



Weatherford
180

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY **M&M EXPLORATION, INC.**
WELL **Z-BAR #4-7**
FIELD **AETNA**
PROVINCE/COUNTY **BARBER**
COUNTRY/STATE **U.S.A. / KANSAS**
LOCATION **1980' FNL & 2080' FEL**
NE/4

SEC	TWP	RGE	Other Services	MML
4	34S	15W	MPD/MDN	
API Number 15-007-23913				
Permit Number				
Permanent Datum G.L., Elevation 1635 feet				
Log Measured From KB				
Drilling Measured From K.B.				
Date	25-AUG-2012			Elevations: KB 1647.00 DF 1646.00 GL 1635.00
Run Number	ONE			
Depth Driller	4950.00			feet
Depth Logger	4950.00			feet
First Reading	4947.00			feet
Last Reading	987.00			feet
Casing Driller	985.00			feet
Casing Logger	987.00			feet
Bit Size	7.875			inches
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.20 lb/USg		73.00 CP	
PH / Fluid Loss	11.00		10.00 ml/30Min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.67 @ 96.0			ohm-m
Rmf @ Measured Temp	0.54 @ 96.0			ohm-m
Rmc @ Measured Temp	0.80 @ 96.0			ohm-m
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.52 @124.0		ohm-m	
Time Since Circulation	5 HOURS			
Max Recorded Temp	124.00		deg F	
Equipment Name	COMPACT			
Equipment / Base	13057	LIB		
Recorded By	L. SCOTT			
Witnessed By	CHASE THOMAS			
S.O.# / JOB#	3537832			LB12-230

BOREHOLE RECORD

Last Edited: 25-AUG-2012 02:06

Bit Size inches	Depth From feet	Depth To feet
7.875	987.00	4950.00

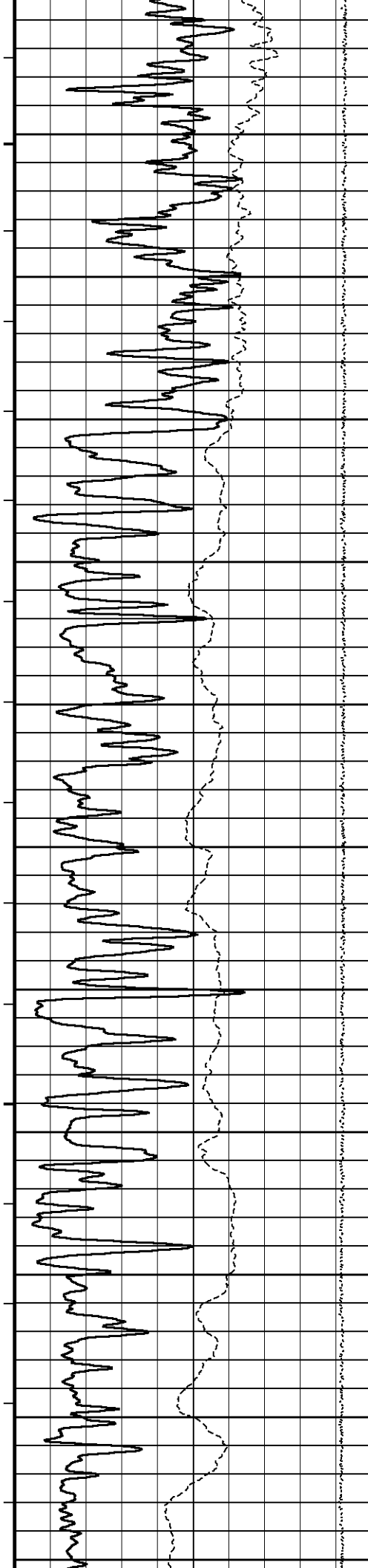
CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	987.00	24.00

REMARKS

Tools Ran: MCG, MML, MDN, MPD, MFE, MAI.
Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used. MFE and MAI 0.5 inch standoffs used.
2.71 g/cc Limestone Density Matrix used to calculate porosity.
All intervals logged and scaled per customer's request.
Tight pulls, washouts and borehole rugosity will affect data quality.
Total hole volume from TD to Surface casing = 1838 cu. ft.
Annular volume with 4.5 inch production casing= 274 cu. ft.
Service order: #3537832
Rig: Southwind Drilling Rig #70
Engineer: L. Scott
Operator(s): K. Rinehart

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.



99°

1300

100°

1400

101°

1500

101°

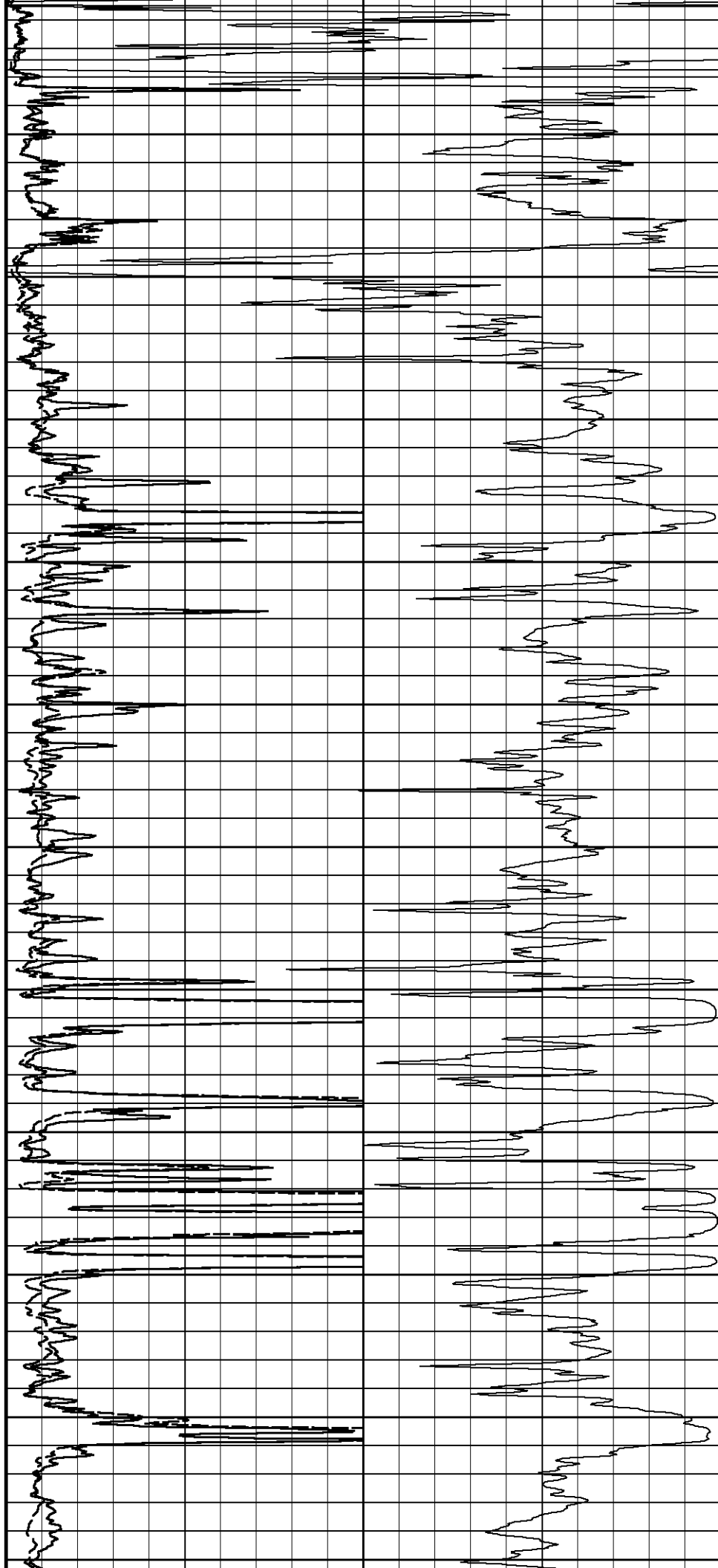
1600

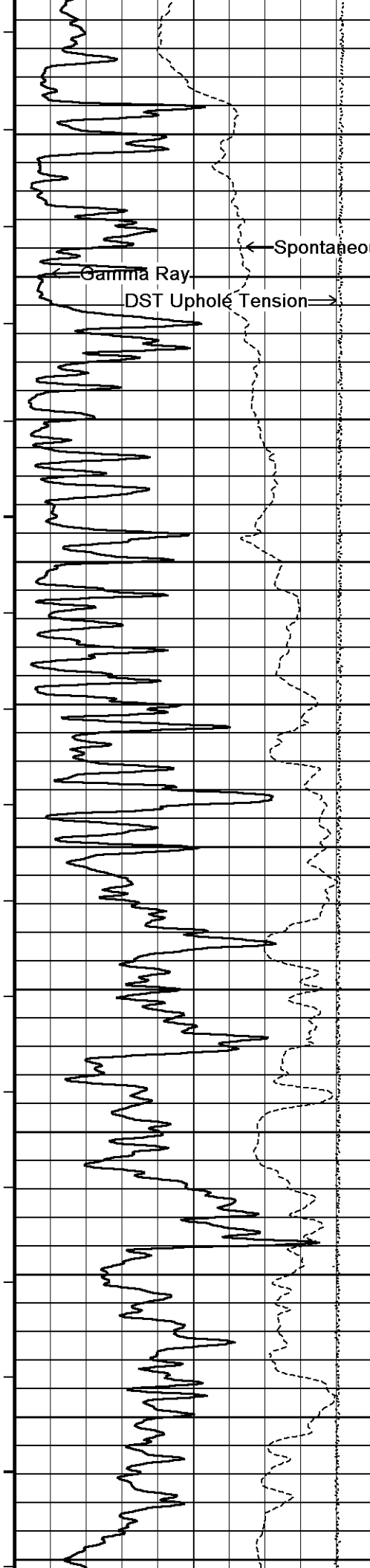
102°

1700

101°

1800





101°
Shallow FE

Spontaneous Potential

1900

102°

2000

103°

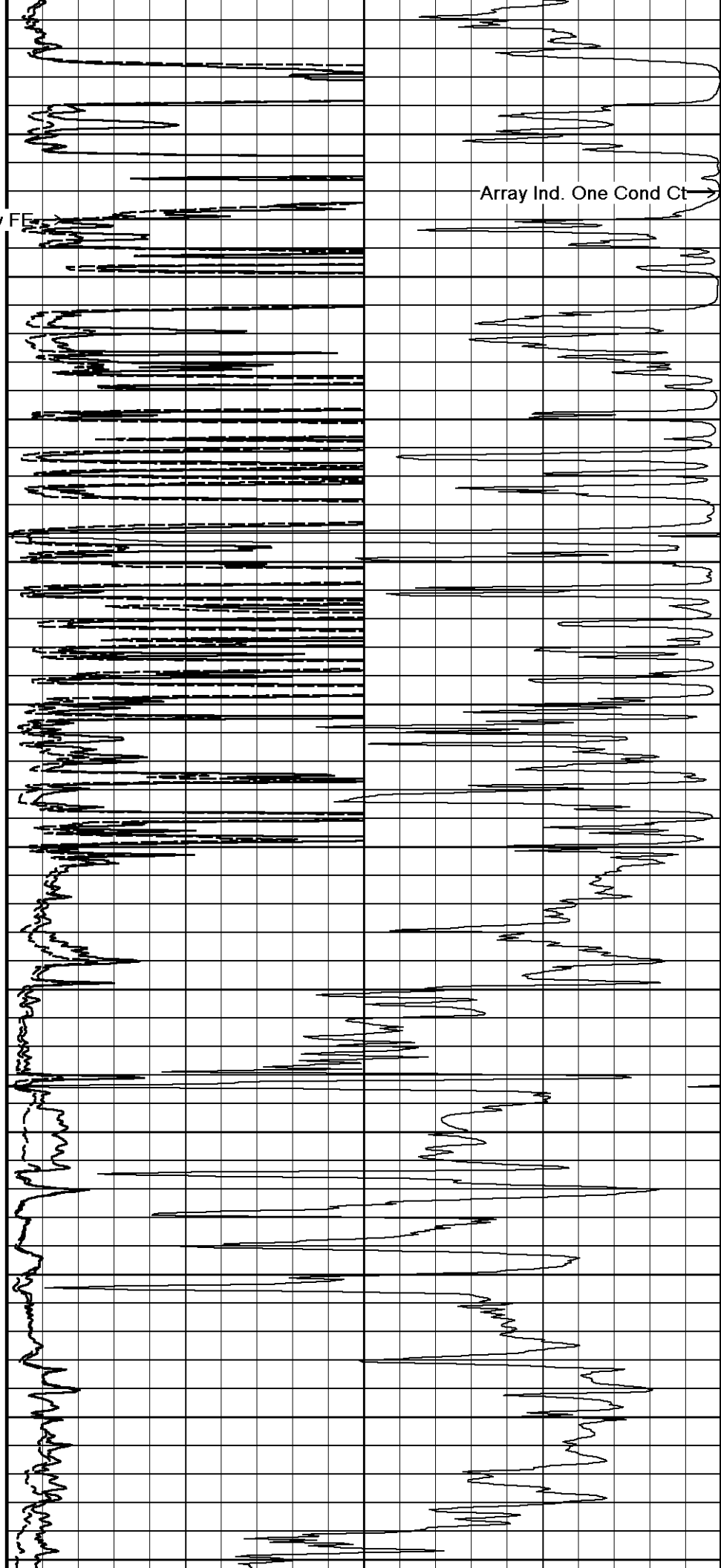
2100

104°

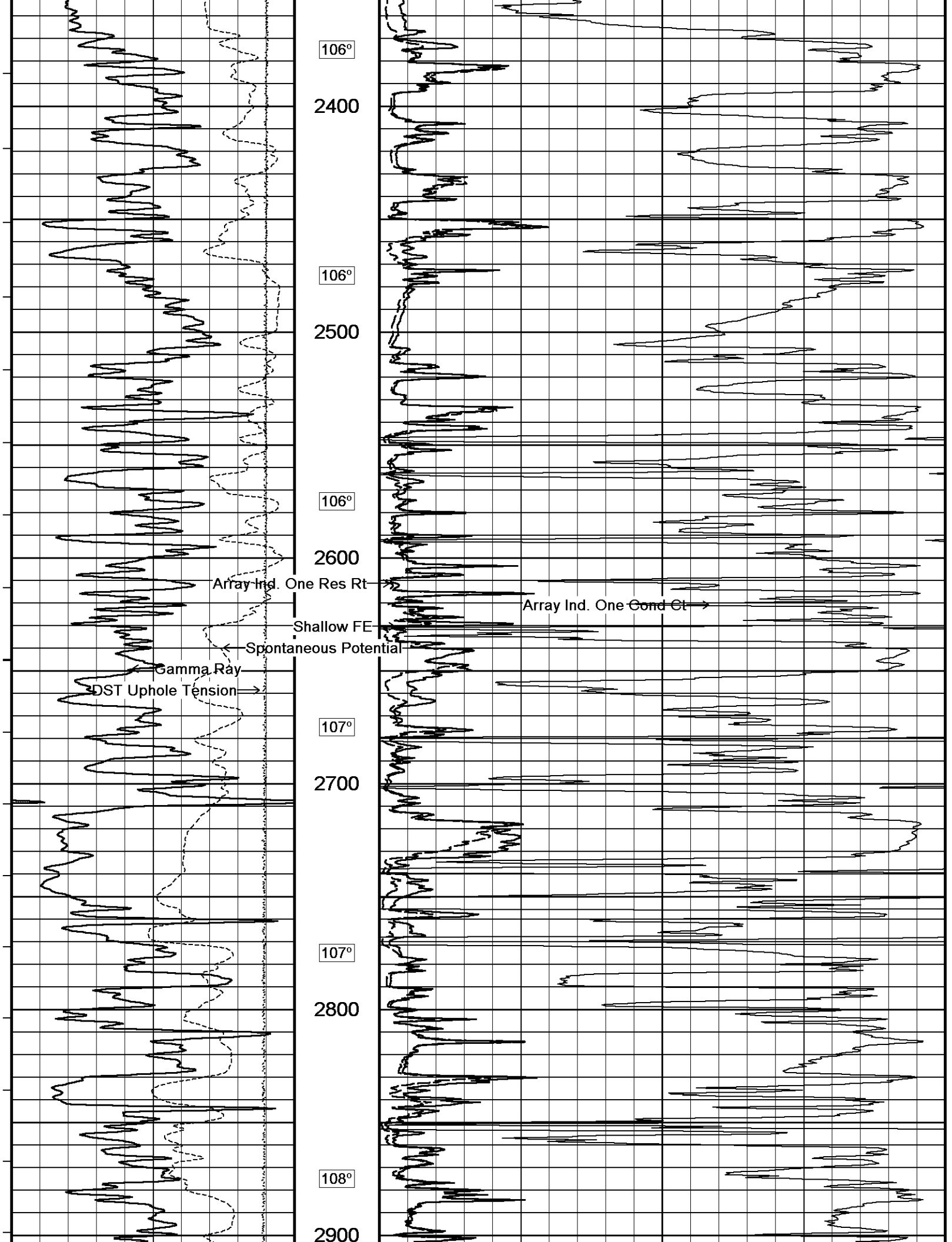
2200

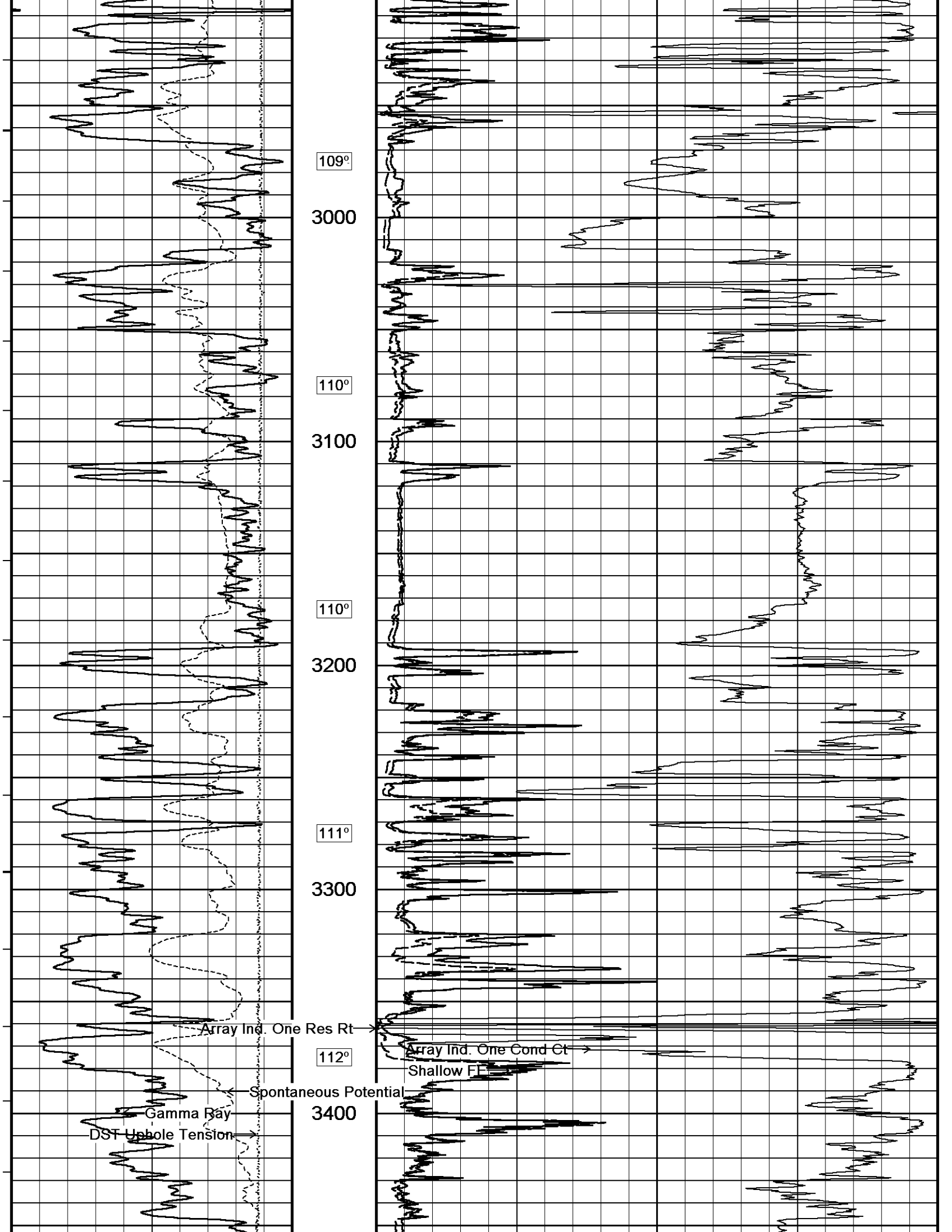
105°

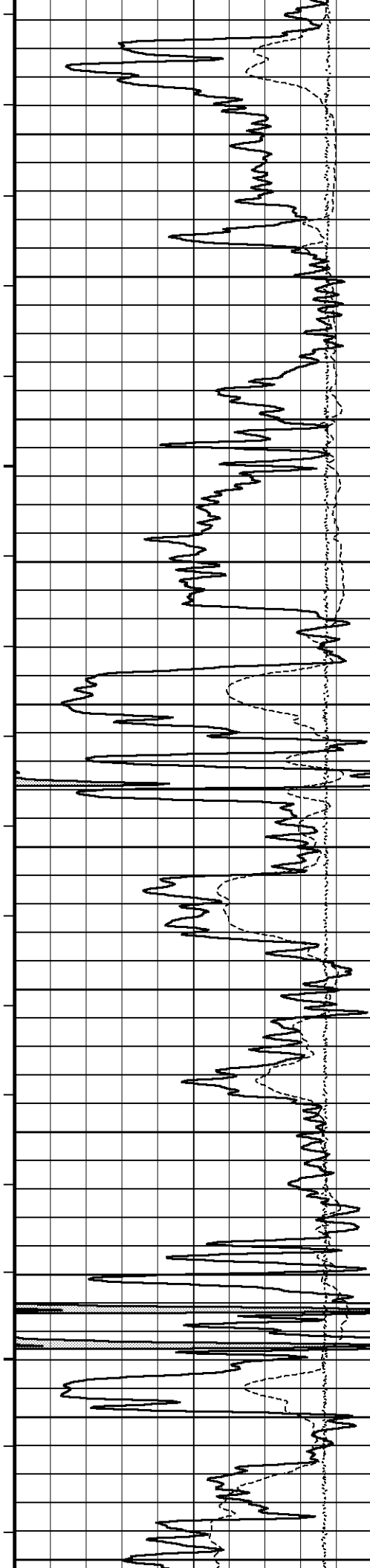
2300



Array Ind. One Cond Ct







113°

3500

114°

3600

114°

3700

115°

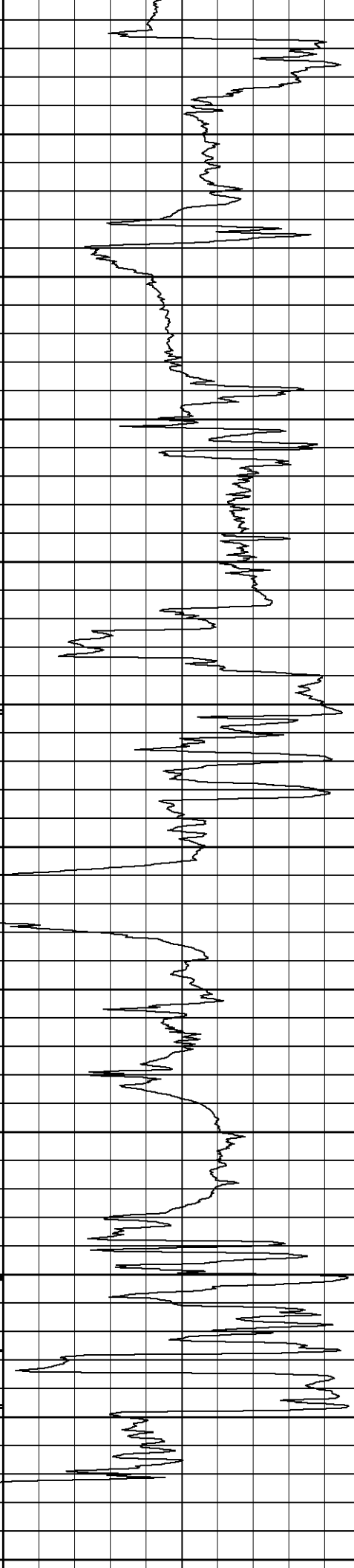
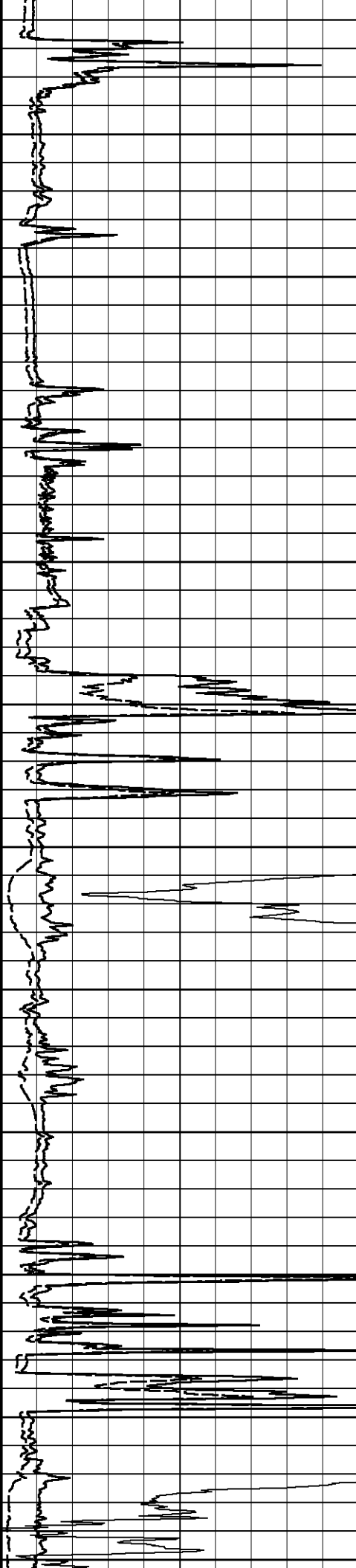
3800

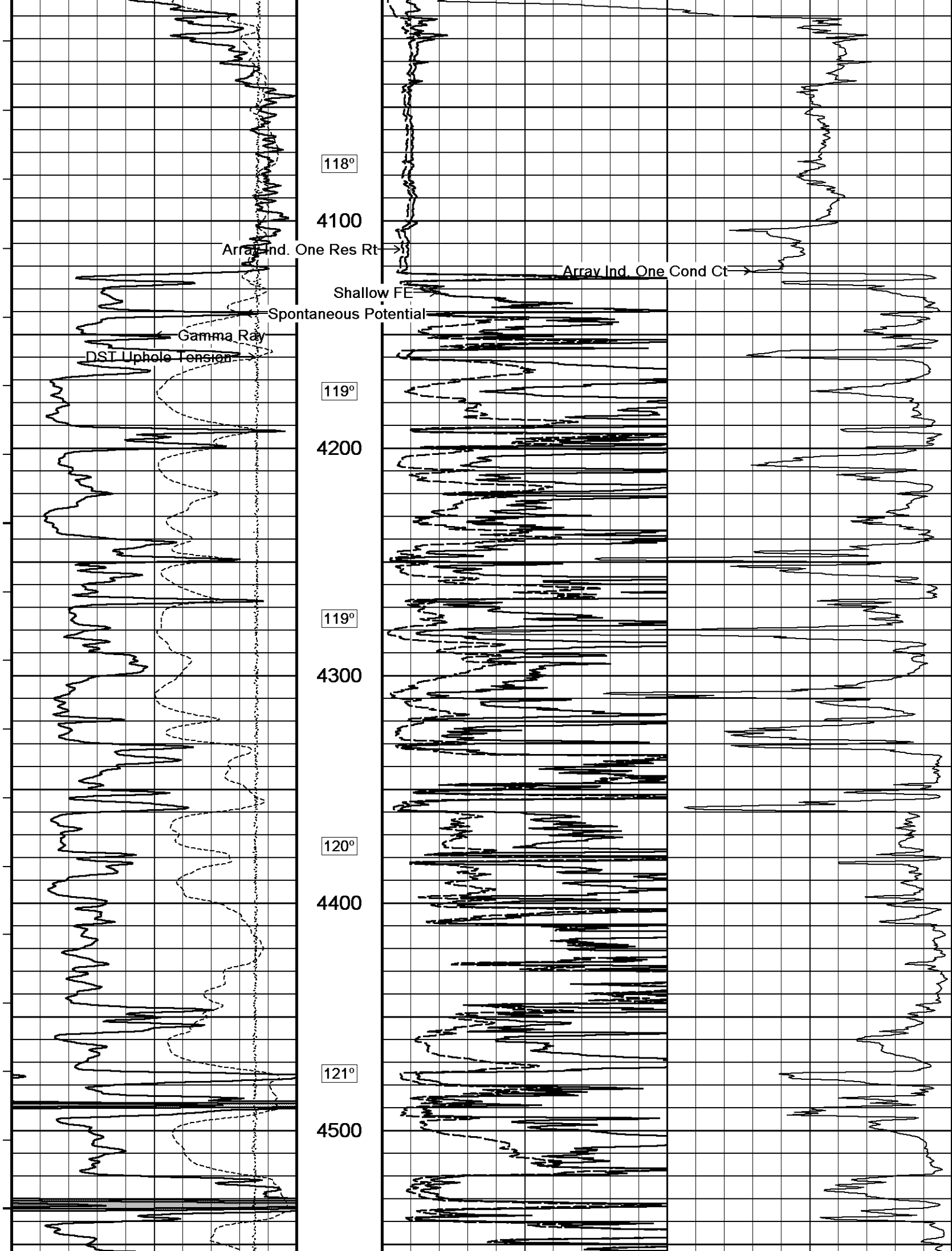
116°

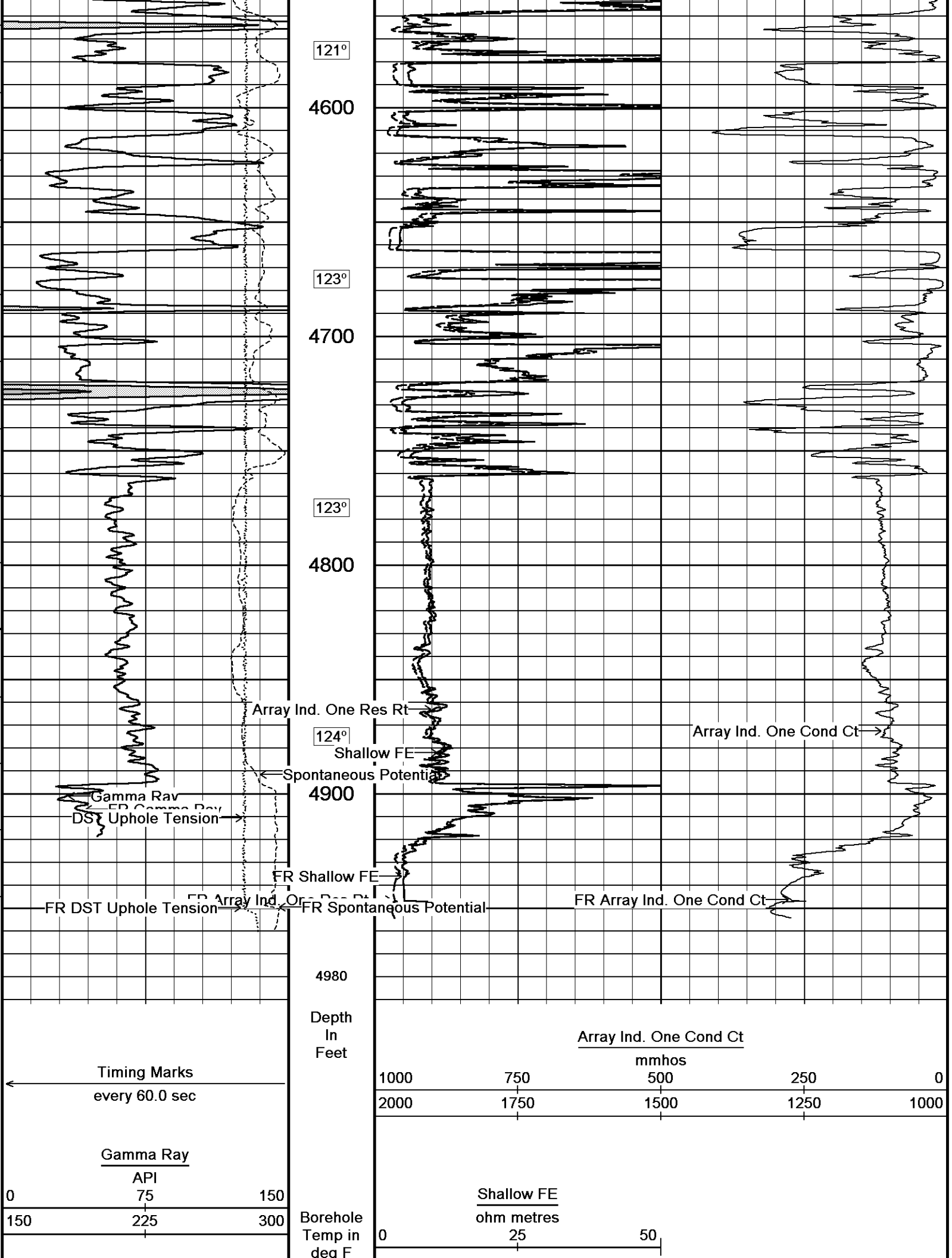
3900

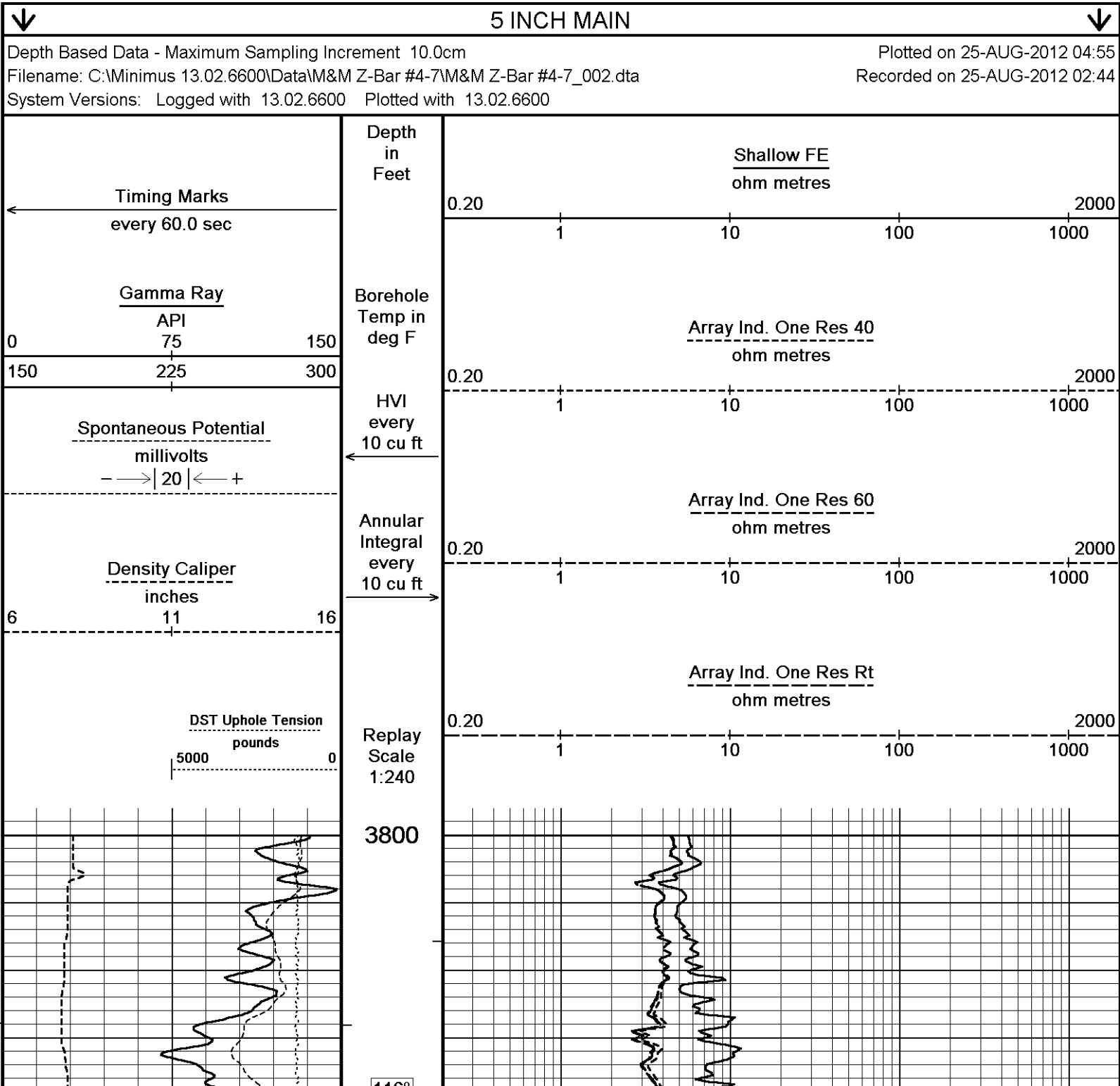
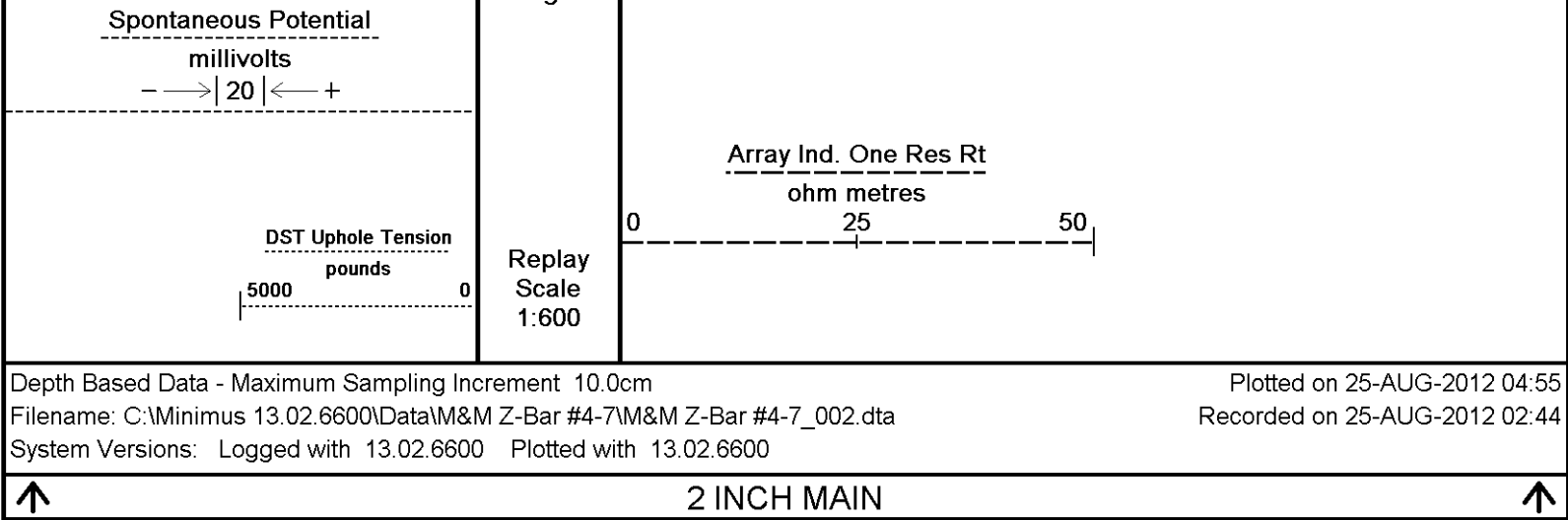
118°

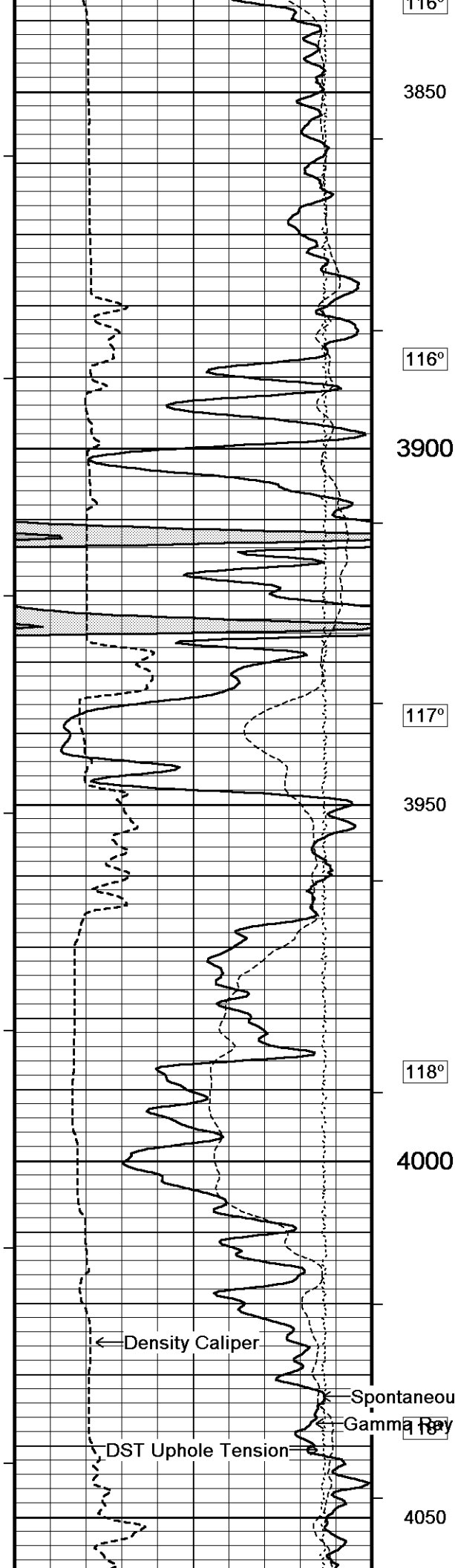
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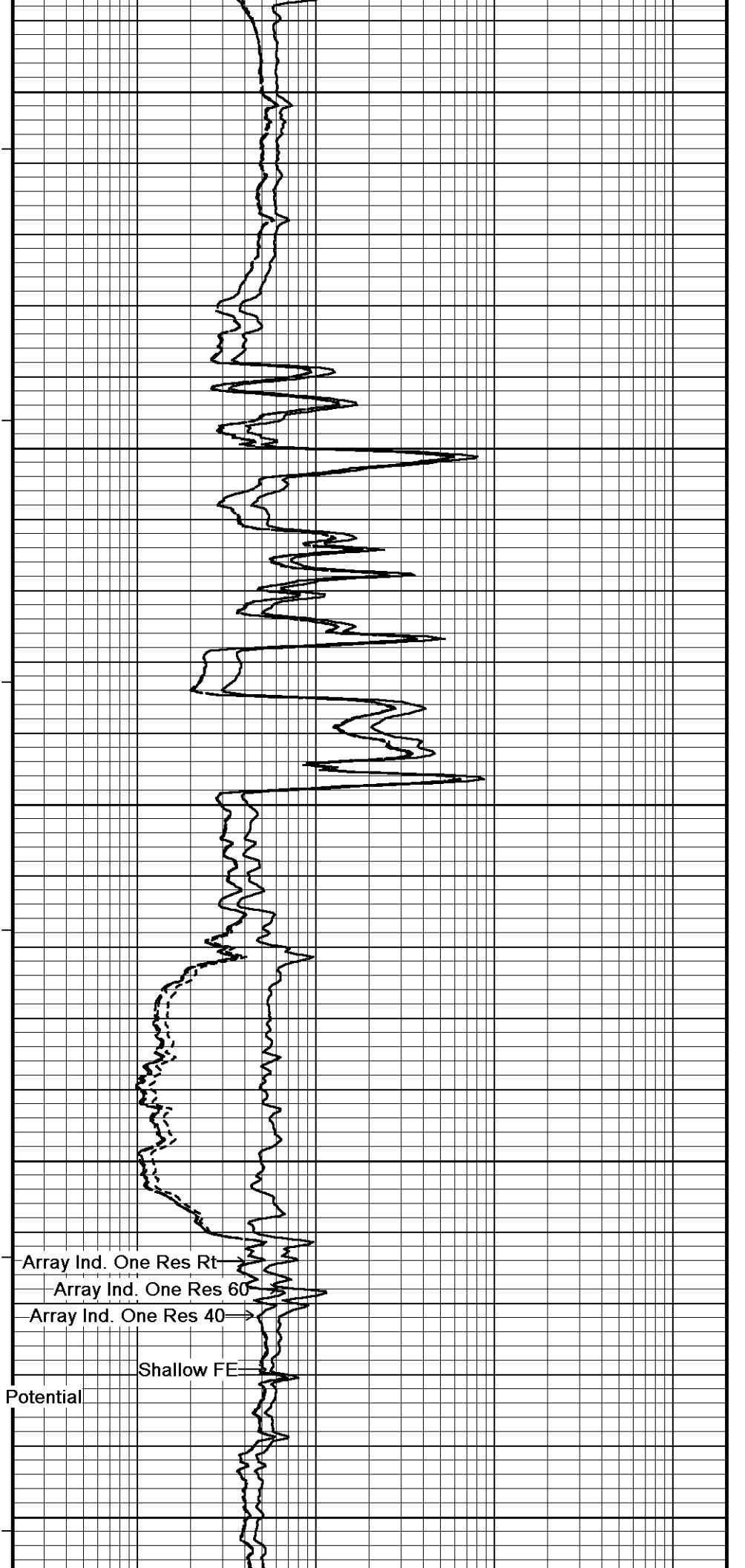








116°
3850
116°
3900
117°
3950
118°
4000
4050

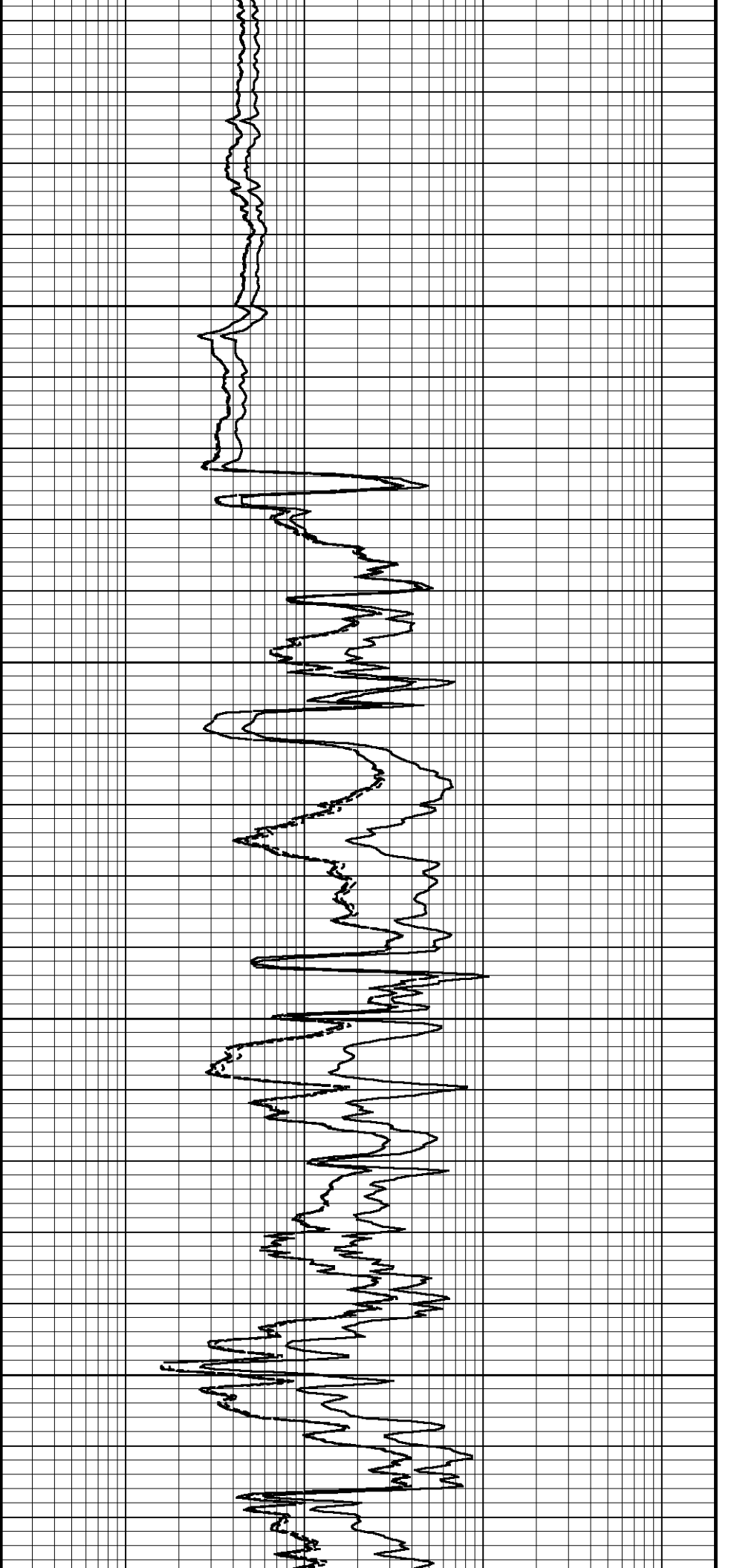
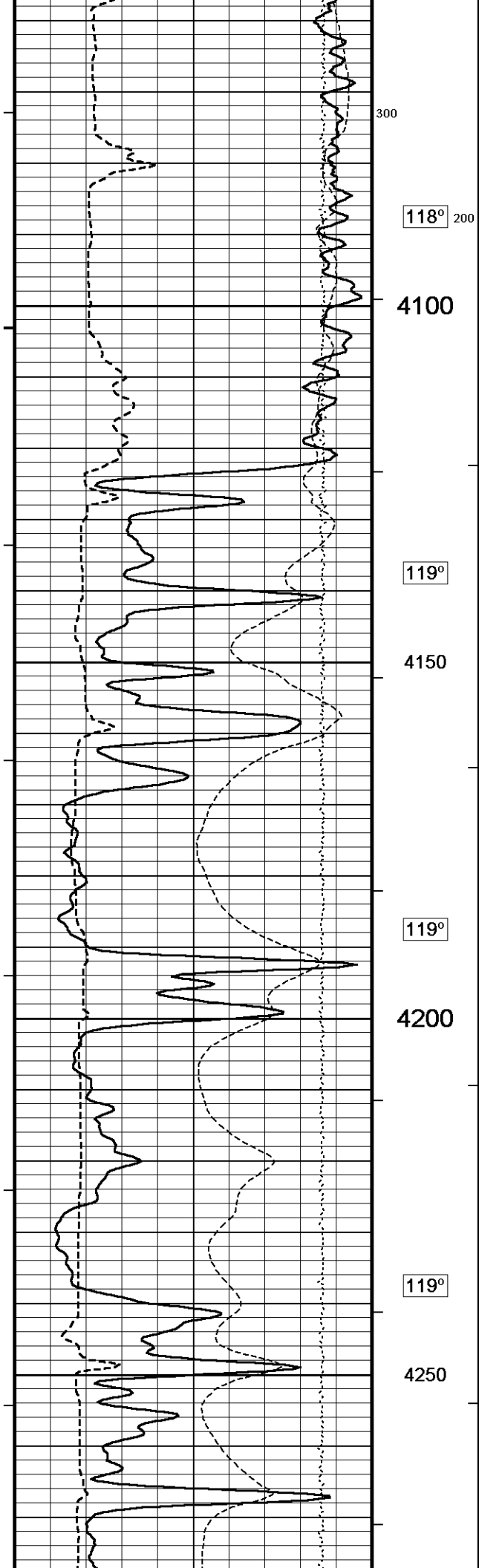


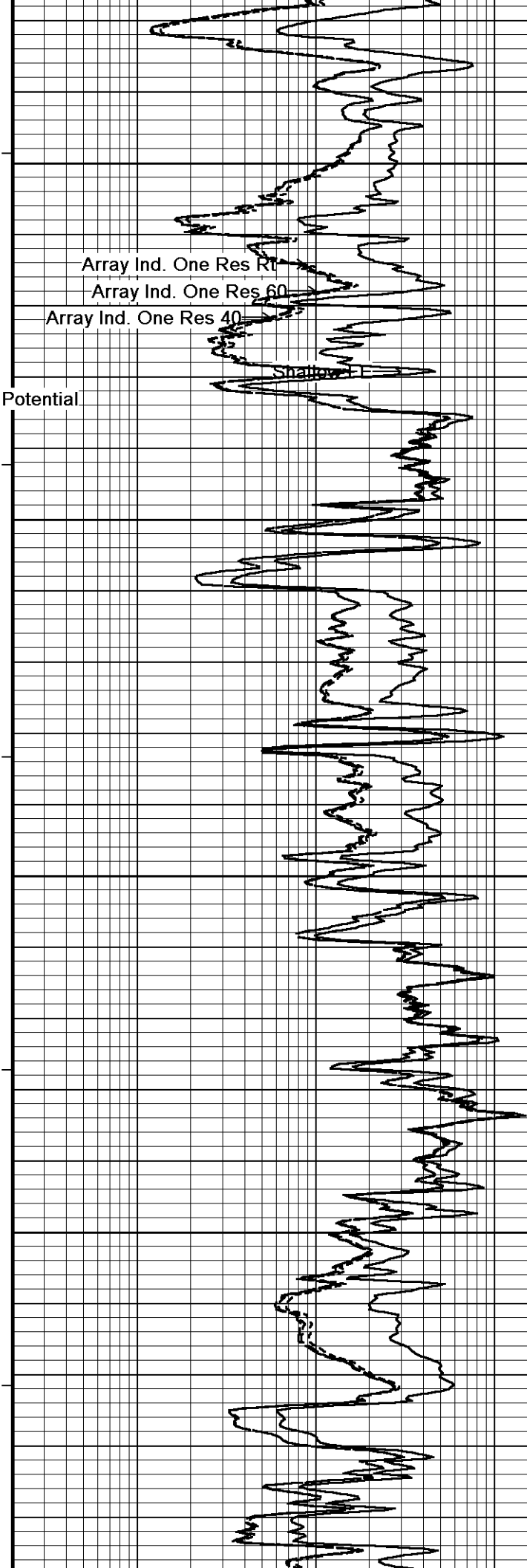
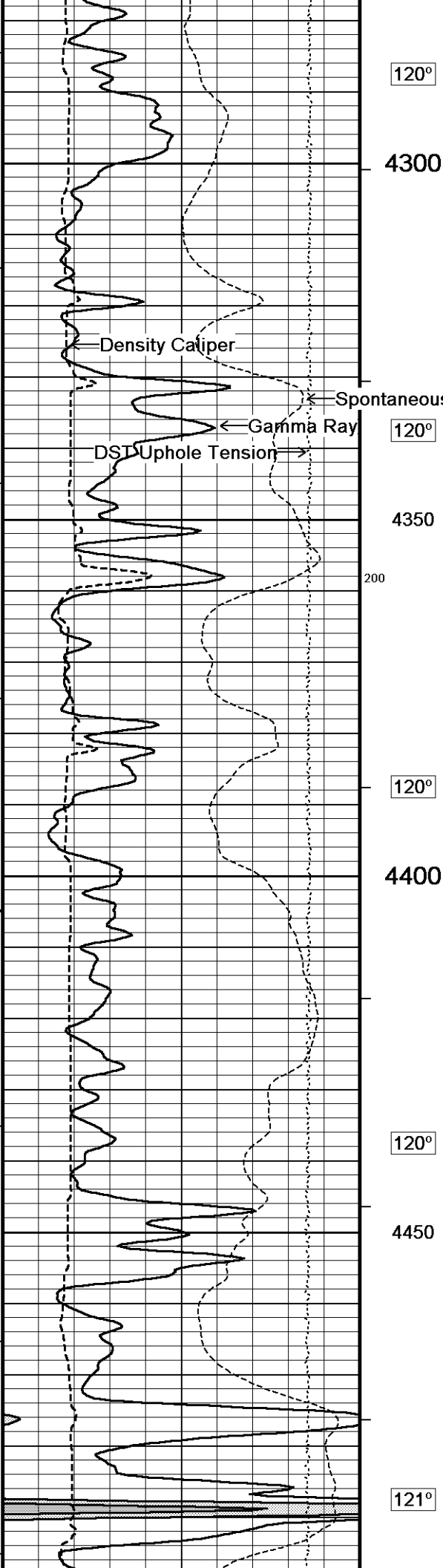
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE

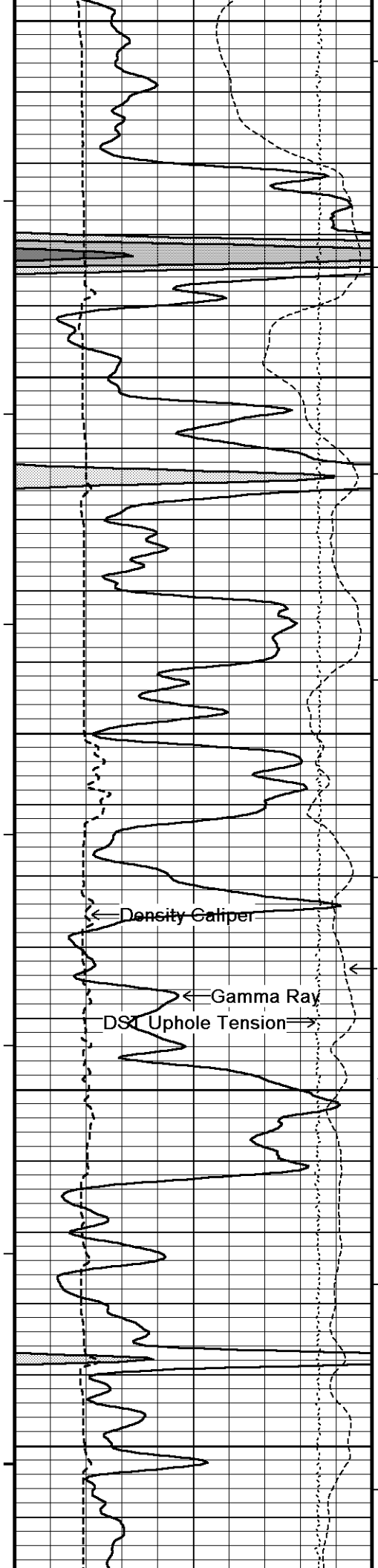
Density Caliper

Spontaneous Potential
Gamma Ray

DST Uphole Tension





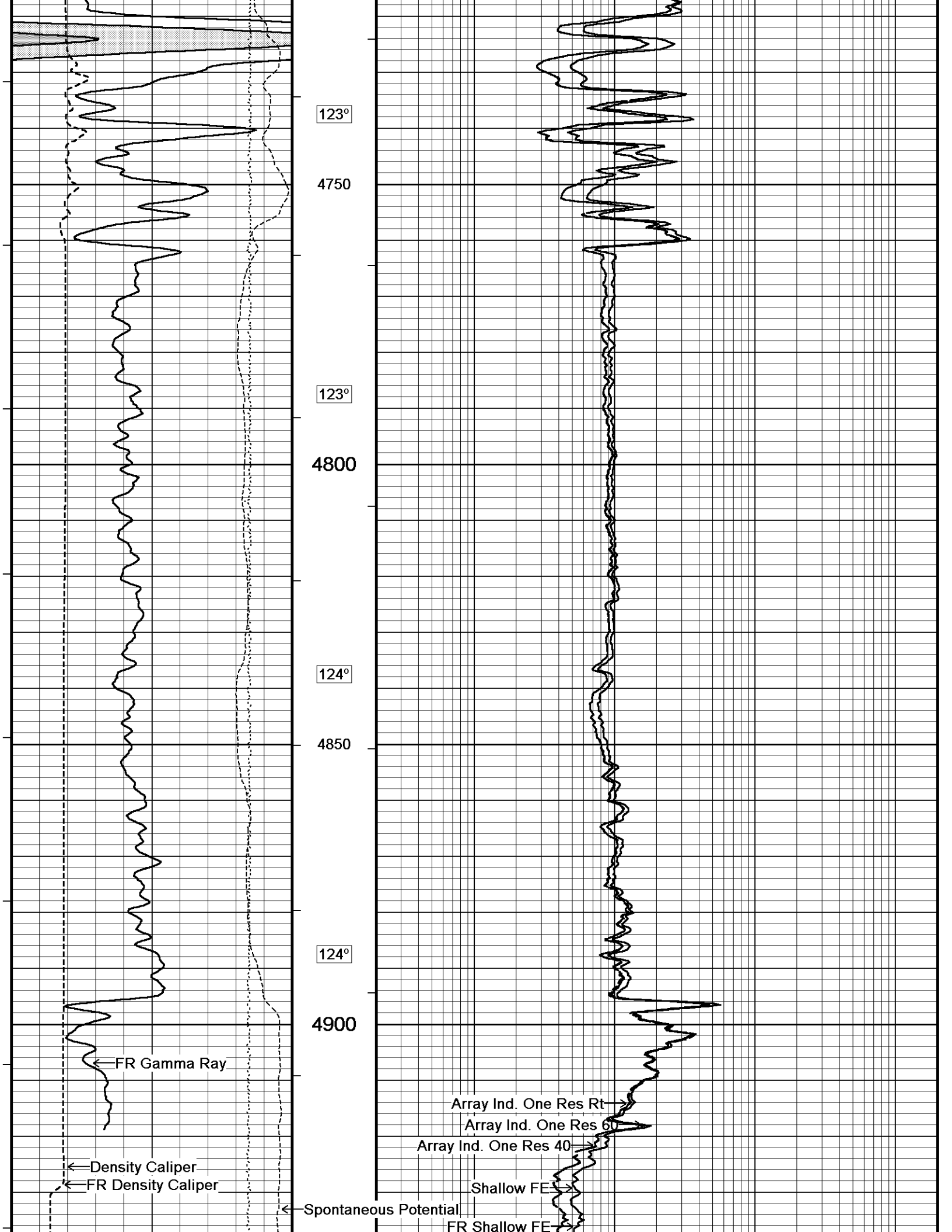


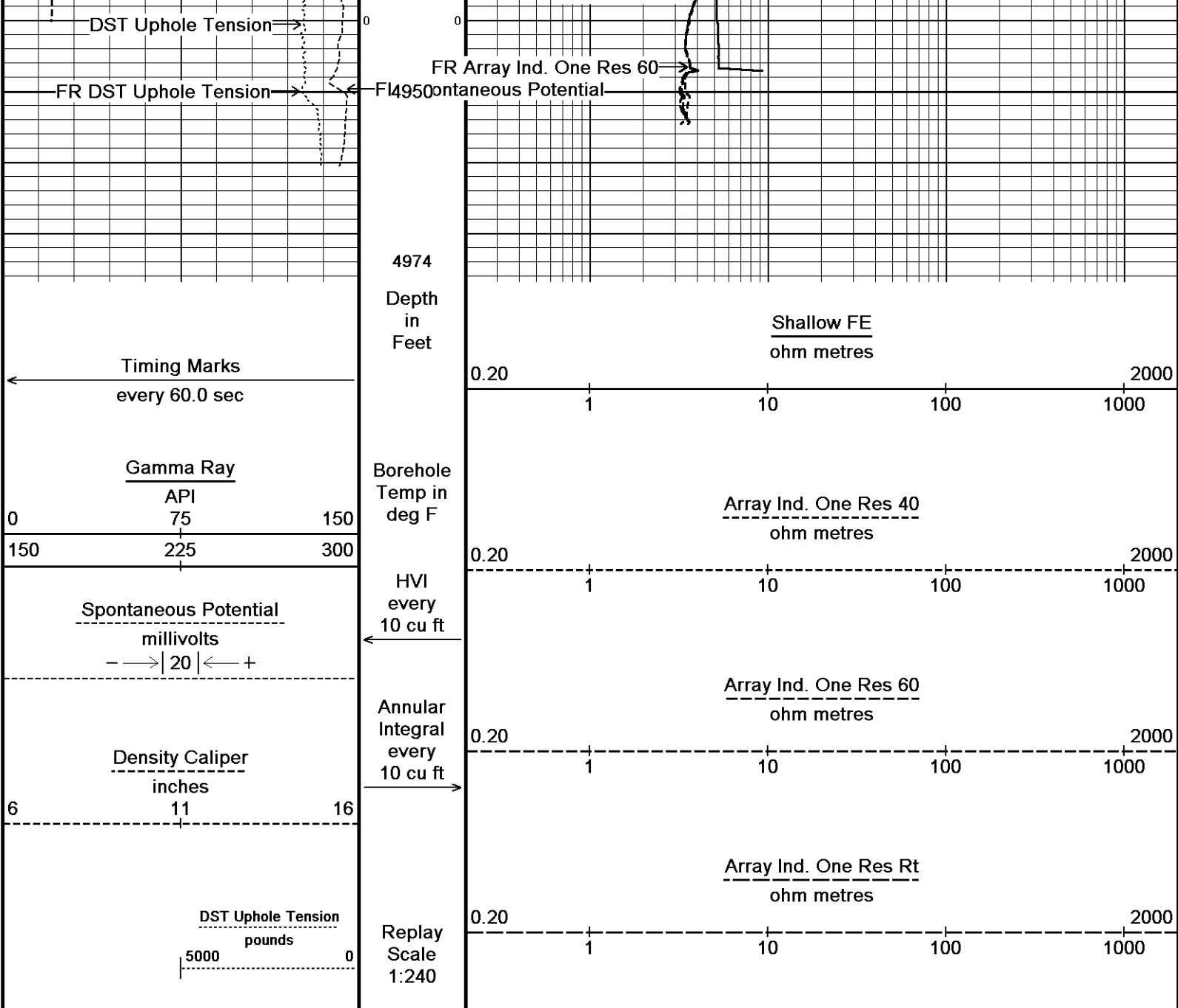
4500
100
121°
4550
122°
4600
122°
100
4650
123°
4700

Spontaneous Potential

Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40

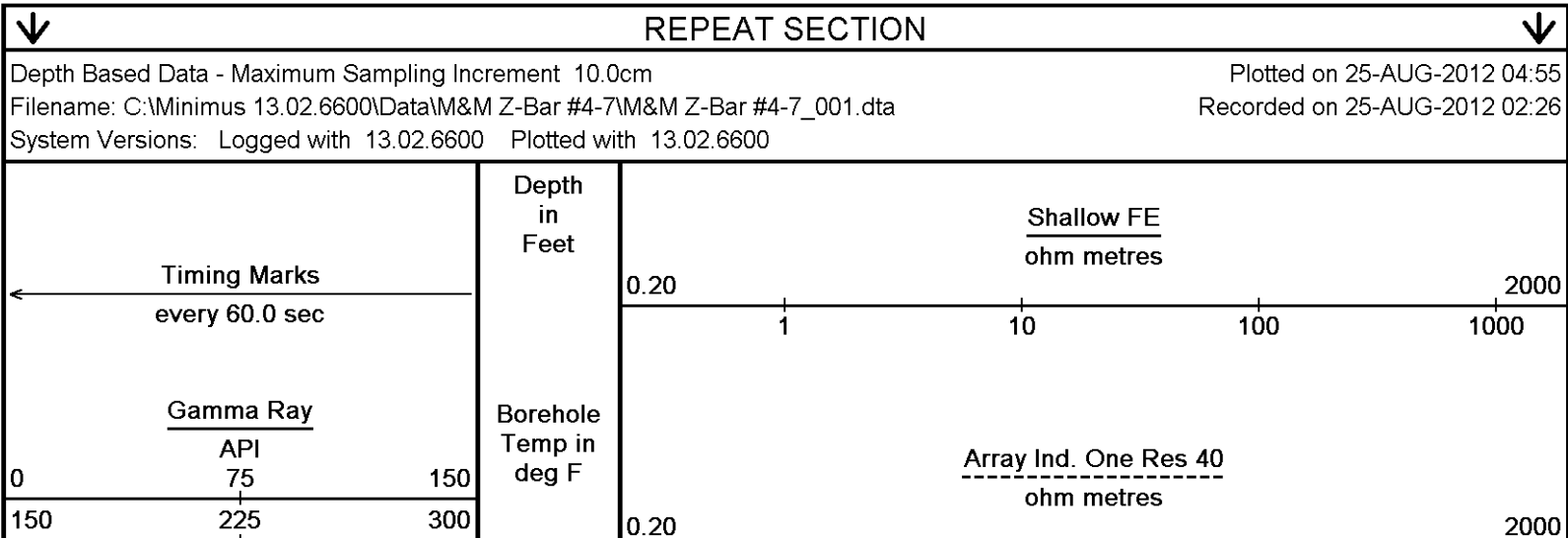
Shallow FE

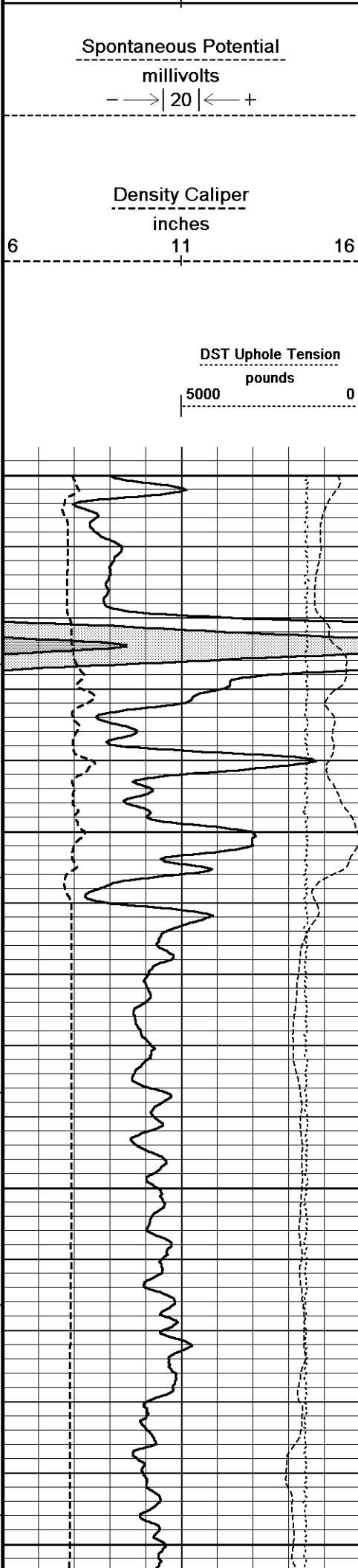




Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #4-7\M&M Z-Bar #4-7_002.dta
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600
Plotted on 25-AUG-2012 04:55
Recorded on 25-AUG-2012 02:44

5 INCH MAIN





HVI
every
10 cu ft
←

Annular
Integral
every
10 cu ft
→

Replay
Scale
1:240

4700

122°

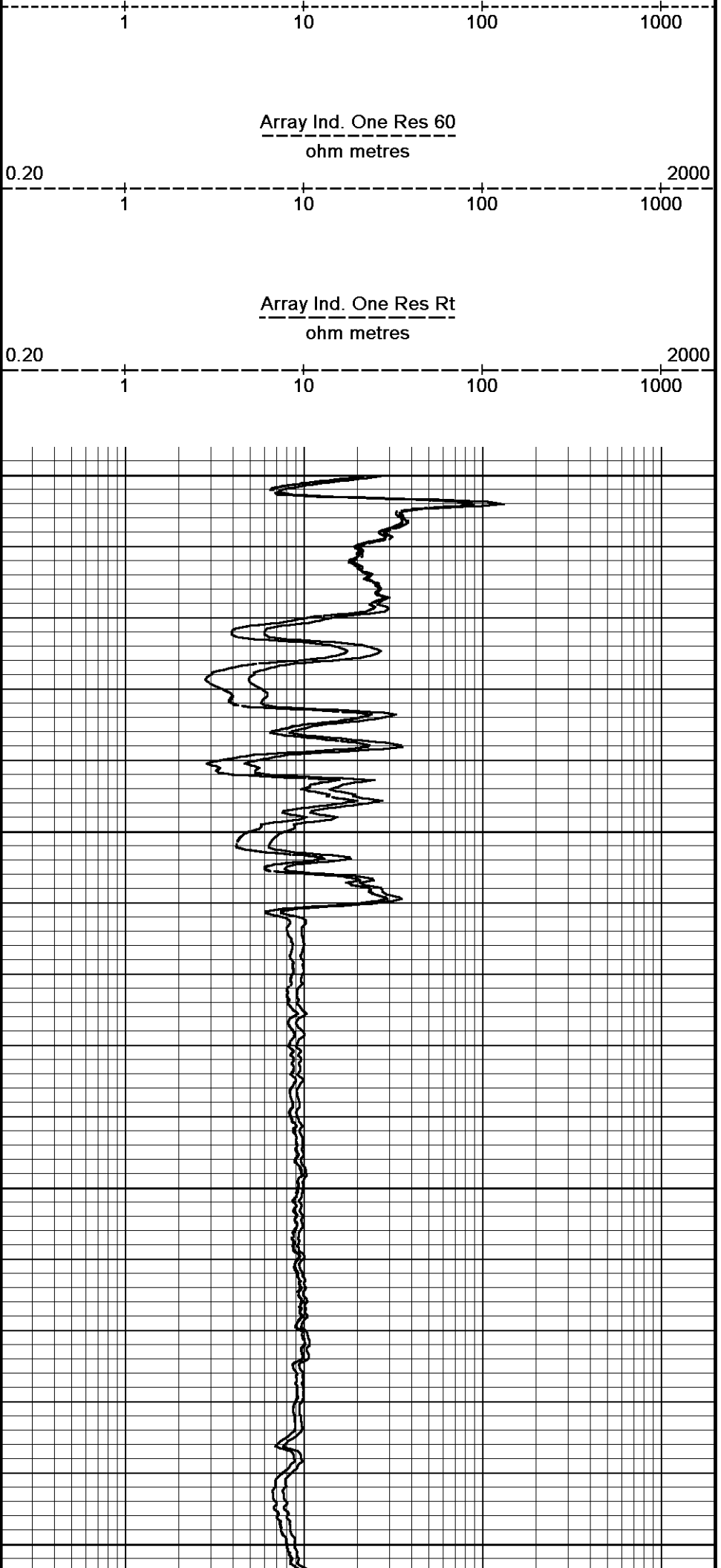
4750

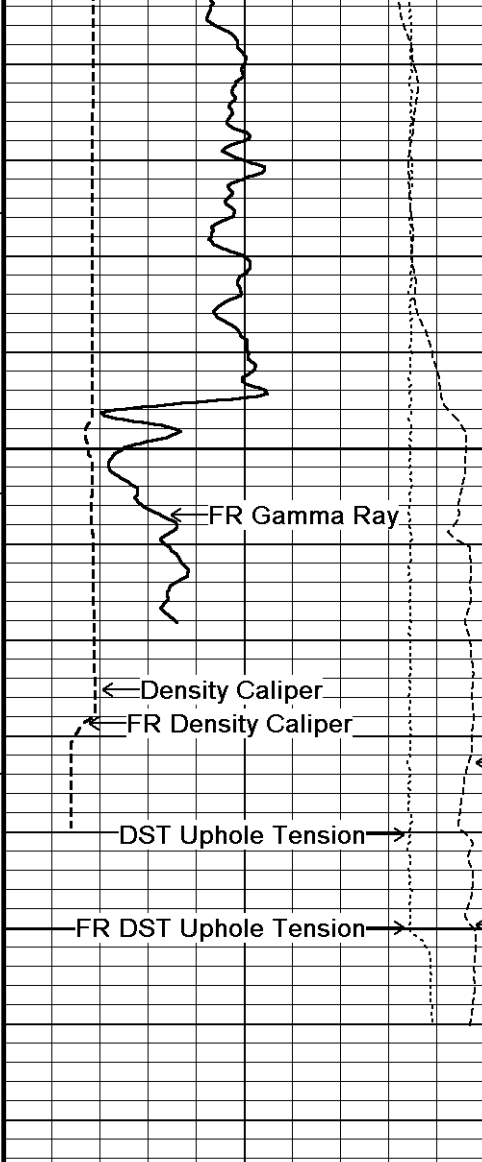
123°

4800

123°

4850





124°

4900

FR Gamma Ray

Density Caliper

FR Density Caliper

DST Uphole Tension

FR DST Uphole Tension

Spontaneous Potential

0

0

FR Array Ind. One Res 60

Spontaneous Potential

4972

Depth
in
Feet

Timing Marks
every 60.0 sec

Gamma Ray

API

75

0

150

225

300

Borehole
Temp in
deg F

Spontaneous Potential

millivolts

- - - - - 20 - - - - - +

Density Caliper

inches

6

11

16

Annular
Integral
every
10 cu ft

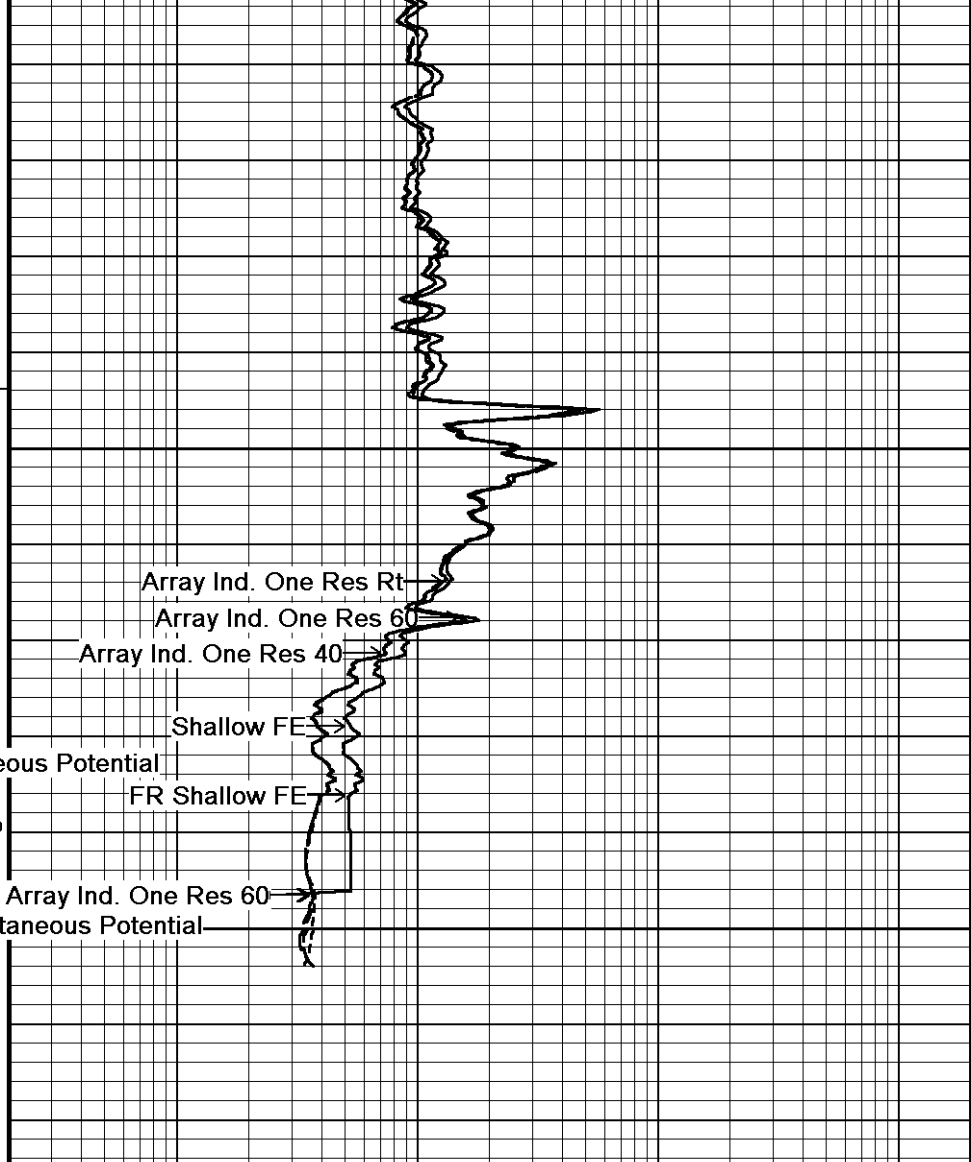
DST Uphole Tension

pounds

5000

0

Replay
Scale
1:240



Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE

FR Shallow FE

FR Array Ind. One Res 60

Spontaneous Potential

Shallow FE
ohm metres

0.20

2000

1

10

100

1000

Array Ind. One Res 40

ohm metres

0.20

2000

1

10

100

1000

Array Ind. One Res 60

ohm metres

0.20

2000

1

10

100

1000

Array Ind. One Res Rt

ohm metres

0.20

2000

1

10

100

1000



REPEAT SECTION



BEFORE SURVEY CALIBRATION

C:\Minimus 13.02.6600\Data\M&M Z-Bar #4-7\M&M Z-Bar #4-7_001.dta

General Constants All 000

Last Edited on 24-AUG-2012,20:37

General Parameters

Mud Resistivity	0.670	ohm-metres
Mud Resistivity Temperature	96.000	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	4.500	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 07-AUG-2012 11:13

Reading No	Measured	Calibrated (lbs)
1	16092.12	0.00
2	16514.94	399.00

Gamma Calibration MCG-C 208

Field Calibration on 21-AUG-2012 21:07

	Measured	Calibrated (API)
Background	68	47
Calibrator (Gross)	1127	772
Calibrator (Net)	1059	725

Gamma Constants MCG-C 208

Last Edited on 24-AUG-2012,20:37

Gamma Calibrator Number	GR38	
Mud Density	1.10	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

SP Calibration MCG-C 208

Field Calibration on 03-AUG-2012 22:37

	Measured	Calibrated (mV)
Reference 1	100.2	101.0
Reference 2	-101.3	-101.0

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 03-AUG-2012,16:18

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00

High Resolution Temperature Constants MCG-C 208

Last Edited on

Pre-filter Length	11
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Micro Normal and Micro Inverse Calibration MML-A 4

Base Calibration on 24-JUL-2012 08:59

Field Check on 10-AUG-2012 09:05

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	15.7	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 4			Last Edited on 24-AUG-2012,20:38	
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	

Caliper Calibration MML-A 4			Base Calibration on 24-JUL-2012 08:53
			Field Calibration on 10-AUG-2012 09:04
Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	15504	5.98	
2	18771	7.97	
3	22124	9.86	
4	25894	11.92	
5	0	0.00	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	5.95	5.98	

Neutron Calibration MDN-A.B 65				Base Calibration on 26-JUL-2012 11:25	
				Field Check on 21-AUG-2012 21:12	
Base Calibration					
		Measured		Calibrated (cps)	
	Near	Far		Near	Far
	3179	99		3714	110
Ratio	32.263			33.764	
Field Calibrator at Base					
				Calibrated (cps)	
				1621	2347
Ratio				0.691	
Field Check					
				Calibrated (cps)	
				1631	2355
Ratio				0.693	

Neutron Constants MDN-A.B 65			Last Edited on 24-AUG-2012,20:38	
Neutron Source Id	PN-521			
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-A.A 55			Base Calibration on 24-JUL-2012 09:23 Field Check on 21-AUG-2012 20:29	
Base Calibration				
	Measured	Calibrated (ohm-m)		
Reference 1	0.0	0.0		

Reference 2	968.0	126.8	
Base Check		276.7	
Field Check		276.7	
FE Constants MFE-A.A 55		Last Edited on 24-AUG-2012,20:38	
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 45		Base Calibration on 26-JUL-2012,09:22 Field Check on 21-AUG-2012 20:59	
Base Calibration			
Test Loop Calibration	Measured	Calibrated (mmho/m)	
Channel	Low High	Low High	
1	14.4 472.6	9.3 966.2	
2	5.7 374.0	7.6 821.4	
3	3.4 261.2	5.2 566.0	
4	2.5 133.9	2.6 279.2	
Array Temperature	78.4	Deg F	
Channel	Base Check (mmho/m)	Field Check (mmho/m)	
	Low High	Low High	
1	0.0 0.0	19.5 3852.8	
2	0.0 0.0	31.8 3630.0	
3	0.0 0.0	28.6 3049.8	
4	0.0 0.0	18.2 2079.4	
Deep	0.0 0.0	16.0 1911.4	
Medium	0.0 0.0	42.3 4061.0	
Shallow	0.0 0.0	49.9 5484.1	
Array Temperature	0.0	83.3	Deg F
Induction Constants MAI-A.A 45		Last Edited on 24-AUG-2012,20:39	
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 45		
	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	75.00	75.00
High Resolution Temperature Constants MAI-A.A 45		
Pre-filter Length	11	
Caliper Calibration MPD-B 31		
		Base Calibration on 26-JUL-2012 09:16
		Field Calibration on 21-AUG-2012 20:40
Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	17567	3.99
2	26416	5.98
3	35056	7.97
4	43488	9.86
5	52816	11.92
6	N/A	N/A
Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	6.04	5.98
Photo Density Calibration MPD-B 31		
		Base Calibration on 26-JUL-2012 10:02
		Field Check on 21-AUG-2012 20:34
Density Calibration		
Base Calibration		
	Measured	Calibrated (sdu)
	Near Far	Near Far
Reference 1	48085 24200	59556 30836
Reference 2	19674 1989	24941 2541
Field Check at Base		
	692.2 849.9	
Field Check		
	692.6 851.2	
PE Calibration		
Base Calibration		
	Measured	Calibrated
	WS WH Ratio	Ratio
Background	127 608	
Reference 1	19234 47953 0.404	0.371
Reference 2	5695 19580 0.293	0.272
Field Check at Base		
	126.7 608.3	
Field Check		
	128.1 606.2	
Density Constants MPD-B 31		
		Last Edited on 24-AUG-2012,20:38
Density Source Id	254	
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	1.13	
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	0.00	

DOWNHOLE EQUIPMENT

C:\Minimus 13.02.6600\Data\M&M Z-Bar #4-7\M&M Z-Bar #4-7_001.dta

Compact Comms Gamma
MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log
MML-A 4 LG: 7.97 ft WT: 81.6 lb OD: 2.24 in

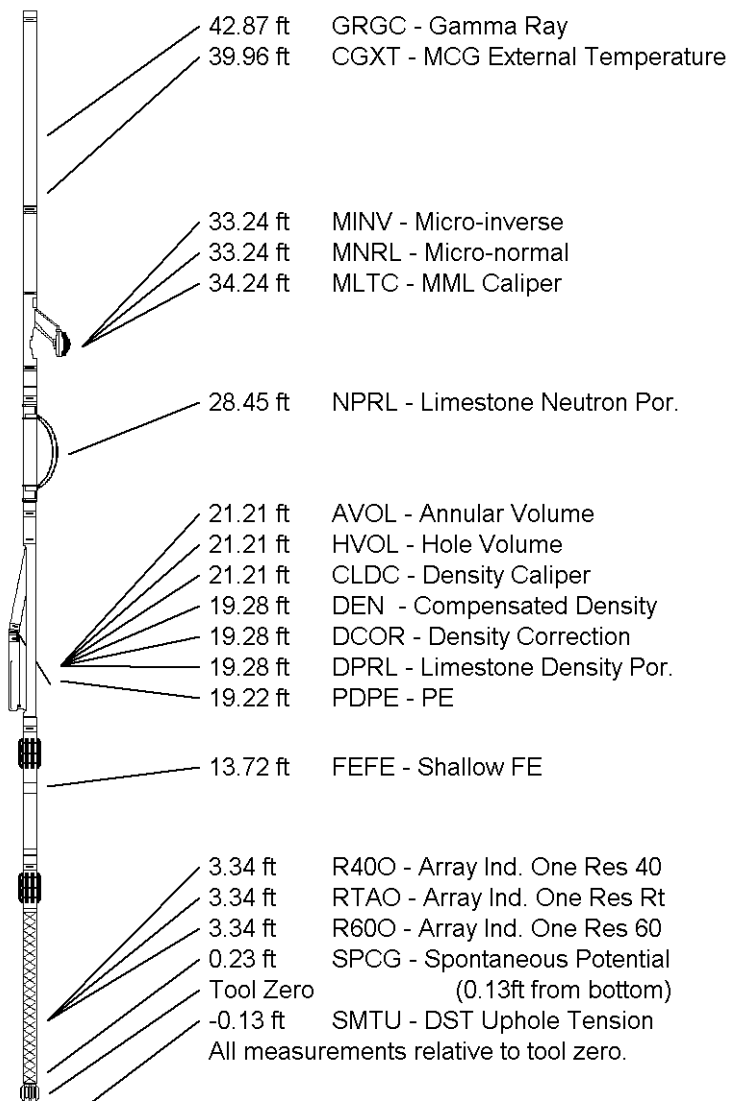
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 48.16 ft Weight: 383.6 lb



COMPANY	M&M EXPLORATION, INC.
WELL	Z-BAR #4-7
FIELD	AETNA
PROVINCE/COUNTY	BARBER
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	1647.00	feet	First Reading	4947.00	feet
Elevation Drill Floor	1646.00	feet	Depth Driller	4950.00	feet
Elevation Ground Level	1635.00	feet	Depth Logger	4950.00	feet



Weatherford®

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG



Weatherford

**ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG**

COMPANY: M&M EXPLORATION, INC.

WELL: Z-BAR #4-7

FIELD: AETNA

PROVINCE/COUNTY: BARBER

COUNTRY/STATE: U.S.A. / KANSAS

LOCATION: 1980' FNL & 2080' FEL

NE/4

SEC: 1

TWP: 34S

RGE: 19W

Other Services: MFL

Log Number: 15-007-23913

Permanent Datum 0 L, Elevation 1635 feet

Log Measured From KB

Drilling Measured From K.B.

Date: 25-AUG-2012

Run Number: ONE

Depth Driller: 4850.00

Depth Logger: 4850.00

First Reading: 4847.00

Last Reading: 987.00

Casing Driller: 985.00

Casing Logger: 987.00

Bit Size: 7.875

Hole Fluid Type: CHEMICAL

Density/Viscosity: 9.20 lbm/59

PH / Fluid Loss: 11.00

Sample Source: FLOWLINE

Rm @ Measured Temp: 0.67 @ 96.0

Rm @ Measured Temp: 0.54 @ 96.0

Rm @ Measured Temp: 0.80 @ 96.0

Source Rm / Rmc: CALC

Rm @ BHT: 0.52 @ 124.0

Time Since Circulation: 5 HOURS

Max Recorded Temp: 124.00

Equipment Name: COMPACT

Equipment Base: 13067

Recorded By: L SCOTT

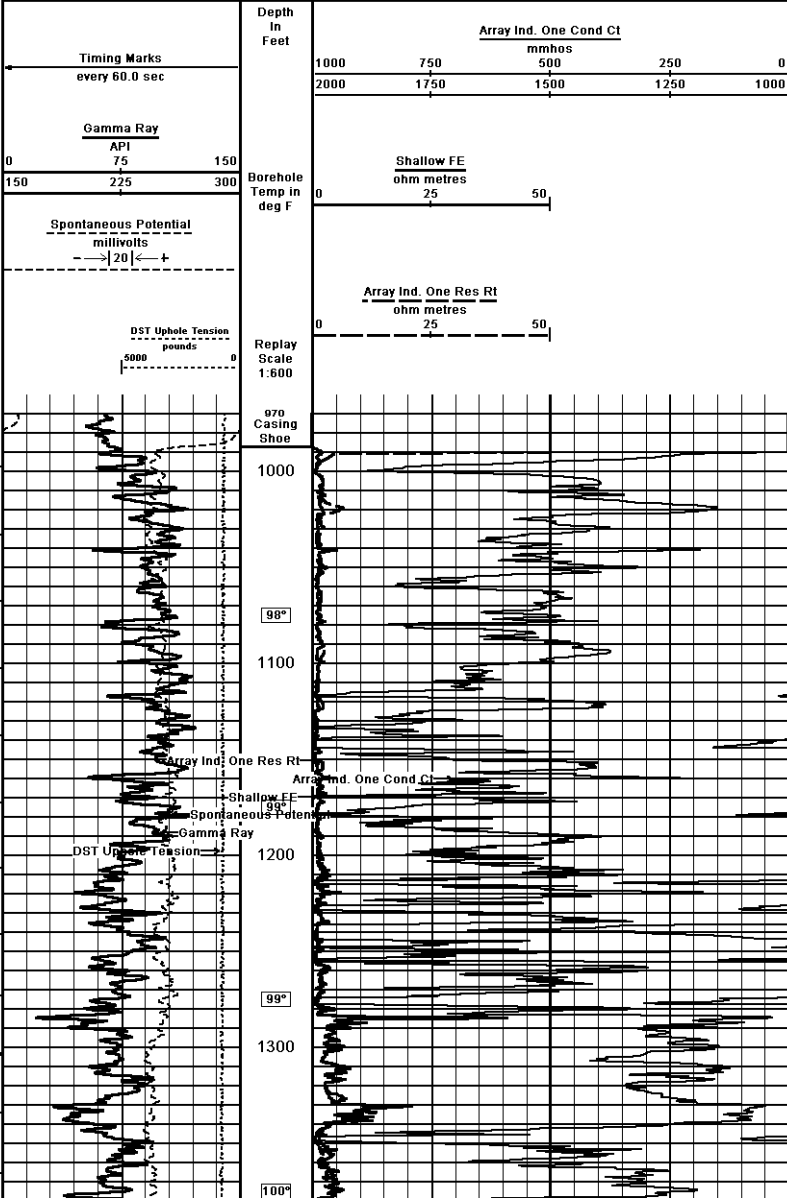
Witnessed By: CHASE THOMAS

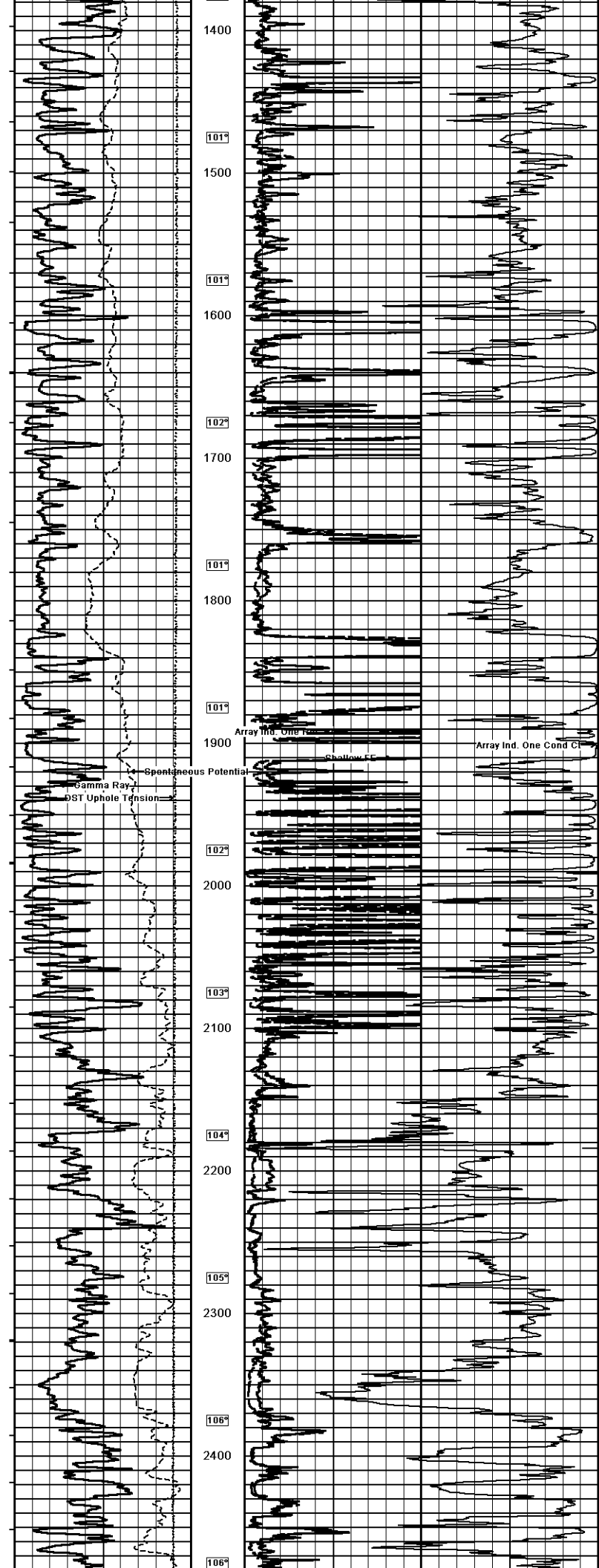
SOI # 108#

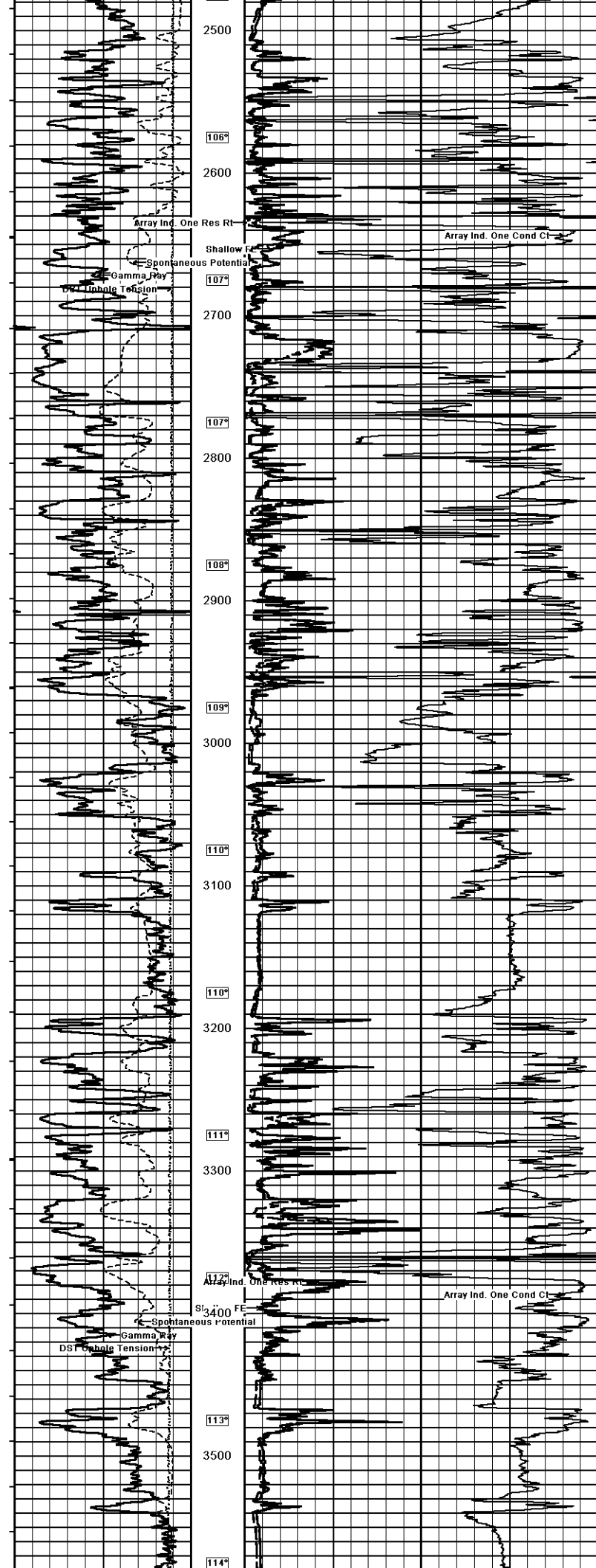
Remarks:
1547
1546
1535

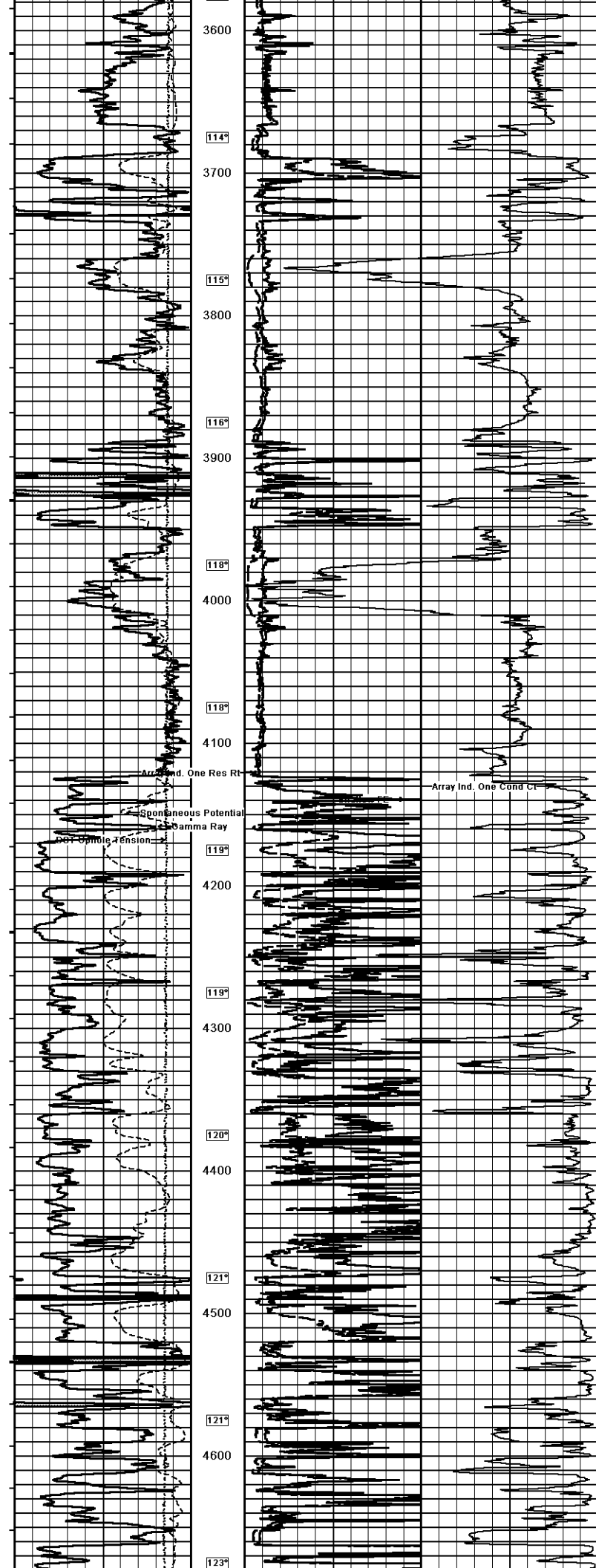
1 INCH MAIN

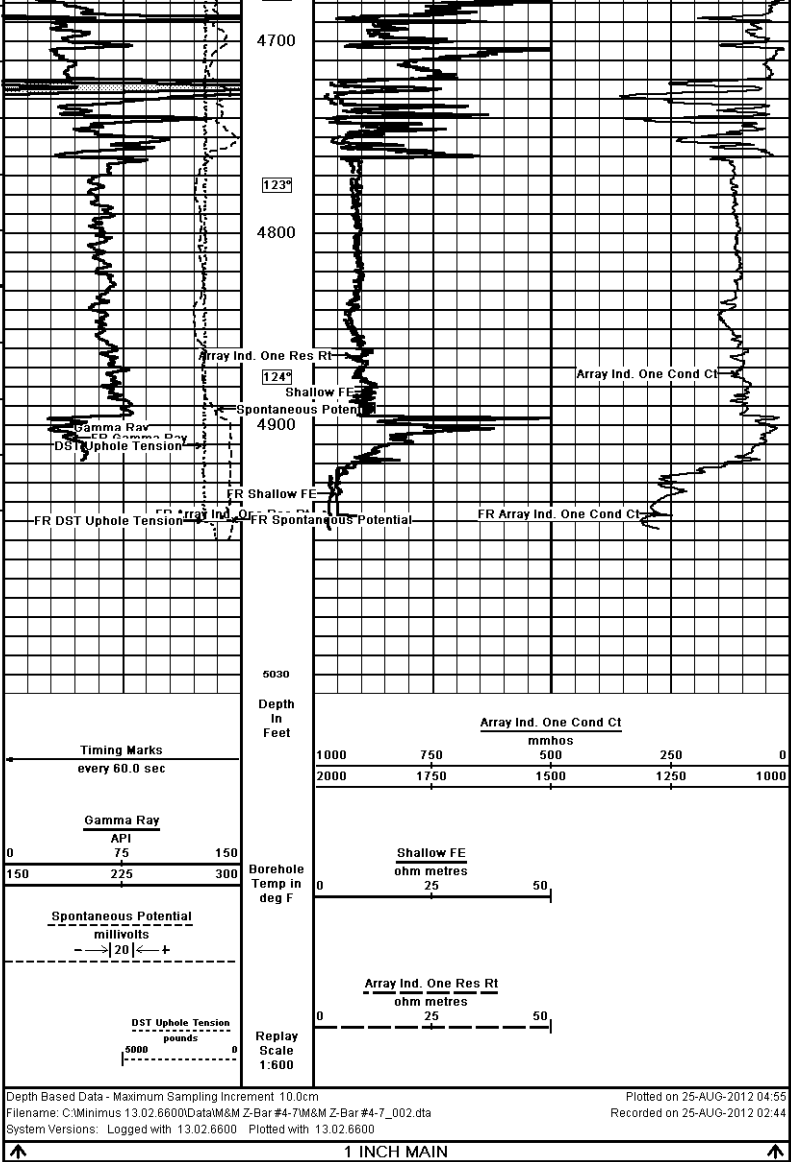
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 25-AUG-2012 04:55
Filename: C:\Minimus 13.02.6600\Data\M&M Z-Bar #4-7\M&M Z-Bar #4-7_002.dta
Recorded on 25-AUG-2012 02:44
System Versions: Logged with 13.02.6600 Plotted with 13.02.6600











COMPANY		M&M EXPLORATION, INC.			
WELL		Z-BAR #4-7			
FIELD		AETNA			
PROVINCE/COUNTY		BARBER			
COUNTRY/STATE		U.S.A. / KANSAS			
Elevation Kelly Bushing	1647.00	feet	First Reading	4947.00	feet
Elevation Drill Floor	1646.00	feet	Depth Driller	4950.00	feet
Elevation Ground Level	1635.00	feet	Depth Logger	4950.00	feet
			ARRAY INDUCTION		
Weatherford			SHALLOW FOCUSED		
			ELECTRIC LOG		