



**Weatherford**<sup>®</sup>

ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG

COMPANY GRAND MESA OPERATING COMPANY  
 WELL BROOKS #1-18  
 FIELD WILDCAT  
 PROVINCE/COUNTY GOVE  
 COUNTRY/STATE UNITED STATES / KANSAS  
 LOCATION 2219' FNL & 1761' FWL  
 NE SW SE NW

SEC 18	TWP 11S	RGE 16W	Other Services MPD/MDN MML	Permanent Datum G.L., Elevation 2664 feet Log Measured From KB Drilling Measured From K.B. @ 5 FEET	Elevations: KB 2669.00 DF 2664.00 GL 2664.00
API Number	15-063-22099	Permit Number			
Date	27-MAR-2013	Run Number	ONE		
Service Order	3538999	Depth Driller	4568.00	feet	
Depth Logger	4572.00	First Reading	4569.00	feet	
Last Reading	269.00	Casing Driller	269.00	feet	
Casing Logger	270.00	Bit Size	7.880	inches	
Hole Fluid Type	CHEMICAL	Density / Viscosity	9.30 lb/USg	63.00 CP	
PH / Fluid Loss	10.50	Sample Source	MUDPIT		
Rm @ Measured Temp	1.30 @ 54.0	Rmf @ Measured Temp	1.04 @ 54.0	ohm-m	
Rmc @ Measured Temp	1.56 @ 54.0	Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.65 @ 108.0	Time Since Circulation	4 HOURS	ohm-m	
Max Recorded Temp	108.00	Equipment / Base	13096	deg F	
Recorded By	W. STAMBAUGH	Witnessed By	BOB SCHREIBER		
JOB #	LB13-081				

### BOREHOLE RECORD

Last Edited: 27-MAR-2013 14:15

Bit Size inches	Depth From feet	Depth To feet
7.880	270.00	4568.00

### CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	270.00	24.00

### REMARKS

Tools Ran: MCG,MML,MDN,MPD,MFE,MAI Ran in Combination  
 Hardware Used: MDN Dual Eccentralizer used. MPD 8 inch profile plate used.  
 MFE: 0.5 inch Standoff = 1  
 MAI: 0.5 inch Standoff = 1  
 2.71 g/cc Limestone Density Matrix used to calculate porosity.  
 Tight pulls, washouts, and borehole rugosity will affect data quality.  
 All intervals logged and scaled per customer's request.  
 Annular volume with 5.5 inch production casing from TD to 3600= 210 cu. ft.  
 Total hole volume from TD to surface casing= 1430 cu. ft.  
 Service order: #3538999  
 Rig: Murfin Drilling #24  
 Engineers: William Stambaugh, Adam Sill  
 Operator(s): Nicolas Adame

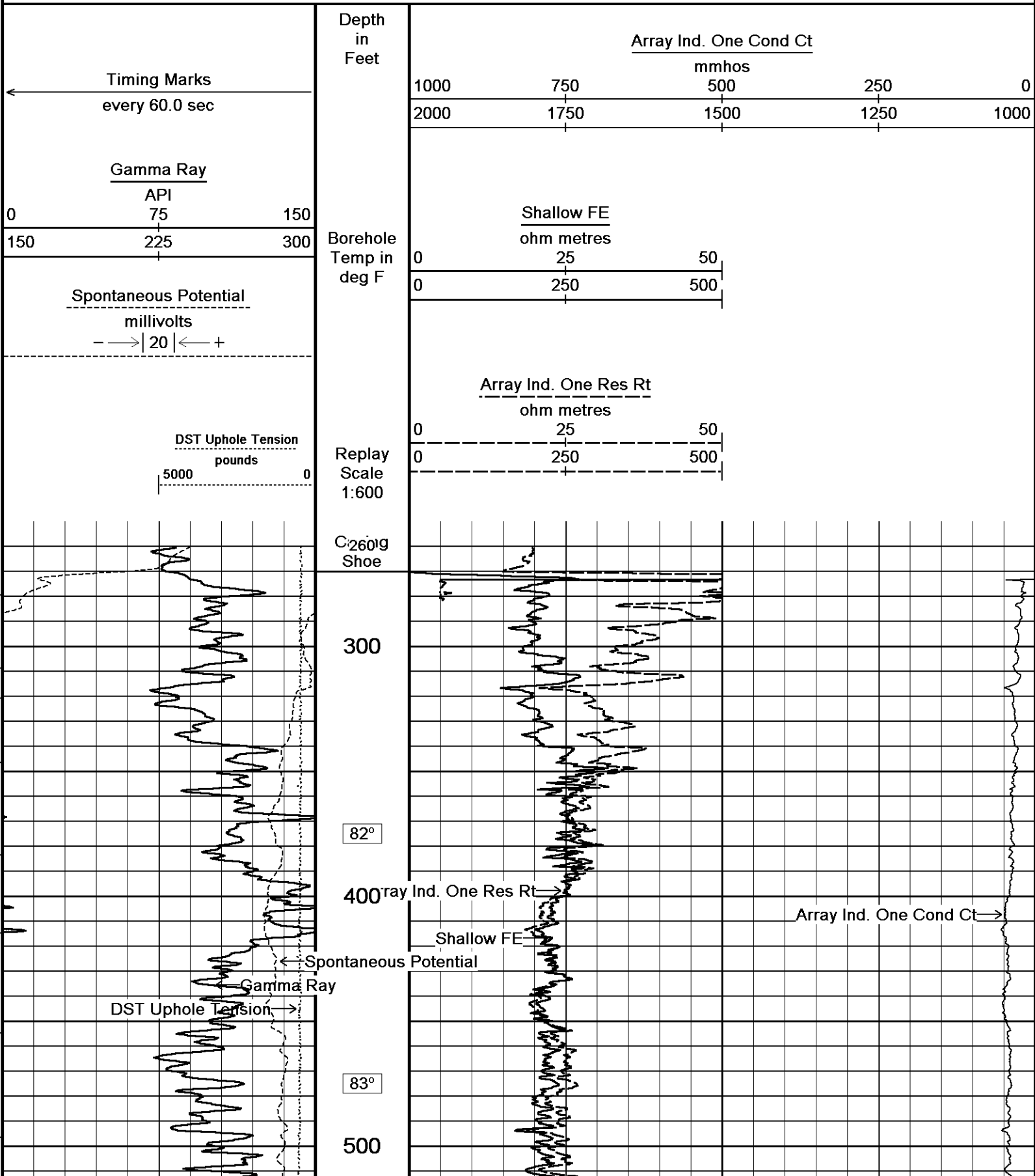
Software duplicates the pH value onto the fluid loss value. The fluid loss is 7.6 ml/30min.

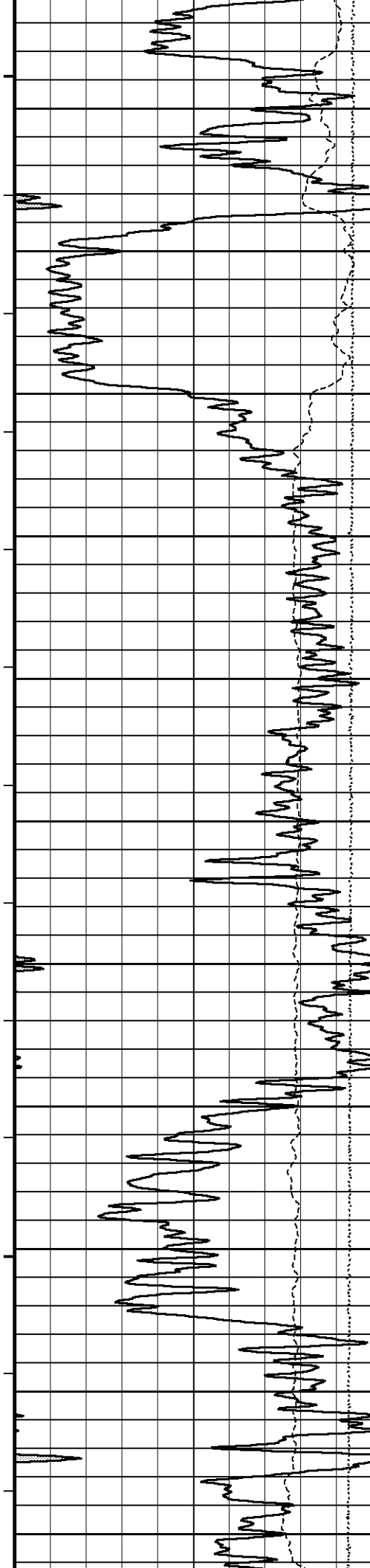
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy

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.

**2 INCH MAIN**

Depth Based Data - Maximum Sampling Increment 10.0cm Plotted on 27-MAR-2013 15:14  
 Filename: C:\Minimus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_002.dta Recorded on 27-MAR-2013 11:53  
 System Versions: Logged with 13.04.8492 Plotted with 13.04.8492





84°

600

85°

700

86°

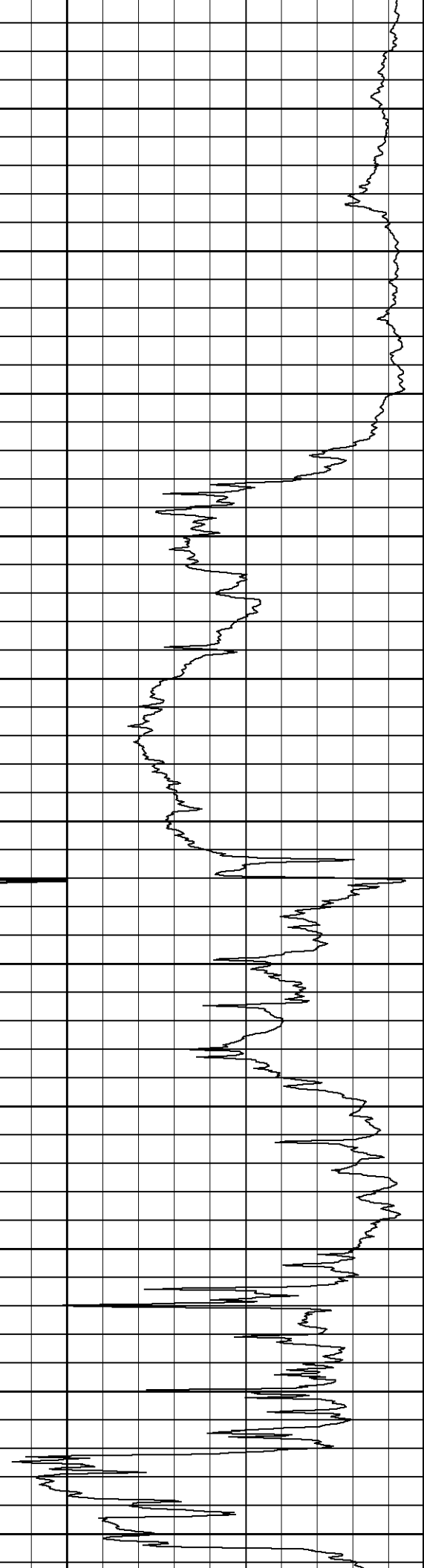
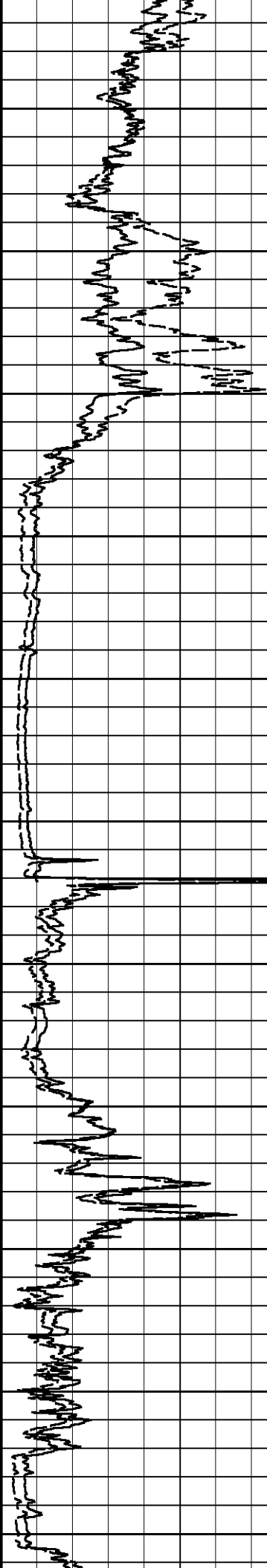
800

