



# Weatherford

## COMPENSATED NEUTRON DENSITY

### LOG

COMPANY

ENCANA

WELL

HERREN 1A-33H

FIELD

WATTENBERG

PROVINCE/COUNTY

WELD

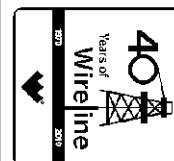
COUNTRY/STATE

U.S.A. / COLORADO

LOCATION

SHL: 246' FNL &amp; 253' FEL

BHL: 1320' FNL &amp; 460' FWL

**FIELD PRINT**

SEC

TWP

RGE

Other Services

33

3N

67W

MAI

API Number

05-123-33249-00

CMI

Permit Number

Permanent Datum G.L., Elevation 4824 feet

Log Measured From K.B. @ 12 FEET above Permanent Datum

Drilling Measured From KB

Elevations:

feet

KB

4836.00

DF

4824.00

GL

Date

15-JUN-2011

Run Number

ONE

Depth Driller

11643.00 feet

Depth Logger

11643.00 feet

First Reading

11564.00 feet

Last Reading

7438.00 feet

Casing Driller

7438.00 feet

Casing Logger

7438.00 feet

Bit Size

6.125 inches

Hole Fluid Type

WBM

Density / Viscosity

10.50 lb/USg 33.00 CP

PH / Fluid Loss

8.00 22.00 ml/30Min

Sample Source

FLOW LINE

Rm @ Measured Temp

1.62 @ 92.0 ohm-m

Rmf @ Measured Temp

1.30 @ 92.0 ohm-m

Rmc @ Measured Temp

1.94 @ 92.0 ohm-m

Source Rmf / Rmc

CALC

Rm @ BHT

0.69 @ 220.0 ohm-m

Time Since Circulation

0.5 HOURS

Max Recorded Temp

237.00 deg F

Equipment Name

COMPACT

Equipment / Base

13038 GD JCT

Recorded By

SLACKEY

Witnessed By

BILL LaFORCE

## BOREHOLE RECORD

Last Edited: 15-JUN-2011 15:52

Bit Size  
inches

6.125

Depth From  
feet

7438.00

Depth To  
feet

11643.00

## CASING RECORD

Type

Size  
inchesDepth From  
feetShoe Depth  
feetWeight  
pounds/ft

SURFACE

9.625

0.00

832.00

40.00

INTERM

7.000

832.00

7438.00

26.00

## REMARKS

SOFTWARE VERSION USED: 11.02.3186

TOOLS CONVEYED VIA COMPACT WELL SHUTTLE.

HARDWARE USED: SEE TOOL DIAGRAM.

ALL DEPTHS RECORDED WITH WEATHERFORD TOTCO DEPTH SYSTEM.  
ALL DEPTHS CORRECTED TO DRILLER'S STRAP DEPTH.

4.5 INCH PRODUCTION CASING USED TO CALCULATE ANNULAR HOLE VOLUME.

ANNULAR HOLE VOLUME FROM T.D. TO INTER. CASING = 460 CUBIC FEET

TOTAL HOLE VOLUME FROM T.D. TO INTER. CASING = 910 CUBIC FEET

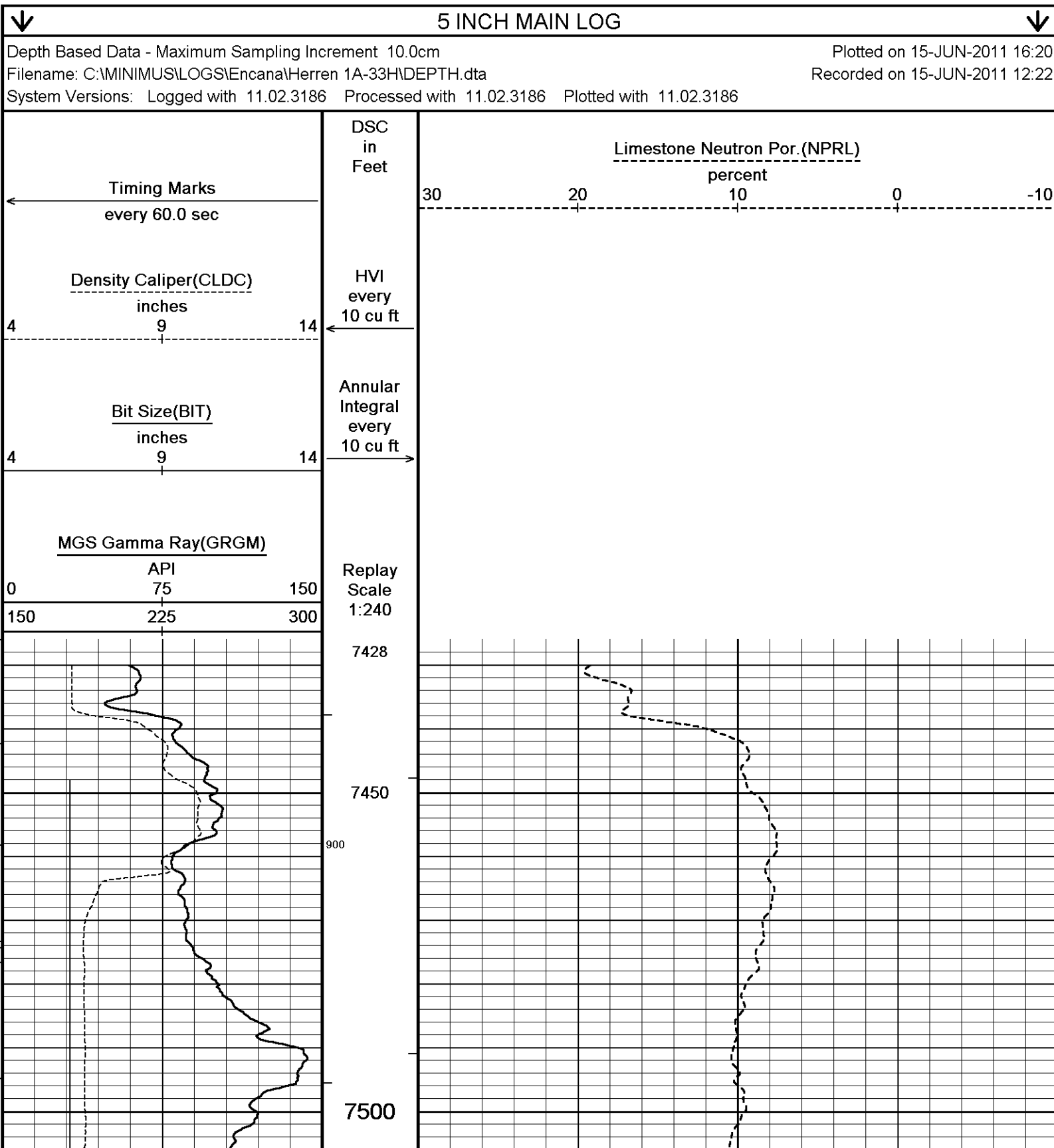
BOREHOLE SIZE AND RUGOSITY WILL AFFECT DATA QUALITY.

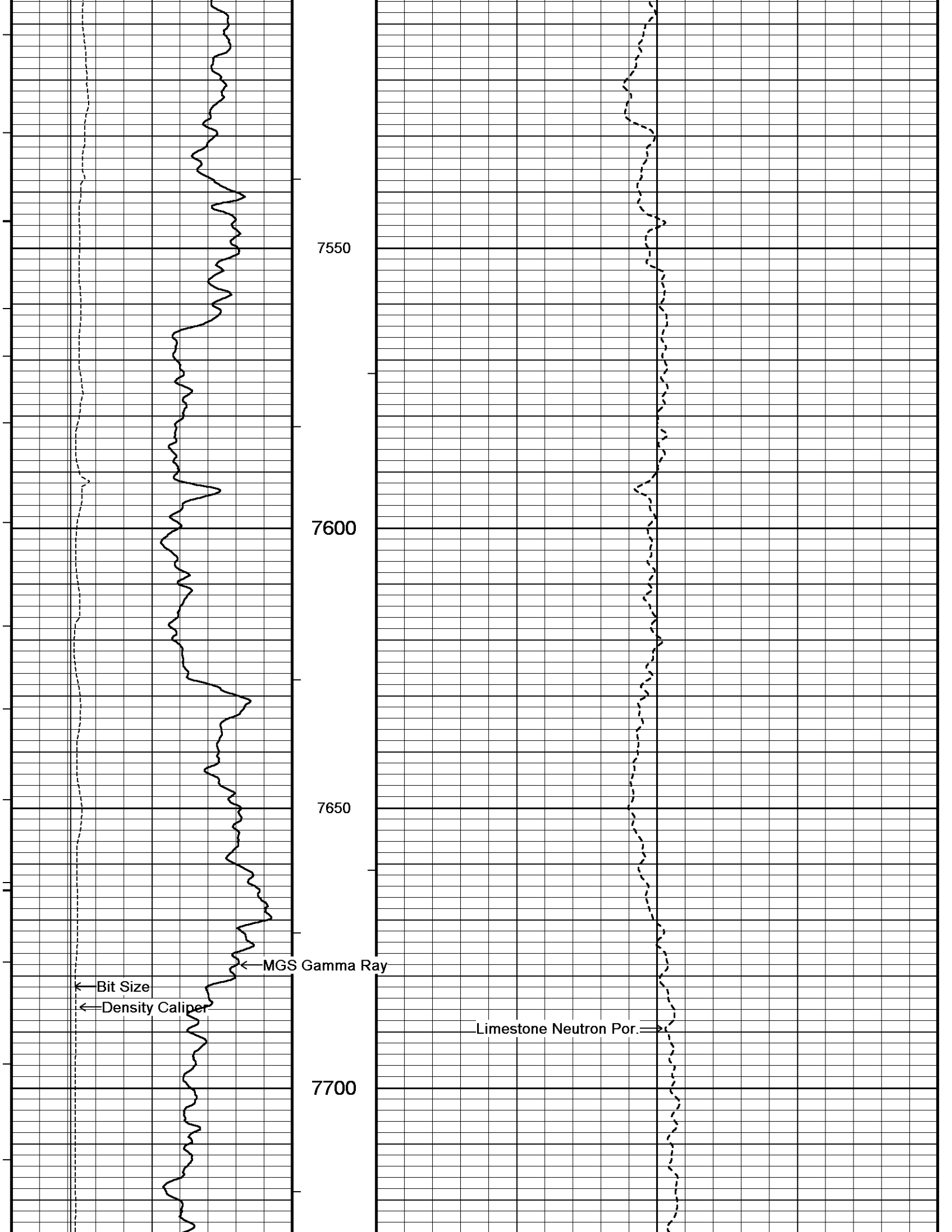
TIGHT PULLS WILL AFFECT DATA QUALITY.

