



Weatherford[®]

ARRAY INDUCTION
COMPACT DENSITY / NEUTRON
MICROLOG / SONIC

COMPANY

TAOS RESOURCES OPERATING CO.

WELL

WEST MADDIX UNIT #20 SWD

FIELD

MADDIX NORTH

PROVINCE/COUNTY

COWLEY

COUNTRY/STATE

USA / KANSAS

LOCATION

2310' FSL & 3300' FEL OF C-NE-NE-SE

SEC 3

TWP 33S

RGE 5E

Other Services

NONE

API NUMBER

15-035-24548

Permanent Datum GL, Elevation 1276 feet

Log Measured From KB

Drilling Measured From KB

Date

29-DEC-2013

Run Number

ONE

Service Order

3546089

Depth Driller

4100.00 feet

Depth Logger

4100.00 feet

First Reading

4097.00 feet

Last Reading

260.00 feet

Casing Driller

262.00 feet

Casing Logger

260.00 feet

Bit Size

7.875 inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.80 lb/USg 44.00 CP

PH / Fluid Loss

9.00 9.20 ml/30Min

Sample Source

FLOWLINE

Rm @ Measured Temp

1.60 @ 74.0 ohm-m

Rmf @ Measured Temp

1.28 @ 74.0 ohm-m

Rmc @ Measured Temp

1.92 @ 74.0 ohm-m

Source Rmf / Rmc

CALC CALC

Rm @ BHT

1.07 @112.0 ohm-m

Time Since Circulation

5 HOURS

Max Recorded Temp

112.00 deg F

Equipment / Base

13379 OKC

Recorded By

J. MONROE

Witnessed By

S. BALL

Elevations:
KB 1286.00
DF 1284.00
GL 1276.00

BOREHOLE RECORD

Last Edited: 29-DEC-2013 18:46

Bit Size inches	Depth From feet	Depth To feet
7.875	262.00	4100.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	262.00	24.00

REMARKS

TOOLS RAN: MCG, MML, MDN, MPD, MFE, MSS, MAI RAN IN COMBINATION.

HARDWARE:
MAI: TWO 0.5 INCH STANDOFFS USED.
MFE: ONE 0.5 INCH STANDOFF USED.
MDN: DUAL NEUTRON BOW SPRINGS USED.
MPD: 8 INCH PROFILE PLATE USED.
MSS: THREE 0.5 INCH STANDOFFS USED.

2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY.
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

TOTAL HOLE VOLUME FROM TD TO SURFACE CASING = 1550 CU.FT.
ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = 925 CU.FT.

SERVICE ORDER # 3546089

RIG: VAI RIG #3

OPERATOR(S): D. TURNER, C. SANFORD

LATITUDE: 37.20688090
LONGITUDE: -96.86179372

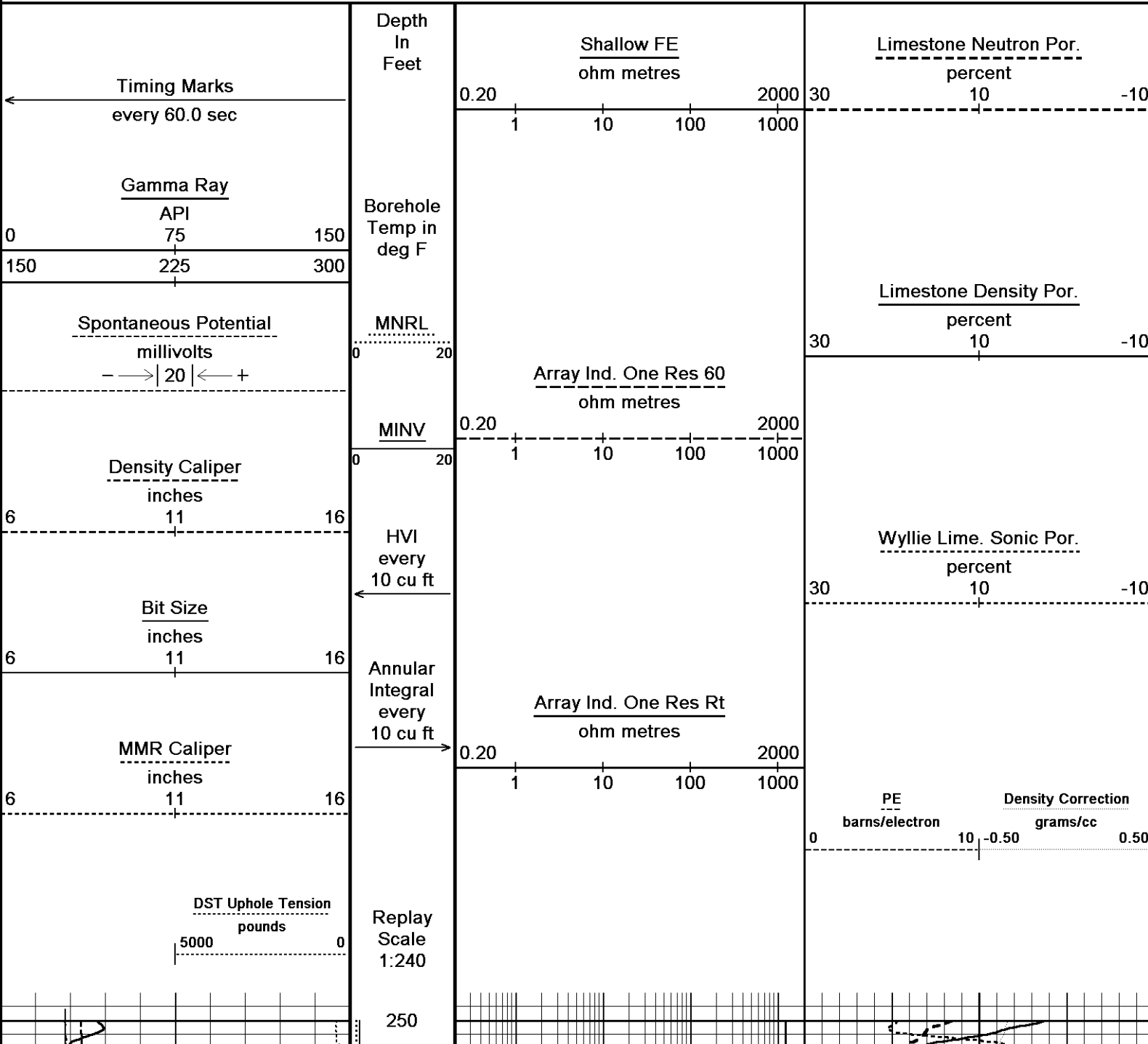
600' (3000'-3600') OF HIGH-RESOLUTION LOG WAS RUN AS PER CUSTOMER REQUEST.

HOLE WASHOUTS AND RUGOSITY WILL AFFECT LOG QUALITY AND REPEATABILITY.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.

5 INCH MAIN SECTION DSC

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 29-DEC-2013 23:53
Filename: C:\Program Files\Weatherford\WLS 13.06\DATA\TAOS R...WEST MADDIX UNIT_MAIN.dta
Recorded on 29-DEC-2013 20:51
System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804



Casing Shoe

78°

300

900

78°

350

79°

400

79°

Array Ind. One Res Rt

450 Array Ind. One Res 60

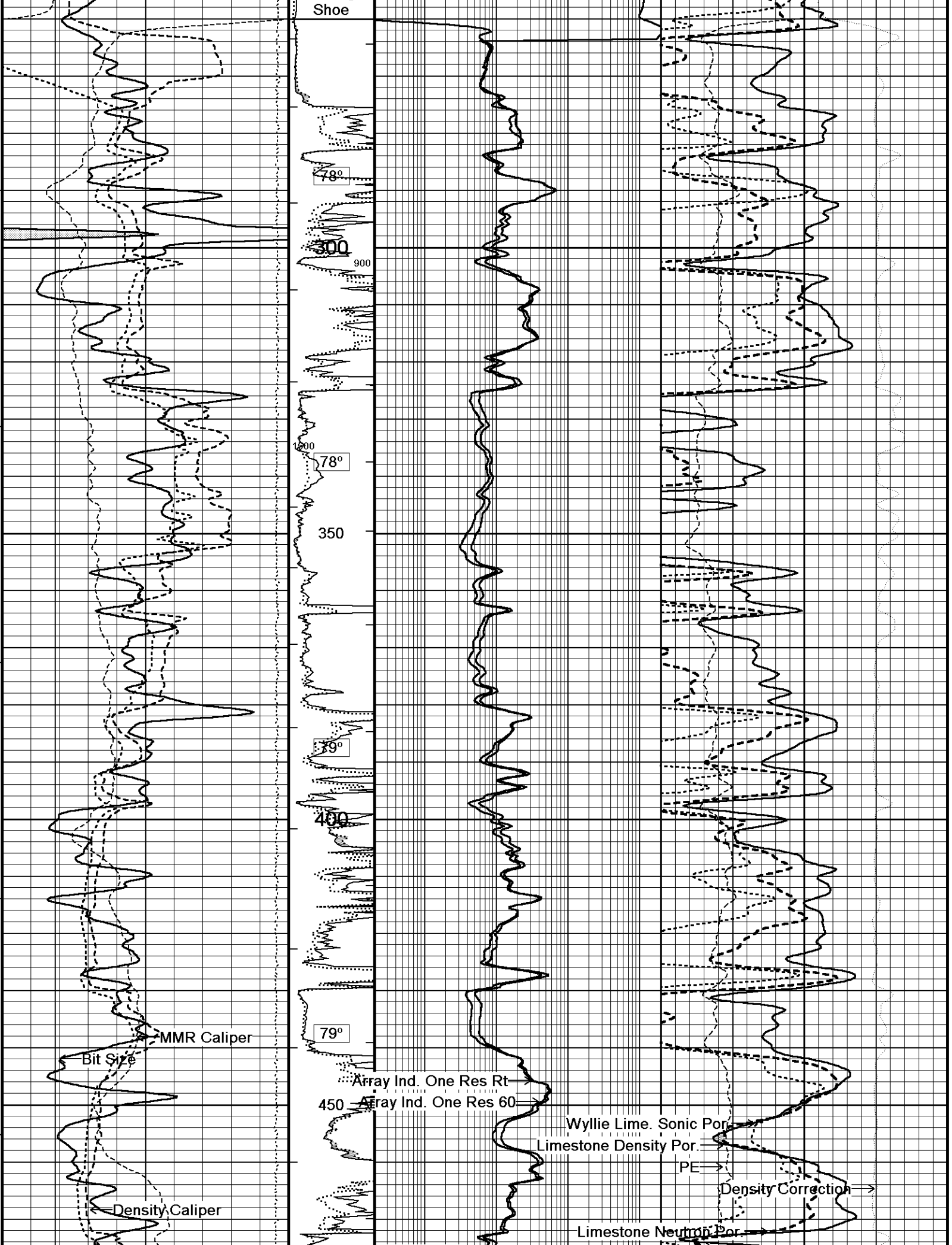
Wyllie Lime. Sonic Por

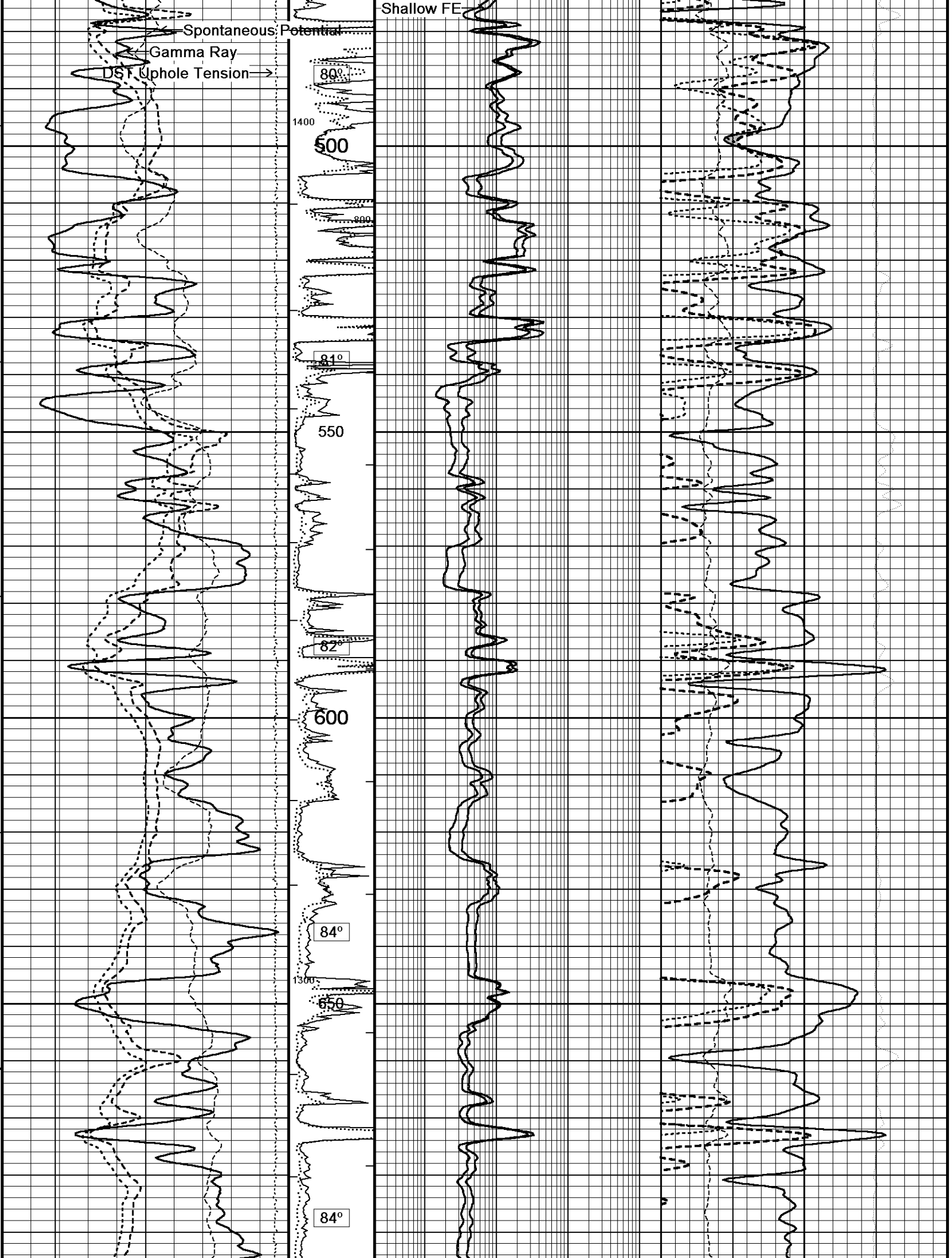
Limestone Density Por

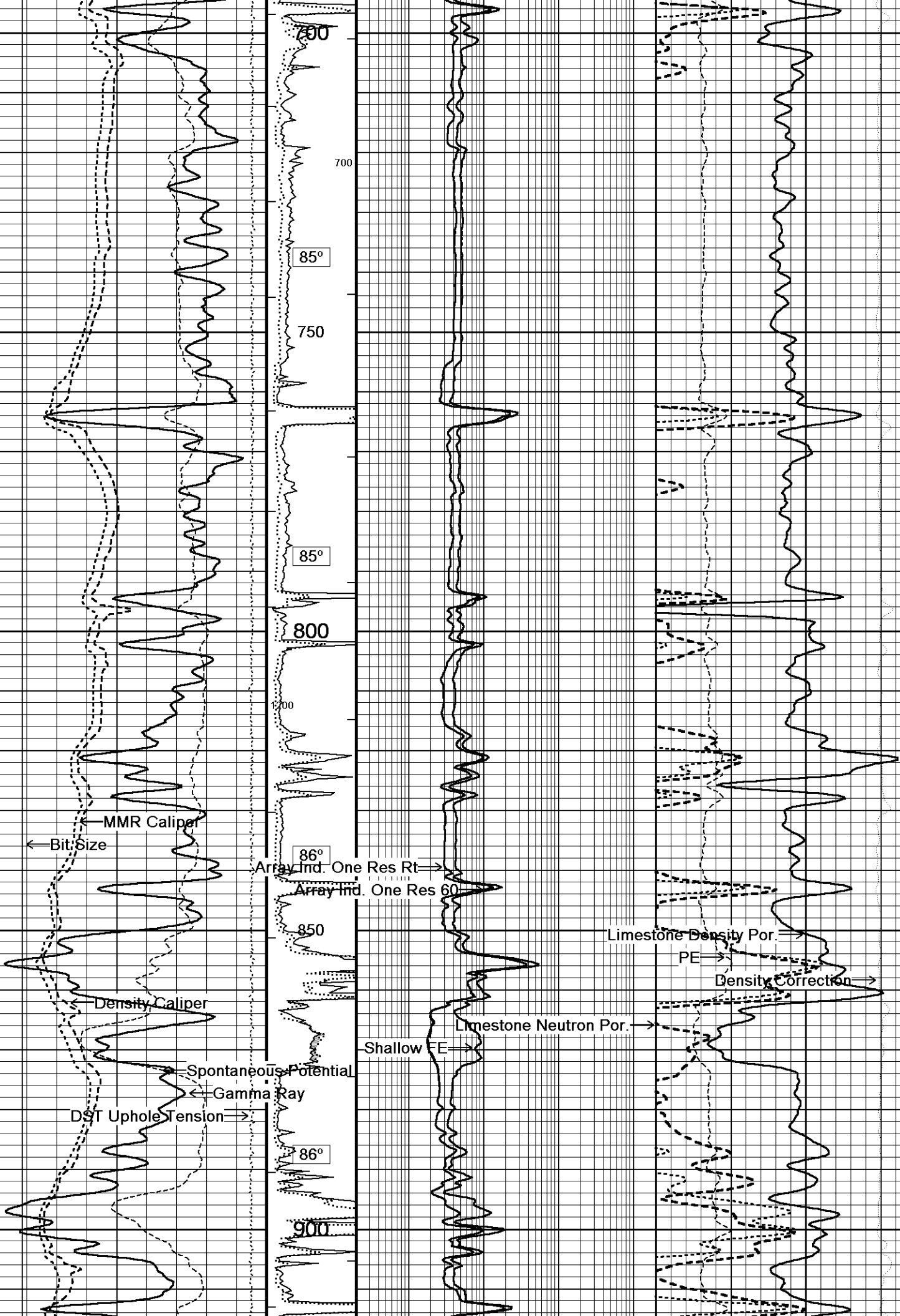
PE

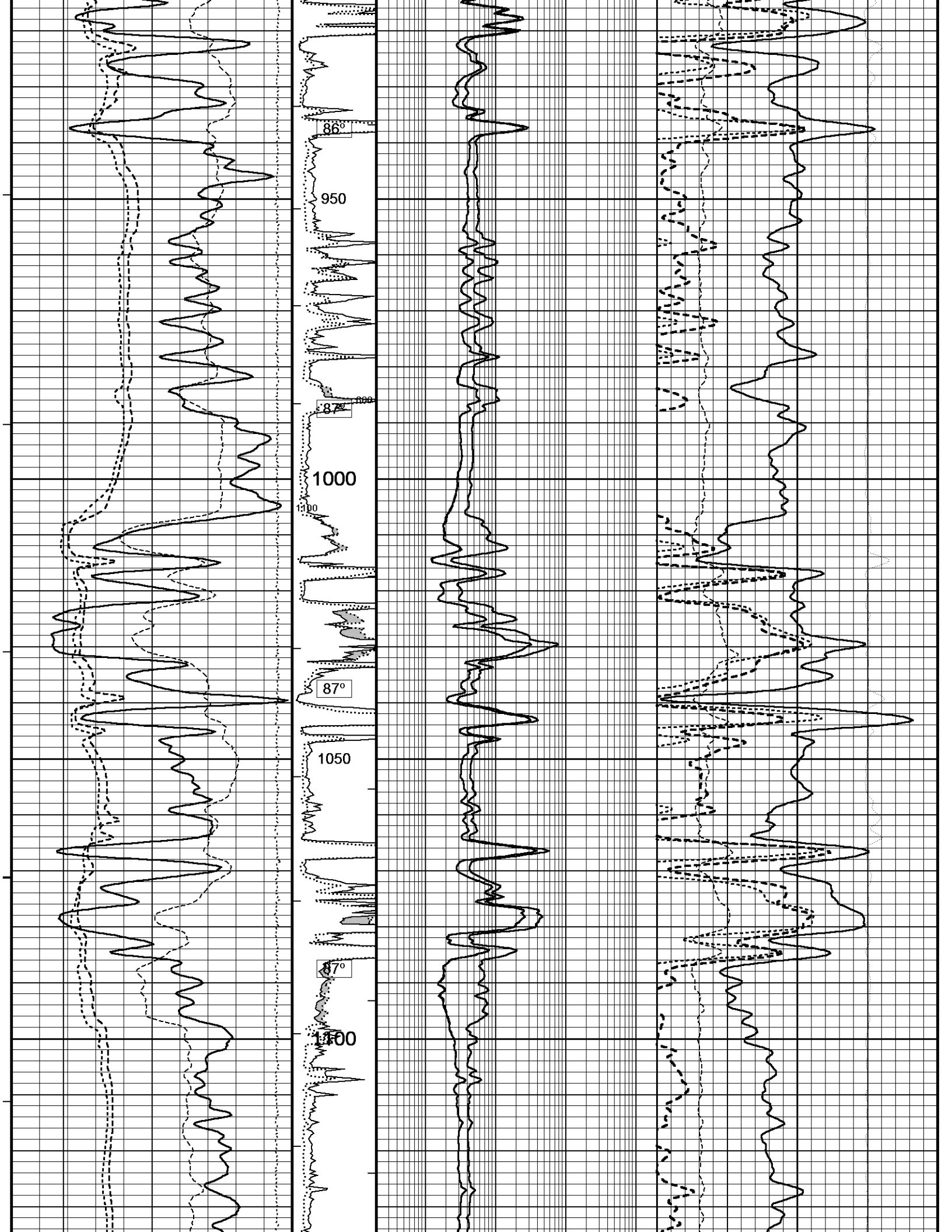
Density Correction

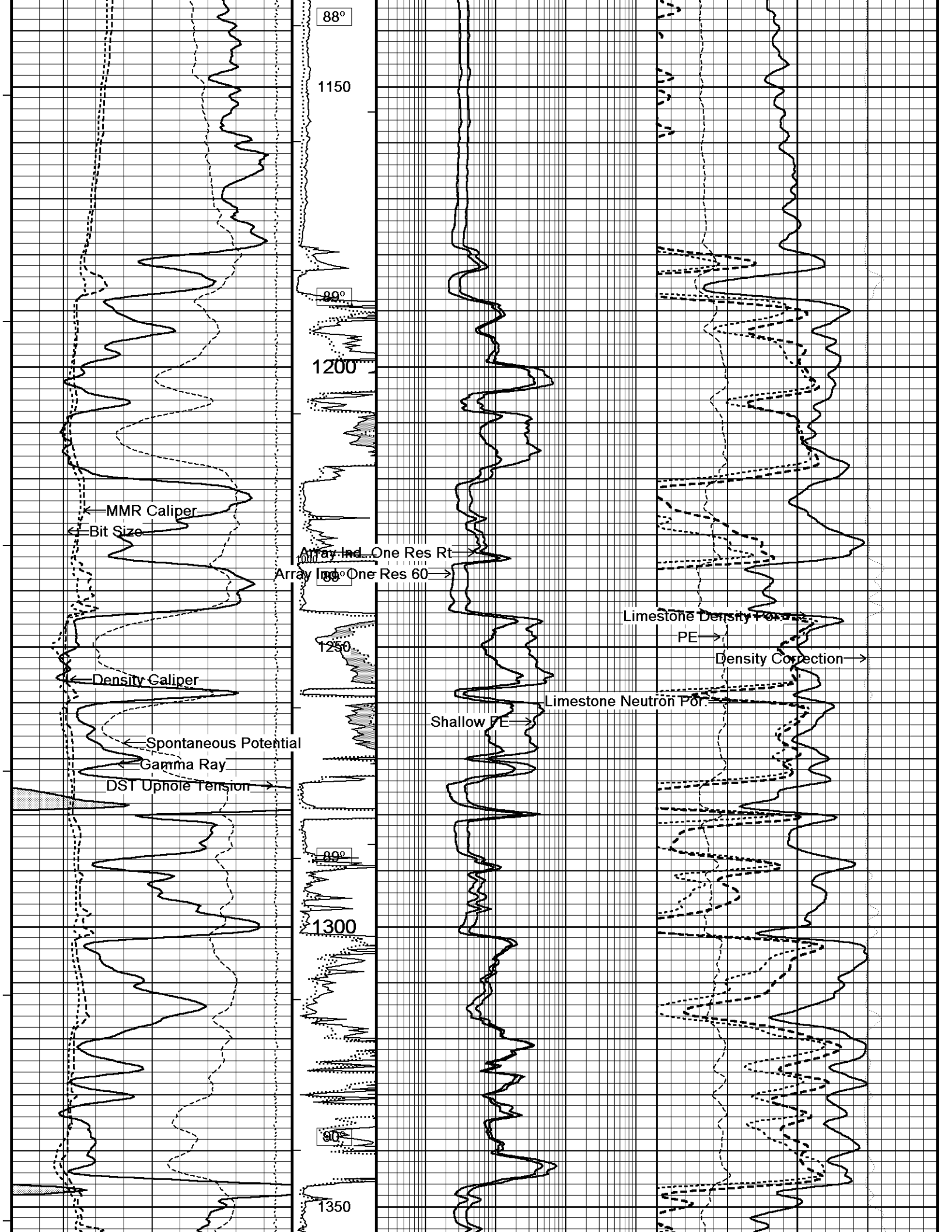
Limestone Neutron Por

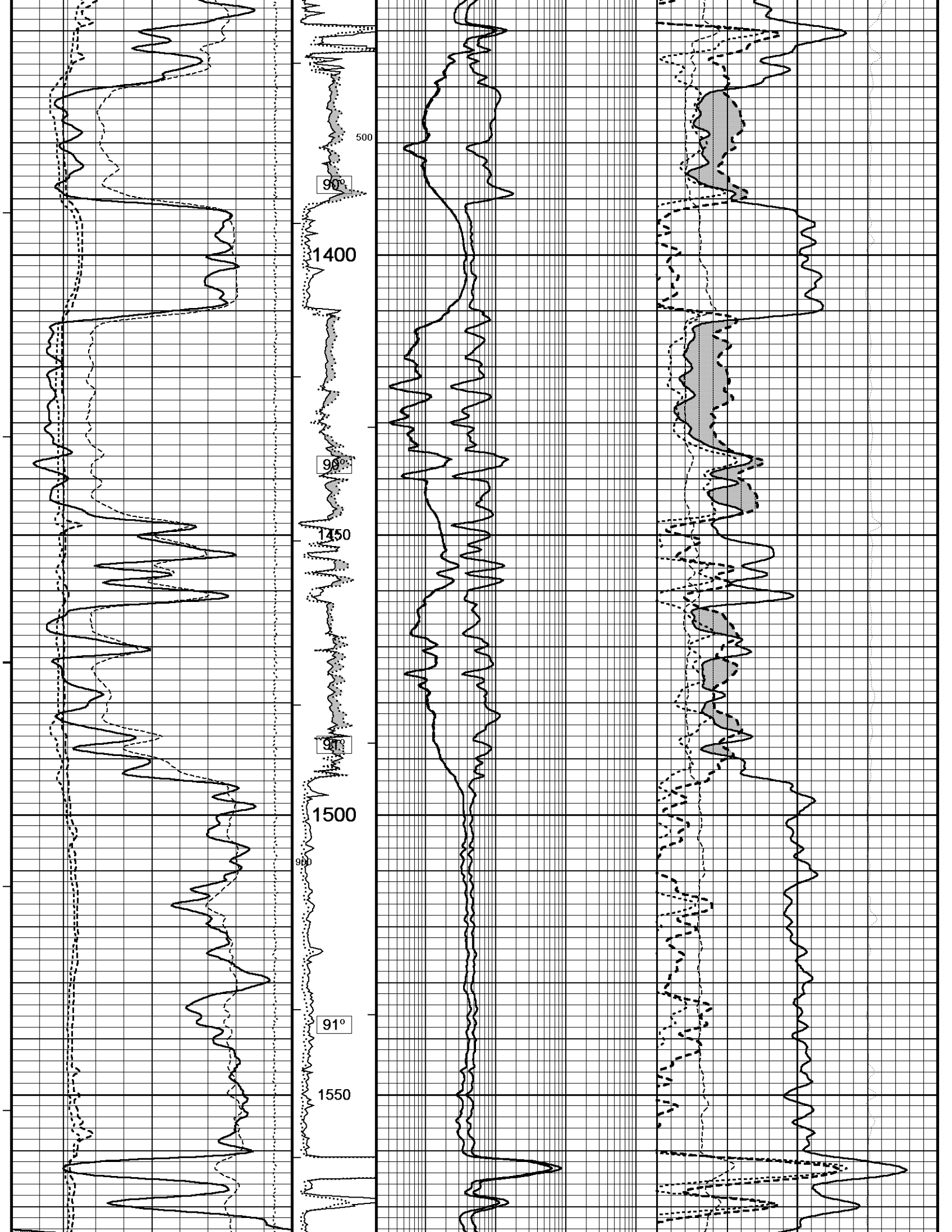


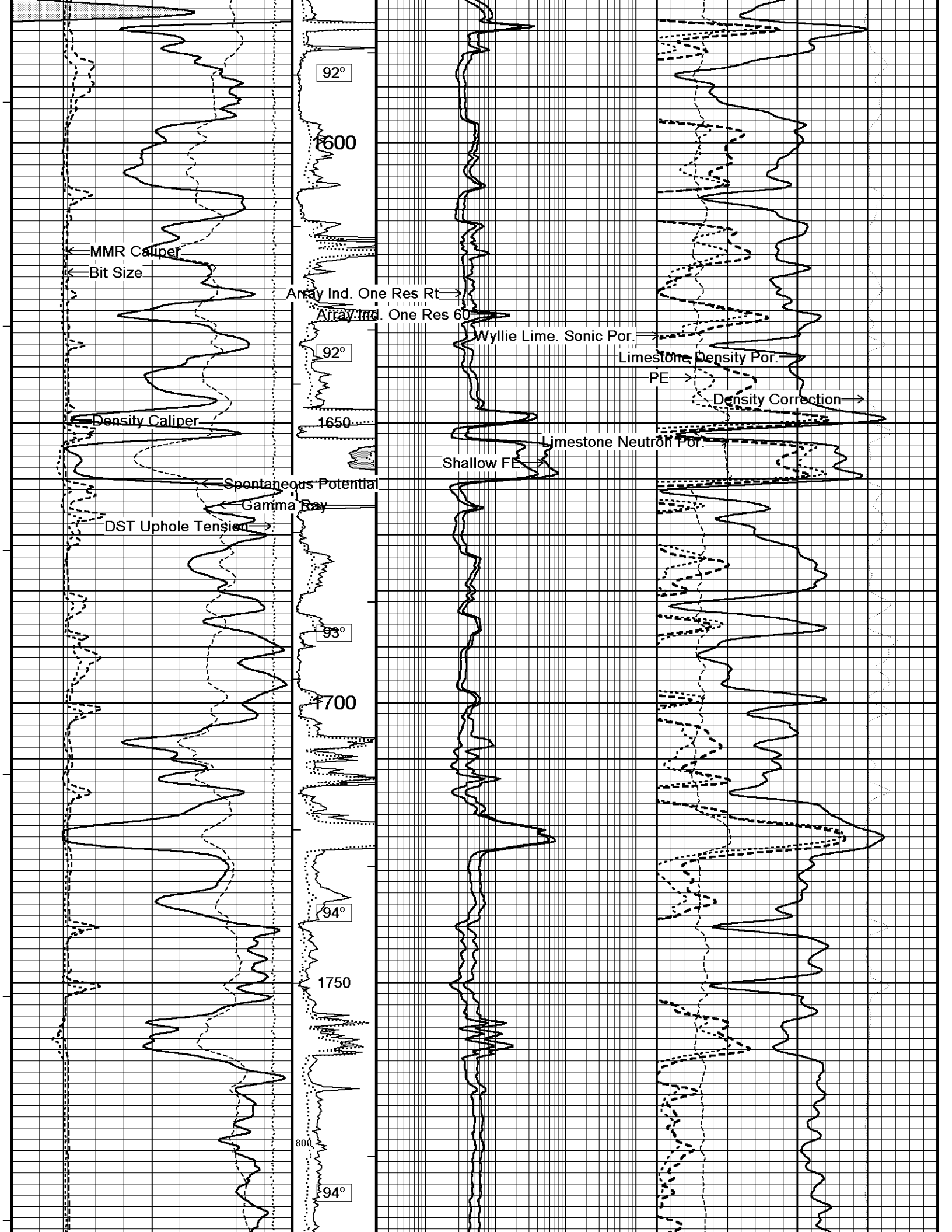


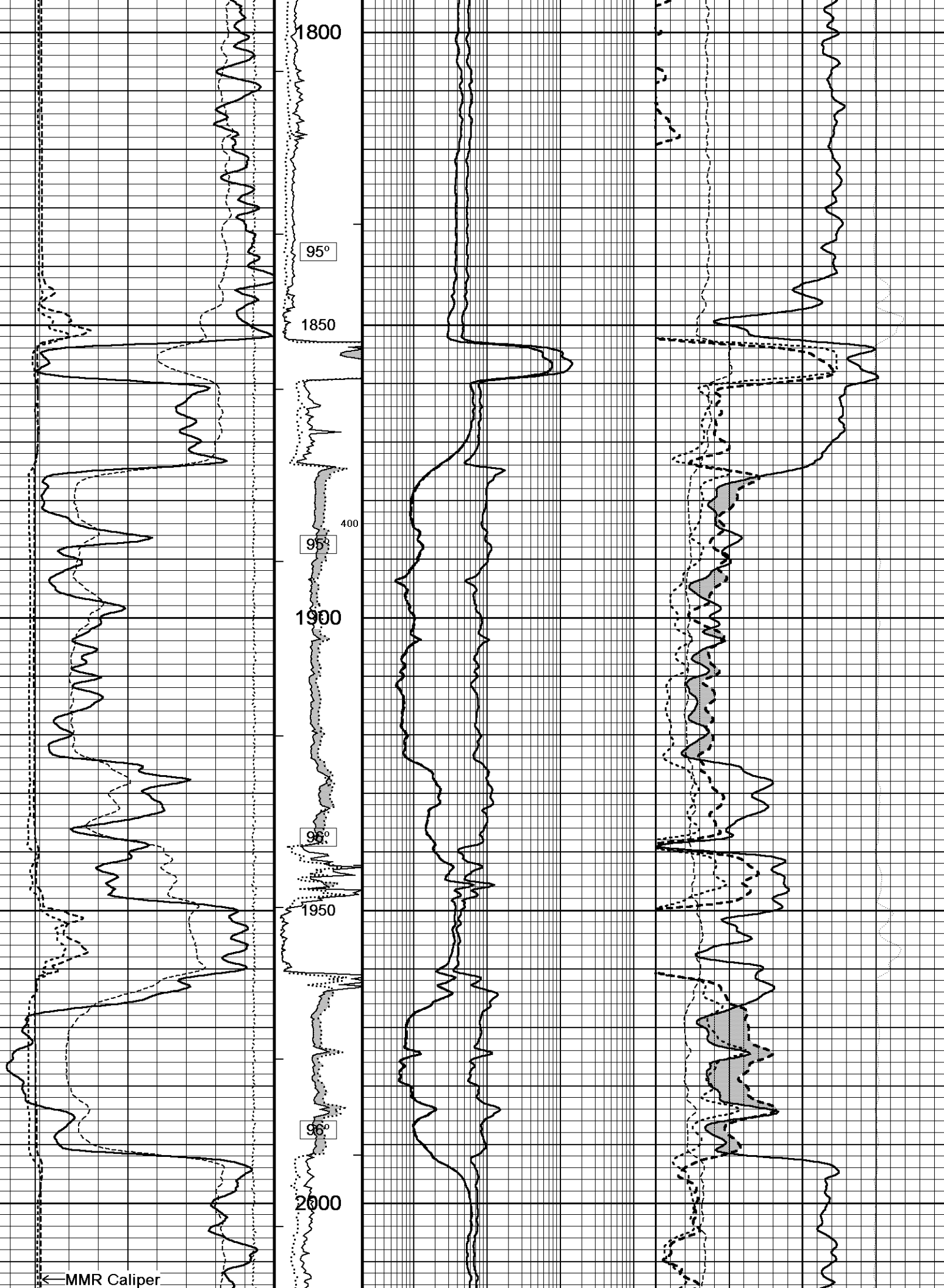


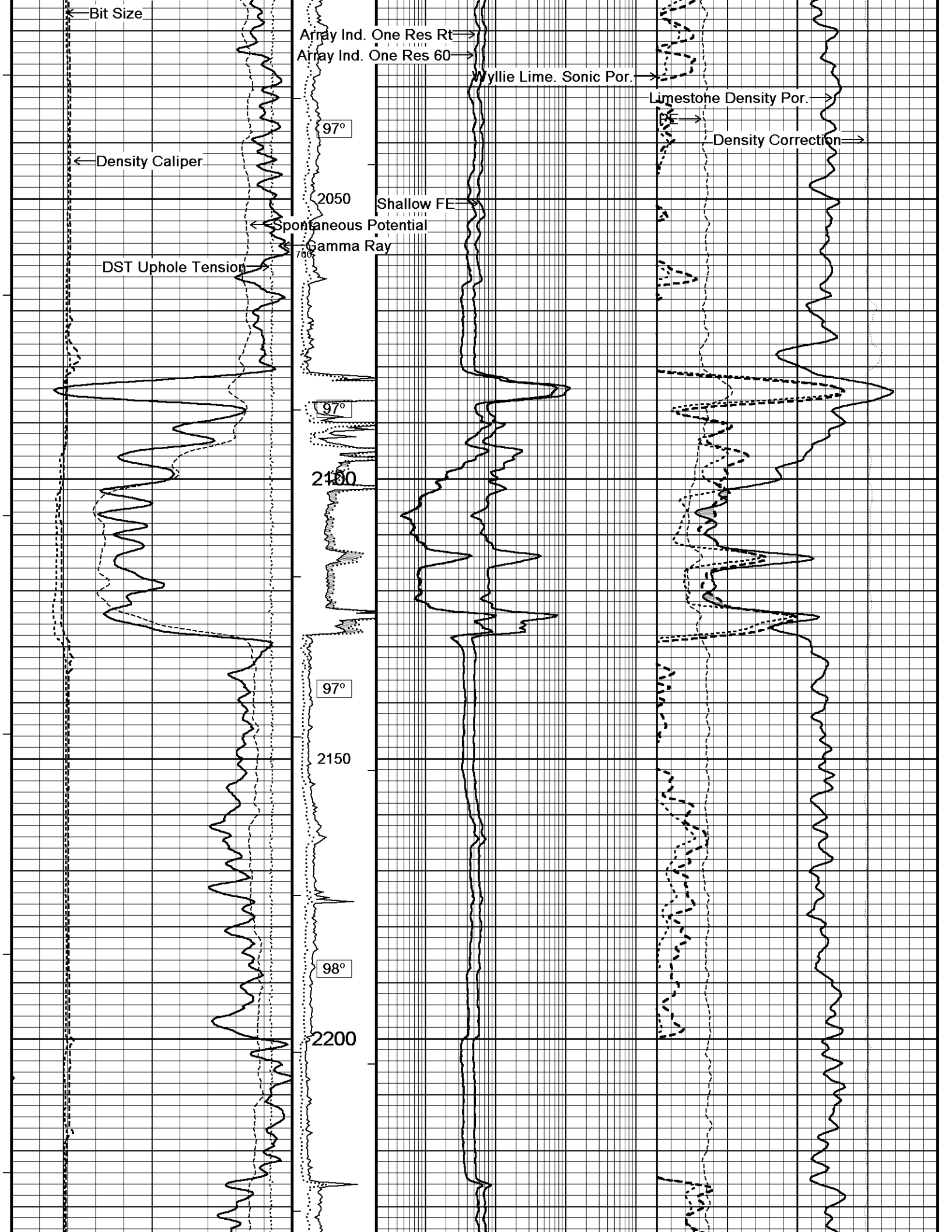


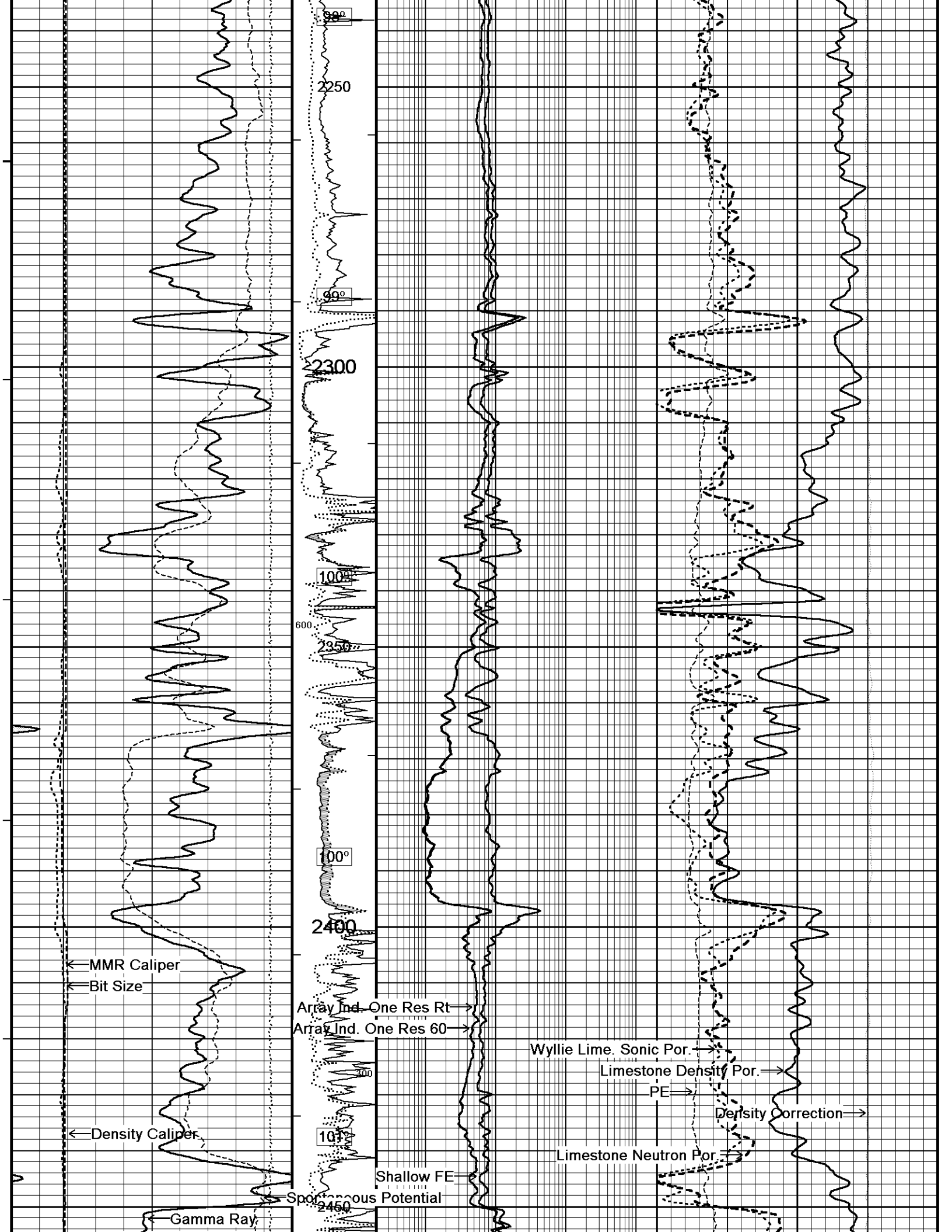




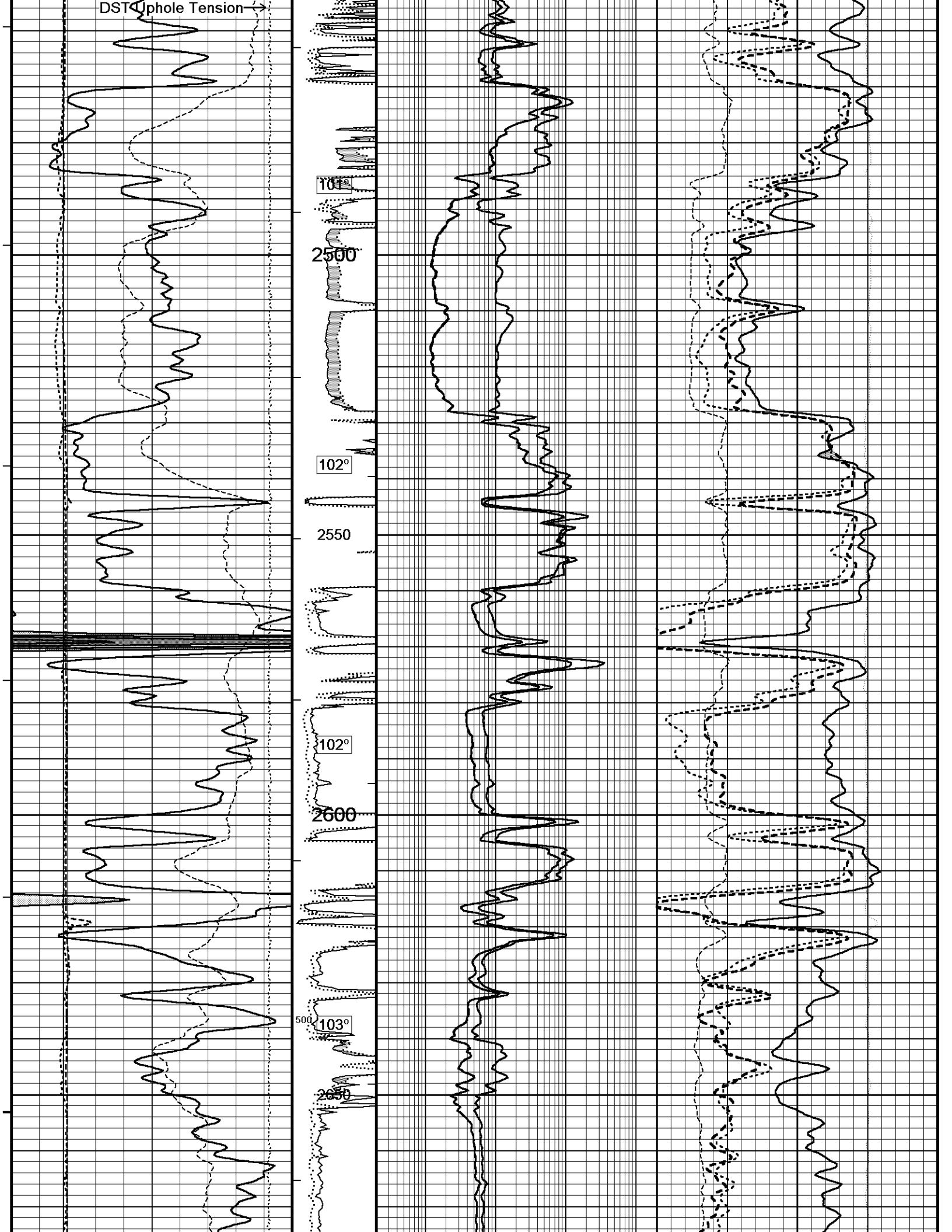


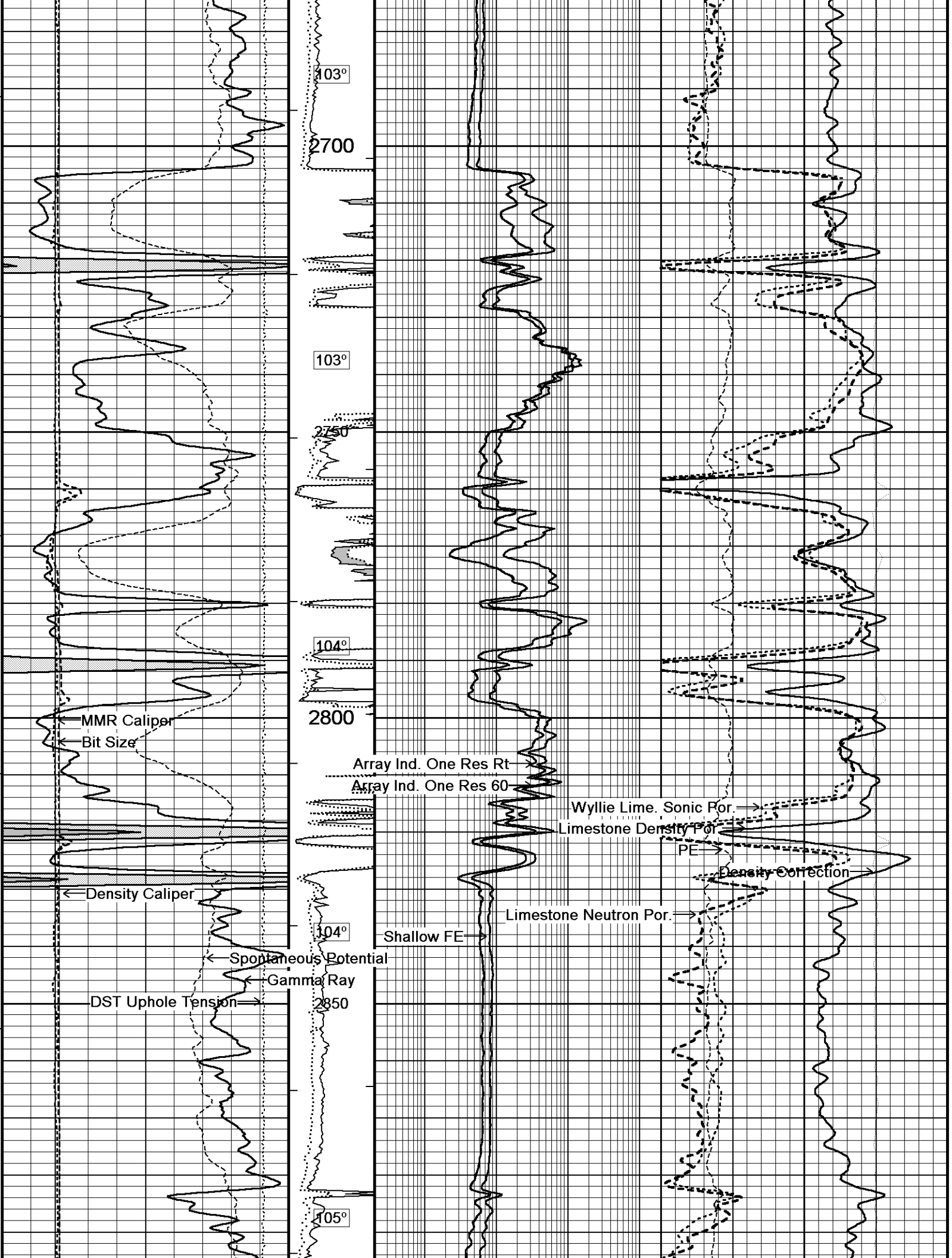


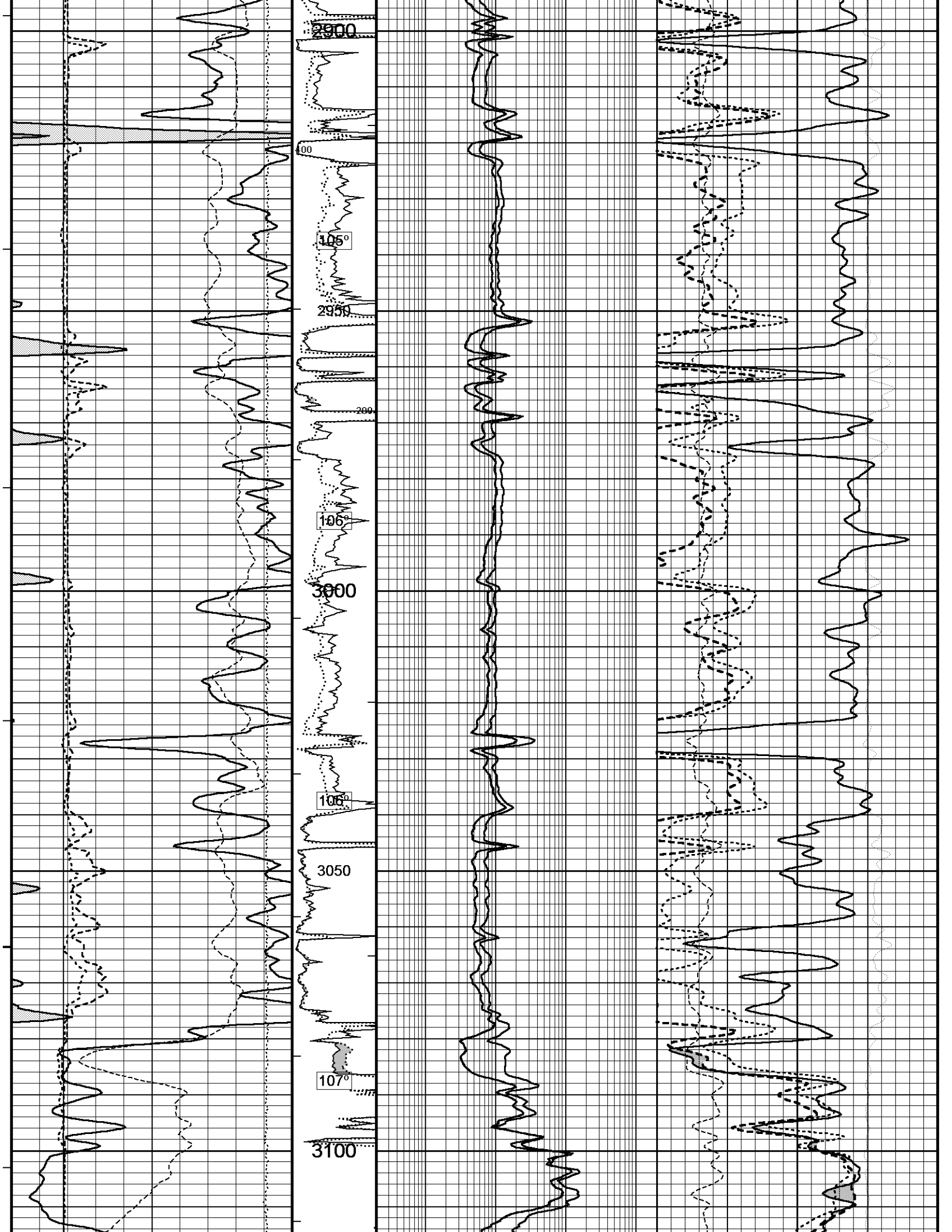


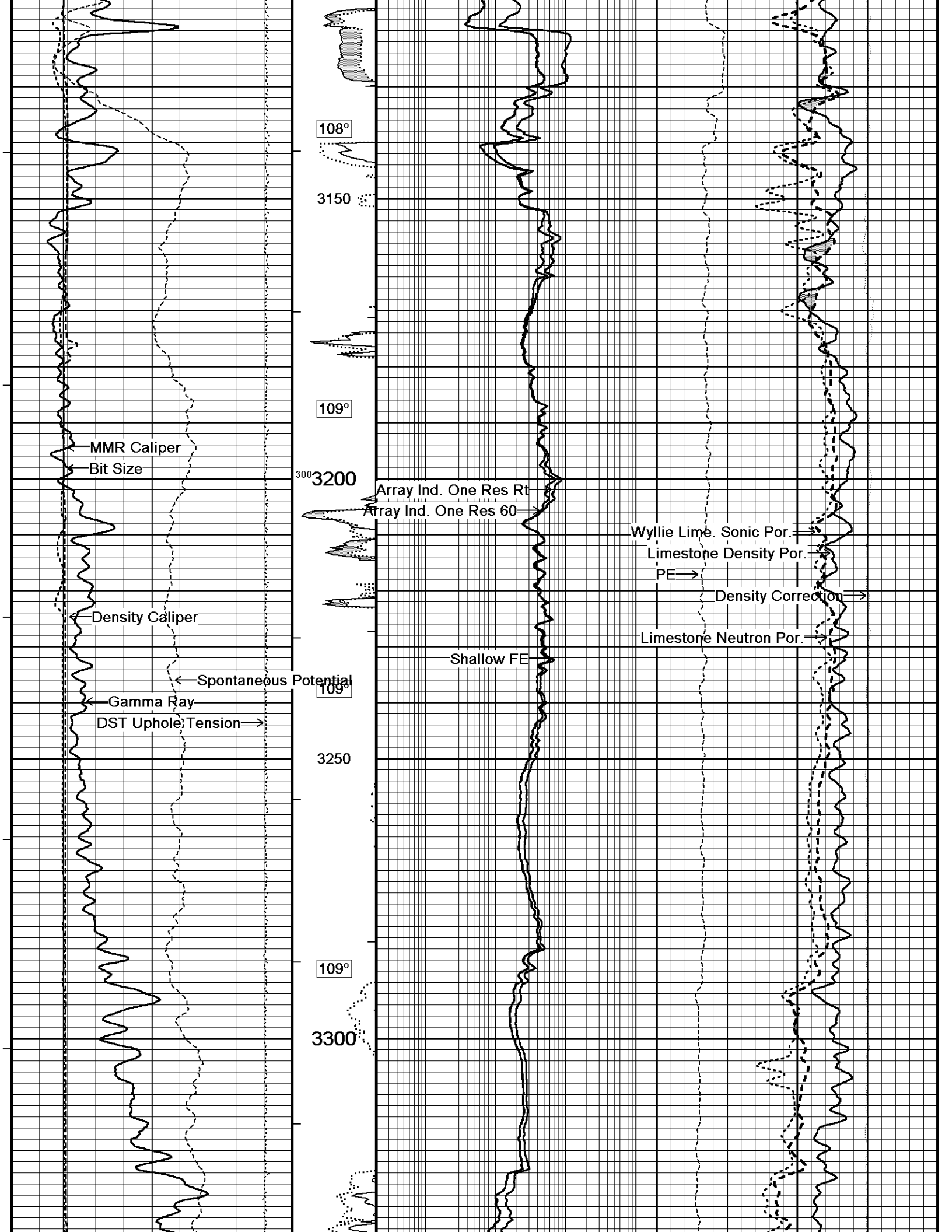


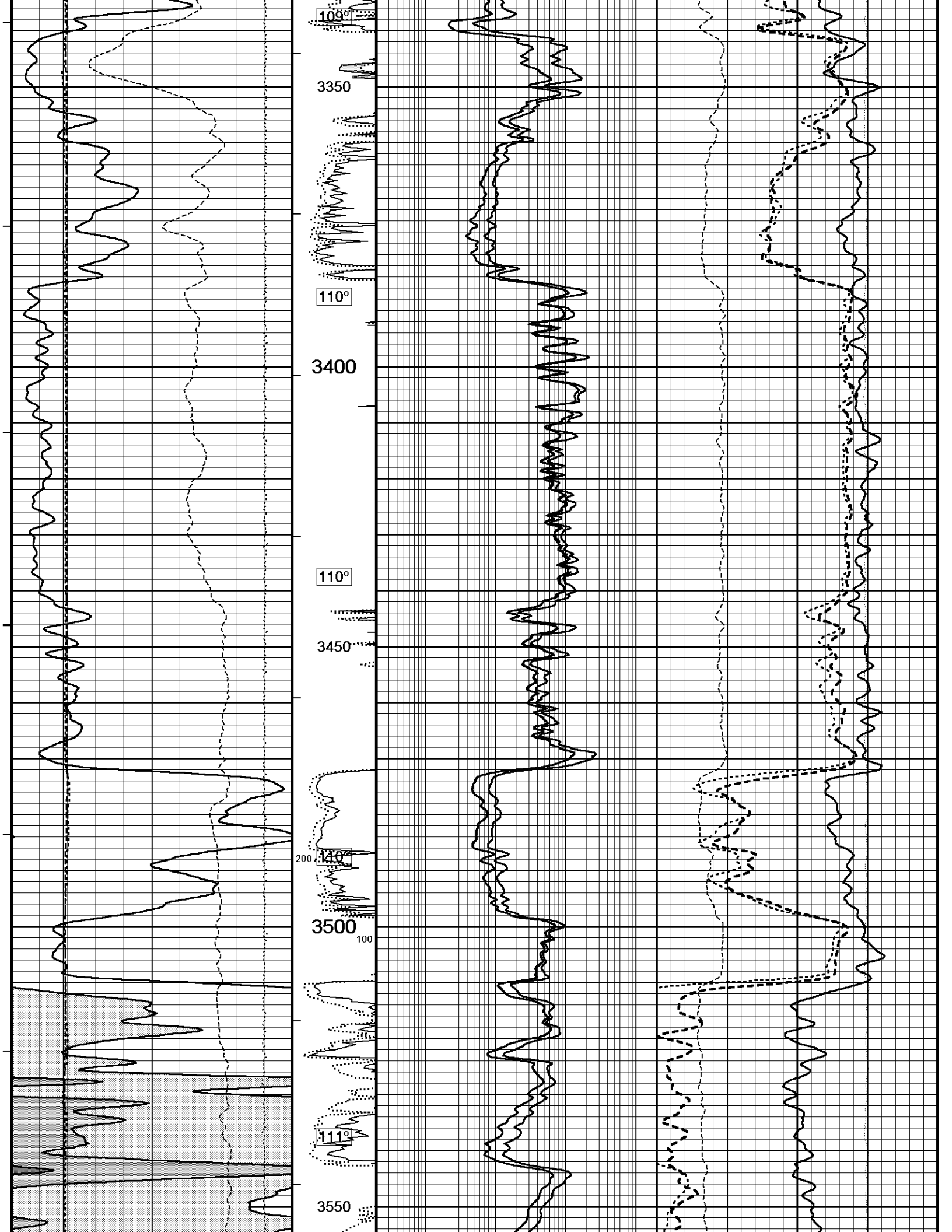
DST \uparrow \downarrow Hole Tension \rightarrow

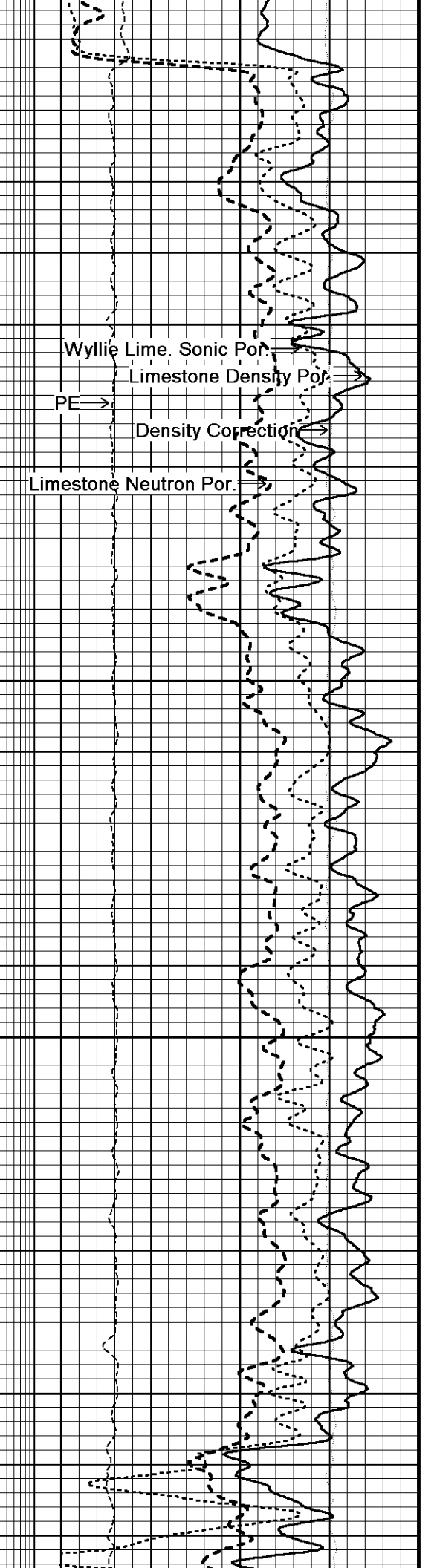
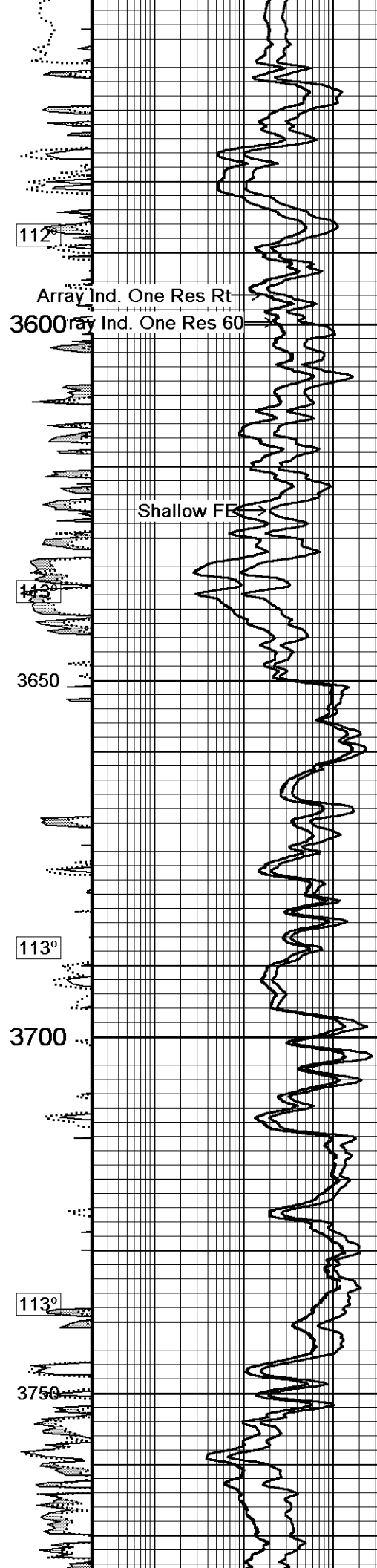
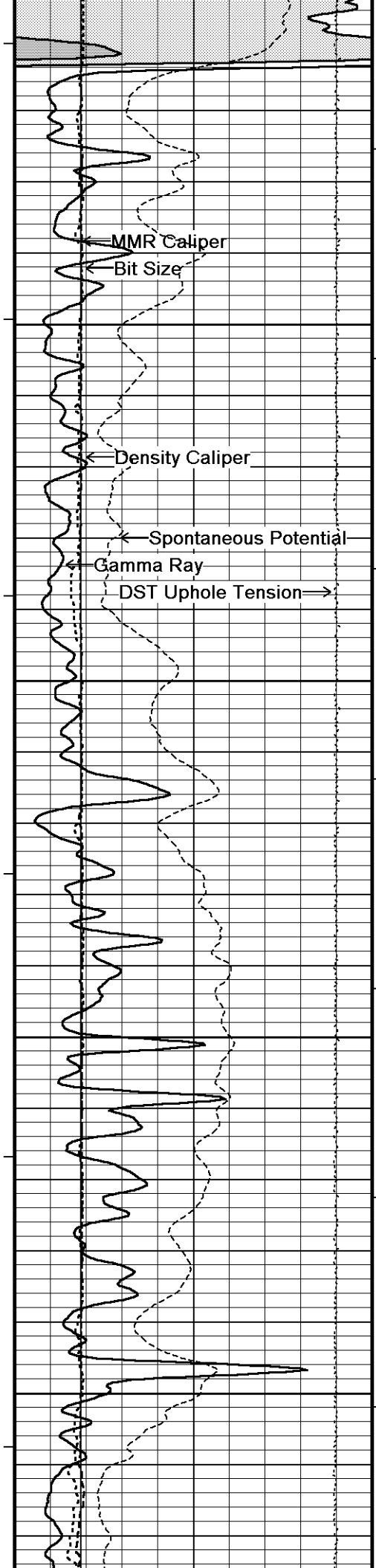


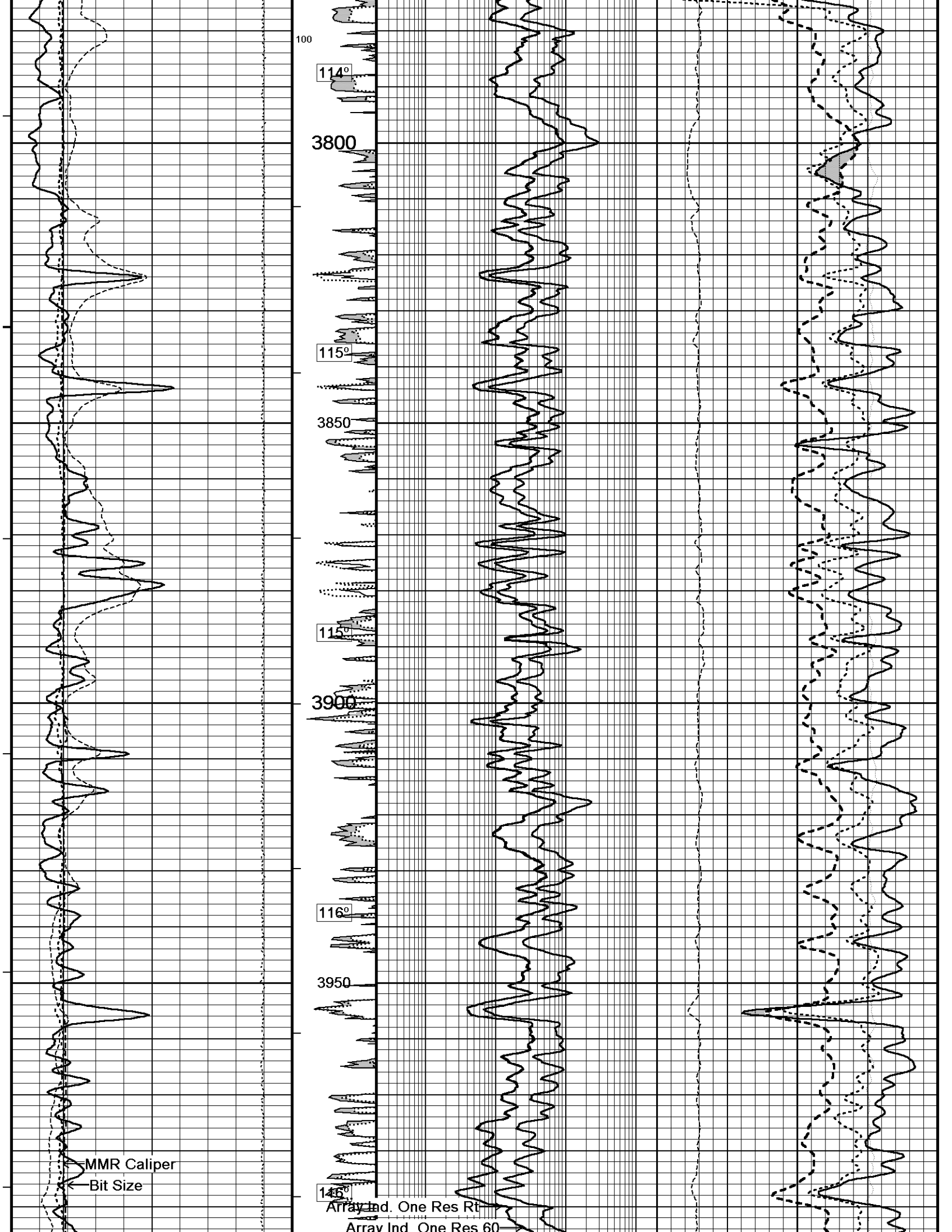


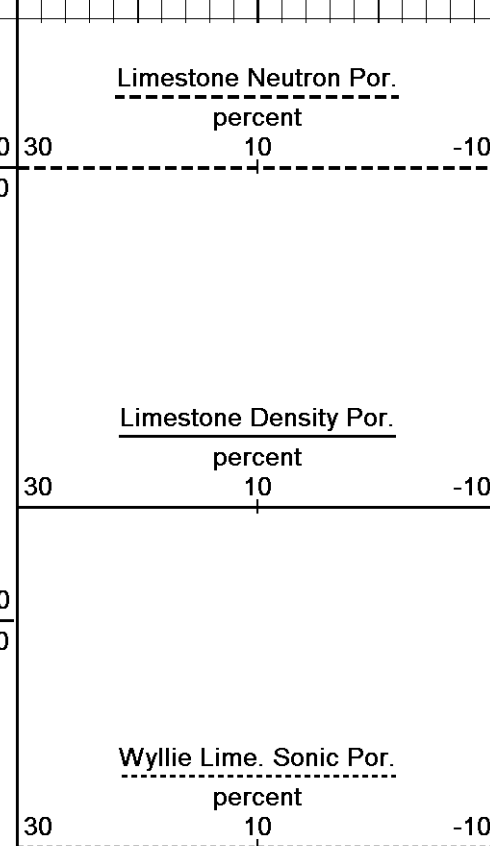
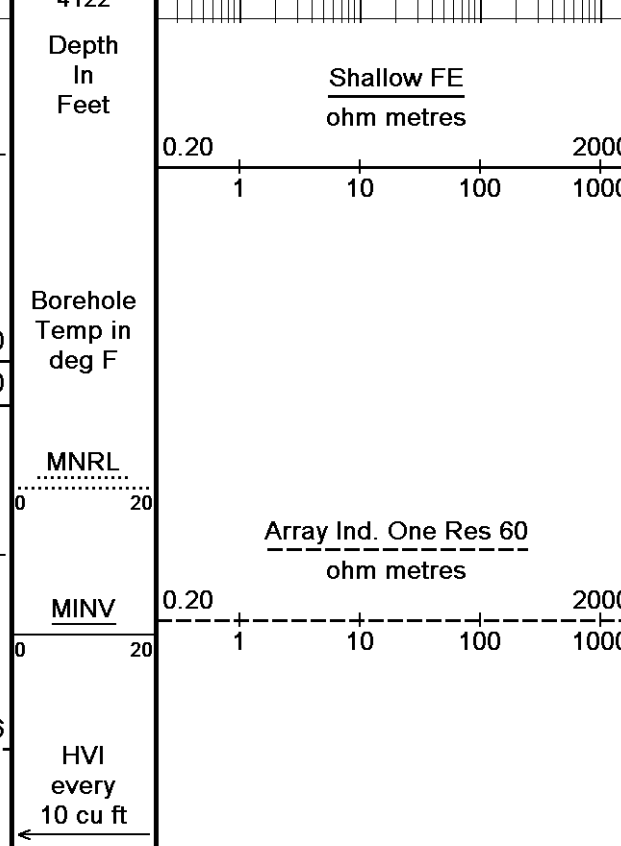
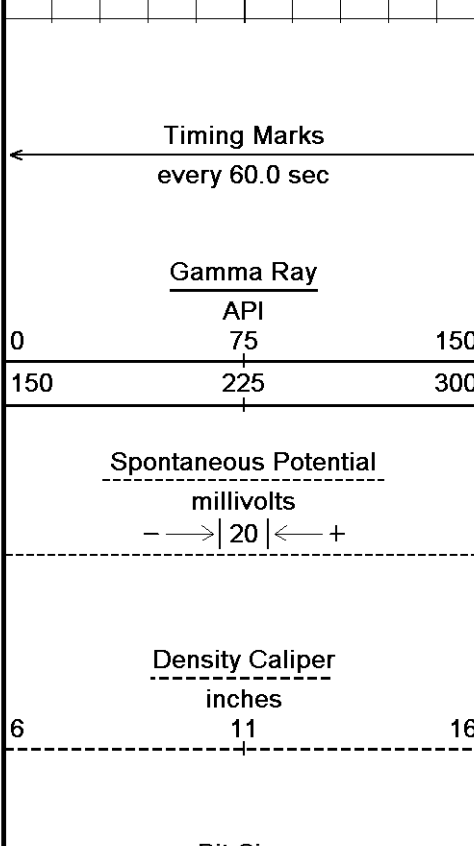
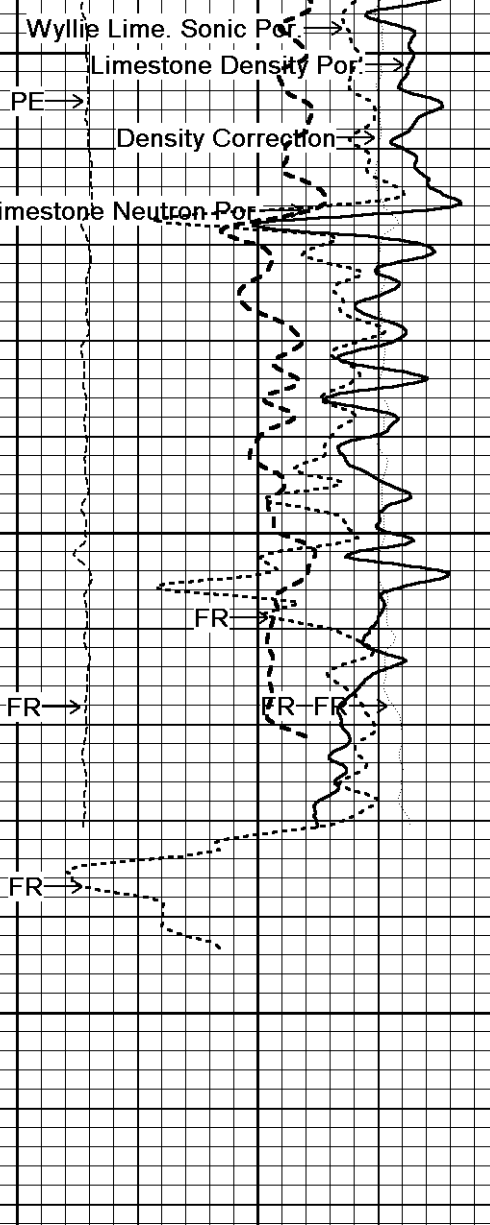
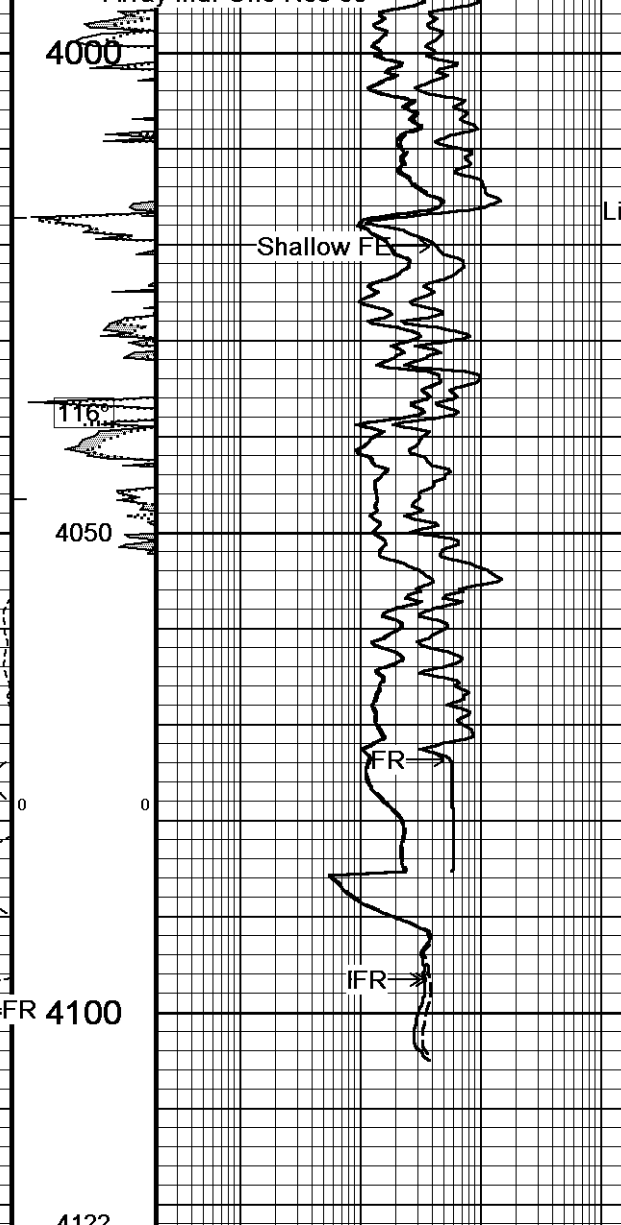
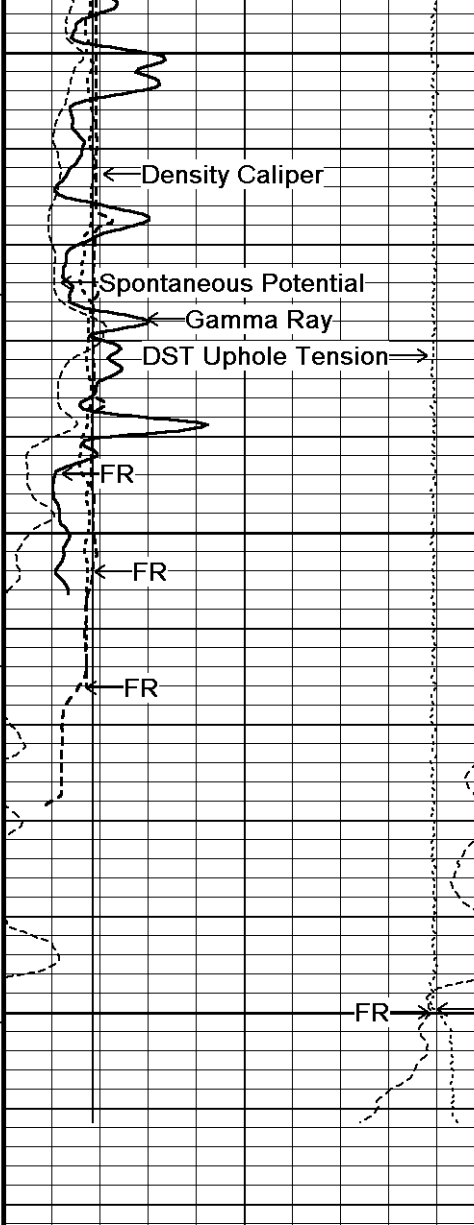


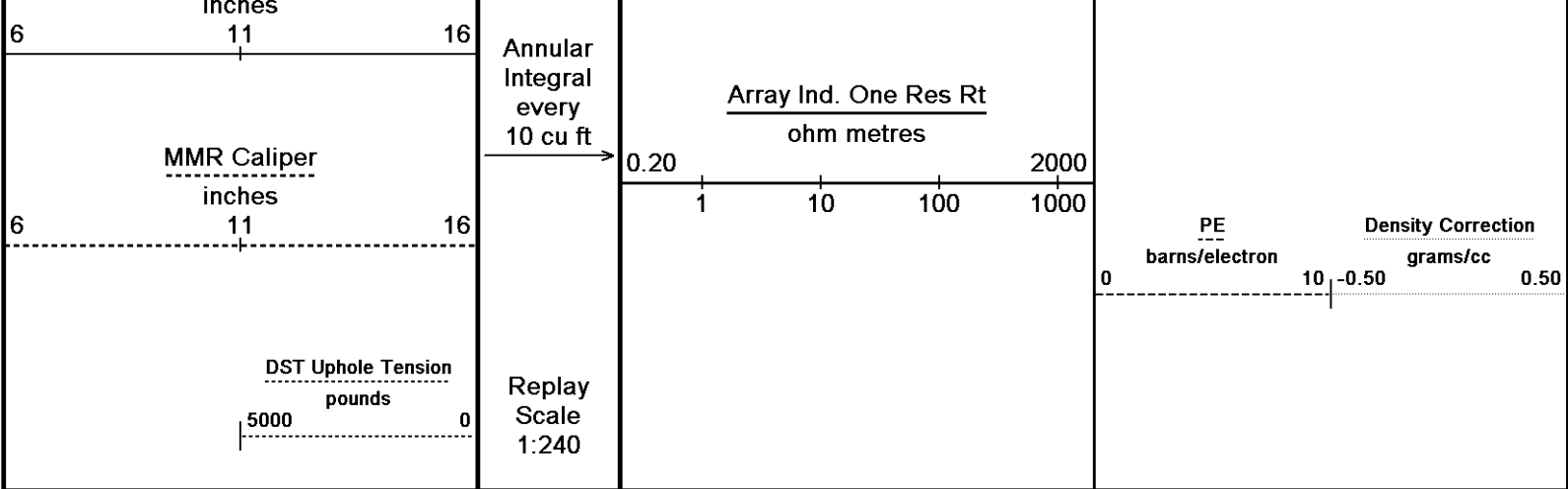










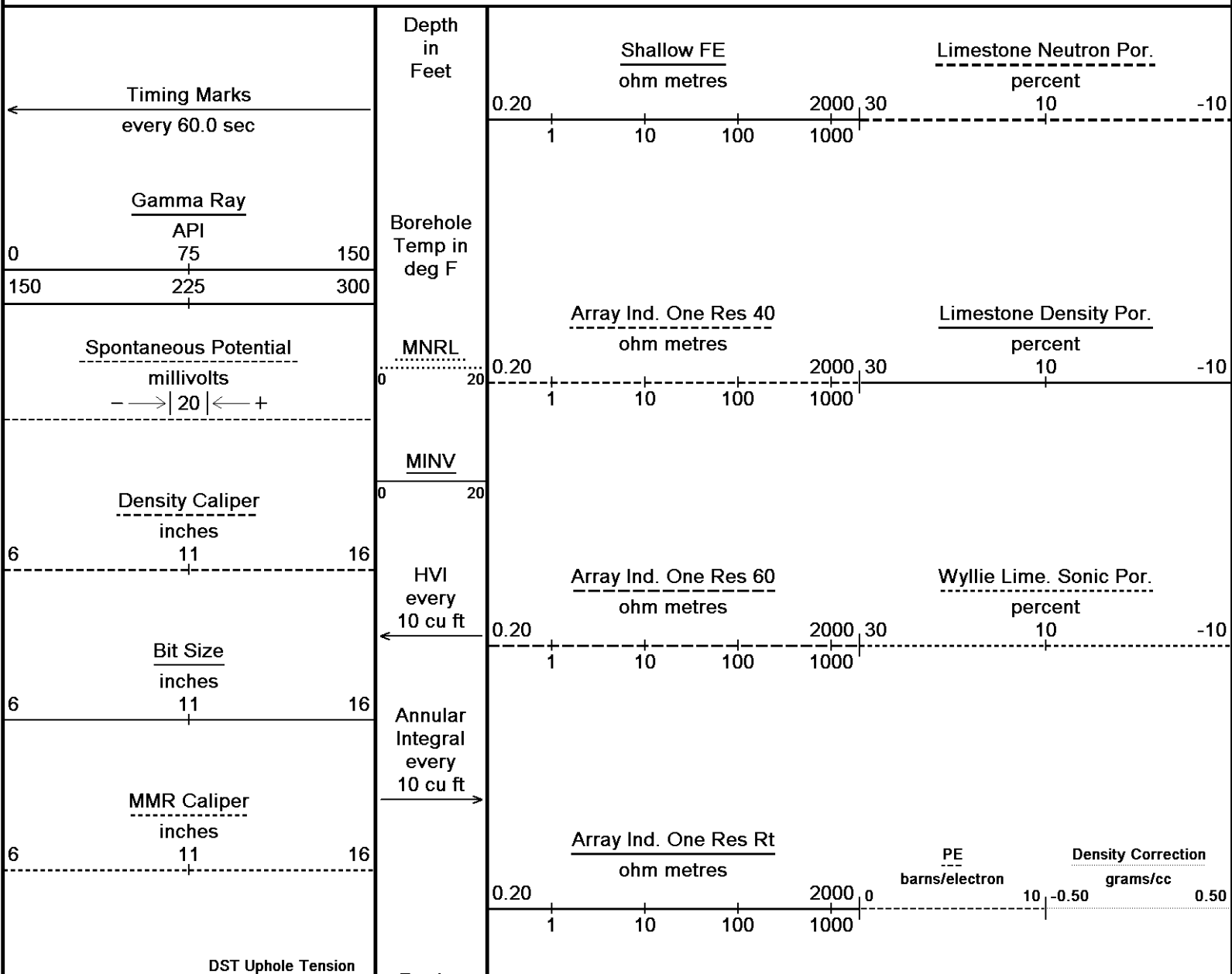


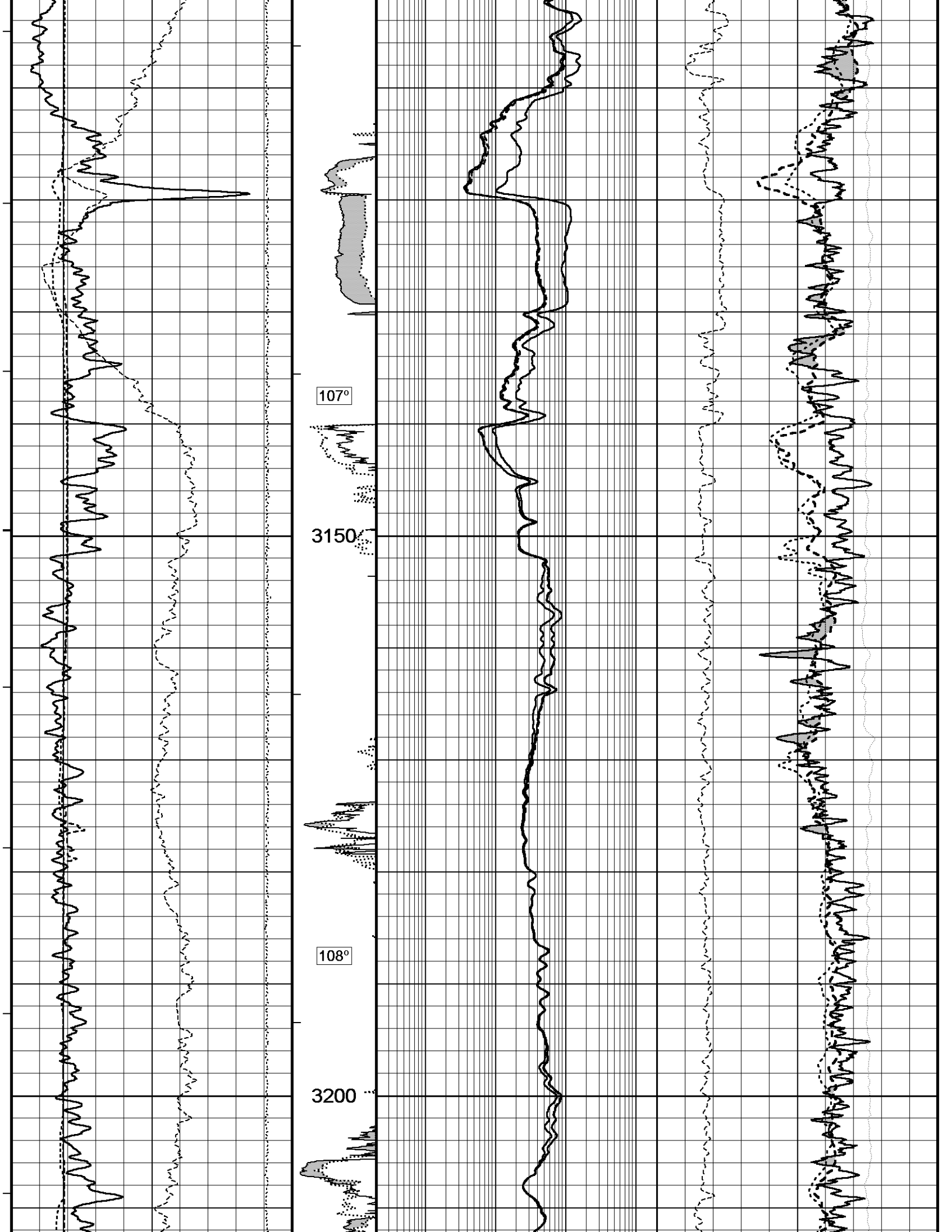
Depth Based Data - Maximum Sampling Increment 10.0cm
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 System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804

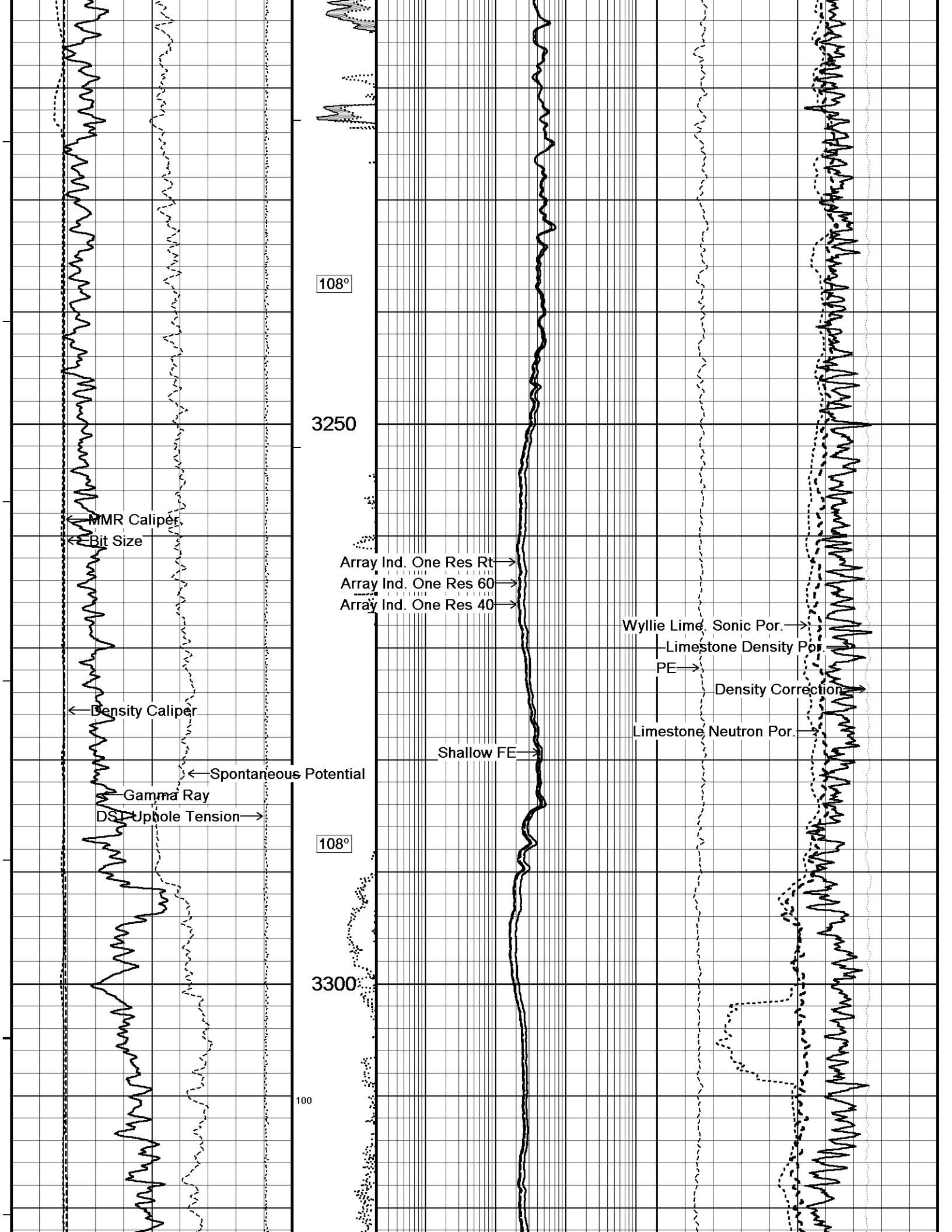
↑ 5 INCH MAIN SECTION DSC ↑

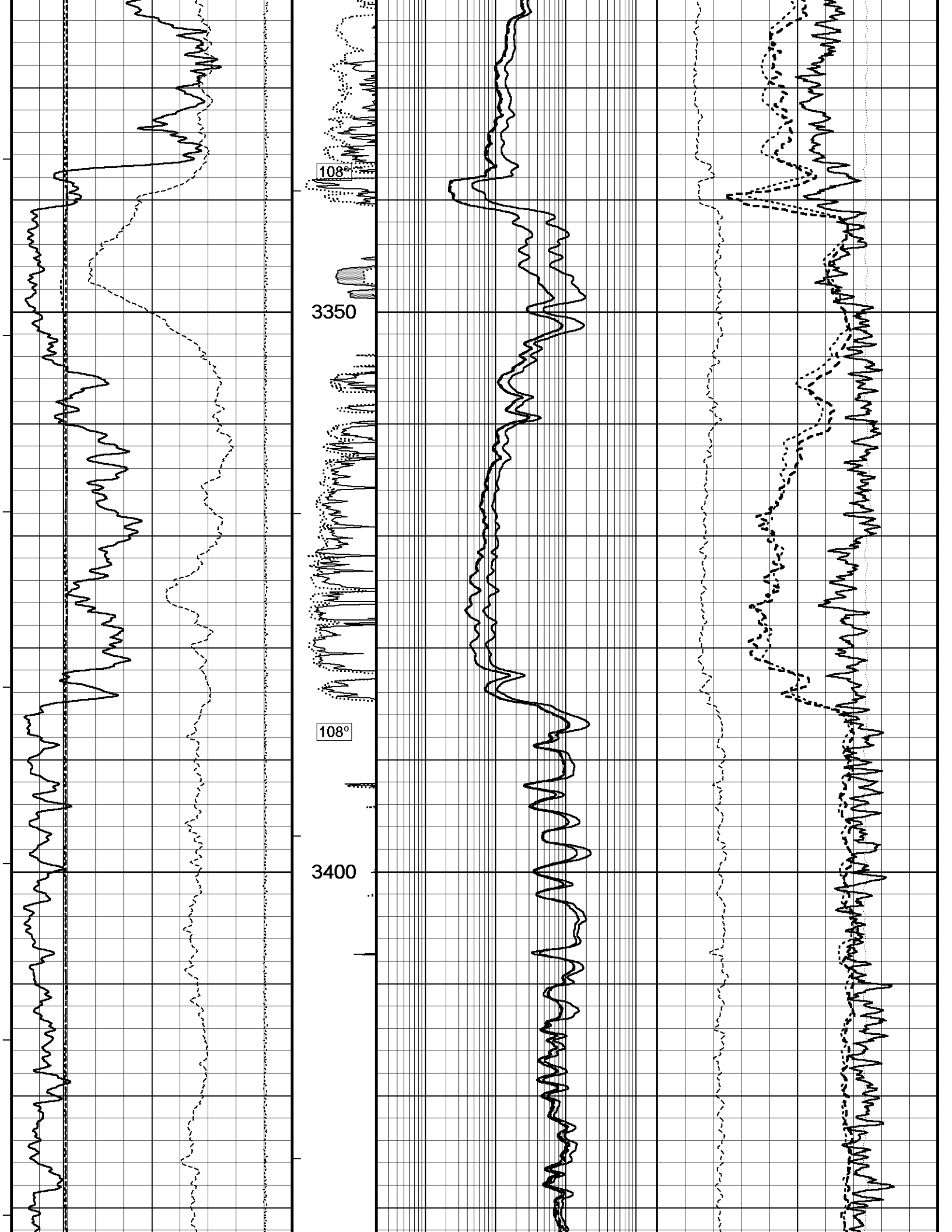
↓ HIGH RESOLUTION SECTION ↓

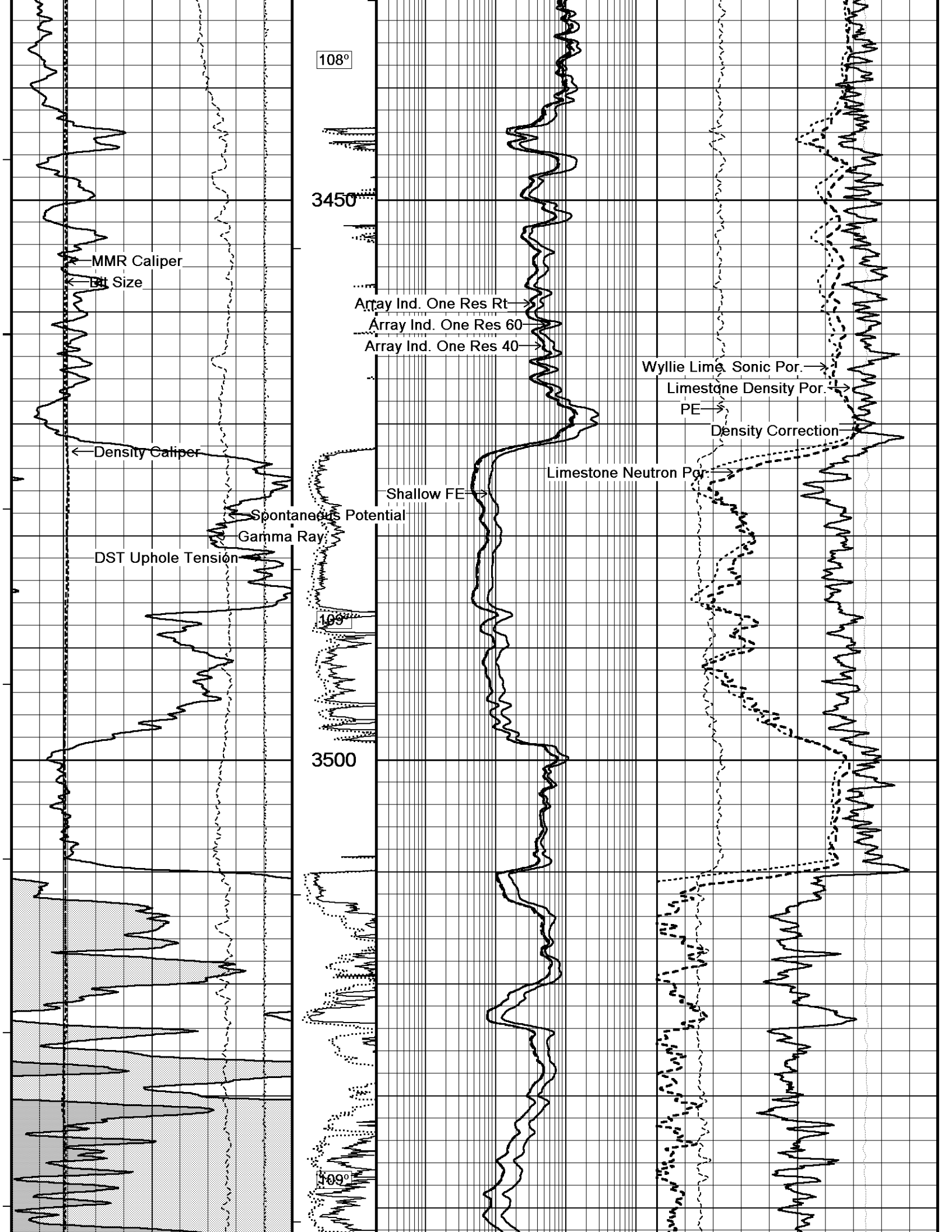
Depth Based Data - Maximum Sampling Increment 2.5cm
 Plotted on 29-DEC-2013 23:53
 Filename: C:\Program Files\Weatherford\WLS 13.06\DATA\TA...WEST MADDIX UNIT_HIGH RES.dta
 Recorded on 29-DEC-2013 19:24
 System Versions: Logged with 13.06.9804 Plotted with 13.06.9804

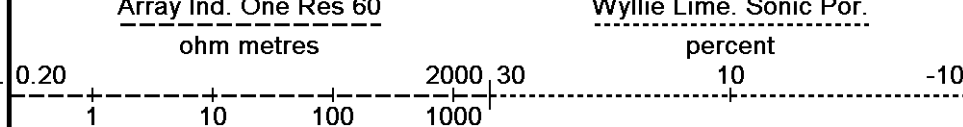
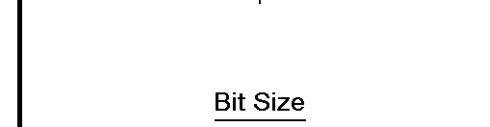
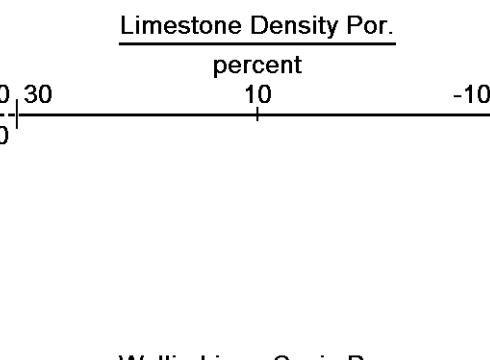
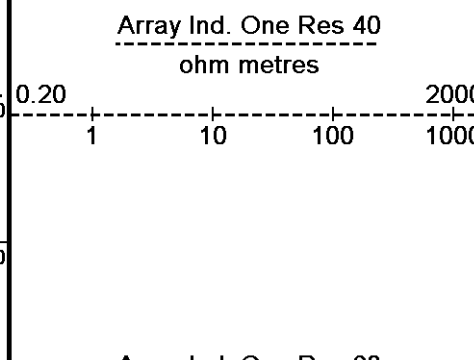
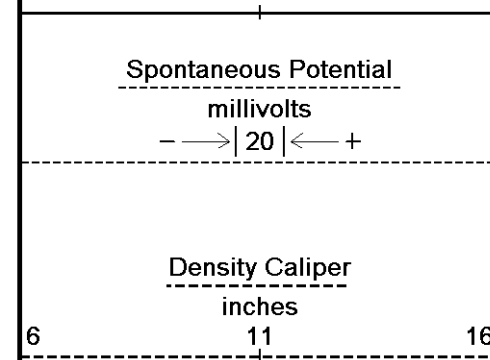
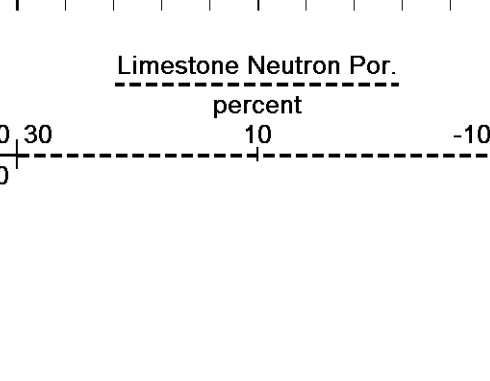
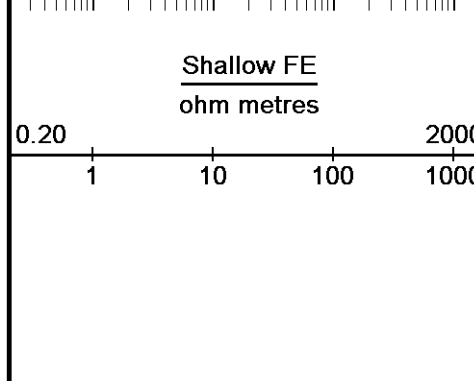
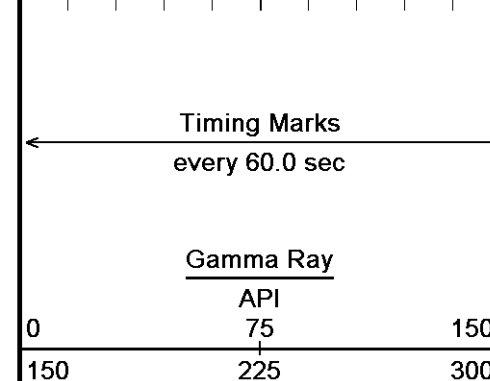
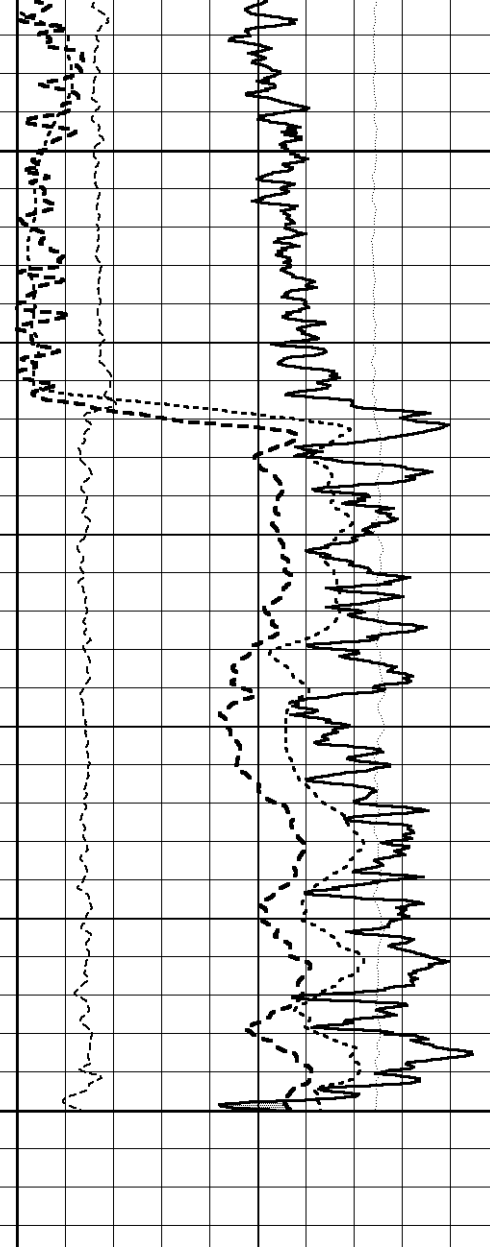
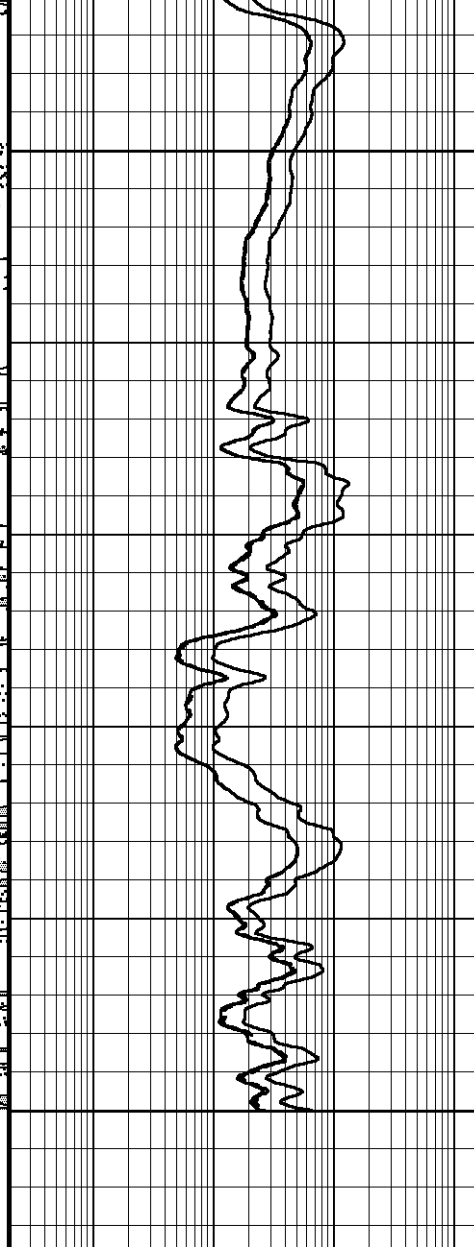
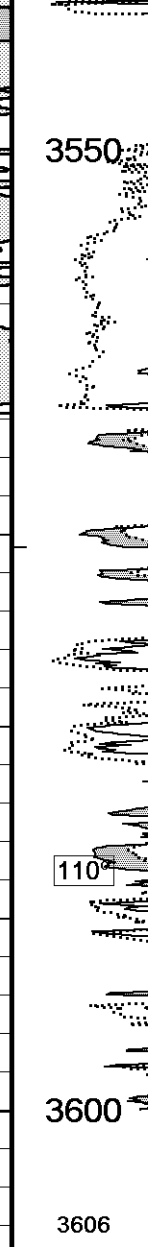
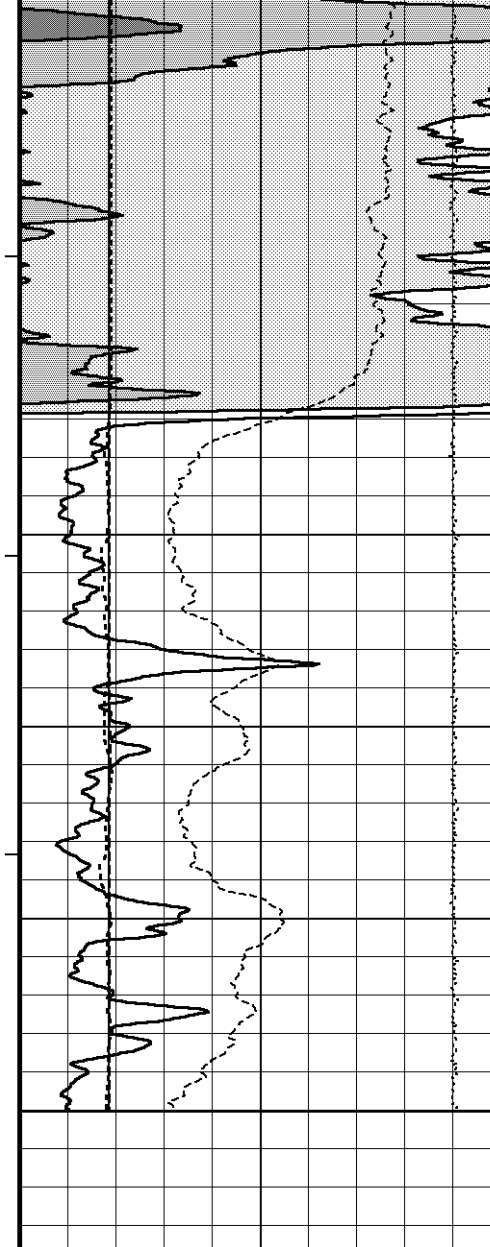


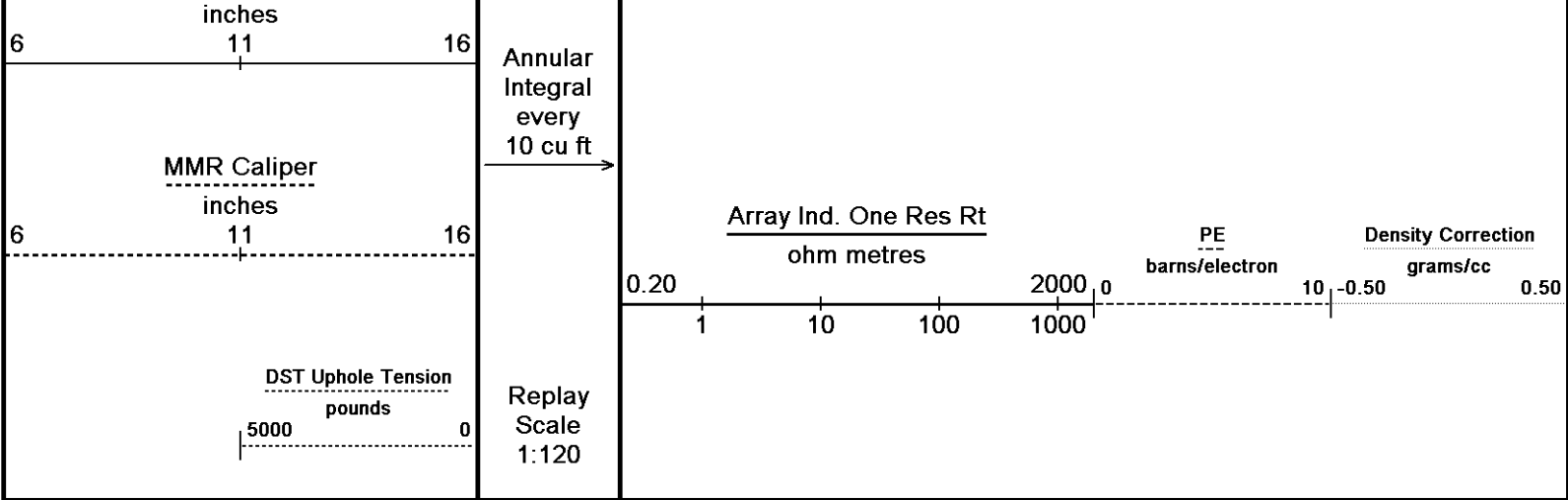










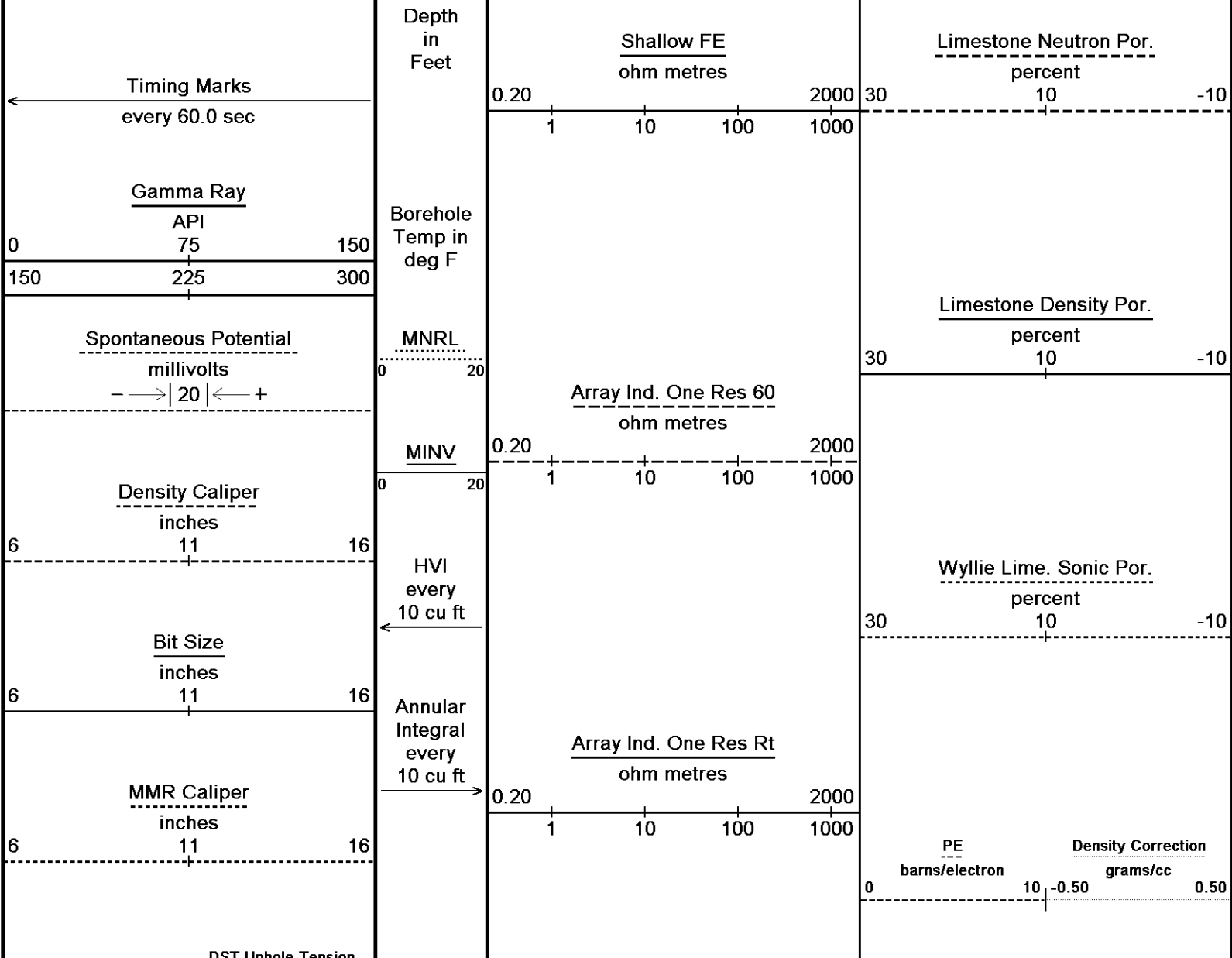


Depth Based Data - Maximum Sampling Increment 2.5cm
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HIGH RESOLUTION SECTION

5 INCH REPEAT SECTION 1:240

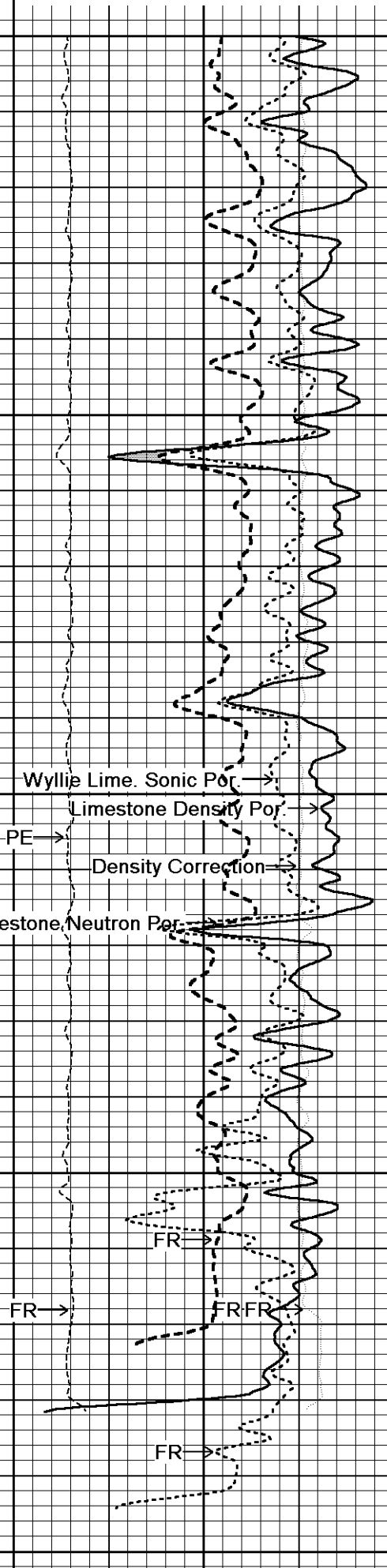
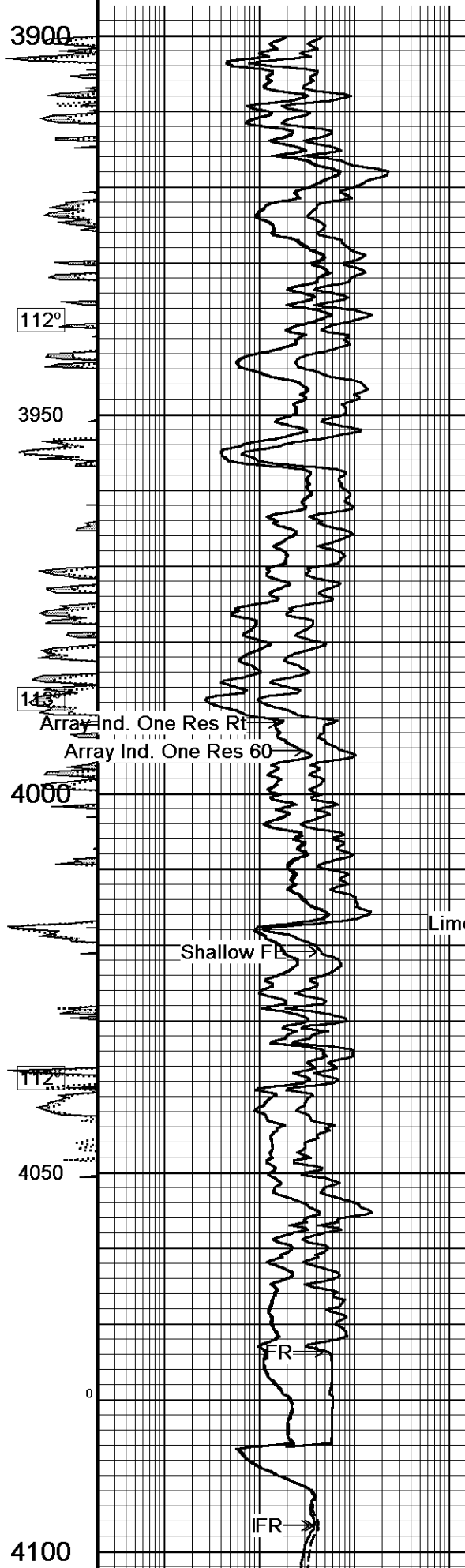
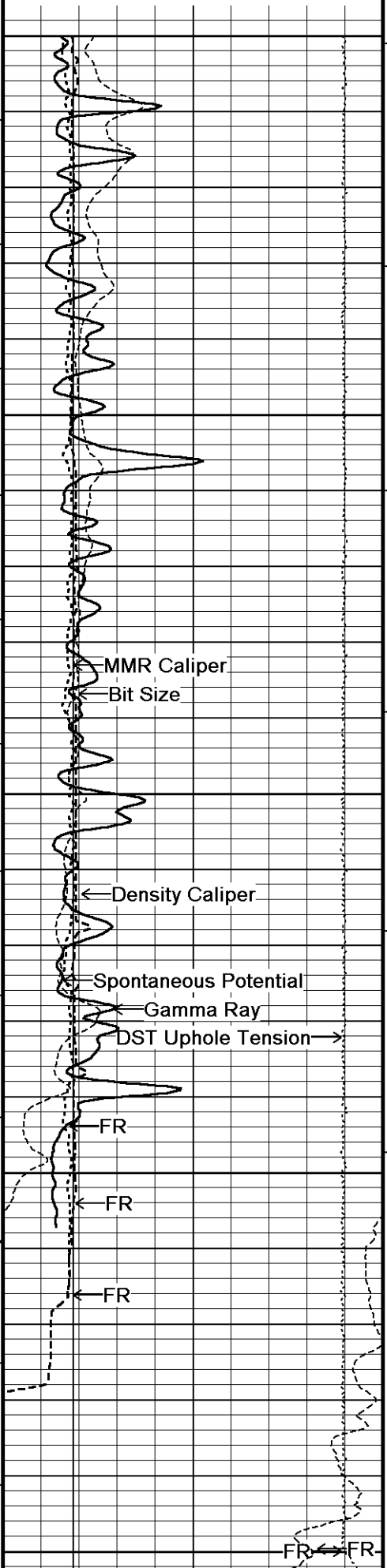
Depth Based Data - Maximum Sampling Increment 10.0cm
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 Recorded on 29-DEC-2013 19:24
 System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804



DST Uphole Tension
pounds

5000 0

Replay
Scale
1:240

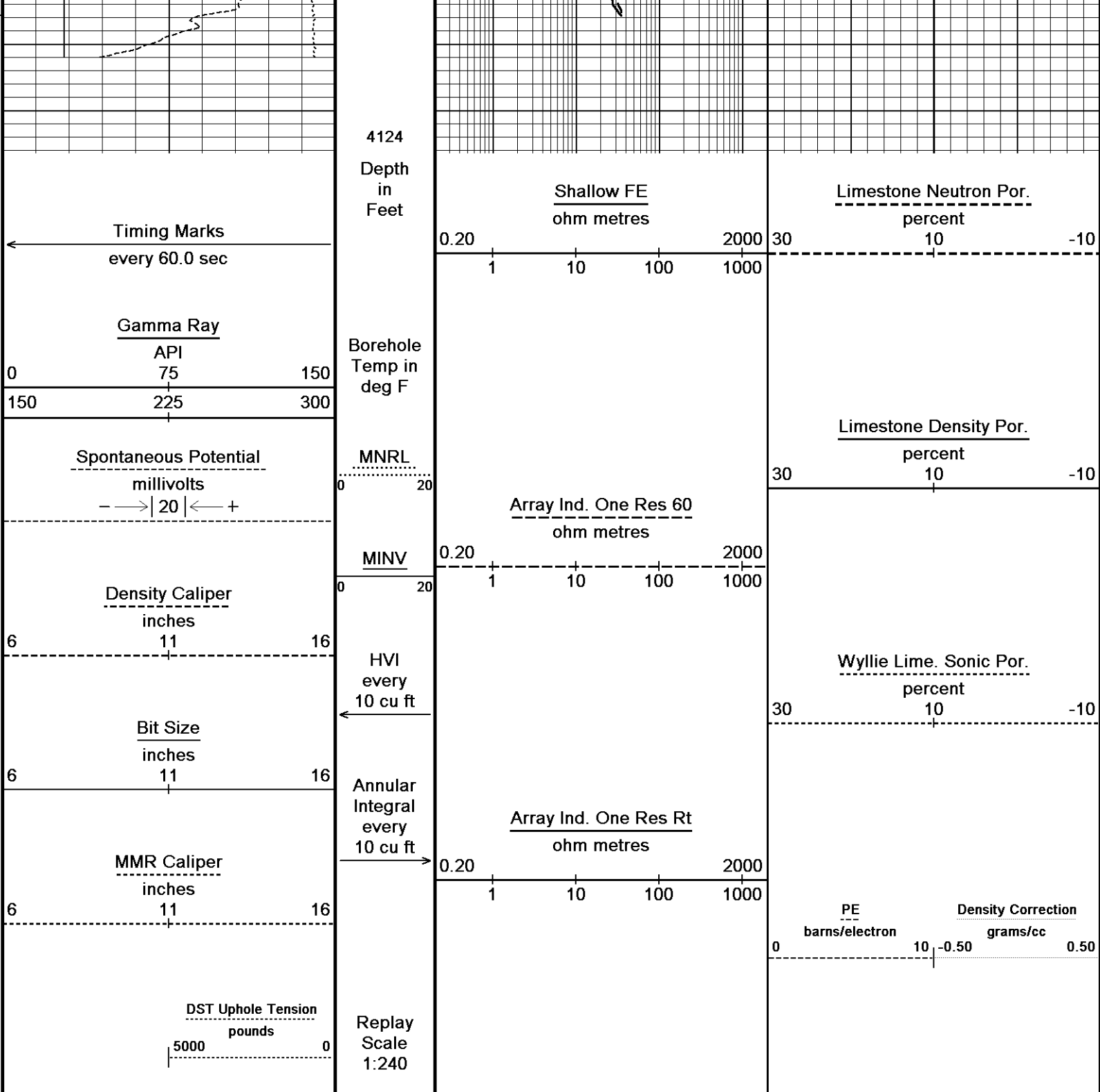


3900
112°
3950
143°
4000
4050
4100

Wyllie Lime. Sonic Por. →
Limestone Density Por. →
PE →
Density Correction →
Limestone Neutron Por. →
FR →
FRFR →
FR →

MMR Caliper
Bit Size
Density Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension →
FR
FR
FR
FR ← FR

Array Ind. One Res Rt
Array Ind. One Res 60
Shallow FR →
IFR →



Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 29-DEC-2013 23:53
 Filename: C:\Program Files\Weatherford\WLS 13.06\DATA\TAO...WEST MADDIX UNIT_REPEAT.dta Recorded on 29-DEC-2013 19:24
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↑ **5 INCH REPEAT SECTION 1:240** ↑

BEFORE SURVEY CALIBRATION

C:\Program Files\Weatherford\WLS 13.06\DATA\TAOS RESOURCES OPERATING CO._WEST ...WEST MADDIX UNIT_MAIN.dta

General Constants All 000 Last Edited on 29-DEC-2013,19:04

General Parameters

Mud Resistivity	1.600	ohm-metres
Mud Resistivity Temperature	74.000	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 17-DEC-2013 12:59

Reading No	Measured	Calibrated (lbs)
1	14609.35	0.00
2	15828.66	415.00

Gamma Calibration MCG-E.A 571

Field Calibration on 26-DEC-2013 11:23

	Measured	Calibrated (API)
Background	54	36
Calibrator (Gross)	1094	732
Calibrator (Net)	1039	696

Gamma Constants MCG-E.A 571

Last Edited on 29-DEC-2013,18:39

Gamma Calibrator Number	696	
Mud Density	1.17	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-E.A 571

Field Calibration on 22-DEC-2013,09:06

	Measured	Calibrated (mV)
Reference 1	100.0	100.0
Reference 2	-100.0	-100.0

High Resolution Temperature Calibration MCG-E.A 571

Field Calibration on 22-DEC-2013,09:06

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-E.A 571

Last Edited on 22-DEC-2013,09:06

Pre-filter Length	11
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Micro Laterolog Calibration MMR-C.A 245

Base Calibration on
Field Check on

Base Calibration				
	Measured		Calibrated (ohm-m)	
	Ref 1	Ref 2	Ref 1	Ref 2
	0.0	0.0	0.0	0.0
	Base Check (ohm-m)		Field Check (ohm-m)	
	0.0		0.0	

Micro Laterolog Constants MMR-C.A 245

Last Edited on 03-NOV-2013 17:42

Pad Type	8 in Profile 3.5 in OD B32583	
Micro Laterolog K Factor	0.0165	
Standoff Offset	0.0000	inches

Mudcake Thickness Correction Constants		
Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper	N/A	

Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	68.00	Deg F
Mud Cake Resistivity Source	Constant Value	
Temp. Source Rmc Correc.	N/A	

Caliper Calibration MMR-C.A 245

Base Calibration on 26-DEC-2013 10:45
Field Calibration on 26-DEC-2013 10:47

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13962	5.96
2	17138	7.99
3	20514	9.94
4	24249	11.90
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
9.93	9.94

Micro Normal and Micro Inverse Calibration MMR-C.A 245

Base Calibration on 13-DEC-2013 14:16
Field Check on 26-DEC-2013 11:02

Base Calibration

Channel	Measured		Calibrated (ohm-m)	
	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	11.7	59.7	5.0	25.0
Micro Inverse	15.5	77.3	5.0	25.0

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	76.0	76.0
Micro Inverse	58.9	58.9

Micro Normal and Micro Inverse Constants MMR-C.A 245

Last Edited on 13-DEC-2013 14:18

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	0.0000	inches	

Neutron Calibration MDN-A.A 11

Base Calibration on 13-DEC-2013 14:23
Field Check on 26-DEC-2013 11:29

Base Calibration

Ratio	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3430	106	3714	110
	32.349		33.764	

Field Calibrator at Base

Calibrated (cps)	
2162	3072
Ratio 0.704	

Field Check

Calibrated (cps)	
2116	3011
Ratio 0.703	

Neutron Constants MDN-A.A 11

Last Edited on 29-DEC-2013,18:40

Neutron Source Id	N1054	
Neutron Jig Number	036	
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 None
 Formation Fluid Salinity N/A kppm
 Barite Mud Correction Not Applied

FE Calibration MFE-A.A 65 Base Calibration on 13-DEC-2013 13:49
 Field Check on 26-DEC-2013 11:01

Base Calibration	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	958.0	126.8
Base Check		281.6
Field Check		281.6

FE Constants MFE-A.A 65 Last Edited on 29-DEC-2013,18:40

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-C.K 368 Last Edited on

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
 Correction for Sonde Skew Applied
 Cycle Stretch Algorithm Applied
 MN3FT 0.00 micro-sec
 MX3FT 1500.00 micro-sec
 Hunt-Raymer Constant 83.13 micro-sec/ft

Sonde Mode Compensated
 Hole Type Open Hole

Sonde Parameters

	Measured	Calibrated
Offset	0.0000	0.0000
Free Pipe	0.0000	

Peak Amplitude Source

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)	Depth (m)	
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	0.00	0.00	0.00	

Full Waveform Parameters

Use 3' Waveform to derive TR No
 Use 4' Waveform to derive TR No
 Use 5' Waveform to derive TR No
 Use 6' Waveform to derive TR No
 3' Waveform Discriminator Level 0.30 mV
 4' Waveform Discriminator Level 0.30 mV

5' Waveform Discriminator Level	0.15	mV
6' Waveform Discriminator Level	0.15	mV
3' Waveform Filter		
4' Waveform Filter		
5' Waveform Filter		
6' Waveform Filter		
Semblance Level	0.50	
Semblance Window Width	120.00	micro-sec
Sonic 1 Despiker	100.00	micro-sec/ft
Sonic 2 Despiker	100.00	micro-sec/ft

Induction Calibration MAI-A.A 169

Base Calibration on 13-DEC-2013,15:15
Field Check on 26-DEC-2013 11:09

Base Calibration

Test Loop Calibration Channel	Measured		Calibrated (mmho/m)	
	Low	High	Low	High
1	17.8	485.7	9.3	966.2
2	6.3	393.9	7.6	821.4
3	3.5	265.5	5.2	566.0
4	2.3	135.1	2.6	279.2

Array Temperature 75.2 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			10.6	3765.7
2			28.9	3447.4
3			27.8	3001.3
4			18.5	2065.5
Deep			16.6	2001.9
Medium			41.4	3922.3
Shallow			43.5	5033.4

Array Temperature 56.8 Deg F

Induction Constants MAI-A.A 169

Last Edited on 29-DEC-2013,18:41

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	6.0000		
Stand-off Fin Angle	60.00	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 169

Field Calibration on 22-DEC-2013,08:32

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MAI-A.A 169

Last Edited on 22-DEC-2013,08:32

Pre-filter Length	11
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Caliper Calibration MPD-B 120

Base Calibration on 26-DEC-2013 10:56

Field Calibration on 26-DEC-2013 10:58

Base Calibration	Measured	Calibrator Size (in)
Reading No		
1	29072	5.96
2	38065	7.99
3	46032	9.94
4	54336	11.90
5	0	0.00
6	N/A	N/A

Field Calibration	Measured Caliper (in)	Actual Caliper (in)
	7.96	7.99

Photo Density Calibration MPD-B 120

Base Calibration on 20-NOV-2013 09:59

Field Check on 26-DEC-2013 11:07

Density Calibration	Measured		Calibrated (sdu)	
Base Calibration	Near	Far	Near	Far
Reference 1	57527	28805	59869	31110
Reference 2	23364	2568	24557	2522
Field Check at Base	996.5	1249.7		
Field Check	989.1	1241.1		

PE Calibration	Measured			Calibrated
Base Calibration	WS	WH	Ratio	Ratio
Background	176	870		
Reference 1	20680	57341	0.363	0.369
Reference 2	5905	23227	0.256	0.271
Field Check at Base	176.1	869.9		
Field Check	175.5	862.4		

Density Constants MPD-B 120

Last Edited on 29-DEC-2013,18:39

Density Source Id	P56135B	
Nylon Calibrator Number	633	
Aluminium Calibrator Number	633	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.17	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)
 2.71
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00

Depth (ft)
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00
 0.00

DOWNHOLE EQUIPMENT

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Compact Comms Gamma
 MCG-E.A 571 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-Resistivity
 MMR-C.A 245 LG: 8.59 ft WT: 81.6 lb OD: 4.88 in

Compact Neutron
 MDN-A.A 11 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

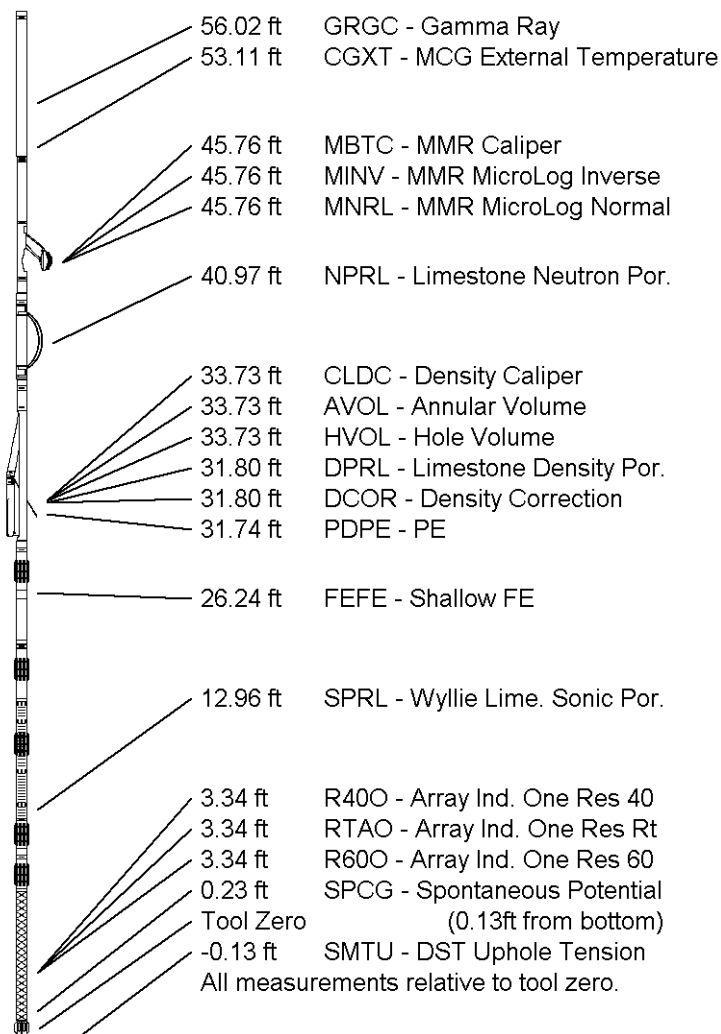
Compact Density/Caliper
 MPD-B 120 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
 MFE-A.A 65 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Sonic
 MSS-C.K 368 LG: 12.52 ft WT: 72.8 lb OD: 2.24 in

Compact Induction
 MAI-A.A 169 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 61.30 ft Weight: 456.4 lb



COMPANY TAOS RESOURCES OPERATING CO.
 WELL WEST MADDIX UNIT #20 SWD
 FIELD MADDIX NORTH
 PROVINCE/COUNTY COWLEY
 COUNTRY/STATE USA / KANSAS

Elevation Kelly Bushing	1286.00	feet	First Reading	4097.00	feet
Elevation Drill Floor	1284.00	feet	Depth Driller	4100.00	feet
Elevation Ground Level	1276.00	feet	Depth Logger	4100.00	feet



ARRAY INDUCTION
 COMPACT DENSITY / NEUTRON

Weatherford®

