



**Weatherford®**

**MEASURED DEPTH  
ARRAY INDUCTION  
LOG**

COMPANY		WHITTING OIL AND GAS CORPORATION			
WELL		RAZOR 21C-0908			
FIELD		REDTAIL			
PROVINCE/COUNTY		WELD			
COUNTRY/STATE		U.S.A. / COLORADO			
LOCATION		329' FNL & 1098' FWL			
SEC 21	TWP 10N	RGE 58W	Other Services		
			MICRO IMAGER		
			SPECTRAL GAMMA		
			DENSITY/NEUTRON		
API Number					05-123-39523
Permanent Datum G.L., Elevation 4844 feet					
Log Measured From KB					
Drilling Measured From K.B. @ 17 FEET					
Date	17-AUG-2014				Elevations: KB 4861.00 DF 4861.00 GL 4844.00
Run Number	ONE				
Service Order	4725-95388534				
Depth Driller	14236.00				feet
Depth Logger	14236.00				feet
First Reading	14210.00				feet
Last Reading	6209.00				feet
Casing Driller	6213.00				feet
Casing Logger	6209.00				feet
Bit Size	6.000				inches
Hole Fluid Type	WBM				
Density / Viscosity	9.50		lb/USg	38.00	type in
PH / Fluid Loss	9.00			6.40	ml/30Min
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.92 @ 81.0			ohm-m	
Rmf @ Measured Temp	0.74 @ 81.0			ohm-m	
Rmc @ Measured Temp	1.10 @ 81.0			ohm-m	
Source Rmf / Rmc	CALC			CALC	
Rm @ BHT	0.34 @224.0			ohm-m	
Time Since Circulation	1 HOUR				
Max Recorded Temp	224.00			deg F	
Equipment / Base	18086			Casper	
Recorded By	K. SALLER				
Witnessed By	P. BUCKNAM				GEOLOGIST
WSL	B. MILLER				WSL

BOREHOLE RECORD				Last Edited: 17-AUG-2014 16:28	
Bit Size inches		Depth From feet		Depth To feet	
6.000		6213.00		14236.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
INTERMED	7.000	1704.00	6213.00	29.00	
SURFACE	9.625	0.00	1704.00	40.00	

REMARKS
LOGGED WITH WLS 14.01.3220
LOGGED USING MESSENGER SHUTTLE METHOD OF DEPLOYMENT
HARDWARE: MDN: MIS-A SINGLE 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: -103.871036 LATITUDE: 40.830142

DATE: 40:030142

DRILL PIPE DEPTH DURING DEPLOYMENT: 14,112 FEET  
LOGGING TOOL DEPTH AFTER DEPLOYMENT: 14,216 FEET

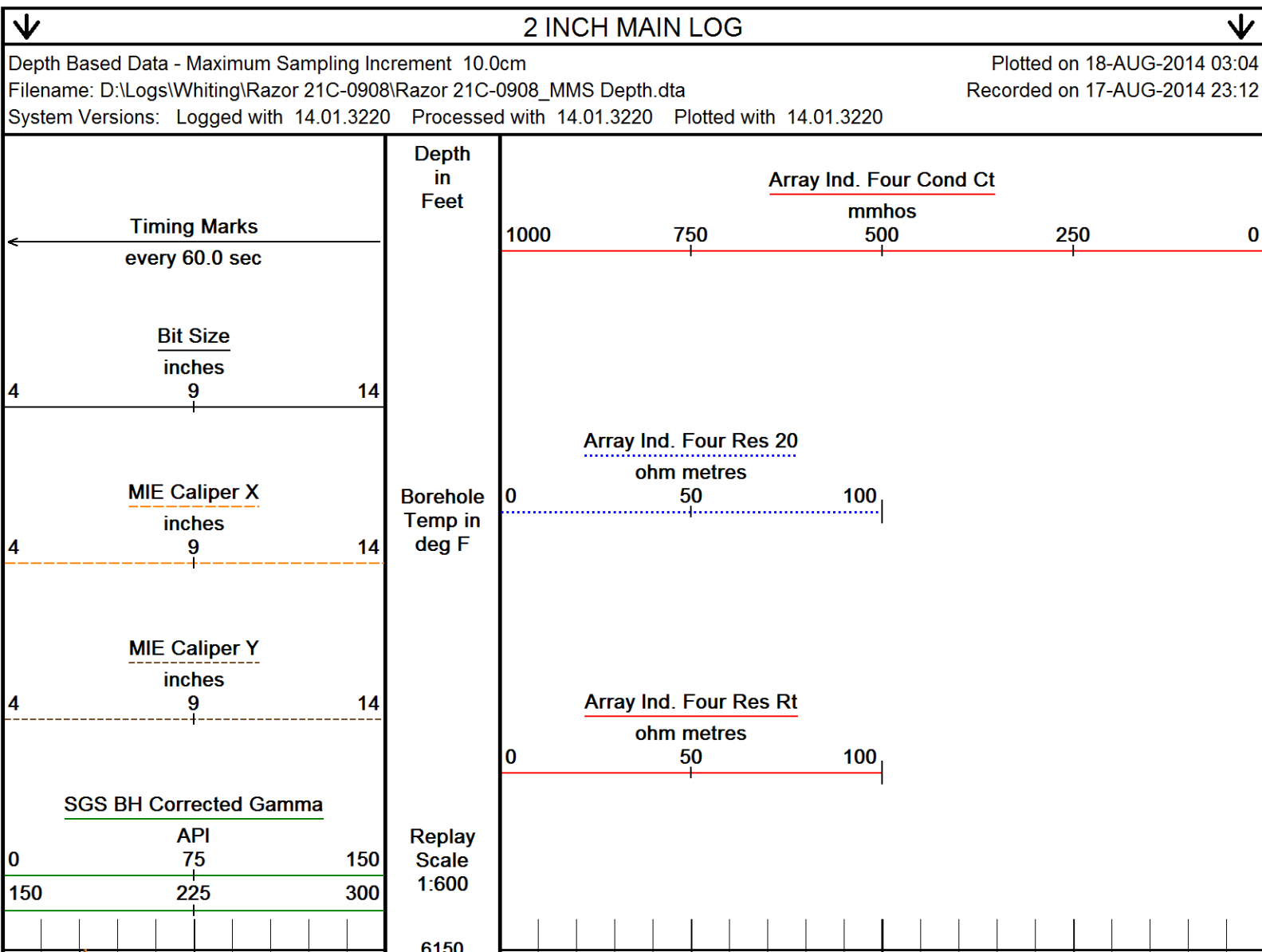
ROTATED LAST 23 STANDS DOWN AT 15RPM TO REACH TD - EXCESSIVE STICK/SLIP SEEN WHEN NOT ROTATING  
ROTATING 15RPM FOR FIRST 1500FT WHILE LOGGING DUE TO EXCESSIVE STICK/SLIP OFF BOTTOM IN ATTEMPT TO IMPROVE  
MICRO-IMAGER DATA.

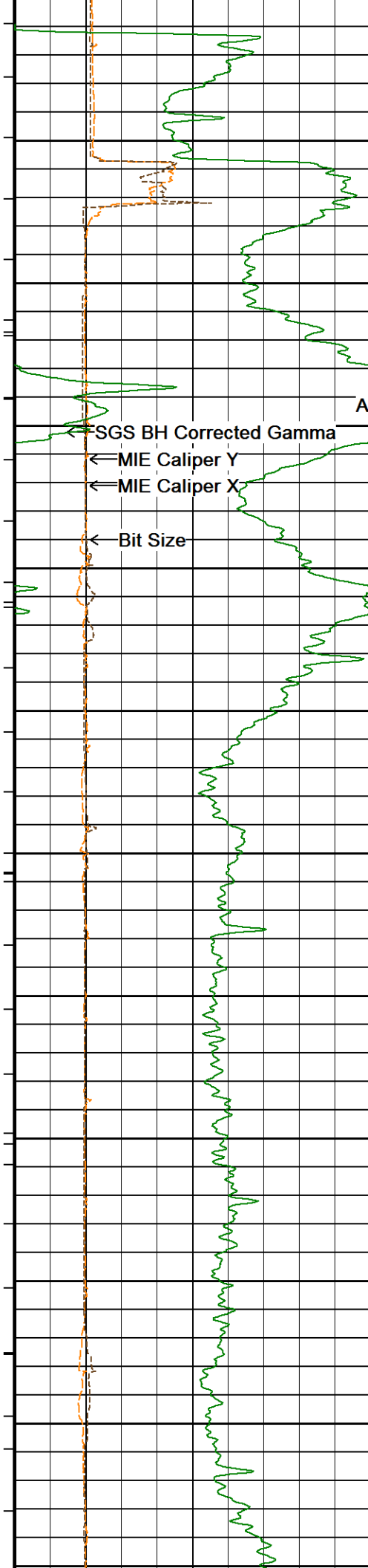
ANNULAR HOLE VOLUME FROM TD TO 7"-29# CASING AT 6209 FEET = 675 CUBIC FEET.  
TOTAL HOLE VOLUME FROM TD TO 7"-29# CASING AT 6209 FEET = 1560 CUBIC FEET.

OPERATORS: S.LANDON, J. GERDES

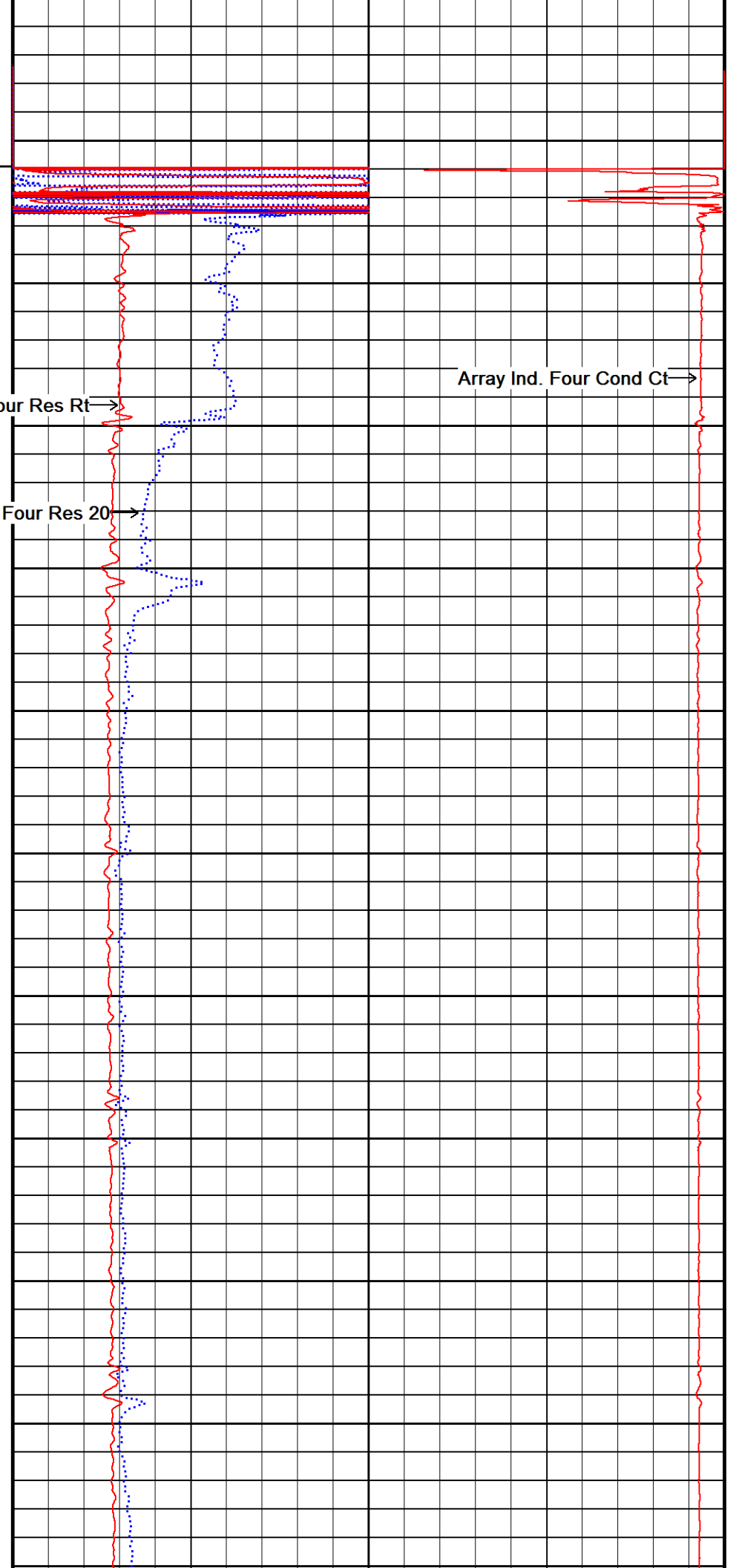
RIG:CADE 23

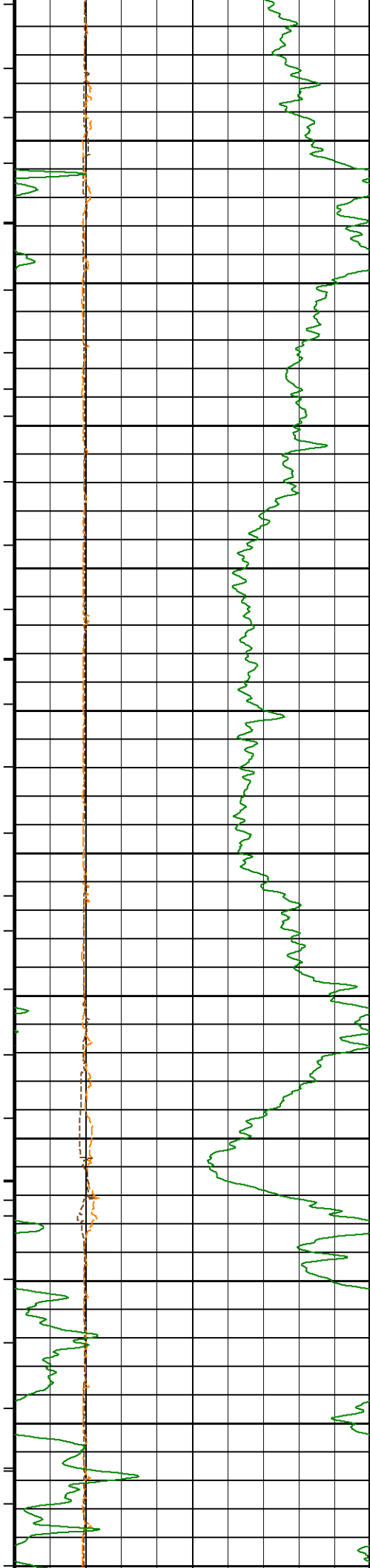
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will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



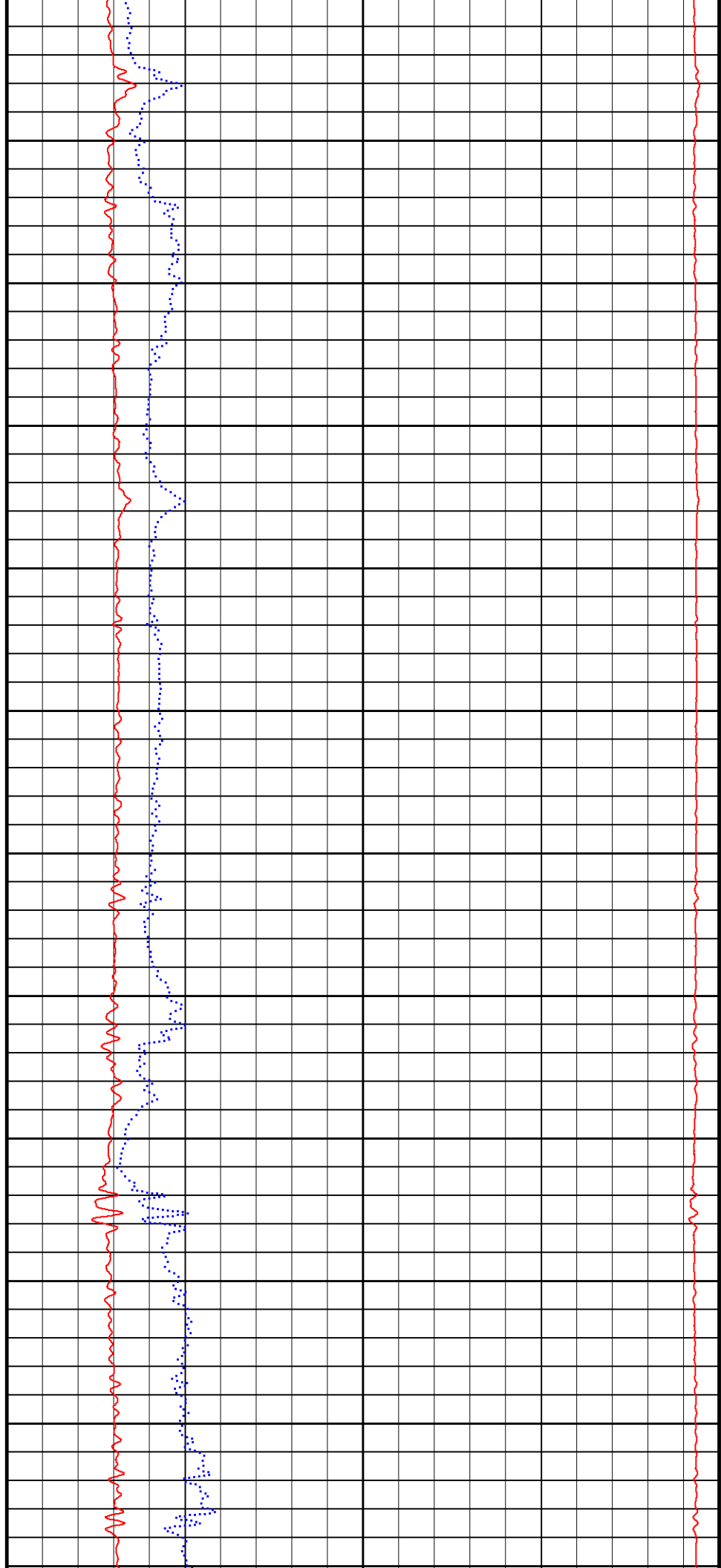


6100  
6200  
209°  
6300  
210°  
6400  
210°  
6500  
211°  
6600  
211°  
6700

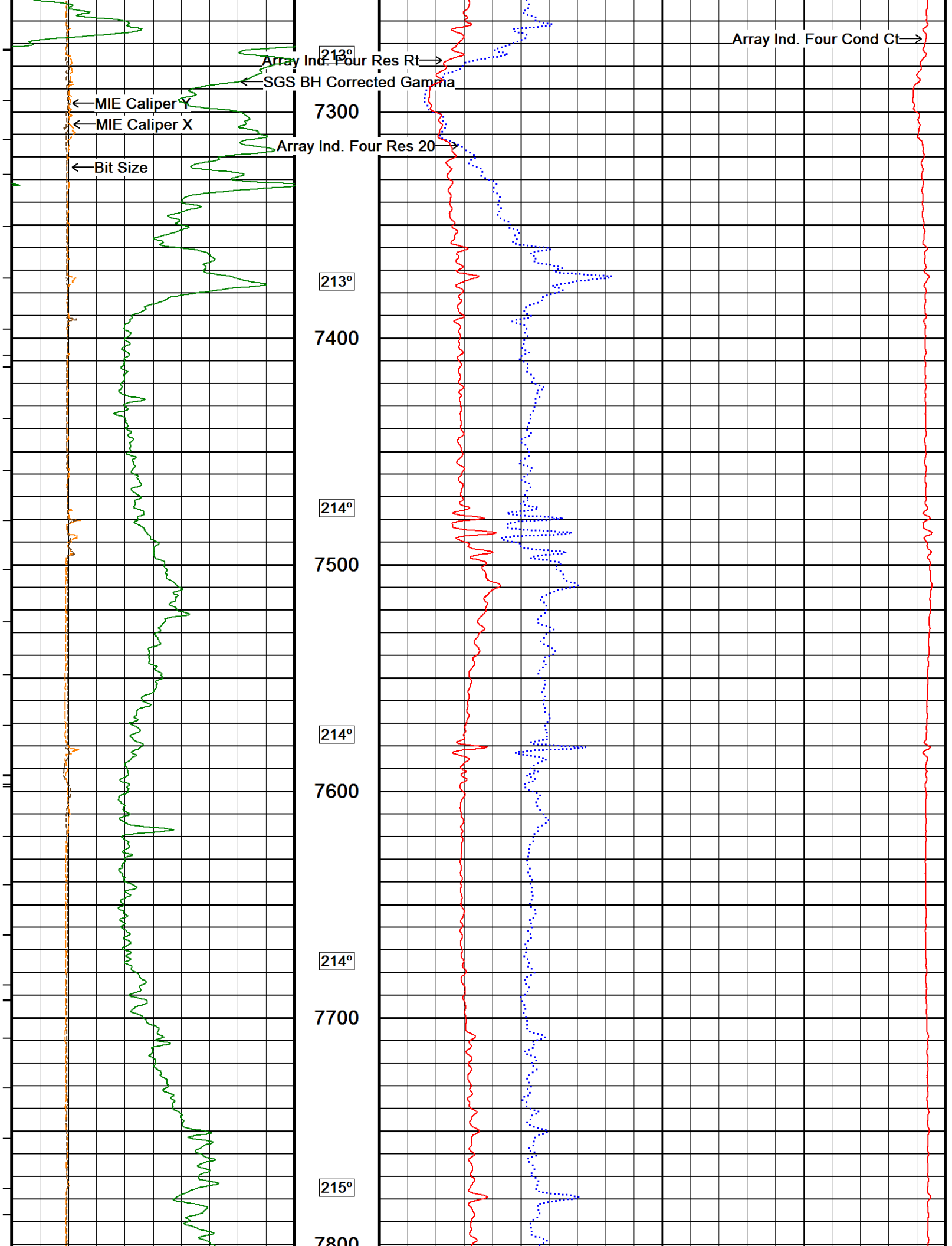


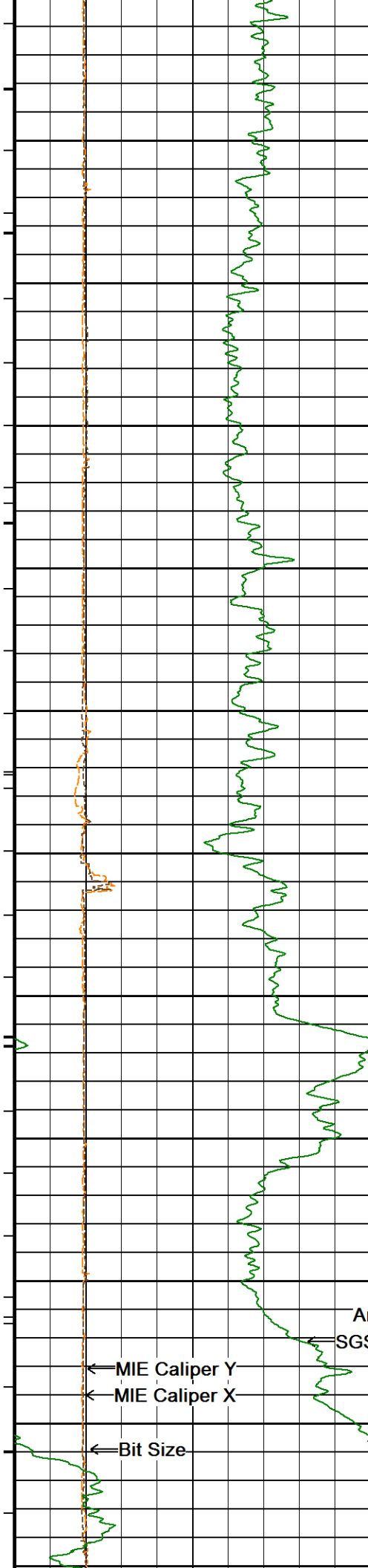


6700  
211°  
6800  
212°  
6900  
212°  
7000  
212°  
7100  
213°  
7200









215°

7900

215°

8000

215°

8100

216°

8200

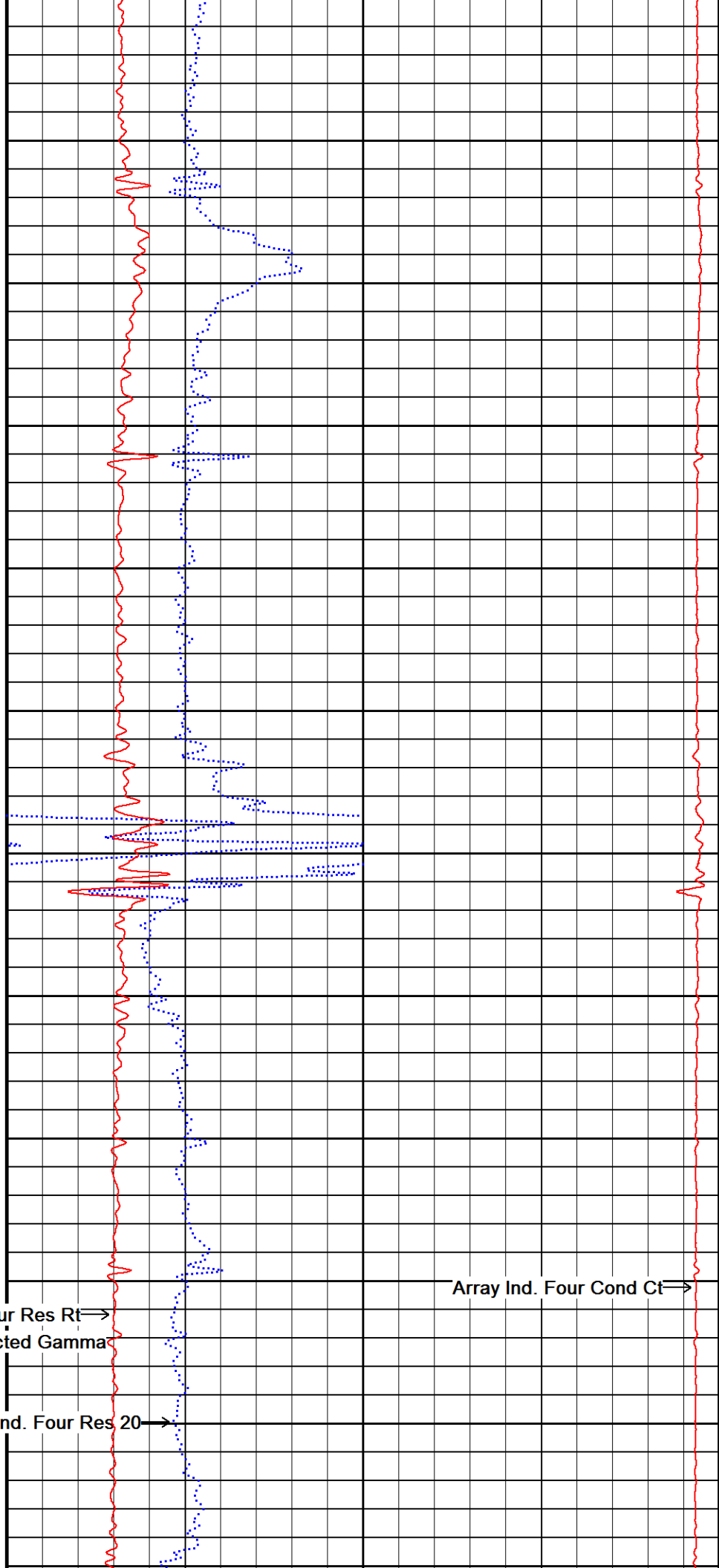
216°

8300

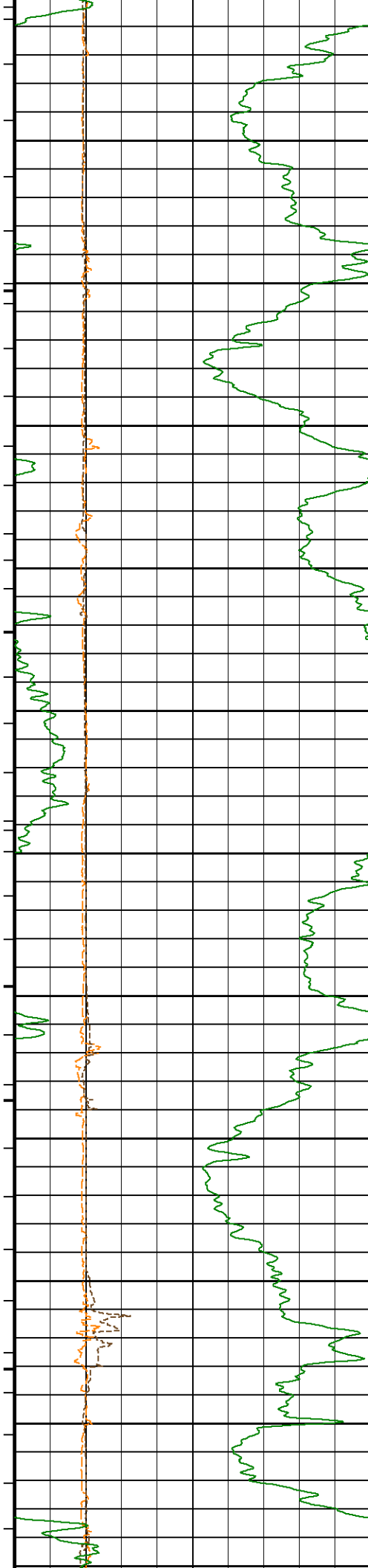
Array Ind. Four Res Rt →

← SGS BH Corrected Gamma

← Ind. Four Res 20



Array Ind. Four Cond Ct →



216°

8400

217°

8500

217°

8600

217°

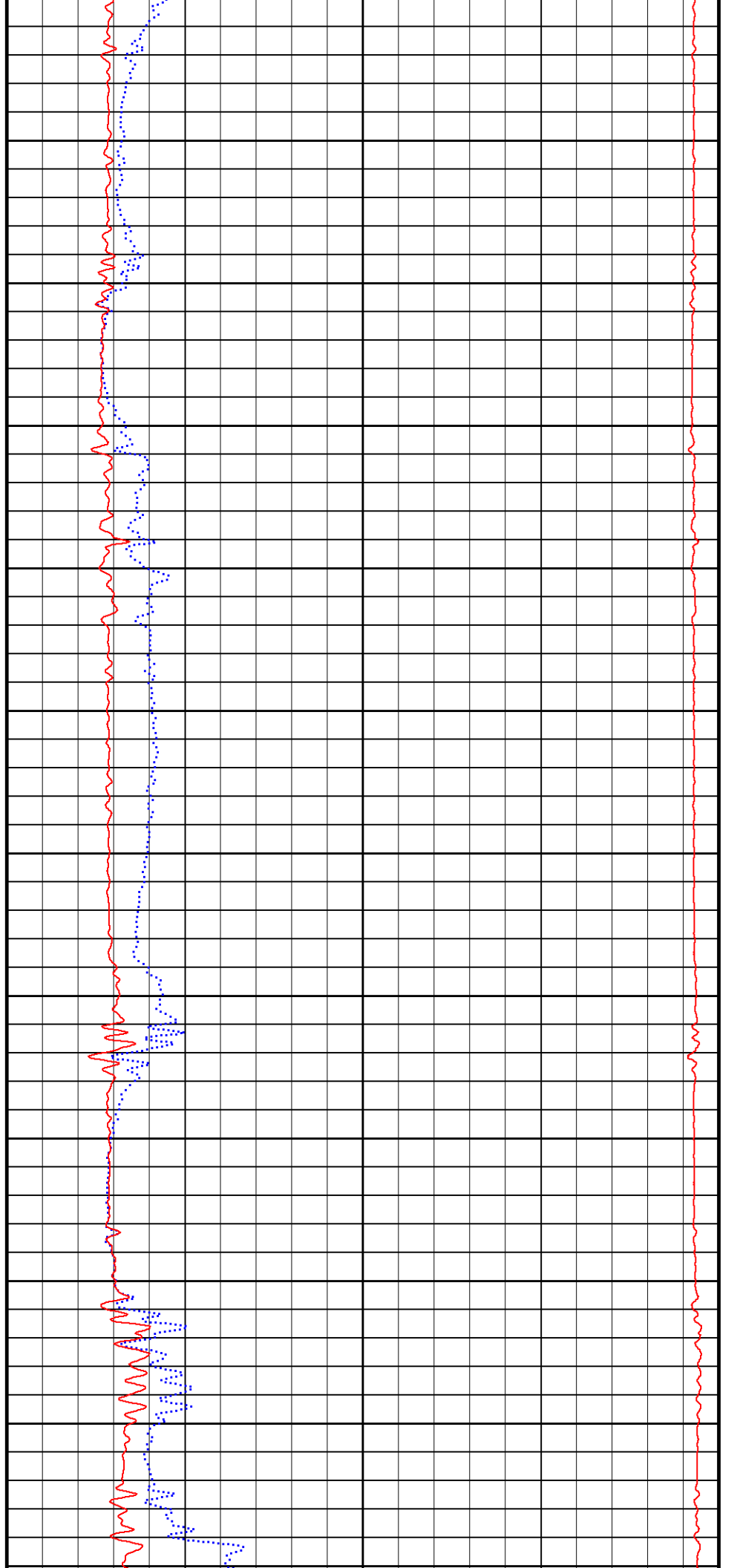
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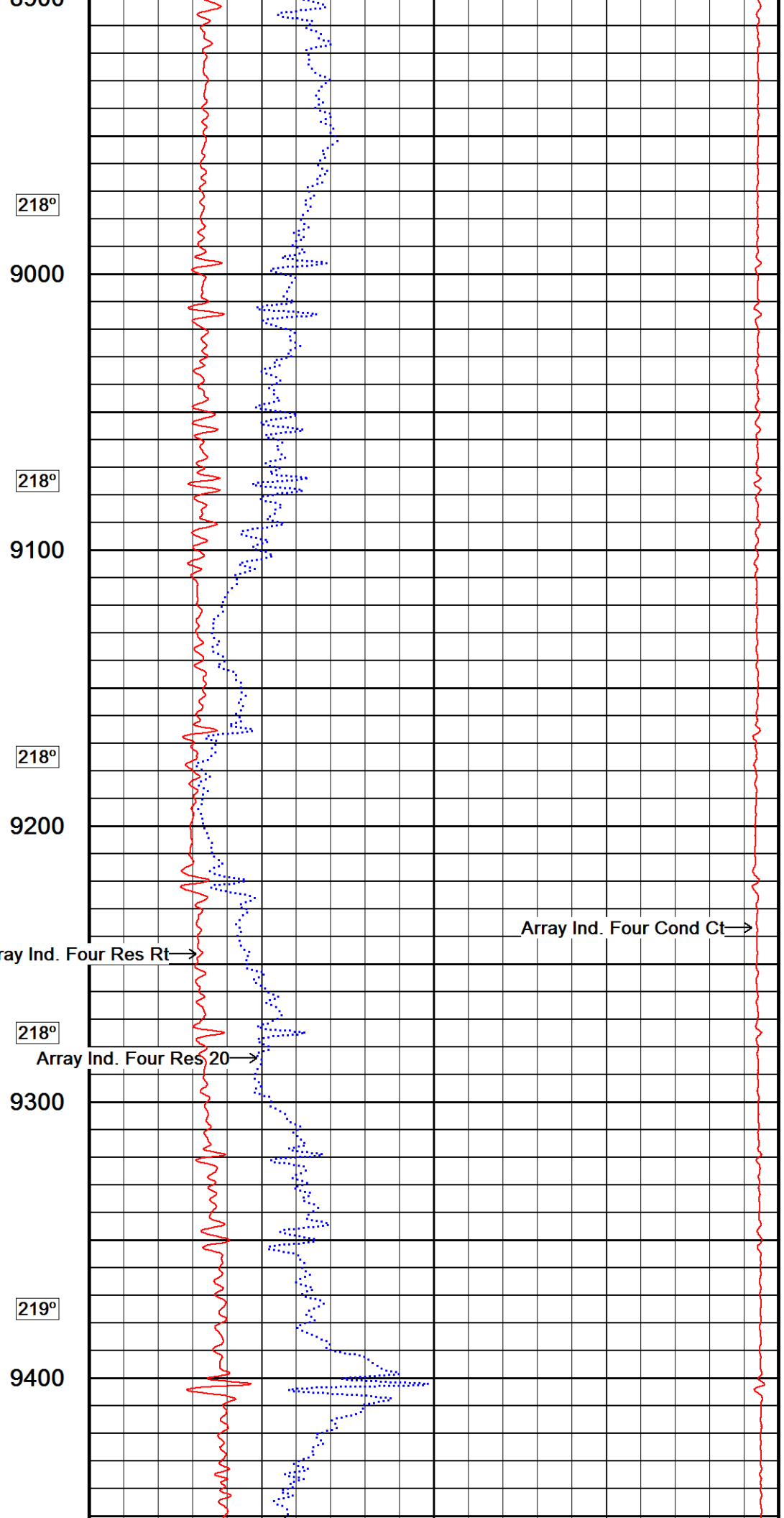
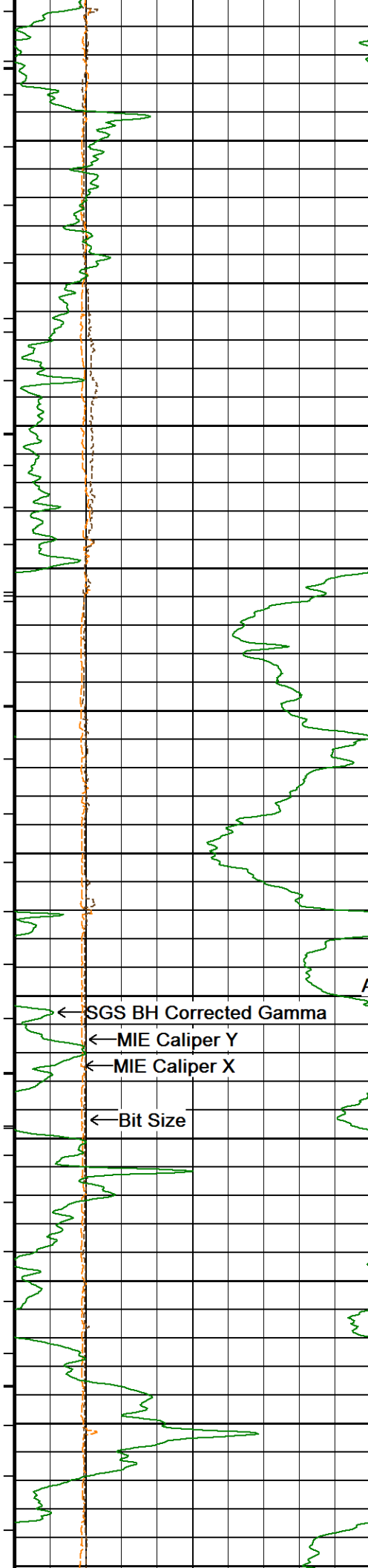
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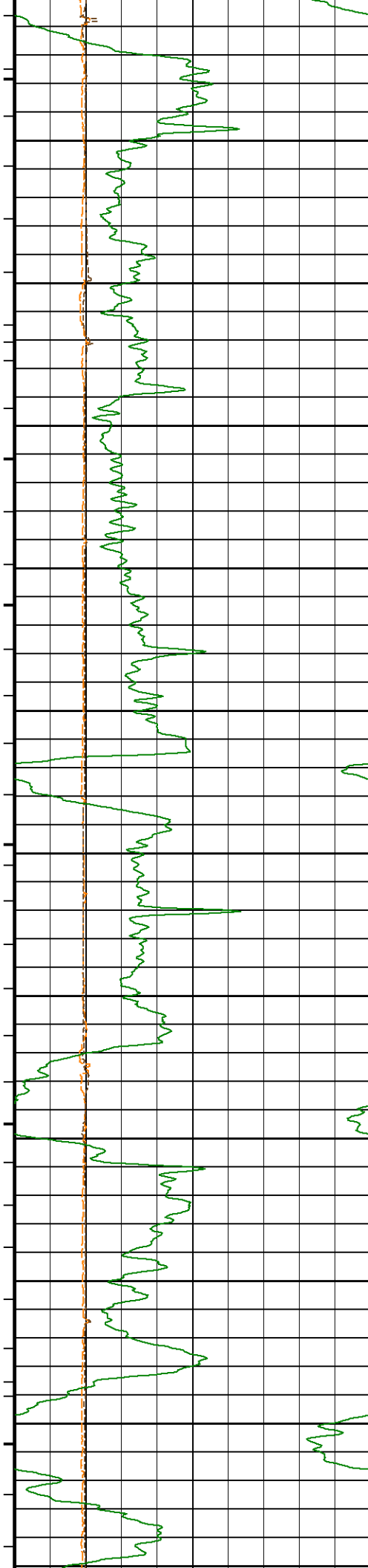
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218°