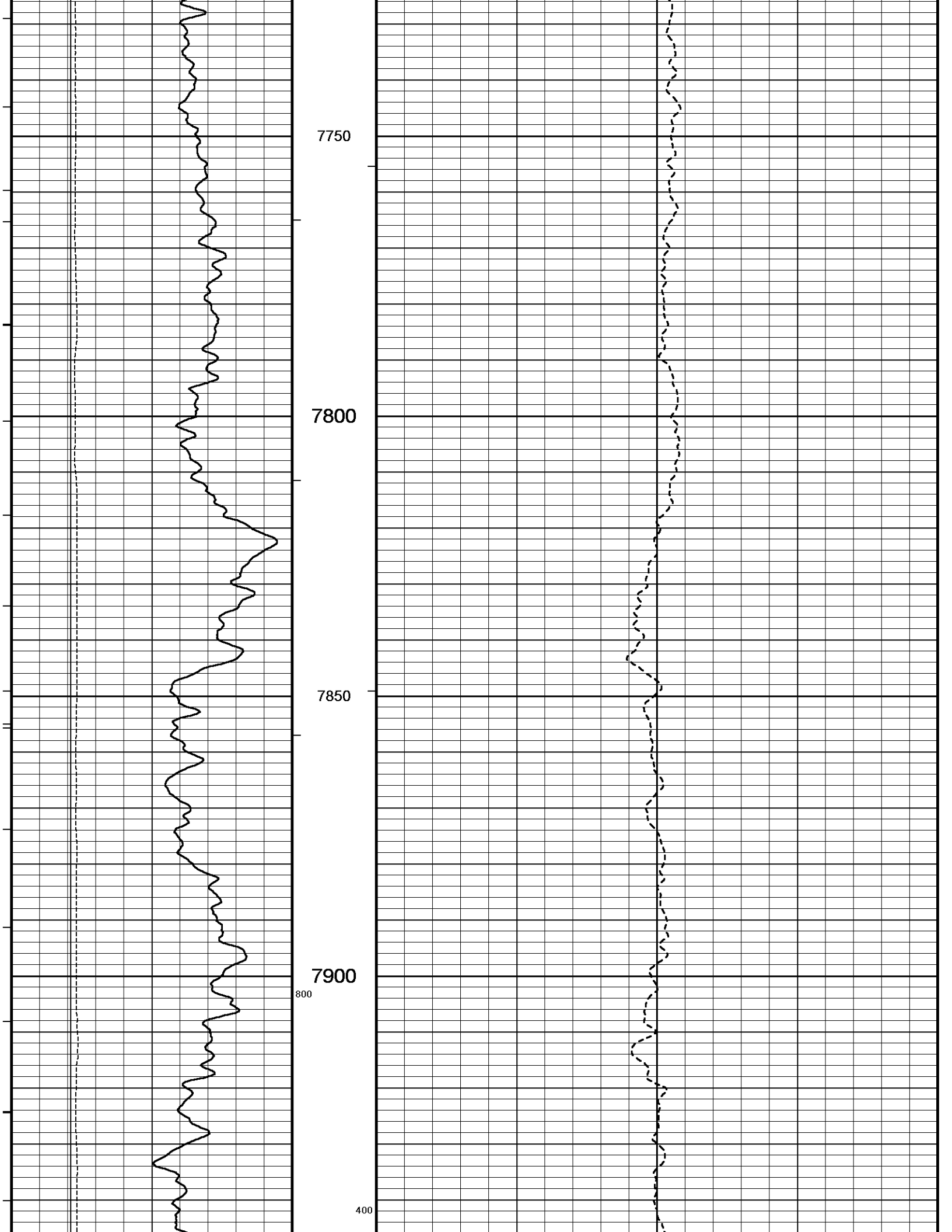
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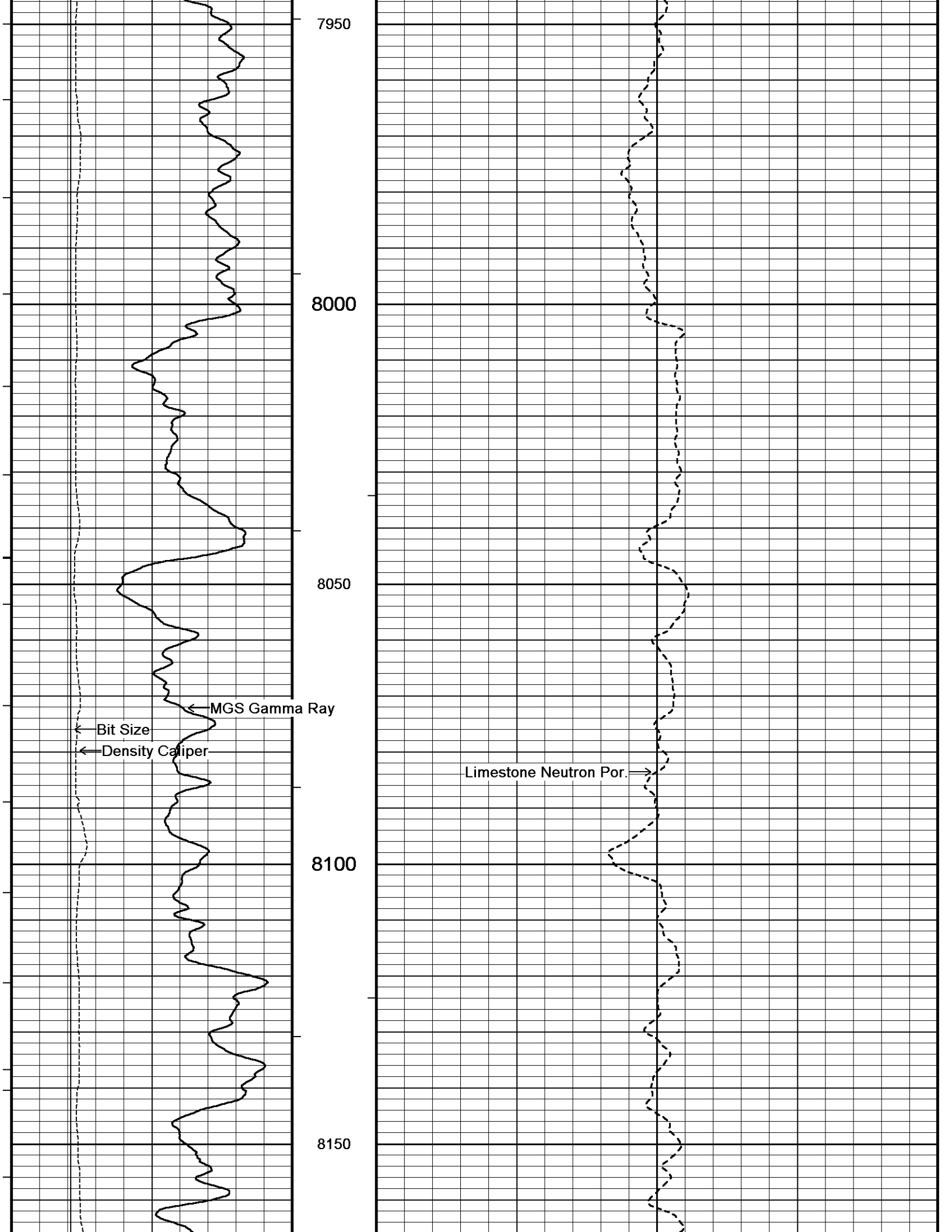
SERVICE ORDER #3526186

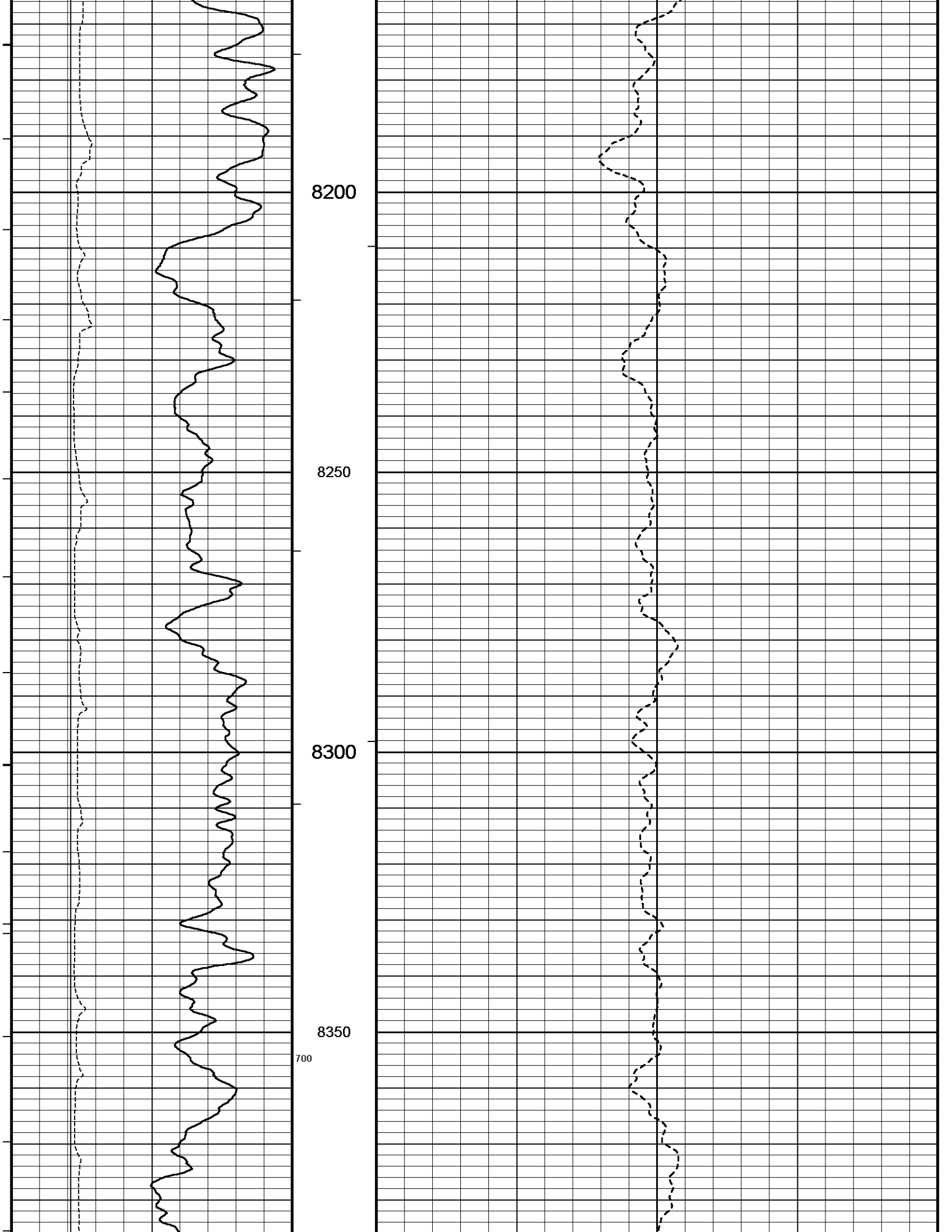
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

