



Weatherford®

**COMPACT ARRAY INDUCTION
LOG**

COMPANY	Caerus Oil & Gas		
WELL	Puckett 32A-26		
FIELD	Grand Valley		
PROVINCE/COUNTY	Garfield		
COUNTRY/STATE	U.S.A. / Colorado		
LOCATION	888' FNL & 1387' FEL		
SEC 26	TWP 06S	RGE 97W	Other Services
Latitude	39.498803		DUAL SPACED NEUTRON
Longitude	-108.182969		PHOTO DENSITY
API Number			
Permanent Datum GL, Elevation 8396 feet			Elevations: feet
Log Measured From KB			KB 8426.00
Drilling Measured From KB@11FT			DF 8396.00
Date	29-JAN-2017		
Run Number	ONE		
Service Order	7884-172911215		
Depth Driller	9032.00	feet	
Depth Logger	9003.00	feet	
First Reading	9003.00	feet	
Last Reading	2498.00	feet	
Casing Driller	2535.00	feet	
Casing Logger	2498.00	feet	
Bit Size	8.750	inches	
Hole Fluid Type	WBM		
Density / Viscosity	9.00 g/cc	61.00 CP	
PH / Fluid Loss	9.50	6.80 ml/30Min	
Sample Source	Flow Tube		
Rm @ Measured Temp	1.803 @ 82.0	ohm-m	
Rmf @ Measured Temp	1.442 @ 82.0	ohm-m	
Rmc @ Measured Temp	2.164 @ 82.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.78 @194.0	ohm-m	
Time Since Circulation	6 Hours		
Max Recorded Temp	194.00	deg F	
Equipment / Base	13174	CASPER	
Recorded By	Miles Wilkins		
Witnessed By	Boyd Cottam		

BOREHOLE RECORD					Last Edited: 30-JAN-2017 13:31
Bit Size inches		Depth From feet		Depth To feet	
8.750		2535.00		9032.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	9.625	0.00	2535.00	36.00	

REMARKS	
SOFTWARE VERSION: 16.03.1458 TOOLS: MTA, SHA, MCG, SKJ, MDN, MPD, MVC, SKJ, MIS-E, SKJ, MIS-D, MLC, MBN, MIS-D, MDM, MRD, MTD, SKJ, MIS-D, MFE, MAI RUN IN COMBINATION	
HARDWARE: MDN: DUAL BOWSPRING MPD: 8 INCH PROFILE PLATE MDM: CENTRALIZER MTD: CENTRALIZER MAI: .IN LINE CENTRALIZER	
LOGGER T.D. IS DEEPEST DEPTH REACHED BY LOGGING TOOLS DUE TO HOLE CONDITIONS	
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.	
TIGHT PULLS, BOREHOLE SIZE, AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.	
FLUID LEVEL IS LOW IN HOLE DUE TO LOSS OF FLUID TO FORMATION. ALSO FOAM IN WELL EFFECTED CROSS DIPOLE READINGS	

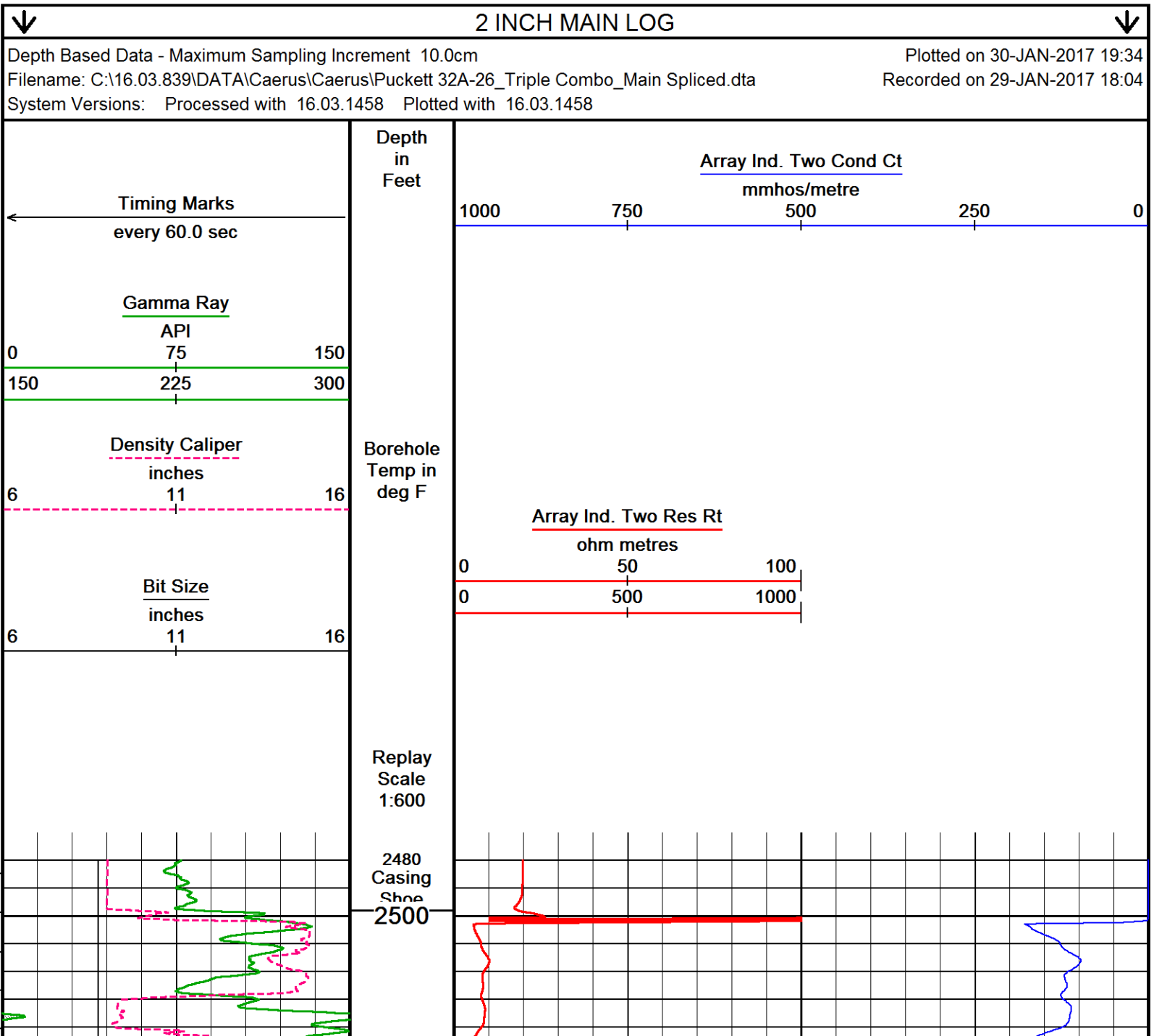
READINGS:

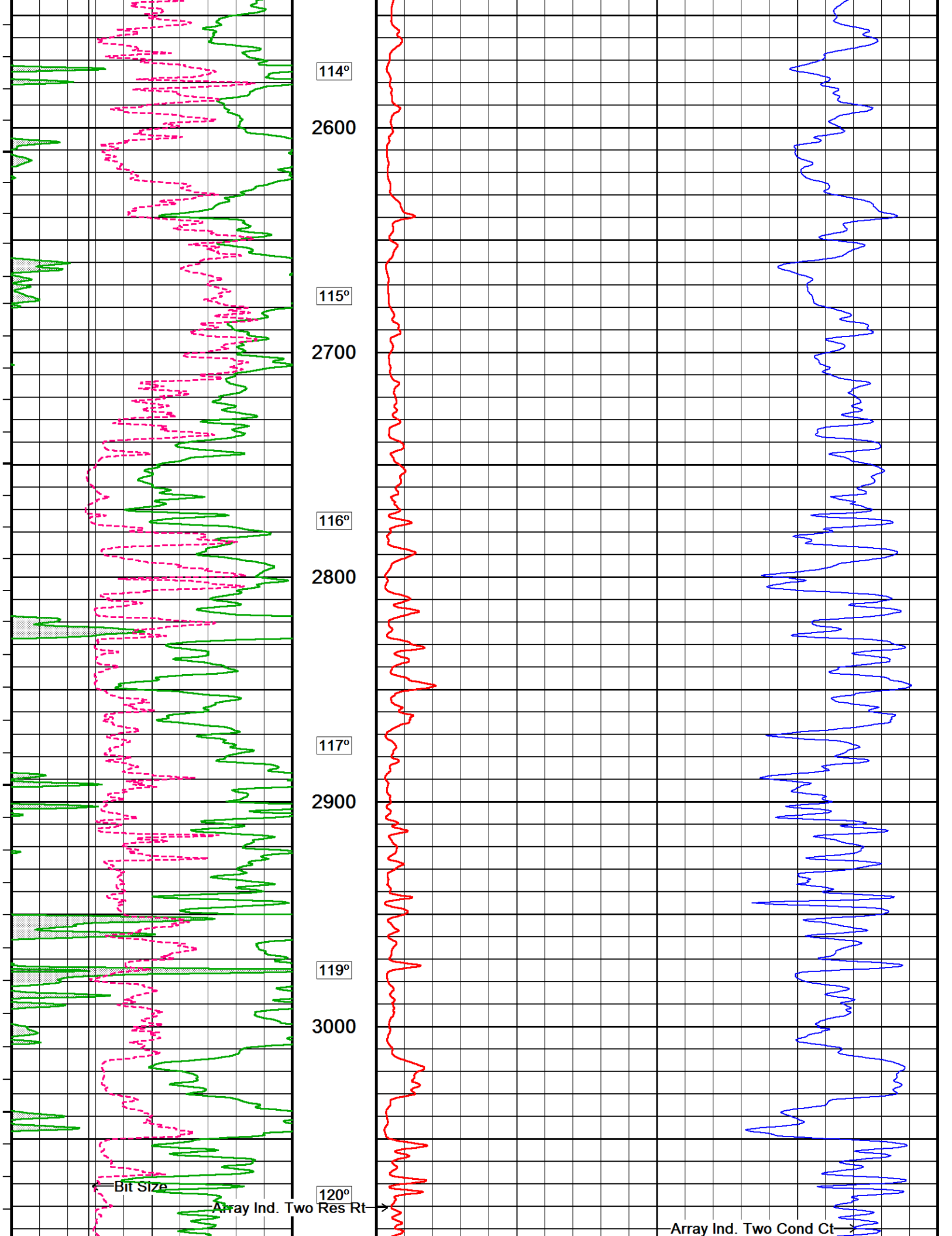
TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 3080 CU.FT.

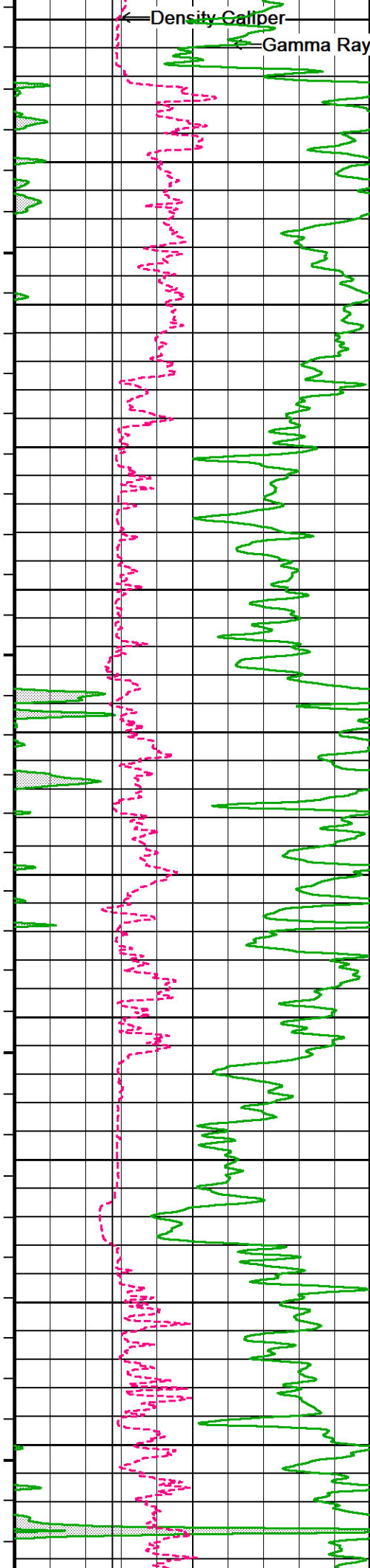
ANNULAR VOLUME FROM TD SURFACE CASING = 2368 CU.FT.

RIG: HP 330

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.







3100

122°

3200

123°

3300

124°

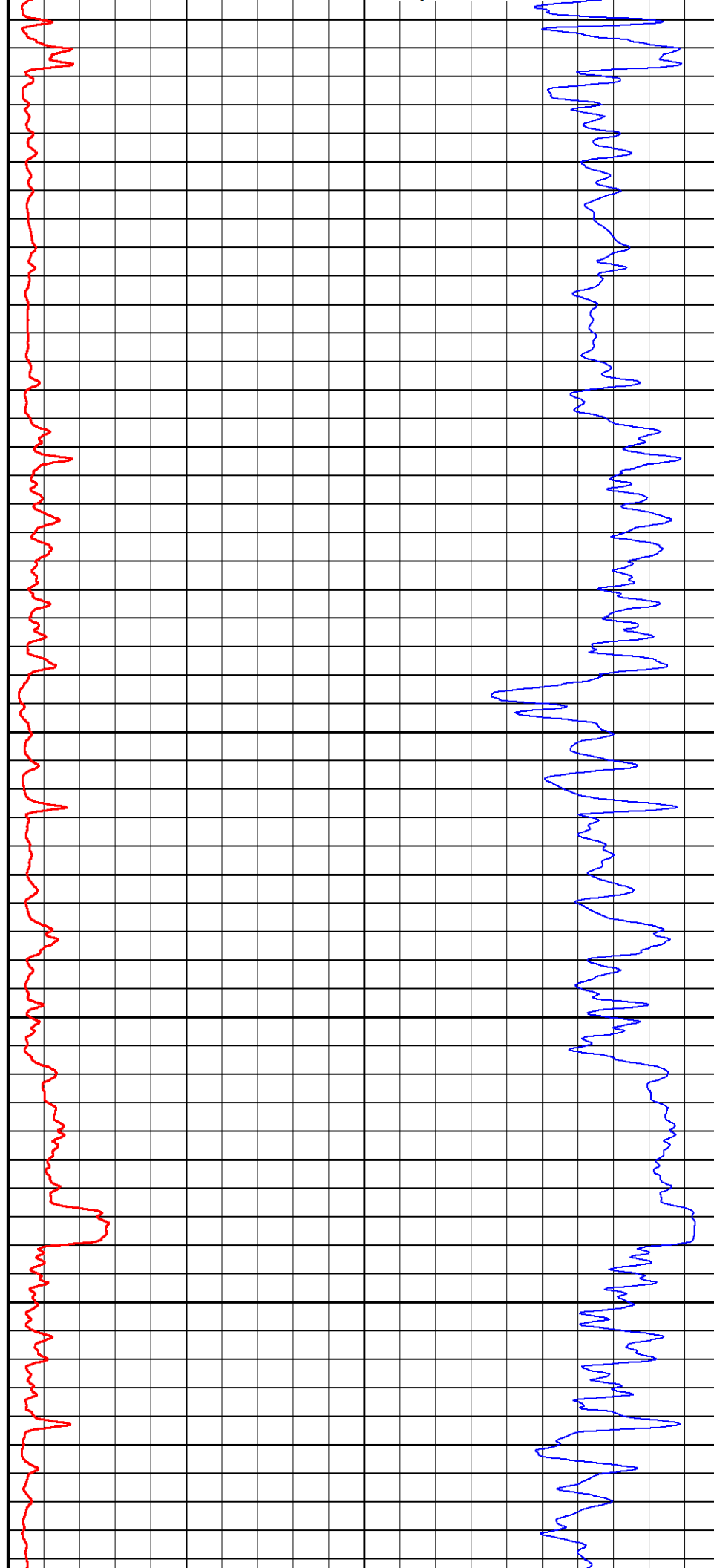
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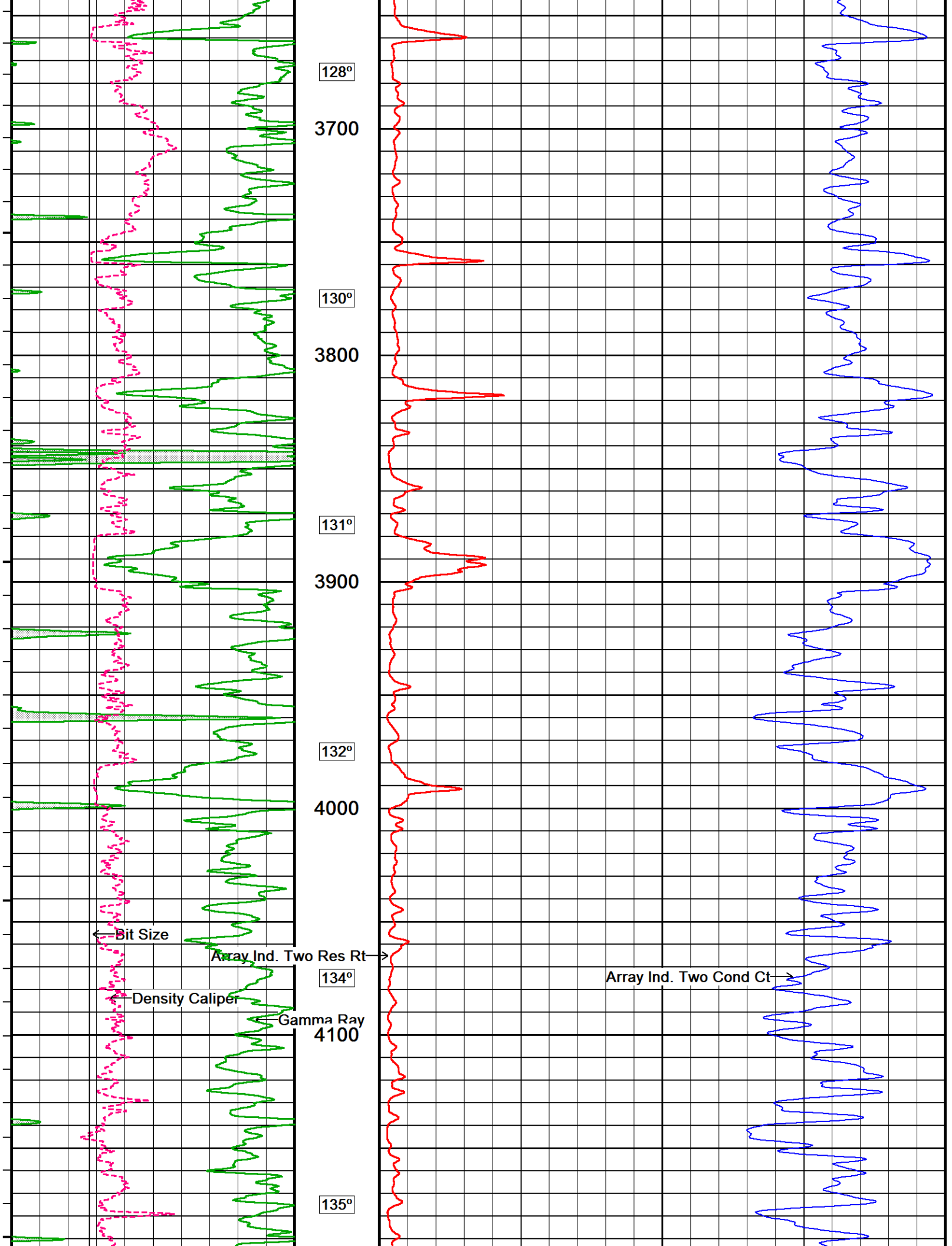
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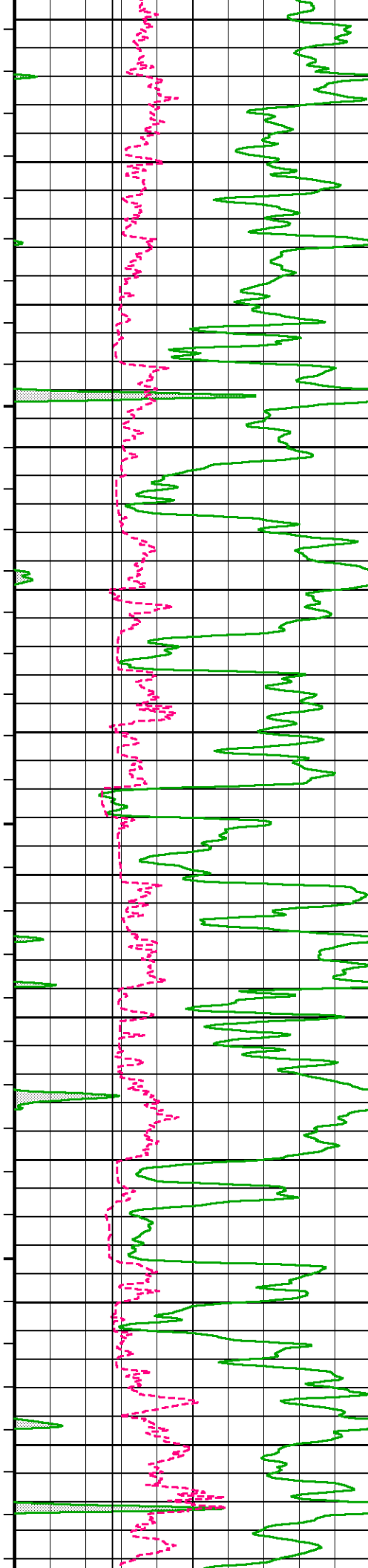
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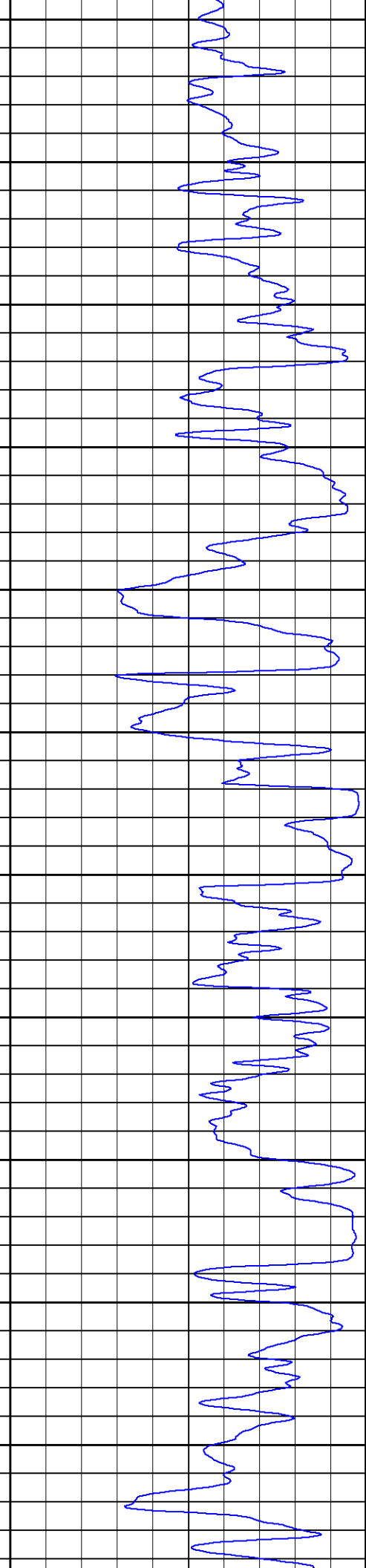
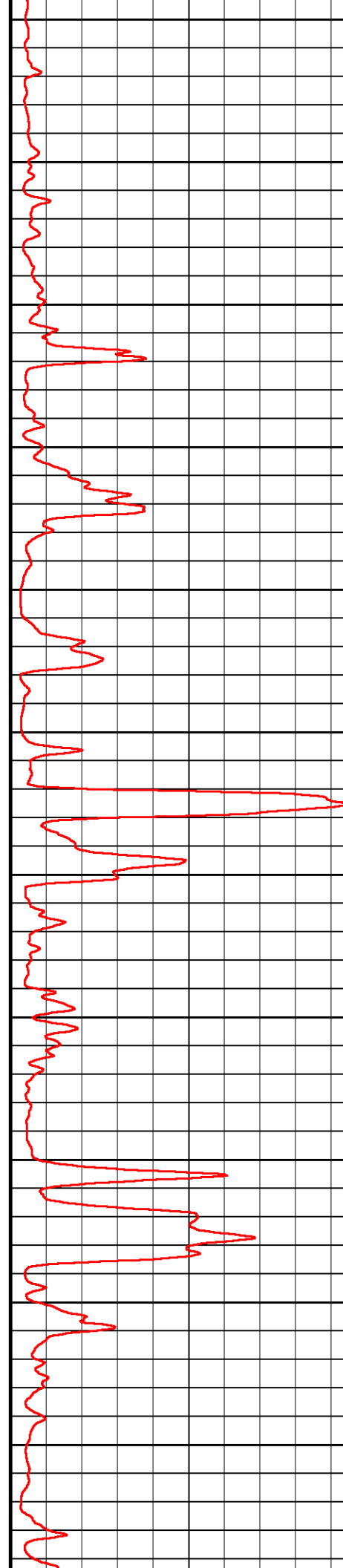
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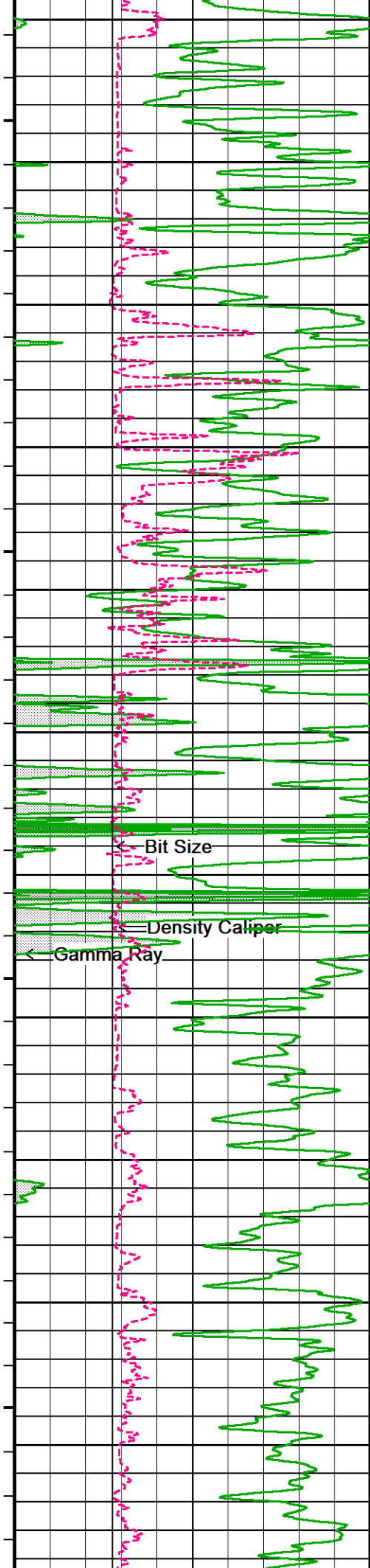






4200
137°
4300
138°
4400
139°
4500
140°
4600
142°
4700





143°

4800

143°

4900

146°

5000

148°

5100

150°

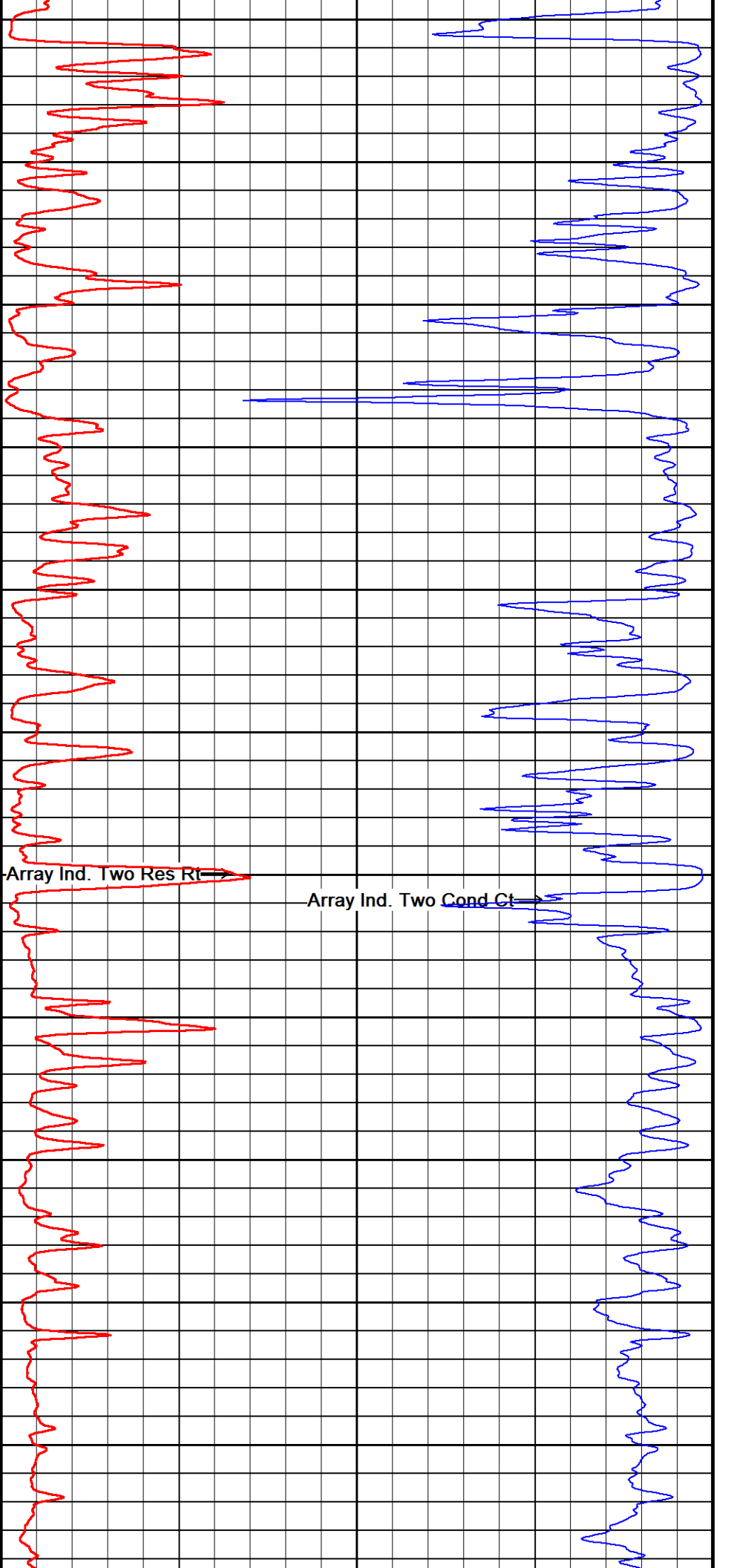
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152°

