



Weatherford

**COMPENSATED SONIC
WITH INTEGRATED TRANSIT TIME**

COMPANY										K3 OIL & GAS OPERATING COMPANY									
WELL										CATHERINE COBERLY UNIT 30-14									
FIELD										WILDCAT									
PROVINCE/COUNTY										GOVE									
COUNTRY/STATE										U.S.A. / KANSAS									
LOCATION										1209' FSL & 2495' FWL									
SEC 30		TWP 15S		RGE 28W		Other Services				MAI/MFE									
Latitude						MPD/MDN													
Longitude						MML													
API Number		15-063-22187																	
Permanent Datum GL, Elevation 2542 feet																			
Log Measured From KB																			
Drilling Measured From KB										Elevations: KB 2550.00 DF 2548.00 GL 2542.00									
Date		06-MAY-2014																	
Run Number		ONE																	
Service Order		4558-86610112																	
Depth Driller		4425.00				feet													
Depth Logger		4429.00				feet													
First Reading		4416.00				feet													
Last Reading		263.00				feet													
Casing Driller		268.00				feet													
Casing Logger		263.00				feet													
Bit Size		7.875				inches													
Hole Fluid Type		CHEMICAL																	
Density / Viscosity		9.20		lb/USg		54.00		CP											
PH / Fluid Loss		9.50				8.80		ml/30Min											
Sample Source		FLOWLINE																	
Rm @ Measured Temp		0.71 @ 95.0				ohm-m													
Rmf @ Measured Temp		0.57 @ 95.0				ohm-m													
Rmc @ Measured Temp		0.85 @ 95.0				ohm-m													
Source Rmf / Rmc		CALC				CALC													
Rm @ BHT		0.56 @120.0				ohm-m													
Time Since Circulation		4 HOURS																	
Max Recorded Temp		120.00				deg F													
Equipment / Base		13244		LIB															
Recorded By		ADAM SILL																	
Witnessed By		PAT DEENIHAN																	
JOB #		LB14-139																	

BOREHOLE RECORD					Last Edited: 06-MAY-2014 22:44
Bit Size inches		Depth From feet		Depth To feet	
7.875		268.00		4425.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
SURFACE	8.625	0.00	268.00	24.00	

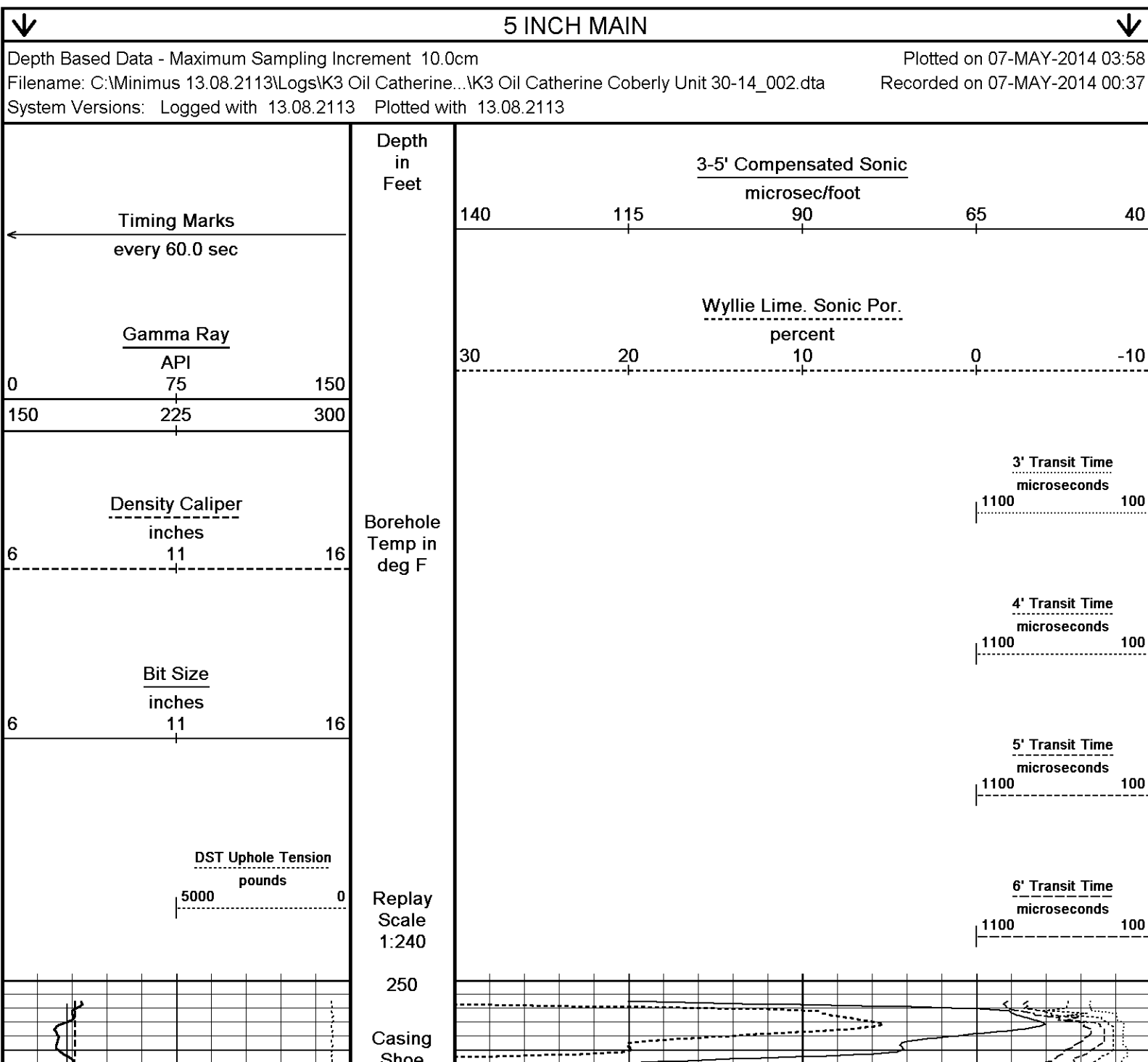
REMARKS
- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION. - HARDWARE: DUAL BOWSPRING USED ON MDN. 0.5 INCH STANDOFF USED ON MFE. TWO 0.5 INCH STANDOFFS USED ON MSS. 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 1801 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3500 FEET: 157 CU.FT.

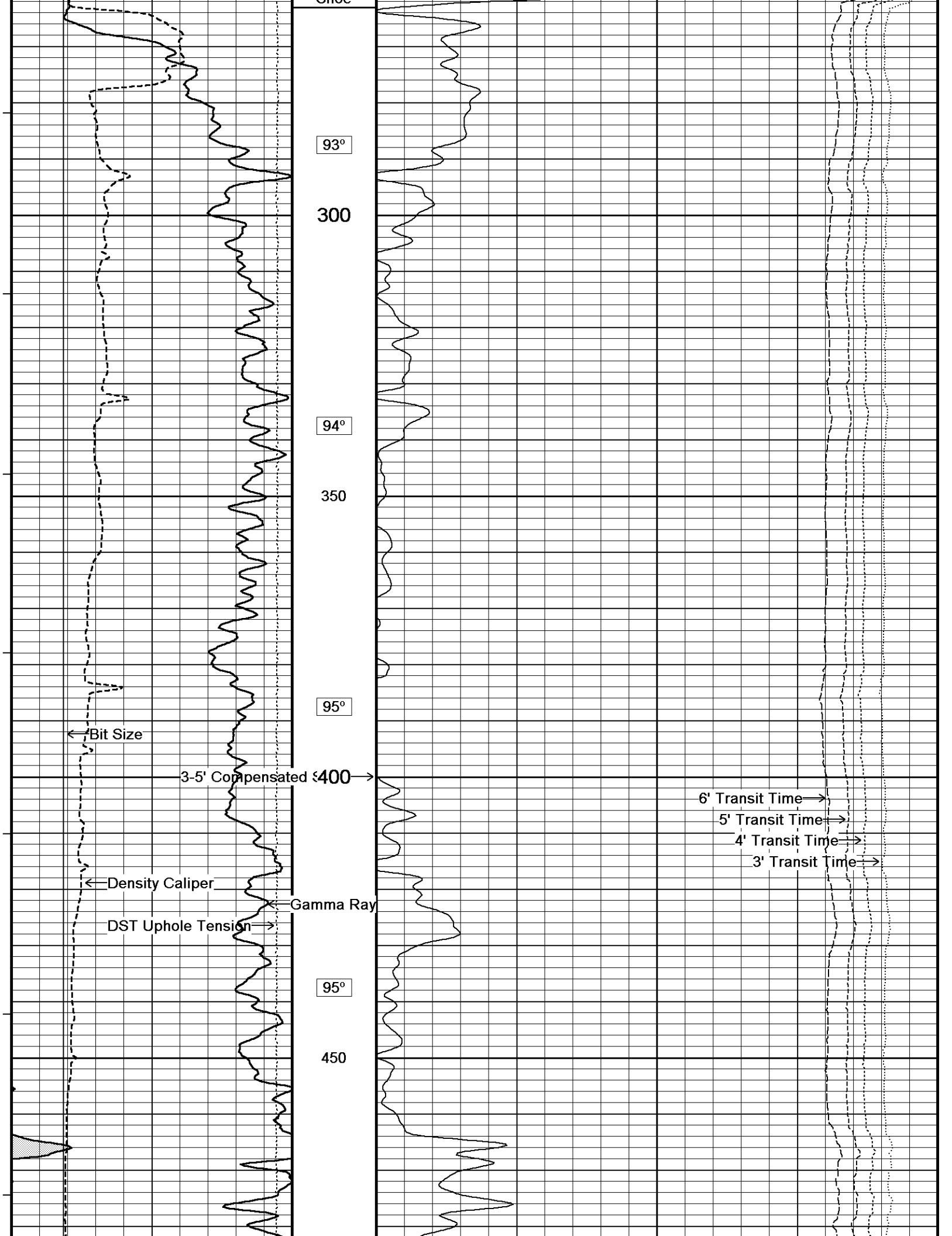
- RIG: DUKE #8.

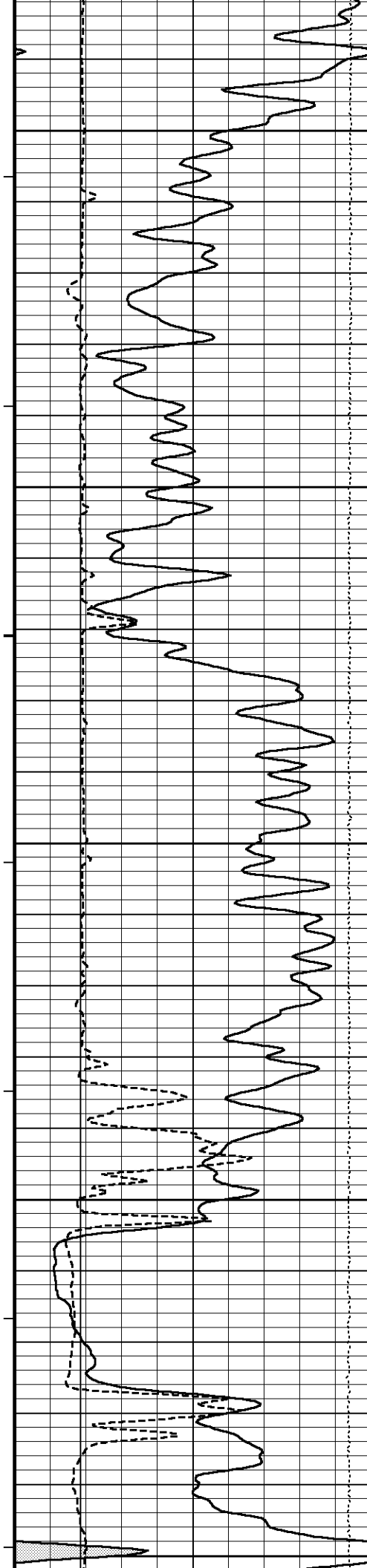
- ENGINEER: A. SILL.

- OPERATOR: J. LaPOINT.

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.







95°

500

96°

550

96°

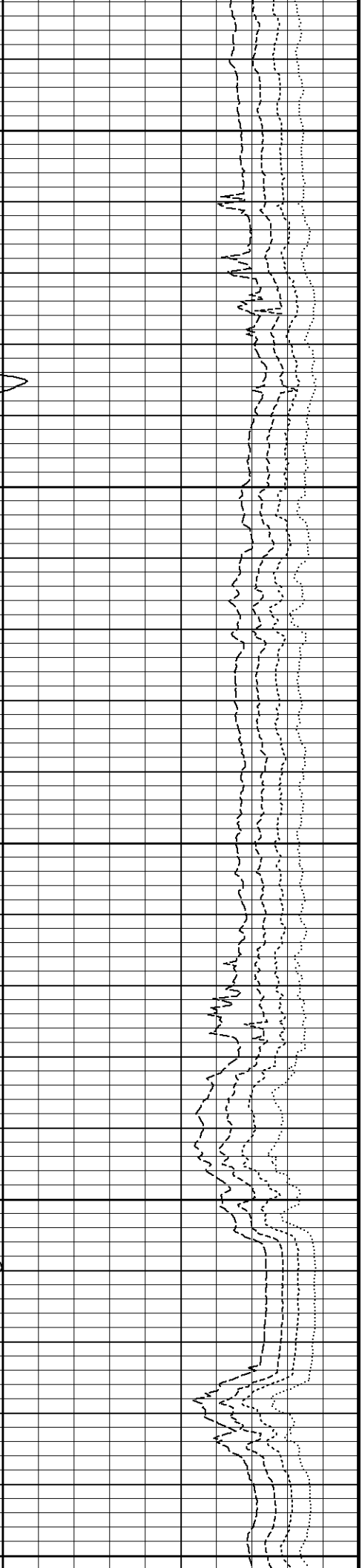
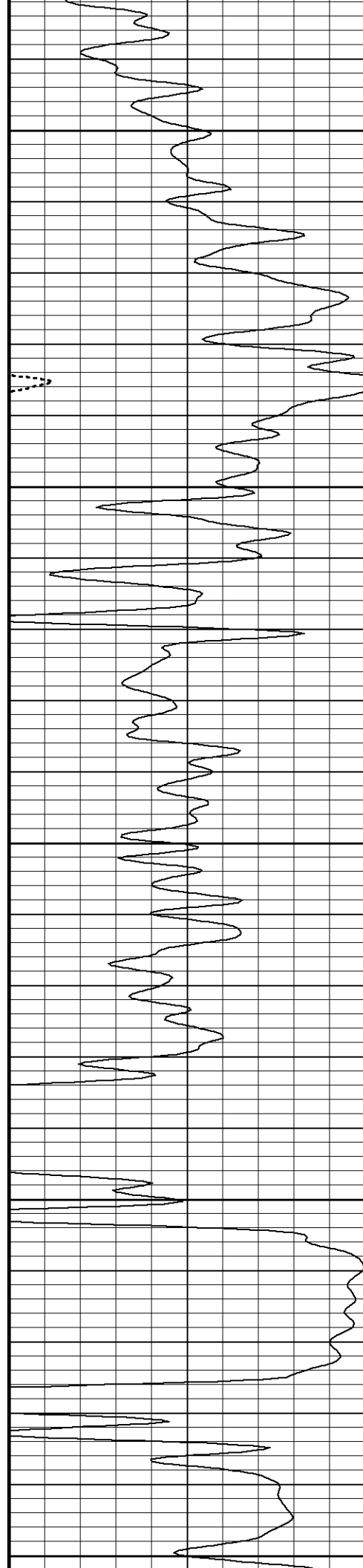
600

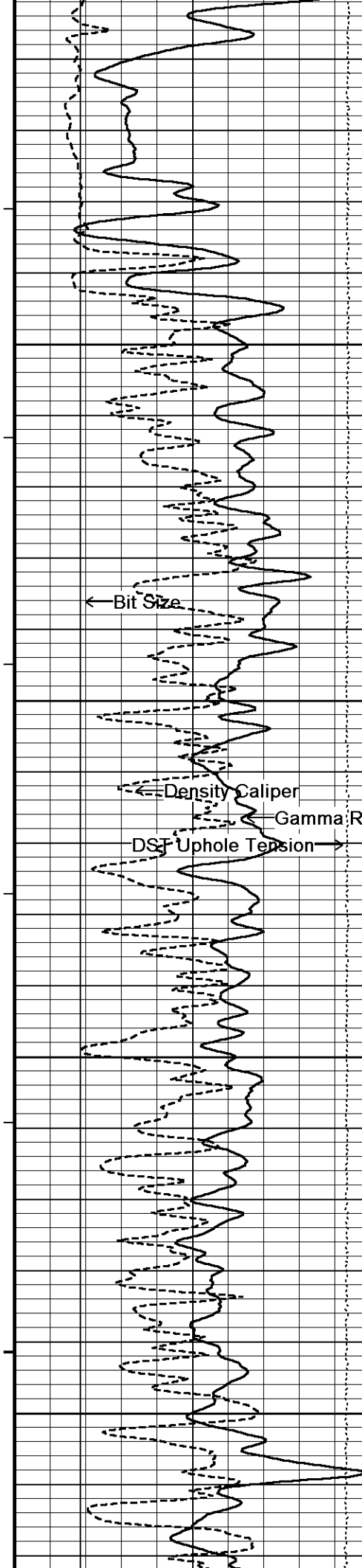
97°

650

97°

700





98°

750

100°

3-5' Compensated Sonic

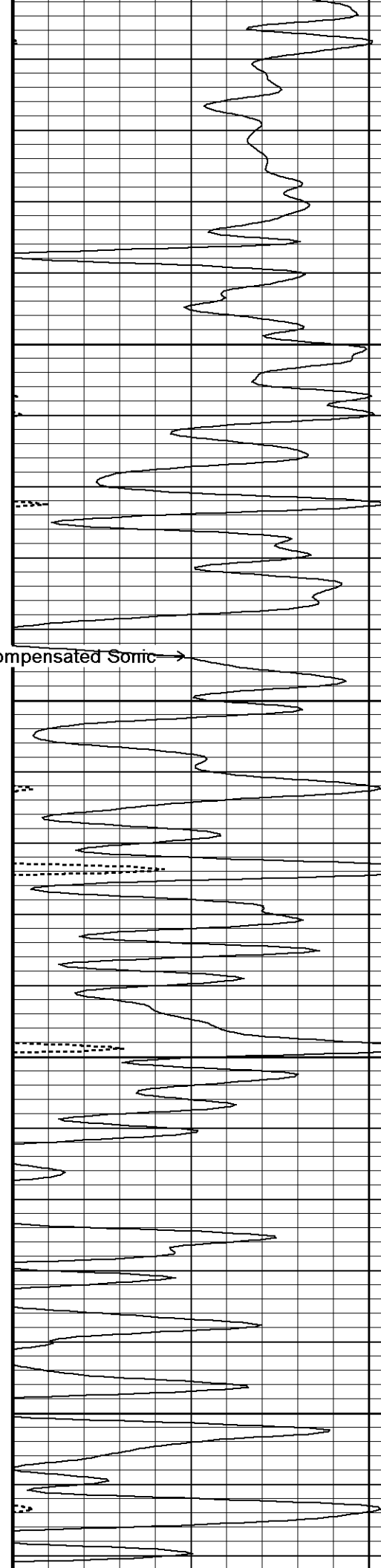
800

100°

850

100°

900

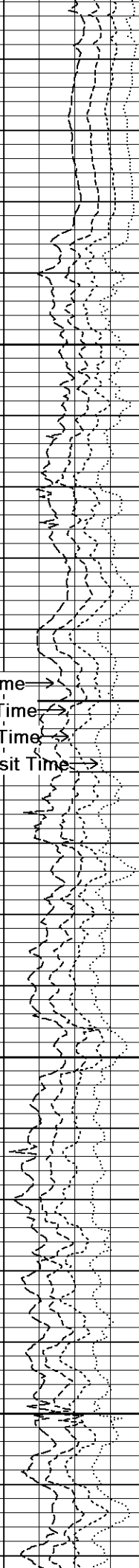


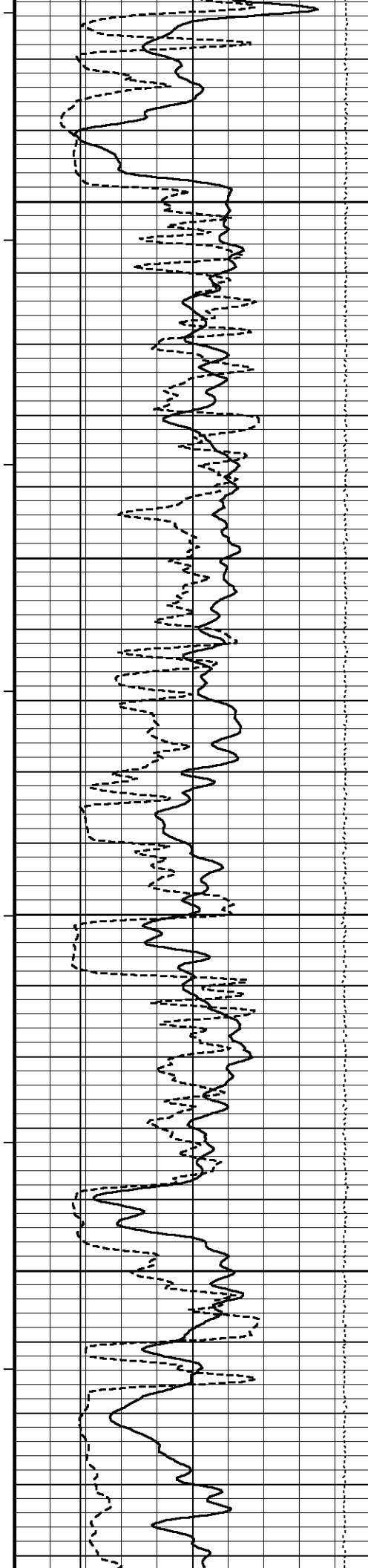
6' Transit Time

5' Transit Time

4' Transit Time

3' Transit Time





100°

950

100°

1000

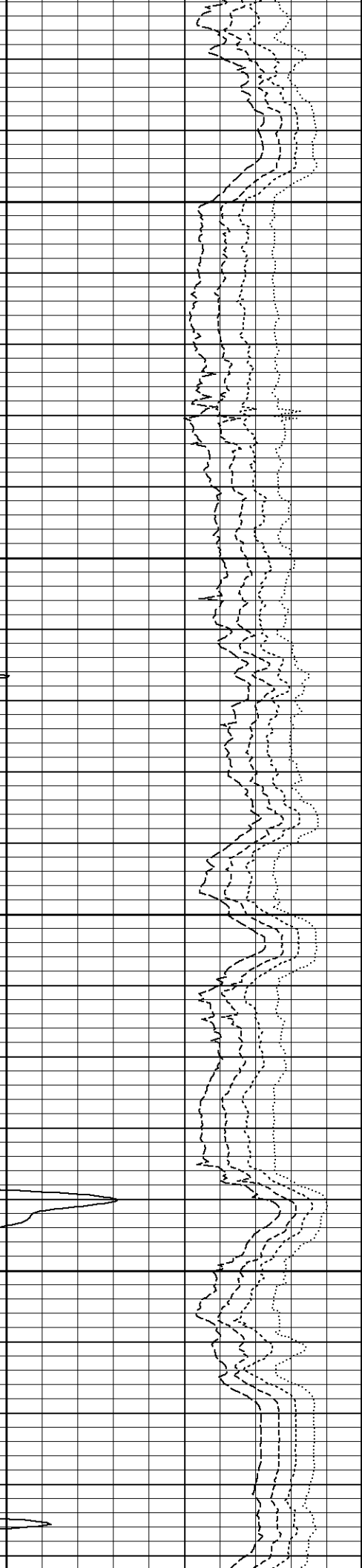
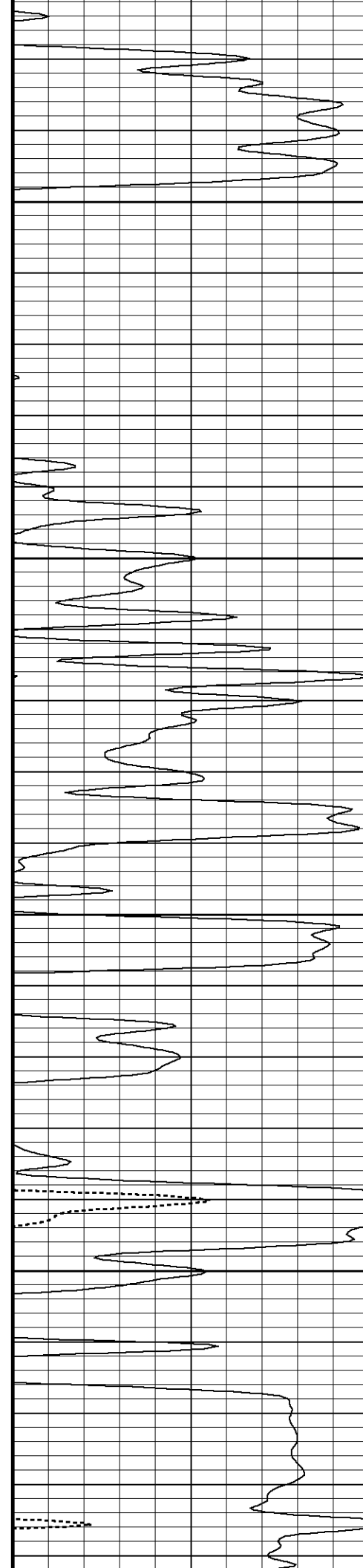
101°

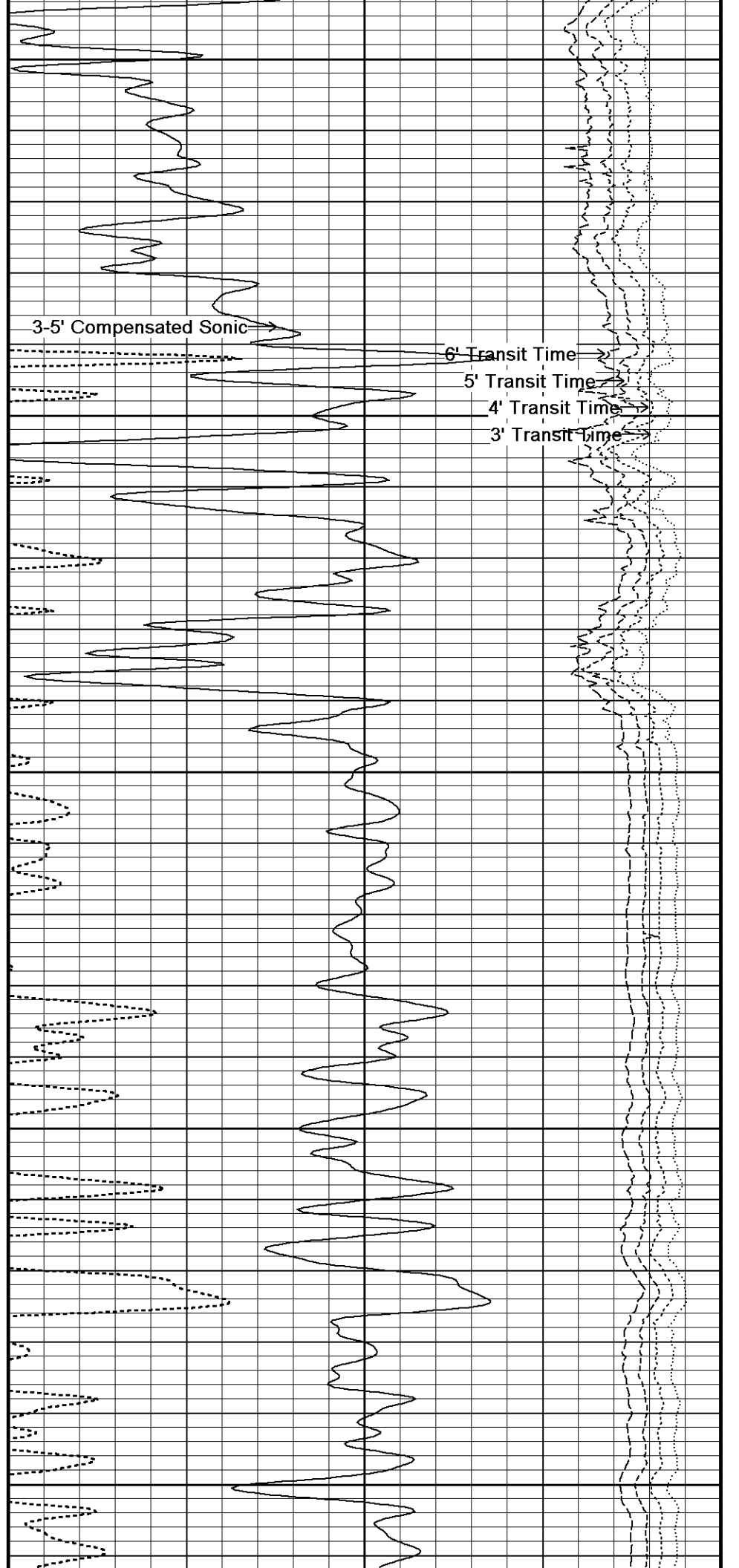
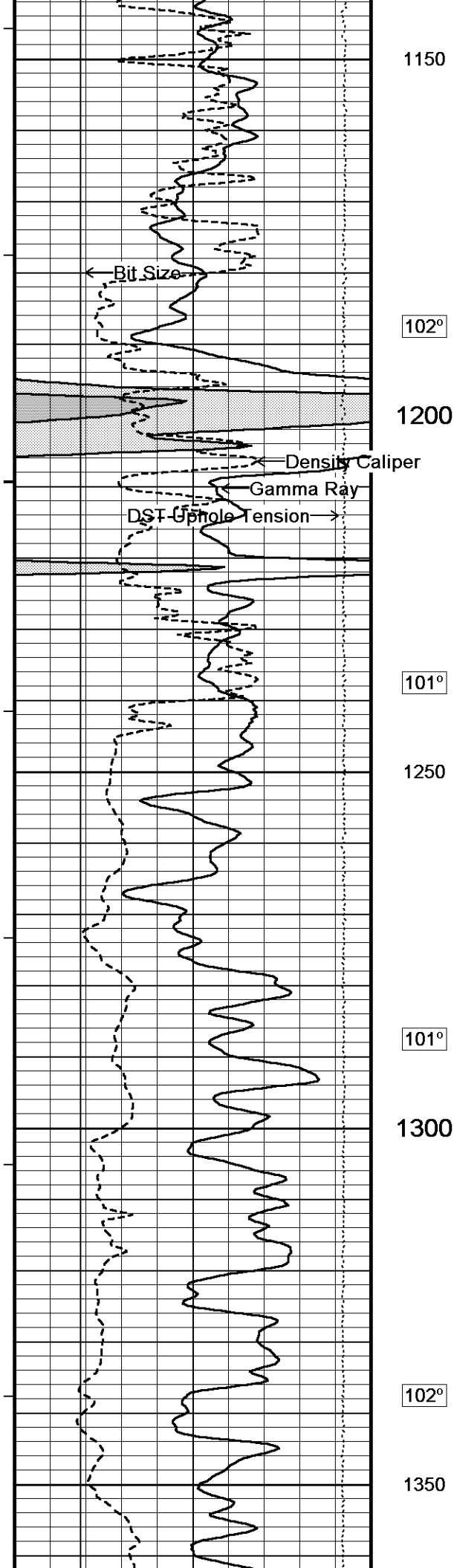
1050

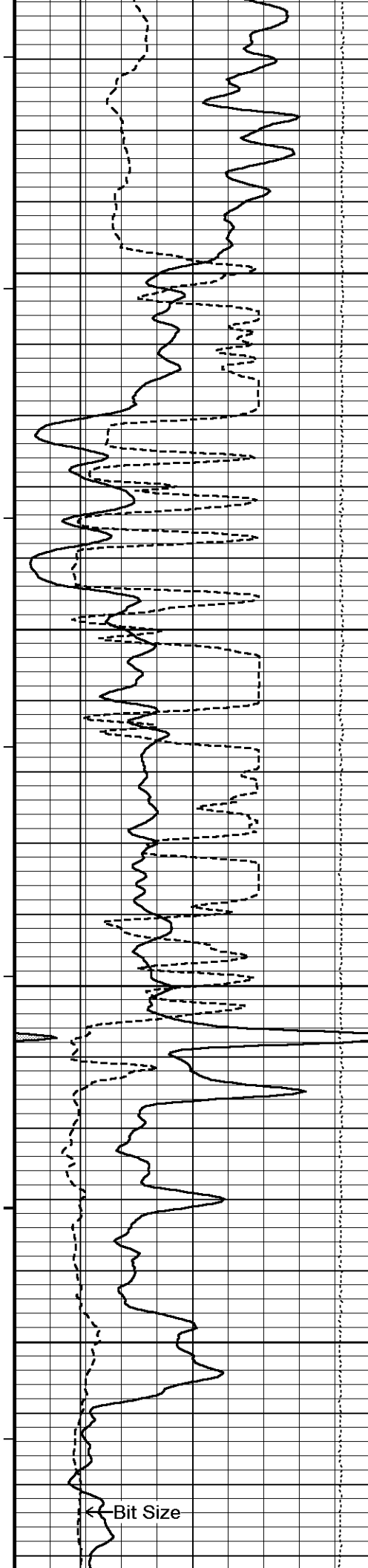
101°

1100

101°







103°

1400

104°

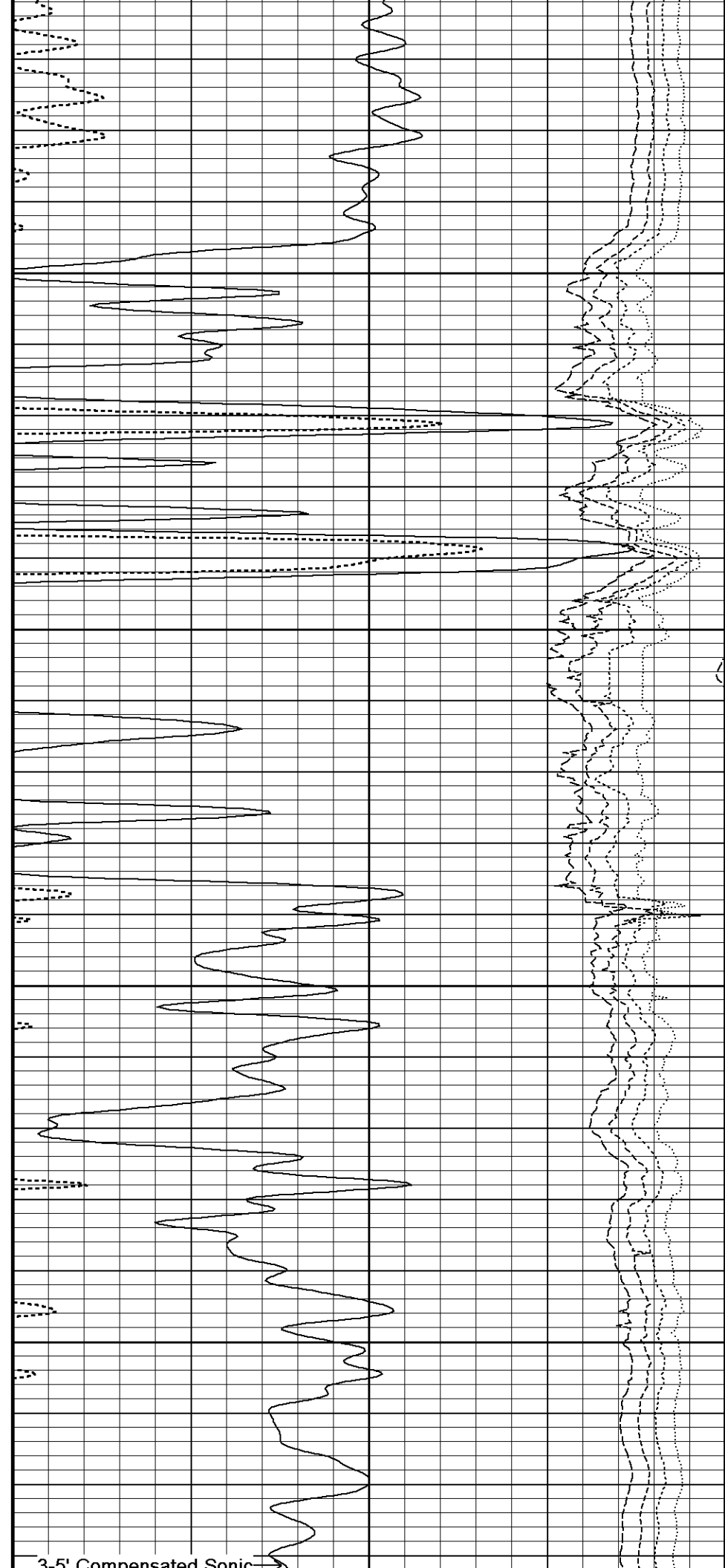
1450

103°

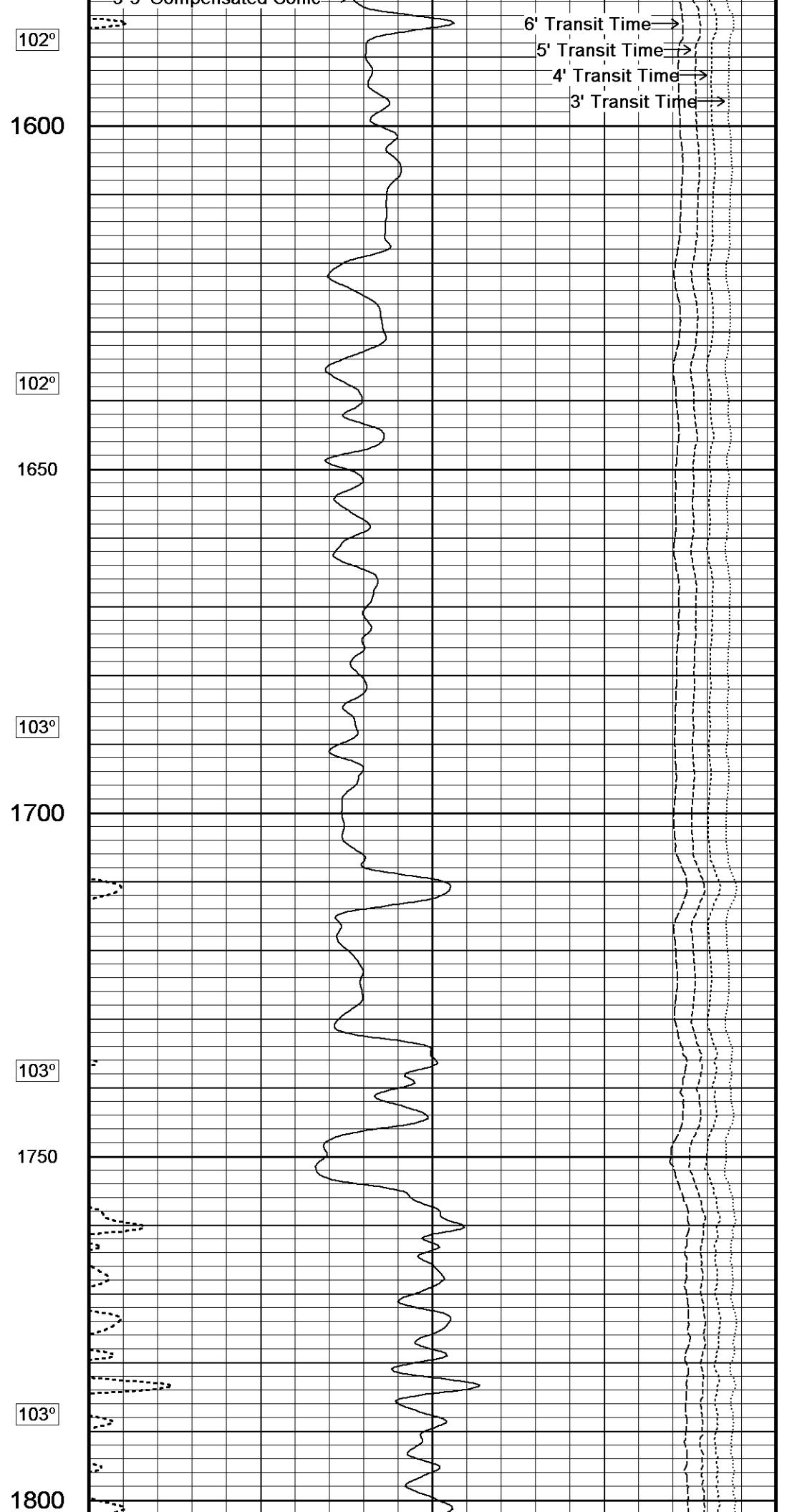
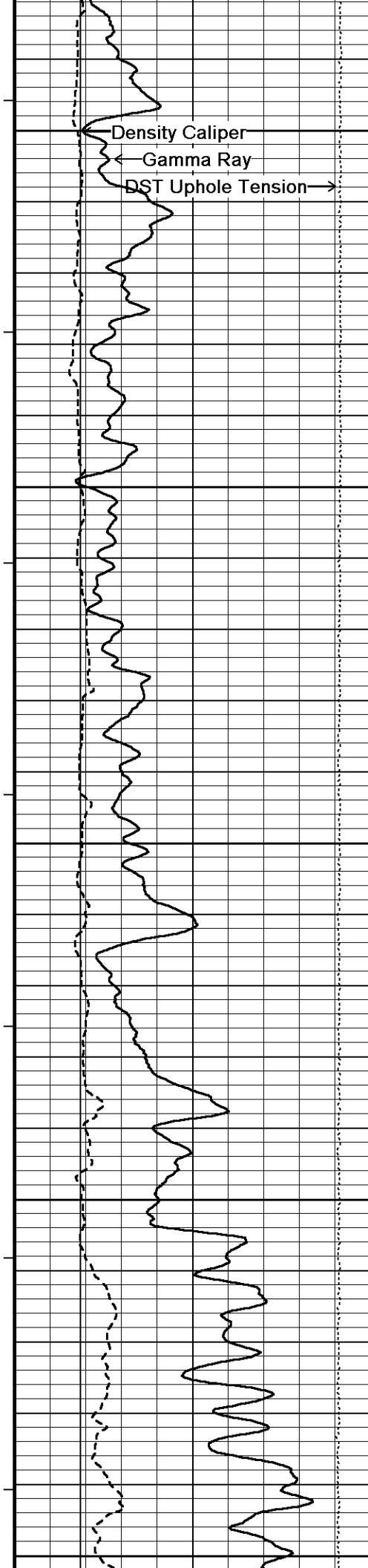
1500

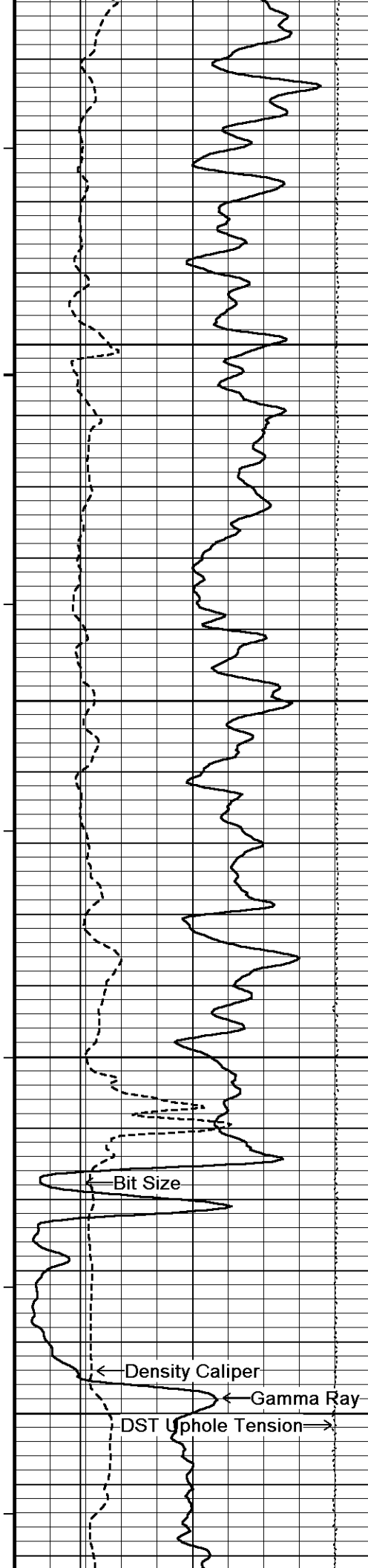
102°

1550



3.5' Compensated Sonic





104°

1850

104°

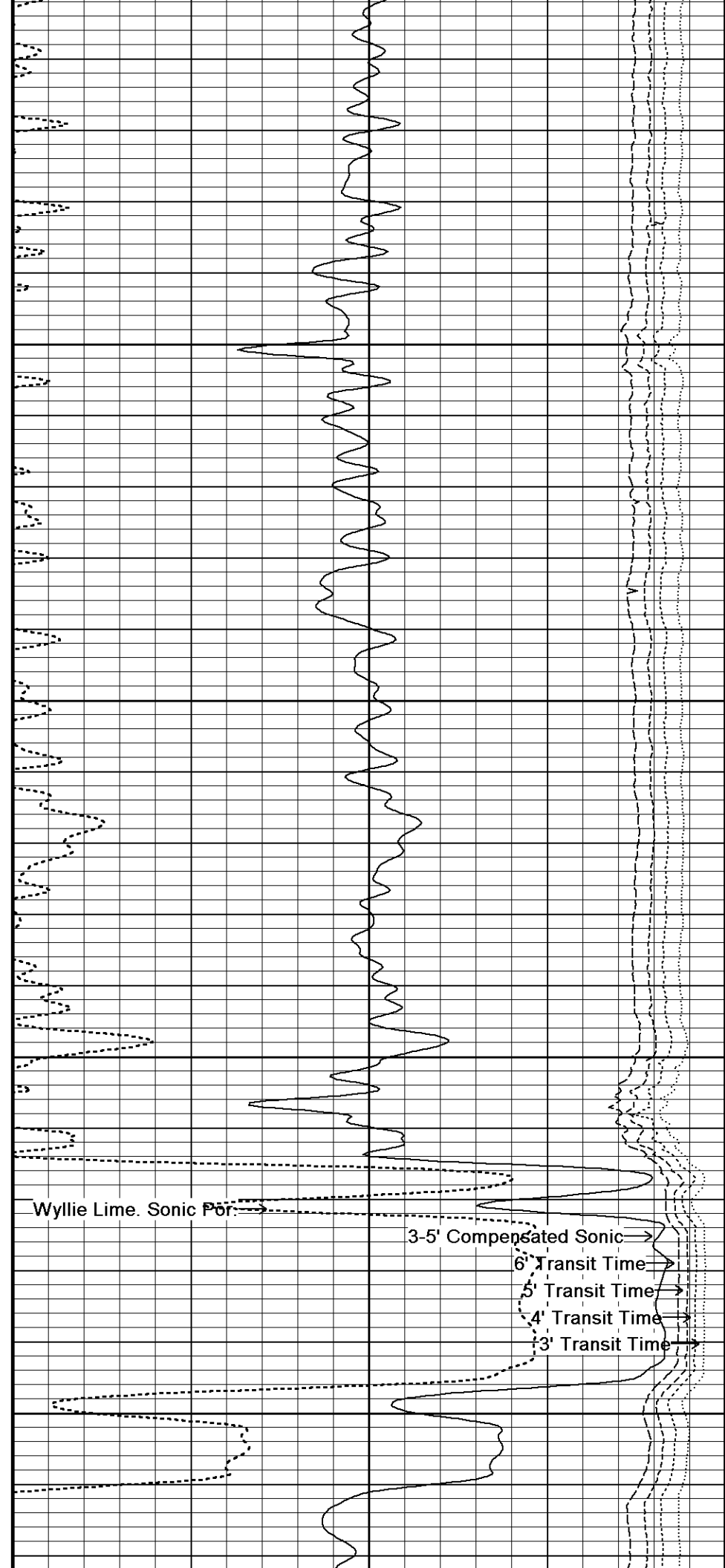
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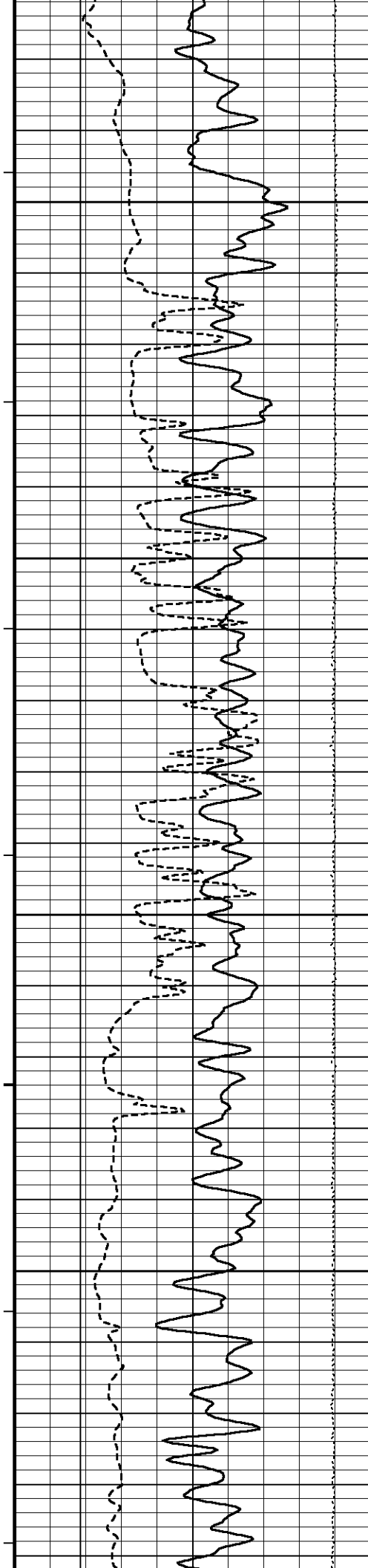
104°

1950

104°

2000





105°

2050

106°

2100

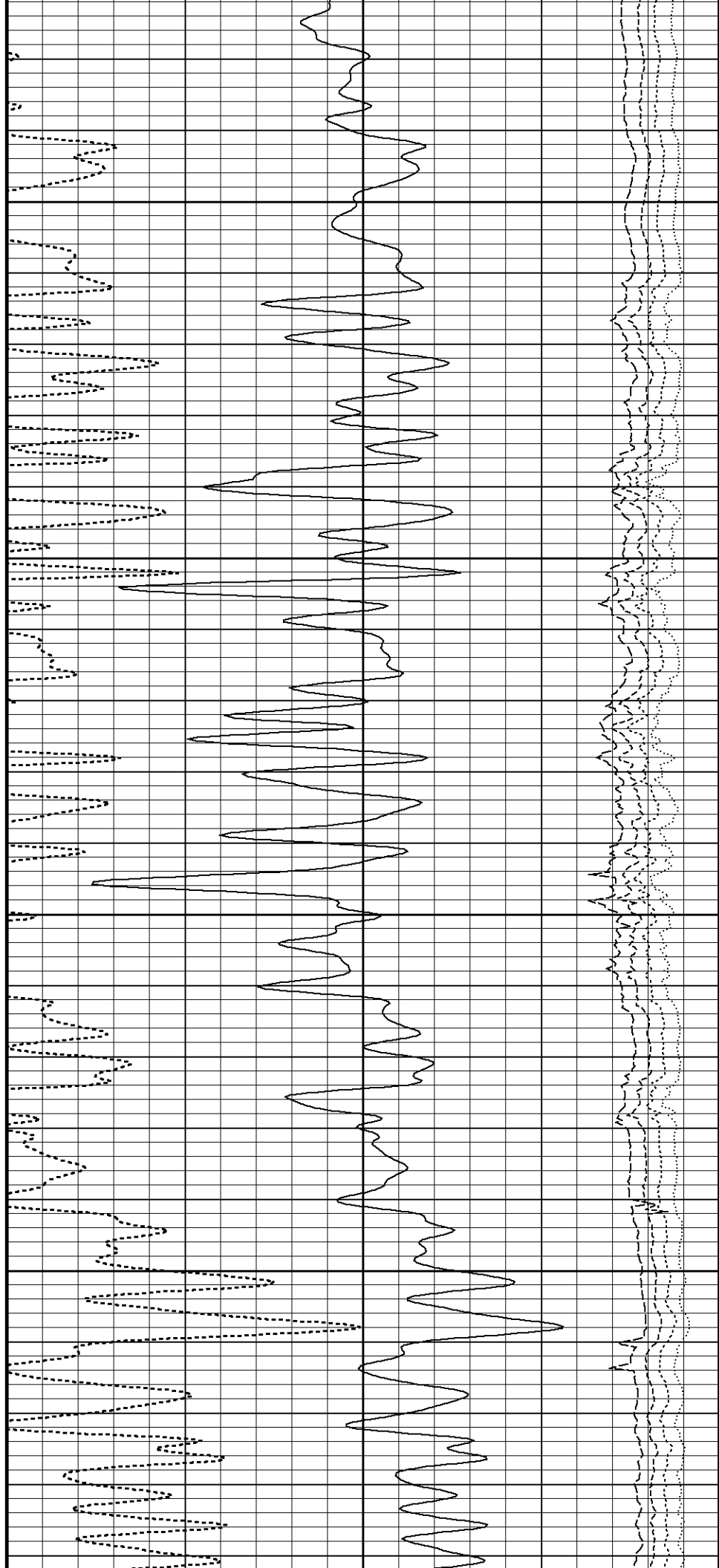
106°

2150

106°

2200

106°



2250

107°

2300

107°

2350

Wyllie Lime. Sonic Pot. →

3-5' Compensated Sonic →

6' Transit Time →

5' Transit Time →

4' Transit Time →

3' Transit Time →

107°

2400

107°

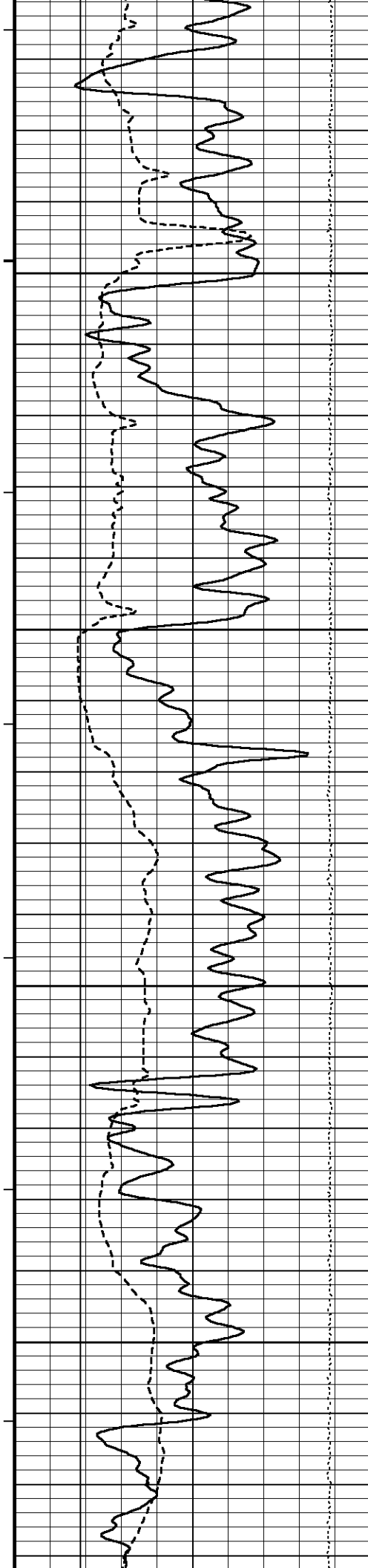
2450

Bit Size

Density Caliper

Gamma Ray

DSF Up-hole Tension →



107°

2500

108°

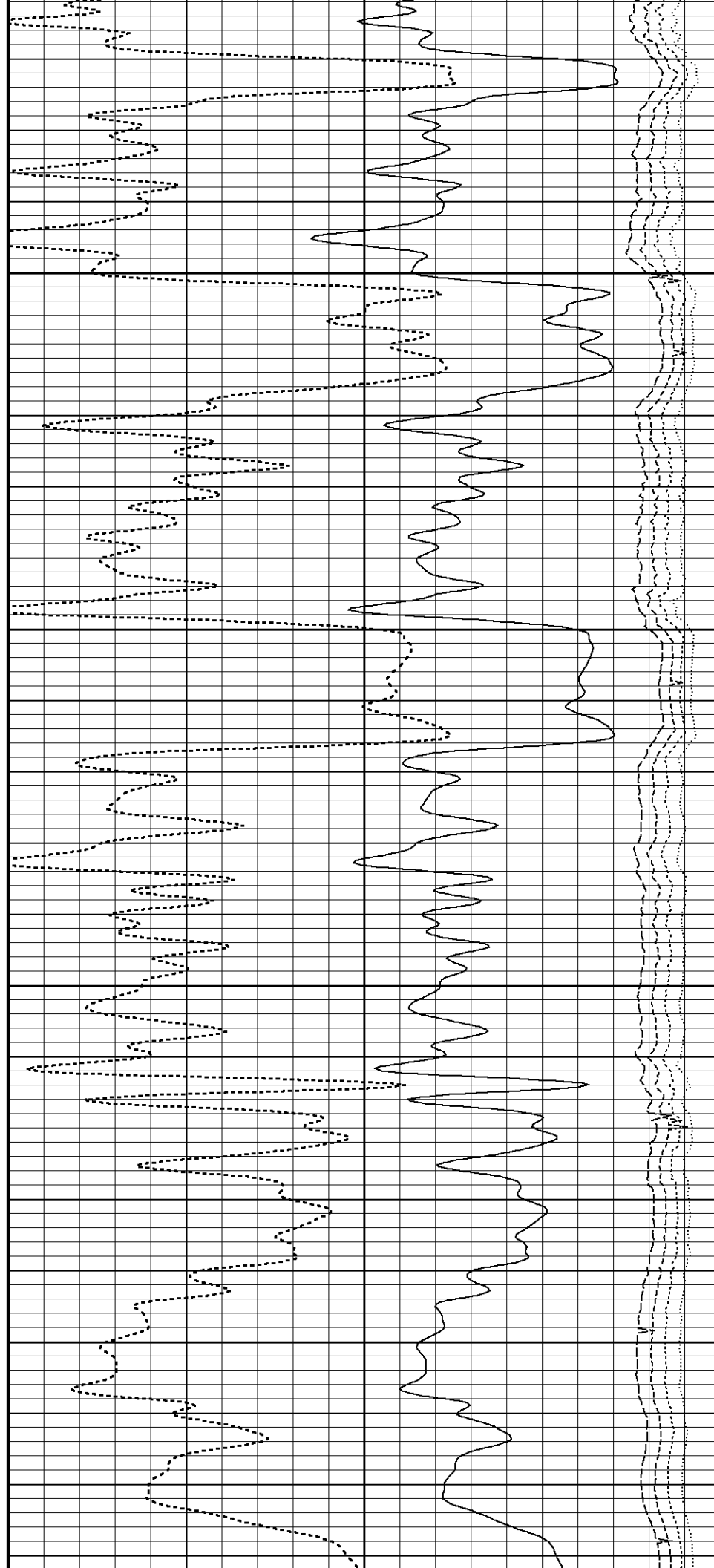
2550

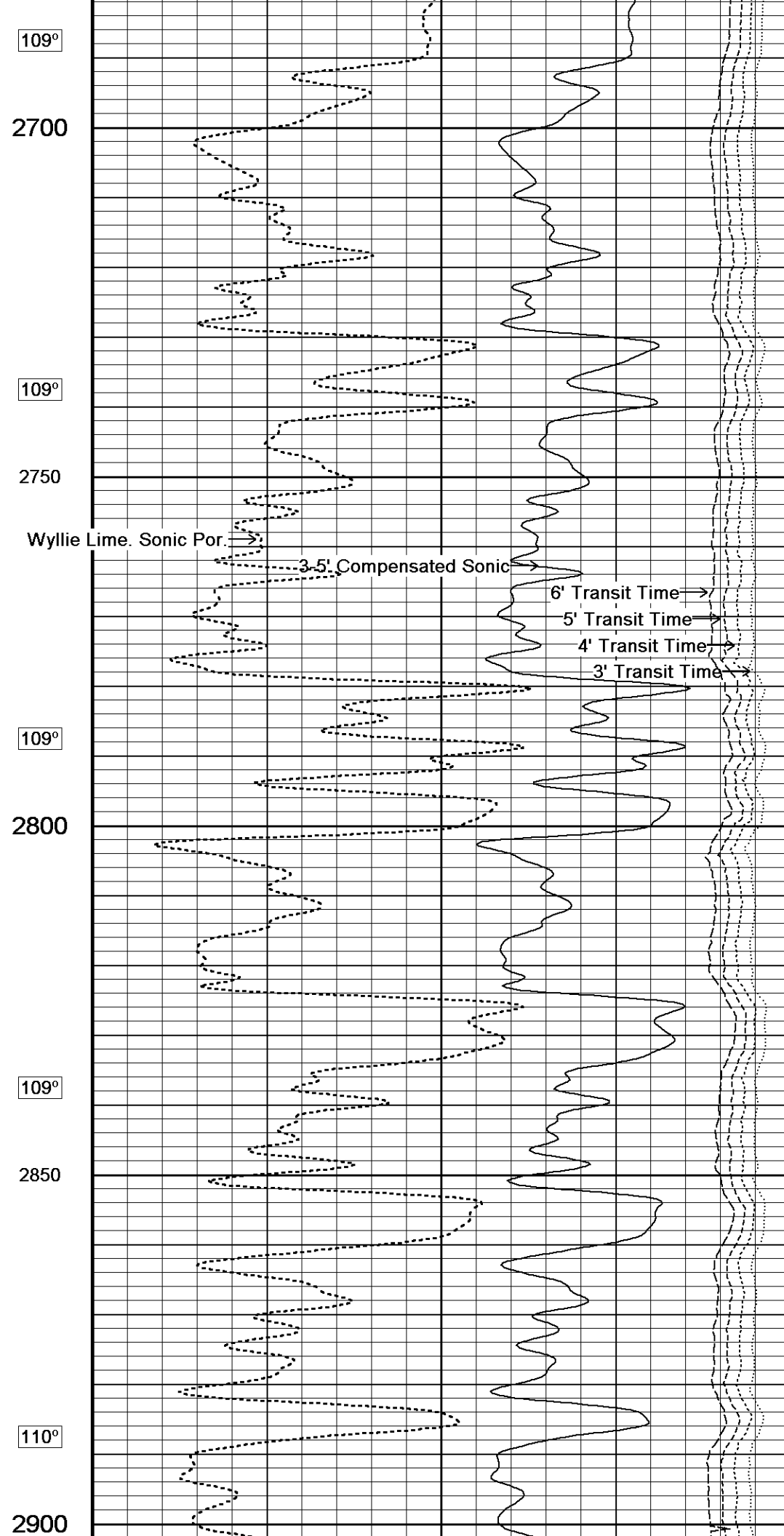
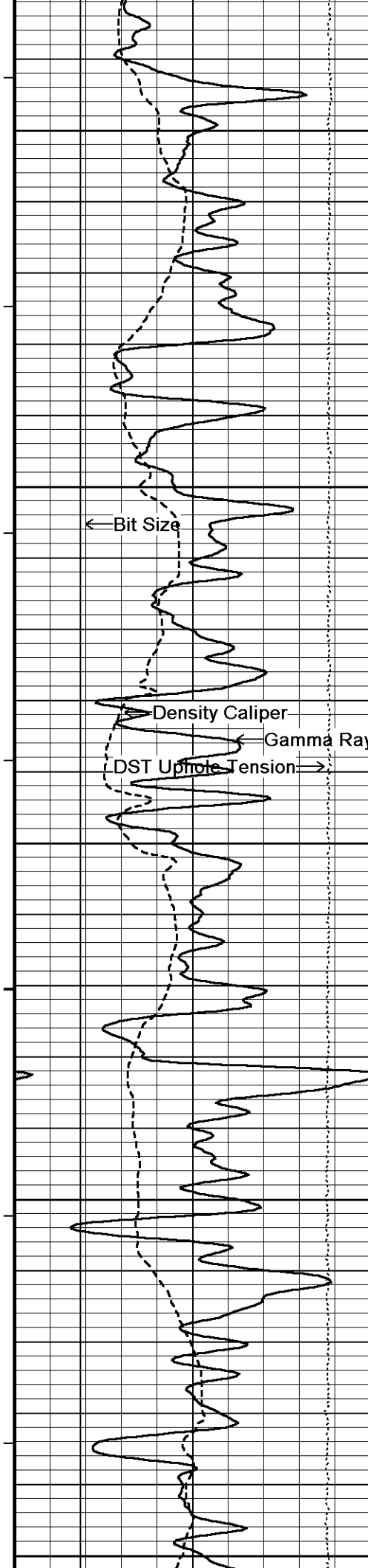
108°

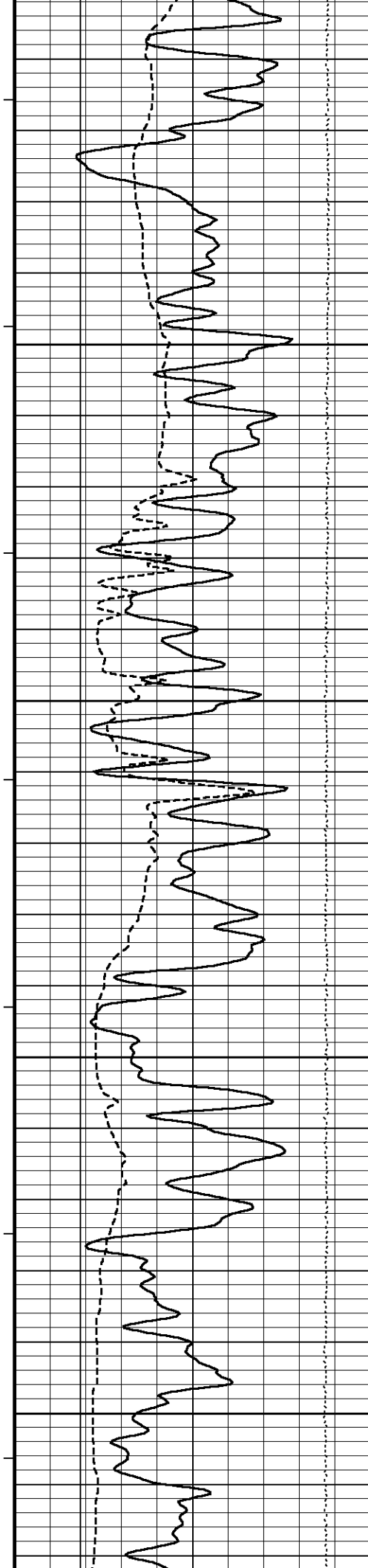
2600

108°

2650







110°

2950

110°

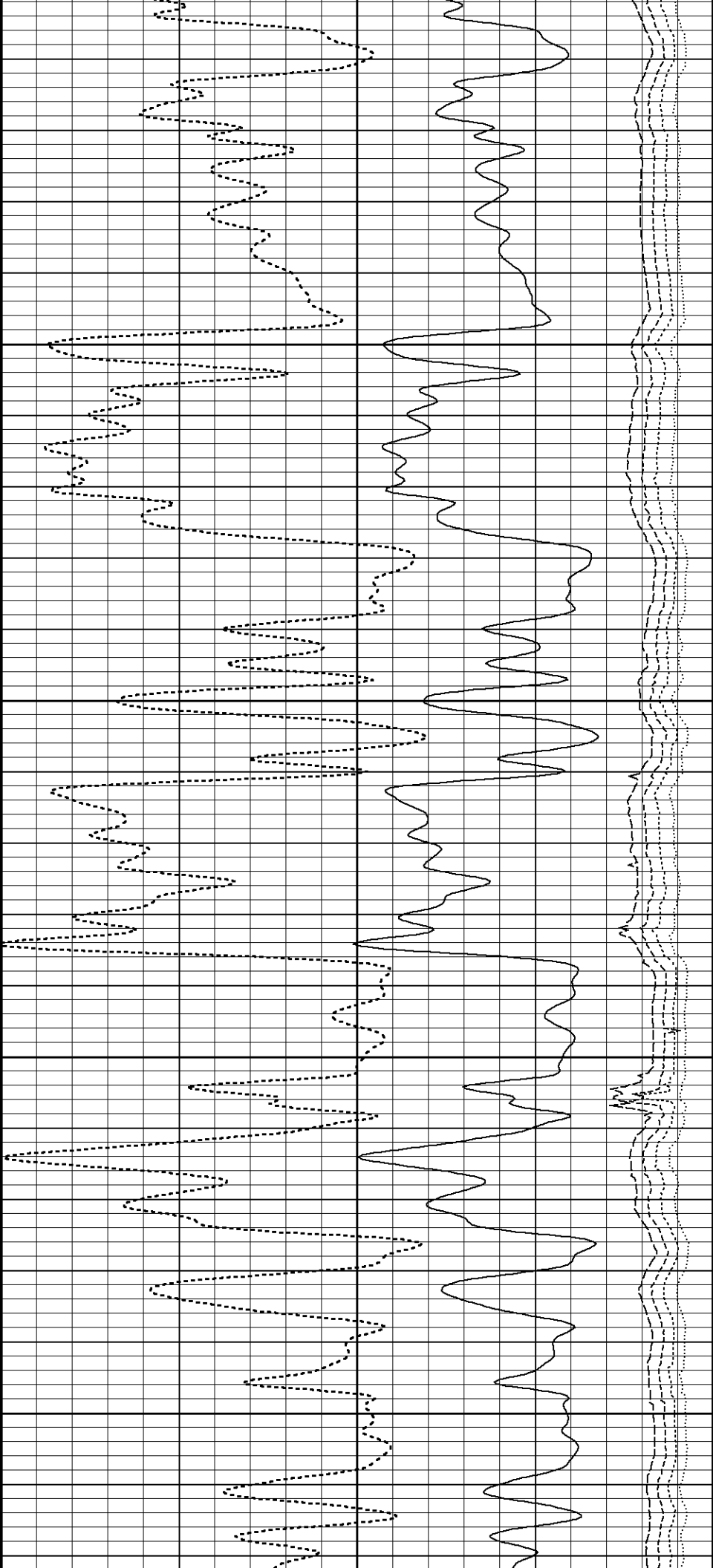
3000

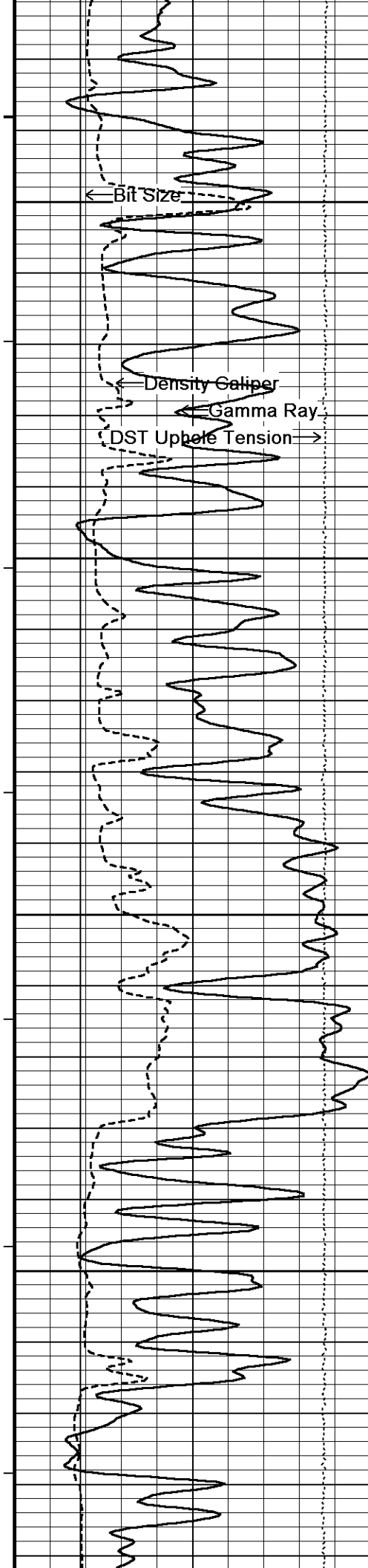
110°

3050

111°

3100





111°

3150

111°

3200

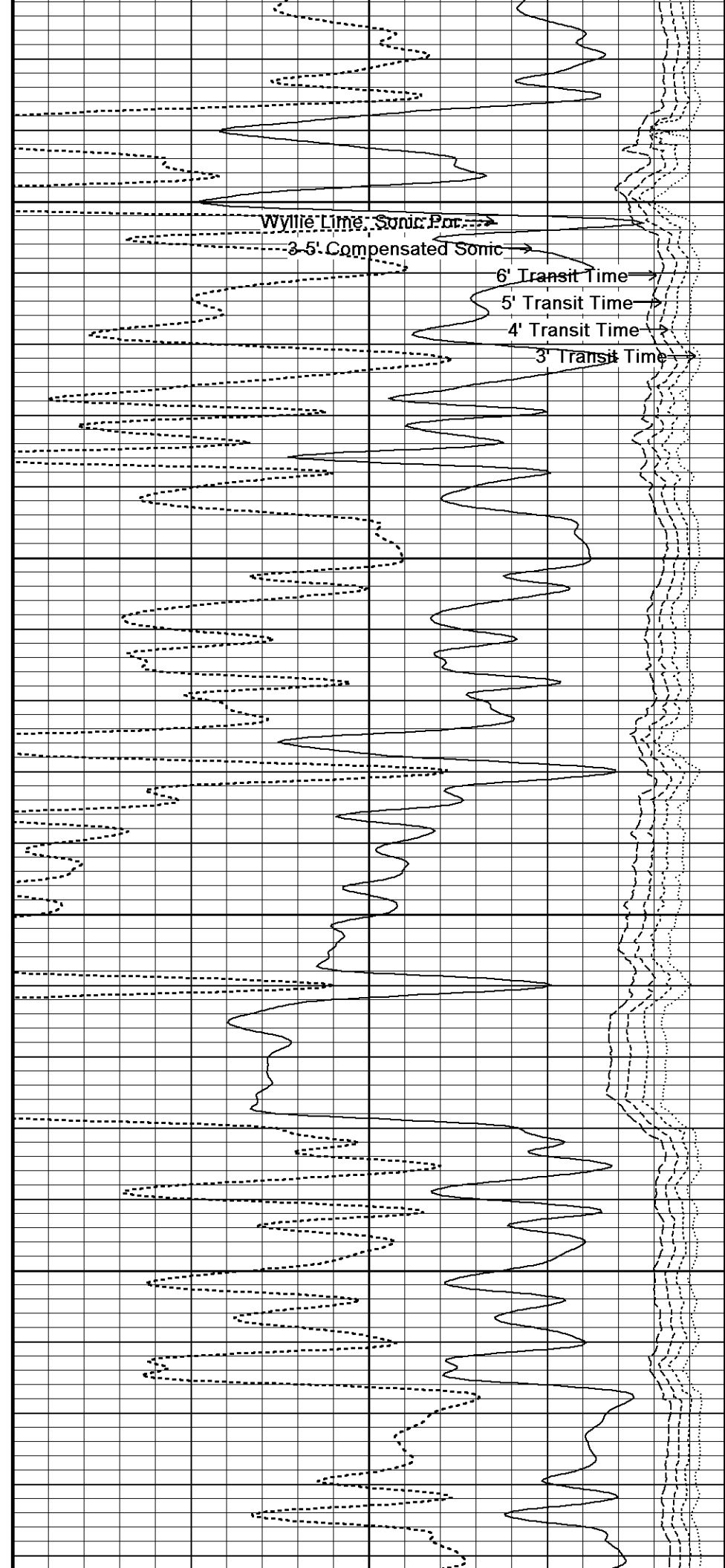
112°

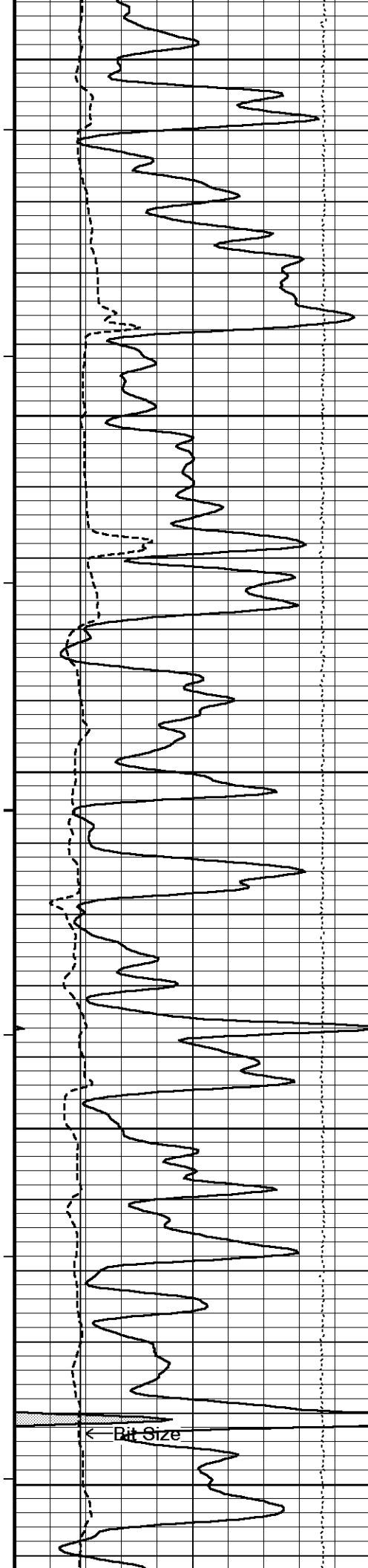
3250

112°

3300

112°





3350

113°

3400

113°

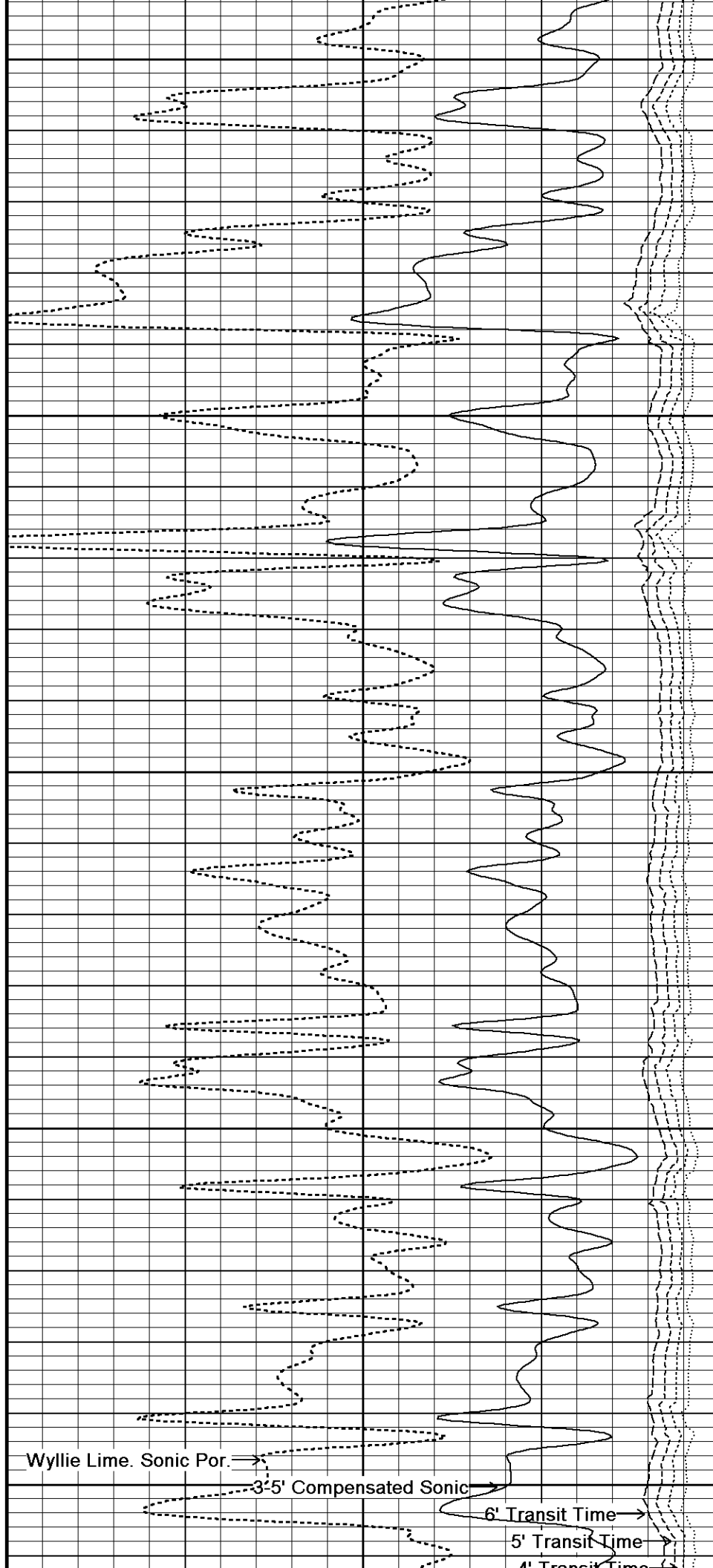
3450

113°

3500

113°

3550



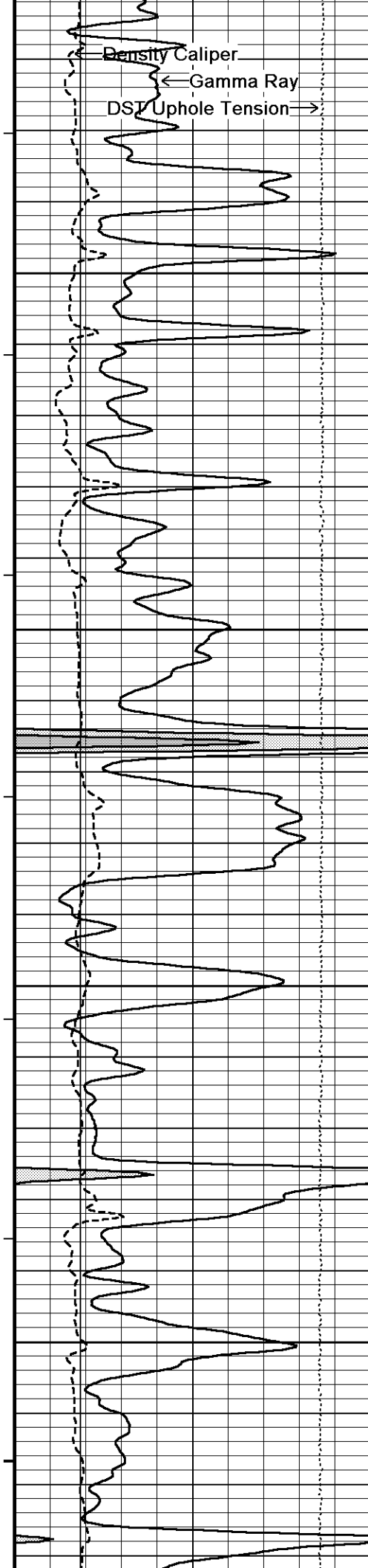
Wyllie Lime. Sonic Por. →

3-5' Compensated Sonic →

6' Transit Time →

5' Transit Time →

4' Transit Time →



113°

3600

113°

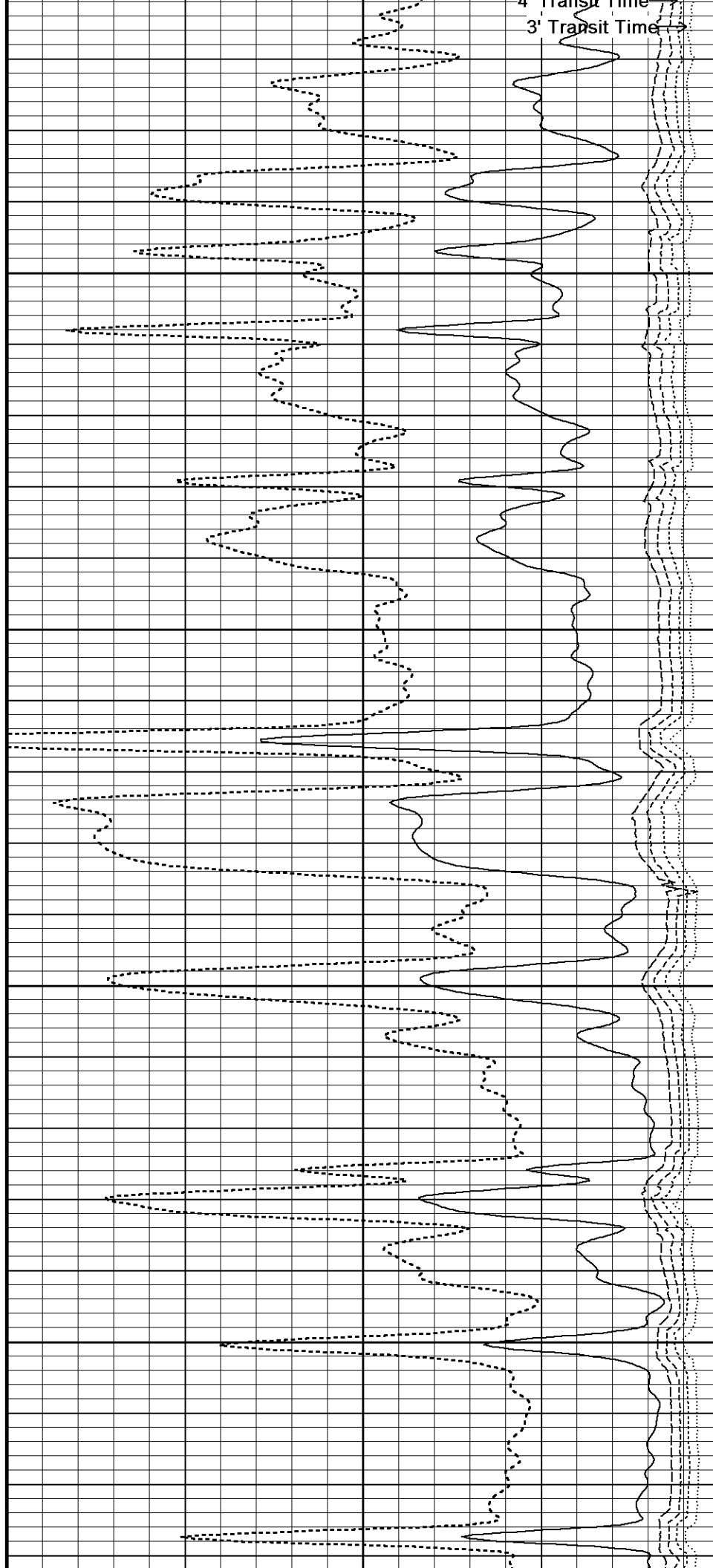
3650

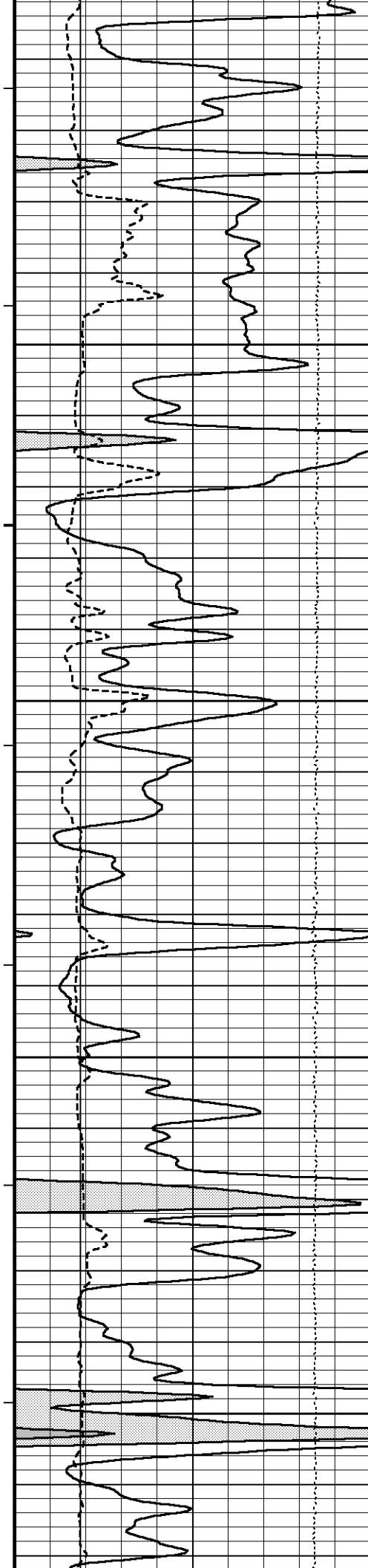
114°

3700

114°

3750





116°

4050

117°

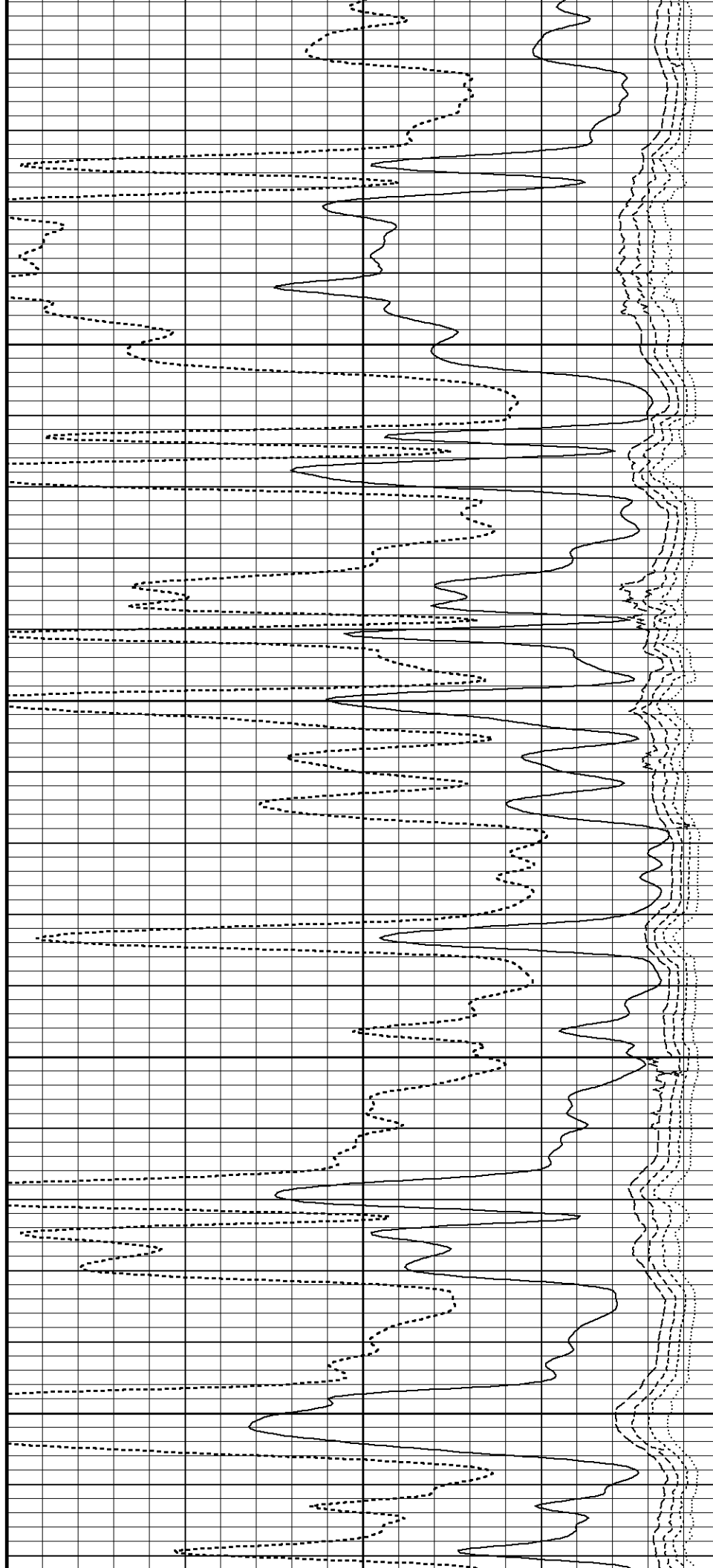
4100

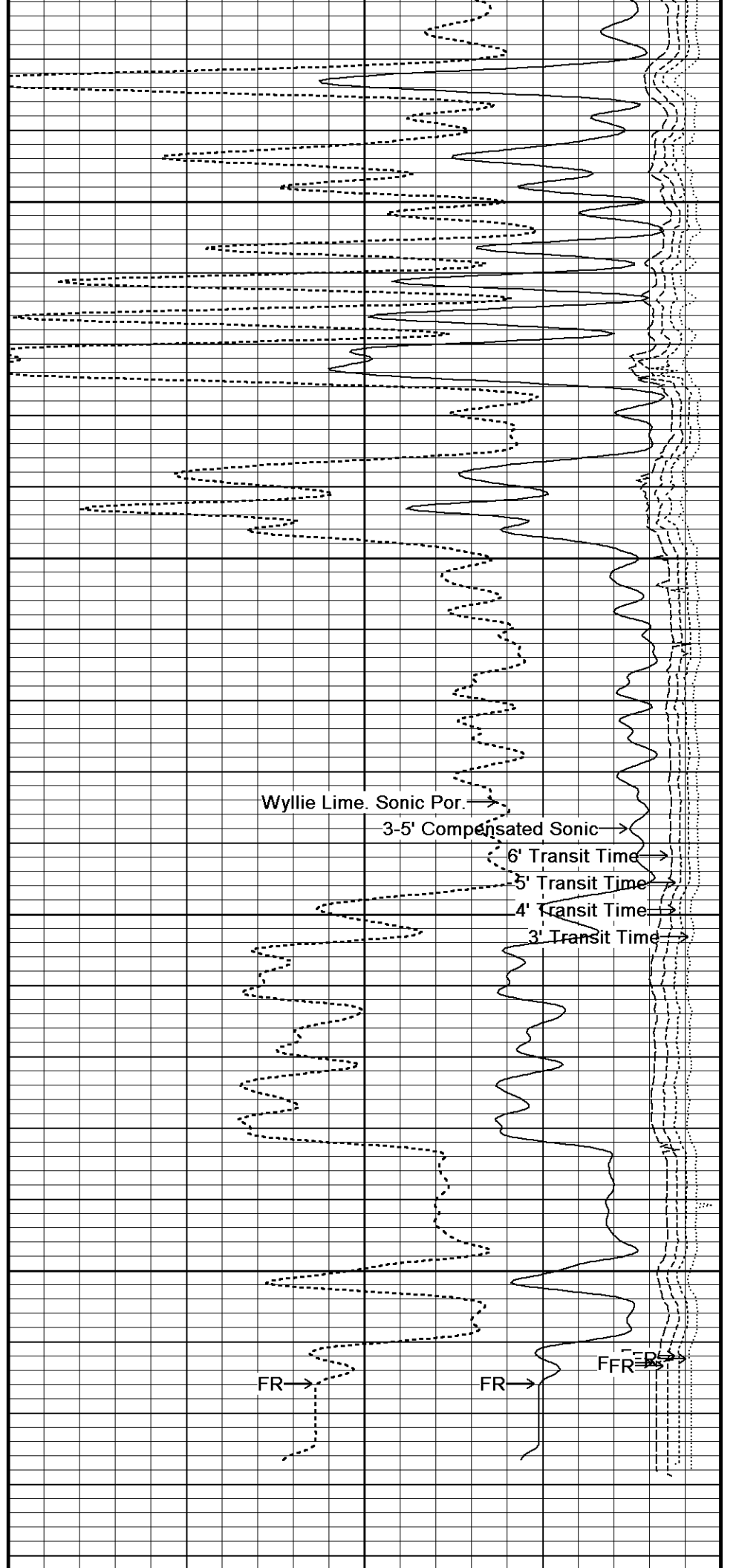
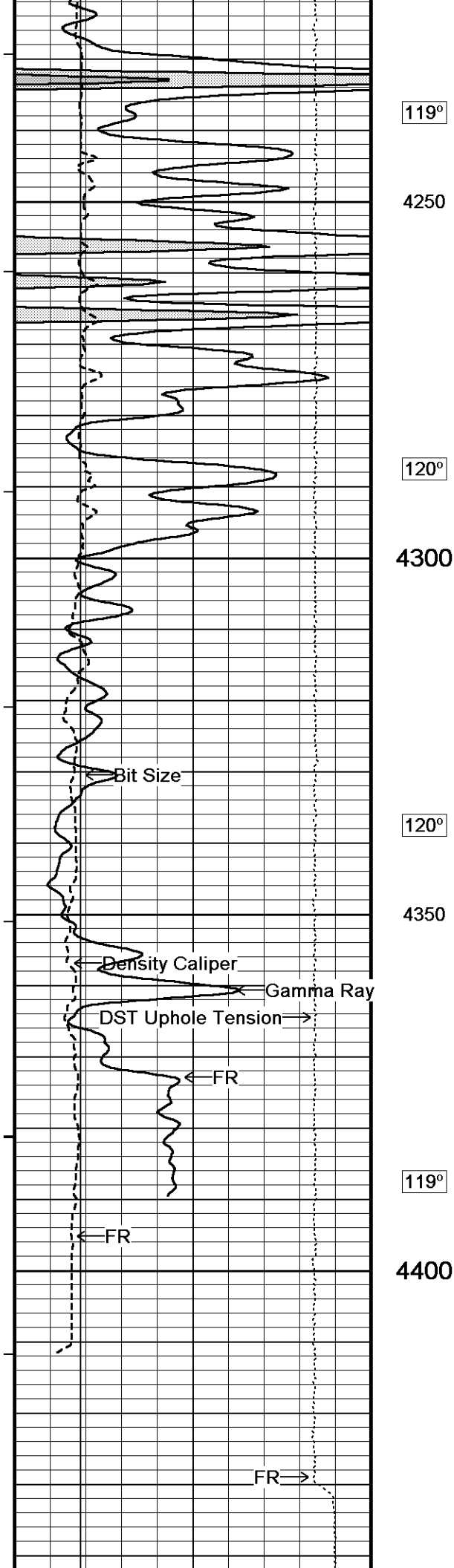
117°

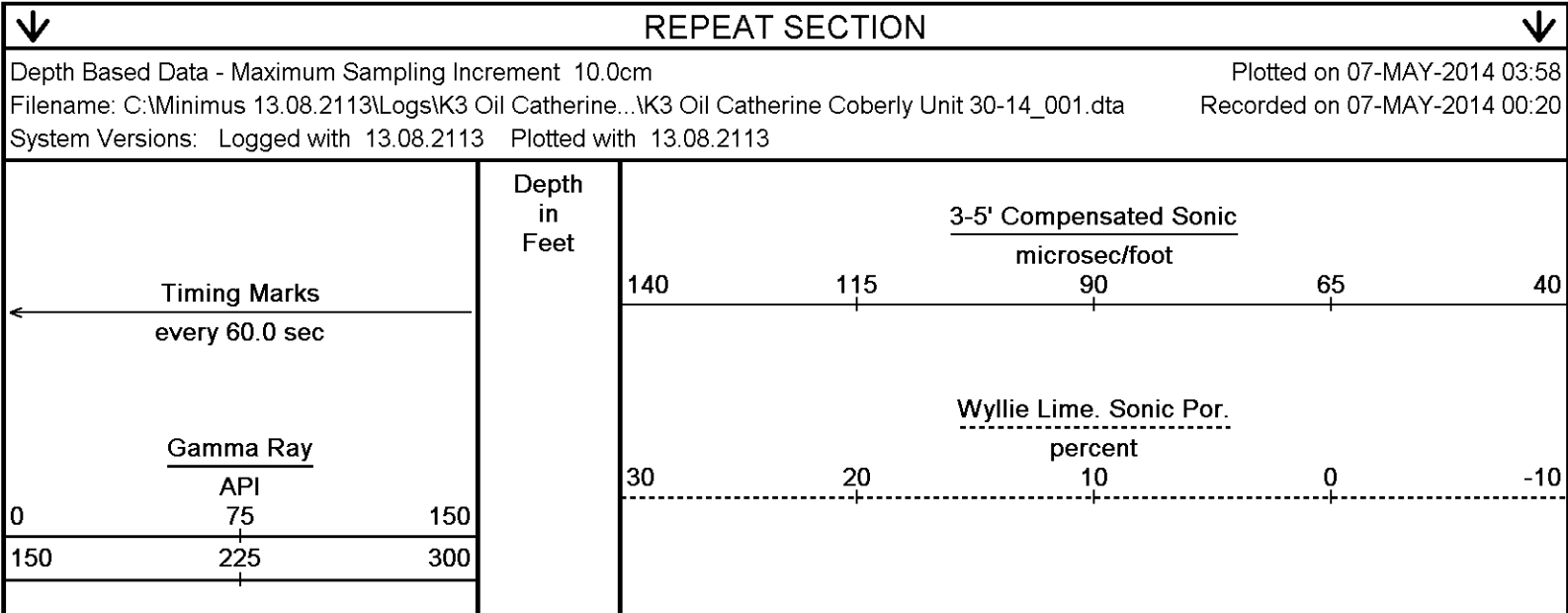
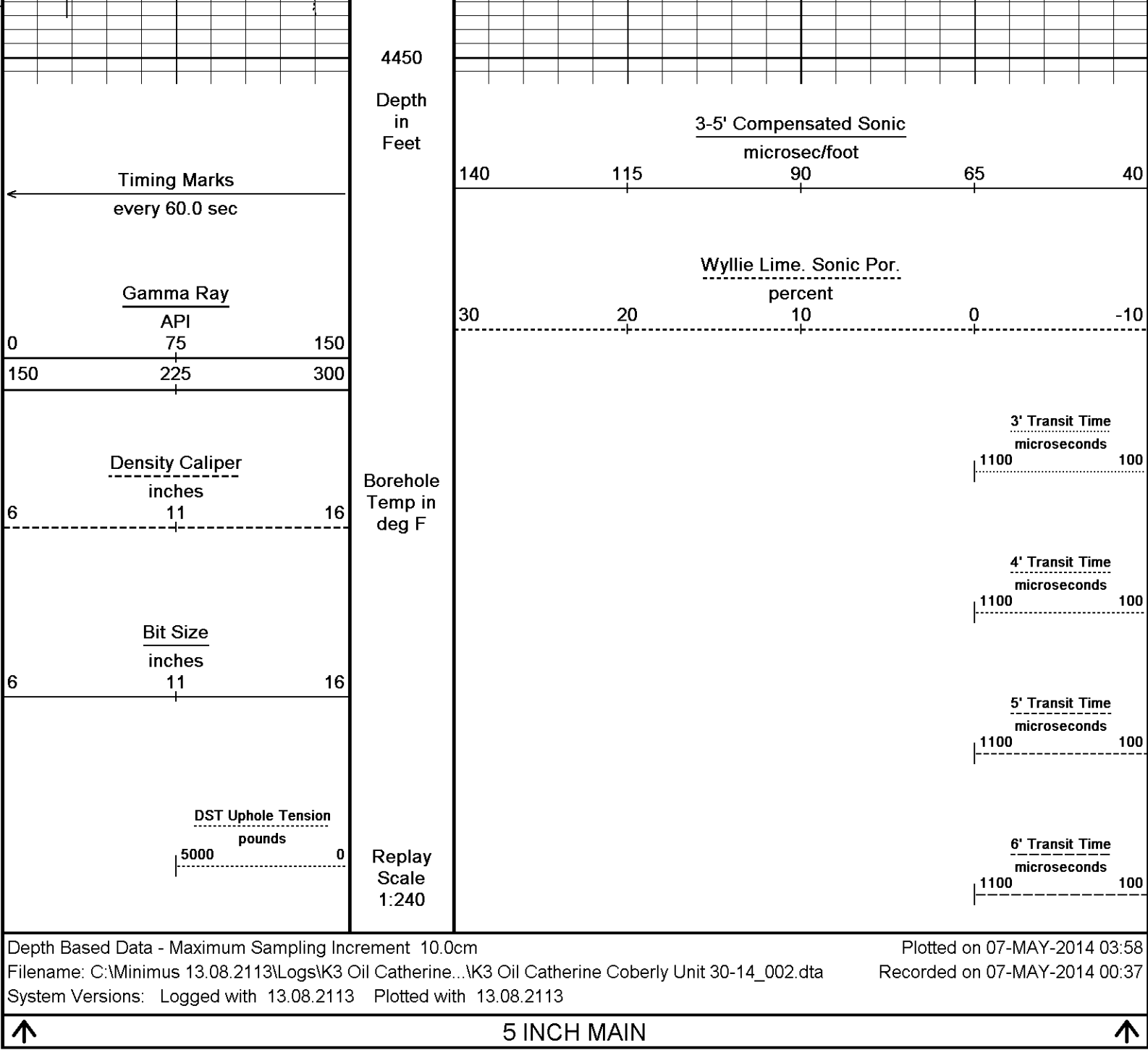
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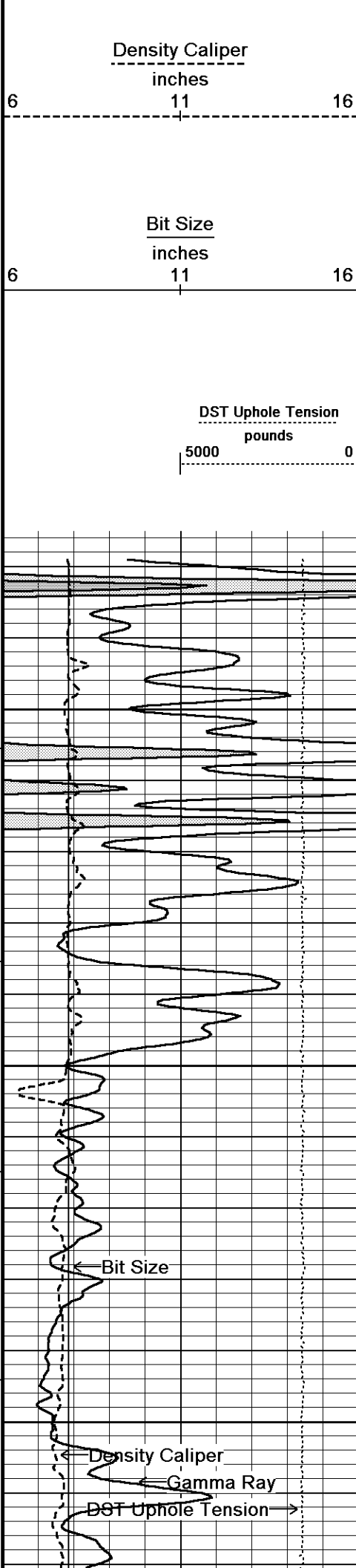
118°

4200









Borehole
Temp in
deg F

Replay
Scale
1:240

4228

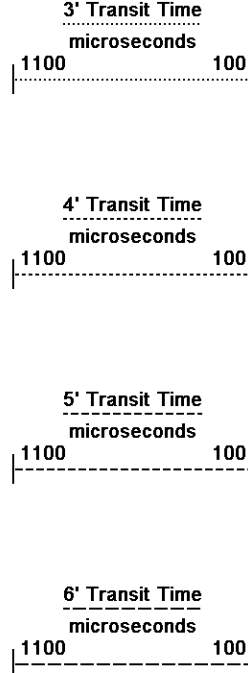
4250

119°

4300

120°

4350



Wyllie Lime. Sonic Por. →

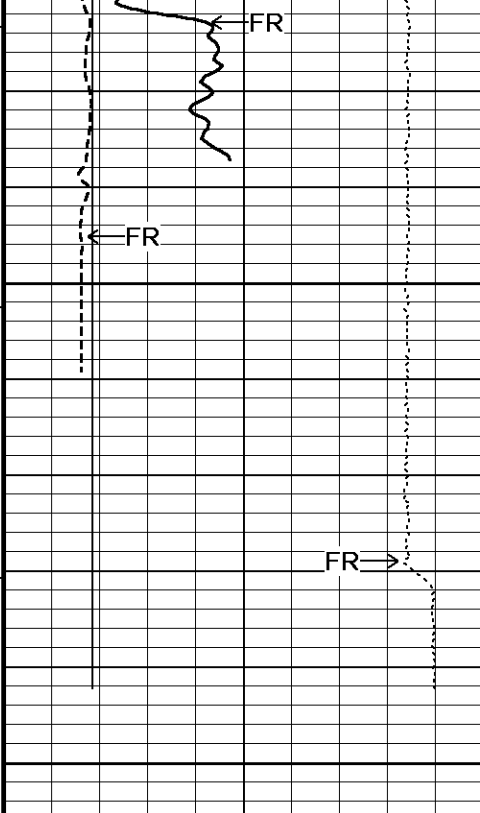
3-5' Compensated Sonic →

6' Transit Time →

5' Transit Time →

4' Transit Time →

3' Transit Time →



119°

4400

4450

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

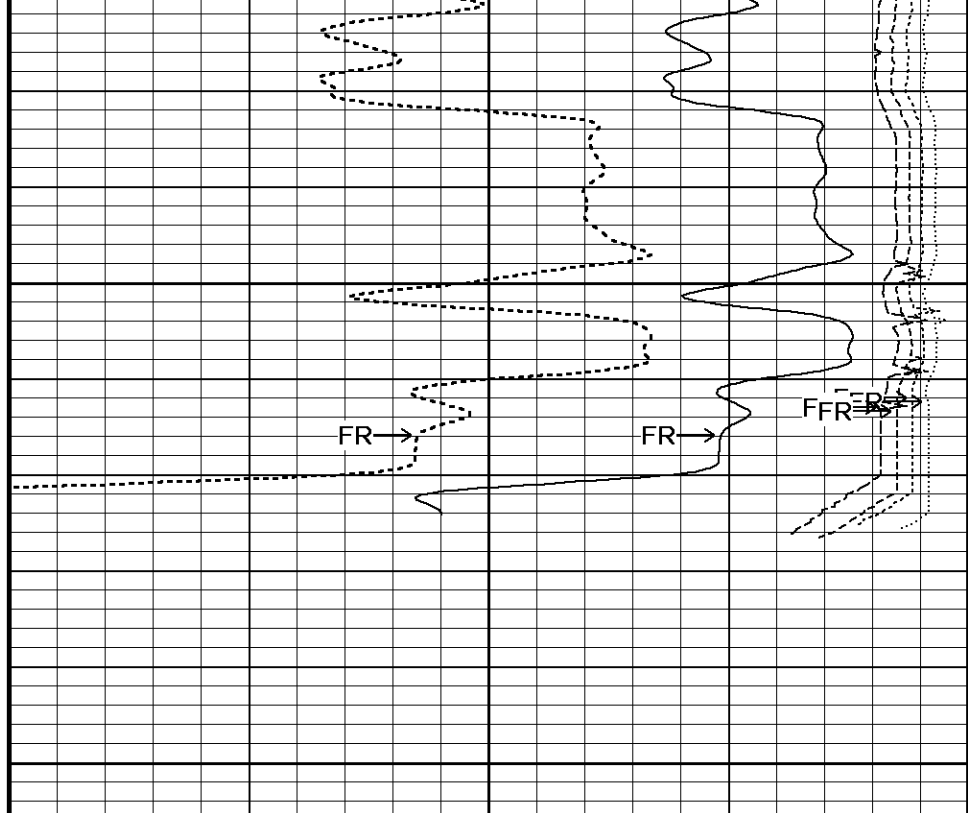
Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Borehole
Temp in
deg F

Replay
Scale
1:240



3-5' Compensated Sonic
microsec/foot

Wyllie Lime. Sonic Por.
percent

3' Transit Time
microseconds

4' Transit Time
microseconds

5' Transit Time
microseconds

6' Transit Time
microseconds



BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\K3 Oil Catherine Coberly Unit 30-14\K3 Oil Catherine Coberly Unit 30-14_002.dta

General Constants All 000

Last Edited on 06-MAY-2014,23:59

General Parameters

Mud Resistivity	0.710	ohm-metres
Mud Resistivity Temperature	95.000	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	MMR Caliper	

Rwa Parameters

Porosity used	Base Density Porosity
Resistivity used	Array Ind. One 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 06-MAY-2014 23:40

Reading No	Measured	Calibrated (lbs)
1	15071.71	0.00
2	15879.48	481.00

Gamma Calibration MCG-C 150

Field Calibration on 06-MAY-2014 18:51

	Measured	Calibrated (API)
Background	68	46
Calibrator (Gross)	1139	771
Calibrator (Net)	1071	725

Gamma Constants MCG-C 150

Last Edited on 06-MAY-2014,22:46

Gamma Calibrator Number	GRC038	
Mud Density	1.10	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 MCG-C 150

Field Calibration on 10-MAR-2014 13:42

	Measured	Calibrated (mV)
Reference 1	99.9	99.0
Reference 2	-97.7	-98.8

High Resolution Temperature Calibration MCG-C 150

Field Calibration on 08-MAR-2014,10:59

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

High Resolution Temperature Constants MCG-C 150

Last Edited on 06-MAY-2014,18:36

Pre-filter Length	11
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Caliper Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:12

Field Calibration on 06-MAY-2014 18:35

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13253	5.96
2	16528	7.97

3	19726	9.95
4	23473	11.91
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.04	7.97

Micro Normal and Micro Inverse Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:03

Field Check on 06-MAY-2014 18:36

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.1	49.8	5.1	25.6
Micro Inverse	9.9	49.5	3.4	16.9
Channel	Base Check (ohm-m)		Field Check (ohm-m)	
Micro Normal	93.6		93.6	
Micro Inverse	62.2		62.2	

Micro Normal and Micro Inverse Constants MMR-C.A 248

Last Edited on 23-JAN-2014,17:04

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159		
Micro Normal K Factor	0.5110		
Micro Inverse K Factor	0.3380		
Standoff Offset	0.0000	inches	

Neutron Calibration MDN-B.J 387

Base Calibration on 21-JAN-2014 13:56

Field Check on 06-MAY-2014 18:56

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2848	86	3714	110
Ratio	32.942		33.764	

Field Calibrator at Base

	Calibrated (cps)
	1737 2564
Ratio	0.677

Field Check

	Calibrated (cps)
	1757 2605
Ratio	0.675

Neutron Constants MDN-B.J 387

Last Edited on 06-MAY-2014,22:46

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron		
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-A.A 55

Base Calibration on 24-MAR-2014 10:21

Field Check on 06-MAY-2014 18:26

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	951.2	126.8

Base Check

281.7

Field Check

281.5

FE Constants MFE-A.A 55

Last Edited on 06-MAY-2014,22:45

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-A.A 73

Last Edited on 06-MAY-2014,22:45

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 Sonic	
Correction for Sonde Skew	Applied	
Cycle Stretch Algorithm	Applied	
MN3FT	N/A	micro-sec
MX3FT	N/A	micro-sec
Hunt-Raymer Constant	83.13	micro-sec/ft

Sonde Mode	Compensated
Hole Type	Open Hole

Sonde Parameters

	Measured	Calibrated
Offset	N/A	0.0000
Free Pipe	N/A	N/A
Peak Amplitude Source		N/A

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)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Full Waveform Parameters

Use 3' Waveform to derive TR	N/A
Use 4' Waveform to derive TR	N/A
Use 5' Waveform to derive TR	N/A
Use 6' Waveform to derive TR	N/A
3' Waveform Discriminator Level	N/A mV
4' Waveform Discriminator Level	N/A mV
5' Waveform Discriminator Level	N/A mV
6' Waveform Discriminator Level	N/A mV
3' Waveform Filter	N/A
4' Waveform Filter	N/A
5' Waveform Filter	N/A
6' Waveform Filter	N/A

Semblance Level	N/A
Semblance Window Width	N/A micro-sec
Sonic 1 Despiker	N/A
Sonic 2 Despiker	N/A

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	16.3	470.8	9.3	966.2
2	5.6	376.1	7.6	821.4
3	2.6	266.1	5.2	566.0
4	1.6	130.0	2.6	279.2

Array Temperature 71.1 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			16.2	3863.5
2			32.1	3590.5
3			30.0	2971.0
4			20.9	2126.0
Deep			18.6	1912.1
Medium			43.2	3860.5
Shallow			47.7	5372.0

Array Temperature 90.1 Deg F

Induction Constants MAI-A.A 5

Last Edited on 06-MAY-2014,22:45

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	
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 5

Field Calibration on 21-JAN-2014,15:43

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

High Resolution Temperature Constants MAI-A A 5

Last Edited on 04-APR-2014,15:47

Pre-filter Length	11	
Caliper Calibration	MPD-D.A 480	Base Calibration on 02-APR-2014 14:28 Field Calibration on 06-MAY-2014 18:28
Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17565	3.99
2	27501	5.98
3	37544	7.97
4	47406	9.86
5	58484	11.92
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.96	7.97

Photo Density Calibration MPD-D.A 480					Base Calibration on 02-APR-2014 14:48	
					Field Check on 06-MAY-2014 18:33	
Density Calibration						
Base Calibration		Measured		Calibrated (sdu)		
		Near	Far	Near	Far	
	Background	1280	1474			
	Reference 1	56490	26296	59556	30836	
	Reference 2	23070	2655	24941	2541	
Field Check at Base						
		1280.1	1473.9			
Field Check						
		1278.5	1472.7			
PE Calibration						
Base Calibration		Measured		Calibrated		
	WS	WH	Ratio	Ratio		
	Background	244	1141			
	Reference 1	23700	56281	0.425	0.371	
	Reference 2	6865	22924	0.304	0.272	
Field Check at Base						
		243.9	1141.4			
Field Check						
		241.3	1140.2			

[illegible]

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\K3 Oil Catherine Coberly Unit 30-14\K3 Oil Catherine Coberly Unit 30-14_002.dta

CBH-C, Cablehead, 11 pin

CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma

MCG-C 150 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity

MMR-C.A 248 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron

MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

MPD-D.A 480 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric

MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

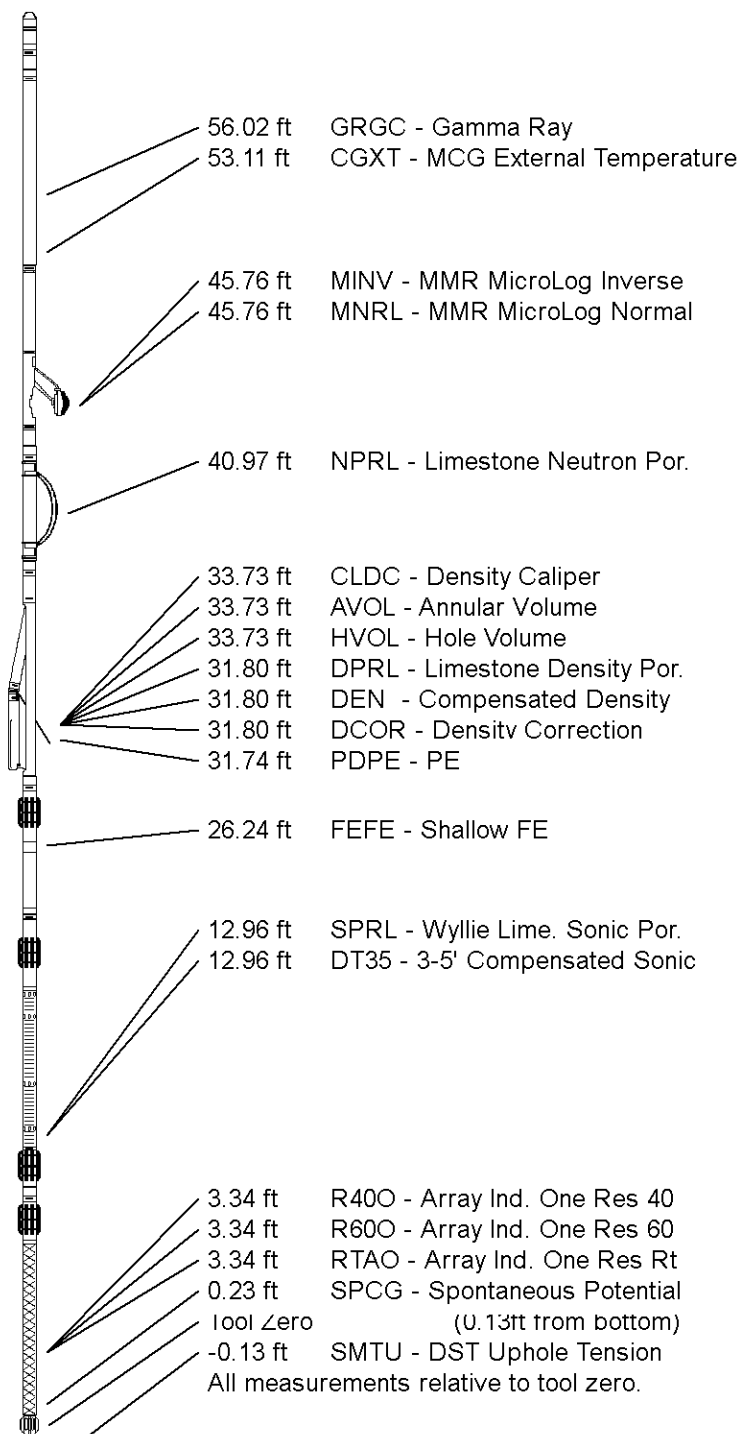
Compact Sonic

MSS-A.A 73 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction

MAI-A.A 5 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 63.70 ft Weight: 480.6 lb



COMPANY

K3 OIL & GAS OPERATING COMPANY

WELL

CATHERINE COBERLY UNIT 30-14

FIELD

WILDCAT

PROVINCE/COUNTY

GOVE

COUNTRY/STATE

U.S.A. / KANSAS

Elevation Kelly Bushing	2550.00	feet
Elevation Drill Floor	2548.00	feet
Elevation Ground Level	2542.00	feet

First Reading	4416.00	feet
Depth Driller	4425.00	feet
Depth Logger	4429.00	feet



The Weatherford logo, featuring the word "Weatherford" in a bold, sans-serif font, with a registered trademark symbol (®) to its upper right.

COMPENSATED SONIC
WITH INTEGRATED TRANSIT TIME