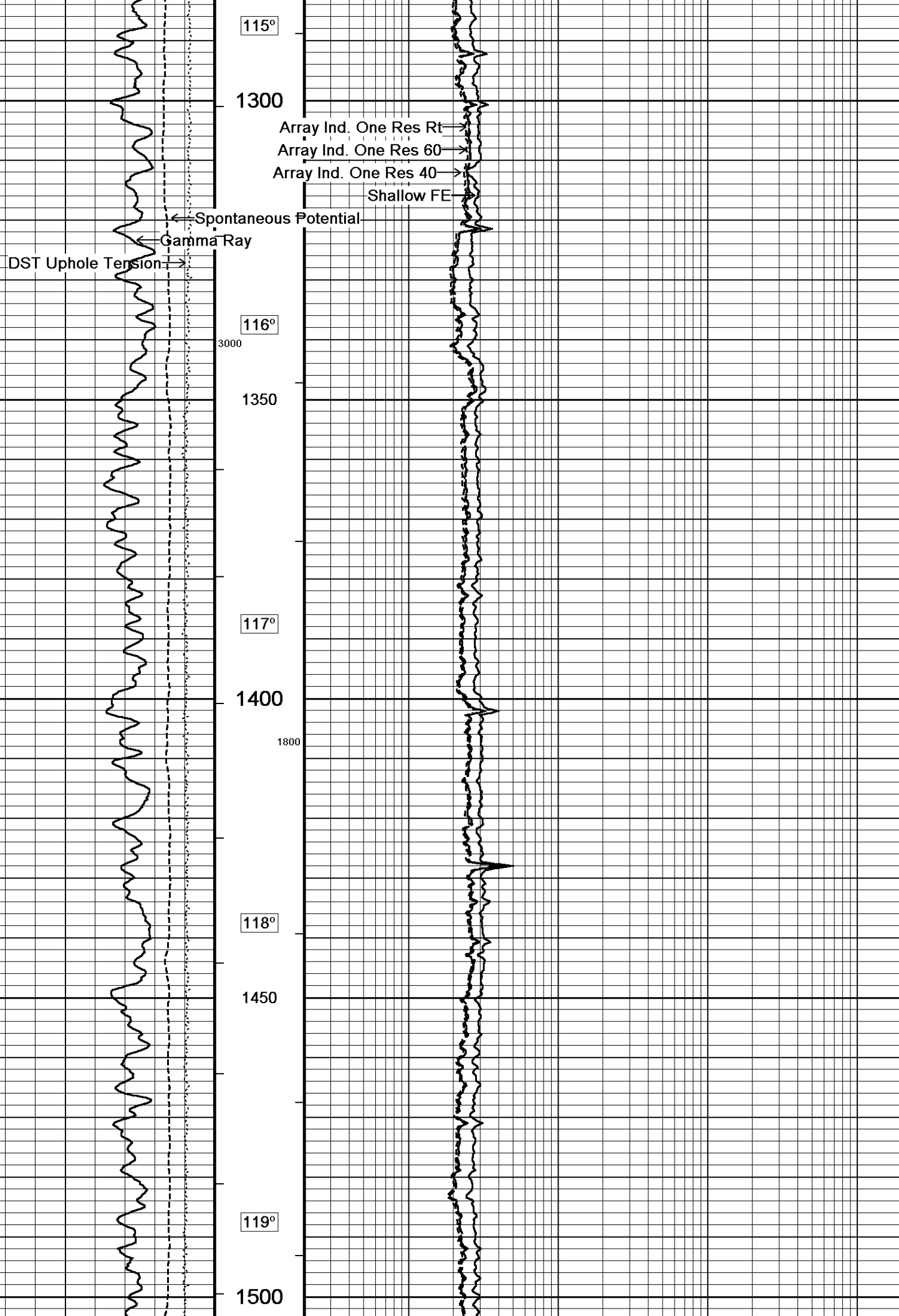
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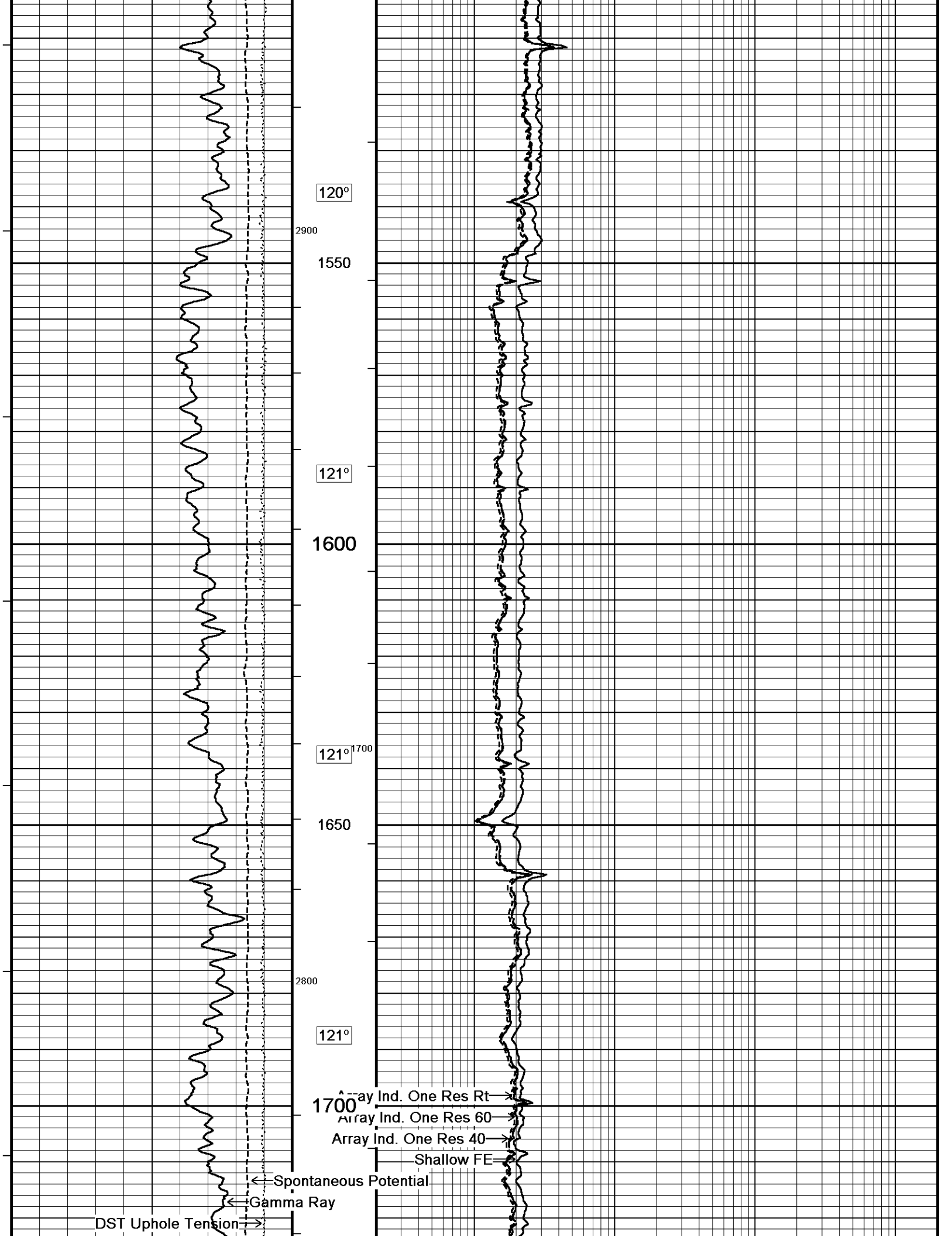
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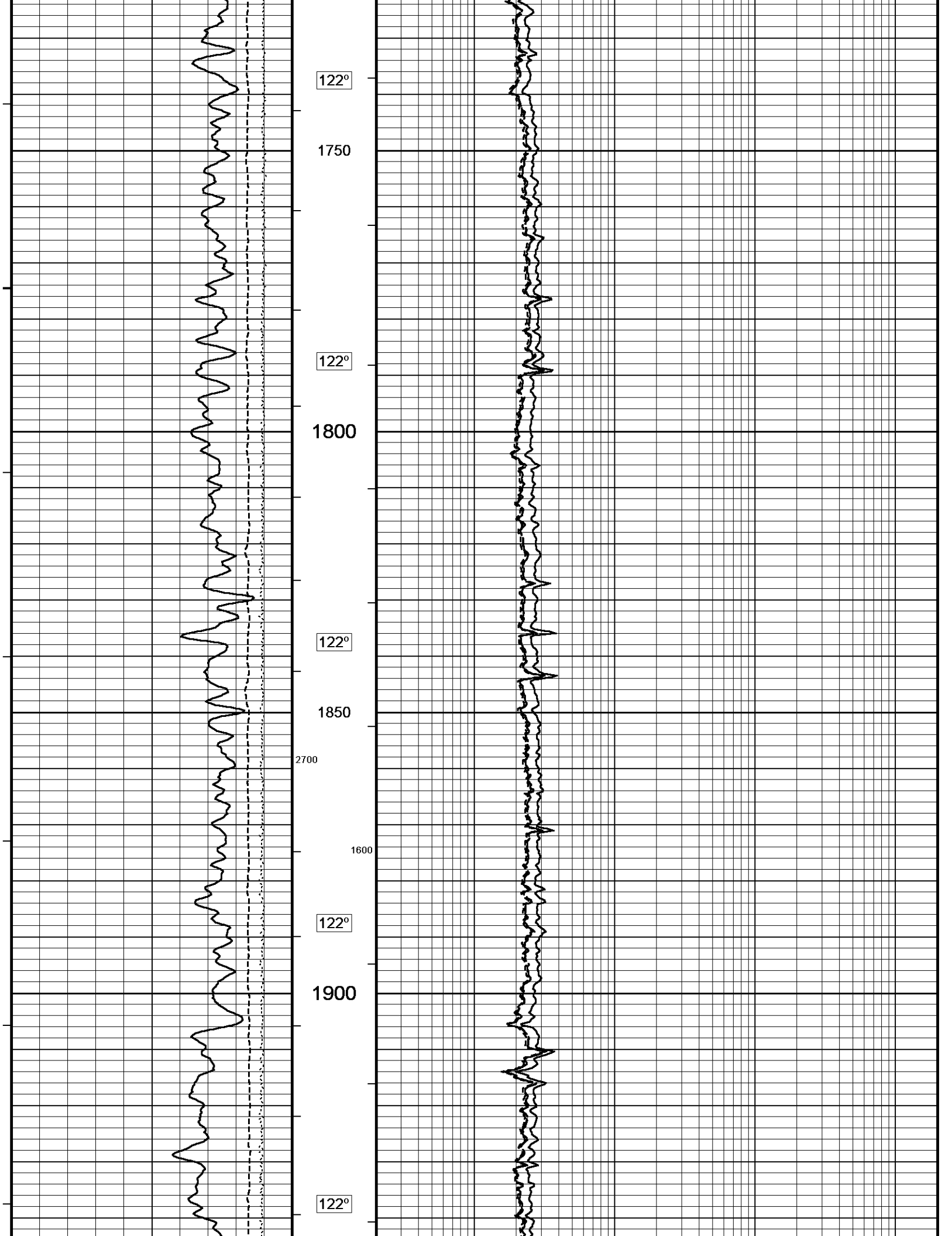