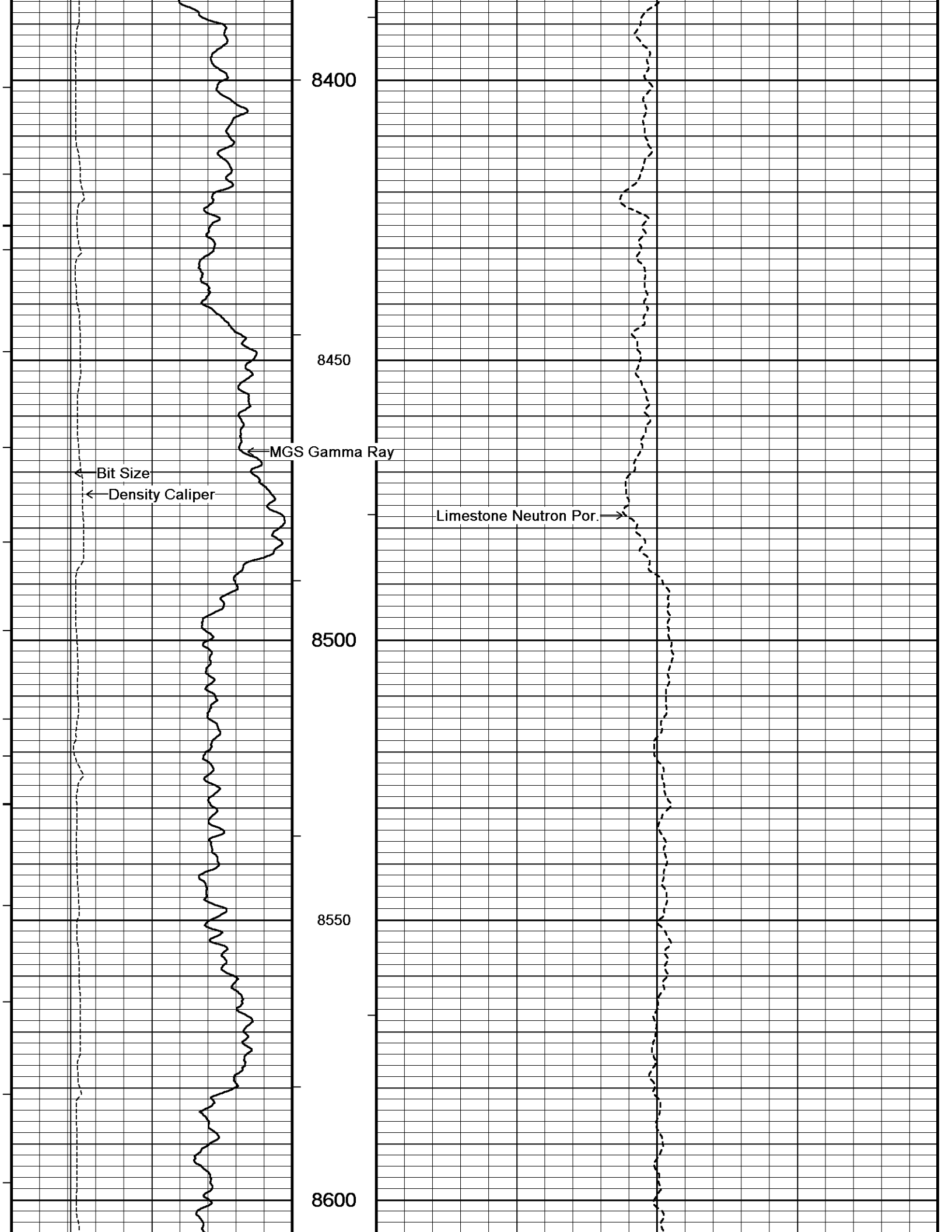


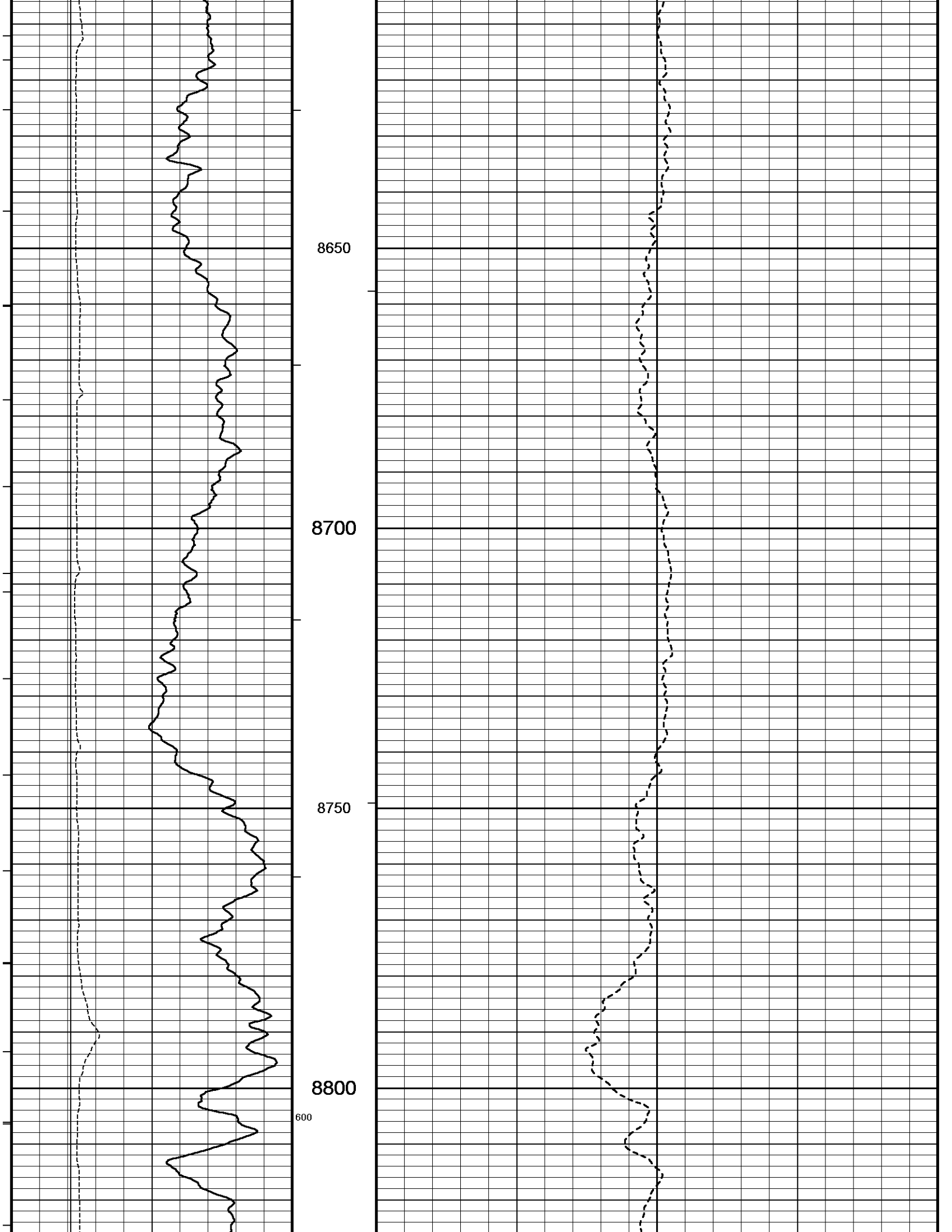




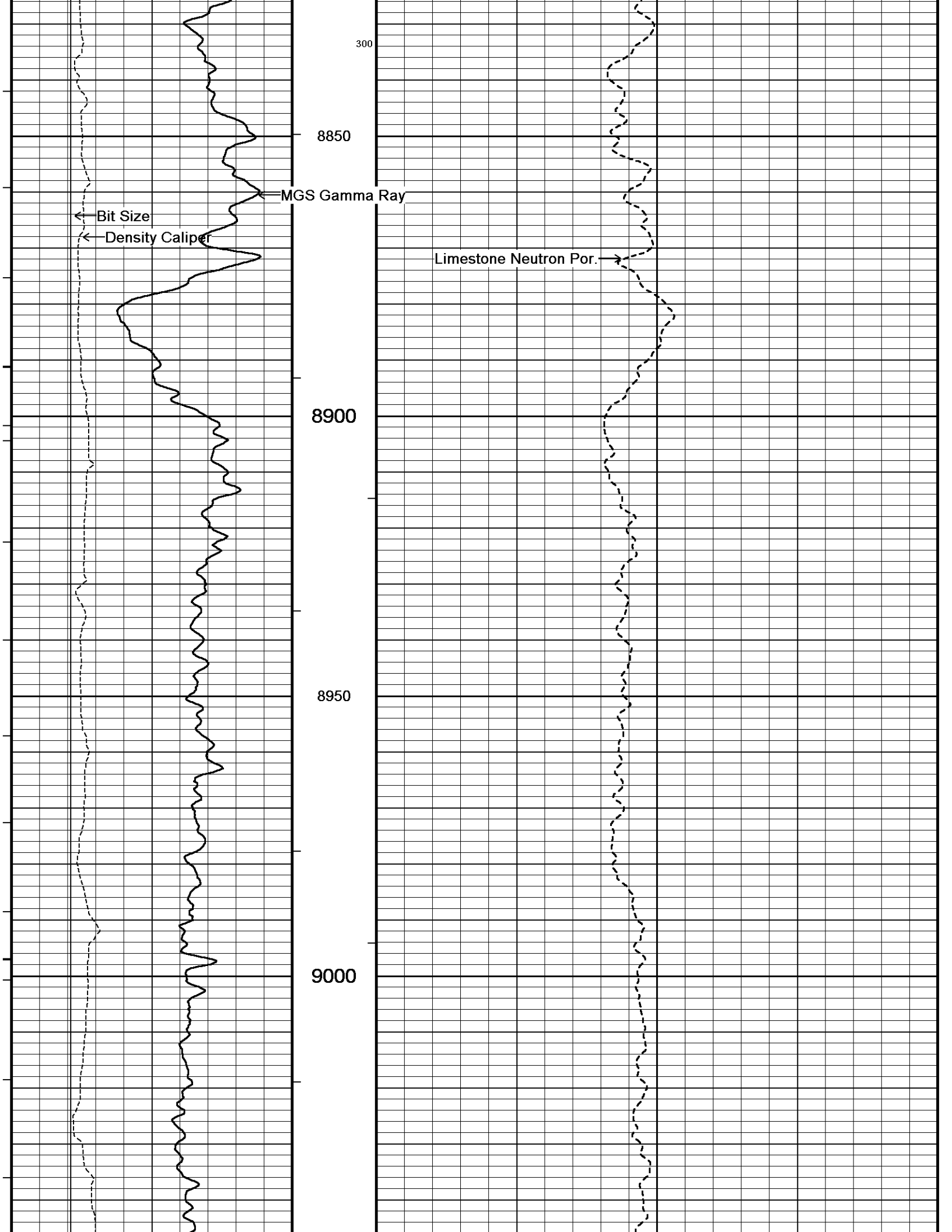


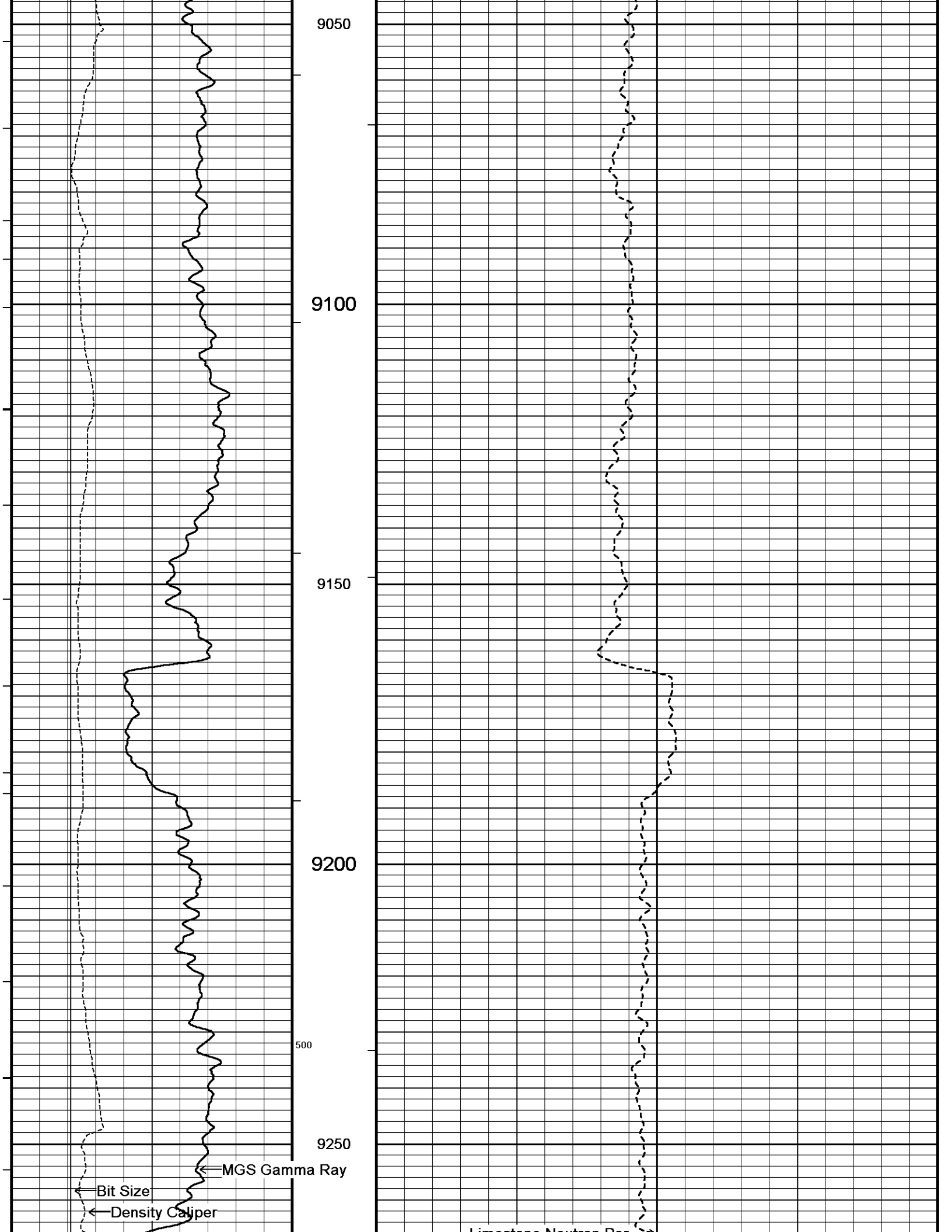


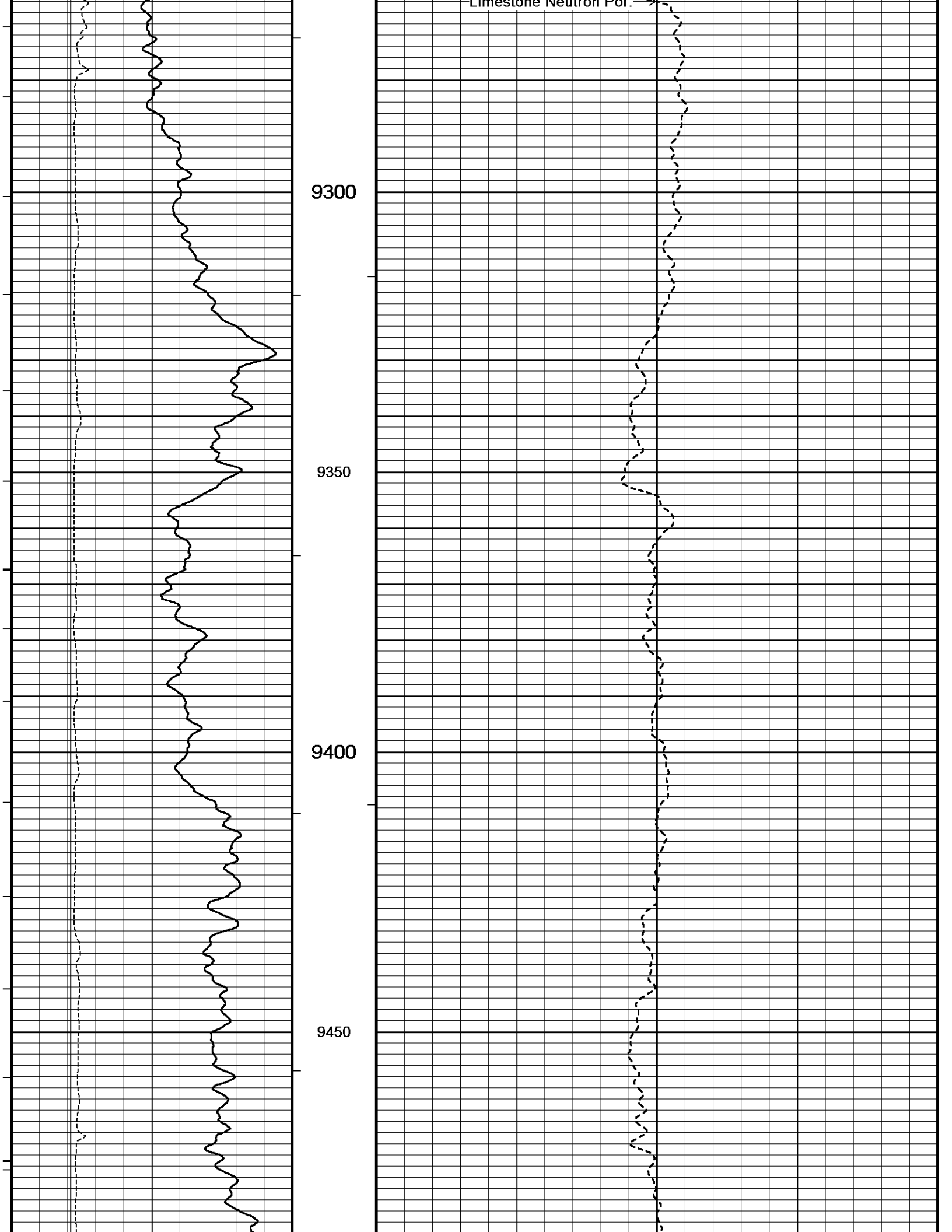


