Weatherford®

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	SHAKESPEARE OIL COMPANY, INC.
WELL	JANZEN #1-26
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2000' FSL & 900' FEL
	SE/4

SEC	TWP	RGE	Other Services
26	16S	34W	MAI/MFE MSS

API Number 15-171-20909
Permit Number

Permanent Datum G.L., Elevation 3109 feet
Log Measured From KB
Drilling Measured From K.B.

Elevations:	feet
KB	3119.00
DF	3118.00
GL	3109.00

Date	15-OCT-2012			
Run Number	ONE			
Depth Driller	4870.00	feet		
Depth Logger	4867.00	feet		
First Reading	4835.00	feet		
Last Reading	3850.00	feet		
Casing Driller	264.00	feet		
Casing Logger	264.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.30 lb/USg	58.00 CP		
PH / Fluid Loss	10.00	9.60 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.51 @ 87.0	ohm-m		
Rmf @ Measured Temp	0.41 @ 87.0	ohm-m		
Rmc @ Measured Temp	0.61 @ 87.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.40 @111.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	111.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	13096	LIB		
Recorded By	LYNN SCOTT			
Witnessed By	TIM PRIEST			
S.O.# / JOB#	3537891		LB12-275	

BOREHOLE RECORD

Last Edited: 15-OCT-2012 08:51

Bit Size inches	Depth From feet	Depth To feet
7.875	264.00	4867.00

CASING RECORD

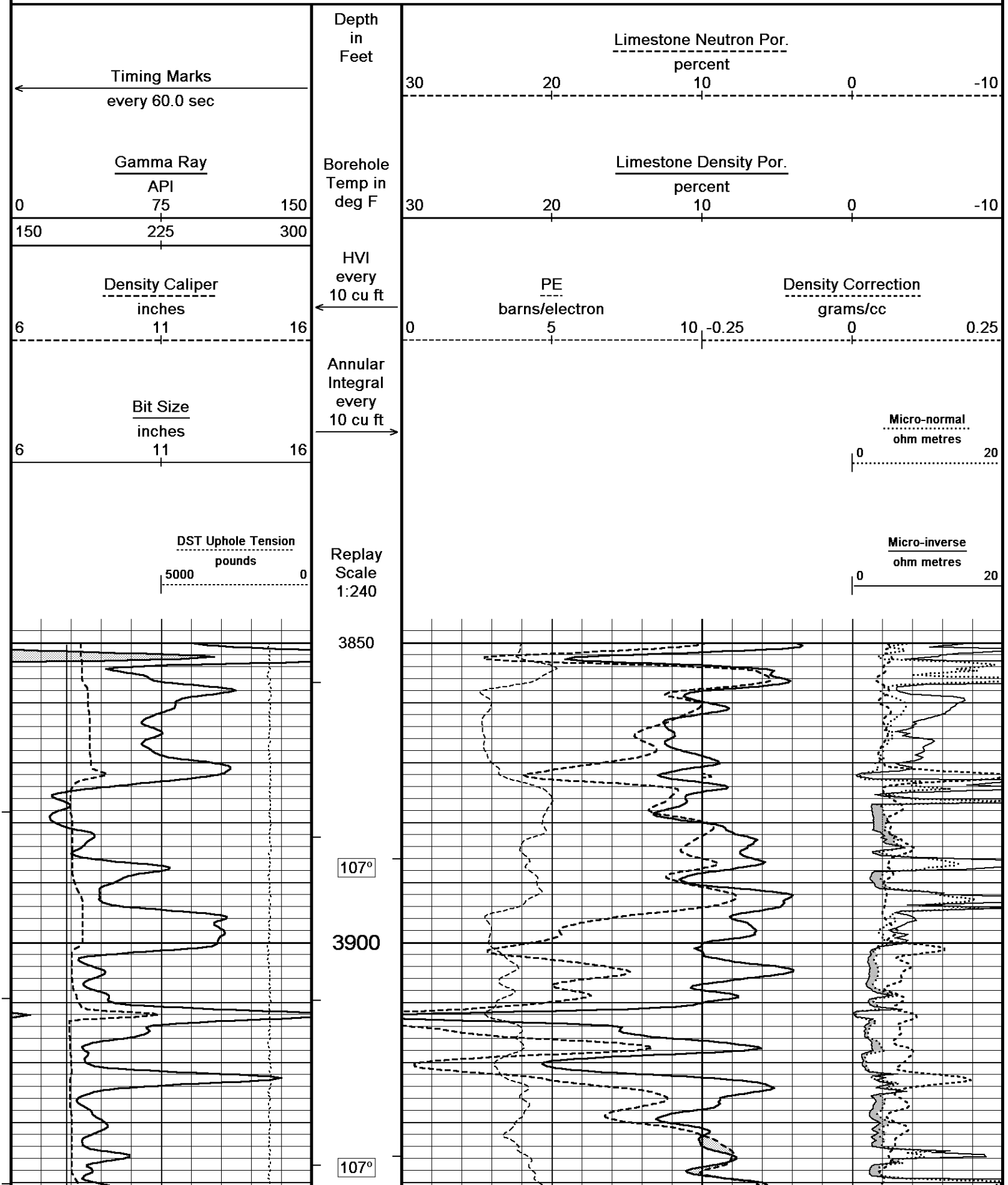
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	264.00	24.00

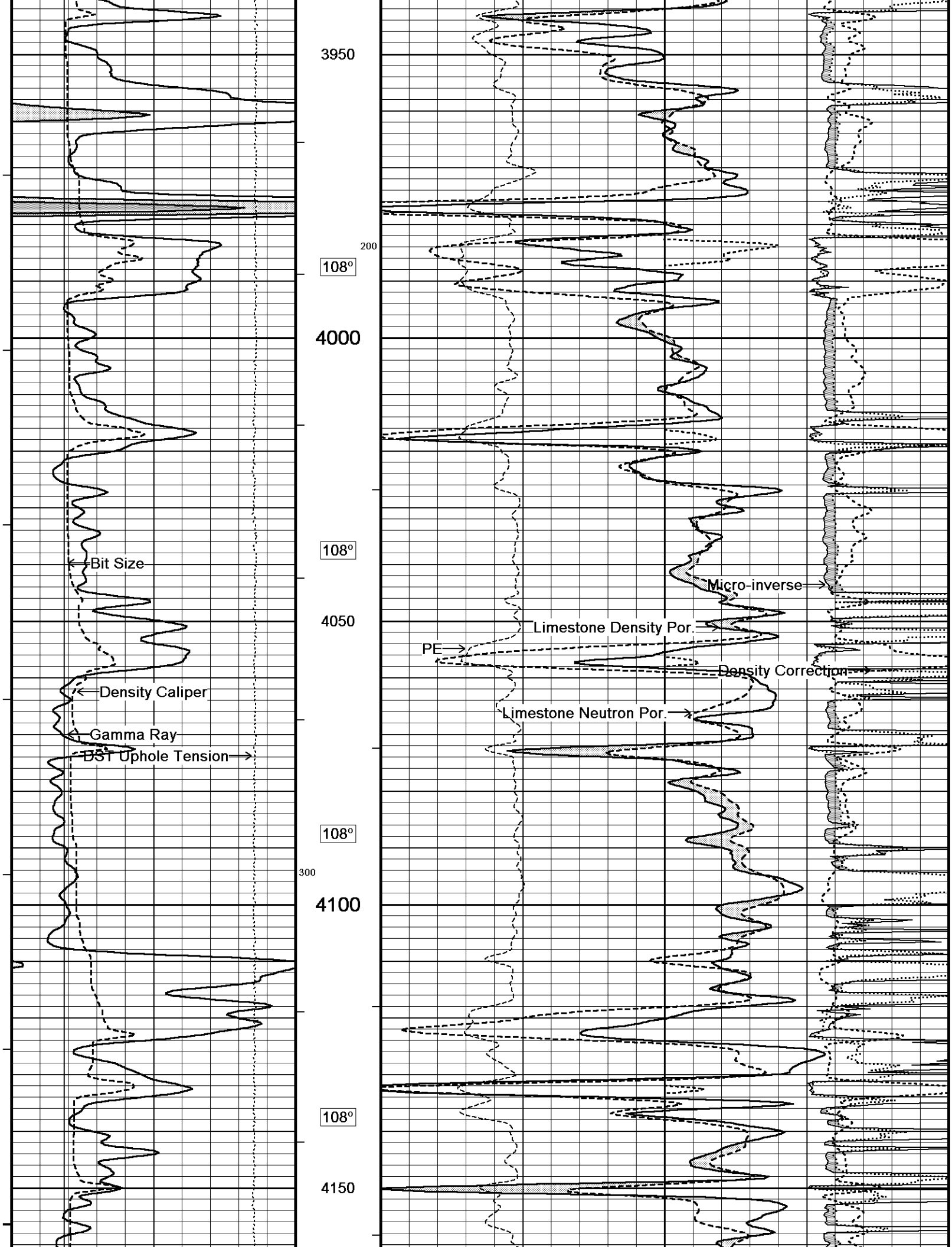
REMARKS

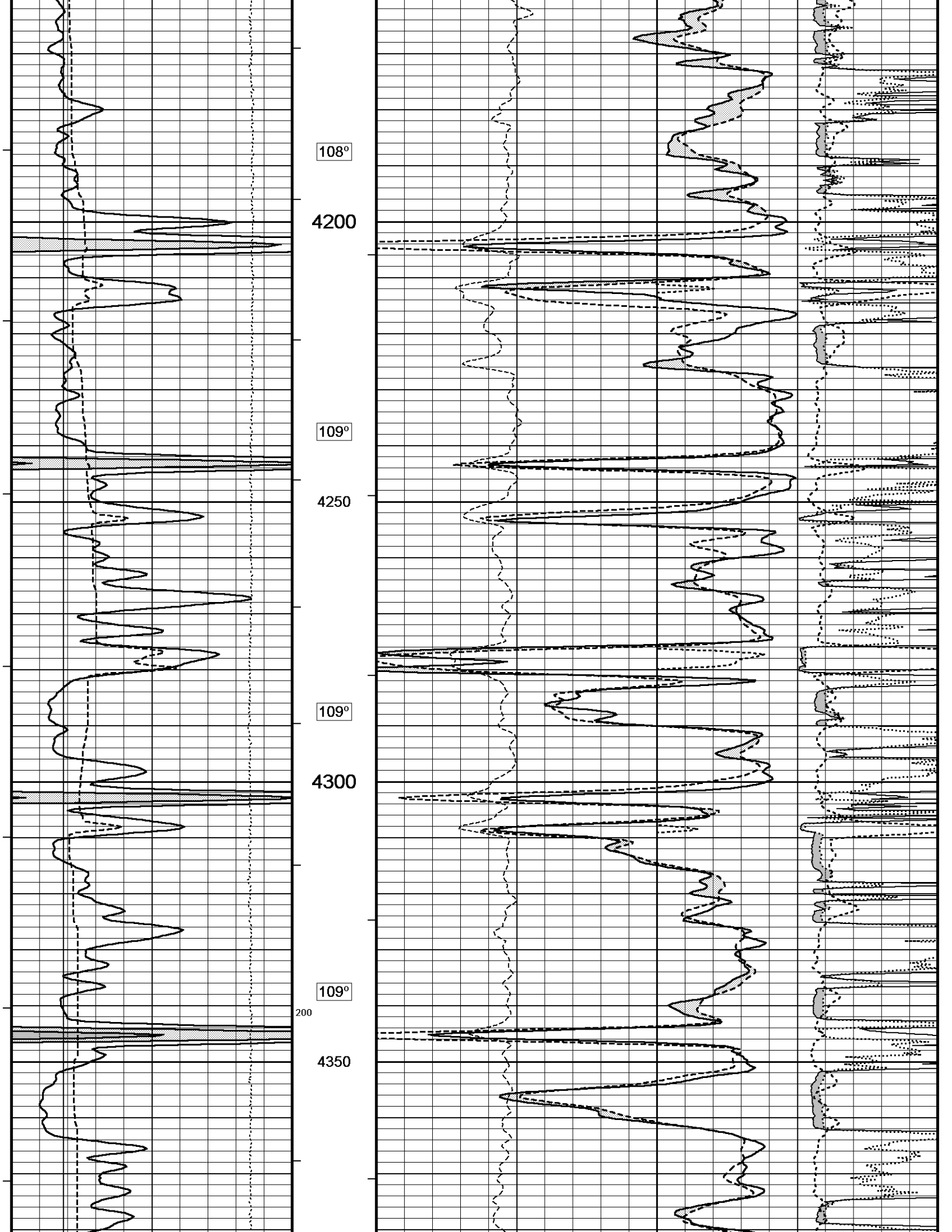
Tools Used: MPD, MCG, MDN, MFE, MAI, MSS, MML
Hardware: MPD: 8 inch profile plate used. MAI, MFE, and MSS: 0.5 Inch standoffs used. MDN: Dual Bowspring used.
2.71 G/CC Limestone density matrix used to calculate porosity.
Sonic porosity calculated using 47.5 usec/ft Limestone scale.
Borehole rugosity, tight pulls, and washouts will affect data quality.
All intervals logged and scaled per customer's request.
Annular volume with 5.5 inch production casing from TD to the top of detail = 227 cubic feet
Total hole volume from TD to Surface casing= 2294 cubic feet
Service order #3537891
Rig: HD #2
Engineer: L. Scott
Operator(s): B. Johnson

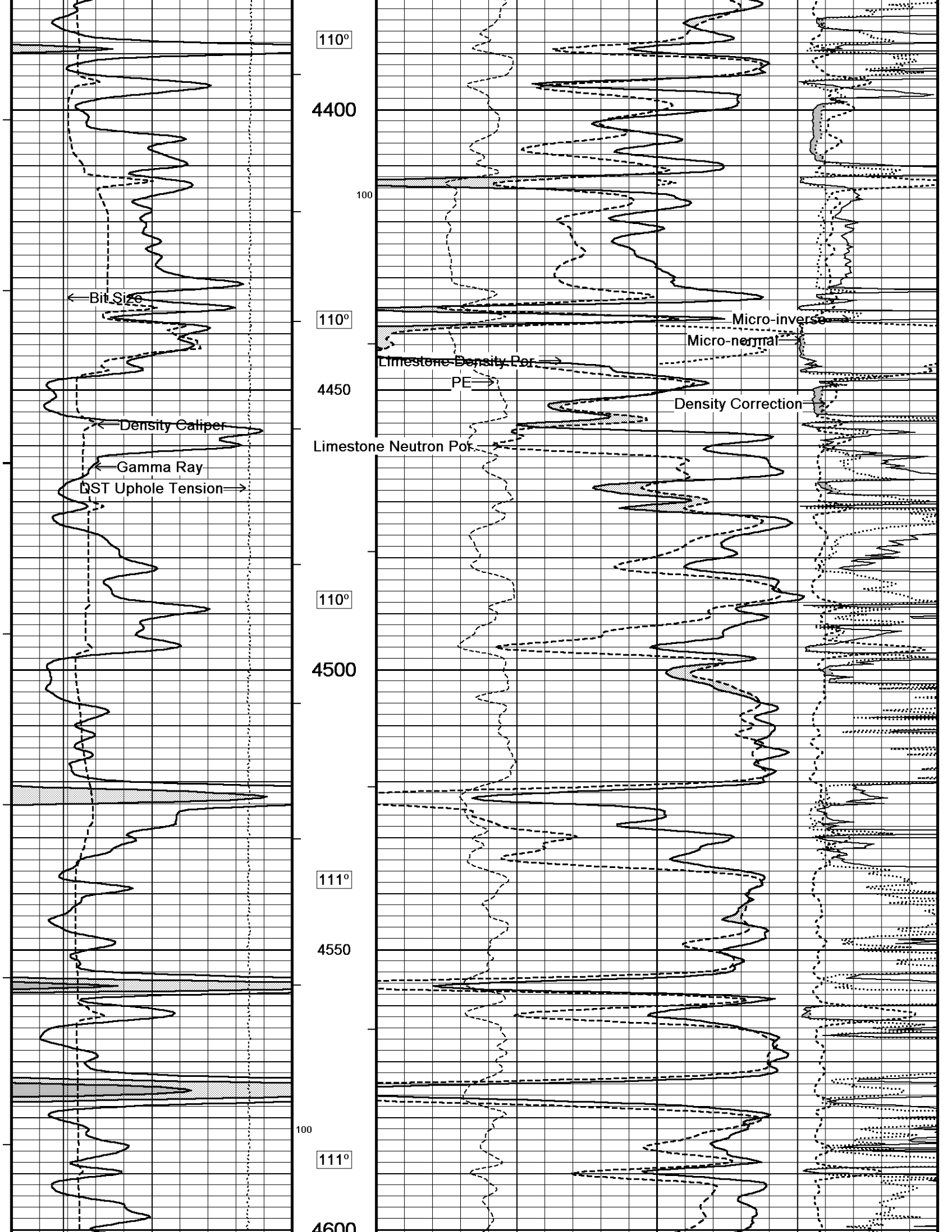
5 INCH MAIN

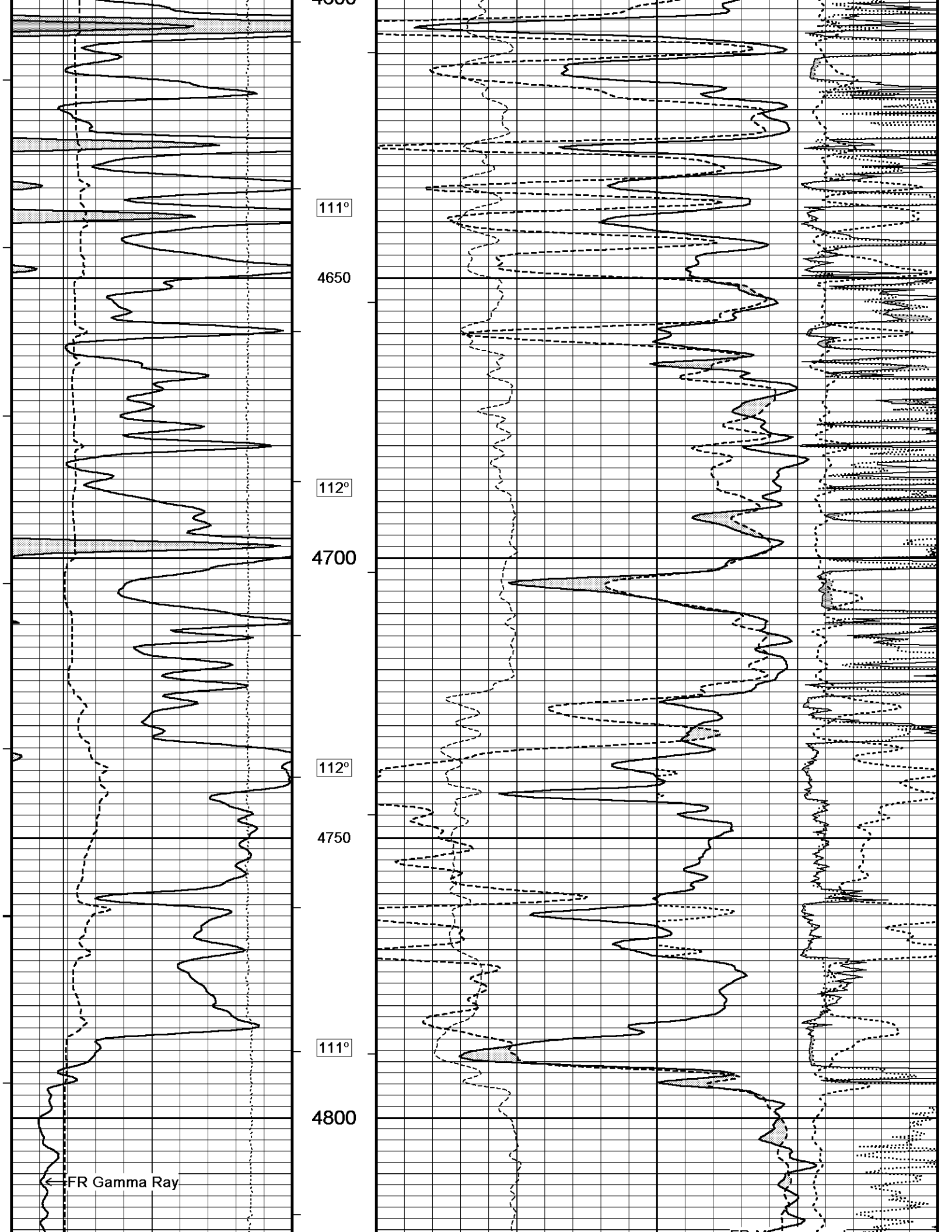
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 15-OCT-2012 11:35
Filename: C:\Minimus 13.02.6600\Data\Shakespeare...\Shakespeare Oil Company Janzen 1-26_002.dta
Recorded on 15-OCT-2012 09:05
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600