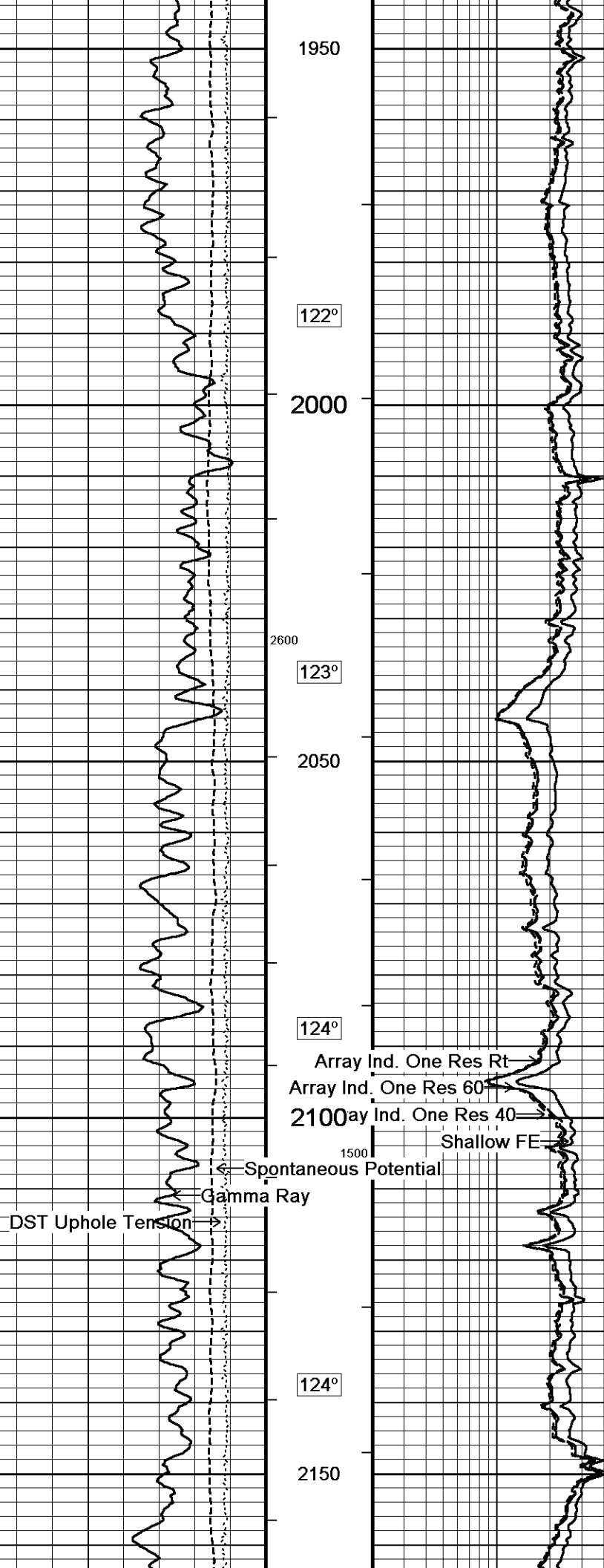


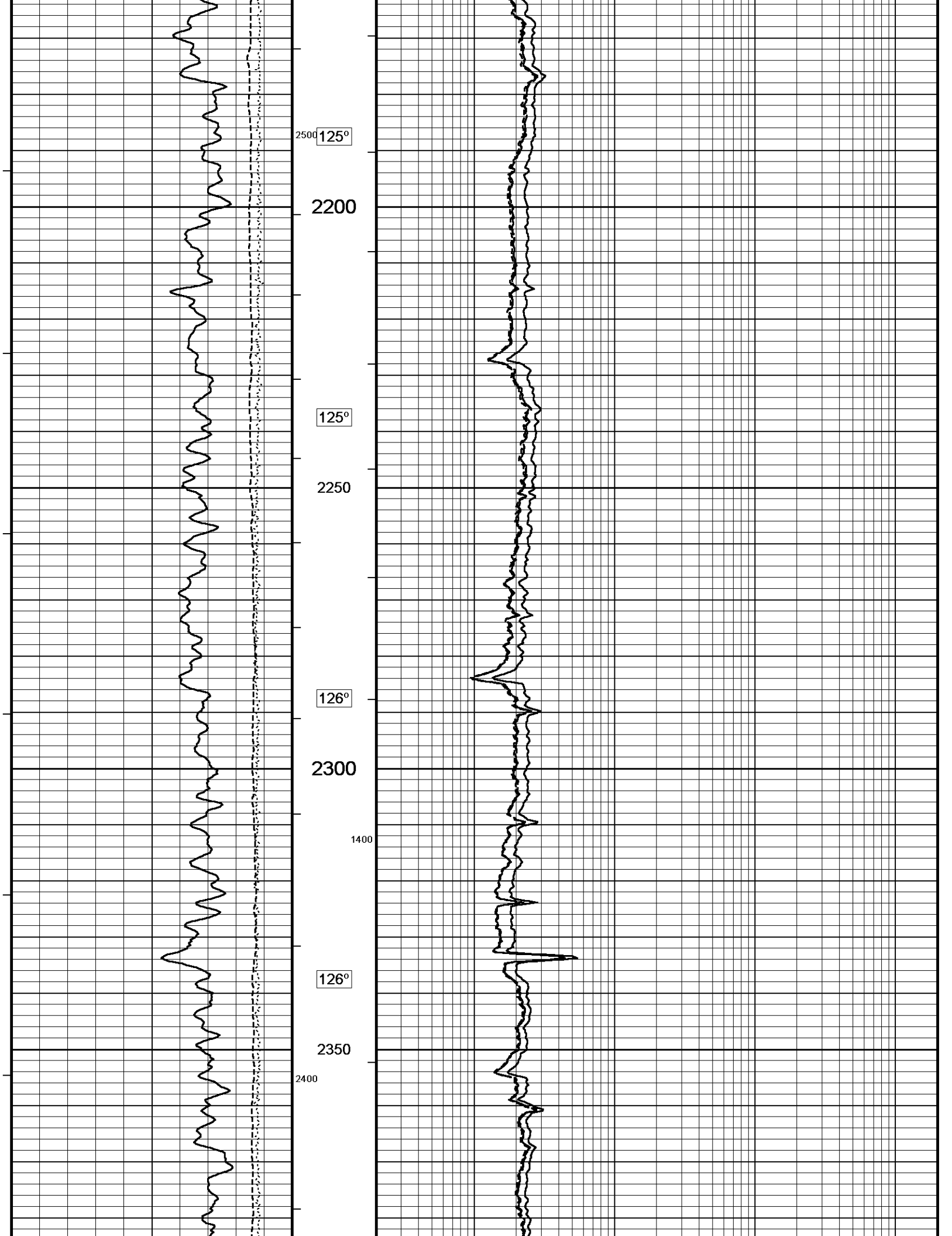


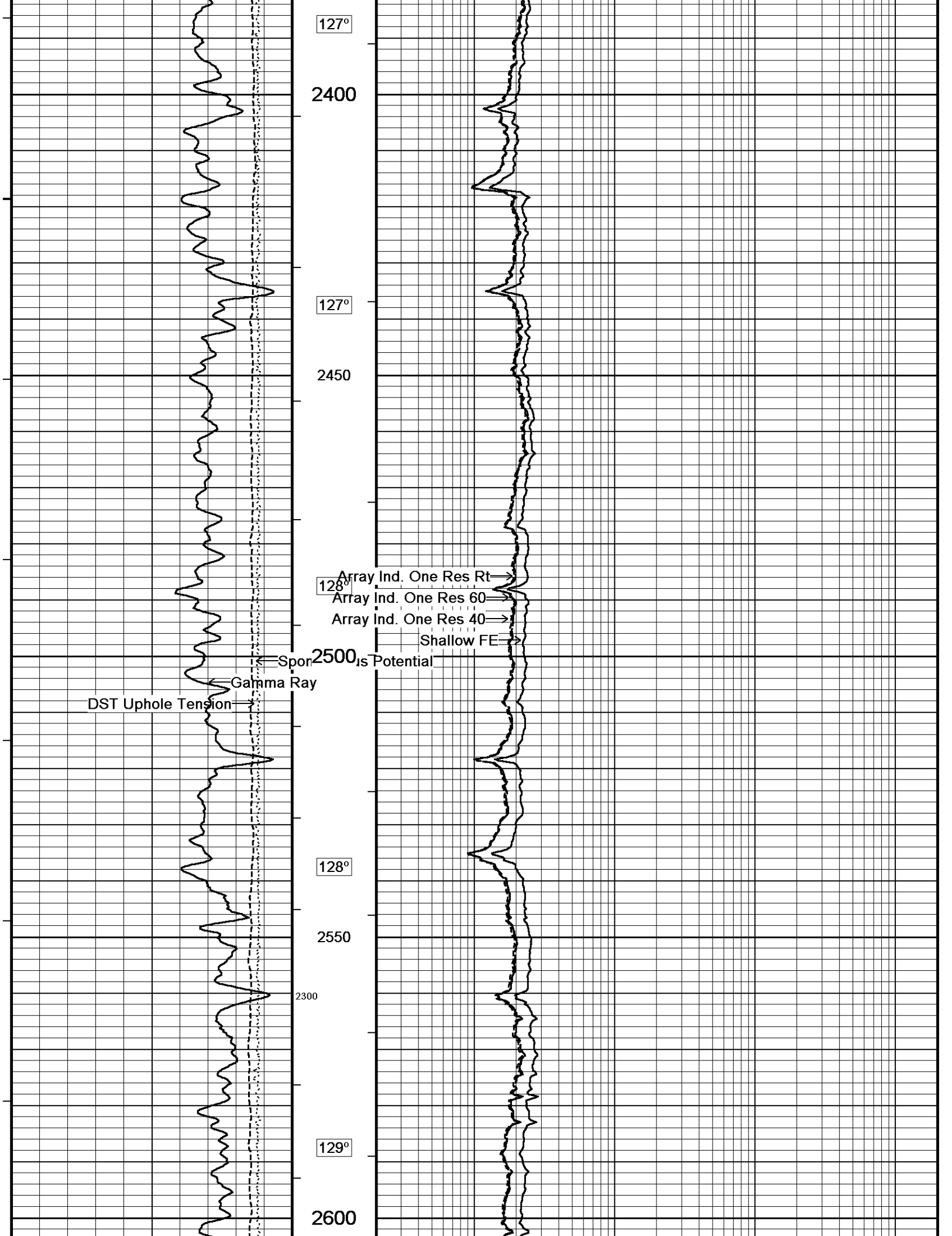


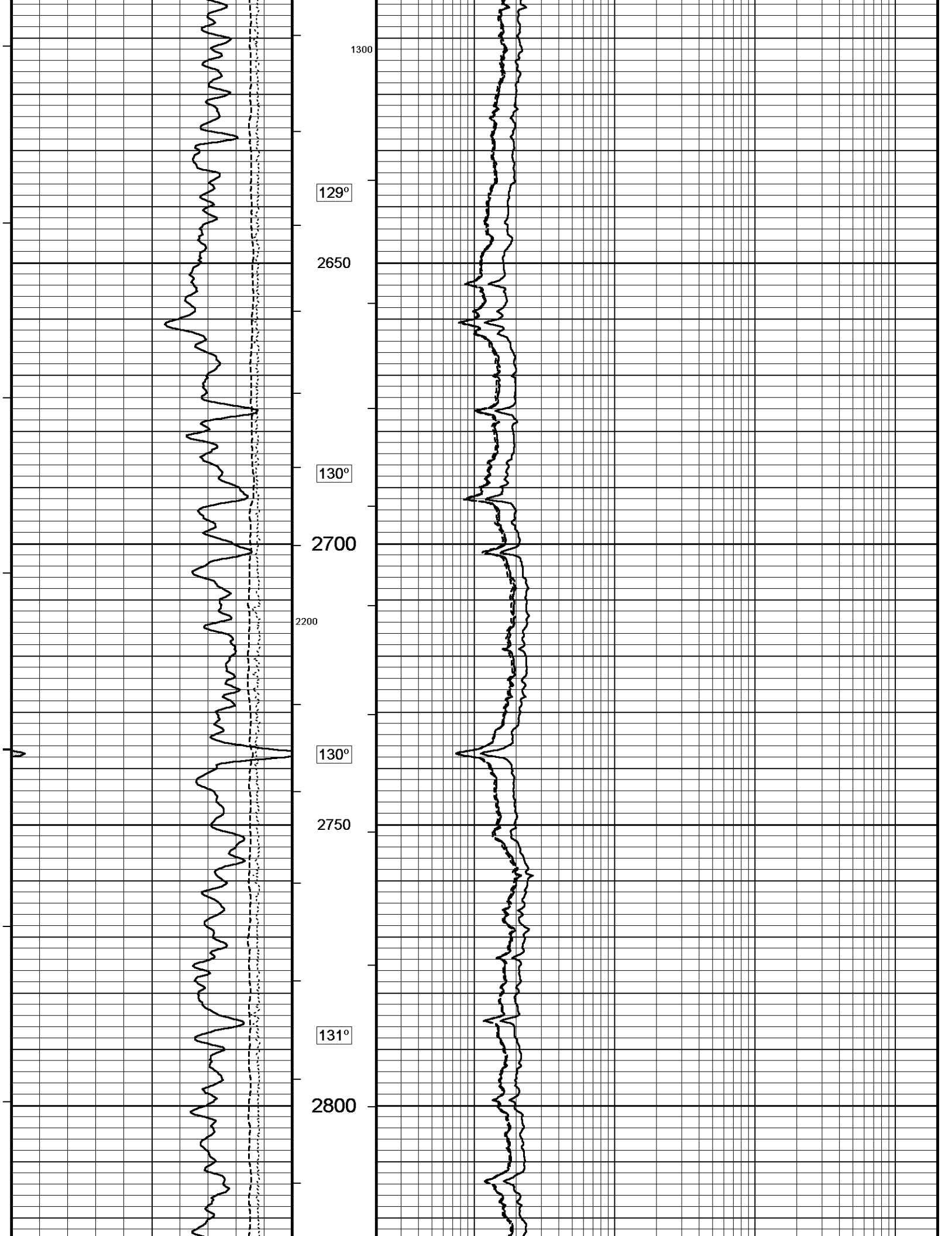


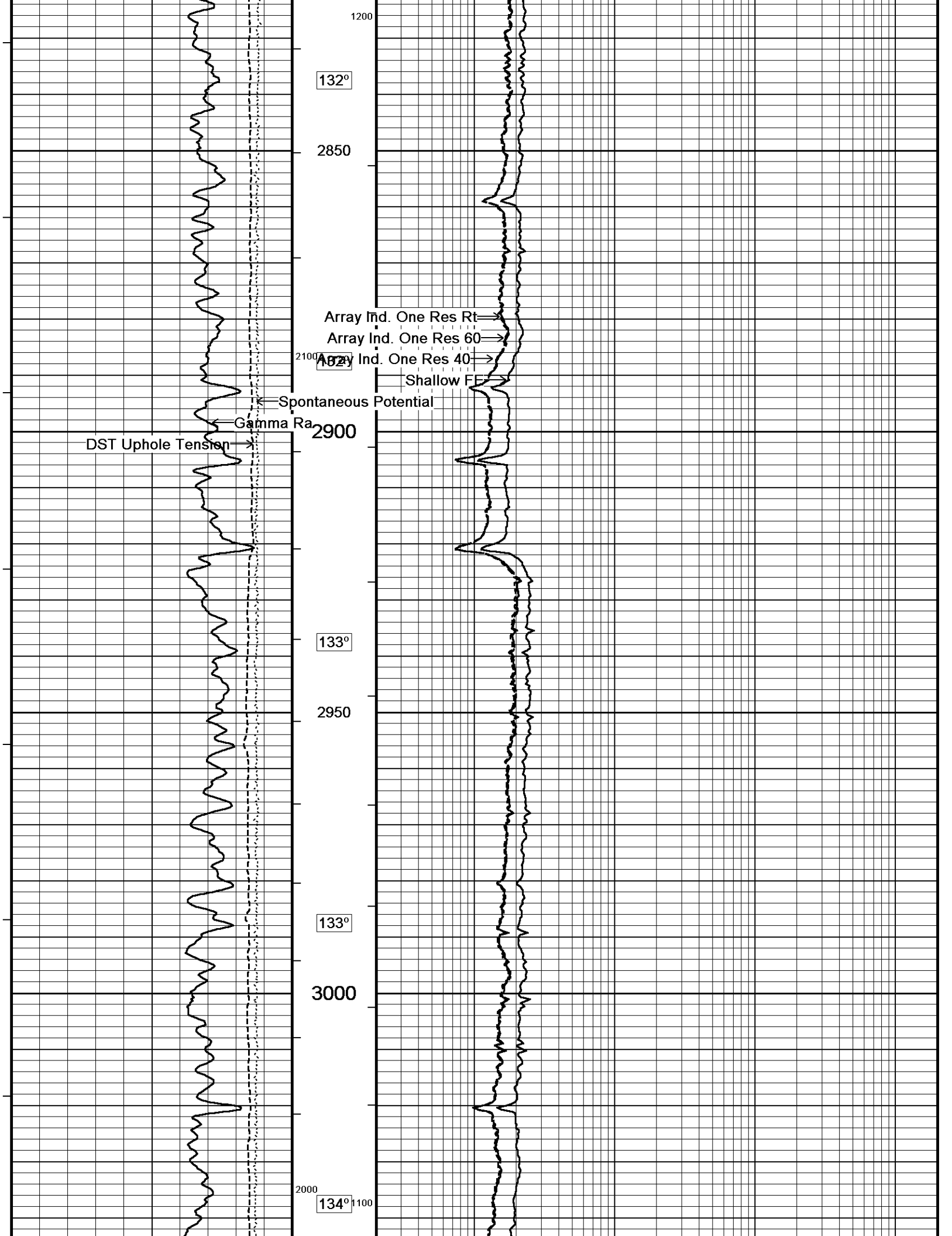


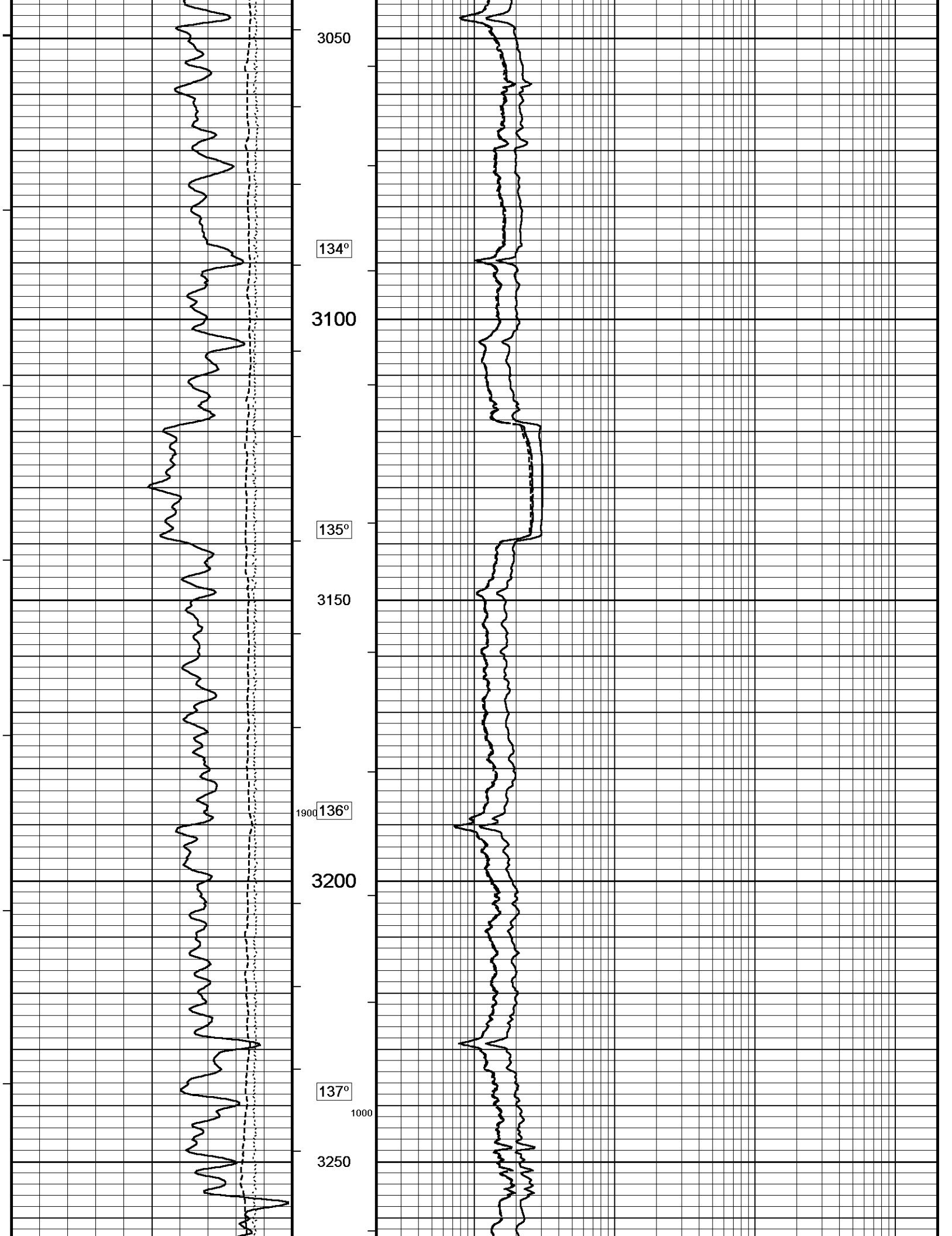


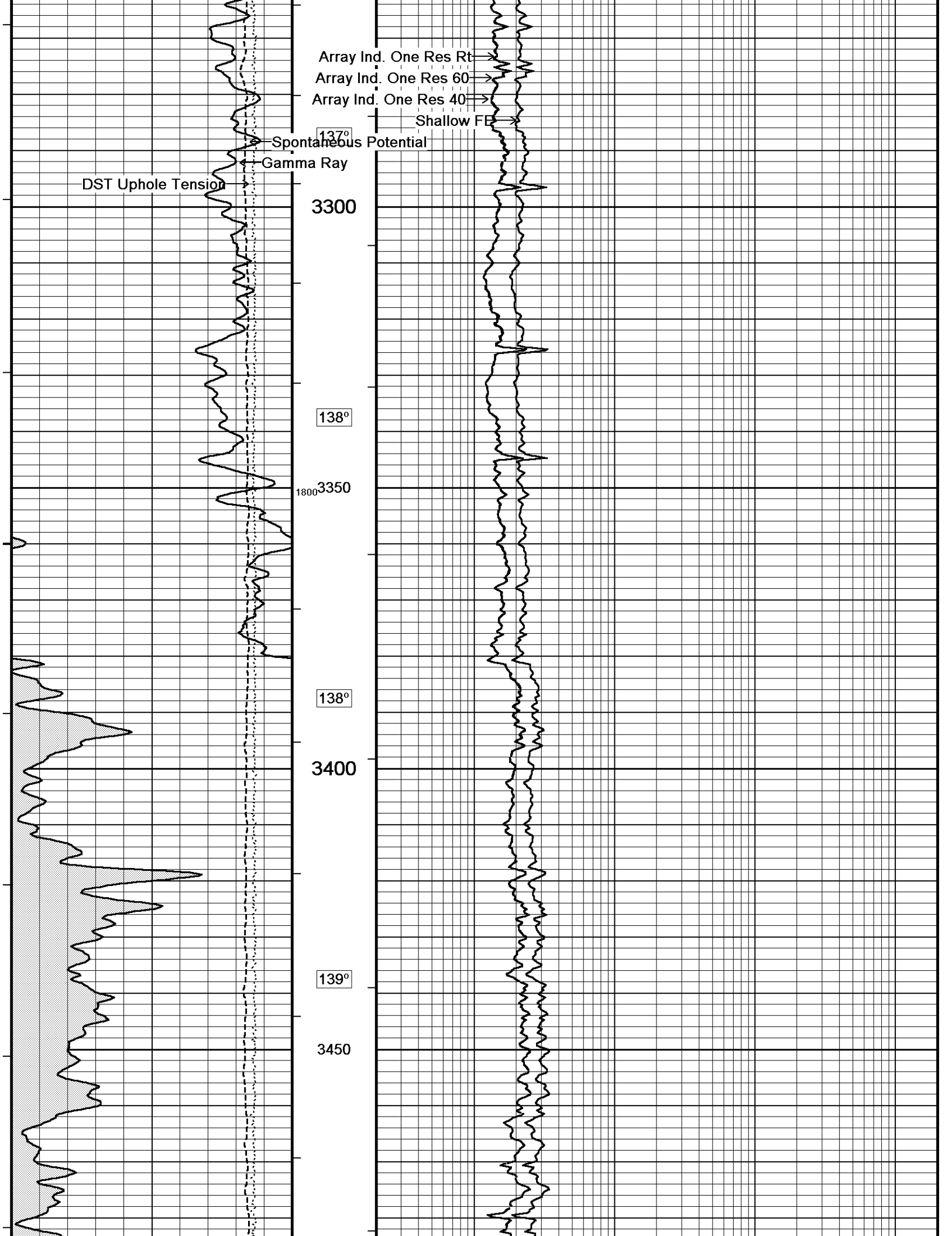


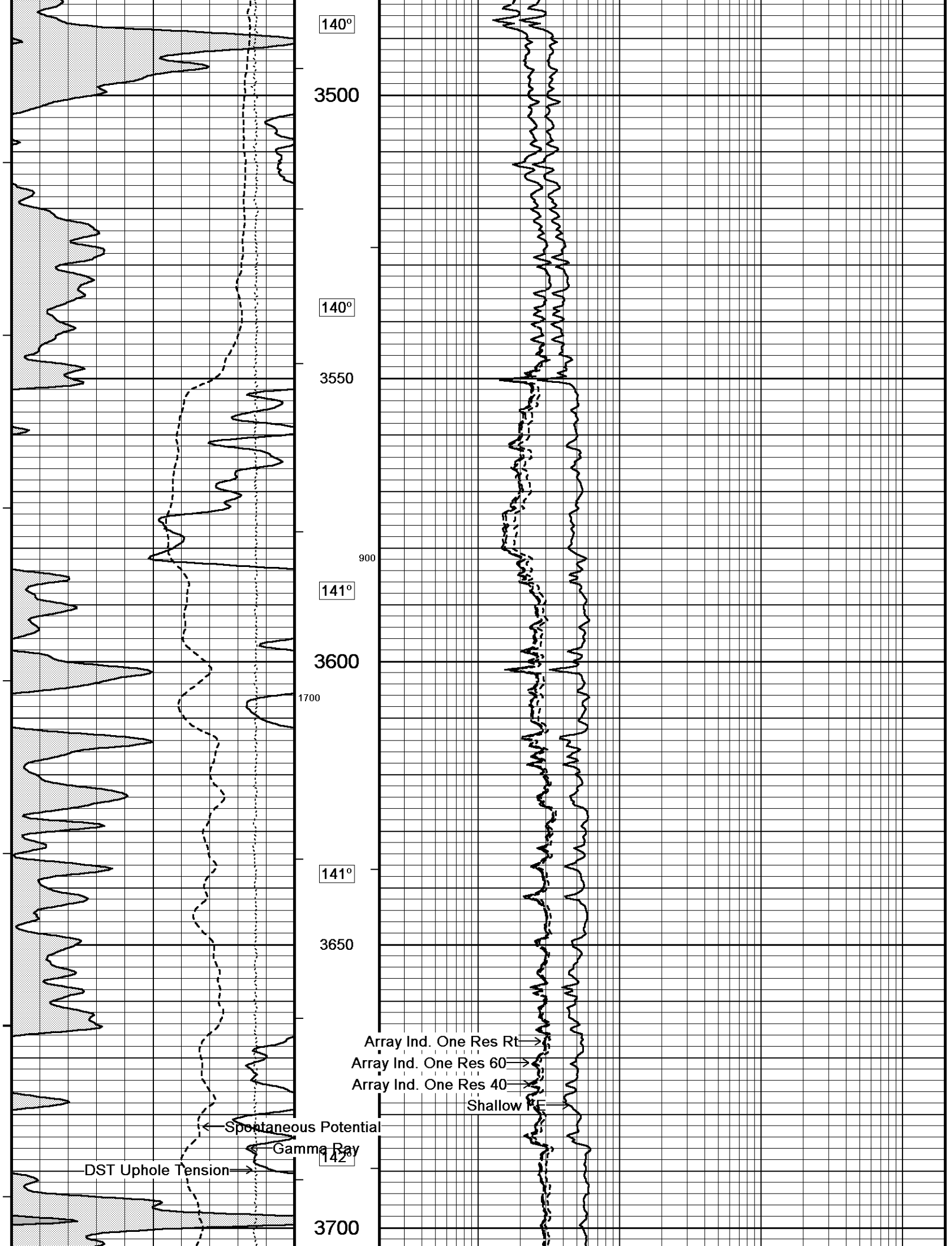


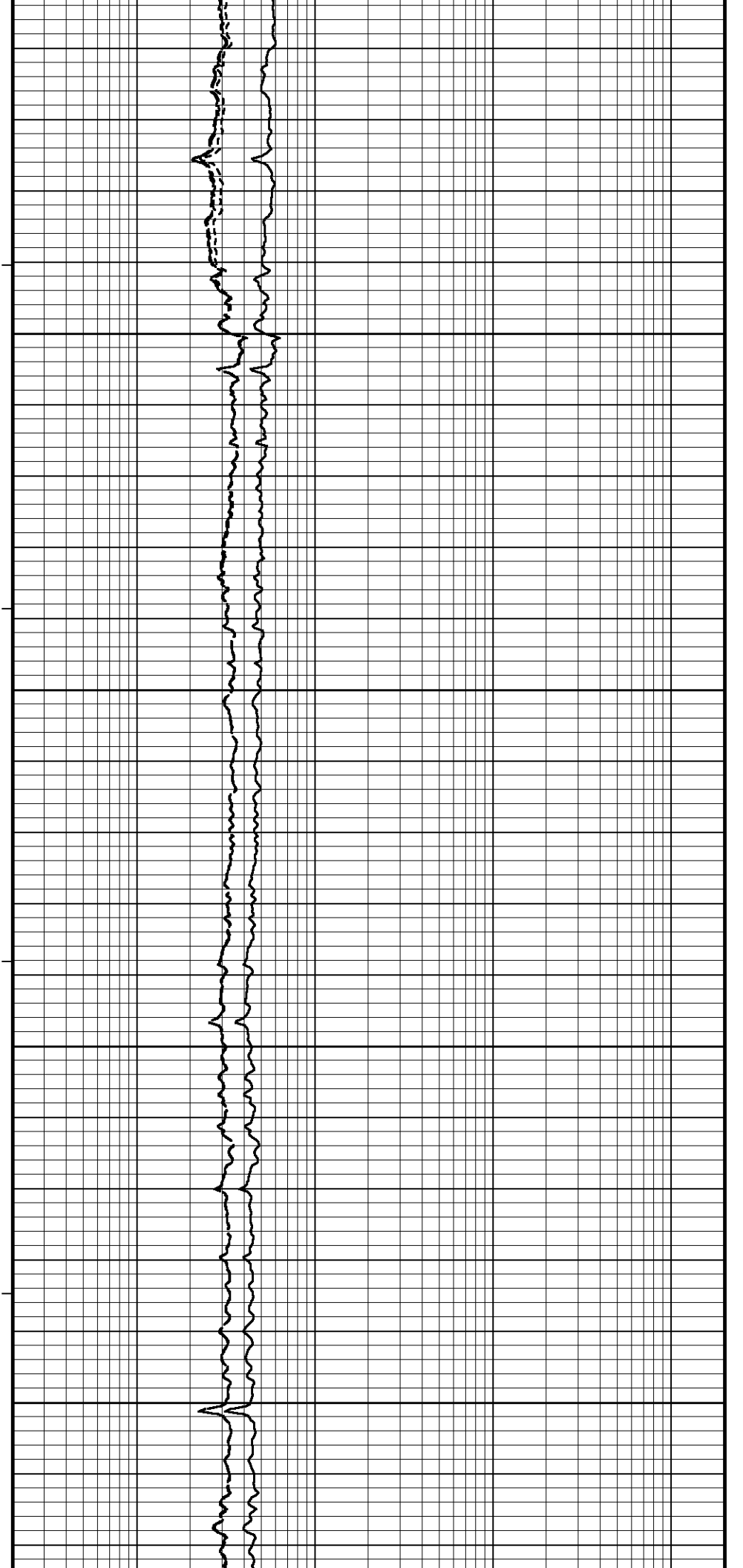
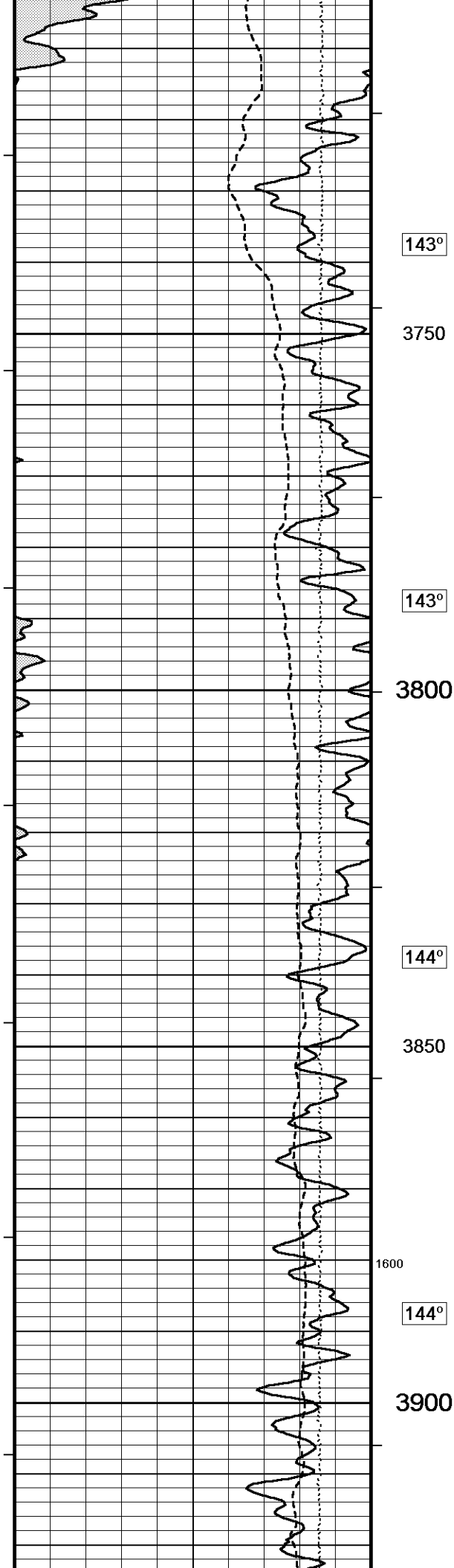


