



Weatherford
LOG

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY

M&M EXPLORATION, INC.

WELL

Z-BAR #9-5

FIELD

AETNA GAS AREA

PROVINCE/COUNTY

BARBER

COUNTRY/STATE

UNITED STATES / KANSAS

LOCATION

1900' FNL & 350' FWL
NW/4

SEC

TWP
34S

RGE
14W

Other Services
MPD/MDN
MML

API Number

15-007-24068

Permit Number

Permanent Datum G.L., Elevation 1656 feet

Log Measured From KB

Drilling Measured From K.B. @ 10 FEET

Date

13-OCT-2013

Run Number

ONE

Service Order

3541096

Depth Driller

5200.00 feet

Depth Logger

5201.00 feet

First Reading

5198.00 feet

Last Reading

314.00 feet

Casing Driller

316.00 feet

Casing Logger

314.00 feet

Bit Size

7.880

inches

Hole Fluid Type

CHEMICAL

Density / Viscosity

9.10 lb/USg

49.00 CP

PH / Fluid Loss

10.40

8.00 ml/30Min

Sample Source

MUDPIT

Rm @ Measured Temp

1.39 @ 75.0 ohm-m

Rmf @ Measured Temp

1.11 @ 75.0 ohm-m

Rmc @ Measured Temp

1.67 @ 75.0 ohm-m

Source Rmf / Rmc

CALC

CALC

Rm @ BHT

0.90 @ 116.0 ohm-m

Time Since Circulation

5 HOURS

Max Recorded Temp

116.00

deg F

Equipment / Base

13096

LIB

Recorded By

W STAMBAUGH

Witnessed By

BILL BUSCH

IOB#

LB13-289

Elevations:
KB 1666.00 feet
DF 1664.00
GL 1656.00

BOREHOLE RECORD

Last Edited: 14-OCT-2013 04:08

Bit Size
inches

7.880

Depth From
feet

316.00

Depth To
feet

5201.00

CASING RECORD

Type

SURFACE

Size
inches

13.375

Depth From
feet

0.00

Shoe Depth
feet

314.00

Weight
pounds/ft

48.00

REMARKS

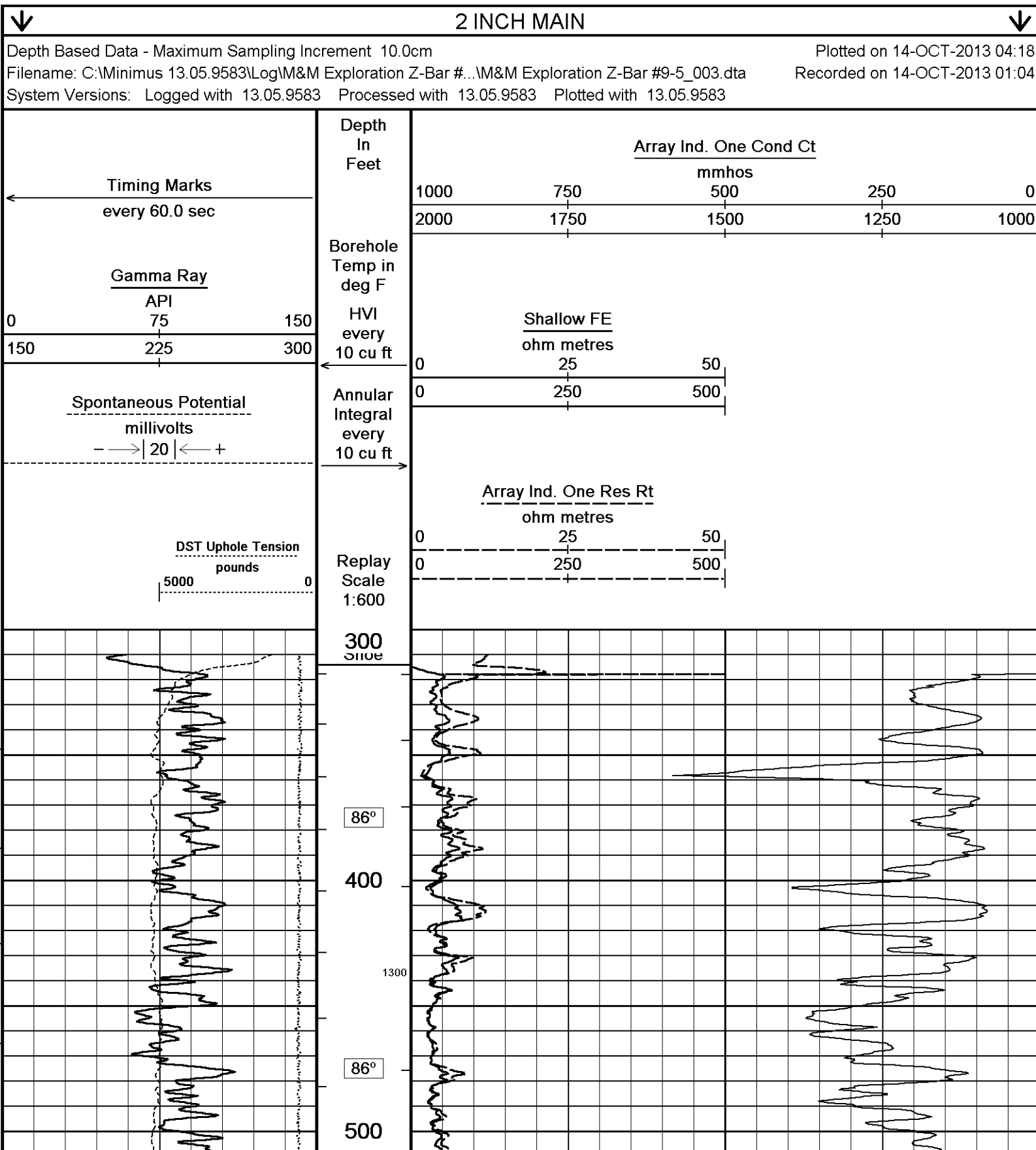
- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, SGS, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING AT 316 FEET: 1880 CU. FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH CASING FROM TD TO SURFACE CASING AT 316 FEET: 1340 CU. FT.

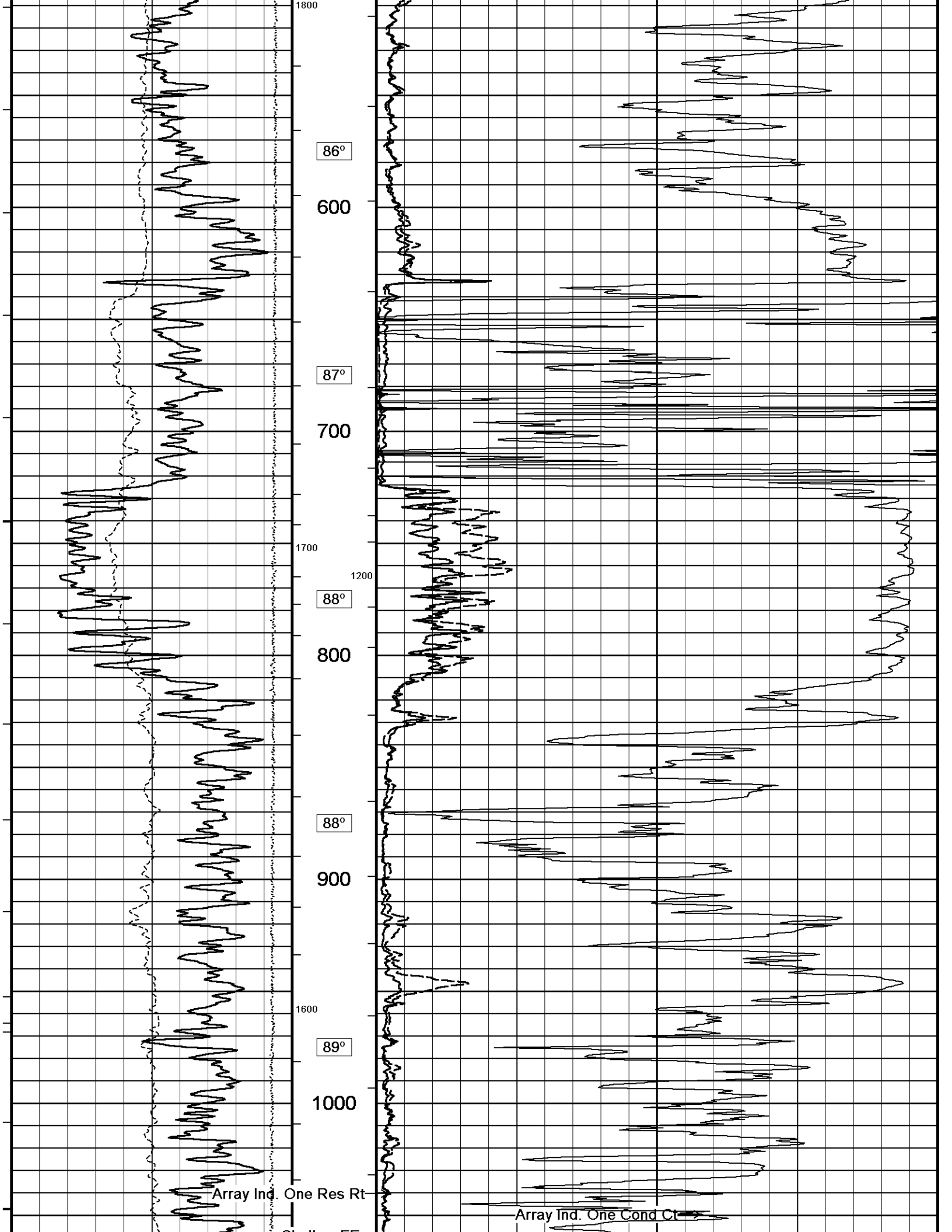
DRILLING RIG: HARDT DRILLING #1

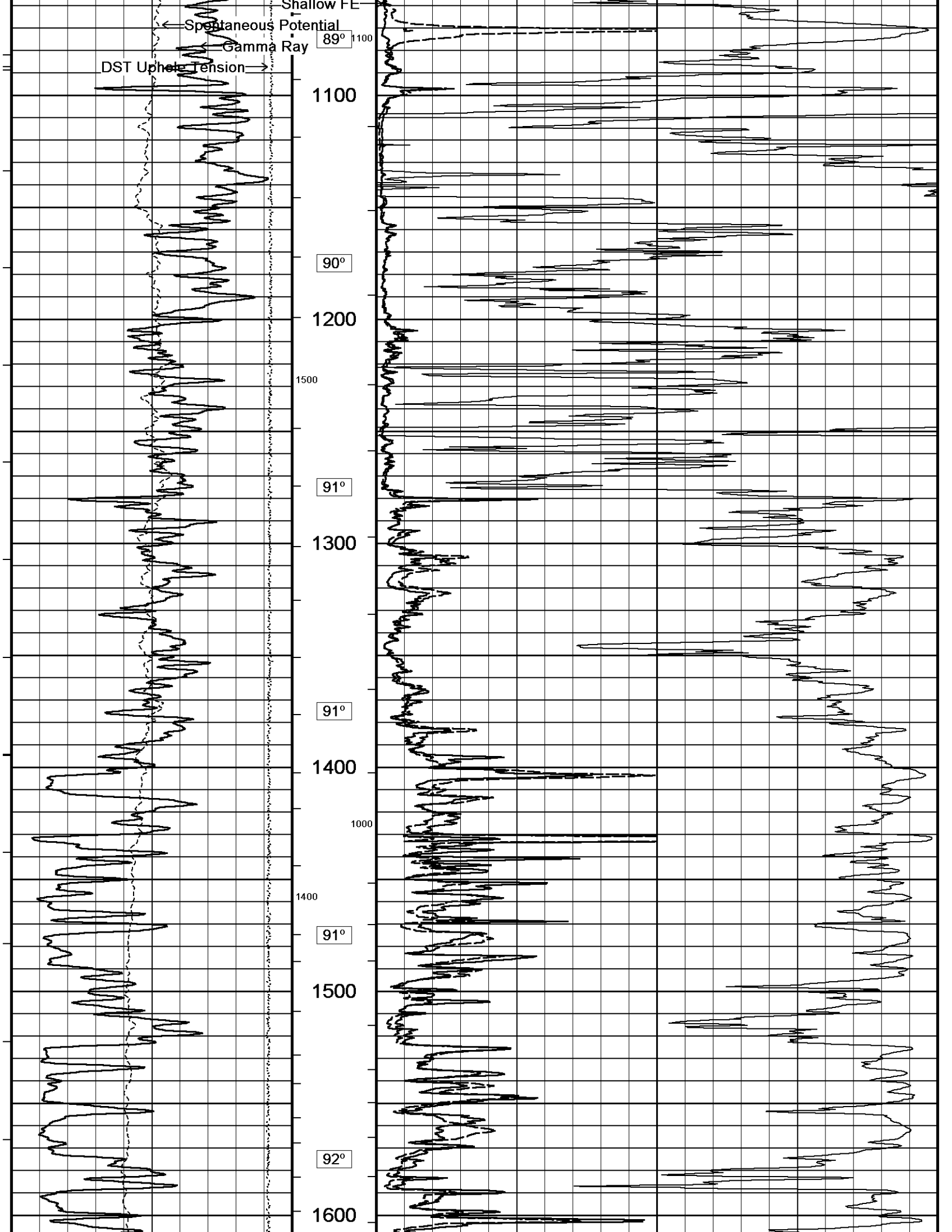
- ENGINEER: W. STAMBAUGH

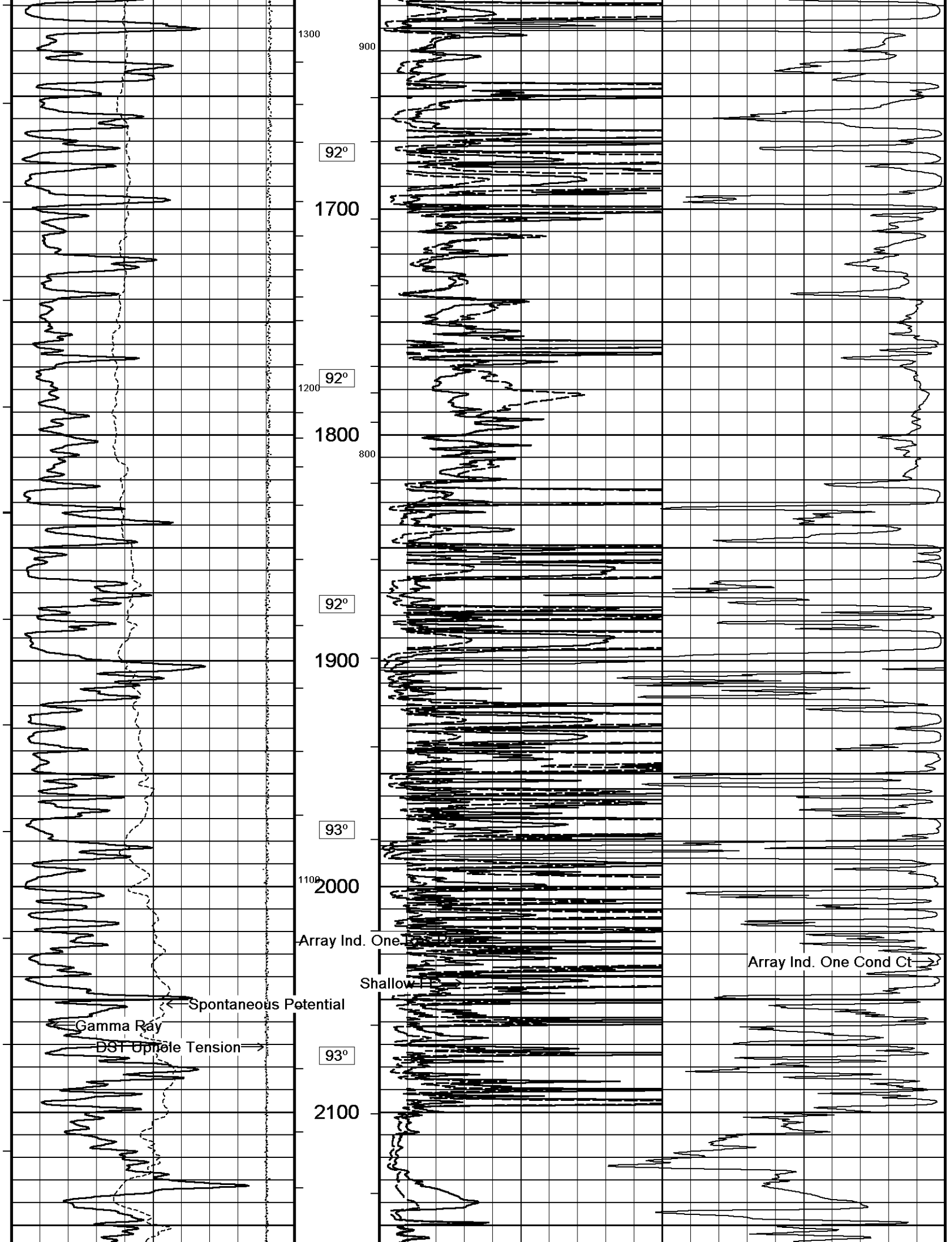
- OPERATOR(S): D. CANADAY

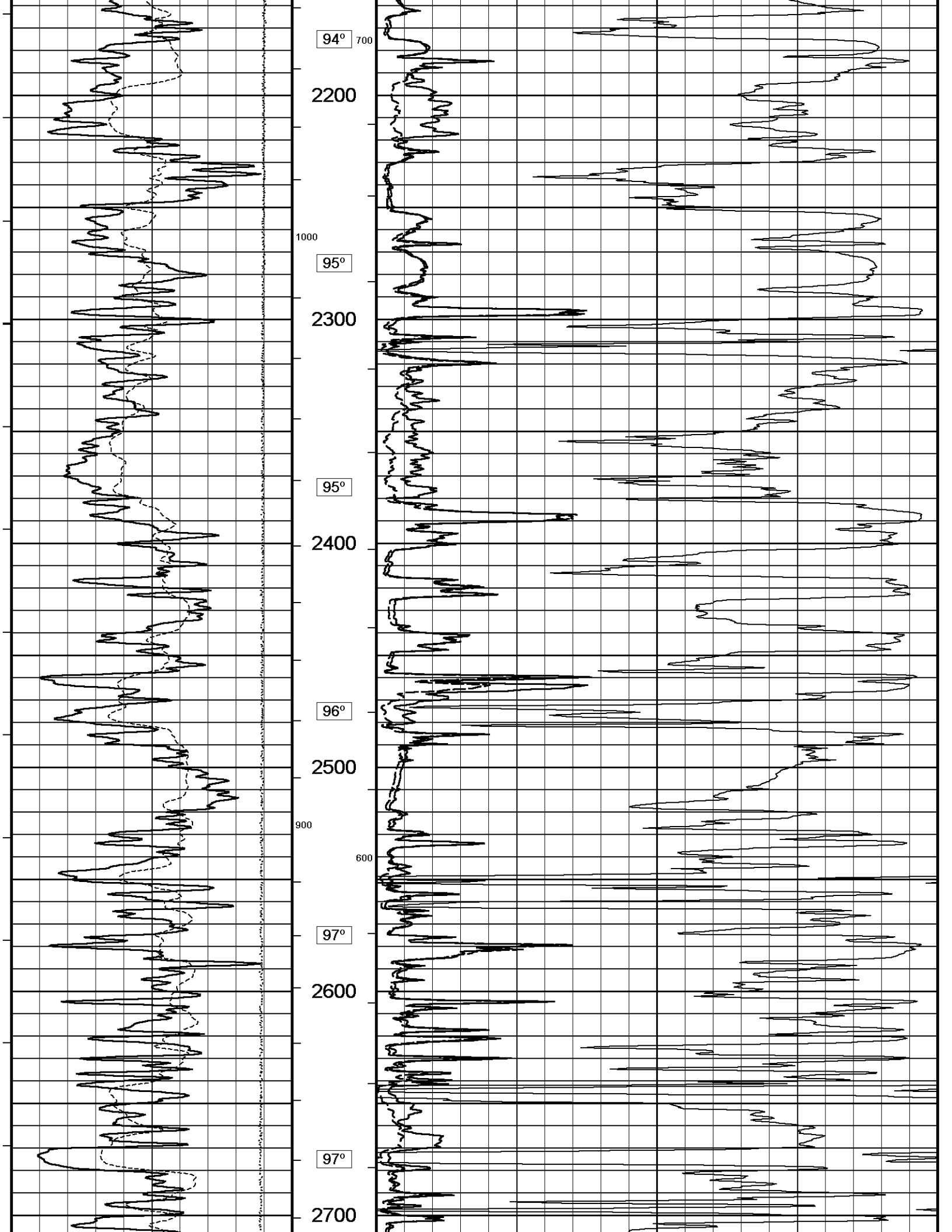
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, 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.

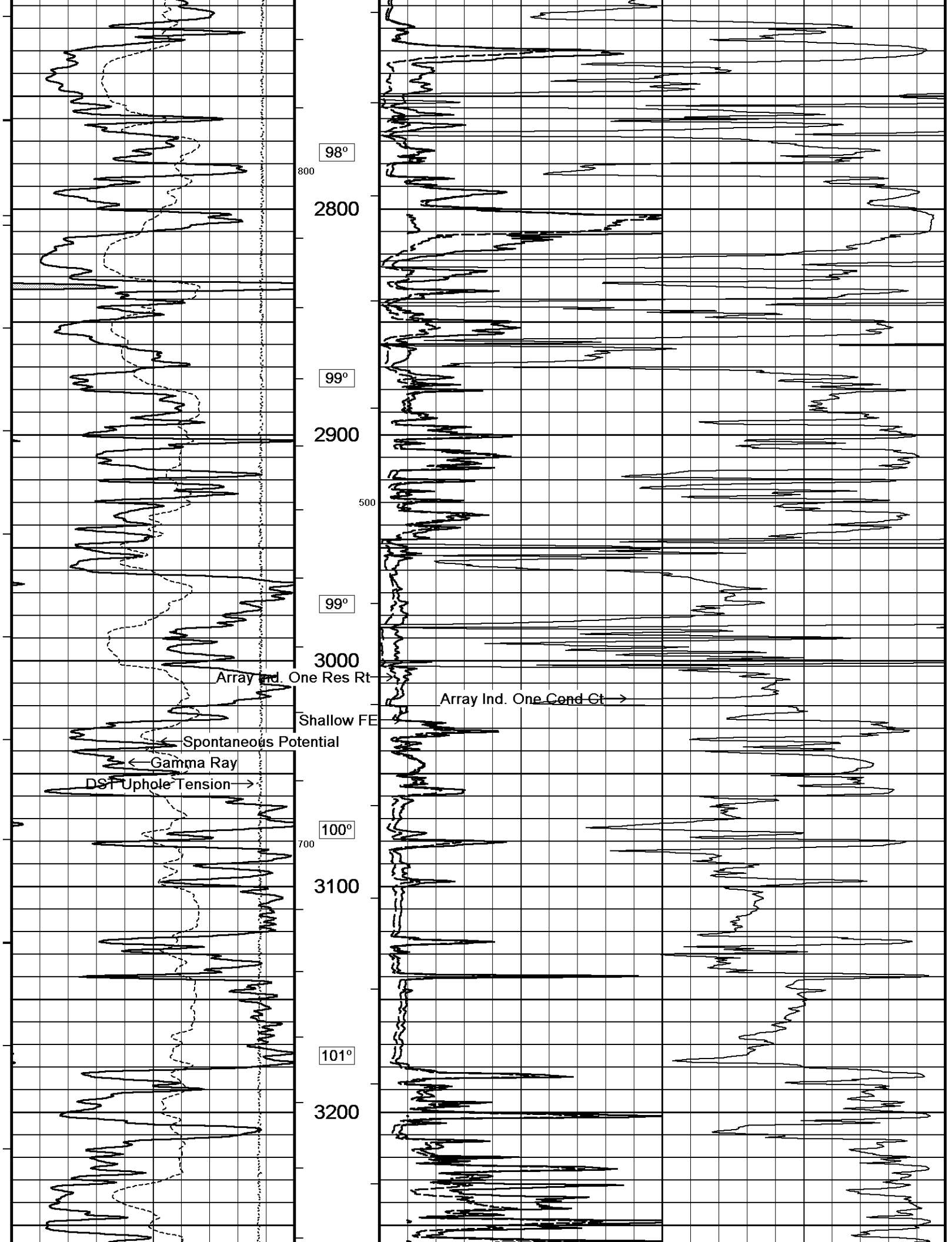


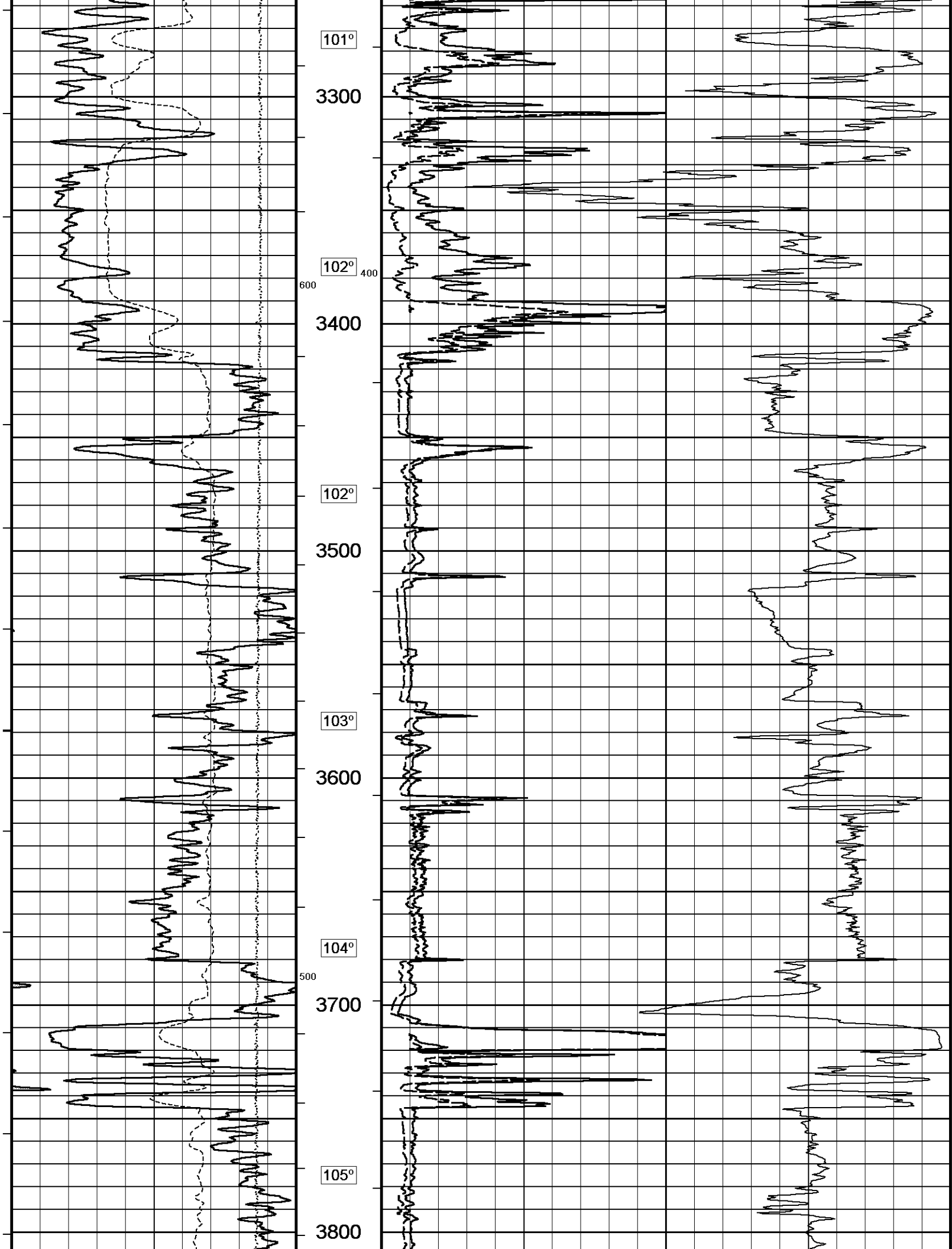


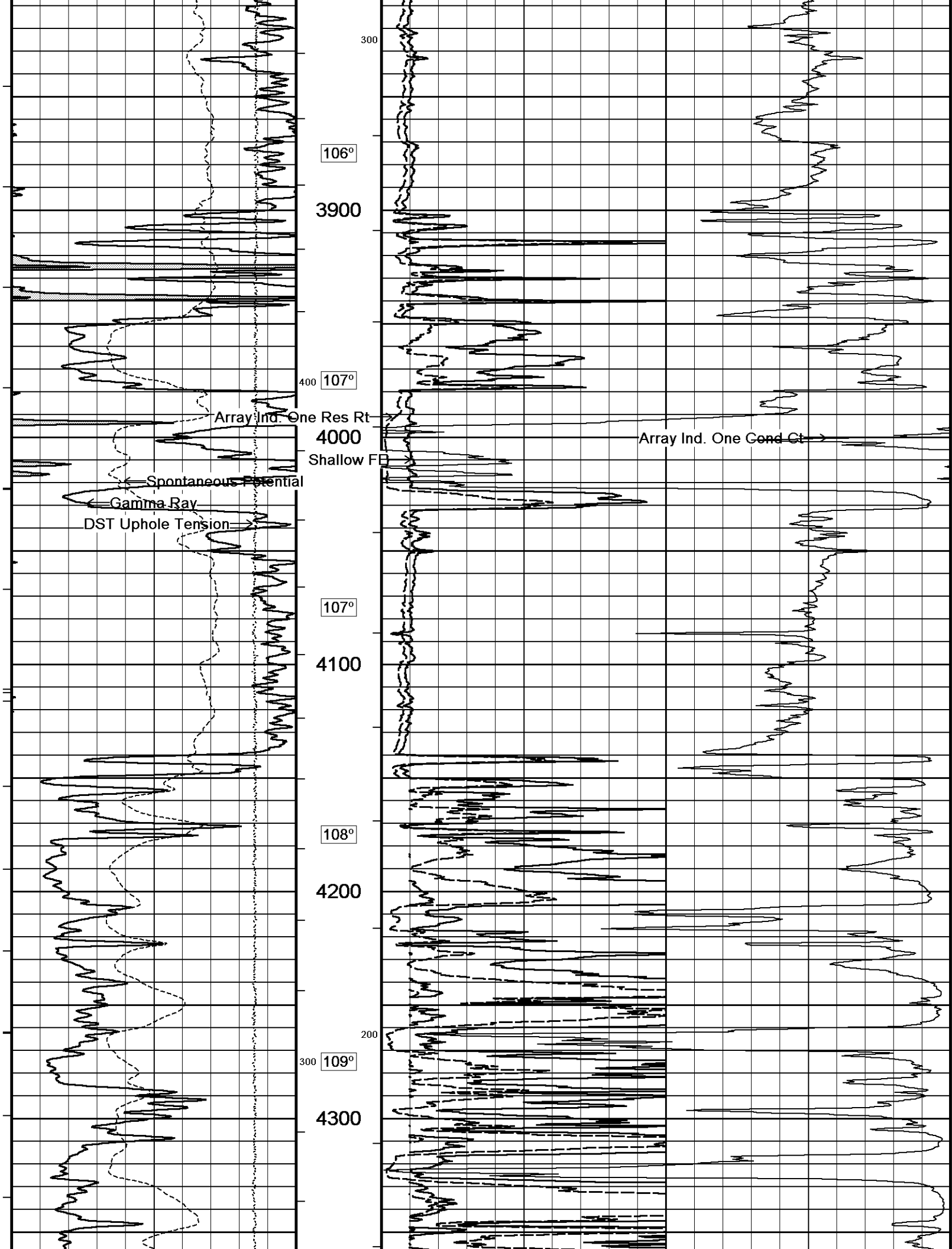


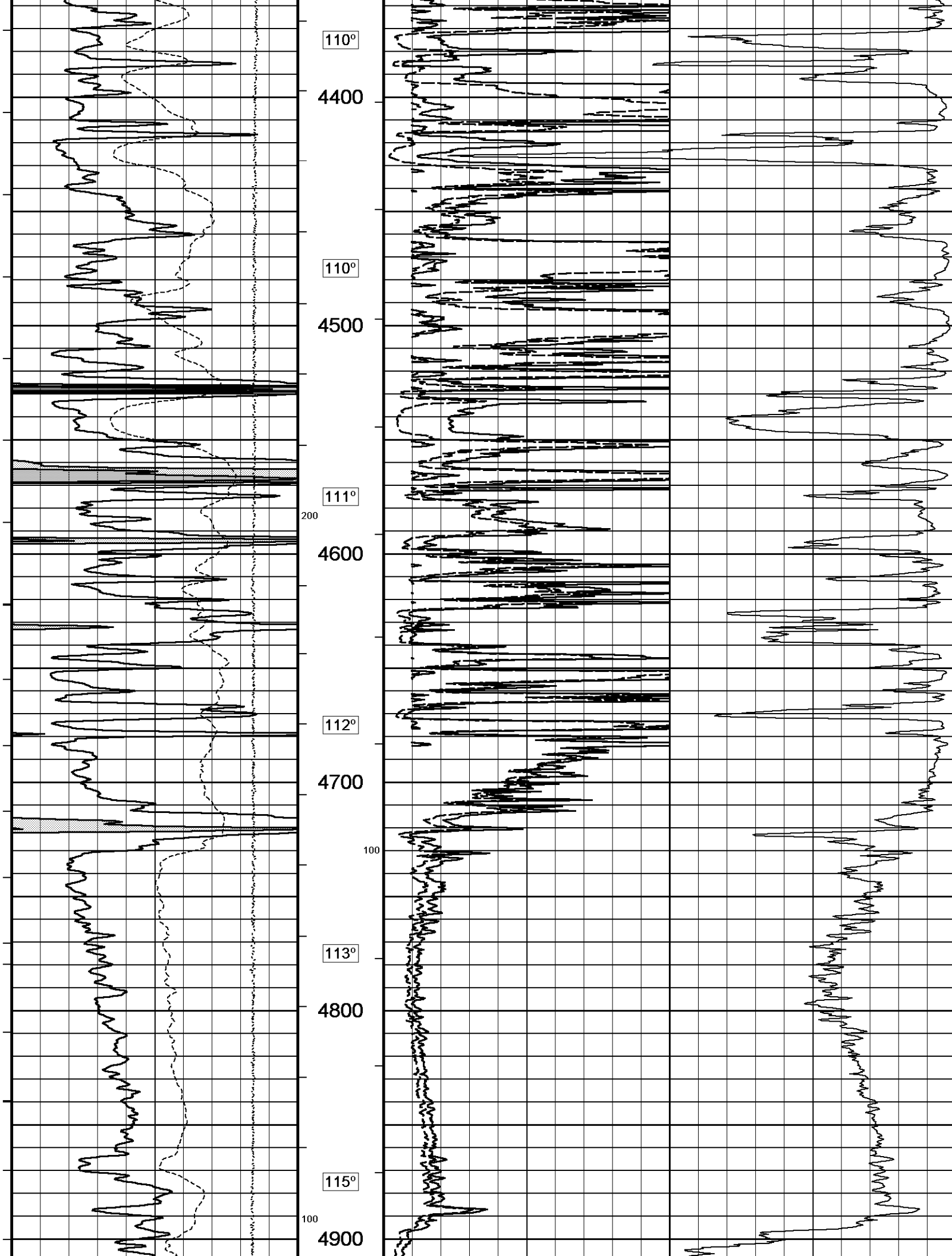


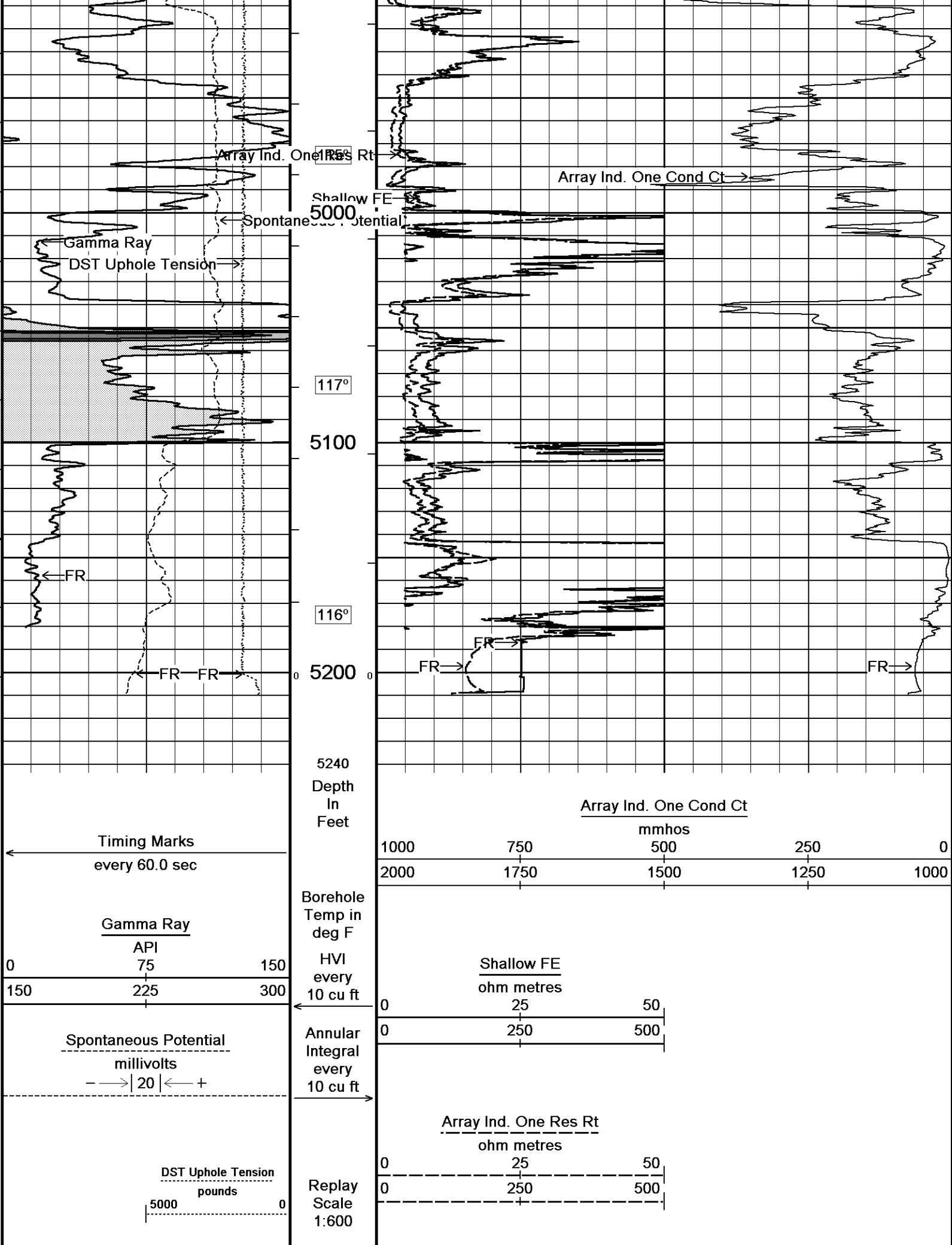












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2 INCH MAIN

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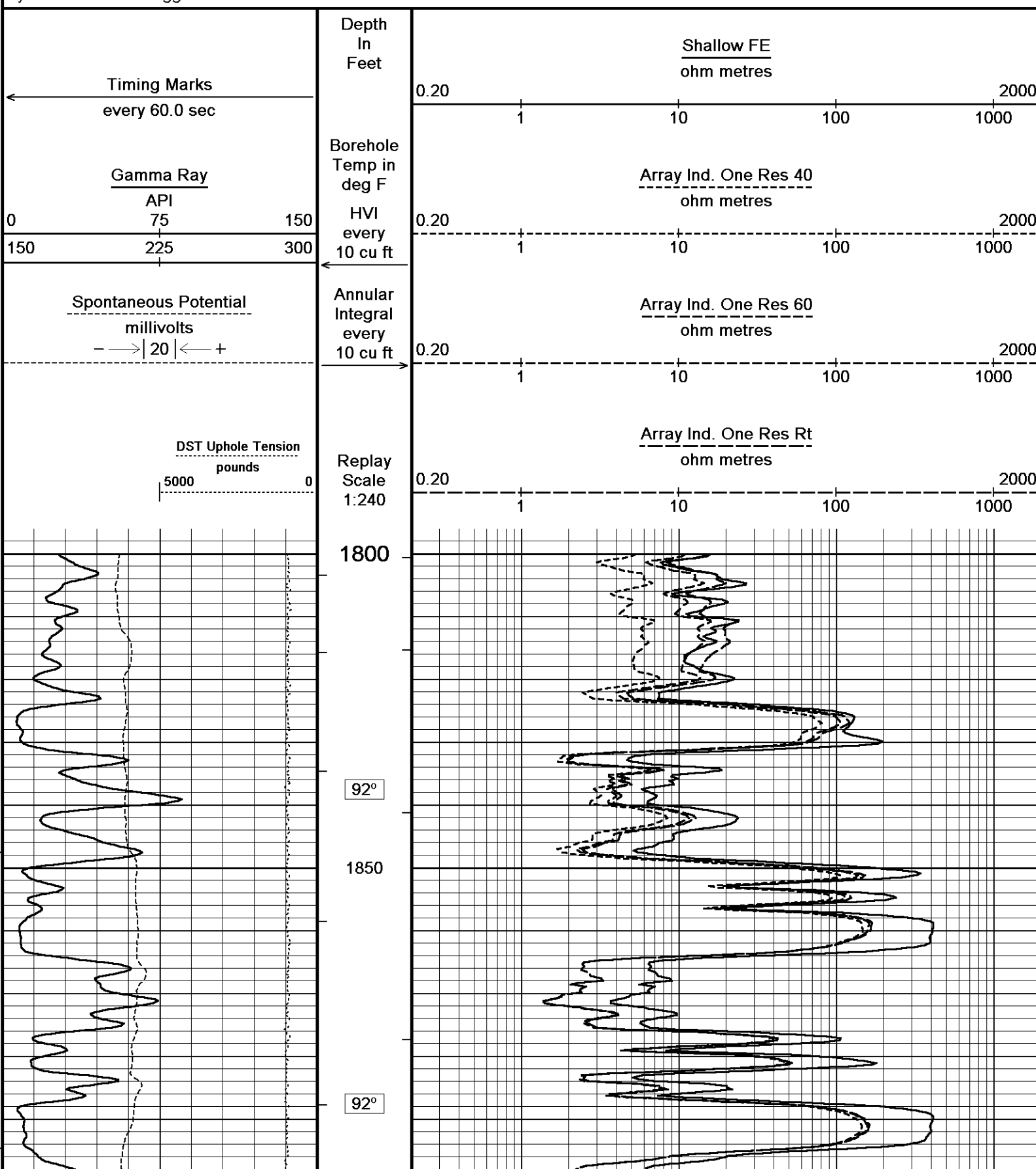
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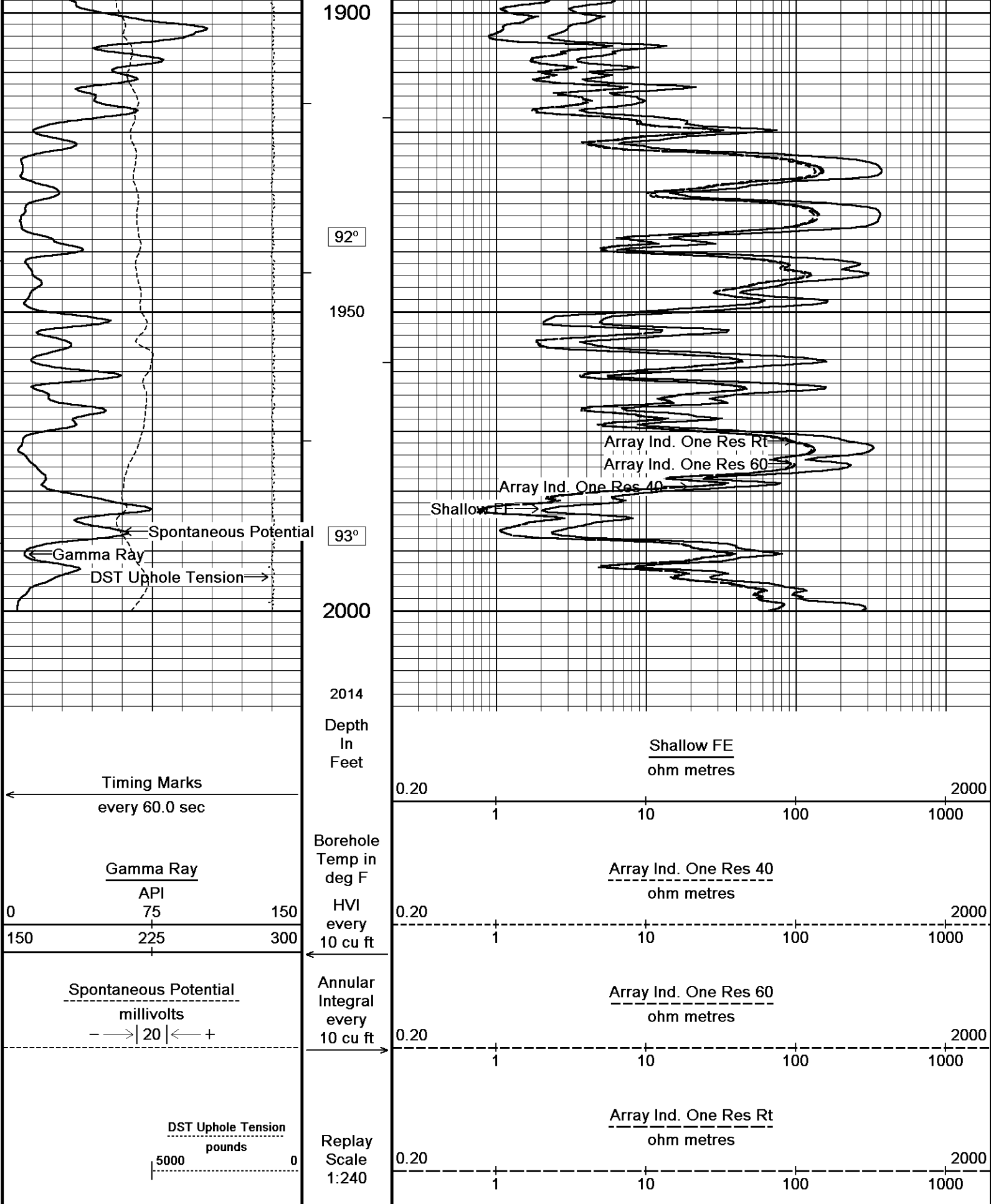
5 INCH MAIN

↓

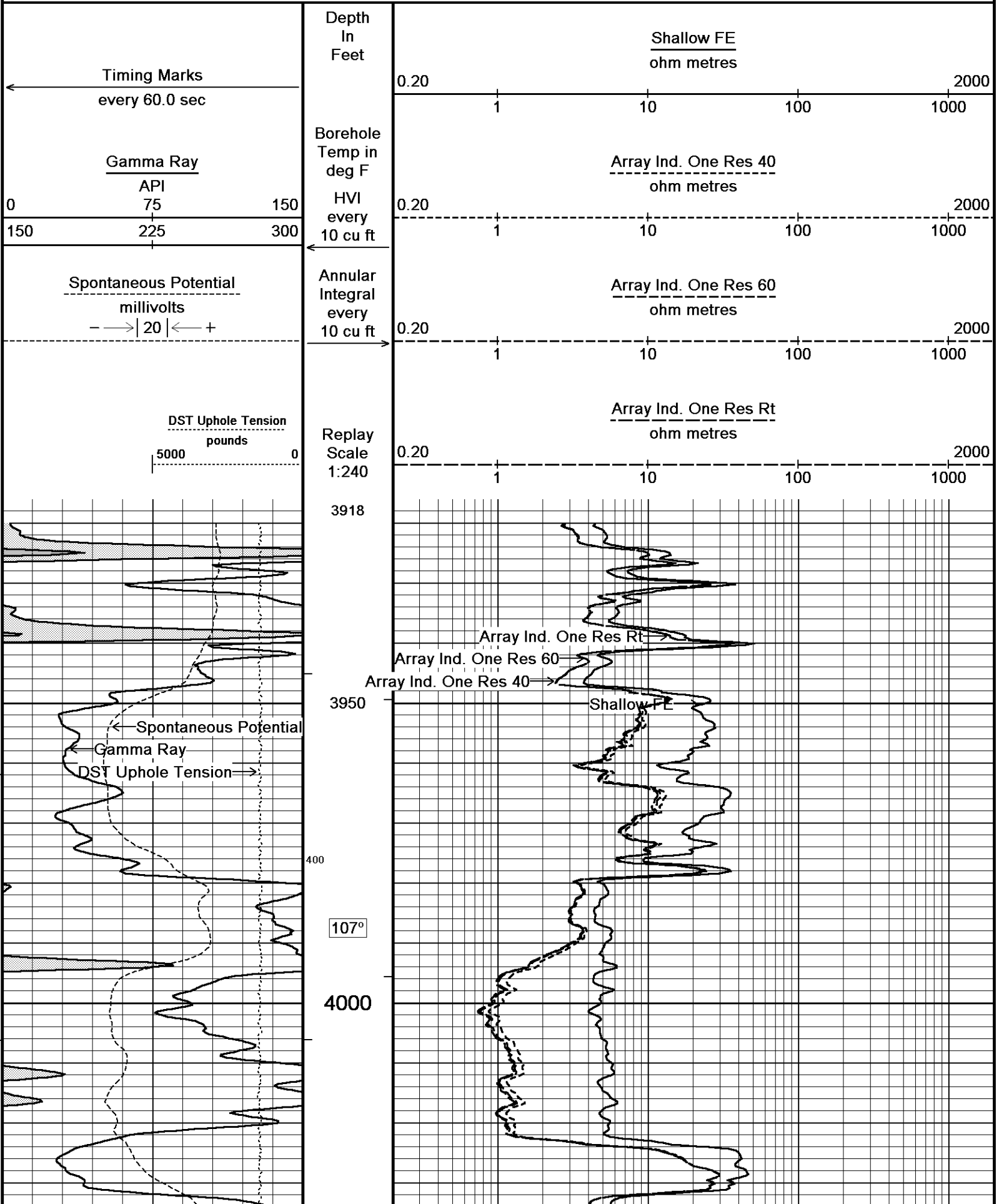
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Log\M&M Exploration Z-Bar #...\M&M Exploration Z-Bar #9-5_003.dta
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583

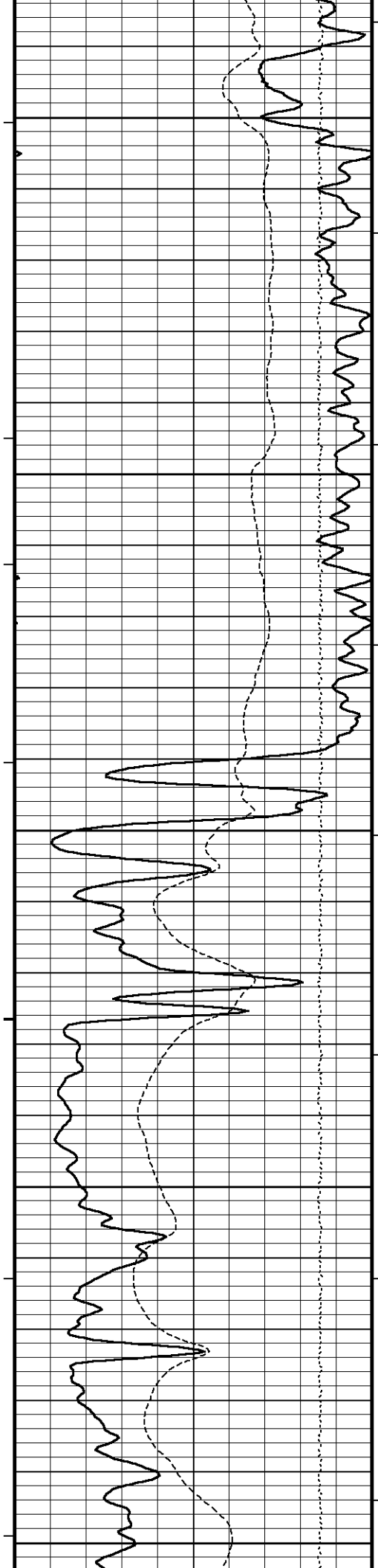
Plotted on 14-OCT-2013 04:18
Recorded on 14-OCT-2013 01:04



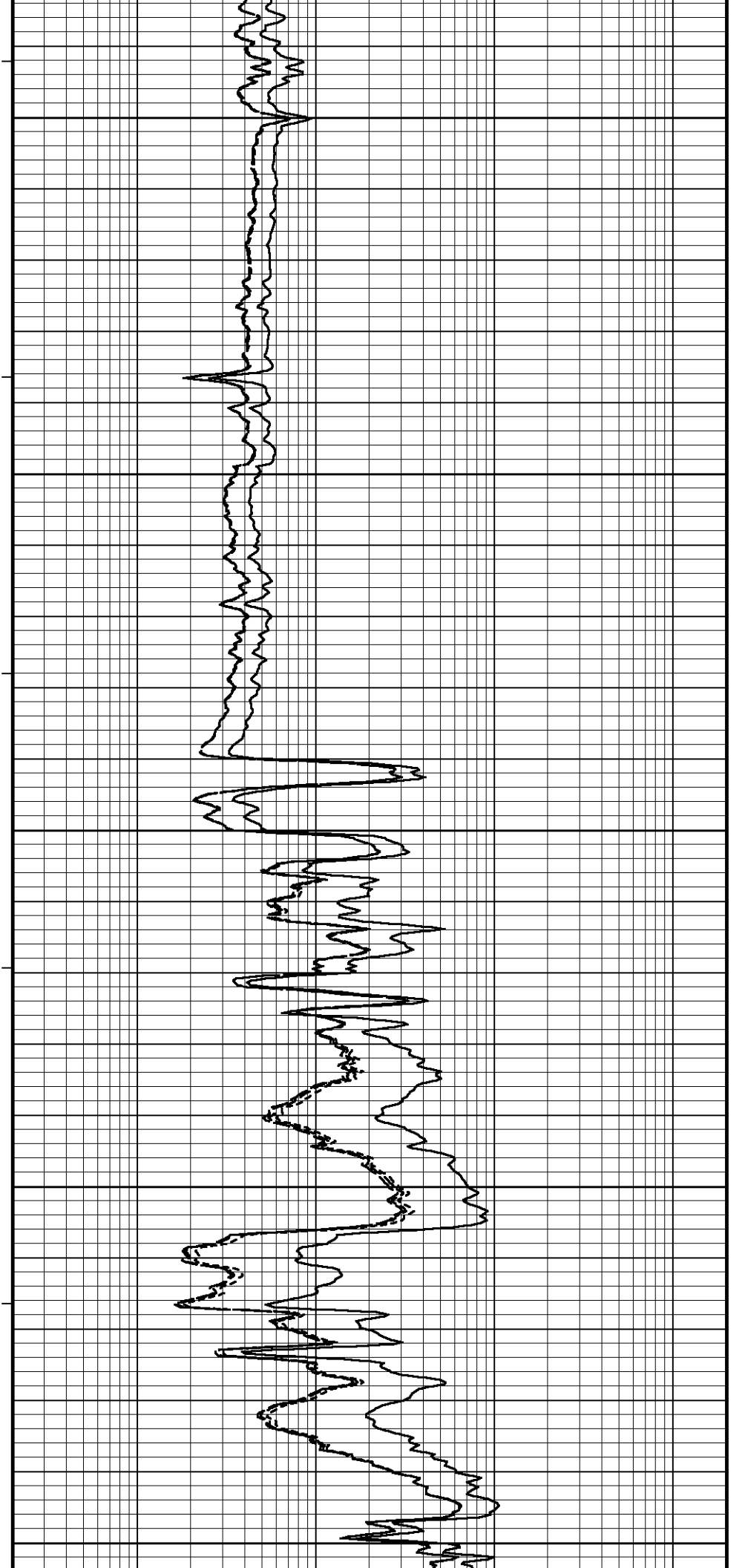


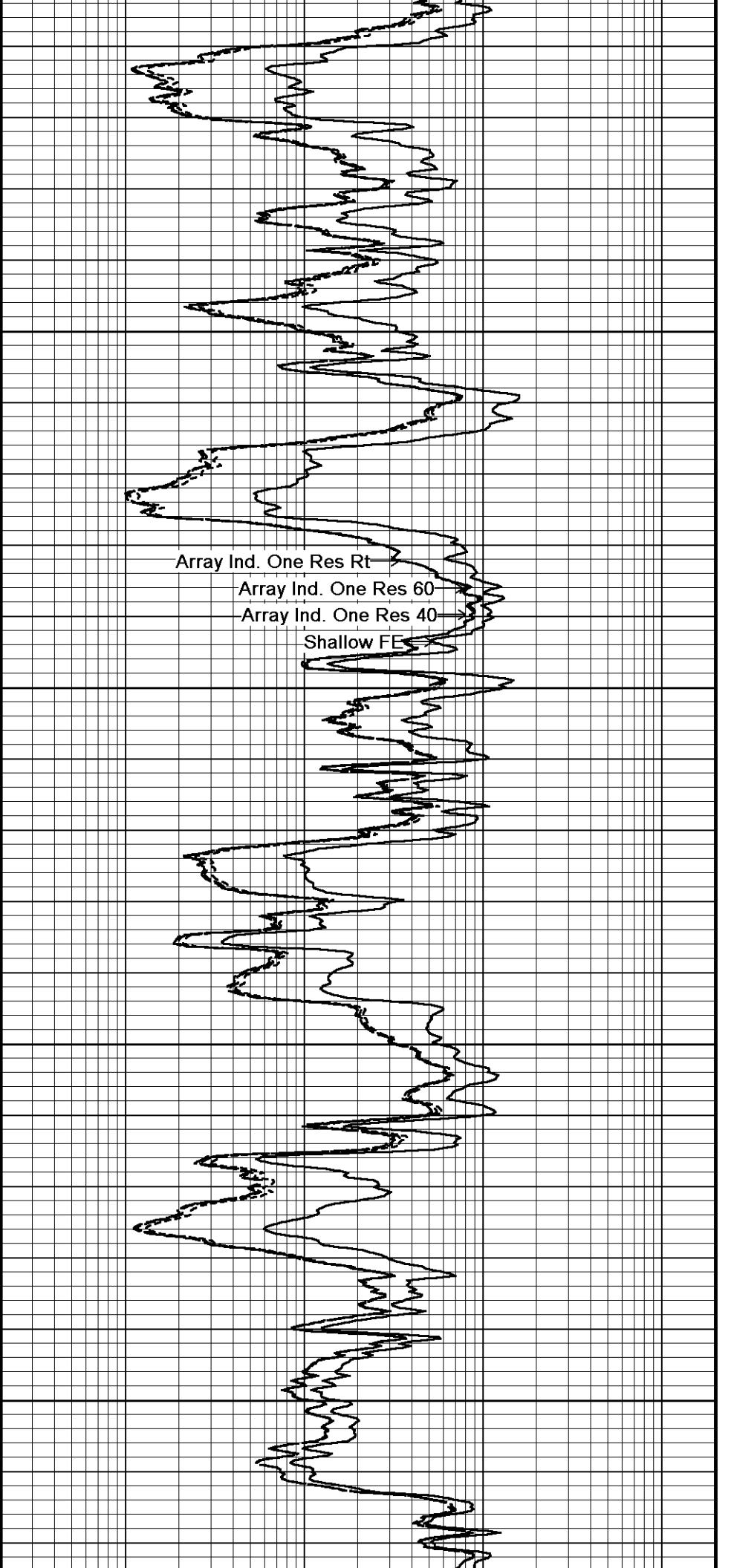
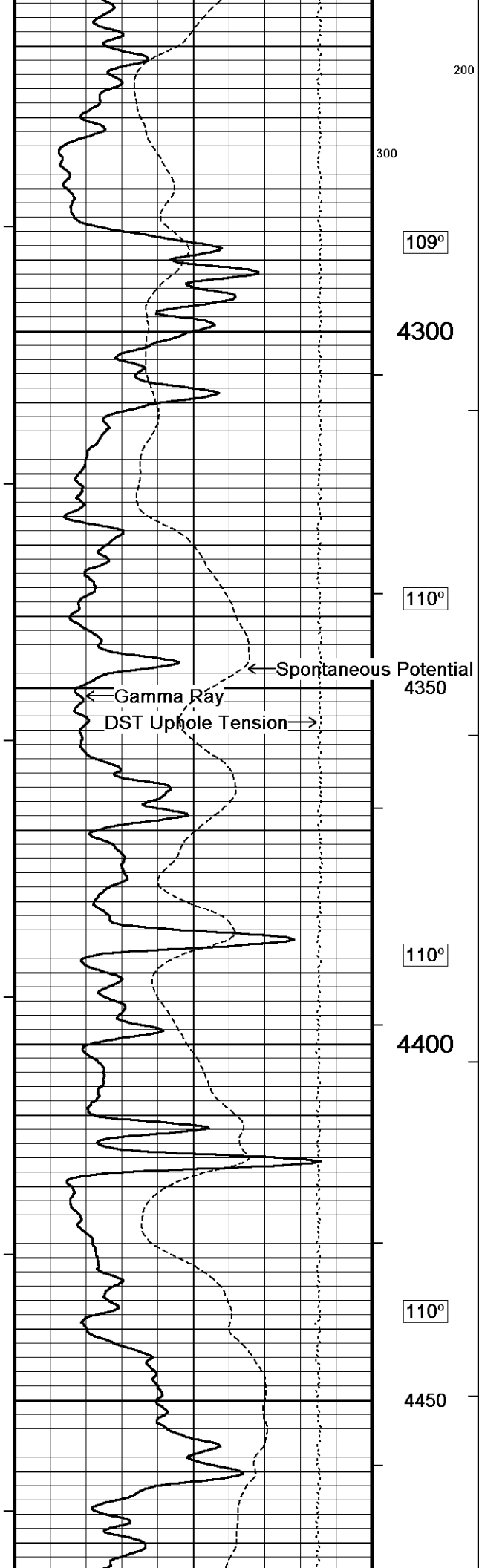
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.05.9583\Log\M&M Exploration Z-Bar #...M&M Exploration Z-Bar #9-5_003.dta
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583
Plotted on 14-OCT-2013 04:18
Recorded on 14-OCT-2013 01:04

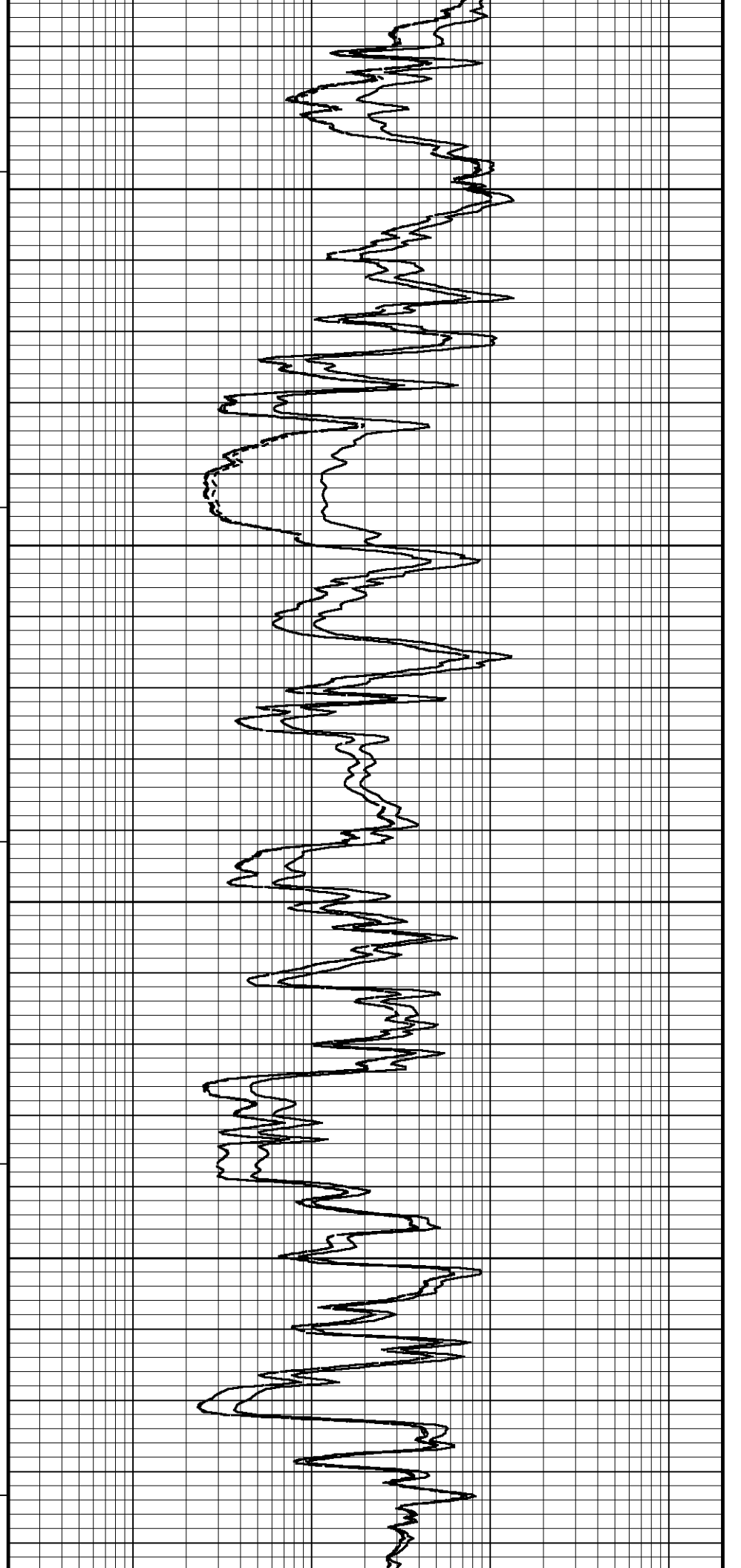
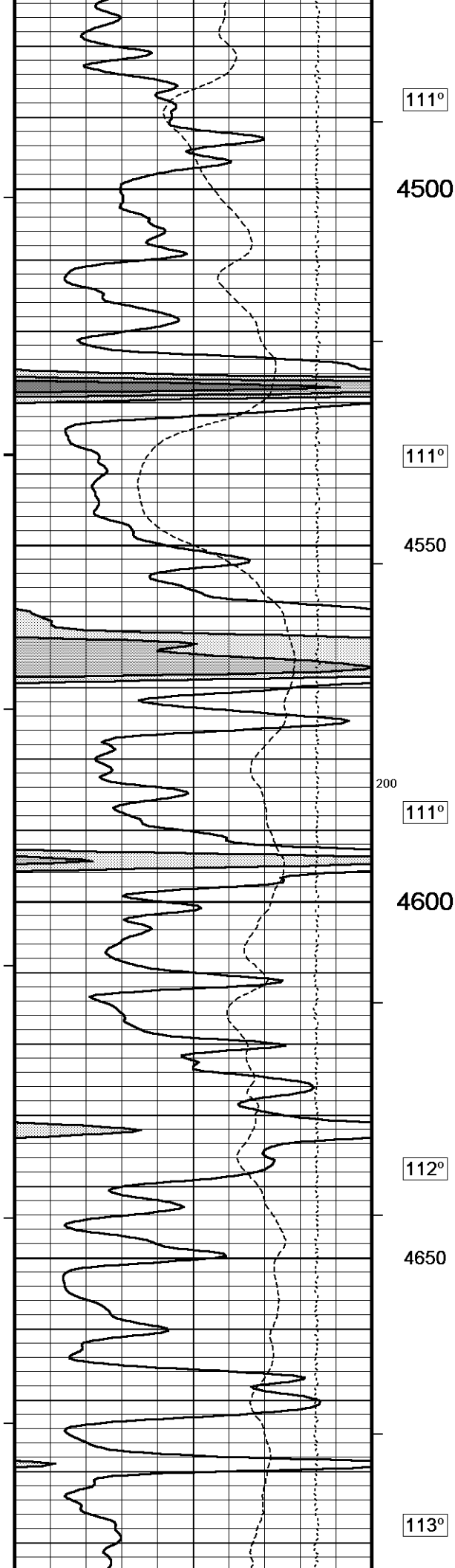


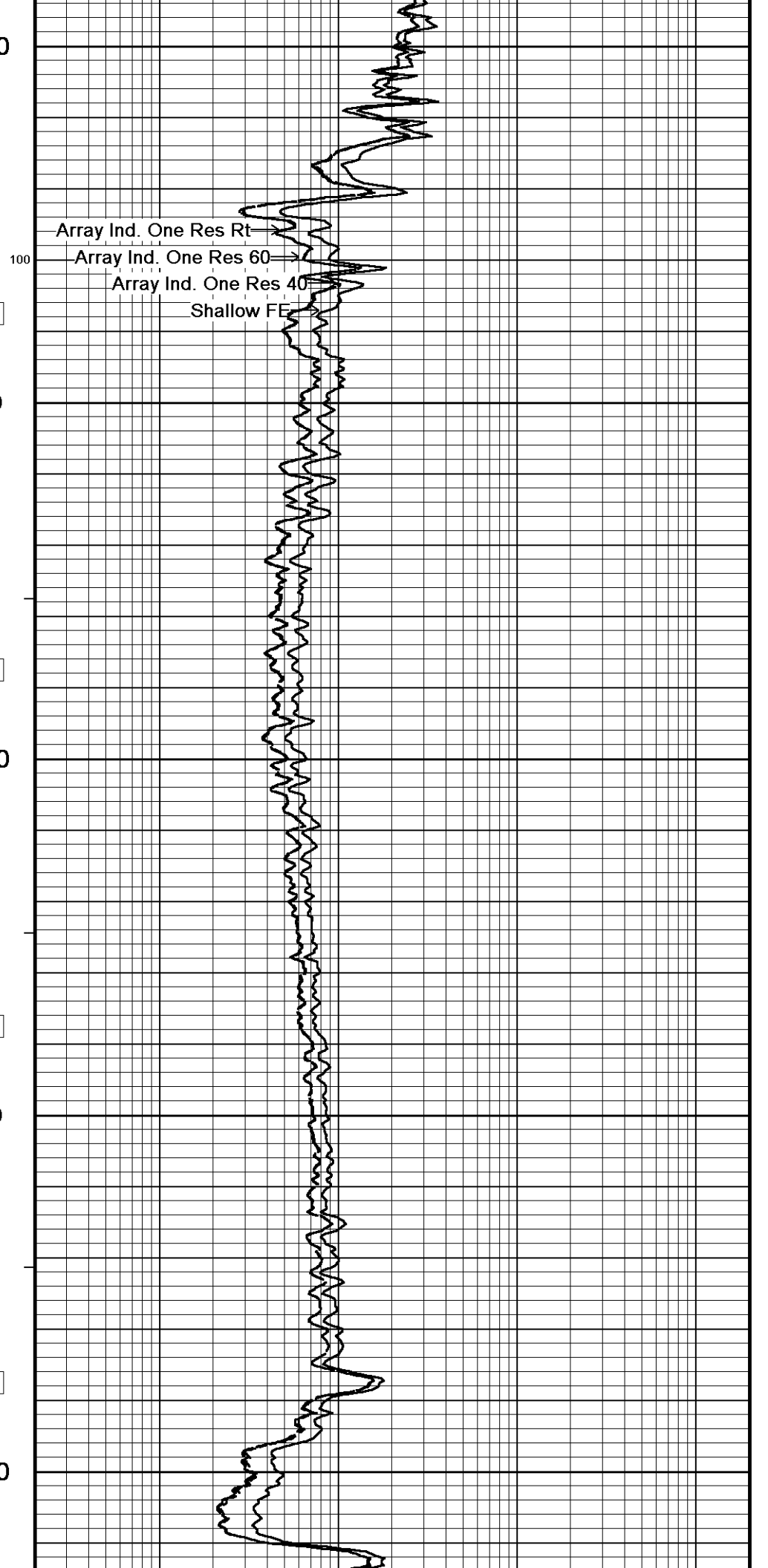
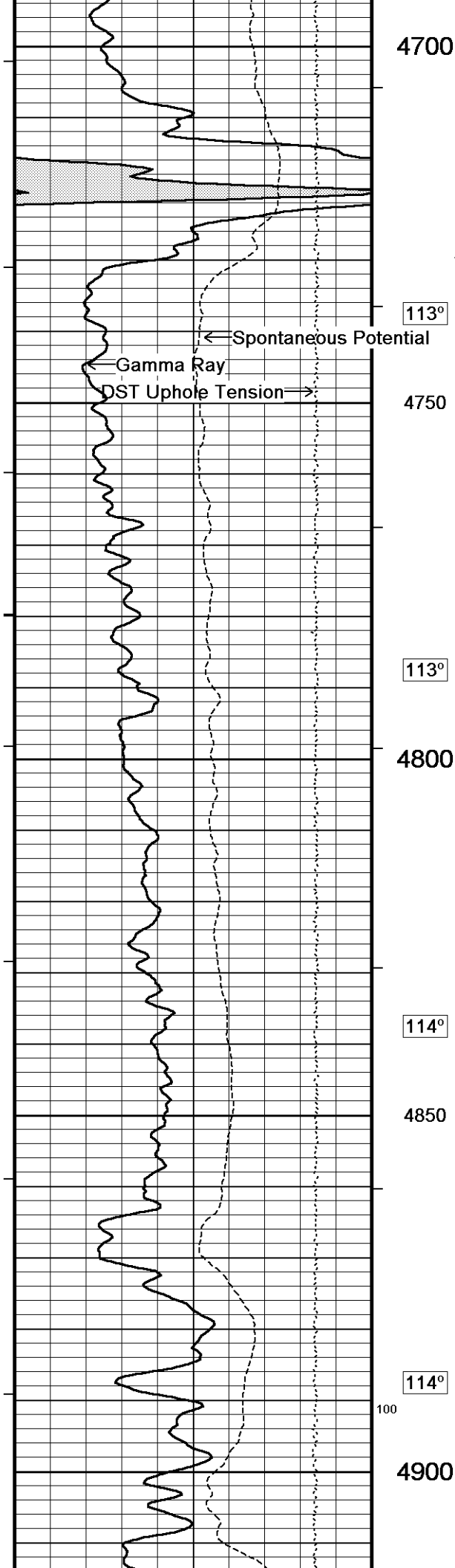


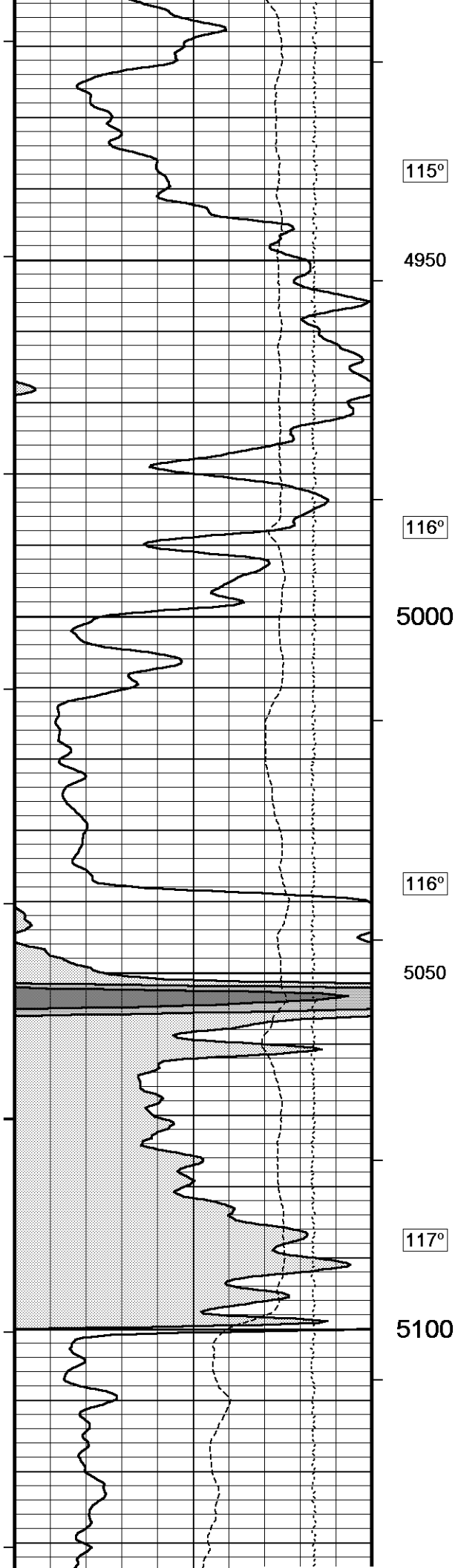
107°
4050
107°
4100
108°
4150
108°
4200
108°
4250











115°

4950

116°

5000

116°

5050

117°

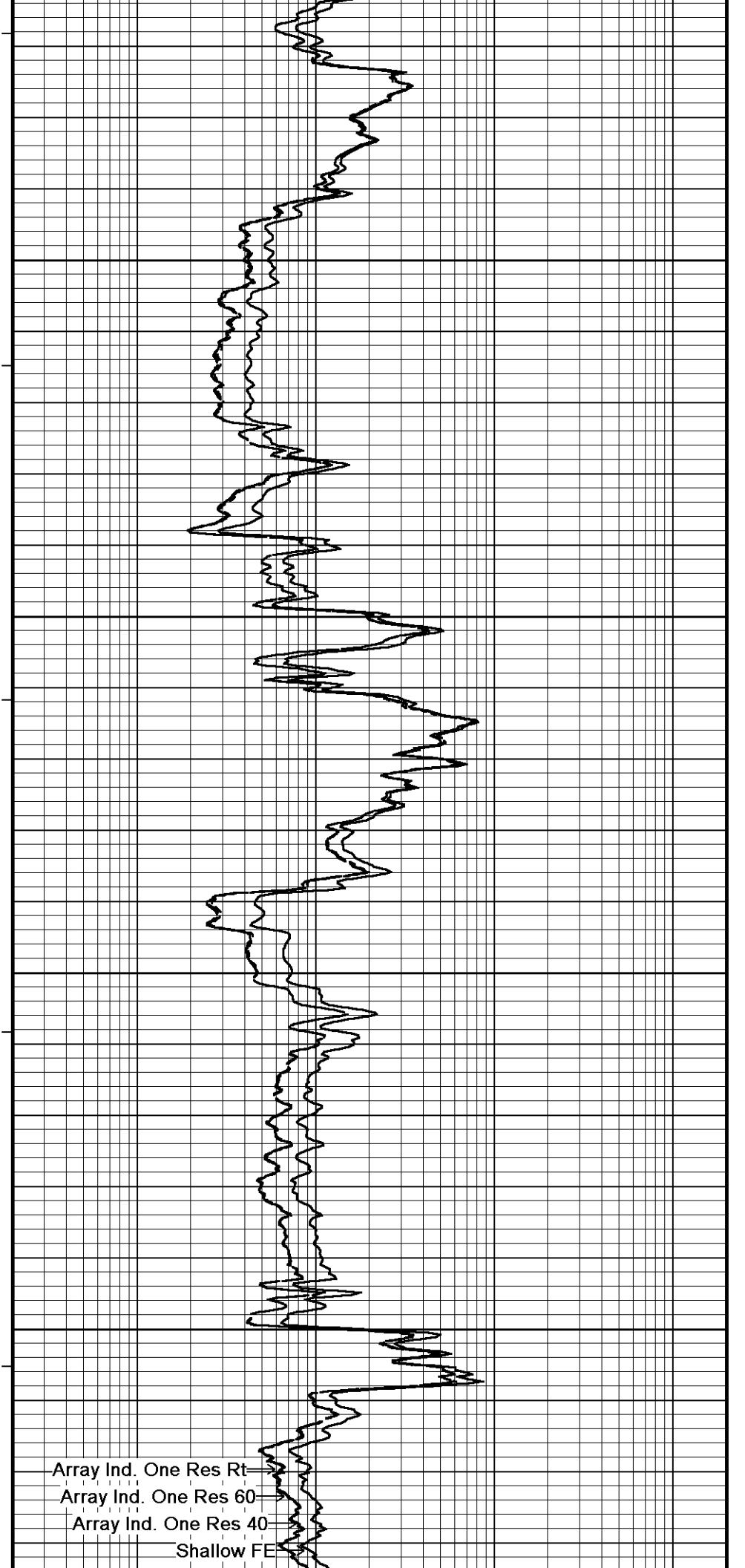
5100

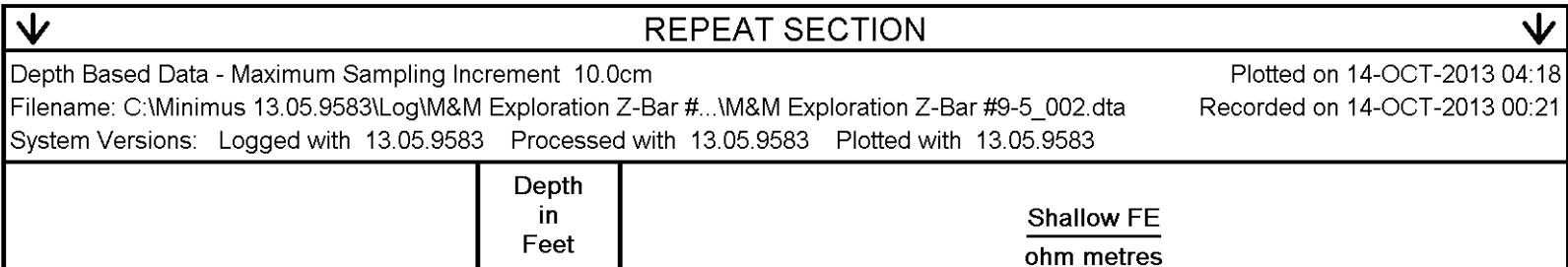
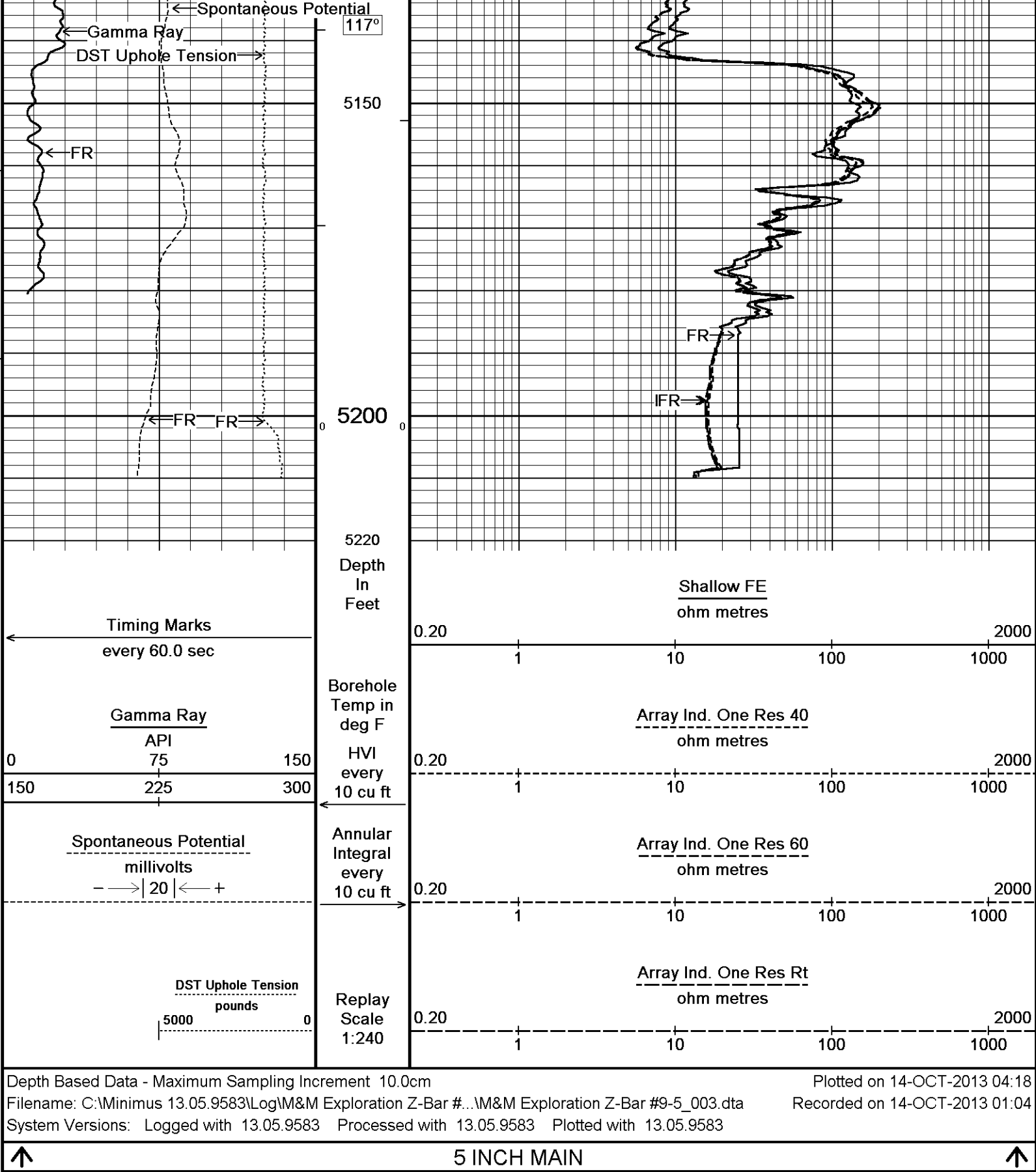
Array Ind. One Res Rt

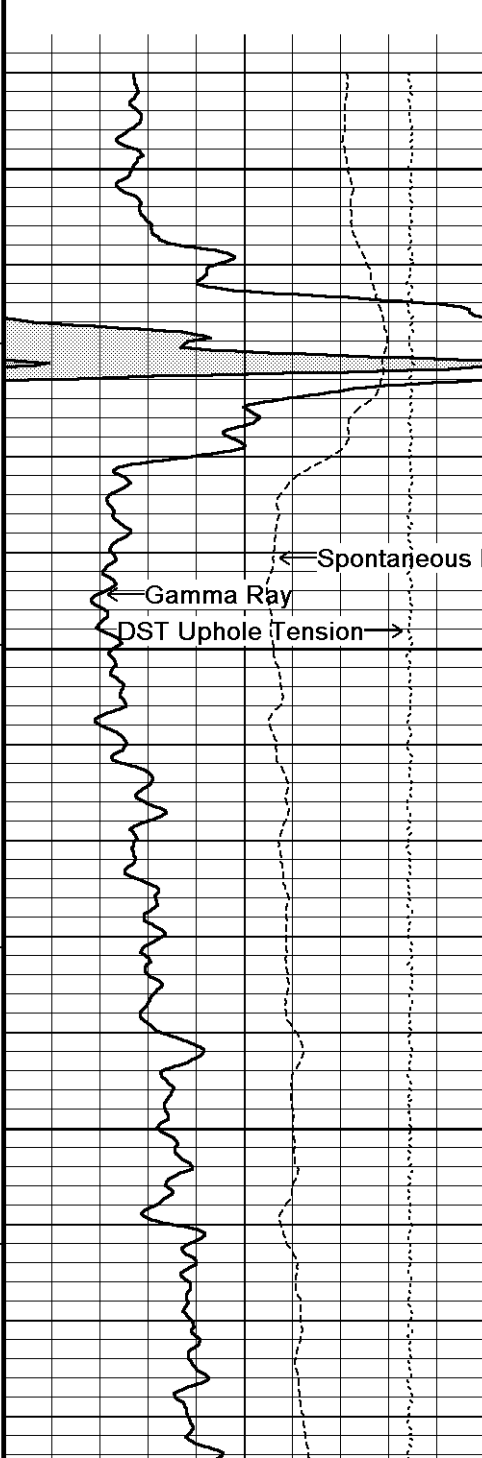
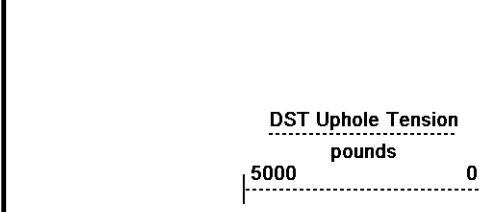
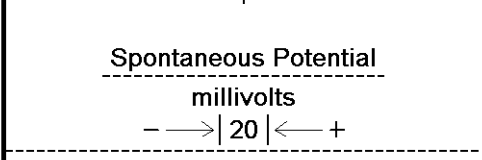
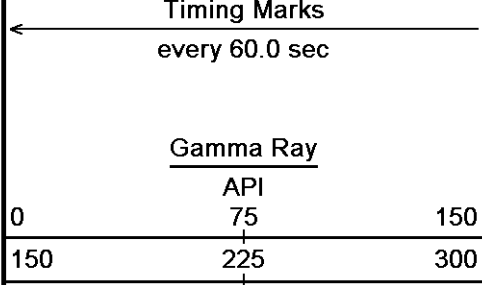
Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE







Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Replay
Scale
1:240

4688

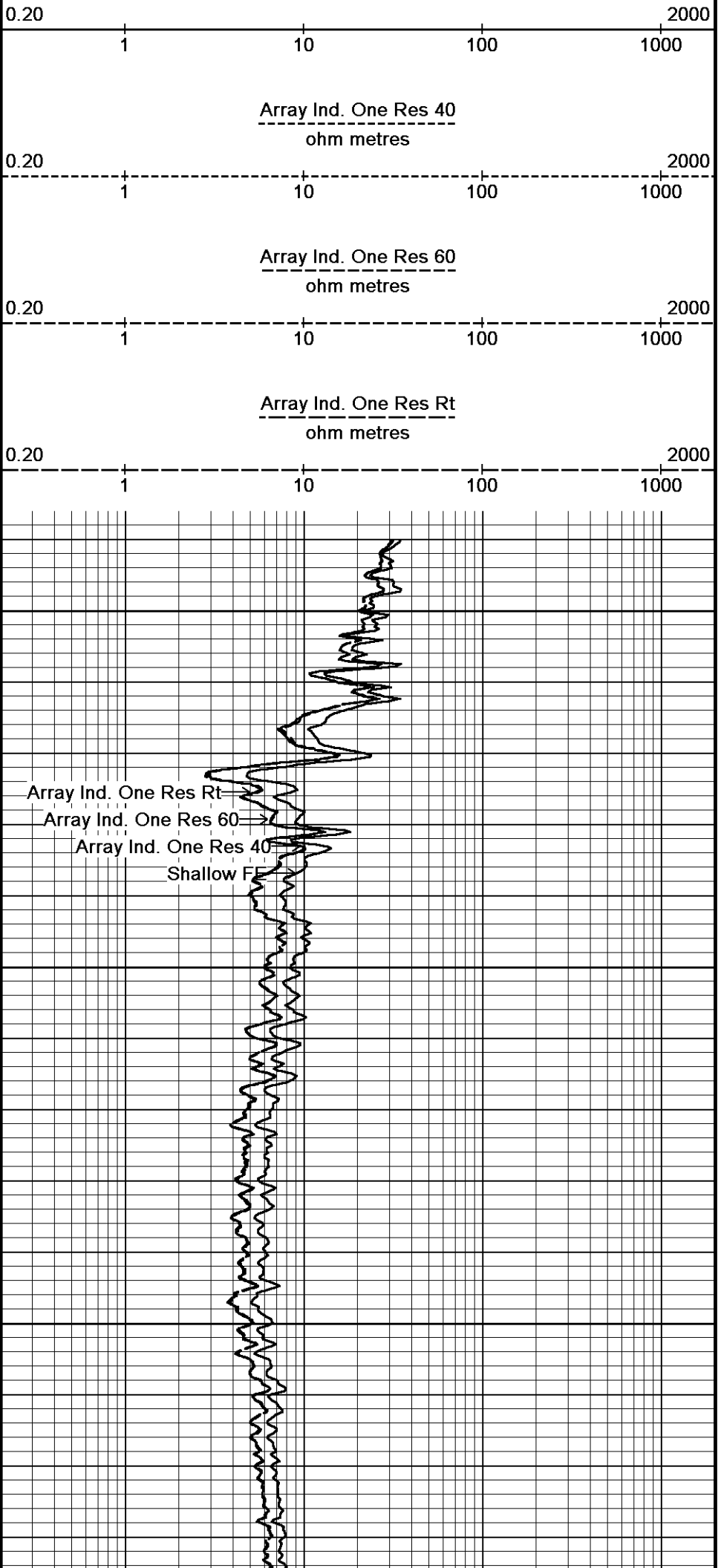
4700

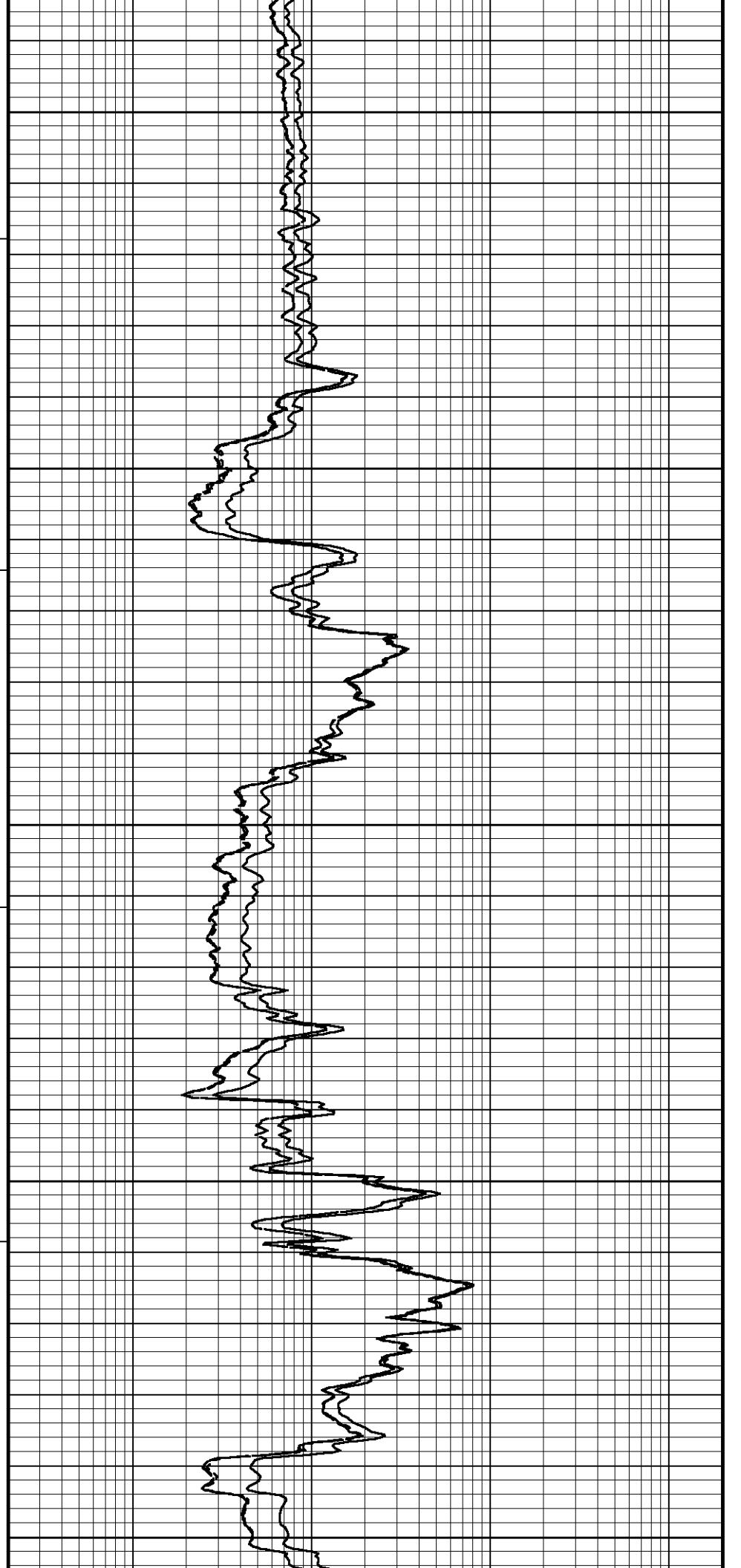
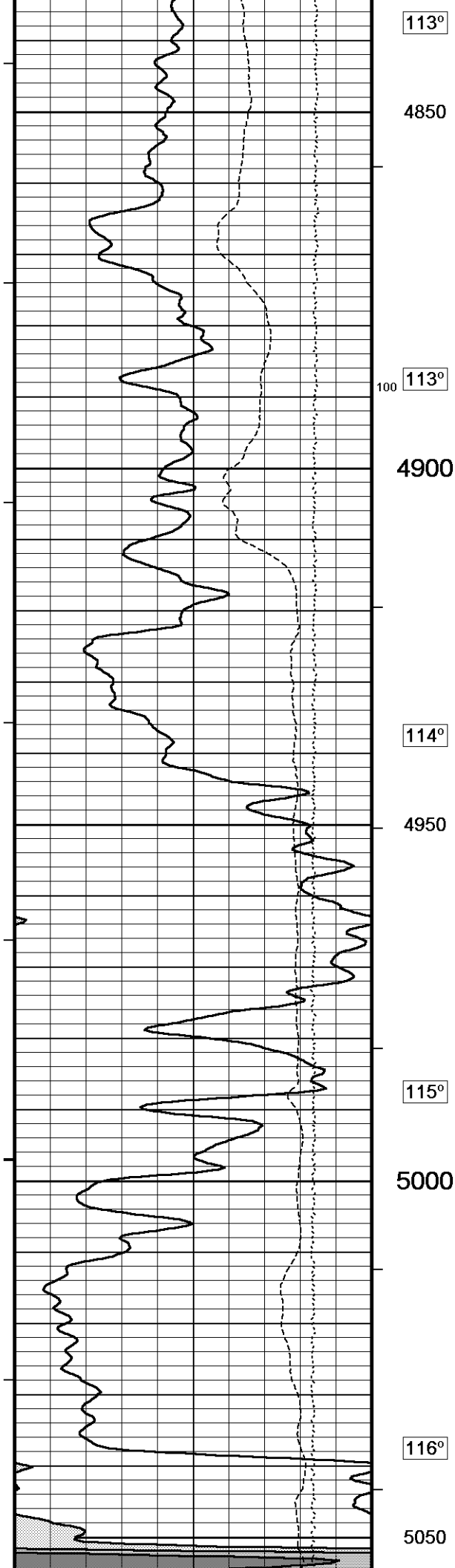
112°

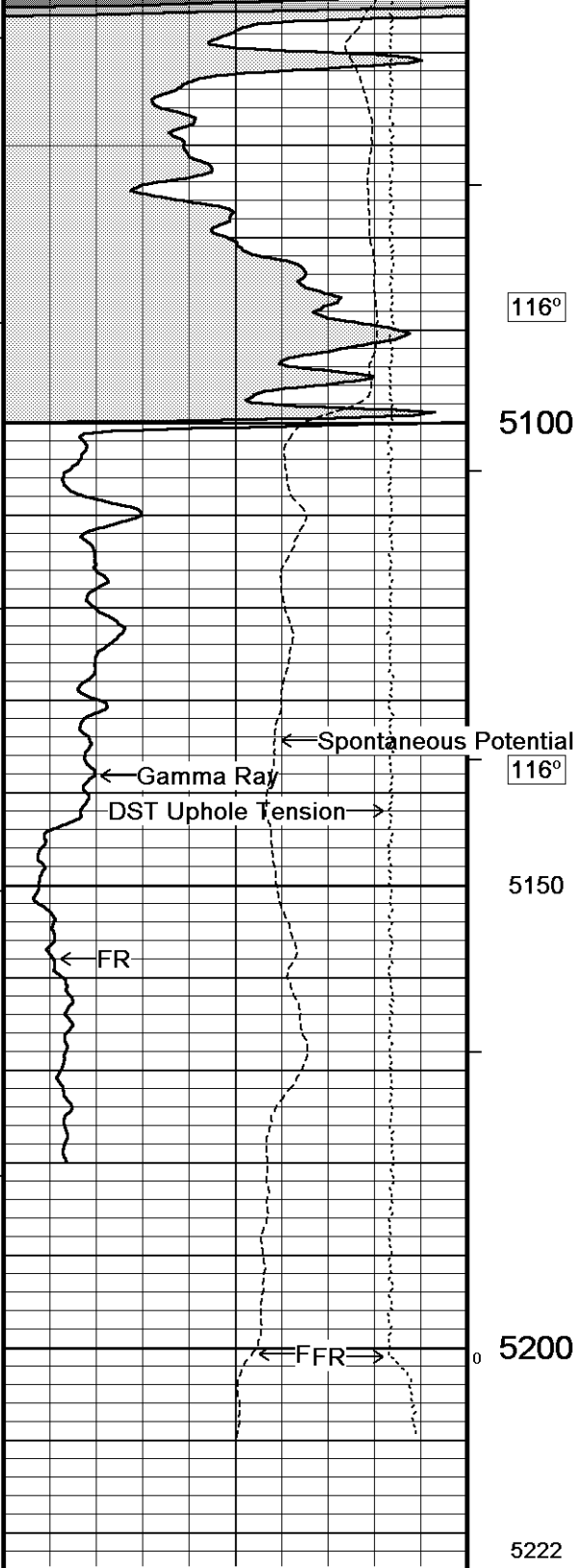
4750

112°

4800







116°

5100

116°

5150

5200

5222
Depth
in
Feet

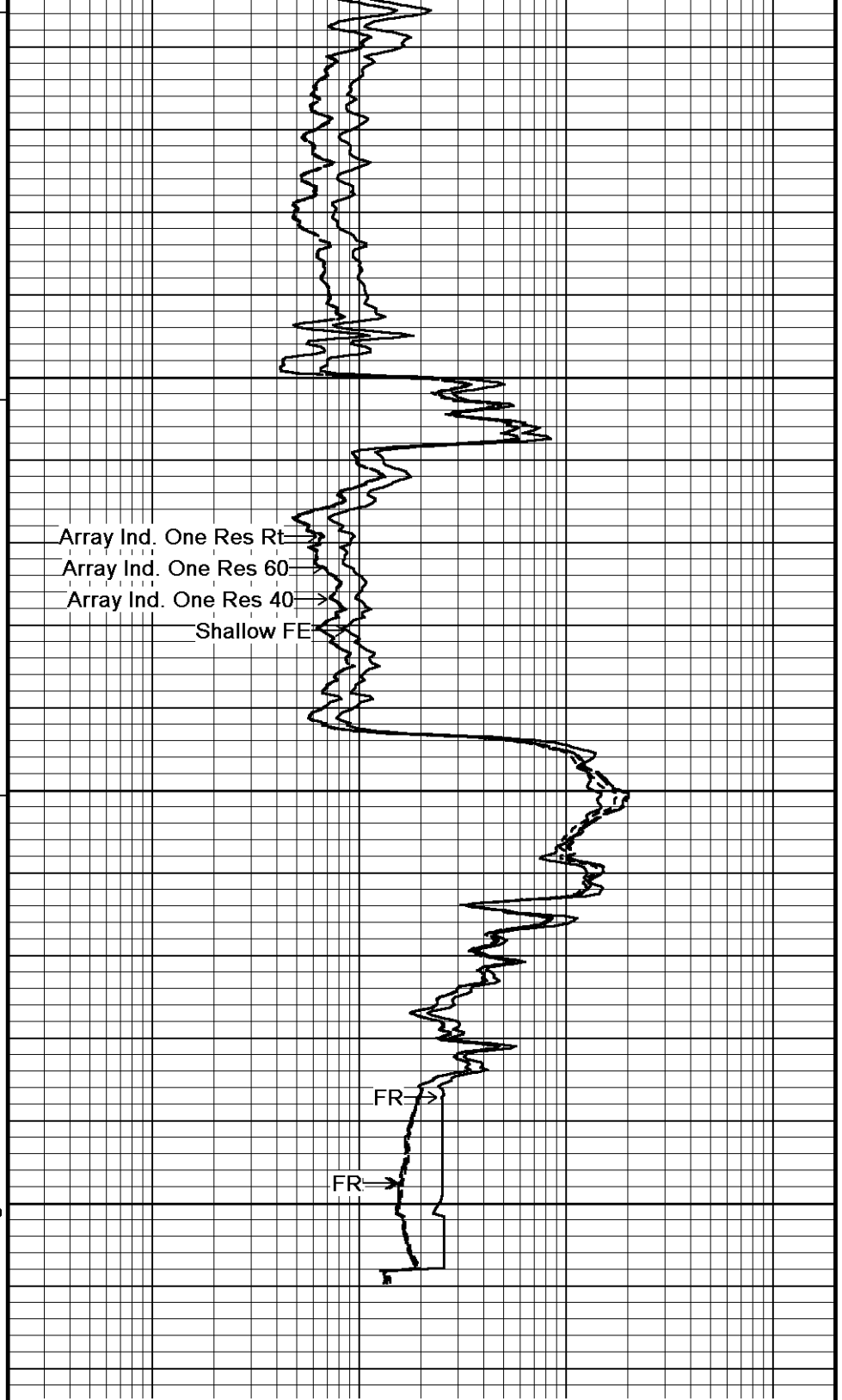
Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Spontaneous Potential
millivolts

Borehole
Temp in
deg F
HVI
every
10 cu ft

Annular
Integral



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

FR

FR

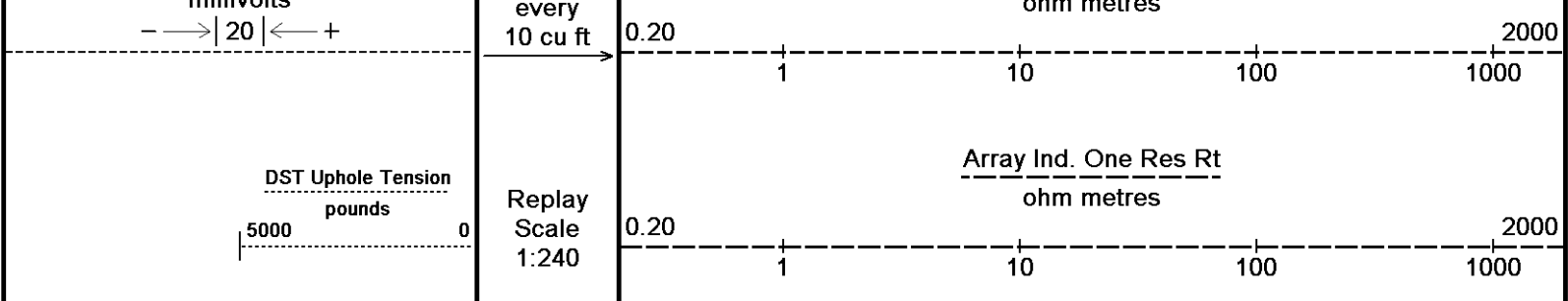
Shallow FE
ohm metres

0.20 1 10 100 1000 2000

Array Ind. One Res 40
ohm metres

0.20 1 10 100 1000 2000

Array Ind. One Res 60
ohm metres



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 14-OCT-2013 04:18
Filename: C:\Minimus 13.05.9583\Log\M&M Exploration Z-Bar #9-5\M&M Exploration Z-Bar #9-5_002.dta	Recorded on 14-OCT-2013 00:21
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583	

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REPEAT SECTION
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BEFORE SURVEY CALIBRATION
C:\Minimus 13.05.9583\Log\M&M Exploration Z-Bar #9-5\M&M Exploration Z-Bar #9-5_003.dta

General Constants All 000		Last Edited on 13-OCT-2013,23:15
General Parameters		
Mud Resistivity	1.350	ohm-metres
Mud Resistivity Temperature	75.000	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	4.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Base Density Porosity	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.K 469		Field Calibration on 10-OCT-2013 10:26
	Measured	Calibrated (API)
Background	70	48
Calibrator (Gross)	1122	773
Calibrator (Net)	1052	725

Gamma Constants MCG-D.K 469		Last Edited on 13-OCT-2013,22:25
Gamma Calibrator Number	GRC38	
Mud Density	1.09	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.K 469		Field Calibration on 18-AUG-2013,02:35
	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 469		Last Edited on 18-AUG-2013,02:35
Pre-filter Length	11	

FE Calibration MFE-B.J 353		Base Calibration on 07-OCT-2013 09:02
Base Calibration		Field Check on 10-OCT-2013 10:03

	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	964.2	126.8	
Base Check		281.0	
Field Check		281.1	
FE Constants MFE-B.J 353			Last Edited on 10-OCT-2013,09:59
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 167			Base Calibration on 02-OCT-2013,14:21 Field Check on 10-OCT-2013 09:59
Base Calibration			
Test Loop Calibration		Measured	Calibrated (mmho/m)
Channel	Low	High	Low 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)		Field Check (mmho/m)
	Low	High	Low High
1			12.8 3839.3
2			29.5 3477.1
3			29.1 3053.1
4			19.8 2081.7
Deep			18.6 2049.0
Medium			42.3 3991.4
Shallow			42.8 5054.5
Array Temperature			69.2 Deg F
Induction Constants MAI-A.A 167			Last Edited on 10-OCT-2013,09:55
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	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	

Caliper Calibration MPD-B 64

Base Calibration on 02-OCT-2013 15:52

Field Calibration on 10-OCT-2013 10:11

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16381	3.99
2	25151	5.98
3	33629	7.97
4	41918	9.86
5	51268	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.12	5.98

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Log\M&M Exploration Z-Bar #9-5\M&M Exploration Z-Bar #9-5_003.dta

3/8" Triple Cone Cable Head (MCB C A)

MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

Compact Comms Gamma

MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Micro-log

MML-A 3 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

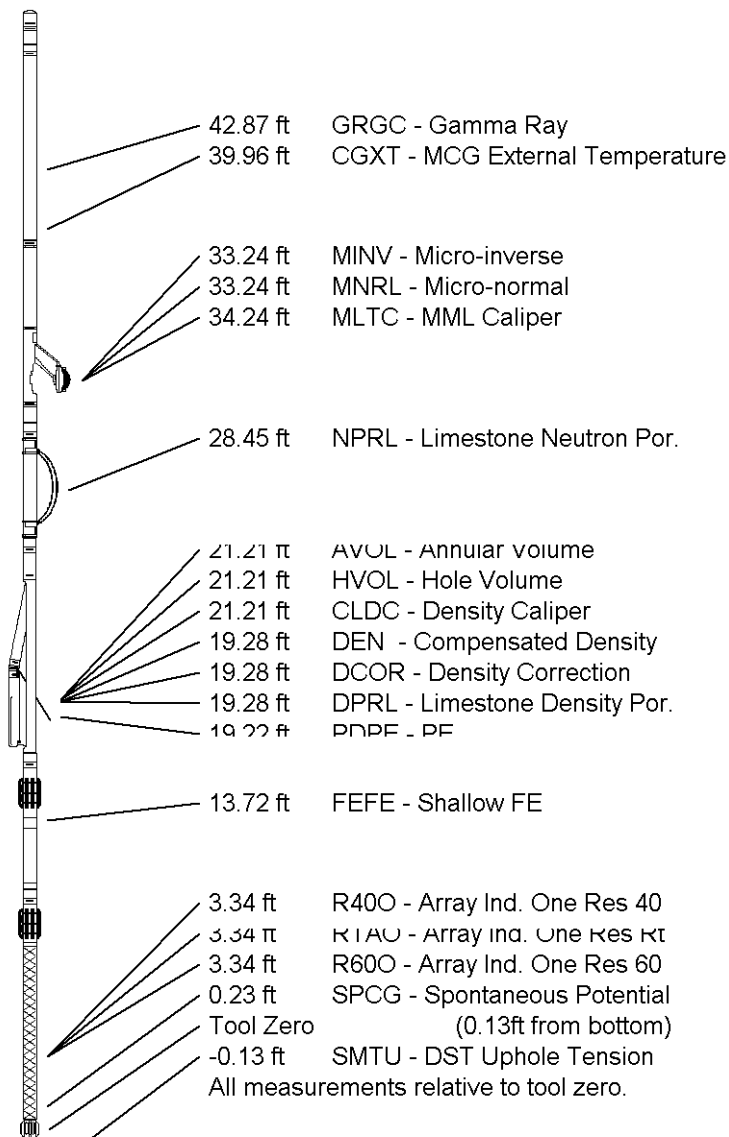
Compact Focussed Electric

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

Compact Induction

MAI-A.A 167 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 49.73 ft Weight: 399.0 lb



COMPANY M&M EXPLORATION, INC.
WELL Z-BAR #9-5
FIELD AETNA GAS AREA
PROVINCE/COUNTY BARBER
COUNTRY/STATE UNITED STATES / KANSAS

Elevation Kelly Bushing	1666.00	feet	First Reading	5198.00	feet
Elevation Drill Floor	1664.00	feet	Depth Driller	5200.00	feet
Elevation Ground Level	1656.00	feet	Depth Logger	5201.00	feet



ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

Weatherford[®]

Weatherford		ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG	
COMPANY M&M EXPLORATION, INC.			
WELL Z-BAR #9-5			
FIELD AETNA GAS AREA			
PROVINCE/COUNTY BARBER			
COUNTRY/STATE UNITED STATES / KANSAS			
LOCATION 1900' FNL & 350' FWL NW/4			
SEC	TIME	FEET	Other Services
9	345	1449	WPC/MCN
API Number	15-007-24068	WELL	
Serial Number			
Permanent Datum O.L. Elevation	1656 feet		
Log Measured From	K.B. @ 10 FEET		
Drilling Measured From	K.B. @ 10 FEET		
Date	13-OCT-2013		
Run Number	ONE		
Service Order	3541096		
Depth Driller	5200.00	feet	
Depth Logger	5201.00	feet	
First Reading	5198.00	feet	
Last Reading	314.00	feet	
Casing Driller	316.00	feet	
Casing Logger	314.00	feet	
BIT Size	7.880	inches	
Flow Fluid Type	CHEMICAL		
Density/Viscosity	9.10 lb/USg	49.00 CP	
pH / Fluid Loss	10.40		
Sample Source	MUD/PIT		
Run @ Measured Temp	1.39 @ 75.0	ohm-m	
Run @ Measured Temp	1.11 @ 75.0	ohm-m	
Run @ Measured Temp	1.67 @ 75.0	ohm-m	
Source Ref / Rinc	CALC		
Run @ BHT	0.90 @ 116.0	ohm-m	
Time Since Circulation	5 HOURS		
Max Recorded Temp	116.00	deg F	
Equipment / Base	13096		
Recorded By	W STANBROUGH		
Witnessed By	BILL BUSCH		
LOG#	LB13-289		

