Weatherford

COMPENSATED NEUTRON SONIC POROSITY OVERLAY

COMPANY	SHAKESPEARE OIL CO., INC.
WELL	JANZEN #5-36
FIELD	CAPSTONE EAST
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	400' FSL & 650' FWL

SEC	TWP	RGE	Other Services
36	16S	34W	

Latitude
Longitude
API Number 15-171-21042

Permanent Datum GL, Elevation 3104 feet
Log Measured From KB
Drilling Measured From KB

Elevations:	feet
KB	3114.00
DF	3112.00
GL	3104.00

Date	05-APR-2014		
Run Number	ONE		
Service Order	3487-83878012		
Depth Driller	4866.00 feet		
Depth Logger	4865.00 feet		
First Reading	4852.00 feet		
Last Reading	3800.00 feet		
Casing Driller	268.00 feet		
Casing Logger	264.00 feet		
Bit Size	7.875 inches		
Hole Fluid Type	CHEMICAL		
Density / Viscosity	9.20 lb/USg	50.00 CP	
PH / Fluid Loss	10.00	8.80 ml/30Min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.38 @ 81.0 ohm-m		
Rmf @ Measured Temp	0.30 @ 81.0 ohm-m		
Rmc @ Measured Temp	0.46 @ 81.0 ohm-m		
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.28 @110.0 ohm-m		
Time Since Circulation	5 HOURS		
Max Recorded Temp	110.00 deg F		
Equipment / Base	13244	LIB	
Recorded By	ADAM SILL		
Witnessed By	TIM PRIEST		
JOB #	LB14-101		

BOREHOLE RECORD

Last Edited: 05-APR-2014 03:46

Bit Size inches	Depth From feet	Depth To feet
7.875	268.00	4866.00

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: 2169 CU.FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 3800 FEET: 193 CU.FT.

- RIG: H-D DRILLING #2.

- 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.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-APR-2014 08:34

Filename: C:\Minimus 13.08.2113\Logs\Shakespeare Janzen #5-36\Shakespeare Janzen #5-36_002.dta — Recorded on 05-APR-2014 05:57

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

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

Depth in Feet

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

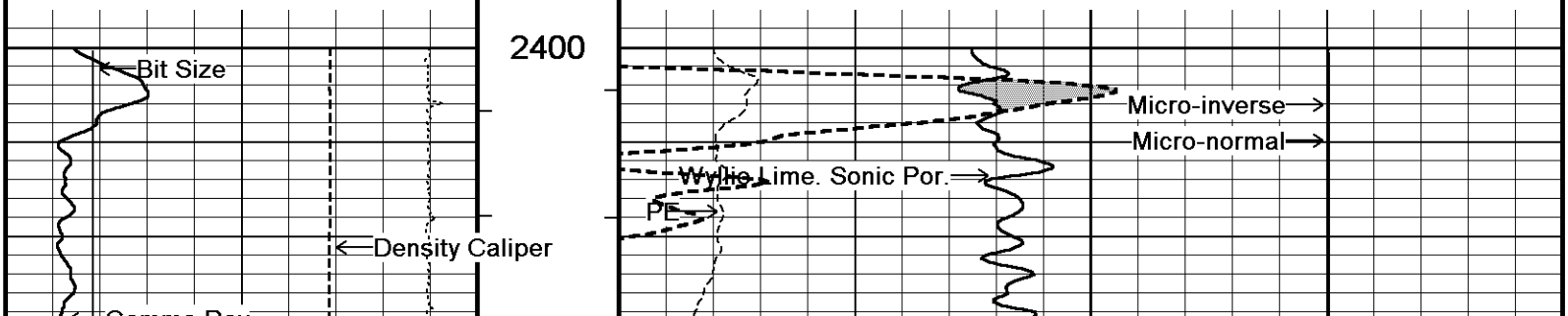
Wyllie Lime. Sonic Por.
percent
30 20 10 0 -10

