



Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY

M & M EXPLORATION, INC.

WELL

Z BAR 5-9

FIELD

AETNA GAS AREA

PROVINCE/COUNTY

BARBER

COUNTRY/STATE

U.S.A. / KANSAS

LOCATION

1515' FSL & 735' FEL SE SW NE SE

SEC 5

TWP 34S

RGE 14W

Other Services

Latitude

MPD/MDN

Longitude

MAI/MFE

API Number

15-007-24150

MML

Permanent Datum GL, Elevation 1651 feet

Log Measured From KB

Drilling Measured From KB @ 10 FEET

Date

30-MAR-2014

Run Number

ONE

Service Order

5872-83329134

Depth Driller

5200.00

Depth Logger

5203.00

First Reading

5200.00

Last Reading

301.00

Casing Driller

301.00

Casing Logger

301.00

Bit Size

7.875

Hole Fluid Type

CHEM

Density / Viscosity

9.10 lb/USg

PH / Fluid Loss

9.50

Sample Source

PIT

Rm @ Measured Temp

1.50 @ 86.0

Rmf @ Measured Temp

1.20 @ 86.0

Rmc @ Measured Temp

1.80 @ 86.0

Source Rmf / Rmc

CALC

Rm @ BHT

1.07 @ 120.0

Time Since Circulation

4 HRS

Max Recorded Temp

120.00

Equipment / Base

13057

Recorded By

D. COLE

Witnessed By

B. BUSCH

LB 14-096

Elevations:
KB 1661.00
DF 1659.00
GL 1651.00

BOREHOLE RECORD

Last Edited: 30-MAR-2014 05:57

Bit Size inches	Depth From feet	Depth To feet
7.875	301.00	5200.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
CASING	13.375	0.00	301.00	48.00

REMARKS

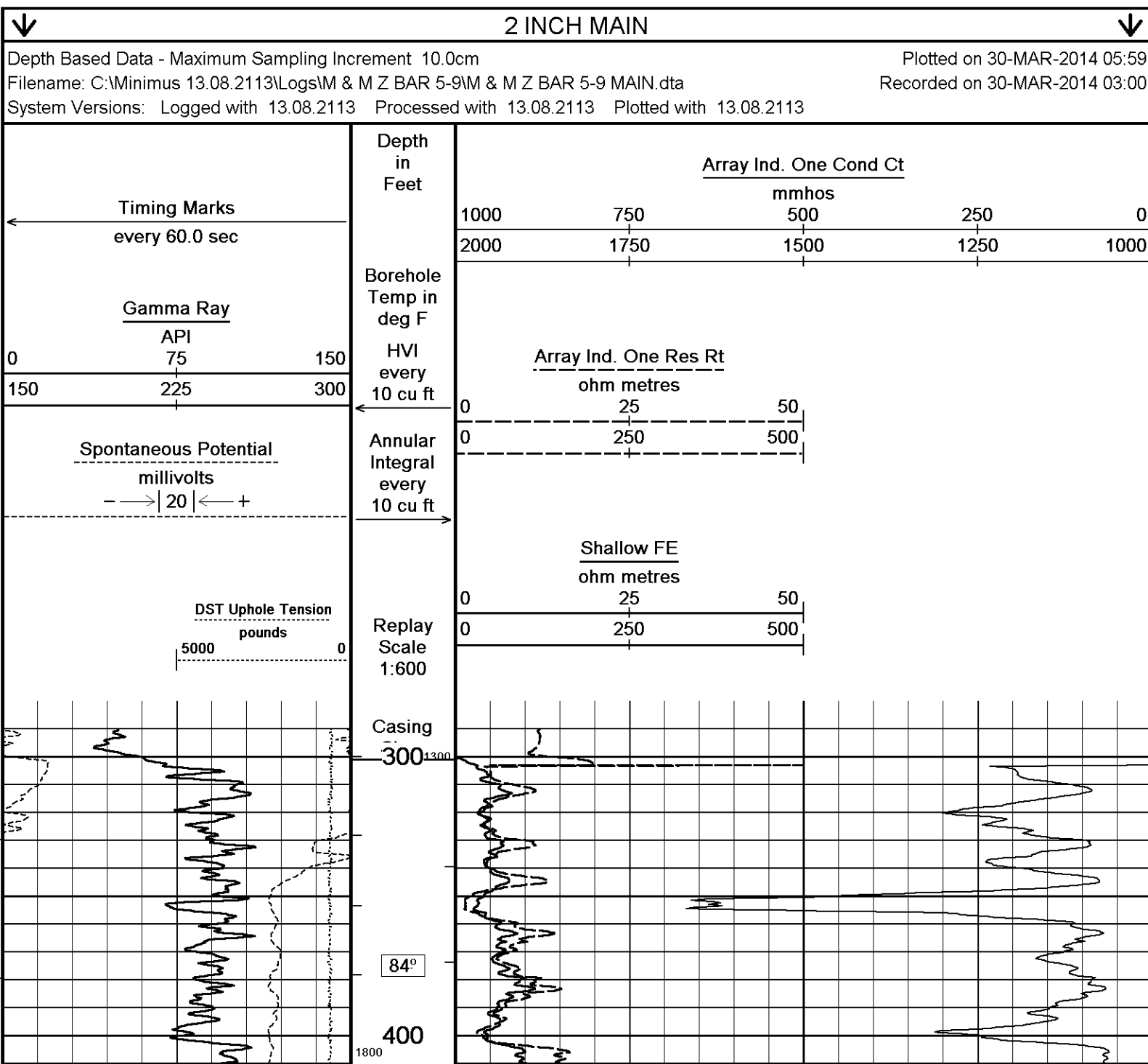
- SOFTWARE ISSUE: WLS 13.08.211.
- RUN ONE: MCG, MML, MDN, MPD, MFE, AND MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- 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: 430 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 290 CU.FT.

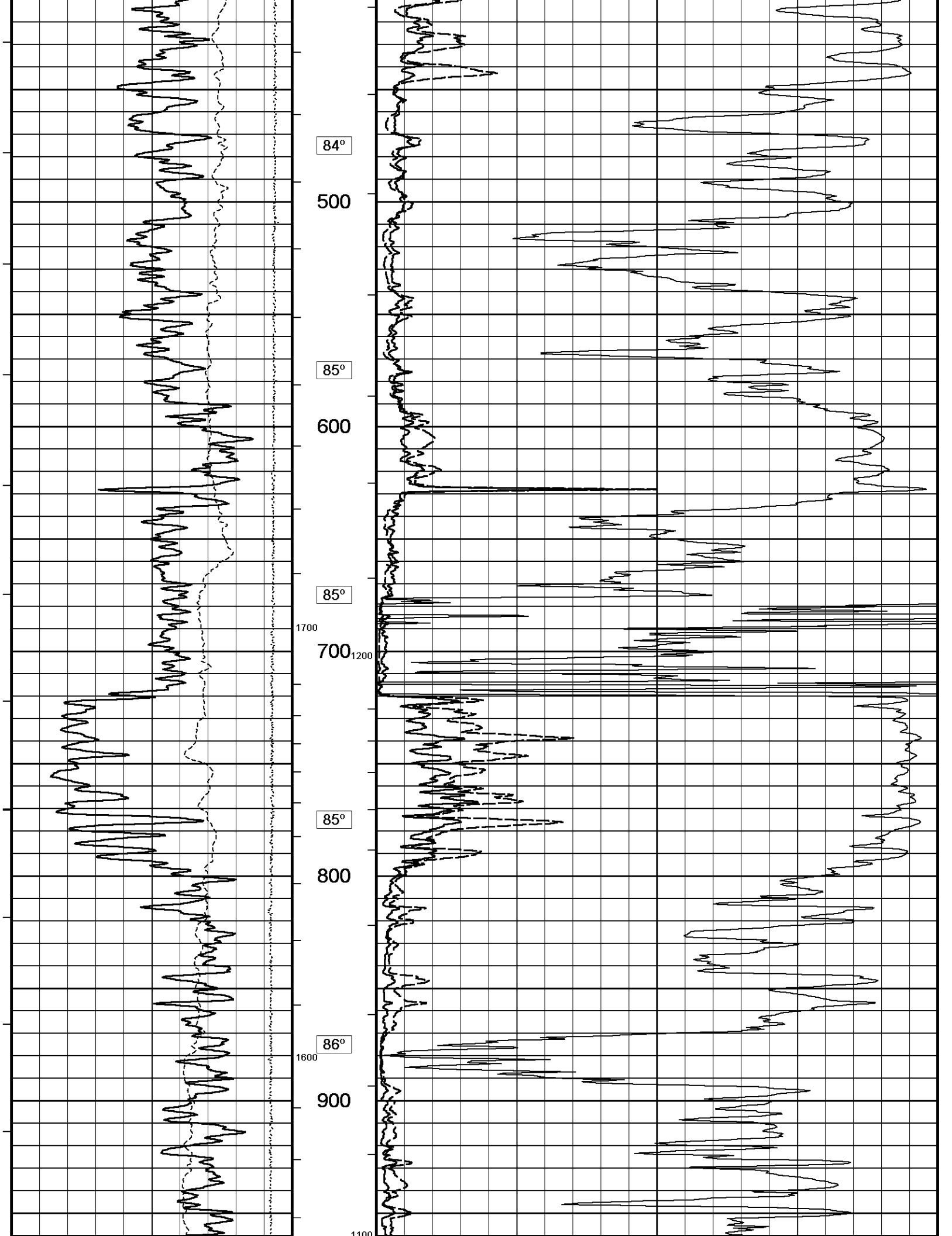
- RIG: HARDT

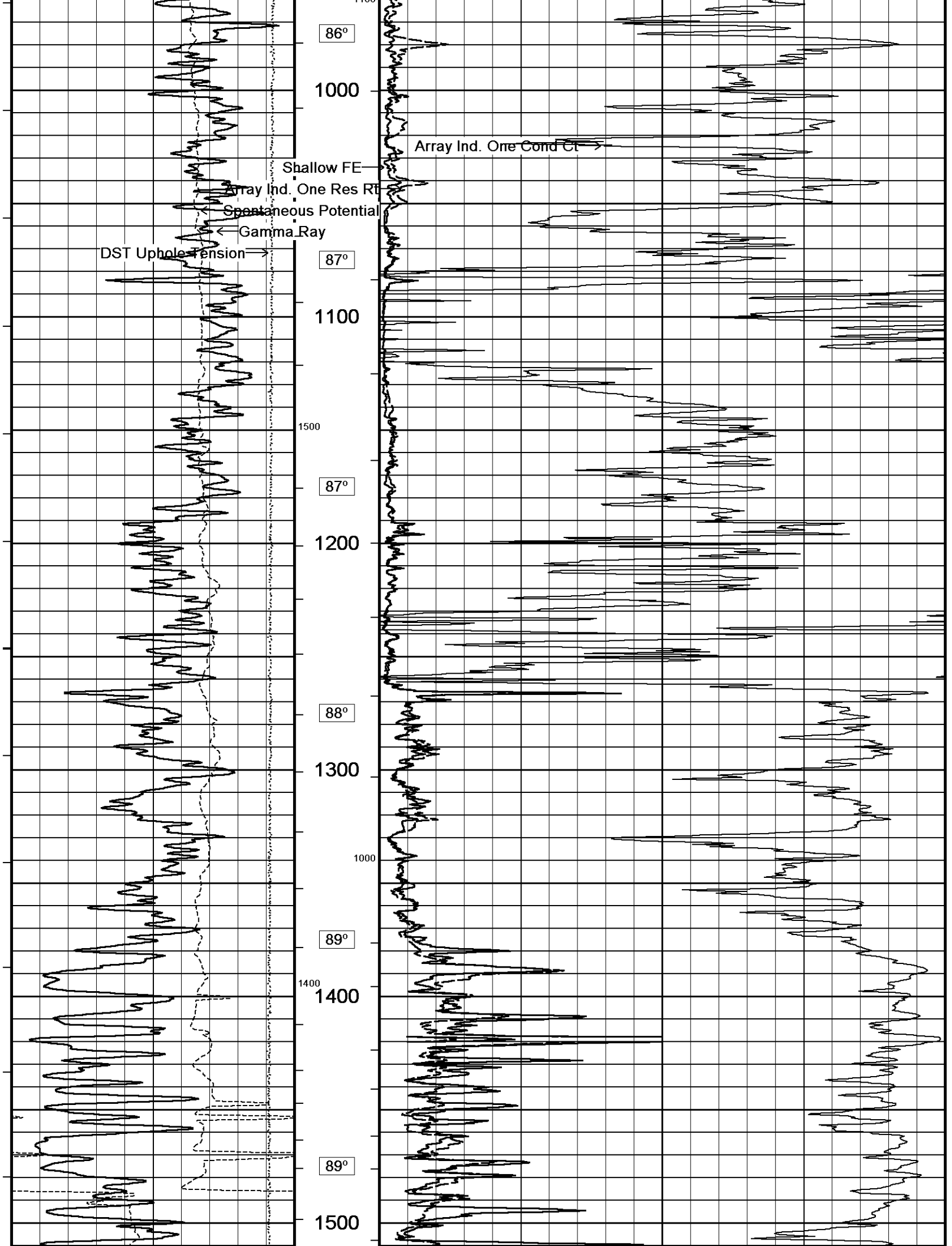
- ENGINEER: D. COLE.

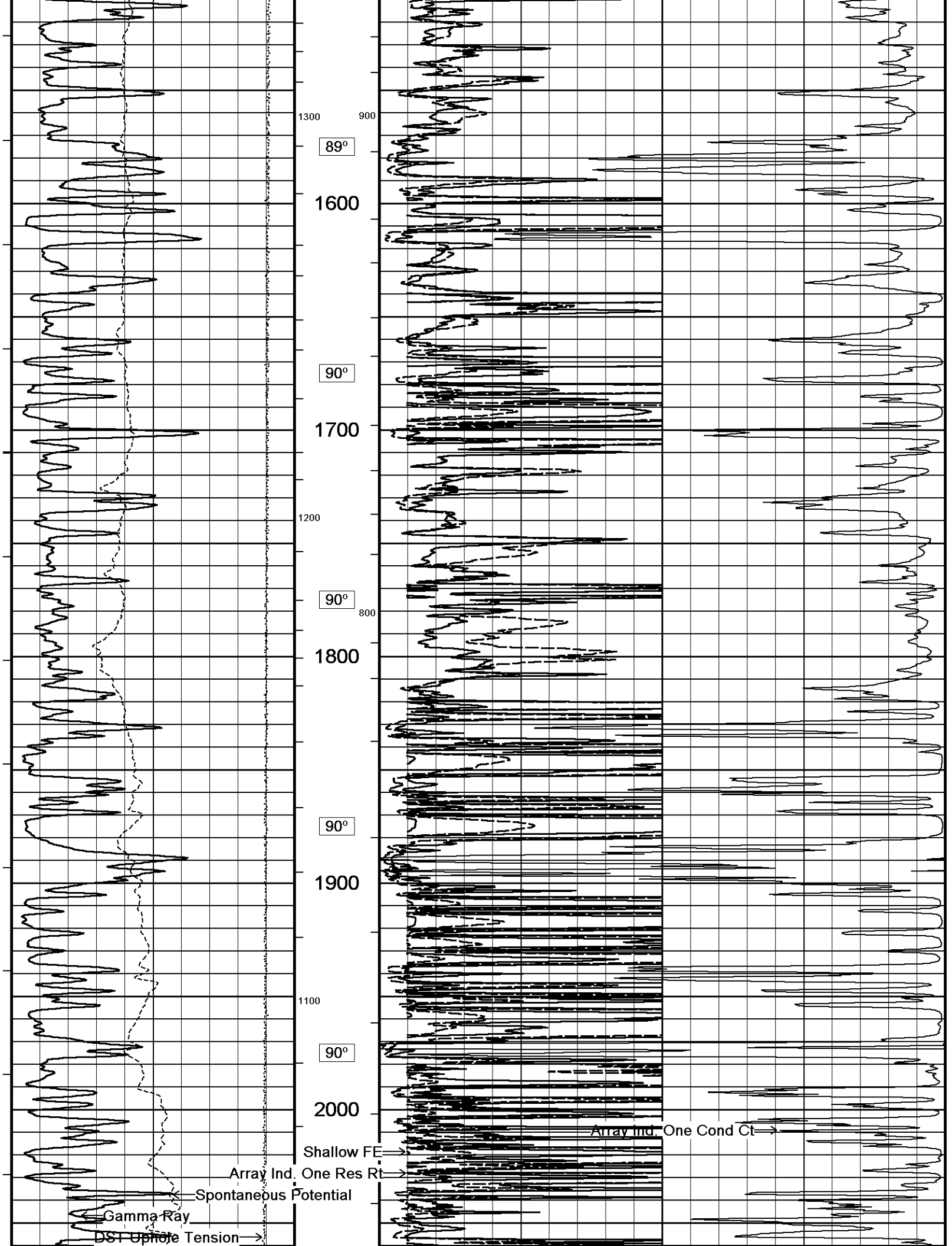
- OPERATOR: J. DUNLAP.

