

**Weatherford****COMPENSATED SONIC
WITH INTEGRATED TRANSIT TIME
LOG**

COMPANY										SHAKESPEARE OIL COMPANY									
WELL										TEETER #1-11									
FIELD										WILDCAT									
PROVINCE/COUNTY										LOGAN									
COUNTRY/STATE										UNITED STATES / KANSAS									
LOCATION										2305' FSL & 630' FEL SE/4									
SEC		TWP		RGE		Other Services						Elevations: KB 3004.00 DF 3003.00 GL 2994.00							
11		13S		32W		MPD/MDN													
API Number		15-109-21168						MAI/MFE											
Permit Number								MML											
Permanent Datum G.L., Elevation 3130 feet																			
Log Measured From KB																			
Drilling Measured From K.B. @ 10 FEET																			
Date		26-JUN-2013																	
Run Number		ONE																	
Service Order		3537768																	
Depth Driller		4700.00								feet									
Depth Logger		4700.00								feet									
First Reading		4687.00								feet									
Last Reading		222.00								feet									
Casing Driller		222.00								feet									
Casing Logger		223.00								feet									
Bit Size		7.880								inches									
Hole Fluid Type		CHEMICAL																	
Density / Viscosity		9.30 lb/USg				54.00 CP													
PH / Fluid Loss		10.00				9.60 ml/30Min													
Sample Source		MUDPIT																	
Rm @ Measured Temp		1.17 @ 85.0								ohm-m									
Rmf @ Measured Temp		0.94 @ 85.0								ohm-m									
Rmc @ Measured Temp		1.40 @ 85.0								ohm-m									
Source Rmf / Rmc		CALC				CALC													
Rm @ BHT		0.84 @118.0								ohm-m									
Time Since Circulation		4 HOURS																	
Max Recorded Temp		118.00				deg F													
Equipment / Base		13096				LIB													
Recorded By		W. STAMBAUGH																	
Witnessed By		TIM PRIEST																	
IOB#		LB13-185																	

BOREHOLE RECORD

Last Edited: 26-JUN-2013 04:45

Bit Size inches	Depth From feet	Depth To feet
7.875	223.00	4700.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	223.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1900 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 1170 CU. FT.

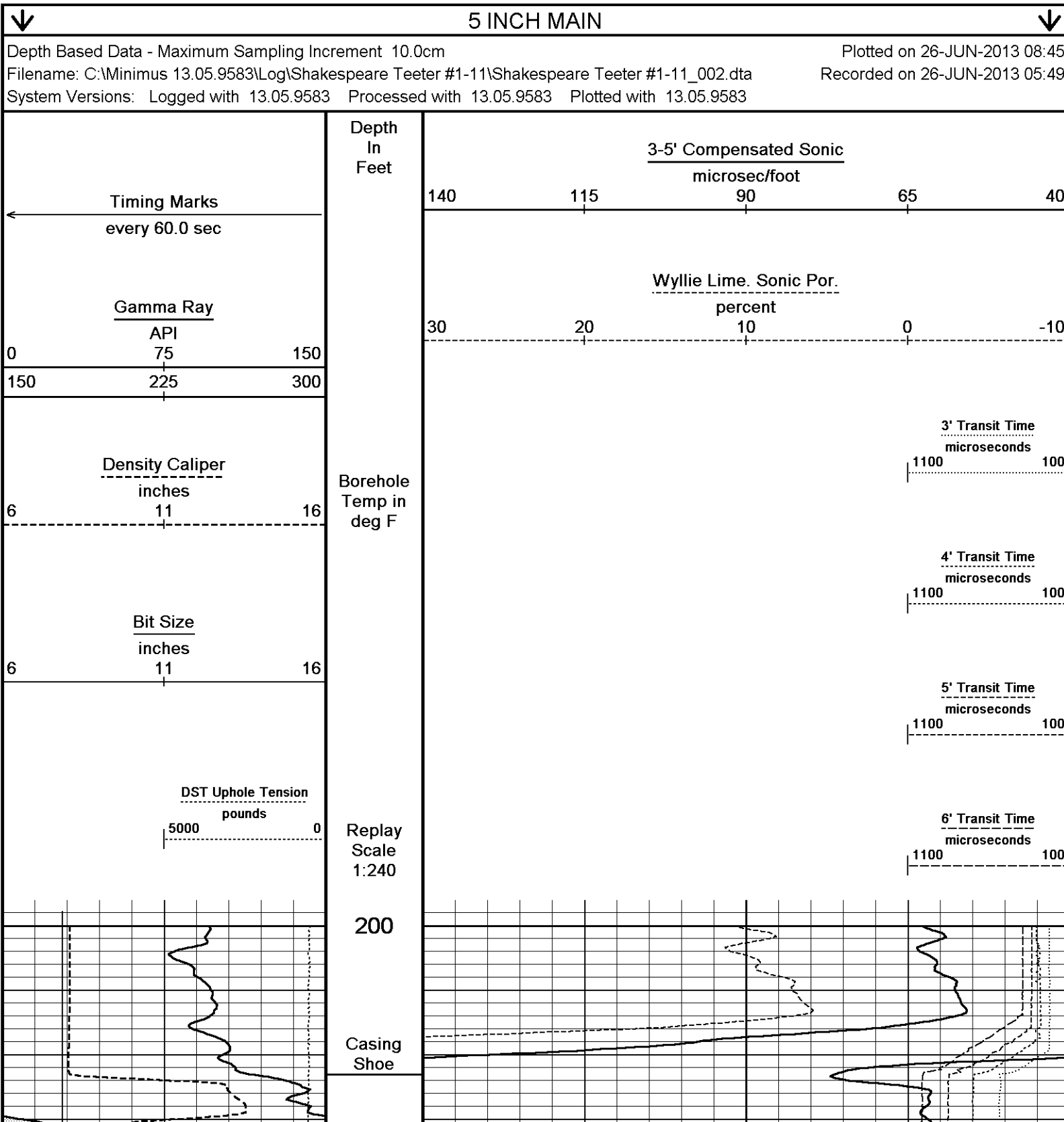
- SERVICE ORDER # 3537768.

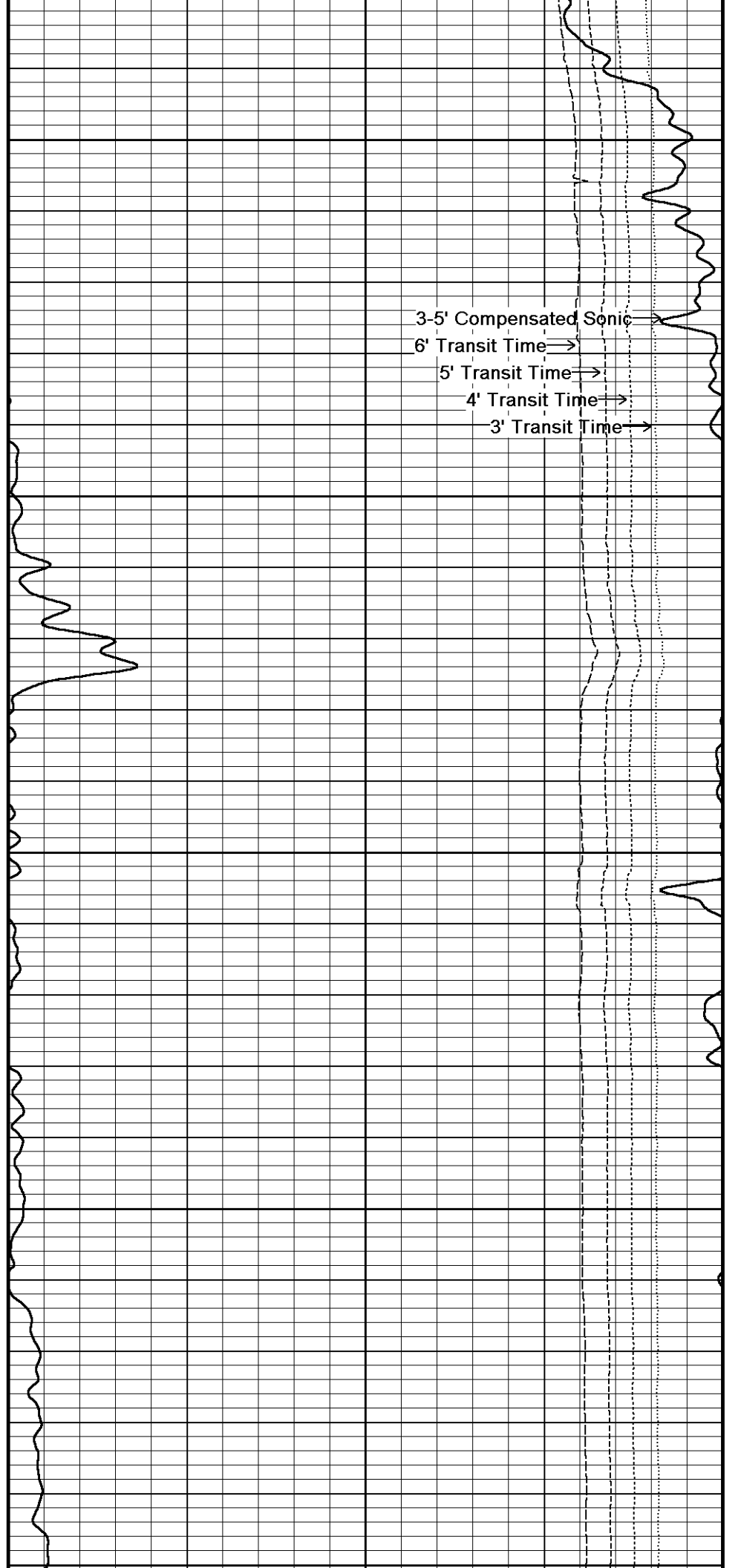
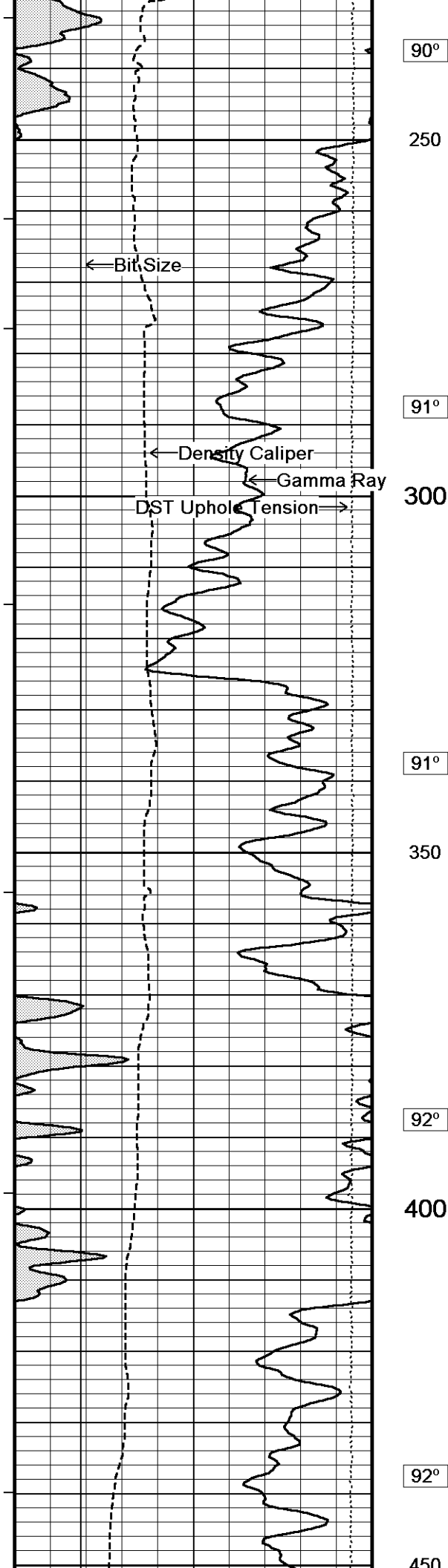
- RIG: HD DRILLING #2.

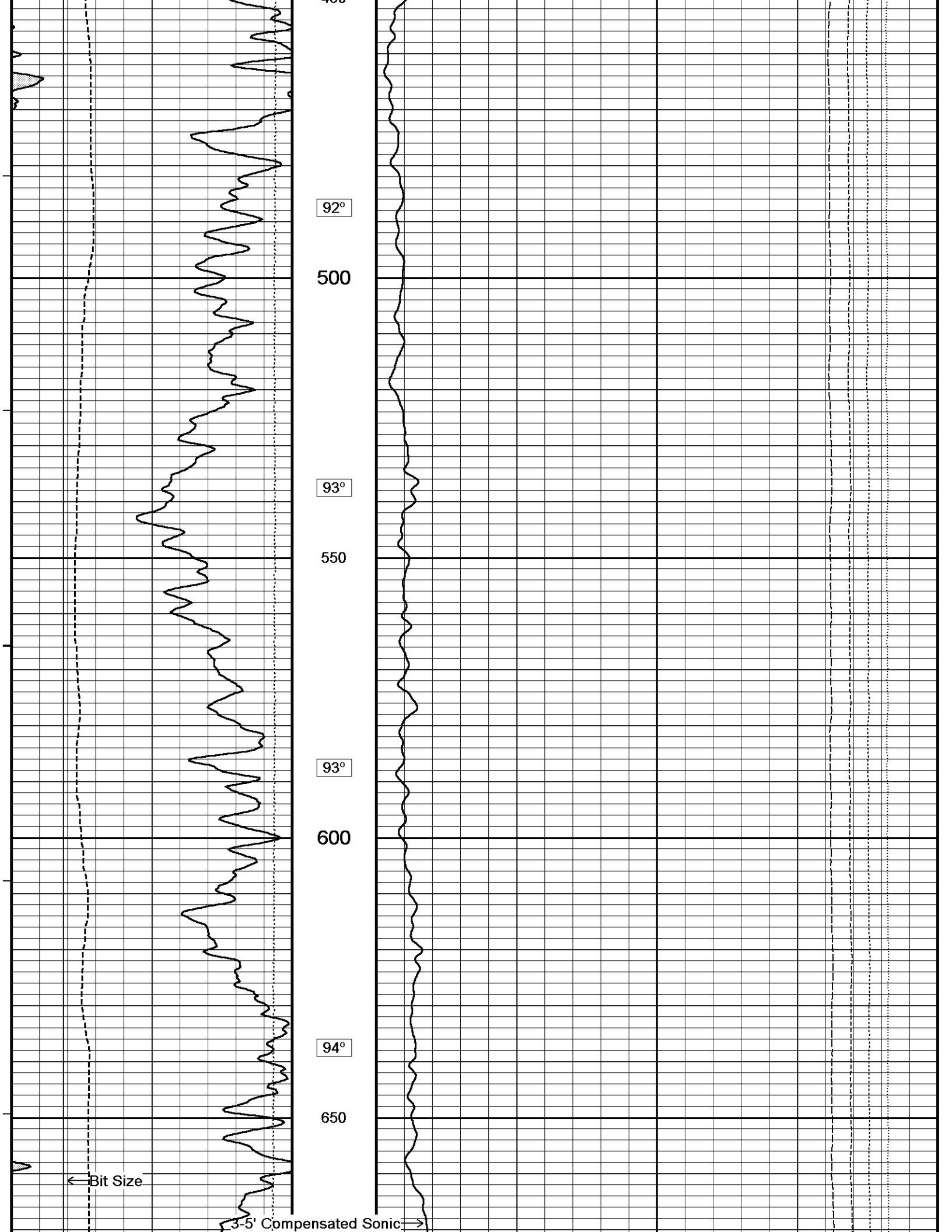
- ENGINEER: WILLIAM STAMBAUGH

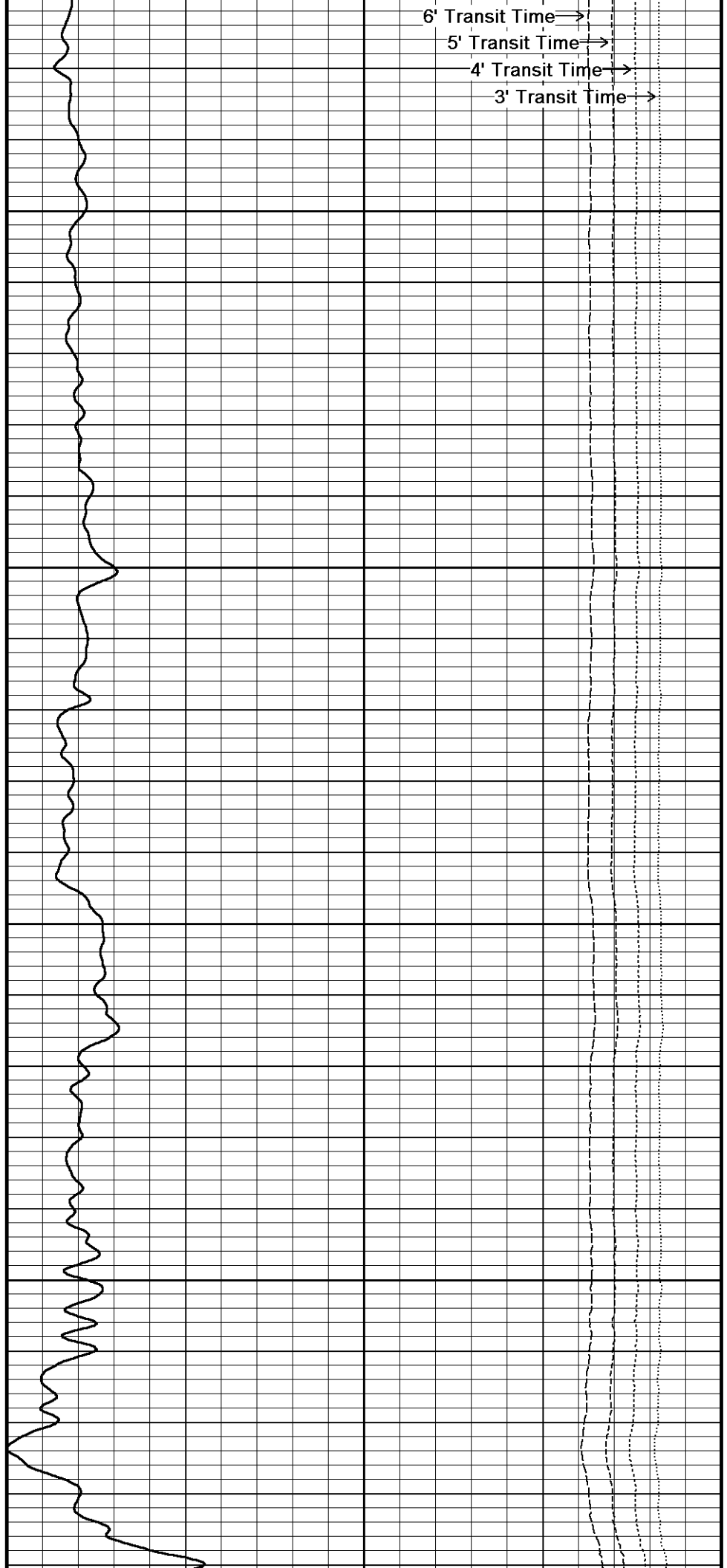
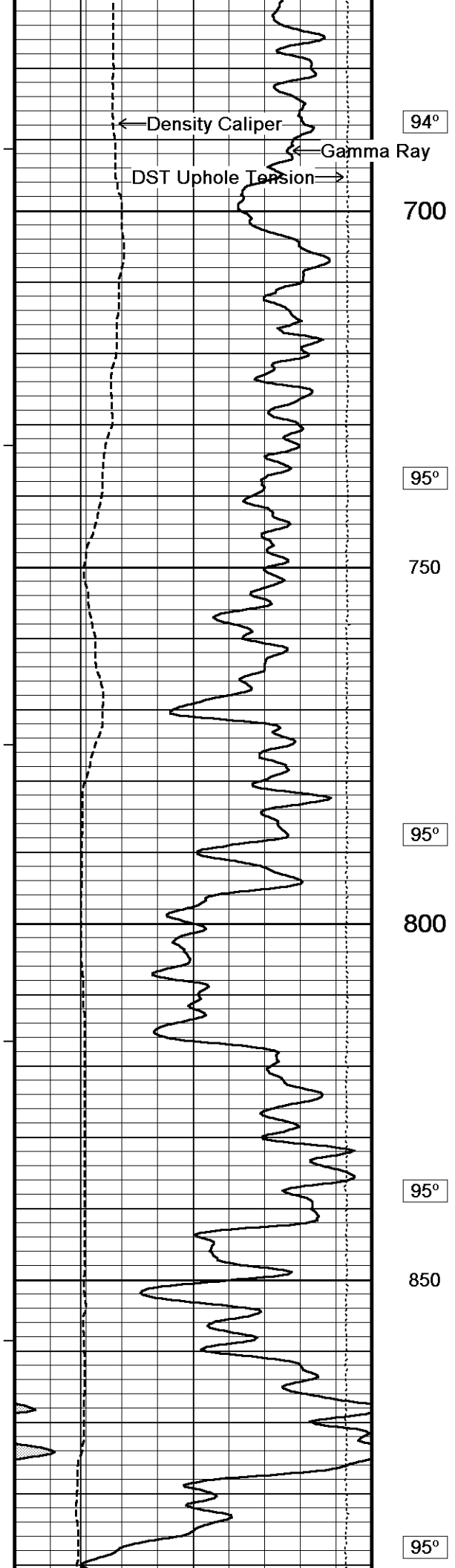
- OPERATOR(S): K. RINEHART, D. CANADAY

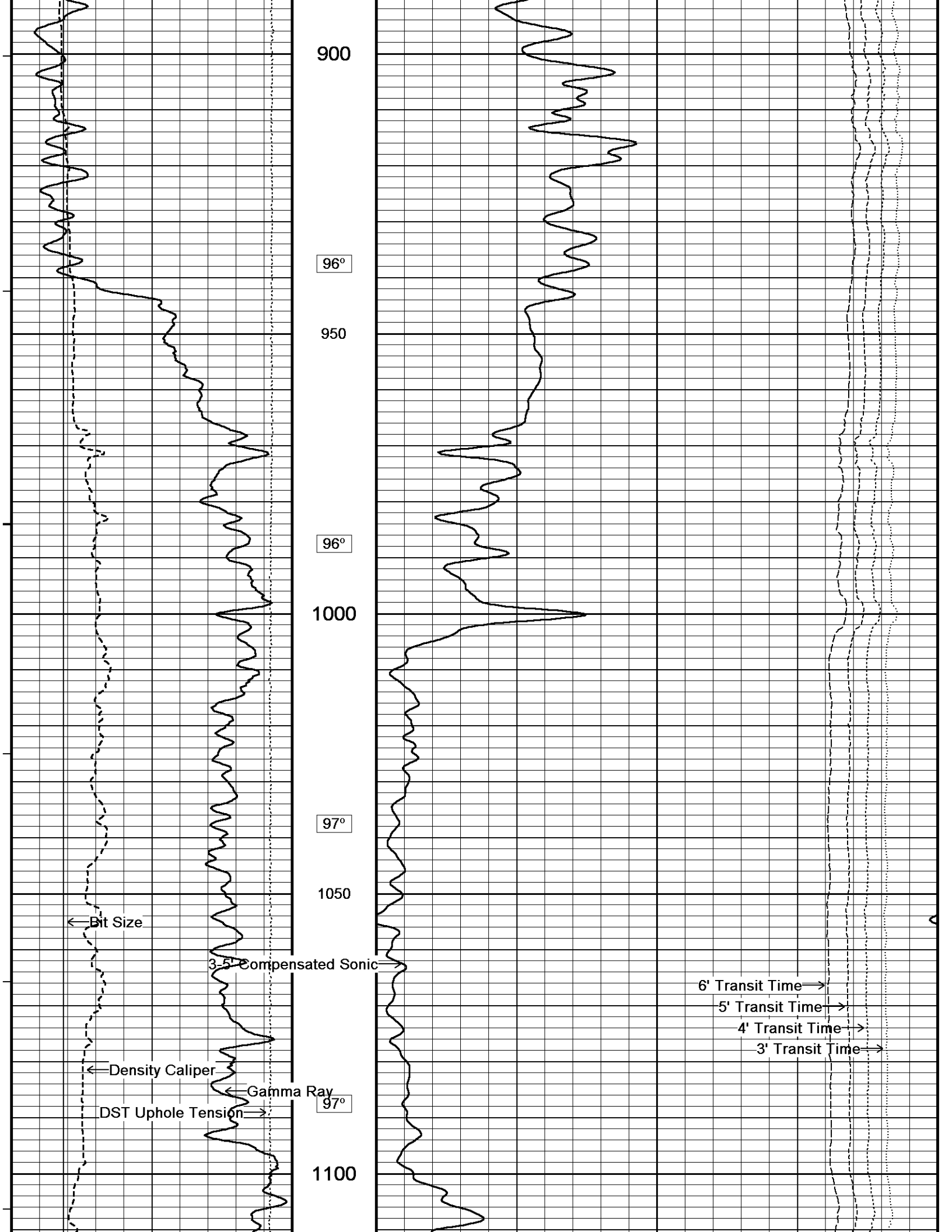
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, 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.

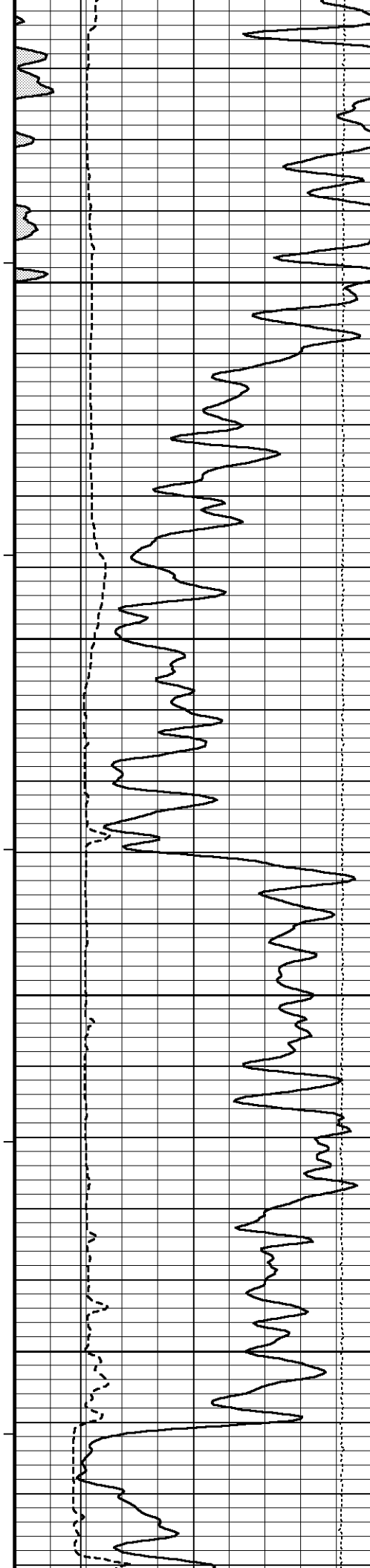












97°

1150

98°

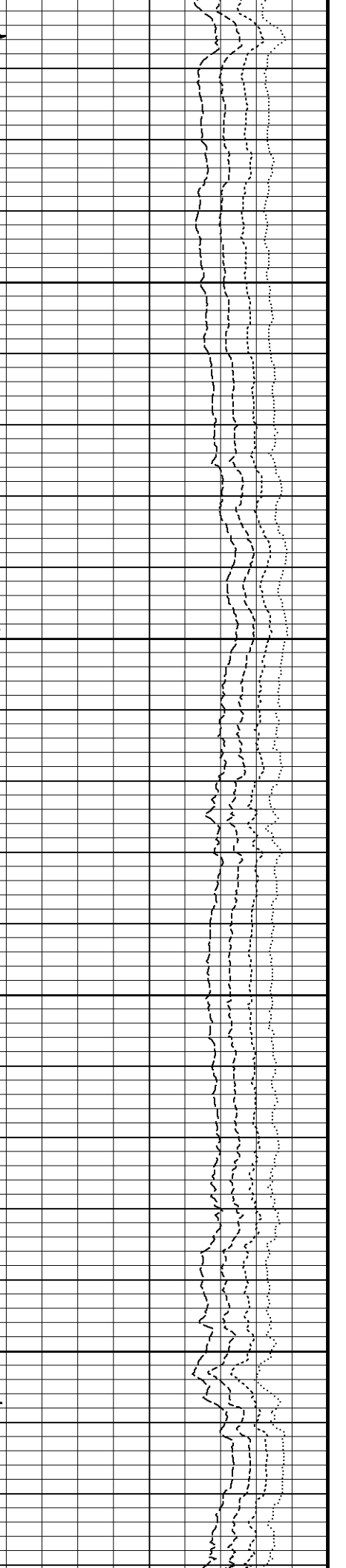
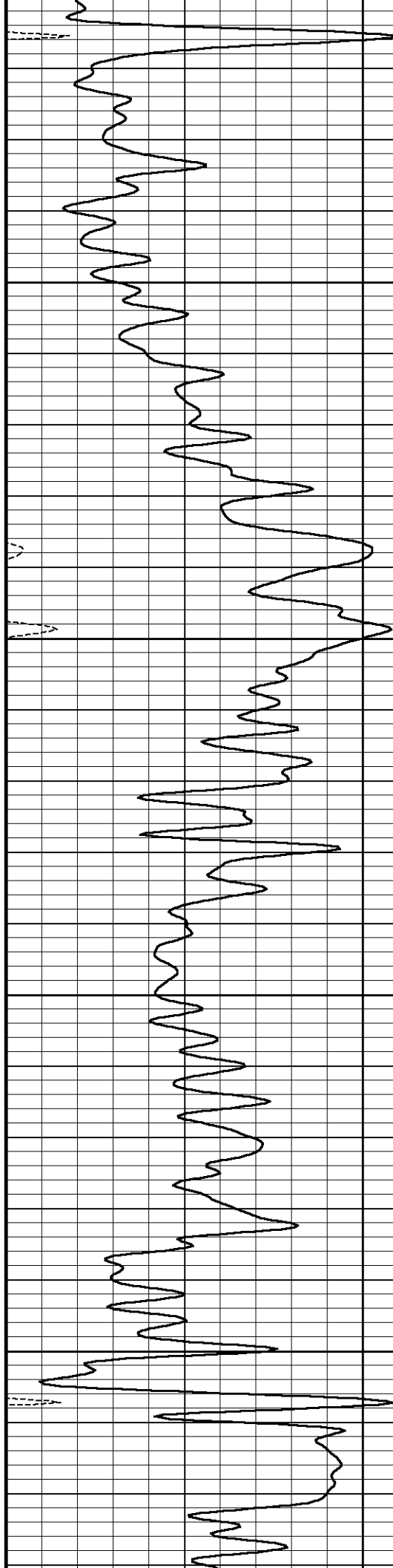
1200