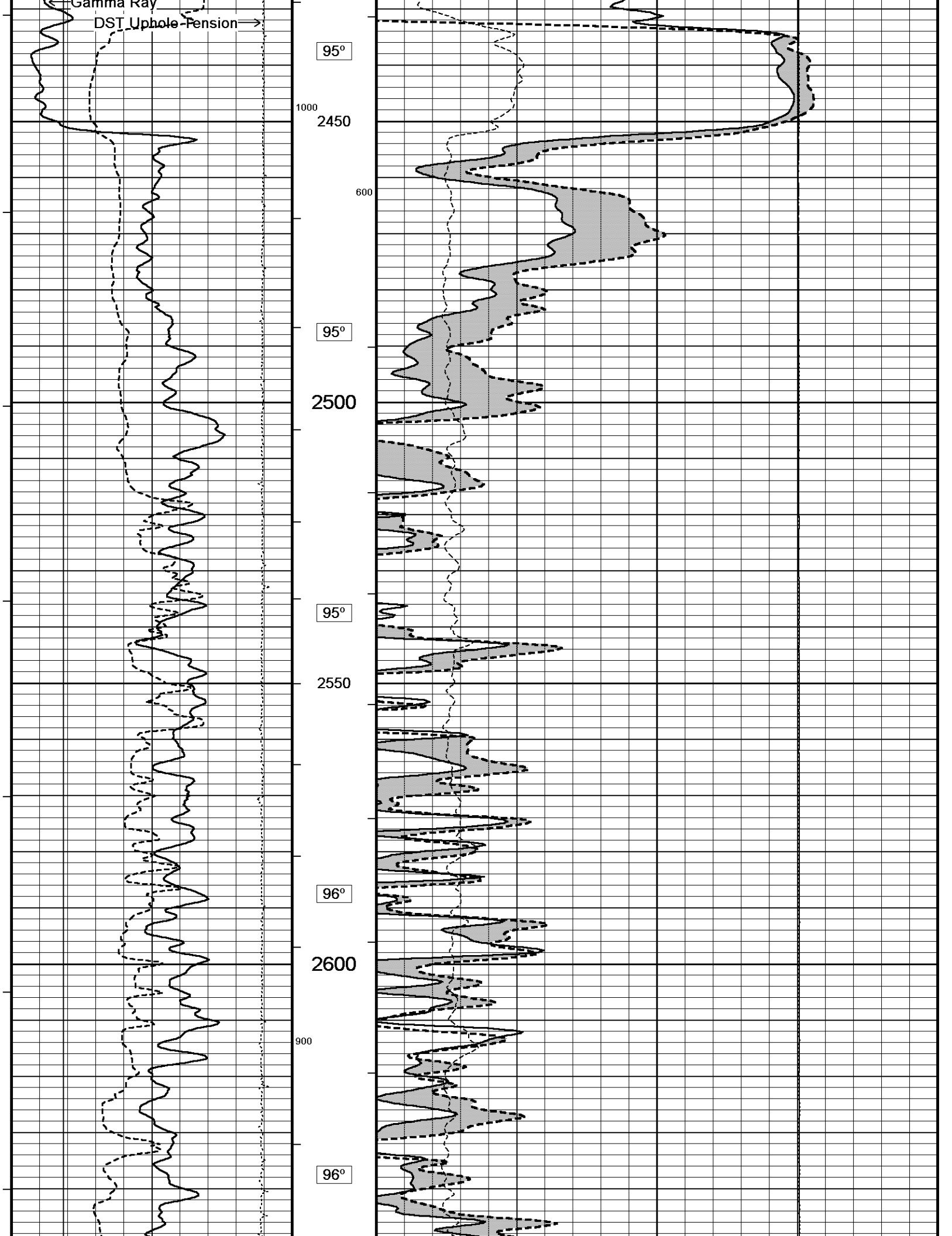
PE
barns/electron
0 5 10

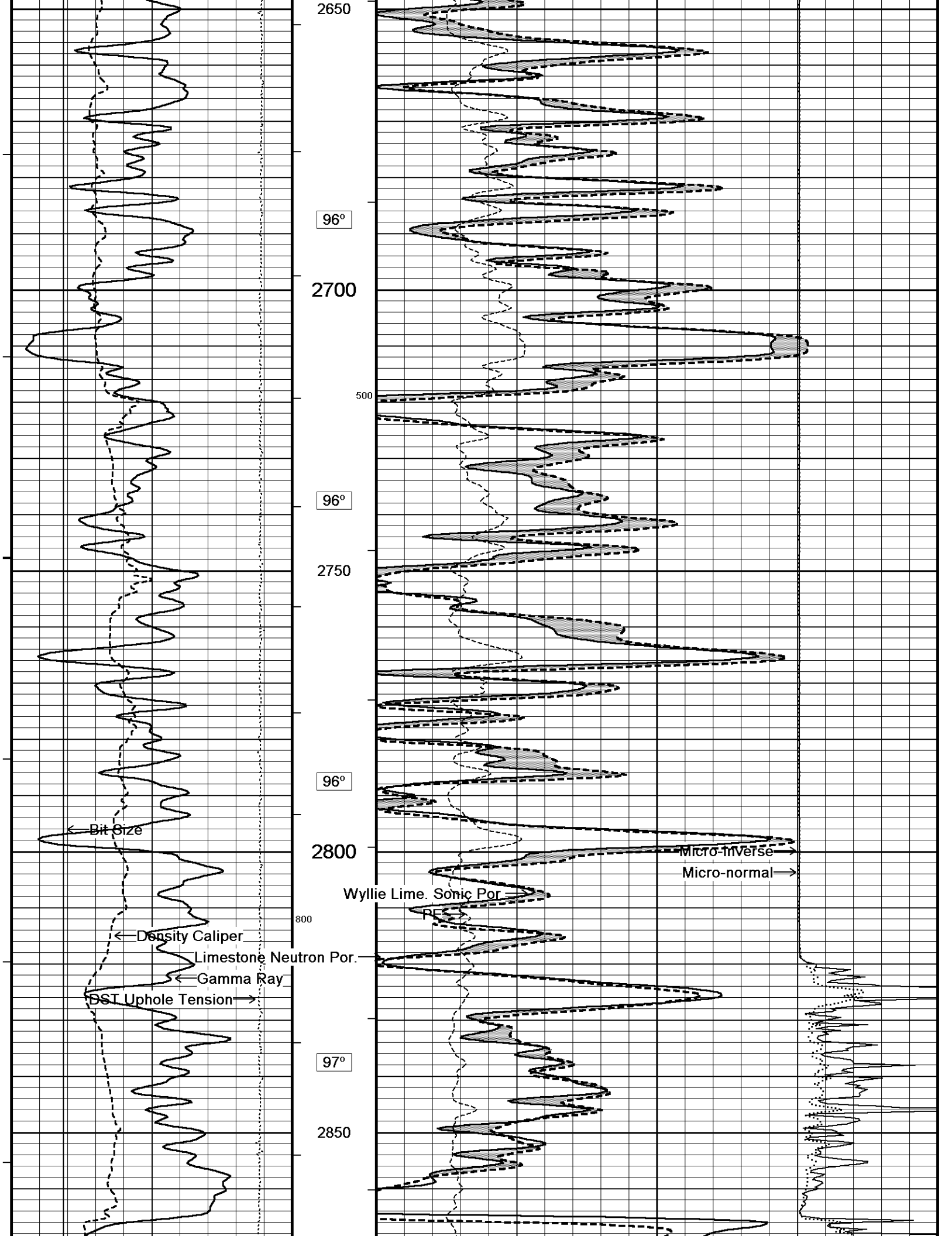
Micro-normal
ohm metres
0 20

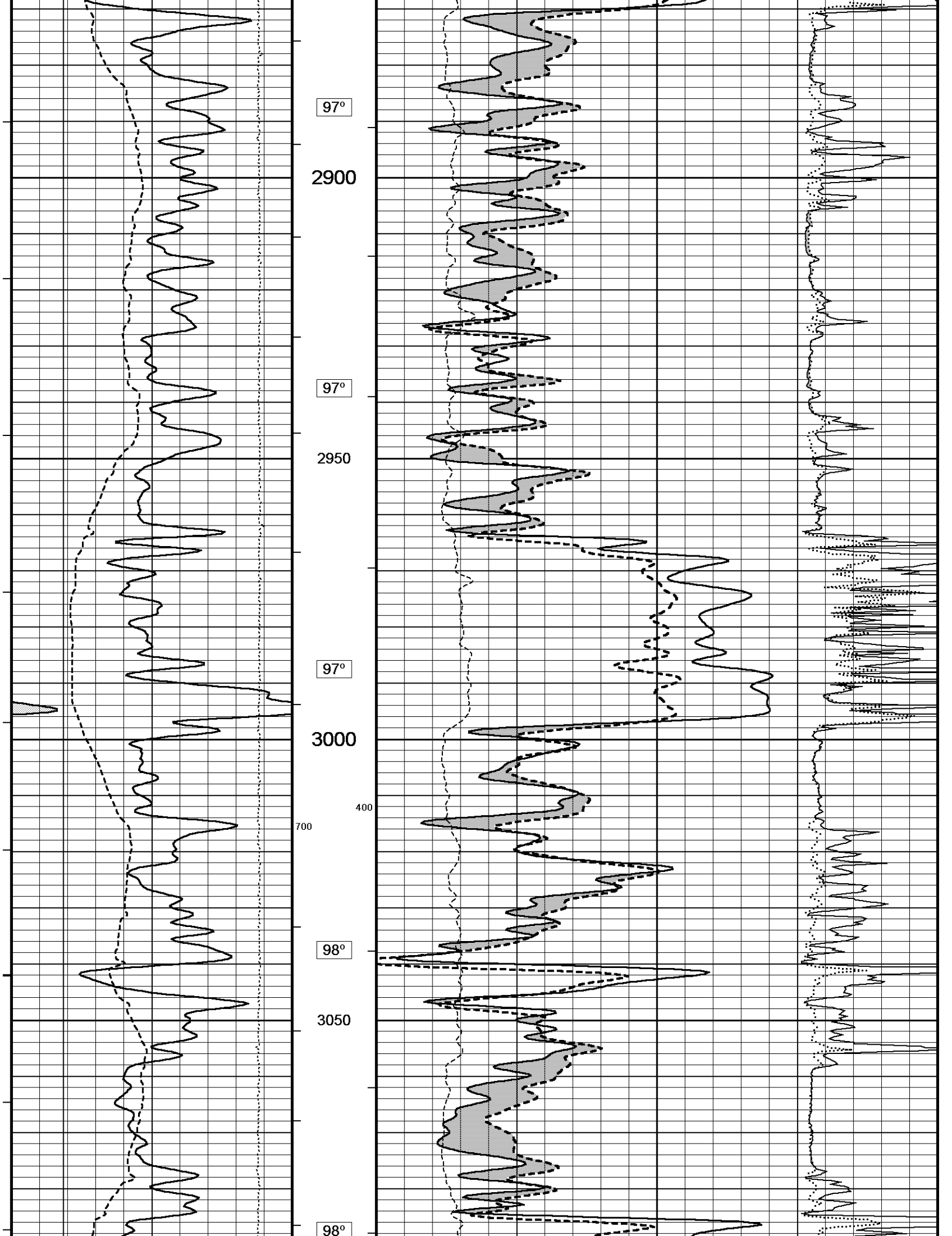
Micro-inverse
ohm metres
0 20

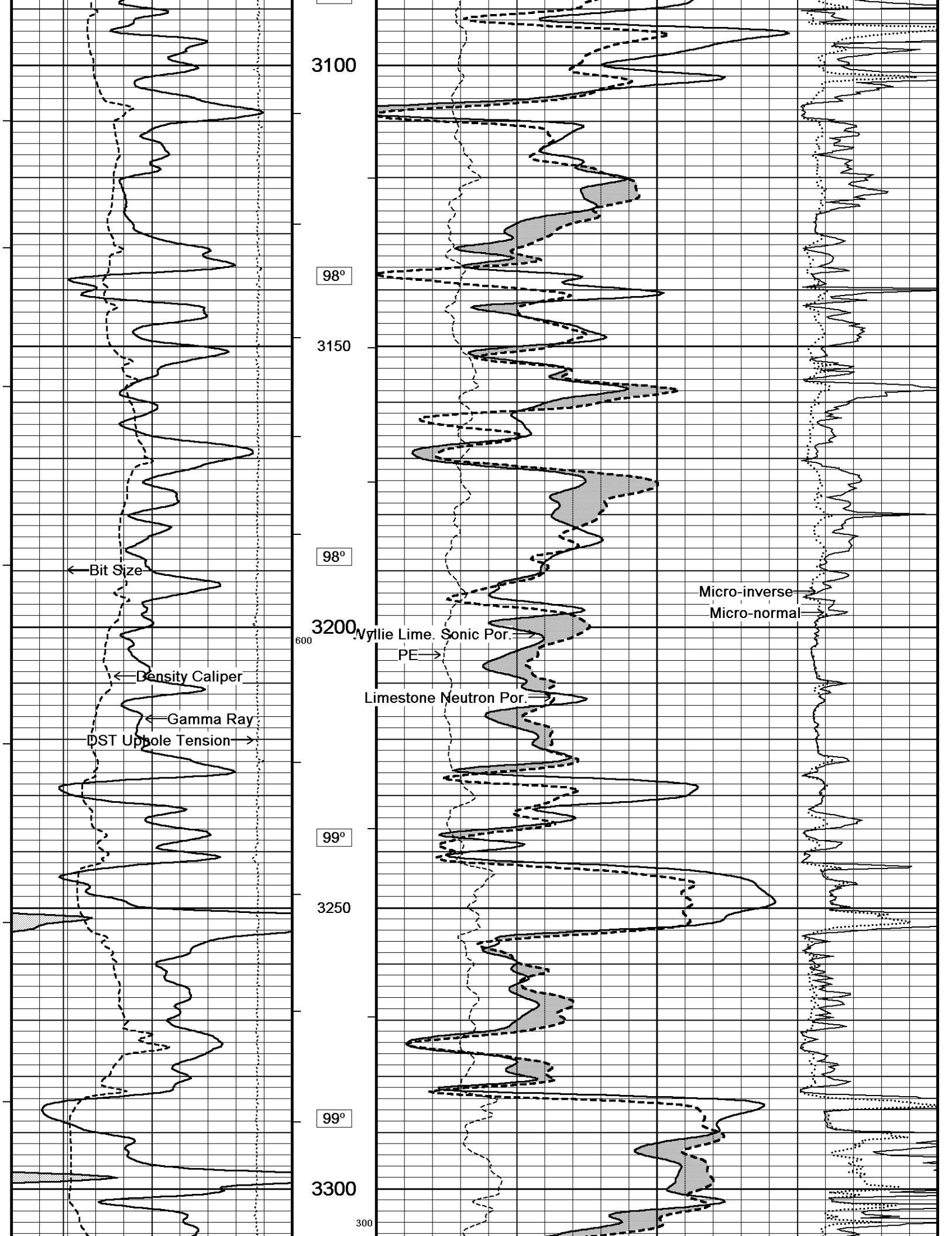
2400

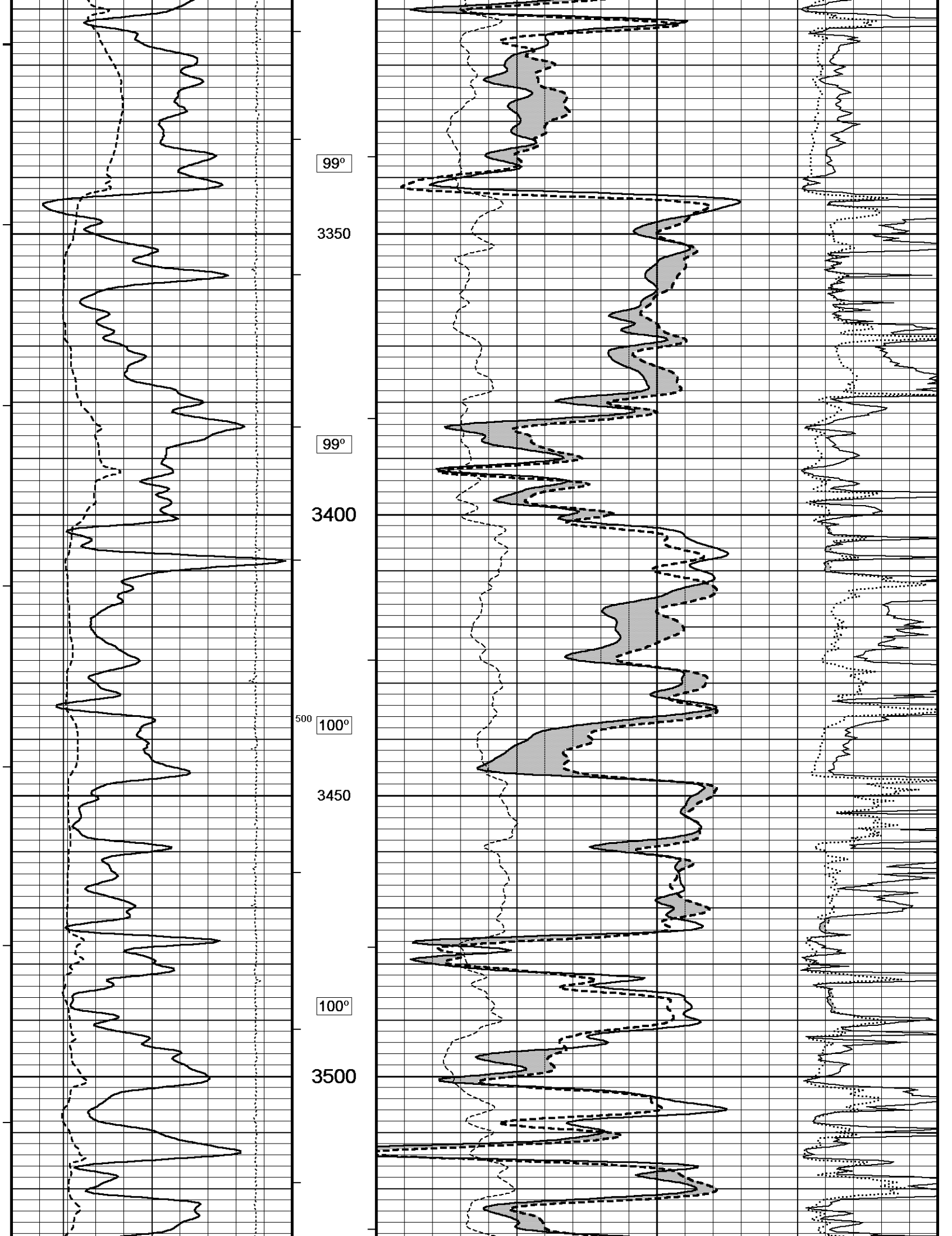


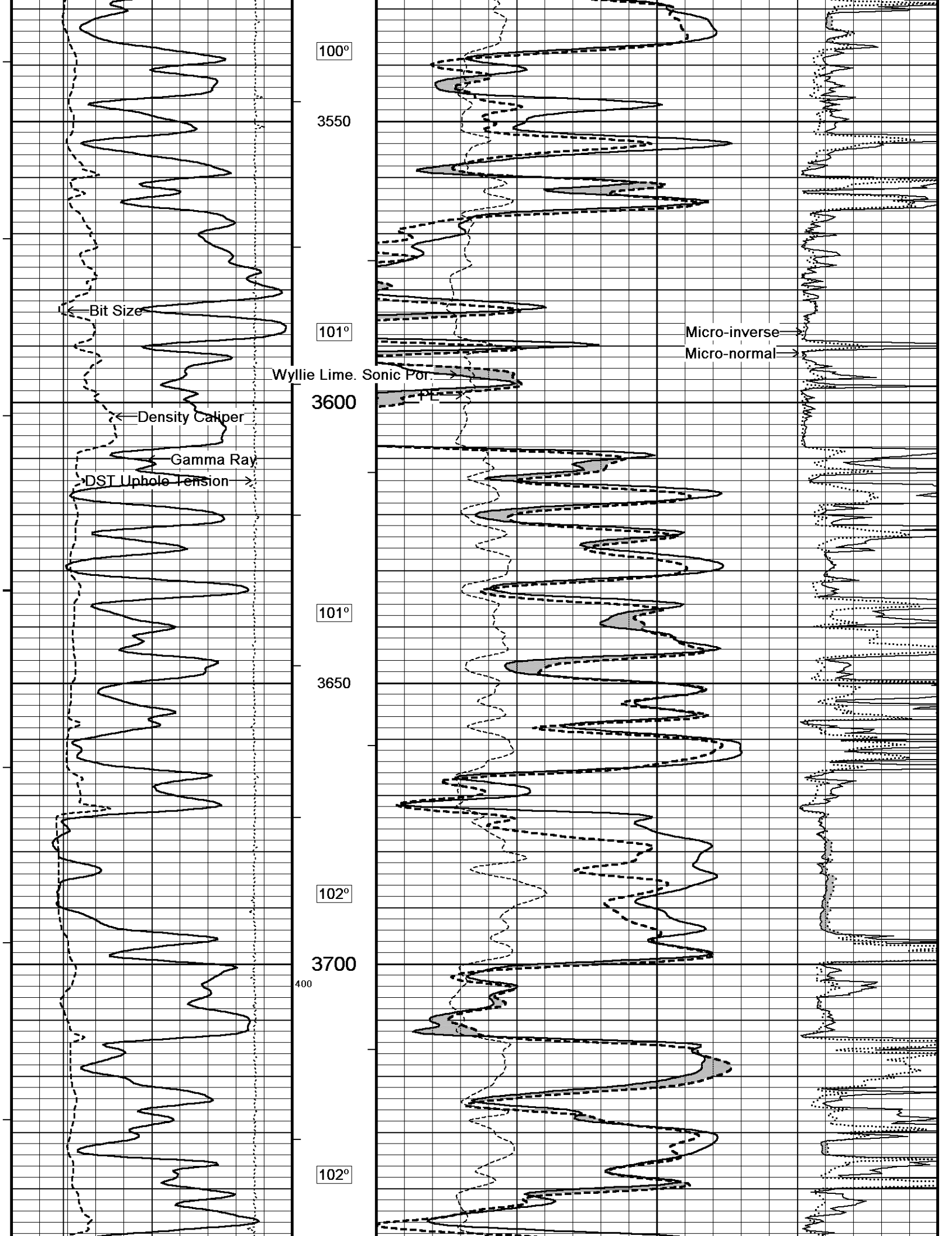

←Gamma Ray
DST Uphole Tension→
95°
1000
2450
600
95°
2500
95°
2550
96°
2600
900
96°

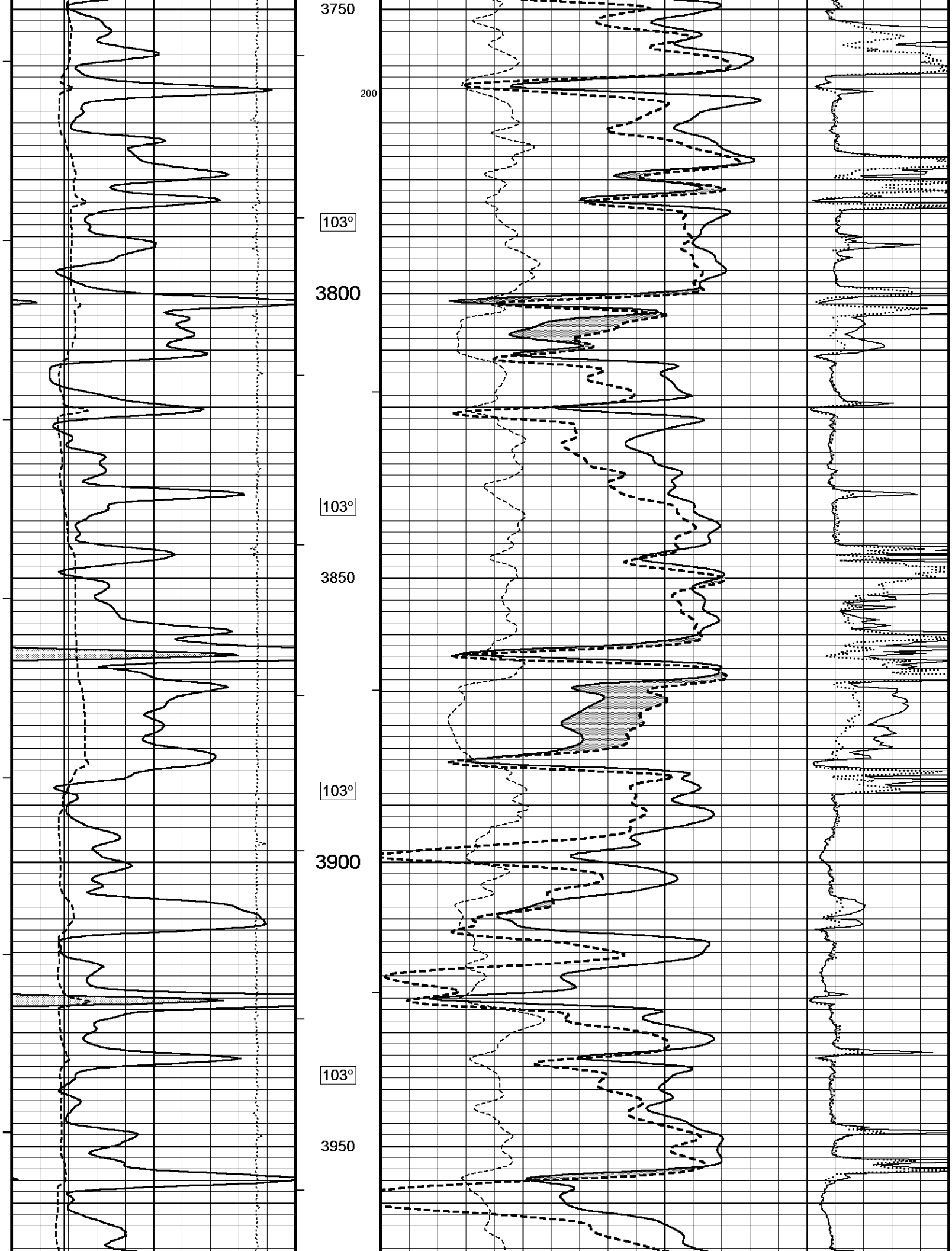

2650
96°
2700
500
96°
2750
96°
← Bit Size
2800
Micro-inverse →
Micro-normal →
Wyllie Lime. Sonic Por.
800
← Density Caliper
Limestone Neutron Por. →
← Gamma Ray
DST Uphole Tension →
97°
2850

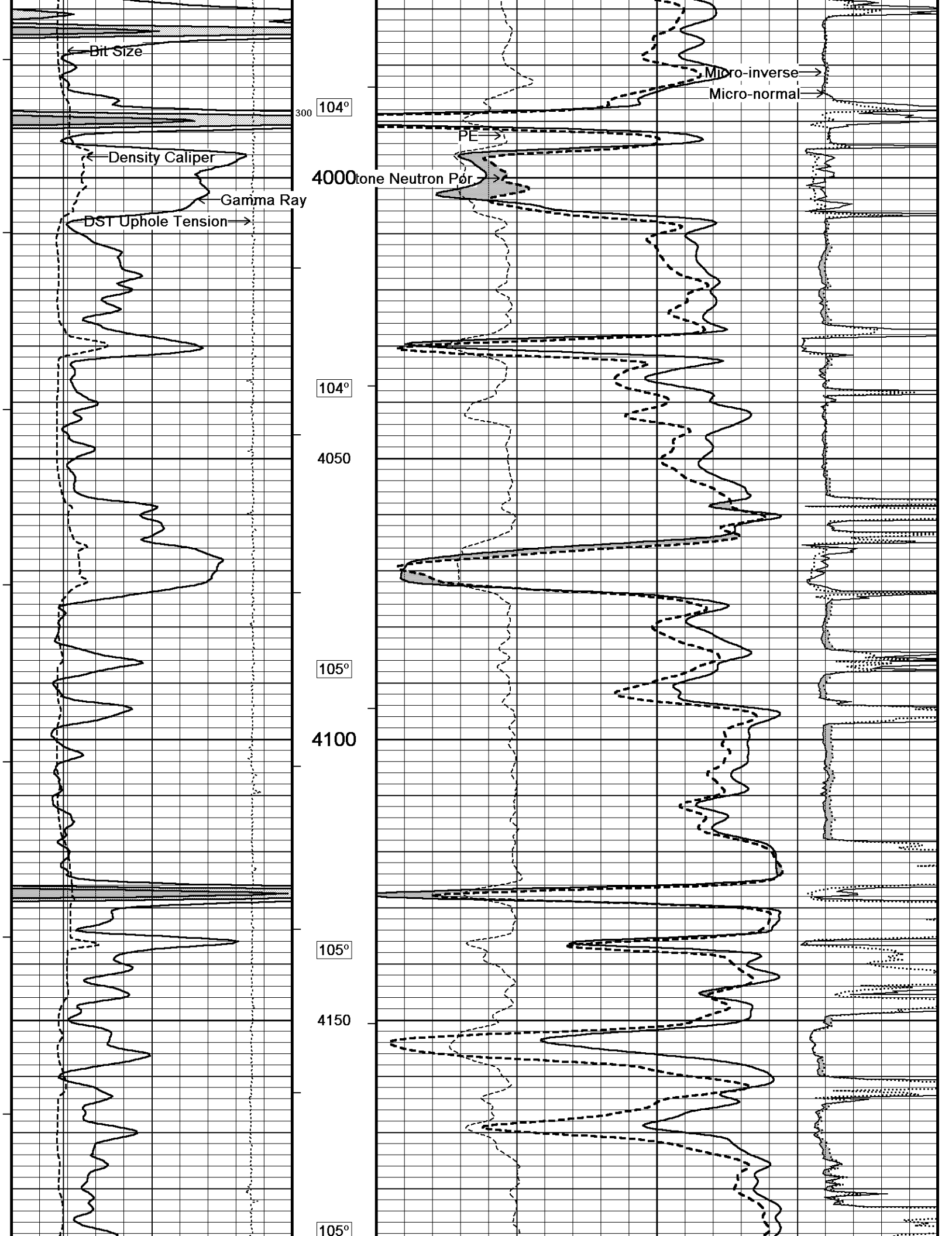

97°
2900
97°
2950
97°
3000
700
400
98°
3050
98°

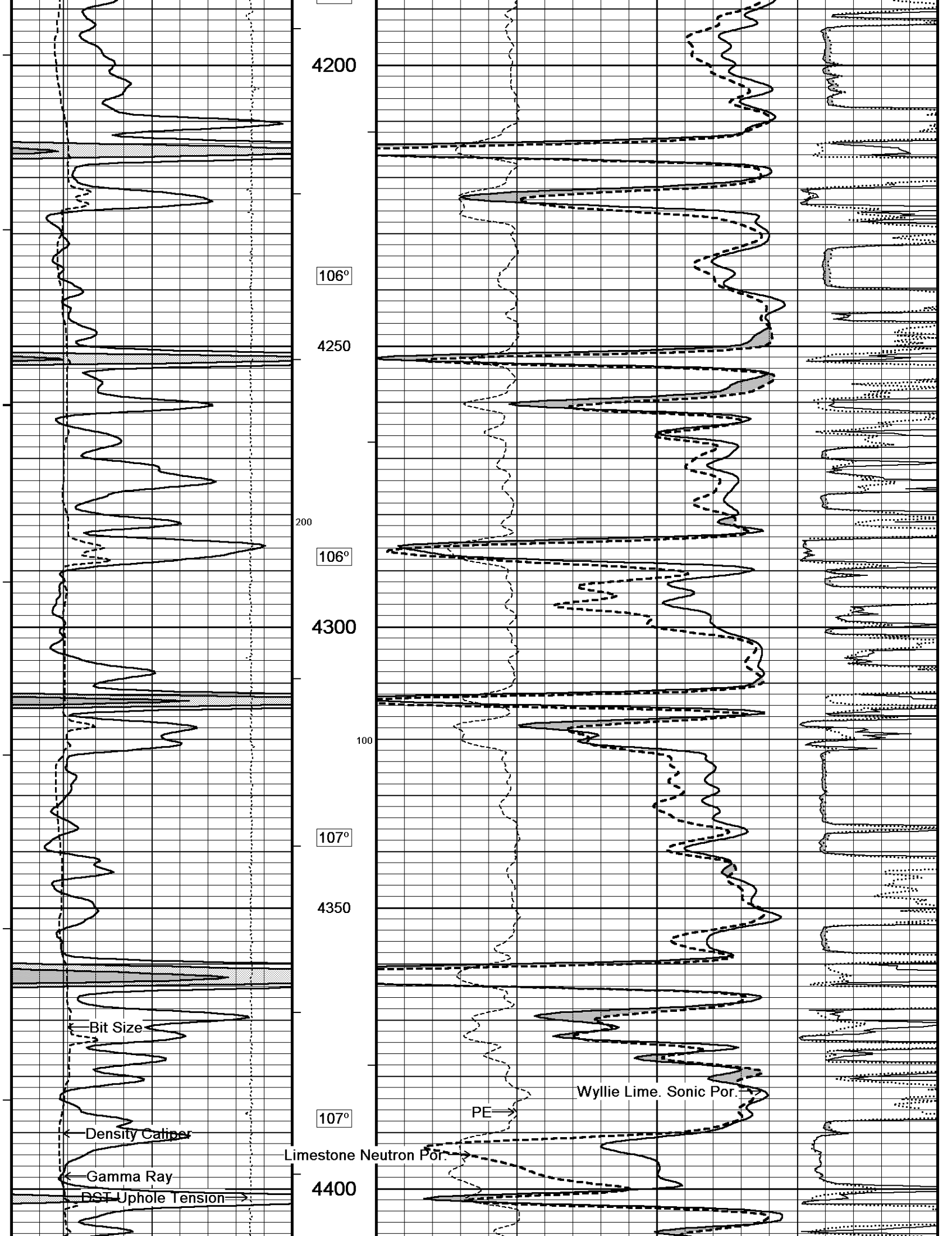

3100
98°
3150
98°
Bit Size
3200
600
Nyllie Lime. Sonic Por.
PE
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
99°
3250
99°
3300
300
Micro-inverse
Micro-normal

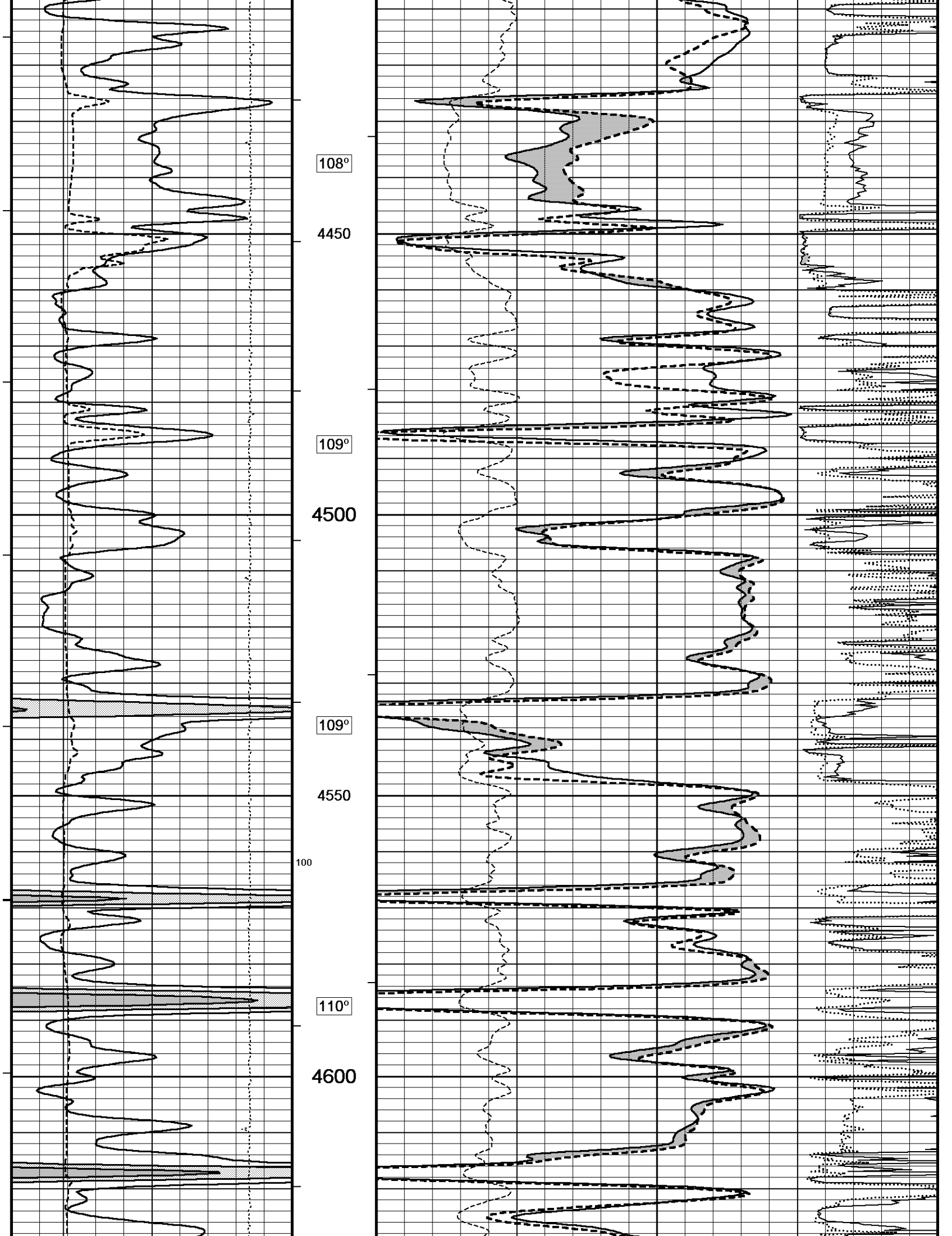

99°
3350
99°
3400
500
100°
3450
100°
3500

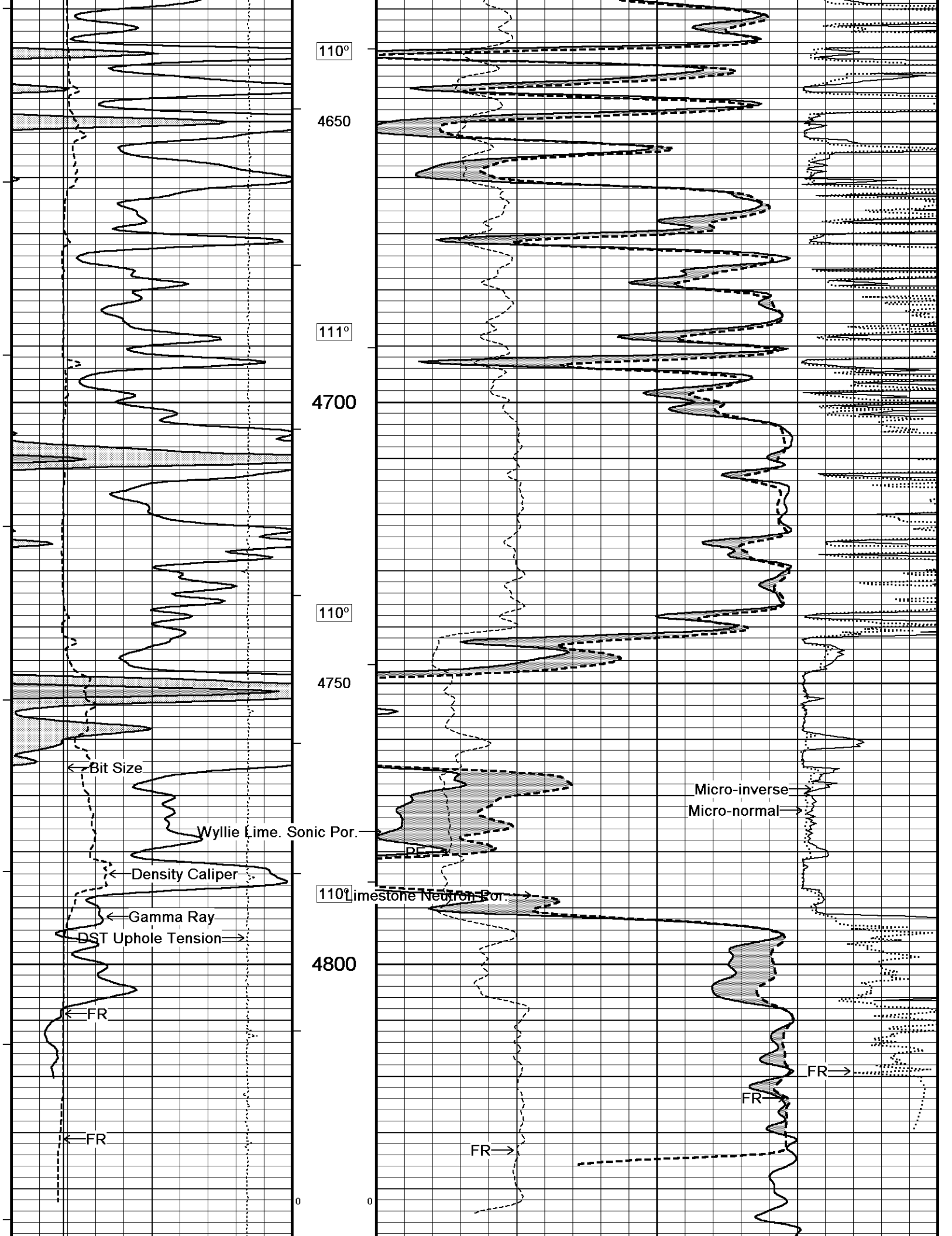

100°
3550
Bit Size
101°
Micro-inverse
Micro-normal
Wyllie Lime. Sonic Por.
PL
3600
Density Caliper
Gamma Ray
DST Uphole Tension
101°
3650
102°
3700
400
102°

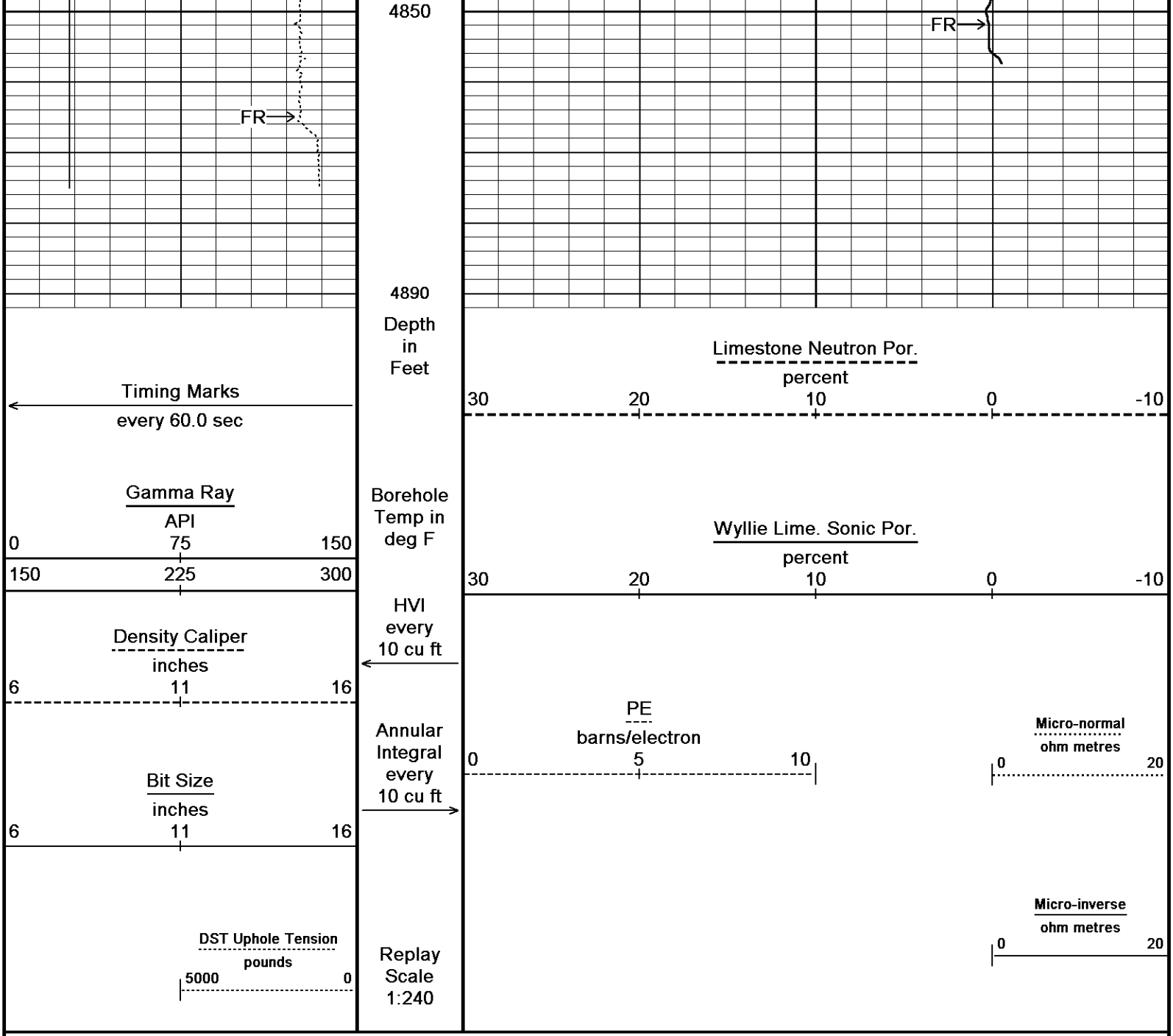

3750
200
103°
3800
103°
3850
103°
3900
103°
3950


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
300
104°
4000
104°
4050
105°
4100
105°
4150
105°
PE
tone Neutron Por
Micro-inverse
Micro-normal


4200
106°
4250
200
106°
4300
100
107°
4350
Bit Size
Wyllie Lime. Sonic Por.
PE
107°
Density Caliper
Limestone Neutron Por.
Gamma Ray
4400
DST Uphole Tension


108°
4450
109°
4500
109°
4550
100
110°
4600


110°
4650
111°
4700
110°
4750
Bit Size
Wyllie Lime. Sonic Por.
Density Caliper
Limestone Neutron Por.
Gamma Ray
DST Uphole Tension
4800
FR
FR
Micro-inverse
Micro-normal
FR
FR
FR
0
0



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 05-APR-2014 08:34

Filename: C:\Minimus 13.08.2113\Logs\Shakespeare Janzen #5-36\Shakespeare Janzen #5-36_002.dta — Recorded on 05-APR-2014 05:57

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH MAIN

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\Shakespeare Janzen #5-36\Shakespeare Janzen #5-36_002.dta

General Constants All 000 — Last Edited on 05-APR-2014,05:06

General Parameters		
Mud Resistivity	0.380	ohm-metres
Mud Resistivity Temperature	81.000	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 05-APR-2014,03:48

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 05-APR-2014,03:48

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 05-APR-2014,03:48

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 05-APR-2014,03:47

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

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

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 05-APR-2014,03:47

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 Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) 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	WS	Measured WH	Measured Ratio	Calibrated 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	

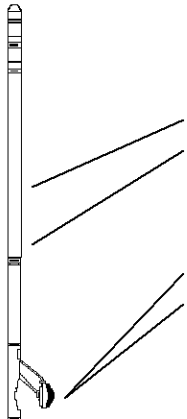
DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\Shakespeare Janzen #5-36\Shakespeare Janzen #5-36_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



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

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

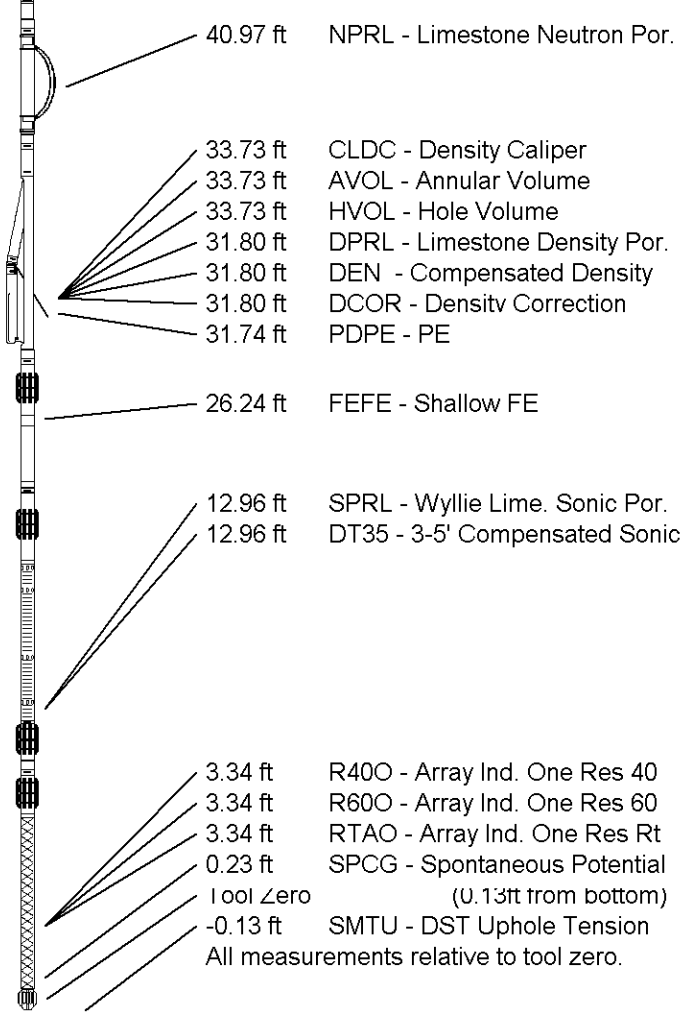
Compact Density/Caliper
MPD-D.A 480 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

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



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	SHAKESPEARE OIL CO., INC.
WELL	JANZEN #5-36
FIELD	CAPSTONE EAST
PROVINCE/COUNTY	SCOTT
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3114.00	feet	First Reading	4852.00	feet
Elevation Drill Floor	3112.00	feet	Depth Driller	4866.00	feet
Elevation Ground Level	3104.00	feet	Depth Logger	4865.00	feet

Weatherford®

COMPENSATED NEUTRON
SONIC POROSITY
OVERLAY