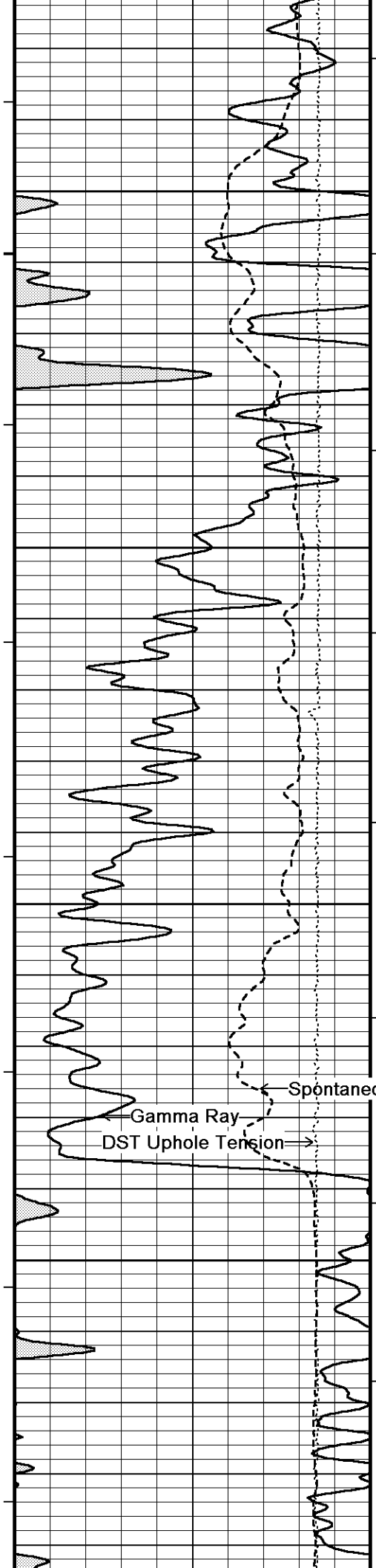












145°

3950

146°

4000

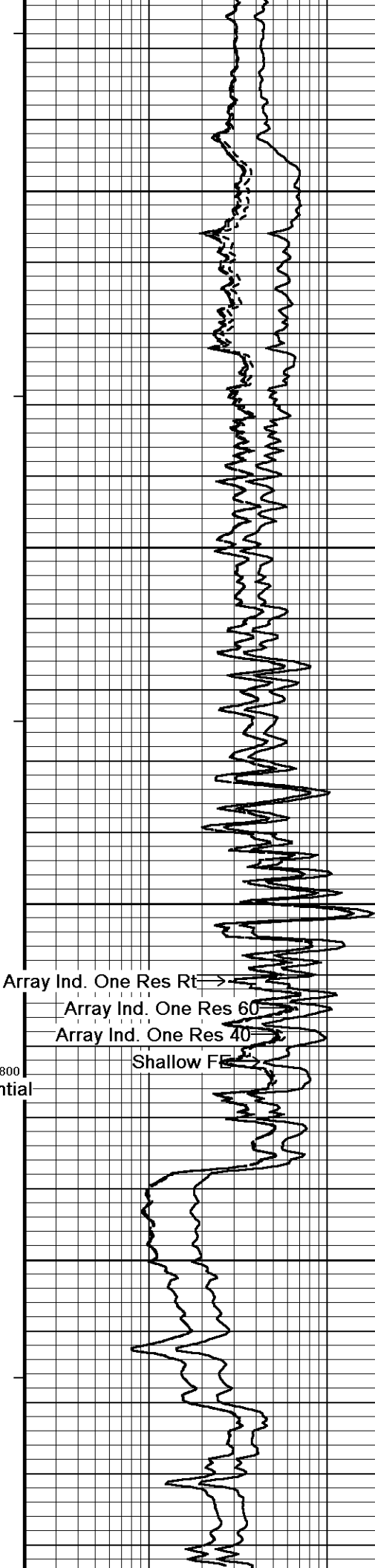
146°

4050

147°

4100

147°



Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

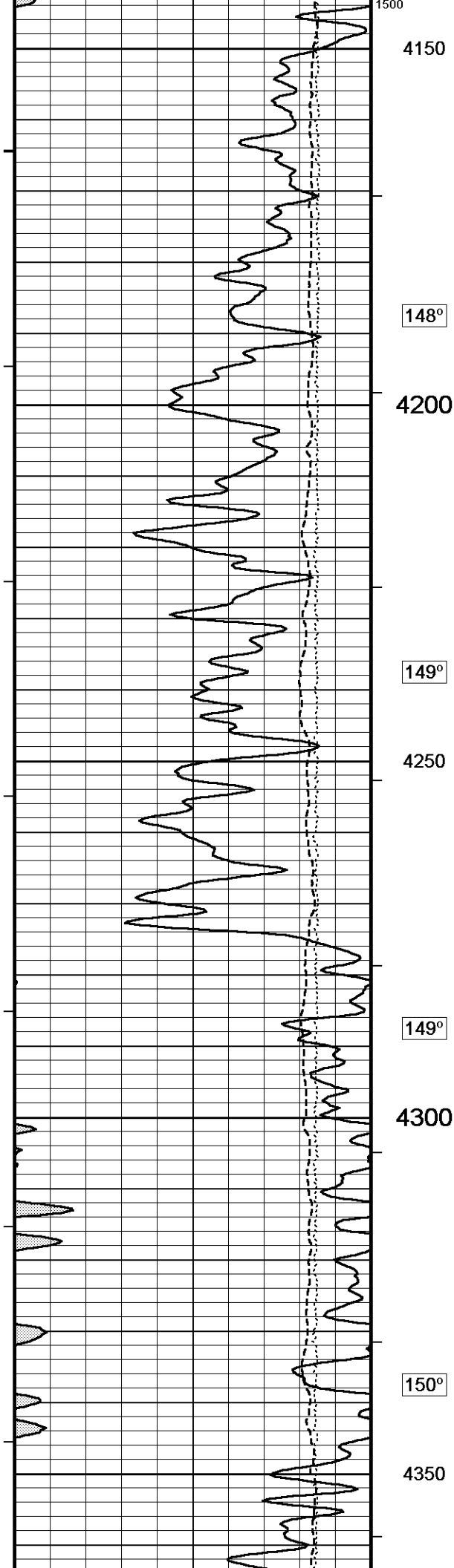
Shallow Fm

800

Spontaneous Potential

Gamma Ray

DST Uphole Tension

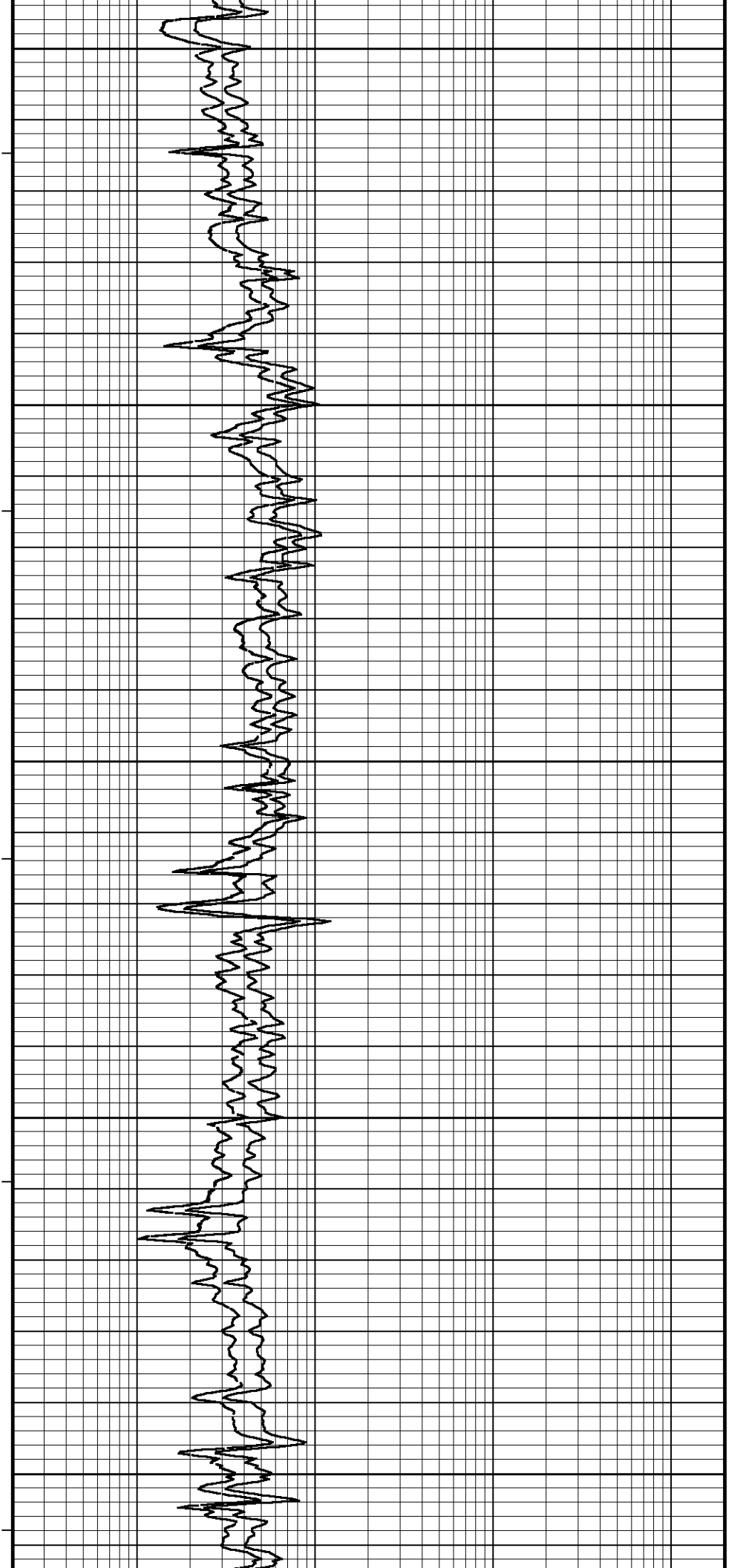


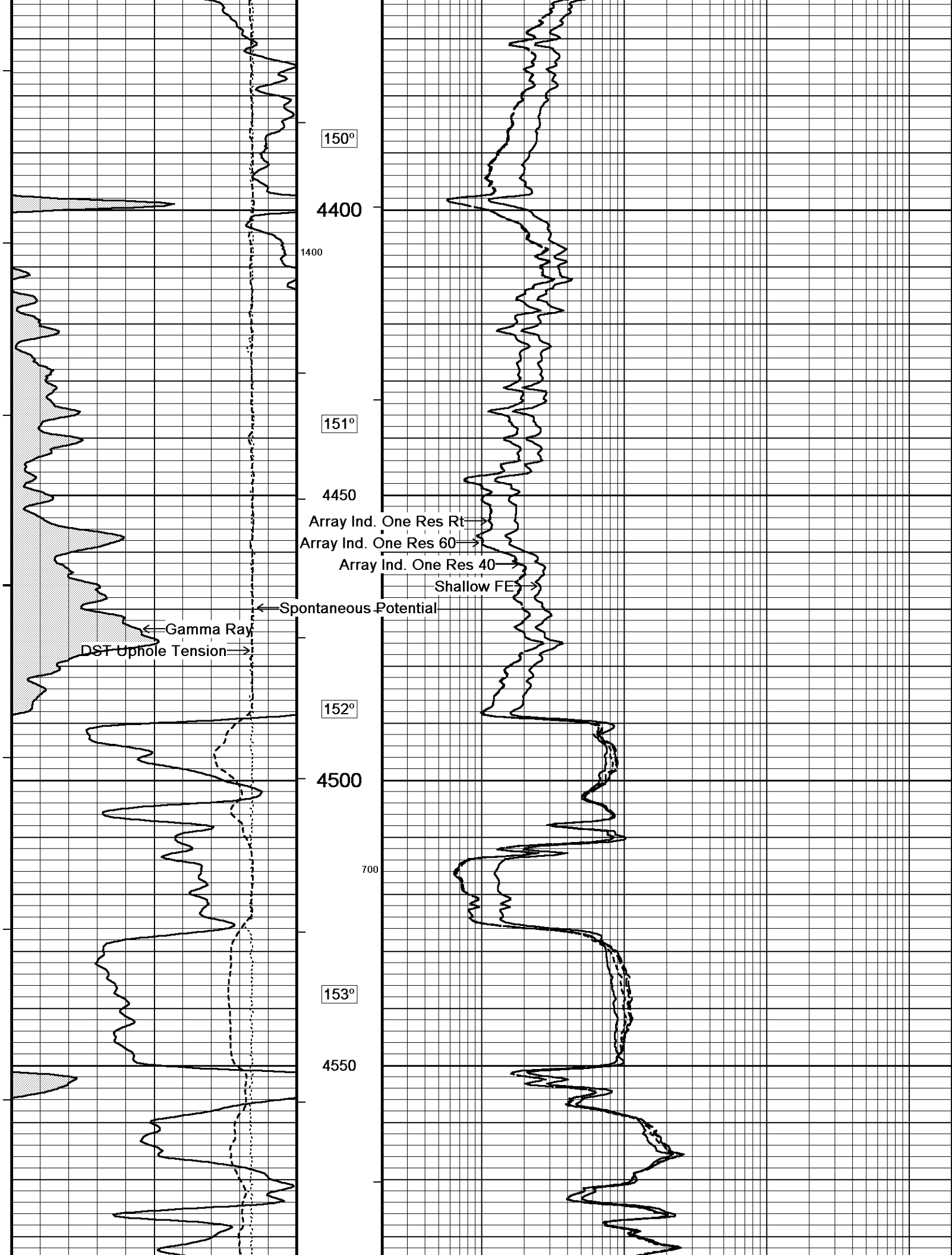
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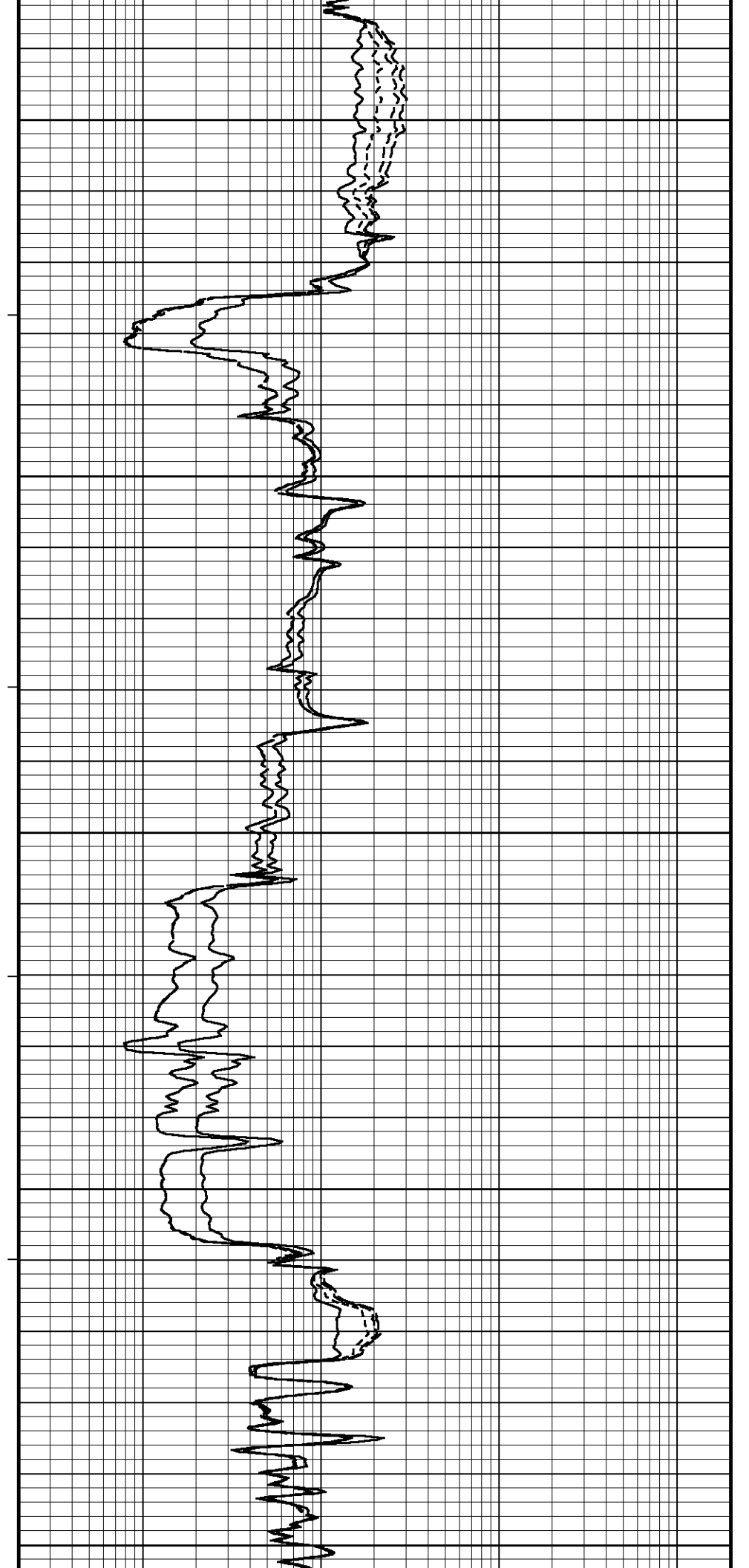
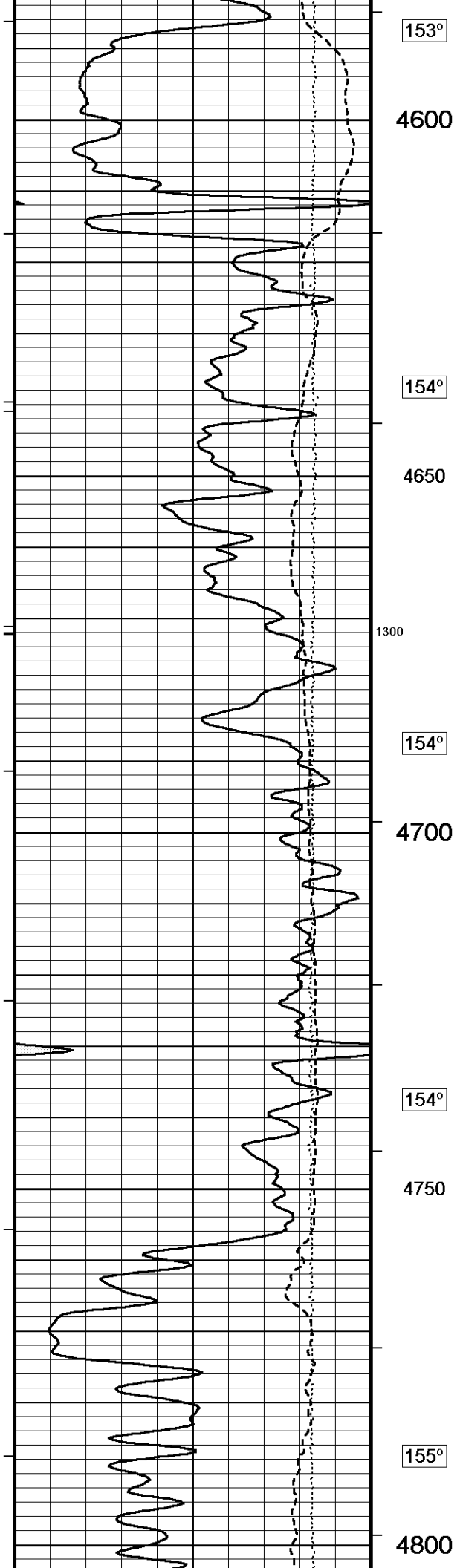
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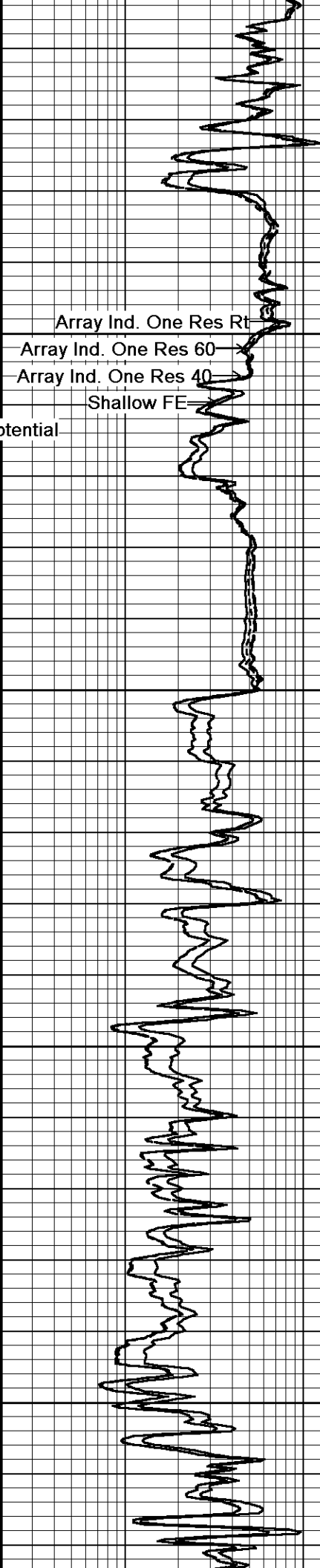
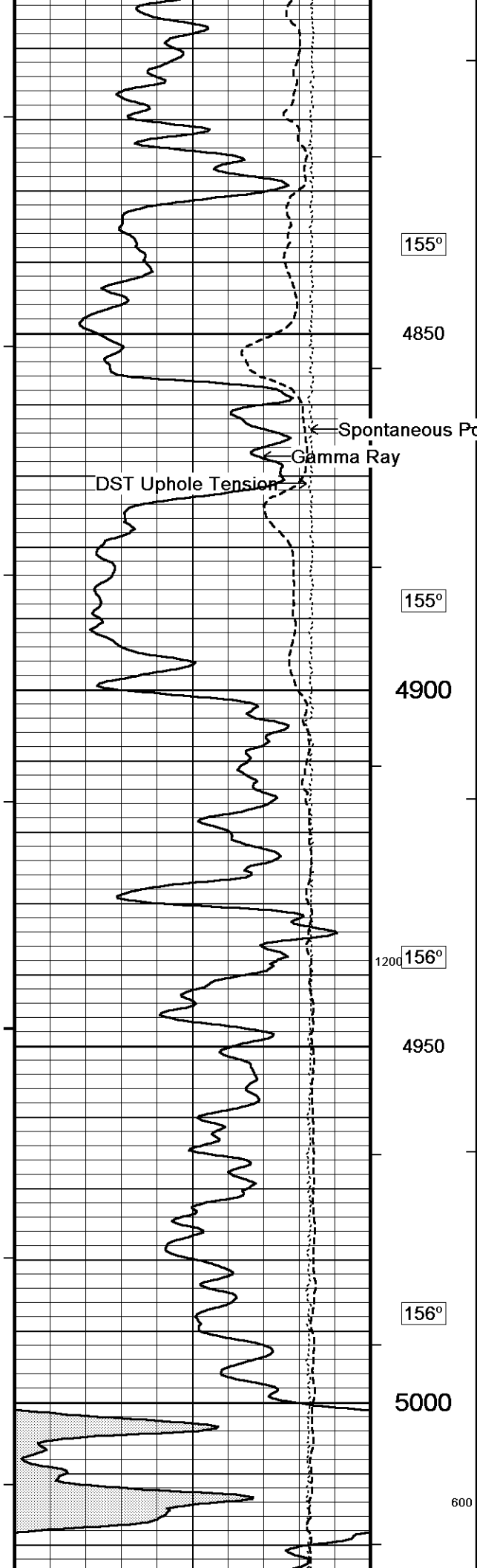
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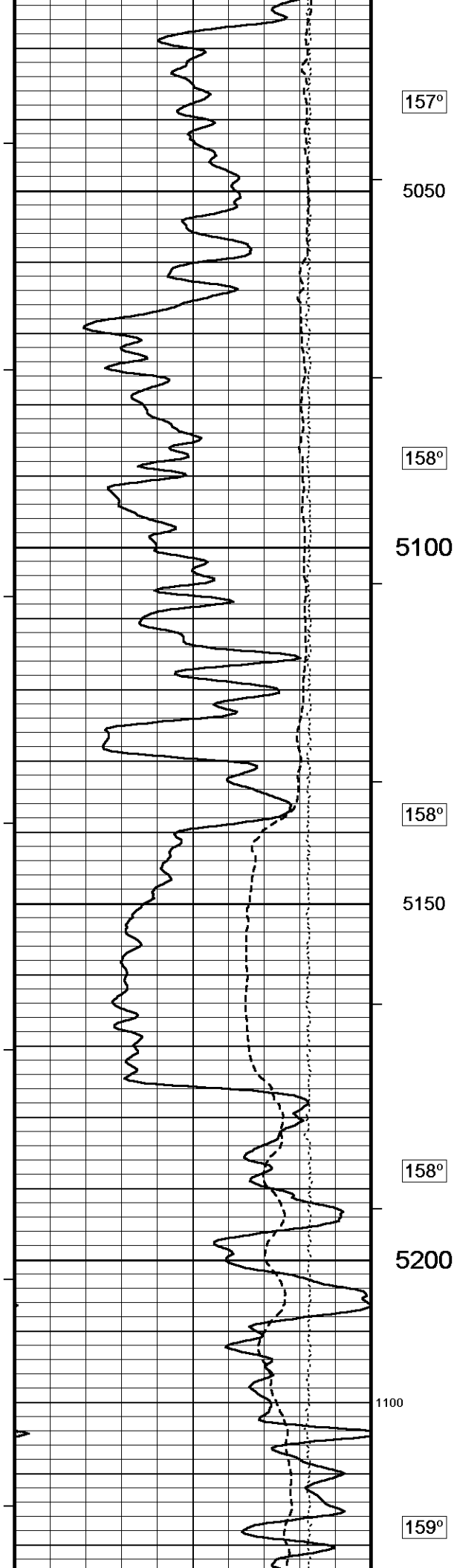
150°