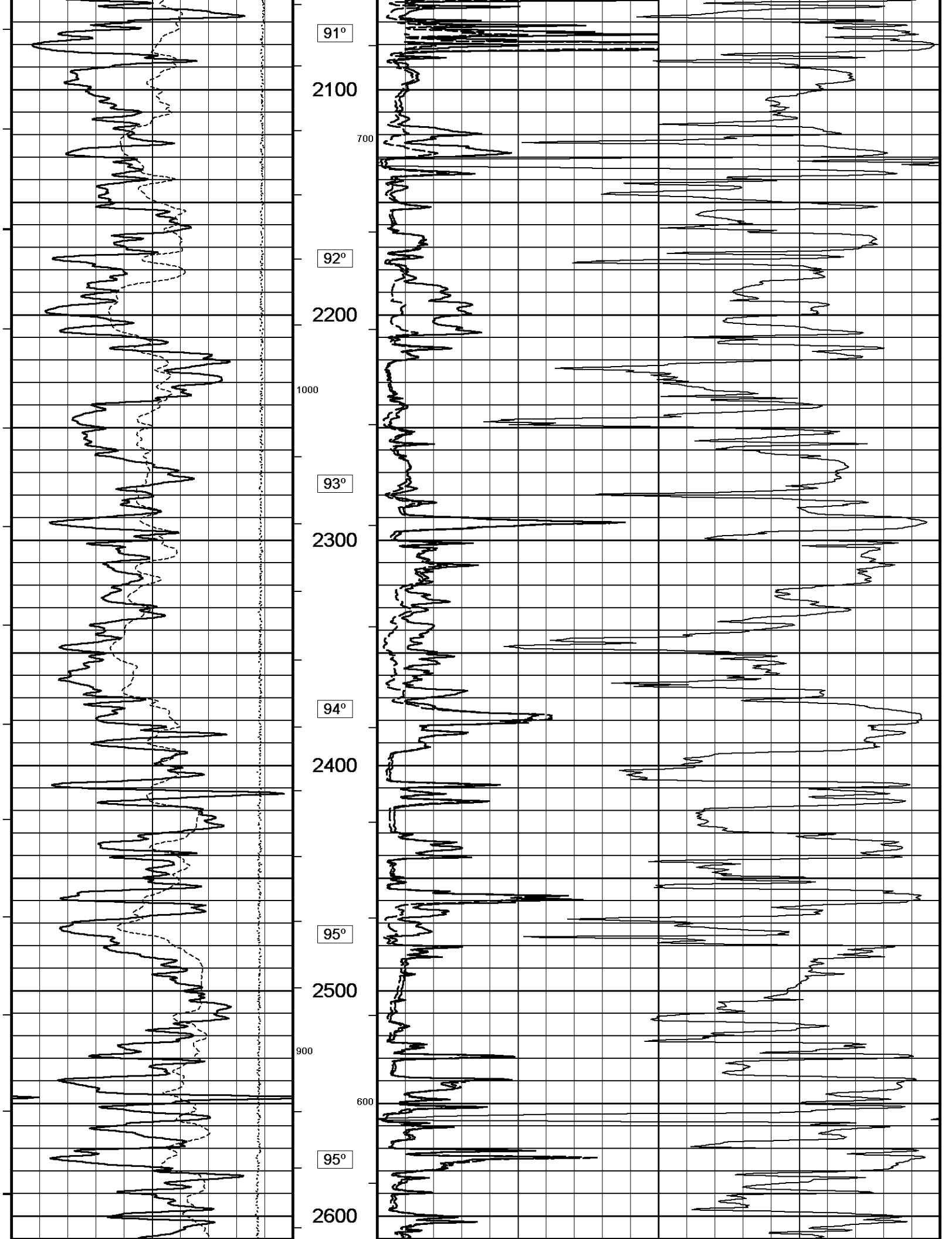
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will 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.

