



Weatherford

ARRAY INDUCTION - RTAP
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY

BILL BARRETT CORPORATION

WELL

GGU KAUFMAN 32D-30-691

FIELD

GIBSON GULCH

PROVINCE/COUNTY

GARFIELD

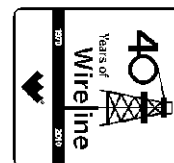
COUNTRY/STATE

U.S.A. / COLORADO

LOCATION

SHL: 1680' FNL & 1007' FWL

BHL: 1510' FNL & 1984' FEL



SEC

TWP

RGE

Other Services
MPD/MDN

30

6S

91W

Permit Number

05-045-20741

Permanent Datum G.L., Elevation 5635 feet

Log Measured From KB

Drilling Measured From K.B. @ 23 FT.

Date

19-DEC-2011

Elevations:
KB
DF
GL

feet
5658.00
5858.00
5635.00

Run Number

ONE

Depth Driller

7900.00

feet

Depth Logger

7899.00

feet

First Reading

7896.00

Last Reading

200.00

Casing Driller

825.00

feet

Casing Logger

824.00

feet

Bit Size

7.875

inches

Hole Fluid Type

LSND

Density / Viscosity

10.90

lb/USg

43.00

sec/qt

PH / Fluid Loss

9.30

10.00

ml/30Min

Sample Source

FLOW LINE

Rm @ Measured Temp

4.0 @ 91.5

ohm-m

Rmf @ Measured Temp

3.20 @ 91.5

ohm-m

Rmc @ Measured Temp

4.80 @ 91.5

ohm-m

Source Rmf / Rmc

CALC

CALC

Rm @ BHT

1.986 @ 187.0

ohm-m

Time Since Circulation

6 HOURS

Max Recorded Temp

187.00

deg F

Equipment Name

COMPACT

BOREHOLE RECORD

Last Edited: 19-DEC-2011 17:19

Bit Size inches	Depth From feet	Depth To feet
8.750	824.00	5497.00
7.875	5497.00	7900.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	9.625	0.00	824.00	36.00

REMARKS

LOGGED USING WLS SOFTWARE VERSION 12.02.4401

TOOLS: SHA, MCG, MDN, MPD, SKJ, MFE, AND MAI RAN IN COMBINATION

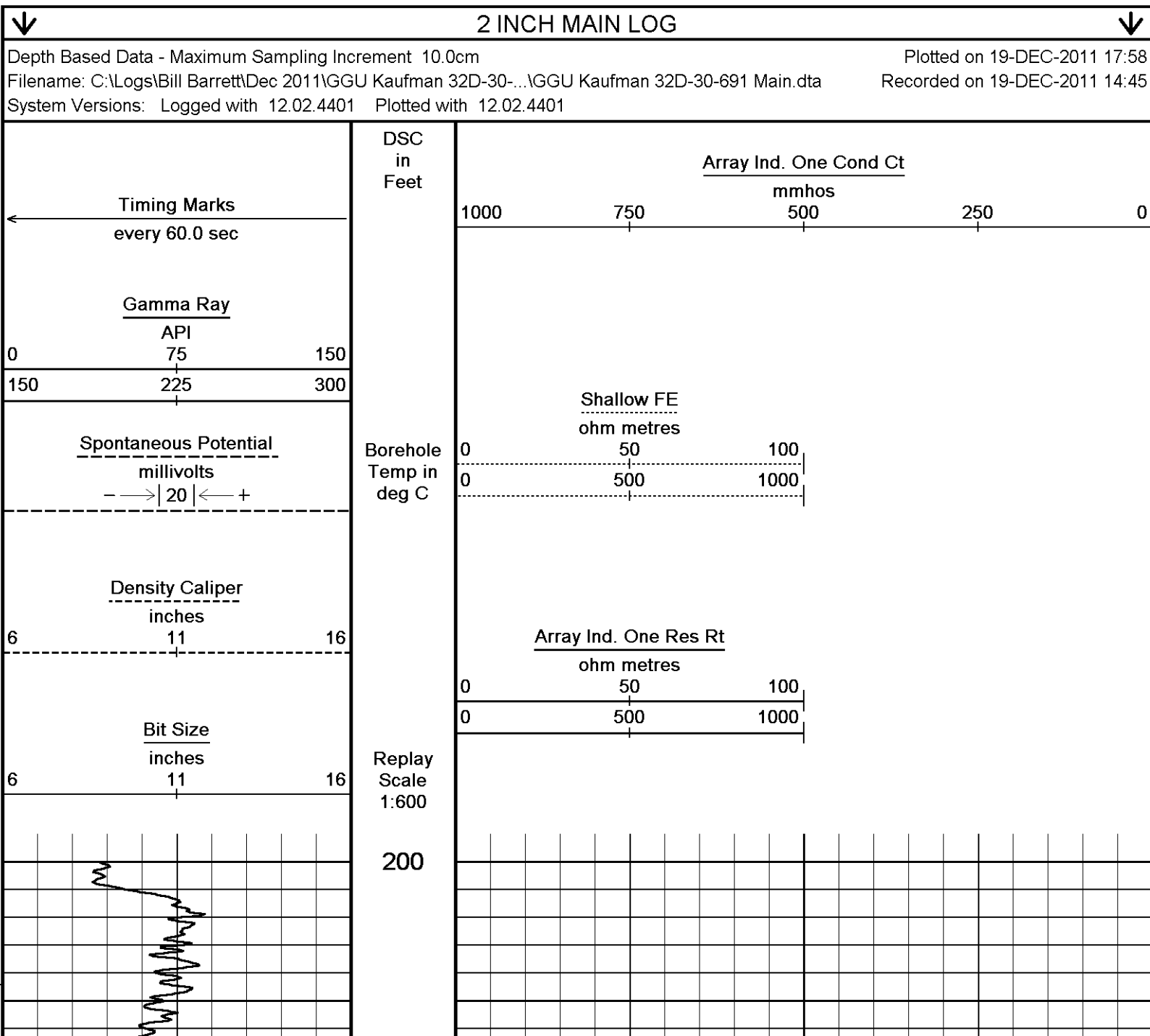
HARDWARE: MPD: (1) 8 INCH PROFILE PLATE
MAI: (2) 0.5 INCH STANDOFF
MFE: (1) 0.5 INCH STANDOFF
MDN: (1) DUAL BOWSPRING

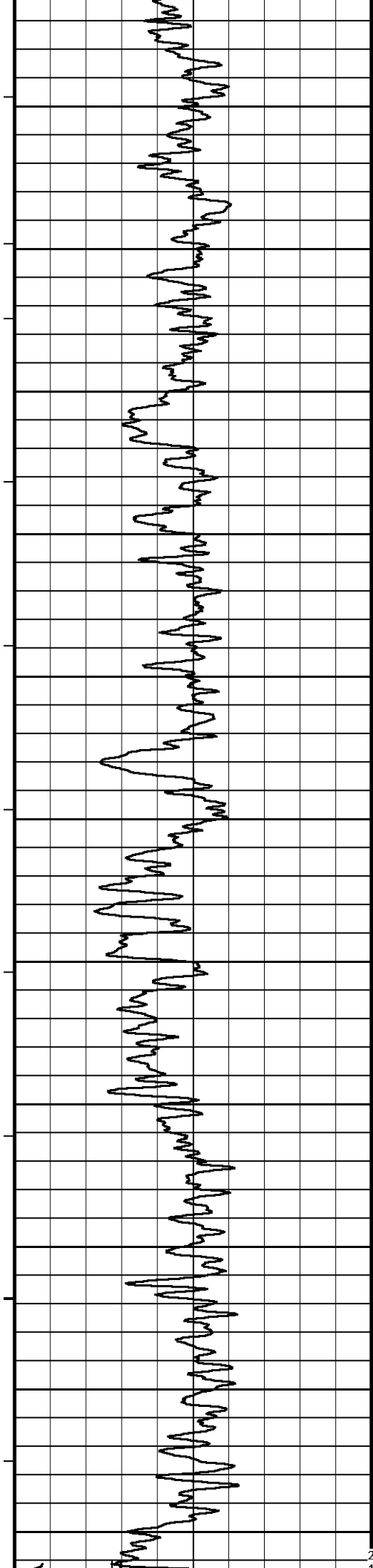
2.68 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY.

ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

TIGHT PULLS, BOREHOLE SIZE, AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.

MAXIMUM DEVIATION OF 38.6 DEGREES.





34°

300

35°

400

36°

500

36°

600

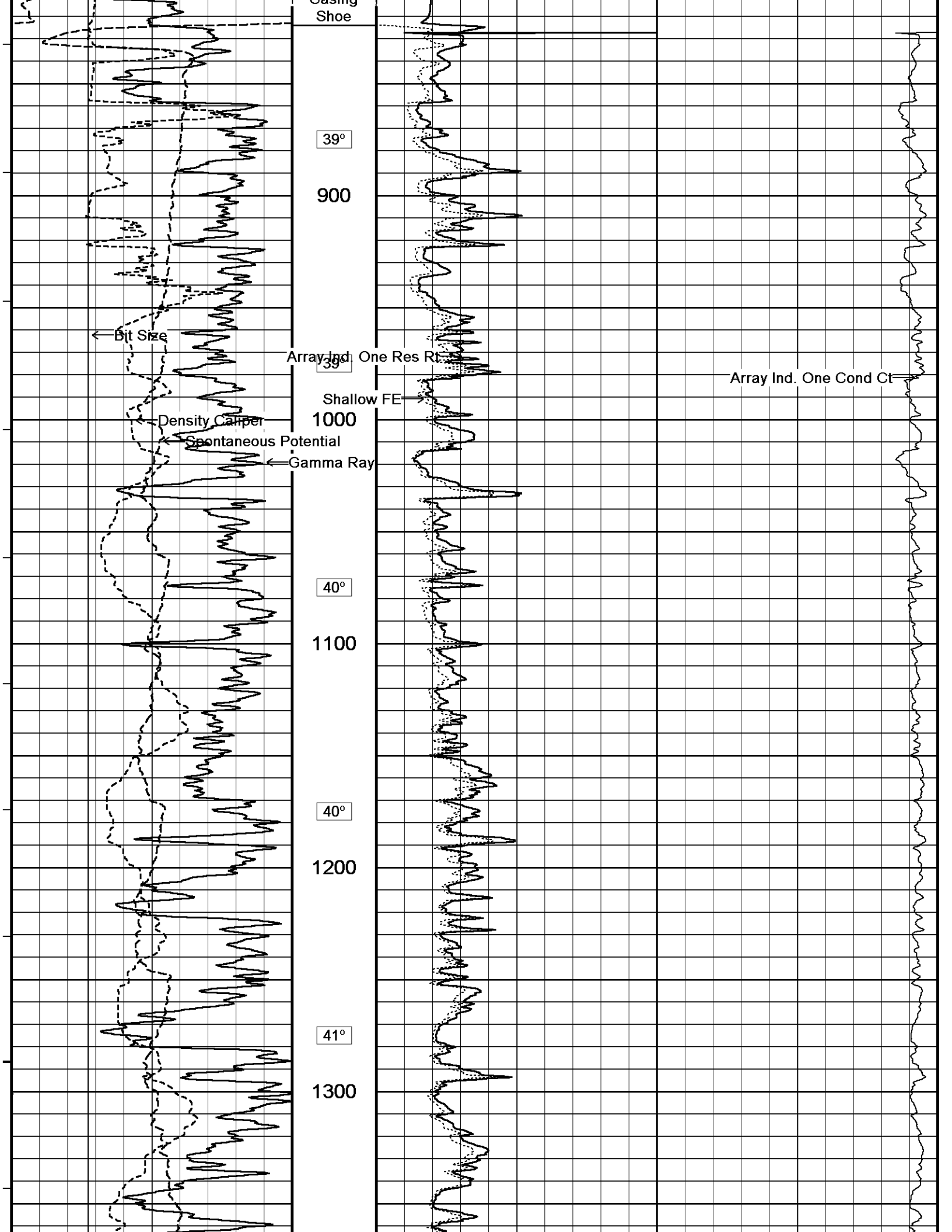
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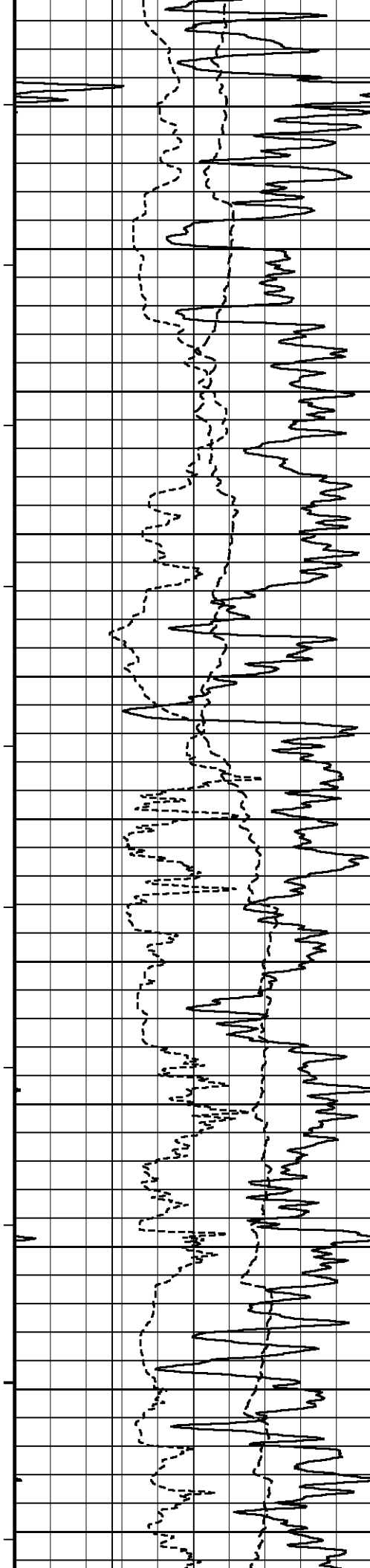
700

38°

800

Casing





41°

1400

42°

1500

42°

1600

42°

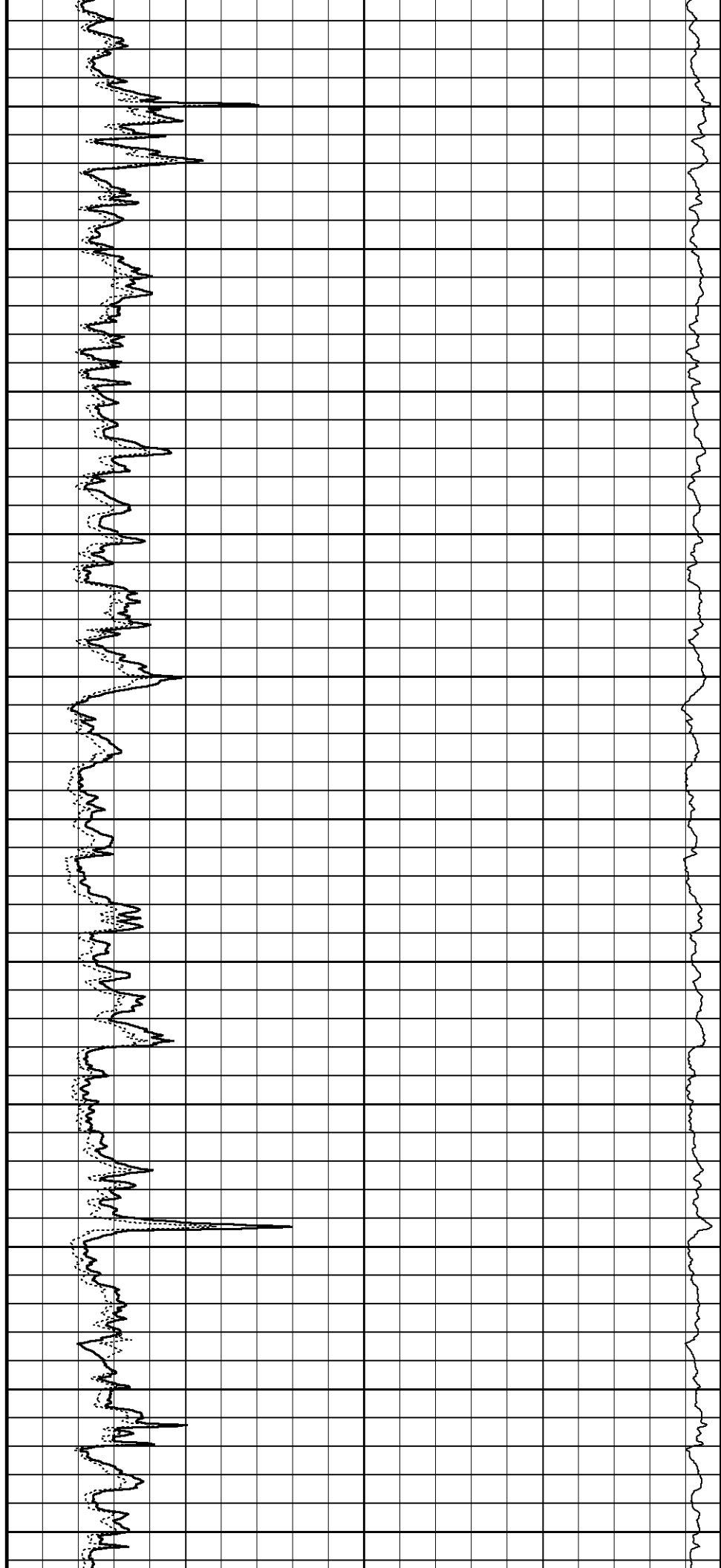
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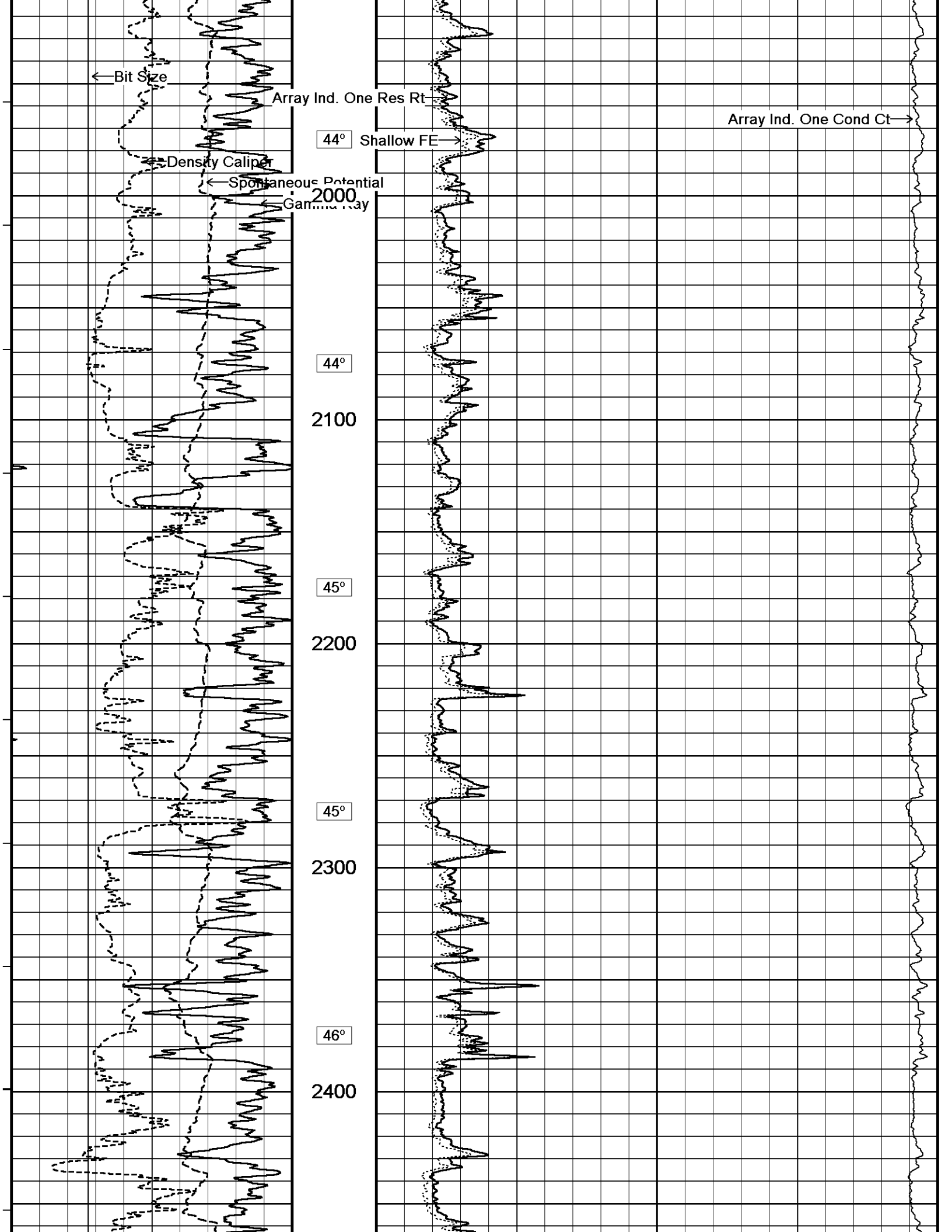
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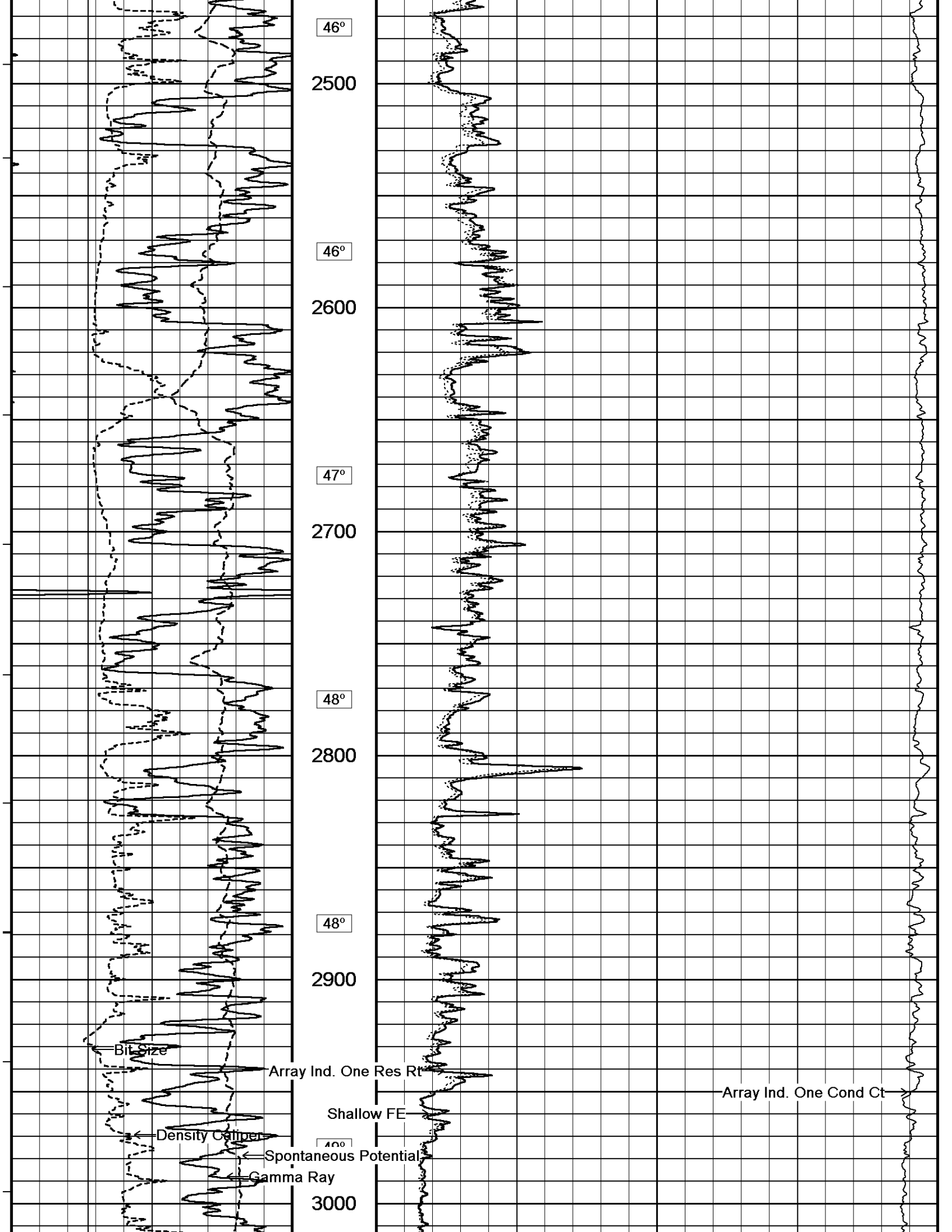
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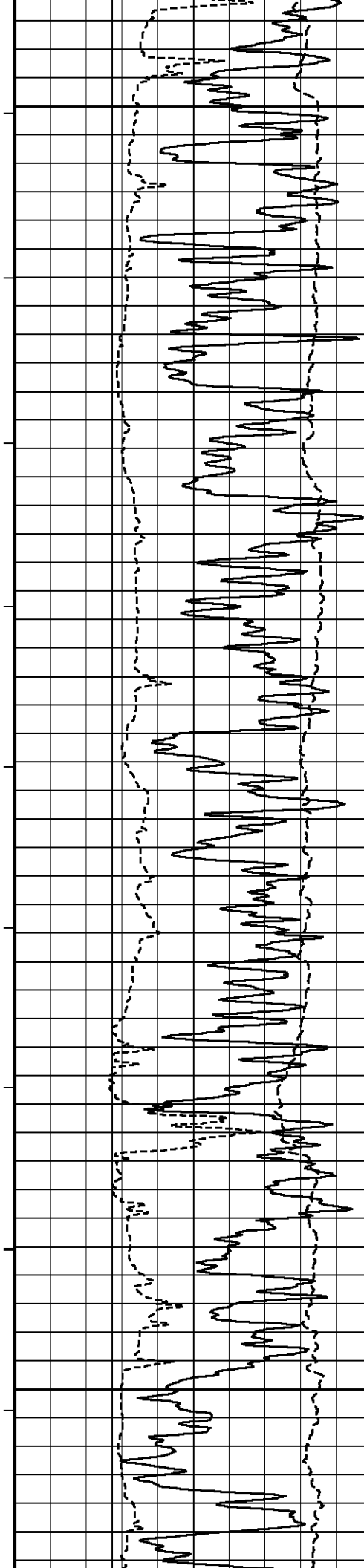
43°

1900









50°

3100

50°

3200

51°

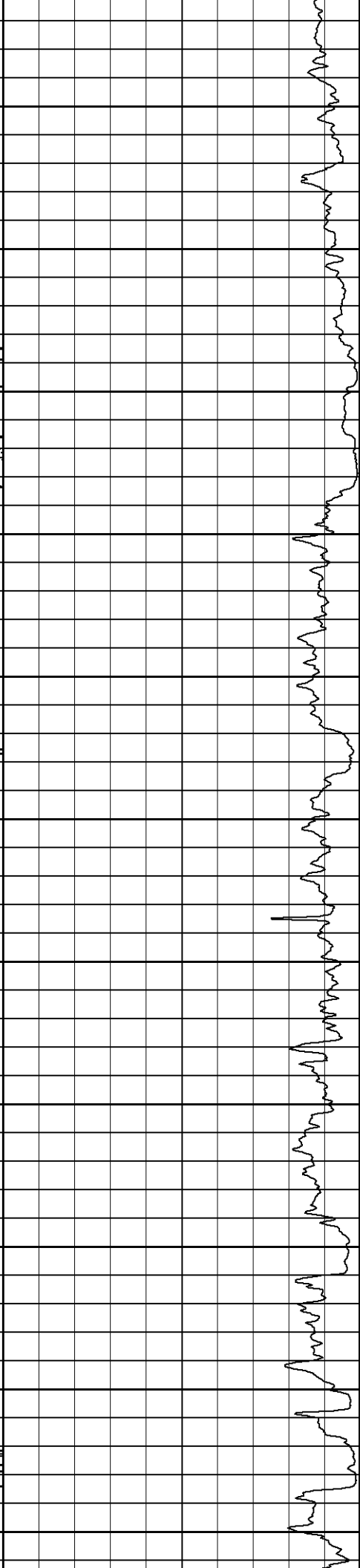
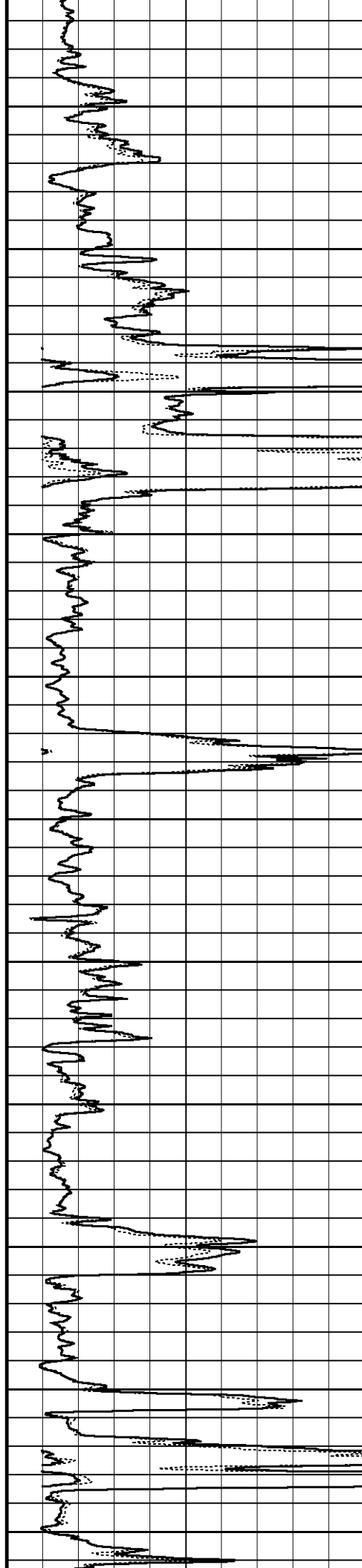
3300

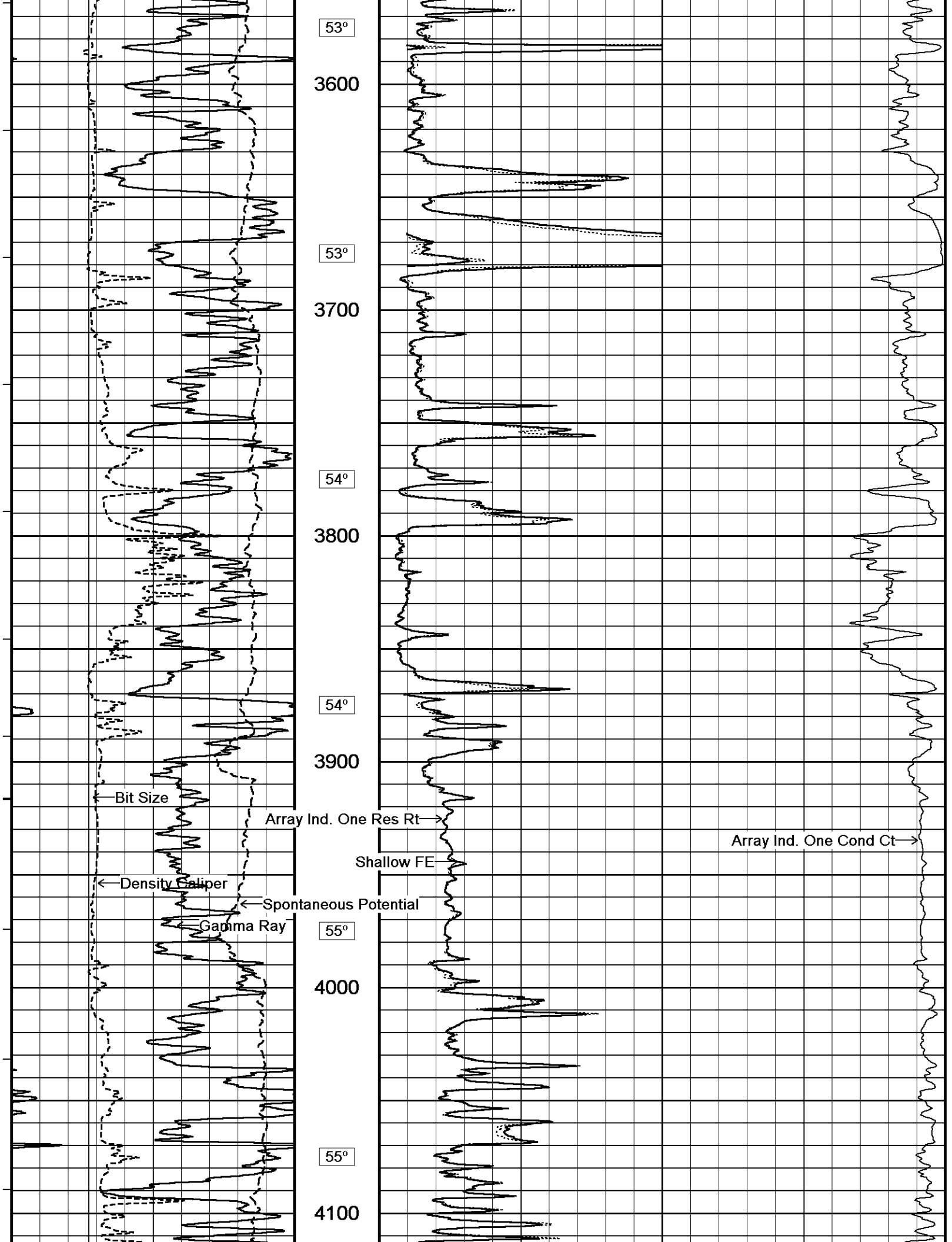
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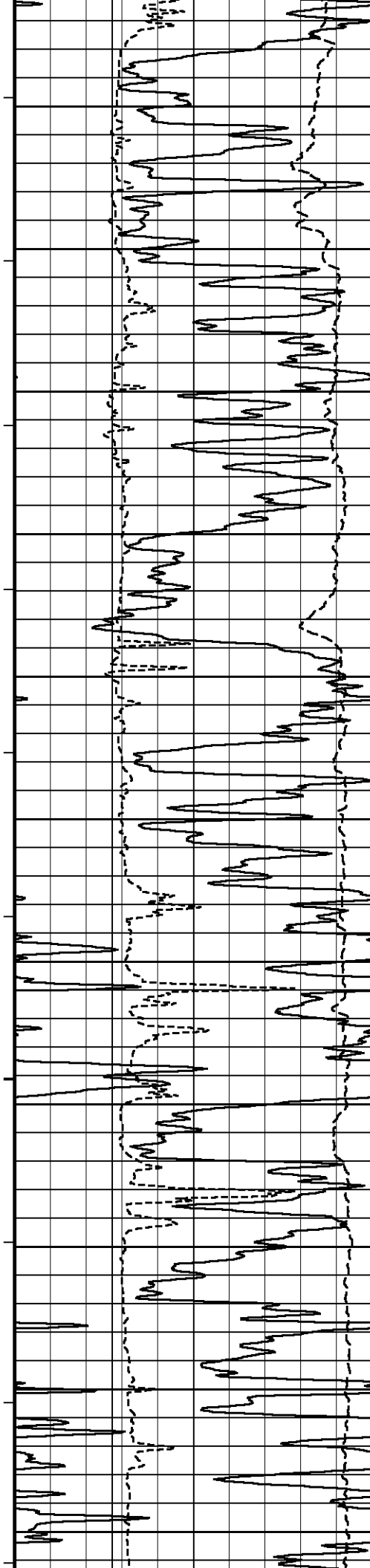
3400

52°

3500







56°

4200

56°

4300

57°

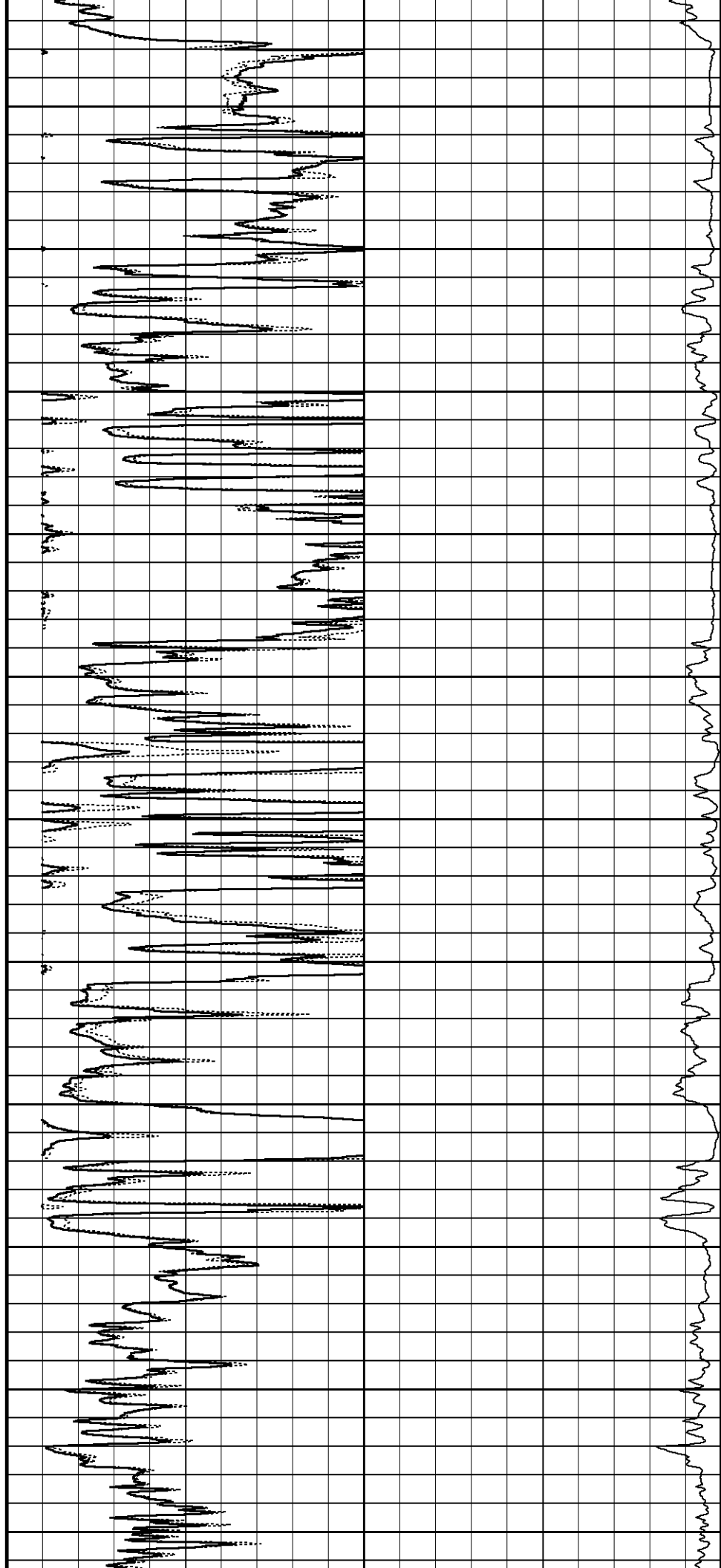
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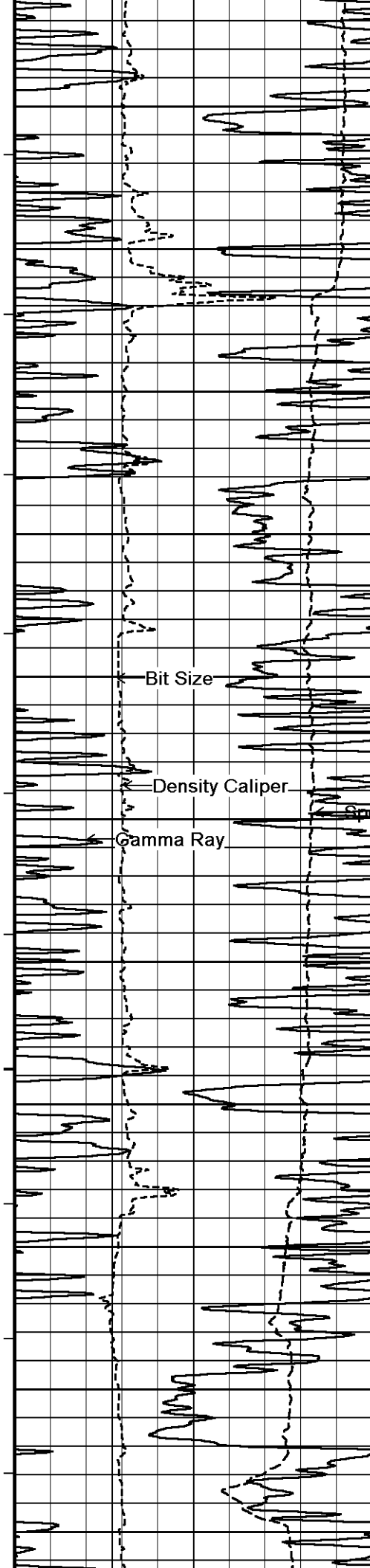
57°

4500

58°

4600





59°

4700

59°

4800

60°

4900

Bit Size

Density Caliper

Gamma Ray

Spontaneous Potential

60°

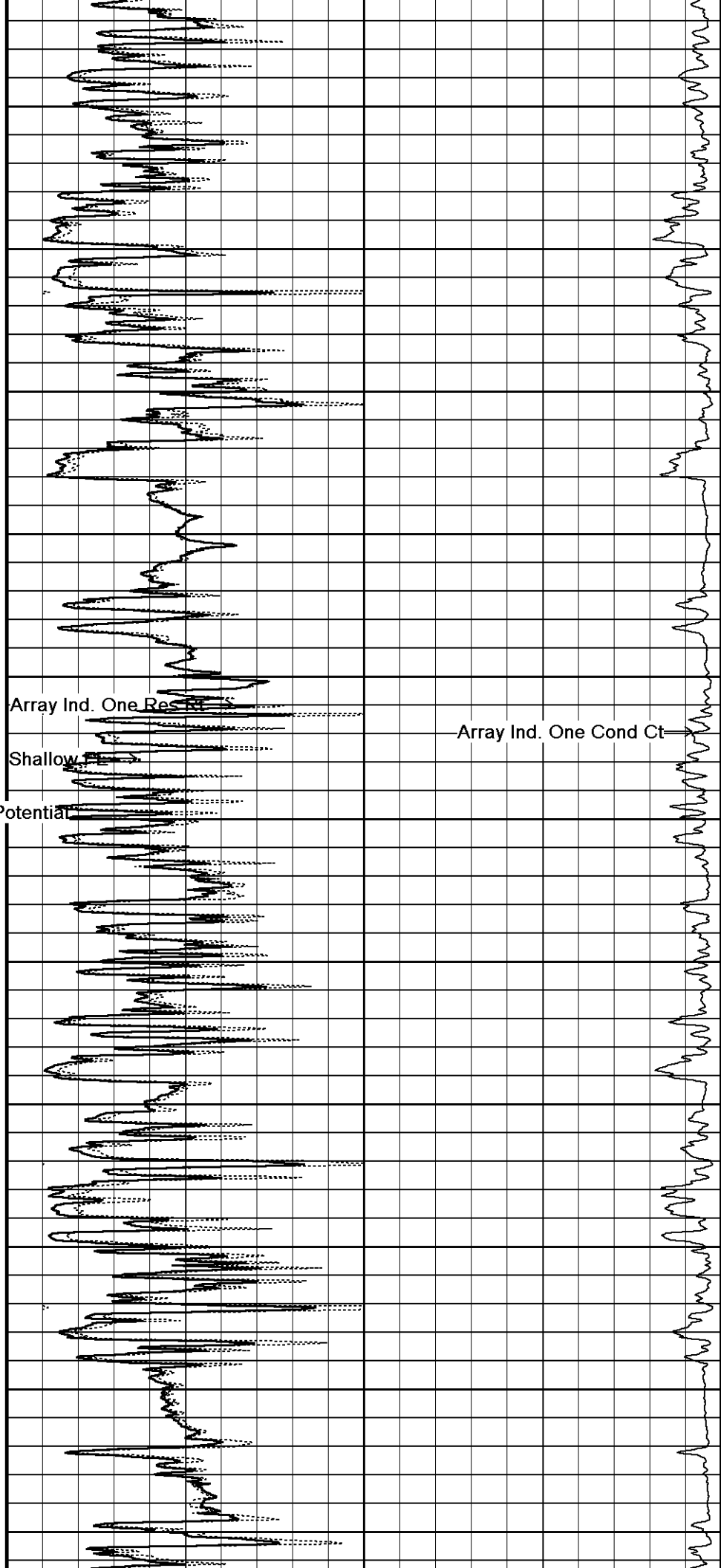
5000

61°

5100

61°

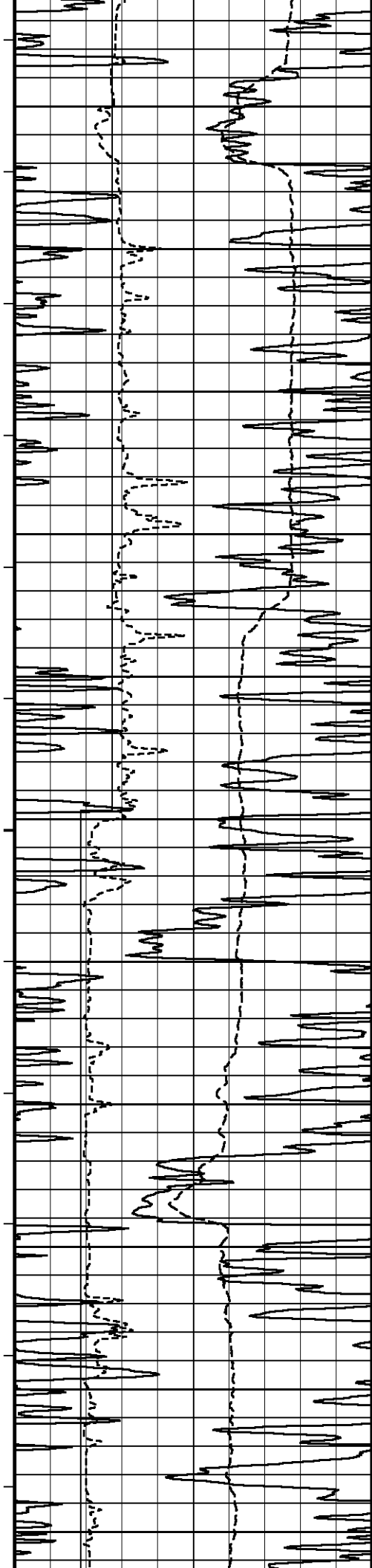
5200



Array Ind. One Res R1-S

Shallow

Array Ind. One Cond Ct



62°

5300

63°

5400

64°

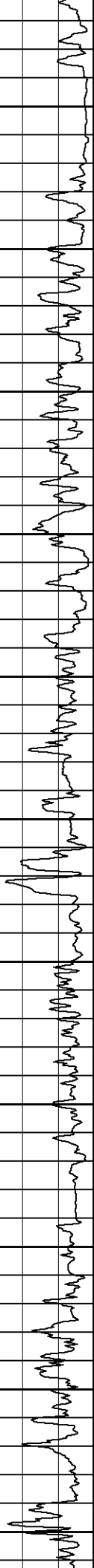
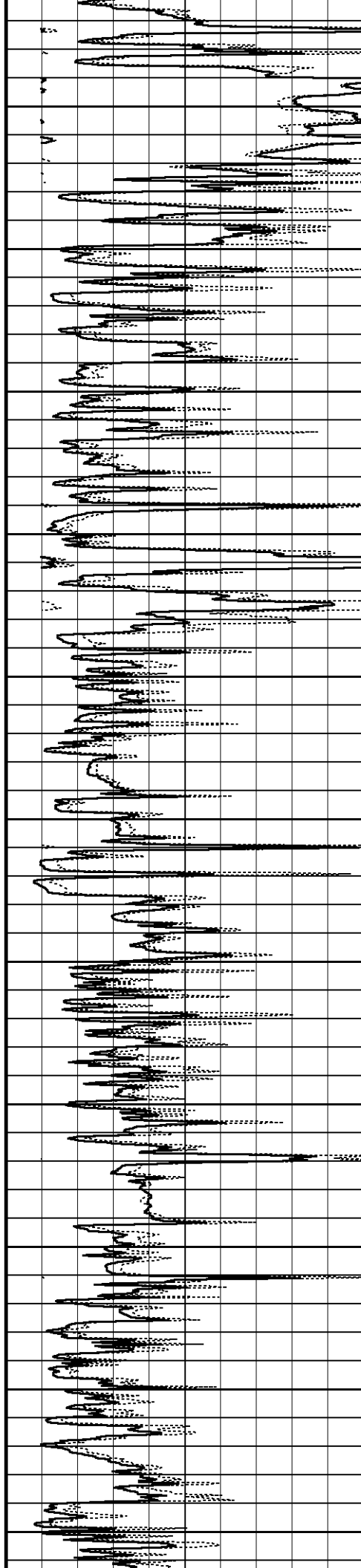
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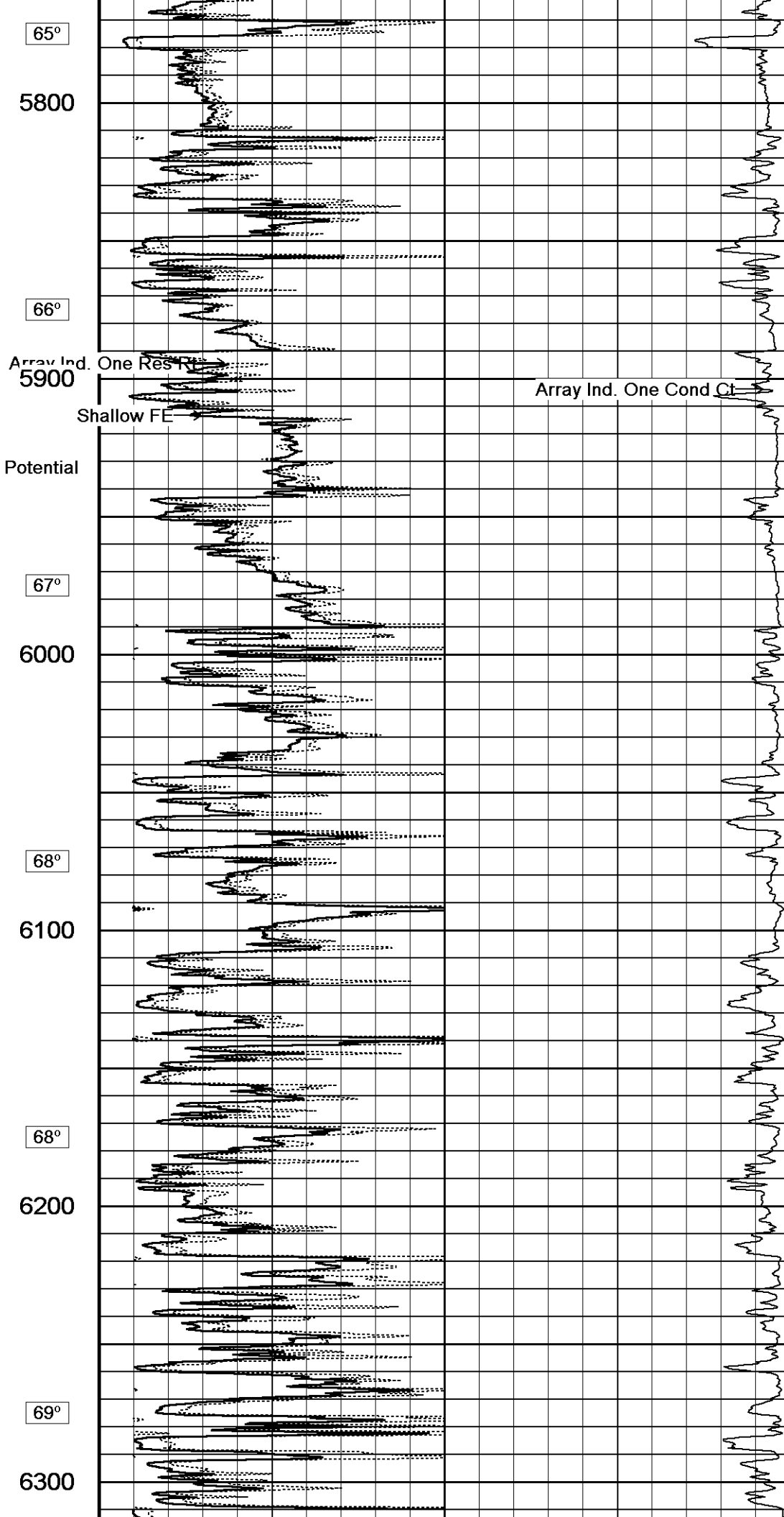
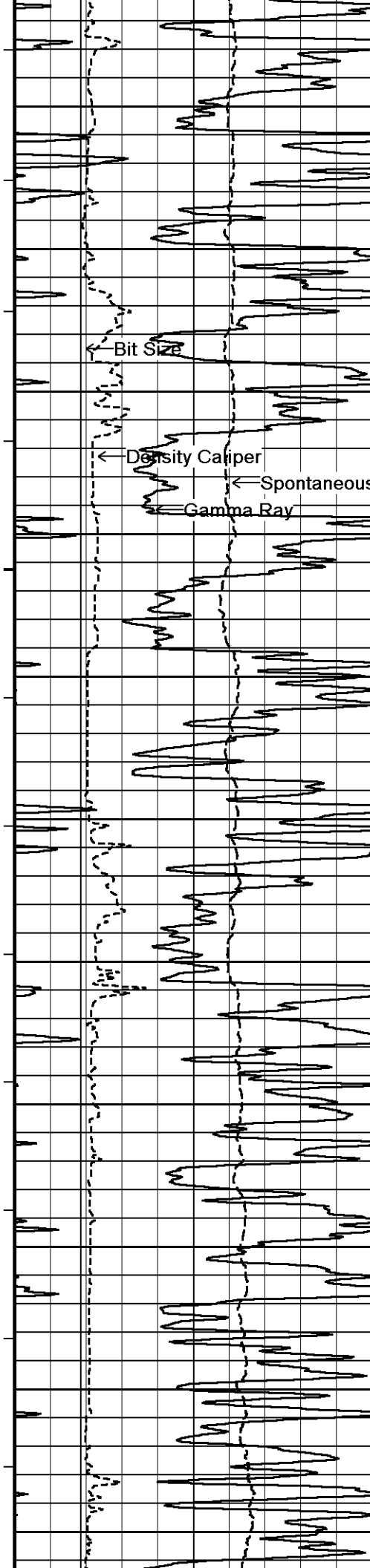
64°

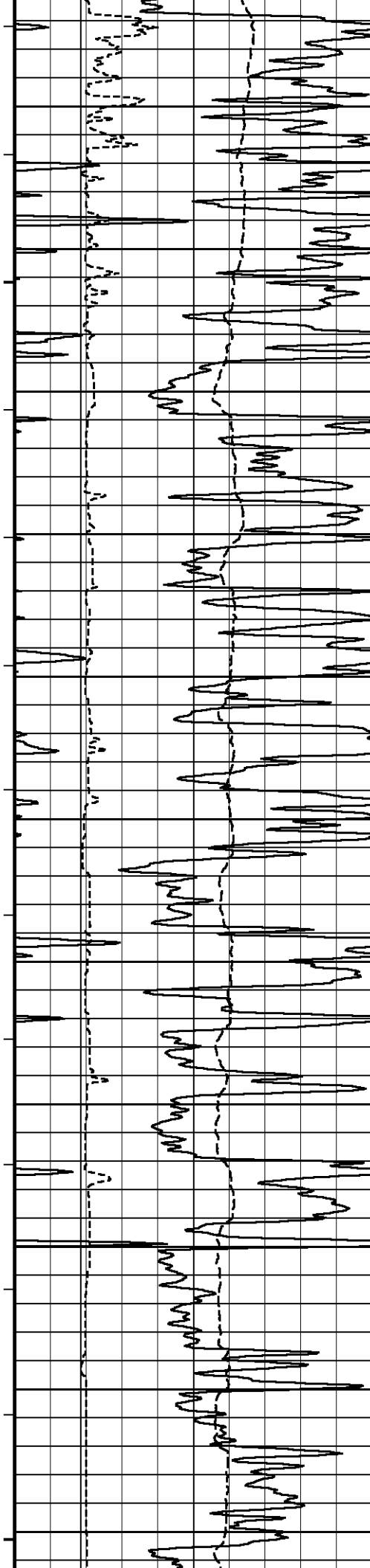
5600

65°

5700







70°

6400

71°

6500

71°

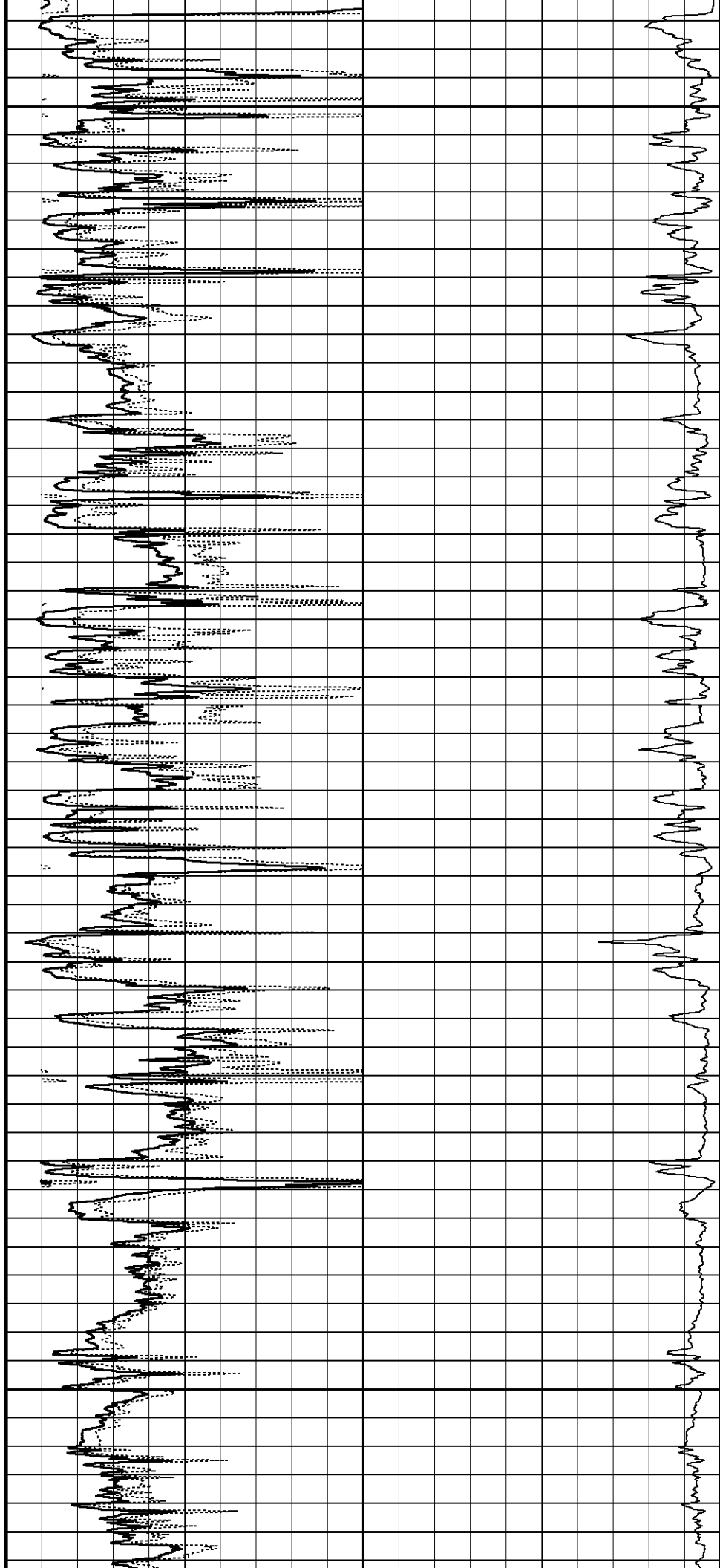
6600

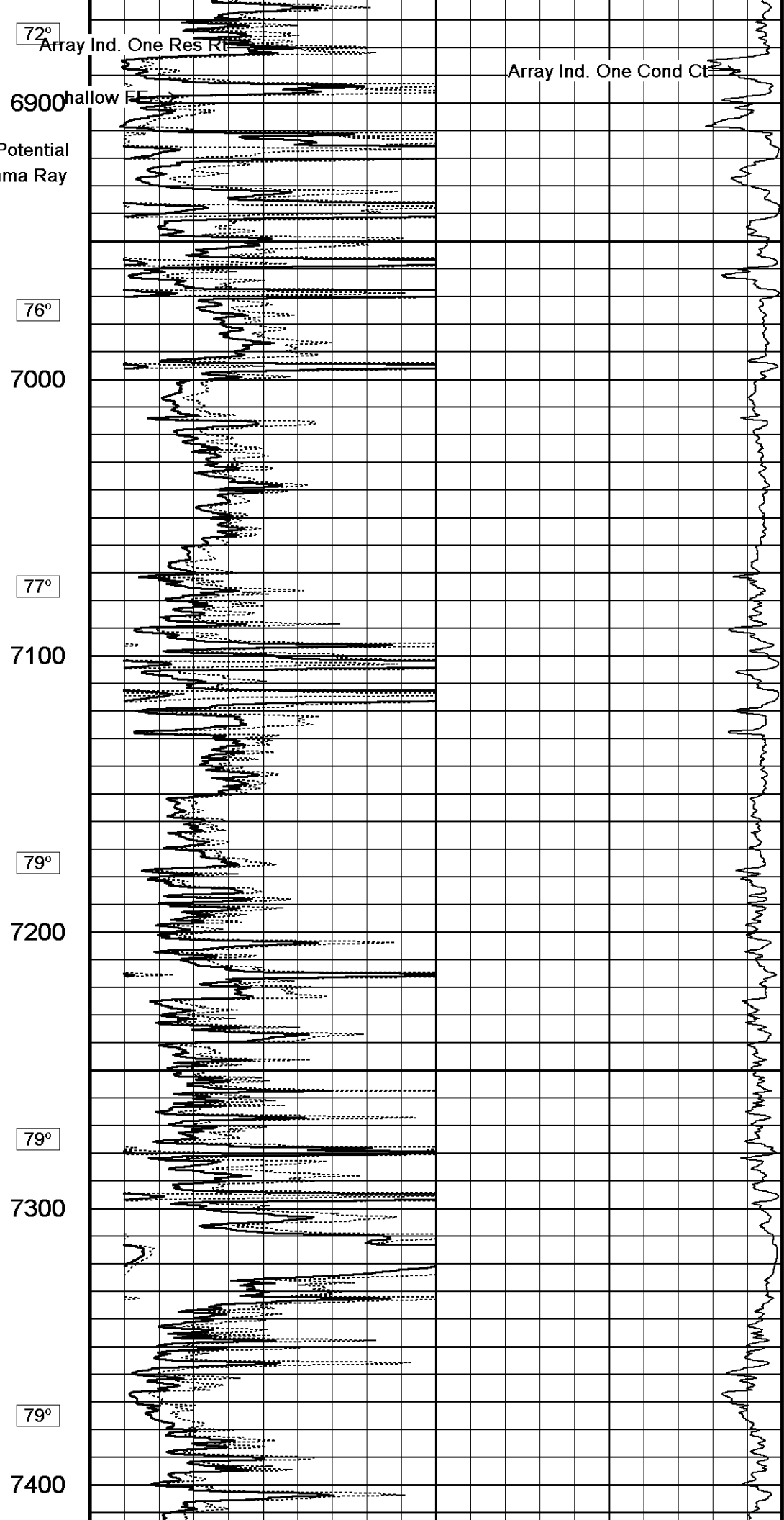
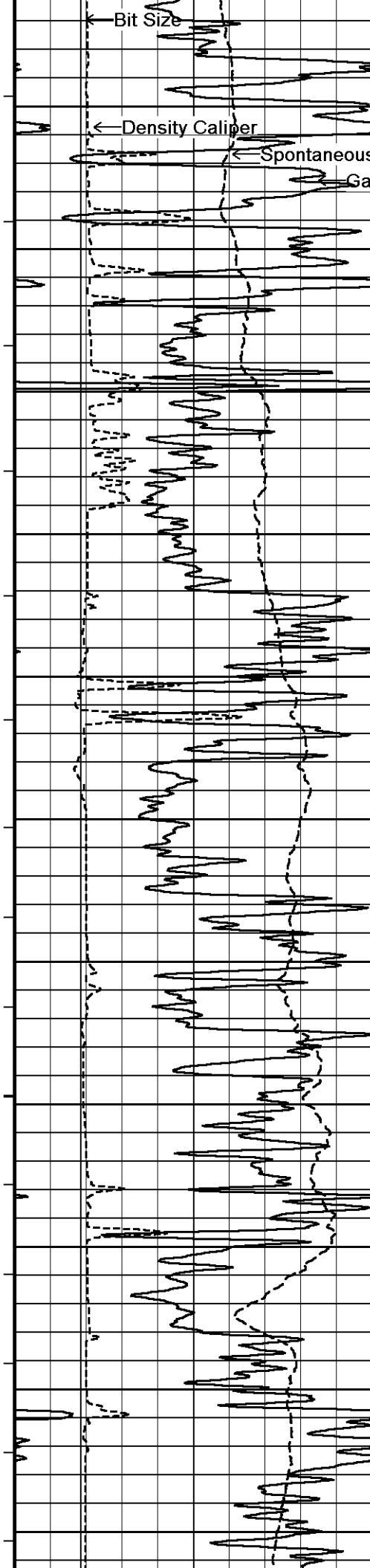
72°