8900







219°

9500

219°

9600

219°

9700

219°

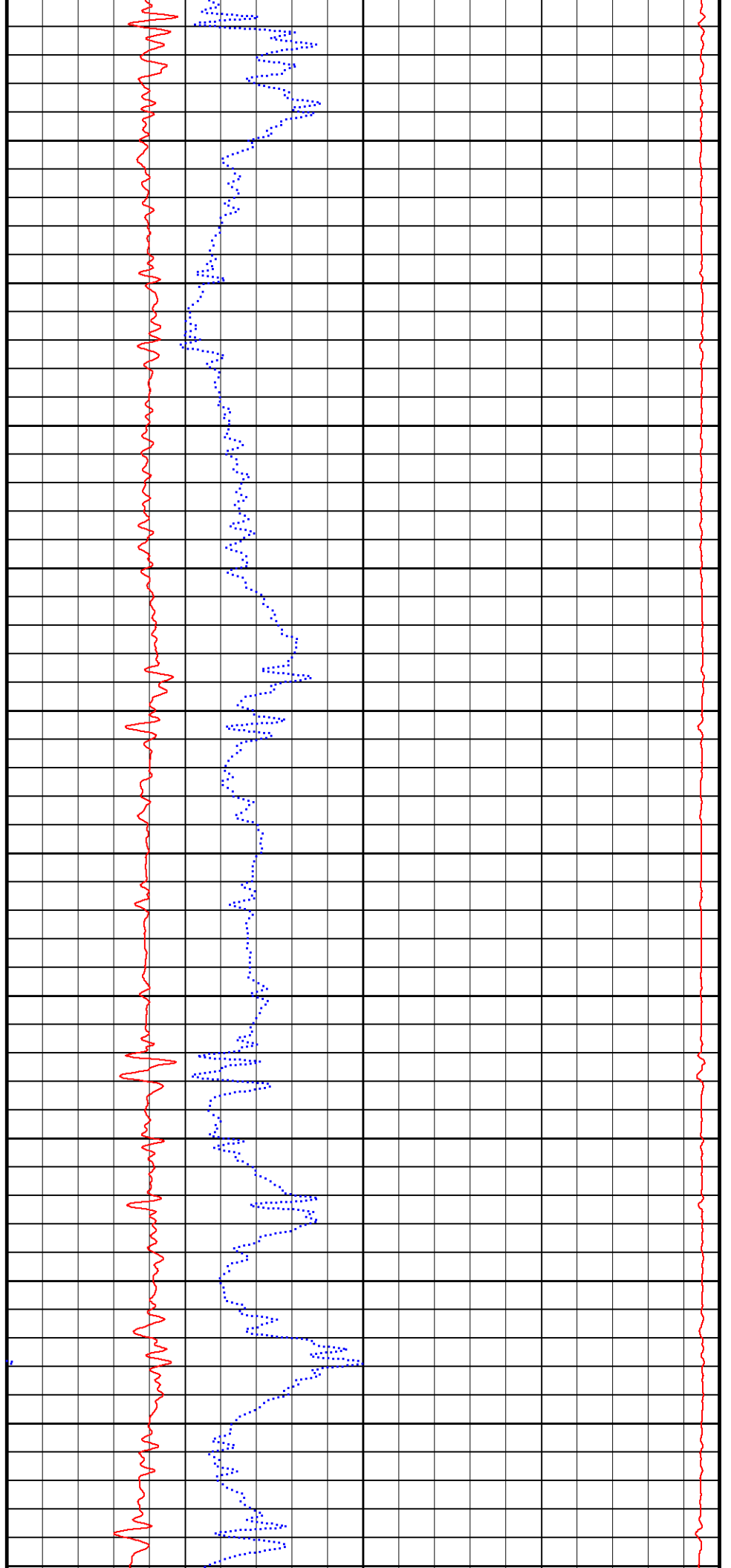
9800

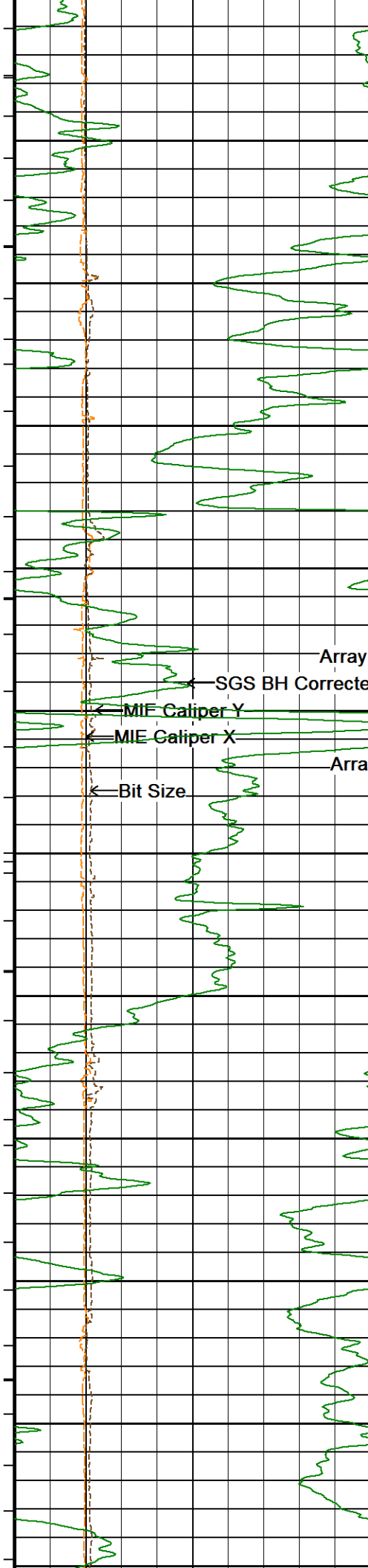
220°

9900

220°

10000





10000

220°

10100

220°

10200

221°

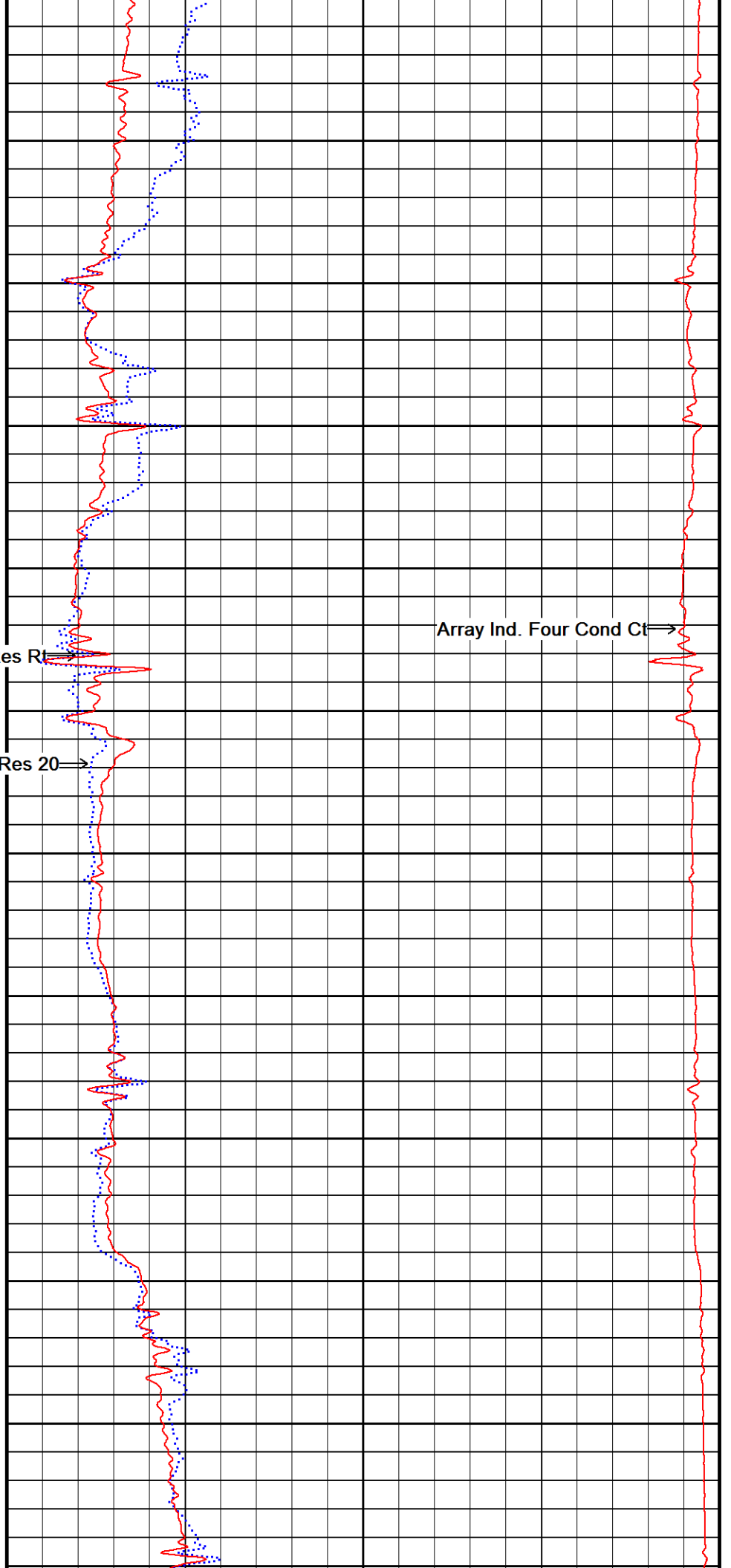
10300

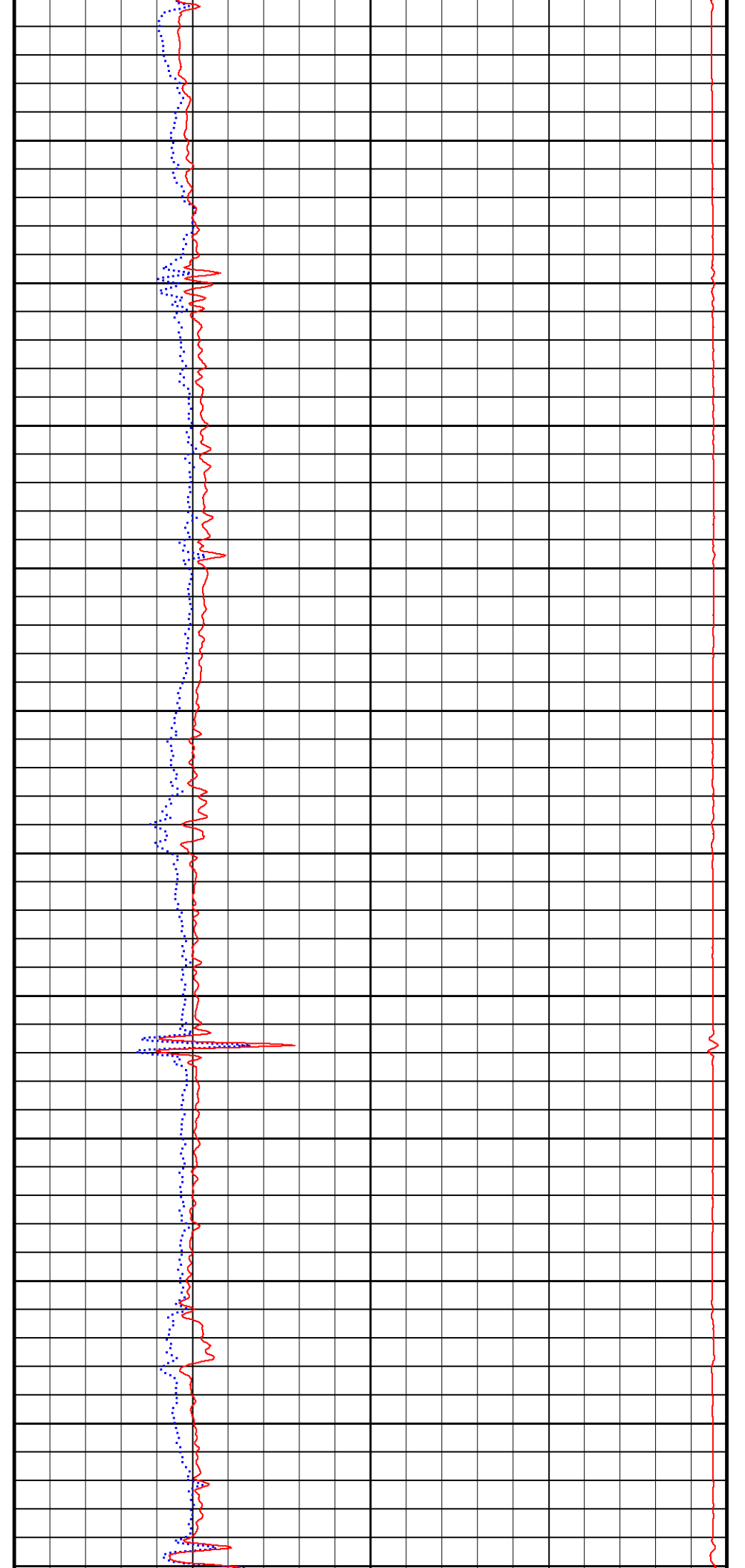
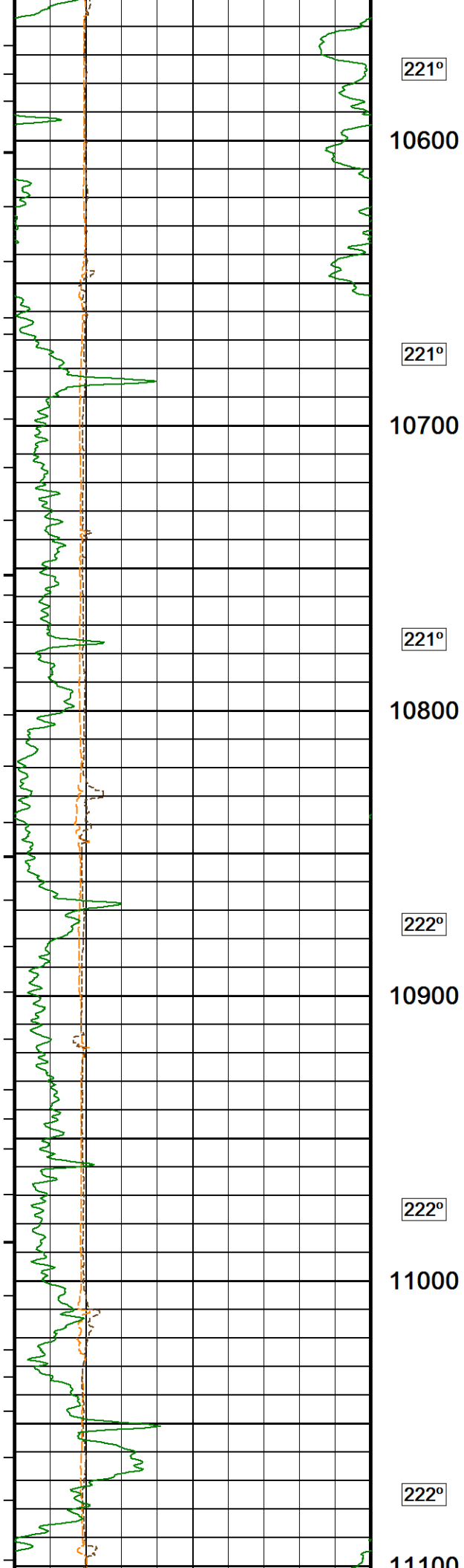
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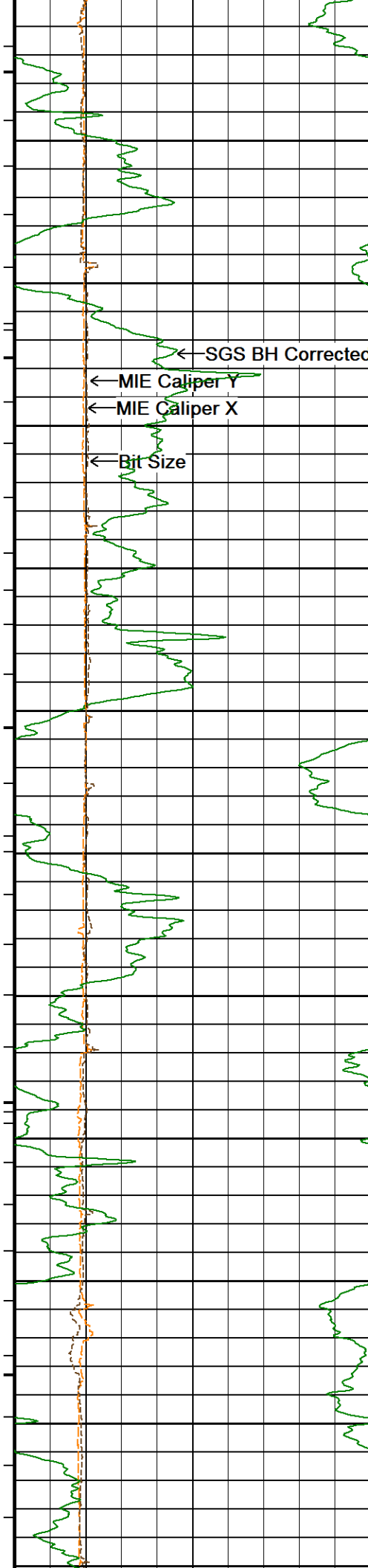
10400

221°

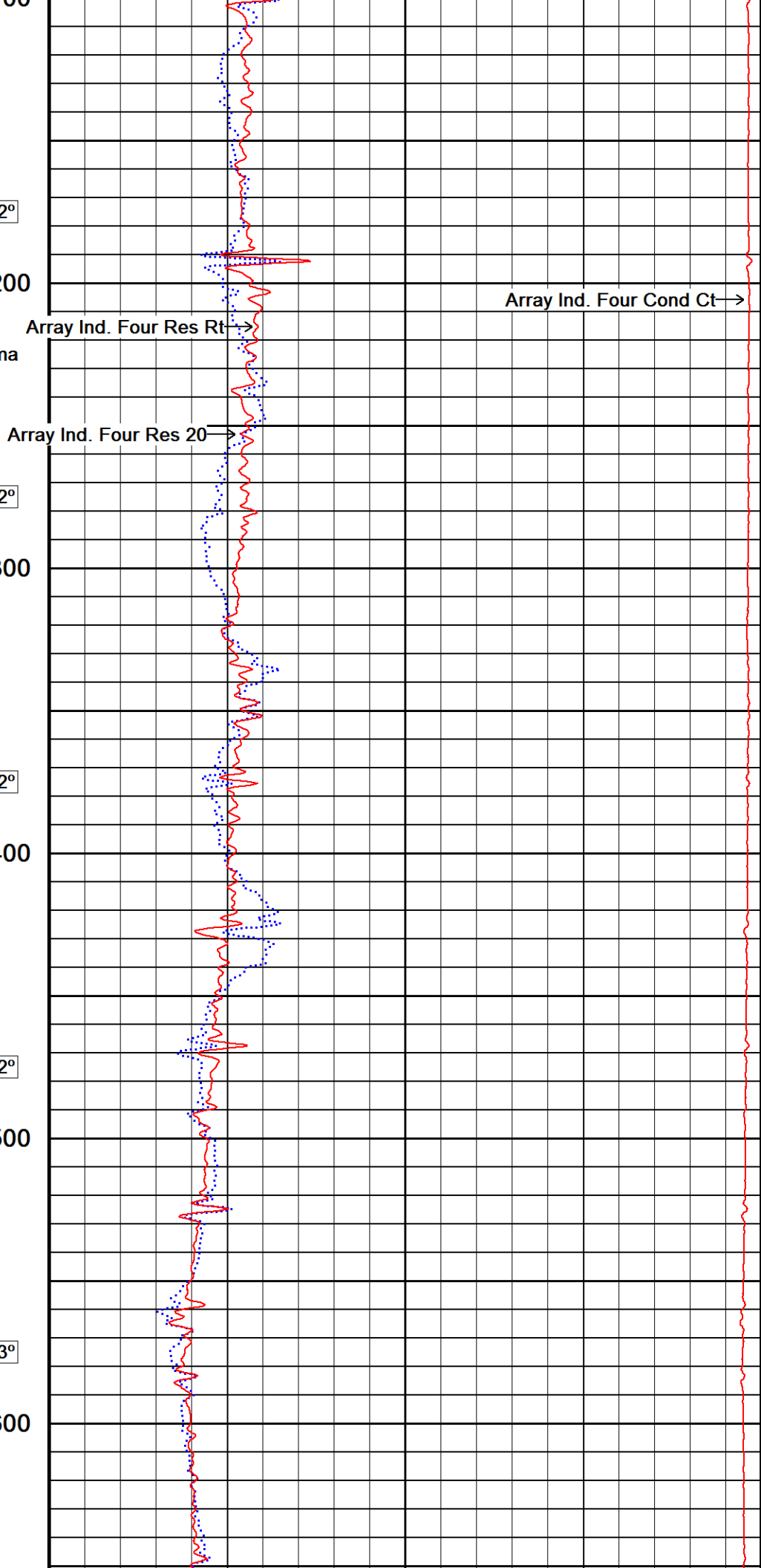
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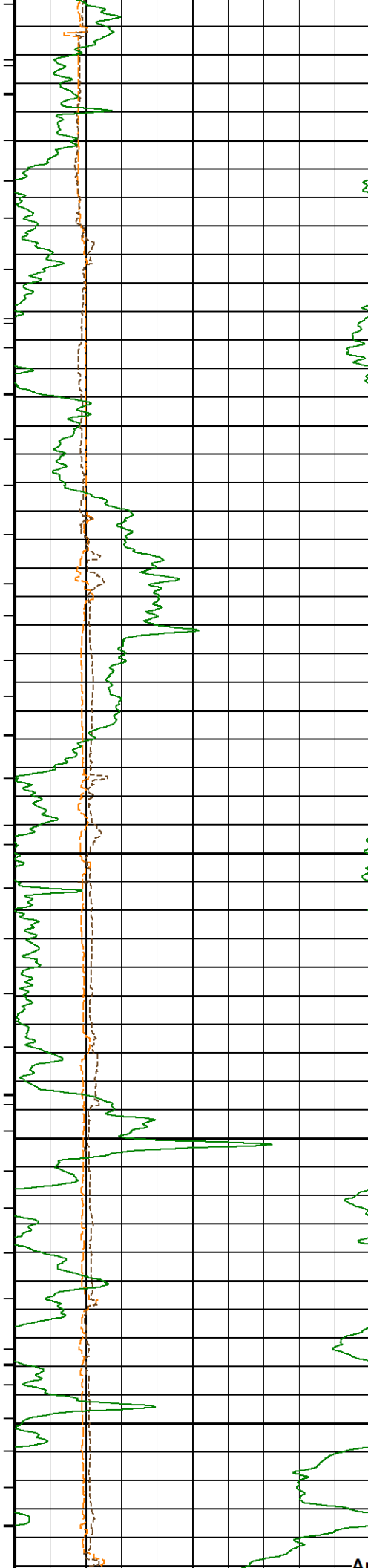




11100  
222°  
11200  
222°  
11300  
222°  
11400  
222°  
11500  
222°  
223°  
11600







223°

11700

223°

11800

223°

11900

223°

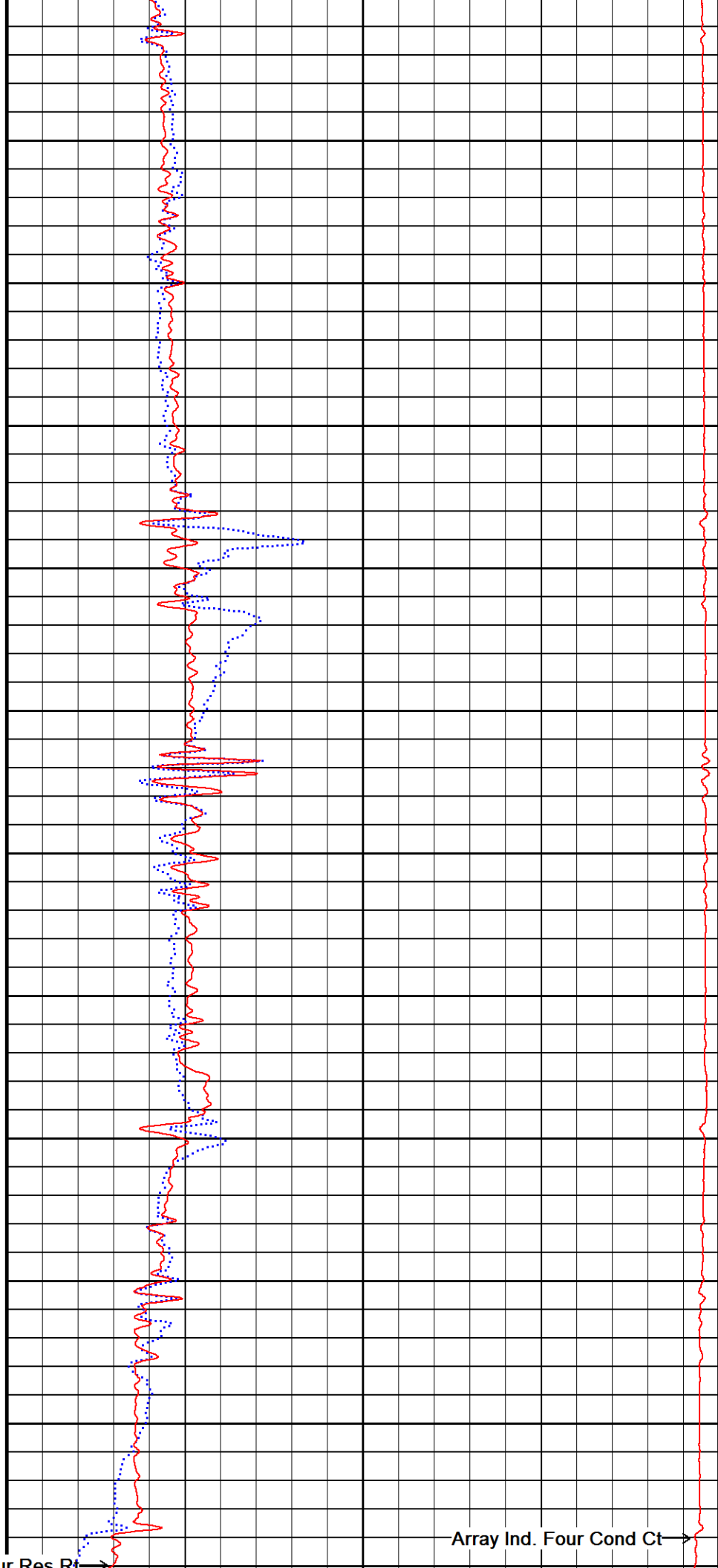
12000

223°

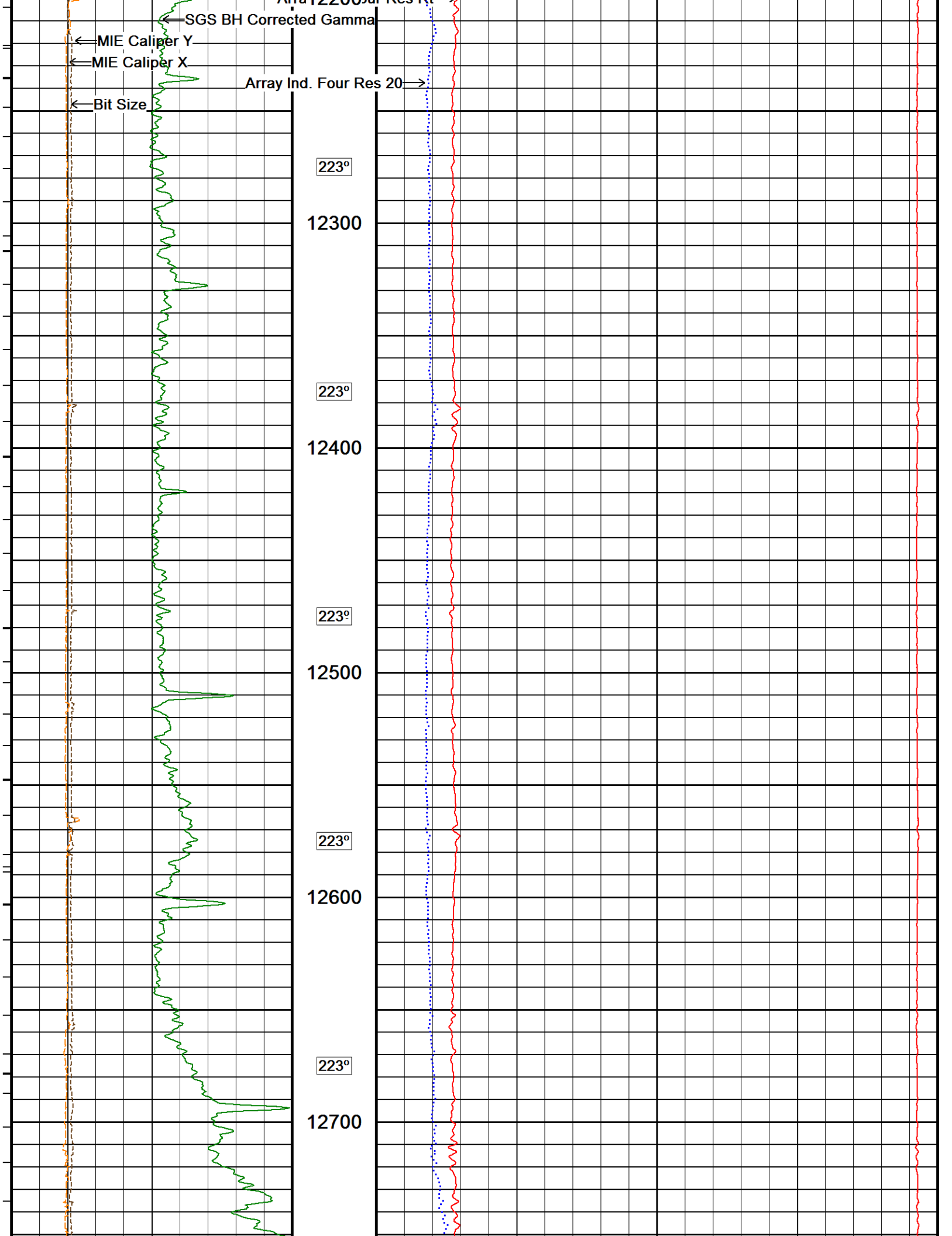
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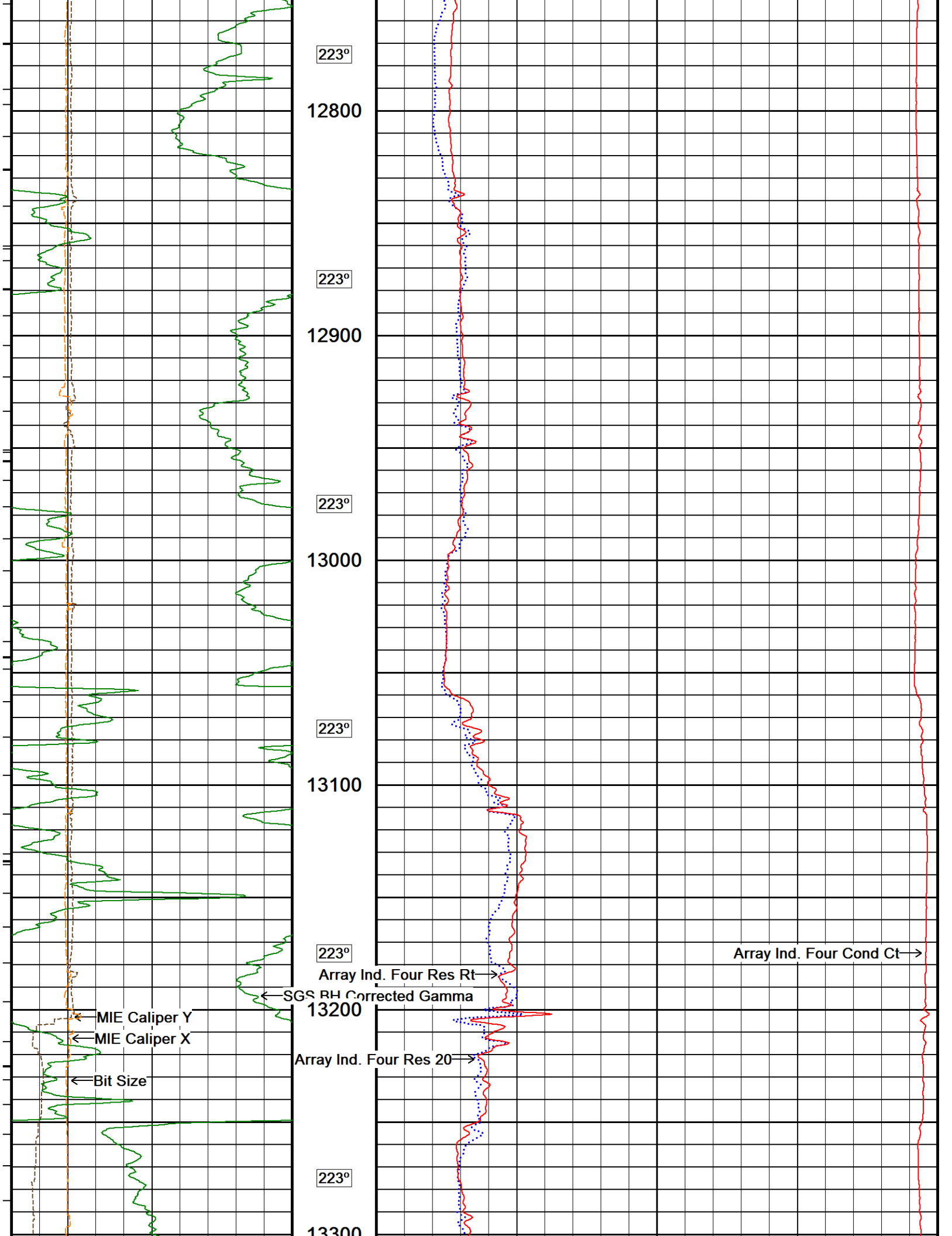
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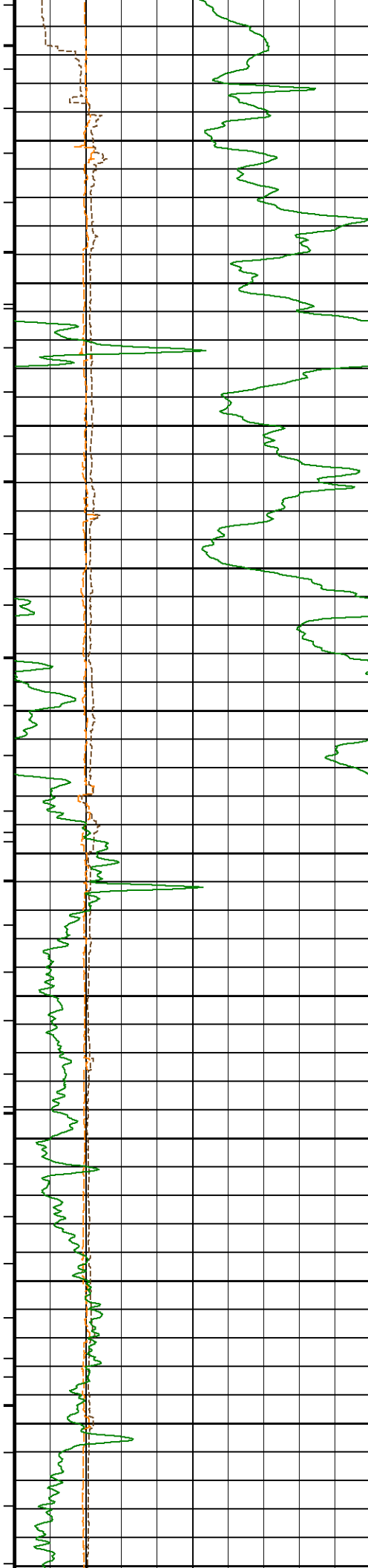
Arra12200ur Res Pt →



