



Weatherford

**ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG**

COMPANY **M&M EXPLORATION INC.**
 WELL **Z-BAR #26-11**
 FIELD **AETNA GAS AREA**
 PROVINCE/COUNTY **BARBER**
 COUNTRY/STATE **U.S.A. / KANSAS**
 LOCATION **2200' FSL & 2200' FWL SW/4**

SEC **26** TWP **33S** RGE **15W** Other Services
 API Number **15-007-23912** MPD/MDN
 Permit Number **MML**

Permanent Datum G.L., Elevation 1786 feet
 Log Measured From **KB**
 Drilling Measured From **K.B. @ 12 FEET**

Date **05-AUG-2012** Elevations: **KB 1798.00**
DF 1796.00
GL 1786.00

Run Number	ONE	feet
Depth Driller	5150.00	feet
Depth Logger	5150.00	feet
First Reading	5147.00	feet
Last Reading	295.00	feet
Casing Driller	300.00	feet
Casing Logger	295.00	feet
Bit Size	7.875	inches
Hole Fluid Type	CHEMICAL	
Density / Viscosity	1.12 g/c3	43.00 CP
PH / Fluid Loss	10.00	12.00 ml/30Min
Sample Source	FLOWLINE	
Rm @ Measured Temp	0.95 @ 89.0	ohm-m
Rmf @ Measured Temp	0.76 @ 89.0	ohm-m
Rmc @ Measured Temp	1.14 @ 89.0	ohm-m
Source Rmf / Rmc	CALC	CALC
Rm @ BHT	0.67 @126.0	ohm-m
Time Since Circulation	4 HOURS	
Max Recorded Temp	126.00	deg F
Equipment Name	COMPACT	
Equipment / Base	13057	LIB
Recorded By	R.HOFFMAN	
Witnessed By	BETH BROCK	
S.O. # / JOB #	3534568	LB12-202

BOREHOLE RECORD			Last Edited: 05-AUG-2012 05:46
Bit Size inches	Depth From feet	Depth To feet	
7.875	295.00	5150.00	

CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	13.375	0.00	295.00	48.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MAI.
 Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used. MFE and MAI 0.5 inch standoffs used.
 2.71 g/cc Limestone Density Matrix used to calculate porosity.
 All intervals logged and scaled per customer's request.
 Tight pulls, washouts and borehole rugosity will affect data quality.
 Total hole volume from TD to Surface casing = 2411 cu. ft.
 Annular volume with 4.5 inch production casing TD to 4000ft = 328 cu. ft.
 Service order: #3534568
 Rig: Southwind Drilling Rig #70
 Engineer: R. Hoffman
 Operator(s): B. Reeves

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

2 INCH MAIN

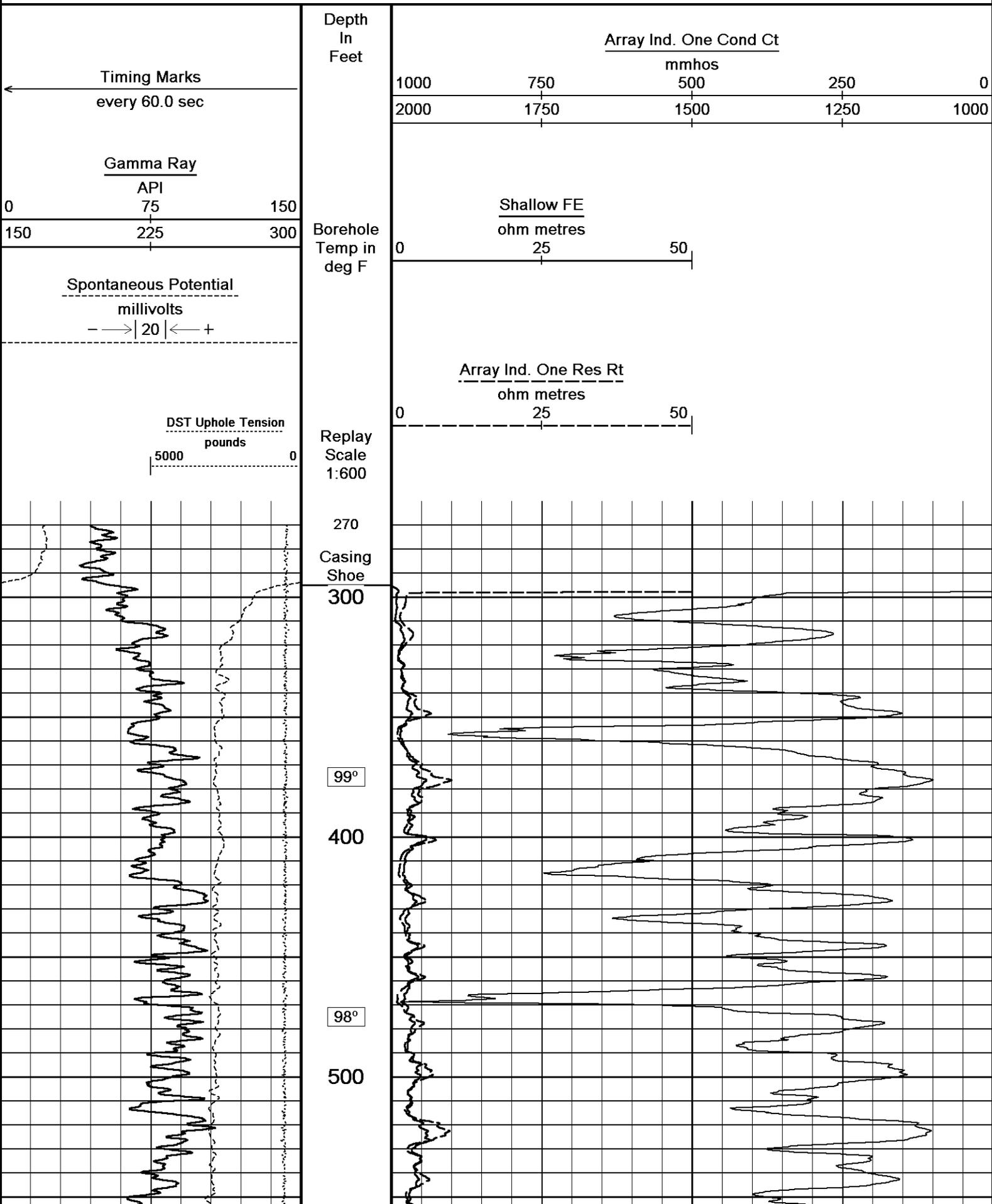
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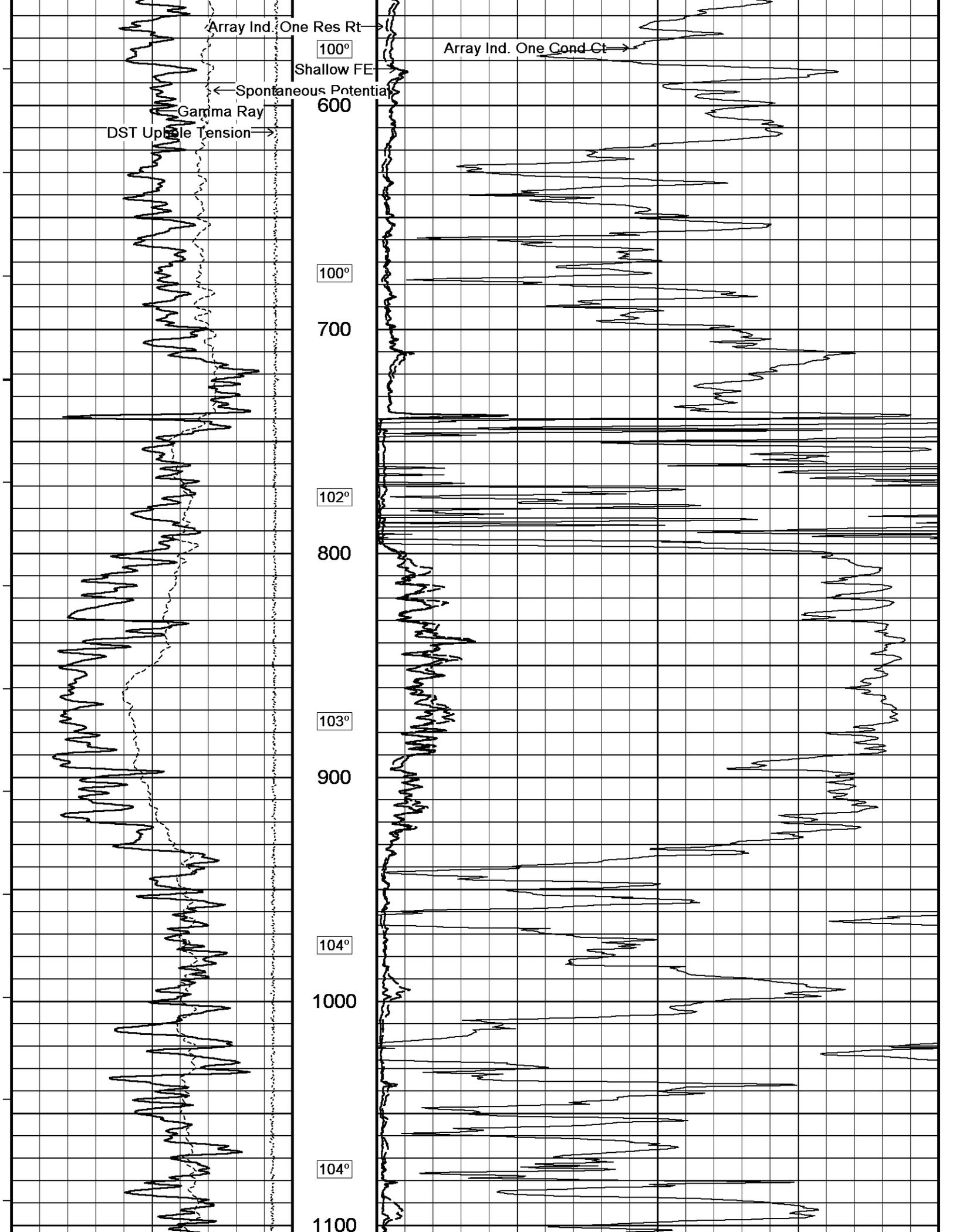
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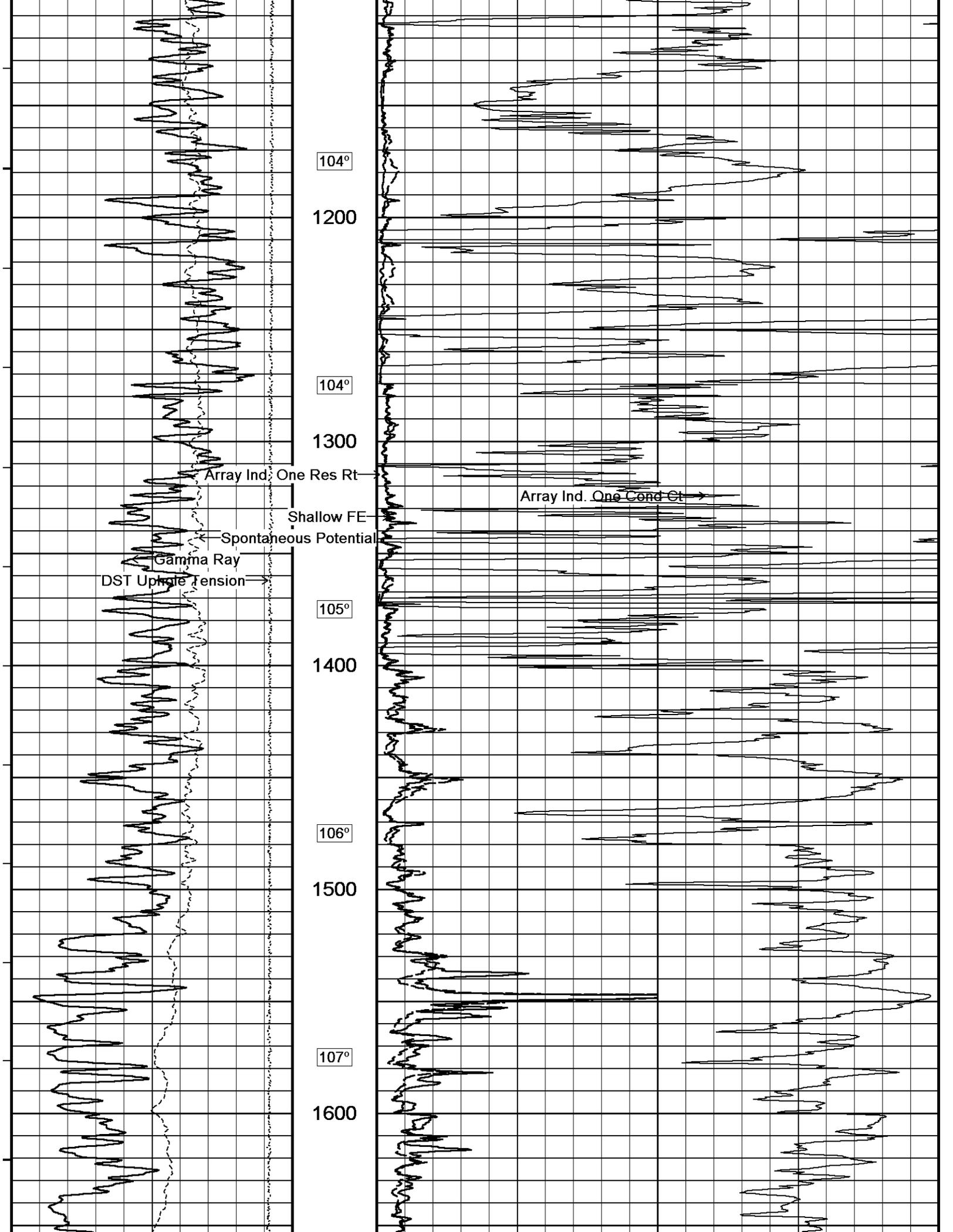
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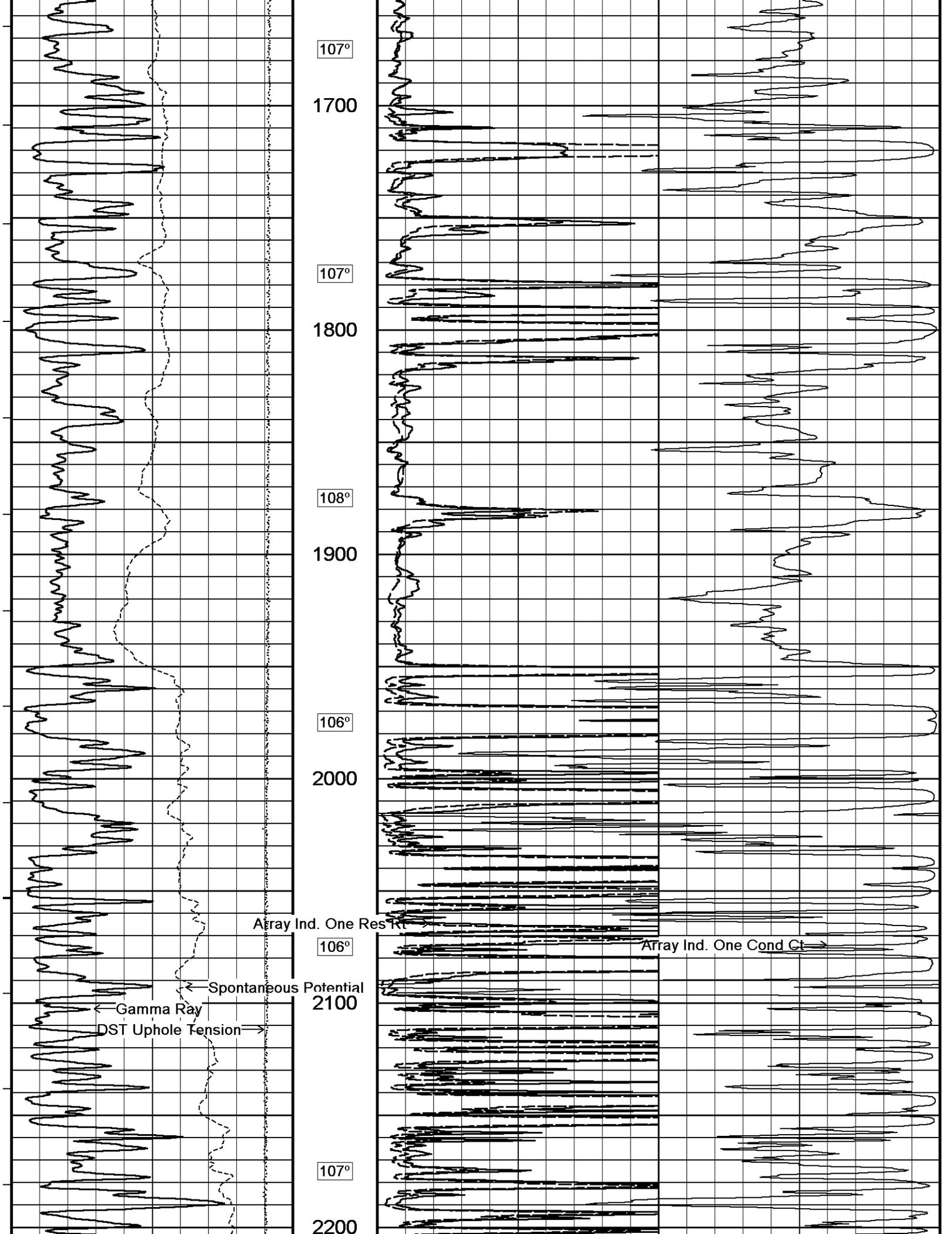
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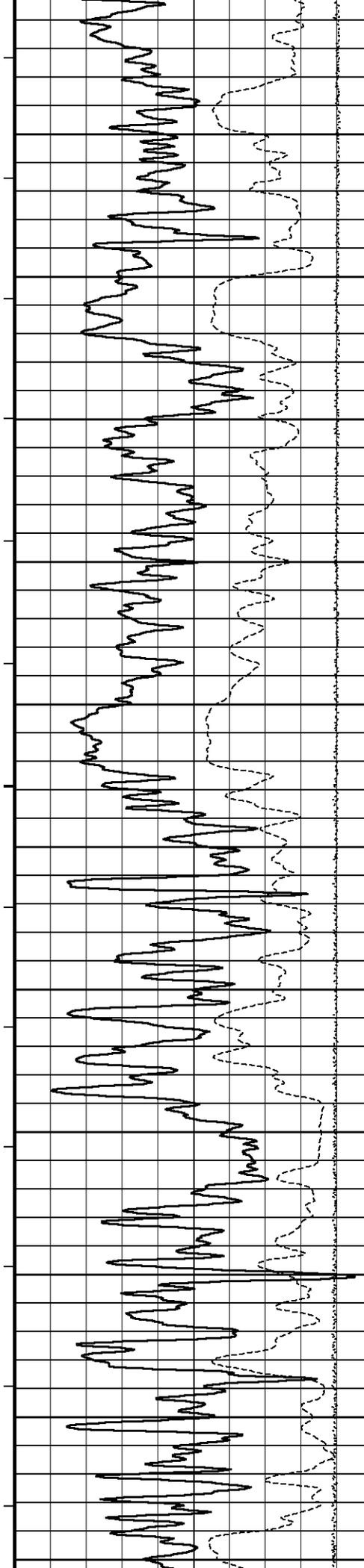
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600



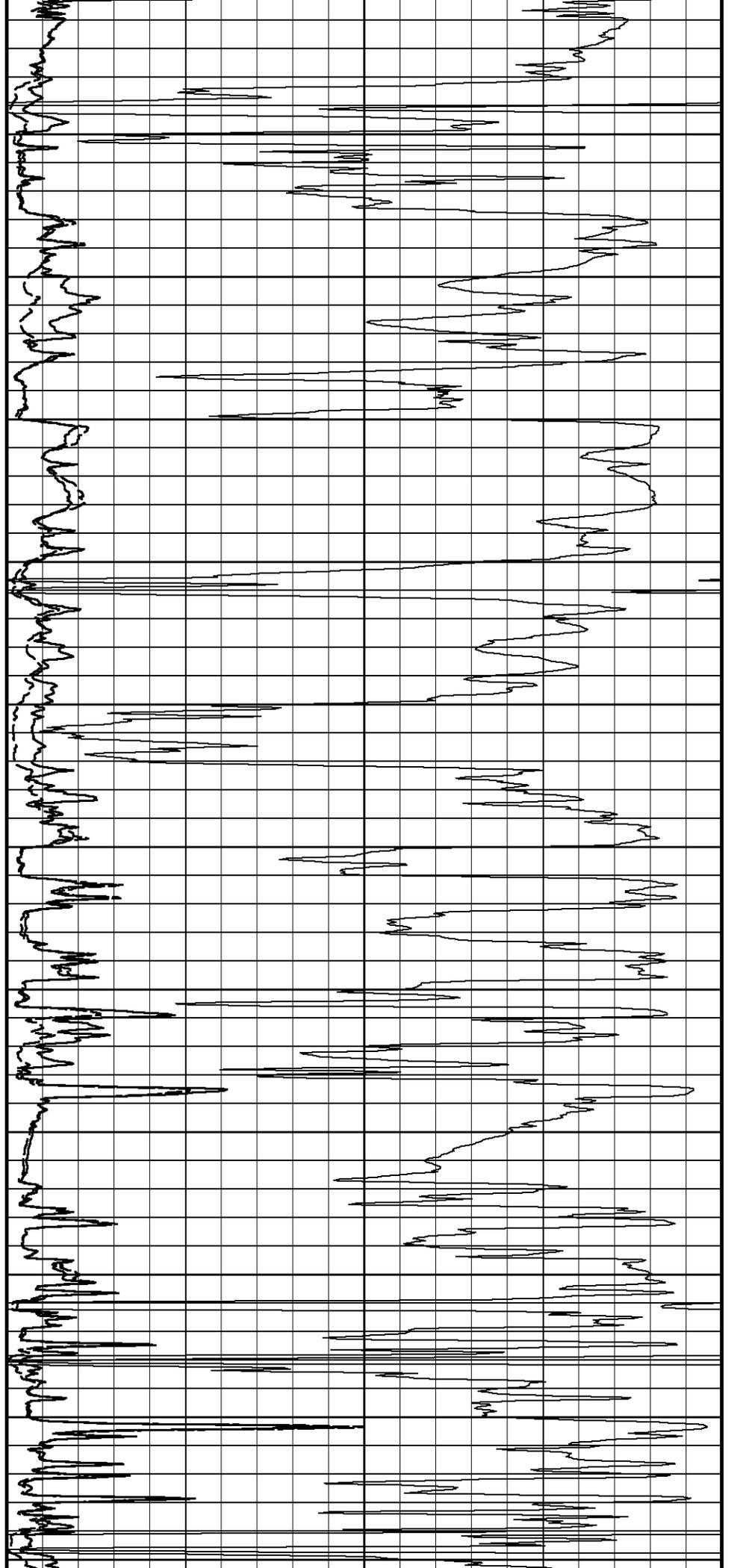


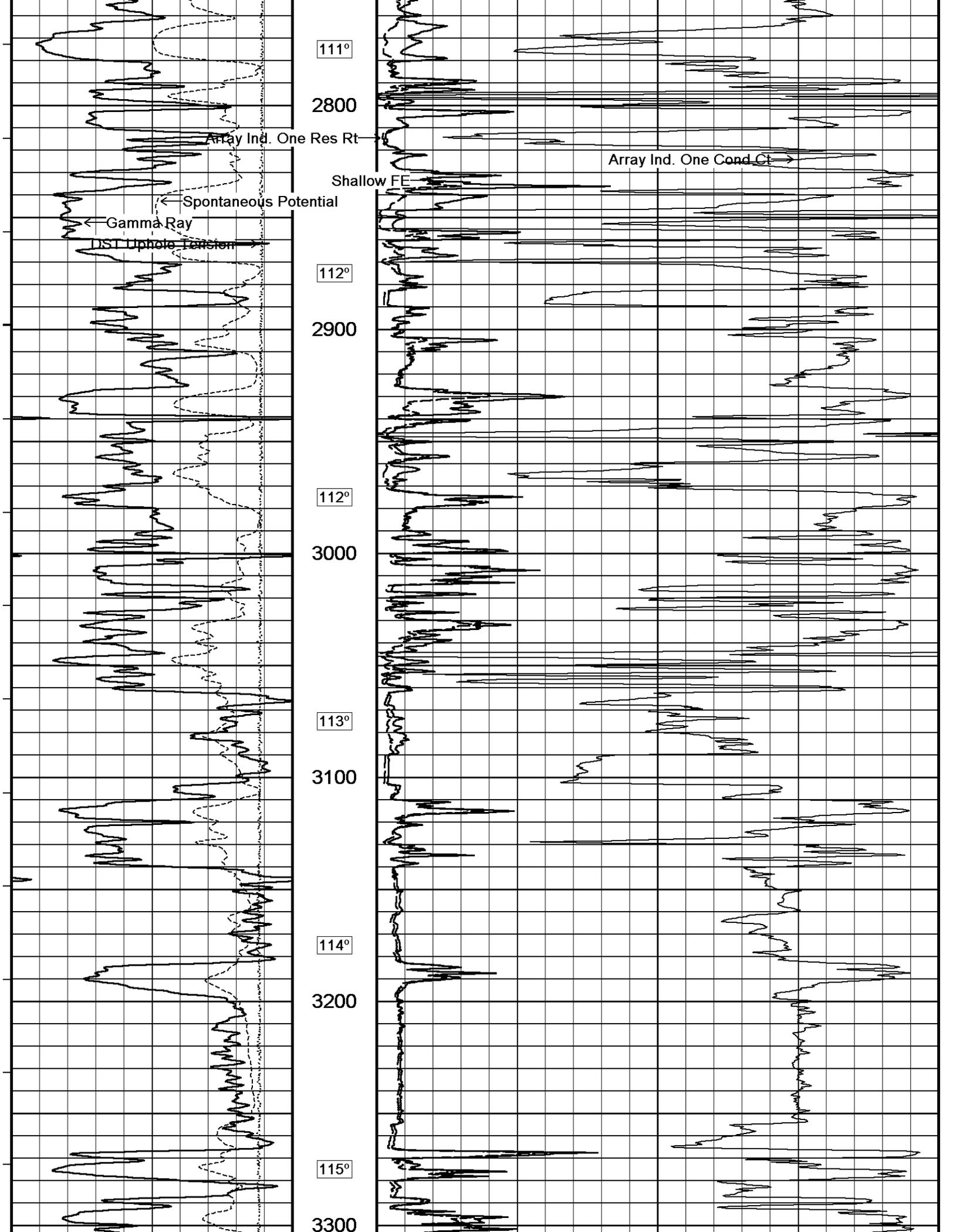


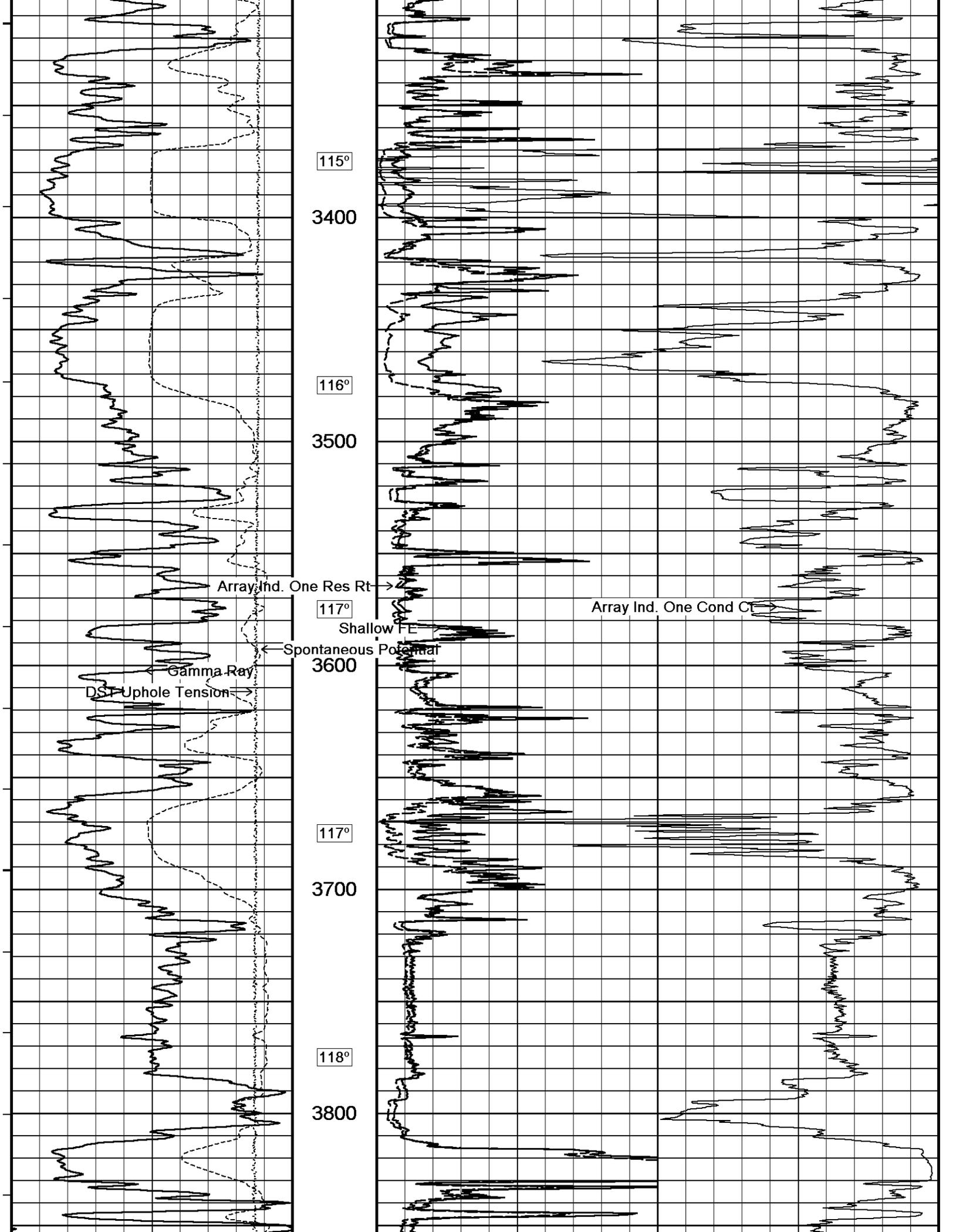


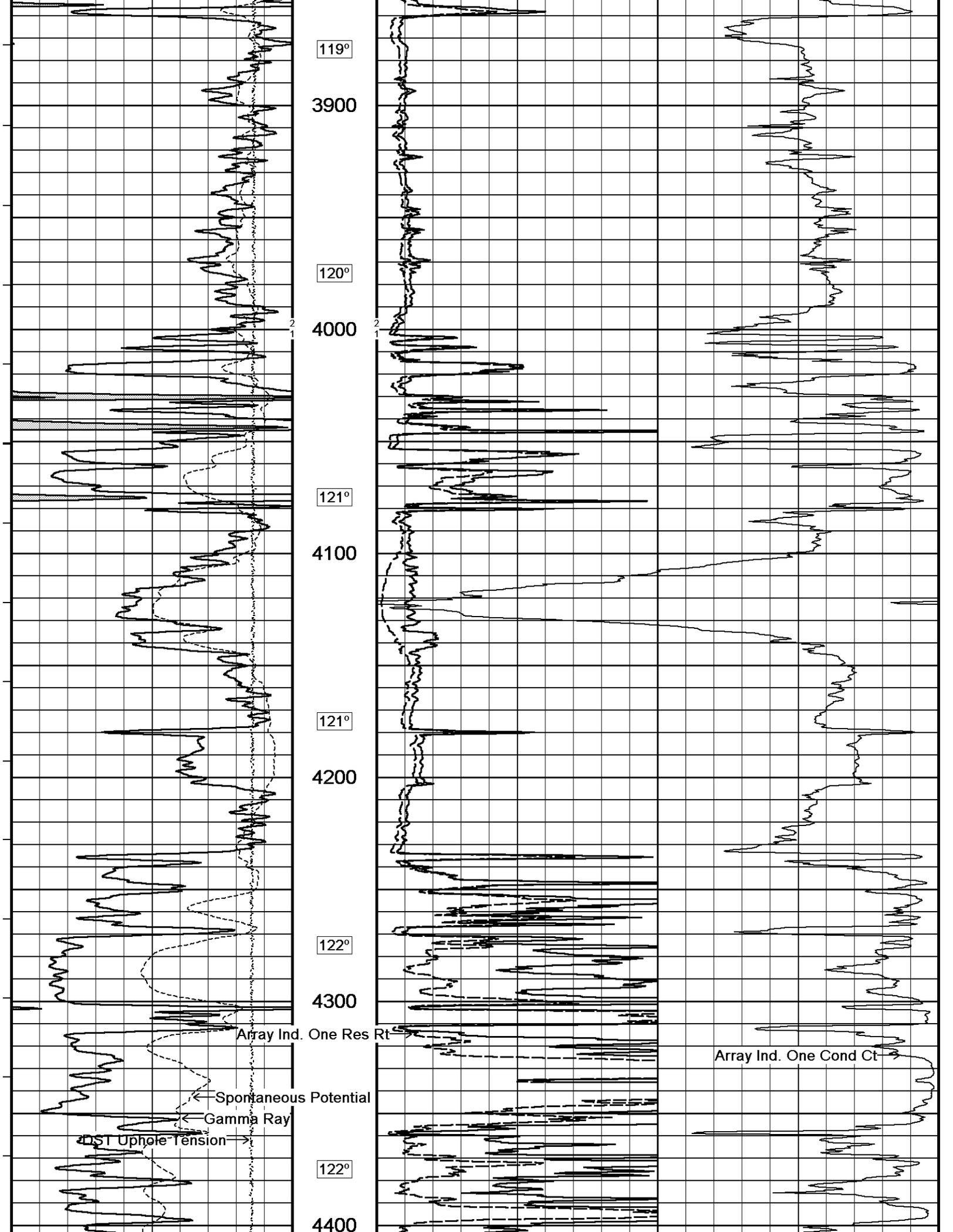


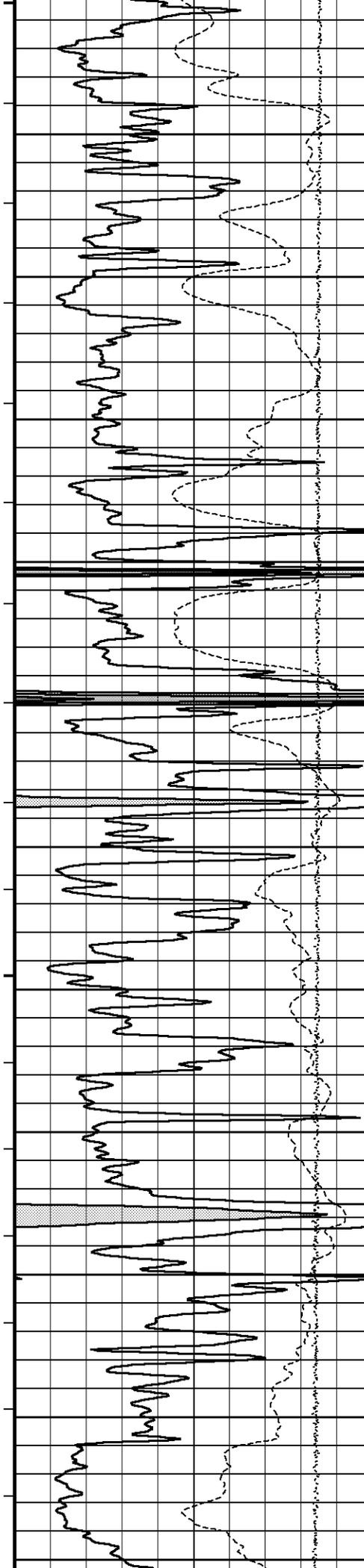
108°
2300
109°
2400
109°
2500
110°
2600
111°
2700











123°

4500

124°

4600

124°

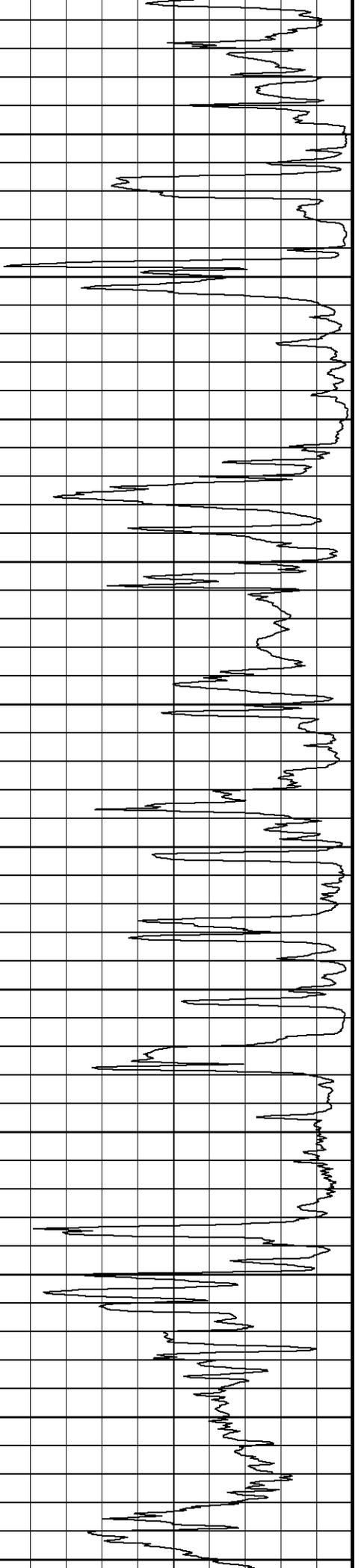
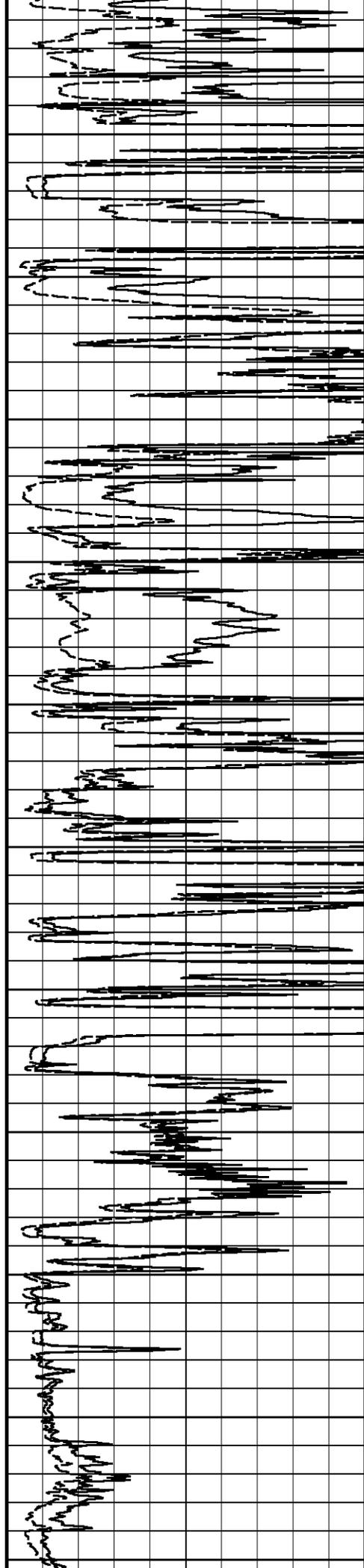
4700

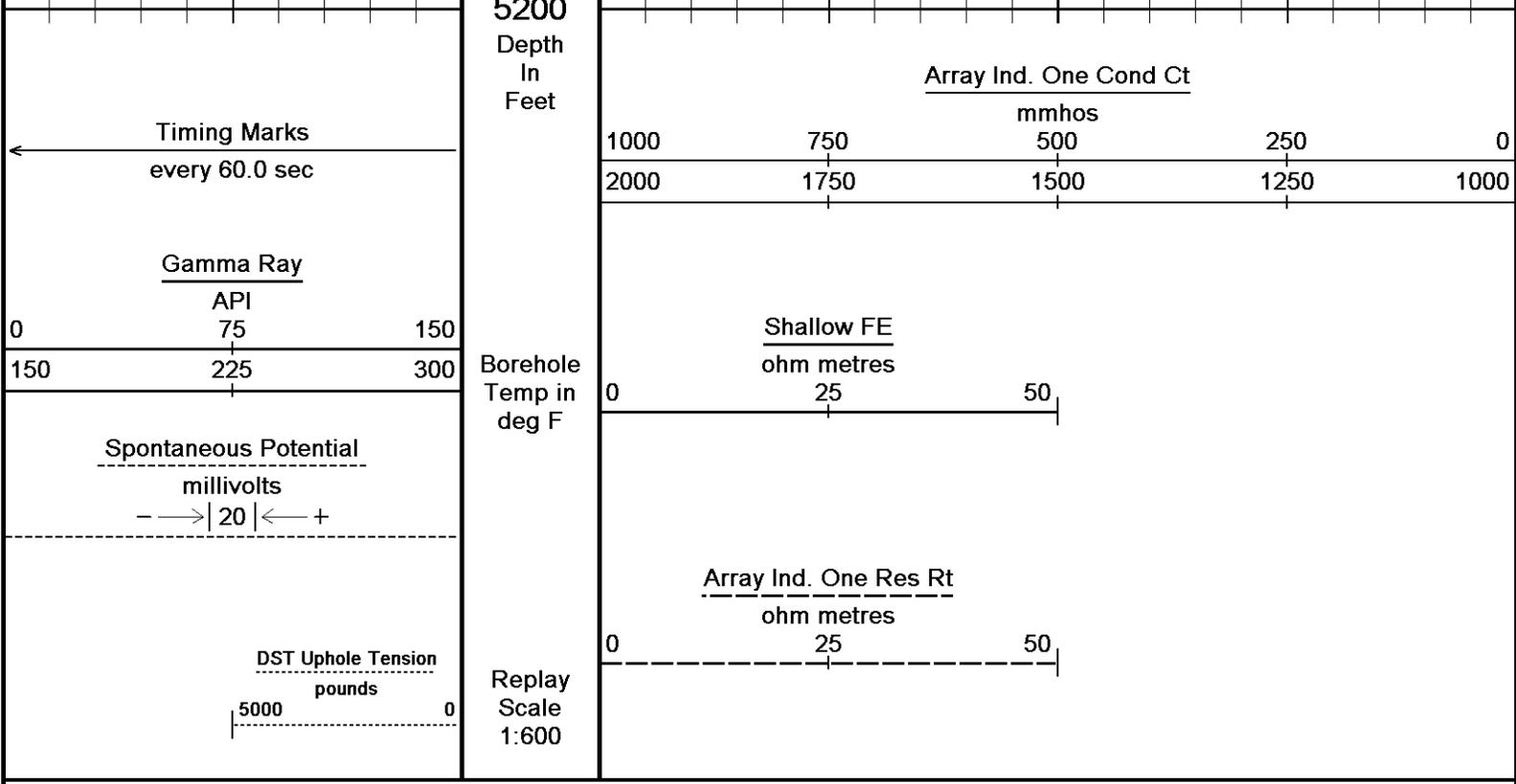
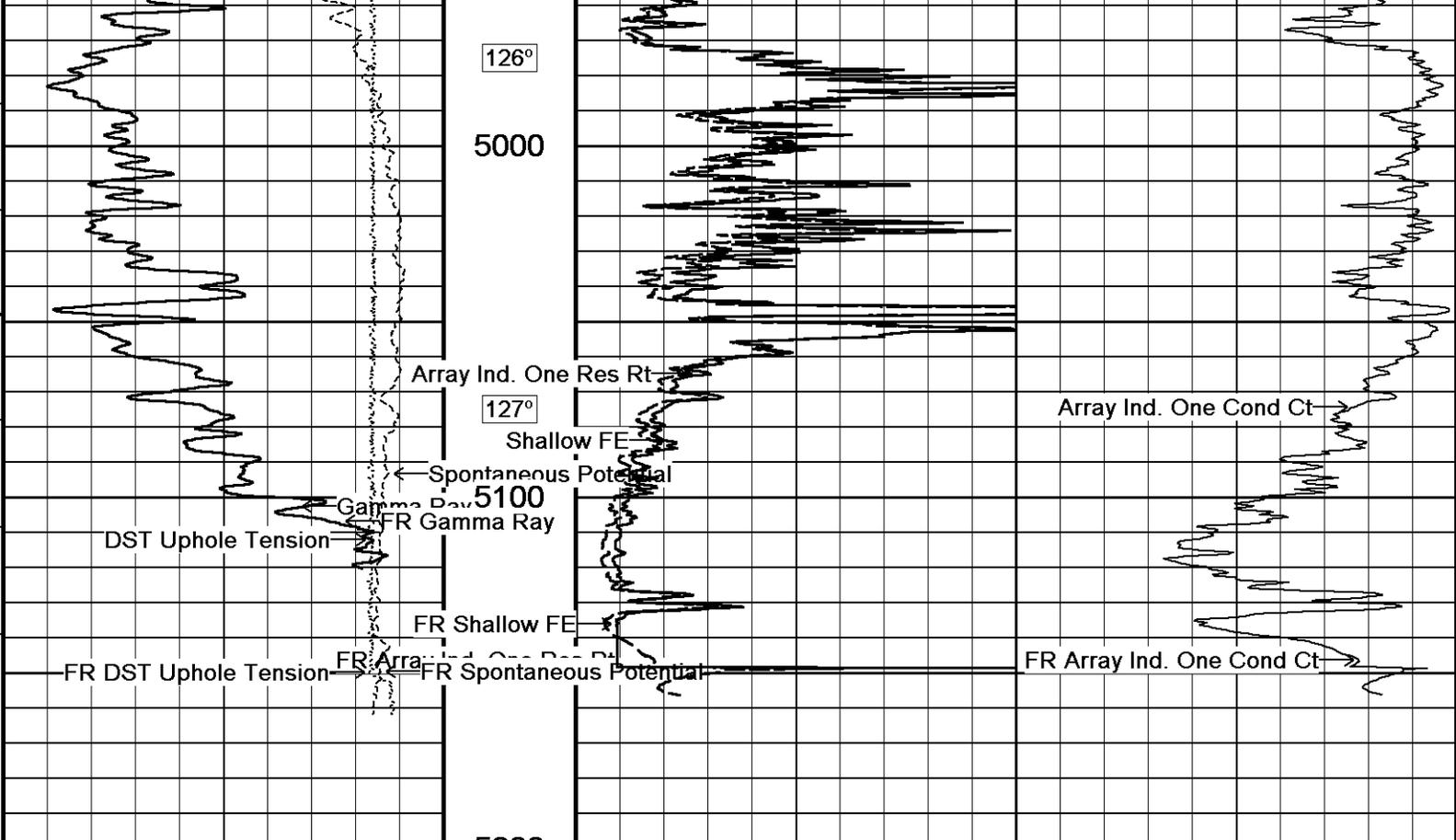
125°

4800

125°

4900



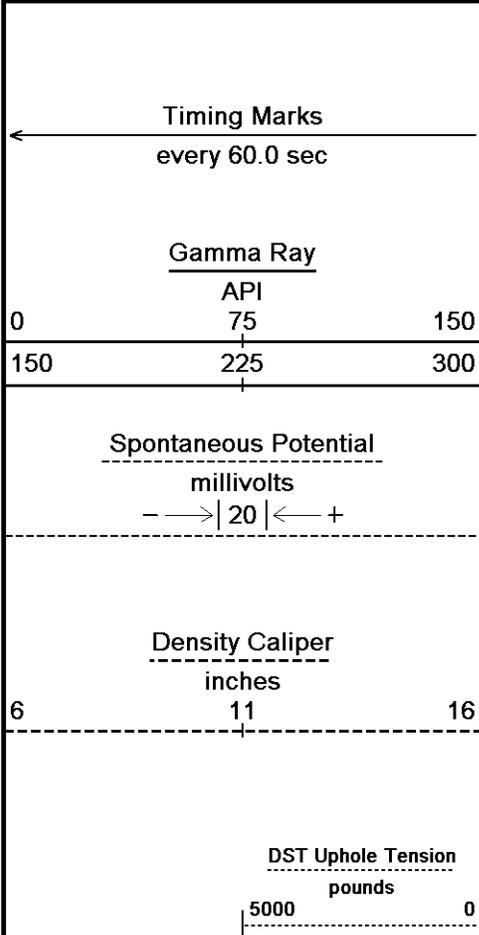


Depth Based Data - Maximum Sampling Increment 10.0cm
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 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600
 Plotted on 05-AUG-2012 06:58
 Recorded on 05-AUG-2012 04:48

↑ 2 INCH MAIN ↑

↓ 5 INCH MAIN ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
 Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Main.dta
 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600
 Plotted on 05-AUG-2012 06:58
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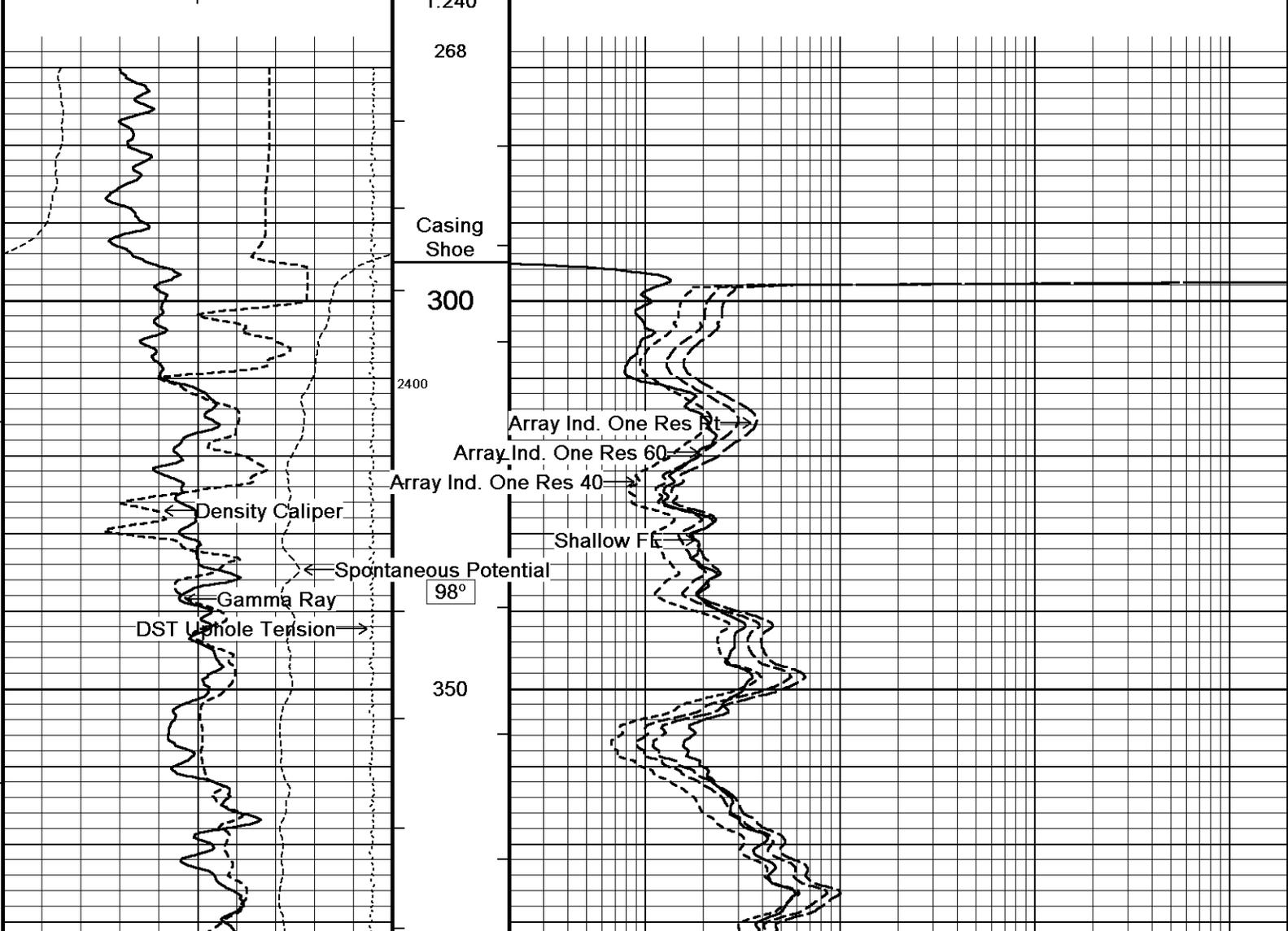
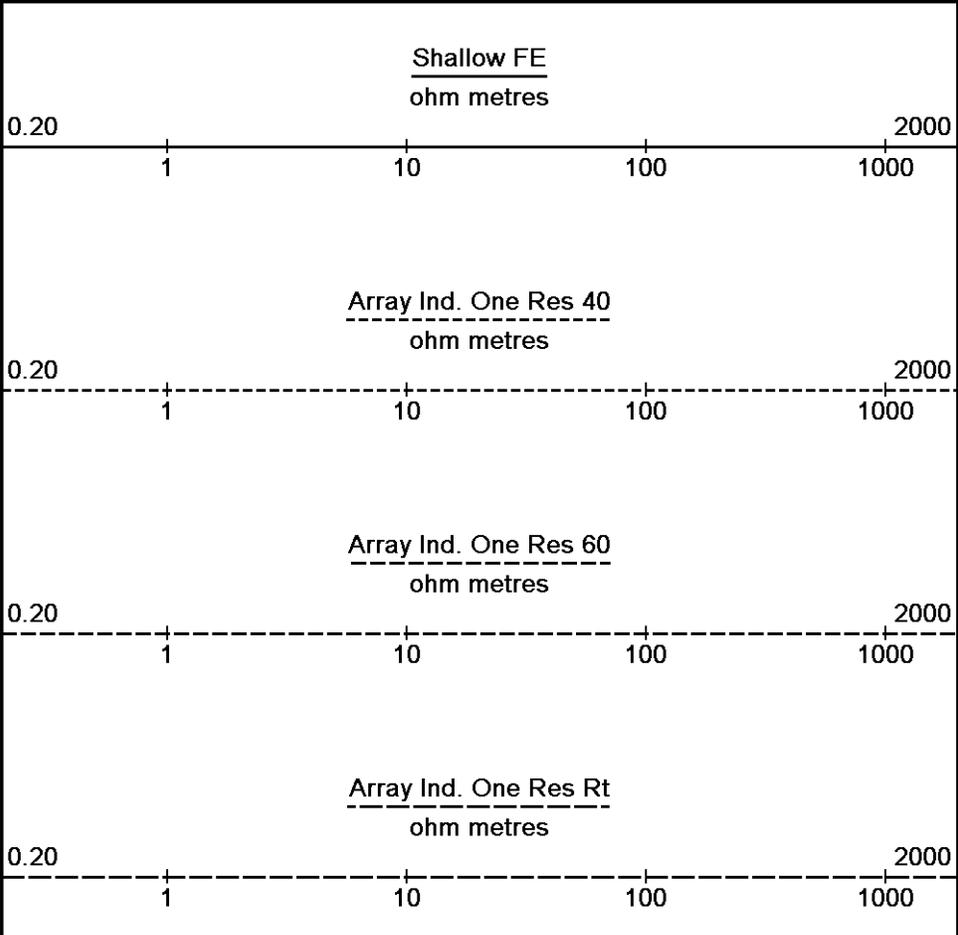
Depth
In
Feet

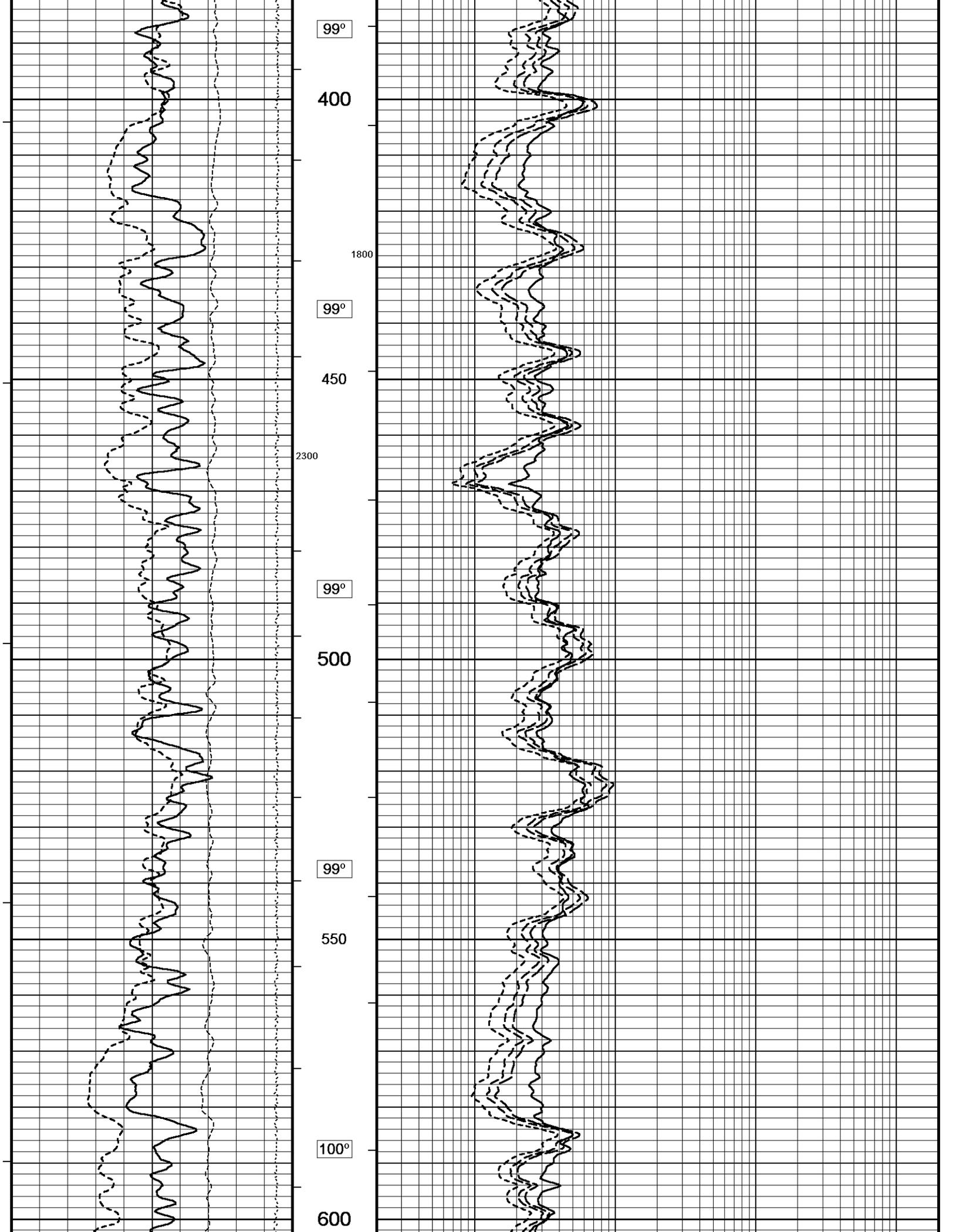
Borehole
Temp in
deg F

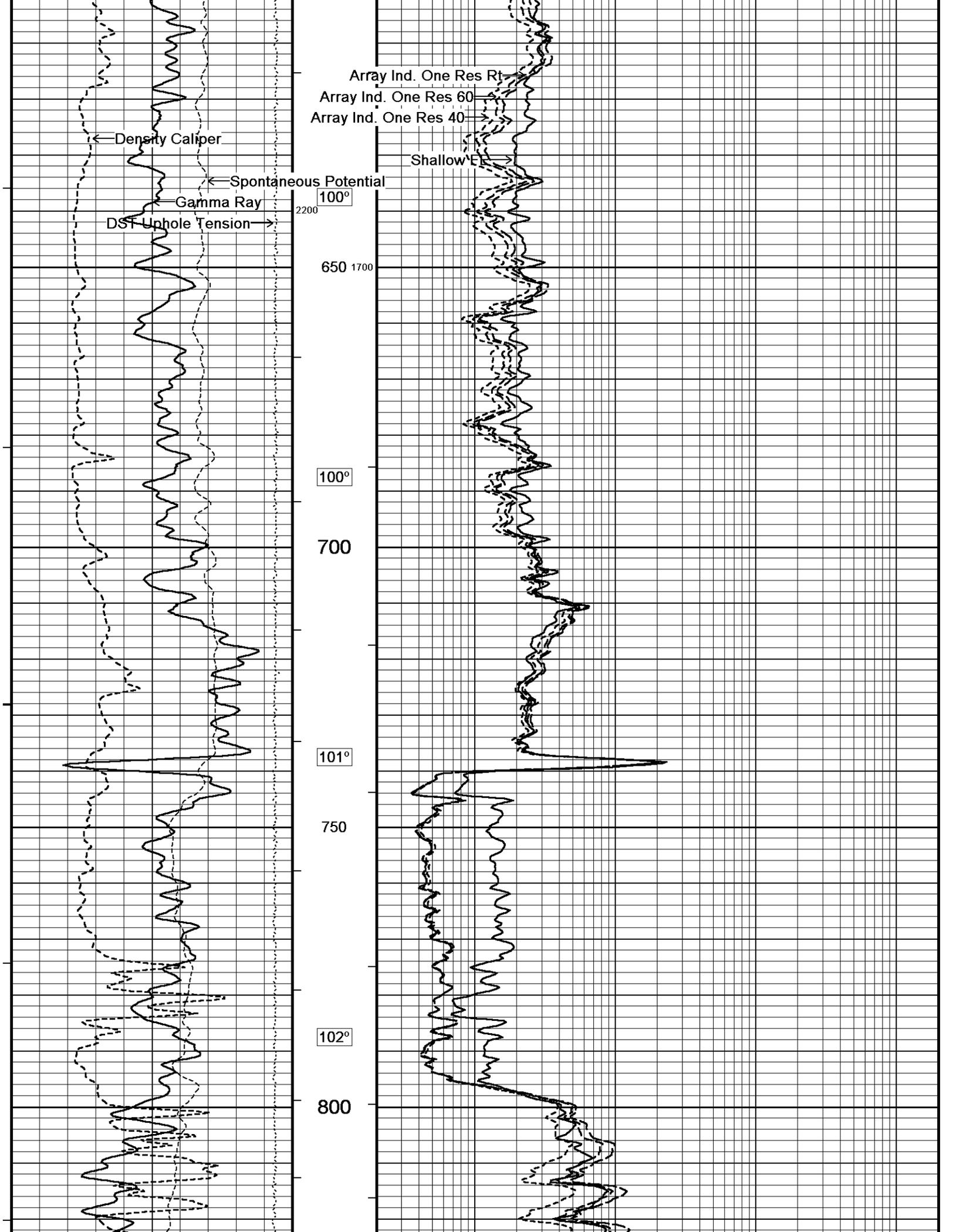
HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240







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

Density Caliper

Spontaneous Potential

Gamma Ray

DST Uphole Tension

Shallow E

100°

650 1700

100°

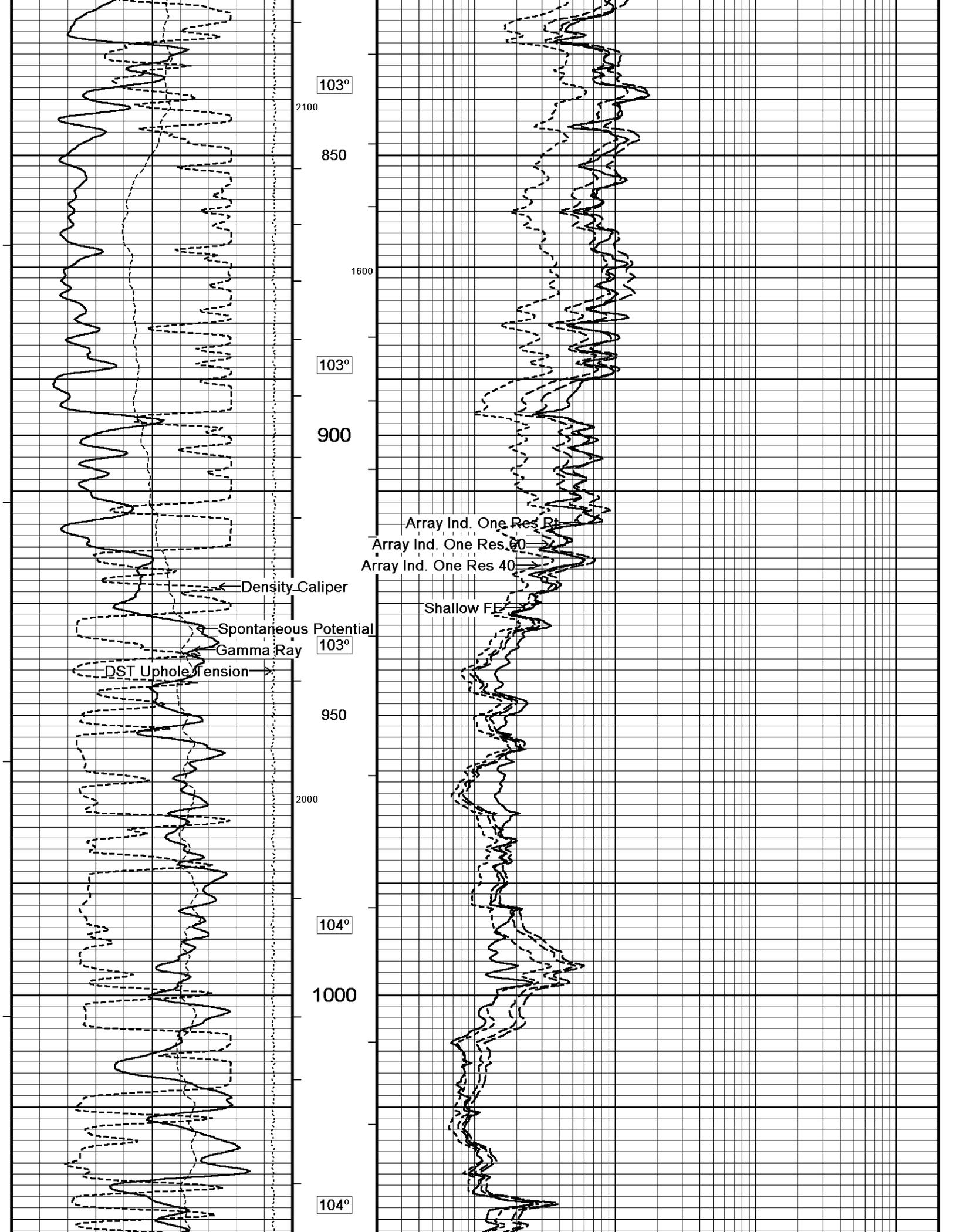
700

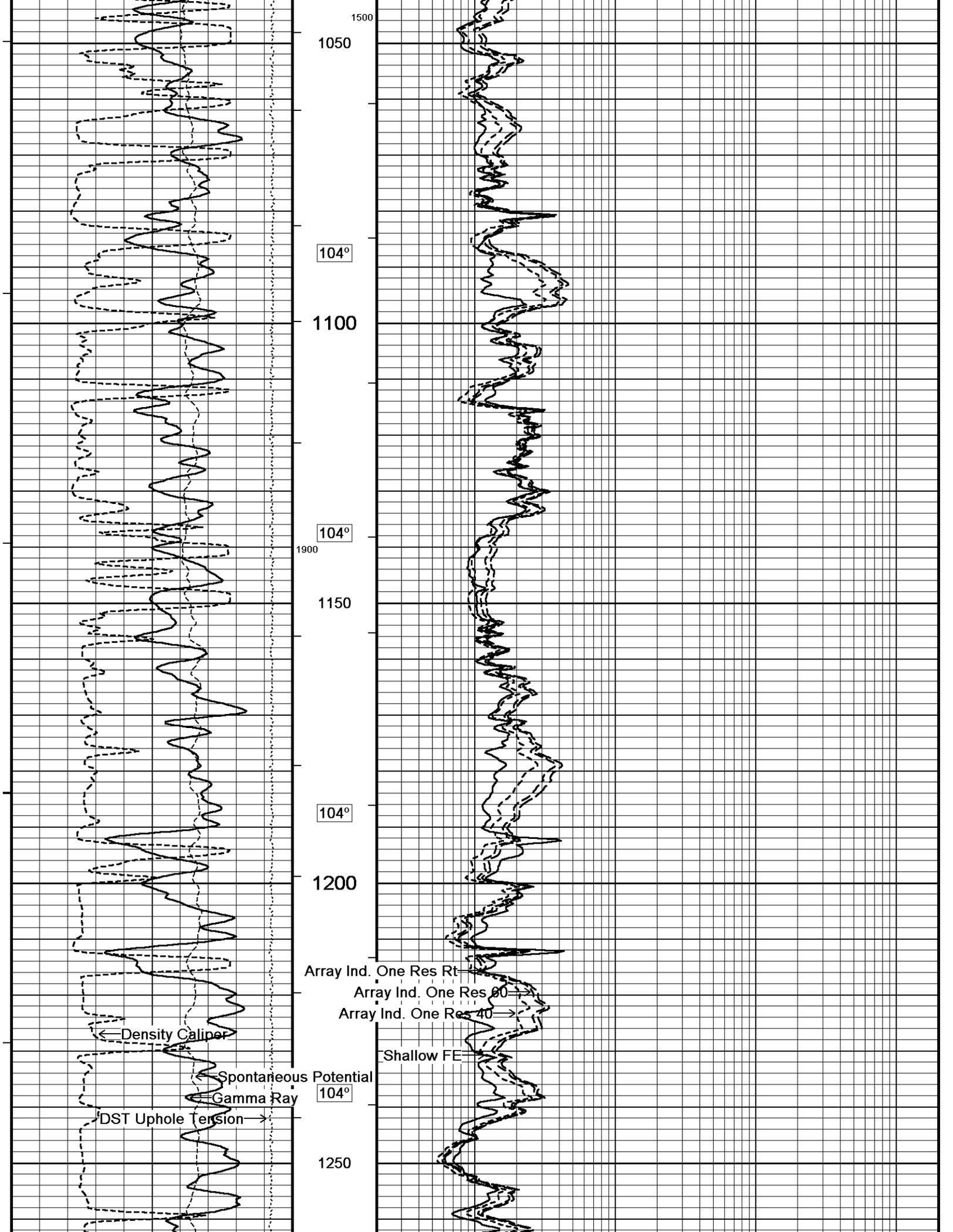
101°

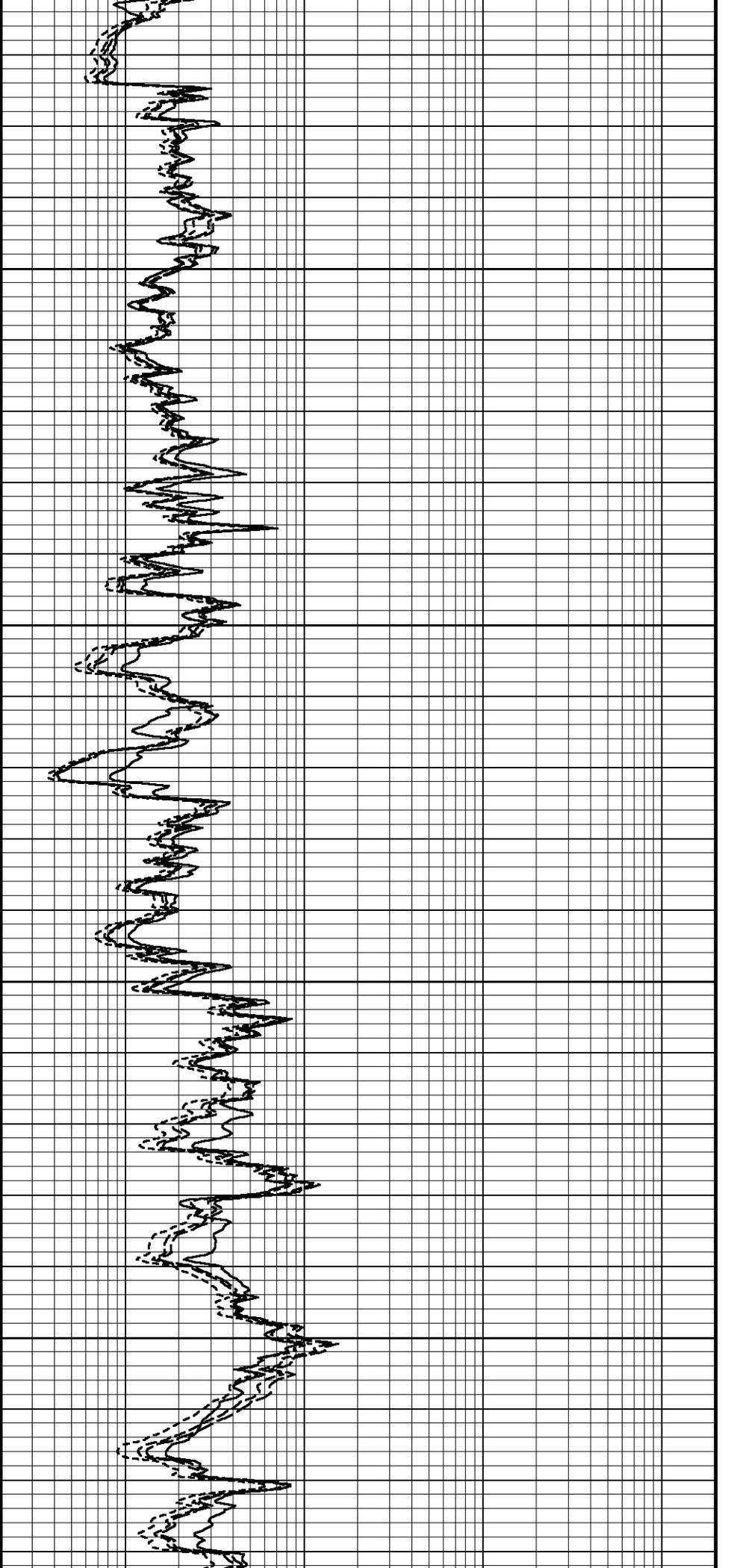
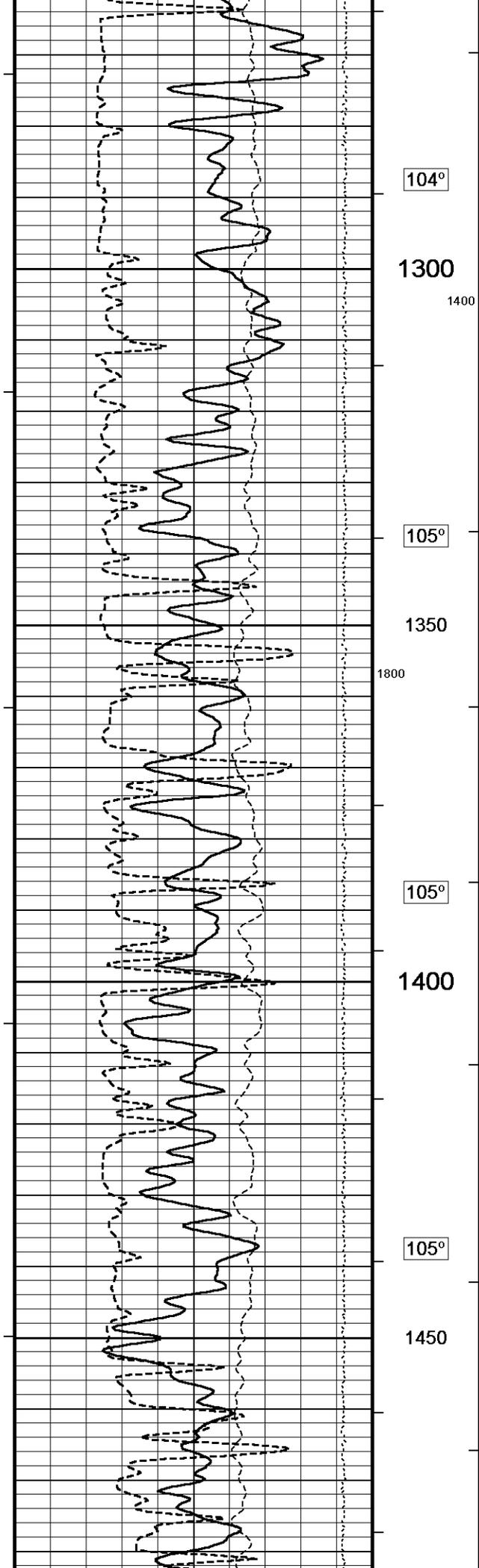
750

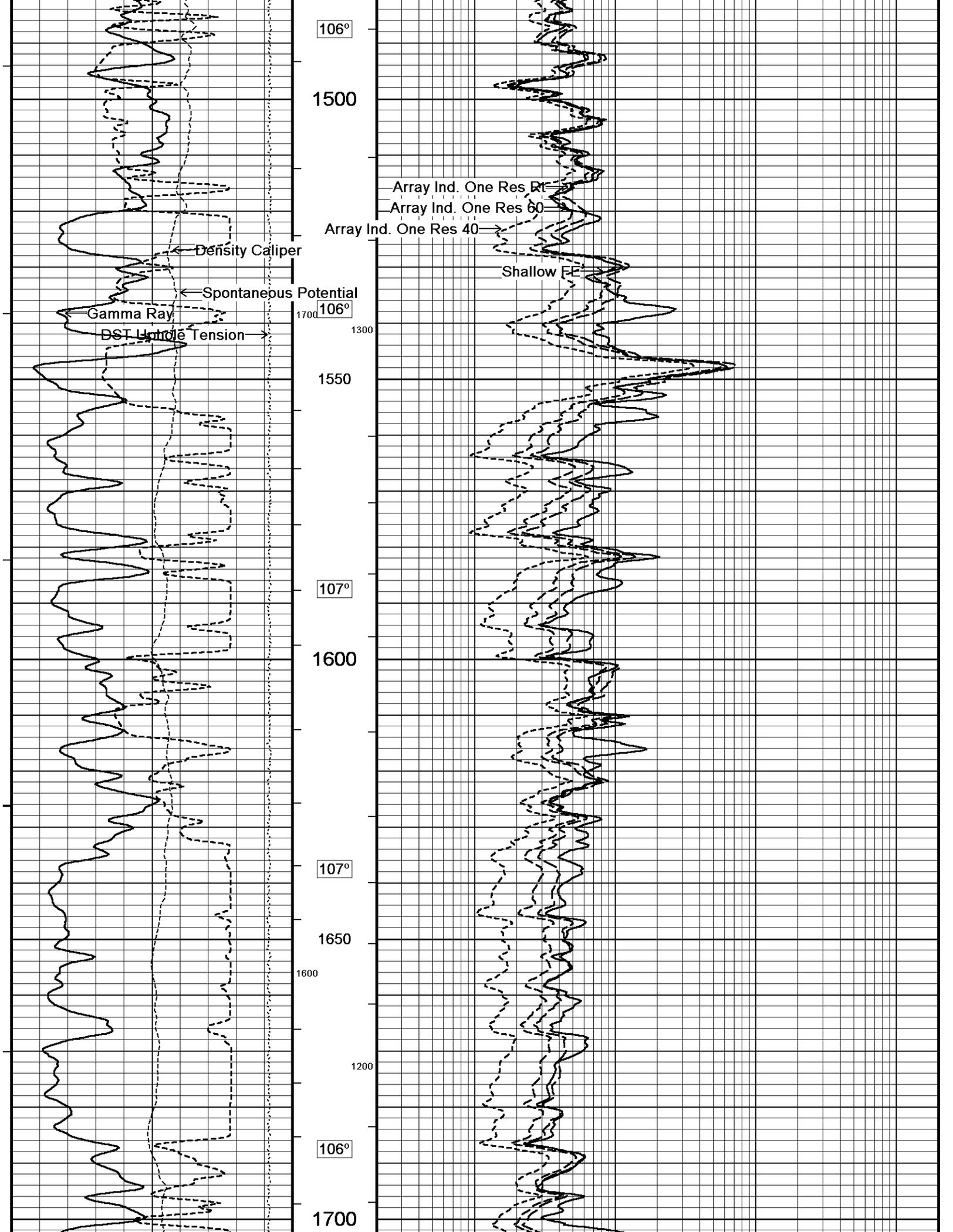
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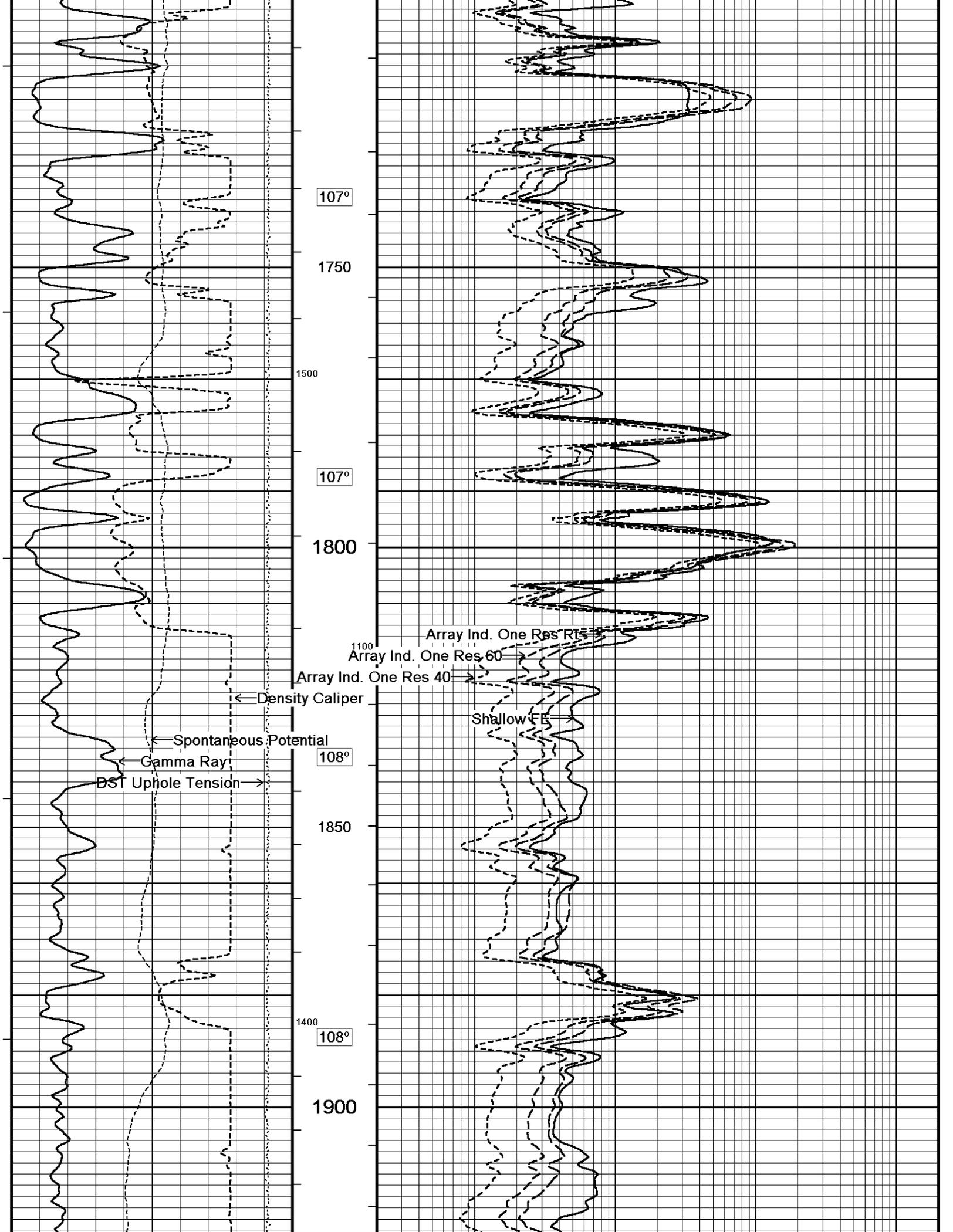
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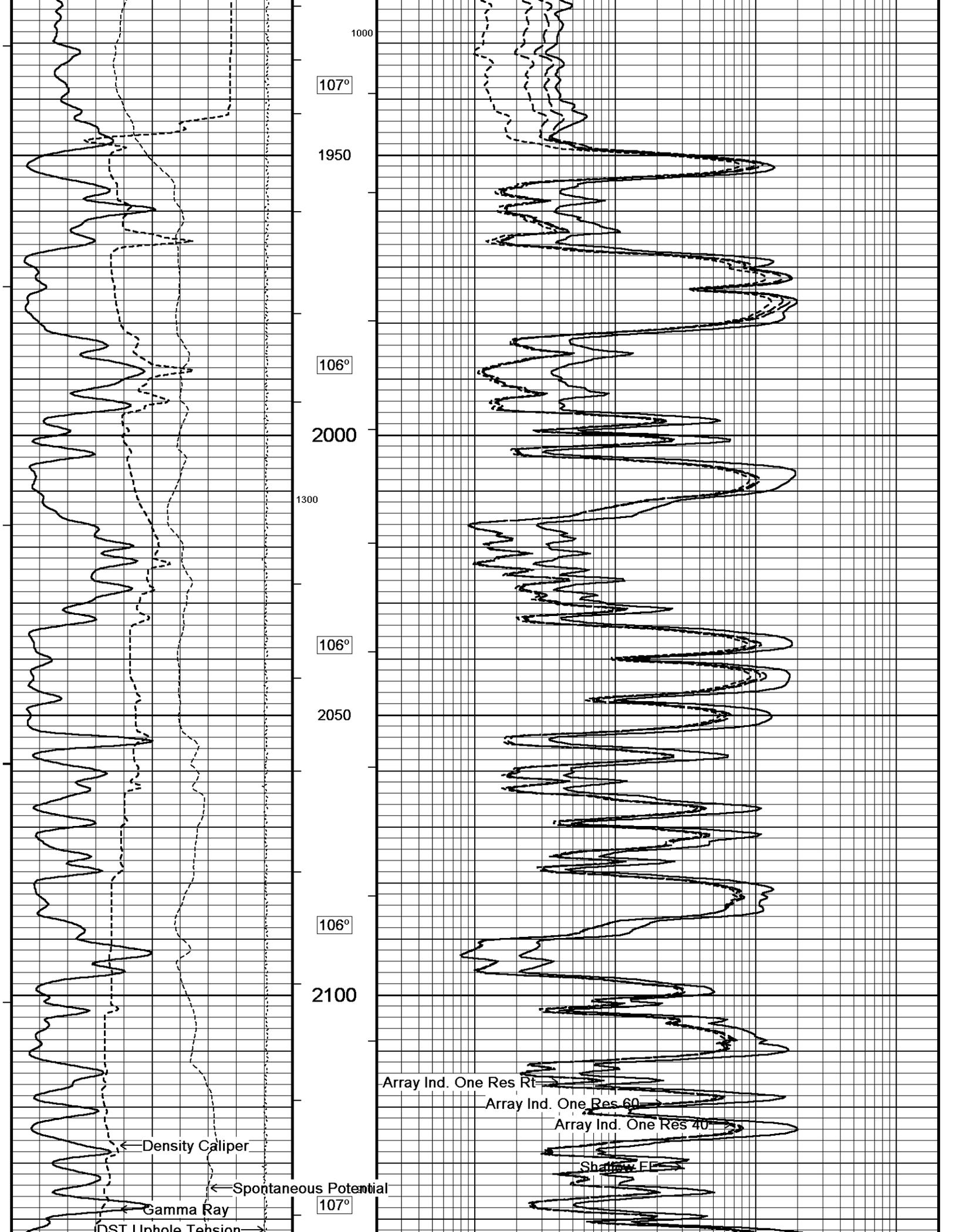


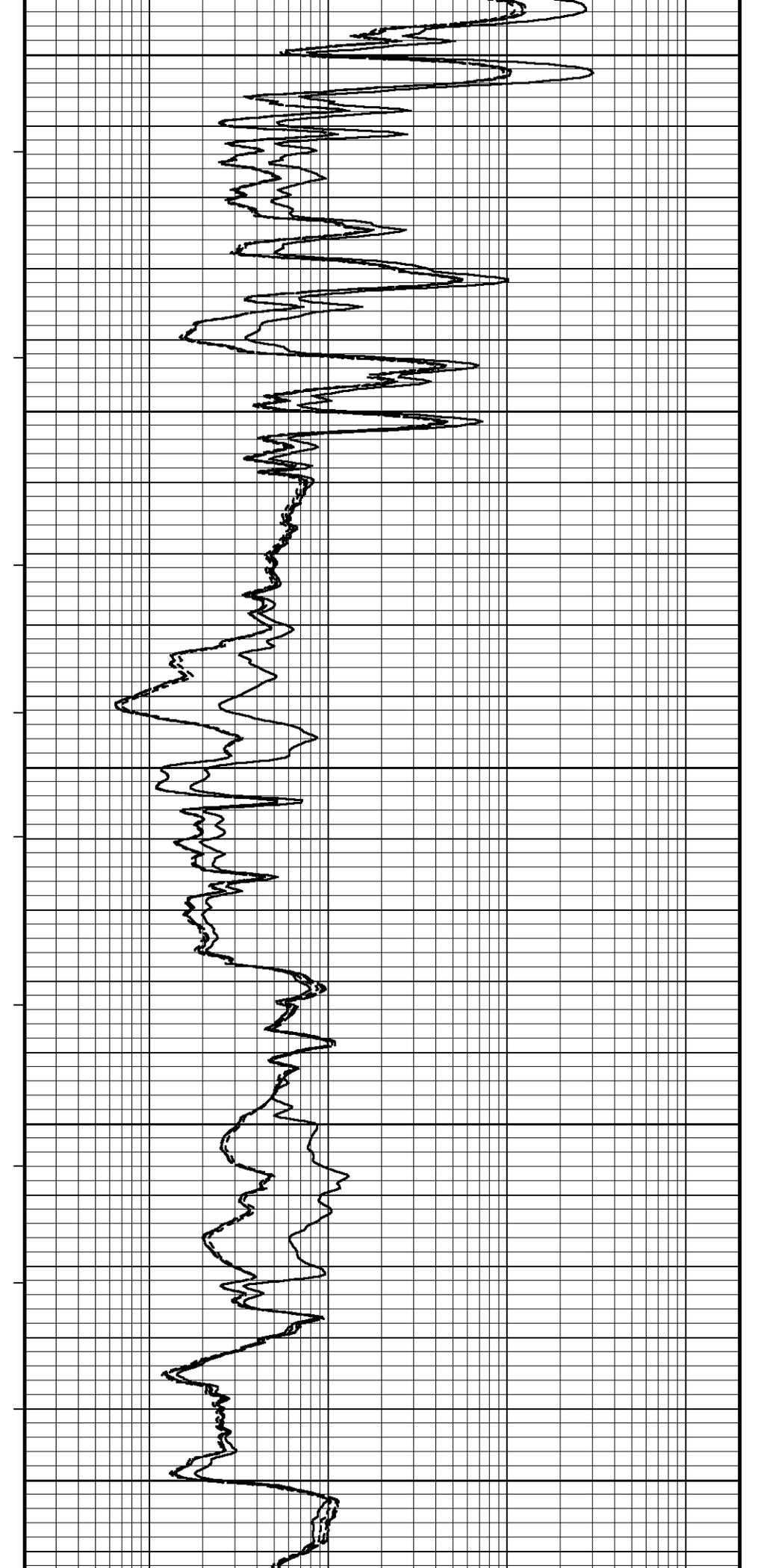
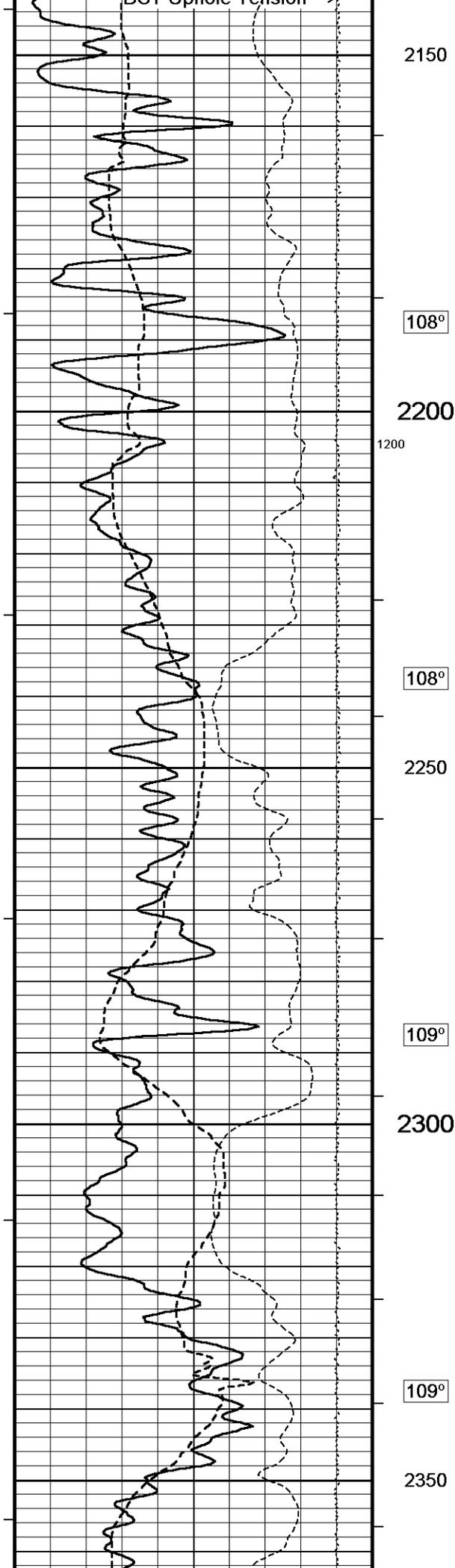


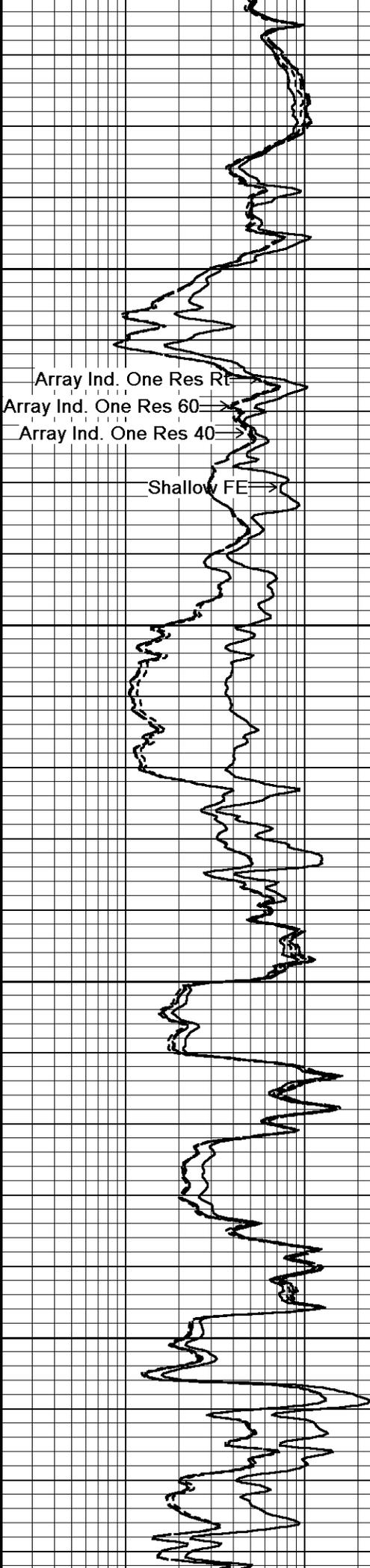
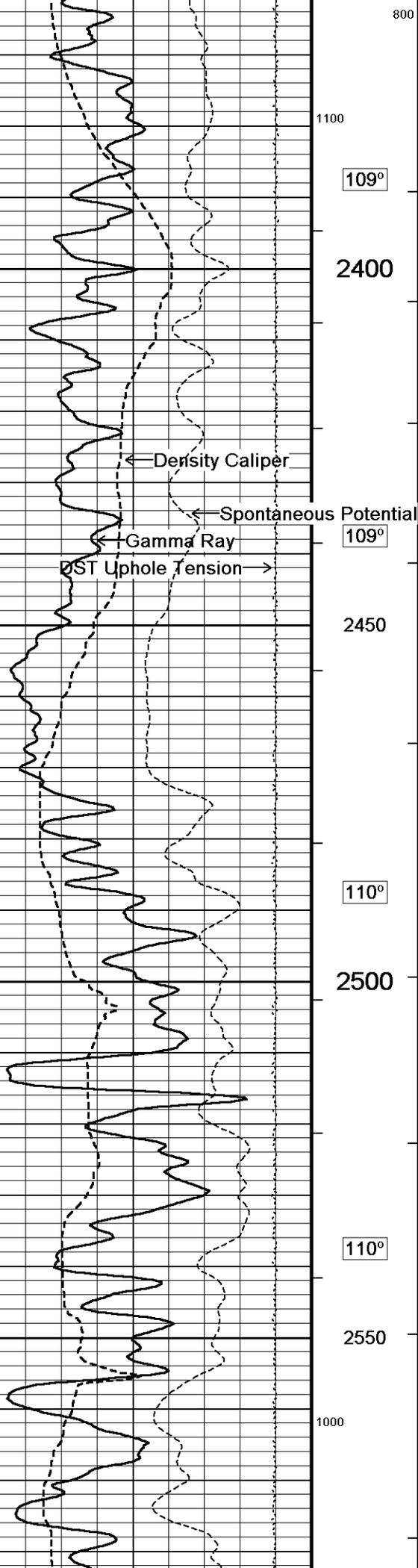












109°

2400

Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE

Density Caliper

Spontaneous Potential

Gamma Ray

DST Uphole Tension

109°

2450

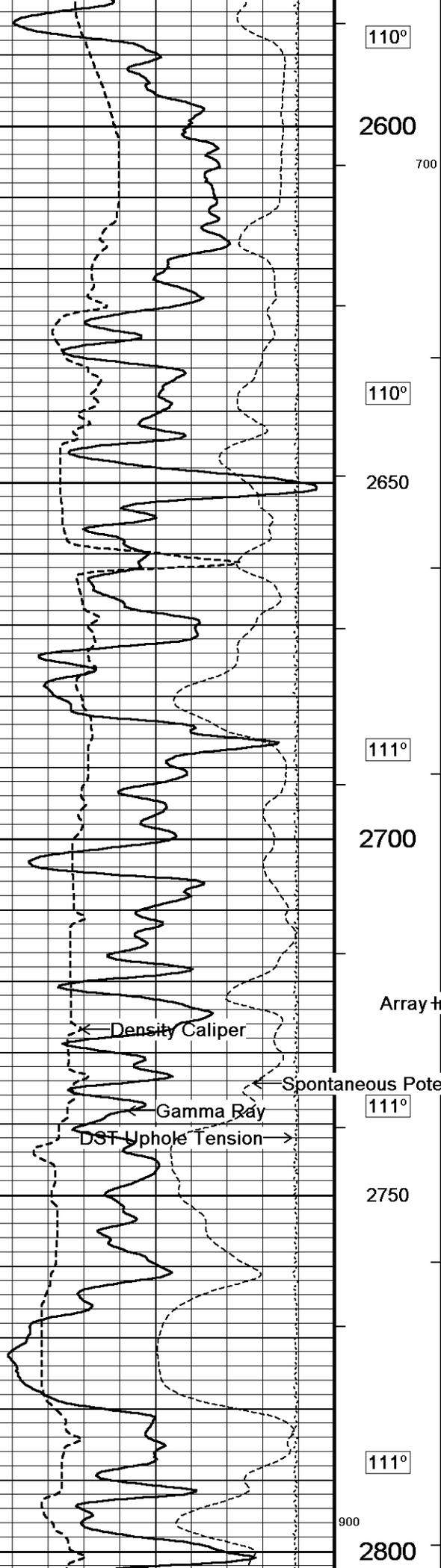
110°

2500

110°

2550

1000



110°

2600

700

110°

2650

111°

2700

Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE

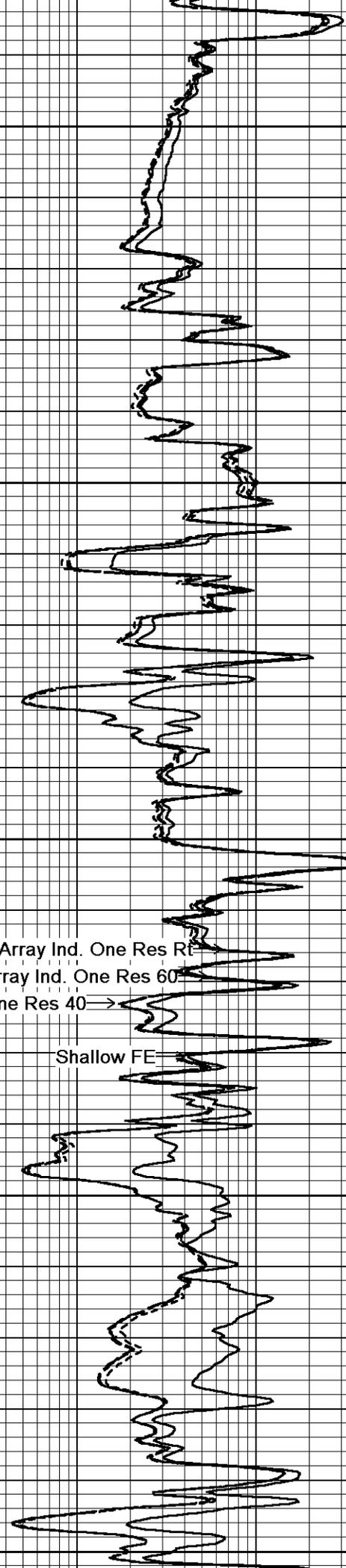
111°

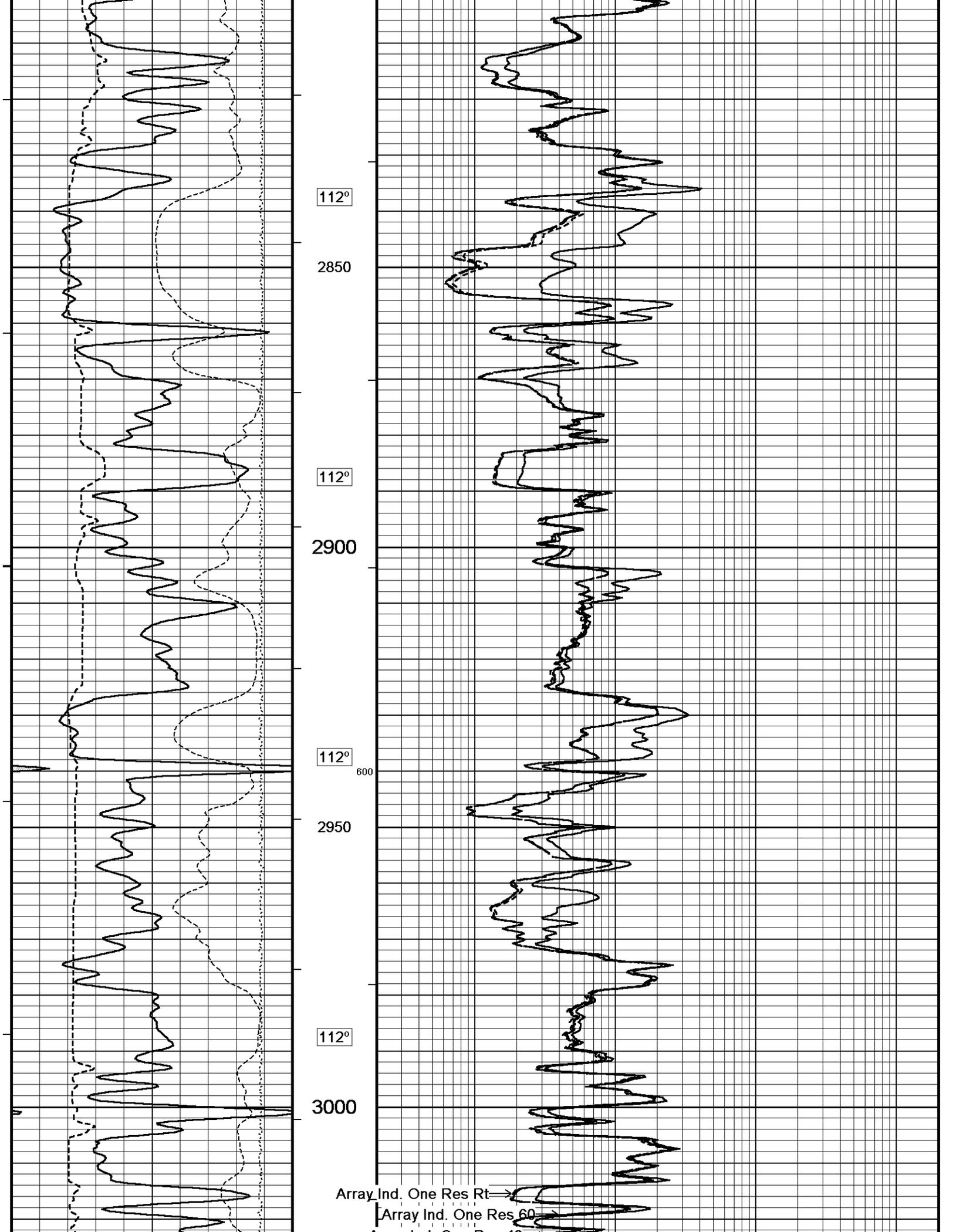
2750

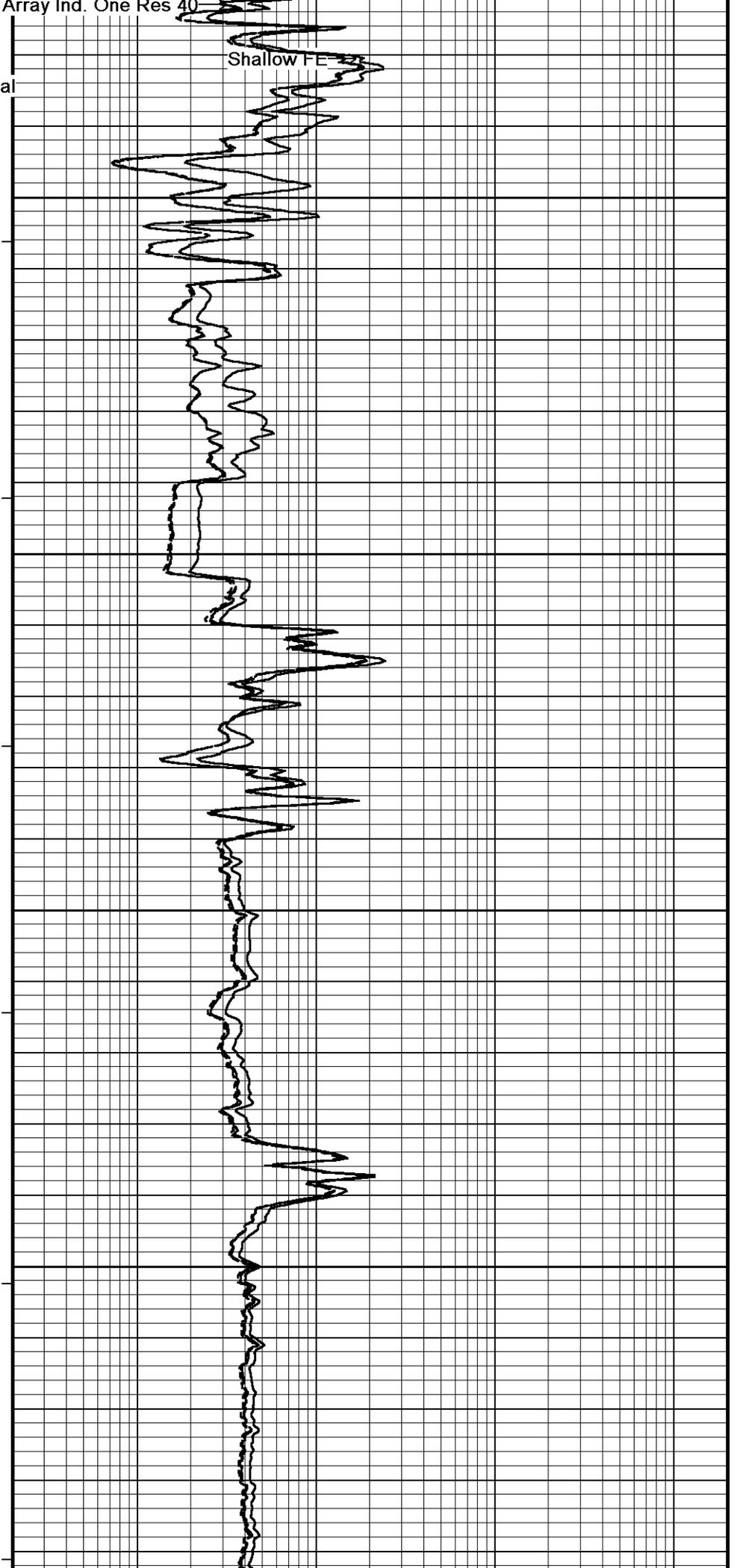
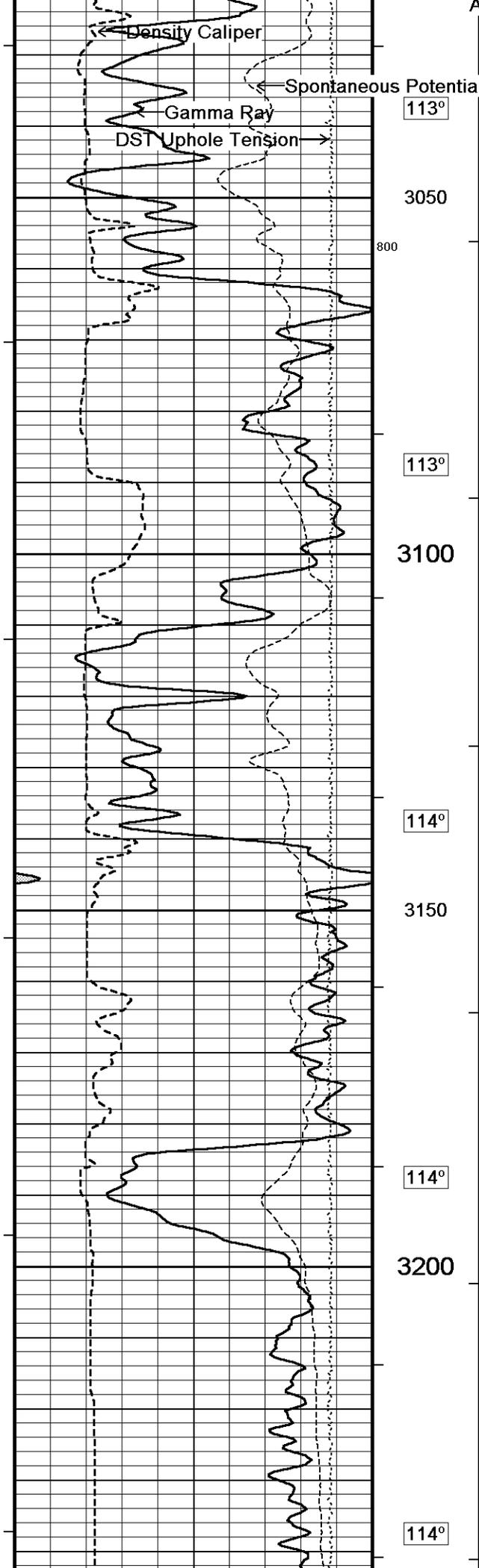
111°

2800

900







3250

115°

3300

Array Ind. One Res Rt

Array Ind. One Res 500

Array Ind. One Res 700

Array Ind. One Res 40

Shallow E

115°

3350

115°

3400

116°

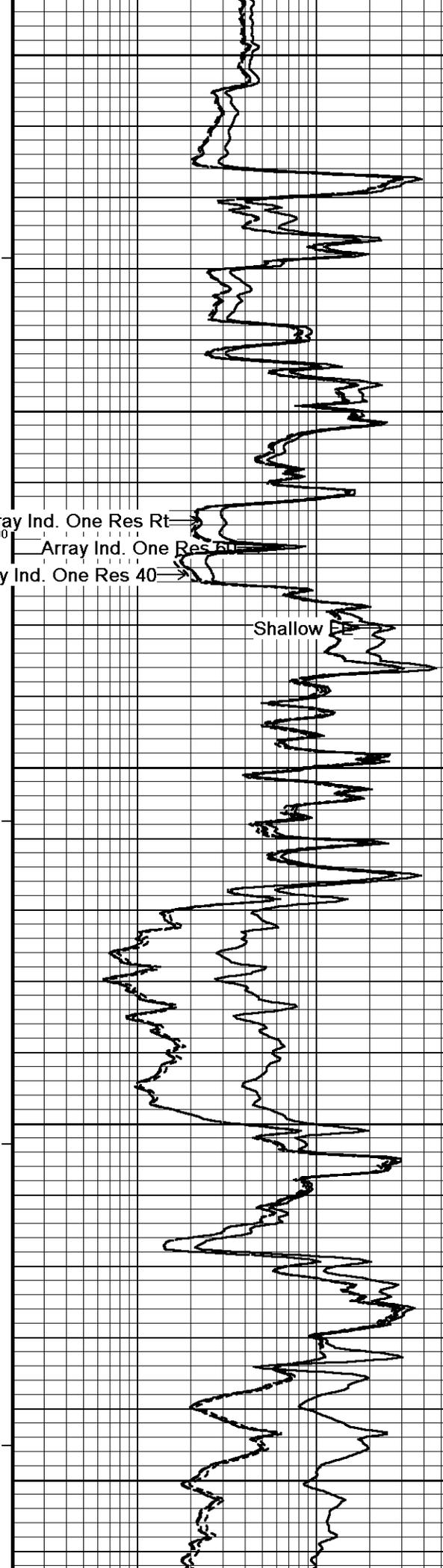
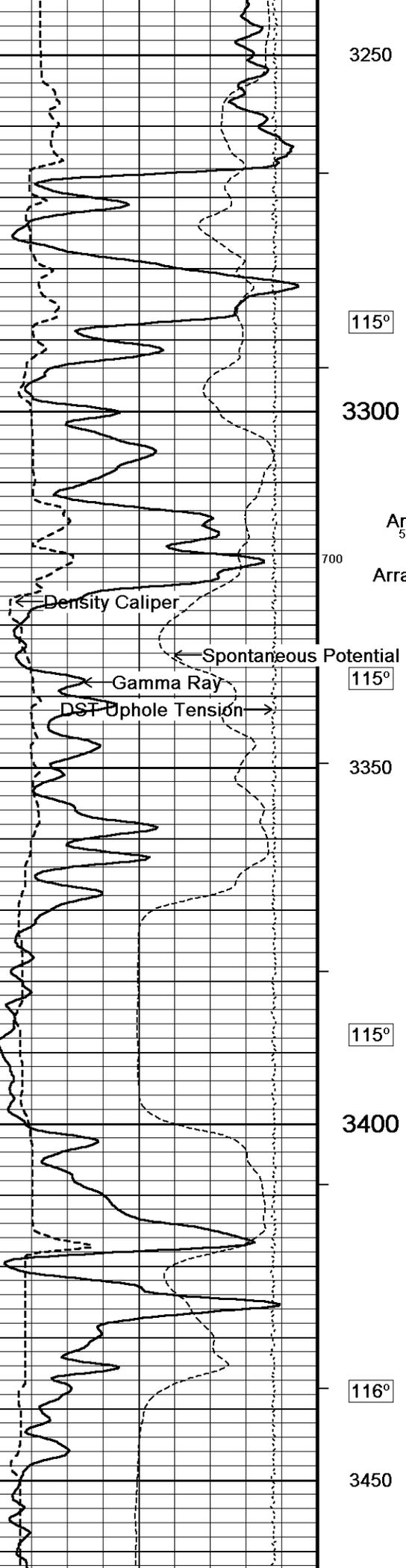
3450

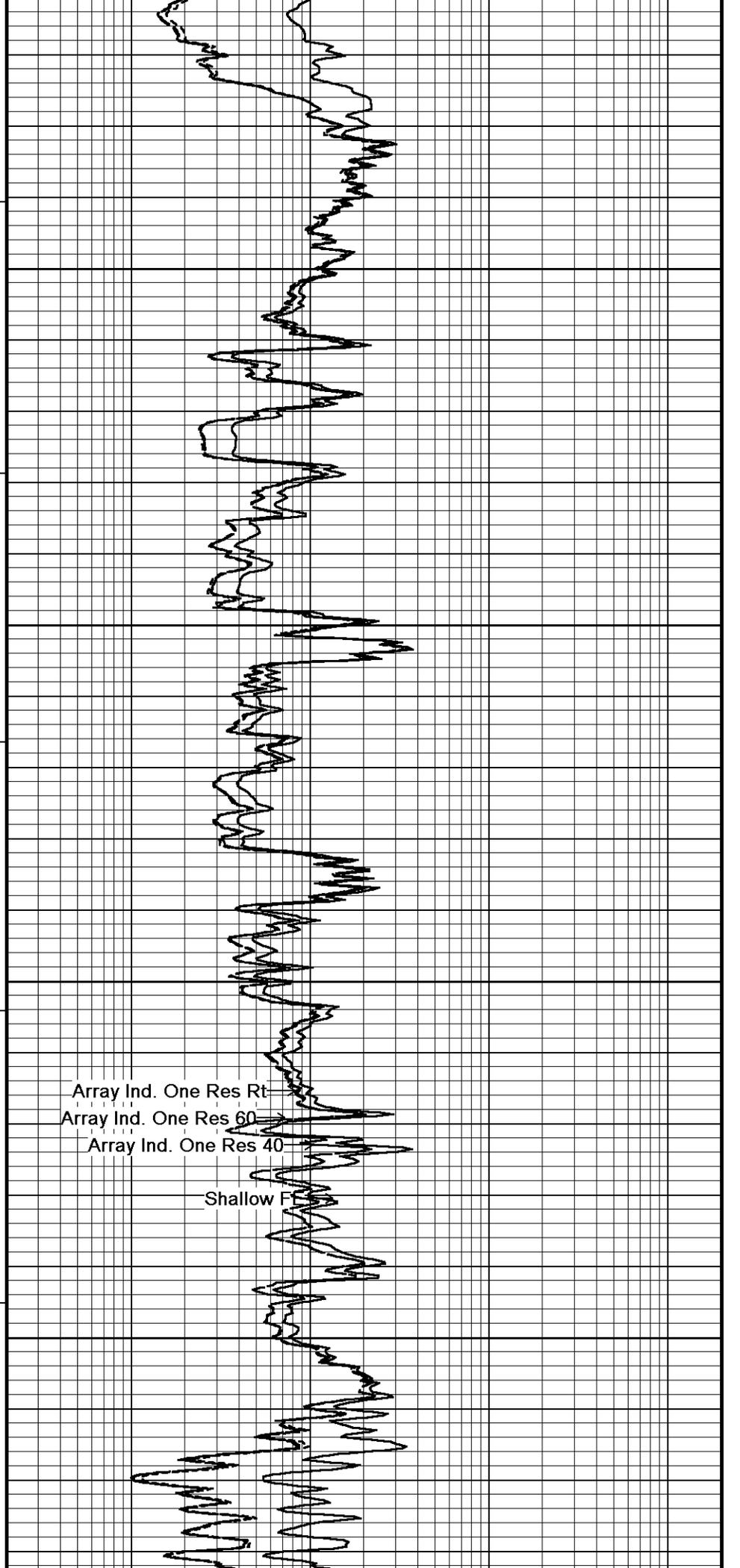
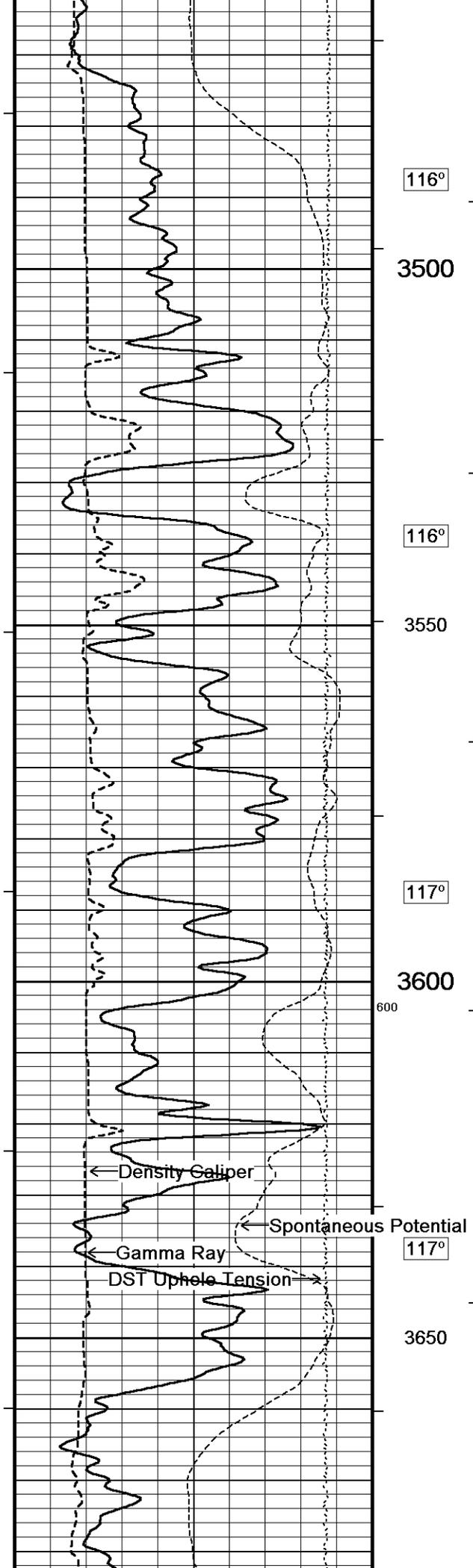
Density Caliper

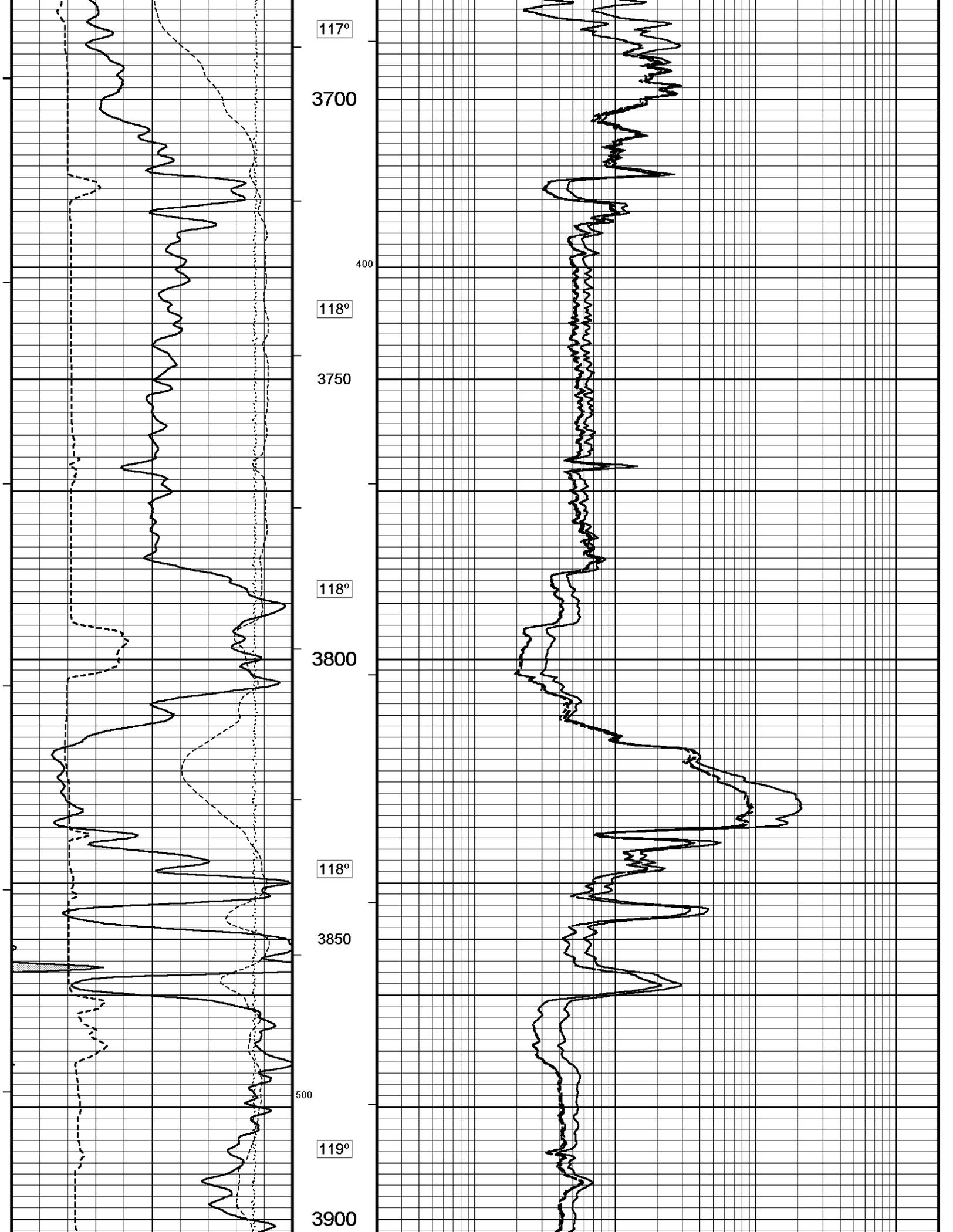
Spontaneous Potential

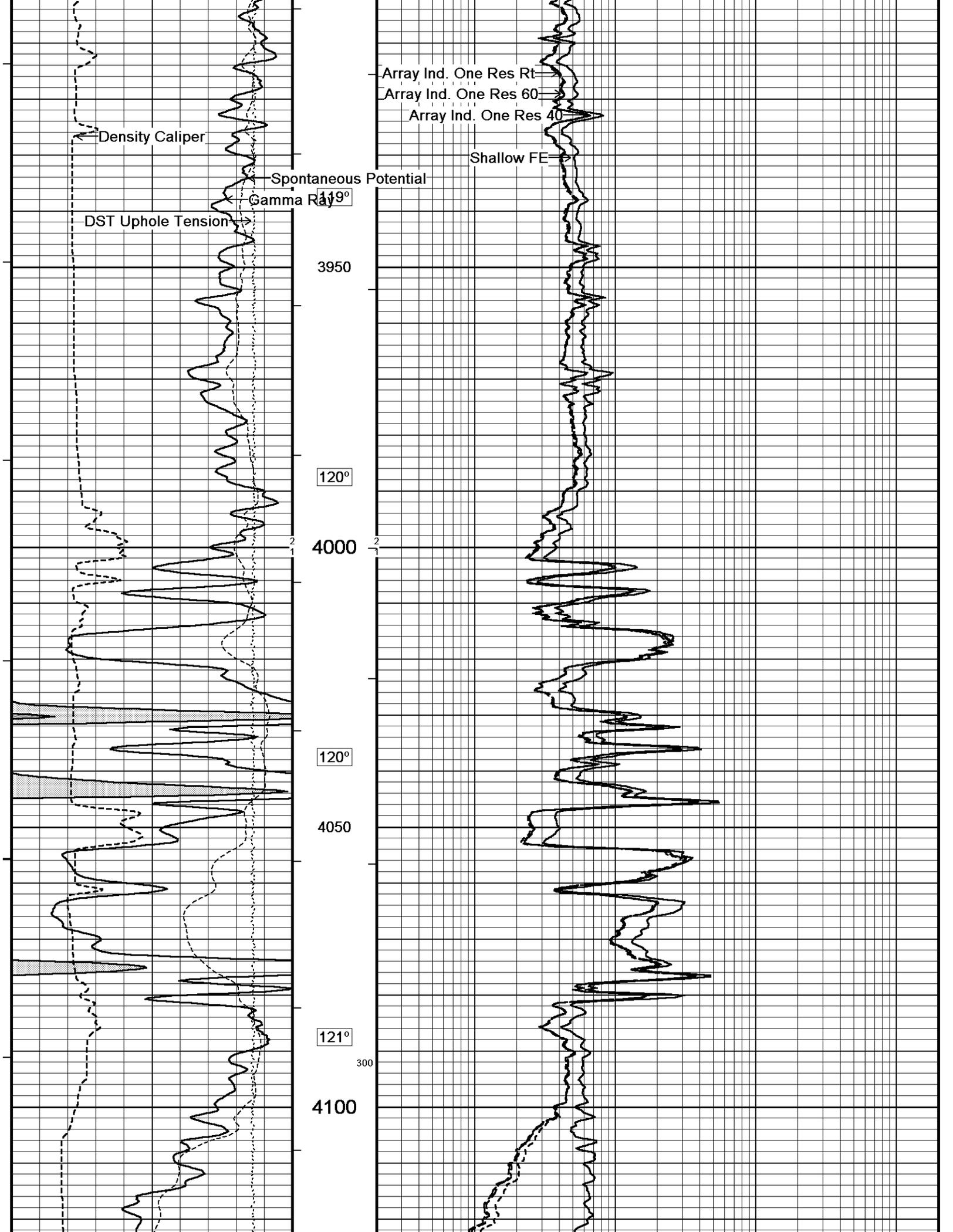
Gamma Ray

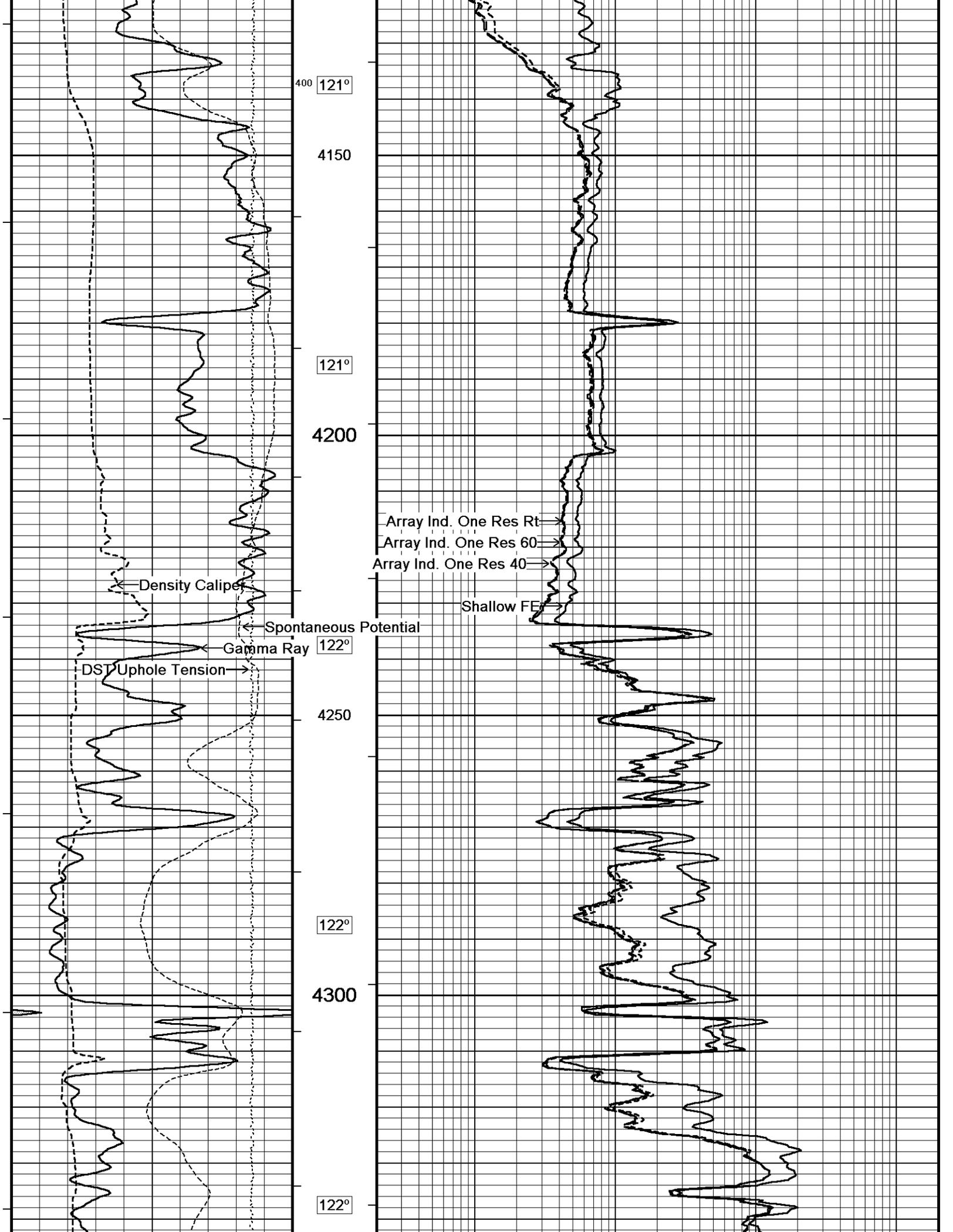
DST Uphole Tension

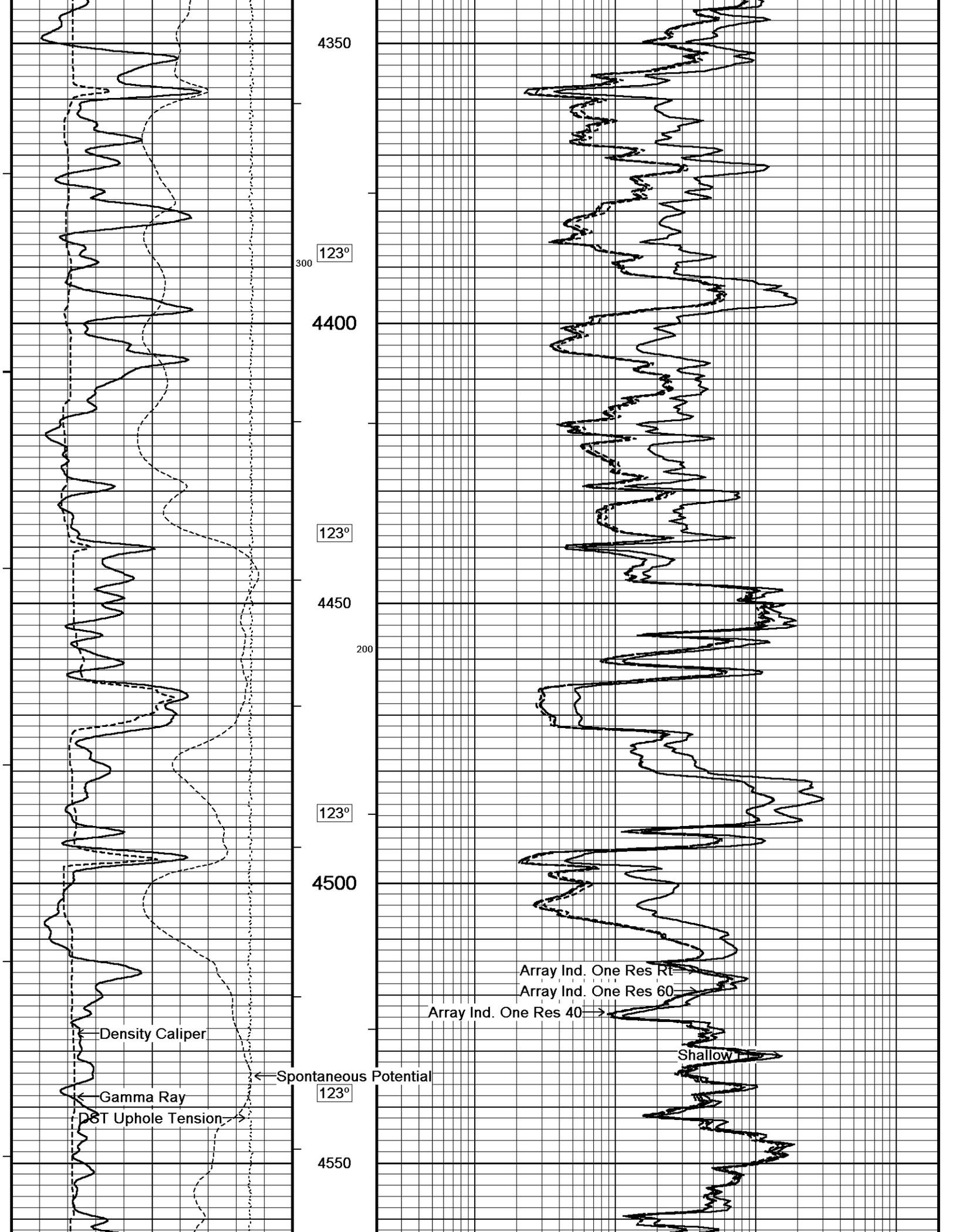


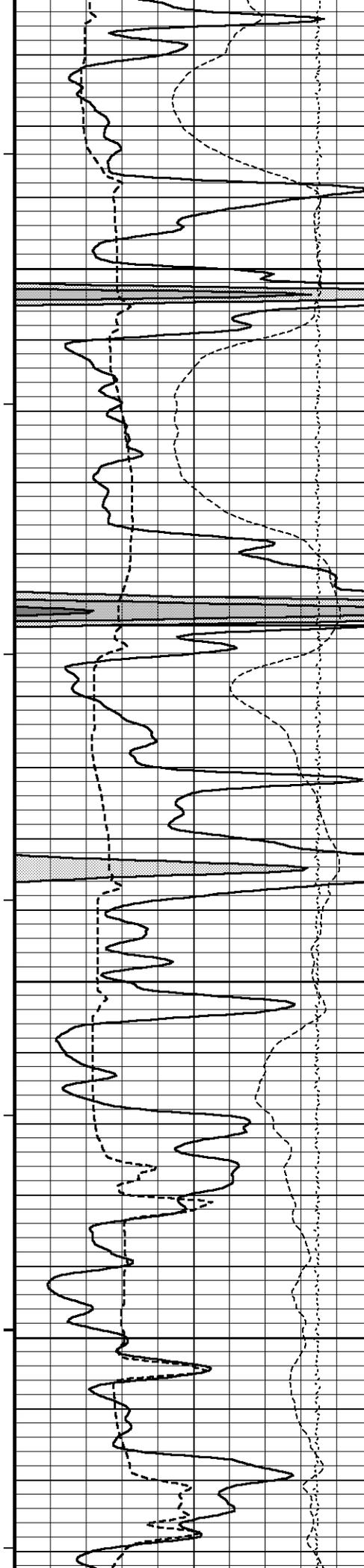












124°

4600

124°

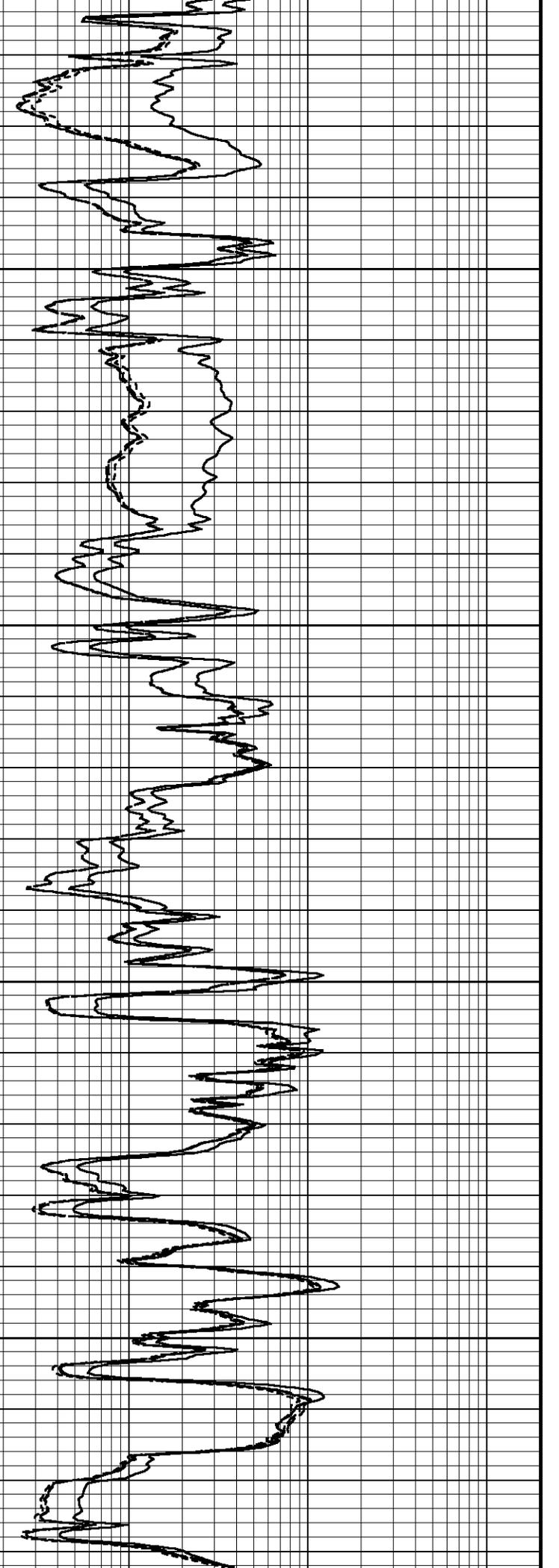
4650

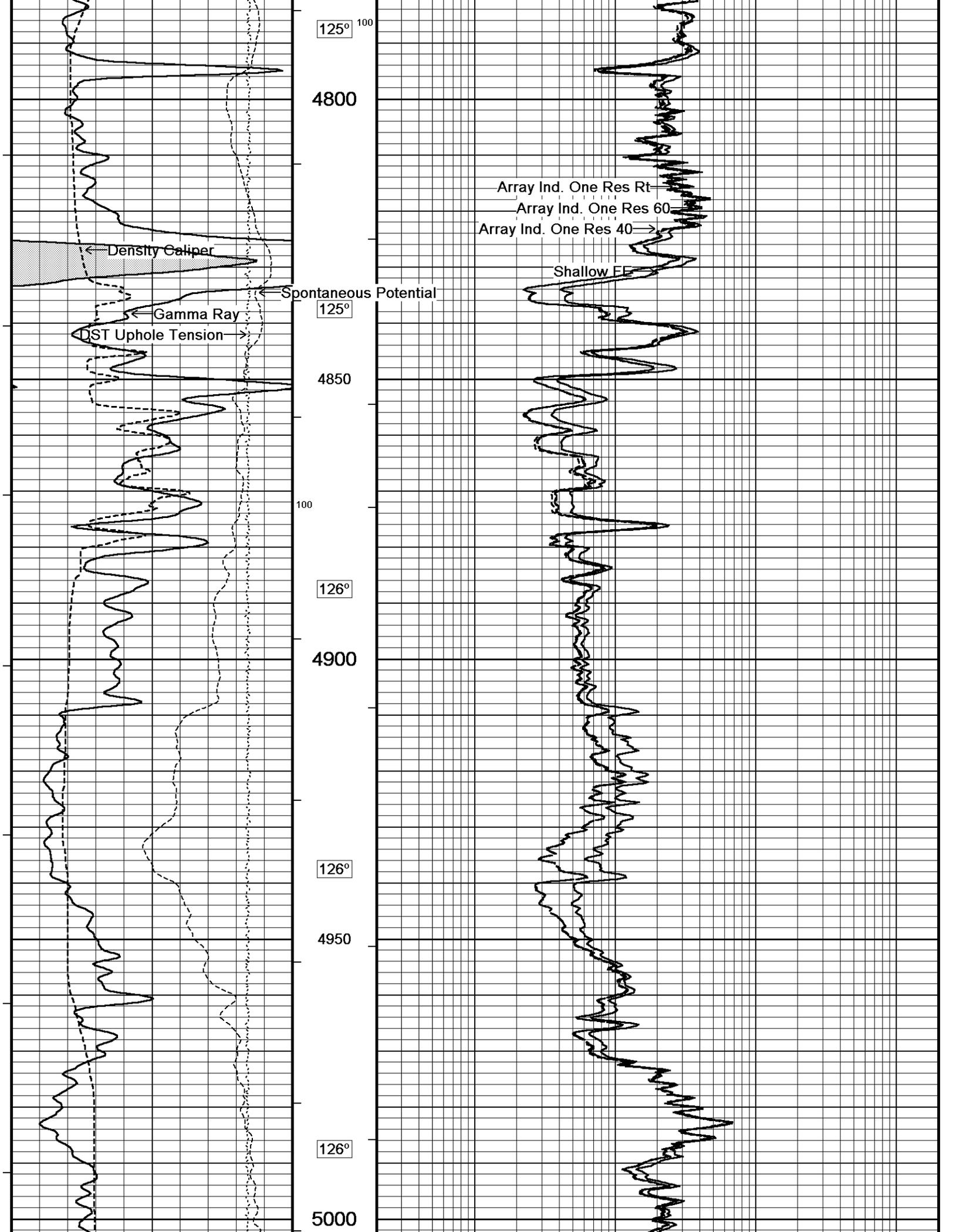
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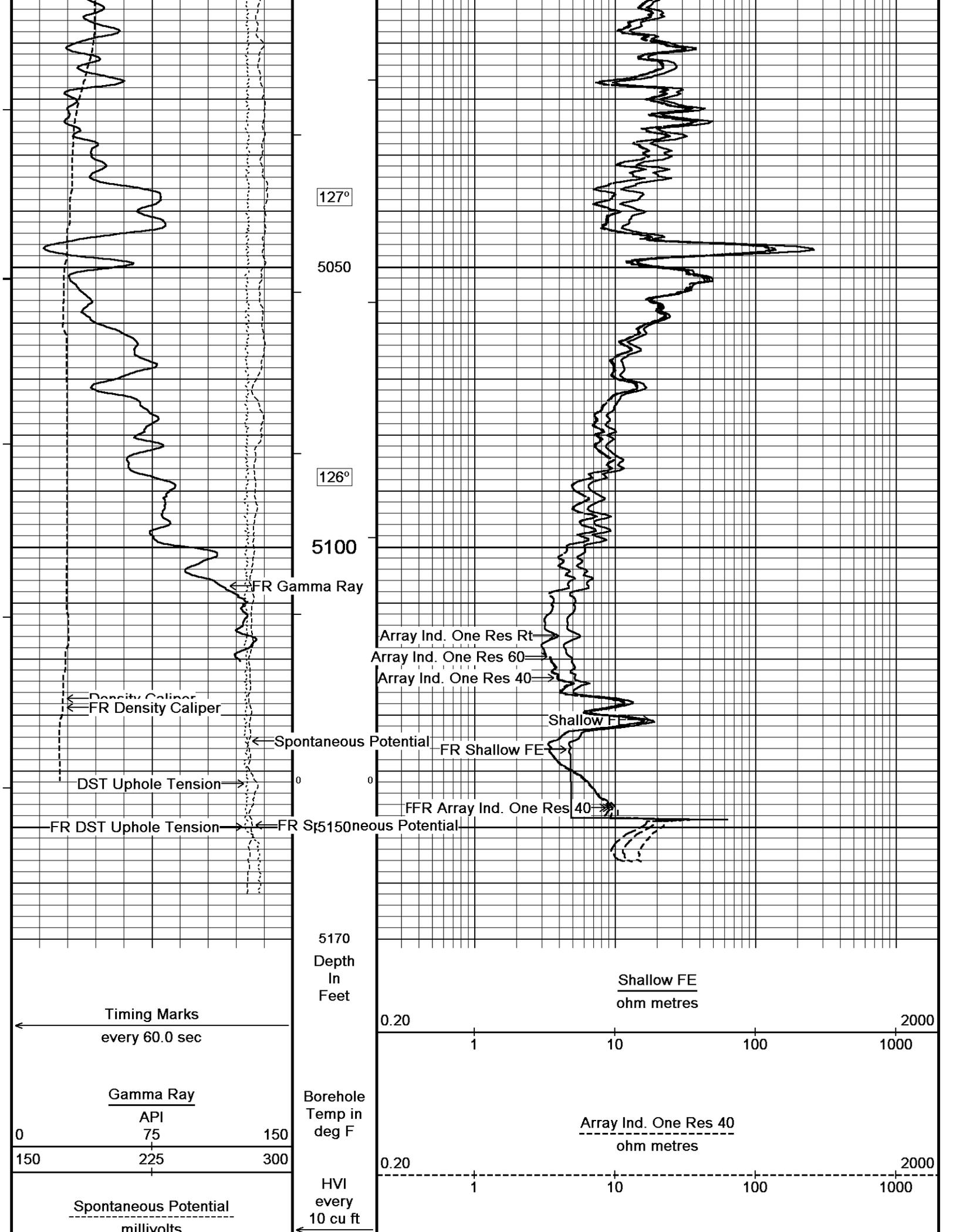
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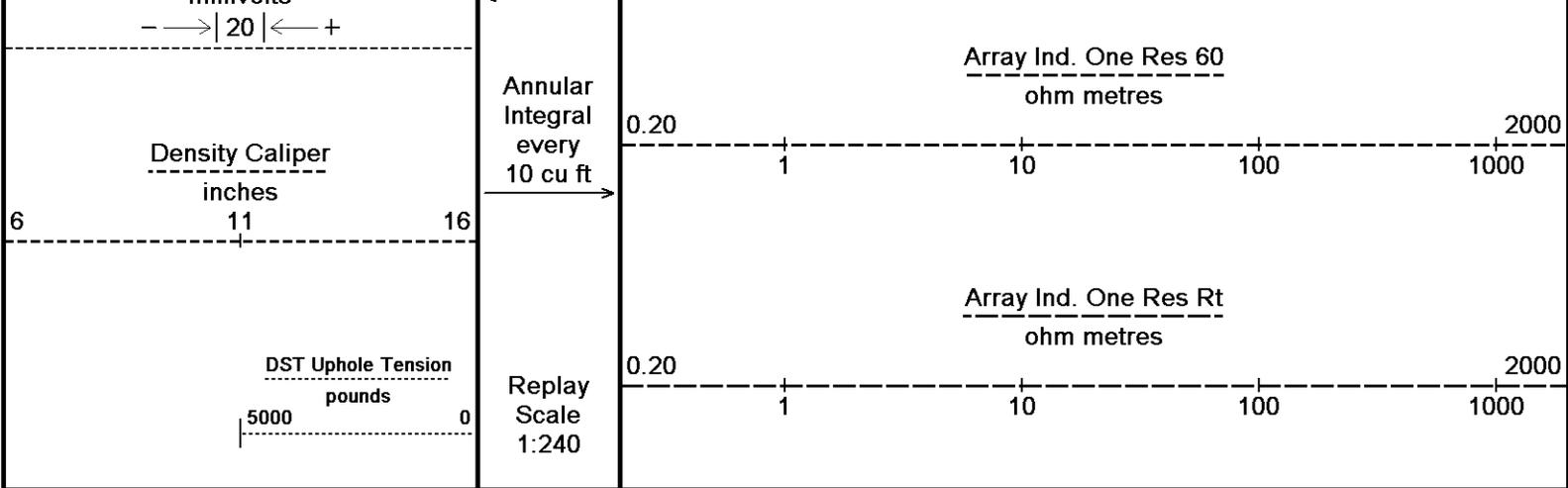
125°

4750





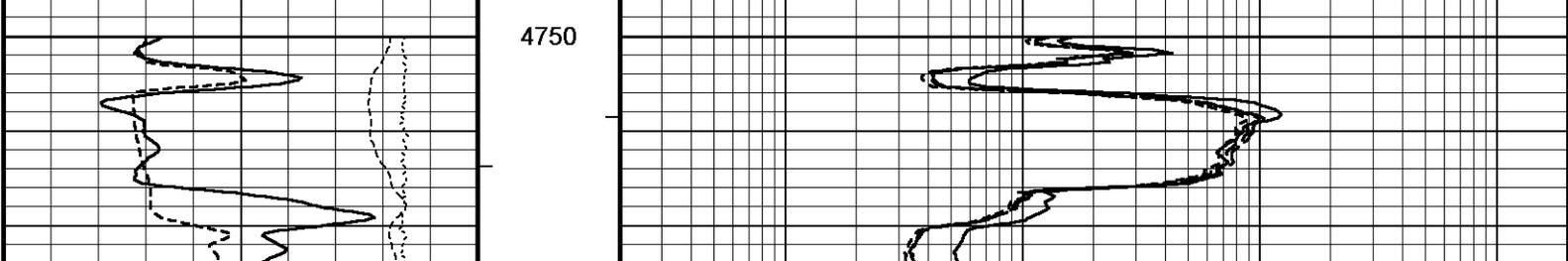
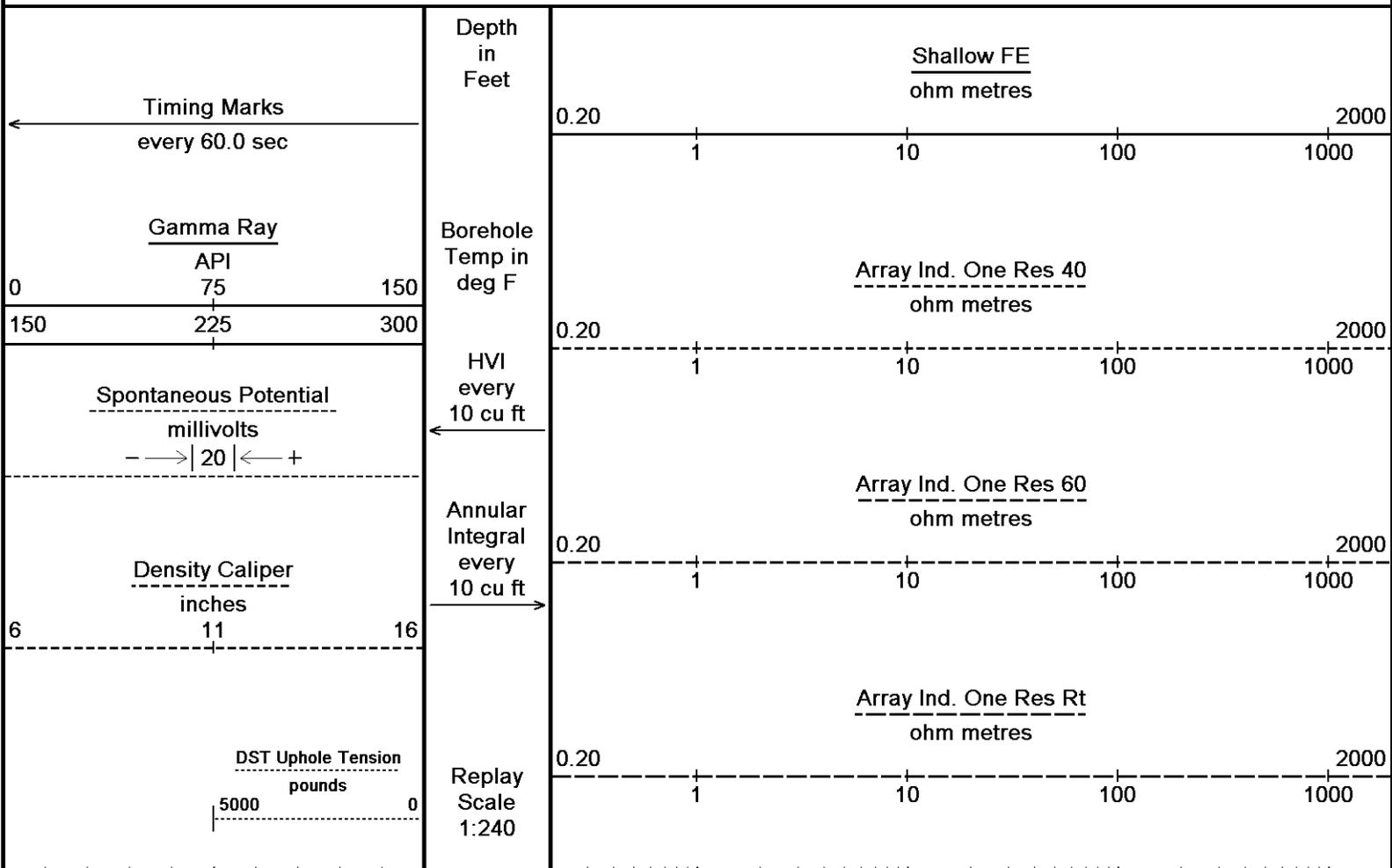


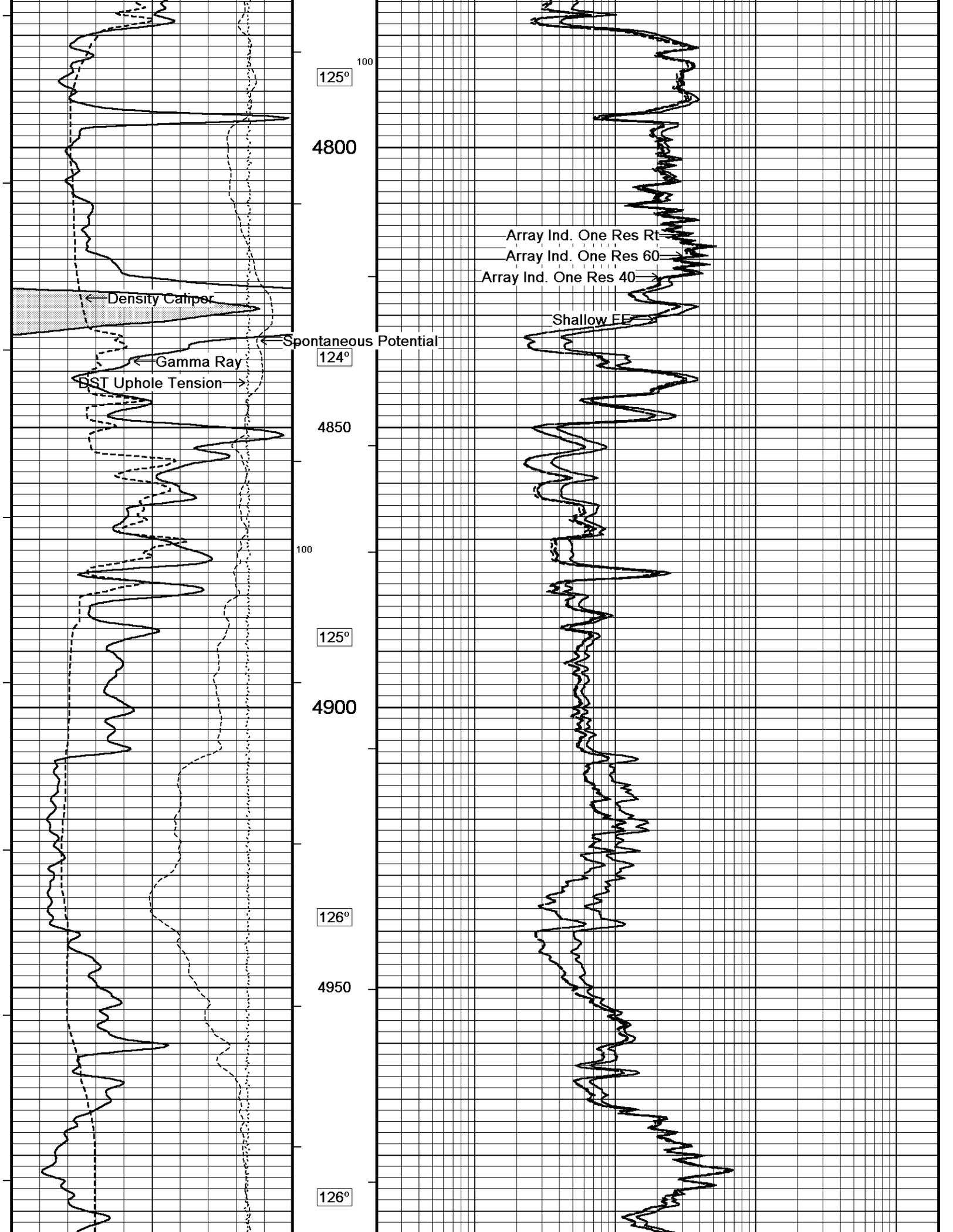


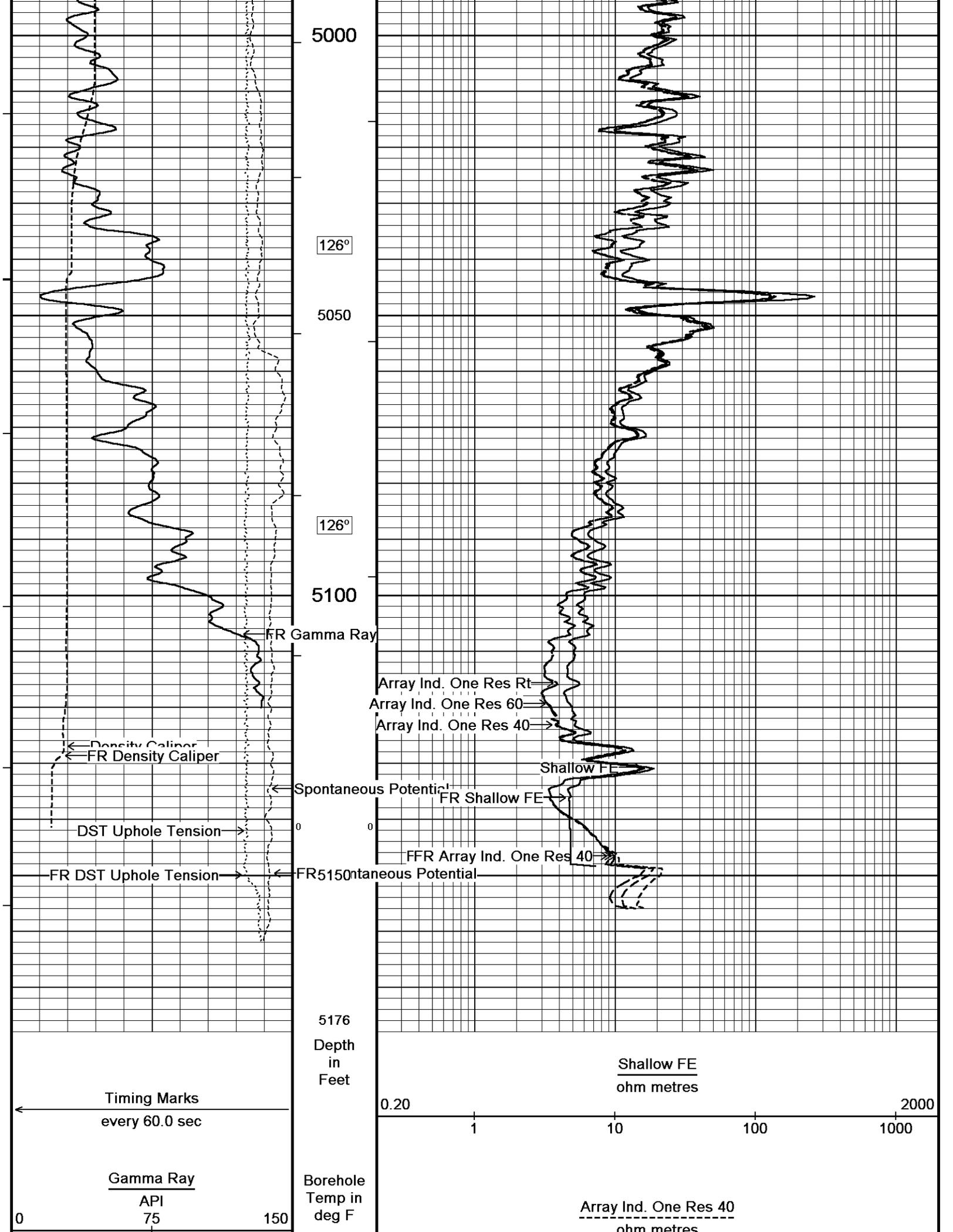
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 Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Main.dta
 Recorded on 05-AUG-2012 04:48
 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

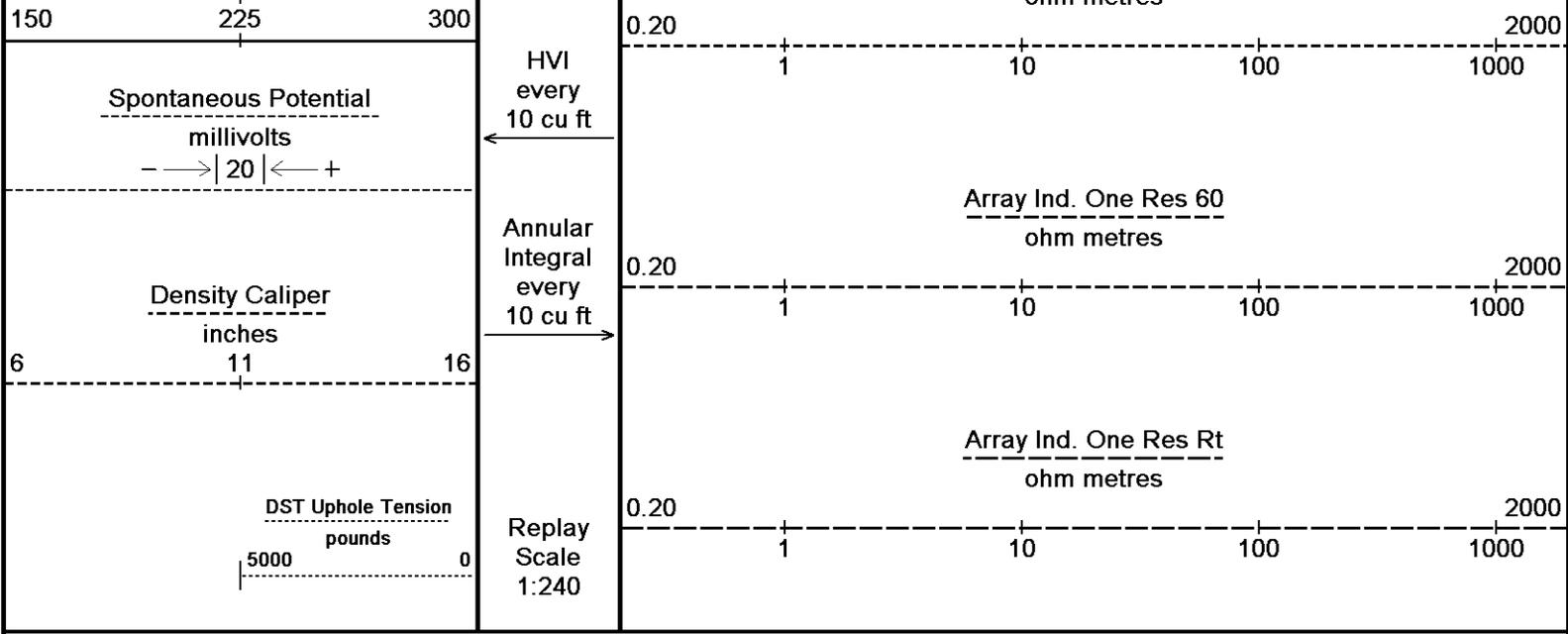
5 INCH MAIN

REPEAT SECTION
 Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 05-AUG-2012 06:58
 Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Repeat.dta
 Recorded on 05-AUG-2012 04:27
 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600









Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 05-AUG-2012 06:58
 Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Repeat.dta Recorded on 05-AUG-2012 04:27
 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION
 C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Main.dta

General Constants All 000 Last Edited on 04-AUG-2012,23:41

General Parameters		
Mud Resistivity	0.950	ohm-metres
Mud Resistivity Temperature	89.000	degrees F
Water Level	0.000	feet
Density/Neutron 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	4.500	inches
Caliper for Differential Caliper	None	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. Four Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	

Down-hole Tension Calibration SMS 0 Field Calibration on 05-AUG-2012 03:51

Reading No	Measured	Calibrated (lbs)
1	15948.01	0.00
2	16538.30	399.00

Gamma Calibration MCG-C 208 Field Calibration on 03-AUG-2012 22:27

	Measured	Calibrated (API)
Background	79	54
Calibrator (Gross)	1135	779
Calibrator (Net)	1056	725

Gamma Constants MCG-C 208 Last Edited on 04-AUG-2012,23:27

Gamma Calibrator Number	GR38	
Mud Density	1.12	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	

Concentration of KCl 0.00 kppm

SP Calibration MCG-C 208

Field Calibration on 03-AUG-2012 22:37

	Measured	Calibrated (mV)
Reference 1	100.2	101.0
Reference 2	-101.3	-101.0

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 03-AUG-2012,16:18

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-C 208

Last Edited on

Pre-filter Length 11

Micro Normal and Micro Inverse Calibration MML-A 4

Base Calibration on 24-JUL-2012 08:59
Field Check on 03-AUG-2012 22:21

Base Calibration		Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2	
Micro Normal	12.2	60.2	5.0	25.0	
Micro Inverse	15.7	78.4	5.0	25.0	
Channel	Base Check (ohm-m)		Field Check (ohm-m)		
Micro Normal	62.9		62.9		
Micro Inverse	48.2		48.2		

Micro Normal and Micro Inverse Constants MML-A 4

Last Edited on 02-AUG-2012,09:13

Pad Type 8-12 in Soft Rubber Inflatable 006-9011-159
 Micro Normal K Factor 1.0000
 Micro Inverse K Factor 1.0000
 Standoff Offset N/A inches

Caliper Calibration MML-A 4

Base Calibration on 24-JUL-2012 08:53
Field Calibration on 03-AUG-2012 22:21

Base Calibration		Measured	Calibrator Size (in)
Reading No			
1		15504	5.98
2		18771	7.97
3		22124	9.86
4		25894	11.92
5		0	0.00
6		N/A	N/A
Field Calibration		Measured Caliper (in)	Actual Caliper (in)
		5.93	5.98

Neutron Calibration MDN-A.B 65

Base Calibration on 26-JUL-2012 11:25
Field Check on 03-AUG-2012 22:33

Base Calibration		Measured		Calibrated (cps)	
	Near	Far	Near	Far	
Ratio	3179	99	3714	110	
	32.263		33.764		
Field Calibrator at Base				Calibrated (cps)	
Ratio			1621	2347	
			0.691		
Field Check				Calibrated (cps)	
Ratio			1614	2231	
			0.723		

Neutron Constants MDN-A.B 65

Last Edited on 02-AUG-2012,09:24

Neutron Source Id PN-521
 Neutron Jig Number 5824NE
 Epithermal Neutron No
 Caliper Source for Processing Density Caliper

Caliper Source for Processing	Density Caliper		
Stand-off	0.00	inches	
Mud Density	1.00	gm/cc	
Limestone Sigma	7.10	cu	
Sandstone Sigma	4.26	cu	
Dolomite Sigma	4.70	cu	
Formation Pressure Source	Constant Value		
Formation Pressure	0.00	kpsi	
Temperature Source	Constant Value		
Temperature	68.00	degrees F	
Mud Salinity	0.00	kppm	
Salinity Correction	Not Applied		
Formation Fluid Salinity Source	Constant Value		
Formation Fluid Salinity	0.00	kppm	
Barite Mud Correction	Not Applied		

FE Calibration MFE-A.A 55

Base Calibration on 24-JUL-2012 09:23
Field Check on 03-AUG-2012 22:12

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	968.0	126.8
Base Check		276.7
Field Check		276.7

FE Constants MFE-A.A 55

Last Edited on 04-AUG-2012,23:27

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Caliper Source for FE correction	Density Caliper	
Caliper Value for FE correction	N/A	inches
Rm Source for FE correction	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	
Stand-off	0.5	inches

Induction Calibration MAI-A.A 45

Base Calibration on 26-JUL-2012,09:22
Field Check on 03-AUG-2012 22:11

Base Calibration

Test Loop Calibration Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	14.4	472.6	9.3	966.2
2	5.7	374.0	7.6	821.4
3	3.4	261.2	5.2	566.0
4	2.5	133.9	2.6	279.2

Array Temperature 78.4 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	19.8	3852.9
2	0.0	0.0	32.0	3630.1
3	0.0	0.0	28.8	3050.0
4	0.0	0.0	18.4	2079.5
Deep	0.0	0.0	16.2	1911.6
Medium	0.0	0.0	42.6	4061.3
Shallow	0.0	0.0	50.1	5484.3

Array Temperature 0.0 82.4 Deg F

Induction Constants MAI-A.A 45

Last Edited on 04-AUG-2012,23:27

Induction Model	RtAP-WBM	
Caliper for Borehole Corr.	Density Caliper	
Hole Size for Borehole Correction	N/A	inches
Tool Centred	No	
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
Borehole Corr. Rm Source	Temperature Corr	

Temp. for Rm Corr.	MCG External Temperature	0.0020	mhos/metre
Squasher Start		N/A	mhos/metre
Squasher Offset			
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

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	

High Resolution Temperature Calibration MAI-A.A 45

Field Calibration on 26-JUL-2012,09:09

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MAI-A.A 45

Last Edited on

Pre-filter Length	11
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Caliper Calibration MPD-B 31

Base Calibration on 26-JUL-2012 09:16
Field Calibration on 03-AUG-2012 22:14

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17567	3.99
2	26416	5.98
3	35056	7.97
4	43488	9.86
5	52816	11.92
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	5.97	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 26-JUL-2012 10:02
Field Check on 03-AUG-2012 22:20

Density Calibration				
Base Calibration				
	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	48085	24200	59556	30836
Reference 2	19674	1989	24941	2541

Field Check at Base	692.2	849.9
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Field Check	691.9	854.9
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PE Calibration				
Base Calibration				
	WS	WH	Ratio	Calibrated Ratio
Background	127	608		
Reference 1	19234	47953	0.404	0.371

Reference 1 19284 47555 0.404 0.371
 Reference 2 5695 19580 0.293 0.272

Field Check at Base
 126.7 608.3

Field Check
 126.9 606.5

Density Constants MPD-B 31

Last Edited on 04-AUG-2012,23:27

Density Source Id 254
 Nylon Calibrator Number DNCE695
 Aluminium Calibrator Number DACD698
 Density Shoe Profile 8 inch
 Caliper Source for Processing Density Caliper
 PE Correction to Density Not Applied
 Mud Density 1.12 gm/cc
 Mud Density Z/A Multiplier 1.13
 Mud Filtrate Density 1.00 gm/cc
 Dry Hole Mud Filtrate Density 1.00 gm/cc
 DNCT 0.00 gm/cc
 CRCT 0.00 gm/cc
 Density Z/A Correction Hybrid

Matrix density (gm/cc)	Depth (m)
2.71	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

DOWNHOLE EQUIPMENT

C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Main.dta

Compact Comms Gamma
 MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

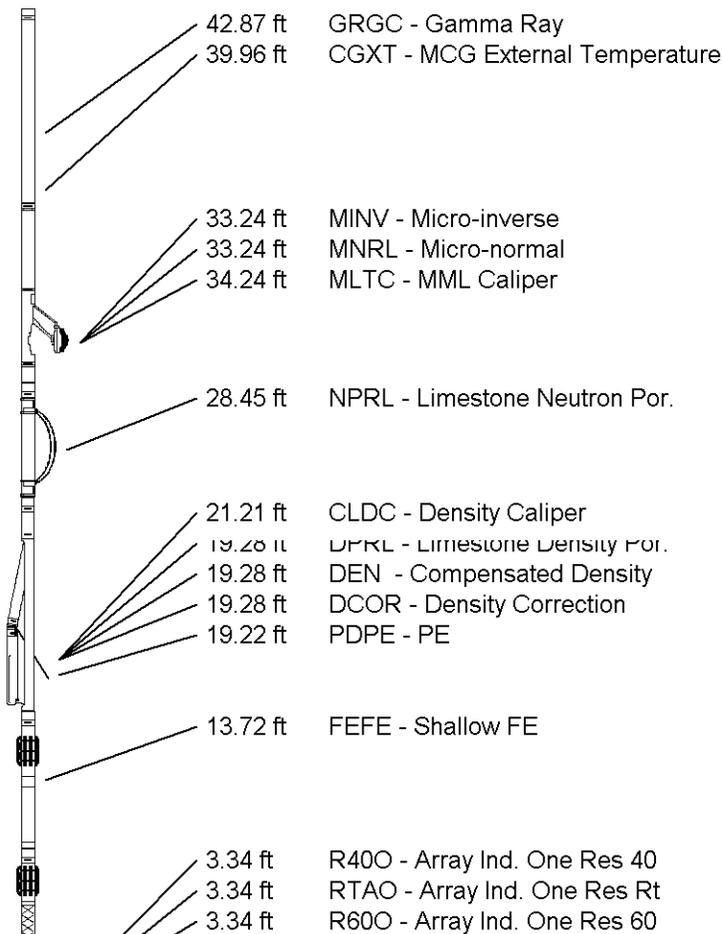
Compact Micro-log
 MML-A 4 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

Compact Neutron
 MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

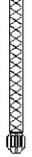
Compact Density/Caliper
 MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
 MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
 MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in



Total Length: 48.16 ft Weight: 383.6 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 M&M EXPLORATION INC.
WELL Z-BAR #26-11
FIELD AETNA GAS AREA
PROVINCE/COUNTY BARBER
COUNTRY/STATE U.S.A. / KANSAS

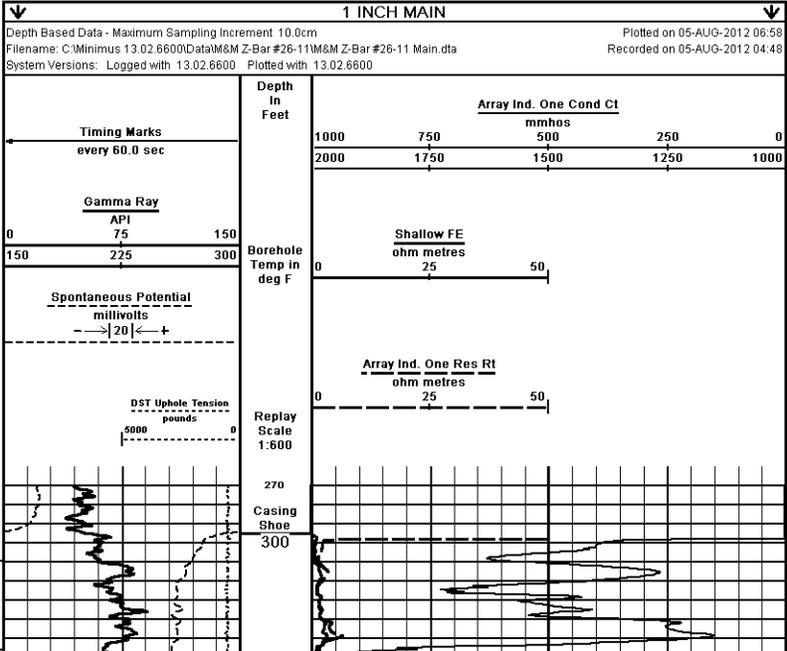
Elevation Kelly Bushing	1798.00	feet	First Reading	5147.00	feet
Elevation Drill Floor	1796.00	feet	Depth Driller	5150.00	feet
Elevation Ground Level	1786.00	feet	Depth Logger	5150.00	feet

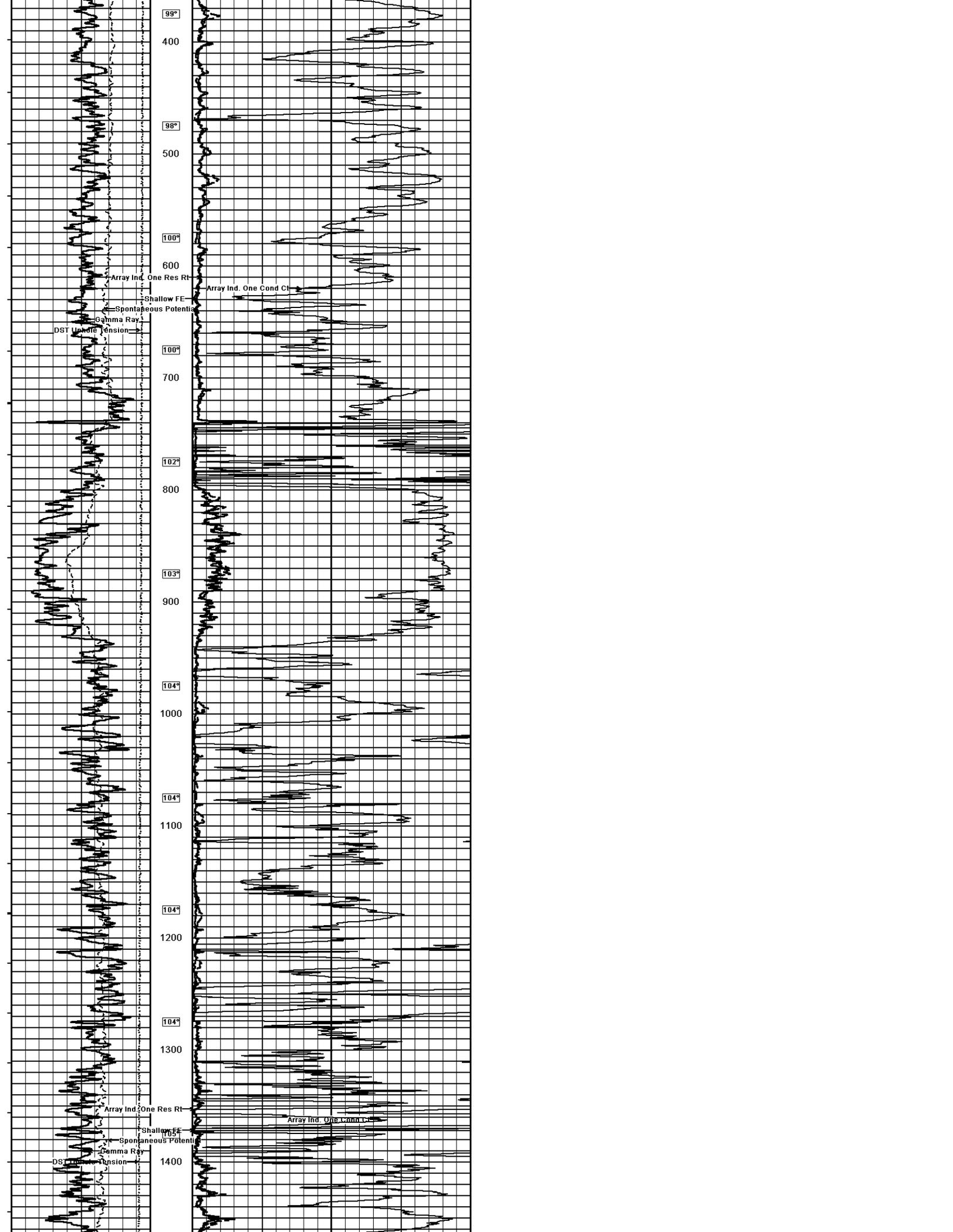


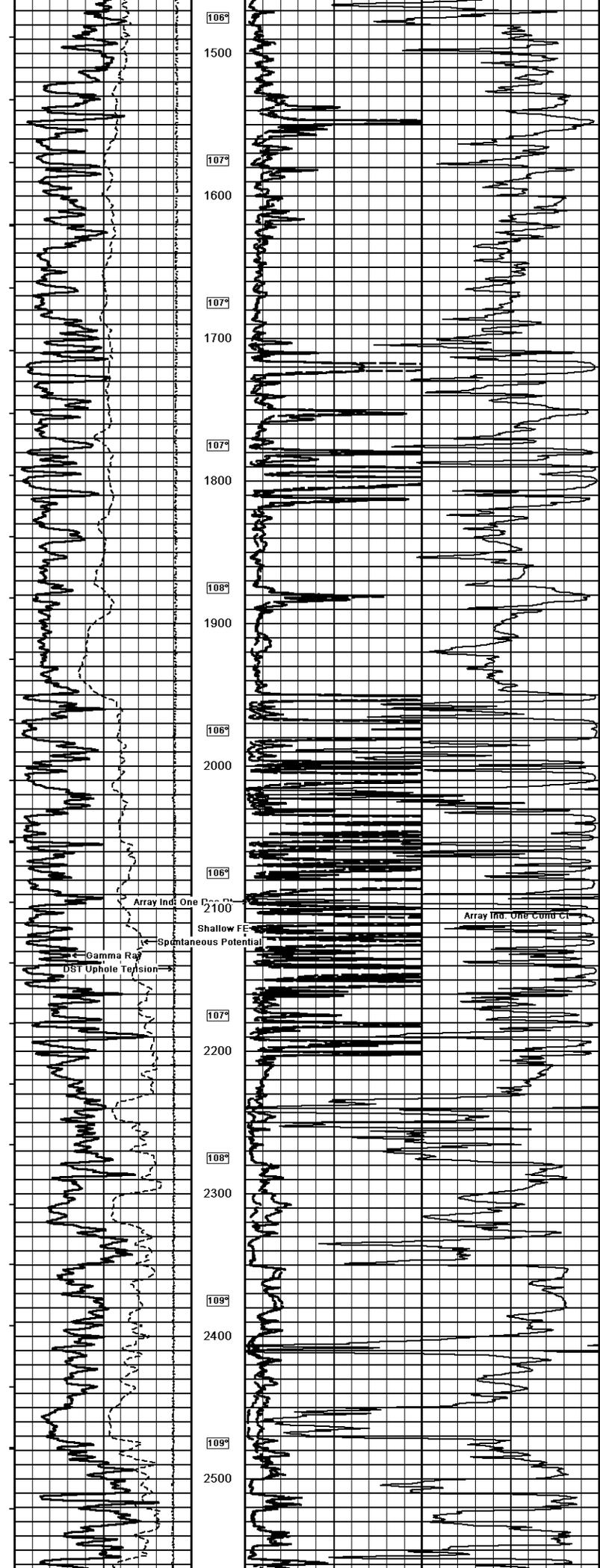
Weatherford[®]

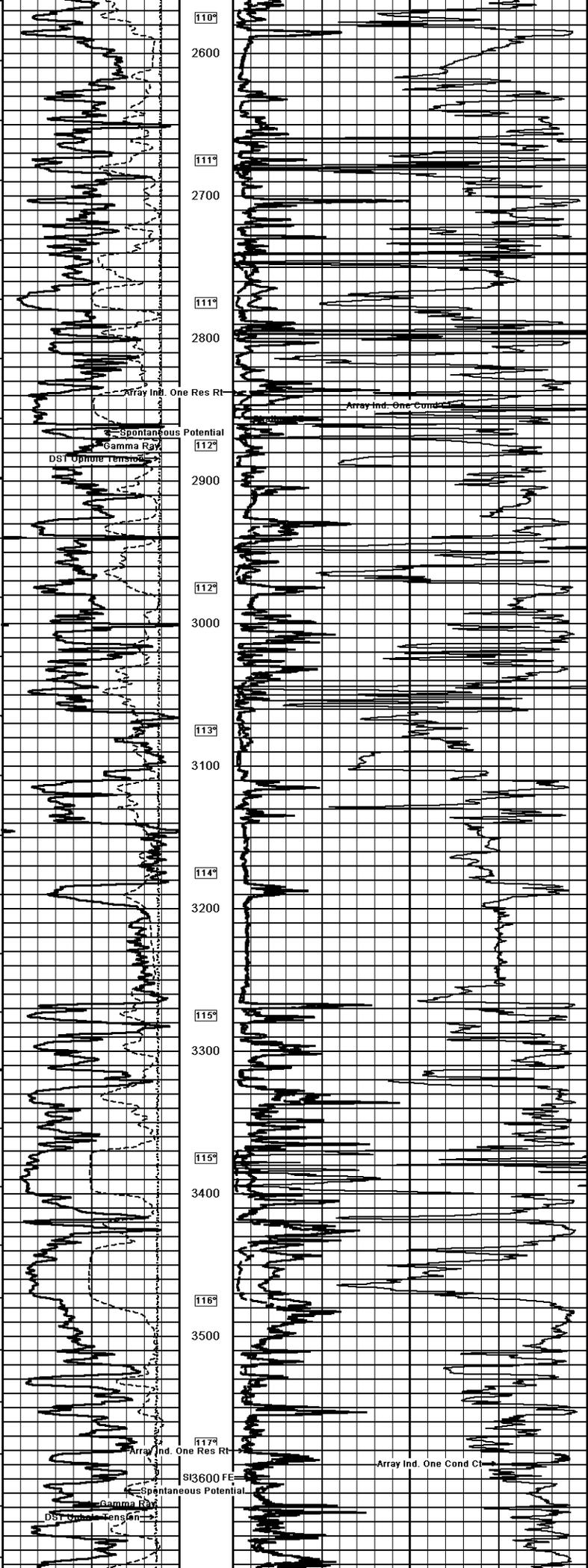
**ARRAY INDUCTION
 SHALLOW FOCUSED
 ELECTRIC LOG**

Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY: M&M EXPLORATION INC. WELL: Z-BAR #26-11 FIELD: AETNA GAS AREA PROVINCE/COUNTY: BARBER COUNTRY/STATE: U.S.A. / KANSAS LOCATION: 2200 FSL & 2200 th E.W.L. SW/4			
Log Measured From KB Drilling Measured From KB @ 12 FEET Date: 05-AUG-2012 Run Number: ONE Depth Driller: 5150.00 feet Depth Logger: 5150.00 feet First Reading: 5147.00 feet Last Reading: 295.00 feet Casing Driller: 300.00 feet Casing Logger: 295.00 feet Bit Size: 7.875 inches Hole Fluid Type: CHEMICAL Density/Viscosity: 11.2 g/cc PH/Fluid Loss: 10.00 Sample source: FLOWLINE Run @ Measured Temp: 0.95 @ 89.0 ohm-m Run @ Measured Temp: 0.76 @ 89.0 ohm-m Run @ Measured Temp: 1.14 @ 89.0 ohm-m Source Fmt/Frac: OALC Time Since Circulation: 0.67 @ 26.0 ohm-m Max Recorded Temp: 126.00 deg F Equipment Name: COMPACT Equipment Base: LIB Recorded By: RICHFMAN Submitted By: BETTI BROCK S.O.#/JOB #: 3534908	Other Services: MEDIANON MML Elevation: 1798.00 feet KB: 1796.00 feet GP: 1786.00 feet OL:		









110°
2600
111°
2700
111°
2800
112°
2900
112°
3000
113°
3100
114°
3200
115°
3300
115°
3400
116°
3500
117°

Array Ind. One Res Rt

Array Ind. One Cond Cl

Spontaneous Potential

Gamma Ray

DST Op/line Tension

Array Ind. One Res Rt

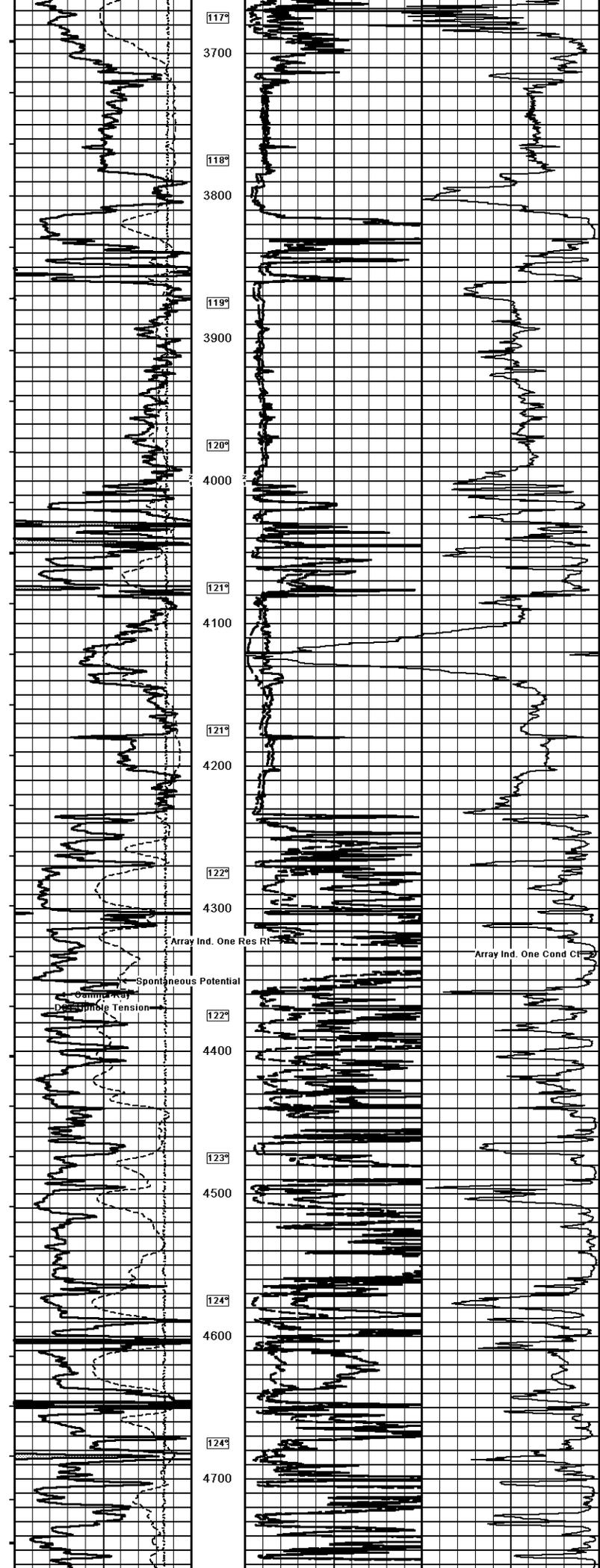
Array Ind. One Cond Cl

Spontaneous Potential

Gamma Ray

DST Op/line Tension

SI3600 FE



117°

3700

118°

3800

119°

3900

120°

4000

121°

4100

121°

4200

122°

4300

Array Ind. One Res Rt

Array Ind. One Cond Ct

Spontaneous Potential

Gamma Ray

Acoustic Tension

122°

4400

123°

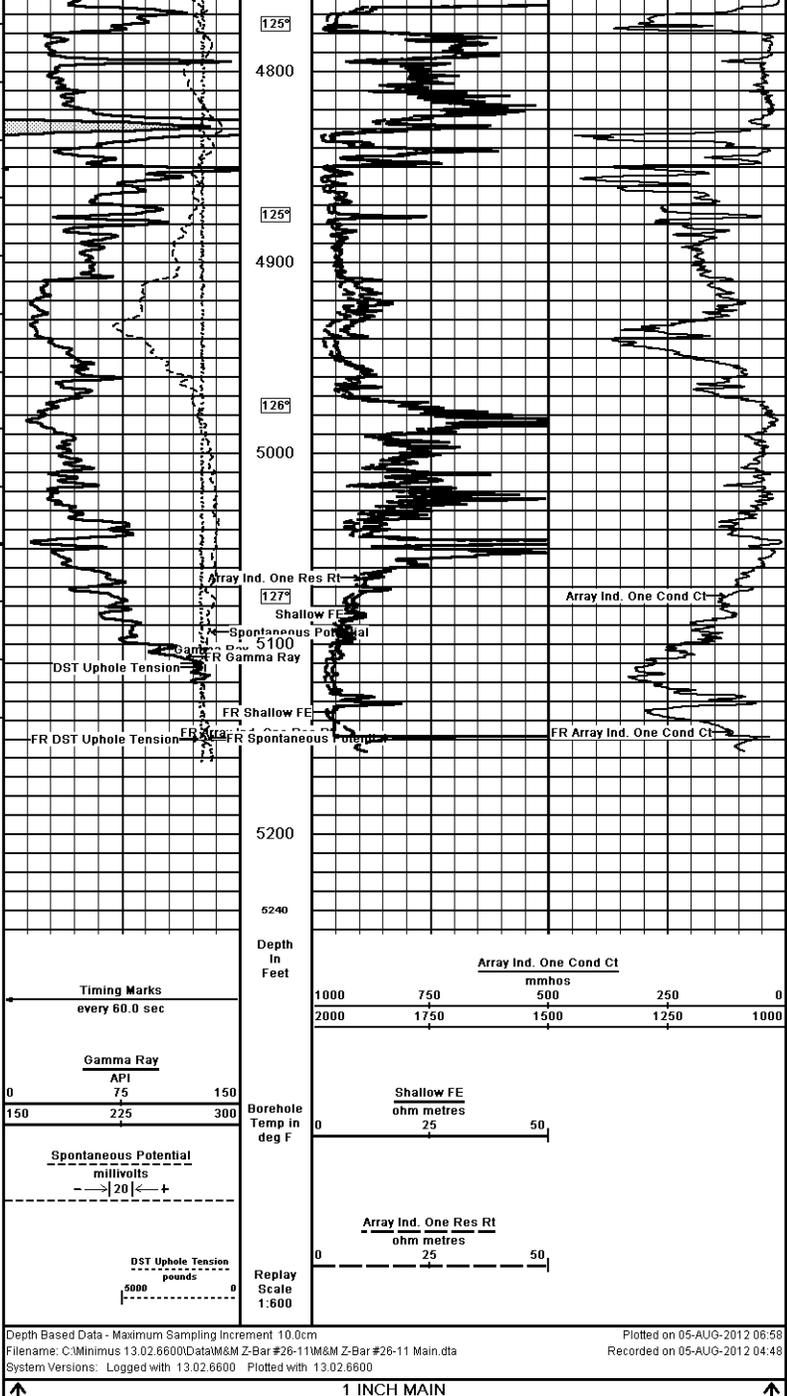
4500

124°

4600

124°

4700



Depth Based Data - Maximum Sampling Increment 10.0cm
 Plotted on 05-AUG-2012 06:58
 Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #26-11\M&M Z-Bar #26-11 Main.dta
 Recorded on 05-AUG-2012 04:48
 System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

COMPANY M&M EXPLORATION INC.
 WELL Z-BAR #26-11
 FIELD AETNA GAS AREA
 PROVINCE/COUNTY BARBER
 COUNTRY/STATE U.S.A. / KANSAS

Elevation Kelly Bushing	1798.00	feet	First Reading	5147.00	feet
Elevation Drill Floor	1796.00	feet	Depth Driller	5150.00	feet
Elevation Ground Level	1786.00	feet	Depth Logger	5150.00	feet



ARRAY INDUCTION
 SHALLOW FOCUSED
 ELECTRIC LOG