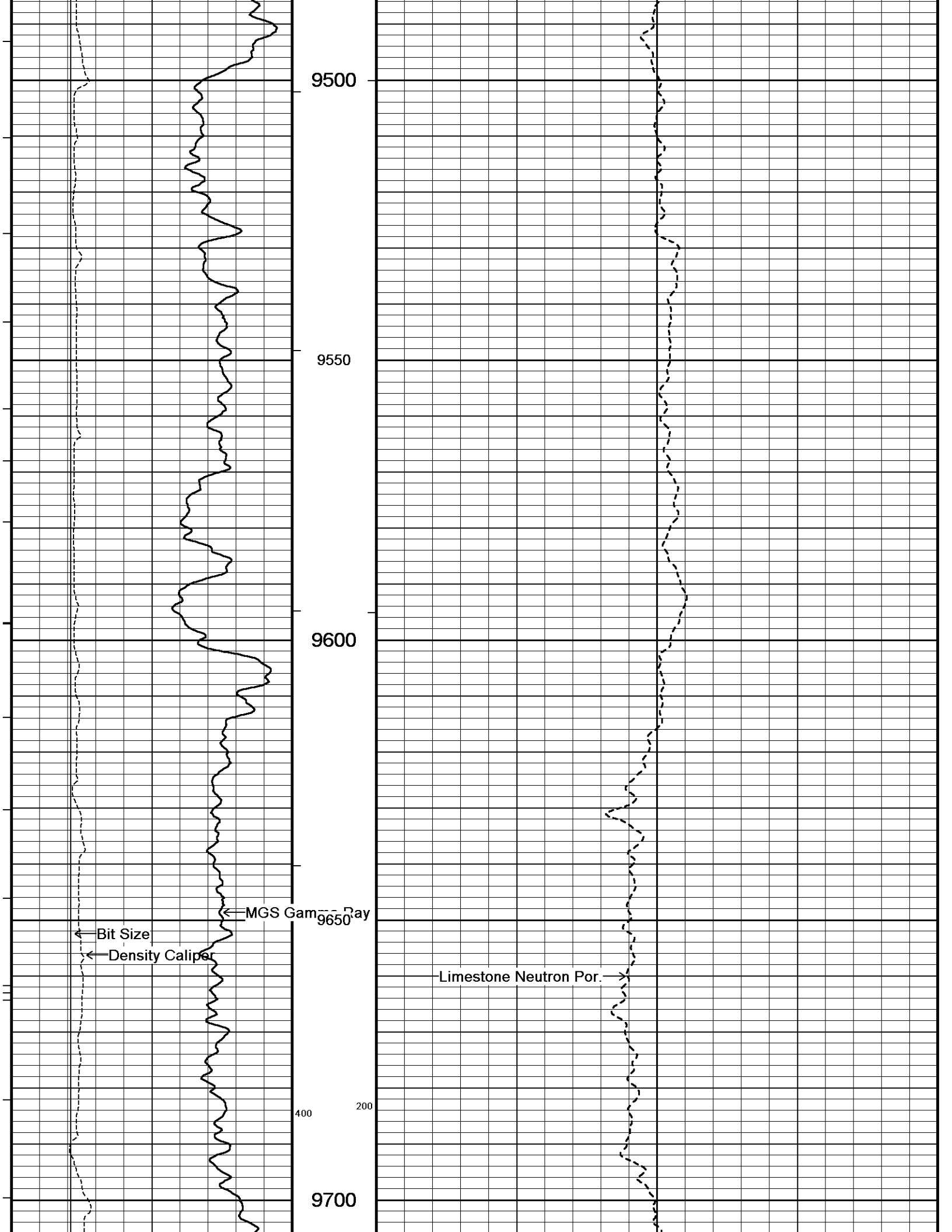


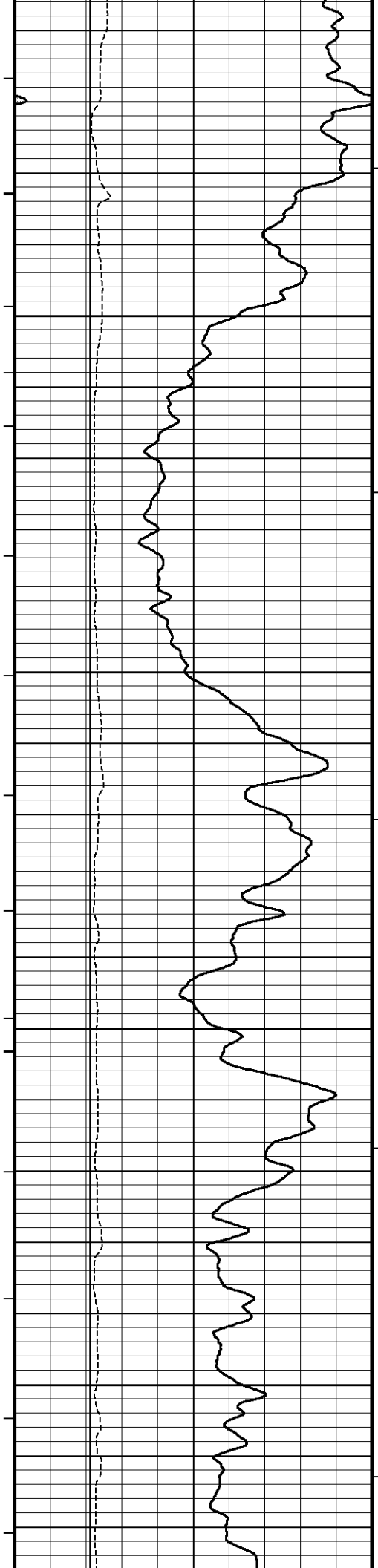










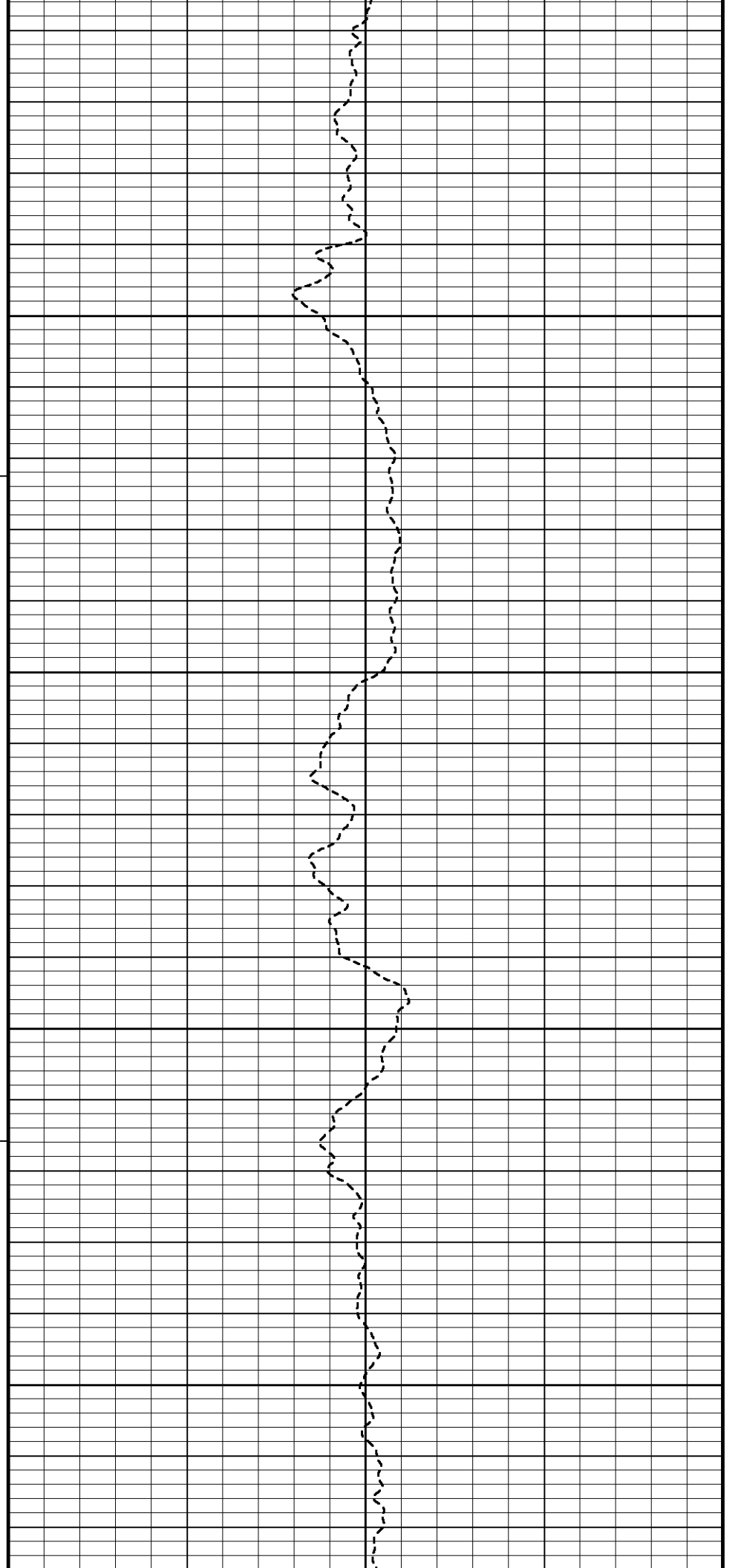


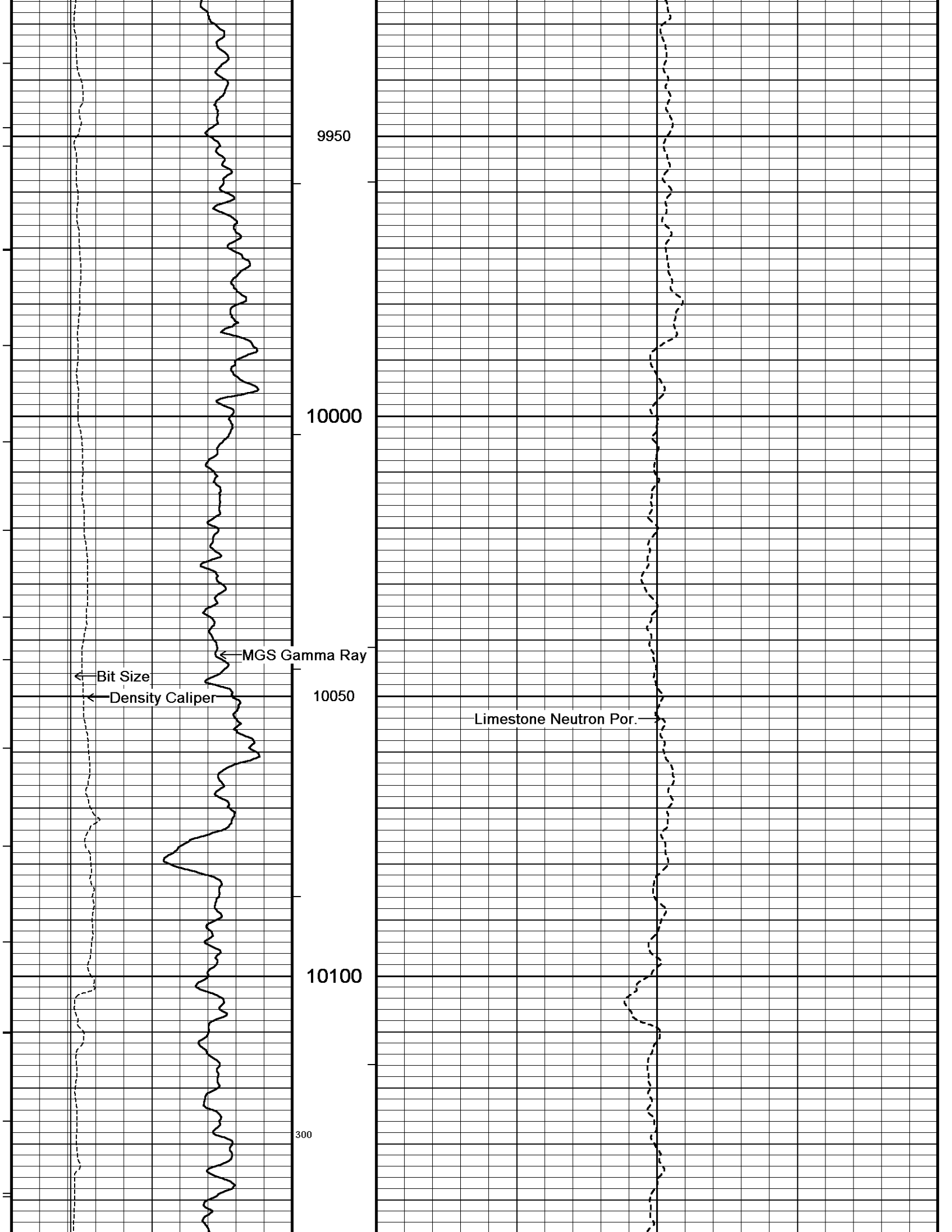
9750

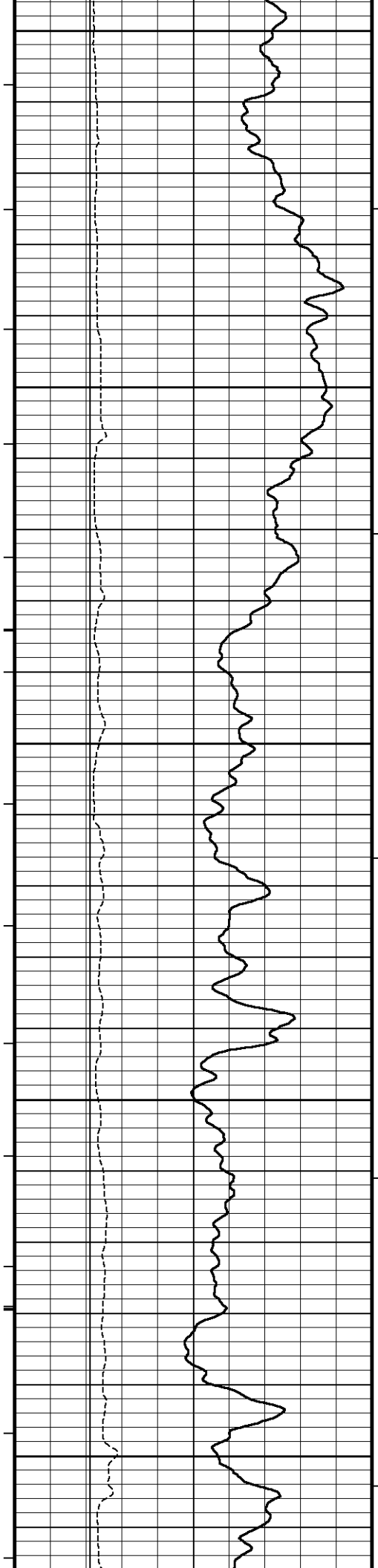
9800

9850

9900