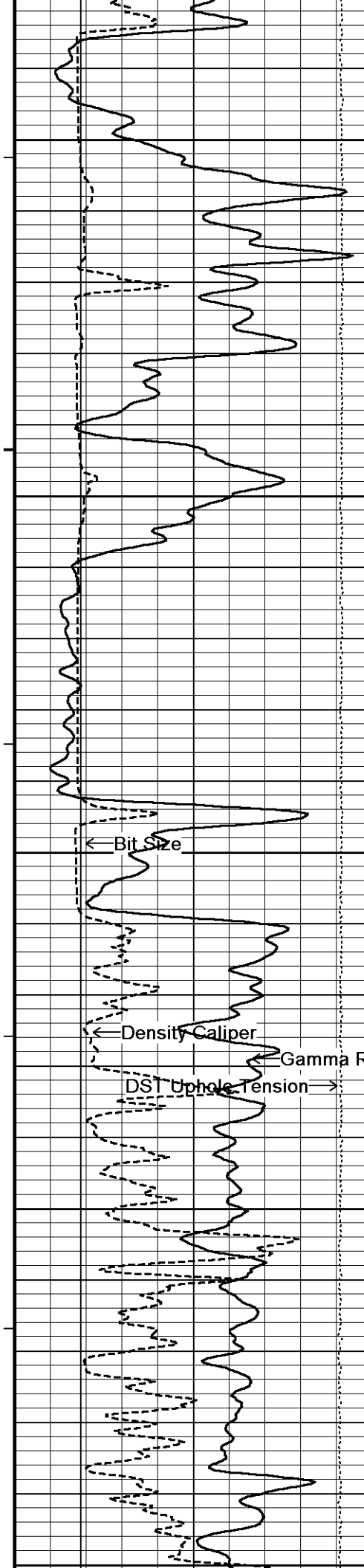
98°

1250

98°

1300





99°

1350

99°

1400

100°

1450

100°

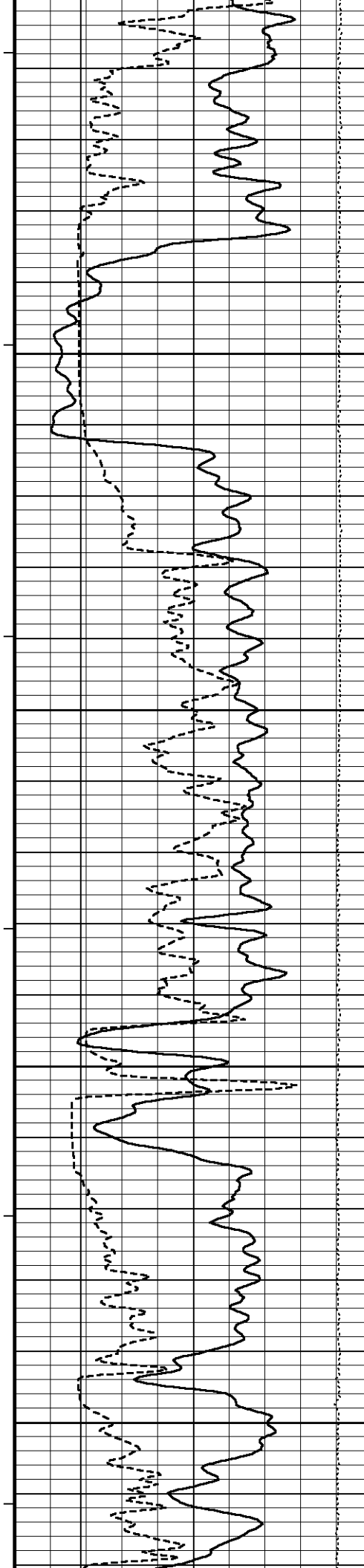
1500

100°

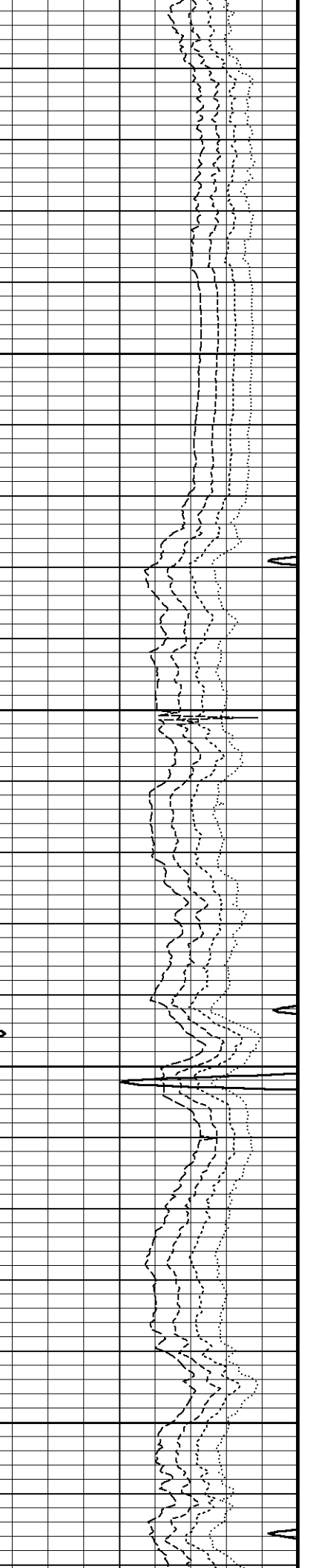
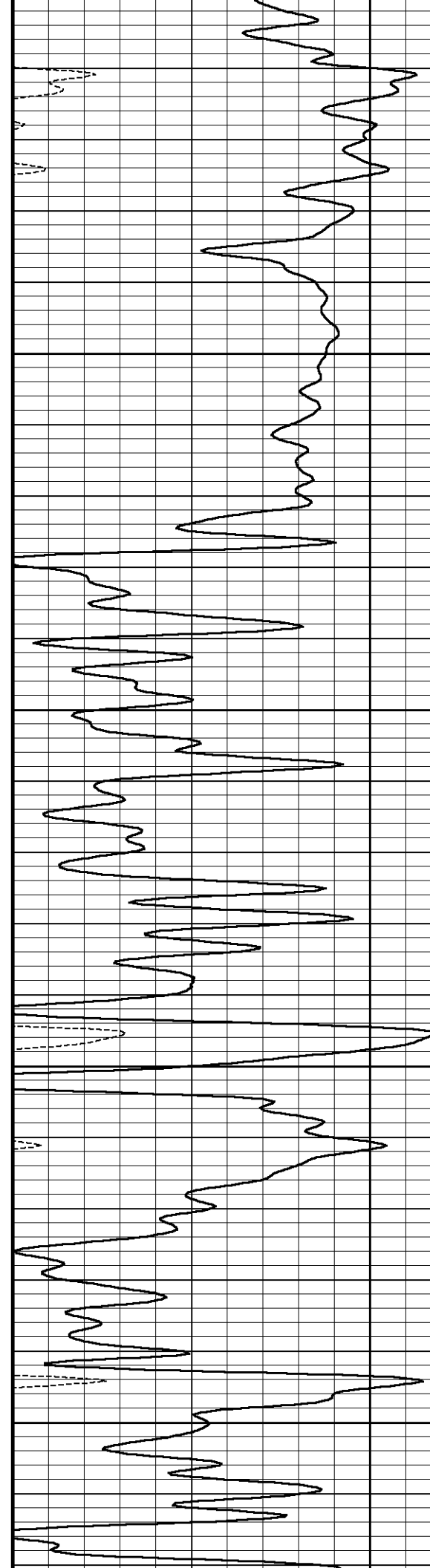
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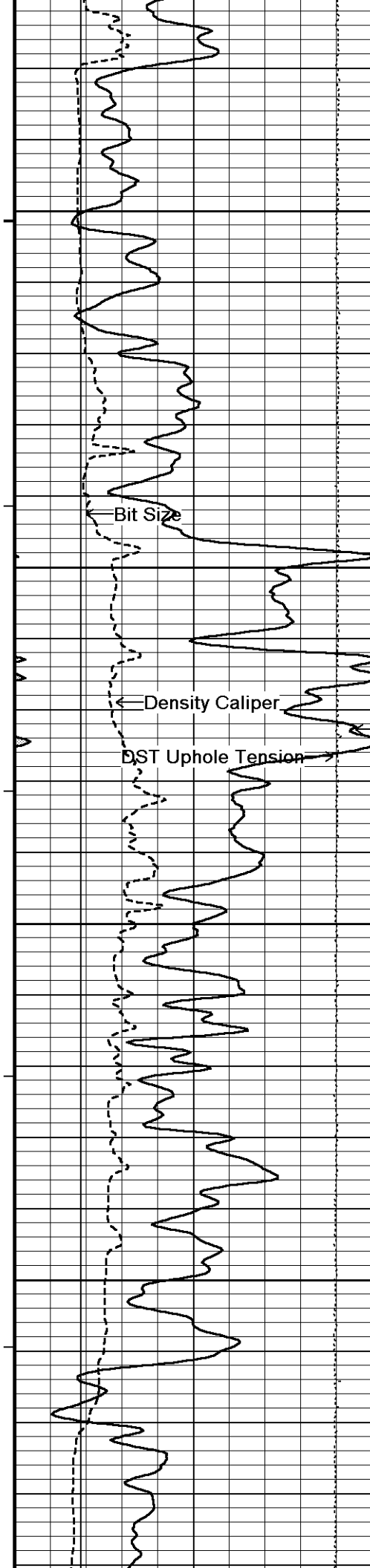
3-5' Compensated Sonic

6' Transit Time
5' Transit Time
4' Transit Time
3' Transit Time



1550
100°
1600
101°
1650
101°
1700
101°
1750





101°

1800

102°

18503-5' Compensated Sonic

Gamma Ray

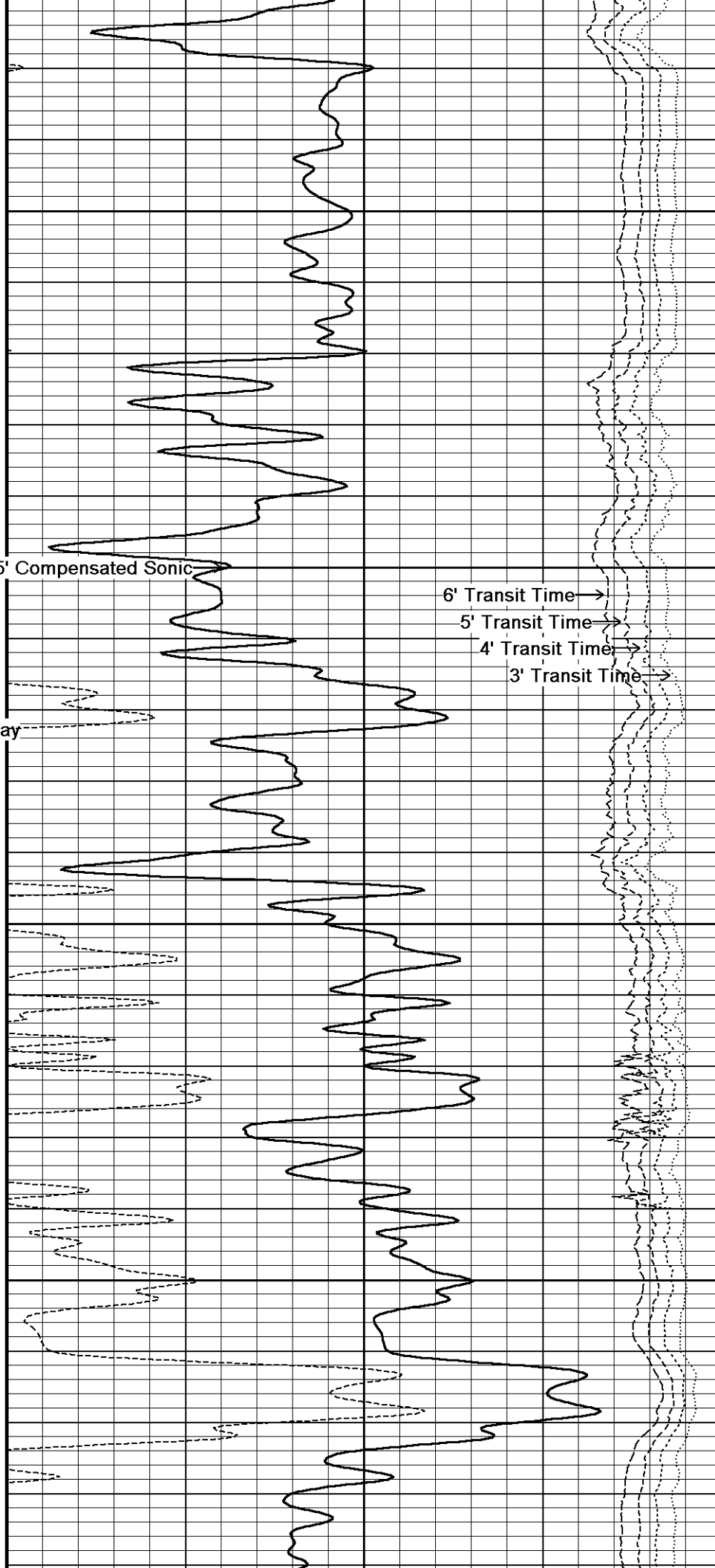
102°

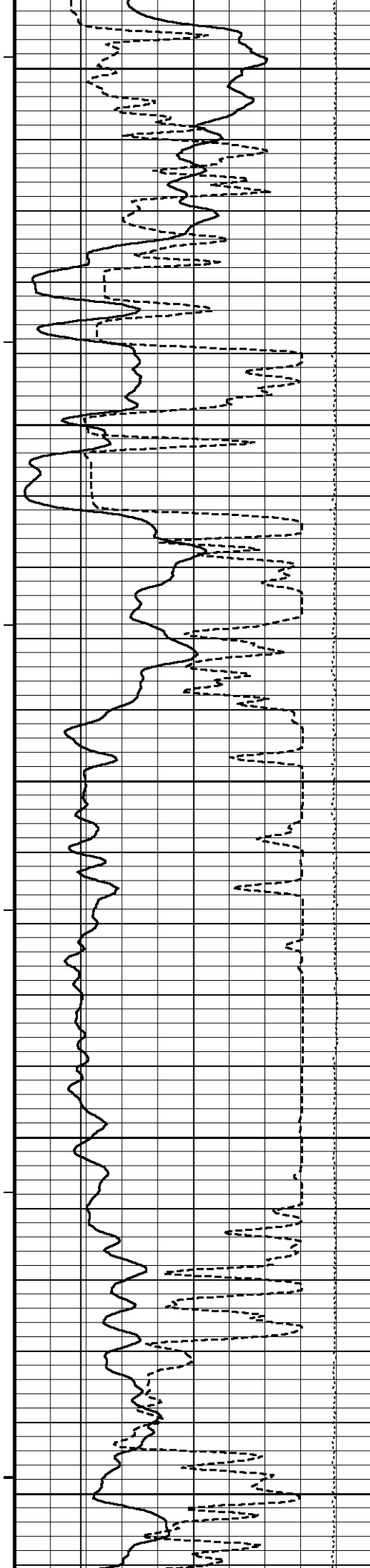
1900

103°

1950

103°





2000

102°

2050

102°

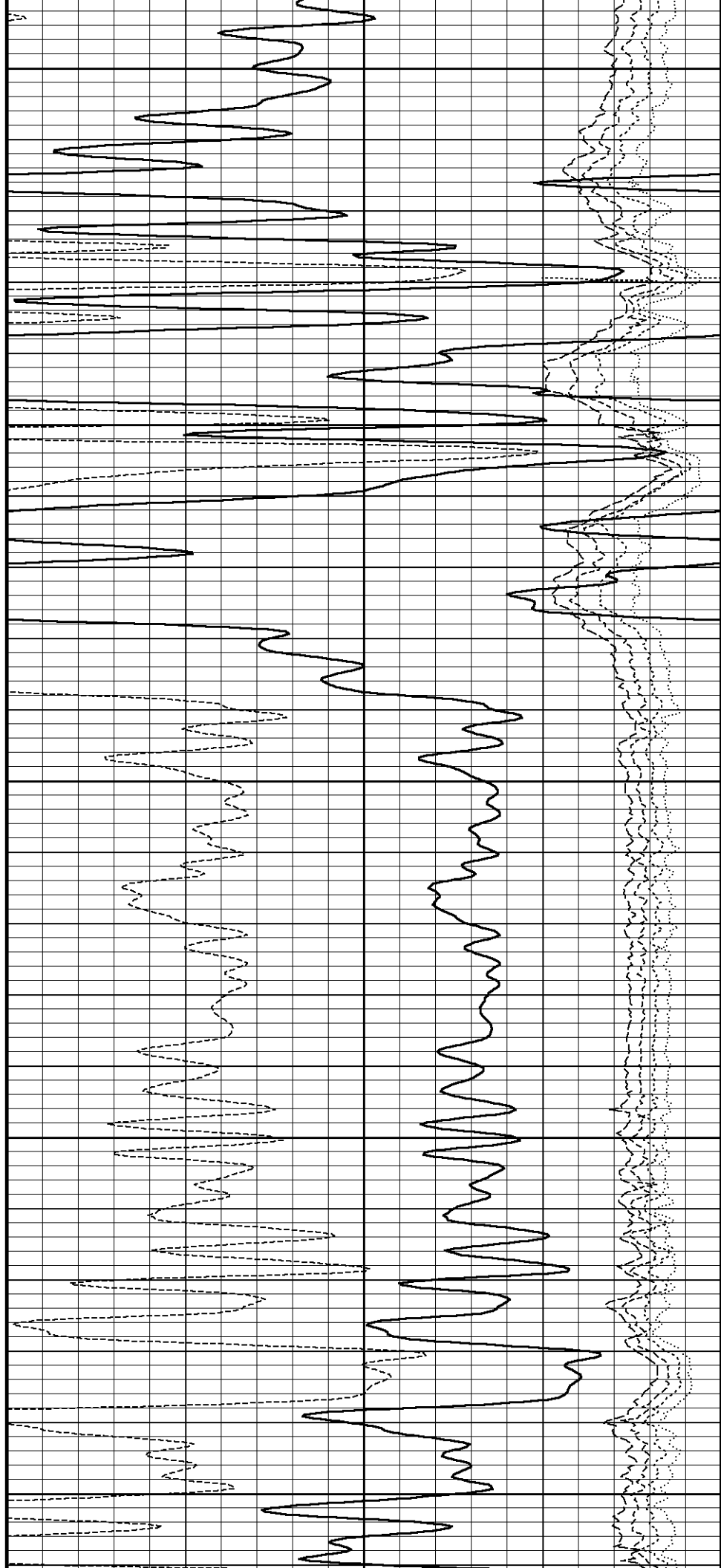
2100

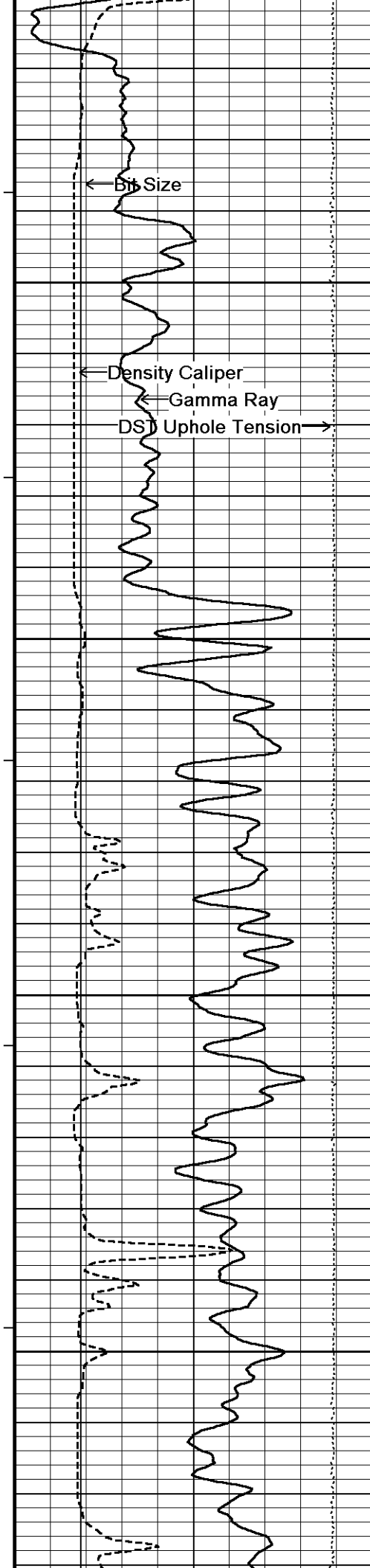
102°

2150

103°

2200





103°

2250

103°

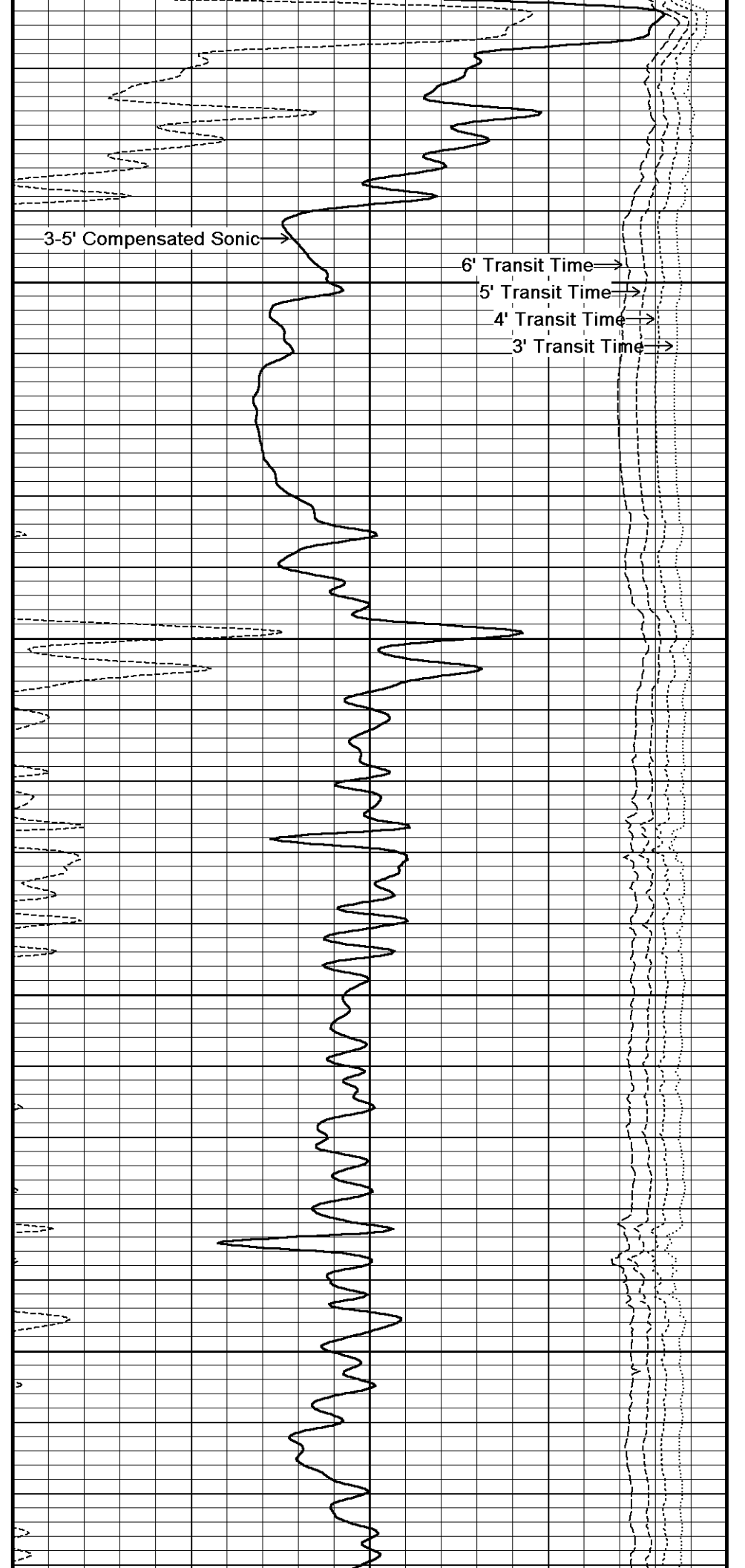
2300

103°

2350

104°

2400



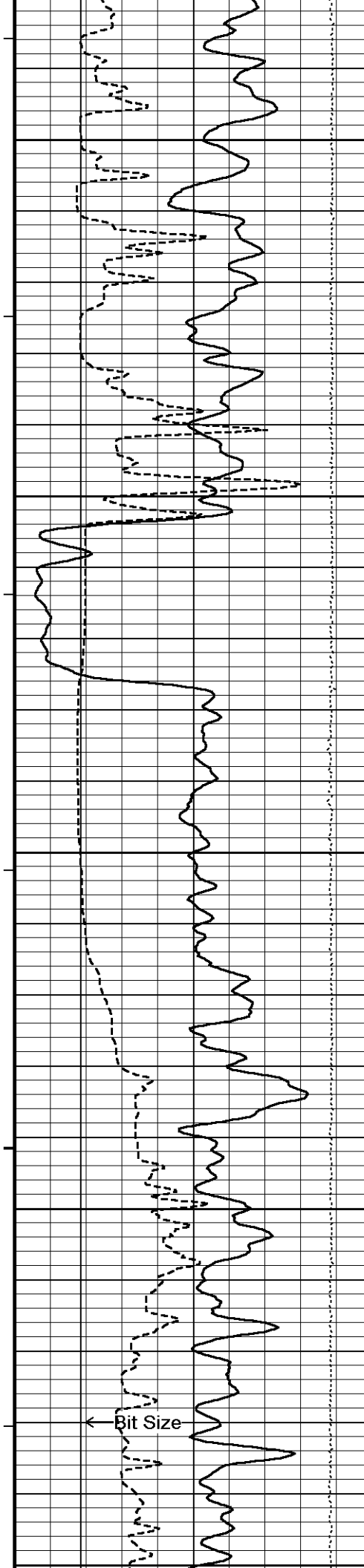
3-5' Compensated Sonic

6' Transit Time

5' Transit Time

4' Transit Time

3' Transit Time



104°

2450

104°

2500

104°

2550

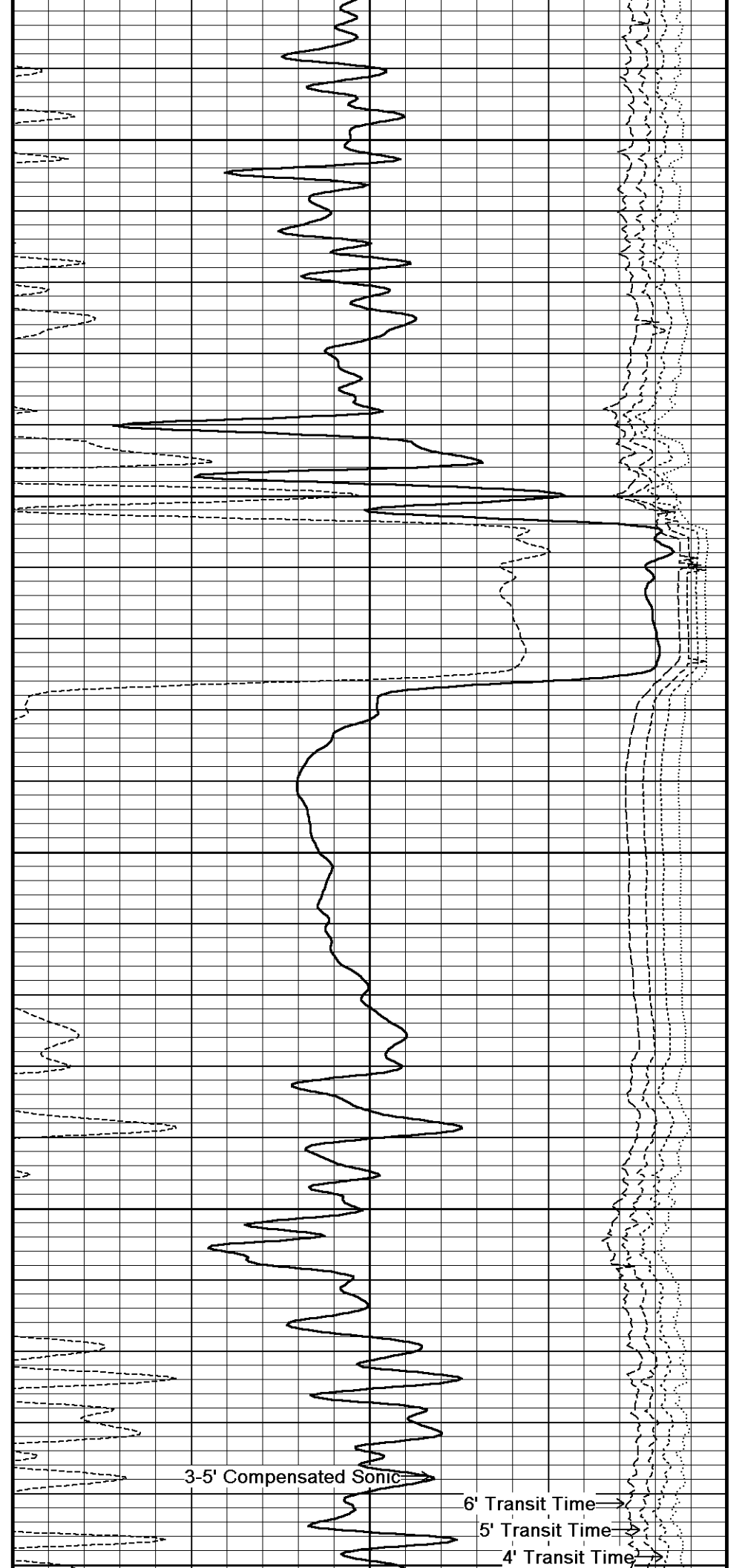
105°

2600

105°

2650

Bit Size

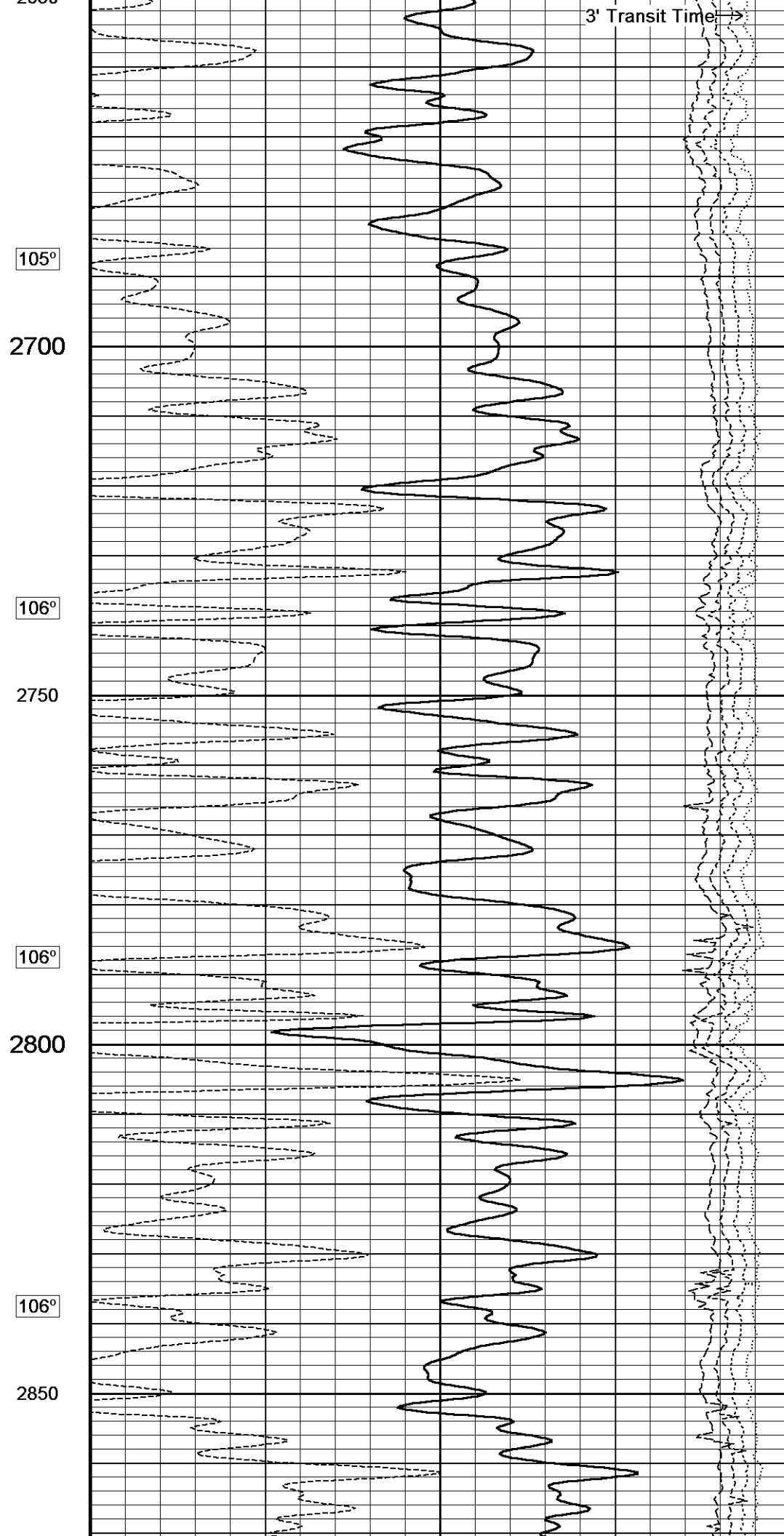
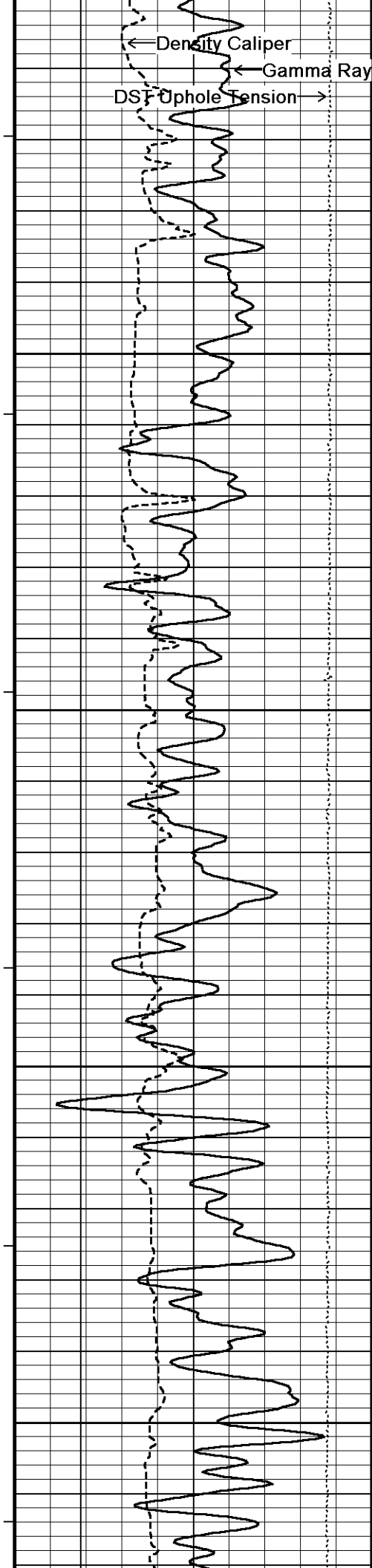


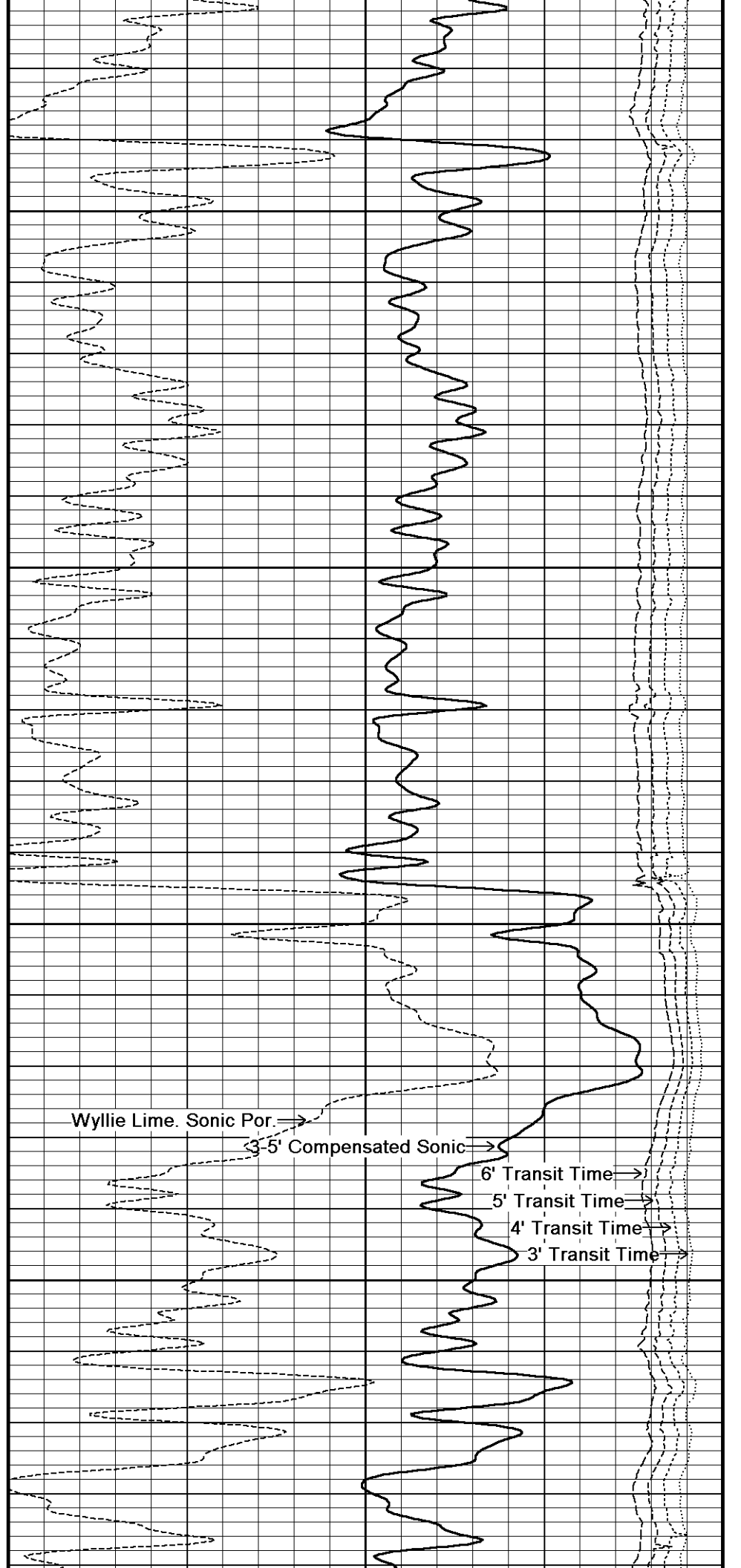
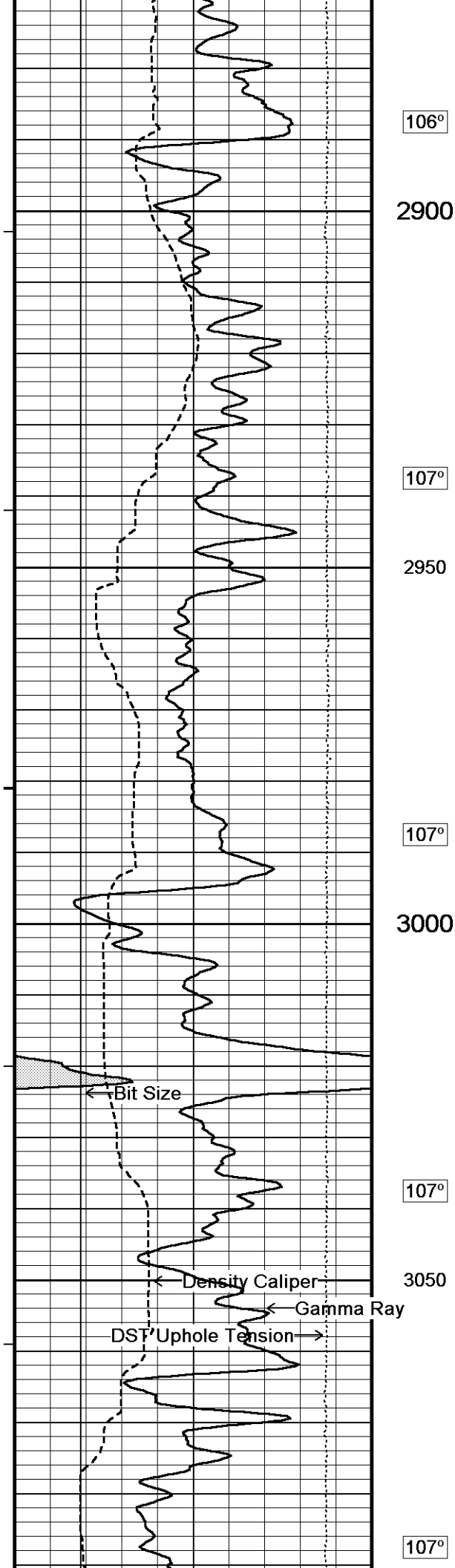
3-5' Compensated Sonic

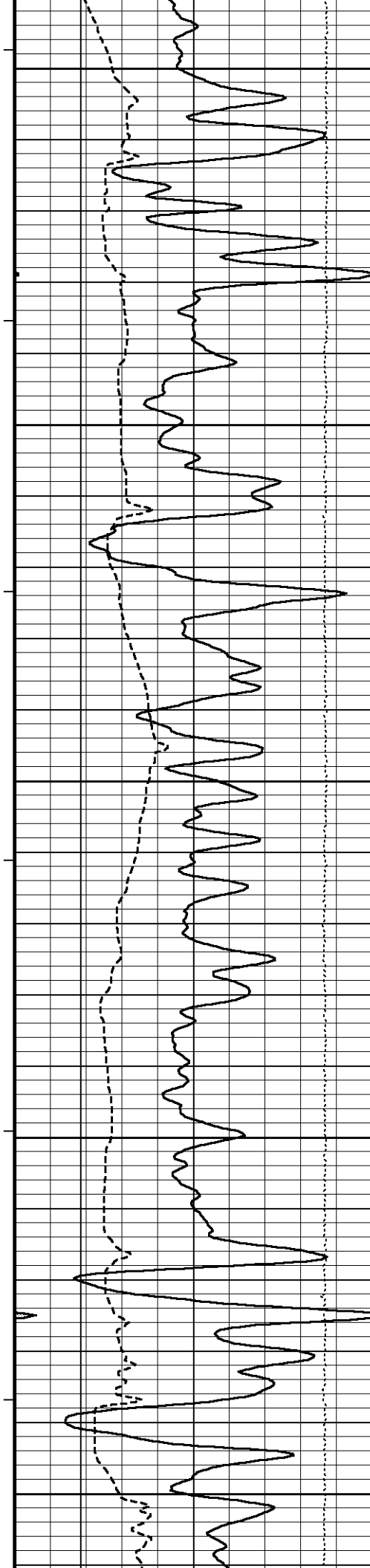
6' Transit Time

5' Transit Time

4' Transit Time







3100

107°

3150

108°

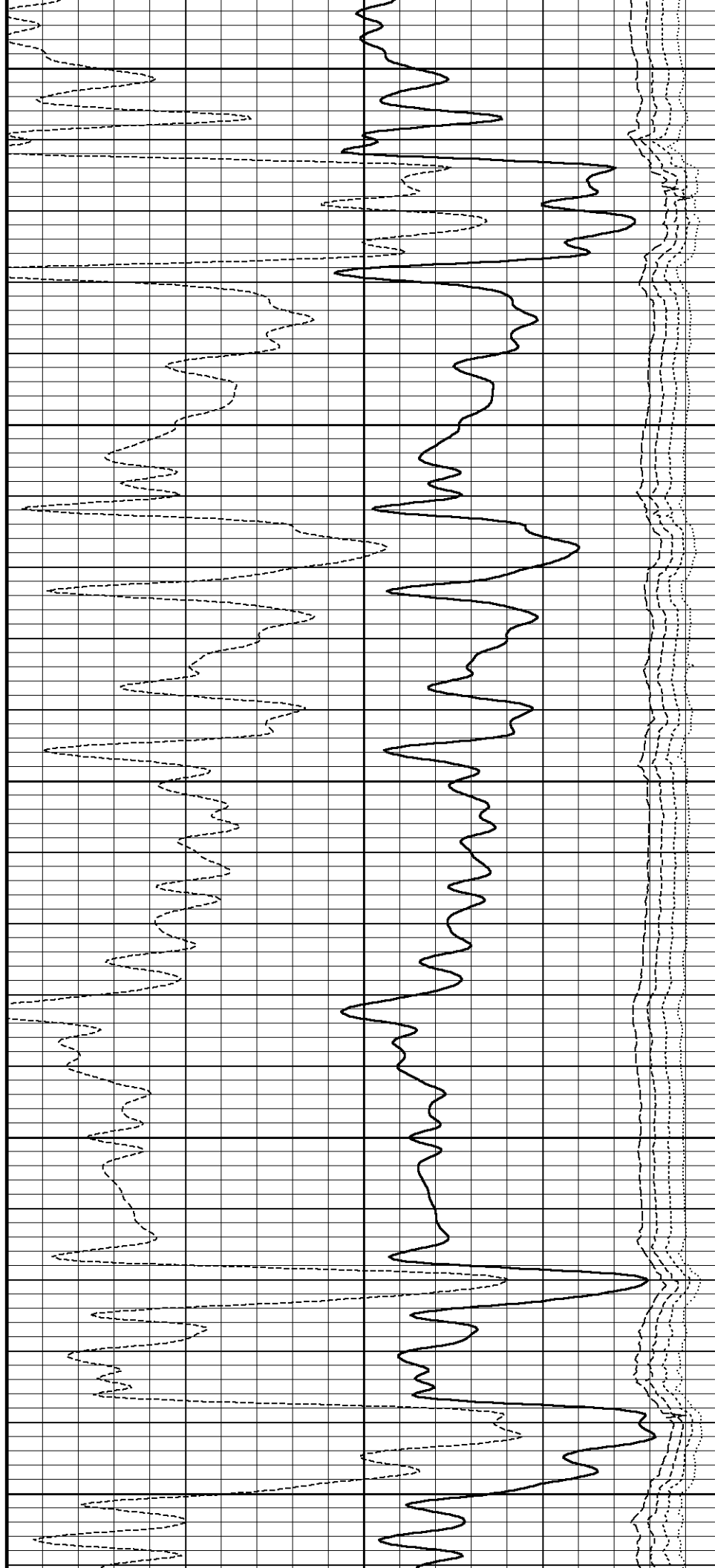
3200

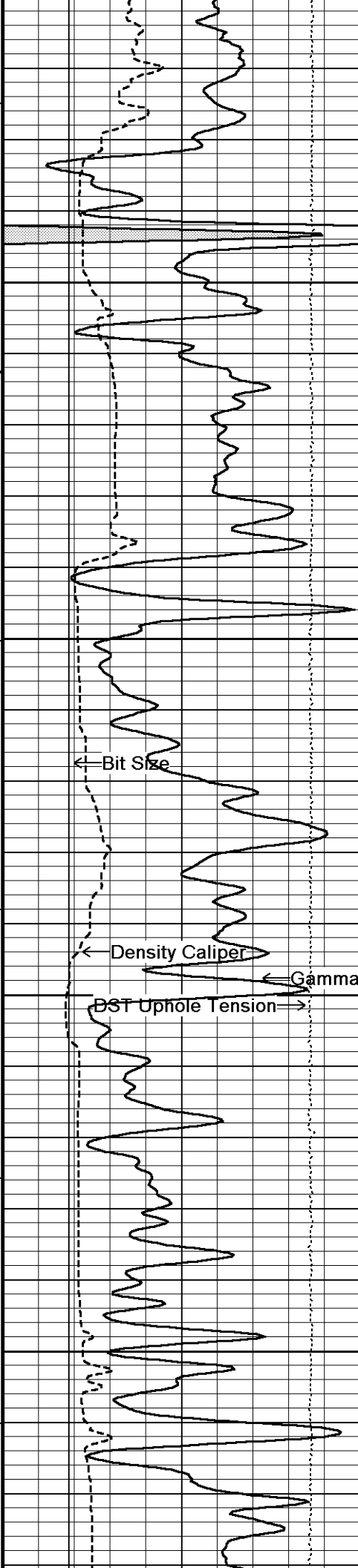
108°

3250

108°

3300





109°

3350

109°

3400

109°

3450

109°

3500

Wyllie Lime. Sonic Por. →

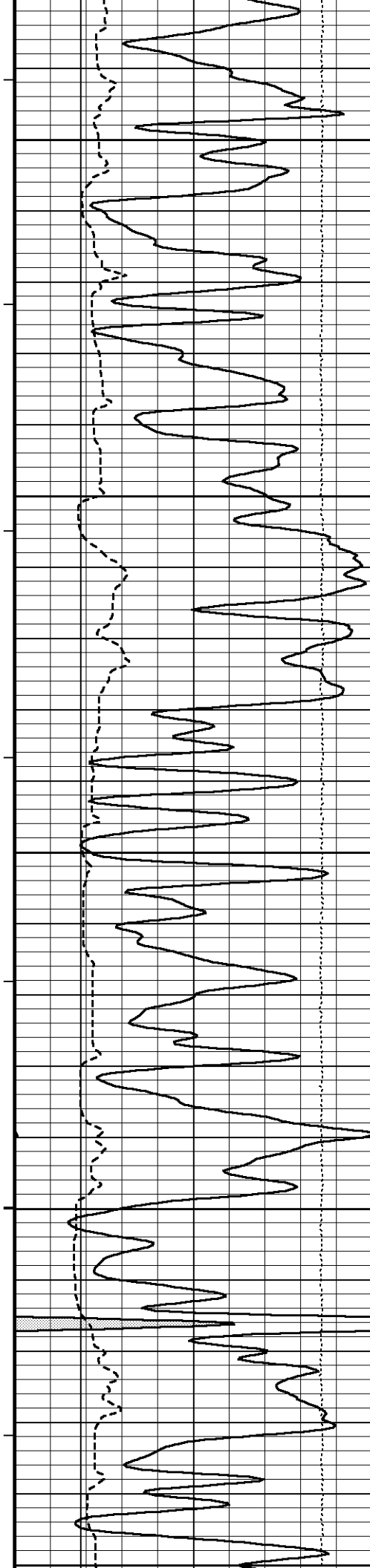
3-5' Compensated Sonic →

6' Transit Time →

5' Transit Time →

4' Transit Time →

3' Transit Time →



110°

3550

110°

3600

111°

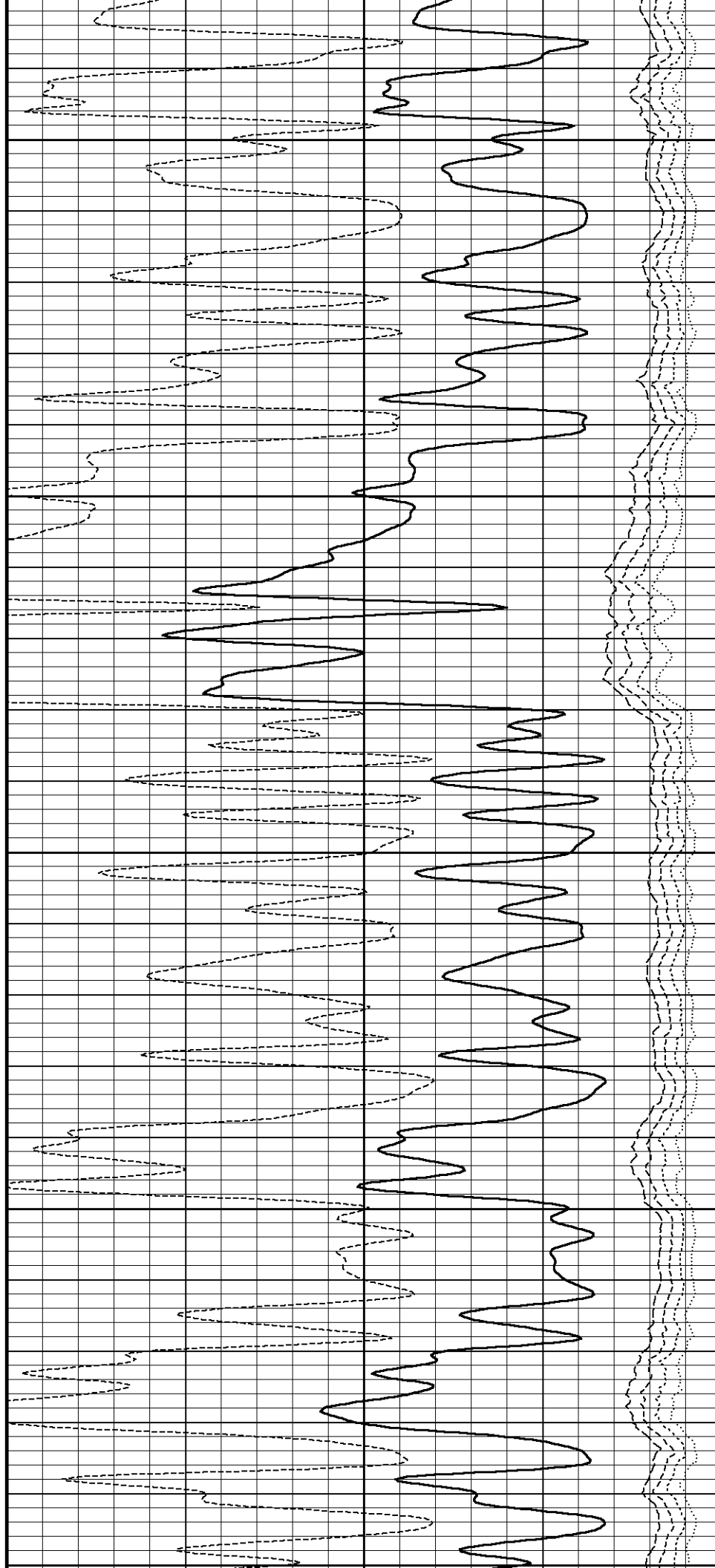
3650

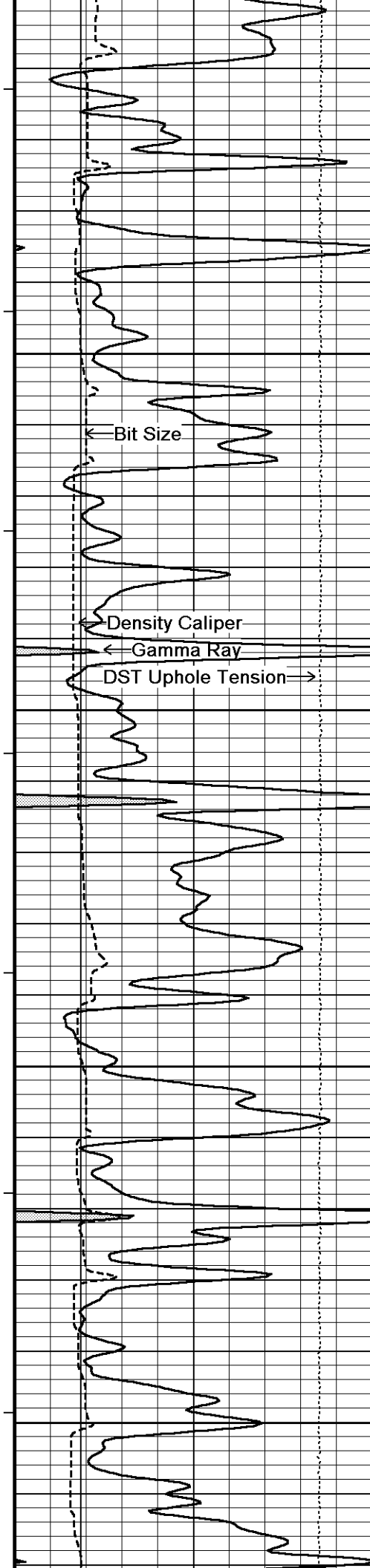
111°

3700

111°

3750





111°

3800

111°

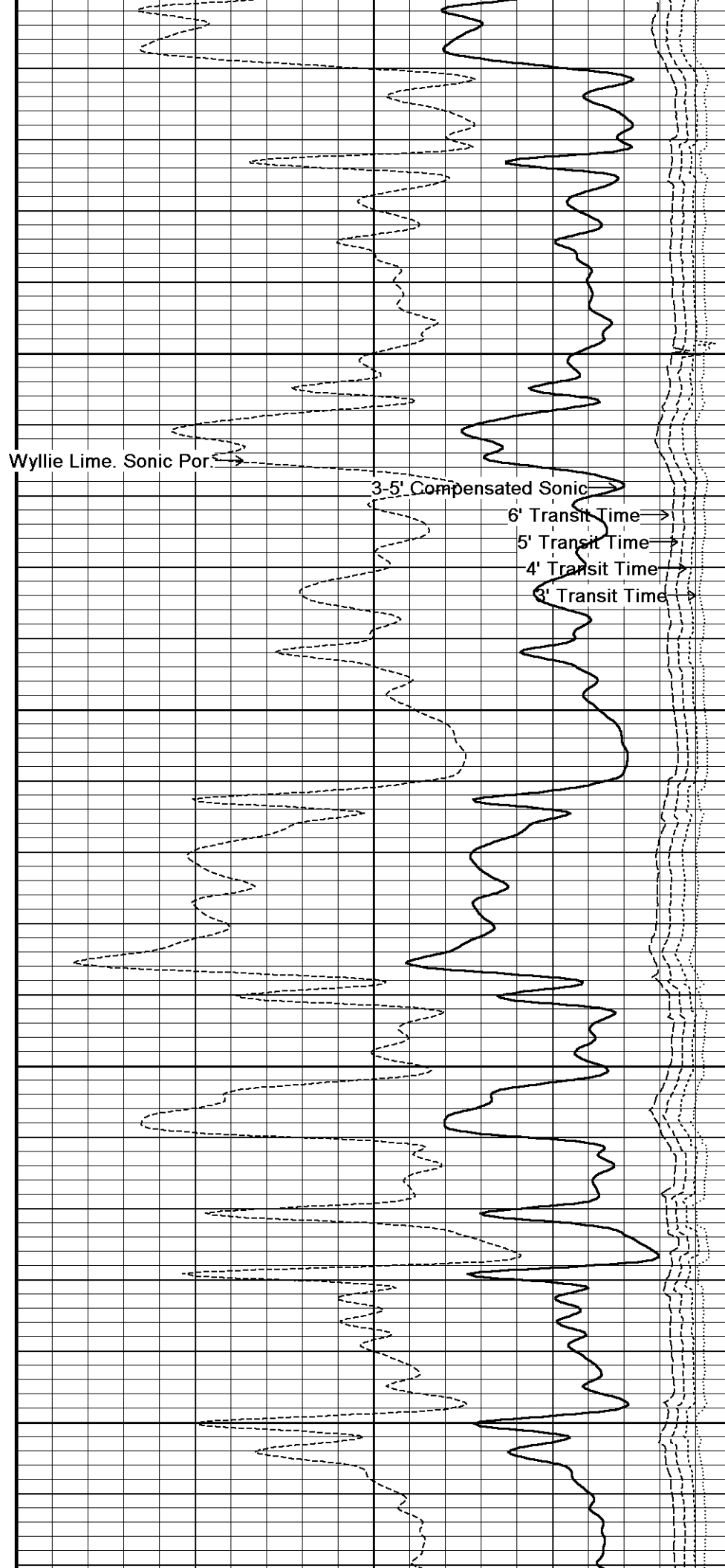
3850

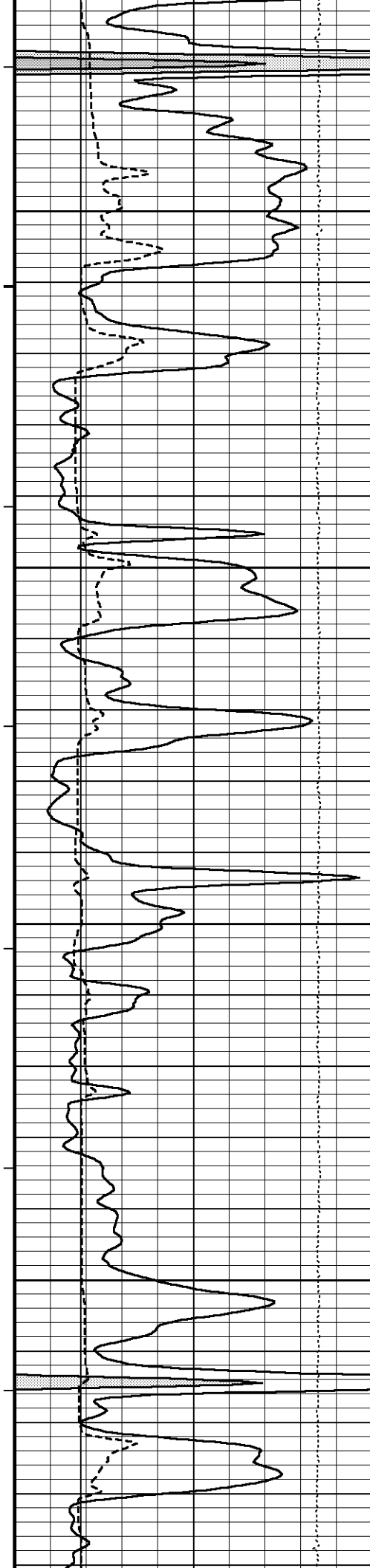
111°

3900

112°

3950





112°

4000

113°

4050

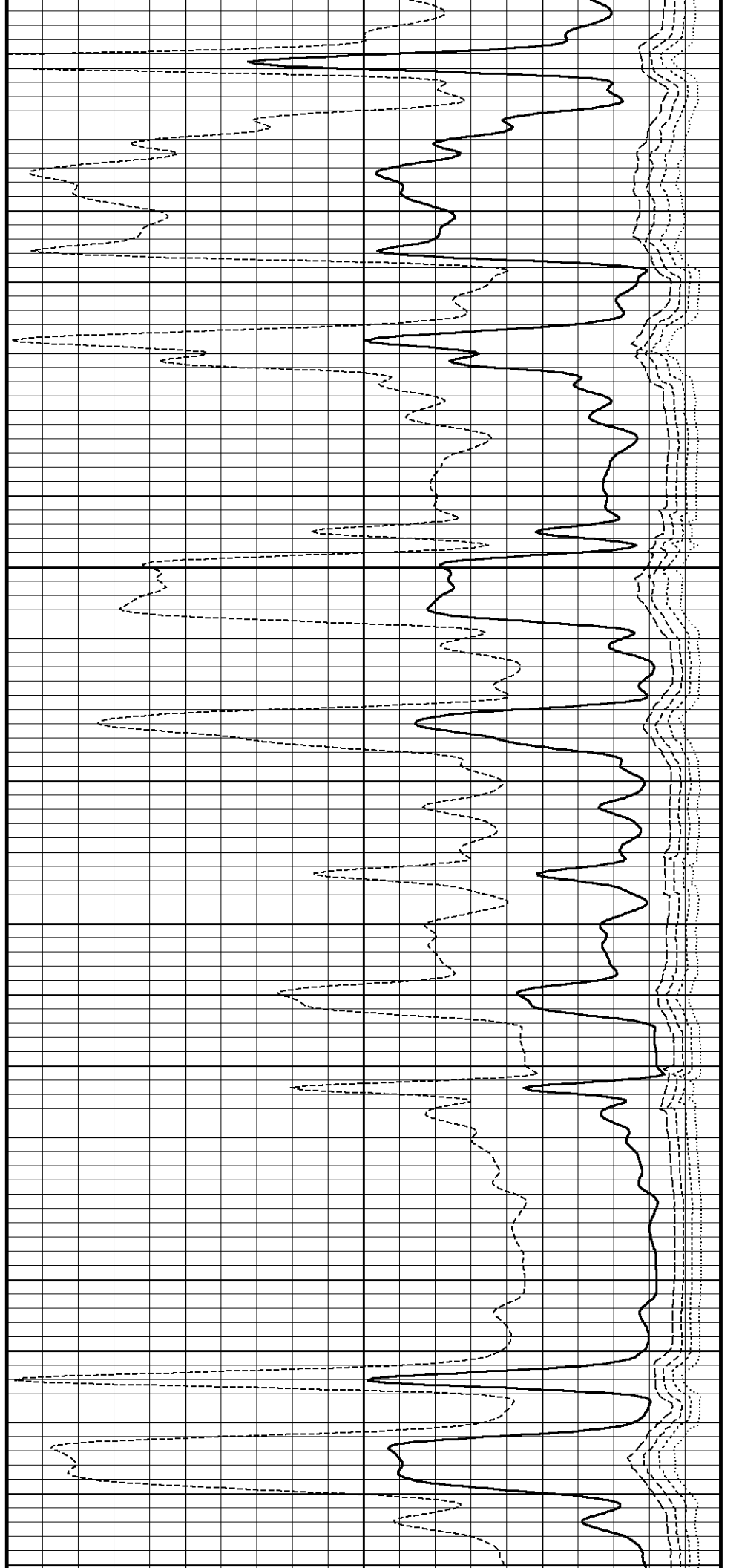
113°

4100

113°

4150

113°





4200

Wyllie Lime. Sonic Por. →

114°

4250

115°

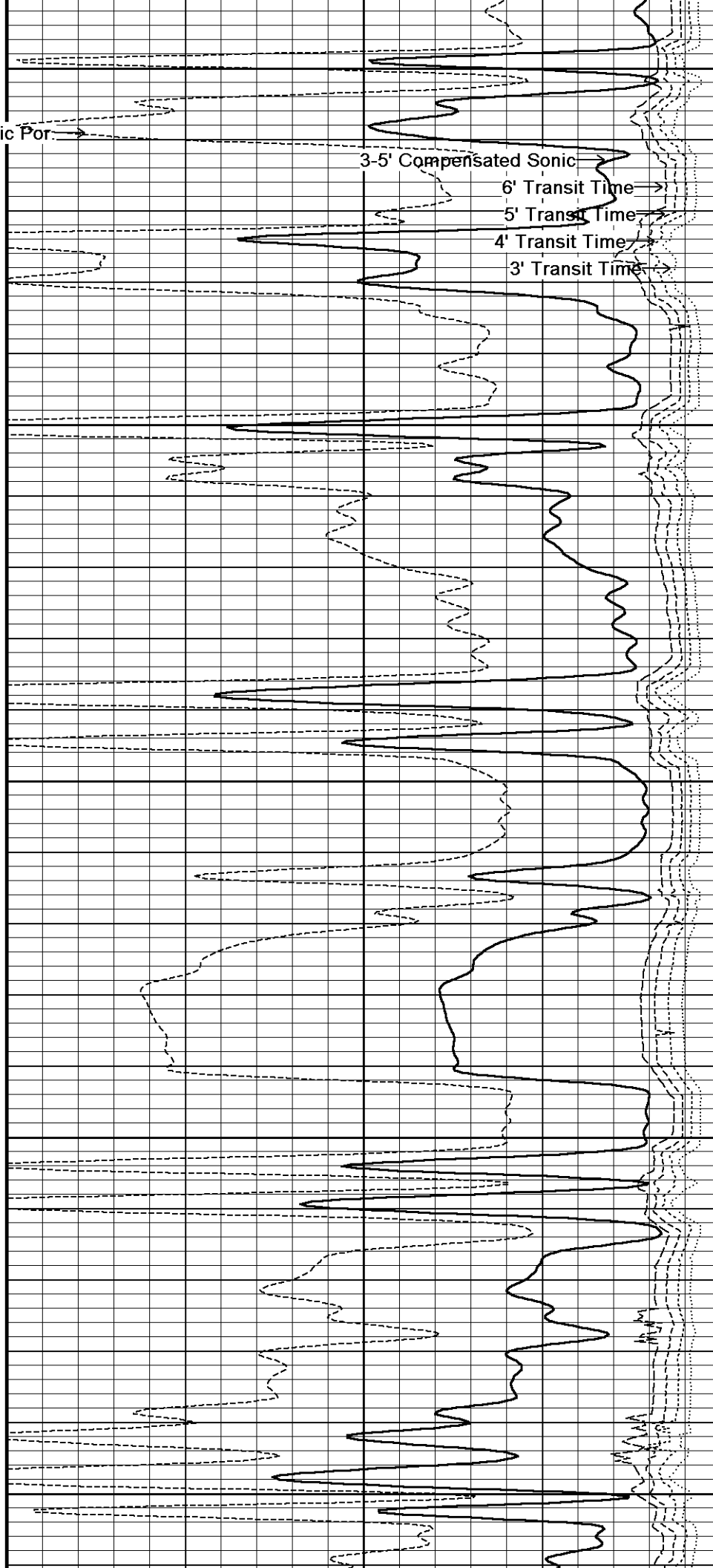
4300

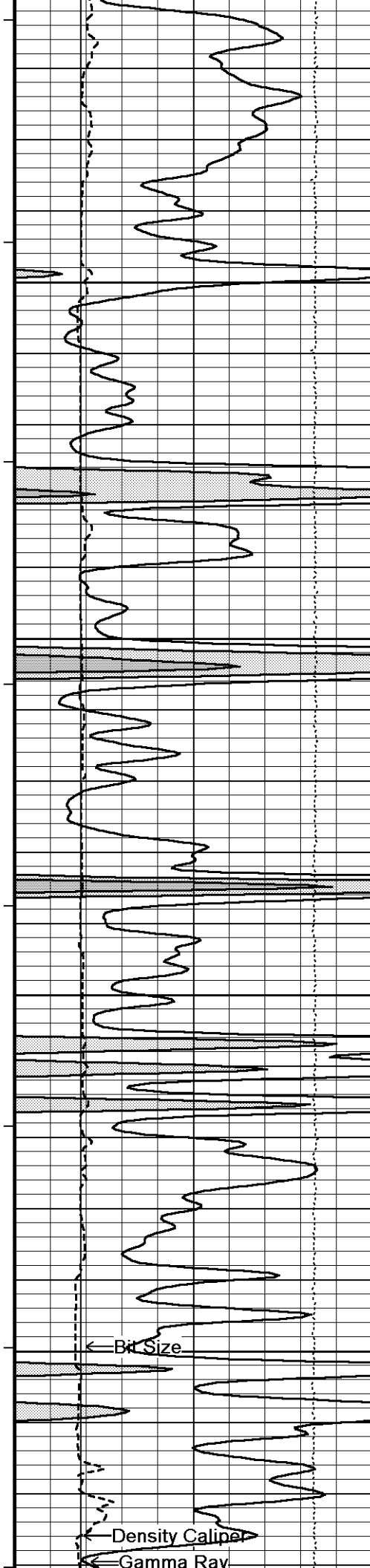
115°

4350

115°

4400





116°

4450

116°

4500

117°

4550

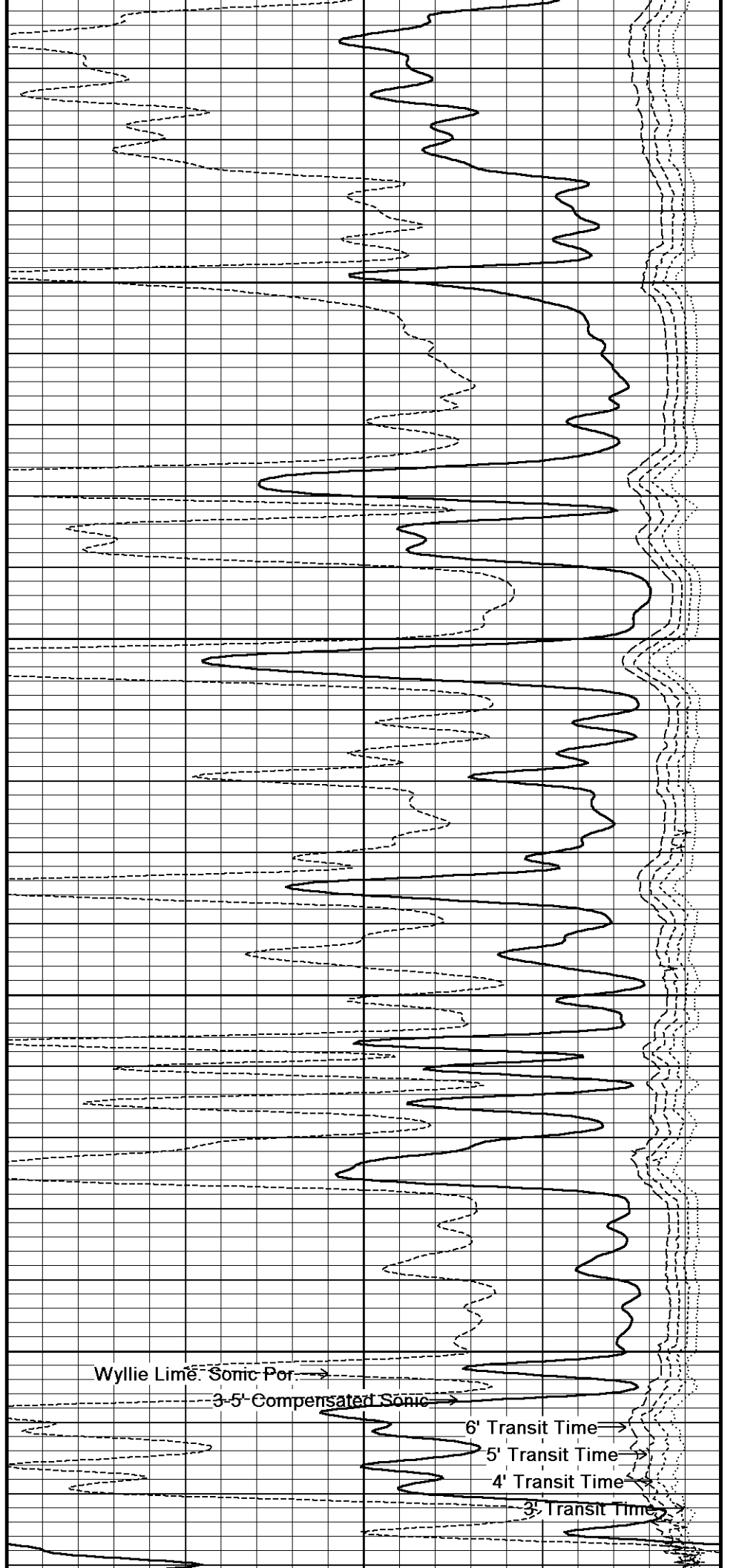
118°

4600

Bit Size

Density Caliper

Gamma Ray



Wyllie Limb Sonic Por

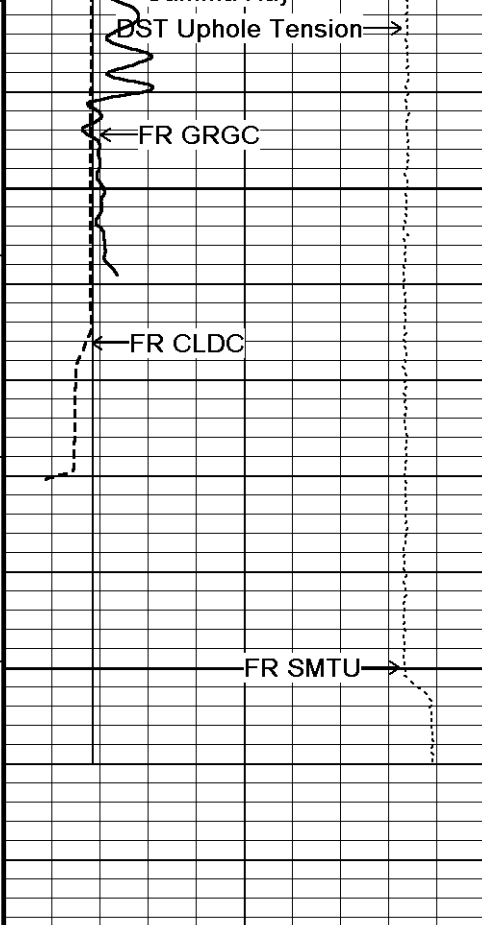
3-5' Compensated Sonic

6' Transit Time

5' Transit Time

4' Transit Time

3' Transit Time



118°

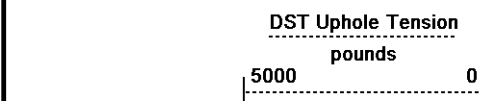
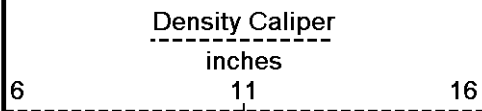
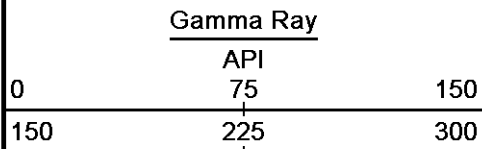
4650

4700

4724

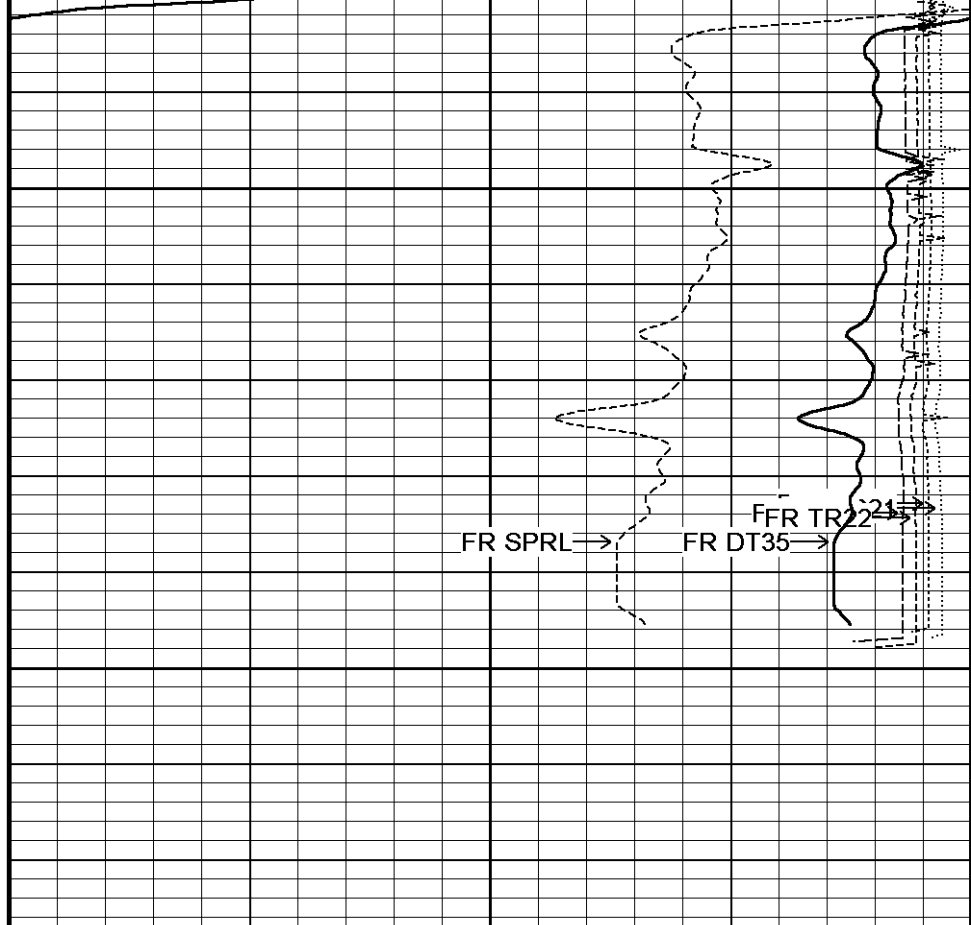
Depth
In
Feet

Timing Marks
every 60.0 sec



Borehole
Temp in
deg F

Replay
Scale
1:240



3-5' Compensated Sonic
microsec/foot

140 115 90 65 40

Wyllie Lime. Sonic Por.
percent

30 20 10 0 -10

3' Transit Time
microseconds

1100 100

4' Transit Time
microseconds

1100 100

5' Transit Time
microseconds

1100 100

6' Transit Time
microseconds

1100 100

↑

5 INCH MAIN

↑

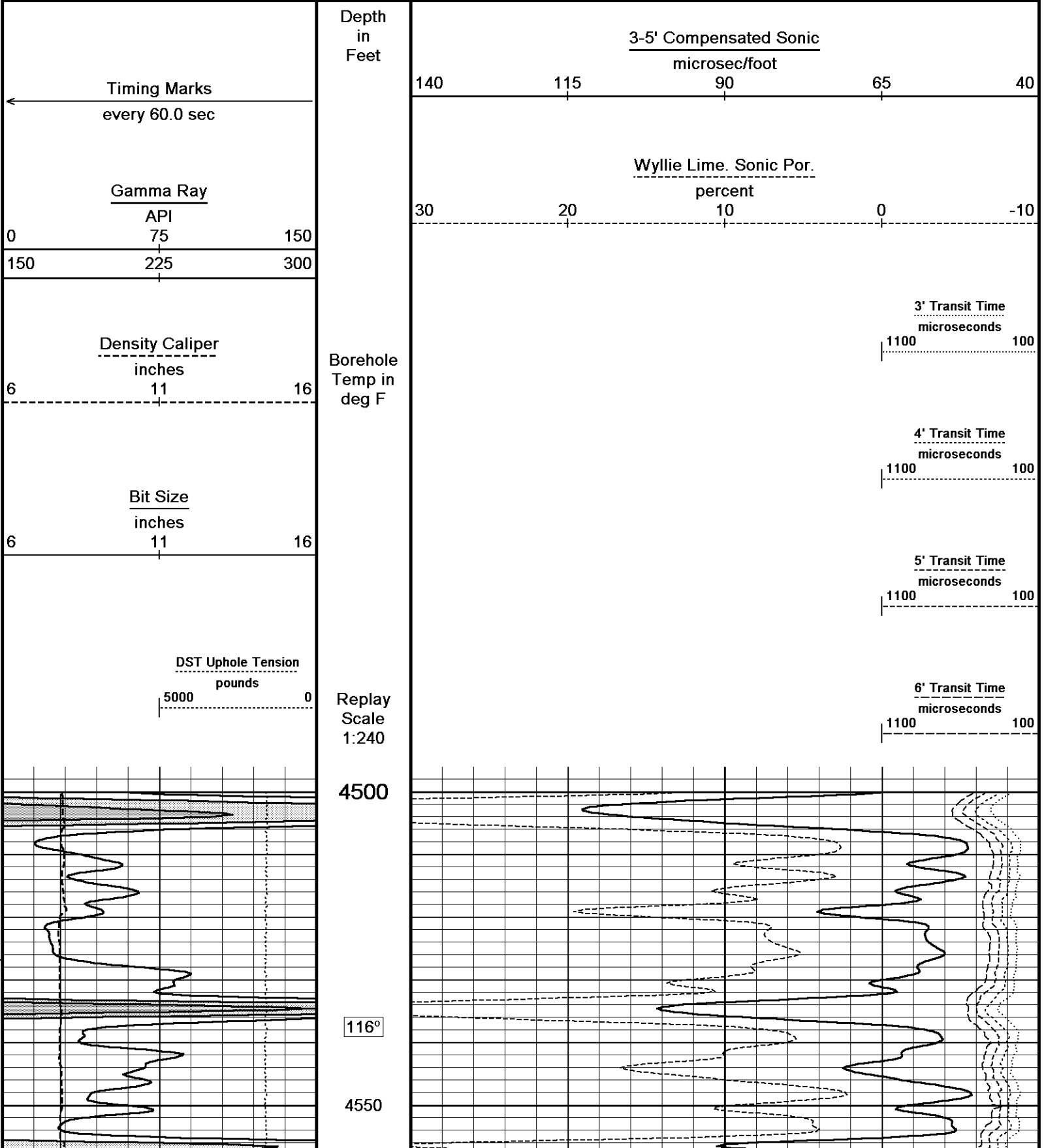
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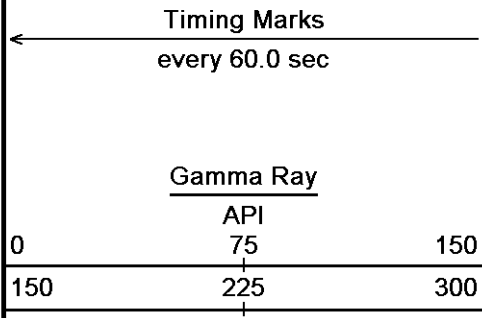
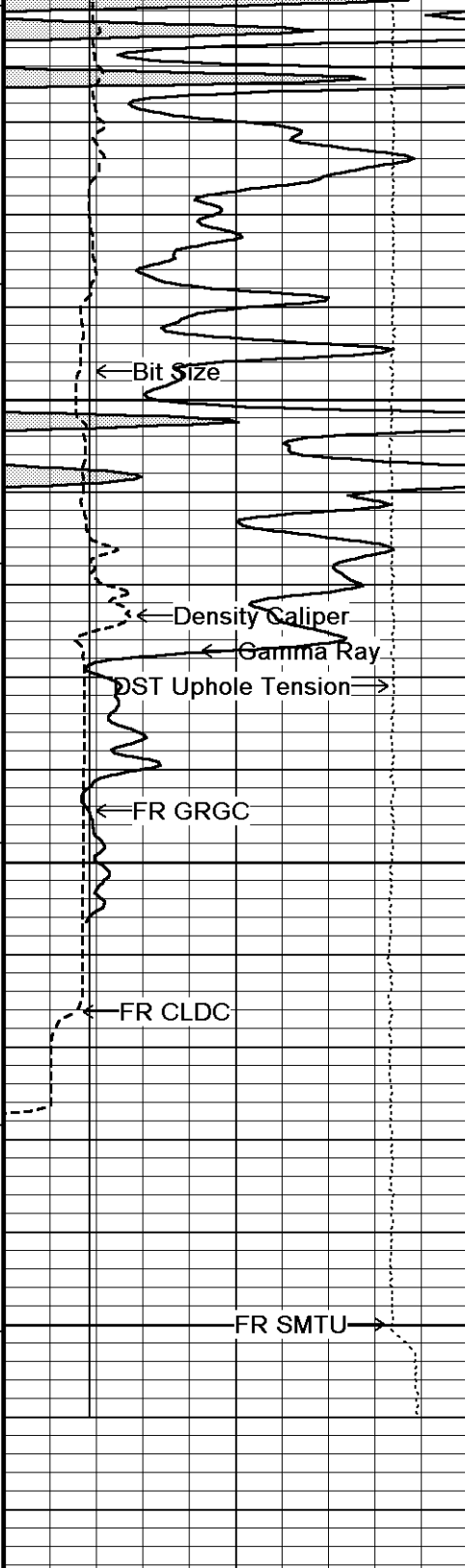
REPEAT SECTION

↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Log\Shakespeare Teeter #1-11\Shakespeare Teeter #1-11_001.dta
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583

Plotted on 26-JUN-2013 08:45
Recorded on 26-JUN-2013 05:32





117°

4600

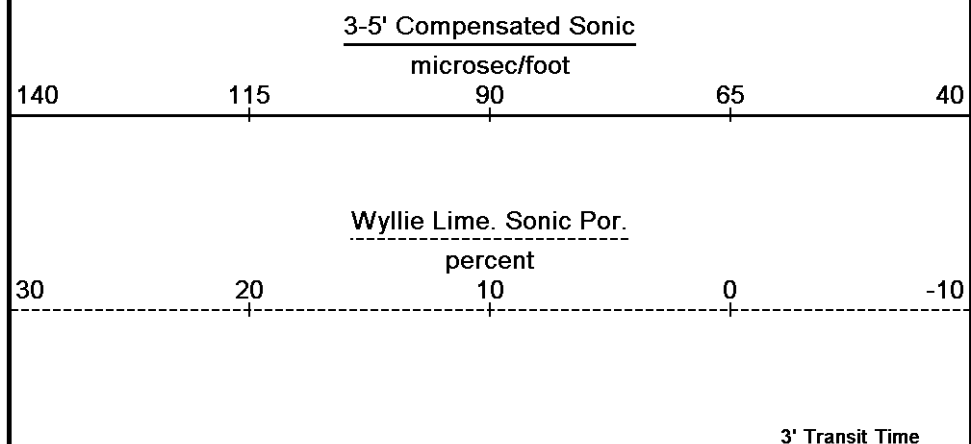
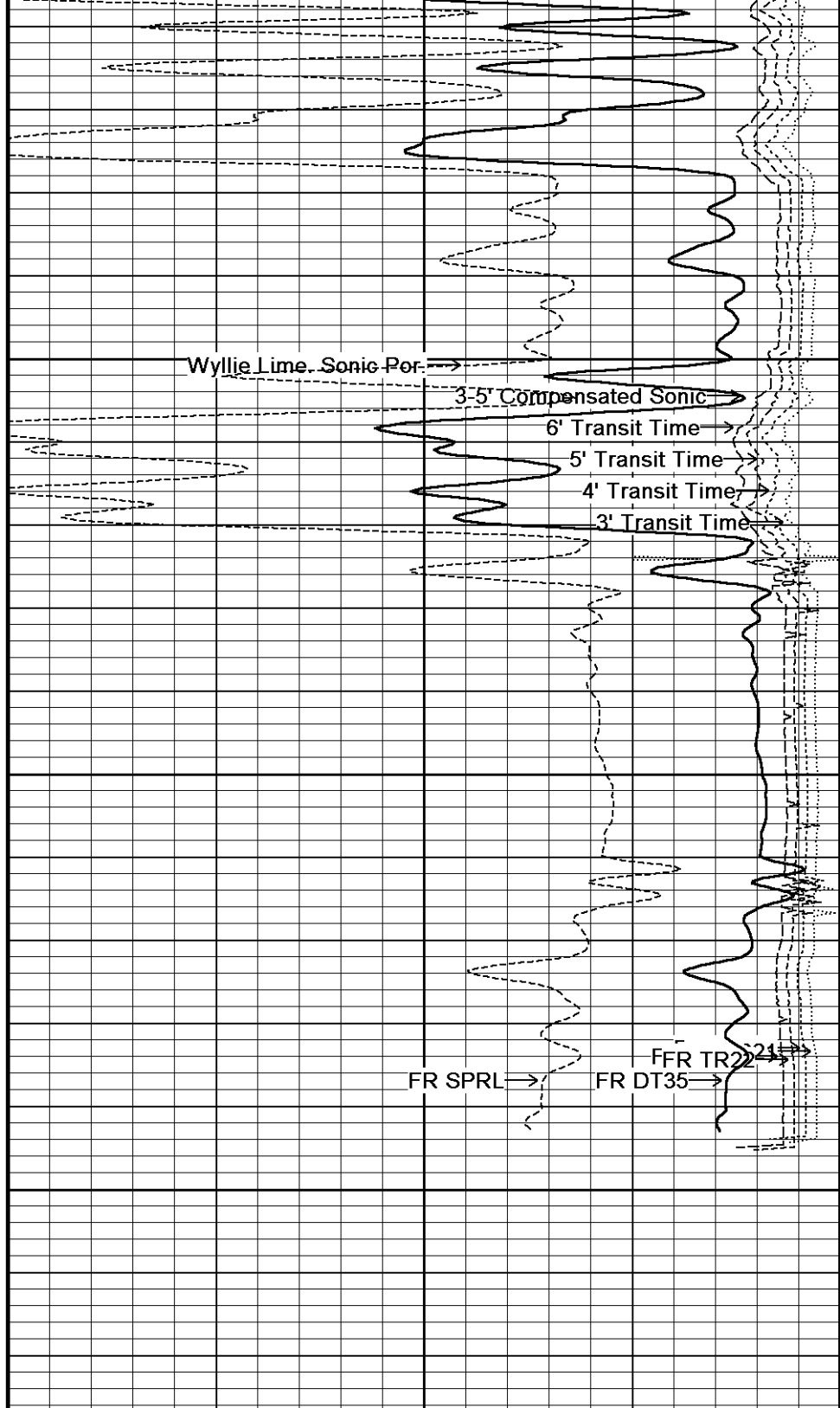
116°

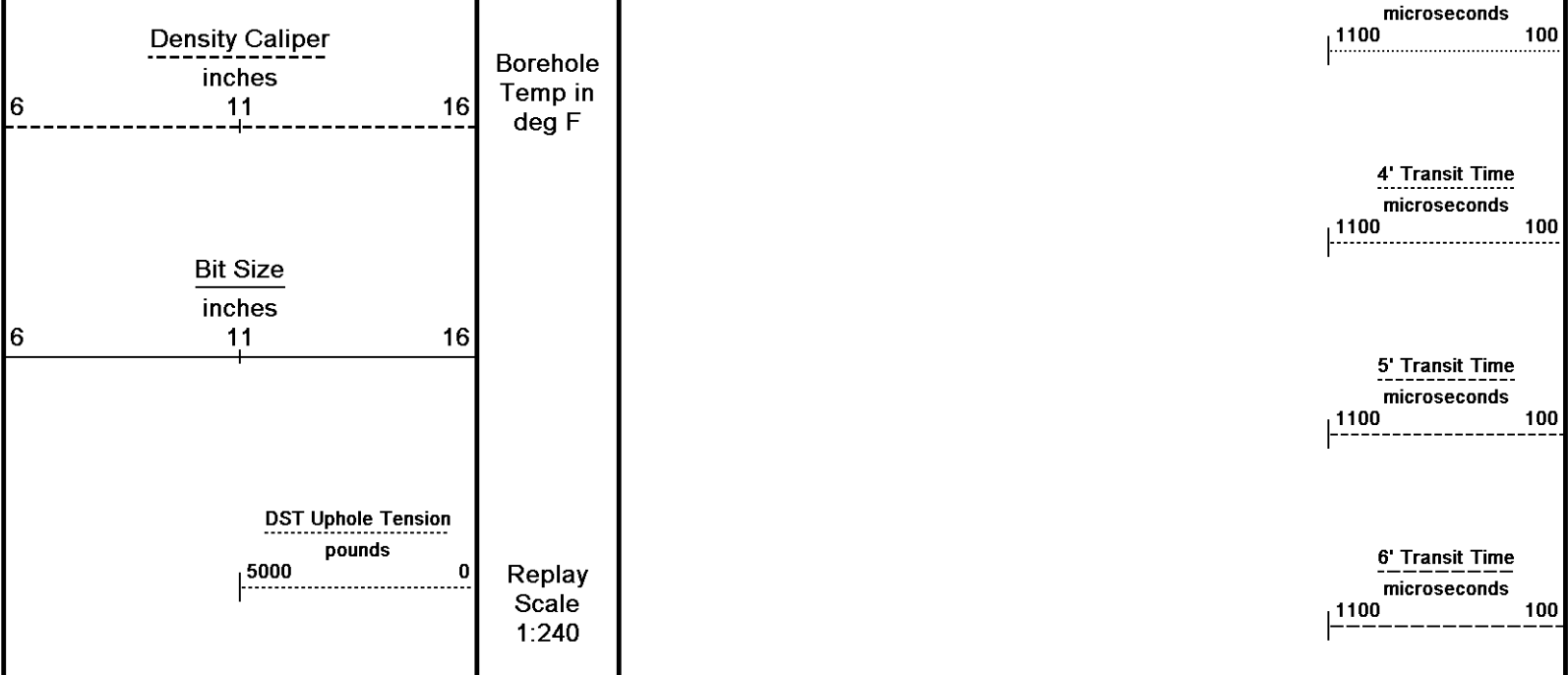
4650

4700

4724

Depth
in
Feet





Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 26-JUN-2013 08:45

Filename: C:\Minimus 13.05.9583\Log\Shakespeare Teeter #1-11\Shakespeare Teeter #1-11_001.dta
Recorded on 26-JUN-2013 05:32

System Versions: Logged with 13.05.9583
Processed with 13.05.9583
Plotted with 13.05.9583

↑
REPEAT SECTION
↑

BEFORE SURVEY CALIBRATION			
C:\Minimus 13.05.9583\Log\Shakespeare Teeter #1-11\Shakespeare Teeter #1-11_002.dta			
General Constants All 000		Last Edited on 26-JUN-2013,04:46	
General Parameters			
Mud Resistivity	1.120	ohm-metres	
Mud Resistivity Temperature	89.000	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	5.500	inches	
Caliper for Differential Caliper	Density Caliper		
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 26-JUN-2013 04:24	
Reading No	Measured	Calibrated (lbs)	
1	13930.99	0.00	
2	15329.61	471.80	
Gamma Calibration MCG-D.K 469		Field Calibration on 21-JUN-2013 10:11	
	Measured	Calibrated (API)	
Background	66	44	
Calibrator (Gross)	1145	769	
Calibrator (Net)	1079	725	
Gamma Constants MCG-D.K 469		Last Edited on 26-JUN-2013,01:00	
Gamma Calibrator Number	GRC38		

Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%
High Resolution Temperature Calibration MCG-D.K 469		
	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00
High Resolution Temperature Constants MCG-D.K 469		
Pre-filter Length	11	
SP Calibration MCG-D.K 469		
	Measured	Calibrated (mV)
Reference 1	105.8	100.0
Reference 2	-94.3	-100.0
Caliper Calibration MML-A 3		
Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14624	5.98
2	17958	7.97
3	21263	9.86
4	25213	11.92
5	0	0.00
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	6.12	5.98
Micro Normal and Micro Inverse Calibration MML-A 3		
Base Calibration		
Channel	Measured	Calibrated (ohm-m)
	Resistor 1	Resistor 2
Micro Normal	12.2	60.2
Micro Inverse	15.7	78.3
Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	63.0	63.0
Micro Inverse	48.2	48.2
Micro Normal and Micro Inverse Constants MML-A 3		
Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	1.0000	
Micro Inverse K Factor	1.0000	
Standoff Offset	N/A	inches
Neutron Calibration MDN-A.B 66		
Base Calibration		
	Measured	Calibrated (cps)
	Near	Far
	3145	98
Ratio	32.215	33.764
Field Calibrator at Base		
	Calibrated (cps)	
	1654	2365
Ratio	0.699	
Field Check		
	Calibrated (cps)	
	1643	2364
Ratio	0.695	
Neutron Constants MDN-A.B 66		

Neutron Source Id	P0204NN	
Neutron Jig Number	5824NE	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
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	Constant Value	
Temperature	68.00	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	

FE Calibration MFE-B.J 353		Base Calibration on 22-MAY-2013 08:22 Field Check on 21-JUN-2013 10:30	
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	964.9	126.8	
Base Check		280.9	
Field Check		280.8	

FE Constants MFE-B.J 353		Last Edited on 21-JUN-2013,10:29	
Running Mode	No Sleeve		
MFE K Factor	0.1268		
Caliper Source for FE correction	Bit Size		
Caliper Value for FE correction	N/A	inches	
Rm Source for FE correction	Temperature Corr		
Temp. for Rm Corr.	MCG External Temperature		
Stand-off	0.5	inches	

Sonic Constants MSS-C.K 368			Last Edited on 19-JUN-2013,16:37		
Maximum Boundary Contrast	100.00		micro-sec/ft		
Fluid Transit Time	189.00		micro-sec/ft		
Limestone Transit Time	47.50		micro-sec/ft		
Sandstone Transit Time	55.50		micro-sec/ft		
Dolomite Transit Time	43.50		micro-sec/ft		
Sonic used for Porosities	3-5' Compensated				
Correction for Sonde Skew	Applied				
Cycle Stretch Algorithm	Applied				
MN3FT	0.00		micro-sec		
MX3FT	1500.00		micro-sec		
Hunt-Raymer Constant	83.13		micro-sec/ft		
Sonde Mode	Compensated				
Hole Type	Open Hole				
Sonde Parameters					
	Measured	Calibrated			
Offset	0.0000	0.0000			
Free Pipe	0.0000				
Peak Amplitude Source					
Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	N/A	N/A	N/A	N/A	N/A
4'	N/A	N/A	N/A	N/A	N/A
5'	N/A	N/A	N/A	N/A	N/A
6'	N/A	N/A	N/A	N/A	N/A

Processed Fixed Gate Parameters

Waveform Used For Processing		N/A		
Start Time (micro-sec)	End Time (micro-sec)	Discriminator (mV)	Depth (ft)	
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	0.00	0.00	0.00	

Full Waveform Parameters

Use 3' Waveform to derive TR	No		
Use 4' Waveform to derive TR	No		
Use 5' Waveform to derive TR	No		
Use 6' Waveform to derive TR	No		
3' Waveform Discriminator Level	0.30	mV	
4' Waveform Discriminator Level	0.30	mV	
5' Waveform Discriminator Level	0.15	mV	
6' Waveform Discriminator Level	0.15	mV	
3' Waveform Filter			
4' Waveform Filter			
5' Waveform Filter			
6' Waveform Filter			
Semblance Level	0.50		
Semblance Window Width	120.00	micro-sec	
Sonic 1 Despiker	100.00	micro-sec/ft	
Sonic 2 Despiker	100.00	micro-sec/ft	

Induction Calibration MAI-A.A 167

Base Calibration on 19-APR-2013,13:41
Field Check on 21-JUN-2013 10:32

Base Calibration

Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel		Low	High	Low	High
1		17.3	474.2	9.3	966.2
2		6.3	388.4	7.6	821.4
3		3.3	259.4	5.2	566.0
4		1.9	133.0	2.6	279.2

Array Temperature 76.8 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			13.4	3837.9
2			29.7	3475.3
3			29.2	3051.8
4			19.8	2081.1
Deep			18.7	2048.7
Medium			42.3	3989.2
Shallow			43.1	5051.0

Array Temperature 79.1 Deg F

Induction Constants MAI-A.A 167

Last Edited on 21-JUN-2013,10:30

Induction Model	RtAP-WBM	
Caliper for Borehole Corr.	Bit Size	
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	8.0000	
Stand-off Fin Angle	60.00	degrees
Stand-off Fin Width	0.5000	inches
Borehole Corr. Rm Source	Temperature Corr	
Temp. for Rm Corr.	MCG External Temperature	
Squasher Start	0.0020	mhos/metre
Squasher Offset	N/A	mhos/metre

Borehole Normalisation

DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000

MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000

Calibration Site Corrections

Channel 1	0.00	mmhos/metre
Channel 2	0.00	mmhos/metre
Channel 3	0.00	mmhos/metre
Channel 4	0.00	mmhos/metre

Apparent Porosity and Water Saturation Constants

Archie Constant (A)	1.00	
Cementation Exponent (M)	2.00	
Saturation Exponent (N)	2.00	
Saturation of Water for Apor	100.00	percent
Resistivity of Water for Apor and Sw	0.05	ohm-m
Resistivity of Mud Filtrate for Sw	0.00	ohm-m
Source for Rt	0.00	
Source for Rxo	0.00	

High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 28-MAY-2013,04:23

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MAI-A.A 167

Last Edited on 28-MAY-2013,04:23

Pre-filter Length	11
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Caliper Calibration MPD-B 64

Base Calibration on 21-MAY-2013 17:34

Field Calibration on 21-JUN-2013 09:49

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14464	3.99
2	23406	5.98
3	32206	7.97
4	40368	9.86
5	50018	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.00	5.98

Photo Density Calibration MPD-B 64

Base Calibration on 21-MAY-2013 17:55

Field Check on 21-JUN-2013 09:53

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	60105	33685	59556	30836
Reference 2	25286	2917	24941	2541

Field Check at Base

1165.8	1353.6
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Field Check

1166.1	1344.8
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PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	210	1037		
Reference 1	22619	59903	0.381	0.371
Reference 2	6846	25146	0.275	0.272

Field Check at Base

210.2	1037.2
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Field Check

212.0	1039.0
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Density Source Id	18235B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.11	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 (m)
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 13.05.9583\Log\Shakespeare Teeter #1-11\Shakespeare Teeter #1-11_002.dta

3/8" Triple Cone Cable Head (MCB C A)

MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

Compact Comms Gamma

MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log

MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

Compact Neutron

MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper

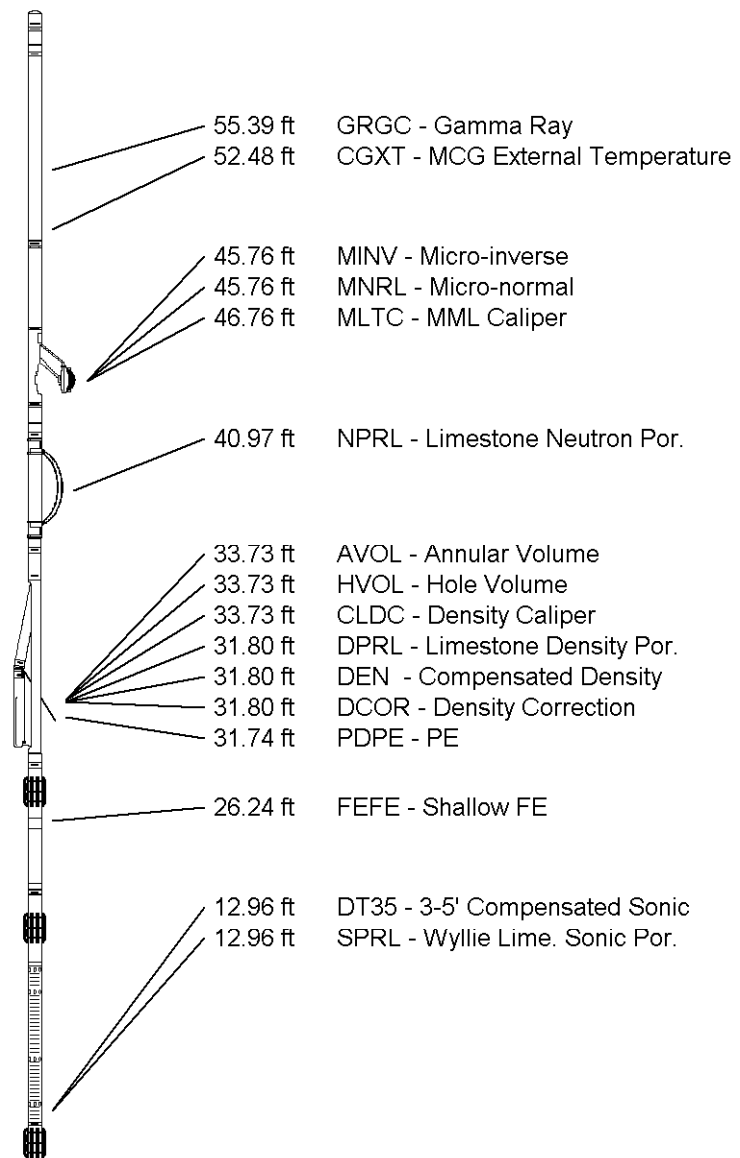
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric

MFE-B.J 353 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Sonic

MSS-C.K 368 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in



Compact Induction
MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 62.25 ft Weight: 471.8 lb



3.34 ft R400 - Array Ind. One Res 40
3.34 ft RTAO - Array Ind. One Res Rt
3.34 ft R600 - Array Ind. One Res 60
0.23 ft SPCG - Spontaneous Potential
Tool Zero (0.13ft from bottom)
-0.13 ft SMTU - DST Uphole Tension
All measurements relative to tool zero.

COMPANY	SHAKESPEARE OIL COMPANY
WELL	TEETER #1-11
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	UNITED STATES / KANSAS

Elevation Kelly Bushing	3004.00	feet	First Reading	4687.00	feet
Elevation Drill Floor	3003.00	feet	Depth Driller	4700.00	feet
Elevation Ground Level	2994.00	feet	Depth Logger	4700.00	feet



COMPENSATED SONIC
WITH INTEGRATED TRANSIT TIME
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