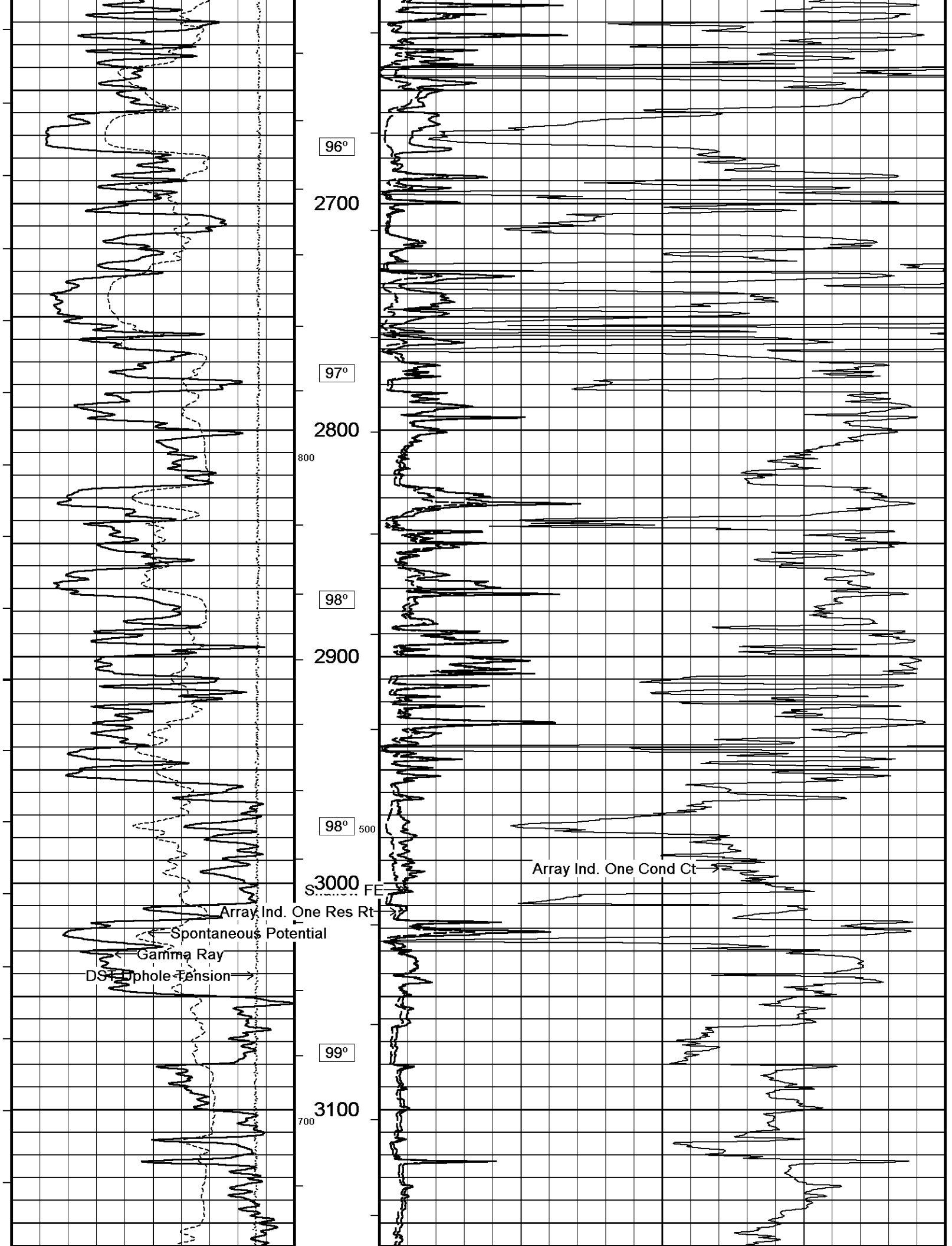


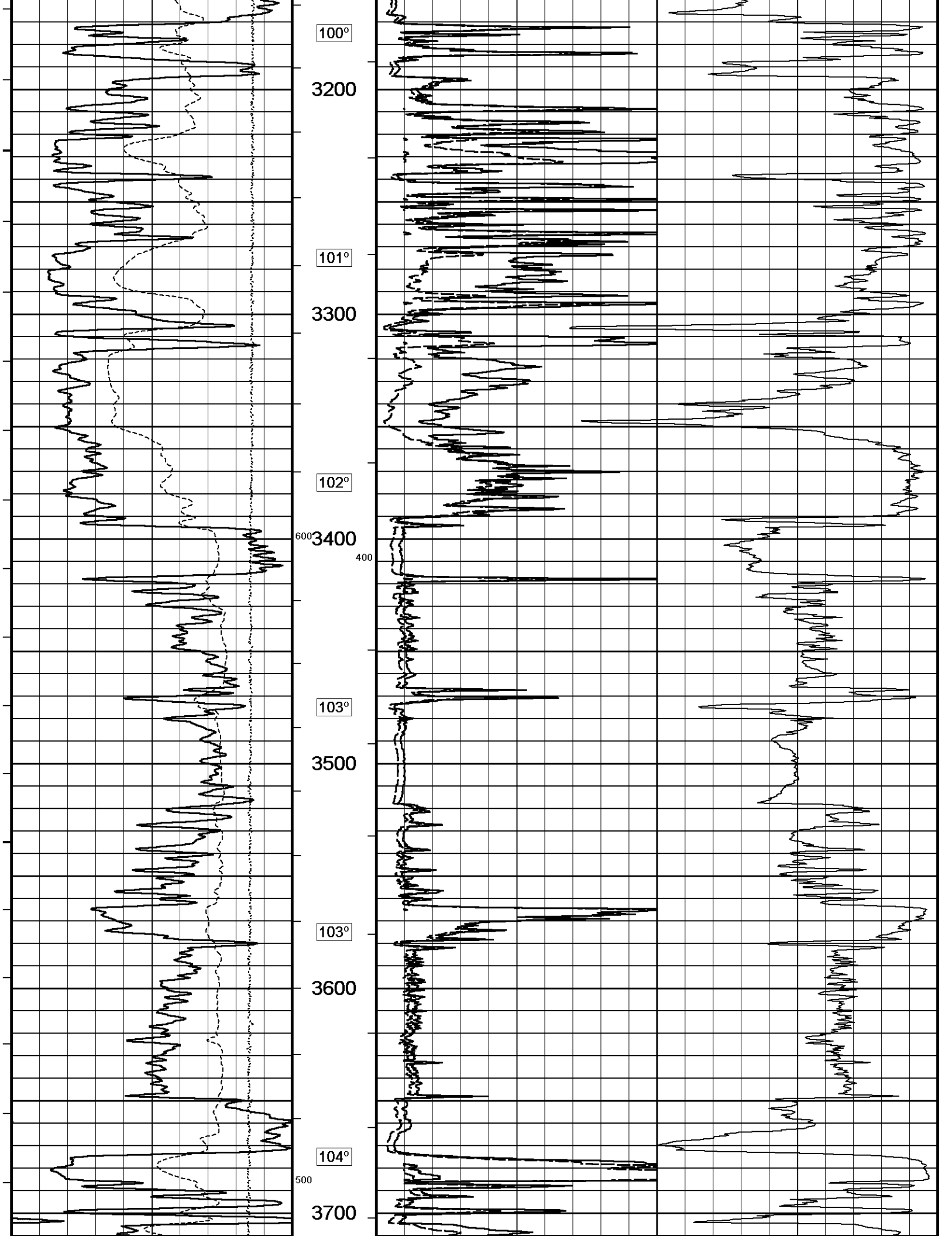


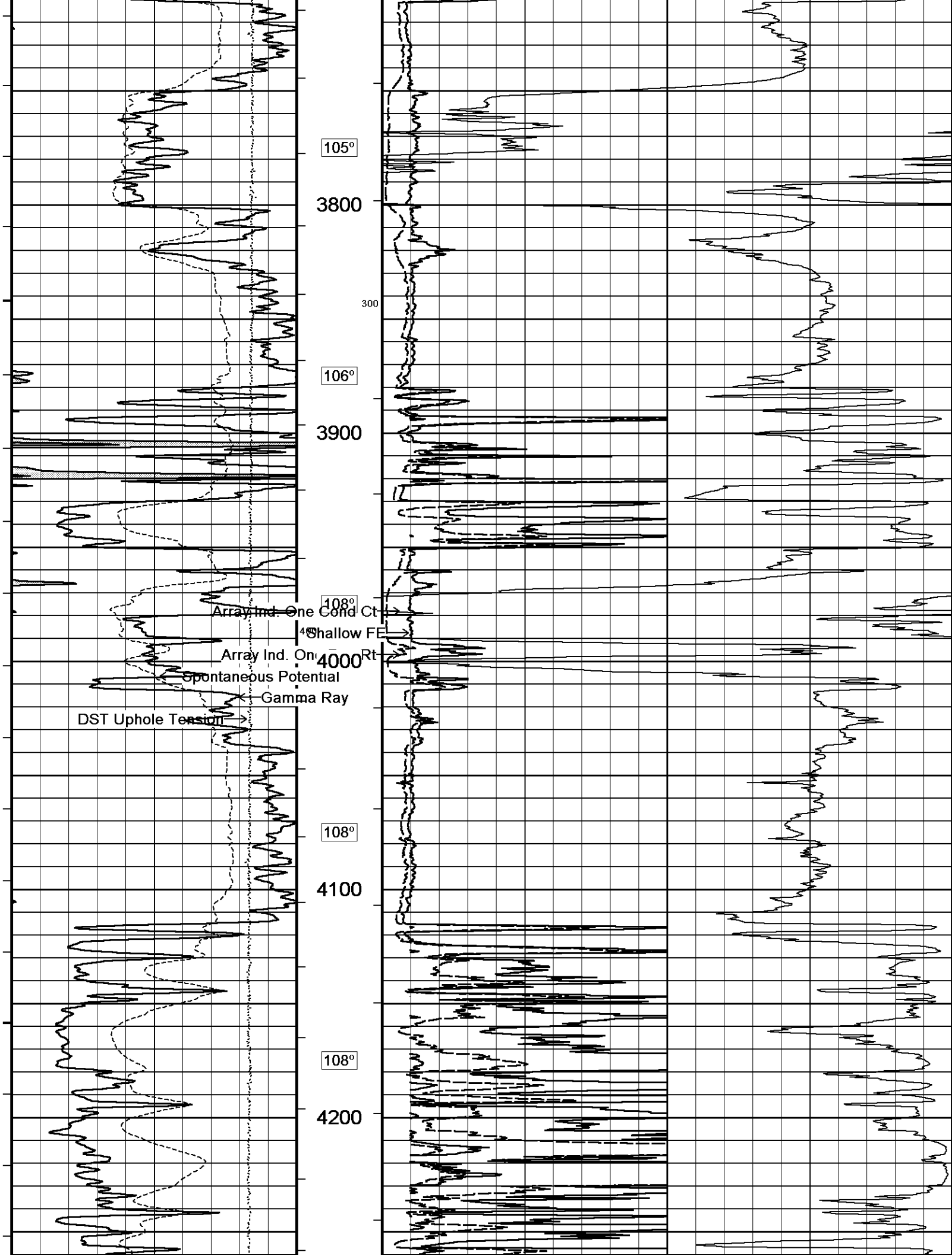


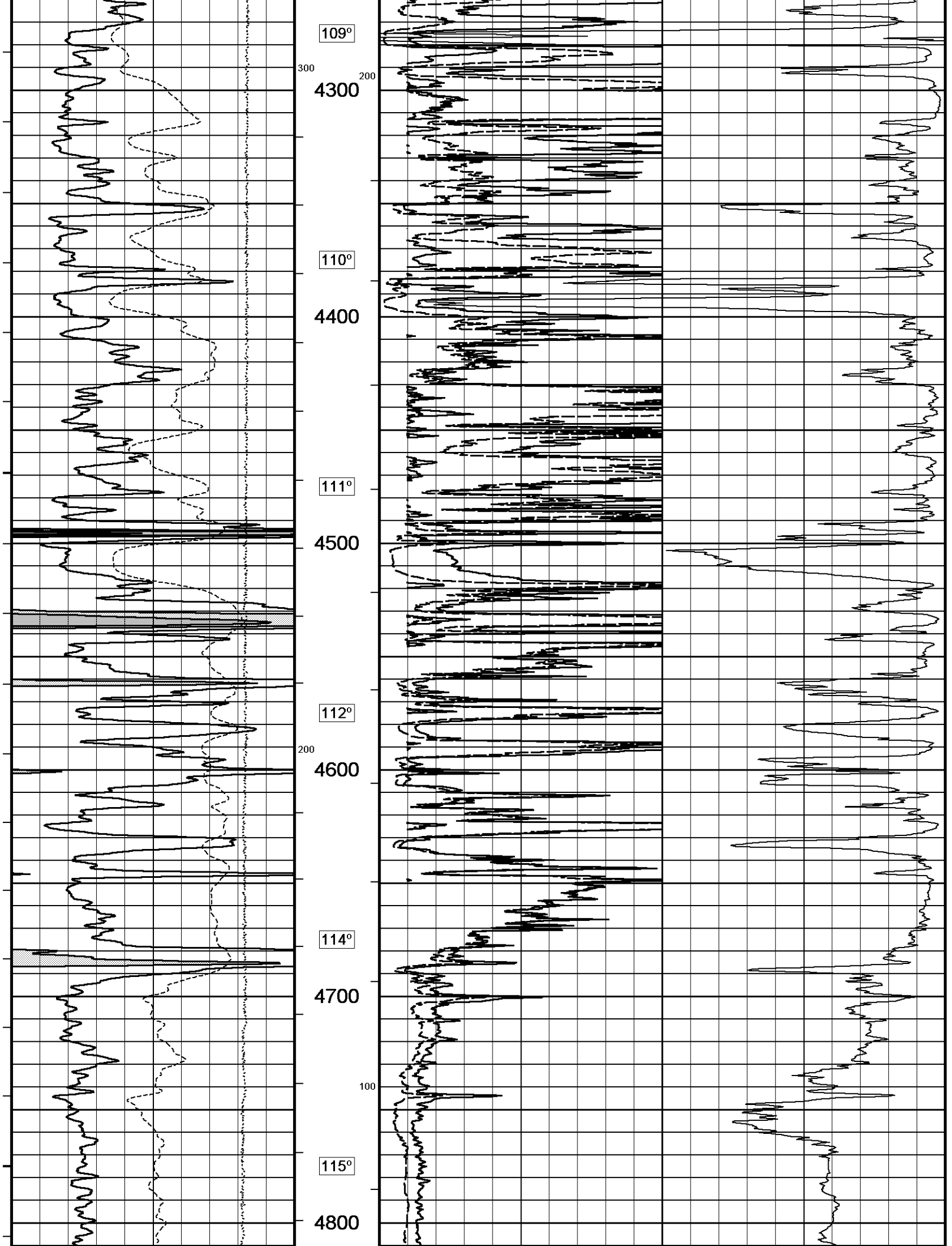


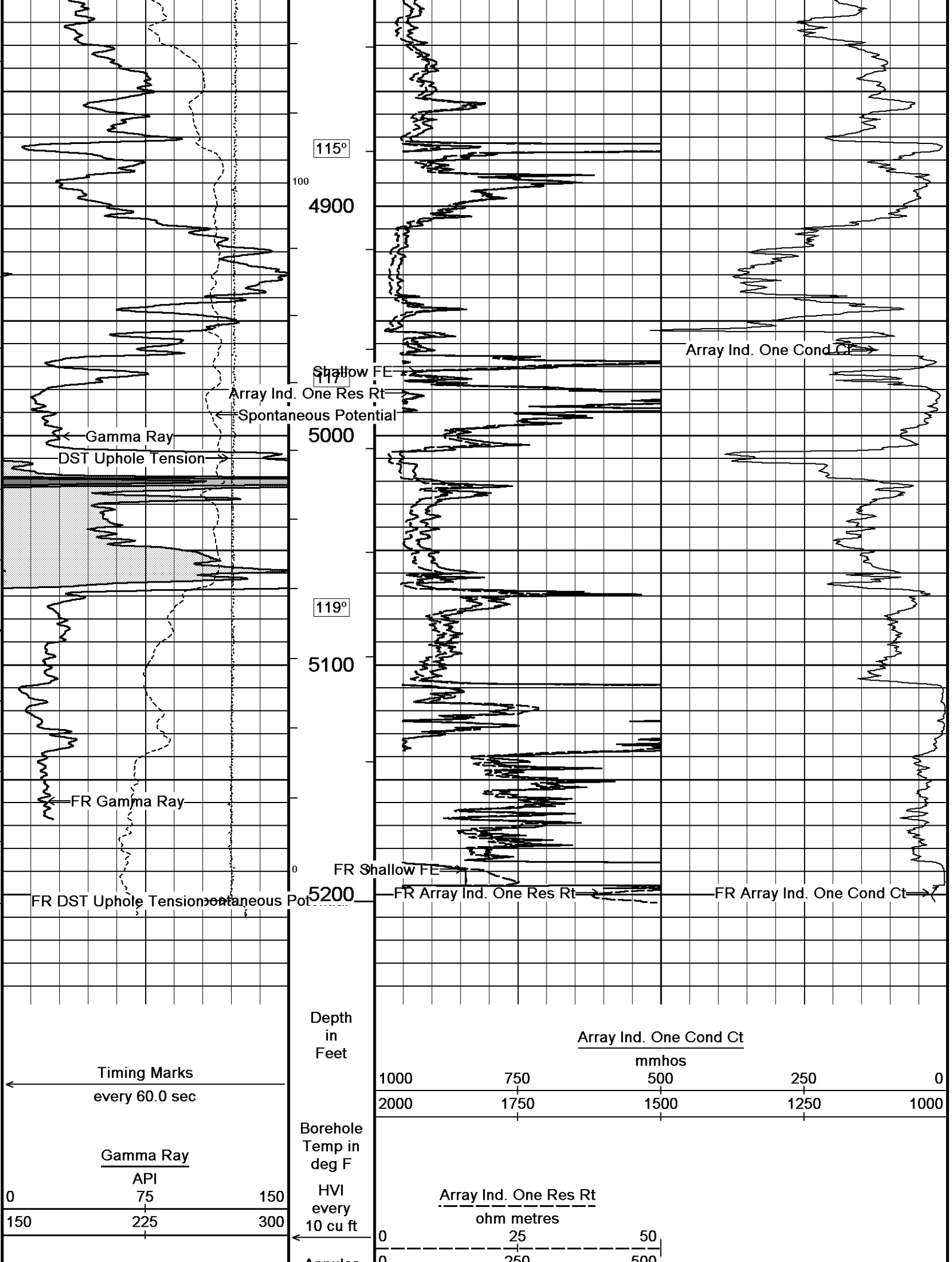


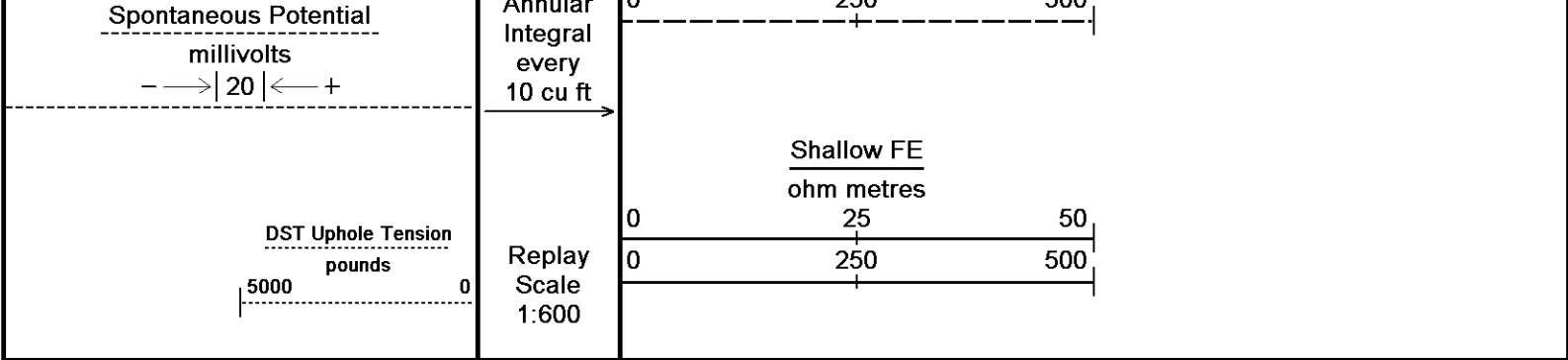










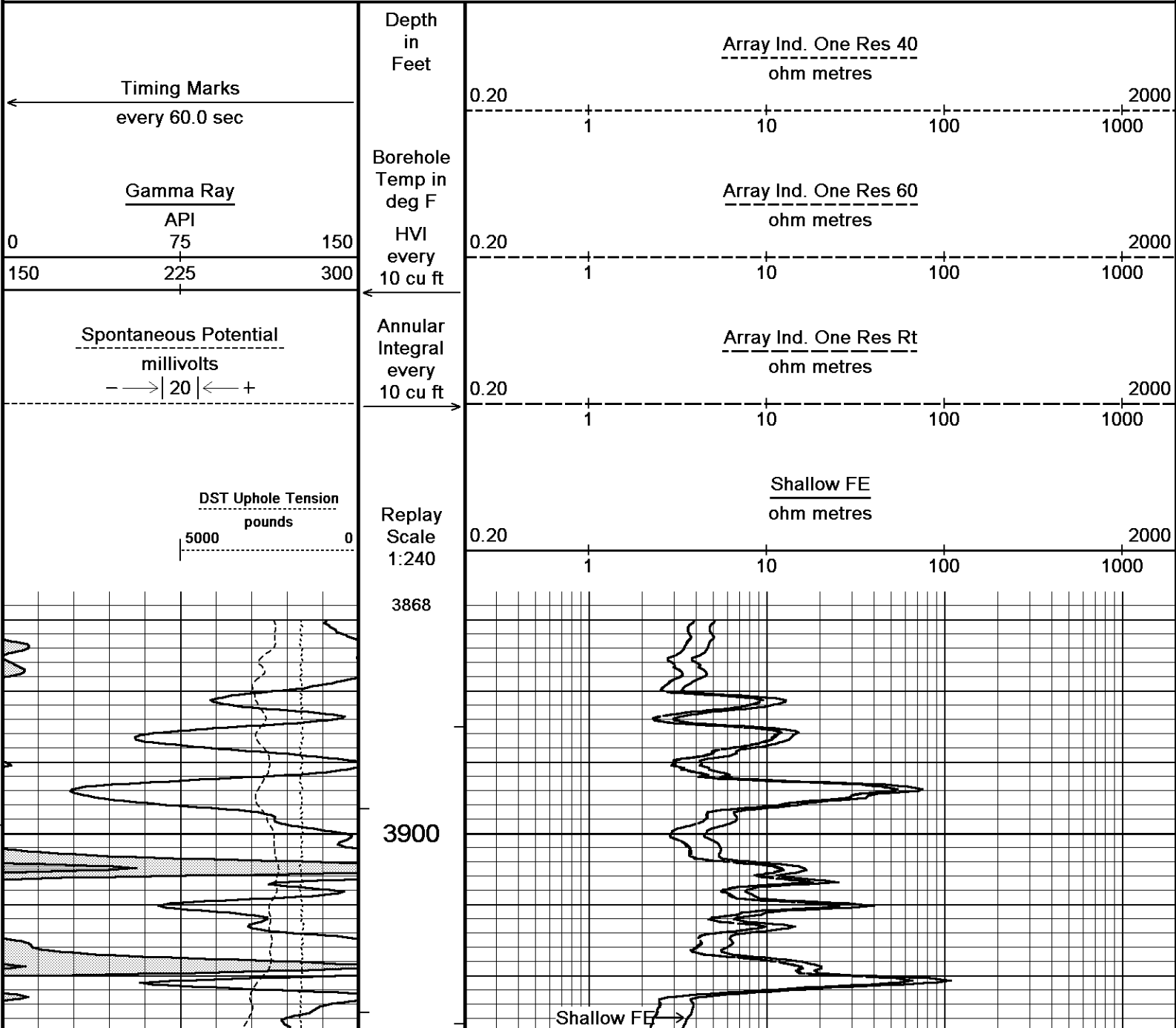


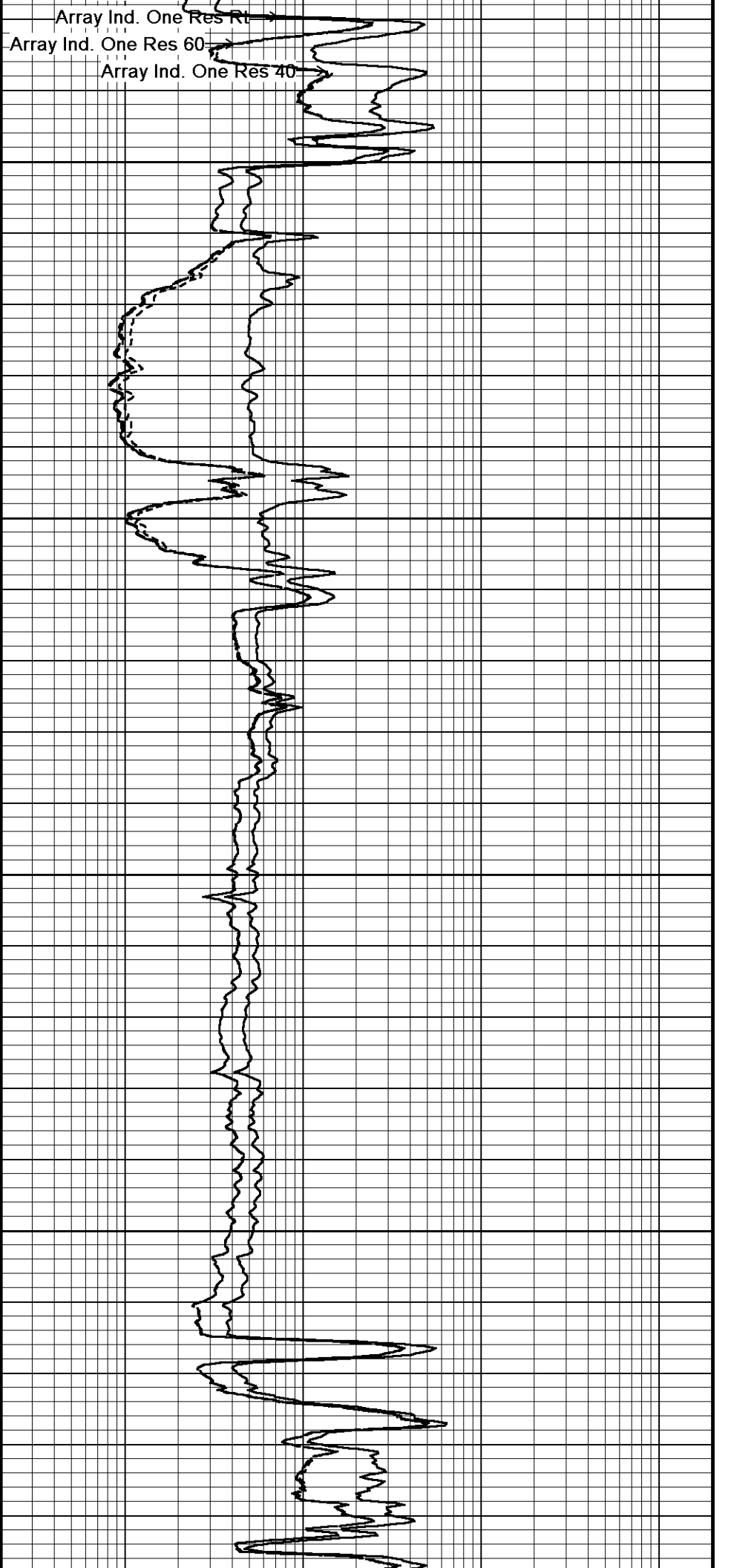
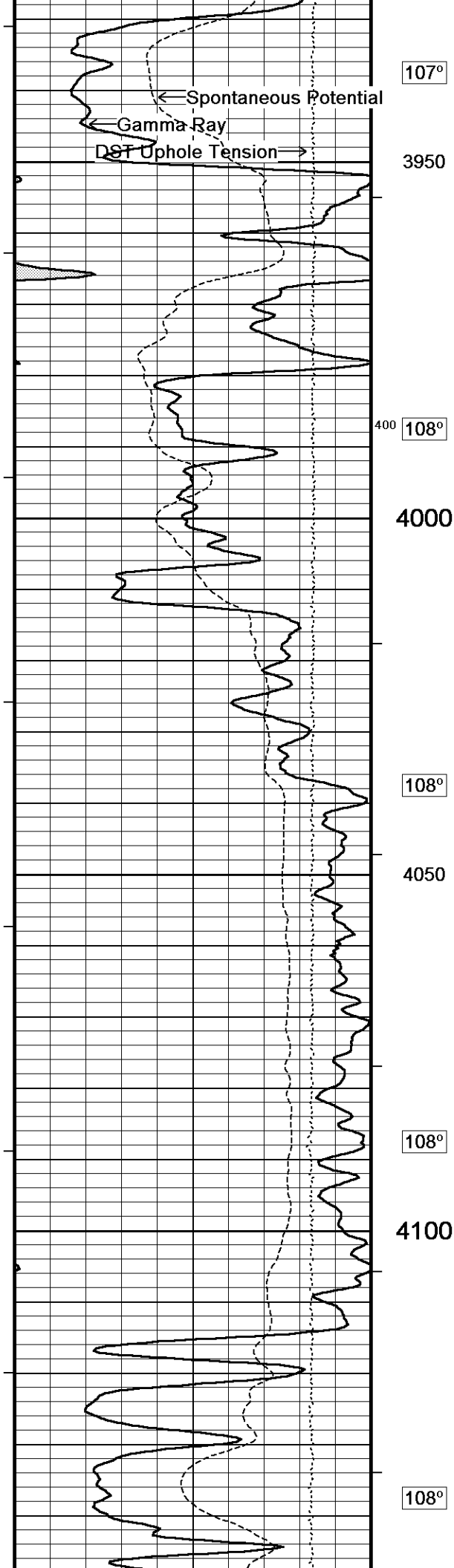
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9\M & M Z BAR 5-9 MAIN.dta
System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113