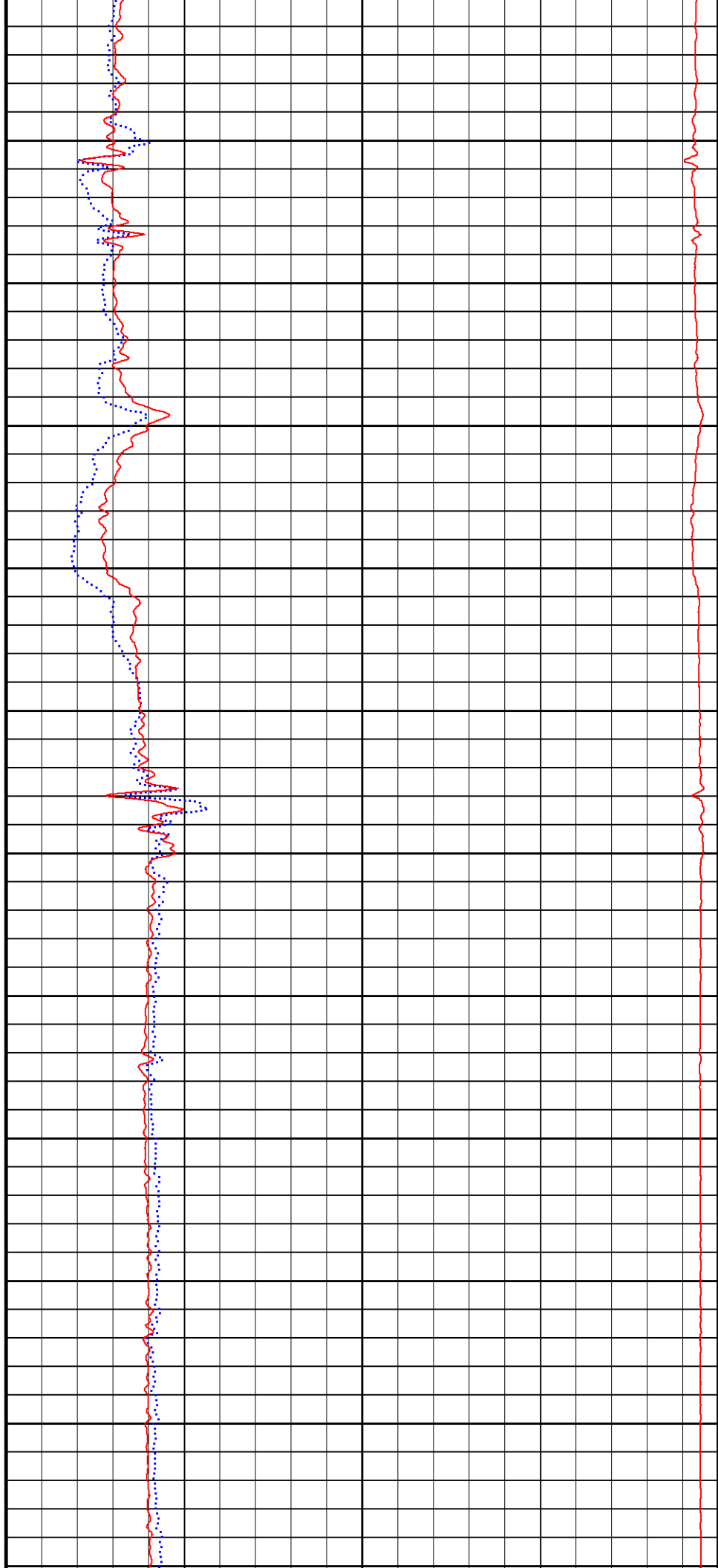
Array Ind. Four Cond Ct →

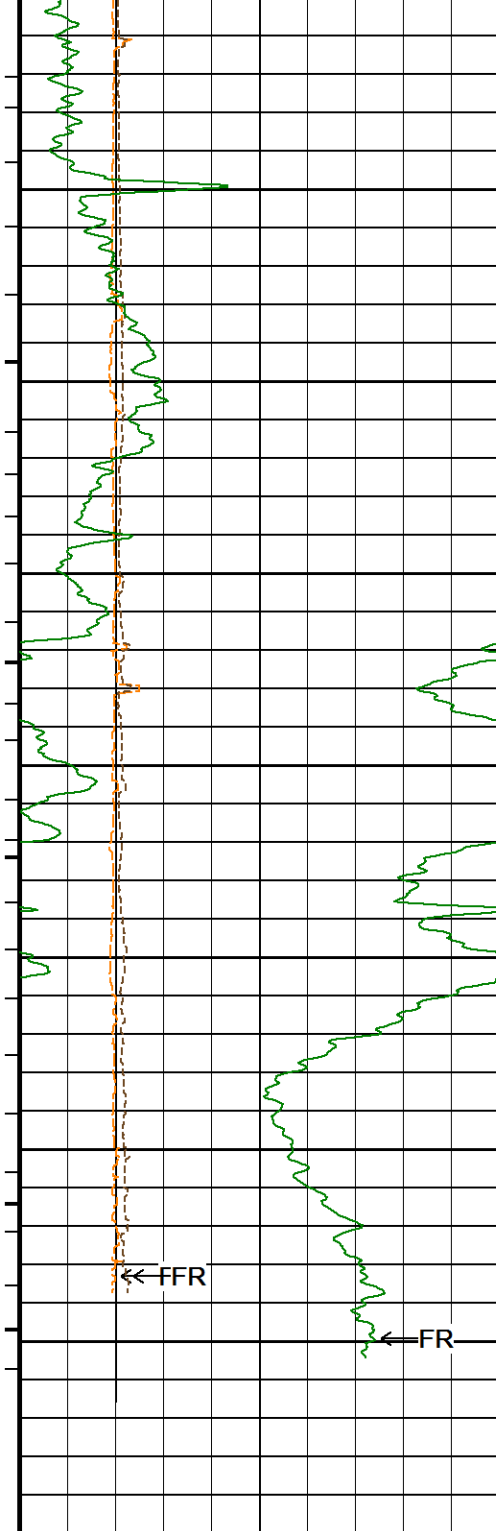






13300  
223°  
13400  
223°  
13500  
223°  
13600  
223°  
13700  
223°  
13800





223°

13900

223°

14000

223°

14100

14200

14240

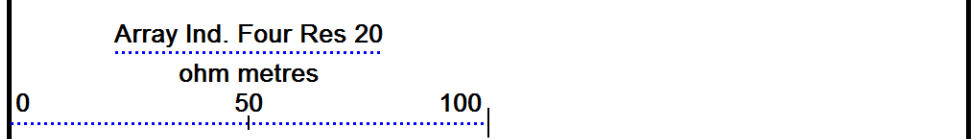
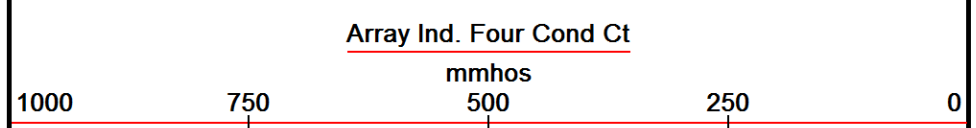
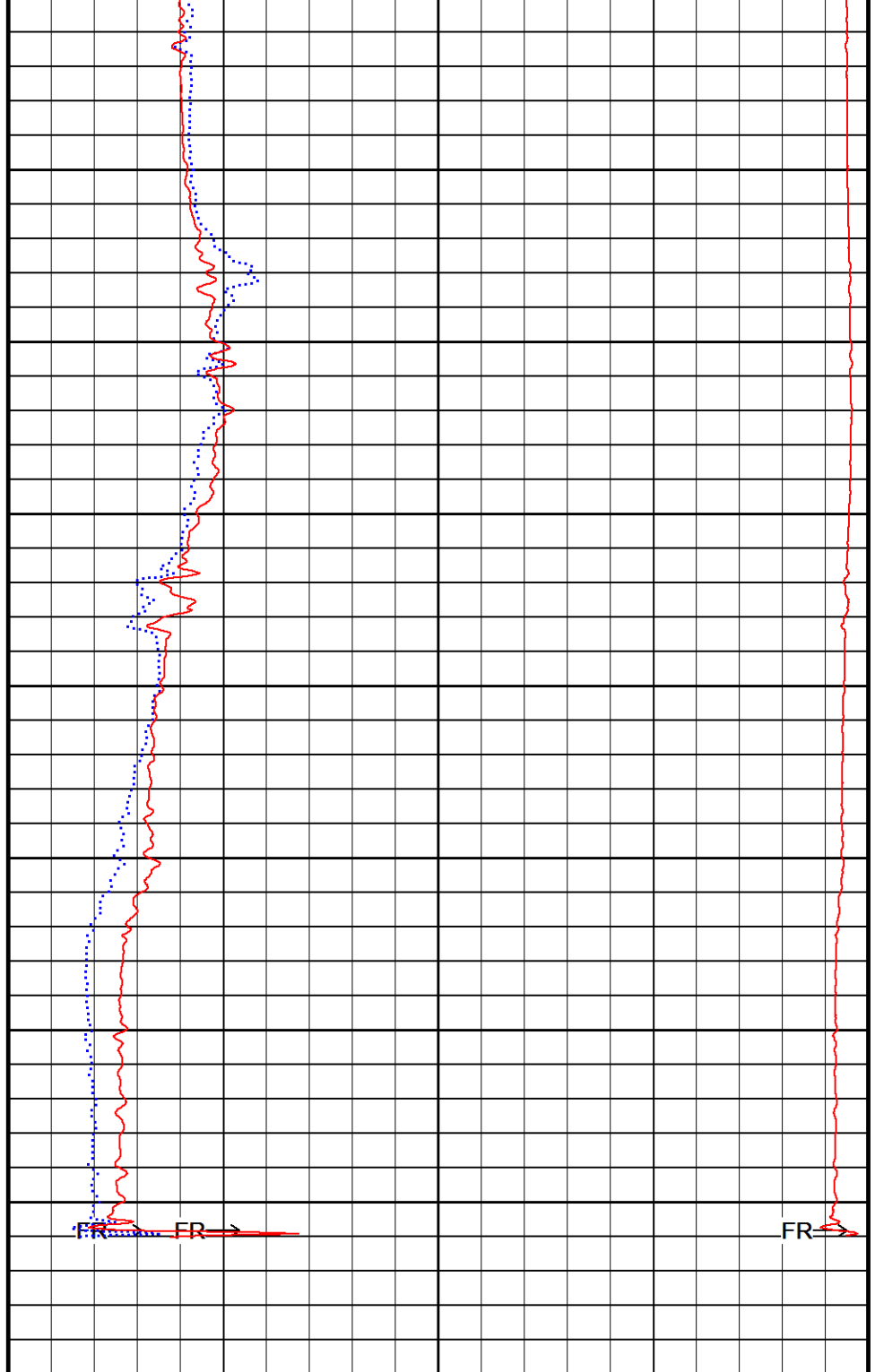
Depth  
in  
Feet

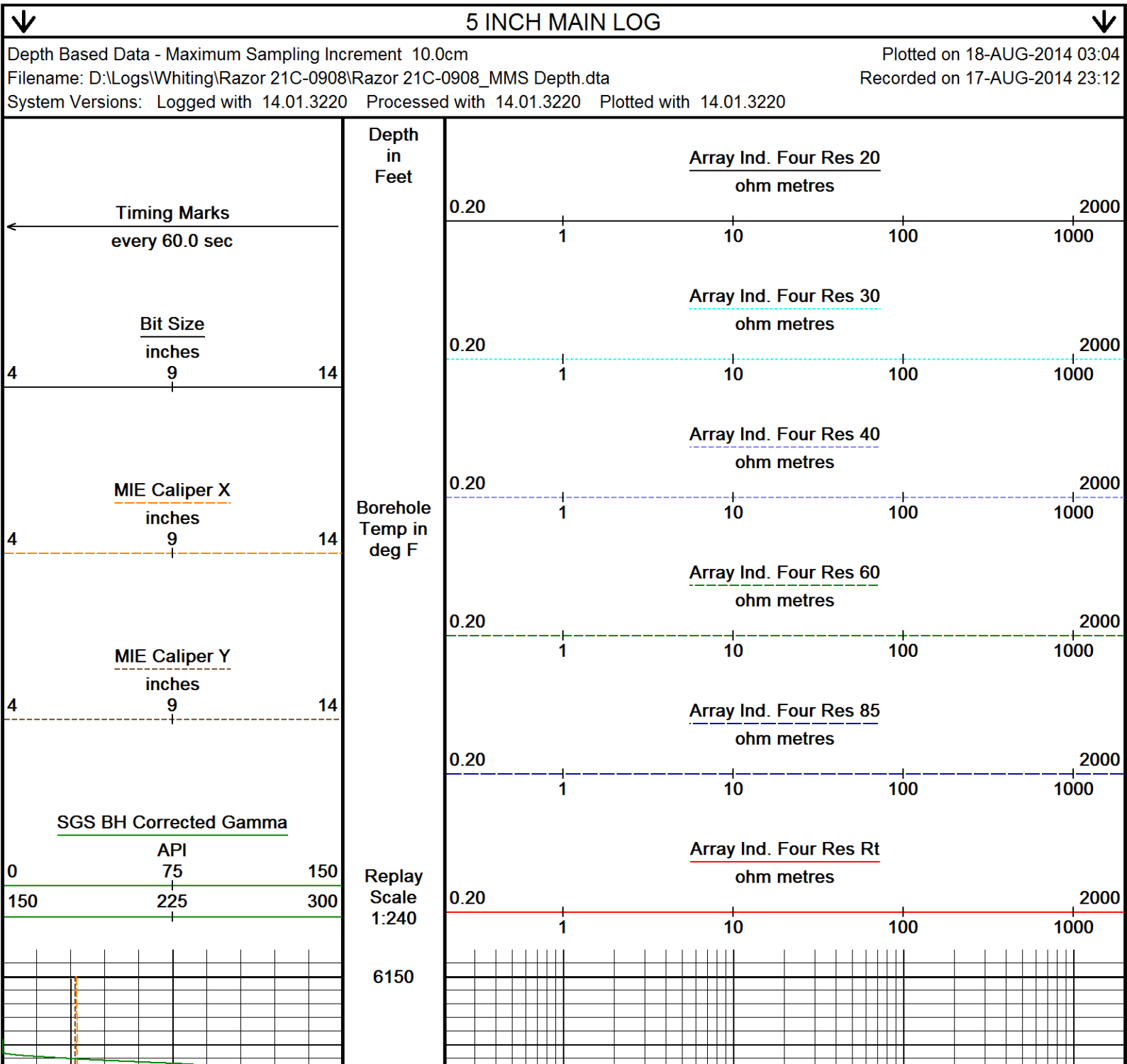
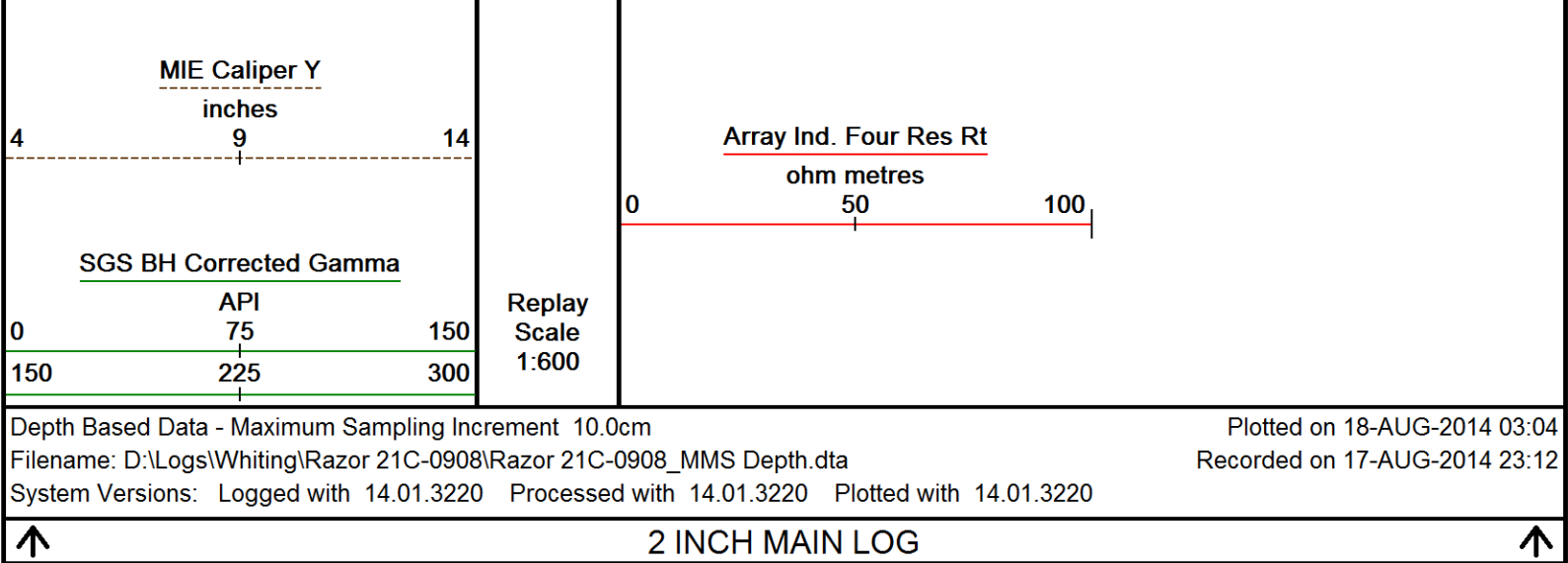
Timing Marks  
every 60.0 sec

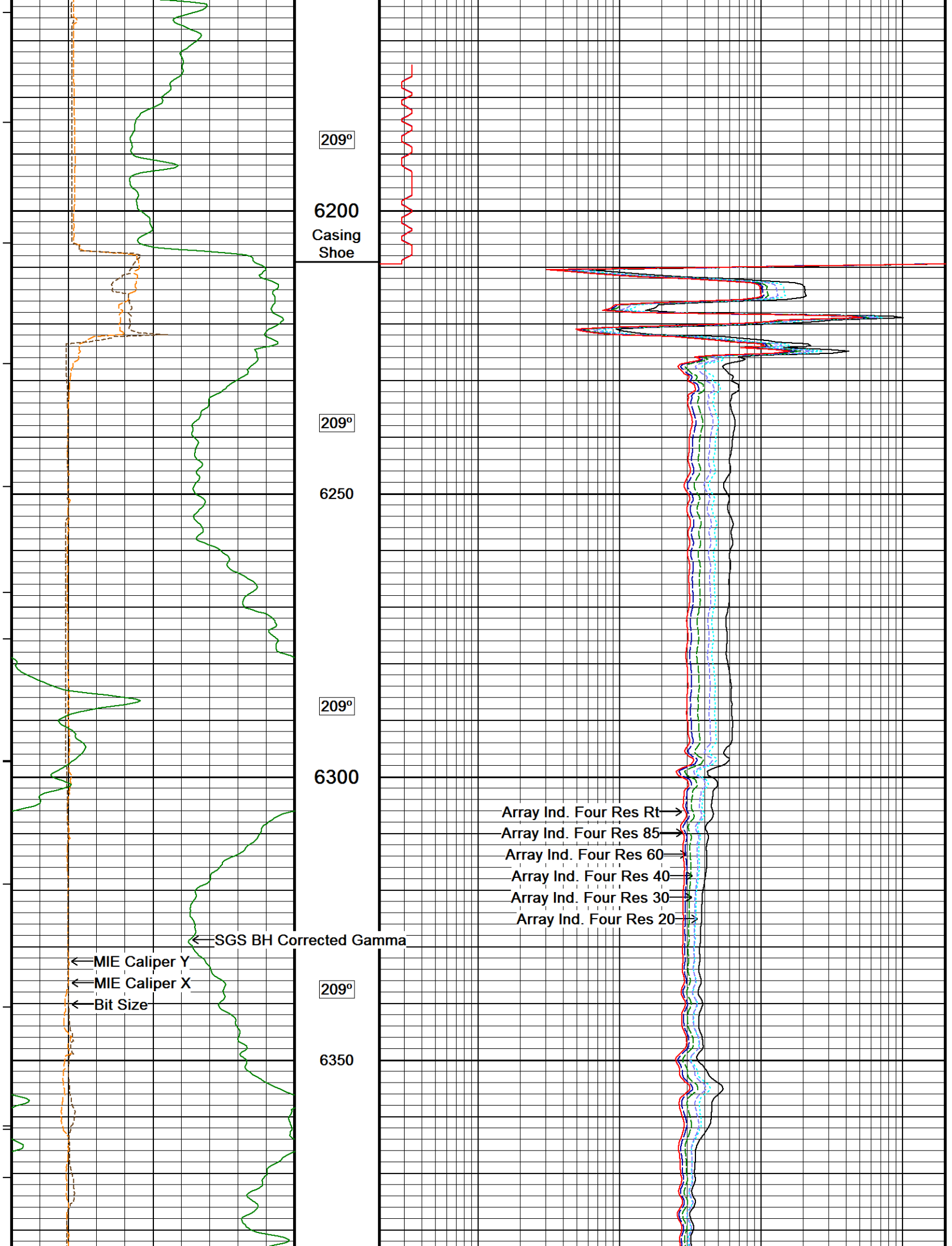
Bit Size  
inches  
4 9 14

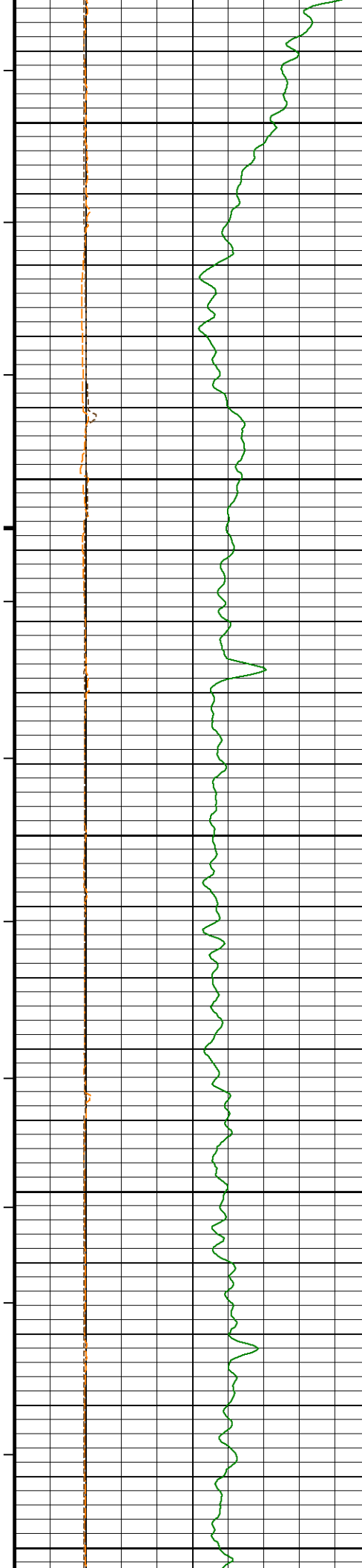
MIE Caliper X  
inches  
4 9 14

Borehole  
Temp in  
deg F









210°

6400

210°

6450

210°

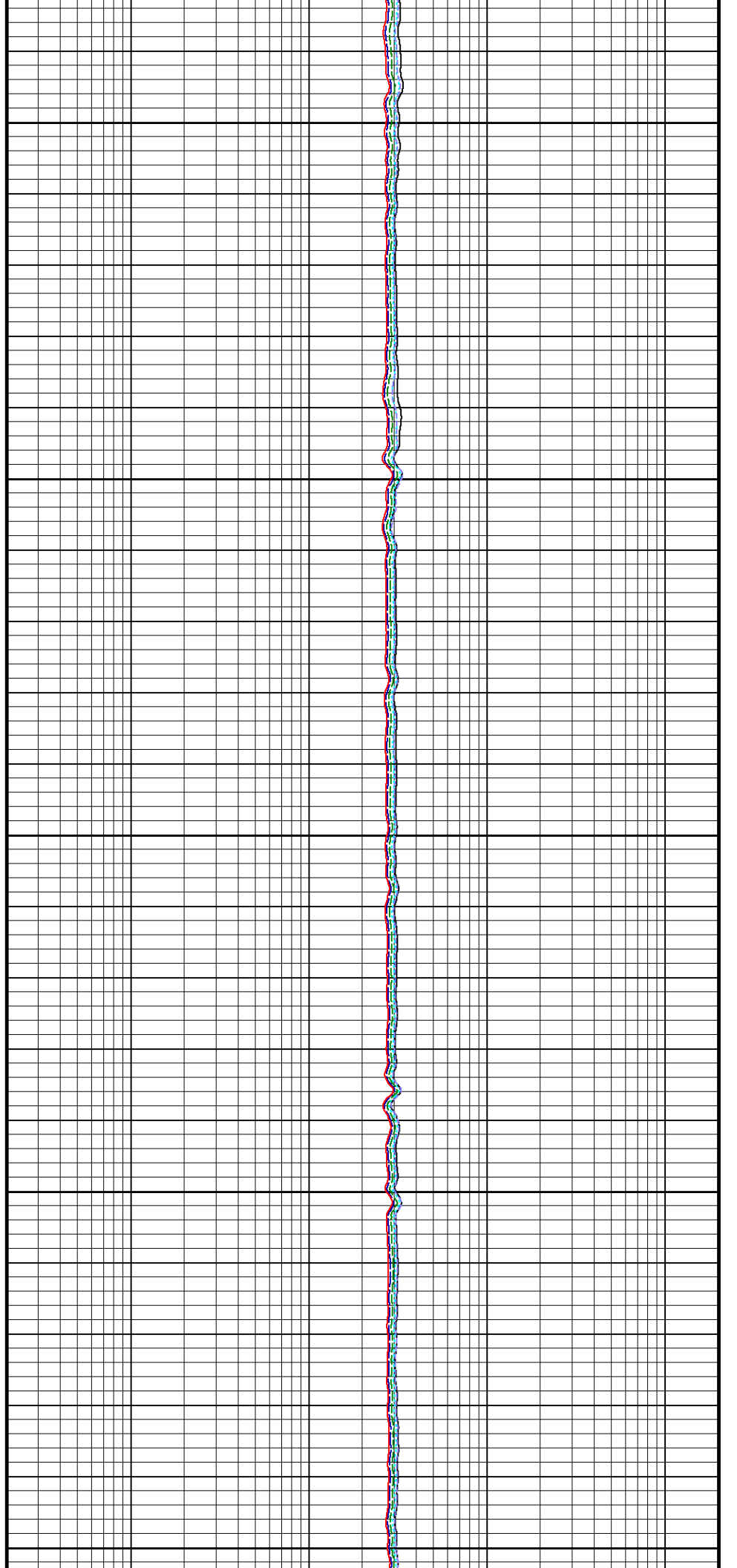
6500

210°

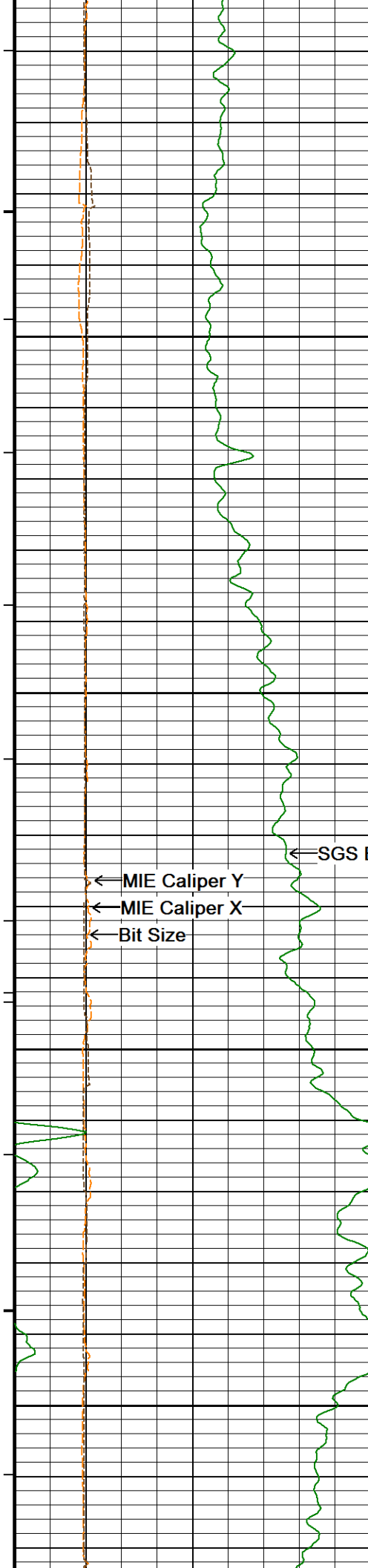
6550

211°

6600







211°

6650

211°

6700

← SGS BH Corrected Gamma

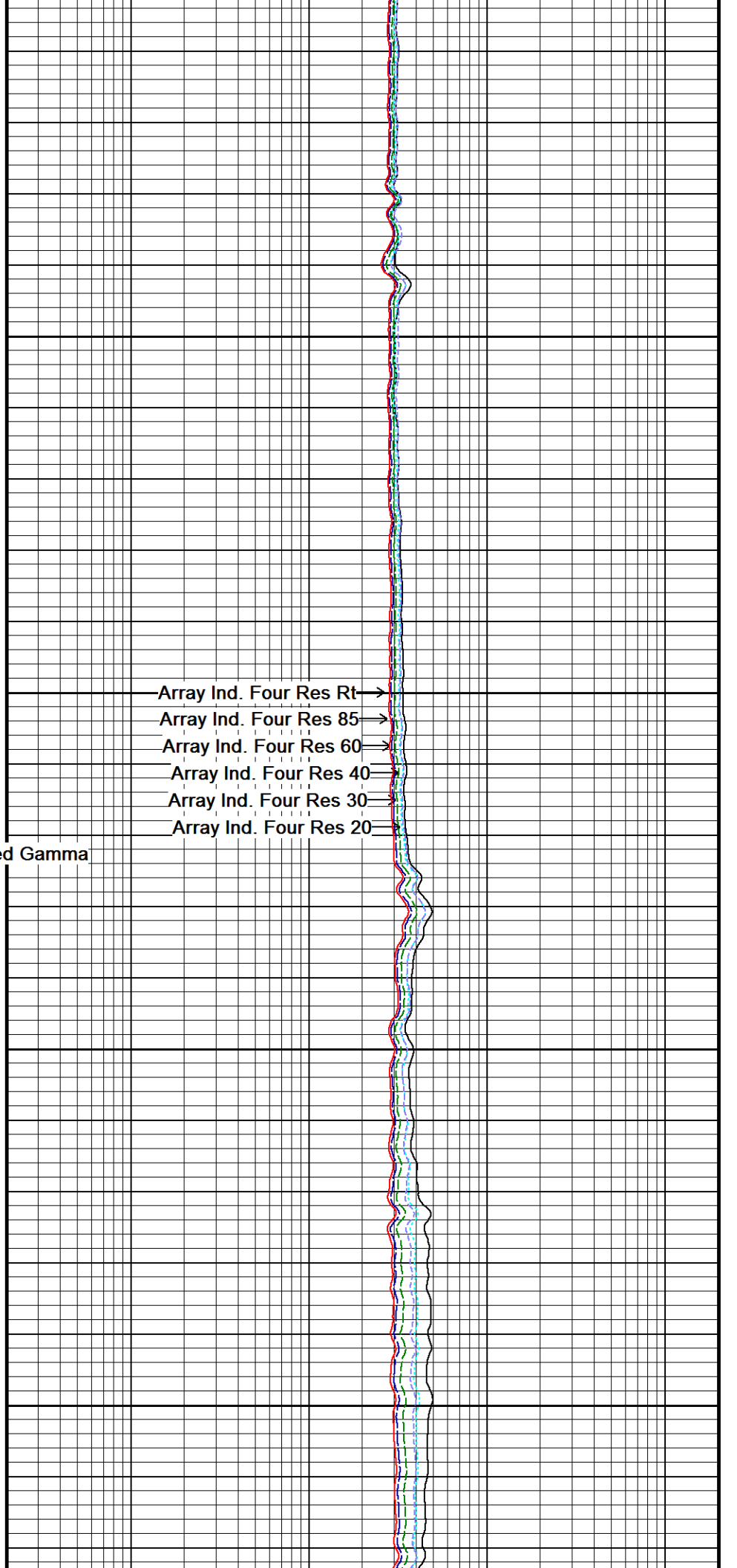
← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

211°

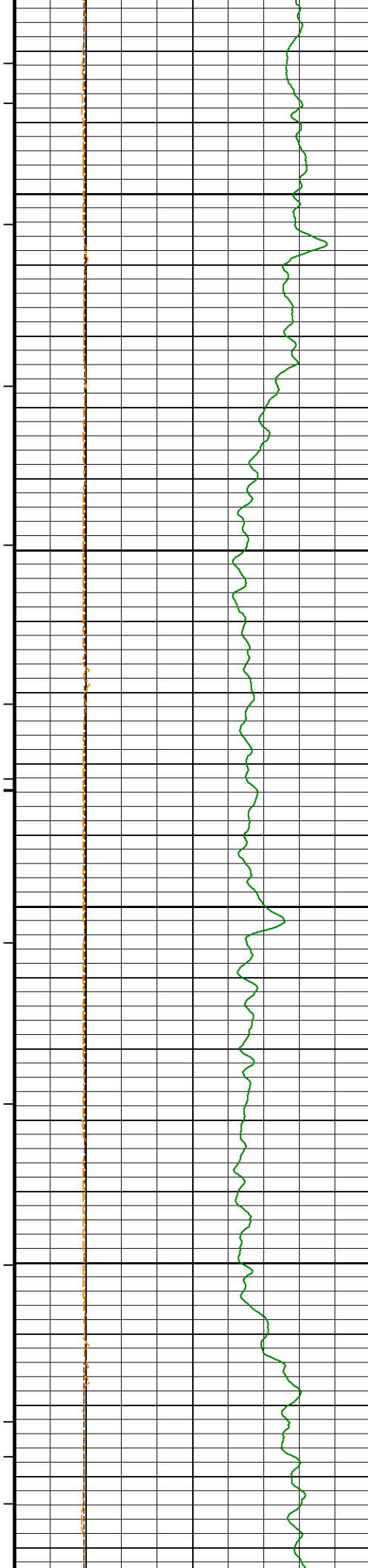
6750

211°

6800



→ 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



212°

6850

212°

6900

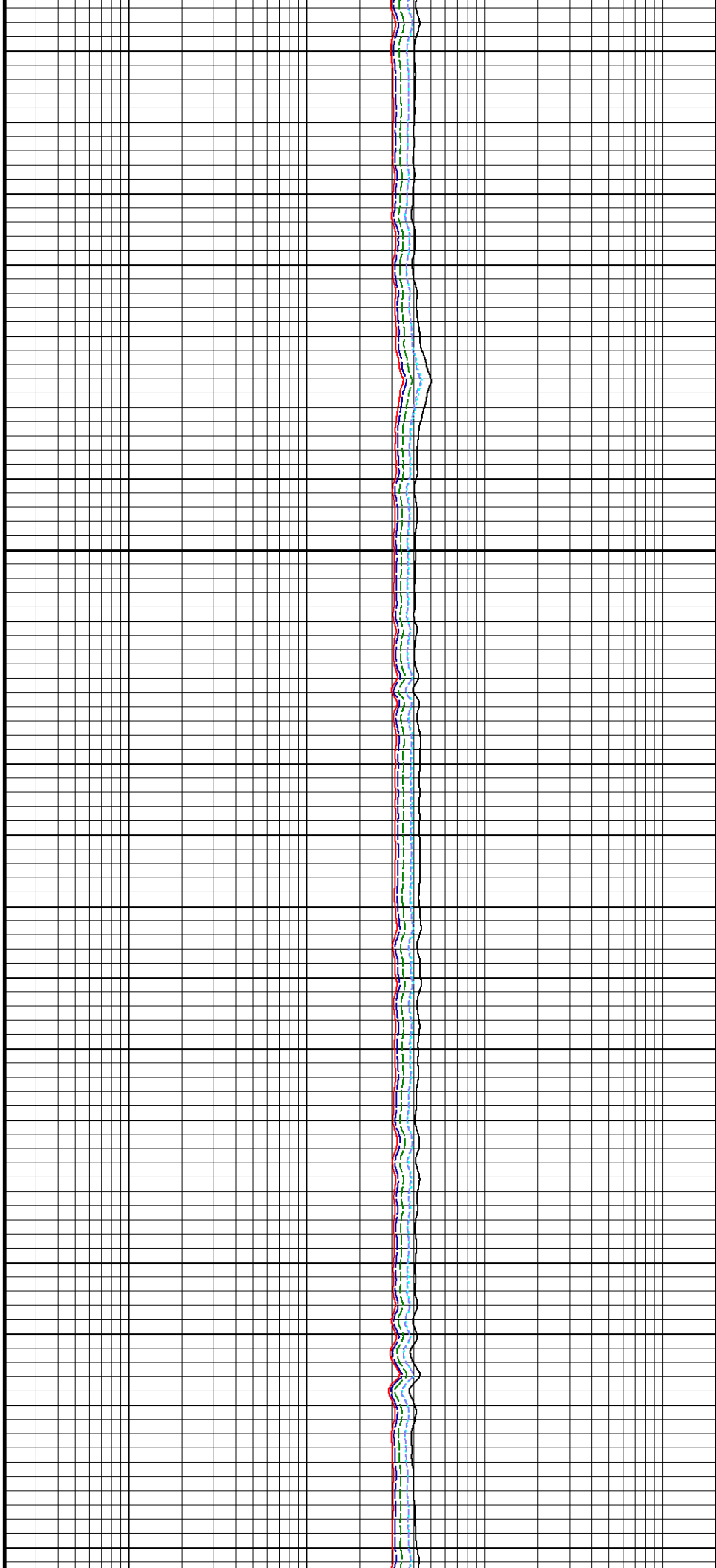
212°

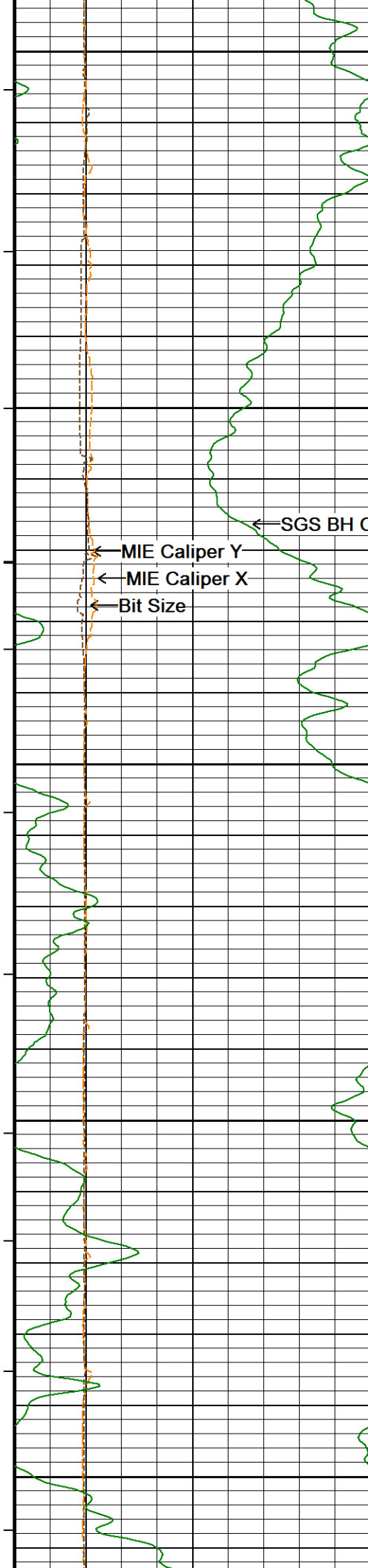
6950

212°

7000

212°





7050

212°

7100

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

← Bit Size

213°

7150

213°

7200

213°

7250

Array Ind. Four Res Rt →

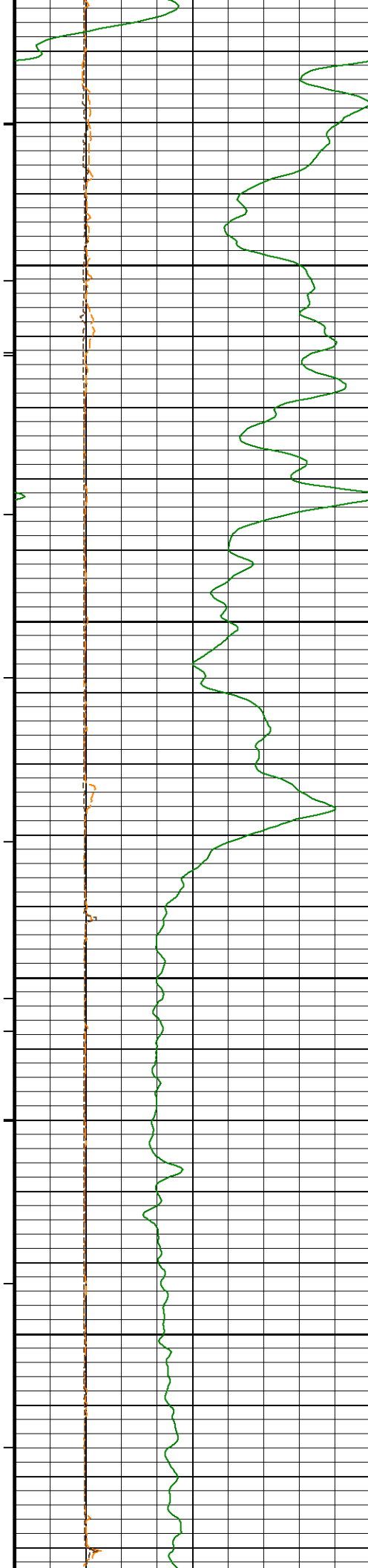
Array Ind. Four Res 85 →

Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →



213°

7300

213°

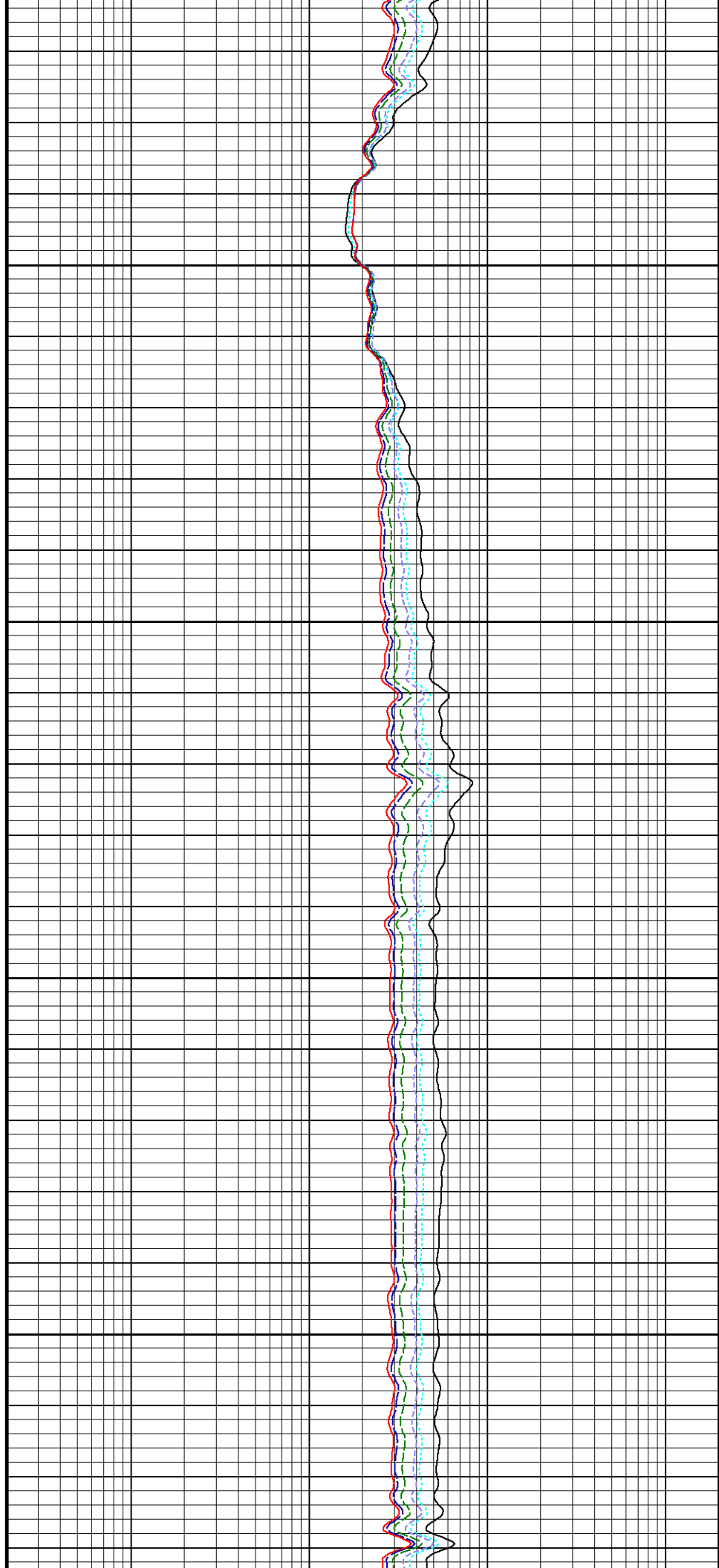
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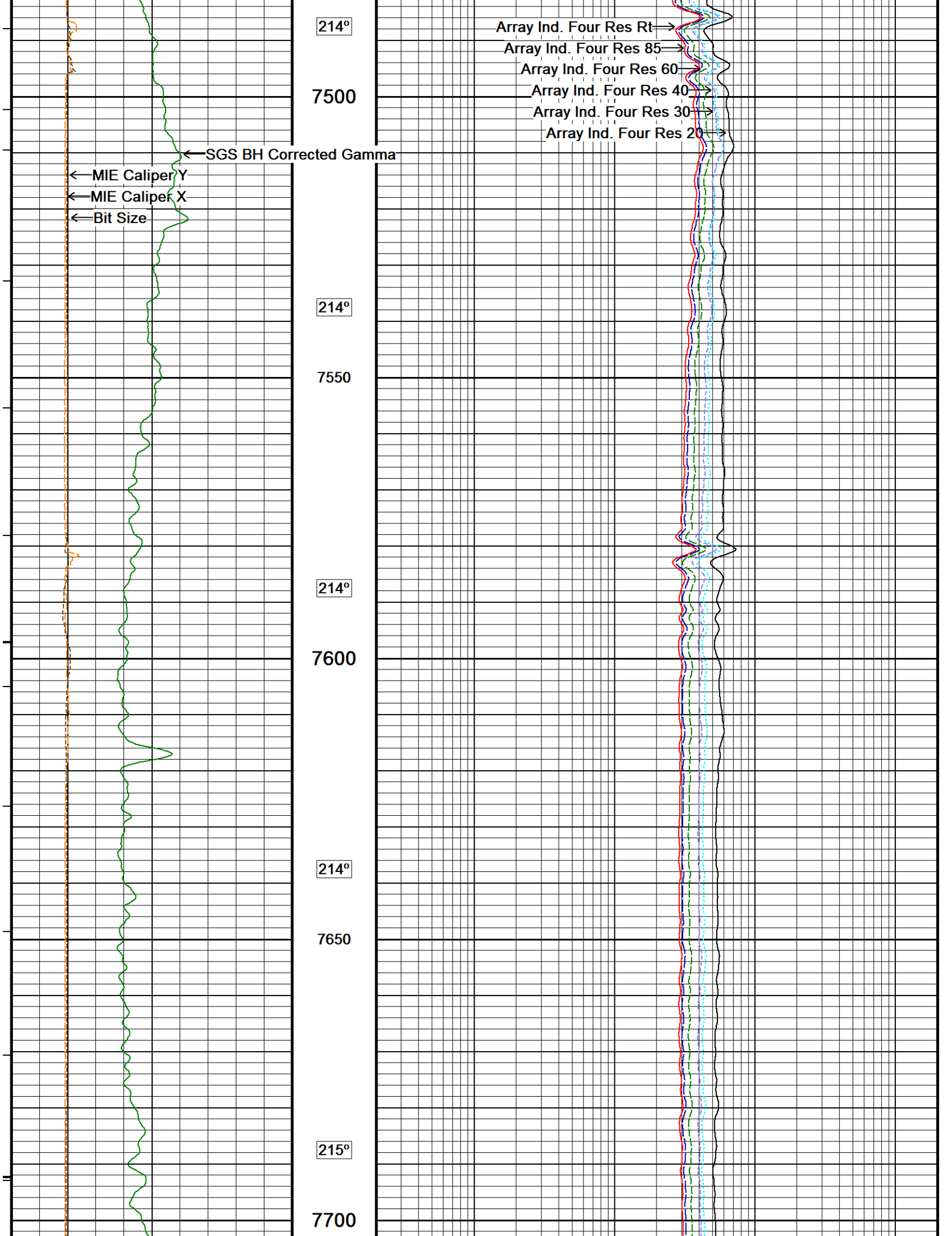
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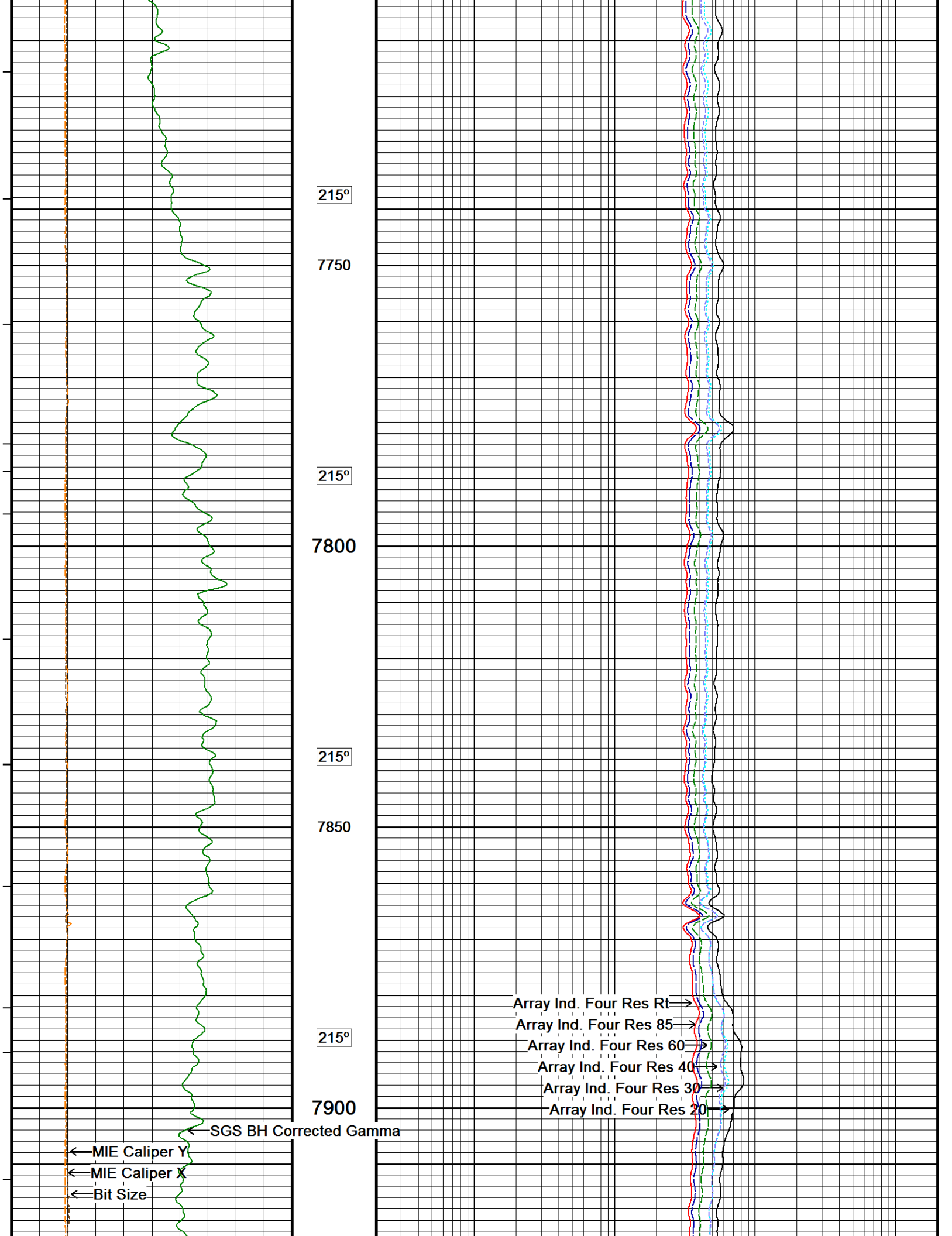
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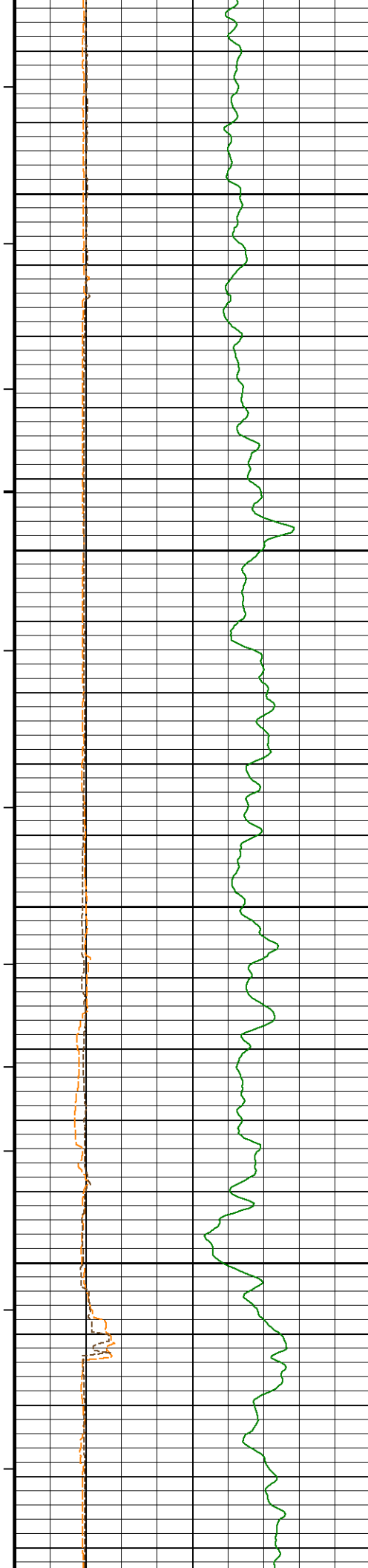
214°

7450









215°

7950

215°

8000

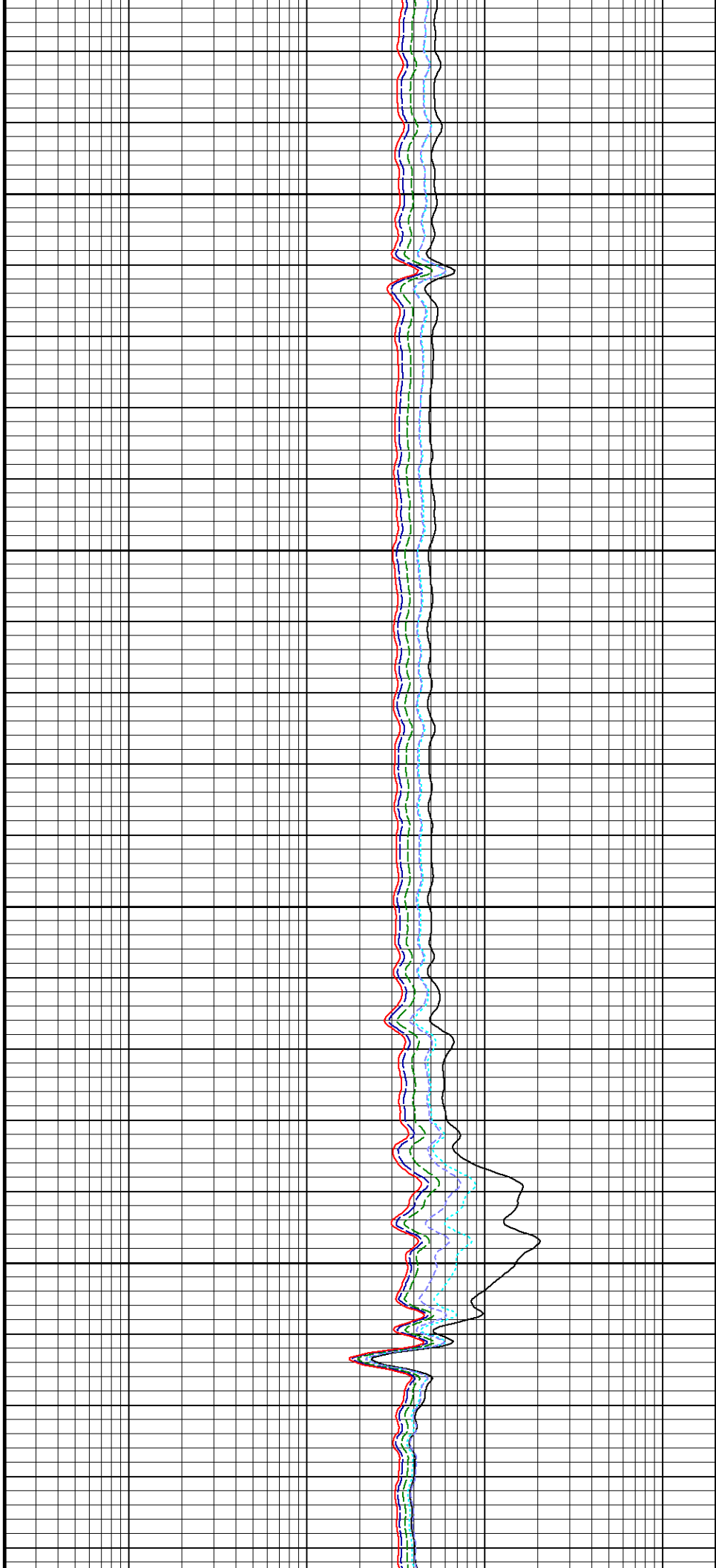
215°

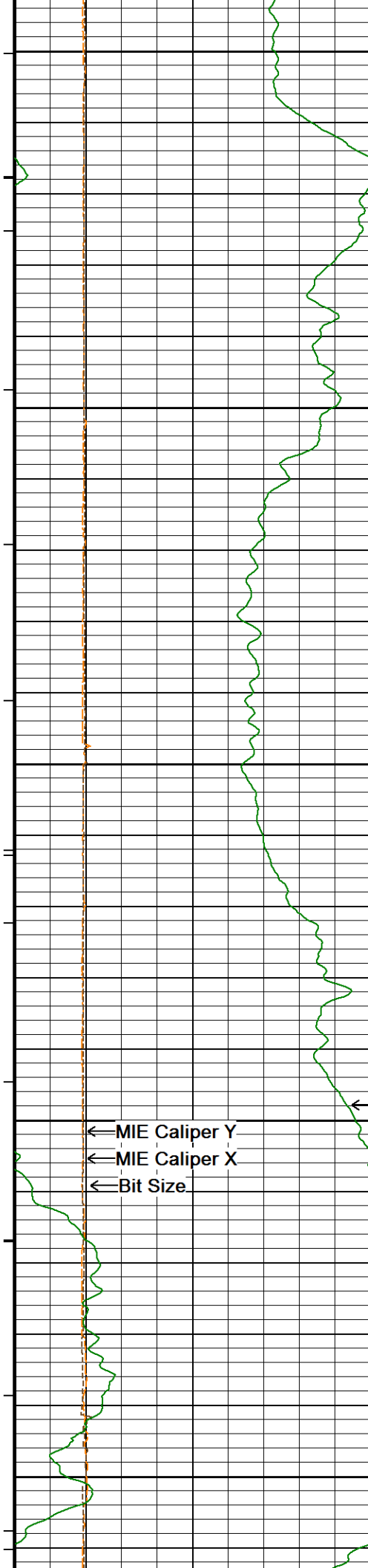
8050

215°

8100

216°





8150

216°

8200

216°

8250

216°

8300

216°

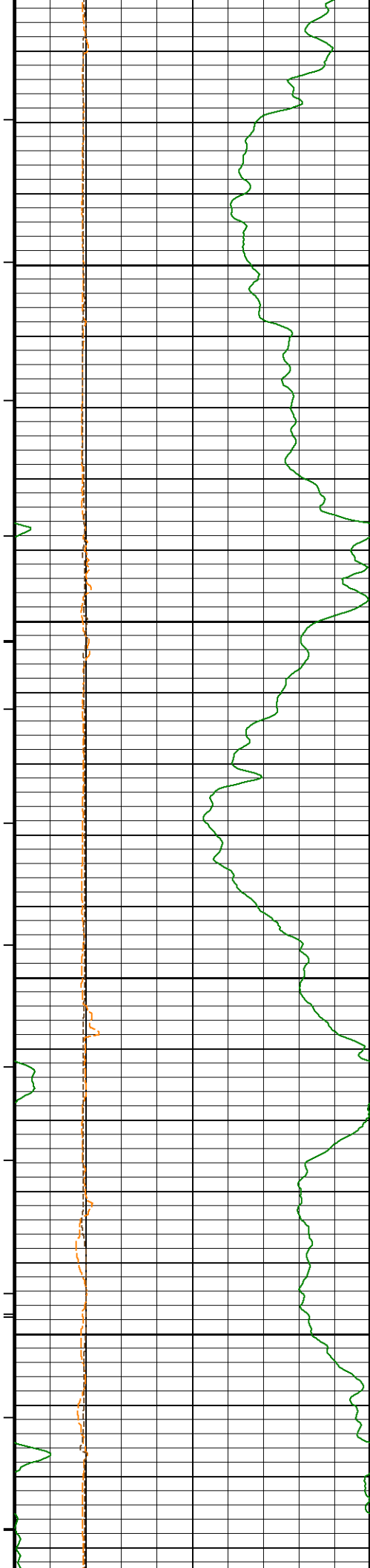
8350

← MIE Caliper Y  
← MIE Caliper X  
← Bit Size

SCS RH 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 →





216°

8400

217°

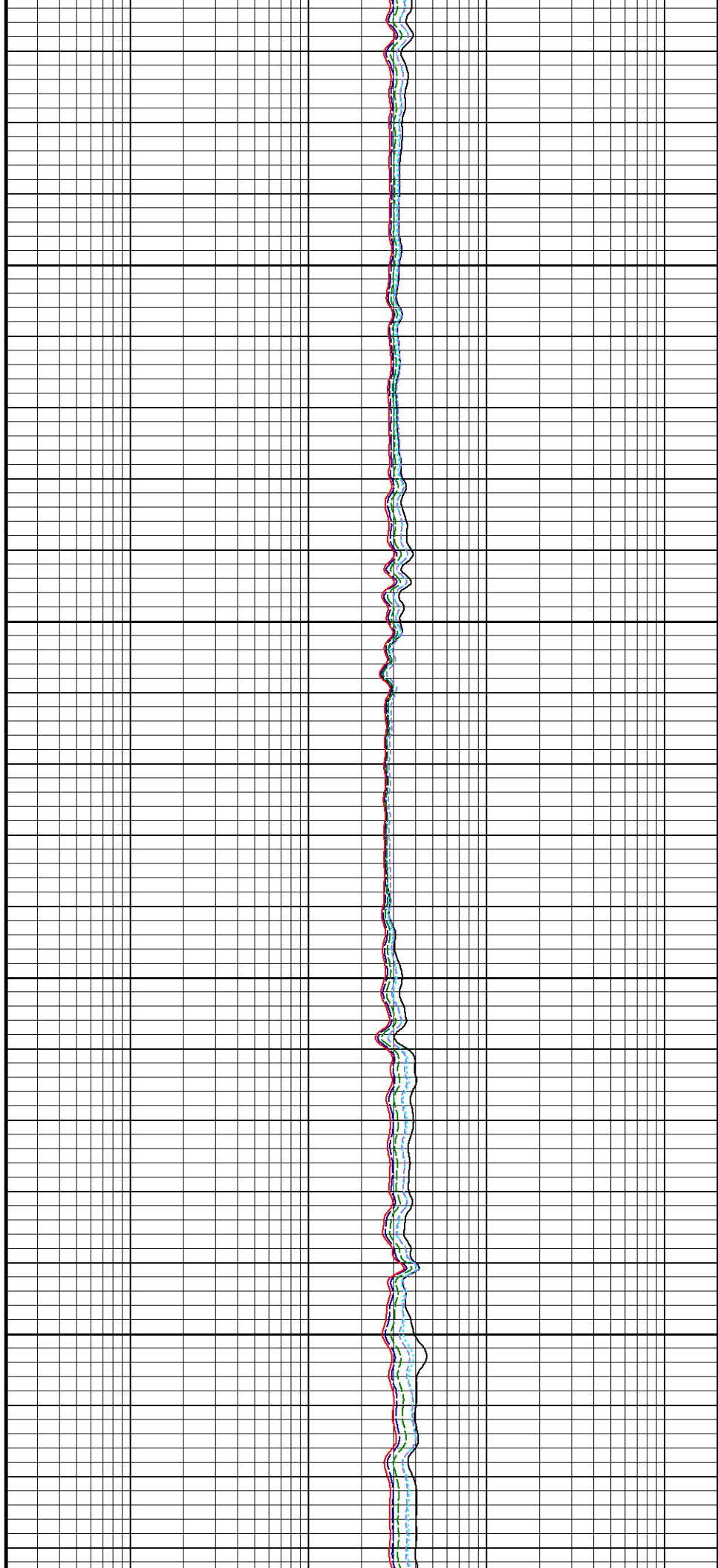
8450

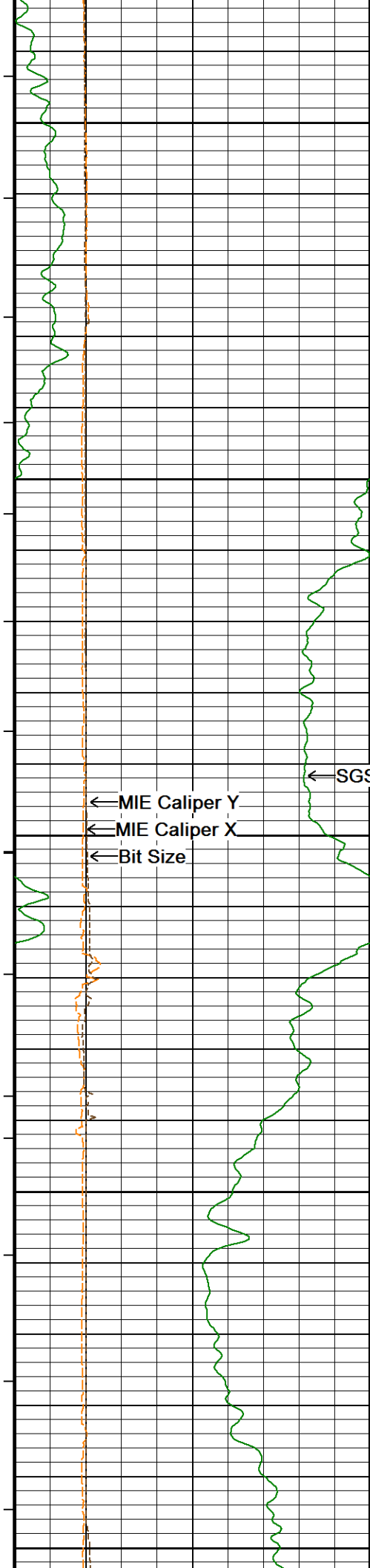
217°

8500

217°

8550





217°

8600

217°

8650

217°

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

← Bit Size

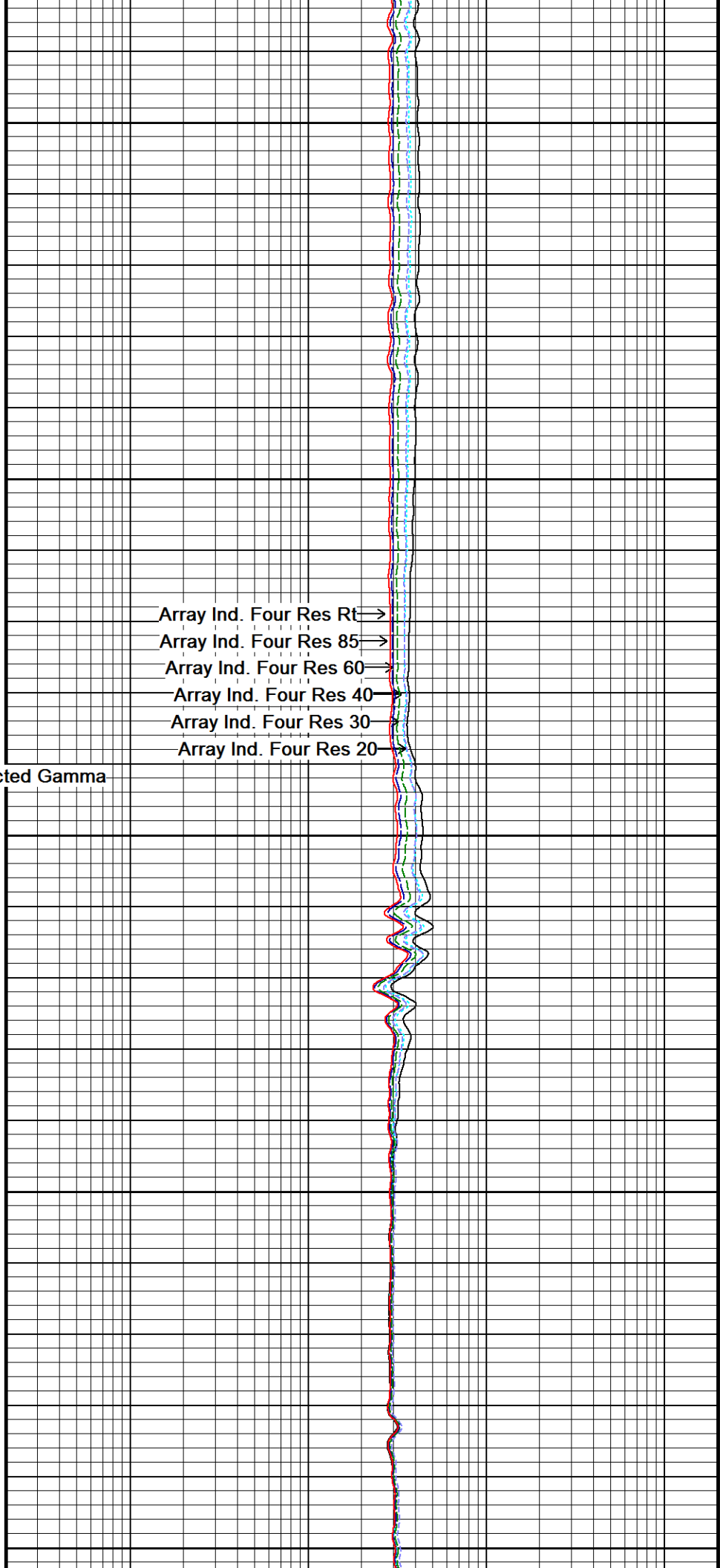
8700

217°

8750

217°

8800



Array Ind. Four Res Rt →

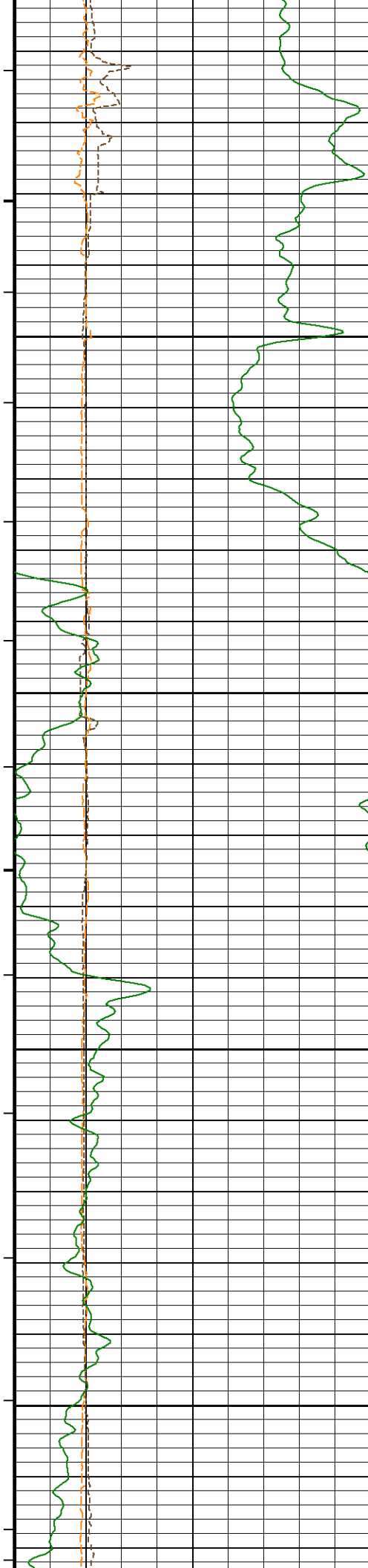
Array Ind. Four Res 85 →

Array Ind. Four Res 60 →

Array Ind. Four Res 40 →

Array Ind. Four Res 30 →

Array Ind. Four Res 20 →



217°

8850

218°

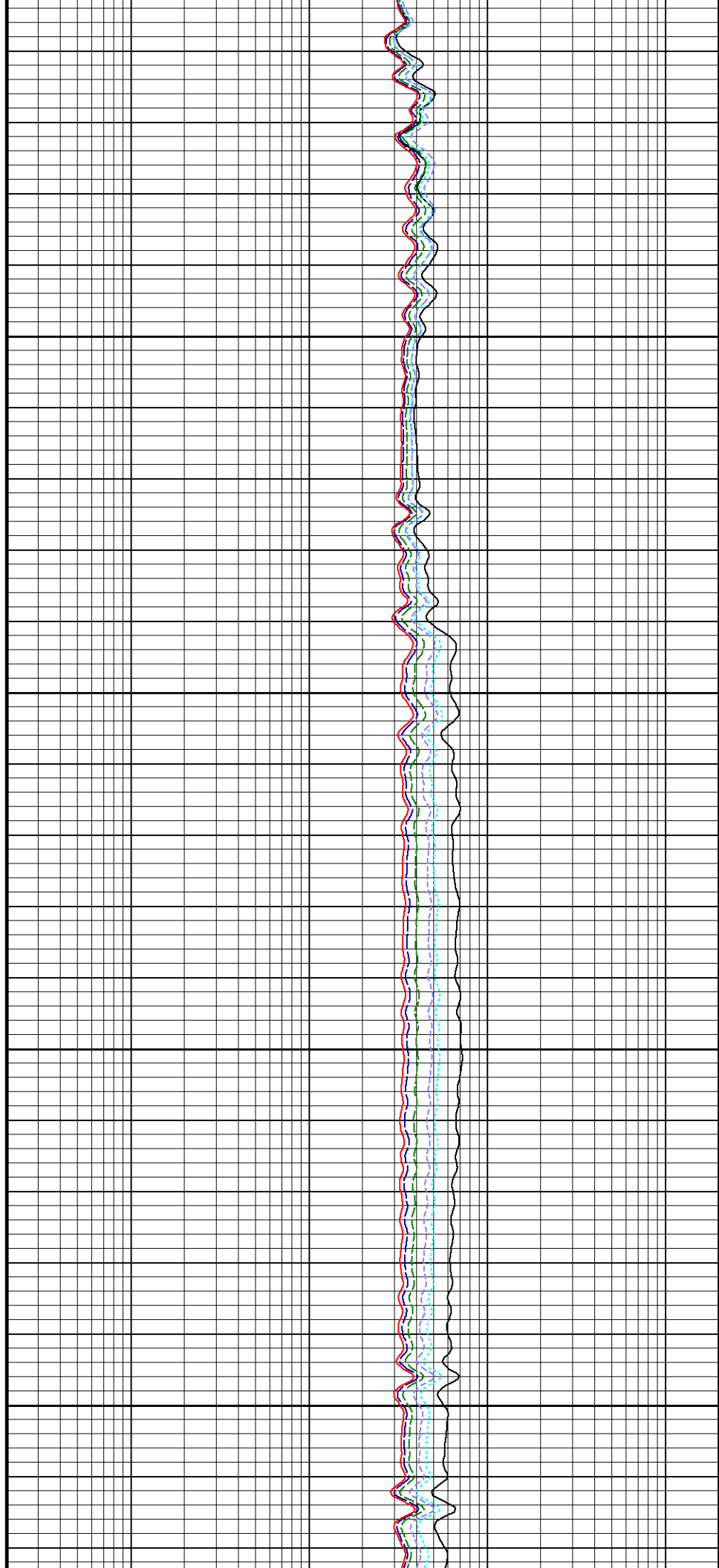
8900

218°

8950

218°

9000





218°

9050

218°

9100

218°

9150

218°

9200

218°

Array Ind. Four Res Rt

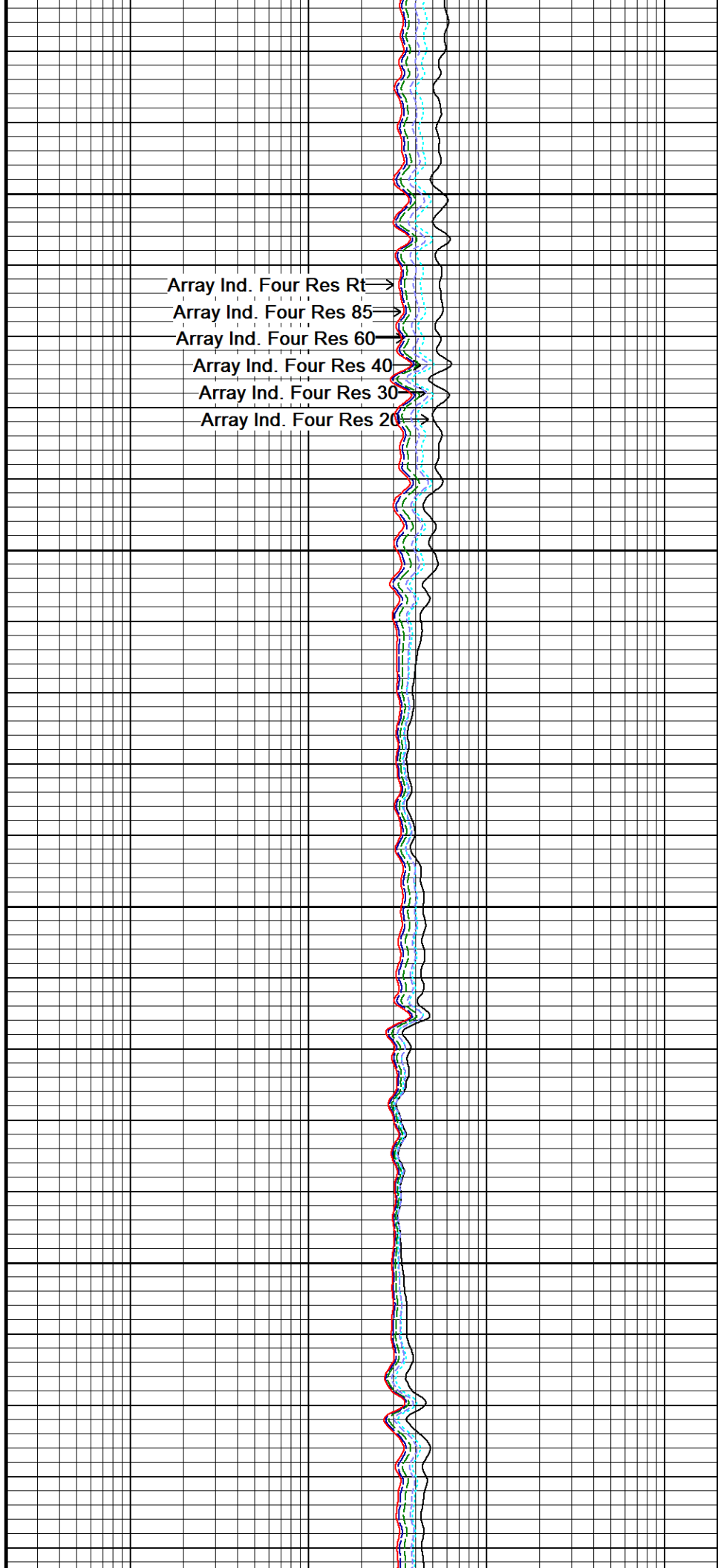
Array Ind. Four Res 85

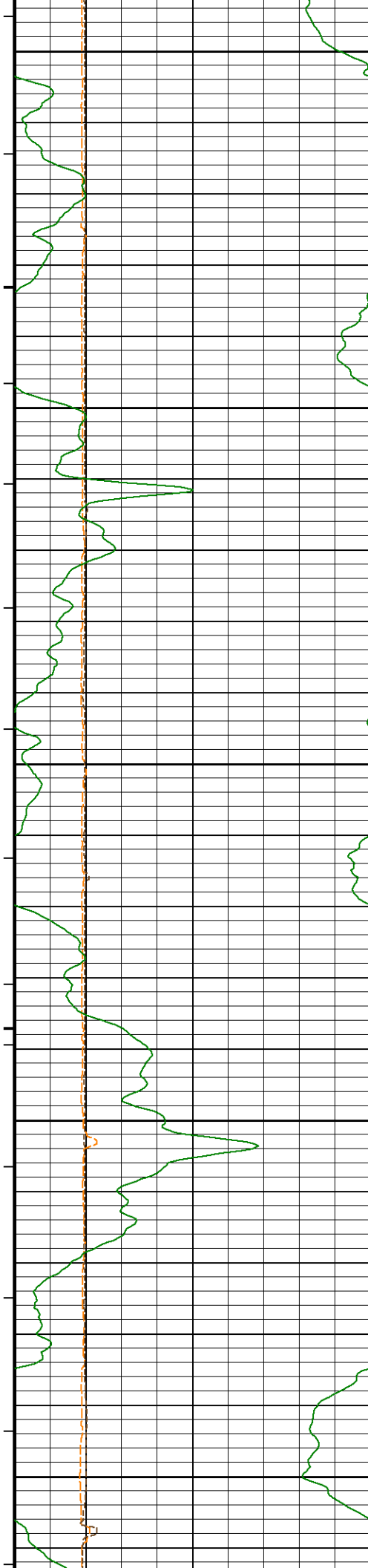
Array Ind. Four Res 60

Array Ind. Four Res 40

Array Ind. Four Res 30

Array Ind. Four Res 20





9250

218°

9300

219°

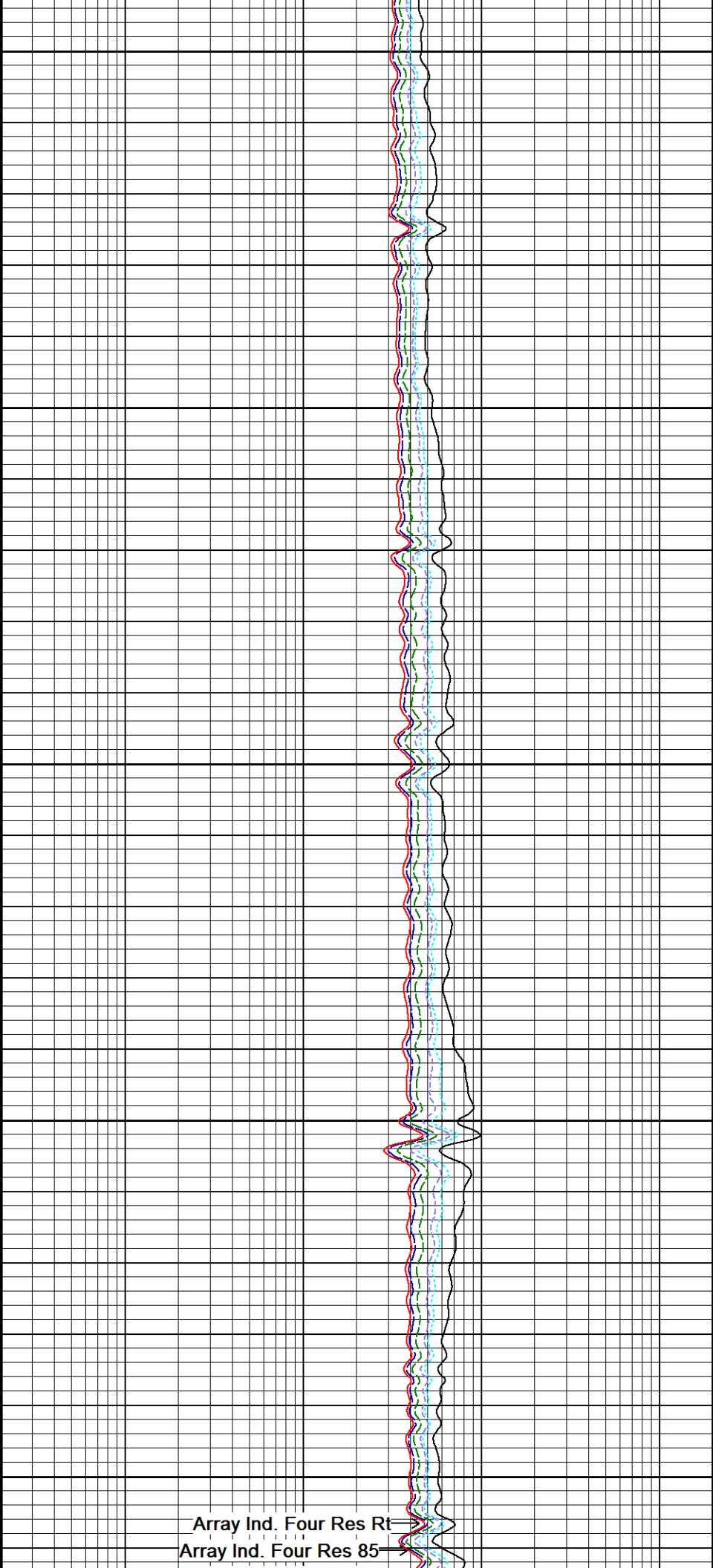
9350

219°

9400

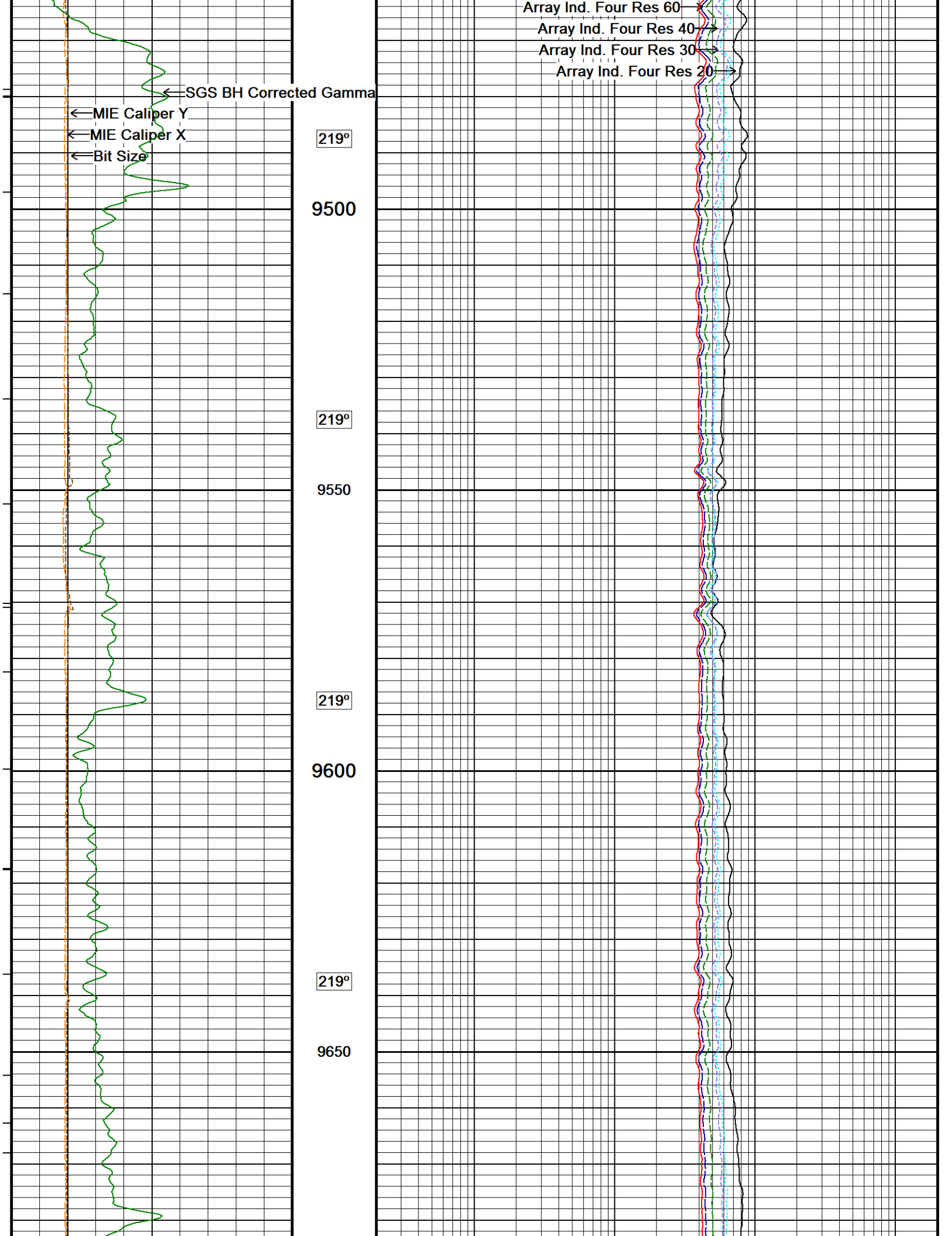
219°

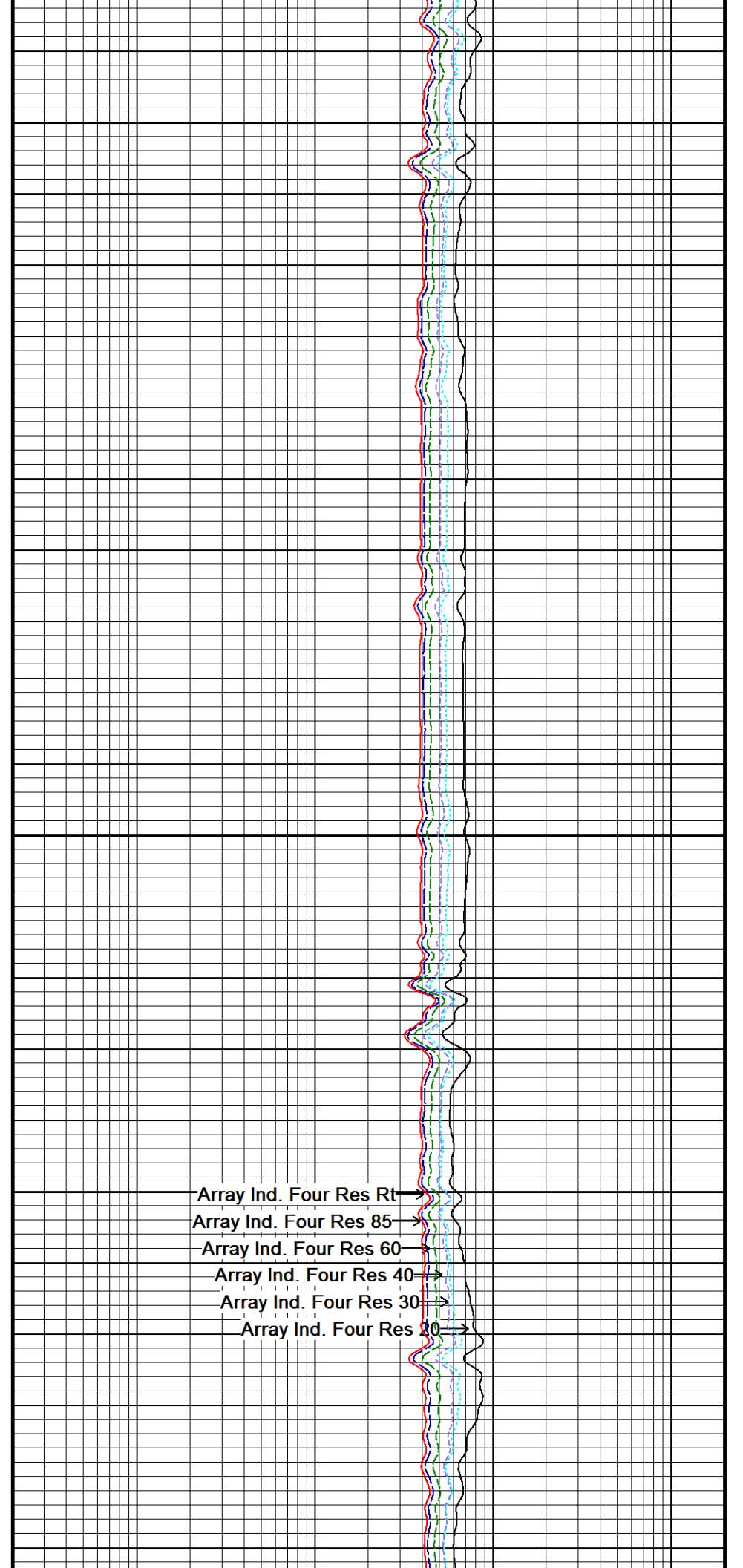
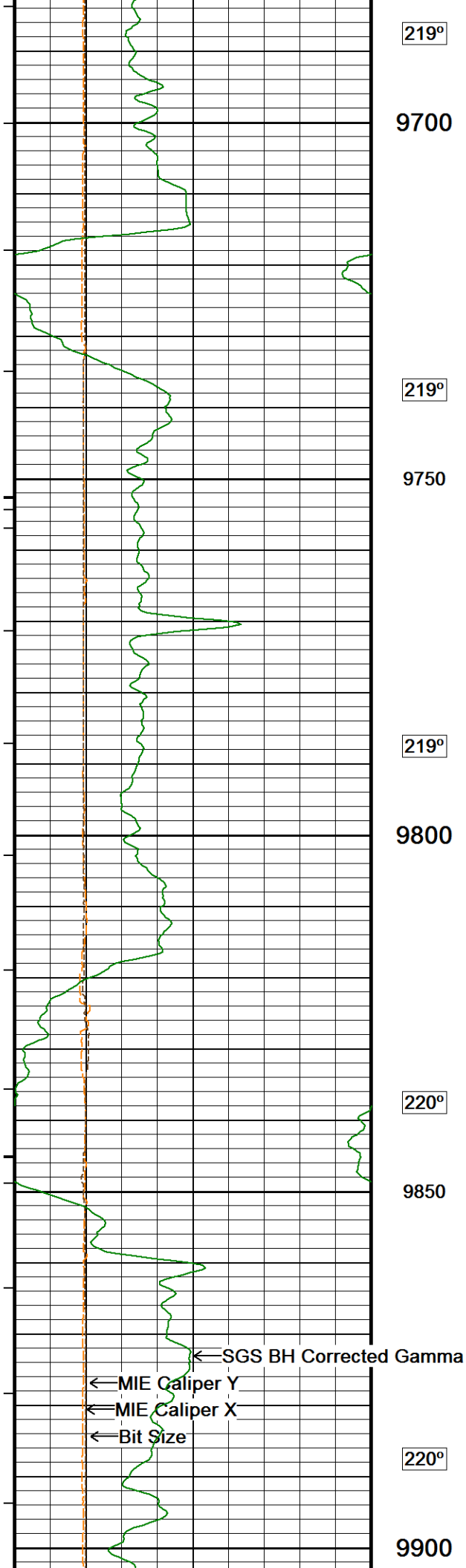
9450

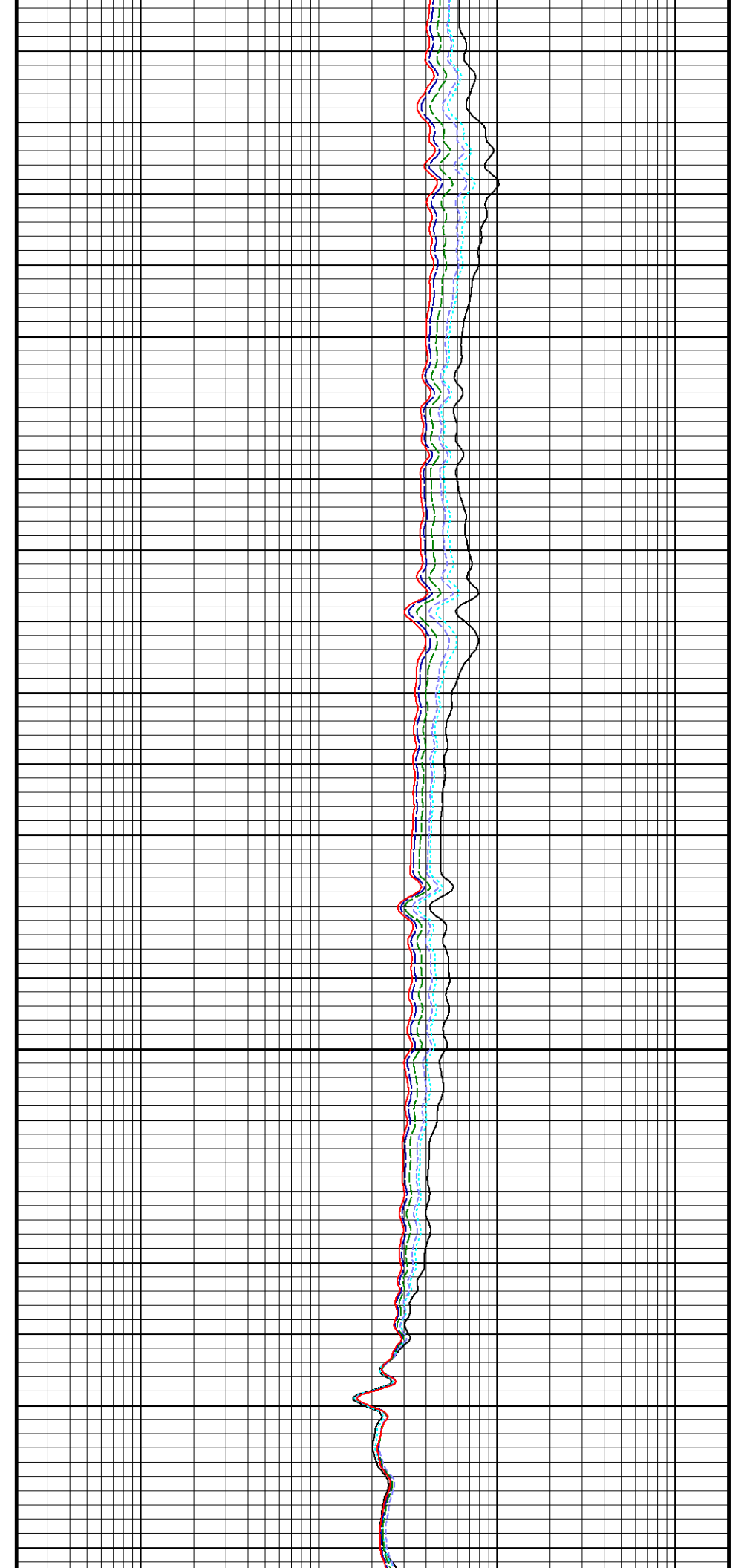
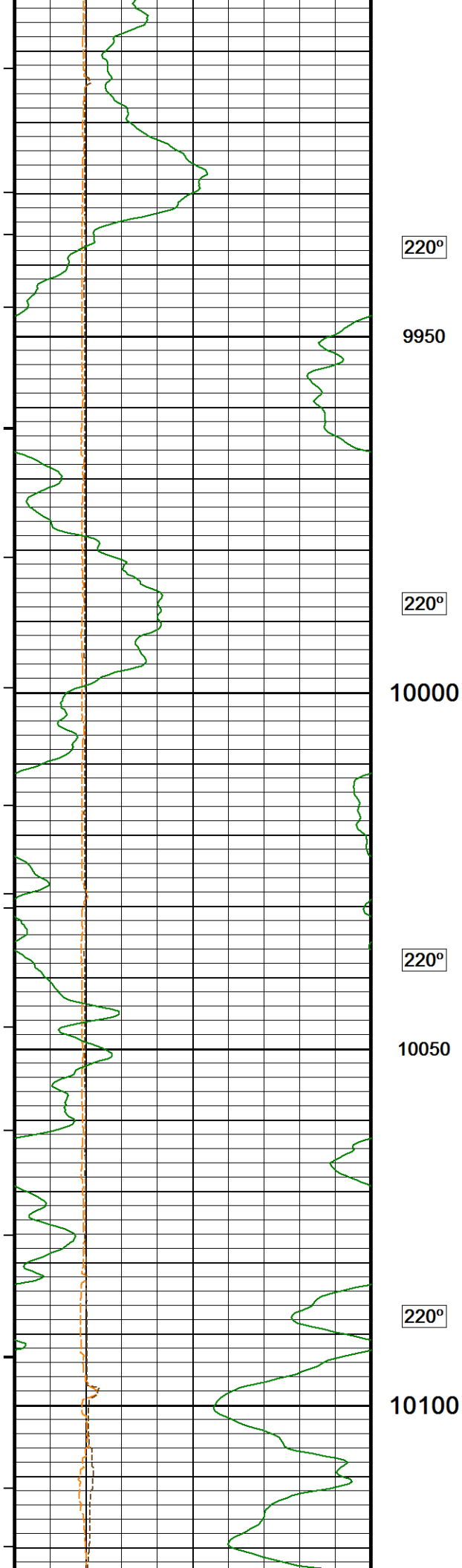


Array Ind. Four Res Rt

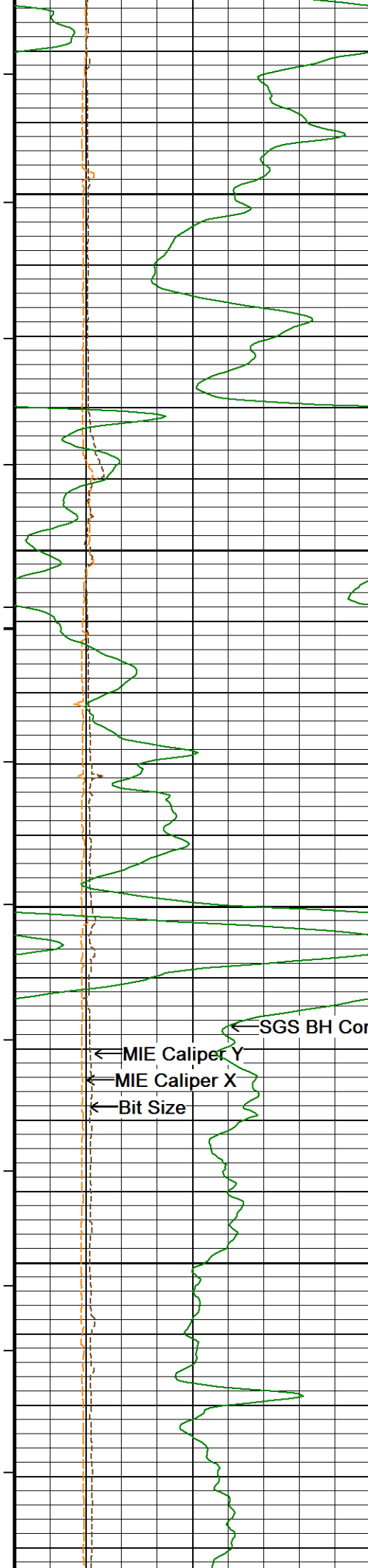
Array Ind. Four Res 85











220°

10150

220°

10200

220°

10250

← SGS BH Corrected Gamma

← MIE Caliper Y

← MIE Caliper X

← Bit Size

221°

10300

221°

Array Ind. Four Res Rt

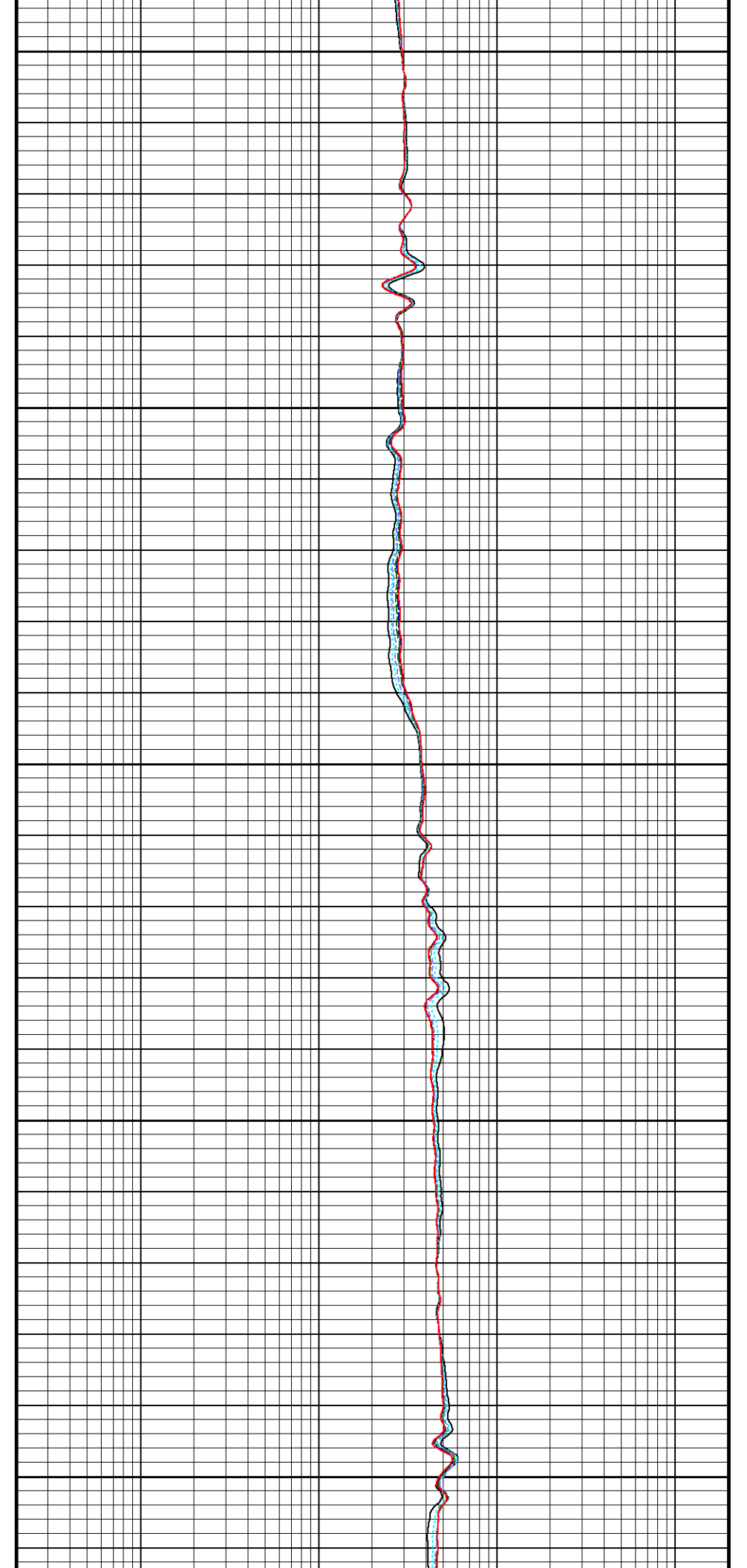
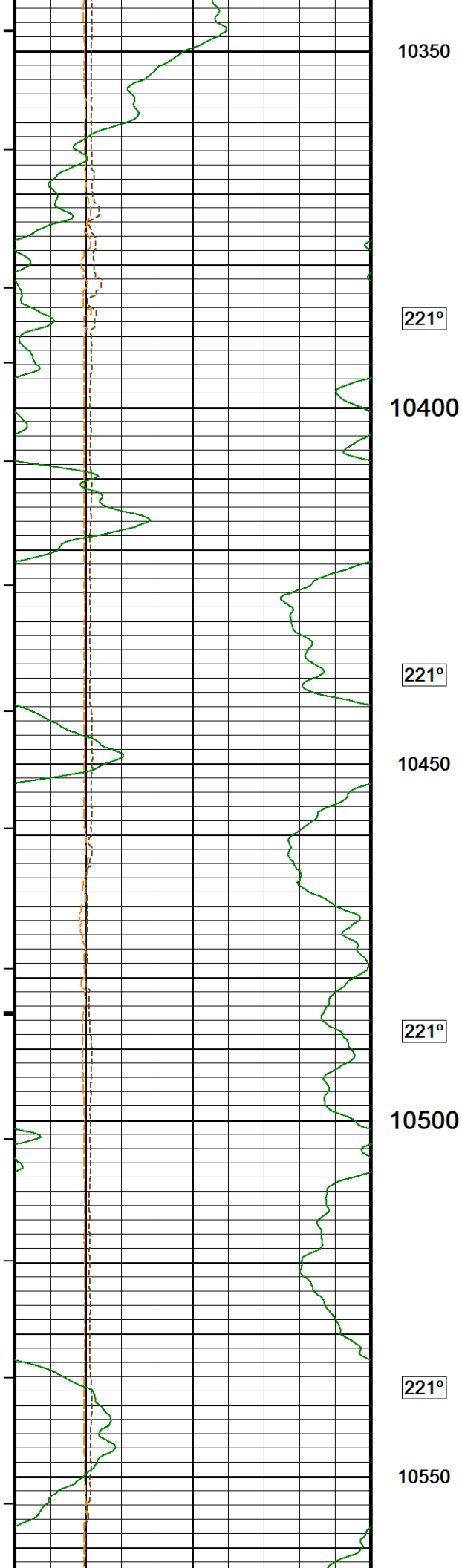
Array Ind. Four Res 85

