Weatherford

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

COMPANY	K3 OIL & GAS OPERATING COMPANY
WELL	SORENSON #4-3
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO
LOCATION	650' FNL & 650' FWL

SEC 3	TWP 16S	RGE 55W
Latitude		
Longitude		
API Number	05-073-06727	

Other Services
MDN/MPD MML
MSS

Permanent Datum GL, Elevation 5030 feet
Log Measured From KB, 18.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	5048.00
DF	5046.00
GL	5030.00

Date	08-NOV-2017			
Run Number	ONE			
Service Order	4558-197333139			
Depth Driller	7550.00	feet		
Depth Logger	7550.00	feet		
First Reading	7547.00	feet		
Last Reading	496.00	feet		
Casing Driller	496.00	feet		
Casing Logger	496.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.40 lb/USg	83.00 CP		
PH / Fluid Loss	10.00	7.20 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	1.76 @ 75.0	ohm-m		
Rmf @ Measured Temp	1.41 @ 75.0	ohm-m		
Rmc @ Measured Temp	2.11 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.74 @178.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	178.00	deg F		
Equipment / Base	13096	LIB		
Recorded By	ADAM SILL			
Witnessed By	RANDY SAY		JOHN MARVIN	
Witnessed By	SUSAN RAINBOLT			

BOREHOLE RECORD

Last Edited: 08-NOV-2017 09:44

Bit Size inches	Depth From feet	Depth To feet
7.875	496.00	7550.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	13.375	0.00	496.00	48.00

REMARKS

- SOFTWARE ISSUE: WLS 17.03.9700.

- 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: 2712 CU.FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 2500 FEET: 914 CU.FT.

- RIG: WW DRILLING #20.

- ENGINEER: A. SILL.

- OPERATOR: B. TOVAR, J. HOLCOMB.

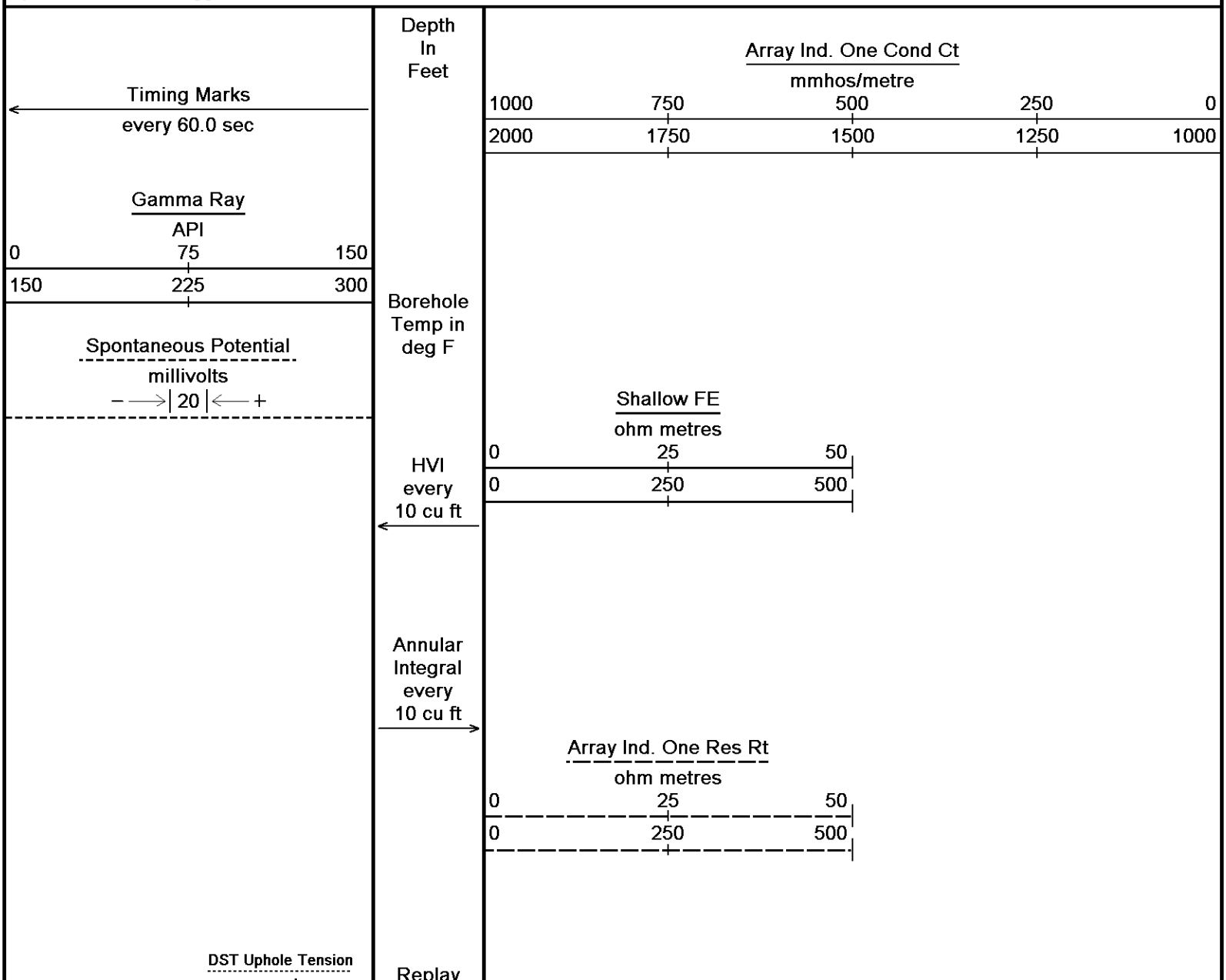
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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

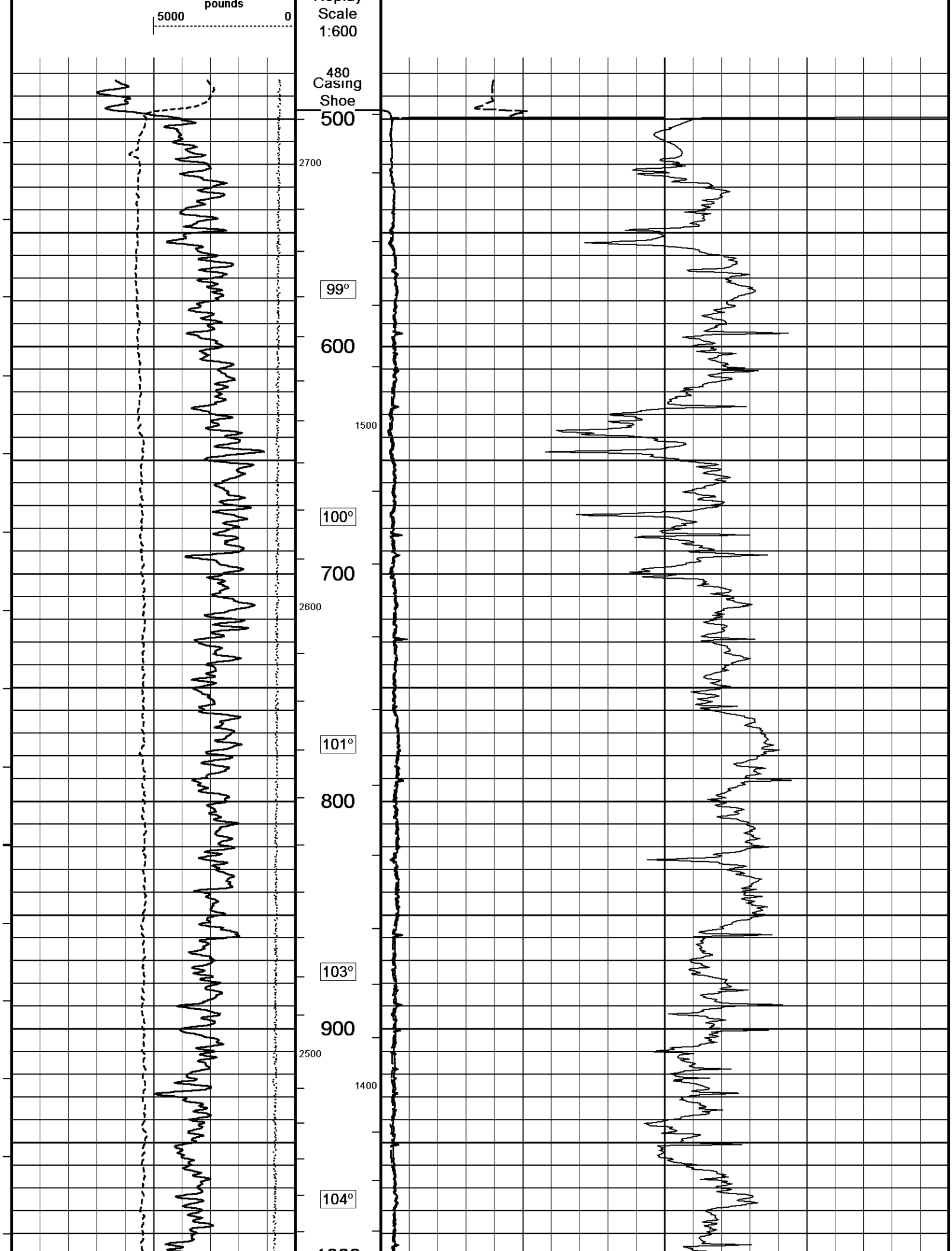
2 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 09-NOV-2017 05:17

Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_003.dta — Recorded on 09-NOV-2017 00:16

System Versions: Logged with 17.03.9700 Plotted with 17.03.9700




pounds
5000
0
Replay
Scale
1:600
480
Casing
Shoe
500
2700
99°
600
1500
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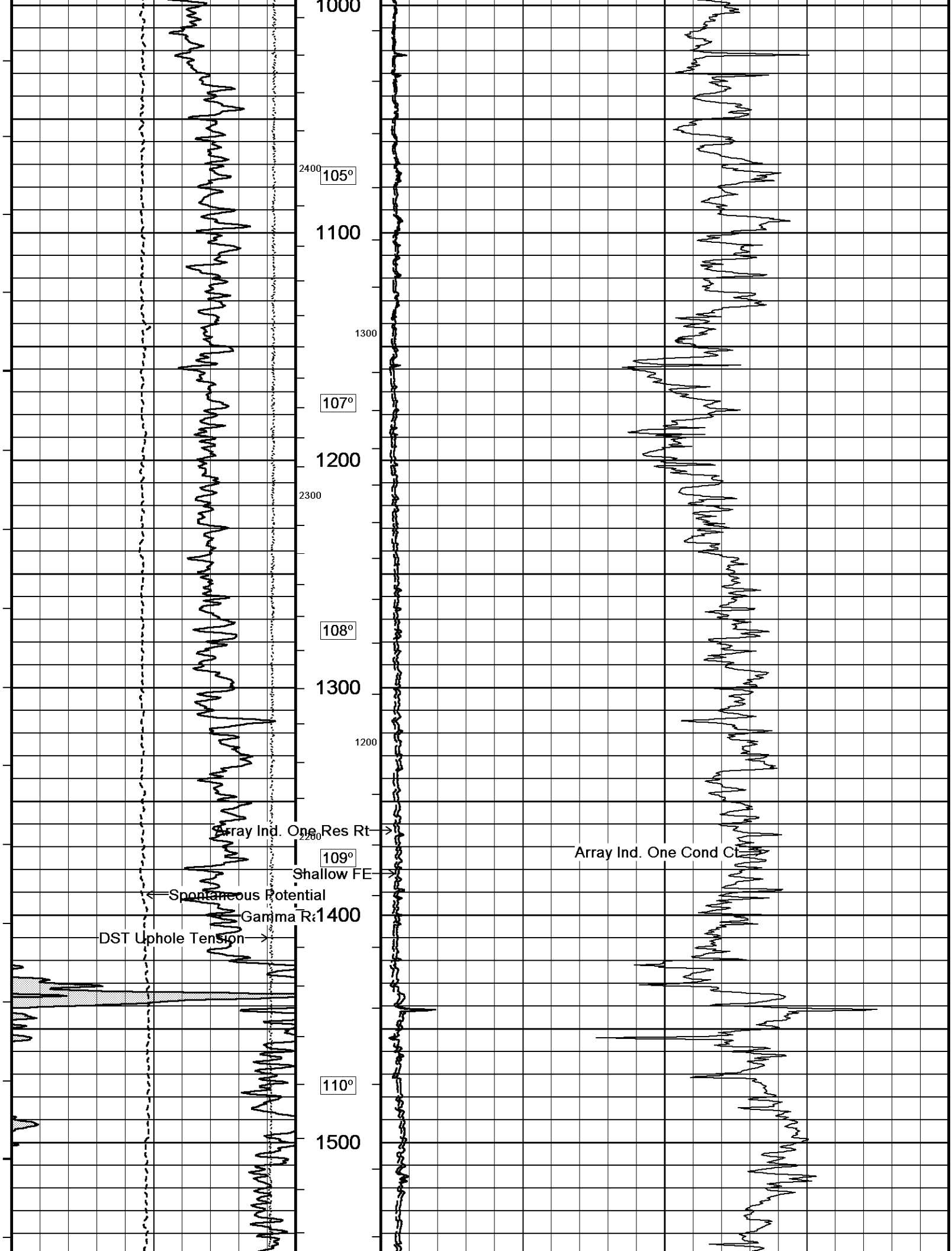
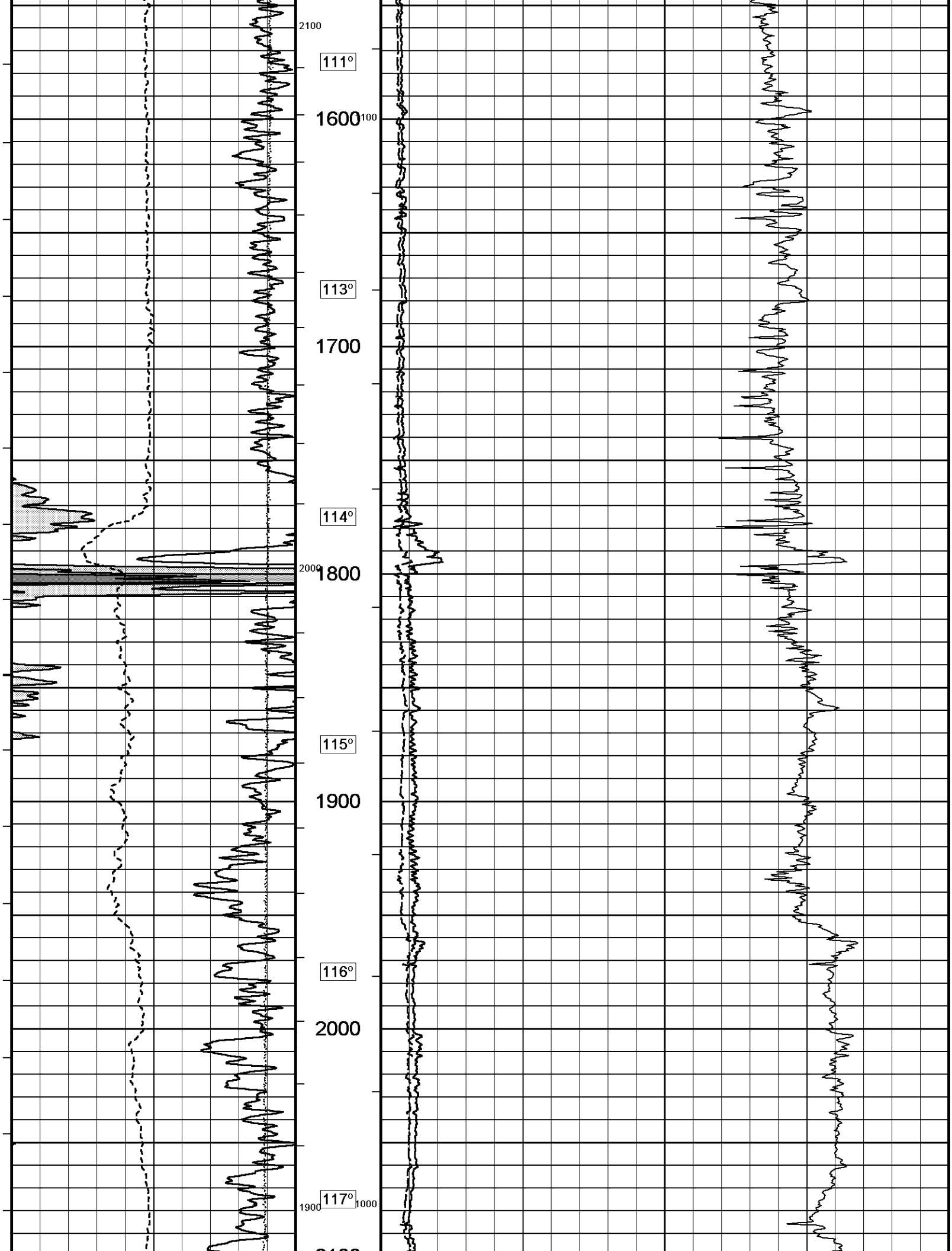
700
2600
101°
800
103°
900
2500
1400
104°


1000
2400
105°
1100
1300
107°
1200
2300
108°
1300
1200
Array Ind. One Res Rt
2200
109°
Shallow FE
Spontaneous Potential
Gamma R
1400
DST Uphole Tension
Array Ind. One Cond Ct
110°
1500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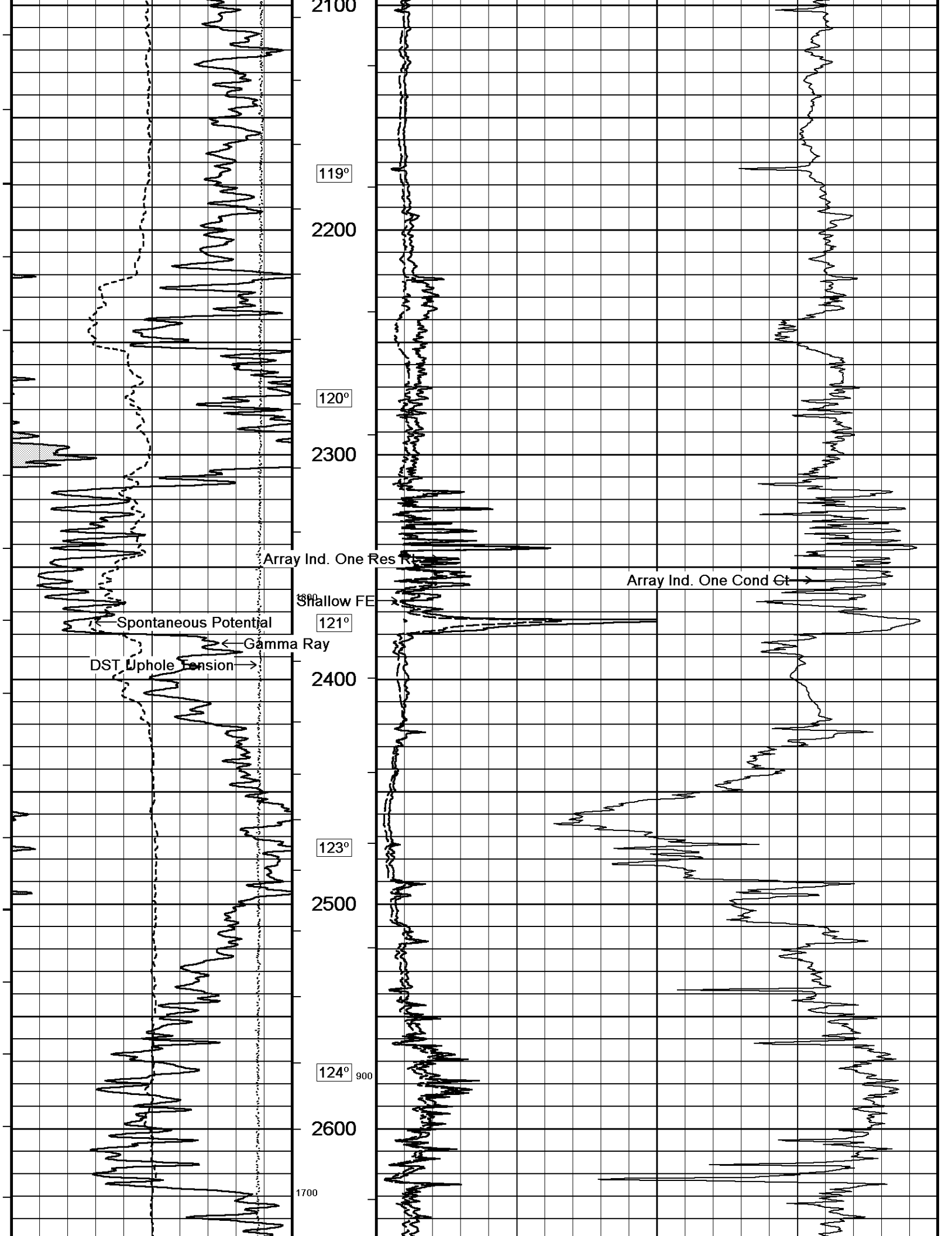
1600
100
113°
1700
114°
2000
1800
115°
1900
116°
2000
1900
117°
1000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119°
2200
120°
2300
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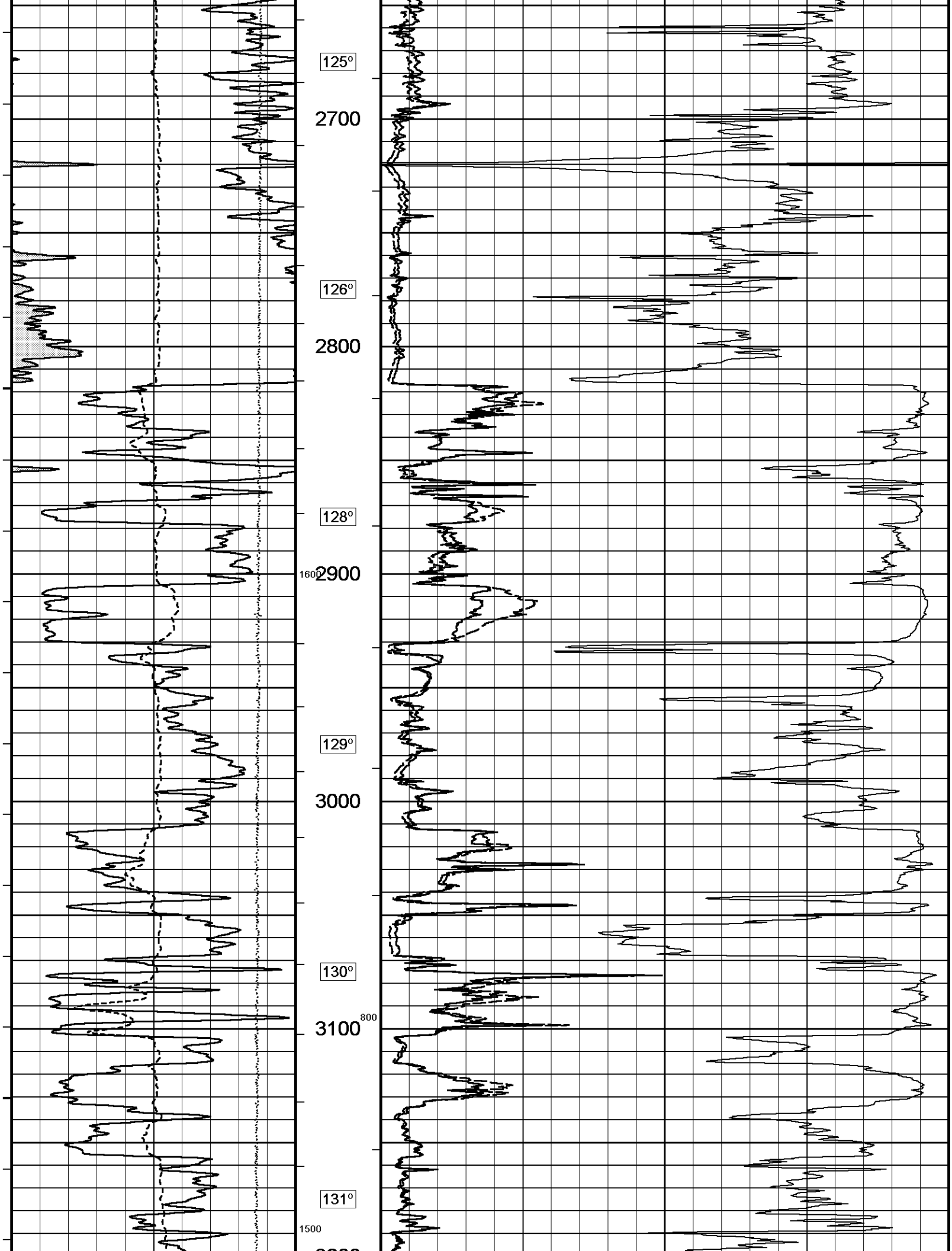
Array Ind. One Cond Ct
1800
Shallow FE
Spontaneous Potential
121°
Gamma Ray
DST Uphole Tension
2400
123°
2500
124°
900
2600
1700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128°
1600
2900
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3000
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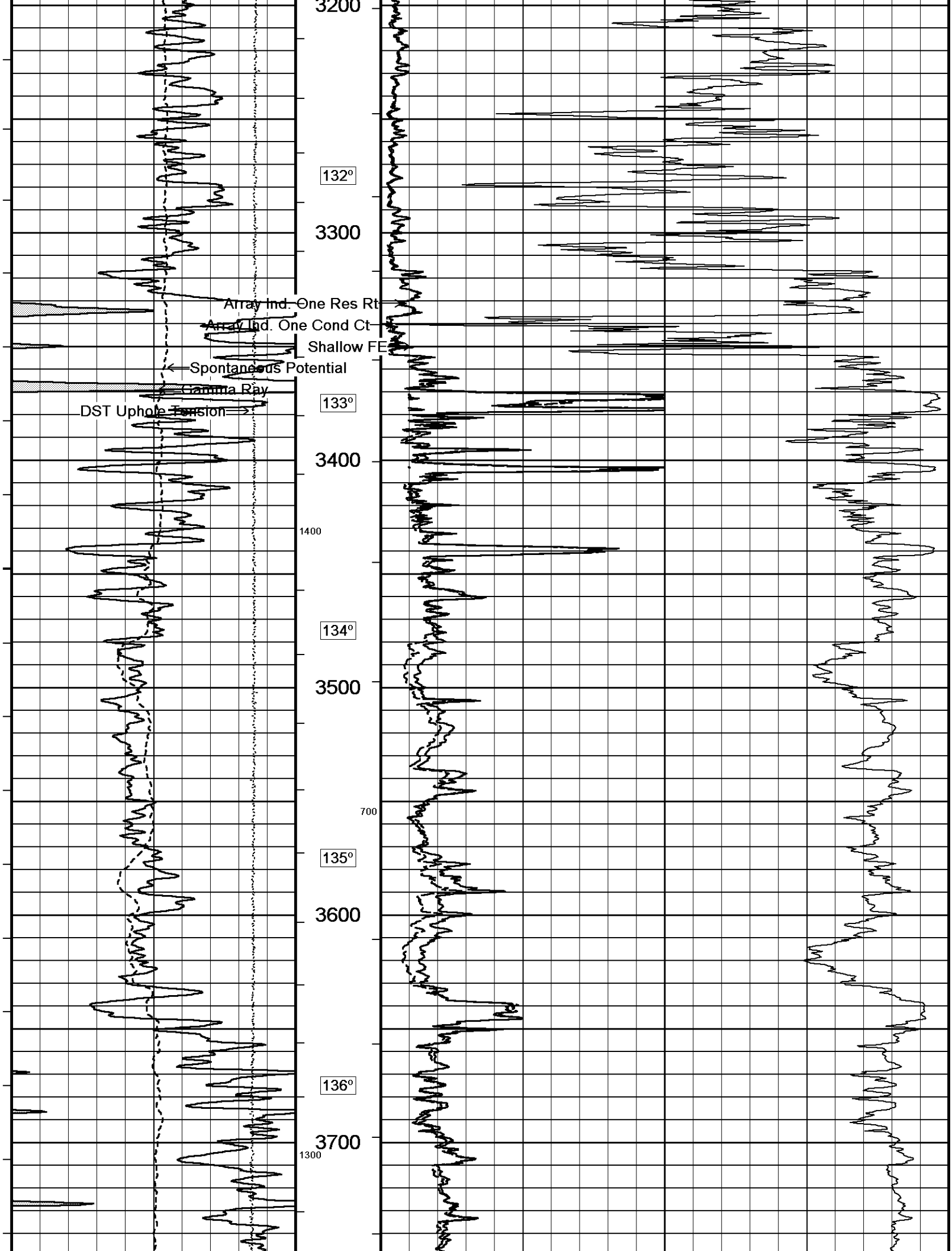
3100
800
131°
1500