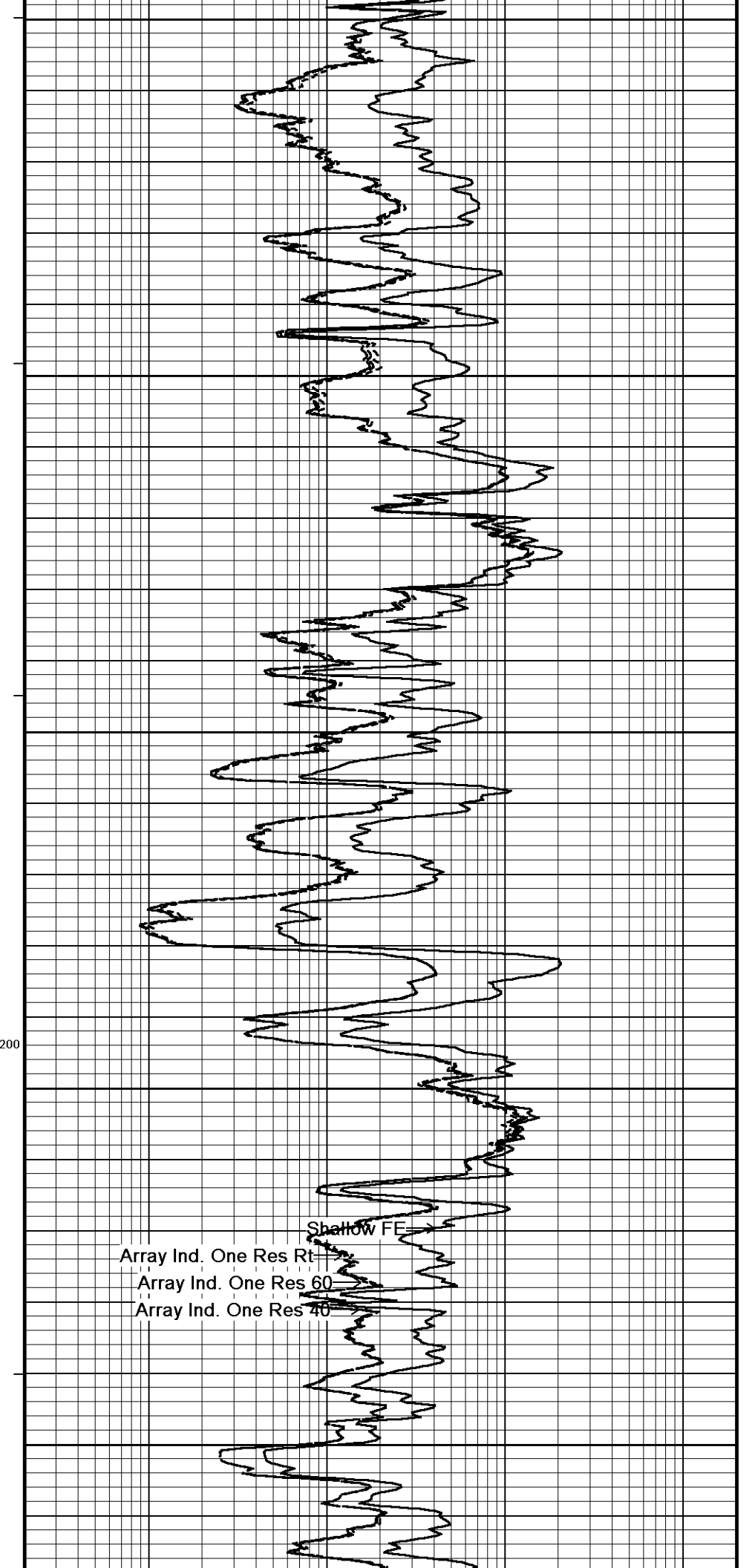
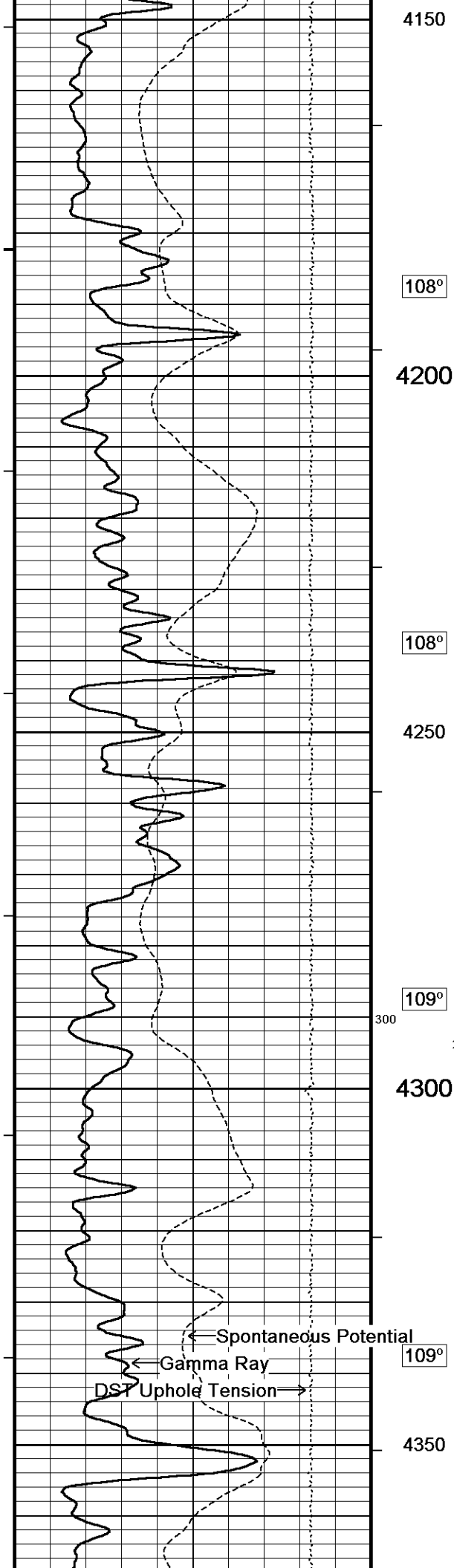
2 INCH MAIN

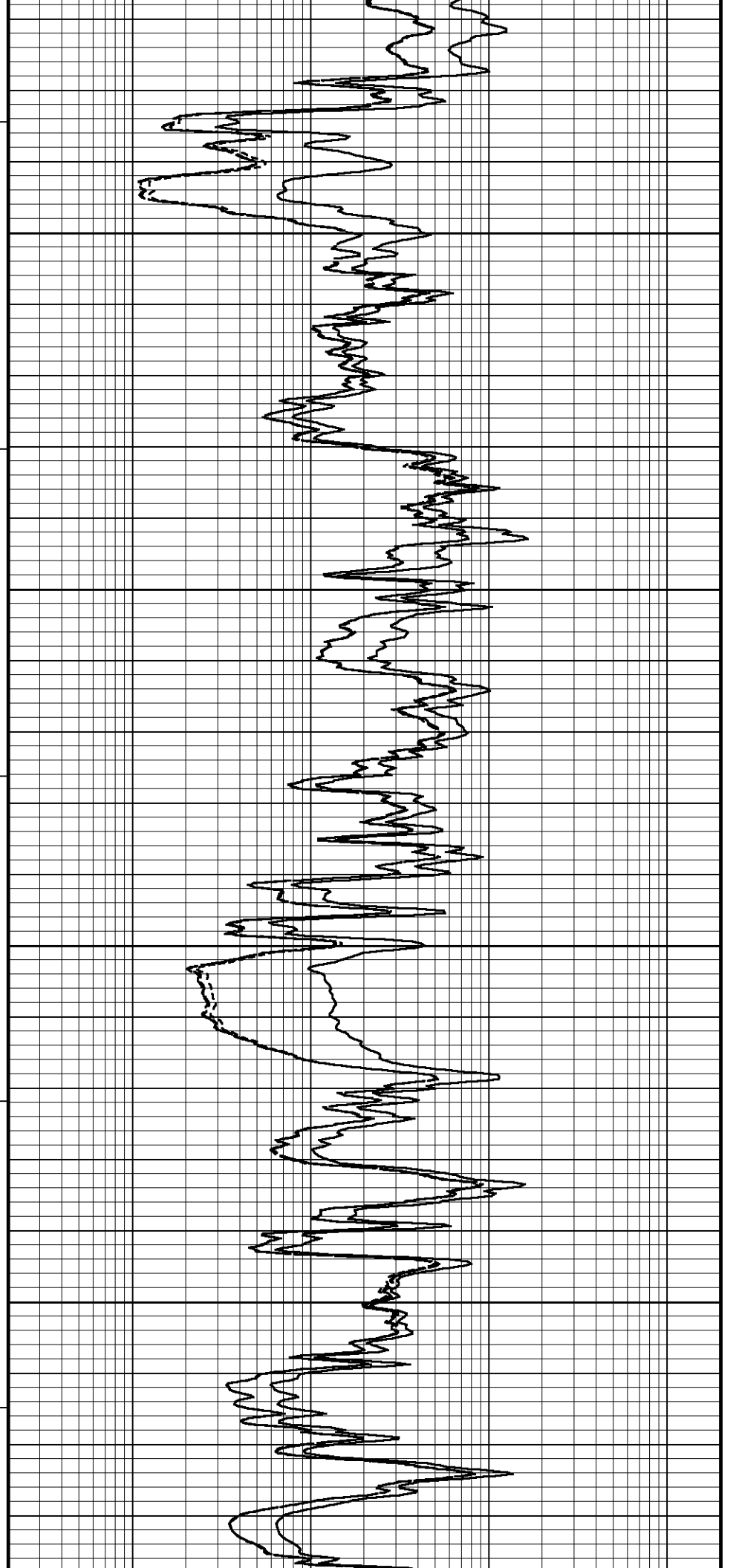
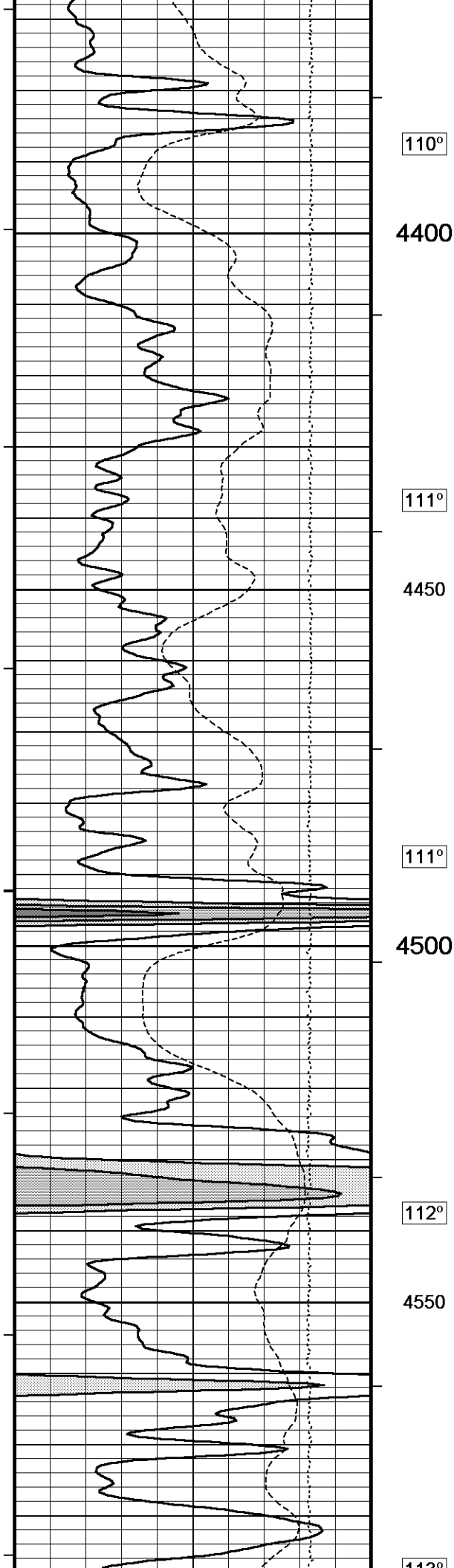
5 INCH MAIN

