



**Weatherford**

**MEASURED DEPTH  
ARRAY INDUCTION  
LOG**

COMPANY			WHITTING OIL AND GAS CORPORATION		
WELL			HORSETAIL 30F-1943		
FIELD			REDTAIL		
PROVINCE/COUNTY			WELD		
COUNTRY/STATE			U.S.A. / COLORADO		
LOCATION			SHL: 2324' FNL & 1920' FWL		
PERMIT NUMBER			AFE: 13-1914		
SEC 30	TWP 10N	RGE 57W	Other Services		
			MICRO IMAGER		
			SPECTRAL GAMMA		
			DENSITY/NEUTRON		
API Number			05-123-38739		
Permanent Datum G.L., Elevation 4780 feet					
Log Measured From KB					
Drilling Measured From K.B. @ 17 FEET					
Date	9-OCT-2014				
Run Number	ONE				
Service Order	2577-100067384				
Depth Driller	13702.00		feet		
Depth Logger	13702.00		feet		
First Reading	13685.00		feet		
Last Reading	5995.00		feet		
Casing Driller	5993.00		feet		
Casing Logger	5995.00		feet		
Bit Size	6.000		inches		
Hole Fluid Type	WBM				
Density / Viscosity	10.20 lb/USg		42.00 type in		
PH / Fluid Loss	9.00		3.80 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	1.65 @ 63.7		ohm-m		
Rmf @ Measured Temp	1.32 @ 63.7		ohm-m		
Rmc @ Measured Temp	1.98 @ 63.7		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.51 @215.0		ohm-m		
Time Since Circulation	NO DELAY				
Max Recorded Temp	215.00		deg F		
Equipment / Base	18063		Casper		
Recorded By	M.RICHINS				
Witnessed By	M. ODEGARD		GEOLOGIST		
WSL	K.RENTON		WSL		

BOREHOLE RECORD					Last Edited: 09-OCT-2014 19:59
Bit Size inches		Depth From feet		Depth To feet	
6.000		5993.00		13702.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	7.000	0.00	5993.00	29.00	

REMARKS
LOGGED WITH WLS 14.01.3220
LOGGED USING MESSENGER SHUTTLE METHOD OF DEPLOYMENT
HARDWARE:
MDN: MIS-A DOUBLE BOWSPRING USED ABOVE MDN
MPD: 4INCH PROFILE PLATE USED, MIS-A SINGLE BOWSPRING USED BELOW MPD
CMI: OVER BODY BASKET AND MIS-D BASKETS PLACED ABOVE AND BELOW FOR CENTRALIZATION
SGS: RAN BELOW CMI. ECCENTRALIZED WITH SKJ.
2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST
LONGITUDE: -103.796464
LATITUDE: 40.810683
ANNULAR HOLE VOLUME FROM TD TO CASING AT 5995 FEET = 770 CUBIC FEET

ANNULAR HOLE VOLUME FROM TD TO CASING AT 5995 FEET = 170 CUBIC FEET.  
TOTAL HOLE VOLUME FROM TD TO CASING AT 5995 FEET = 1620 CUBIC FEET.

DRILL PIPE DEPTH DURING DEPLOYMENT: 13586.17 FEET  
LOGGING TOOL DEPTH AFTER DEPLOYMENT: 13688.35 FEET

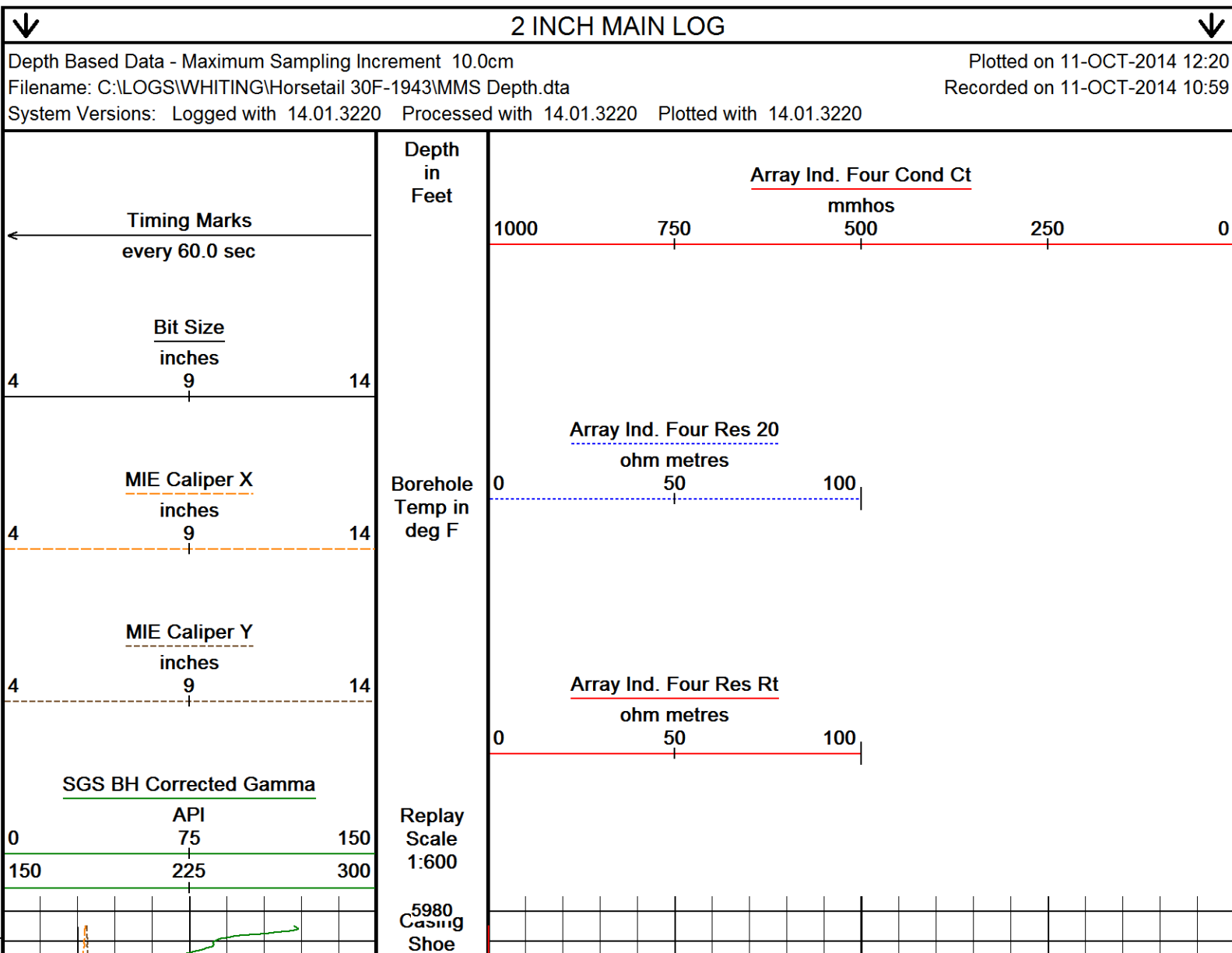
SLOWLY ROTATED LAST 26 STANDS DOWN AT 20-30 RPM TO REACH TD - EXCESSIVE STICK/SLIP LOW HOOKLOAD WHEN NOT ROTATING.

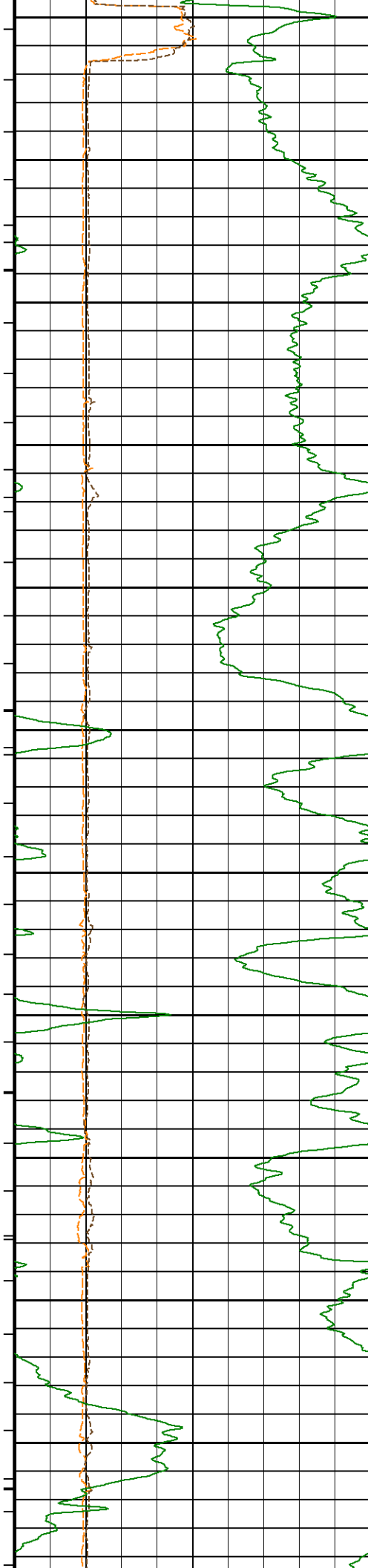
PIPE ROTATED AT 20 RPM FOR FIRST 10 STANDS DURING LOGGING RUN

OPERATORS: D.SMITH, C.WADLINGTON

RIG: XTREME 18

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.





6000

201°

6100

202°

6200

202°

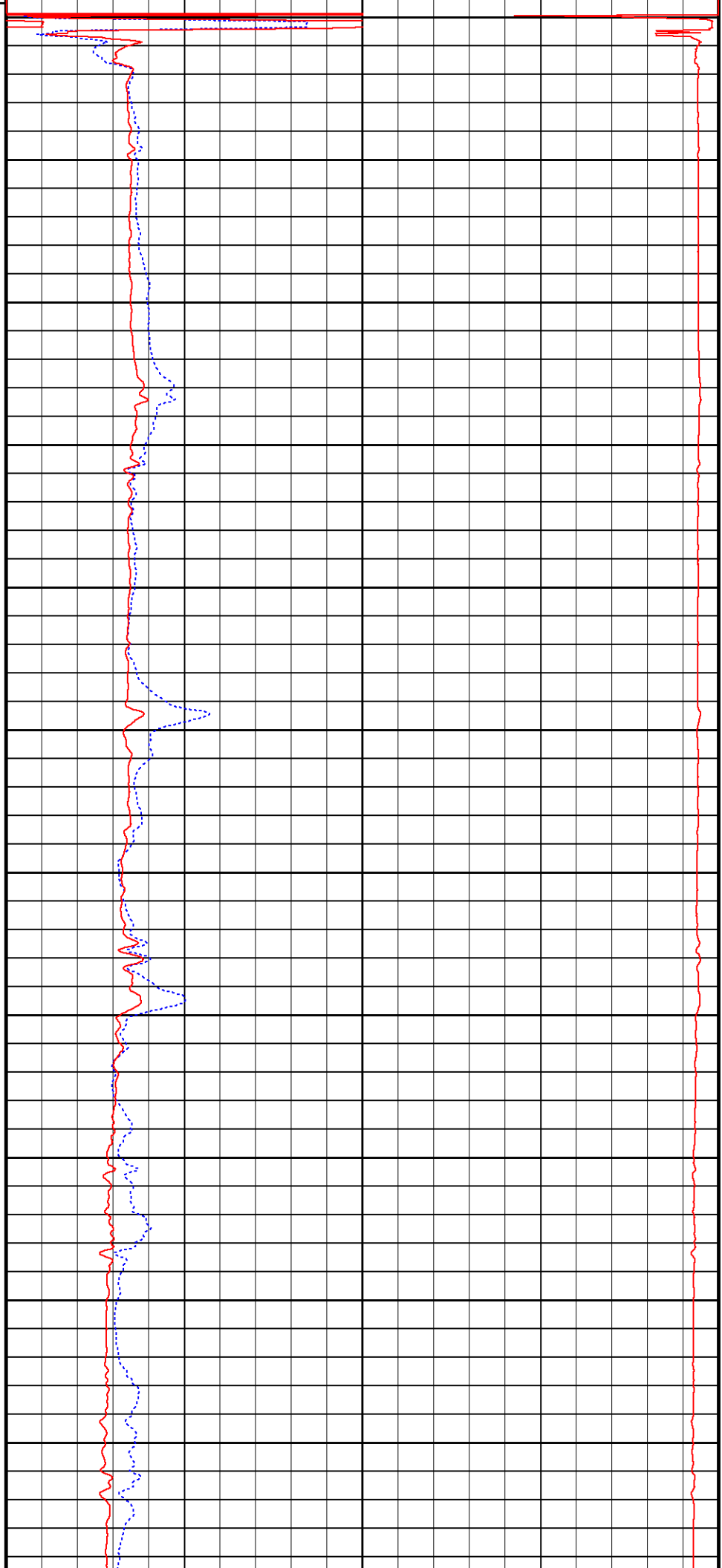
6300

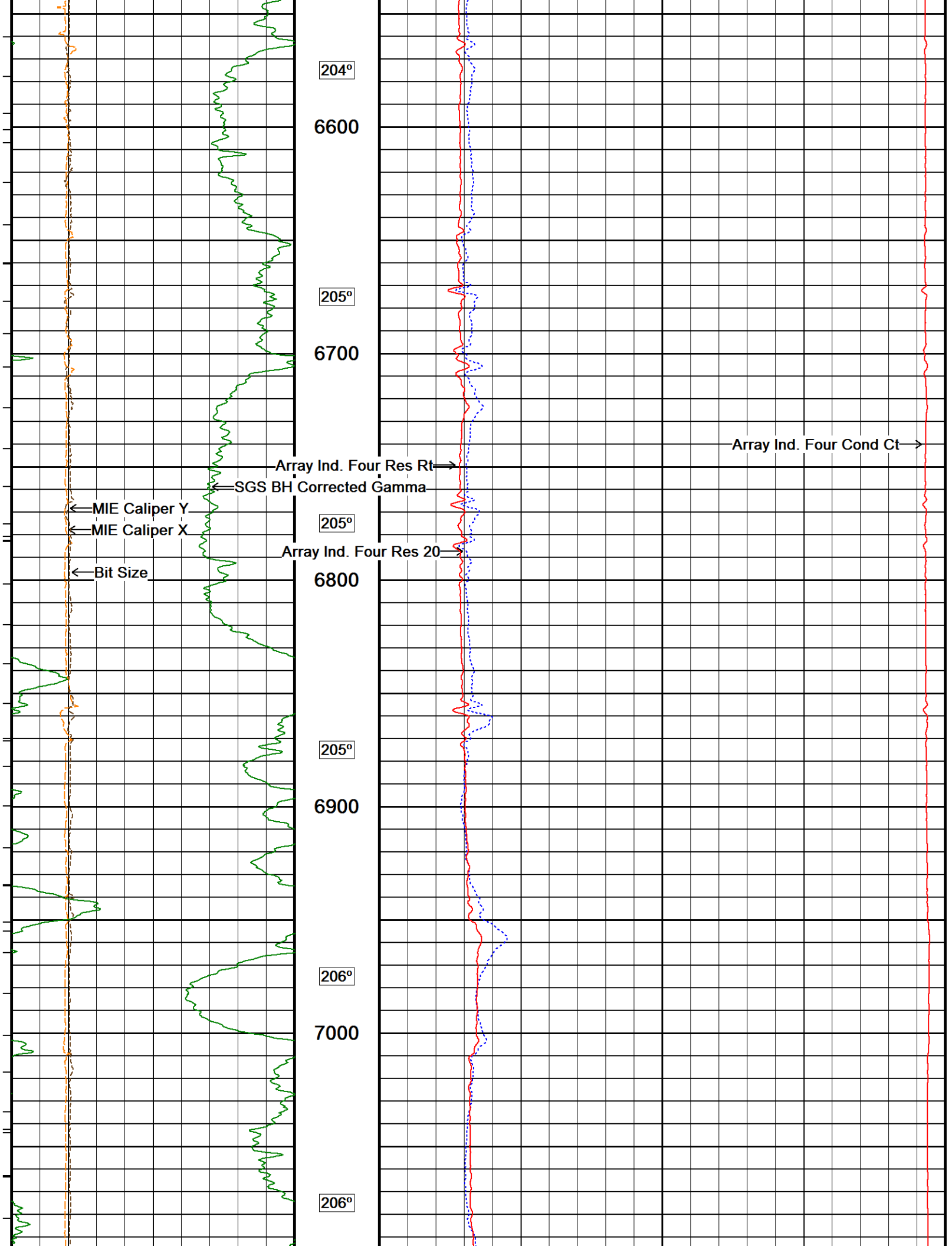
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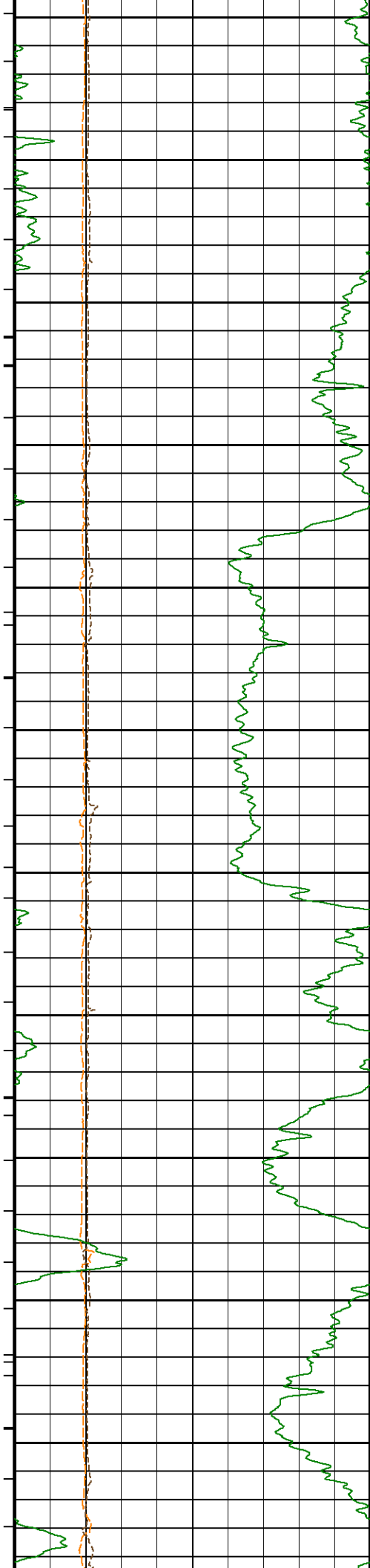
204°

6500









7100

206°

7200

207°

7300

207°

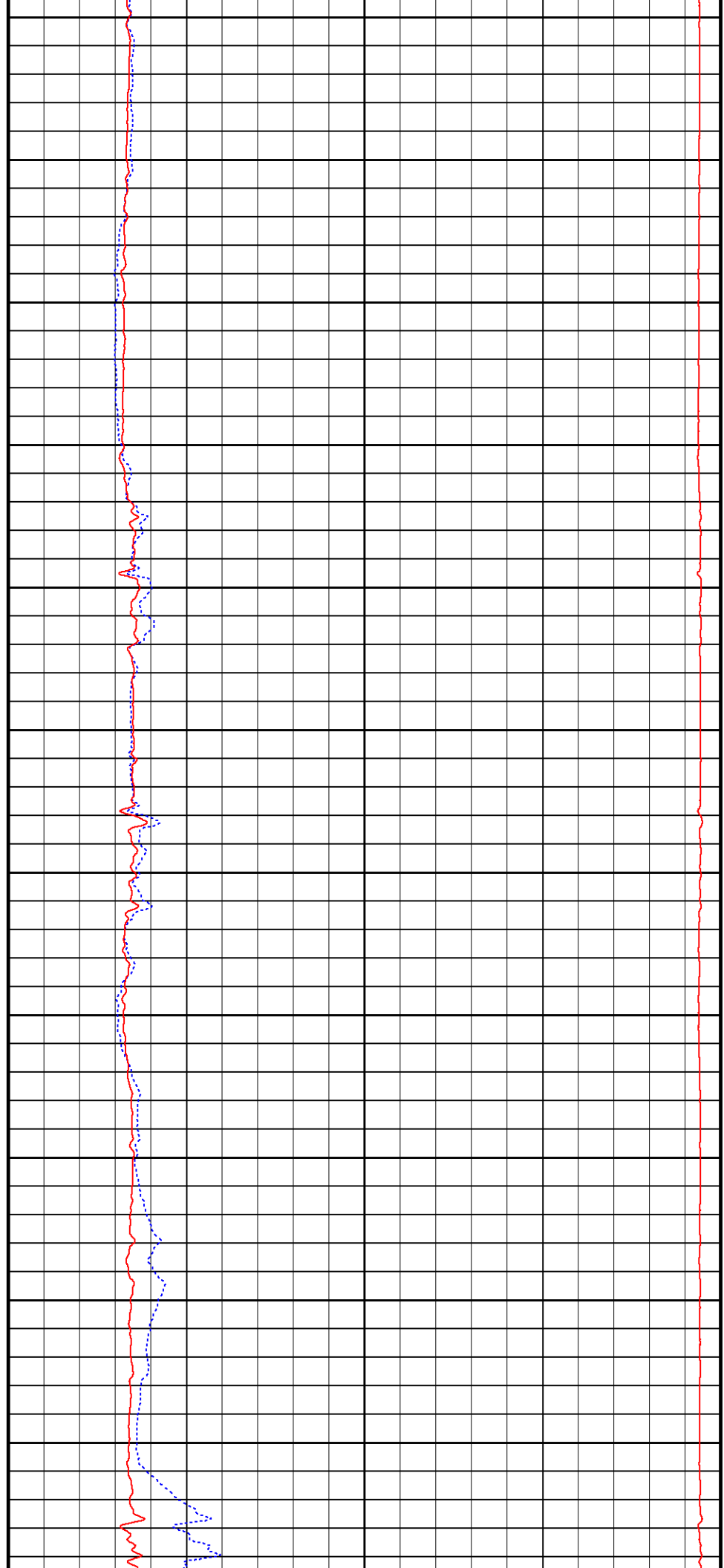
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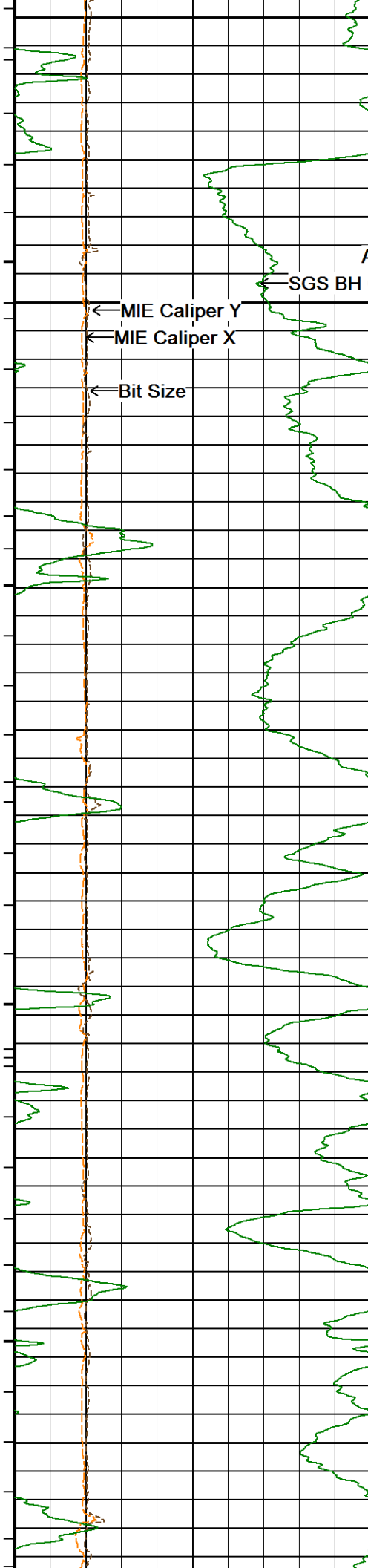
208°

7500

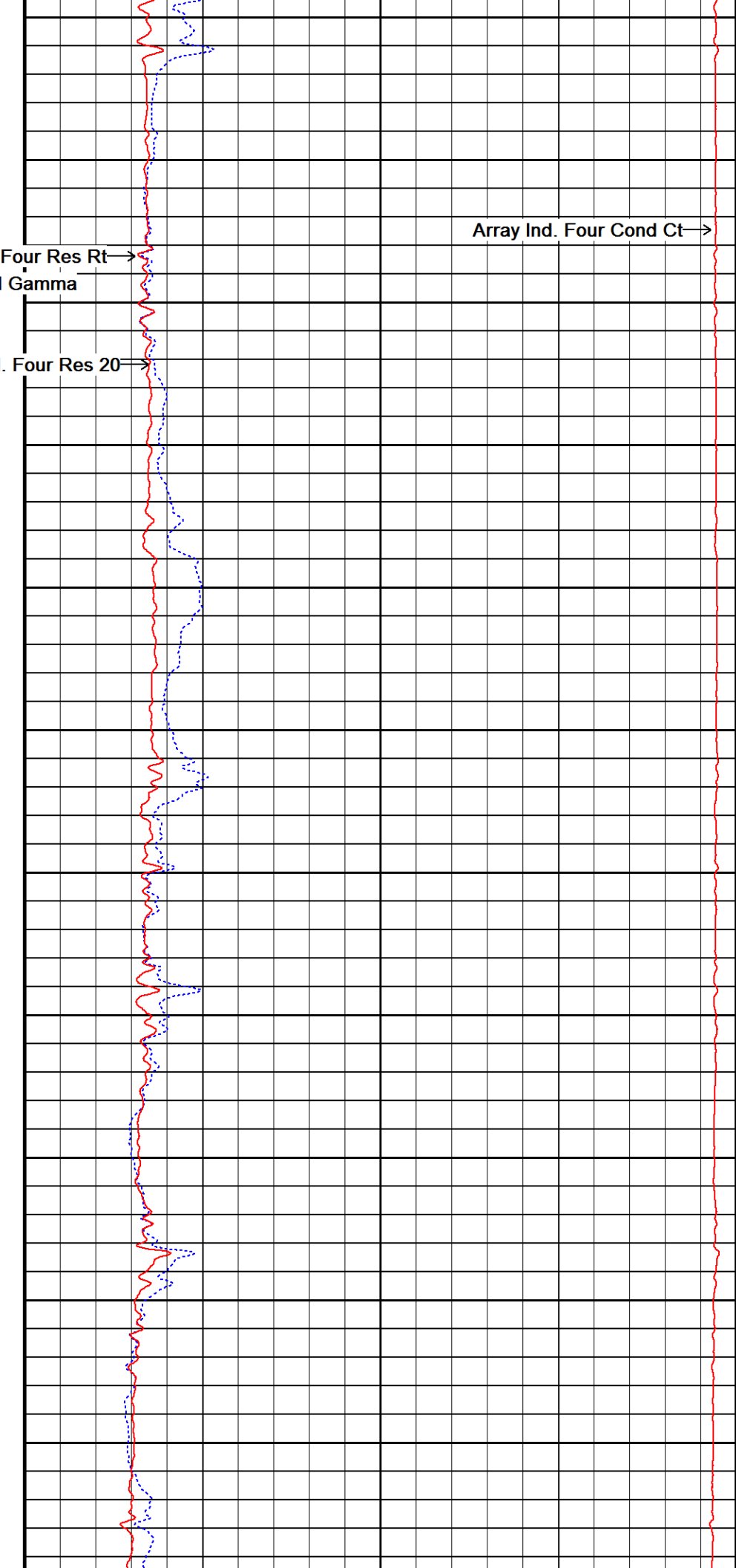
208°

7600





208°  
7700  
209°  
7800  
209°  
7900  
209°  
8000  
210°  
8100  
210°

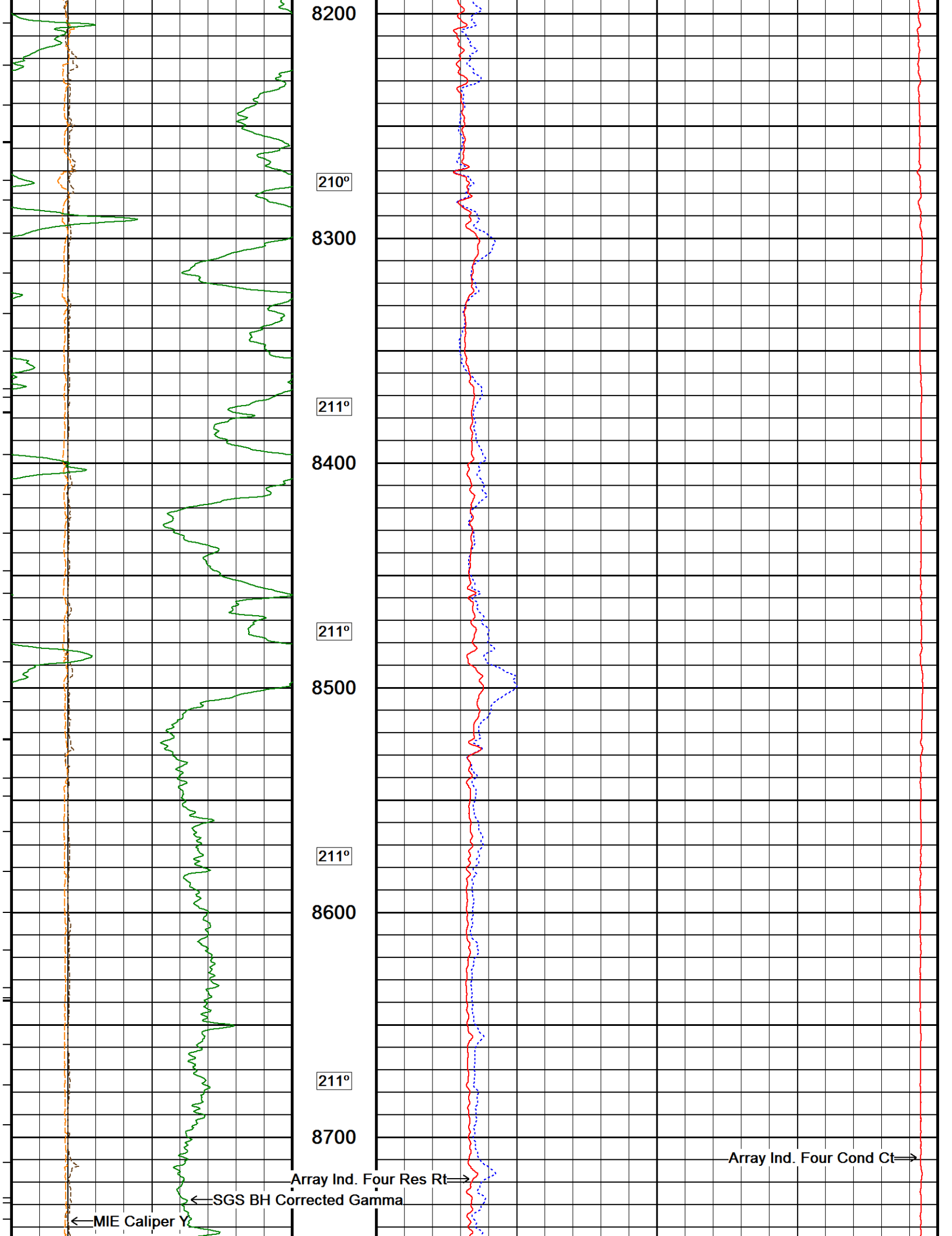


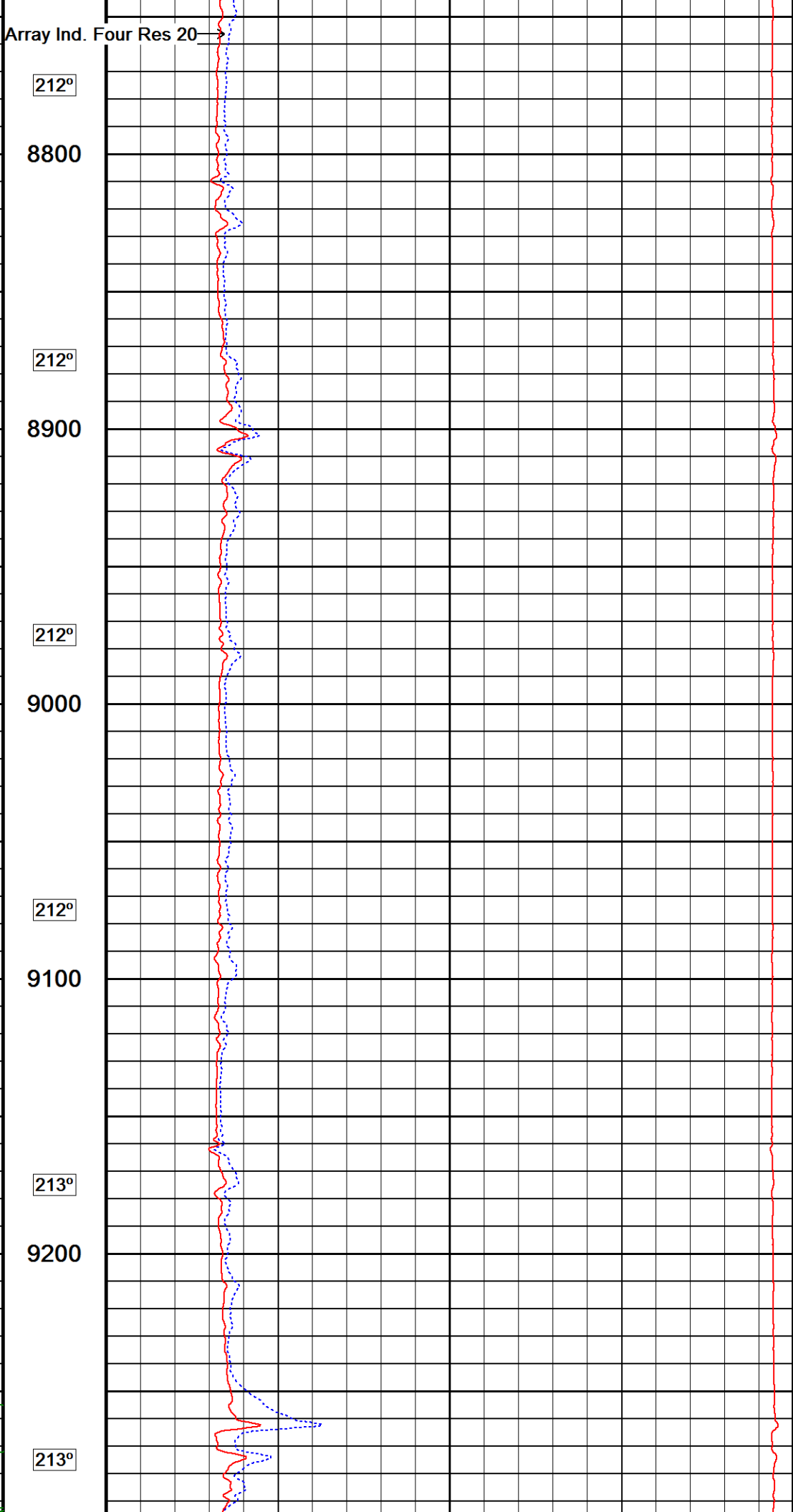
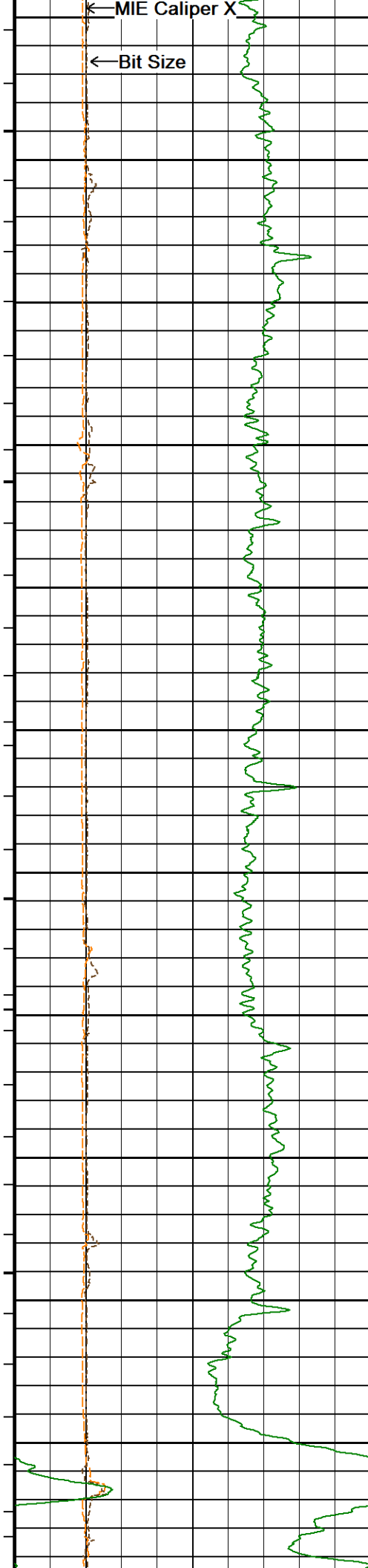
← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