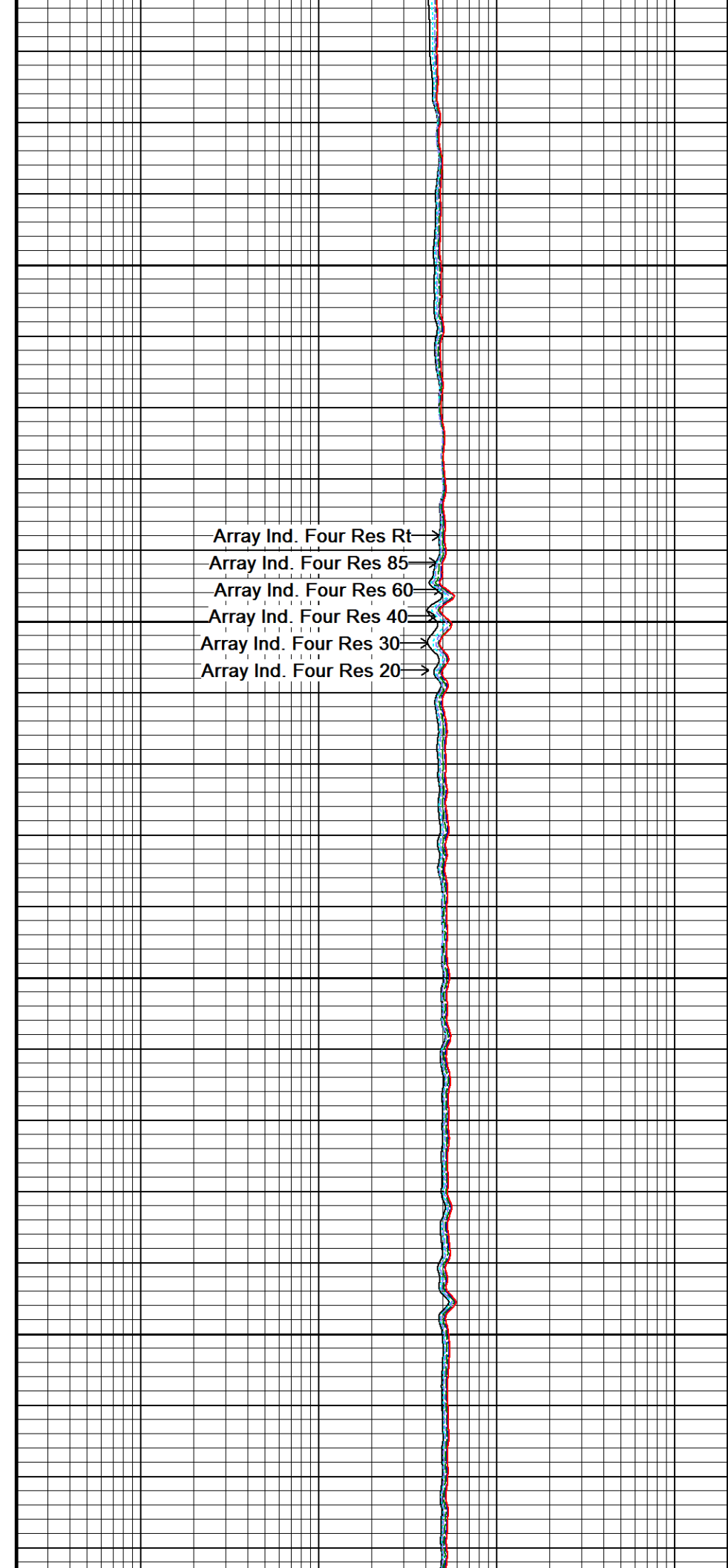
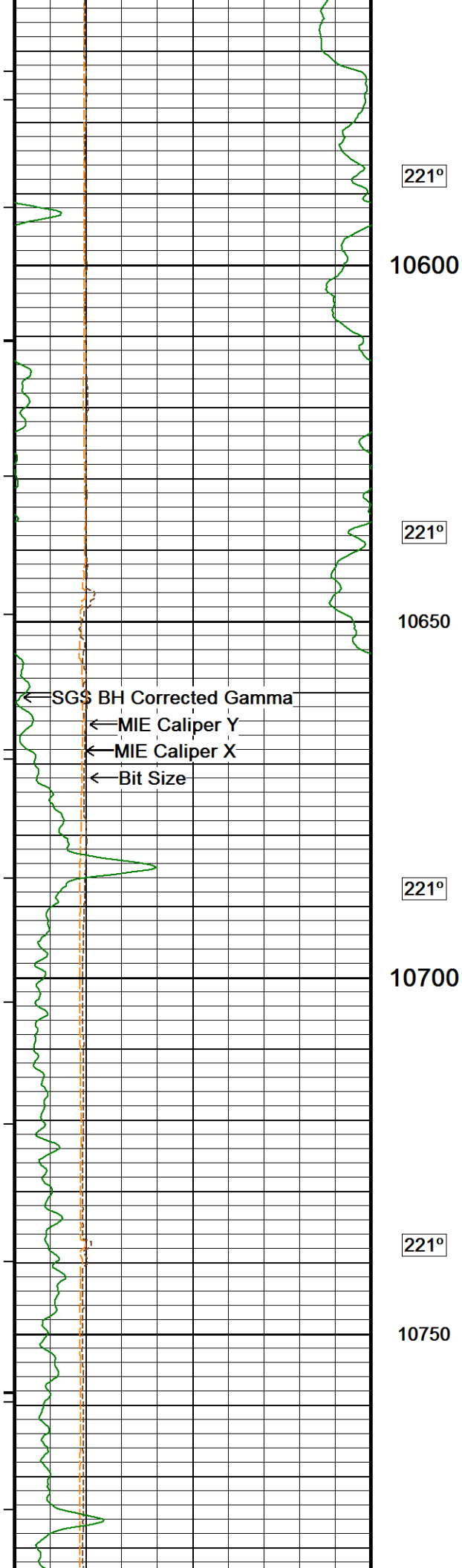
Array Ind. Four Res 60

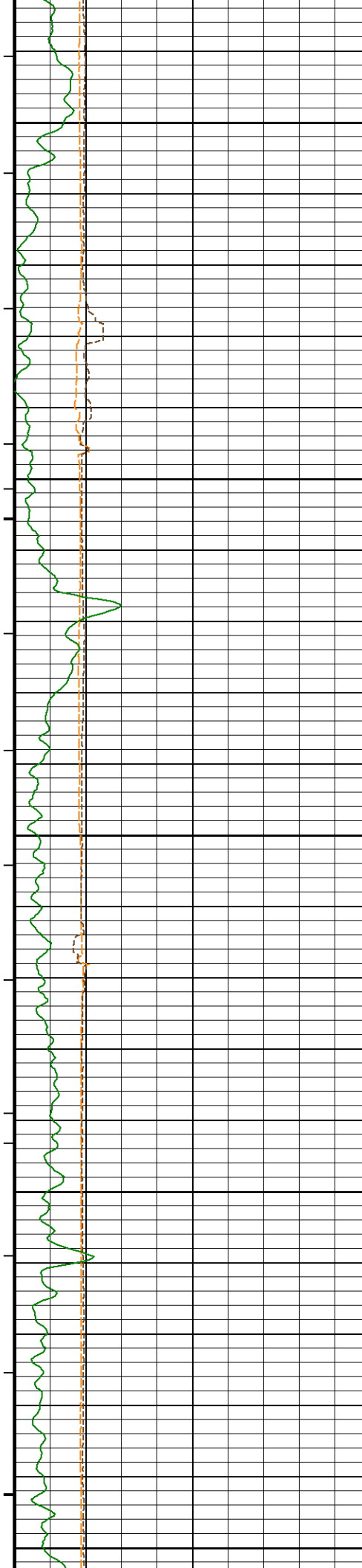
Array Ind. Four Res 40

Array Ind. Four Res 30

Array Ind. Four Res 20







221°

10800

222°

10850

222°

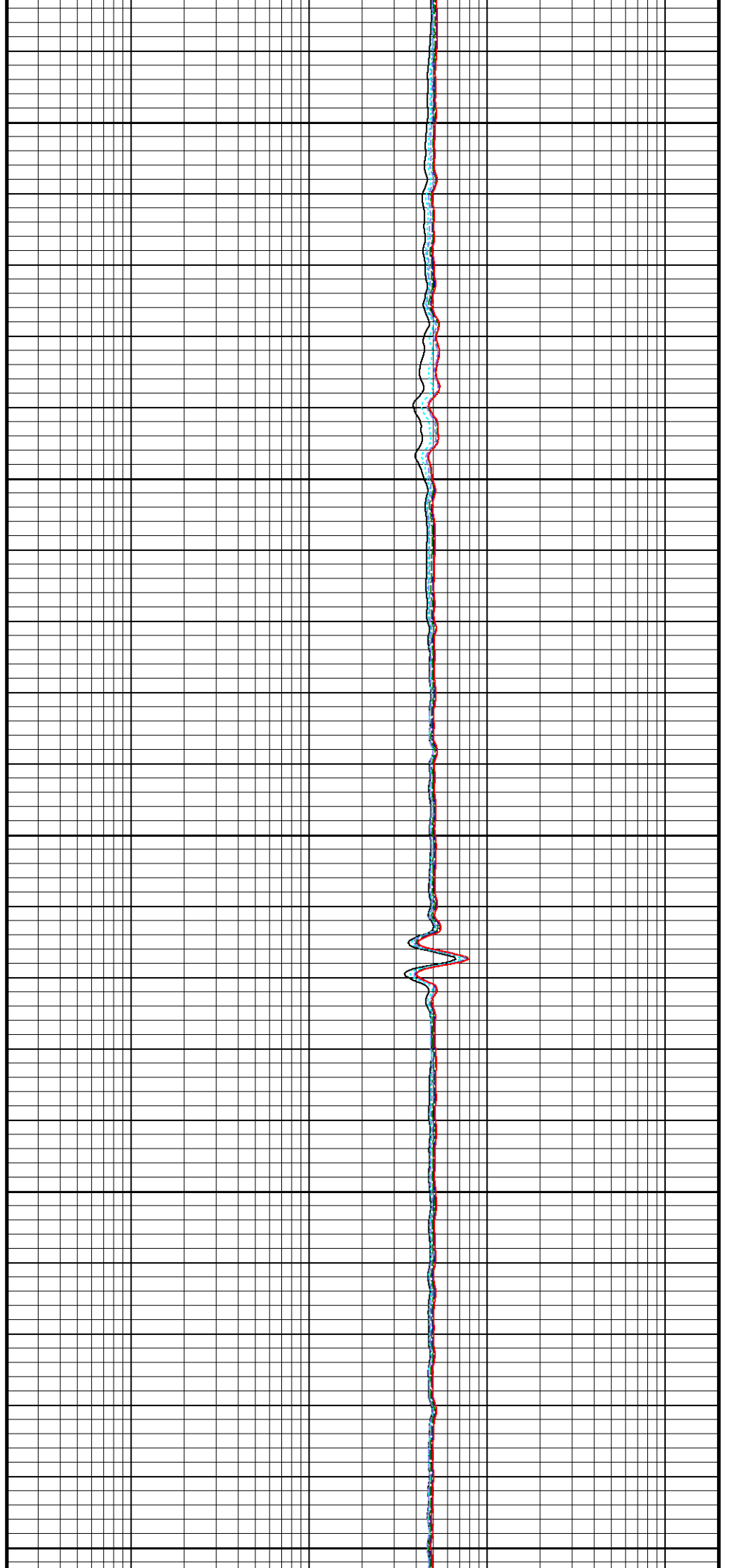
10900

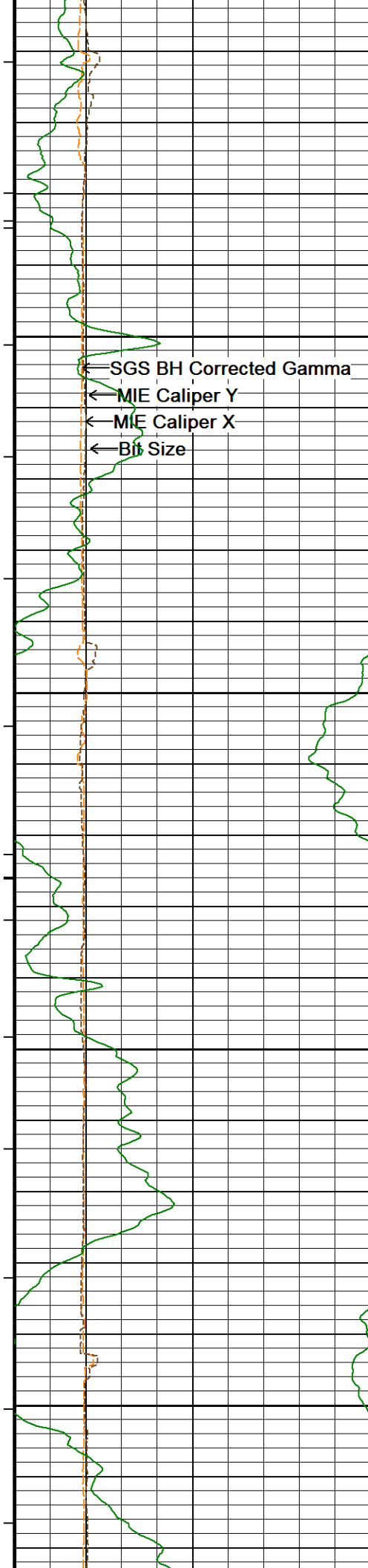
222°

10950

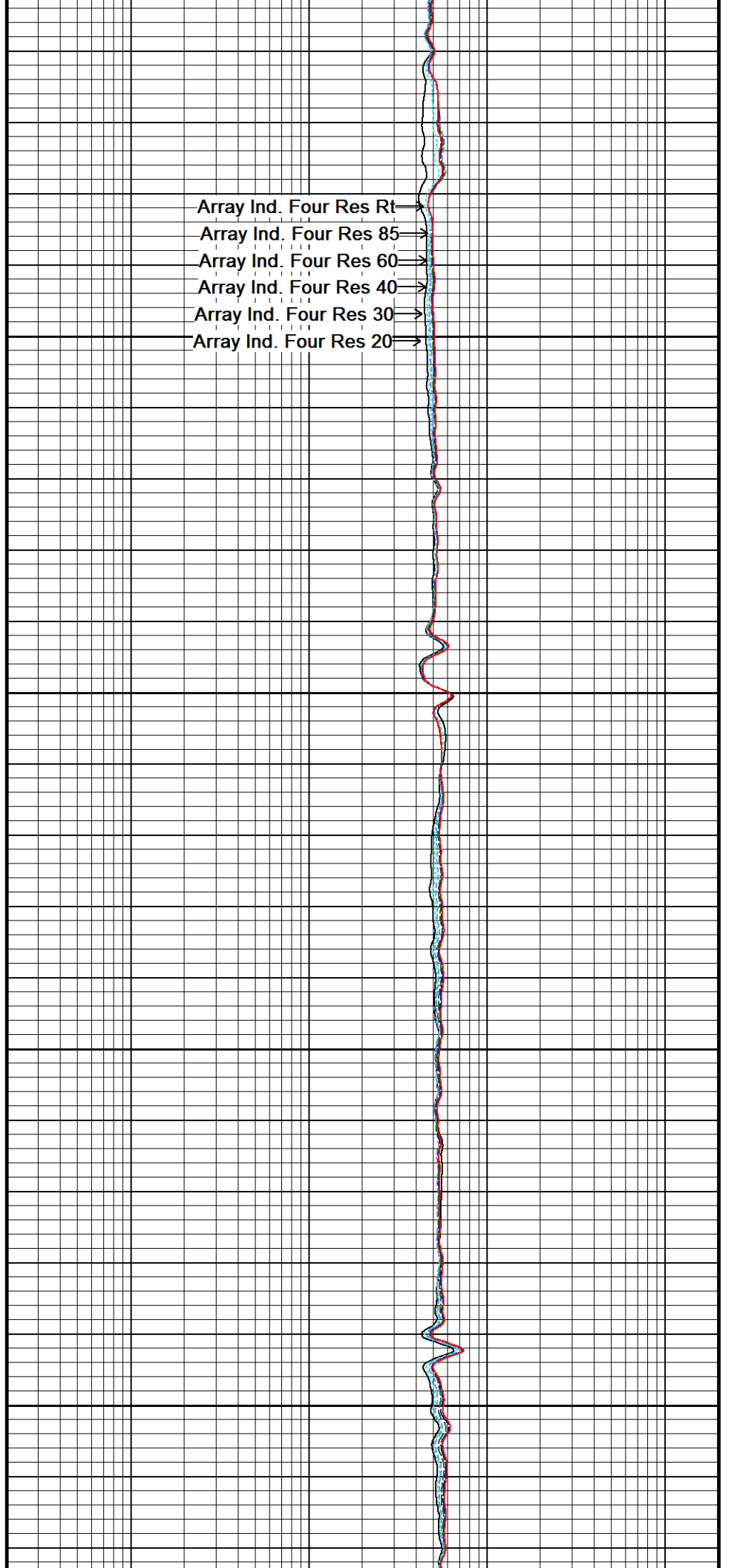
222°

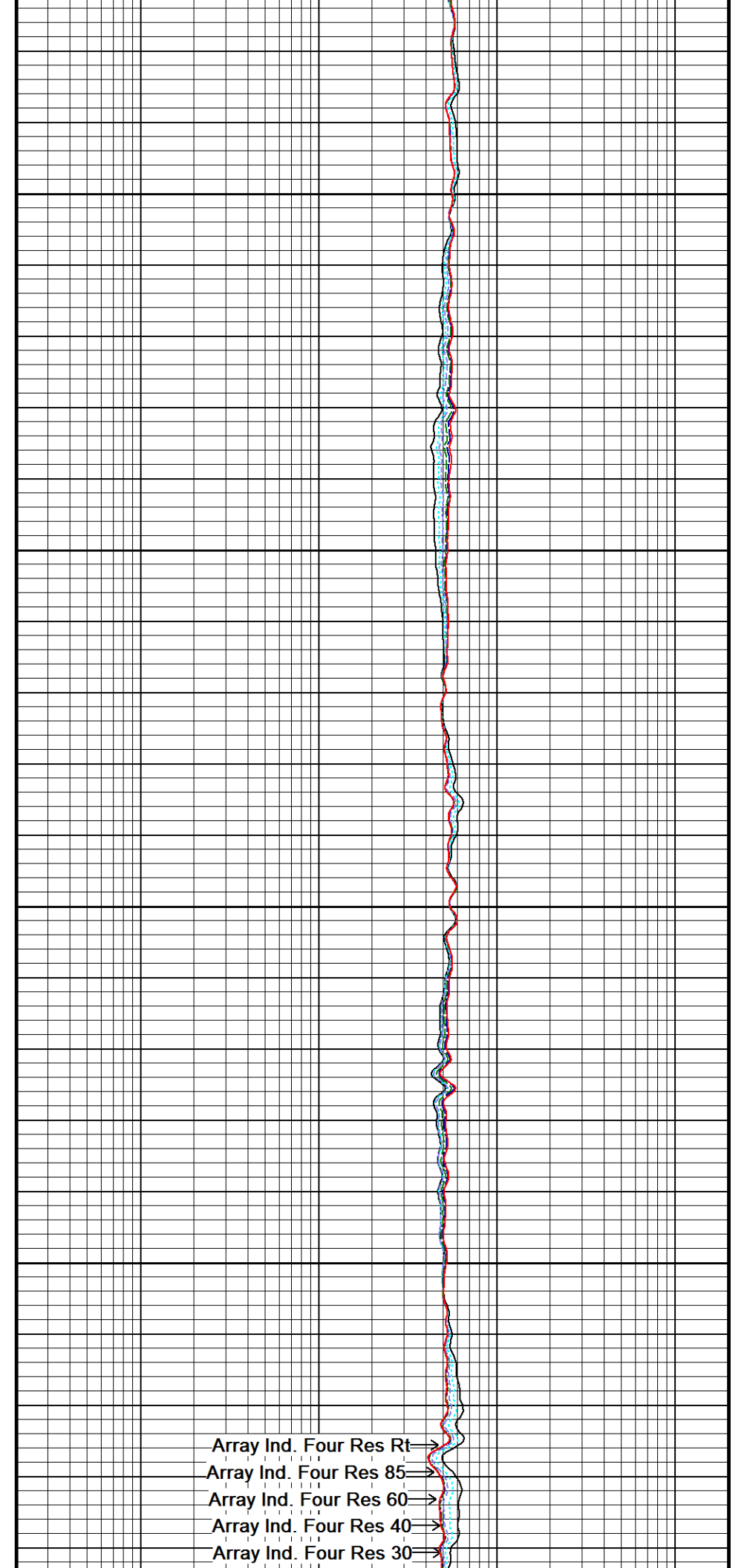
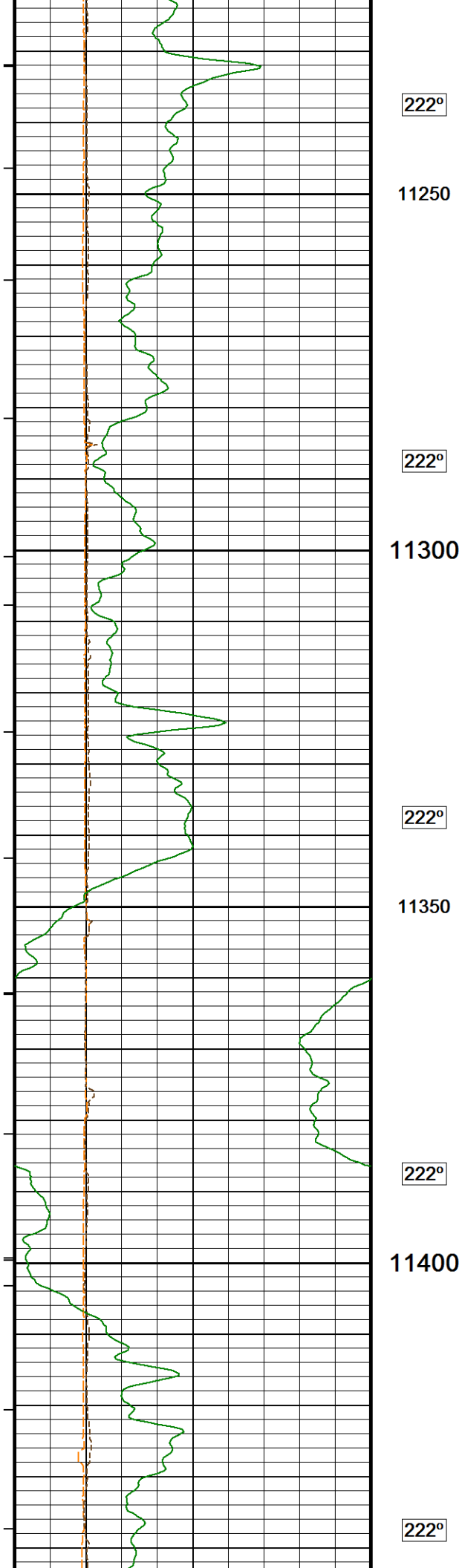
11000

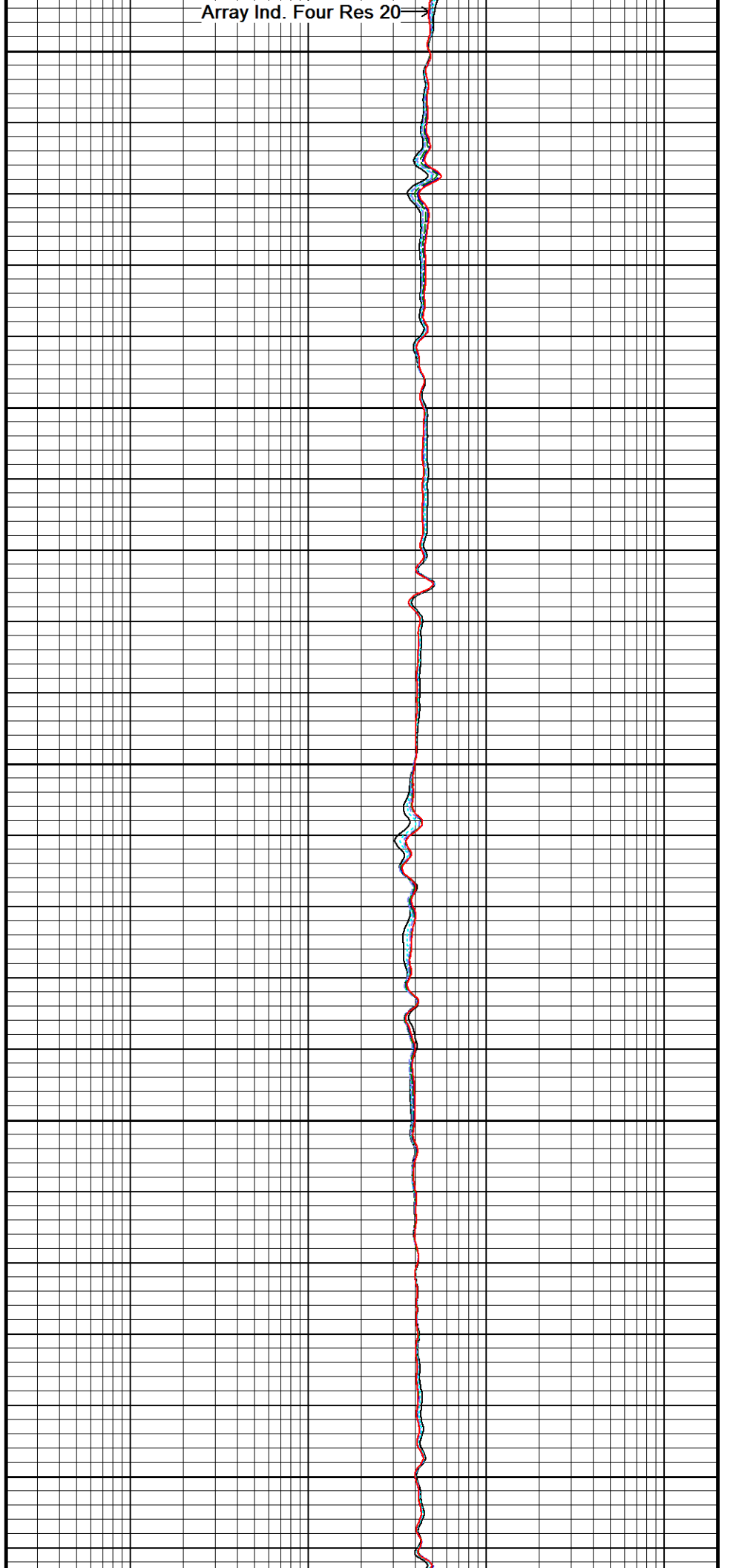
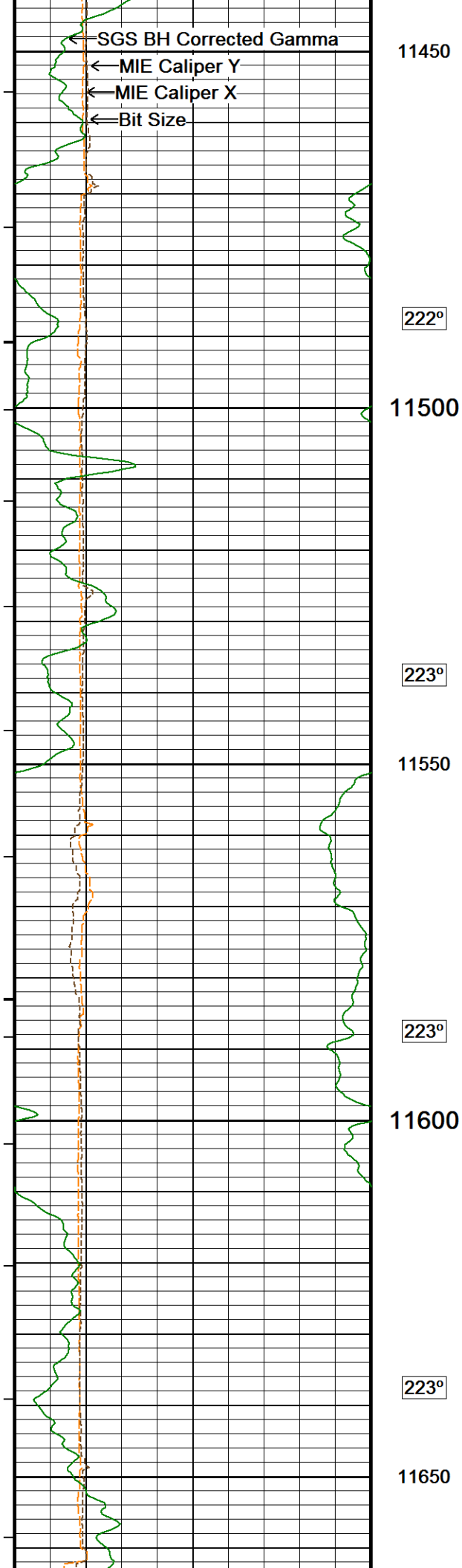


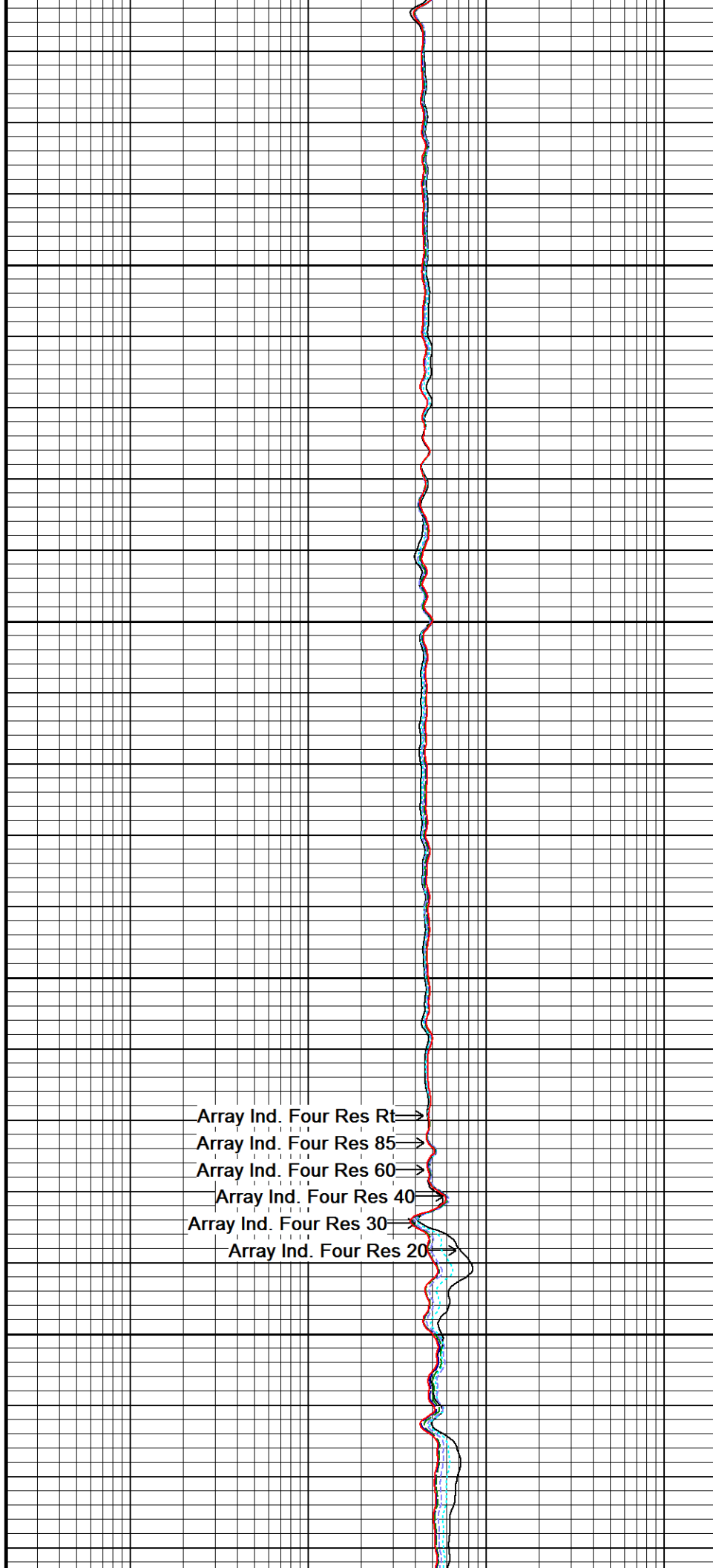
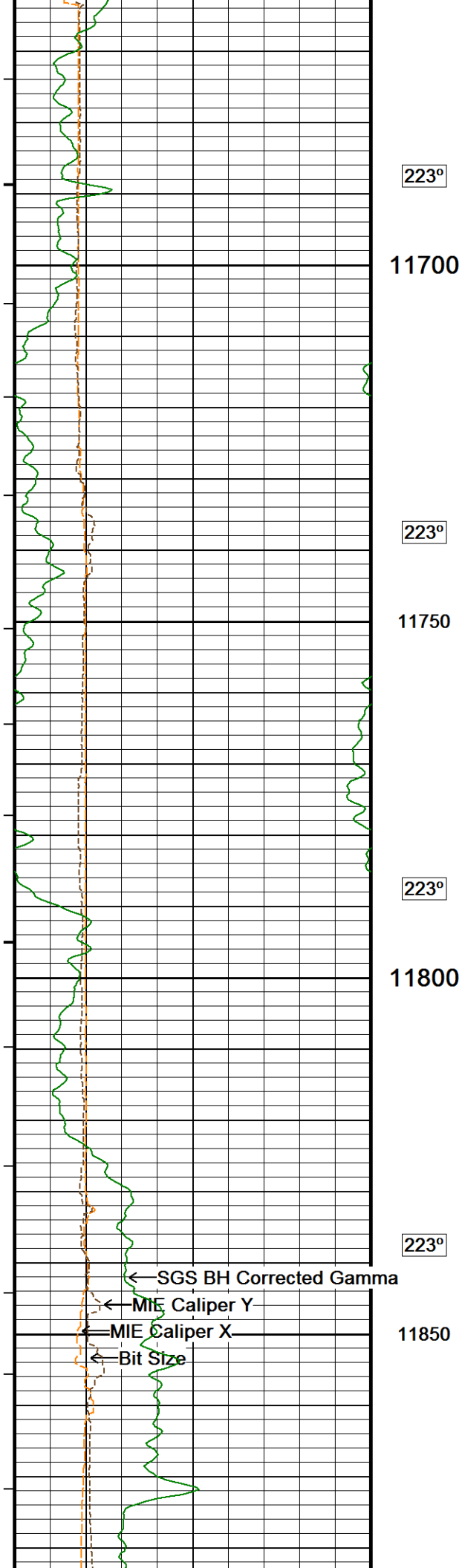