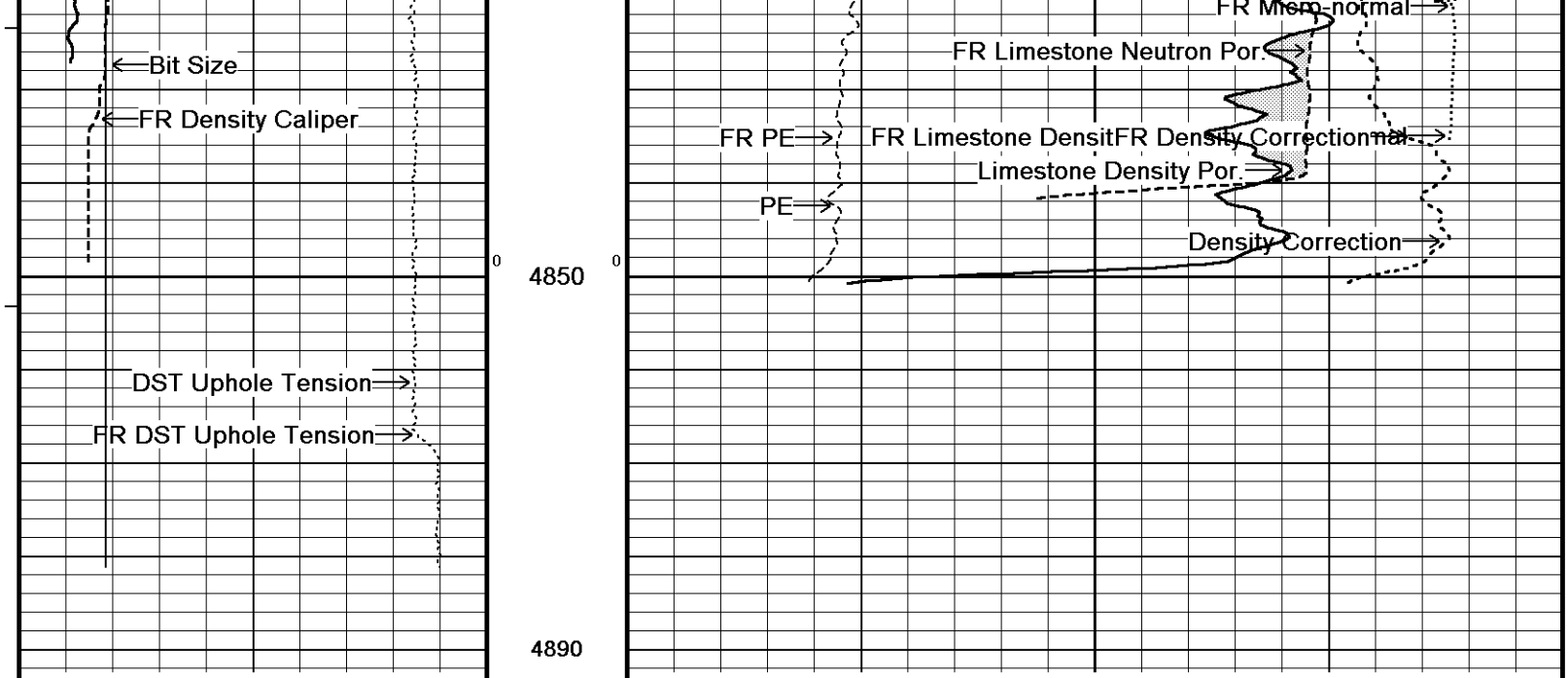



3950
200
108°
4000
108°
Bit Size
Micro-inverse
4050
Limestone Density Por.
PE
Density Correction
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
108°
300
4100
108°
4150


108°
4200
109°
4250
109°
4300
109°
200
4350


110°
4400
100
Bit Size
110°
Micro-inverse
Micro-normal
Limestone Density Por
PE
4450
Density Correction
Density Caliper
Limestone Neutron Por
Gamma Ray
DST Uphole Tension
110°
4500
111°
4550
100
111°
4600


111°
4650
112°
4700
112°
4750
111°
4800
FR Gamma Ray



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

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

Limestone Neutron Por.
percent
30 20 10 0 -10

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

Density Correction
grams/cc
-0.25 0 0.25

Micro-normal
ohm metres
0 20

Micro-inverse
ohm metres
0 20

Depth Based Data - Maximum Sampling Increment 10.0cm
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5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
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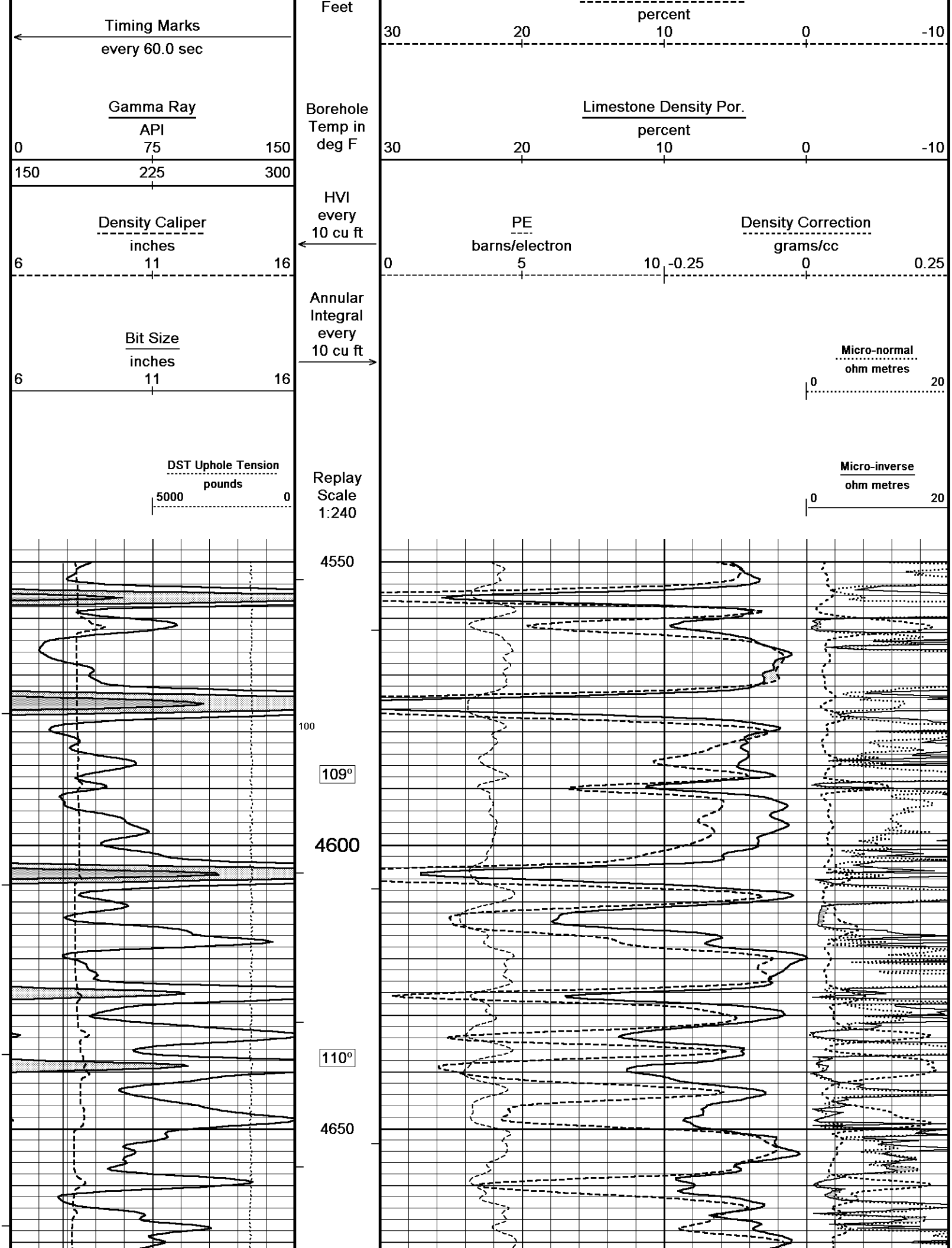
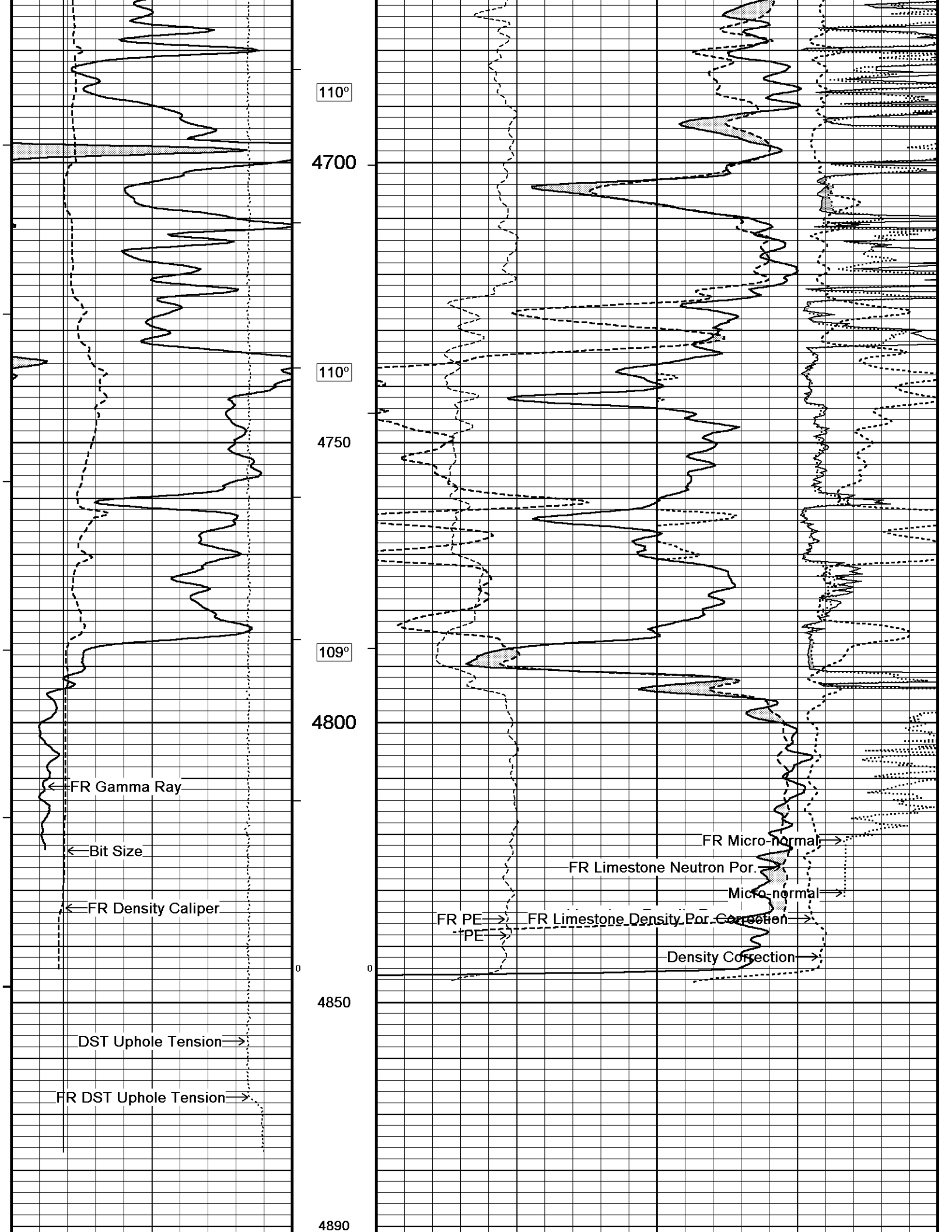
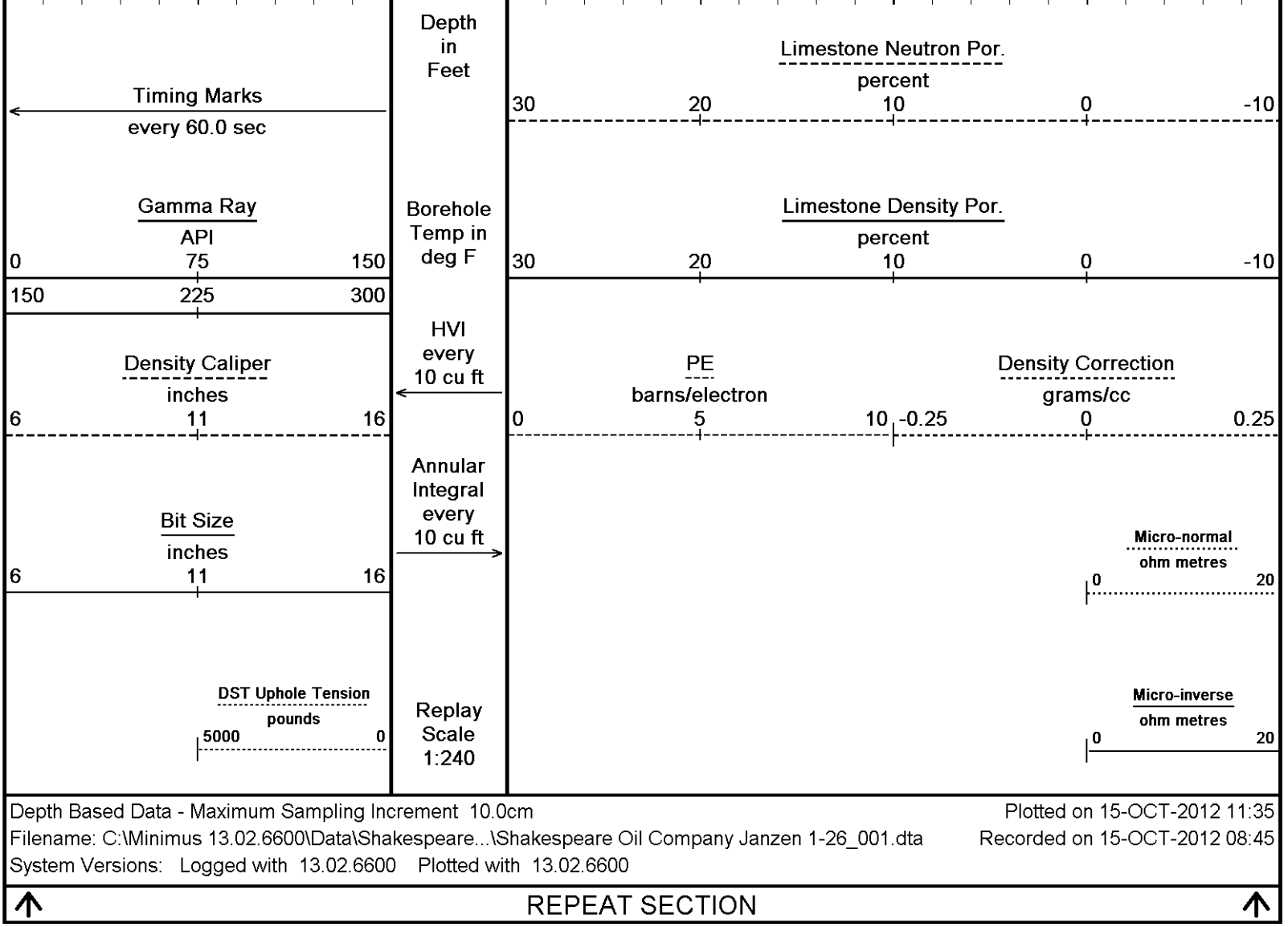
Depth in

Limestone Neutron Por.


Timing Marks
every 60.0 sec
Feet
percent
30 20 10 0 -10
Gamma Ray
API
0 75 150
150 225 300
Borehole Temp in deg F
Limestone Density Por.
percent
30 20 10 0 -10
HVI every 10 cu ft
Density Caliper
inches
6 11 16
PE
barns/electron
0 5 10
Density Correction
grams/cc
-0.25 0 0.25
Annular Integral every 10 cu ft
Bit Size
inches
6 11 16
Micro-normal
ohm metres
0 20
DST Uphole Tension
pounds
5000 0
Replay Scale 1:240
Micro-inverse
ohm metres
0 20
4550
100
109°
4600
110°
4650


110°
4700
110°
4750
109°
4800
4850
4890
FR Gamma Ray
Bit Size
FR Density Caliper
DST Uphole Tension
FR DST Uphole Tension
0
0
FR PE
PE
FR Micro-normal
FR Limestone Neutron Por.
Micro-normal
FR Limestone Density Por. Correction
Density Correction



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REPEAT SECTION

5 INCH MAIN

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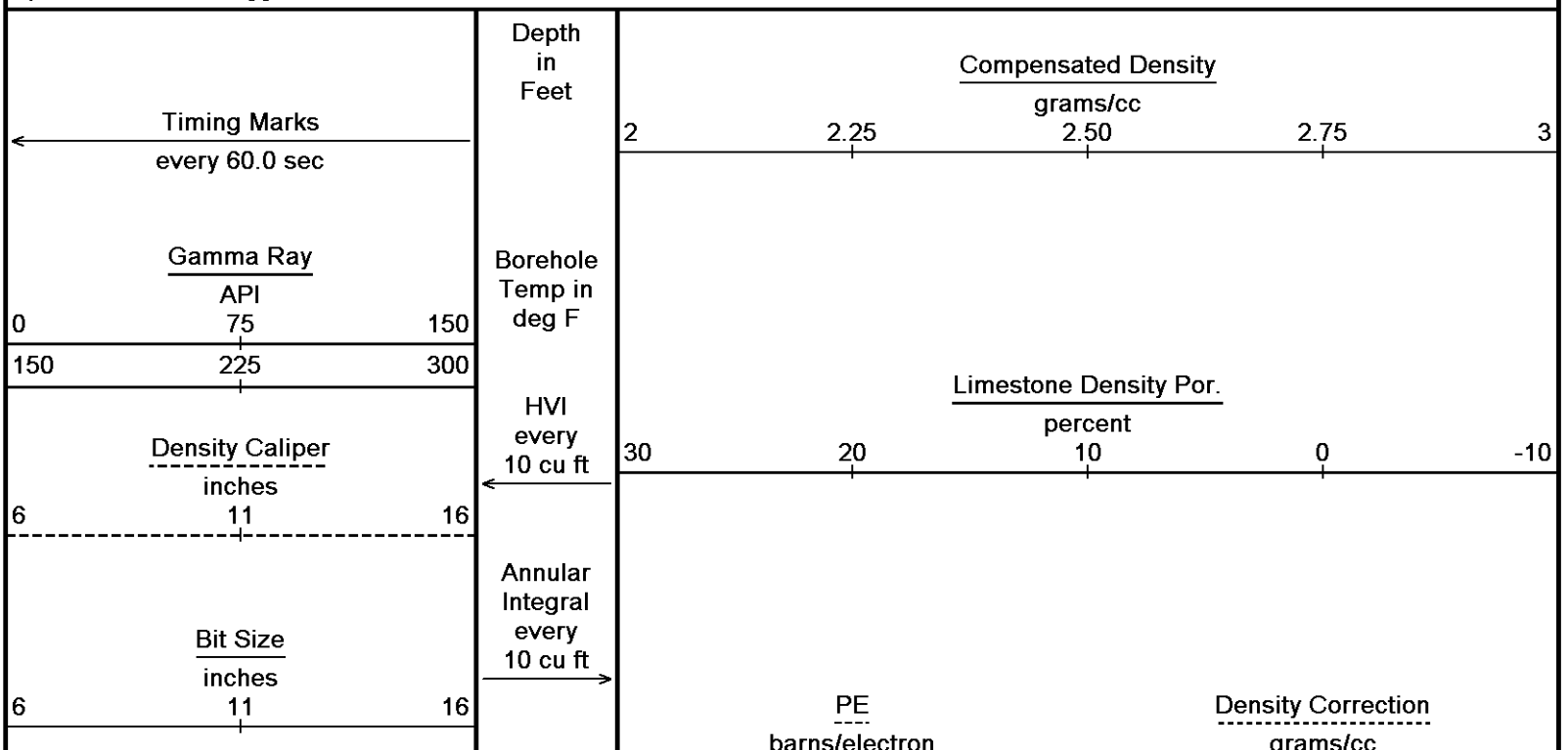
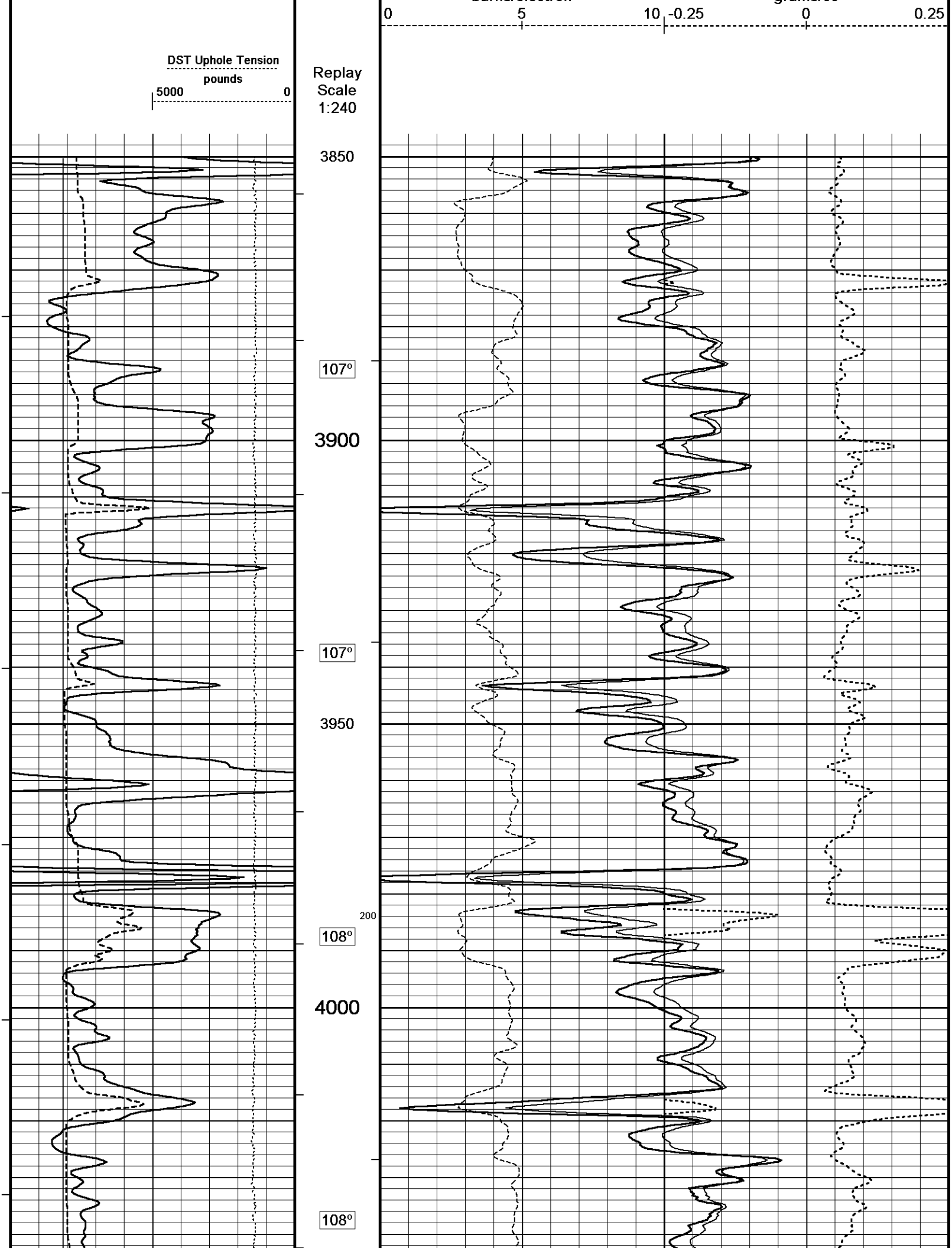
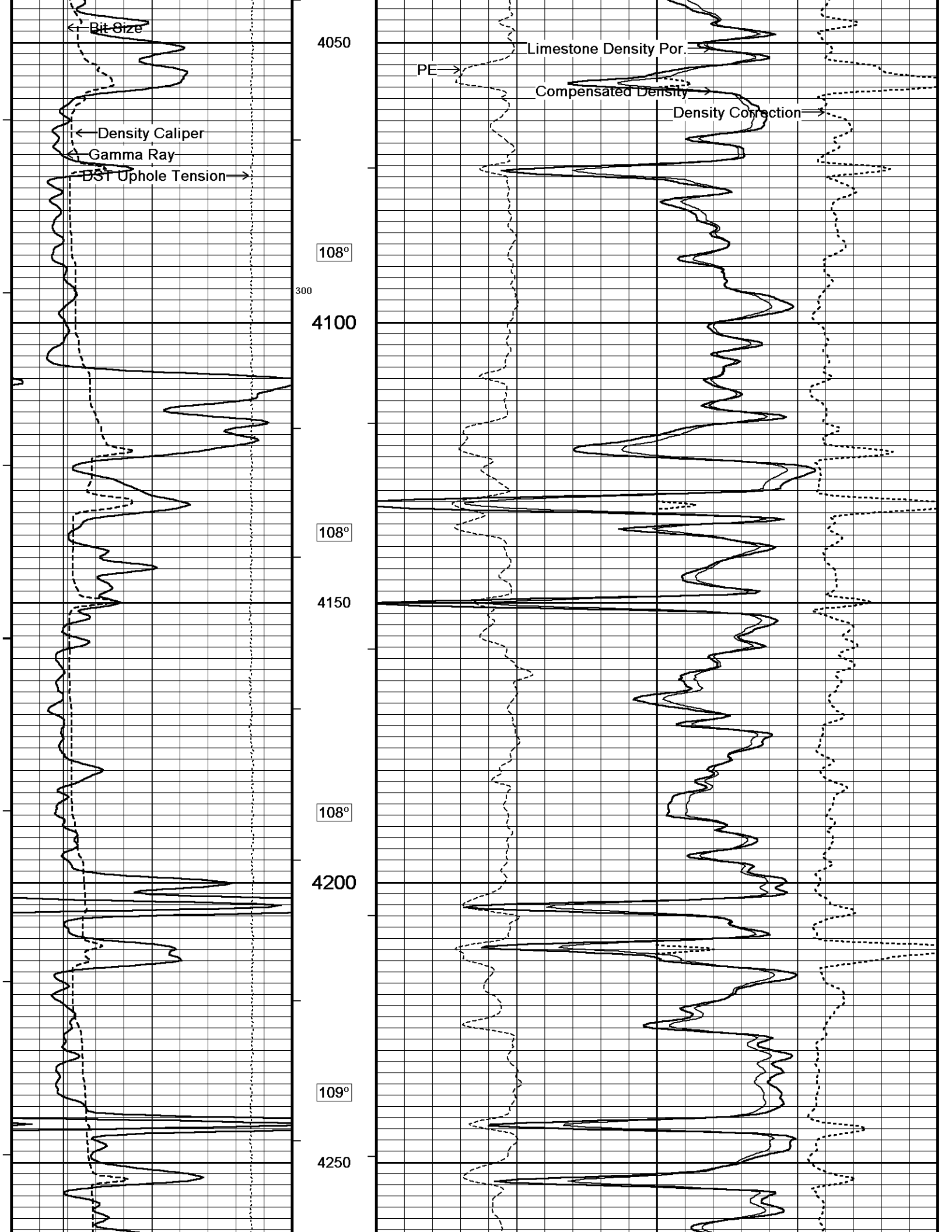
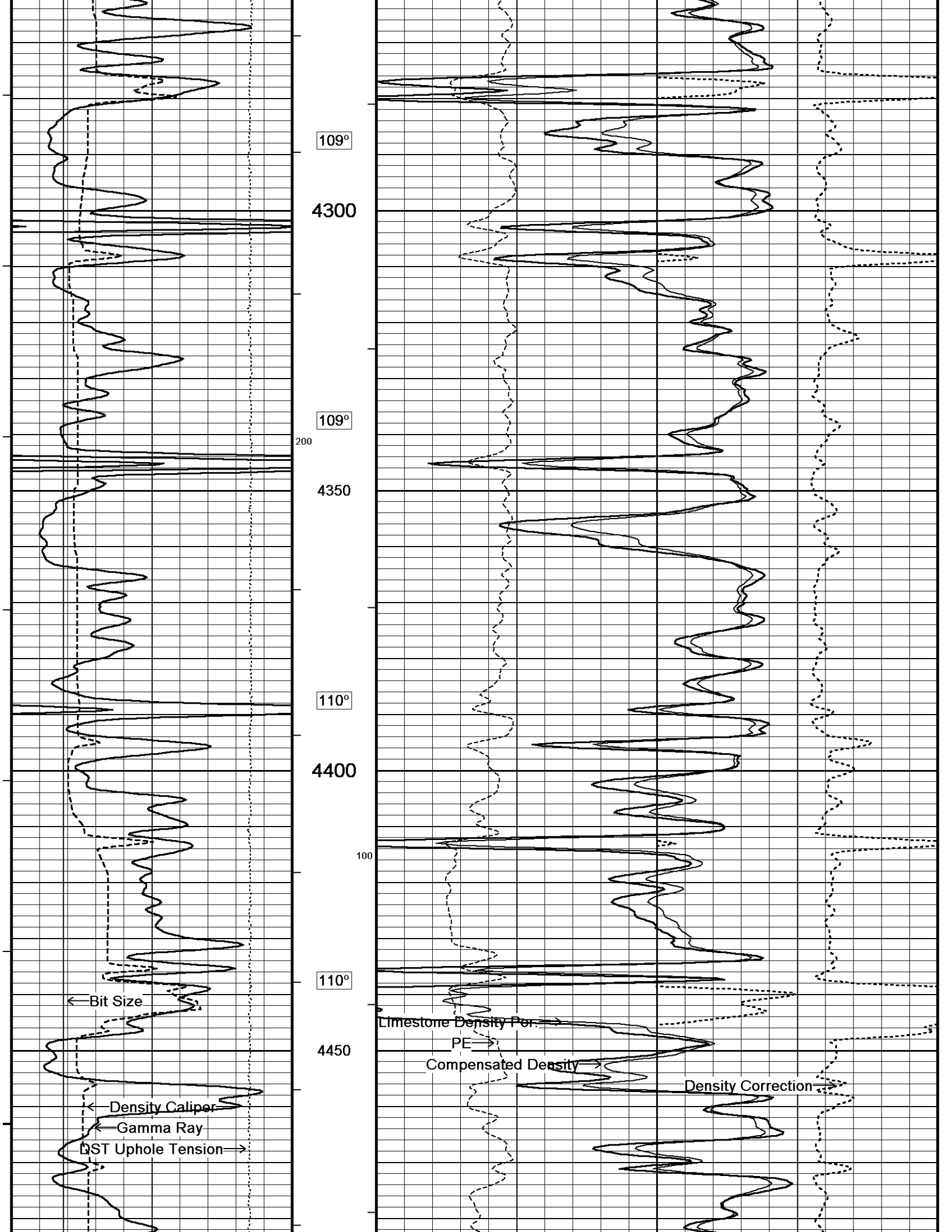
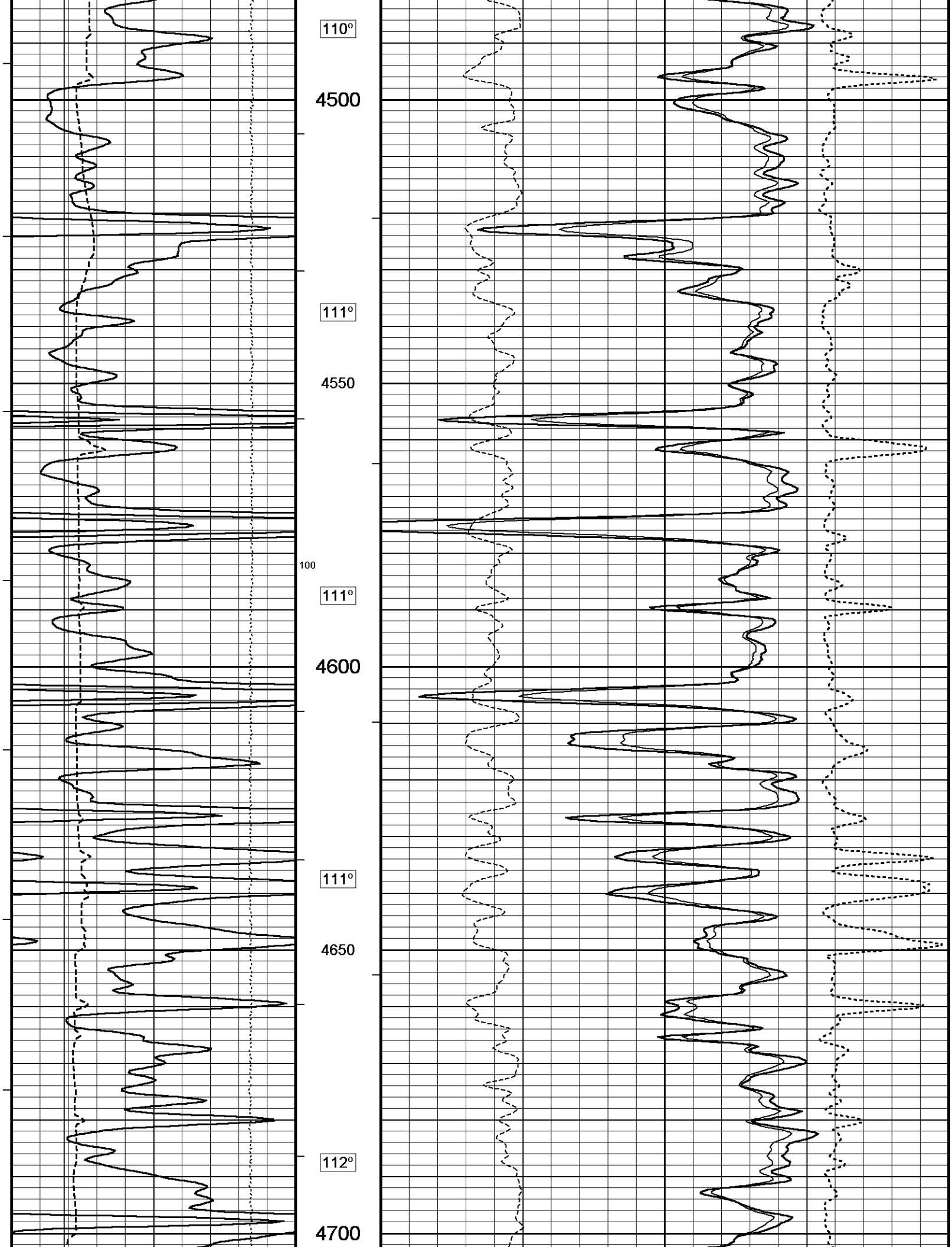
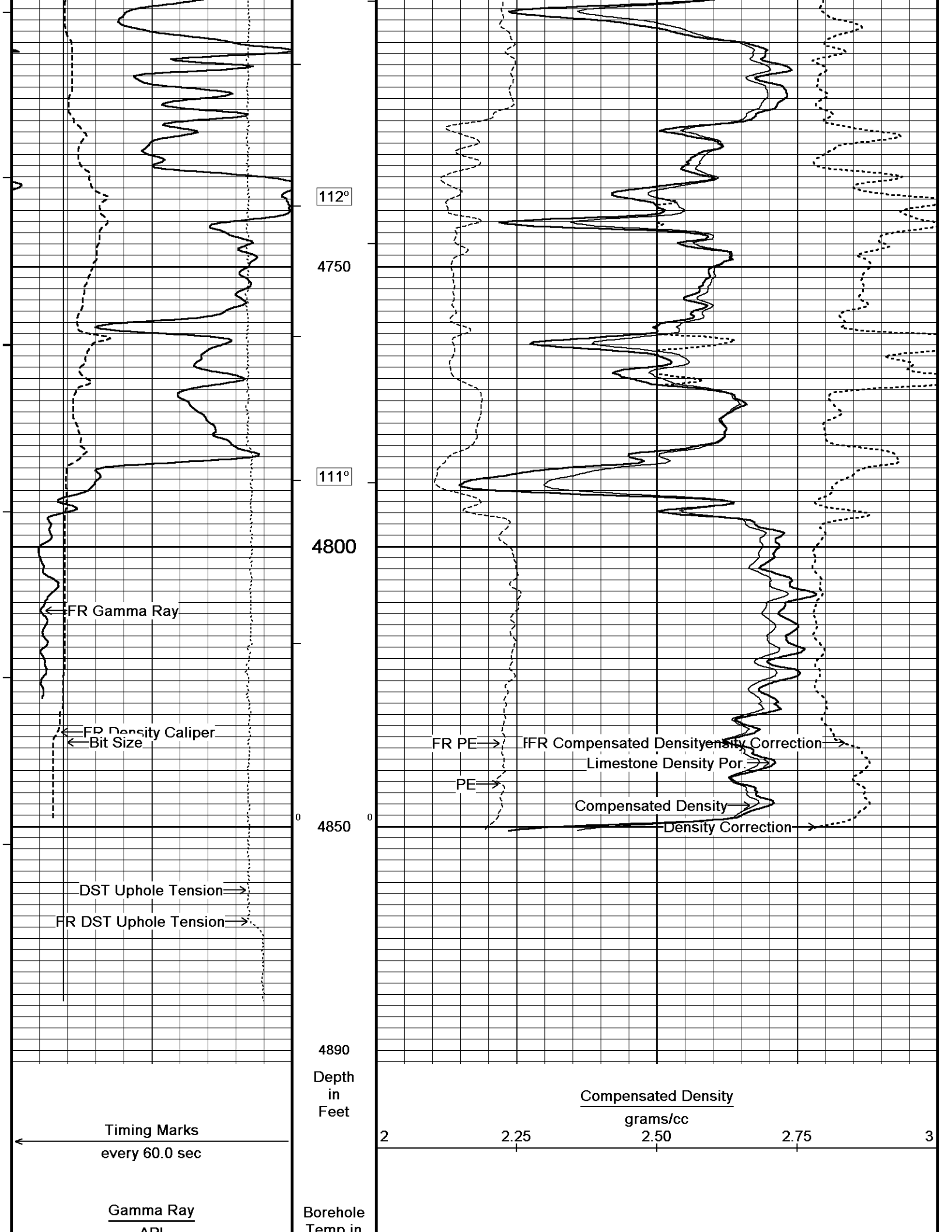


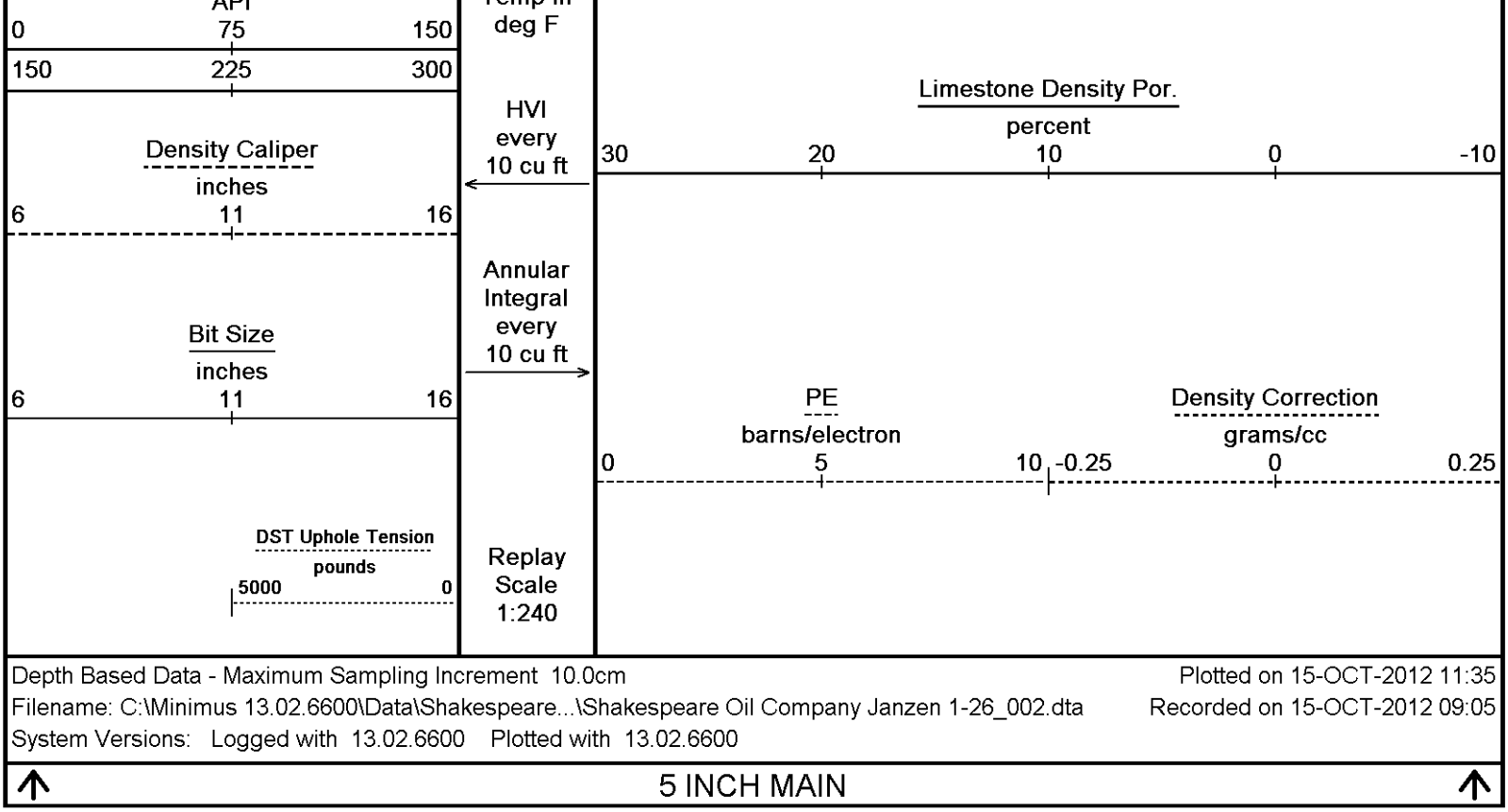

DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
0
5
10
-0.25
0
0.25
3850
107°
3900
107°
3950
200
108°
4000
108°


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
4050
PE
Limestone Density Por.
Compensated Density
Density Correction
108°
300
4100
108°
4150
108°
4200
109°
4250


109°
4300
109°
200
4350
110°
4400
100
110°
4450
←Bit Size
←Density Caliper
←Gamma Ray
DST Uphole Tension→
Limestone Density Por.→
PE→
Compensated Density→
Density Correction→


110°
4500
111°
4550
100
111°
4600
111°
4650
112°
4700


112°
4750
111°
4800
FR Gamma Ray
FR Density Caliper
Bit Size
0
4850
0
DST Uphole Tension
FR DST Uphole Tension
FR PE
FR Compensated Density
Density Correction
Limestone Density Por
PE
Compensated Density
Density Correction
4890
Depth
in
Feet
Timing Marks
every 60.0 sec
Gamma Ray
Borehole
Temp in
Compensated Density
grams/cc
2
2.25
2.50
2.75
3



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REPEAT SECTION

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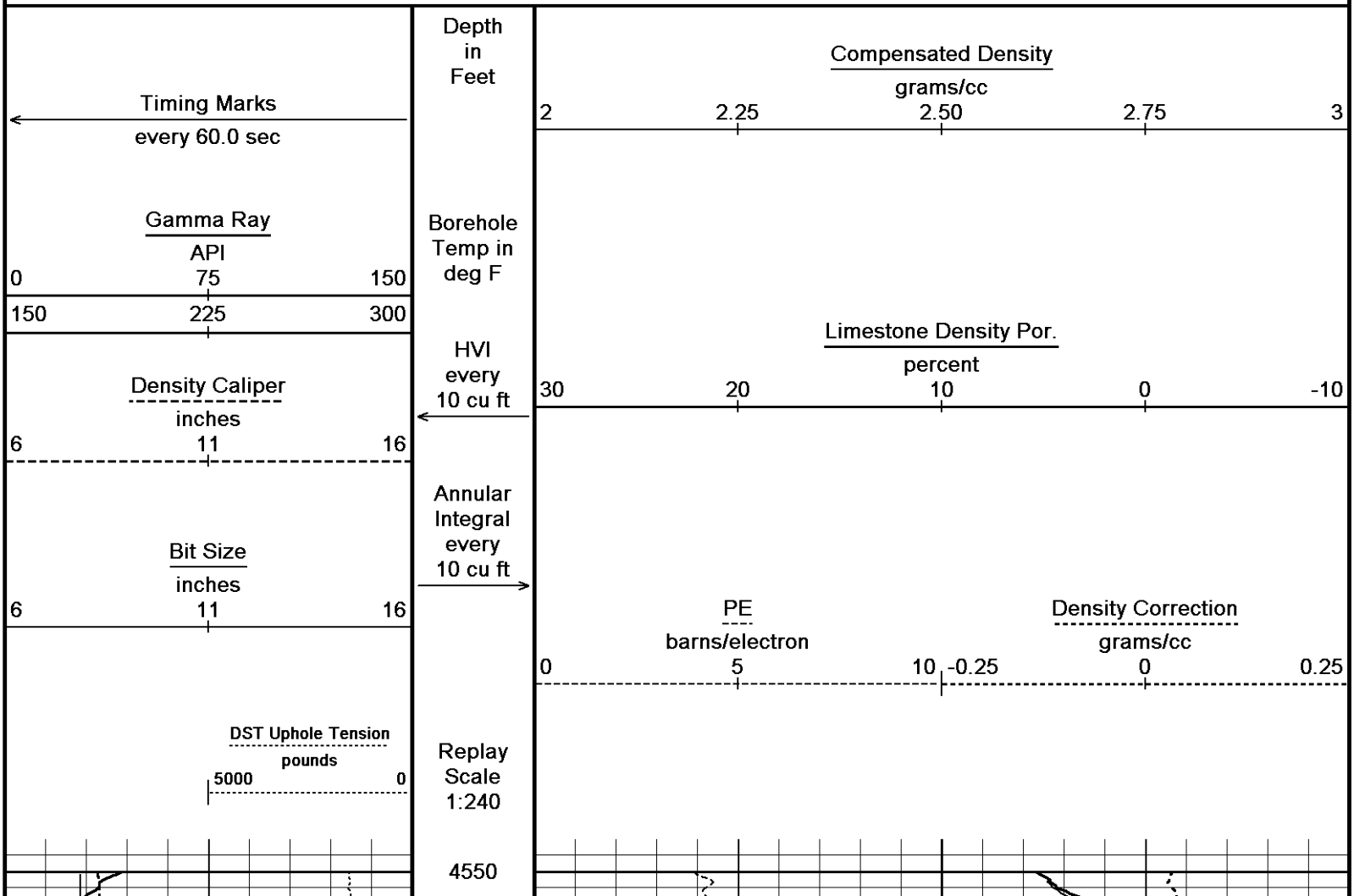
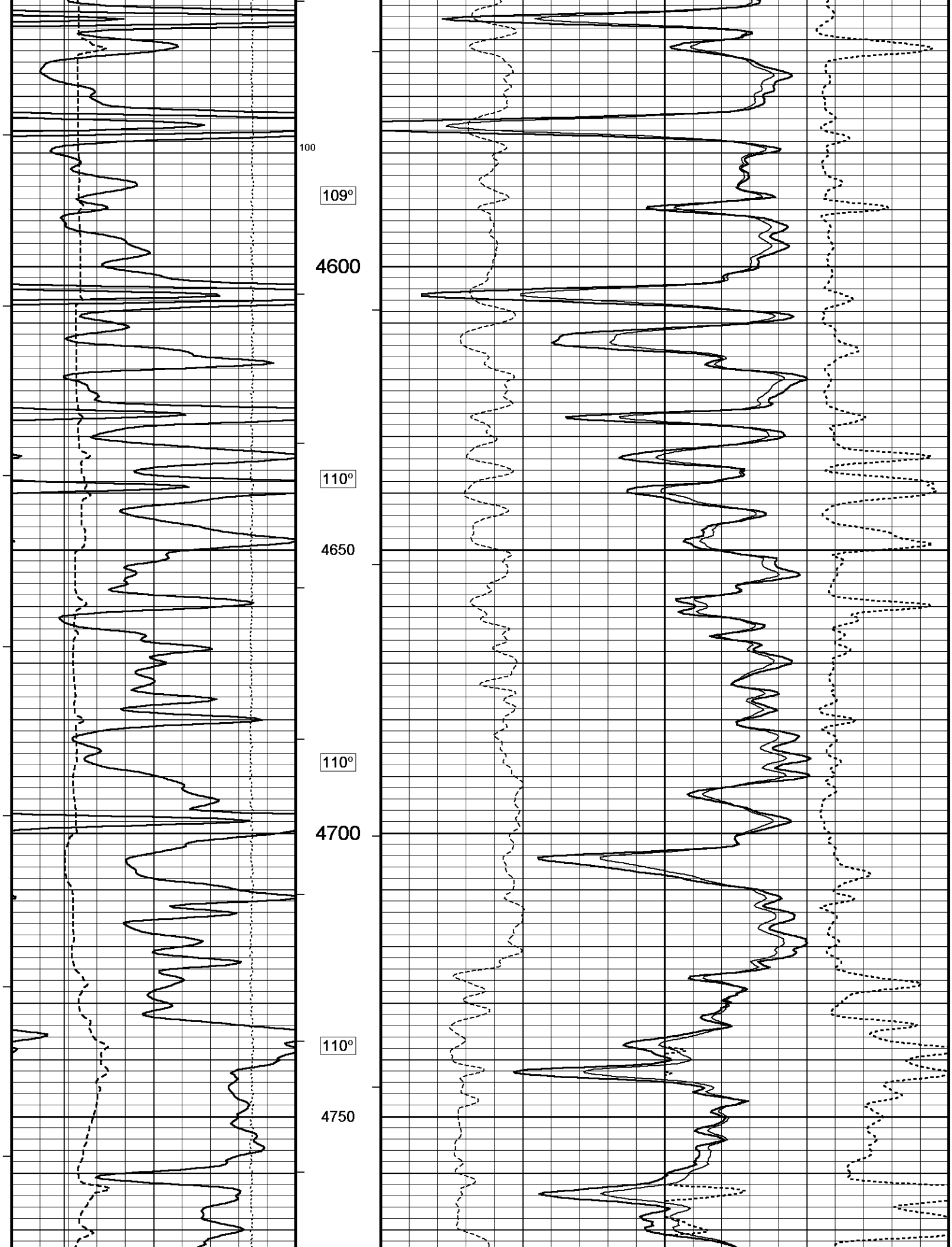
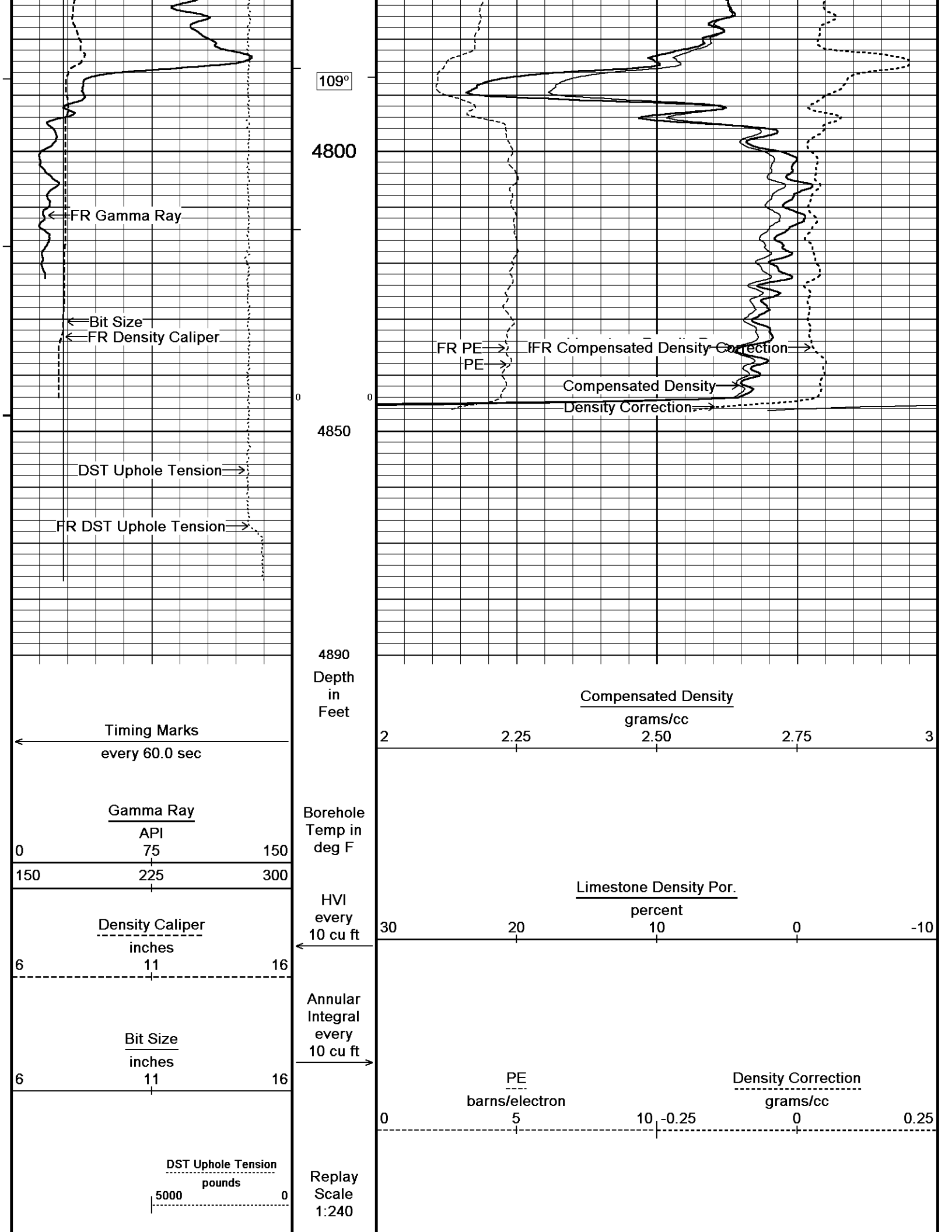



100
109°
4600
110°
4650
110°
4700
110°
4750


109°
4800
FR Gamma Ray
Bit Size
FR Density Caliper
DST Uphole Tension
FR DST Uphole Tension
0
4850
FR PE
PE
FR Compensated Density Correction
Compensated Density
Density Correction
0
4890
Depth in Feet
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Borehole Temp in deg F
HVI every 10 cu ft
Limestone Density Por.
percent
30
20
10
0
-10
Density Caliper
inches
6
11
16
Annular Integral every 10 cu ft
Bit Size
inches
6
11
16
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.25
0
0.25
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 15-OCT-2012 11:35
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REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.02.6600\Data\Shakespeare Oil Company Janzen 1-26\Shakespeare Oil Company Janzen 1-26_001.dta

General Constants All 000

Last Edited on 15-OCT-2012,06:35

General Parameters		
Mud Resistivity	0.510	ohm-metres
Mud Resistivity Temperature	87.000	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 10-SEP-2012 04:28

Reading No	Measured	Calibrated (lbs)
1	15456.86	0.00
2	16071.78	384.00

Gamma Calibration MCG-D.K 442

Field Calibration on 14-OCT-2012 02:07

	Measured	Calibrated (API)
Background	69	46
Calibrator (Gross)	1152	771
Calibrator (Net)	1083	725

Gamma Constants MCG-D.K 442

Last Edited on 14-OCT-2012,08:31

Gamma Calibrator Number	GRC38	
Mud Density	1.12	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

Caliper Calibration MML-A 16

Base Calibration on 30-SEP-2012 19:38
Field Calibration on 14-OCT-2012 02:01

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13888	5.98

2	16946	7.97
3	20169	9.86
4	23996	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.03	5.98

Micro Normal and Micro Inverse Calibration MML-A 16

Base Calibration on 30-SEP-2012 19:42
Field Check on 14-OCT-2012 02:02

Base Calibration

		Measured	Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.2	60.2	5.0	25.0
Micro Inverse	15.6	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 16

Last Edited on 14-OCT-2012,02:01

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 10-OCT-2012 14:12
Field Check on 14-OCT-2012 02:13

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3058	95	3714	110
Ratio	32.033		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1673	2395
Ratio	0.698	

Field Check

	Calibrated (cps)	
	1678	2400
Ratio	0.699	

Neutron Constants MDN-A.B 66

Last Edited on 14-OCT-2012,08:31

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 01-OCT-2012 09:16
Field Check on 14-OCT-2012 01:52

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	965.2	126.8

Base Check	280.7
Field Check	280.9

FE Constants MFE-B.J 353

Last Edited on 14-OCT-2012,08:30

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 55

Last Edited on 15-OCT-2012,06:36

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	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	N/A
Sonic 2 Despiker	N/A	N/A

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

Induction Calibration MAI-A.A 167

Base Calibration on 17-JUL-2012,13:55
Field Check on 14-OCT-2012 01:51

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) 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) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1	0.0	0.0	12.3	3841.0
2	0.0	0.0	29.3	3478.5
3	0.0	0.0	28.9	3054.3
4	0.0	0.0	19.7	2082.6
Deep	0.0	0.0	18.5	2049.7
Medium	0.0	0.0	42.1	3992.9
Shallow	0.0	0.0	42.5	5056.6
Array Temperature	0.0		64.3	Deg F

Induction Constants MAI-A.A 167

Last Edited on 14-OCT-2012,08:30

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 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	

Caliper Calibration MPD-B 64

Base Calibration on 10-OCT-2012 12:35
Field Calibration on 14-OCT-2012 01:53

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	12128	3.99
2	20753	5.98
3	29254	7.97
4	37705	9.86
5	46896	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.95	5.98

Photo Density Calibration MPD-B 64

Base Calibration on 10-OCT-2012 12:54
Field Check on 14-OCT-2012 02:00

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	58951	32645	59556	30836
Reference 2	24760	2893	24941	2541

Field Check at Base

1181.6	1375.1

Field Check

1187.9	1371.9

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	215	1053		
Reference 1	22216	58751	0.381	0.371
Reference 2	6718	24623	0.276	0.272

Field Check at Base

215.0	1052.6

Field Check

215.0	1059.8

Density Constants MPD-B 64

Last Edited on 14-OCT-2012,08:30

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	1.12	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)
2.87	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 13.02.6600\Data\Shakespeare Oil Company Janzen 1-26\Shakespeare Oil Company Janzen 1-26_001.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 16 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

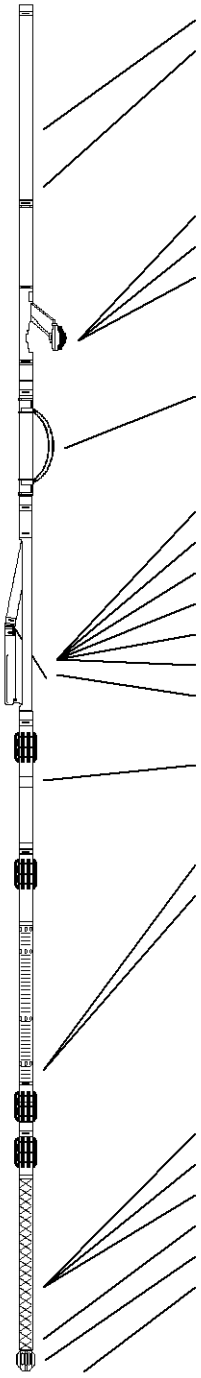
Compact Density/Caliper
MPD-B 64 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

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

Compact Sonic
MSS-A.A 55 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



55.39 ft	GRGC - Gamma Ray
52.48 ft	CGXT - MCG External Temperature
45.76 ft	MINV - Micro-inverse
45.76 ft	MNRL - Micro-normal
46.76 ft	MLTC - MML Caliper
40.97 ft	NPRL - Limestone Neutron Por.
33.73 ft	AVOL - Annular Volume
33.73 ft	HVOL - Hole Volume
33.73 ft	CLDC - Density Caliper
31.80 ft	DPRL - Limestone Density Por.
31.80 ft	DEN - Compensated Density
31.80 ft	DCOR - Density Correction
31.74 ft	PDPE - PE
26.24 ft	FEFE - Shallow FE
12.96 ft	DT35 - 3-5' Compensated Sonic
12.96 ft	SPRL - Wyllie Lime. Sonic Por.
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	RTAO - Array Ind. One Res Rt
3.34 ft	R60O - 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, INC.
WELL	JANZEN #1-26
FIELD	WILDCAT
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3119.00	feet	First Reading	4835.00	feet
Elevation Drill Floor	3118.00	feet	Depth Driller	4870.00	feet
Elevation Ground Level	3109.00	feet	Depth Logger	4867.00	feet

COMPACT PHOTO DENSITY

Weatherford®

COMPENSATED NEUTRON
MICRORESISTIVITY LOG