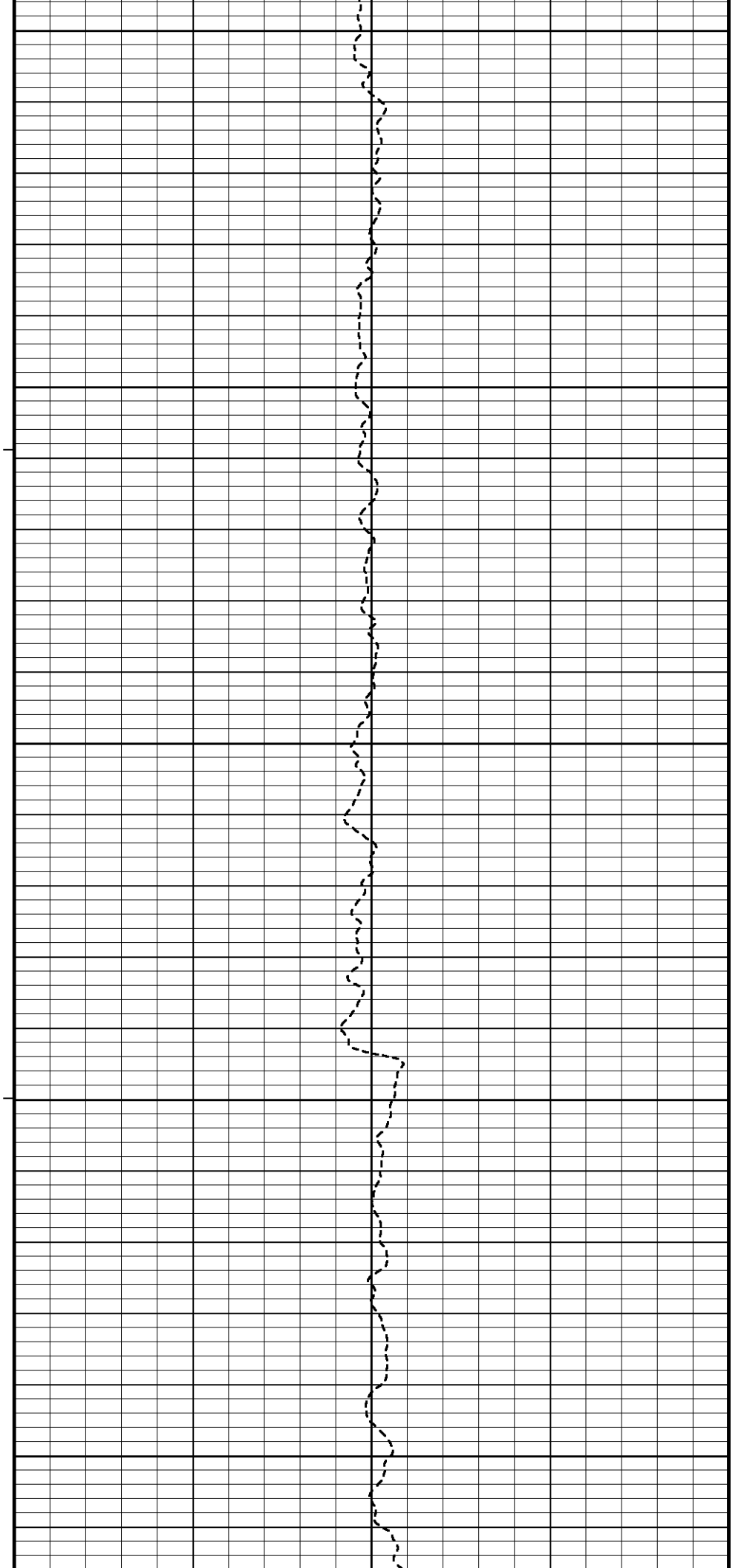
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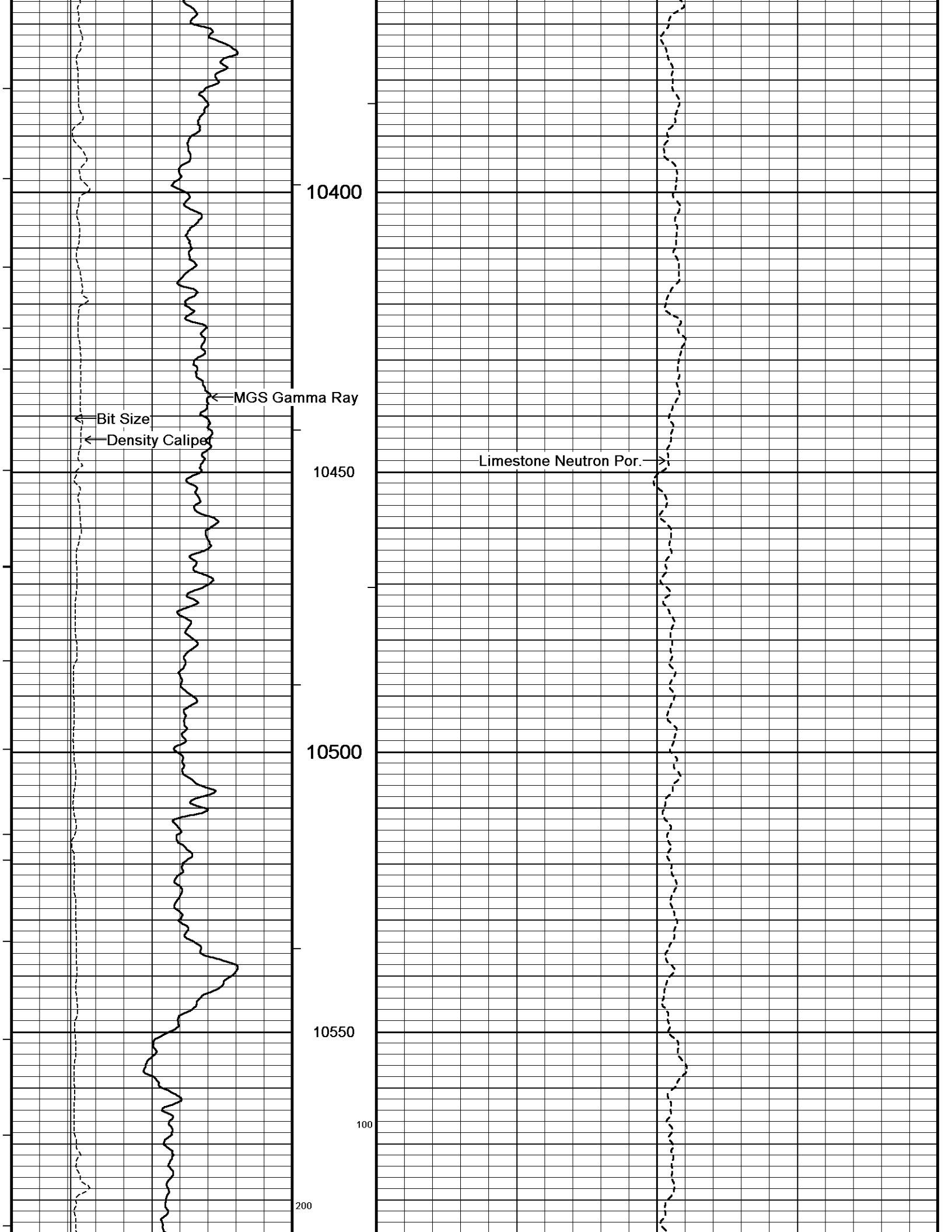
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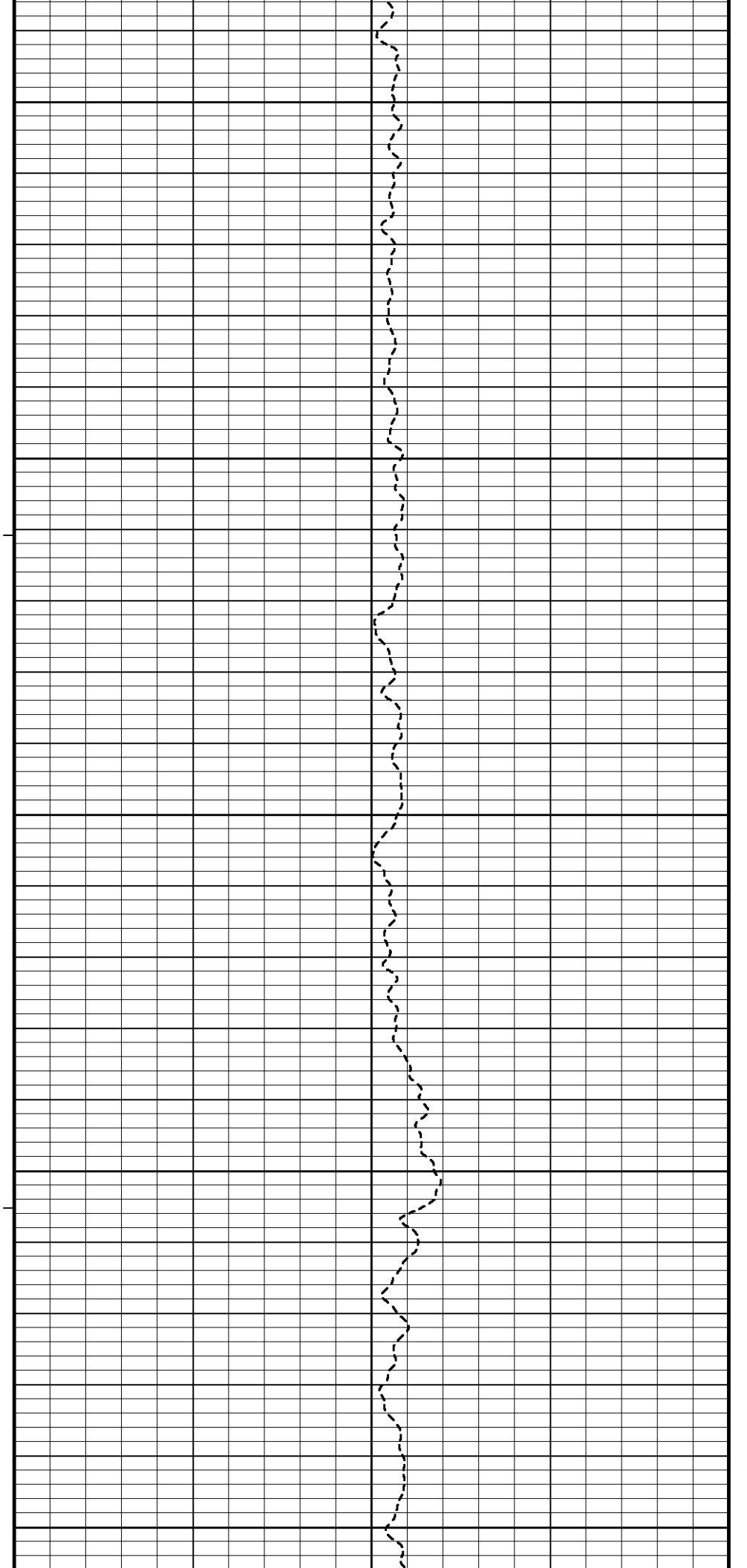
