COMPENSATED NEUTRON
SONIC POROSITY
OVERLAY

COMPANY	BEREXCO LLC.
WELL	ELNORA #2-20
FIELD	WILDCAT
PROVINCE/COUNTY	FINNEY
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	940' FNL & 1655' FWL

SEC	TWP	RGE	Other Services
20	26S	33W	

Latitude
Longitude
API Number 15-055-22288

Permanent Datum GL, Elevation 2928 feet
Log Measured From KB
Drilling Measured From KB

Elevations:	feet
KB	2941.00
DF	2939.00
GL	2928.00

Date	04-APR-2014		
Run Number	ONE		
Service Order	3487-83817538		
Depth Driller	5400.00	feet	
Depth Logger	5393.00	feet	
First Reading	5380.00	feet	
Last Reading	1783.00	feet	
Casing Driller	1772.00	feet	
Casing Logger	1783.00	feet	
Bit Size	7.875	inches	
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.20 lb/USg	51.00 CP	
PH / Fluid Loss	9.50	7.60 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.48 @ 84.0	ohm-m	
Rmf @ Measured Temp	0.38 @ 84.0	ohm-m	
Rmc @ Measured Temp	0.58 @ 84.0	ohm-m	
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.34 @120.0	ohm-m	
Time Since Circulation	5 HOURS		
Max Recorded Temp	120.00	deg F	
Equipment / Base	13244	LIB	
Recorded By	ADAM SILL		
Witnessed By	IAN BOSMEIJER		
JOB #	LB14-100		

BOREHOLE RECORD

Last Edited: 04-APR-2014 15:44

Bit Size inches	Depth From feet	Depth To feet
7.875	1772.00	5400.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1772.00	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.

- RUN TWO: SHA, MCG, MIM, MIE RUN IN COMBINATION.
  - HARDWARE: CENTRALIZER BOWSPRING USED ON MIM.
  1.5 INCH STANDOFF USED ON MIE.

- 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: 1789 CU.FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 353 CU.FT.

- RIG: BEREDCO #1.

- ENGINEER: A. SILL.

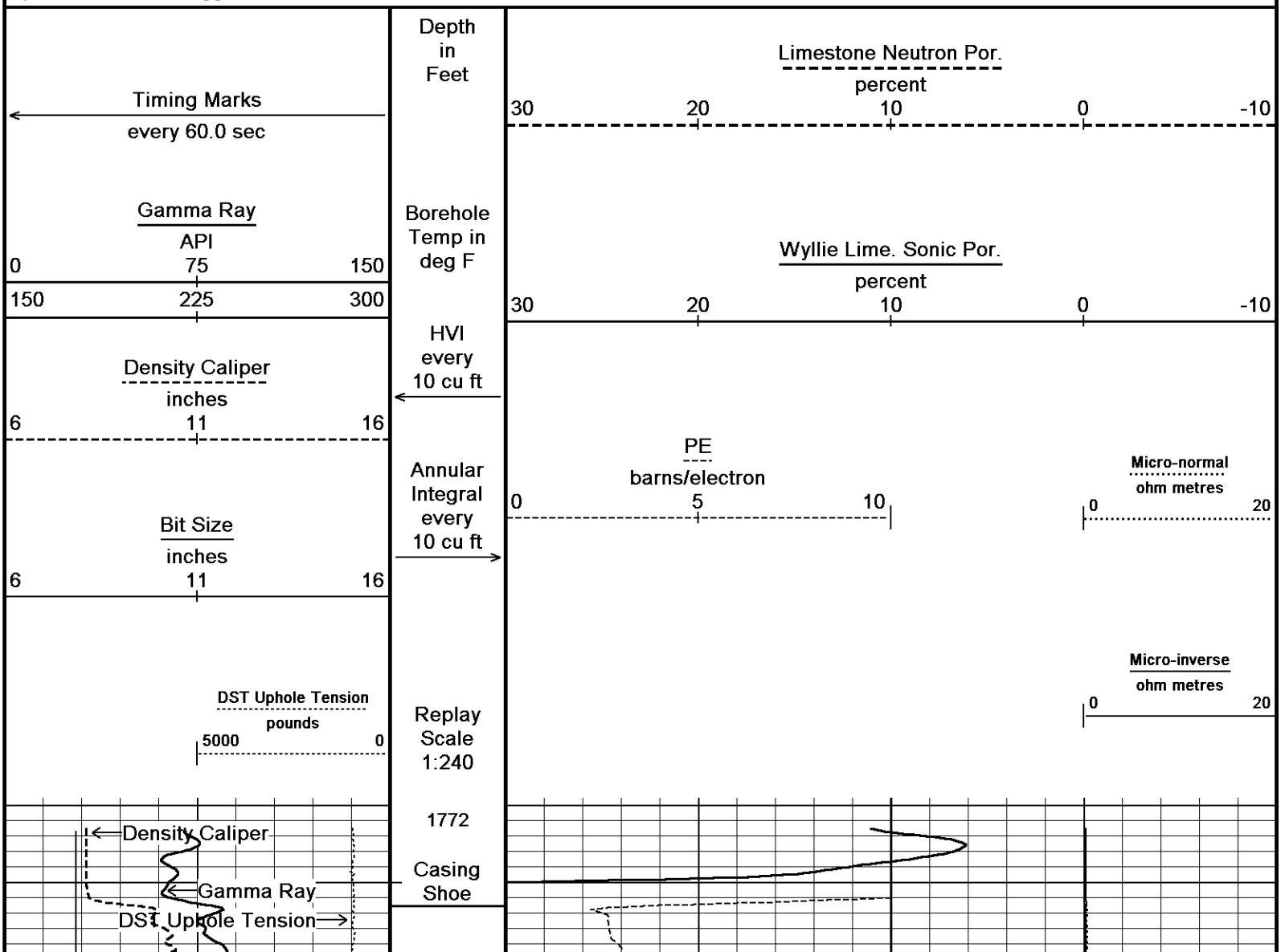
- OPERATOR: J. LaPOINT.

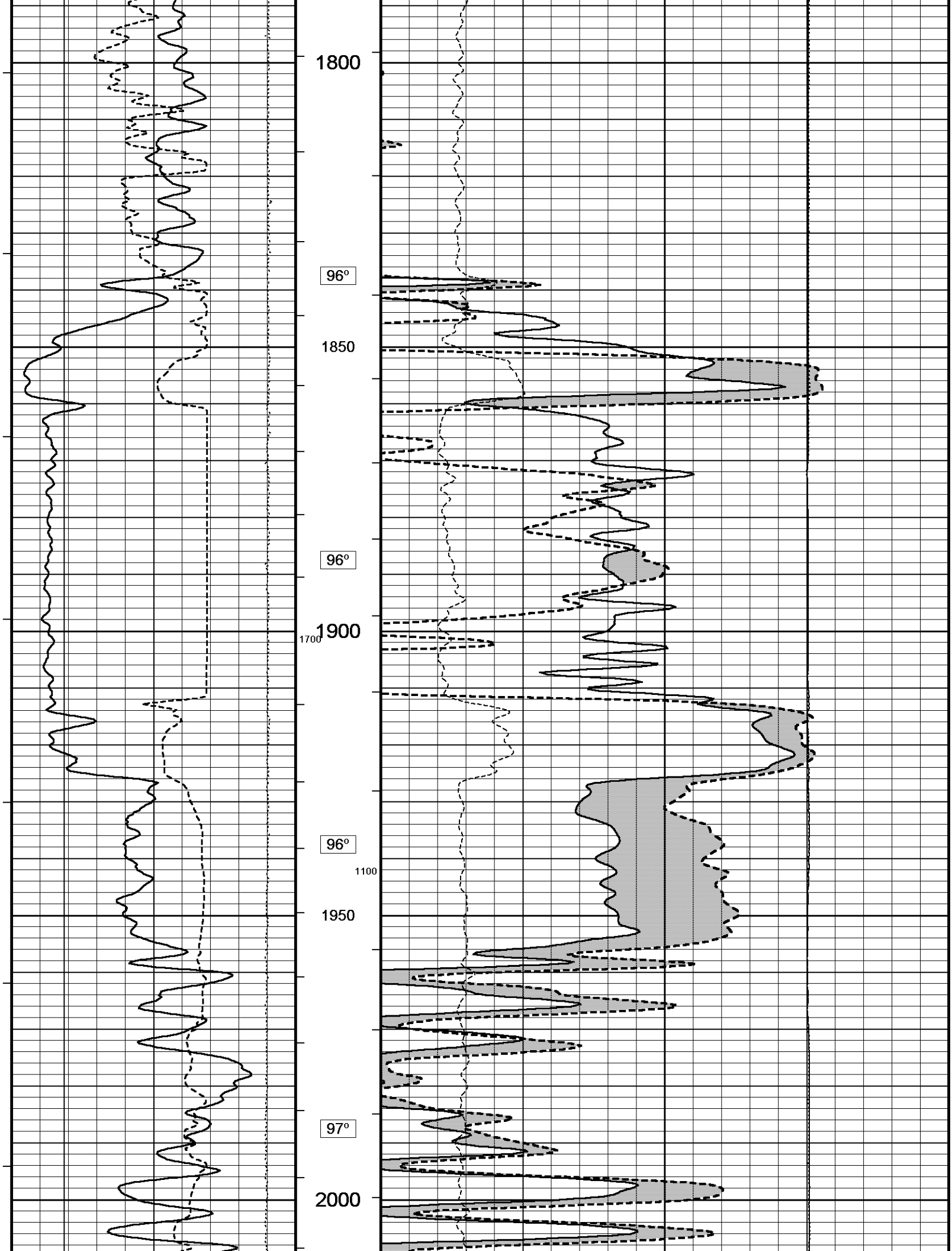
5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-APR-2014 22:44

