Weatherford®

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

COMPANY	CHACO ENERGY CO.
WELL	SMITH 2-27
FIELD	LOCH
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	335' FSL & 2605' FEL

SEC	TWP	RGE	Other Services
27	13S	32W	MPD/MDN
API Number 15-109-21145			MML
Permit Number			MSS

Permanent Datum G.L., Elevation 2892 feet
Log Measured From KB
Drilling Measured From K.B. @ 9 FEET

Elevations:	feet
KB	2901.00
DF	2899.00
GL	2892.00

Date	03-DEC-2012			
Run Number	ONE			
Service Order	3538958			
Depth Driller	4640.00	feet		
Depth Logger	4639.00	feet		
First Reading	4636.00	feet		
Last Reading	224.00	feet		
Casing Driller	225.00	feet		
Casing Logger	224.00	inches		
Bit Size	7.875			
Hole Fluid Type	CHEMICAL	lb/USg		
Density / Viscosity	9.20 lb/USg	55.00 CP		
PH / Fluid Loss	10.50	10.50		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.89 @102.0	ohm-m		
Rmf @ Measured Temp	0.71 @102.0	ohm-m		
Rmc @ Measured Temp	1.07 @102.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.76 @119.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	119.00	deg F		
Equipment / Base	13057	LIB		
Recorded By	R. HOFFMAN			
Witnessed By	AUSTIN GARNER			
JOB #	LB12-321			

BOREHOLE RECORD

Last Edited: 03-DEC-2012 20:56

Bit Size inches	Depth From feet	Depth To feet
7.875	224.00	4639.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	224.00	24.00

REMARKS

Tools Used: MCG, MML, MDN, MPD, MFE, MSS, MAI ran in combination.
Hardware: MPD: 8 inch profile plate used. MAI, MSS, MFE: 0.5 Inch standoffs used. MDN: Dual Bowspring used.
2.71 G/CC Limestone density matrix used to calculate porosity.
Sonic porosity calculated using a Limestone scale (47.5 usec/ft).
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= 1732 cubic feet
Annular volume with 5.5 inch production casing TD to 3650ft = 149 cubic feet
Service order #3538958
Rig: H2 Drilling Rig #
Engineer: R. Hoffman
Operator(s): R. Venegas

2 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 03-DEC-2012 21:01
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta
Recorded on 03-DEC-2012 17:55
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
− → | 20 | ← +

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

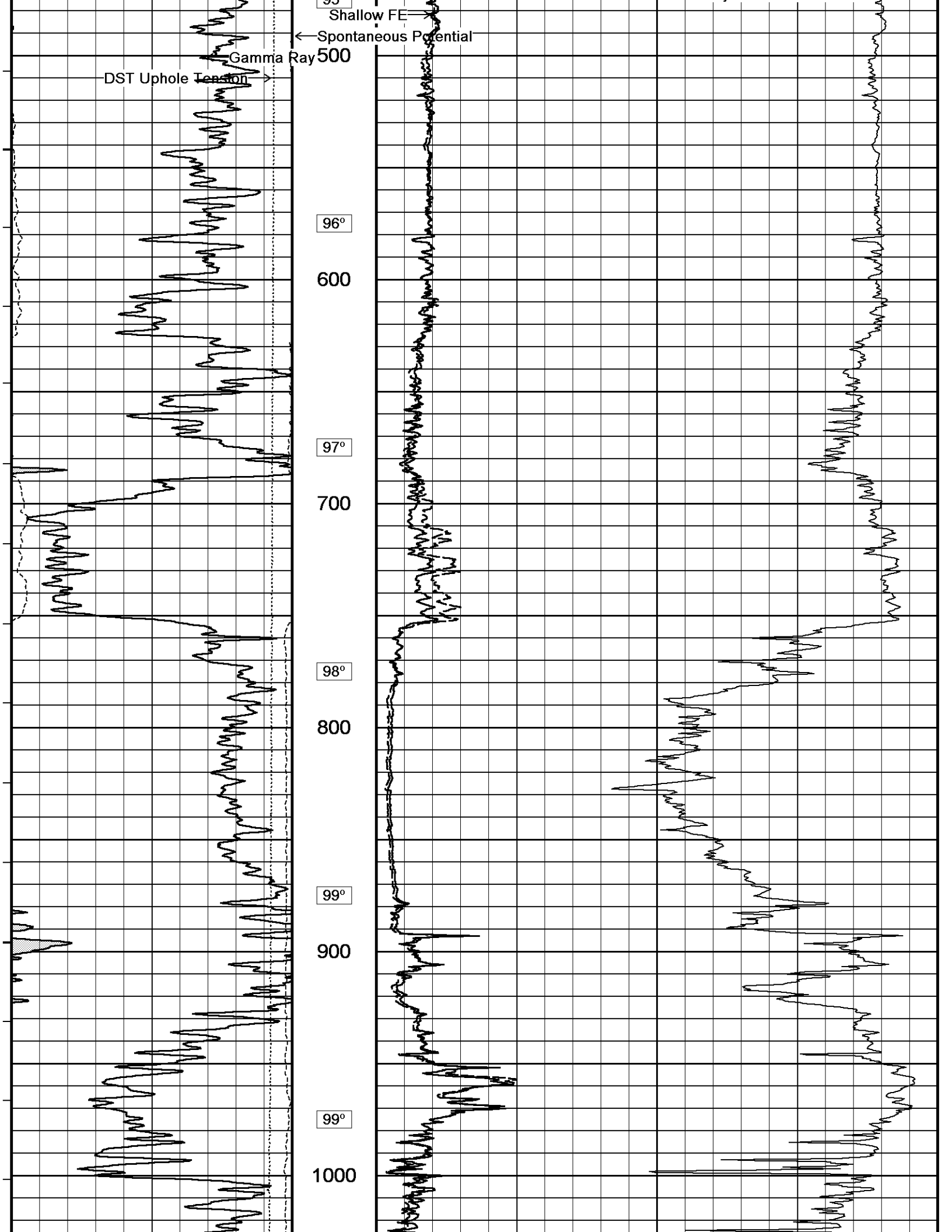
Replay Scale 1:600

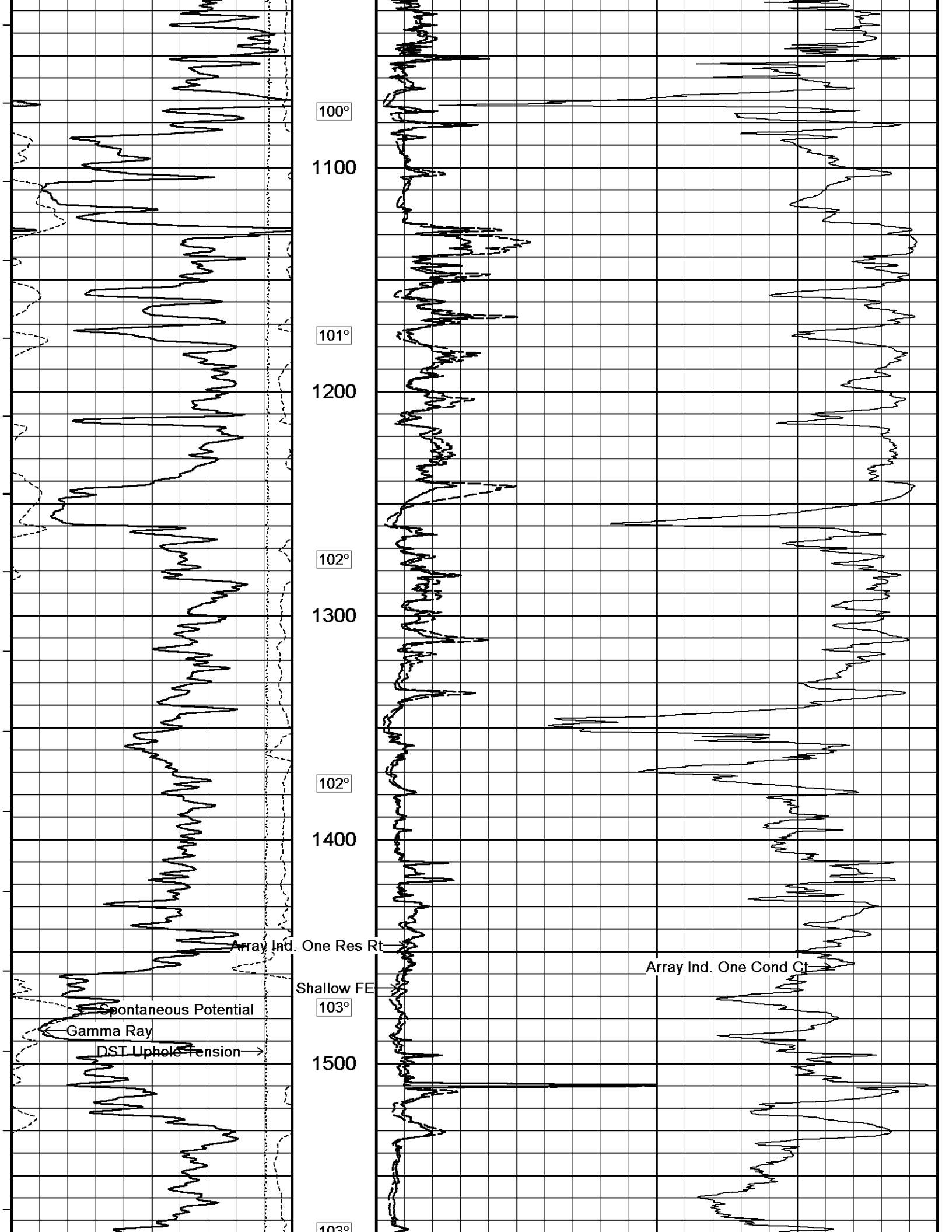
Array Ind. One Cond Ct
mmhos
1000 750 500 250 0
2000 1750 1500 1250 1000

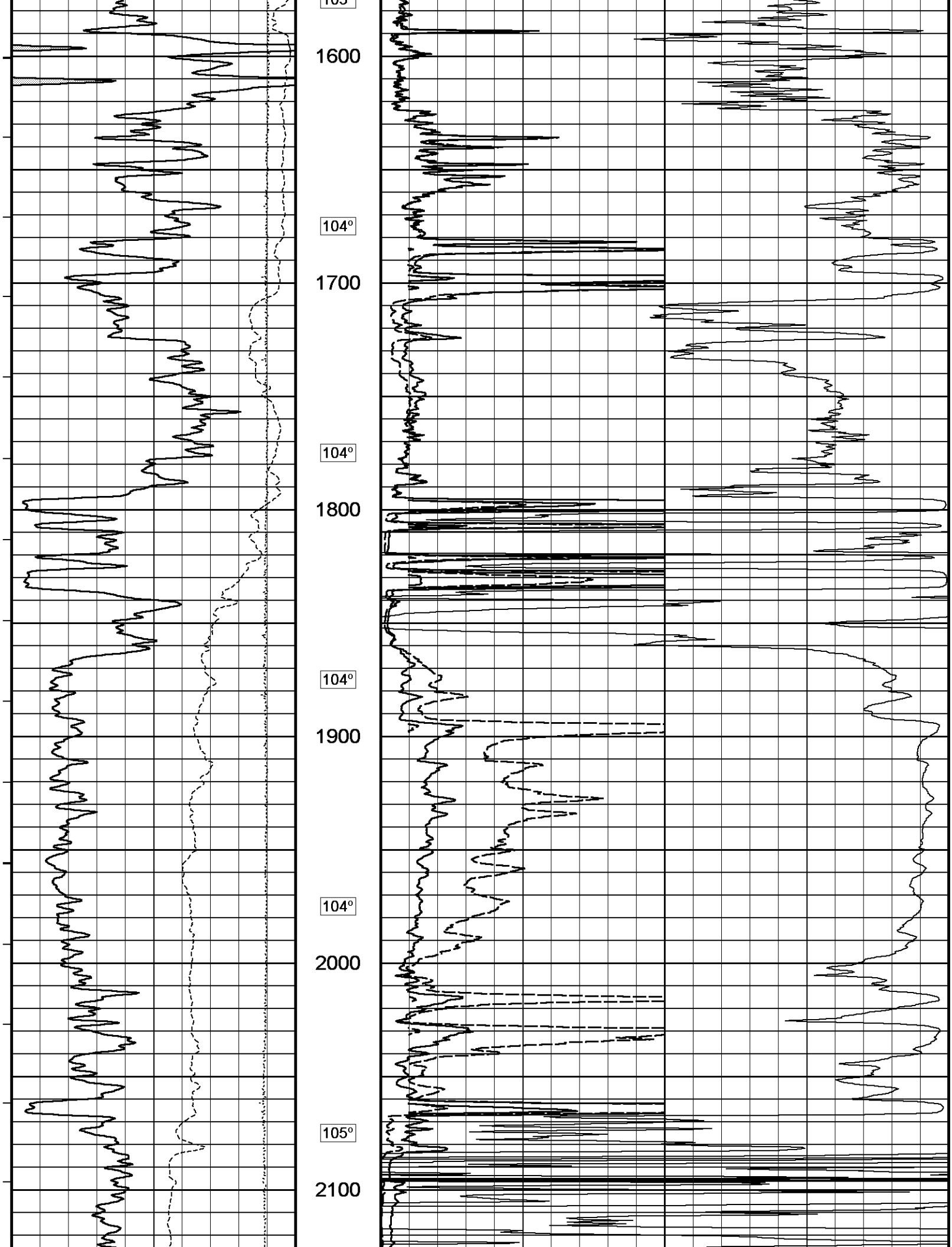
Shallow FE
ohm metres
0 25 50
0 250 500

Array Ind. One Res Rt
ohm metres
0 25 50
0 250 500

200
Casing Shoe
92°
300
94°
400
Array Ind. One Res Rt →
95°
Array Ind. One Cond Ct →


Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
500
96°
600
97°
700
98°
800
99°
900
99°
1000


100°
1100
101°
1200
102°
1300
102°
1400
Array Ind. One Res Rt
Shallow FE
Spontaneous Potential
103°
Gamma Ray
DST Uphole Tension
1500
Array Ind. One Cond Ct
103°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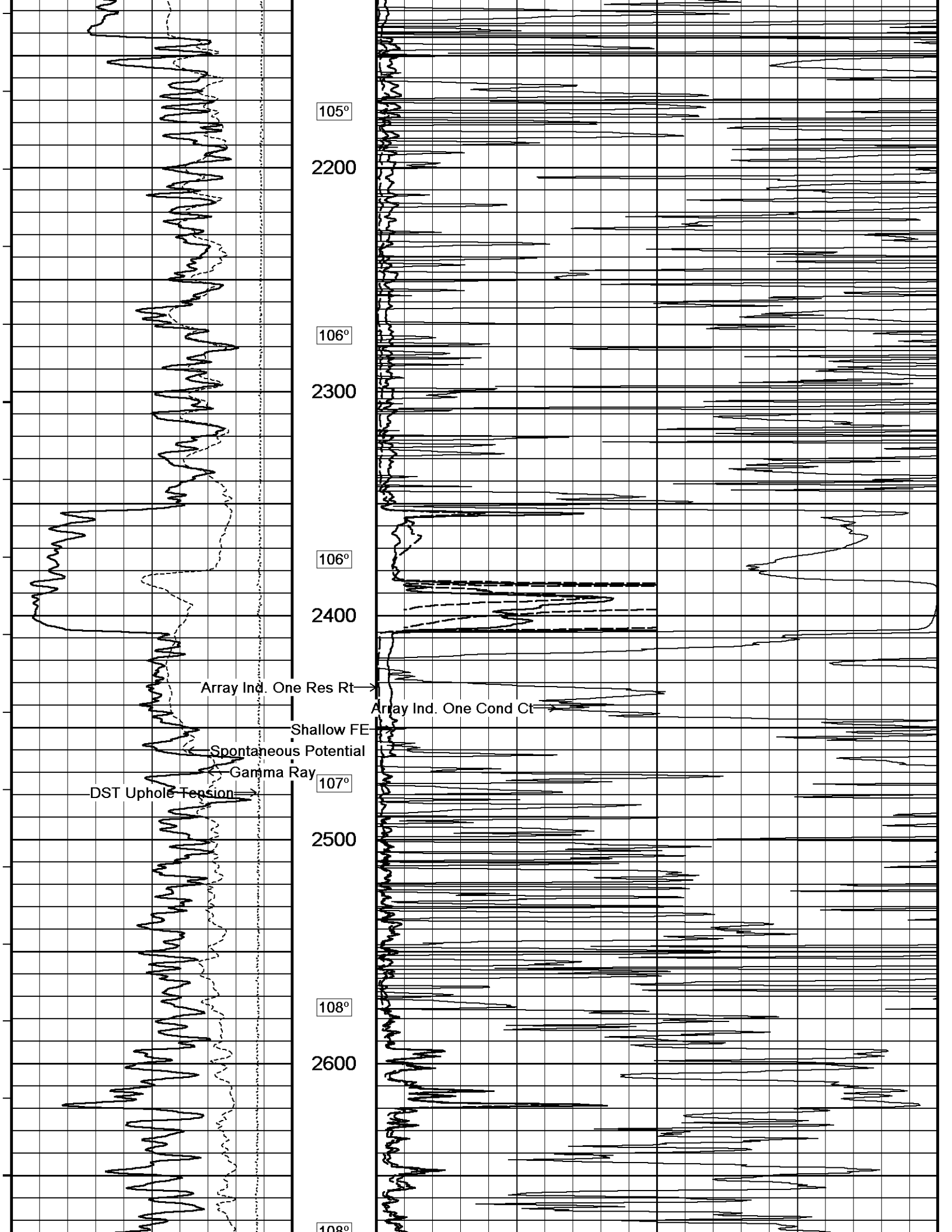
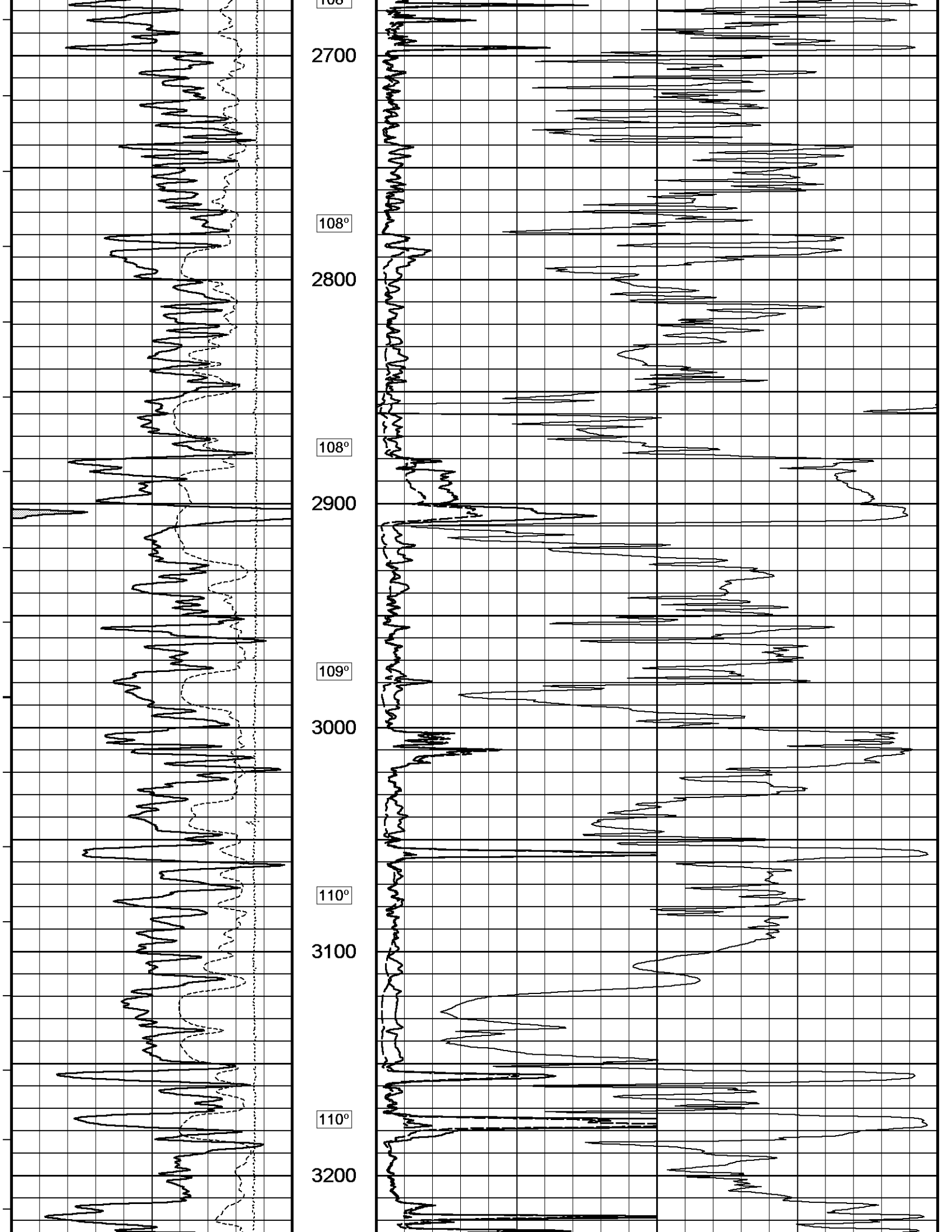
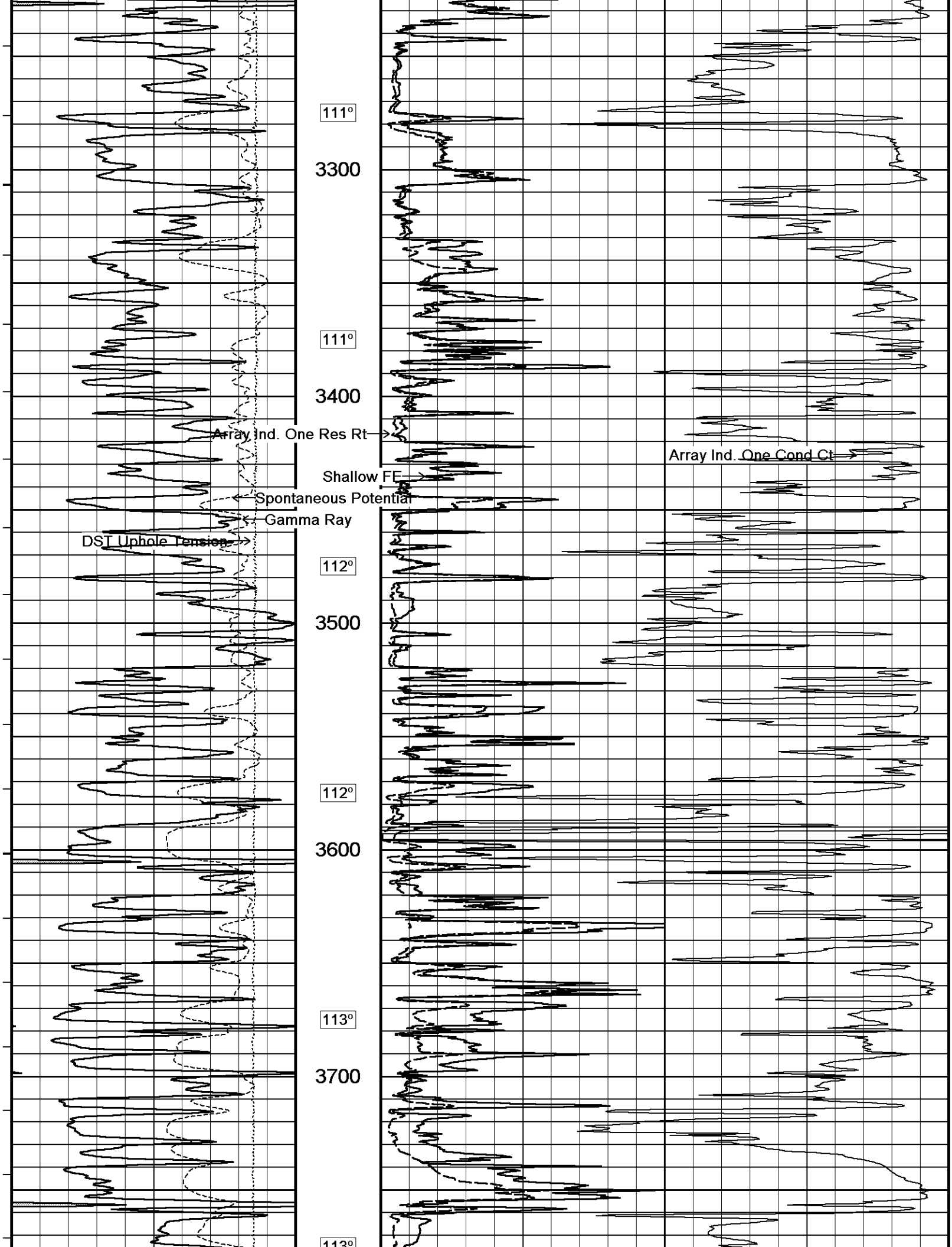
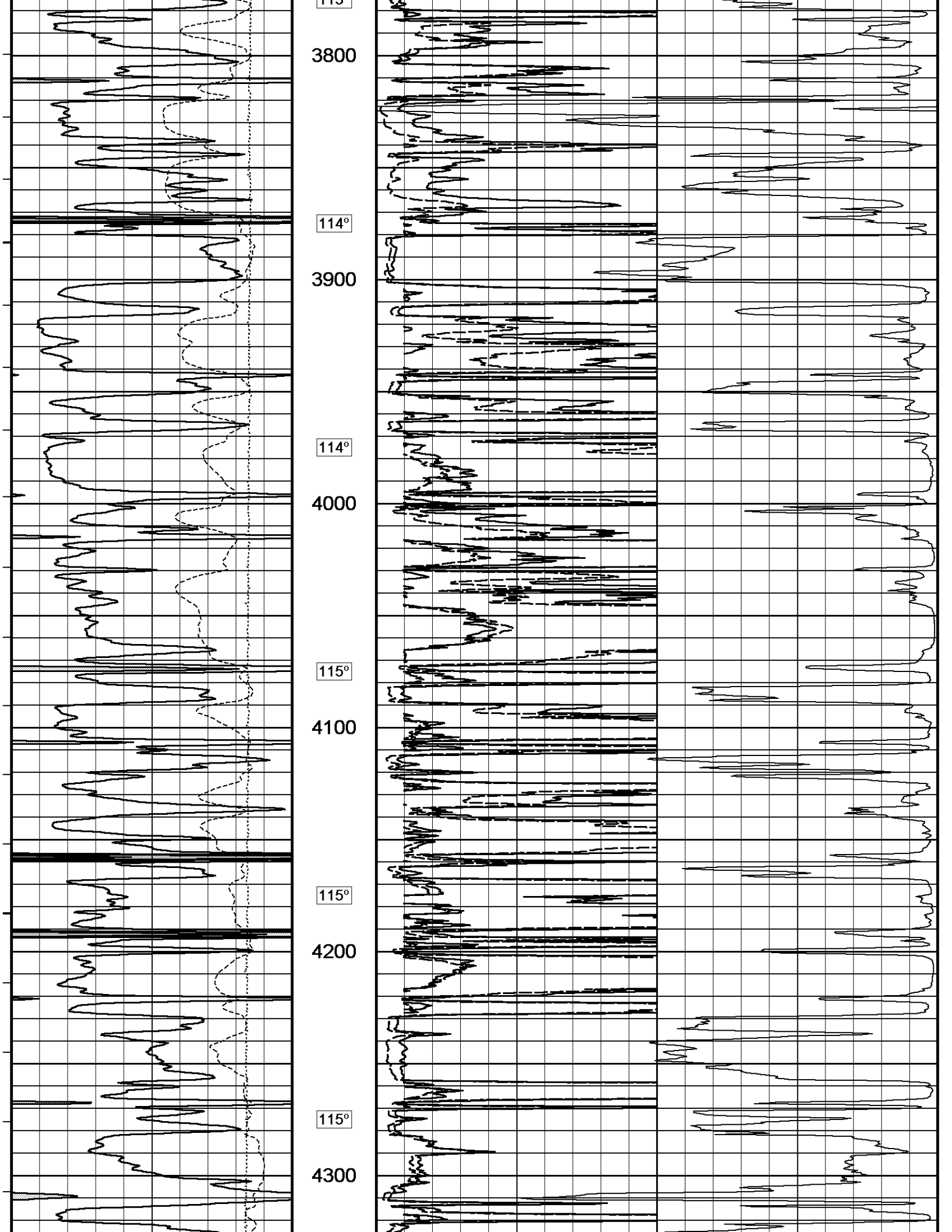
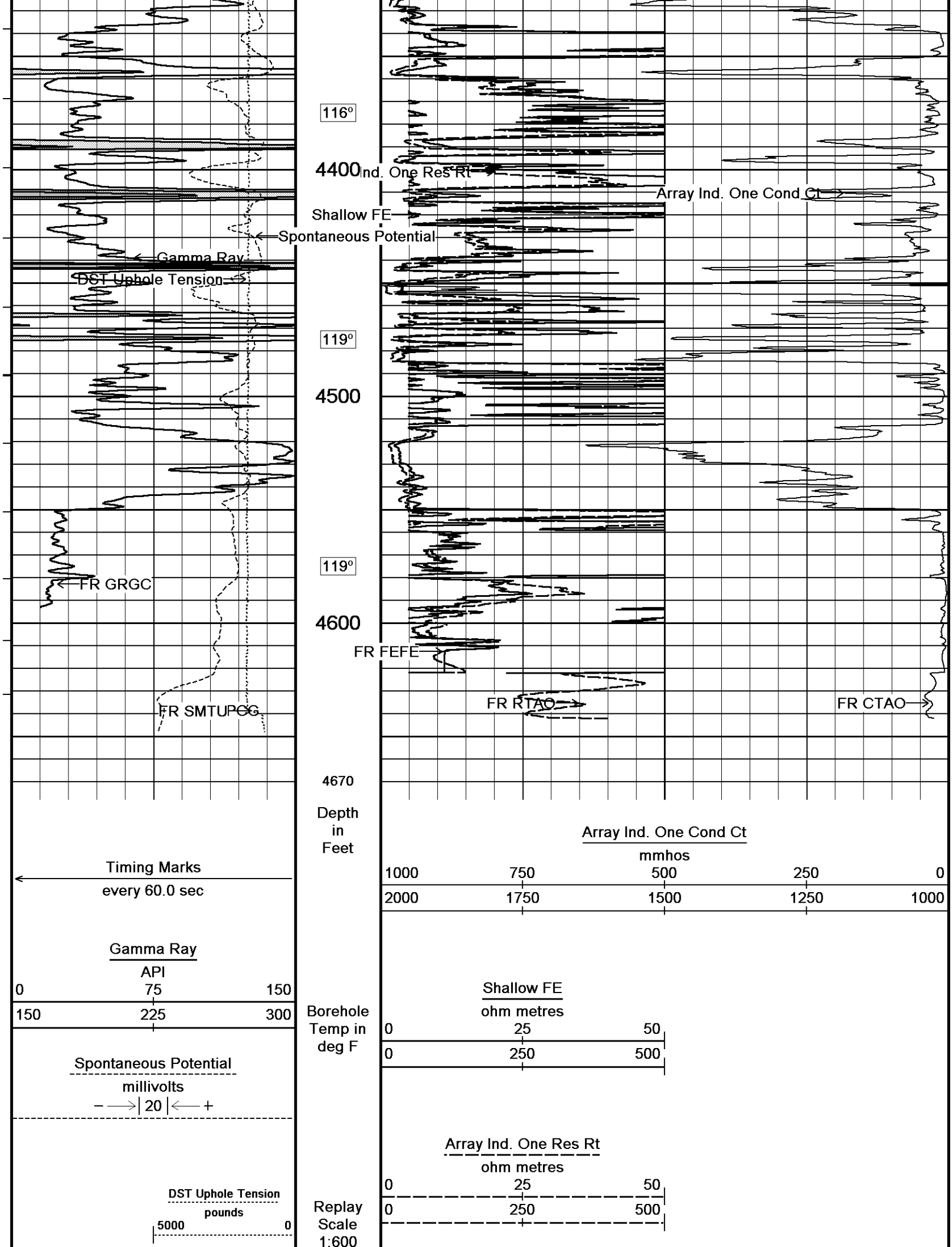
1600
104°
1700
104°
1800
104°
1900
104°
2000
105°
2100


105°
2200
106°
2300
106°
2400
Array Ind. One Res Rt
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
107°
2500
108°
2600
108°


108°
2700
108°
2800
108°
2900
109°
3000
110°
3100
110°
3200


111°
3300
111°
3400
Array Ind. One Res Rt
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
112°
3500
112°
3600
113°
3700
113°


115°
3800
114°
3900
114°
4000
115°
4100
115°
4200
115°
4300


116°
4400
Ind. One Res Rt
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
119°
4500
119°
FR GRGC
4600
FR FEFE
FR SMTUPCG
FR RTAO
FR CTAO
4670
Depth in Feet
Timing Marks
every 60.0 sec
Array Ind. One Cond Ct
mmhos
1000 750 500 250 0
2000 1750 1500 1250 1000
Gamma Ray
API
0 75 150
150 225 300
Shallow FE
ohm metres
0 25 50
0 250 500
Borehole Temp in deg F
Spontaneous Potential
millivolts
– 20 +
Array Ind. One Res Rt
ohm metres
0 25 50
0 250 500
DST Uphole Tension
pounds
5000 0
Replay Scale 1:600

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

Plotted on 03-DEC-2012 21:01
Recorded on 03-DEC-2012 17:55

2 INCH MAIN

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

Plotted on 03-DEC-2012 21:01
Recorded on 03-DEC-2012 17:55

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts
– → | 20 | ← +

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

Shallow FE
ohm metres
0.20 1 10 100 1000 2000

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

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

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

200

Casing Shoe

Shallow FE →

← Spontaneous Potential

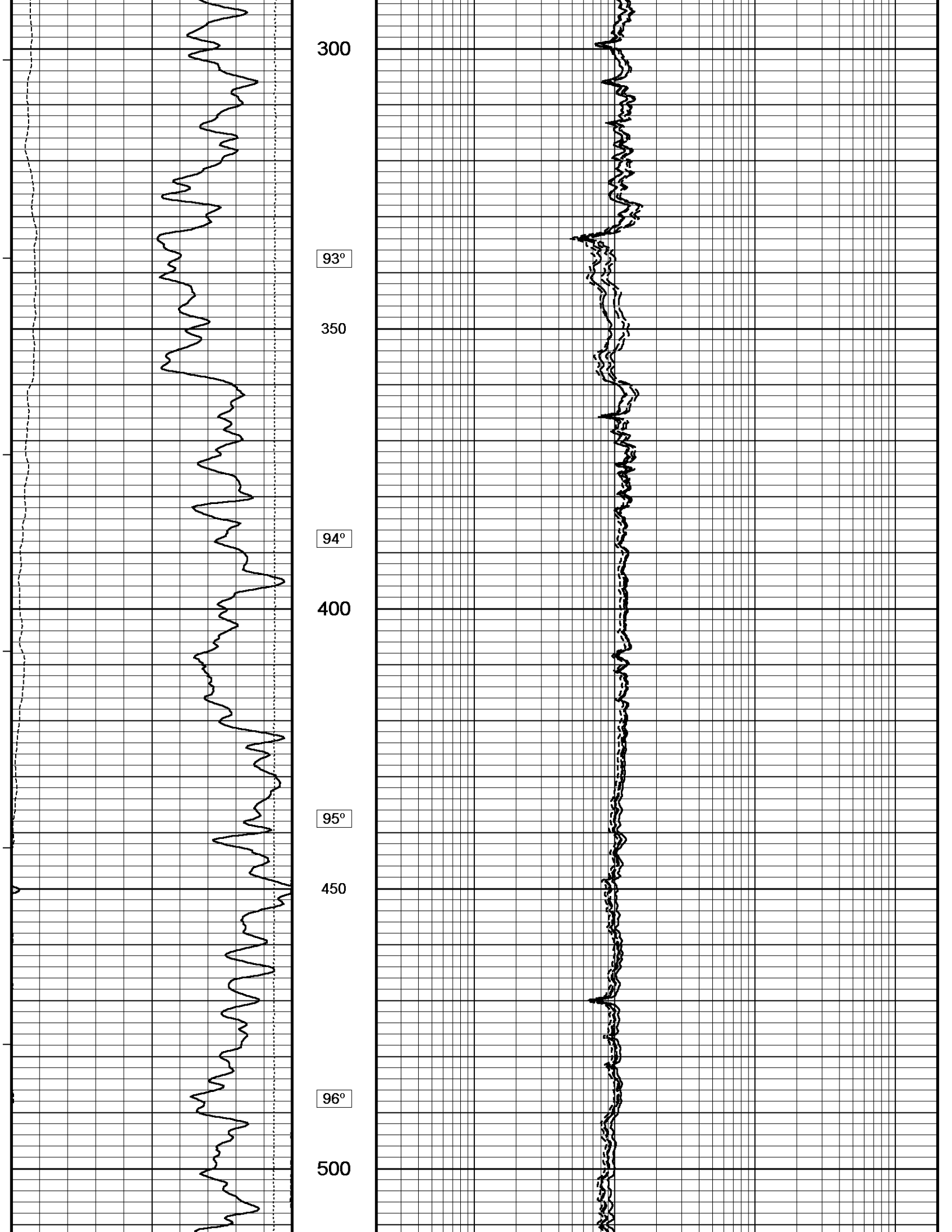
← Gamma Ray

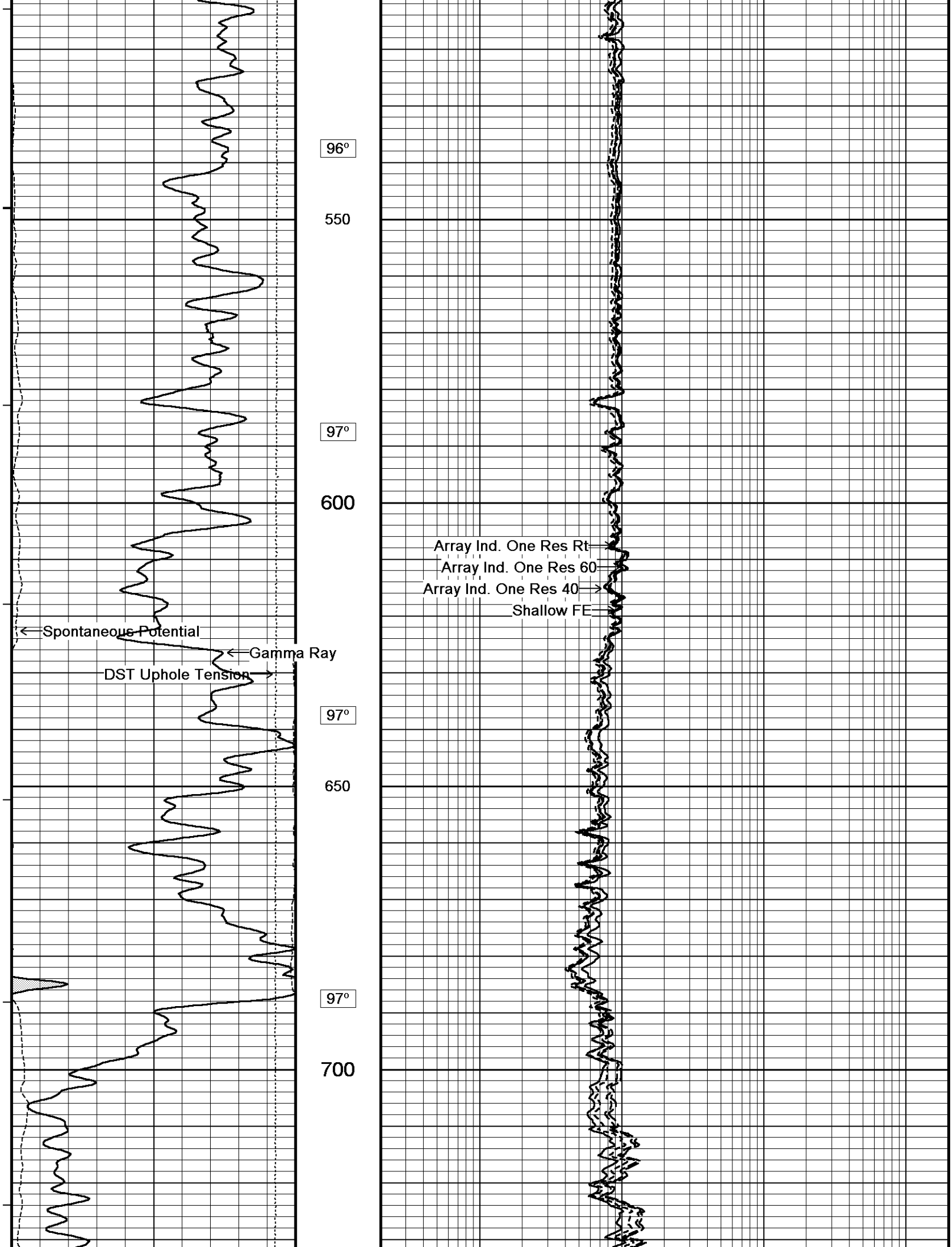
DST Uphole Tension →

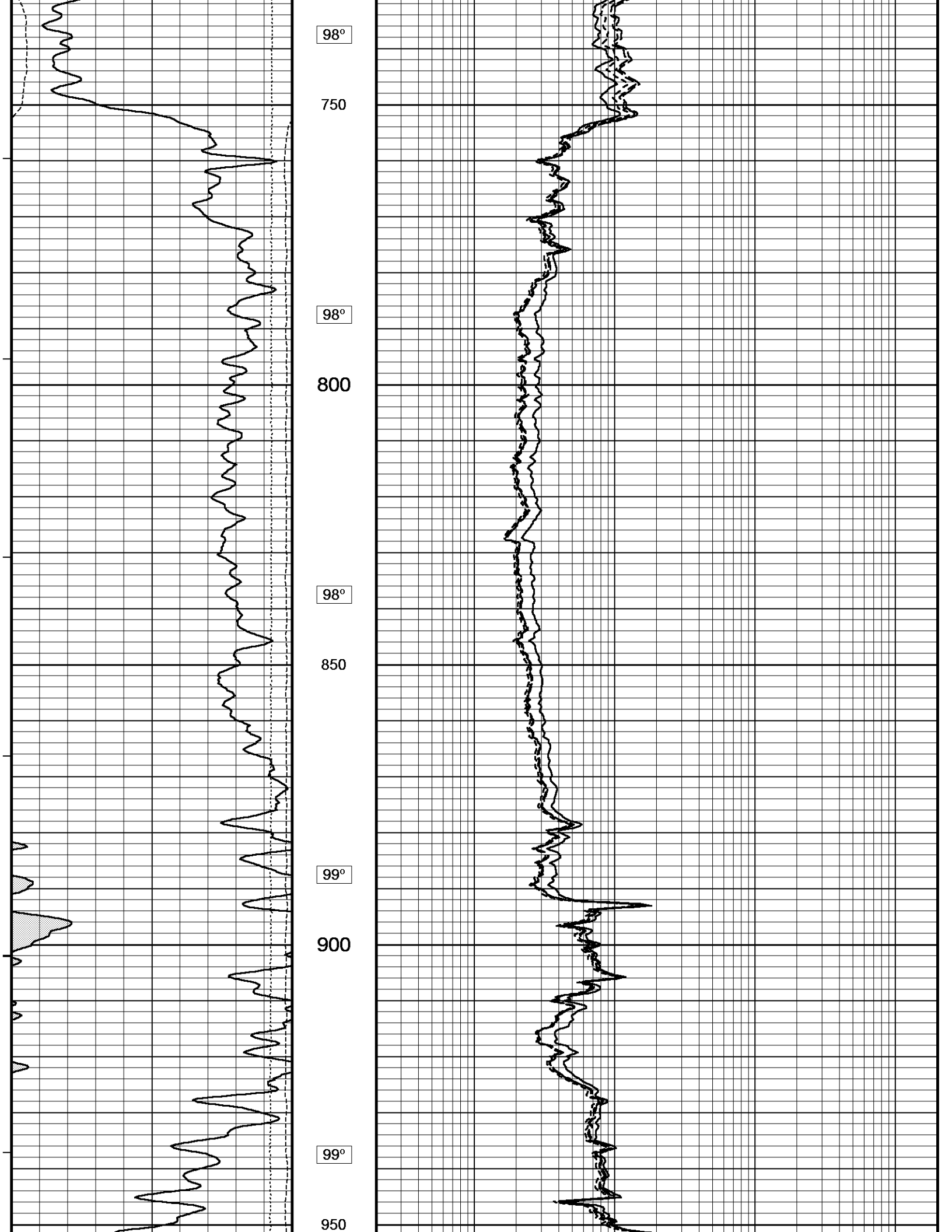
91°

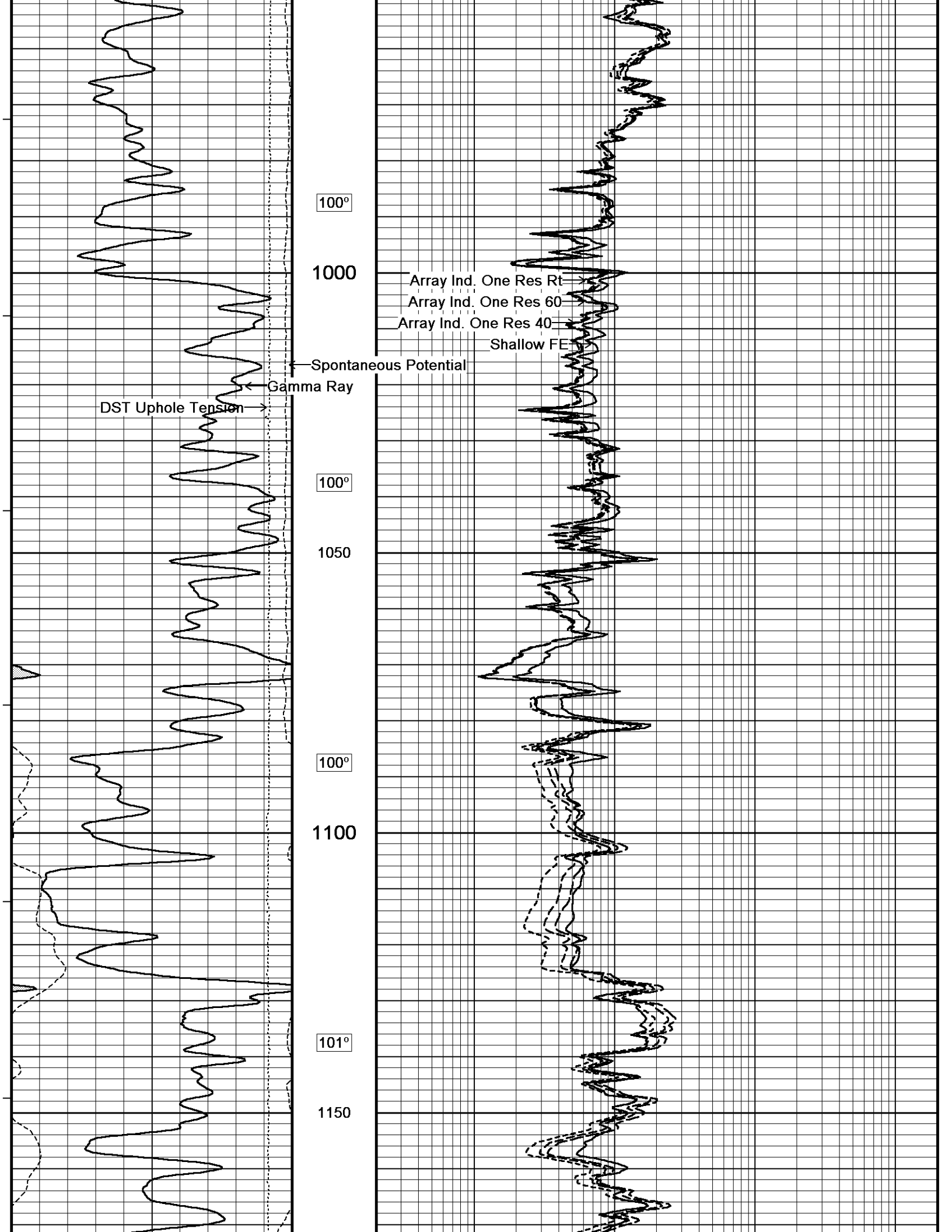
250

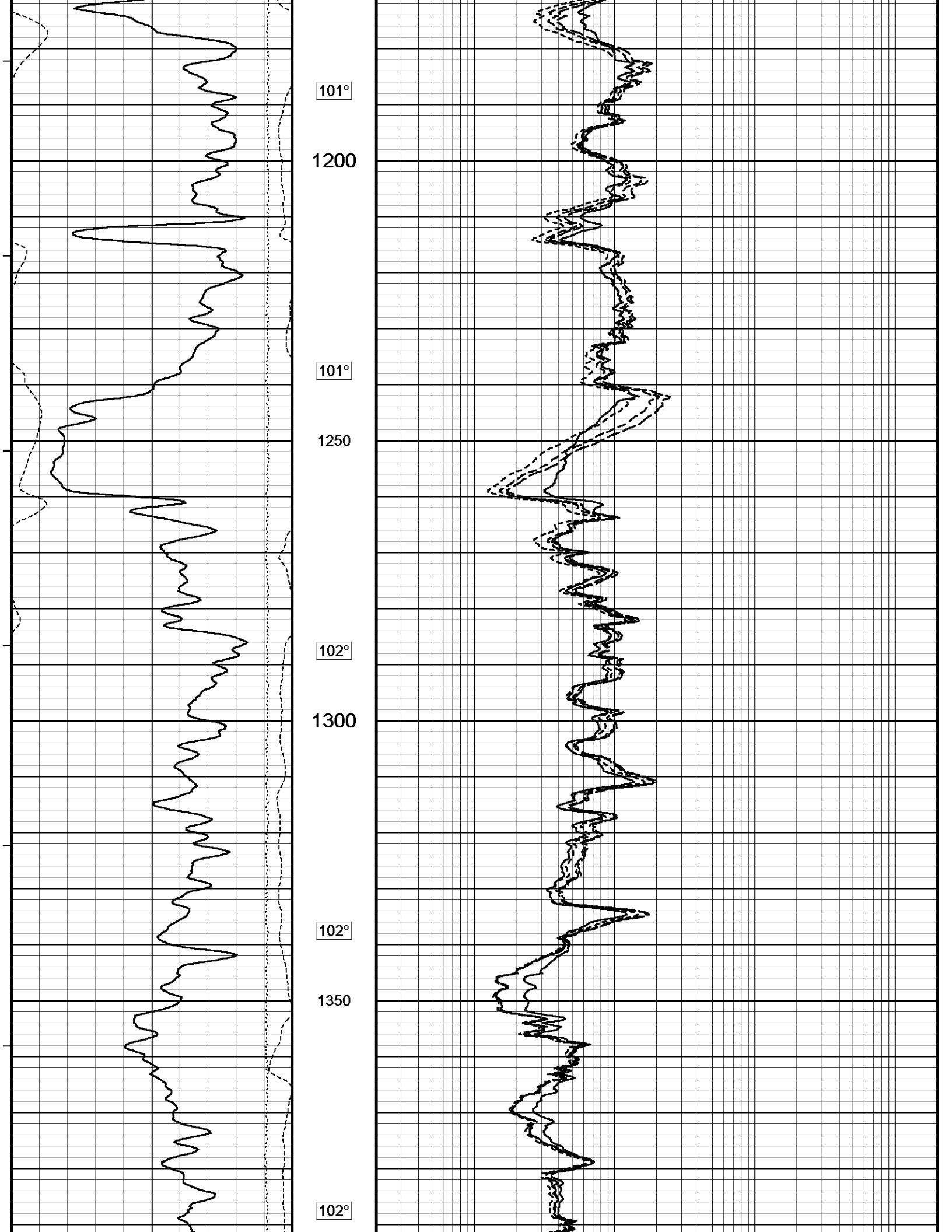
92°

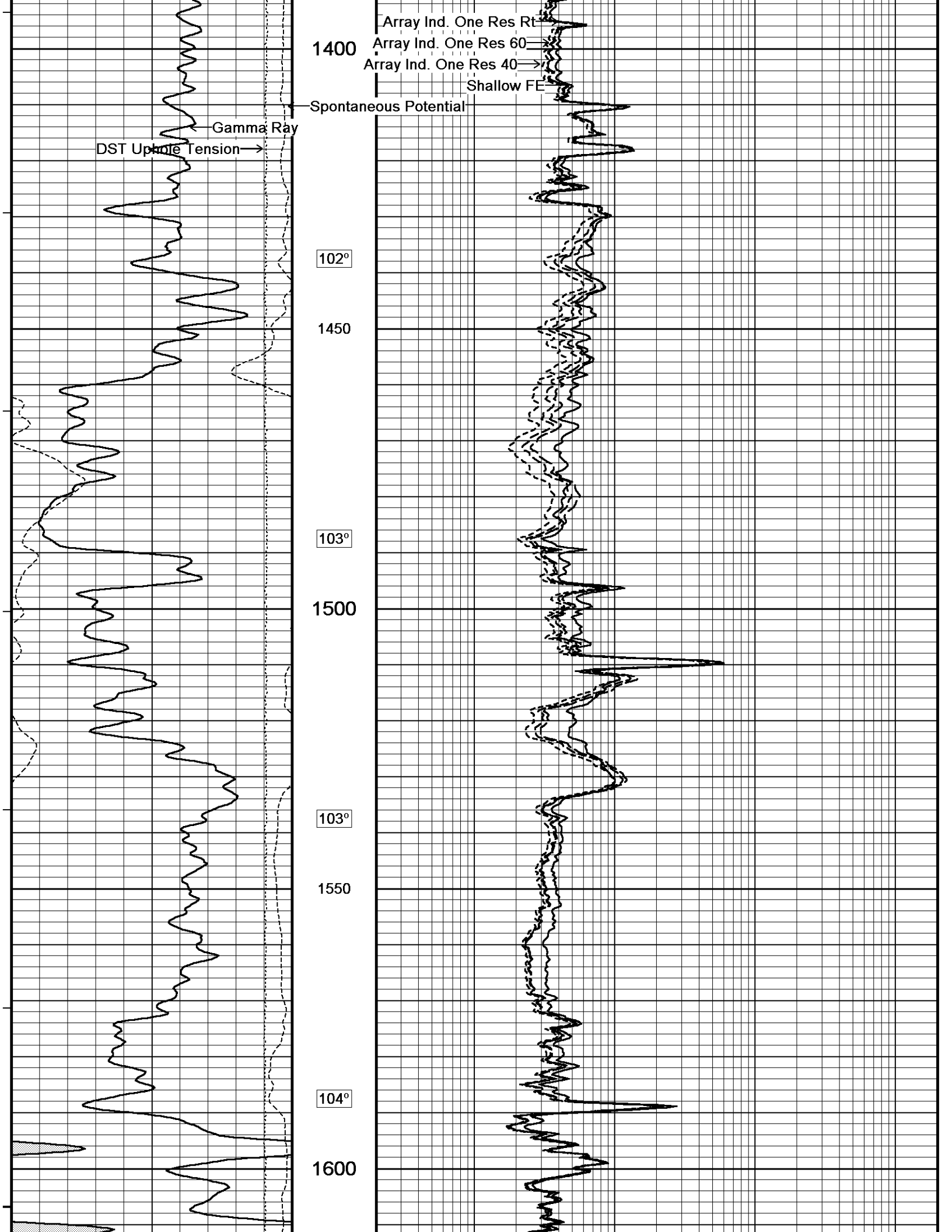

300
93°
350
94°
400
95°
450
96°
500

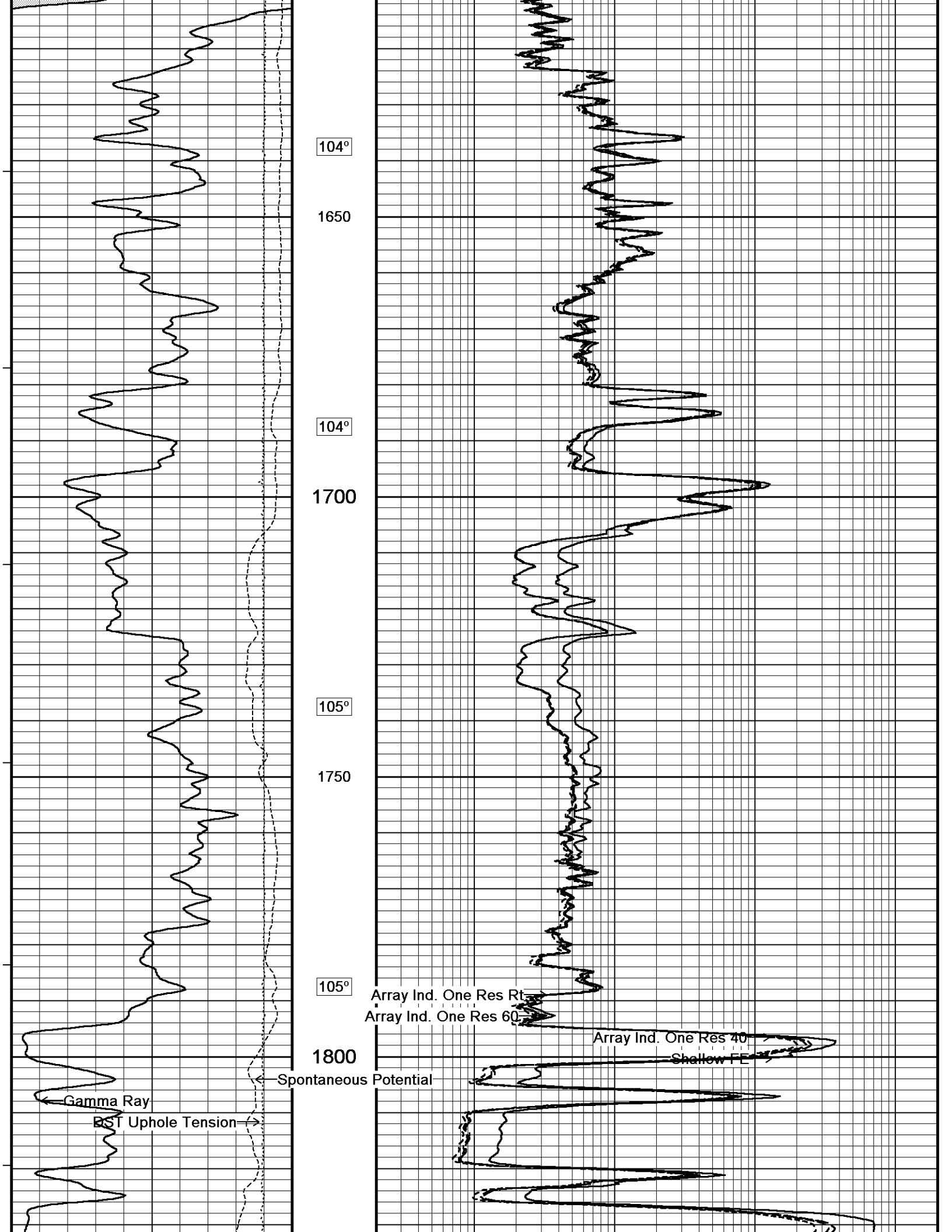

96°
550
97°
600
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
97°
650
97°
700

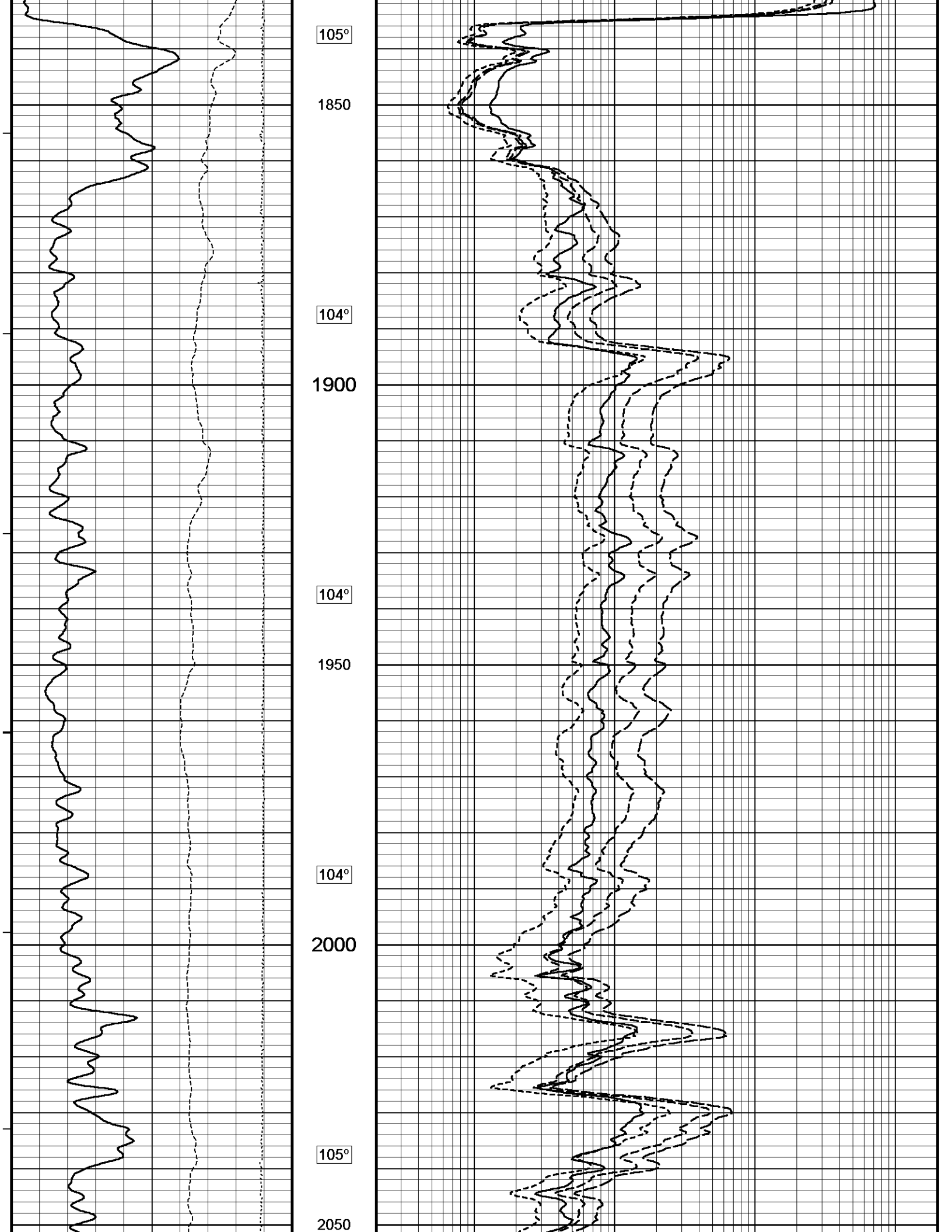

98°
750
98°
800
98°
850
99°
900
99°
950

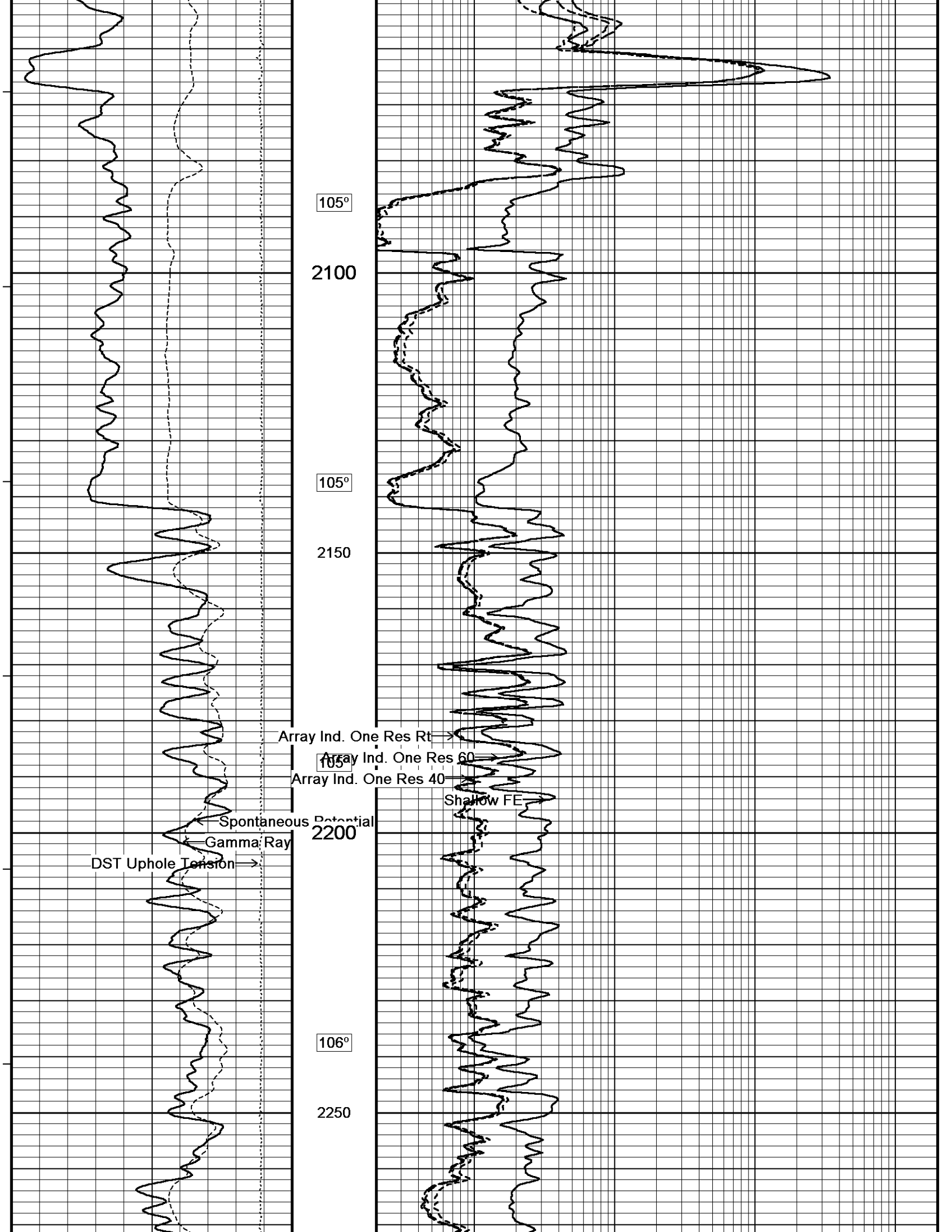

100°
1000
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
100°
1050
100°
1100
101°
1150

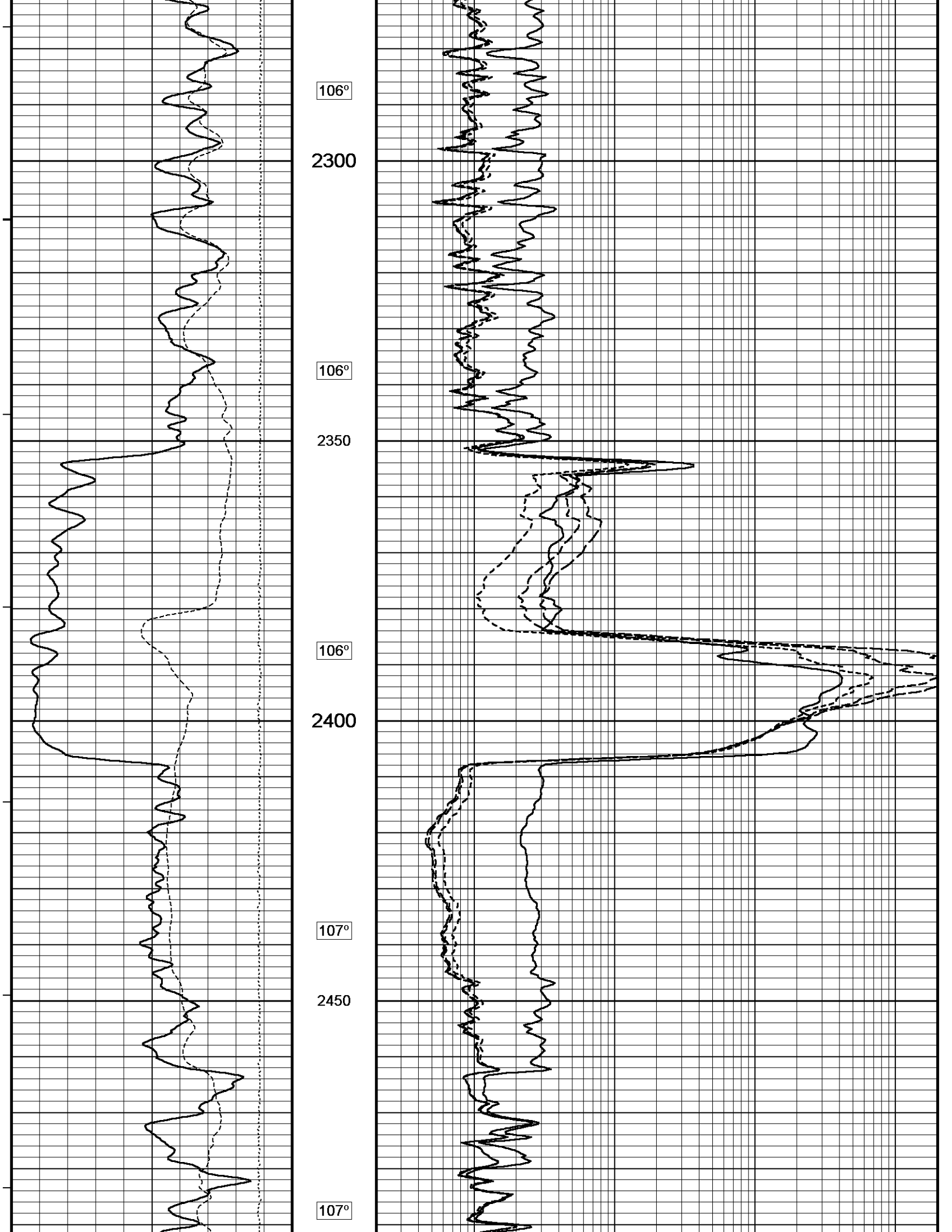

101°
1200
101°
1250
102°
1300
102°
1350
102°

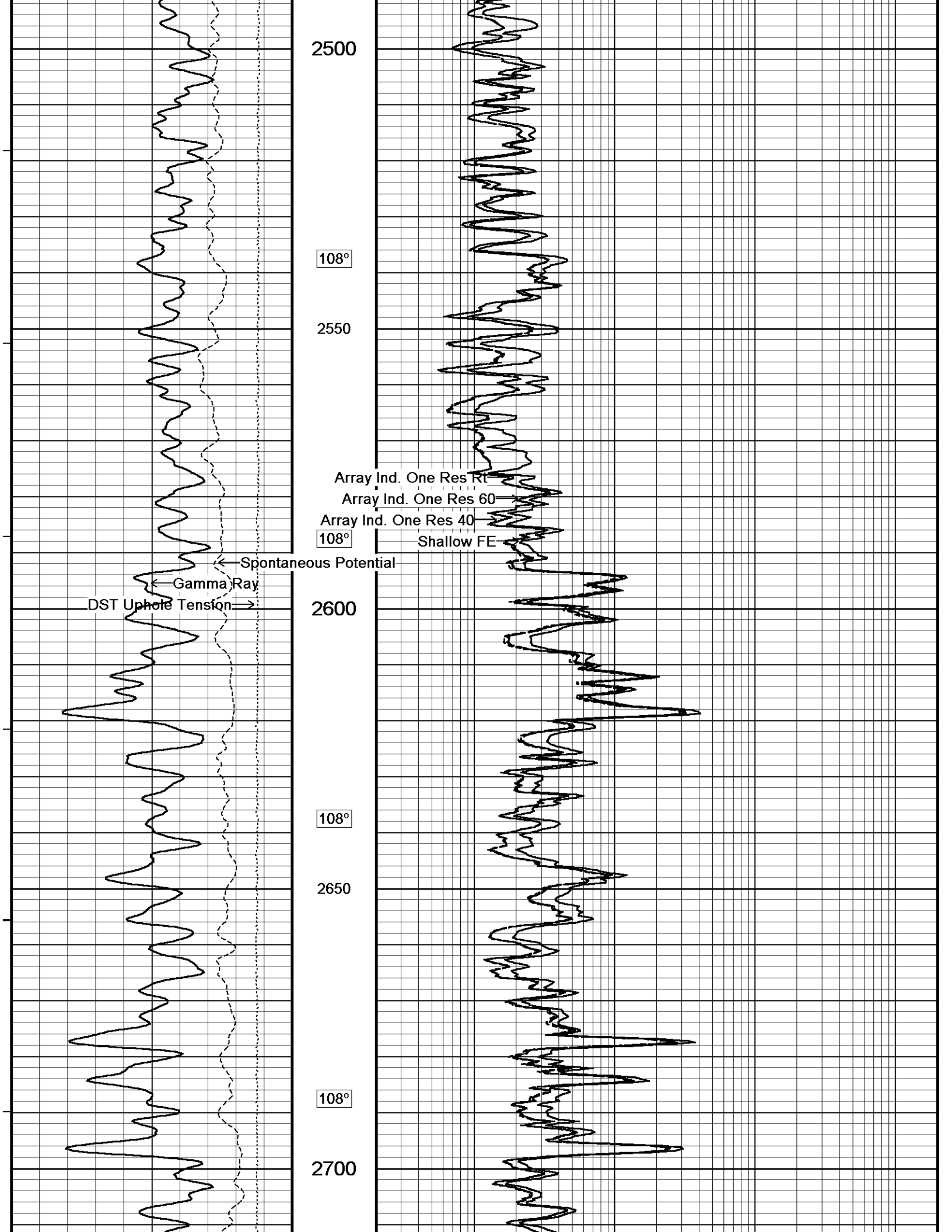

Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
1400
102°
1450
103°
1500
103°
1550
104°
1600

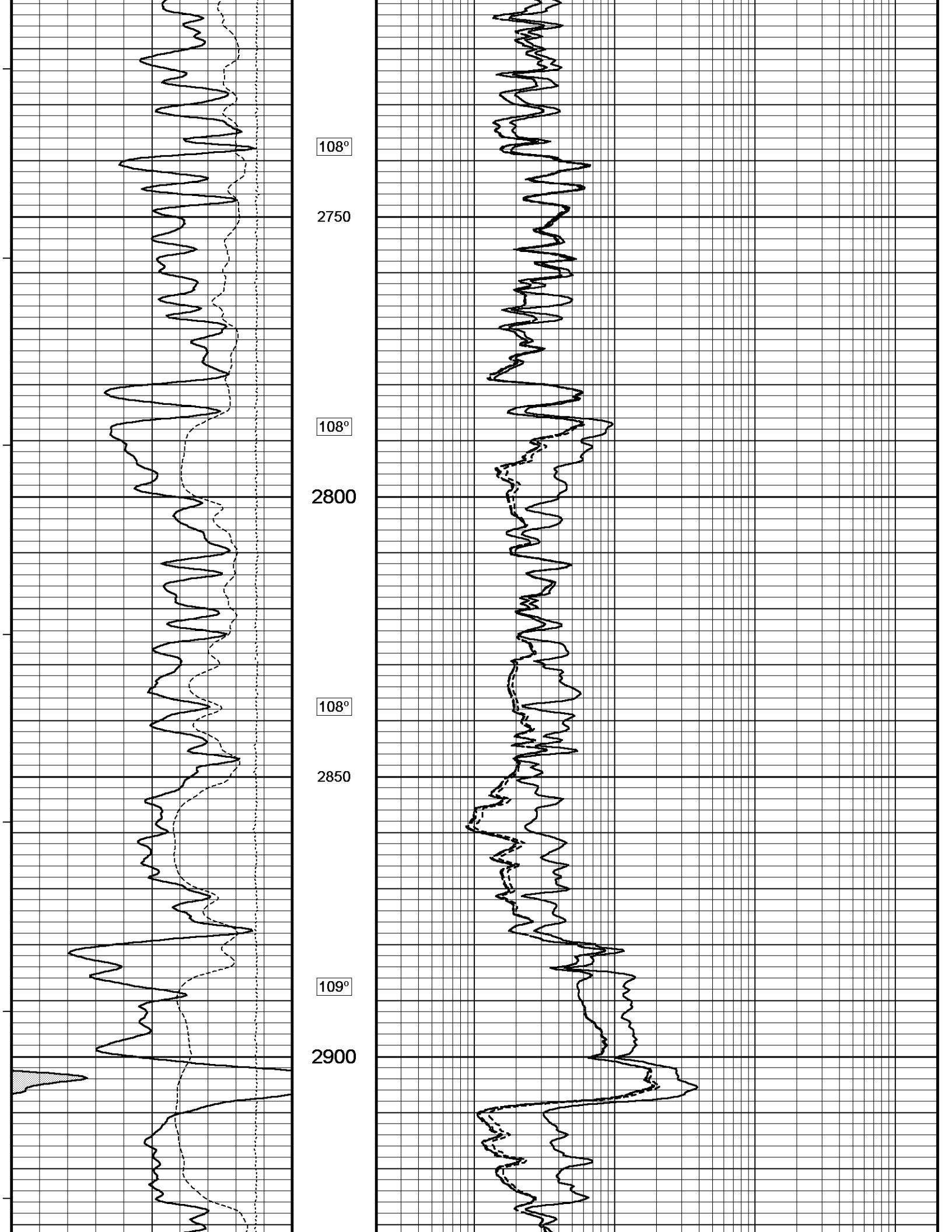

104°
1650
104°
1700
105°
1750
105°
1800
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension

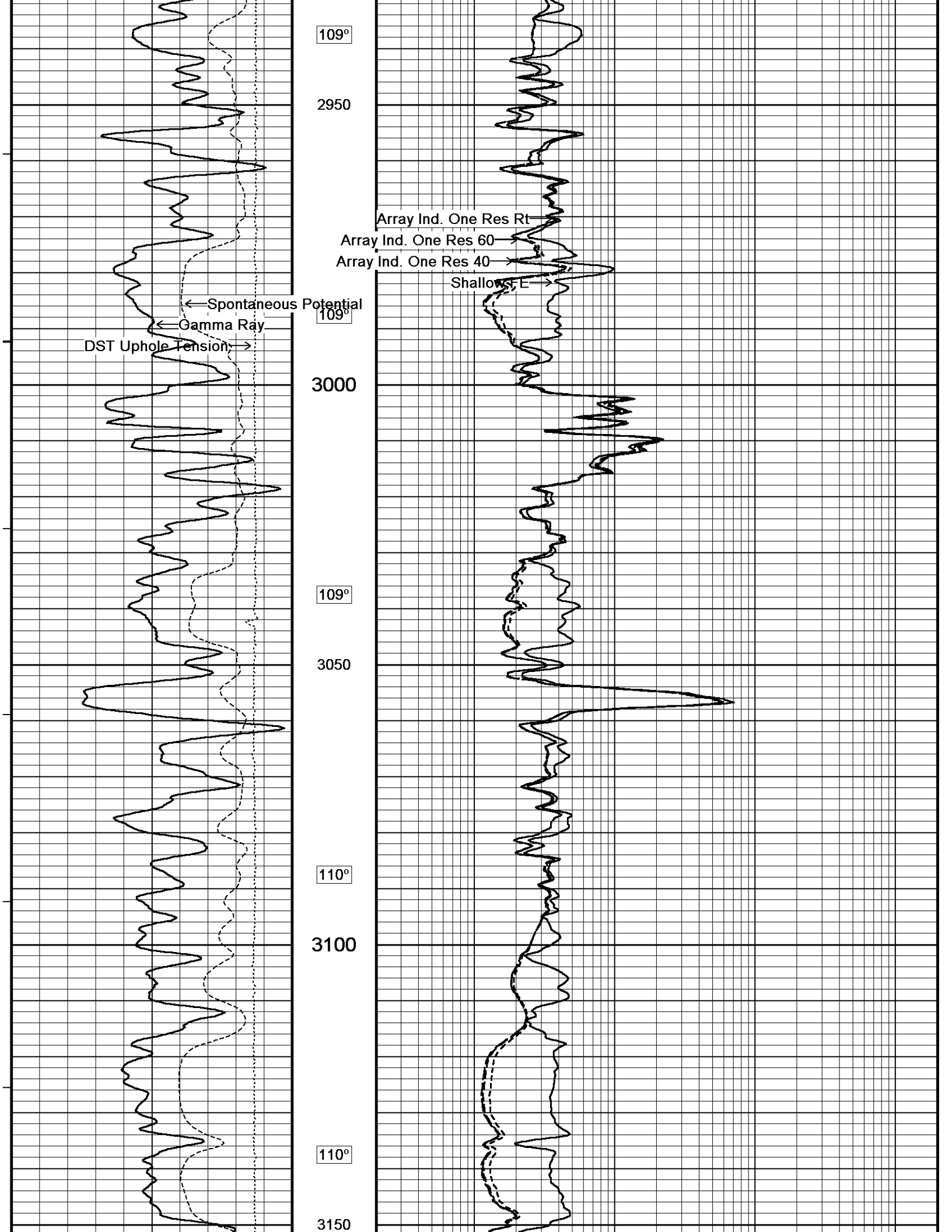

105°
1850
104°
1900
104°
1950
104°
2000
105°
2050

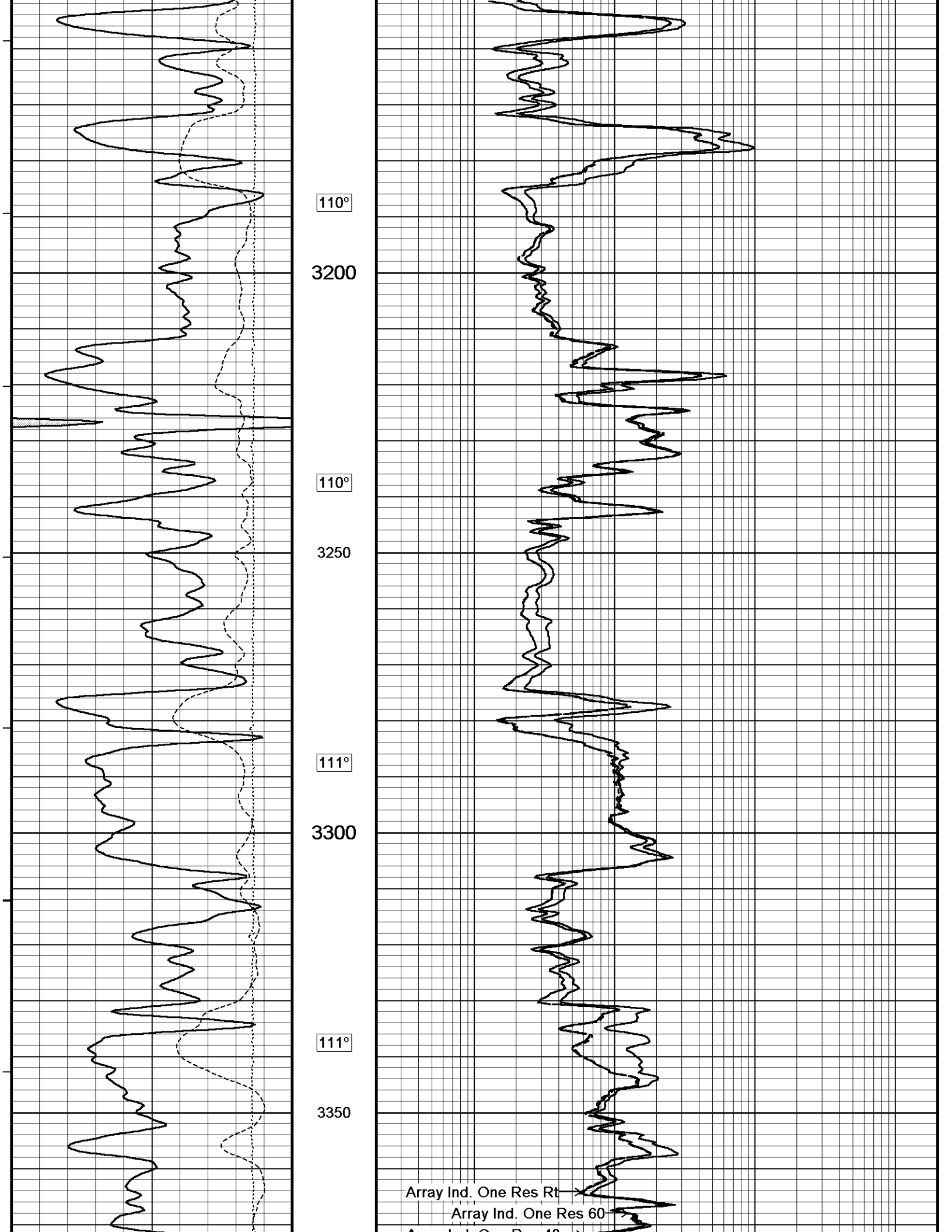

105°
2100
105°
2150
Array Ind. One Res Rt
Array Ind. One Res 60
105
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
2200
Gamma Ray
DST Uphole Tension
106°
2250

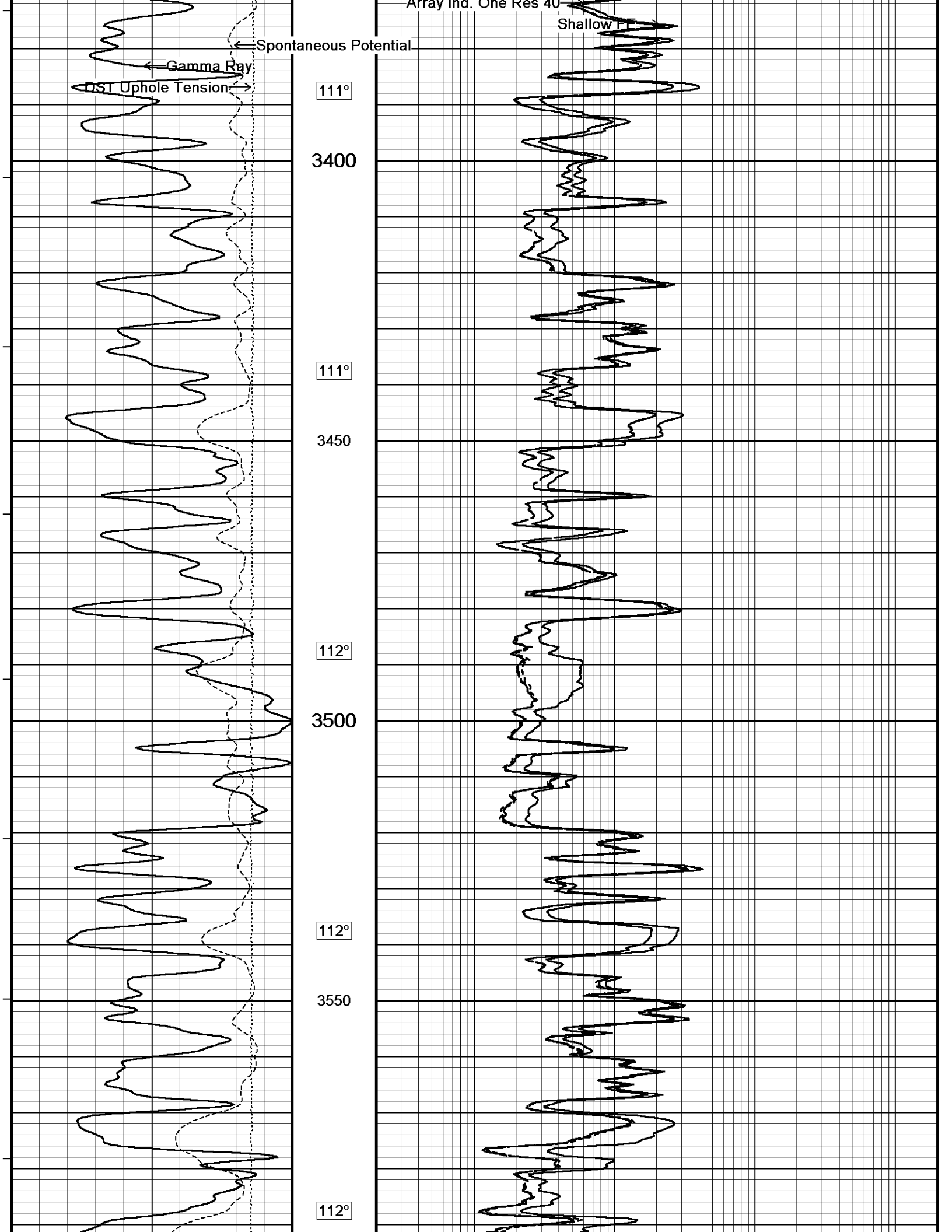

106°
2300
106°
2350
106°
2400
107°
2450
107°

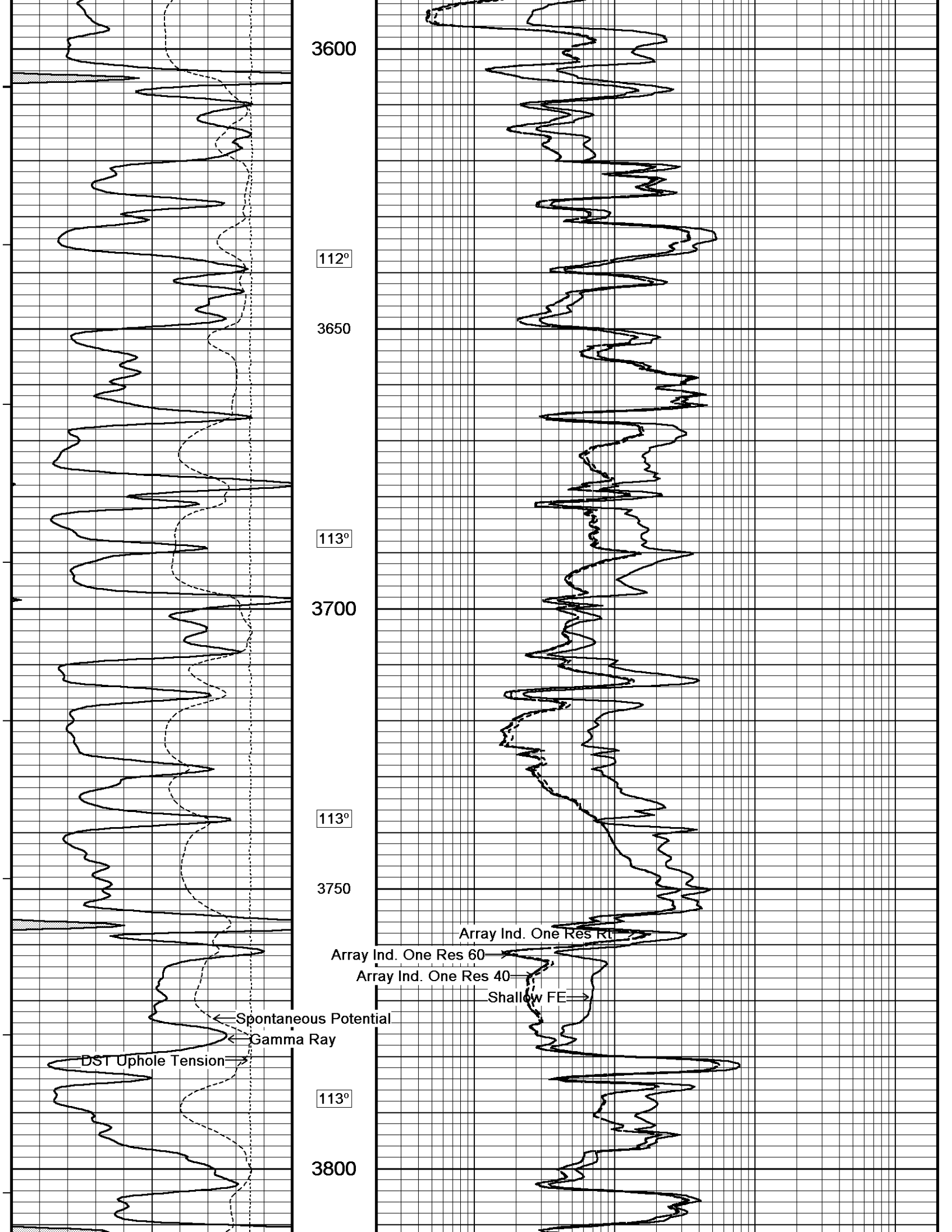

2500
108°
2550
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
108°
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
2600
108°
2650
108°
2700

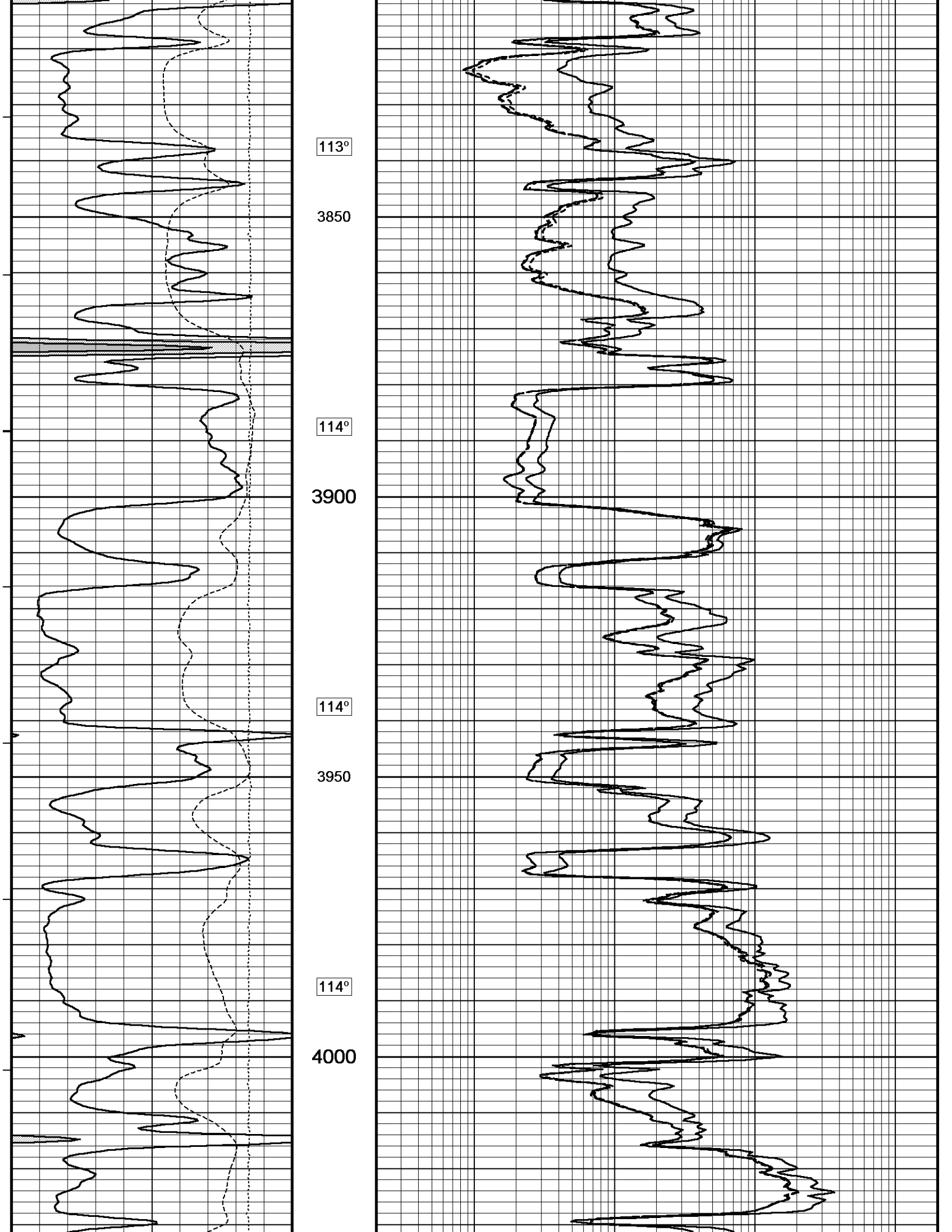

108°
2750
108°
2800
108°
2850
109°
2900

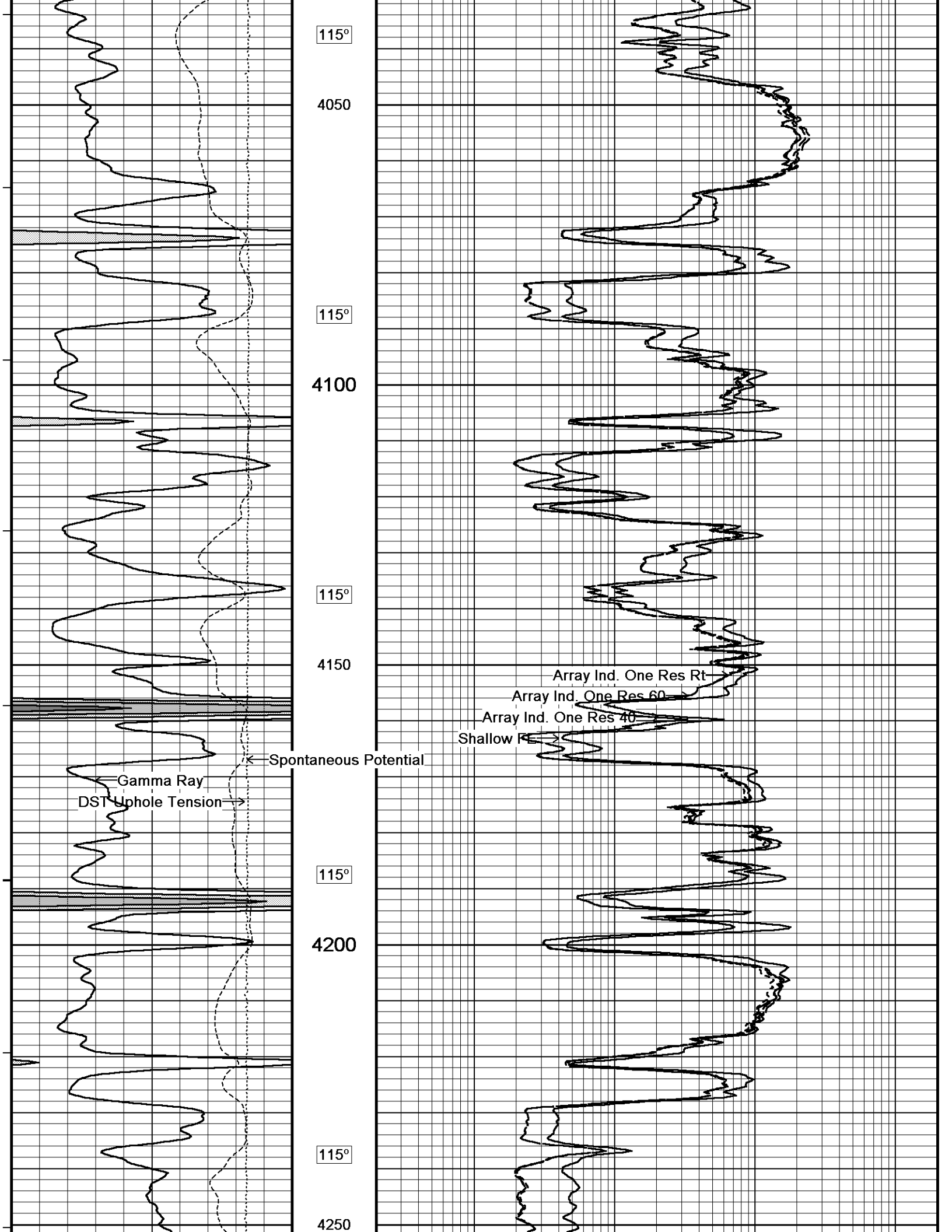

109°
2950
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
109°
Gamma Ray
DST Uphole Tension
3000
109°
3050
110°
3100
110°
3150

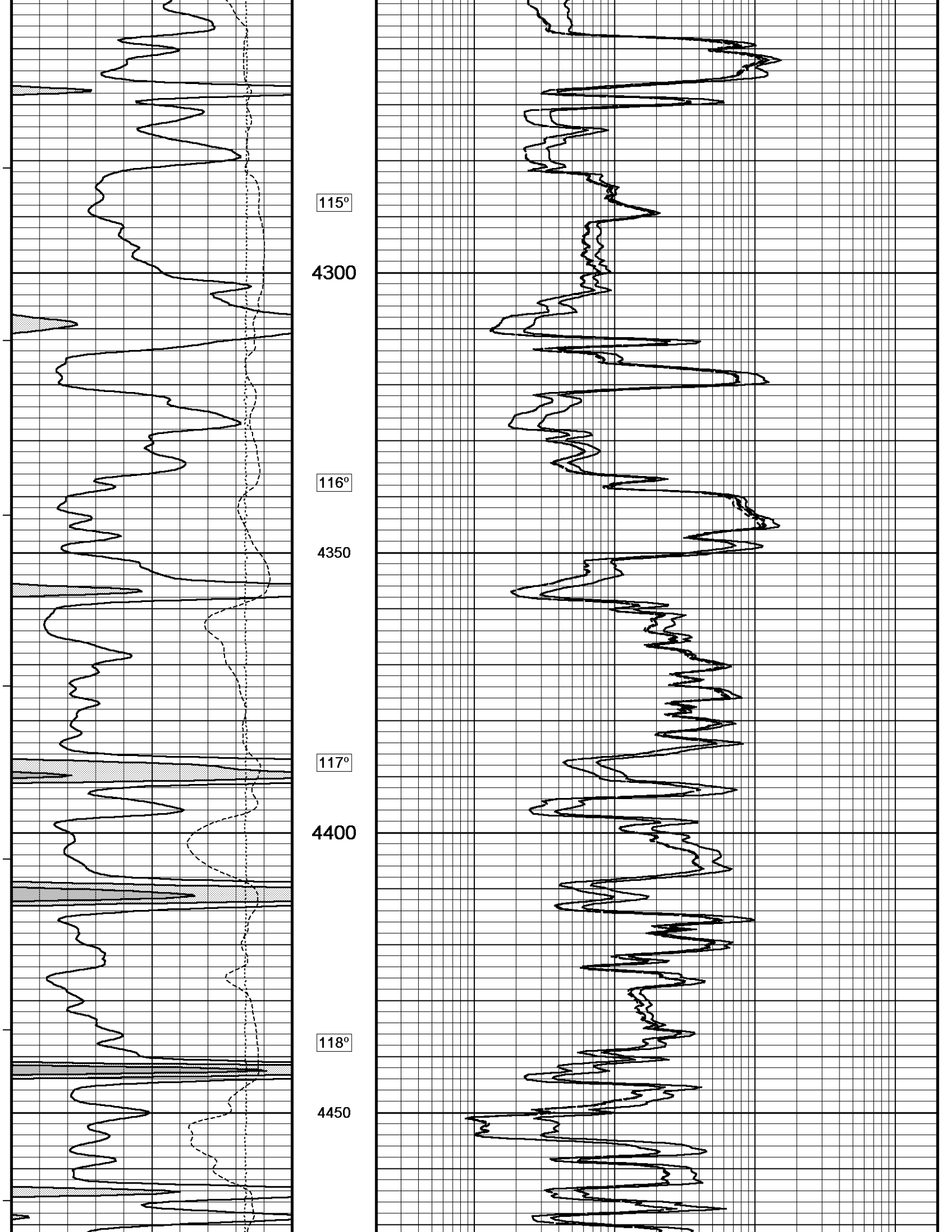

110°
3200
110°
3250
111°
3300
111°
3350
Array Ind. One Res Rt
Array Ind. One Res 60

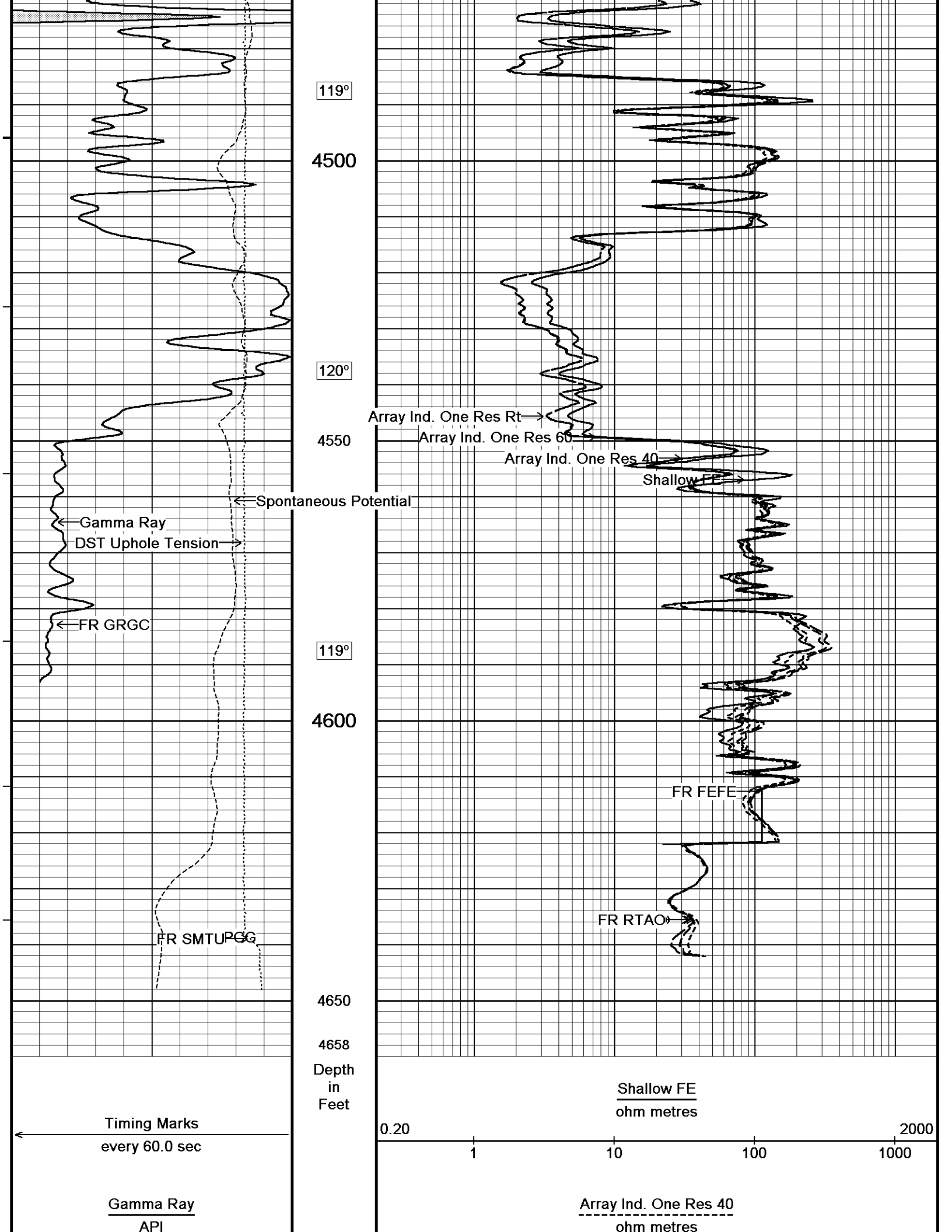

Array Ind. One Res 40
Shallow Rt
Spontaneous Potential
Gamma Ray
DST Uphole Tension
111°
3400
111°
3450
112°
3500
112°
3550
112°

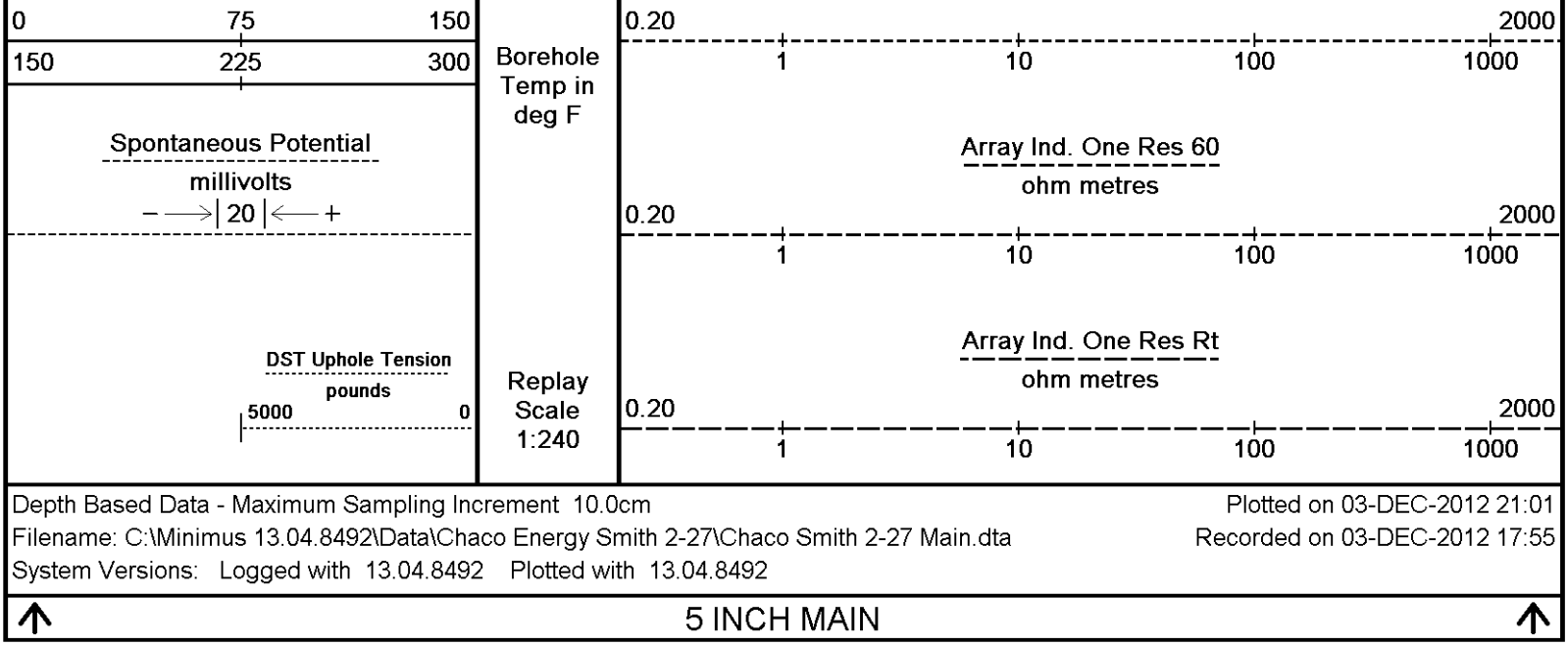

3600
112°
3650
113°
3700
113°
3750
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
113°
3800


113°
3850
114°
3900
114°
3950
114°
4000


115°
4050
115°
4100
115°
4150
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow RT
Spontaneous Potential
Gamma Ray
DST Uphole Tension
115°
4200
115°
4250


115°
4300
116°
4350
117°
4400
118°
4450


119°
4500
120°
4550
119°
4600
4650
4658
Depth
in
Feet
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
FR GRGC
FR FEFE
FR RTAO
FR SMTUPCG
Timing Marks
every 60.0 sec
Gamma Ray
API
Shallow FE
ohm metres
0.20
1
10
100
1000
2000
Array Ind. One Res 40
ohm metres

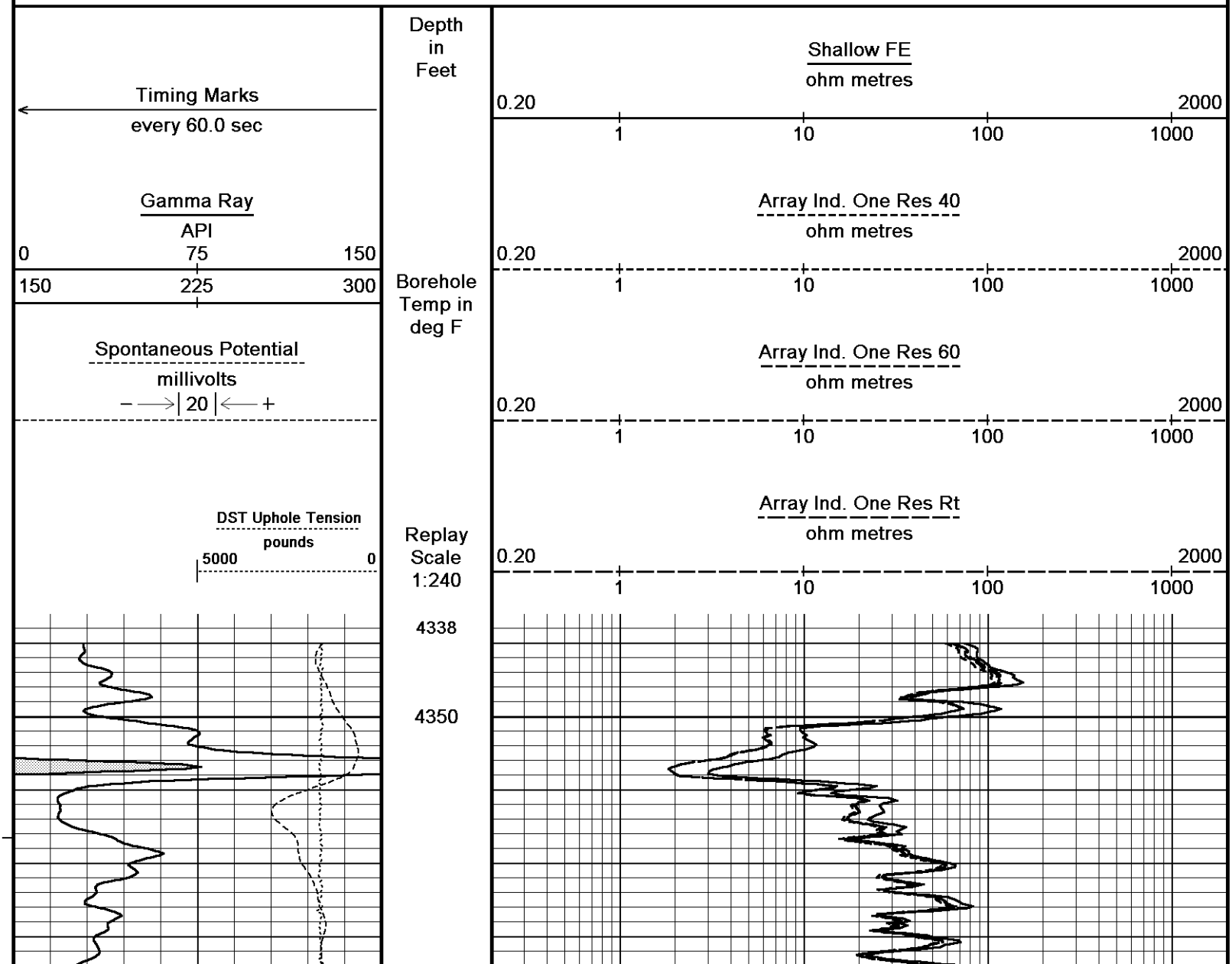


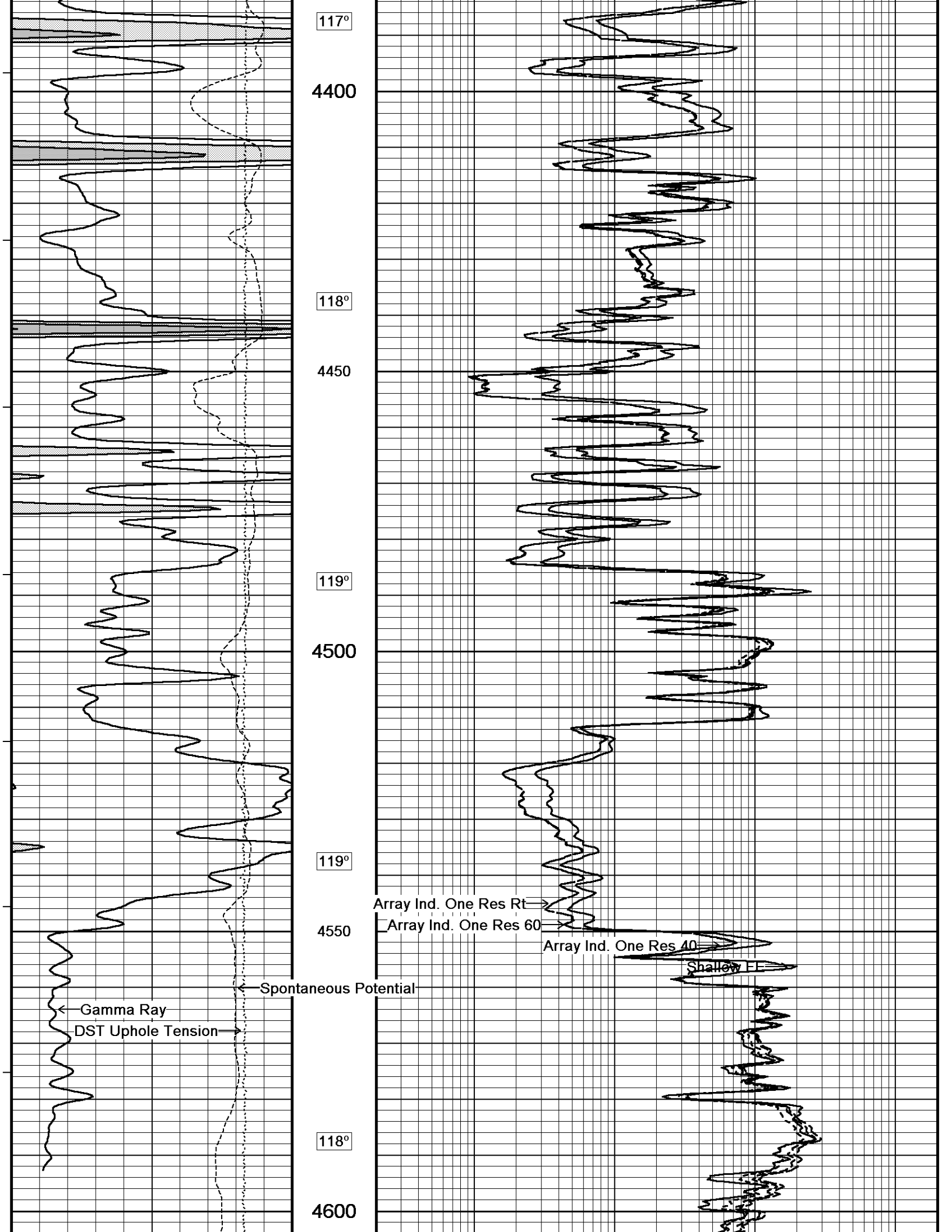
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 03-DEC-2012 21:01
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta — Recorded on 03-DEC-2012 17:55
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

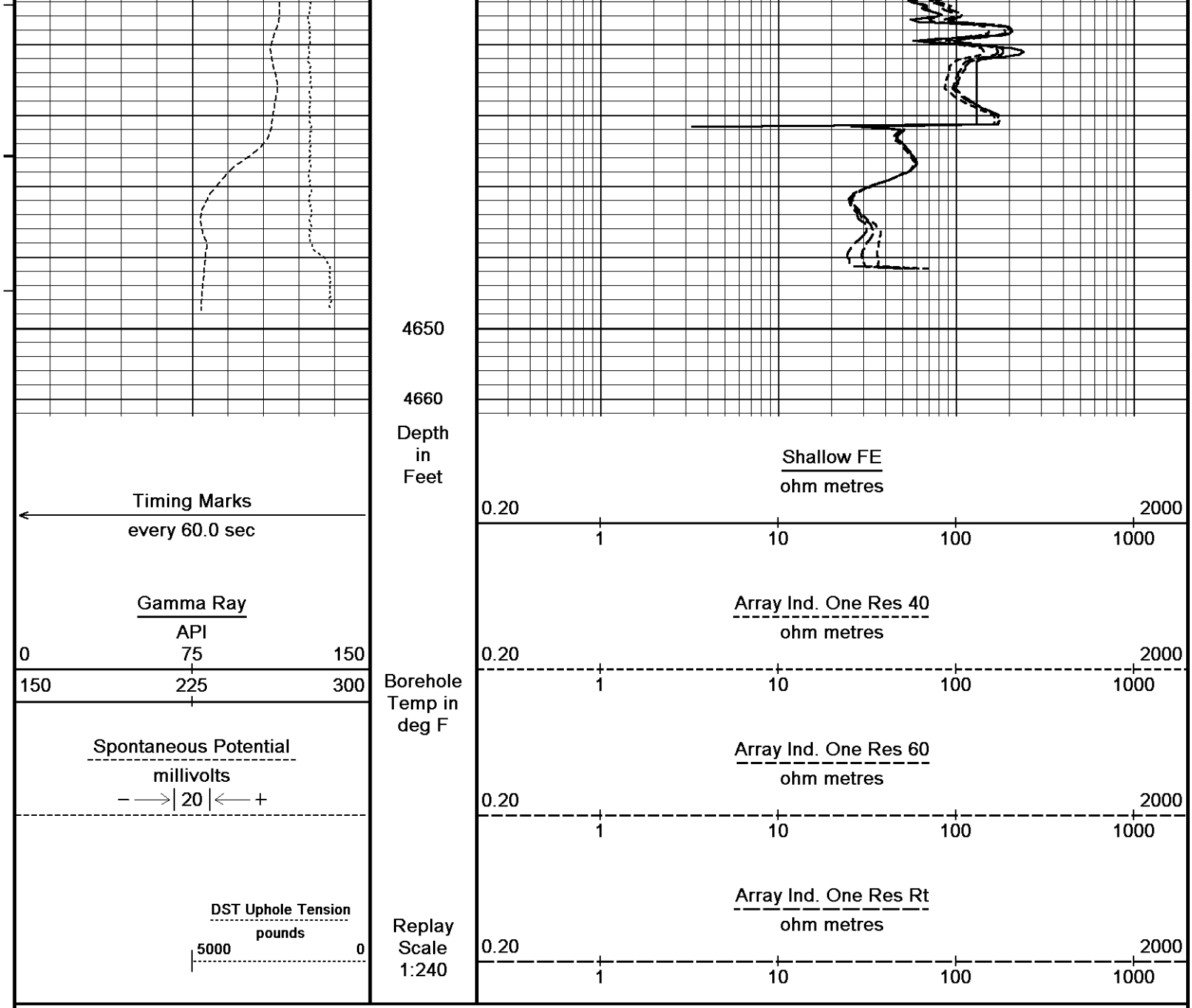
5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 03-DEC-2012 21:01
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Repeat.dta — Recorded on 03-DEC-2012 17:33
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492




117°
4400
118°
4450
119°
4500
119°
4550
118°
4600
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension



Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 03-DEC-2012 21:01
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Repeat.dta
Recorded on 03-DEC-2012 17:33
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta

General Constants All 000

Last Edited on 03-DEC-2012,12:40

General Parameters		
Mud Resistivity	0.890	ohm-metres
Mud Resistivity Temperature	102.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	

Rwa Parameters

Porosity used	Base Density Porosity
Resistivity used	Array Ind. Four Res Rt
RWA Constant A	1.000
RWA Constant M	2.000

Down-hole Tension Calibration SMS 0

Field Calibration on 03-DEC-2012 16:33

Reading No	Measured	Calibrated (lbs)
1	14224.14	0.00
2	14255.74	470.00

SP Calibration MCG-C 208

Field Calibration on 07-NOV-2012 10:11

	Measured	Calibrated (mV)
Reference 1	101.1	100.7
Reference 2	-100.5	-100.7

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 05-NOV-2012,14:26

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

High Resolution Temperature Constants MCG-C 208

Last Edited on 05-NOV-2012,14:25

Pre-filter Length	11

Gamma Calibration MCG-C 208

Field Calibration on 02-DEC-2012 12:03

	Measured	Calibrated (API)
Background	77	54
Calibrator (Gross)	1114	779
Calibrator (Net)	1037	725

Gamma Constants MCG-C 208

Last Edited on 02-DEC-2012,16:05

Gamma Calibrator Number	GR38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

Micro Laterolog Calibration MMR-A 11

Base Calibration on 31-DEC-1999 00:00
Field Check on 31-DEC-1999 00:00

Base Calibration

Measured		Calibrated (ohm-m)	
Ref 1	Ref 2	Ref 1	Ref 2
0.0	0.0	0.0	0.0

Base Check (ohm-m)	Field Check (ohm-m)
0.0	0.0

Micro Laterolog Constants MMR-A 11

Last Edited on 12-NOV-2012,01:59

Pad Type	6 in Solid Nylon B23059	
Micro Laterolog K Factor	0.0128	
Standoff Offset	0.0000	inches

Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper	N/A	
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	68.00	Deg F
Mud Cake Resistivity Source	Constant Value	
Temp. Source Rmc Correc.	N/A	

Caliper Calibration MMR-A 11

Base Calibration on 19-NOV-2012 09:29
Field Calibration on 02-DEC-2012 11:57

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13673	5.98
2	16880	7.97

3	20107	9.86
4	24060	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.03	5.98

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 19-NOV-2012 09:34
Field Check on 02-DEC-2012 11:56

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.3	59.8	5.0	25.0
Micro Inverse	15.5	77.5	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.5	76.5
Micro Inverse	58.7	58.7

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 05-NOV-2012,13:54

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	0.0000	inches

Neutron Calibration MDN-A.B 65

Base Calibration on 05-NOV-2012 09:18
Field Check on 02-DEC-2012 12:08

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3015	94	3714	110
Ratio	32.234		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1713	2459
Ratio	0.697	

Field Check

	Calibrated (cps)	
	1700	2446
Ratio	0.690	

Neutron Constants MDN-A.B 65

Last Edited on 02-DEC-2012,12:03

Neutron Source Id	PN-521	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
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-B.J 352

Base Calibration on 05-NOV-2012 14:17
Field Check on 02-DEC-2012 11:49

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	964.3	126.8

Base Check	281.3
Field Check	281.5

FE Constants MFE-B.J 352

Last Edited on 03-DEC-2012,16:38

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Caliper Source for FE correction	Bit Size	
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

High Resolution Temperature Calibration MAI-A.A 45

Field Calibration on 05-NOV-2012,14:25

	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 07-NOV-2012,09:50

Pre-filter Length	11

Induction Calibration MAI-A.A 45

Base Calibration on 05-NOV-2012,09:49
Field Check on 02-DEC-2012 11:45

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) 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) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1			18.7	3851.3
2			31.9	3629.4
3			28.8	3049.5
4			18.4	2079.3
Deep			16.2	1911.3
Medium			42.7	4060.6
Shallow			49.8	5483.0

Array Temperature	62.3	Deg F

Induction Constants MAI-A.A 45

Last Edited on 02-DEC-2012,11:43

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	
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	

Sonic Constants MSS-C.K 330

Last Edited on 03-DEC-2012,17:09

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
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
3' Waveform Filter	N/A	
4' Waveform Filter	N/A	
5' Waveform Filter	N/A	
6' Waveform Filter	N/A	
Semblance Level	N/A	
Semblance Window Width	N/A	micro-sec

Sonic 1 Despiker	N/A	N/A
Sonic 2 Despiker	N/A	N/A

Caliper Calibration MPD-B 31

Base Calibration on 29-NOV-2012 09:28
Field Calibration on 02-DEC-2012 11:49

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15376	3.99
2	23920	5.98
3	32624	7.97
4	40960	9.86
5	50336	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.96	5.98

Photo Density Calibration MPD-B 31

Base Calibration on 29-NOV-2012 09:55
Field Check on 02-DEC-2012 11:55

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	46639	23534	59556	30836
Reference 2	18878	1942	24941	2541

Field Check at Base

681.8	842.8

Field Check

683.4	846.1

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	126	606		
Reference 1	19142	46516	0.414	0.371
Reference 2	5691	18799	0.306	0.272

Field Check at Base

126.3	606.0

Field Check

126.8	606.8

Density Constants MPD-B 31

Last Edited on 02-DEC-2012,16:04

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	1.10	gm/cc
Mud Density Z/A Multiplier	1.11	
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 (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

DOWNHOLE EQUIPMENT

C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

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

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.88 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-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Sonic
MSS-C.K 330 LG: 12.52 ft WT: 72.8 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: 62.88 ft Weight: 471.8 lb

56.02 ft	GRGC - Gamma Ray
53.11 ft	CGXT - MCG External Temperature
45.76 ft	MBTC - MMR Caliper
45.76 ft	MINV - MMR MicroLog Inverse
45.76 ft	MNRL - MMR MicroLog Normal
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
12.96 ft	DT35 - 3-5' Compensated Sonic
12.96 ft	SPRL - Wyllie Lime. Sonic Por.
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	RTAO - Array Ind. One Res Rt
3.34 ft	R60O - Array Ind. One Res 60
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	CHACO ENERGY CO.
WELL	SMITH 2-27
FIELD	LOCH
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2901.00	feet	First Reading	4636.00	feet
Elevation Drill Floor	2899.00	feet	Depth Driller	4640.00	feet
Elevation Ground Level	2892.00	feet	Depth Logger	4639.00	feet

ARRAY INDUCTION

SHALLOW FOCUSED

Weatherford® SHALLOW FOCUSED ELECTRIC LOG

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

Weatherford

COMPANY	CHACO ENERGY CO.	
WELL	SMITH 2-27	
FIELD	LOCH	
PROVINCE/COUNTY	LOGAN	
COUNTRY/STATE	U.S.A. / KANSAS	
LOCATION	335' FSL & 2605' FEL	
SEC 27	TWP 13S	RGE 32W
API Number	15-109-21145	Other Services: MPD/MDN, MML, MSS
Permit Number		
Permanent Datum G.L., Elevation 2892 feet		Elevations: feet
Log Measured From KB		KB 2901.00
Drilling Measured From K.B. @ 9 FEET		DF 2899.00
		GL 2892.00

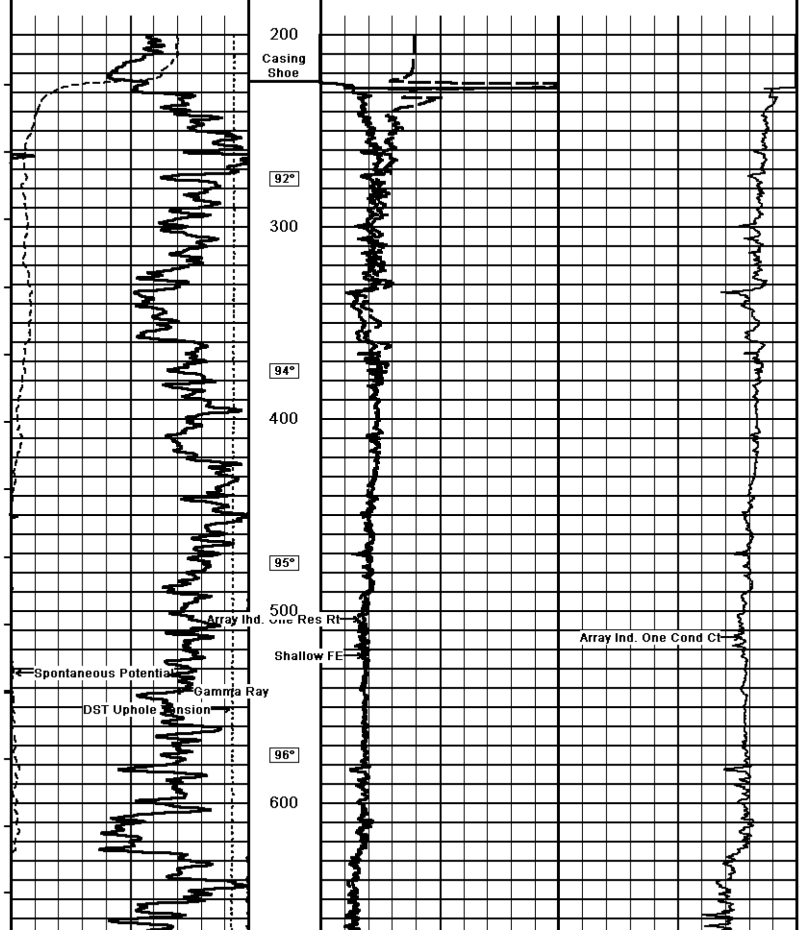
Date	03-DEC-2012		
Run Number	ONE		
Service Order	3538958		
Depth Driller	4640.00	feet	
Depth Logger	4639.00	feet	
First Reading	4636.00	feet	
Last Reading	224.00	feet	
Casing Driller	225.00	feet	
Casing Logger	224.00	inches	
Bit Size	7.875		
Hole Fluid Type	CHEMICAL	lb/USg	
Density / Viscosity	9.20 lb/USg	55.00 CP	
PH / Fluid Loss	10.50	10.50	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.89 @102.0	ohm-m	
Rmf @ Measured Temp	0.71 @102.0	ohm-m	
Rmc @ Measured Temp	1.07 @102.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.76 @119.0	ohm-m	
Time Since Circulation	4 HOURS		
Max Recorded Temp	119.00	deg F	
Equipment / Base	13057	LIB	
Recorded By	R. HOFFMAN		
Witnessed By	AUSTIN GARNER		
JOB #	LB12-321		

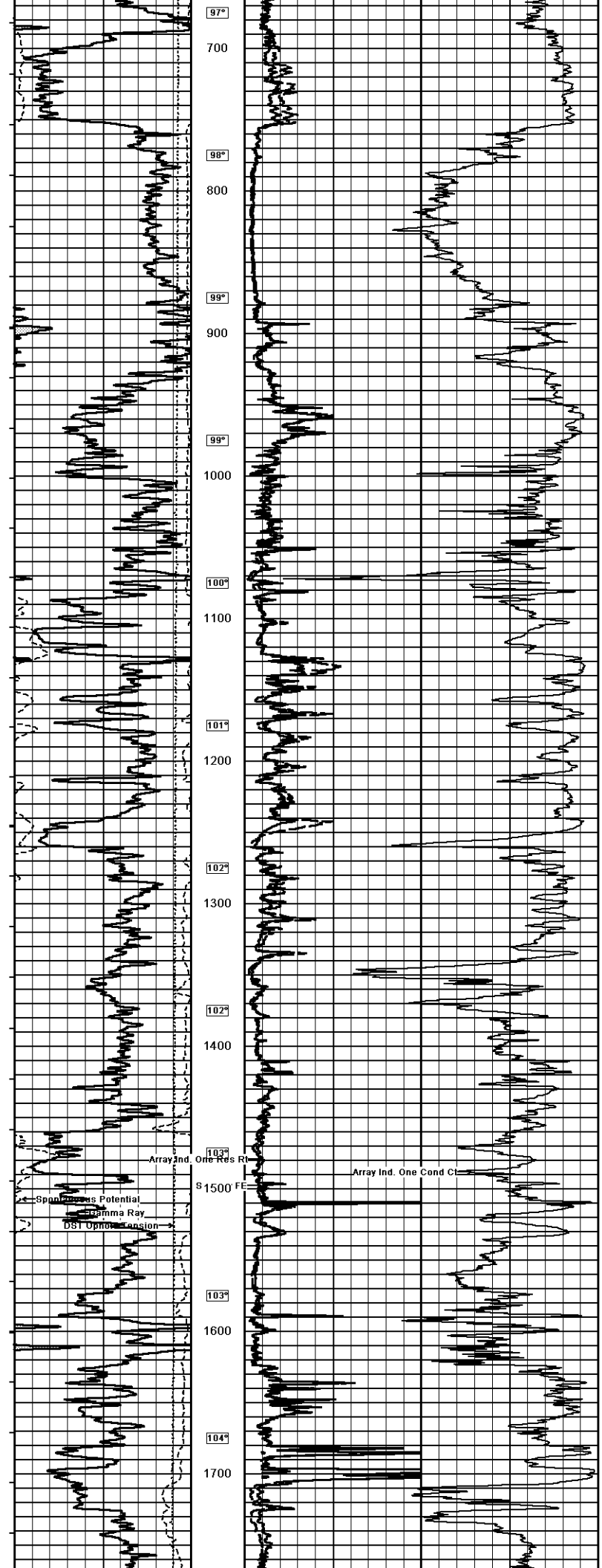
1 INCH MAIN

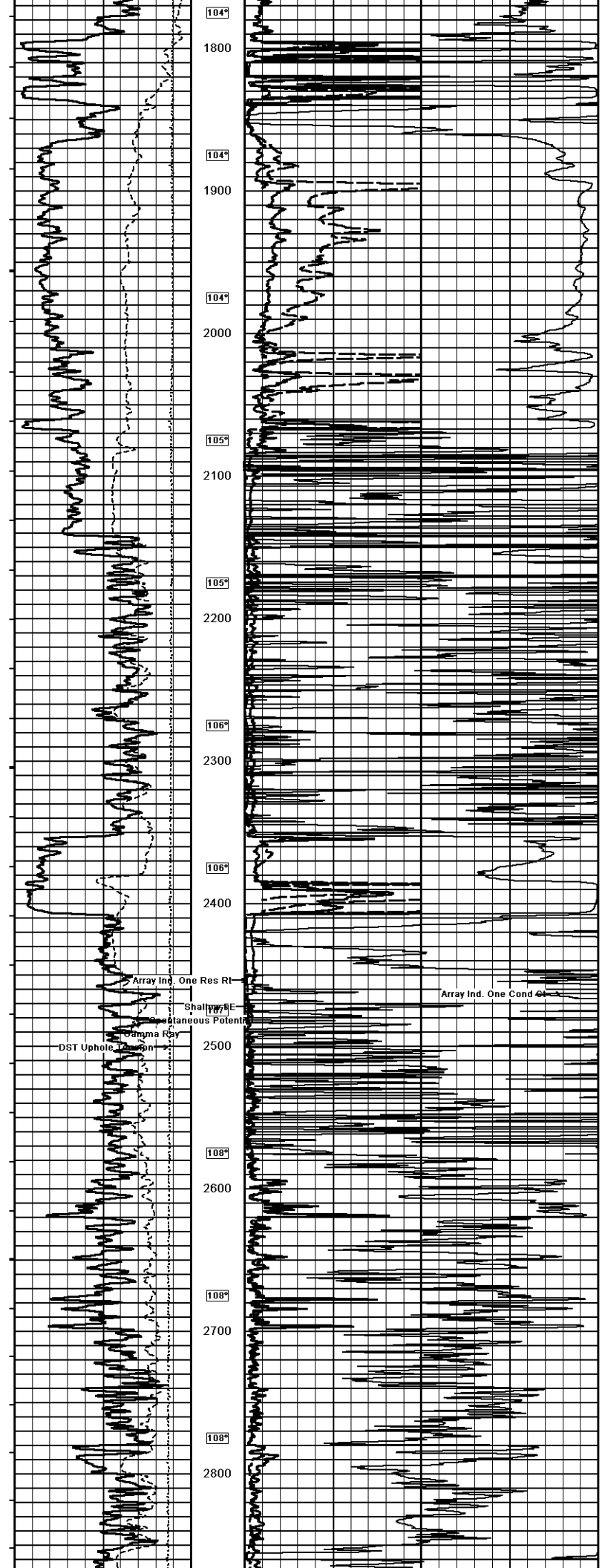
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

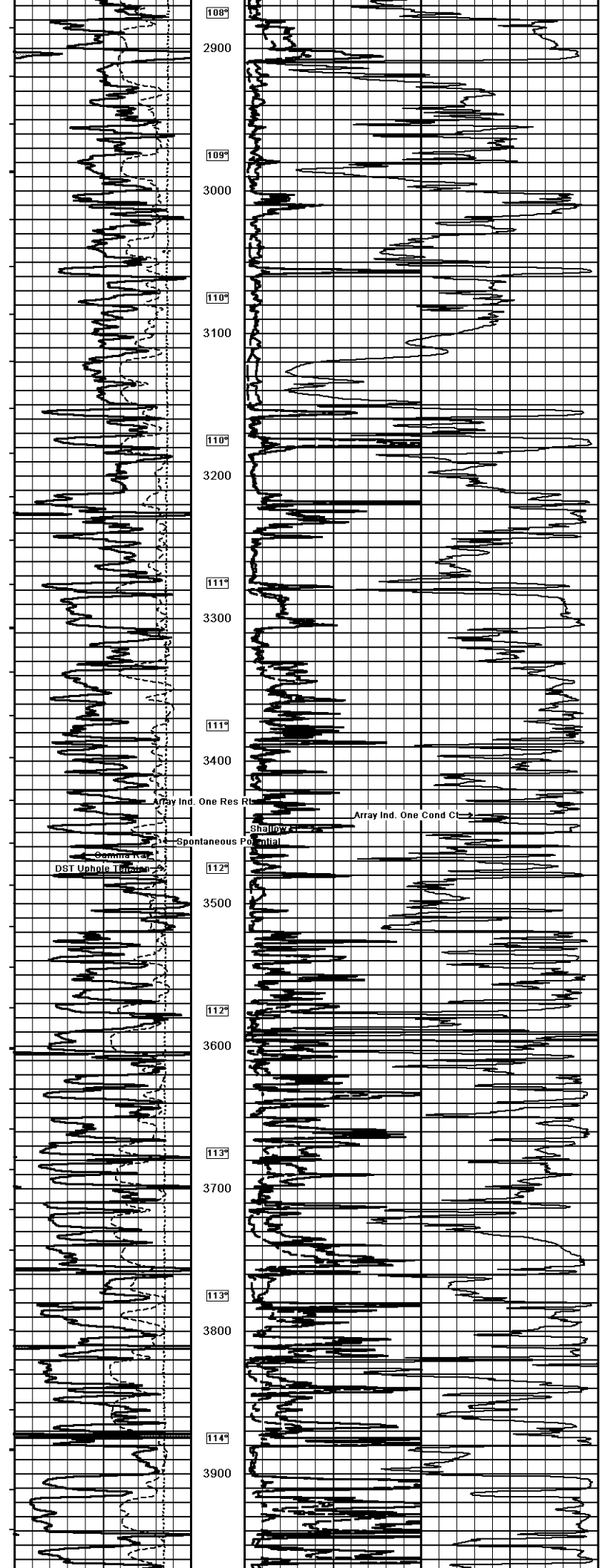
Plotted on 03-DEC-2012 21:01
Recorded on 03-DEC-2012 17:55

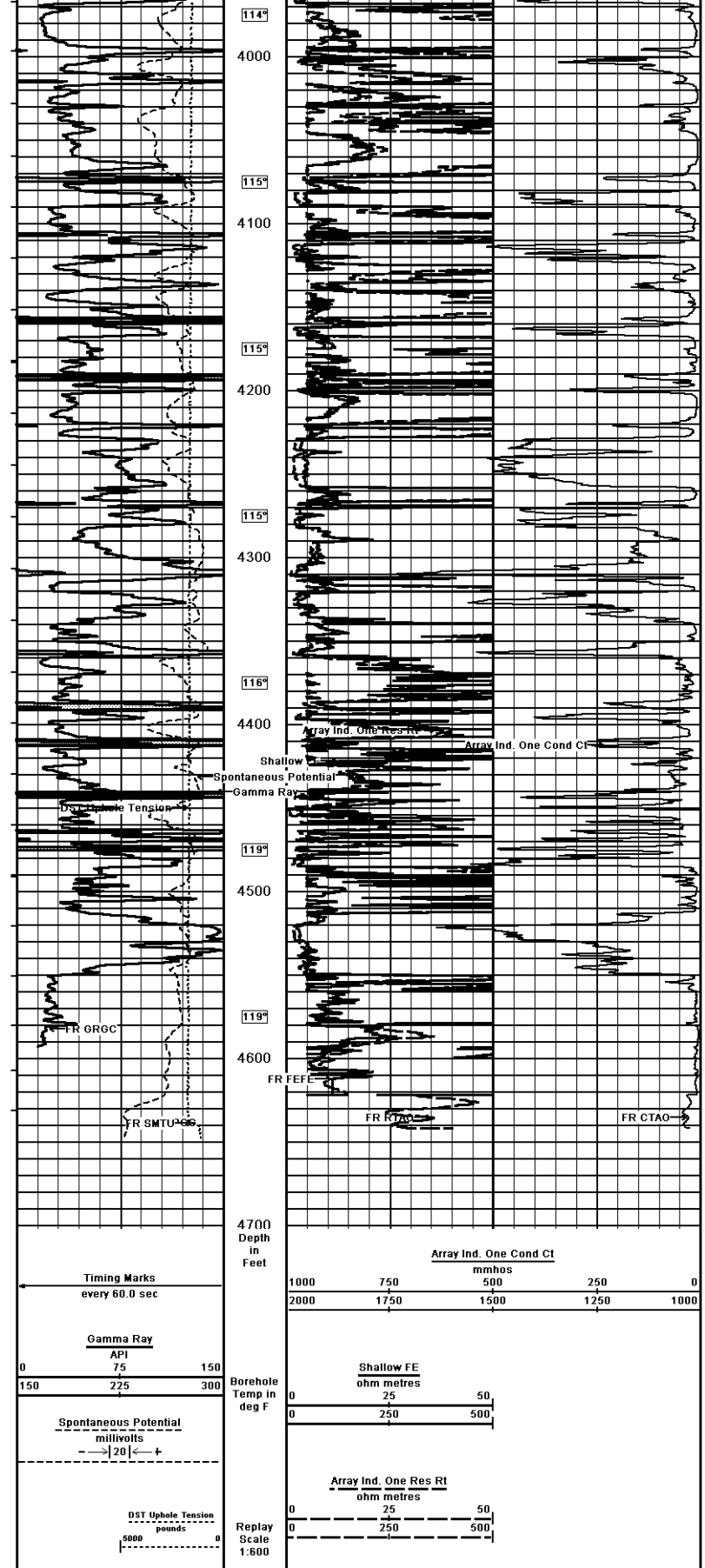
Track 1	Depth	Track 2–3
Timing Marks — every 60.0 sec	Depth in Feet	Array Ind. One Cond Ct — mmhos: 1000, 750, 500, 250, 0 / 2000, 1750, 1500, 1250, 1000
Gamma Ray — API: 0, 75, 150 / 150, 225, 300	Borehole Temp in deg F	Shallow FE — ohm metres: 0, 25, 50 / 0, 250, 500
Spontaneous Potential — millivolts: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




97°
700
98°
800
99°
900
99°
1000
100°
1100
101°
1200
102°
1300
102°
1400
103°
Array Ind. One Res Rt
Array Ind. One Cond Ct
1500
Spontaneous Potential
Gamma Ray
DST Options Tension
103°
1600
104°
1700


104"
1800
104"
1900
104"
2000
105"
2100
105"
2200
106"
2300
106"
2400
Array Ind. One Res Rt
Array Ind. One Cond Ct
Shallow E
Spontaneous Potentia
Gamma Ray
DST Uphole Tension
2500
108"
2600
108"
2700
108"
2800


108"
2900
109"
3000
110"
3100
110"
3200
111"
3300
111"
3400
Array Ind. One Res Rt
Array Ind. One Cond Ct
Shallow Ct
Spontaneous Potential
Gamma Ray
DST Uphole Tension
112"
3500
112"
3600
113"
3700
113"
3800
114"
3900



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 03-DEC-2012 21:01
Filename: C:\Minimus 13.04.8492\Data\Chaco Energy Smith 2-27\Chaco Smith 2-27 Main.dta — Recorded on 03-DEC-2012 17:55
System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

1 INCH MAIN

COMPANY	CHACO ENERGY CO.
WELL	SMITH 2-27
FIELD	LOCH
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2901.00	feet	First Reading	4636.00	feet
Elevation Drill Floor	2899.00	feet	Depth Driller	4640.00	feet
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ARRAY INDUCTION

Weatherford

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ELECTRIC LOG