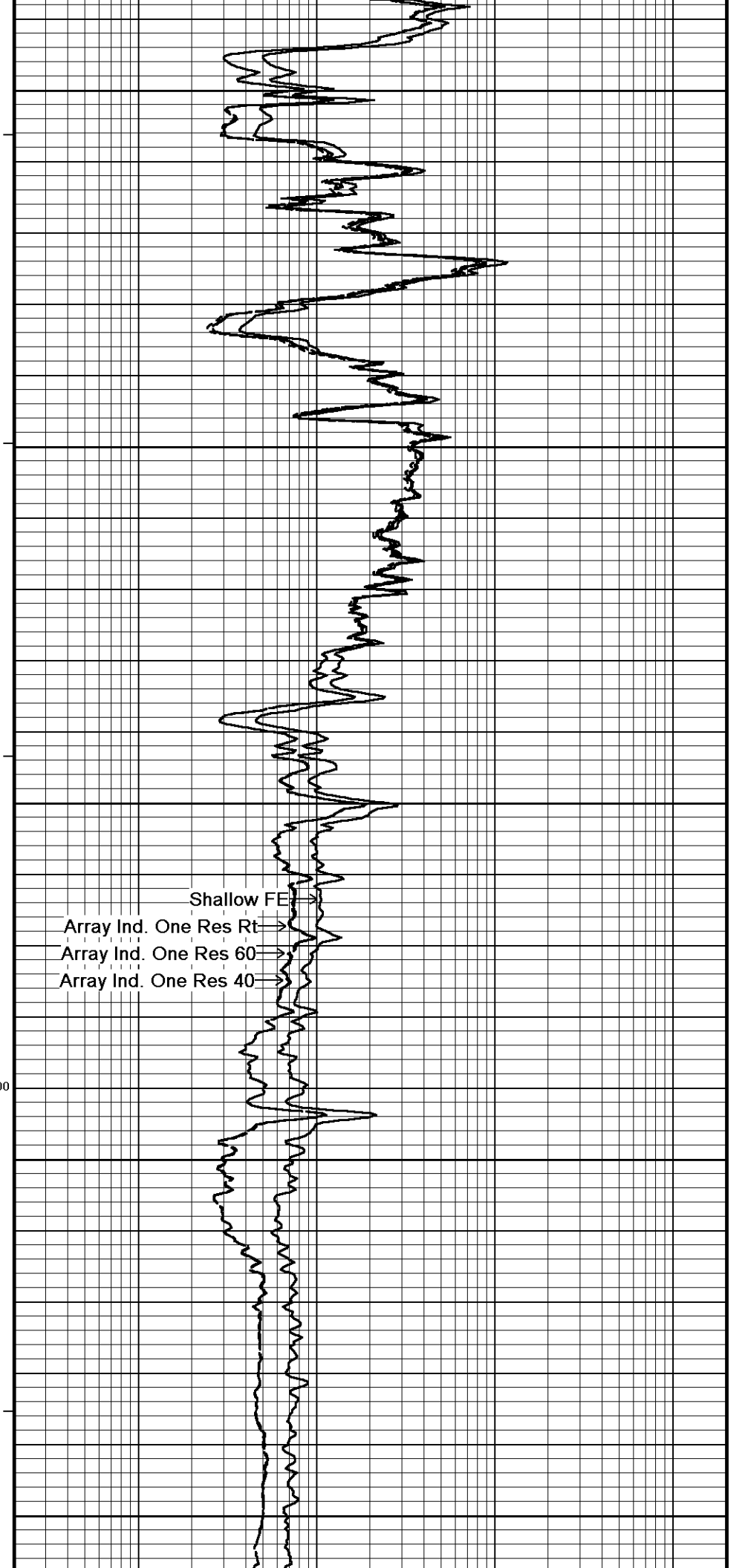
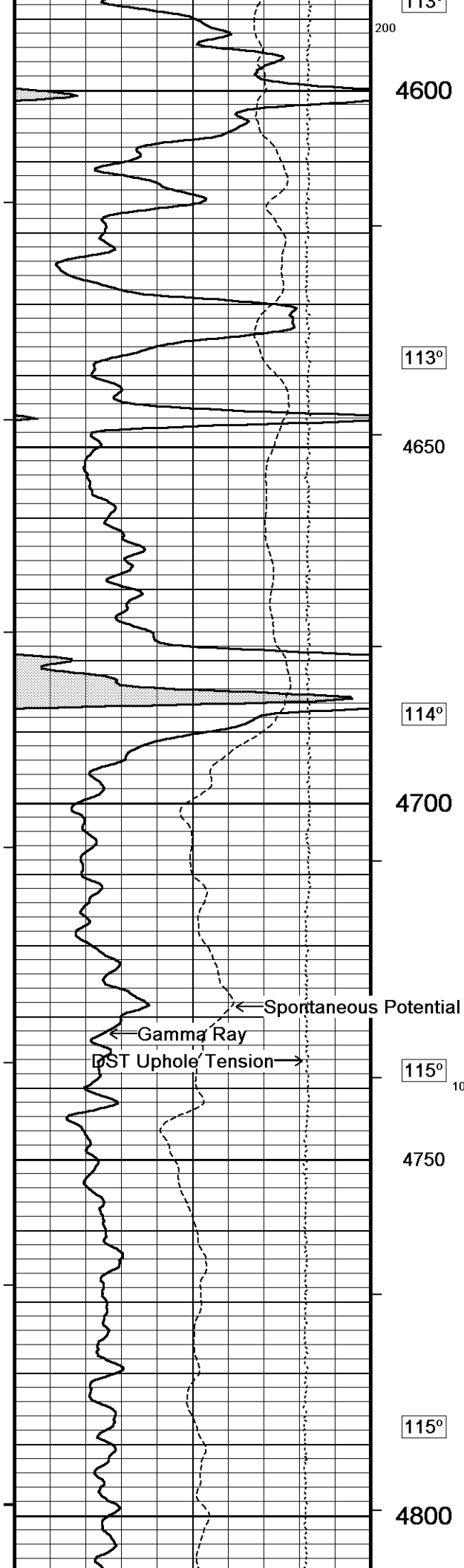
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9\M & M Z BAR 5-9 MAIN.dta
System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113

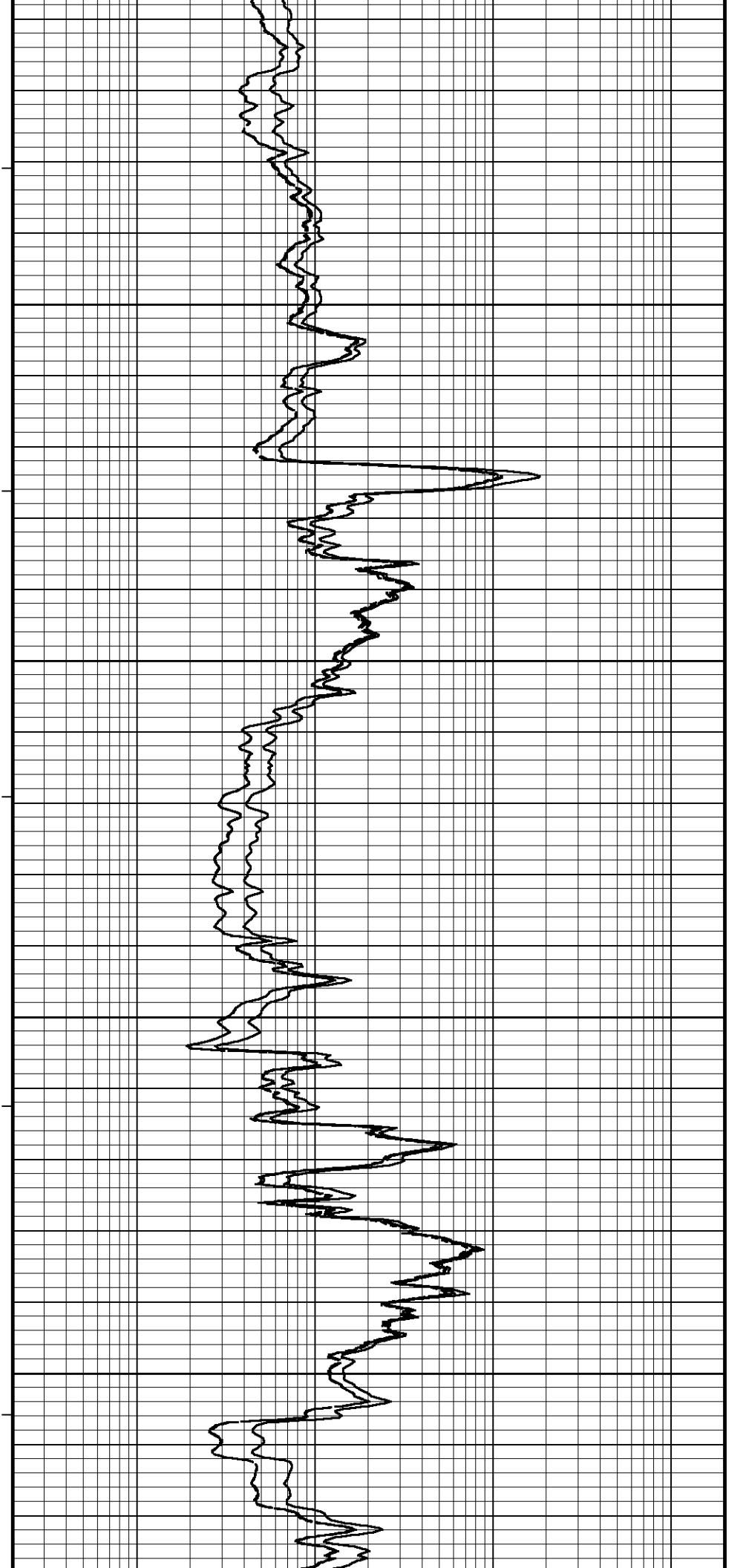
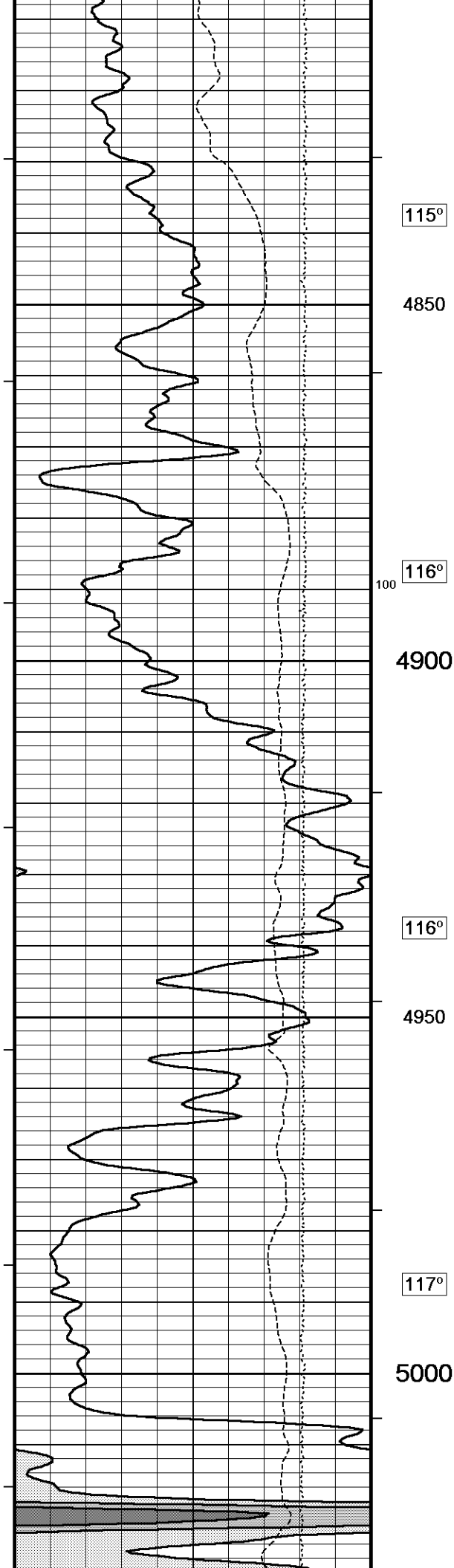


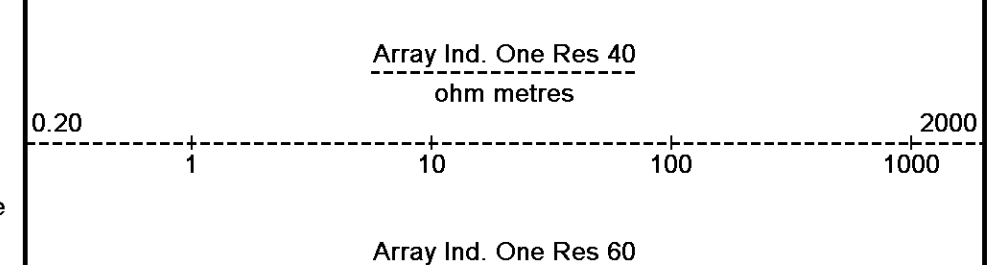
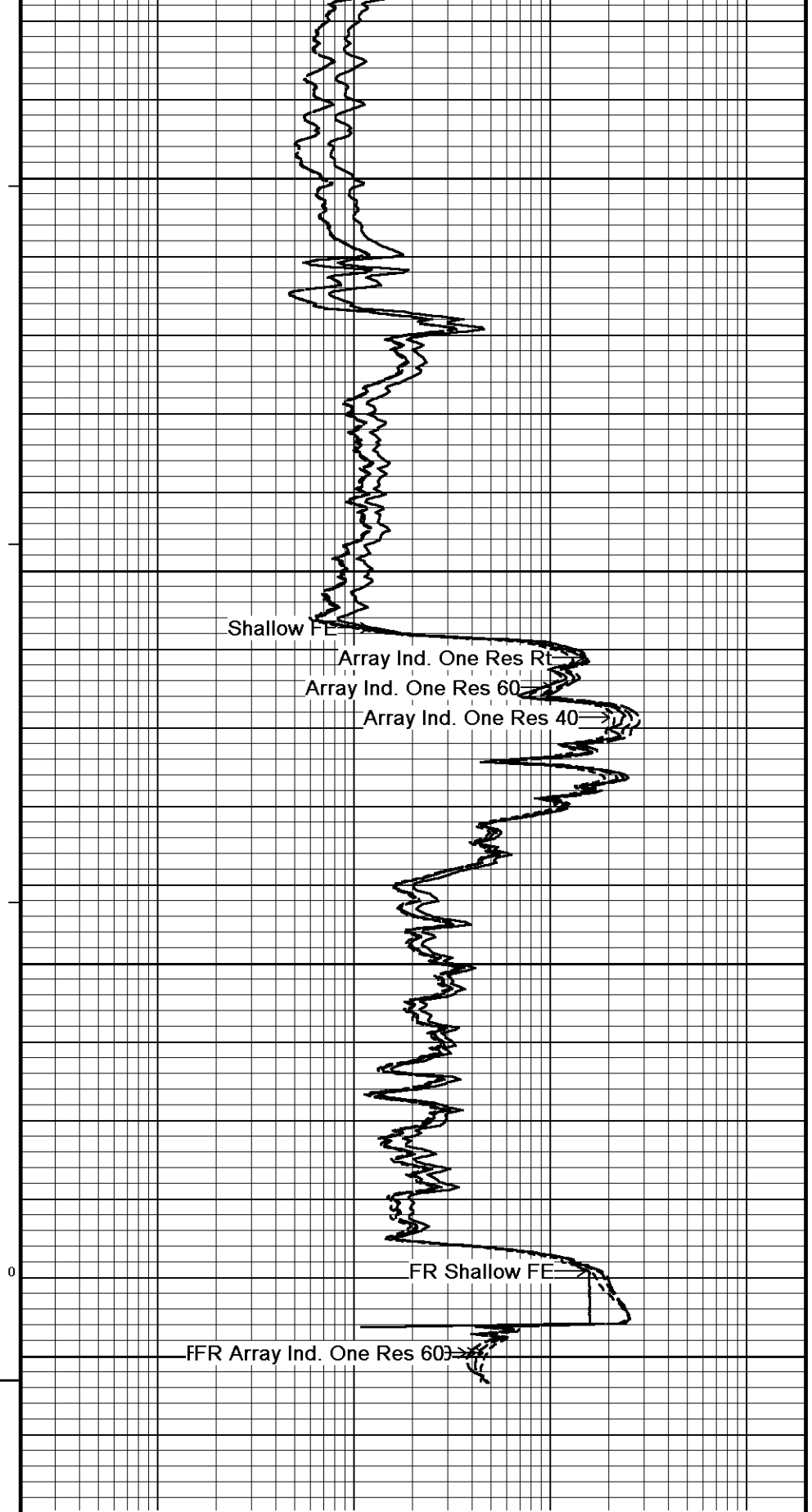
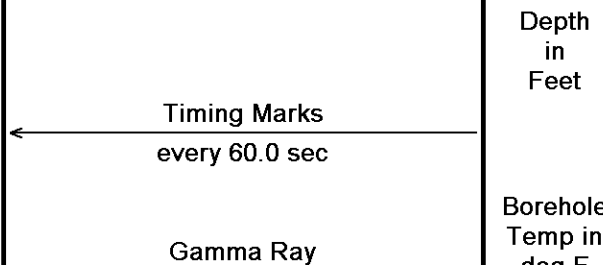
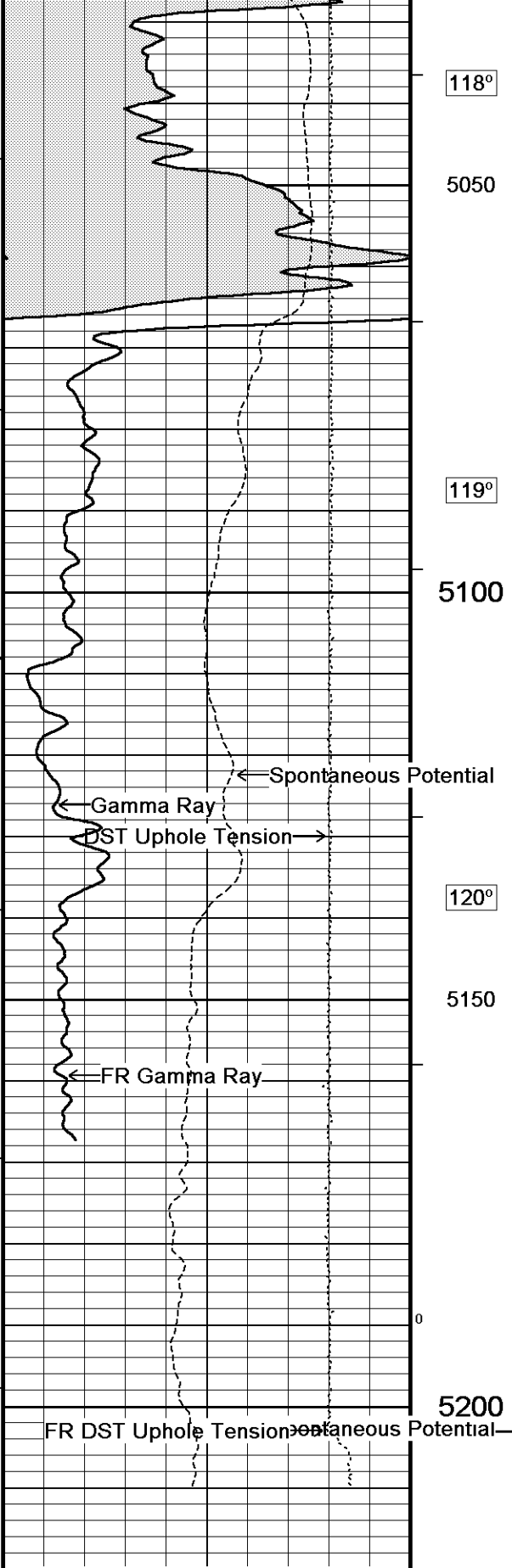