222°  
11050  
222°  
11100  
222°  
11150  
222°  
11200

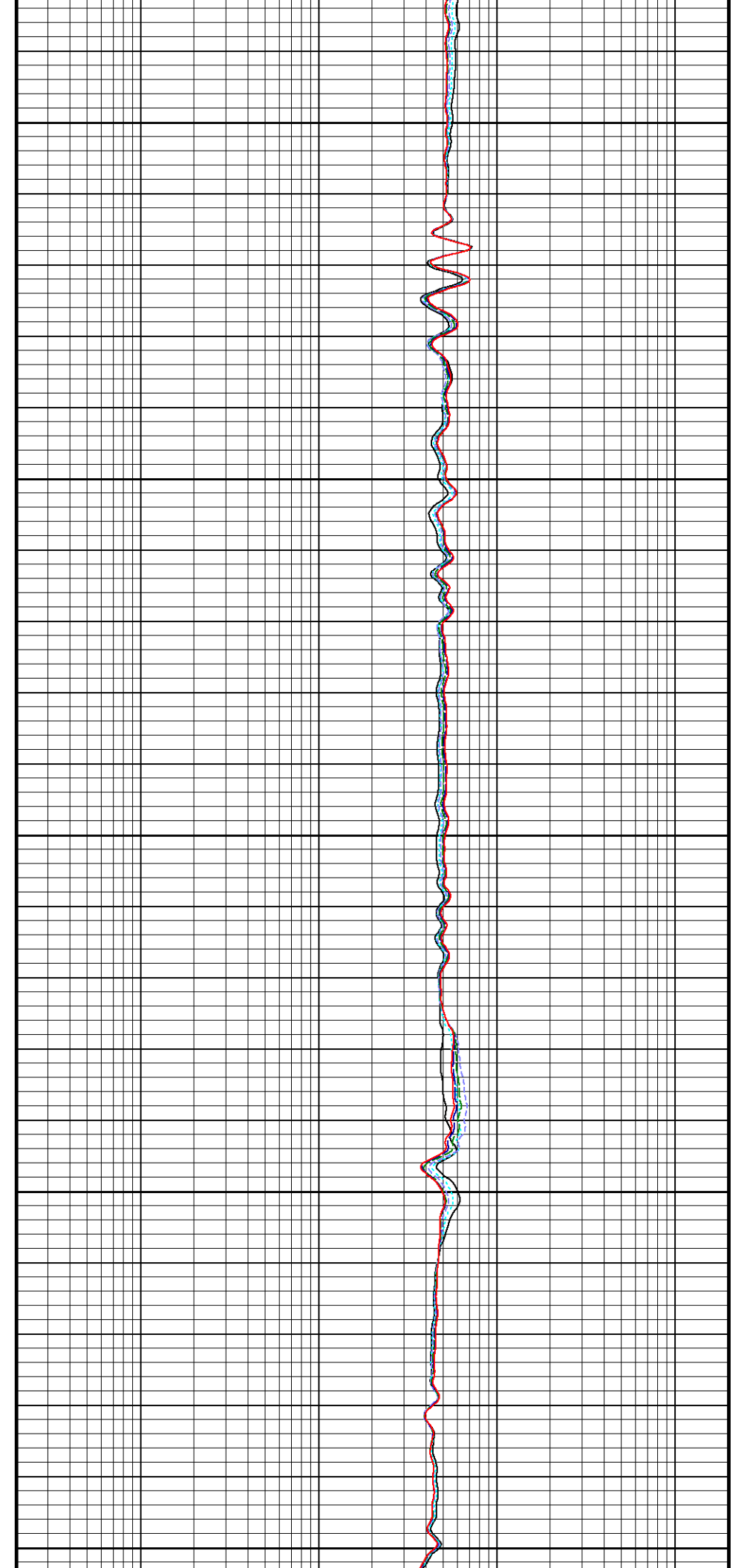
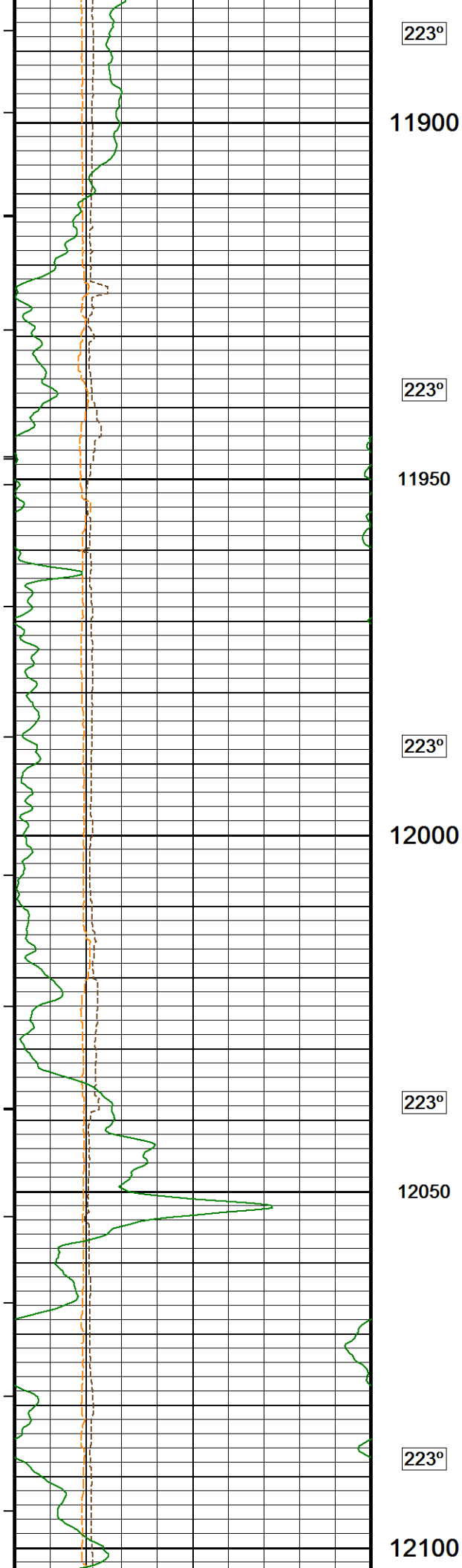


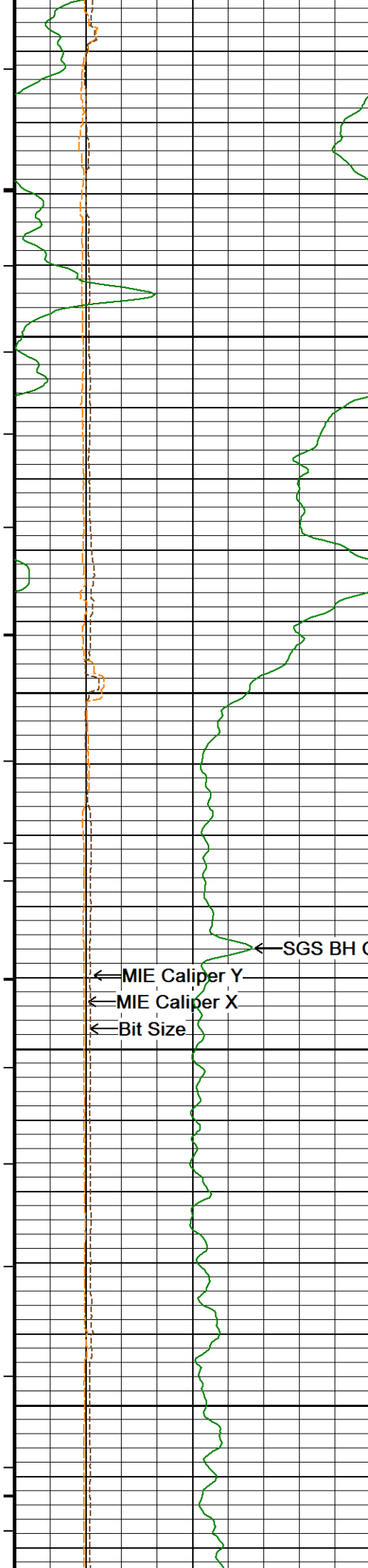




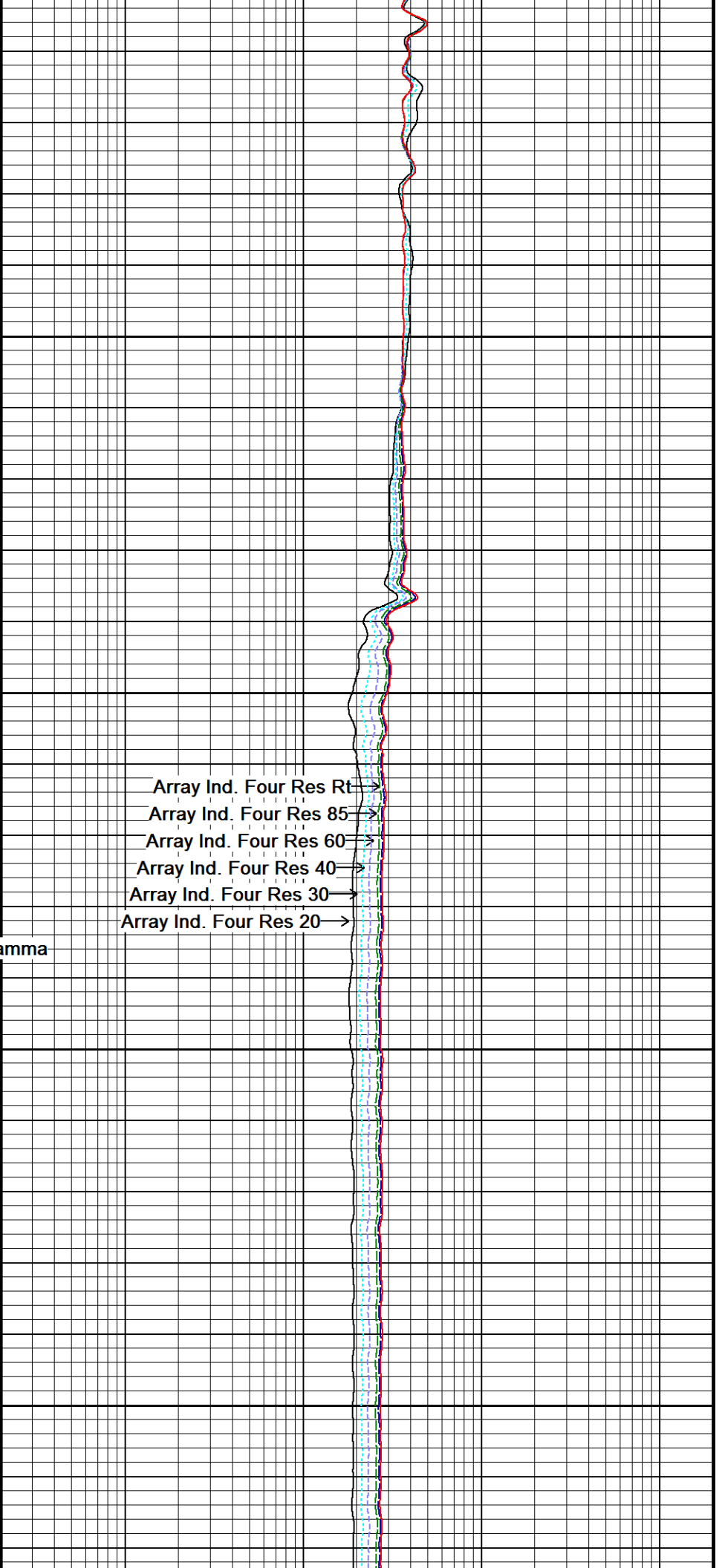




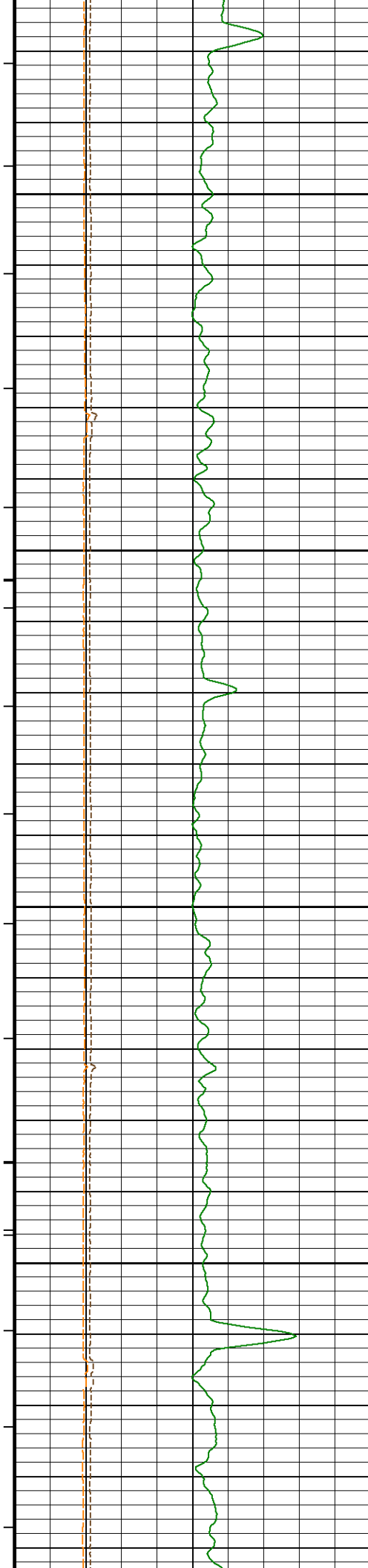




223°  
12150  
223°  
12200  
223°  
12250  
223°  
12300



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



223°

12350

223°

12400

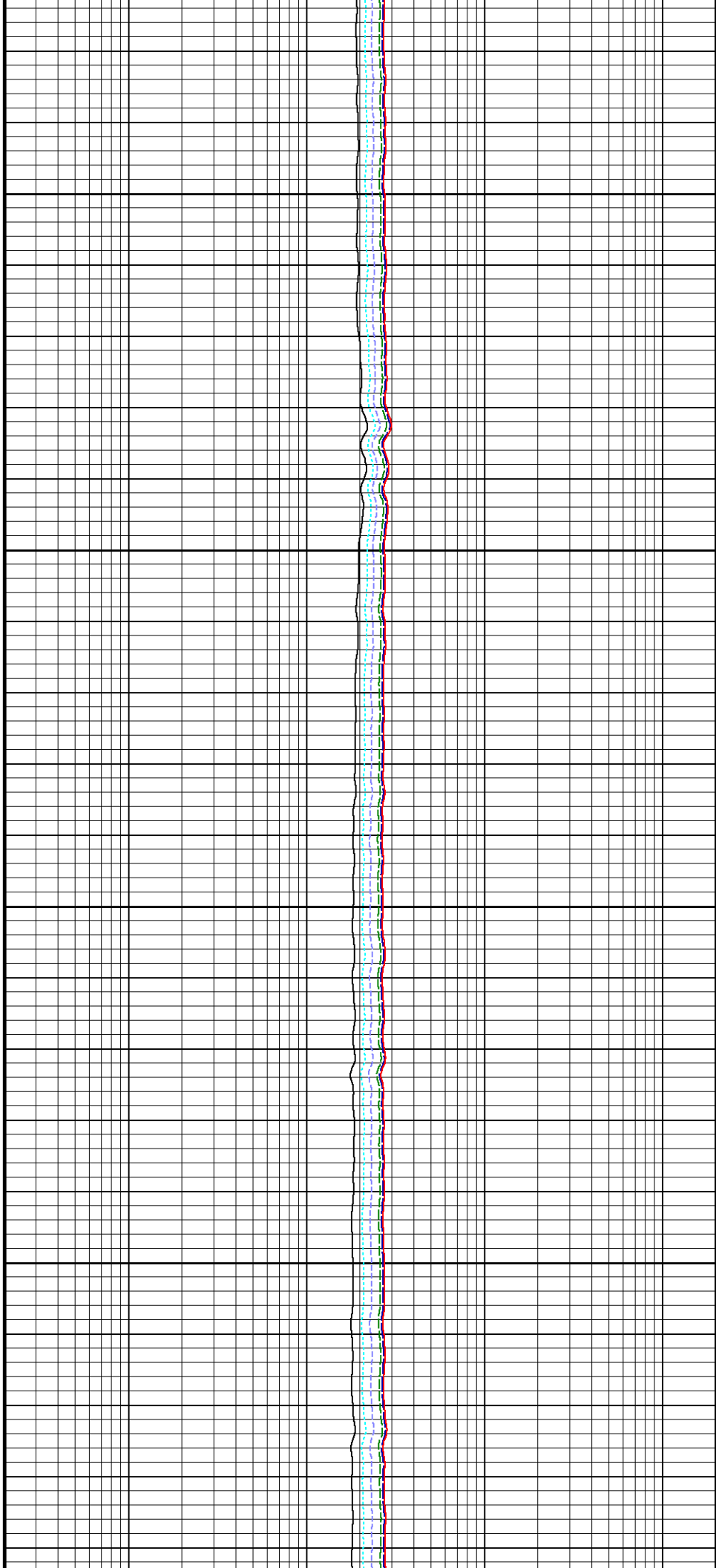
223°

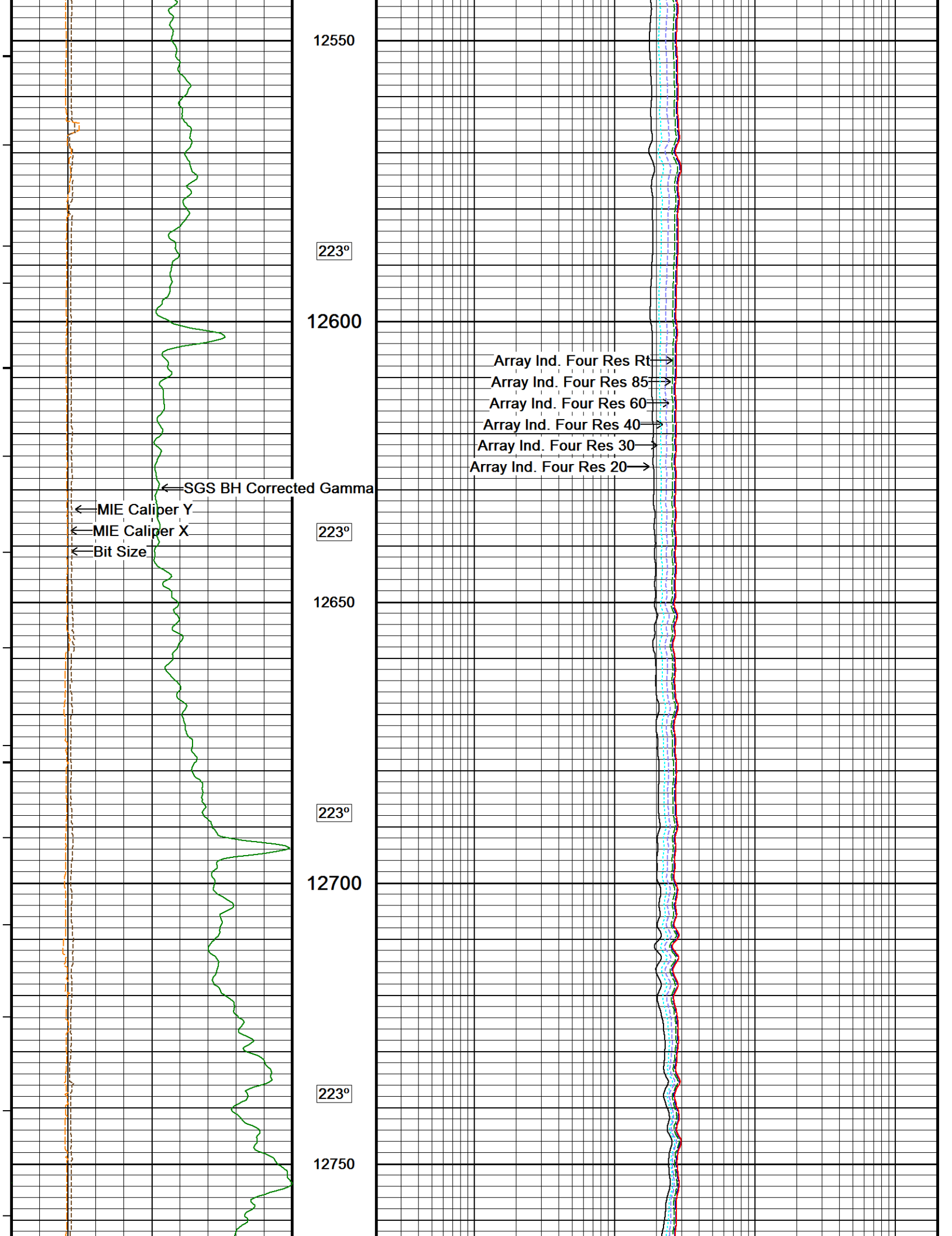
12450

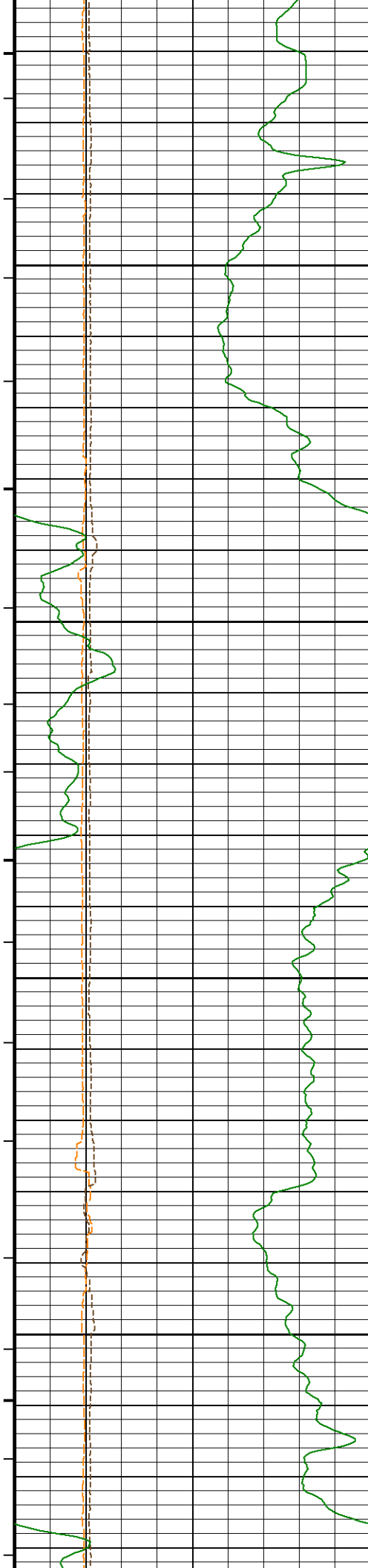
223°

12500

223°







223°

12800

223°

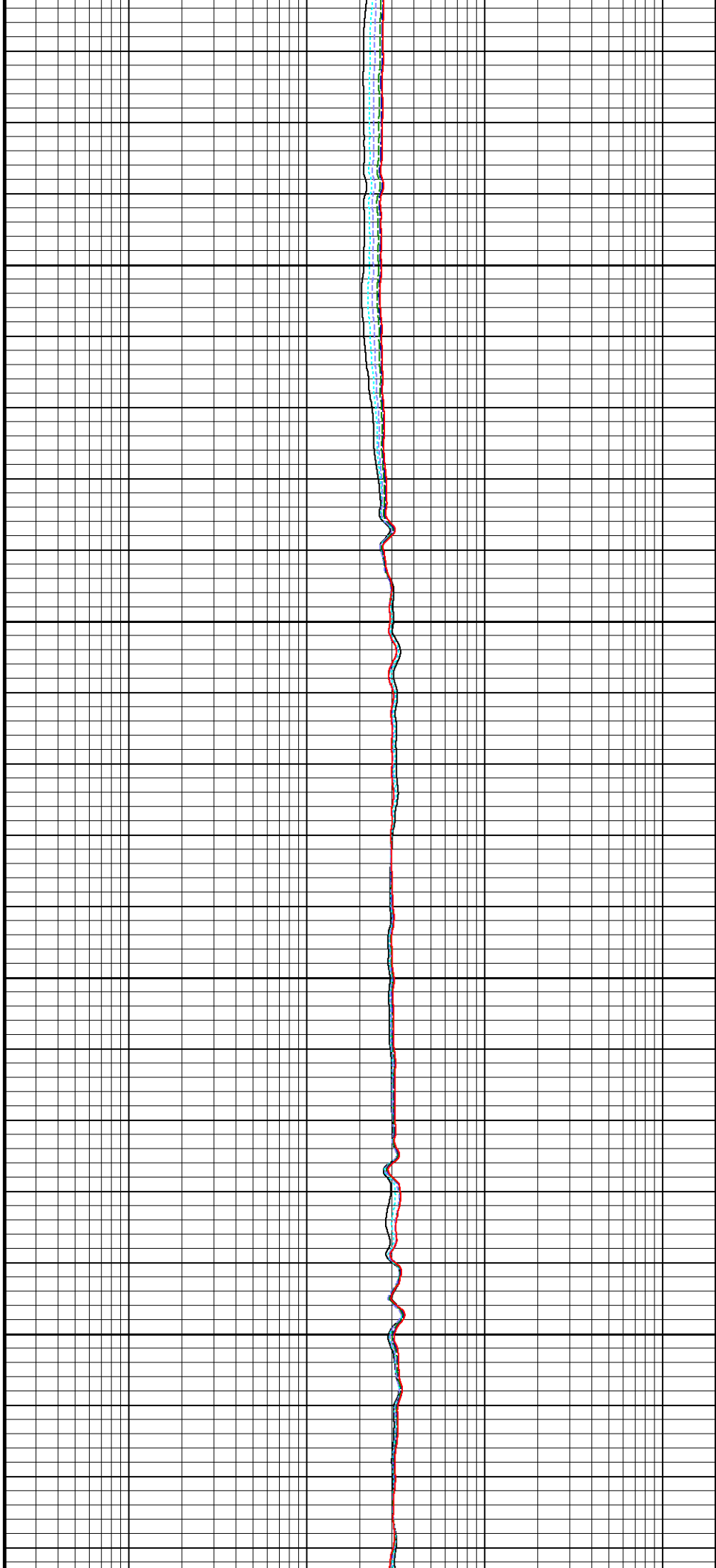
12850

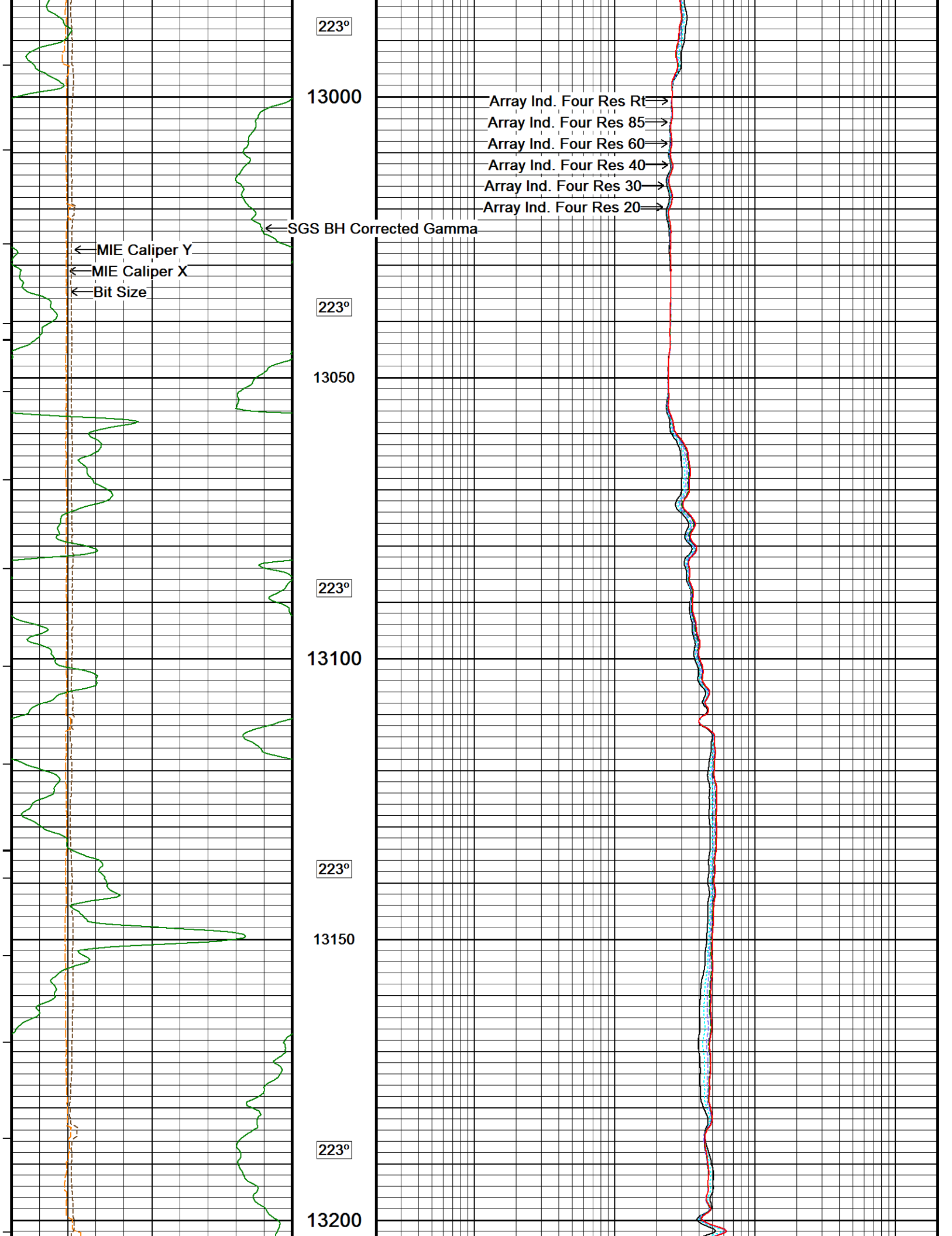
223°

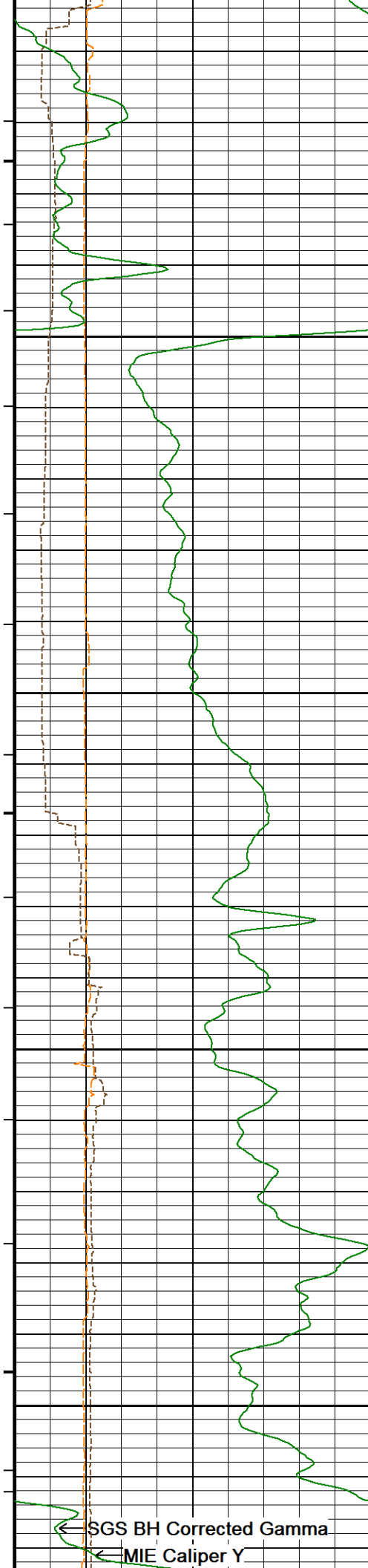
12900

223°

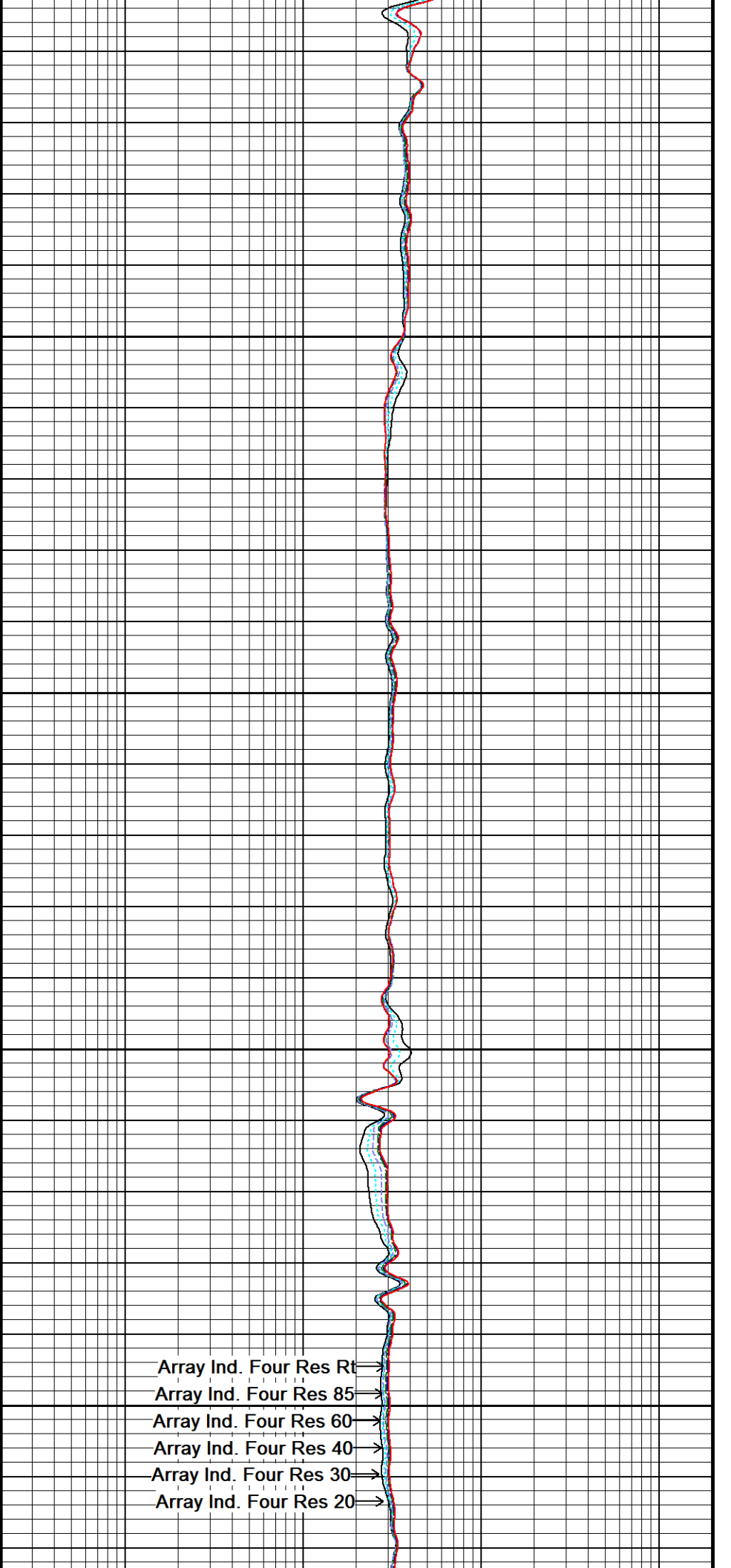
12950







223°  
13250  
223°  
13300  
223°  
13350  
223°  
13400



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



223°

13450

223°

13500

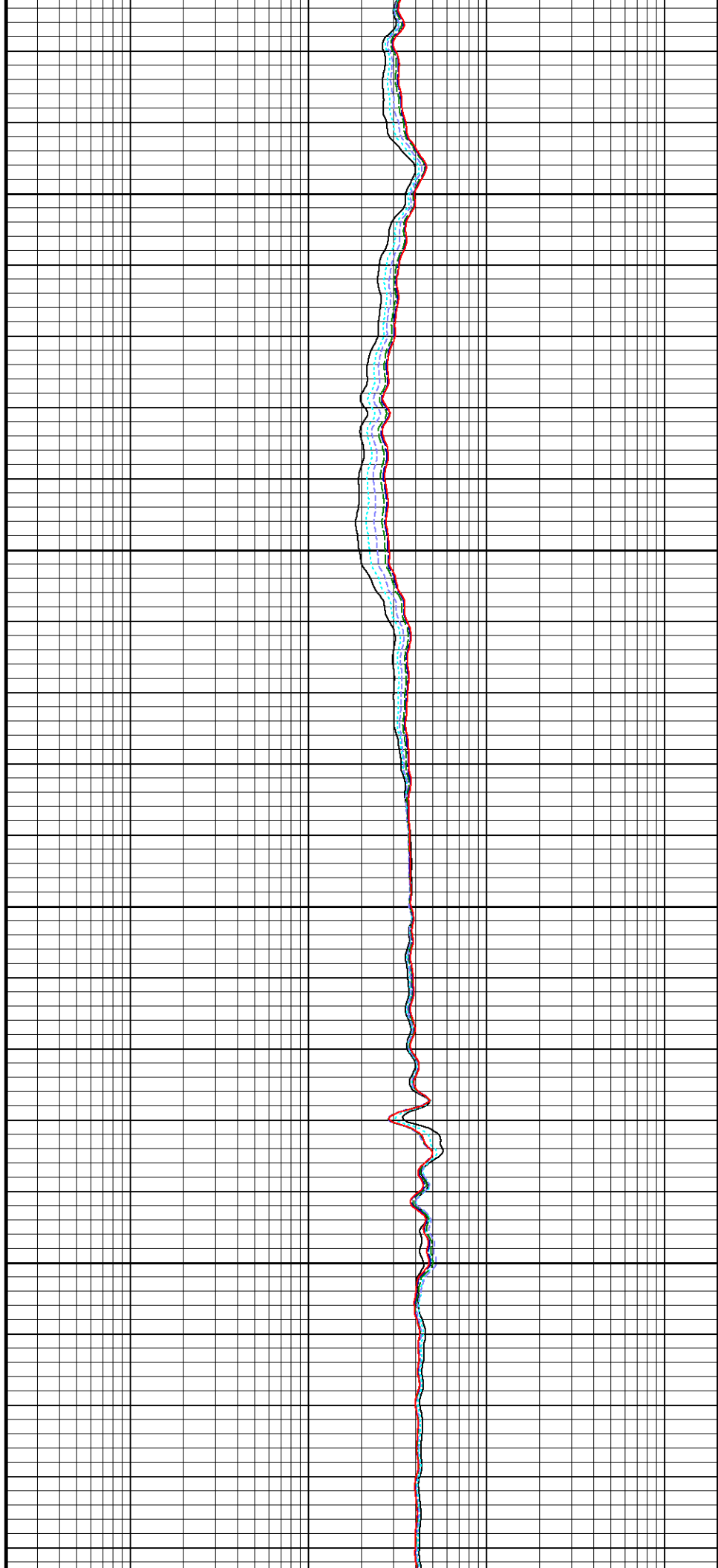
223°

13550

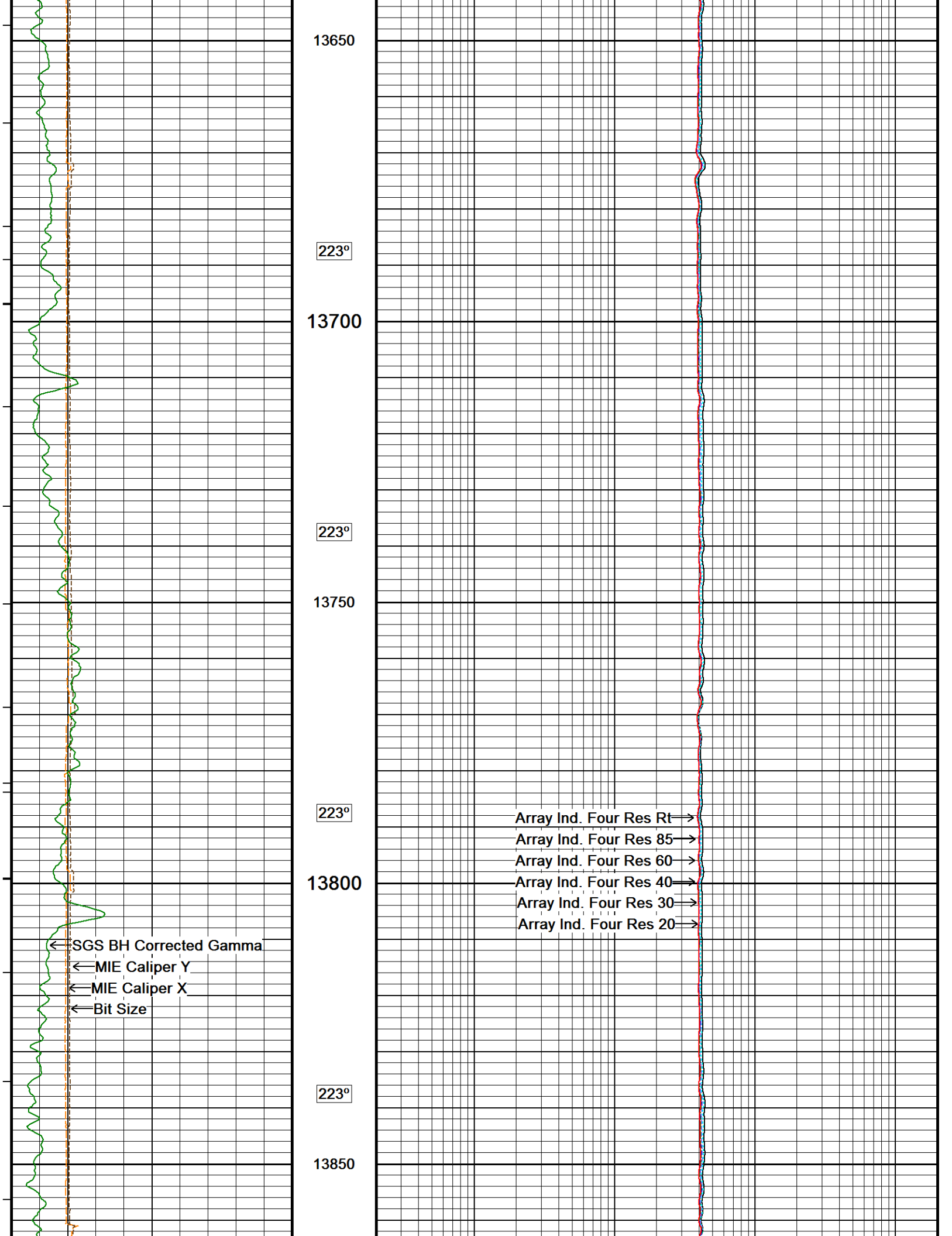
223°

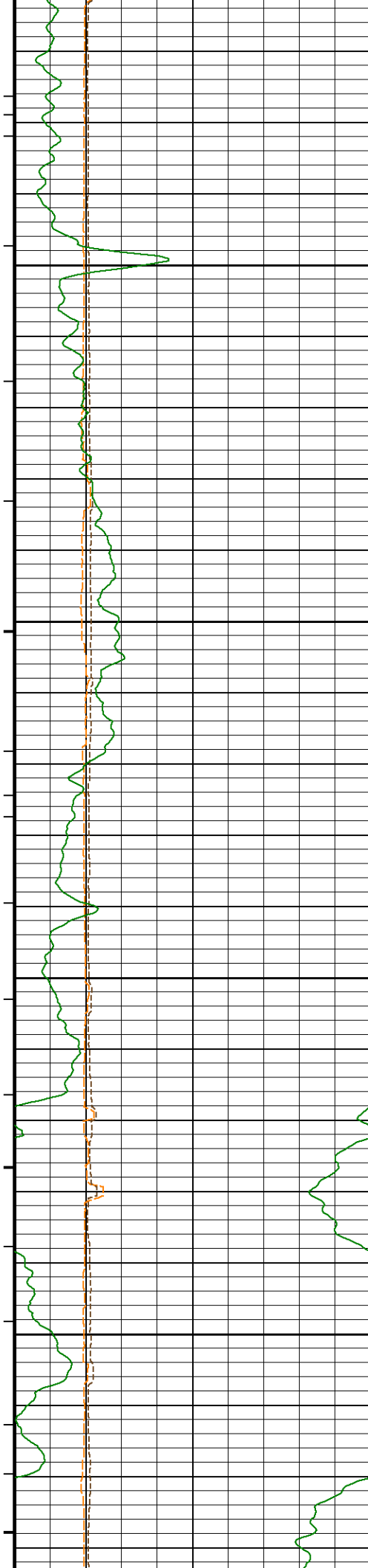
13600

223°









222°

13900

223°

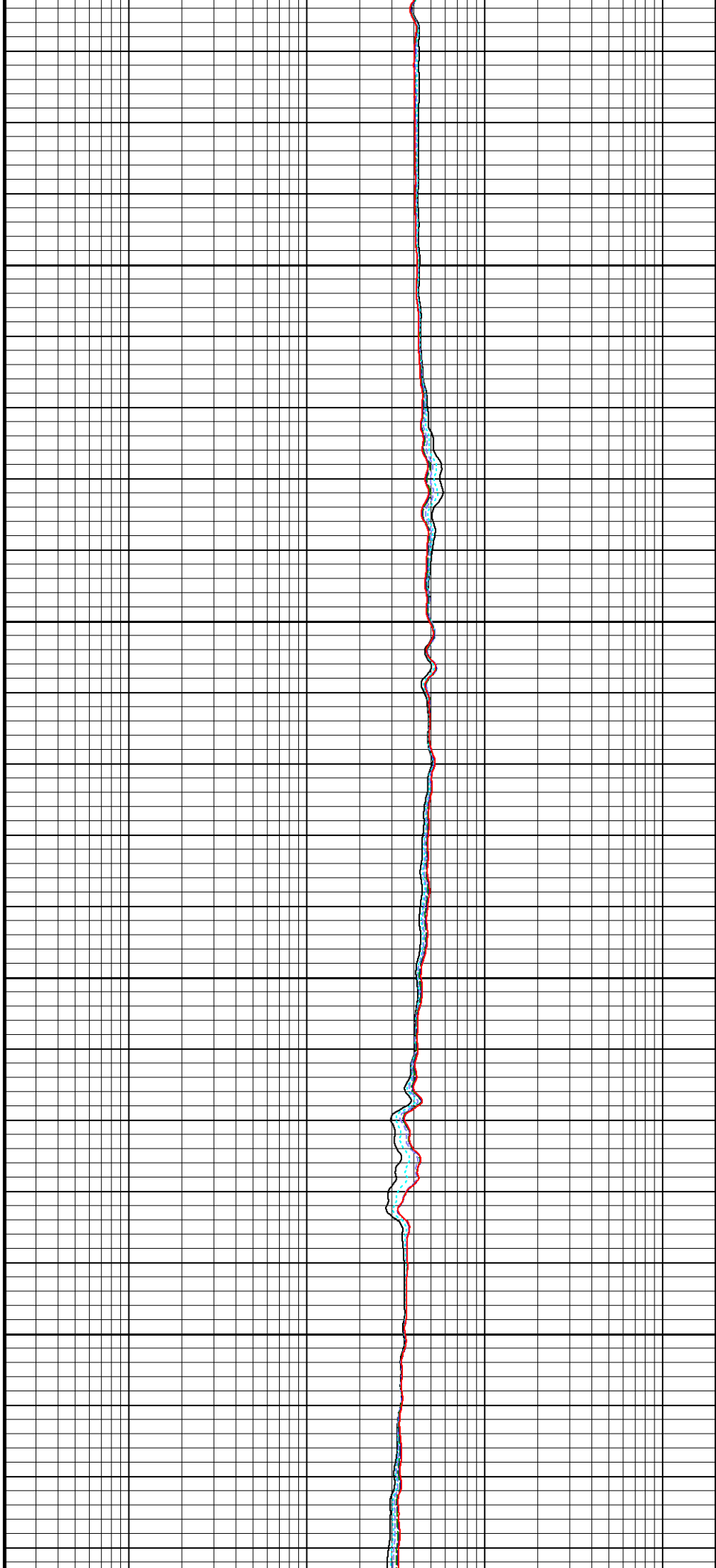
13950

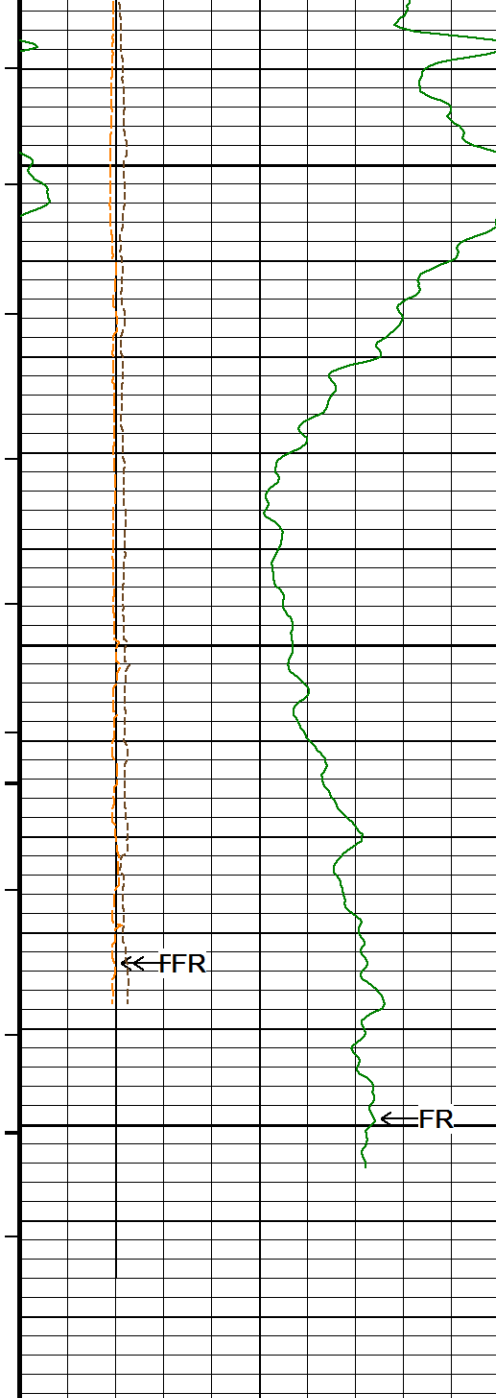
222°

14000

223°

14050





224°

14100

14150

14200

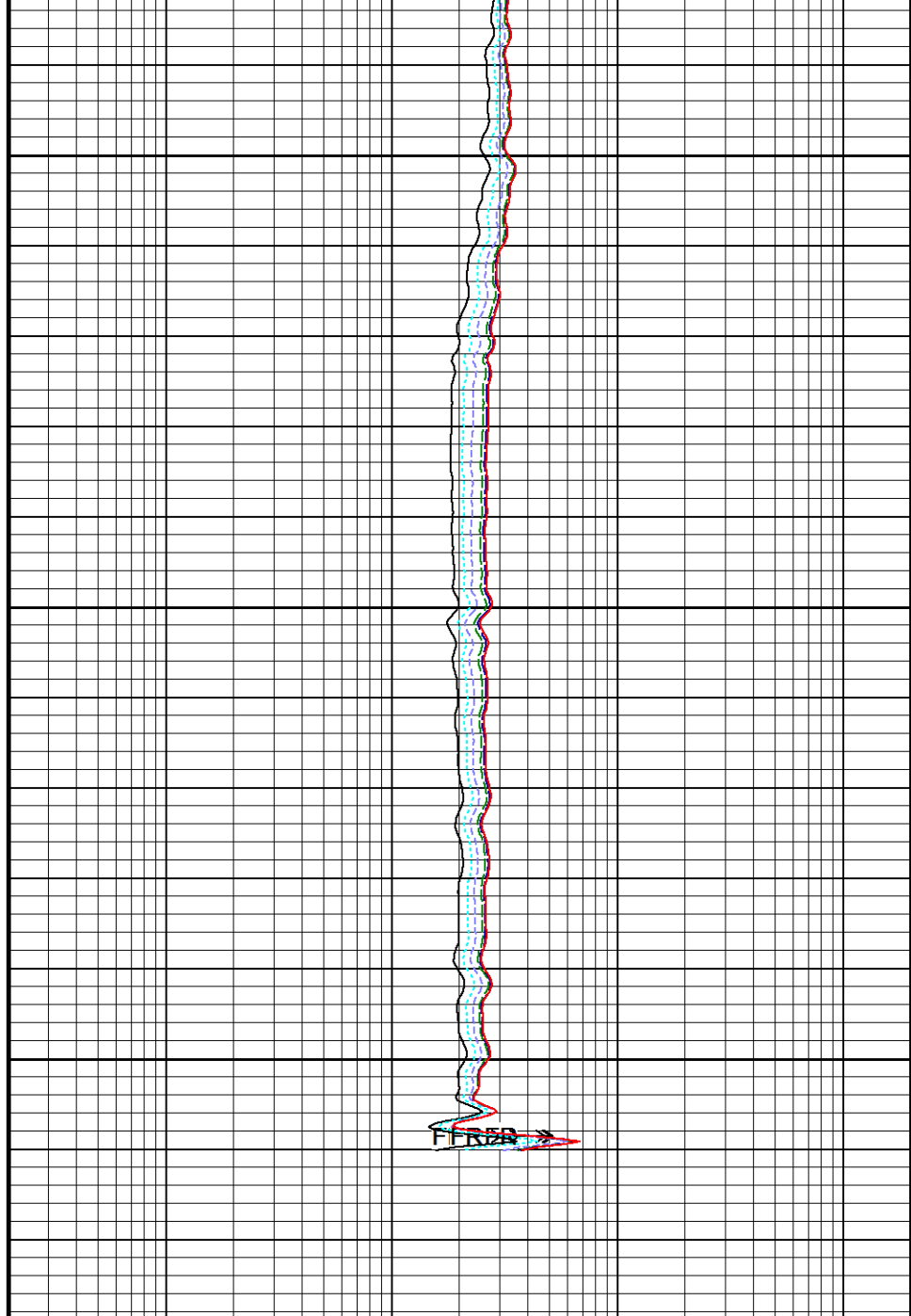
Depth  
in  
Feet

Timing Marks  
every 60.0 sec

Bit Size  
inches  
4 9 14

MIE Caliper X  
inches  
4 9 14

Borehole  
Temp in  
deg F



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

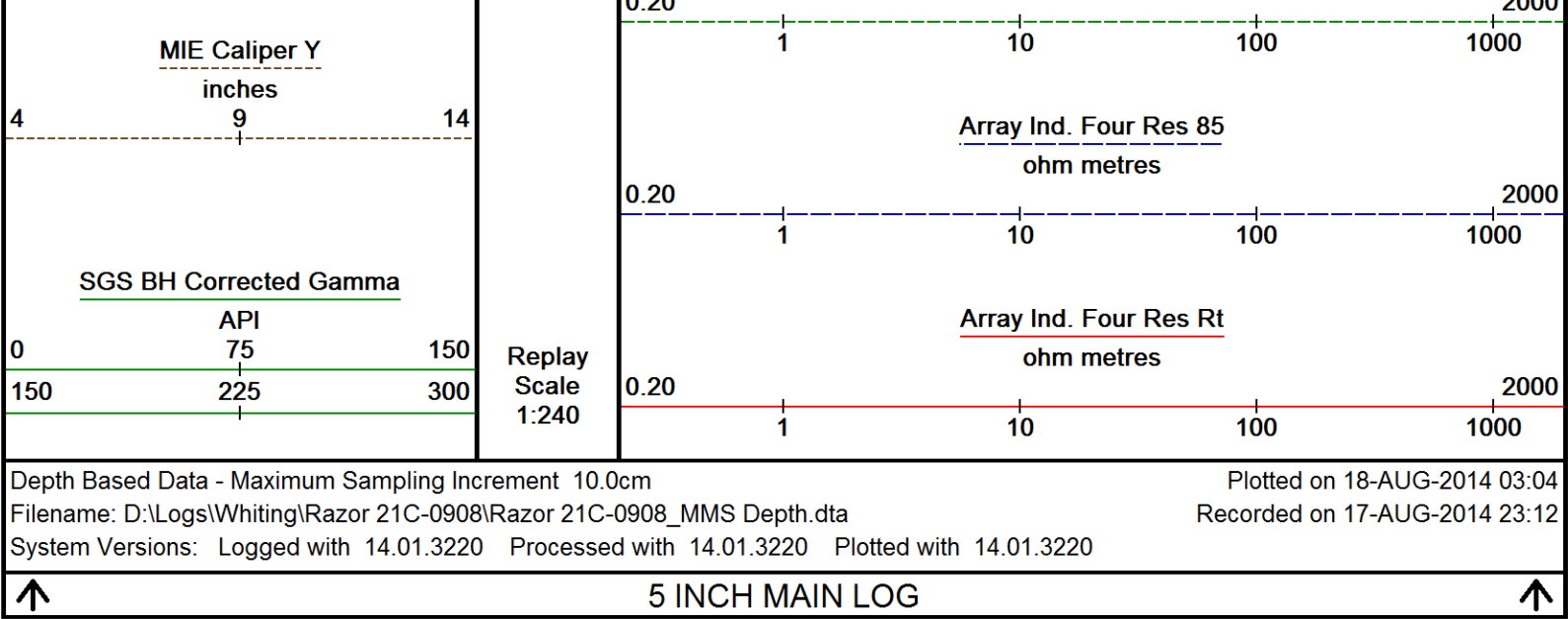
1000

2000

Array Ind. Four Res 60  
ohm metres

0.20

2000



BEFORE SURVEY CALIBRATION									
D:\Logs\Whiting\Razor 21C-0908\Razor 21C-0908_MMS Depth.dta									
General Constants All 000					Last Edited on 17-AUG-2014,17:03				
General Parameters									
Mud Resistivity	0.920				ohm-metres				
Mud Resistivity Temperature	81.000				degrees F				
Water Level	0.000				feet				
Borehole Fluid Processing	Wet Hole								
Hole/Annular Volume and Differential Caliper Parameters									
HVOL Method	XY Caliper								
HVOL Caliper 1	MIE Diam. X Armswing				inches				
HVOL Caliper 2	MIE Diam. Y Armswing								
Annular Volume Diameter	4.500								
Caliper for Differential Caliper	MIE Diam. X Armswing								
Rwa Parameters									
Porosity used	Base Density Porosity								
Resistivity used	Array Ind. Four Res Rt								
RWA Constant A	0.610								
RWA Constant M	2.150								
SW/APOR Tool Source	0.000								
Down-hole Tension Calibration SMS 0					Field Calibration on 03-MAR-2014 17:38				
Reading No	Measured			Calibrated (lbs)					
1	15344.12			0.00					
2	16163.79			590.00					
Strain Gauge Constants MMS-F.A 248					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		

## Logging Parameters

Firmware Version	2v52	
Caliper Open On	MAI	
Caliper Open Delay		minutes
Caliper Closed On	Unknown	
Caliper Closed Delay	N/A	minutes
Sample Rate	1.00	seconds
Use Deep Sleep	Yes	
Delay Deep Sleep	No	
Deep Sleep Wake Time	360.0	minutes
Deep Sleep Wake on Temperature	No	
Deep Sleep Wake Temperature	N/A	degrees C
Deep Sleep Wake on Pressure	No	
Deep Sleep Wake Pressure	N/A	psi
MMI Pad Pressure	8.0	

## Release Parameters

Pulse Duration Base Level	5.0	seconds
Pulse Duration Transition Time	30.0	seconds
Pulse Duration Status Pulse From	10.0	seconds
Pulse Duration Caliper Close From	72.0	seconds
Pulse Duration Caliper Open From	75.0	seconds
Pulse Duration Release Pulse From	107.0	seconds
Pulse Duration Release Pulse To	140.0	seconds
Pulse Release Duration	120.0	seconds
Pulse Discriminator Pressure Band	171.0	seconds
Pulse Pressure Discriminator	382.0	seconds
Use Negative Pulsing	No	
Good Status Reply Open Hole	65535.0	seconds
Good Status Reply Cased Hole	10.0	seconds
Bad Status Reply	30.0	seconds
Status Pulse To	40.0	seconds
Caliper Close To		seconds
Caliper Open To	105.0	seconds

## Configuration

MMS,MGS,MDN,MPD,MPD,MIM,MIE,SGS,MAI

## Gamma Calibration MGS-D.A 218

Field Calibration on 16-AUG-2014 08:49

	Measured	Calibrated (API)
Background	177	104
Calibrator (Gross)	1075	632
Calibrator (Net)	898	528

## Gamma Constants MGS-D.A 218

Last Edited on 17-AUG-2014,17:02

Gamma Calibrator Number	224	
Mud Density	1.14	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

## SP Calibration MGS-D.A 218

Field Calibration on 10-AUG-2014,17:45

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

## High Resolution Temperature Calibration MGS-D.A 218

Field Calibration on 10-AUG-2014,17:44

	Measured	Calibrated(Deg F)
Lower	30.00	30.00
Upper	200.00	200.00

## High Resolution Temperature Constants MGS-D.A 218

Last Edited on 16-AUG-2014,08:30

## Neutron Calibration MDN-B.J 427

Base Calibration on 13-AUG-2014 10:23

Field Check on 16-AUG-2014 08:30

## Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2972	91	3714	110
Ratio	32.769		33.764	

## Field Calibrator at Base

	Calibrated (cps)
	2227
Ratio	0.681

## Field Check

	Calibrated (cps)
	2206
Ratio	0.674

## Neutron Constants MDN-B.J 427

Last Edited on 17-AUG-2014,17:01

Neutron Source Id	P44385B	
Neutron Jig Number	NJ6628	
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	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

## Imager Pad Check MIE-A.A 125

Field Check on 28-JUL-2014 14:37

Pad 1	20/20 Buttons Verified	Pad 5	20/20 Buttons Verified
Pad 2	24/24 Buttons Verified	Pad 6	24/24 Buttons Verified
Pad 3	20/20 Buttons Verified	Pad 7	20/20 Buttons Verified
Pad 4	24/24 Buttons Verified	Pad 8	24/24 Buttons Verified

## Compact Micro Imager Constants MIE-A.A 125

Last Edited on 17-JAN-2014,11:21

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	

## Navigation Constants MIE-A.A 125

Last Edited on 14-AUG-2014,09:06

Magnetic Declination	0.00	degrees	East
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## Magnetometer Parameters MIE-A.A 125

Date Of Last Magnetometer Calibration	21-MAY-2014,15:53		
	X Magnetometer	Y Magnetometer	Z Magnetometer
Slope	-1.000000	-0.998397	-0.988599
Offset	0.012919	-0.017168	0.009969

Magnetometer Calibrator Number	000
--------------------------------	-----

Accelerometer Parameters MIE-A.A 125				
Date Of Last Accelerometer Calibration		21-MAY-2014,10:10		
	X Accelerometer	Y Accelerometer	Z Accelerometer	
Slope	-1.108385	-1.106299	-1.113631	
Offset	0.004188	-0.002654	-0.003372	

Accelerometer Constants MIE-A.A 125			Last Edited on 14-AUG-2014,09:06	
Accelerometer Calibrator Number		000		
Accelerometer Temperature Characterisation				
X Accelerometer				
Serial Number		867		
Calibration Date		25-Jun-2009		
	B0	B1	B2	B3
Bias(g)	0.00000e+000	8.88300e-006	1.42920e-008	-7.14234e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.84901e-004	3.65464e-007	1.00140e-009
Y Accelerometer				
Serial Number		898		
Calibration Date		12-Apr-2010		
	B0	B1	B2	B3
Bias(g)	0.00000e+000	3.09504e-006	-4.17750e-009	1.00603e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.73446e-004	3.06615e-007	8.00001e-010
Z Accelerometer				
Serial Number		883		
Calibration Date		10-Apr-2010		
	B0	B1	B2	B3
Bias(g)	0.00000e+000	8.19055e-006	-3.32398e-008	7.38691e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.68615e-004	3.36203e-007	6.38362e-010

Caliper Calibration MIE-A.A 125				Base Calibration on 16-AUG-2014 08:59	
				Field Calibration on 16-AUG-2014 09:01	
Base Calibration					
Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)		
1	26465	26635	5.96		
2	36695	36908	7.98		
3	46259	46323	9.86		
4	56815	56947	11.88		
5	0	0	0.00		
Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	25558	24202	23467	23520	5.96
2	34403	32772	31600	31991	7.98
3	42799	40867	39342	39899	9.86
4	52565	50298	48043	49174	11.88
5	0	0	0	0	0.00
Field Calibration					
	Measured	Measured	Actual		
	Pads 1-5 Caliper(in)	Pads 3-7 Caliper(in)	Caliper(in)		
	5.94	5.92	5.96		
	Measured	Measured	Measured	Measured	Actual
	Pad 2 Caliper(in)	Pad 4 Caliper(in)	Pad 6 Caliper(in)	Pad 8 Caliper(in)	Caliper(in)
	2.97	2.97	3.04	3.00	5.96

Caliper Constants MIE-A.A 125		Last Edited on 06-MAR-2012 18:40	
Caliper Difference for BRKT	0.120	inches	

Caliper Difference for BRKT		0.120	inches
Induction Calibration MAI-B.J 434		Base Calibration on 24-JAN-2012,20:11 Field Check on 16-AUG-2014 08:15	
Base Calibration			
Test Loop Calibration	Measured	Calibrated (mmho/m)	



Channel	Low	High	Low	High	
1	14.7	442.4	9.3	966.2	
2	5.0	355.7	7.6	821.4	
3	3.2	250.0	5.2	566.0	
4	1.6	129.2	2.6	279.2	
Array Temperature	23.6		Deg F		
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	0.0	0.0	19.1	4104.9	
2	0.0	0.0	34.6	3792.3	
3	0.0	0.0	30.1	3170.7	
4	0.0	0.0	20.7	2139.8	
Deep	0.0	0.0	16.9	1970.7	
Medium	0.0	0.0	44.0	4227.4	
Shallow	0.0	0.0	54.2	5755.3	
Array Temperature	0.0		75.8		Deg F

Induction Constants MAI-B.J 434

Last Edited on 17-AUG-2014,16:53

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		1.0000	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.J 434

Field Calibration on 24-JAN-2012,20:11

	Measured	Calibrated(Deg C)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MAI-B.J 434

Last Edited on

Pre-filter Length	11
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Photo Density Calibration MPD-C.J 377

Base Calibration on 23-JUL-2014 18:54

Field Check on 16-AUG-2014 08:19



Density Calibration		Measured		Calibrated (sdu)	
Base Calibration		Near	Far	Near	Far
Background		1315	1528		
Reference 1		52972	28114	59443	30683
Reference 2		21695	2761	25113	2508
Field Check at Base					
		1314.8	1528.4		
Field Check					
		1320.4	1539.3		

PE Calibration				
Base Calibration		Measured		Calibrated
	WS	WH	Ratio	Ratio
Background		245	1175	
Reference 1		20955	52770	0.401
Reference 2		5969	21550	0.281
Field Check at Base				
		244.9	1175.4	
Field Check				
		243.7	1182.7	

## Density Constants MPD-C.J 377

Last Edited on 17-AUG-2014,17:01

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	1.14 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

## Caliper Calibration MPD-C.J 377

Base Calibration on 24-JUL-2014 19:38  
Field Calibration on 16-AUG-2014 08:23

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	15841	4.00
2	23887	5.96
3	32305	7.98
4	40384	9.86
5	49264	11.88
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	5.88	5.96

## Spectral Gamma Calibration SGS-E.J 135

Base Calibration on 08-AUG-2014 11:18  
Field Calibration on 13-AUG-2014 17:30

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

Background	112.6	38.0	4.5	1.6	2.6
Calibrator (Gross)	232.7	123.4	29.3	1.6	2.8
Calibrator (Net)	120.2	85.4	24.8	-0.0	0.2

	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	112.6	38.0	4.5	1.6	2.6
Calibrator (Gross)	545.3	195.5	17.1	12.0	5.8
Calibrator (Net)	432.7	157.4	12.6	10.4	3.2

	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	112.6	38.0	4.5	1.6	2.6
Calibrator (Gross)	414.4	155.6	11.9	6.8	17.5
Calibrator (Net)	301.8	117.5	7.4	5.1	15.0

	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	112.6	38.0	4.5	1.6	2.6
Calibrator (Gross)	889.9	367.2	48.9	14.7	20.2
Calibrator (Net)	777.4	329.2	44.4	13.1	17.6

#### Field Calibration

##### Gamma Ray

	Measured	Calibrated (API)
Background	171	35
Calibrator (Gross)	1361	275
Calibrator (Net)	1189	240

#### Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	111.9	41.1	4.9	1.7	3.3
Calibrator (Gross)	892.2	374.0	49.1	15.8	21.4
Calibrator (Net)	780.3	333.0	44.2	14.0	18.1

Spectral Gamma Constants SGS-E.J 135

Last Edited on 17-AUG-2014,17:00

Background Calibrator Number	440	
Mixture Calibrator Number	450	
Potassium Calibrator Number	500	
Uranium Calibrator Number	506	
Thorium Calibrator Number	503	
Mud Density	1.14	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

## DOWNHOLE EQUIPMENT

D:\Logs\Whiting\Razor 21C-0908\Razor 21C-0908\_MMS Depth.dta

Shuttle Running Tool 3.5"  
SRT-A.A 68 LG: 6.62 ft WT: 37.5 lb OD: 2.520 in

Compact Linker 200V STD  
MLK-A 1 LG: 8.53 ft WT: 30.9 lb OD: 2.240 in



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

MIS-E.A Compact Inline Standoff sub  
MIS-E.A 183 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

SHA-J.B Compact Swivel Head Adaptor  
SHA-J.B 677 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

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

MBS-F.A 200v Compact Battery Sub  
MBS-F.A 63 LG: 17.06 ft WT: 123.5 lb OD: 2.240 in

Compact Memory Sub F.A  
MMS-F.A 248 LG: 5.20 ft WT: 37.5 lb OD: 2.244 in

Compact Tool Isolator sub.  
MTI-C.A 99 LG: 1.54 ft WT: 13.2 lb OD: 2.244 in

Compact Short Gamma  
MGS-D.A 218 LG: 3.41 ft WT: 24.3 lb OD: 2.244 in

Compact Collar Locator  
MCL-B.J 51 LG: 3.17 ft WT: 26.5 lb OD: 2.244 in

SKJ-E.B Compact Knuckle Joint  
SKJ-E.B 597 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

SHA-J.B Compact Swivel Head Adaptor  
SHA-J.B 678 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 731 LG: 5.70 ft WT: 33.1 lb OD: 2.240 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 377 LG: 9.59 ft WT: 90.4 lb OD: 2.244 in

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

SHA-J.B Compact Swivel Head Adaptor  
SHA-J.B 589 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

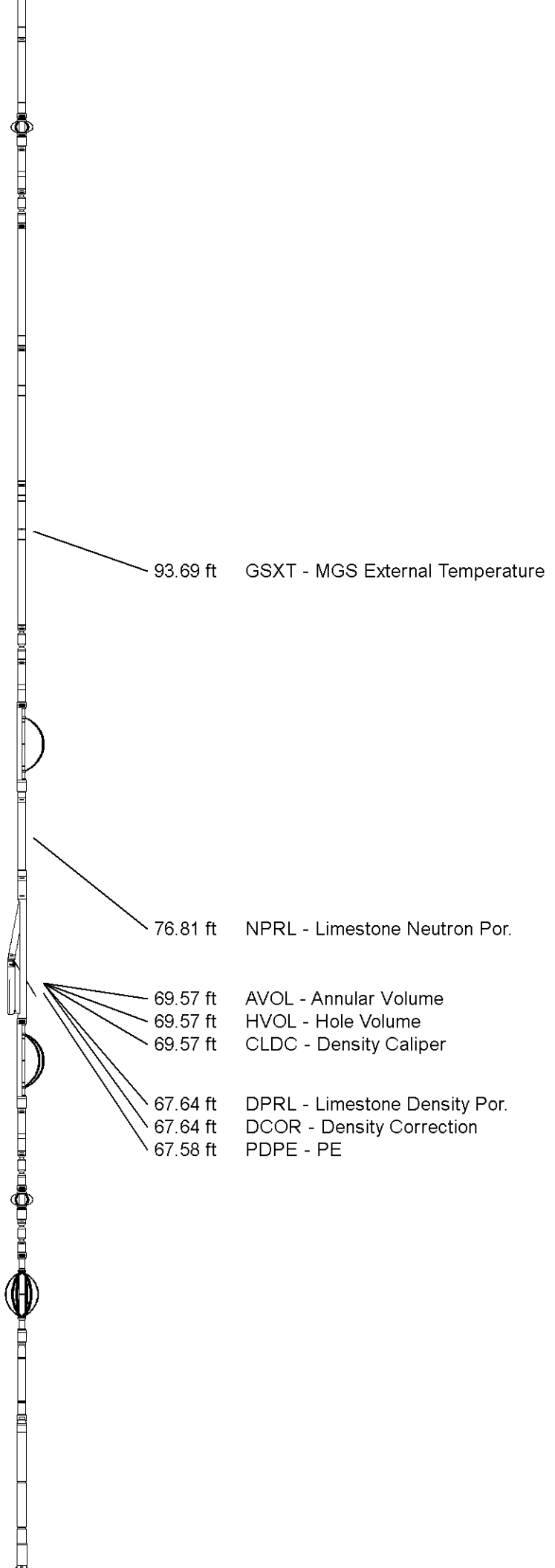
SKJ-E.B Compact Knuckle Joint  
SKJ-E.B 612 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-E.B Compact Inline Standoff sub  
MIS-E.B 693 LG: 2.14 ft WT: 15.4 lb OD: 2.244 in

SKJ-E.A Compact Knuckle Joint  
SKJ-E.A 244 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

MIS-D.A Compact Inline Bowspring sub  
MIS-D.A 437 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

Compact MMI Memory Section  
MIM-A.A 125 LG: 4.65 ft WT: 26.5 lb OD: 2.244 in



Compact MMI Electrode Section  
MIE-A.A 125 LG: 13.96 ft WT: 99.2 lb OD: 4.094 in

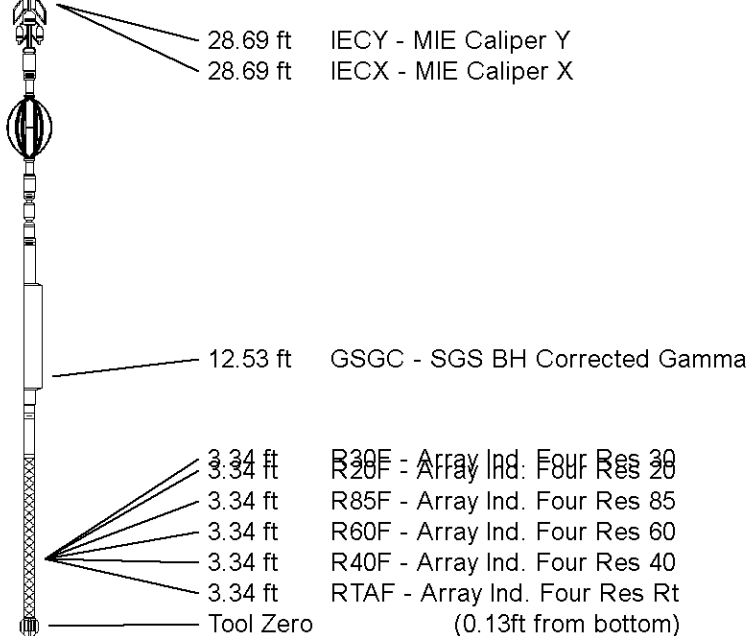
MIS-D.B Compact Inline Bowspring sub  
MIS-D.B 654 LG: 5.70 ft WT: 33.1 lb OD: 2.240 in

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

Spectral Gamma Ray Sub  
SGS-E.J 135 LG: 7.78 ft WT: 105.8 lb OD: 3.543 in

Compact Induction  
MAI-B.J 434 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 156.38 ft Weight: 1095.7 lb



COMPANY	WHITING OIL AND GAS CORPORATION
WELL	RAZOR 21C-0908
FIELD	REDTAIL
PROVINCE/COUNTY	WELD
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	4861.00	feet	First Reading	14210.00	feet
Elevation Drill Floor	4861.00	feet	Depth Driller	14236.00	feet
Elevation Ground Level	4844.00	feet	Depth Logger	14236.00	feet



**Weatherford®**

MEASURED DEPTH  
ARRAY INDUCTION  
LOG