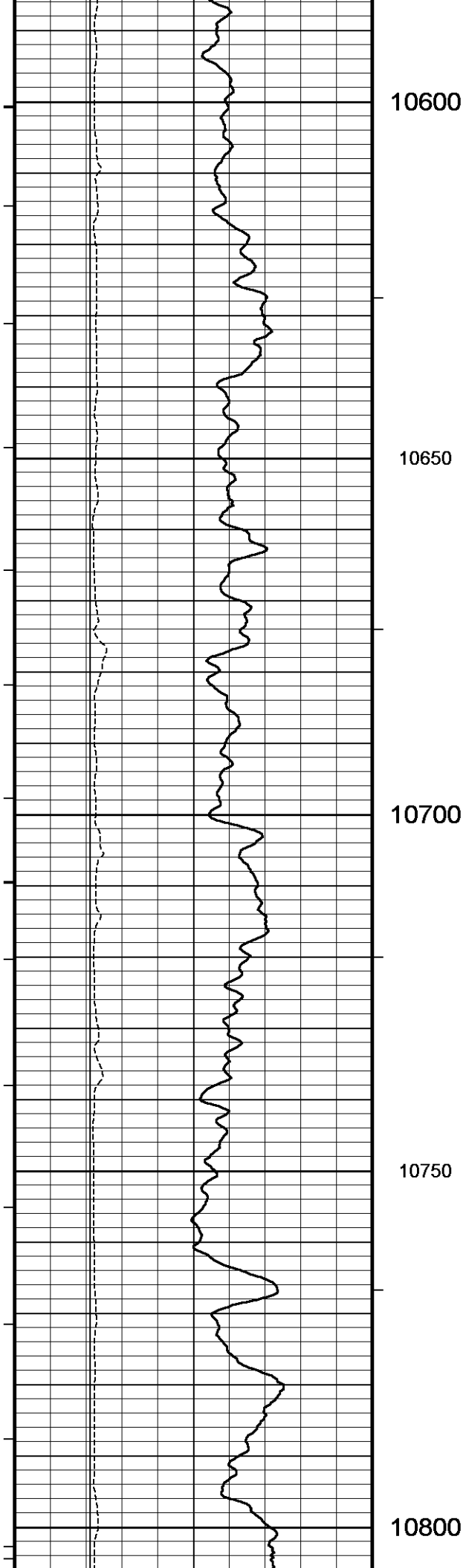
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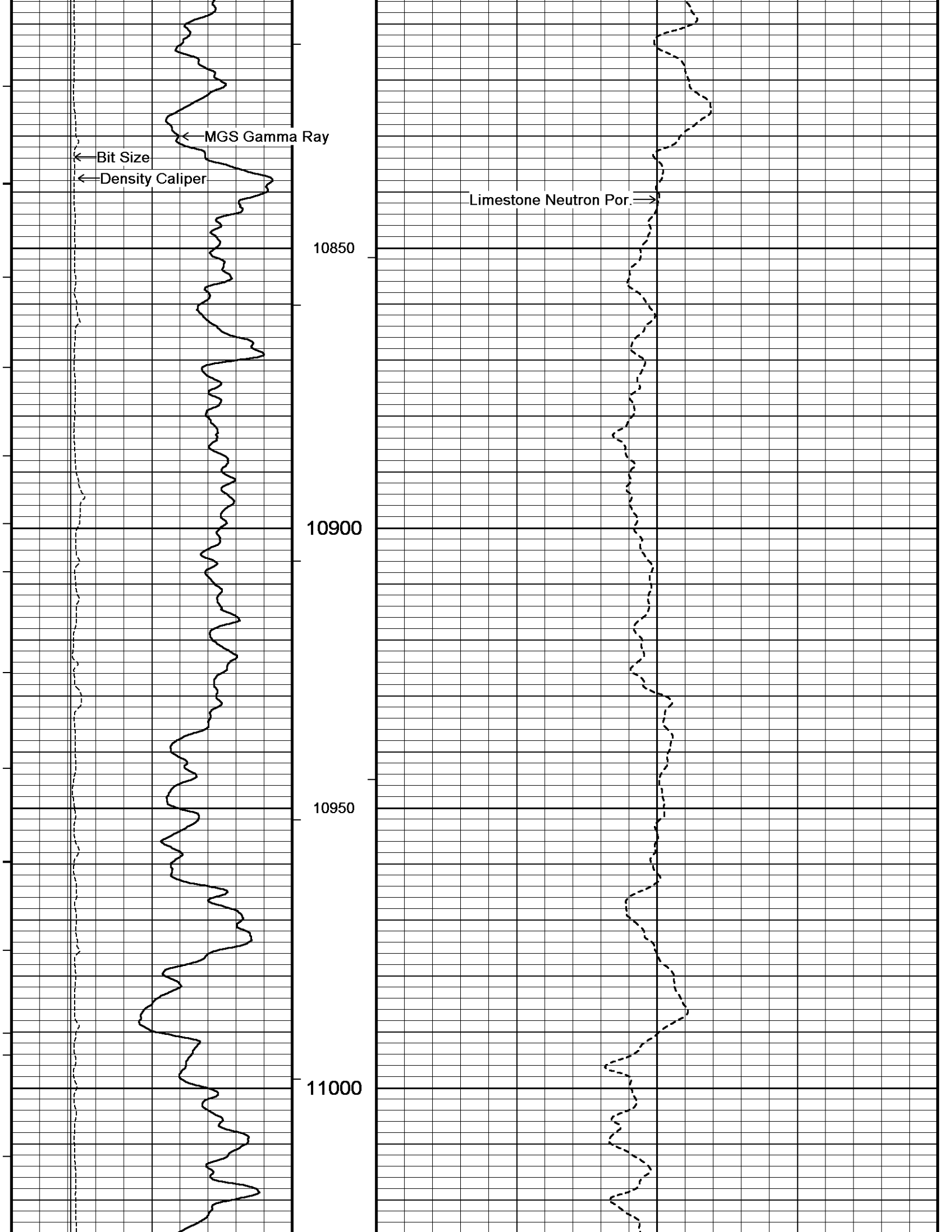
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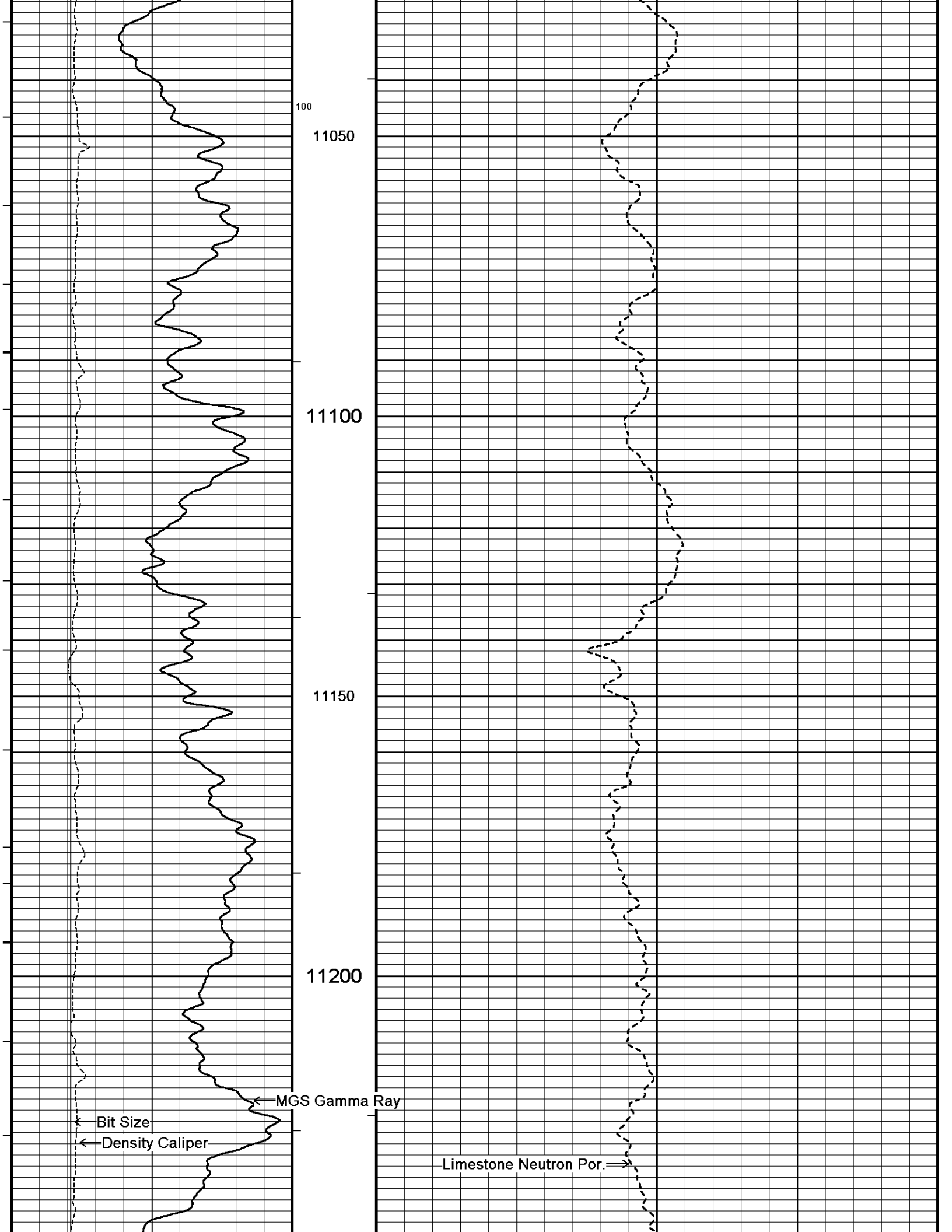


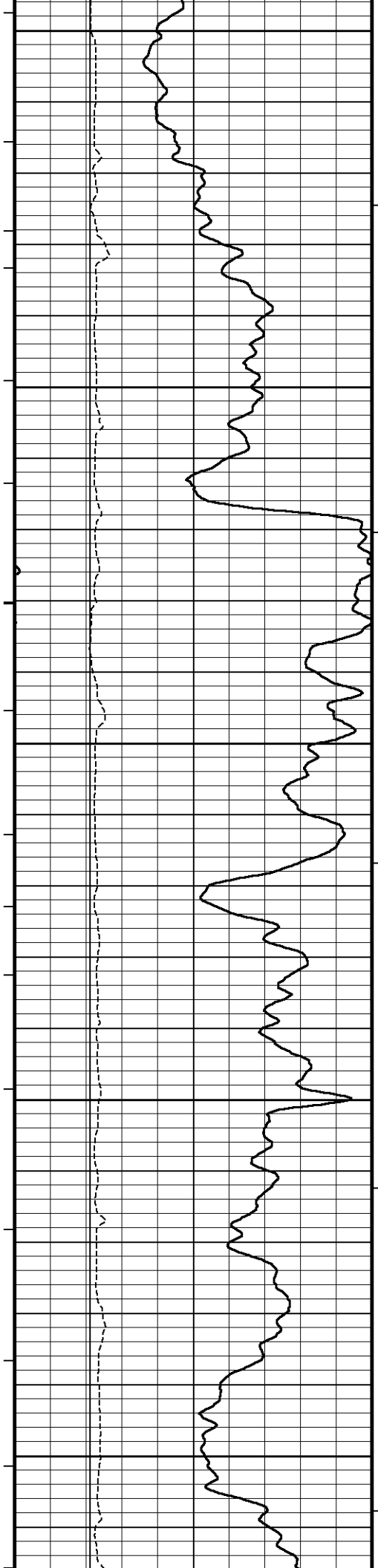












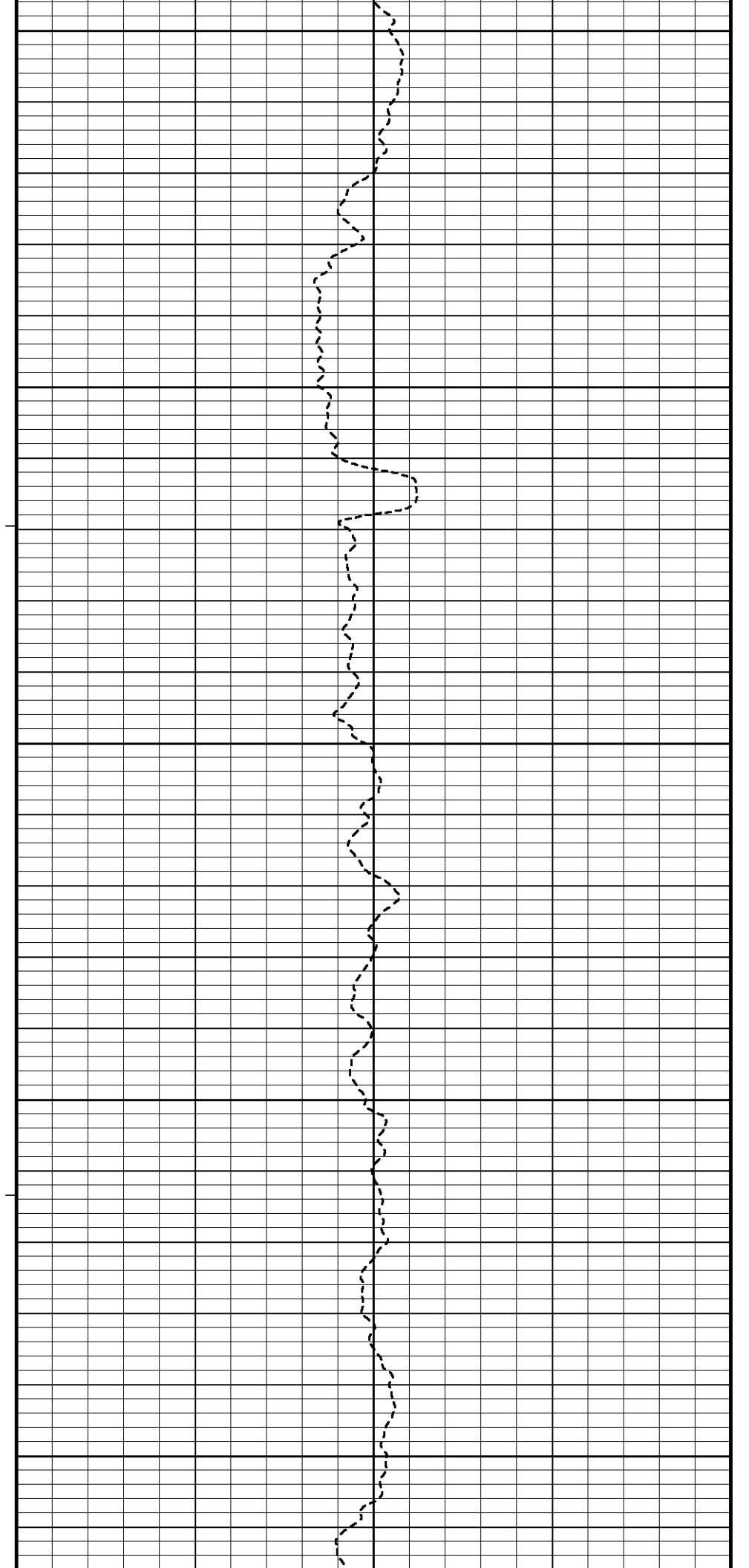
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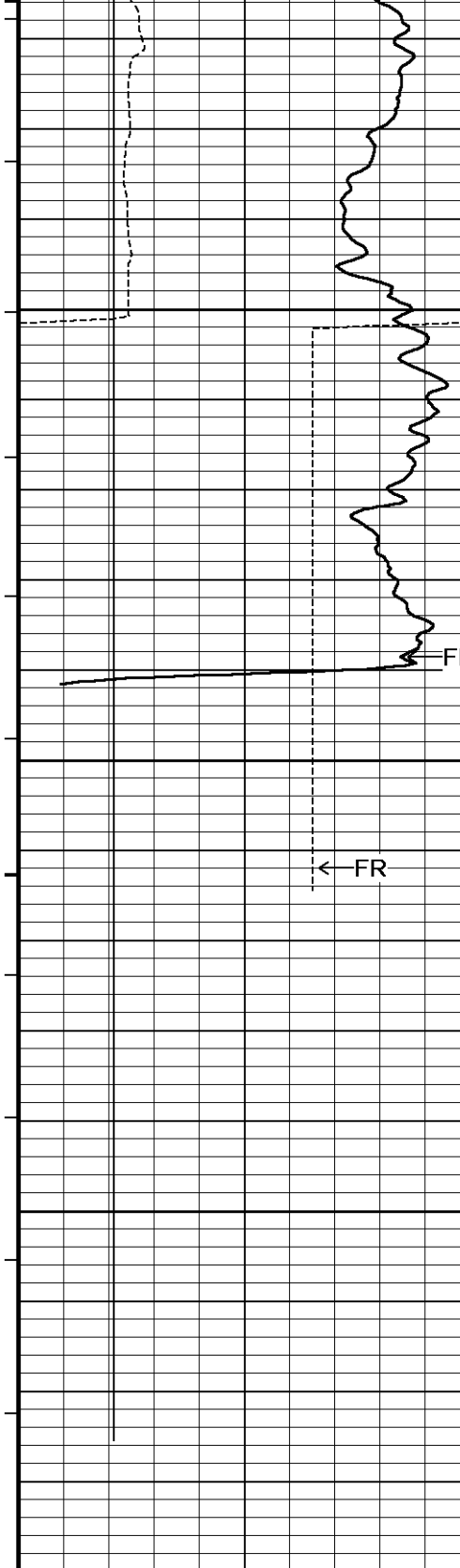
11300

11350

11400

11450





11500

11550

11600

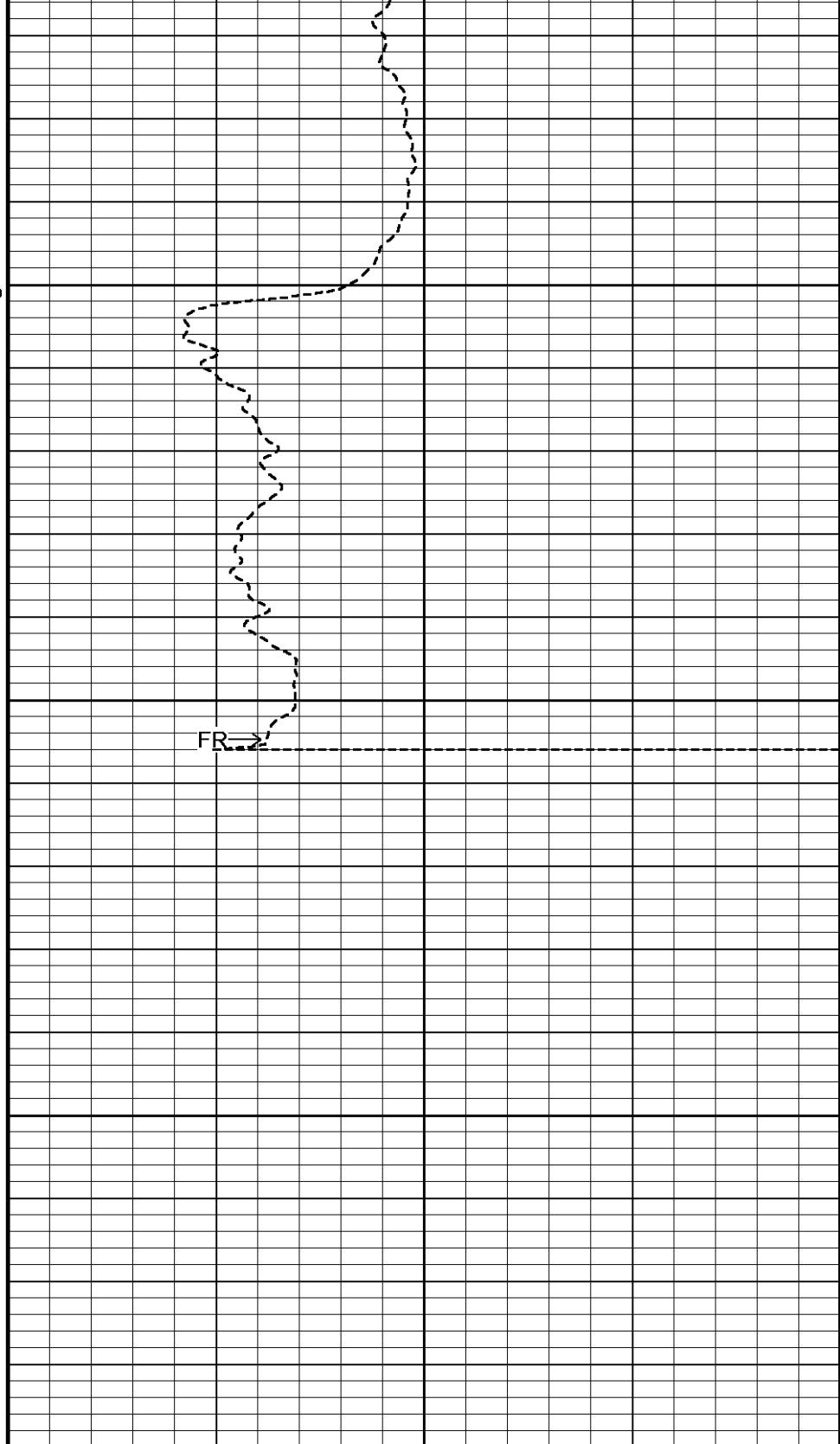
DSC  
in  
Feet

Timing Marks  
every 60.0 sec

Density Caliper (CLDC)  
inches  
4 9 14

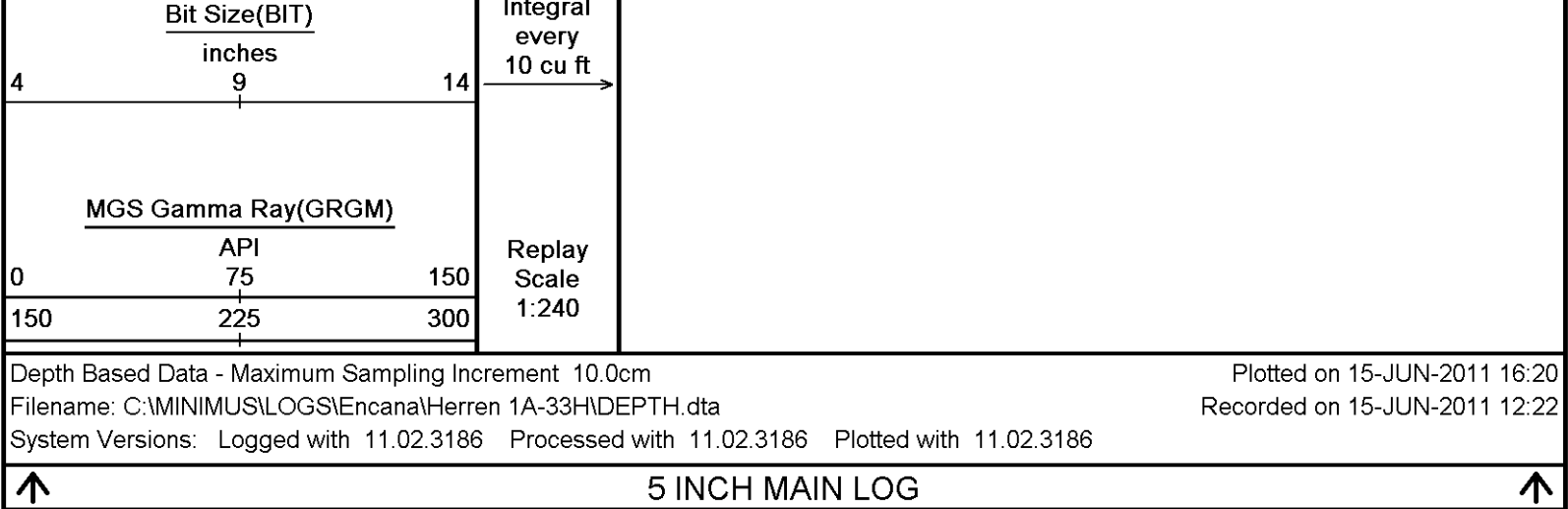
HVI  
every  
10 cu ft

Annular



Limestone Neutron Por. (NPRL)  
percent

30 20 10 0 -10



BEFORE SURVEY CALIBRATION			
C:\MINIMUS\LOGS\Encana\Herren 1A-33H\DEPTH.dta			
General Constants All 000		Last Edited on 15-JUN-2011,13:48	
General Parameters			
Mud Resistivity	1.620	ohm-metres	
Mud Resistivity Temperature	92.000	degrees F	
Water Level	0.000	feet	
Density/Neutron Processing	Wet Hole		
Hole/Annular Volume and Differential Caliper Parameters			
HVOL Method	Single Caliper		
HVOL Caliper 1	Density Caliper		
HVOL Caliper 2	N/A		
Annular Volume Diameter	4.500	inches	
Caliper for Differential Caliper	None		
Rwa Parameters			
Porosity used	Base Density Porosity		
Resistivity used	Array Ind. Four Res Rt		
RWA Constant A	0.610		
RWA Constant M	2.150		
Down-hole Tension Calibration SMS 0		Field Calibration on 10-MAY-2011 00:47	
Reading No	Measured	Calibrated (lbs)	
1	15586.83	0.00	
2	16481.04	390.00	
MMS Parameters MMS-E.B 151		Last Edited on 14-Jun-2011 09:53	
Logging Parameters			
Firmware Version	2v40		
Caliper Open On	MAI		
Caliper Open Delay	0.0	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	480.0	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	10.0	seconds	
Pulse Duration Transition Time	5.0	seconds	

Pulse Duration Status Pulse From	10.0	seconds
Pulse Duration Caliper Close From	35.0	seconds
Pulse Duration Caliper Open From	50.0	seconds
Pulse Duration Release Pulse From	70.0	seconds
Pulse Duration Release Pulse To	100.0	seconds
Pulse Release Duration	30.0	seconds
Pulse Discriminator Pressure Band	96.0	seconds
Pulse Pressure Discriminator	213.0	seconds
Use Negative Pulsing	No	
Good Status Reply Open Hole	65535.0	seconds
Good Status Reply Cased Hole	10.0	seconds
Bad Status Reply	25.0	seconds
Status Pulse To	15.0	seconds
Caliper Close To	0.0	seconds
Caliper Open To	55.0	seconds

#### Configuration

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

#### Gamma Calibration MGS-C.J 119

Field Calibration on 14-JUN-2011 07:55

	Measured	Calibrated (API)
Background	186	107
Calibrator (Gross)	1105	634
Calibrator (Net)	919	527

#### Gamma Constants MGS-C.J 119

Last Edited on

Gamma Calibrator Number	GRC-005	
Mud Density	1.00	gm/cc
Caliper Source for Processing	Bit Size	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

#### SP Calibration MGS-C.J 119

Field Calibration on 15-JUN-2011,13:08

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

#### High Resolution Temperature Calibration MGS-C.J 119

Field Calibration on 15-JUN-2011,13:08

	Measured	Calibrated(Deg F)
Lower	-100.00	-100.00
Upper	100.00	100.00

#### High Resolution Temperature Constants MGS-C.J 119

Last Edited on 31-MAR-2011,23:25

Pre-filter Length	11
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#### Neutron Calibration MDN-B.A 296

Base Calibration on 15-JUN-2011,13:08  
Field Check on

##### Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
Ratio	2880	88	3714	110
	32.660		33.764	

##### Field Calibrator at Base

	Calibrated (cps)	
Ratio	1642	2424
	0.677	

##### Field Check

	Calibrated (cps)	
Ratio	0	0
	0.000	

#### Neutron Constants MDN-B.A 296

Last Edited on 15-JUN-2011,13:08

Neutron Source Id	755	
Neutron Jig Number	6532	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand off	0.00	inches

Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	None	
Temperature	N/A	degrees F
Mud Salinity	0.00	kppm
Formation Fluid Salinity Source	Constant Value	
Formation Fluid Salinity	0.00	kppm
Barite Mud Correction	Not Applied	

Navigation Constants MIE-A.A 210			Last Edited on 14-JUN-2011,08:37		
Magnetic Declination	0.00	degrees	East		

Imager Pad Check MIE-A.A 210				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.A 210			Last Edited on 14-JUN-2011,08:37		
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				

Magnetometer Parameters MIE-A.A 210				
Date Of Last Magnetometer Calibration	08-DEC-2010,17:49			
	X Magnetometer	Y Magnetometer	Z Magnetometer	
Slope	-1.000000	-1.010840	-1.008324	
Offset	0.011365	-0.015921	0.015296	

Magnetometer Constants MIE-A.A 210		Last Edited on	
Magnetometer Calibrator Number	000		

Accelerometer Parameters MIE-A.A 210				
Date Of Last Accelerometer Calibration	08-DEC-2010,11:49			
	X Accelerometer	Y Accelerometer	Z Accelerometer	
Slope	-1.111578	-1.111209	-1.113349	
Offset	0.003650	0.008008	0.005680	

Accelerometer Constants MIE-A.A 210			Last Edited on 08-DEC-2010,17:50		
Accelerometer Calibrator Number		000			
Accelerometer Temperature Characterisation					
X Accelerometer					
Serial Number		892			
Calibration Date		11-Apr-2010			
		B0	B1	B2	B3
Bias(g)	0.00000e+000	-5.47566e-006	-2.70682e-008	4.45053e-010	
		SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.35337e-004	5.89919e-007	-4.69102e-011	
Y Accelerometer					
Serial Number		807			
Calibration Date		01-Jan-1998			
		B0	B1	B2	B3
Bias(g)	0.00000e+000	1.30535e-005	6.25044e-009	5.21869e-011	



Bias(g)	0.00000e+000	1.50000e-003	0.25044e-003	0.21000e-011
Scale Factor(mA/g)	3.00000e+000	2.96965e-004	2.16414e-007	1.34927e-009
Z Accelerometer				
Serial Number	832			
Calibration Date	01-Jan-1998			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.99502e-005	8.08101e-009	-1.79679e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.37288e-004	6.89664e-007	-1.79209e-010

Caliper Calibration MIE-A.A 210				Base Calibration on 14-JUN-2011 07:08	
				Field Calibration on 14-JUN-2011 07:10	
Base Calibration					
Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)		
1	26213	26043	5.96		
2	36998	36897	7.98		
3	46794	46452	9.86		
4	58094	57904	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	23890	25365	25318	24910	5.96
2	33581	34544	33774	33460	7.98
3	41758	42904	42139	41918	9.86
4	51339	52376	51736	51679	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)		
	6.04	6.00	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)
	3.07	3.02	2.94	2.97	5.96

Caliper Constants MIE-A.A 210			Last Edited on		
Caliper Difference for BRKT	3.000	mm			

Induction Calibration MAI-B.A 286				Base Calibration on 15-JUN-2011,13:06	
				Field Check on	
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.8	471.4	9.3	966.2	
2	6.8	387.0	7.6	821.4	
3	3.2	259.6	5.2	566.0	
4	2.0	136.1	2.6	279.2	
Array Temperature		75.2	Deg F		
Channel	Base Check (mmho/m)		Field Check (mmho/m)		
	Low	High	Low	High	
1	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	
Deep	0.0	0.0	0.0	0.0	
Medium	0.0	0.0	0.0	0.0	
Shallow	0.0	0.0	0.0	0.0	
Array Temperature		0.0	0.0	Deg F	

Induction Constants MAI-B.A 286			Last Edited on 15-JUN-2011,13:48		
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				

Number of Fins on Stand-off	6.0000		
Stand-off Fin Angle	60.00	degrees	
Stand-off Fin Width	0.5000	inches	
Borehole Corr. Rm Source	Temperature Corr		
Temp. for Rm Corr.	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 286

Field Calibration on 28-MAR-2011,19:09

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

#### High Resolution Temperature Constants MAI-B.A 286

Last Edited on

Pre-filter Length	11
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#### Caliper Calibration MPD-C.A 297

Base Calibration on 13-JUN-2011 04:54

Field Calibration on 13-JUN-2011 04:55

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	16580	3.98
2	24753	5.96
3	33184	7.96
4	41326	9.86
5	50560	11.88
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.94	7.96

#### Photo Density Calibration MPD-C.A 297

Base Calibration on 15-JUN-2011,13:54

Field Check on

Density Calibration				
Base Calibration				
	Measured	Calibrated (sdu)		
	Near	Far	Near	Far
Reference 1	54284	17816	53115	19186
Reference 2	25706	2716	25020	2536
Field Check at Base				
	1222.3	1407.4		
Field Check				
	0.0	0.0		

PE Calibration

Base Calibration	WS	WH	Measured Ratio	Calibrated Ratio
Background	220	1081		
Reference 1	19045	54076	0.355	0.320
Reference 2	7276	25549	0.288	0.272
Field Check at Base				
	220.5	1080.8		
Field Check				
	0.0	0.0		

Density Constants MPD-C.A 297			Last Edited on 15-JUN-2011,13:07	
Density Source Id	271			
Nylon Calibrator Number	507			
Aluminium Calibrator Number	507			
Density Shoe Profile	4 inch			
Caliper Source for Processing	Density Caliper			
PE Correction to Density	Not Applied			
Mud Density	1.26	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			

DOWNHOLE EQUIPMENT			C:\MINIMUS\LOGS\Encana\Herren 1A-33H\DEPTH.dta	
Shuttle Running Tool 3.5" (SRT A)				
SRT-A 5 LG: 5.90 ft WT: 37.5 lb OD: 2.52 in				
Compact Linker				
MLK-A 1 LG: 14.27 ft WT: 30.9 lb OD: 2.24 in				
Compact Linker				
MLK-A 2 LG: 14.27 ft WT: 30.9 lb OD: 2.24 in				
MBS-F.A 200v Compact Battery Sub				
MBS-F.A 119 LG: 17.06 ft WT: 123.5 lb OD: 2.24 in				
Compact Memory Sub E.B				
MMS-E.B 151 LG: 5.20 ft WT: 37.5 lb OD: 2.24 in				
Compact Tool Isolator sub.				
MTI-B.A 55 LG: 1.54 ft WT: 13.2 lb OD: 2.24 in				
Compact Short Gamma				
MGS-C.J 119 LG: 3.41 ft WT: 24.3 lb OD: 2.24 in				
SKJ-E.A Compact Knuckle Joint				
SKJ-E.A 154 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in				
SHA-E Compact Swivel Head Adapter				



85.18 ft GRGM - MGS Gamma Ray  
83.19 ft GSXT - MGS External Temperature

SHA-F Compact Swivel Head Adaptor  
SHA-F 25 LG: 2.74 ft WT: 26.5 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub  
MIS-D.A 292 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact Neutron  
MDN-B.A 296 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper  
MPD-C.A 297 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub  
MIS-D.A 439 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

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

SKJ-E.A Compact Knuckle Joint  
SKJ-E.A 260 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-E.A Compact Inline Standoff sub  
MIS-E.A 365 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint  
SKJ-D.A 203 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub  
MIS-D.A 296 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact MMI Memory Section  
MIM-A.A 210 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

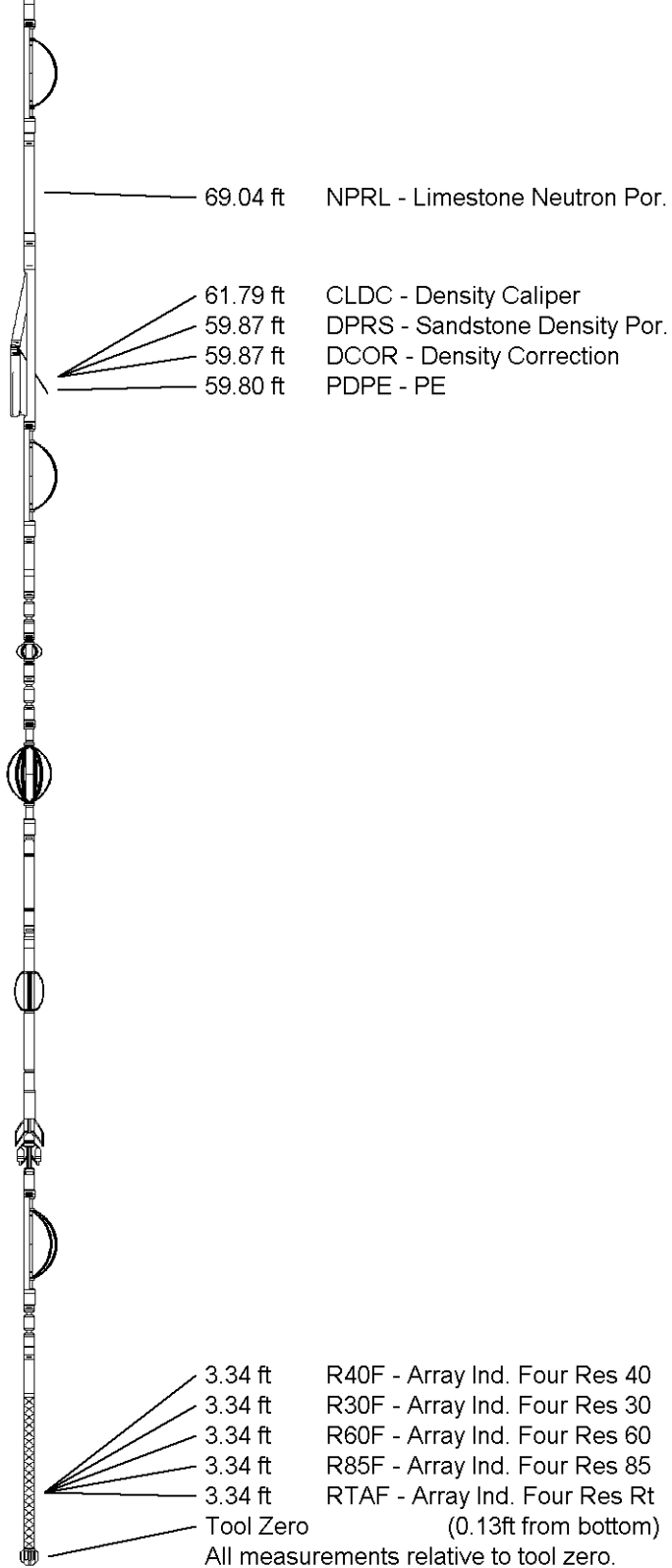
Compact MMI Electrode Section  
MIE-A.A 210 LG: 13.96 ft WT: 99.2 lb OD: 4.10 in

MIS-D.A Compact Inline Bowspring sub  
MIS-D.A 442 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint  
SKJ-D.A 66 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

Compact Induction  
MAI-B.A 286 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 144.32 ft Weight: 906.1 lb



COMPANY	ENCANA
WELL	HERREN 1A-33H
FIELD	WATTENBERG
PROVINCE/COUNTY	WELD
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	4836.00	feet	First Reading	11564.00	feet
Elevation Drill Floor		feet	Depth Driller	11643.00	feet
Elevation Ground Level	4824.00	feet	Depth Logger	11643.00	feet