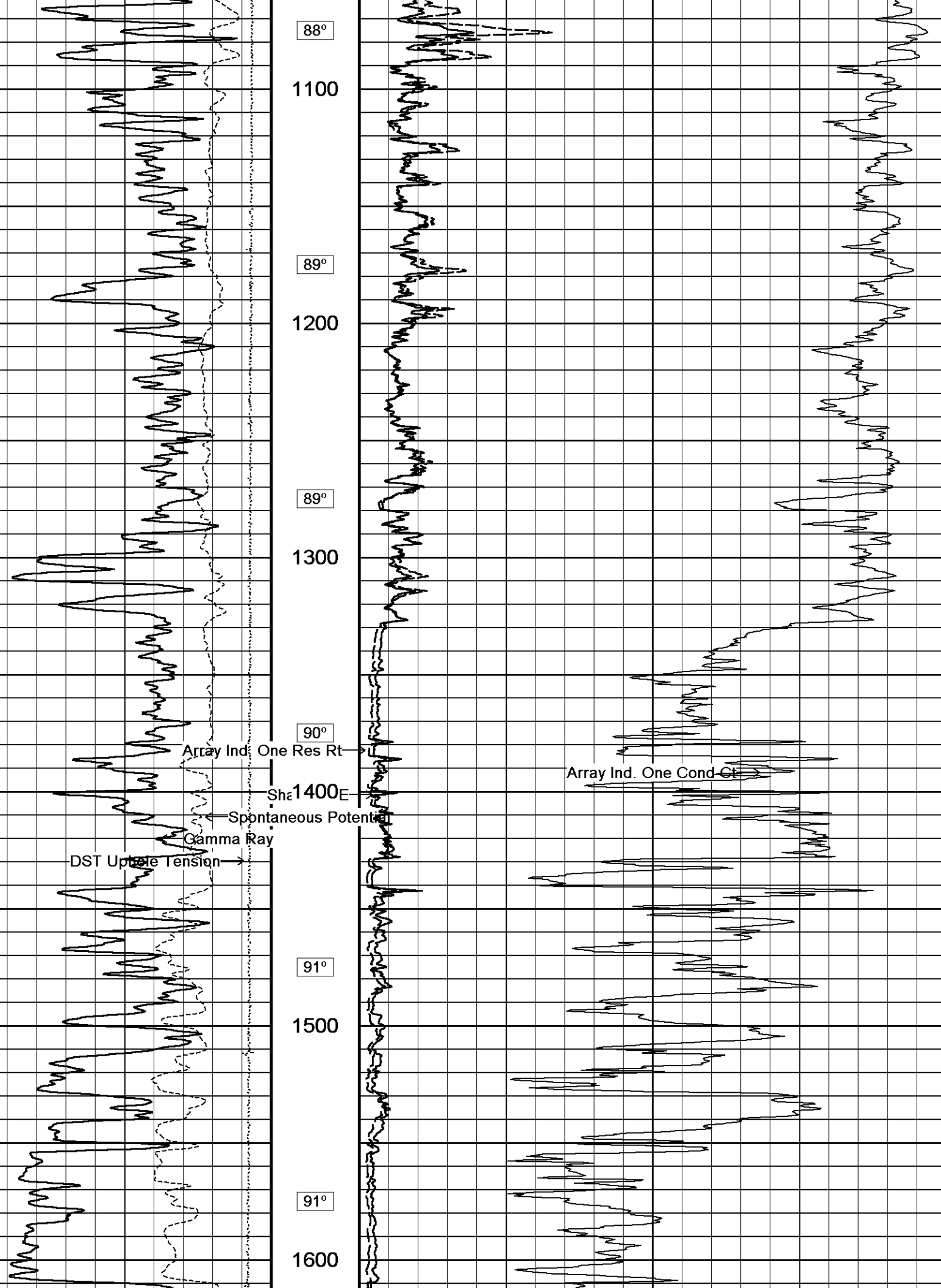
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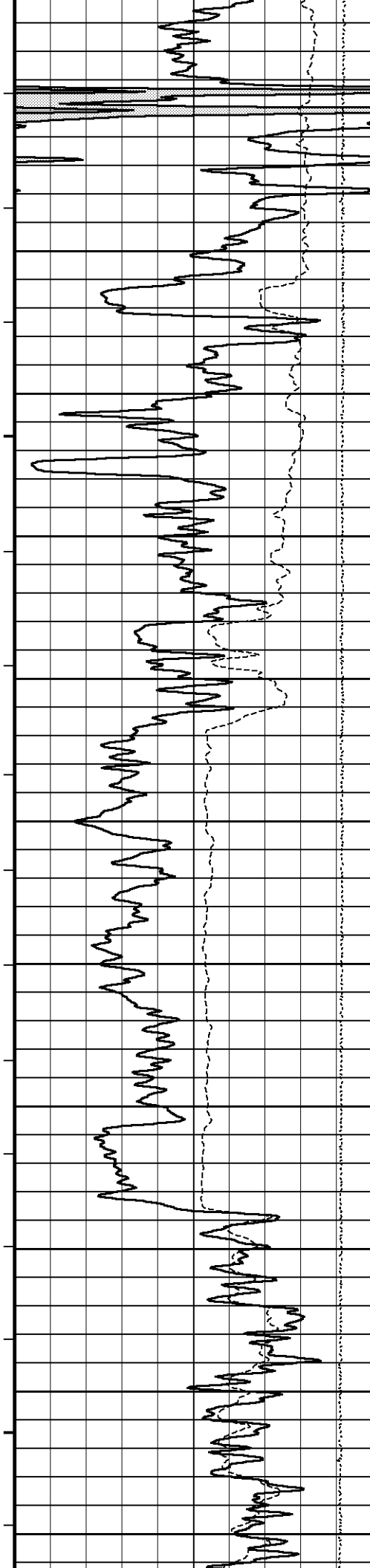
900