3200
132°
3300
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Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
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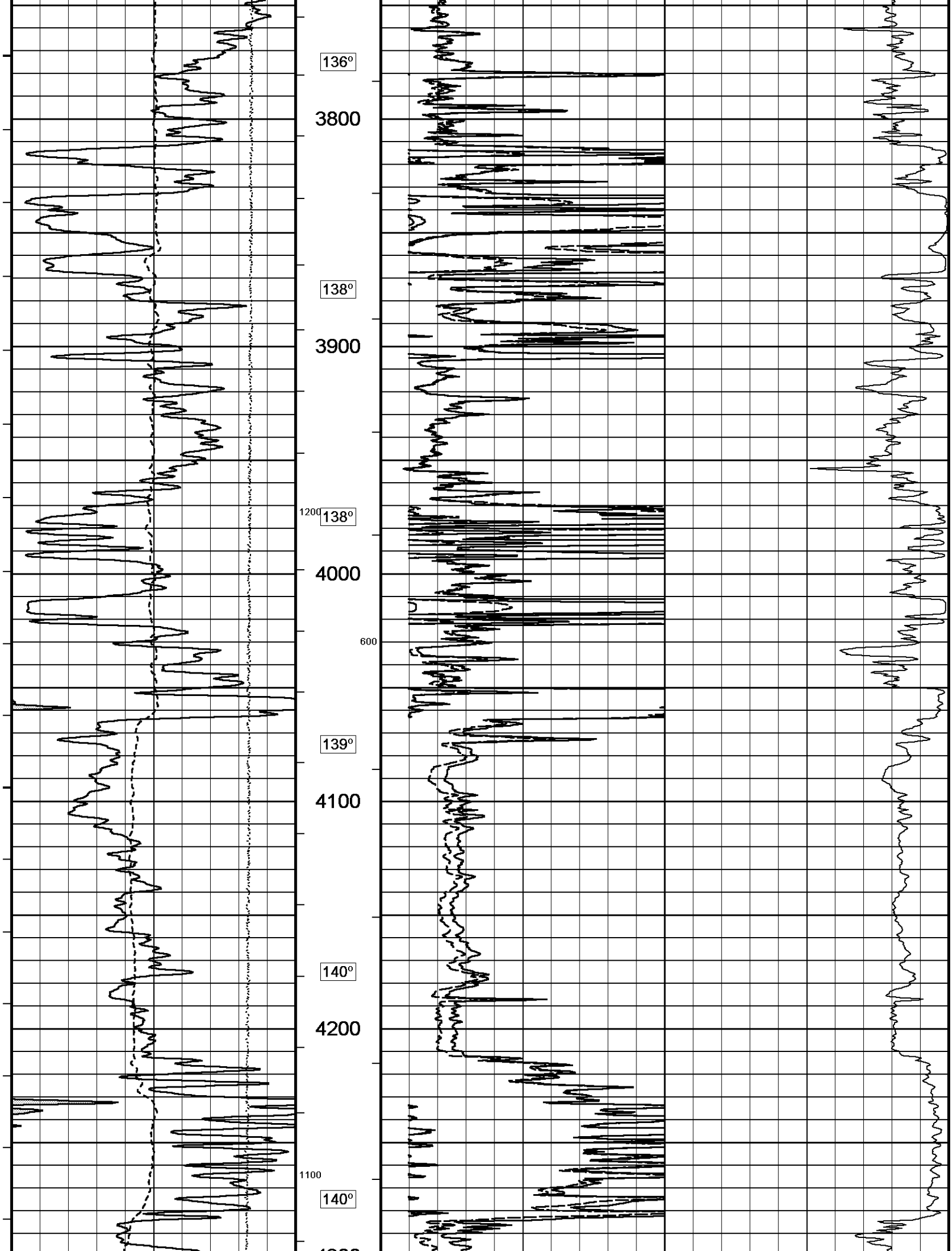
3400
1400
134°
3500
700
135°
3600
136°
3700
1300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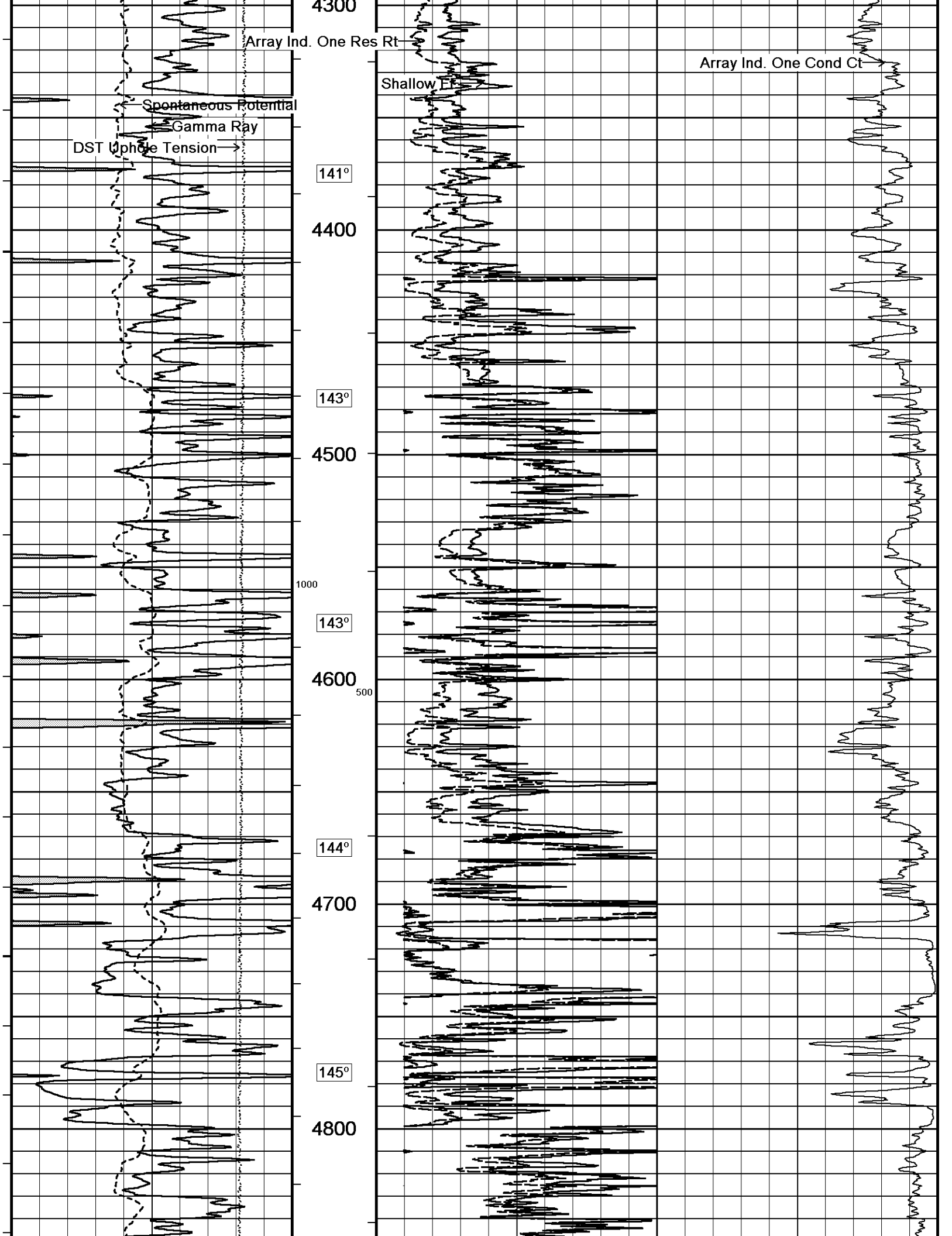
3800
138°
3900
1200
138°
4000
600
139°
4100
140°
4200
1100
140°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Shallow Ft
Array Ind. One Cond Ct
Spontaneous Potential
Gamma Ray
DST Uphole Tension
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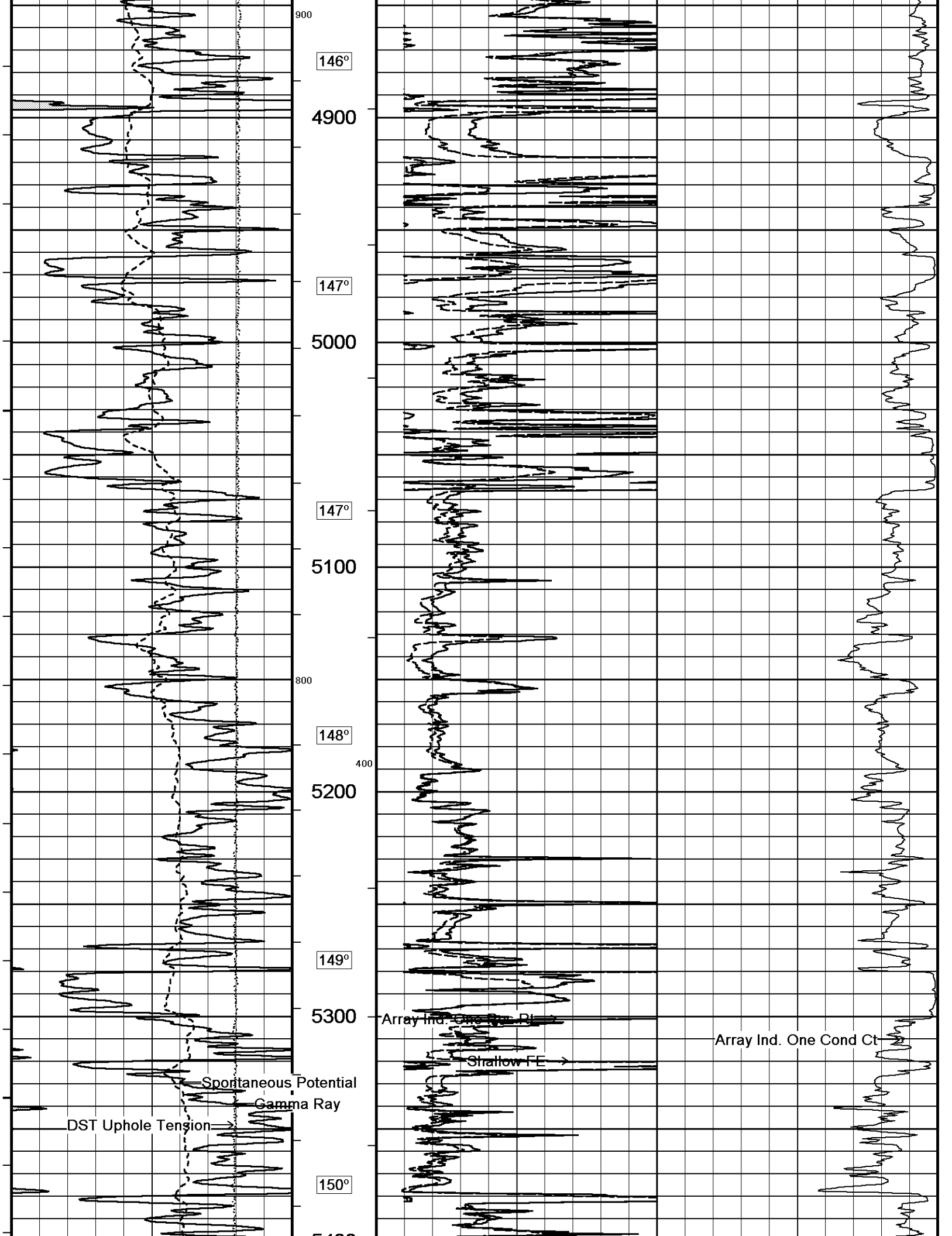
141°
4400
143°
4500
1000
143°
4600
500
144°
4700
145°
4800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146°
4900
147°
5000
147°
5100
800
148°
400
5200
149°
5300
150°
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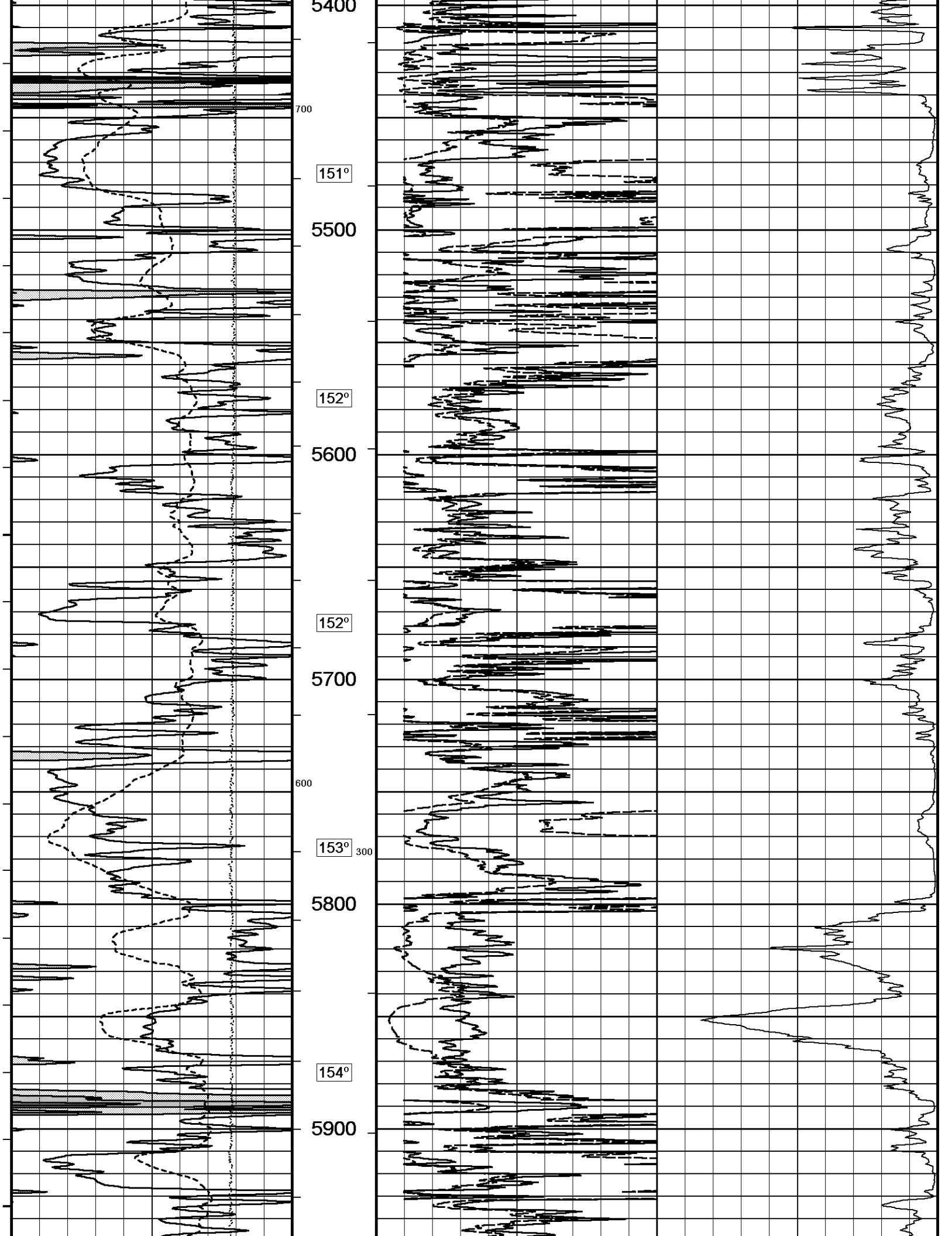
Shallow FE
Array Ind. One Cond Ct
Spontaneous Potential
Gamma Ray
DST Uphole Tension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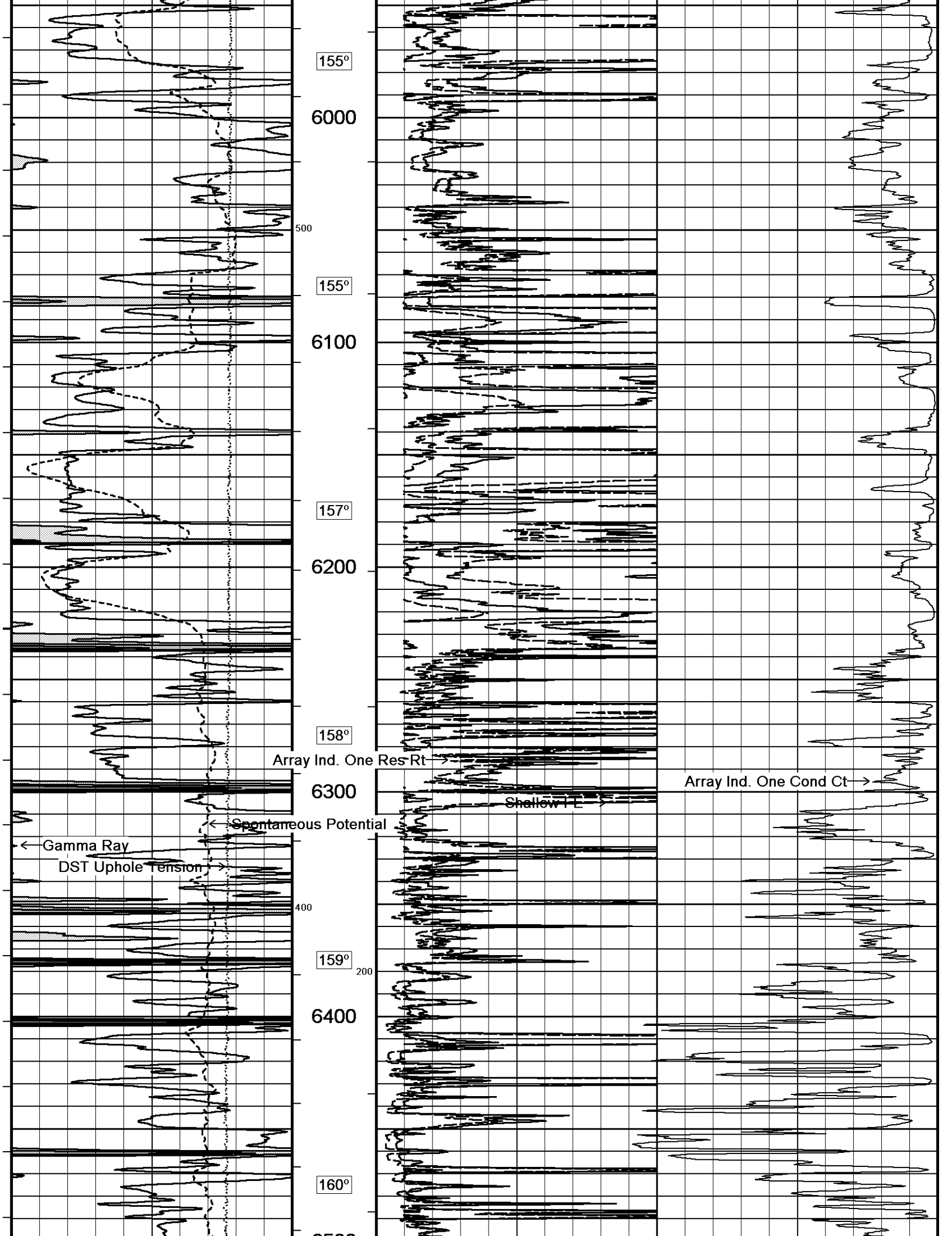
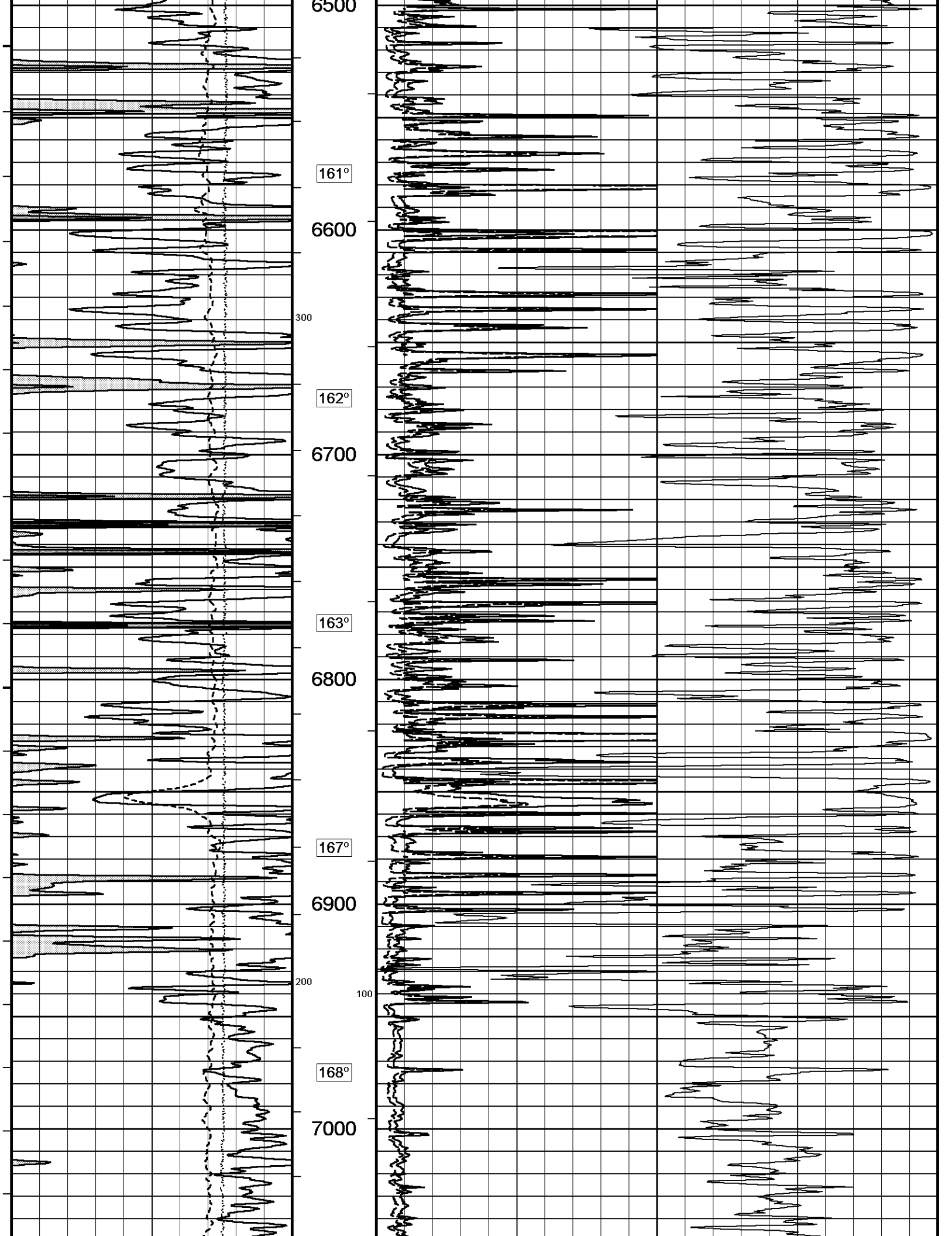
700
151°
5500
152°
5600
152°
5700
600
153°
300
5800
154°
5900


155°
6000
500
155°
6100
157°
6200
158°
Array Ind. One Res Rt
6300
Array Ind. One Cond Ct
Shallow LL
Spontaneous Potential
Gamma Ray
DST Uphole Tension
400
159°
200
6400
160°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161°
6600
300
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6700
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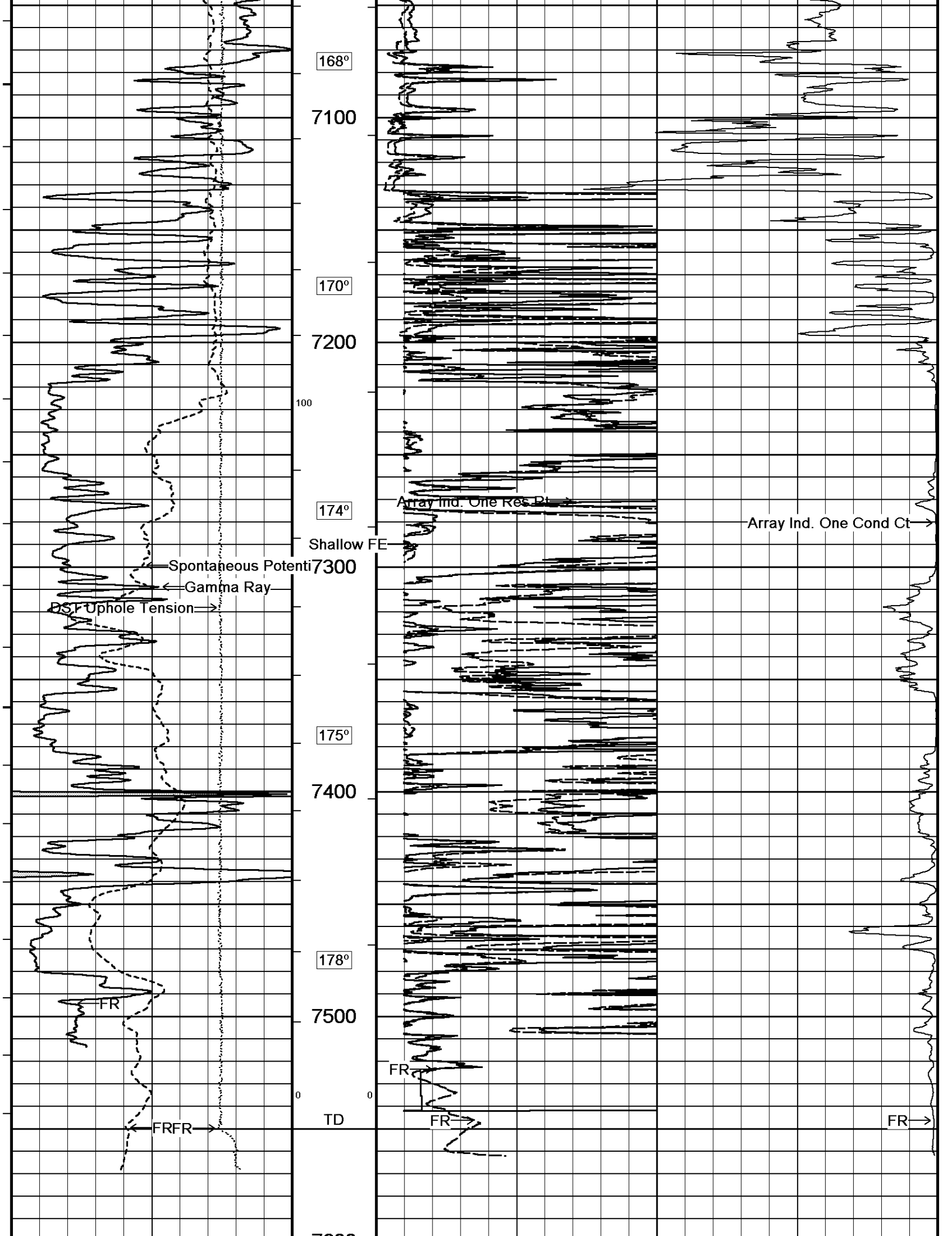
167°
6900
200
100
168°
7000


168°
7100
170°
7200
100
174°
Shallow FE
Spontaneous Potenti
7300
Gamma Ray
DSI Uphole Tension
175°
7400
178°
FR
7500
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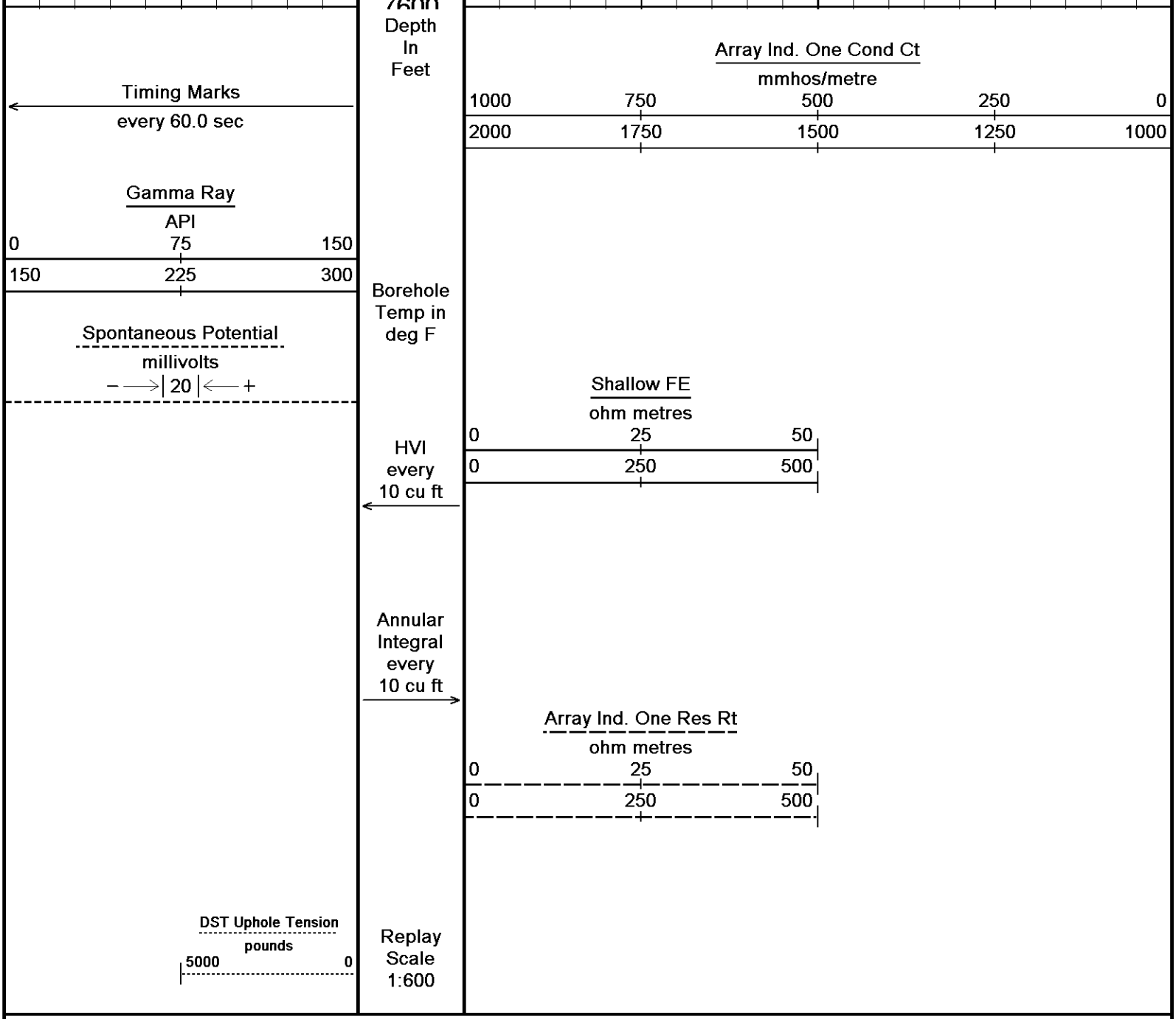
0
TD
FRFR
Array Ind. One Res Rt
Array Ind. One Cond Ct
FR
FR
FR



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 09-NOV-2017 05:17
Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_003.dta
Recorded on 09-NOV-2017 00:16
System Versions: Logged with 17.03.9700 Plotted with 17.03.9700

2 INCH MAIN

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 09-NOV-2017 05:17
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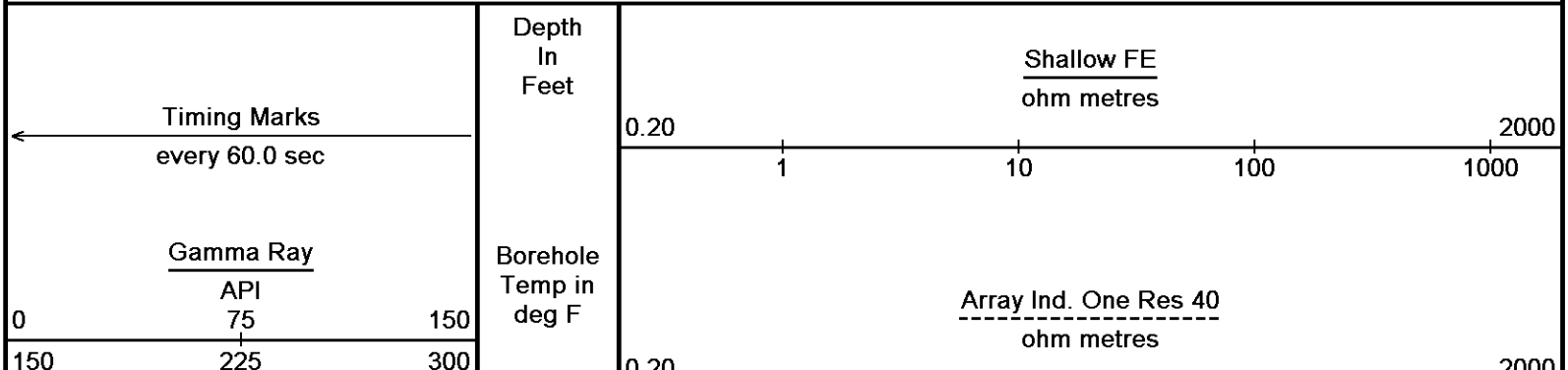
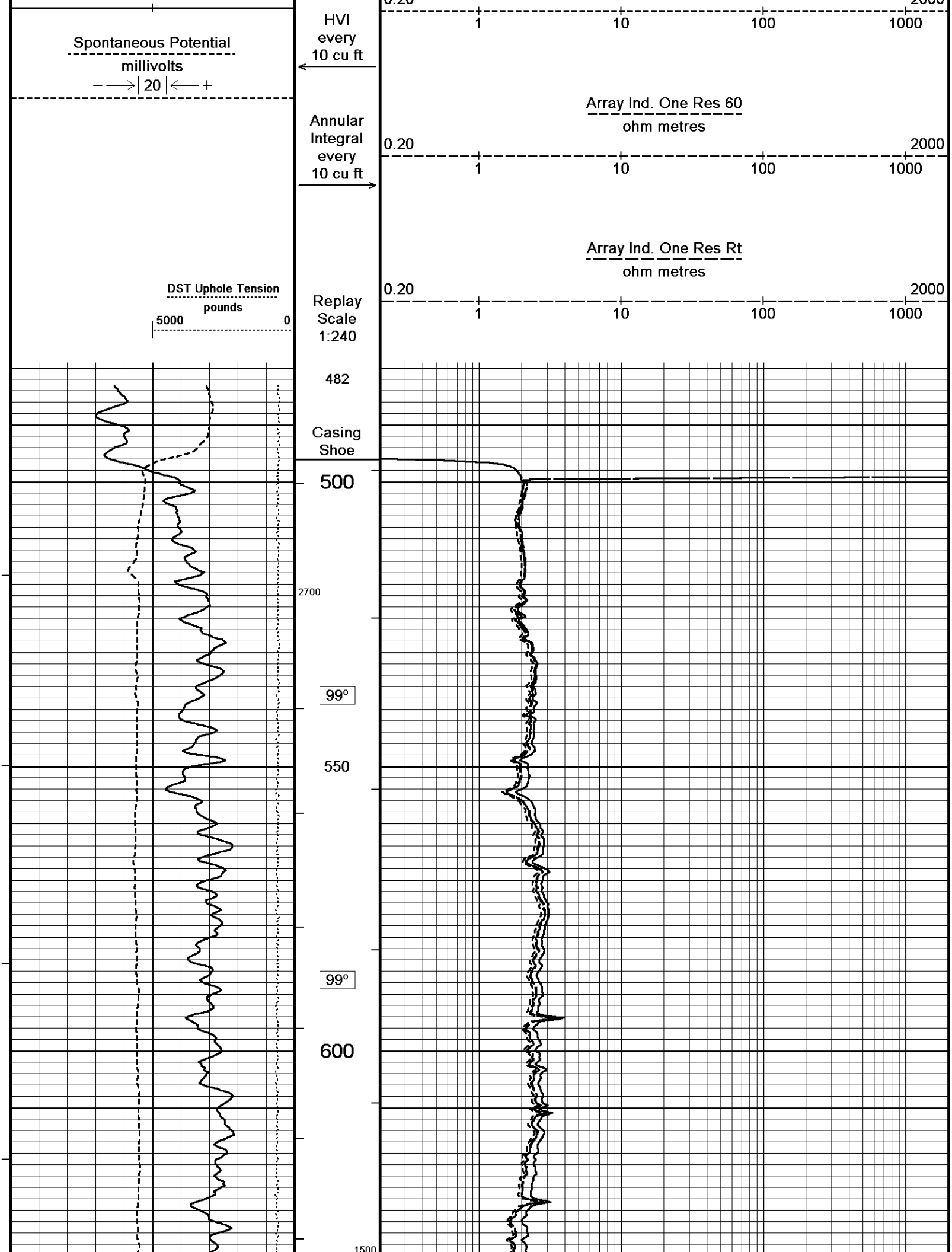
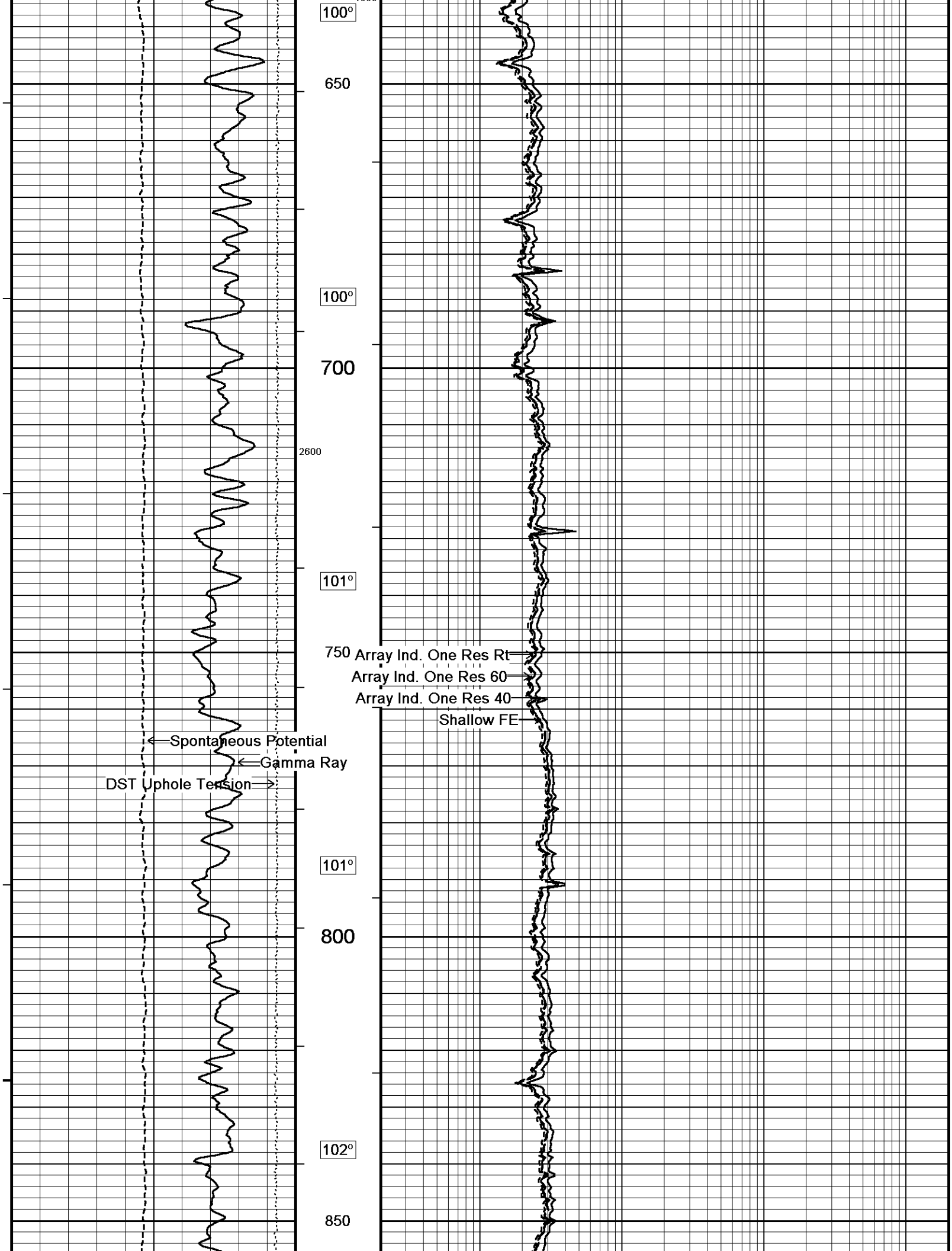
System Versions: Logged with 17.03.9700 Plotted with 17.03.9700




Spontaneous Potential
millivolts
– 20 +
HVI
every
10 cu ft
Annular
Integral
every
10 cu ft
Array Ind. One Res 60
ohm metres
0.20
2000
1
10
100
1000
Array Ind. One Res Rt
ohm metres
0.20
2000
1
10
100
1000
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
482
Casing
Shoe
500
2700
99°
550
99°
600
1500


100°
650
100°
700
2600
101°
750
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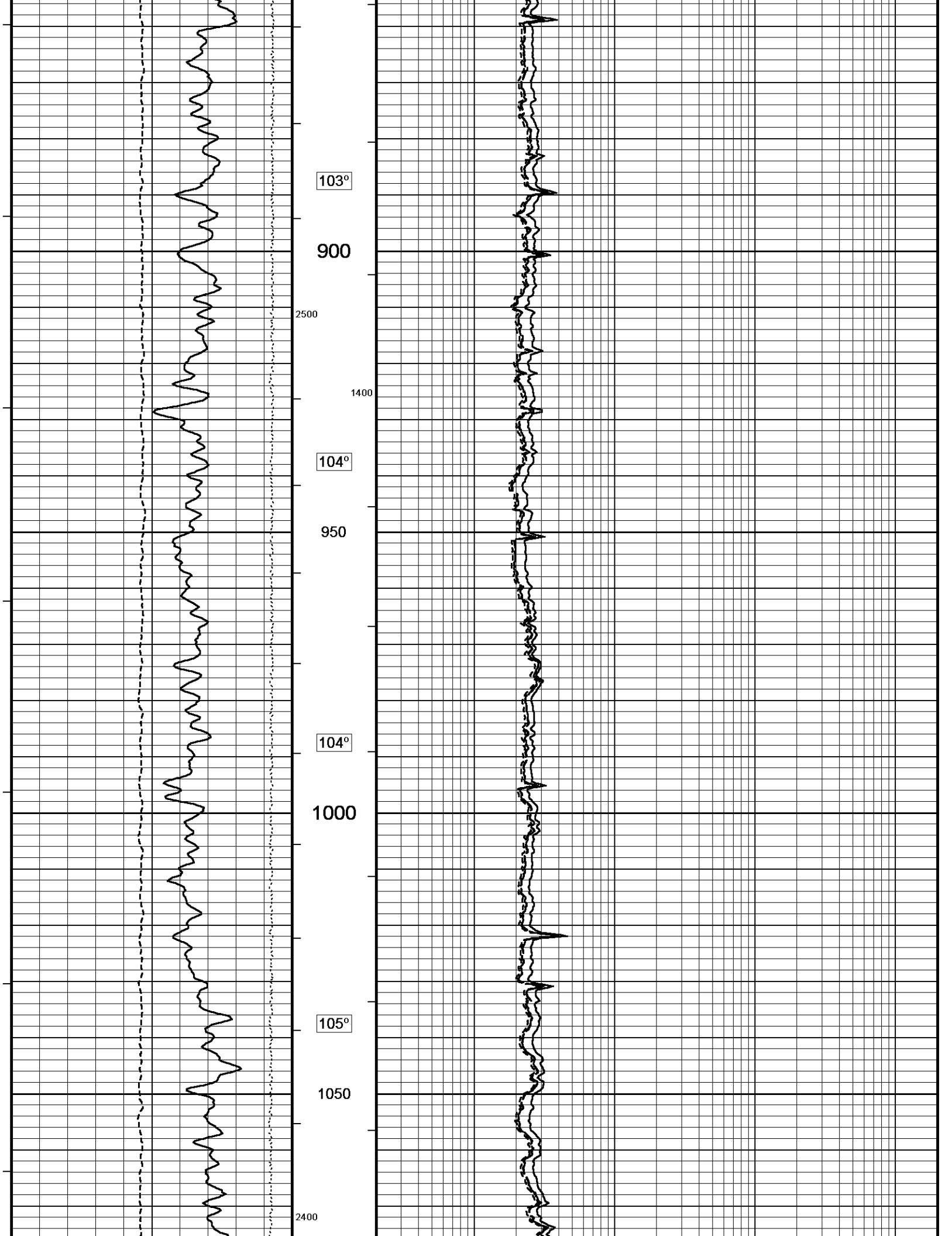
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
101°
800
102°
850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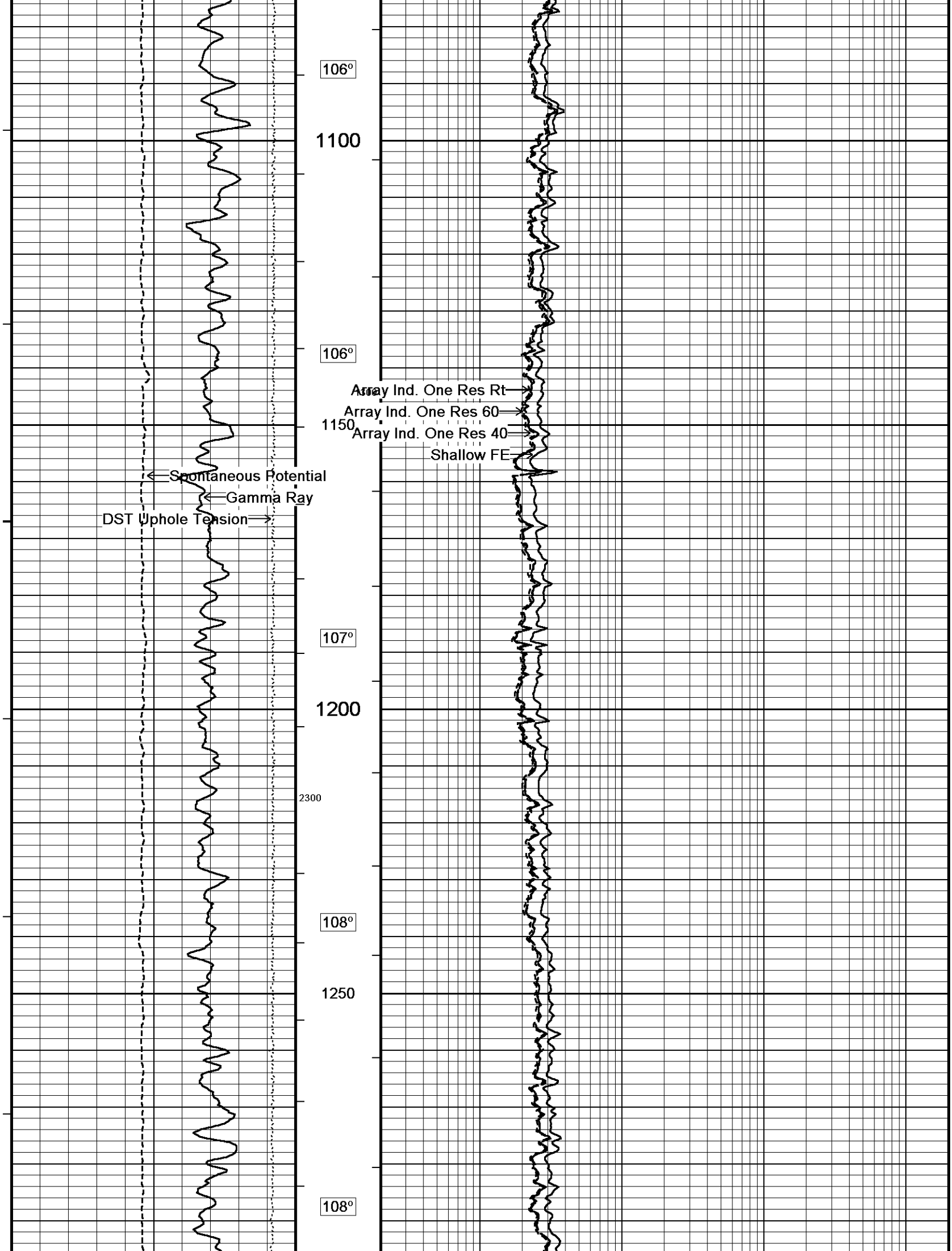
900
2500
1400
104°
950
104°
1000
105°
1050
2400


106°
1100
106°
Array Ind. One Res Rt
Array Ind. One Res 60
1150
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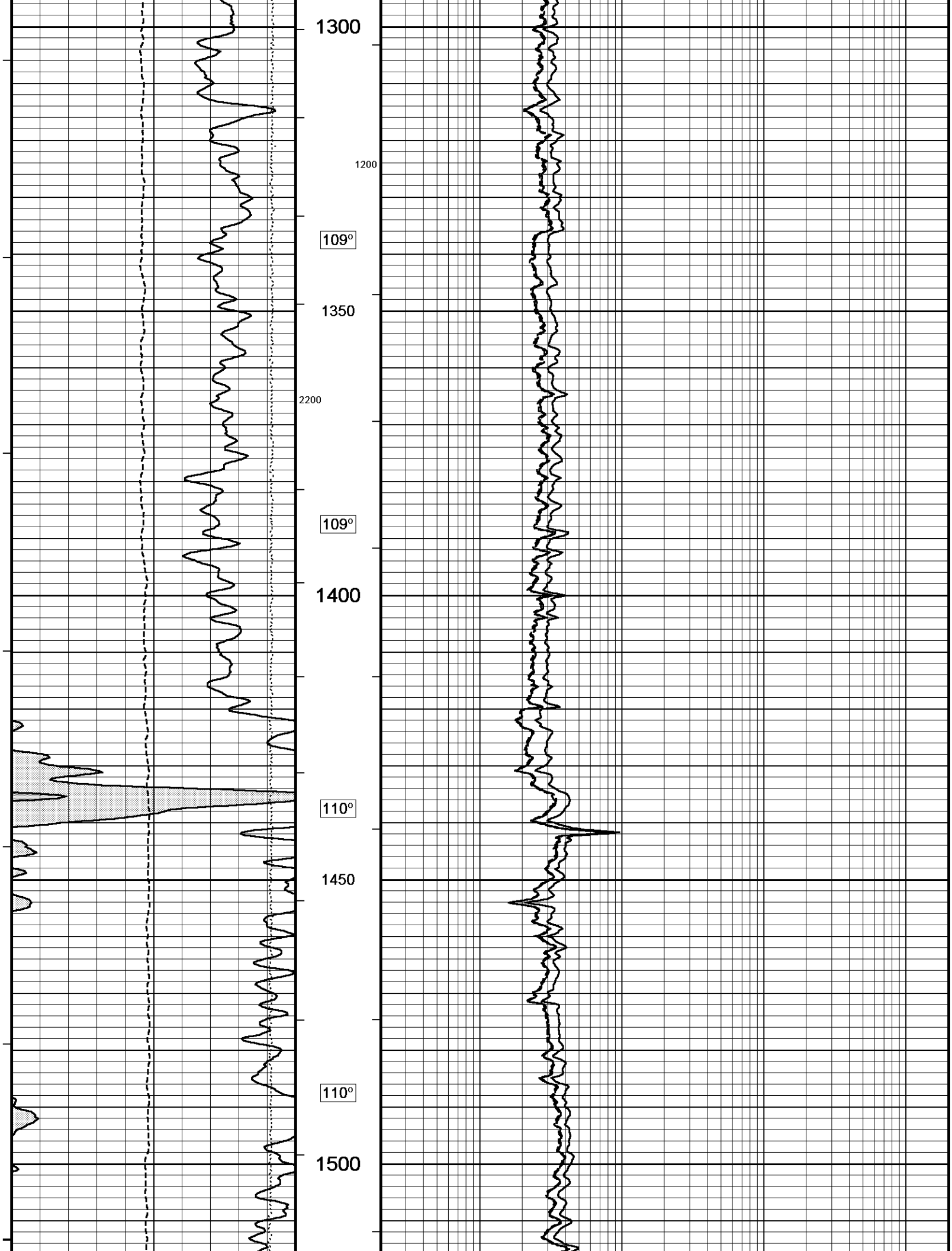
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
107°
1200
2300
108°
1250
108°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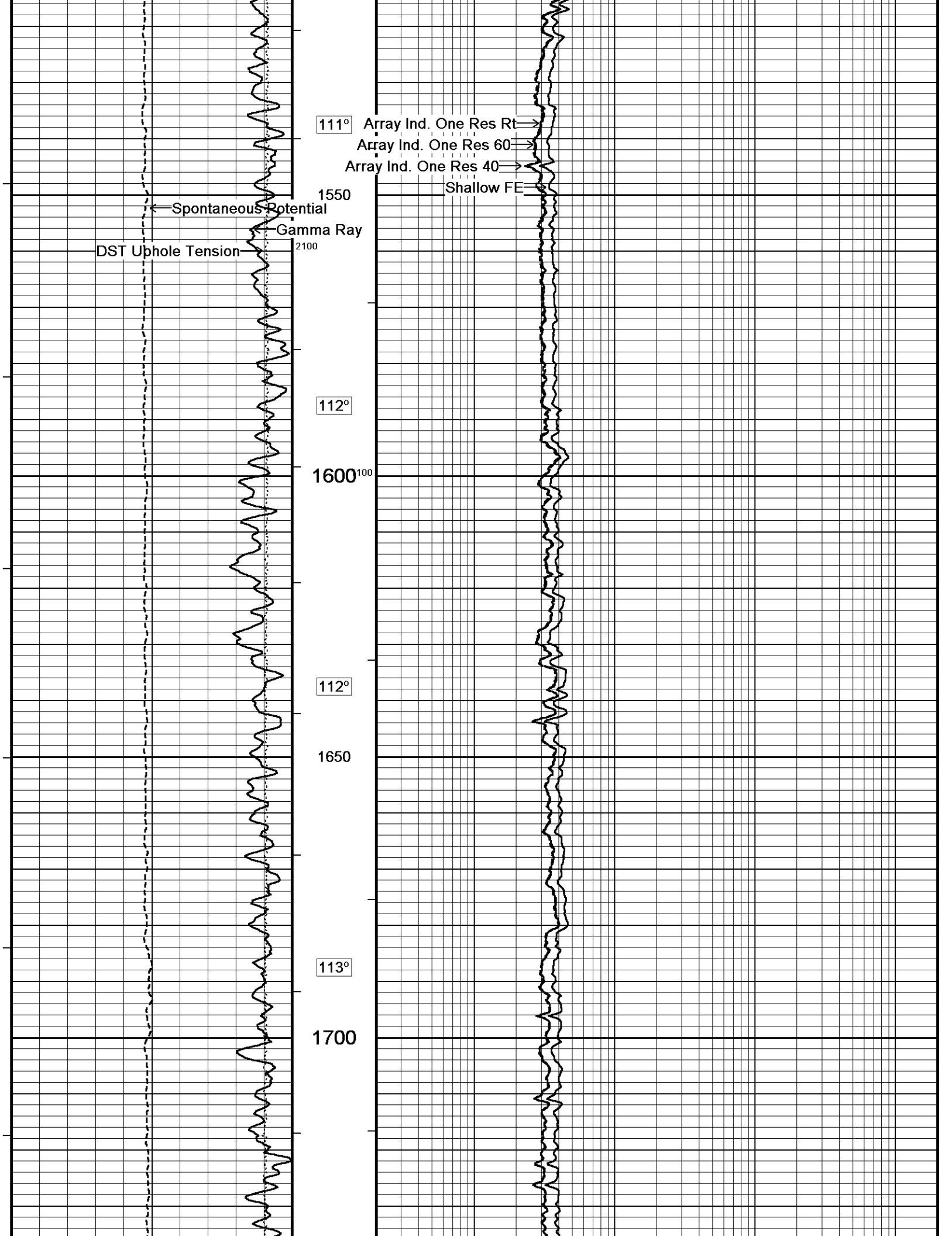
1200
109°
1350
2200
109°
1400
110°
1450
110°
1500


111°
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
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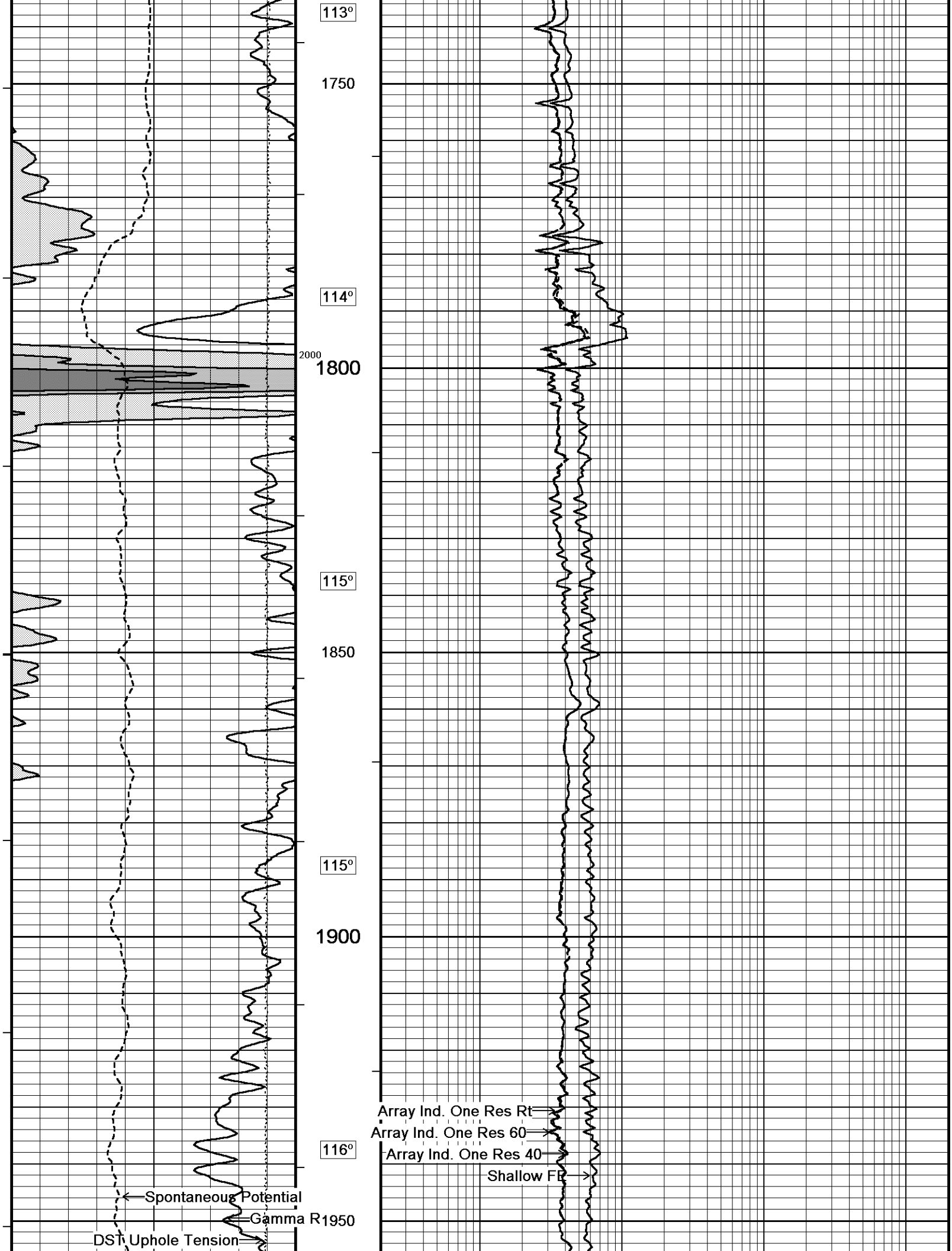
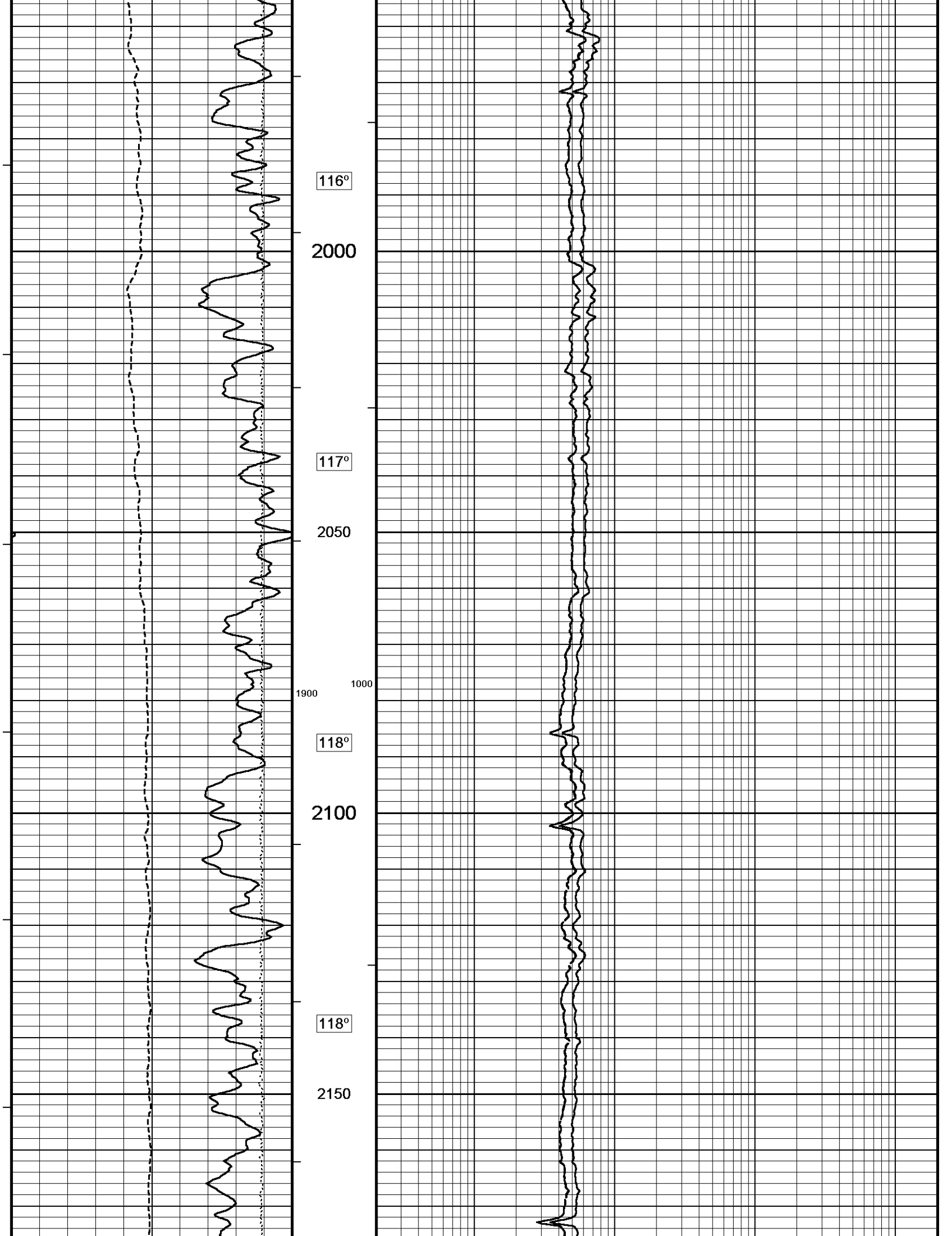
Spontaneous Potential
Gamma Ray
DST Uphole Tension
2100
112°
1600
100
112°
1650
113°
1700


113°
1750
114°
2000
1800
115°
1850
115°
1900
116°
1950
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma R
DST Uphole Tension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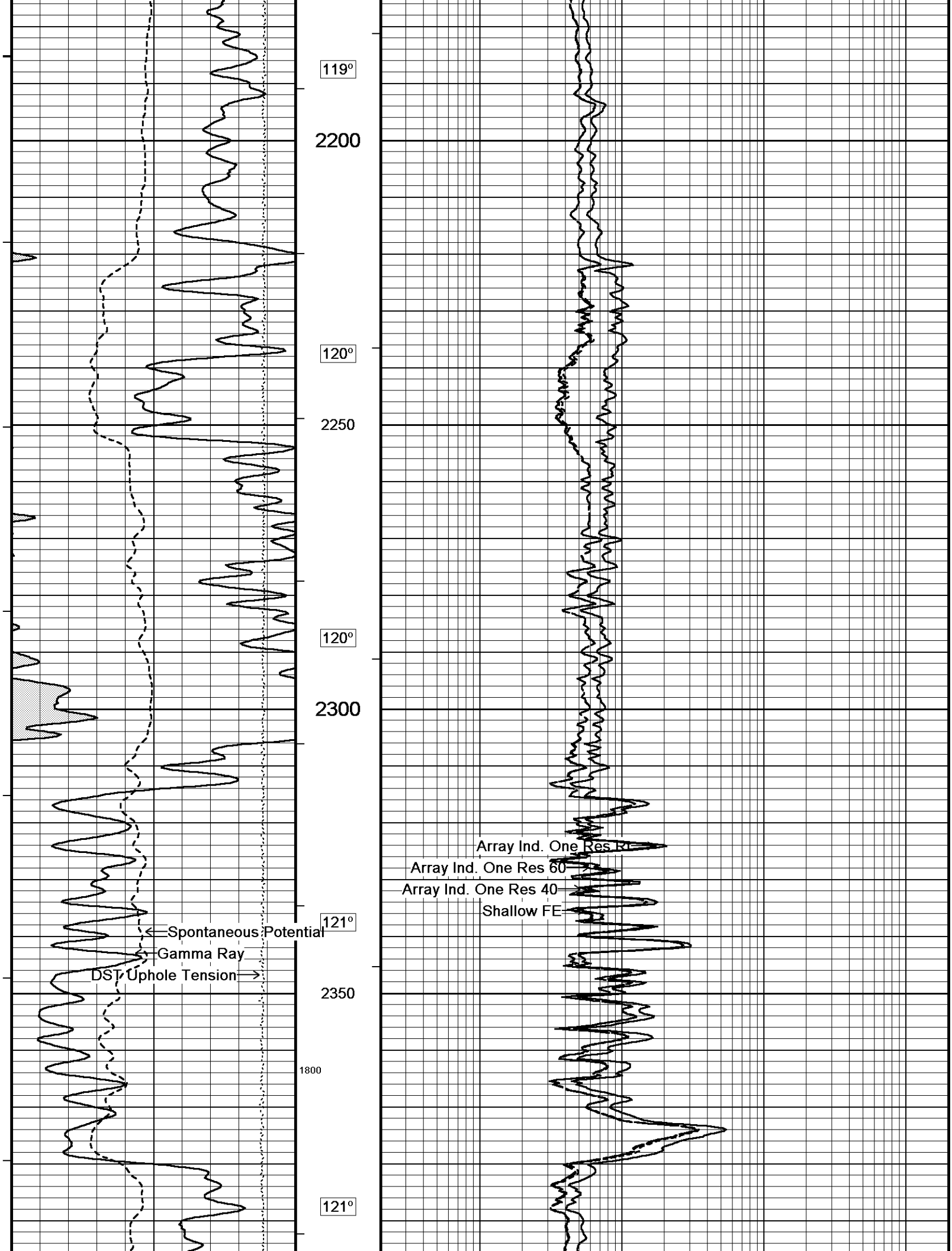
2000
117°
2050
1900
1000
118°
2100
118°
2150


119°
2200
120°
2250
120°
2300
121°
2350
1800
121°
Spontaneous Potential
Gamma Ray
DST Uphole Tension
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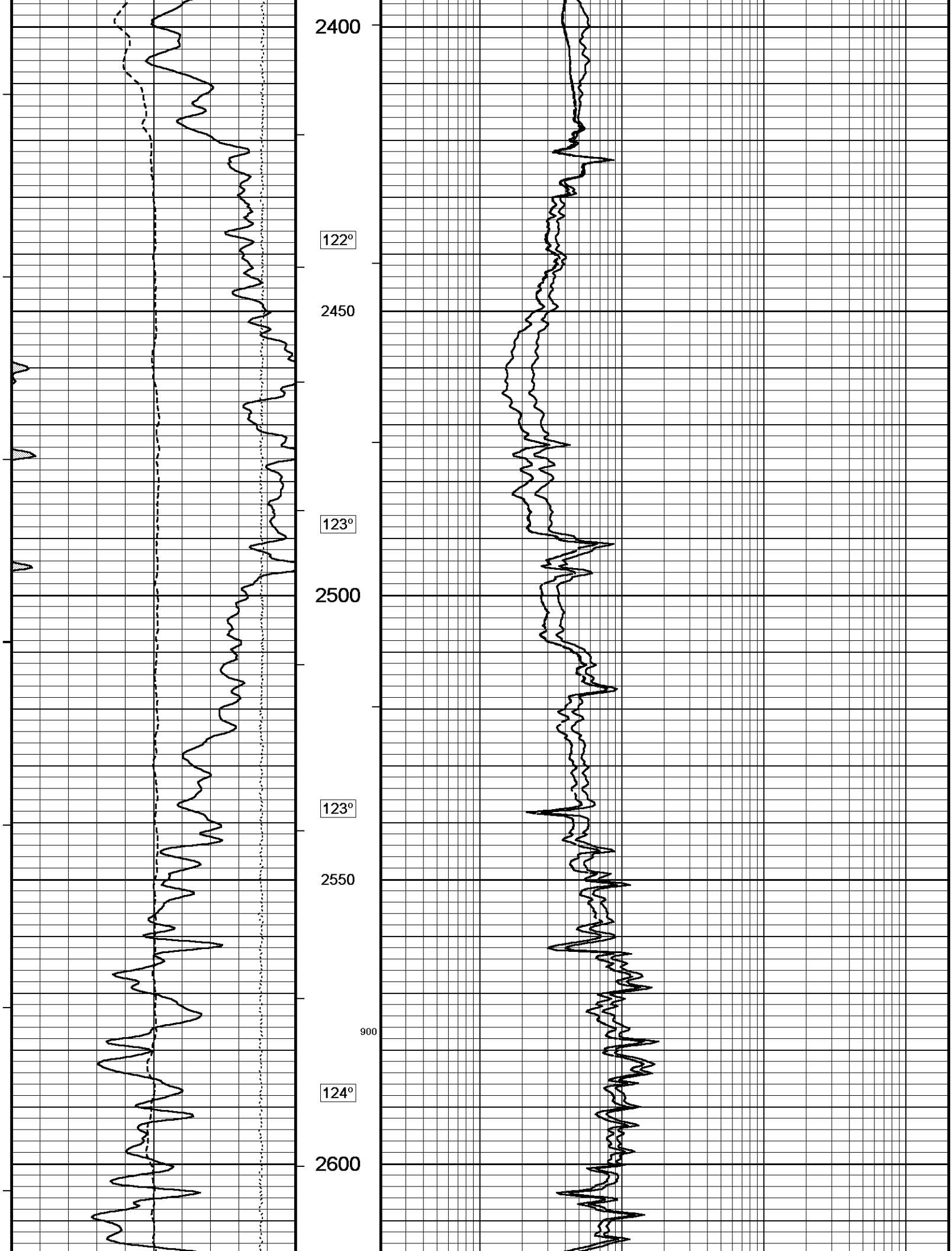
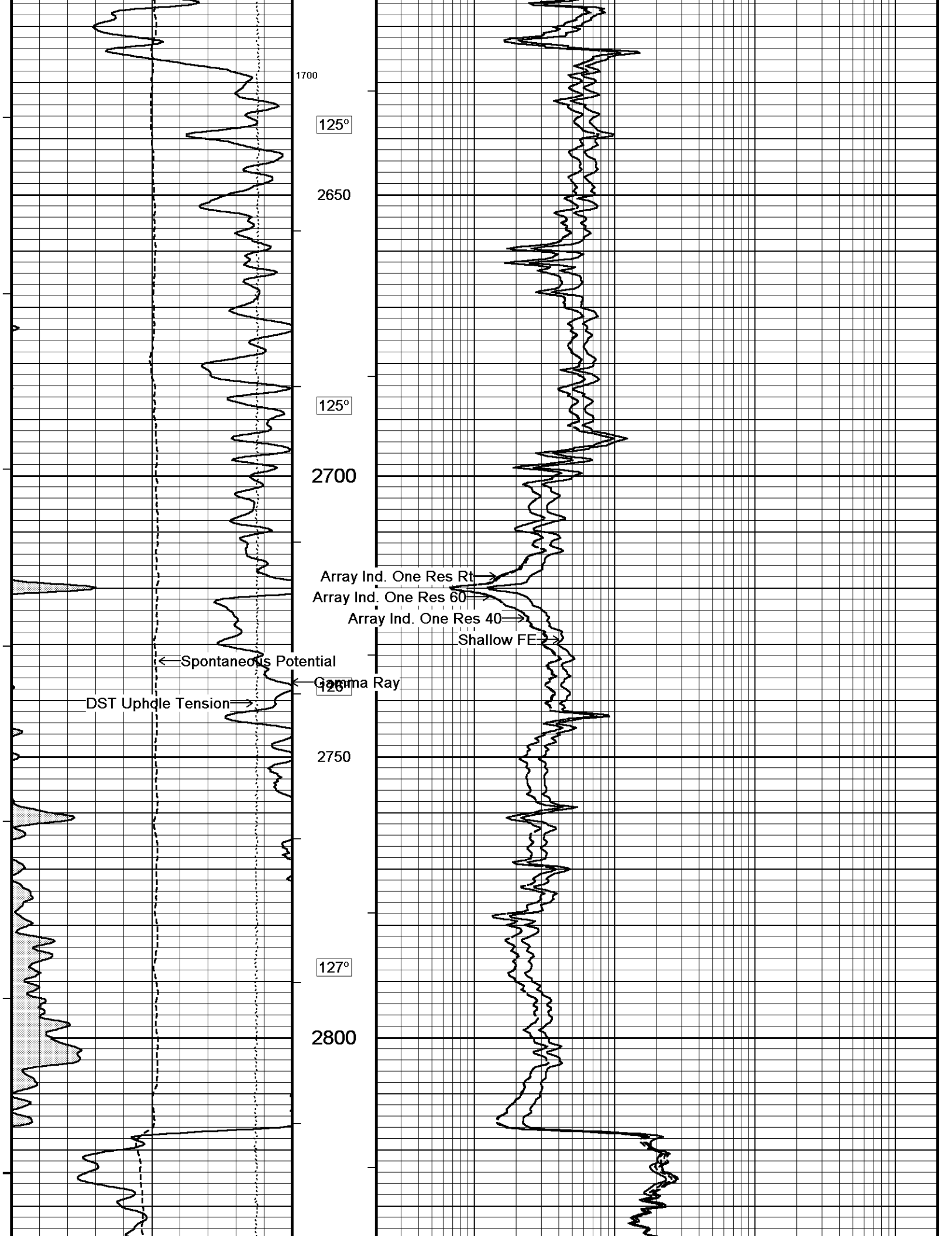
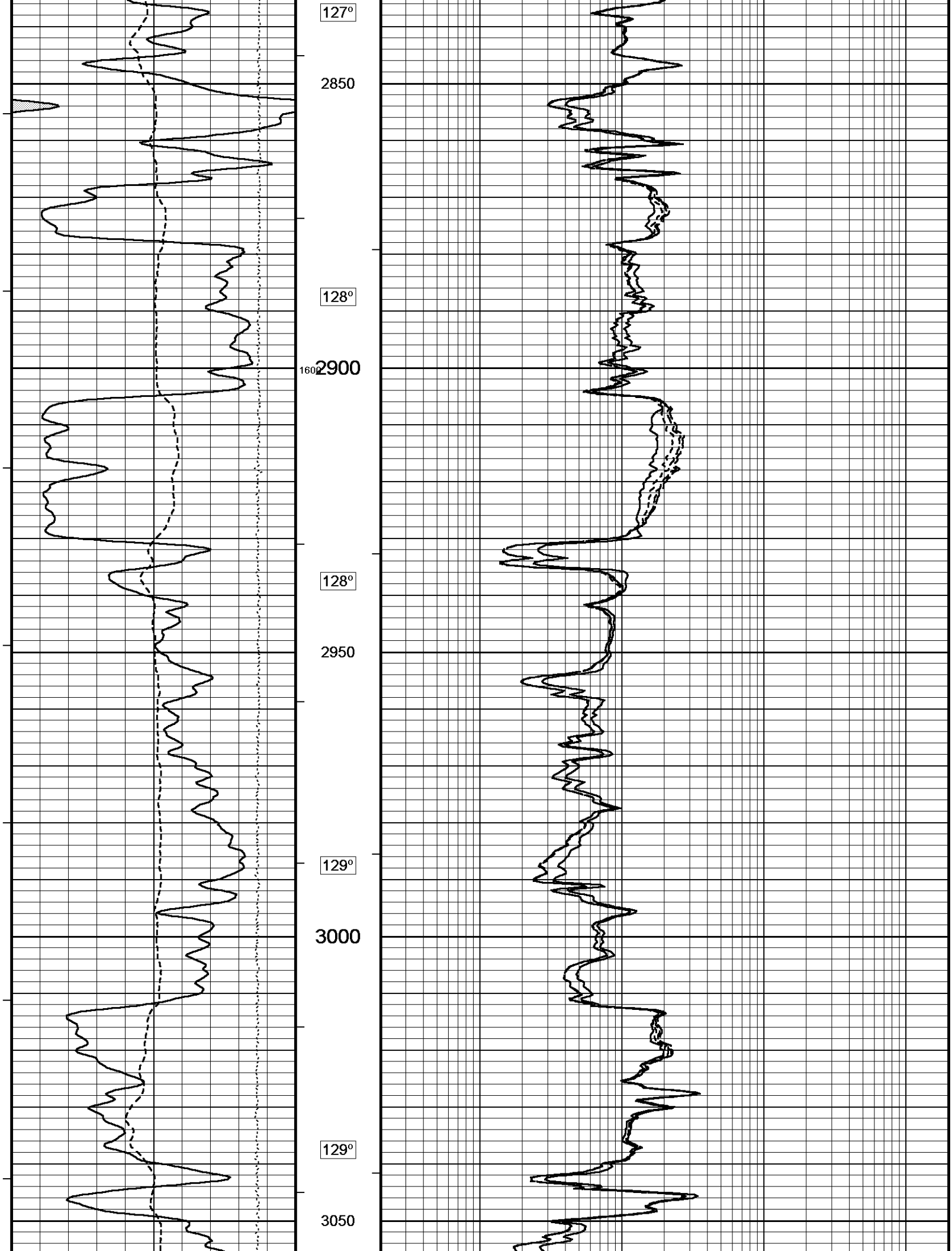
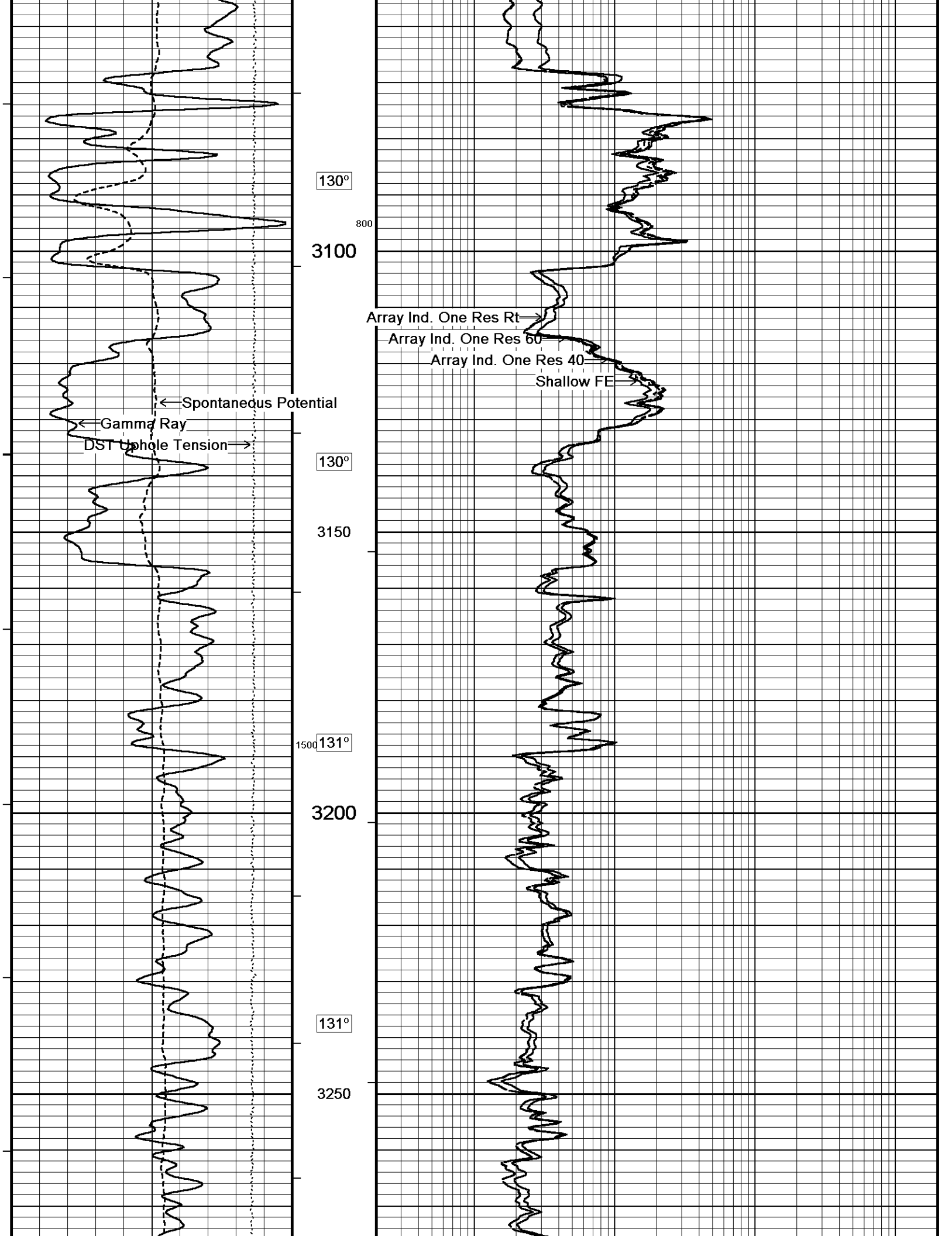
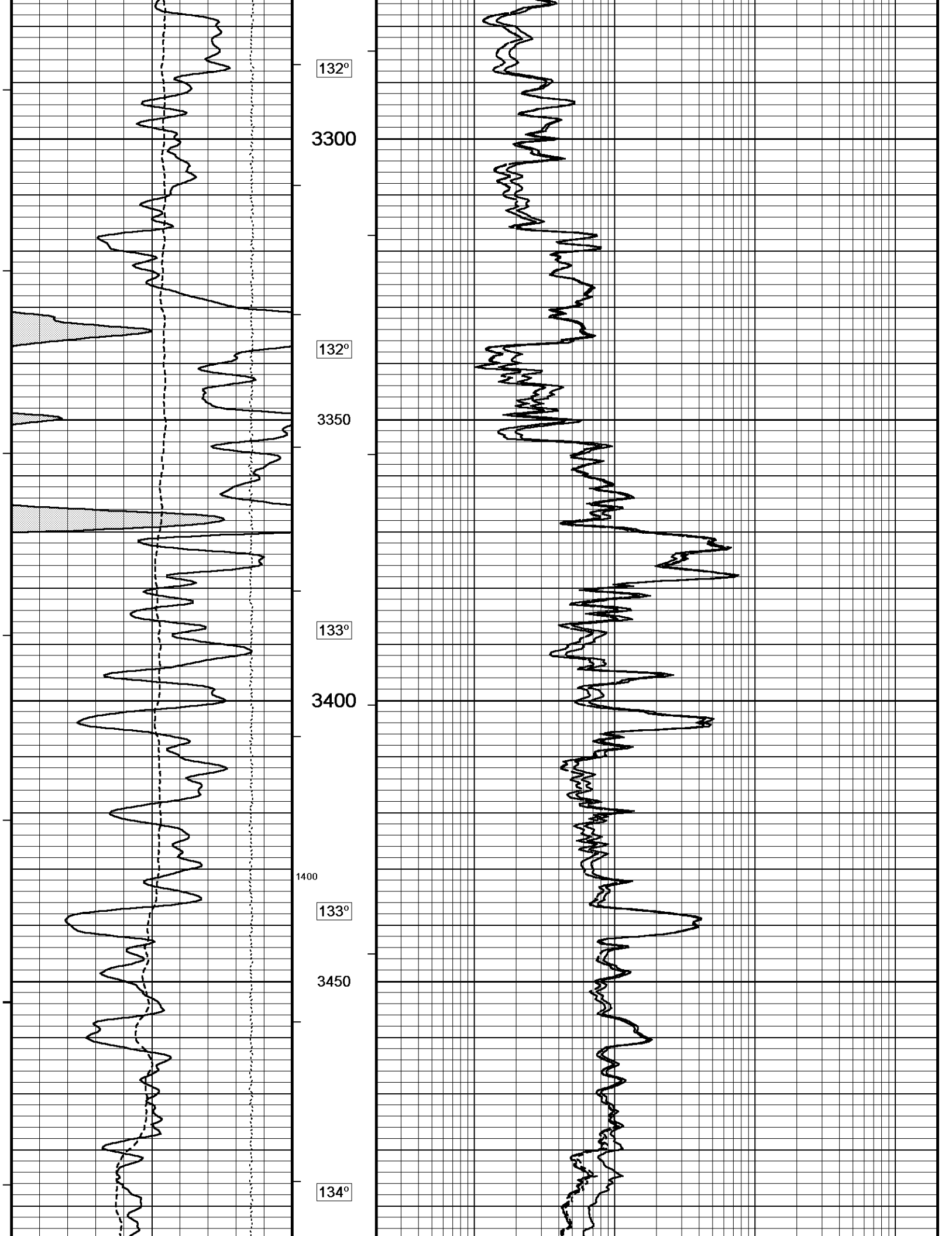
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE

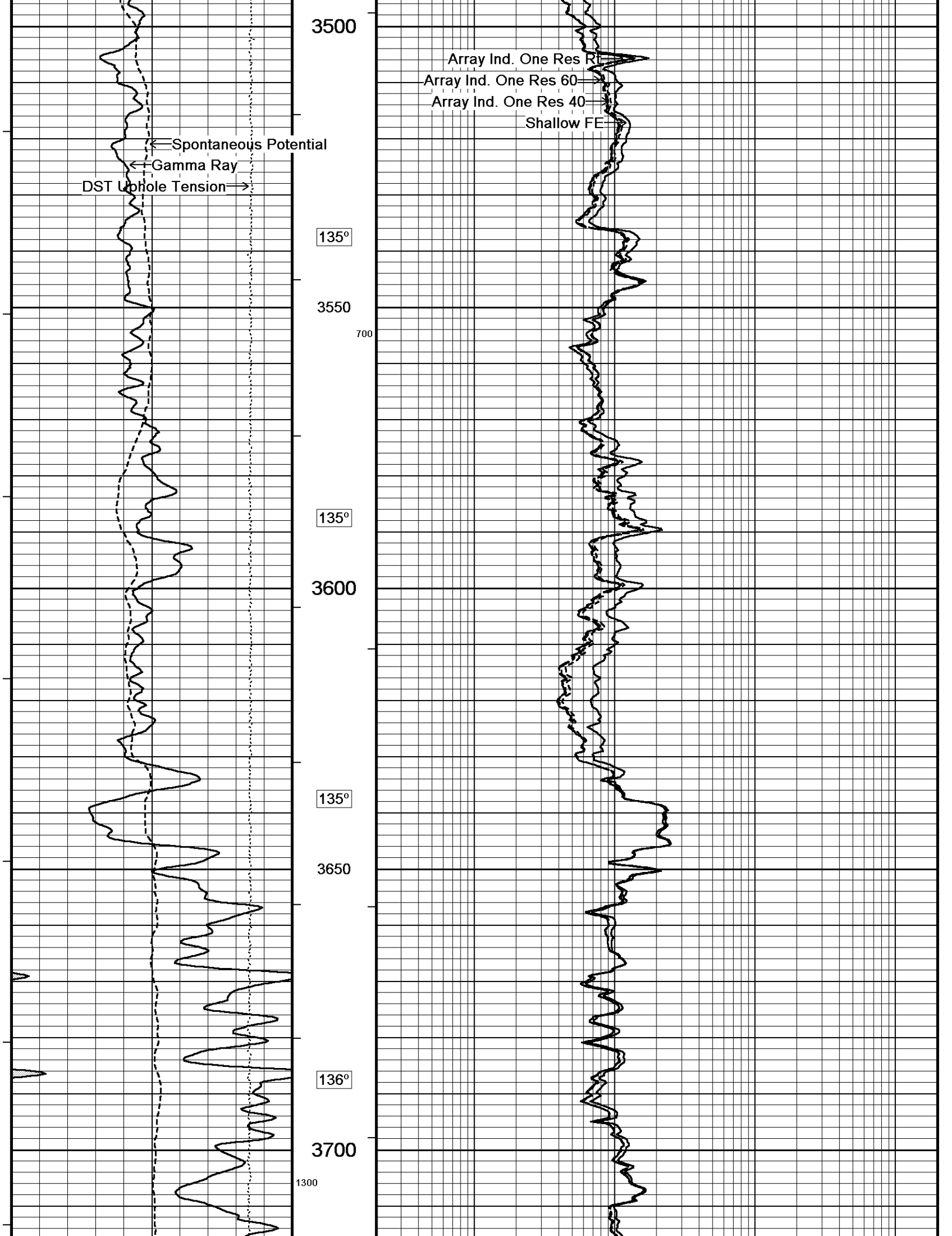

2400
122°
2450
123°
2500
123°
2550
900
124°
2600


1700
125°
2650
125°
2700
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
126
DST Uphole Tension
2750
127°
2800


127°
2850
128°
1600
2900
128°
2950
129°
3000
129°
3050


130°
800
3100
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
130°
3150
1500
131°
3200
131°
3250


132°
3300
132°
3350
133°
3400
1400
133°
3450
134°


3500
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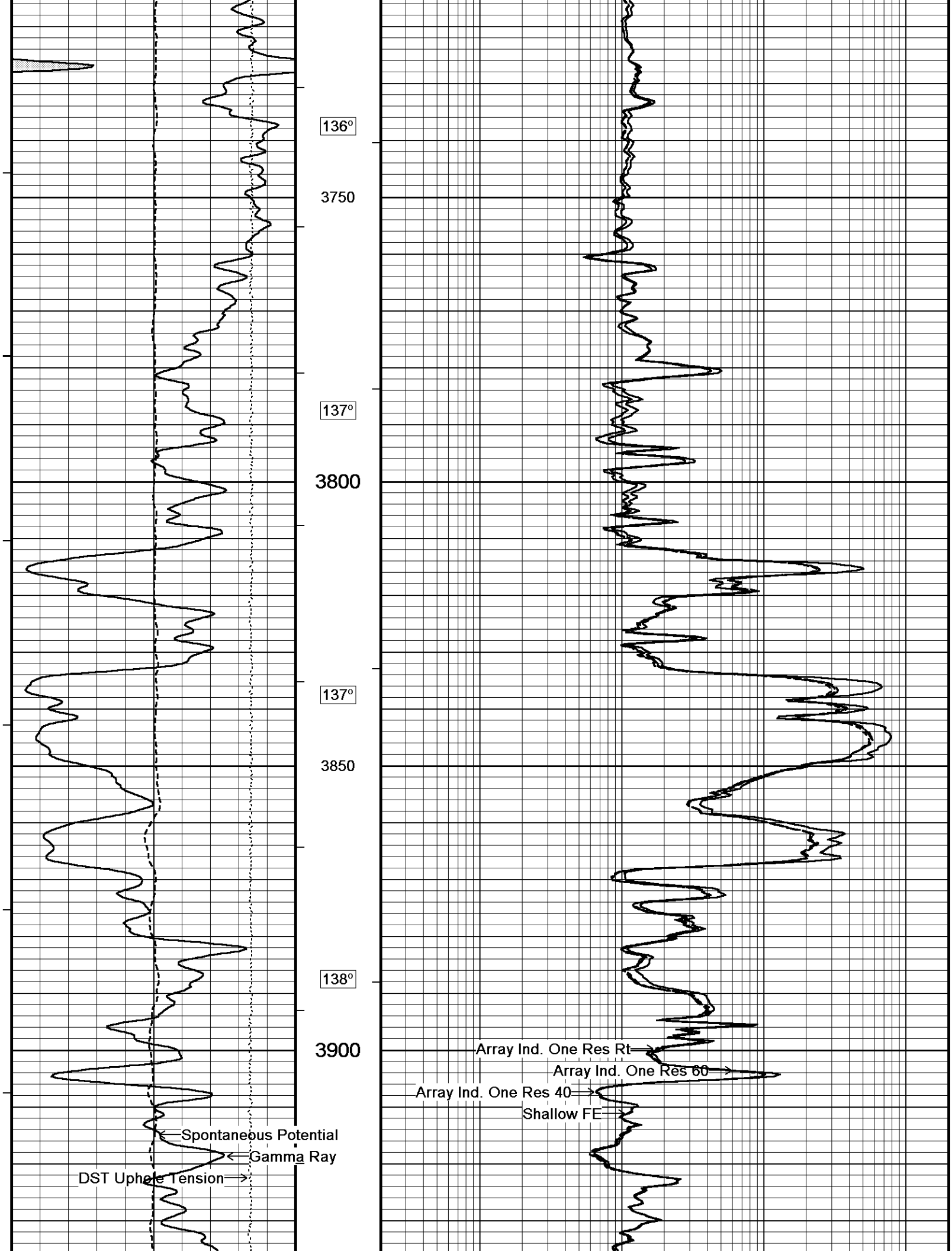
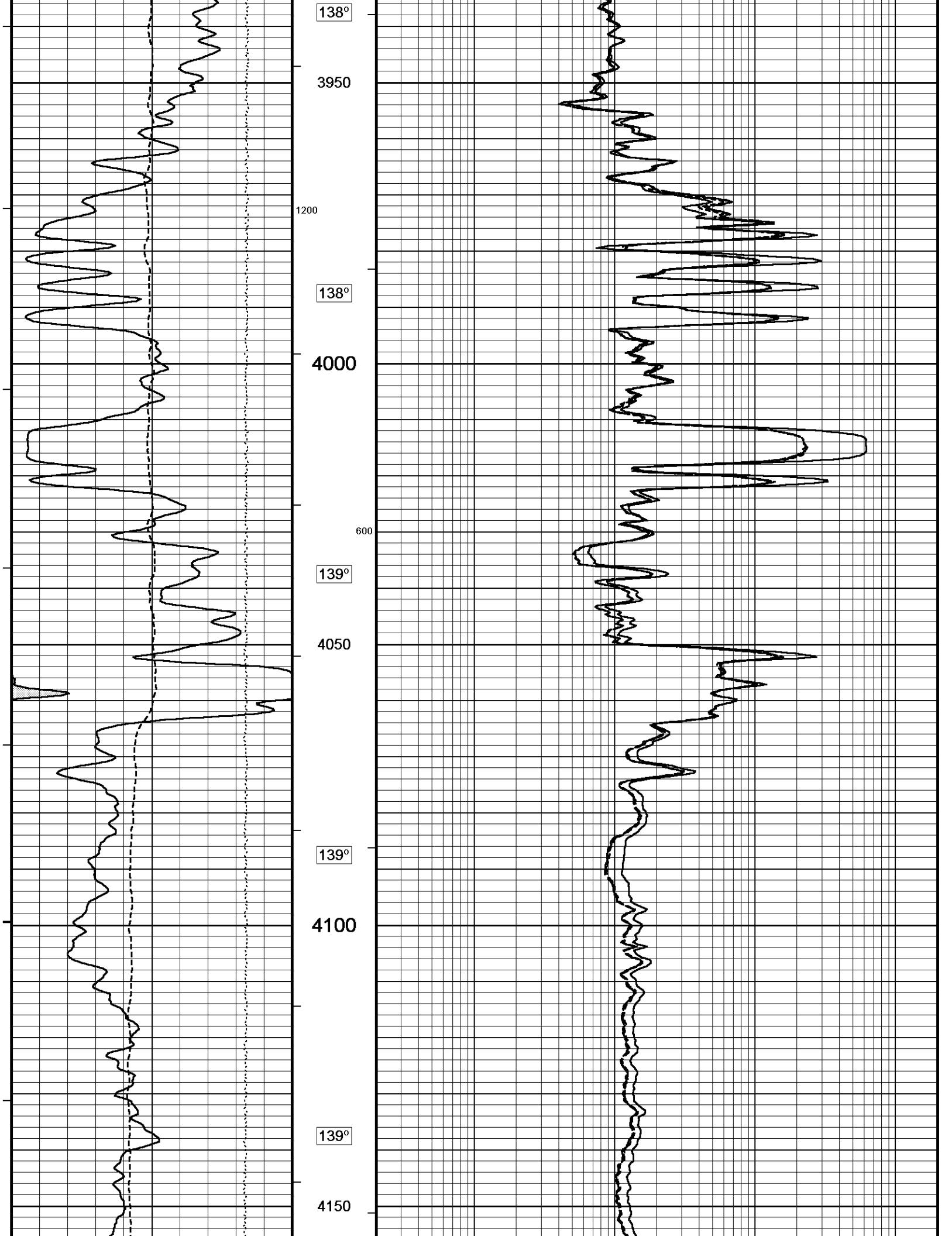
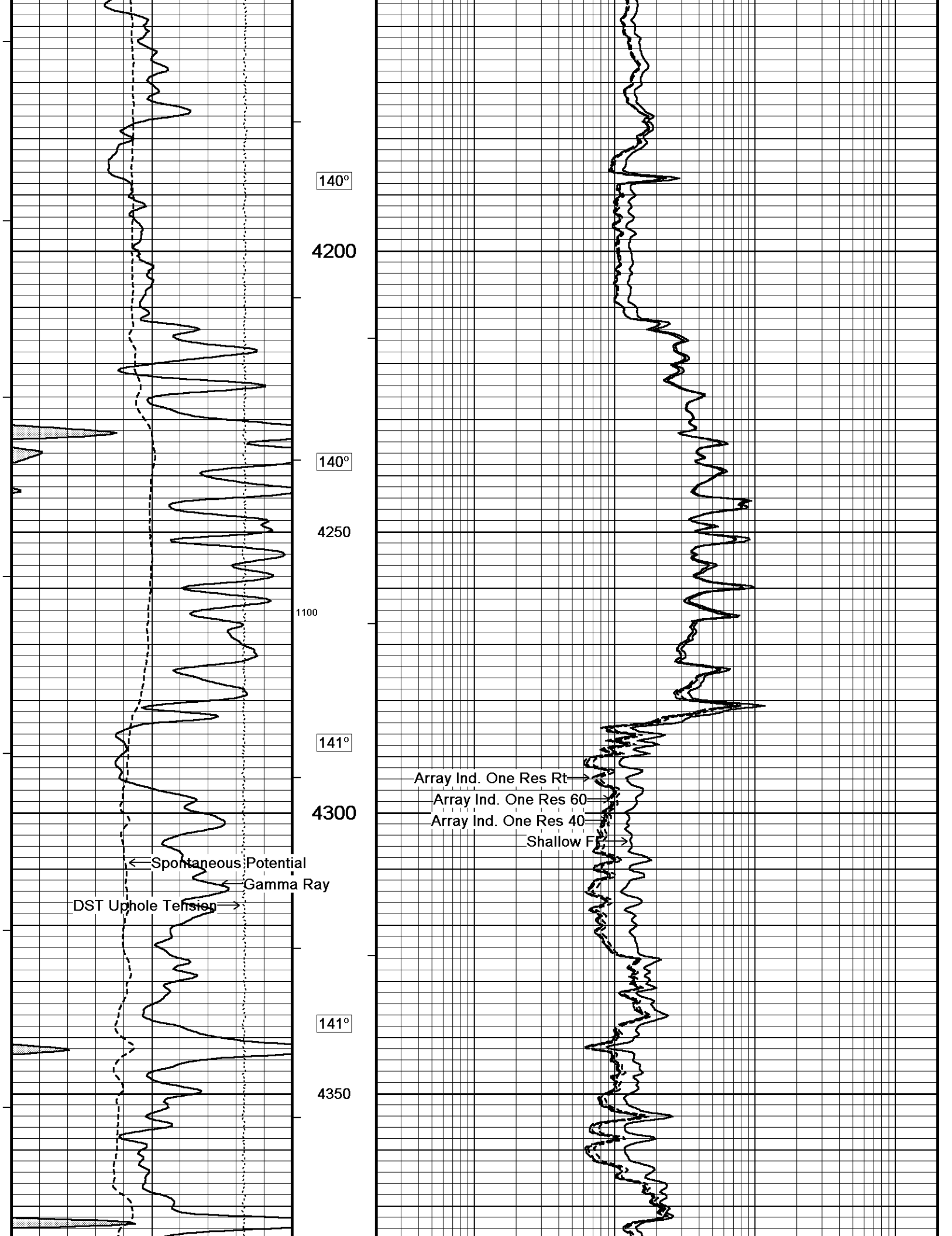
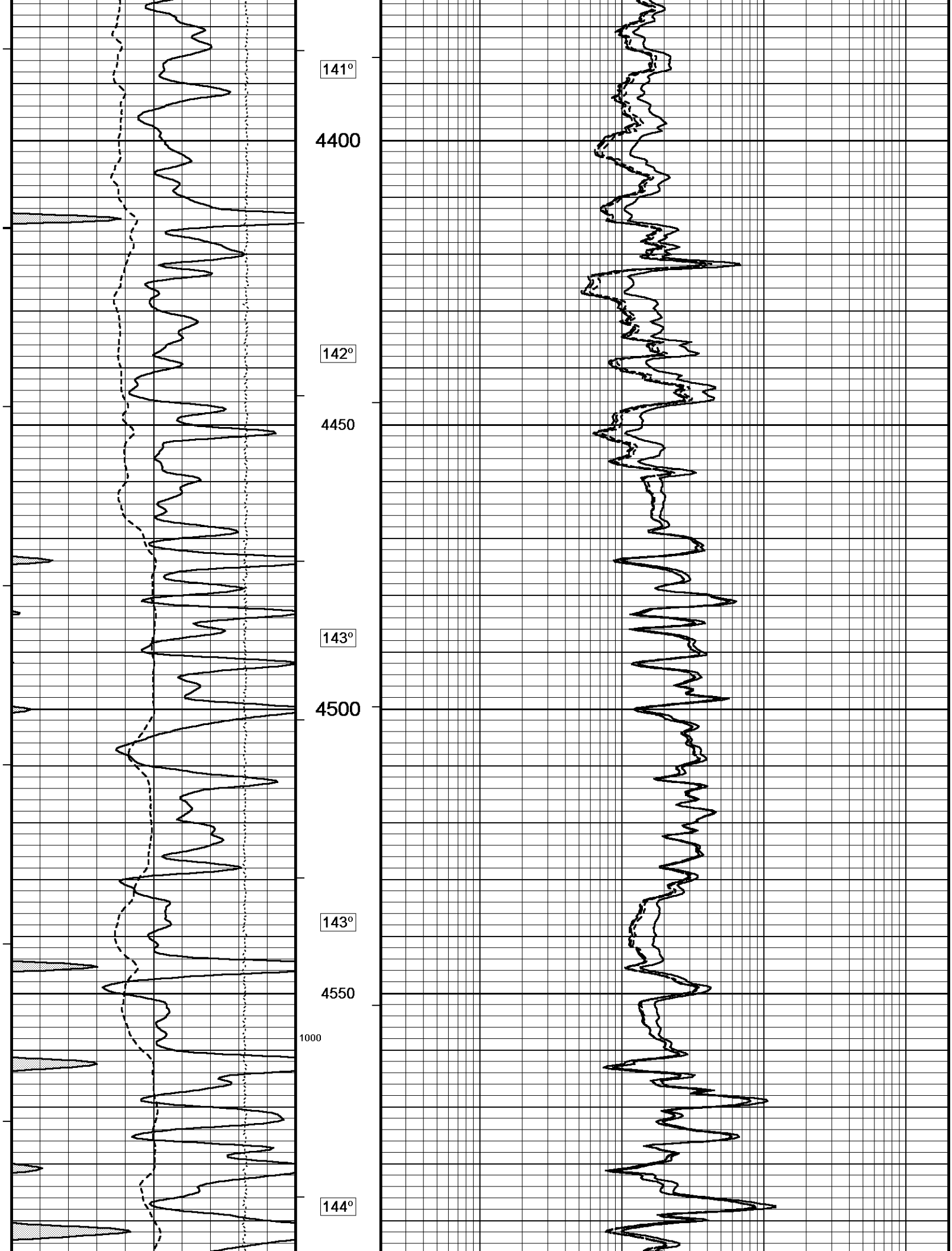
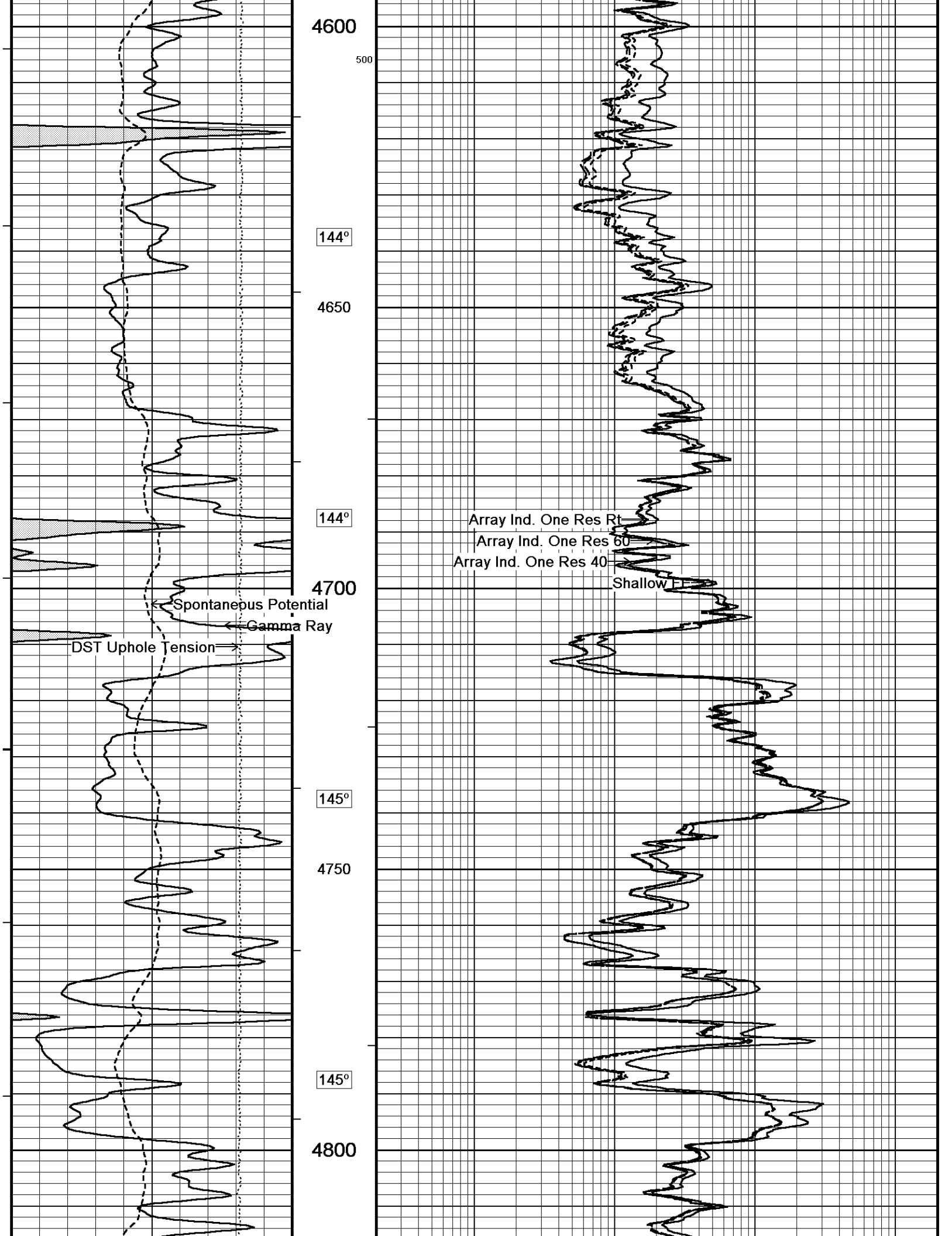
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
135°
3550
700
135°
3600
135°
3650
136°
3700
1300

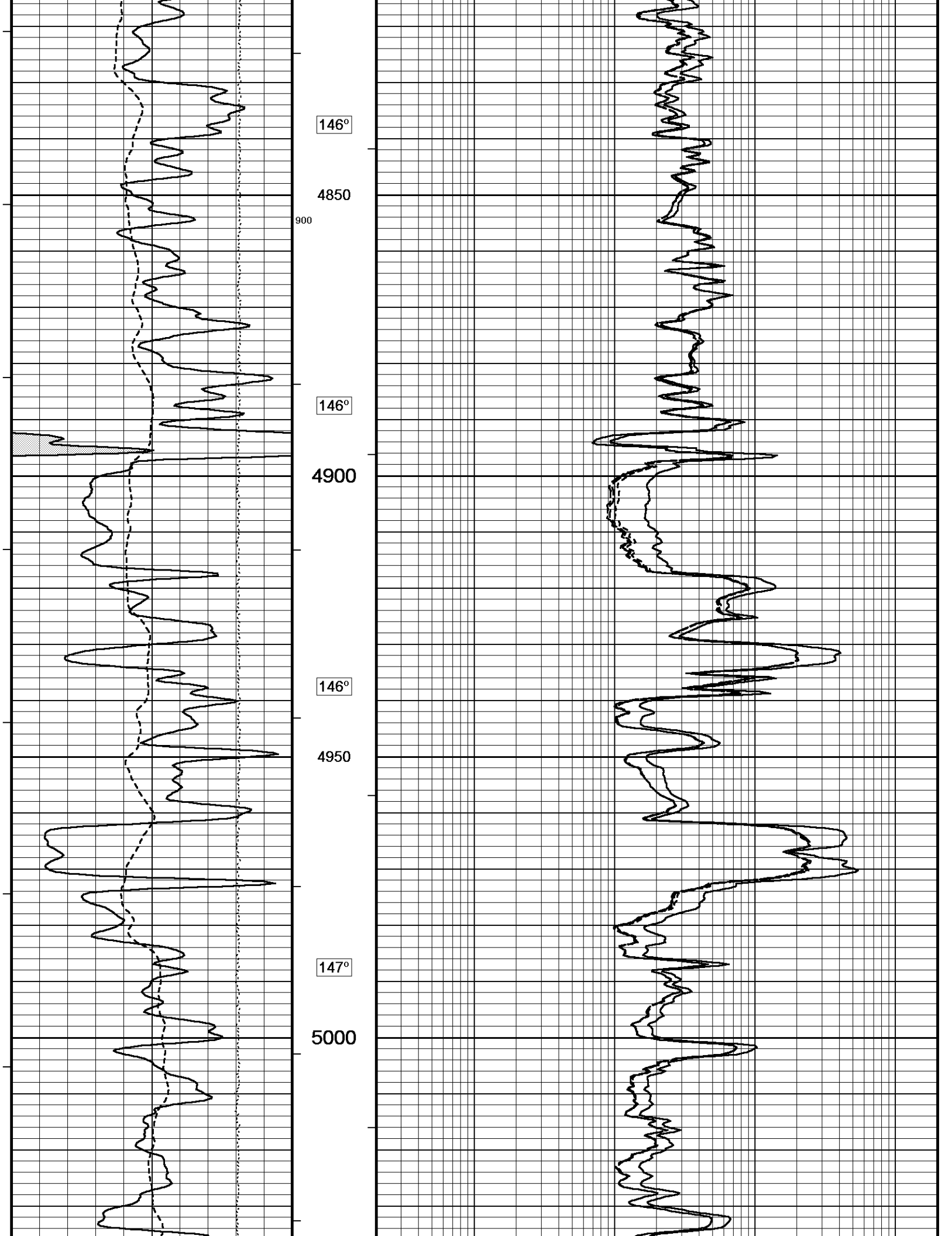

136°
3750
137°
3800
137°
3850
138°
3900
Spontaneous Potential
Gamma Ray
DST Uphole Tension
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE

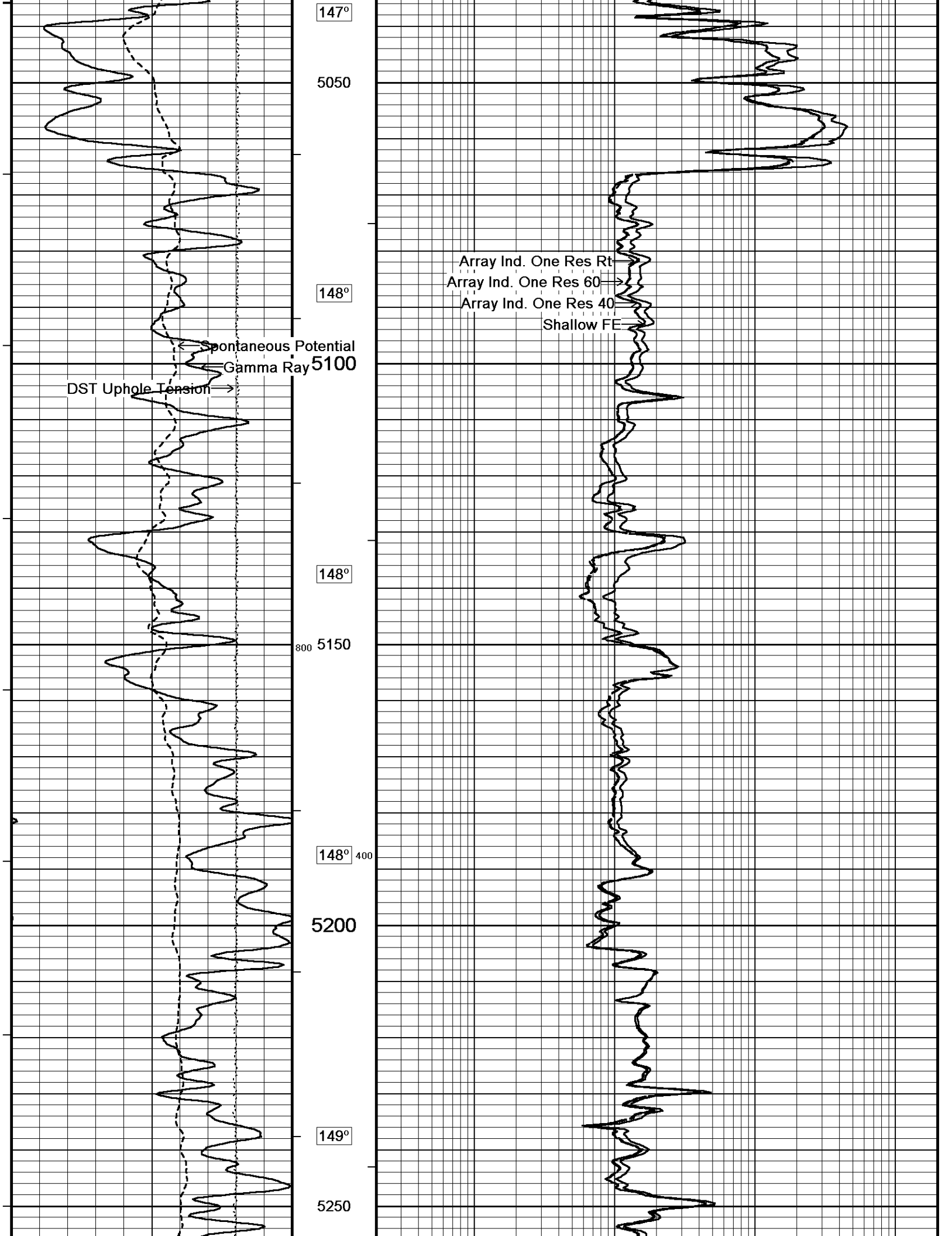

138°
3950
1200
138°
4000
600
139°
4050
139°
4100
139°
4150

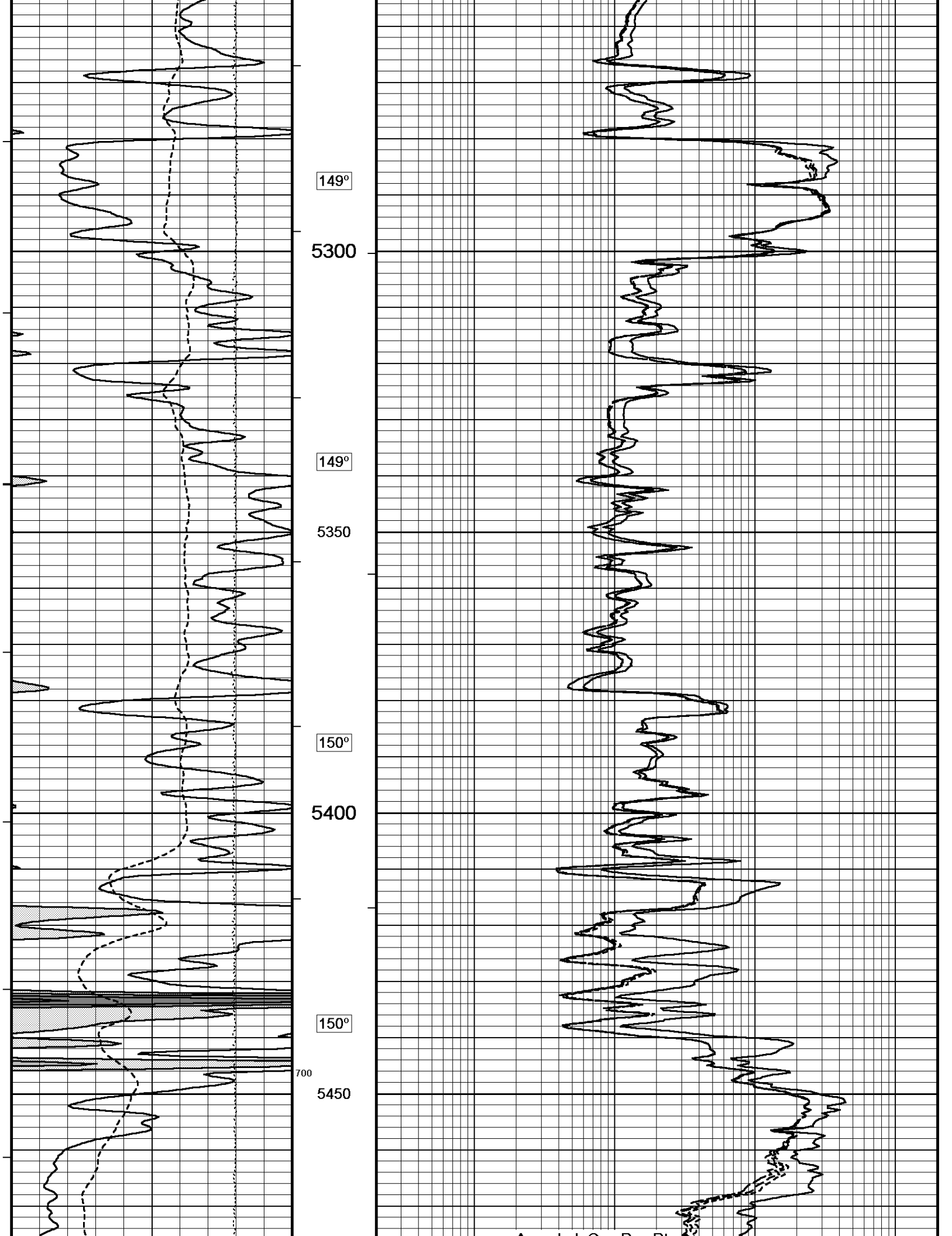

140°
4200
140°
4250
1100
141°
4300
141°
4350
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow F
Spontaneous Potential
Gamma Ray
DST Uphole Tension

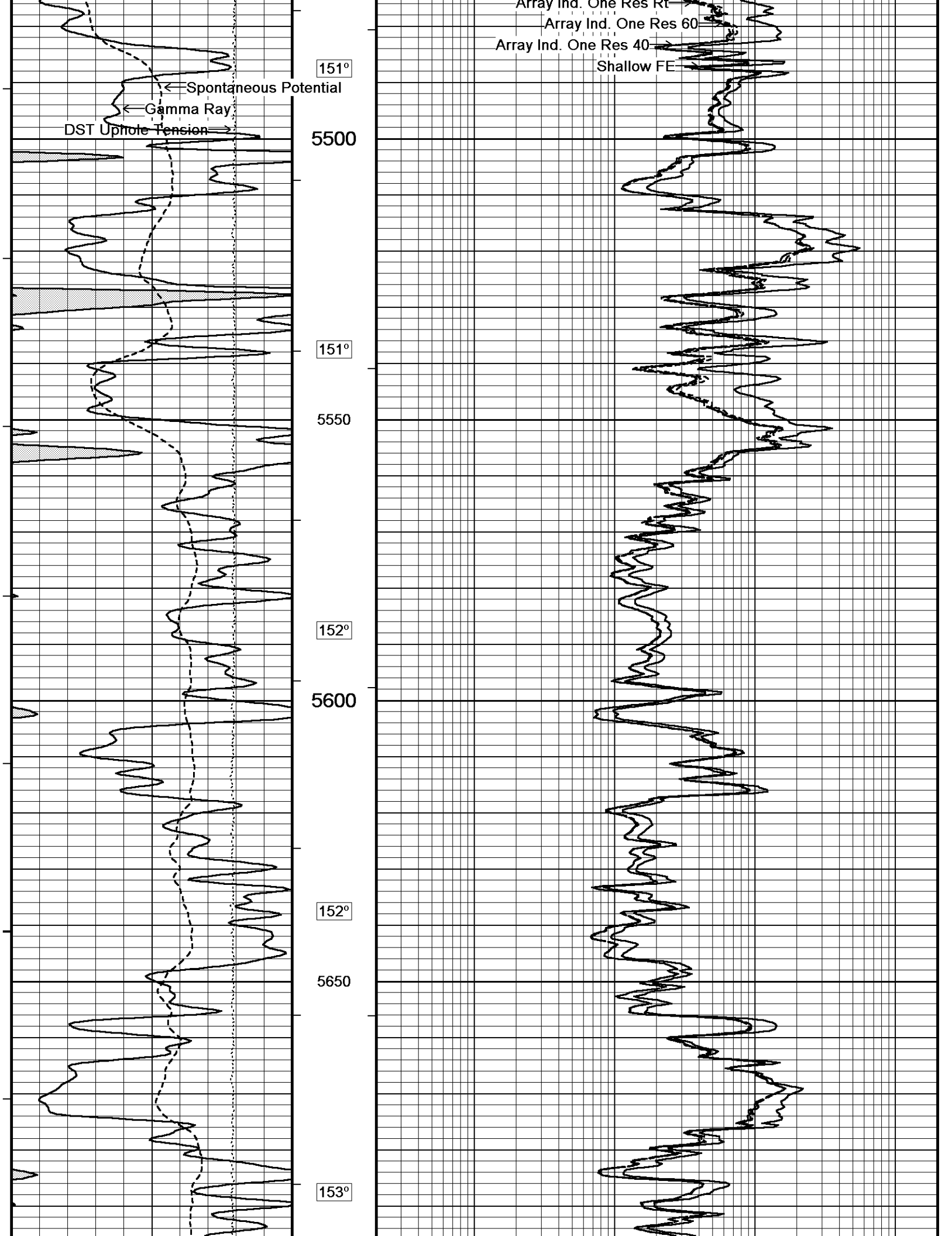

141°
4400
142°
4450
143°
4500
143°
4550
1000
144°

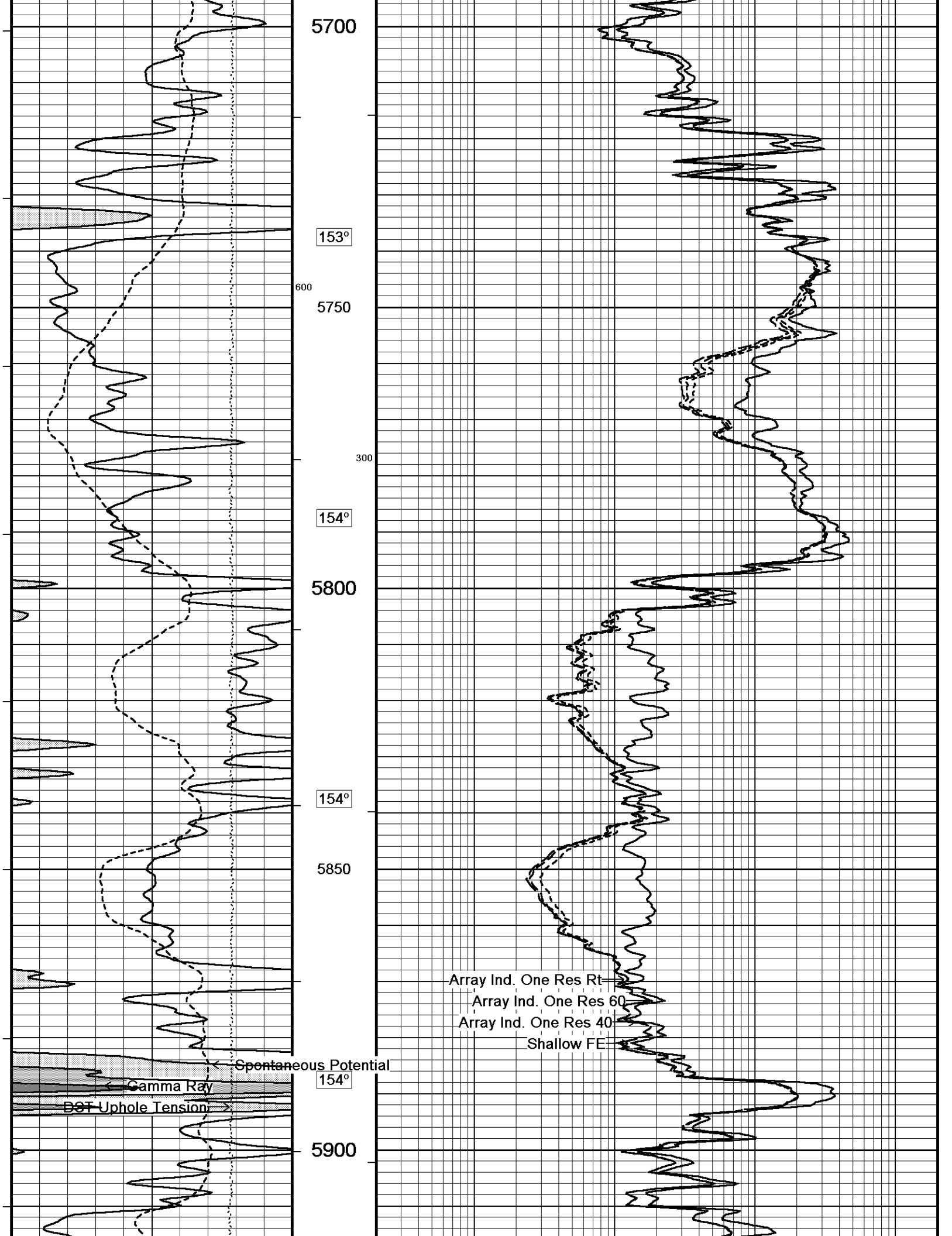

4600
500
144°
4650
144°
4700
Spontaneous Potential
Gamma Ray
DST Uphole Tension
145°
4750
145°
4800
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow I

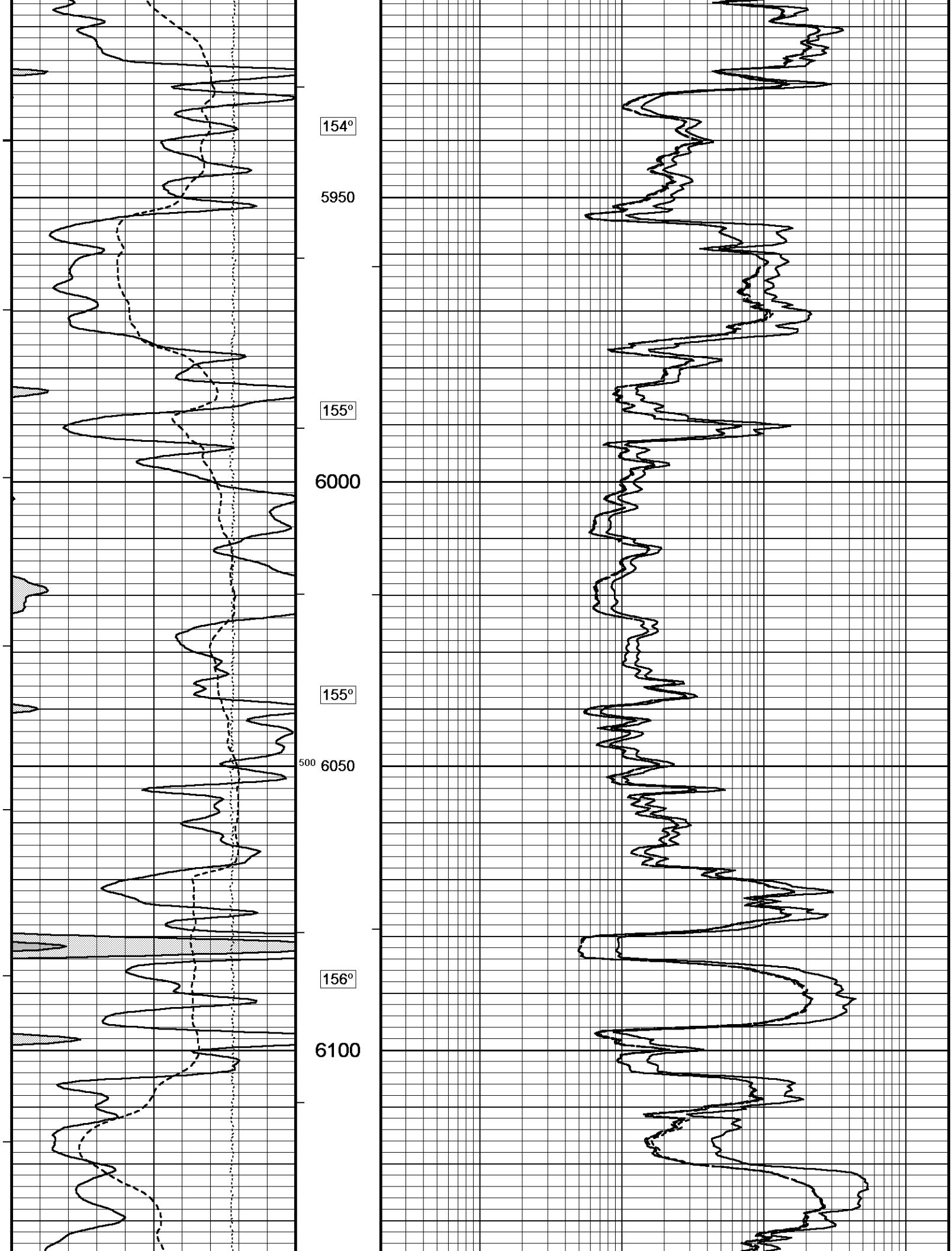

146°
4850
900
146°
4900
146°
4950
147°
5000

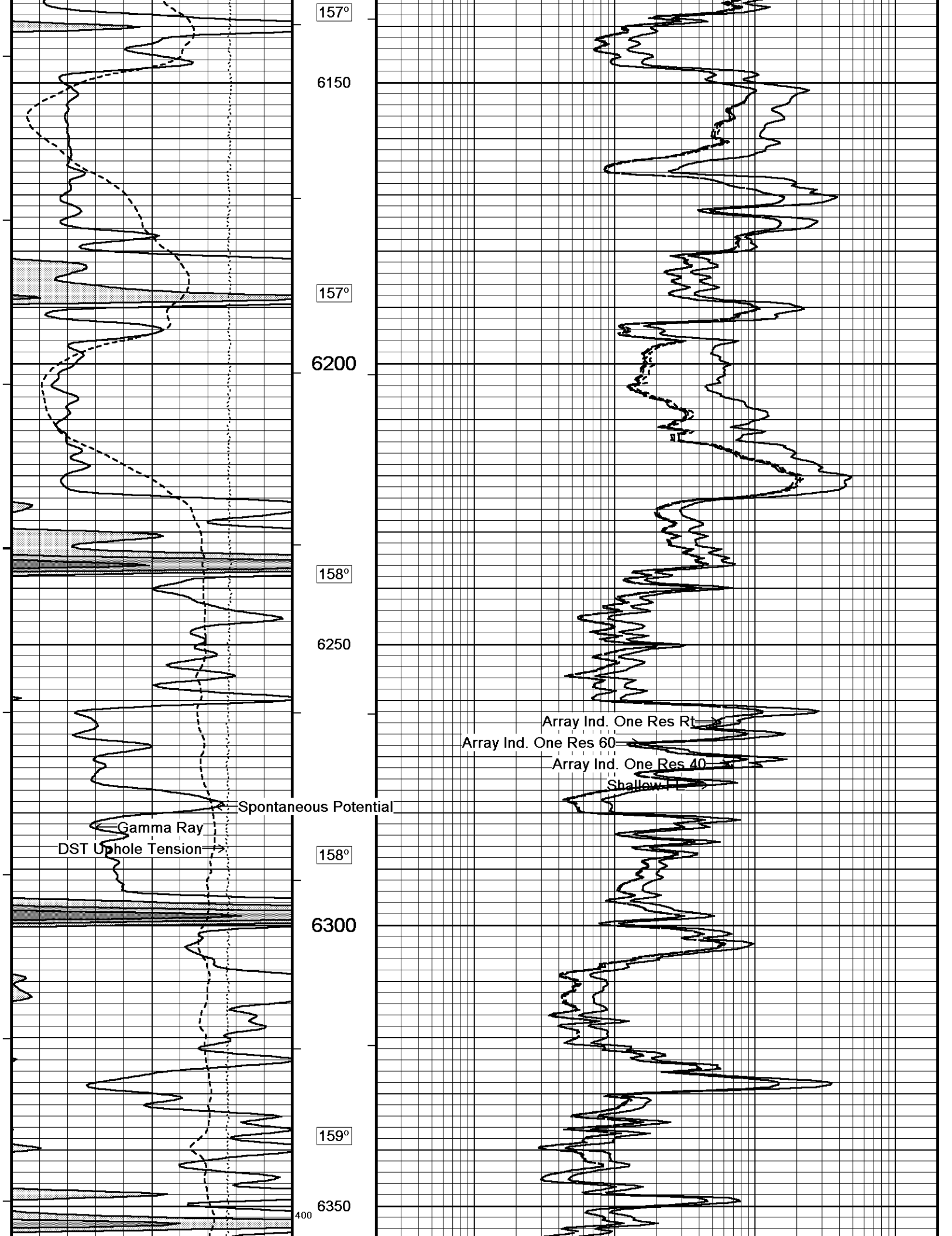

147°
5050
148°
Spontaneous Potential
Gamma Ray
5100
DST Uphole Tension
148°
800
5150
148°
400
5200
149°
5250
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE

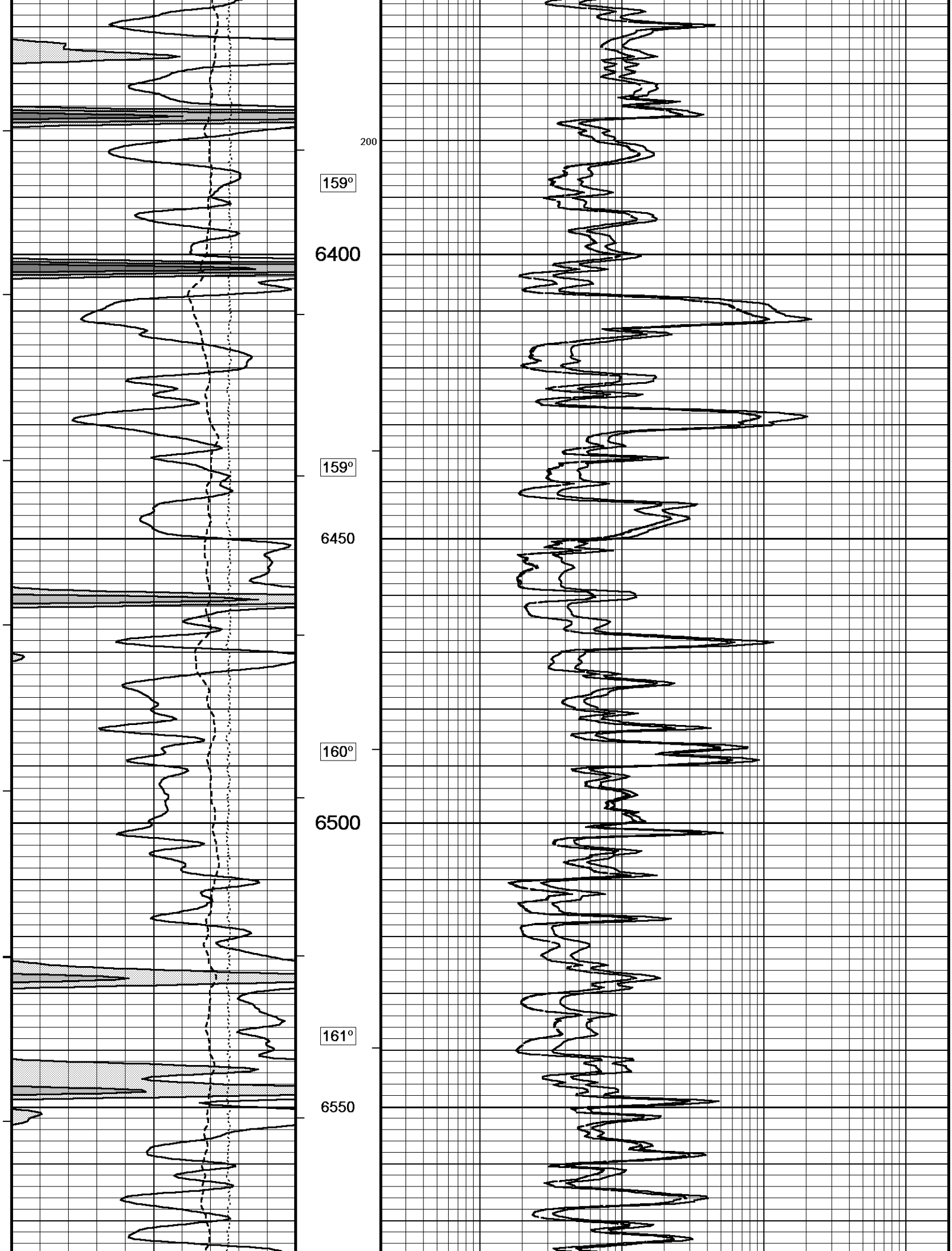

149°
5300
149°
5350
150°
5400
150°
700
5450

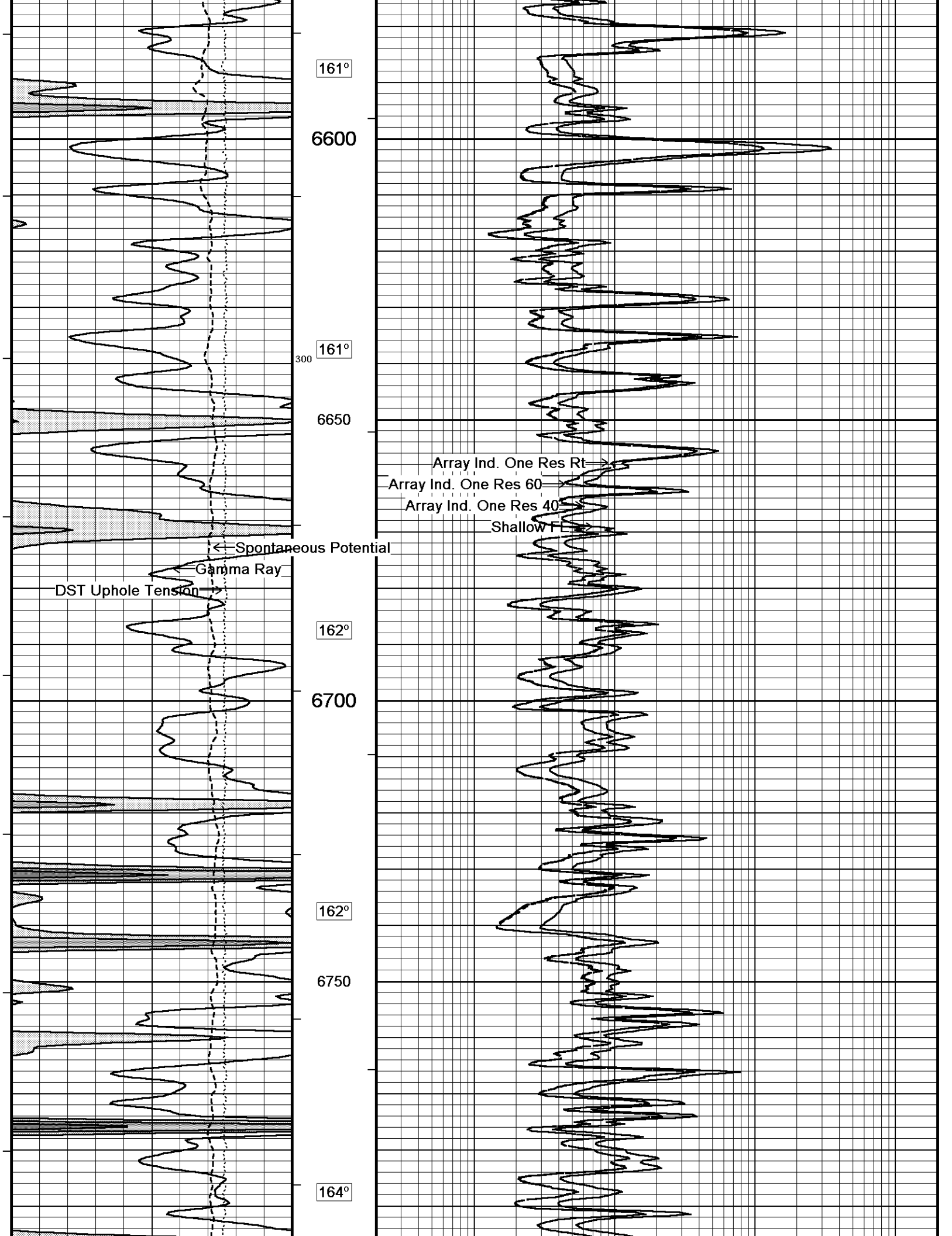

Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
151°
5500
151°
5550
152°
5600
152°
5650
153°

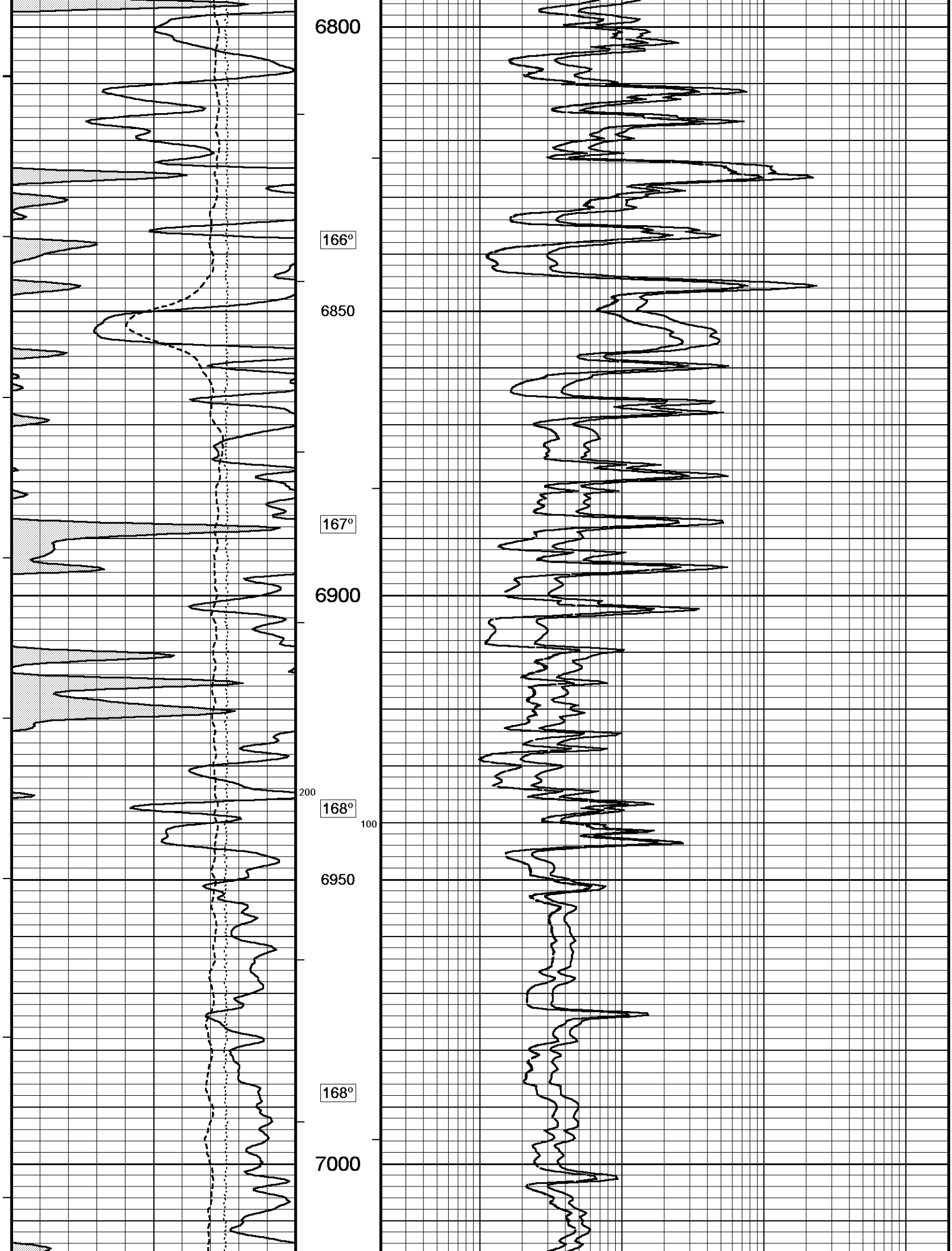

5700
153°
600
5750
300
154°
5800
154°
5850
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
154°
Gamma Ray
DOT Uphole Tension
5900

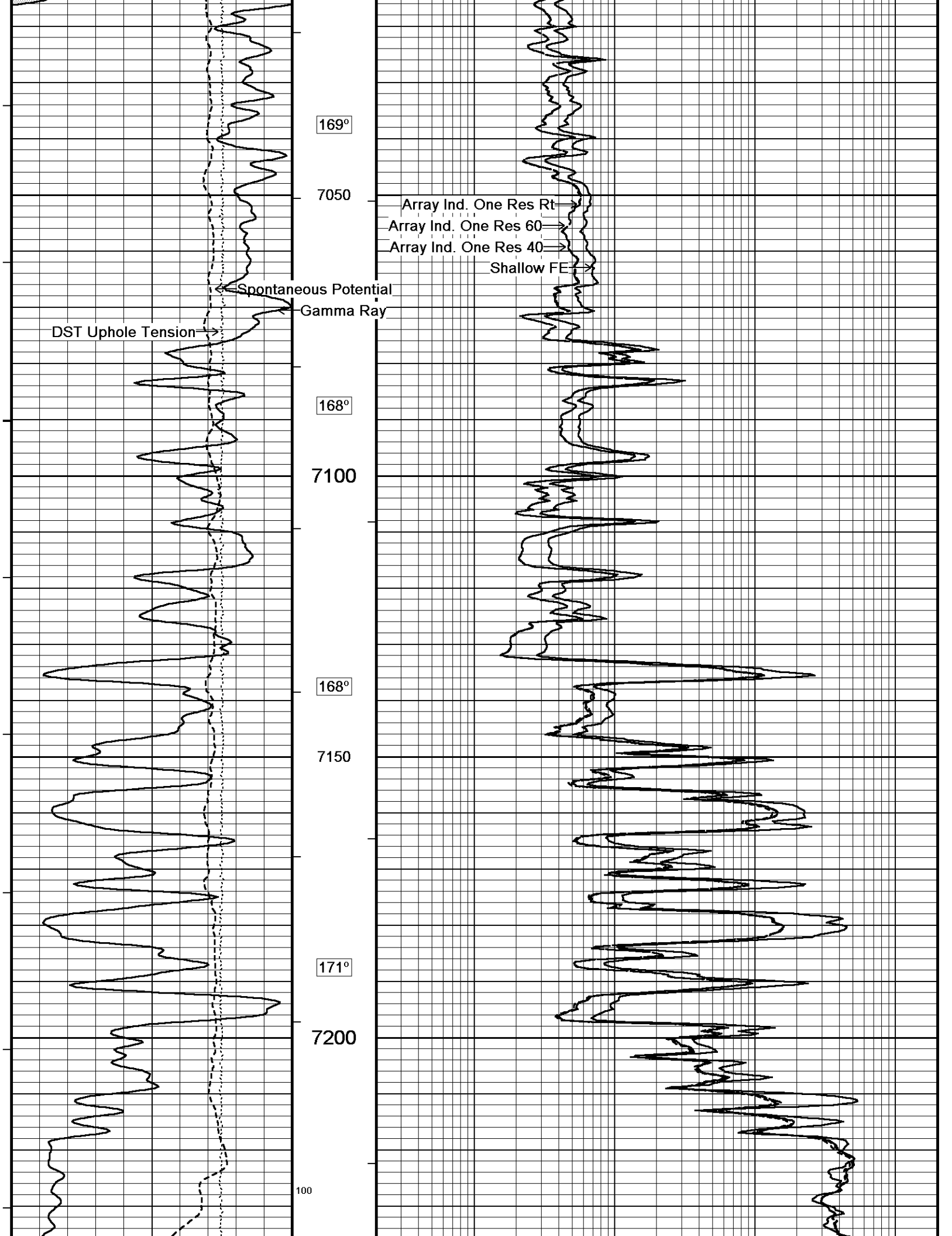

154°
5950
155°
6000
155°
500 6050
156°
6100

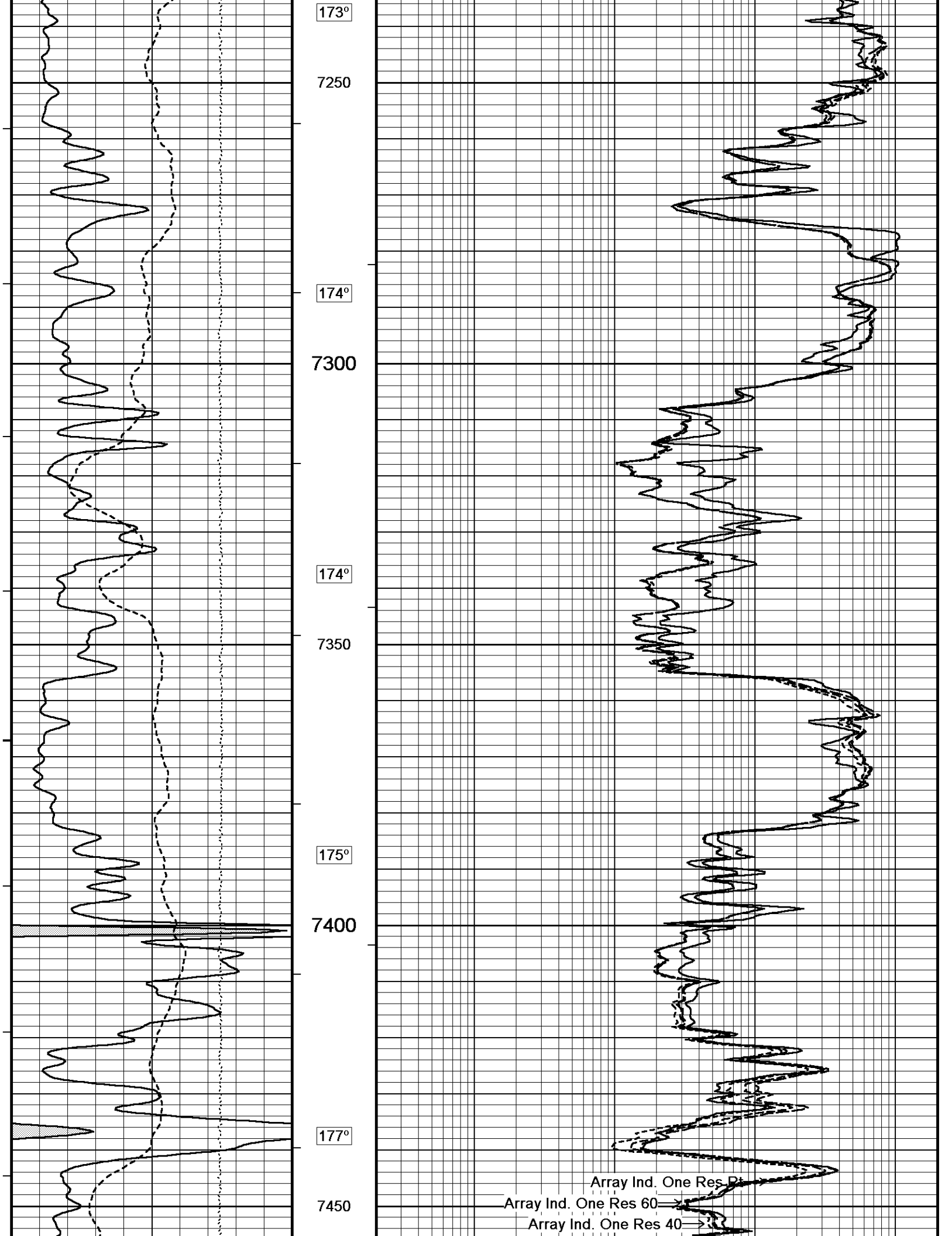

157°
6150
157°
6200
158°
6250
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow LL
Spontaneous Potential
Gamma Ray
DST Uphole Tension
158°
6300
159°
6350
400

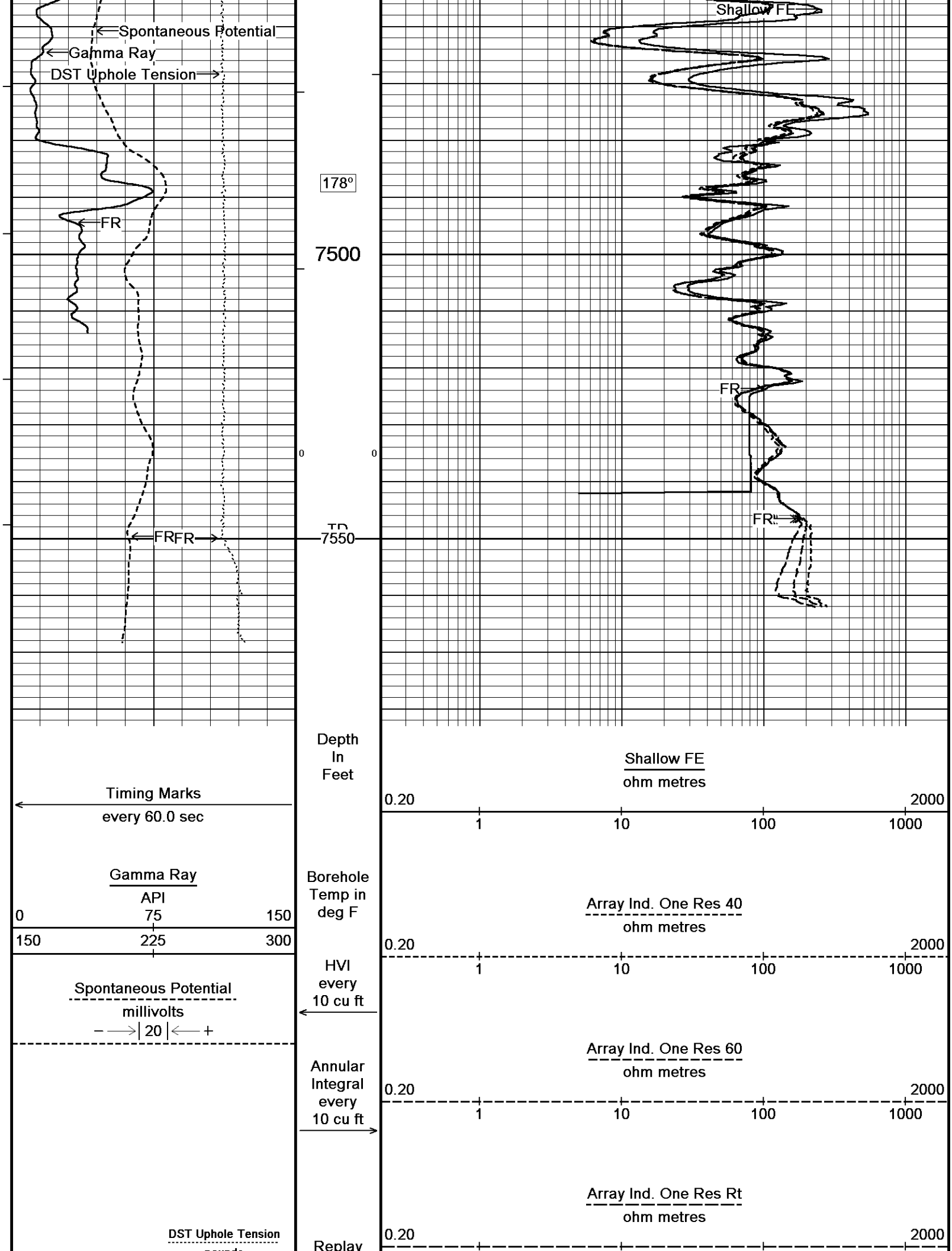

200
159°
6400
159°
6450
160°
6500
161°
6550


161°
6600
161°
300
6650
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow Ft
Spontaneous Potential
Gamma Ray
DST Uphole Tension
162°
6700
162°
6750
164°


6800
166°
6850
167°
6900
200
168°
100
6950
168°
7000


169°
7050
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
168°
7100
168°
7150
171°
7200
100


173°
7250
174°
7300
174°
7350
175°
7400
177°
7450
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40


Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR
FR
FR
Shallow FE
FR
FR
178°
7500
0
0
TD
7550
Depth
In
Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Spontaneous Potential
millivolts
– 20 +
Borehole
Temp in
deg F
HVI
every
10 cu ft
Annular
Integral
every
10 cu ft
DST Uphole Tension
pounds
Replay
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
2000

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

1 10 100 1000

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_003.dta
System Versions: Logged with 17.03.9700 Plotted with 17.03.9700

Plotted on 09-NOV-2017 05:17
Recorded on 09-NOV-2017 00:16

5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_002.dta
System Versions: Logged with 17.03.9700 Plotted with 17.03.9700

Plotted on 09-NOV-2017 05:17
Recorded on 08-NOV-2017 23:42

Depth in Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
− → | 20 | ← +

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Shallow FE
ohm metres
0.20 2000
1 10 100 1000

Array Ind. One Res 40
ohm metres
0.20 2000
1 10 100 1000

Array Ind. One Res 60
ohm metres
0.20 2000
1 10 100 1000

Array Ind. One Res Rt
ohm metres
0.20 2000
1 10 100 1000

DST Uphole Tension
pounds
5000 0

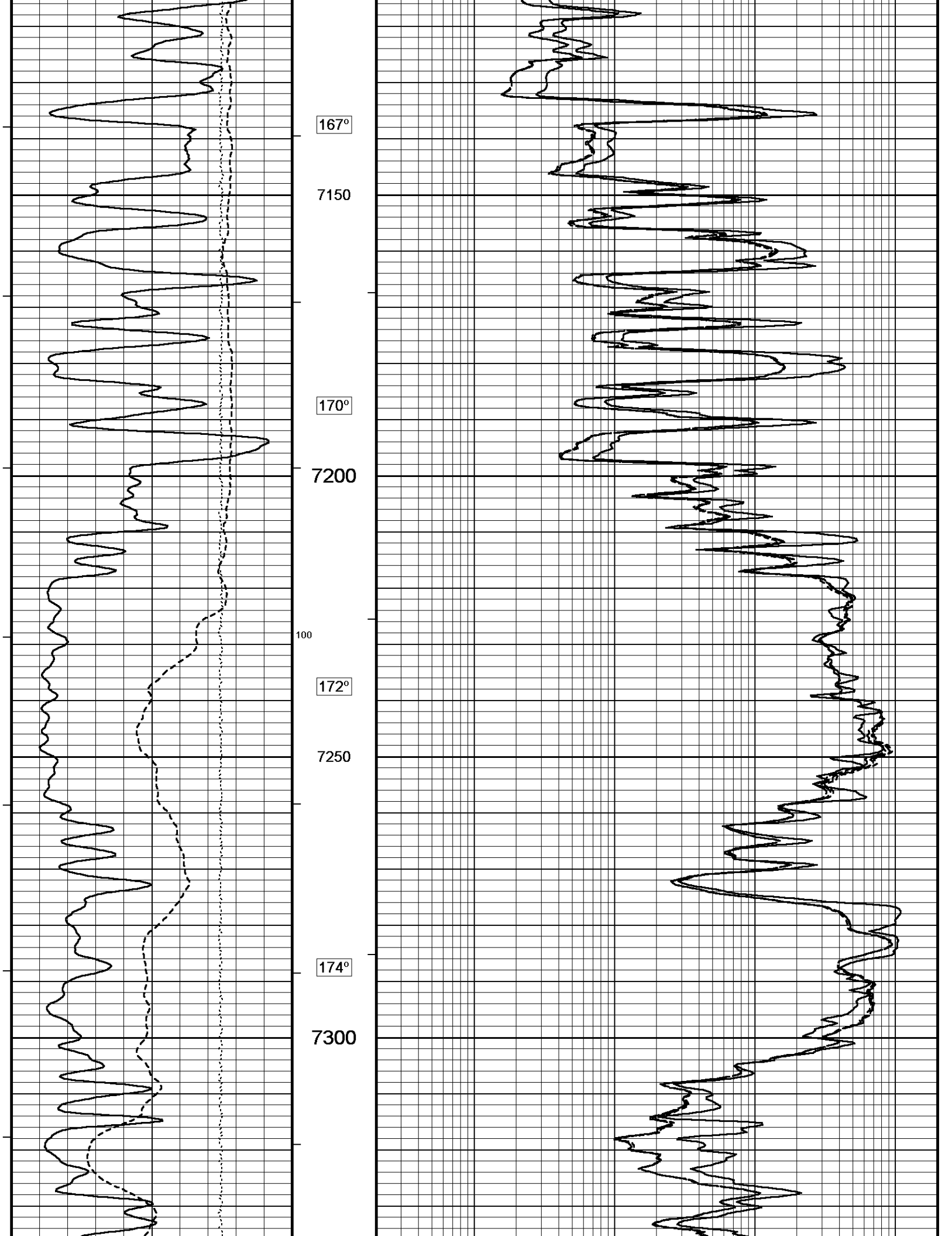
Replay Scale 1:240

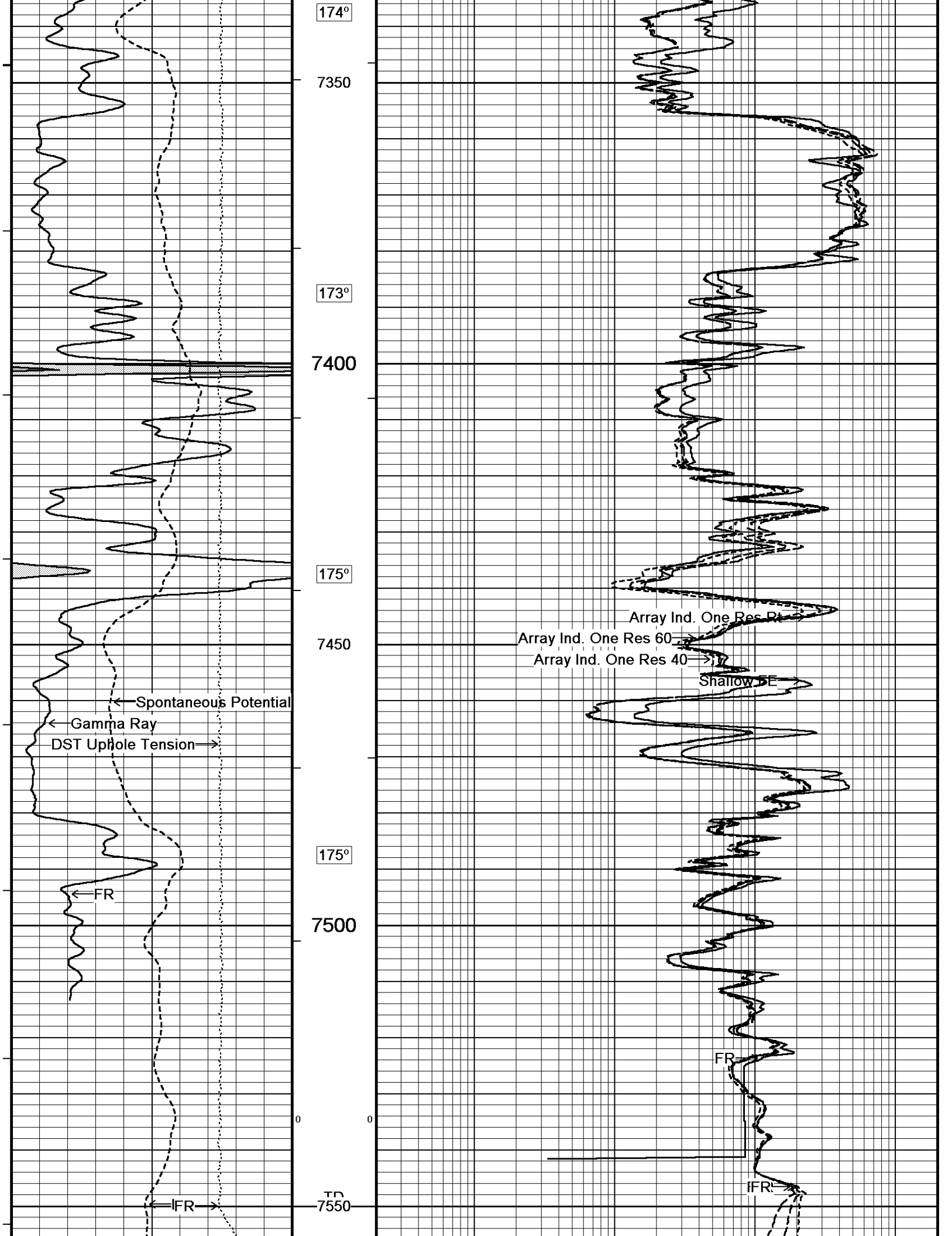
7050

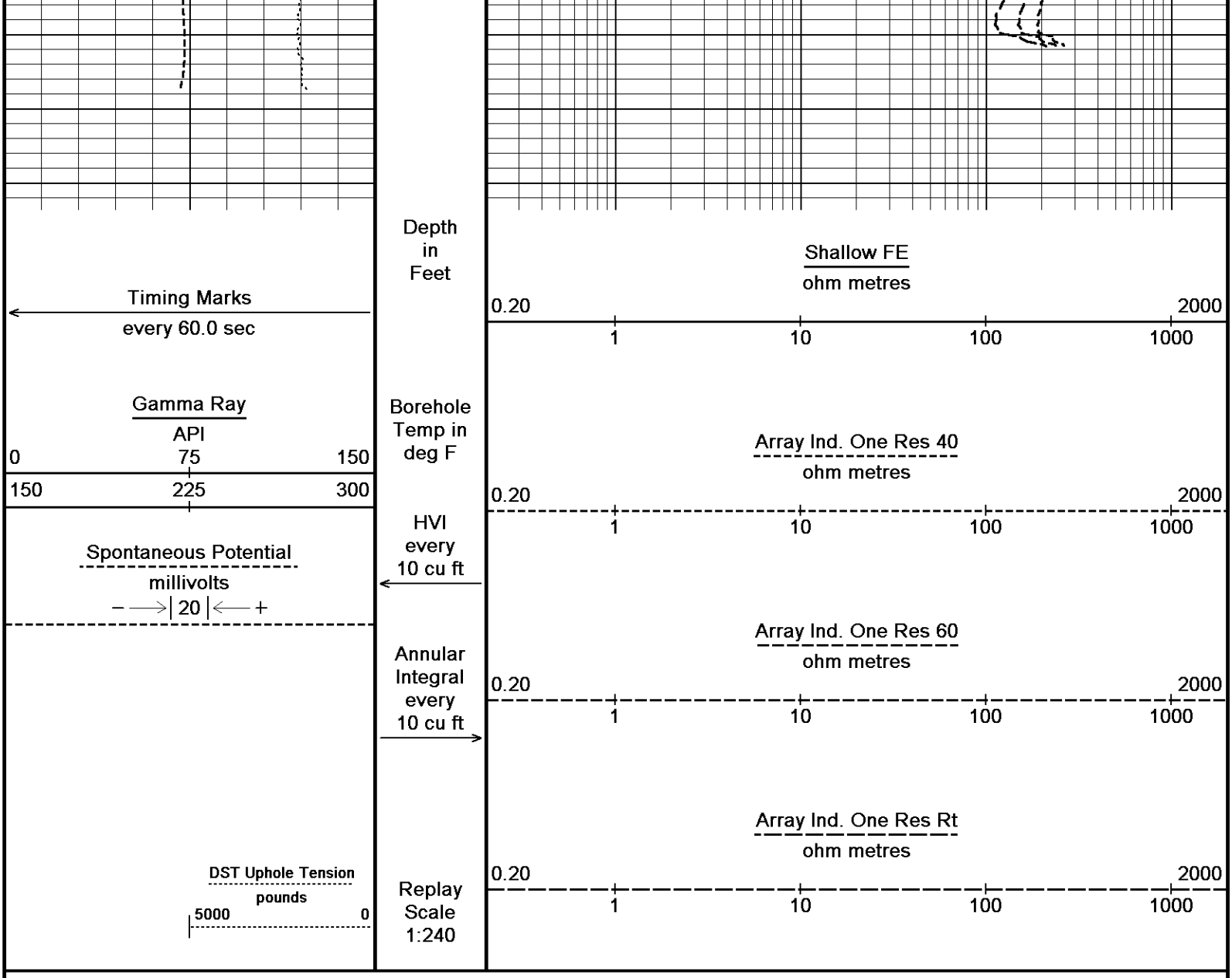
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension

166°

7100


167°
7150
170°
7200
100
172°
7250
174°
7300


174°
7350
173°
7400
175°
7450
175°
7500
7550
TD
Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR
IFR
Array Ind. One Res R
Array Ind. One Res 60
Array Ind. One Res 40
Shallow DE
FR
IFR



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 09-NOV-2017 05:17

Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_002.dta — Recorded on 08-NOV-2017 23:42

System Versions: Logged with 17.03.9700 Plotted with 17.03.9700

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_002.dta

General Constants All 000 — Last Edited on 08-NOV-2017,09:45

General Parameters		
Mud Resistivity	1.760	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. One Res Rt	

RWA Constant A	0.620
RWA Constant M	2.150
SW/APOR Tool Source	0.000

Down-hole Tension Calibration SMS 0

Field Calibration on 03-NOV-2017 15:03

Reading No	Measured	Calibrated (lbs)
1	-64.04	0.00
2	-2337.74	481.00

Gamma Calibration MCG-C 84

Field Calibration on 05-NOV-2017 09:45

	Measured	Calibrated (API)
Background	97	67
Calibrator (Gross)	758	523
Calibrator (Net)	661	456

Gamma Calibration Tolerances MCG-C 84

Ratio 1.449 (1.40 | 1.475 | 1.55) Counts/API

Gamma Constants MCG-C 84

Last Edited on 08-NOV-2017,07:35

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	%

SP Calibration MCG-C 84

Field Calibration on 27-OCT-2017,07:20

	Measured	Calibrated (mV)
Reference 1	104.4	100.1
Reference 2	-95.8	-100.1

High Resolution Temperature Calibration MCG-C 84

Field Calibration on 27-OCT-2017,07:21

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

High Resolution Temperature Constants MCG-C 84

Last Edited on 30-AUG-2017,13:52

Pre-filter Length	11

Micro Normal and Micro Inverse Calibration MML-A 7

Base Calibration on 23-OCT-2017 14:05
Field Check on 03-NOV-2017 15:31

	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0

Base Calibration

	Measured		Calibrated (ohm-m)	
Micro Normal	10.1	50.4	5.1	25.6
Micro Inverse	10.0	50.1	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.7	76.7
Micro Inverse	51.0	51.0

Micro Normal & Micro Inverse Calibration Tolerance MML-A 7

Micro Normal Res. 1 10.1 (-5% | 10.0 | +5%) ohm
Micro Normal Res. 2 50.4 (-5% | 50.0 | +5%) ohm
Micro Inverse Res. 1 10.0 (-5% | 10.0 | +5%) ohm
Micro Inverse Res. 2 50.1 (-5% | 50.0 | +5%) ohm

Micro Normal Base Check 76.7 (-2% | 76.57 | +2%) ohm-m
Micro Inverse Base Check 51.0 (-2% | 50.96 | +2%) ohm-m

Micro Normal Field Check 76.7 (-2% | 76.7 | +2%) ohm-m
Micro Inverse Field Check 51.0 (-2% | 51.0 | +2%) ohm-m

Micro Normal and Micro Inverse Constants MML-A 7

Last Edited on 08-NOV-2017,07:35

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	N/A	inches

Caliper Calibration MML-A 7

Base Calibration on 23-OCT-2017 13:59
Field Calibration on 03-NOV-2017 15:29

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14085	5.98
2	17580	7.97
3	20846	9.86
4	24750	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.11	8.10

Caliper Calibration Tolerances MML-A 7

Short Arm Field Cal.	8.11	7.90	8.10	8.30	in

Neutron Calibration MDN-A.B 114

Base Calibration on 25-OCT-2017 16:20
Field Check on 05-NOV-2017 09:48

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3039	94	3714	110
Ratio	32.458		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	2150	3142
Ratio	0.684	

Field Check

	Calibrated (cps)	
	2141	3120
Ratio	0.686	

Neutron Calibration Tolerances MDN-A.B 114

Ratio	32.458	-5%	33	+5%	
Base Check	0.684	0.65	0.7	0.75	
Field Check	0.686	0.664	0.684	0.704	

Neutron Constants MDN-A.B 114

Last Edited on 08-NOV-2017,07:35

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Modified Ratio	
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	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

Barite Mud Correction Not Applied

FE Calibration MFE-B.J 352

Base Calibration on 23-OCT-2017 13:20
Field Check on 06-NOV-2017 11:50

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

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.8	126.8
Base Check		281.3
Field Check		281.2

FE Calibration Tolerances MFE-B.J 352

Reference 2	963.8	-3% 980.0 +3%	ohm
Base Check	281.3	-2% 277.0 +2%	ohm-m
Field Check	281.2	-2% 281.3 +2%	ohm-m

FE Constants MFE-B.J 352

Last Edited on 08-NOV-2017,07:34

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	

Sonic Constants MSS-A.A 55

Last Edited on 08-NOV-2017,07:34

Maximum Boundary Contrast	100.00	micro-sec/ft
Fluid Transit Time	189.00	micro-sec/ft
Limestone Transit Time	47.50	micro-sec/ft
Sandstone Transit Time	55.50	micro-sec/ft
Dolomite Transit Time	43.50	micro-sec/ft
Sonic used for Porosities	3-5' Compensated Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft
Sonde Mode	Compensated	
Hole Type	Open Hole	

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A

Peak Amplitude Source N/A

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing N/A

Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	N/A
N/A	N/A	N/A	
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A	
Use 4' Waveform to derive TR	N/A	
Use 5' Waveform to derive TR	N/A	
Use 6' Waveform to derive TR	N/A	
3' Waveform Discriminator Level	N/A	mV
4' Waveform Discriminator Level	N/A	mV
5' Waveform Discriminator Level	N/A	mV
6' Waveform Discriminator Level	N/A	mV
Waveform Discriminator Filter	N/A	
Semblance Window Width	N/A	micro-sec
Sonic Despiker	N/A	N/A

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 01-OCT-2017,14:58

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

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length	11

Induction Calibration MAI-A.A 111

Factory Loop Calibration 03-NOV-2017 04:57
Field Check on 05-NOV-2017 09:34

Factory Loop Calibration

Low Conductivity Reference Resistor	3.3	ohm
High 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	0.0	0.0
2	6.4	385.9	7.6	821.4	0.0	0.0
3	3.2	264.0	5.2	566.0	0.0	0.0
4 (far)	2.1	135.5	2.6	279.2	0.0	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)	10.7	3840.6	10.6	3840.6	
2	28.8	3498.9	28.7	3499.1	
3	28.2	2996.4	28.1	2996.7	
4 (far)	18.5	2041.3	18.5	2041.9	
Array Temperature		65.6		63.9	Deg F

Induction Check Tolerances MAI-A.A 111

Low Array 1	10.6	9.2 / 10.7 / 12.2	mmho/m	High Array 1	3840.6	3839.1 / 3840.6 / 3842.1 mmho/m
Low Array 2	28.7	27.3 / 28.8 / 30.3	mmho/m	High Array 2	3499.1	3497.4 / 3498.9 / 3500.4 mmho/m
Low Array 3	28.1	26.7 / 28.2 / 29.7	mmho/m	High Array 3	2996.7	2994.9 / 2996.4 / 2997.9 mmho/m
Low Array 4	18.5	17.0 / 18.5 / 20.0	mmho/m	High Array 4	2041.9	2039.8 / 2041.3 / 2042.8 mmho/m

Induction Constants MAI-A.A 111

Last Edited on 08-NOV-2017,07:34

Induction Model	RtAP-WBM	
Borehole Correction Constants		
Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Stand-off Type	Fins	
Stand-off	0.50	inches
Number of Fins on Stand-off	8.0000	

Stand-off Fin Angle	45.00	degrees
Stand-off Fin Width	0.5000	inches
Rm Source	Global Value: 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	

Photo Density Calibration MPD-C.A 216

Base Calibration on 23-OCT-2017 14:37
Field Check on 06-NOV-2017 11:49

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	1025	1218		
Reference 1	51146	24580	59556	30836
Reference 2	20383	2310	24941	2541
Field Check at Base	1024.7	1217.9		
Field Check	1021.0	1211.5		

PE Calibration

Base Calibration	Measured WS	Measured WH	Measured Ratio	Calibrated Ratio
Background	187	916		
Reference 1	21227	50978	0.420	0.371
Reference 2	5863	20269	0.293	0.272
Field Check at Base	187.1	916.4		
Field Check	185.7	907.5		

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio 2.59 (-5% 2.52 +5%; 0.089 0.110 0.131)

Far Density Ratio 21.38 (-5% 21.00 +5%)

PE Calibration	0.118				
Near Den. Field Check	1021.0	-3% 1024.7 +3%	Far Den. Field Check	1211.5	-3% 1217.9 +3%
PE WS Field Check	185.7	-6% 187.1 +6%	PE WH Field Check	907.5	-6% 916.4 +6%

Density Constants MPD-C.A 216

Last Edited on 08-NOV-2017,07:35

Density Source Id	P50557B	
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	1.13	gm/cc
Mud Density Type		
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	
Precision Enhanced Density Processing	Not Applied	

Matrix Density (gm/cc)	Depth (ft)
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

Caliper Calibration MPD-C.A 216

Base Calibration on 23-OCT-2017 14:16
Field Calibration on 06-NOV-2017 12:00

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16832	3.99
2	27040	5.98
3	37135	7.97
4	46864	9.86
5	58032	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.92	8.92

Caliper Calibration Tolerances MPD-C.A 216

Short Arm Field Cal.	8.92	8.72 8.92 9.12	in

DOWNHOLE EQUIPMENT

C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_002.dta

Cablehead, 11 pin
CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 84 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-log
MML-A 7 LG: 7.97 ft WT: 81.6 lb OD: 2.244 in

55.39 ft GRGC - MCG Gamma Ray

52.48 ft CGXT - MCG External Temperature

46.76 ft MLTC - MML Caliper
45.76 ft MINV - Micro-inverse
45.76 ft MNRL - Micro-normal

Compact Neutron
MDN-A.B 114   LG: 5.04 ft   WT: 50.7 lb   OD: 2.244 in

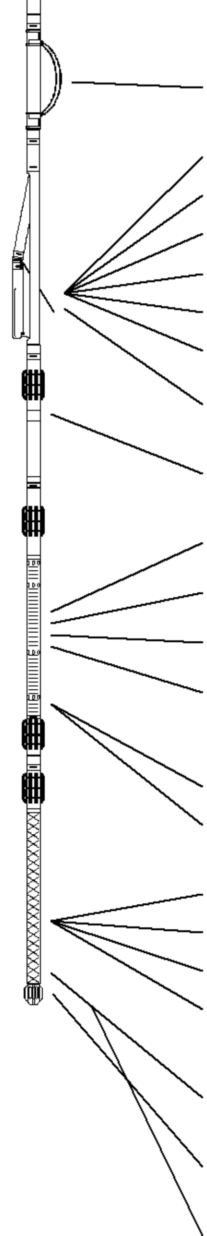
Compact Density/Caliper
MPD-C.A 216   LG: 9.59 ft   WT: 90.4 lb   OD: 2.449 in

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

Compact Sonic
MSS-A.A 55   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: 63.07 ft   Weight: 480.6 lb



40.97 ft	NPRL - Limestone Neutron Por.
33.73 ft	AVOL - Annular Volume
33.73 ft	HVOL - Hole Volume
33.73 ft	CLDC - Density Caliper
31.80 ft	DPRL - Limestone Density Por.
31.80 ft	DEN - Compensated Density
31.80 ft	DCOR - Density Correction
31.74 ft	PDPE - PE
26.24 ft	FEFE - Shallow FE
16.96 ft	TR11 - 4' Transit Time
16.46 ft	TR21 - 3' Transit Time
15.95 ft	TR12 - 6' Transit Time
15.46 ft	TR22 - 5' Transit Time
12.96 ft	SPRL - Wyllie Lime. Sonic Por.
12.96 ft	DT35 - 3-5' Compensated Sonic
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	CTAO - Array Ind. One Cond Ct
3.34 ft	RTAO - Array Ind. One Res Rt
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	K3 OIL & GAS OPERATING COMPANY
WELL	SORENSON #4-3
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5048	feet	First Reading	7547.00	feet
Elevation Drill Floor	5046	feet	Depth Driller	7550.00	feet
Elevation Ground Level	5030	feet	Depth Logger	7550.00	feet

Weatherford®

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

Weather
COMPANY
WELL
FIELD
PROVINCE/COUNTY
COUNTRY/STATE
LOCATION
SEC 3   TWP 16S
Latitude
Longitude
API Number
Permanent Datum GL, El
Log Measured From KB,
Drilling Measured From K
Date
Run Number
Service Order
Depth Driller
Depth Logger
First Reading
Last Reading
Casing Driller
Casing Logger
Bit Size
Hole Fluid Type
Density / Viscosity
PH / Fluid Loss
Sample Source
Rm @ Measured Temp
Rmf @ Measured Temp
Rmc @ Measured Temp
Source Rmf / Rmc
Rm @ BHT
Time Since Circulation
Max Recorded Temp
Equipment / Base
Recorded By
Witnessed By
Witnessed By

ford

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

K3 OIL & GAS OPERATING COMPANY
SORENSON #4-3
WILDCAT
LINCOLN
U.S.A. / COLORADO
50' FNL & 650' FWL

RGE 55W | Other Services: MDN/MPD, MSS, MML

05-073-06727

Elevation 5030 feet
18.00 feet above Permanent Datum
KB

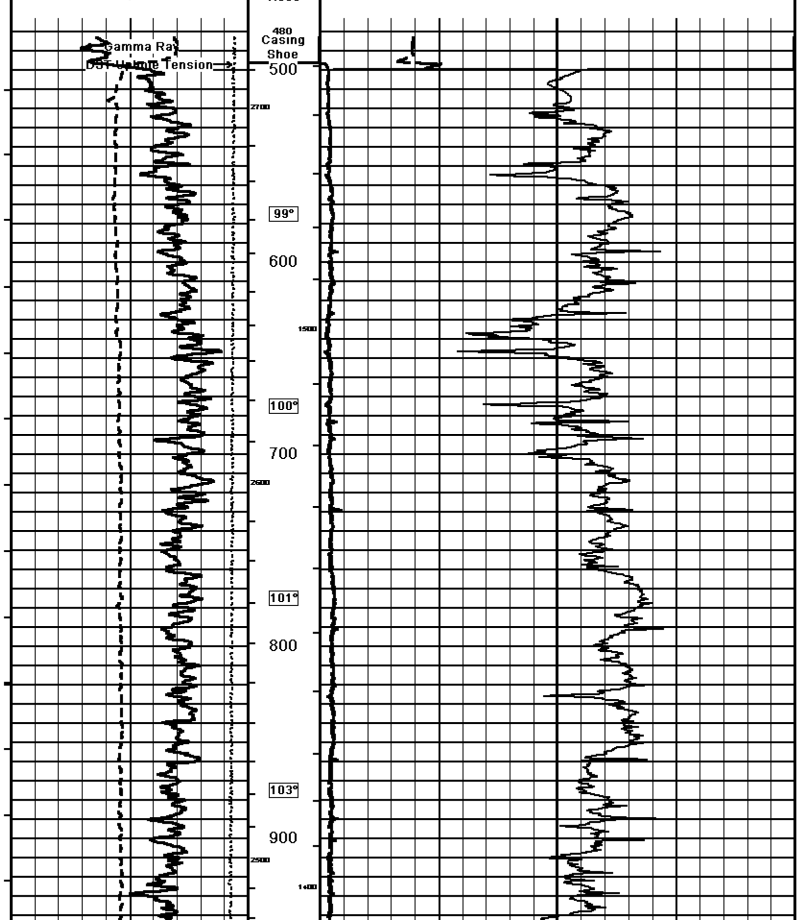
Elevations: KB 5048.00, DF 5046.00, GL 5030.00 (feet)

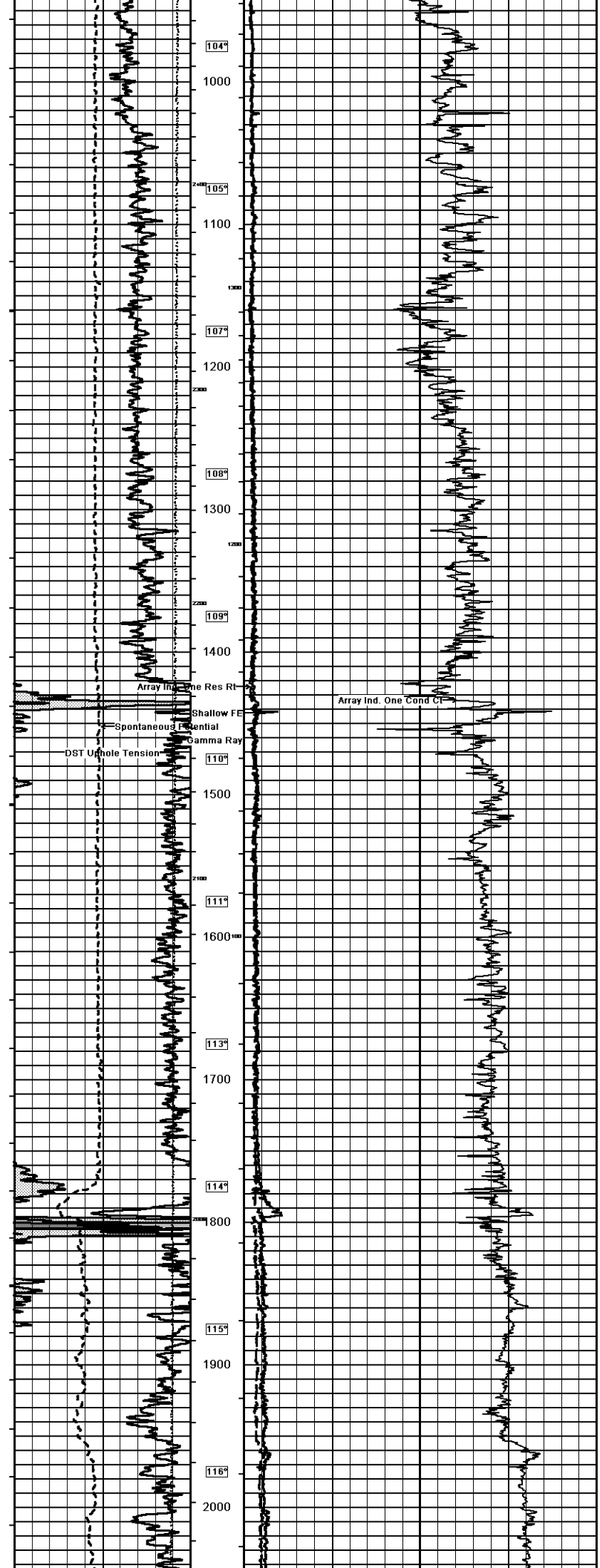
08-NOV-2017	
ONE	
4568-19733139	
7550.00	feet
7550.00	feet
7547.00	feet
496.00	feet
496.00	feet
496.00	feet
7.875	inches
CHEMICAL	
9.40 lb/USg	83.00 CP
10.00	7.20 ml/30Min
FLOWLINE	
1.76 @75.0	ohm-m
1.41 @75.0	ohm-m
2.11 @75.0	ohm-m
CALC	CALC
0.74 @178.0	ohm-m
5 HOURS	
178.00	deg F
13096	LIB
ADAM SILL	
RANDY SAY	JOHN MARVIN
SUSAN RAINBOLT	

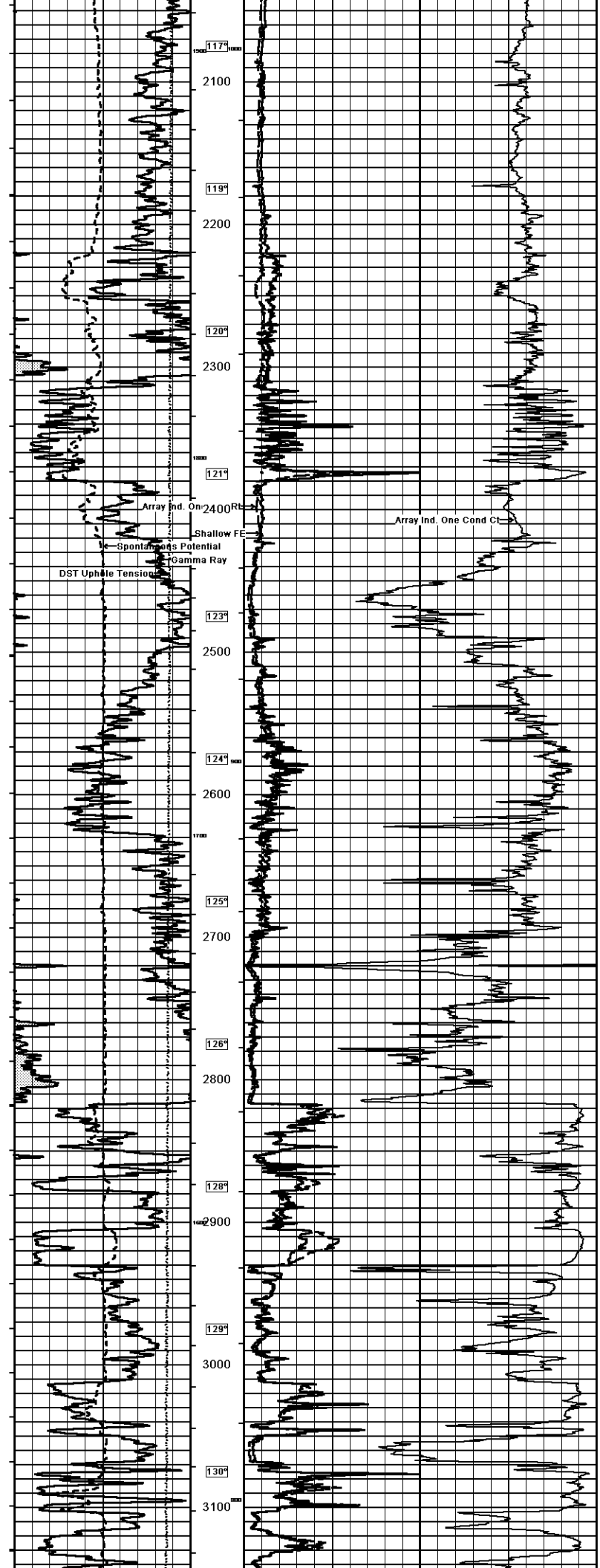
1 INCH MAIN

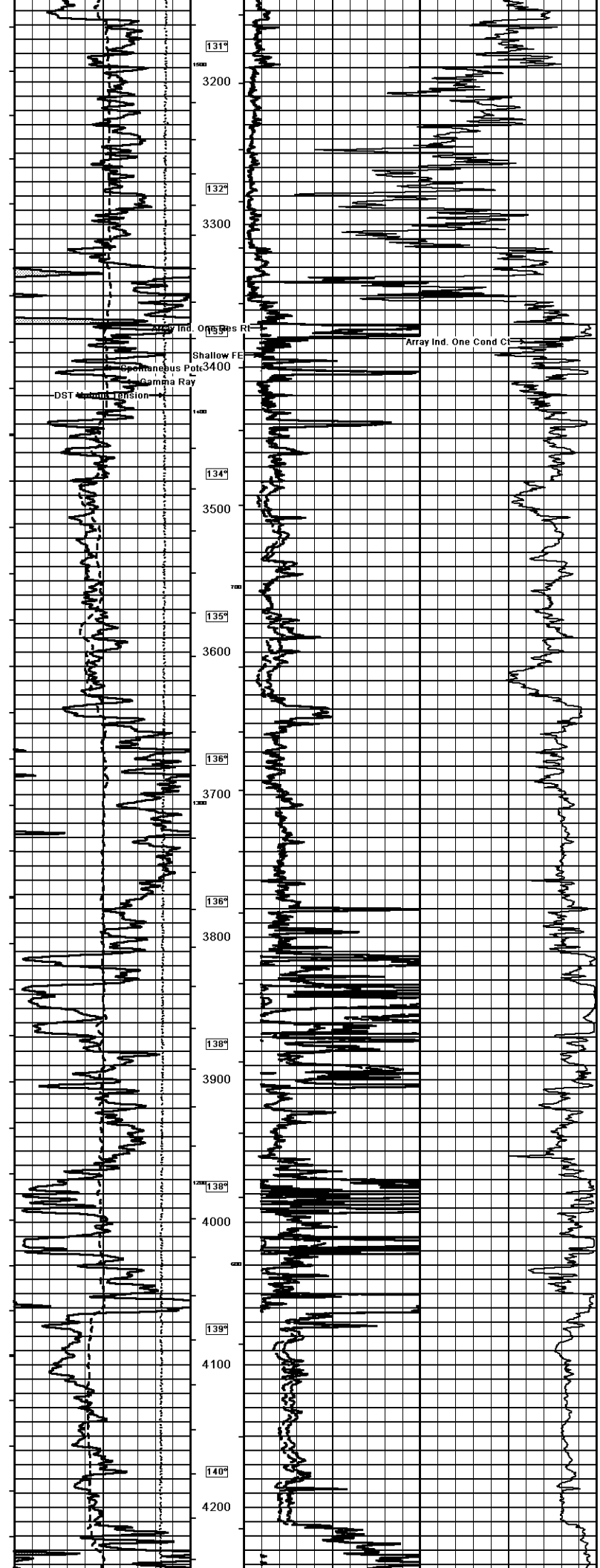
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 09-NOV-2017 05:17
Filename: C:\Minimus 17.03.9700\Data\K3 Sorenson #4-3\K3 Sorenson #4-3_003.dta — Recorded on 09-NOV-2017 00:16
System Versions: Logged with 17.03.9700 Plotted with 17.03.9700

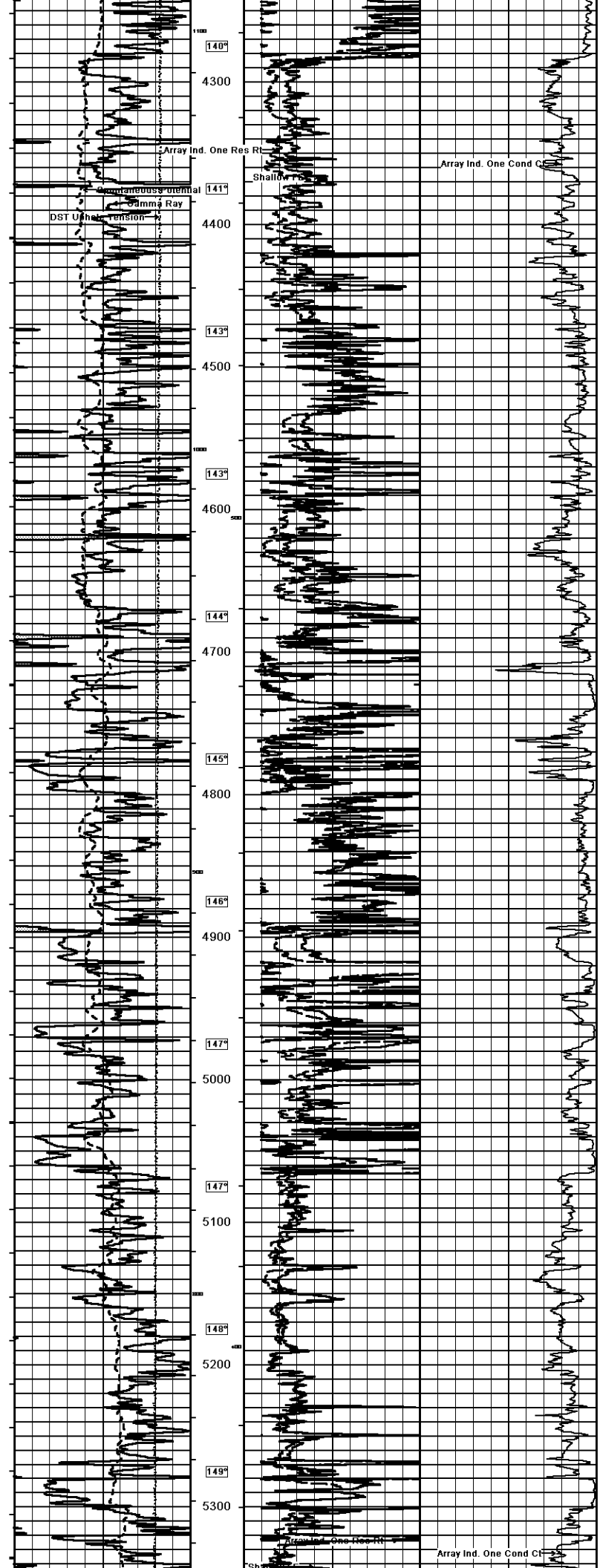
Track 1	Depth Track	Track 2/3
Timing Marks, every 60.0 sec	Depth In Feet	Array Ind. One Cond Ct, mmhos/metre: 1000 750 500 250 0; 2000 1750 1500 1250 1000
Gamma Ray, API: 0 75 150; 150 225 300	Borehole Temp in deg F	
Spontaneous Potential, millivolts: − → 20 ← +	HVI every 10 cu ft	Shallow FE, ohm metres: 0 25 50; 0 250 500
	Annular Integral every 10 cu ft	Array Ind. One Res Rt, ohm metres: 0 25 50; 0 250 500
DST Uphole Tension, pounds: 5000 0	Replay Scale 1:600	




104°
1000
105°
1100
107°
1200
108°
1300
109°
1400
Array Ind. One Res Rt
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
Array Ind. One Cond Ct
110°
1500
111°
1600
113°
1700
114°
1800
115°
1900
116°
2000


117°
2100
119°
2200
120°
2300
121°
Array Ind. One
2400
Rt
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
123°
2500
124°
2600
125°
2700
126°
2800
128°
2900
129°
3000
130°
3100


131°
3200
132°
3300
Array Ind. One Res RI
Array Ind. One Cond CI
Shallow FE
Spontaneous Pote
Gamma Ray
DST Borehole Tension
3400
134°
3500
135°
3600
136°
3700
136°
3800
138°
3900
138°
4000
139°
4100
140°
4200


Array Ind. One Res RI
Array Ind. One Cond CI
Shallow Res
Spontaneous Potential
Gamma Ray
DST Upper Tension
Array Ind. One Res RI
Array Ind. One Cond CI
140°
141°
143°
143°
144°
145°
146°
147°
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149°
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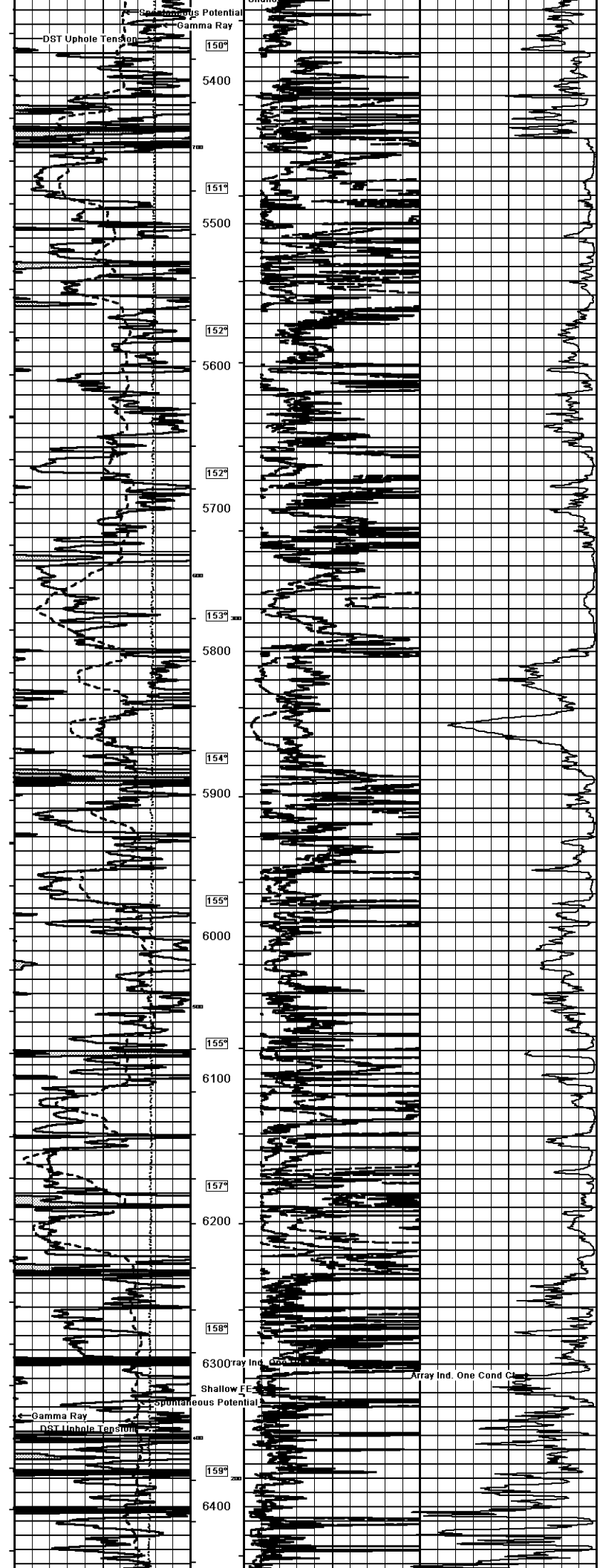
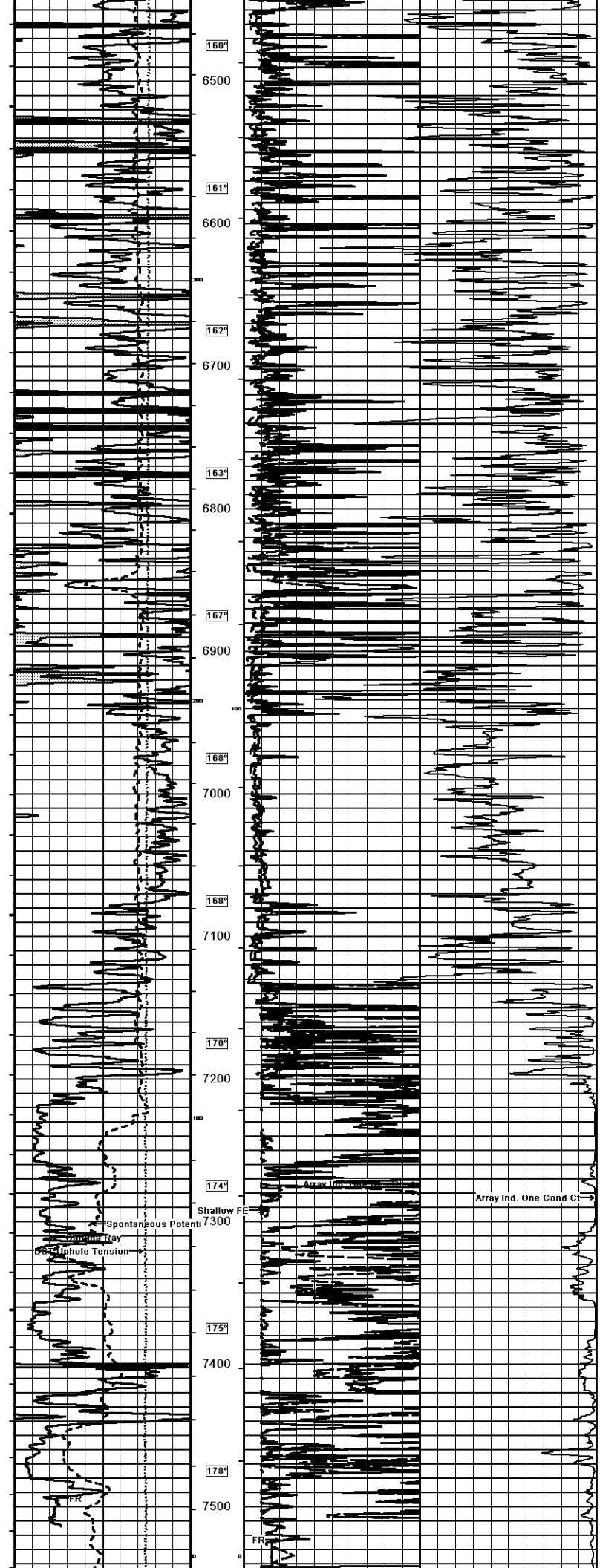
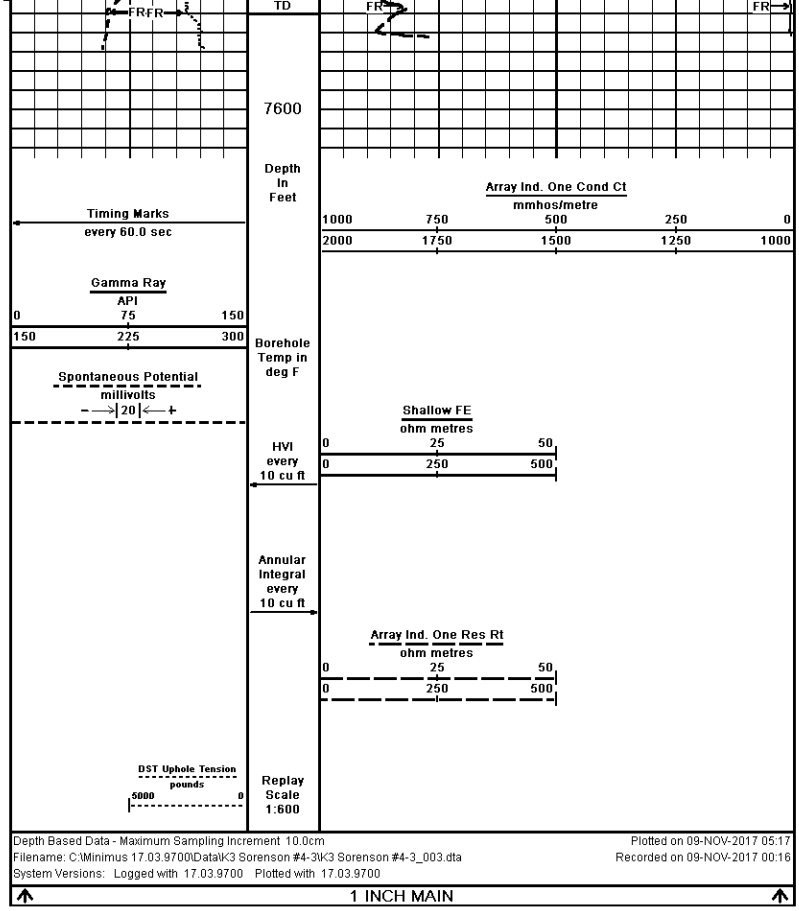
4600
4700
4800
4900
5000
5100
5200
5300


Spontaneous Potential
Gamma Ray
DST Uphole Tension
150°
5400
151°
5500
152°
5600
152°
5700
153°
5800
154°
5900
155°
6000
155°
6100
157°
6200
158°
6300
Array Ind. One Cond Co
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
159°
6400


160°
6500
161°
6600
162°
6700
163°
6800
167°
6900
168°
7000
168°
7100
170°
7200
174°
7300
175°
7400
178°
7500
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potenti
Gamma Ray
Cable Tension
FR
FR



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