Bit Size

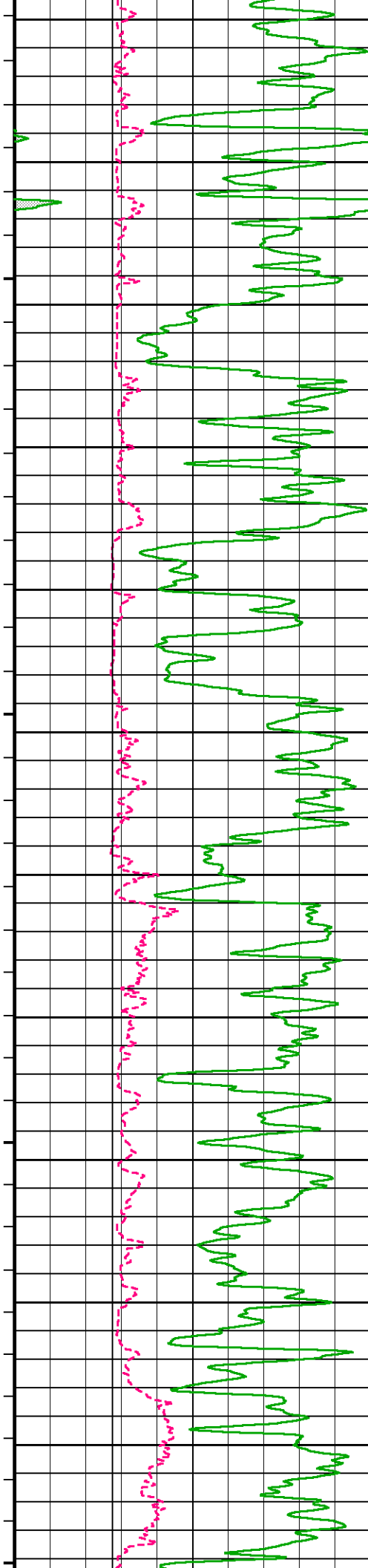
Density Caliper

Gamma Ray



Array Ind. Two Res Rt

Array Ind. Two Cond Ct



5300

153°

5400

154°

5500

156°

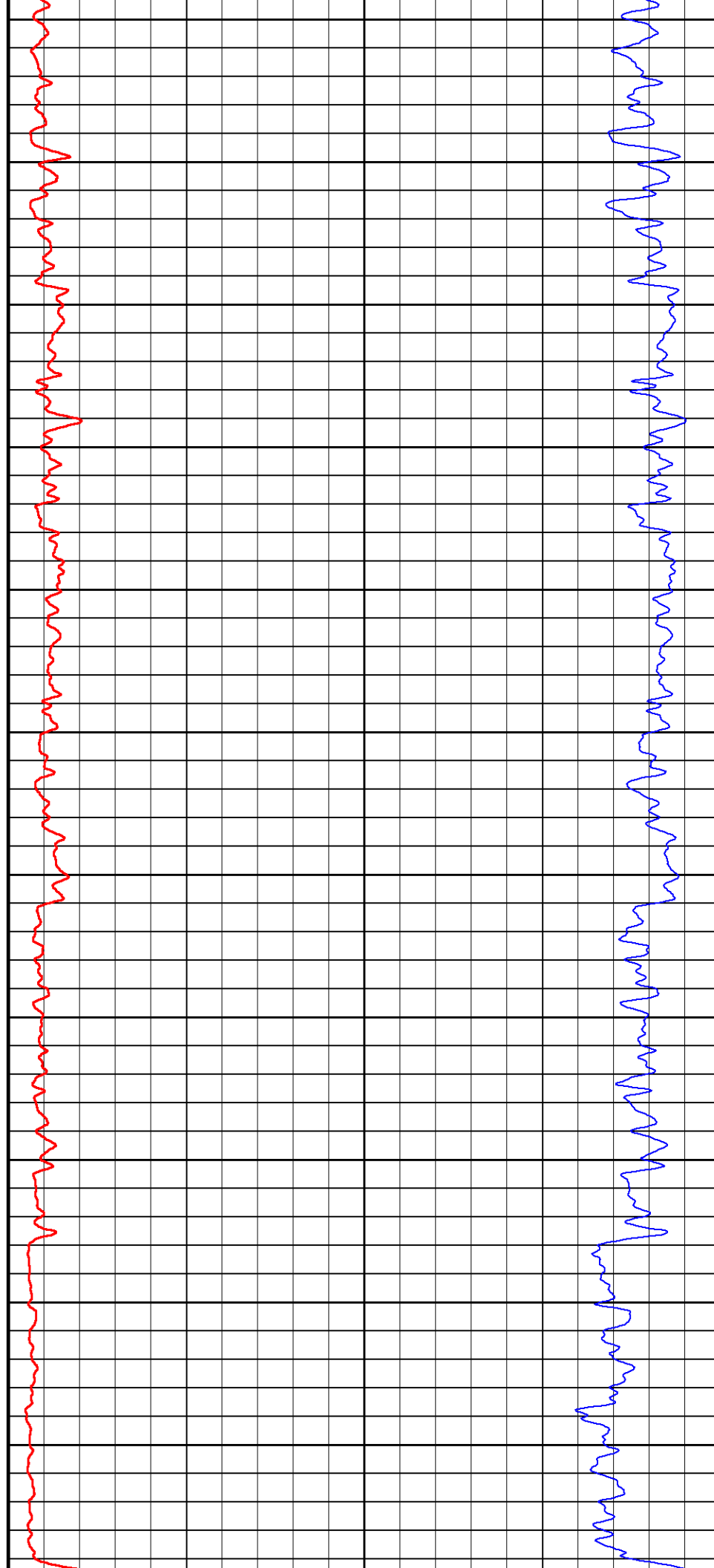
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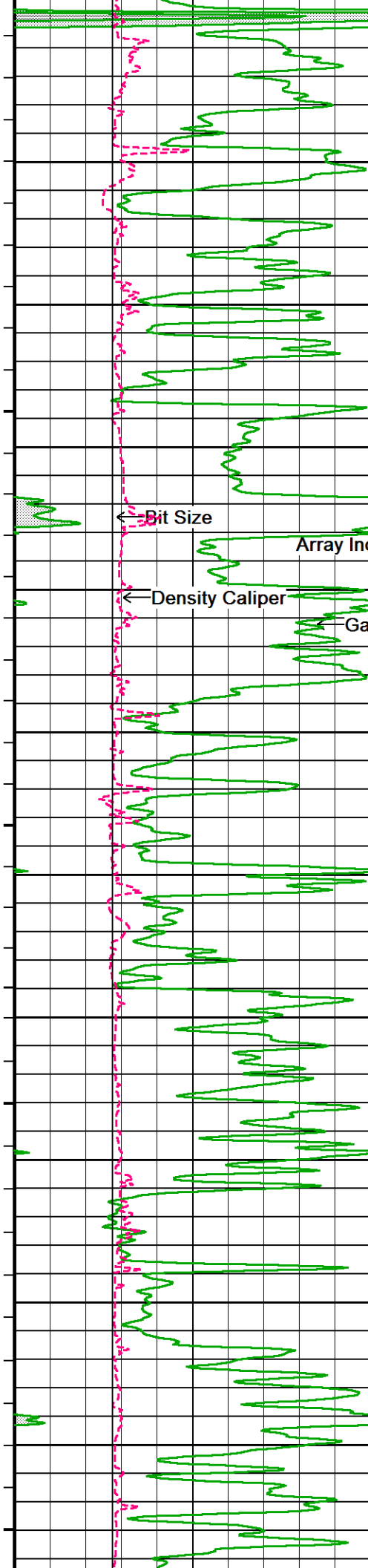
157°

5700

159°

5800





160°

5900

162°

6000

← Bit Size

Array Ind. Two Res Rt →

← Density Caliper

← Gamma Ray

163°

6100

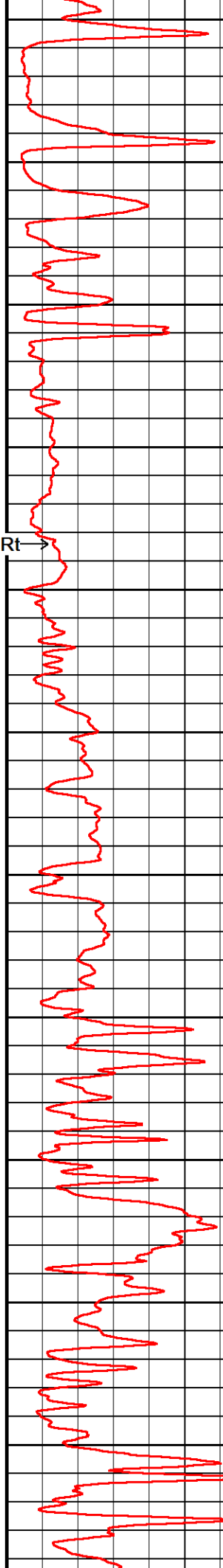
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6200

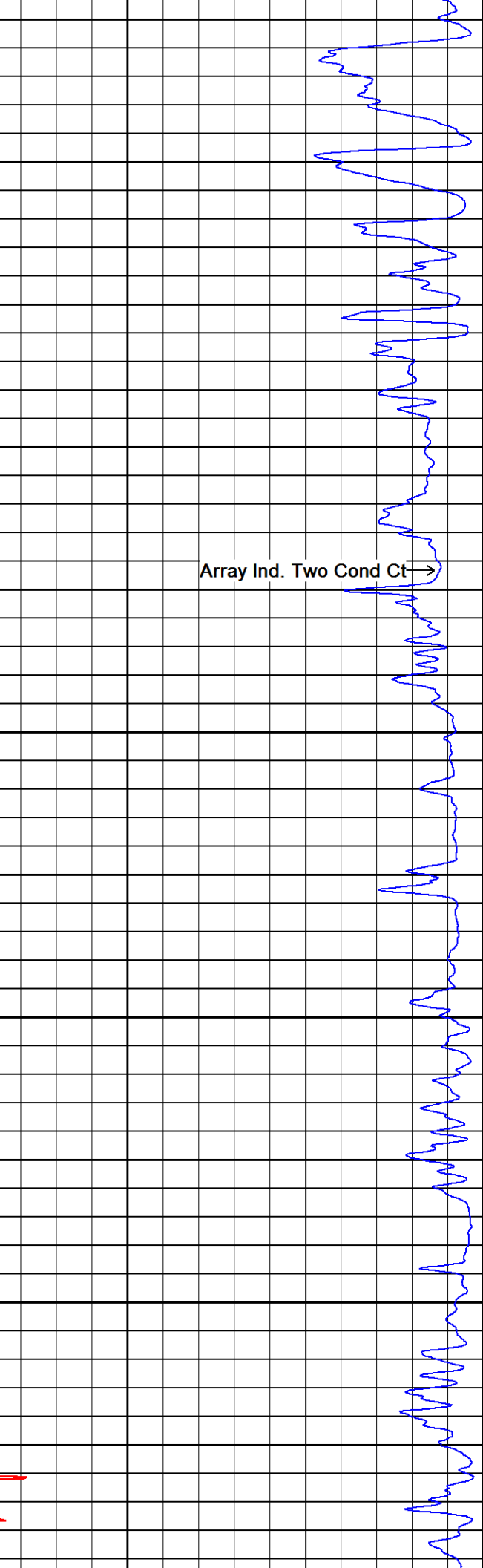
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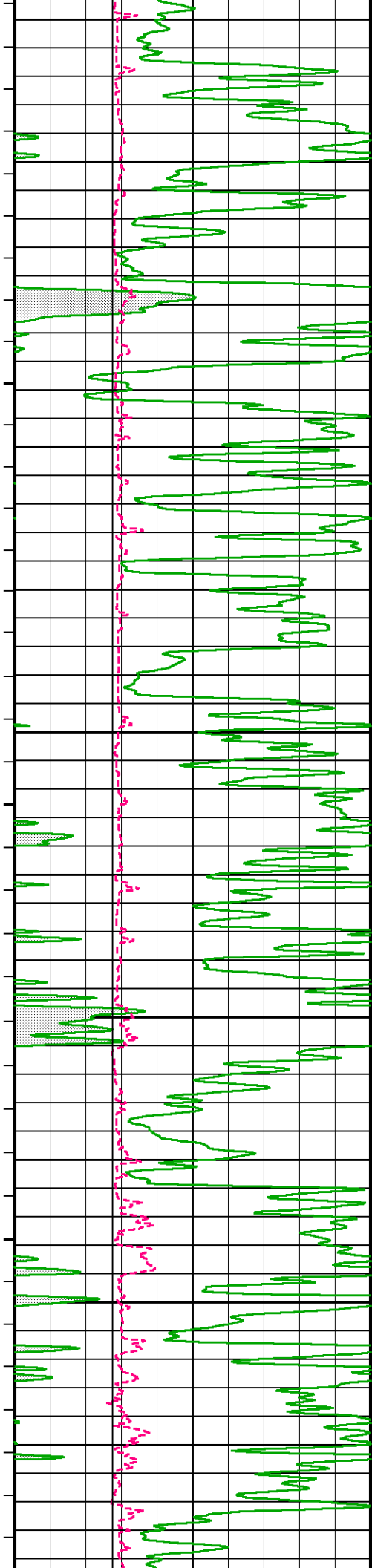
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167°



Array Ind. Two Cond Ct →





6400

168°

6500

169°

6600

170°

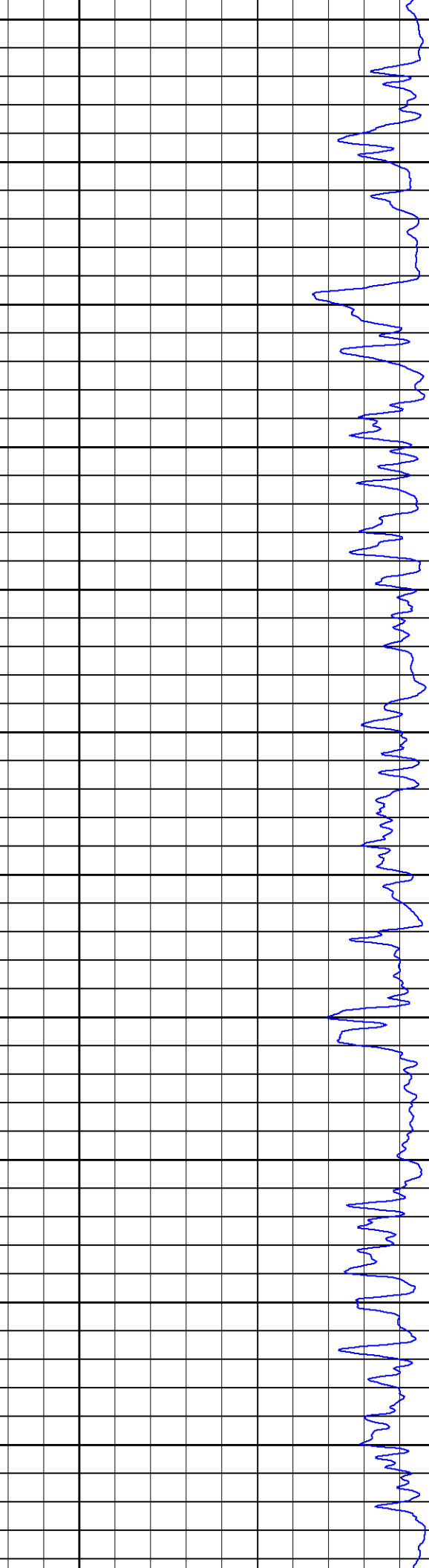
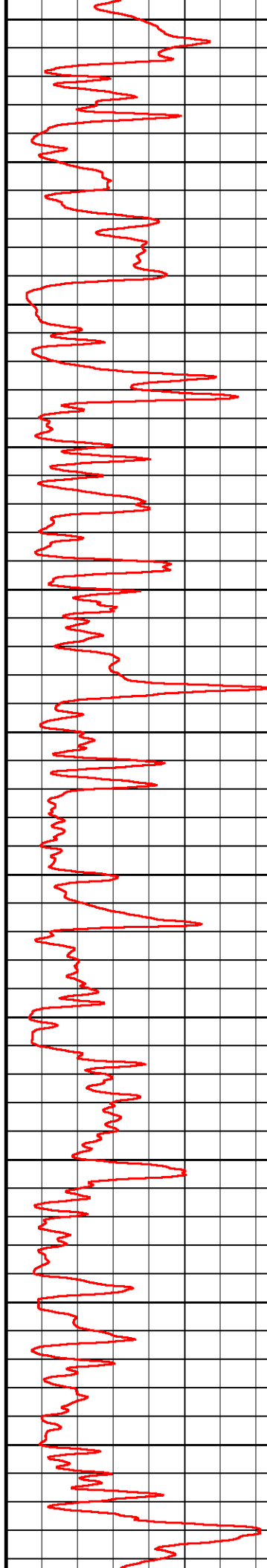
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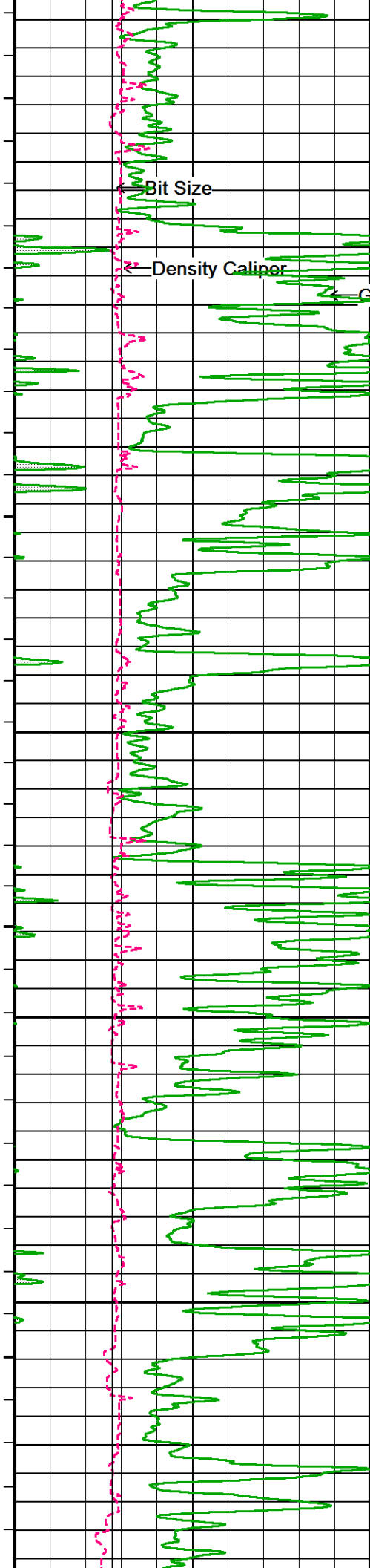
172°

6800

173°

6900





174°

7000

Array Ind. Two Res Rt

Gamma Ray

175°

7100

176°

7200

177°

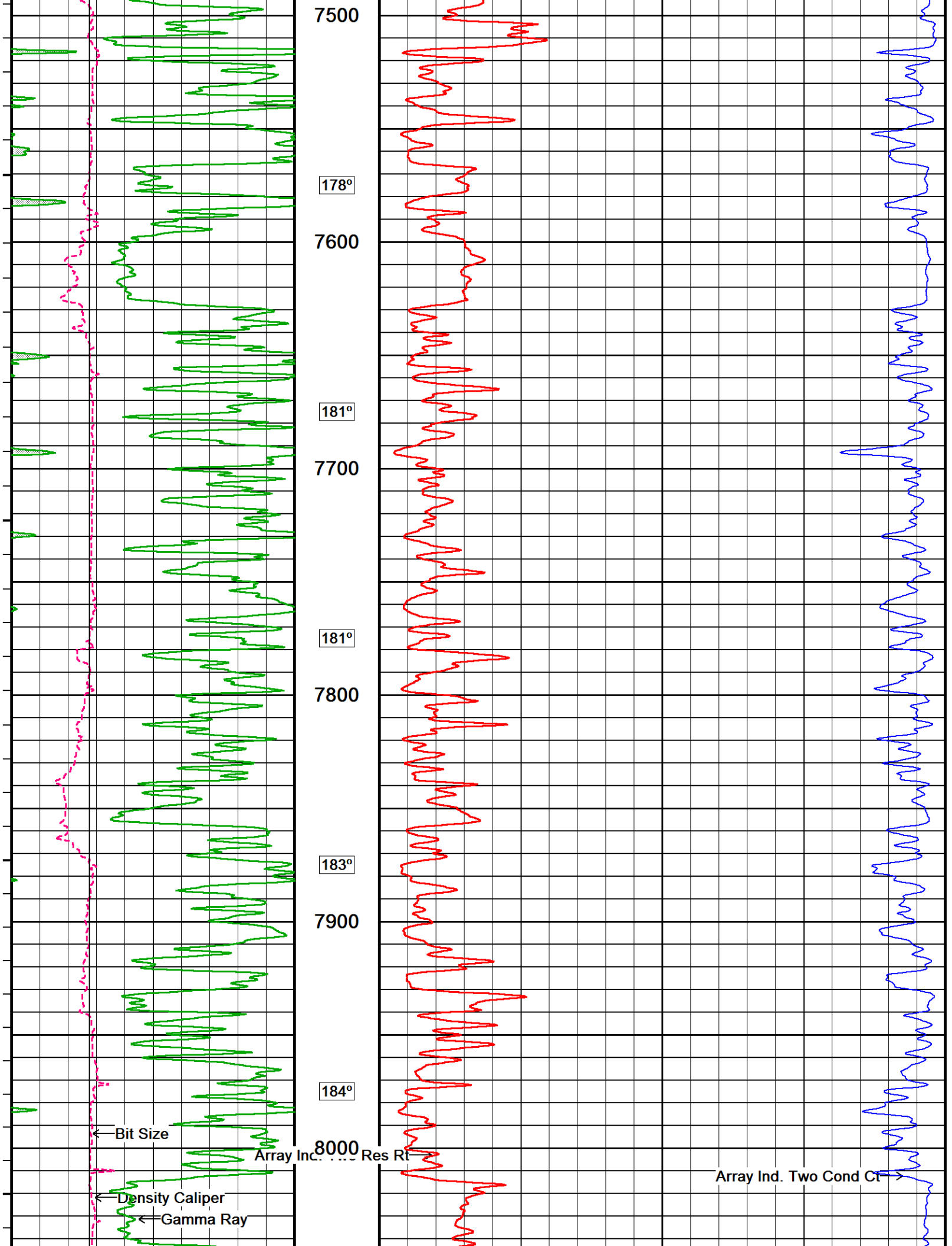
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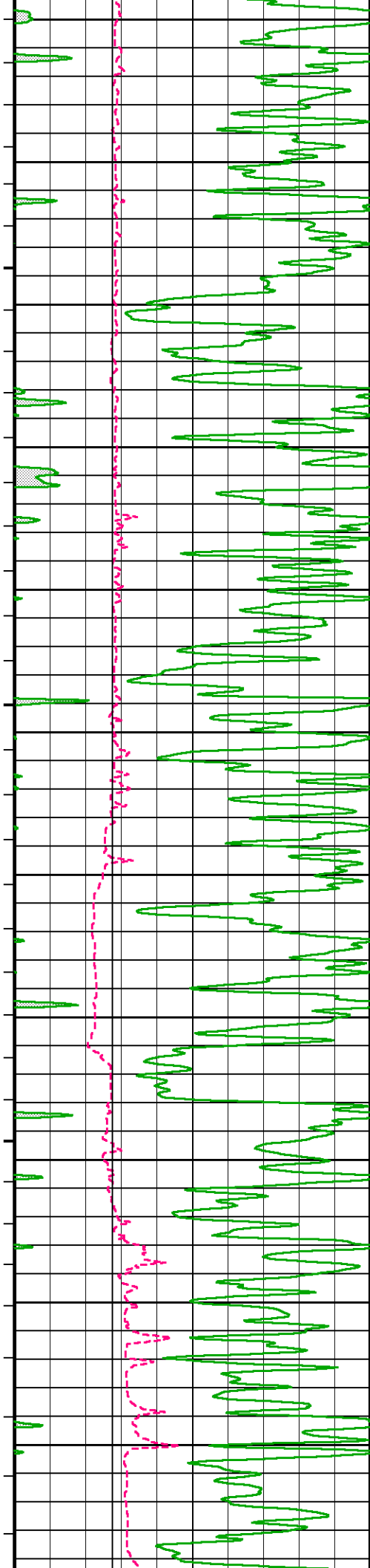
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7400

178°

Array Ind. Two Cond Ct





186°

8100

187°

8200

188°

8300

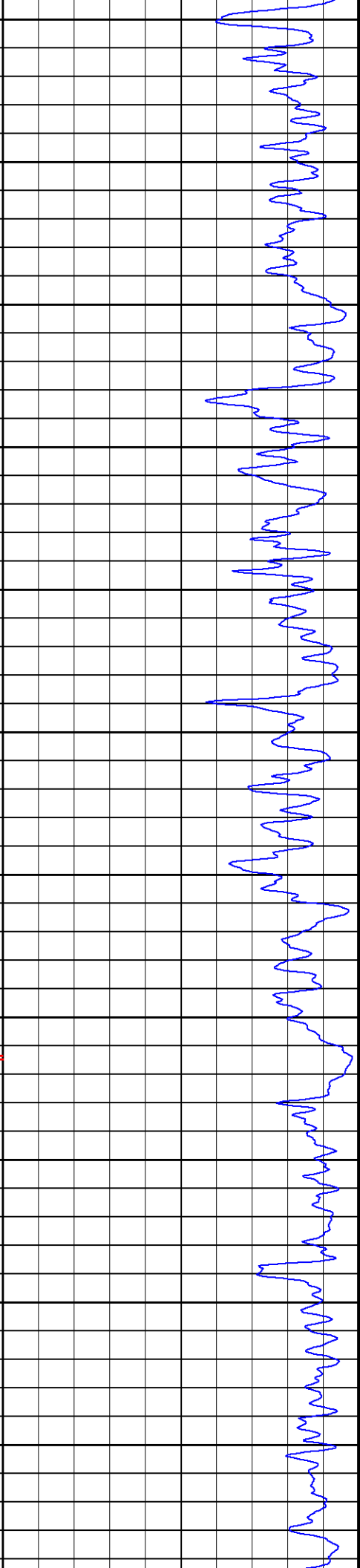
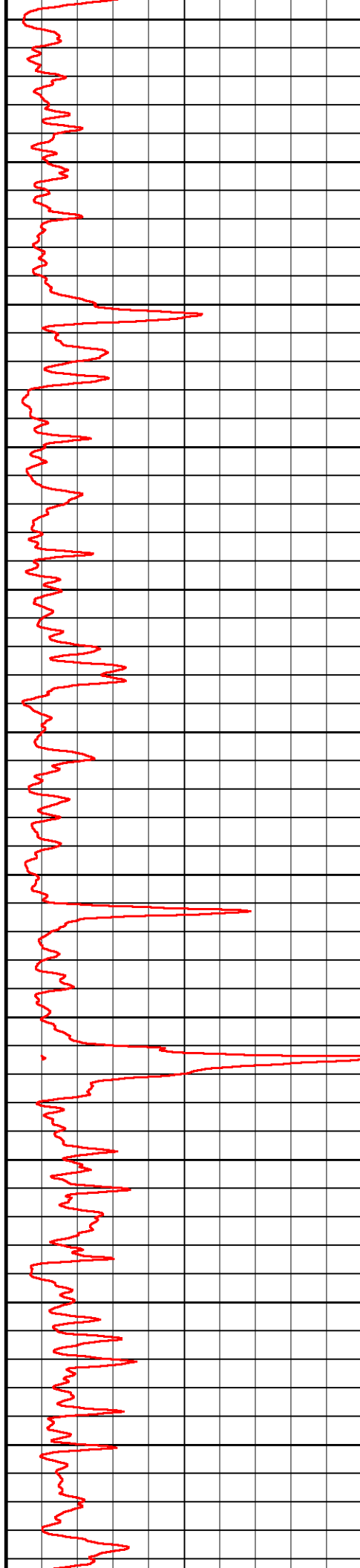
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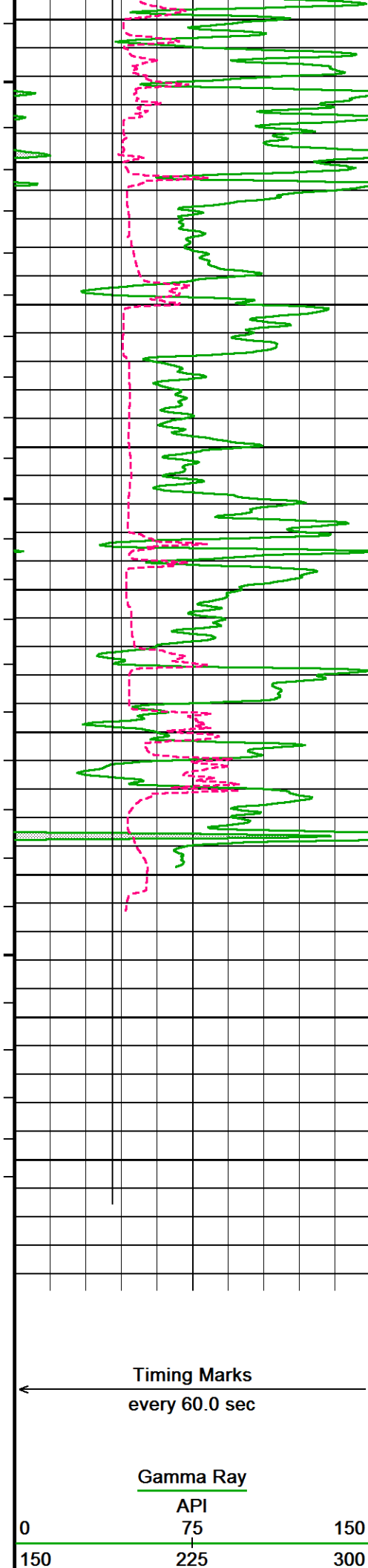
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189°

8500

190°





8600

192°

8700

186°

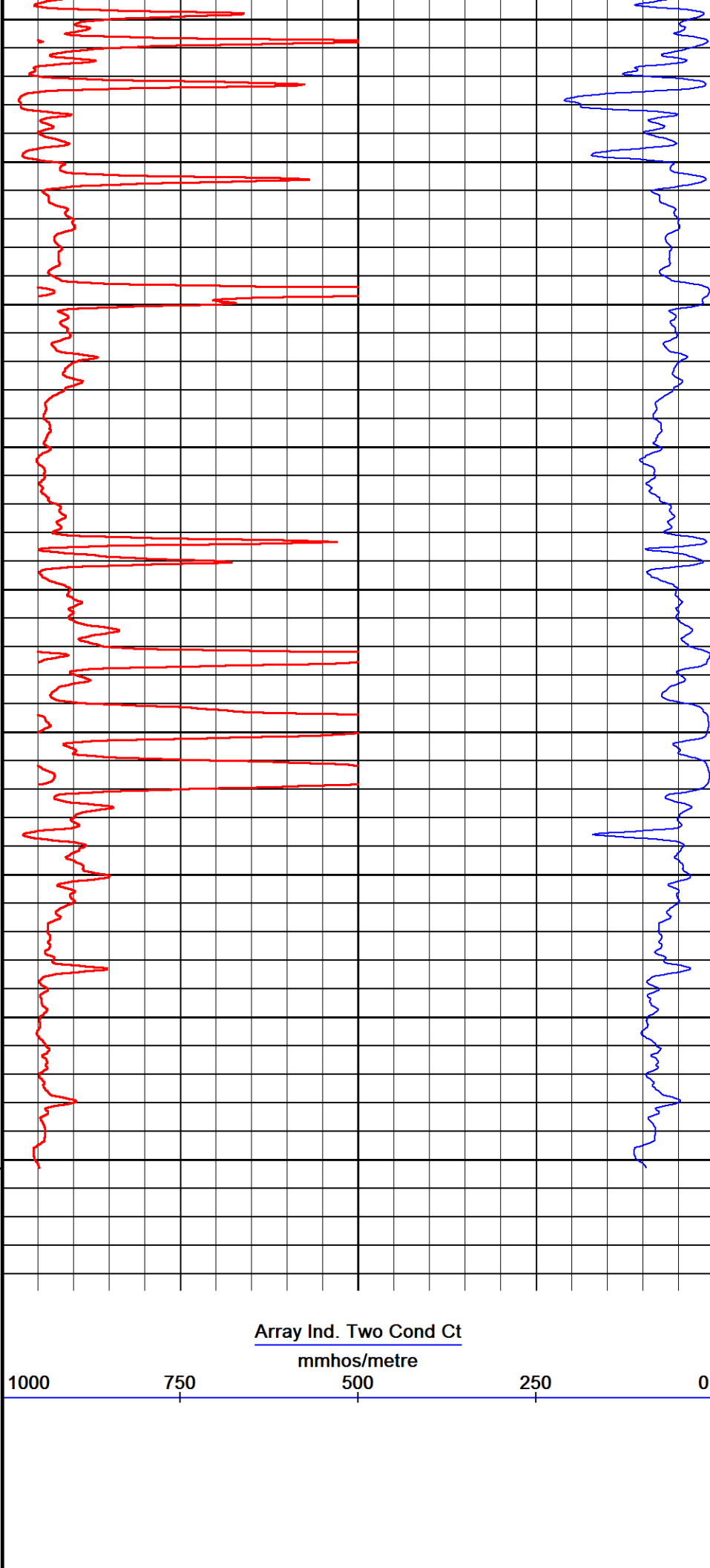
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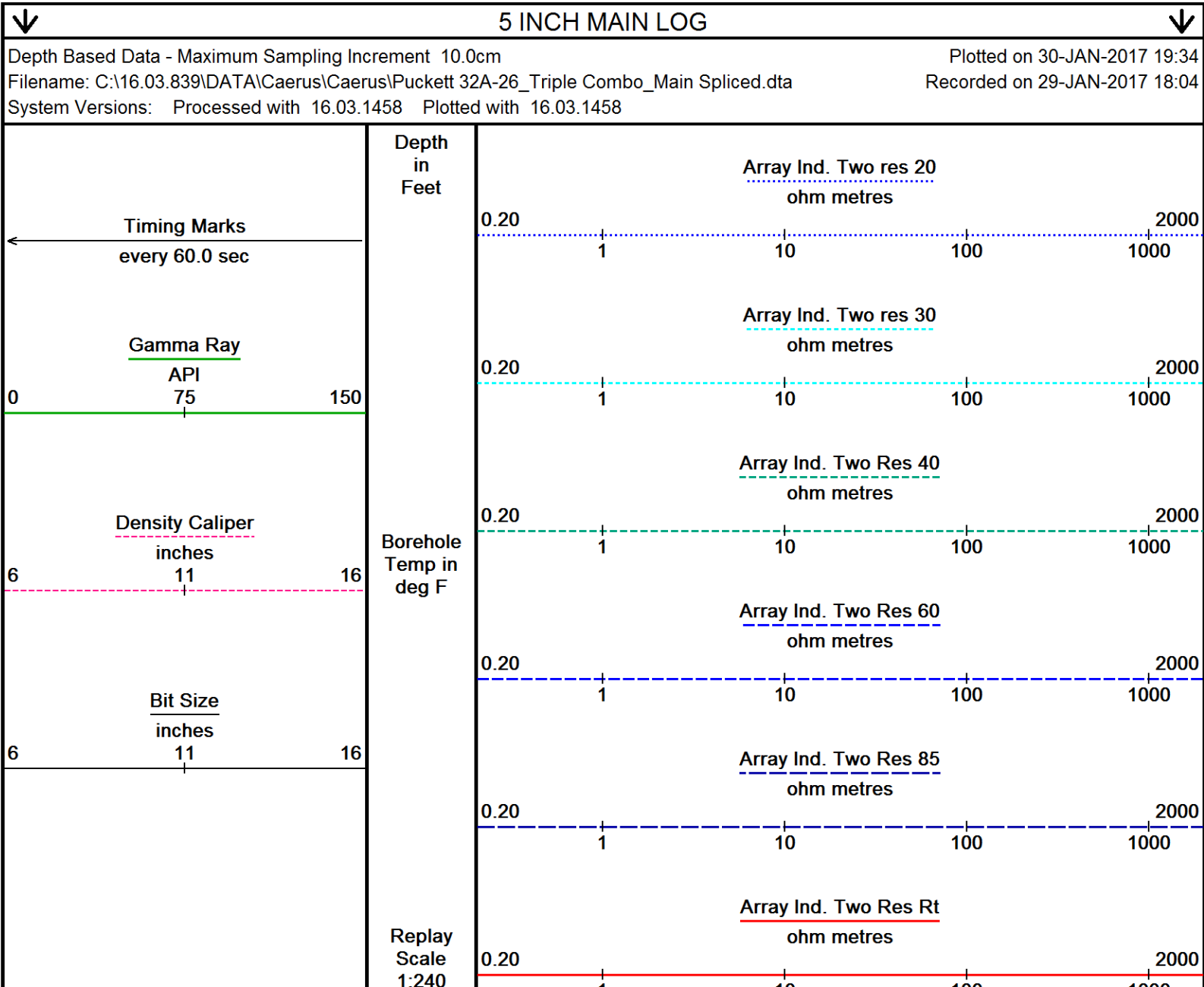
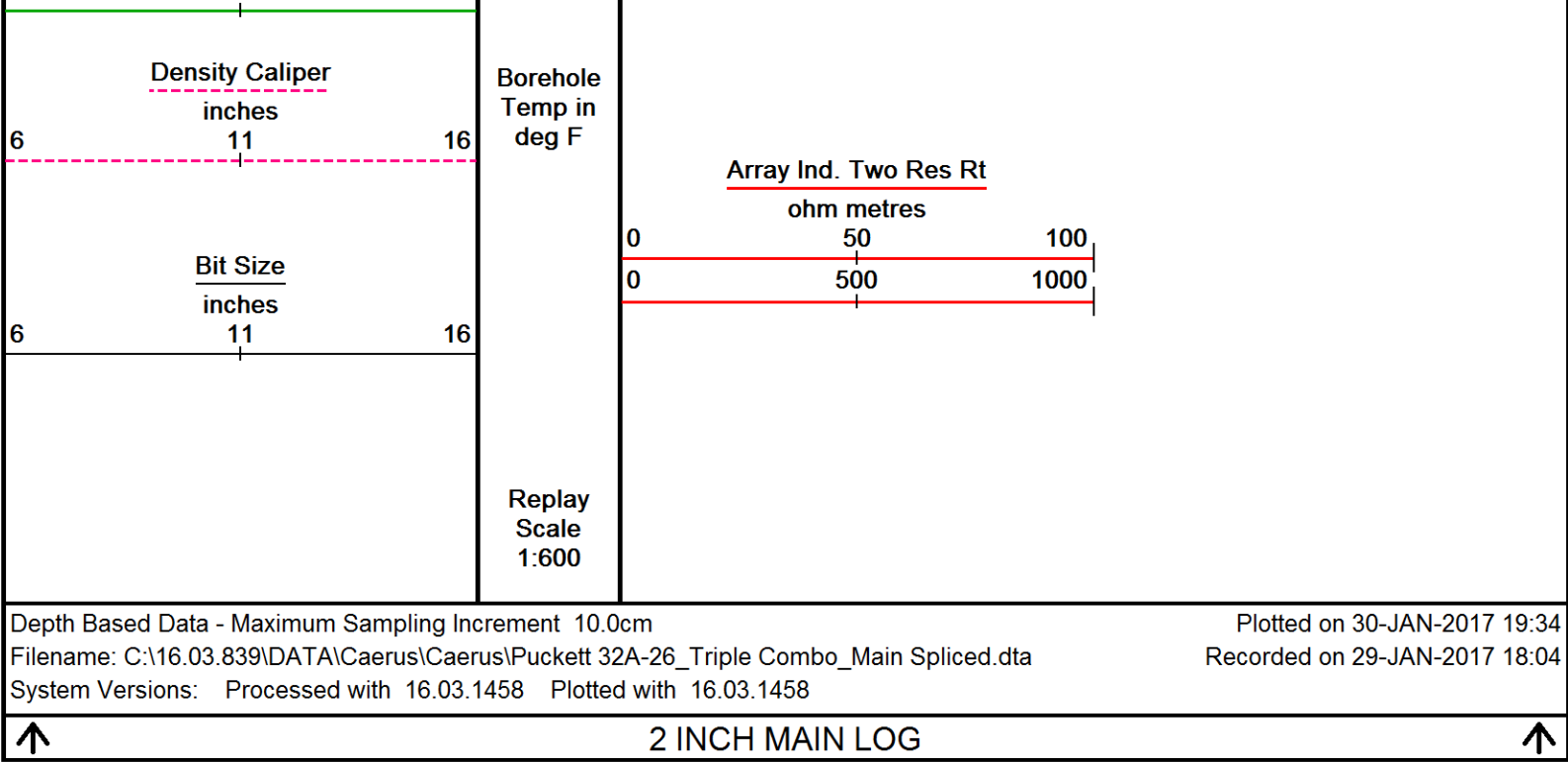
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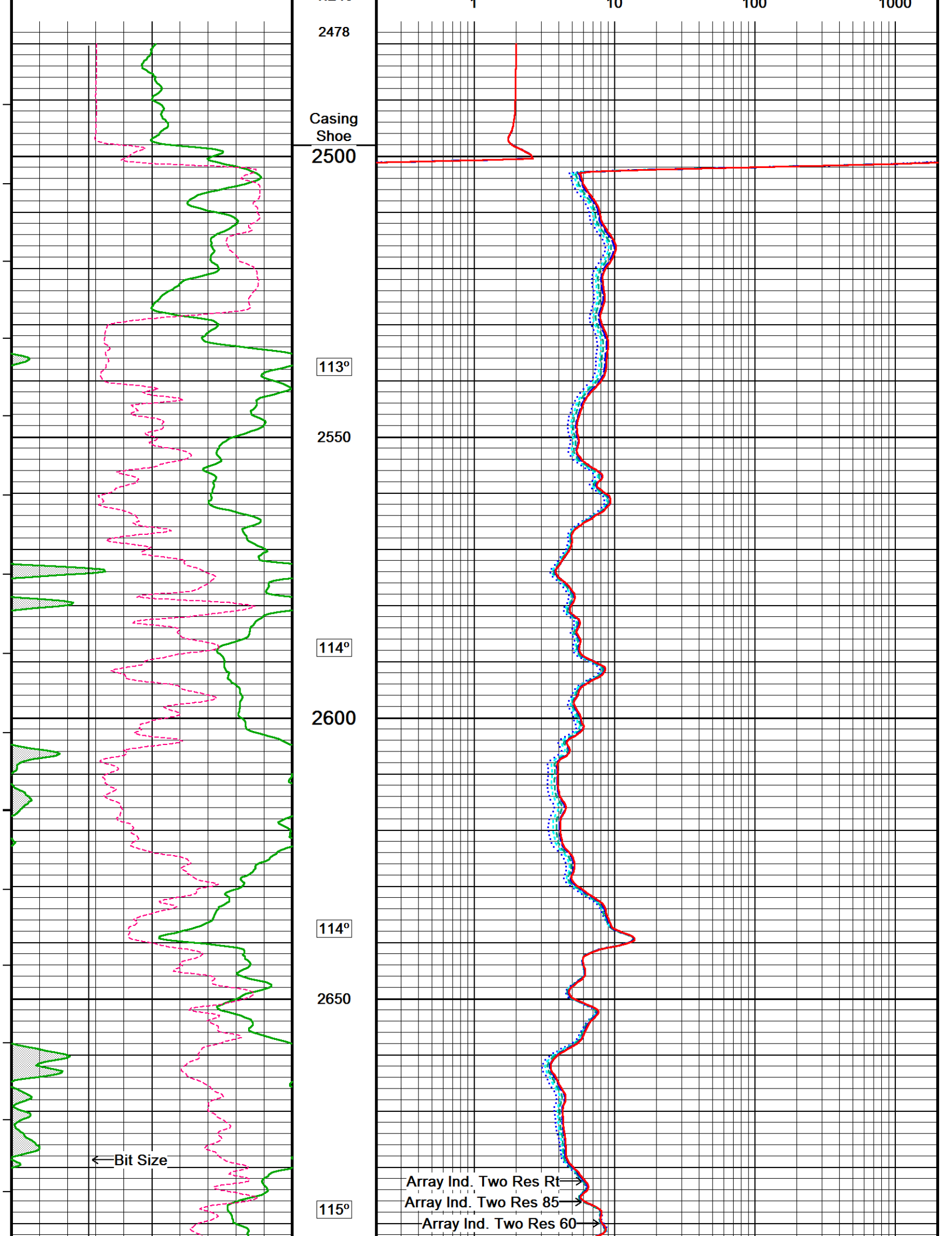
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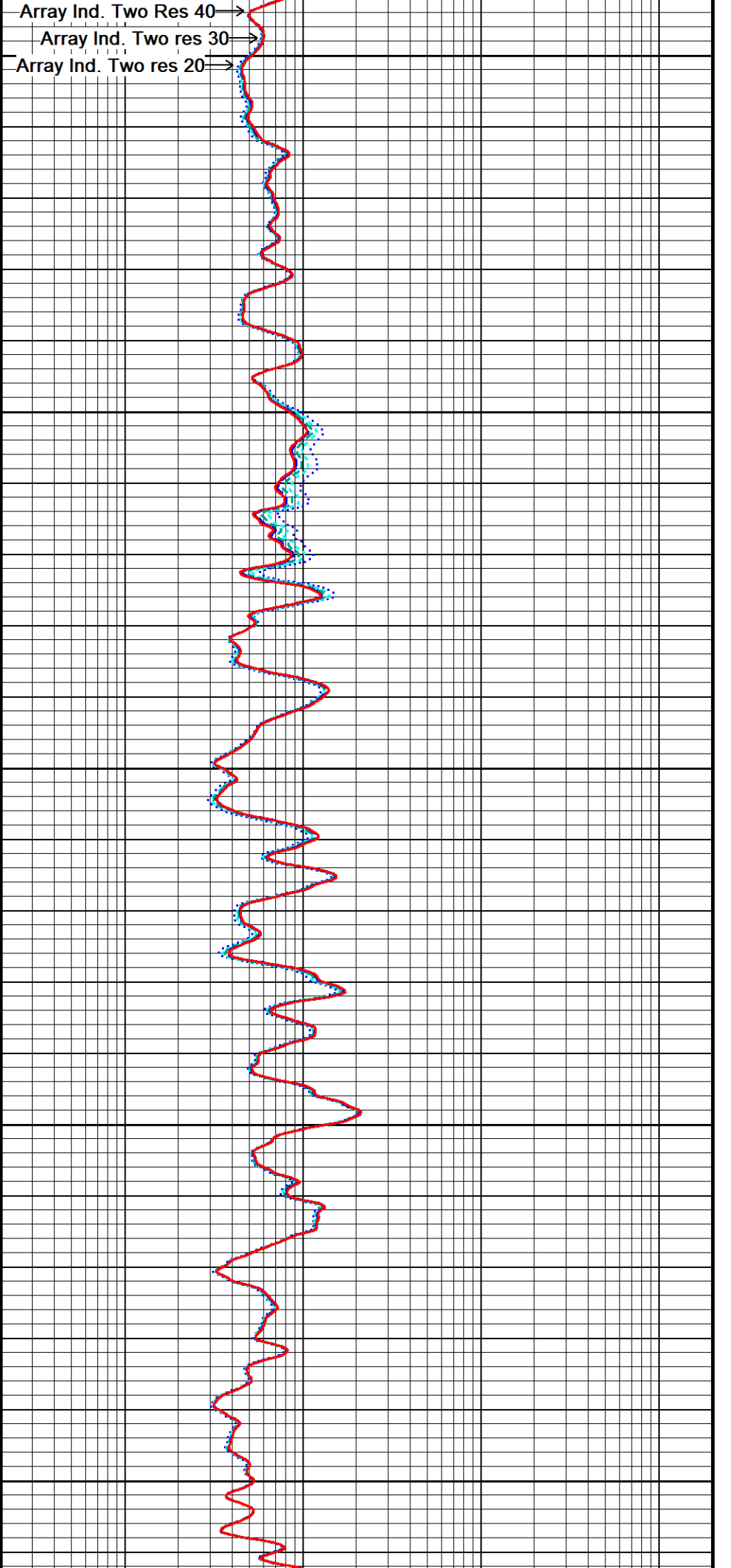
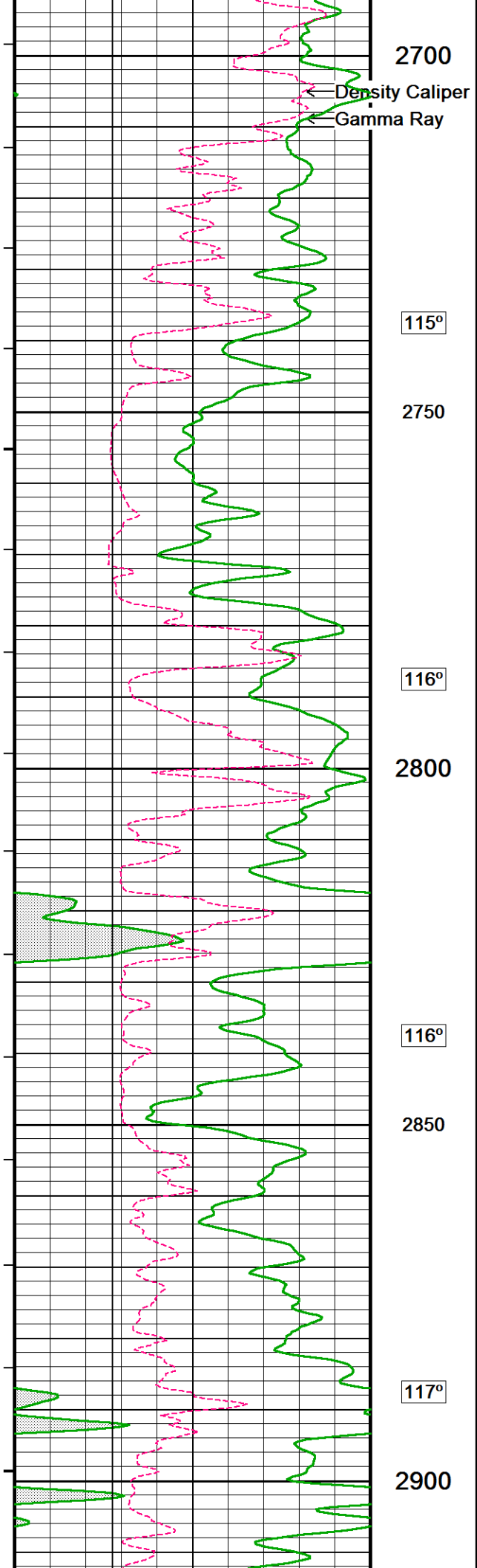
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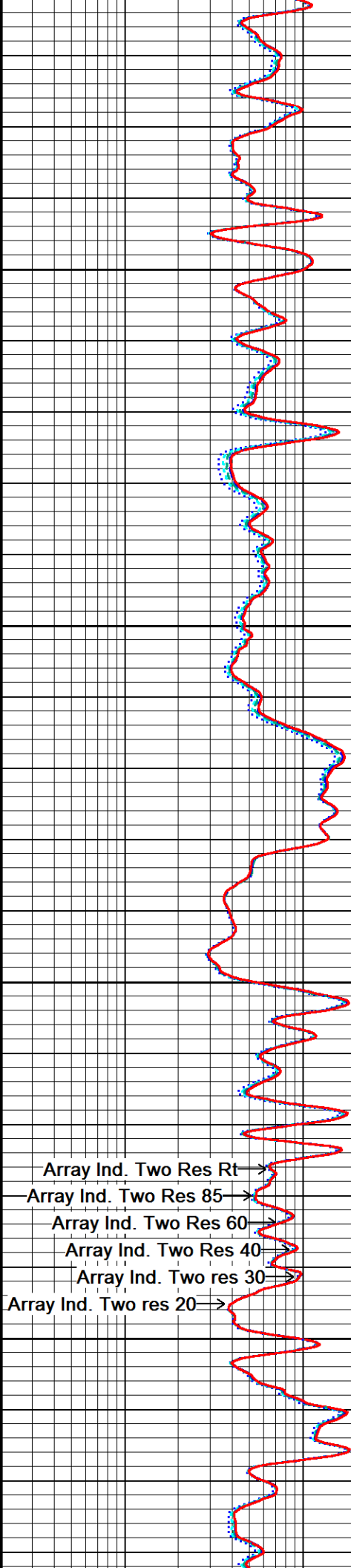
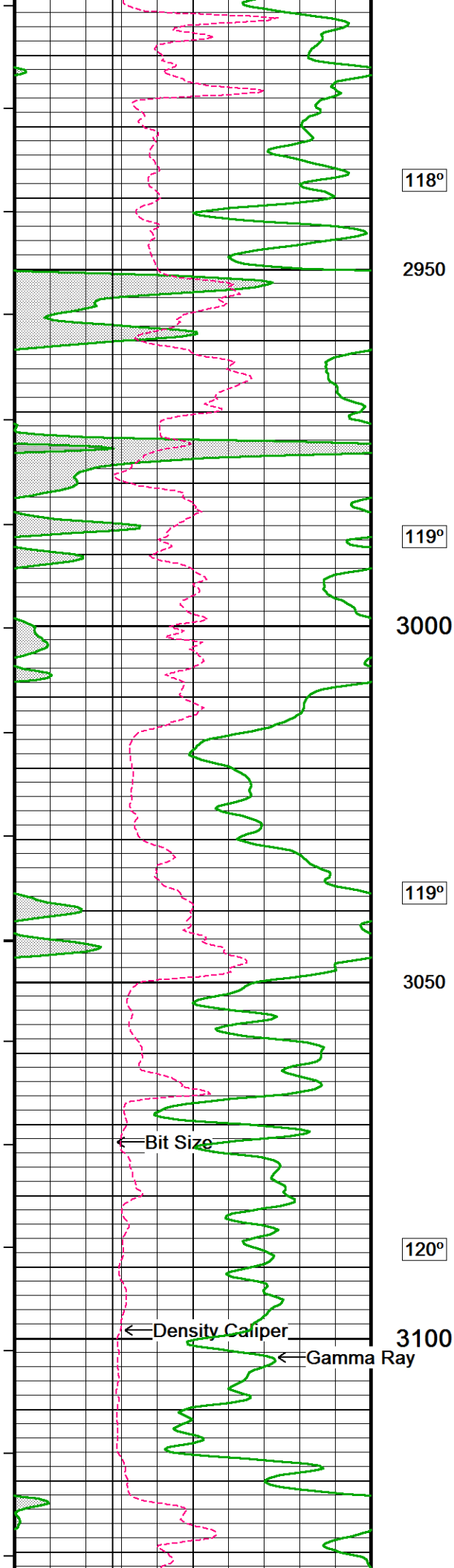
Depth
in
Feet

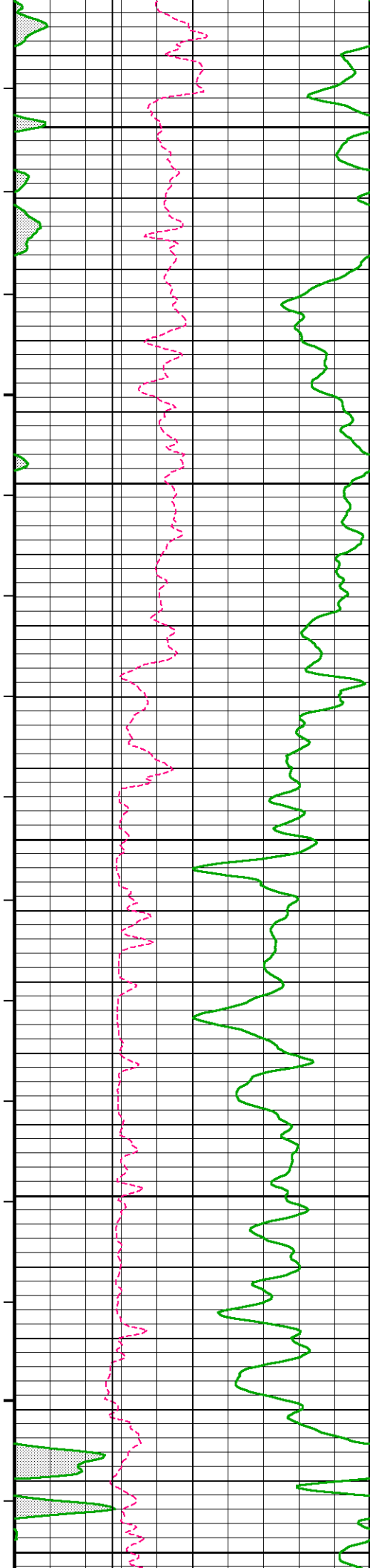












121°

3150

122°

3200

122°

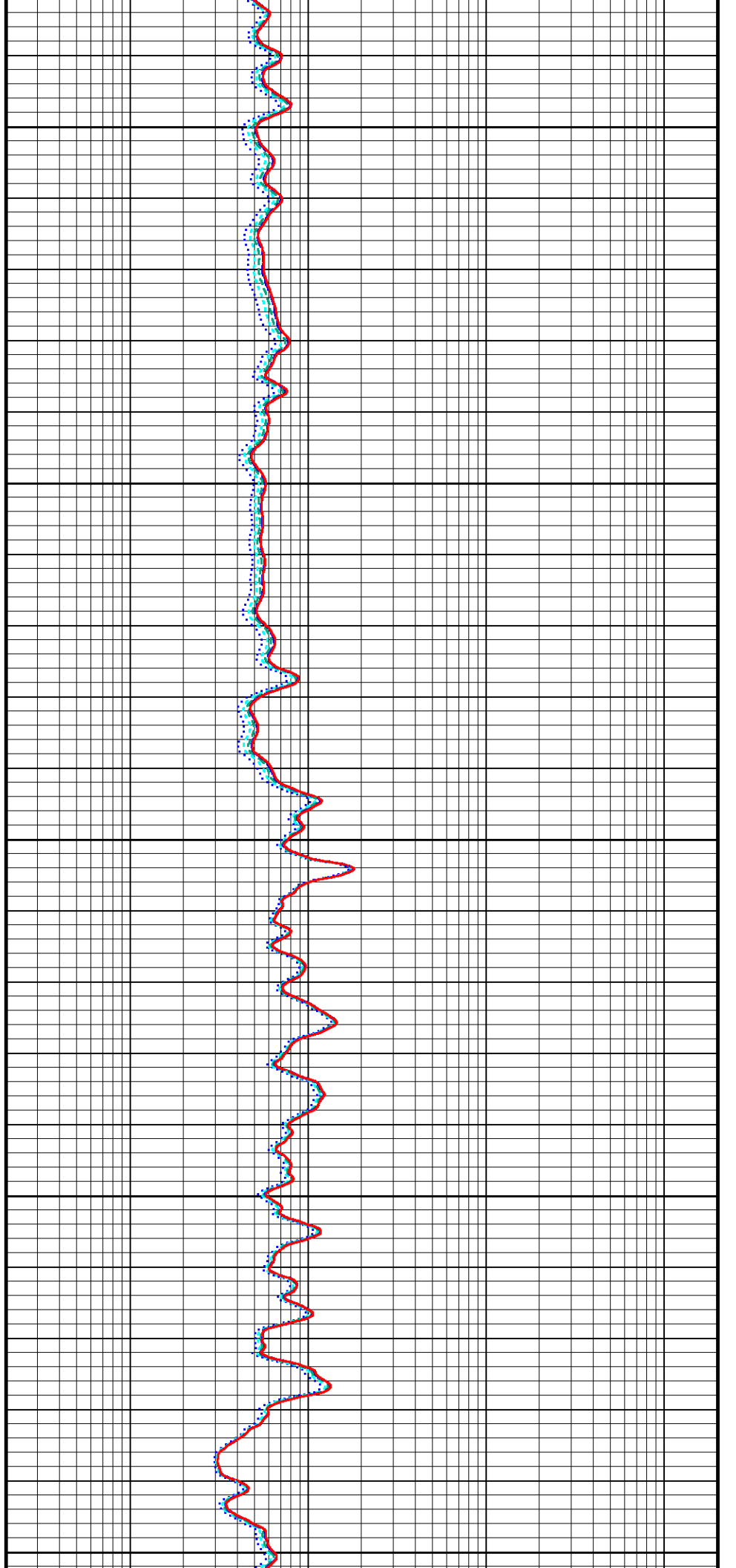
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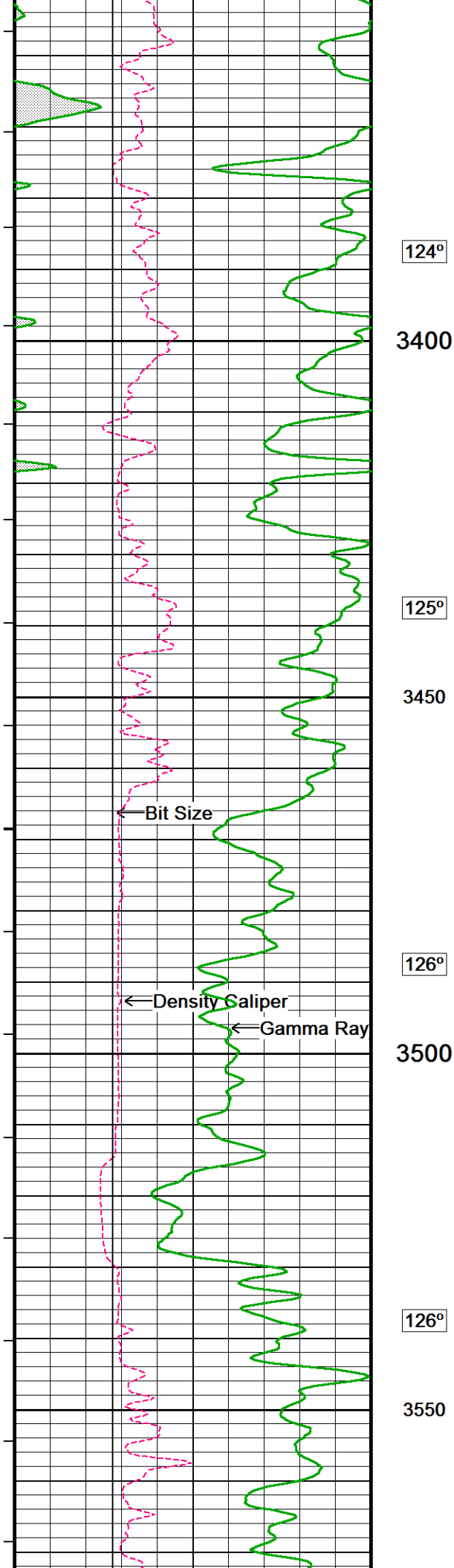
123°