Timing Marks
every 60.0 sec

Gamma Ray

Depth
in
Feet

Borehole
Temp in
deg F

Array Ind. One Res 40
ohm metres

0.20

1

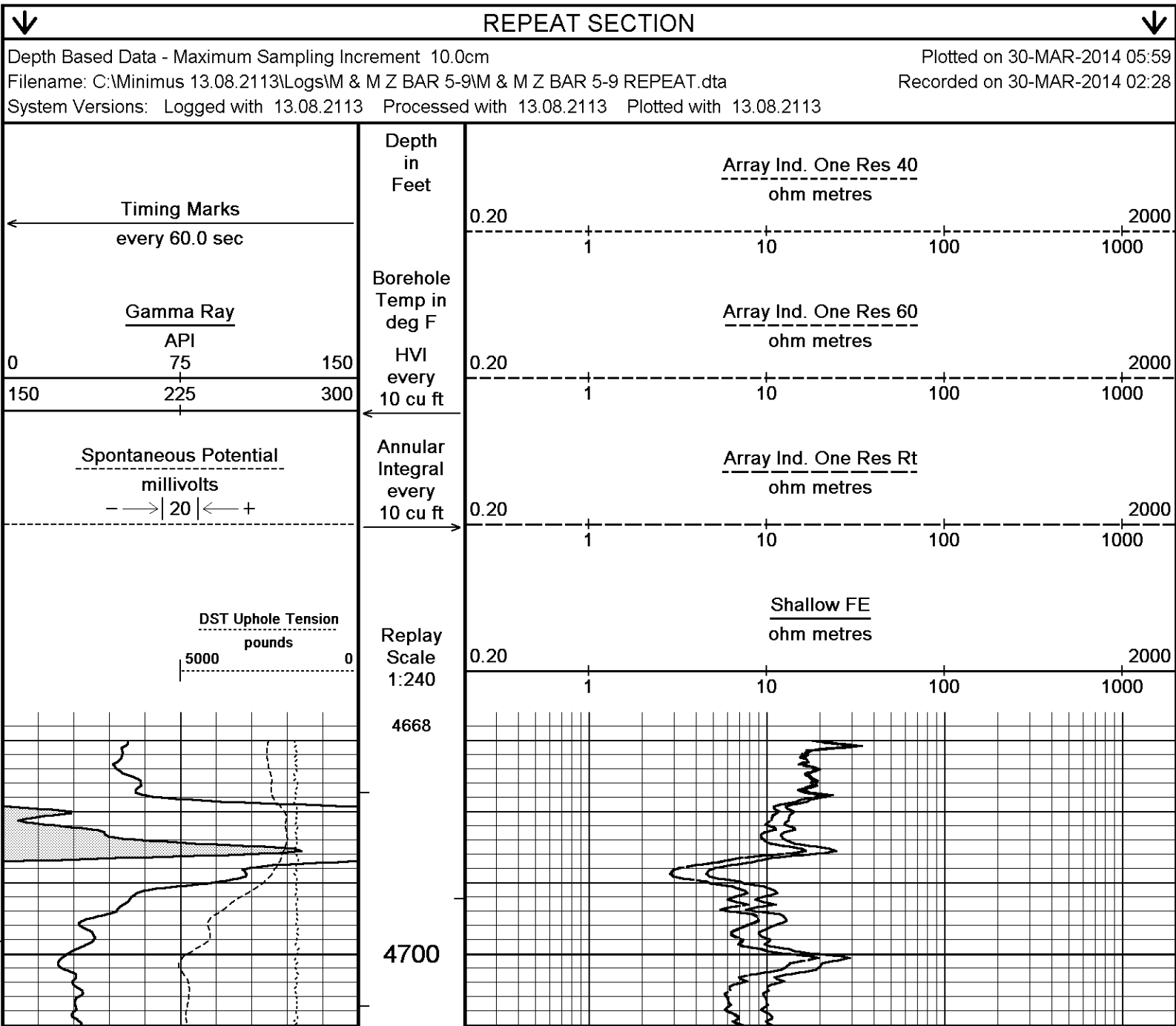
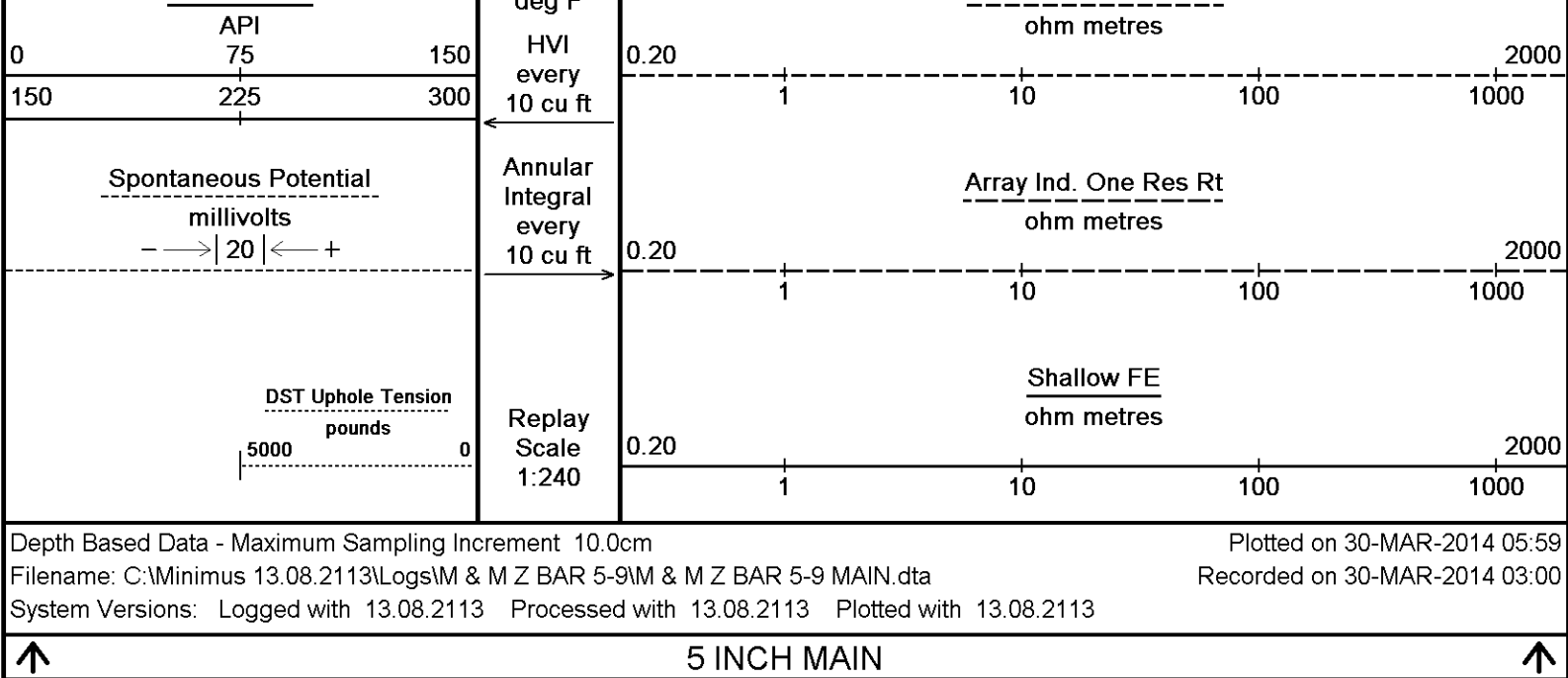
10

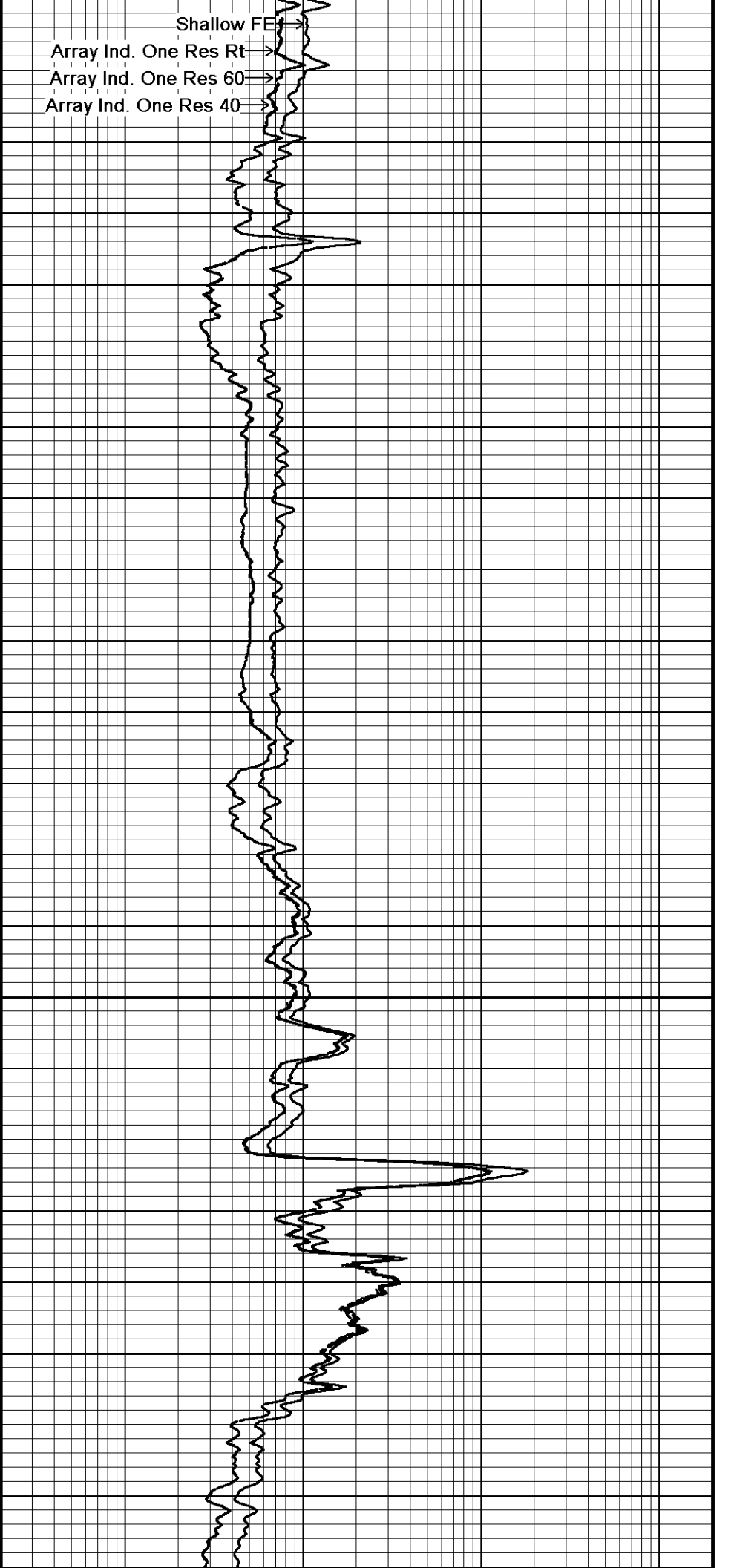
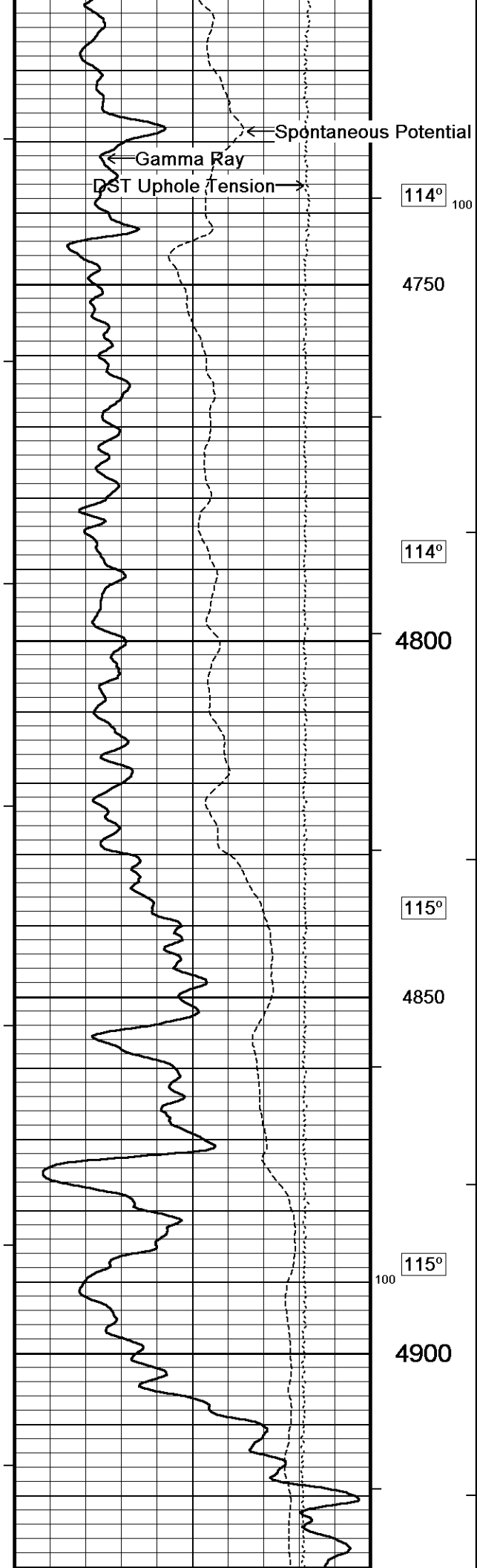
100