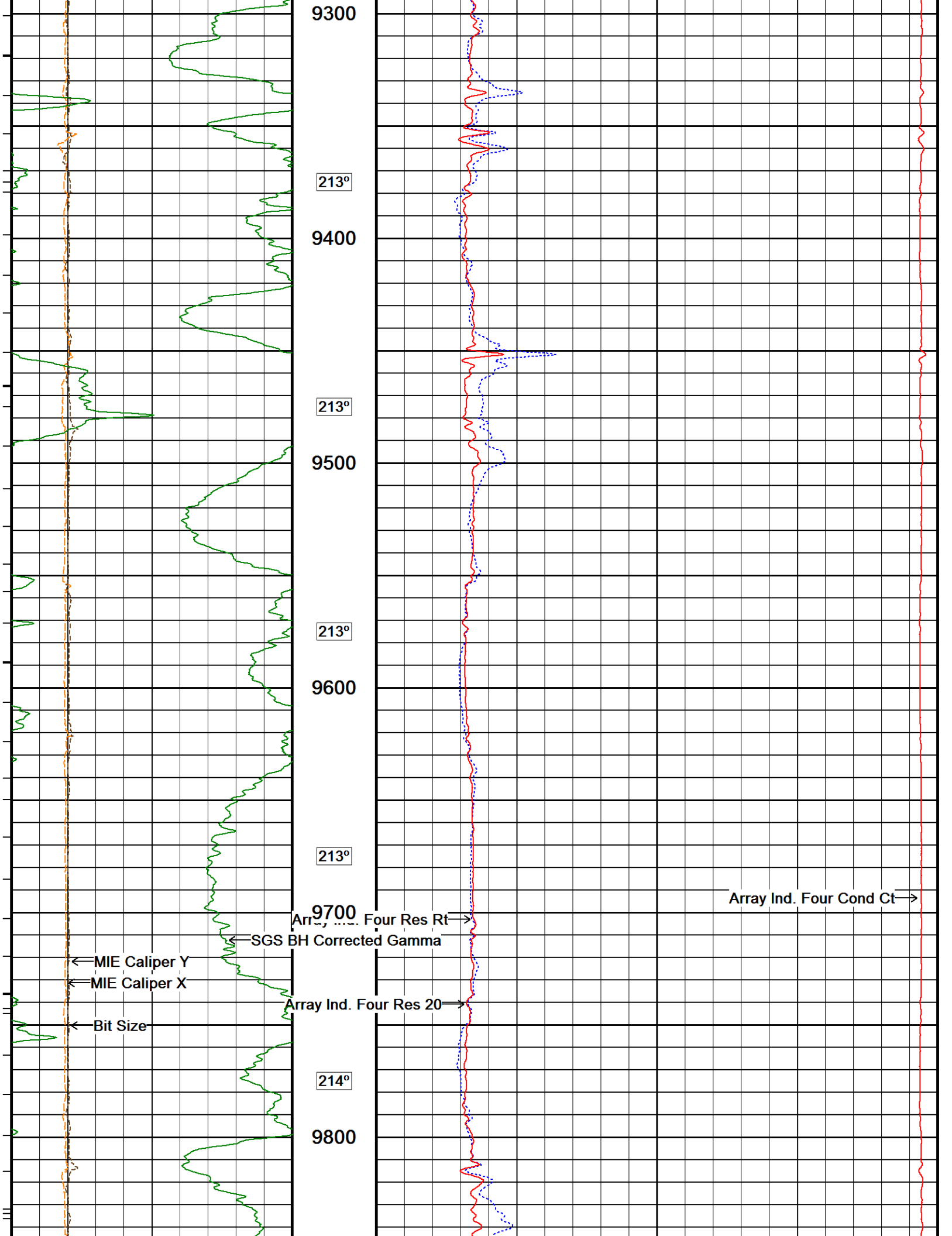
Array Ind. Four Res Rt →  
SGS BH Corrected Gamma

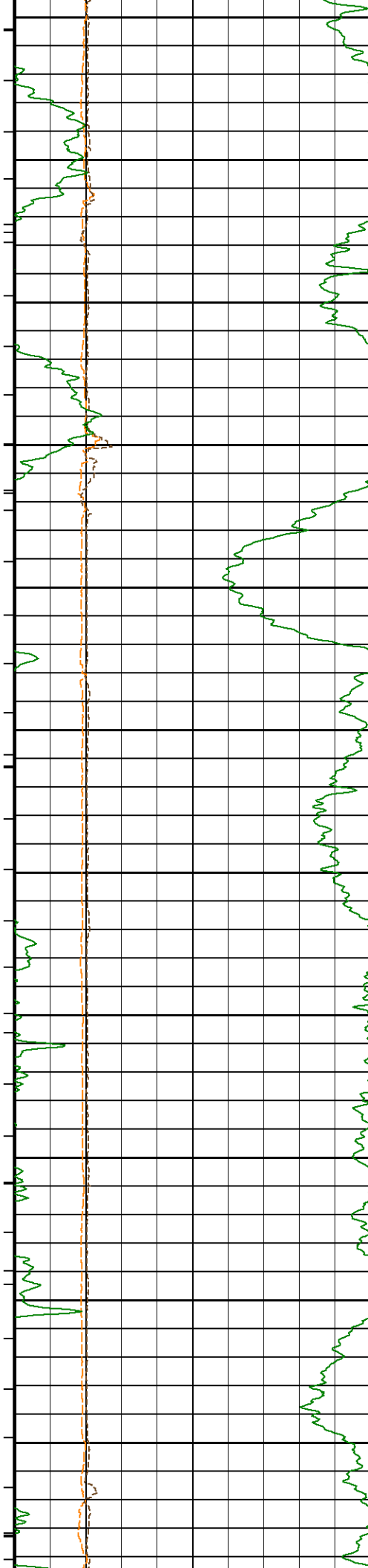
Array Ind. Four Cond Ct →

Array Ind. Four Res 20 →









214°

9900

214°

10000

214°

10100

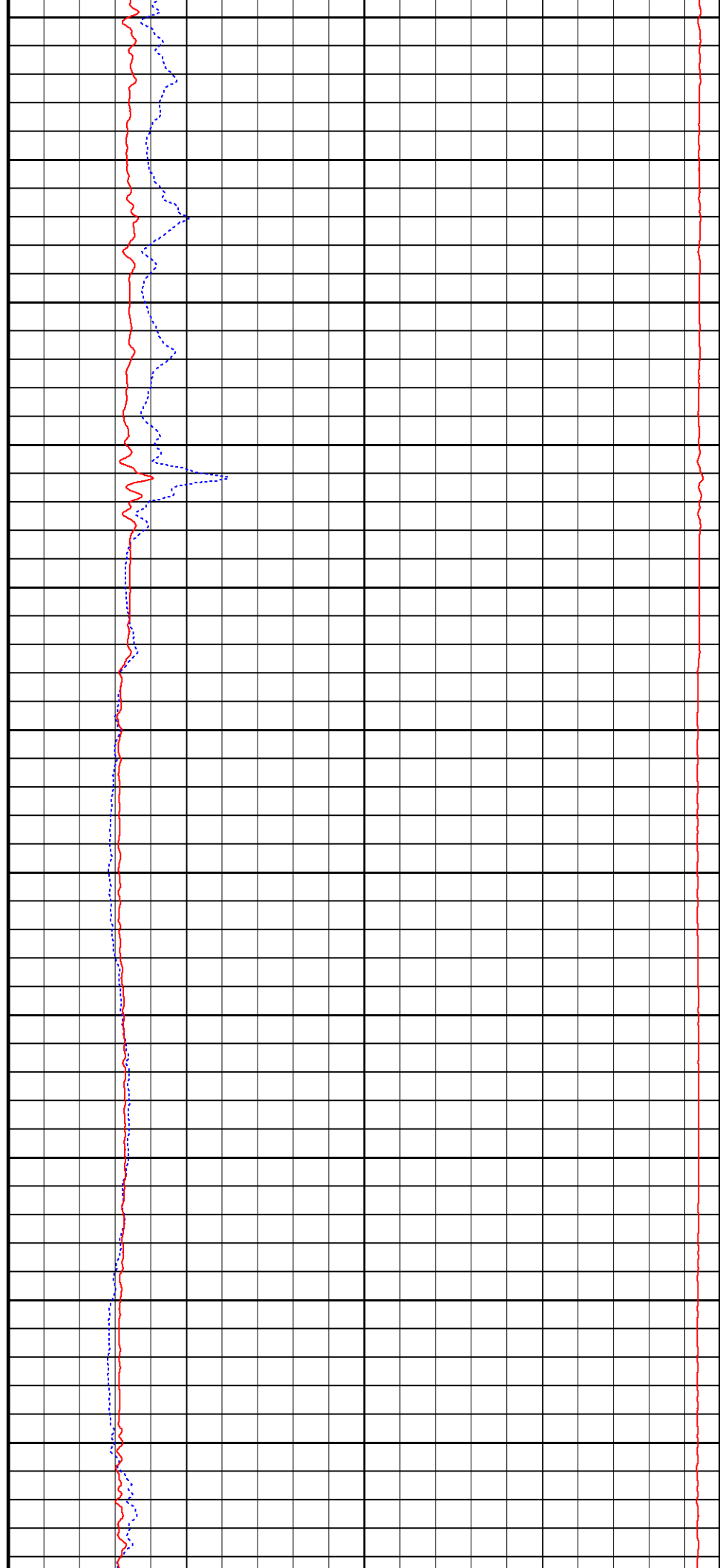
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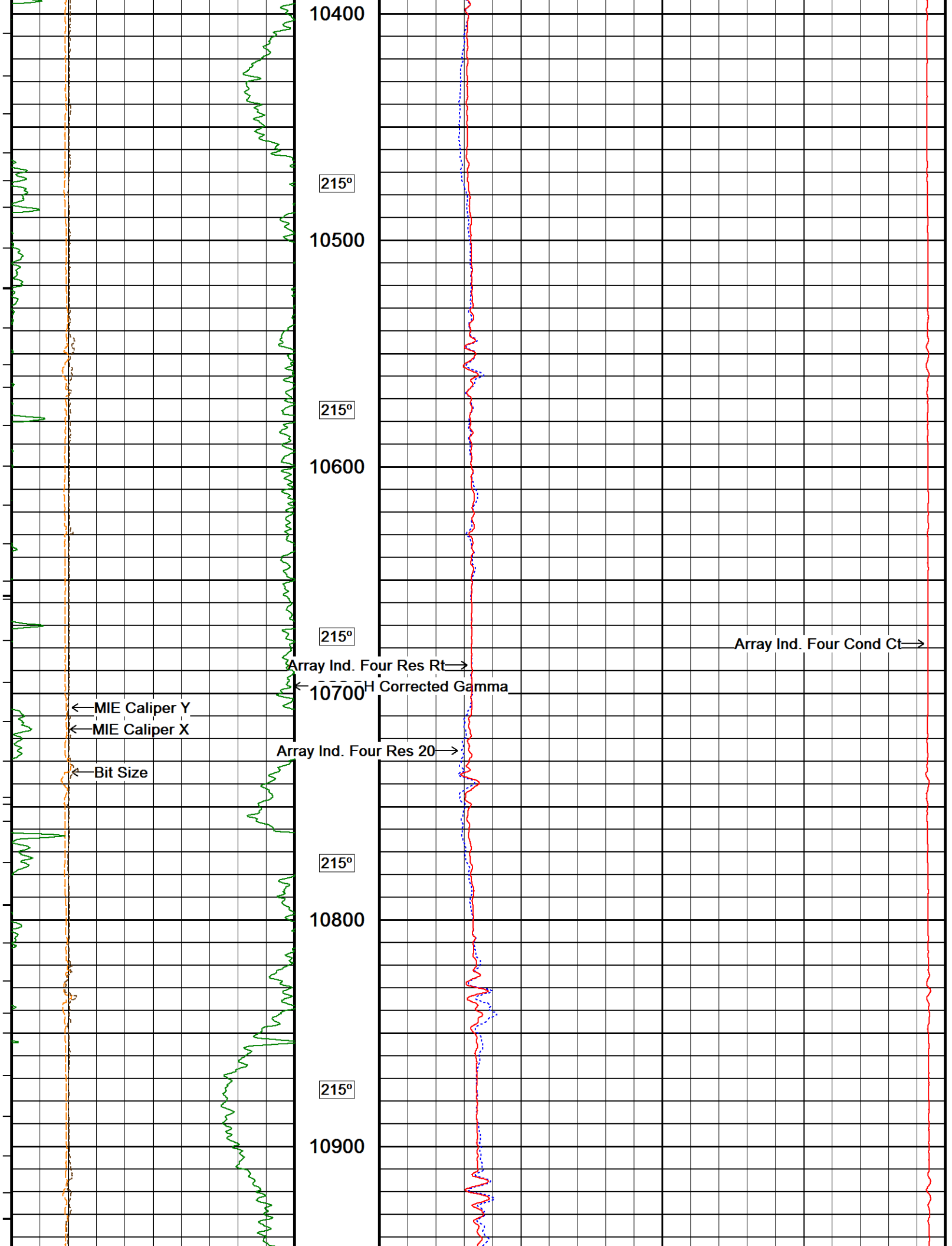
10200

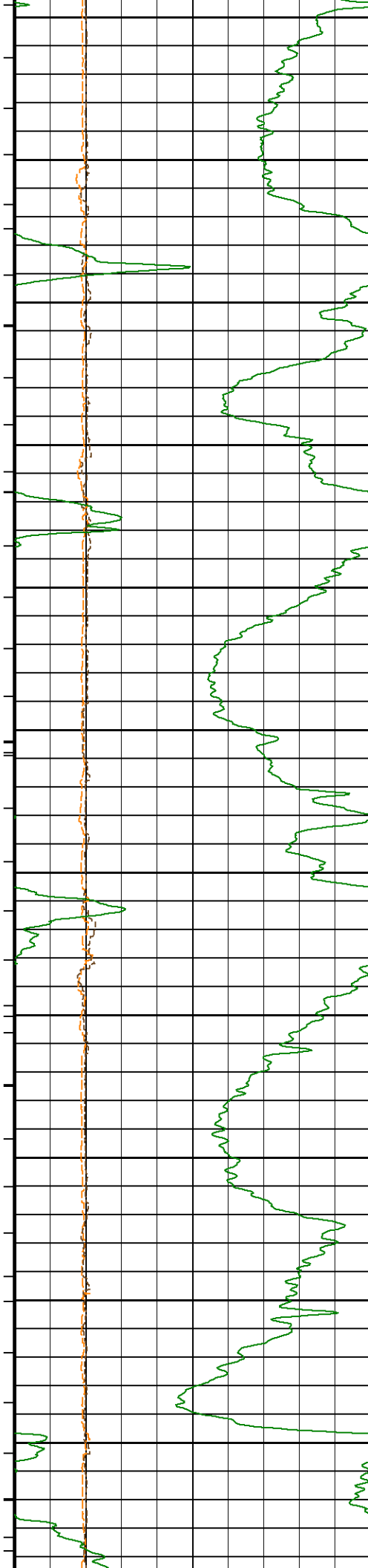
214°

10300

215°







215°

11000

215°

11100

215°

11200

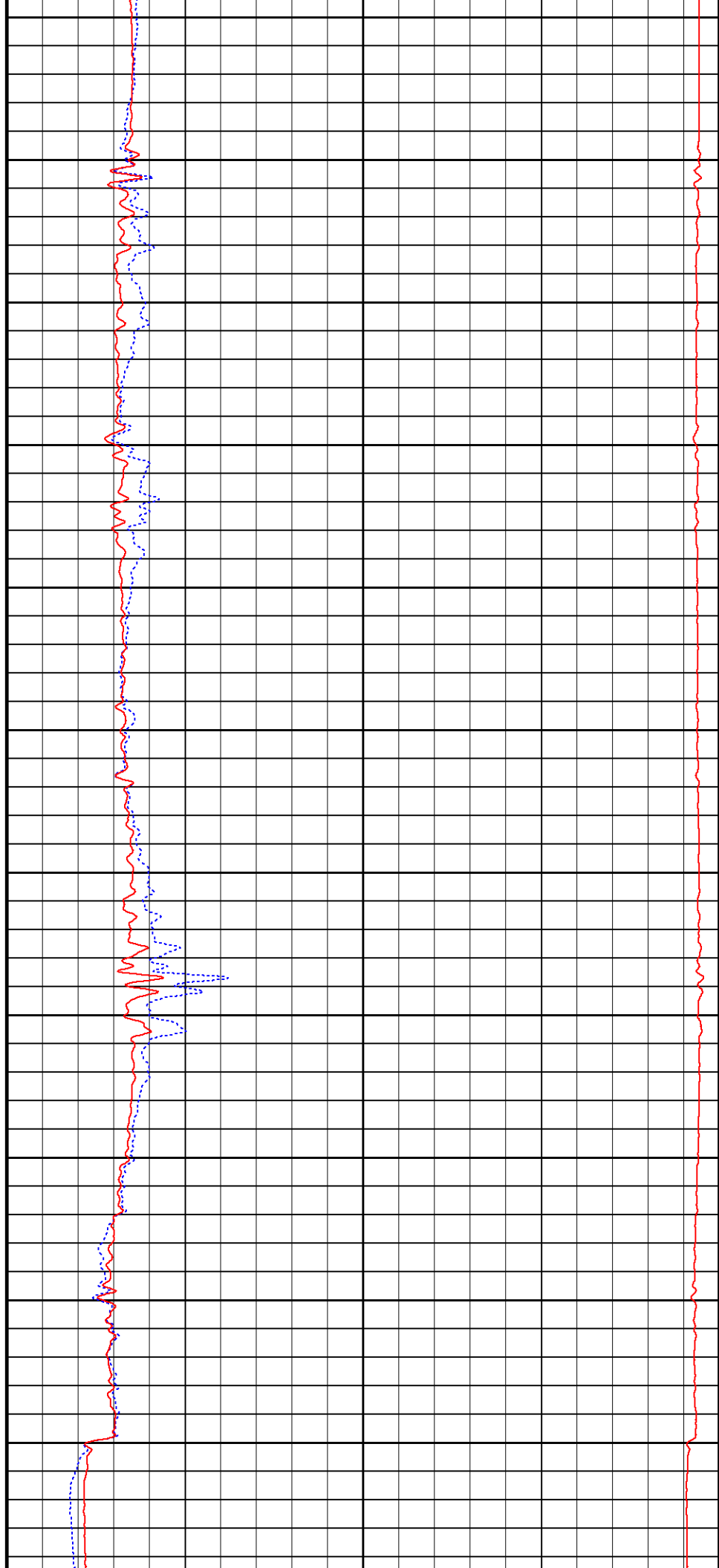
215°

11300

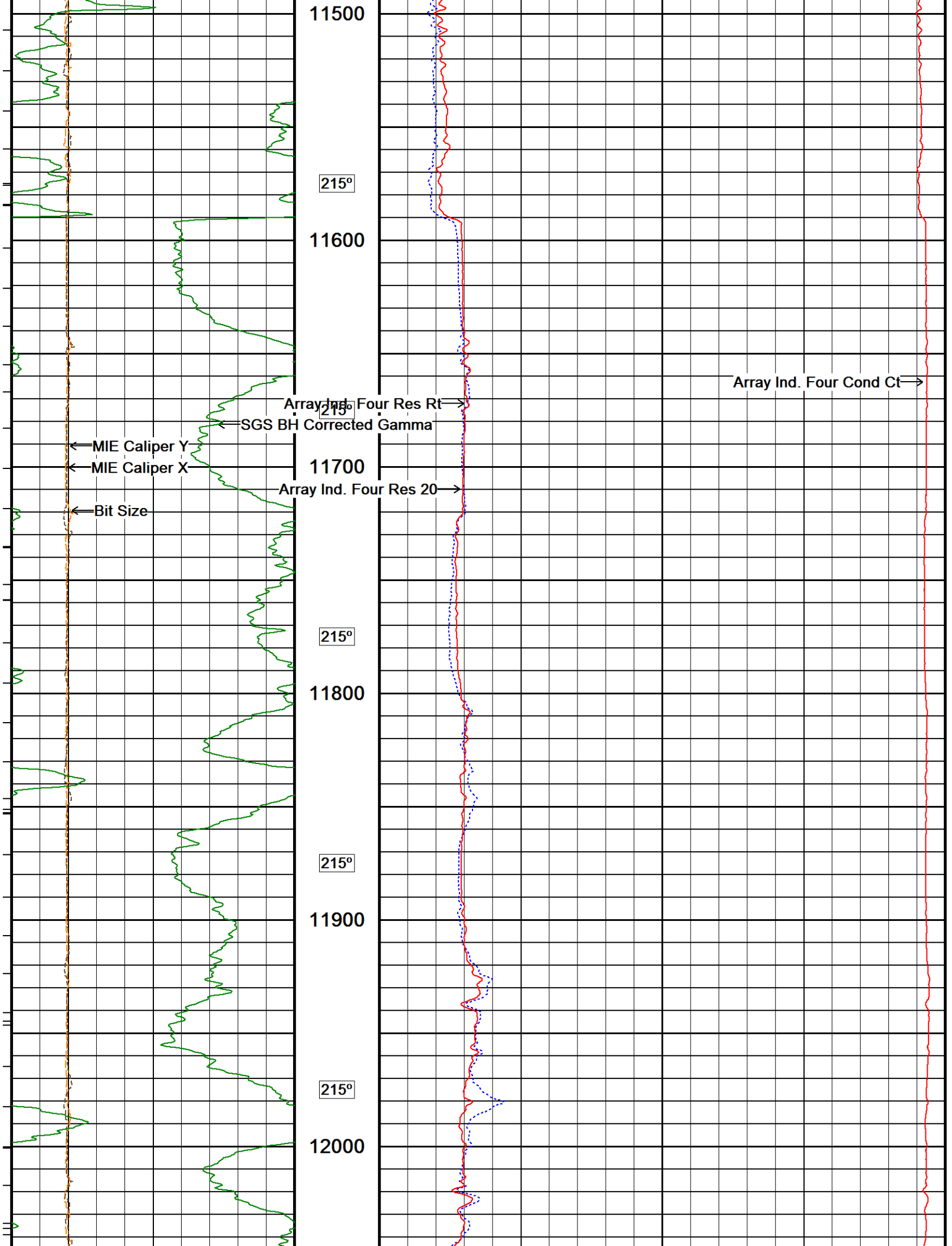
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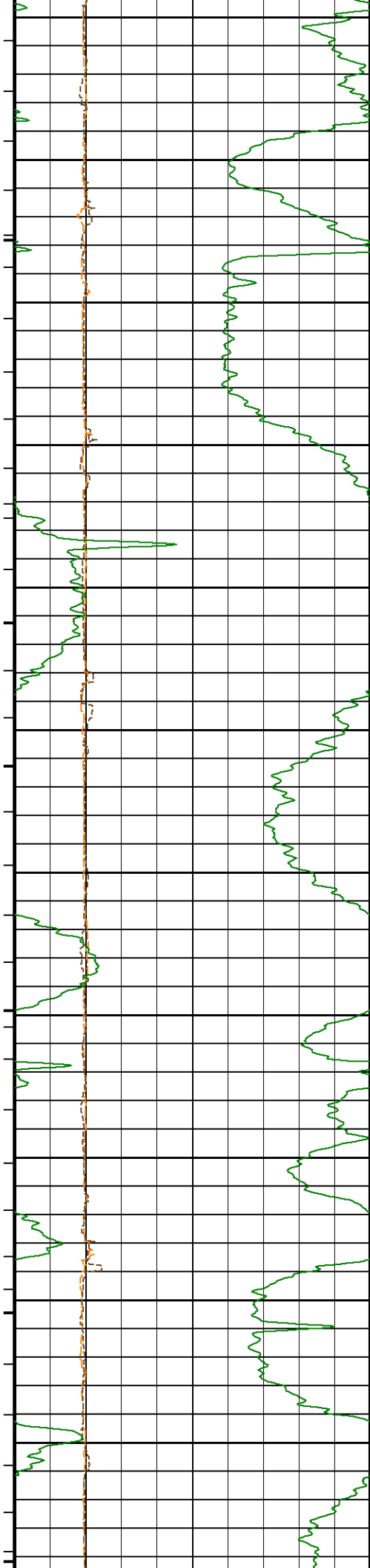
11400

215°









215°

12100

215°

12200

214°

12300

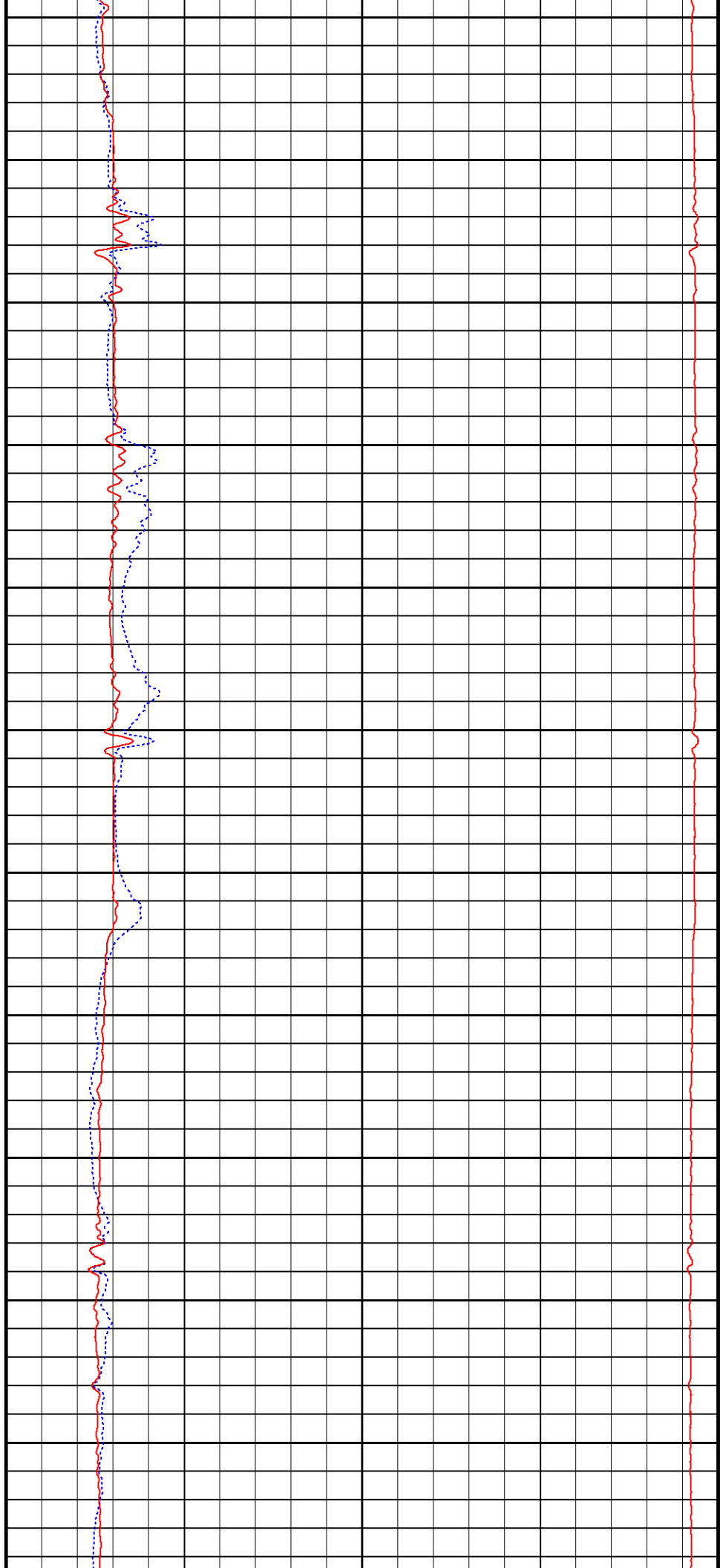
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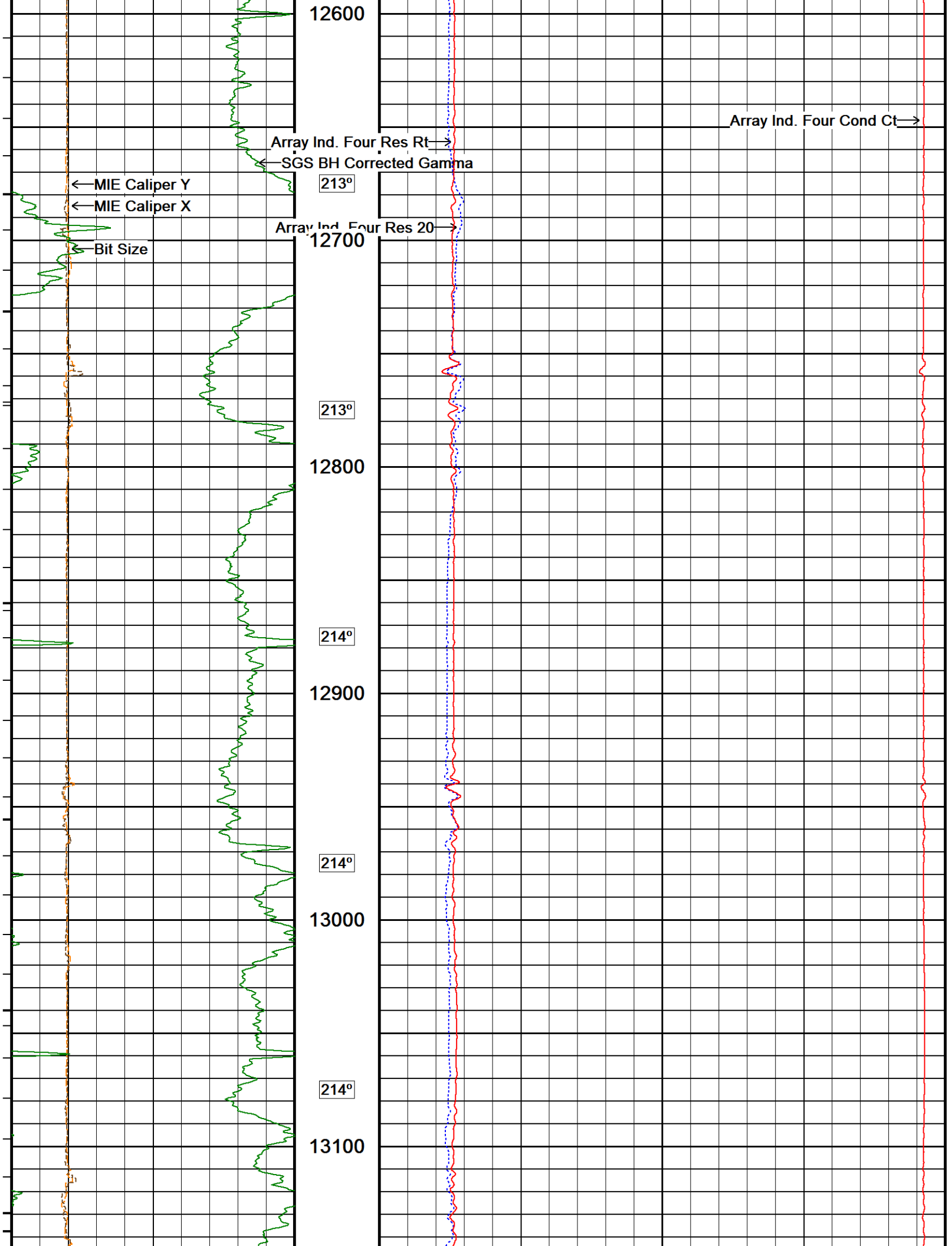
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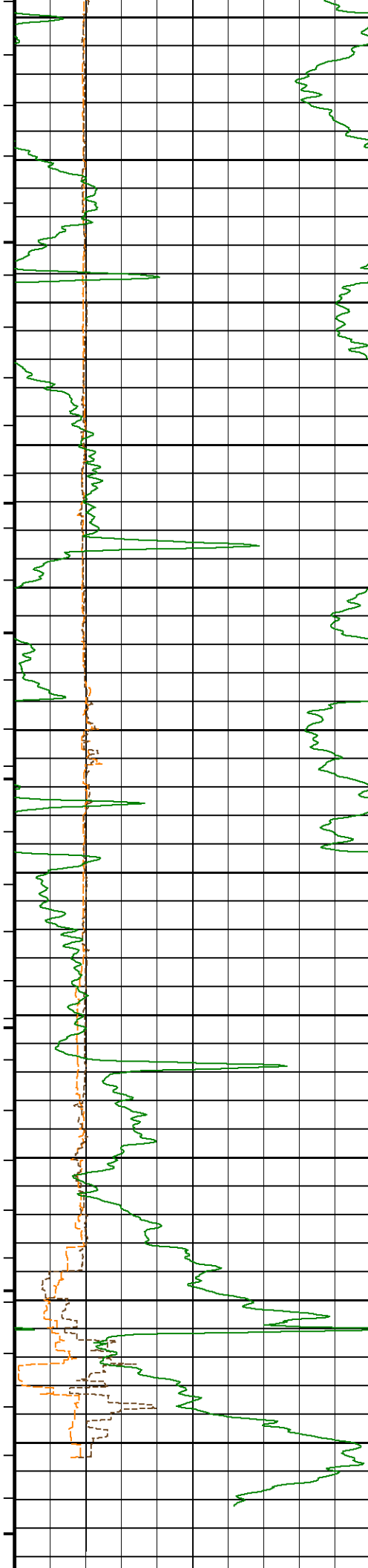
214°