3300

124°

3350





124°

3400

125°

3450

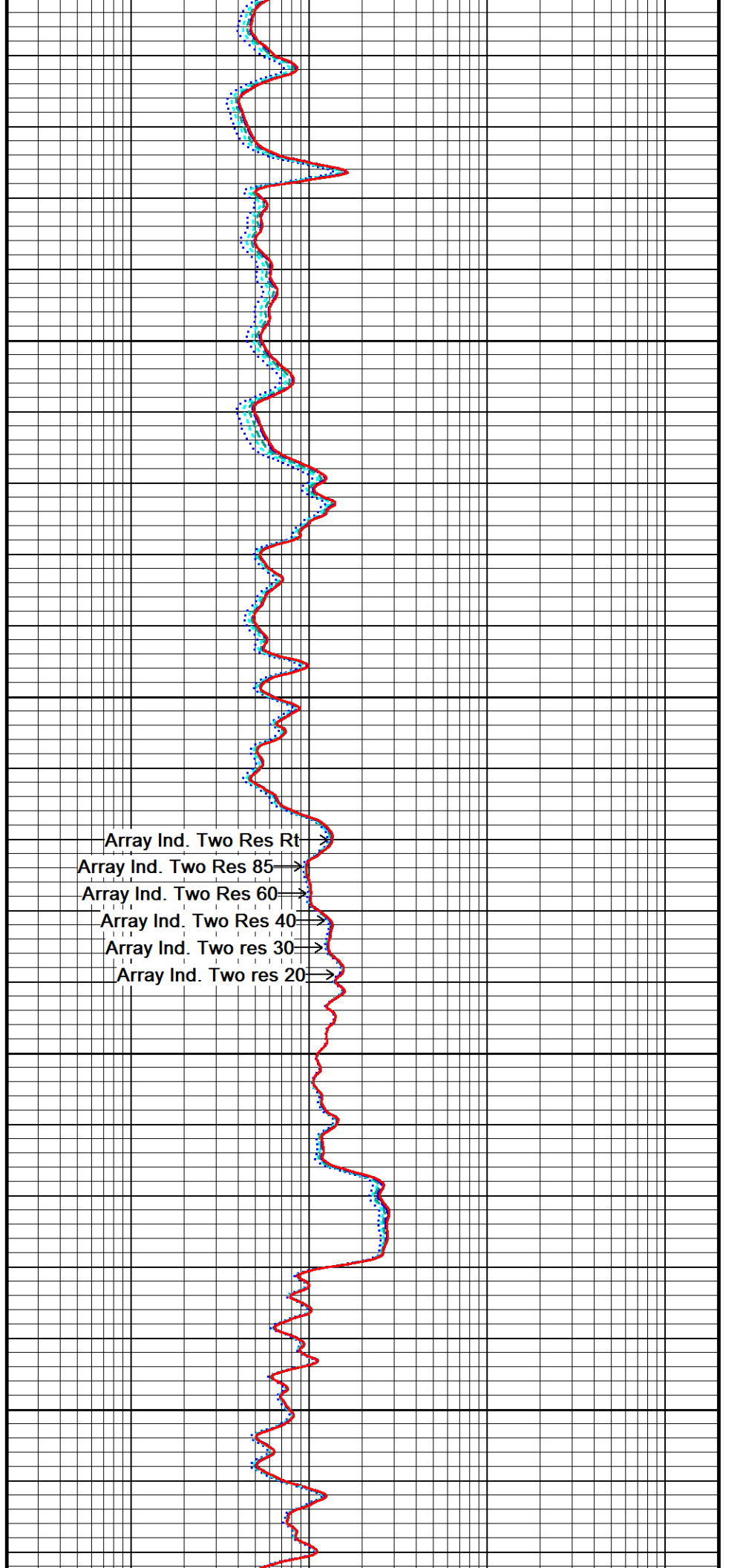
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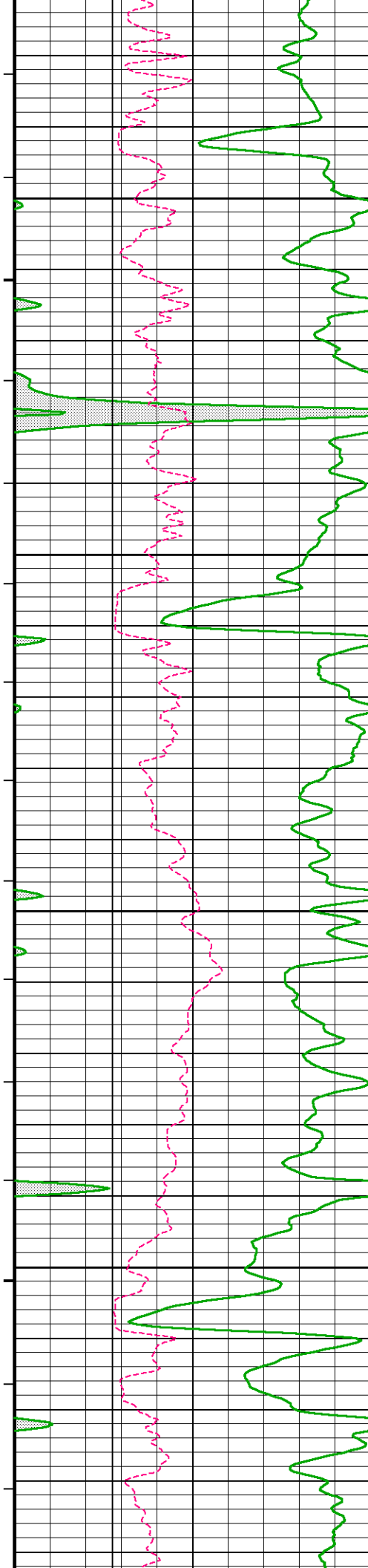
3500

126°

3550

Array Ind. Two Res Rt →
Array Ind. Two Res 85 →
Array Ind. Two Res 60 →
Array Ind. Two Res 40 →
Array Ind. Two res 30 →
Array Ind. Two res 20 →





127°

3600

128°

3650

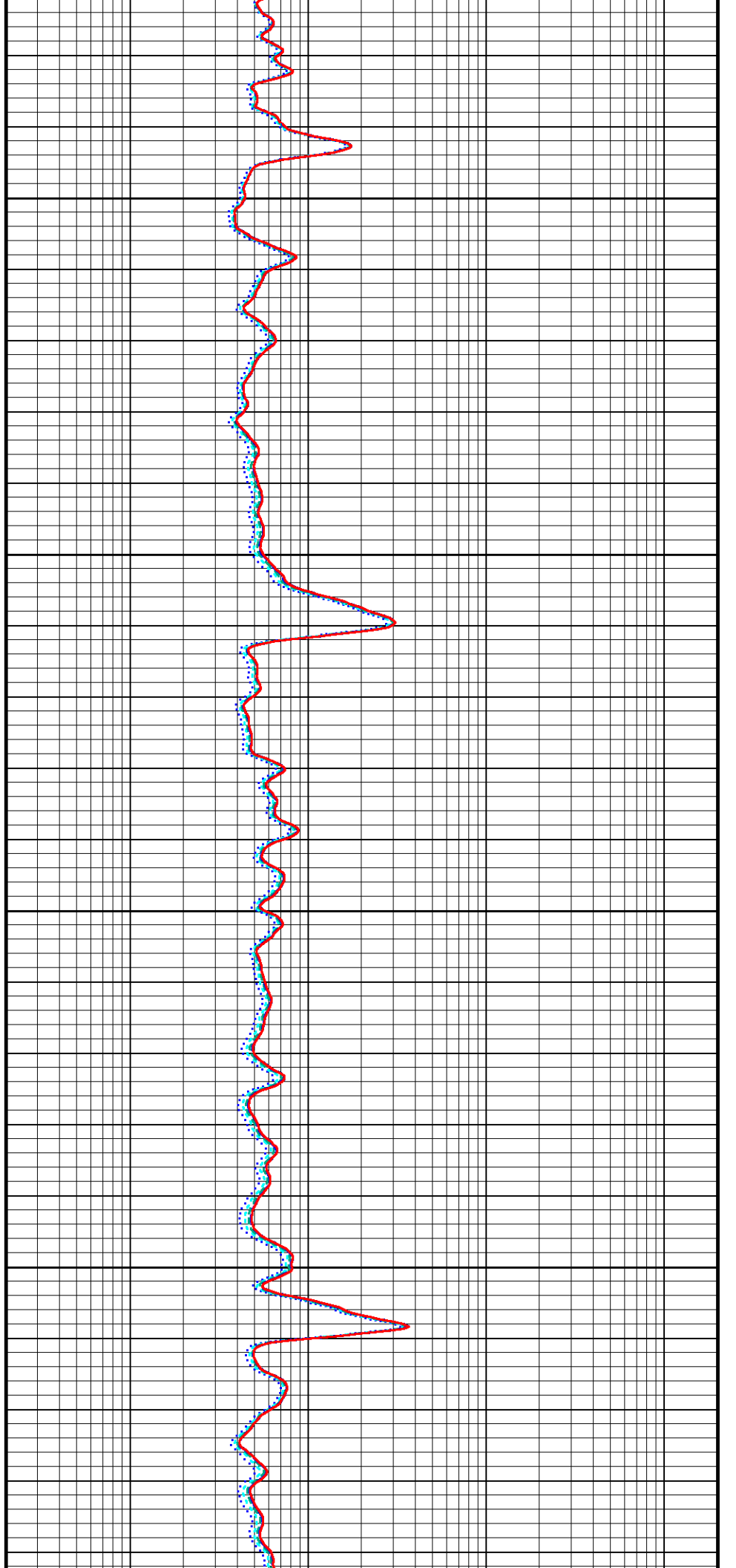
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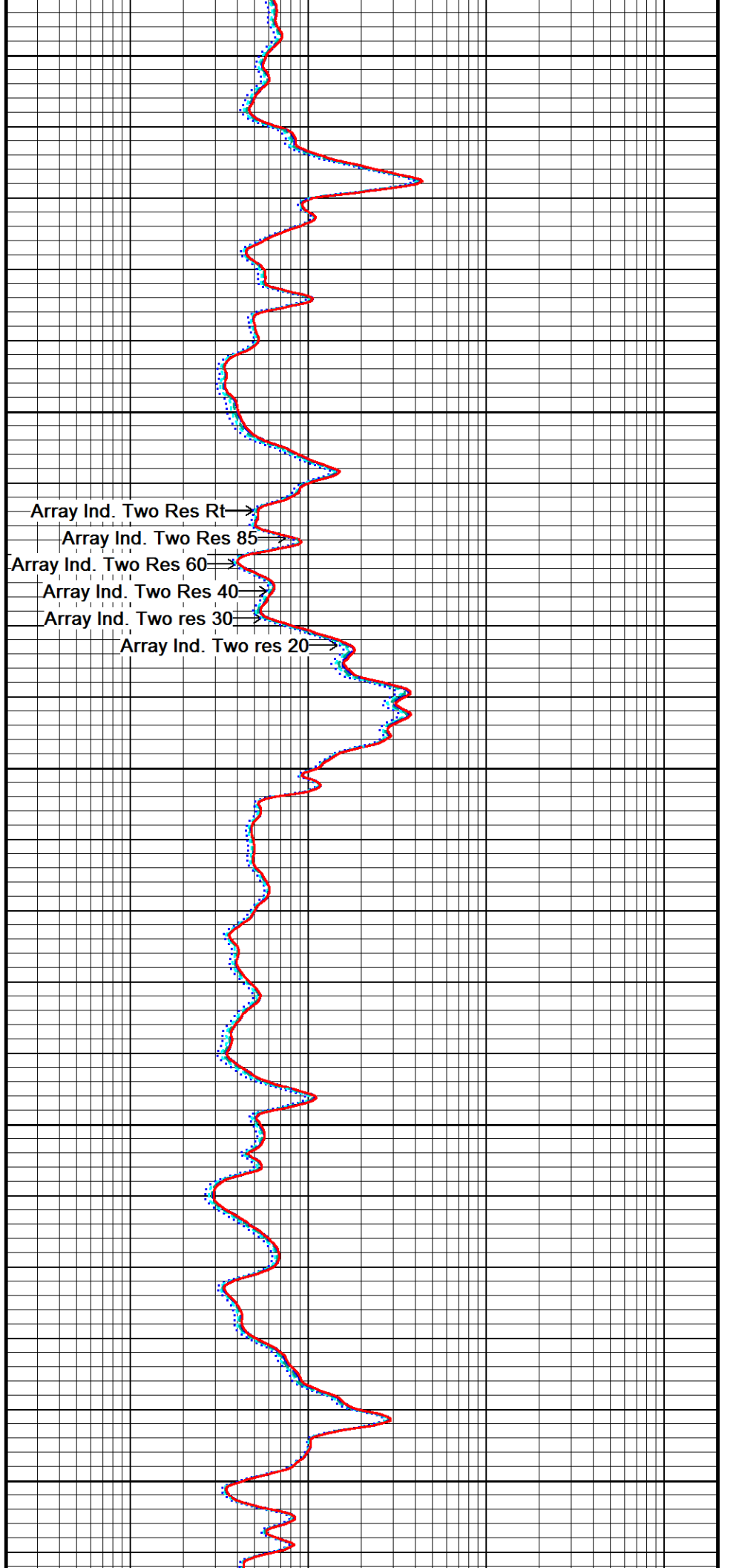
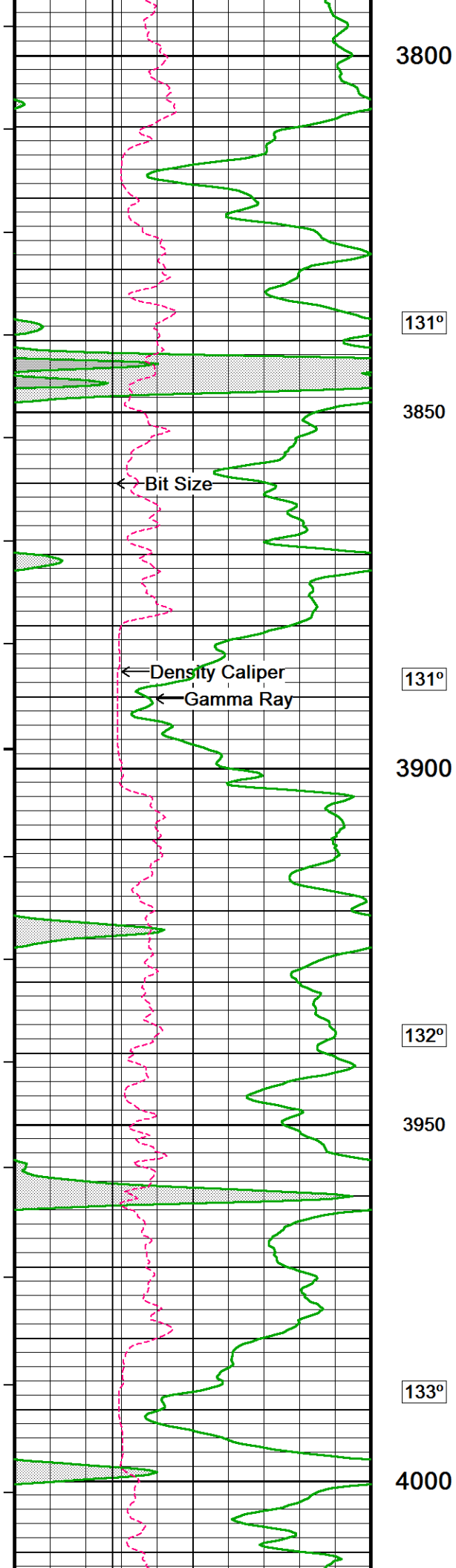
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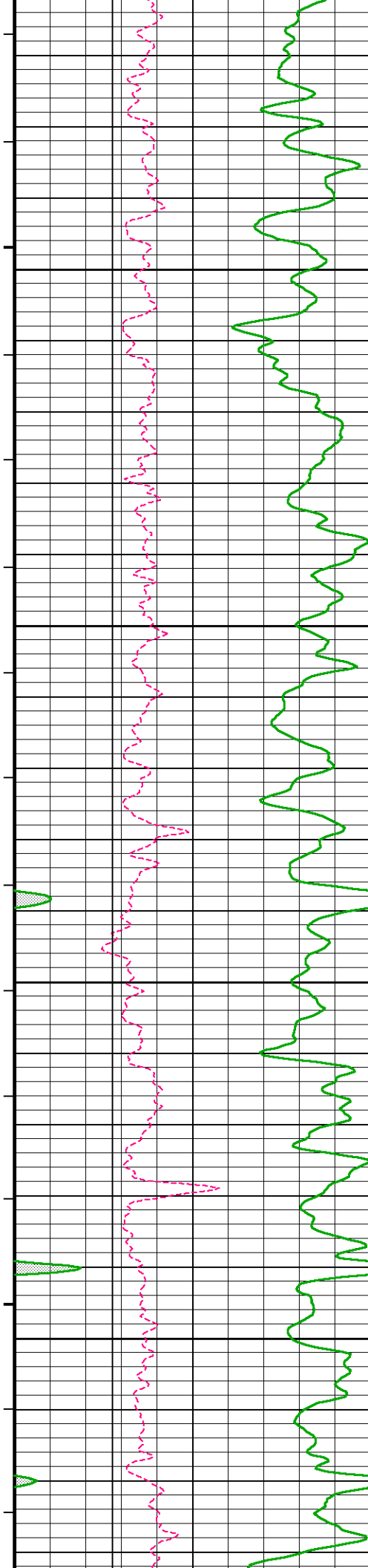
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3750

130°







133°

4050

134°

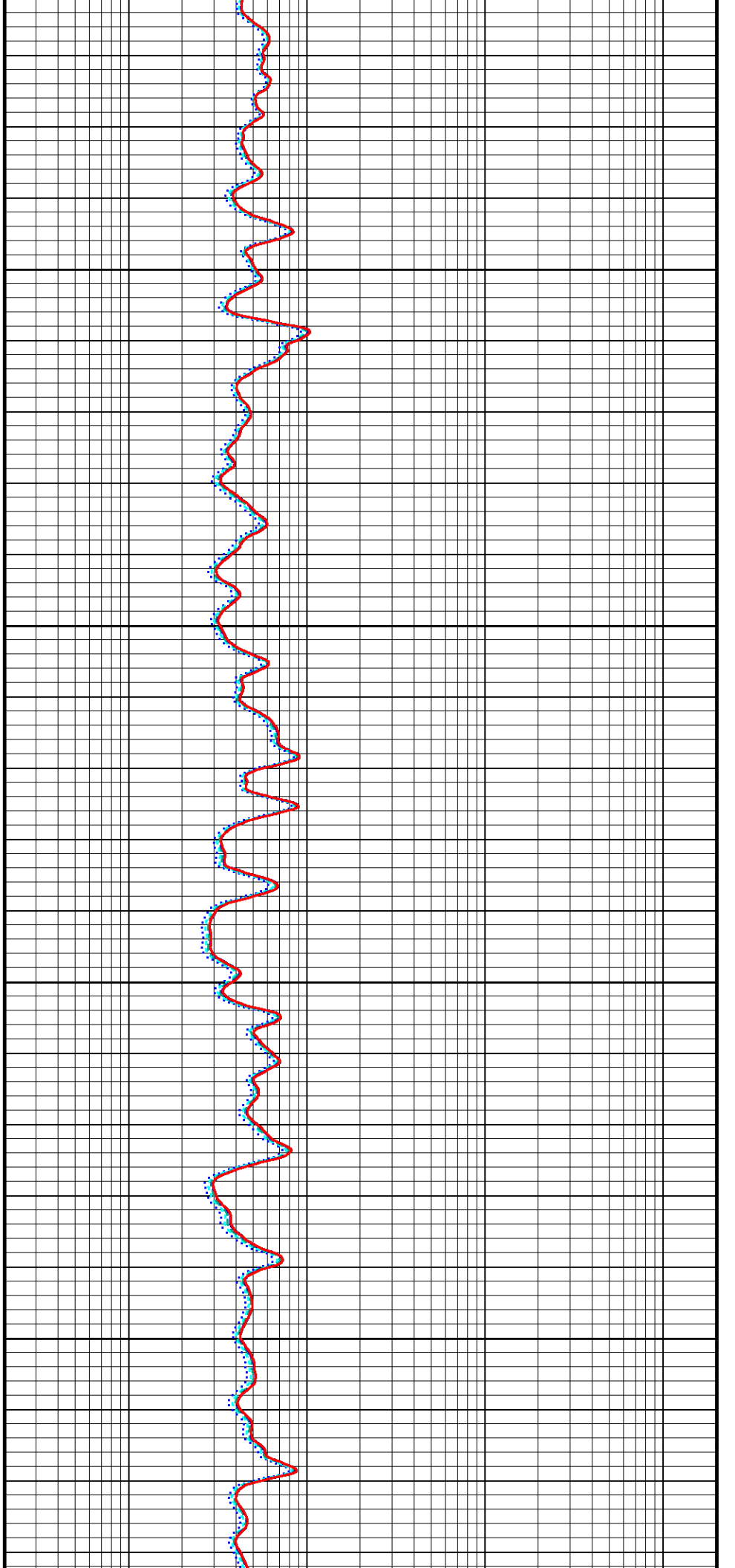
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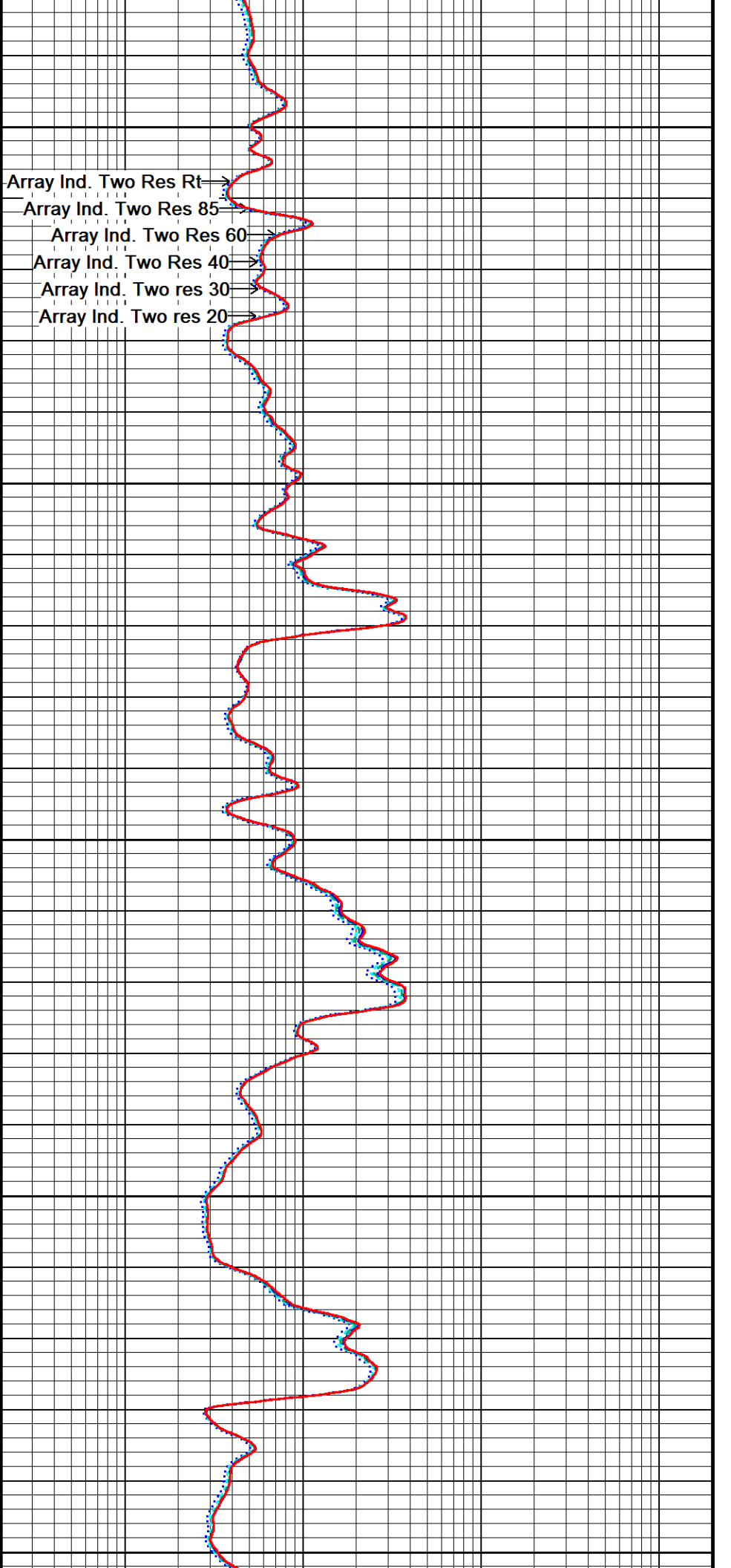
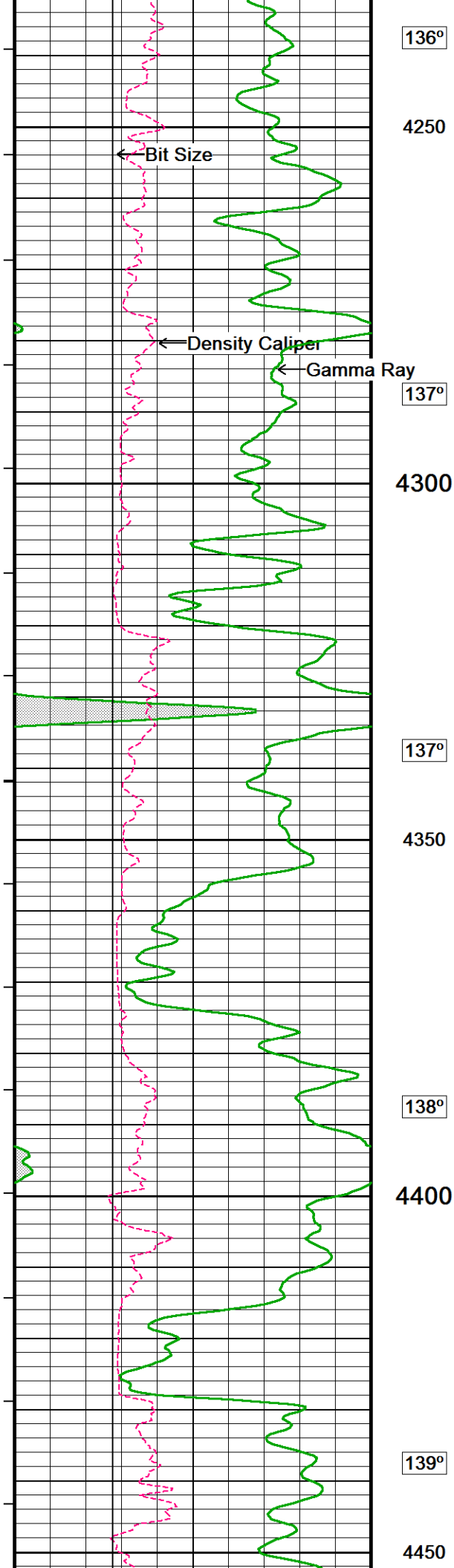
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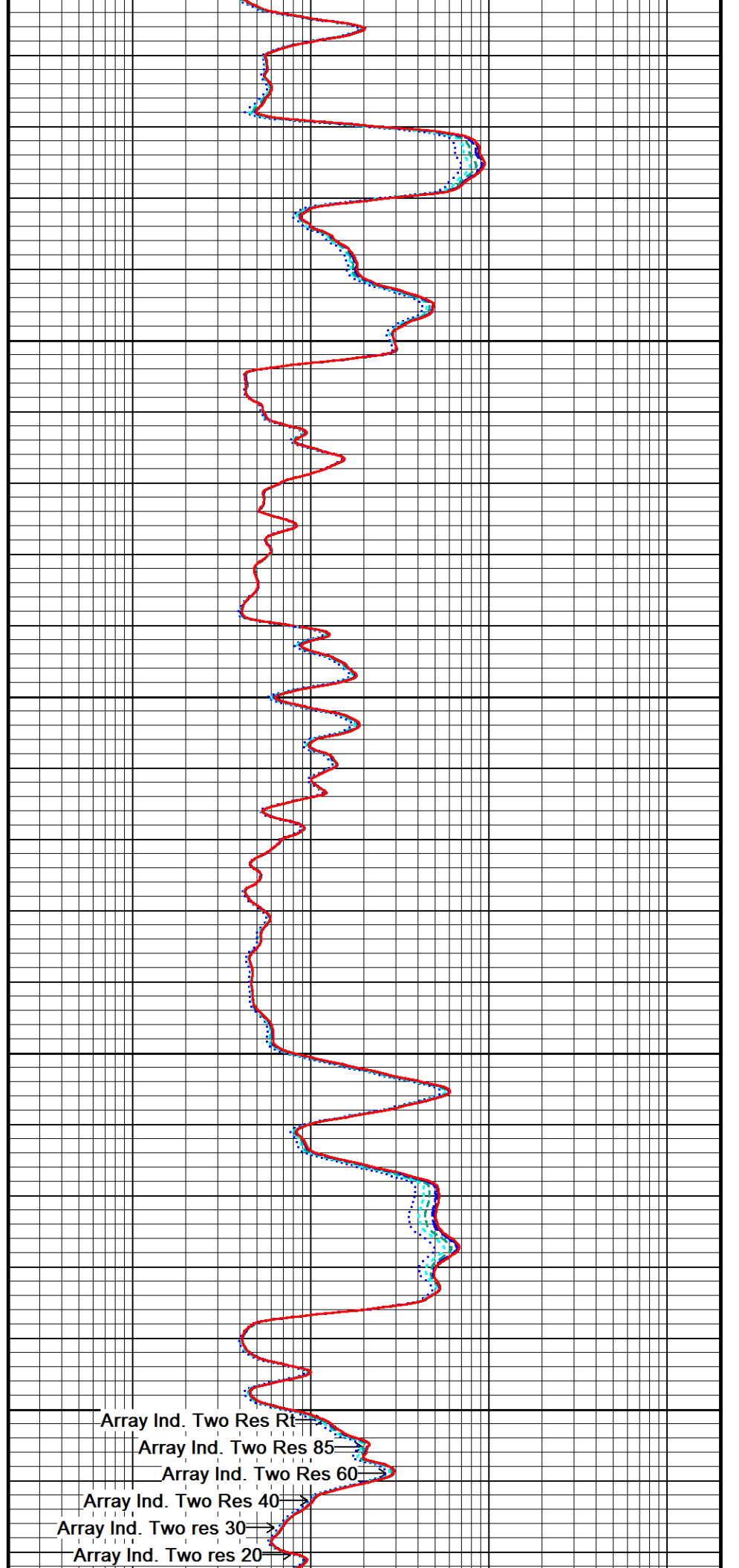
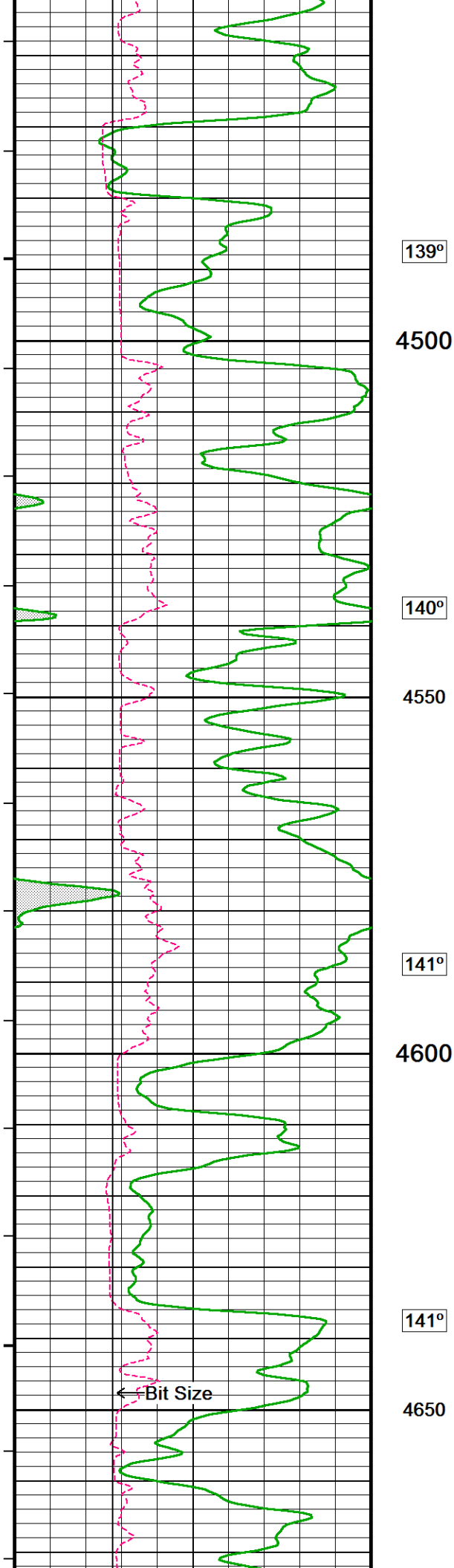
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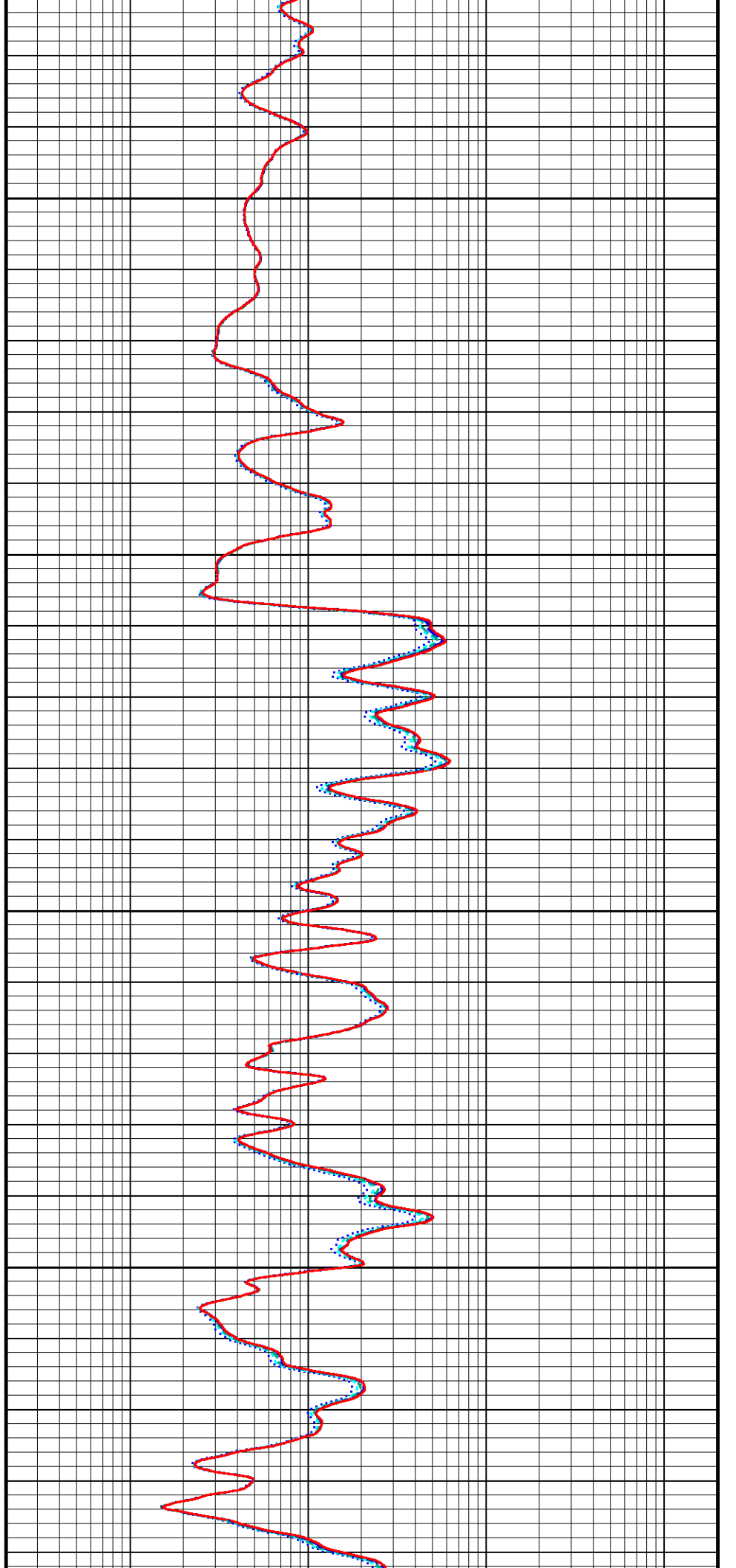
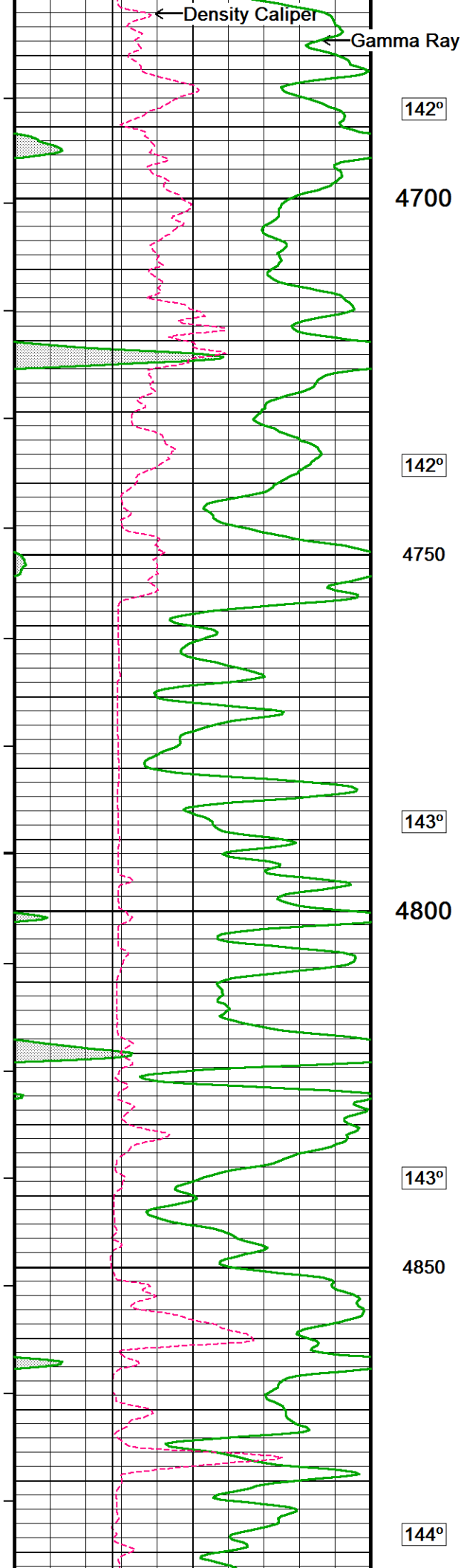
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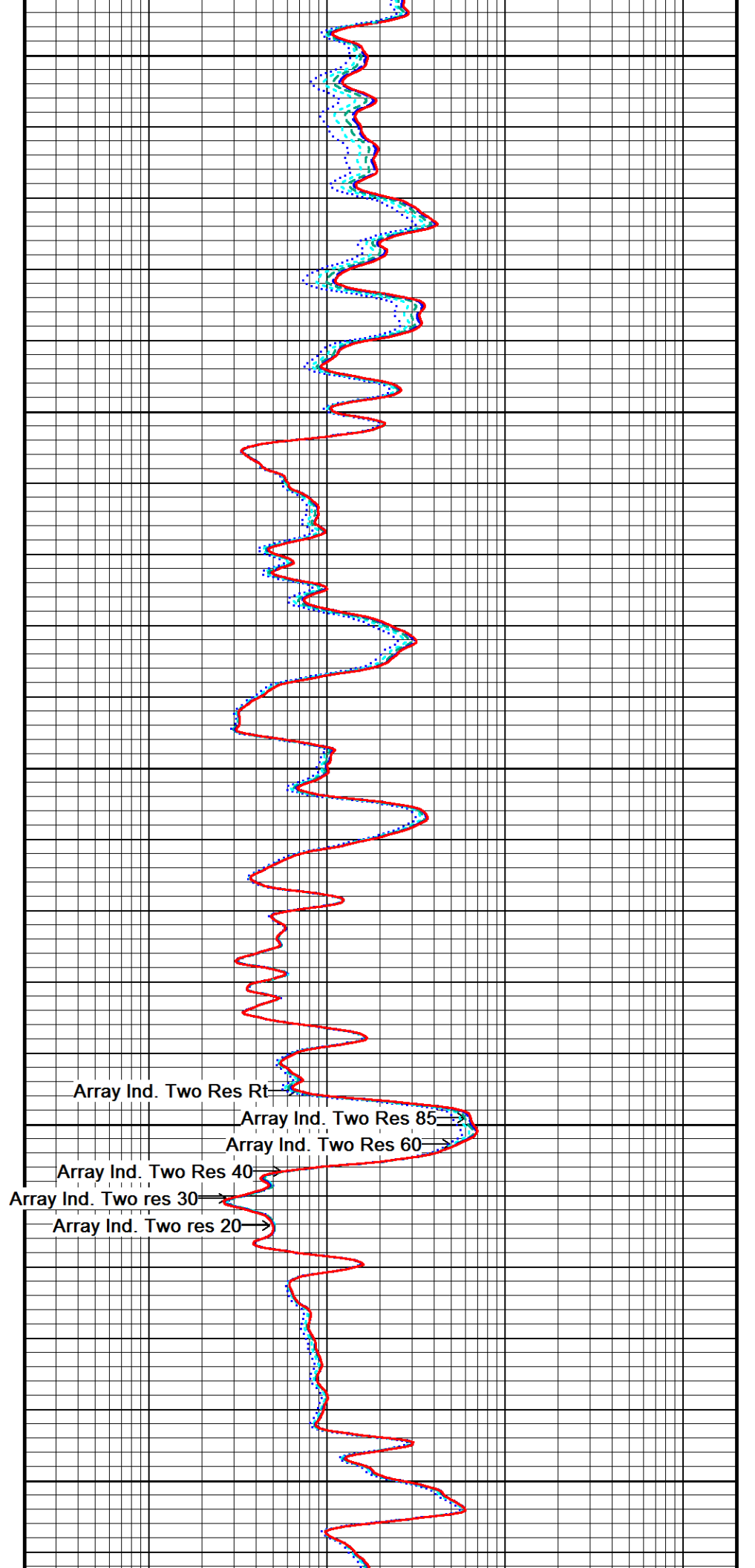
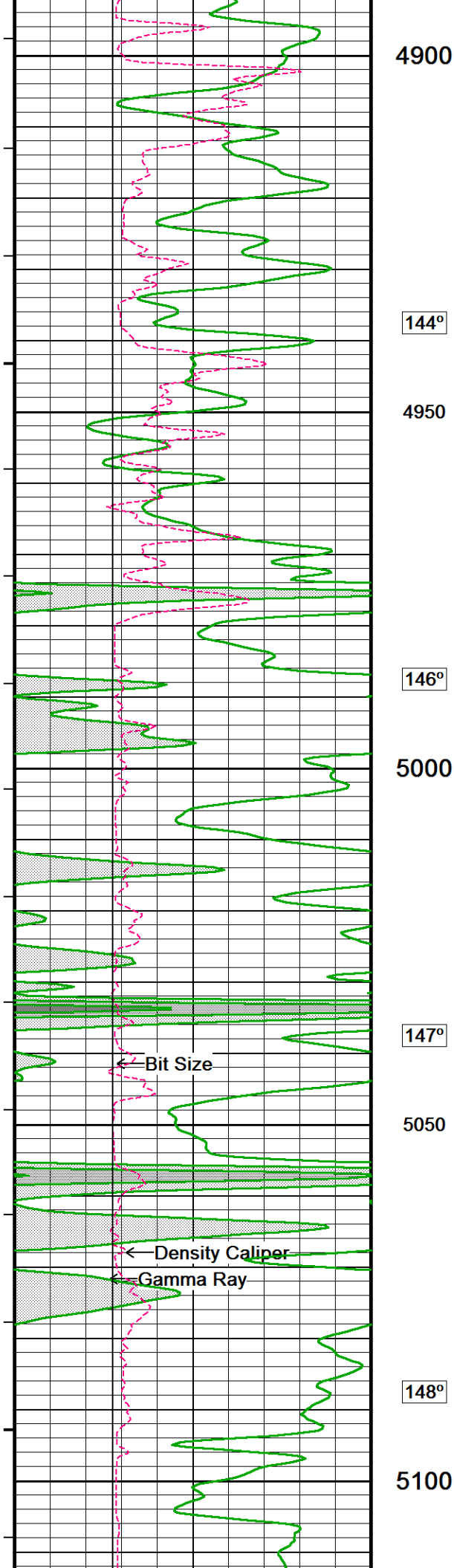
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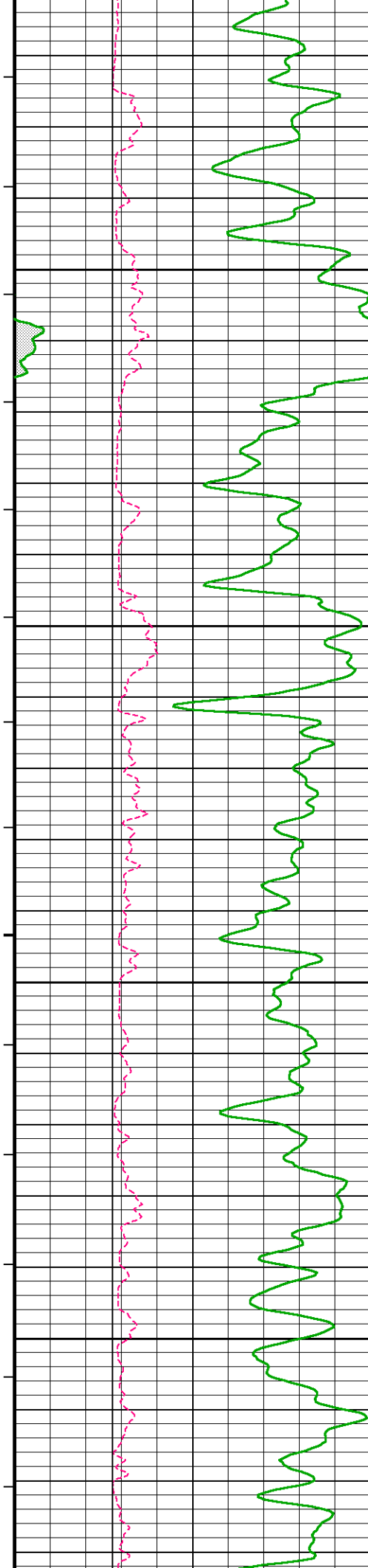












149°

5150

150°

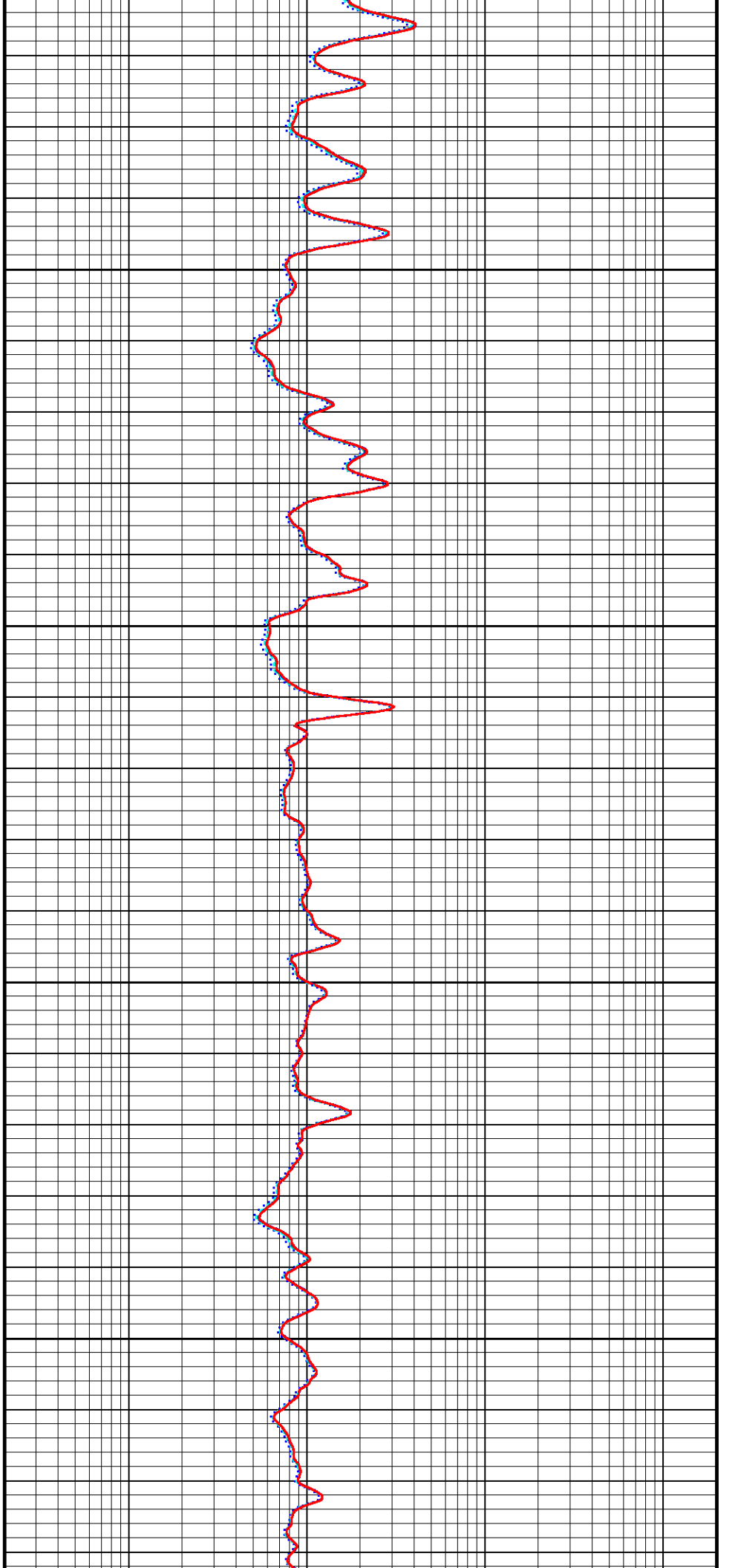
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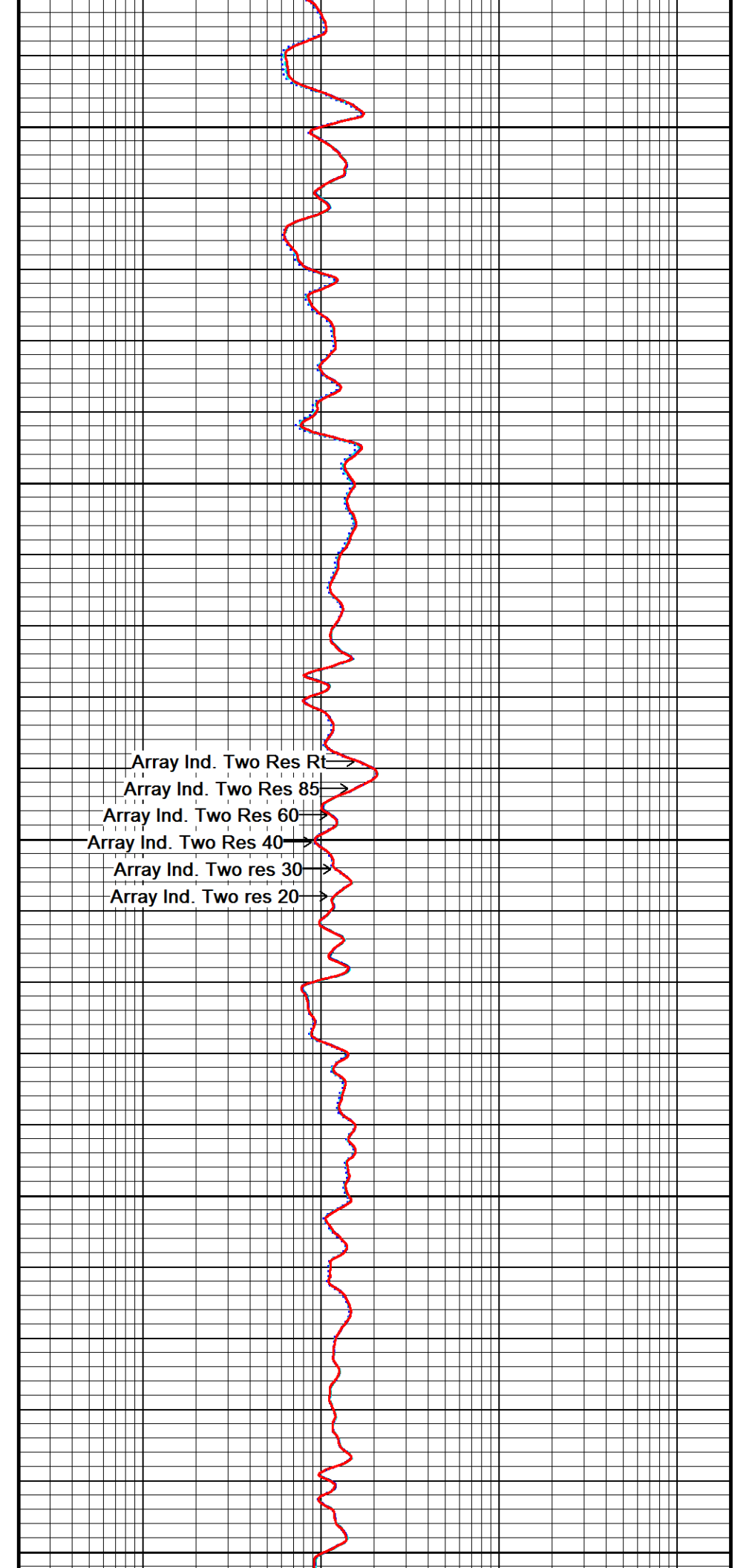
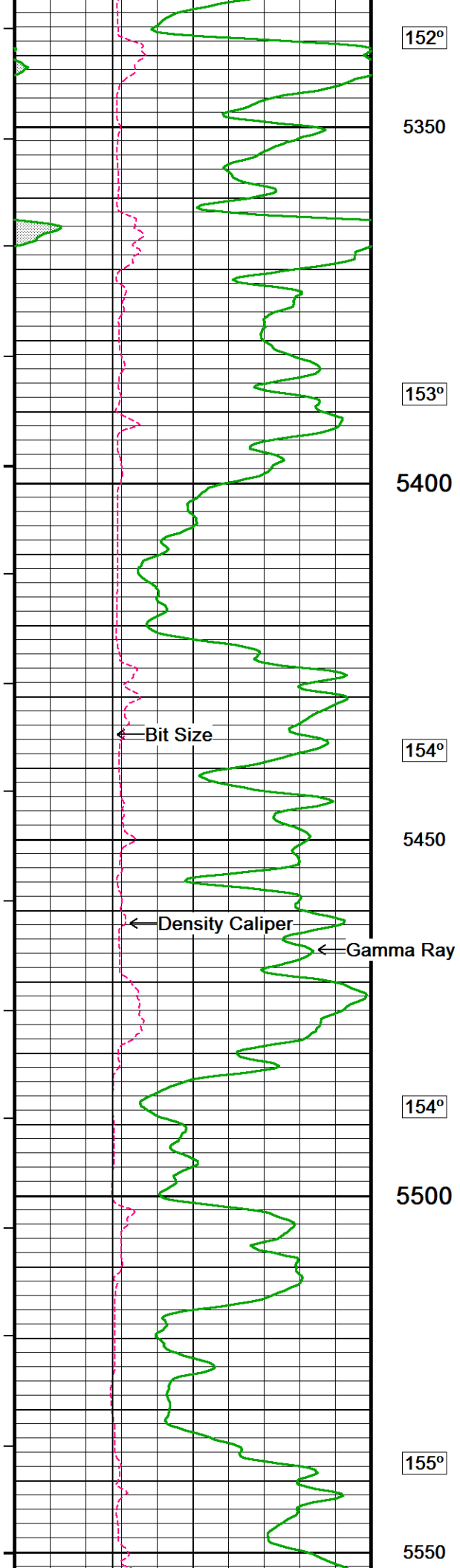
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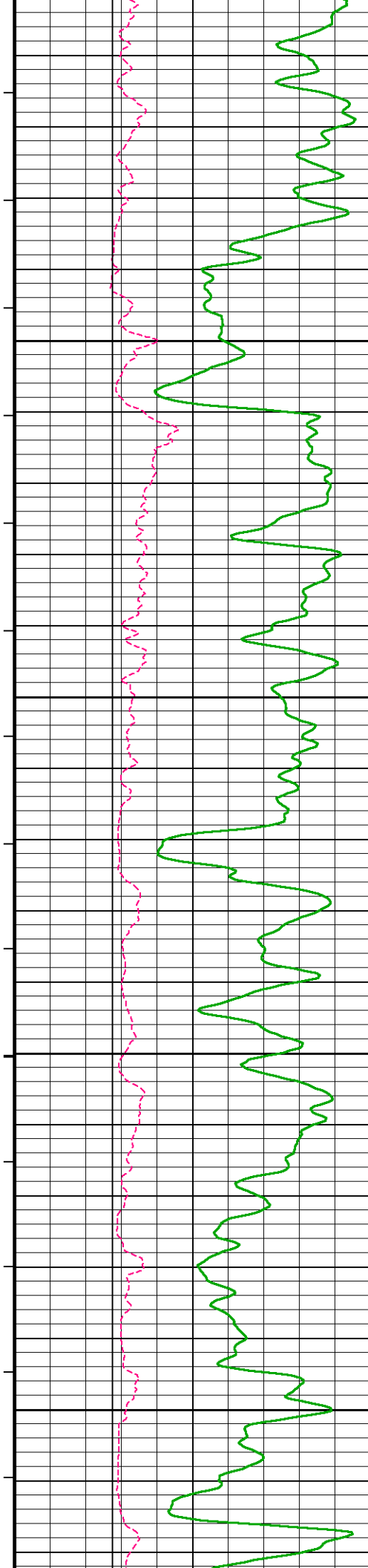
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152°

5300







156°

5600

156°

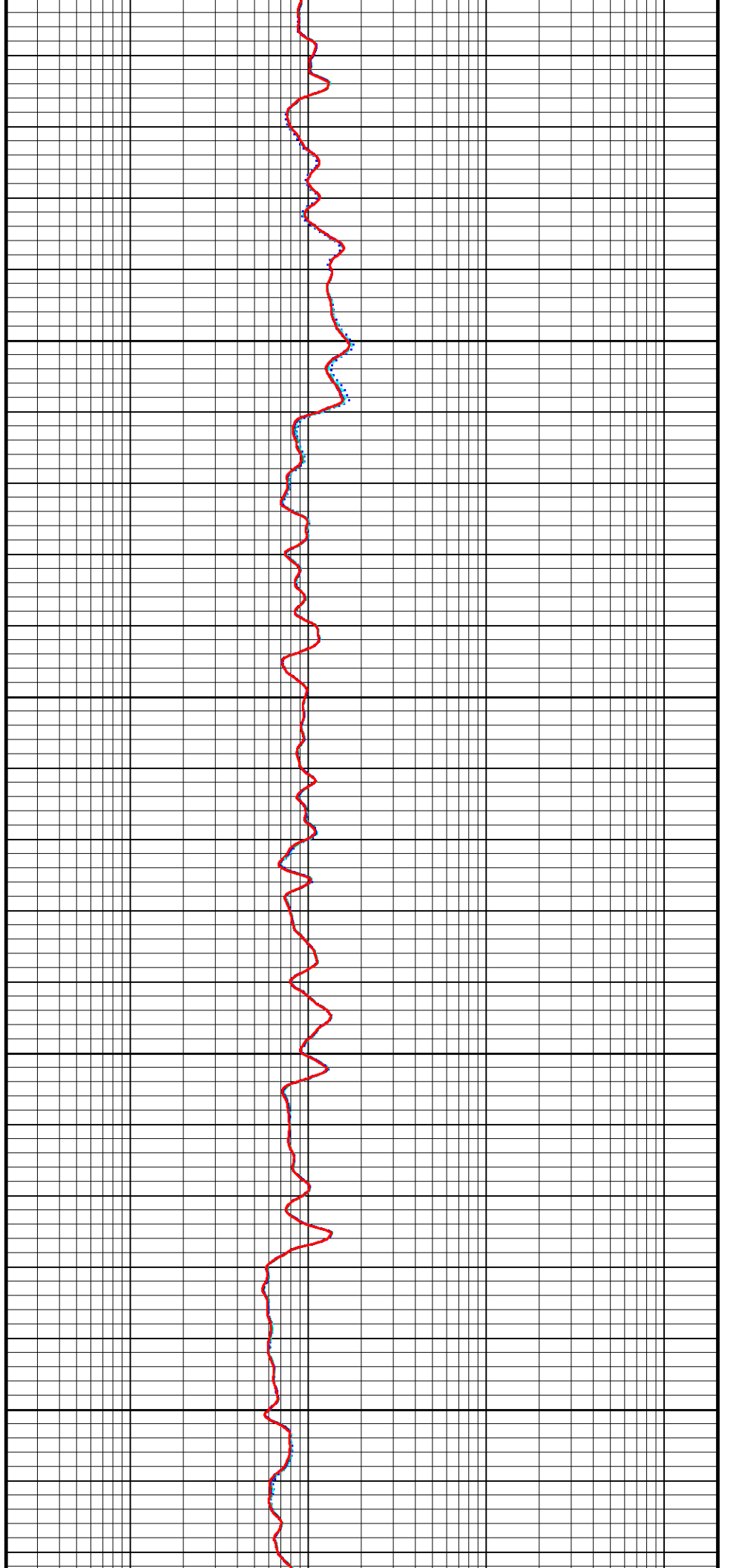
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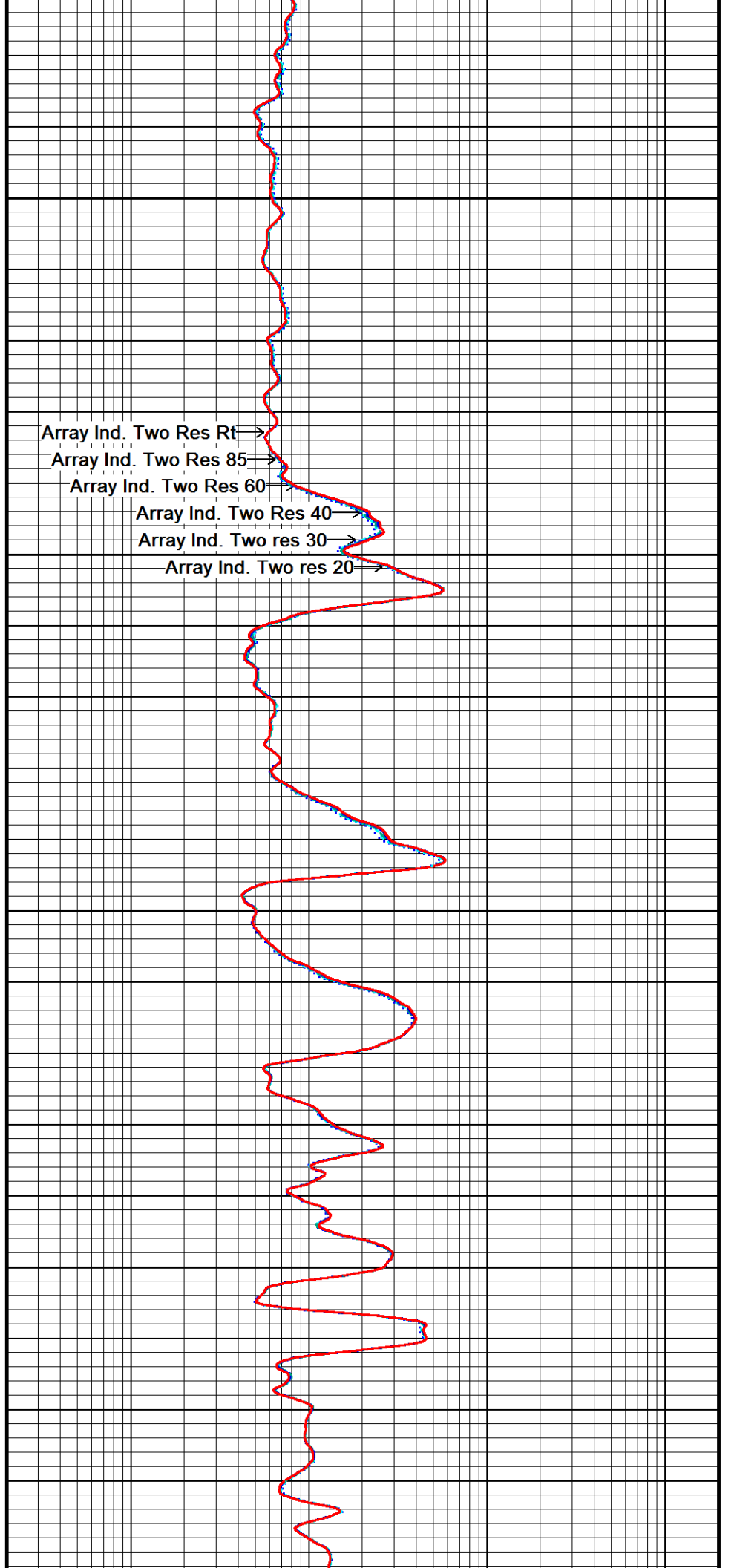
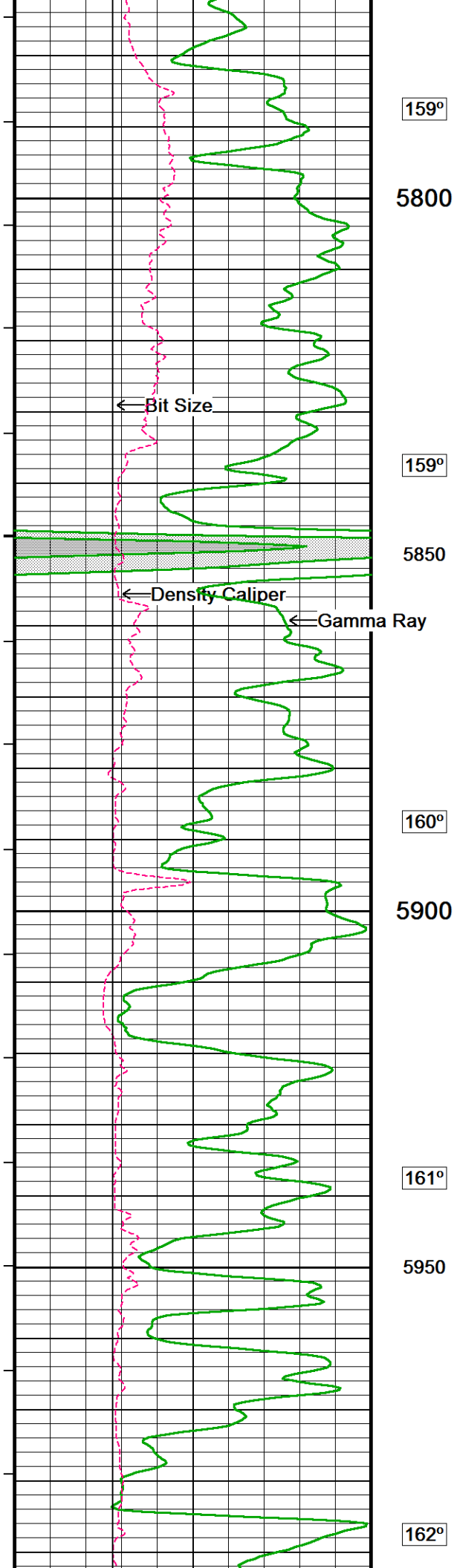
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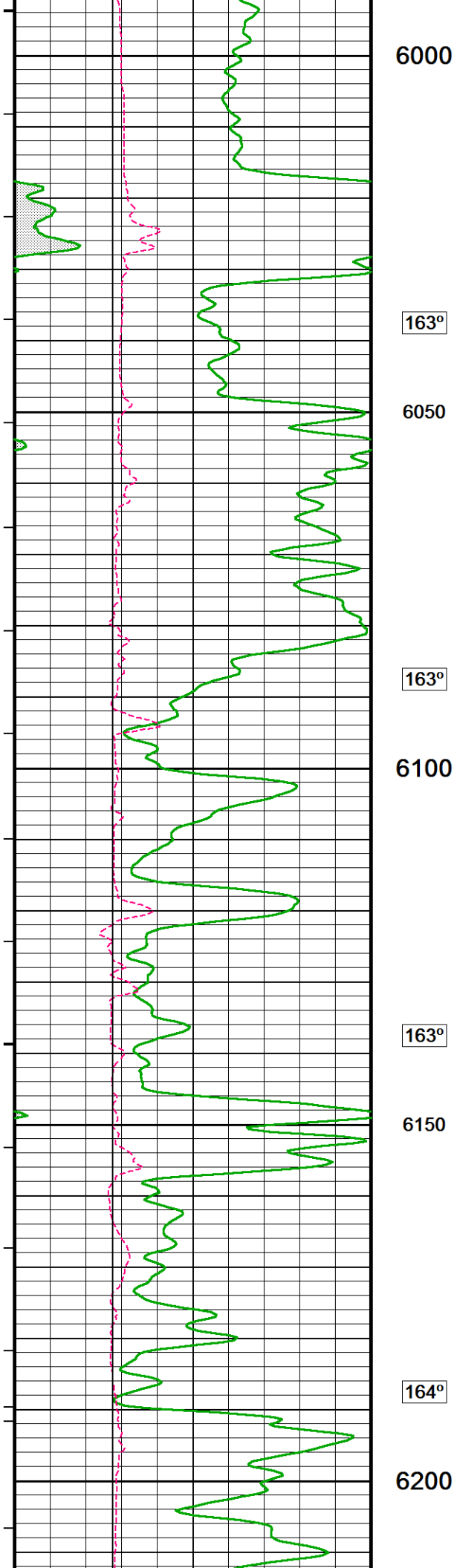
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158°

5750







6000

163°

6050

163°

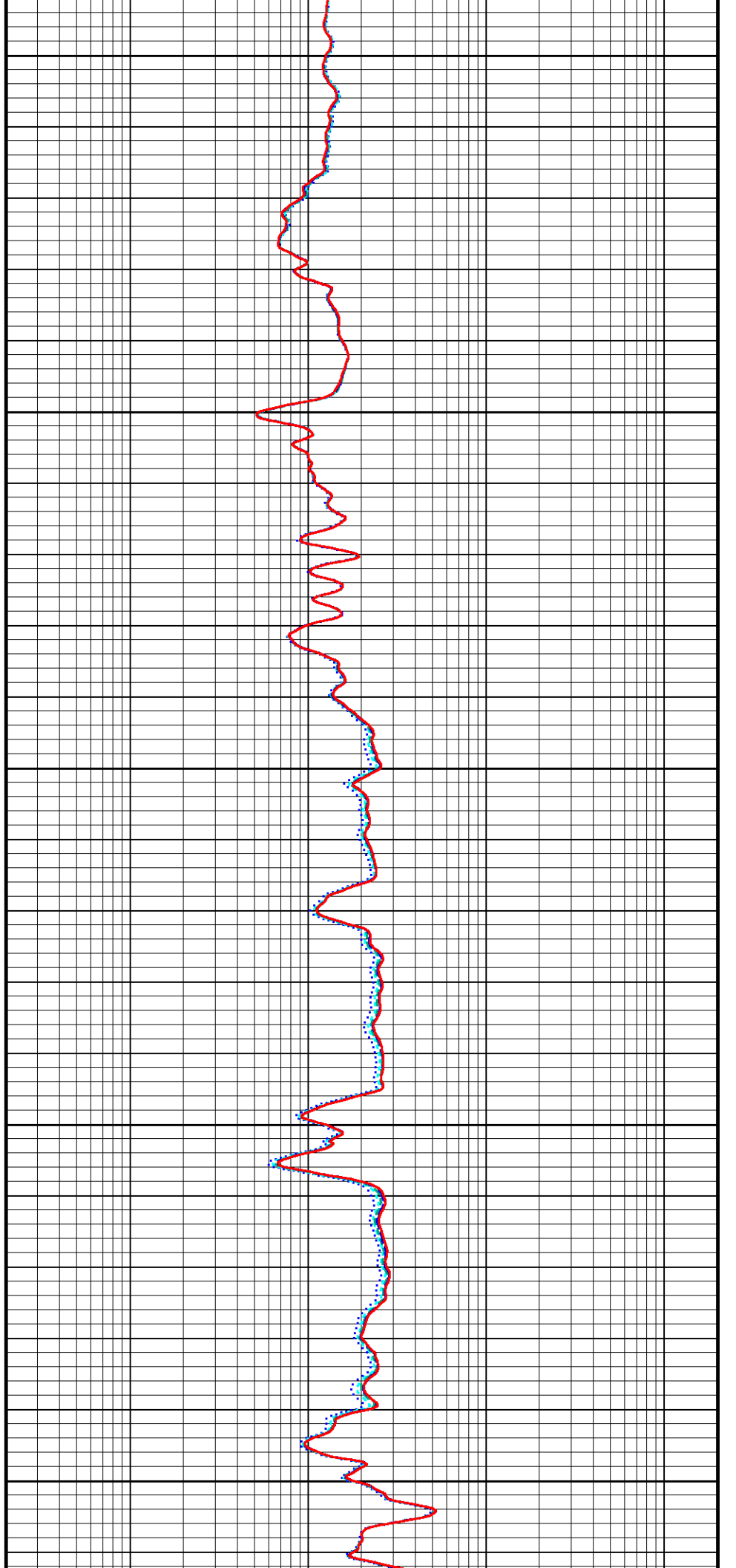
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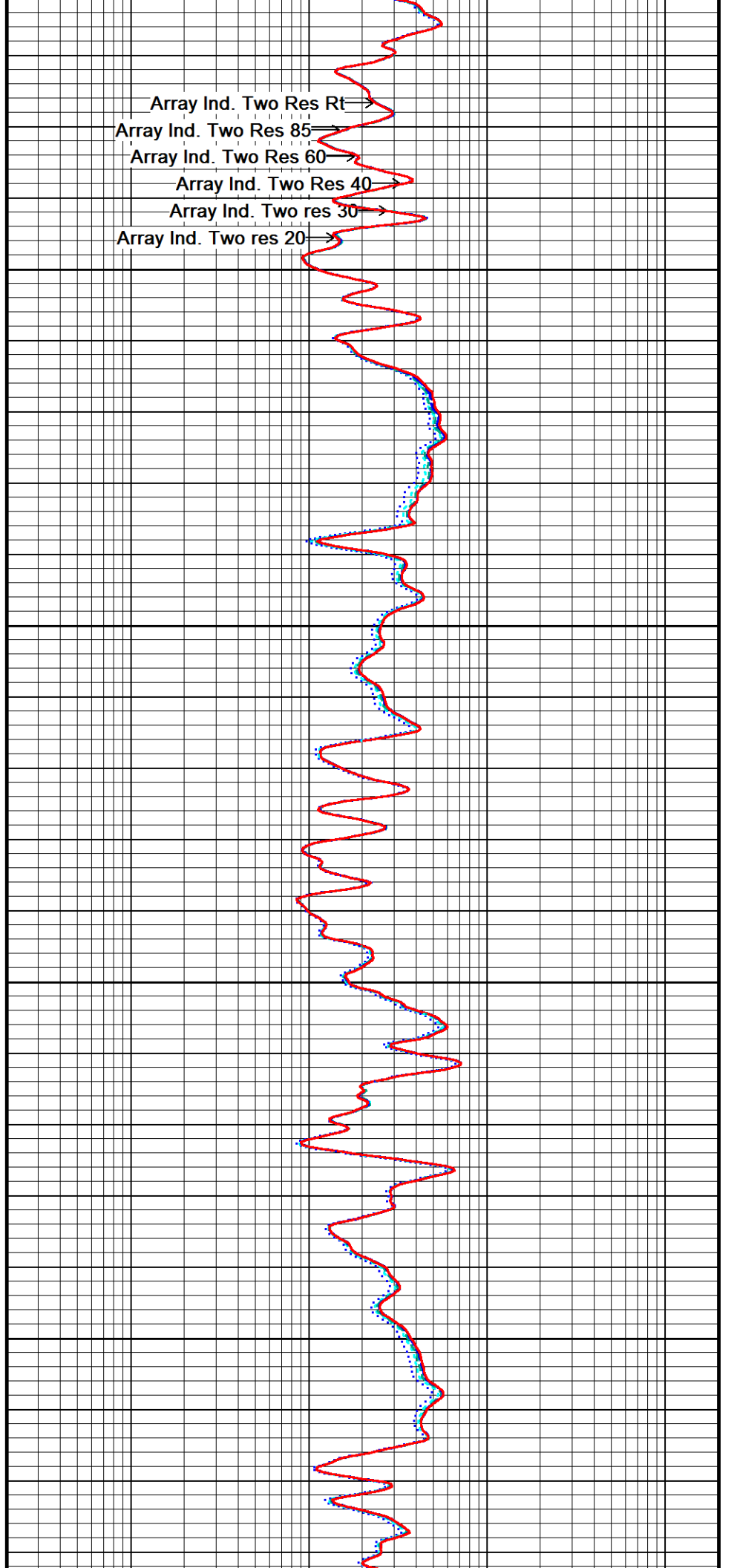
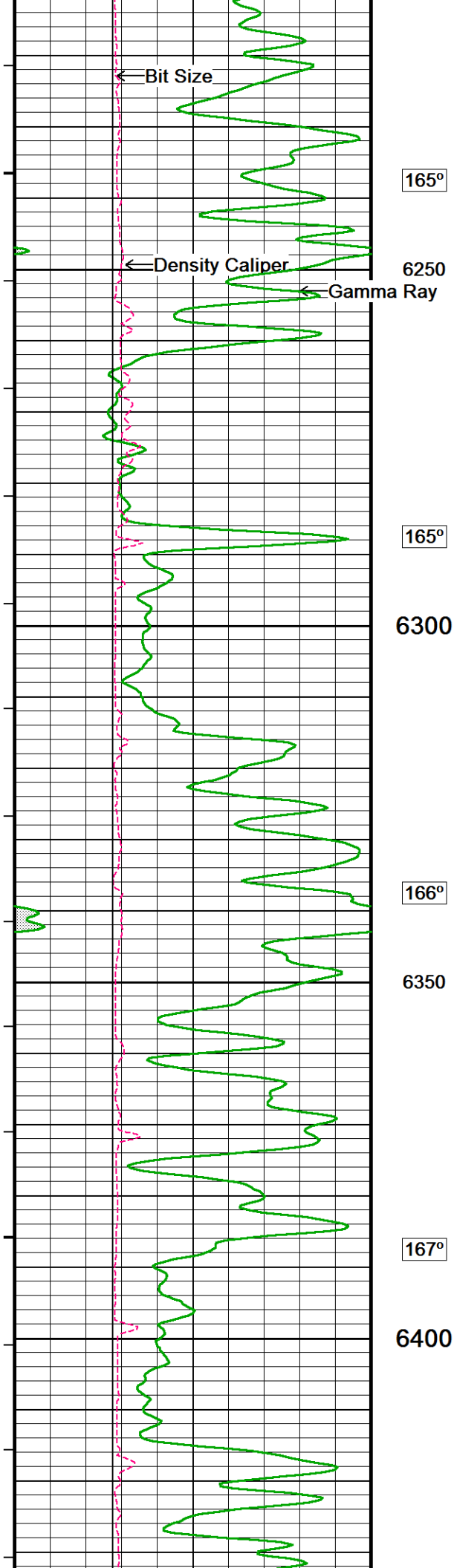
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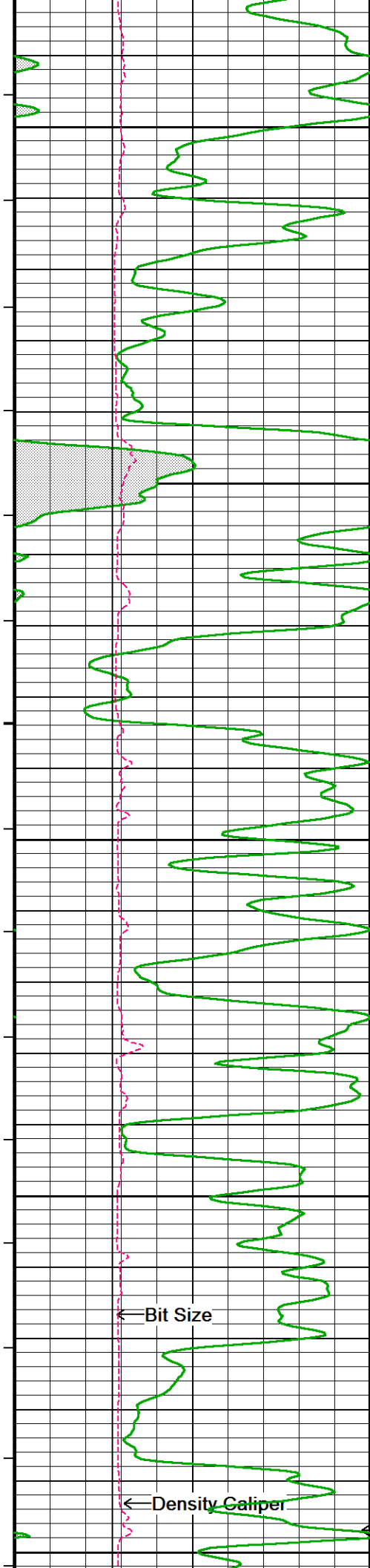
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164°

6200







167°

6450

168°

6500

169°

6550

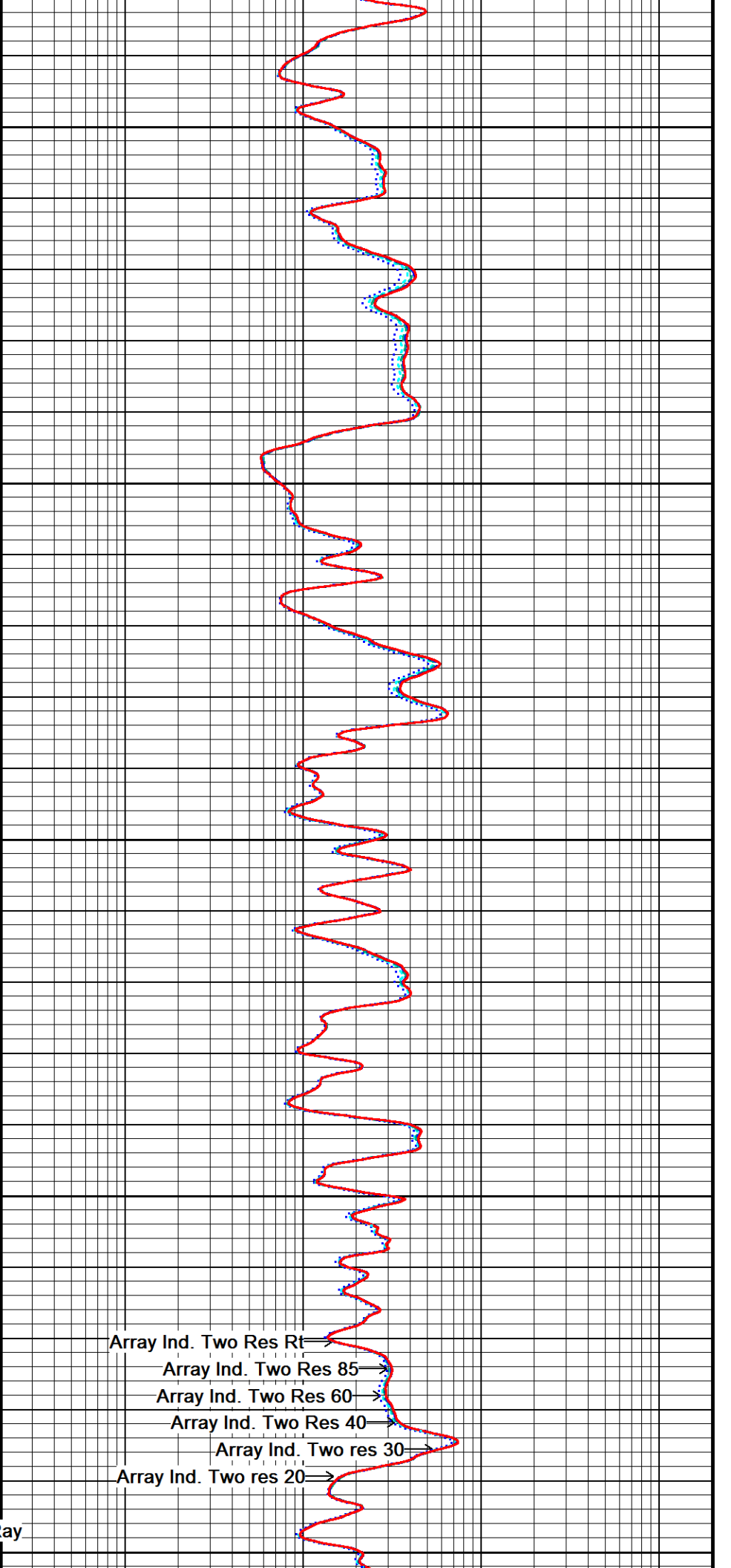
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6600

← Bit Size

← Density Caliper

Gamma Ray
6650



Array Ind. Two Res Rt

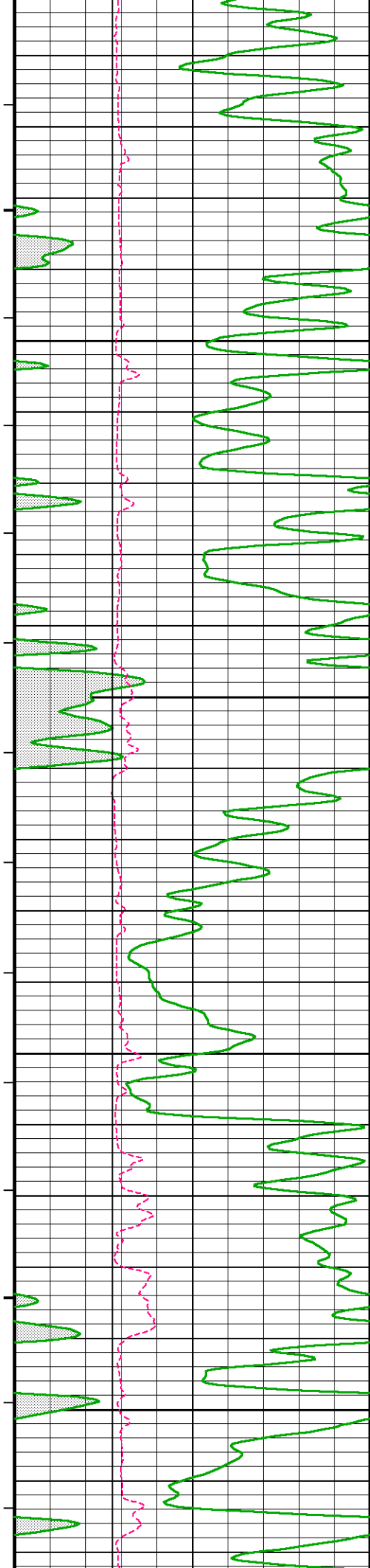
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Array Ind. Two Res 60

Array Ind. Two Res 40

Array Ind. Two res 30

Array Ind. Two res 20



170°

6700

171°

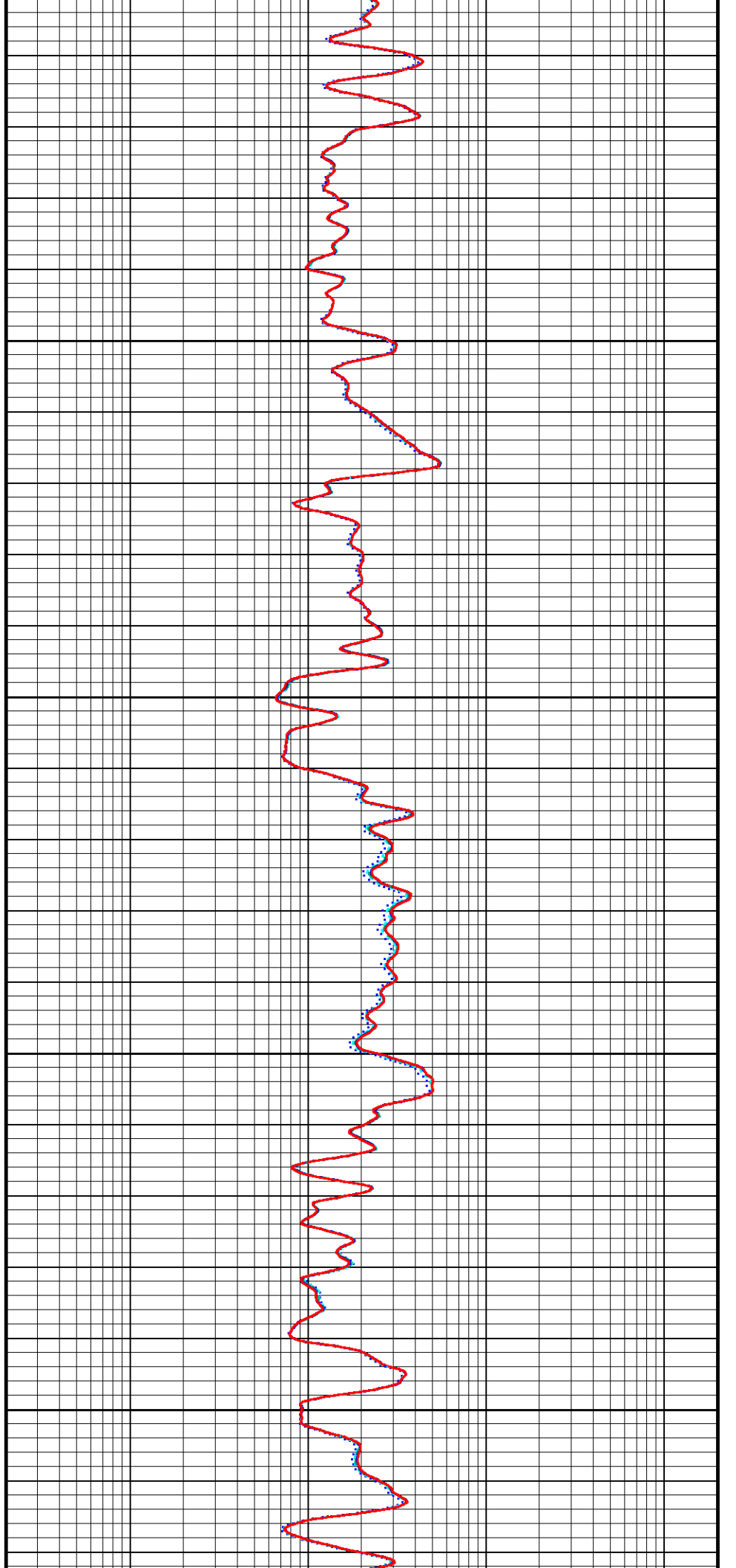
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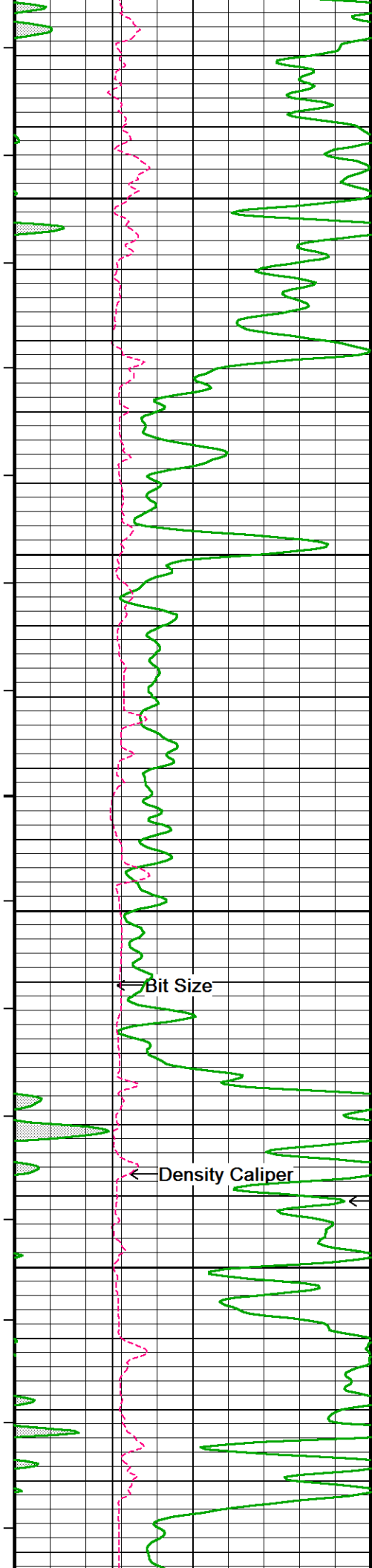
172°

6800

172°

6850





173°

6900

173°

6950

174°

7000

← Bit Size

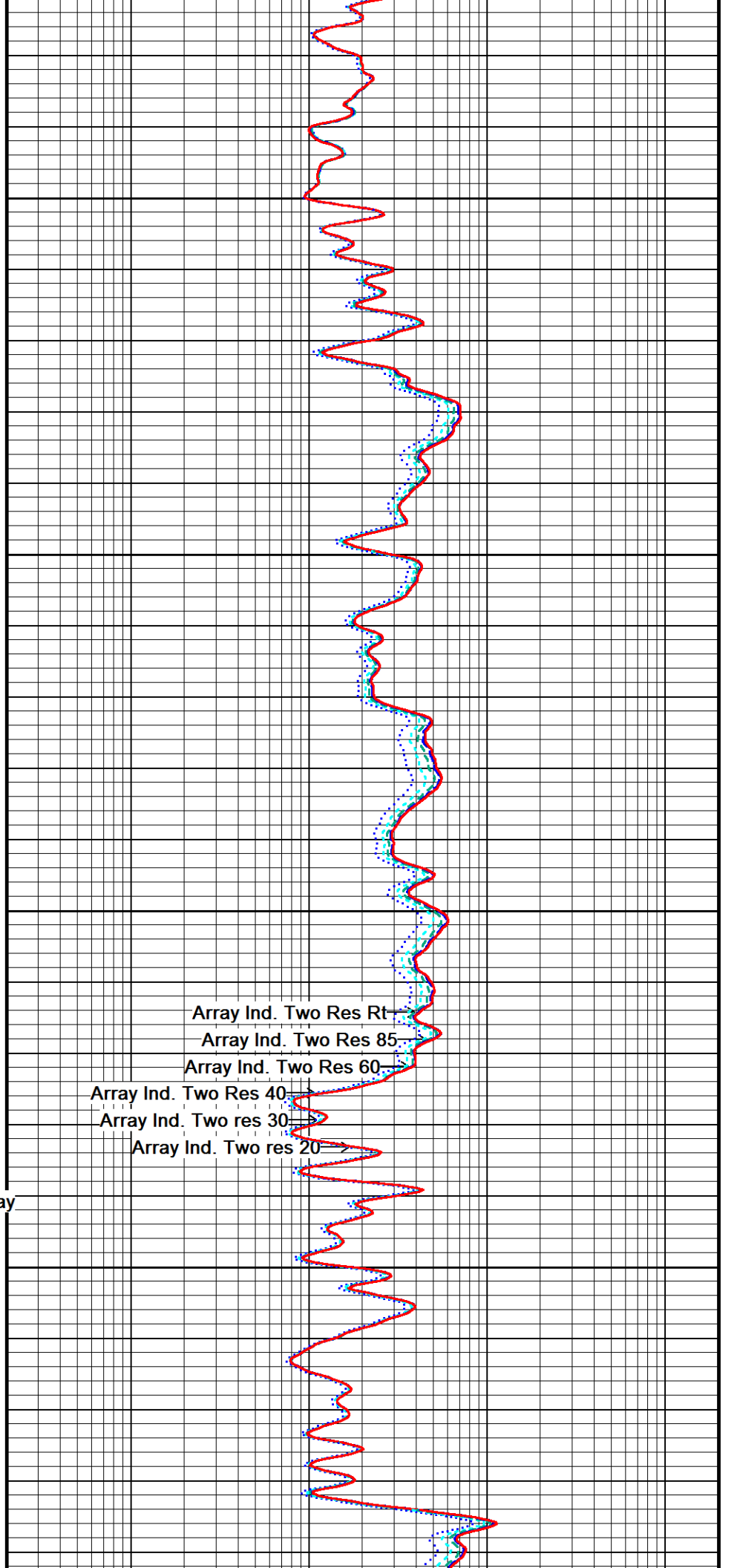
← Density Caliper

← Gamma Ray

175°

7050

175°



Array Ind. Two Res Rt

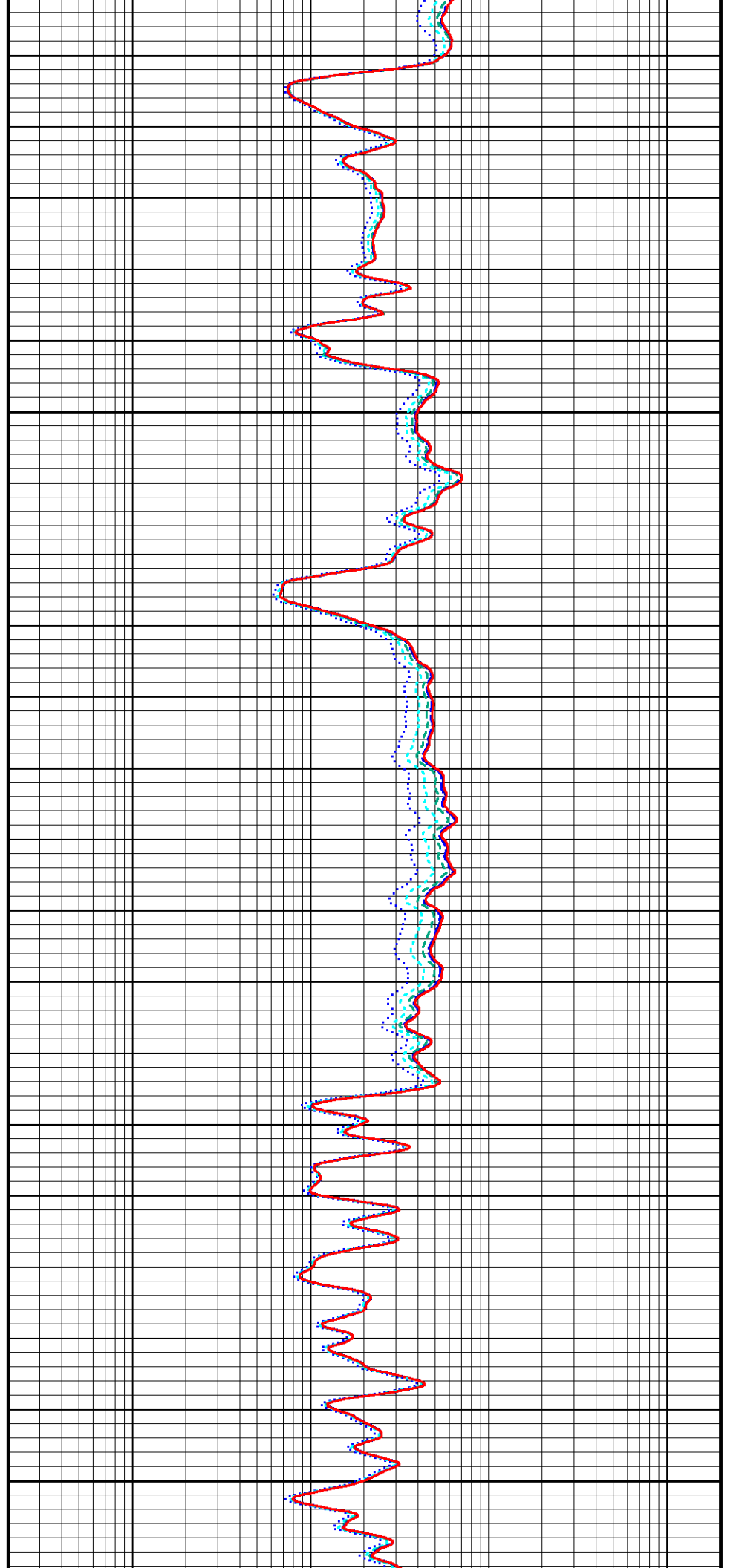
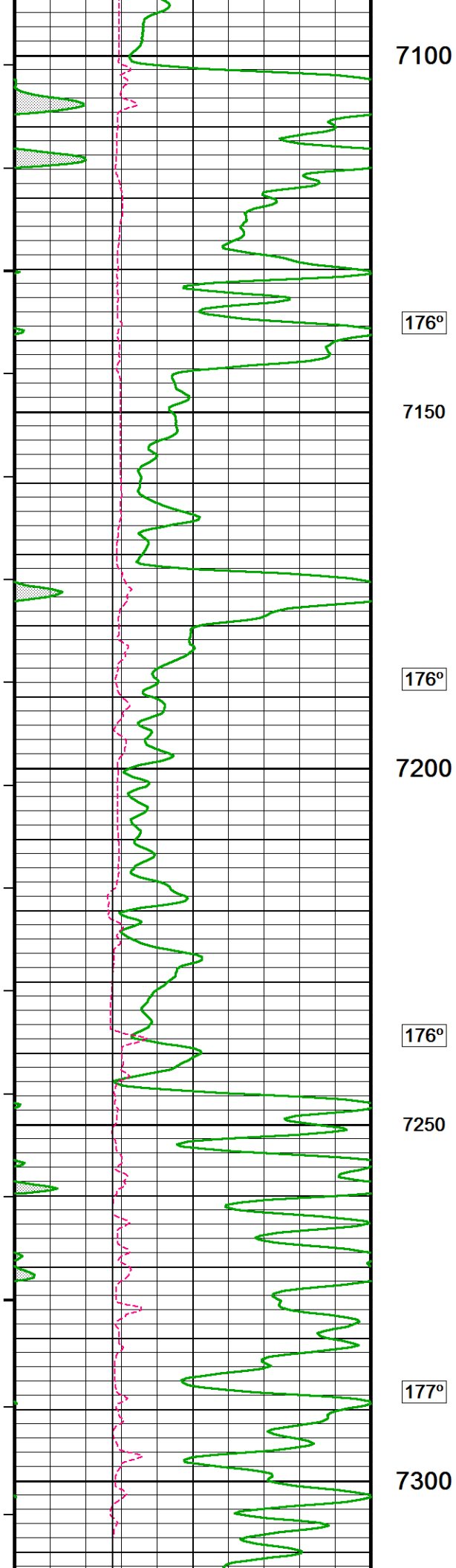
Array Ind. Two Res 85

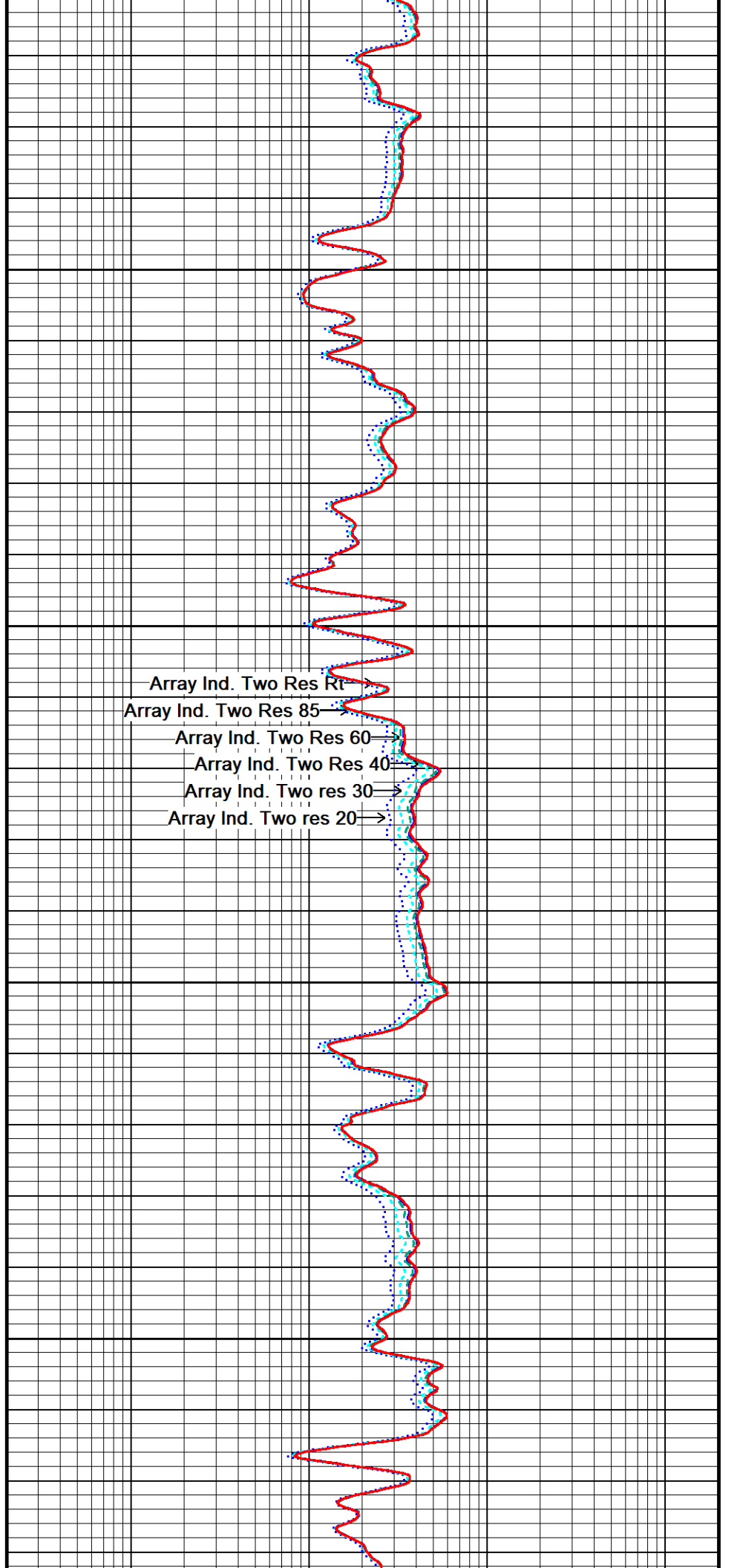
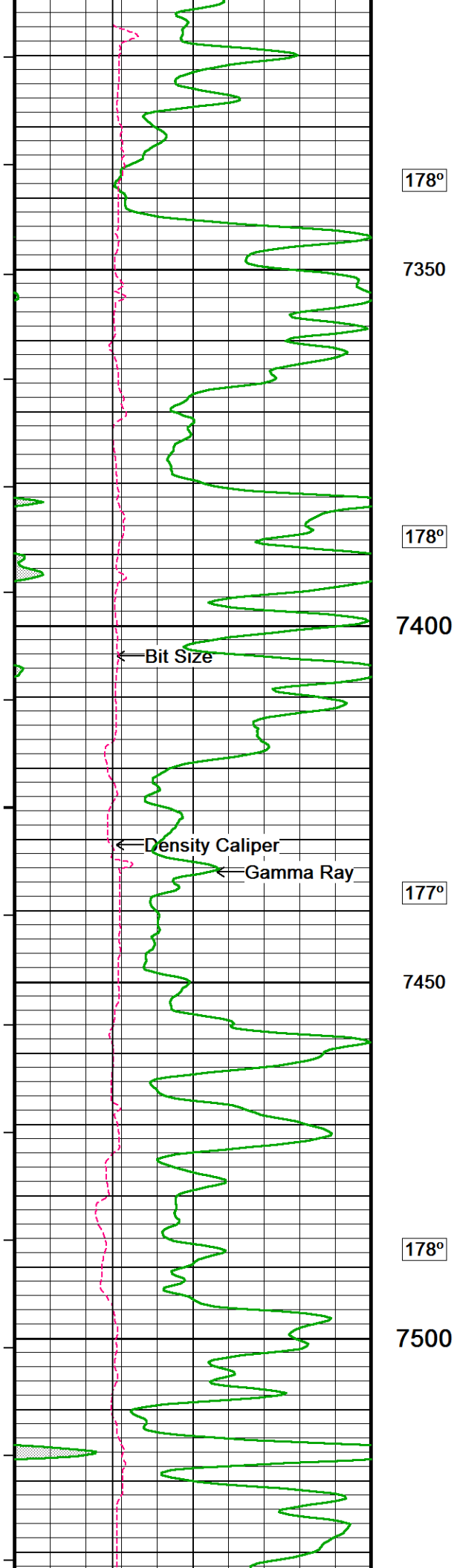
Array Ind. Two Res 60

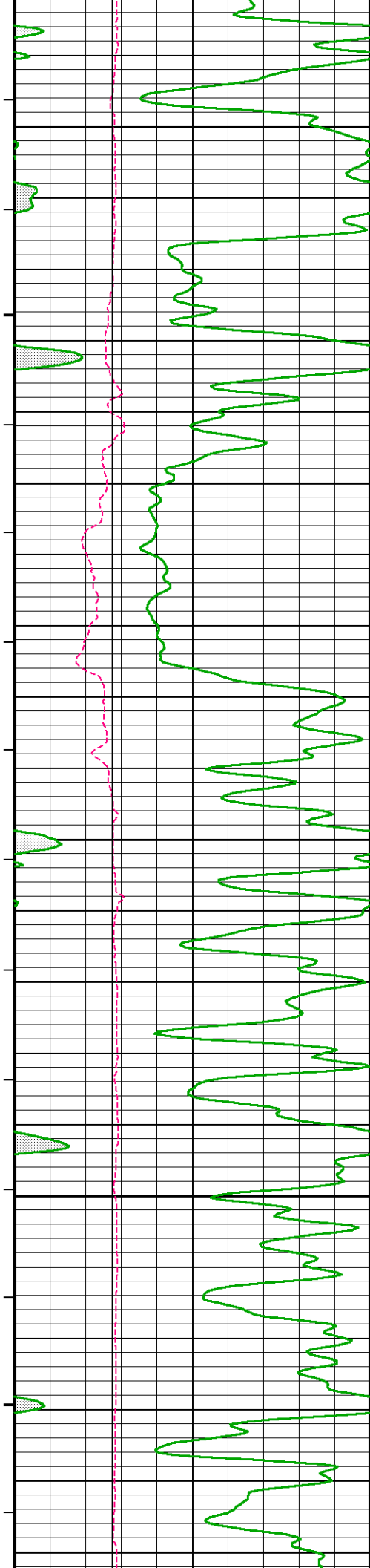
Array Ind. Two Res 40

Array Ind. Two res 30

Array Ind. Two res 20







178°

7550

178°

7600

180°

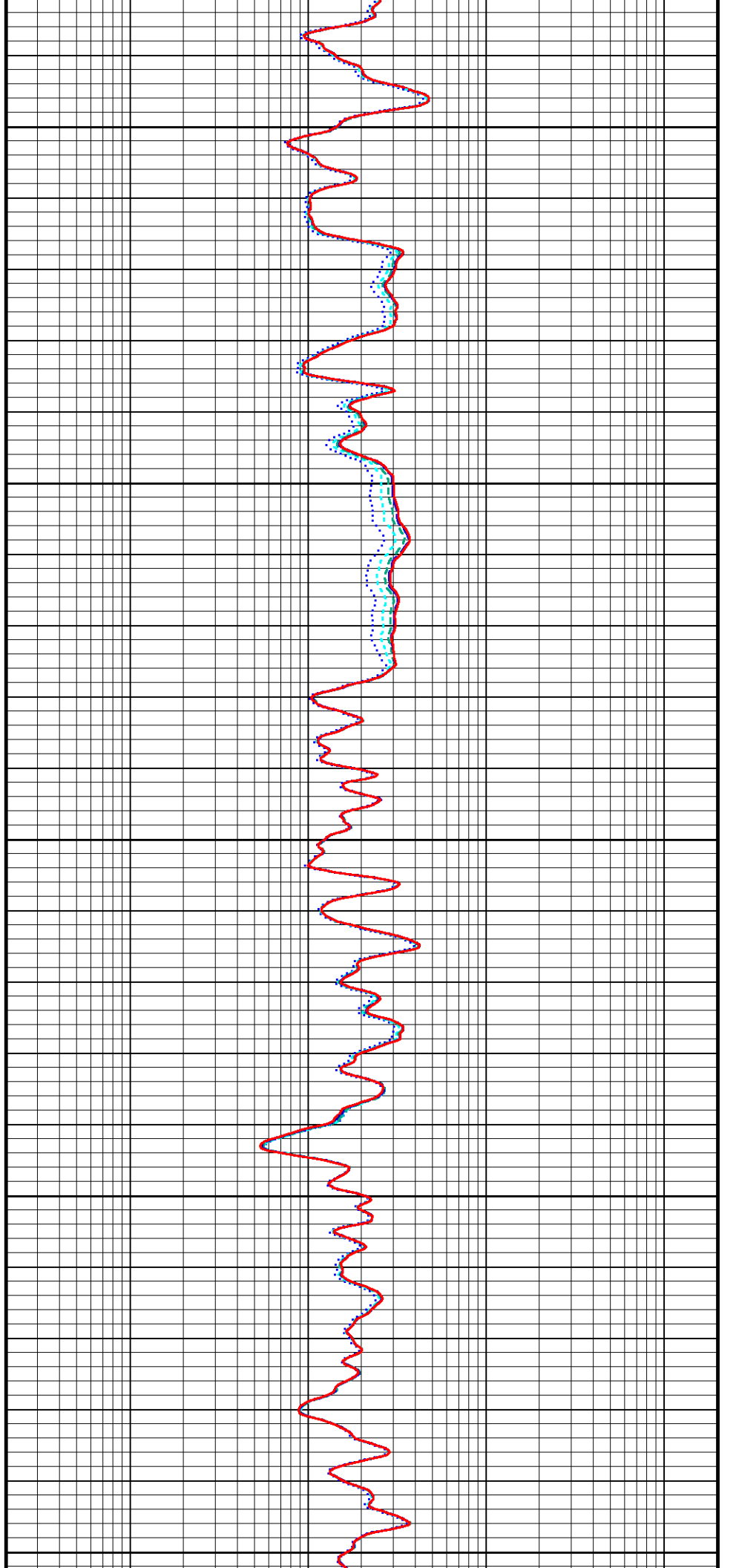
7650

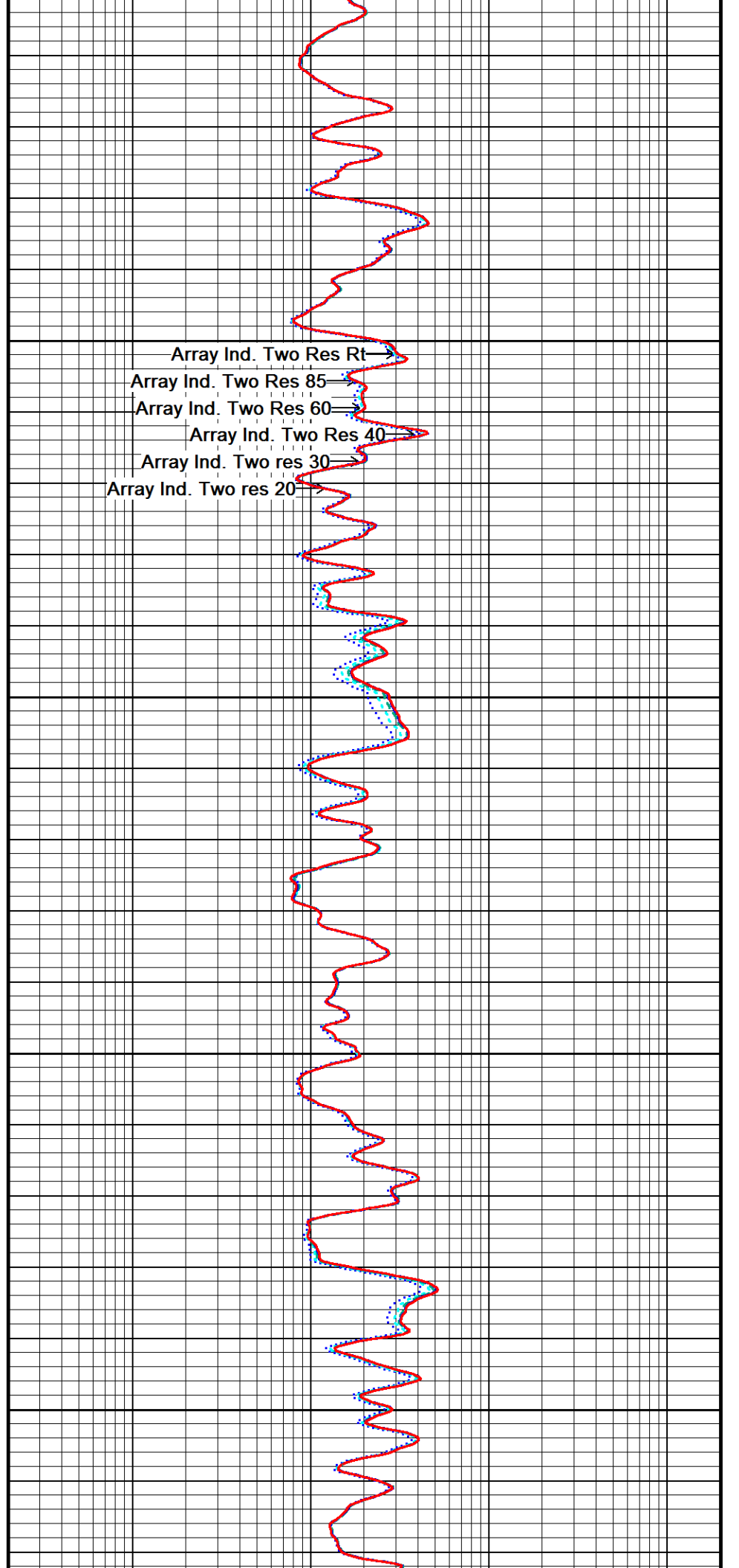
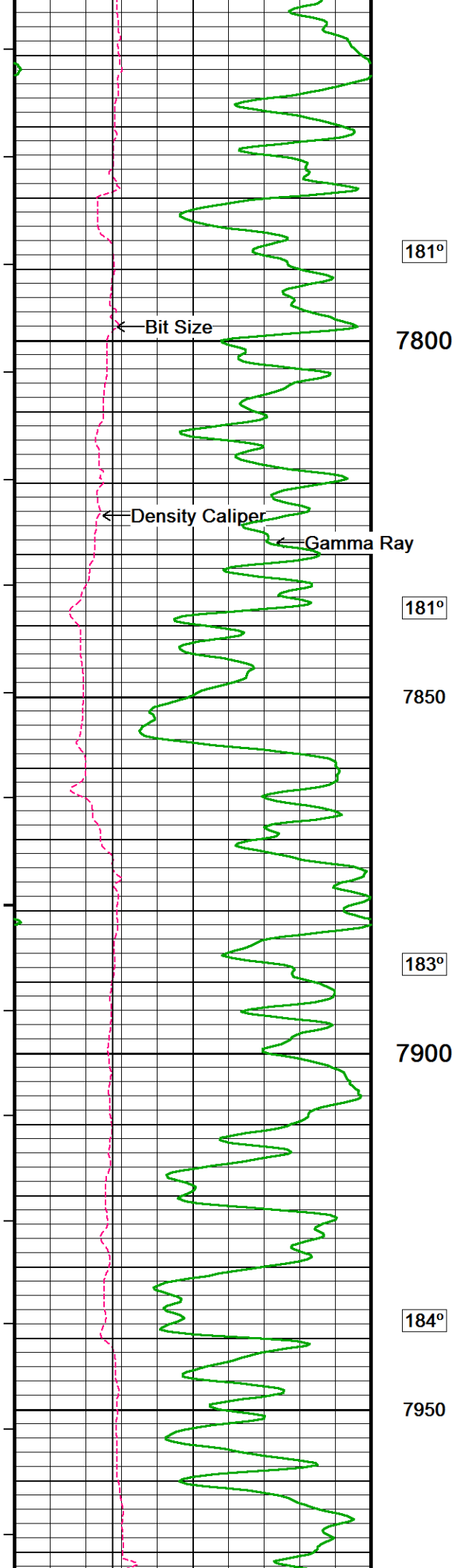
181°

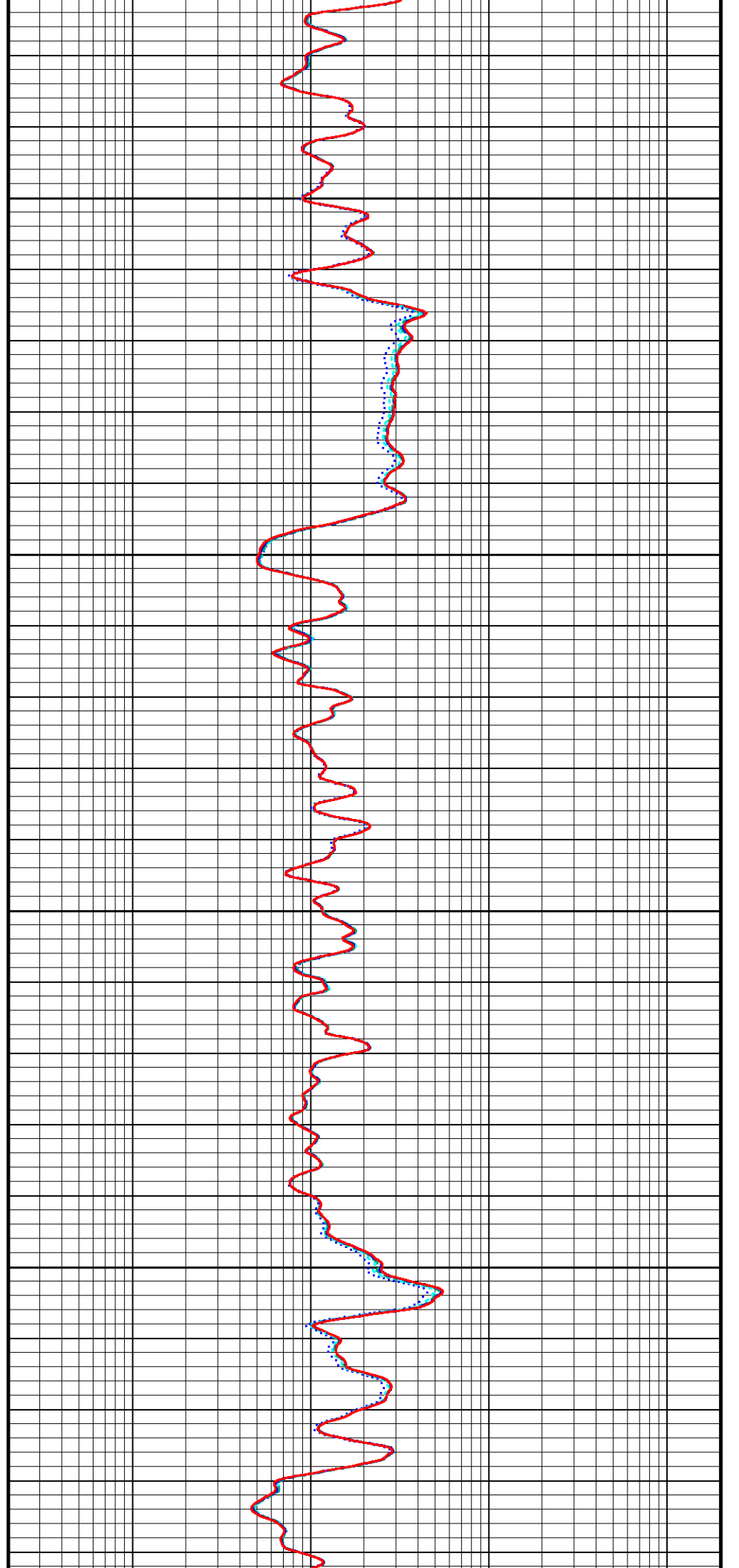
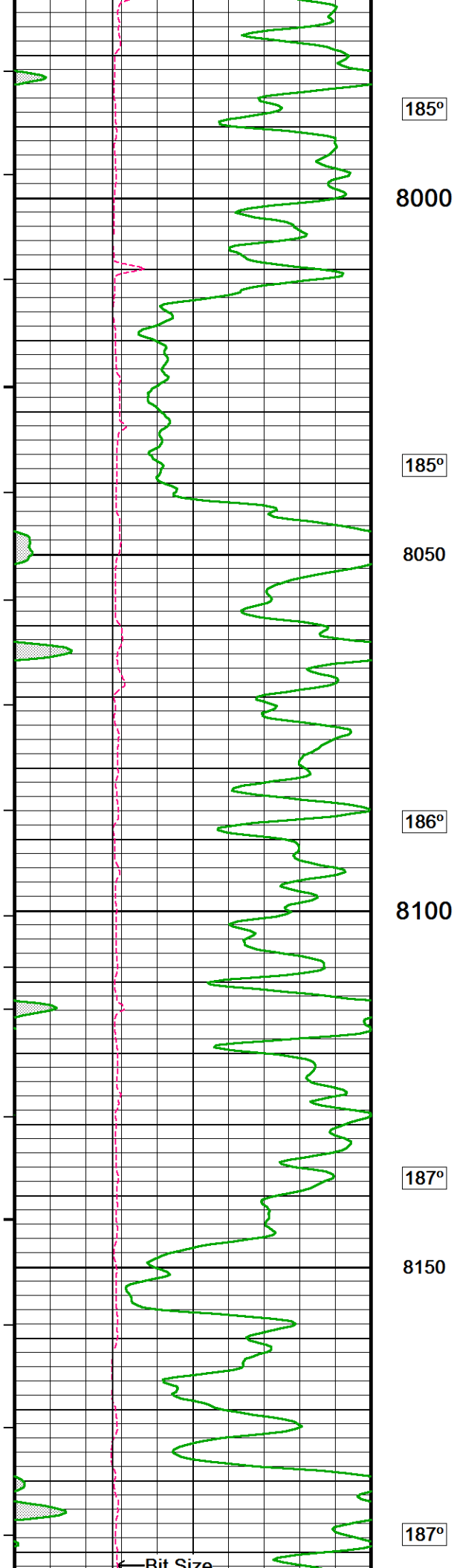
7700

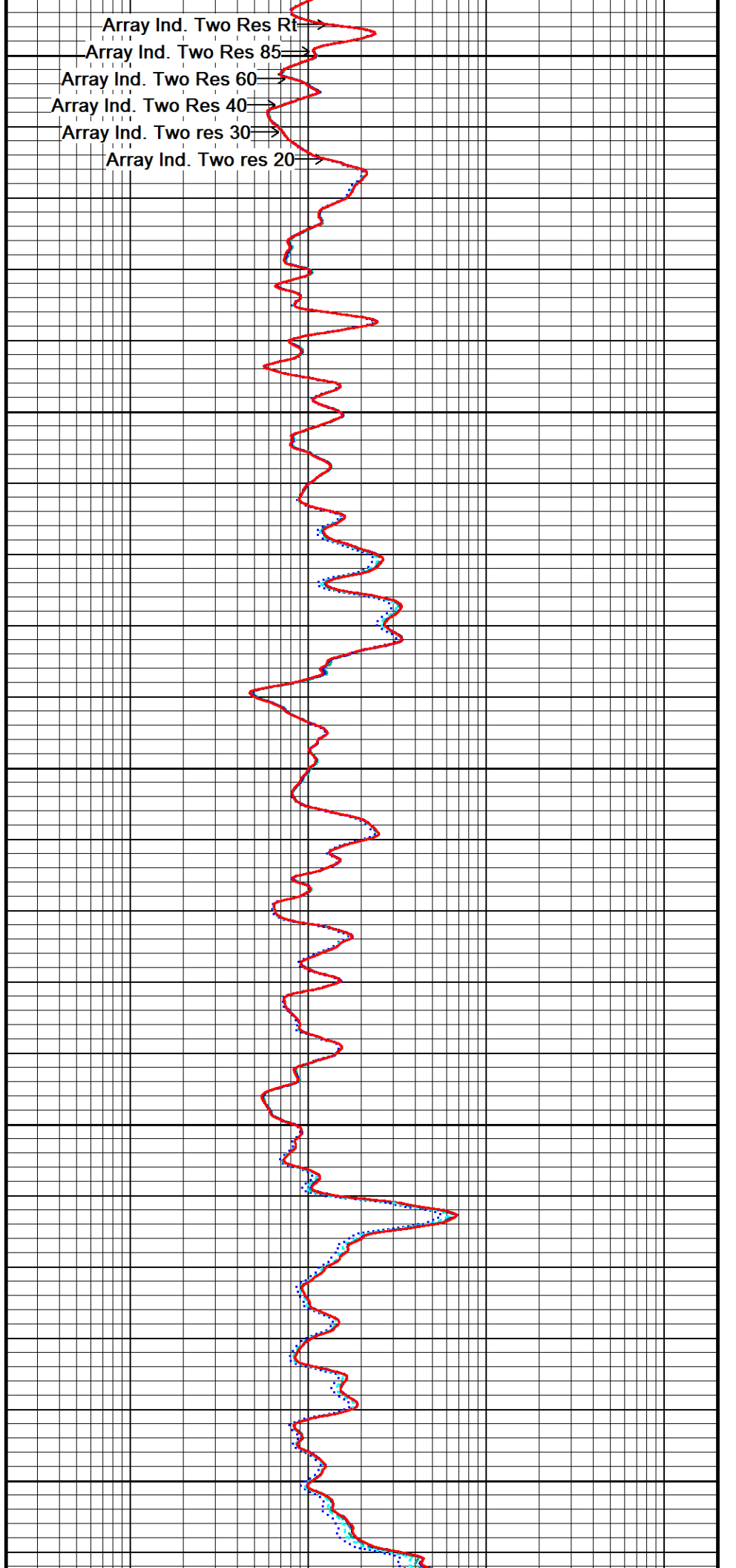
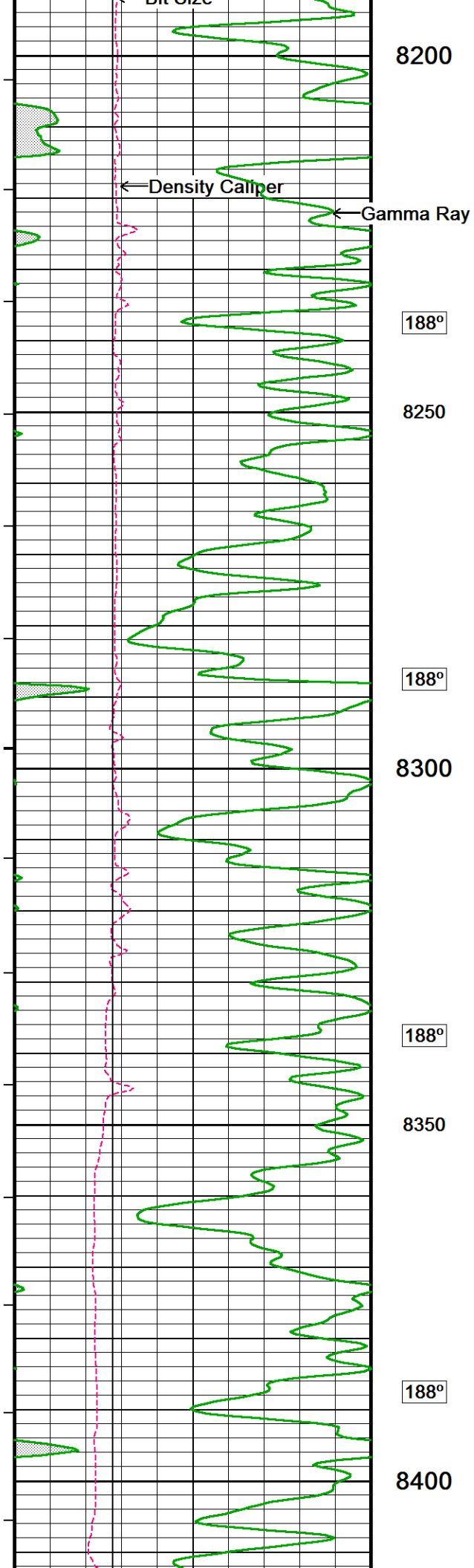
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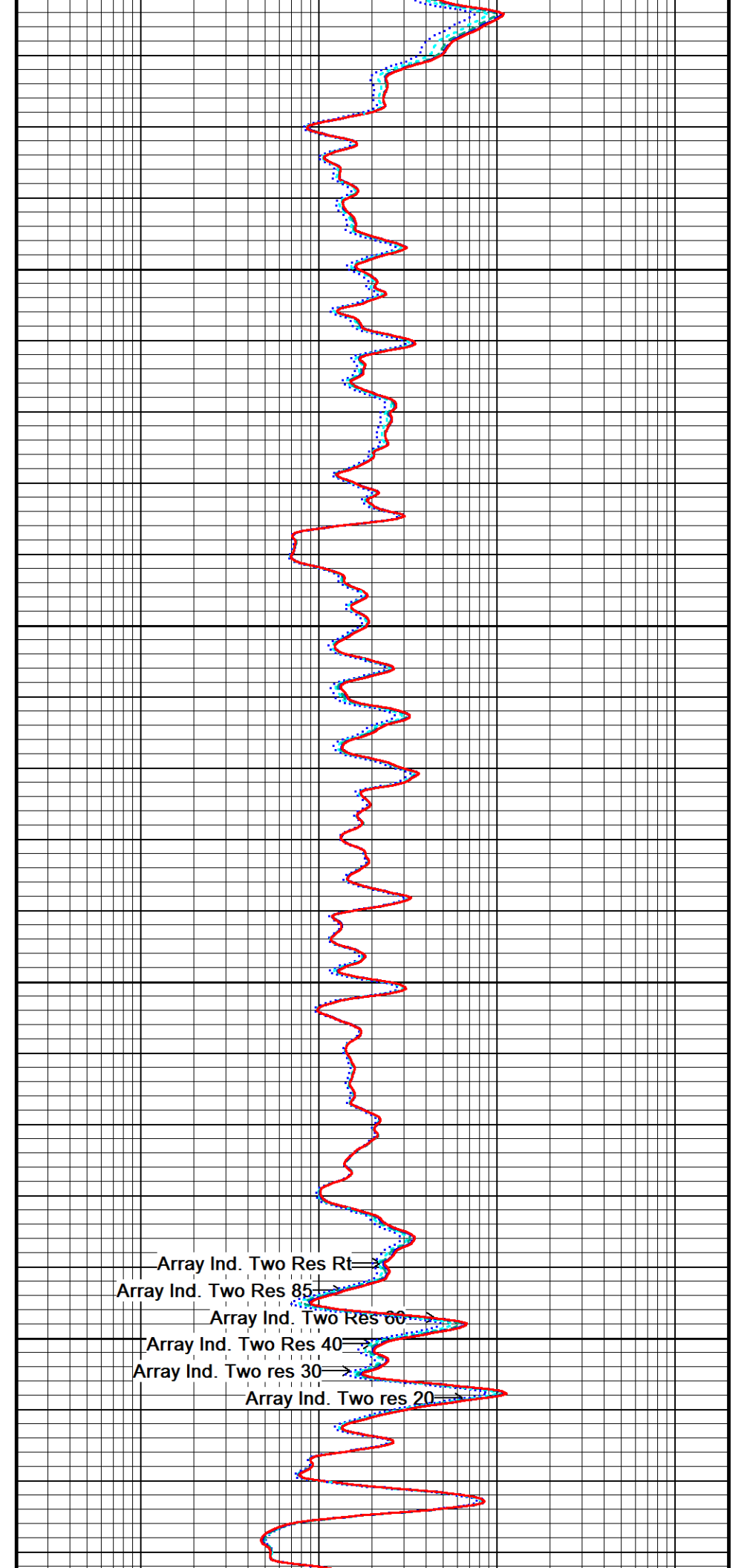
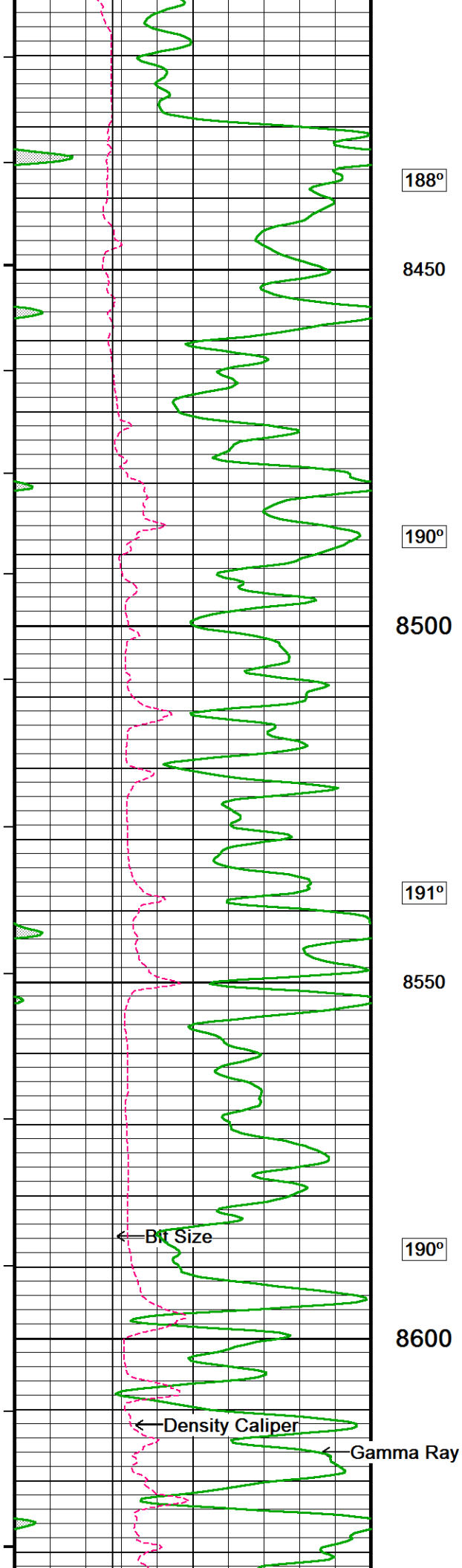
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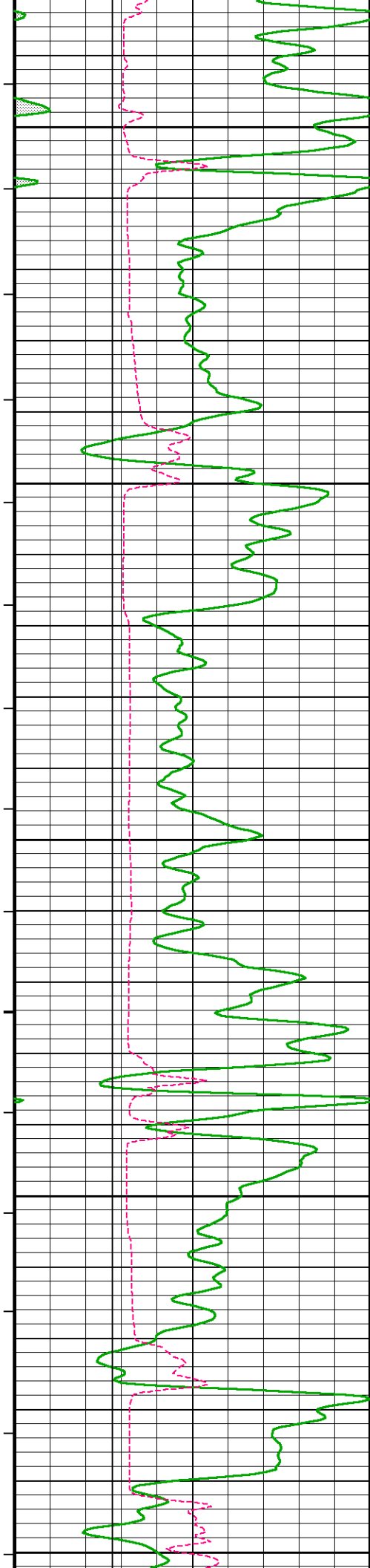












193°

8650

193°

8700

188°

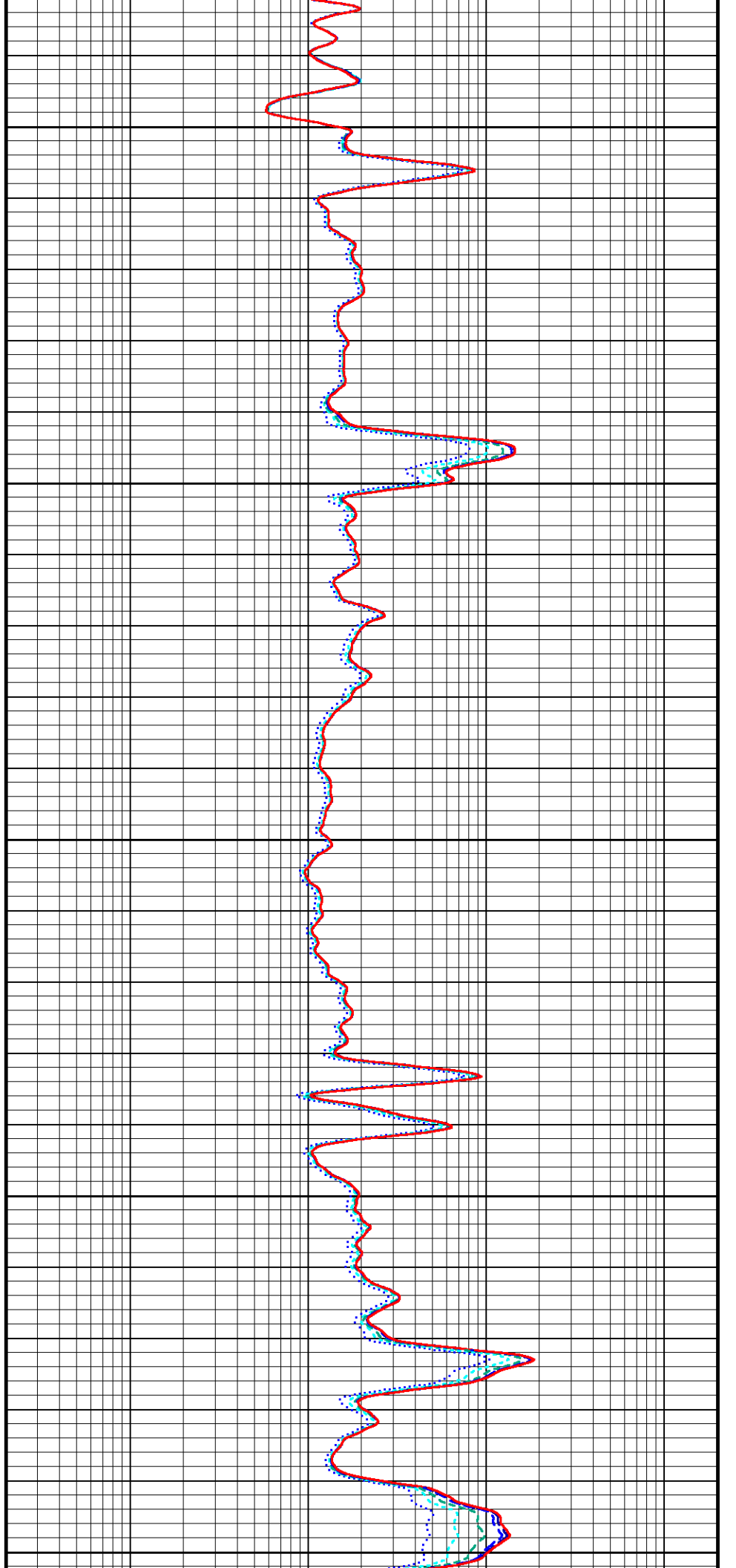
8750

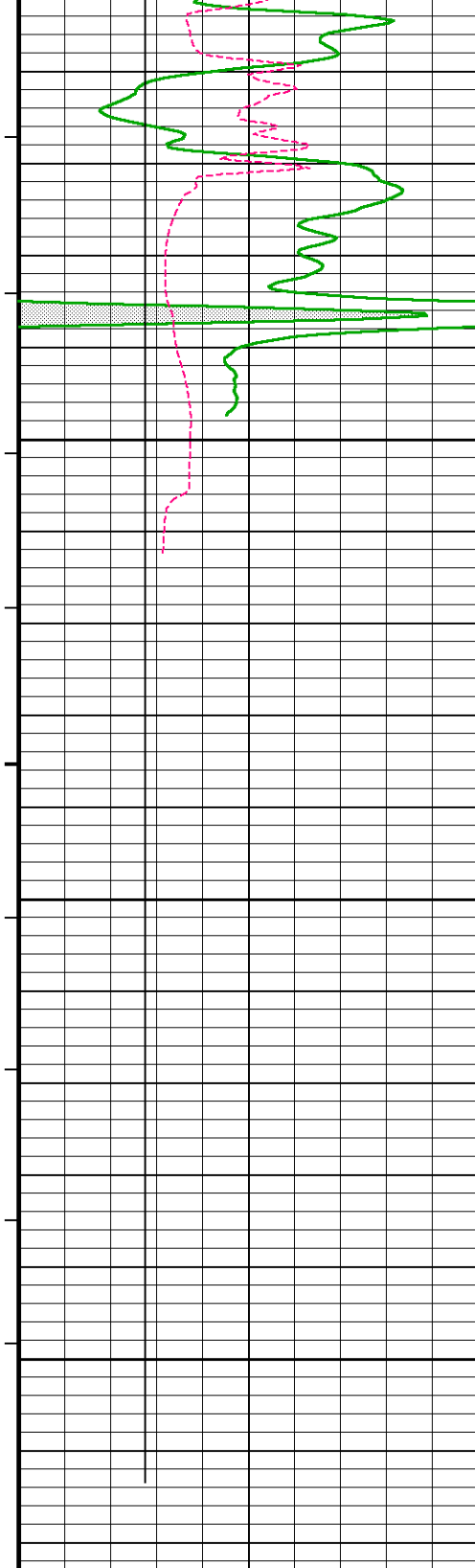
186°

8800

182°

8850





189°

8900

8950

9000

Depth
in
Feet

Timing Marks
every 60.0 sec

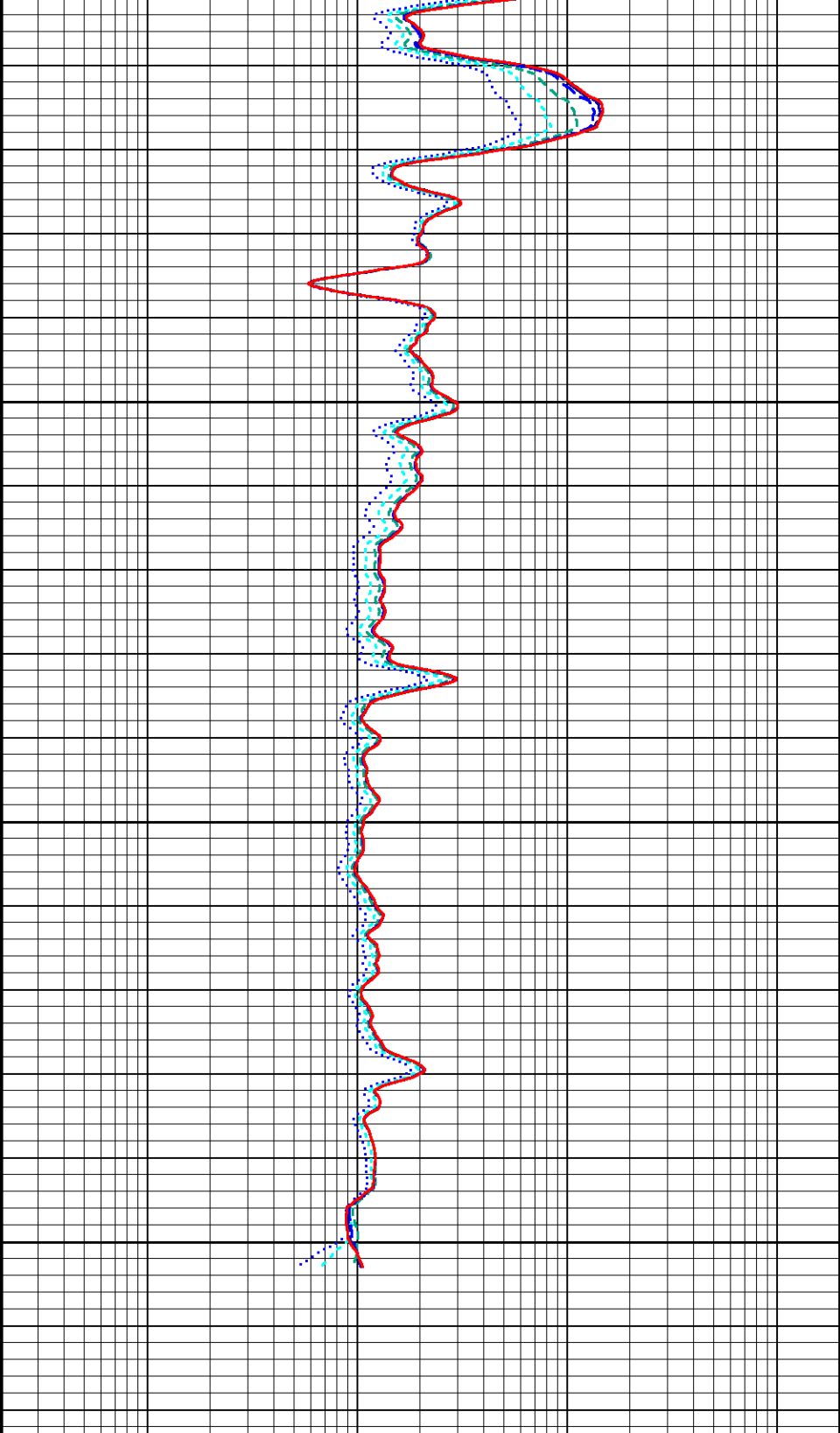
Gamma Ray

API

75

0

150



Array Ind. Two res 20
ohm metres

0.20

1

10

100

1000

2000

Array Ind. Two res 30
ohm metres

0.20

1

10

100

1000

2000

Array Ind. Two Res 40

Gamma Calibration Tolerances MCG-E.A 514					
Ratio	1.501	<div><div>1.40</div><div>1.475</div><div>1.55</div></div>	Counts/API		
Gamma Constants MCG-E.A 514			Last Edited on 29-JAN-2017,11:22		
Gamma Calibrator Number	GRC 51				
GRC-M Calibrator Jig in Use?	NO				
Inactive Background Jig in Use?	NO				
Mud Density	1.08	gm/cc			
Caliper Source for Processing	Density Caliper				
Tool Position	Eccentred				
Potassium Equivalence	Chloride				
K Mud Concentration	0.00	%			
Magnetometer Parameters MBN-C.J 146					
Date Of Last Magnetometer Calibration	22-MAR-2015,13:57				
	X Magnetometer	Y Magnetometer	Z Magnetometer		
Slope	-1.000000	1.000728	1.002803		
Offset	-0.017225	0.018340	0.035281		
Magnetometer Constants MBN-C.J 146			Last Edited on		
Magnetometer Calibrator Number	000				
Navigation Constants MBN-C.J 146			Last Edited on 29-JAN-2017,19:44		
Magnetic Declination	9.73	degrees	East		
Accelerometer Parameters MBN-C.J 146					
Date Of Last Accelerometer Calibration	20-MAR-2015,16:34				
	X Accelerometer	Y Accelerometer	Z Accelerometer		
Slope	-1.113362	-1.103172	-1.099380		
Offset	-0.004743	0.003596	-0.005586		
Accelerometer Constants MBN-C.J 146			Last Edited on 15-FEB-2016,10:20		
Accelerometer Calibrator Number	000				
Accelerometer Temperature Characterisation					
X Accelerometer					
Serial Number	1013				
Calibration Date	12-Feb-2011				
	B0	B1	B2	B3	
Bias(g)	0.00000e+000	-9.33042e-006	-5.43613e-009	3.26808e-010	
	SF0	SF1	SF2	SF3	
Scale Factor(mA/g)	3.00000e+000	2.57435e-004	3.69697e-007	7.37279e-010	
Y Accelerometer					
Serial Number	1109				
Calibration Date	04-Jul-2011				
	B0	B1	B2	B3	
Bias(g)	0.00000e+000	1.07571e-005	-7.01503e-009	9.36978e-011	
	SF0	SF1	SF2	SF3	
Scale Factor(mA/g)	3.00000e+000	2.76402e-004	2.92956e-007	6.97968e-010	
Z Accelerometer					
Serial Number	1087				
Calibration Date	07-May-2011				
	B0	B1	B2	B3	
Bias(g)	0.00000e+000	7.29157e-006	2.12028e-008	9.77407e-011	
	SF0	SF1	SF2	SF3	
Scale Factor(mA/g)	3.00000e+000	2.71055e-004	2.46581e-007	1.04581e-009	
Induction Calibration MAI-B.J 363			Base Calibration on 17-SEP-2015,09:22		
			Field Check on 29-JAN-2017 11:31		
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.8	467.2	9.3	966.2	

2	6.3	374.8	7.6	821.4
3	3.8	260.7	5.2	566.0
4	2.0	132.4	2.6	279.2

Array Temperature 69.4 Deg F

Test Loop Calibration Verified 28-DEC-2016 15:25

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	11.8	3903.3	9.1	3902.9
2	30.5	3610.7	29.8	3613.3
3	28.1	3048.3	27.7	3051.6
4	19.7	2097.2	19.5	2099.6
Deep	16.5	1949.8	16.2	1952.3
Medium	41.4	4019.2	41.2	4024.1
Shallow	46.6	5403.1	45.5	5406.2
Array Temperature	64.2		28.4	Deg F

Induction Calibration Tolerances MAI-B.J 363

Low Conductivity 1	17.8		mmho/m	High Conductivity 1	467.2		mmho/m
Low Conductivity 2	6.3		mmho/m	High Conductivity 2	374.8		mmho/m
Low Conductivity 3	3.8		mmho/m	High Conductivity 3	260.7		mmho/m
Low Conductivity 4	2.0		mmho/m	High Conductivity 4	132.4		mmho/m
Background Vx 1	0.0		mmho/m	Phase Check Loop 1	0.0		%
Background Vx 2	0.0		mmho/m	Phase Check Loop 2	0.0		%
Background Vx 3	0.0		mmho/m	Phase Check Loop 3	0.0		%
Background Vx 4	0.0		mmho/m	Phase Check Loop 4	0.0		%

Induction Constants MAI-B.J 363

Last Edited on 29-JAN-2017,11:32

Induction Model RtAP-WBM

Borehole Correction Constants

Tool Centred	Yes
Hole Size Source	Density Caliper
Hole Size Constant Value	N/A inches
Stand-off Type	N/A
Stand-off	N/A inches
Number of Fins on Stand-off	N/A
Stand-off Fin Angle	N/A degrees
Stand-off Fin Width	N/A inches
Rm Source	Global Value: Temperature Corrected
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

Symmetrised Receiver Gains

Receiver 1	1.00
Receiver 2	1.00
Receiver 3	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	

Caliper Calibration MPD-C.J 379

Base Calibration on 28-DEC-2016 09:58

Field Calibration on 29-JAN-2017 11:34

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15600	3.99
2	24262	5.96
3	32944	7.96
4	41133	9.85
5	50275	11.88
6	N/A	N/A

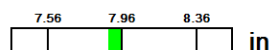
Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.88	7.96

Caliper Calibration Tolerances MPD-C.J 379

Long Arm Field Cal.

7.88



DOWNHOLE EQUIPMENT

C:\16.03.839\DATA\Caerus\Caerus\Puckett 32A-26_Triple Combo_Main Spliced.dta

Cablehead, 11 pin

CBH-CA 226 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

11C-11B Compact Tool Adaptor

MTA-K.A 334 LG: 1.53 ft WT: 13.2 lb OD: 2.240 in

Compact Swivel Head Adaptor

SHA-J.B 588 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma

MCG-E.A 514 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Knuckle Joint

SKJ-E.B 534 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Neutron

MDN-B.J 427 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

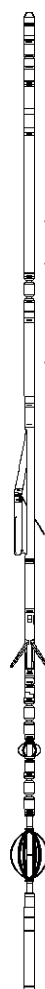
MPD-C.J 379 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Vee Arm Caliper

MVC-A.A 141 LG: 8.06 ft WT: 61.7 lb OD: 2.244 in

Compact Knuckle Joint

SKJ-E.B 612 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in



111.84 ft GRGC - MCG Gamma Ray

108.93 ft CGXT - MCG External Temperature

103.22 ft NPRS - Sandstone Neutron Por.

95.98 ft AVOL - Annular Volume

95.98 ft HVOL - Hole Volume

95.98 ft CLDC - Density Caliper

94.05 ft DPOR - Base Density Porosity

94.05 ft DEN - Compensated Density

94.05 ft DCOR - Density Correction

93.99 ft PDPE - PE

Compact Inline Standoff sub
MIS-E.B 785 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

Compact Knuckle Joint
SKJ-E.B 533 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Inline Bowspring sub
MIS-D.B 731 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Linker (MCL-C.A)
MLK-E.A 118 LG: 3.17 ft WT: 26.5 lb OD: 2.240 in

Compact Navigation
MBN-C.J 146 LG: 11.81 ft WT: 70.5 lb OD: 2.244 in

Compact Inline Bowspring sub
MIS-D.B 723 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Dipole Memory
MDM-C.A 212 LG: 4.48 ft WT: 39.7 lb OD: 2.244 in

Compact Dipole Receiver
MRD-C.A 212 LG: 8.89 ft WT: 88.2 lb OD: 2.244 in

Compact Dipole Transmitter
MTD-C.A 212 LG: 12.63 ft WT: 110.2 lb OD: 2.244 in

Compact Knuckle Joint
SKJ-E.B 588 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Inline Bowspring sub
MIS-D.B 735 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Focussed Electric
MFE-C.A 404 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-B.J 363 LG: 14.76 ft WT: 48.5 lb OD: 2.240 in

Total Length: 127.30 ft Weight: 970.0 lb



13.91 ft FEFE - Shallow FE

3.34 ft R40O - Array Ind. One Res 40

3.34 ft R30O - Array Ind. One Res 30

3.34 ft R20O - Array Ind. One Res 20

3.34 ft RTAO - Array Ind. One Res Rt

3.34 ft R85O - Array Ind. One Res 85


3.34 ft R60O - Array Ind. One Res 60

0.23 ft SPCG - Spontaneous Potential

Tool Zero (4.09ft from bottom)

-4.09 ft SMTU - DST Uphole Tension

All measurements relative to tool zero.

FIELD		Grand Valley			
PROVINCE/COUNTY		Garfield			
COUNTRY/STATE		U.S.A. / Colorado			
Elevation Kelly Bushing	8426	feet	First Reading	9003.00	feet
Elevation Drill Floor		feet	Depth Driller	9032.00	feet
Elevation Ground Level	8396	feet	Depth Logger	9003.00	feet
<div><div><div>COMPACT ARRAY INDUCTION</div><div>LOG</div></div><div>Weatherford®</div></div>					