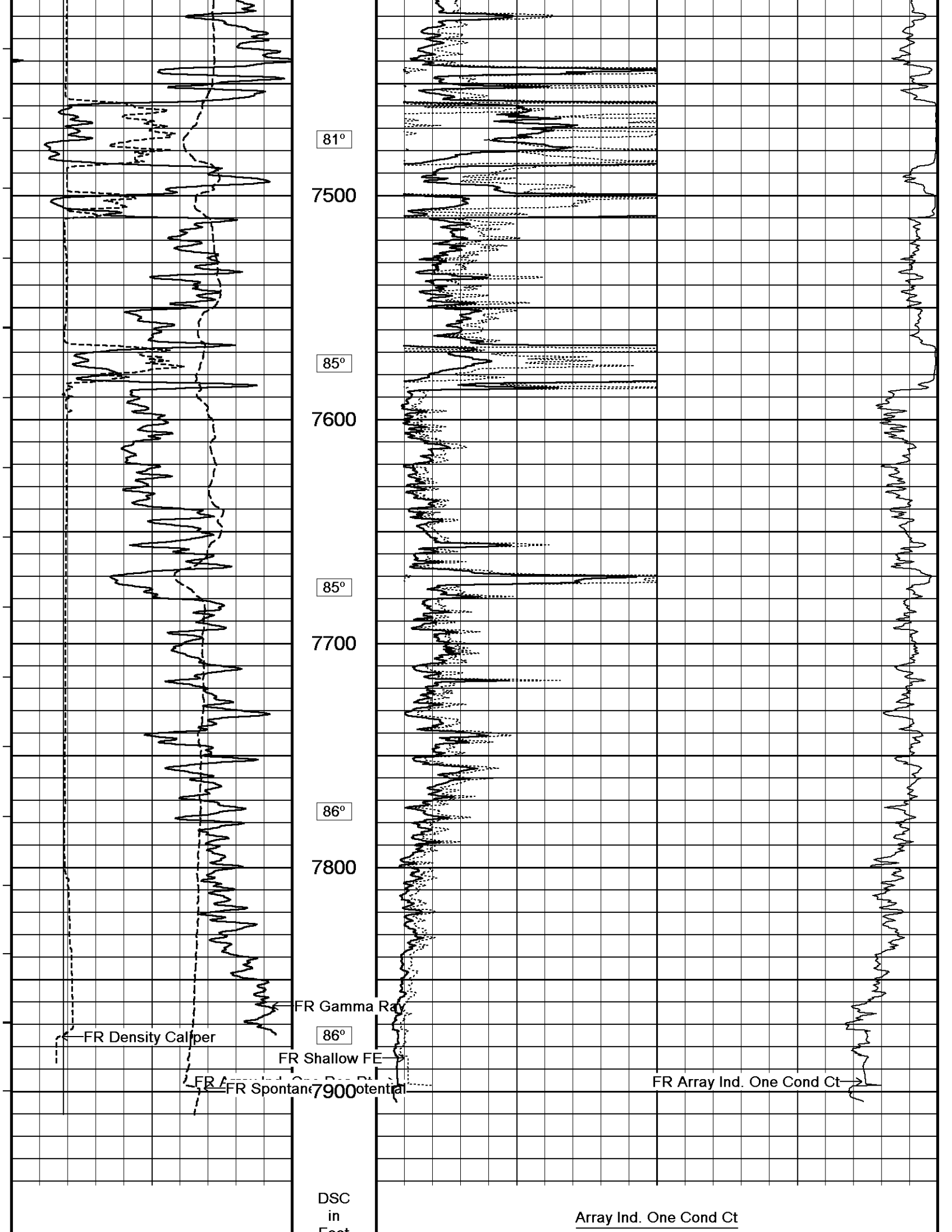
6700

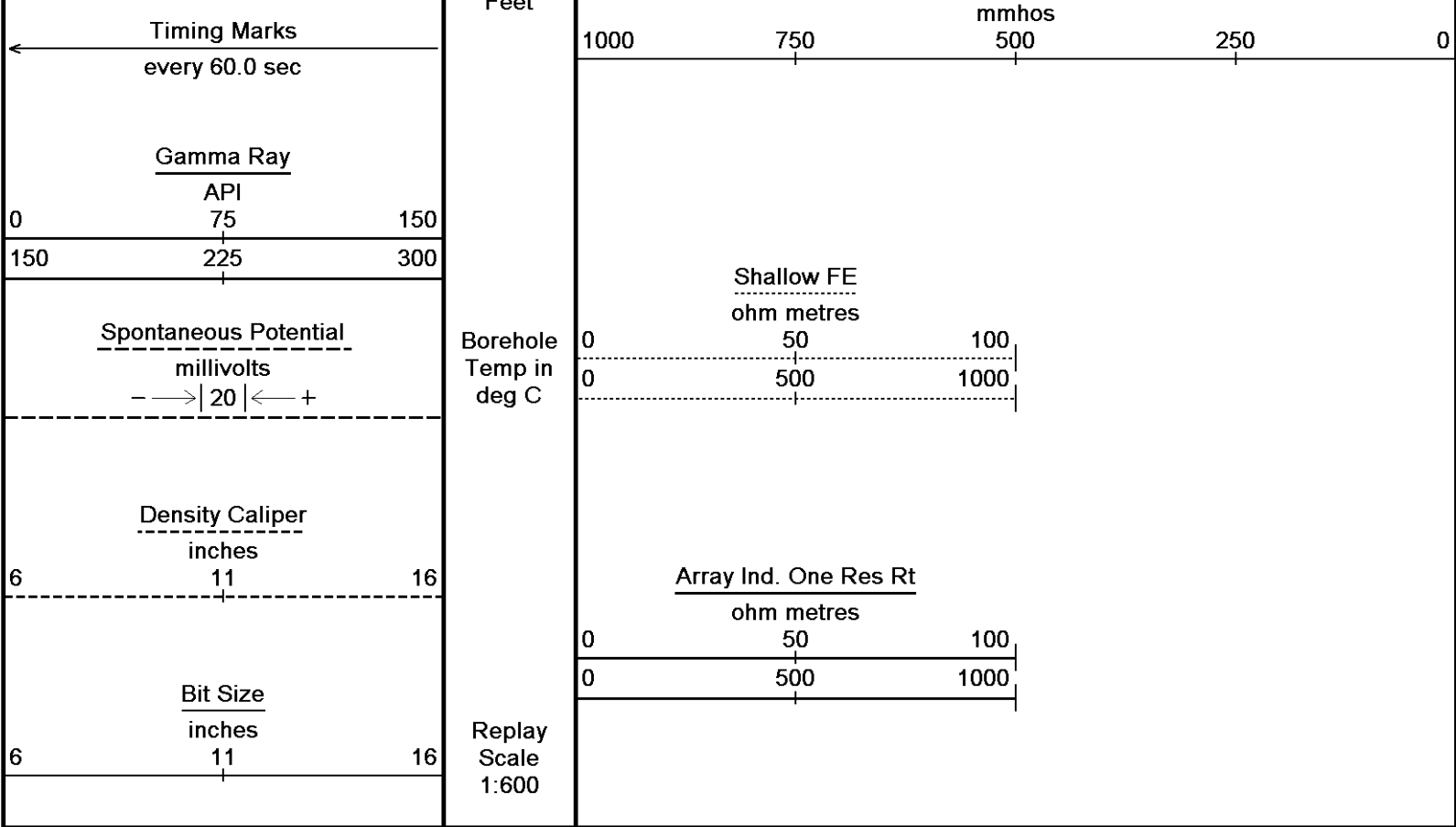
72°

6800









Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 19-DEC-2011 17:58

Filename: C:\Logs\Bill Barrett\Dec 2011\GGU Kaufman 32D-30-...\GGU Kaufman 32D-30-691 Main.dta

Recorded on 19-DEC-2011 14:45

System Versions: Logged with 12.02.4401 Plotted with 12.02.4401

↑

2 INCH MAIN LOG

↑

↓

5 INCH MAIN LOG

↓

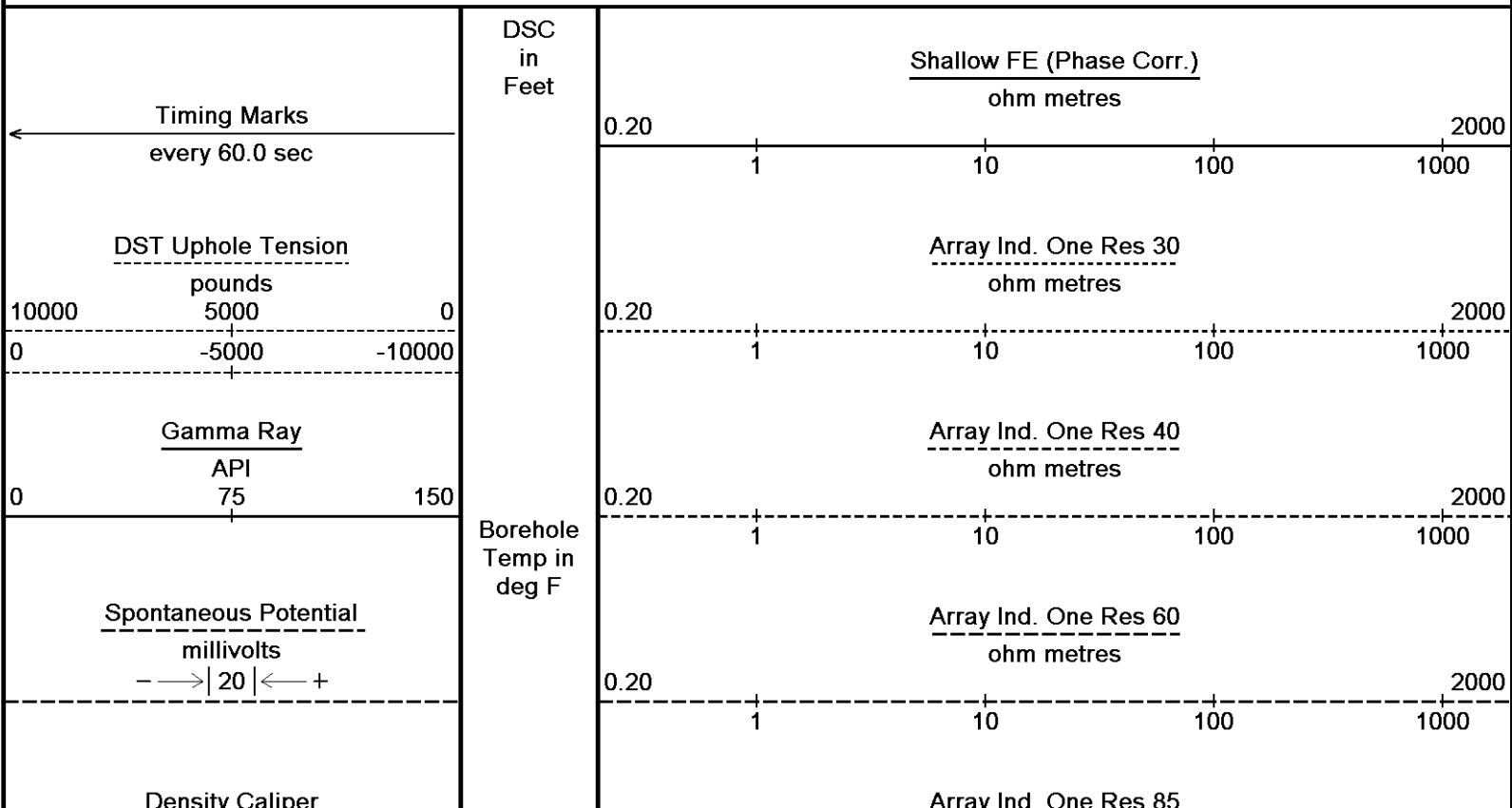
Depth Based Data - Maximum Sampling Increment 10.0cm

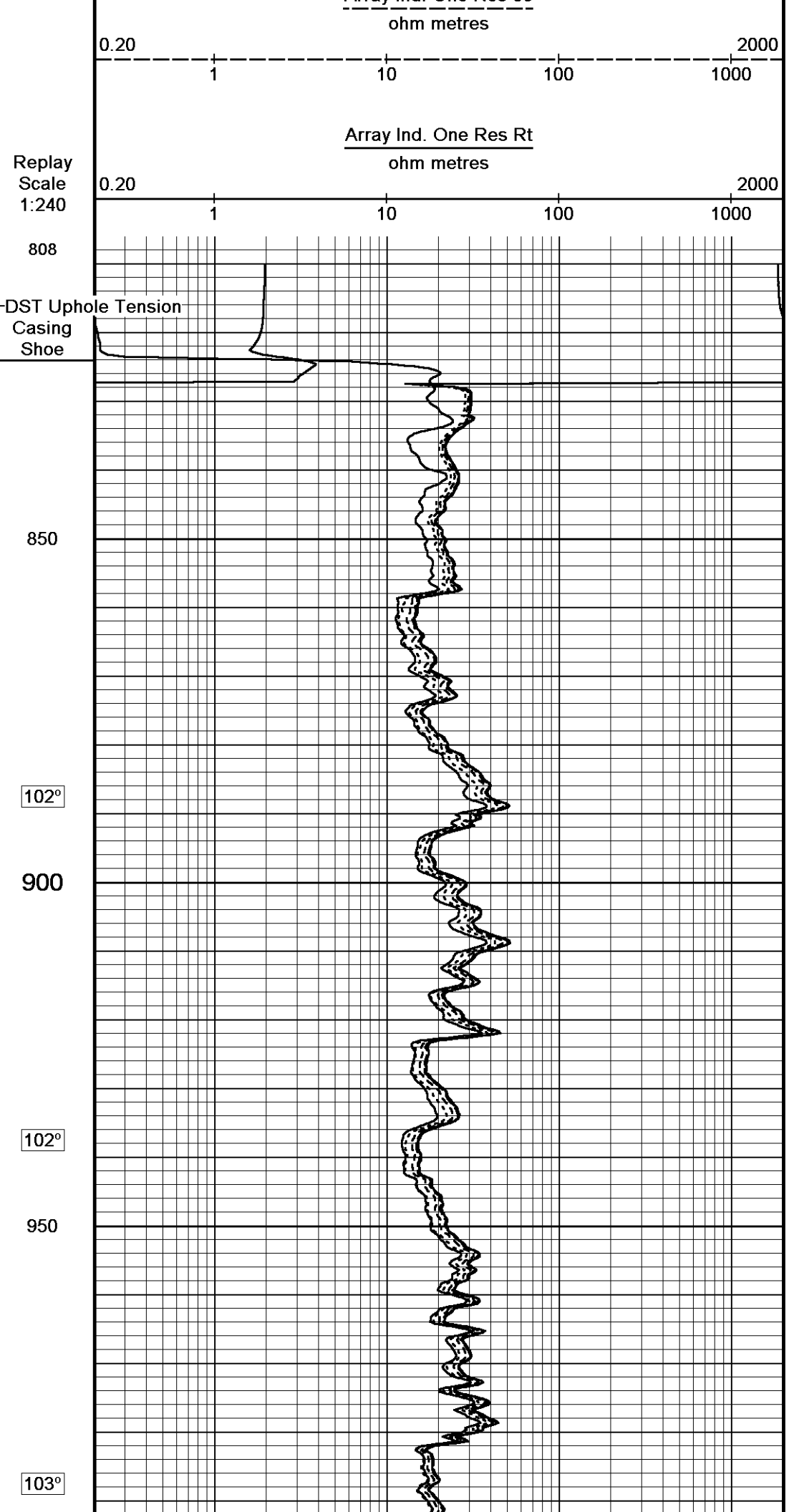
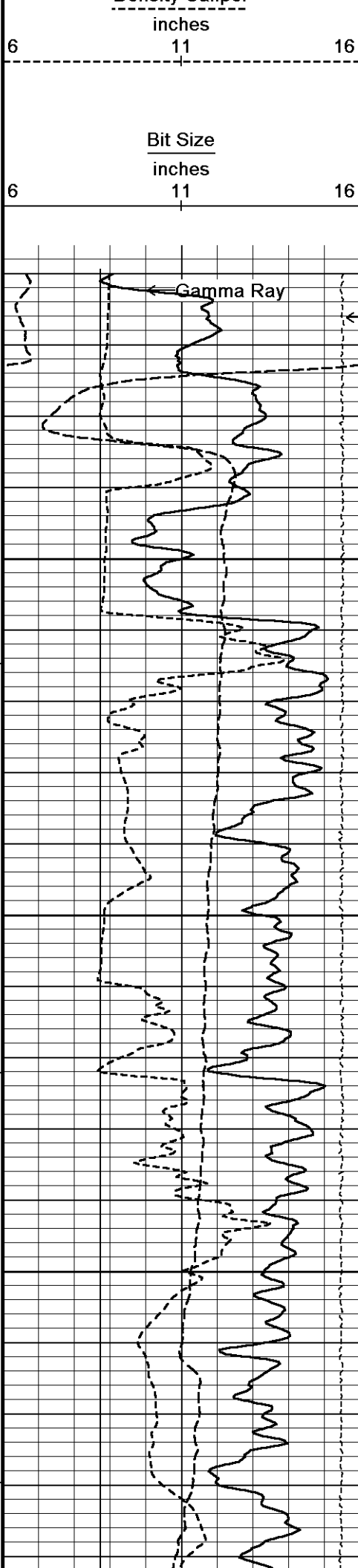
Plotted on 19-DEC-2011 17:58

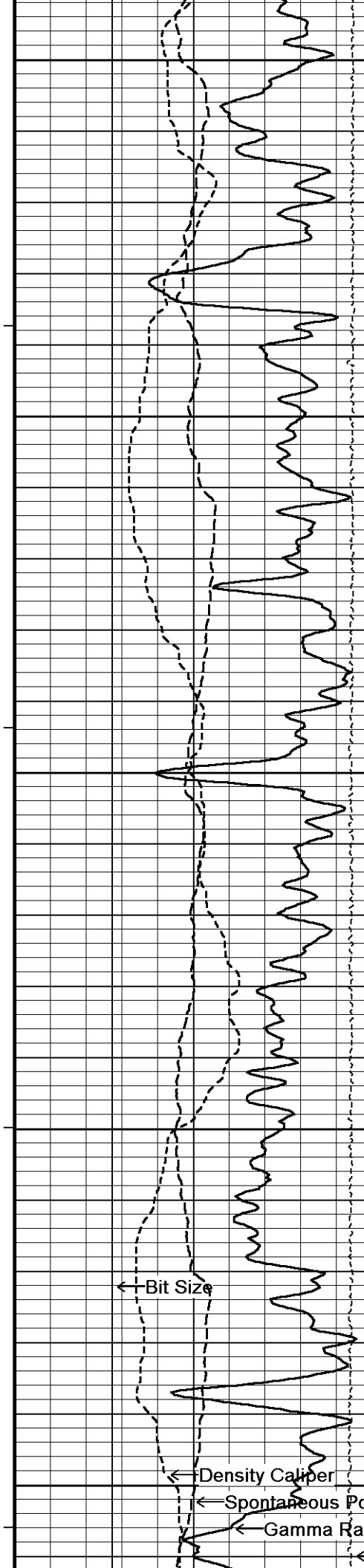
Filename: C:\Logs\Bill Barrett\Dec 2011\GGU Kaufman 32D-30-...\GGU Kaufman 32D-30-691 Main.dta

Recorded on 19-DEC-2011 14:45

System Versions: Logged with 12.02.4401 Plotted with 12.02.4401







1000

104°

1050

104°

1100

104°

1150

105°

1200

← Bit Size

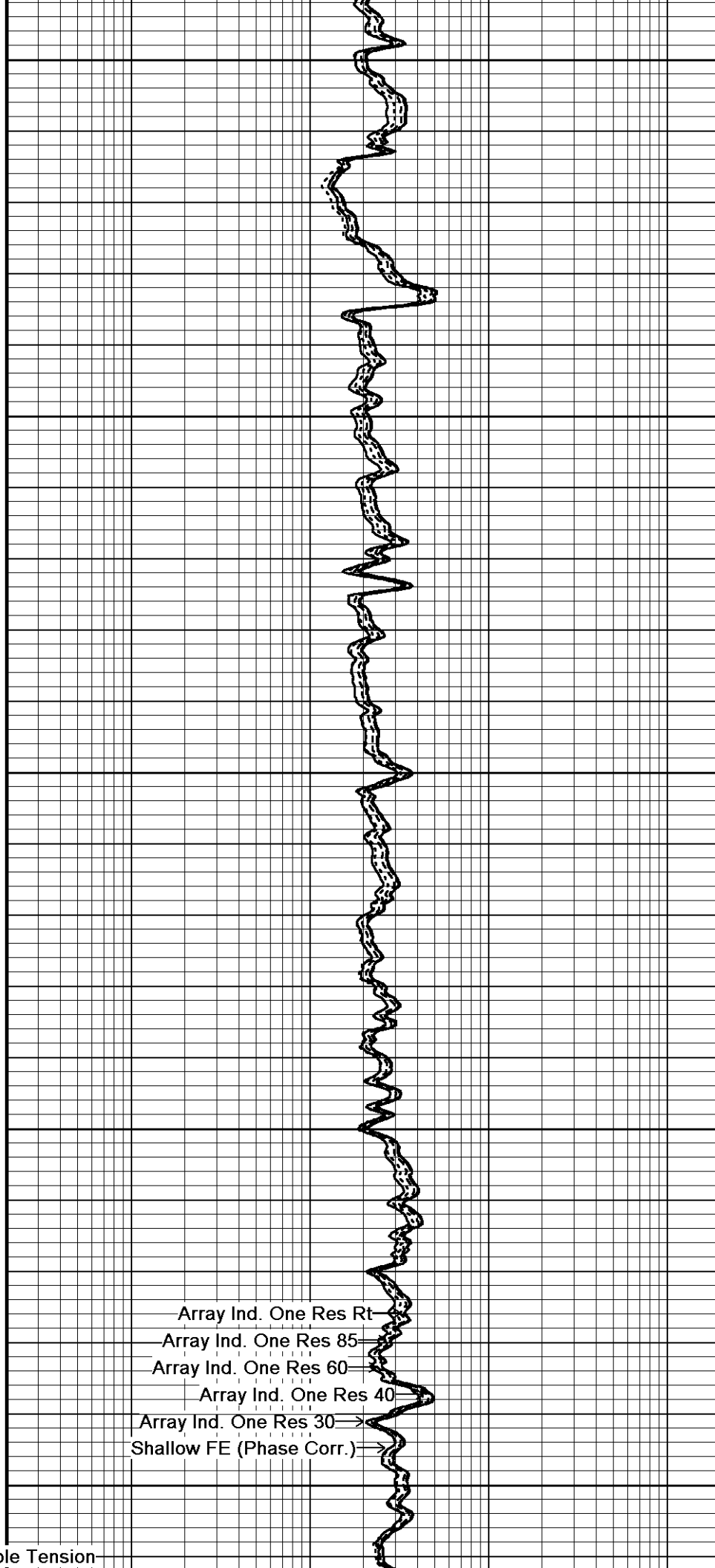
← Density Caliper

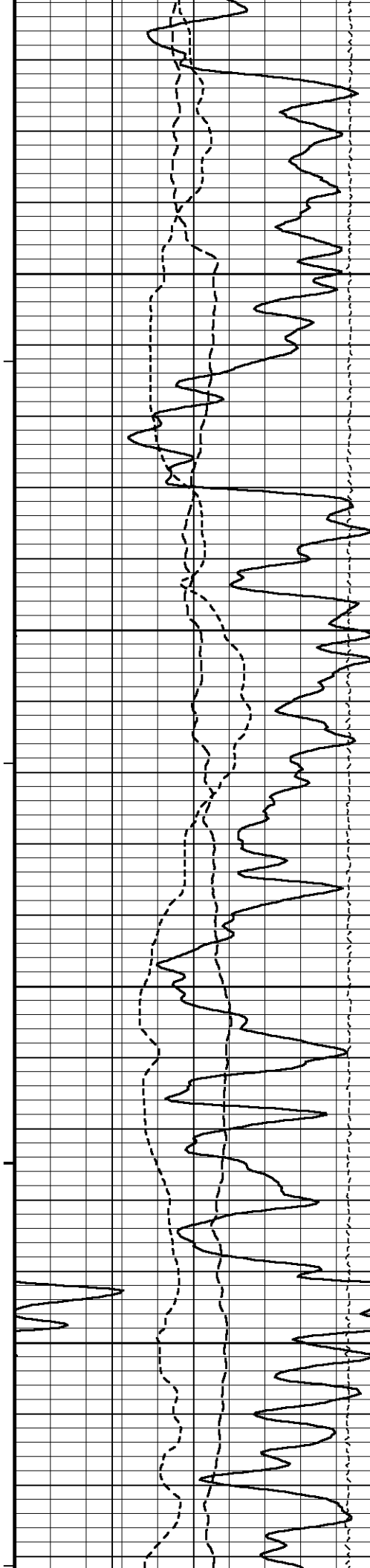
← Spontaneous Potential

← Gamma Ray

← DST Uphole Tension

Array Ind. One Res Rt
Array Ind. One Res 85
Array Ind. One Res 60
Array Ind. One Res 40
Array Ind. One Res 30
Shallow FE (Phase Corr.)





105°

1250

106°

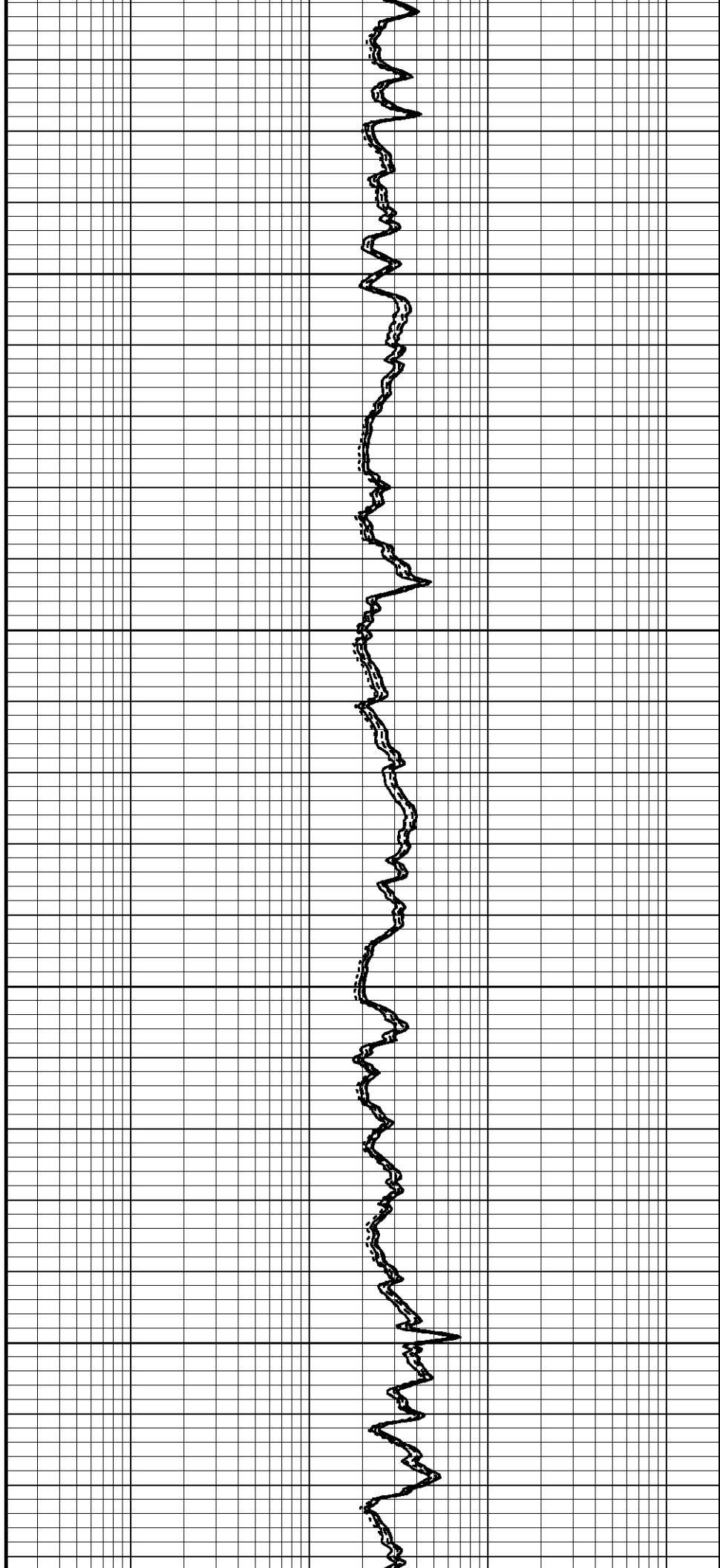
1300

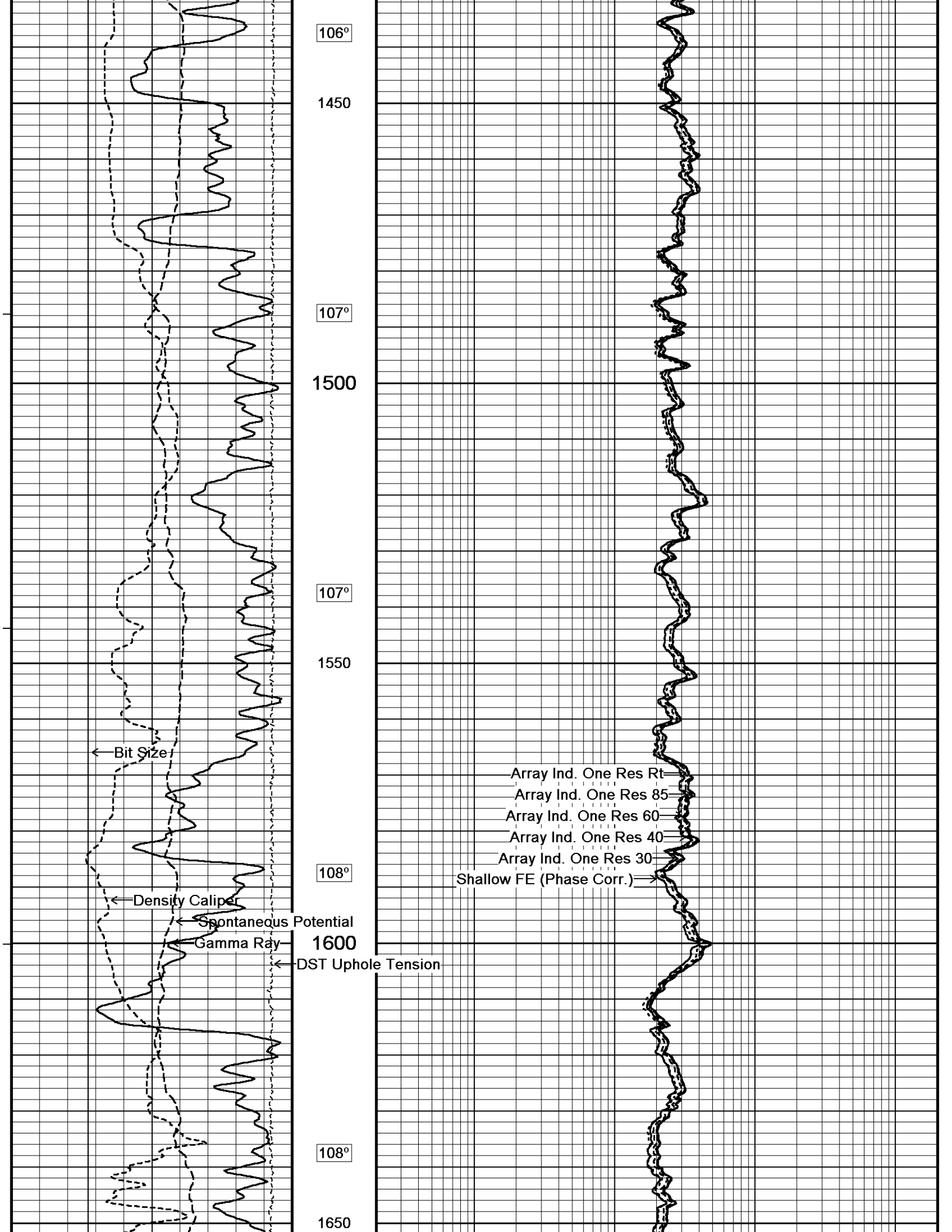
105°

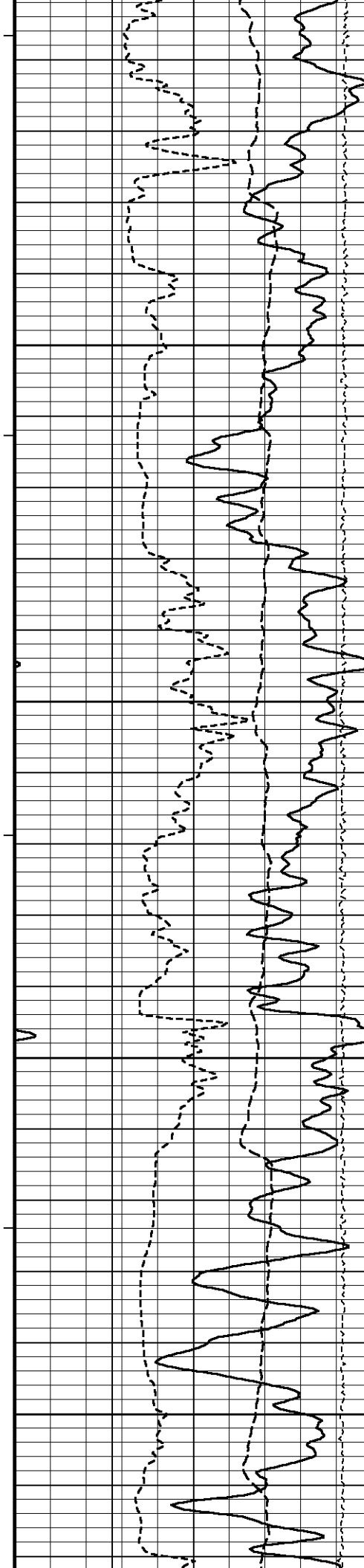
1350

106°

1400







108°

1700

109°

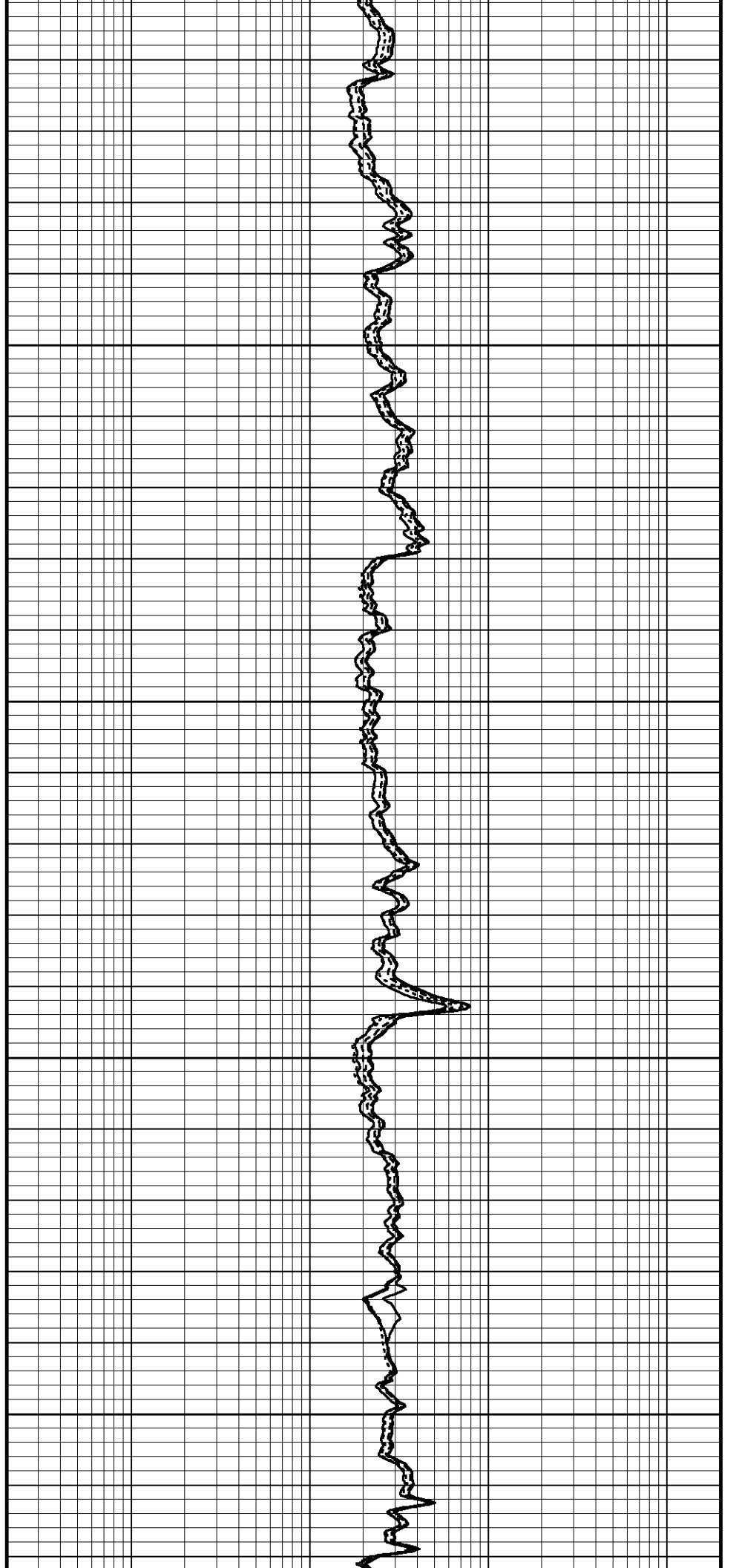
1750

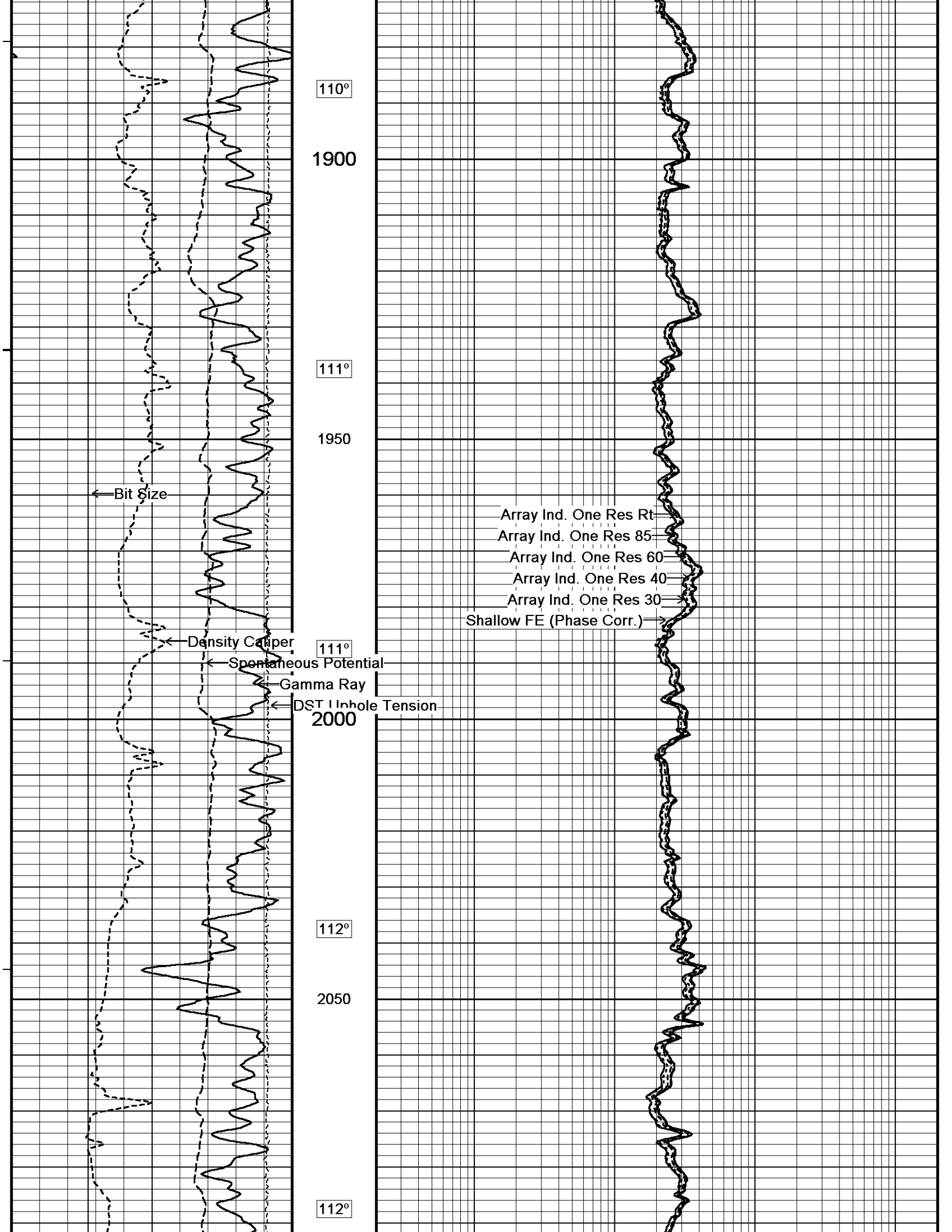
109°

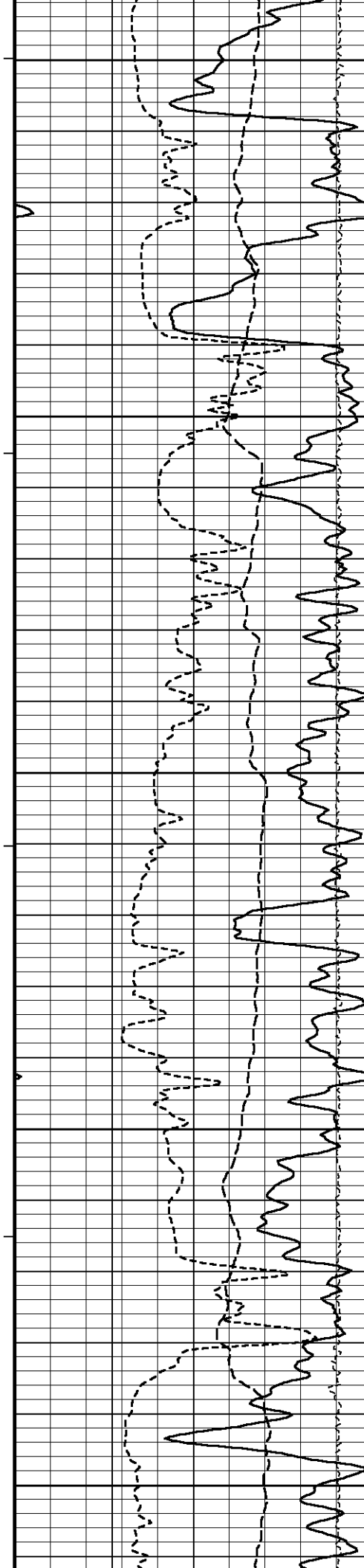
1800

109°

1850







2100

113°

2150

113°

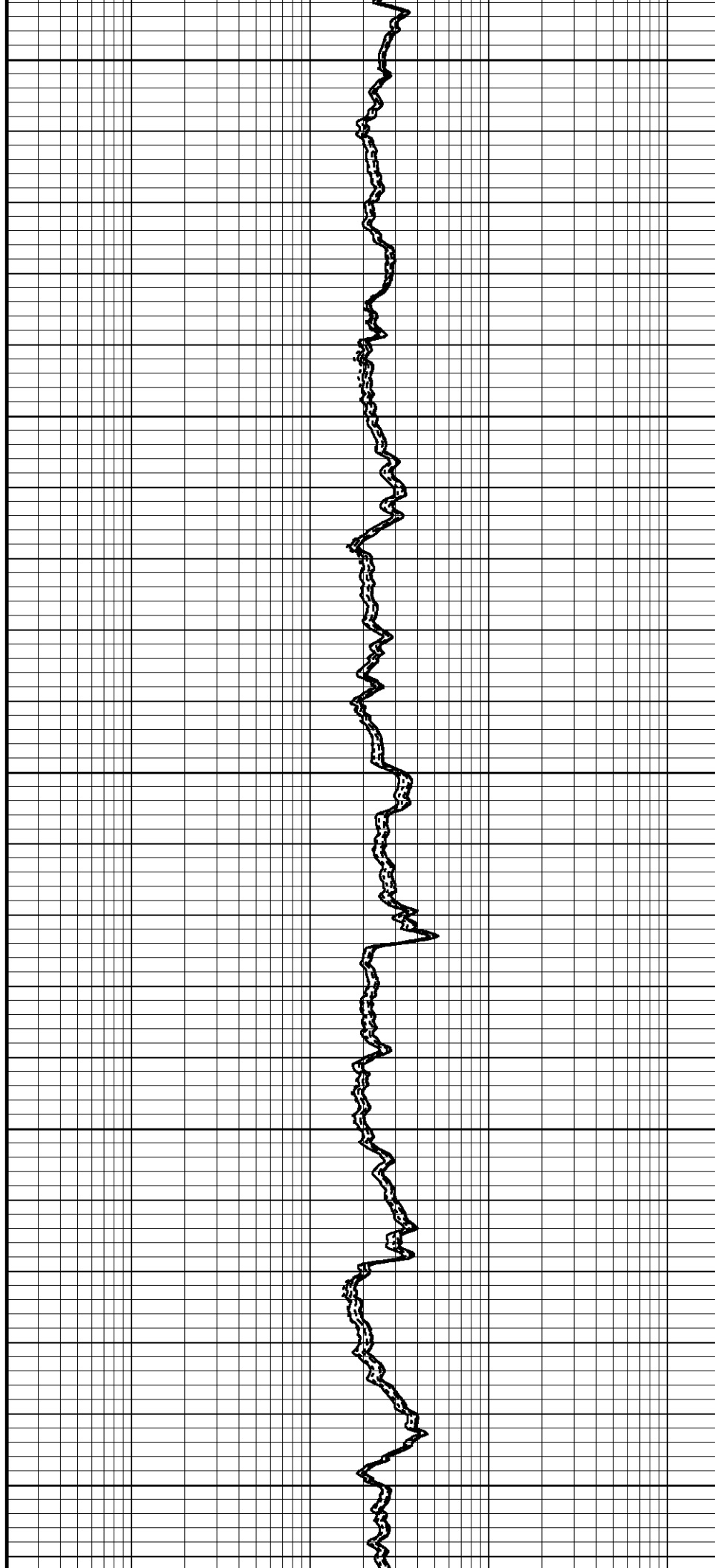
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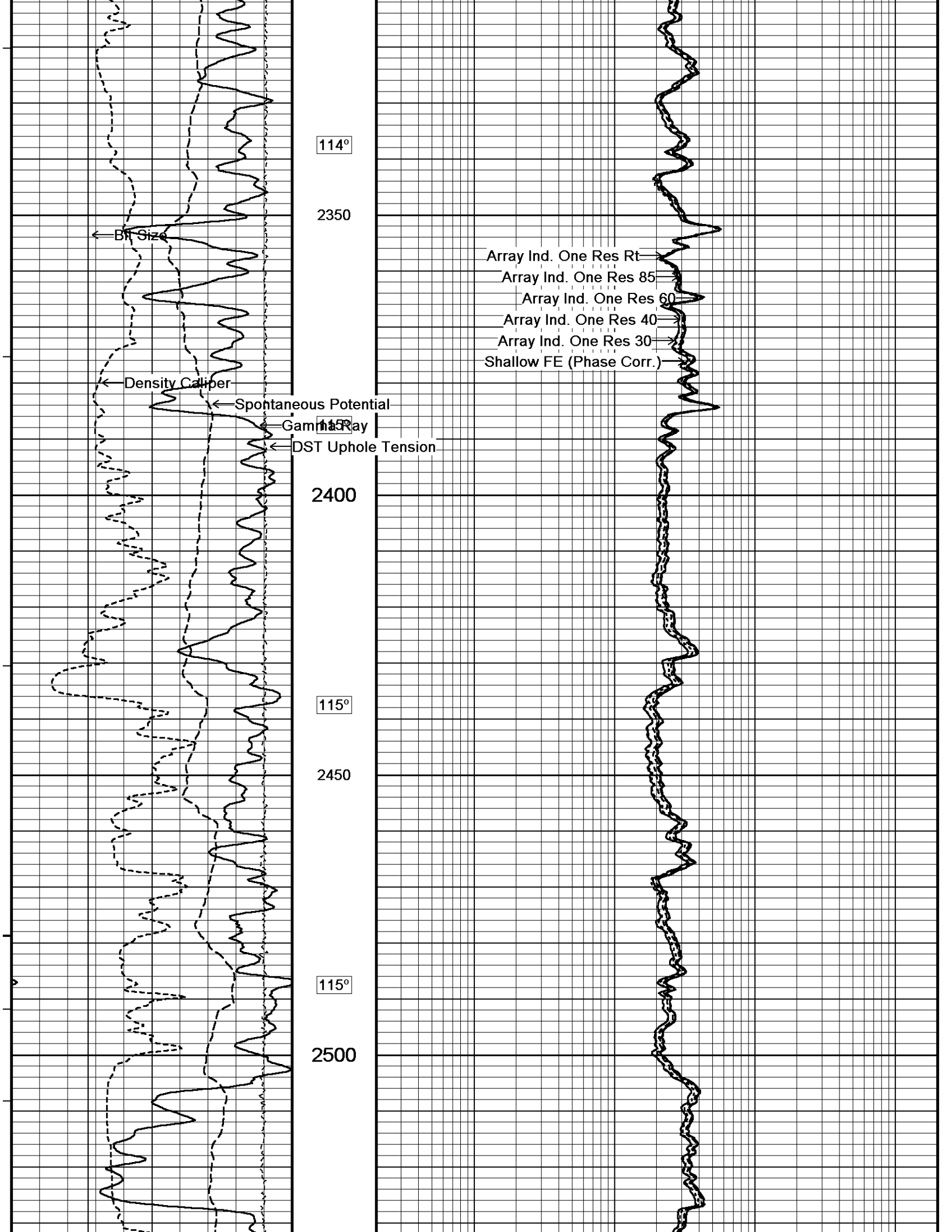
113°

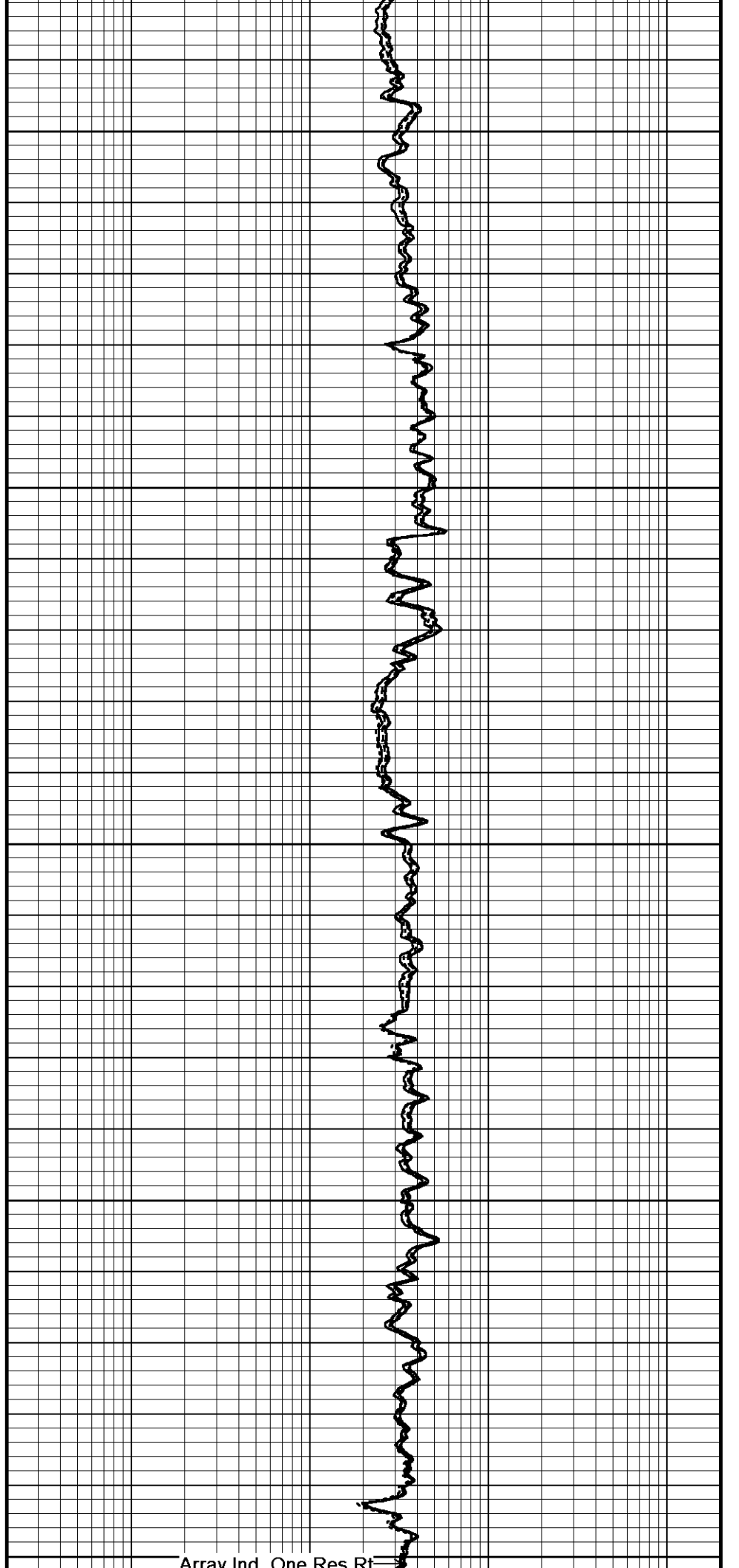
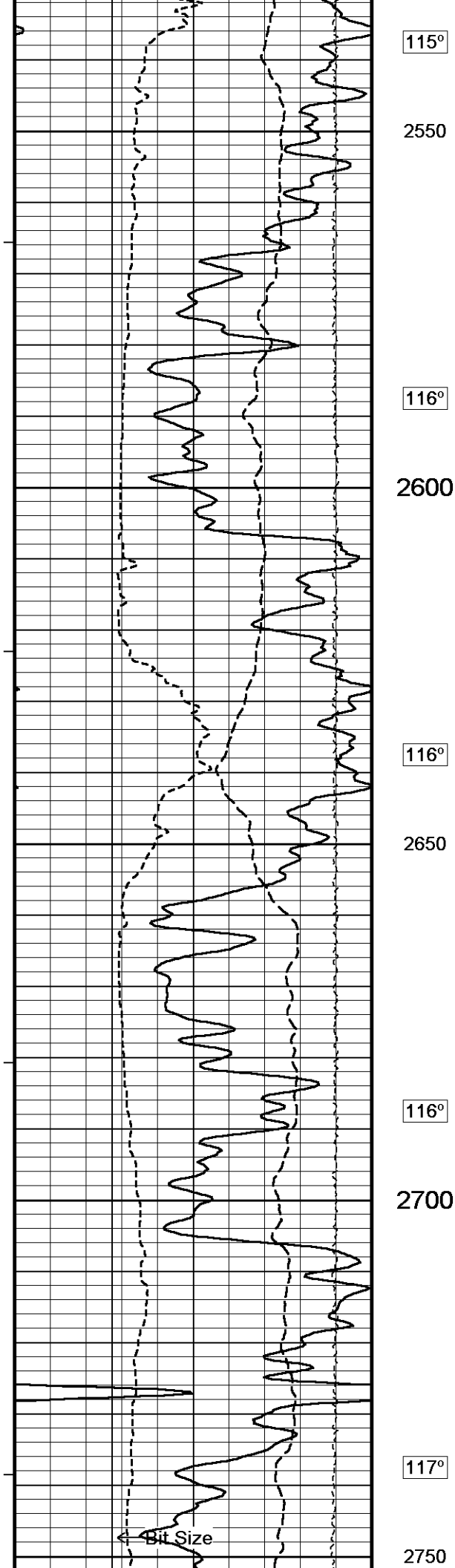
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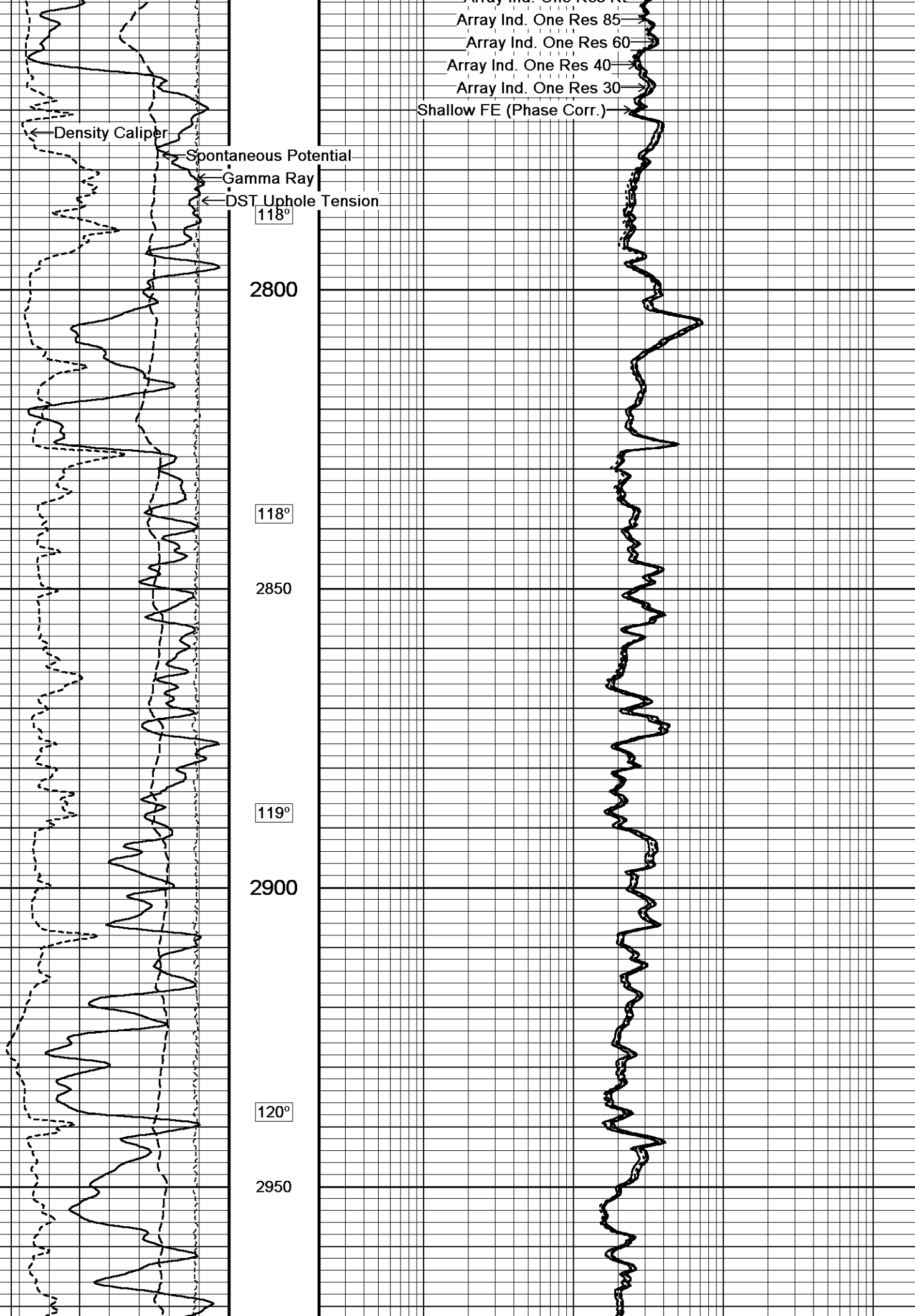
114°

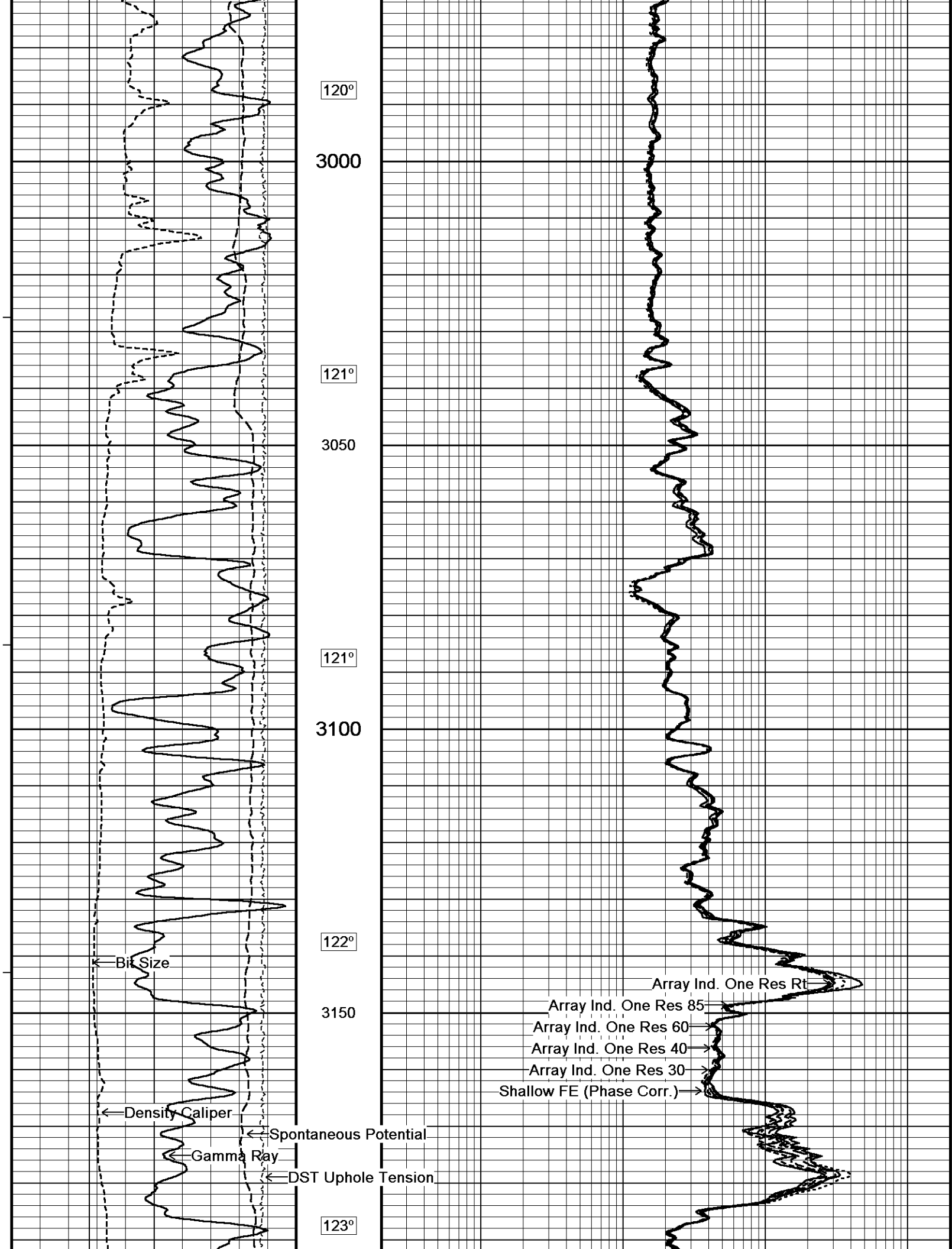
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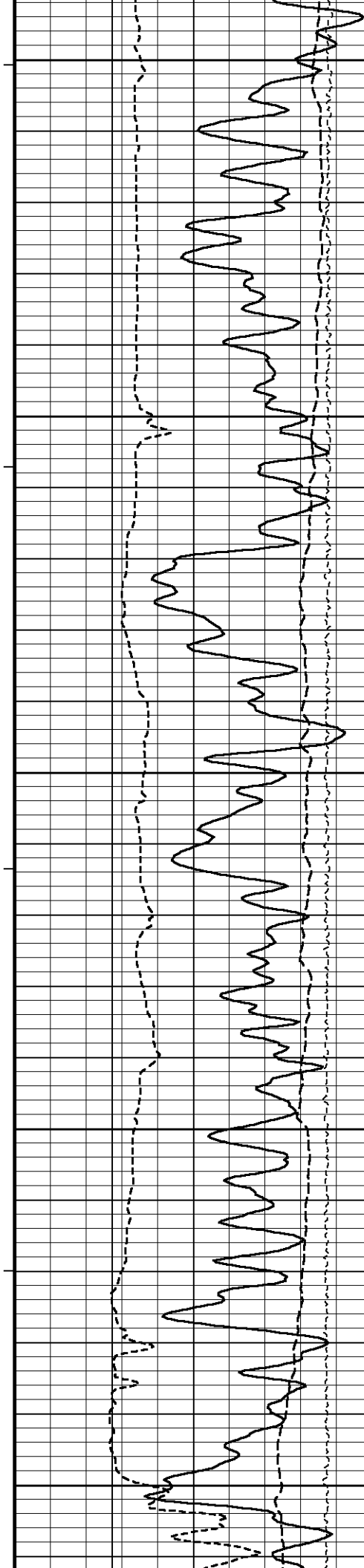












3200

123°

3250

124°

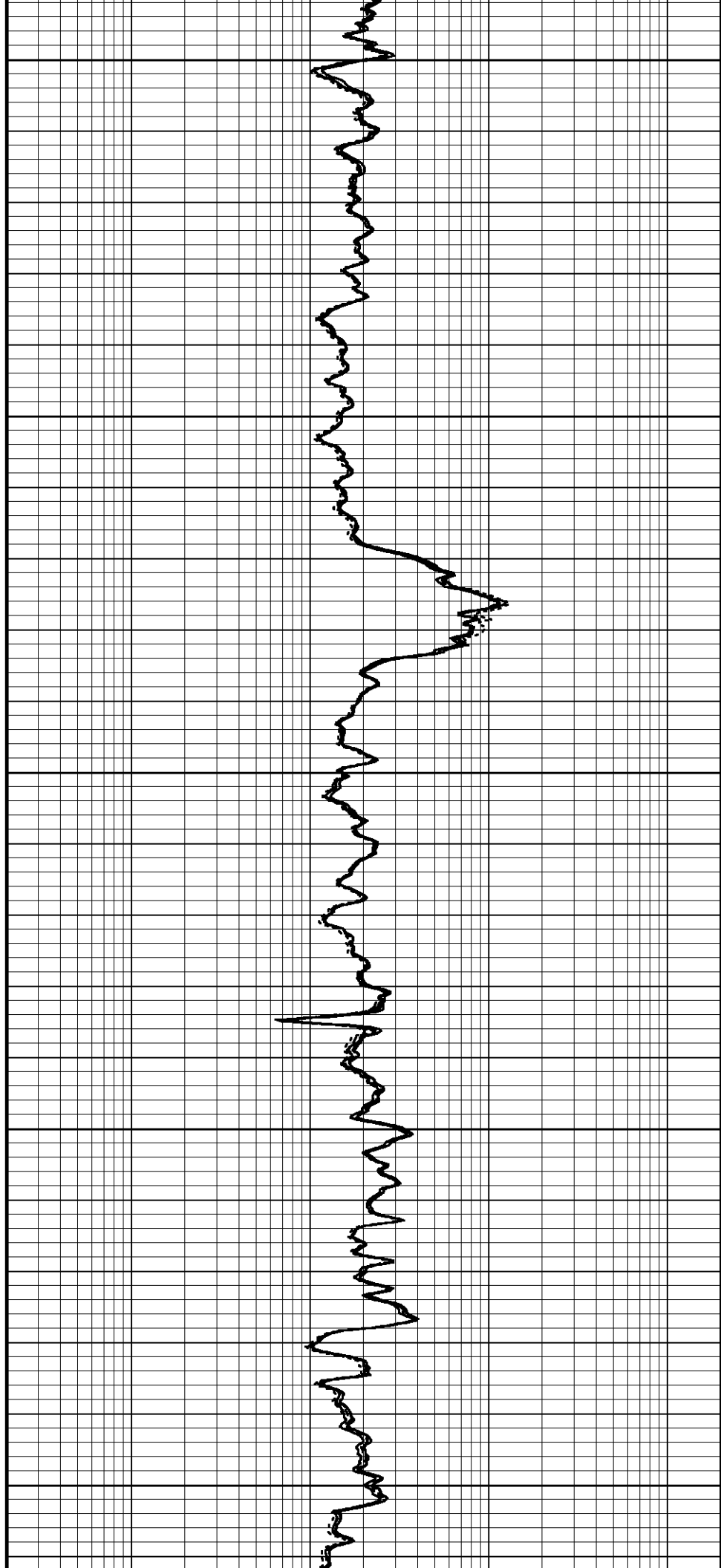
3300

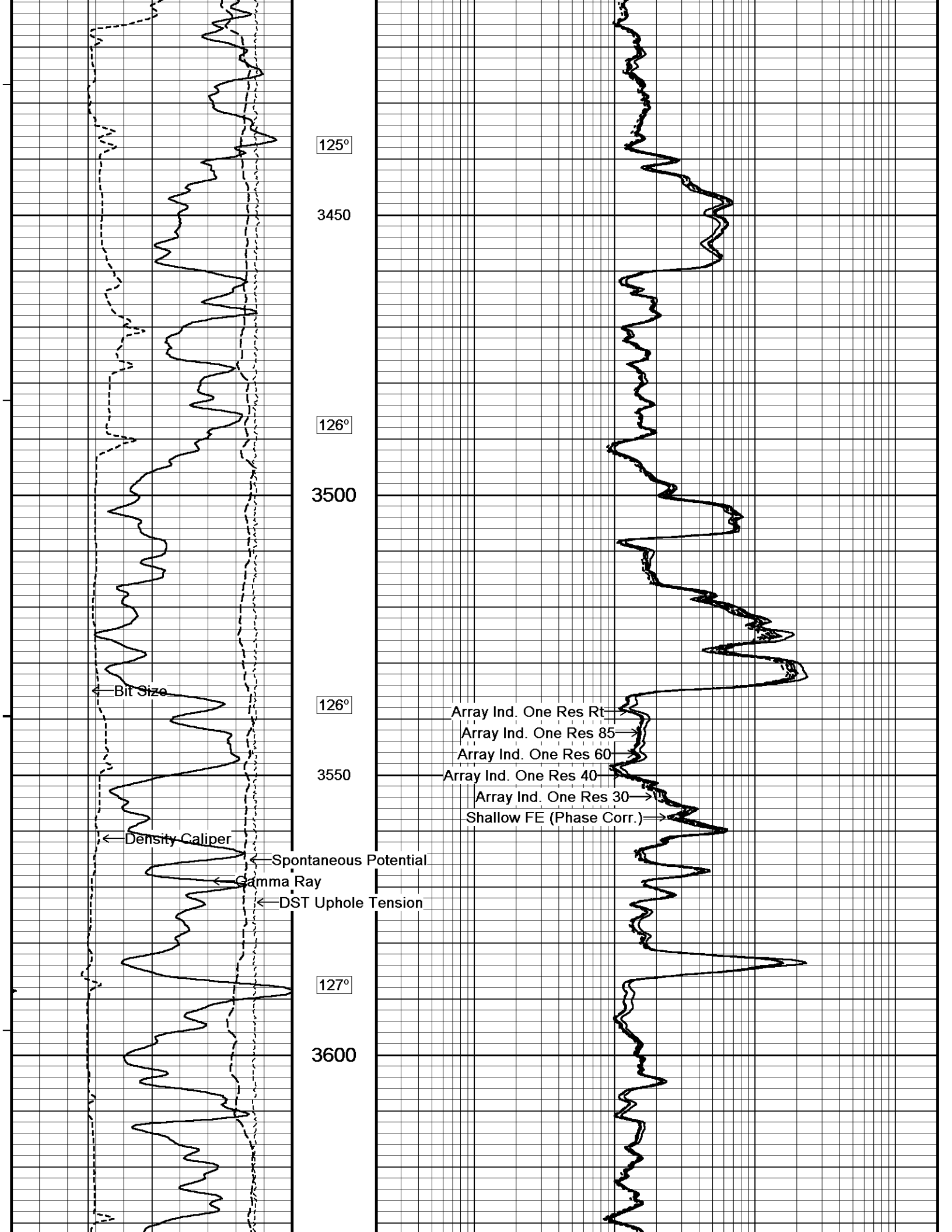
124°

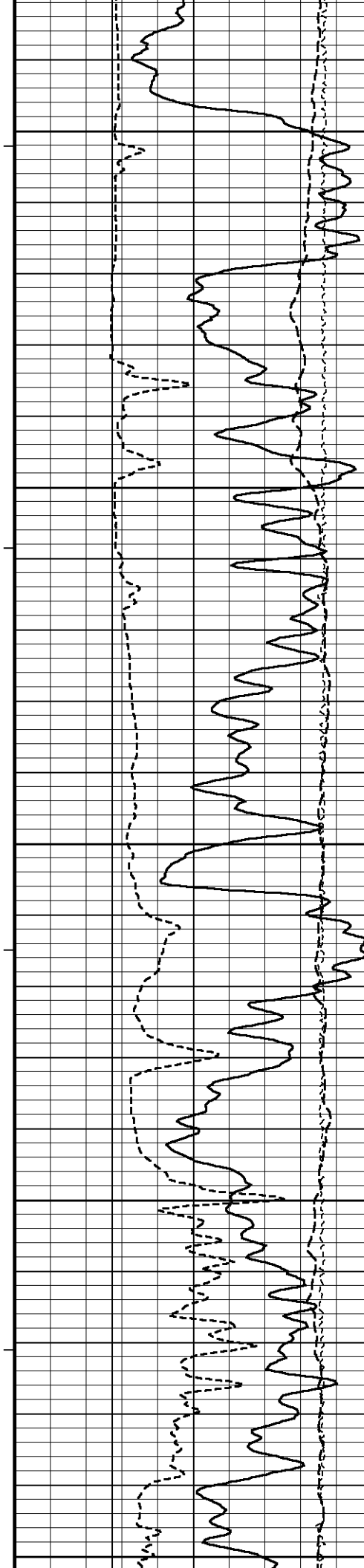
3350

125°

3400







128°

3650

128°

3700

129°

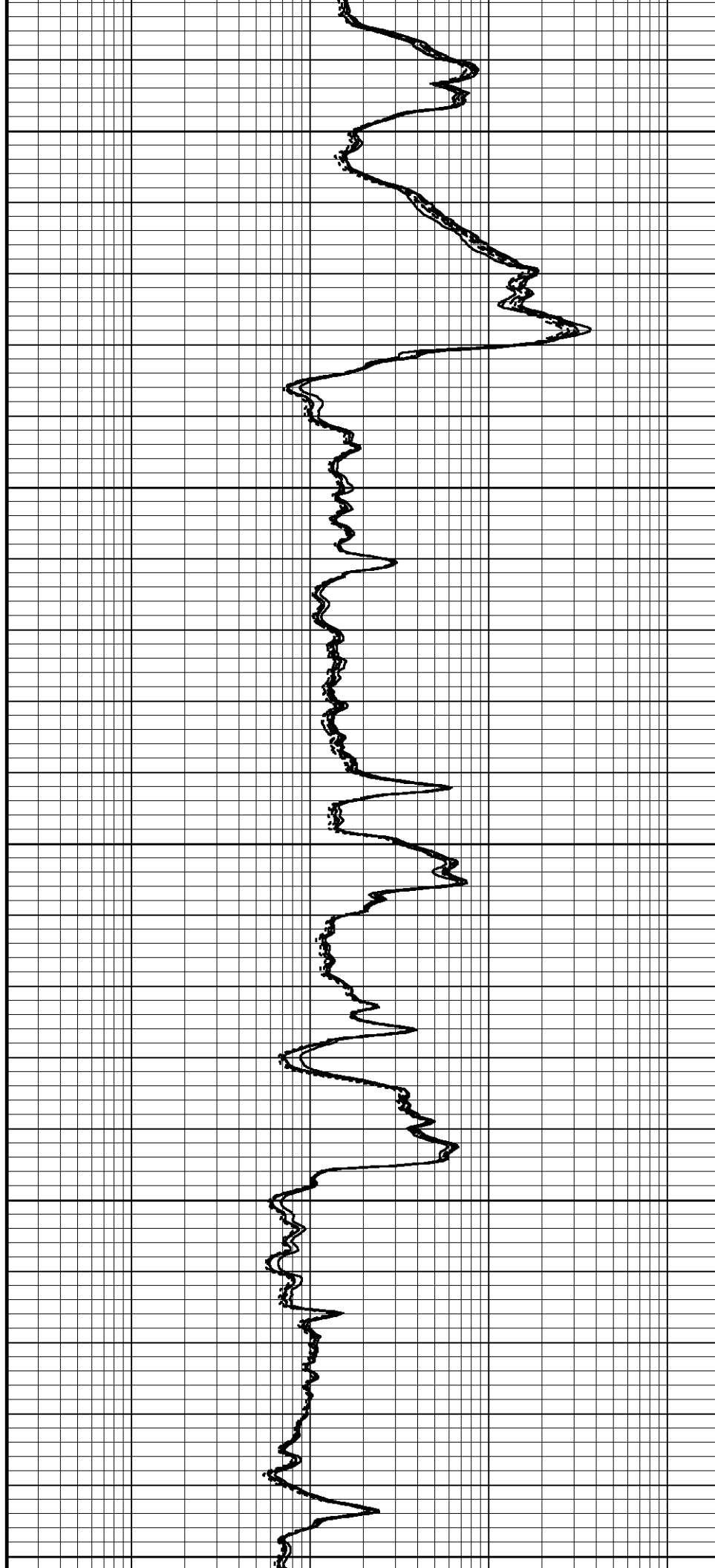
3750

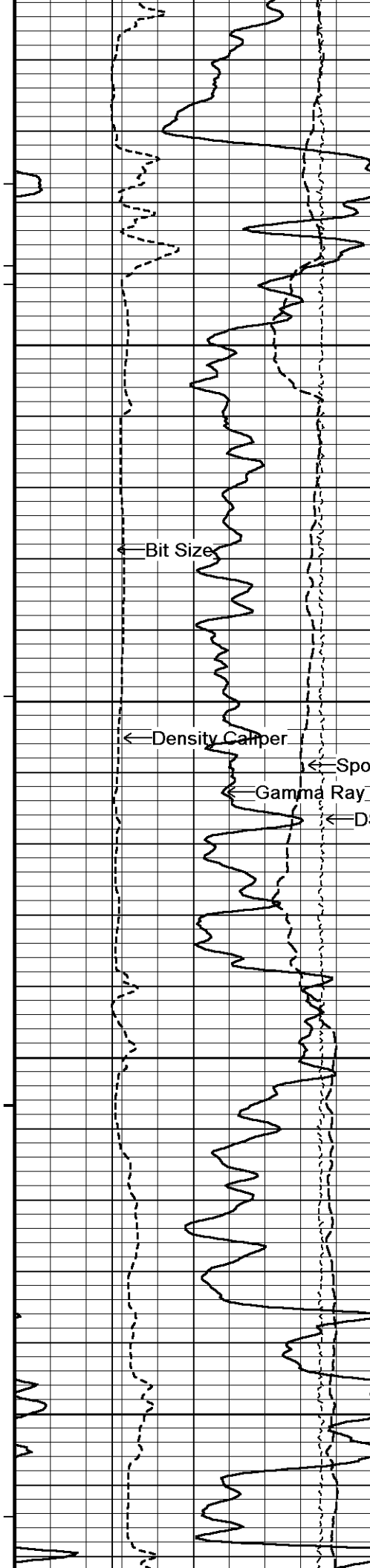
129°

3800

129°

3850





129°

3900

130°

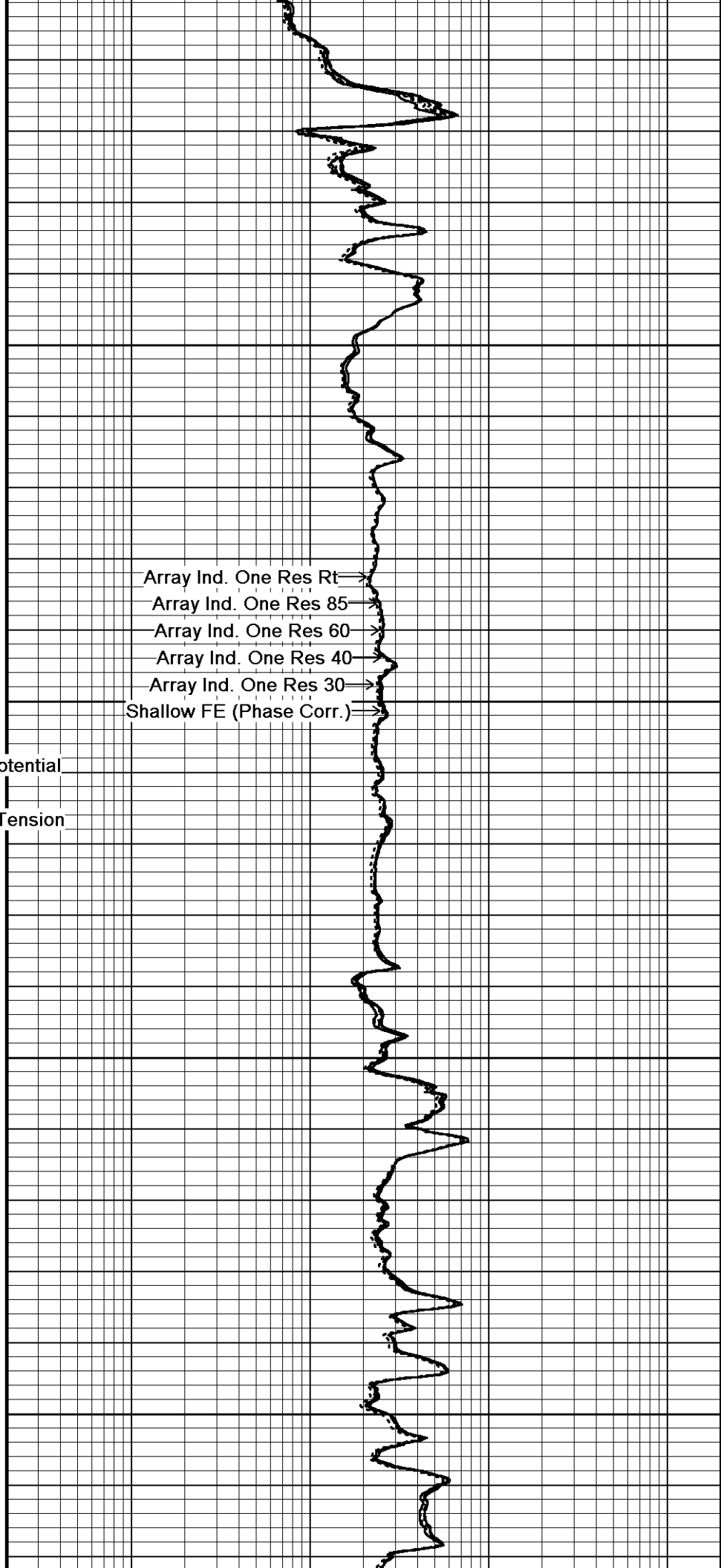
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131°

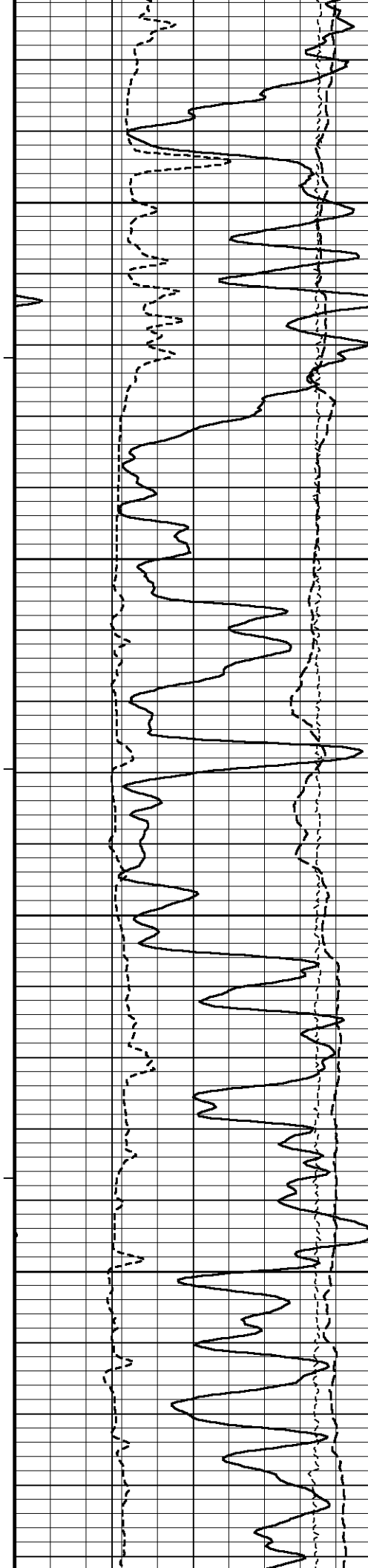
4000

131°

4050



Array Ind. One Res Rt
Array Ind. One Res 85
Array Ind. One Res 60
Array Ind. One Res 40
Array Ind. One Res 30
Shallow FE (Phase Corr.)



131°

4100

131°

4150

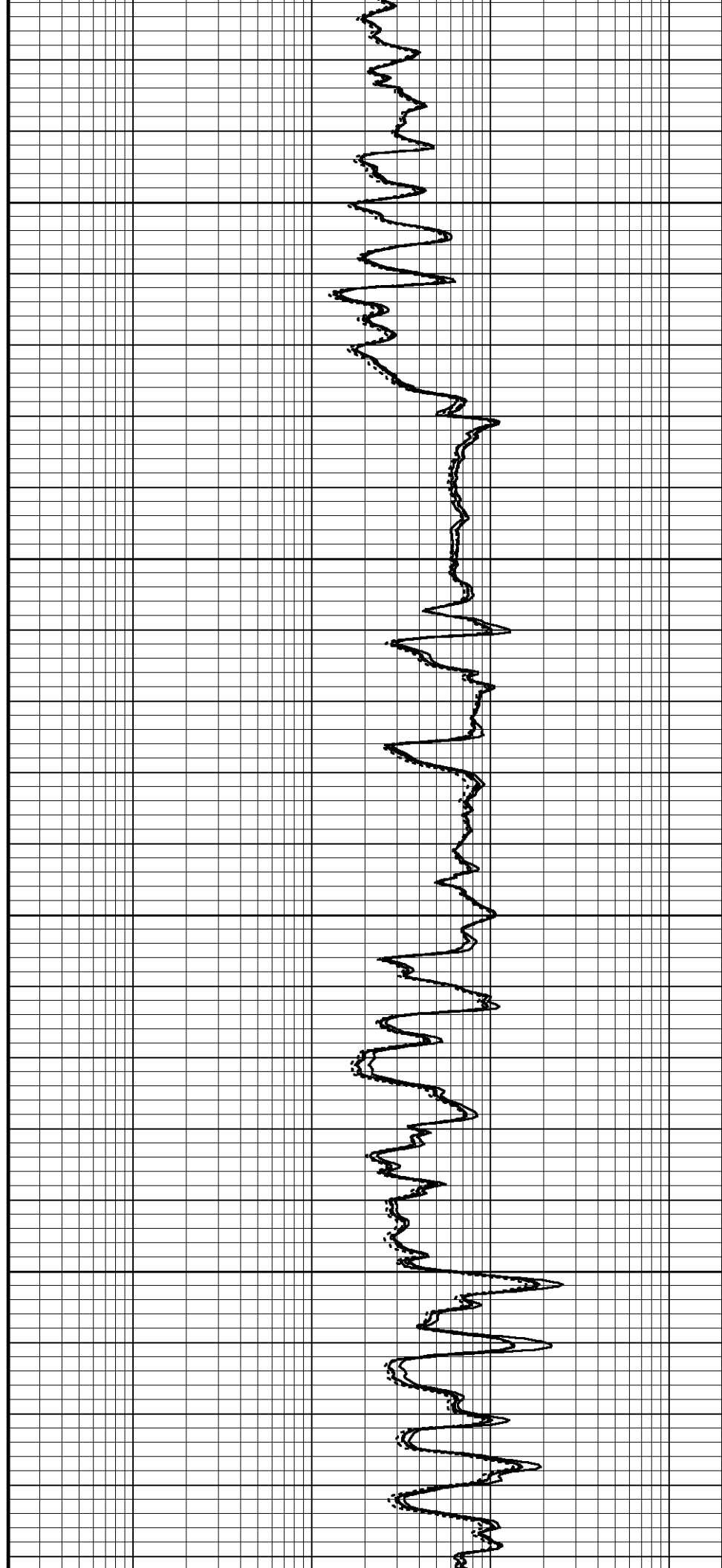
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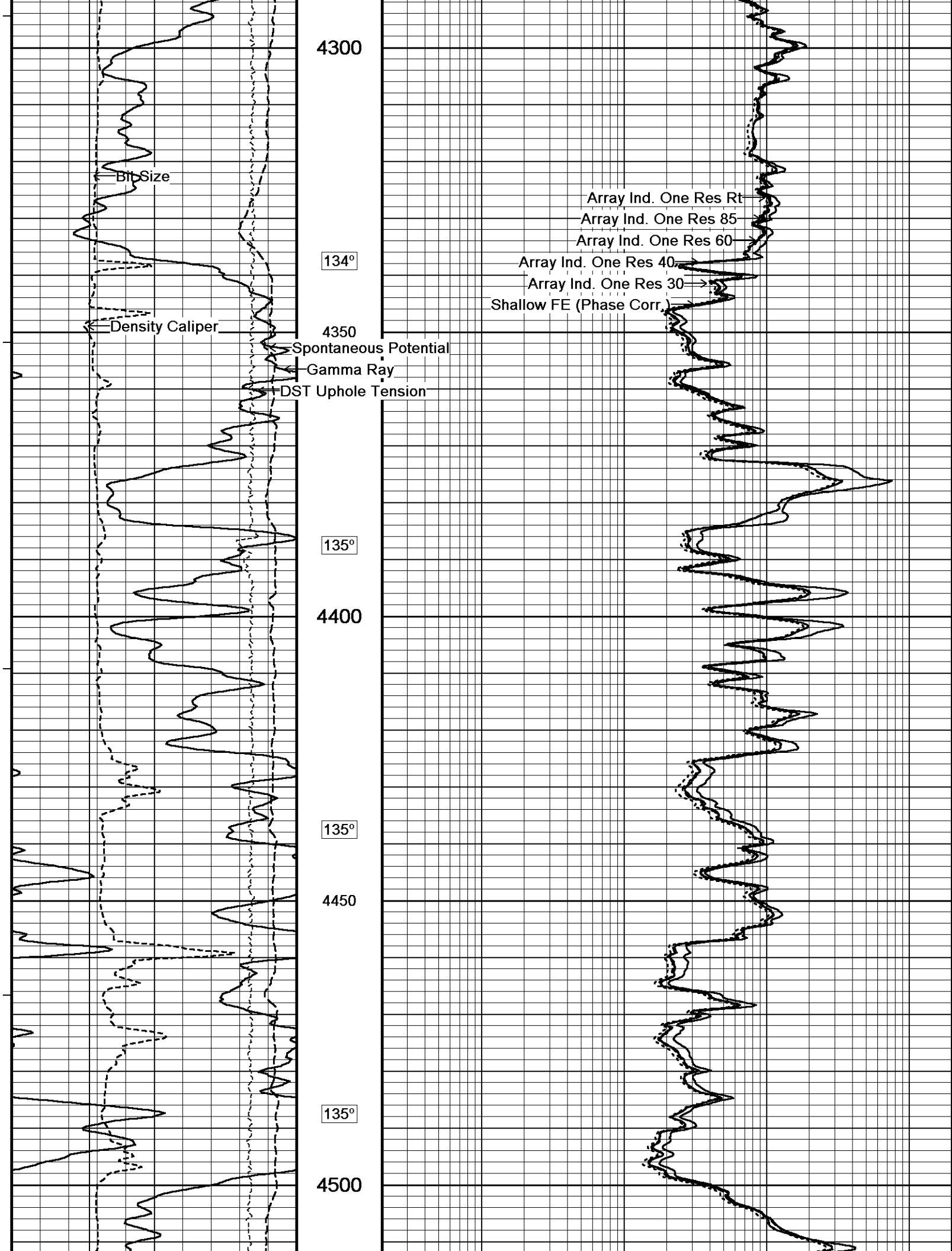
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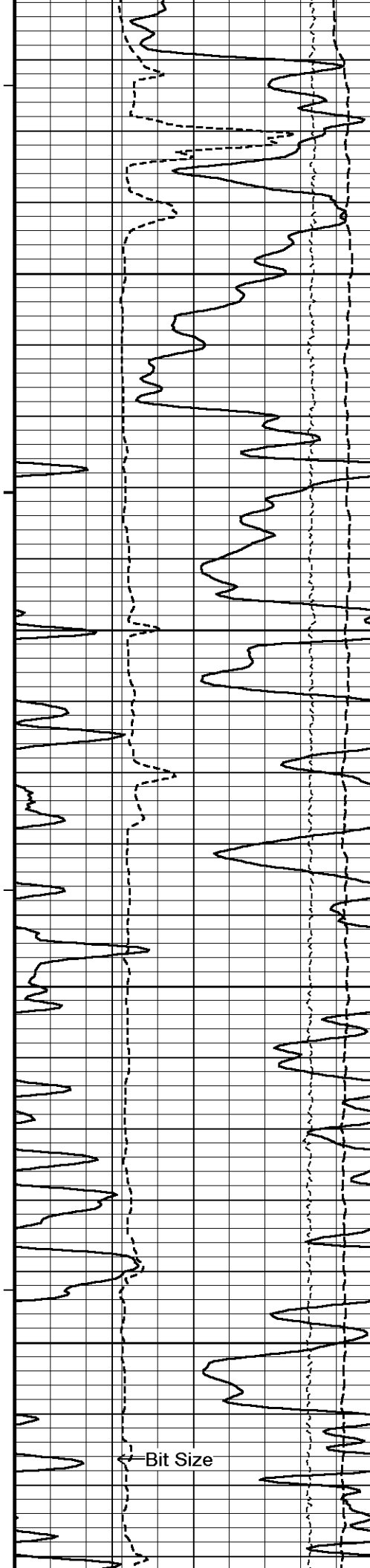
133°

4250

133°







136°

4550

137°

4600

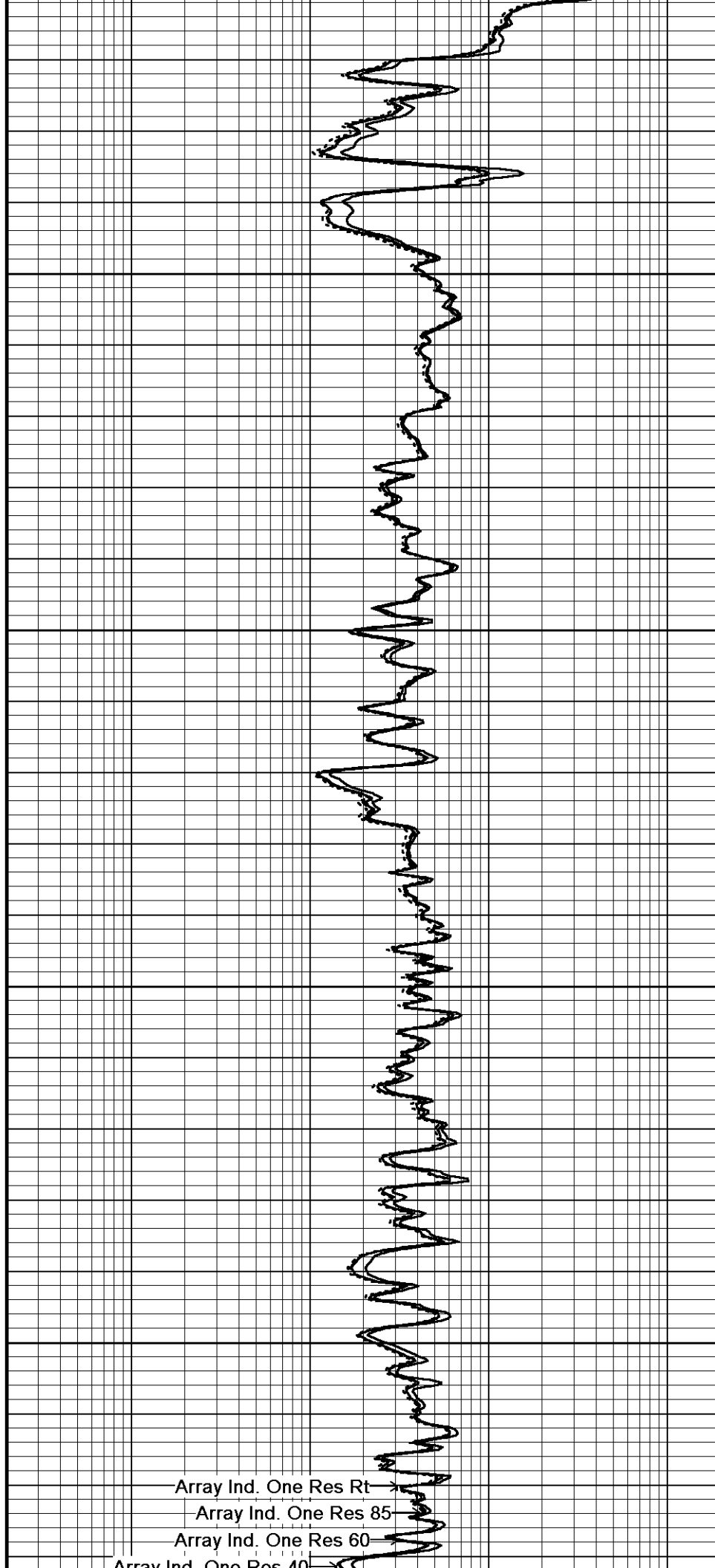
137°

4650

138°

4700

Bit Size

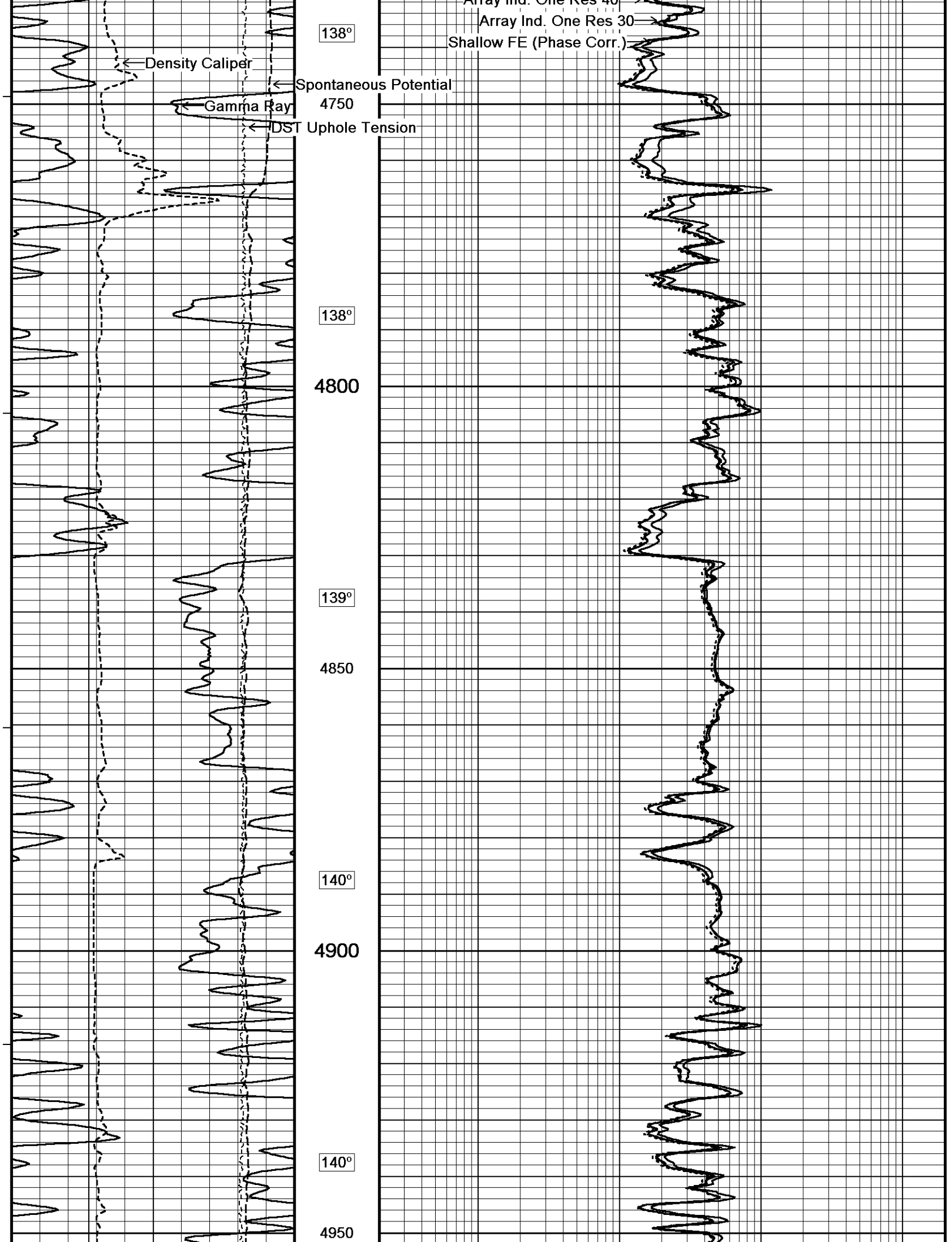


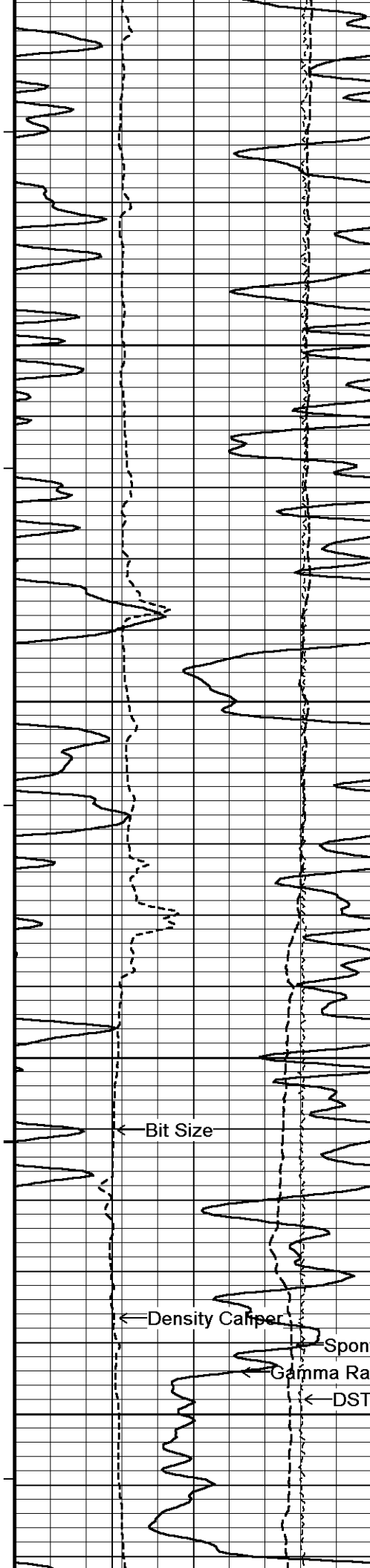
Array Ind. One Res Rt

Array Ind. One Res 85

Array Ind. One Res 60

Array Ind. One Res 40





140°

5000

141°

5050

141°

5100

← Bit Size

← Density Caliper

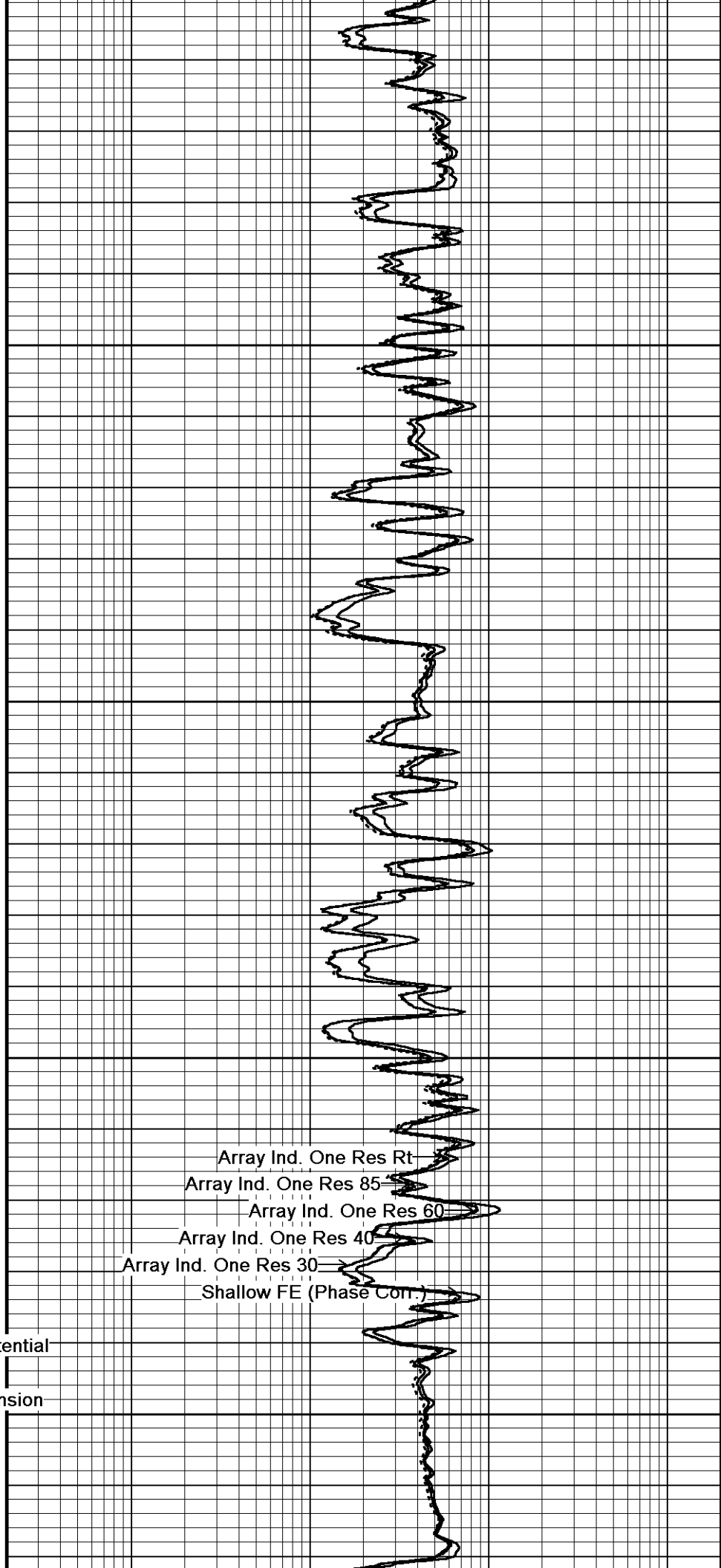
← Spontaneous Potential

← Gamma Ray

← DST Uphole Tension

142°

5150



Array Ind. One Res Rt

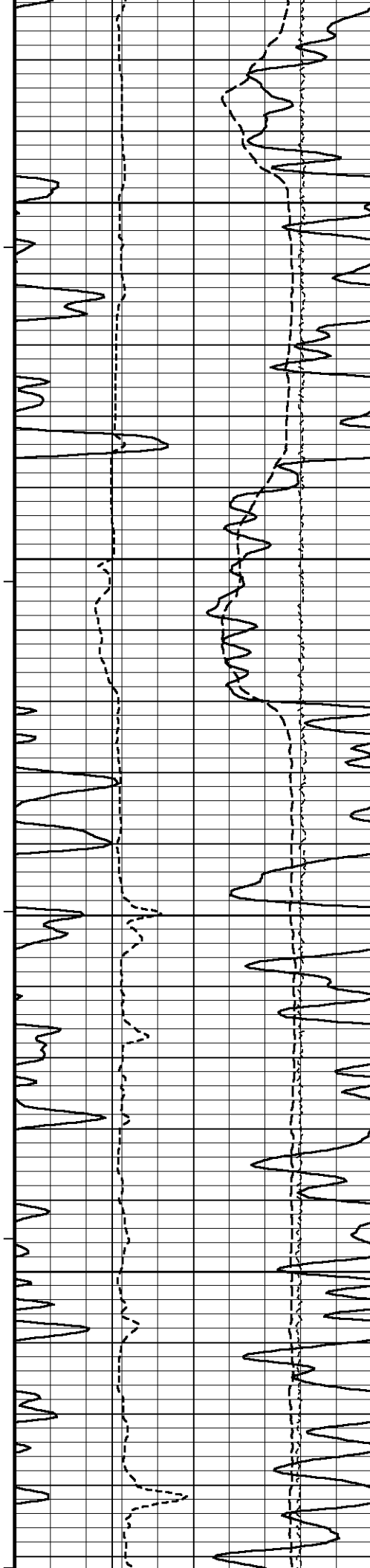
Array Ind. One Res 85

Array Ind. One Res 60

Array Ind. One Res 40

Array Ind. One Res 30

Shallow FE (Phase Corr.)



142°

5200

143°

5250

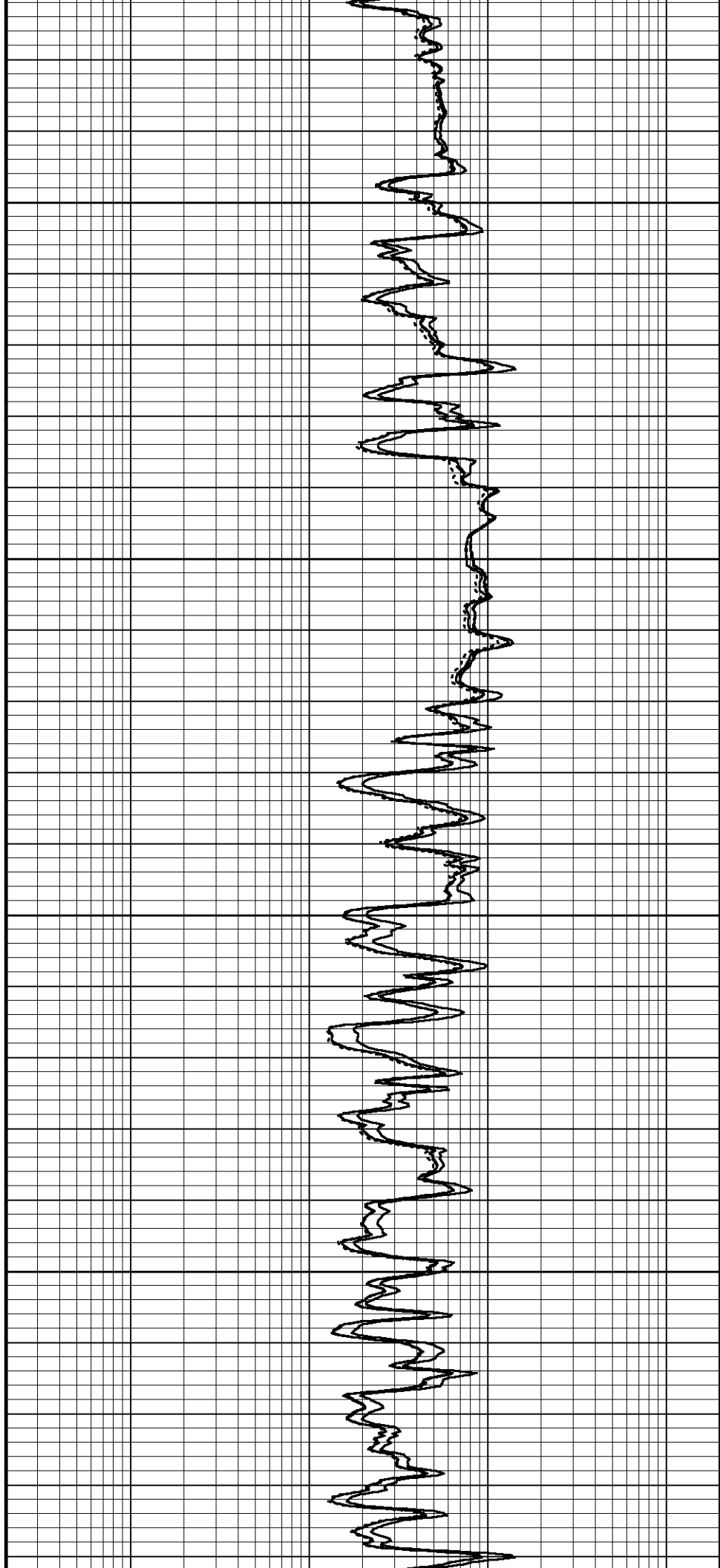
144°

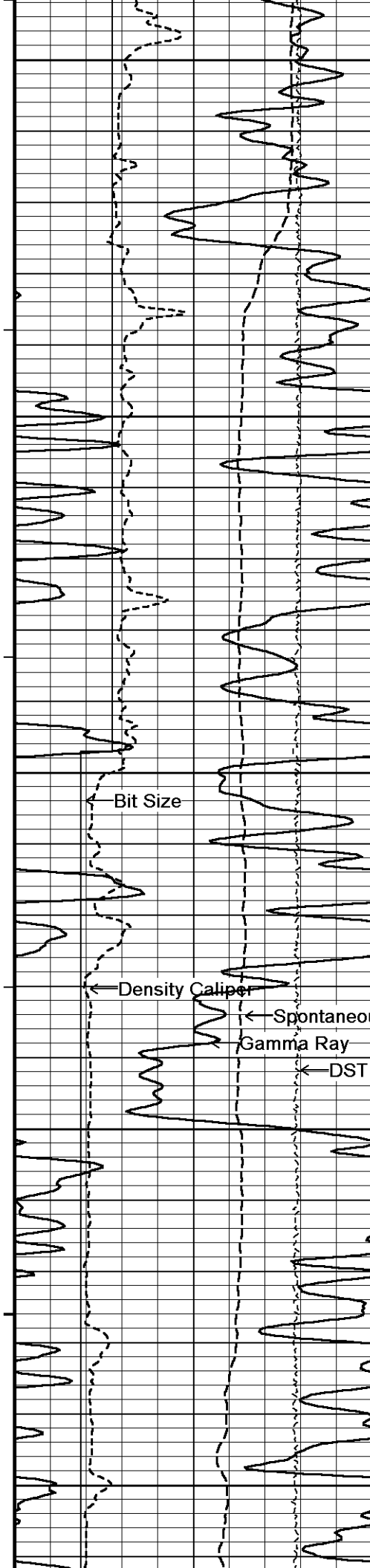
5300

145°

5350

145°





5400

146°

5450

147°

5500

Bit Size

Density Caliper

Spontaneous Potential

Gamma Ray

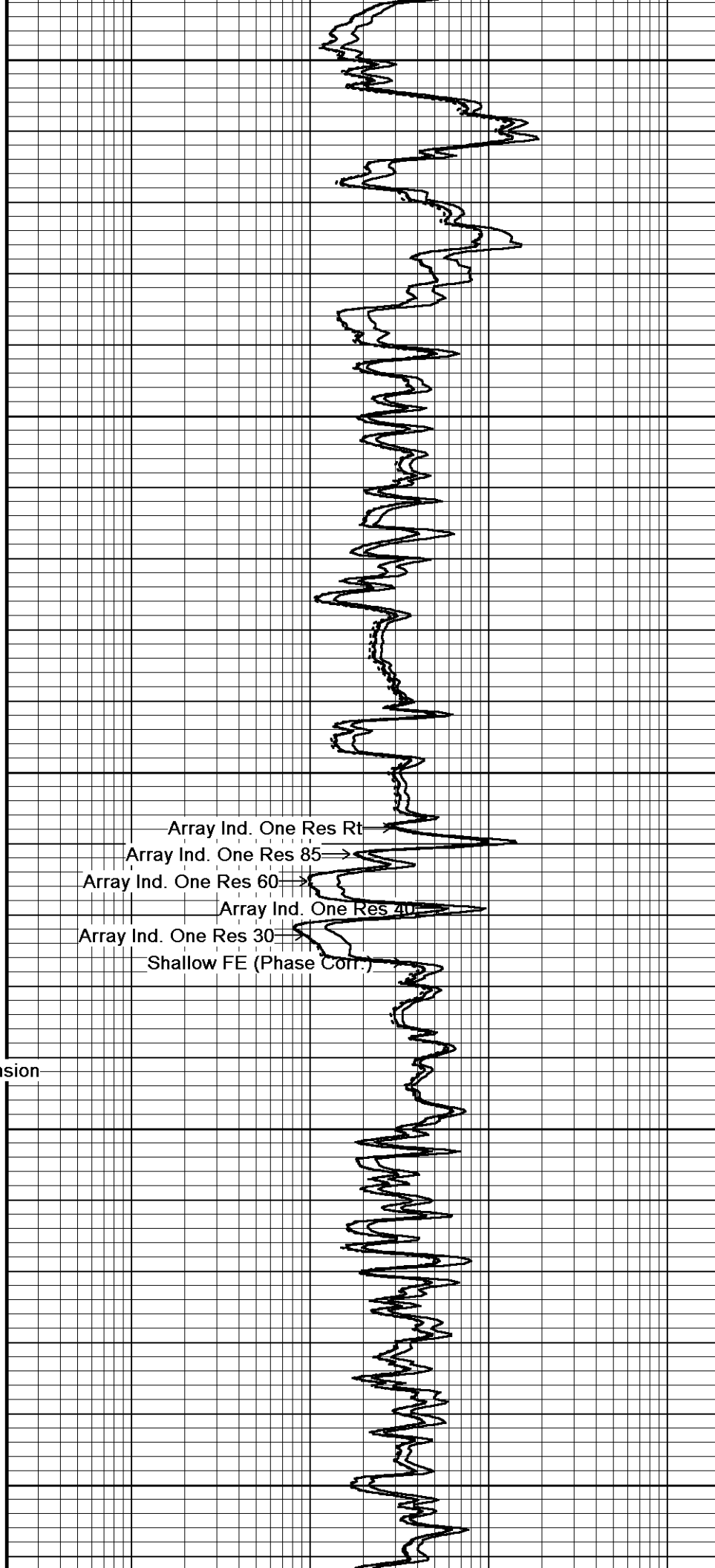
DST Uphole Tension

147°

5550

148°

5600



Array Ind. One Res Rt

Array Ind. One Res 85

Array Ind. One Res 60

Array Ind. One Res 40

Array Ind. One Res 30

Shallow FE (Phase Corr.)



148°

5650

149°

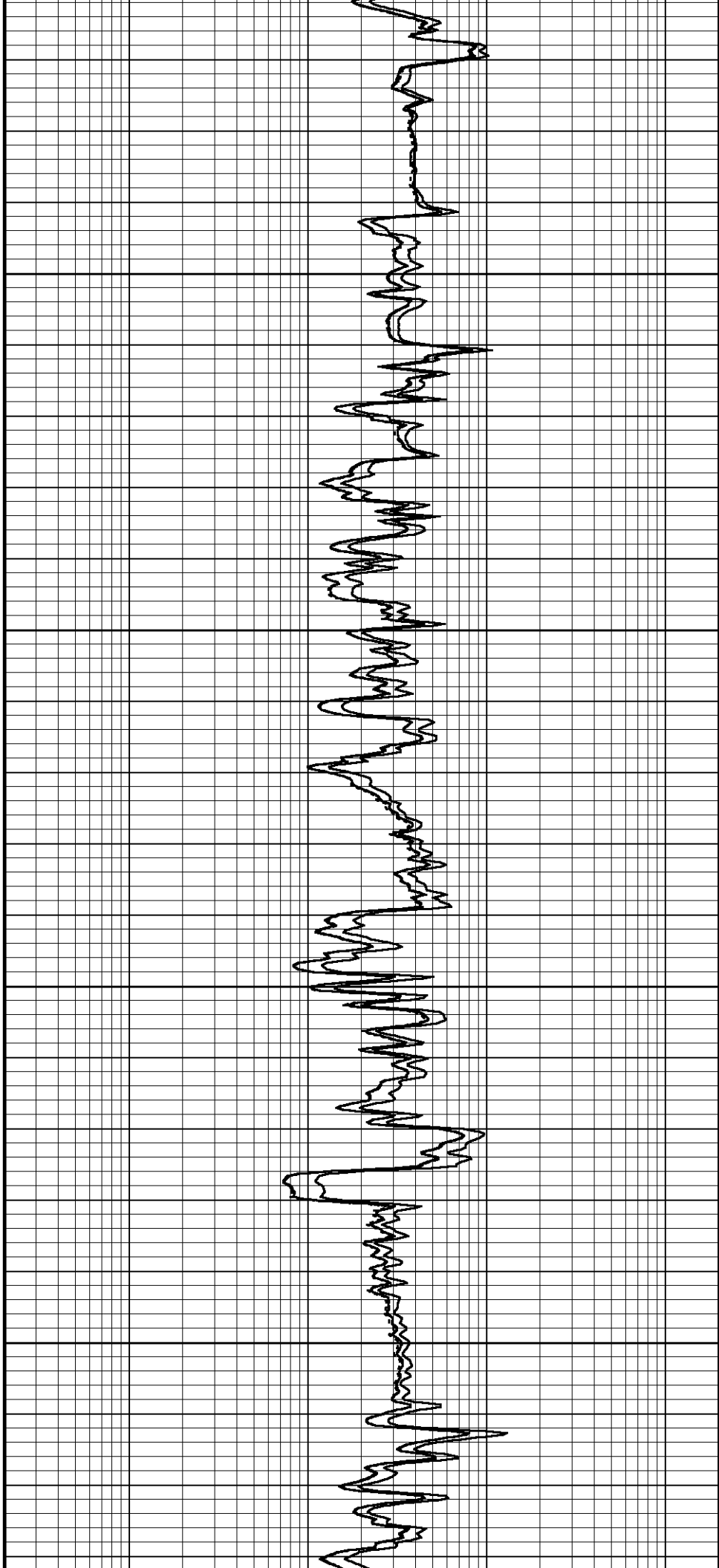
5700

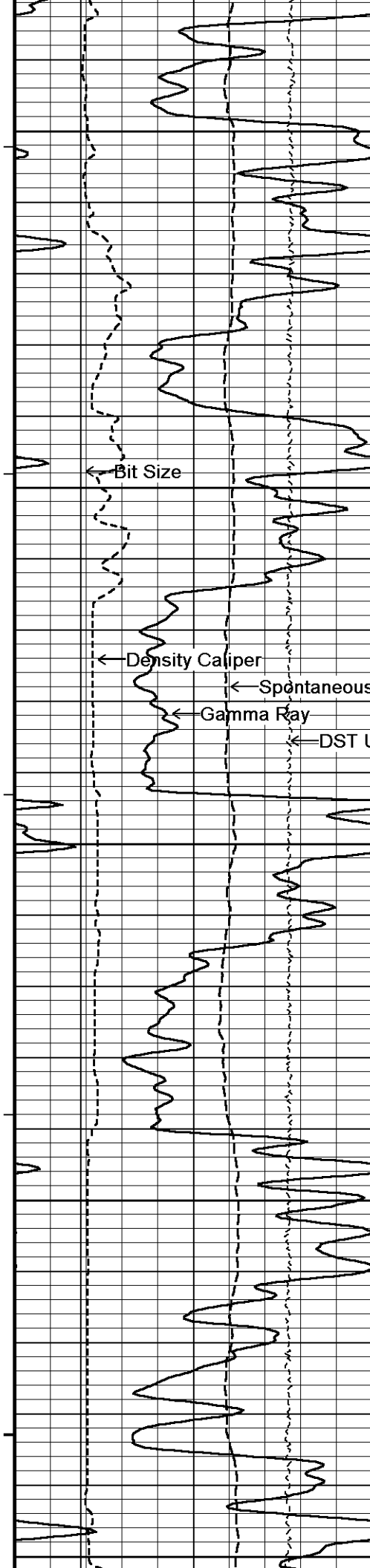
149°

5750

150°

5800





150°

5850

152°

5900

152°

5950

153°

6000

153°

6050

Bit Size

Density Caliper

Spontaneous Potential

Gamma Ray

DST Uphole Tension

Array Ind. One Res Rt

Array Ind. One Res 85

Array Ind. One Res 60

Array Ind. One Res 40

Array Ind. One Res 30

Shallow FE (Phase Corr.)



154°

6100

154°

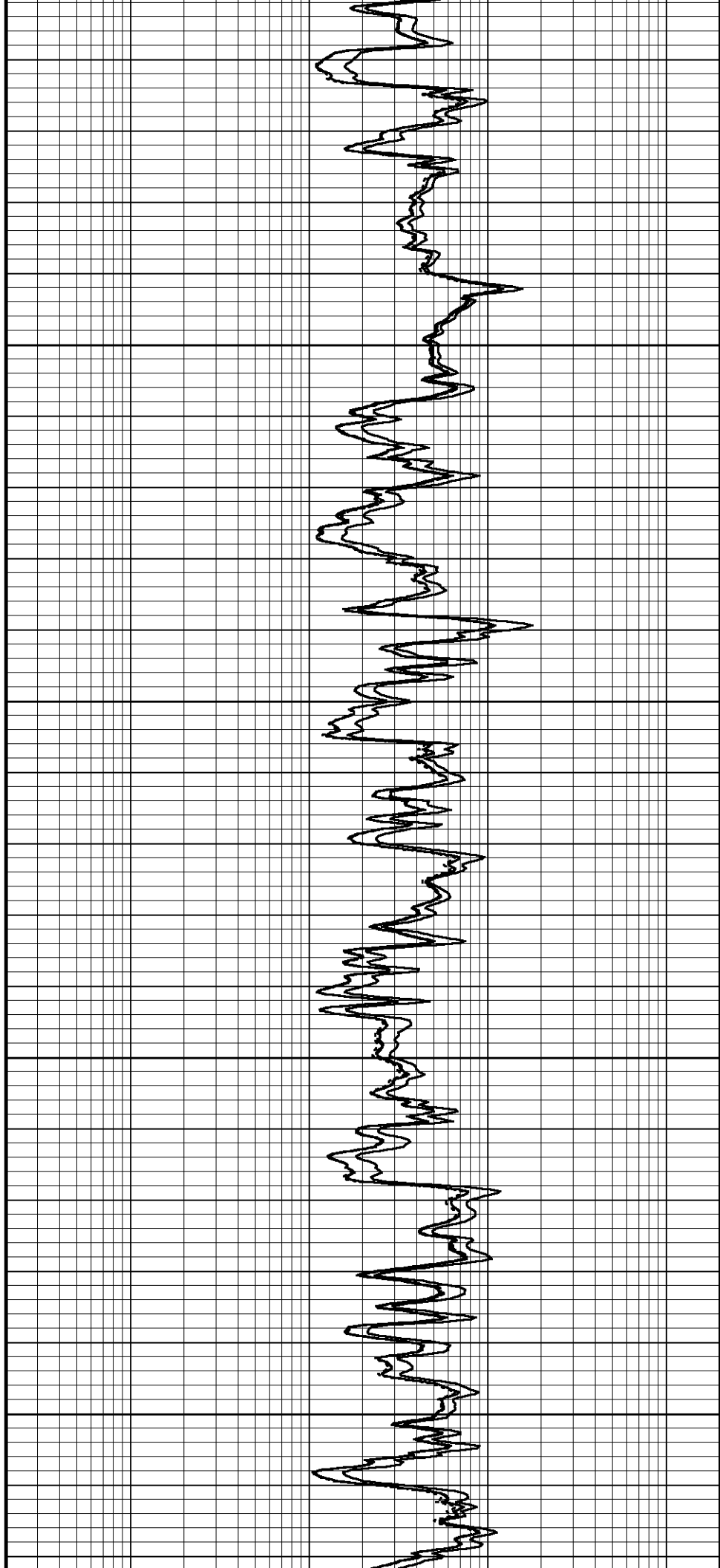
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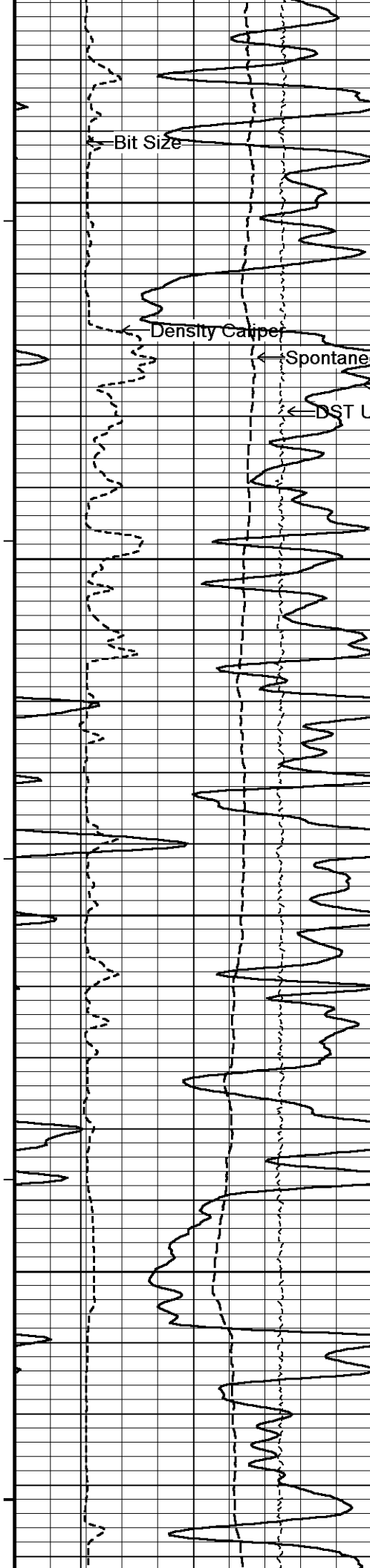
155°

6200

156°

6250





157°

6300

Density Caliper

Spontaneous Potential

Gamma Ray

DST Uphole Tension

158°

6350

159°

6400

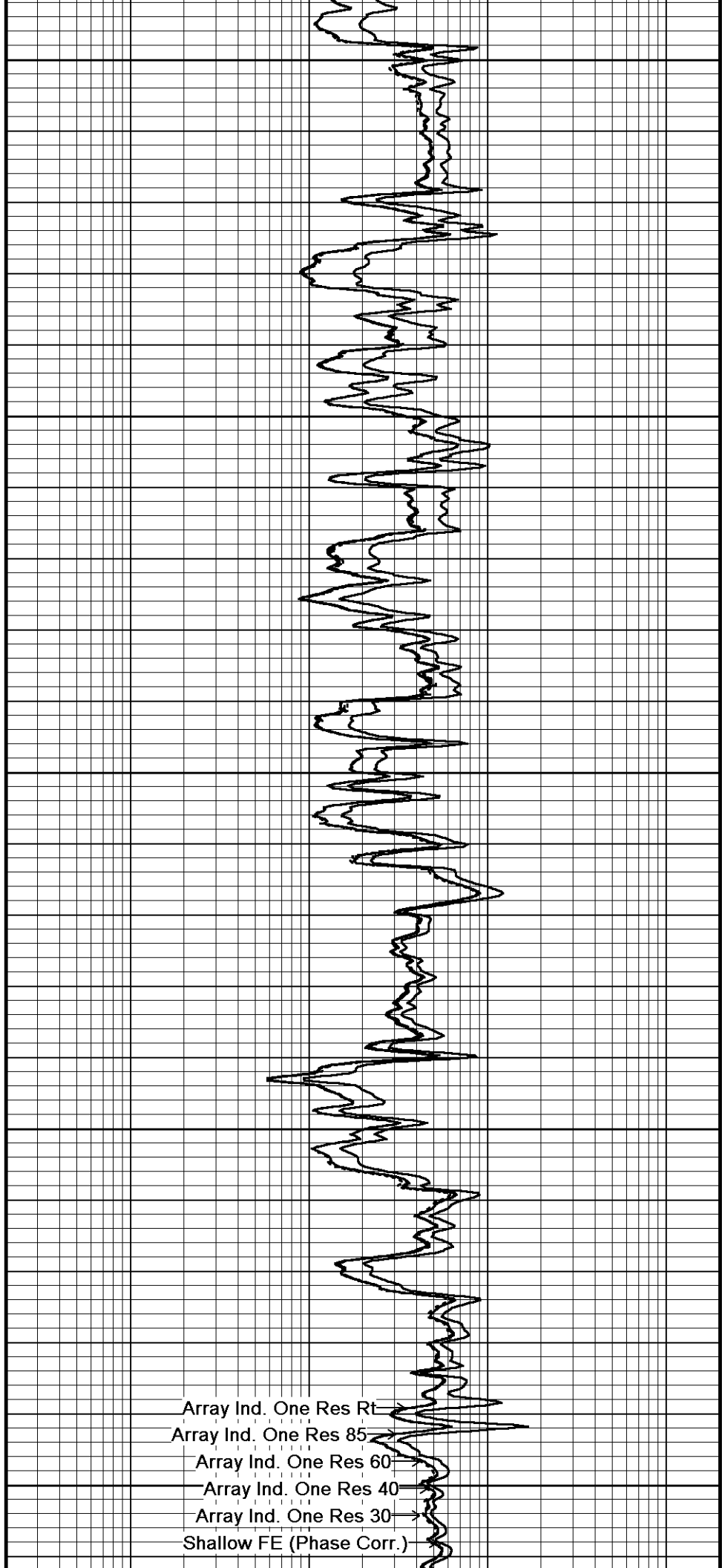
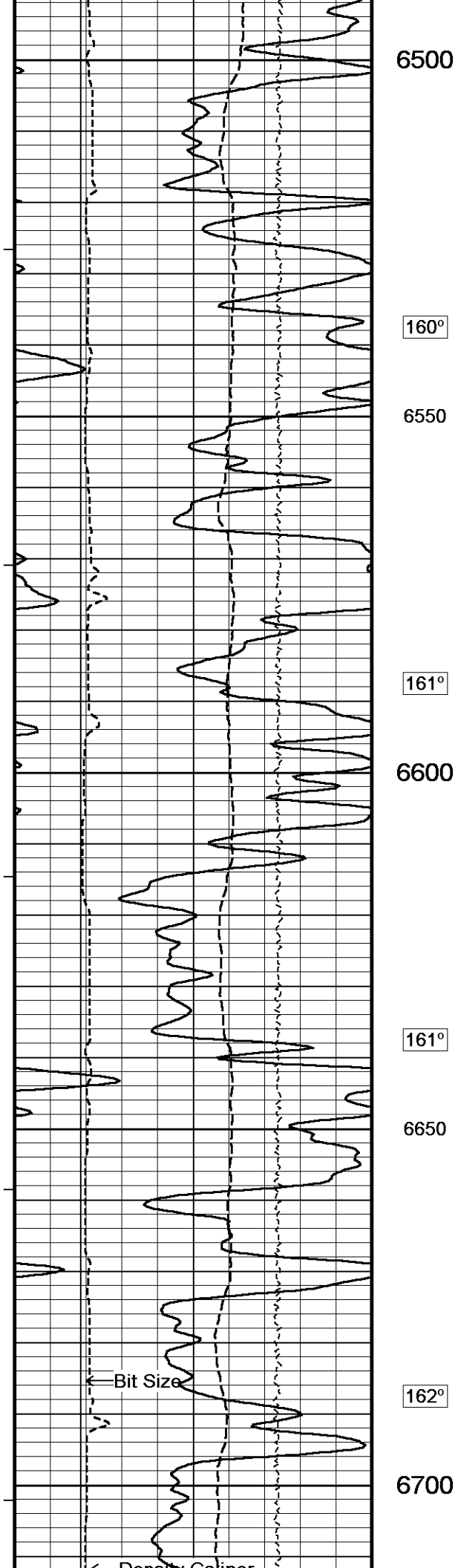
159°

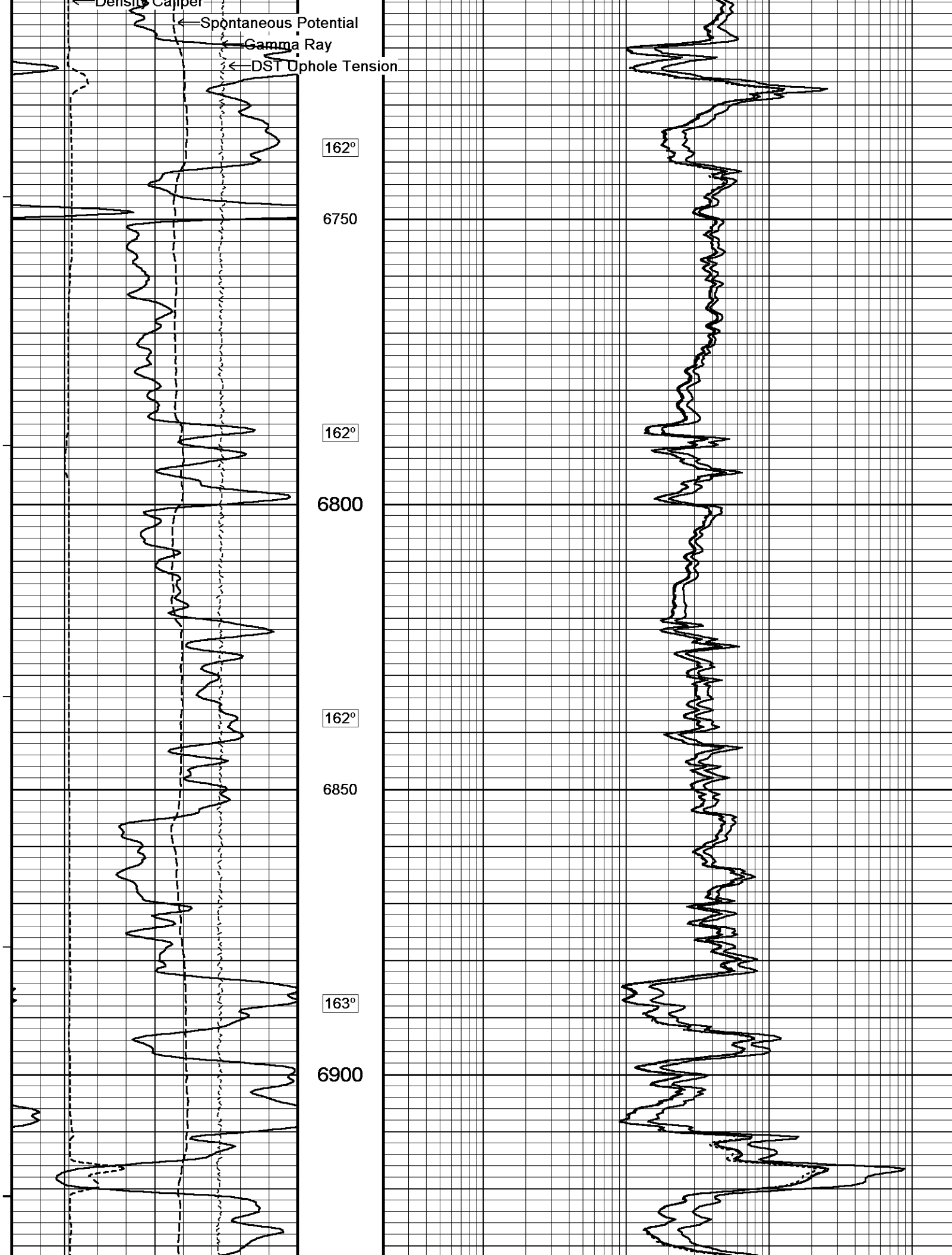
6450

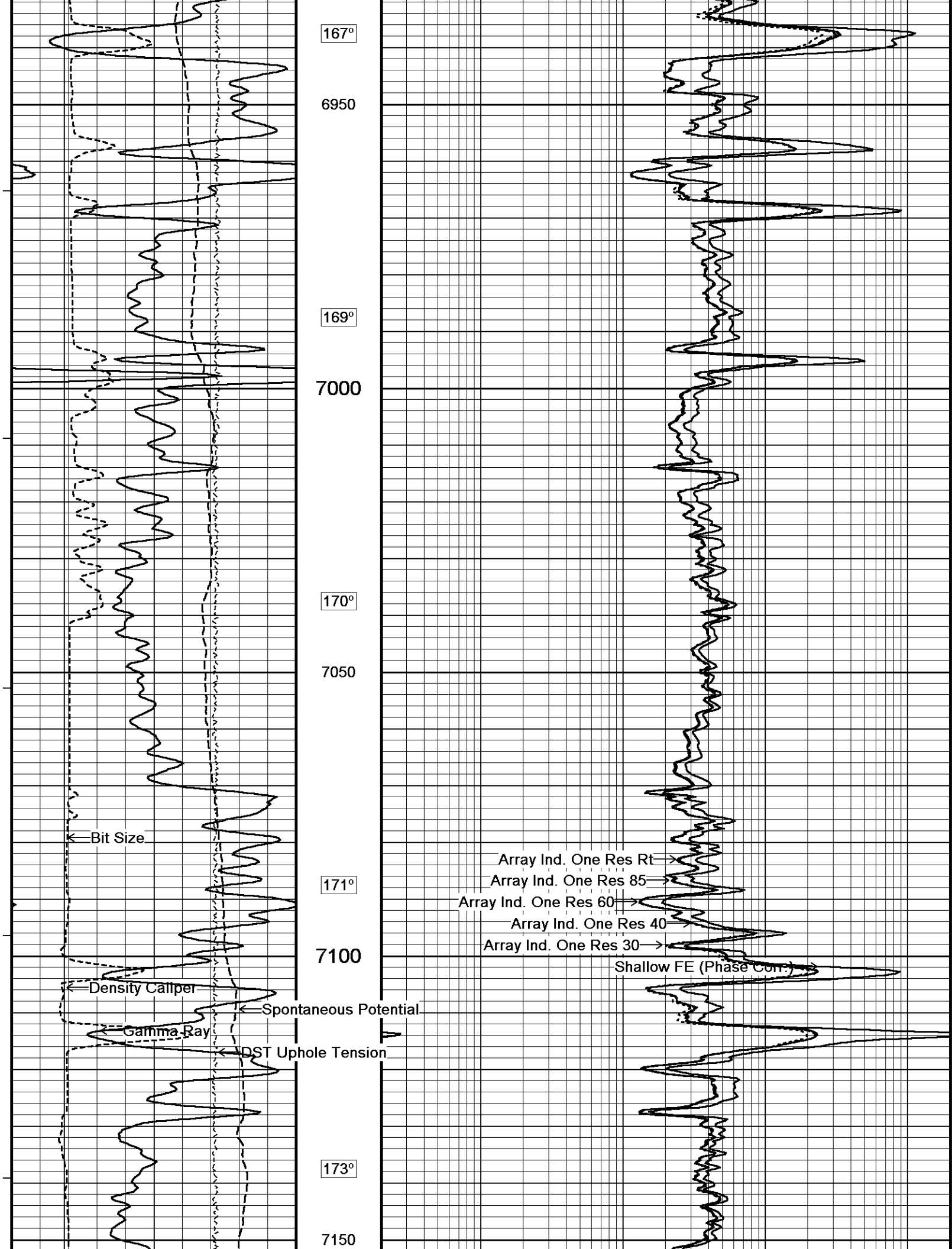
160°

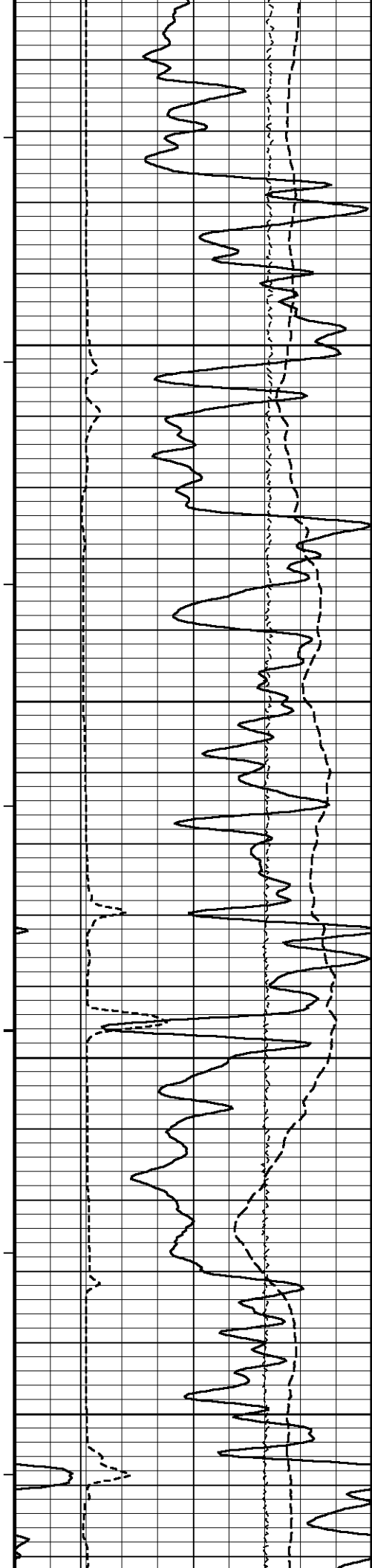
Array Ind. One Res Rt
Array Ind. One Res 85
Array Ind. One Res 60
Array Ind. One Res 40
Array Ind. One Res 30
Shallow FE (Phase Corr)

Shallow FE (Phase Corr)









174°

7200

174°

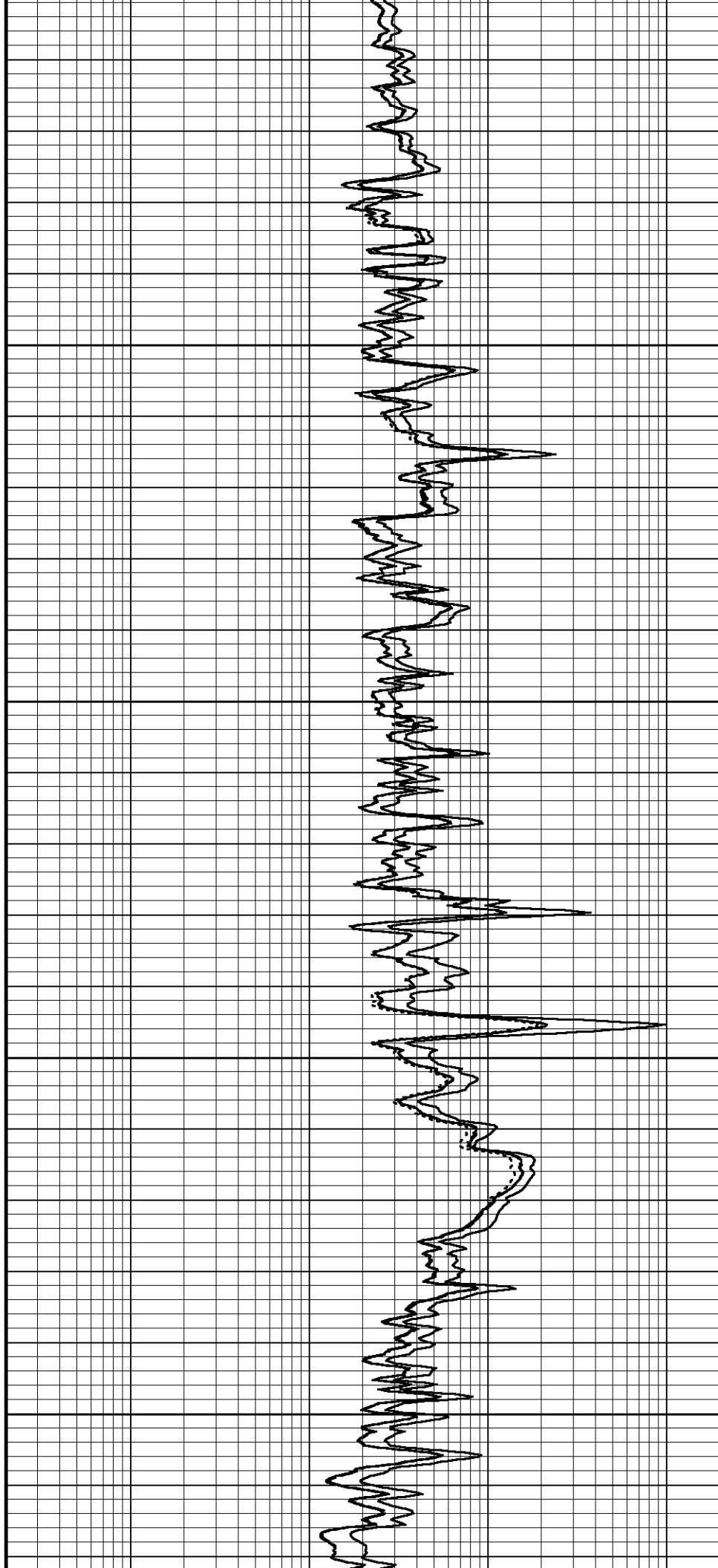
7250

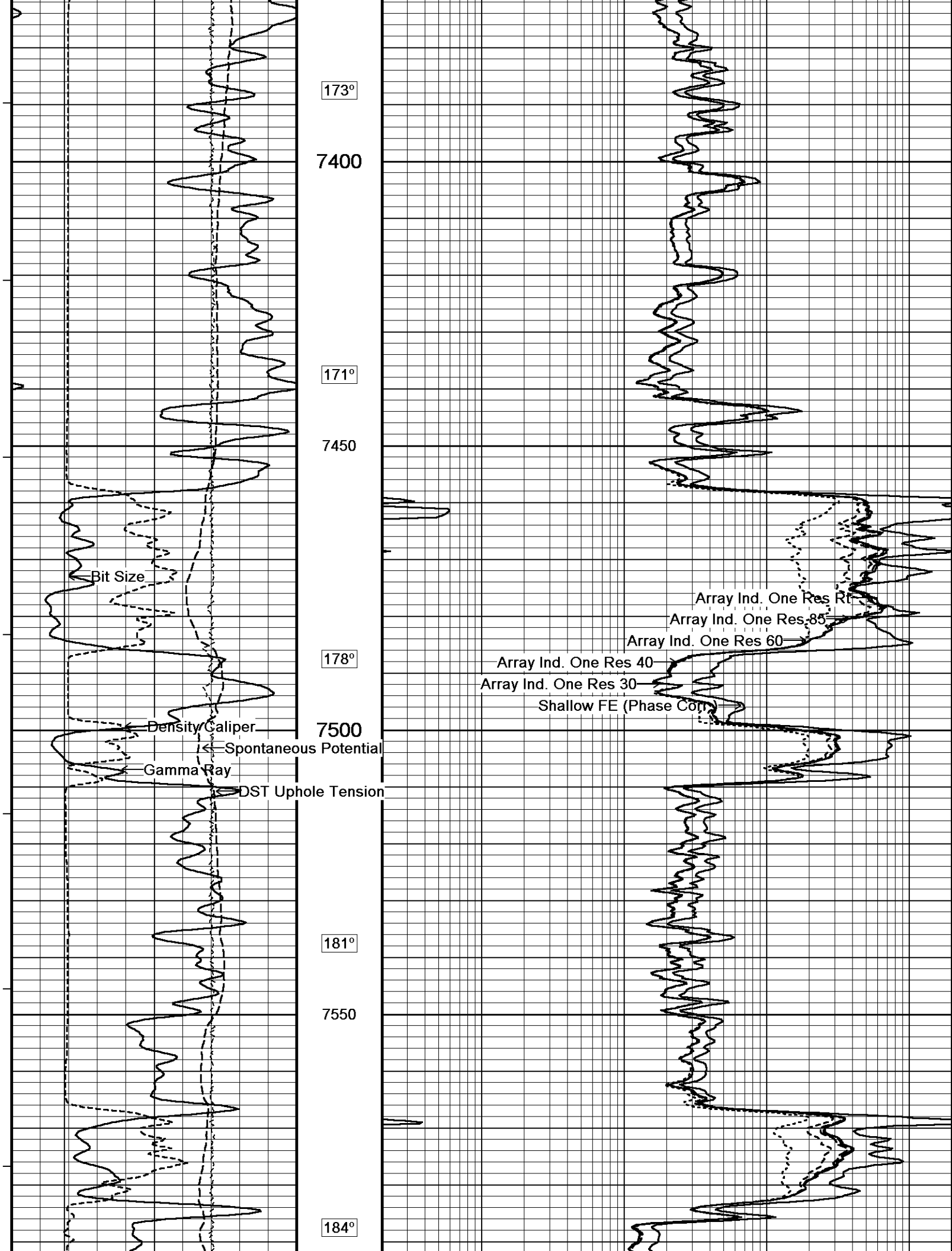
175°

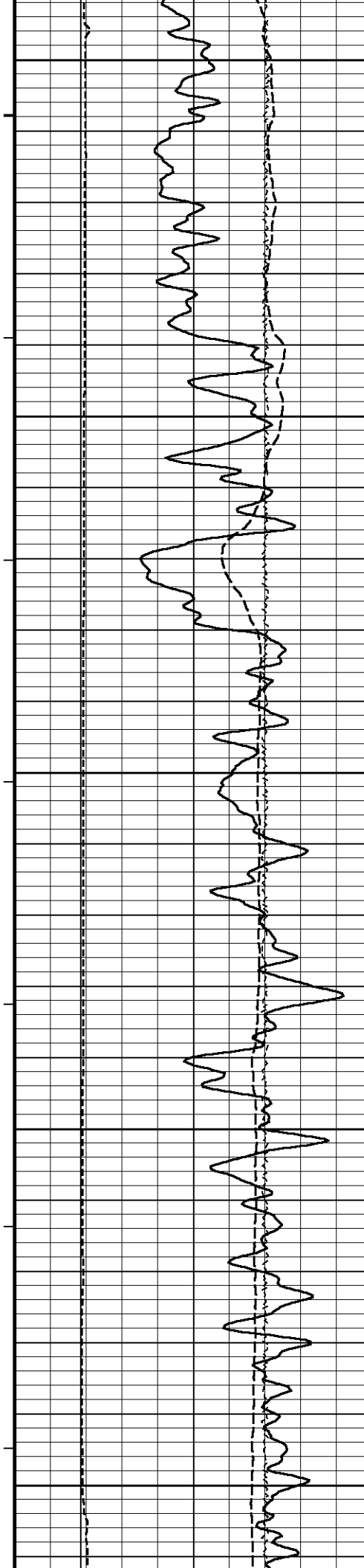
7300

175°

7350







7600

185°

7650

185°

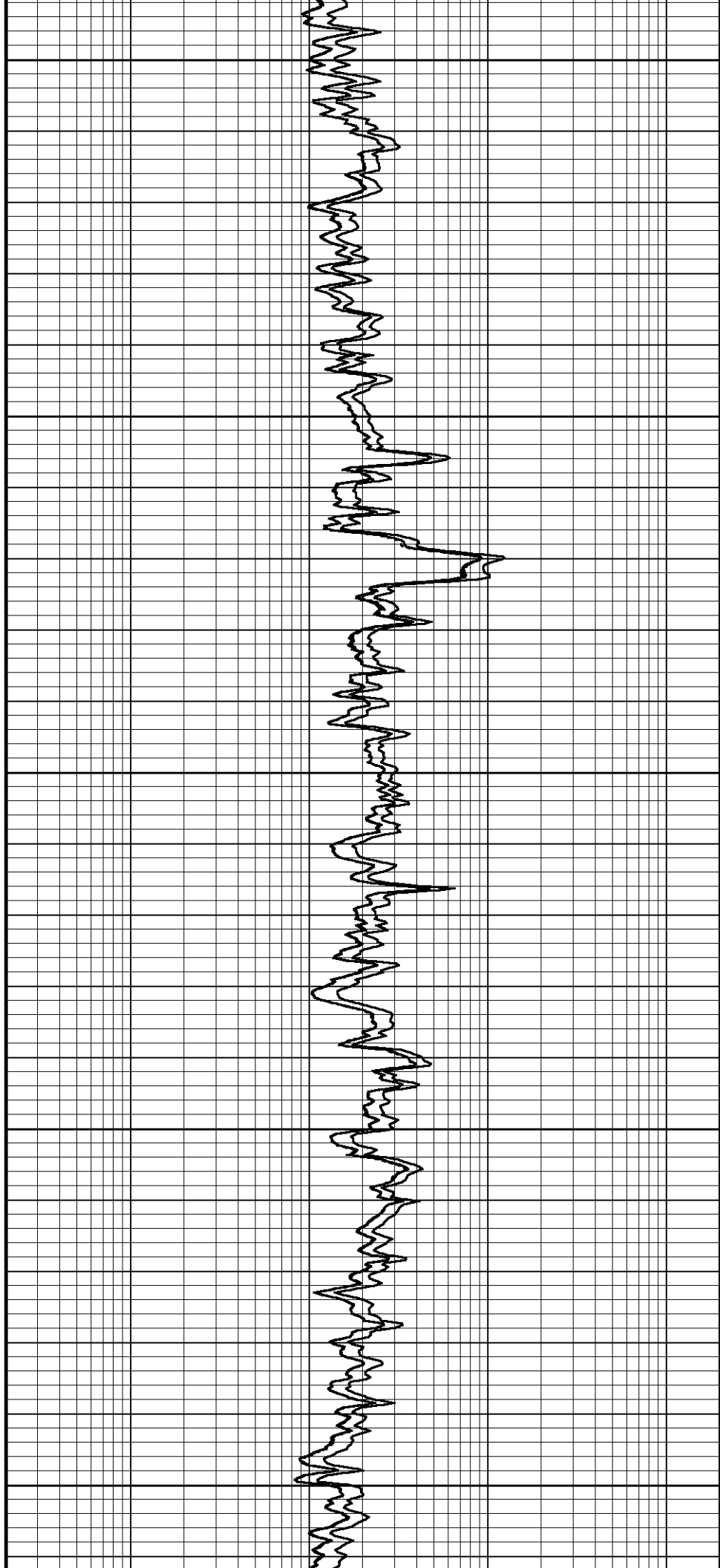
7700

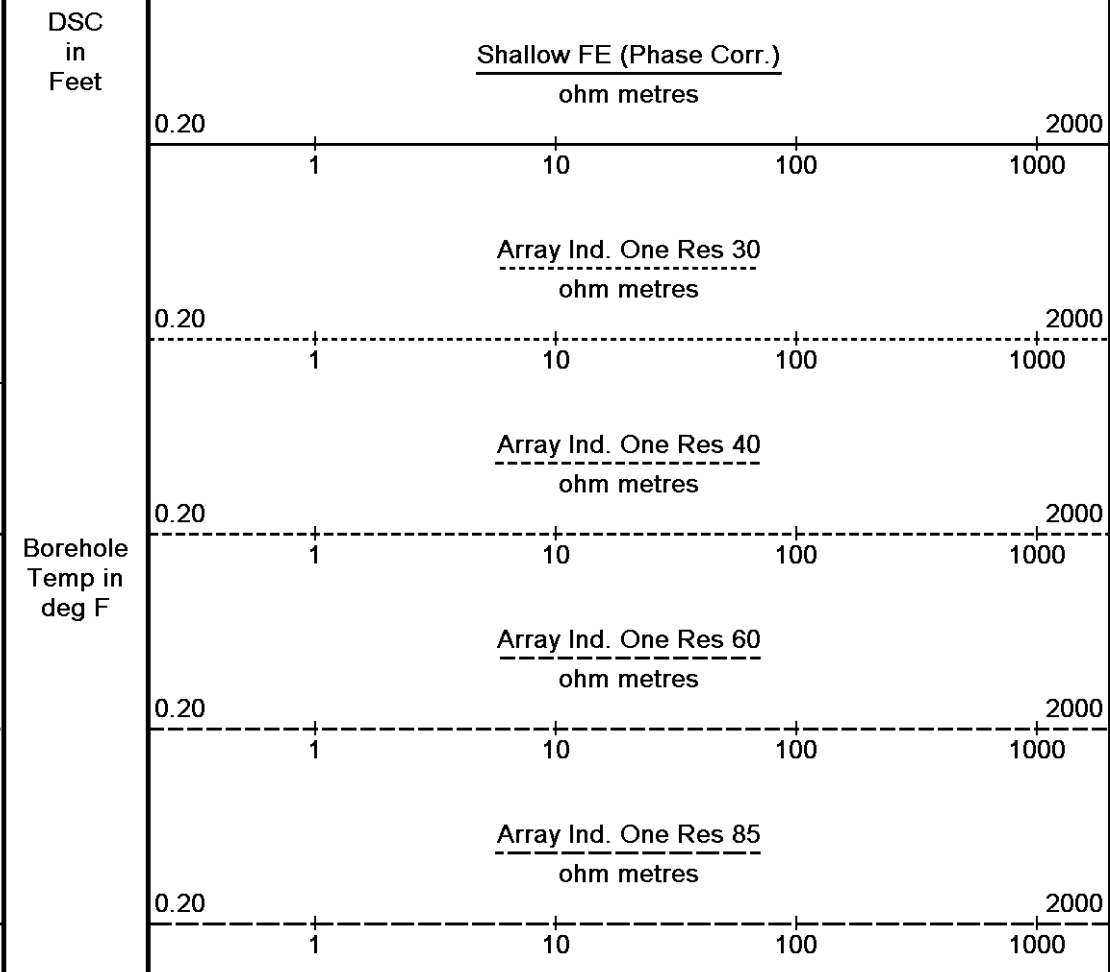
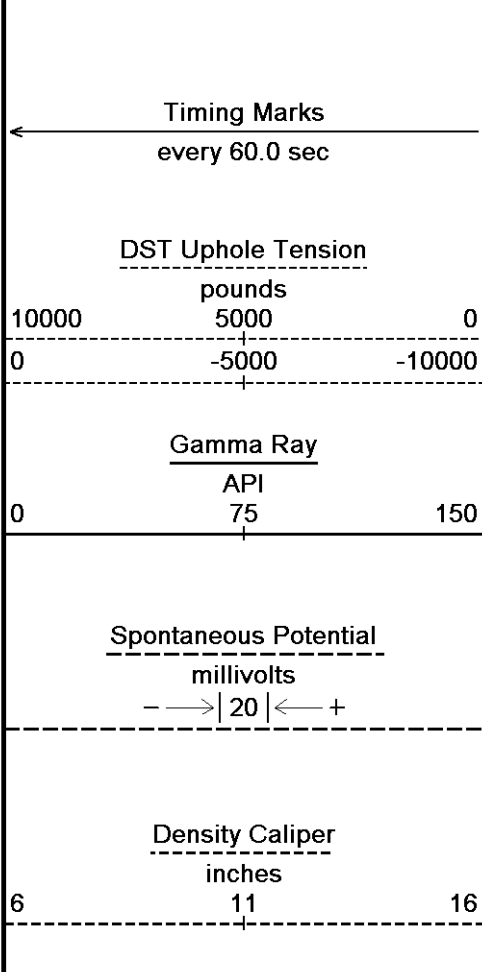
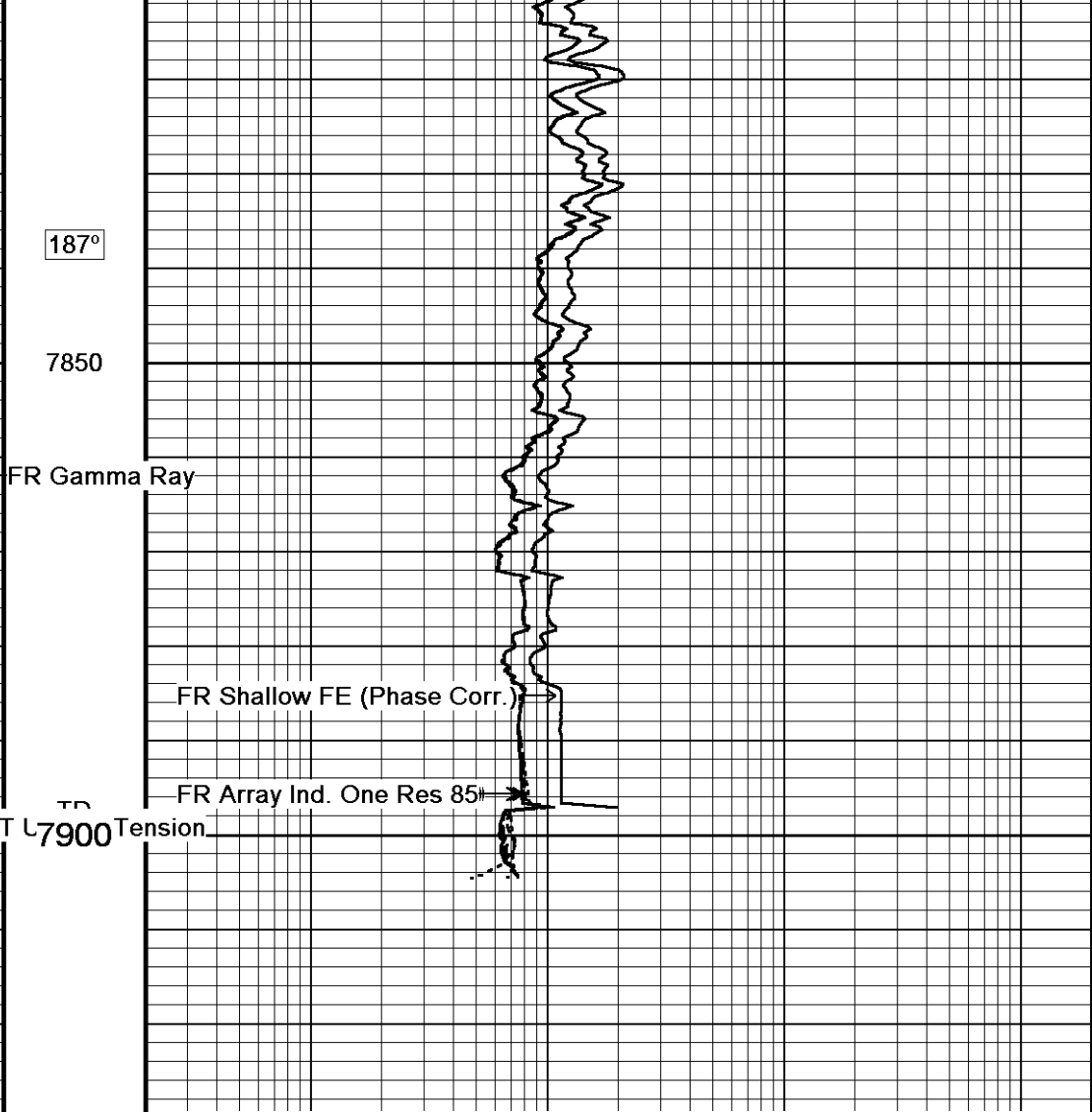
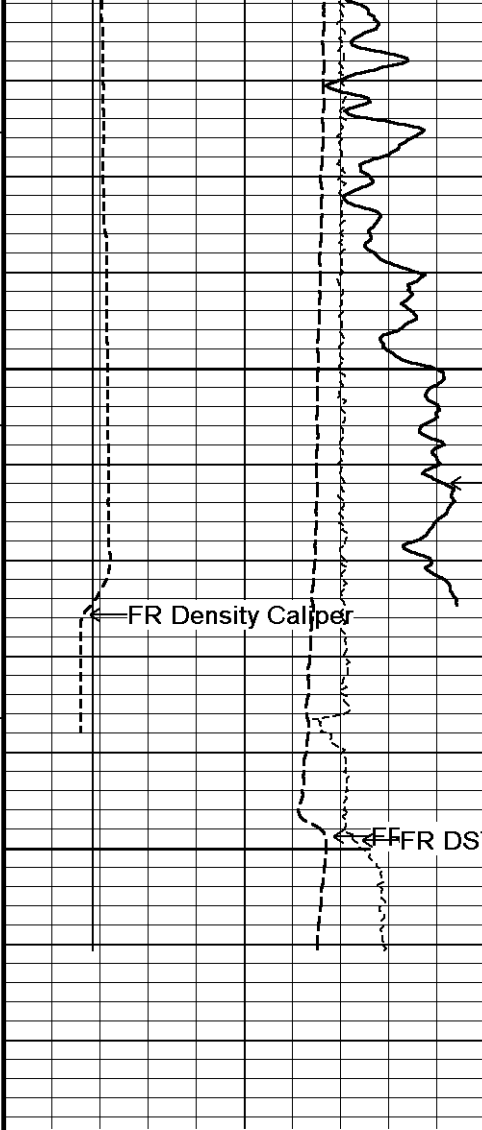
186°

7750

187°

7800





185°

7700

186°

7750

187°

7800

187°

7850

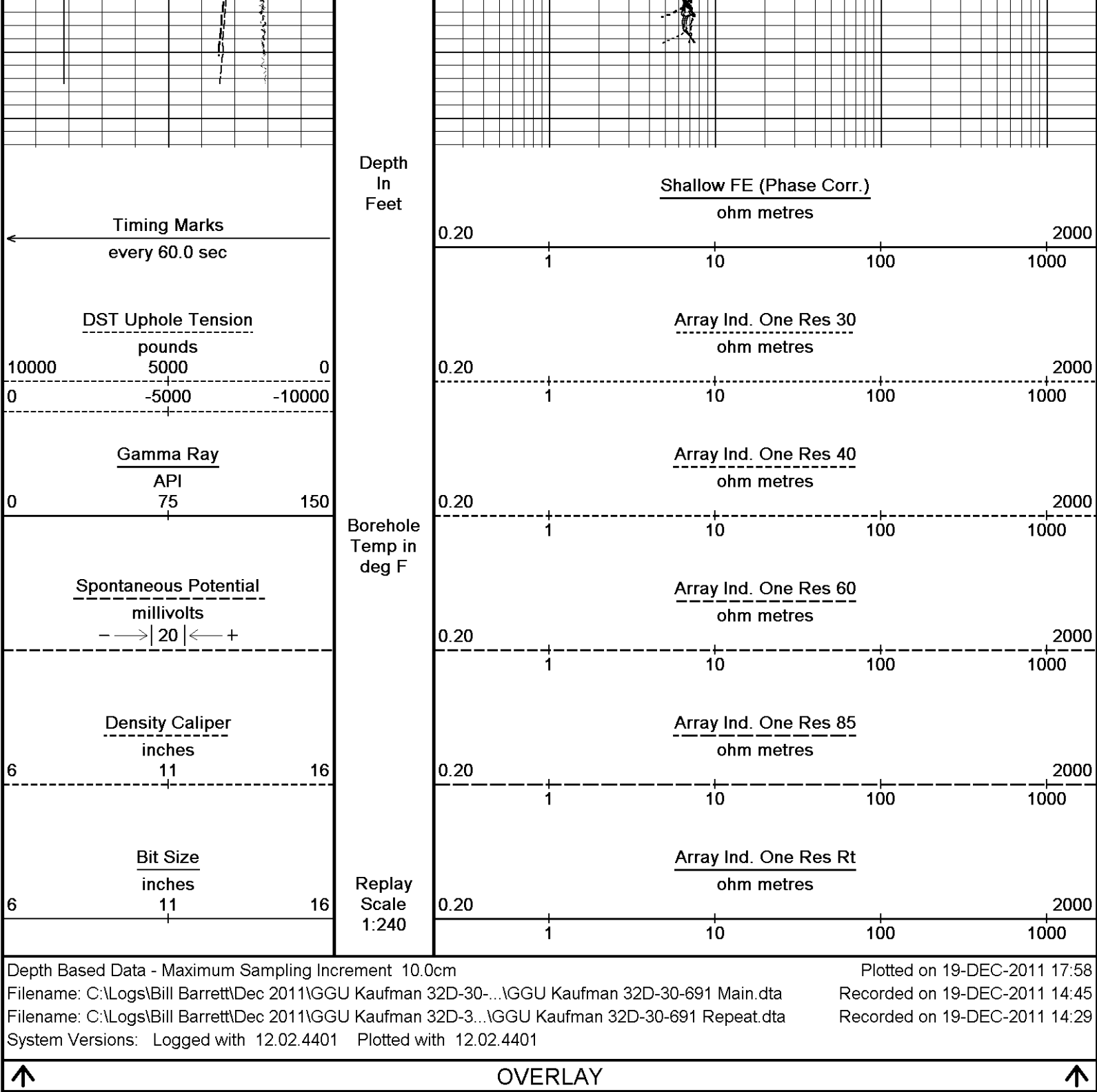
FR Gamma Ray

FR Density Caliper

FR Shallow FE (Phase Corr.)

FR Array Ind. One Res Rtl

FFFR DST L7900 Tension



BEFORE SURVEY CALIBRATION		
C:\Logs\Bill Barrett\Dec 2011\GGU Kaufman 32D-30-691\GGU Kaufman 32D-30-691 Main.dta		
General Constants All 000		Last Edited on 19-DEC-2011 12:04
General Parameters		
Mud Resistivity	4.000	ohm-metres
Mud Resistivity Temperature	91.500	degrees F
Water Level	0.000	feet
Density/Neutron Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	4.500	inches

Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
High Resolution Temperature Calibration MCG-D.A 342		Field Calibration on 19-DEC-2011 11:38
	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	75.00	75.00
High Resolution Temperature Constants MCG-D.A 342		Last Edited on
Pre-filter Length	11	
Gamma Calibration MCG-D.A 342		Field Calibration on 19-DEC-2011 11:38
	Measured	Calibrated (API)
Background	121	81
Calibrator (Gross)	903	608
Calibrator (Net)	782	527
Gamma Constants MCG-D.A 342		Last Edited on 19-DEC-2011 12:04
Gamma Calibrator Number	GRC-174	
Mud Density	1.00	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm
FE Calibration MFE-B.A 179		Base Calibration on 12-NOV-2011 12:46 Field Check on 19-DEC-2011 11:51
Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	965.6	126.8
Base Check		279.6
Field Check		279.7
FE Constants MFE-B.A 179		Last Edited on 19-DEC-2011 12:07
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 191		Base Calibration on 31-AUG-2011 09:58 Field Check on 19-DEC-2011 11:54
Base Calibration		
Test Loop Calibration		
Channel	Measured	Calibrated (mmho/m)
	Low High	Low High
1	15.8 467.8	9.3 966.2
2	6.2 382.6	7.6 821.4
3	3.9 257.9	5.2 566.0
4	2.1 136.5	2.6 279.2
Array Temperature	88.9	Deg F
Channel	Base Check (mmho/m)	Field Check (mmho/m)
	Low High	Low High
1	13.7 3863.4	14.3 3864.1
2	29.4 3514.0	29.6 3514.2
3	27.4 3064.1	27.5 3064.1
4	18.6 2020.7	18.6 2020.6
Deep	16.4 1982.6	16.4 1982.5

Medium	40.3	4080.4	40.3	4080.5
Shallow	44.6	5207.3	44.8	5208.0
Array Temperature		37.6		46.8
				Deg F

Induction Constants MAI-A.A 191

Last Edited on 19-DEC-2011 12:07

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		6.0000	
Stand-off Fin Angle		60.00	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-B 167

Base Calibration on 08-DEC-2011 11:58

Field Calibration on 19-DEC-2011 11:47

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14191	3.98
2	22640	5.96
3	31232	7.96
4	39520	9.86
5	48571	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.99	7.96

AFTER SURVEY CALIBRATION

C:\Logs\Bill Barrett\Dec 2011\GGU Kaufman 32D-30-691\GGU Kaufman 32D-30-691 Main.dta

FE Check MFE-B.A 179

Before Survey Check 19-DEC-2011 11:51

After Survey Check on 19-DEC-2011 17:39

Before (ohm-m)	After (ohm-m)
279.7	279.5

Induction Check MAI-A.A 191

Before Survey Check on 19-DEC-2011 11:54

After Survey Check on 19-DEC-2011 17:37

Channel	Before Survey (mmho/m)		After Survey (mmho/m)		
	Low	High	Low	High	
1	14.3	3864.1	16.3	3864.5	
2	29.6	3514.2	30.3	3513.6	
3	27.5	3064.1	28.0	3063.9	
4	18.6	2020.6	18.8	2020.5	
Deep	16.4	1982.5	16.8	1982.9	
Medium	40.3	4080.5	40.9	4079.8	
Shallow	44.8	5208.0	45.8	5206.2	
Array Temperature		46.8		73.0	Deg F

DOWNHOLE EQUIPMENT

C:\Logs\Bill Barrett\Dec 2011\GGU Kaufman 32D-30-691\GGU Kaufman 32D-30-691 Main.dta

SHA-J.A Compact Swivel Head Adaptor

SHA-J.A 314 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

Compact Comms Gamma

MCG-D.A 342 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Neutron

MDN-B.A 250 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper

MPD-B 167 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

SKJ-D.A Compact Knuckle Joint

SKJ-D.A 88 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

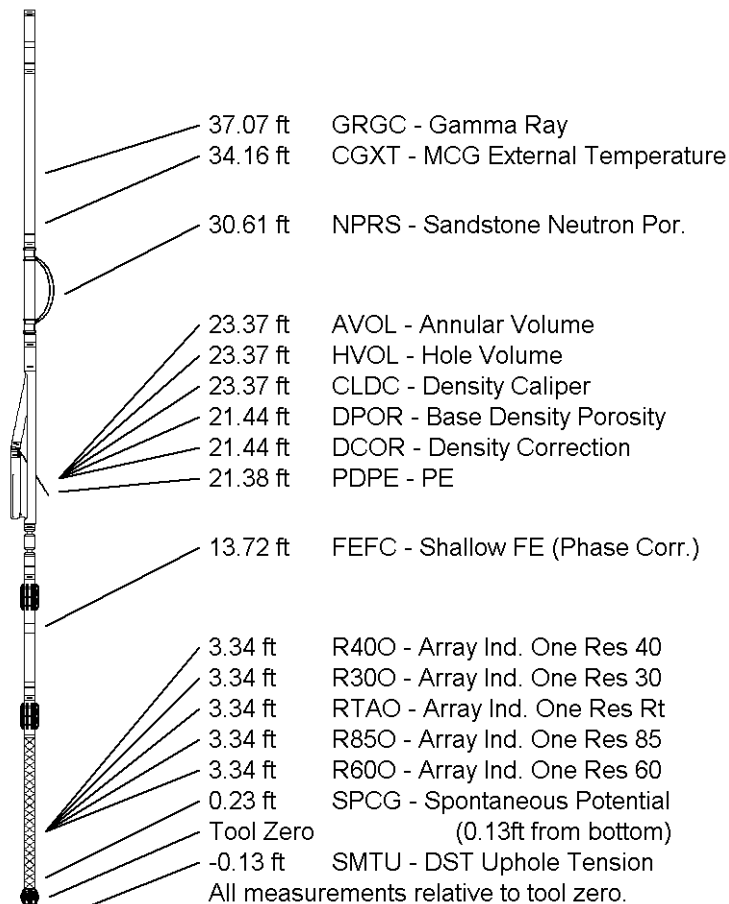
Compact Focussed Electric

MFE-B.A 179 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction

MAI-A.A 191 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 44.66 ft Weight: 348.3 lb



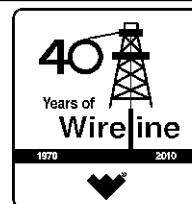
COMPANY	BILL BARRETT CORPORATION
WELL	GGU KAUFMAN 32D-30-691
FIELD	GIBSON GULCH
PROVINCE/COUNTY	GARFIELD
COUNTRY/STATE	U.S.A. / COLORADO

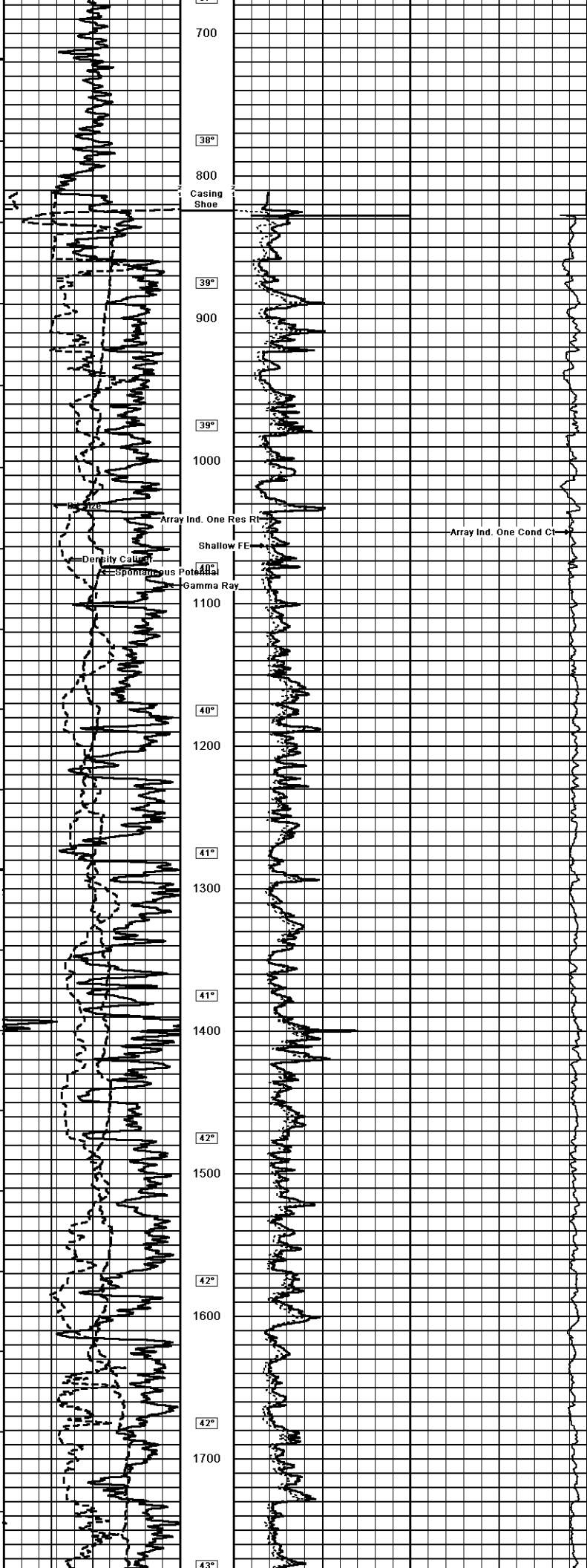
Elevation Kelly Bushing	5858.00	feet	First Reading	7896.00	
Elevation Drill Floor	5858.00	feet	Depth Driller	7900.00	feet
Elevation Ground Level	5835.00	feet	Depth Logger	7899.00	feet

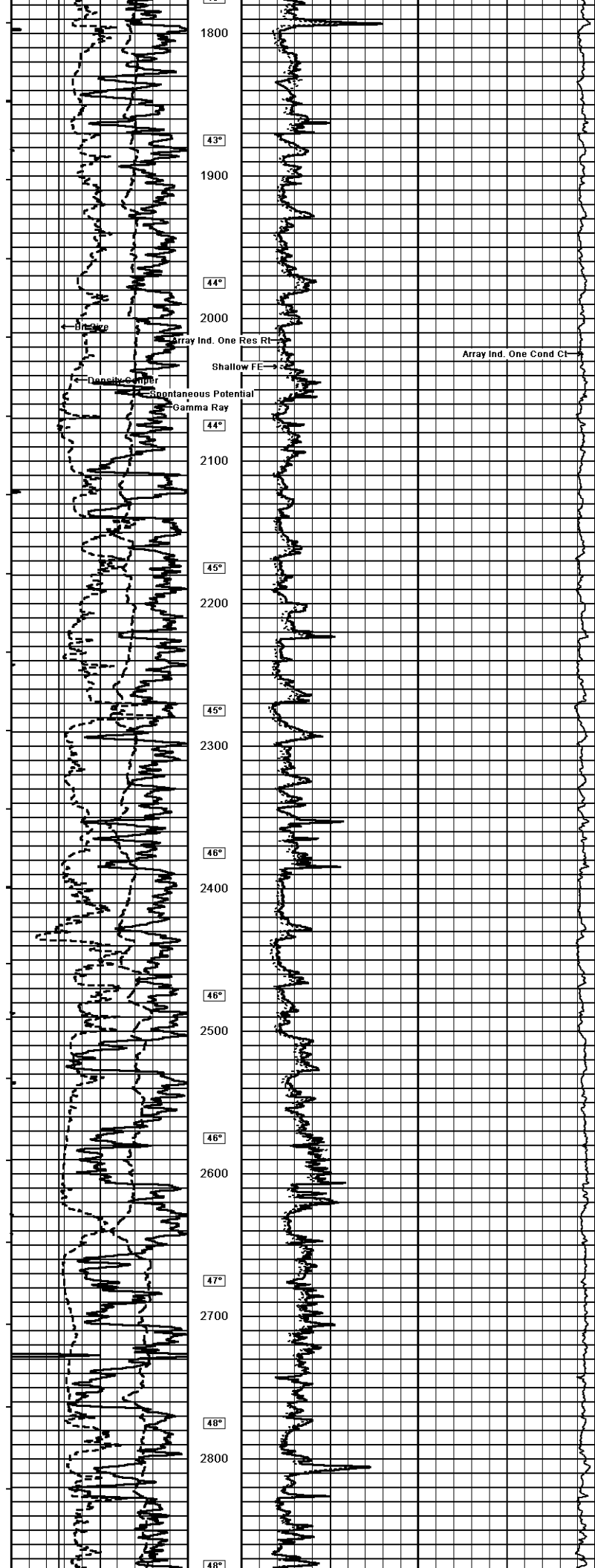


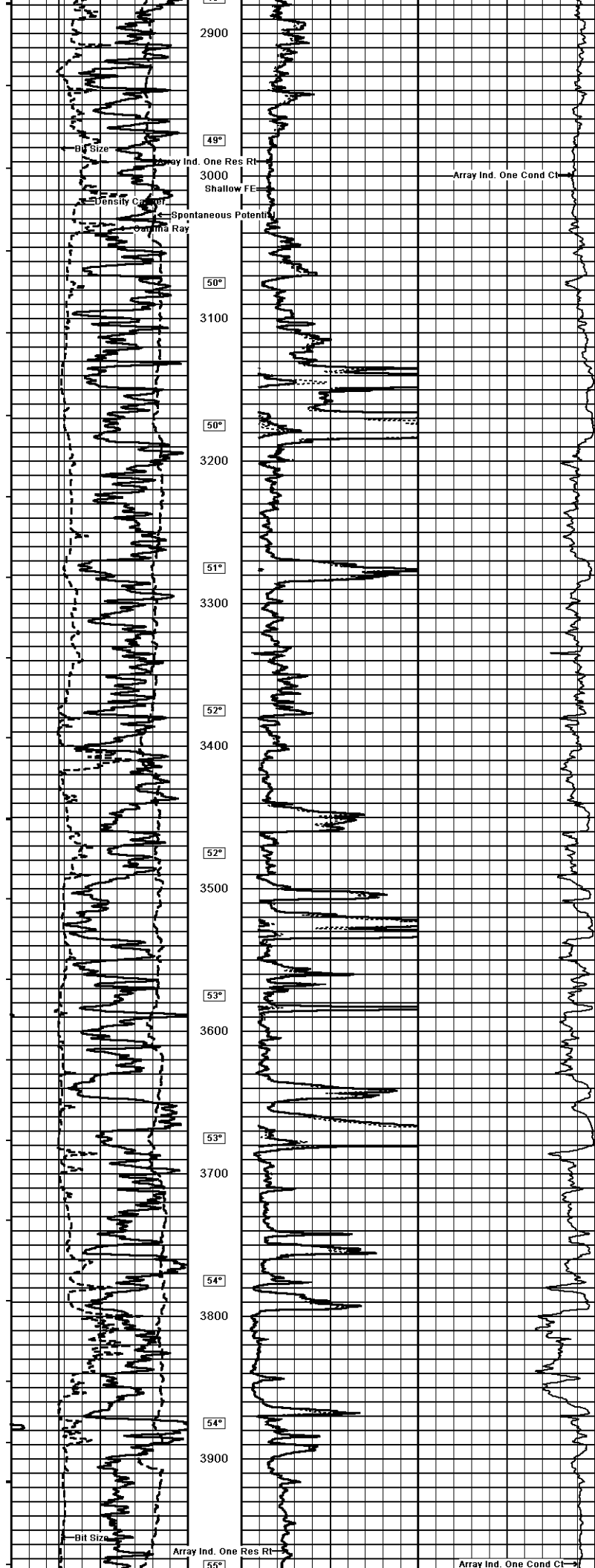
Weatherford®

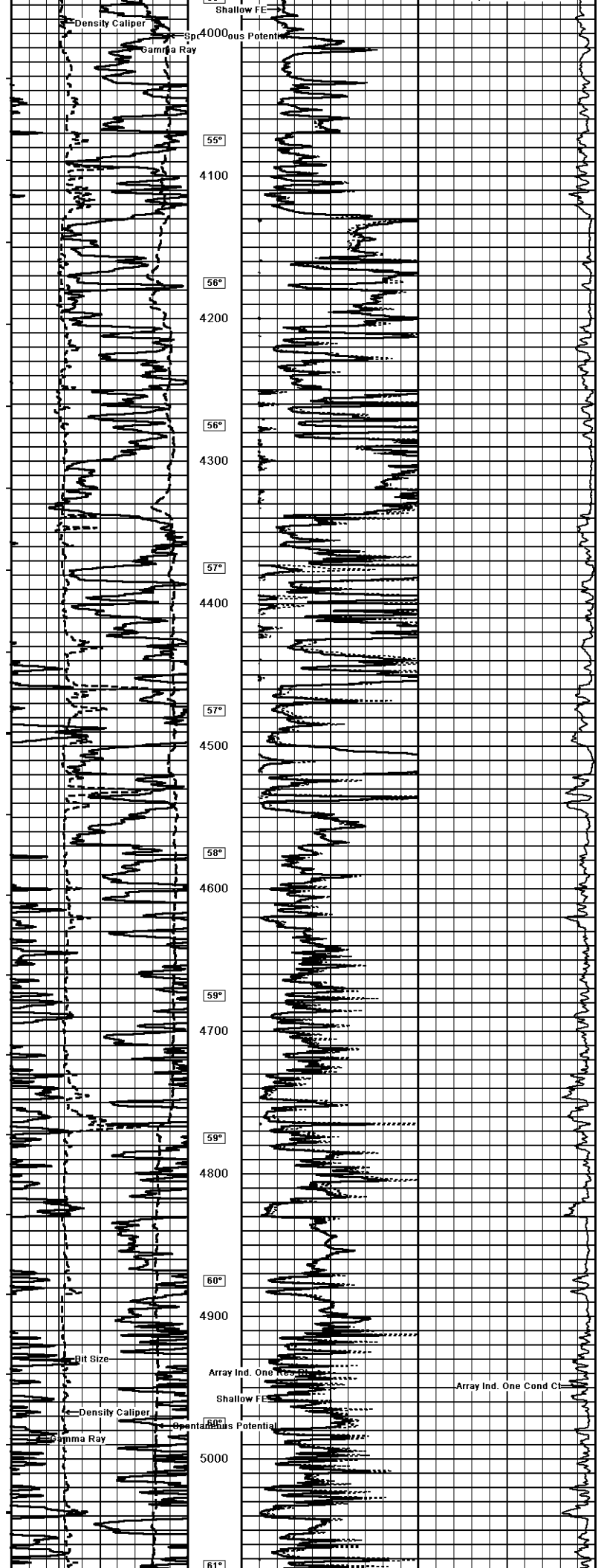
ARRAY INDUCTION - RTAP
SHALLOW FOCUSED
ELECTRIC LOG











55°

56°

56°

57°

57°

58°

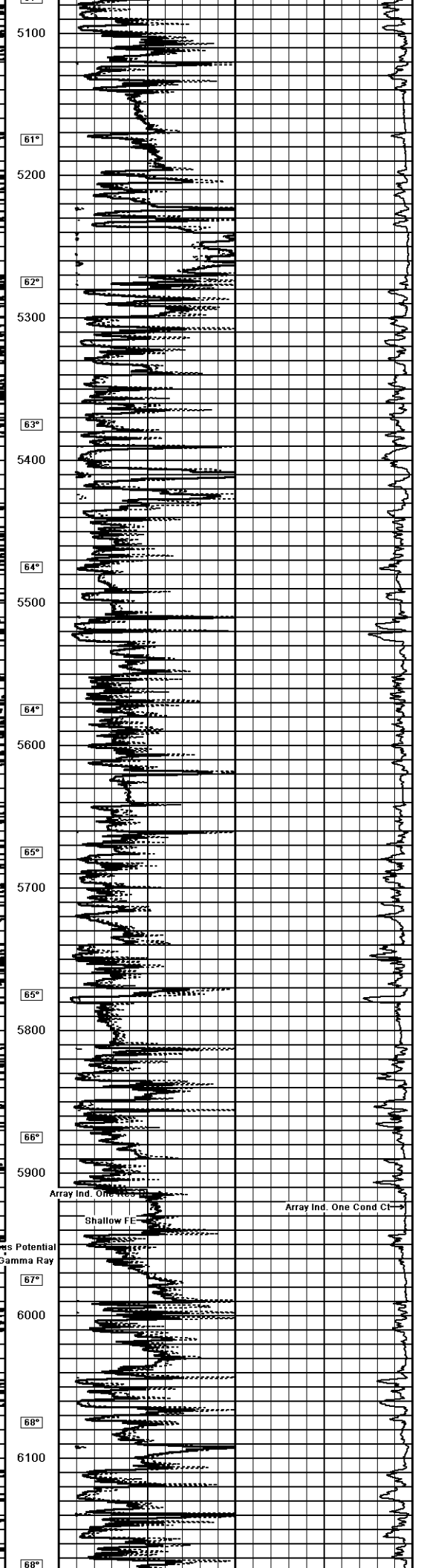
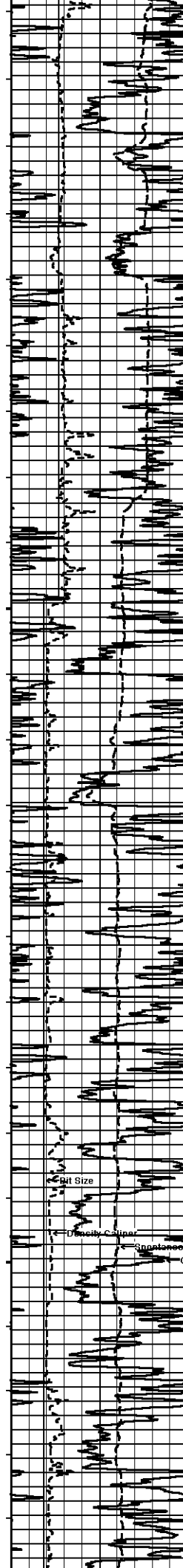
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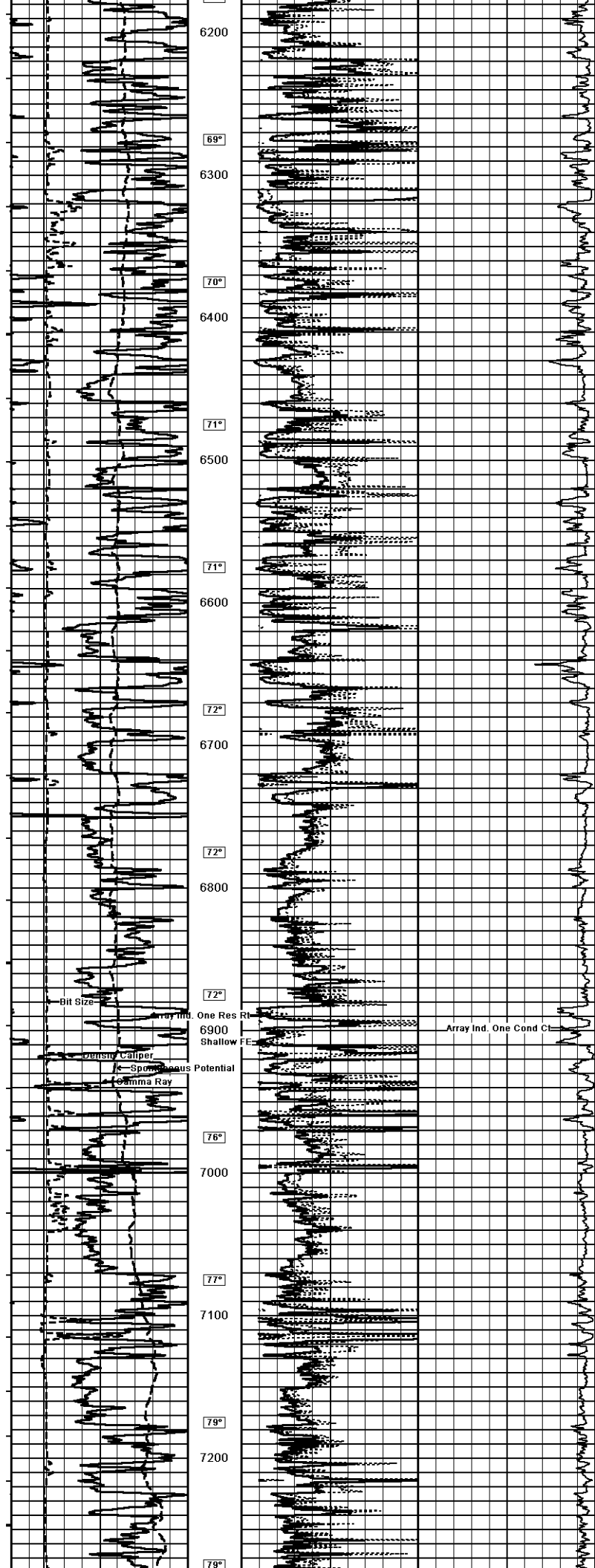
59°

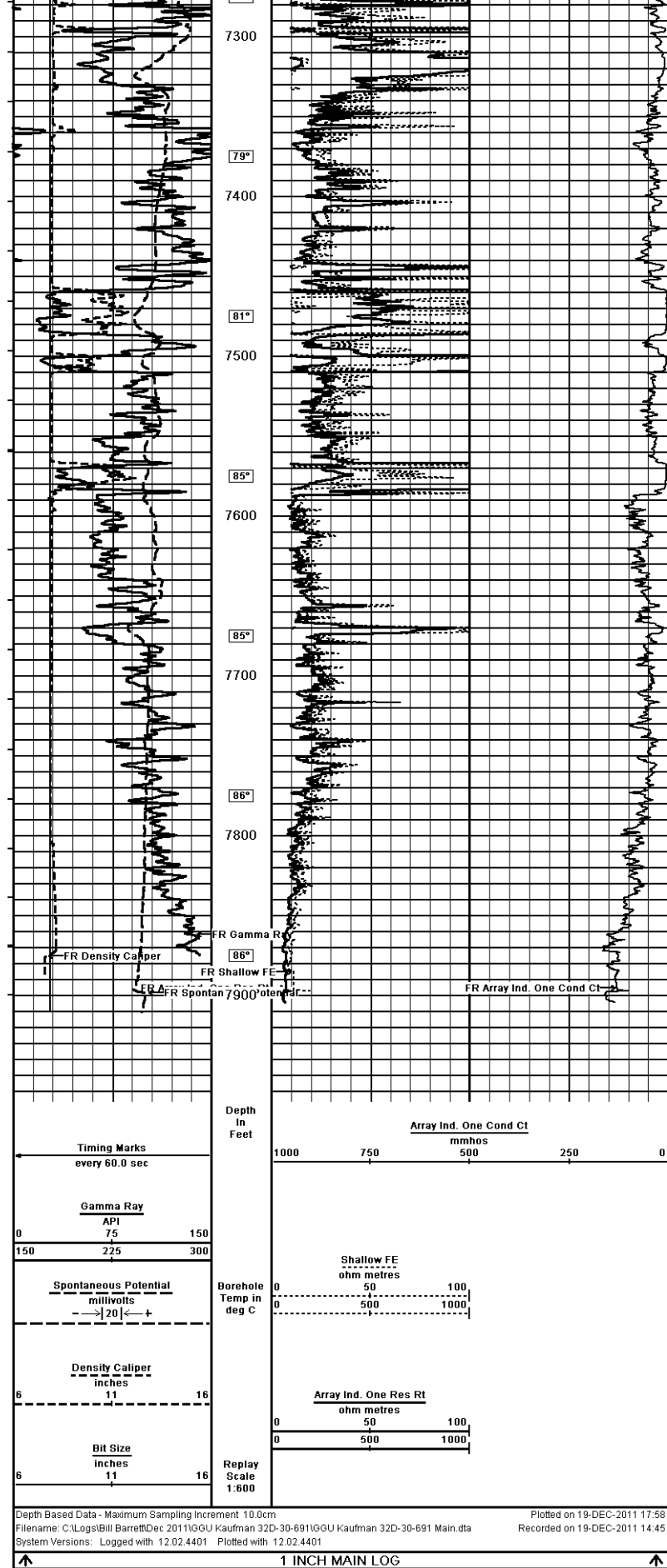
60°

60°

61°







COMPANY	BILL BARRETT CORPORATION			
WELL	GGU KAUFMAN 32D-30-691			
FIELD	GIBSON GULCH			
PROVINCE/COUNTY	GARFIELD			
COUNTRY/STATE	U.S.A. / COLORADO			
Elevation Kelly Bushing	5858.00	feet	First Reading	7896.00
Elevation Drill Floor	5858.00	feet	Depth Driller	7900.00 feet
Elevation Ground Level	5835.00	feet	Depth Logger	7899.00 feet

ARRAY INDUCTION - RTAP