12500

214°







214°

13200

214°

13300

214°

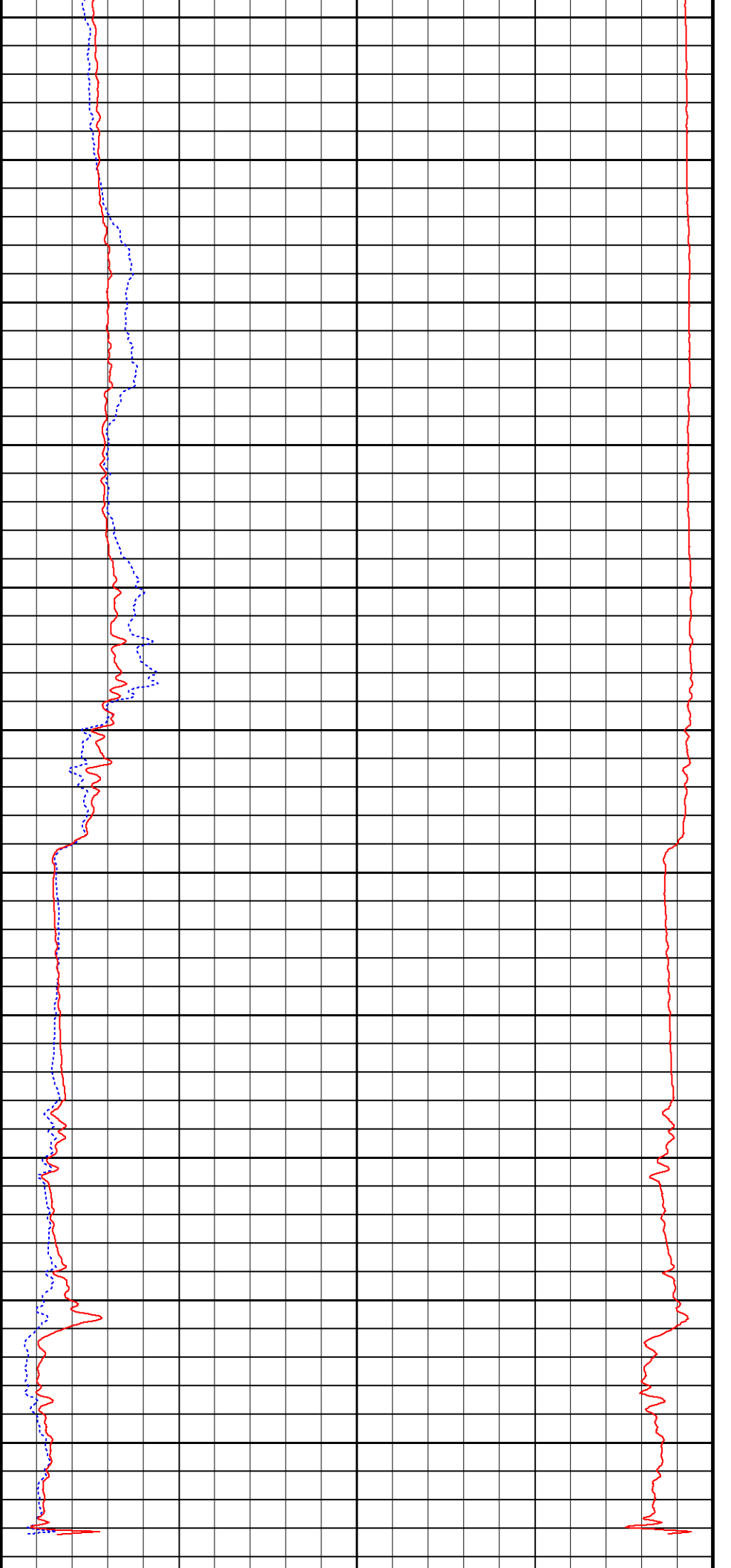
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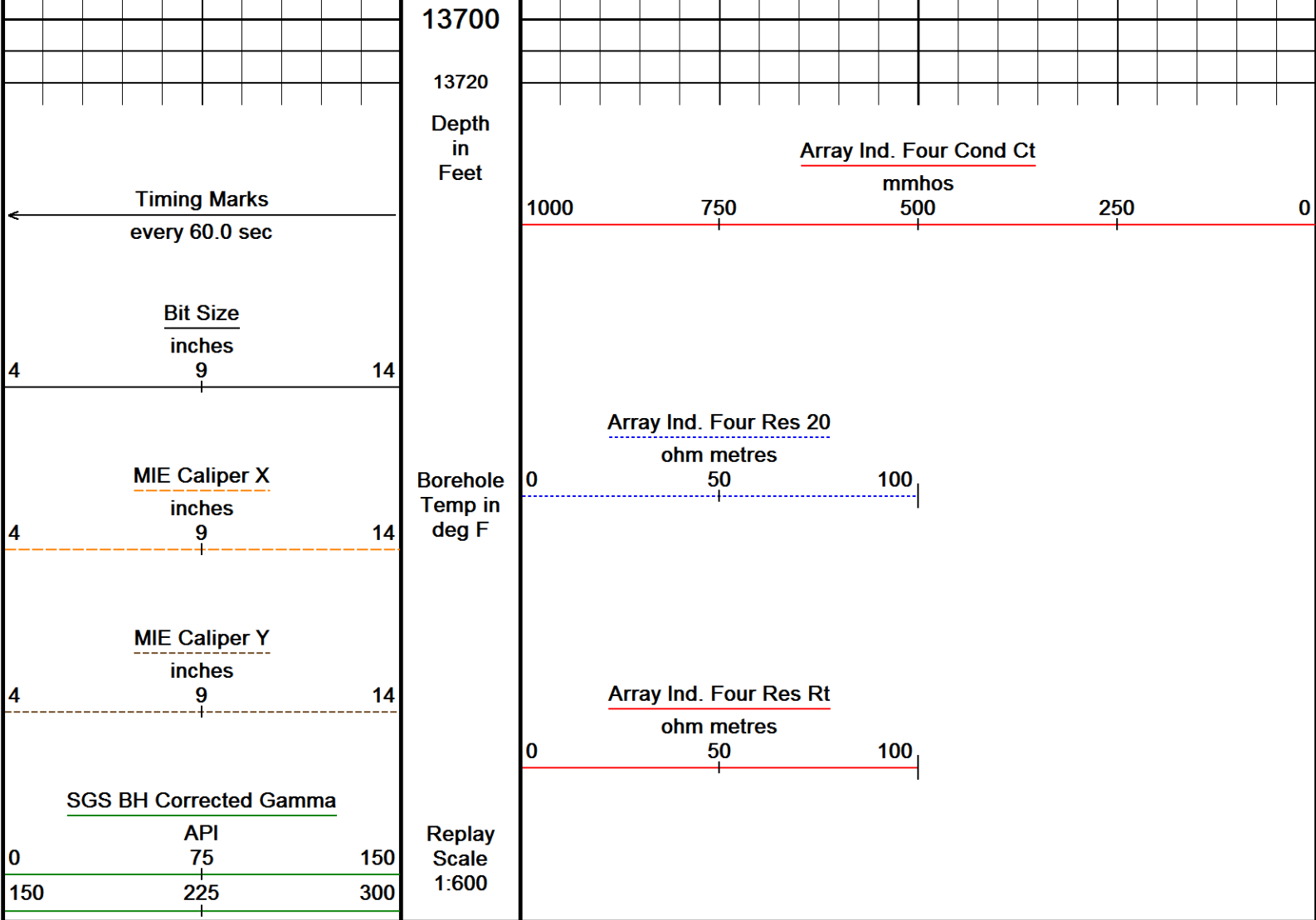
214°

13500

219°

13600





Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 11-OCT-2014 12:20

Filename: C:\LOGS\WHITING\Horsetail 30F-1943\MMS Depth.dta

Recorded on 11-OCT-2014 10:59

System Versions: Logged with 14.01.3220 Processed with 14.01.3220 Plotted with 14.01.3220

↑ 2 INCH MAIN LOG ↑

↓ 5 INCH MAIN LOG ↓

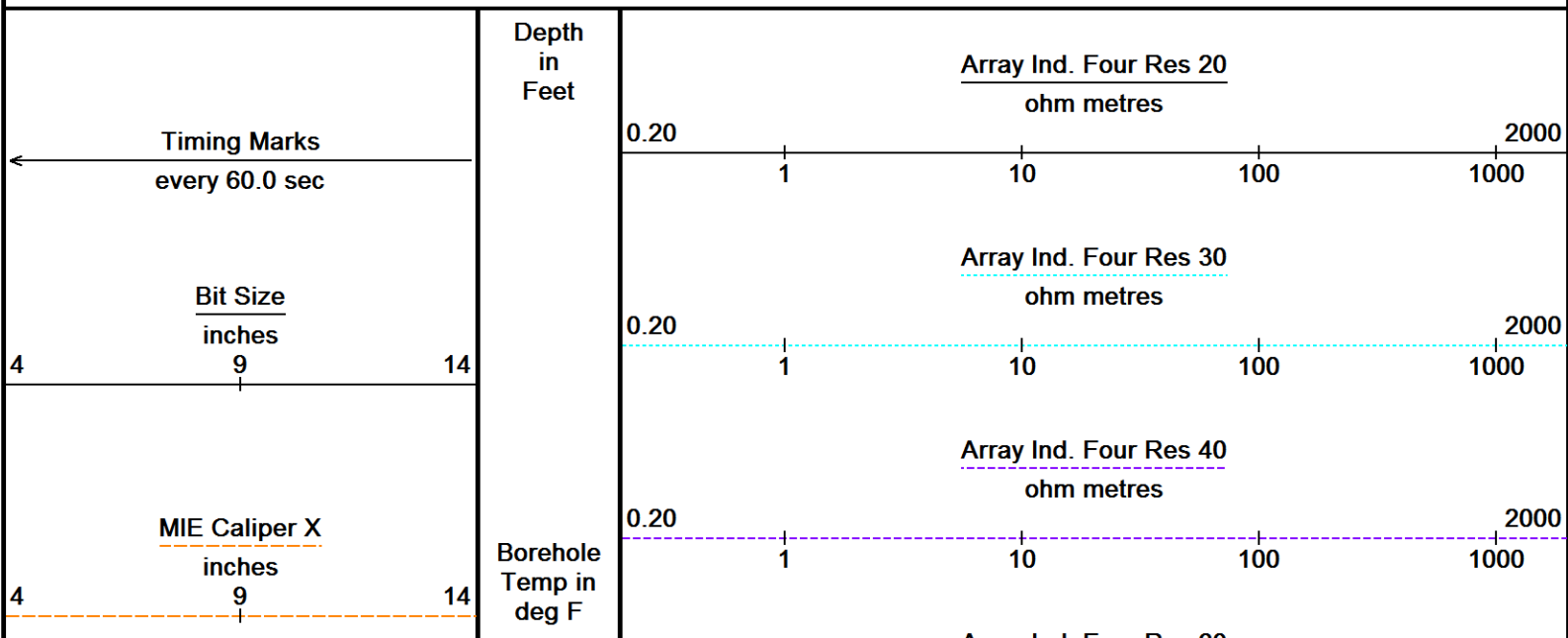
Depth Based Data - Maximum Sampling Increment 10.0cm

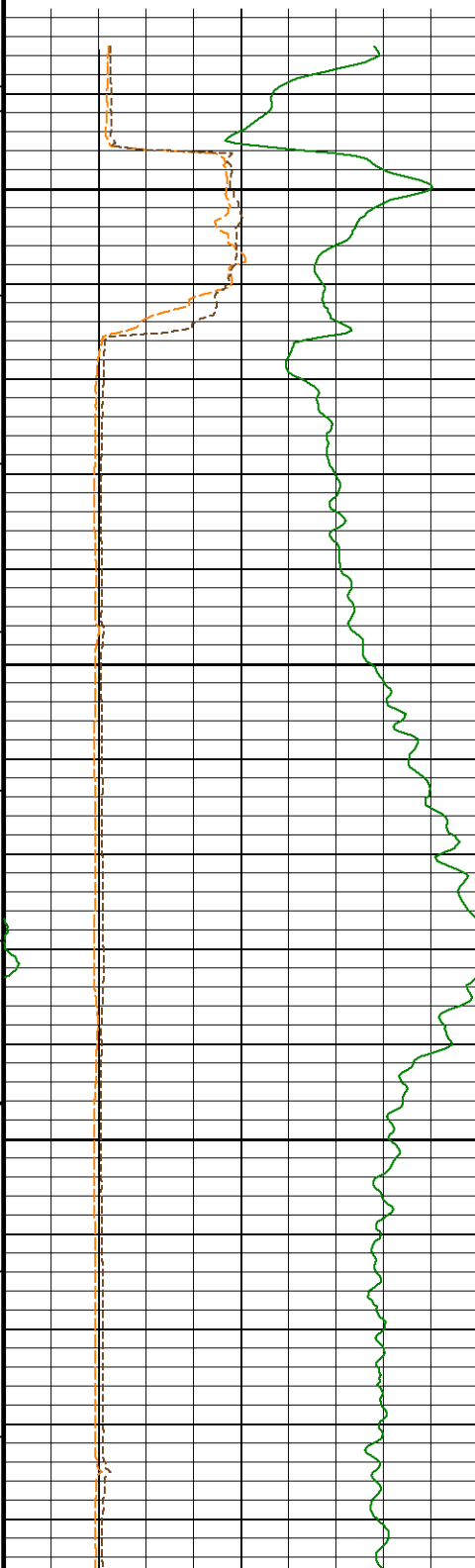
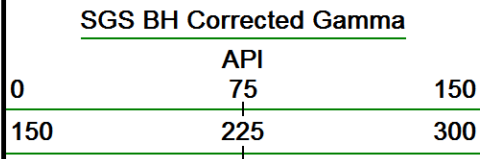
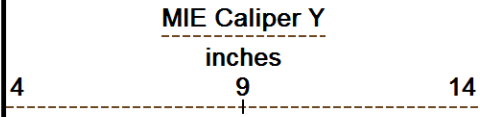
Plotted on 11-OCT-2014 12:20

Filename: C:\LOGS\WHITING\Horsetail 30F-1943\MMS Depth.dta

Recorded on 11-OCT-2014 10:59

System Versions: Logged with 14.01.3220 Processed with 14.01.3220 Plotted with 14.01.3220





Replay  
Scale  
1:240

5984  
Casing  
Shoe

6000

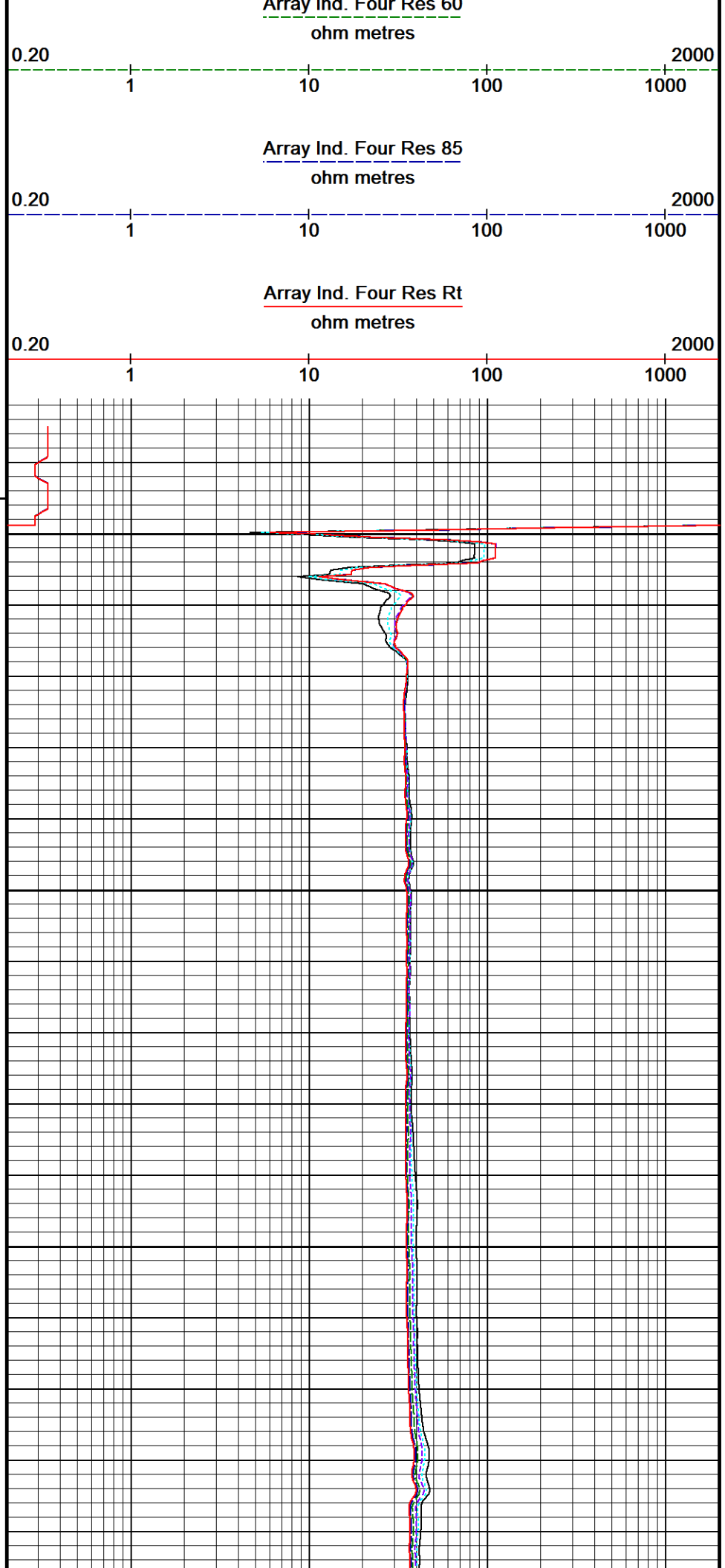
201°

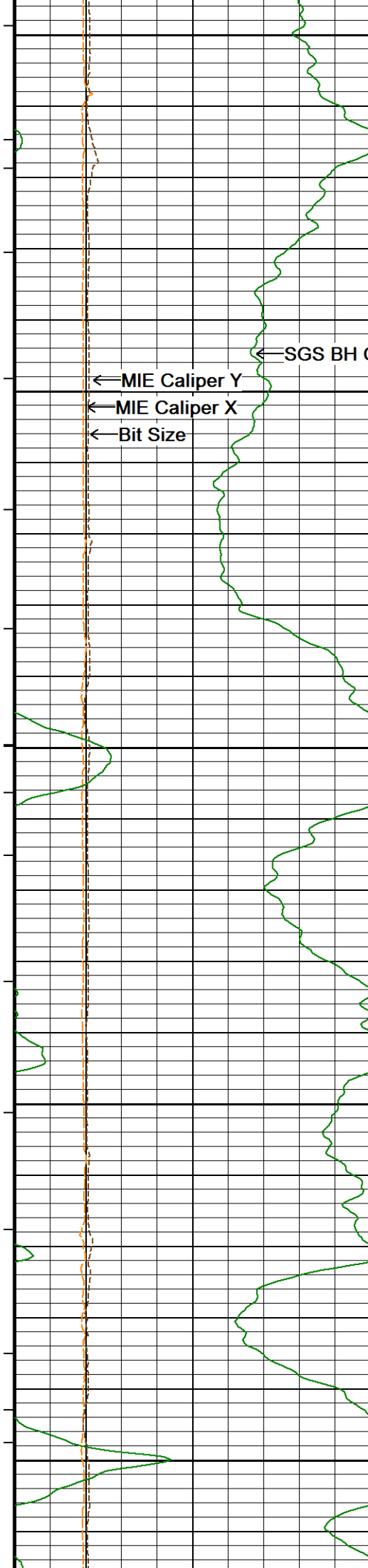
6050

201°

6100

202°





6150

202°

6200

202°

6250

203°

6300

203°

6350

Array Ind. Four Res Rt →

Array Ind. Four Res 85 →

Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →



203°

6400

203°

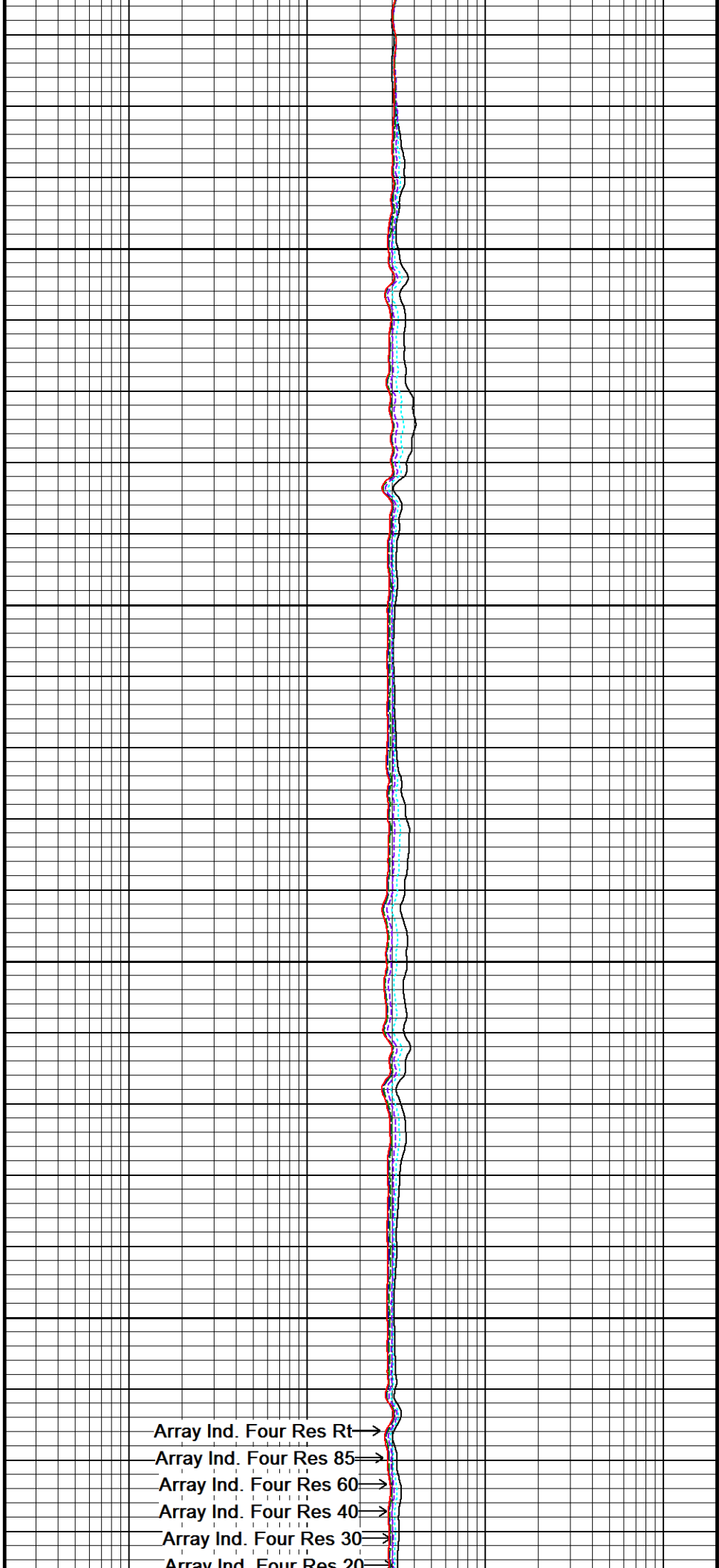
6450

204°

6500

204°

6550



Array Ind. Four Res Rt→

Array Ind. Four Res 85→

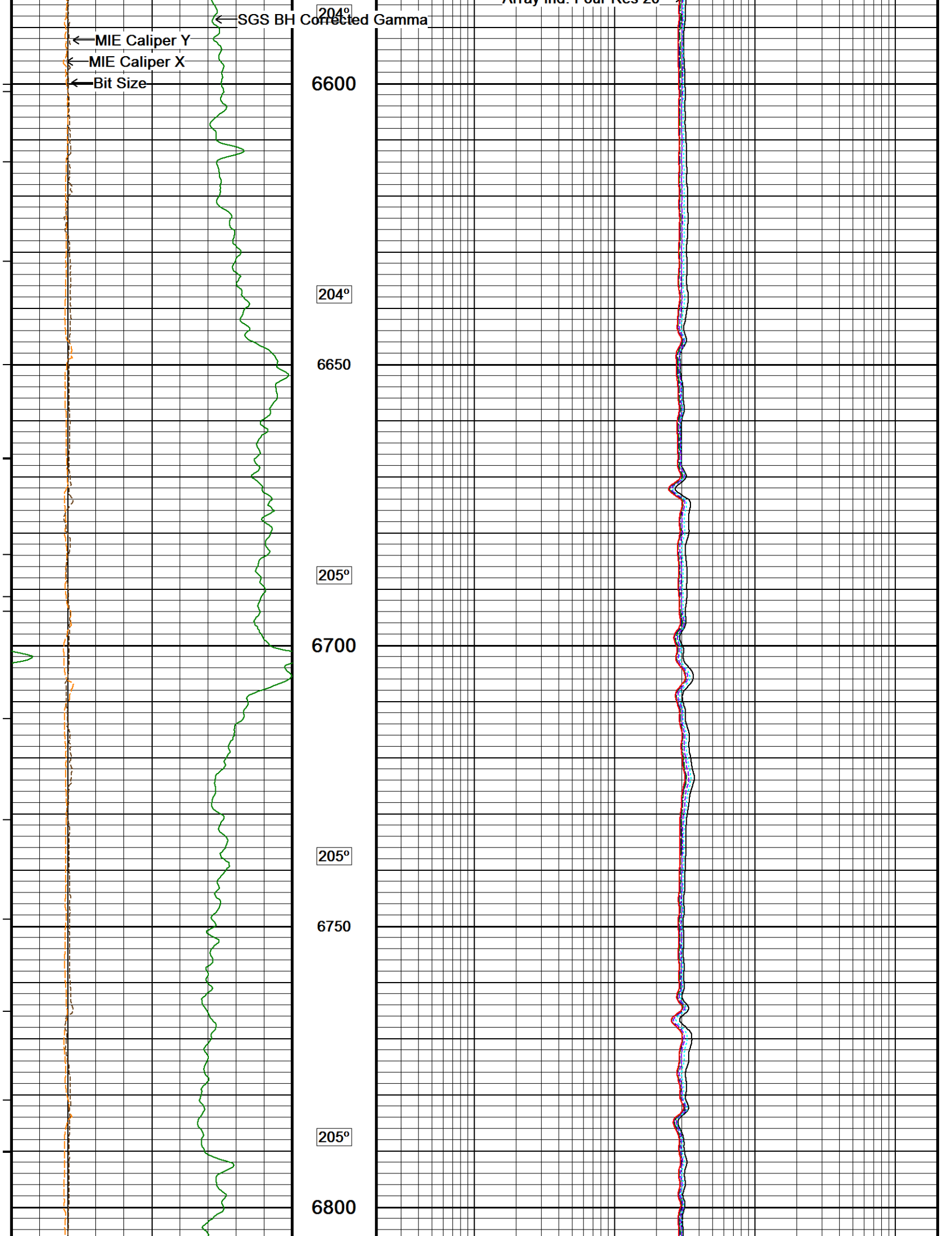
Array Ind. Four Res 60→

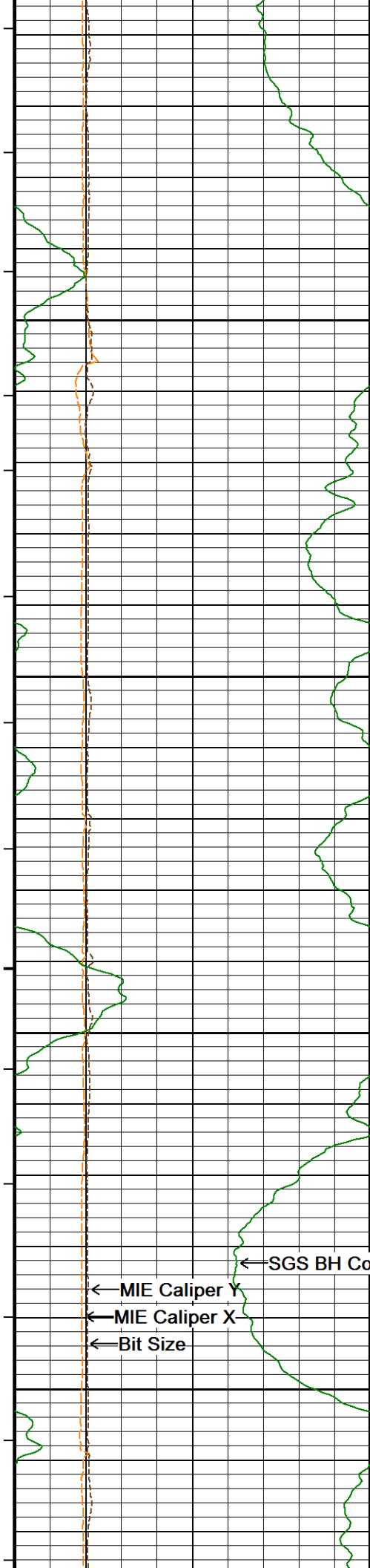
Array Ind. Four Res 40→

Array Ind. Four Res 30→

Array Ind. Four Res 20→







205°

6850

205°

6900

206°

6950

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

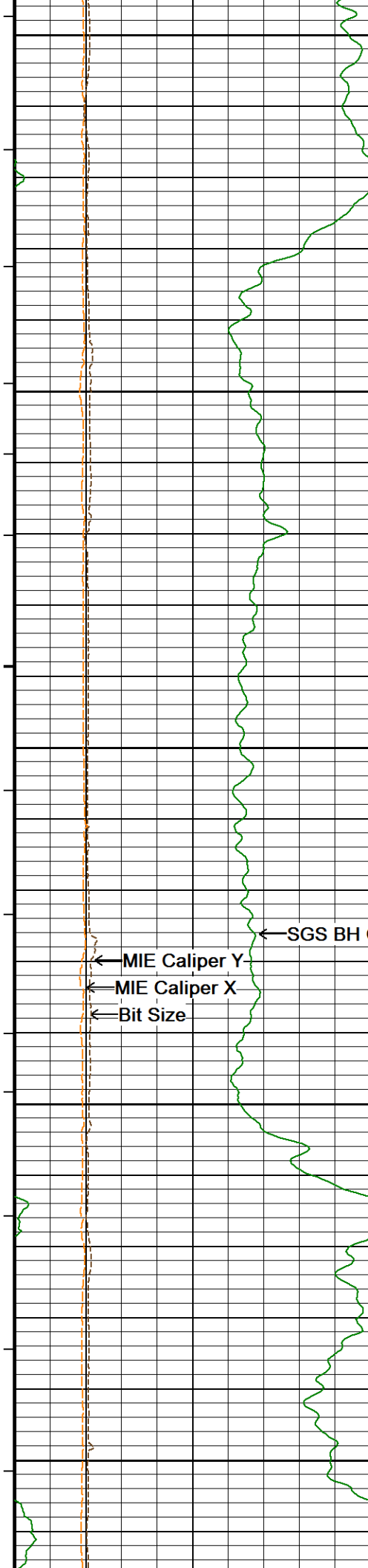
← Bit Size

206°

7000

Array Ind. Four Res Rt →  
Array Ind. Four Res 85 →  
Array Ind. Four Res 60 →  
Array Ind. Four Res 40 →  
Array Ind. Four Res 30 →  
Array Ind. Four Res 20 →





7250

207°

7300

207°

7350

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

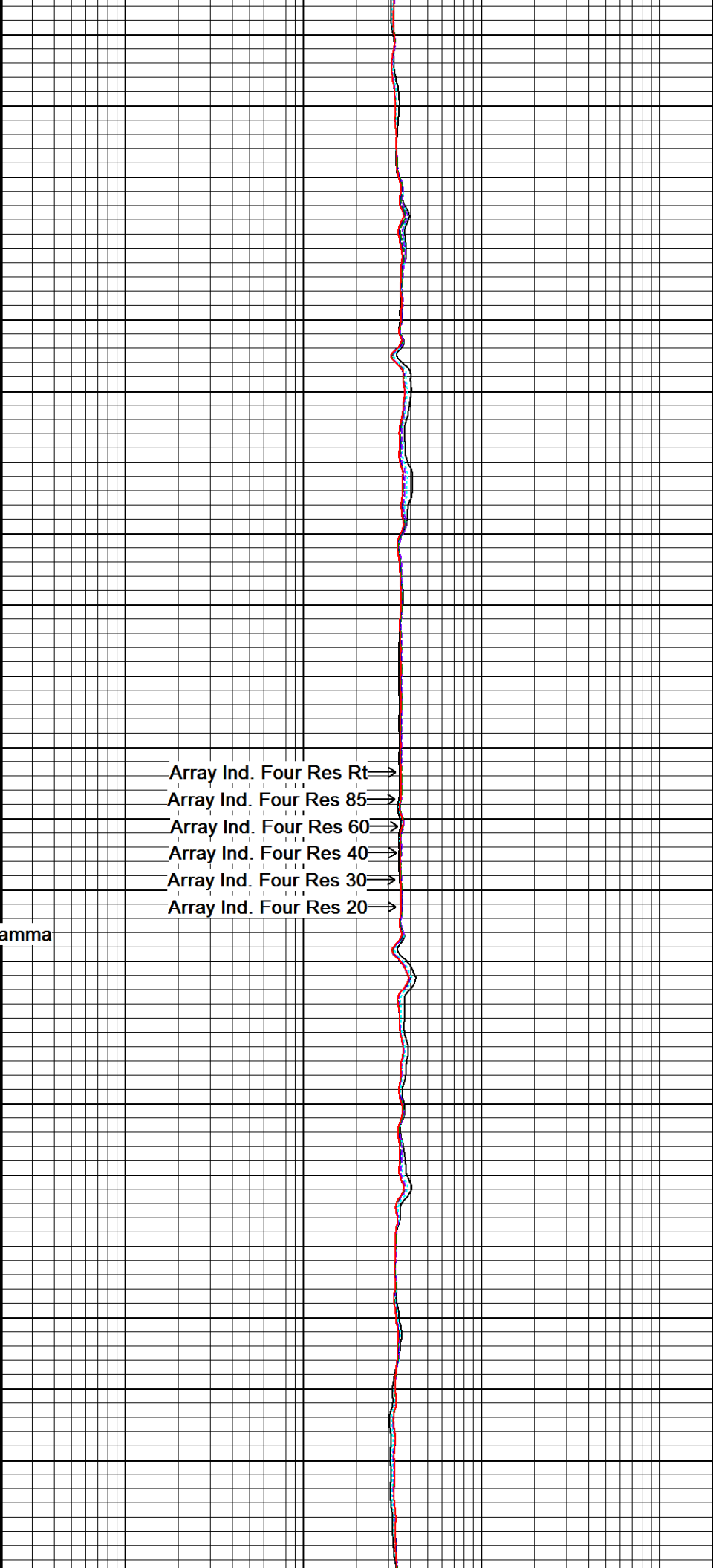
← Bit Size

207°

7400

207°

7450



Array Ind. Four Res Rt →

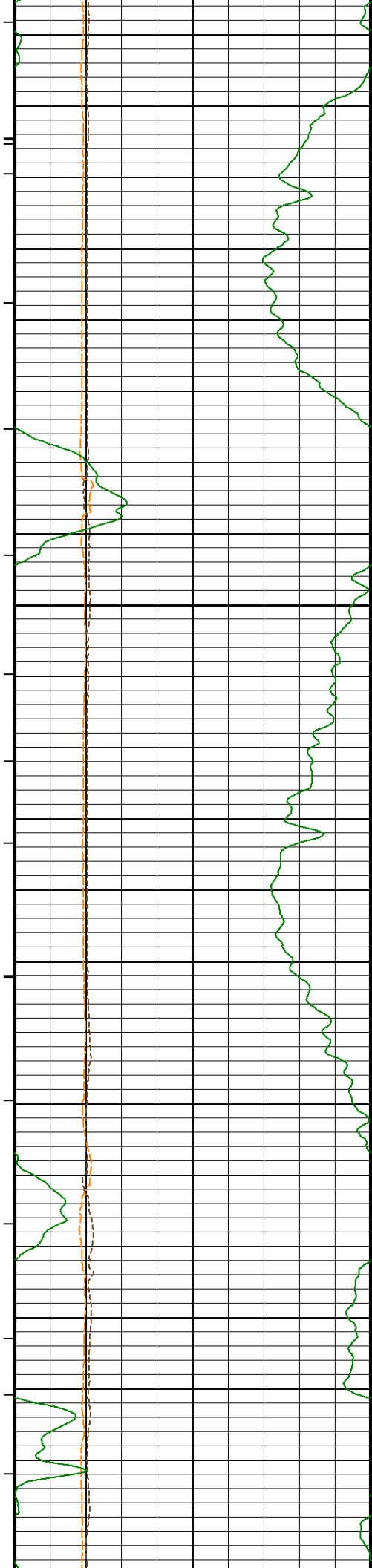
Array Ind. Four Res 85 →

Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →



208°

7500

208°

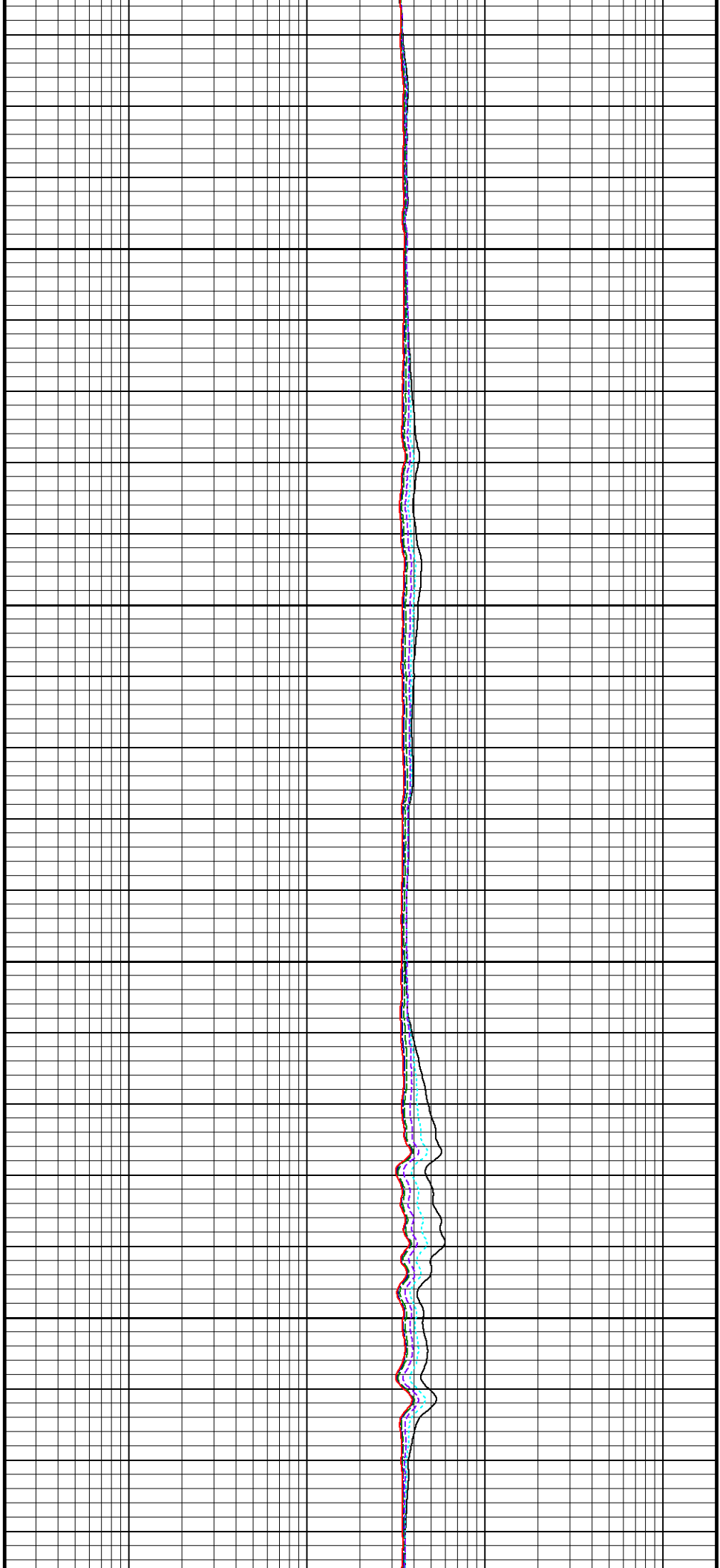
7550

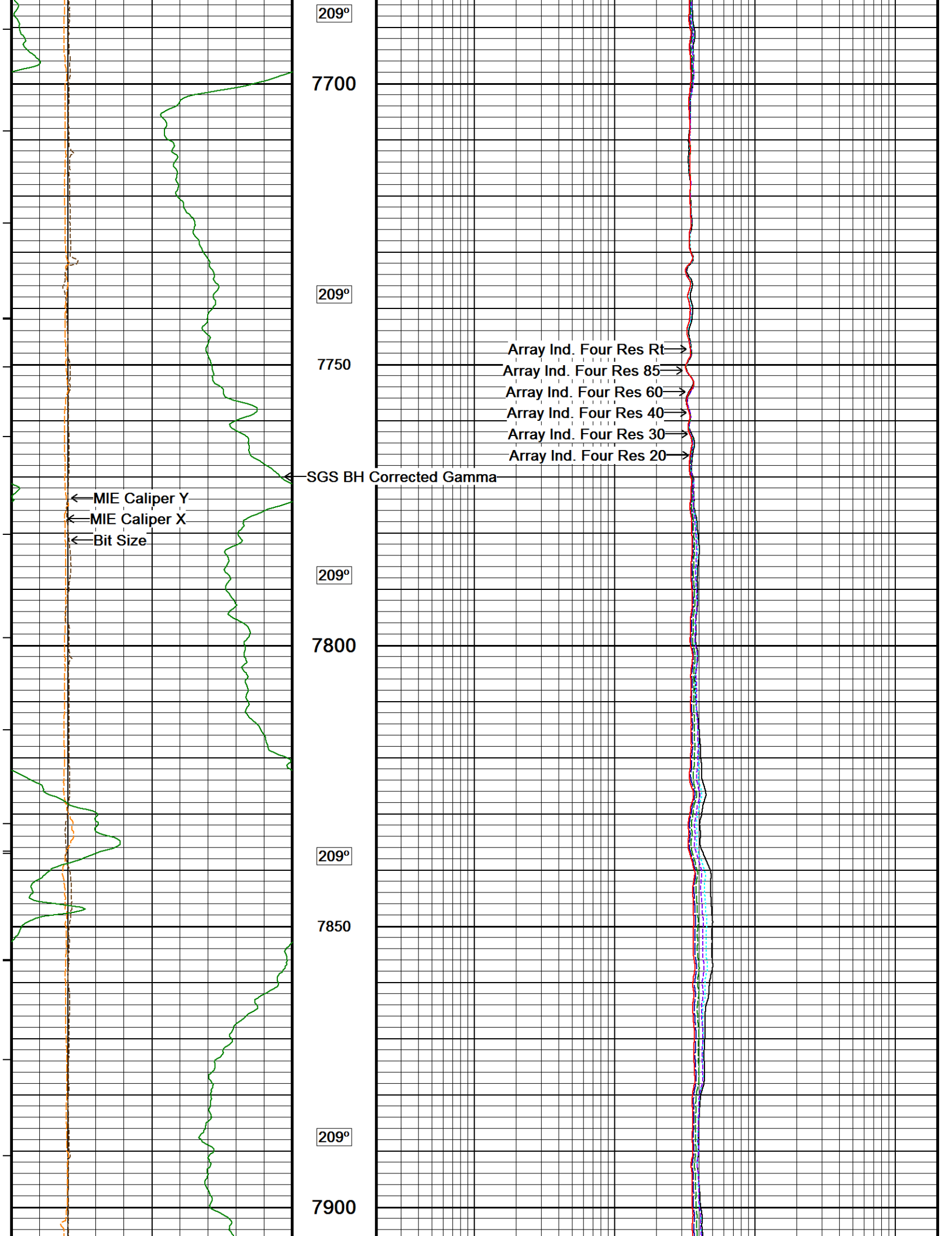
208°

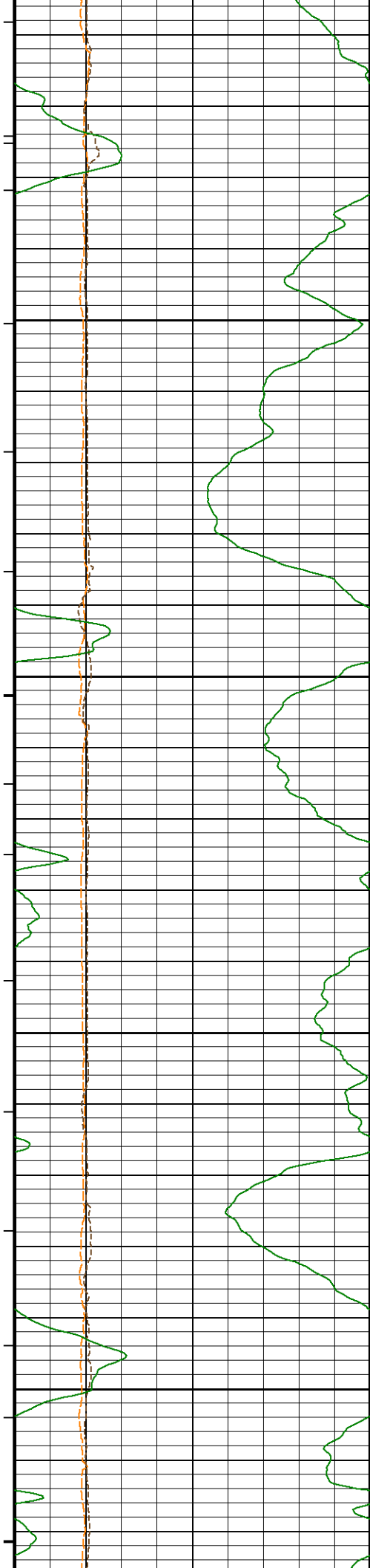
7600

208°

7650







209°

7950

209°

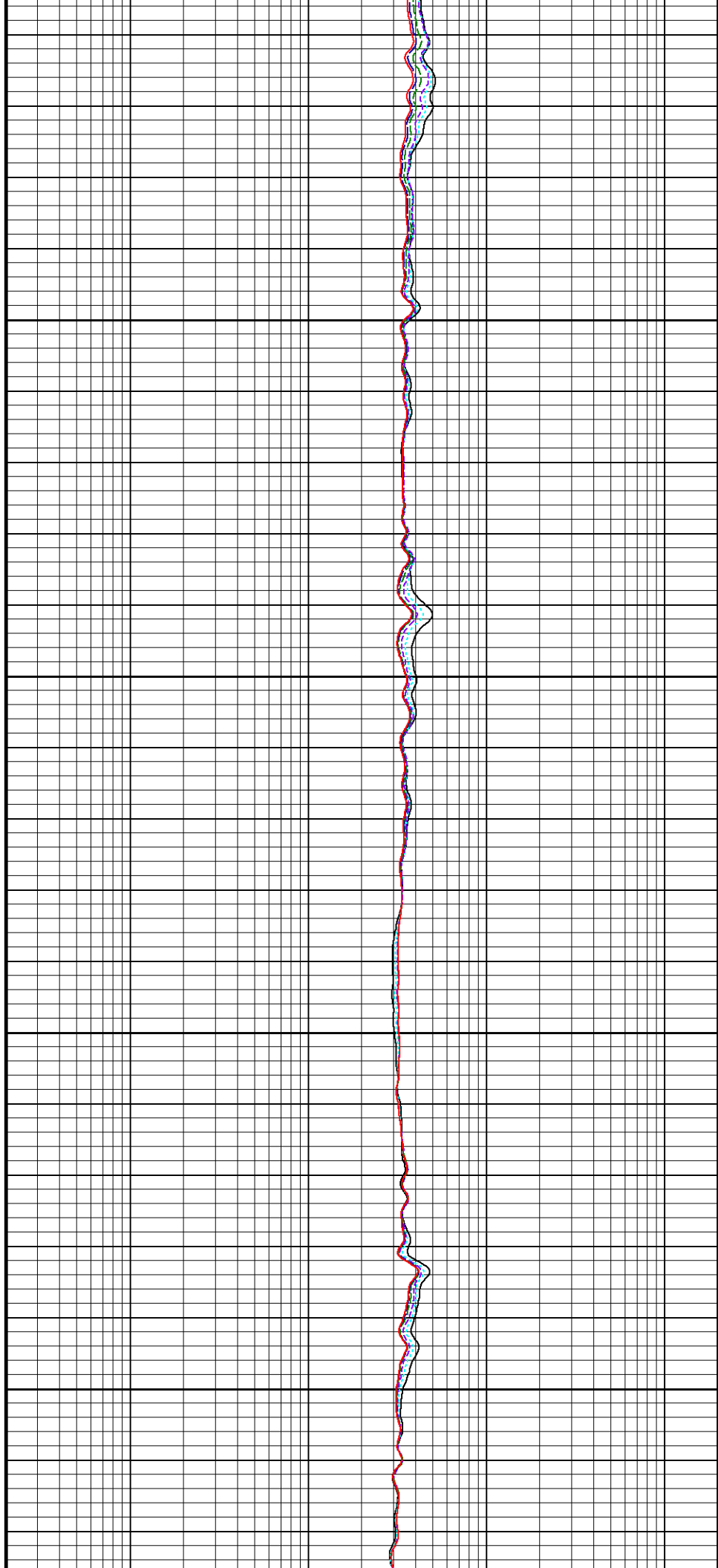
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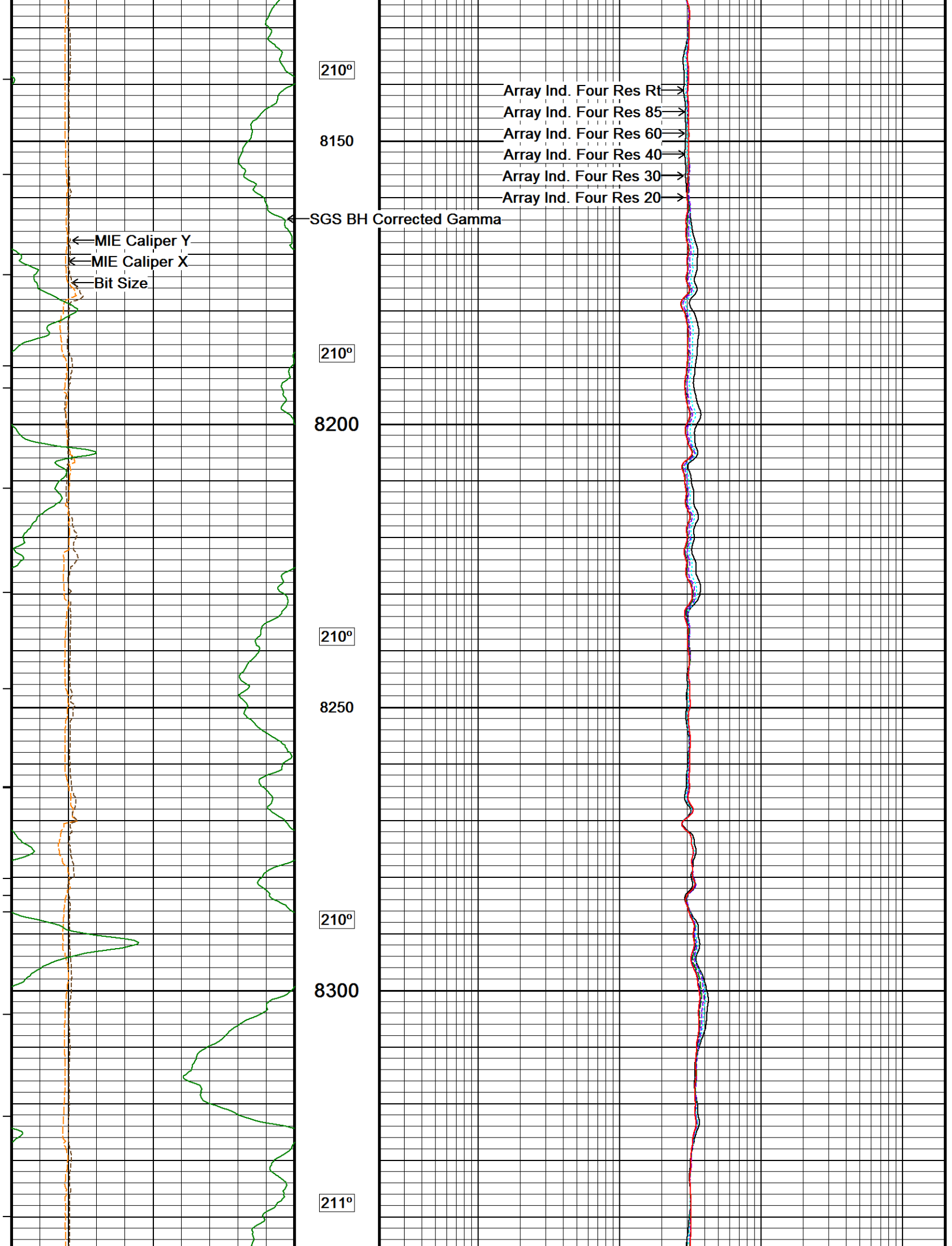
210°

8050

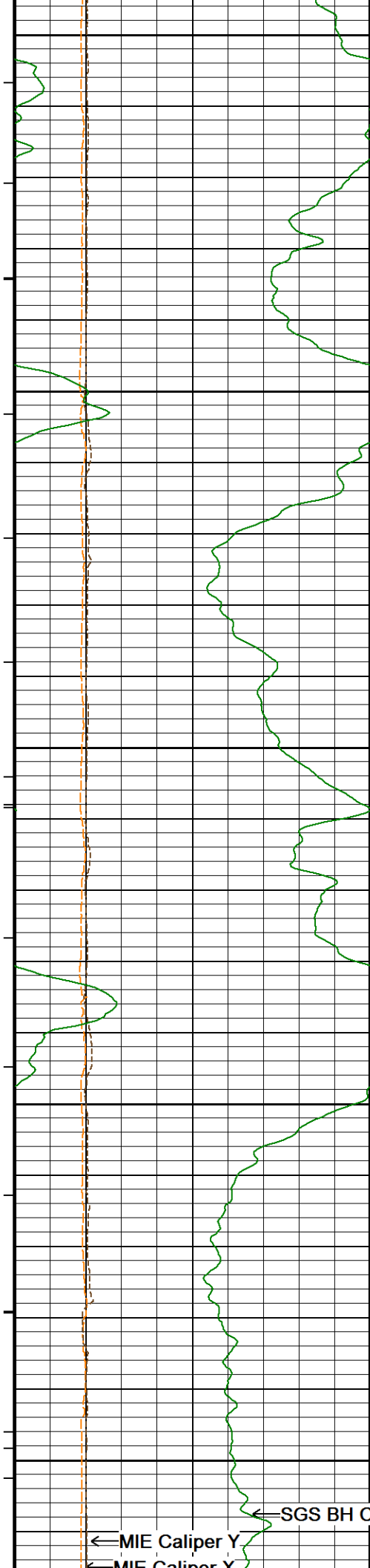
210°

8100









8350

211°

8400

211°

8450

211°

8500

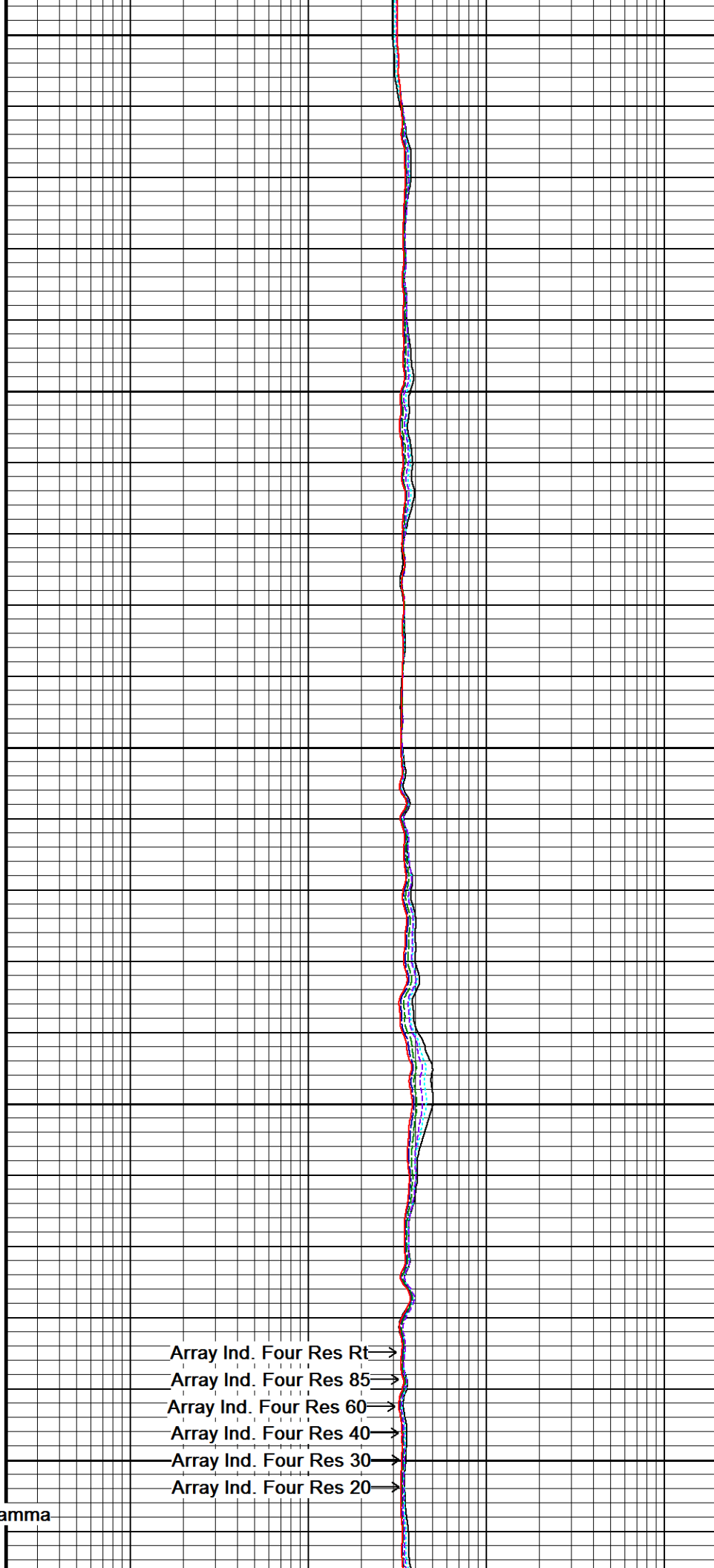
211°

8550

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper Y



Array Ind. Four Res Rt →

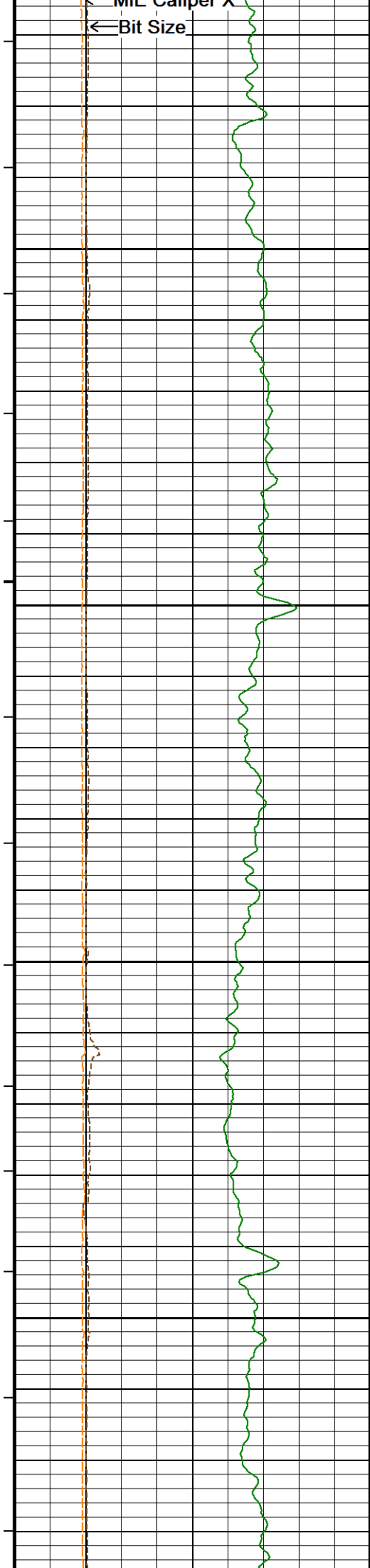
Array Ind. Four Res 85 →

Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →



211°

8600

211°

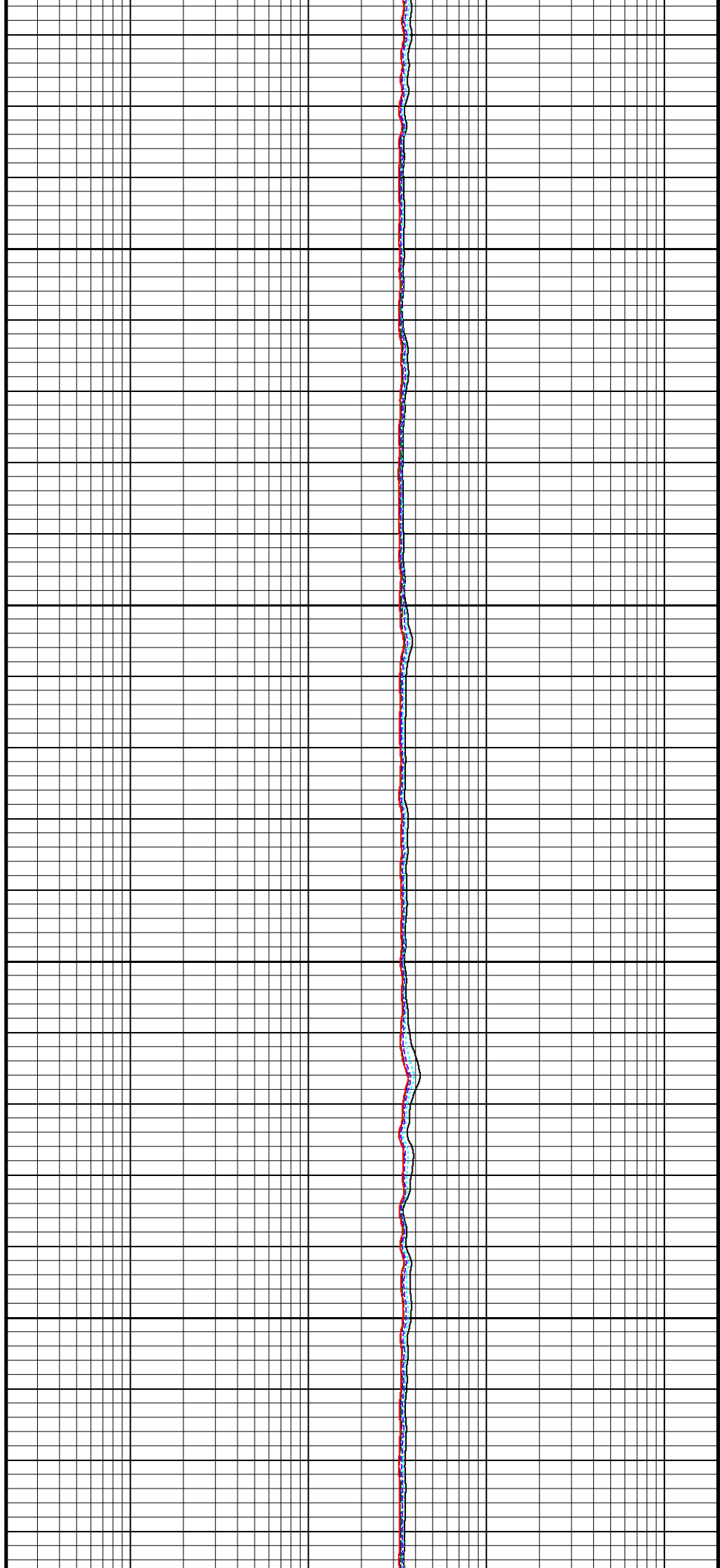
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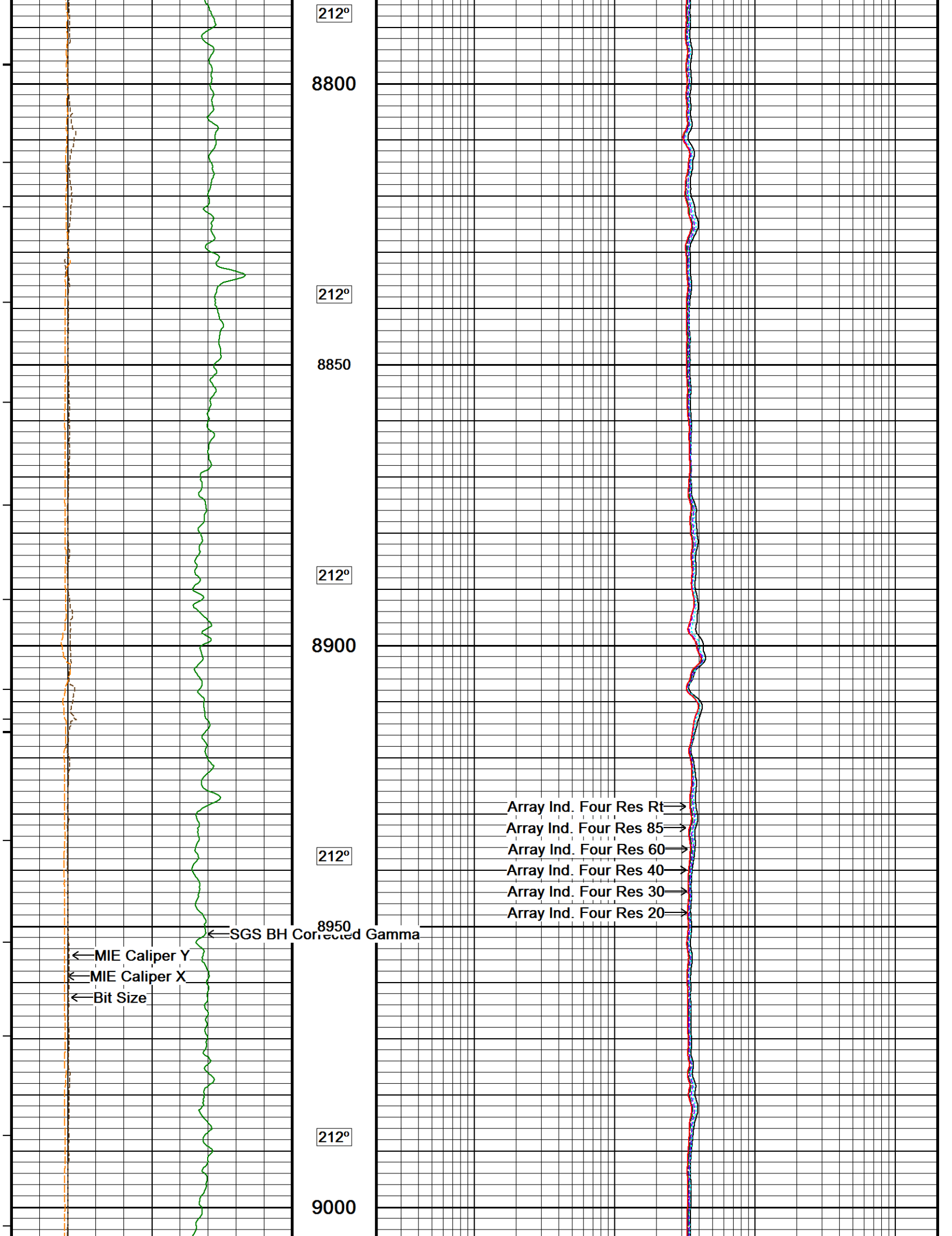
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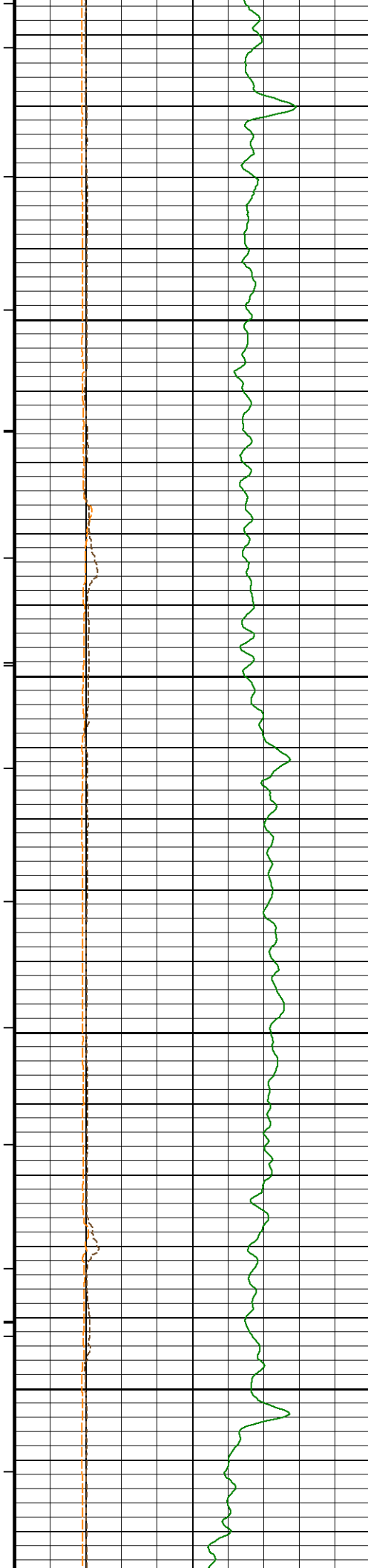
8700

212°

8750







212°

9050

212°

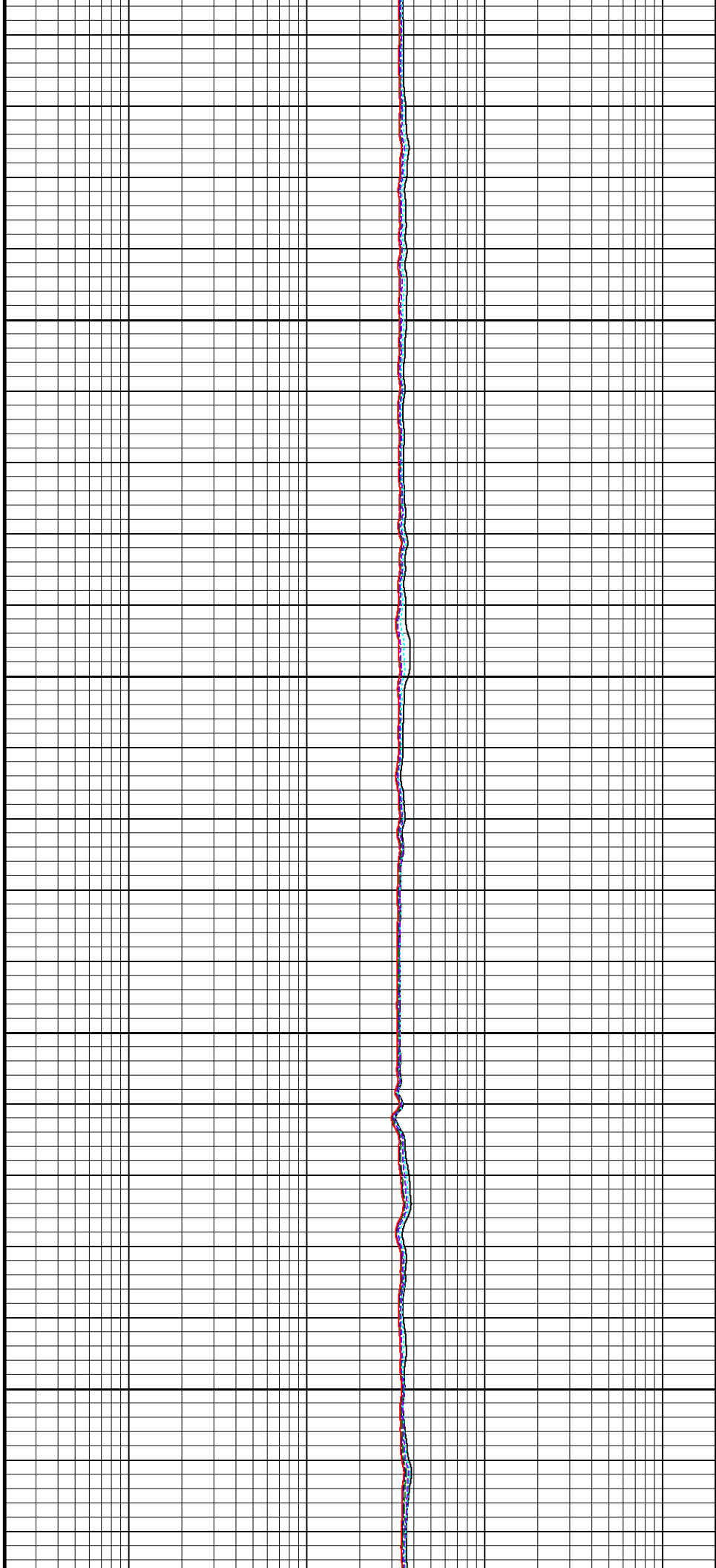
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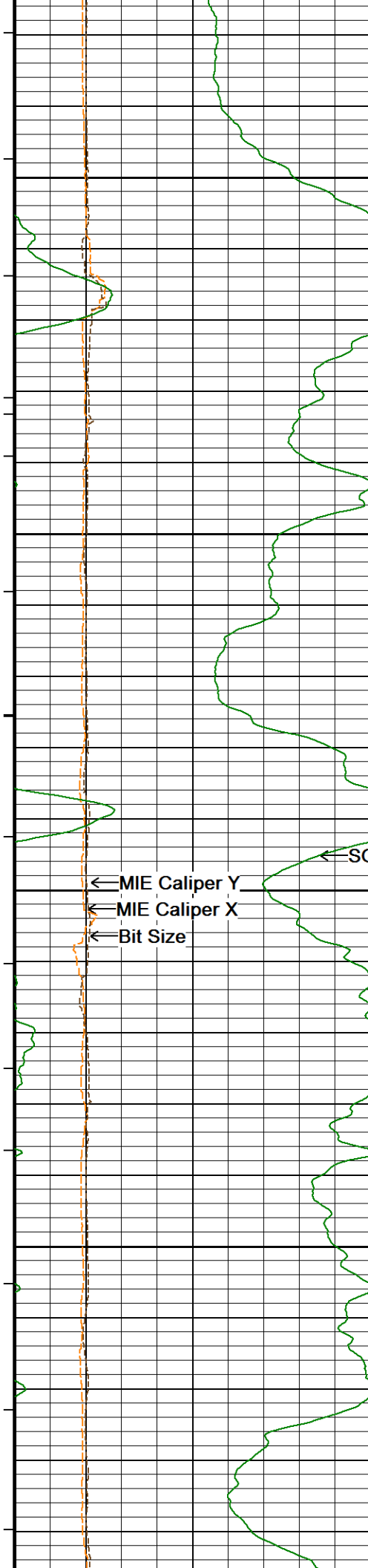
212°

9150

213°

9200





213°

9250

213°

9300

213°

← SGS BH Corrected Gamma

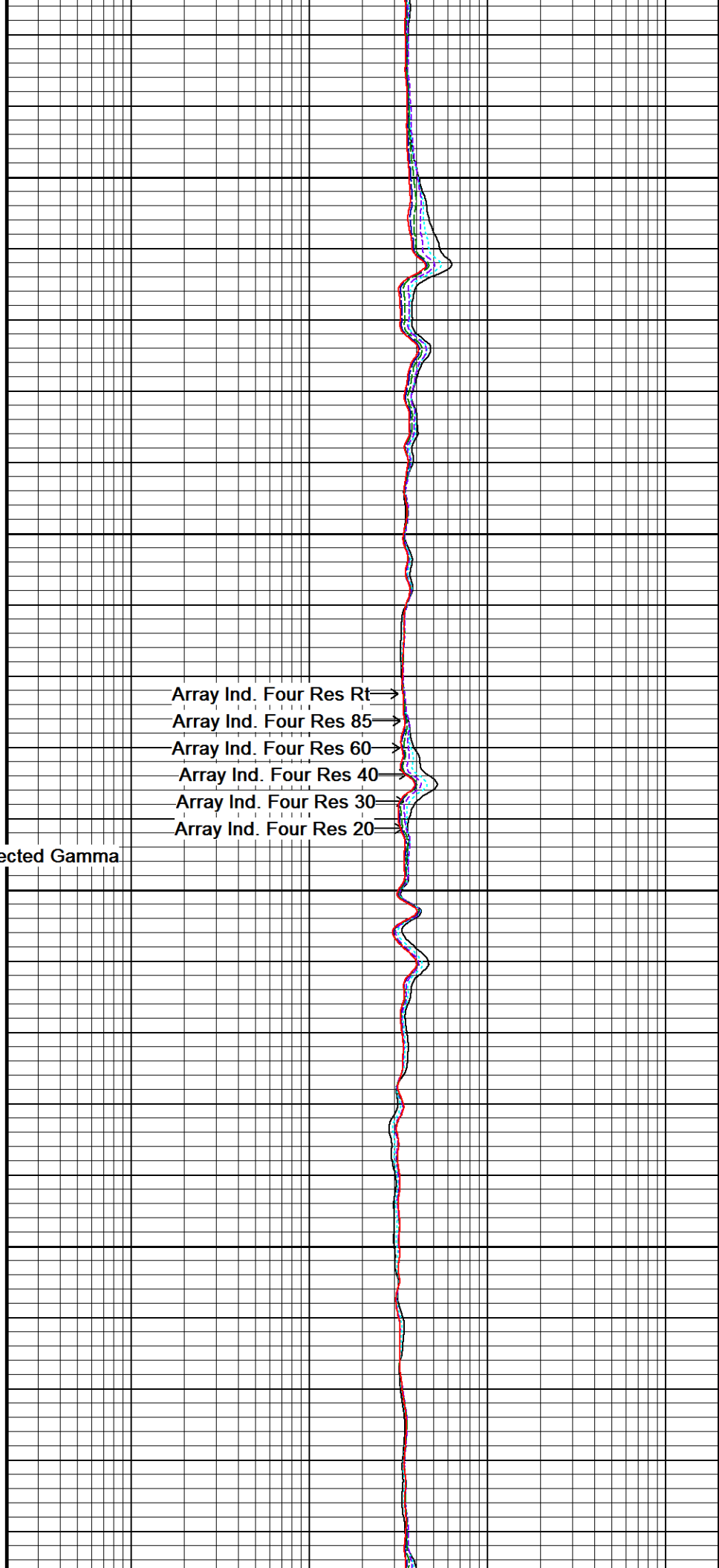
9350

← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

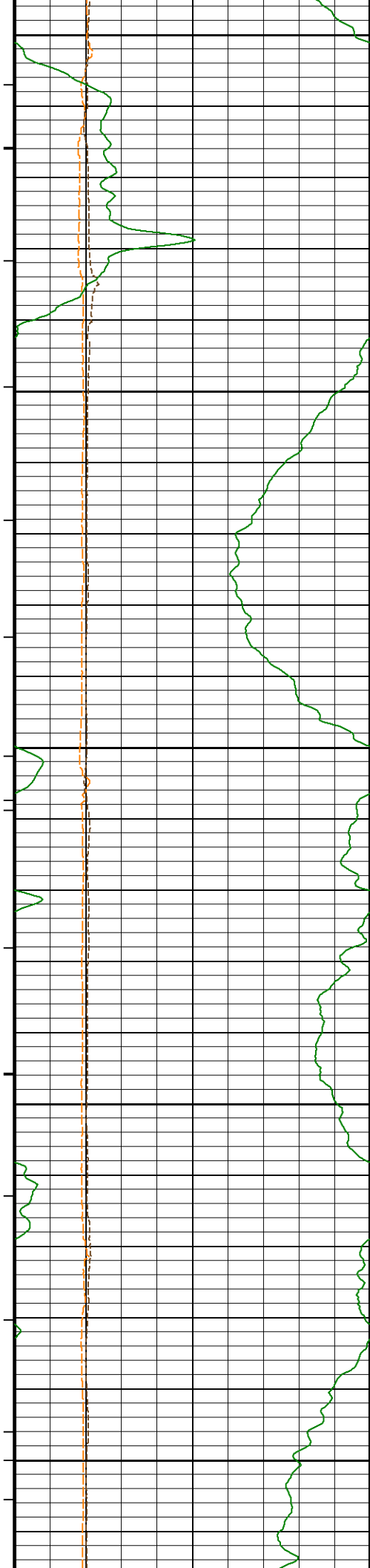
213°

9400

213°



Array Ind. Four Res Rt  
Array Ind. Four Res 85  
Array Ind. Four Res 60  
Array Ind. Four Res 40  
Array Ind. Four Res 30  
Array Ind. Four Res 20



9450

213°

9500

213°

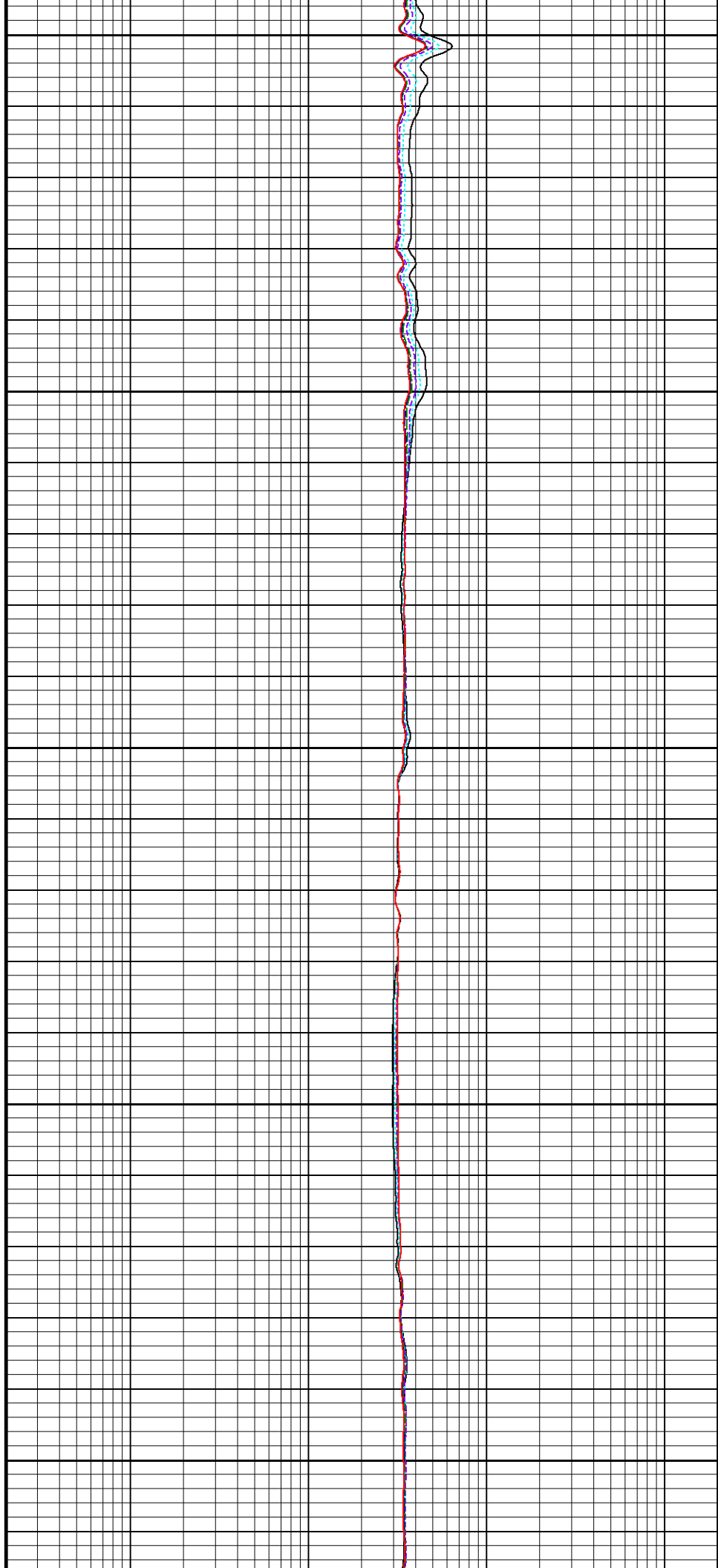
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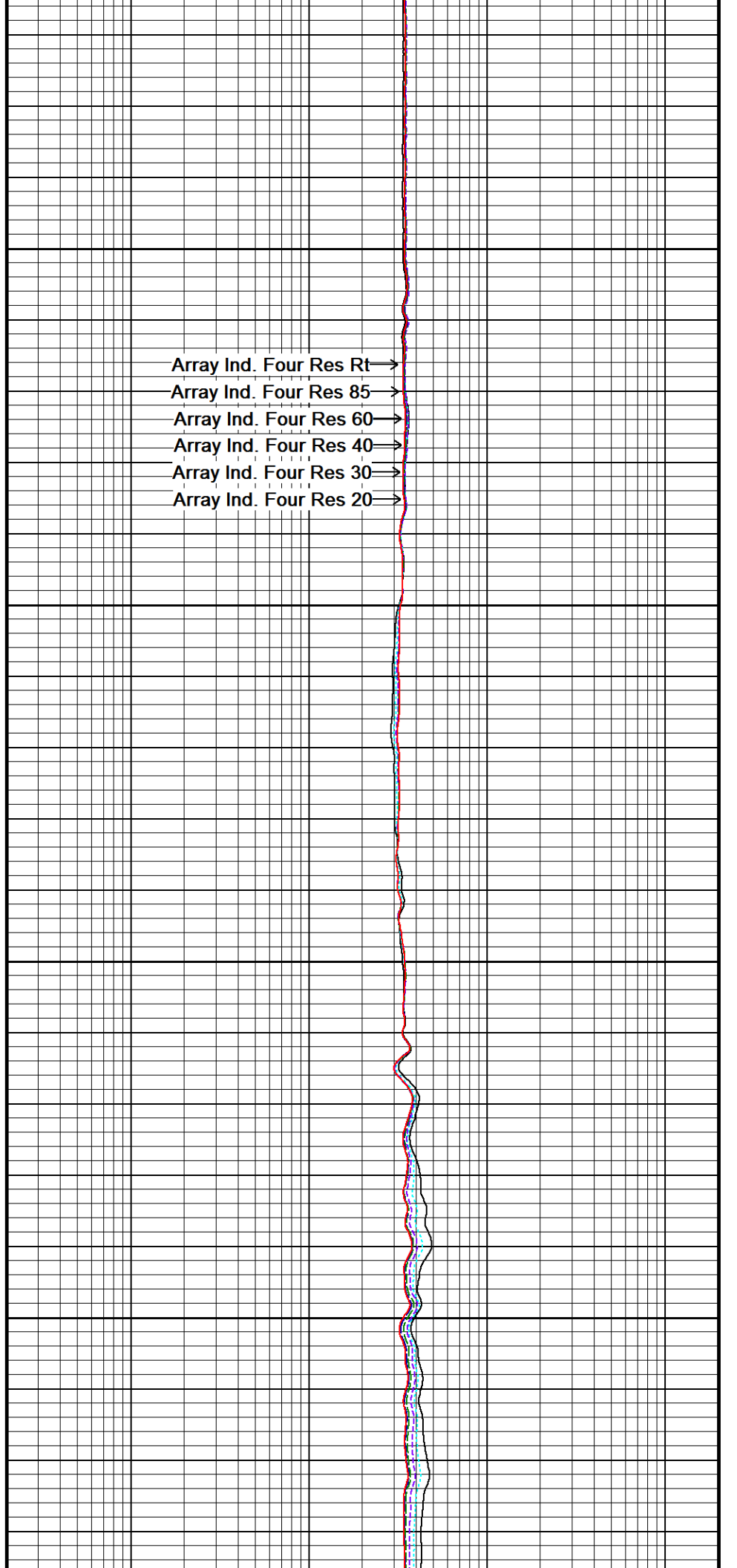
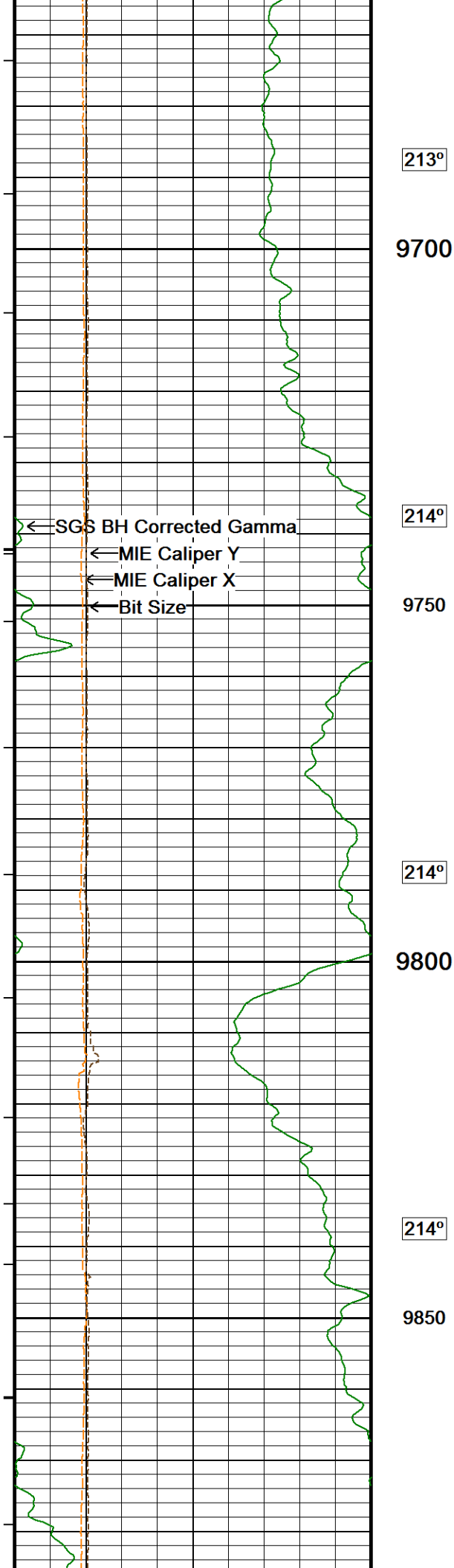
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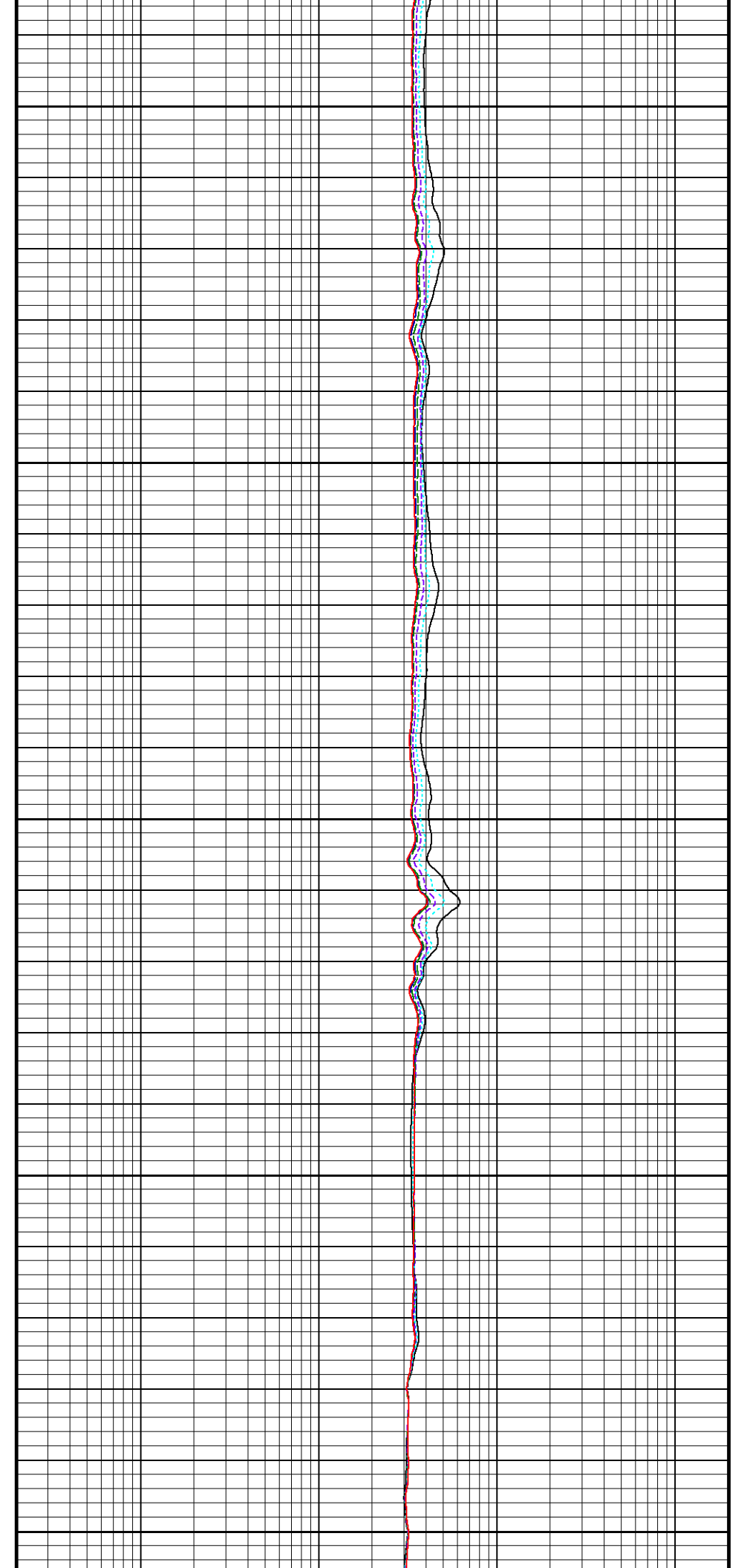
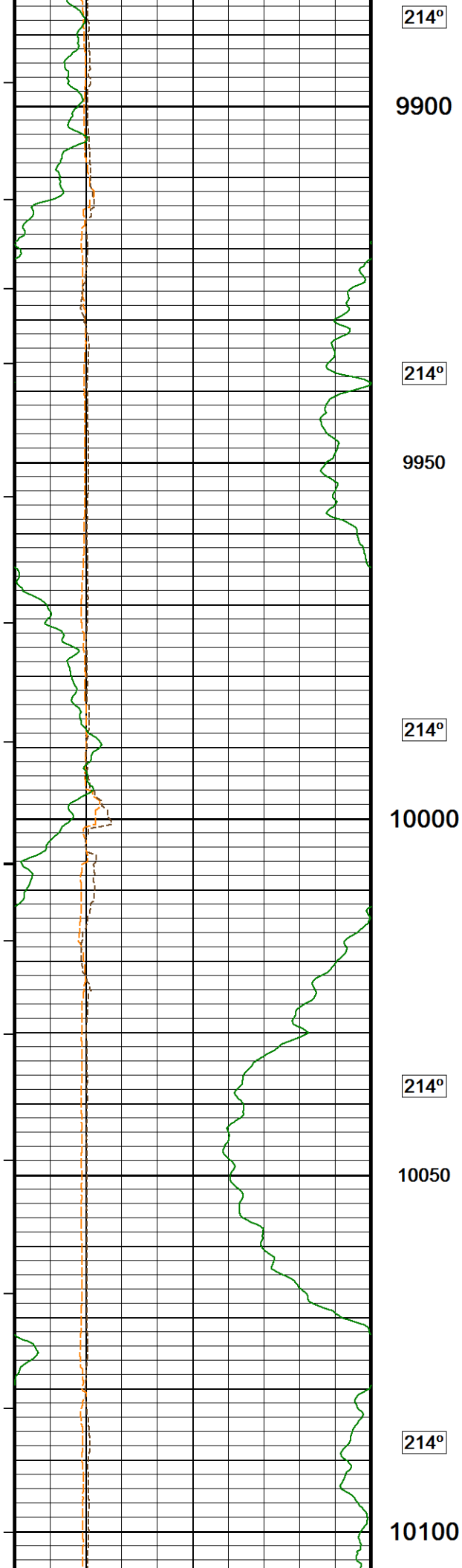
9600

213°

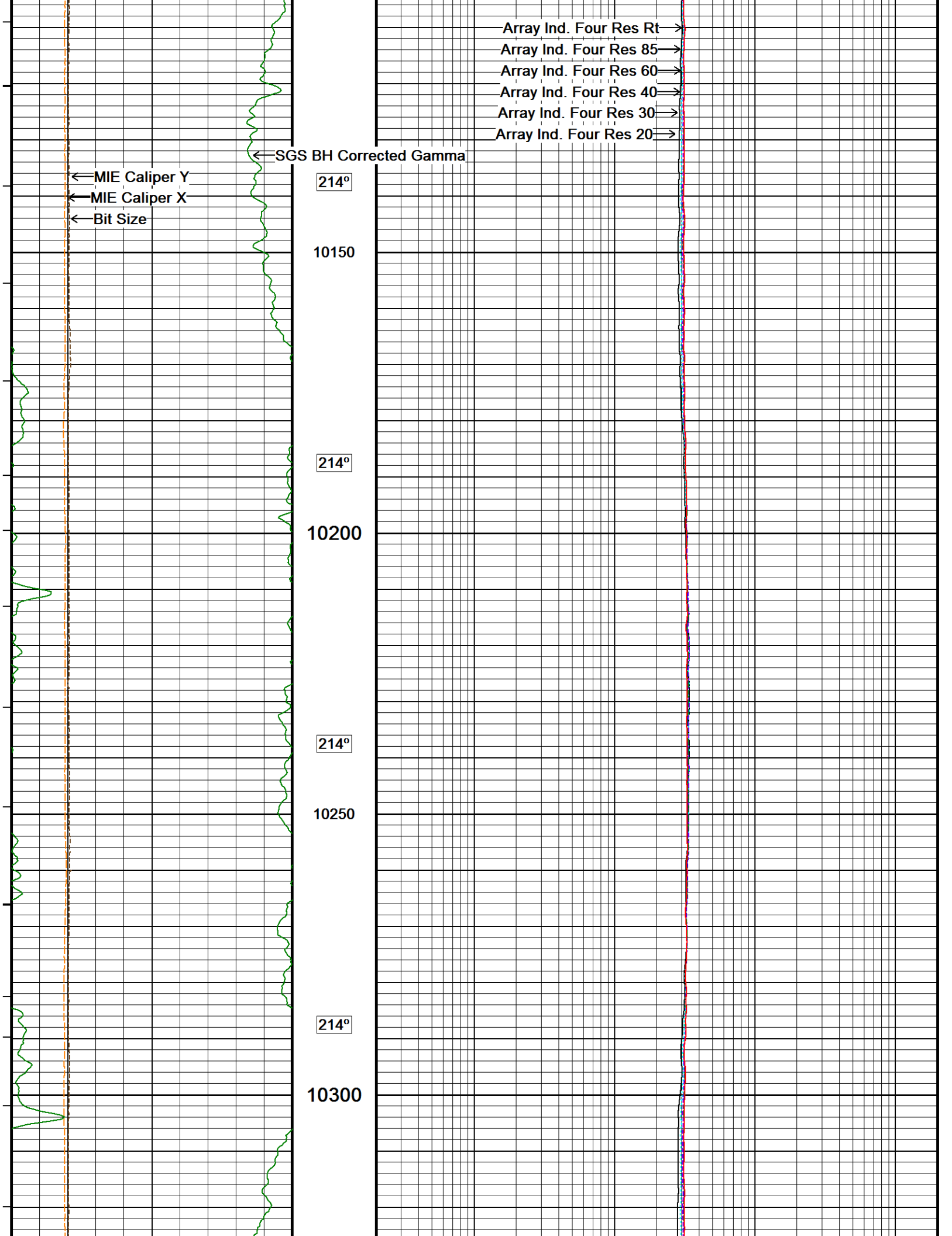
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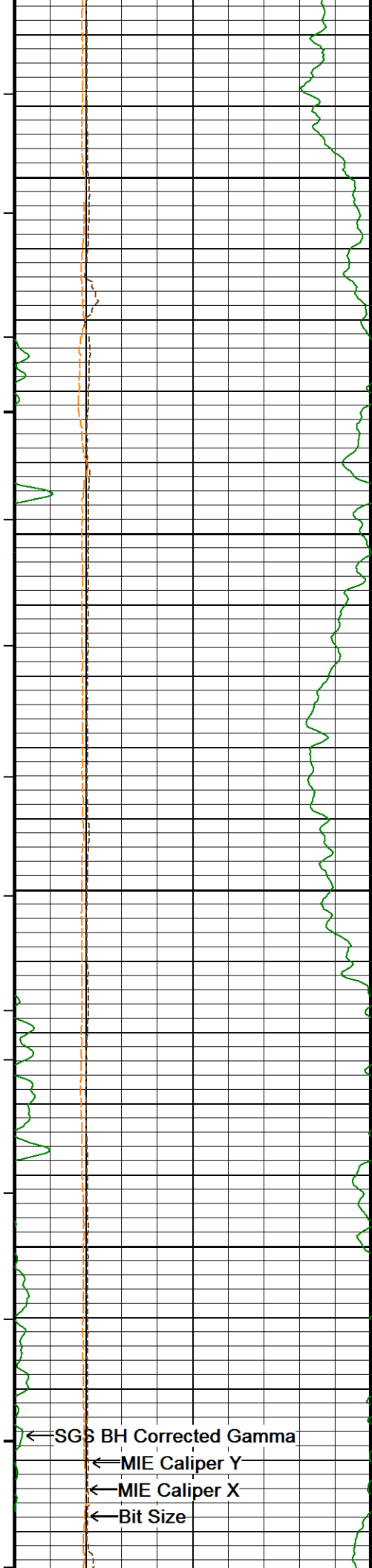












215°

10350

215°

10400

215°

10450

215°

10500

215°

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

← Bit Size

Array Ind. Four Res Rt→

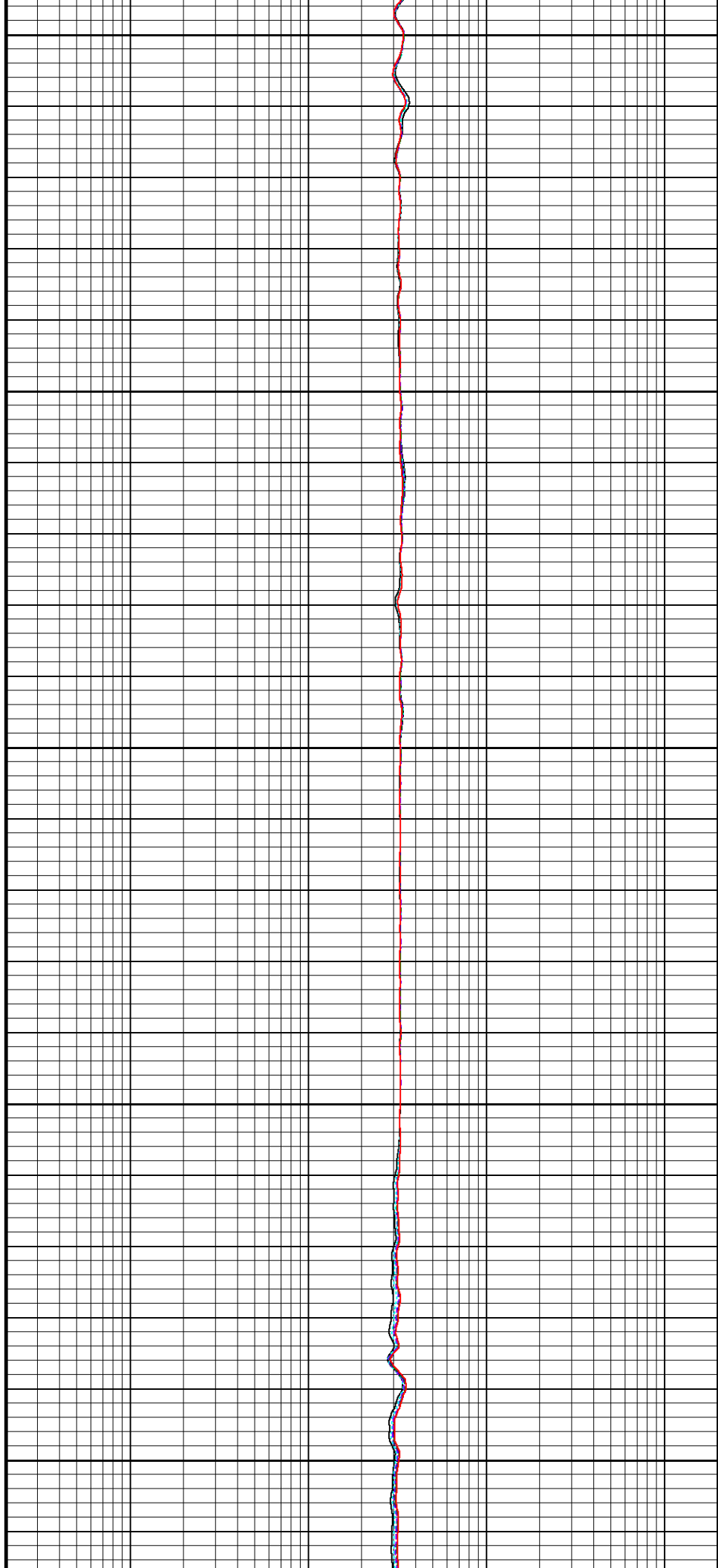
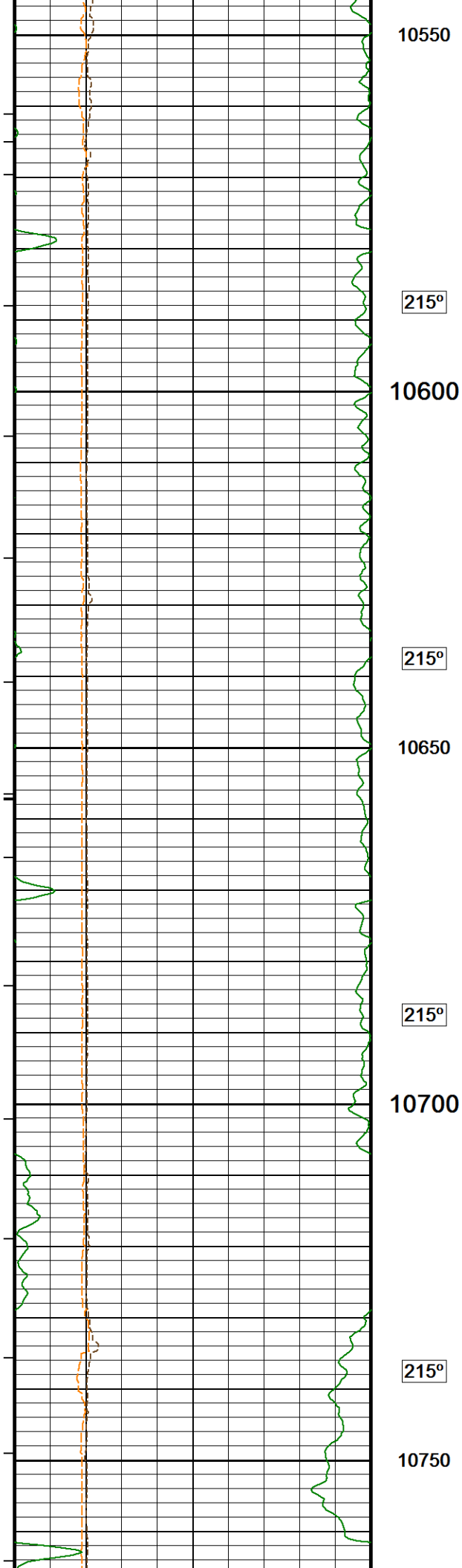
Array Ind. Four Res 85→

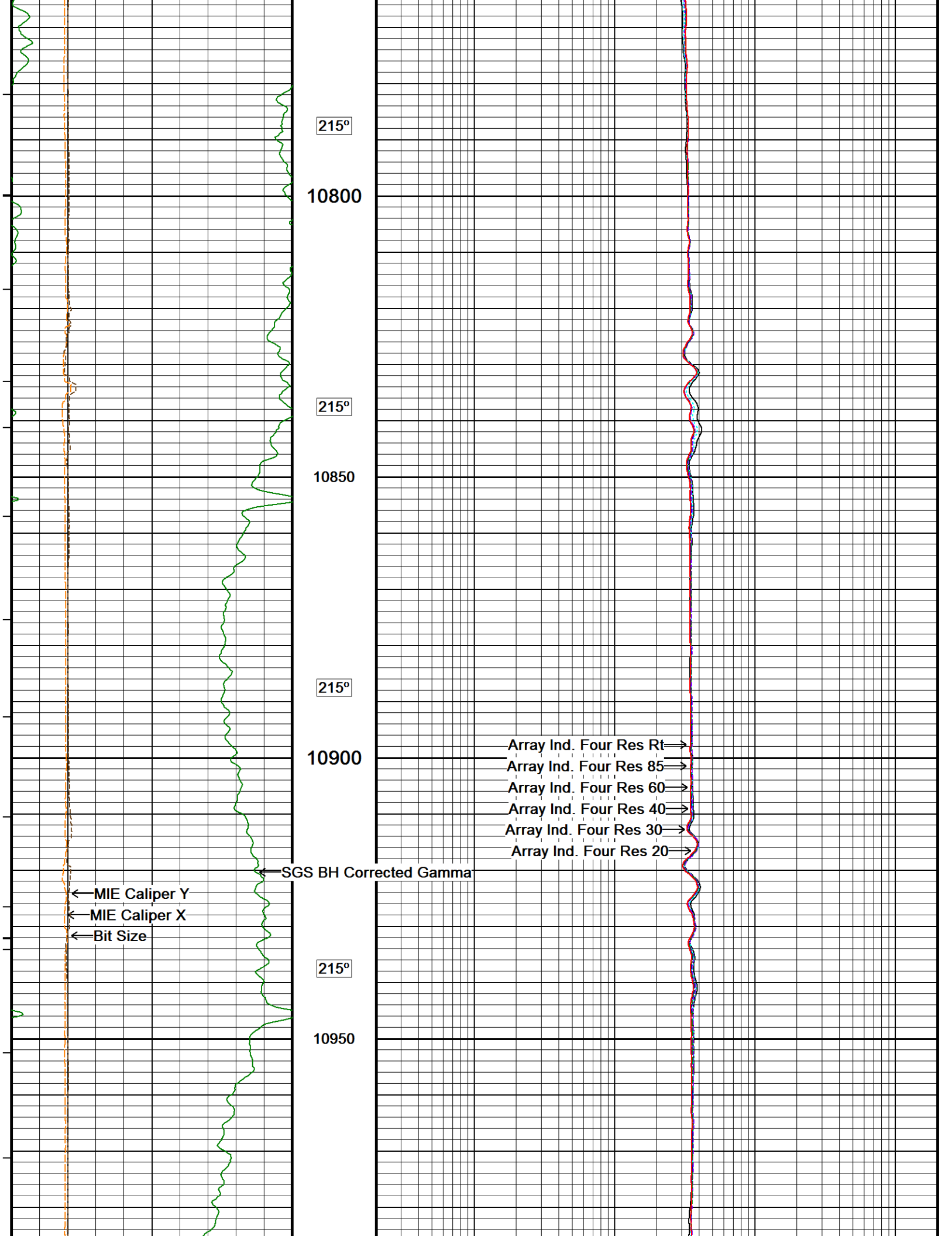
Array Ind. Four Res 60→

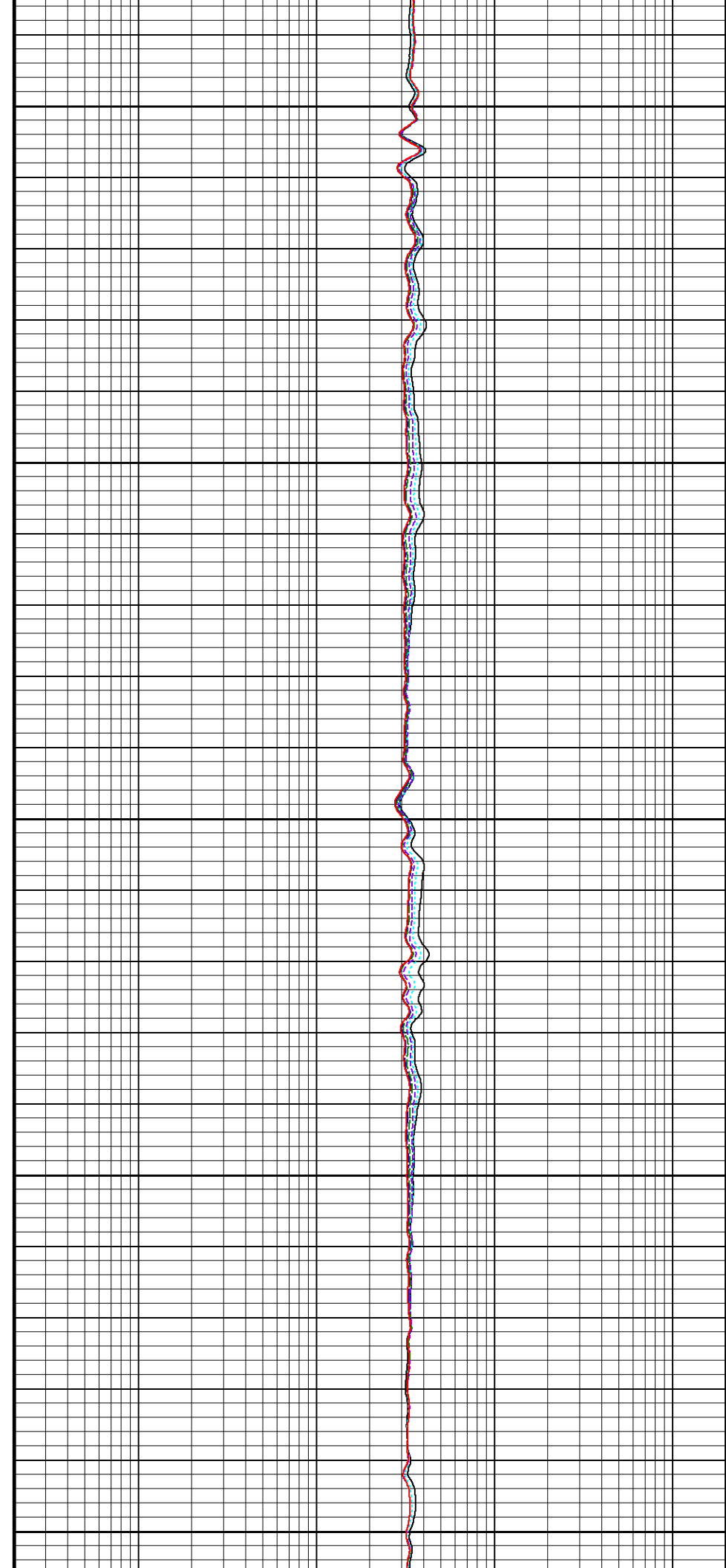
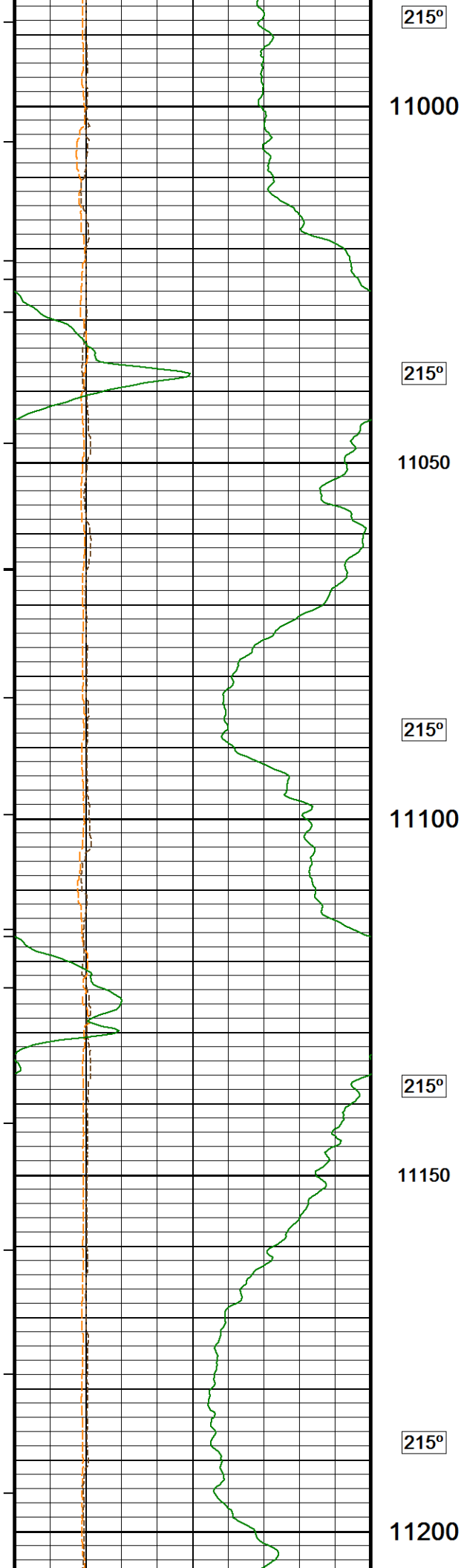
Array Ind. Four Res 40→

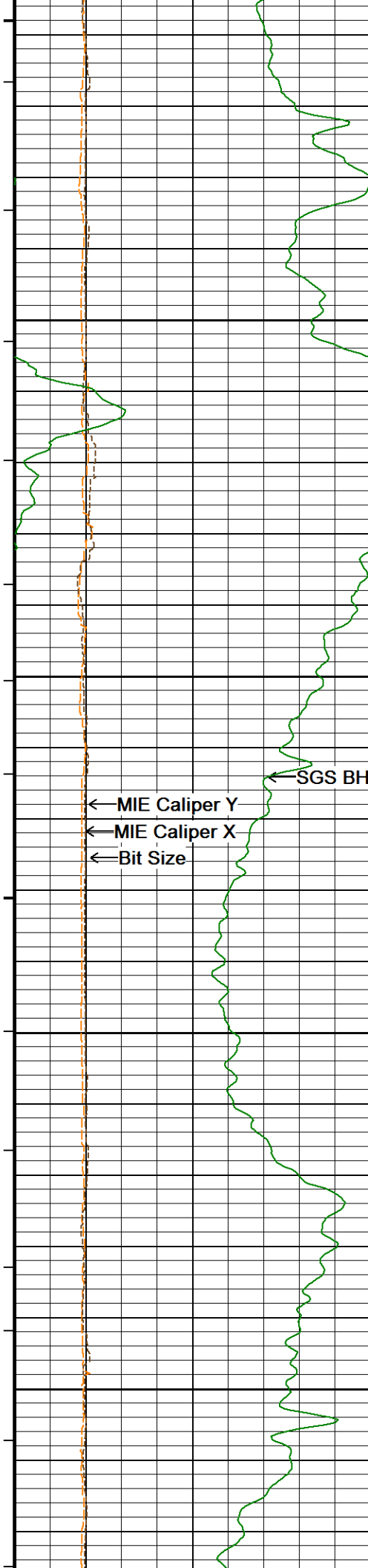
Array Ind. Four Res 30→

Array Ind. Four Res 20→









215°

11250

215°

11300

← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

← SGS BH Corrected Gamma

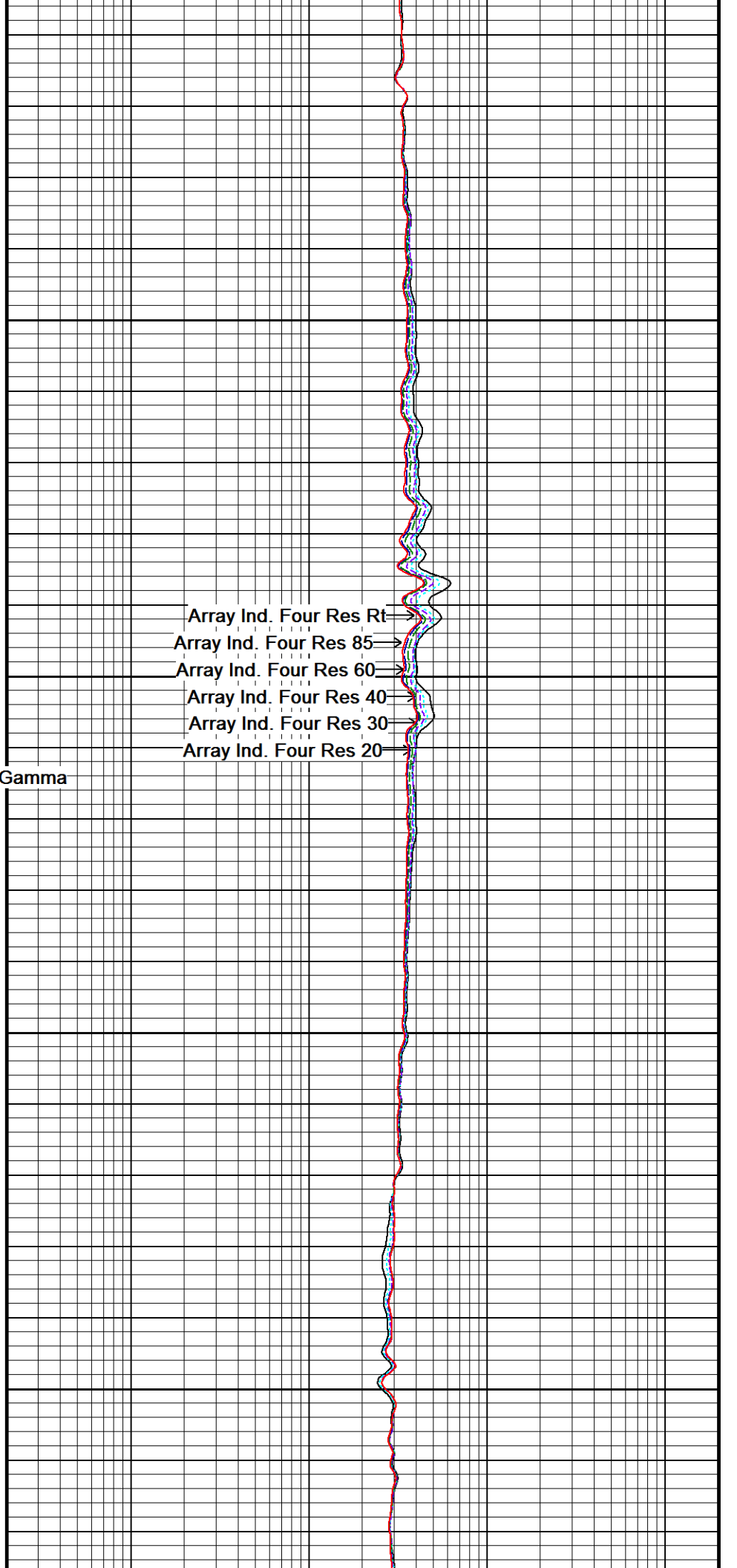
215°

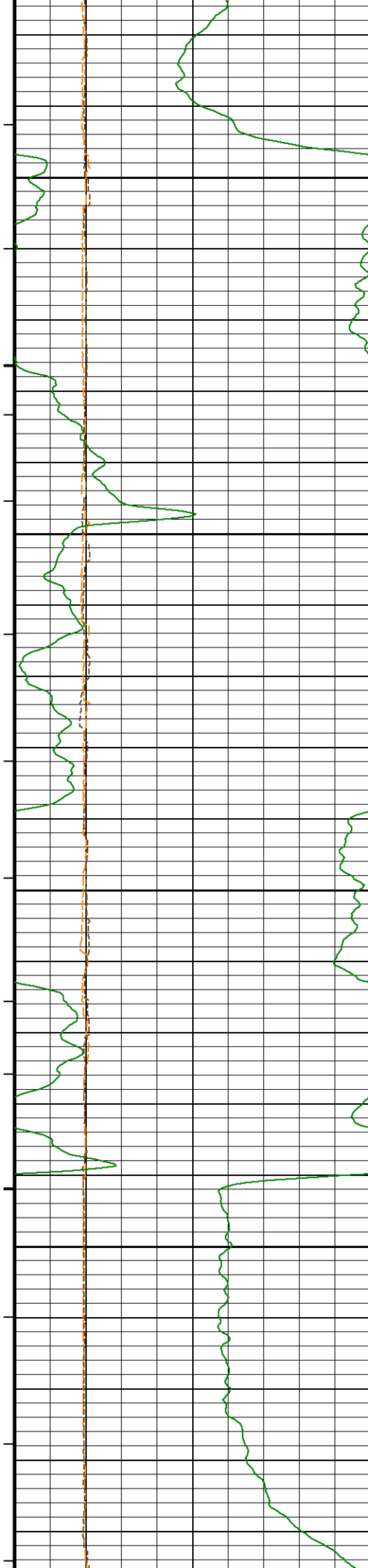
11350

215°

11400

Array Ind. Four Res Rt  
Array Ind. Four Res 85  
Array Ind. Four Res 60  
Array Ind. Four Res 40  
Array Ind. Four Res 30  
Array Ind. Four Res 20





215°

11450

215°

11500

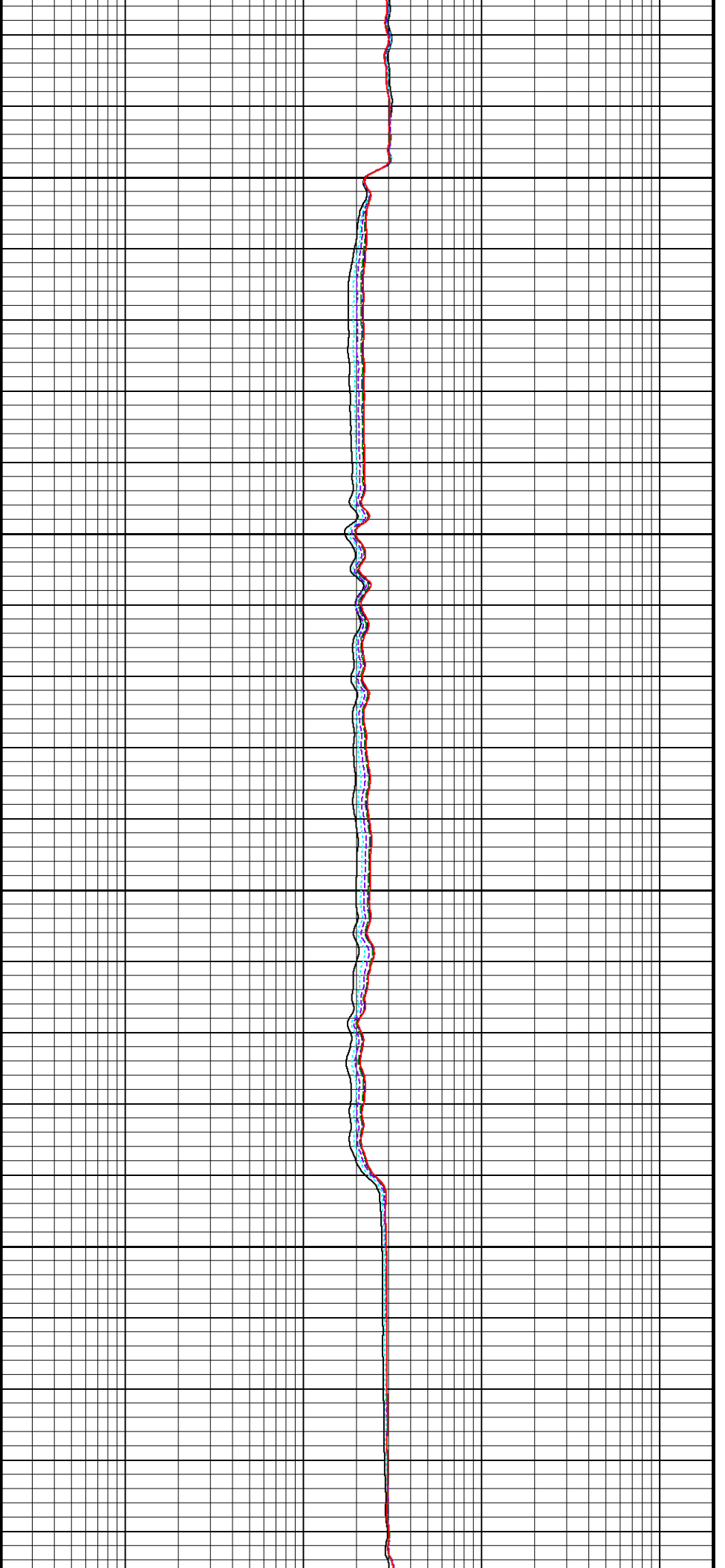
215°

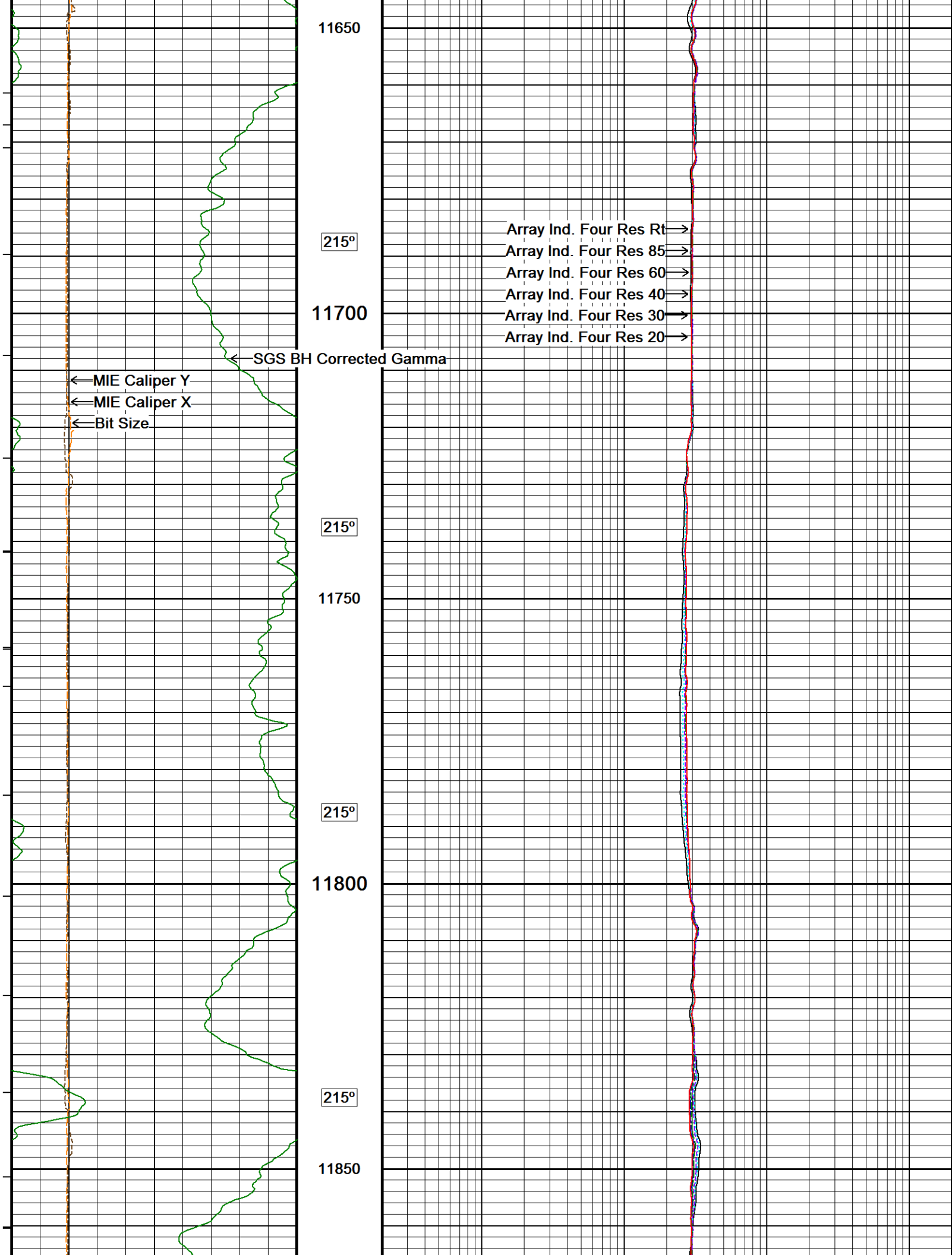
11550

215°

11600

215°









215°

11900

215°

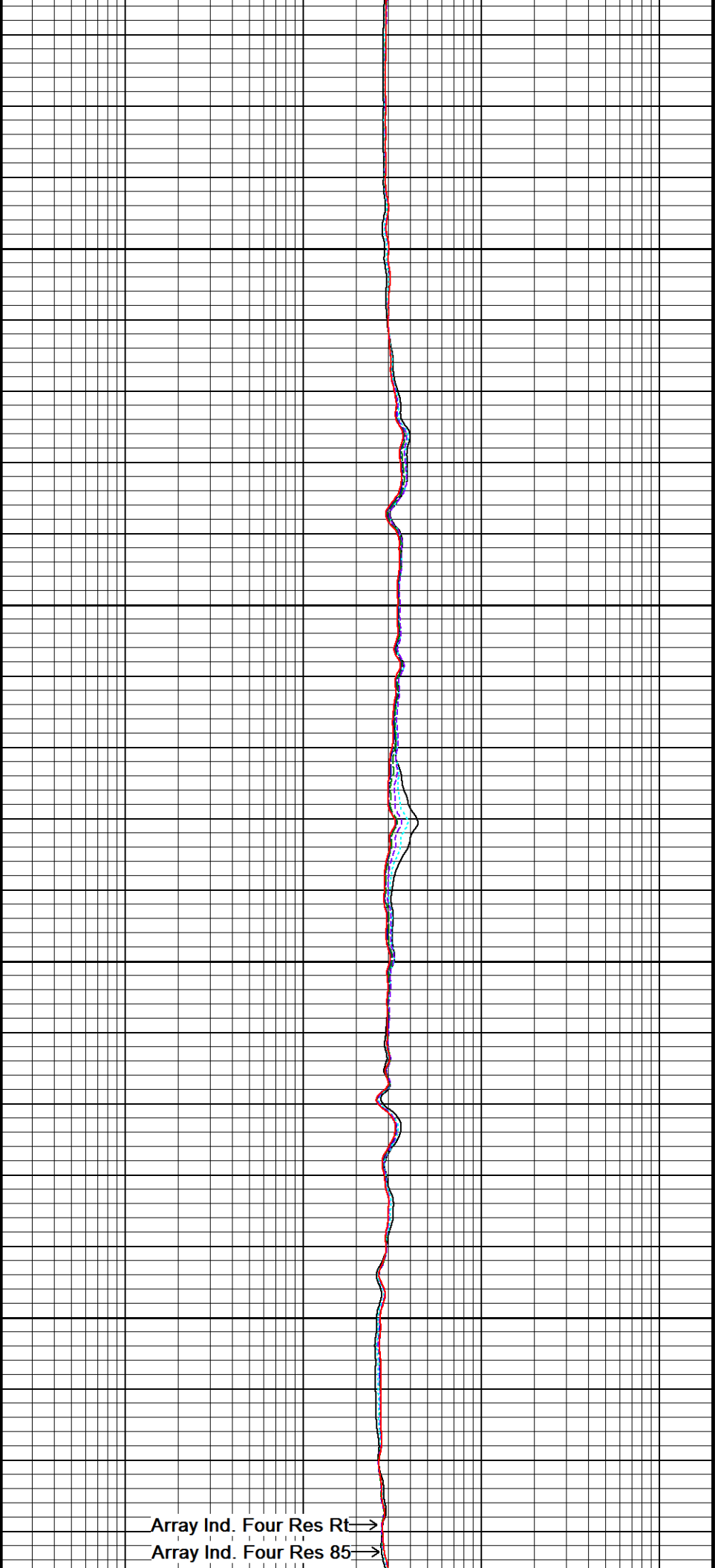
11950

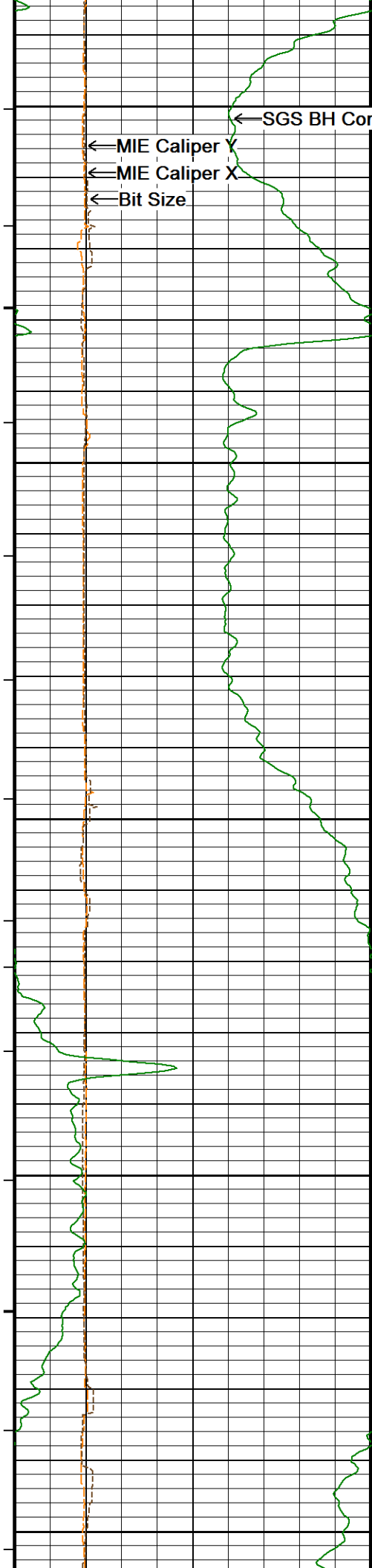
215°

12000

215°

12050





215°

12100

215°

12150

215°

12200

214°

12250

214°

12300

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

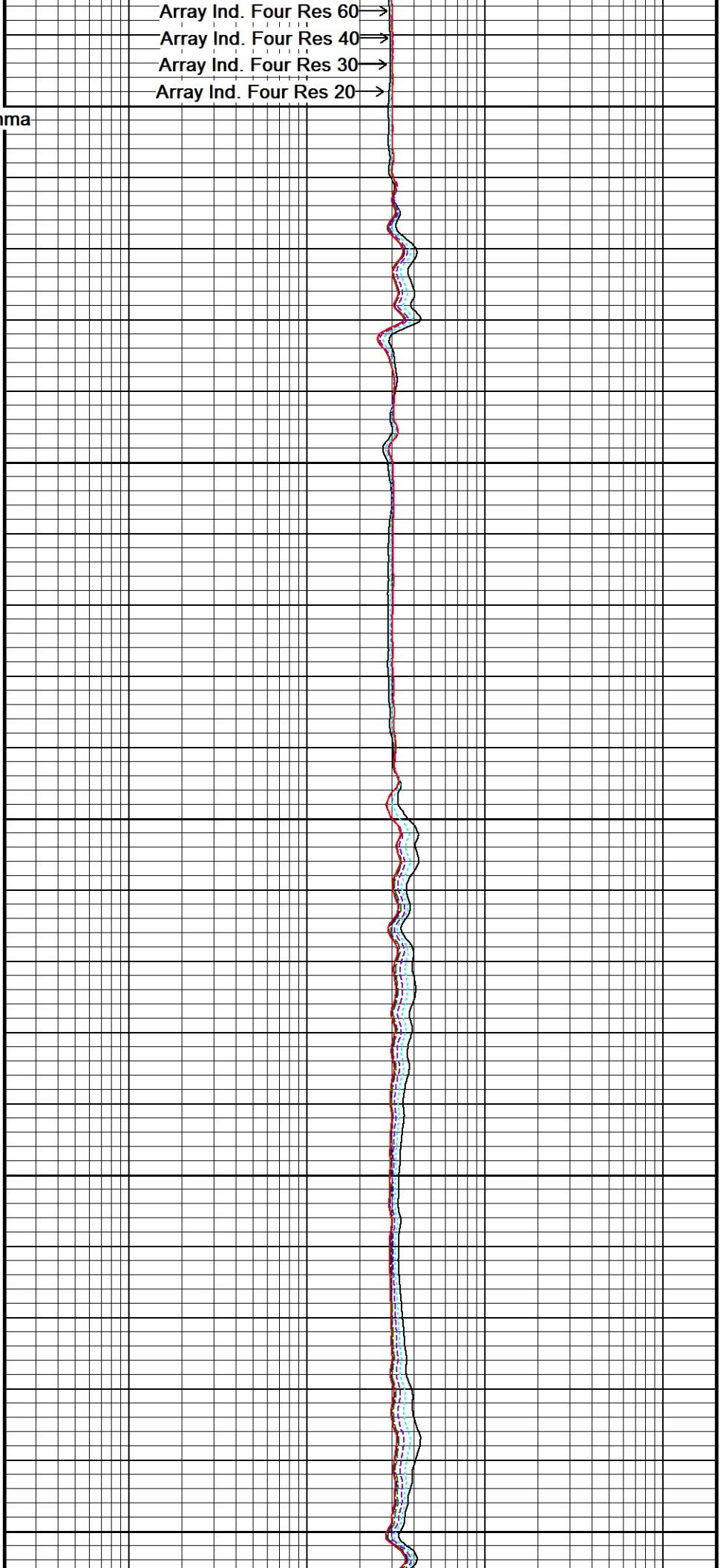
← Bit Size

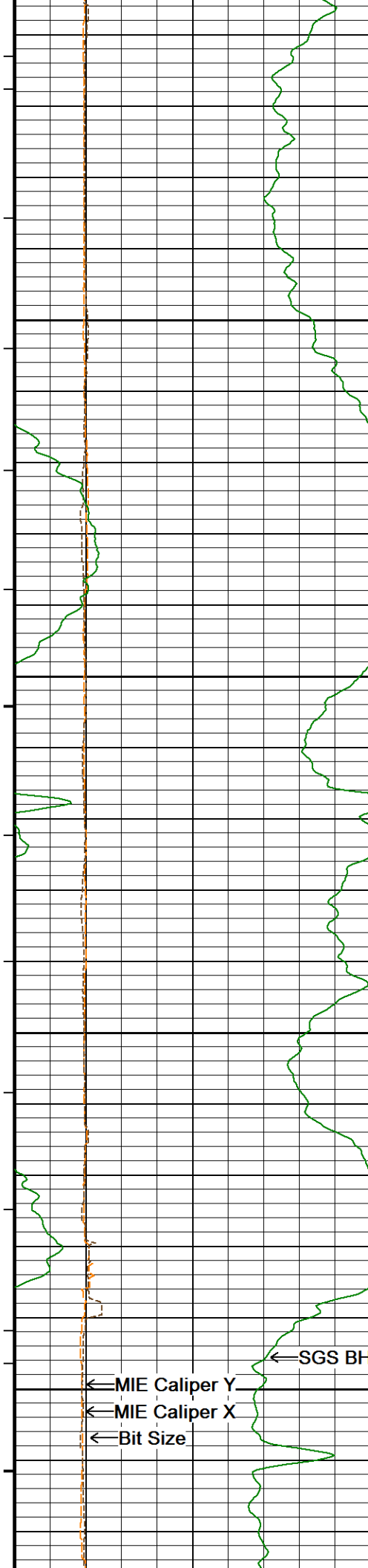
Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →





214°

12350

214°

12400

214°

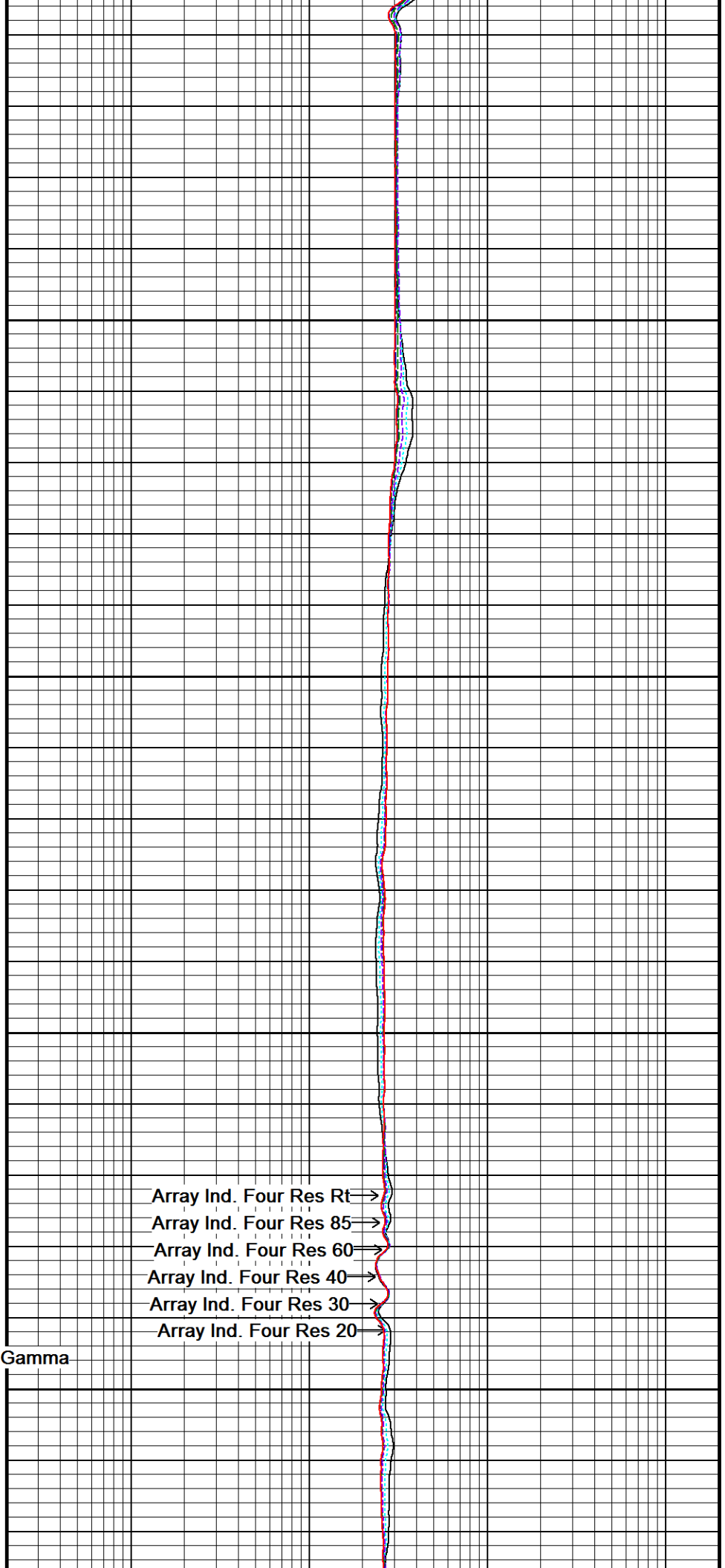
12450

214°

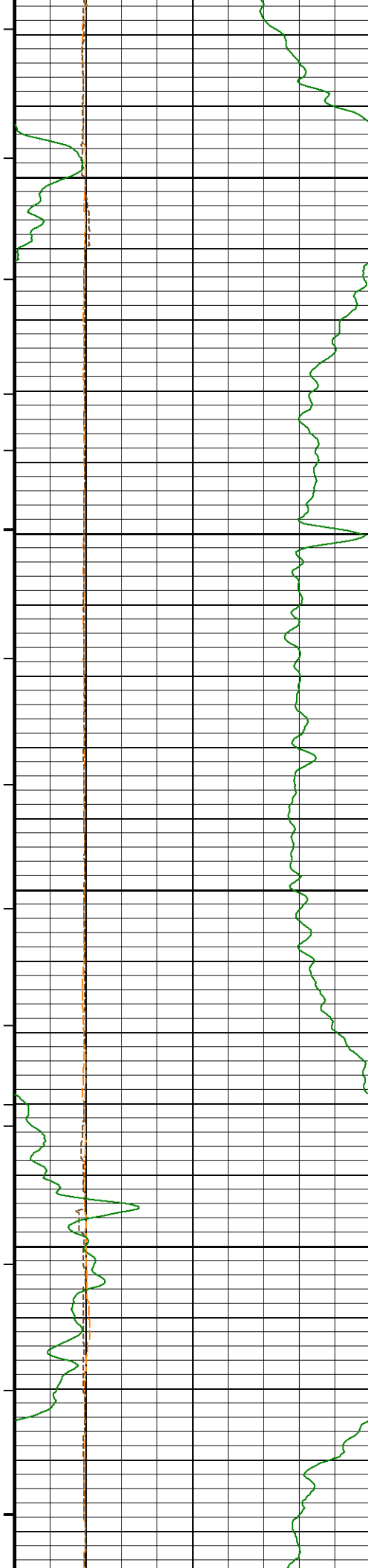
12500

← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

← SGS BH Corrected Gamma



Array Ind. Four Res Rt →  
Array Ind. Four Res 85 →  
Array Ind. Four Res 60 →  
Array Ind. Four Res 40 →  
Array Ind. Four Res 30 →  
Array Ind. Four Res 20 →



214°

12550

213°

12600

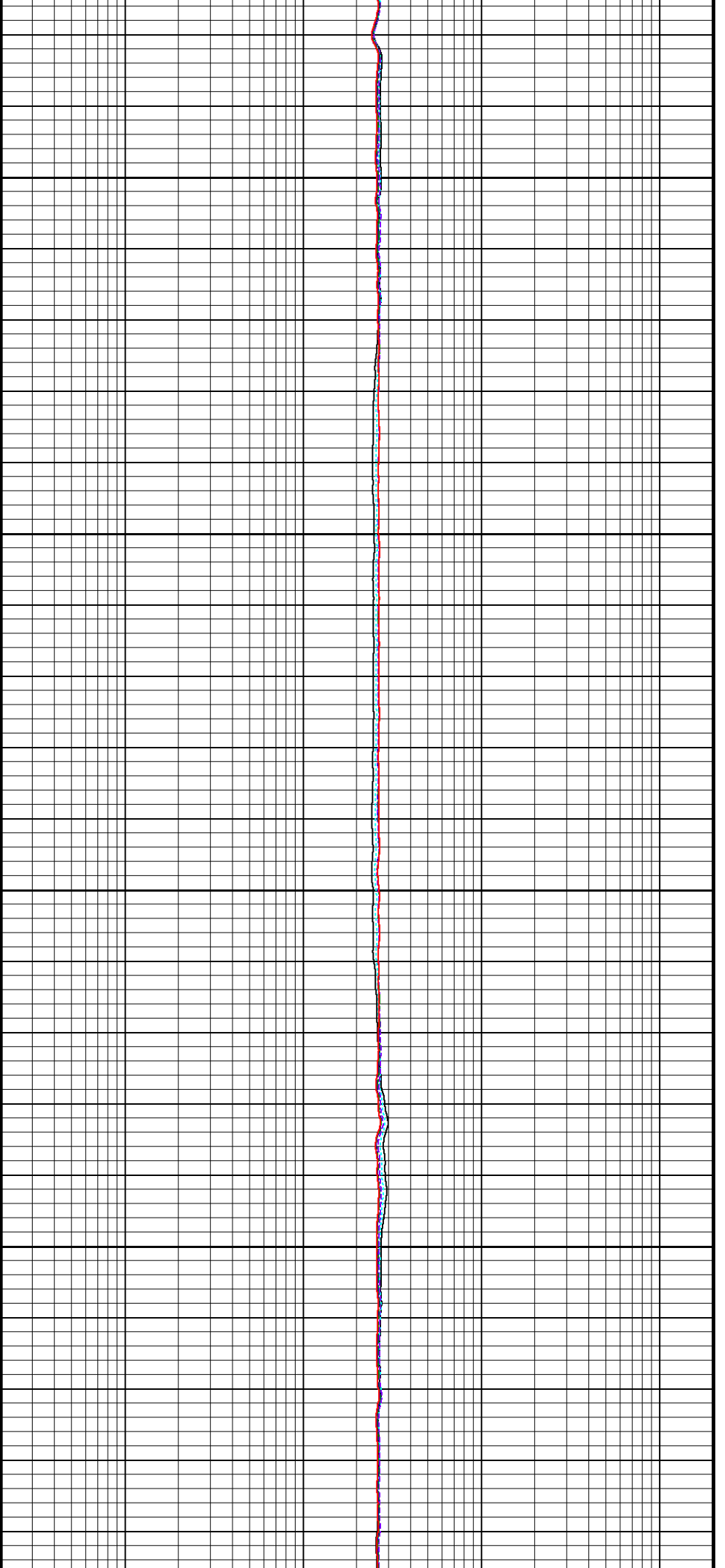
213°

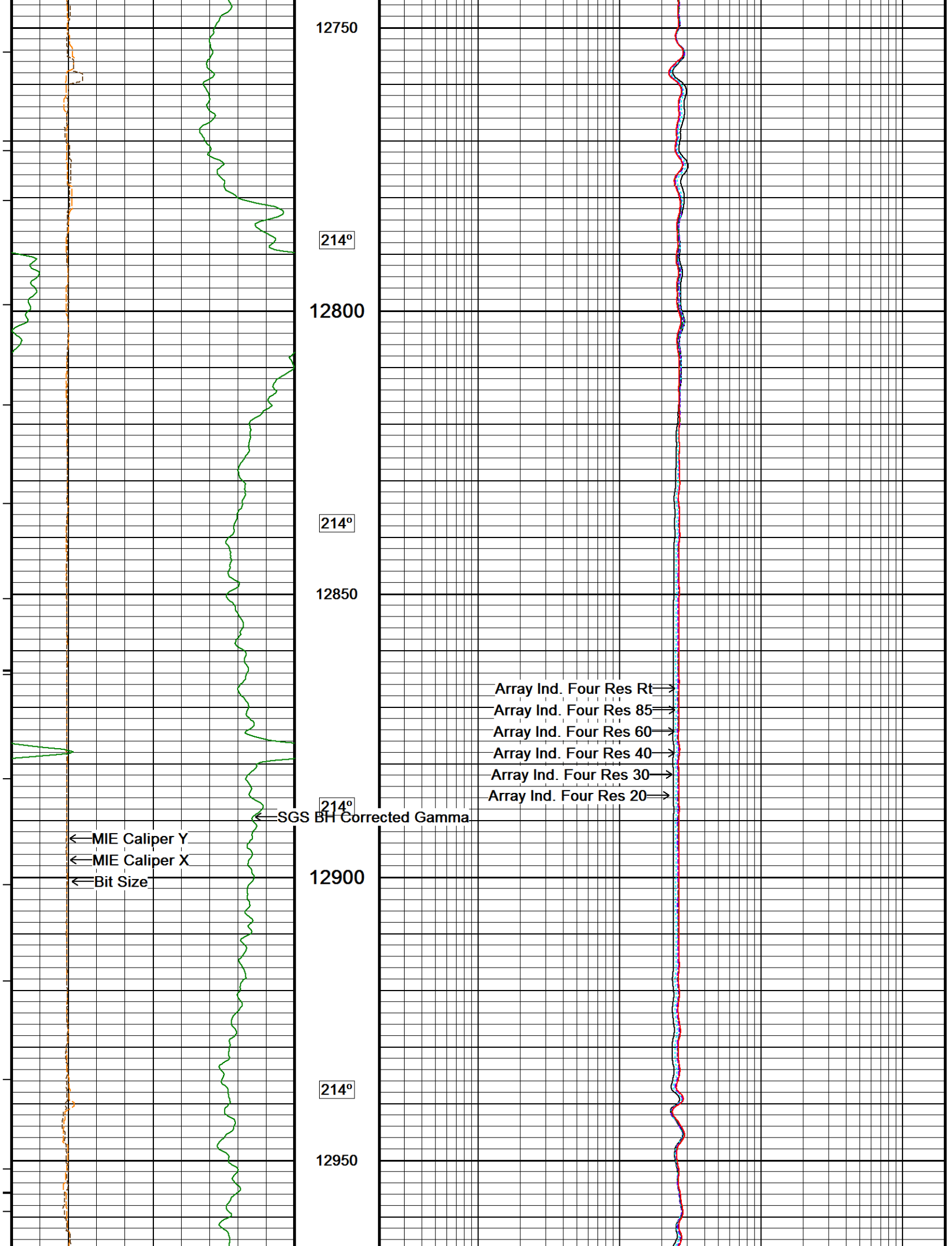
12650

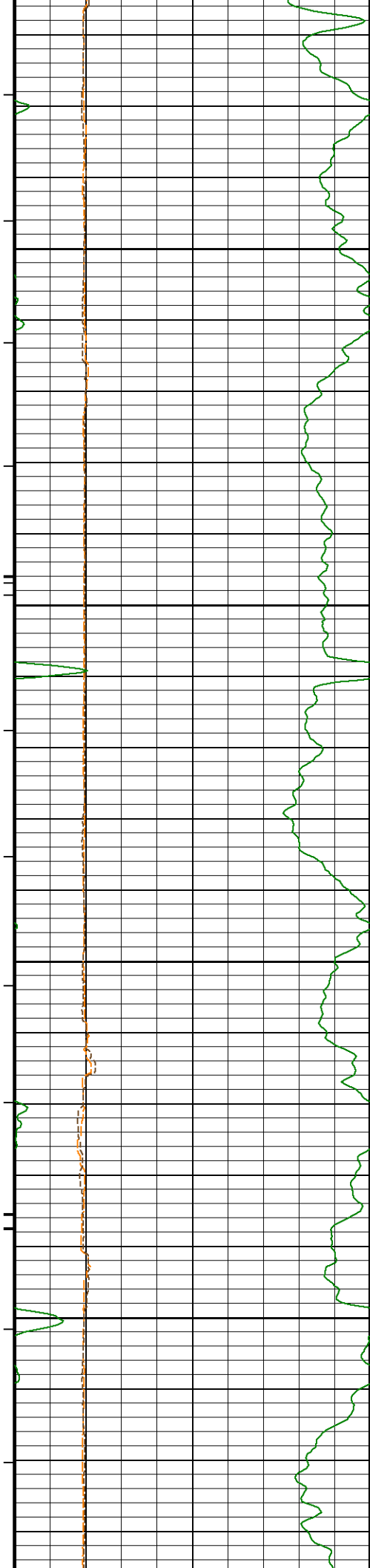
213°

12700

213°







214°

13000

214°

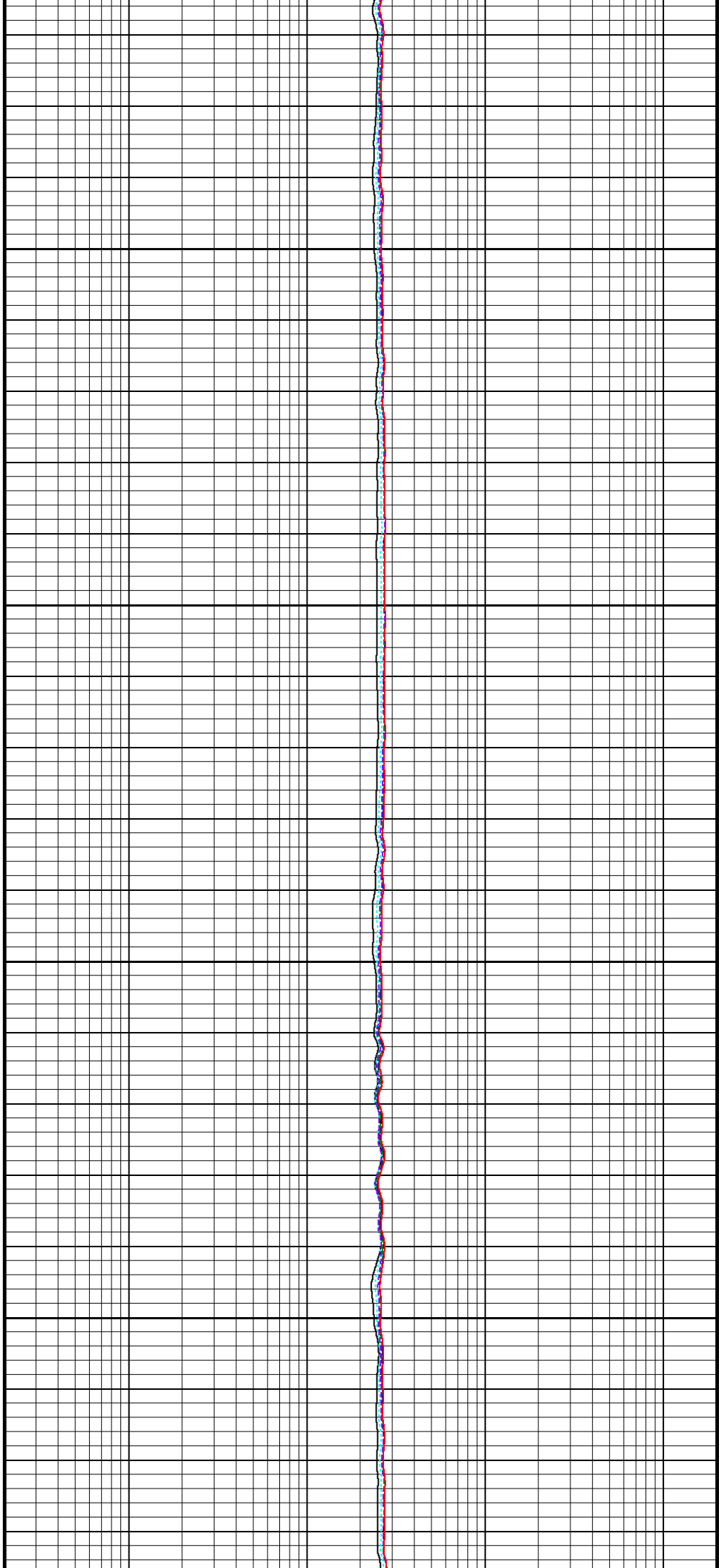
13050

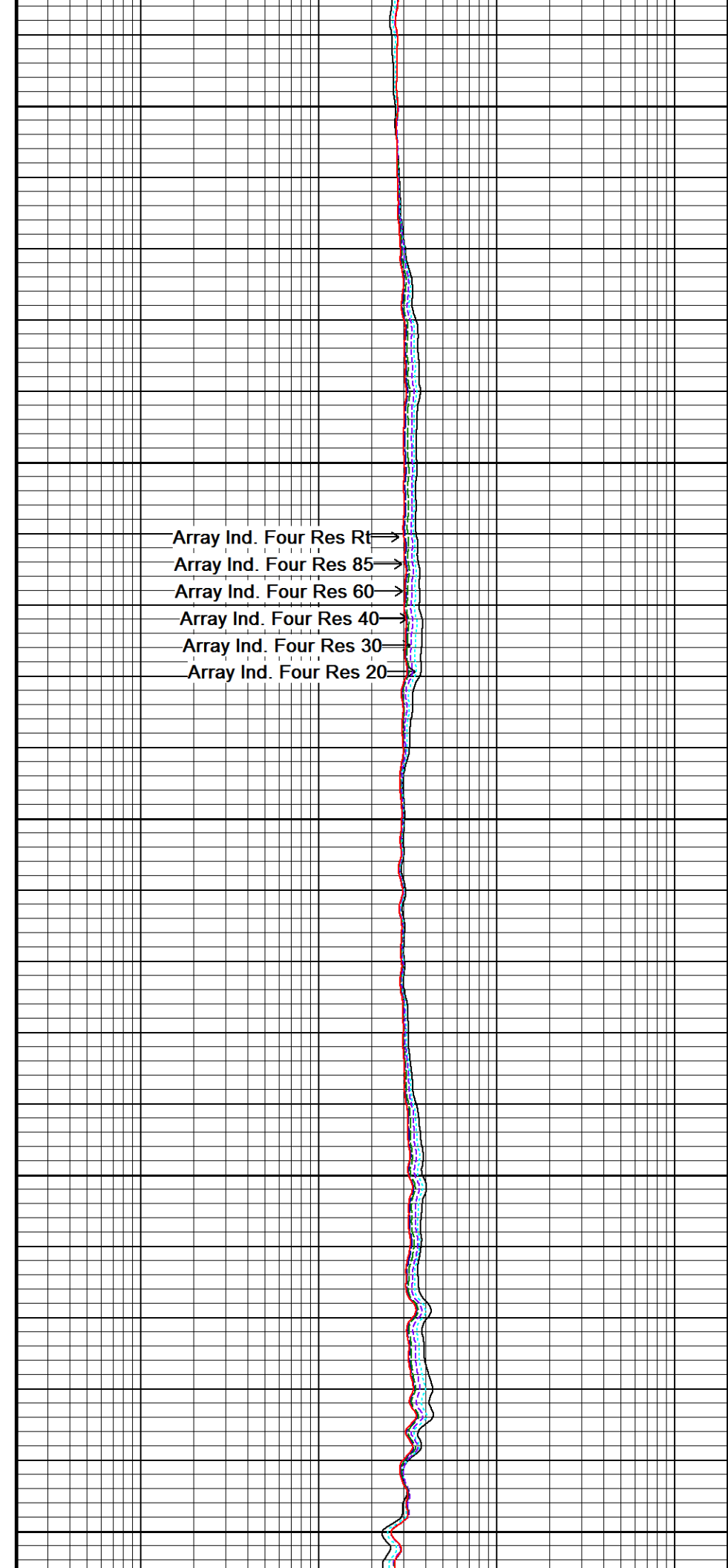
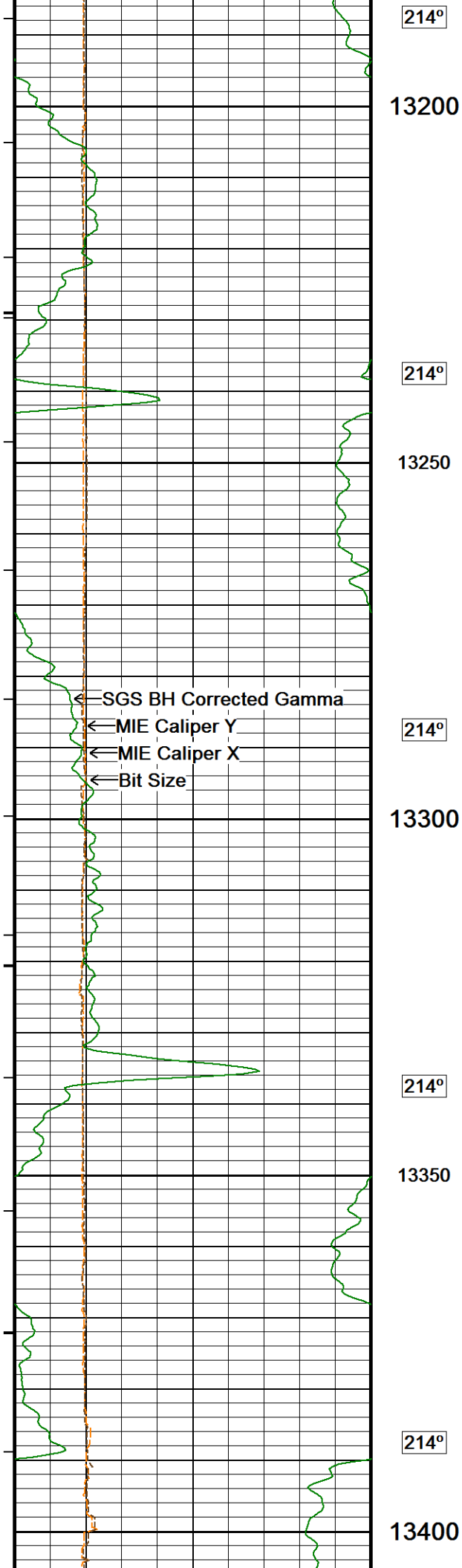
214°

13100

214°

13150







214°

13450

214°

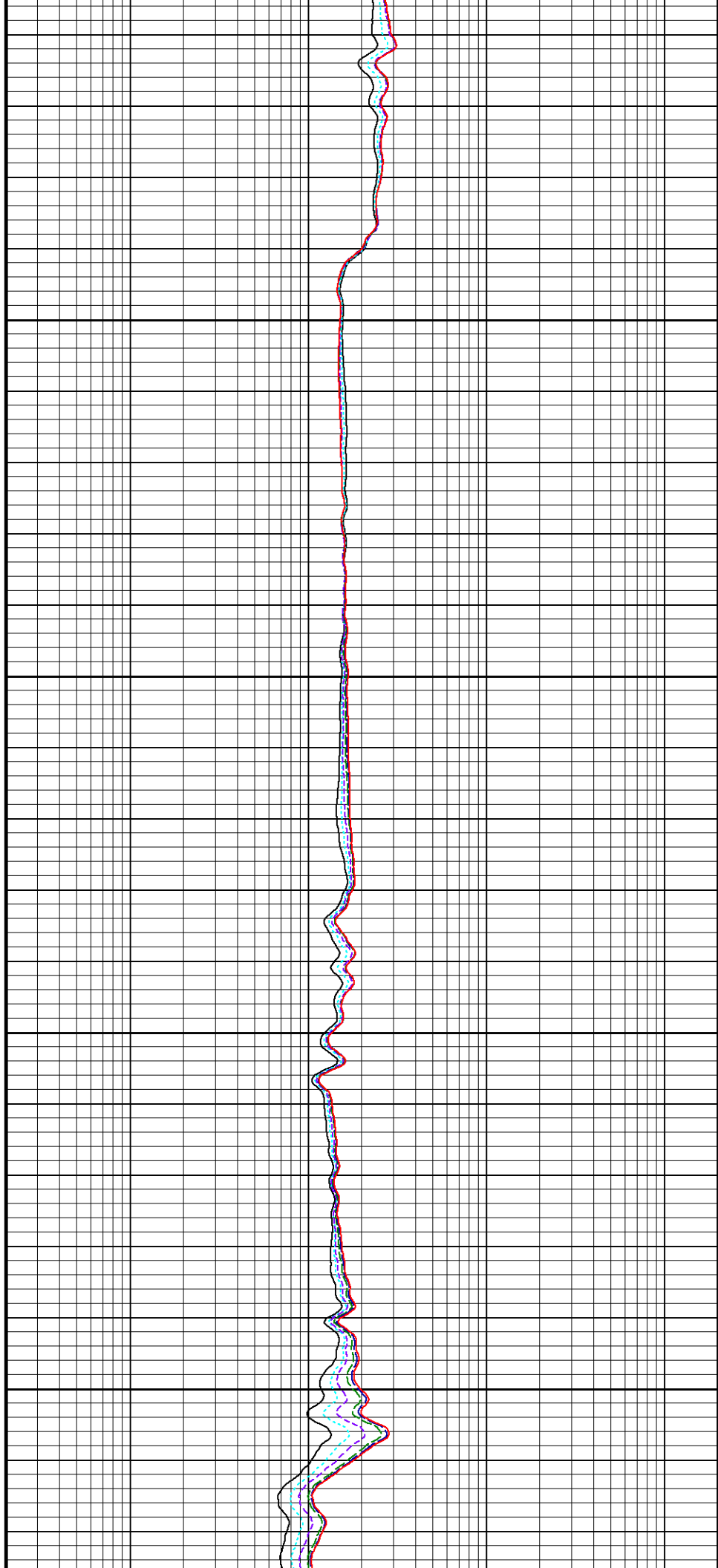
13500

217°

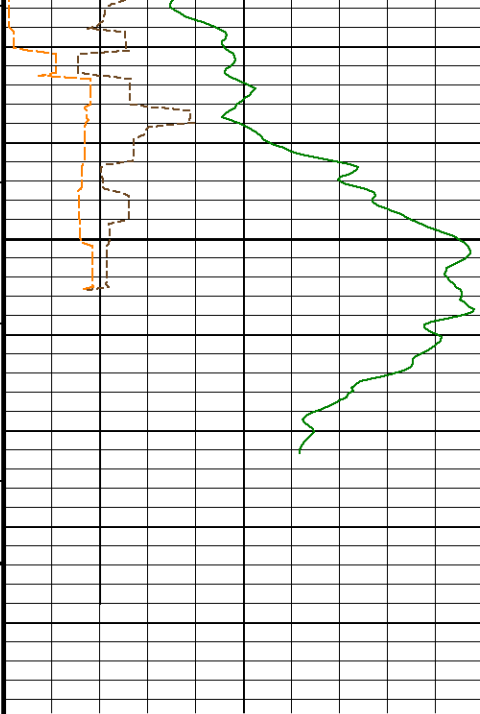
13550

219°

13600







13650

Depth  
in  
Feet

Timing Marks  
every 60.0 sec

Bit Size  
inches

4 9 14

MIE Caliper X  
inches

4 9 14

MIE Caliper Y  
inches

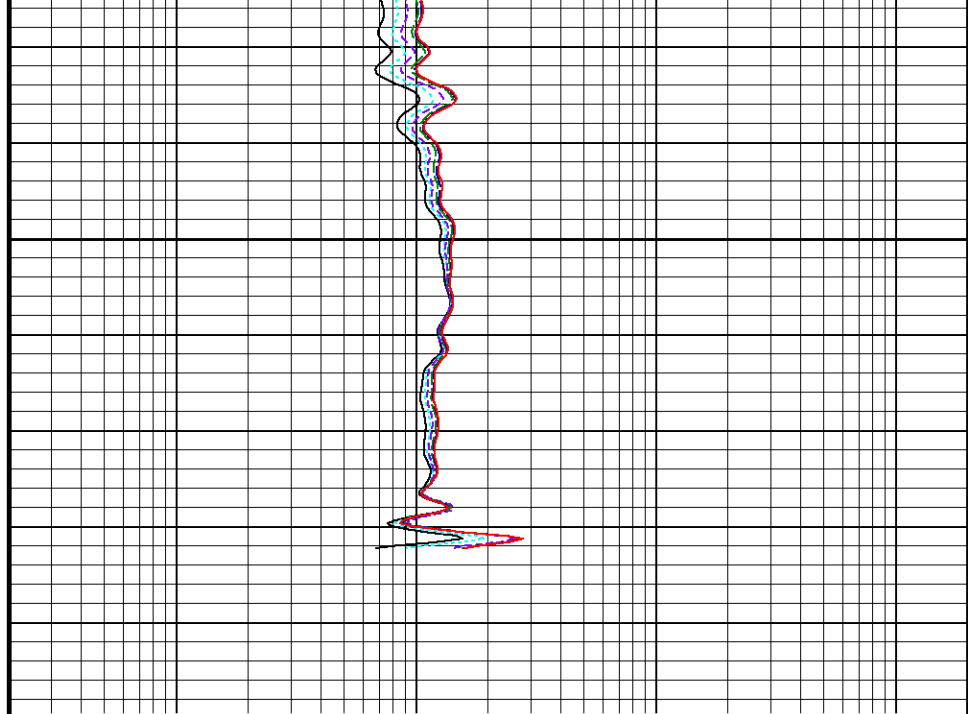
4 9 14

SGS BH Corrected Gamma

0 75 150  
150 225 300

Borehole  
Temp in  
deg F

Replay  
Scale  
1:240



Array Ind. Four Res 20  
ohm metres

0.20 1 10 100 1000 2000

Array Ind. Four Res 30  
ohm metres

0.20 1 10 100 1000 2000

Array Ind. Four Res 40  
ohm metres

0.20 1 10 100 1000 2000

Array Ind. Four Res 60  
ohm metres

0.20 1 10 100 1000 2000

Array Ind. Four Res 85  
ohm metres

0.20 1 10 100 1000 2000

Array Ind. Four Res Rt  
ohm metres

0.20 1 10 100 1000 2000

Depth Based Data - Maximum Sampling Increment 10.0cm

Filename: C:\LOGS\WHITING\Horsetail 30F-1943\MMS Depth.dta

System Versions: Logged with 14.01.3220 Processed with 14.01.3220 Plotted with 14.01.3220

Plotted on 11-OCT-2014 12:20

Recorded on 11-OCT-2014 10:59



5 INCH MAIN LOG



## BEFORE SURVEY CALIBRATION

C:\LOGS\WHITING\Horsetail 30F-1943\MMS Depth.dta

## General Constants All 000

Last Edited on 11-OCT-2014,09:40

## General Parameters

Mud Resistivity	1.650	ohm-metres
Mud Resistivity Temperature	63.700	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	4.500	inches
Caliper for Differential Caliper	Density Caliper	

## Rwa Parameters

Porosity used	N/A
Resistivity used	N/A
RWA Constant A	N/A
RWA Constant M	N/A
SW/APOR Tool Source	0.000

## Strain Gauge Constants MMS-F.A 246

Last Edited on

Atmospheric Pressure	14.70	psi						
Serial Number	0							
Calibration Date	000000000000							
Base Check Date								
Dead Weight Serial Number	0							
Dead Weight Gravitational Correction	1.0							
Temperature	75.0	150.0	250.0	350.0	degrees F			
Pressure psia	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10000.0	0.000		0.000		0.000		0.000	

## Gamma Calibration MGS-D.A 220

Field Calibration on 09-OCT-2014 19:30

	Measured	Calibrated (API)
Background	176	125
Calibrator (Gross)	1026	727
Calibrator (Net)	849	602

## Gamma Constants MGS-D.A 220

Last Edited on 09-OCT-2014,19:14

Gamma Calibrator Number	GRC-224	
Mud Density	1.22	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.29	%

## SP Calibration MGS-D.A 220

Field Calibration on 09-OCT-2014,21:40

	Measured	Calibrated (mV)
Reference 1	100.0	101.0
Reference 2	-100.0	-101.0

## High Resolution Temperature Calibration MGS-D.A 220

Field Calibration on 09-OCT-2014,21:40

	Measured	Calibrated (Deg F)
Lower	20.00	21.00
Upper	200.00	201.00

## High Resolution Temperature Constants MGS-D.A 220

Last Edited on 10-OCT-2014,22:06

## Neutron Calibration MDN-B.J 372

Base Calibration on 01-OCT-2014 13:06

Field Check on 09-OCT-2014 19:13

## Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2881	87	3714	110
Ratio	33.018		33.764	

## Field Calibrator at Base

	Calibrated (cps)
	2377
Ratio	0.679

## Field Check

	Calibrated (cps)
	2390
Ratio	0.671

## Neutron Constants MDN-B.J 372

Last Edited on 10-OCT-2014,22:07

Neutron Source Id	P44385B	
Neutron Jig Number	NJ5236	
Air Hole Processing	Modified Ratio	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	7.00	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	None	
Temperature	N/A	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	

## Caliper Calibration MIE-A.J 244

Base Calibration on 25-JUL-2014 11:44

Field Calibration on 02-OCT-2014 16:29

## Base Calibration

Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)
1	26004	25378	5.97
2	36167	35519	7.96
3	46431	45371	9.86
4	57324	56752	11.92
5	0	0	0.00

Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	26012	25269	23347	25203	5.97
2	34599	33642	31769	34020	7.96
3	42691	41621	39973	42619	9.86
4	52950	51129	49036	52308	11.92
5	0	0	0	0	0.00

## Field Calibration

	Measured	Measured	Actual	
	Pads 1-5 Caliper(in)	Pads 3-7 Caliper(in)	Caliper(in)	
	5.84	5.85	5.97	
	Measured	Measured	Measured	Actual
	Pad 2 Caliper(in)	Pad 4 Caliper(in)	Pad 6 Caliper(in)	Caliper(in)
	2.81	2.98	3.15	3.00
				5.97

## Caliper Constants MIE-A.J 244

Last Edited on 25-JUL-2014,11:39

Caliper Difference for BRKT	0.120	inches
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## Accelerometer Parameters MIE-A.J 244

Date Of Last Accelerometer Calibration	13-FEB-2013,14:31
--	-------------------

Slope		X Accelerometer	-1.103572	Y Accelerometer	-1.107641	Z Accelerometer	-1.103778
Offset			-0.006989		0.006286		-0.003996
Accelerometer Constants MIE-A.J 244						Last Edited on 02-OCT-2014,16:25	
Accelerometer Calibrator Number			000				
Accelerometer Temperature Characterisation							
X Accelerometer							
Serial Number		1016					
Calibration Date		12-Apr-2011					
		B0	B1	B2	B3		
Bias(g)		0.00000e+000	1.93698e-005	-7.60293e-010	6.54727e-011		
		SF0	SF1	SF2	SF3		
Scale Factor(mA/g)		3.00000e+000	2.59257e-004	6.13375e-007	-3.90888e-010		
Y Accelerometer							
Serial Number		973					
Calibration Date		19-Jan-2011					
		B0	B1	B2	B3		
Bias(g)		0.00000e+000	1.95276e-005	-1.88058e-008	2.74122e-010		
		SF0	SF1	SF2	SF3		
Scale Factor(mA/g)		3.00000e+000	2.75268e-004	3.53140e-007	7.52116e-010		
Z Accelerometer							
Serial Number		1032					
Calibration Date		18-Apr-2011					
		B0	B1	B2	B3		
Bias(g)		0.00000e+000	-1.14960e-005	3.94288e-009	8.97135e-011		
		SF0	SF1	SF2	SF3		
Scale Factor(mA/g)		3.00000e+000	2.88058e-004	2.44833e-007	8.38007e-010		
Magnetometer Parameters MIE-A.J 244							
Date Of Last Magnetometer Calibration			22-AUG-2013,09:56				
		X Magnetometer	Y Magnetometer	Z Magnetometer			
Slope		-1.000000	-1.011965	-0.991340			
Offset		0.010303	-0.015788	0.008269			
Magnetometer Constants MIE-A.J 244						Last Edited on	
Magnetometer Calibrator Number			000				
Navigation Constants MIE-A.J 244						Last Edited on 10-OCT-2014,22:11	
Magnetic Declination			7.92	degrees	East		
Imager Pad Check MIE-A.J 244						Field Check on	
Pad 1	Pad Not Tested	Pad 5	Pad Not Tested				
Pad 2	Pad Not Tested	Pad 6	Pad Not Tested				
Pad 3	Pad Not Tested	Pad 7	Pad Not Tested				
Pad 4	Pad Not Tested	Pad 8	Pad Not Tested				
Compact Micro Imager Constants MIE-A.J 244						Last Edited on 25-JUL-2014,11:39	
Sonde Configuration		Imager Mode					
Arm-Pad Kit		Normal Pads (12.25 in)					
Arm-Pad Kit Serial Number							
Centre Pad 1 Rotational Offset		0.00	degrees				
Image/Borehole Ovality Reference		Azimuth of Pad 1					
Non Active Buttons		Omit					
Search Angle		0.00	degrees				
Correlation Interval		3.28	feet				
Correlation Step		1.64	feet				
Current Offset		0.0000	mAmp				
Squasher Start		0.0500	mAmp				
Image Processing		Enabled					
Induction Calibration MAI-B.A 289						Base Calibration on 09-OCT-2014,22:26	
						Field Check on 09-OCT-2014 22:28	
Base Calibration							
Test Loop Calibration		Measured	Calibrated (mmba/m)				

Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel		Low	High	Low	High
1		16.7	472.3	9.3	966.2
2		5.8	381.9	7.6	821.4
3		3.2	261.2	5.2	566.0
4		1.9	138.0	2.6	279.2
Array Temperature		76.1		Deg F	
		Base Check (mmho/m)		Field Check (mmho/m)	
Channel		Low	High	Low	High
1		0.0	0.0	13.0	3835.7
2		0.0	0.0	30.8	3521.5
3		0.0	0.0	28.8	3021.0
4		0.0	0.0	19.0	1997.2
Deep		0.0	0.0	16.6	1912.9
Medium		0.0	0.0	43.1	4040.1
Shallow		0.0	0.0	47.3	5283.2
Array Temperature		0.0		53.9	Deg F

Induction Constants MAI-B.A 289				Last Edited on 09-OCT-2014,22:41	
Induction Model		RtAP-WBM			
Caliper for Borehole Corr.		Density Caliper			
Hole Size for Borehole Correction		N/A		inches	
Tool Centred		No			
Stand-off Type		Pineapple			
Stand-off		0.49		inches	
Number of Fins on Stand-off		5.0000			
Stand-off Fin Angle		72.00		degrees	
Stand-off Fin Width		1.3878		inches	
Borehole Corr. Rm Source		Temperature Corr			
Temp. for Rm Corr.		MGS 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			

High Resolution Temperature Calibration MAI-B.A 289				Field Calibration on 19-NOV-2008,15:30	
		Measured	Calibrated(Deg C)		
Lower		10.00	10.00		
Upper		100.00	100.00		

High Resolution Temperature Constants MAI-B.A 289		Last Edited on
Pre-filter Length	11	

Photo Density Calibration	MPD-C.J 378	Base Calibration on 01-OCT-2014 11:53
		Field Check on 09-OCT-2014 19:05

Density Calibration		Measured		Calibrated (sdu)	
Base Calibration		Near	Far	Near	Far
Background		1145	1223		
Reference 1		56123	24901	59443	30683
Reference 2		22147	2322	25113	2508
Field Check at Base					
		1145.2	1222.9		
Field Check					
		1146.8	1224.5		

PE Calibration		Measured		Calibrated
Base Calibration		WS	WH	Ratio
Background		209	1030	
Reference 1		24056	55936	0.434
Reference 2		6396	22017	0.295
Field Check at Base				
		209.3	1029.7	
Field Check				
		210.6	1030.1	

## Density Constants MPD-C.J 378

Last Edited on 10-OCT-2014,22:07

Density Source Id	P44264B
Nylon Calibrator Number	652
Aluminium Calibrator Number	659
Density Shoe Profile	4 inch
Caliper Source for Processing	Density Caliper
PE Correction to Density	Not Applied
Mud Density	1.22 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	0.00
0.00	0.00

## Caliper Calibration MPD-C.J 378

Base Calibration on 01-OCT-2014 12:42

Field Calibration on 09-OCT-2014 18:46

Base Calibration		Calibrator Size (in)	
Reading No	Measured		
1	12771	4.01	
2	21027	5.97	
3	29312	7.96	
4	37448	9.86	
5	46707	11.92	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	7.93	7.96	

## Spectral Gamma Calibration SGS-E.J 128

Base Calibration on 25-SEP-2014 17:21

Field Calibration on 03-OCT-2014 16:24

Base Calibration						
Potassium Calibrator		Gate 1	Gate 2	Gate 3	Gate 4	Gate 5

Background	Gate 1 106.5	Gate 2 36.9	Gate 3 3.8	Gate 4 1.4	Gate 5 2.3
Calibrator (Gross)	234.7	121.4	29.0	1.5	2.4
Calibrator (Net)	128.2	84.5	25.2	0.1	0.1

	K %	U ppm	Th ppm
Concentrations	5.9	0.0	0.0

#### Uranium Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	106.5	36.9	3.8	1.4	2.3
Calibrator (Gross)	561.8	196.8	17.3	11.1	5.9
Calibrator (Net)	455.4	159.9	13.5	9.7	3.6

	K %	U ppm	Th ppm
Concentrations	0.0	16.6	0.0

#### Thorium Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	106.5	36.9	3.8	1.4	2.3
Calibrator (Gross)	424.1	156.4	12.6	6.6	17.3
Calibrator (Net)	317.6	119.5	8.8	5.2	14.9

	K %	U ppm	Th ppm
Concentrations	0.0	0.0	44.7

#### Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	106.5	36.9	3.8	1.4	2.3
Calibrator (Gross)	906.0	369.5	48.4	14.6	19.8
Calibrator (Net)	799.6	332.5	44.6	13.2	17.5

#### Field Calibration

##### Gamma Ray

	Measured	Calibrated (API)
Background	157	31
Calibrator (Gross)	1356	271
Calibrator (Net)	1199	240

#### Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	105.4	35.9	3.8	1.4	2.2
Calibrator (Gross)	900.9	365.2	48.3	14.3	19.5
Calibrator (Net)	795.4	329.3	44.5	12.9	17.3

Spectral Gamma Constants SGS-E.J 128

Last Edited on 09-OCT-2014,19:31

Background Calibrator Number	440
Mixture Calibrator Number	450
Potassium Calibrator Number	500
Uranium Calibrator Number	506
Thorium Calibrator Number	503
Mud Density	1.22 gm/cc
Caliper Source for Processing	Density Caliper
Tool Position	Eccentred
Concentration of KCl	kppm
K Mud Type	Chloride
K Mud Concentration	0.29 %

## DOWNHOLE EQUIPMENT

C:\LOGS\WHITING\Horsetail 30F-1943\MMS Depth.dta

Shuttle Running Tool 3.5"  
SRT-A.A 59 LG: 6.62 ft WT: 37.5 lb OD: 2.520 in

Compact Linker 400 EXT  
MLK-A 2 LG: 14.23 ft WT: 30.9 lb OD: 2.240 in





Compact Linker 200 STD  
MLK-A 1 LG: 8.52 ft WT: 30.9 lb OD: 2.240 in

SHA-J.A Compact Swivel Head Adaptor  
SHA-J.A 397 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

SKJ-E.A Compact Knuckle Joint  
SKJ-E.A 245 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-E.B Compact Inline Standoff sub  
MIS-E.B 662 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

MBS-F.A 200v Compact Battery Sub  
MBS-F.A 123 LG: 17.06 ft WT: 123.5 lb OD: 2.240 in

Compact Memory Sub F.A  
MMS-F.A 246 LG: 5.20 ft WT: 37.5 lb OD: 2.244 in

Compact Tool Isolator sub.  
MTI-C.A 146 LG: 1.54 ft WT: 13.2 lb OD: 2.244 in

Compact Short Gamma  
MGS-D.A 220 LG: 3.41 ft WT: 24.3 lb OD: 2.244 in

Compact Collar Locator  
MCL-C.A 129 LG: 3.17 ft WT: 26.5 lb OD: 2.244 in

SKJ-E.B Compact Knuckle Joint  
SKJ-E.B 610 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

SHA-J.A Compact Swivel Head Adaptor  
SHA-J.A 314 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 695 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact Neutron  
MDN-B.J 372 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper  
MPD-C.J 378 LG: 9.59 ft WT: 90.4 lb OD: 2.244 in

MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 734 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

SHA-J.B Compact Swivel Head Adaptor  
SHA-J.B 682 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

SKJ-E.B Compact Knuckle Joint  
SKJ-E.B 537 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-E.A Compact Inline Standoff sub  
MIS-E.A 363 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

SKJ-E.A Compact Knuckle Joint  
SKJ-E.A 410 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 698 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact MMI Memory Section  
MIM-A.J 244 LG: 4.65 ft WT: 26.5 lb OD: 2.244 in



98.00 ft GSXT - MGS External Temperature

81.11 ft NPRL - Limestone Neutron Por.

73.87 ft AVOL - Annular Volume  
73.87 ft HVOL - Hole Volume  
73.87 ft CLDC - Density Caliper

71.94 ft DPRL - Limestone Density Por.  
71.94 ft DCOR - Density Correction  
71.88 ft PDPE - PE



Compact MMI Electrode Section  
MIE-A.J 244 LG: 13.96 ft WT: 99.2 lb OD: 4.094 in

MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 810 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

SKJ-E.A Compact Knuckle Joint  
SKJ-E.A 203 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

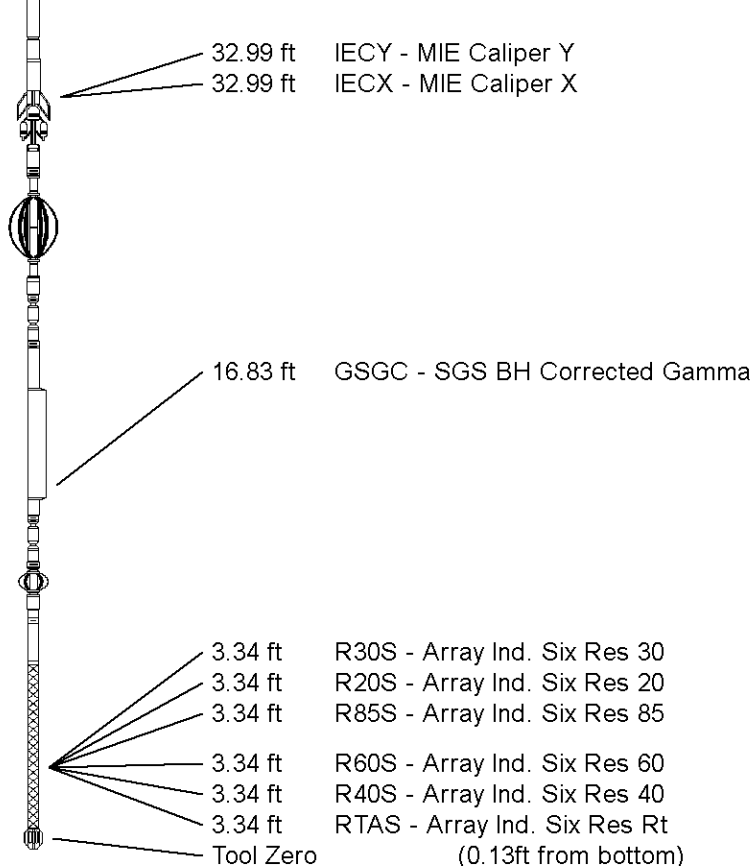
Spectral Gamma Ray Sub  
SGS-E.J 128 LG: 7.78 ft WT: 105.8 lb OD: 3.543 in

SKJ-E.B Compact Knuckle Joint  
SKJ-E.B 611 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-E.B Compact Inline Standoff sub  
MIS-E.B 695 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

Compact Induction  
MAI-B.A 289 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 160.68 ft Weight: 1135.4 lb



COMPANY	WHITING OIL AND GAS CORPORATION
WELL	HORSETAIL 30F-1943
FIELD	REDTAIL
PROVINCE/COUNTY	WELD
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	4797.00	feet	First Reading	13685.00	feet
Elevation Drill Floor	4797.00	feet	Depth Driller	13702.00	feet
Elevation Ground Level	4780.00	feet	Depth Logger	13702.00	feet



MEASURED DEPTH  
ARRAY INDUCTION  
LOG

**Weatherford**<sup>®</sup>