



Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY			WESTERN OPERATING COMPANY		
WELL			MARTIN-PETERSON #1		
FIELD			ARROYO		
PROVINCE/COUNTY			STANTON		
COUNTRY/STATE			U.S.A. / KANSAS		
LOCATION			2100' FSL & 2150' FWL		
SEC 16	TWP 29S	RGE 41W	Other Services		MML
Latitude		MPD/MDN			
Longitude					
API Number		15-187-21342			
Permanent Datum GL, Elevation 3404 feet					Elevations:
Log Measured From KB, 13.00 feet above Permanent Datum					KB 3417.00
Drilling Measured From KB					DF 3415.00
					GL 3404.00
Date	09-JAN-2019				
Run Number	ONE				
Service Order	4558-234191091				
Depth Driller	5708.00				feet
Depth Logger	5711.00				feet
First Reading	5708.00				feet
Last Reading	1656.00				feet
Casing Driller	1657.00				feet
Casing Logger	1656.00				feet
Bit Size	7.875				inches
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.15 lb/USg		53.00 CP		
PH / Fluid Loss	10.00		6.40 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.86 @ 75.0		ohm-m		
Rmf @ Measured Temp	1.49 @ 75.0		ohm-m		
Rmc @ Measured Temp	2.23 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	1.14 @122.0		ohm-m		
Time Since Circulation	5 HOURS				
Max Recorded Temp	122.00		deg F		
Equipment / Base	13096	LIB			
Recorded By	ADAM SILL				
Witnessed By	PETER DEBENHAM				

BOREHOLE RECORD					Last Edited: 09-JAN-2019 01:26
Bit Size inches		Depth From feet		Depth To feet	
7.875		1657.00		5708.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	1657.00	24.00	

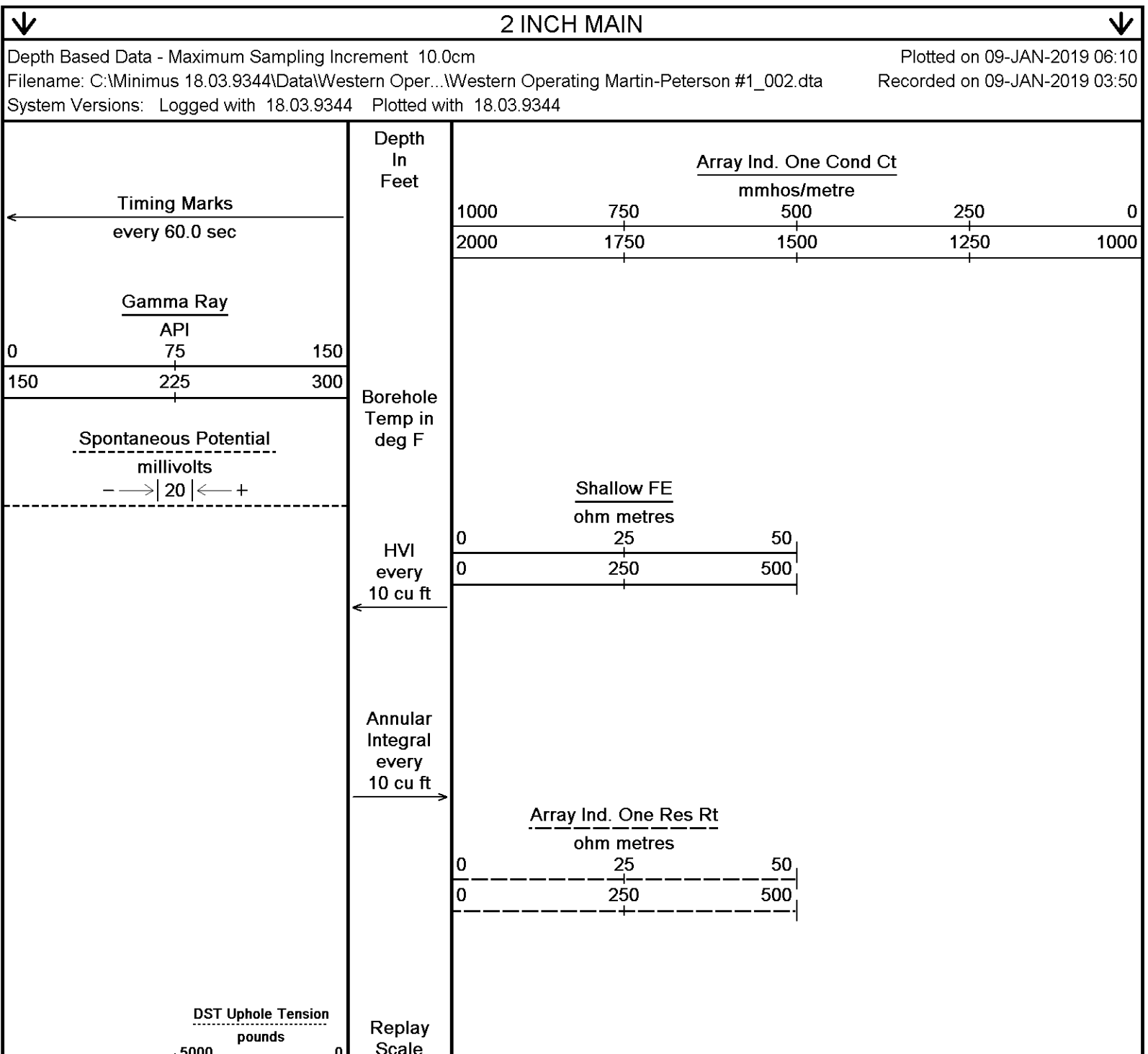
REMARKS
- SOFTWARE ISSUE: WLS 18.03.9344.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1433 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3500 FEET: 400 CU.FT.
- RIG: DUKE #9

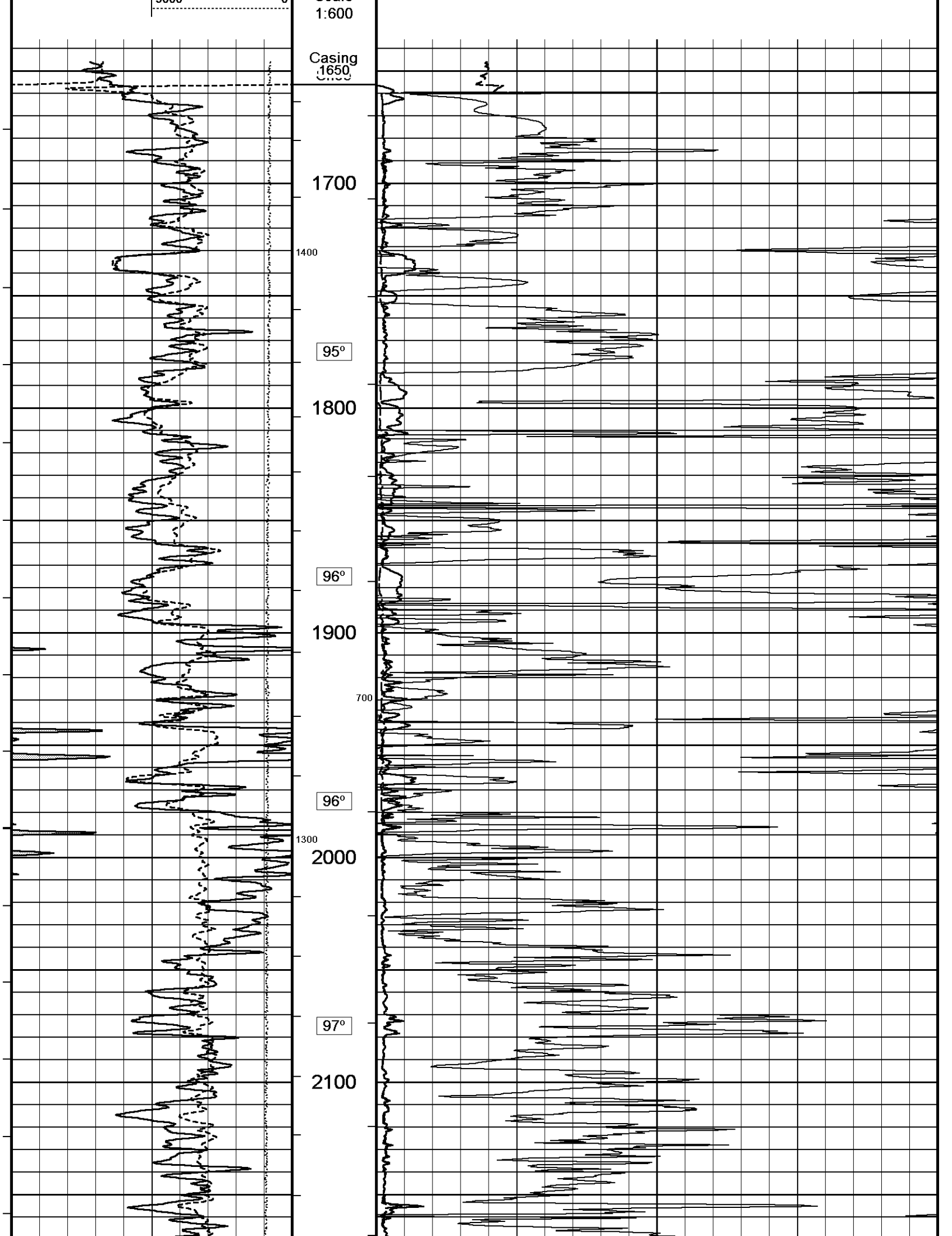
RIS: DORE %C.

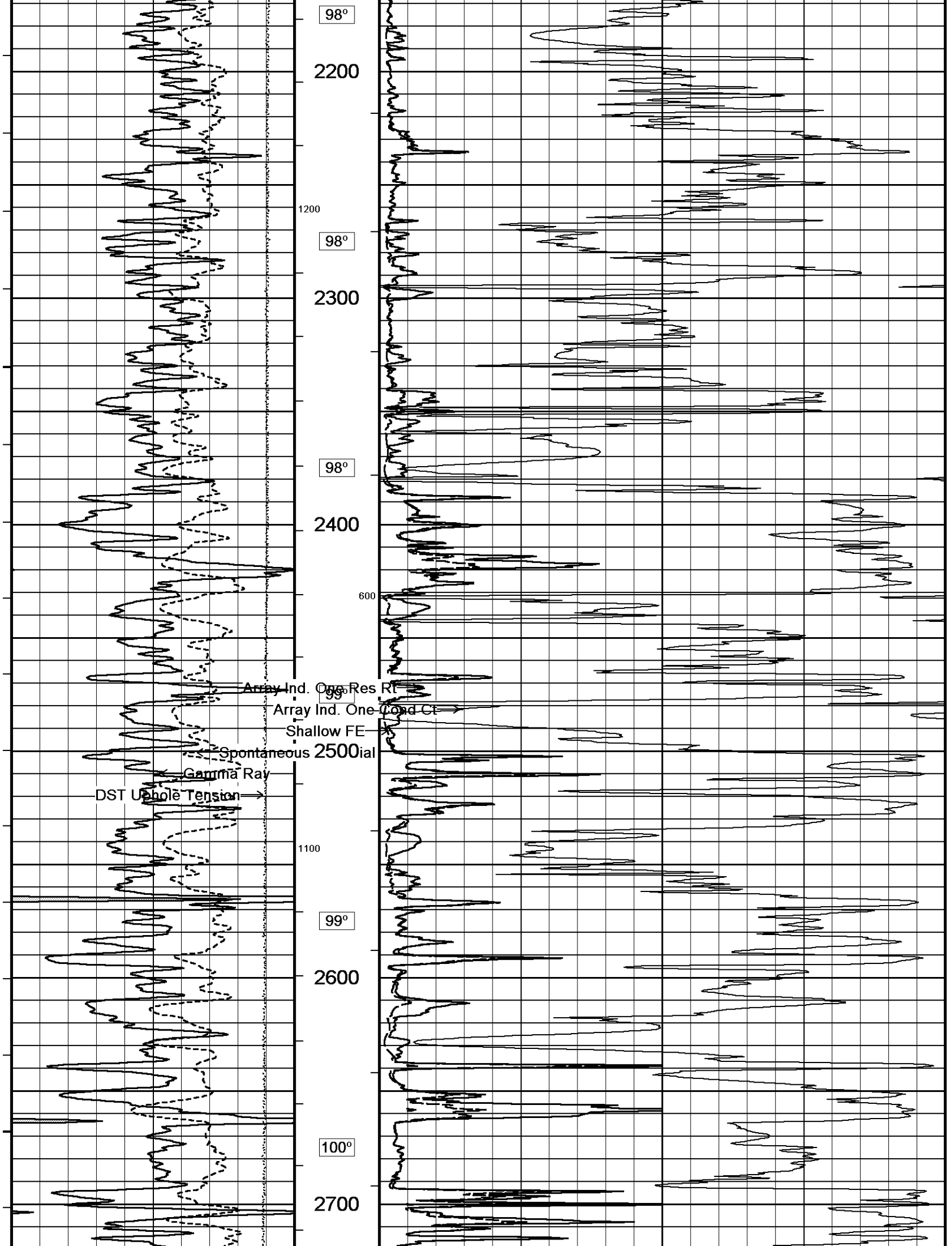
- ENGINEER: A. SILL.

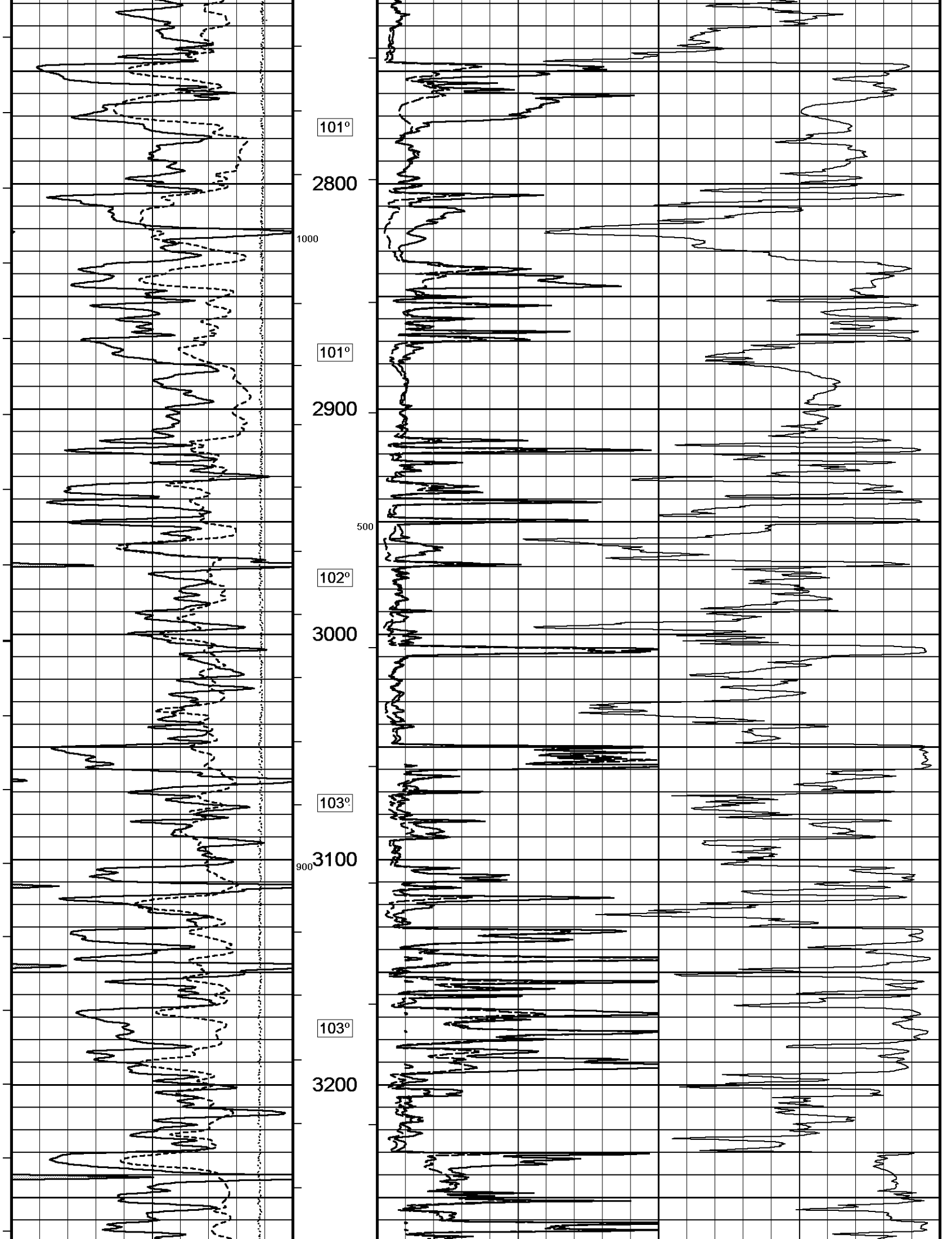
- OPERATOR: B. TOVAR, B. COPELAND.

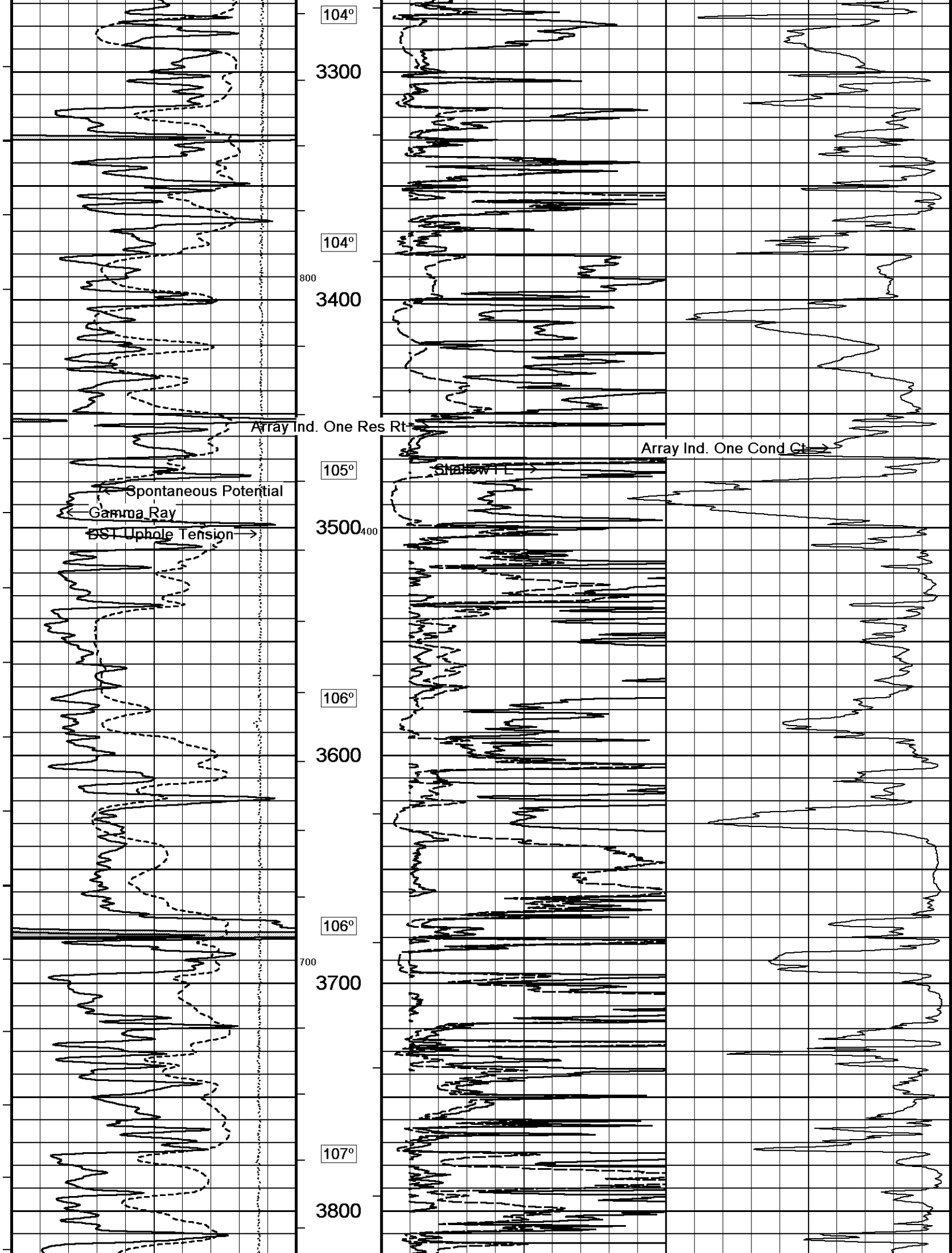
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

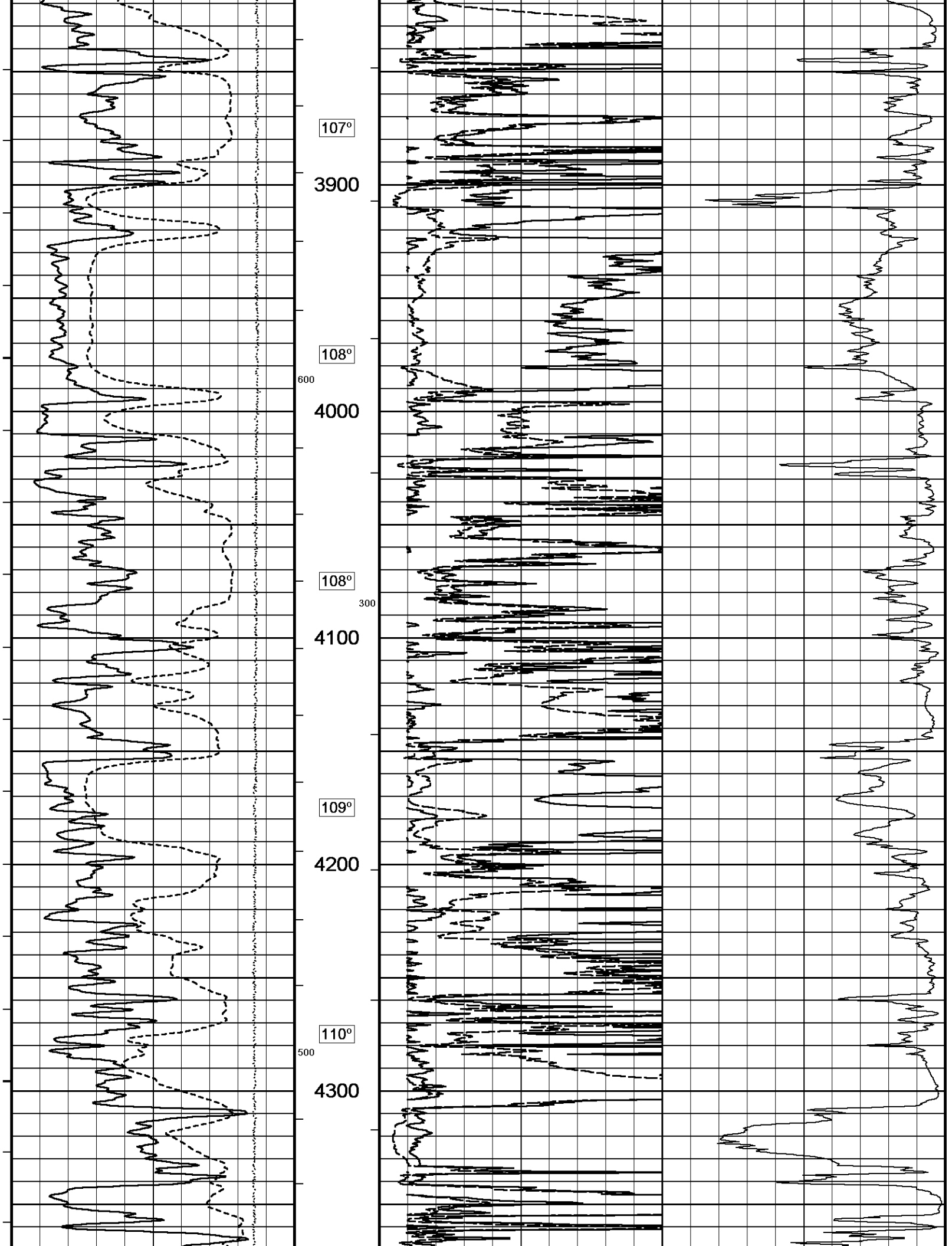


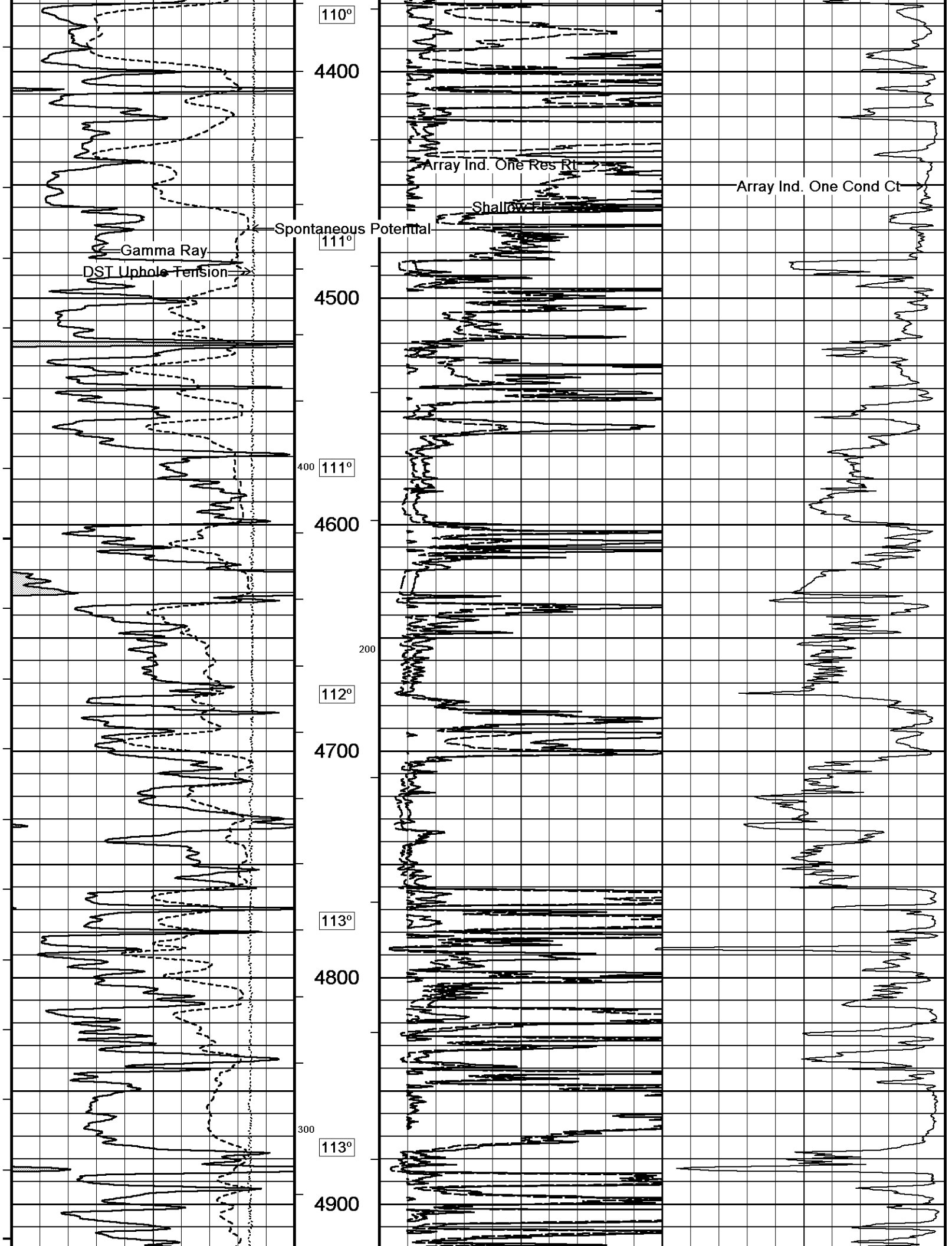


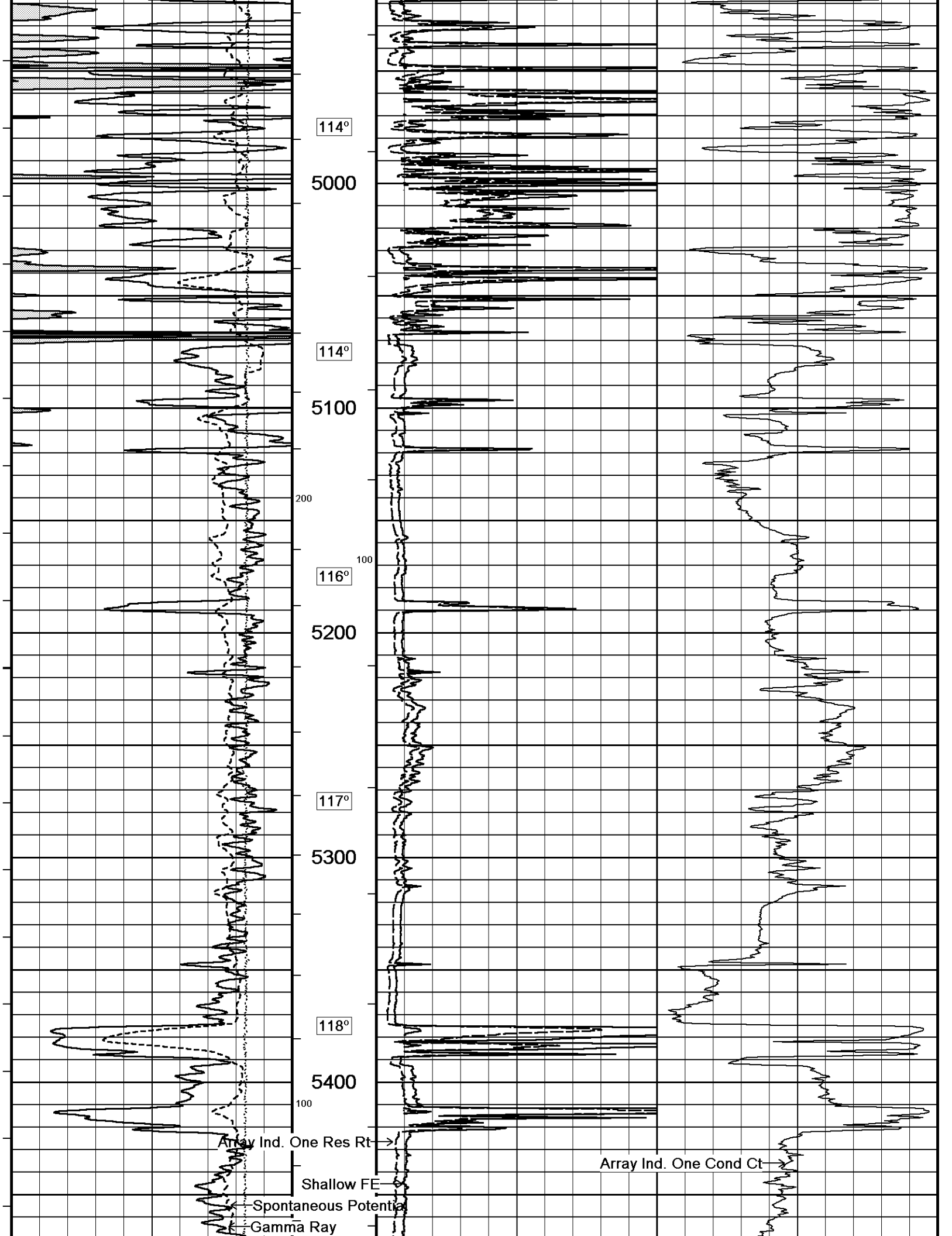


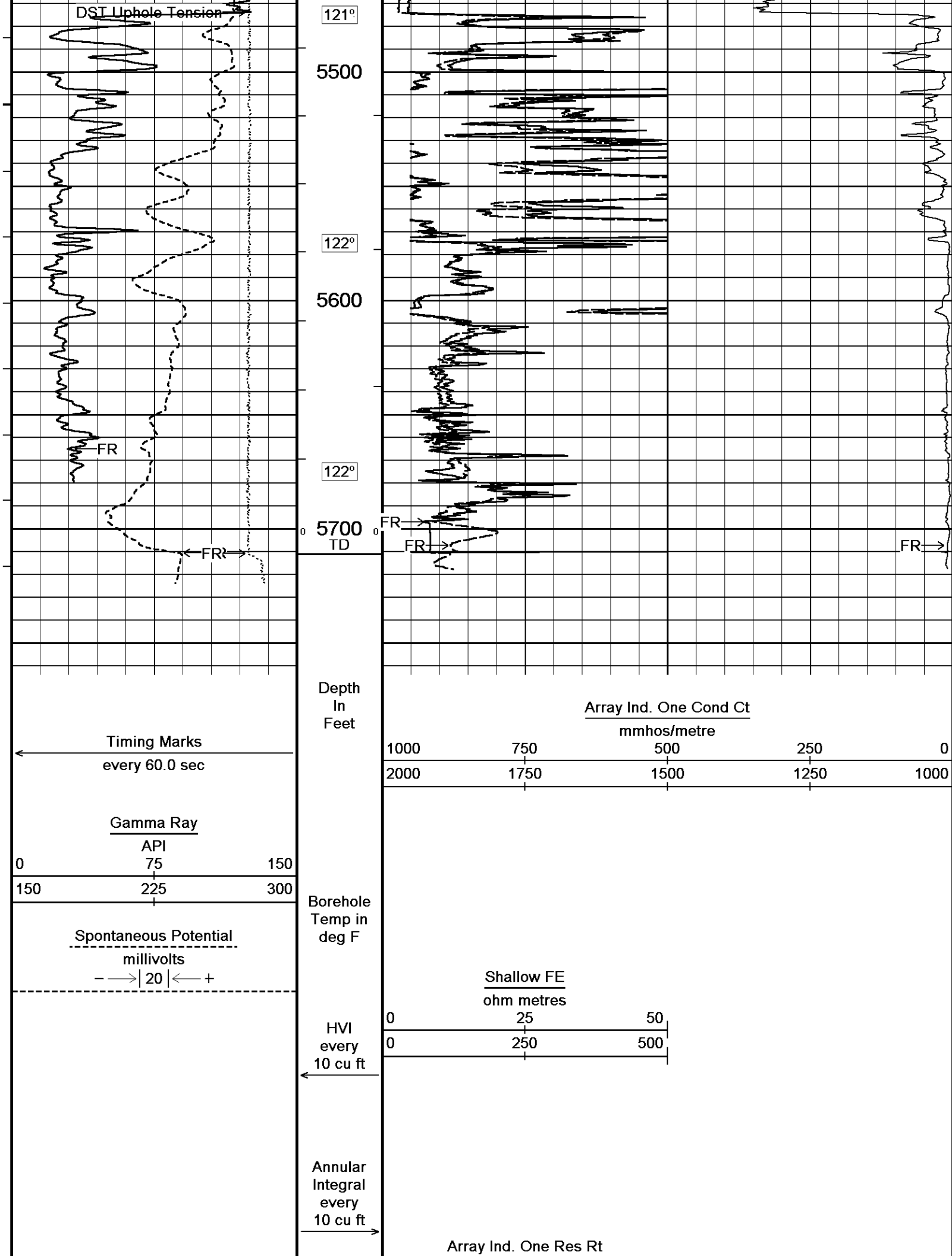


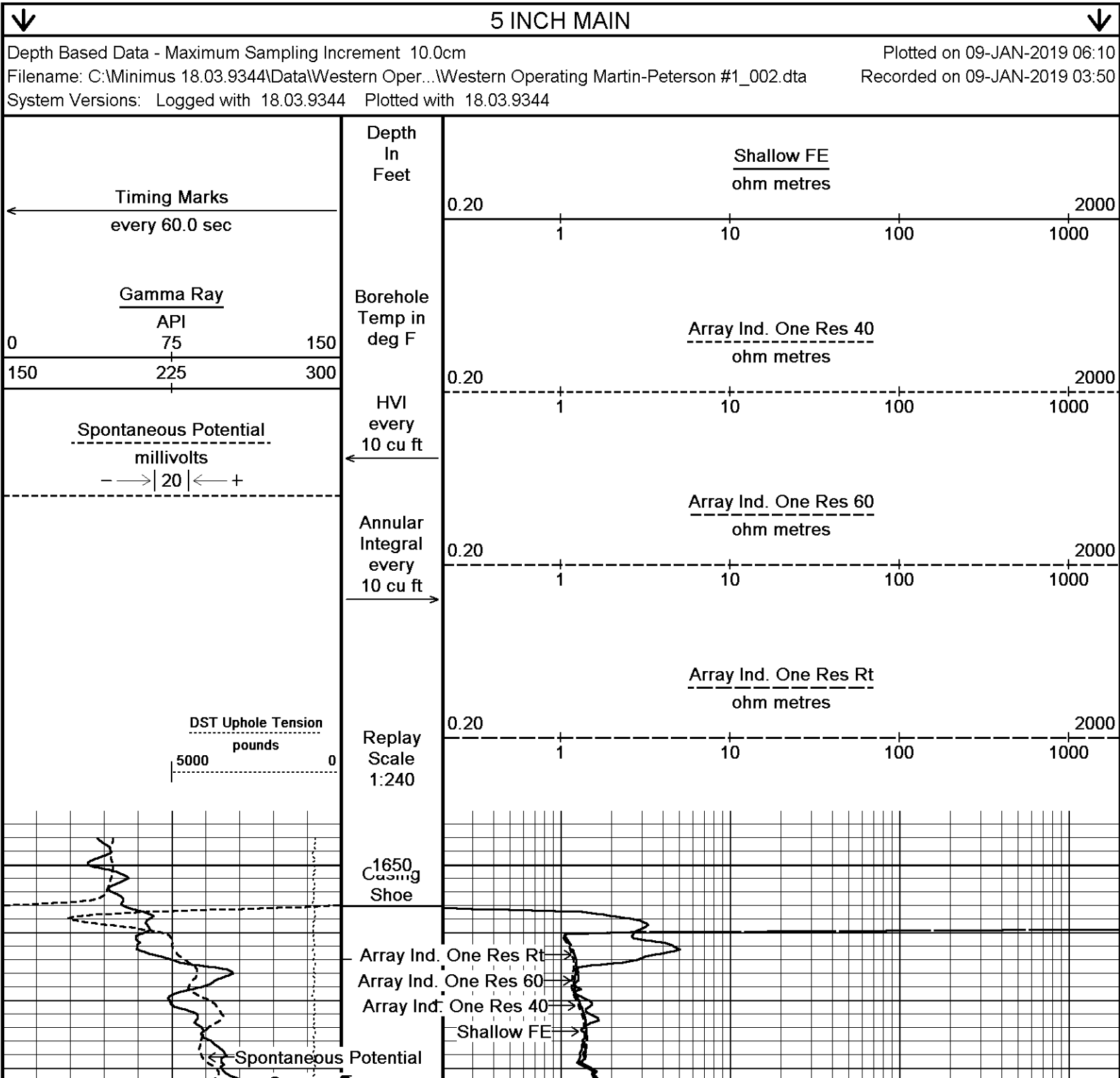
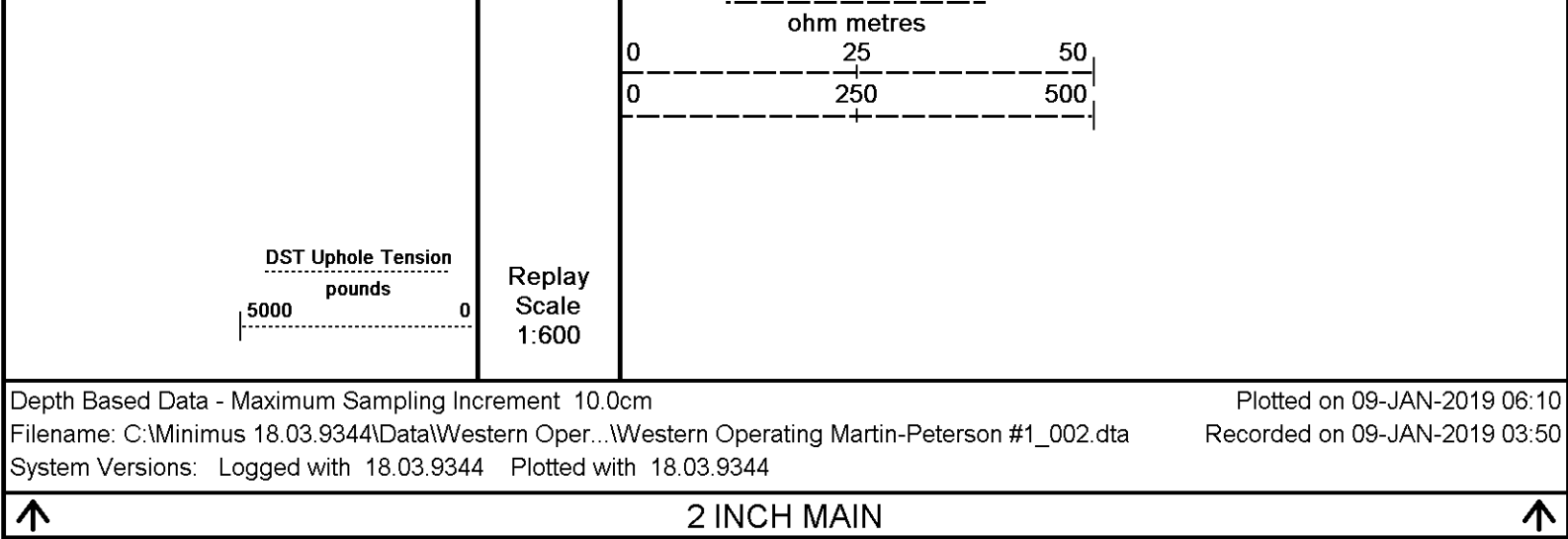


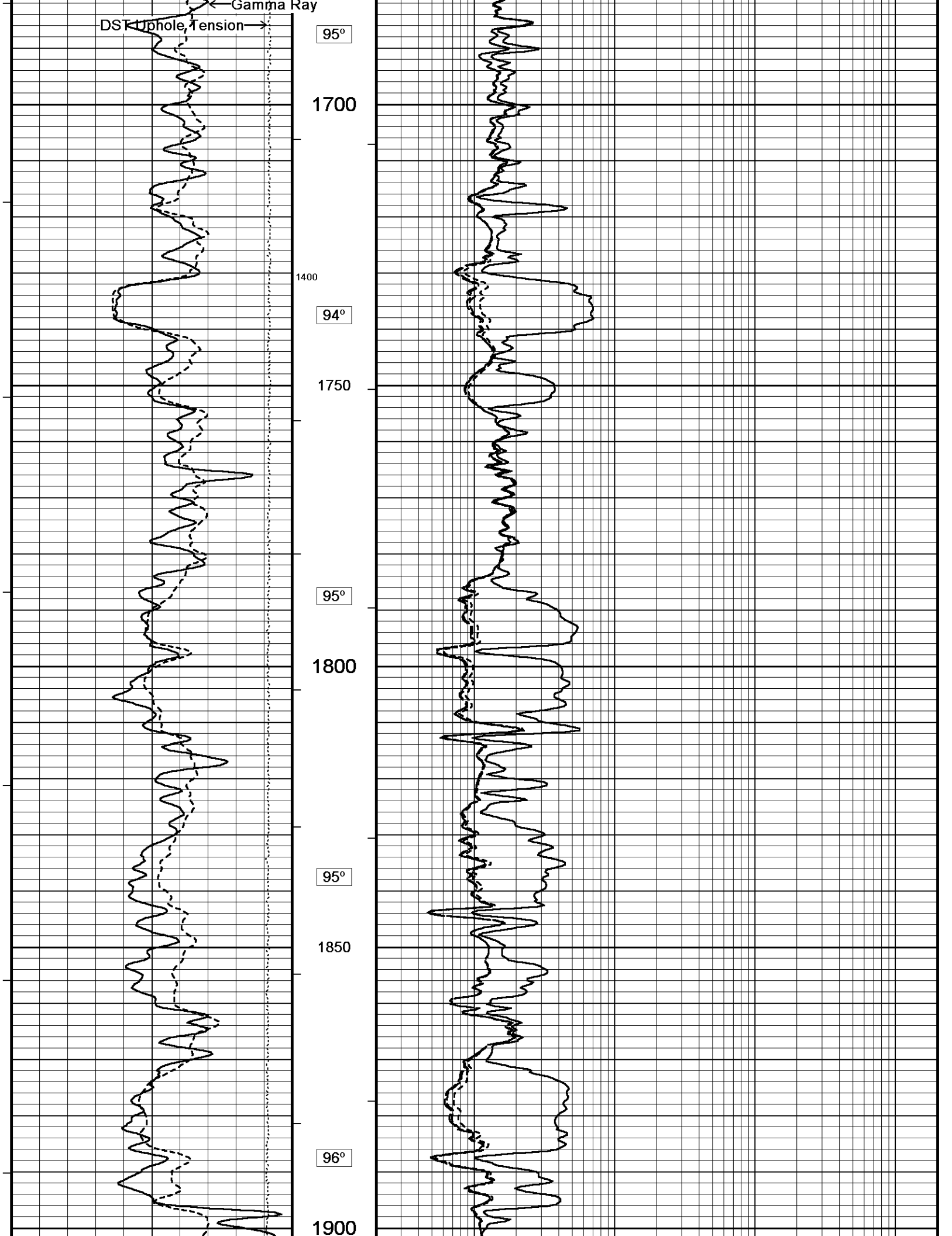


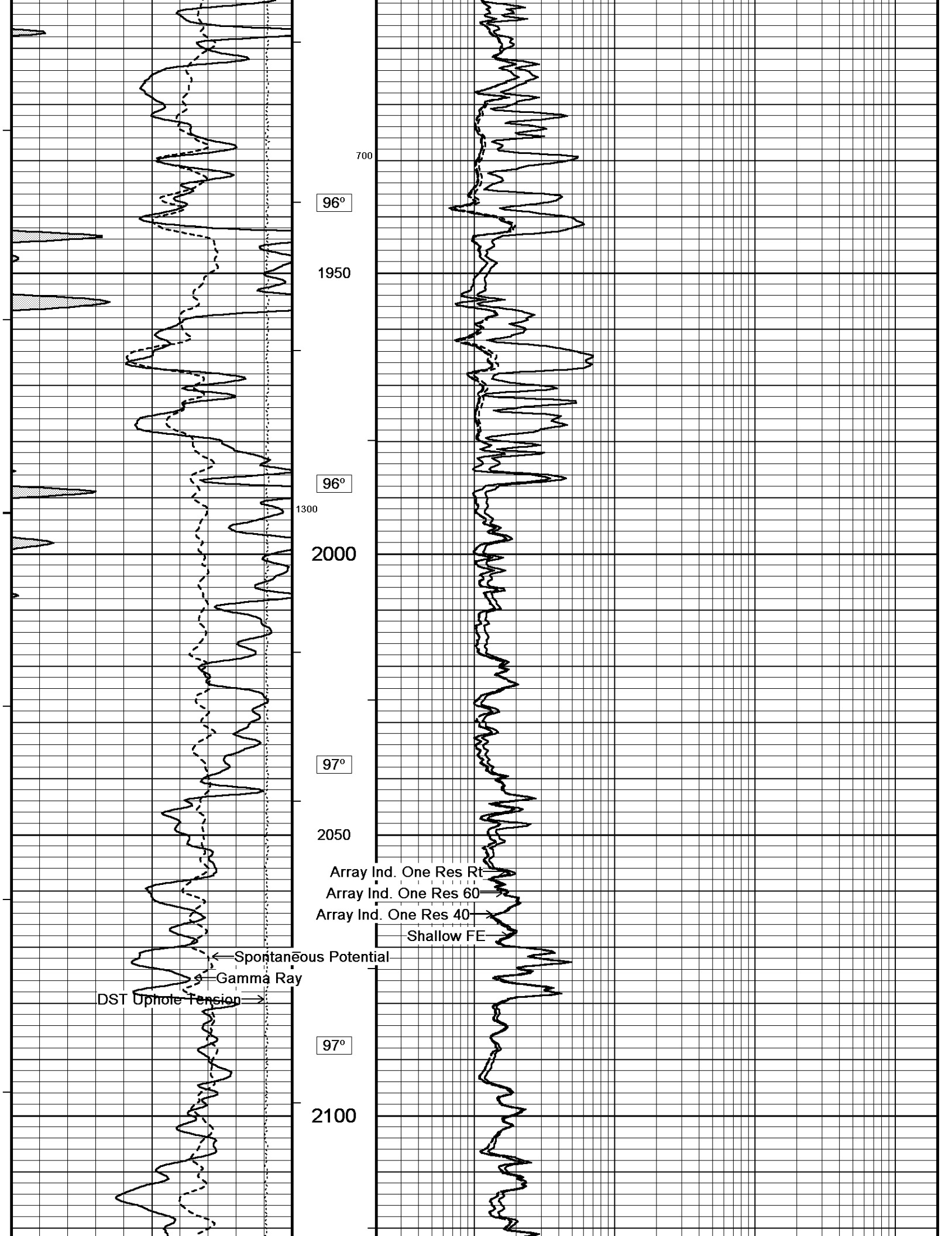


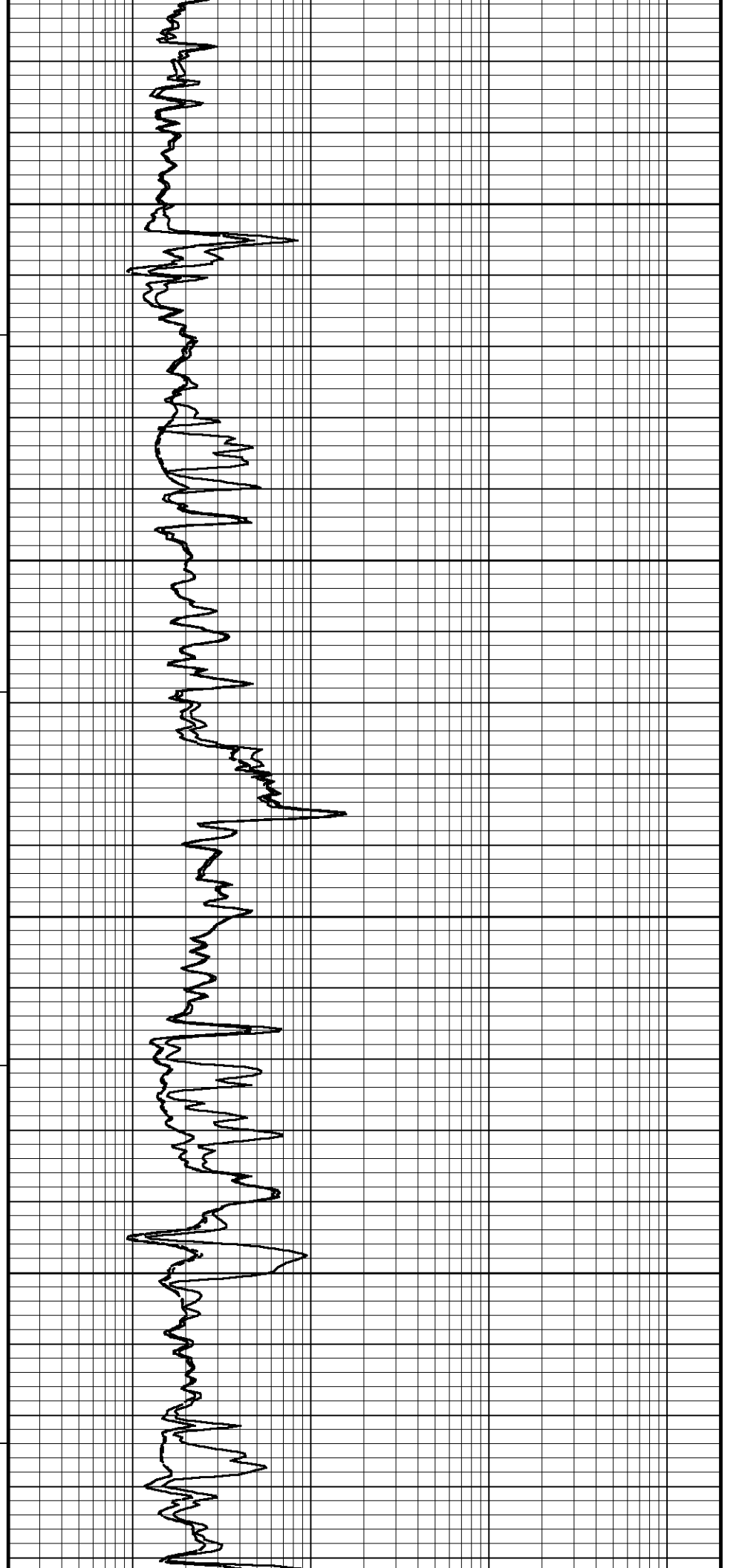
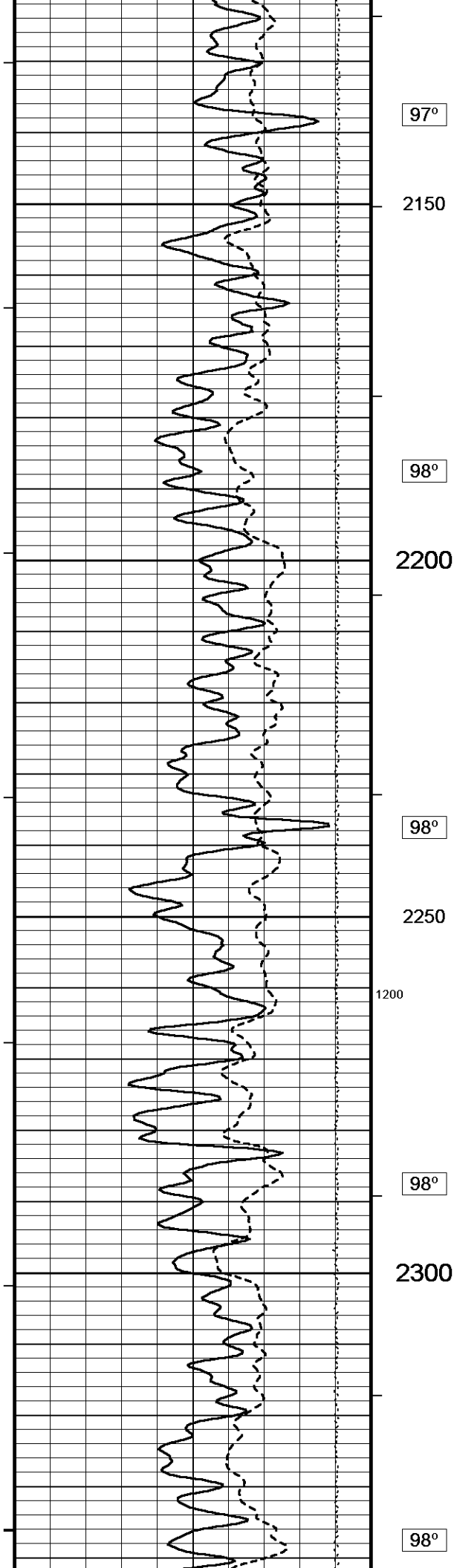


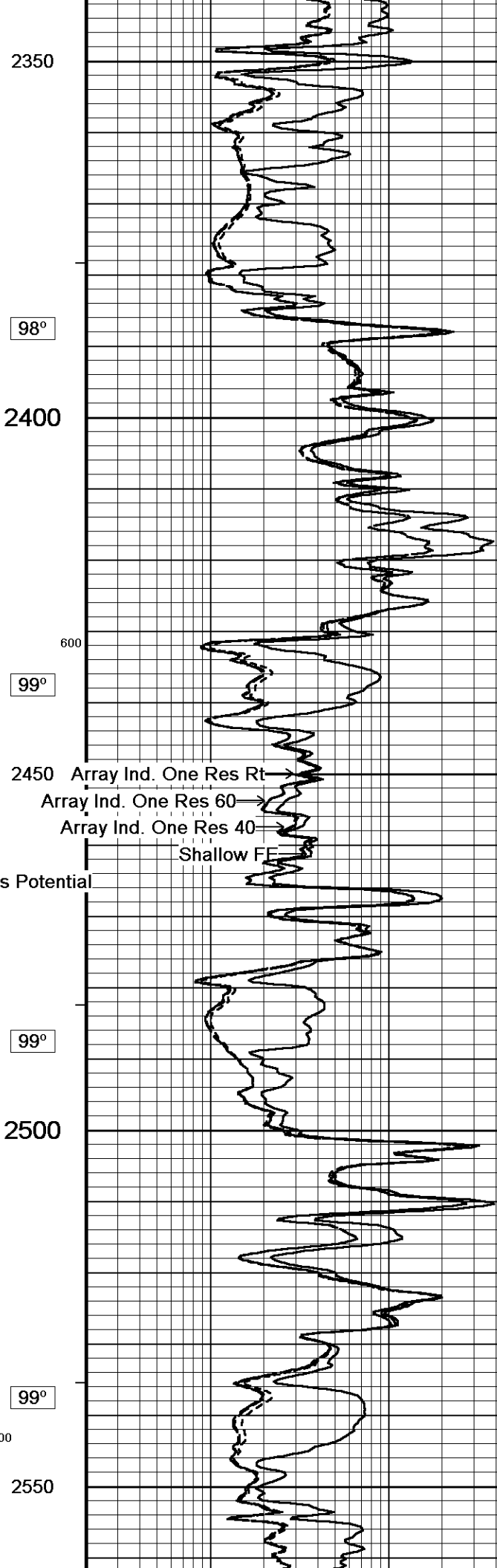
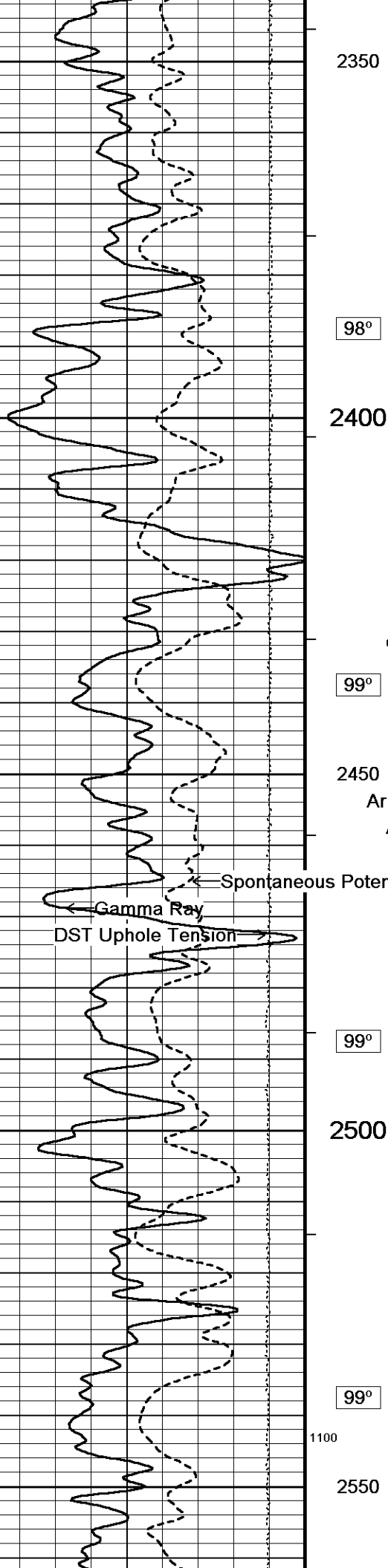


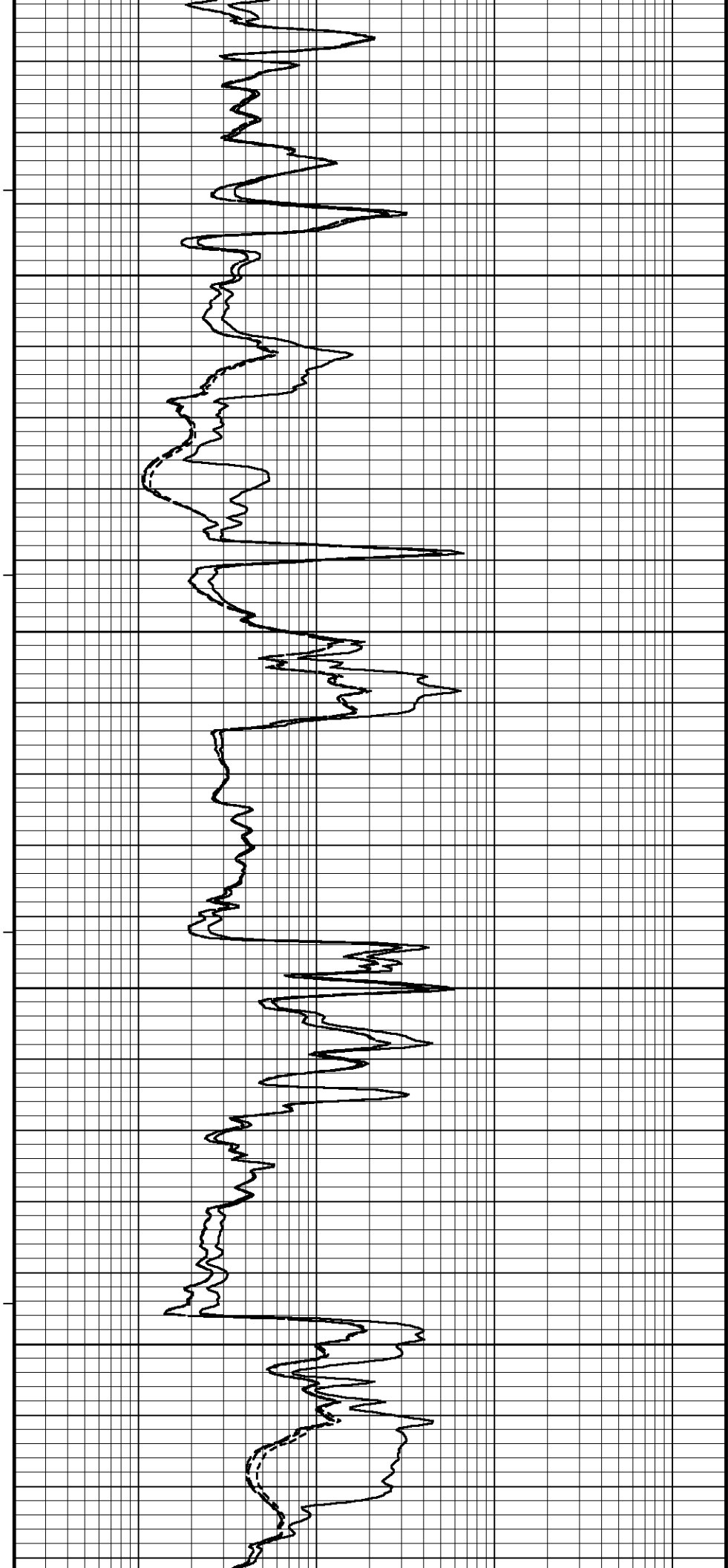
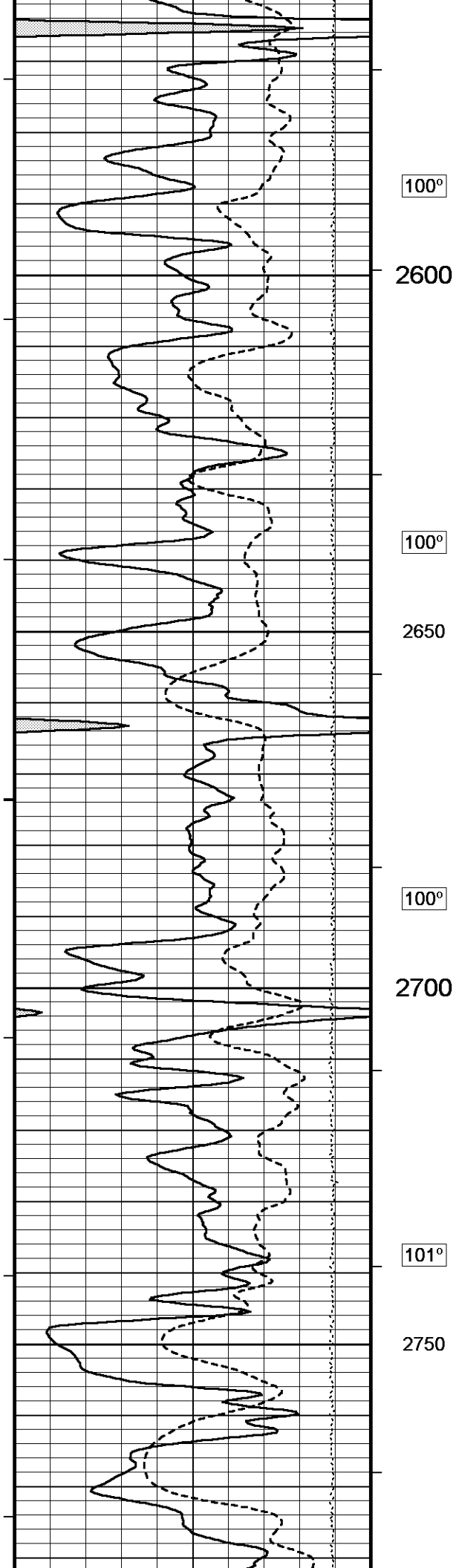


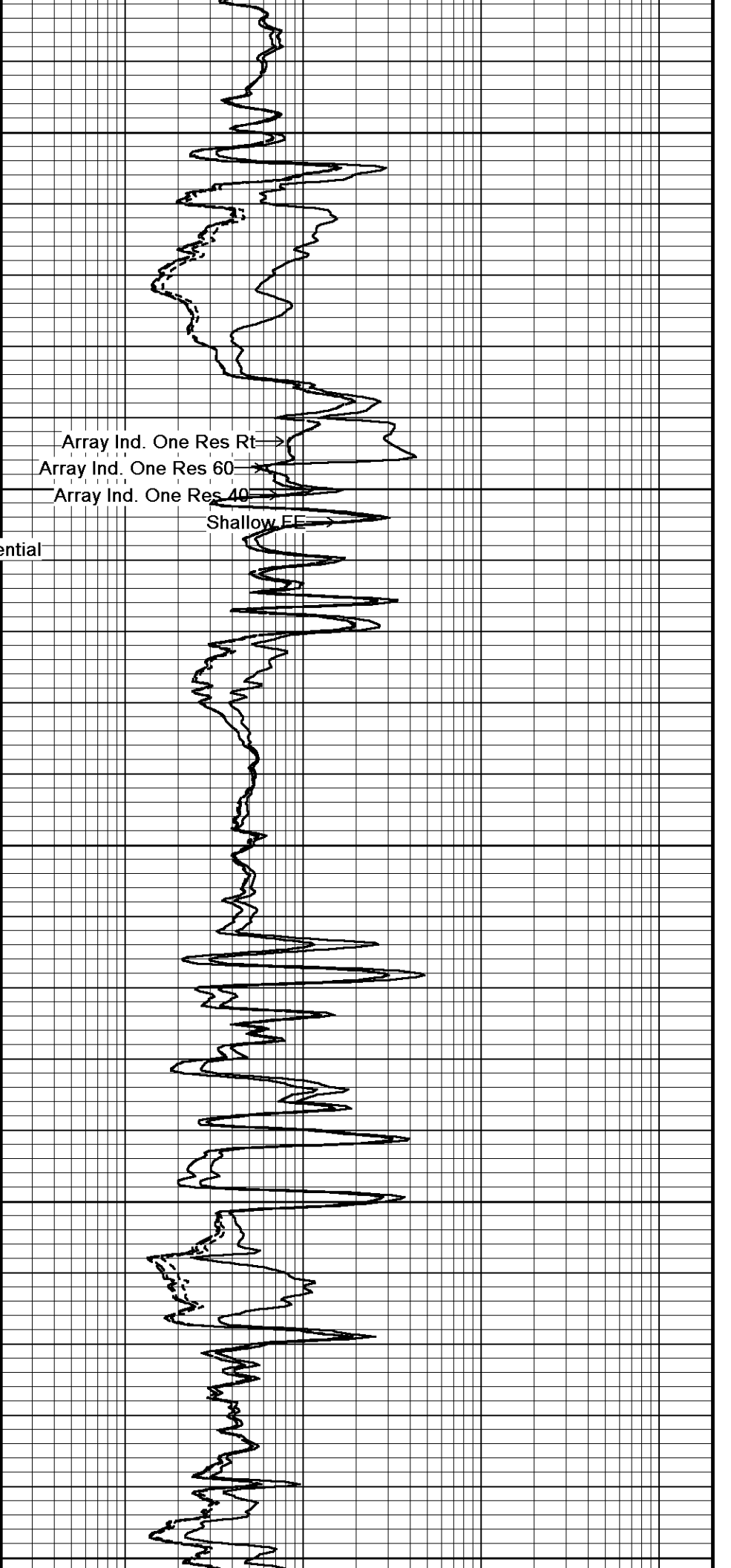
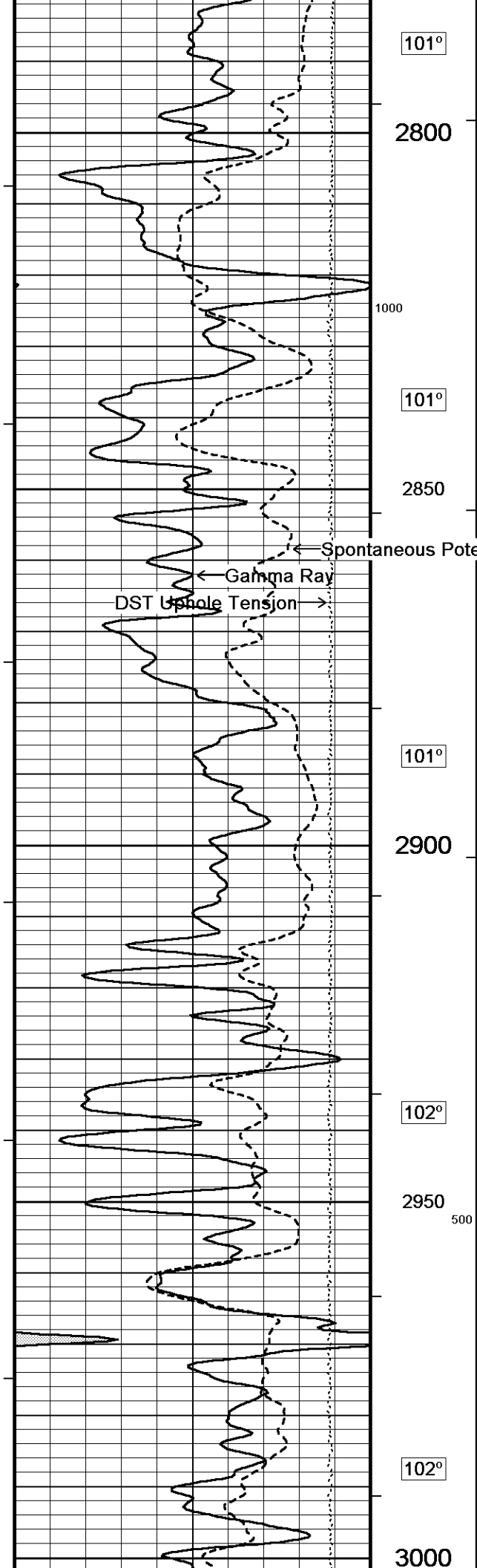


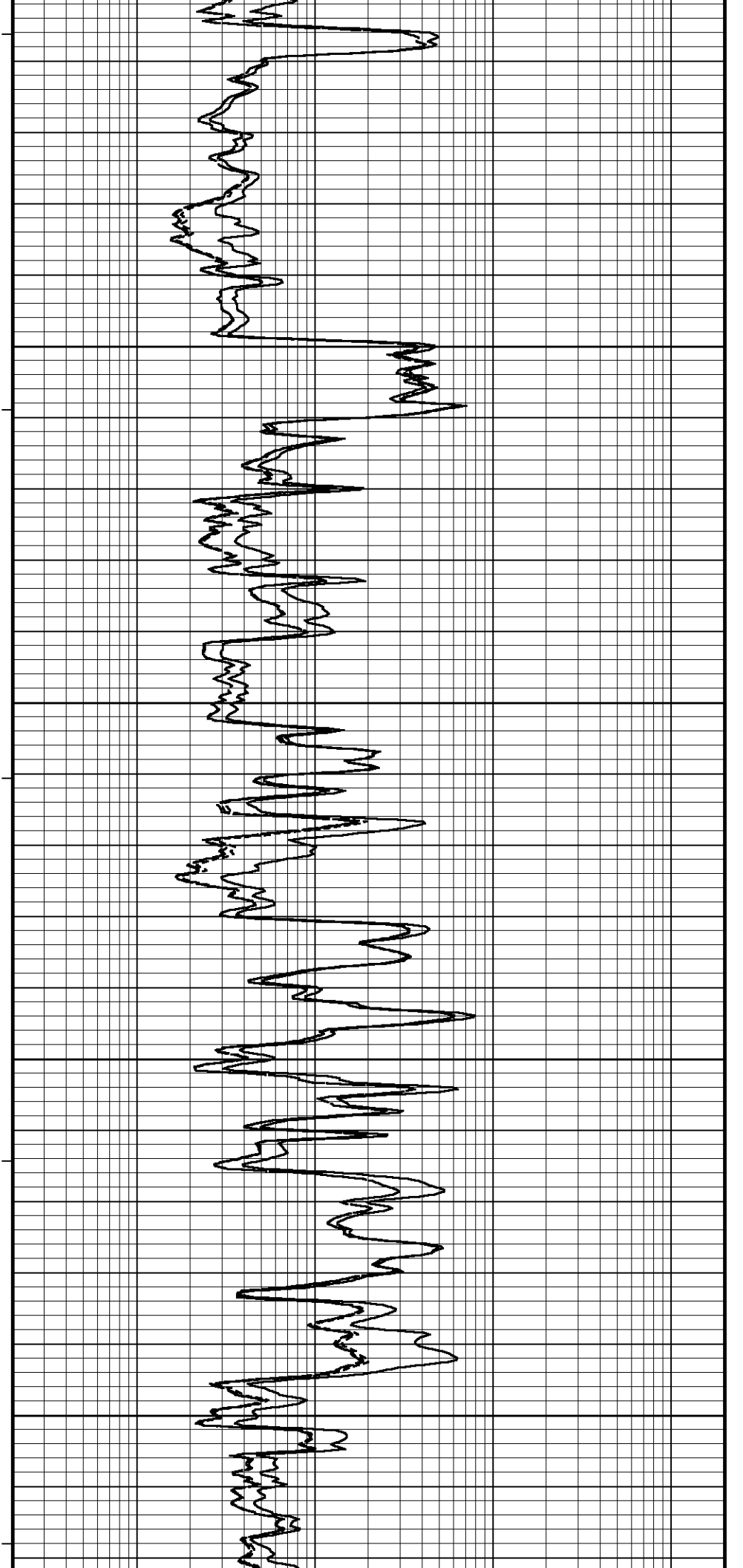
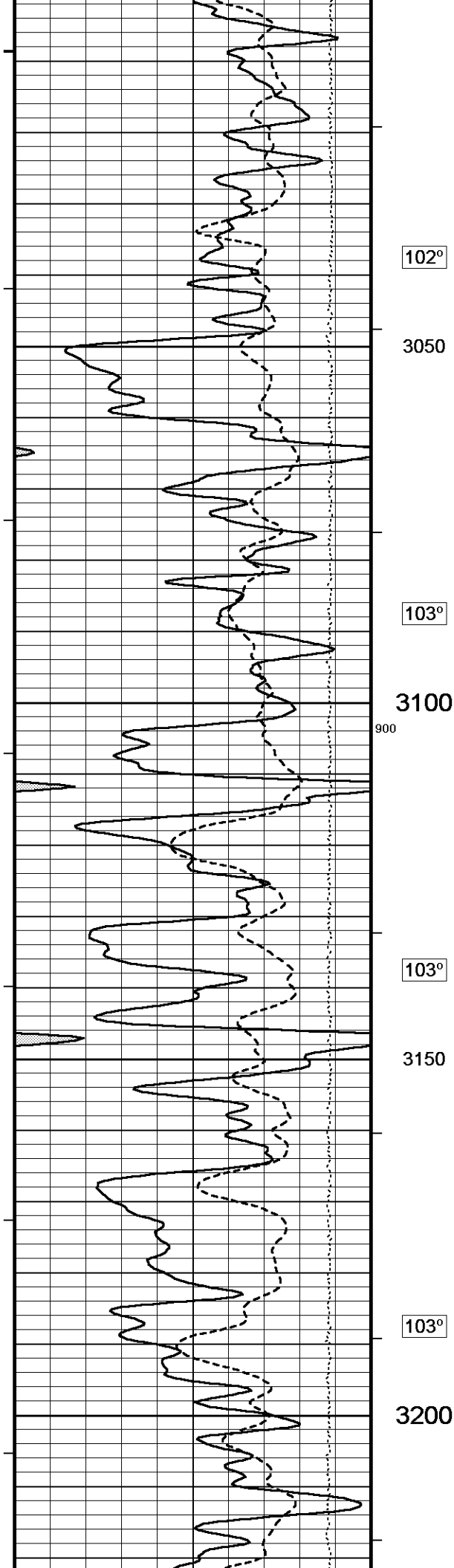


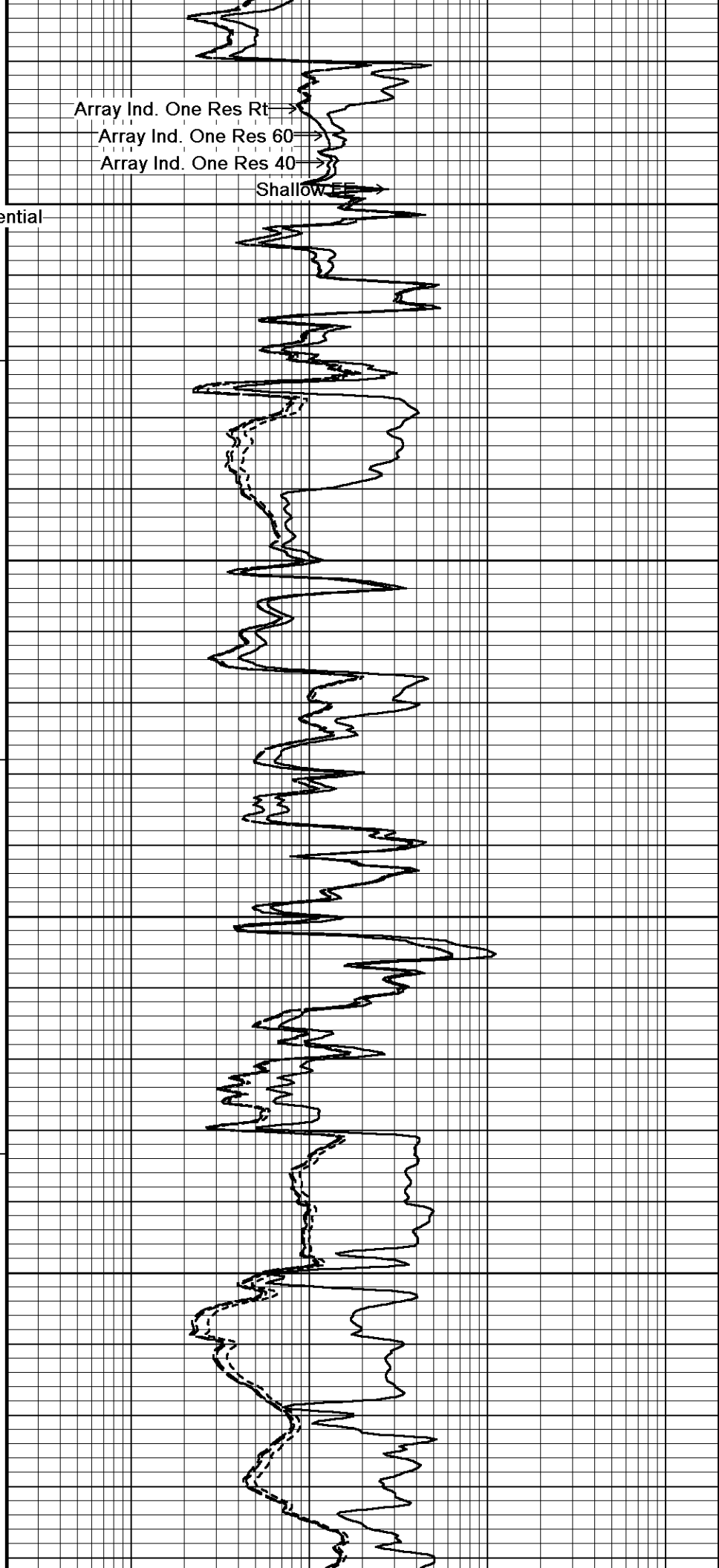
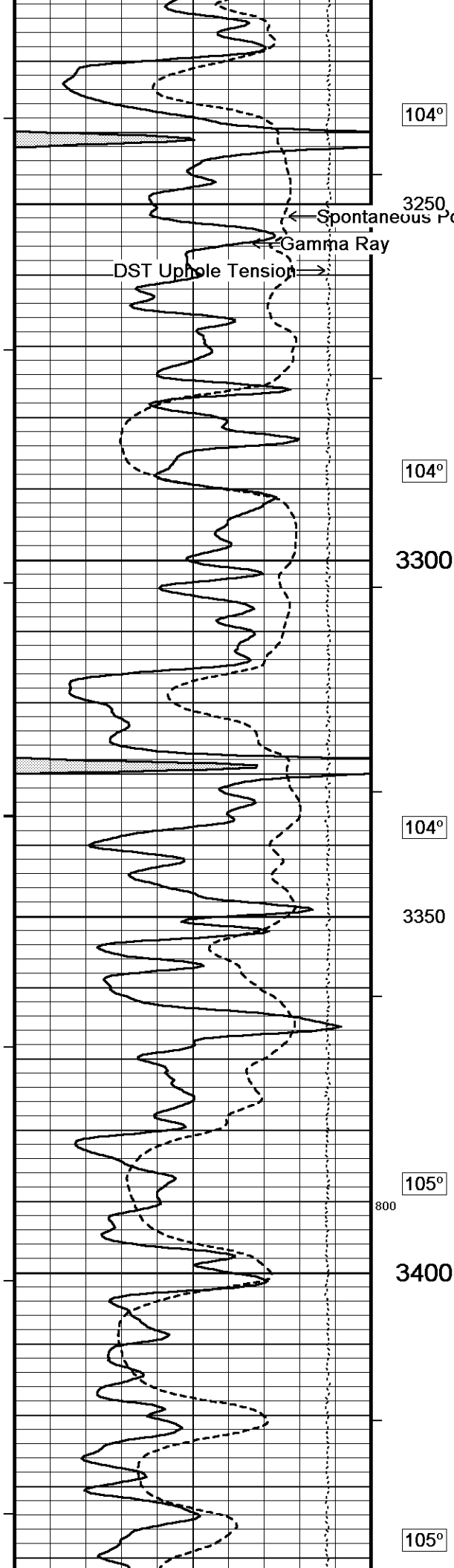


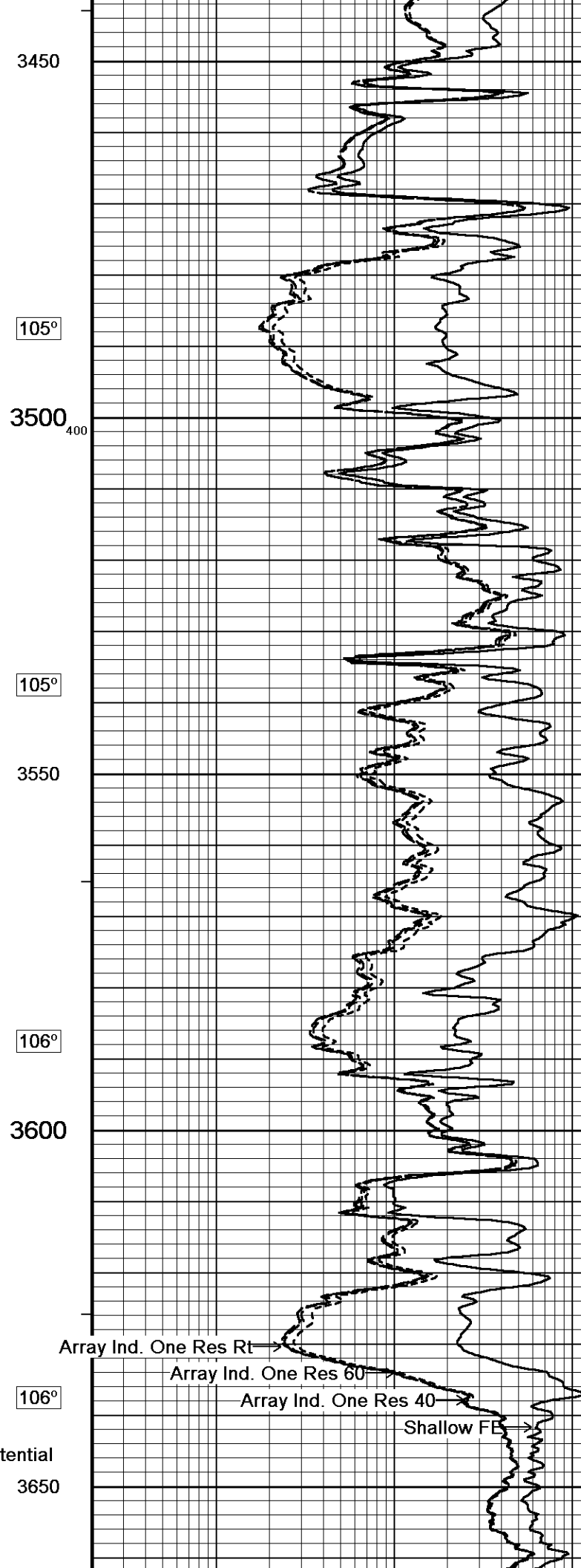
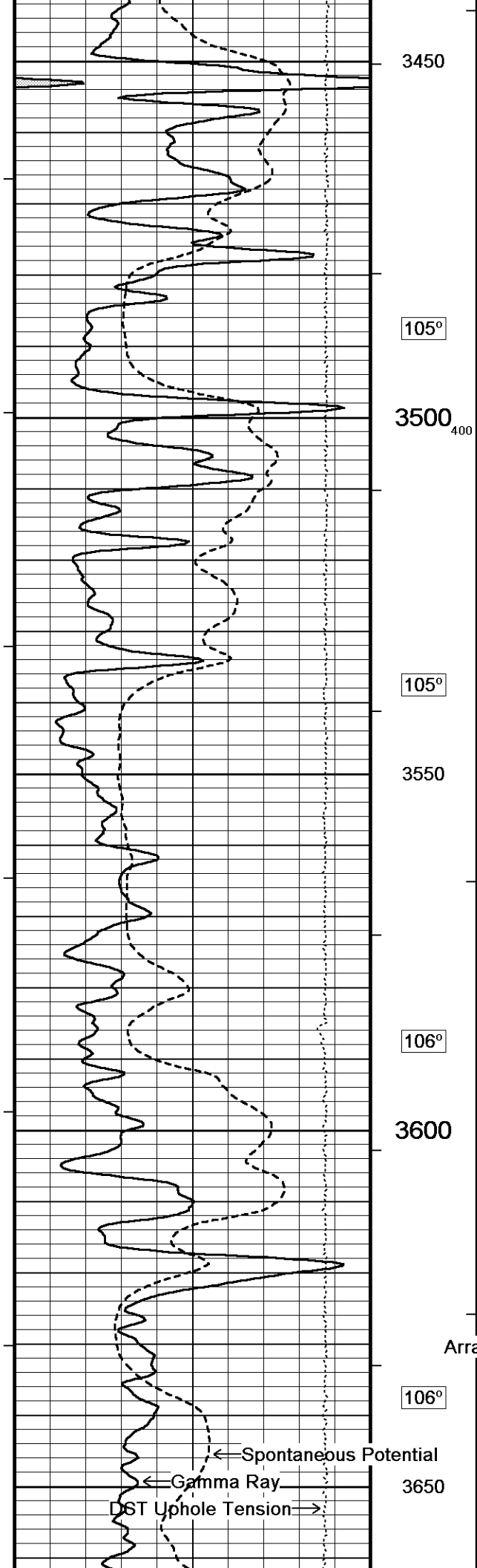


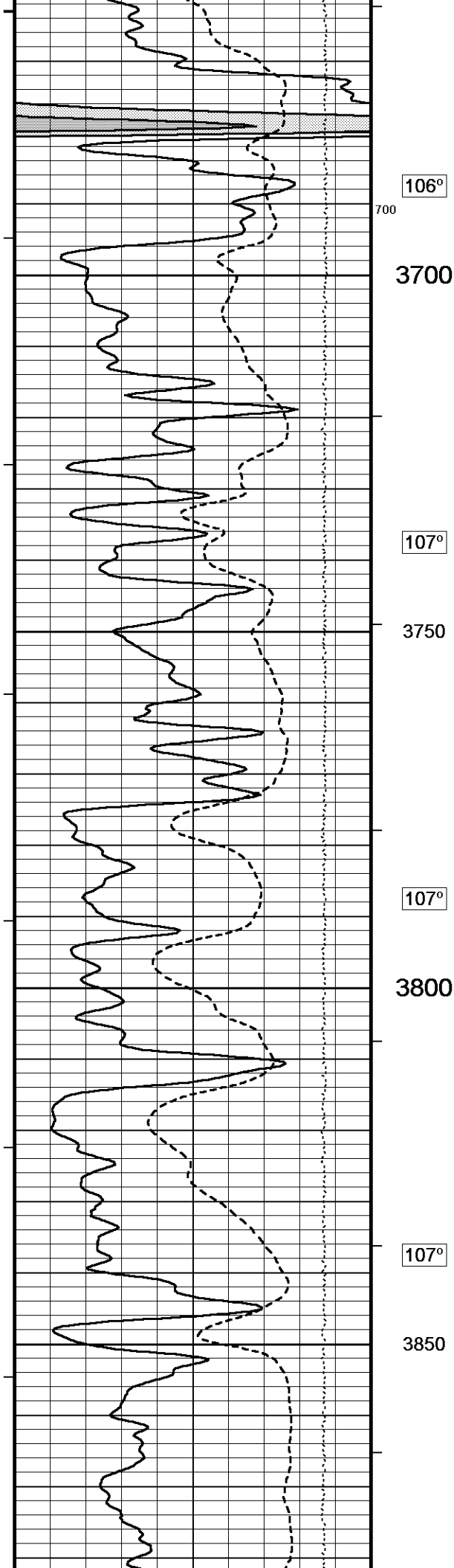












106°

3700

107°

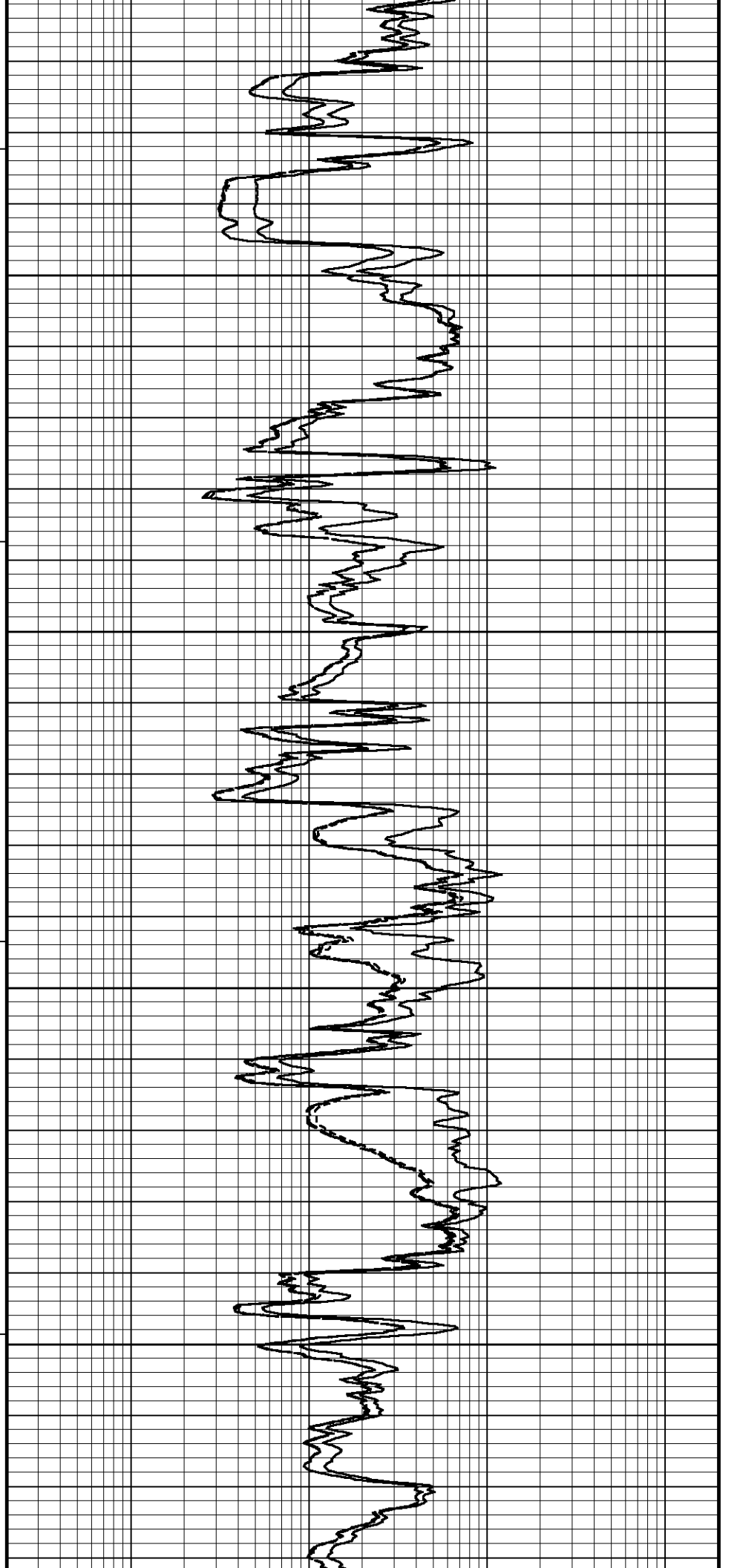
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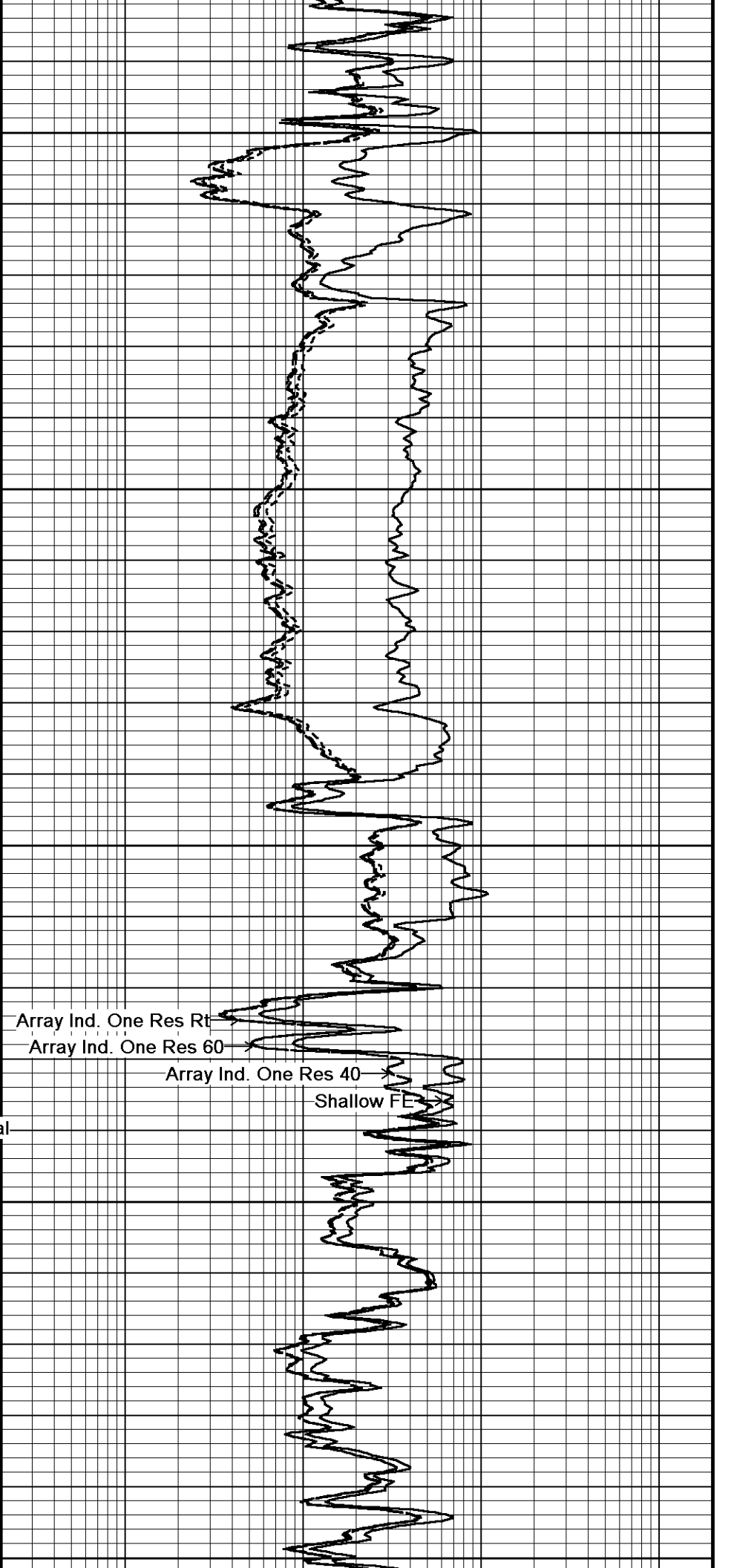
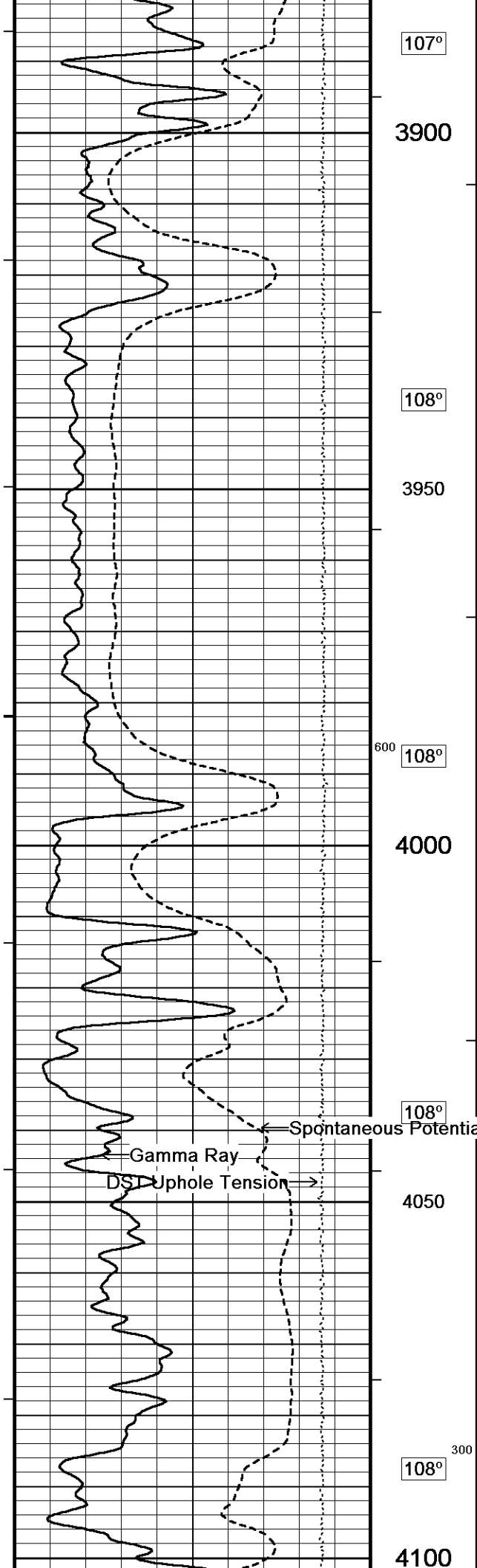
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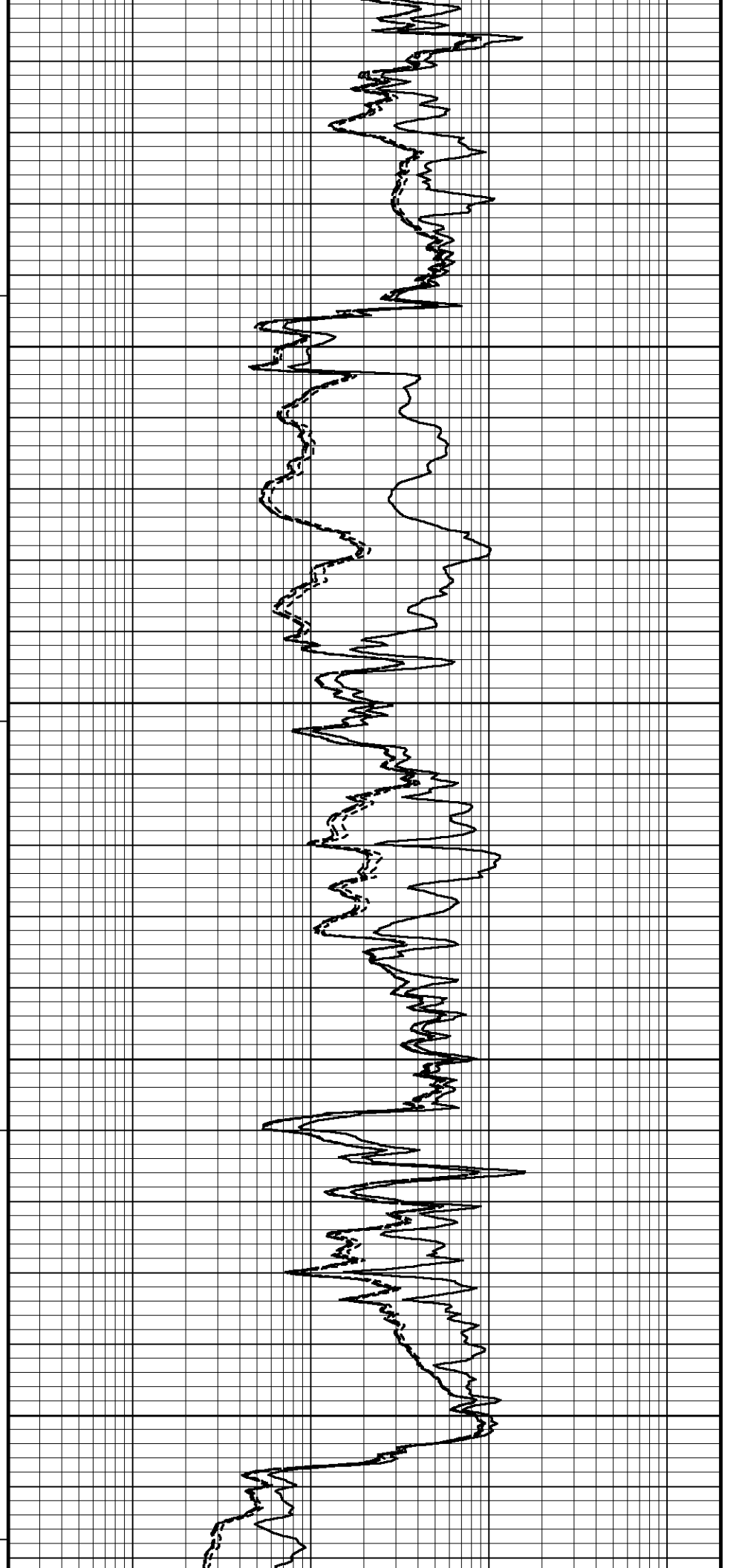
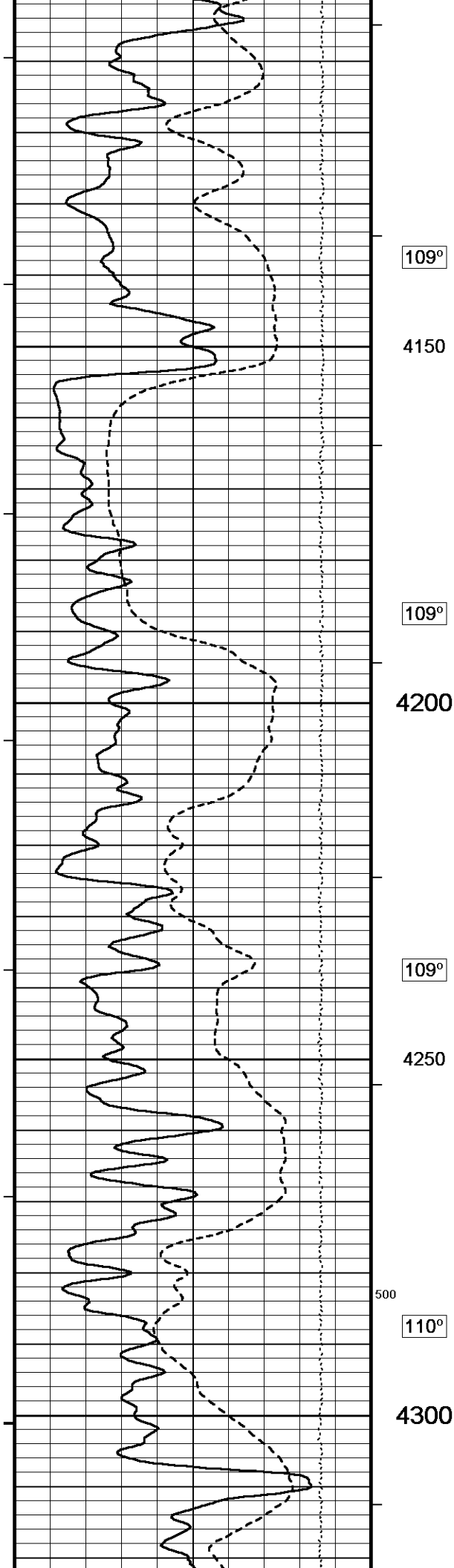
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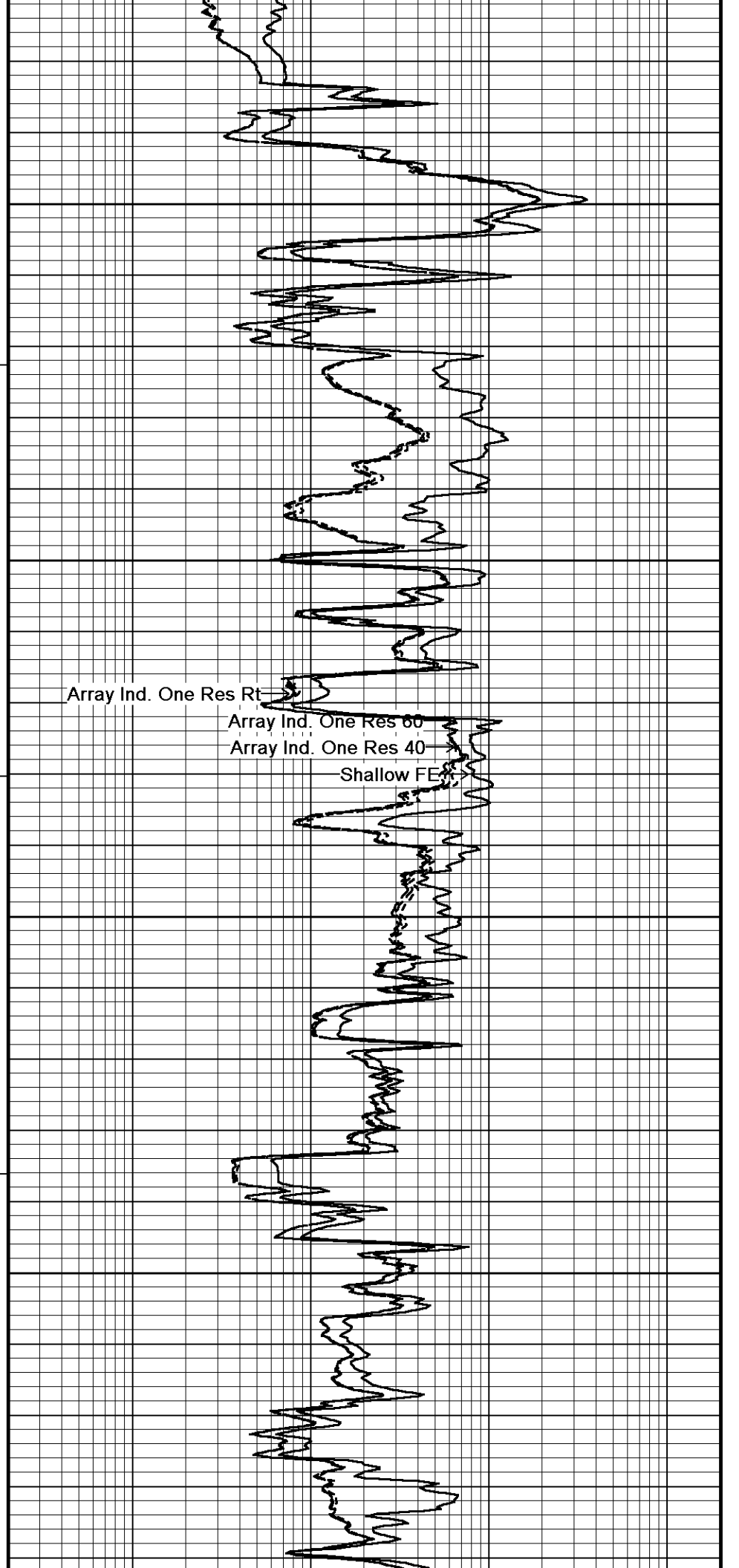
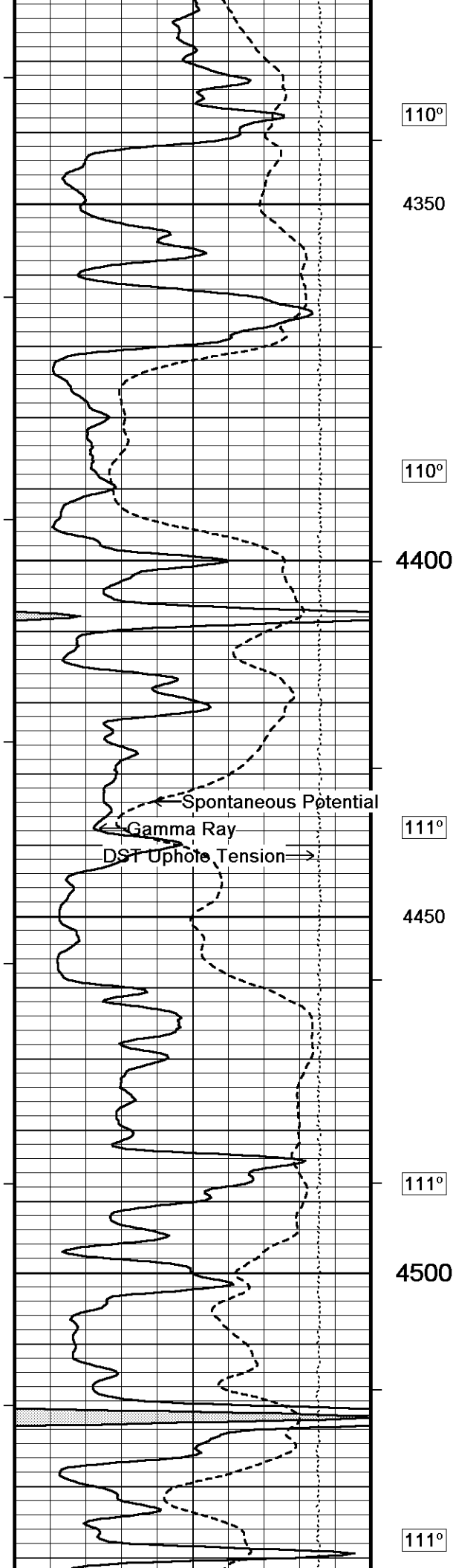
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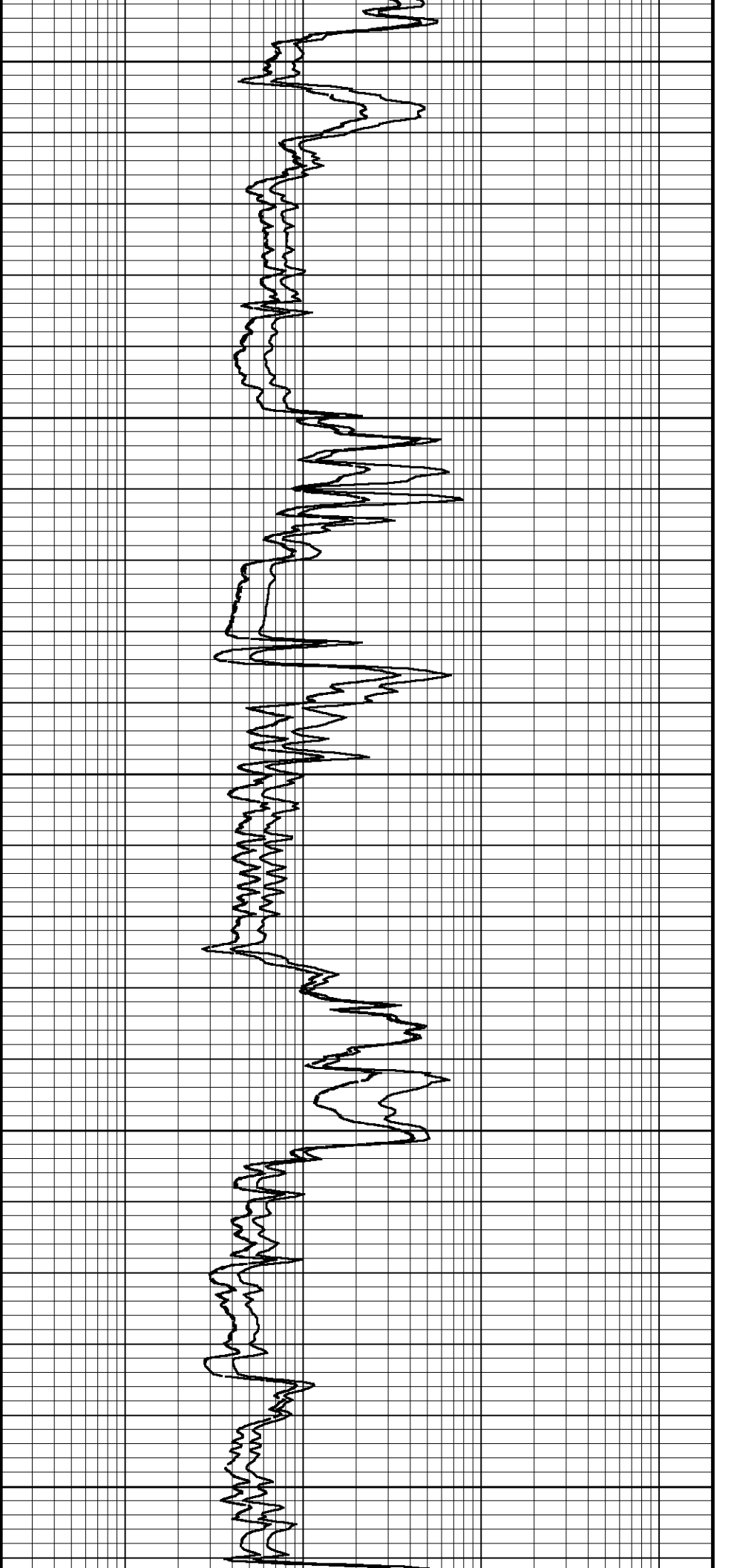
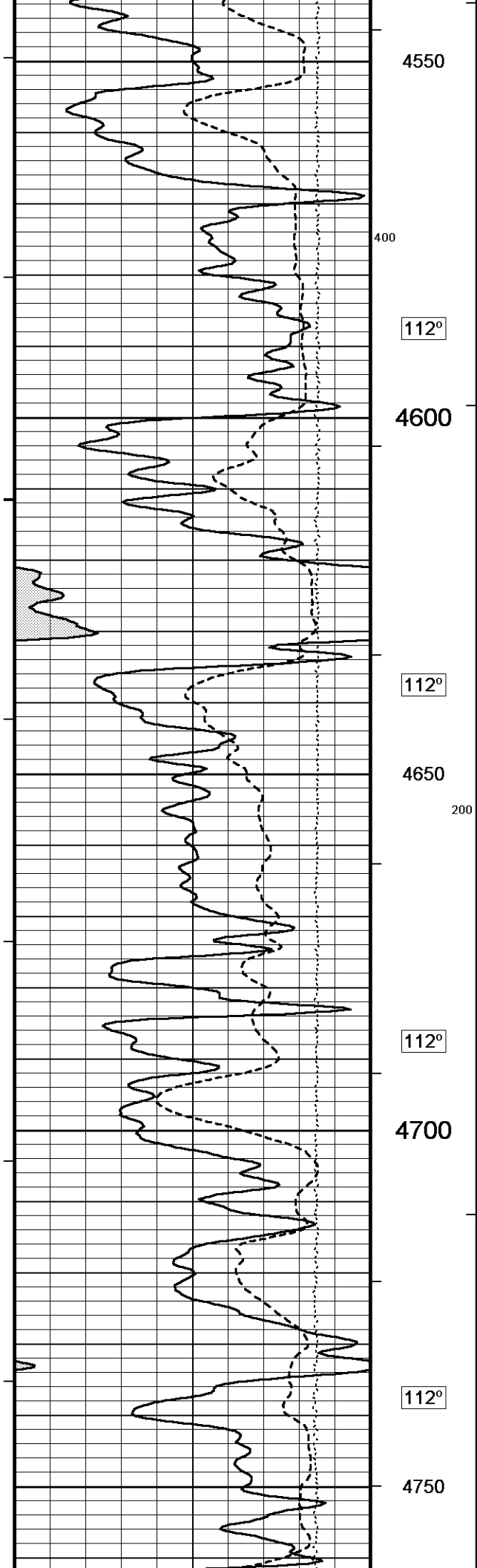
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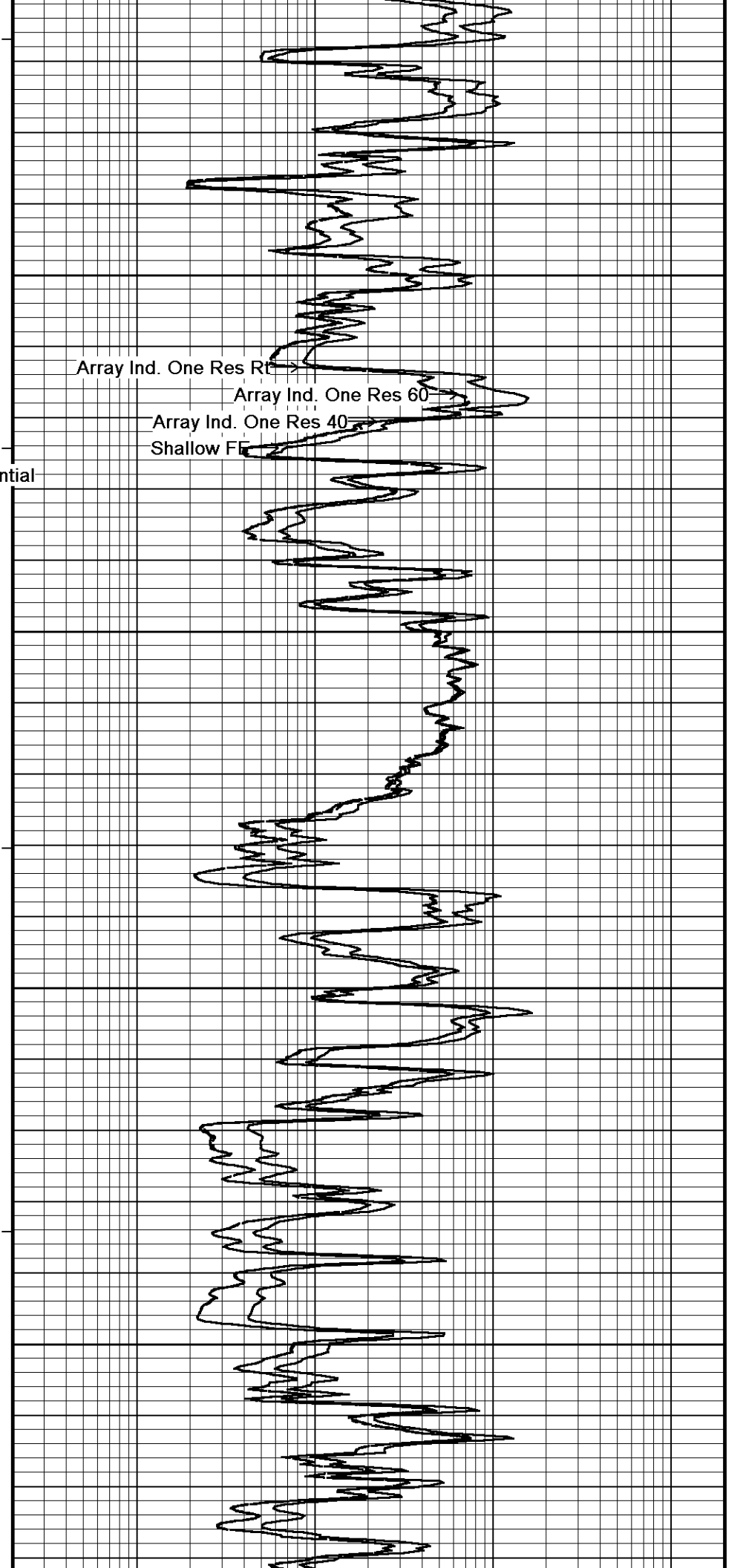
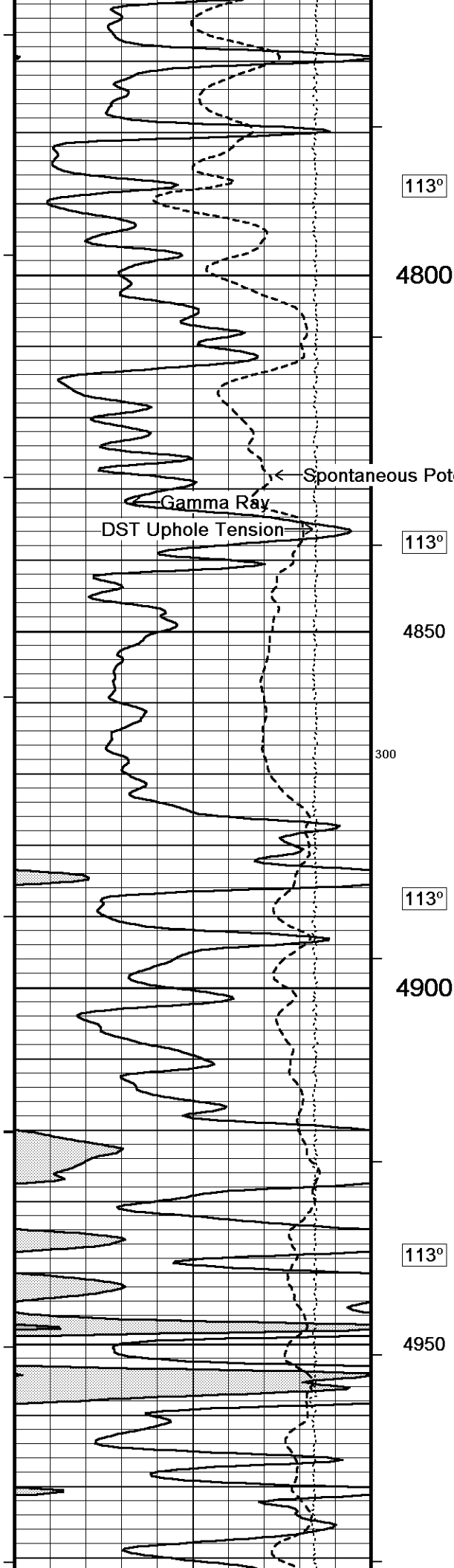


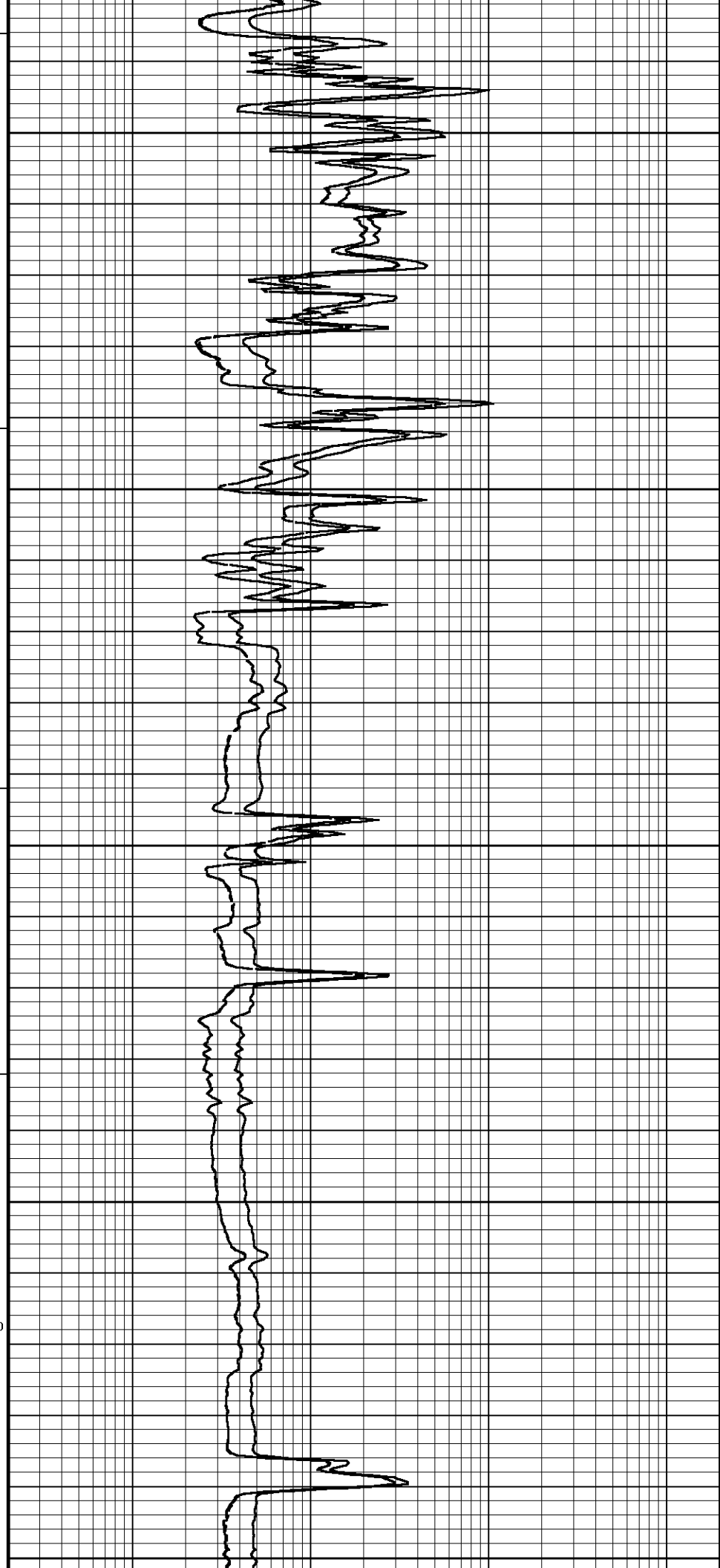
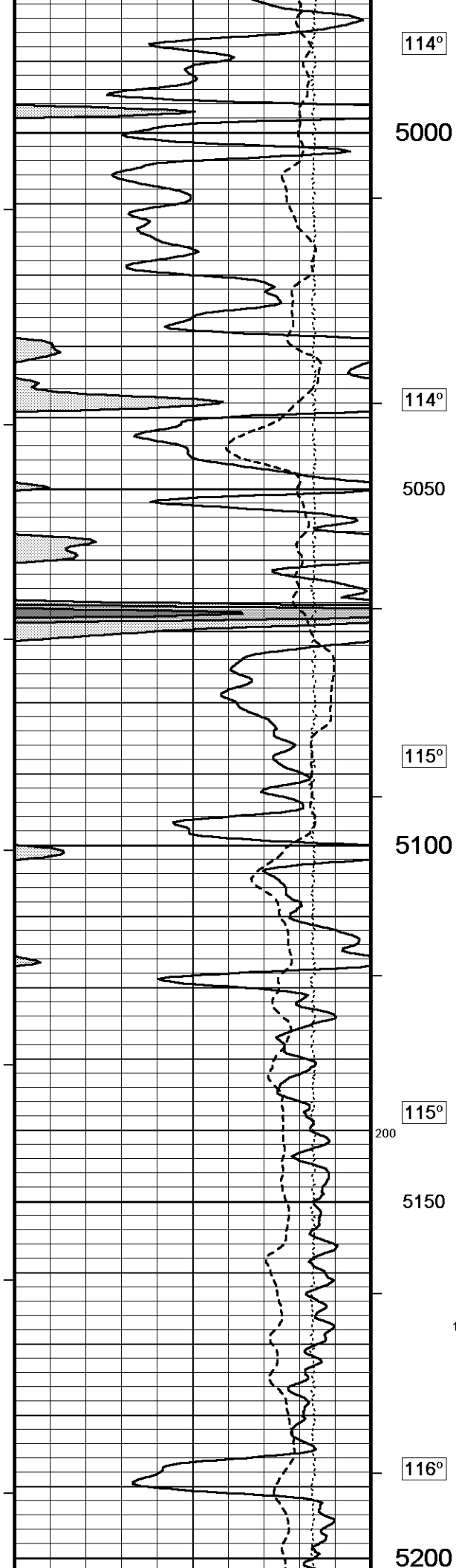


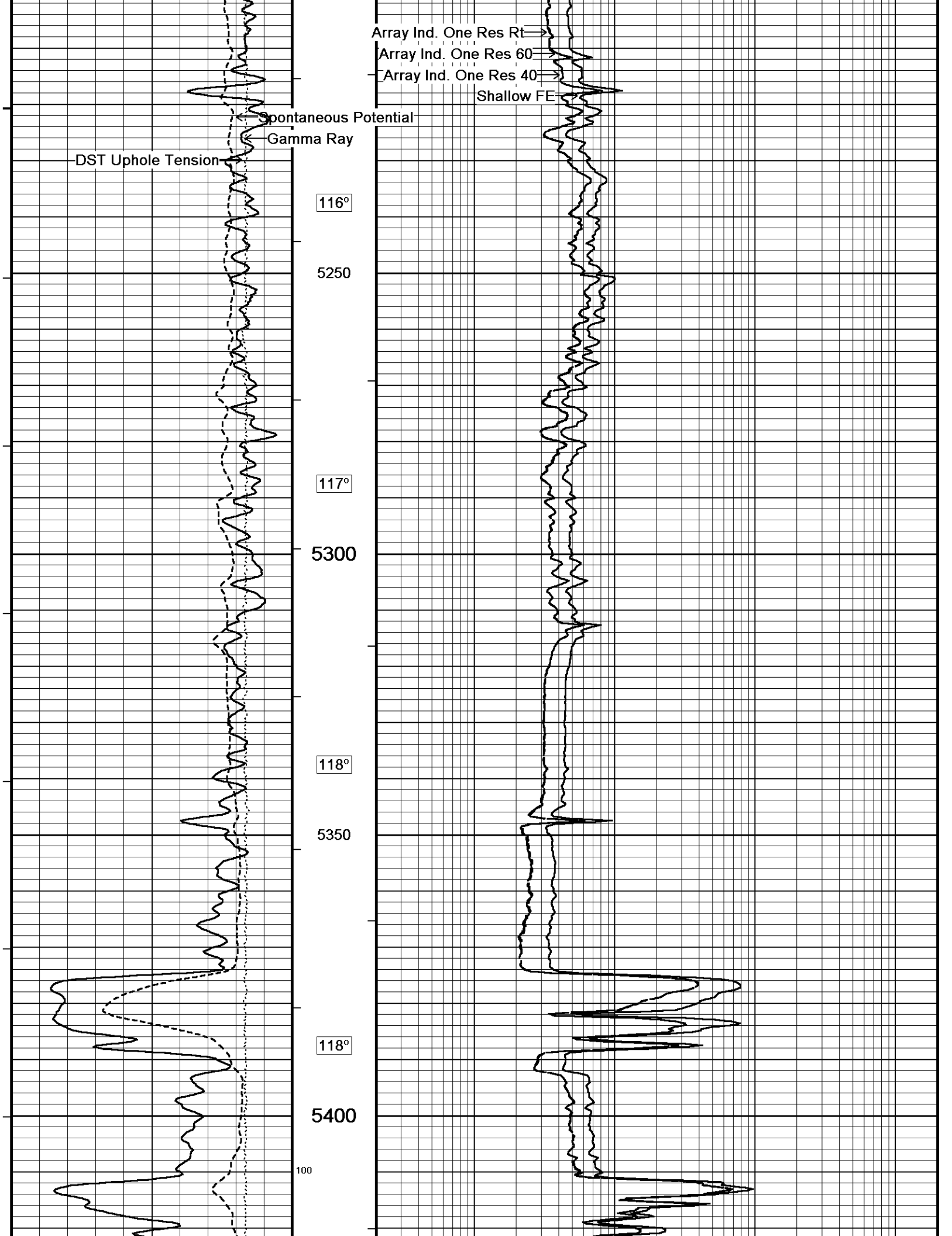


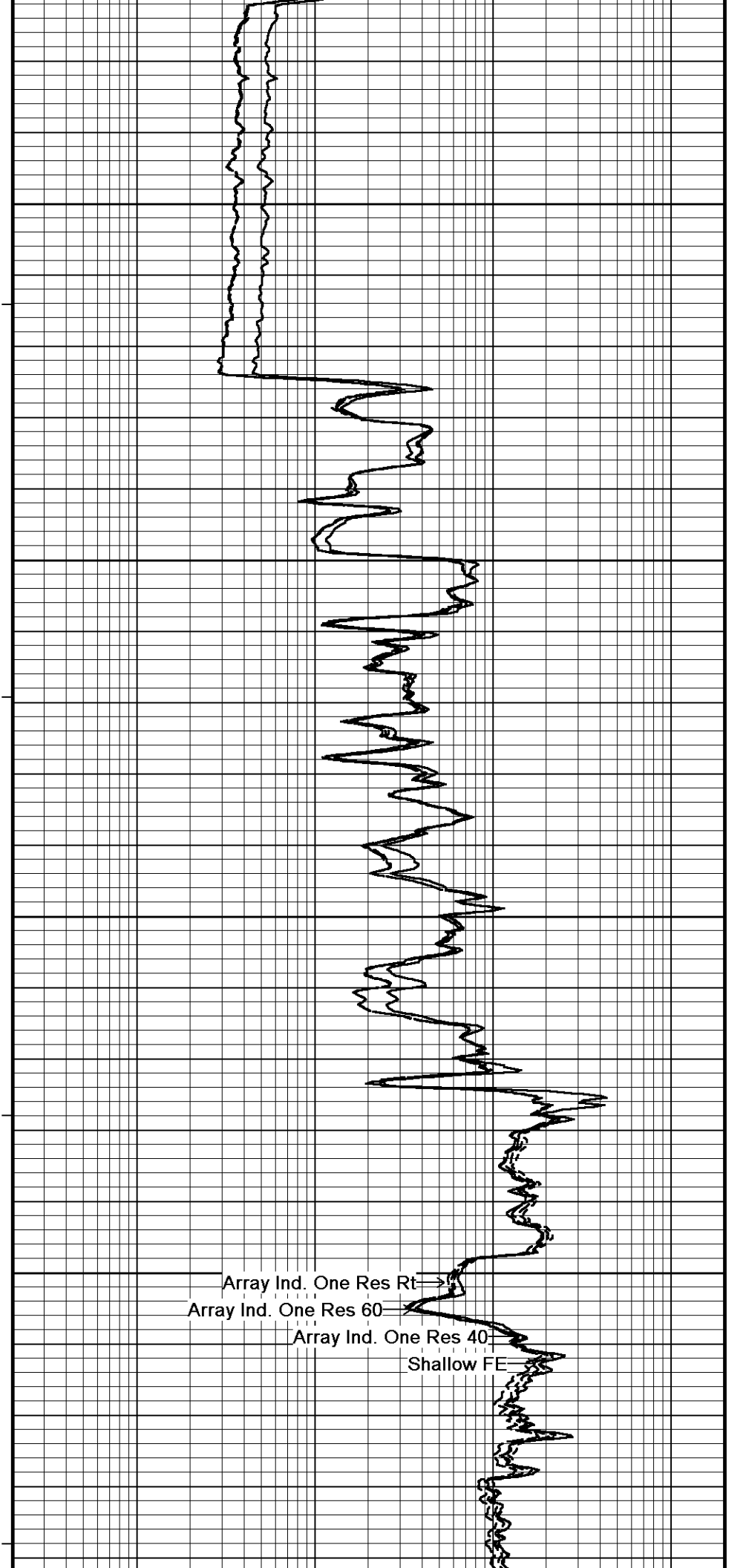
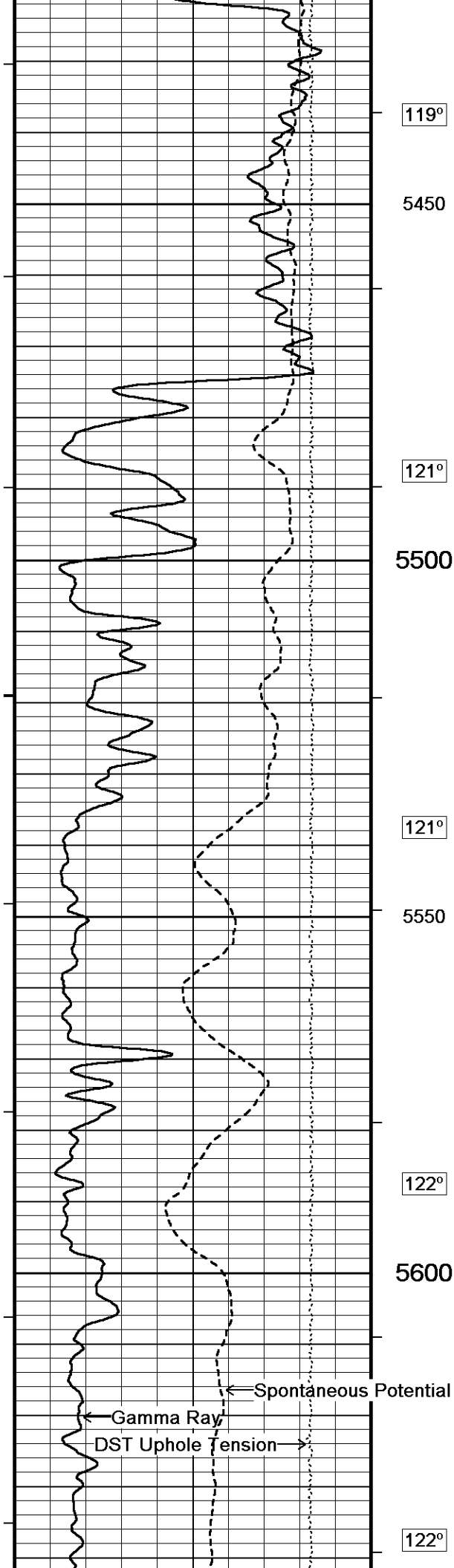


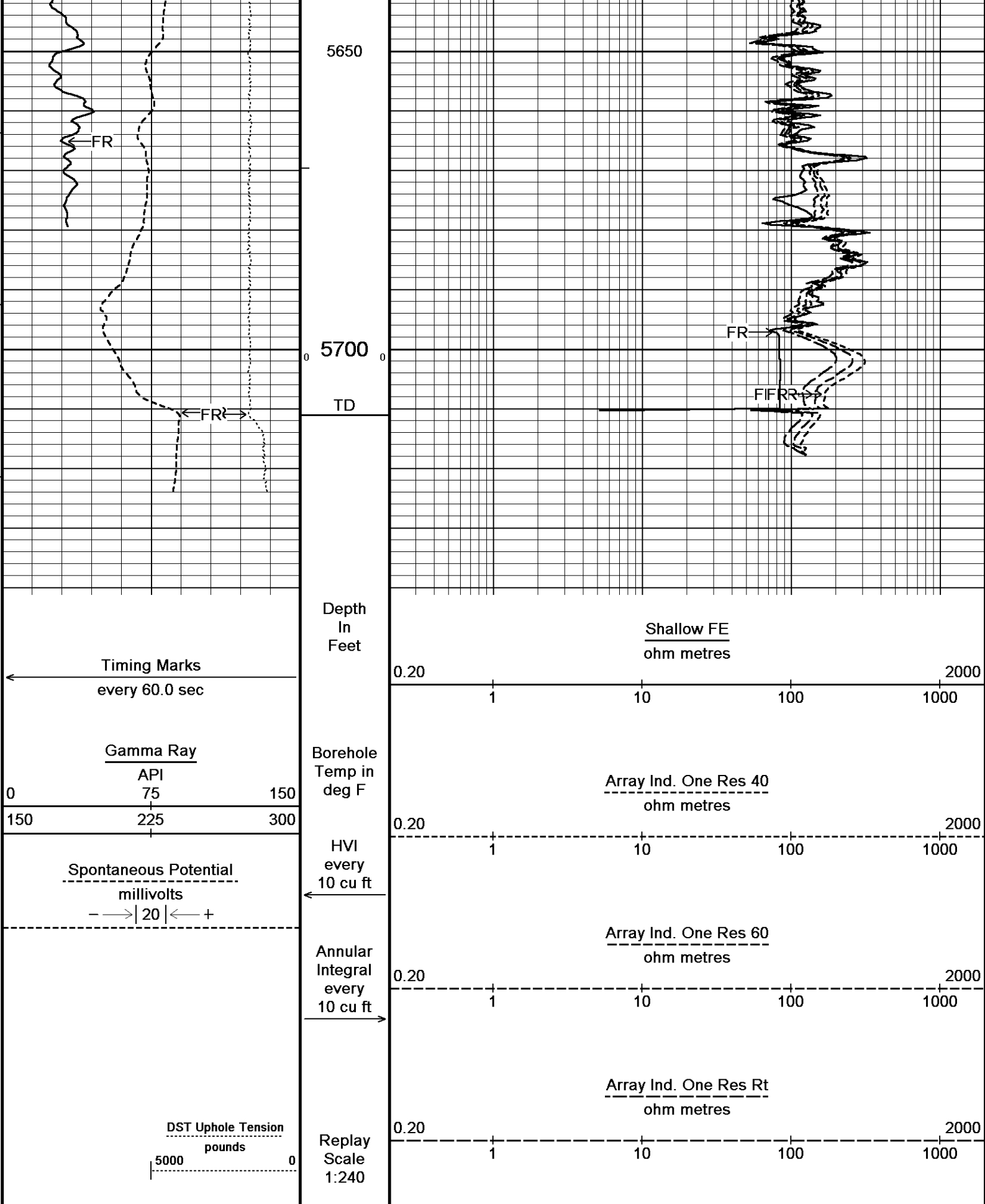


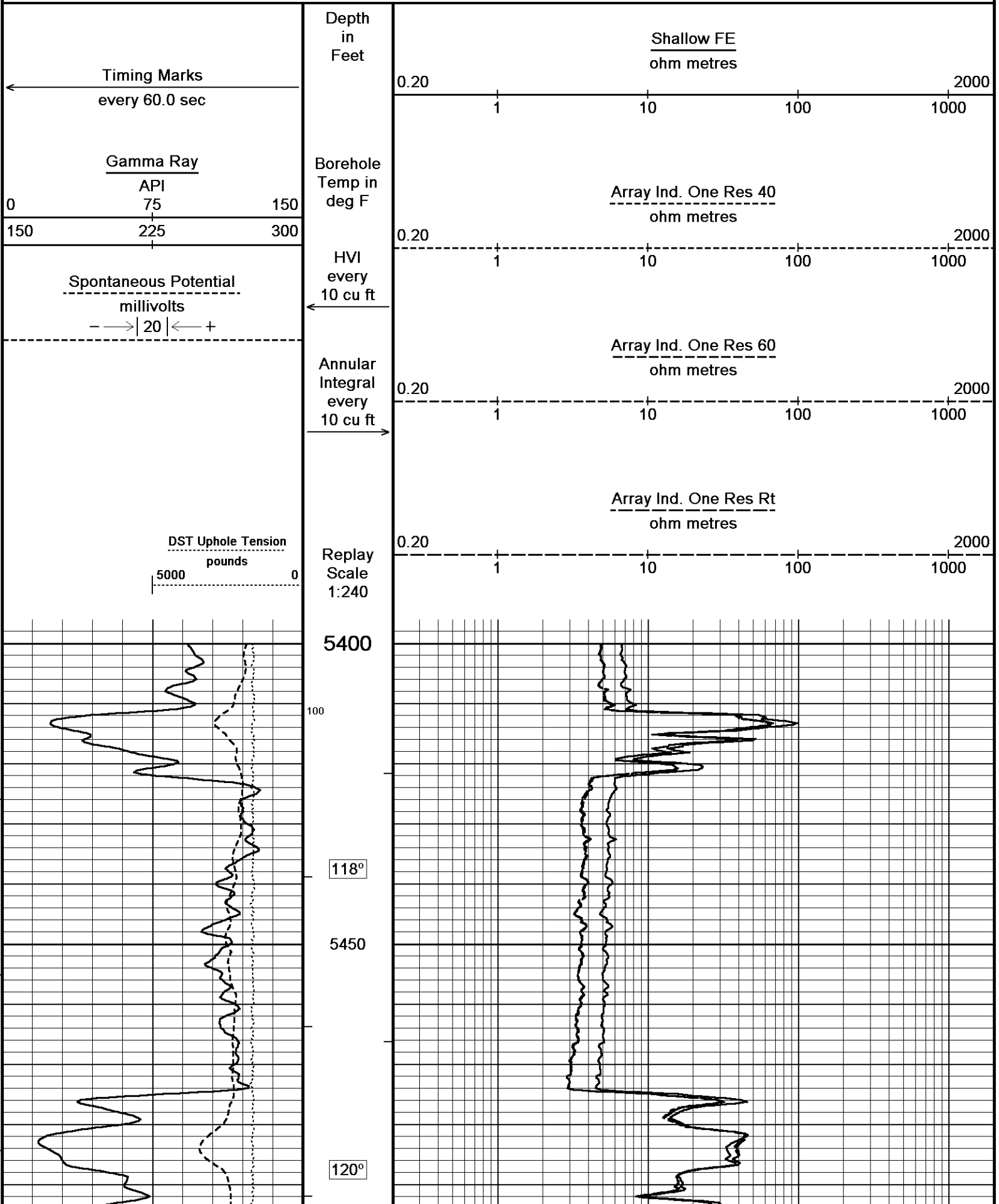












5500

120°

5550

121°

5600

← Spontaneous Potential

Gamma Ray

DST Uphole Tension →

121°

5650

FR

5700

0

TD

← FR →

Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE

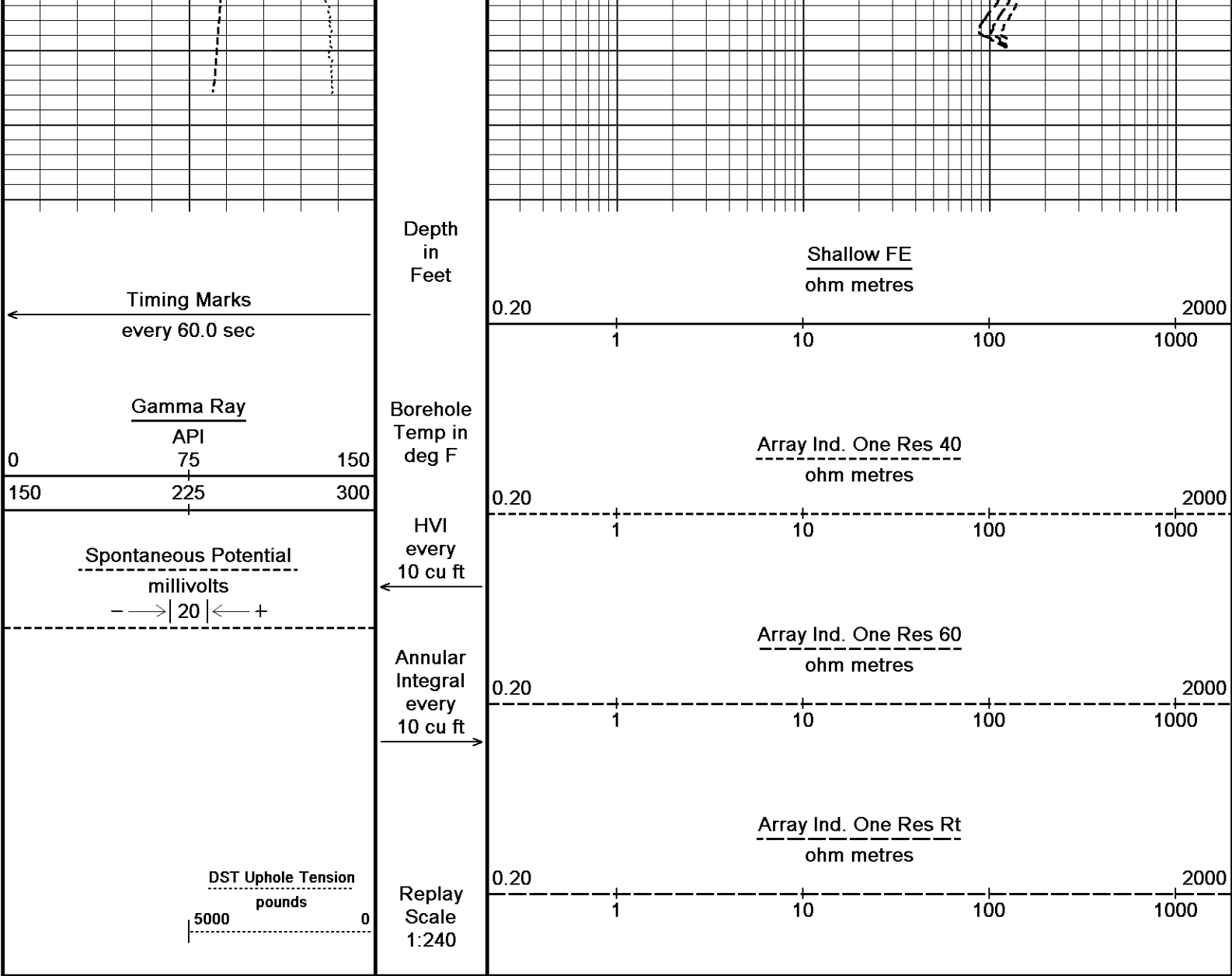
FR

FRFR

0

TD

← FR →



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.03.9344\Data\Western Operating Martin-Peterson #1_001.dta
System Versions: Logged with 18.03.9344 Plotted with 18.03.9344

Plotted on 09-JAN-2019 06:10
Recorded on 09-JAN-2019 03:31

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION		
C:\Minimus 18.03.9344\Data\Western Operating Martin-Peterson #1\Western Operating Martin-Peterson #1_001.dta		
General Constants All 000		Last Edited on 09-JAN-2019,03:06
General Parameters		
Mud Resistivity	1.860	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 08-JAN-2019 22:15
	Measured	Calibrated (API)
Background	120	84
Calibrator (Gross)	774	540
Calibrator (Net)	654	456
Gamma Calibration Tolerances MCG-D.K 443		
Ratio	1.435	1.40 1.475 1.55 Counts/API
Gamma Constants MCG-D.K 443		Last Edited on 09-JAN-2019,01:30
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	%
FE Calibration MFE-B.J 352		Base Calibration on 07-JAN-2019,10:39 Field Check on 08-JAN-2019 21:40
	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		276.0
FE Calibration Tolerances MFE-B.J 352		
Reference 2	982.1	-3% 980.0 +3% ohm
Base Check	276.0	-2% 277.0 +2% ohm-m
Field Check	276.0	-2% 276.0 +2% ohm-m
FE Constants MFE-B.J 352		Last Edited on 08-JAN-2019,21:39
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 07-JAN-2019 10:28 Field Check on 08-JAN-2019 21:39
Factory Loop Calibration		
High Conductivity Reference Resistor	3.3	ohm

High Conductivity Reference Resistor 333.3 ohm
Low Conductivity Reference Resistor

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)		Deg F
	Low	High	Low	High	
1 (near)	13.2	3960.1	13.2	3959.2	
2	29.9	3563.5	29.9	3563.0	
3	27.9	3061.4	27.9	3061.6	
4 (far)	19.7	2087.8	19.7	2088.2	
Array Temperature	64.9		65.3		

Induction Check Tolerances MAI-B.J 390

Low Array 1	13.2	11.7 13.2 14.7	mmho/m	High Array 1	3959.2	-0.5% 3960.1 +0.5%	mmho/m
Low Array 2	29.9	28.4 29.9 31.4	mmho/m	High Array 2	3563.0	-0.5% 3563.5 +0.5%	mmho/m
Low Array 3	27.9	26.4 27.9 29.4	mmho/m	High Array 3	3061.6	-0.5% 3061.4 +0.5%	mmho/m
Low Array 4	19.7	18.2 19.7 21.2	mmho/m	High Array 4	2088.2	-0.5% 2087.8 +0.5%	mmho/m

Induction Constants MAI-B.J 390

Last Edited on 08-JAN-2019,21:37

Induction Model	RtAP-WBM		
Borehole Correction Constants			
Tool Centred	No		
Hole Size Source	Density Caliper		
Hole Size Constant Value	N/A		
Stand-off Type	Fins		
Stand-off	0.50		
Number of Fins on Stand-off	8.0000		
Stand-off Fin Angle	45.00		
Stand-off Fin Width	0.5000		
Rm Source	Global Value: Constant Temperature		
Temp. for Rm Corr.	N/A		
Borehole Correction Method	Default		
Squasher Start	0.0020		
Squasher Offset	N/A		
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 07-JAN-2019,10:51
Field Calibration on 08-JAN-2019 21:42

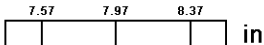
Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15599	3.99
2	24289	5.98
3	32989	7.97
4	41250	9.86
5	50464	11.92
6	N/A	N/A

Field Calibration

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

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.97  in

DOWNHOLE EQUIPMENT

C:\Minimus 18.03.9344\Data\Western Operating Martin-Peterson #1\Western Operating Martin-Peterson #1_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

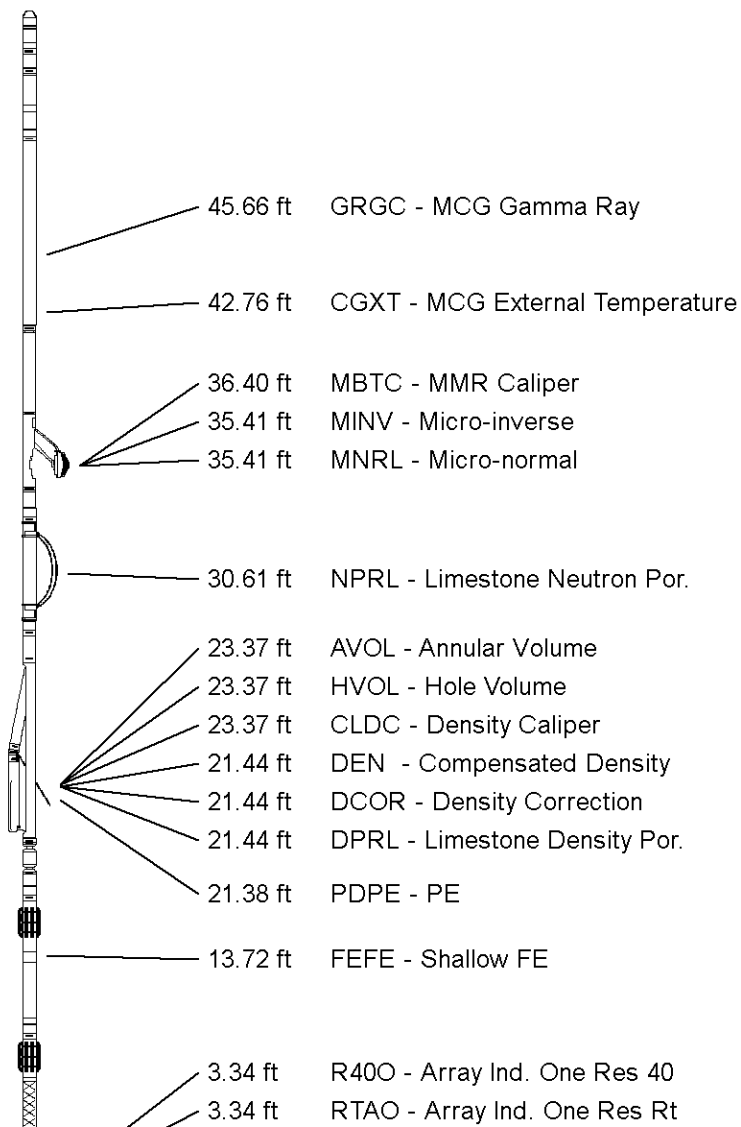
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

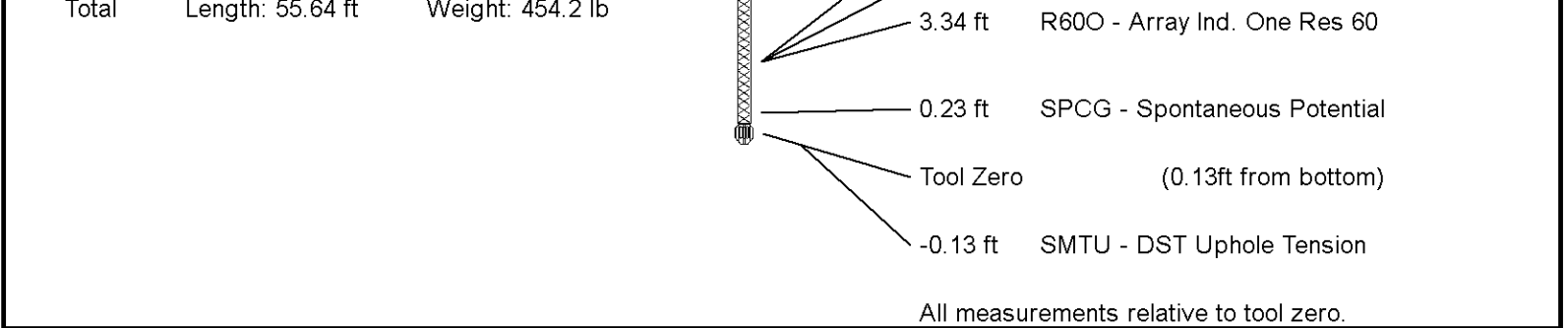
Compact Focussed Electric

MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction

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





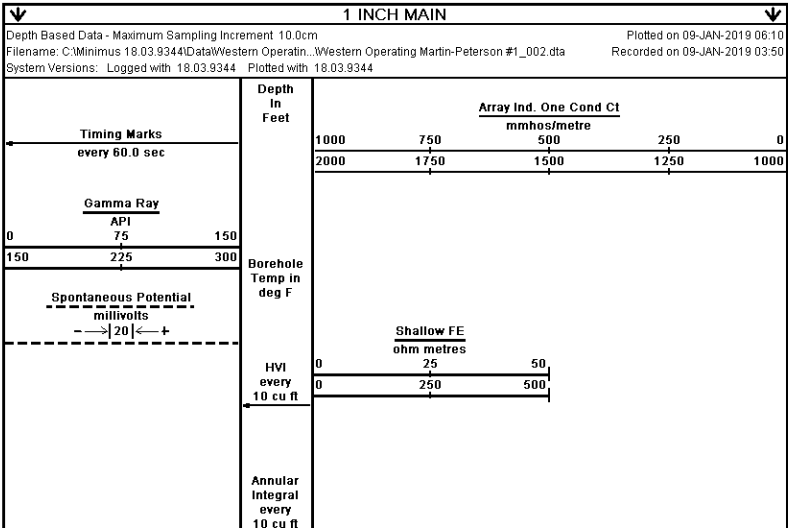
COMPANY	WESTERN OPERATING COMPANY		
WELL	MARTIN-PETERSON #1		
FIELD	ARROYO		
PROVINCE/COUNTY	STANTON		
COUNTRY/STATE	U.S.A. / KANSAS		

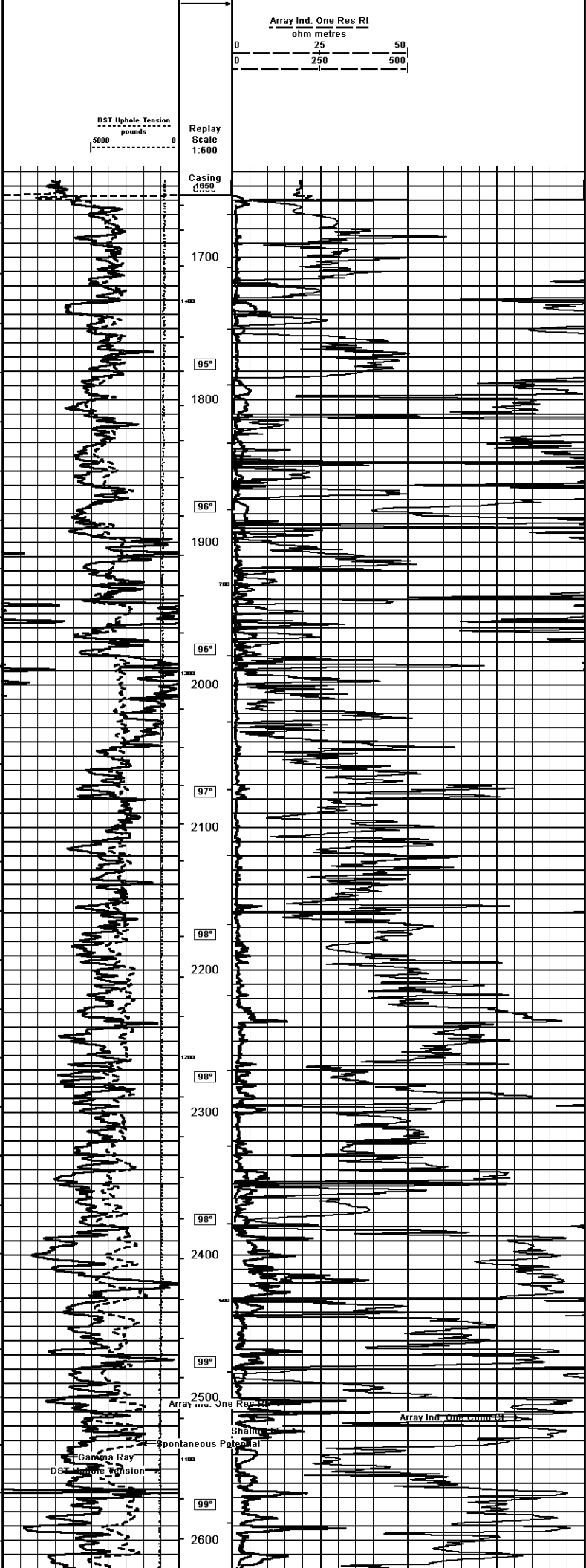
Elevation Kelly Bushing	3417	feet	First Reading	5708.00	feet
Elevation Drill Floor	3415	feet	Depth Driller	5708.00	feet
Elevation Ground Level	3404	feet	Depth Logger	5711.00	feet

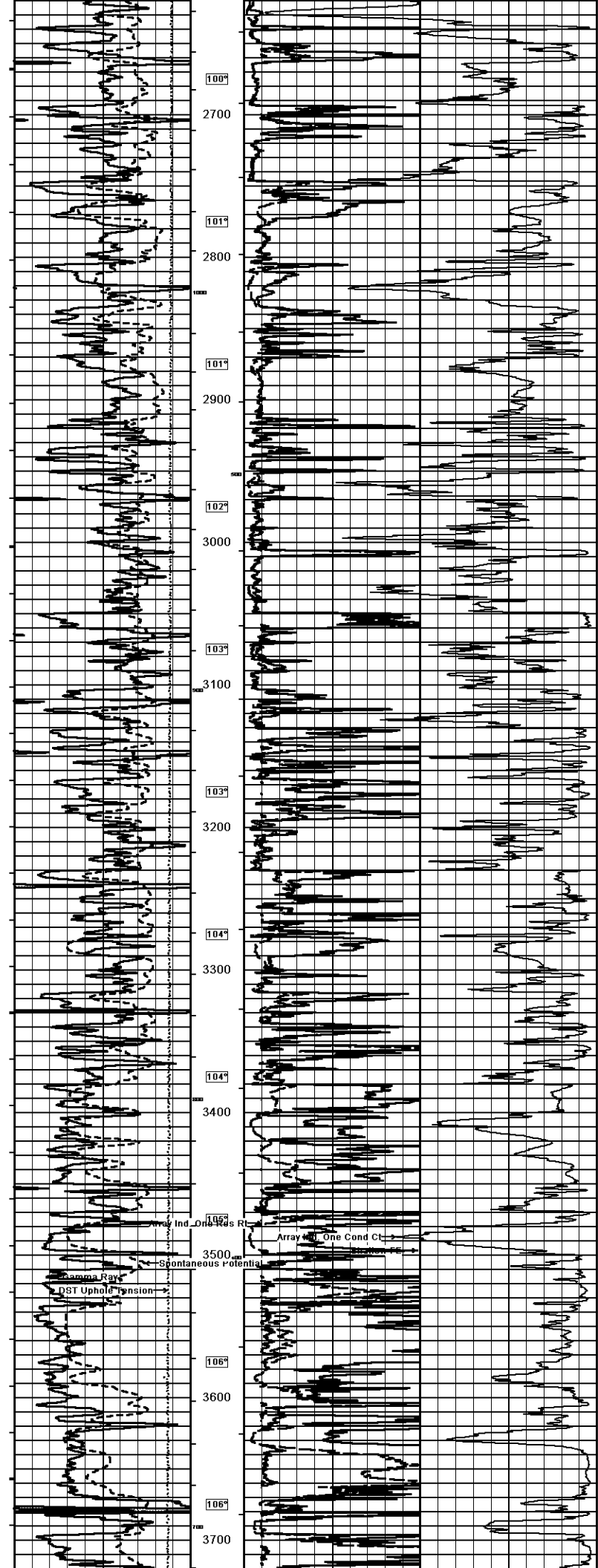
Weatherford[®]

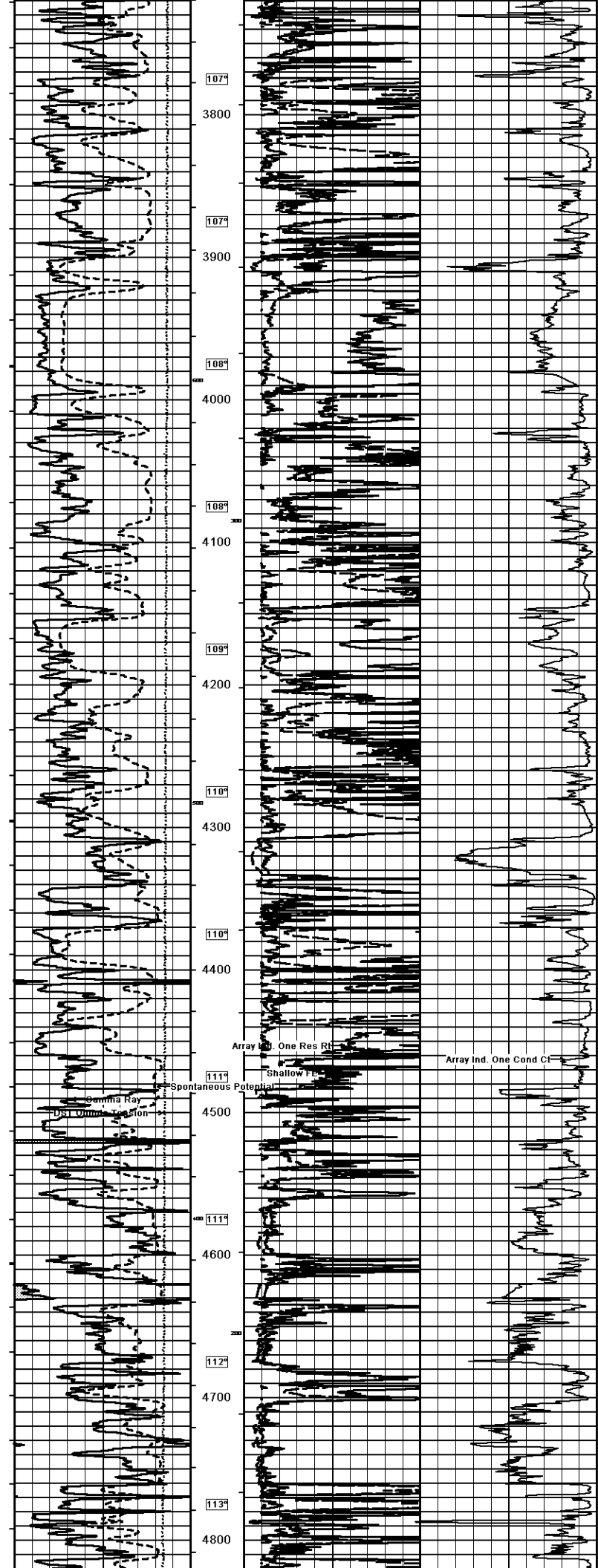
ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

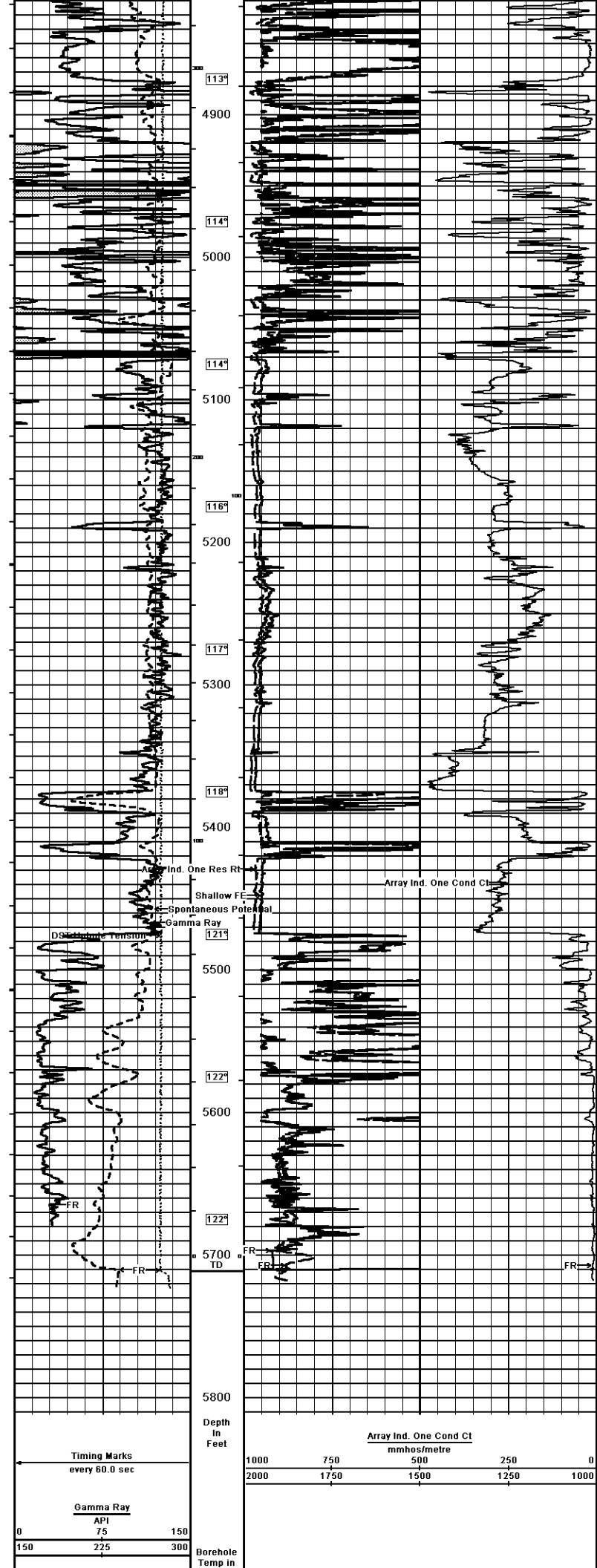
		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY WESTERN OPERATING COMPANY		MARTIN-PETERSON #1	
WELL ARROYO		STANTON	
PROVINCE/COUNTY U.S.A. / KANSAS		2100' FSL & 2150' FWL	
COUNTRY/STATE U.S.A. / KANSAS		MML	
LOCATION SEC 16 T1P 23S R1E 41W		MML	
Log Date 15-02-21342		MML	
Log Number 15-02-21342		MML	
Permanent Datum G.L. Elevation 3404 feet		MML	
Log Measured From X@ 13.00 feet above Permanent Datum		MML	
Drilling Measured From X@		MML	
Date 09-JAN-2019		MML	
Run Number ONE		MML	
Service Order 4558-234191091		MML	
Depth Driller 5708.00		MML	
Depth Logger 5711.00		MML	
First Reading 5708.00		MML	
Last Reading 5708.00		MML	
Casing Driller 1857.00		MML	
Casing Logger 1856.00		MML	
Bit Size 7.875		MML	
Hole Fluid Type CHEMICAL		MML	
Density/Viscosity 9.15 lb/lb 53.00 CP		MML	
PH/Fluid Loss 10.00		MML	
Sample Source FLOWLINE		MML	
Run @ Measured Temp 1.86 @ 75.0 ohm-m		MML	
Run @ Measured Temp 1.49 @ 75.0 ohm-m		MML	
Run @ Measured Temp 2.23 @ 75.0 ohm-m		MML	
Source Rmt / Fmc CALC		MML	
Run @ BHT 1.14 @ 22.0 ohm-m		MML	
Time Since Circulation 5 HOURS		MML	
Max Recorded Temp 112.00 deg F		MML	
Equipment / Base 13006 LIB		MML	
Recorded By JOAN SILL		MML	
Witnessed By PETER DEBENHAM		MML	

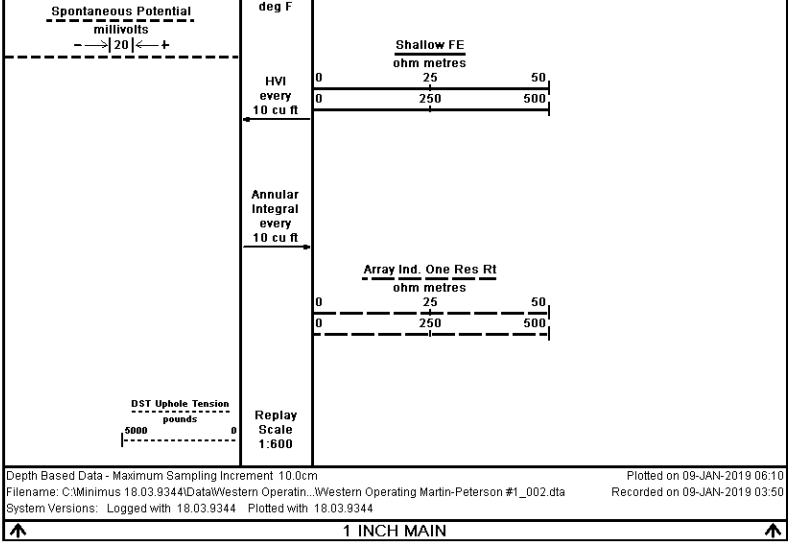












COMPANY	WESTERN OPERATING COMPANY			
WELL	MARTIN-PETERSON #1			
FIELD	ARROYO			
PROVINCE/COUNTY	STANTON			
COUNTRY/STATE	U.S.A. / KANSAS			
Elevation Kelly Bushing	3417	feet	First Reading	5708.00 feet
Elevation Drill Floor	3415	feet	Depth Driller	5708.00 feet
Elevation Ground Level	3404	feet	Depth Logger	5711.00 feet
ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG				