



**Weatherford**<sup>®</sup>

**COMPACT PHOTO DENSITY  
COMPENSATED NEUTRON  
MICRORESISTIVITY LOG**

COMPANY	O'BRIEN RESOURCES, LLC		
WELL	HARPER 35 #1		
FIELD	WILDCAT		
PROVINCE/COUNTY LANE	U.S.A. / KANSAS		
COUNTRY/STATE	1185' FNL & 875' FEL		
LOCATION	SE SW NE NE		
PERMIT NUMBER	SE SW NE NE		
SEC 35	TWP 16S	RGE 30W	Other Services
Latitude	MA/IMFE		
Longitude	15-101-22516		
API Number	Permanent Datum GL, Elevation 2846 feet		
Log Measured From	KB		
Drilling Measured From	KB @ 8 FEET		
Date	18-AUG-2014		Elevations: KB 2854.00 DF 2852.00 GL 2846.00
Run Number	ONE		
Service Order	4558-95560163		
Depth Driller	4675.00	feet	
Depth Logger	4678.00	feet	
First Reading	4659.00	feet	
Last Reading	3700.00	feet	
Casing Driller	258.00	feet	
Casing Logger	263.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.20 lb/USg	39.00 CP	
PH / Fluid Loss	11.00	8.00 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	1.24 @ 90.0	ohm-m	
Rmf @ Measured Temp	0.99 @ 90.0	ohm-m	
Rmc @ Measured Temp	1.49 @ 90.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.97 @ 115.0	ohm-m	
Time Since Circulation	4 HOURS		
Max Recorded Temp	115.00	deg F	
Equipment / Base	13096	LIB	
Recorded By	ADAM SILL		
Witnessed By	KURT TALBOTT		
JOB #	LB14-240		

**BOREHOLE RECORD**

Last Edited: 18-AUG-2014 08:43

Bit Size inches	Depth From feet	Depth To feet
7.875	258.00	4675.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	258.00	24.00

**REMARKS**

- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
  - HARDWARE: DUAL BOWSPRING USED ON MDN.
  - 0.5 INCH STANDOFF USED ON MFE.
  - 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: 1991 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO 3700 FEET: 268 CU.FT.
- RIG: LANDMARK #5

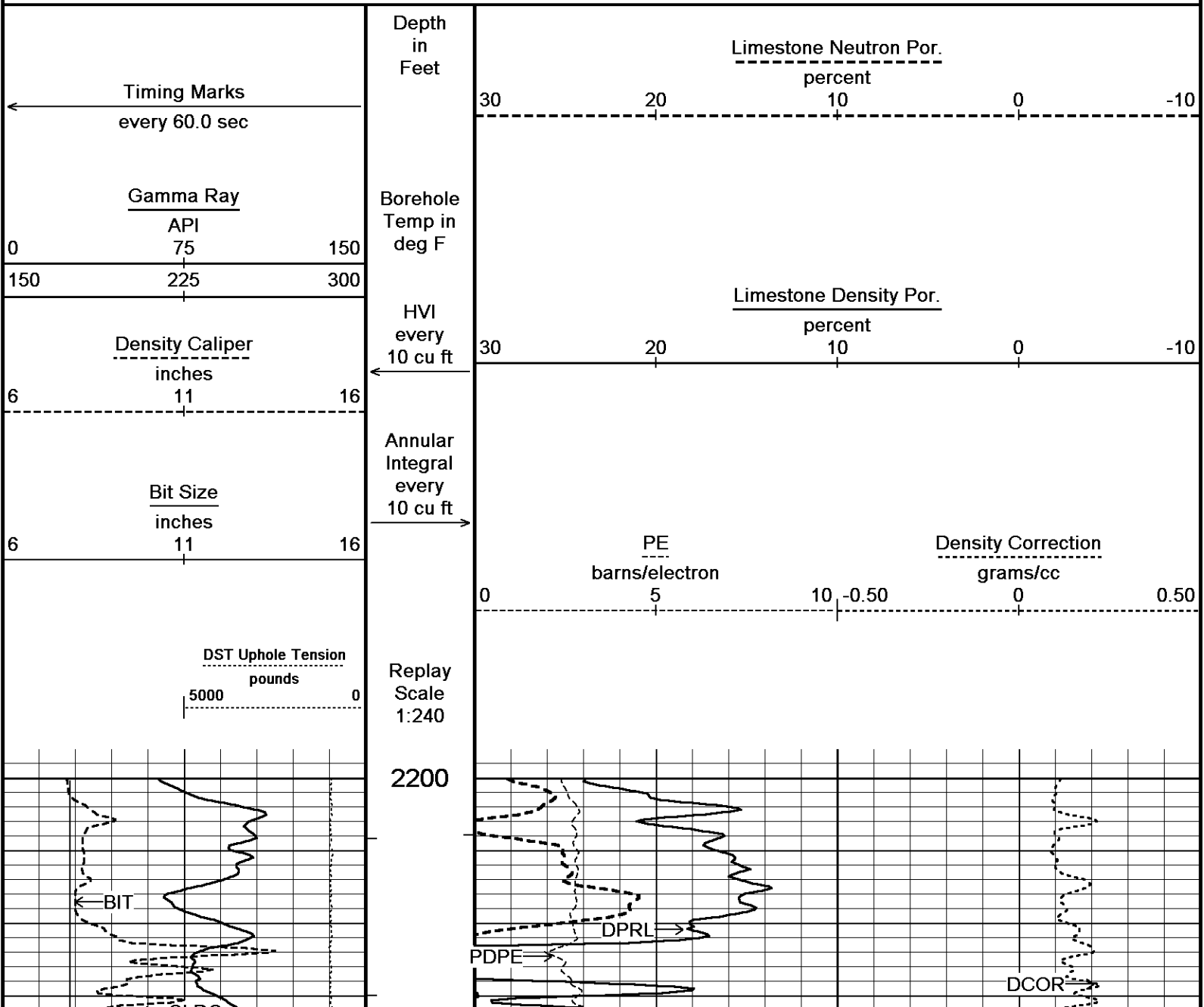
- ENGINEER: A. SILL.

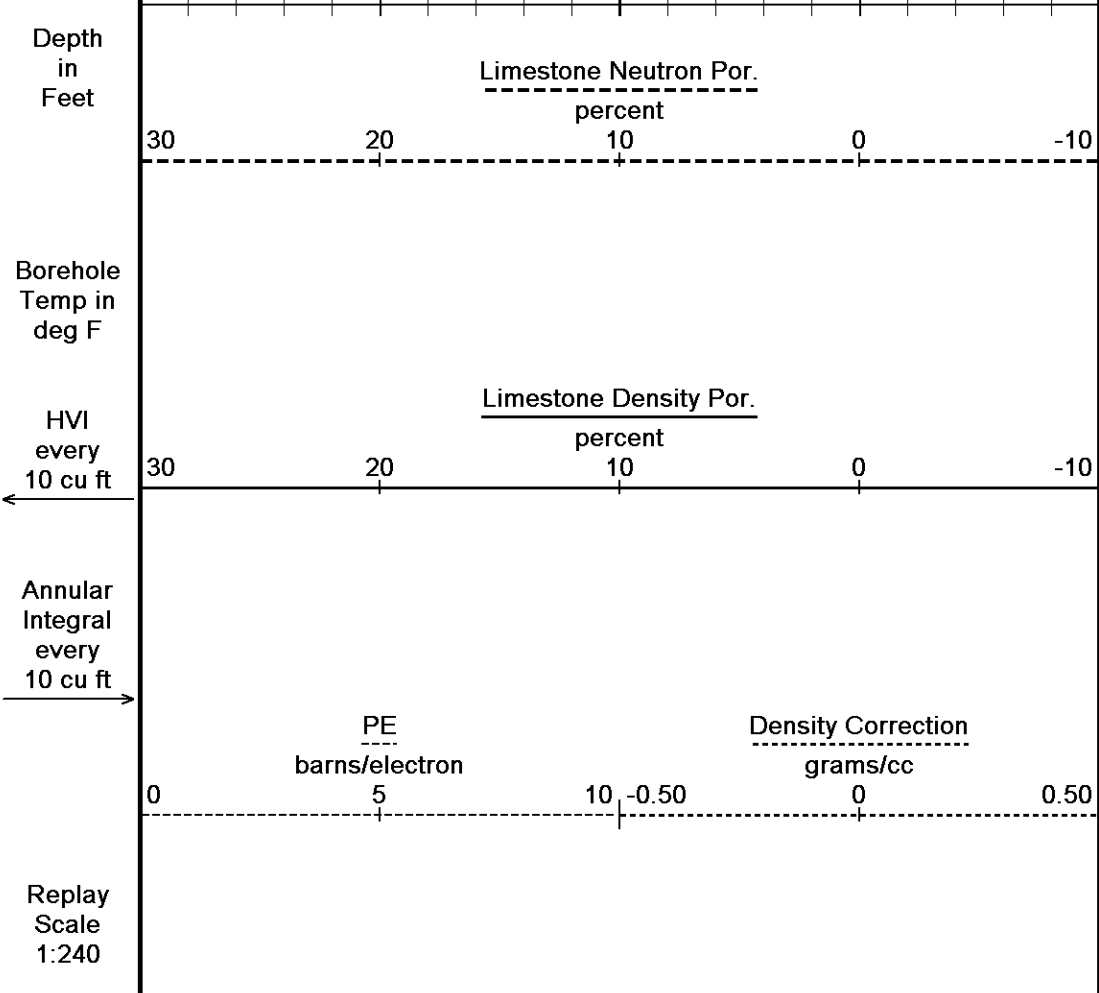
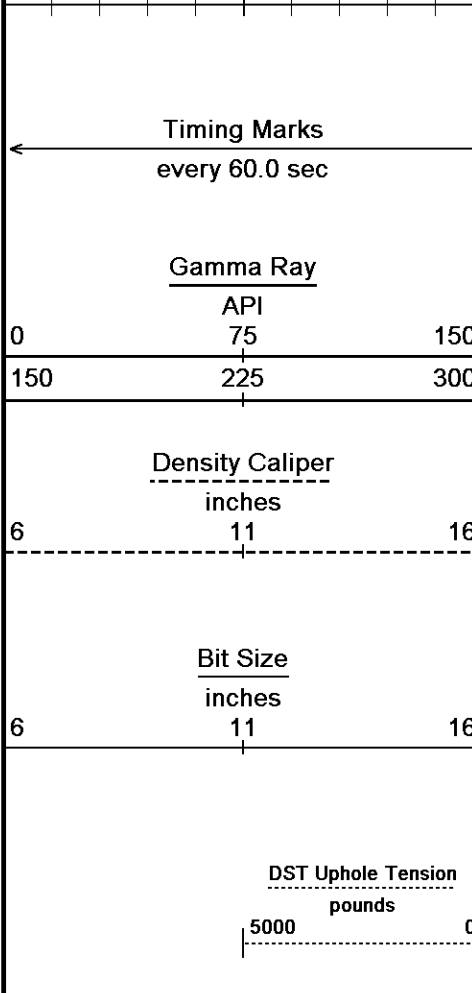
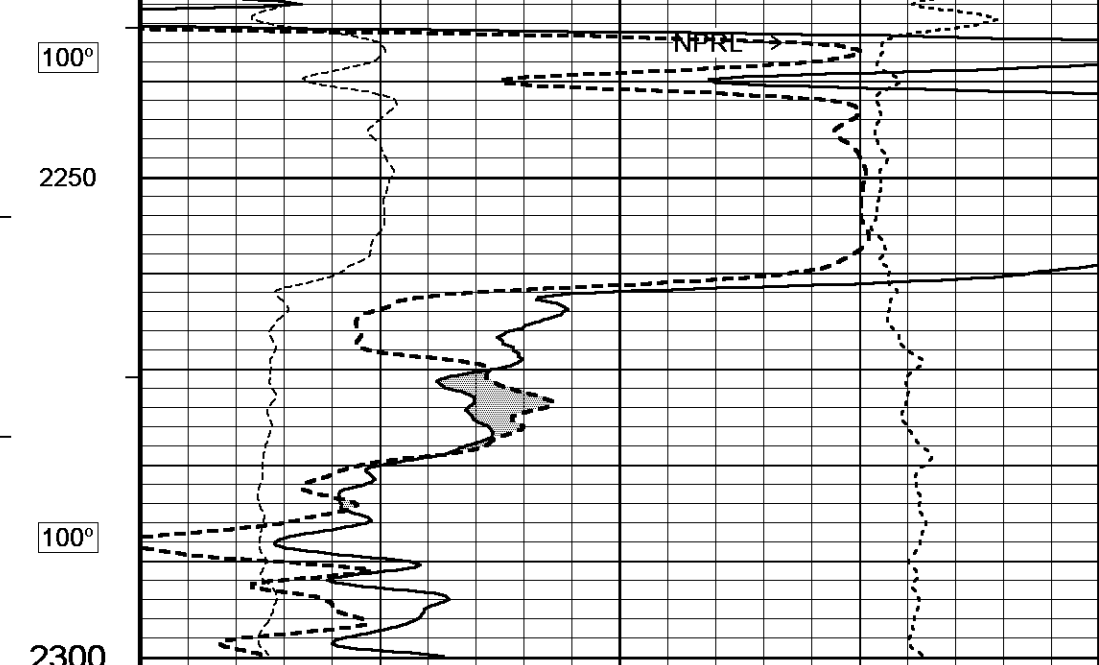
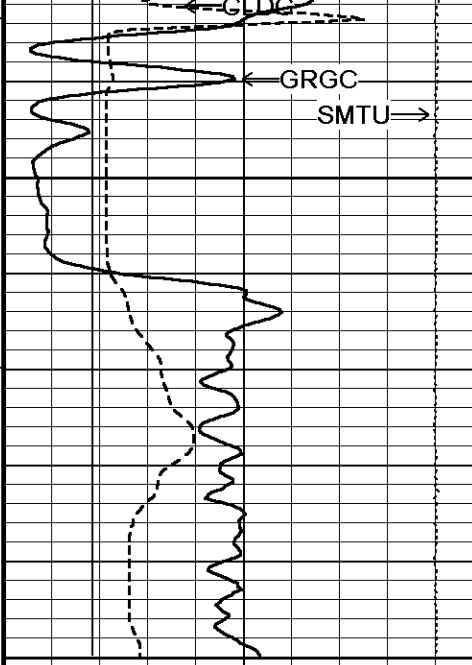
- OPERATOR: J. DUNLAP.

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.

**5 INCH MAIN ANHYDRITE**

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 18-AUG-2014 14:51  
 Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...O'Brien (LA) Harper 35 #1\_002.dta Recorded on 18-AUG-2014 12:24  
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113



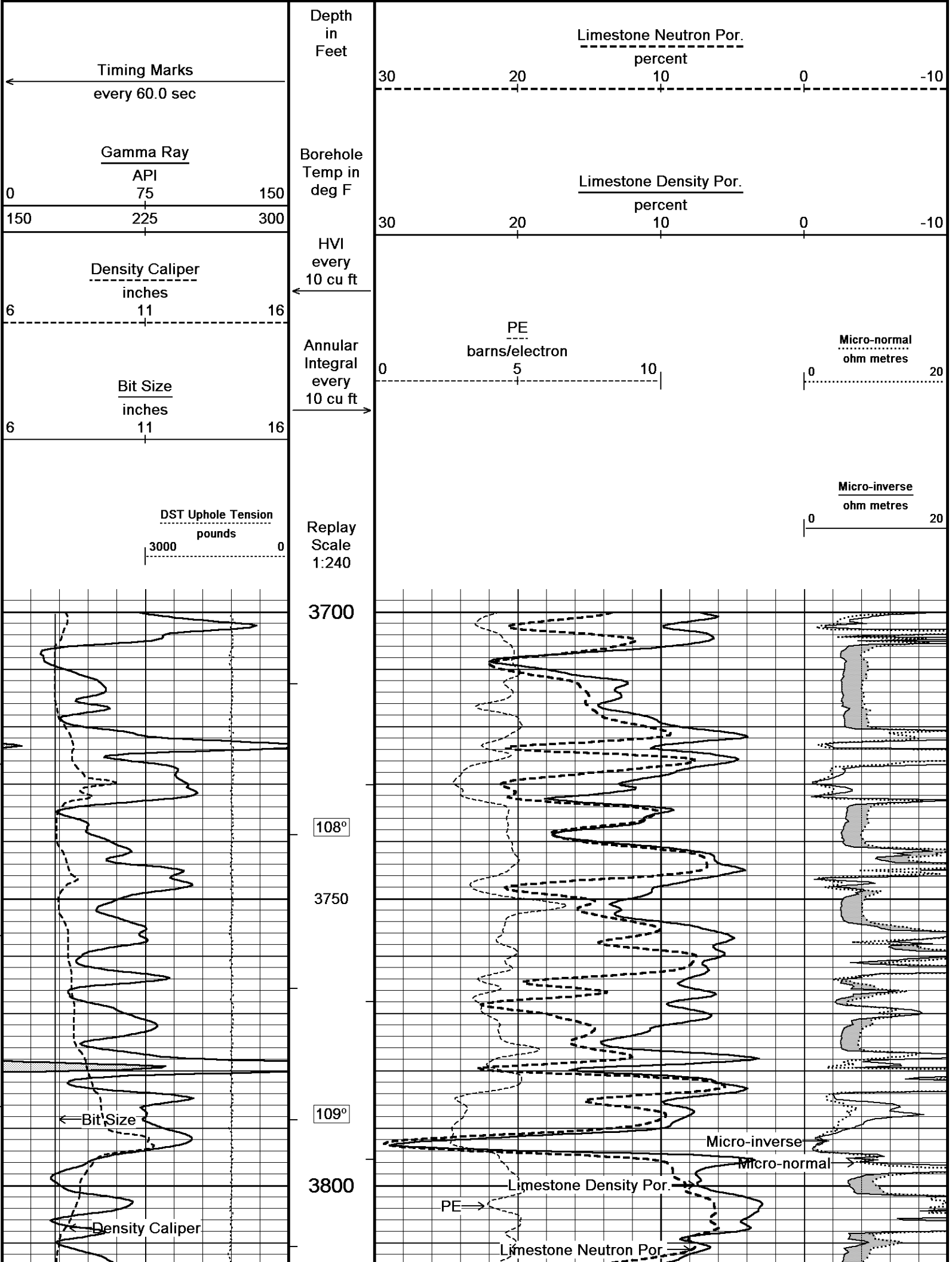


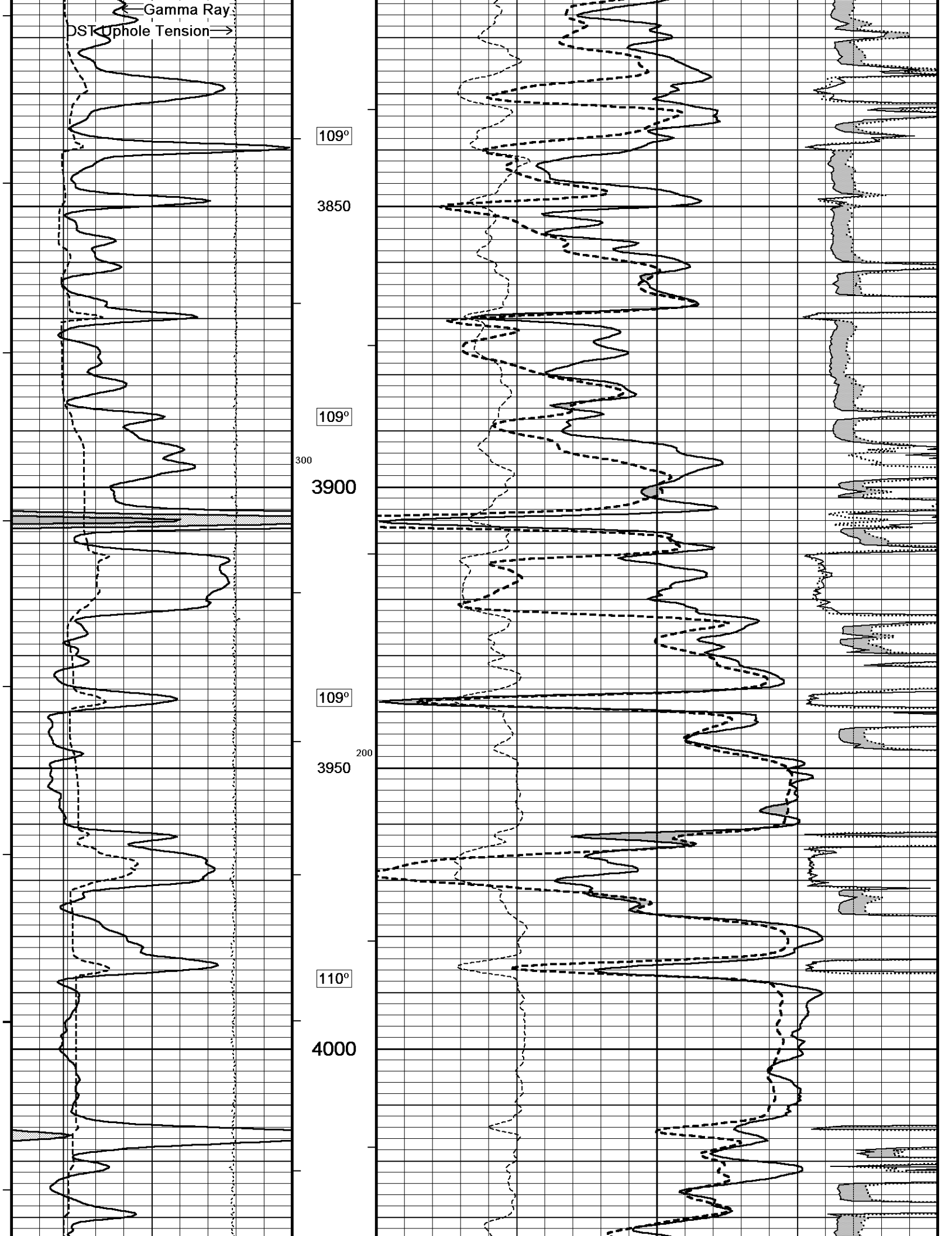
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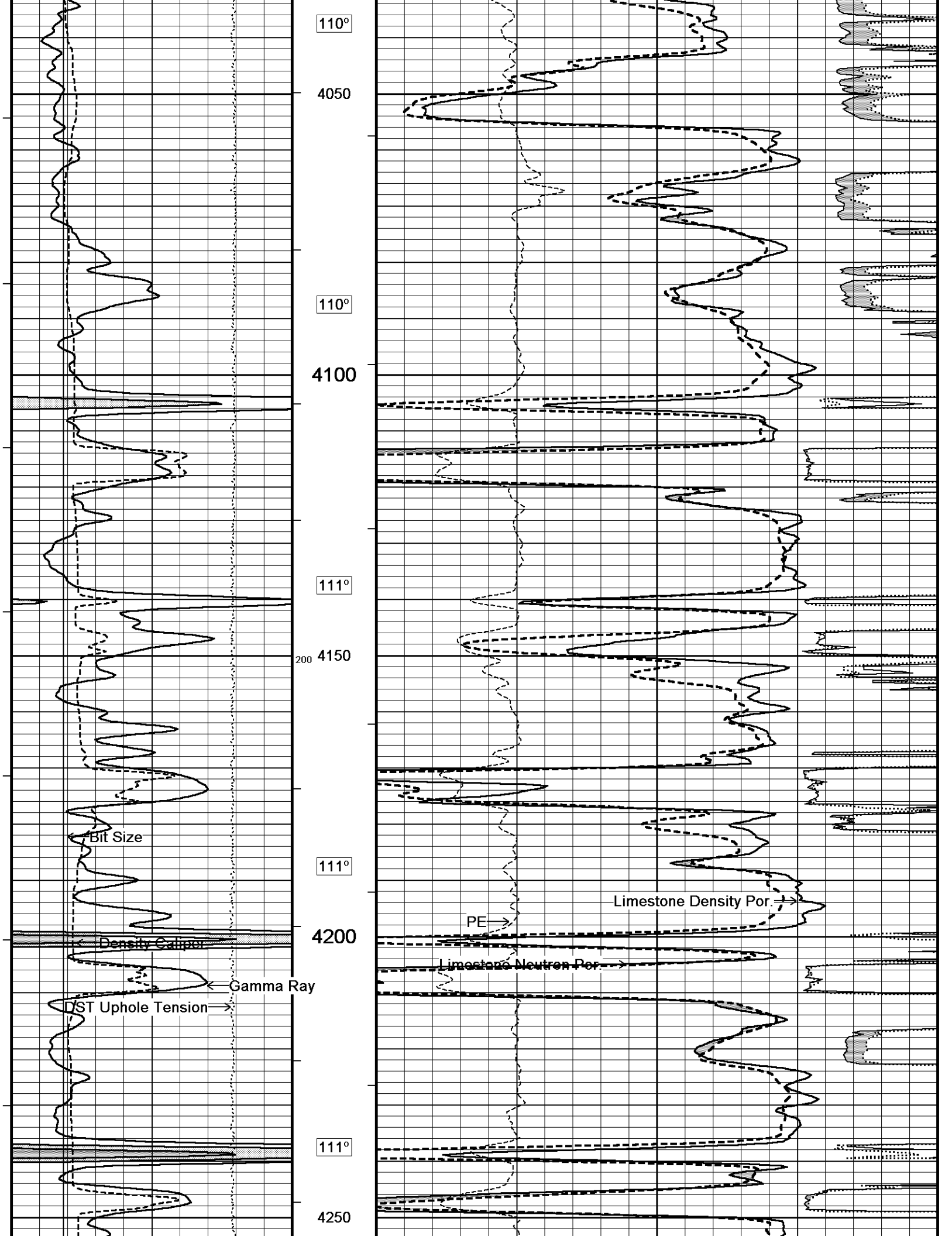
↑ 5 INCH MAIN ANHYDRITE ↑

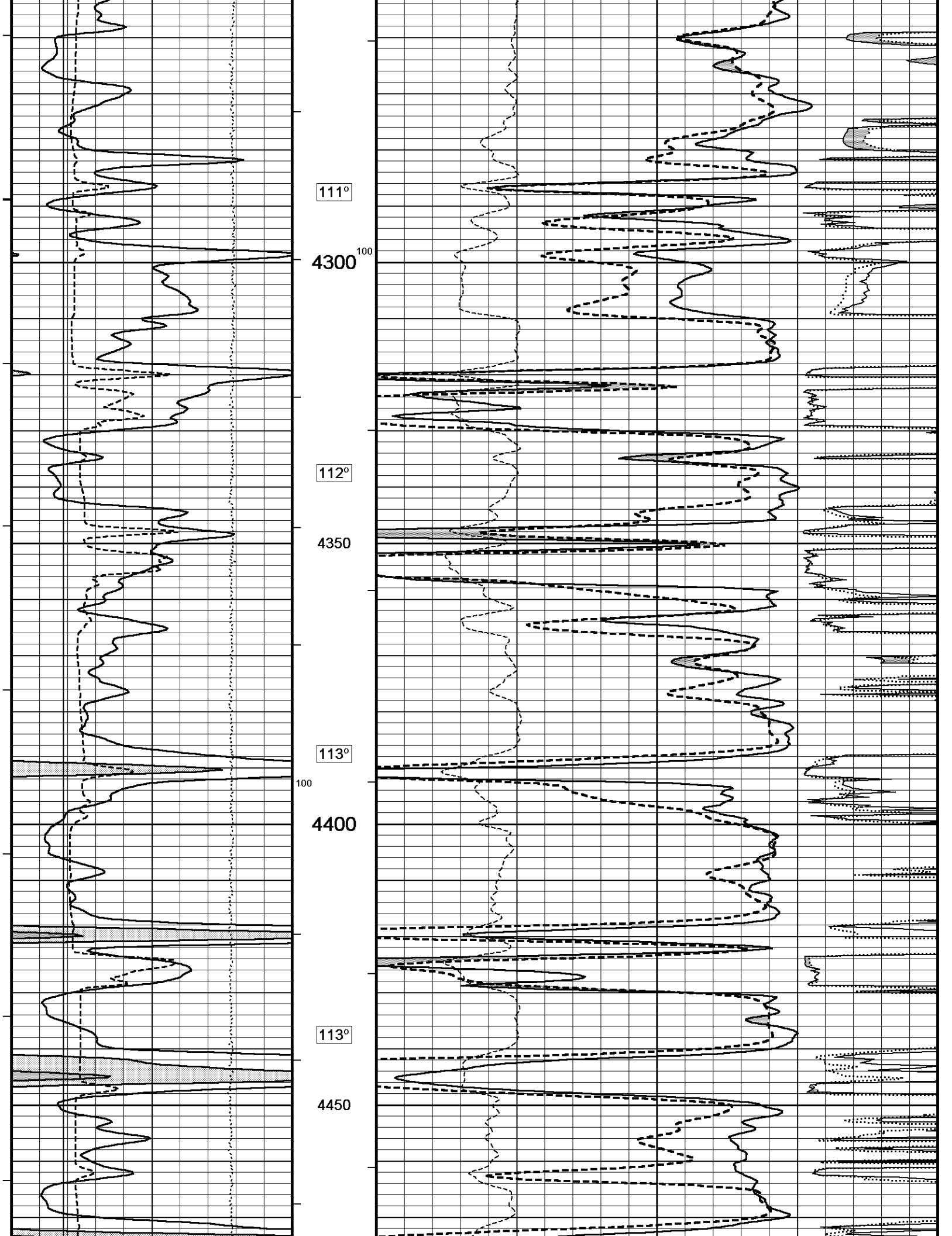
↓ 5 INCH MAIN ↓

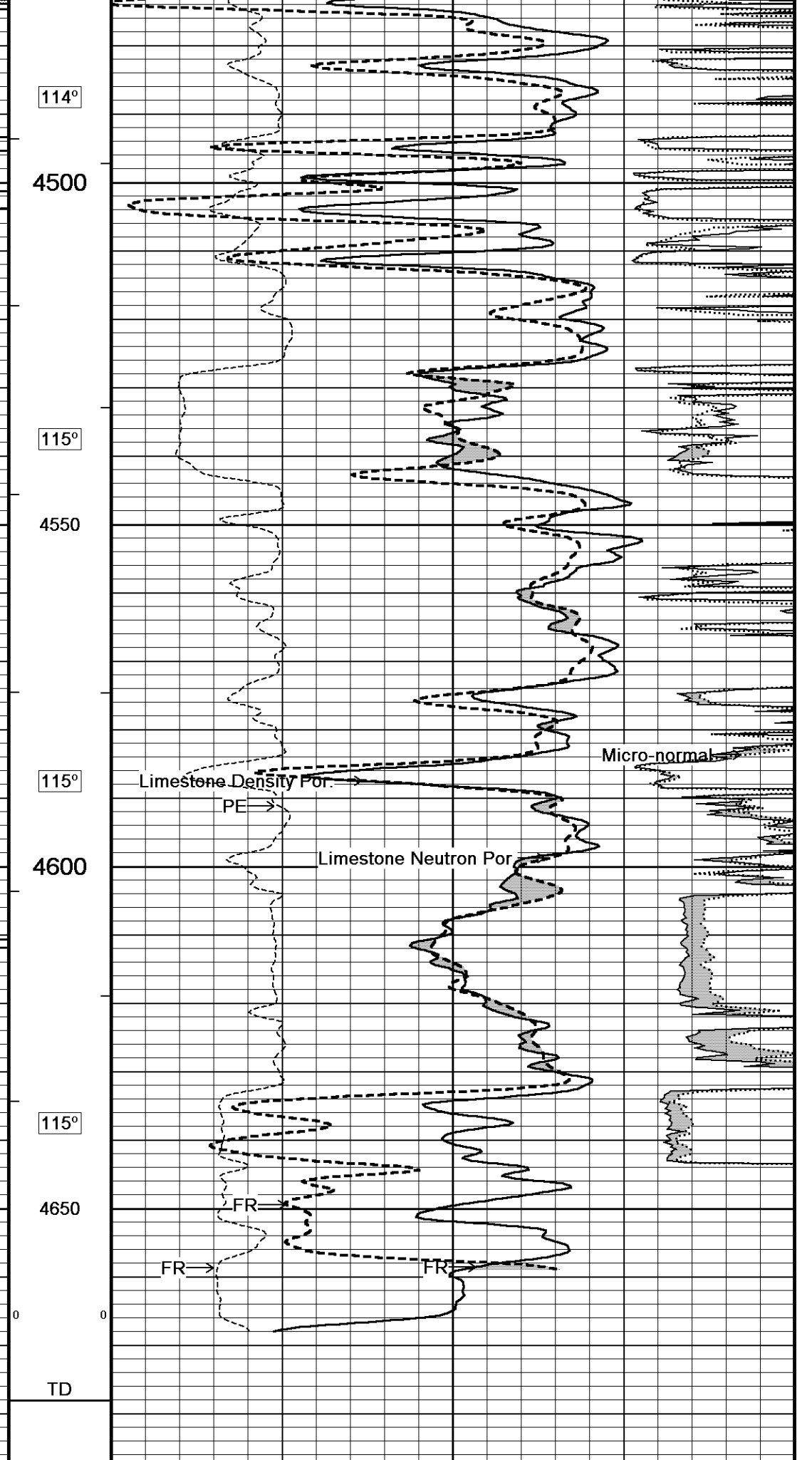
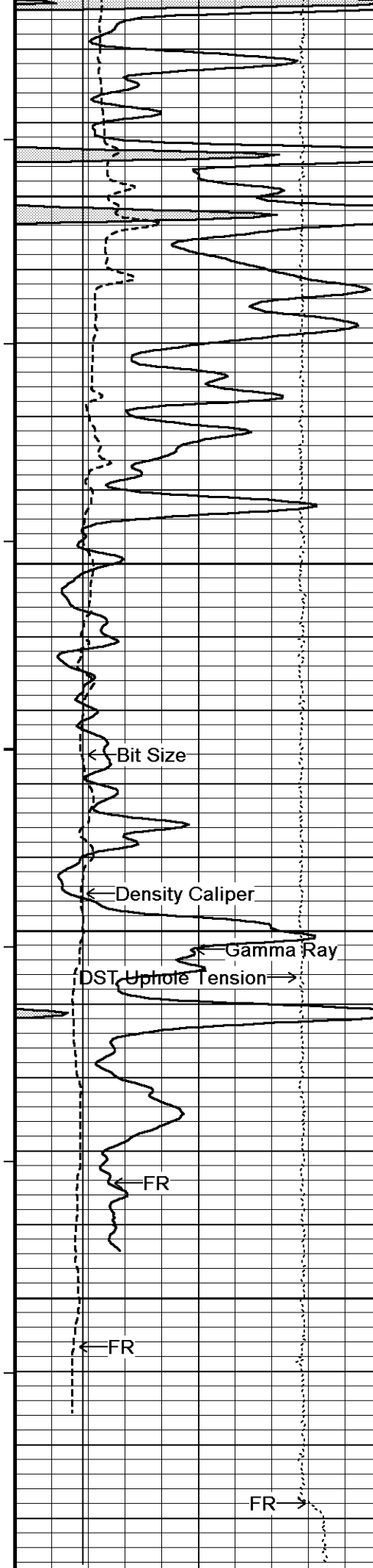
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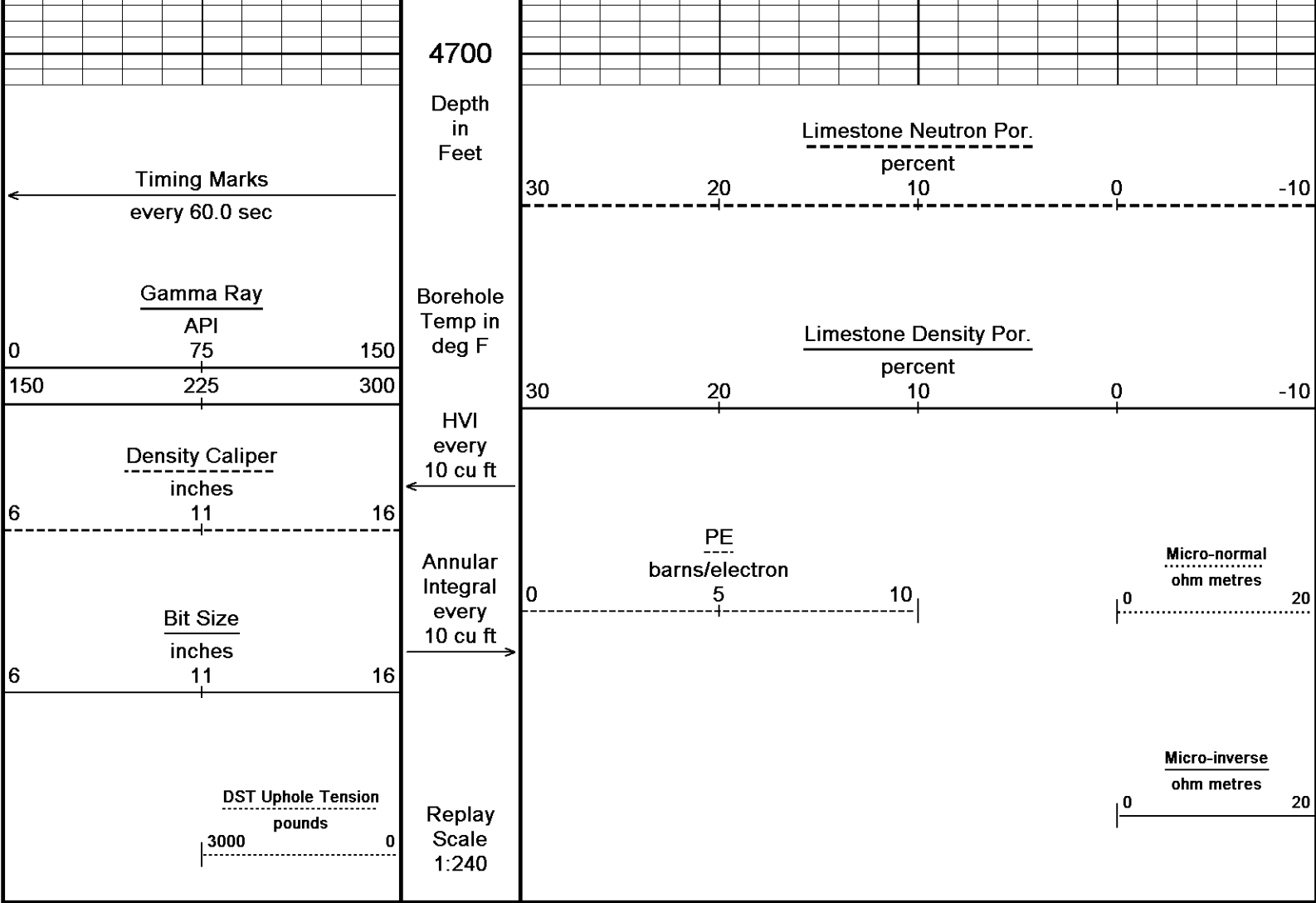








114°  
 4500  
 115°  
 4550  
 115°  
 4600  
 115°  
 4650  
 0  
 TD

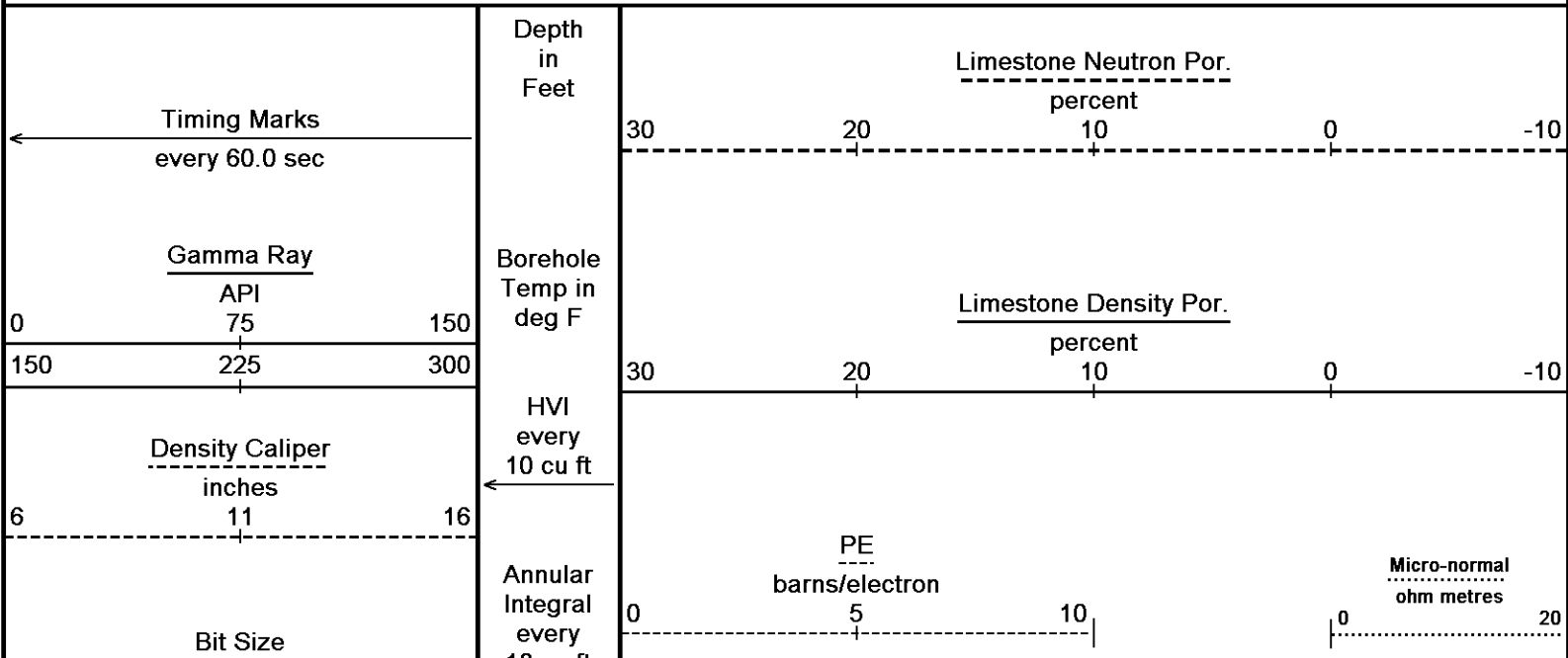


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↑ **5 INCH MAIN** ↑

↓ **REPEAT SECTION** ↓

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 18-AUG-2014 14:51  
 Filename: C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 3...\O'Brien (LA) Harper 35 #1\_001.dta Recorded on 18-AUG-2014 12:04  
 System Versions: Logged with 13.08.2113 Plotted with 13.08.2113



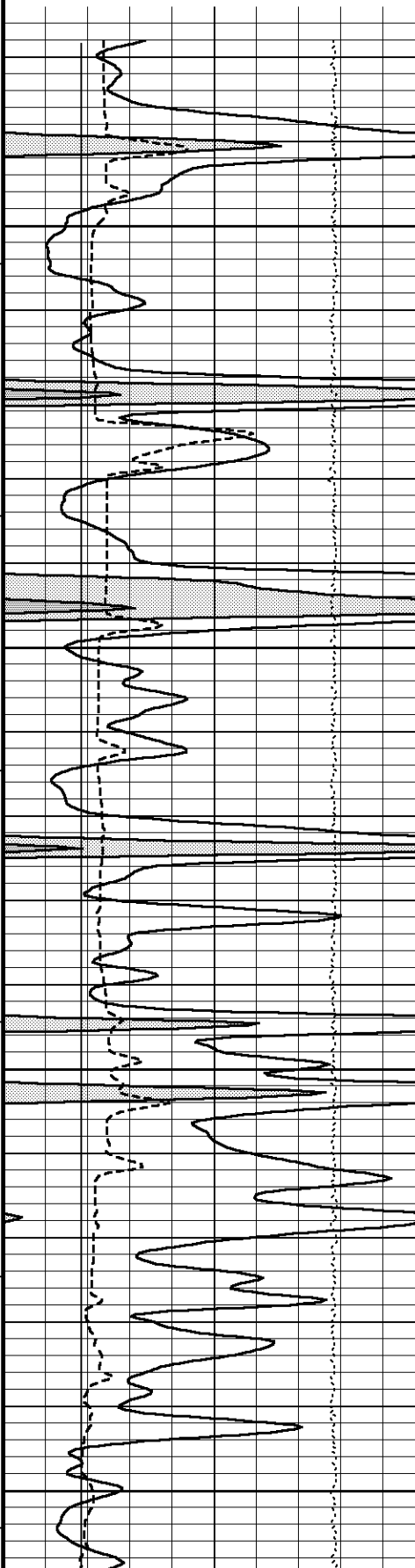
6 inches 11 16

DST Uphole Tension  
pounds  
3000 0

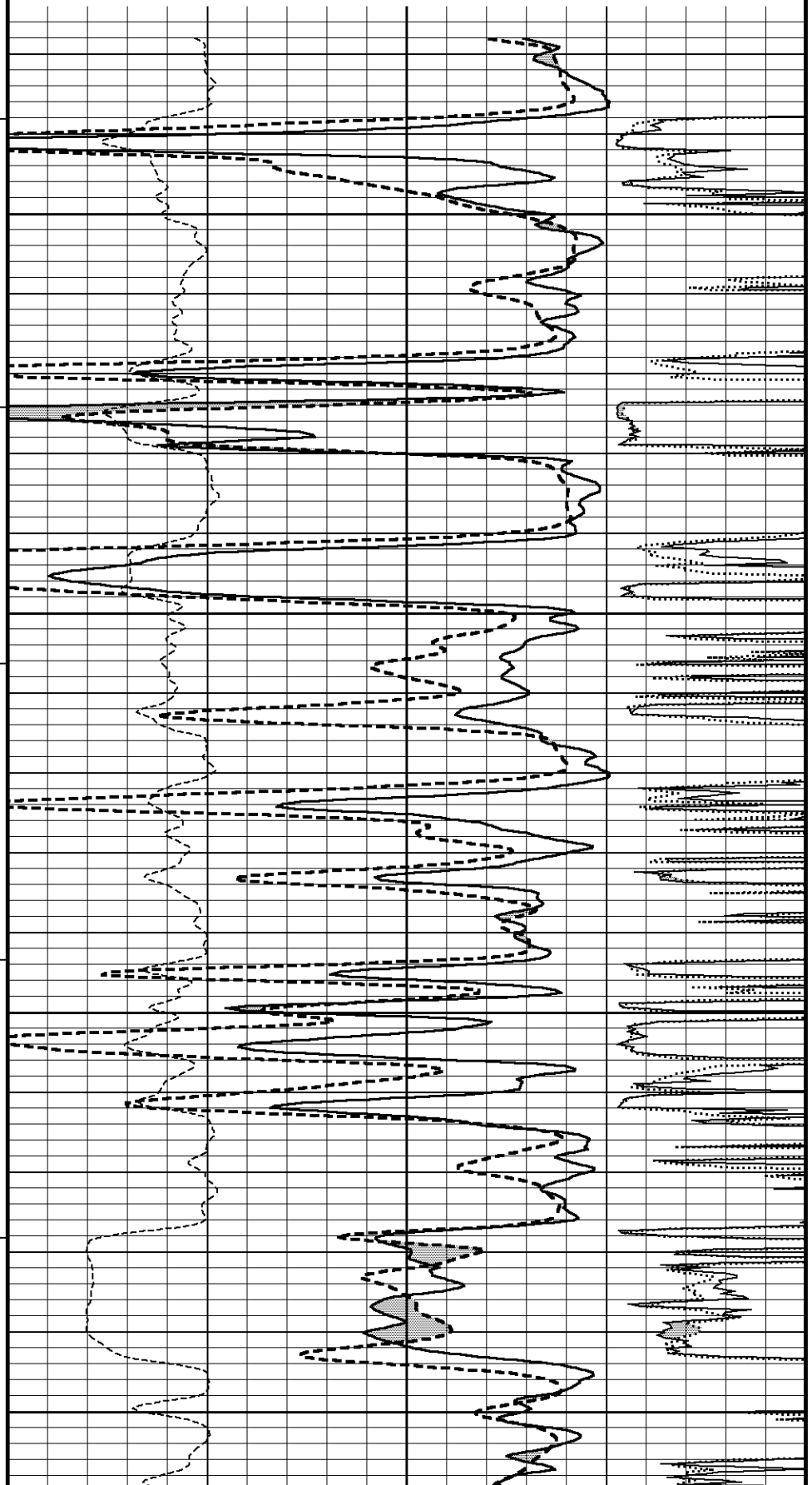
10 cu ft

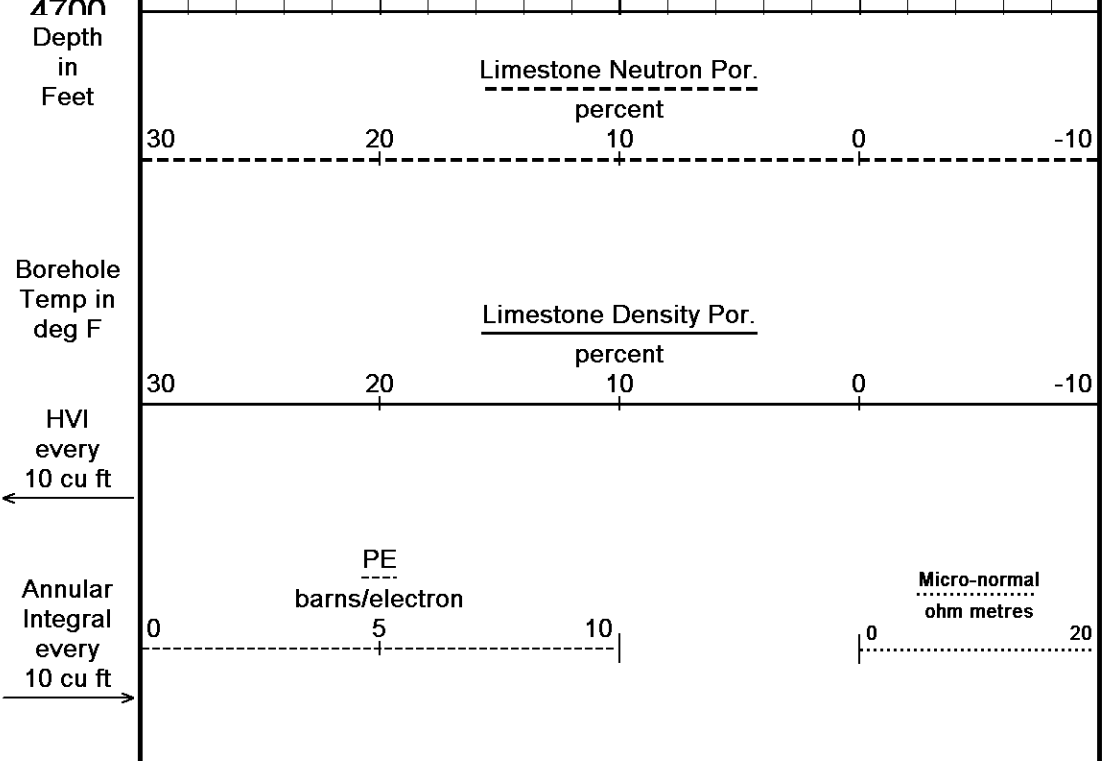
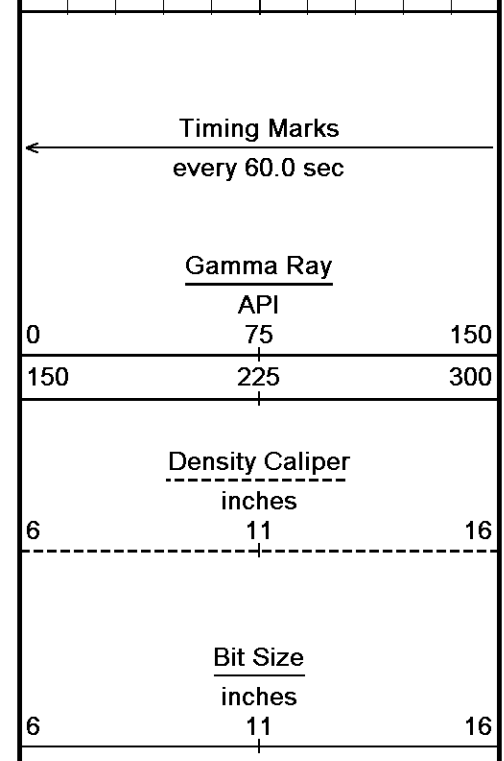
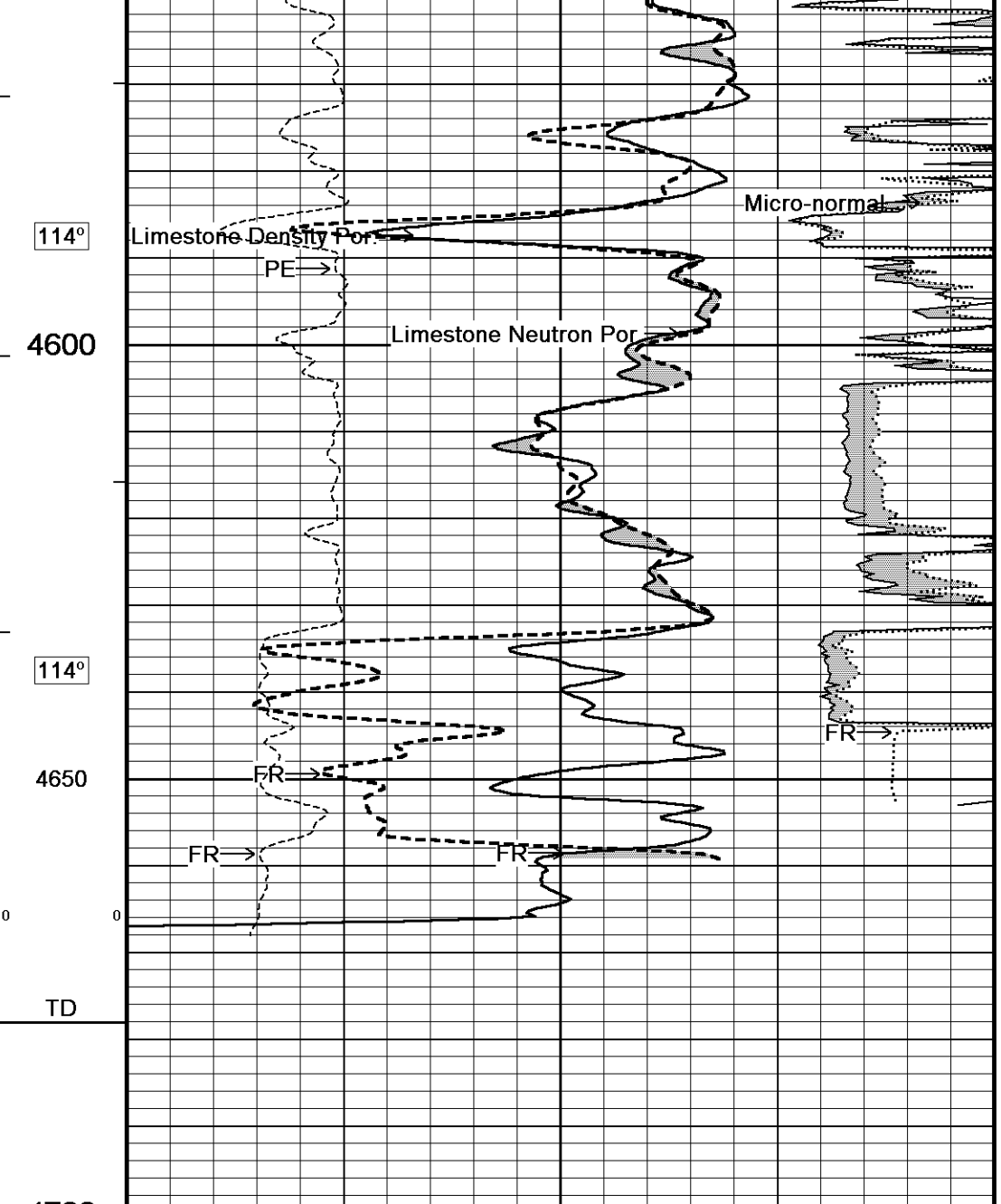
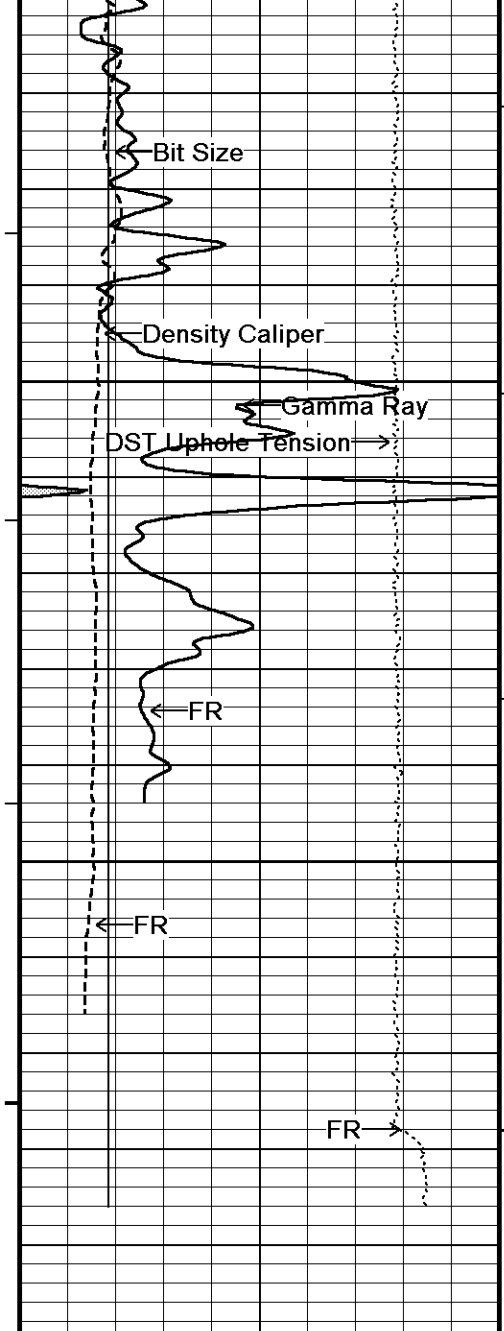
Replay  
Scale  
1:240

Micro-inverse  
ohm metres  
0 20

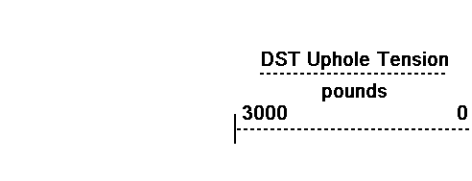


4376  
100  
4400  
112°  
4450  
113°  
4500  
114°  
4550

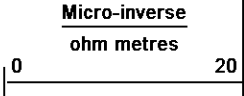




Borehole Temp in deg F  
HVI every 10 cu ft  
Annular Integral every 10 cu ft



Replay  
Scale  
1:240

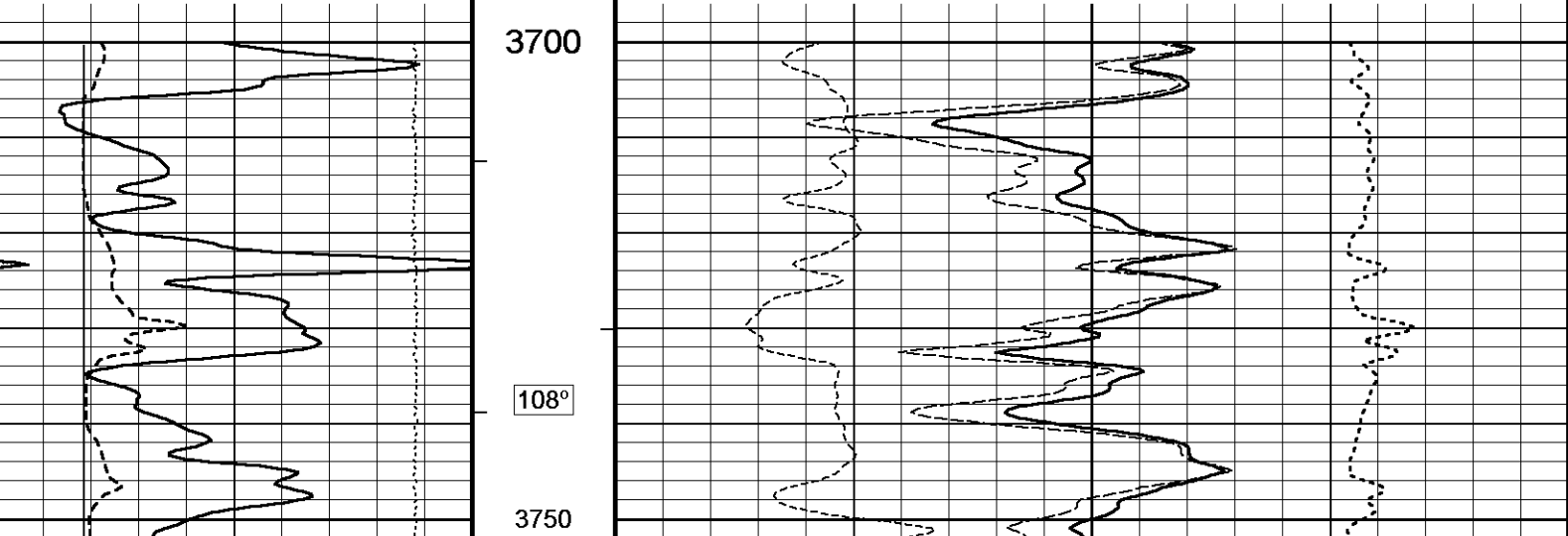
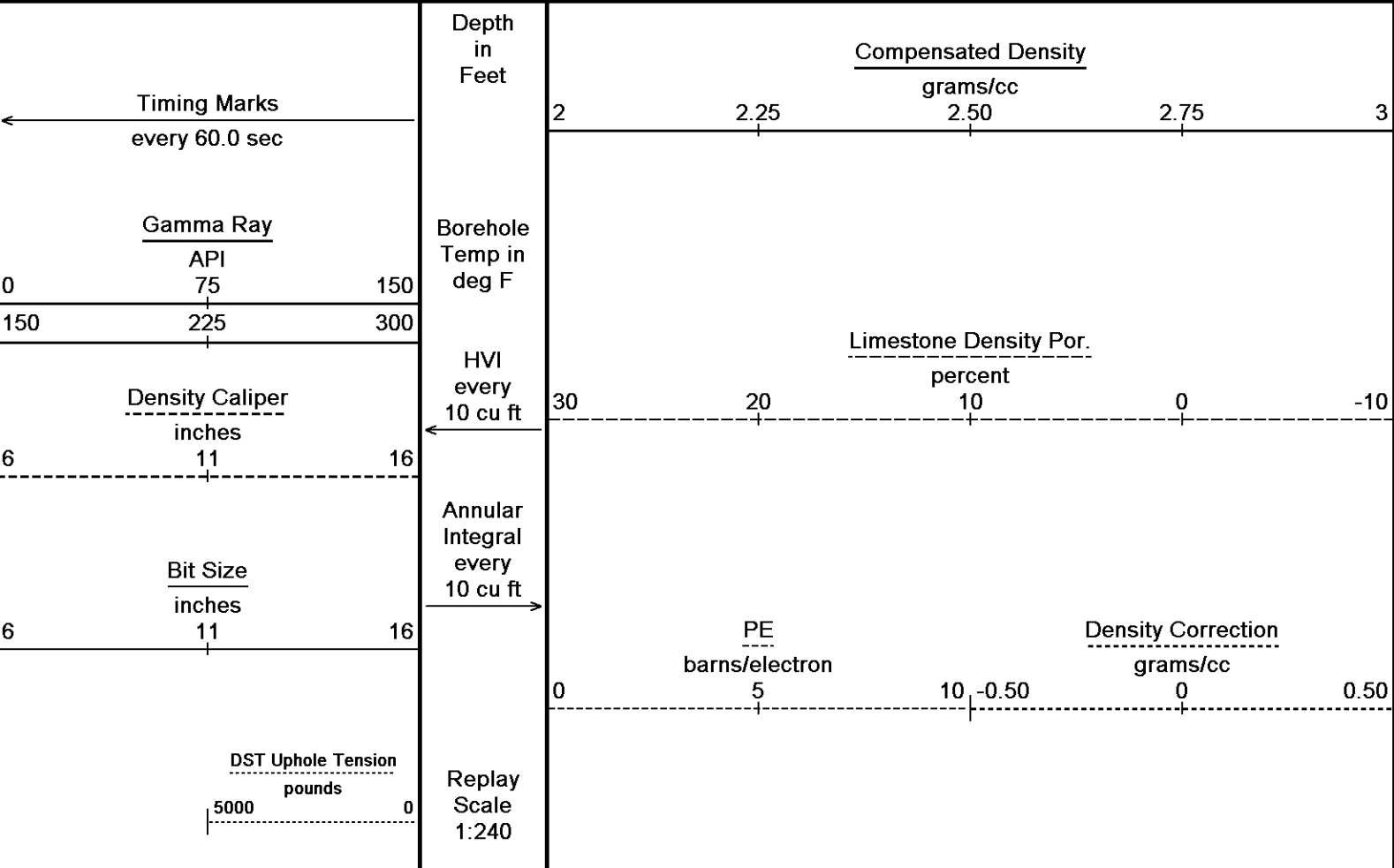


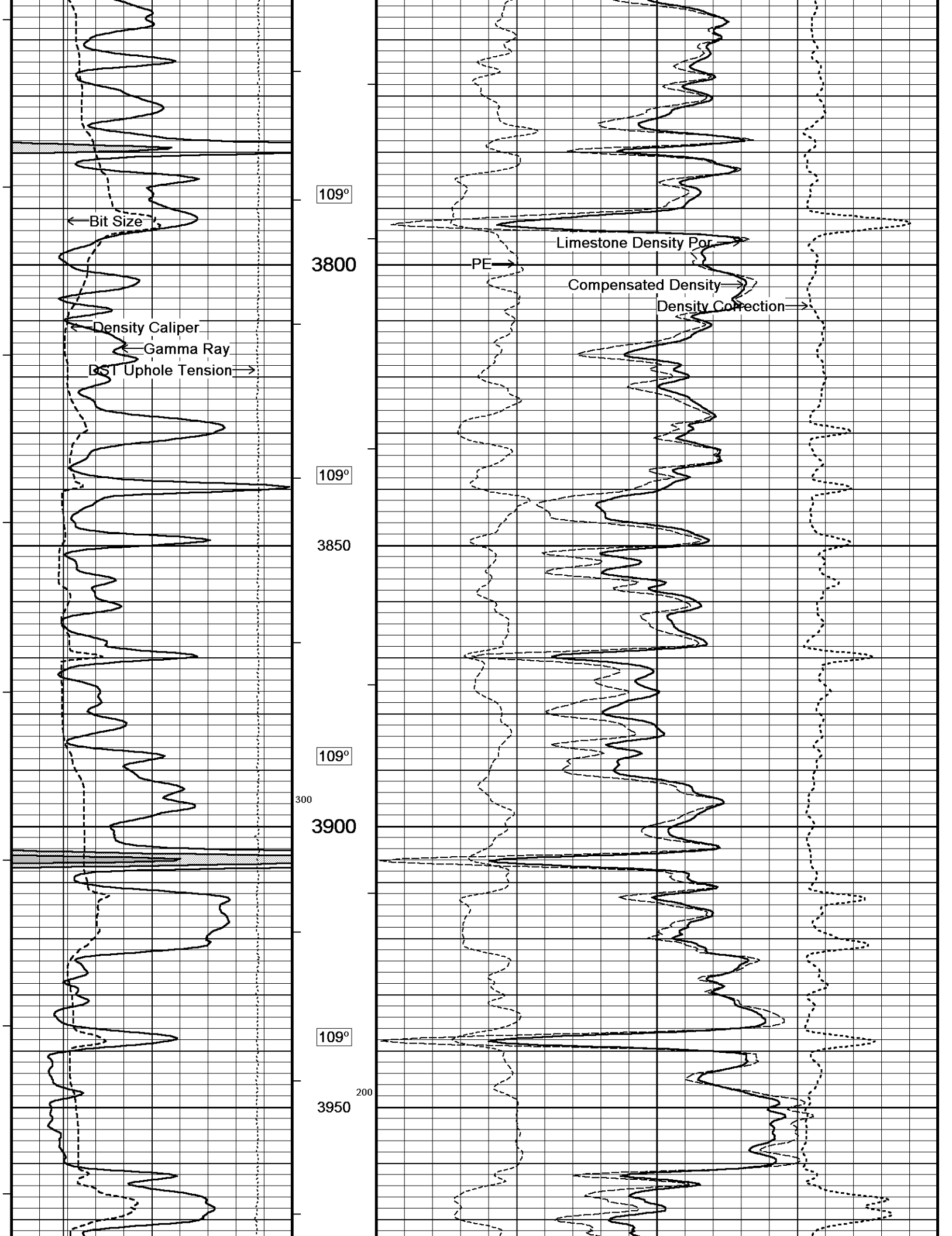
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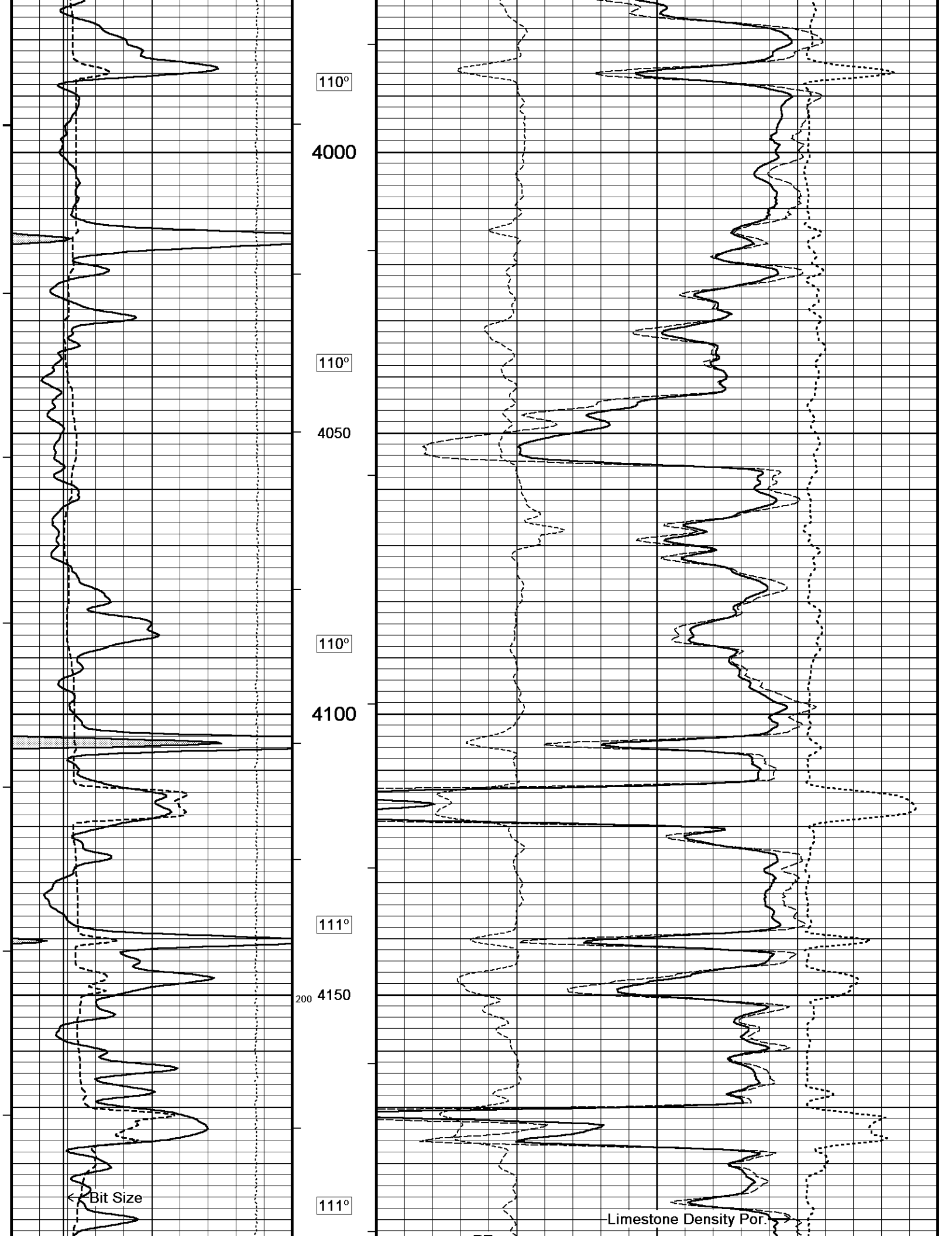
↑ REPEAT SECTION ↑

↓ 5 INCH MAIN ↓

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110°

4000

110°

4050

110°

4100

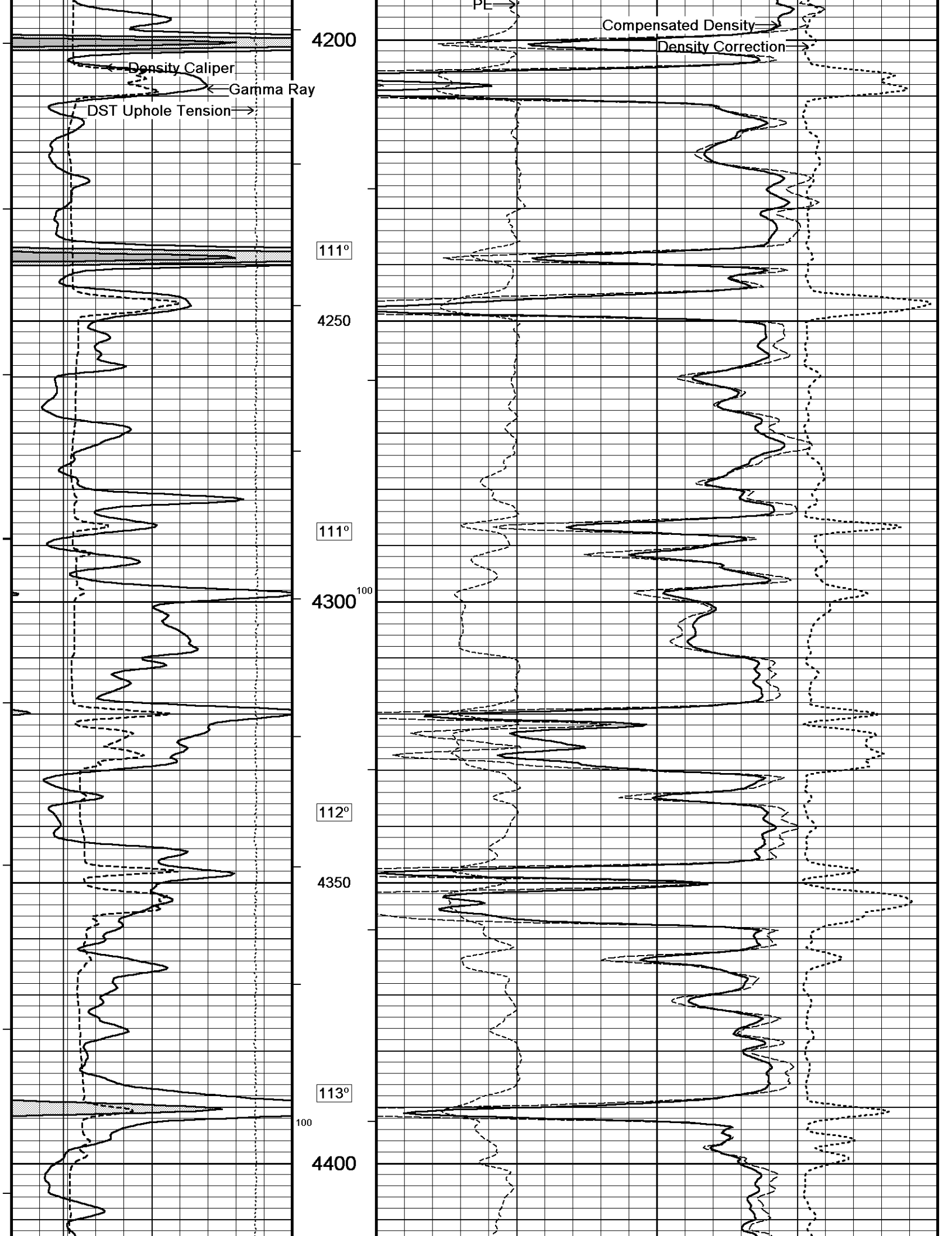
111°

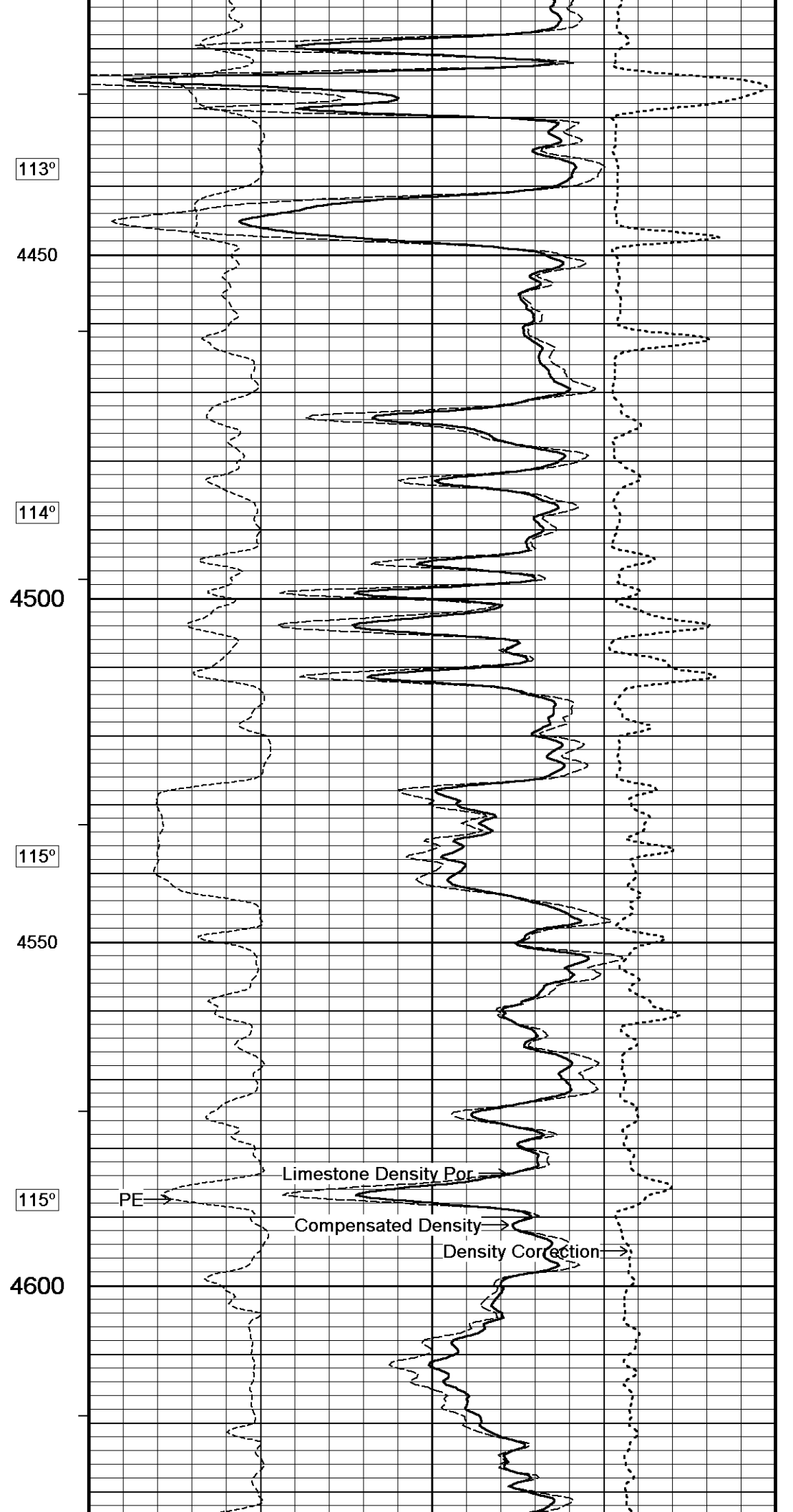
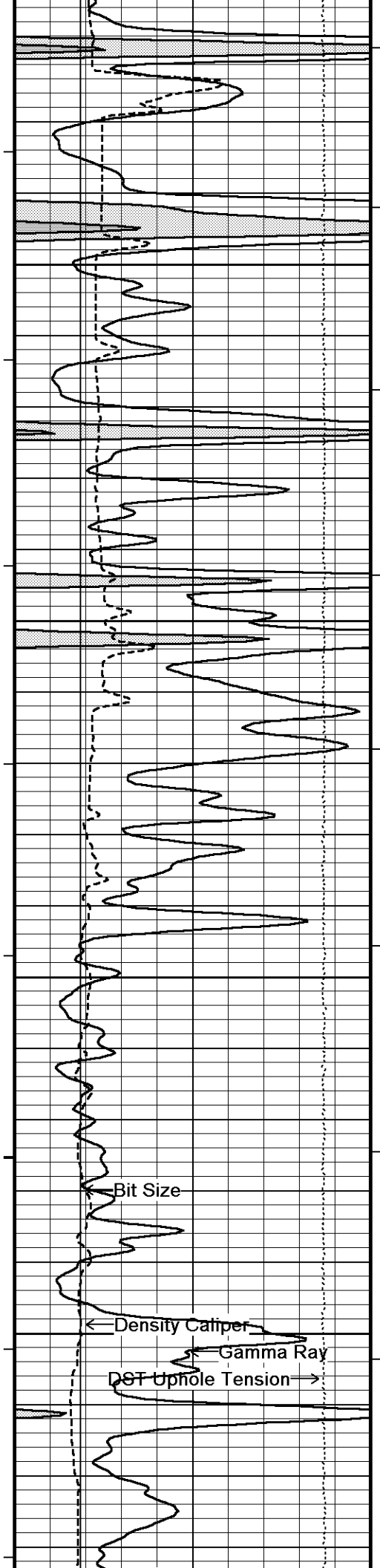
200 4150

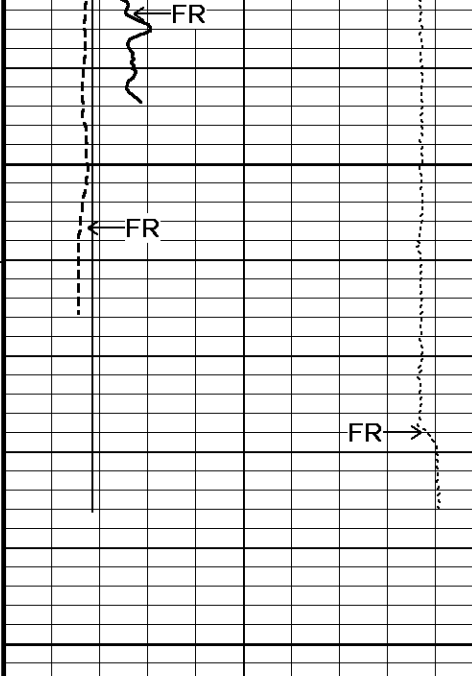
111°

← Bit Size

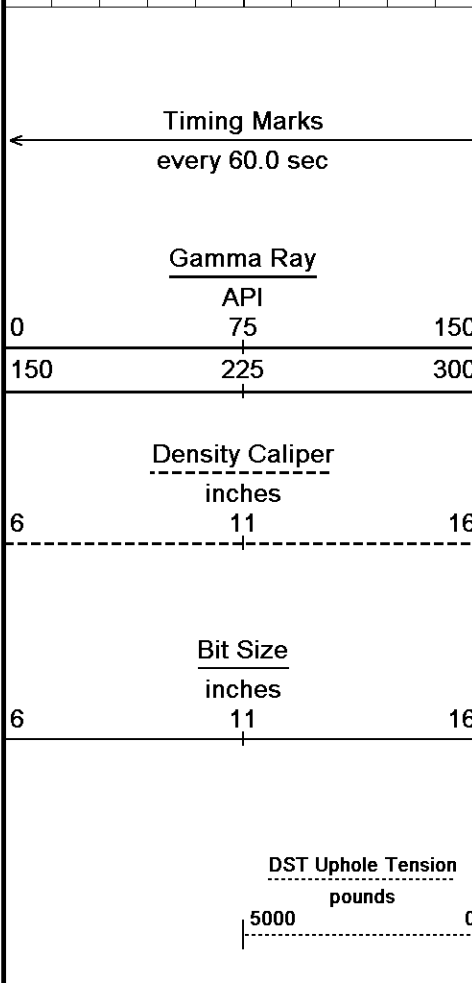
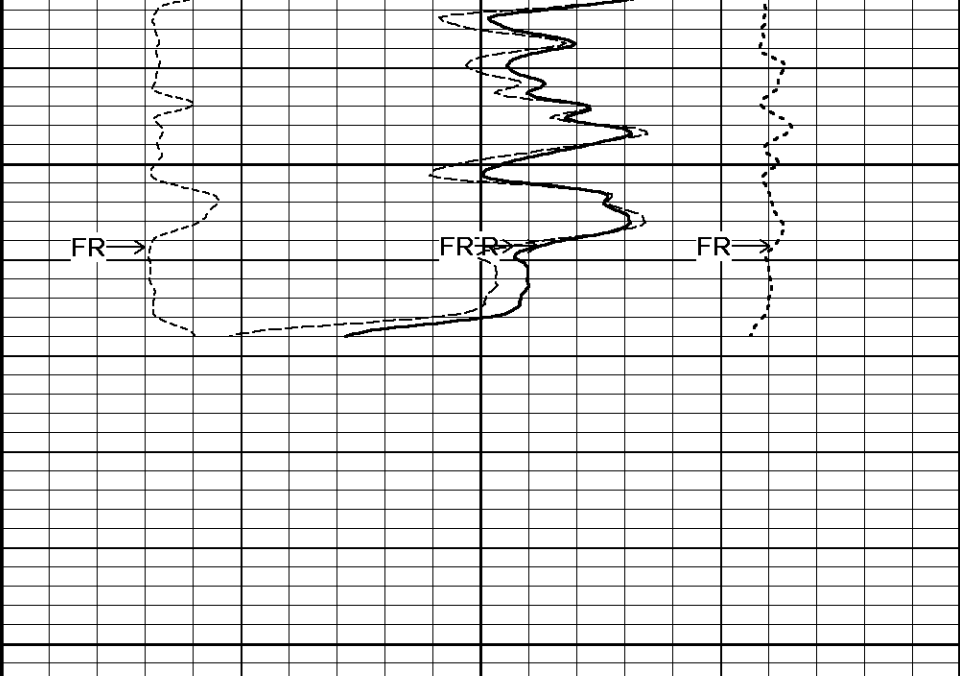
Limestone Density Por. →



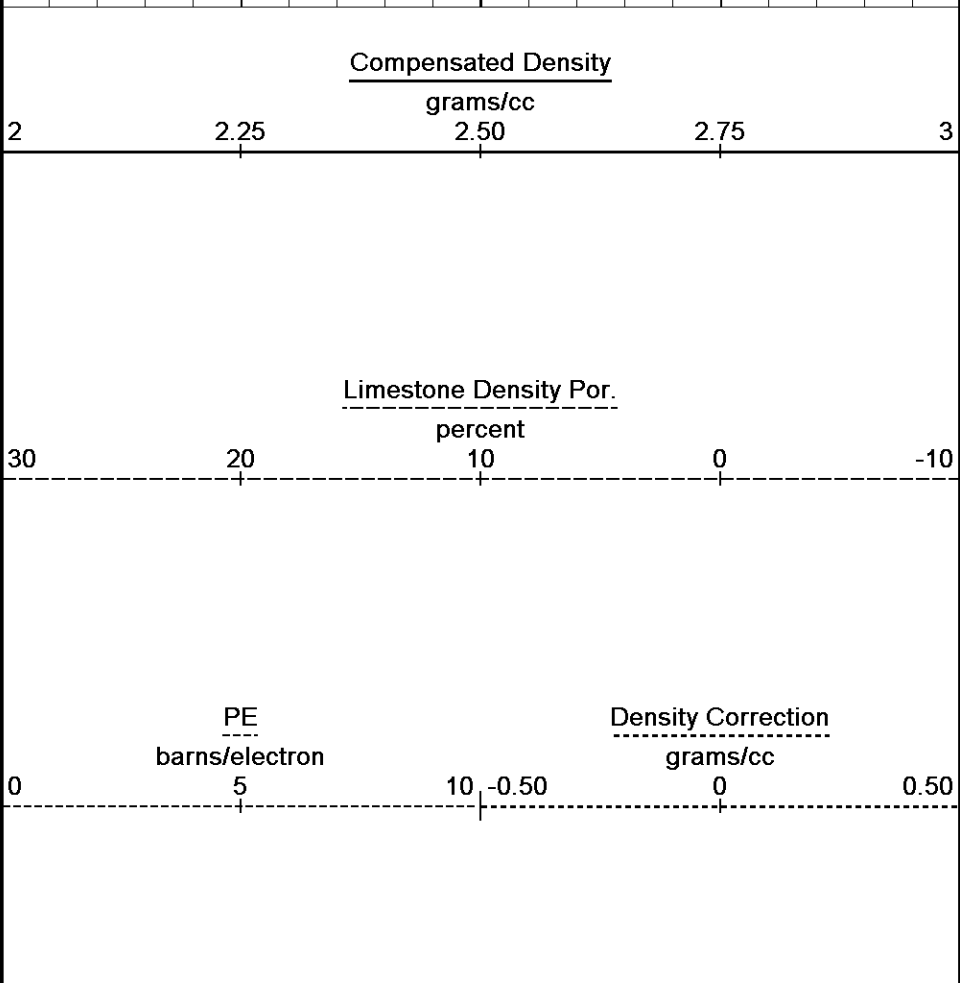




115°  
4650  
0  
TD  
4700



Depth in Feet  
Borehole Temp in deg F  
HVI every 10 cu ft  
Annular Integral every 10 cu ft  
Replay Scale 1:240

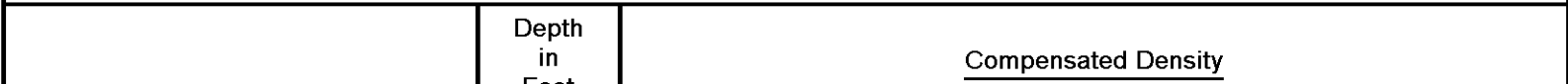


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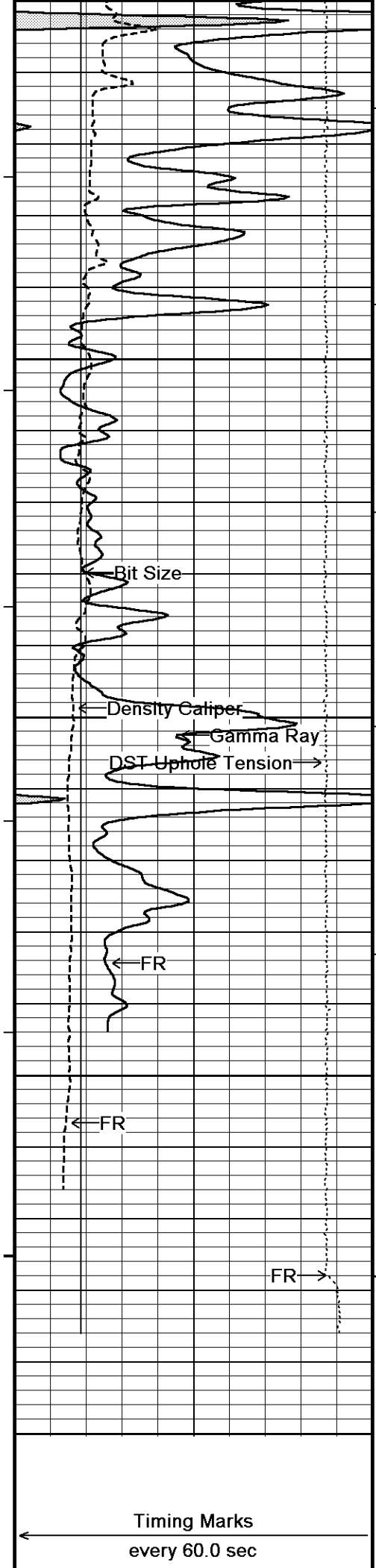
5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm  
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4500

114°

4550

114°

4600

114°

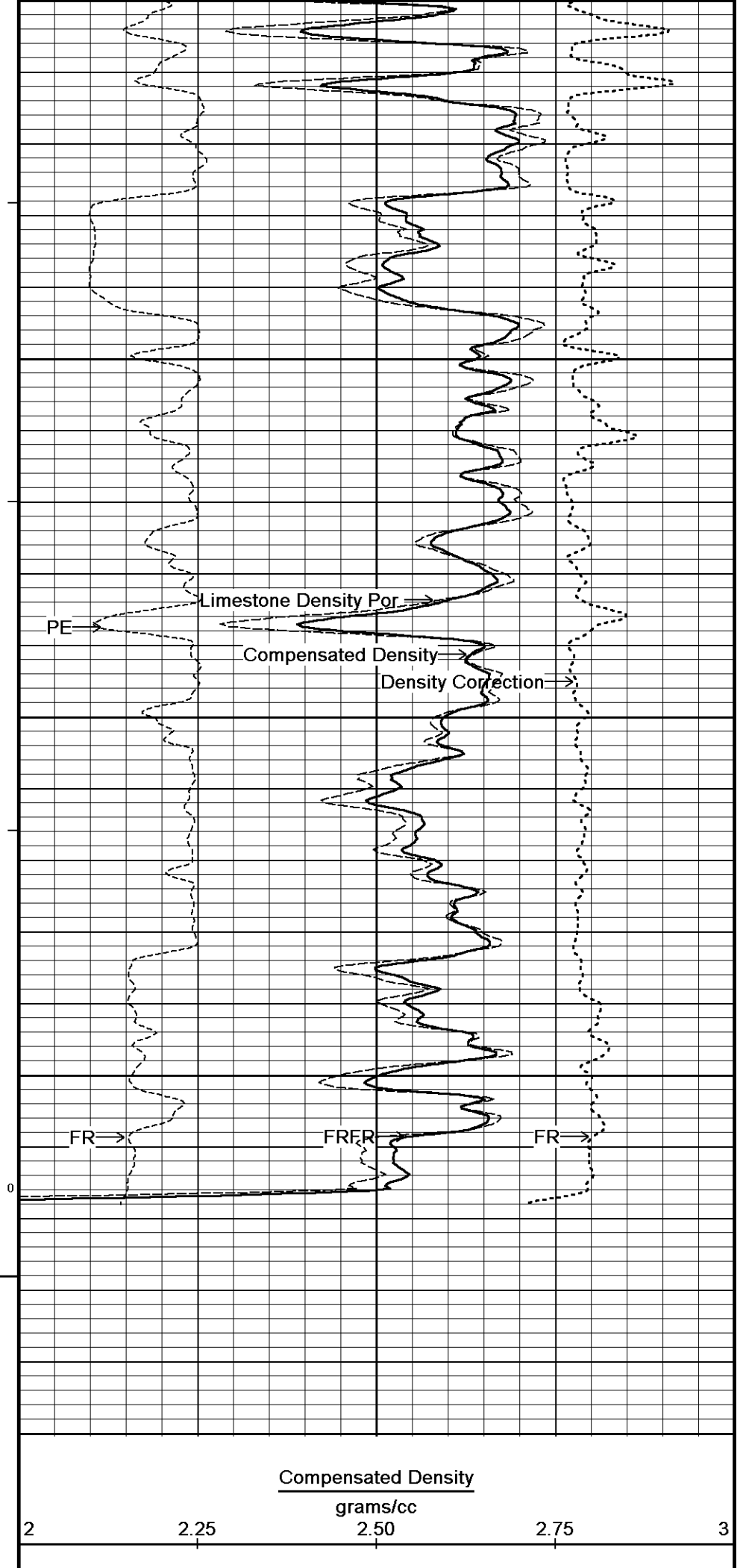
4650

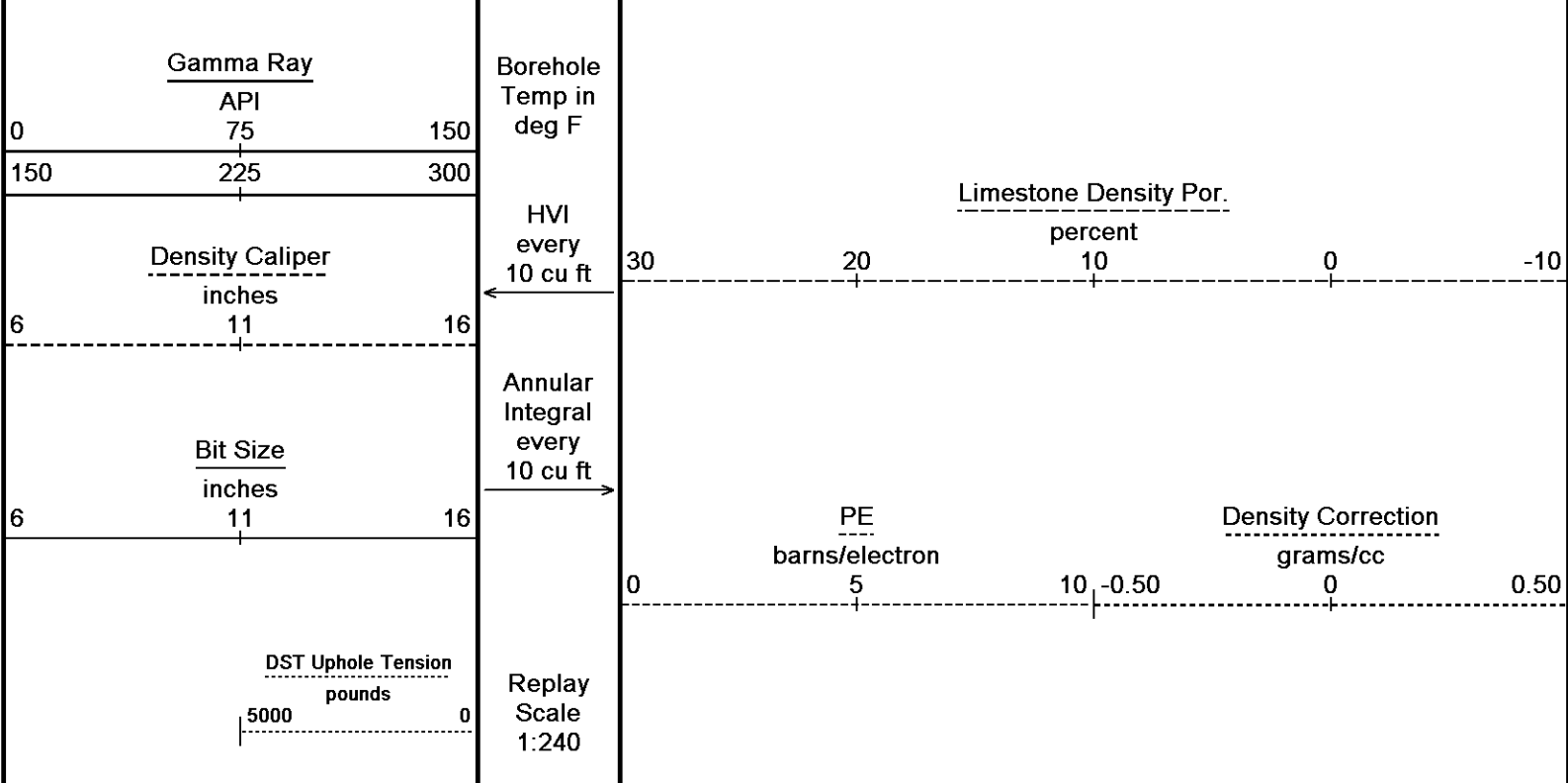
0

TD

4700

Depth in Feet





Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 18-AUG-2014 14:51  
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↑ REPEAT SECTION ↑

**BEFORE SURVEY CALIBRATION**  
 C:\Minimus 13.08.2113\Log Data\O'Brien (LA) Harper 35 #1\O'Brien (LA) Harper 35 #1\_001.dta

General Constants All 000 Last Edited on 18-AUG-2014,10:15

<b>General Parameters</b>		
Mud Resistivity	1.240	ohm-metres
Mud Resistivity Temperature	90.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
<b>Hole/Annular Volume and Differential Caliper Parameters</b>		
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	
<b>Rwa Parameters</b>		
Porosity used	Crossplot 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 13-AUG-2014 23:32

Reading No	Measured	Calibrated (lbs)
1	15257.38	0.00
2	16219.48	580.00

**Gamma Calibration MCG-D.K 469** Field Calibration on 13-AUG-2014 17:12

	Measured	Calibrated (API)
Background	68	45
Calibrator (Gross)	1159	770
Calibrator (Net)	1091	725

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	%

## High Resolution Temperature Calibration MCG-D.K 469

Field Calibration on 12-MAY-2014,02:16

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

## High Resolution Temperature Constants MCG-D.K 469

Last Edited on 13-JUL-2014,14:53

Pre-filter Length 11

## SP Calibration MCG-D.K 469

Field Calibration on 12-AUG-2014 12:46

	Measured	Calibrated (mV)
Reference 1	98.8	100.0
Reference 2	-100.9	-100.1

## Caliper Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:44

Field Calibration on 12-AUG-2014 12:43

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	13622	5.96
2	17090	7.98
3	20281	9.85
4	24282	11.92
5	0	0.00
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	7.97	7.97

## Micro Normal and Micro Inverse Calibration MMR-B.A 98

Base Calibration on 05-AUG-2014 14:56

Field Check on 12-AUG-2014 12:41

Base Calibration				
Channel	Resistor 1	Measured Resistor 2	Calibrated Resistor 1	Resistor 2 (ohm-m)
Micro Normal	10.2	49.8	5.1	25.6
Micro Inverse	9.9	49.4	3.4	16.9
Channel	Base Check (ohm-m)		Field Check (ohm-m)	
Micro Normal	93.8		93.8	
Micro Inverse	62.3		62.3	

## Micro Normal and Micro Inverse Constants MMR-B.A 98

Last Edited on 05-AUG-2014,14:47

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-A.B 66

Base Calibration on 04-AUG-2014 14:27

Field Check on 13-AUG-2014 17:16

Base Calibration				
	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3244	101	3714	110
Ratio	32.136		33.764	
Field Calibrator at Base			Calibrated (cps)	
			1595	2291
Ratio	0.696			
Field Check			Calibrated (cps)	

Ratio

Neutron Constants MDN-A.B 66

Last Edited on 18-AUG-2014,08:56

Neutron Source Id	P0204NN		
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 135

Base Calibration on 05-AUG-2014 14:10  
Field Check on 13-AUG-2014 16:34

Base Calibration		
	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.8	126.8
Base Check		281.1
Field Check		281.3

FE Constants MFE-A.A 135

Last Edited on 18-AUG-2014,08:44

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	

Induction Calibration MAI-A.A 111

Base Calibration on 26-MAY-2010,08:56  
Field Check on 13-AUG-2014 16:30

Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	17.6	473.6	9.3	966.2	
2	6.4	385.9	7.6	821.4	
3	3.2	264.0	5.2	566.0	
4	2.1	135.5	2.6	279.2	
Array Temperature	23.0		Deg F		
Channel		Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High	
1	0.0	0.0	14.2	3871.7	
2	0.0	0.0	30.2	3525.1	
3	0.0	0.0	29.2	3018.5	
4	0.0	0.0	19.1	2056.4	
Deep			17.9	1960.2	
Medium			43.0	3972.4	
Shallow			45.0	5228.4	
Array Temperature	0.0		94.4		Deg F

Induction Constants MAI-A.A 111

Last Edited on 18-AUG-2014,08:44

Induction Model	RtAP-WBM
Caliper for Borehole Corr	Density Caliper

Caliper for Borehole Corr.	Density Sample	N/A	inches
Hole Size for Borehole Correction		No	
Tool Centred		Fins	
Stand-off Type		0.50	inches
Stand-off		8.0000	
Number of Fins on Stand-off		45.00	degrees
Stand-off Fin Angle		0.5000	inches
Stand-off Fin Width		Temperature Corr	
Borehole Corr. Rm Source		MCG External Temperature	
Temp. for Rm Corr.		0.0020	mhos/metre
Squasher Start		N/A	mhos/metre
Squasher Offset			

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 111			Field Calibration on 20-JUN-2014,09:22
	Measured	Calibrated(Deg F)	
Lower	10.00	10.00	
Upper	100.00	100.00	

High Resolution Temperature Constants MAI-A.A 111		Last Edited on 26-JUN-2014,15:06
Pre-filter Length	11	

Caliper Calibration MPD-B 103			Base Calibration on 05-AUG-2014 11:04	Field Calibration on 13-AUG-2014 16:57
Base Calibration				
Reading No	Measured	Calibrator Size (in)		
1	13922	3.99		
2	22576	5.96		
3	31328	7.98		
4	39552	9.85		
5	48880	11.92		
6	N/A	N/A		
Field Calibration				
	Measured Caliper (in)	Actual Caliper (in)		
	7.94	7.97		

Photo Density Calibration MPD-B 103					Base Calibration on 05-AUG-2014 13:34	Field Check on 13-AUG-2014 16:49
Density Calibration						
Base Calibration						
		Measured	Calibrated (sdu)			
	Near	Far	Near	Far		
Background	1057	1213				
Reference 1	58408	29979	59556	30836		
Reference 2	24379	2613	24941	2541		
Field Check at Base						
	1056.8	1212.0				

Field Check

1054.5 1207.8

PE Calibration

Base Calibration	WS	Measured WH	Ratio	Calibrated Ratio
Background	190	946		
Reference 1	23042	58225	0.399	0.371
Reference 2	6677	24258	0.278	0.272

Field Check at Base

189.6 945.6

Field Check

190.9 944.4

Density Constants MPD-B 103

Last Edited on 17-AUG-2014,14:11

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	1.10 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 13.08.2113\Log Data\O'Brien (LA) Harper 35 #1\O'Brien (LA) Harper 35 #1\_001.dta

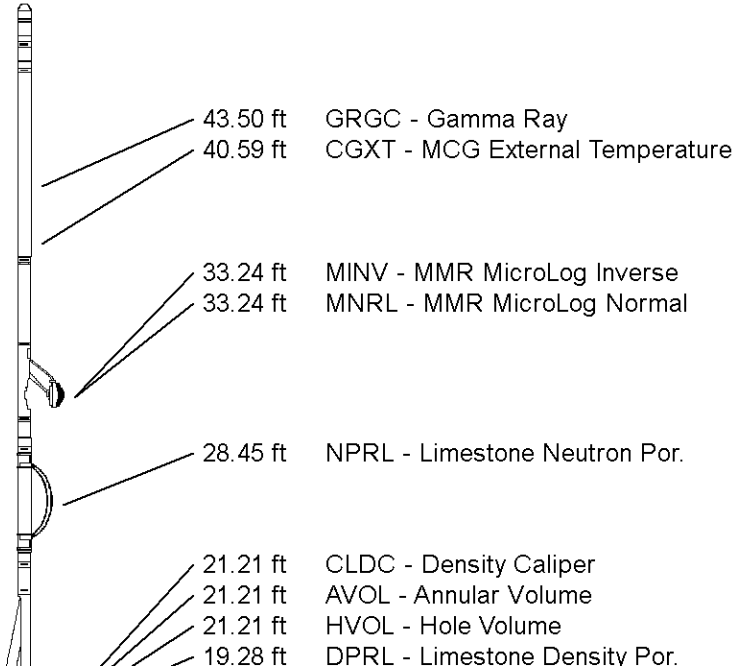
CBH-C, Cablehead, 11 pin  
CBH-CA 170 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma  
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

Compact Micro-Resistivity  
MMR-B.A 98 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron  
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

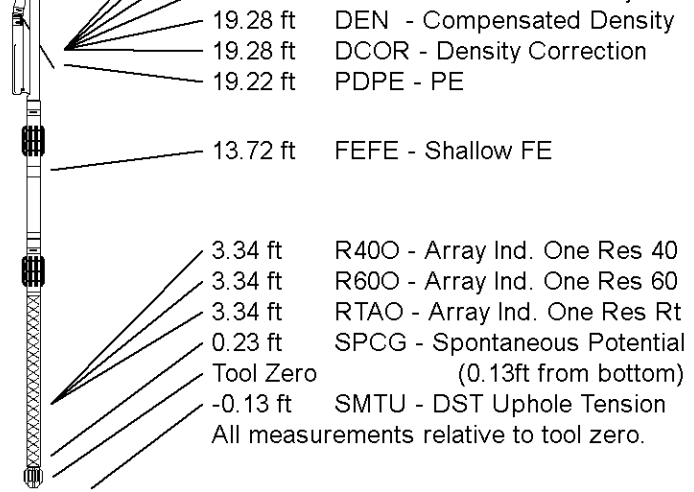
Compact Density/Caliper  
MPD-B 103 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in



Compact Focussed Electric  
 MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction  
 MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 51.18 ft Weight: 407.9 lb



COMPANY	O'BRIEN RESOURCES, LLC				
WELL	HARPER 35 #1				
FIELD	WILDCAT				
PROVINCE/COUNTY	LANE				
COUNTRY/STATE	U.S.A. / KANSAS				
Elevation Kelly Bushing	2854.00	feet	First Reading	4659.00	feet
Elevation Drill Floor	2852.00	feet	Depth Driller	4675.00	feet
Elevation Ground Level	2846.00	feet	Depth Logger	4678.00	feet



COMPACT PHOTO DENSITY  
 COMPENSATED NEUTRON  
 MICRORESISTIVITY LOG