Filename: C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_003.dta — Recorded on 04-APR-2014 17:54

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

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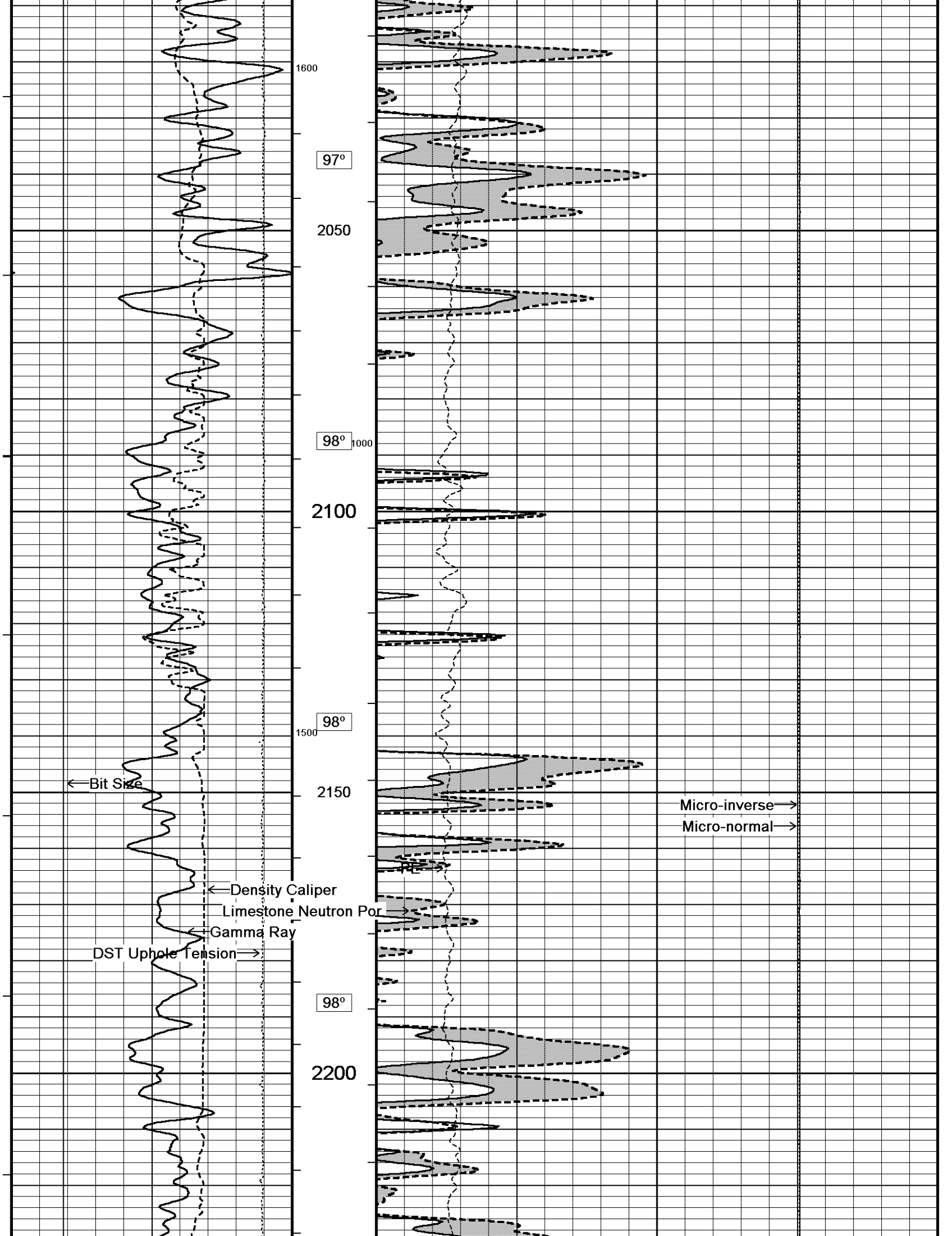
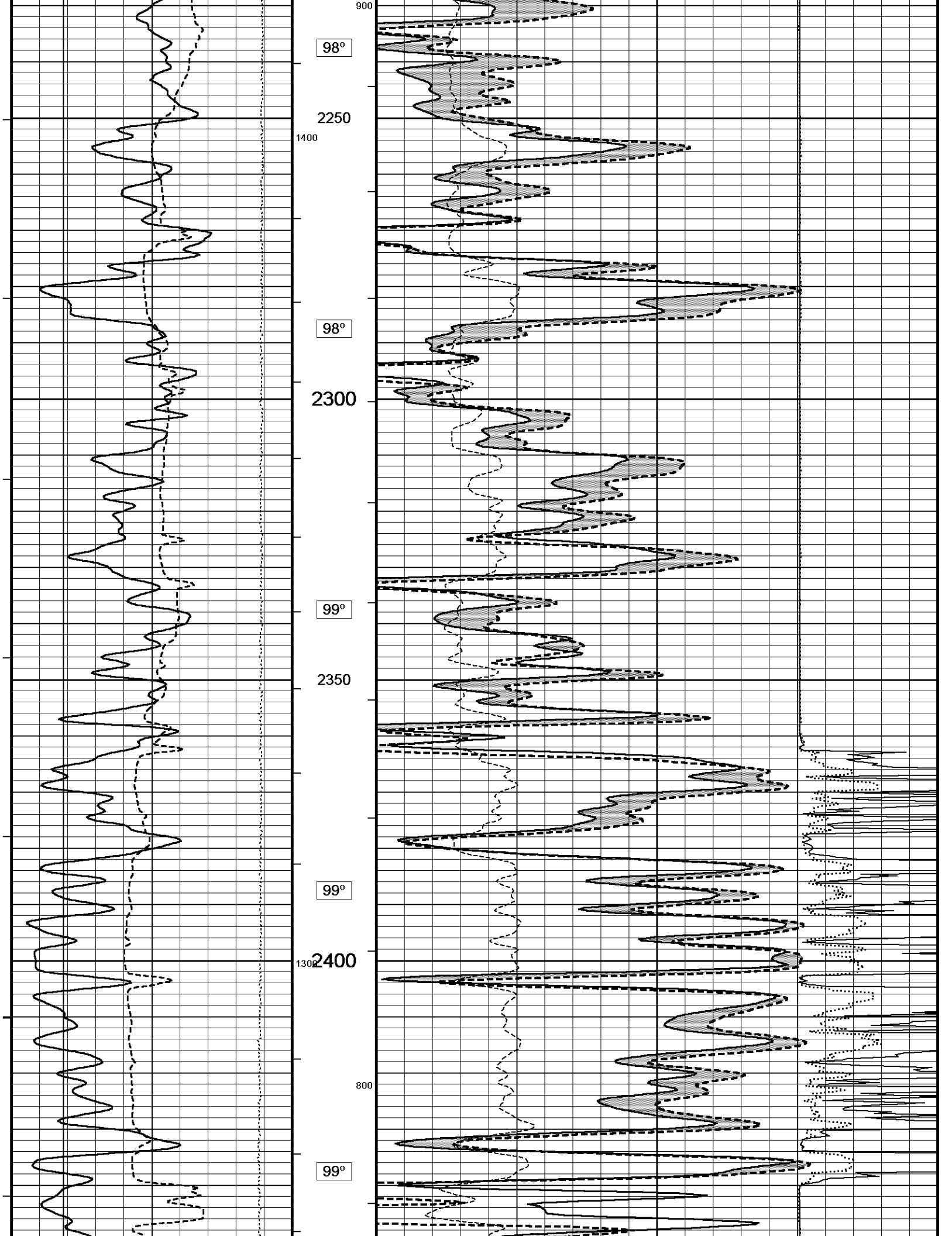
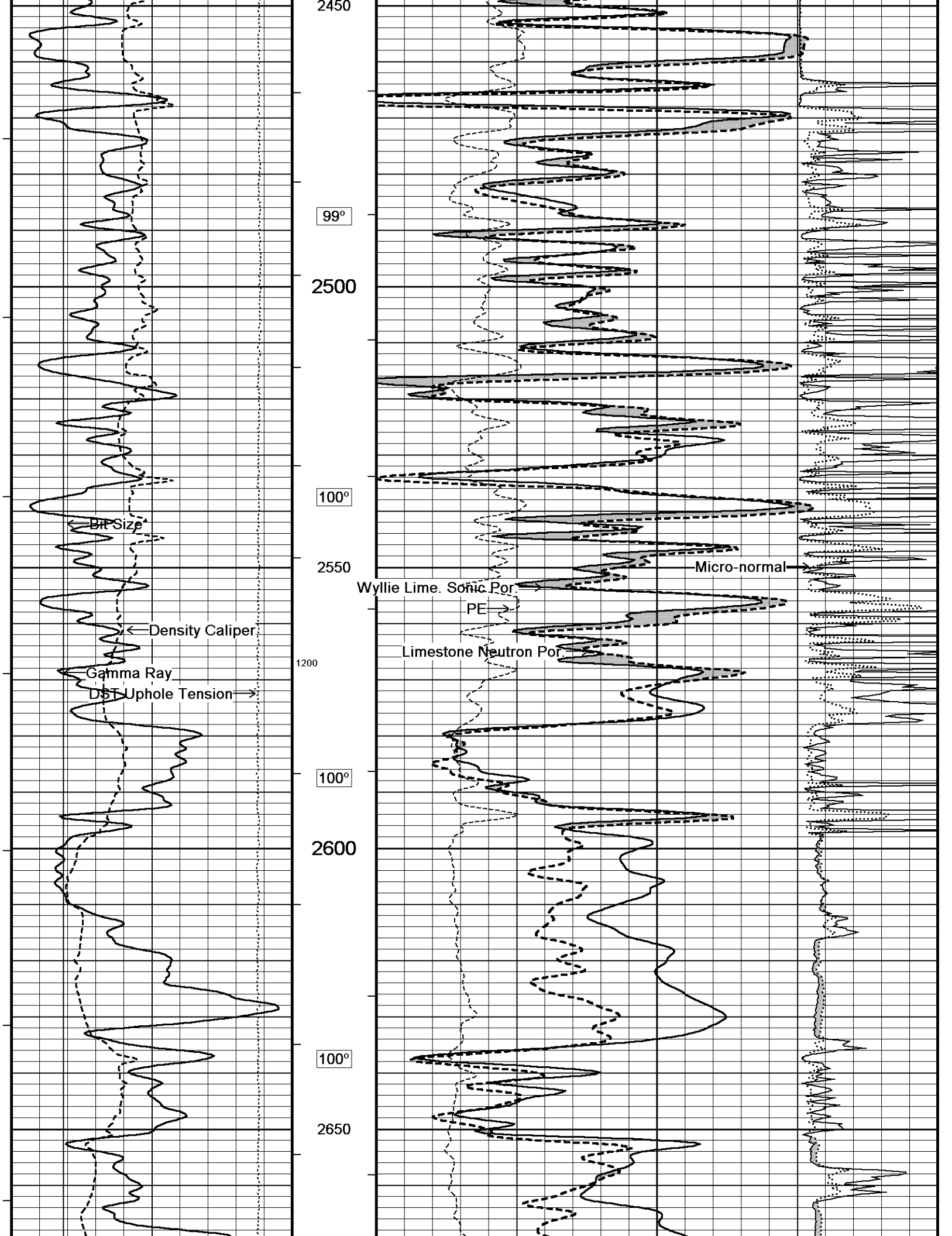
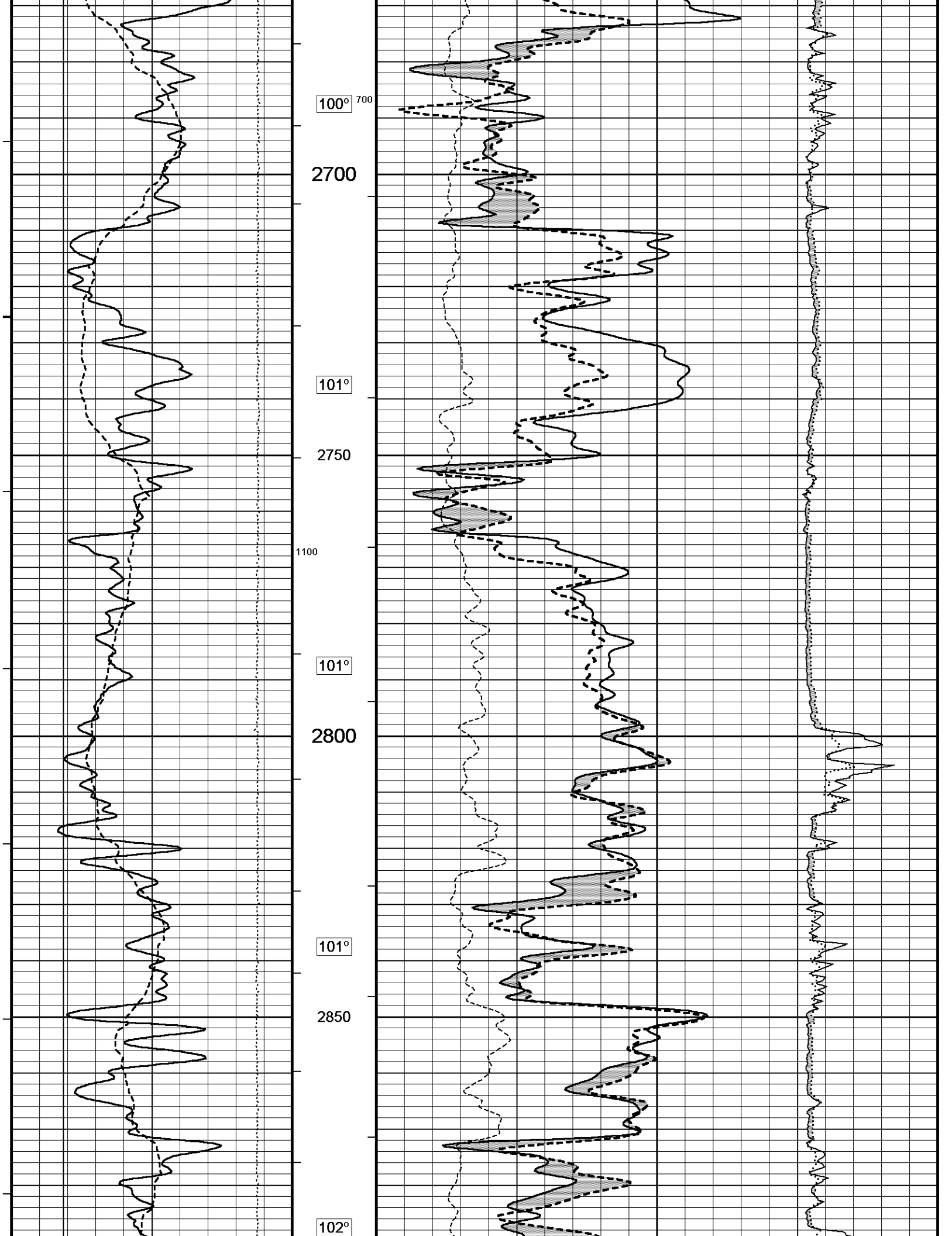
96°
1850
96°
1700
1900
96°
1100
1950
97°
2000


1600
97°
2050
98°
1000
2100
98°
1500
2150
98°
2200
←Bit Size
←Density Caliper
Limestone Neutron Por→
←Gamma Ray
DST Uphole Tension→
Micro-inverse→
Micro-normal→


900
98°
2250
1400
98°
2300
99°
2350
99°
1300
2400
800
99°


2450
99°
2500
100°
Bit Size
2550
Micro-normal
Wyllie Lime. Sonic Por
PE
Density Caliper
Limestone Neutron Por
1200
Gamma Ray
DST Uphole Tension
100°
2600
100°
2650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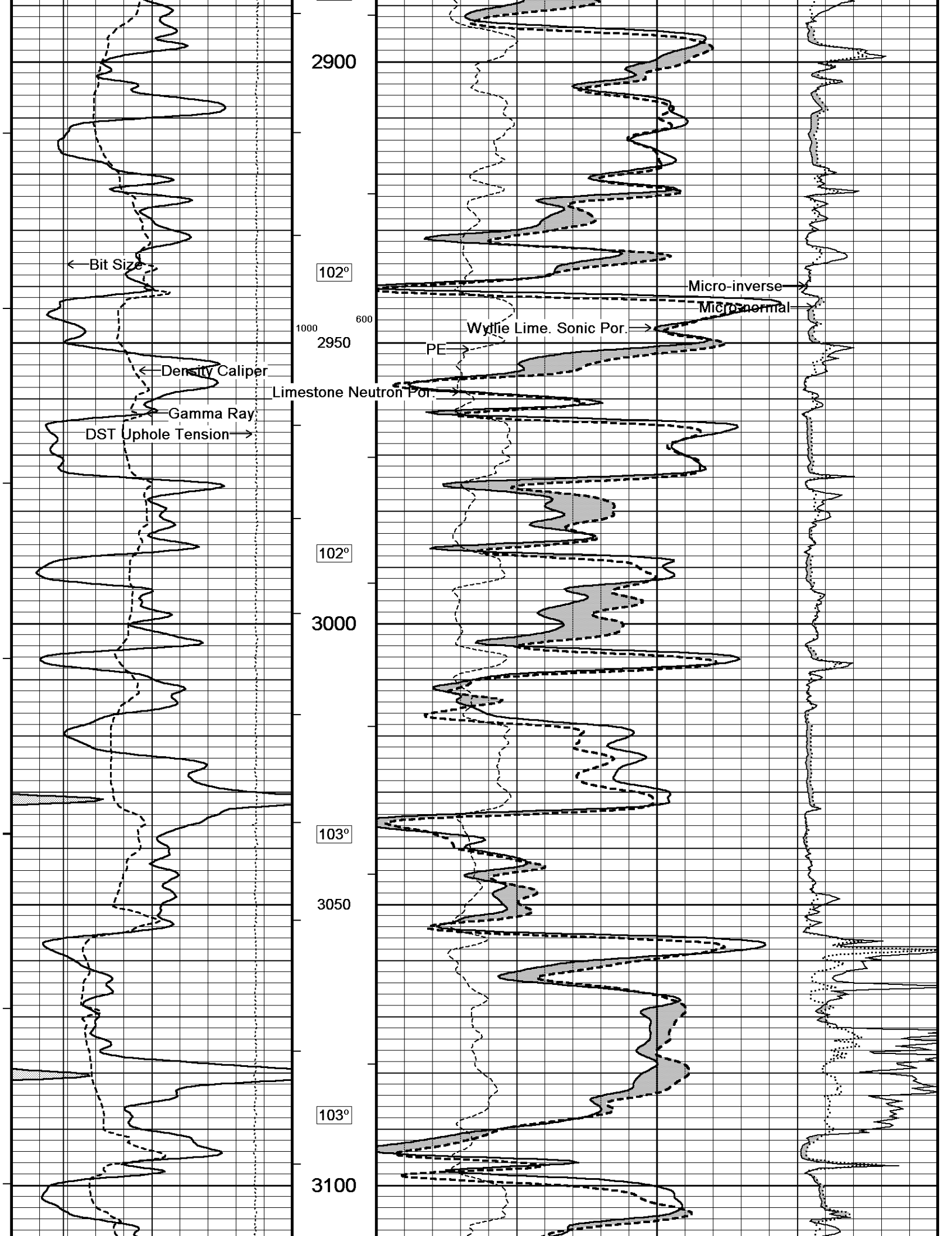
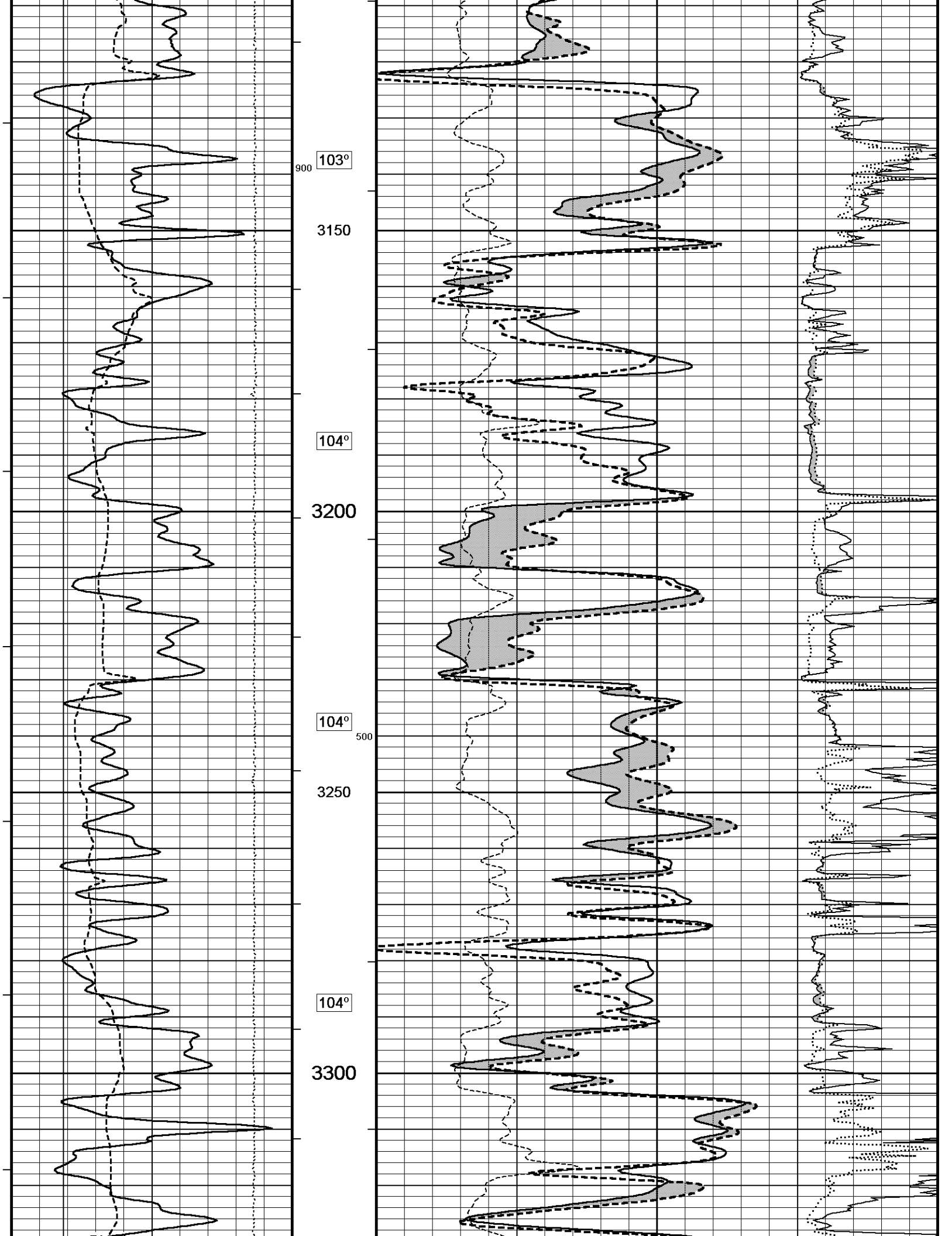
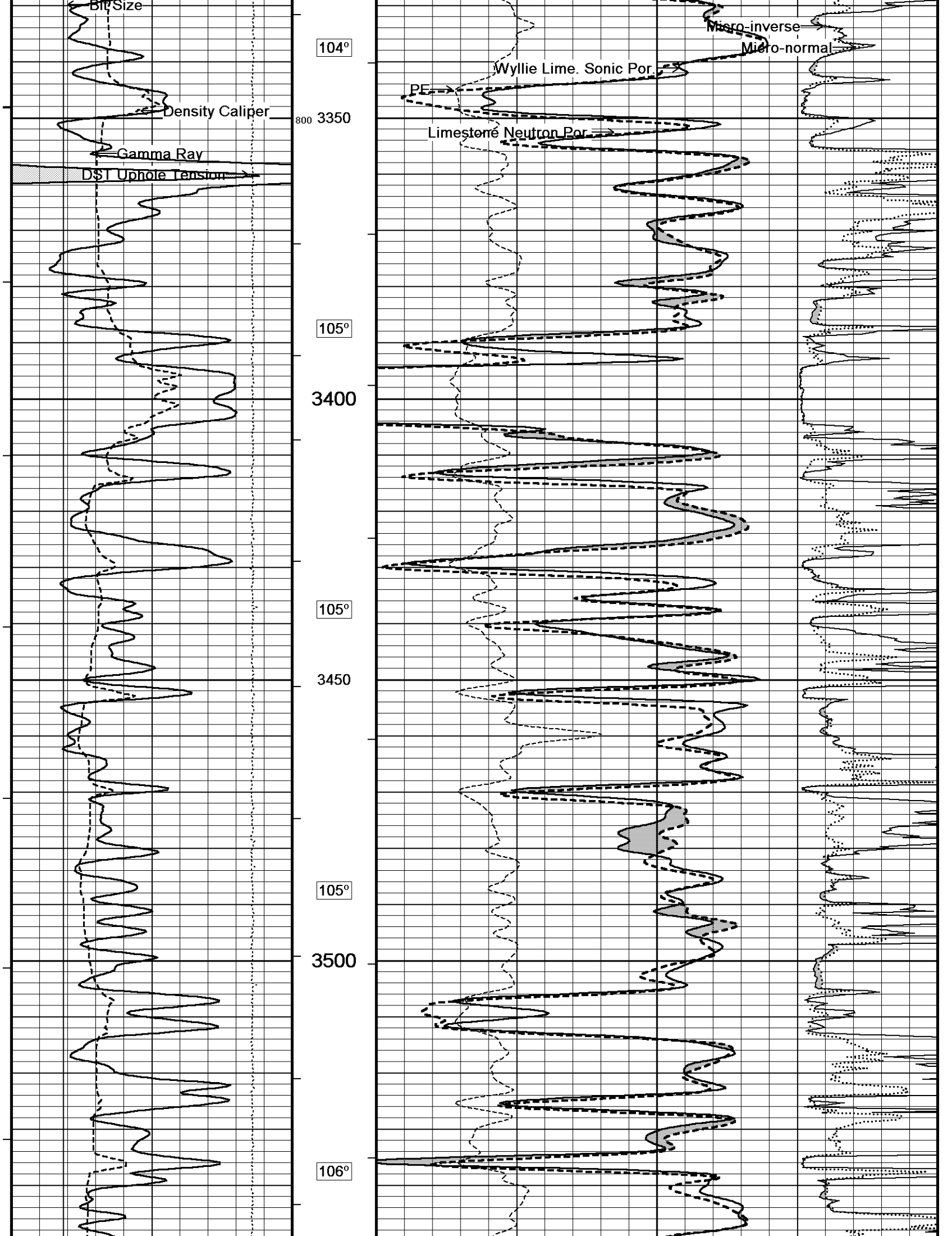
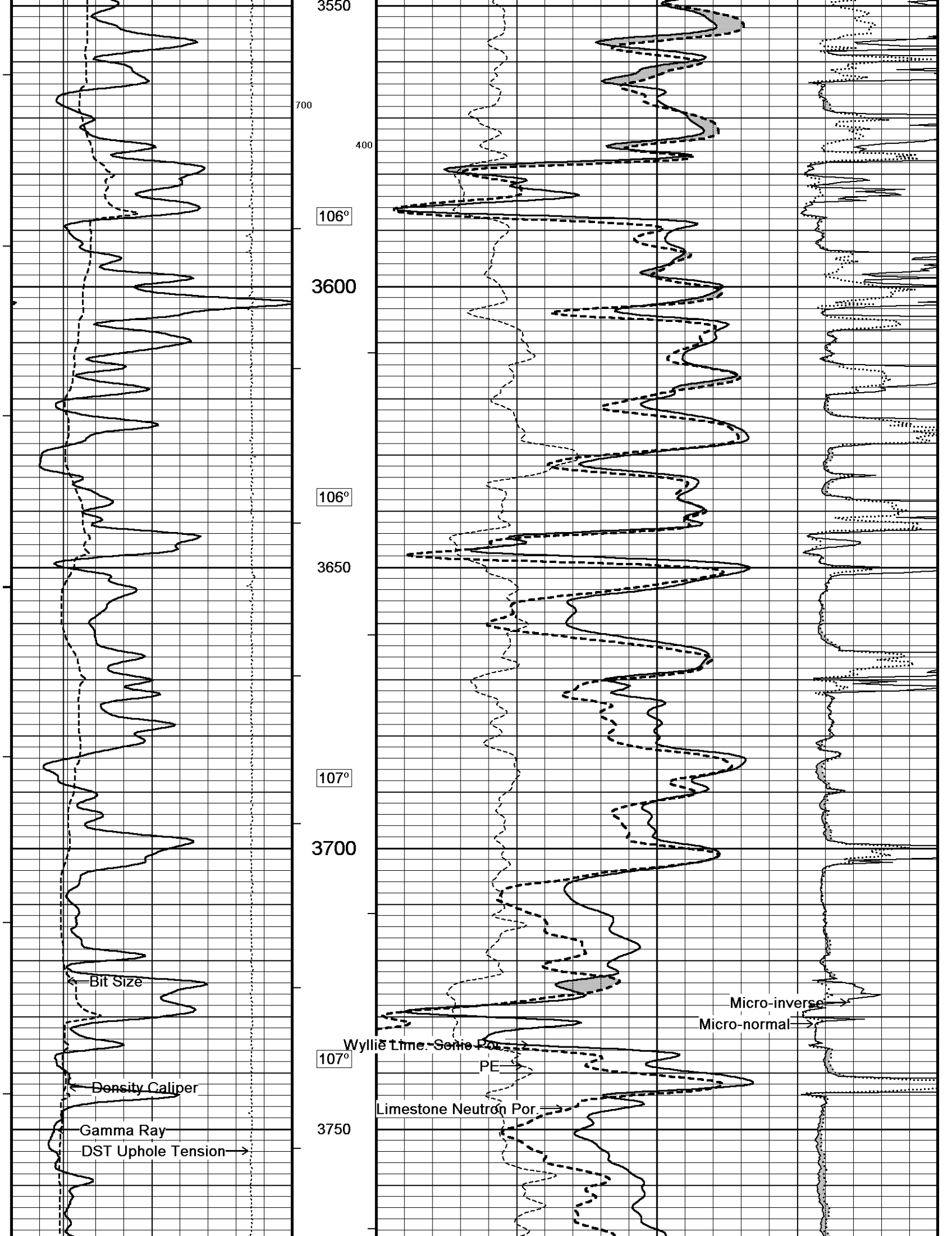
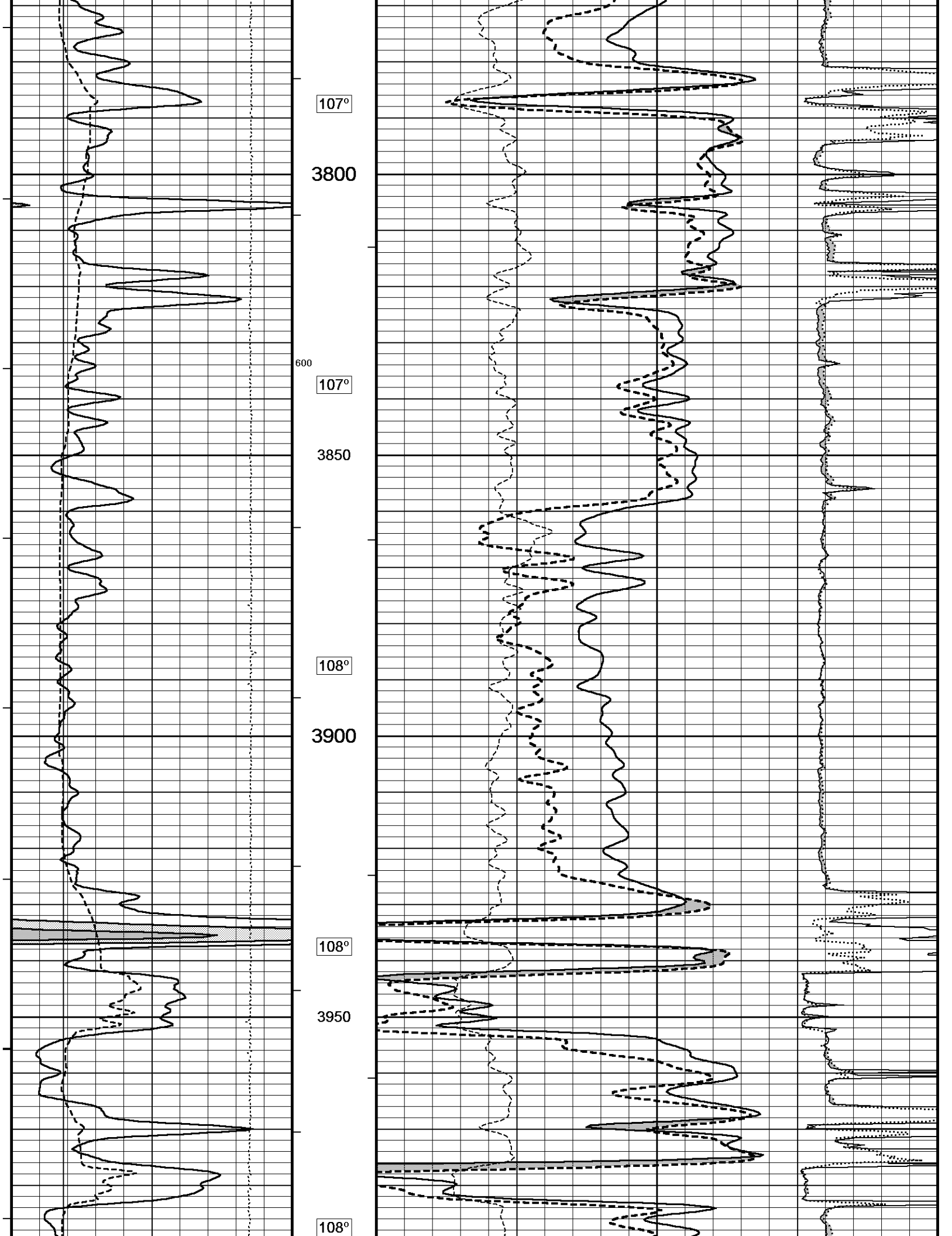
700
2700
101º
2750
1100
101º
2800
101º
2850
102º

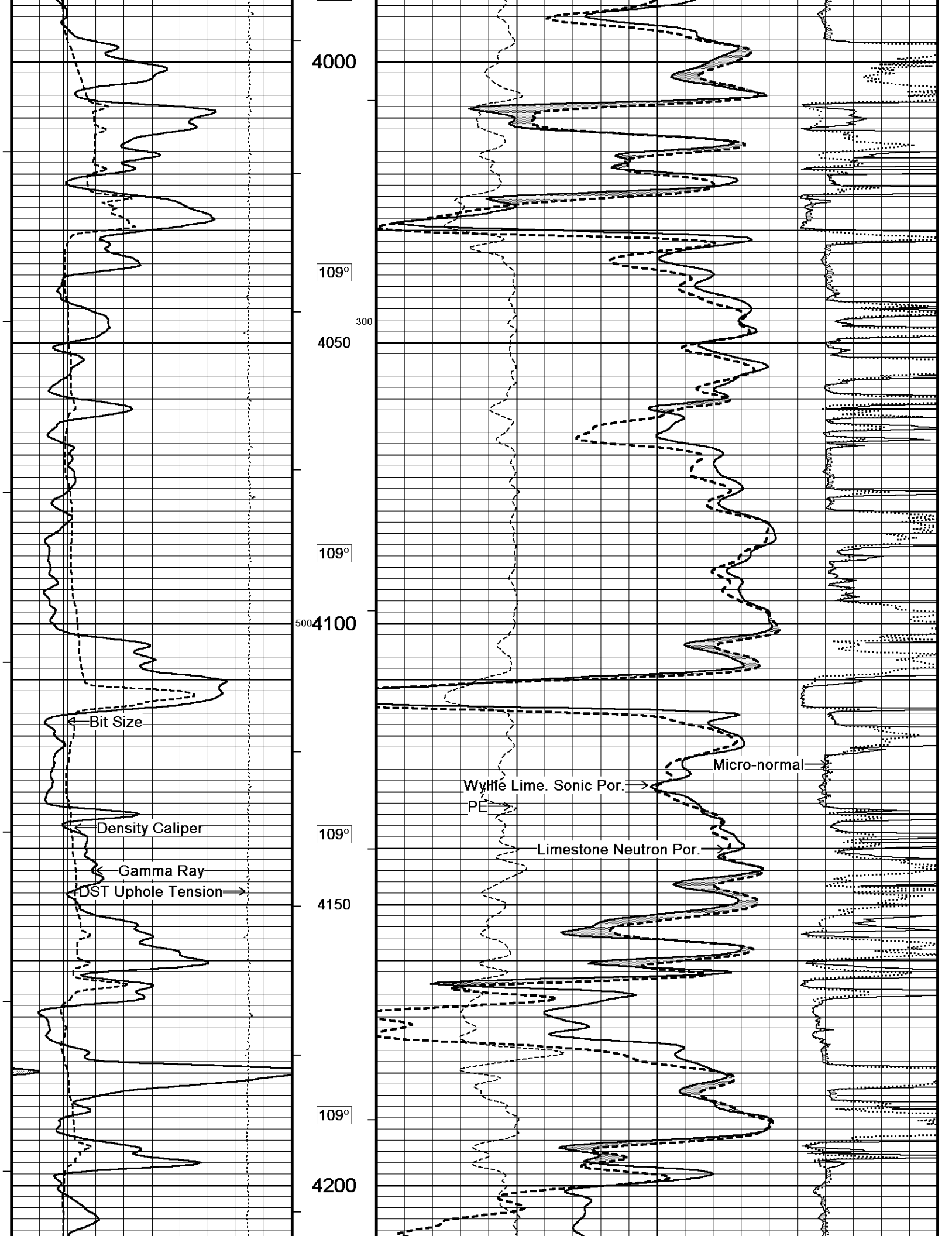

2900
Bit Size
102°
Micro-inverse
Micronormal
1000
600
2950
Wyllie Lime. Sonic Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
102°
3000
103°
3050
103°
3100