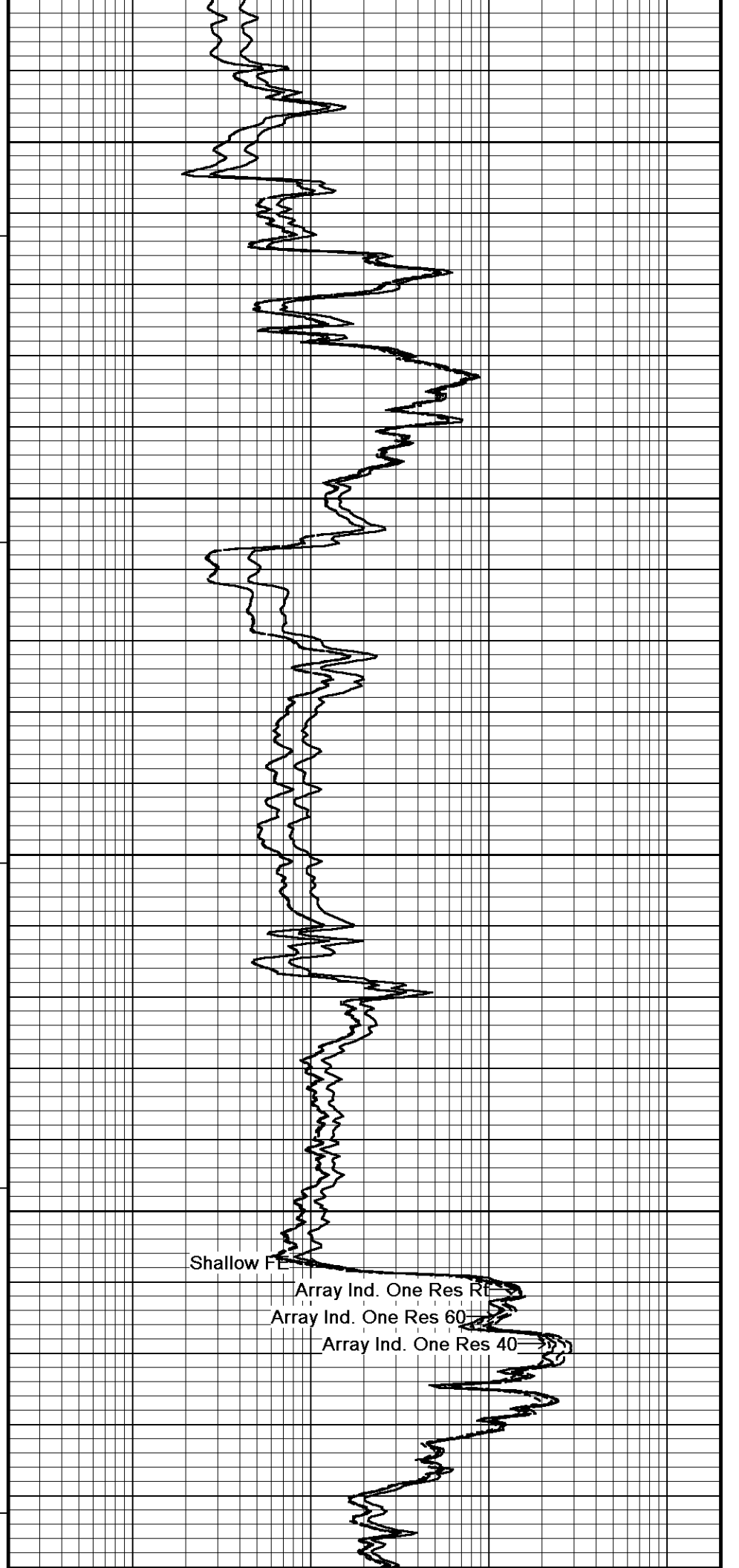
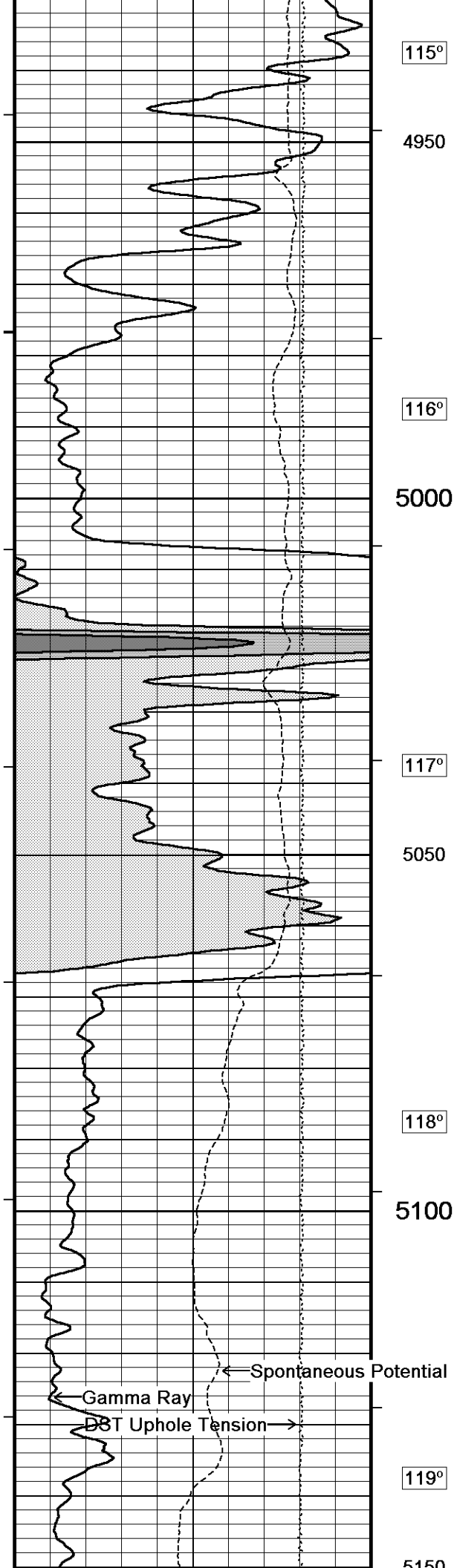
1000

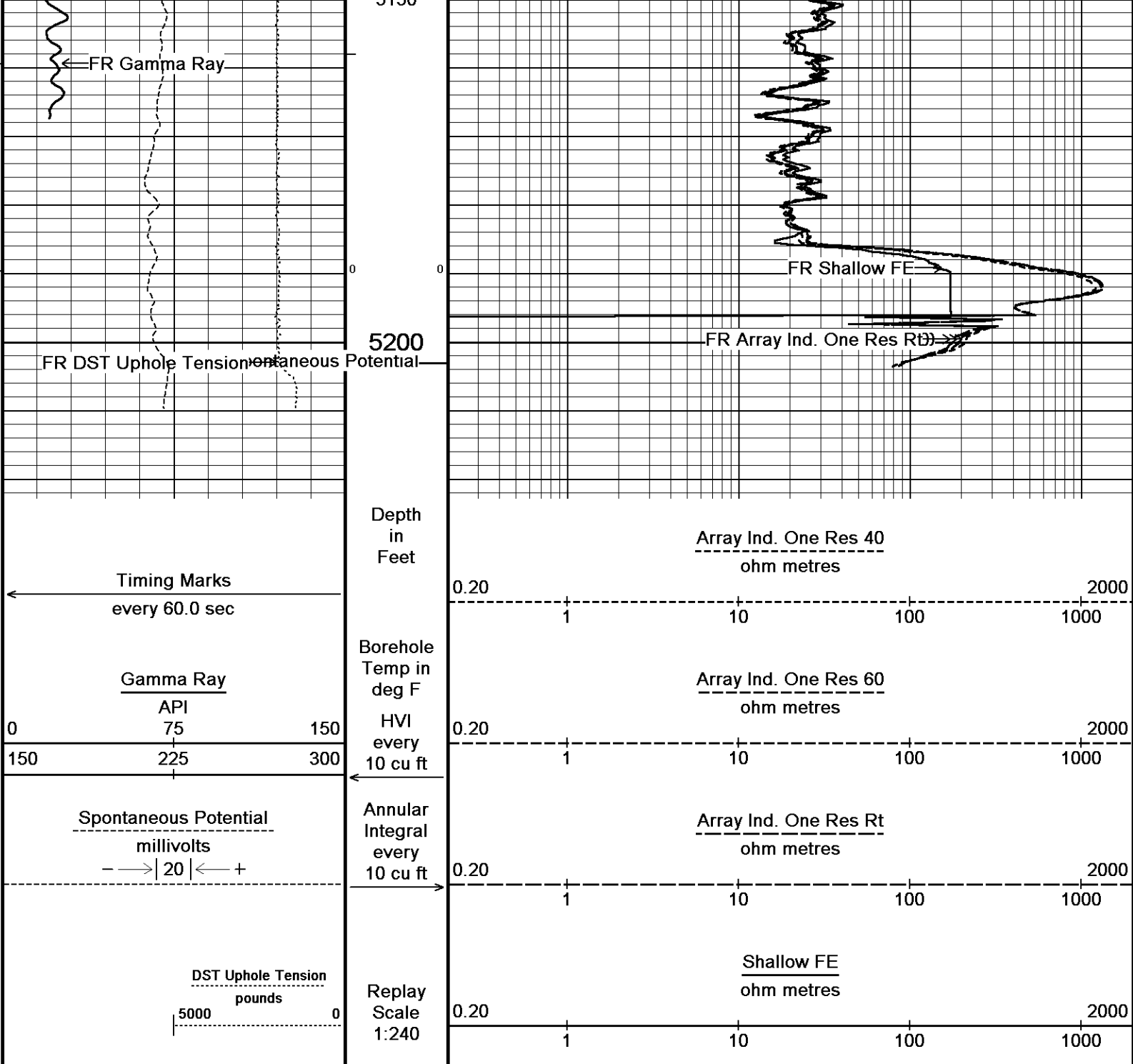
2000

Array Ind. One Res 60









Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 REPEAT.dta
System Versions: Logged with 13.08.2113 Processed with 13.08.2113 Plotted with 13.08.2113

Plotted on 30-MAR-2014 05:59
Recorded on 30-MAR-2014 02:28

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION		
C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9M & M Z BAR 5-9 REPEAT.dta		
General Constants All 000		Last Edited on 30-MAR-2014,01:52
General Parameters		
Mud Resistivity	1.500	ohm-metres
Mud Resistivity Temperature	86.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Water Level Switch	
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	MMR 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	
SW/APOR Tool Source	0.000	

Gamma Calibration MCG-D.K 443			Field Calibration on 19-MAR-2014 12:14
	Measured	Calibrated (API)	
Background	68	46	
Calibrator (Gross)	1142	771	
Calibrator (Net)	1074	725	

Gamma Constants MCG-D.K 443			Last Edited on 30-MAR-2014,01:41
Gamma Calibrator Number	GRC38		
Mud Density	1.09	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Centred		
Concentration of KCl		kppm	
K Mud Type	Chloride		
K Mud Concentration	0.00	%	

High Resolution Temperature Calibration MCG-D.K 443			Field Calibration on 05-MAR-2014,20:50
	Measured	Calibrated(Deg F)	
Lower	50.00	50.00	
Upper	75.00	75.00	

High Resolution Temperature Constants MCG-D.K 443			Last Edited on 05-MAR-2014,20:50
Pre-filter Length	11		

FE Calibration MFE-B.J 352			Base Calibration on 05-MAR-2014 09:29 Field Check on 19-MAR-2014 11:49
Base Calibration			
	Measured	Calibrated (ohm-m)	
Reference 1	0.0	0.0	
Reference 2	963.3	126.8	
Base Check		281.7	
Field Check		281.7	

FE Constants MFE-B.J 352			Last Edited on 22-MAR-2014,00:29
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	Constant Value		
Temp. for Rm Corr.	N/A		
Stand-off	Centred	inches	

Induction Calibration MAI-A.A 45				Base Calibration on 21-MAY-2013,16:47	
				Field Check on 19-MAR-2014 11:47	
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		0.0		Deg F	
Channel	Base Check (mmho/m)			Field Check (mmho/m)	
	Low	High		Low	High

1	18.6	3850.7
2	31.8	3628.7
3	28.7	3048.9
4	18.3	2079.0
Deep	16.1	1911.0
Medium	42.6	4059.7
Shallow	49.8	5481.9
Array Temperature	60.8	Deg F

Induction Constants MAI-A.A 45

Last Edited on 22-MAR-2014,00:29

Induction Model	RtAP-WBM		
Caliper for Borehole Corr.	Density Caliper		
Hole Size for Borehole Correction	2.500	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	

Caliper Calibration MPD-B 31

Base Calibration on 05-MAR-2014 10:47

Field Calibration on 20-MAR-2014,07:24

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18528	3.99
2	26688	5.98
3	34842	7.97
4	43098	9.86
5	52480	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.06	7.88

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\M & M Z BAR 5-9\M & M Z BAR 5-9 REPEAT.dta

MCB-A 11B Tension Cablehead
MCB-A 170 LG: 2.18 ft WT: 19.8 lb OD: 2.240 in

Compact Comms Gamma
MCG-D.K 443 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-A 11 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

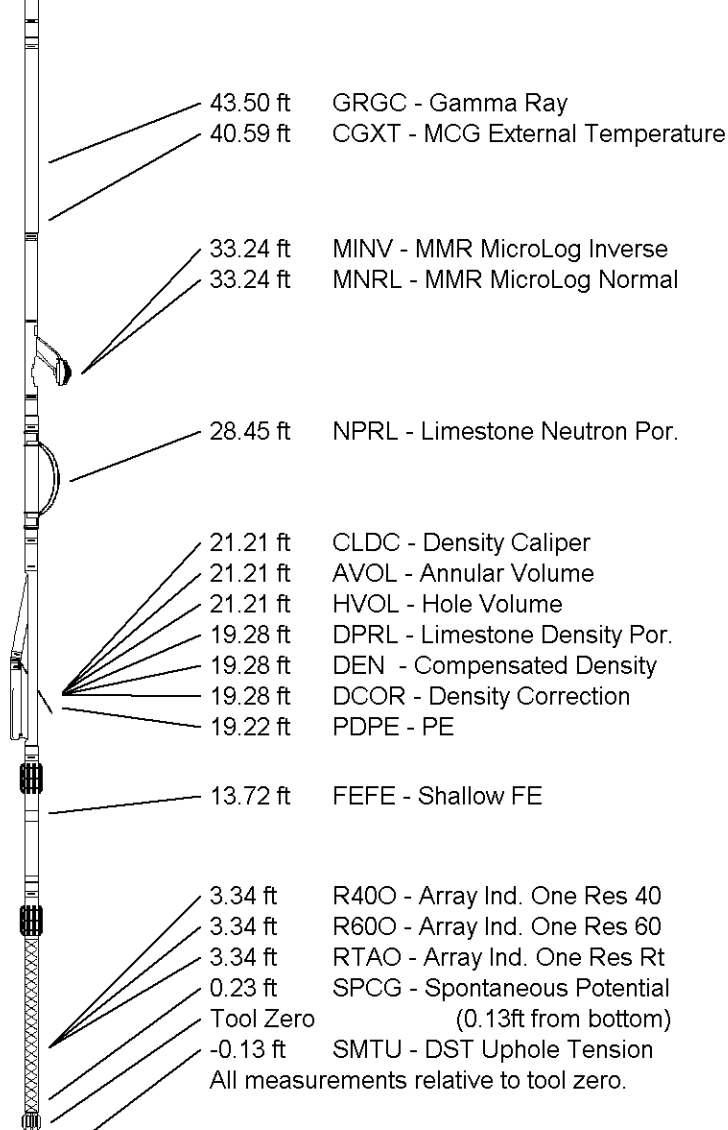
Compact Neutron
MDN-A.B 65 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-B 31 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-B.J 352 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 45 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 50.96 ft Weight: 403.4 lb



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

Elevation Kelly Bushing	1661.00	feet	First Reading	5200.00	feet
Elevation Drill Floor	1659.00	feet	Depth Driller	5200.00	feet
Elevation Ground Level	1651.00	feet	Depth Logger	5203.00	feet



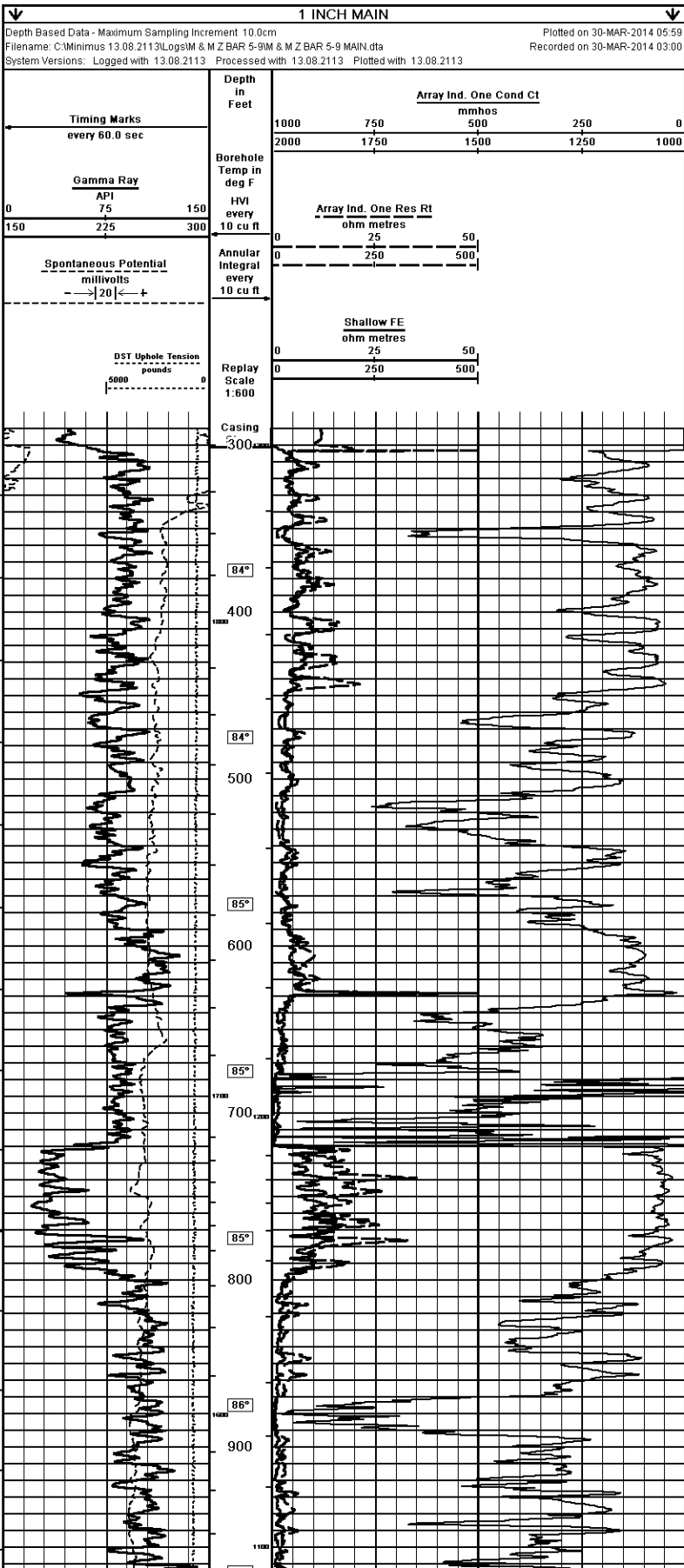
ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

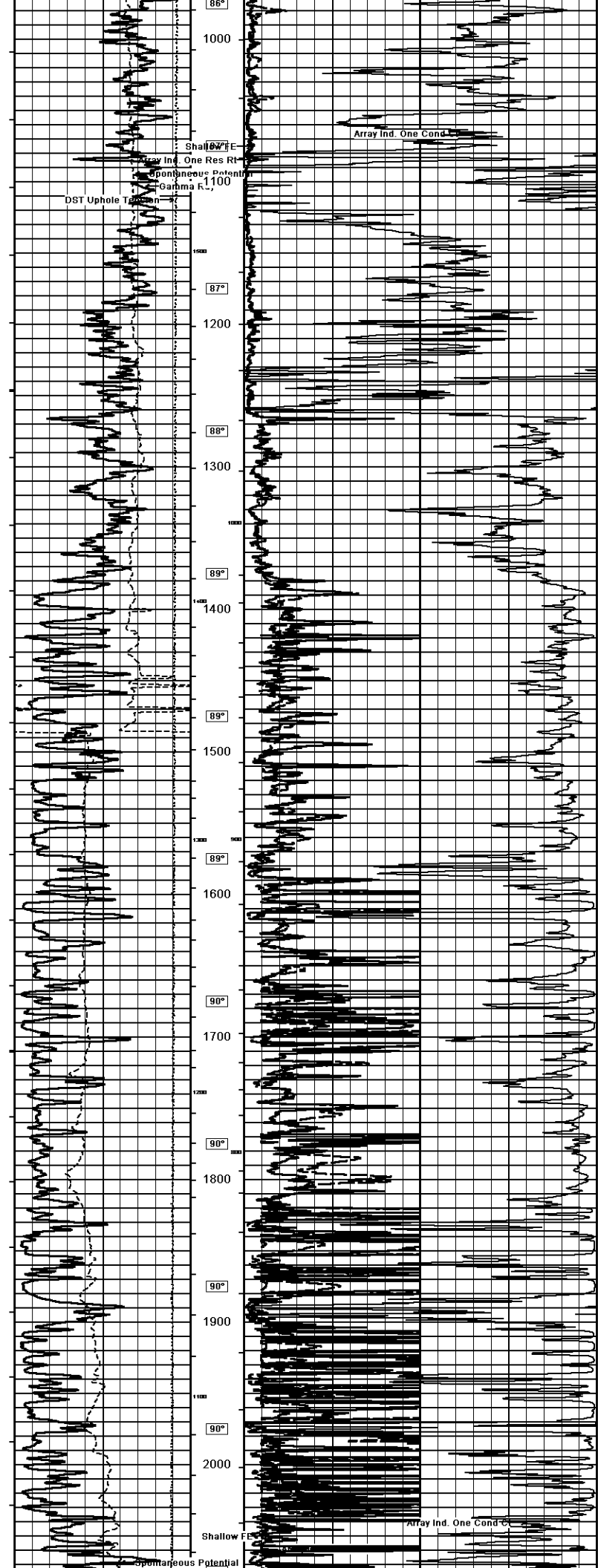
Weatherford

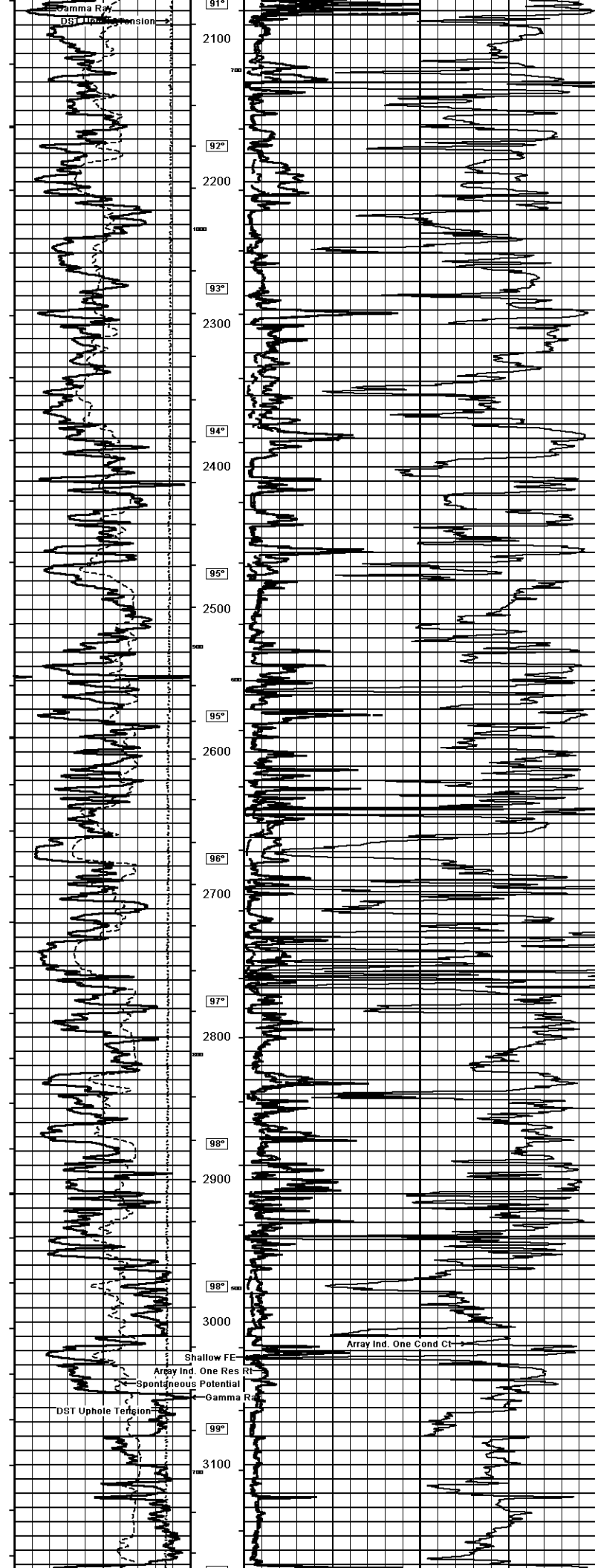
Weatherford		Weatherford	
COMPANY M & M EXPLORATION, INC.		WELL Z BAR 5-9	
FIELD AETNA GAS AREA		PROVINCE/COUNTY BARBER	
COUNTRY/STATE U.S.A. / KANSAS		LOCATION 15151 FSU & 7351 E	
SEC. 5		TWP. 34S	
RANGE 14W		COR. 14W	
MAGNETIC		MAGNETIC	
LOG MEASURED FROM KB		LOG MEASURED FROM KB	
DATE 30-MAR-2014		DATE 30-MAR-2014	
SERVICE ORDER 5872-83329134		SERVICE ORDER 5872-83329134	
DEPTH DRILLER 5200.00		DEPTH DRILLER 5200.00	
DEPTH LOGGER 5203.00		DEPTH LOGGER 5203.00	
LAST READING 301.00		LAST READING 301.00	
CASSING DRILLER 301.00		CASSING DRILLER 301.00	
BIT SIZE 7.875		BIT SIZE 7.875	
HOLE FLUID TYPE CHEM		HOLE FLUID TYPE CHEM	
DENSITY/VISCOSITY 9.10		DENSITY/VISCOSITY 9.10	
PHI/FLUID LOSS 9.50		PHI/FLUID LOSS 9.50	
SAMPLE SOURCE PIT		SAMPLE SOURCE PIT	
RMT @ MEASURED TEMP 1.50 @ 86.0		RMT @ MEASURED TEMP 1.50 @ 86.0	
RMT @ MEASURED TEMP 1.20 @ 86.0		RMT @ MEASURED TEMP 1.20 @ 86.0	
RMT @ MEASURED TEMP 1.80 @ 86.0		RMT @ MEASURED TEMP 1.80 @ 86.0	
SOURCE RMT / RMC CALC		SOURCE RMT / RMC CALC	
RMT @ BHT 1.07 @ 210.0		RMT @ BHT 1.07 @ 210.0	
TIME SINCE CIRCULATION 4 HRS		TIME SINCE CIRCULATION 4 HRS	
MAX RECORDED TEMP 120.00		MAX RECORDED TEMP 120.00	
EQUIPMENT / BASE 13067		EQUIPMENT / BASE 13067	
RECORDED BY D. COLE		RECORDED BY D. COLE	
INTERFERED BY B. BOSCH		INTERFERED BY B. BOSCH	
JOB # 15114396		JOB # 15114396	

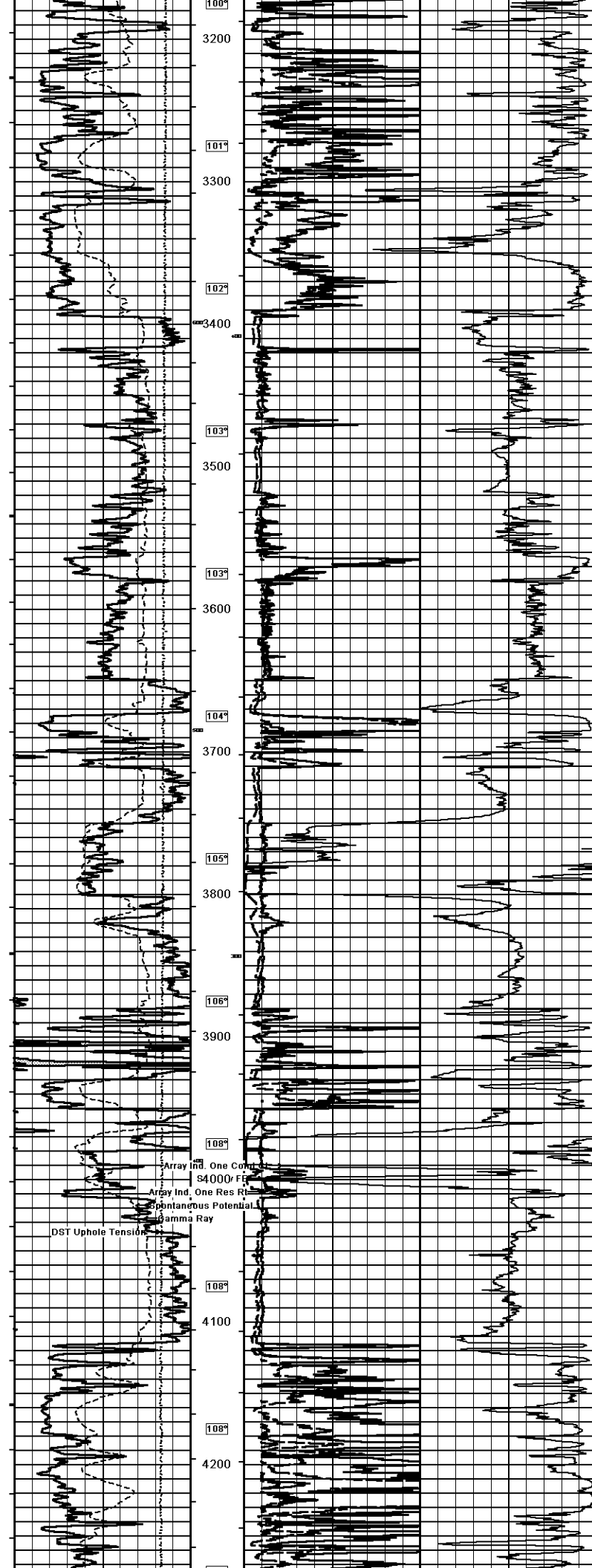
EL SE SW NE SE

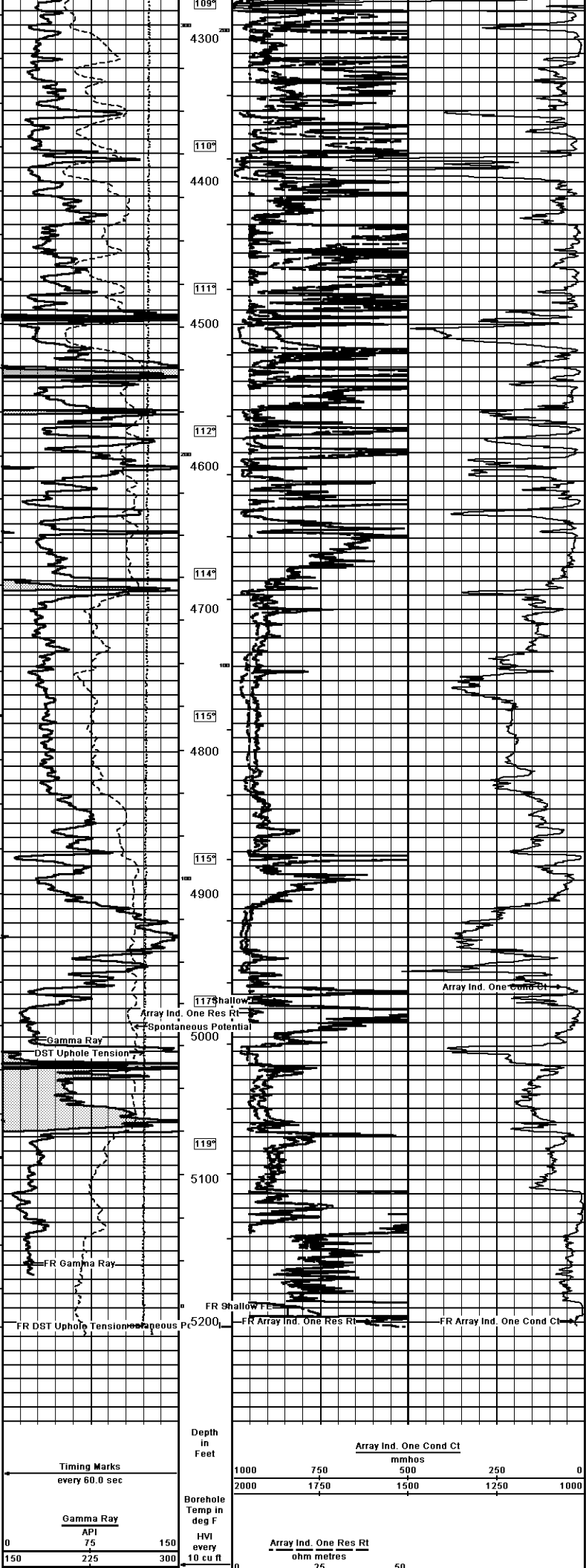
Elevations:	feet
KB	1661.00
DF	1659.00
GL	1651.00

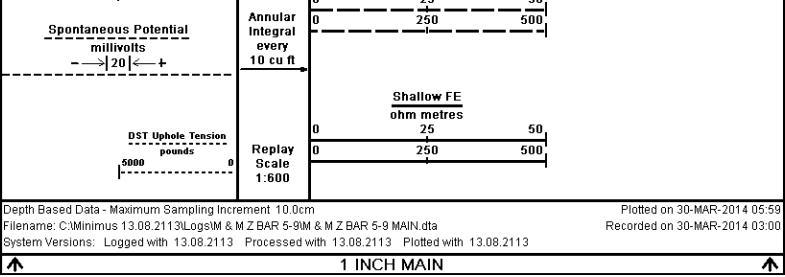












COMPANY

WELL

FIELD

PROVINCE/COUNTY

COUNTRY/STATE

M & M EXPLORATION, INC.

Z BAR 5-9

AETNA GAS AREA

BARBER

U.S.A. / KANSAS

Elevation Kelly Bushing	1661.00	feet	First Reading	5200.00	feet
Elevation Drill Floor	1659.00	feet	Depth Driller	5200.00	feet
Elevation Ground Level	1651.00	feet	Depth Logger	5203.00	feet

Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG