



**Weatherford**

**COMPENSATED SONIC  
WITH INTEGRATED TRANSIT TIME**

COMPANY

SHAKESPEARE OIL COMPANY, INC.

WELL

FOSTER #1-17

FIELD

WILDCAT

PROVINCE/COUNTY

LOGAN

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

800' FNL & 2289' FEL

SEC

TWP

17

14S

32W

Other Services

MAI/MFE

MML

MPD/MDN

Elevations:

KB

DF

GL

2783.00

2781.00

2773.00

API Number

15-109-21092

Permit Number

Permanent Datum GL, Elevation 2773 feet

Log Measured From KB

Drilling Measured From KB

Date

14-AUG-2012

Run Number

ONE

Depth Driller

4550.00

Depth Logger

4543.00

First Reading

4530.00

Last Reading

222.00

Casing Driller

225.00

Casing Logger

222.00

Bit Size

7.875

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.20 lb/USg

PH / Fluid Loss

10.00

Sample Source

MUDPIT

Rm @ Measured Temp

0.63 @ 71.0

Rmf @ Measured Temp

0.50 @ 71.0

Rmc @ Measured Temp

0.76 @ 71.0

Source Rmf / Rmc

CALC

Rm @ BHT

0.41 @ 113.0

Time Since Circulation

5 HOURS

Max Recorded Temp

113.00

Equipment Name

COMPACT

Equipment / Base

13096

Recorded By

ADAM SILL

Witnessed By

TIM PRIEST

S.O. # / JOB #

3534515

LB12-213

**BOREHOLE RECORD**

Last Edited: 14-AUG-2012 06:53

Bit Size inches	Depth From feet	Depth To feet
7.875	225.00	4550.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	225.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 13.02.6600.
- MCG, MML, MDN, MPD, MFE, MSS, MAI RAN 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.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING: 260 CU. FT.
- SERVICE ORDER # 3534515.

- RIG: HD DRILLING #2.

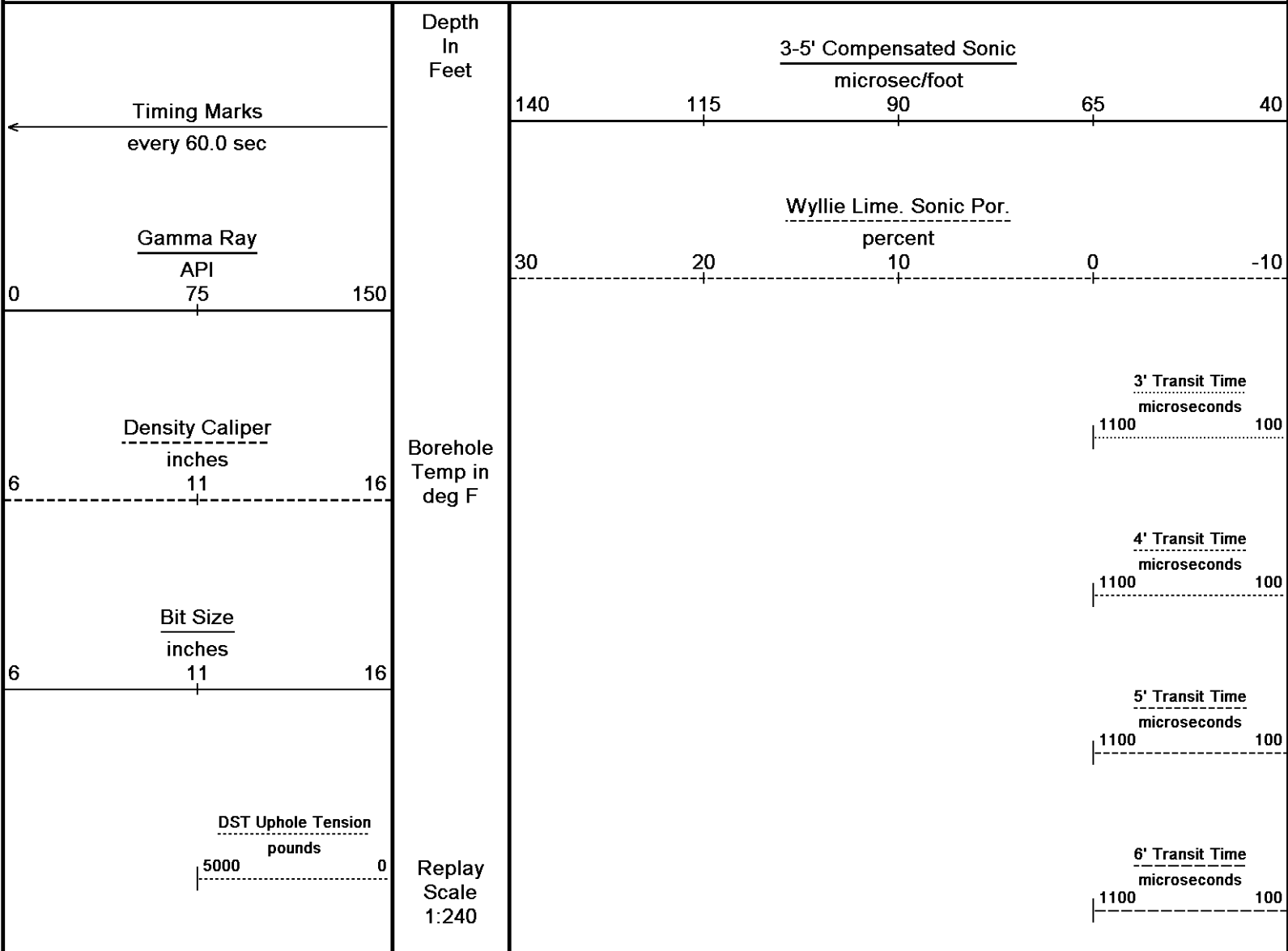
- ENGINEER: A. SILL.

- OPERATOR(S): M. STEGMAN.

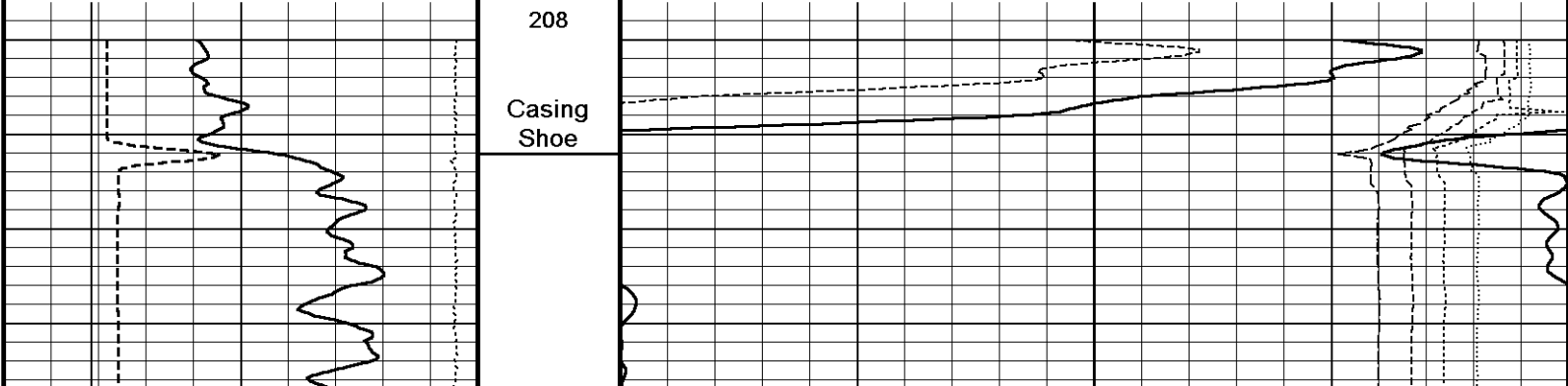
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs,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

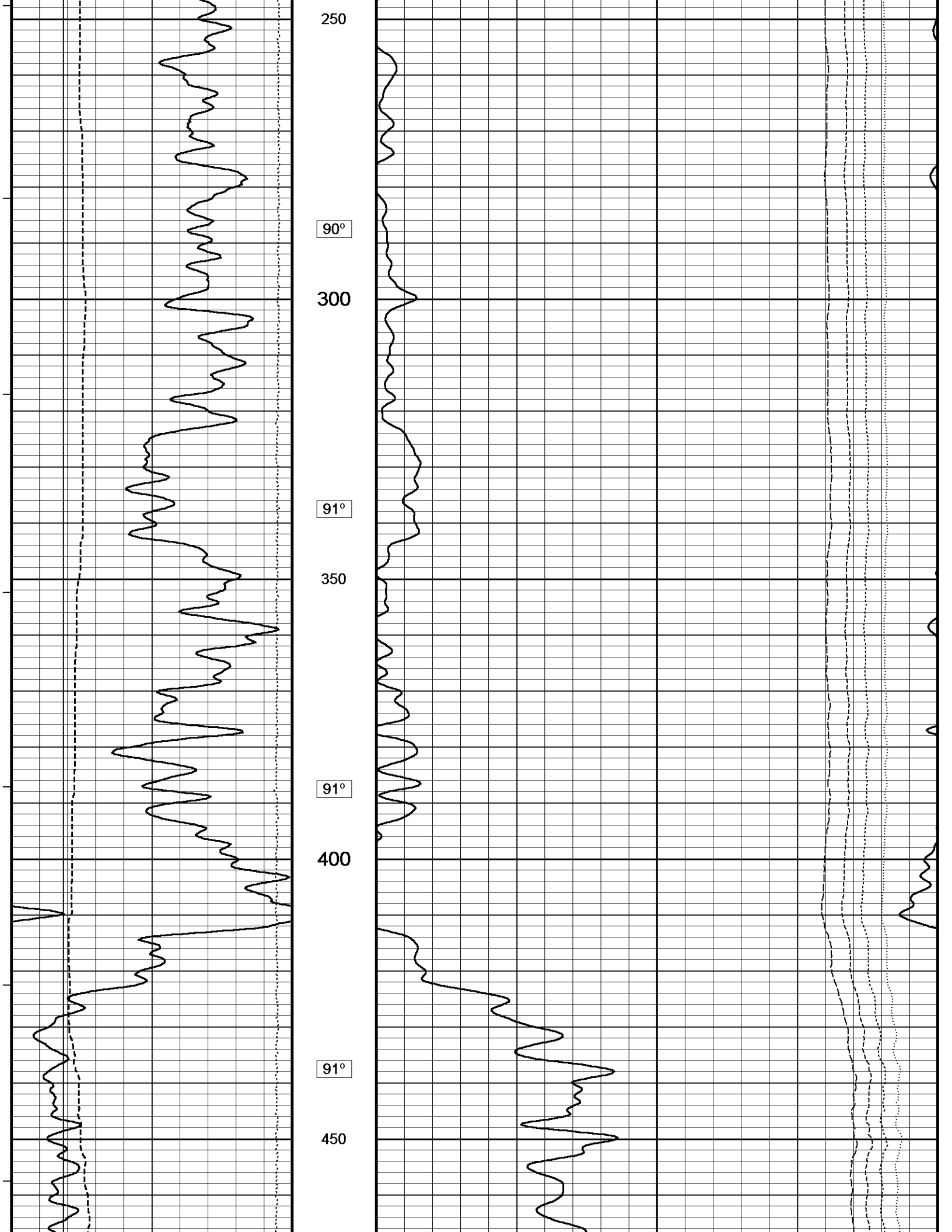
5 INCH MAIN

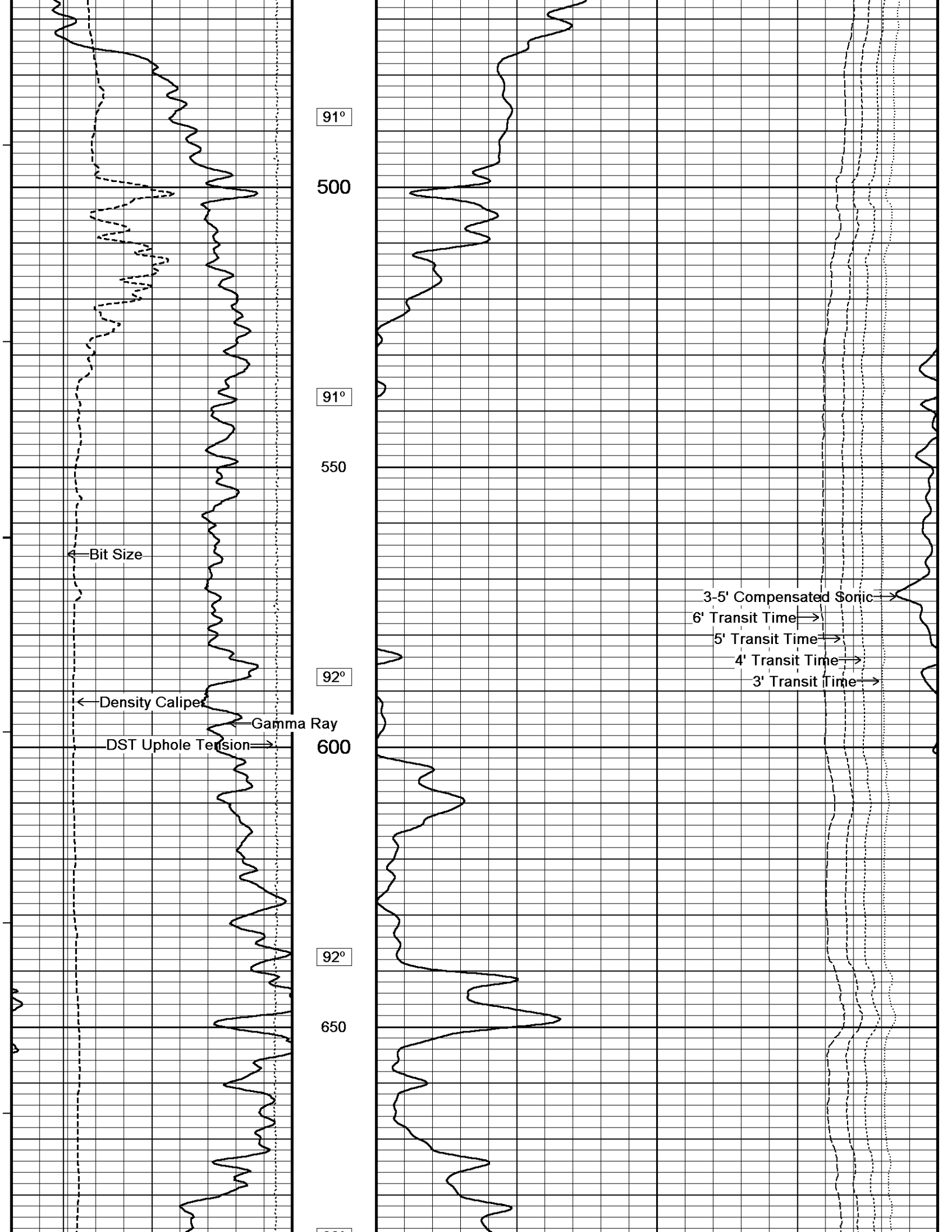
Depth Based Data - Maximum Sampling Increment 10.0cm  
Plotted on 14-AUG-2012 12:31  
Filename: C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_004.dta  
Recorded on 14-AUG-2012 09:51  
System Versions: Processed with 13.02.6600 Plotted with 13.02.6600

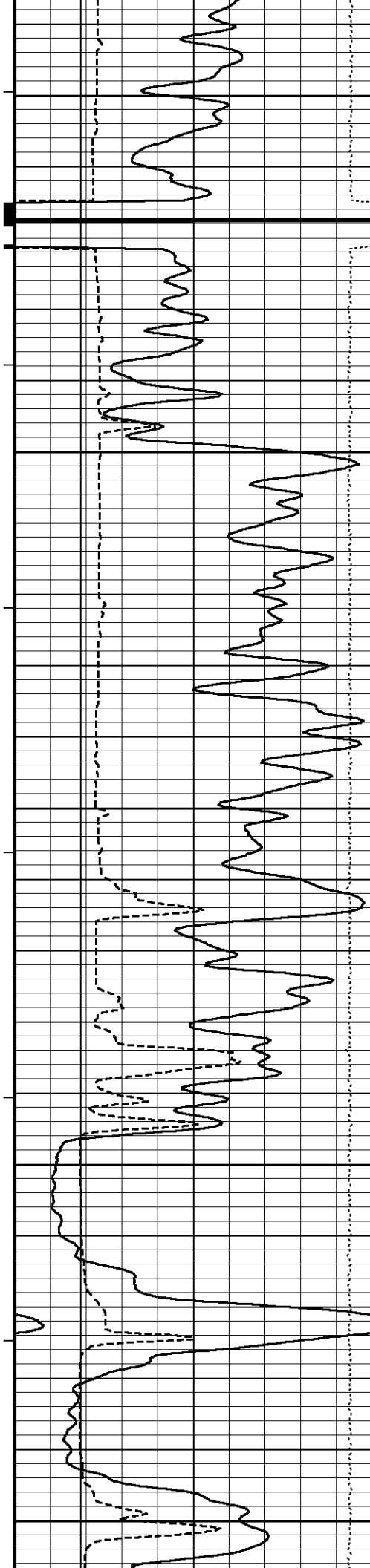


Depth In Feet  
Borehole Temp in deg F  
208  
Casing Shoe

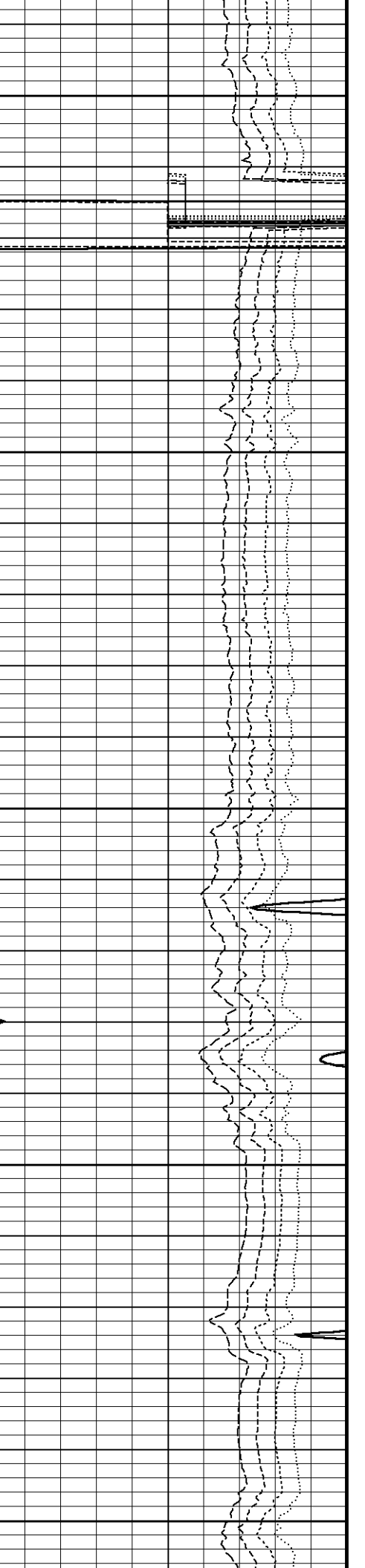
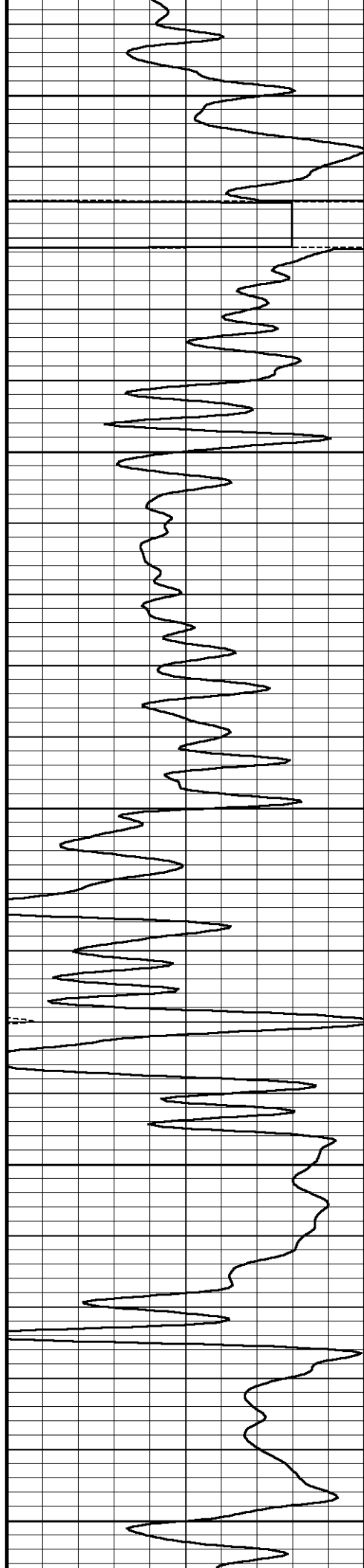


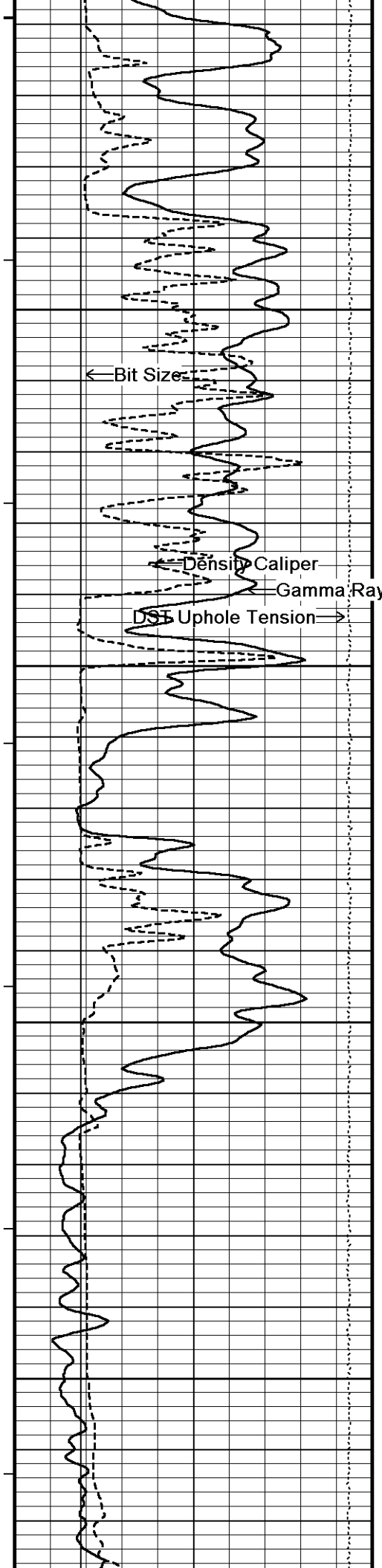






93°  
700  
93°  
750  
93°  
800  
93°  
850  
93°  
900





93°

950

← Bit Size

← Density Caliper

← Gamma Ray

← DST Uphole Tension

94°

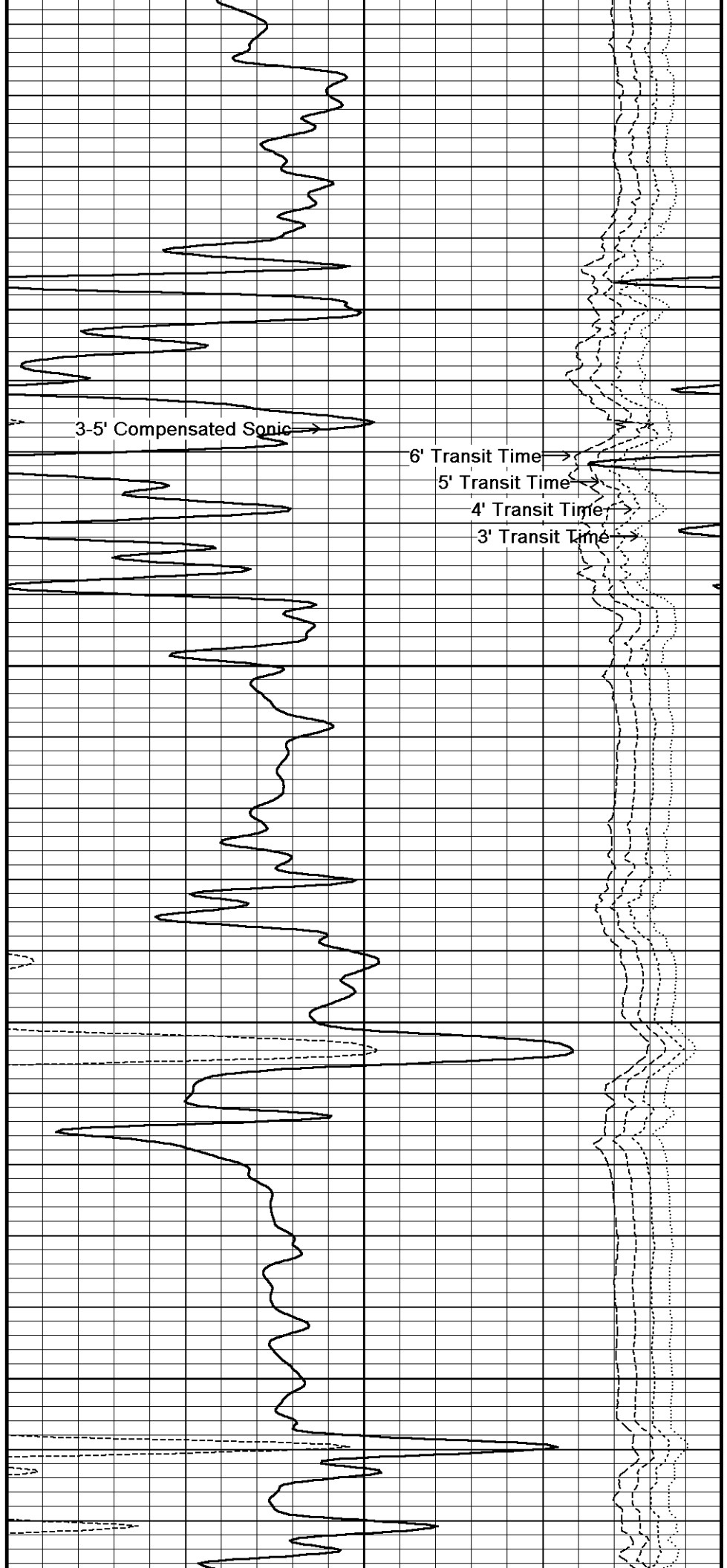
1000

93°

1050

94°

1100



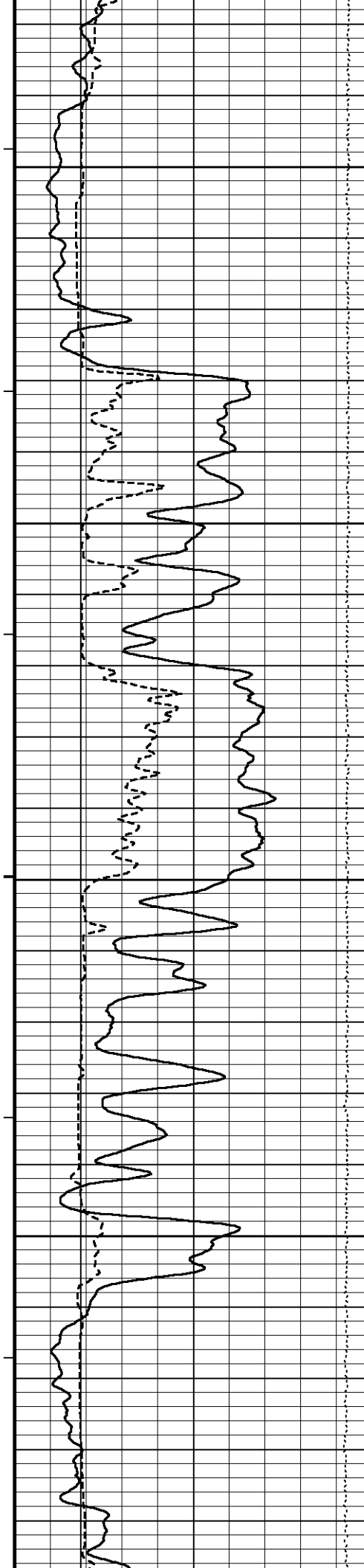
→ 3-5' Compensated Sonic

→ 6' Transit Time

→ 5' Transit Time

→ 4' Transit Time

→ 3' Transit Time



94°

1150

95°

1200

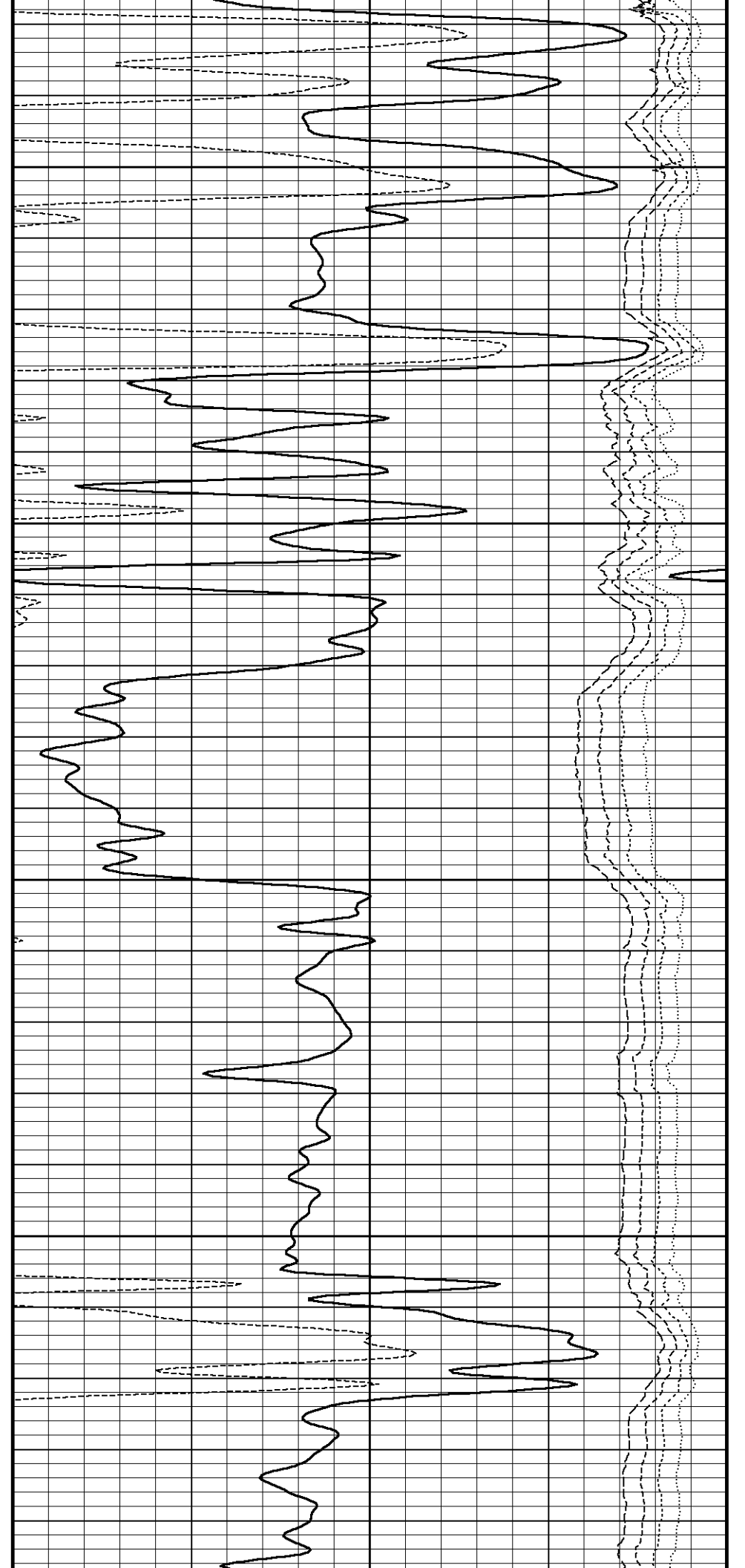
95°

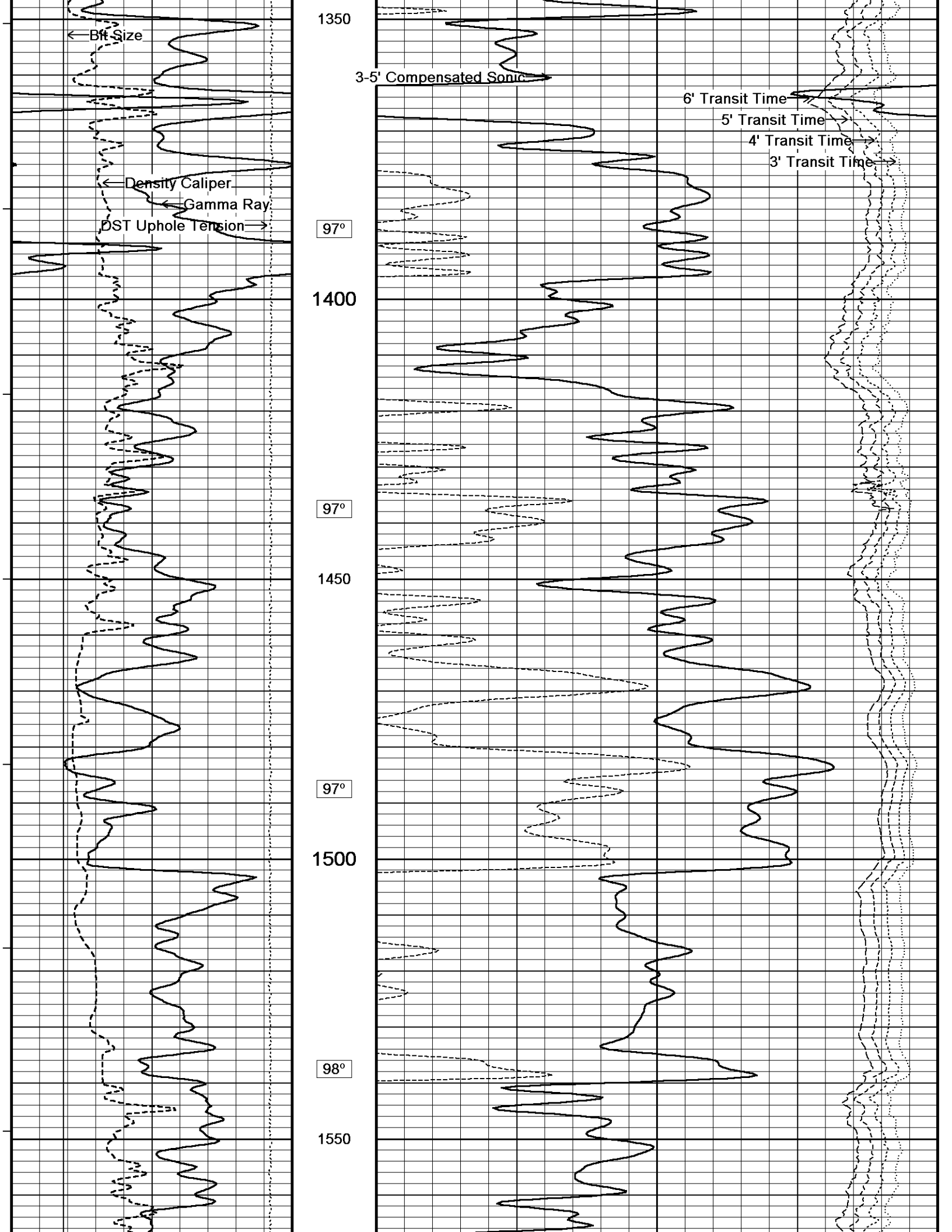
1250

96°

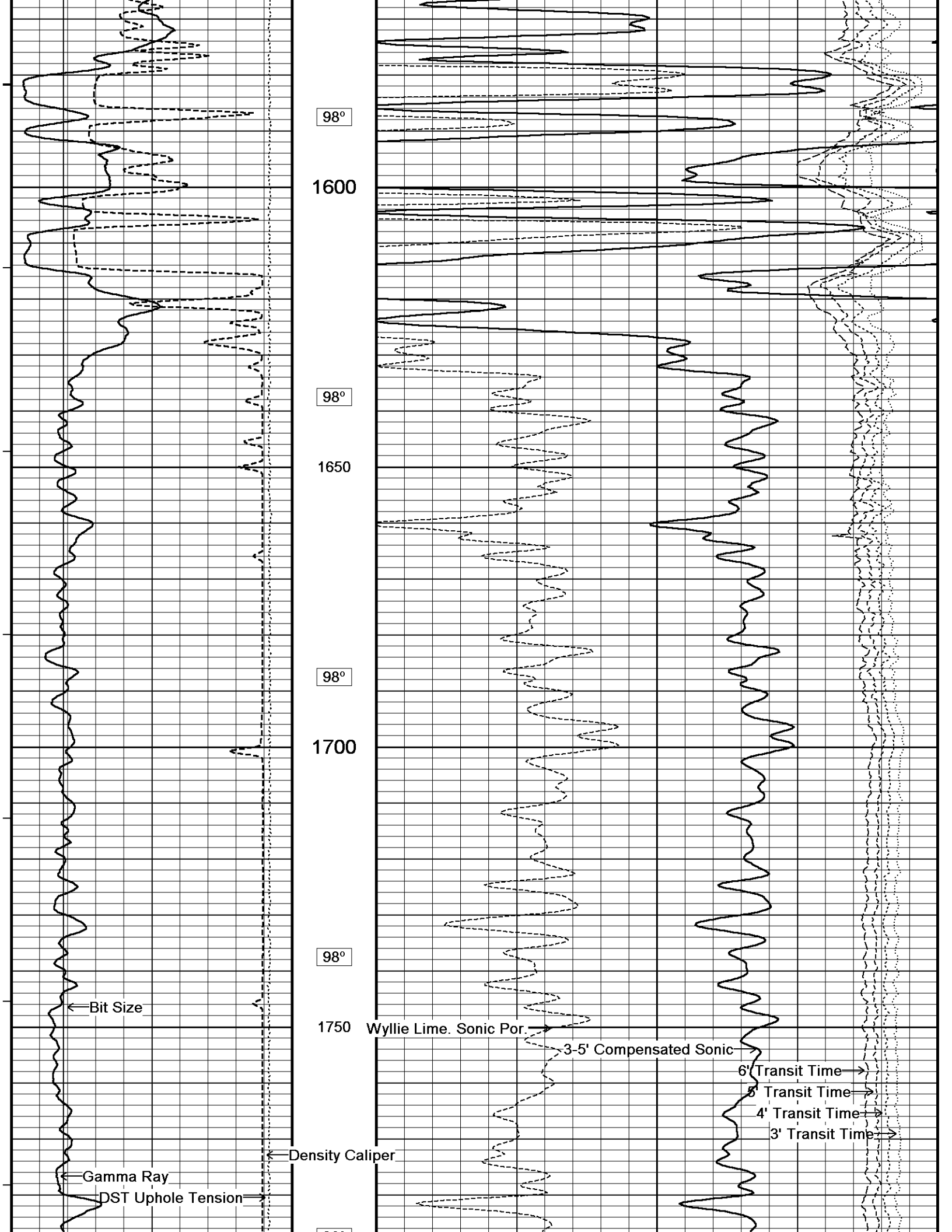
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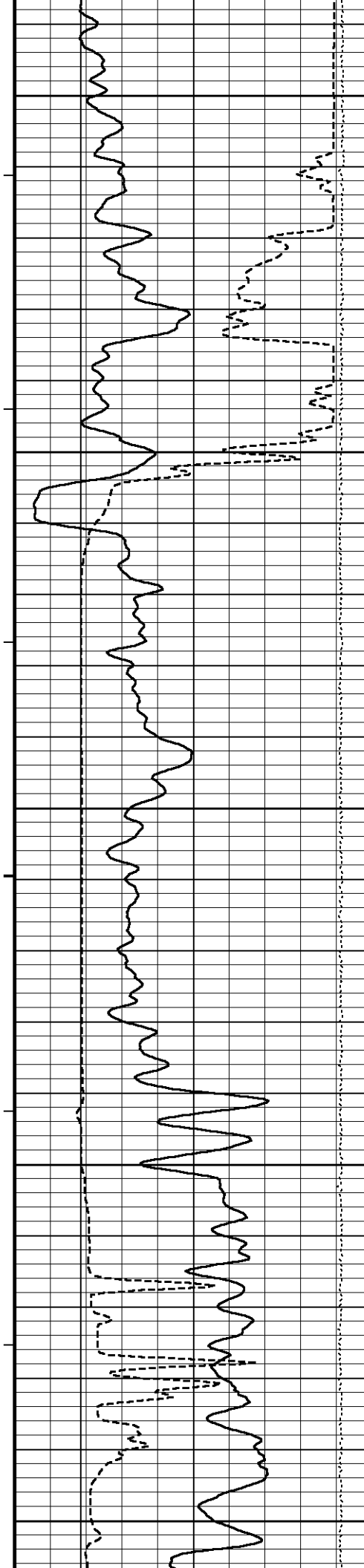
96°



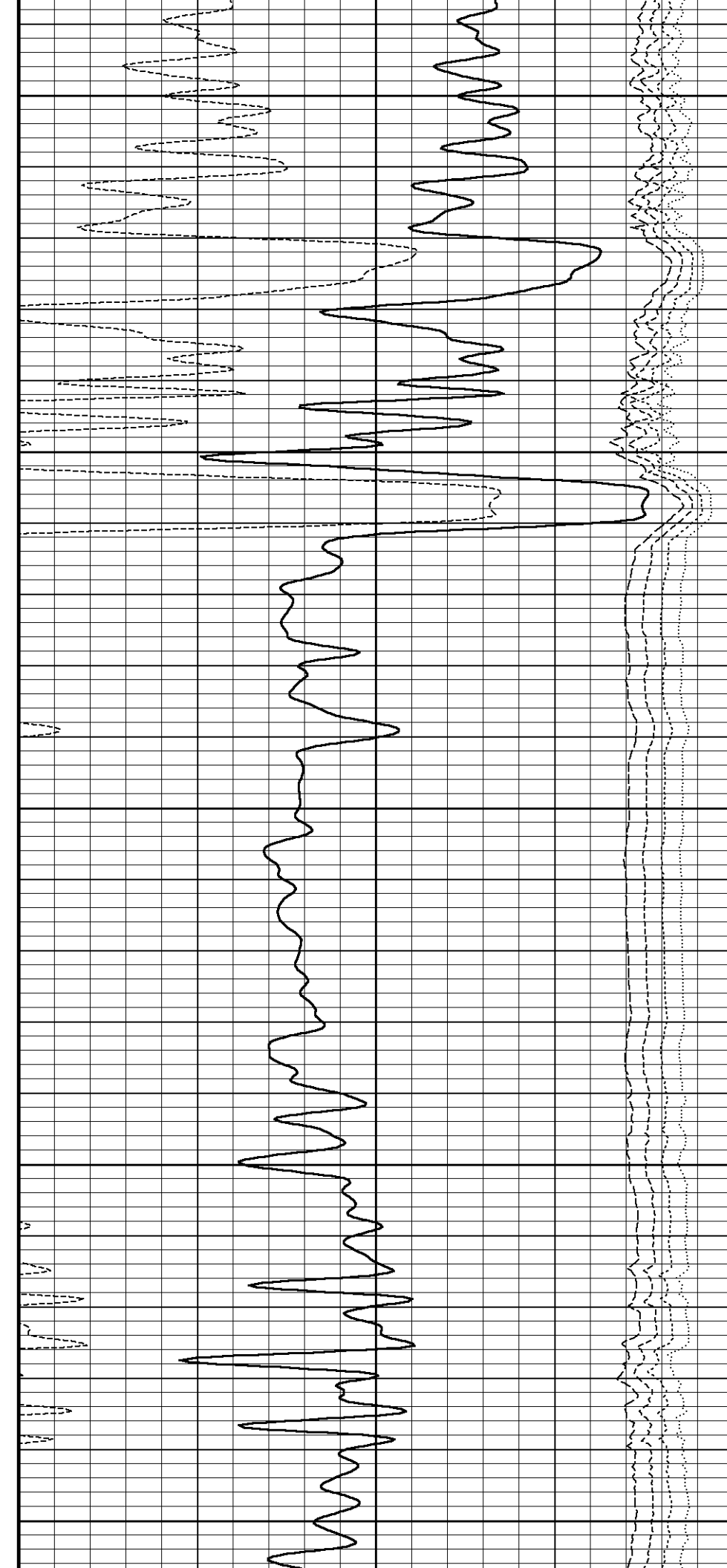


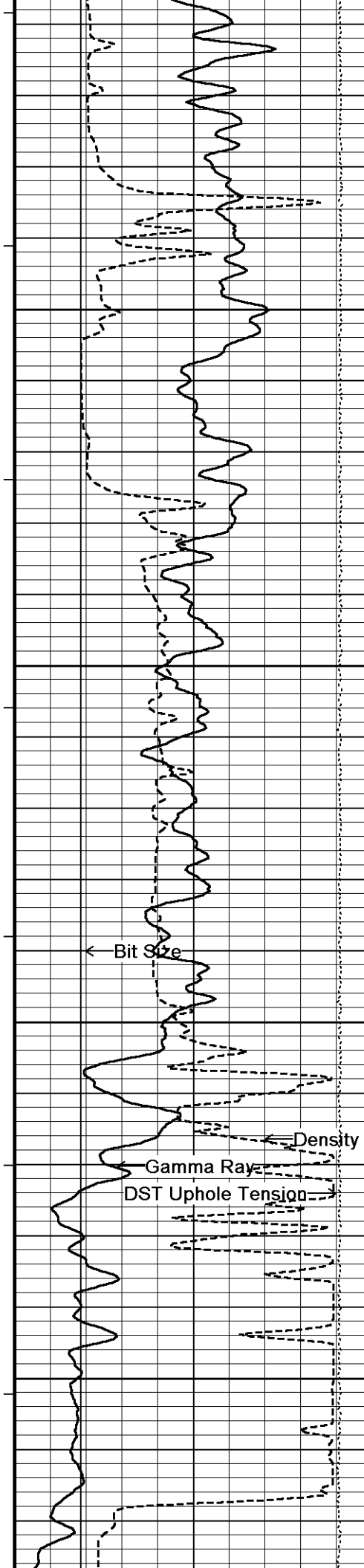






98°  
1800  
99°  
1850  
99°  
1900  
99°  
1950  
99°  
2000





100°

2050

100°

2100

100°

2150

100°

2200

Wyllie Lime. Sonic Por. →

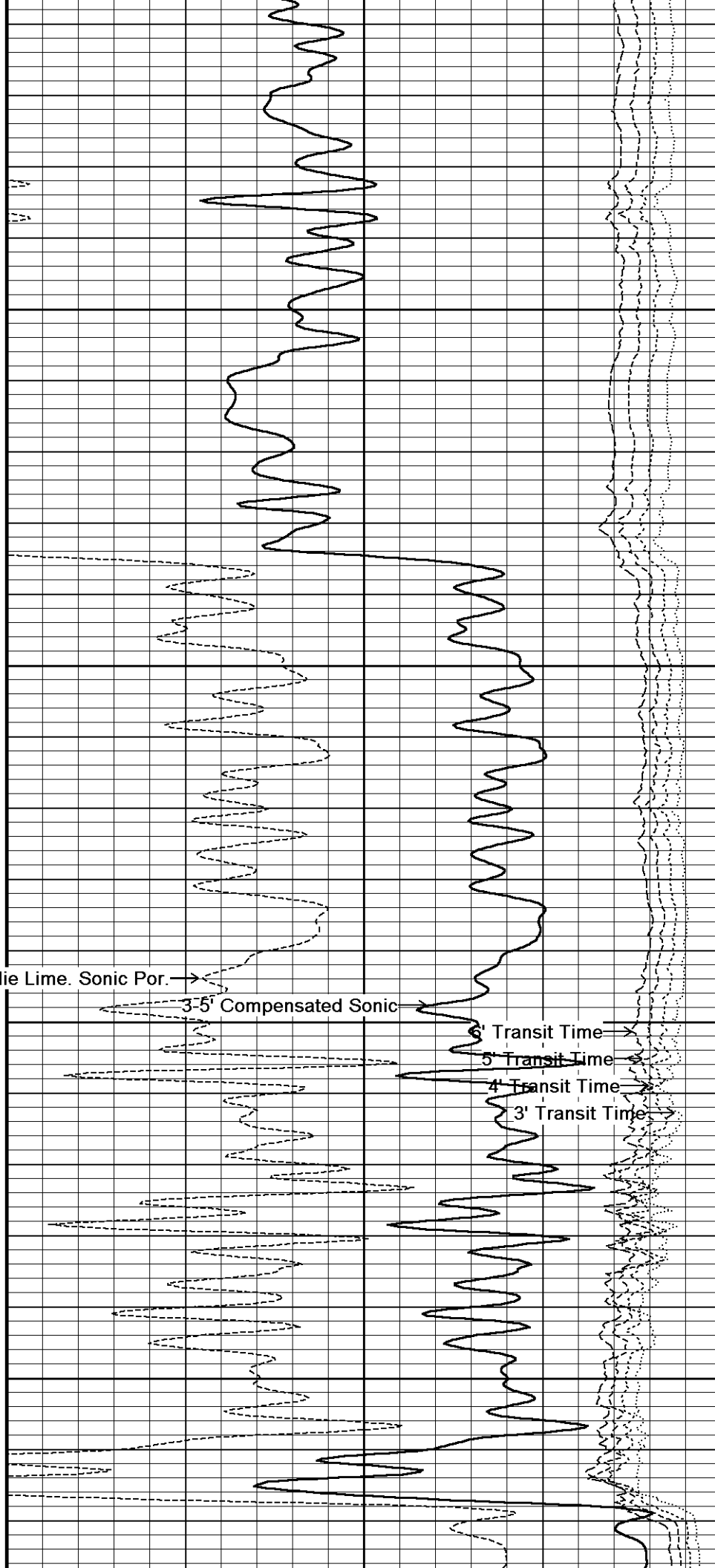
3-5' Compensated Sonic

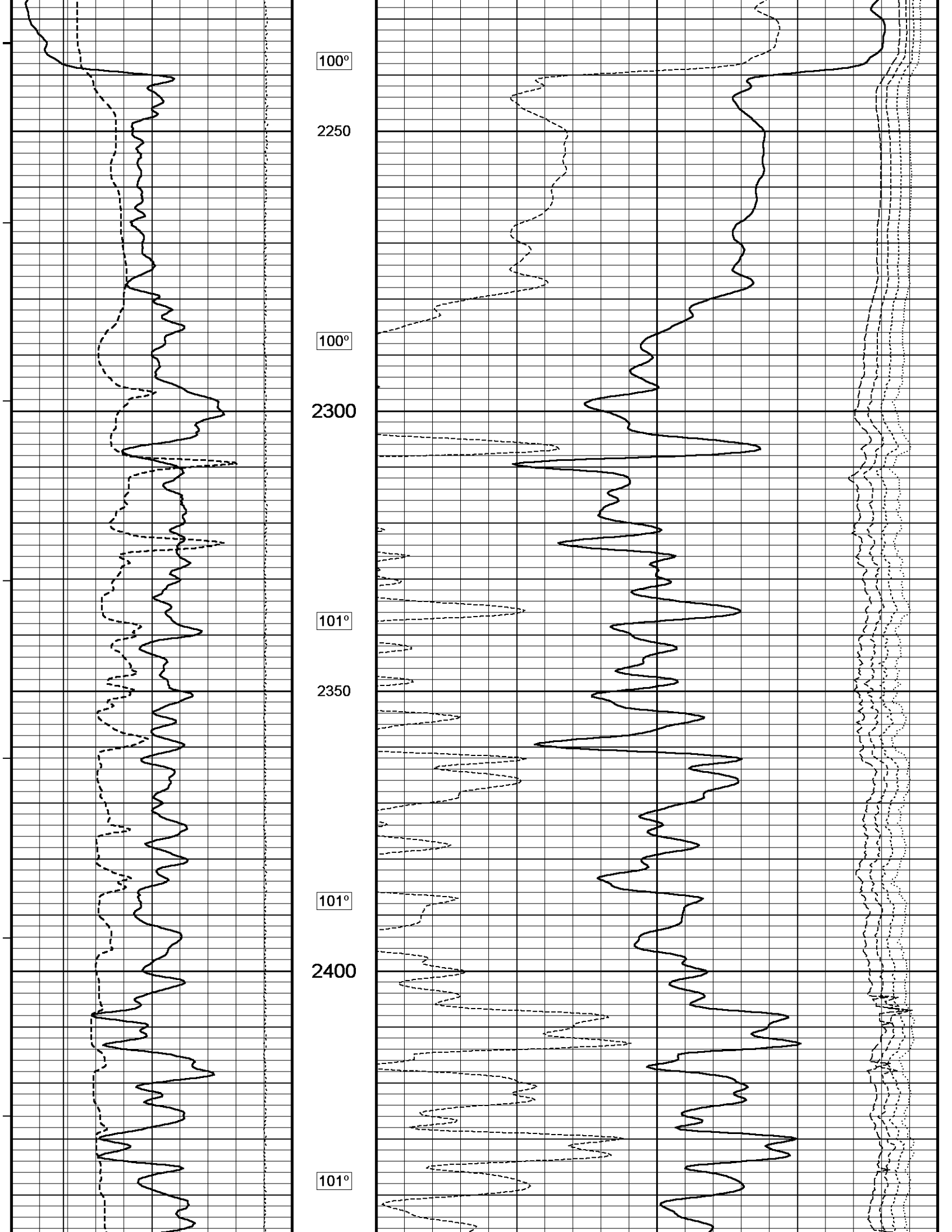
6' Transit Time →

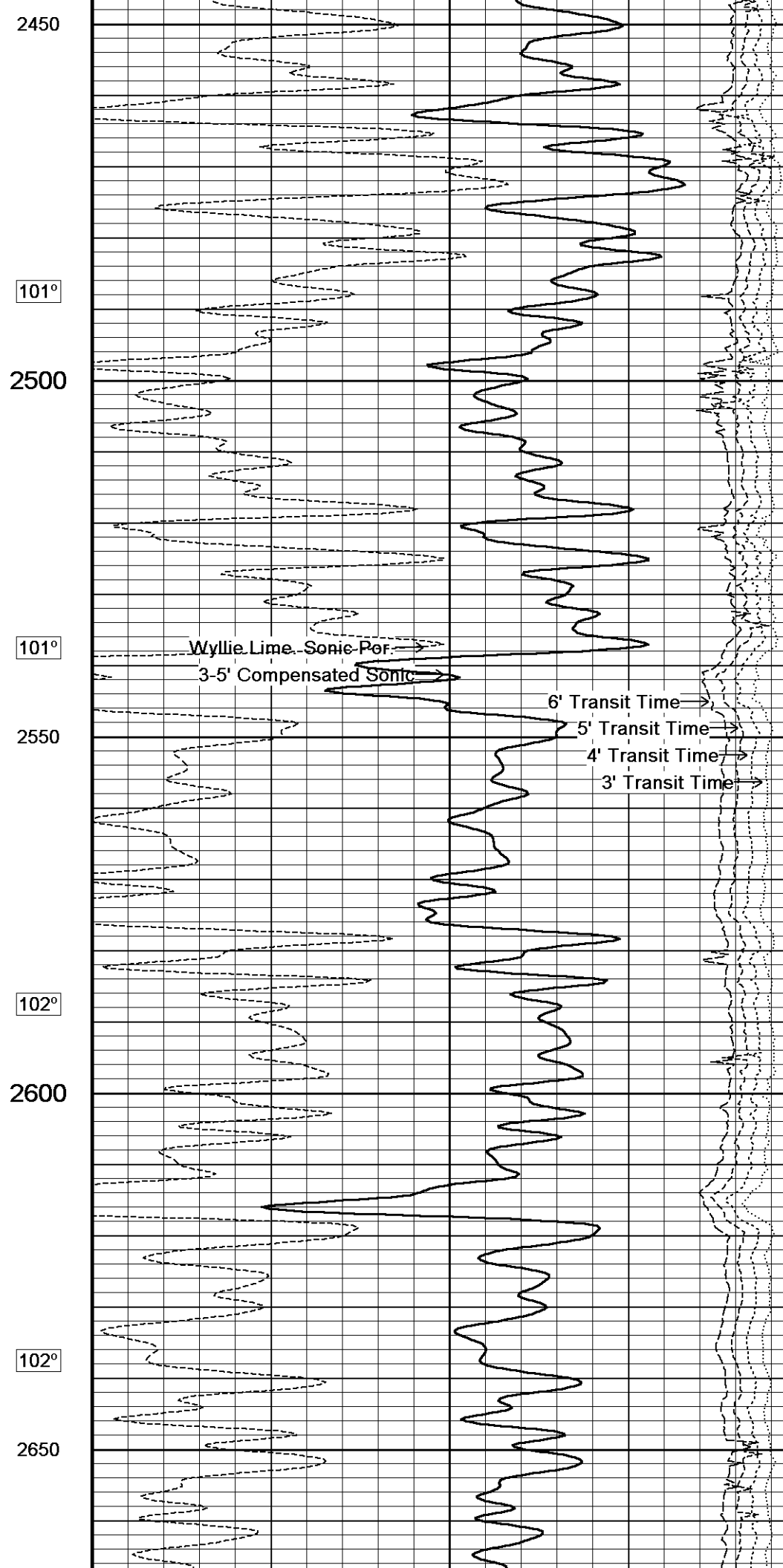
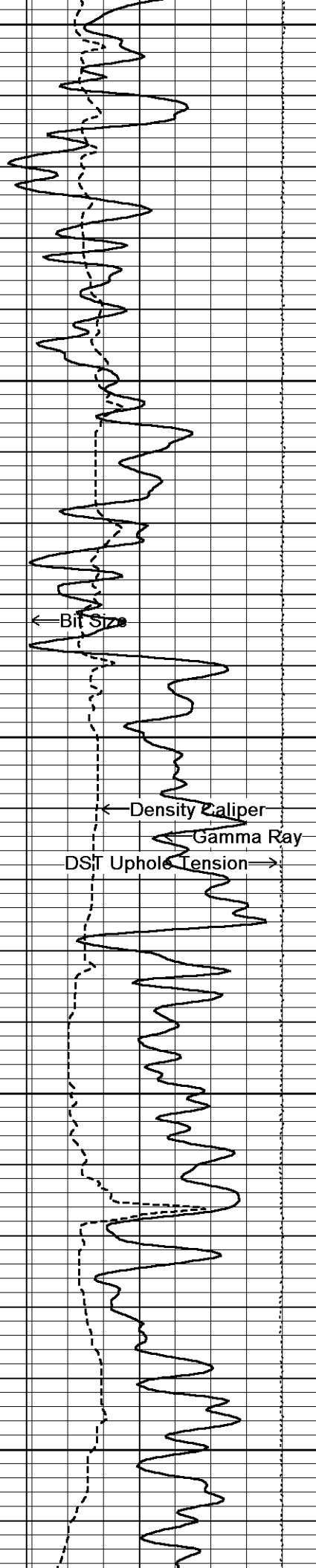
5' Transit Time →

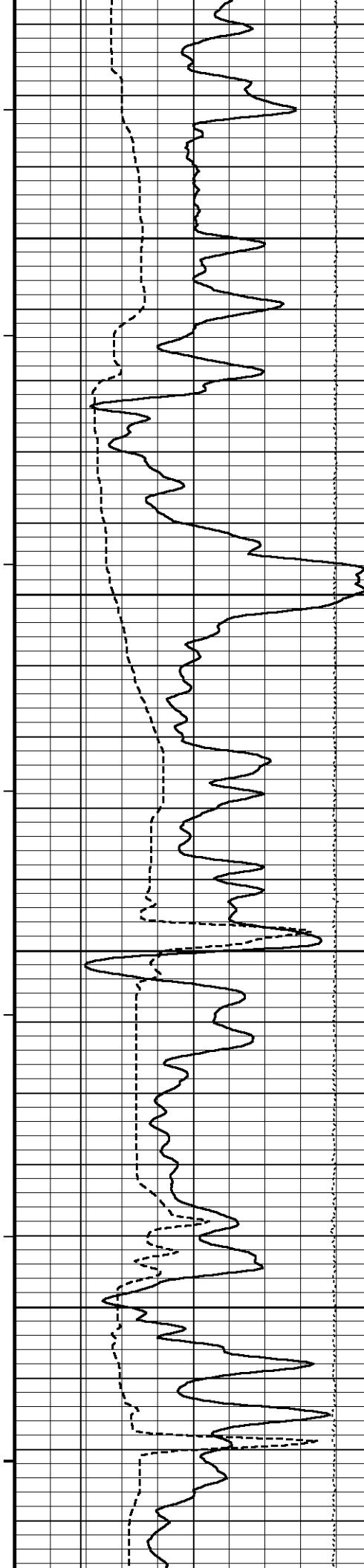
4' Transit Time →

3' Transit Time →









102°

2700

102°

2750

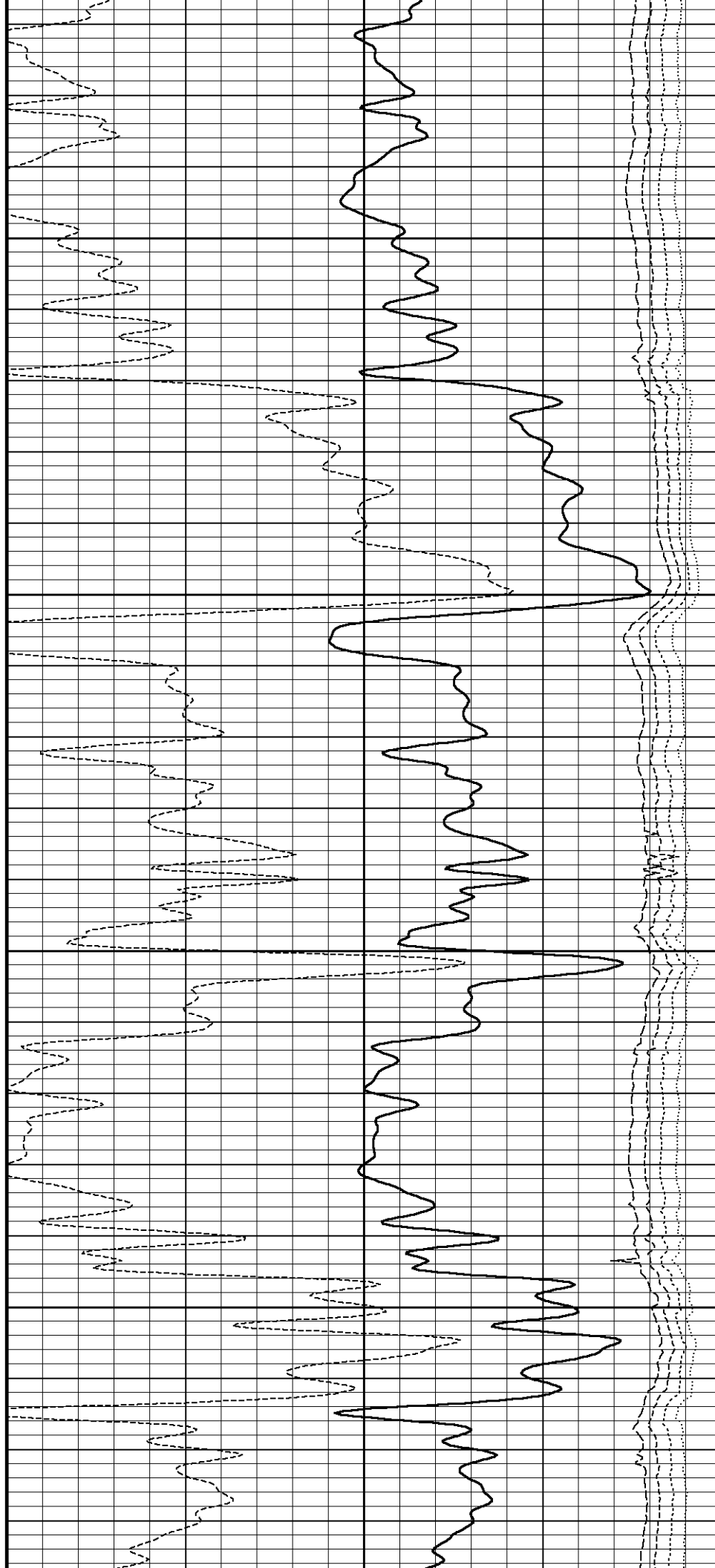
103°

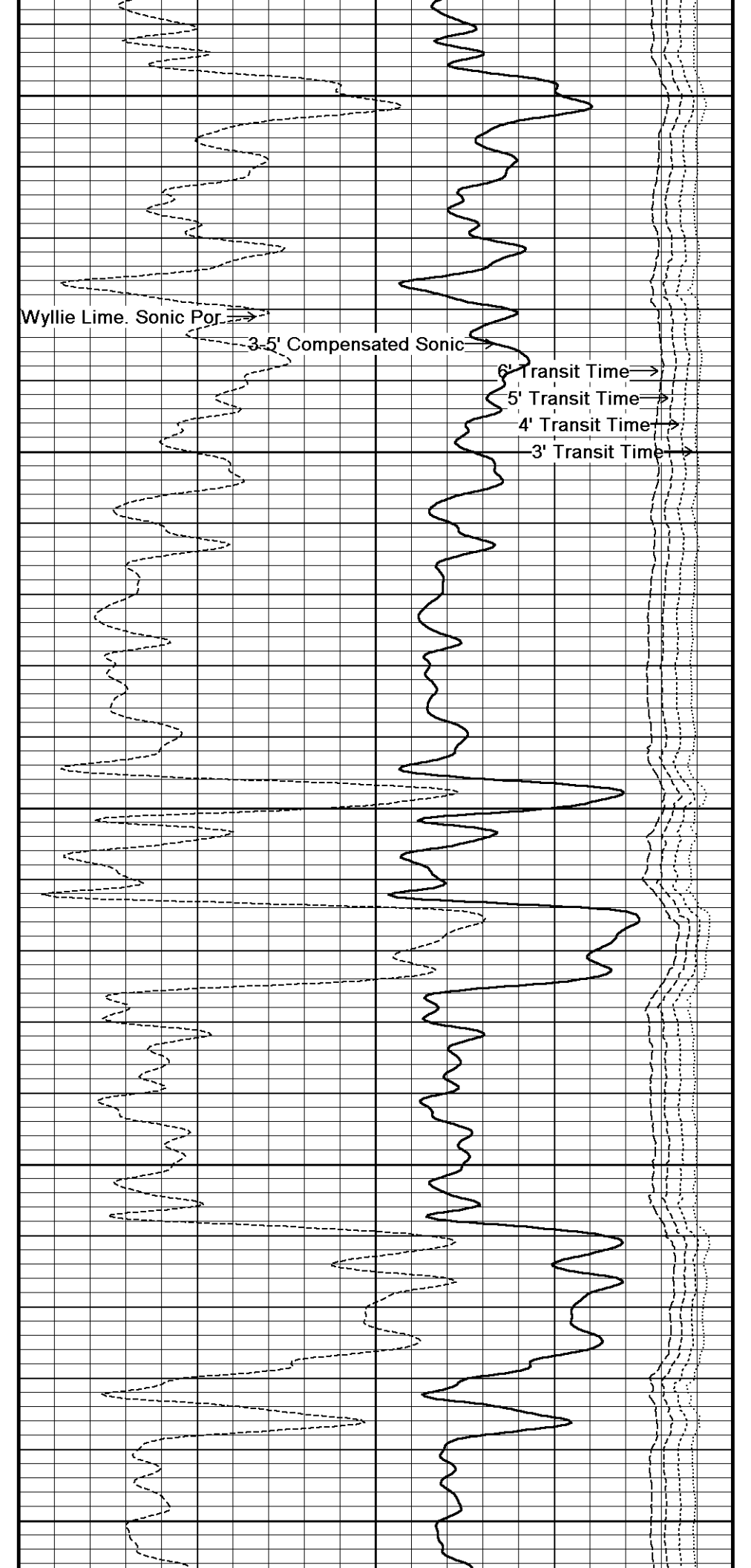
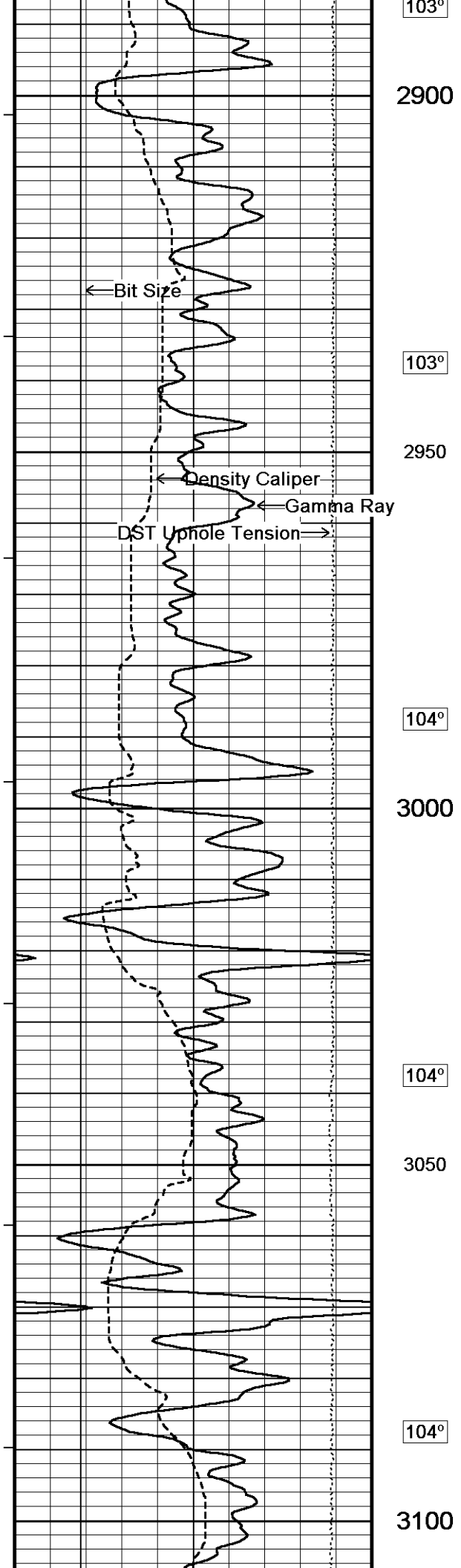
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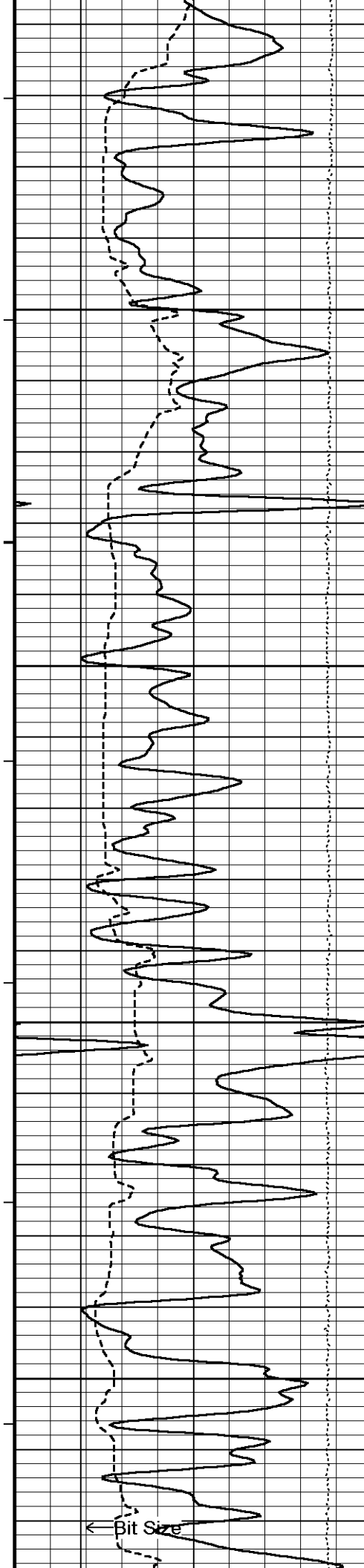
103°

2850

2900







104°

3150

105°

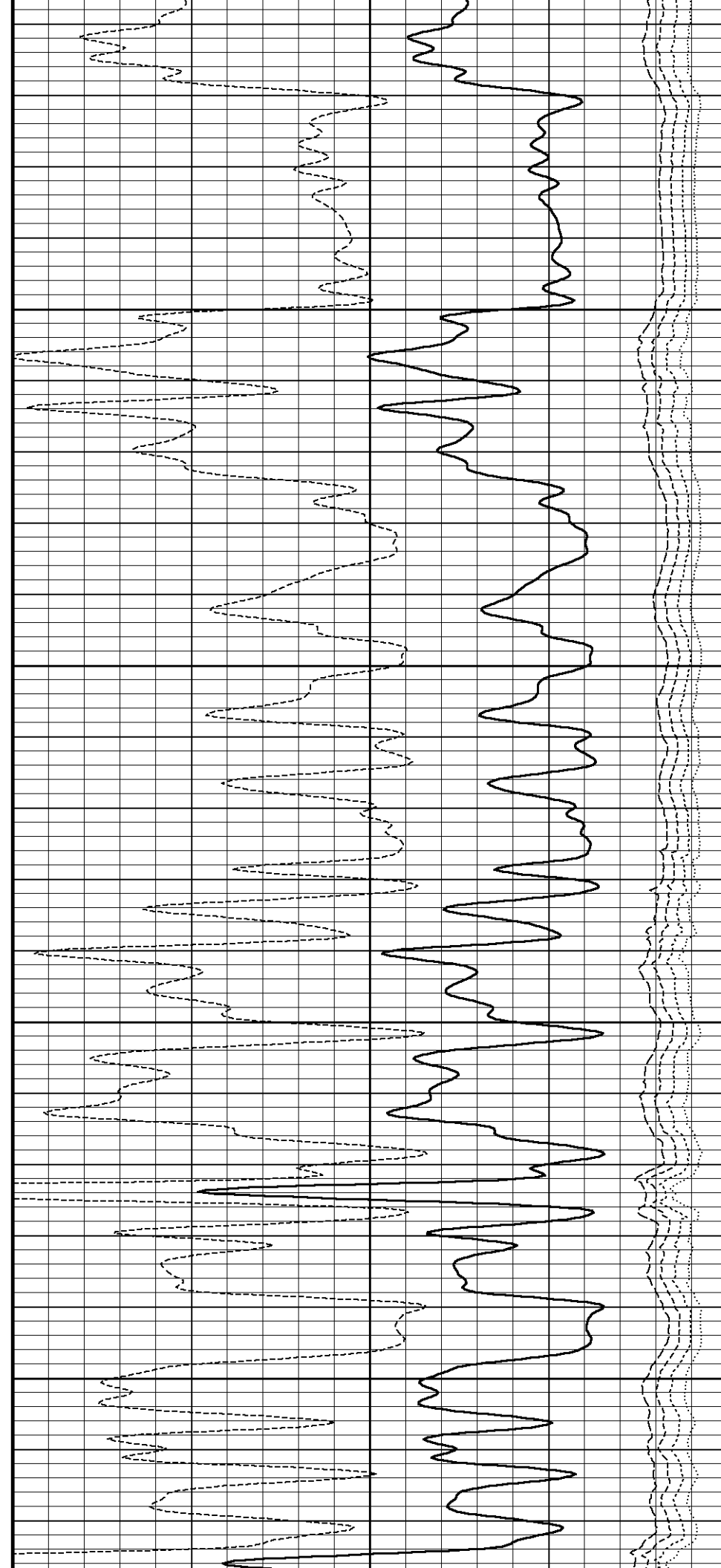
3200

105°

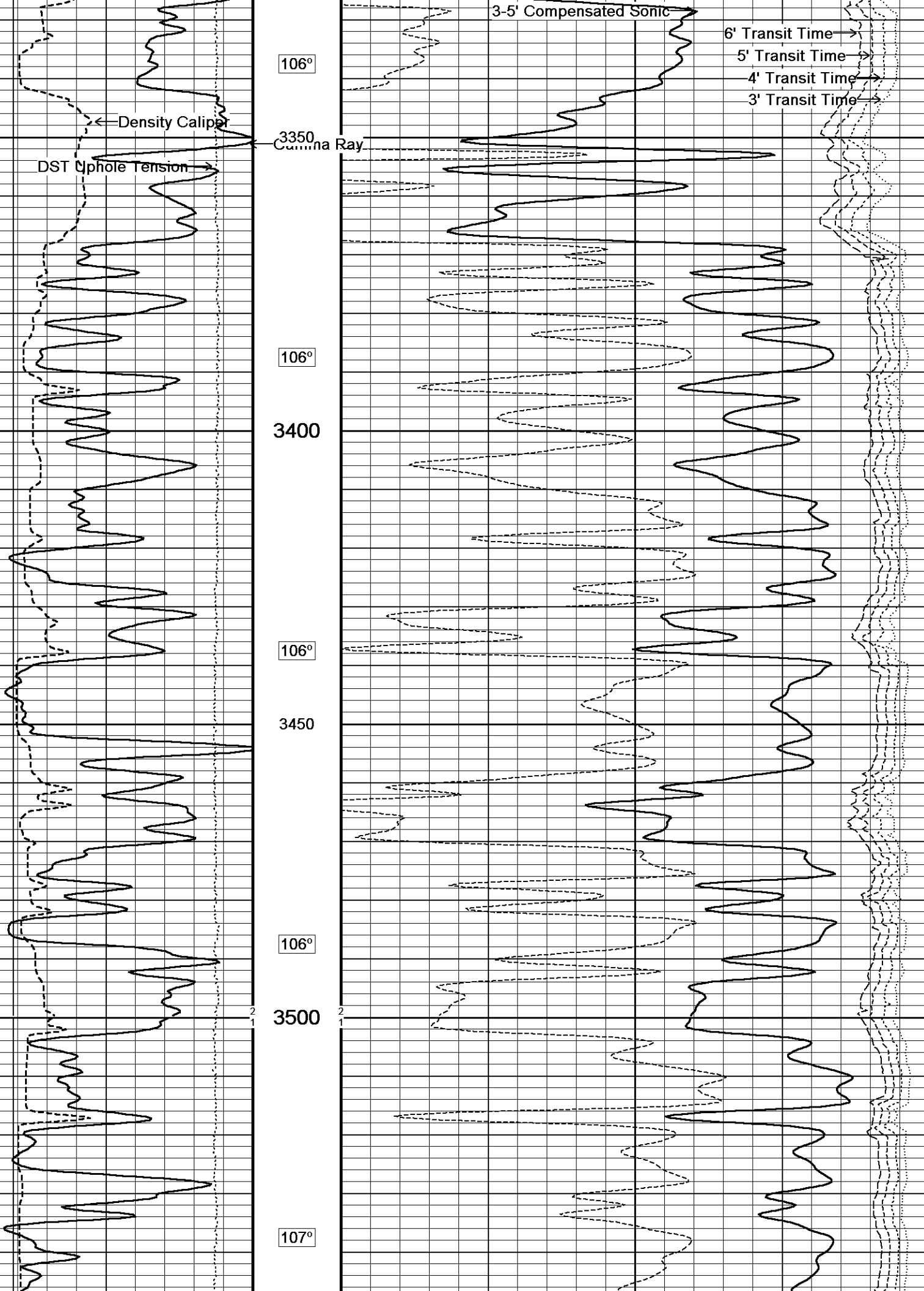
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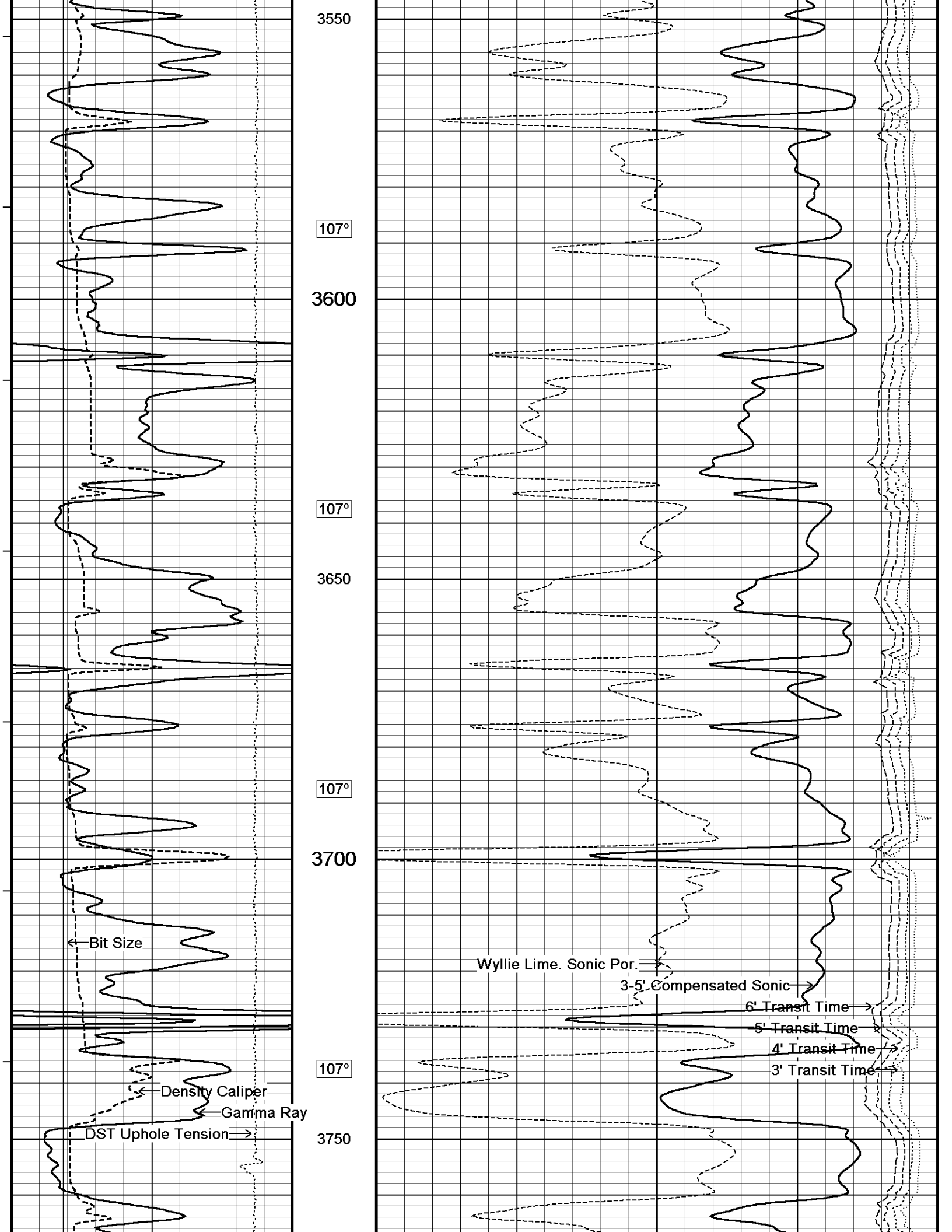
105°

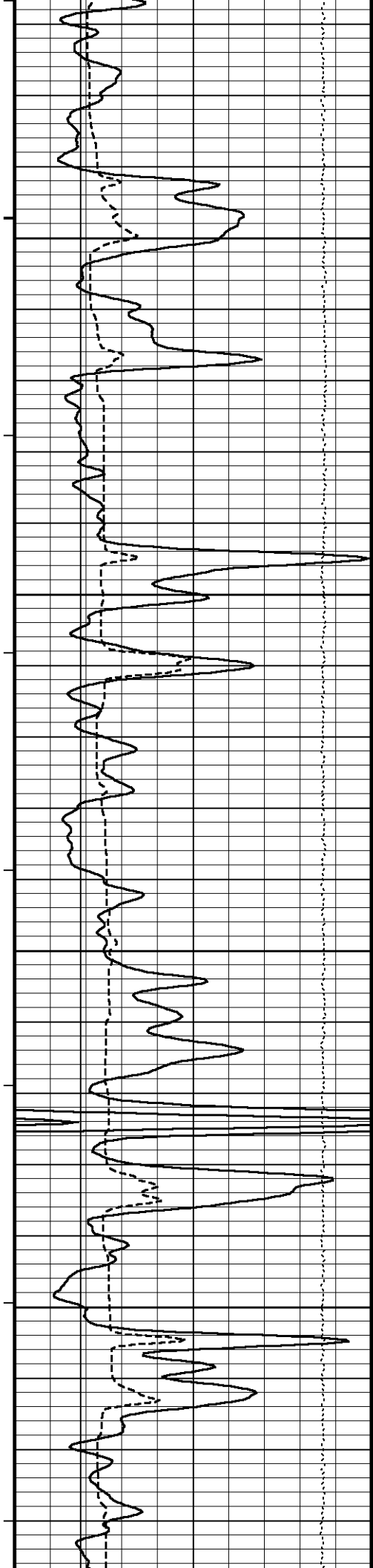
3300











108°

3800

108°

3850

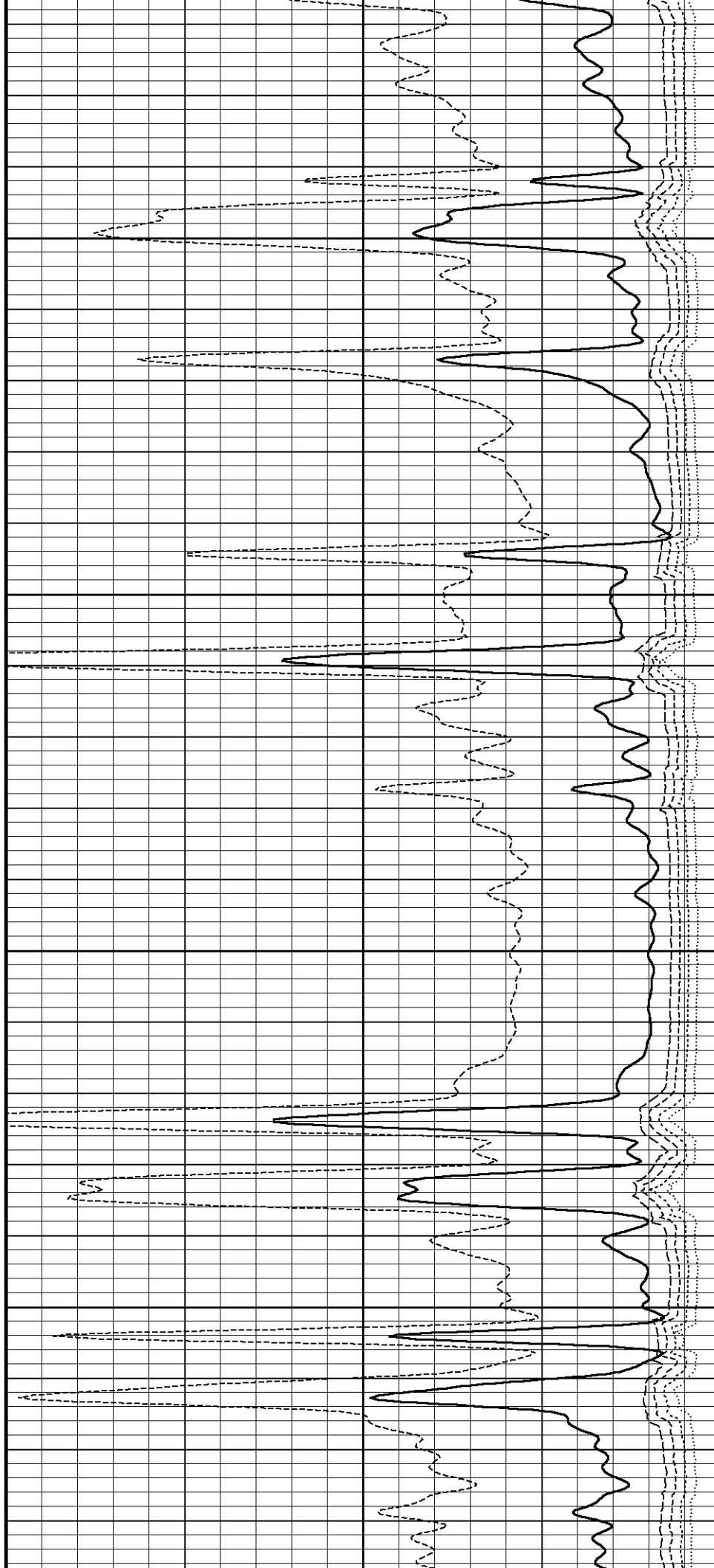
108°

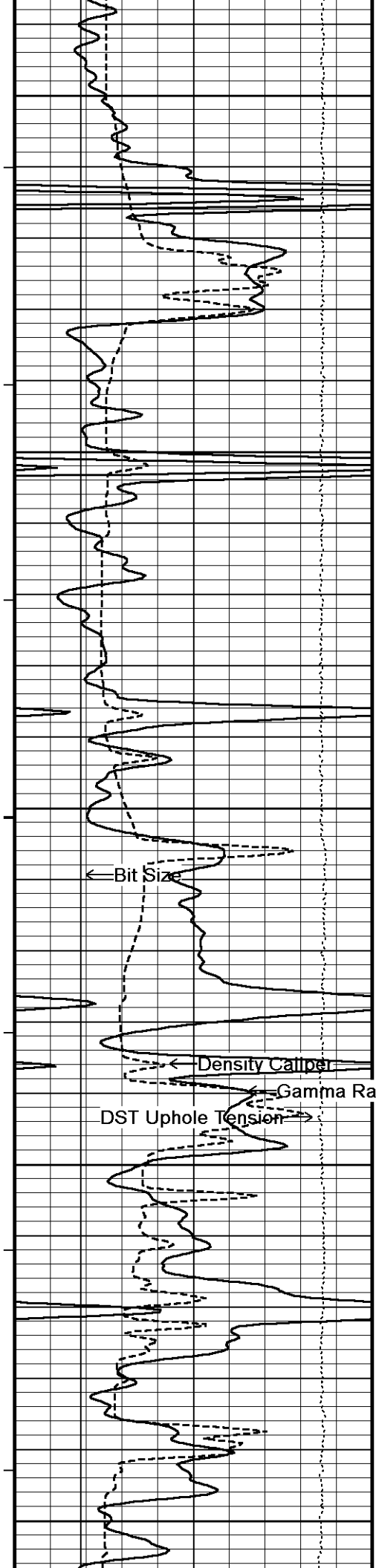
3900

109°

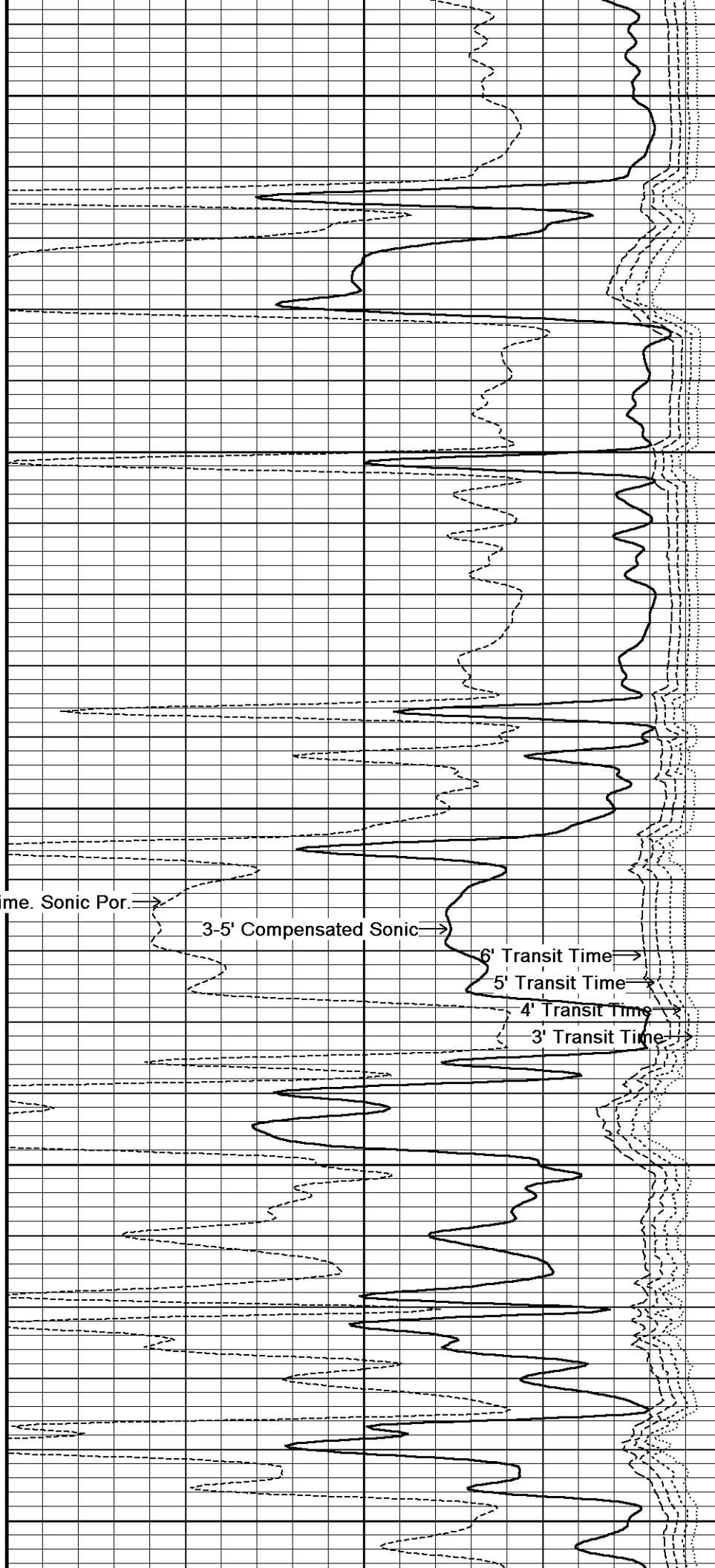
3950

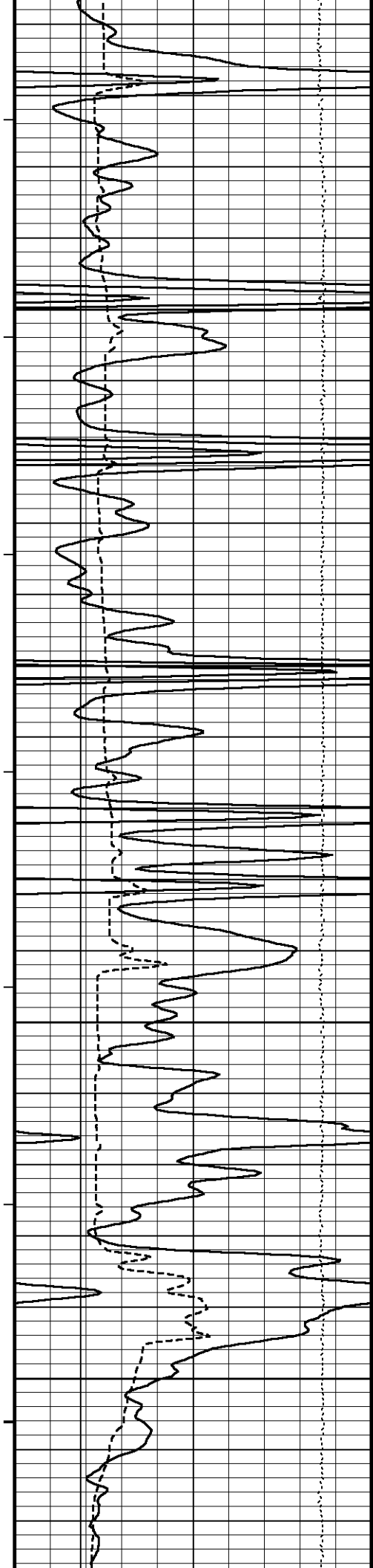
4000





109°  
4000  
109°  
4050  
110°  
4100  
Wyllie Lime. Sonic Por. →  
110°  
4150  
111°  
4200





111°

4250

112°

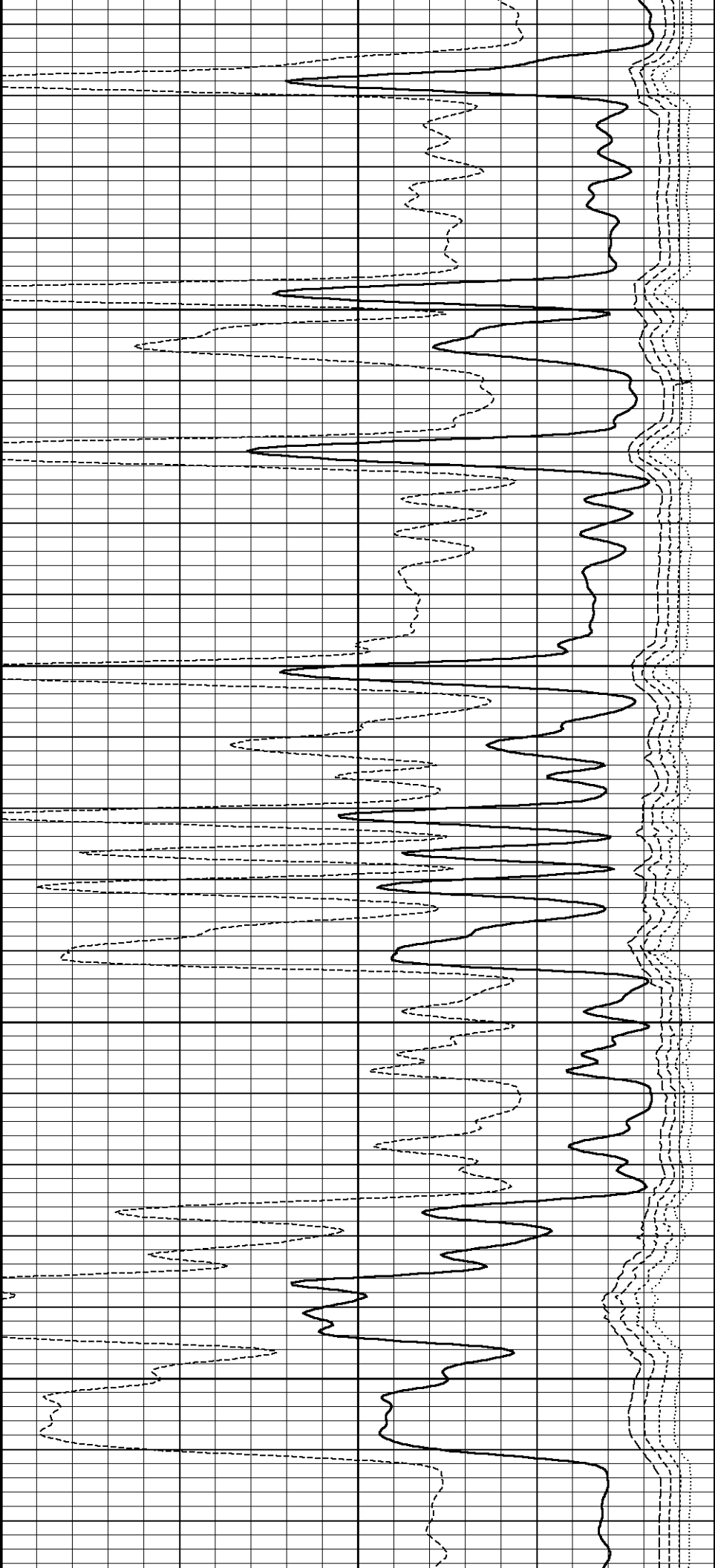
4300

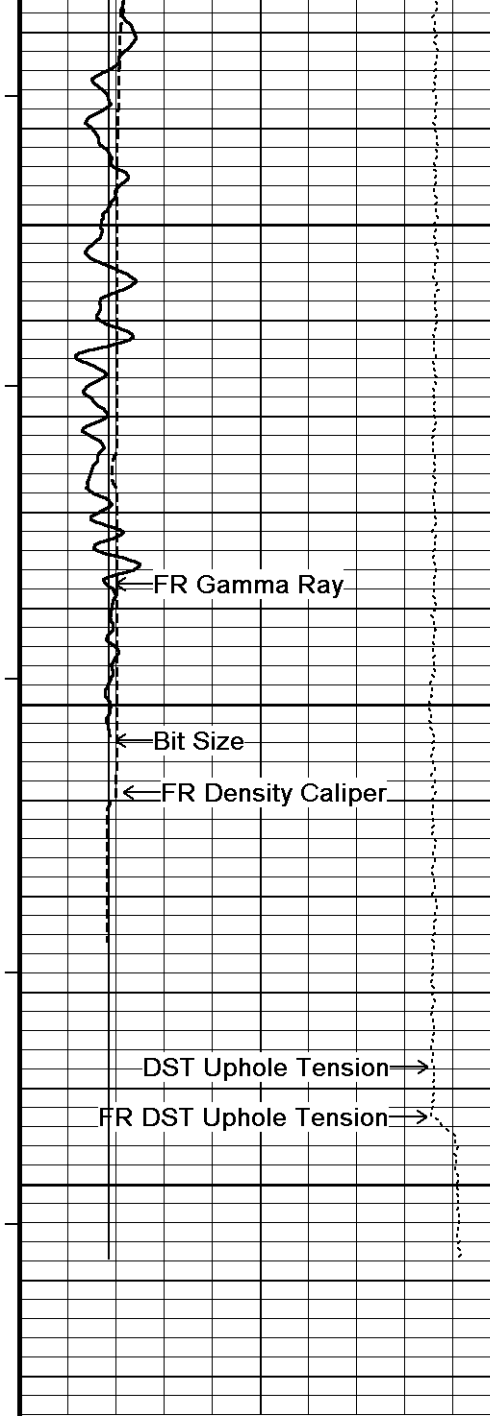
112°

4350

113°

4400





113°

4450

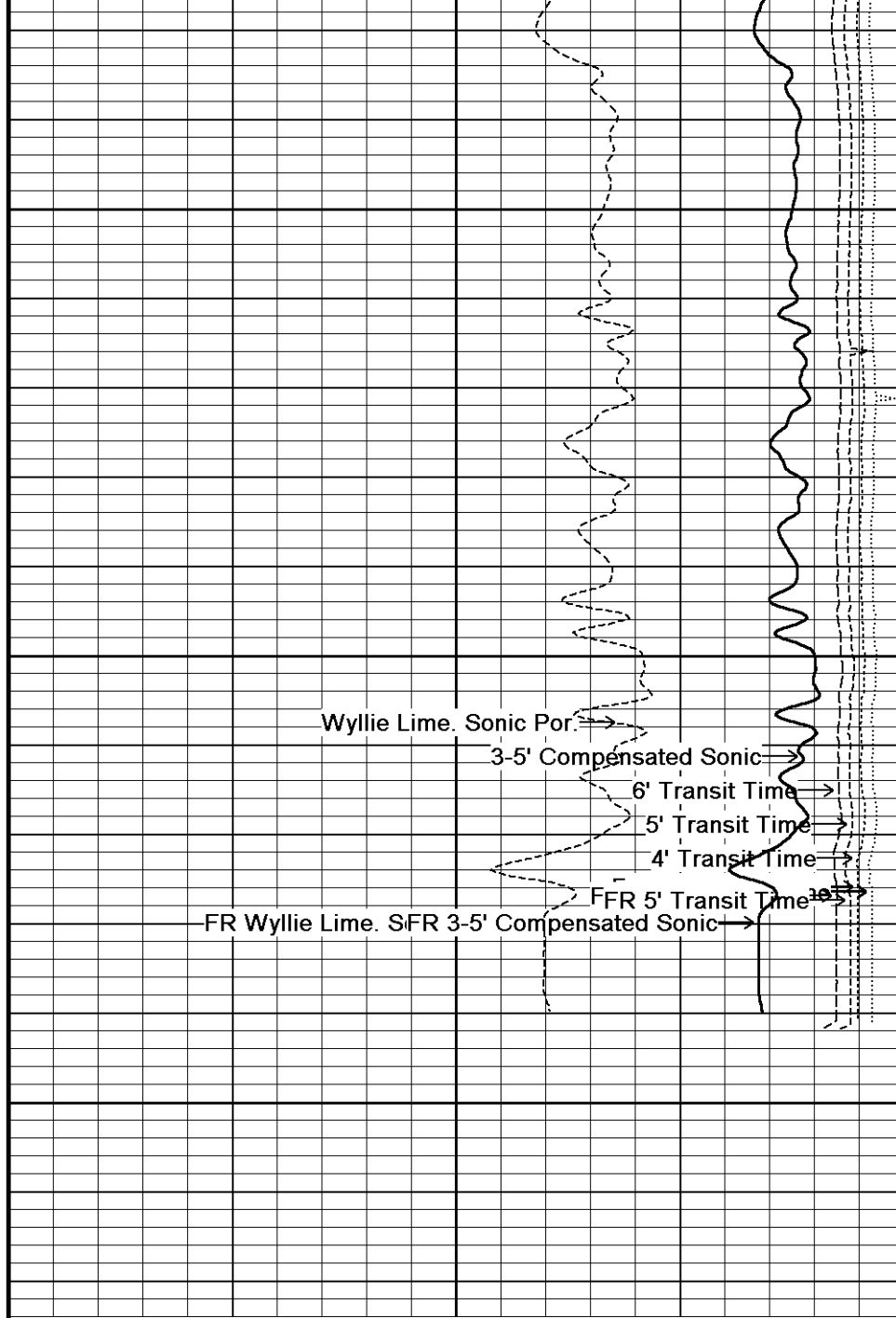
112°

4500

4550

4572

Depth In Feet



Timing Marks every 60.0 sec

Gamma Ray  
API  
0 75 150

Density Caliper  
inches  
6 11 16

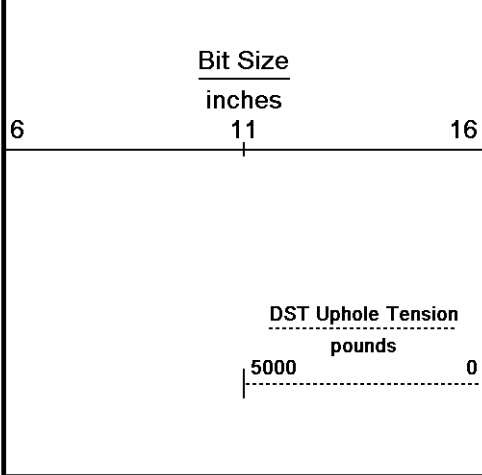
3-5' Compensated Sonic  
microsec/foot  
140 115 90 65 40

Wyllie Lime. Sonic Por.  
percent  
30 20 10 0 -10

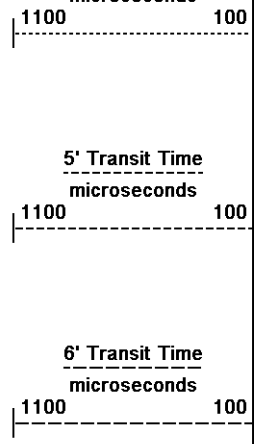
Borehole Temp in deg F

3' Transit Time  
microseconds  
1100 100

4' Transit Time  
microseconds



Replay  
Scale  
1:240

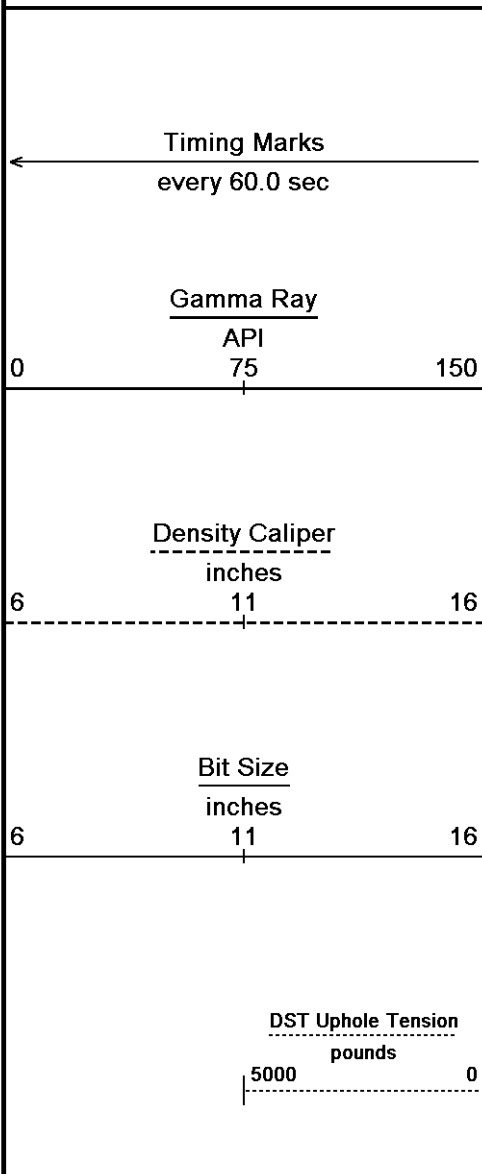


Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 14-AUG-2012 12:31  
 Filename: C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_004.dta  
 Recorded on 14-AUG-2012 09:51  
 System Versions: Processed with 13.02.6600 Plotted with 13.02.6600

↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 14-AUG-2012 12:31  
 Filename: C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_002.dta  
 Recorded on 14-AUG-2012 09:27  
 System Versions: Logged with 13.02.6600 Processed with 13.02.6600 Plotted with 13.02.6600

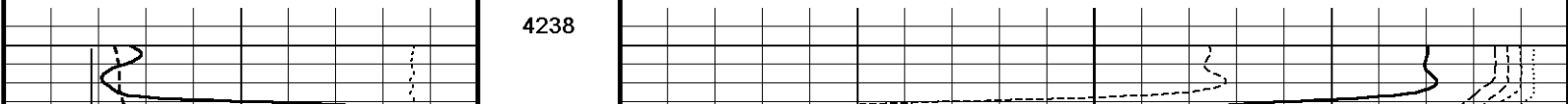
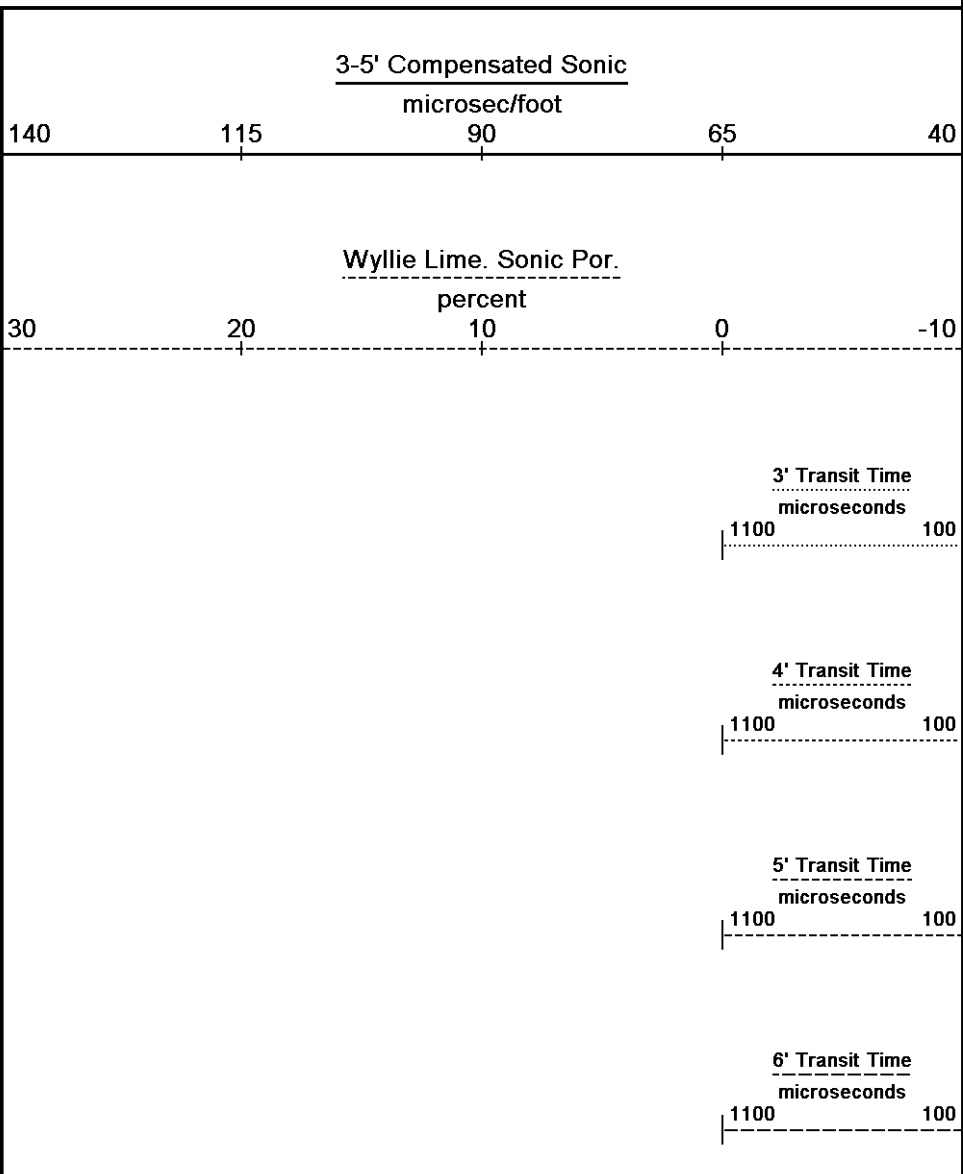


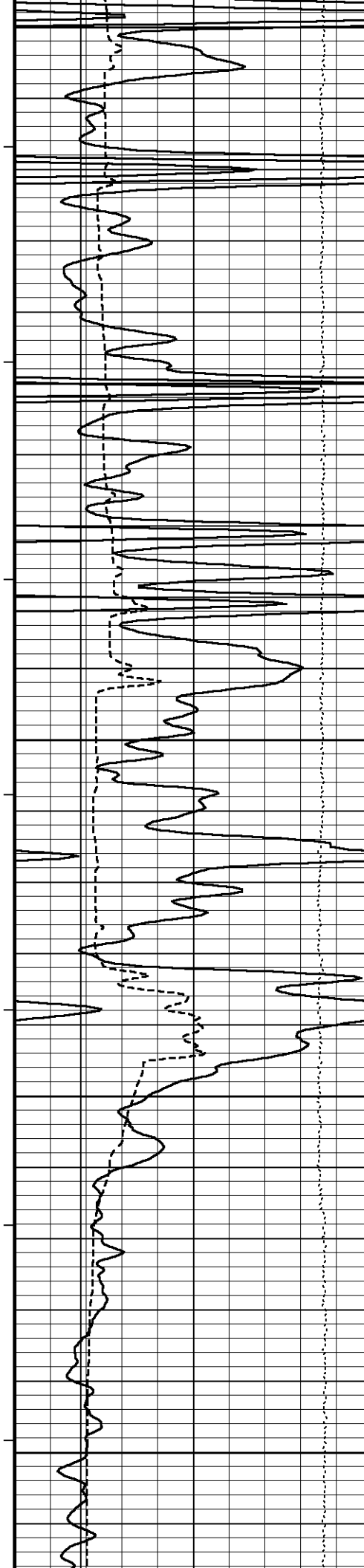
Depth  
in  
Feet

Borehole  
Temp in  
deg F

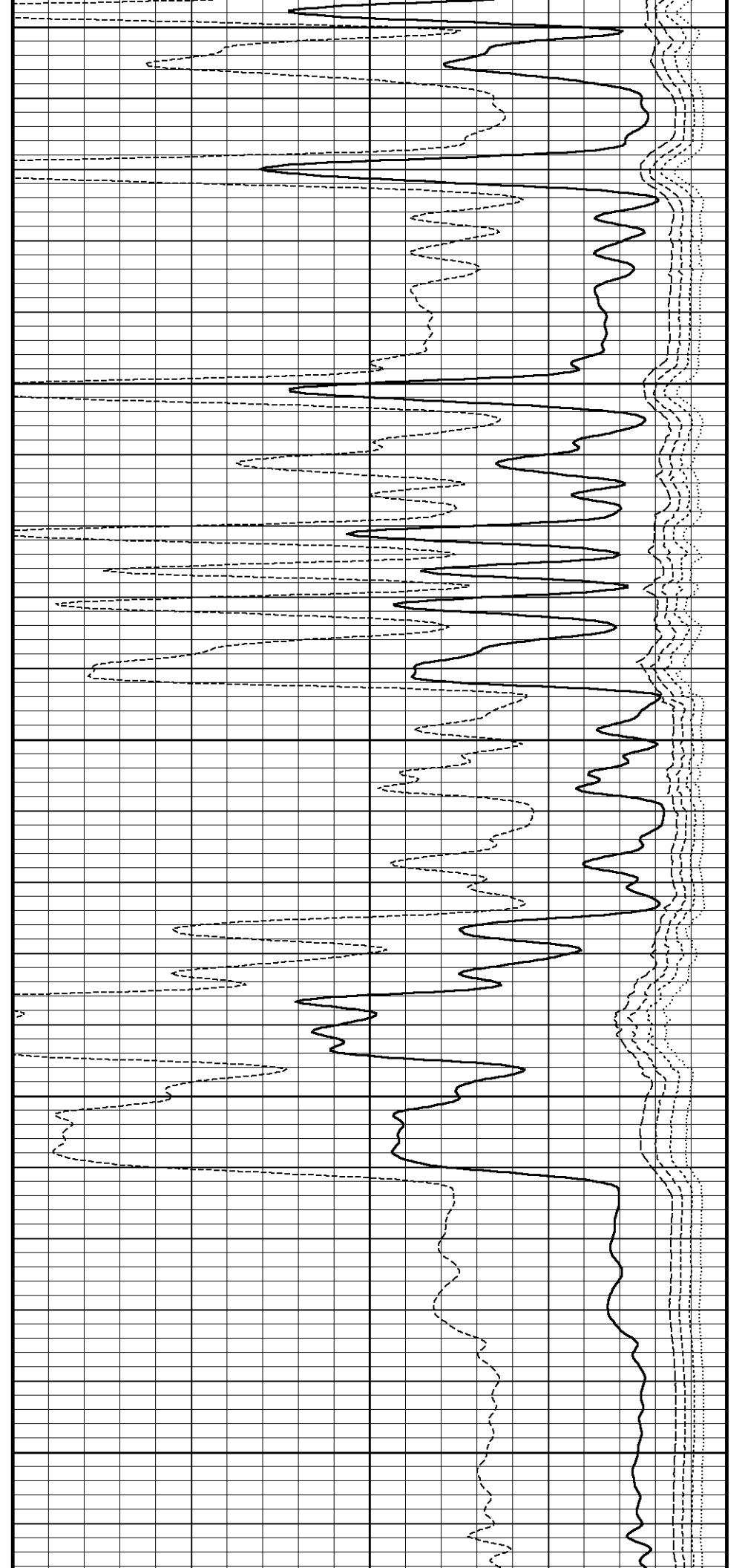
Replay  
Scale  
1:240

4238

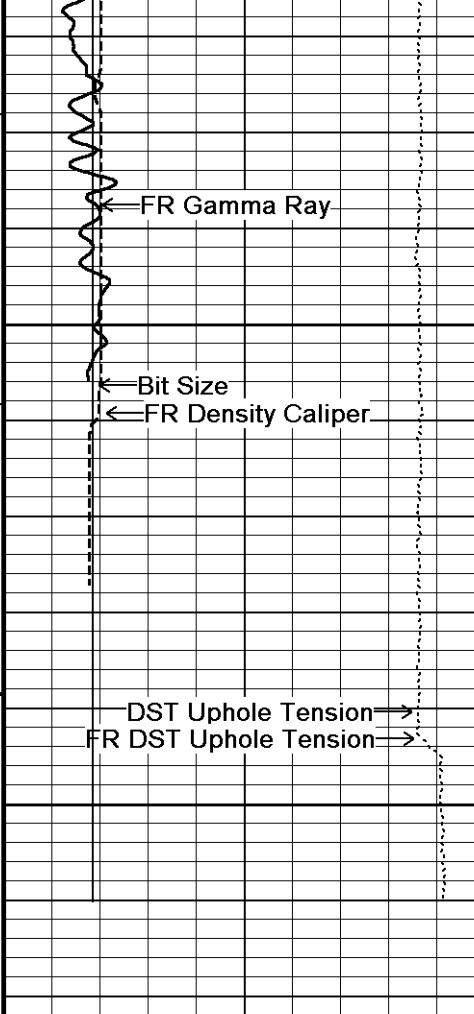




4250  
111°  
4300  
112°  
4350  
112°  
4400  
111°  
4450







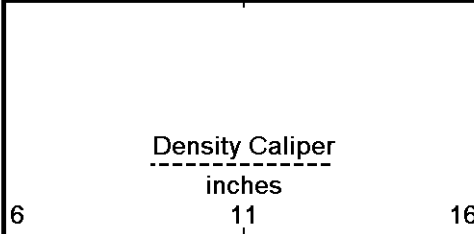
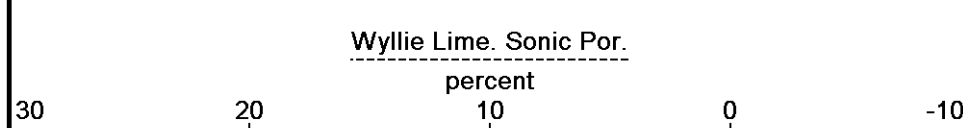
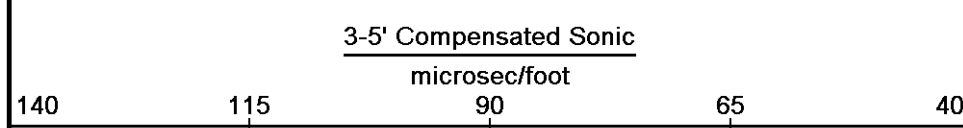
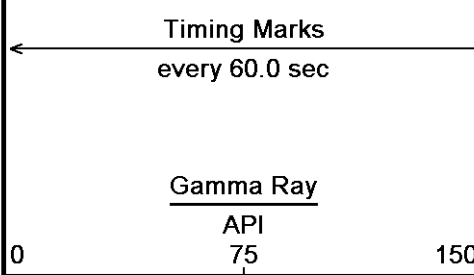
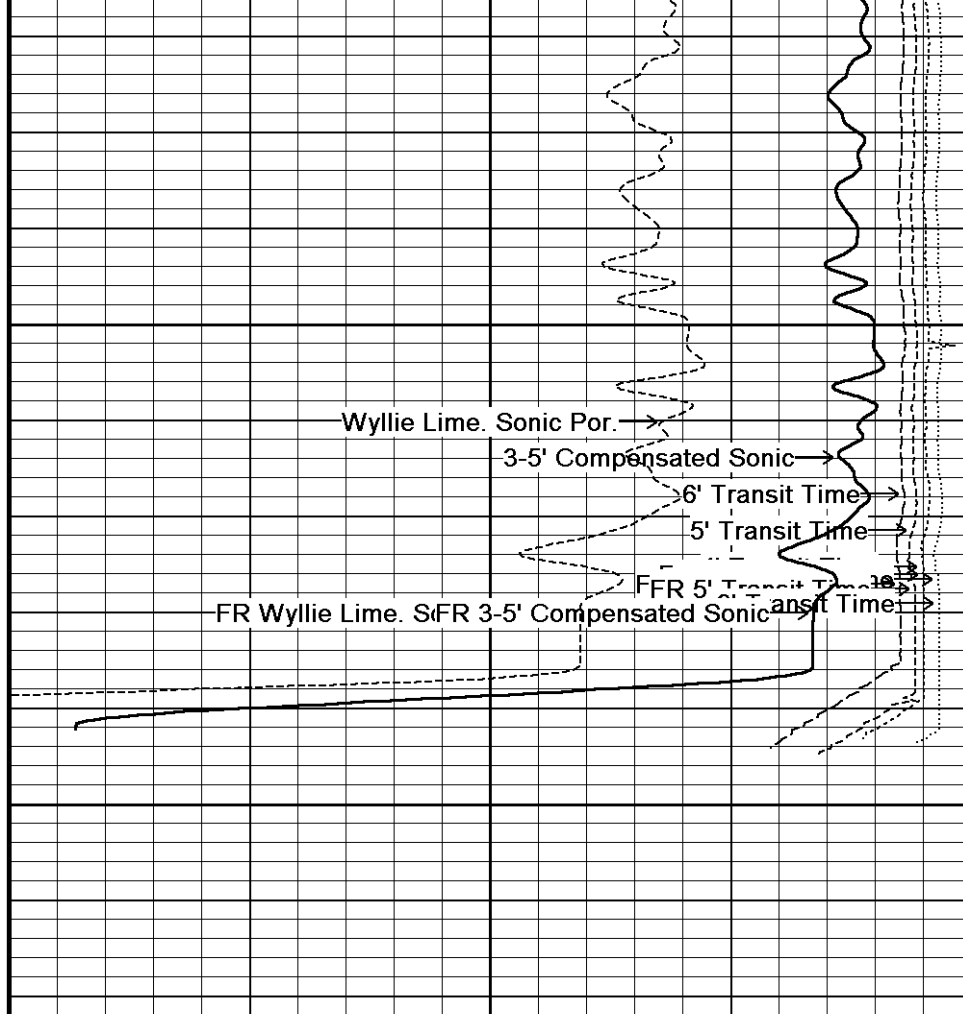
110°

4500

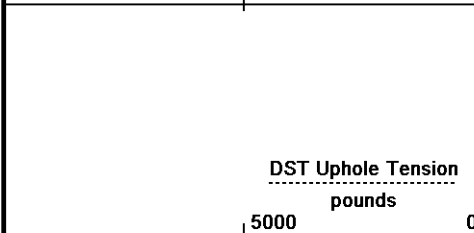
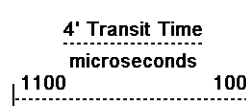
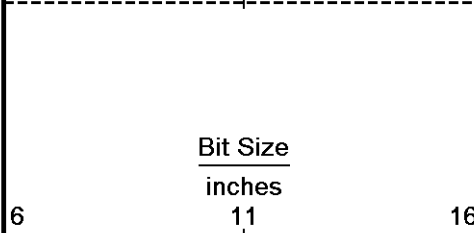
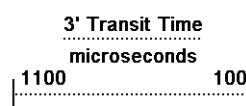
4550

4570

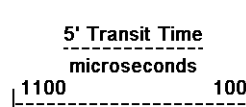
Depth in Feet



Borehole Temp in deg F



Replay Scale



Depth Based Data - Maximum Sampling Increment 10.0cm

Plotted on 14-AUG-2012 12:31

Filename: C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_002.dta

Recorded on 14-AUG-2012 09:27

System Versions: Logged with 13.02.6600 Processed with 13.02.6600 Plotted with 13.02.6600



REPEAT SECTION



## BEFORE SURVEY CALIBRATION

C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_004.dta

## General Constants All 000

Last Edited on 14-AUG-2012,12:08

## General Parameters

Mud Resistivity	0.630	ohm-metres
Mud Resistivity Temperature	71.000	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	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

## Down-hole Tension Calibration SMS 0

Field Calibration on 25-JUL-2012 21:44

Reading No	Measured	Calibrated (lbs)
1	15962.51	0.00
2	17047.62	562.20

## Gamma Calibration MCG-D.K 442

Field Calibration on 13-AUG-2012 09:24

	Measured	Calibrated (API)
Background	69	46
Calibrator (Gross)	1150	771
Calibrator (Net)	1081	725

## Gamma Constants MCG-D.K 442

Last Edited on 14-AUG-2012,06:56

Gamma Calibrator Number	GRC38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

## SP Calibration MCG-D.K 442

Field Calibration on 17-JUL-2012 16:34

	Measured	Calibrated (mV)
Reference 1	100.2	100.0
Reference 2	-99.9	-100.0

## High Resolution Temperature Calibration MCG-D.K 442

Field Calibration on 17-JUL-2012,16:35

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

## High Resolution Temperature Constants MCG-D.K 442

Last Edited on

Pre-filter Length	11
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## Caliper Calibration MML-A 4

Base Calibration on 24-JUL-2012 08:53

Field Calibration on 13-AUG-2012 09:01

Base Calibration

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15504	5.98
2	18771	7.97
3	22124	9.86
4	25894	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.88	5.98

Micro Normal and Micro Inverse Calibration MML-A 4

Base Calibration on 24-JUL-2012 08:59  
Field Check on 13-AUG-2012 09:03

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.2	60.2	5.0	25.0
Micro Inverse	15.7	78.4	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	62.9	62.9
Micro Inverse	48.2	48.2

Micro Normal and Micro Inverse Constants MML-A 4

Last Edited on 14-AUG-2012,06:56

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 on 17-JUL-2012 10:54  
Field Check on 13-AUG-2012 09:29

Base Calibration

Ratio	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3220	101	3714	110
	31.859		33.764	

Field Calibrator at Base

Ratio	Calibrated (cps)
	1595 2289
	0.696

Field Check

Ratio	Calibrated (cps)
	1598 2276
	0.702

Neutron Constants MDN-A.B 66

Last Edited on 14-AUG-2012,06:56

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	Constant Value		
Formation Pressure	0.00	kpsi	
Temperature Source	Constant Value		
Temperature	68.00	degrees F	
Mud Salinity	0.00	kppm	
Salinity Correction	Not Applied		
Formation Fluid Salinity Source	Constant Value		
Formation Fluid Salinity	0.00	kppm	
Barite Mud Correction	Not Applied		

FE Calibration MFE-B.J 353

Base Calibration on 17-JUL-2012 15:58  
Field Check on 13-AUG-2012 09:00

Base Calibration

Measured	Calibrated (ohm-m)
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Reference 1	Measured	0.0	Calibrated (cm/m)	0.0
Reference 2		964.8		126.8
Base Check				280.6
Field Check				280.9

FE Constants MFE-B.J 353

Last Edited on 14-AUG-2012,06:55

Running Mode	No Sleeve		
MFE K Factor	0.1268		
Caliper Source for FE correction	Density Caliper		
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 330

Last Edited on 13-AUG-2012,09:31

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	0.0000
Peak Amplitude Source	0	

Waveform	Start Time (micro-sec)	Width (micro-sec)	Pre Gain	Start Gain	Discriminator (mV)
3'	0	0	0	0	0
4'	0	0	0	0	0
5'	0	0	0	0	0
6'	0	0	0	0	0

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	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	0
4' Waveform Filter	0
5' Waveform Filter	0
6' Waveform Filter	0

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

### High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 17-JUL-2012,13:53

	Measured	Calibrated(Deg F)
Lower	1.00	33.80
Upper	11.00	51.80

### High Resolution Temperature Constants MAI-A.A 167

Last Edited on 17-JUL-2012,13:49

Pre-filter Length	11
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### Induction Calibration MAI-A.A 167

Base Calibration on 17-JUL-2012,13:55

Field Check on 13-AUG-2012 08:59

#### Base Calibration

##### Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	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
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Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	13.3	3838.4
2	0.0	0.0	29.6	3476.3
3	0.0	0.0	29.1	3052.2
4	0.0	0.0	19.8	2081.0
Deep	0.0	0.0	18.6	2048.1
Medium	0.0	0.0	42.2	3990.5
Shallow	0.0	0.0	43.0	5053.7

Array Temperature	0.0	79.3	Deg F
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### Induction Constants MAI-A.A 167

Last Edited on 14-AUG-2012,06:55

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	8.0000	
Stand-off Fin Angle	45.00	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



0.00  
0.00

0.00  
0.00

### DOWNHOLE EQUIPMENT

C:\Minimus 13.02.6600\Data\Shakespeare Foster #1-17\Shakespeare Foster #1-17\_004.dta

Compact Comms Gamma  
MCG-D.K 442 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log  
MML-A 4 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

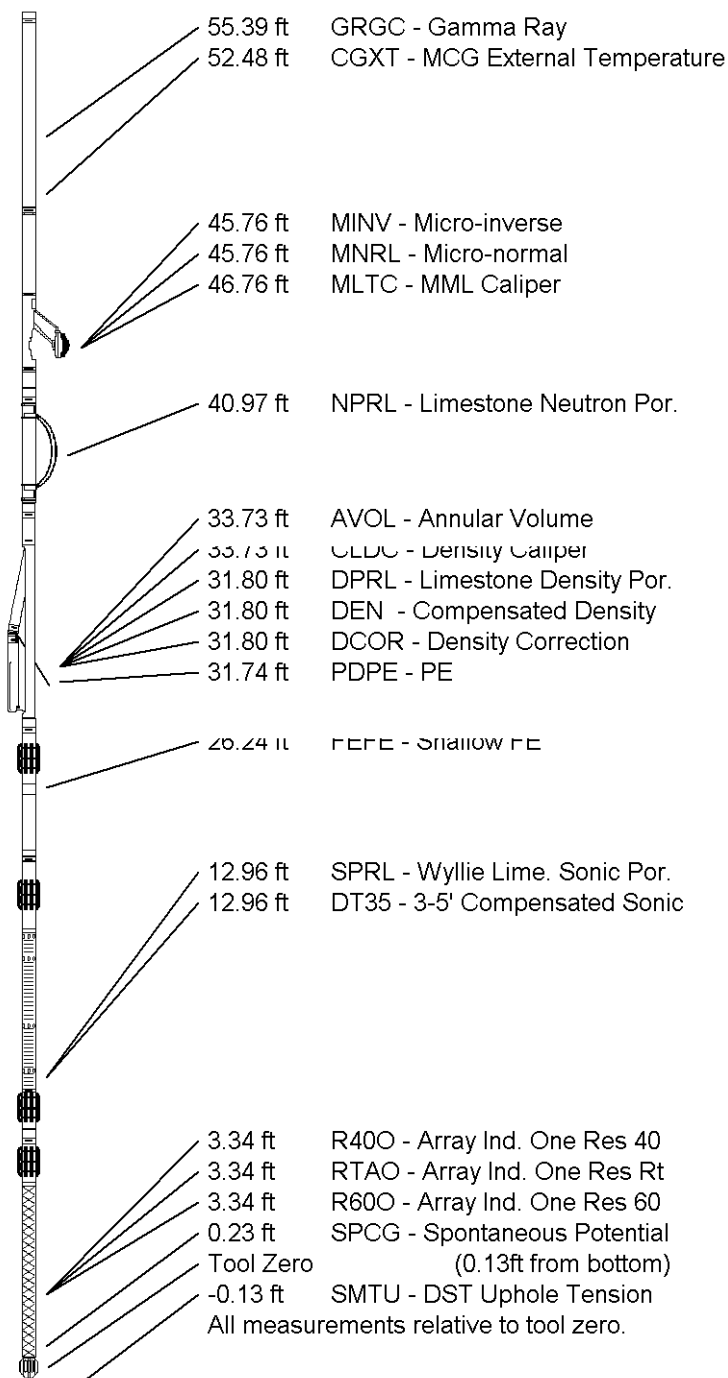
Compact Density/Caliper  
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

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

Compact Sonic  
MSS-C.K 330 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: 60.68 ft Weight: 456.4 lb



<b>COMPANY</b>	<b>SHAKESPEARE OIL COMPANY, INC.</b>
<b>WELL</b>	<b>FOSTER #1-17</b>
<b>FIELD</b>	<b>WILDCAT</b>
<b>PROVINCE/COUNTY</b>	<b>LOGAN</b>
<b>COUNTRY/STATE</b>	<b>U.S.A. / KANSAS</b>

Elevation Kelly Bushing	2783.00	feet	First Reading	4530.00	feet
Elevation Drill Floor	2781.00	feet	Depth Driller	4550.00	feet
Elevation Ground Level	2773.00	feet	Depth Logger	4543.00	feet

The logo for Weatherford, featuring the word "Weatherford" in a bold, sans-serif font with a registered trademark symbol (®) to its upper right. A black downward-pointing triangle is positioned above the first few letters of the word.

COMPENSATED SONIC  
WITH INTEGRATED TRANSIT TIME