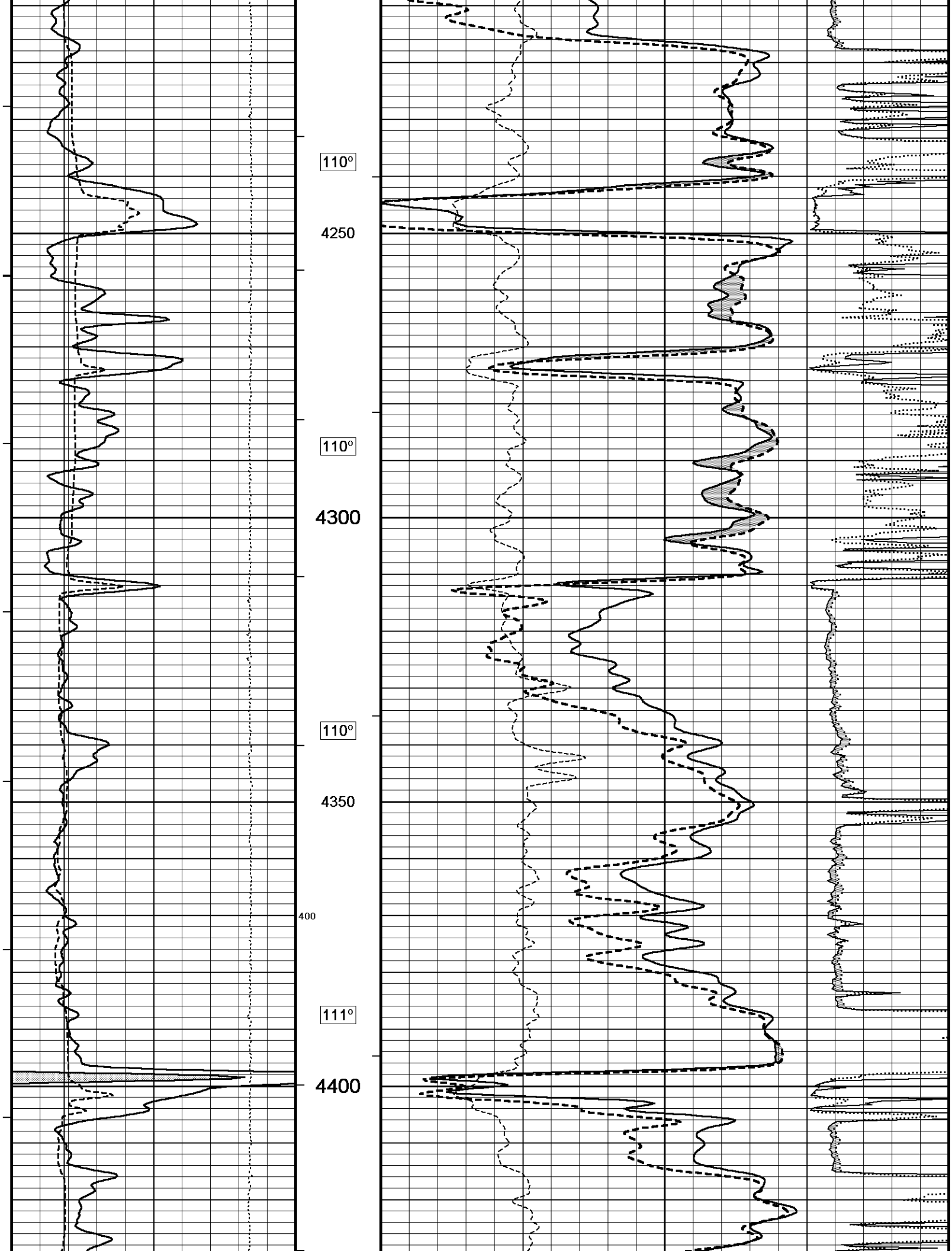

900
103°
3150
104°
3200
104°
500
3250
104°
3300

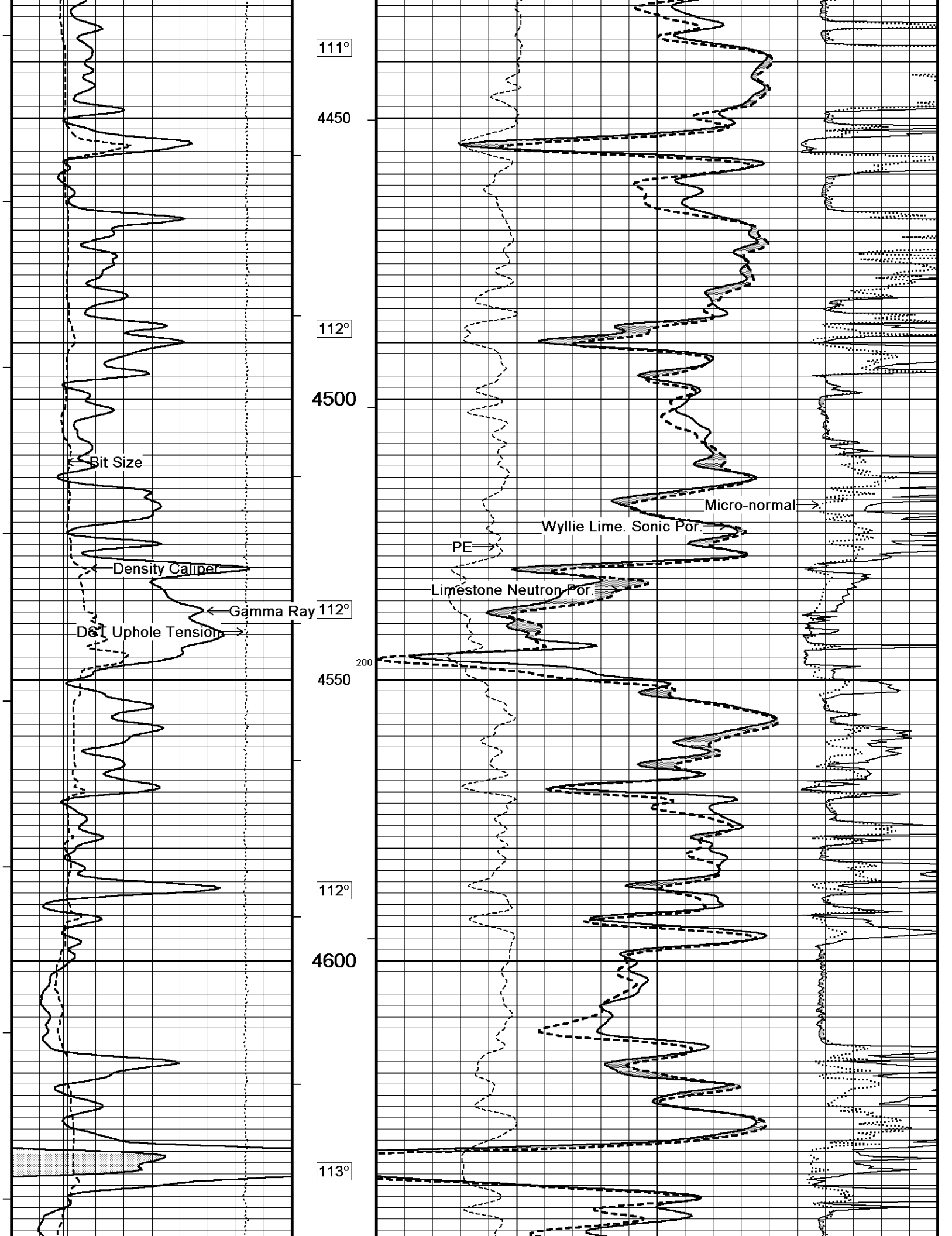

Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
104°
800 3350
105°
3400
105°
3450
105°
3500
106°
Micro-inverse
Micro-normal
Wyllie Lime. Sonic Por
PE
Limestone Neutron Por

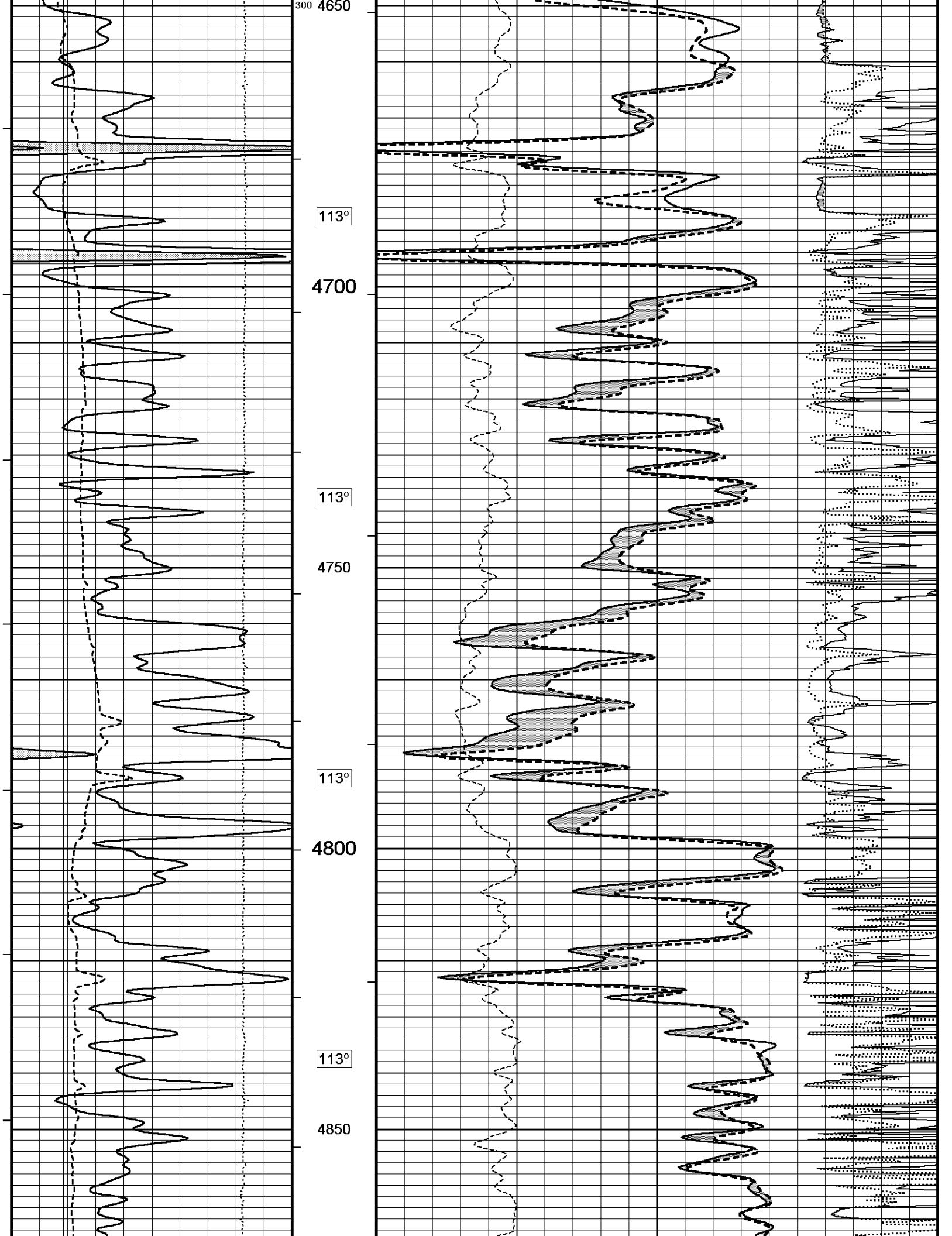

3550
700
400
106°
3600
106°
3650
107°
3700
107°
3750
Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
Wyllie Lime. Sonic Por.
PE
Limestone Neutron Por.
Micro-inverse
Micro-normal

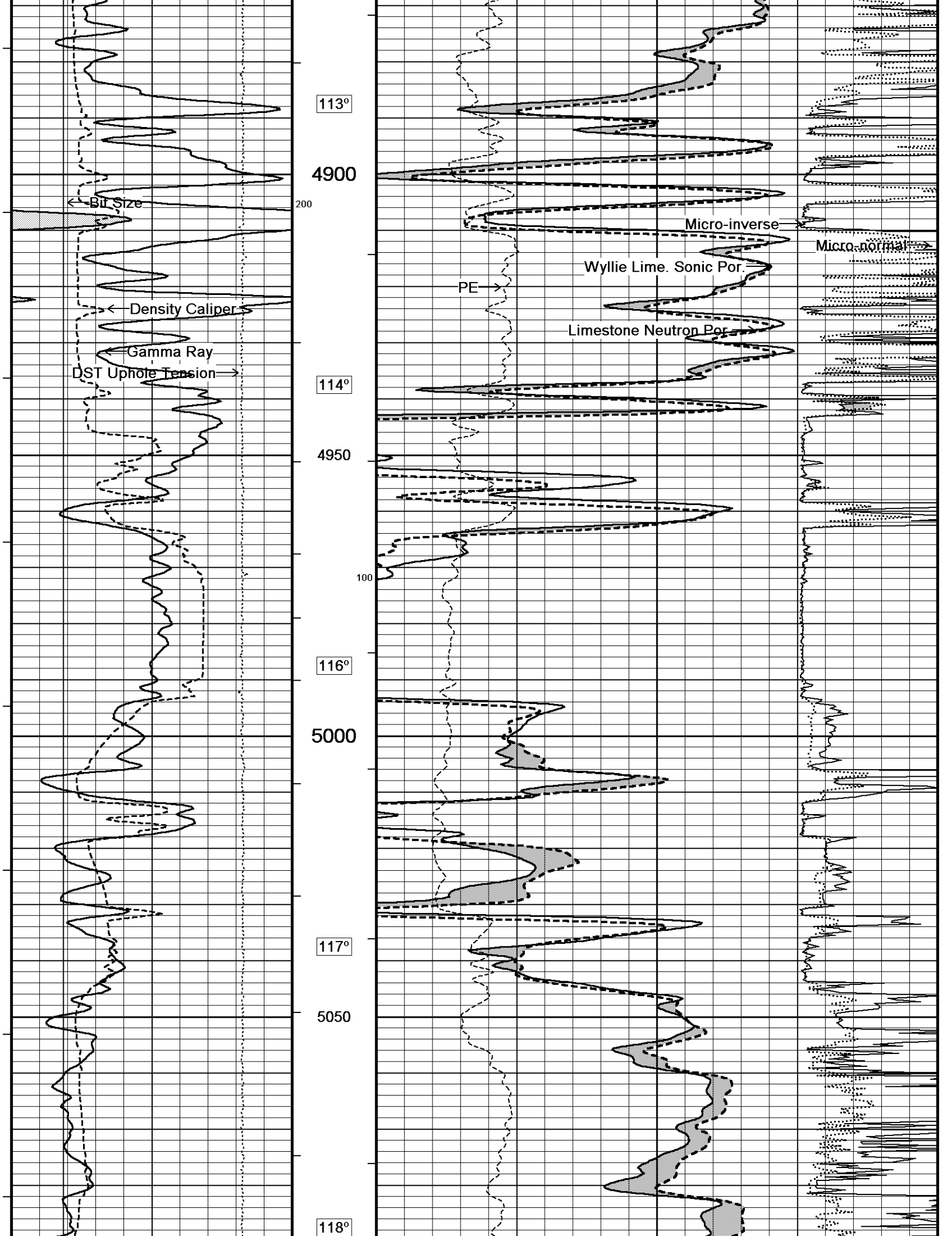

107°
3800
600
107°
3850
108°
3900
108°
3950
108°

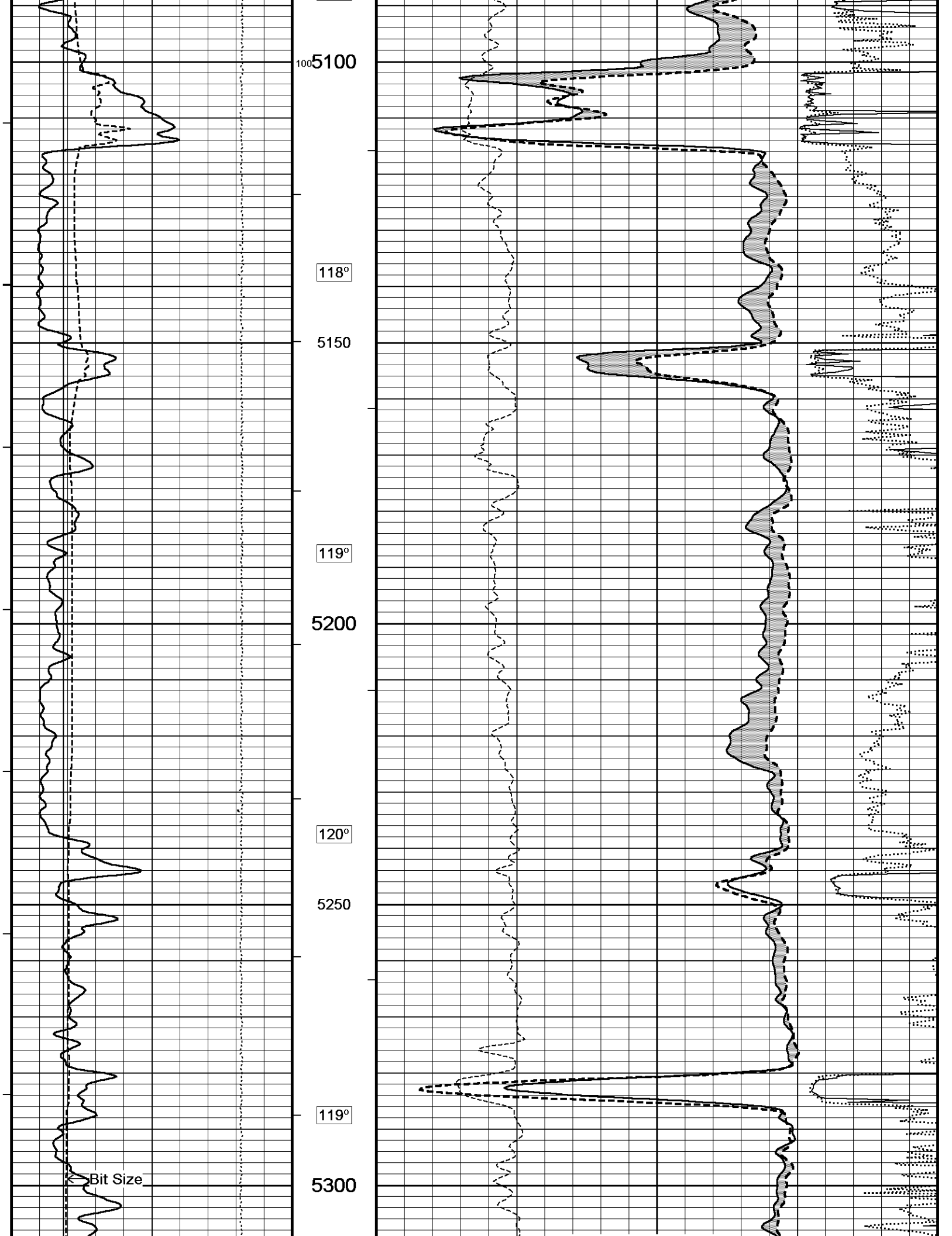

4000
109°
300
4050
109°
500
4100
Bit Size
Micro-normal
Wyllie Lime. Sonic Por.
PE
Density Caliper
109°
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
4150
109°
4200

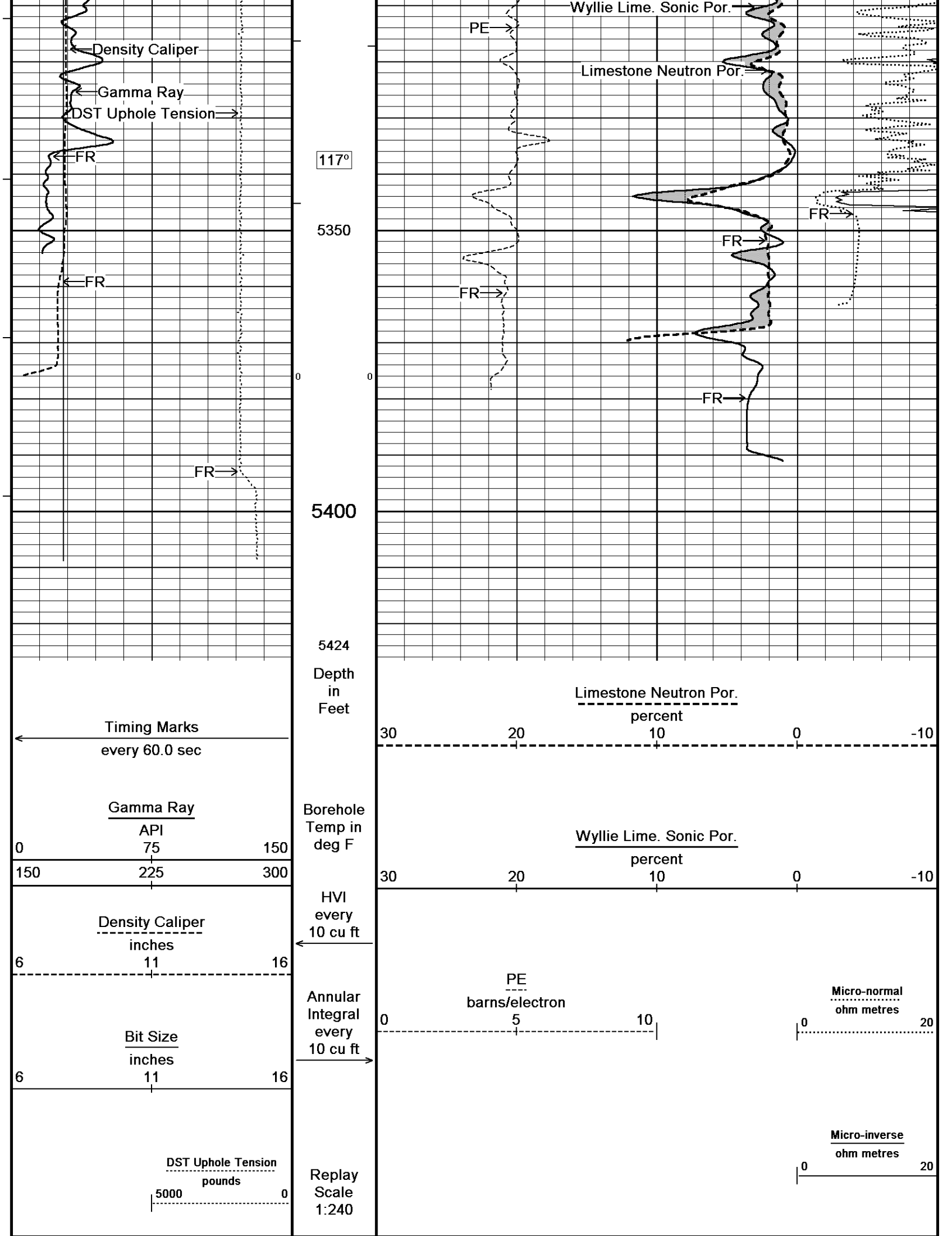

110°
4250
110°
4300
110°
4350
400
111°
4400


111°
4450
112°
4500
Bit Size
Micro-normal
Wyllie Lime. Sonic Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
112°
DST Uphole Tension
200
4550
112°
4600
113°


300
4650
113°
4700
113°
4750
113°
4800
113°
4850


113°
4900
200
Bit Size
Micro-inverse
Micro-normal
Wyllie Lime. Sonic Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
114°
4950
100
116°
5000
117°
5050
118°


100
5100
118°
5150
119°
5200
120°
5250
119°
Bit Size
5300


Density Caliper
Gamma Ray
DST Uphole Tension
FR
FR
FR
PE
Wyllie Lime. Sonic Por.
Limestone Neutron Por.
FR
FR
FR
FR
117°
5350
0
0
5400
5424
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
Wyllie Lime. Sonic Por.
percent
30 20 10 0 -10
PE
barns/electron
0 5 10
Micro-normal
ohm metres
0 20
Micro-inverse
ohm metres
0 20

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-APR-2014 22:44
Filename: C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_003.dta — Recorded on 04-APR-2014 17:54
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH MAIN

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_003.dta

General Constants All 000

Last Edited on 04-APR-2014,16:49

General Parameters		
Mud Resistivity	0.480	ohm-metres
Mud Resistivity Temperature	84.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	5.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. 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 18-MAR-2014 09:04

Reading No	Measured	Calibrated (lbs)
1	15374.81	0.00
2	15847.36	399.00

Gamma Calibration MCG-C 150

Field Calibration on 04-APR-2014 11:36

	Measured	Calibrated (API)
Background	70	48
Calibrator (Gross)	1142	773
Calibrator (Net)	1071	725

Gamma Constants MCG-C 150

Last Edited on 04-APR-2014,15:46

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 04-APR-2014,15:47

Pre-filter Length	11

Caliper Calibration MMR-C.A 248

Base Calibration on 24-MAR-2014 11:12
Field Calibration on 01-APR-2014 09:23

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)
8.00	7.97

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

Base Calibration on 24-MAR-2014 11:03
Field Check on 01-APR-2014 09:24

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	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 04-APR-2014 11:42

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)	
	1718	2552
Ratio	0.674	

Neutron Constants MDN-B.J 387

Last Edited on 04-APR-2014,15:46

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 04-APR-2014 11:19

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	951.2	126.8
Base Check		281.7
Field Check		281.6

FE Constants MFE-A.A 55

Last Edited on 04-APR-2014,15:45

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 04-APR-2014,15:45

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	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

Induction Calibration MAI-A.A 5

Base Calibration on 21-JAN-2014,09:50
Field Check on 03-APR-2014 14:51

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) 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) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1	13.7	3863.6	13.6	3863.5
2	31.5	3592.9	31.4	3592.8
3	29.7	2973.4	29.7	2973.5
4	20.8	2127.8	20.8	2127.8
Deep	18.3	1913.7	18.4	1913.7
Medium	43.0	3863.9	43.0	3864.1
Shallow	46.8	5375.4	46.7	5375.3
Array Temperature	47.7		47.5	Deg F

Induction Constants MAI-A.A 5

Last Edited on 04-APR-2014,15:45

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 02-APR-2014 14:29

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)
7.94	7.97

Photo Density Calibration MPD-D.A 480

Base Calibration on 02-APR-2014 14:48
Field Check on 02-APR-2014 14:55

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

1276.2	1470.6

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

239.9	1140.2

Density Constants MPD-D.A 480

Last Edited on 04-APR-2014,15:46

Density Source Id	P50557B	
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 (m)
2.71	
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

0.00	0.00
0.00	0.00
0.00	0.00

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\Berexco Elnora #2-20\Berexco Elnora #2-20_003.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: 2.240 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

56.02 ft	GRGC - Gamma Ray
53.11 ft	CGXT - MCG External Temperature
45.76 ft	MINV - MMR MicroLog Inverse
45.76 ft	MNRL - MMR MicroLog Normal
40.97 ft	NPRL - Limestone Neutron Por.
33.73 ft	CLDC - Density Caliper
33.73 ft	AVOL - Annular Volume
33.73 ft	HVOL - Hole Volume
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	SPRL - Wyllie Lime. Sonic Por.
12.96 ft	DT35 - 3-5' Compensated Sonic
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	RTAO - Array Ind. One Res Rt
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	BEREXCO LLC.
WELL	ELNORA #2-20
FIELD	WILDCAT
PROVINCE/COUNTY	FINNEY
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2941.00	feet	First Reading	5380.00	feet

Elevation Drill Floor	2939.00	feet	Depth Driller	5400.00	feet
Elevation Ground Level	2928.00	feet	Depth Logger	5393.00	feet

Weatherford®

COMPENSATED NEUTRON
SONIC POROSITY
OVERLAY