157°

5050

158°

5100

158°

5150

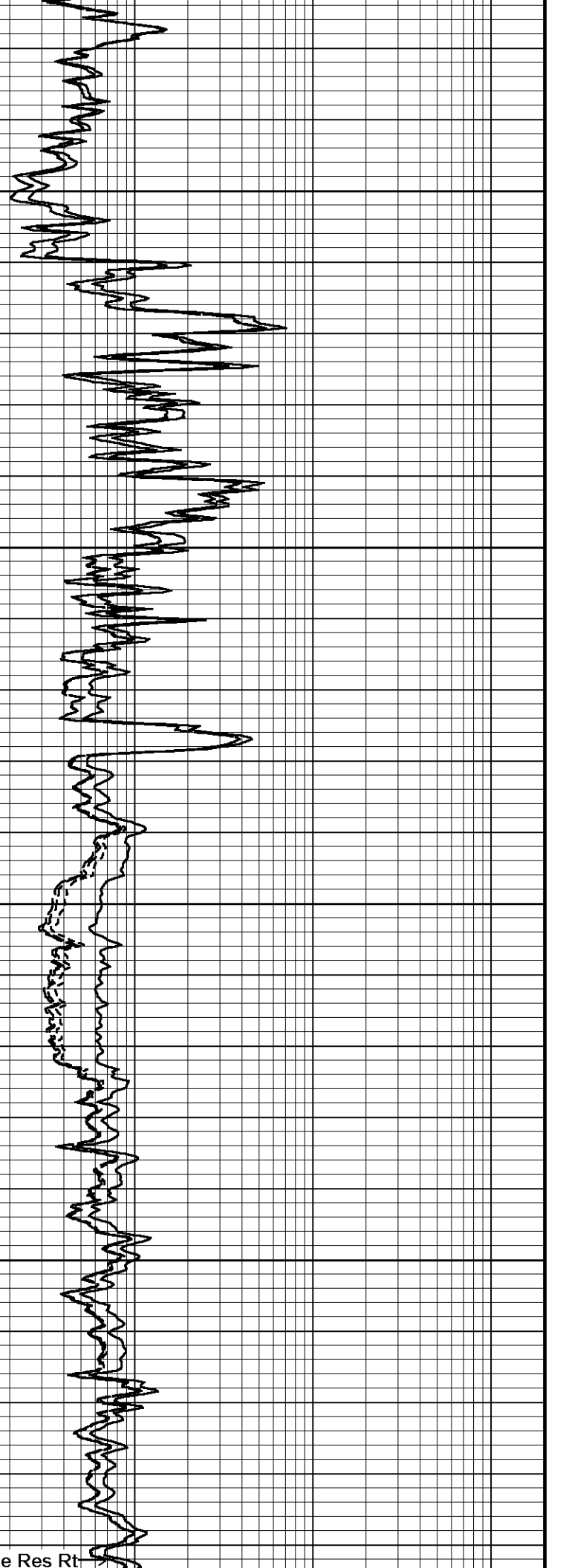
158°

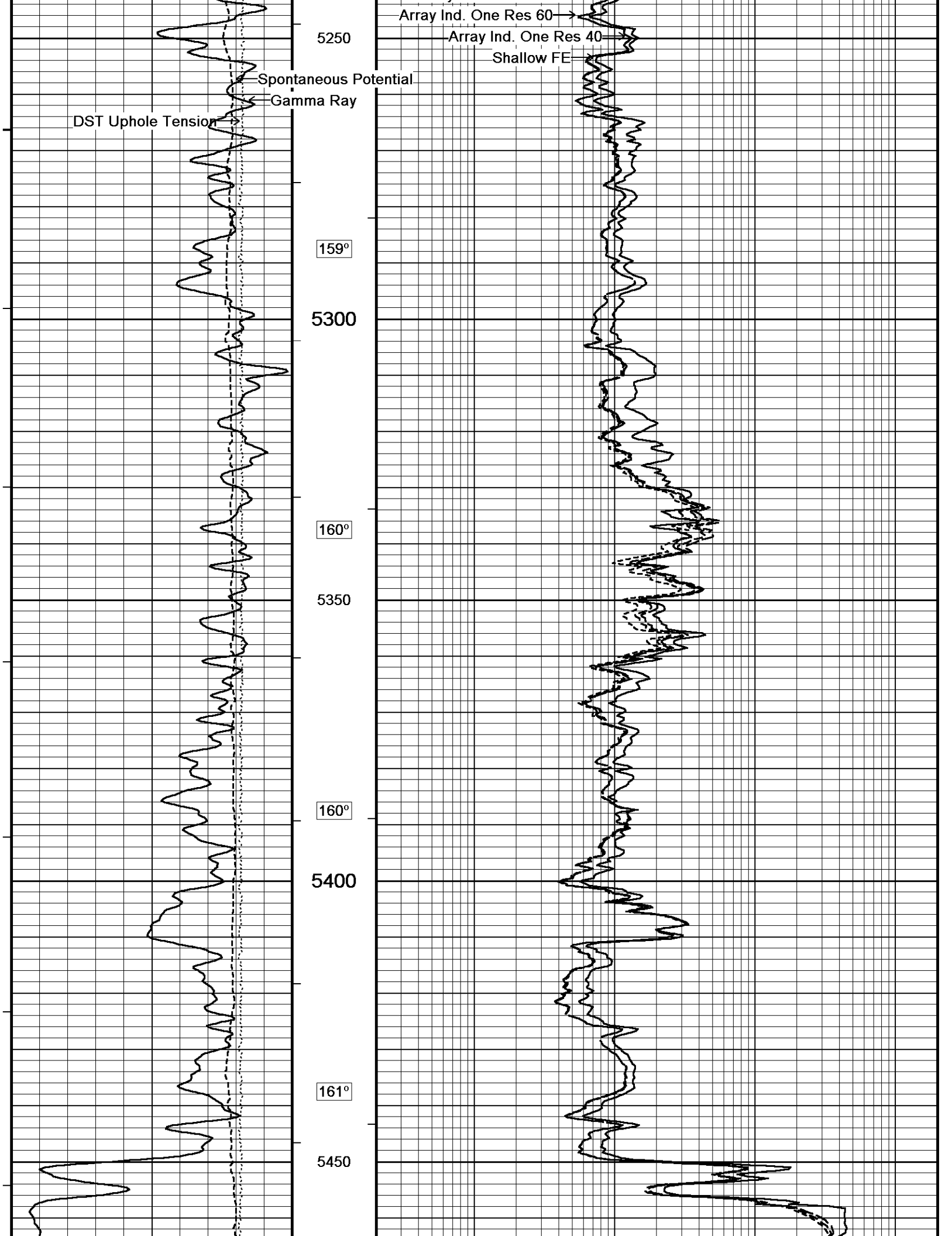
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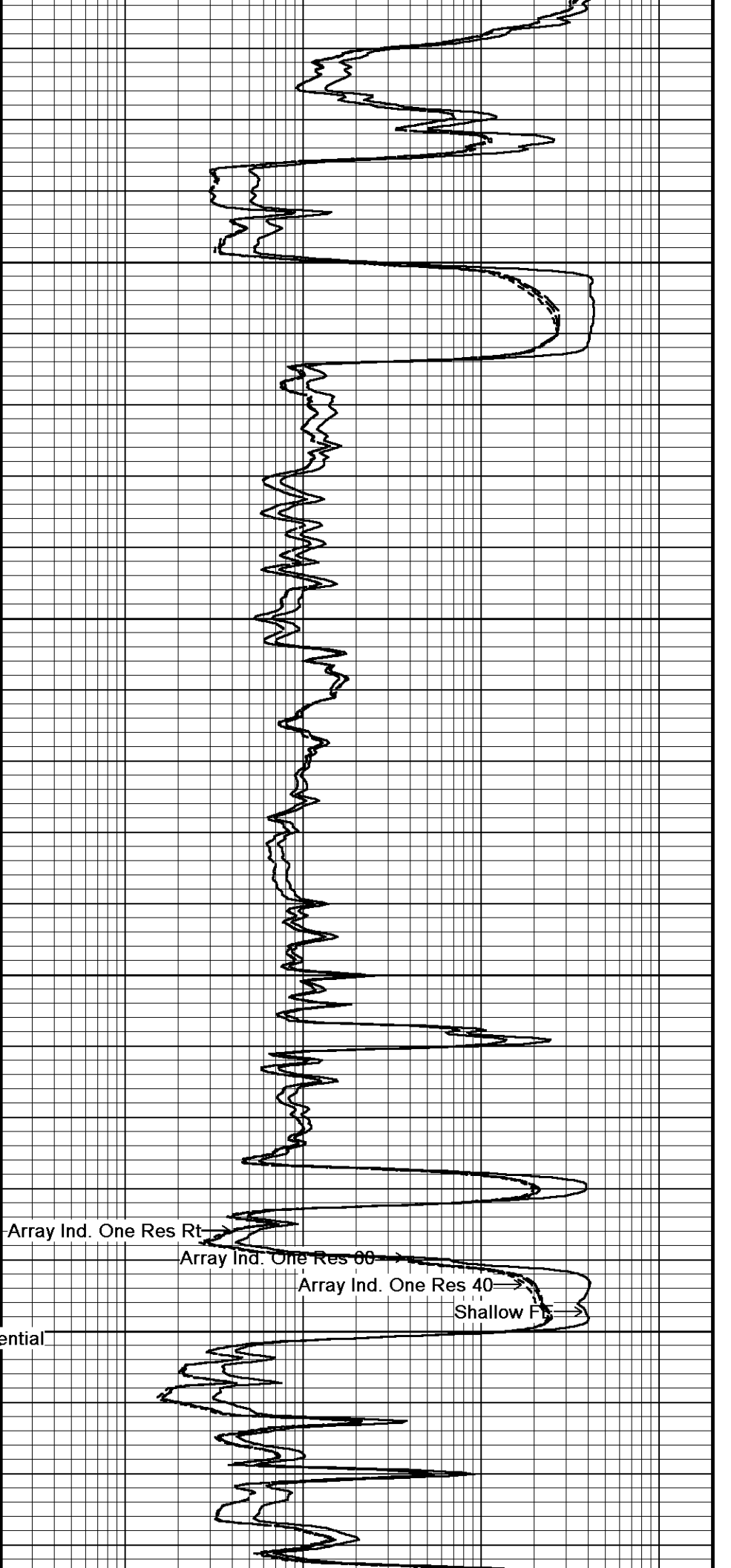
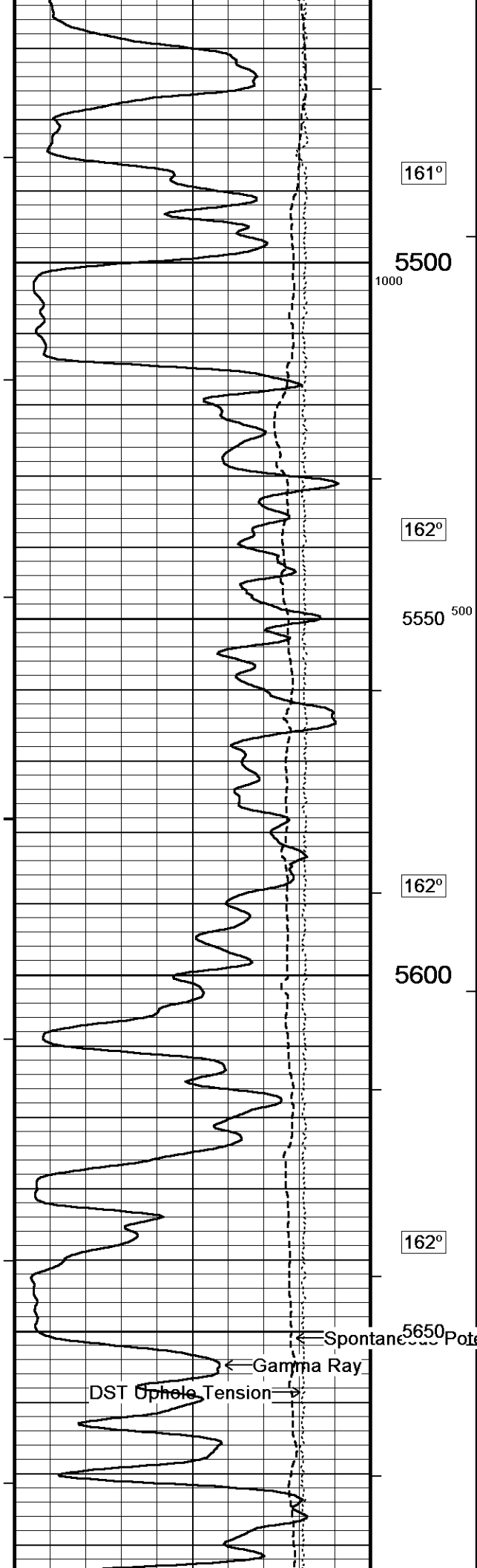
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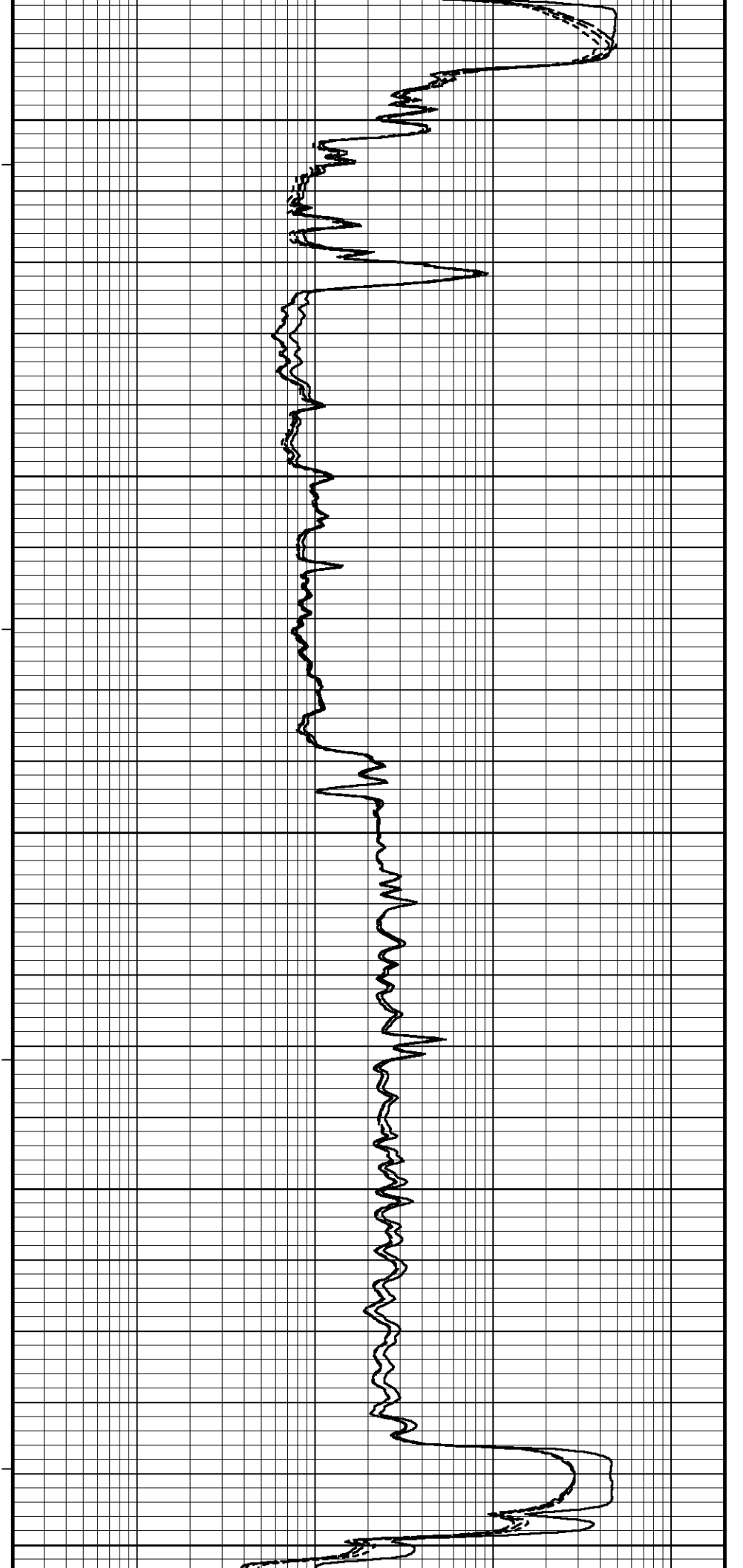
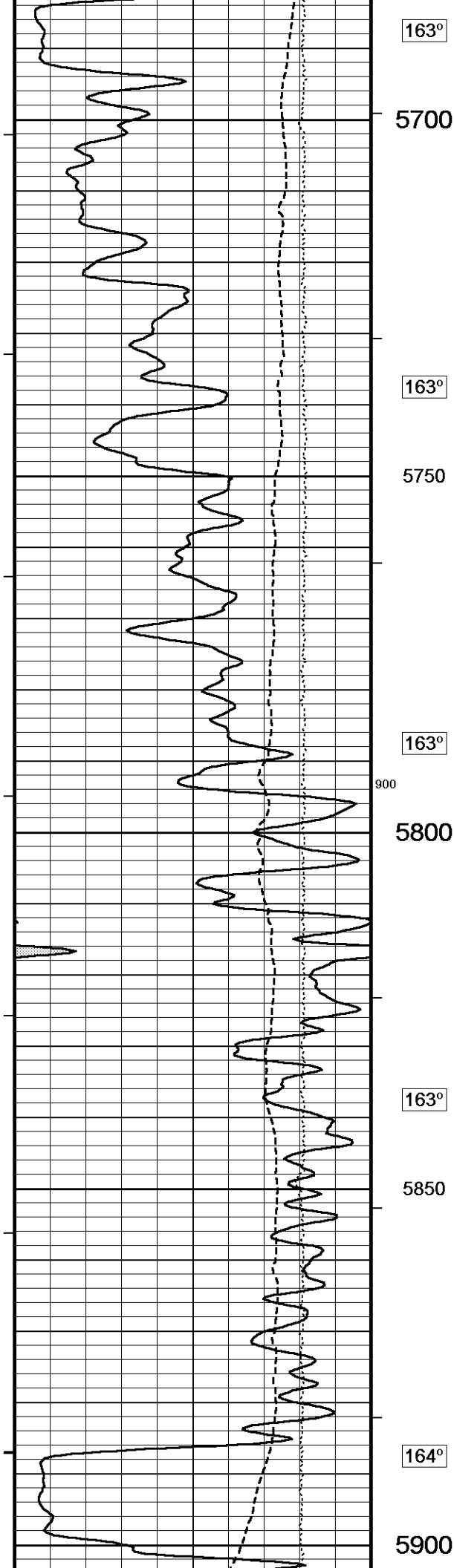
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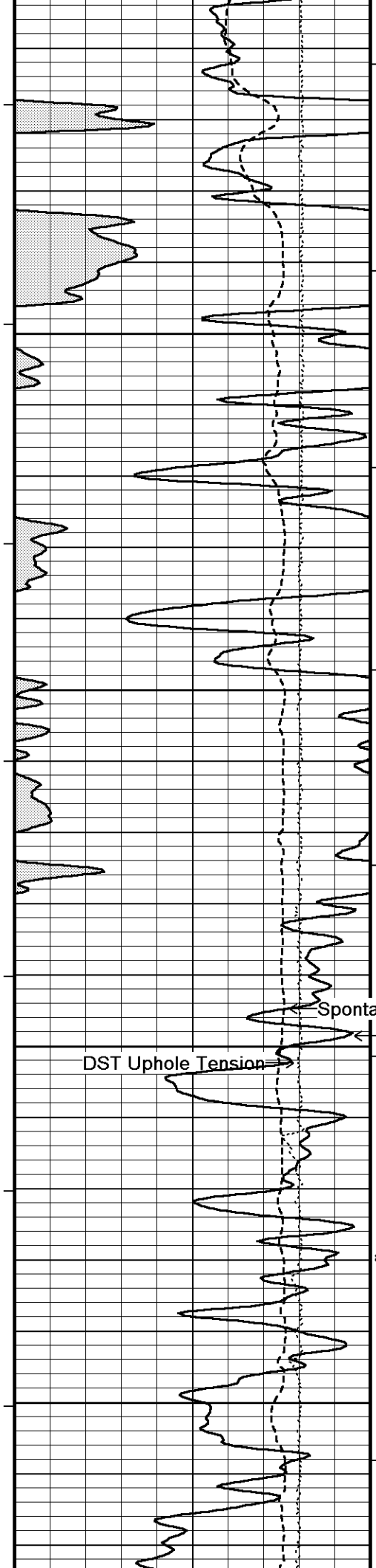
Array Ind. One Res Rt











163°

5950

164°

6000

Array Ind. One Res Rt

Array Ind. One Res 60

164° Array Ind. One Res 40

Shallow FE

Spontaneous Potential

Gamma Ray

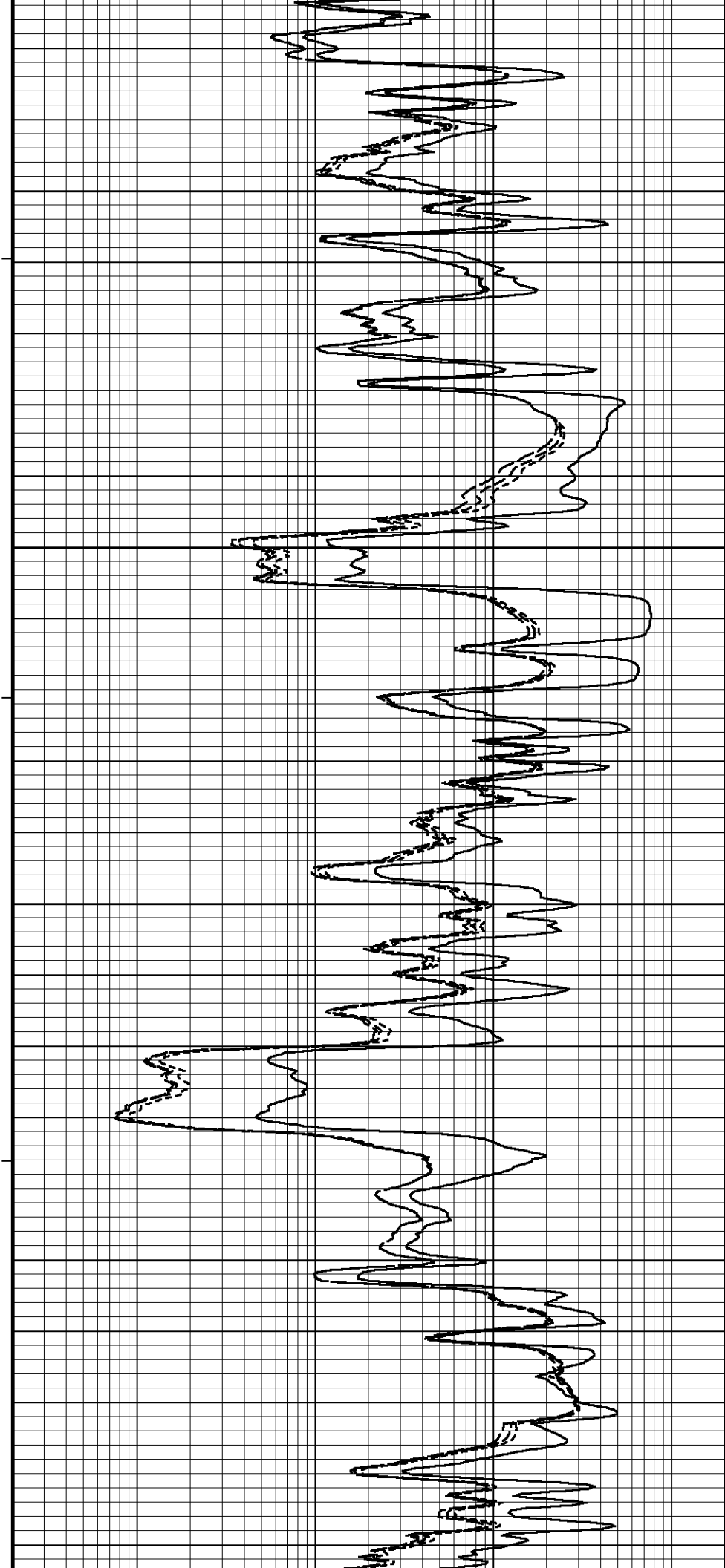
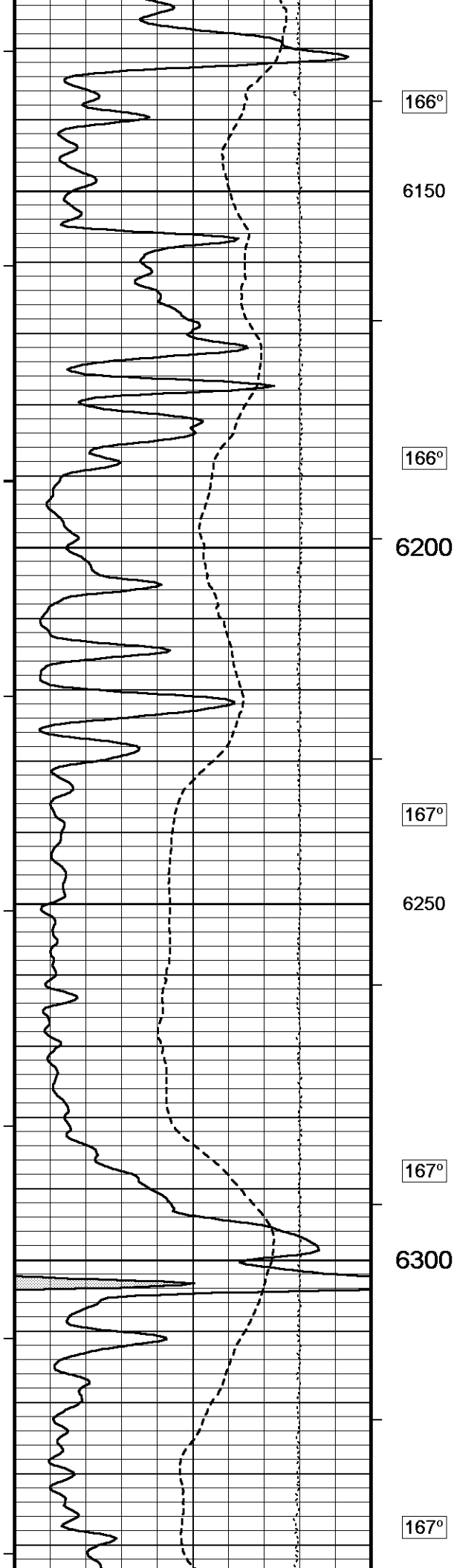
DST Uphole Tension

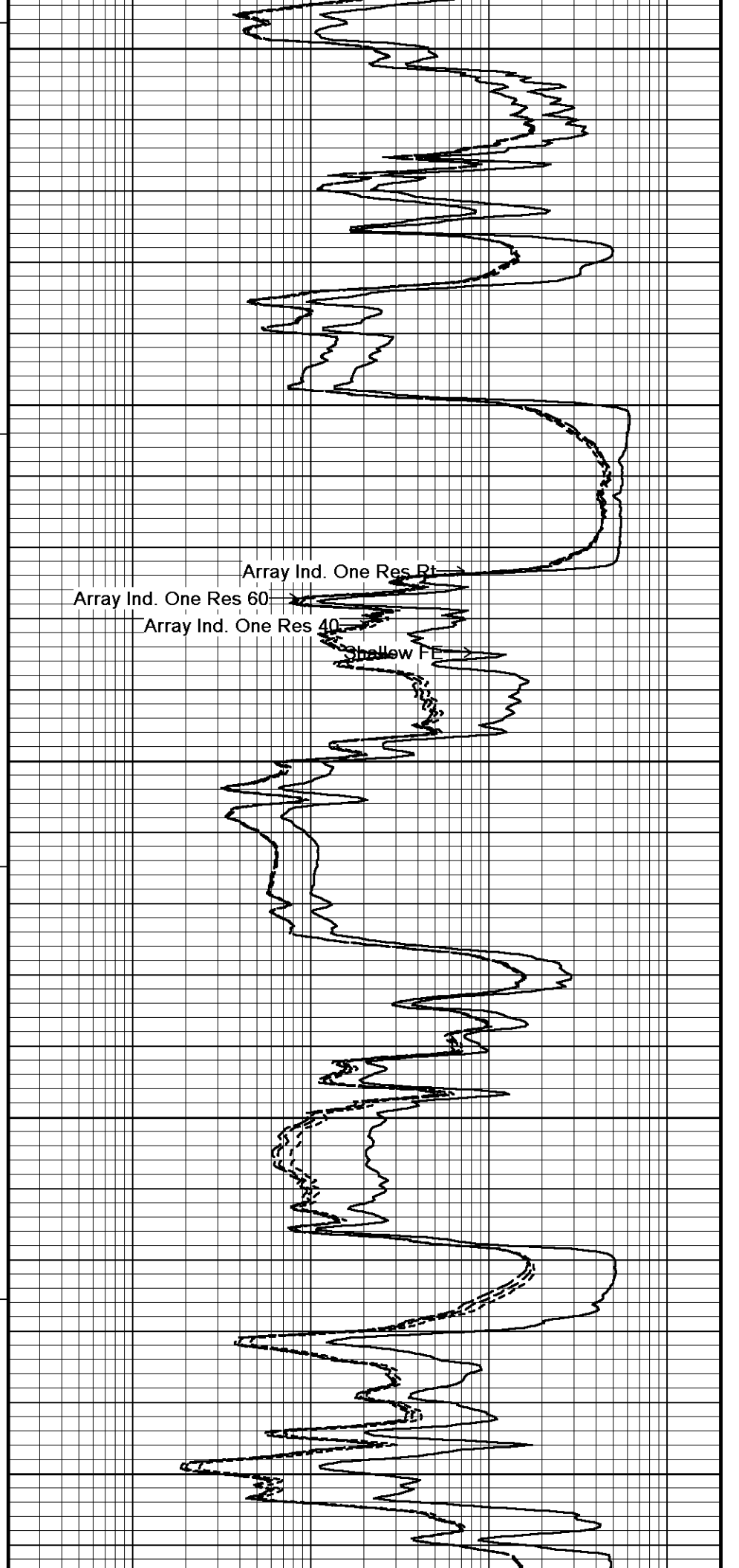
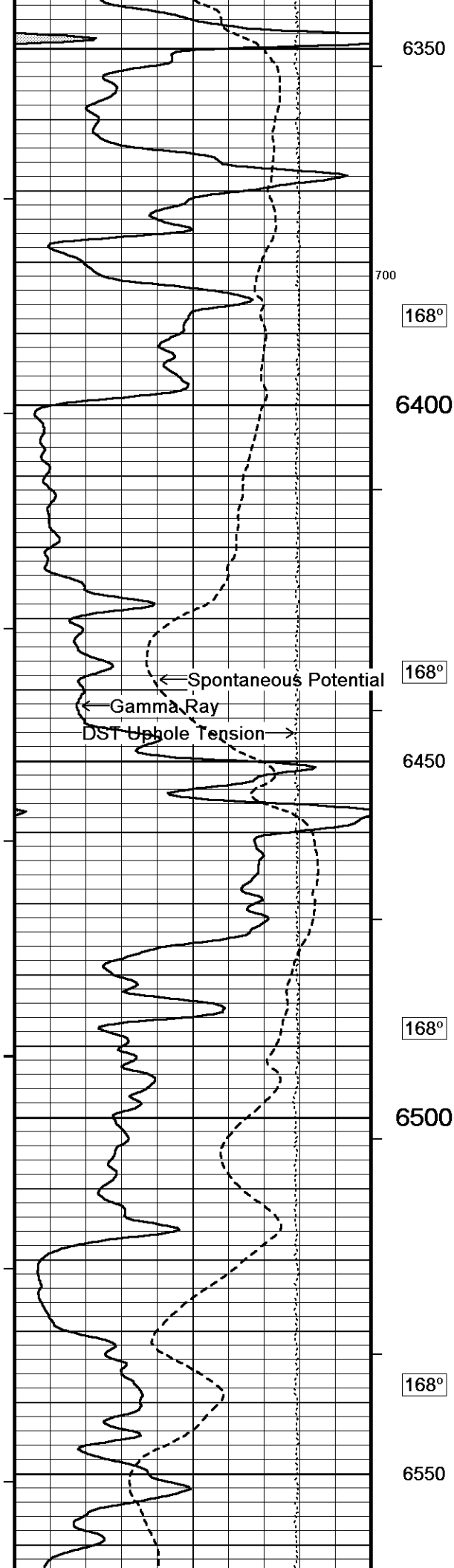
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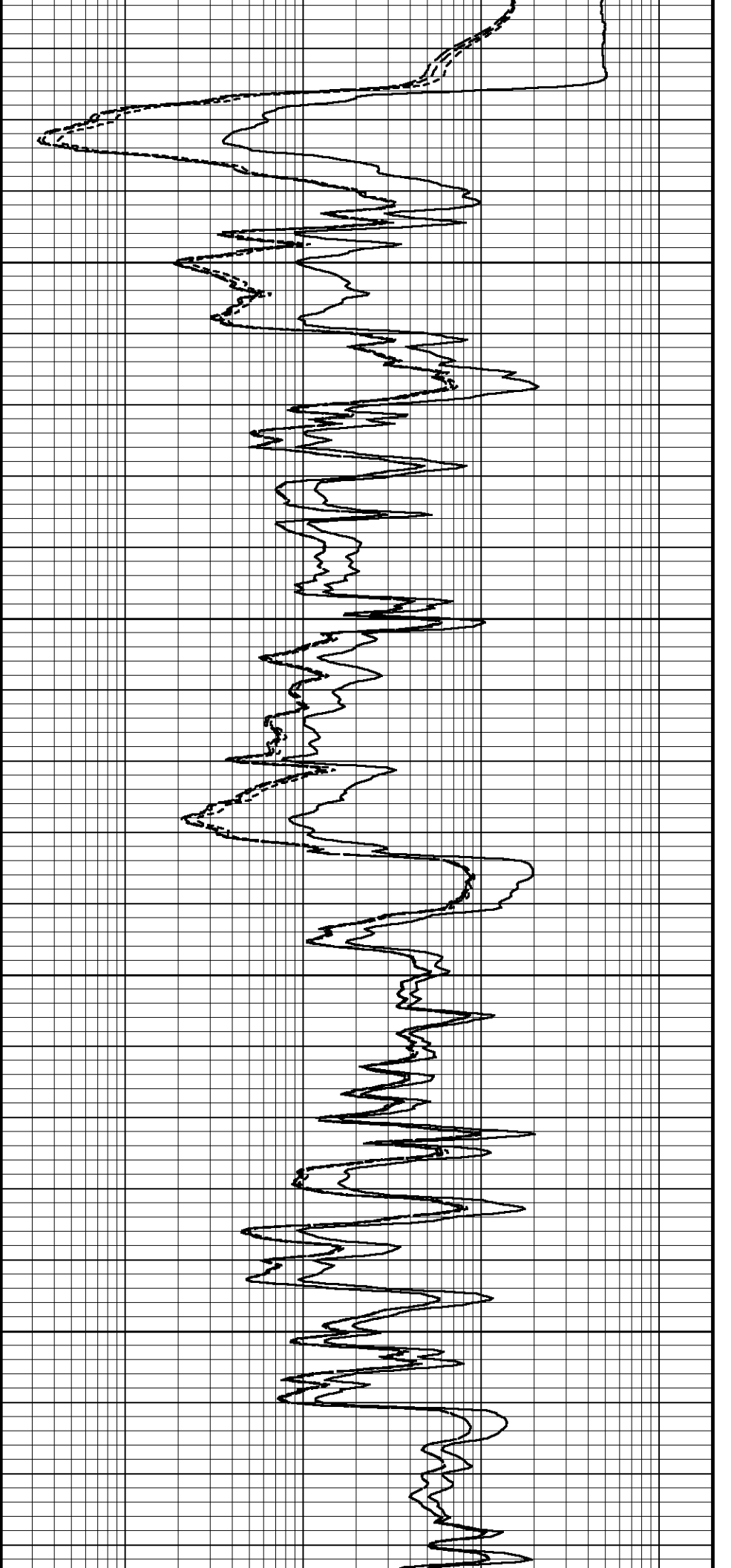
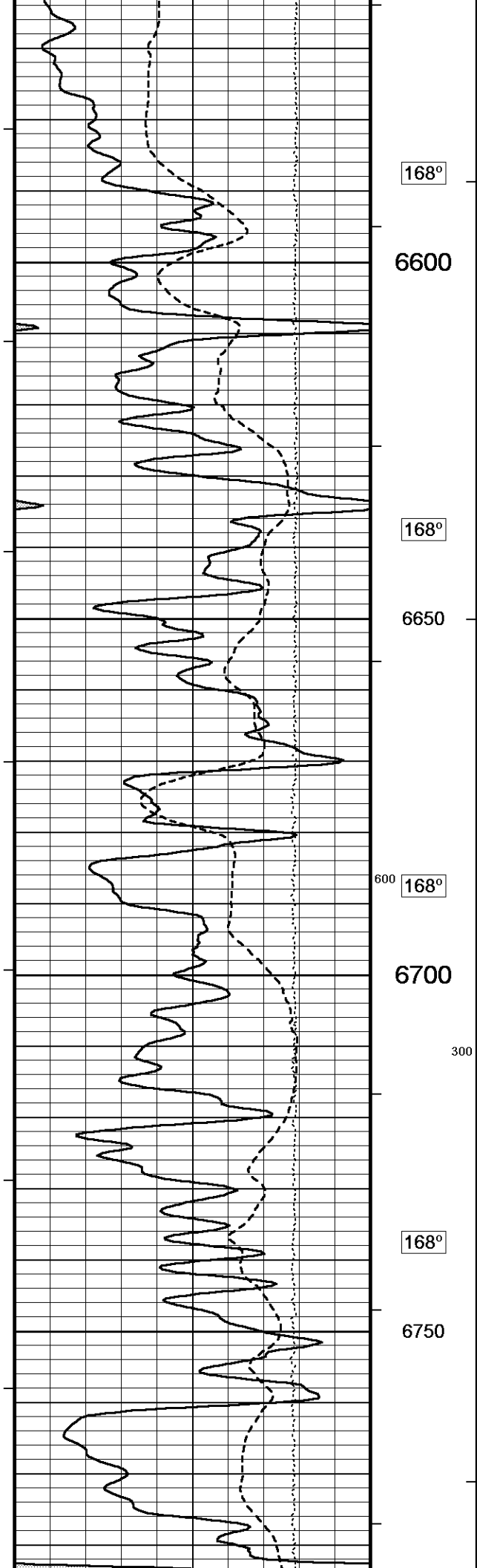
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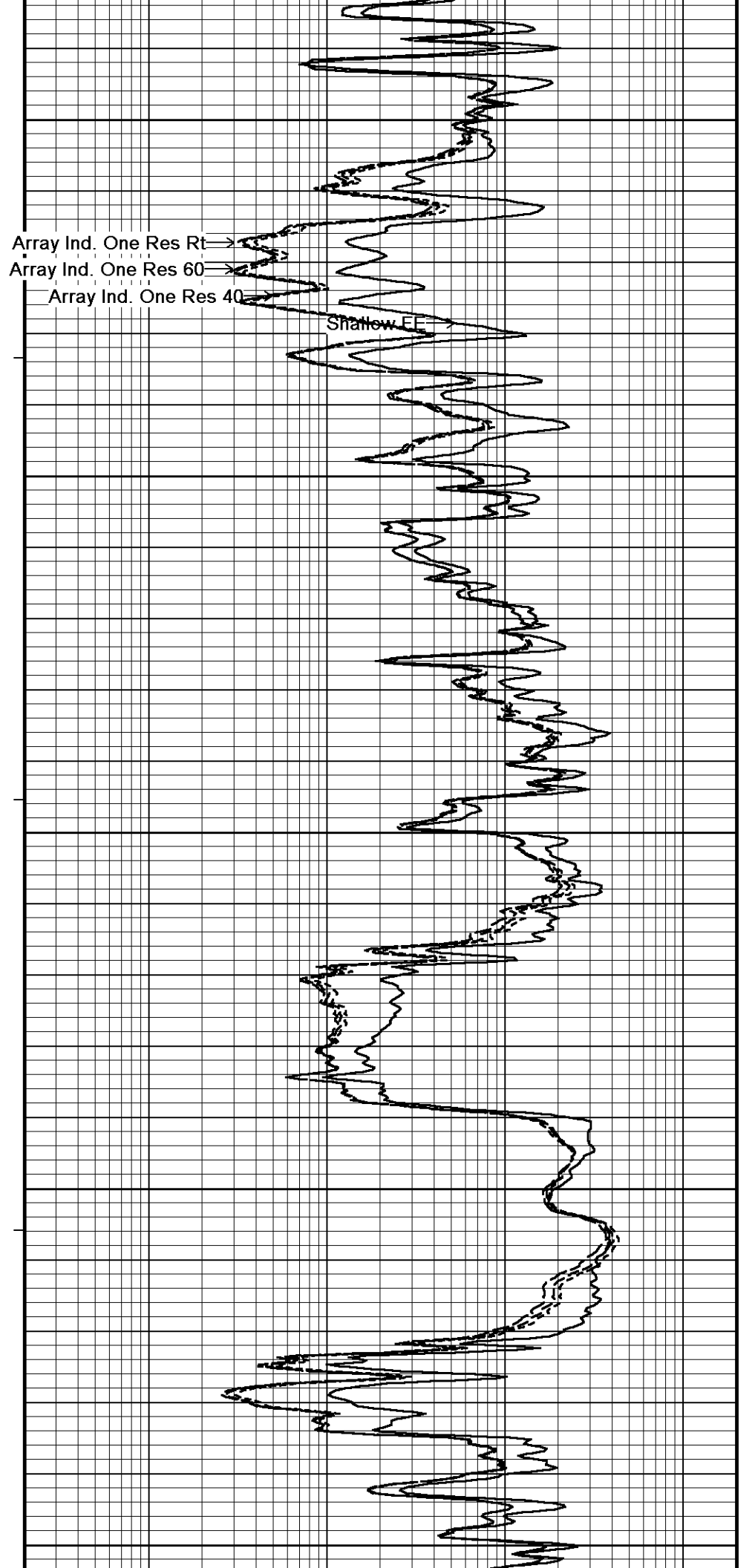
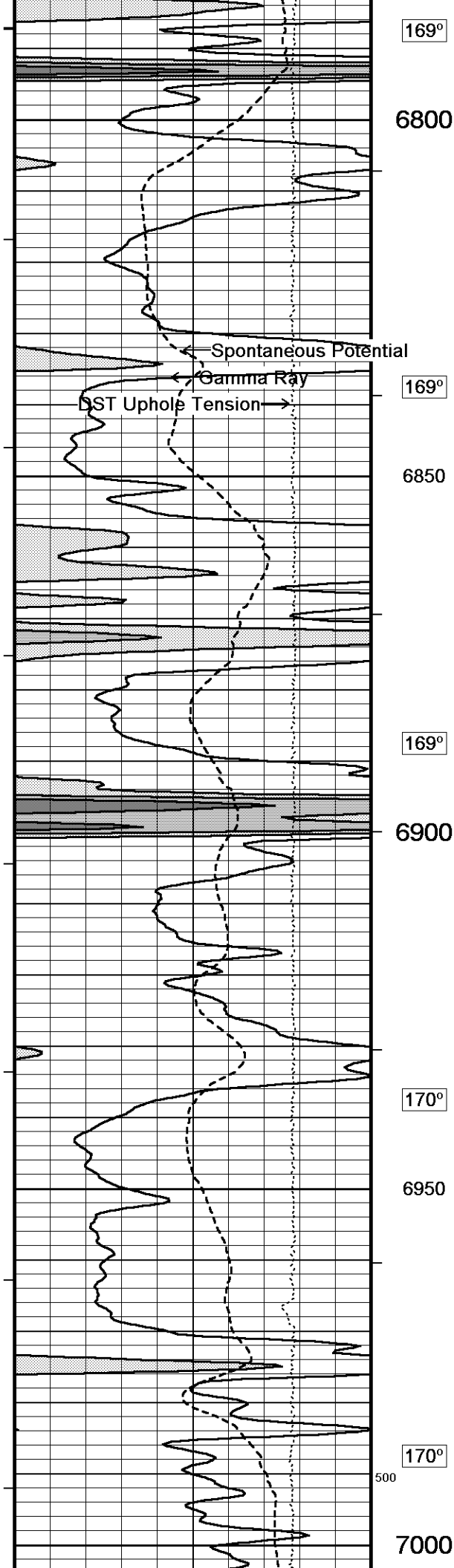
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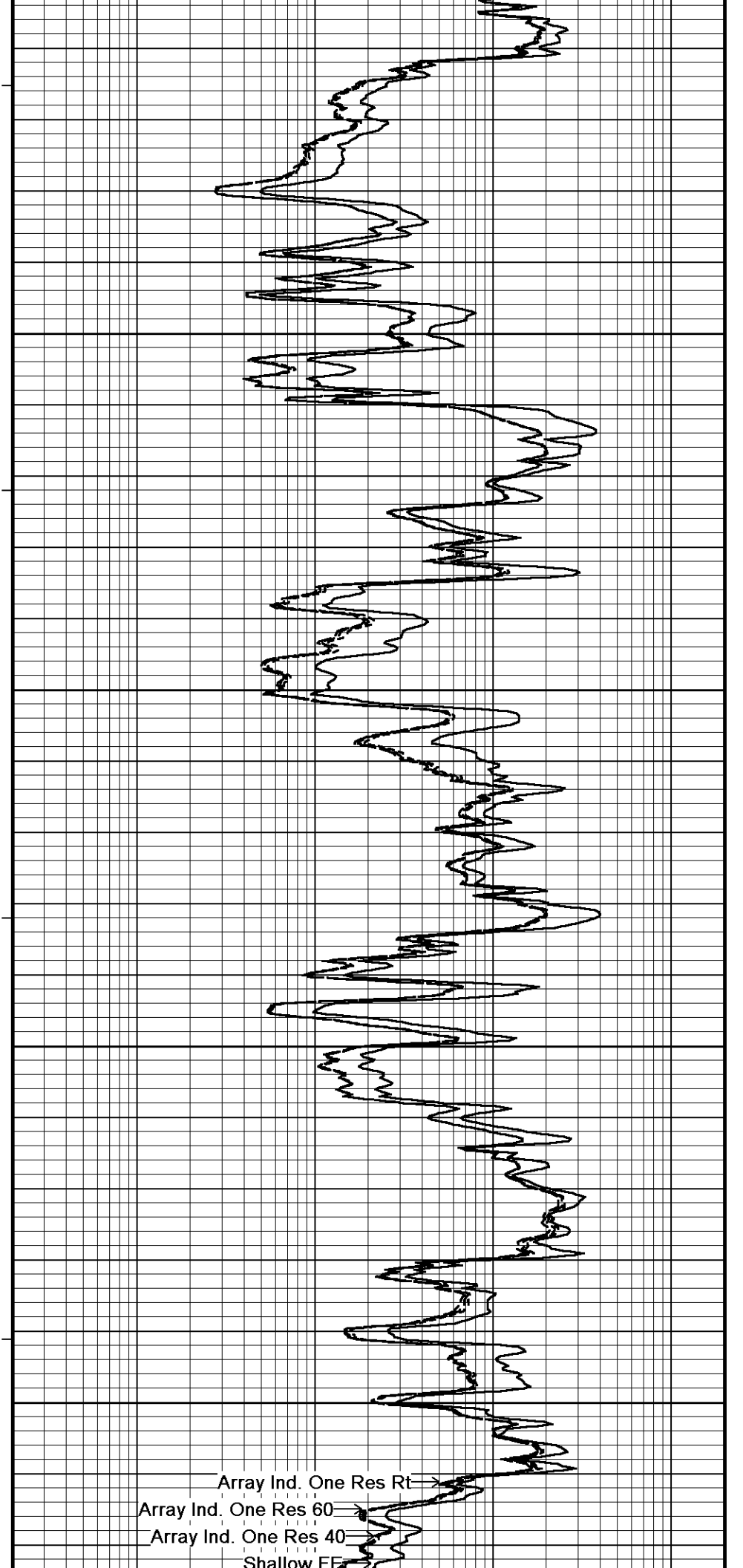
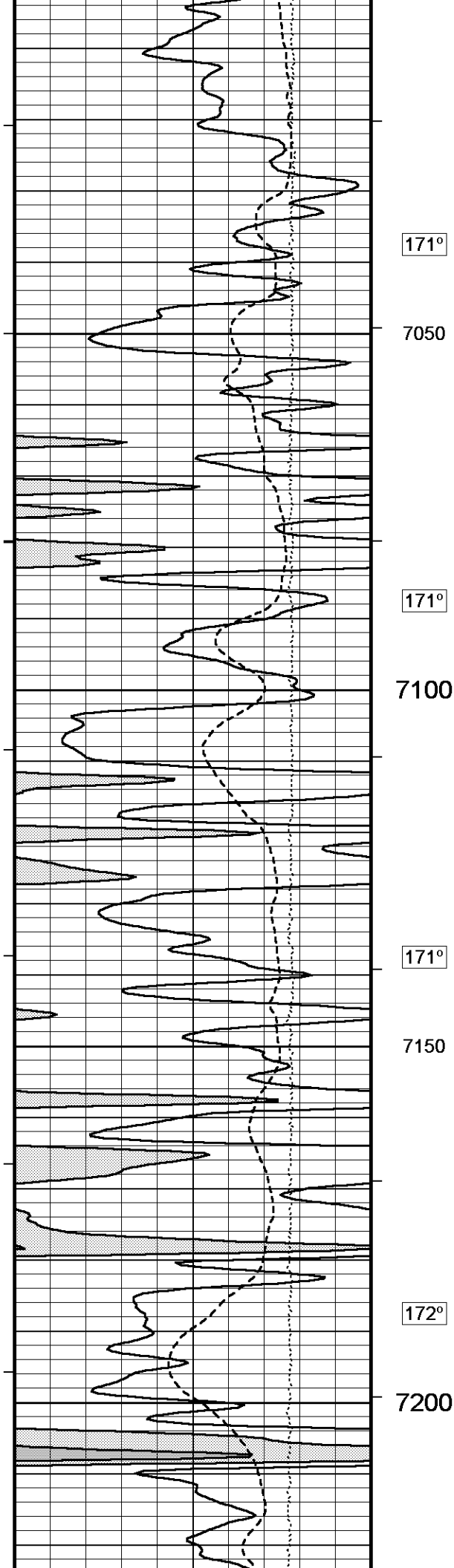
400



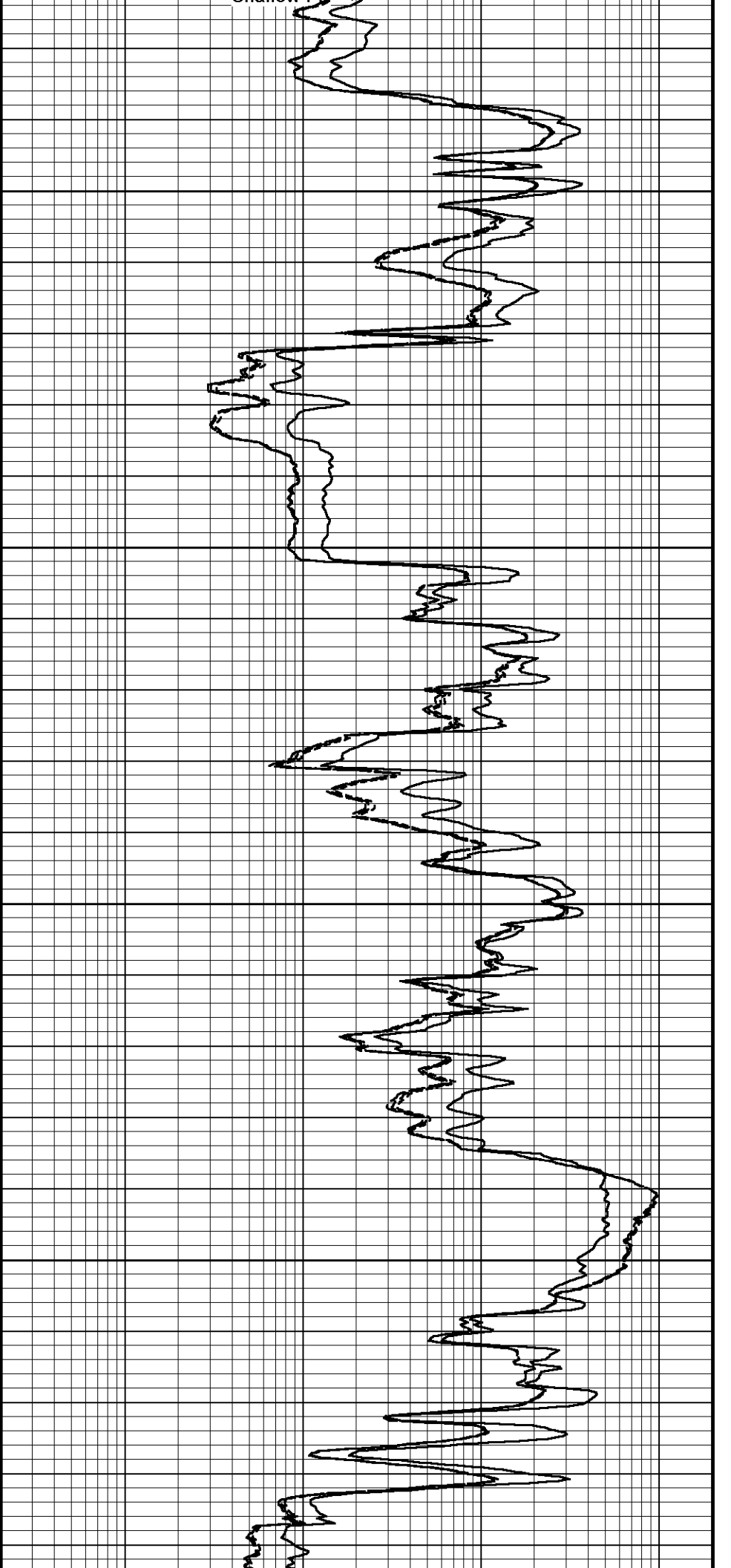
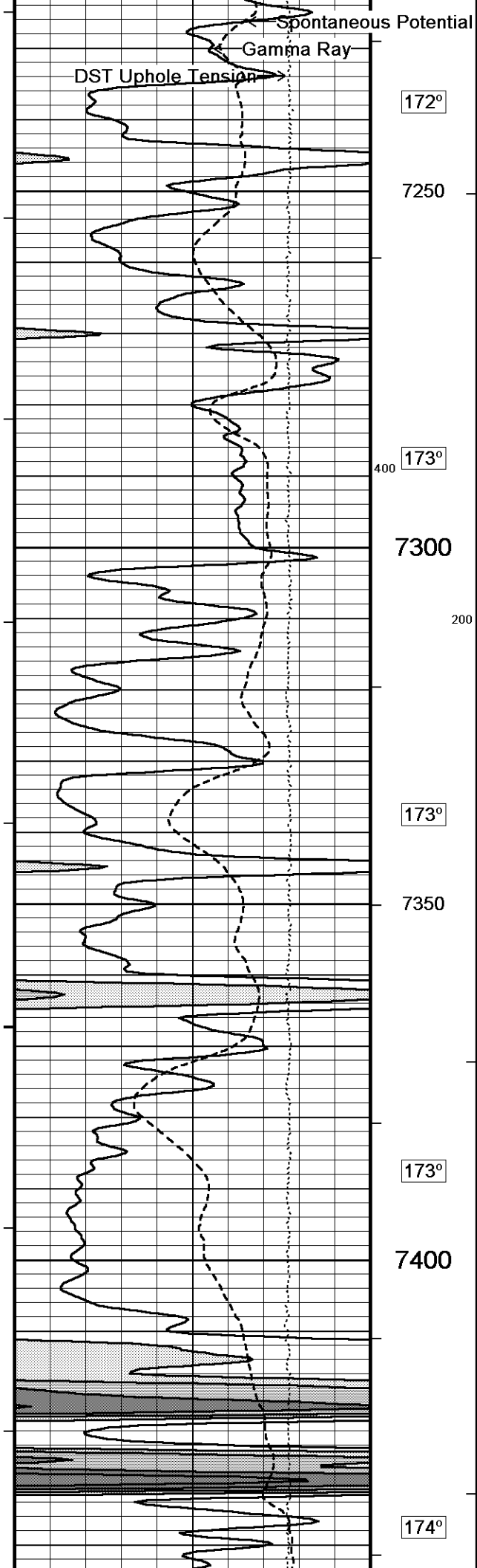


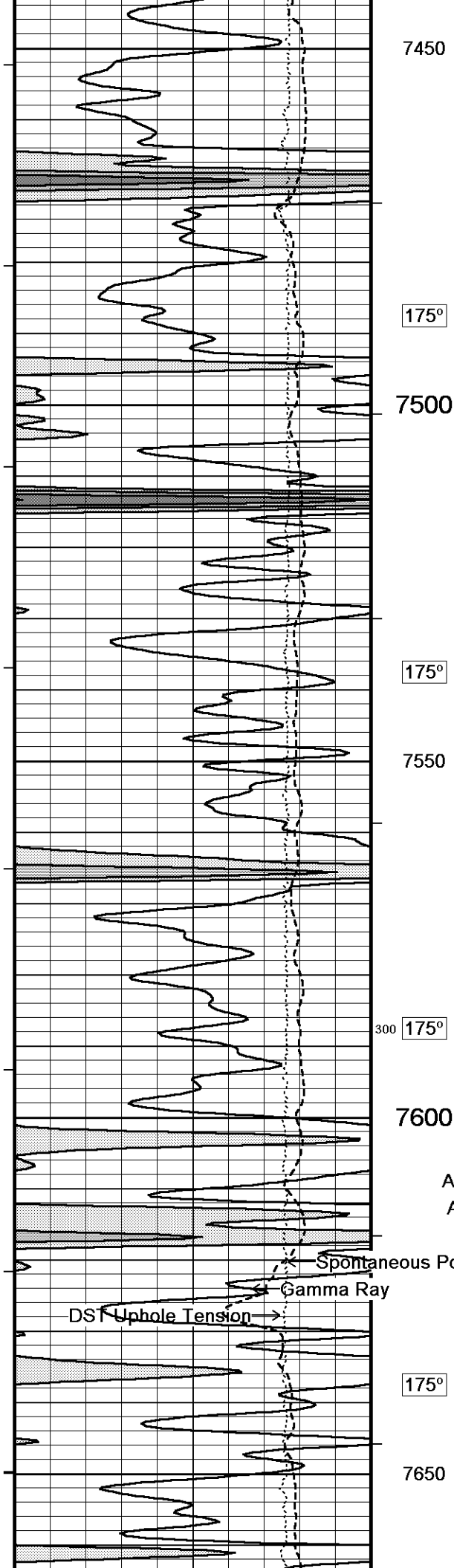






Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FF





7450

175°

7500

175°

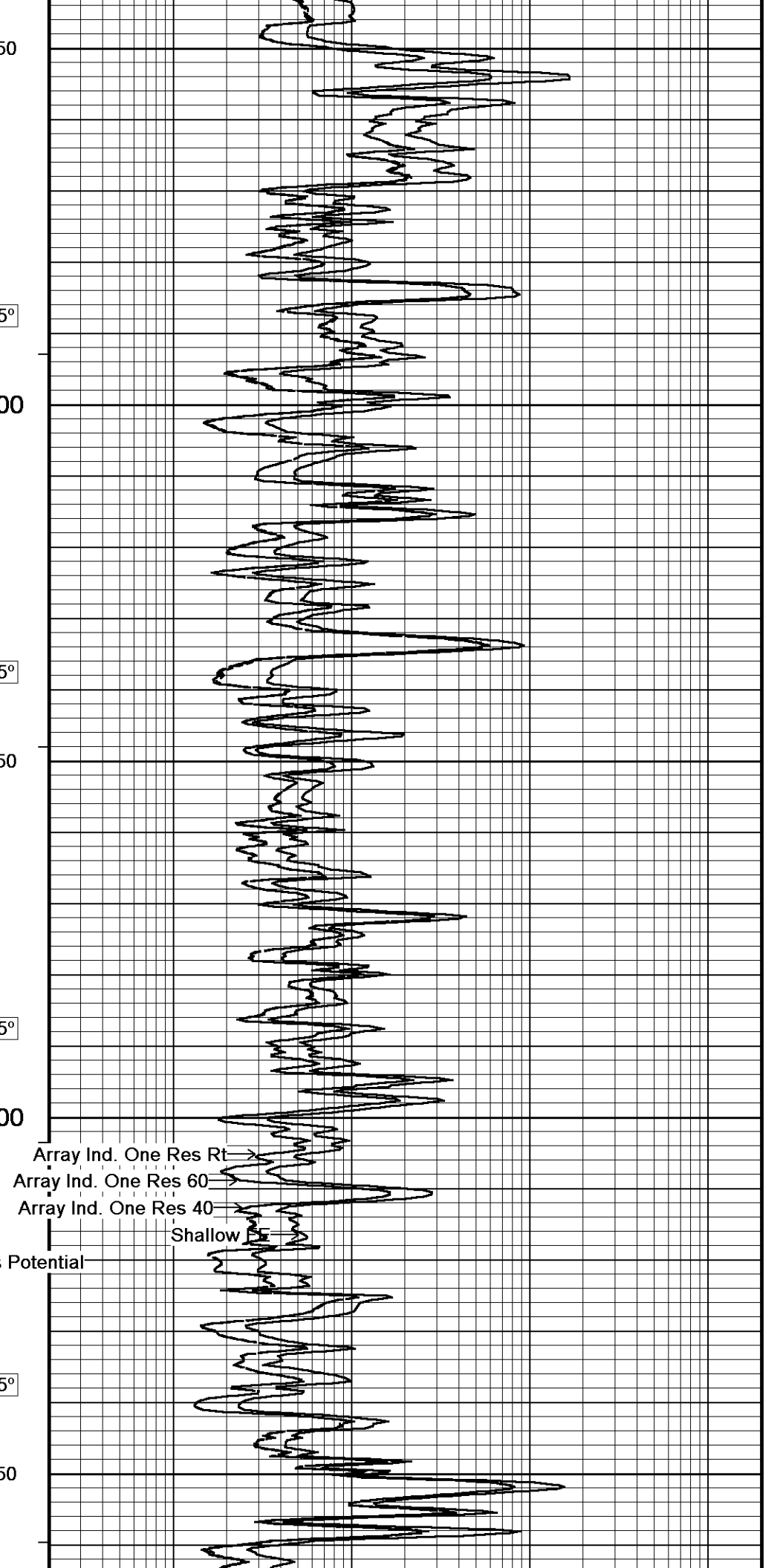
7550

300 175°

7600

175°

7650

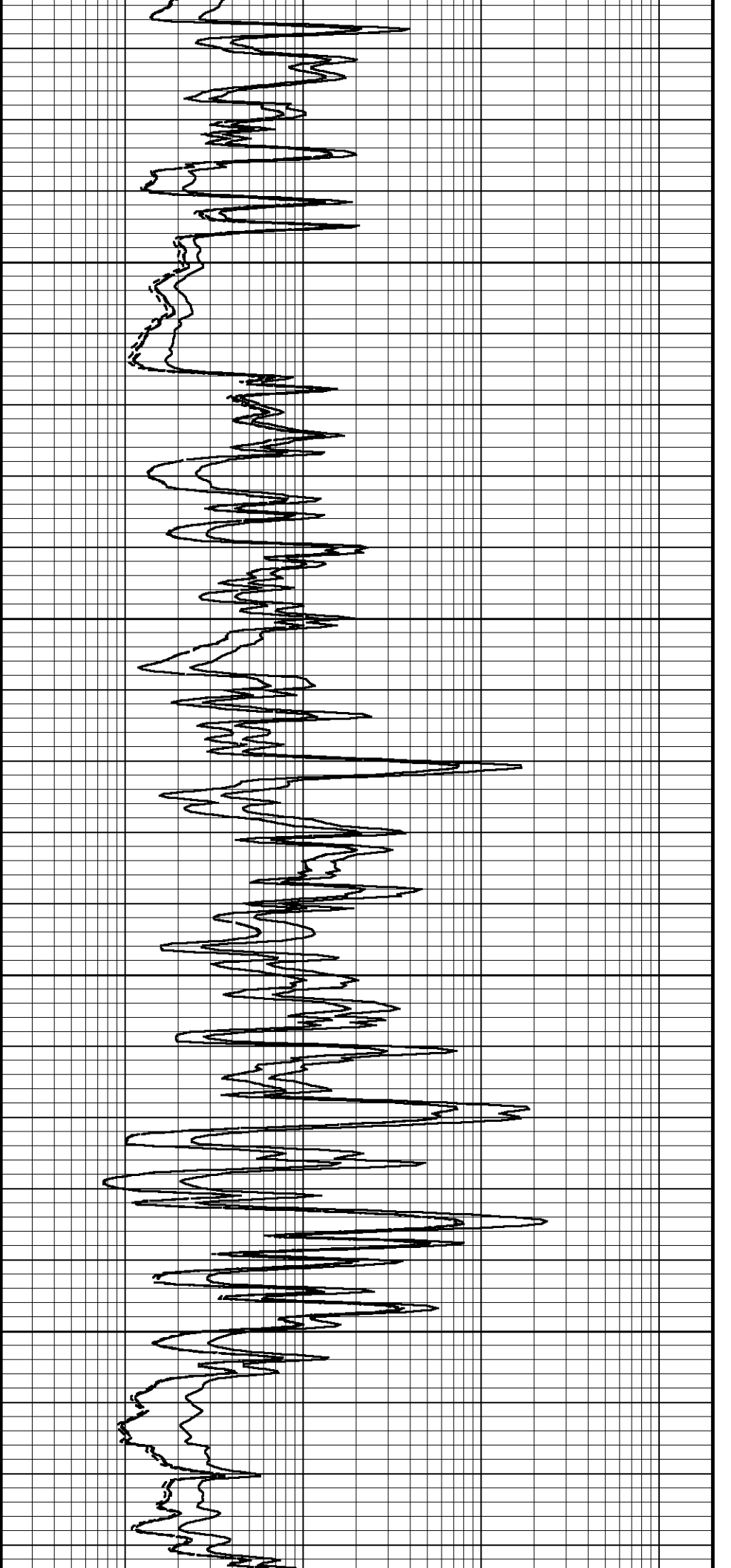
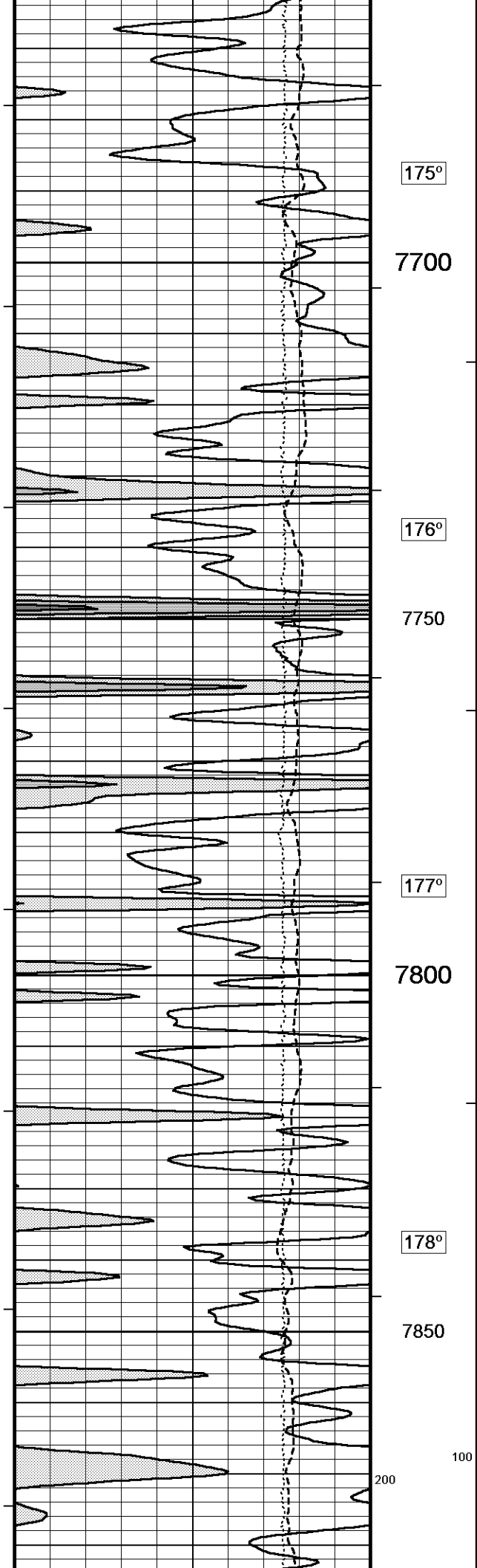


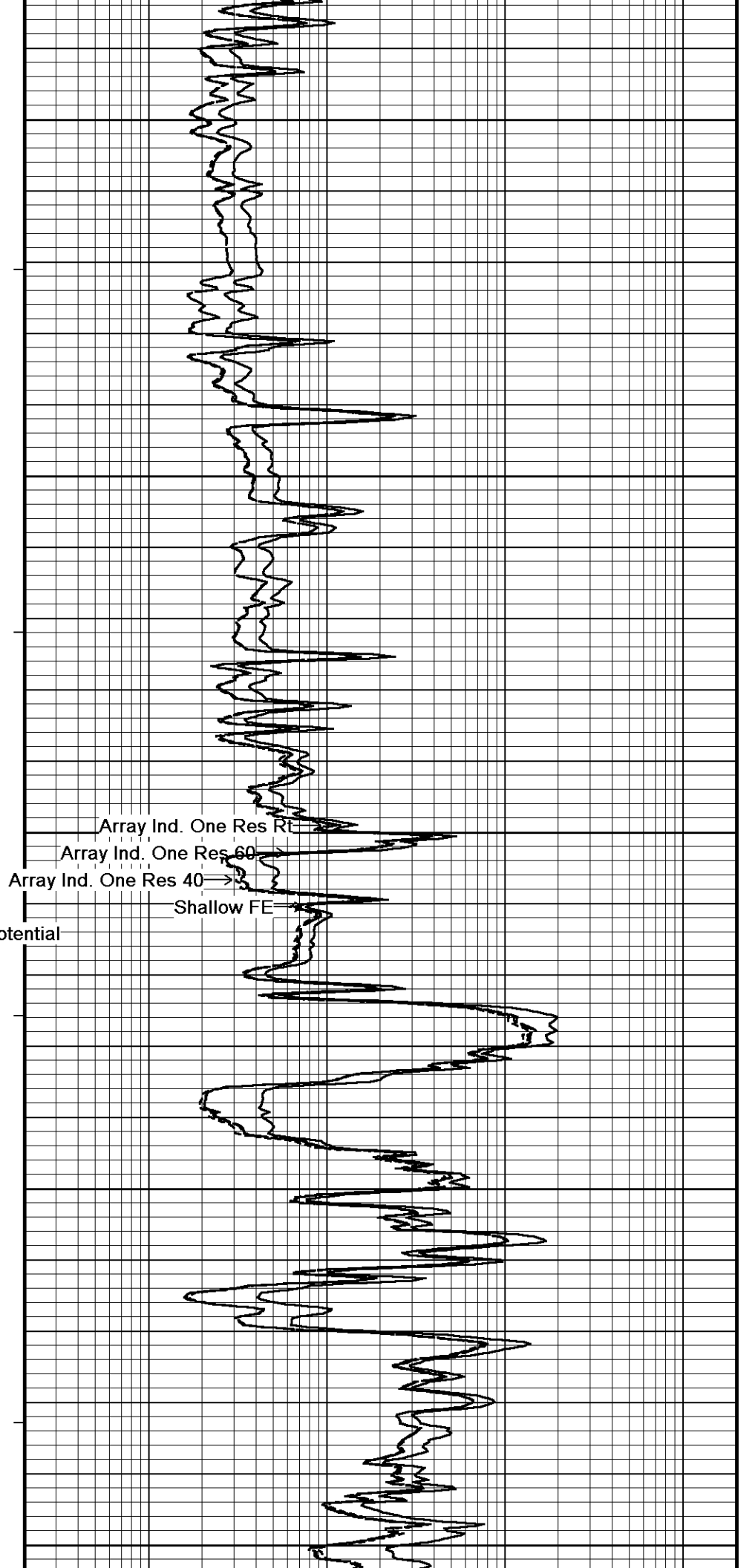
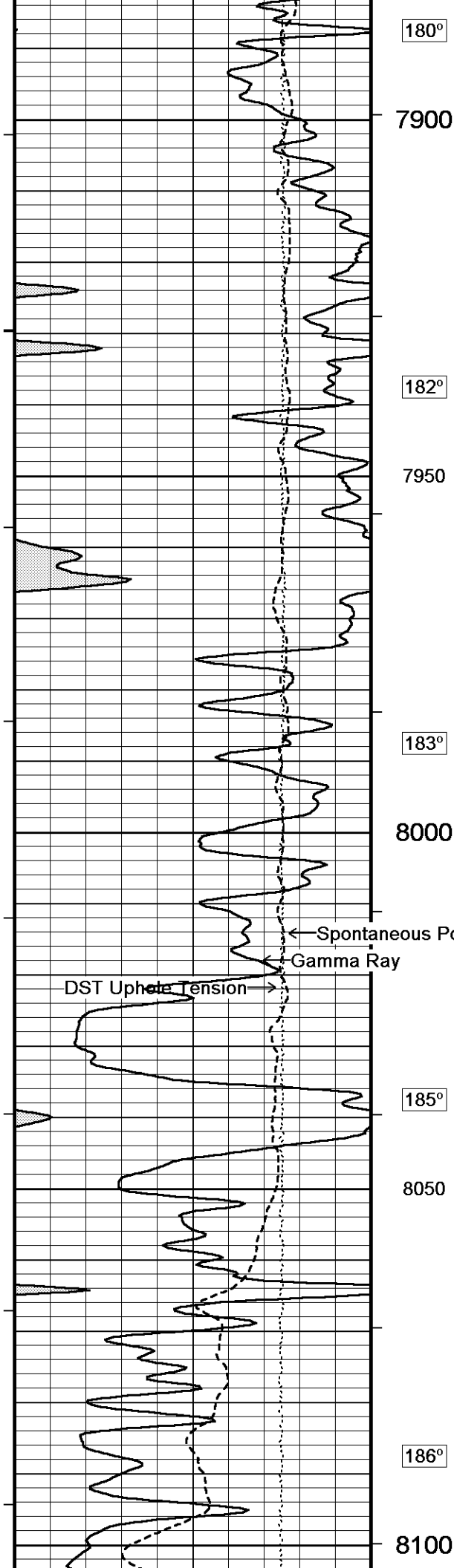
Array Ind. One Res Rt

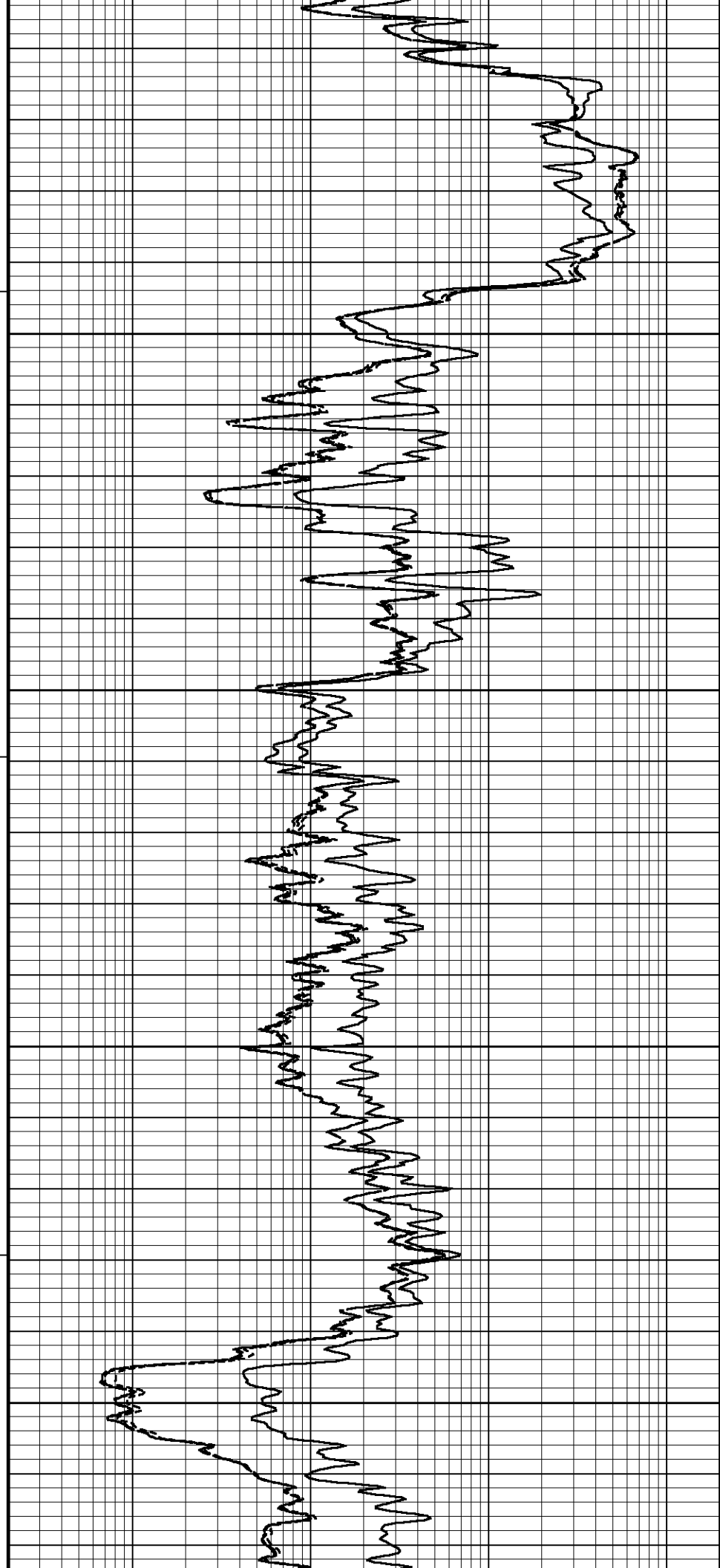
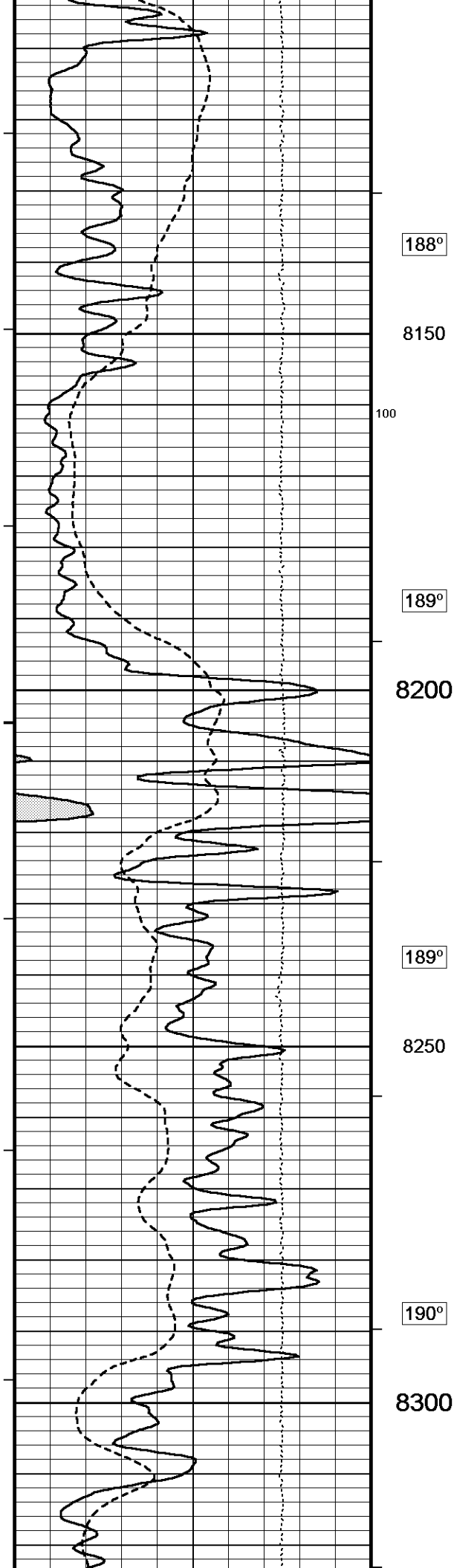
Array Ind. One Res 60

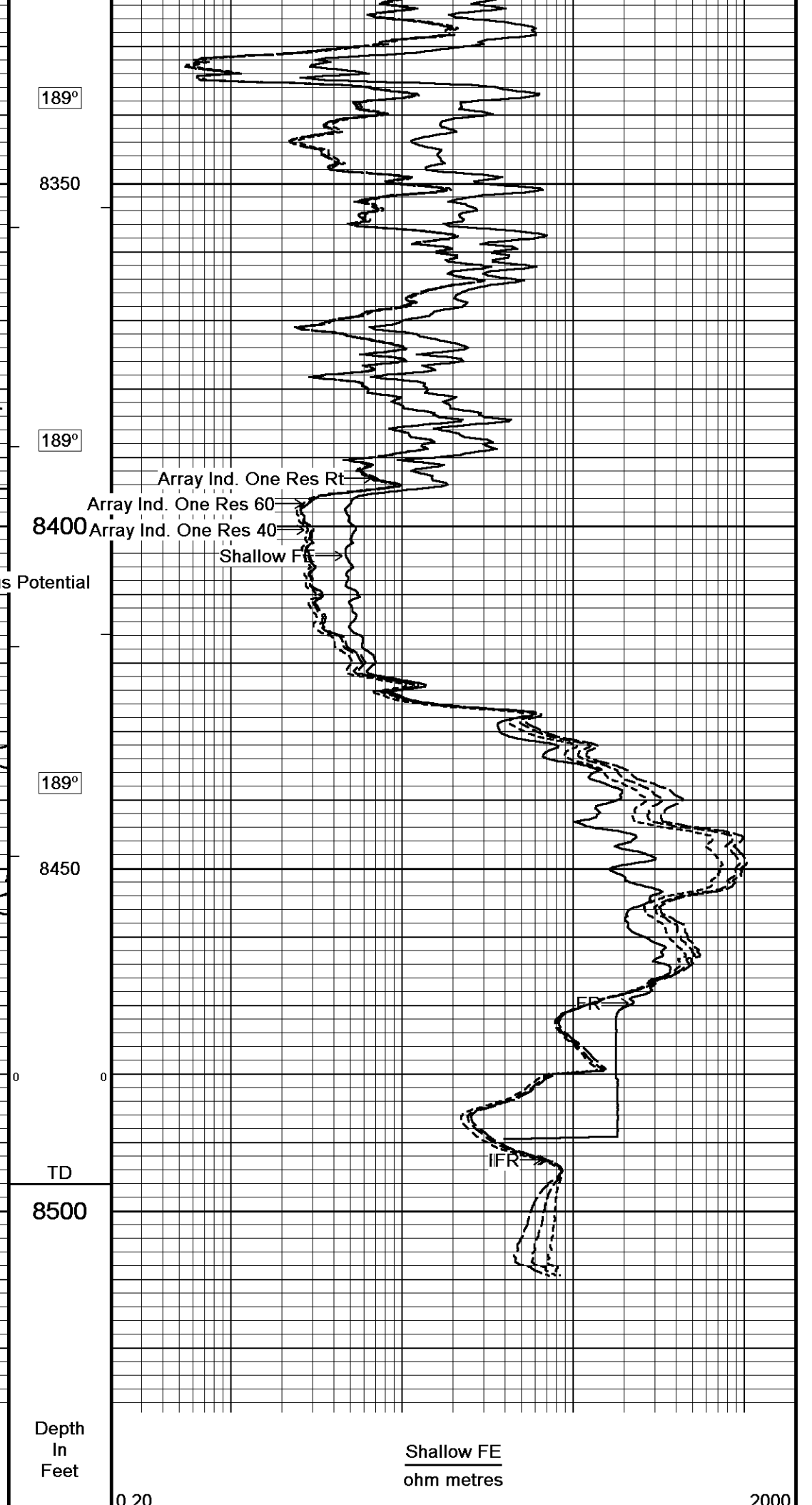
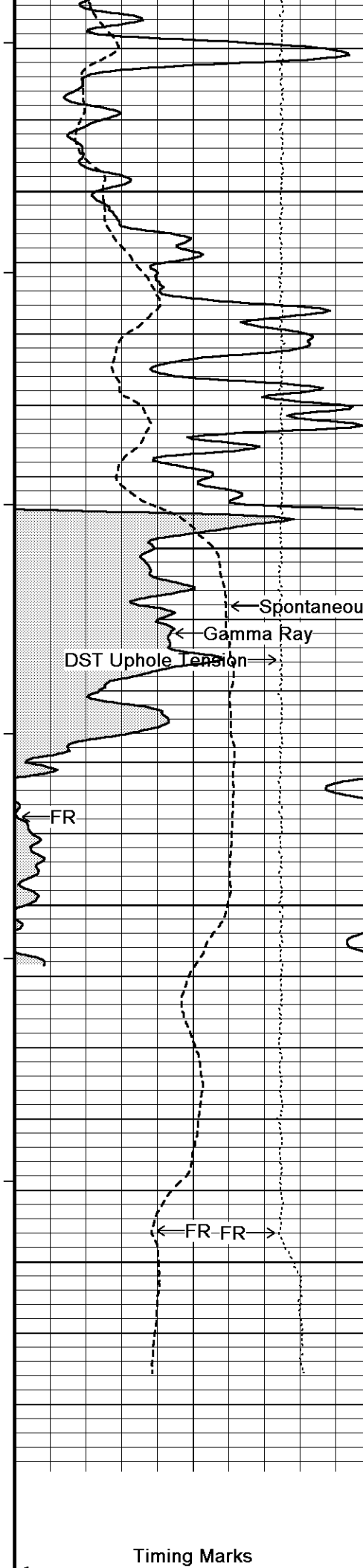
Array Ind. One Res 40

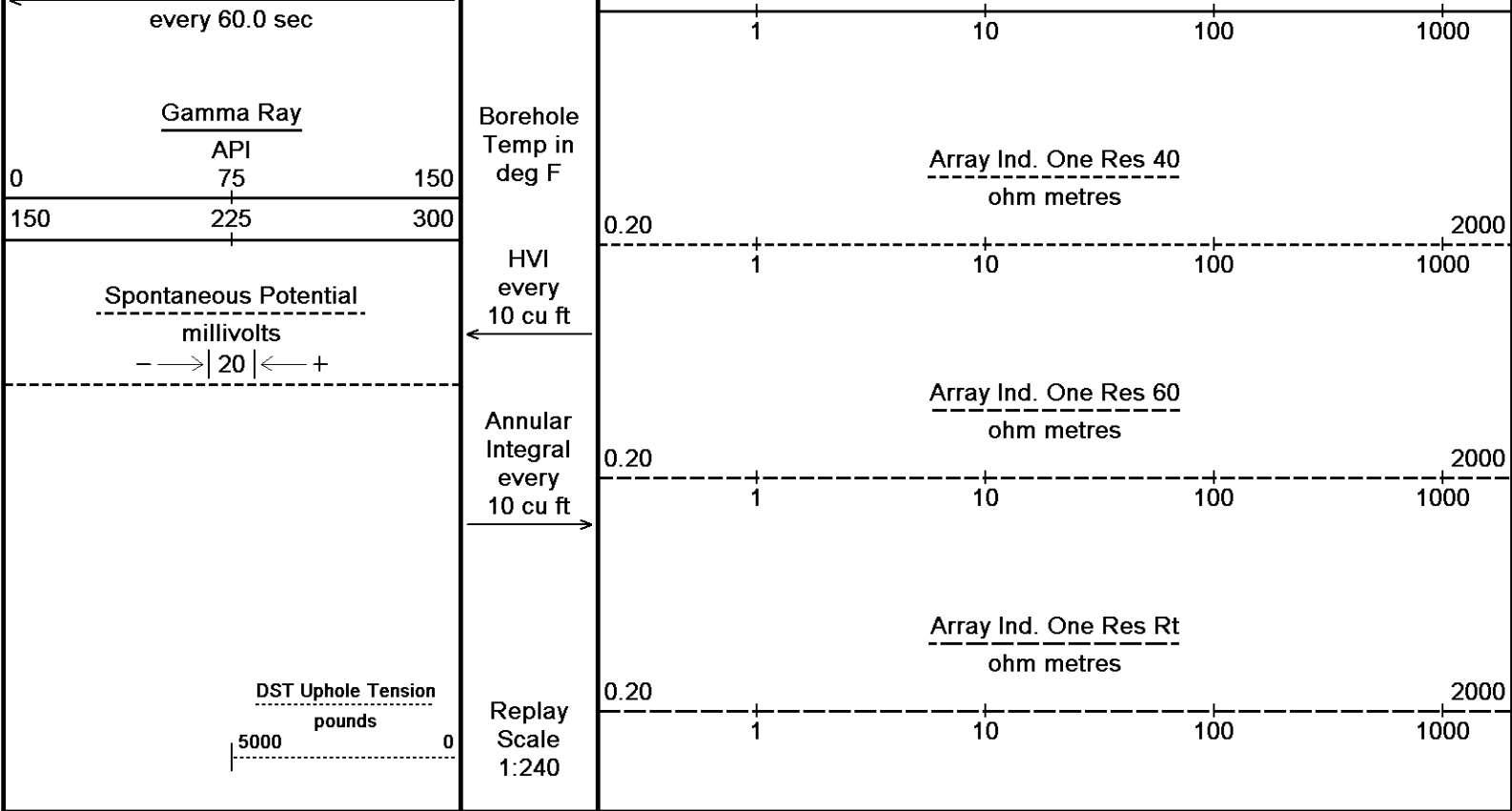
Shallow











Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 29-APR-2018 20:57

Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_002.dtaRecorded on 29-APR-2018 15:30

System Versions: Logged with 18.01.5248Plotted with 18.01.5248

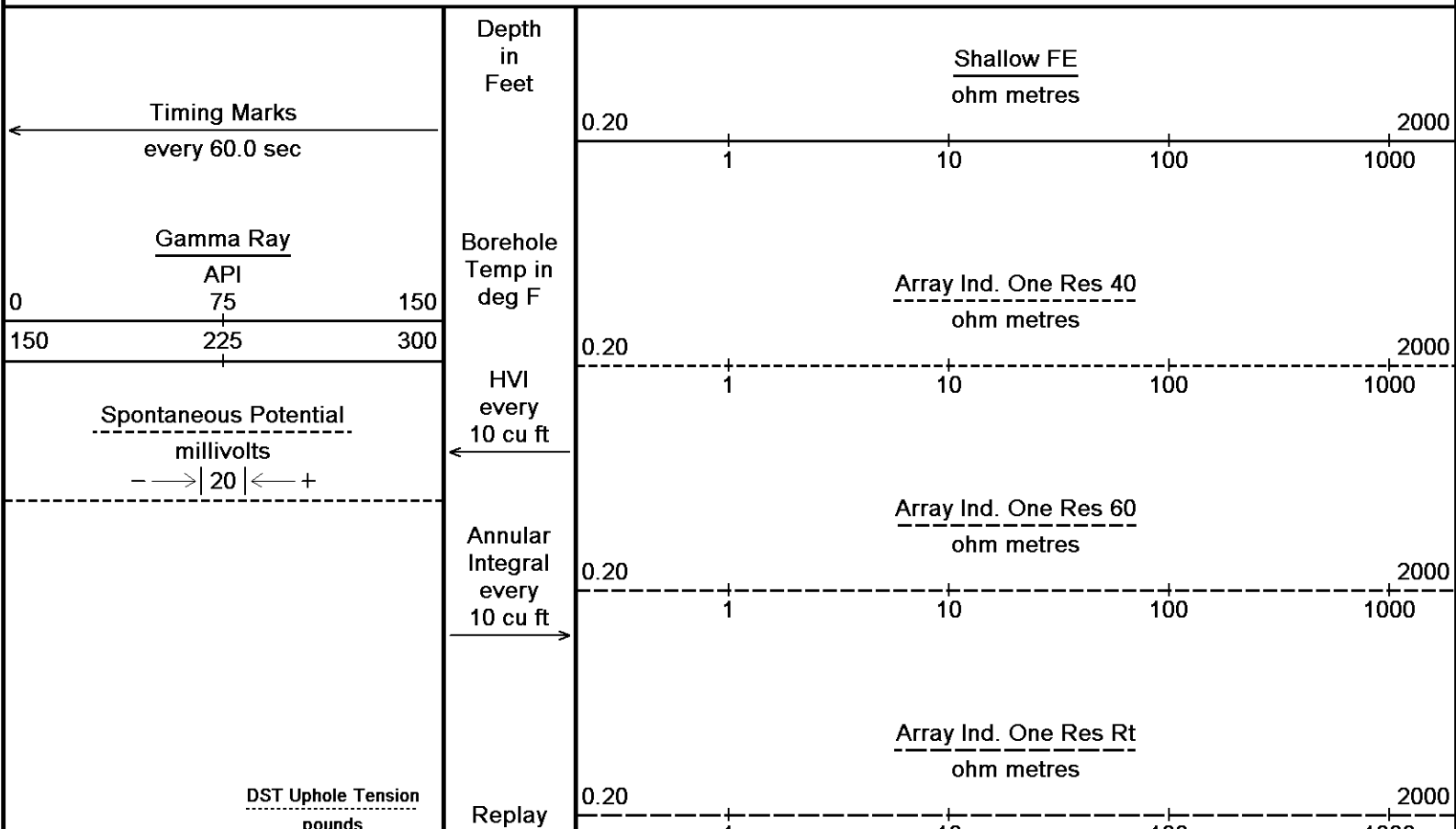
↑5 INCH MAIN↑

↓REPEAT SECTION↓

Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 29-APR-2018 20:57

Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_001.dtaRecorded on 29-APR-2018 15:05

System Versions: Logged with 18.01.5248Plotted with 18.01.5248



5000 0

Scale
1:240

8200

187°

8250

188°

8300

187°

8350

186°

Array Ind. One Res Rt

Array Ind. One Res 60

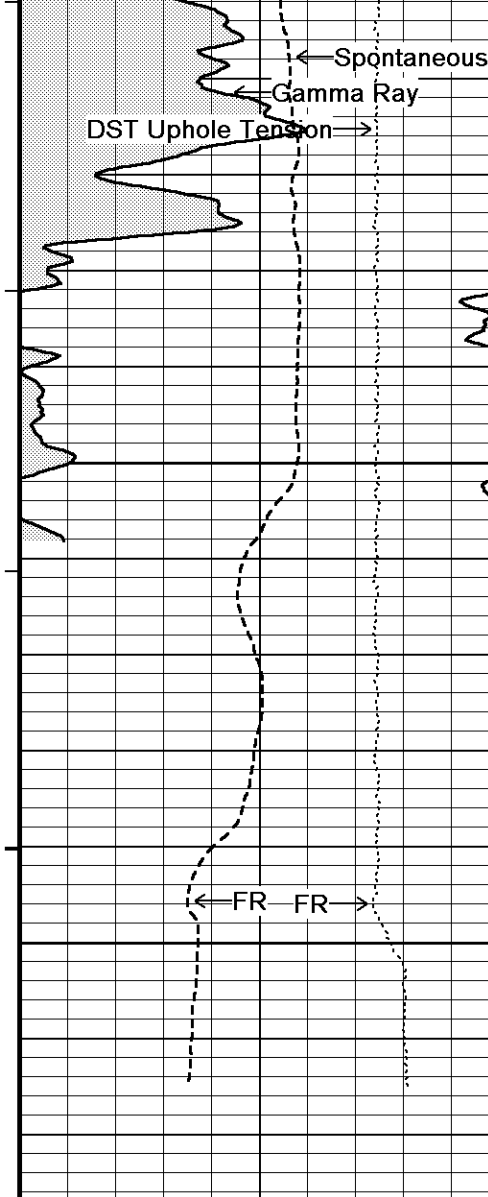
8400 Array Ind. One Res 40

1

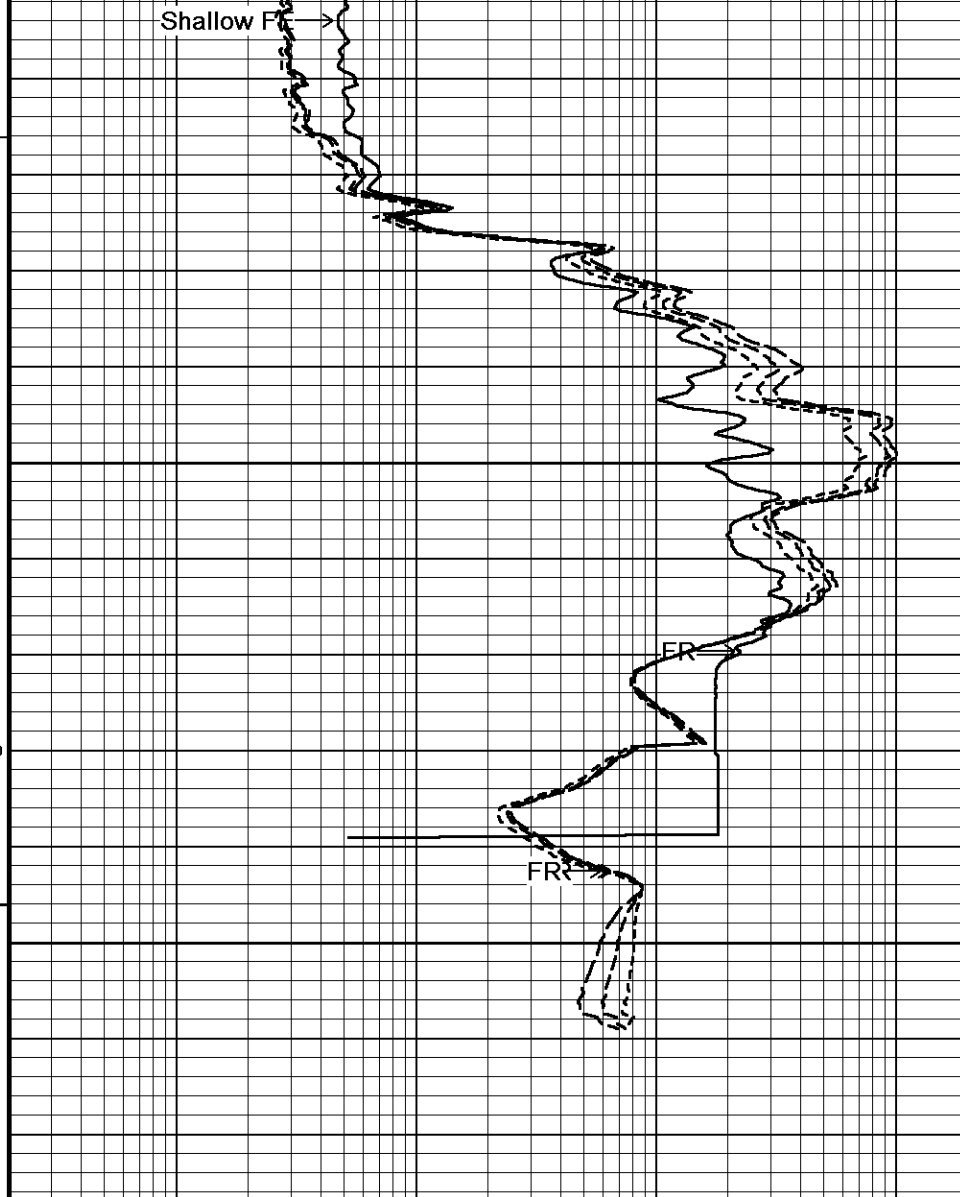
10

100

1000



Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR
FR
TD
8450
8500



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

Timing Marks
every 60.0 sec
Gamma Ray
API
0 75 150
150 225 300
Spontaneous Potential
millivolts
- - - - - 20 - - - - -
DST Uphole Tension
pounds
5000 0
Replay
Scale

Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 29-APR-2018 20:57
 Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater Lake #1-8_001.dta
 Recorded on 29-APR-2018 15:05
 System Versions: Logged with 18.01.5248 Plotted with 18.01.5248



REPEAT SECTION



BEFORE SURVEY CALIBRATION

C:\Minimus 18.01.5248\Data\Grand Mesa Crater Lake #1-8\Grand Mesa Crater Lake #1-8_001.dta

General Constants All 000

Last Edited on 29-APR-2018,14:19

General Parameters

Mud Resistivity	0.940	ohm-metres
Mud Resistivity Temperature	75.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	

Hole/Annular Volume and Differential Caliper Parameters

HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	None	

Rwa Parameters


Porosity used	Crossplot Porosity
Resistivity used	Array Ind. Two Res Rt
RWA Constant A	0.620
RWA Constant M	2.150
SW/APOR Tool Source	0.000

Gamma Calibration MCG-D.J 422

Field Calibration on 29-APR-2018 05:25

	Measured	Calibrated (API)
Background	90	63
Calibrator (Gross)	742	519
Calibrator (Net)	653	456

Gamma Calibration Tolerances MCG-D.J 422

Ratio 1.431  Counts/API

Gamma Constants MCG-D.J 422

Last Edited on 29-APR-2018,12:43

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.J 422

Field Calibration on 13-APR-2018,06:34

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

High Resolution Temperature Constants MCG-D.J 422

Last Edited on 07-DEC-2017,17:17

Pre-filter Length 11

FE Calibration MFE-A.A 135

Base Calibration on 06-APR-2018 10:10

Field Check on 29-APR-2018 05:34

Resistor 1 (ohm)	0.0	Resistor 2 (ohm)	1000.0
------------------	-----	------------------	--------

Base Calibration

Measured	Calibrated (ohm-m)
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Reference 1	0.0	0.0
Reference 2	963.3	126.8
Base Check		281.1
Field Check		281.2

FE Calibration Tolerances MFE-A.A 135		
Reference 2	963.3	<div> <div>-3%</div> <div>963.3</div> <div>+3%</div> </div> ohm
Base Check	281.1	<div> <div>-2%</div> <div>281.1</div> <div>+2%</div> </div> ohm-m
Field Check	281.2	<div> <div>-2%</div> <div>281.2</div> <div>+2%</div> </div> ohm-m

FE Constants MFE-A.A 135			Last Edited on 29-APR-2018,12:43		
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 111				Factory Loop Calibration 13-APR-2018 06:16			
				Field Check on 29-APR-2018 05:33			
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)		9.4	3838.6	10.1	3839.9		
2		27.5	3497.6	28.2	3498.1		
3		27.1	2995.5	27.7	2995.7		
4 (far)		17.8	2040.7	18.2	2040.9		
Array Temperature		67.7		68.1		Deg F	

Induction Check Tolerances MAI-A.A 111		
Low Array 1	10.1	<div> <div>7.9</div> <div>10.1</div> <div>12.3</div> </div> mmho/m
Low Array 2	28.2	<div> <div>26.0</div> <div>28.2</div> <div>30.4</div> </div> mmho/m
Low Array 3	27.7	<div> <div>25.6</div> <div>27.7</div> <div>29.8</div> </div> mmho/m
Low Array 4	18.2	<div> <div>16.3</div> <div>18.2</div> <div>20.1</div> </div> mmho/m
High Array 1	3839.9	<div> <div>-0.5%</div> <div>3839.9</div> <div>+0.5%</div> </div> mmho/m
High Array 2	3498.1	<div> <div>-0.5%</div> <div>3498.1</div> <div>+0.5%</div> </div> mmho/m
High Array 3	2995.7	<div> <div>-0.5%</div> <div>2995.7</div> <div>+0.5%</div> </div> mmho/m
High Array 4	2040.9	<div> <div>-0.5%</div> <div>2040.9</div> <div>+0.5%</div> </div> mmho/m

Induction Constants MAI-A.A 111		Last Edited on 29-APR-2018,12:42	
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	Pineapple		
Stand-off	0.49	inches	

Number of Fins on Stand-off	5.0000		
Stand-off Fin Angle	72.00	degrees	
Stand-off Fin Width	1.3878	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 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		

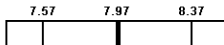
Caliper Calibration MPD-C.A 216

Base Calibration on 06-APR-2018 10:55
Field Calibration on 29-APR-2018 05:40

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	13889	3.99
2	22592	5.98
3	31350	7.97
4	39584	9.86
5	48879	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.99	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.99  in

DOWNHOLE EQUIPMENT

C:\Minimus 18.01.5248\Data\Grand Mesa Crater Lake #1-8\Grand Mesa Crater Lake #1-8_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 724 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in



Compact Comms Gamma
MCG-D.J 422 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

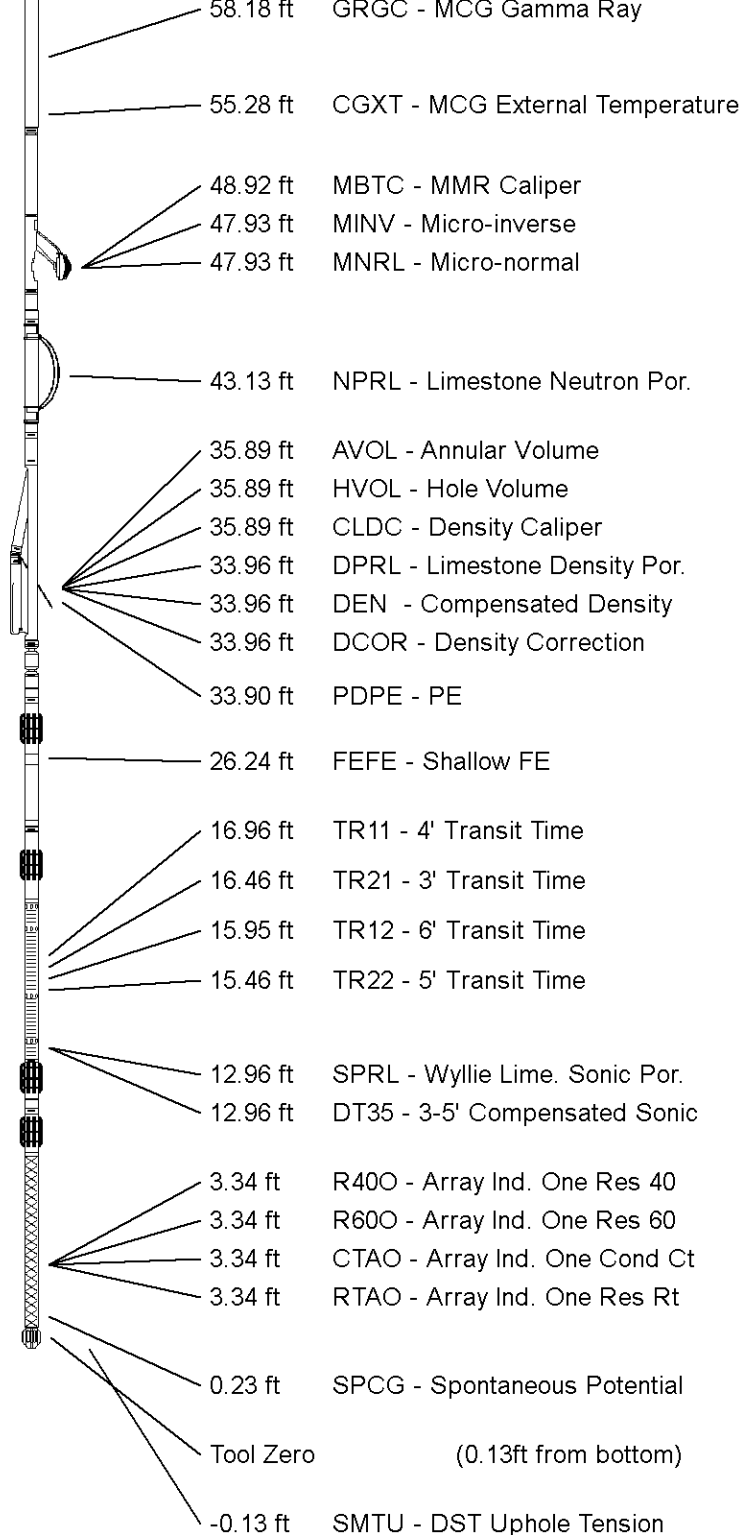
Compact Knuckle Joint
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

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

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: 2.244 in

Total Length: 68.16 ft Weight: 526.9 lb




All measurements relative to tool zero.

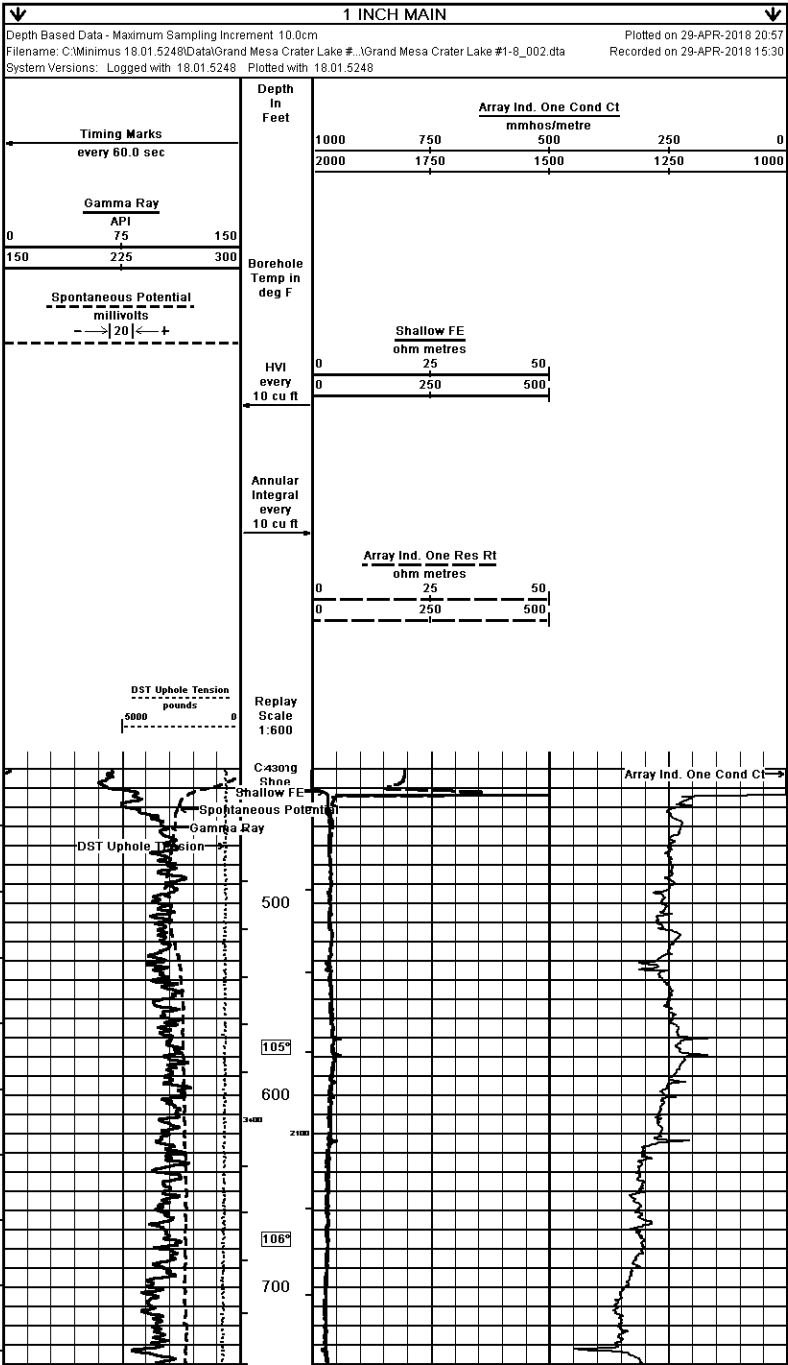
COMPANY	GRAND MESA OPERATING COMPANY
WELL	CRATER LAKE #1-8
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO

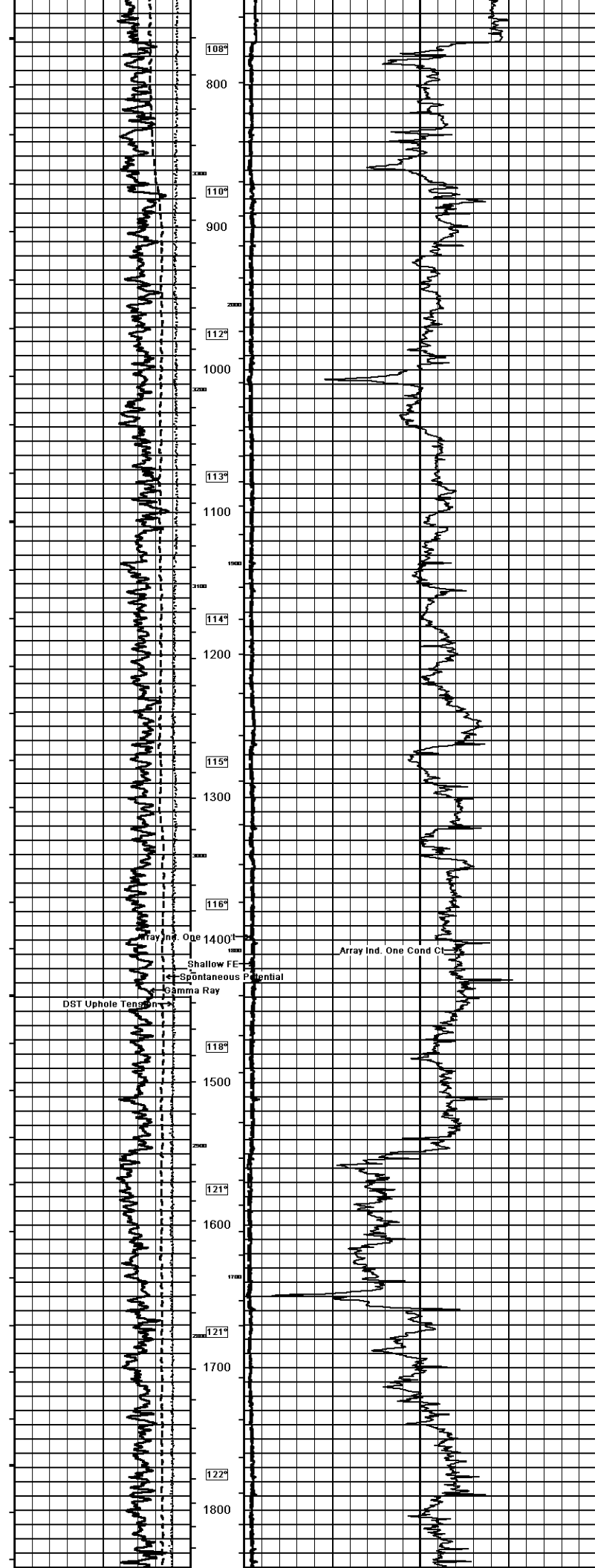
Elevation Kelly Bushing	5423	feet	First Reading	8493.00	feet
Elevation Drill Floor	5421	feet	Depth Driller	8495.00	feet
Elevation Ground Level	5404	feet	Depth Logger	8496.00	feet

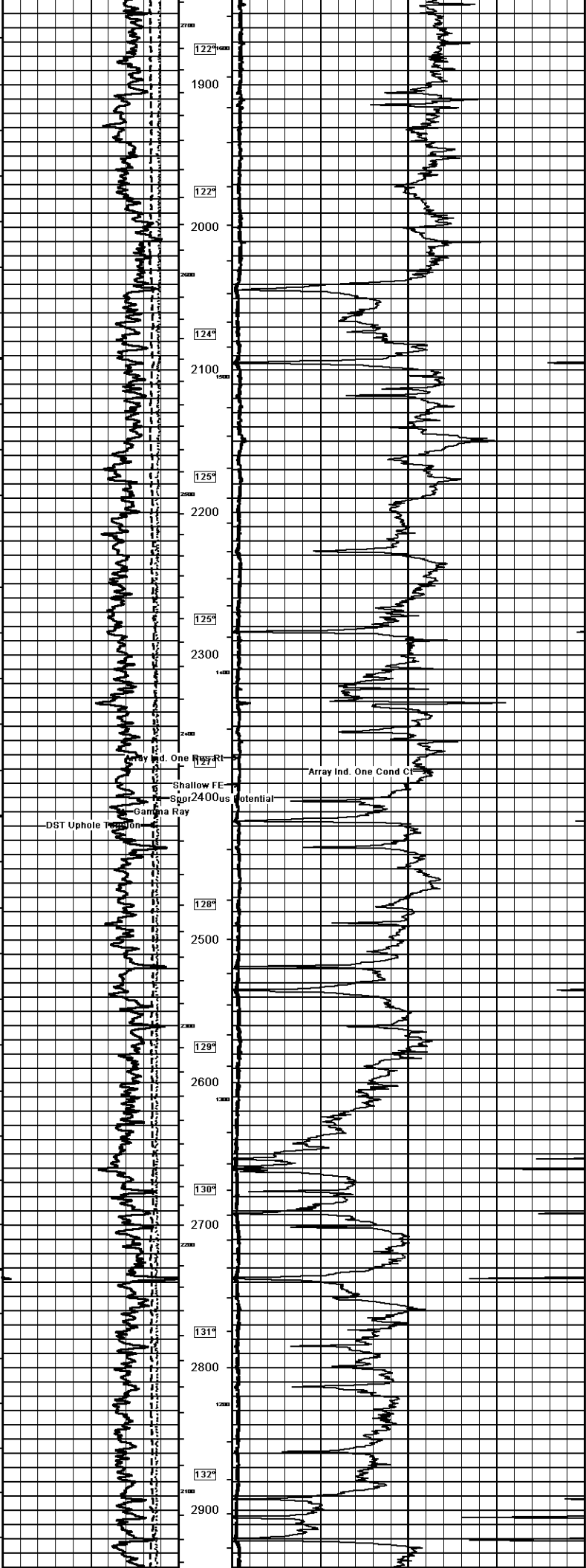


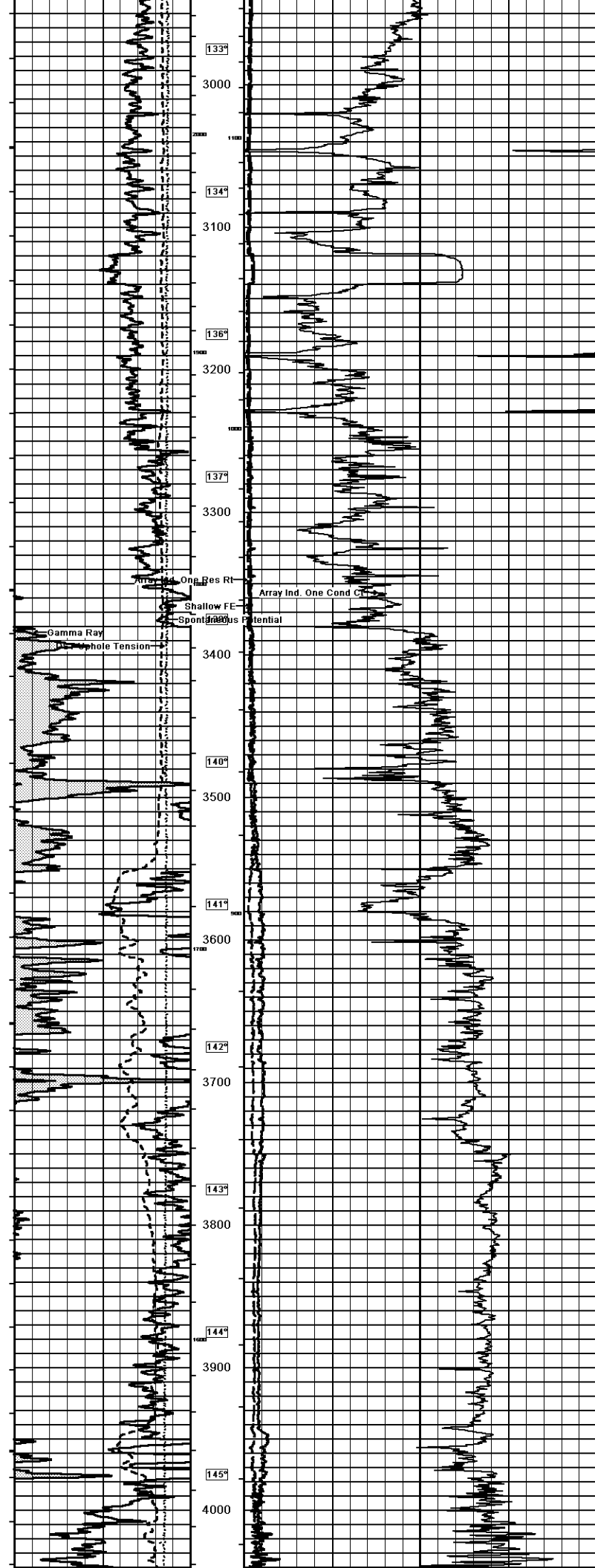
ARRAY INDUCTION

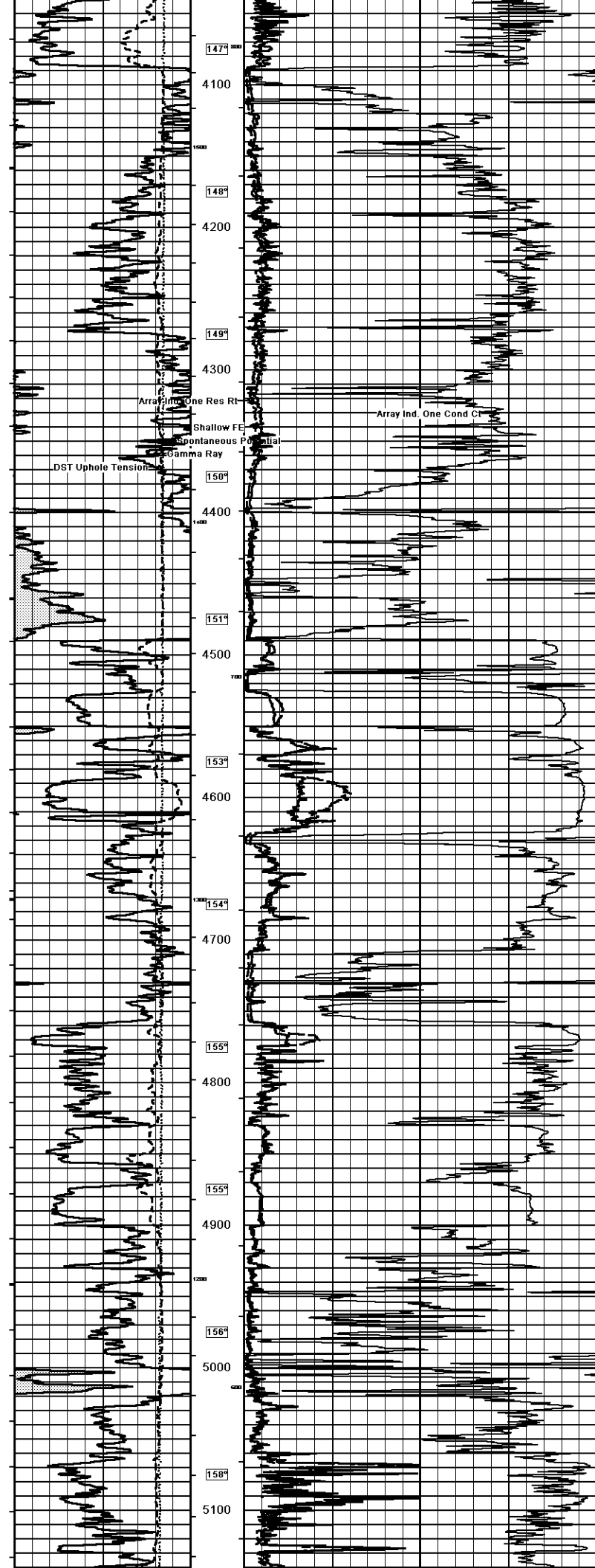
		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY		GRAND MESA OPERATING COMPANY	
WELL		CRATER LAKE #1-8	
FIELD		WILDCAT	
PROVINCE/COUNTY		LINCOLN	
COUNTRY/STATE		U.S.A. / COLORADO	
LOCATION		1145 ENL & 1934 FEL	
SEC 8	TWP 35	RGE 54W	Other Services
Latitude	Longitude	05-07-206729	
Log Date	Log Number	29-APR-2018	
Permanent Datum Q.L. Elevation 5404 feet		Elev. above:	
Log Measured From KB, 19.00 feet above Permanent Datum		KB	
Drilling Measured From KB		DF	
		GL	
		5423.00	
		5421.00	
		5404.00	
Run Number		ONE	
Service Order		4558-212180226	
Depth Driller		8495.00 feet	
Depth Logger		8495.00 feet	
First Reading		8493.00 feet	
Last Reading		441.00 feet	
Casing Driller		441.00 feet	
Casing Logger		441.00 feet	
Bit Size		7.875 inches	
Hole Fluid Type		CHEMICAL	
Density/Viscosity		9.40 lbu/sq 91.00 CP	
PH / Fluid Loss		11.00 7.20 m/c/min	
Sample Source		FLOWLINE	
RM @ Measured Temp		0.94 @ 75.0 ohm-m	
RM @ Measured Temp		0.75 @ 75.0 ohm-m	
RM @ Measured Temp		1.13 @ 75.0 ohm-m	
Source Rmt / Rmc		CALC	
RM @ BHT		0.37 @ 189.0 ohm-m	
Time Since Circulation		6 HOURS	
Max Recorded Temp		189.00 deg F	
Equipment / Base		13096 LIB	
Recorded By		ADAM BILL	
Witnessed By		KENT MATSON	

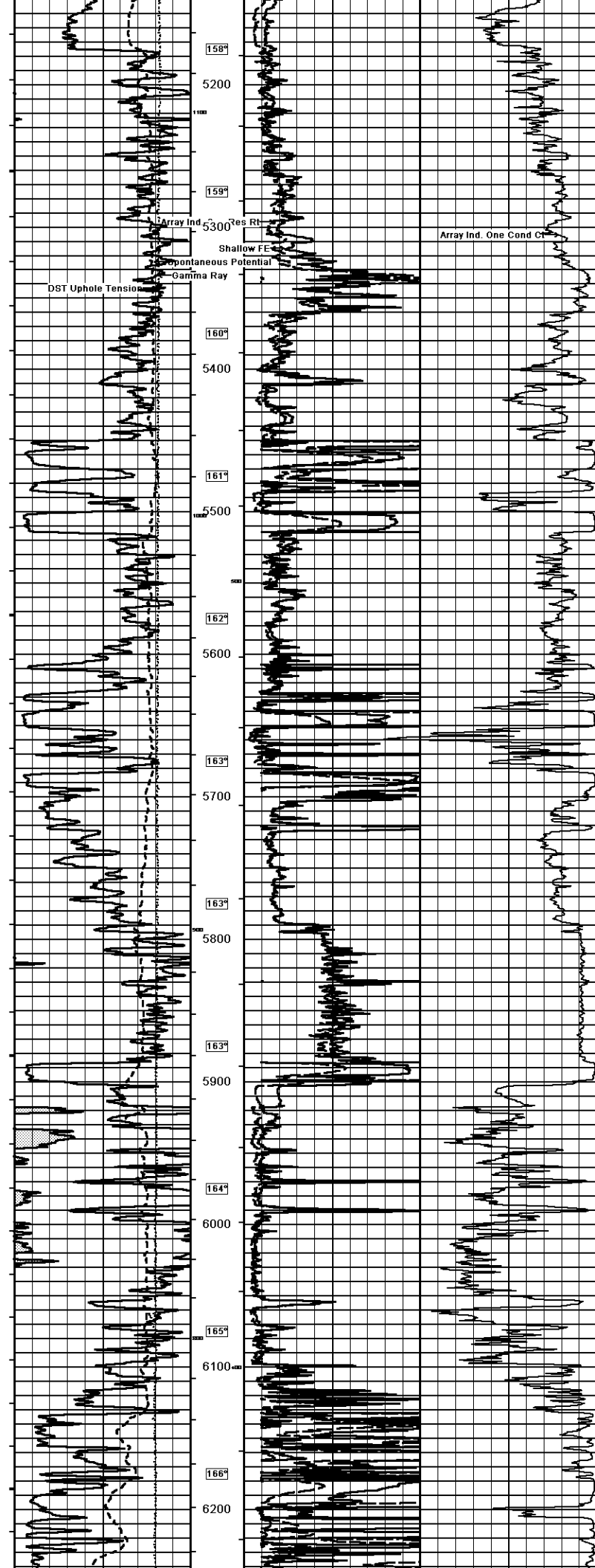


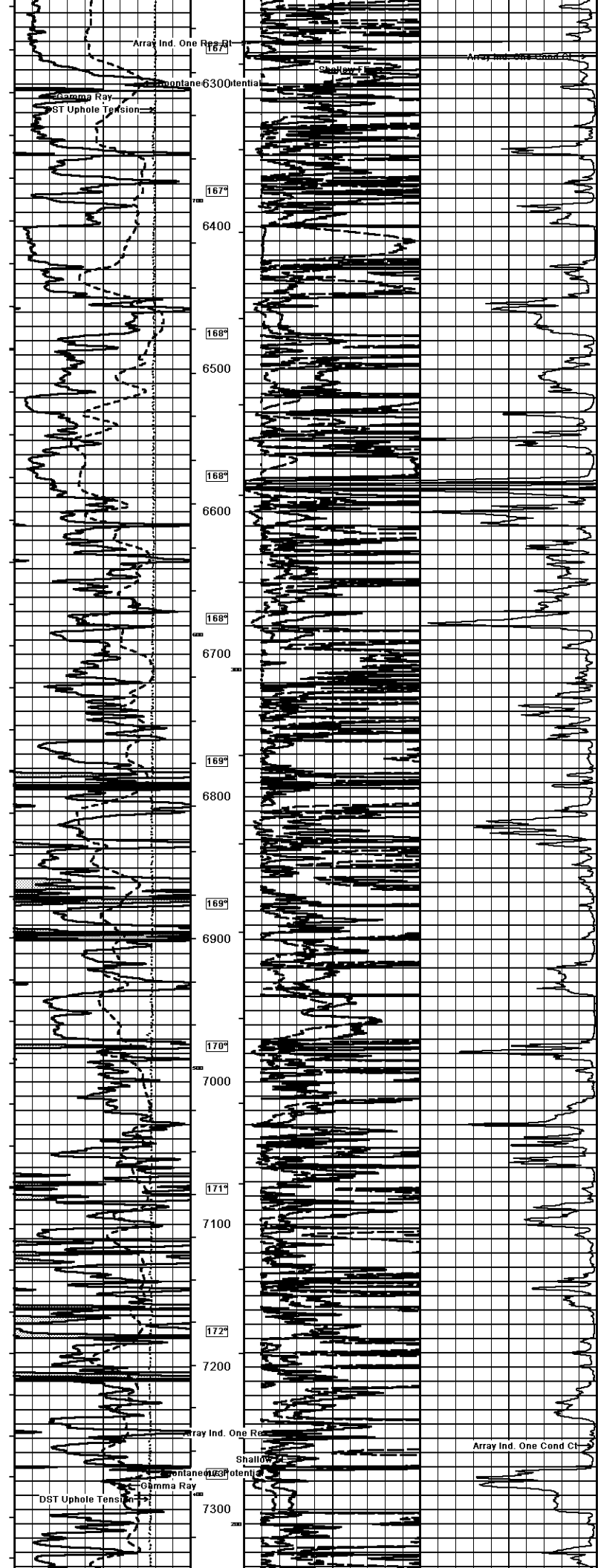


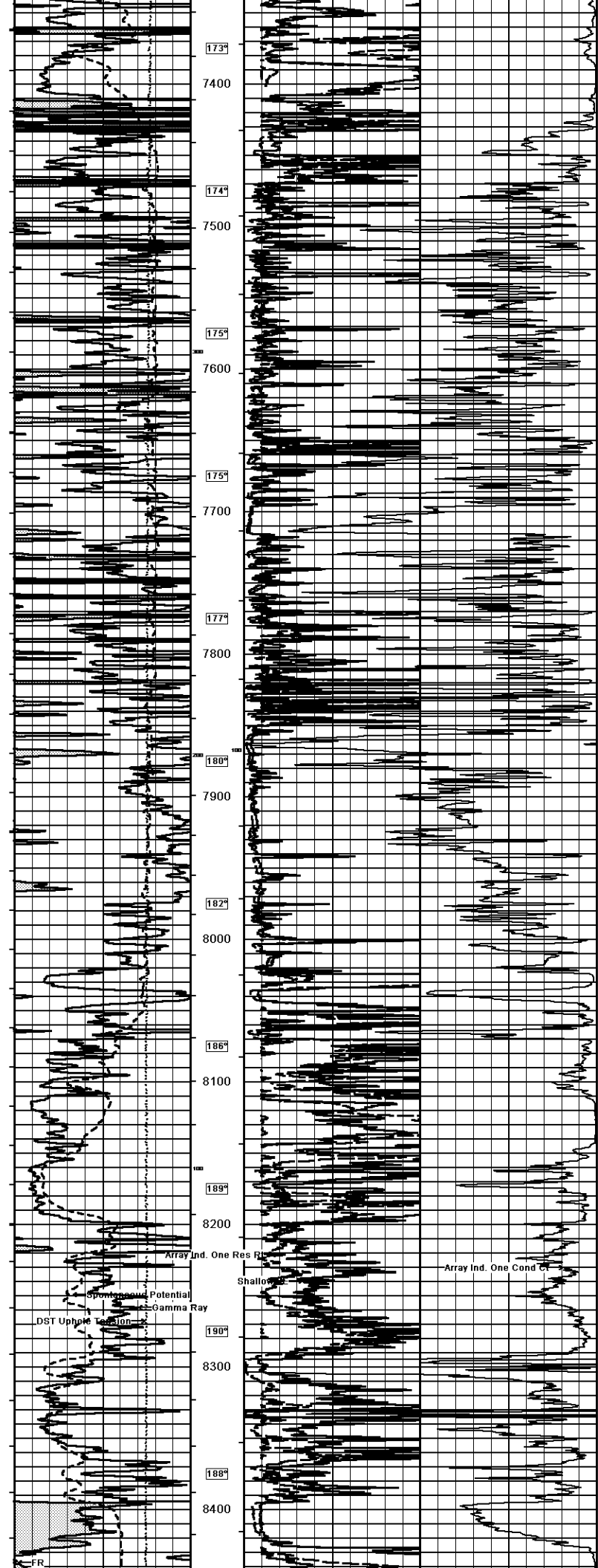


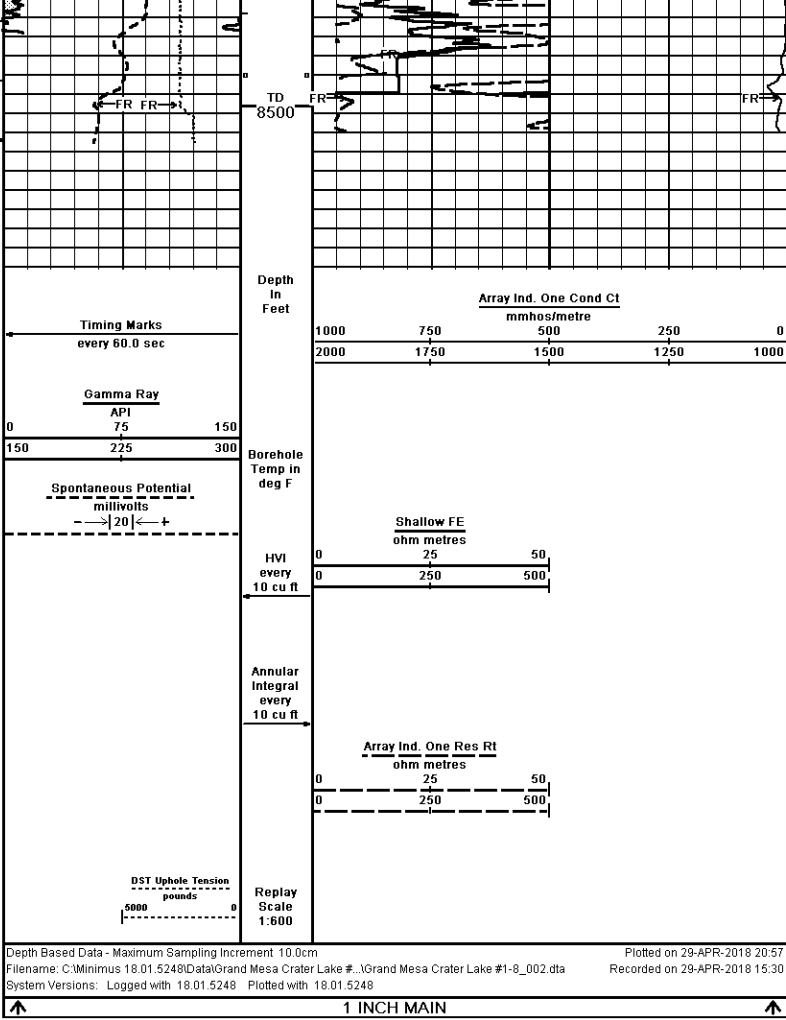













COMPANY	GRAND MESA OPERATING COMPANY			
WELL	CRATER LAKE #1-8			
FIELD	WILDCAT			
PROVINCE/COUNTY	LINCOLN			
COUNTRY/STATE	U.S.A. / COLORADO			
Elevation Kelly Bushing	5423	feet	First Reading	8493.00 feet
Elevation Drill Floor	5421	feet	Depth Driller	8495.00 feet
Elevation Ground Level	5404	feet	Depth Logger	8496.00 feet
 ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG				