



**Weatherford**

**ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG**

COMPANY	CMX, INC.		
WELL	#1 KREHBIEL		
FIELD	WELCH-BORNHOLDT		
PROVINCE/COUNTY	RICE		
COUNTRY/STATE	U.S.A. / KANSAS		
LOCATION	1270' FSL & 330' FEL		
SEC 1	TWP 21S	RGE 6W	Other Services
Latitude			MPD/MDN
Longitude			MML
API Number	15-159-22774		
Permanent Datum GL, Elevation	1529 feet		
Log Measured From	KB		
Drilling Measured From	KB @ 13 FEET		
Date	30-APR-2014		
Run Number	ONE		
Service Order	7036-86005377		
Depth Driller	3500.00	feet	Elevations: KB 1542.00
Depth Logger	3500.00	feet	DF 1540.00
First Reading	3496.66	feet	GL 1529.00
Last Reading	267.00	feet	
Casing Driller	265.00	feet	
Casing Logger	267.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.40 lb/USg	53.00 CP	
PH / Fluid Loss	9.50	14.00 ml/30Min	
Sample Source	MUDDPIT		
Rm @ Measured Temp	0.50 @ 75.0	ohm-m	
Rmf @ Measured Temp	0.40 @ 75.0	ohm-m	
Rmc @ Measured Temp	0.60 @ 75.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.37 @ 103.0	ohm-m	
Time Since Circulation	3 HOURS		
Max Recorded Temp	103.00	deg F	
Equipment / Base	13096	LIB	
Recorded By	DEREK CARTER		
Witnessed By	LEAH KASTENS		
JOB #	LB14-132		

BOREHOLE RECORD			Last Edited: 30-APR-2014 02:20	
Bit Size inches	Depth From feet	Depth To feet		
7.875	265.00	3500.00		

CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	265.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 13.08.2113.

- TOOLS: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION

- HARDWARE:  
 MDN: DUAL BOWSPRING ECCENTRALIZER  
 MFE: 1 X 0.5 INCH STANDOFF  
 MAI: 2 X 0.5 INCH STANDOFF

- 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: 1340 CU. FT.

- ANNUAL HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 2400 FT : 190 CU. FT.

- RIG: DUKE DRILLING #7

- SERVICE ORDER: 7036-86005377

- ENGINEER: DEREK CARTER

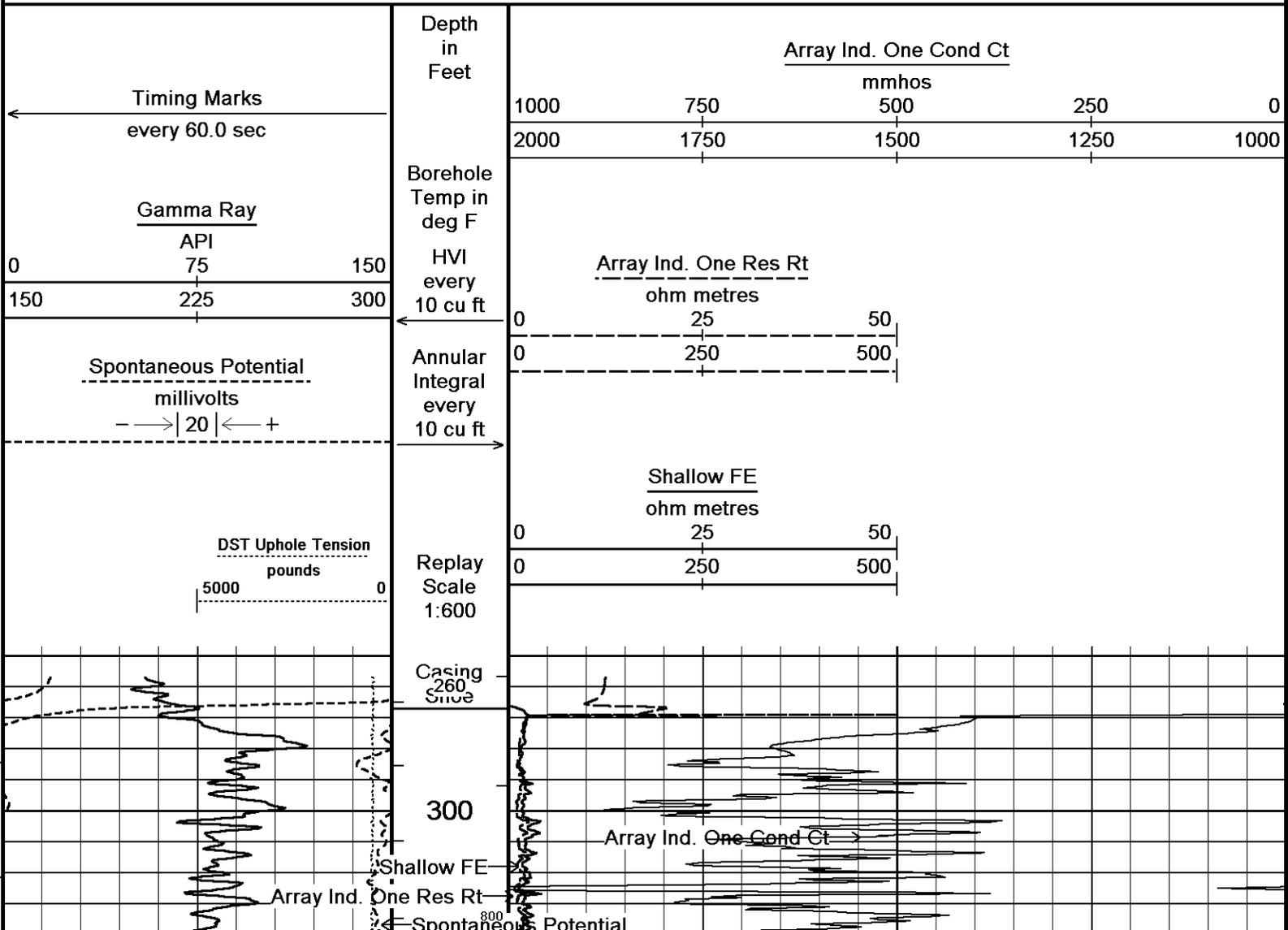
- OPERATOR: CARLOS RAMIREZ

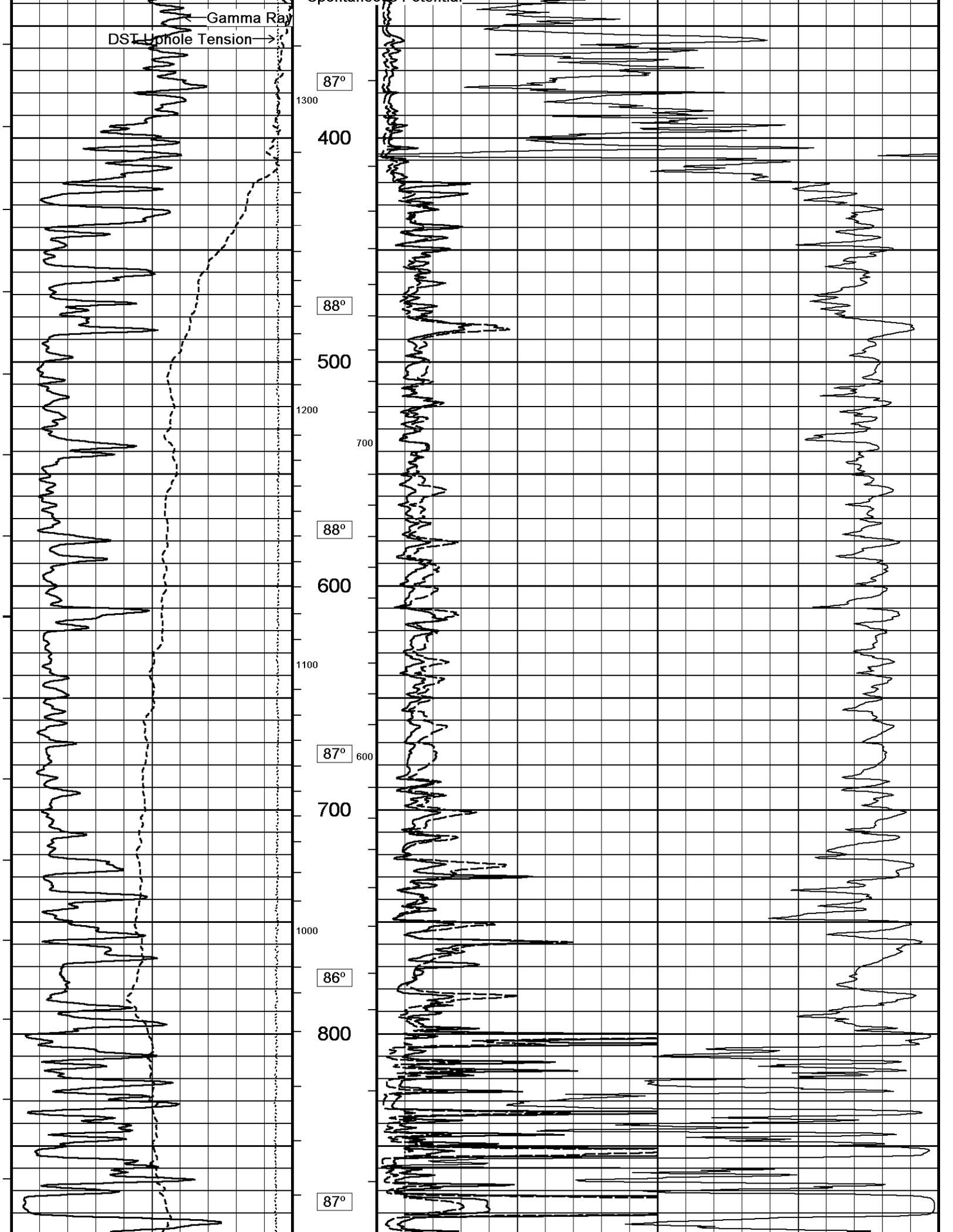
- HIT LEDGE AT 672 FT. WHILE RIH; PULLED TOOLS OFF LEDGE AND RAN PAST WITH NO FURTHER PROBLEMS

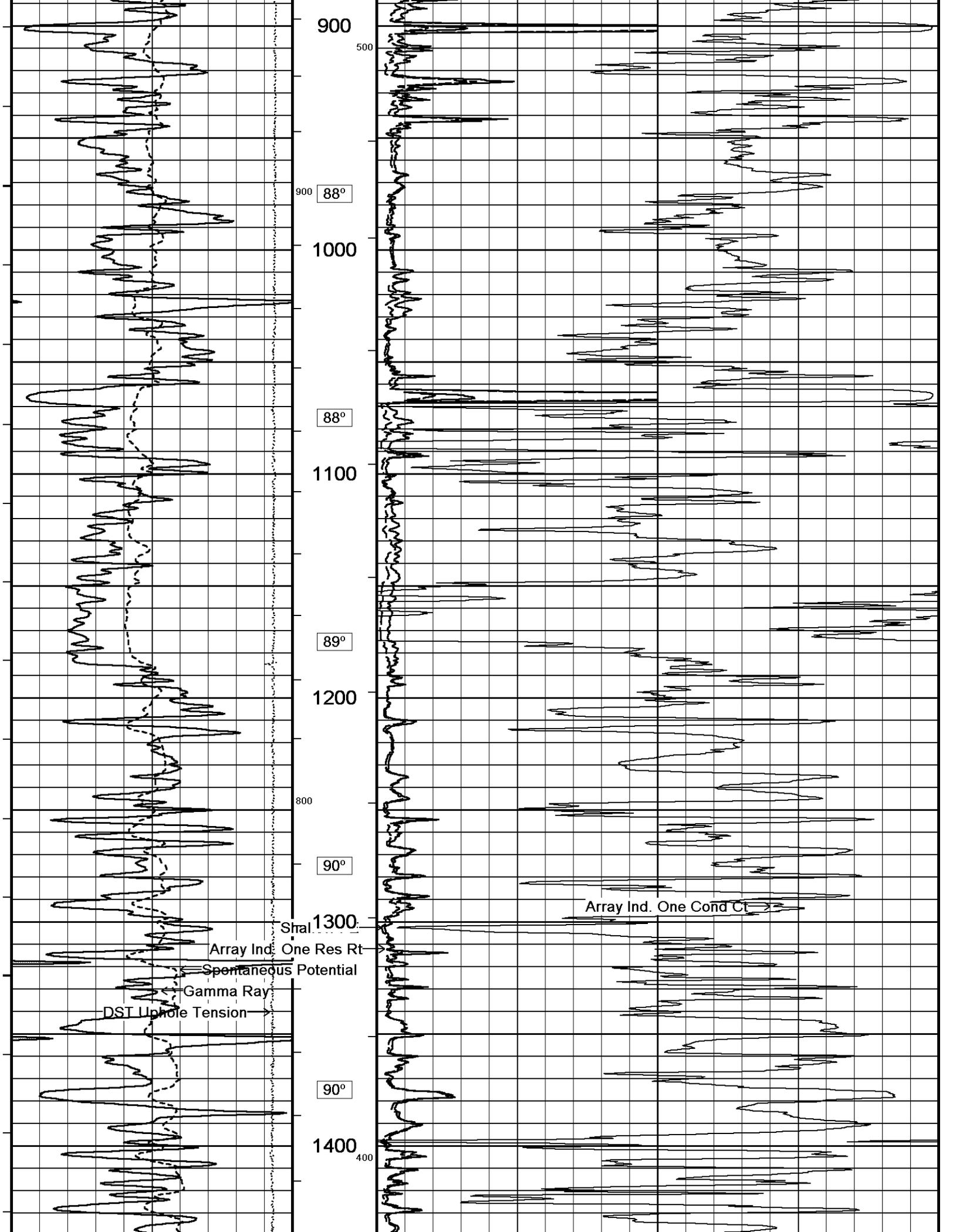
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

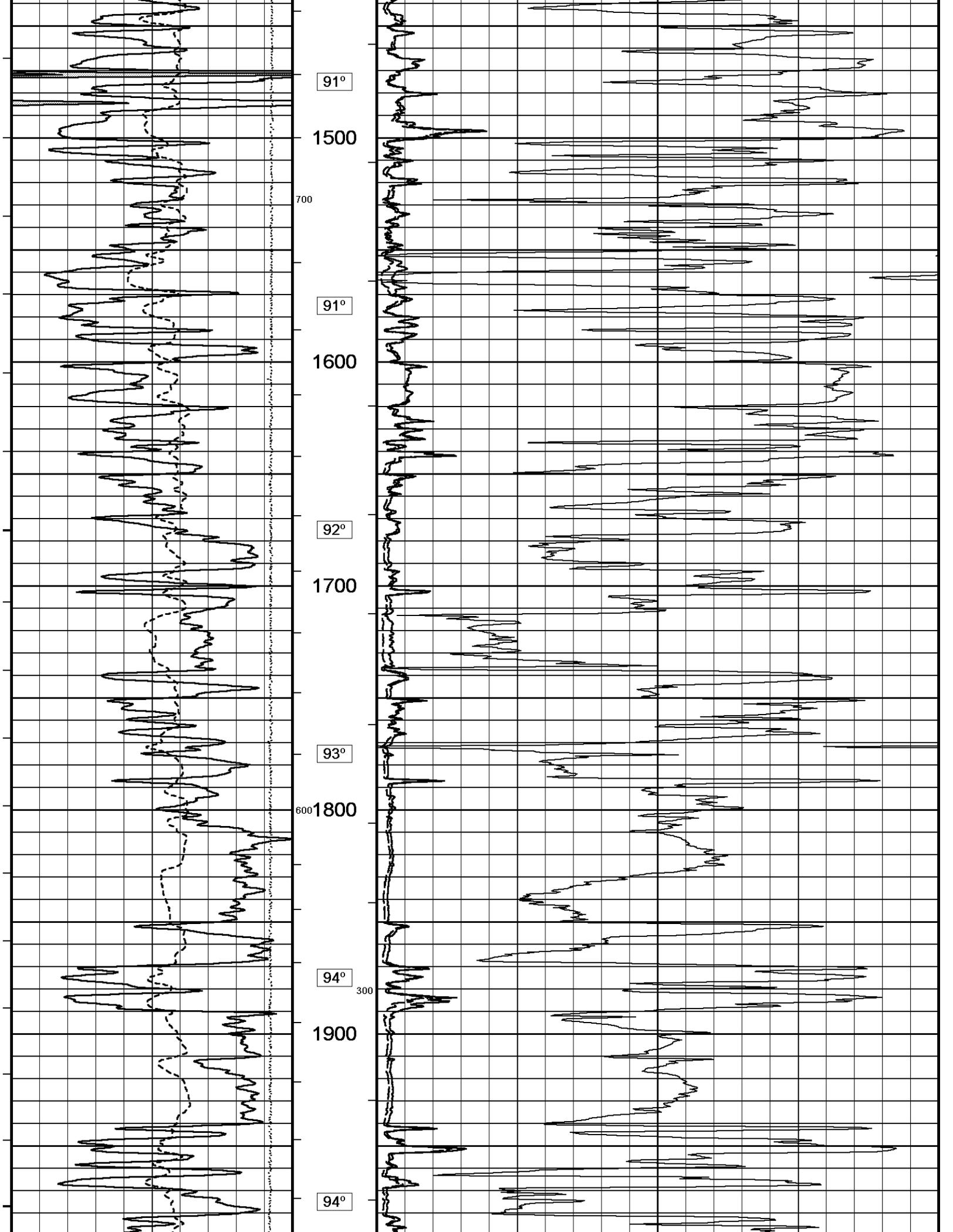
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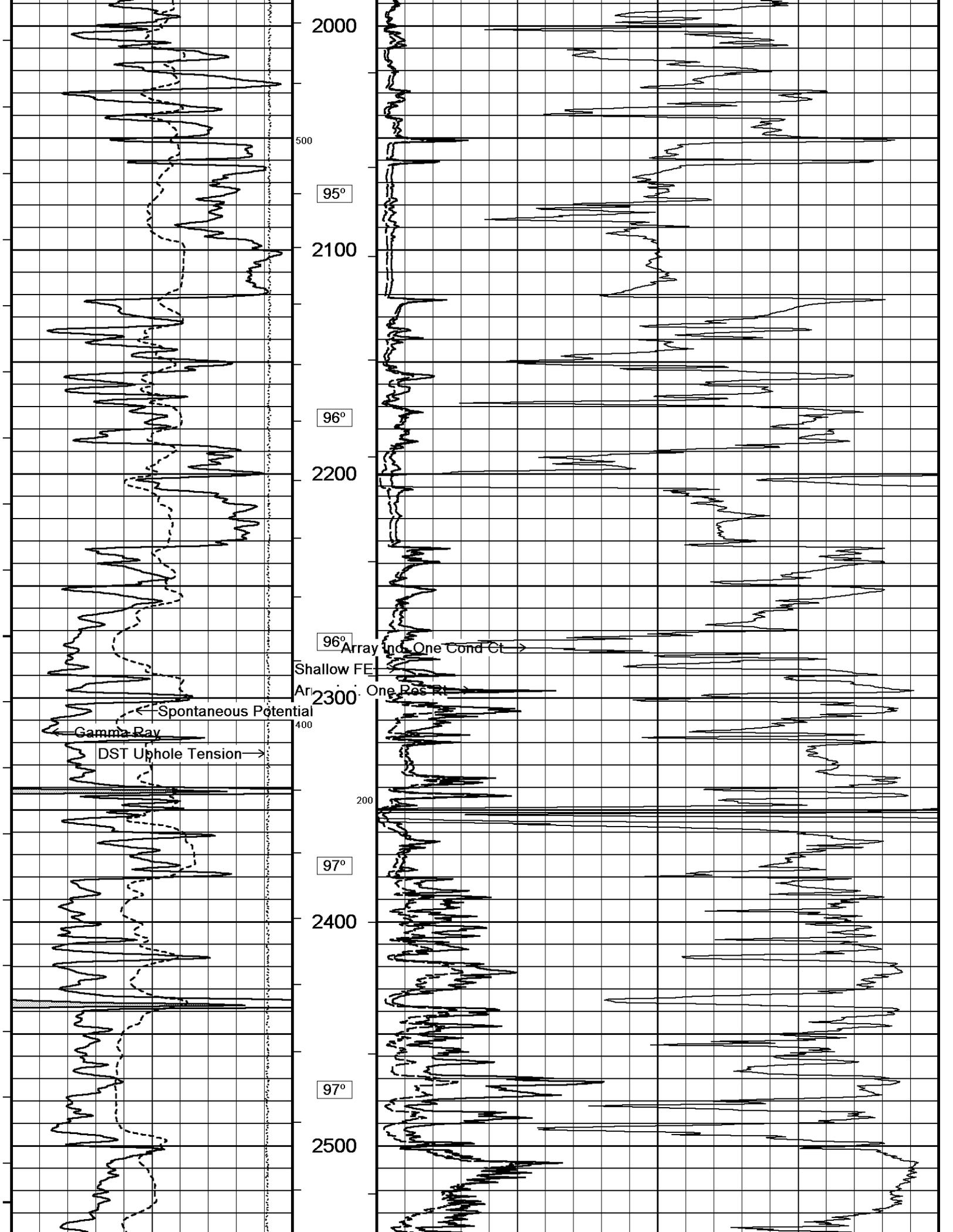
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System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

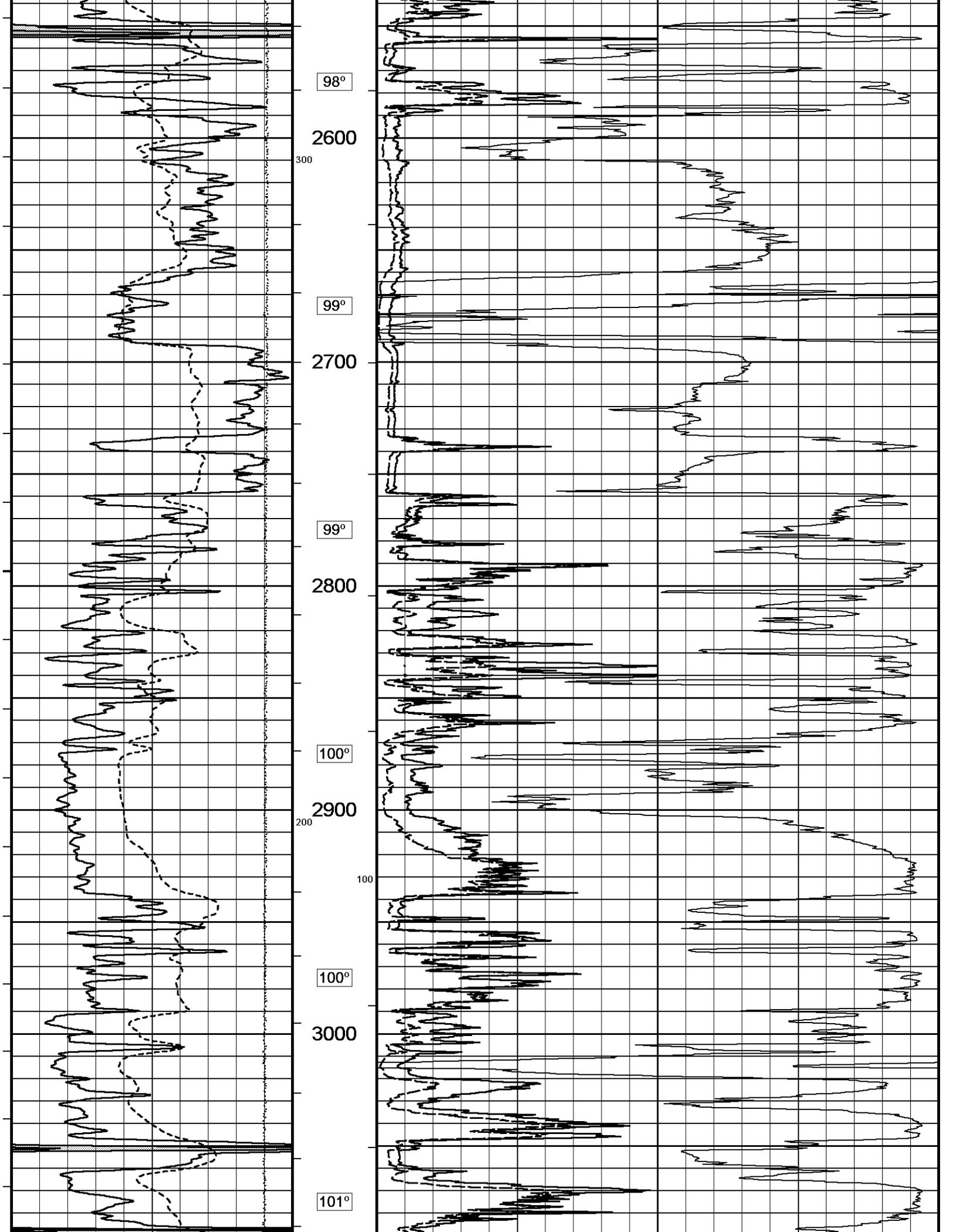


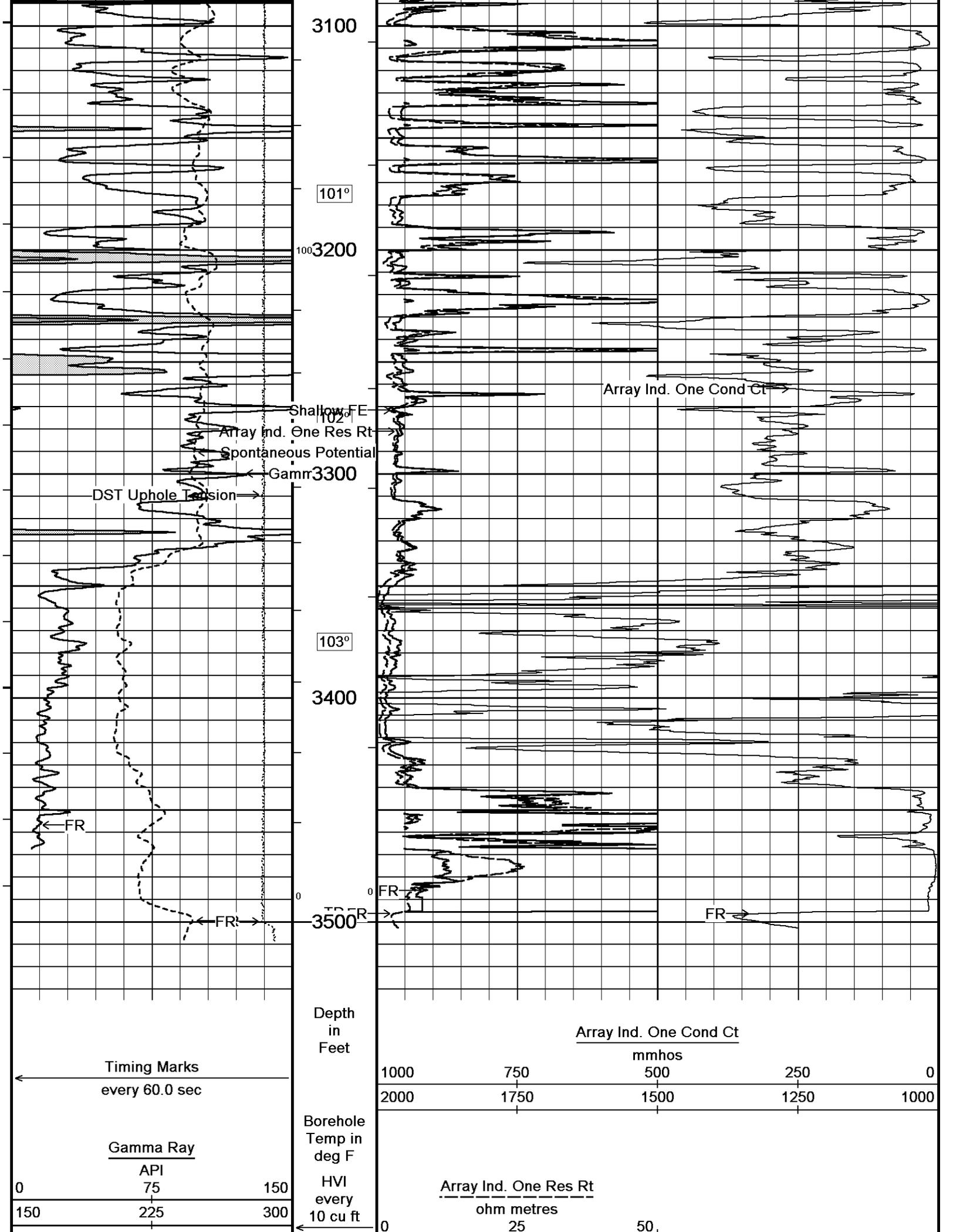


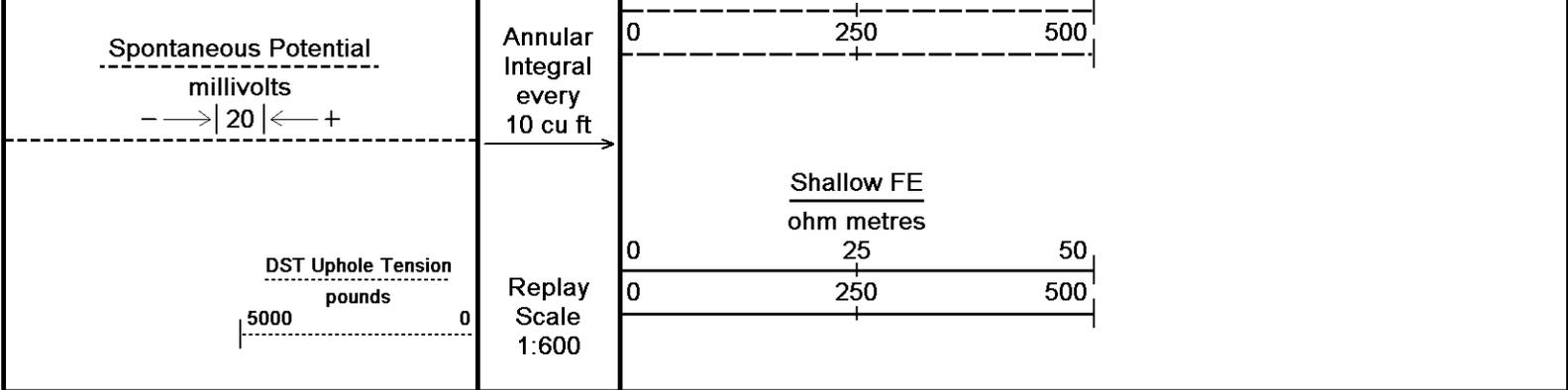










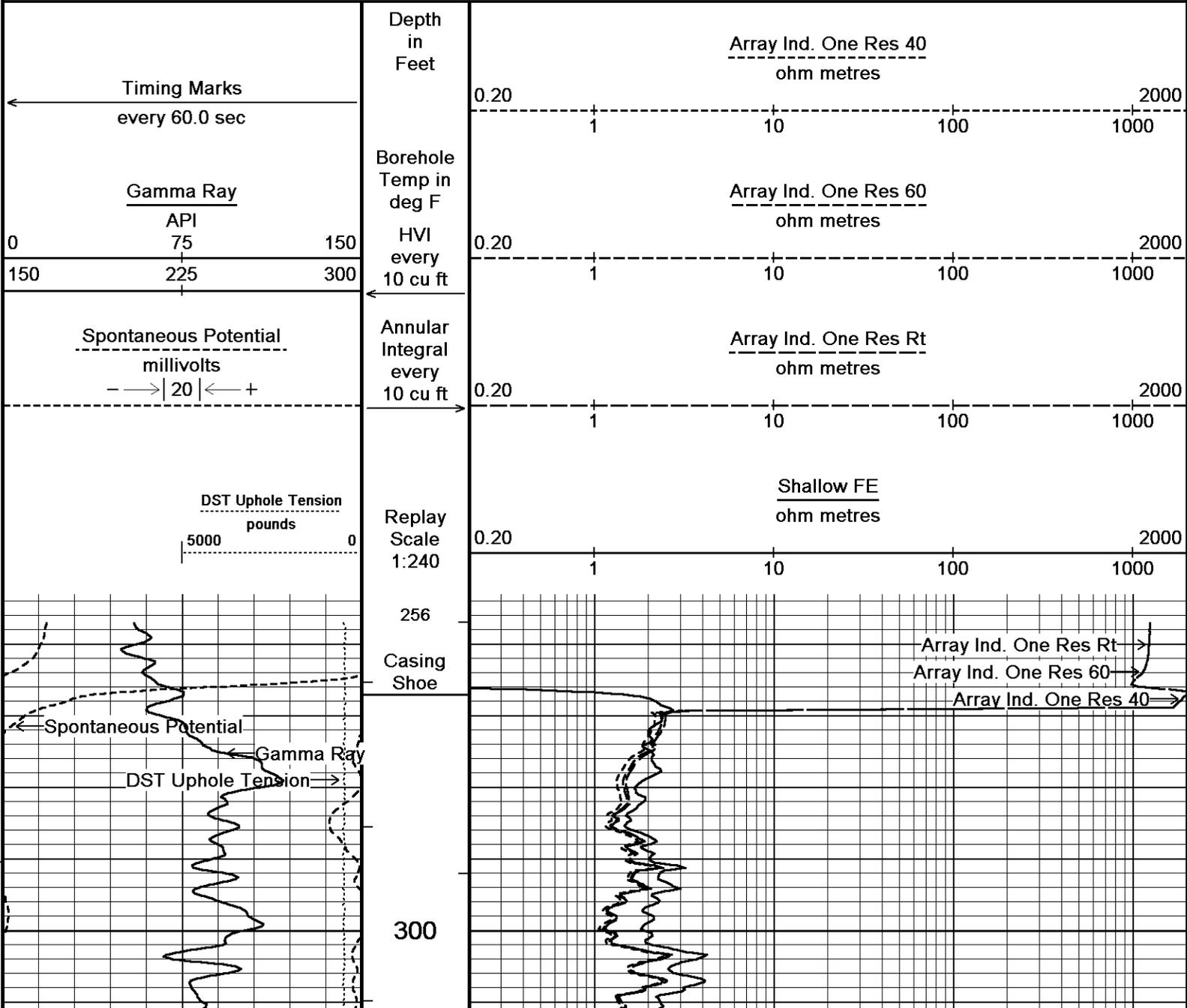


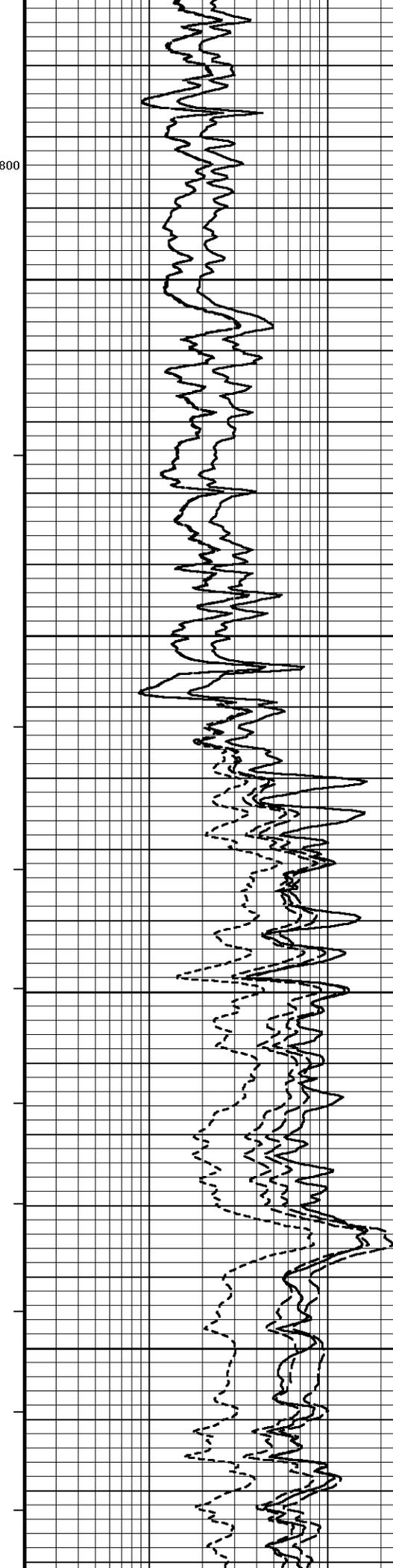
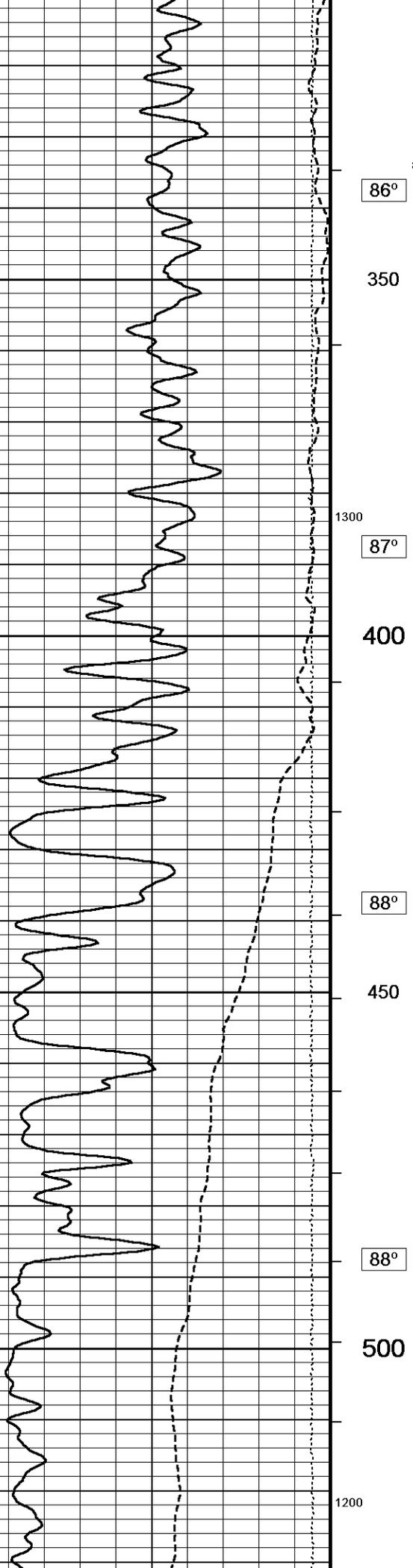
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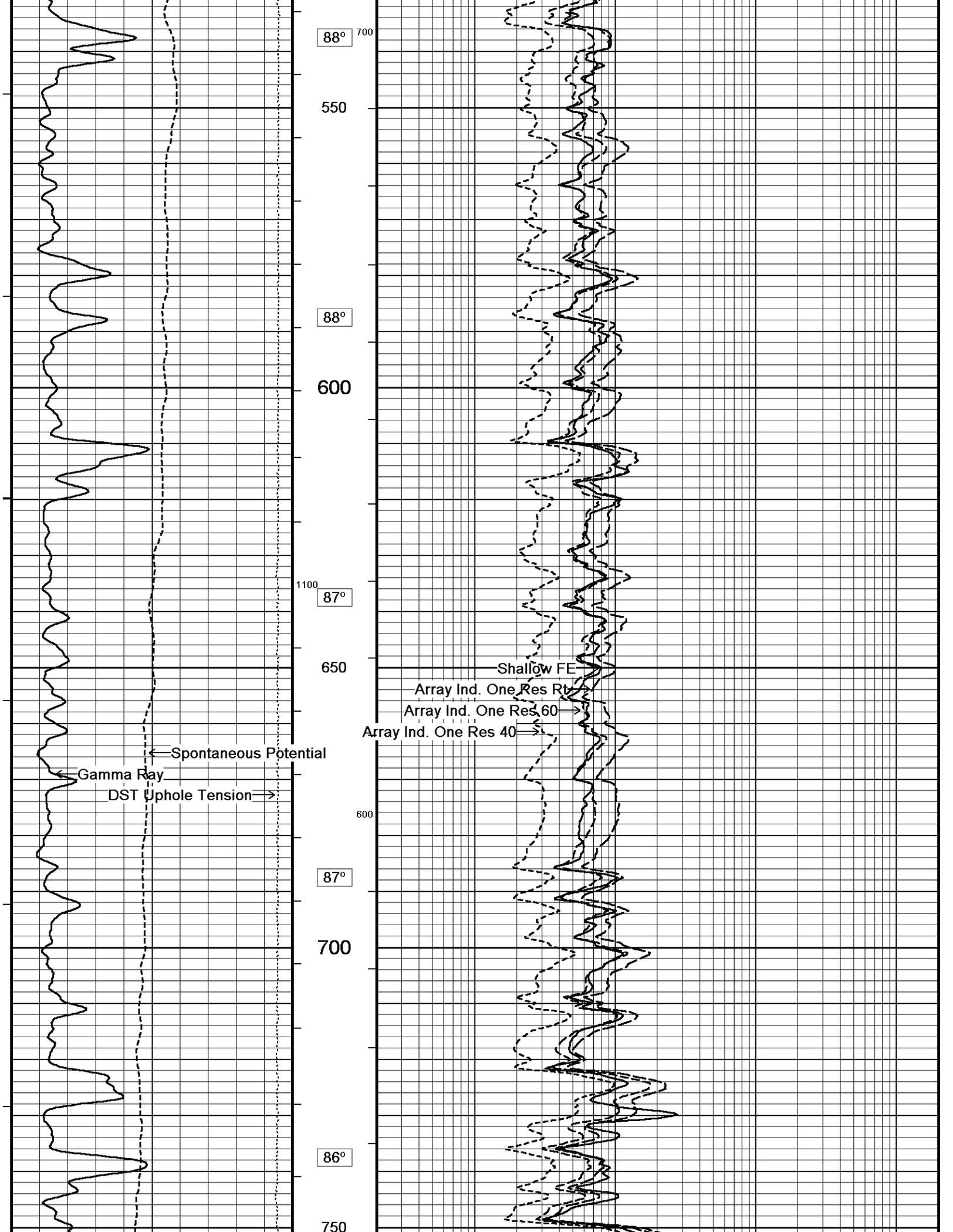
↑ 2 INCH MAIN ↑

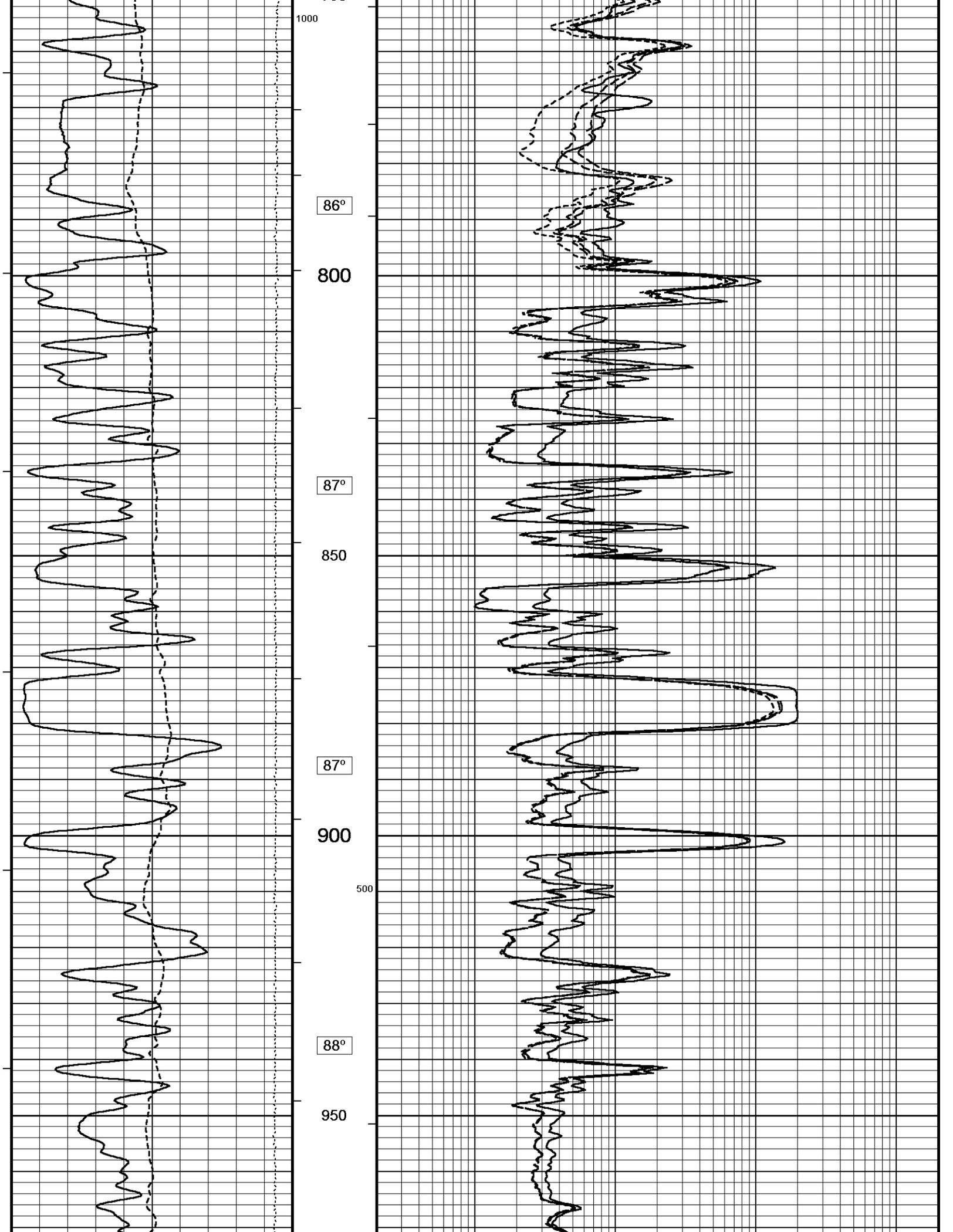
↓ 5 INCH MAIN ↓

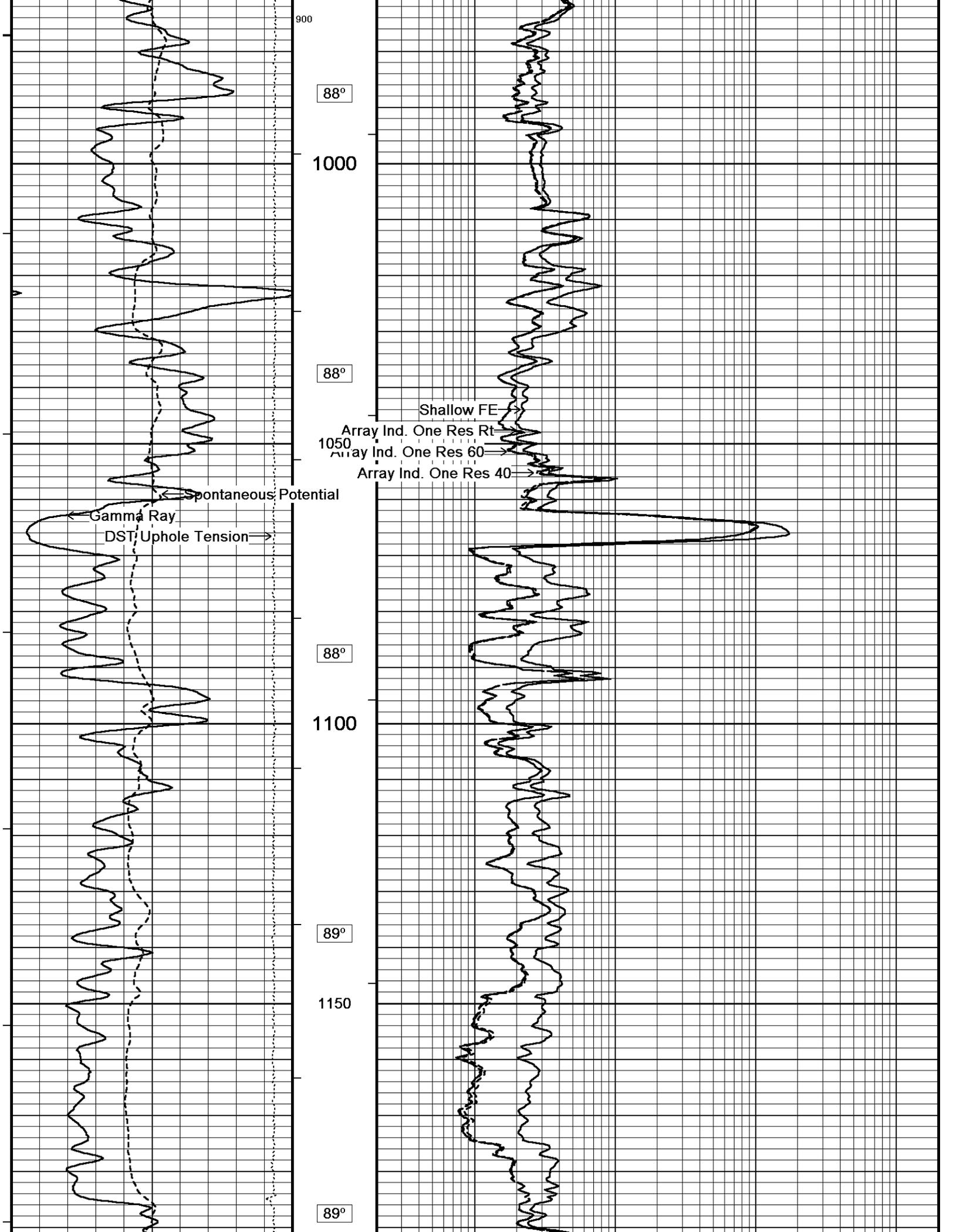
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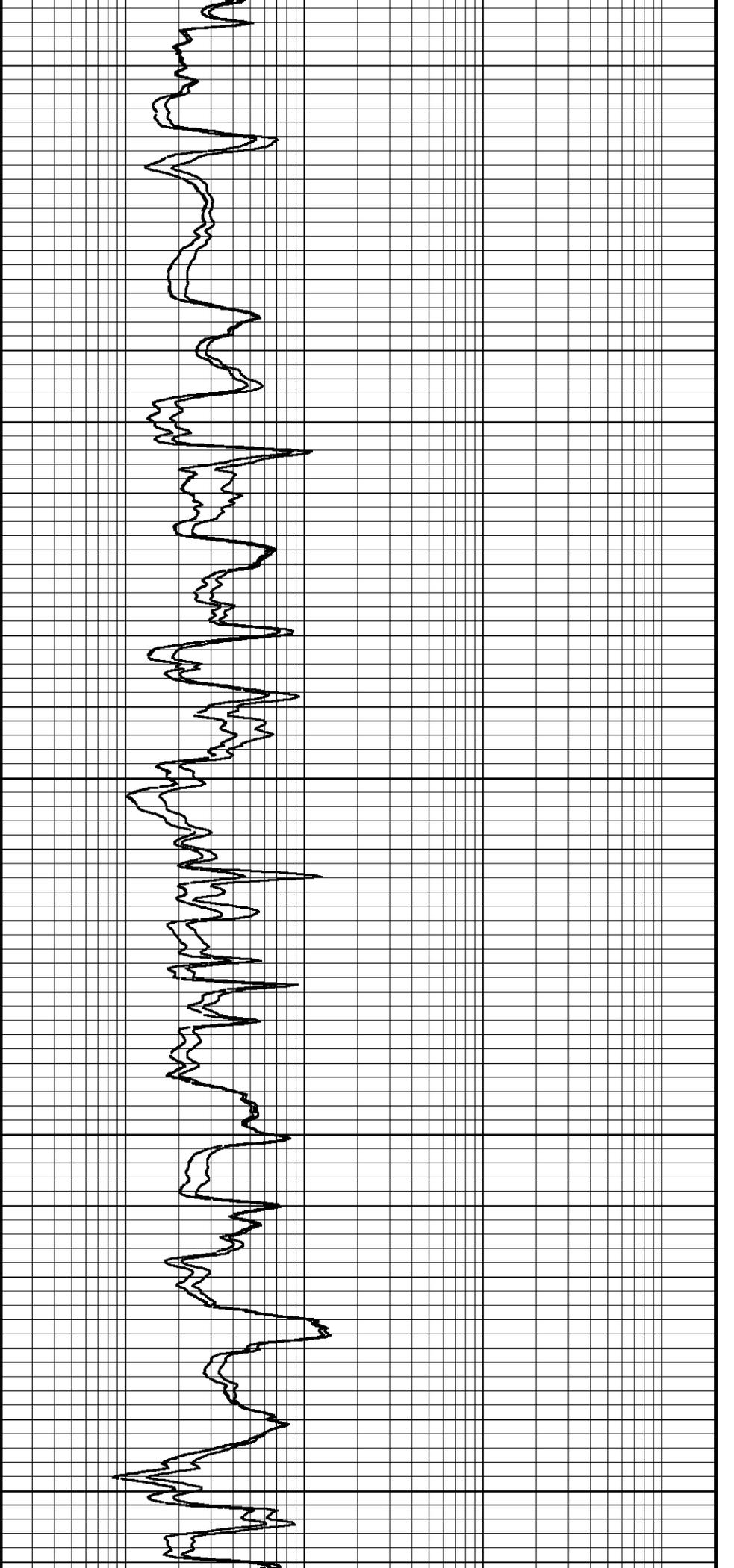
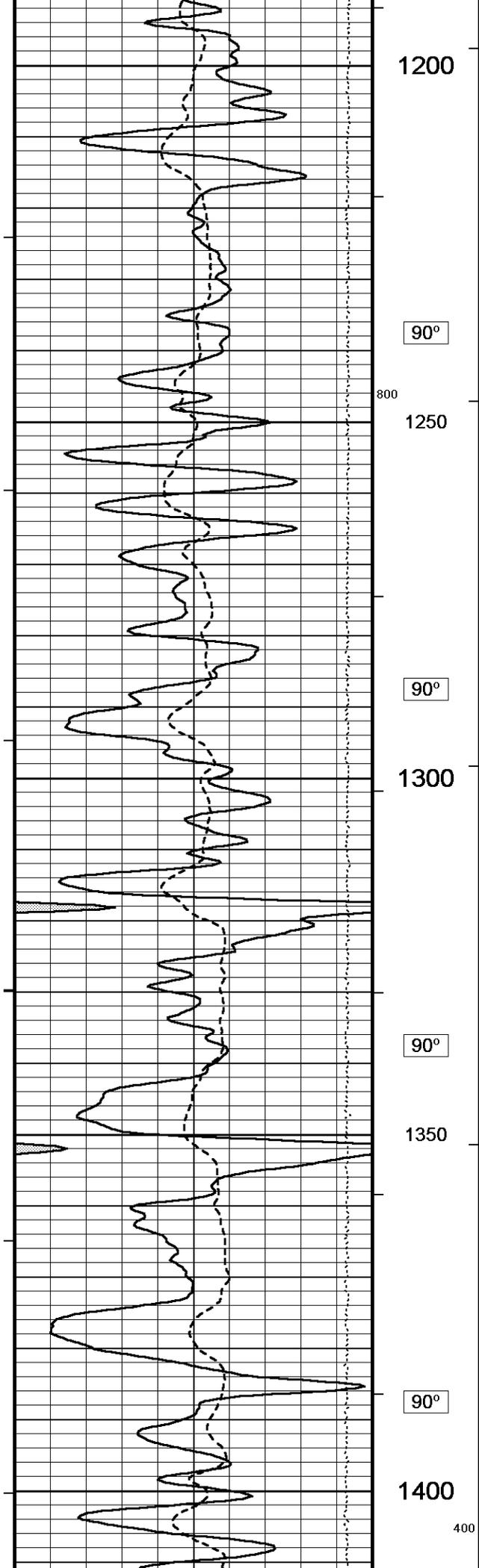


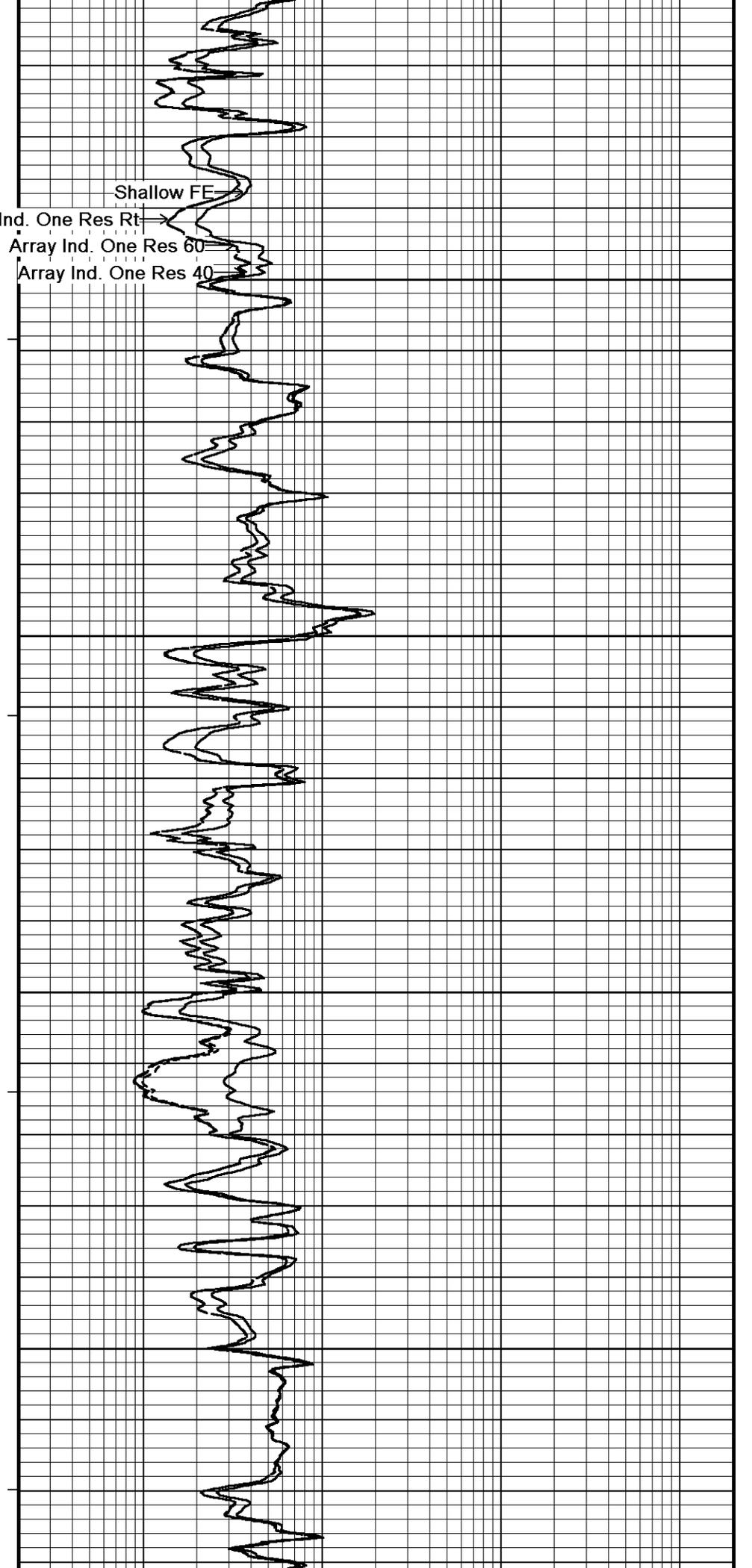
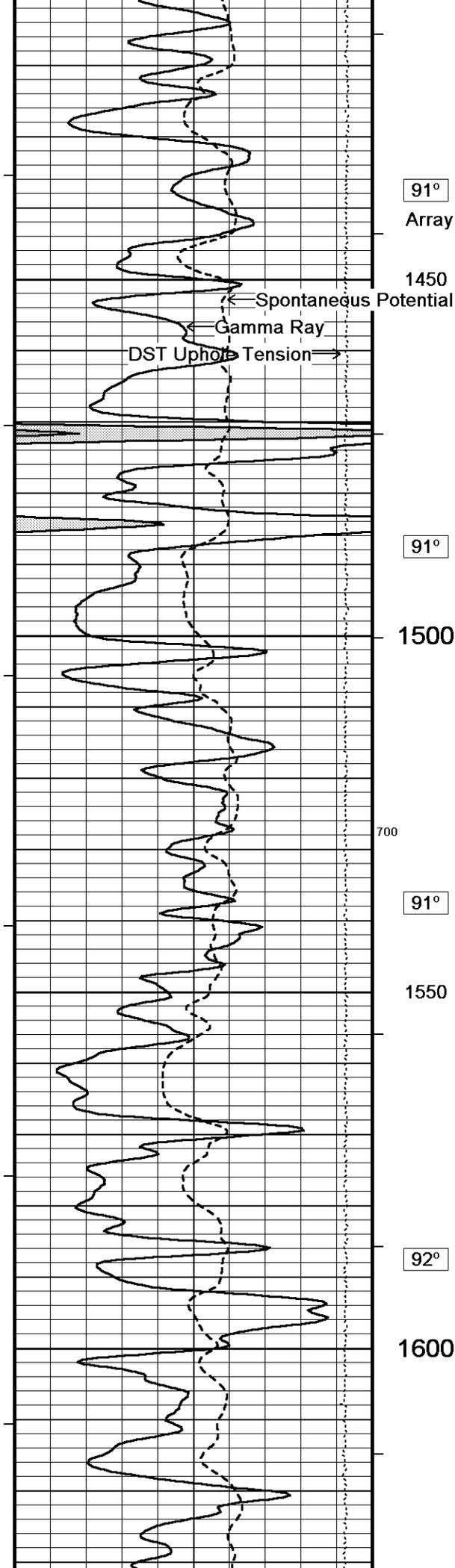












91°

Shallow FE

Array Ind. One Res Rt

Array Ind. One Res 60

1450 Array Ind. One Res 40

Spontaneous Potential

Gamma Ray

DST Uphole Tension

91°

1500

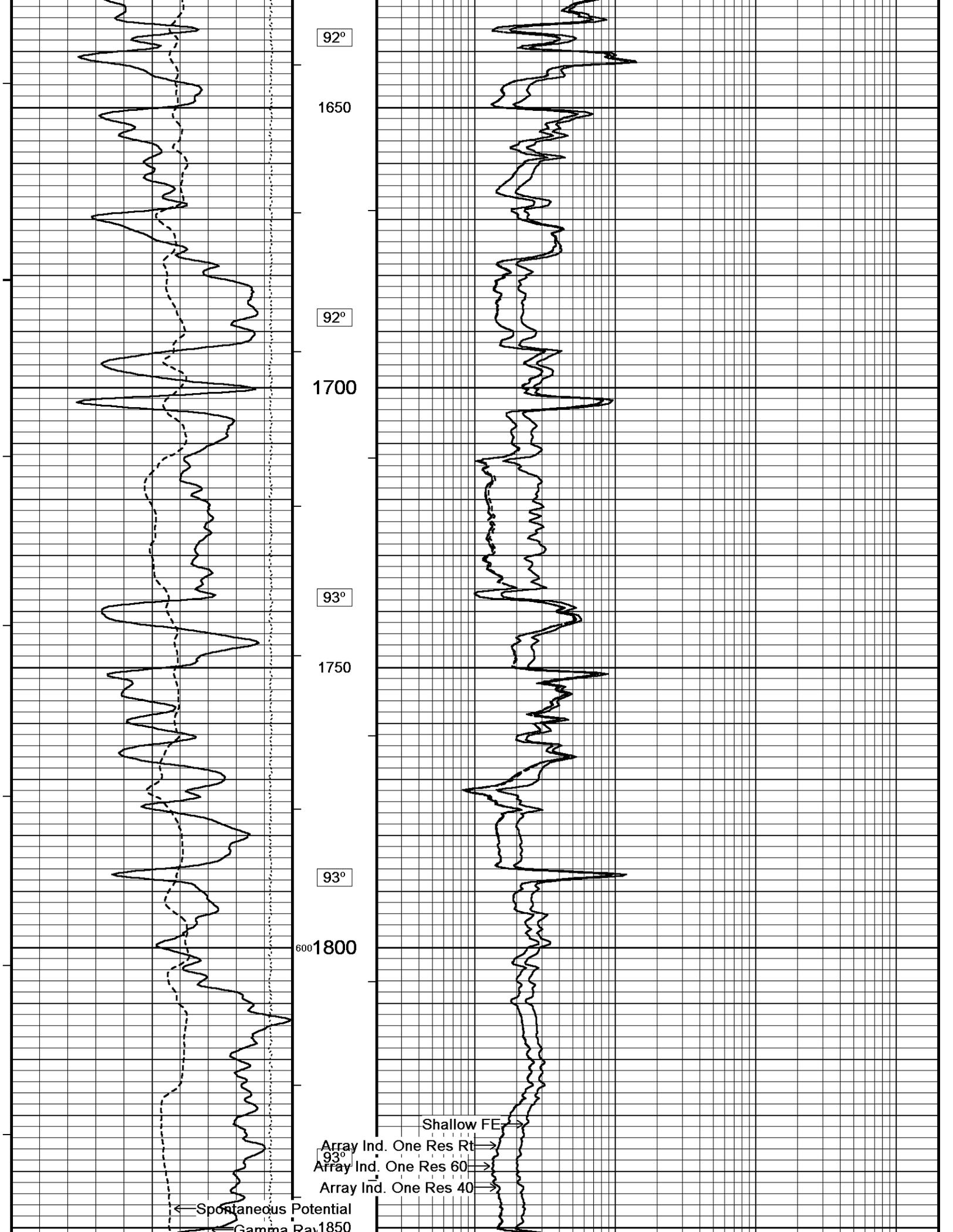
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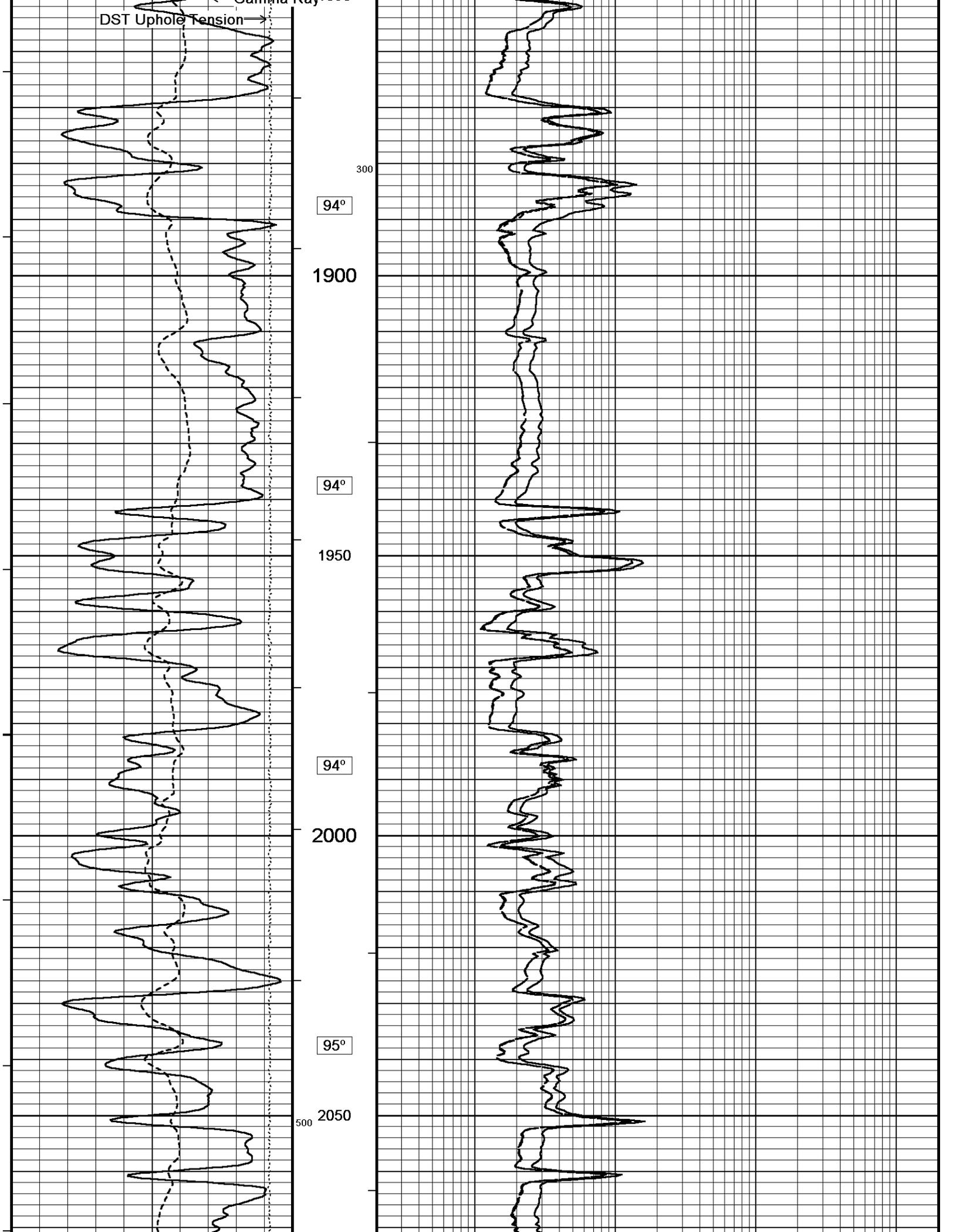
91°

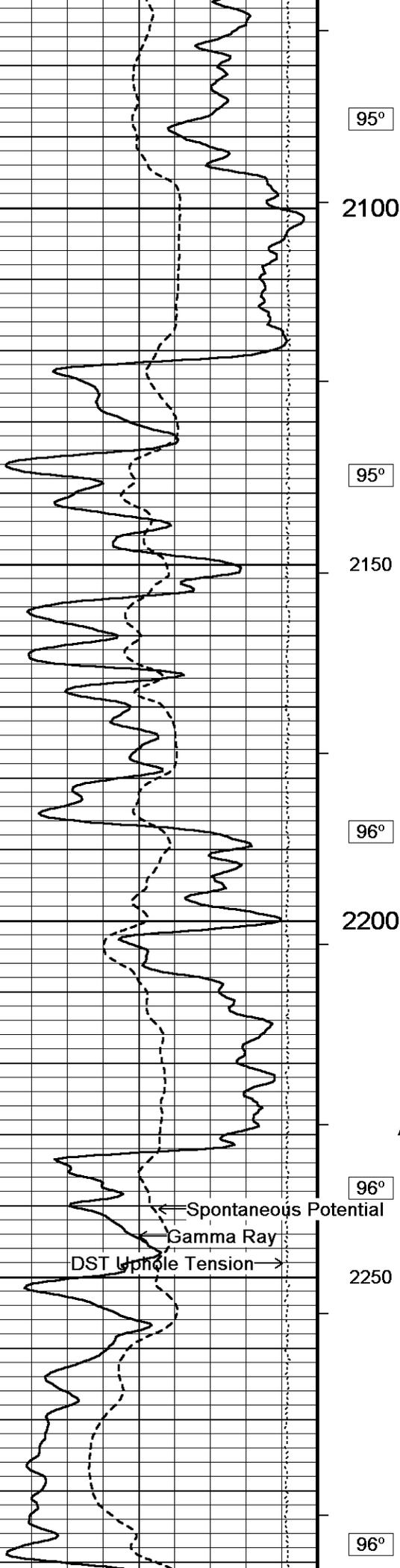
1550

92°

1600







95°

2100

95°

2150

96°

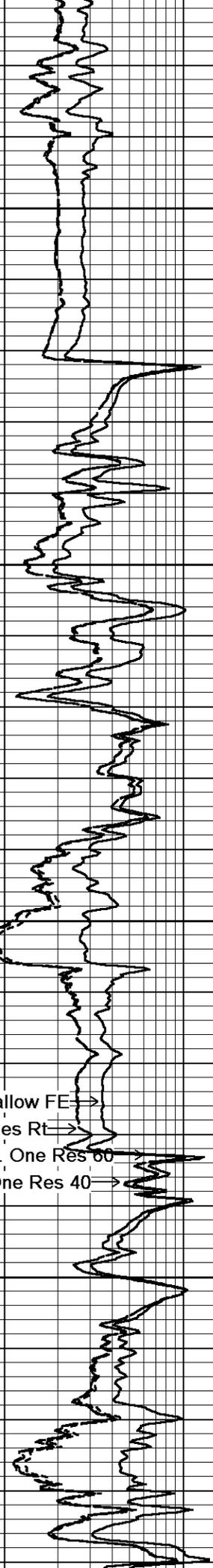
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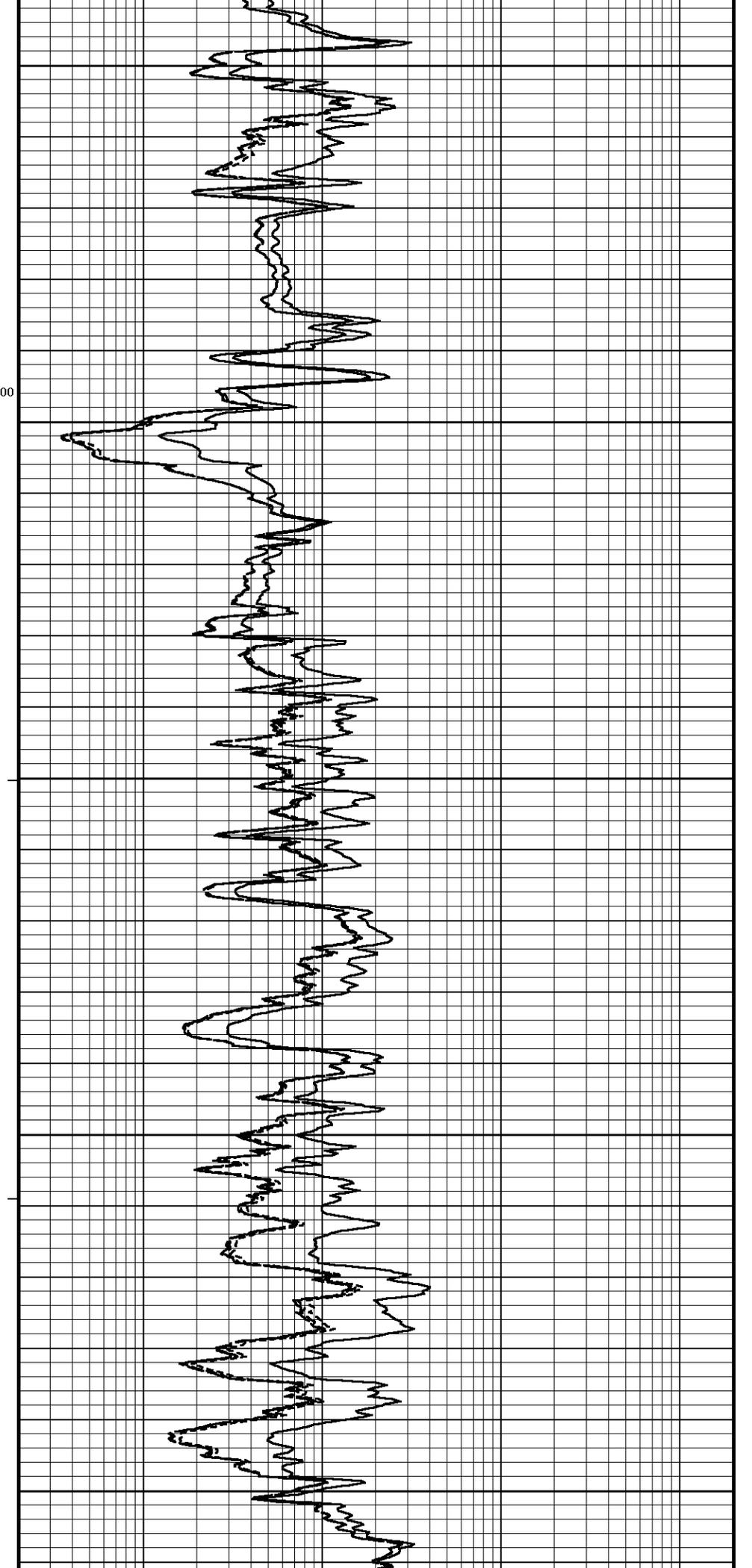
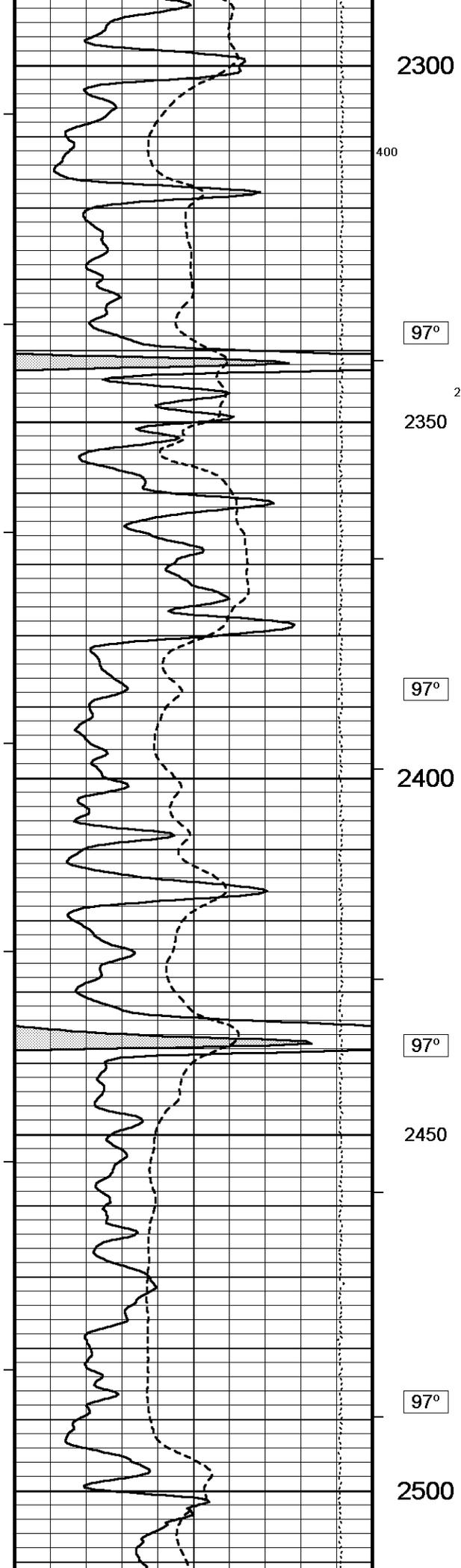
96°

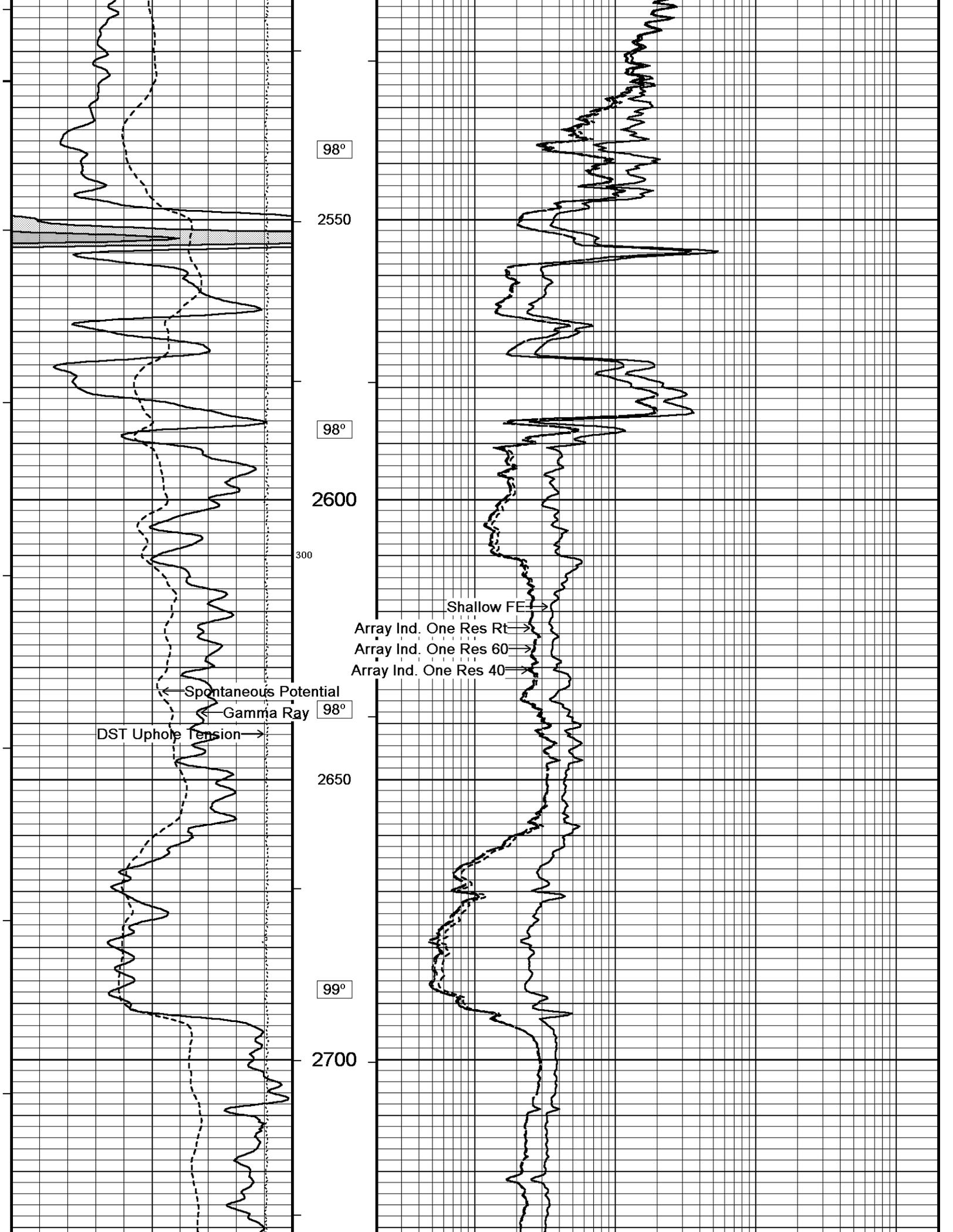
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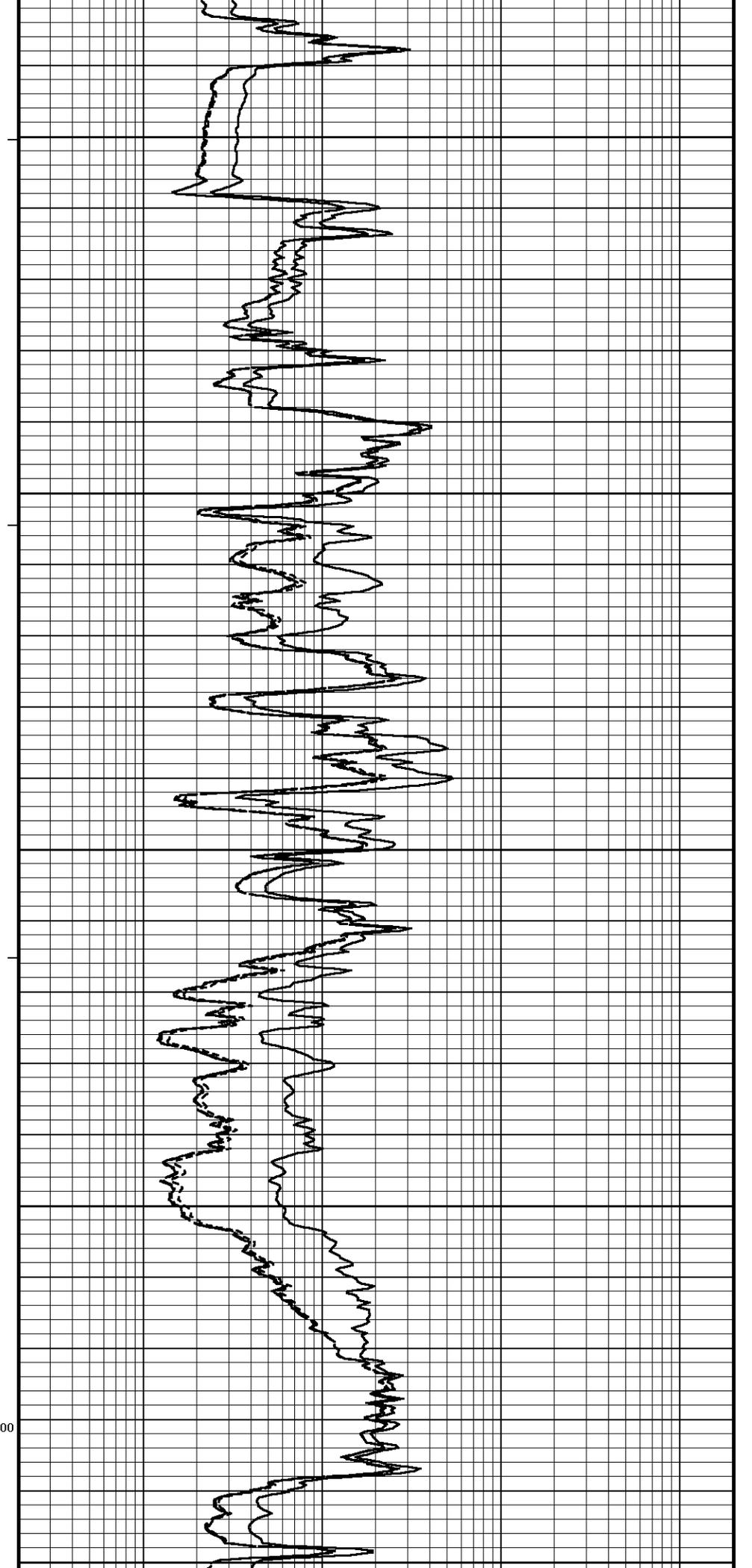
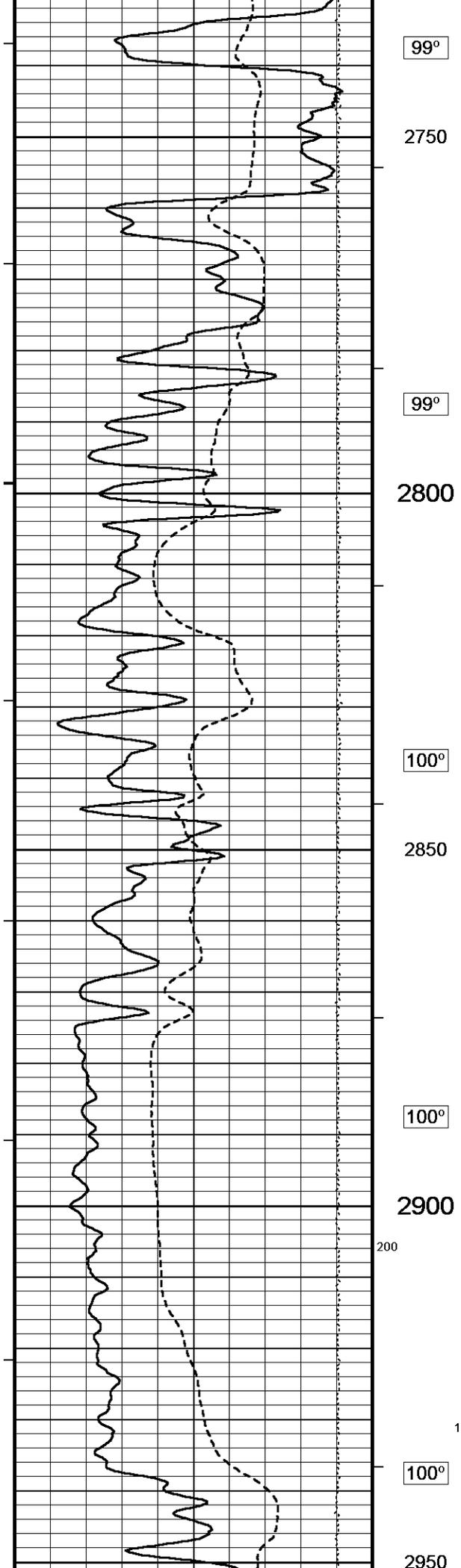
96°

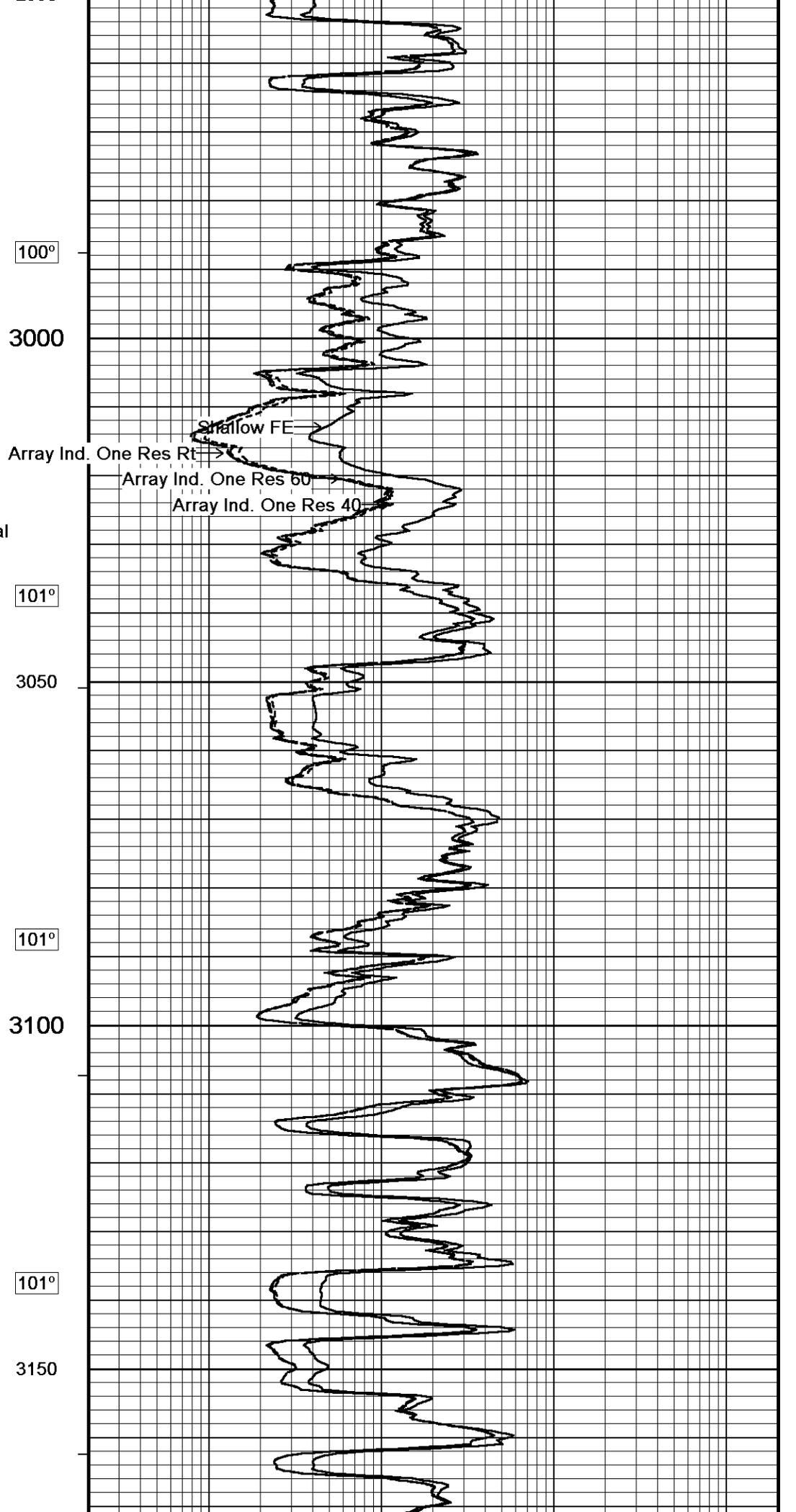
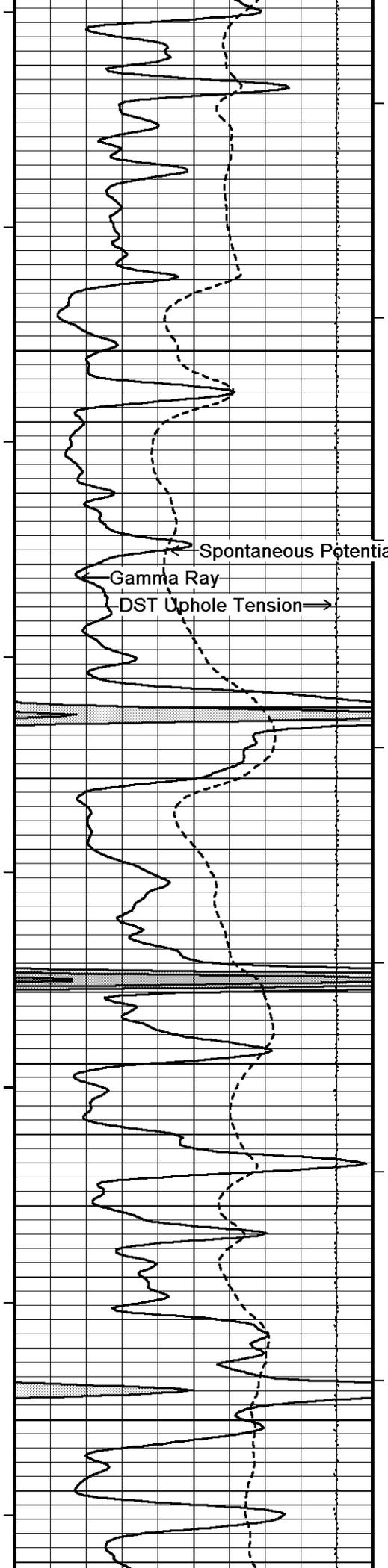
Shallow FE →  
Array Ind. One Res Rt →  
Array Ind. One Res 60 →  
Array Ind. One Res 40 →

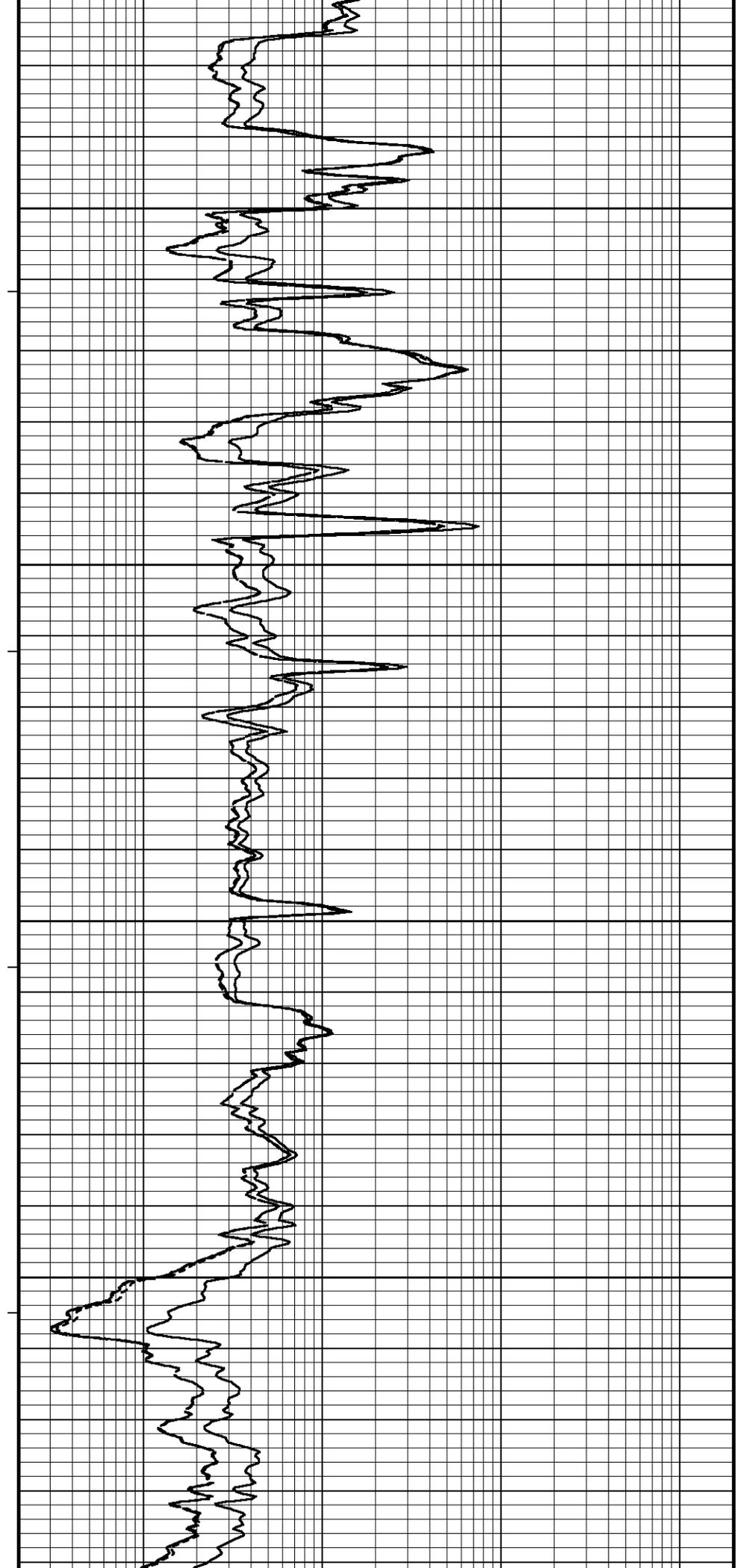
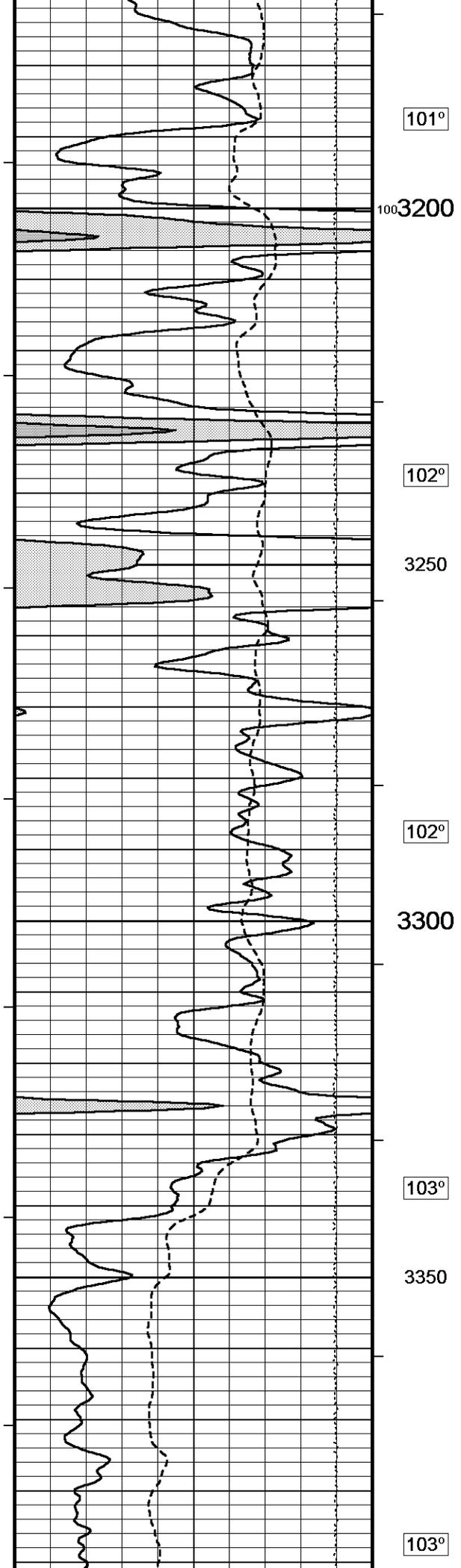


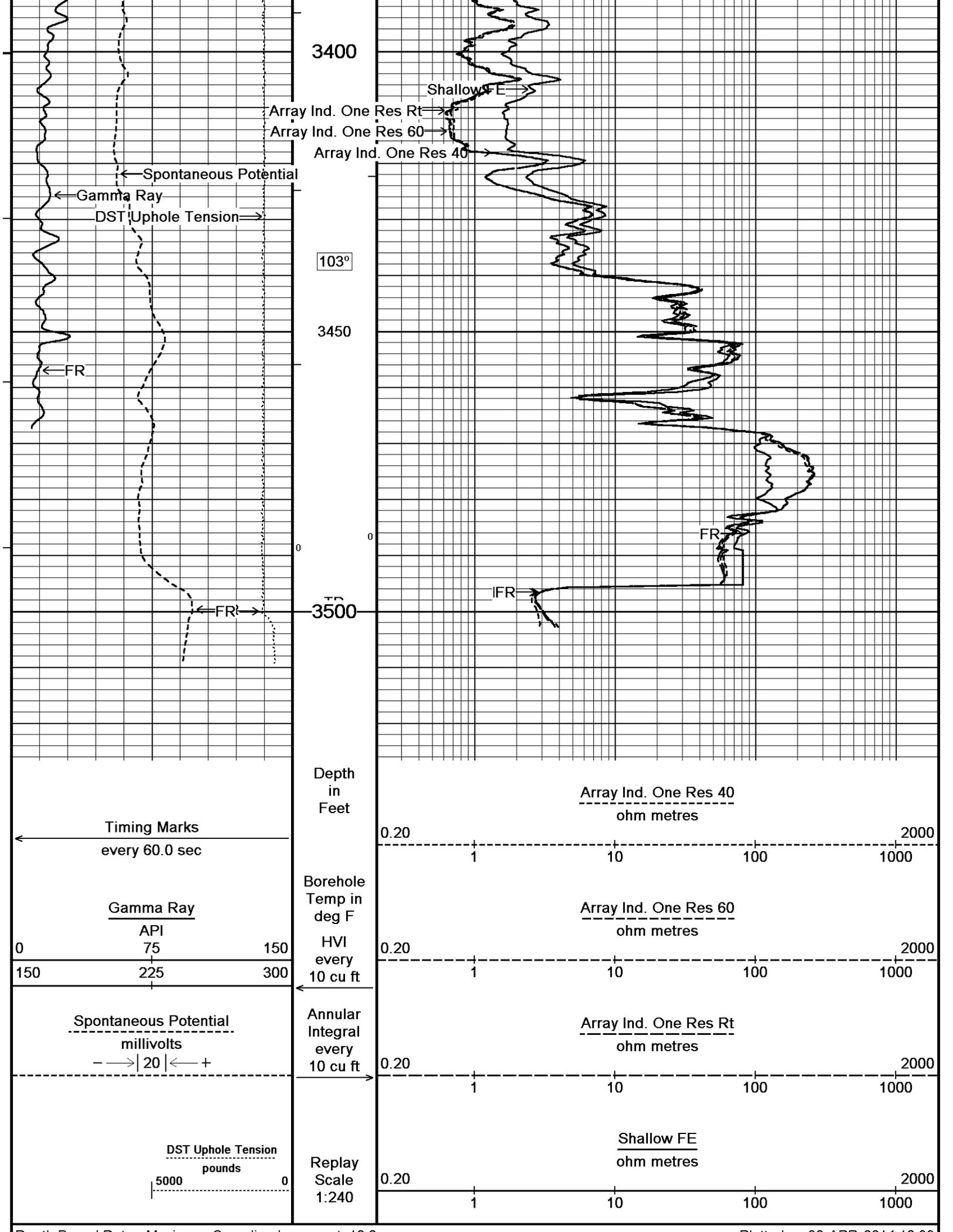












5 INCH MAIN

REPEAT SECTION

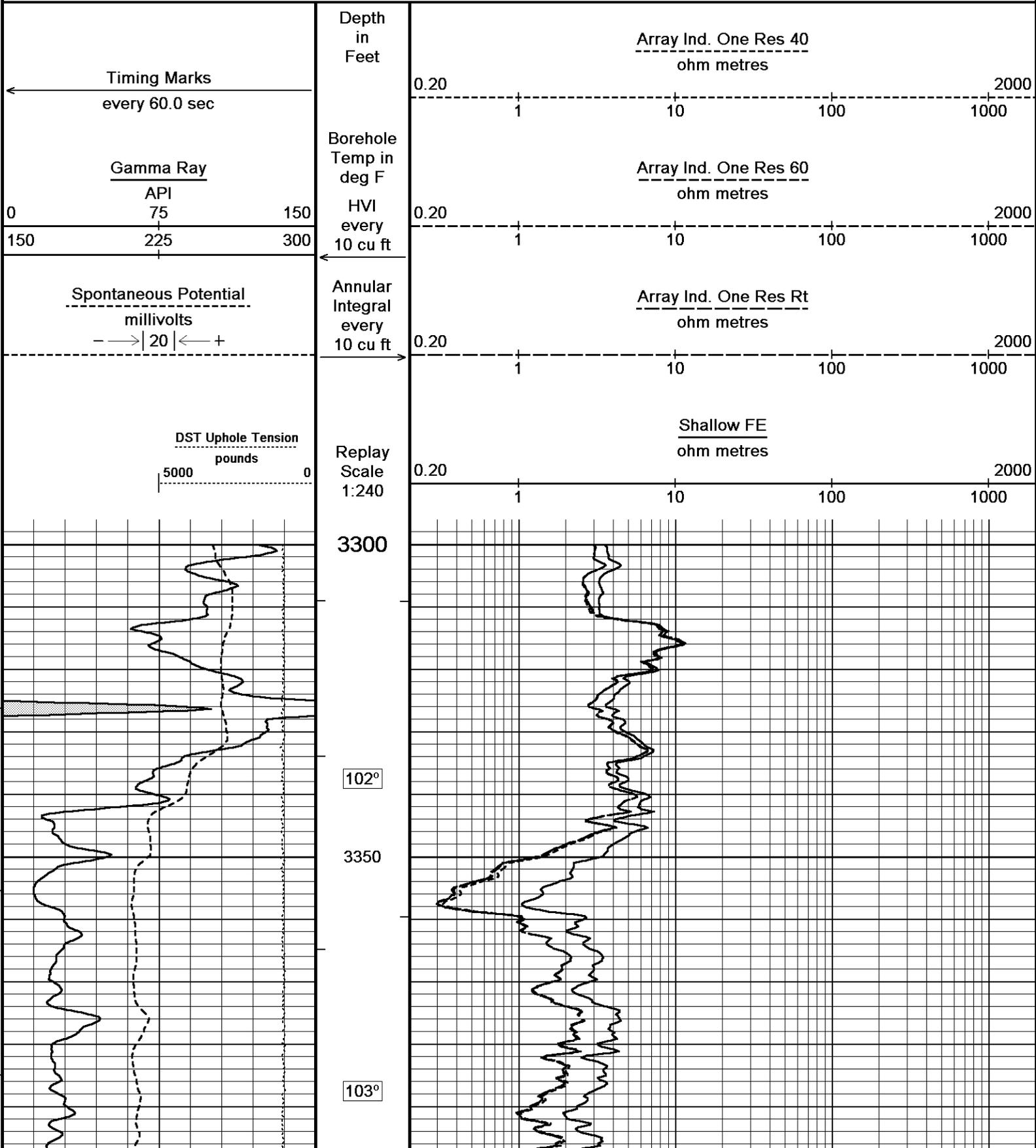
Depth Based Data - Maximum Sampling Increment 10.0cm

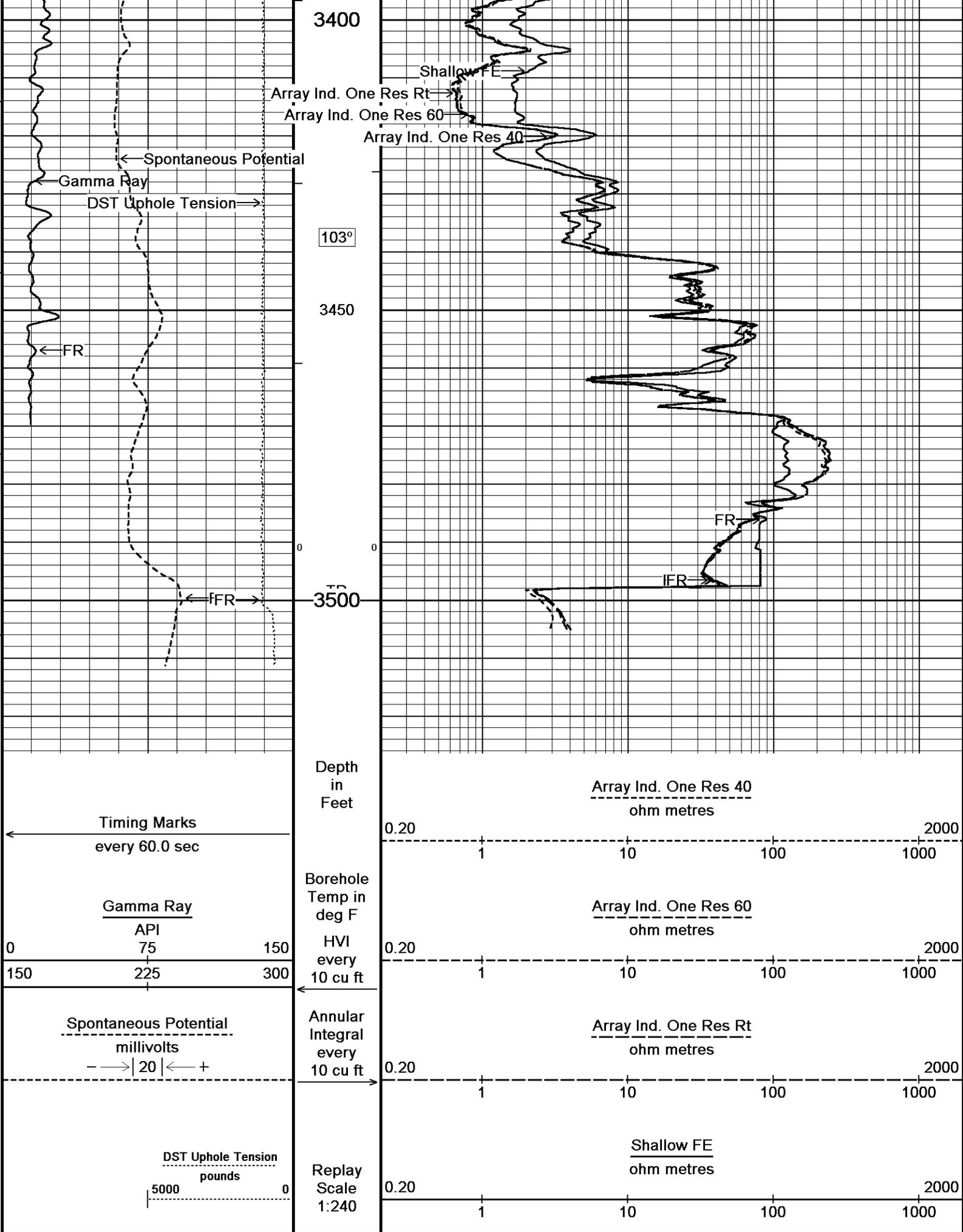
Plotted on 30-APR-2014 10:33

Filename: C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Repeat.dta

Recorded on 30-APR-2014 07:55

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113







## REPEAT SECTION



## BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Main.dta

## General Constants All 000

Last Edited on 30-APR-2014,07:32

## General Parameters

Mud Resistivity	0.500	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	MML Caliper	

## Rwa Parameters

Porosity used	Crossplot Porosity
Resistivity used	Array Ind. One Res Rt
RWA Constant A	1.000
RWA Constant M	2.000
SW/APOR Tool Source	0.000

## Gamma Calibration MCG-B 39

Field Calibration on 29-APR-2014 13:04

	Measured	Calibrated (API)
Background	70	47
Calibrator (Gross)	1149	772
Calibrator (Net)	1080	725

## Gamma Constants MCG-B 39

Last Edited on 30-APR-2014,02:27

Gamma Calibrator Number	GRC038	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

## High Resolution Temperature Calibration MCG-B 39

Field Calibration on 17-APR-2014,10:21

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

## High Resolution Temperature Constants MCG-B 39

Last Edited on 17-APR-2014,10:21

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

Base Calibration on 29-APR-2014 10:08

Field Check on 29-APR-2014 10:14

## Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.7	126.8
Base Check		281.2
Field Check		281.2

## FE Constants MFE-A.A 135

Last Edited on 30-APR-2014,02:26

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 167

Base Calibration on 22-FEB-2014,14:07  
 Field Check on 29-APR-2014 10:29

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	17.3	474.2	9.3	967.1
2	6.3	388.4	7.6	822.1
3	3.3	259.4	5.2	566.5
4	1.9	133.0	2.6	279.5

Array Temperature 76.8 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	12.2	3844.3
2	0.0	0.0	29.4	3481.8
3	0.0	0.0	29.0	3057.3
4	0.0	0.0	19.8	2084.7
Deep			18.5	2052.0
Medium			42.2	3996.8
Shallow			42.6	5061.0

Array Temperature 0.0 59.6 Deg F

Induction Constants MAI-A.A 167

Last Edited on 29-APR-2014,10:24

Induction Model RtAP-WBM  
 Caliper for Borehole Corr. Density Caliper  
 Hole Size for Borehole Correction 2.500 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  
 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

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 24-APR-2014 15:34  
 Field Calibration on 29-APR-2014 13:15

Base Calibration

Base Calibration

Reading No
1
2
3
4
5
6

Measured
16880
26832
36848
46696
57888
N/A

Calibrator Size (in)
3.99
5.98
7.97
9.86
11.92
N/A

Field Calibration

Measured Caliper (in)
7.95

Actual Caliper (in)
7.97

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Log Data\CMX #1 Krehbiel\CMX #1 Krehbiel Main.dta

3/8" Triple Cone Cable Head (MCB C A)  
 MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.244 in

Compact Comms Gamma  
 MCG-B 39 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log  
 MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

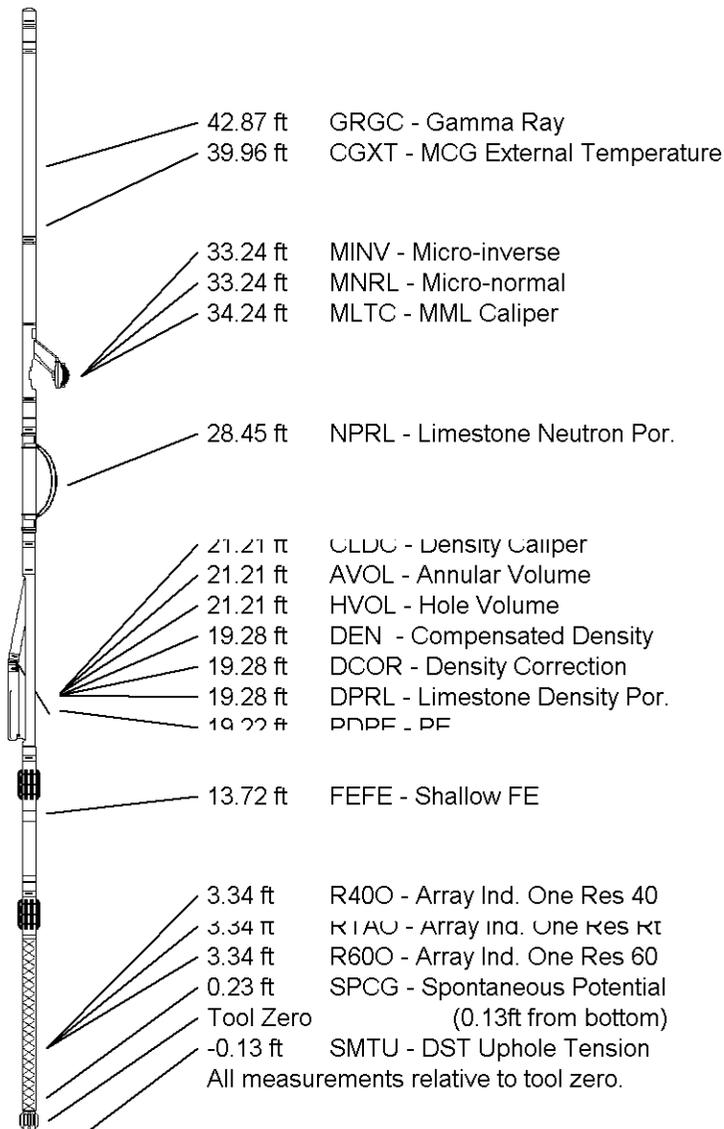
Compact Neutron  
 MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper  
 MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

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

Compact Induction  
 MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 49.73 ft Weight: 399.0 lb



COMPANY	CMX, INC.
WELL	#1 KREHBIEL
FIELD	WELCH-BORNHOLDT
PROVINCE/COUNTY	RICE
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1542.00	feet	First Reading	3496.66	feet
Elevation Drill Floor	1540.00	feet	Depth Driller	3500.00	feet
Elevation Ground Level	1529.00	feet	Depth Logger	3500.00	feet

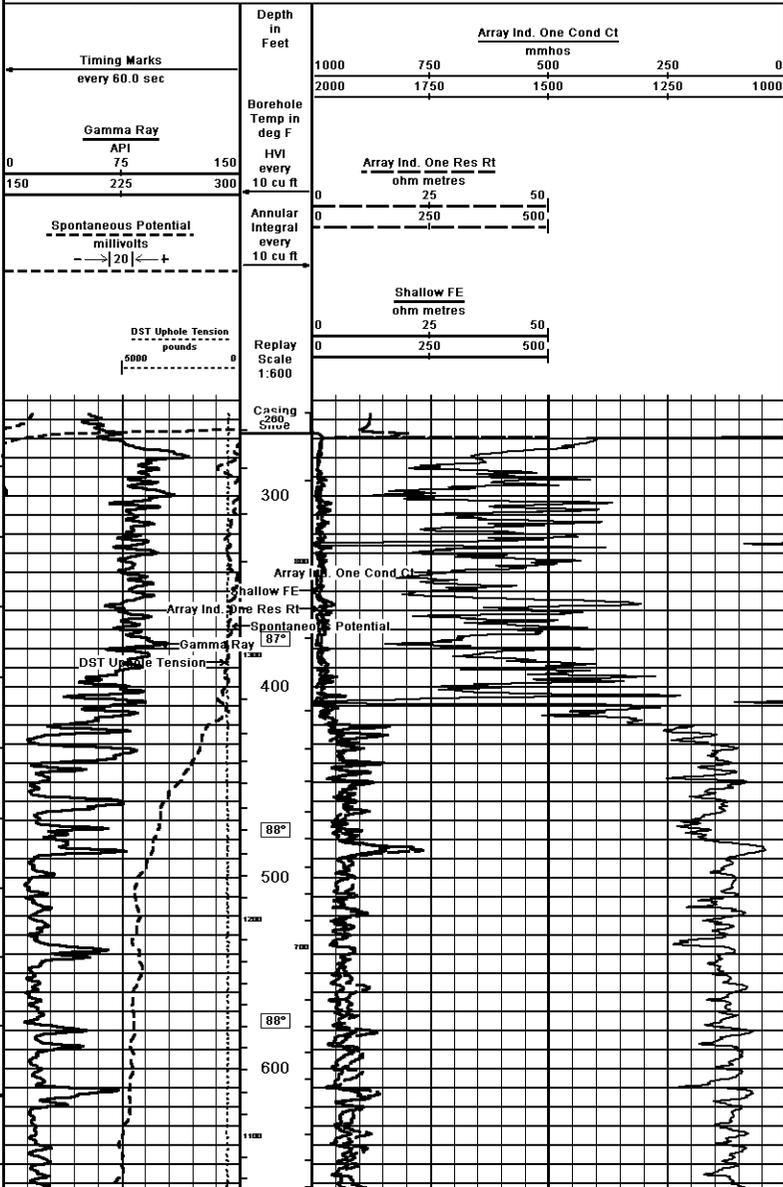


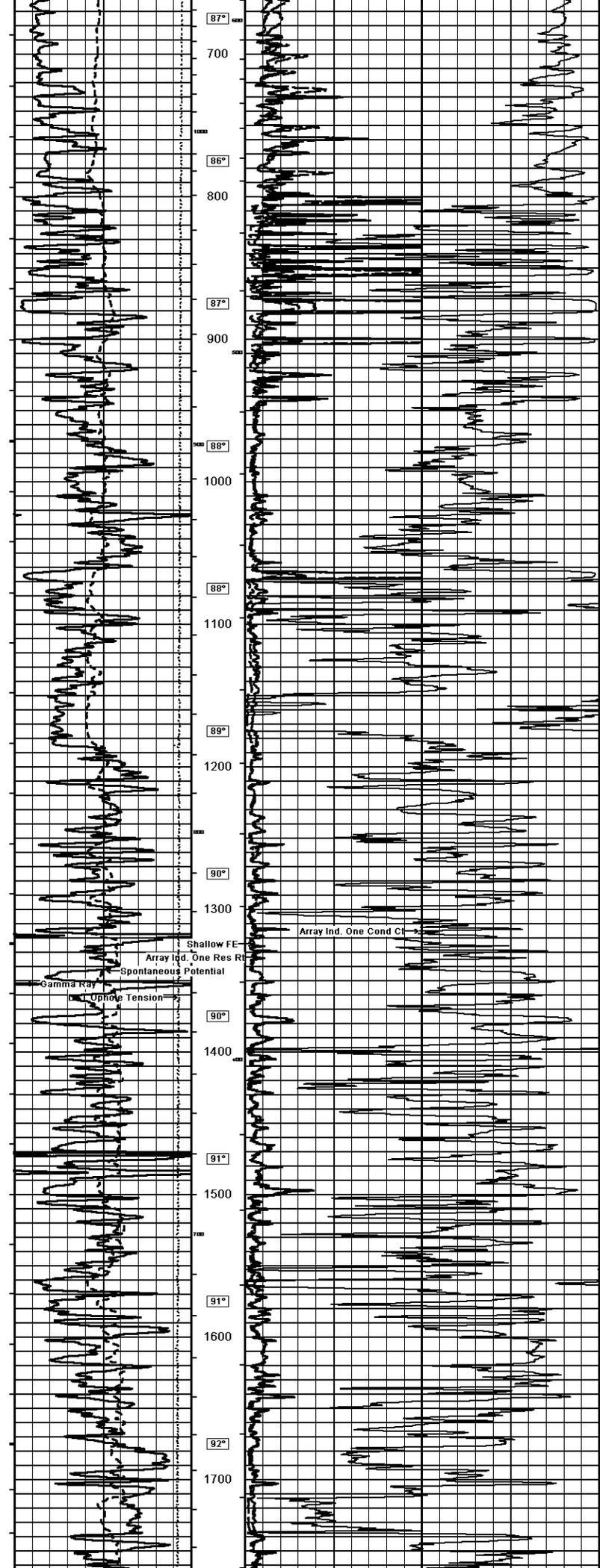
# Weatherford®

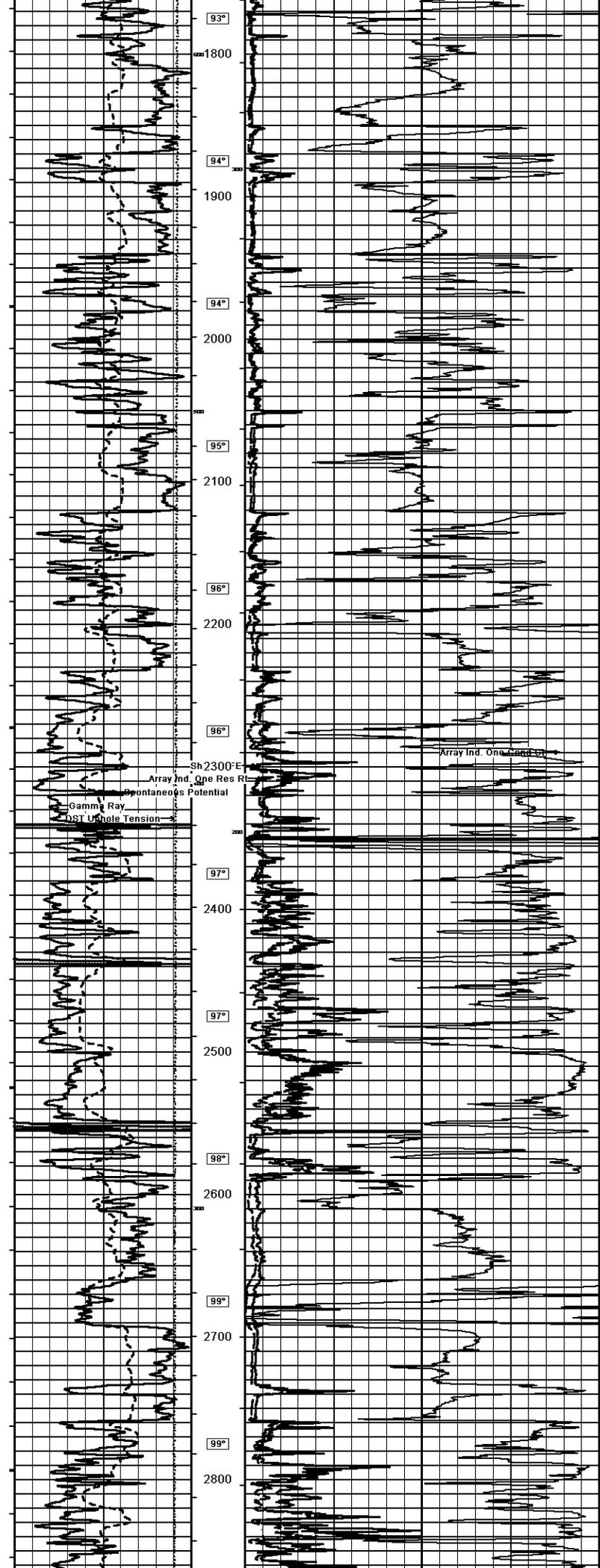
## ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

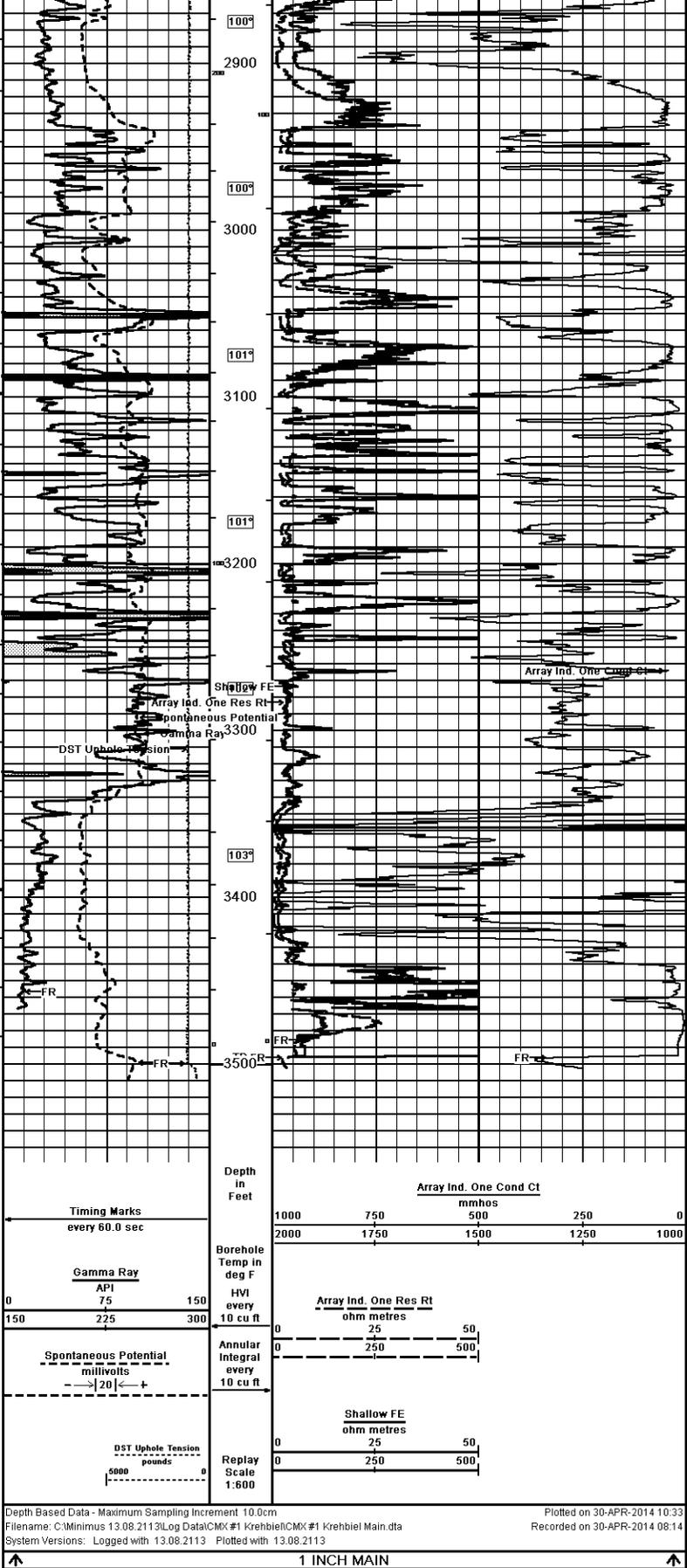
<b>Weatherford</b>		<b>ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG</b>	
COMPANY	CMX, INC.	WELL	#1 KREHBIEL
FIELD	WELCH-BORNHOLDT	PROVINCE/COUNTY	RICEL
COUNTRY/STATE	U.S.A. / KANSAS	LOCATION	12701 ESL & 3301 EEL
SEC 1	T1P	21S	R2E
34	04	04	04
Latitude	37.151522774	Longitude	-97.011011111
Well Number	ONE	Run Number	30-APR-2014
Service Order	7036-86005377	Depth Diller	3500.00 feet
Depth Logger	3500.00 feet	First Reading	3498.88 feet
Last Reading	267.00 feet	Casing Diller	267.00 feet
Casing Logger	267.00 feet	Bit Size	7.875 inches
Flow Fluid Type	CHEMICAL	Density/Viscosity	9.40 lb/USG 14.00 mPa/30m
PH/Fluid Loss	MUDPIT	Sample Source	0.50 @ 75.0 0.40 @ 13.0 0.80 @ 75.0
RM @ Measured Temp	0.50 @ 75.0	RM @ Measured Temp	0.40 @ 13.0
RM @ Measured Temp	0.80 @ 75.0	Source Rmt/Rmc	CALC
RM @ BHT	0.37 @ 103.0	Time Since Circulation	3 HOURS
Max Recorded Temp	103.00 deg F	Equipment/Base	13006
Recorded By	DEREK CARTER	Missed By	LEHASTENS
LOG #	LEH14732		

1 INCH MAIN  
 Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 30-APR-2014 10:33  
 Filename: C:\Minimus 13.08.2113\Log Data\CMX#1 Krehbiel Main.dta  
 Recorded on 30-APR-2014 08:14  
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113









Depth Based Data - Maximum Sampling Increment: 10.0cm  
 Plotted on 30-APR-2014 10:33  
 Filename: C:\Minimus 13.08.2113\Log Data\CMX\#1 Krehbiel\CMX\#1 Krehbiel Main.dta  
 Recorded on 30-APR-2014 08:14  
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COMPANY	CMX, INC.		
WELL	#1 KREHBIEL		
FIELD	WELCH-BORNHOLDT		
PROVINCE/COUNTY	RICE		
COUNTRY/STATE	U.S.A. / KANSAS		
Elevation Kelly Bushing	1542.00 feet	First Reading	3496.66 feet
Elevation Drill Floor	1540.00 feet	Depth Driller	3500.00 feet
Elevation Ground Level	1529.00 feet	Depth Logger	3500.00 feet

**Weatherford** ARRAY INDUCTION  
 SHALLOW FOCUSED  
 ELECTRIC LOG