87°

1000







92°

1700

92°

1800

93°

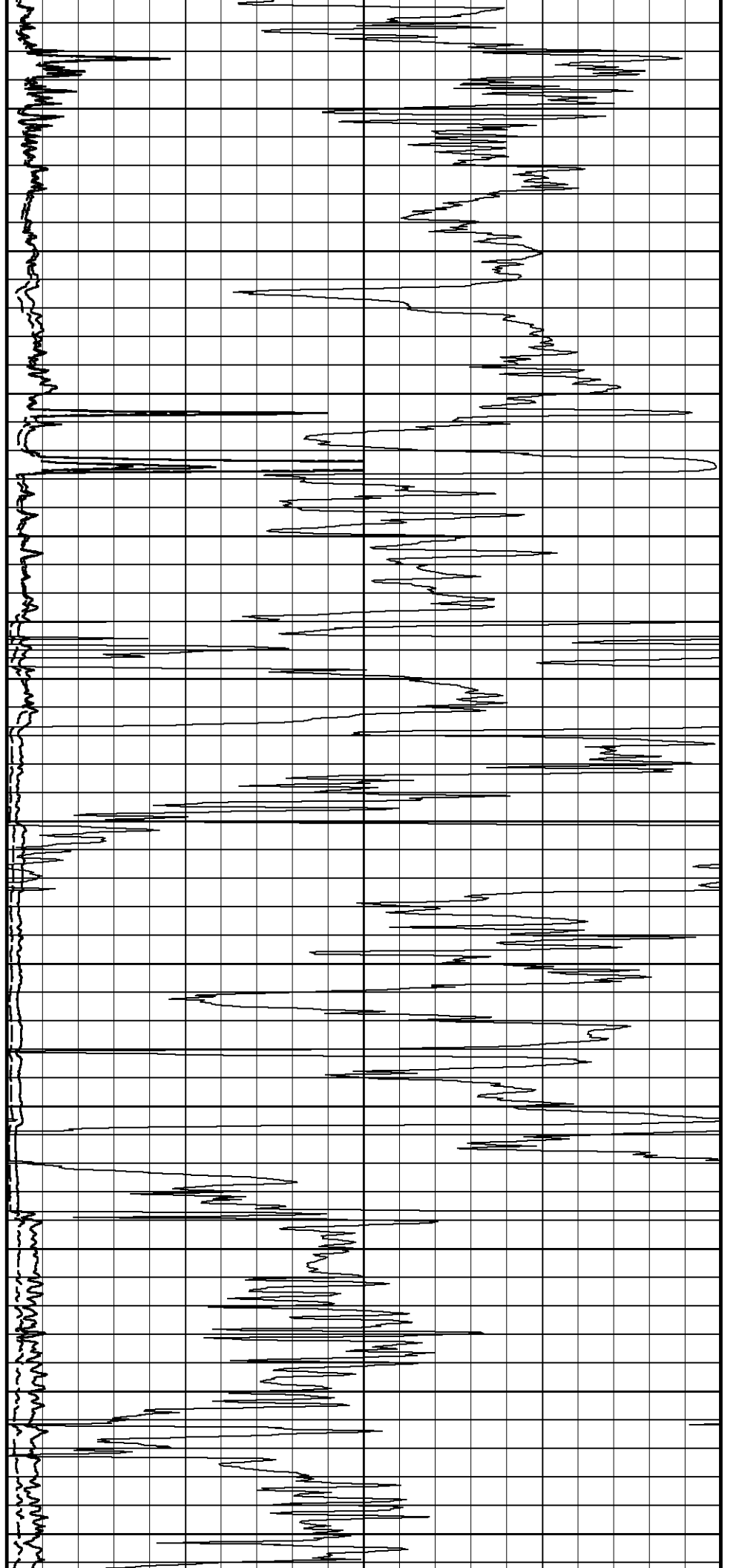
1900

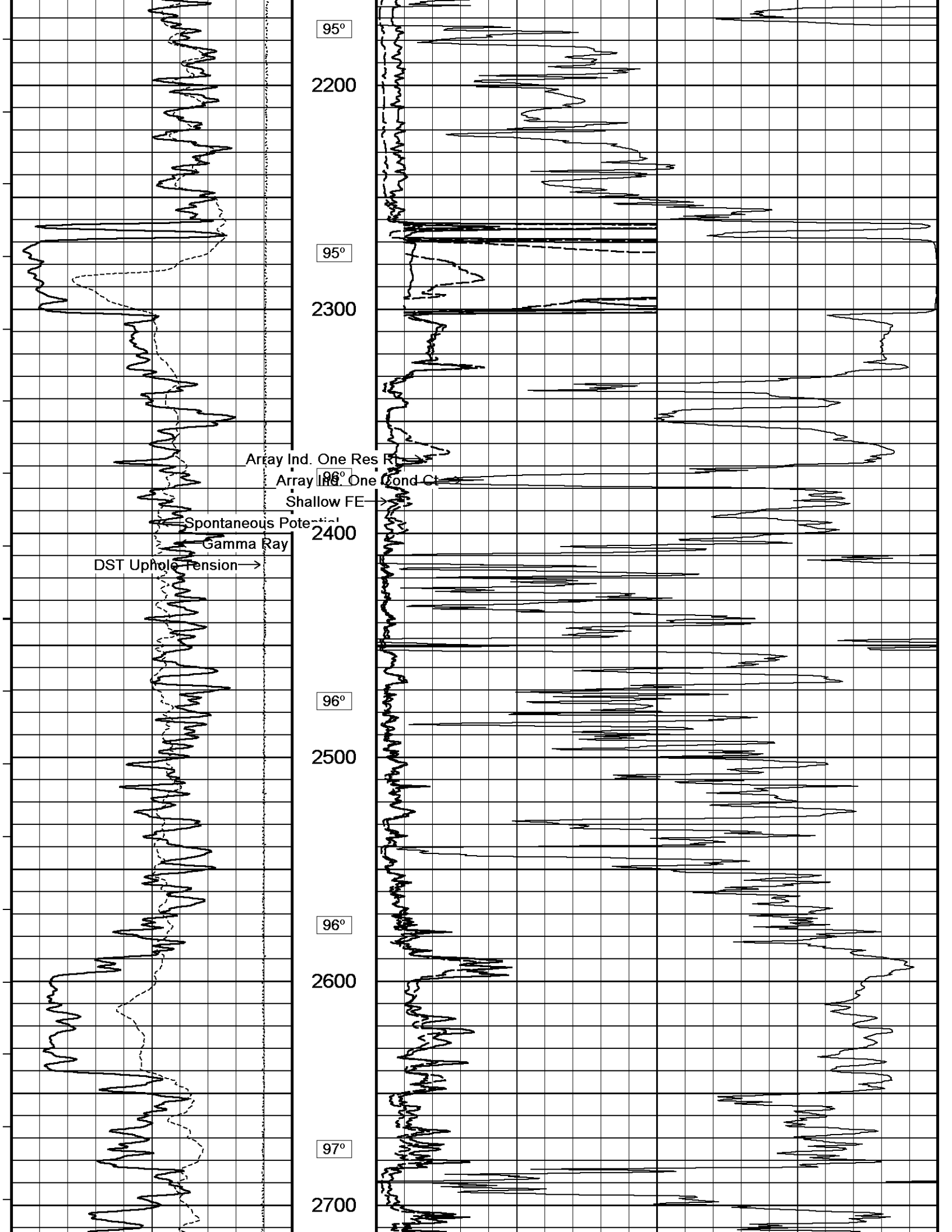
94°

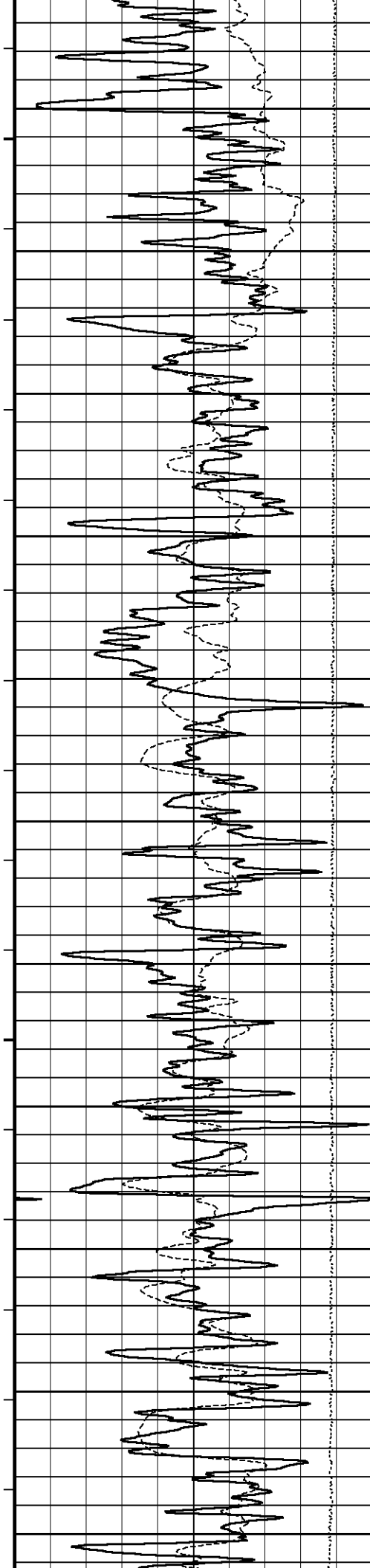
2000

94°

2100







98°

2800

98°

2900

99°

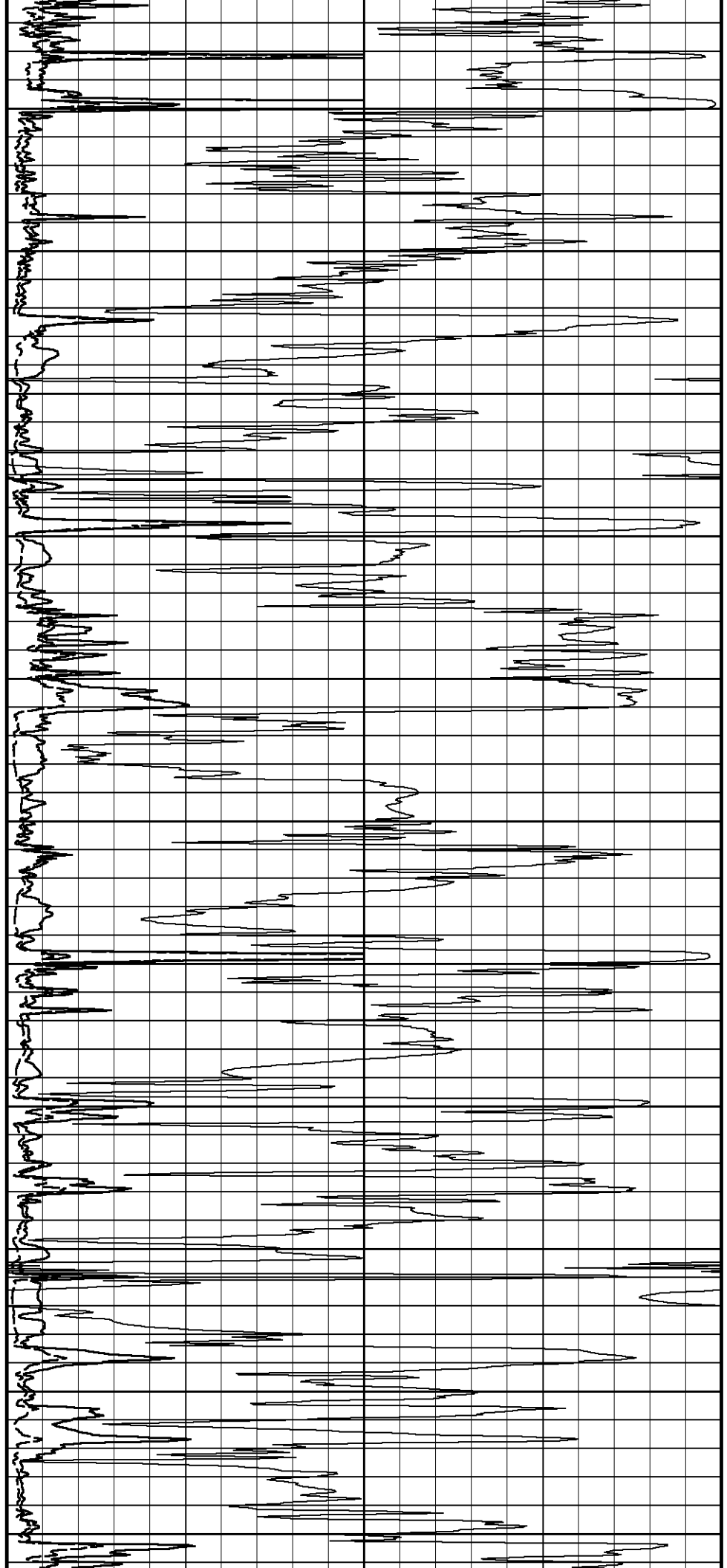
3000

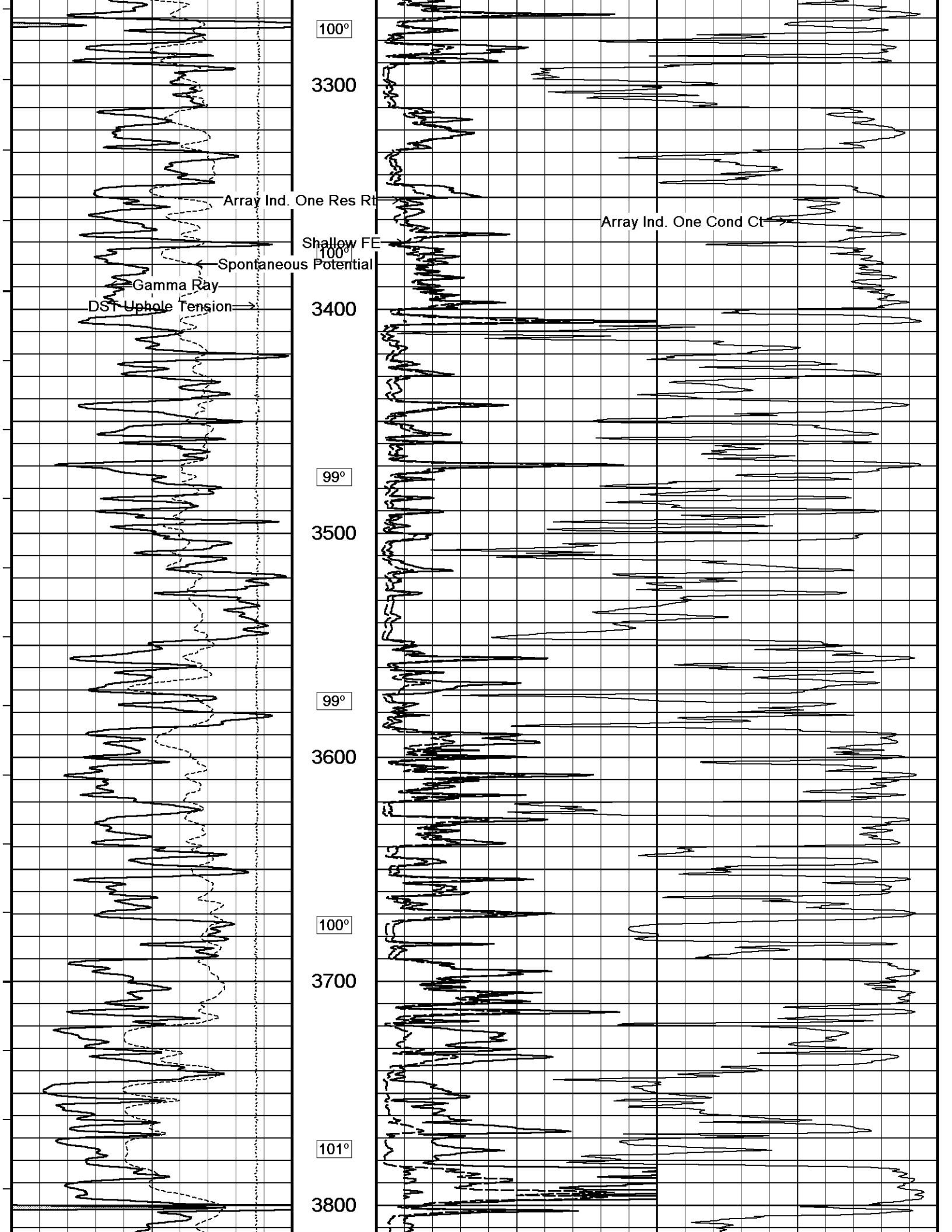
99°

3100

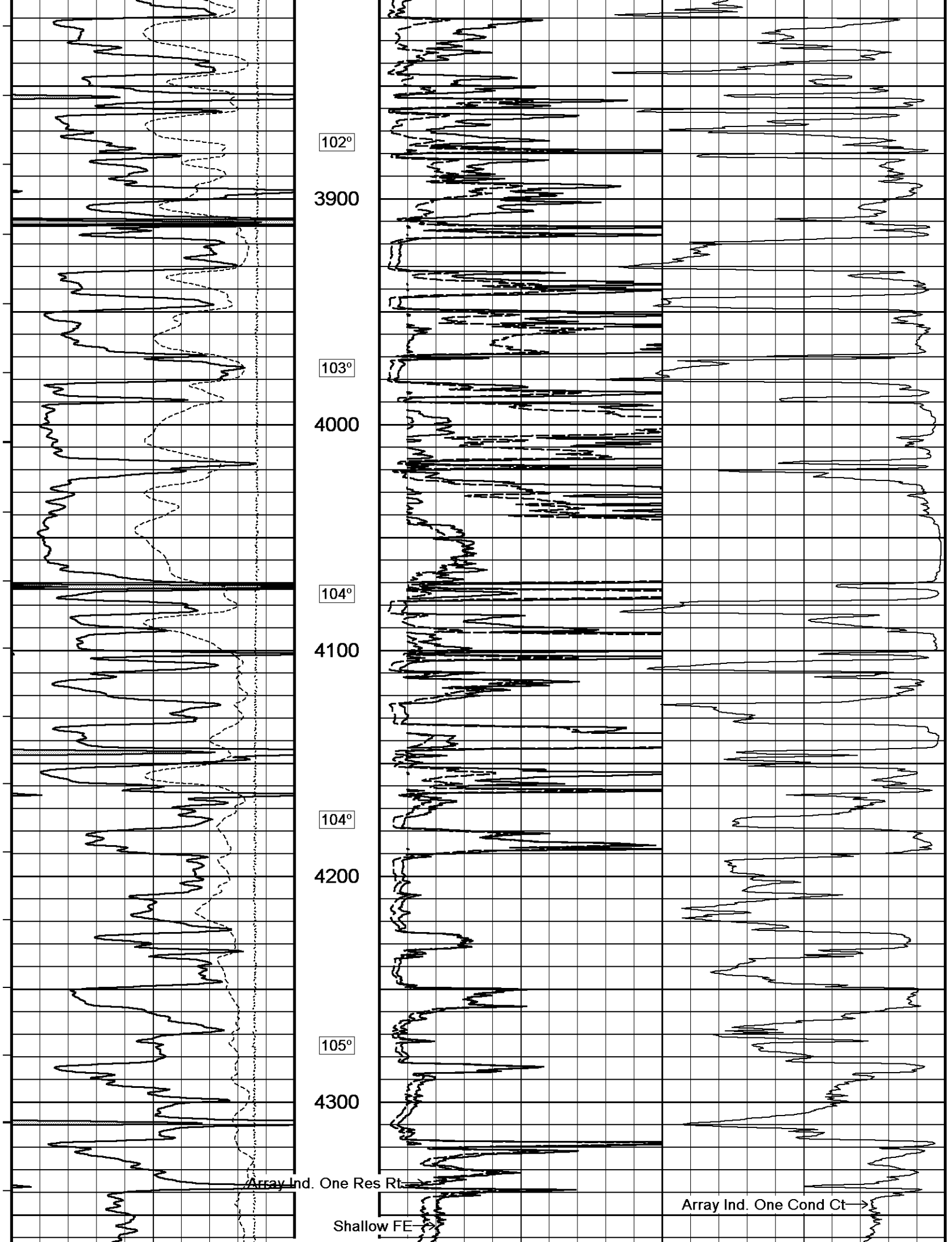
99°

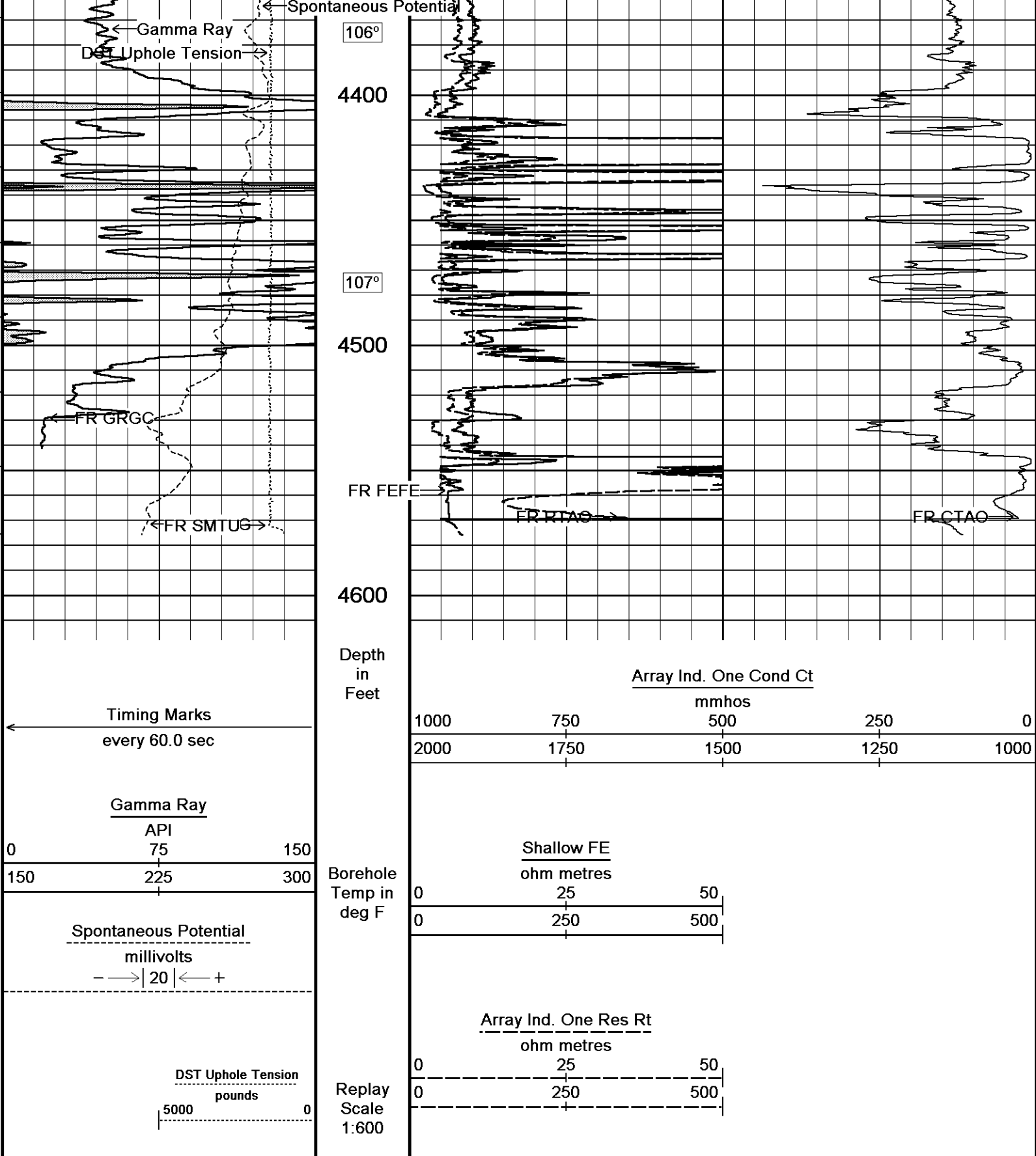
3200









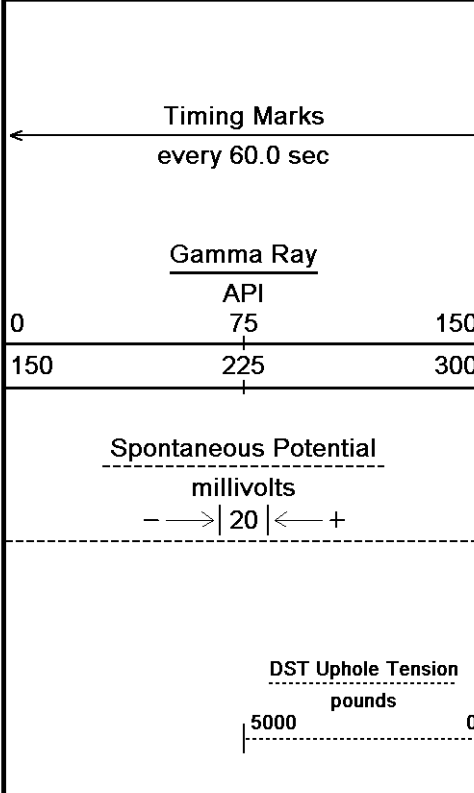


Depth Based Data - Maximum Sampling Increment 10.0cm  
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 System Versions: Logged with 13.04.8492 Plotted with 13.04.8492

↑ 2 INCH MAIN ↑

↓ 5 INCH MAIN ↓

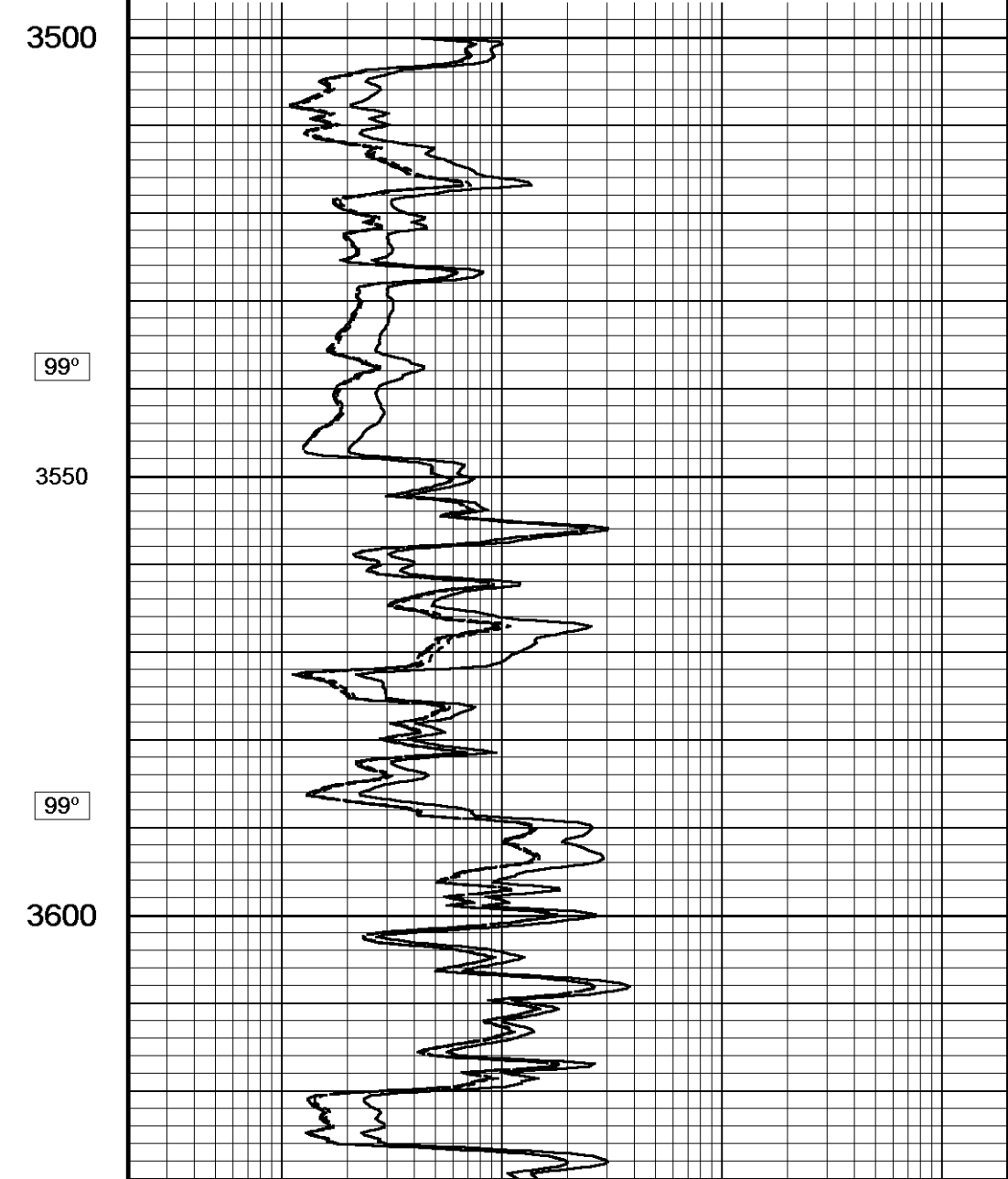
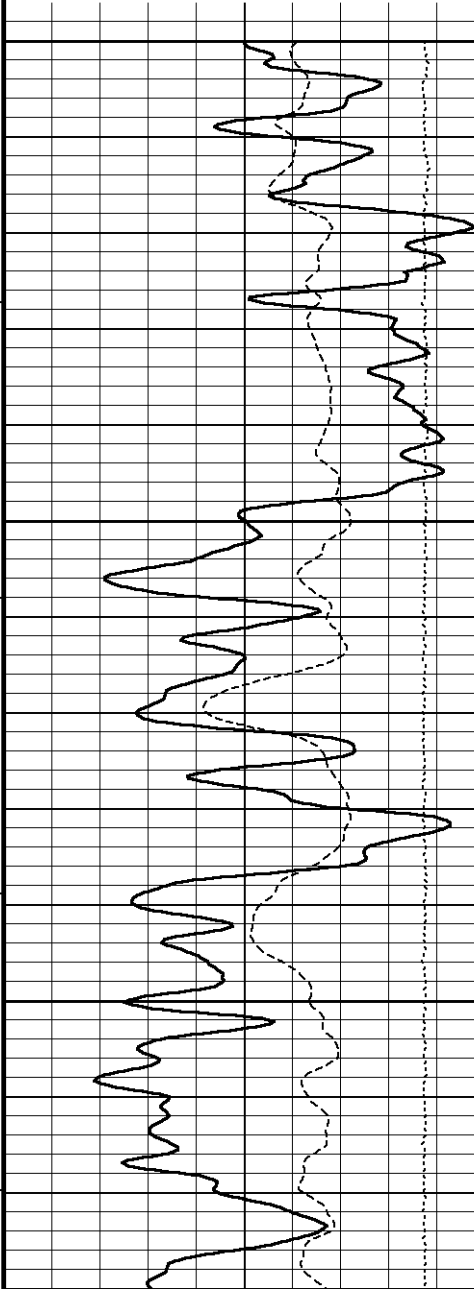
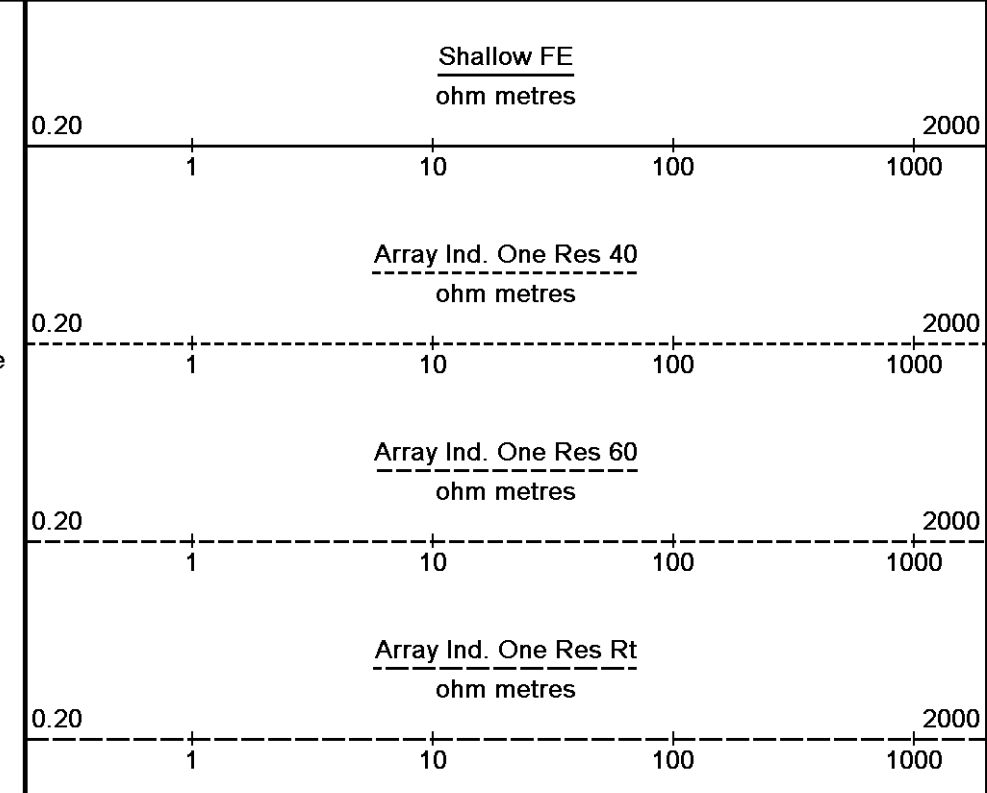
Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 27-MAR-2013 15:14  
 Filename: C:\Minimus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_002.dta  
 Recorded on 27-MAR-2013 11:53



Depth  
in  
Feet

Borehole  
Temp in  
deg F

Replay  
Scale  
1:240

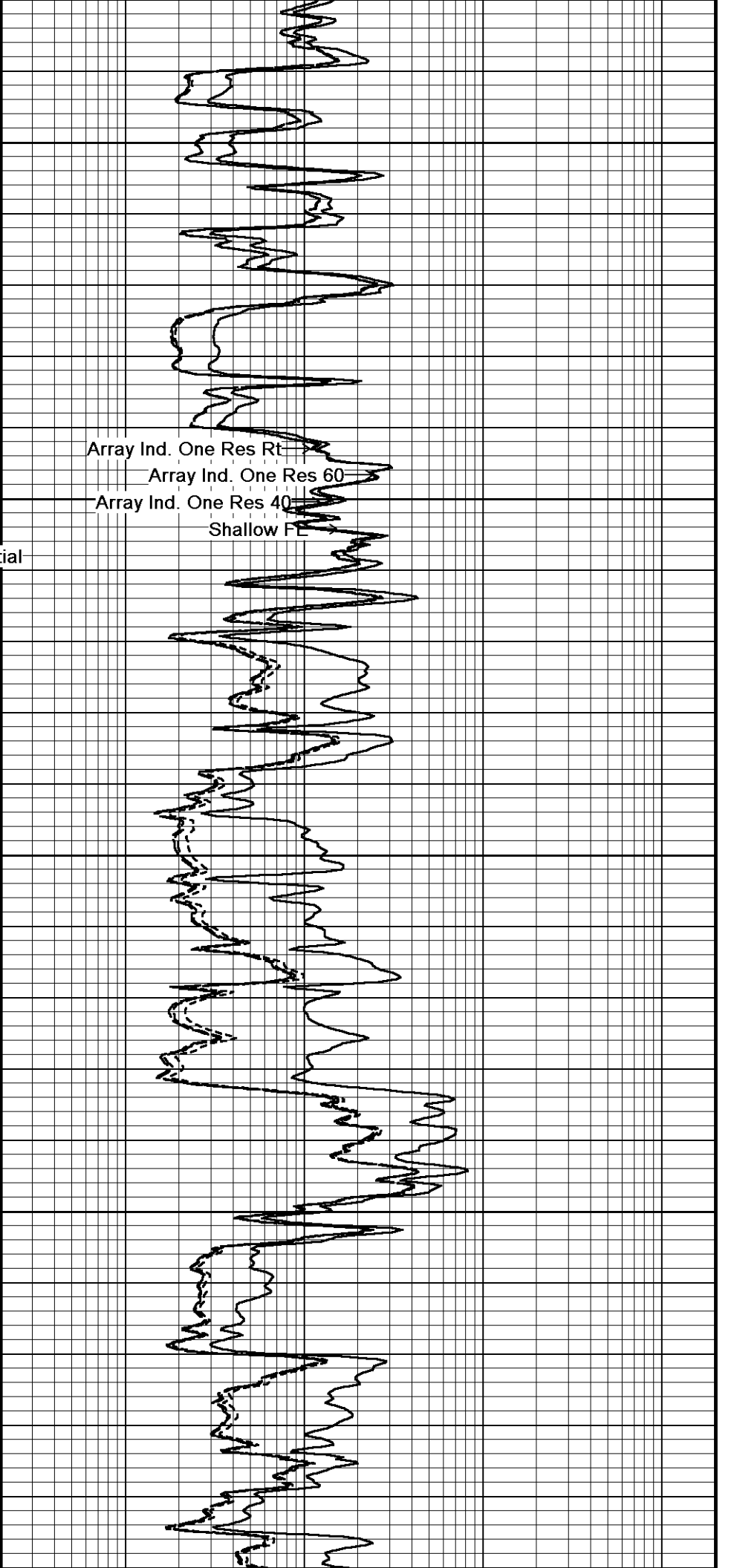
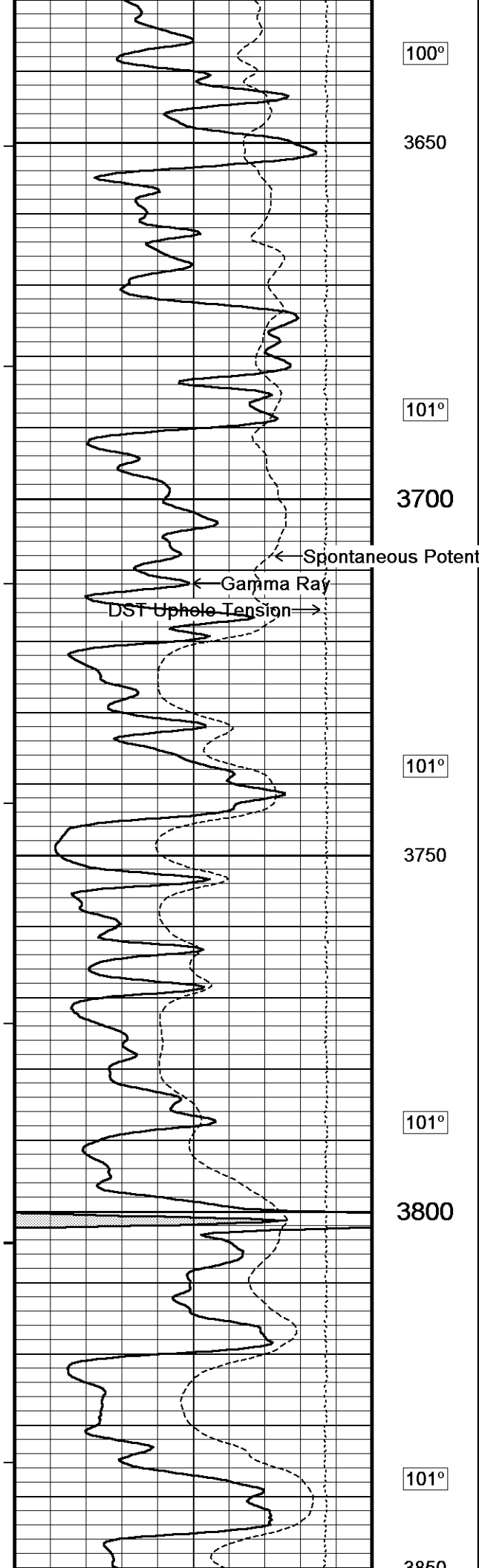


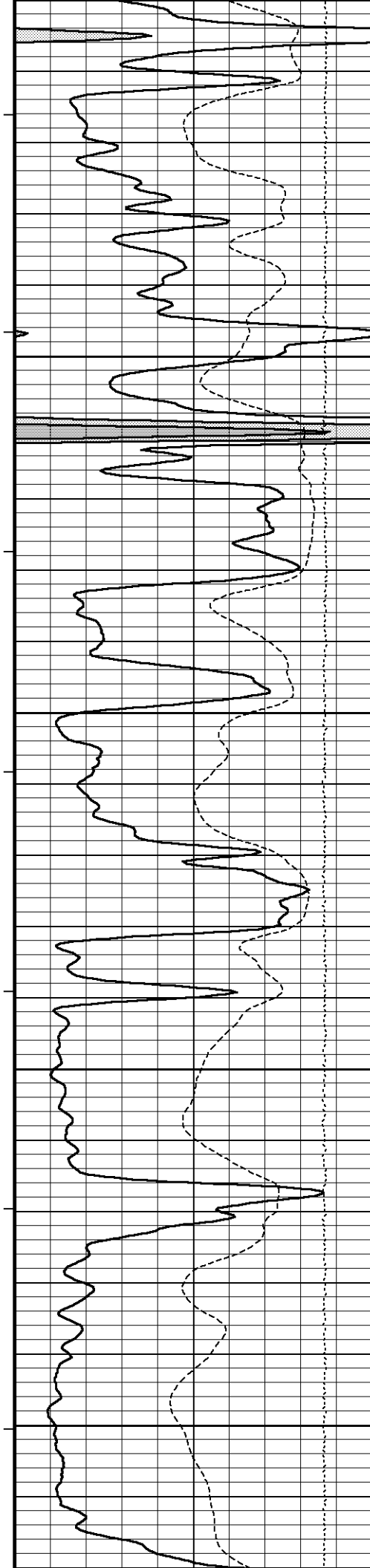
99°

3550

99°

3600





3850

102°

3900

102°

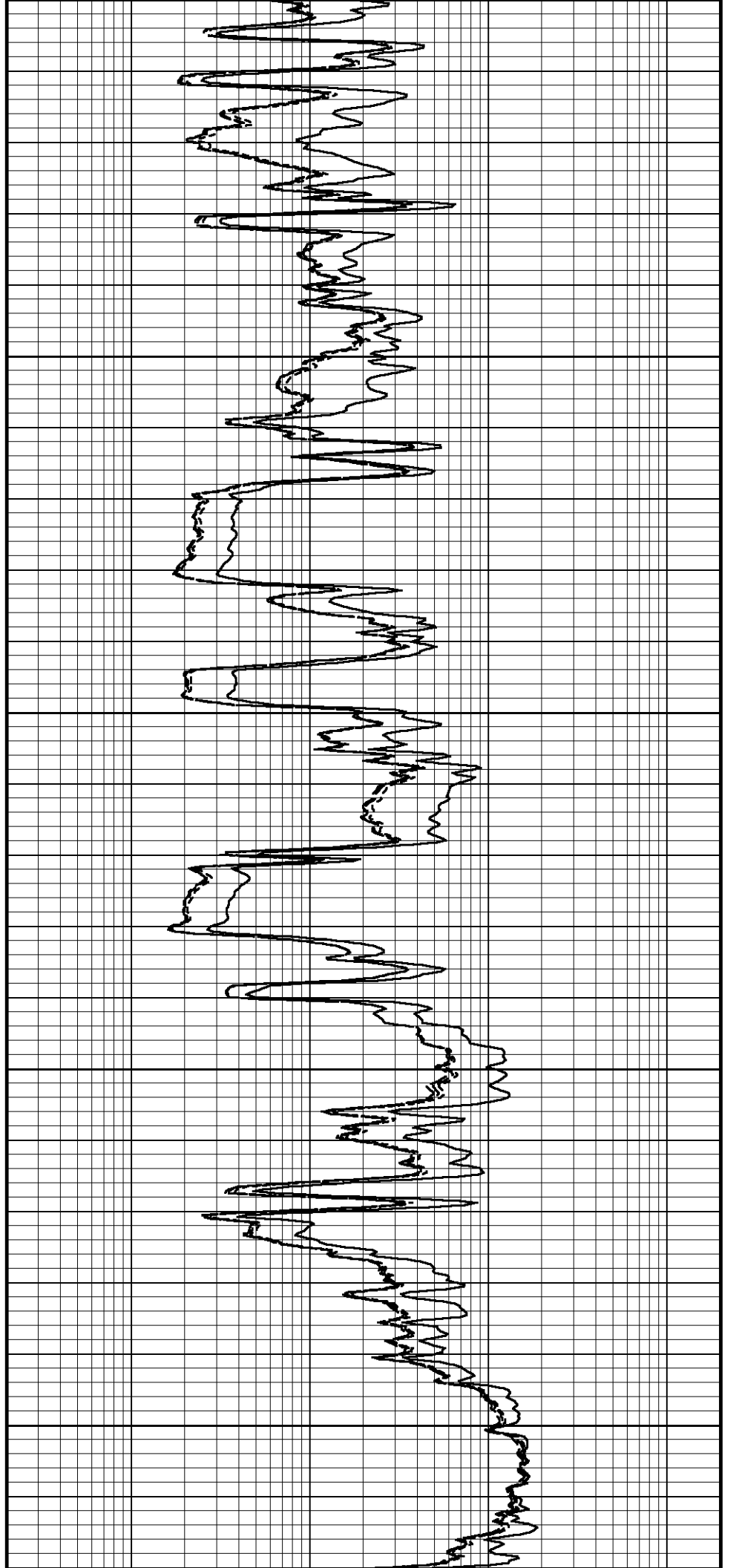
3950

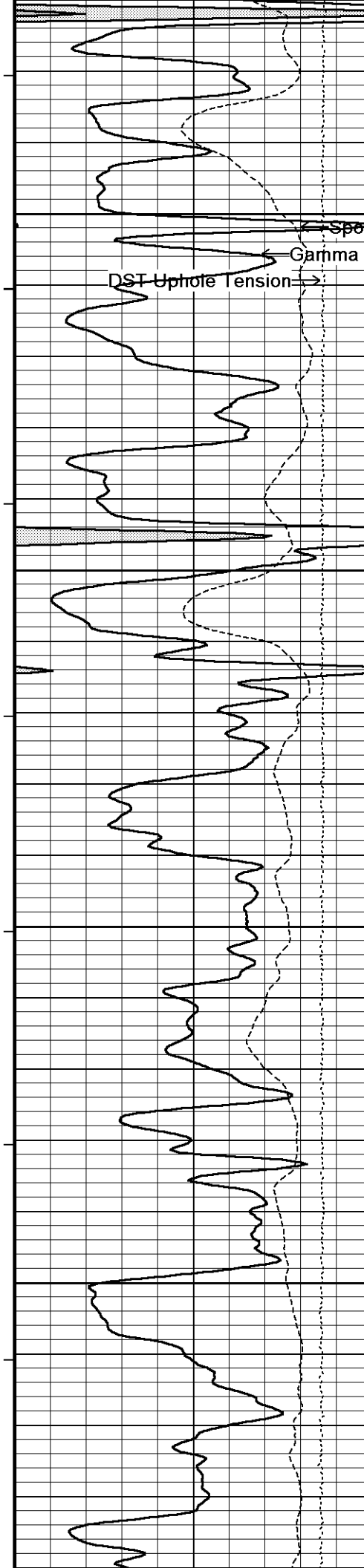
103°

4000

104°

4050





104°

4100

104°

4150

104°

4200

104°

4250

105°

Array Ind. One Res Rt →

Array Ind. One Res 60 →

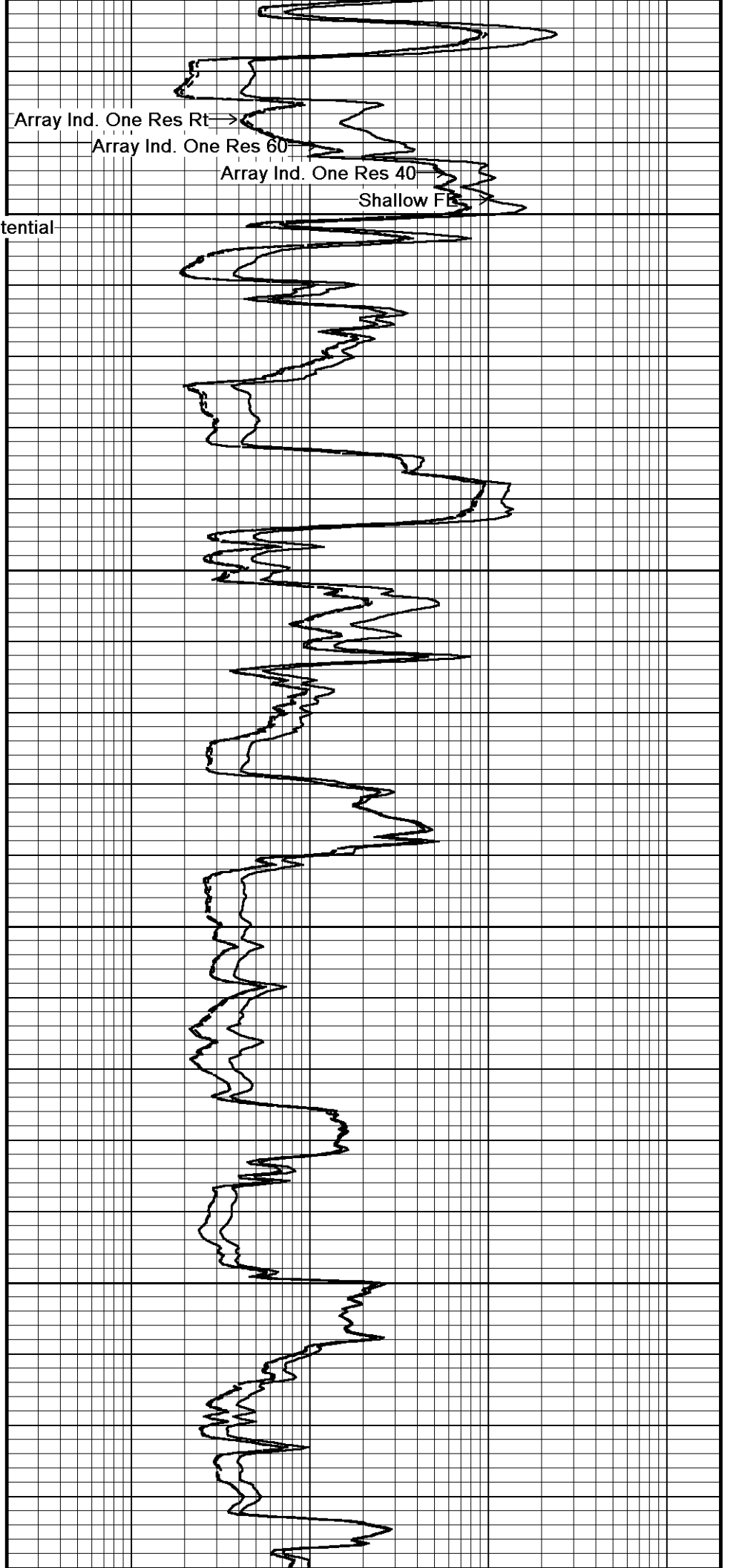
Array Ind. One Res 40 →

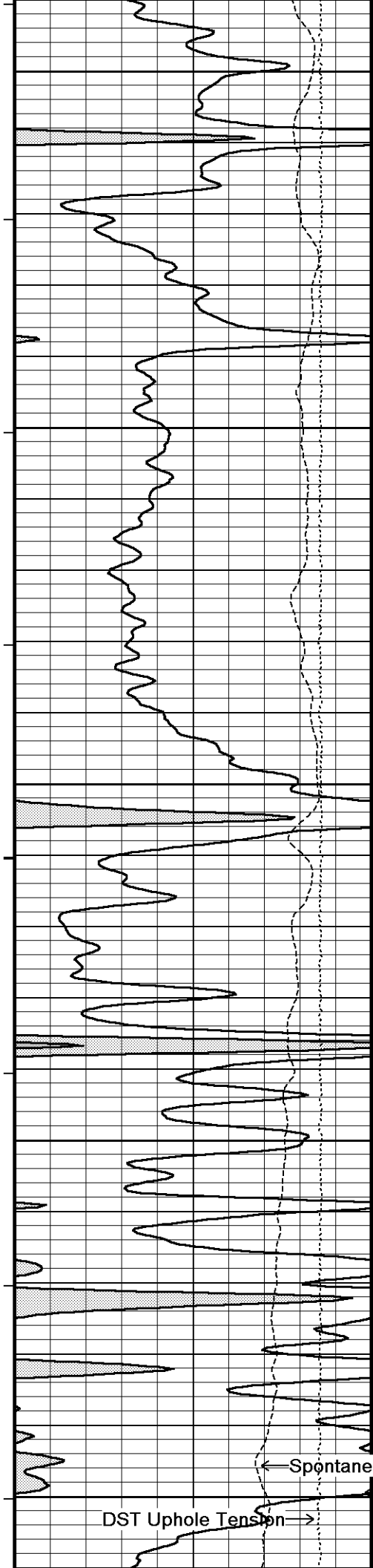
Shallow FB →

Spontaneous Potential

← Gamma Ray

DST Uphole Tension →





4300

106°

4350

106°

4400

107°

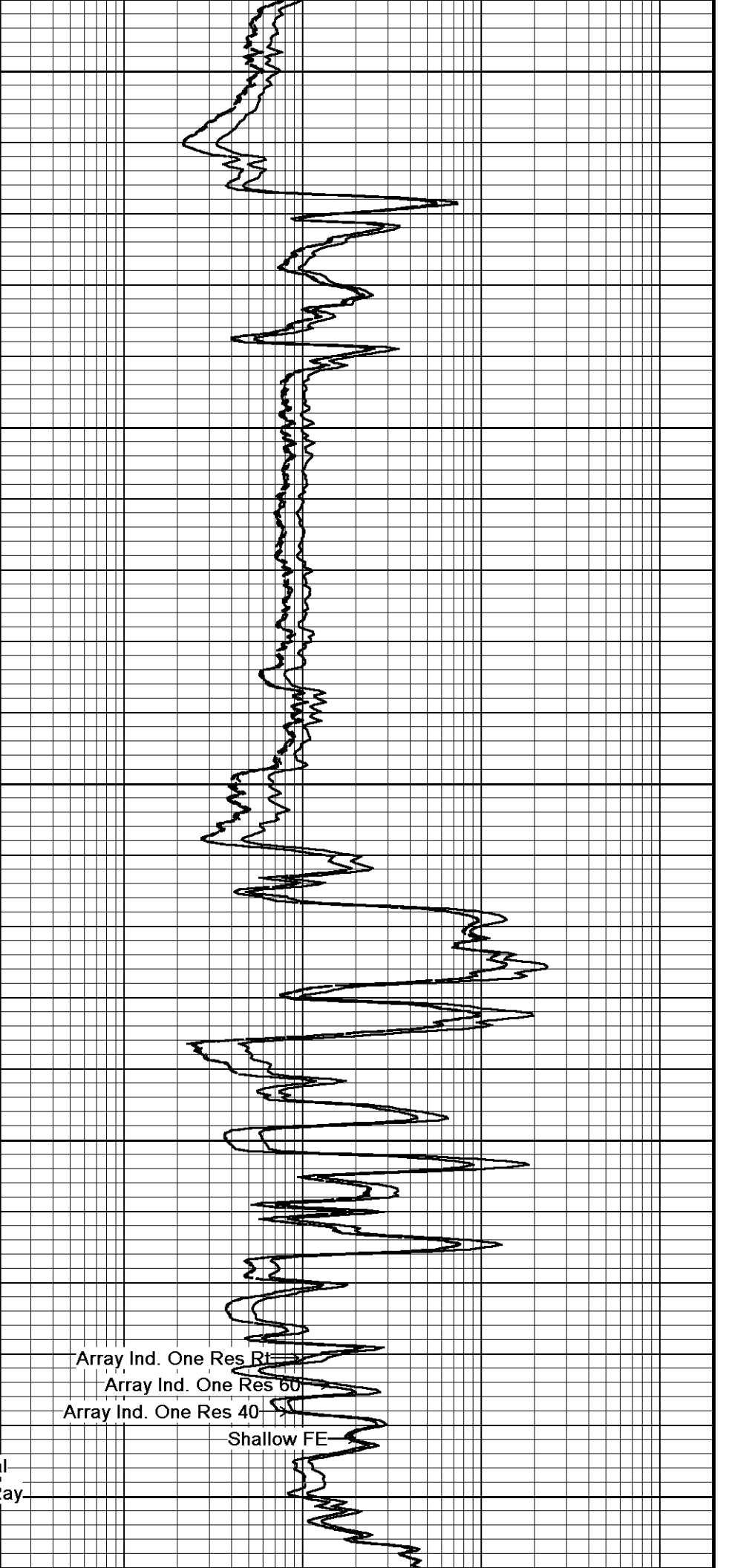
4450

108°

4500

DST Uphole Tension →

← Spontaneous Potential



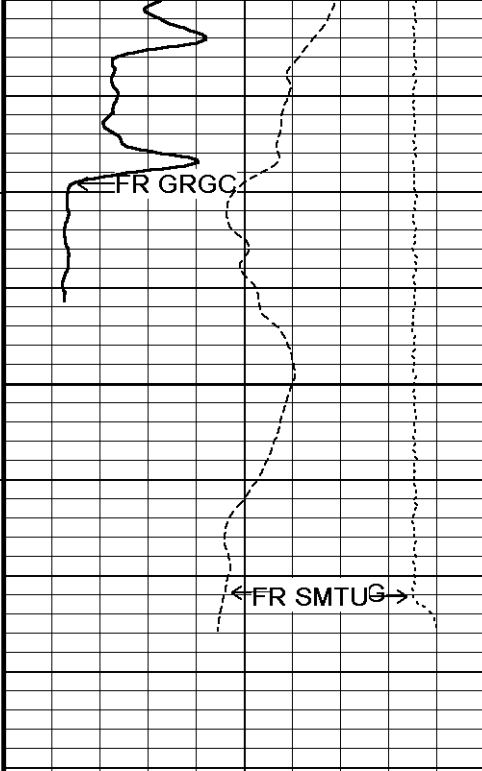
Array Ind. One Res Rt

Array Ind. One Res 60

Array Ind. One Res 40

Shallow FE

← Ray



107°

4550

4588

Depth in Feet

← Timing Marks every 60.0 sec

Gamma Ray API

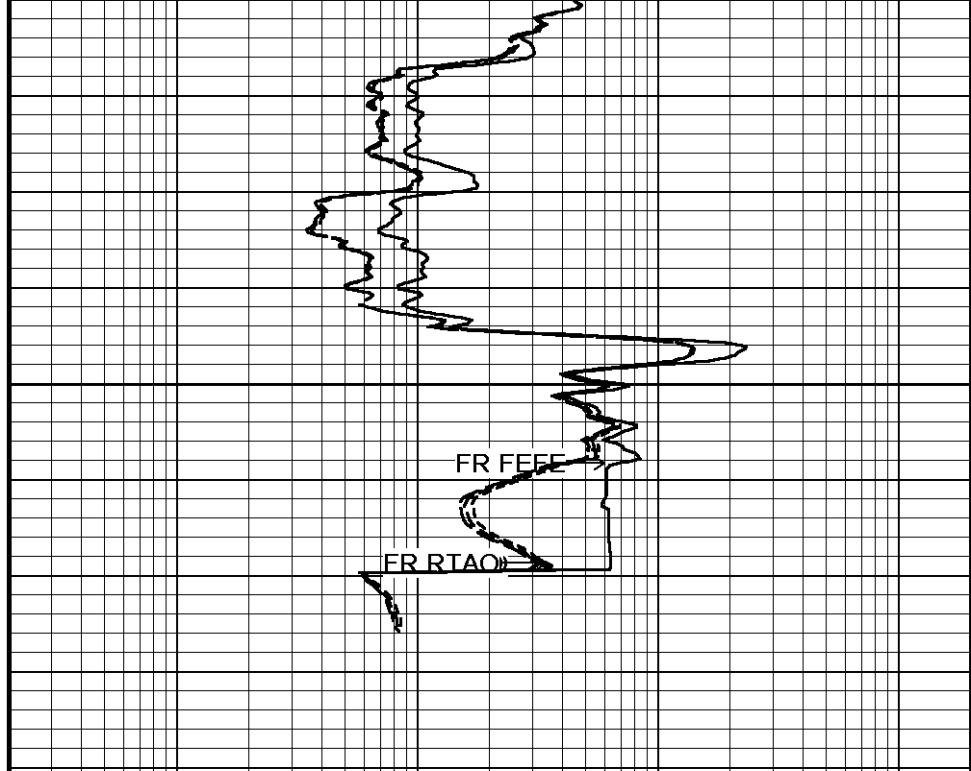
0	75	150
150	225	300

Spontaneous Potential millivolts  
 - - - - -> | 20 | < - - - - - +

DST Uphole Tension pounds  
 | 5000 | 0

Borehole Temp in deg F

Replay Scale 1:240



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  
 0.20 1 10 100 1000 2000

Array Ind. One Res Rt ohm metres  
 0.20 1 10 100 1000 2000

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 Recorded on 27-MAR-2013 11:53

↑ 5 INCH MAIN ↑

↓ REPEAT SECTION ↓

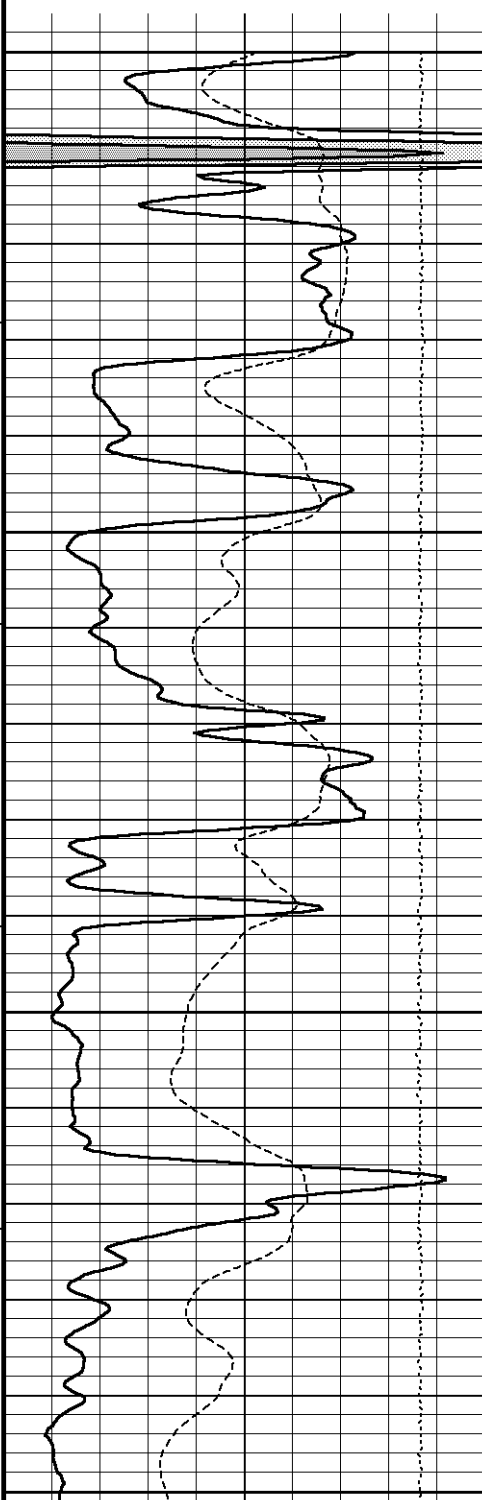
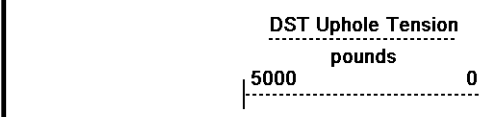
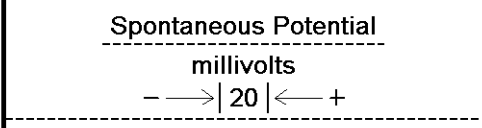
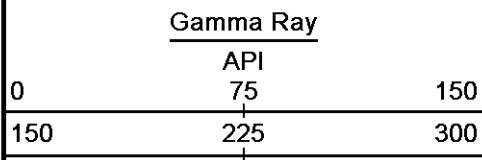
Depth Based Data - Maximum Sampling Increment 10.0cm  
 Filename: C:\Minimus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_001.dta  
 System Versions: Logged with 13.04.8492 Plotted with 13.04.8492  
 Plotted on 27-MAR-2013 15:14  
 Recorded on 27-MAR-2013 11:13

← Timing Marks every 60.0 sec

Depth in Feet

Shallow FE ohm metres  
 0.20 1 10 100 1000 2000

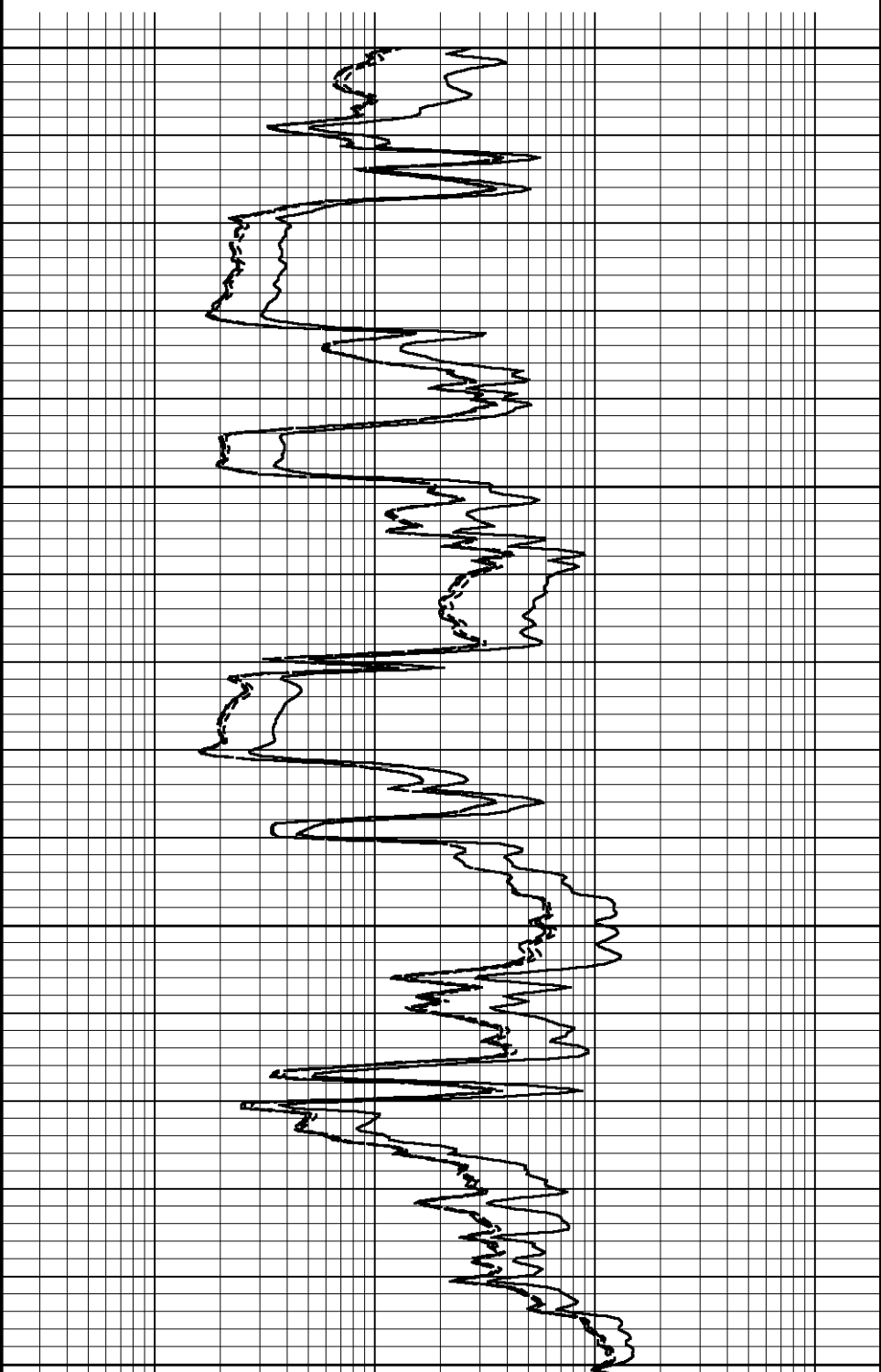
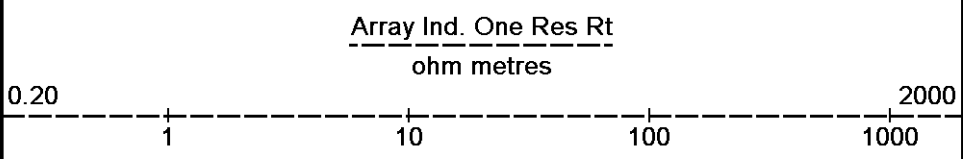
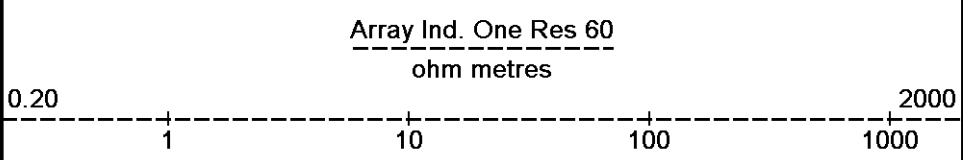
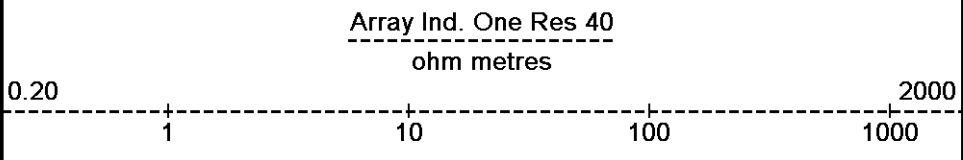


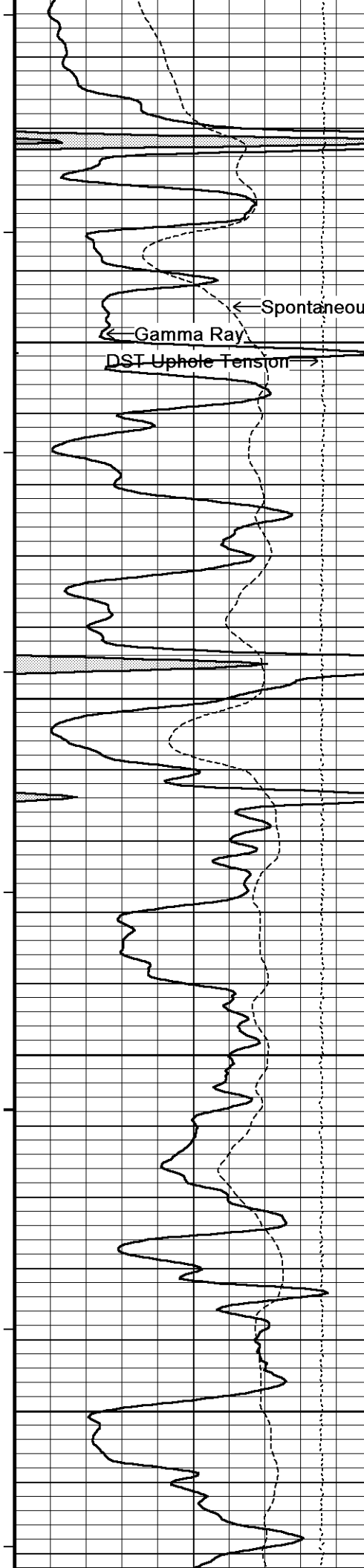


Borehole  
Temp in  
deg F

Replay  
Scale  
1:240

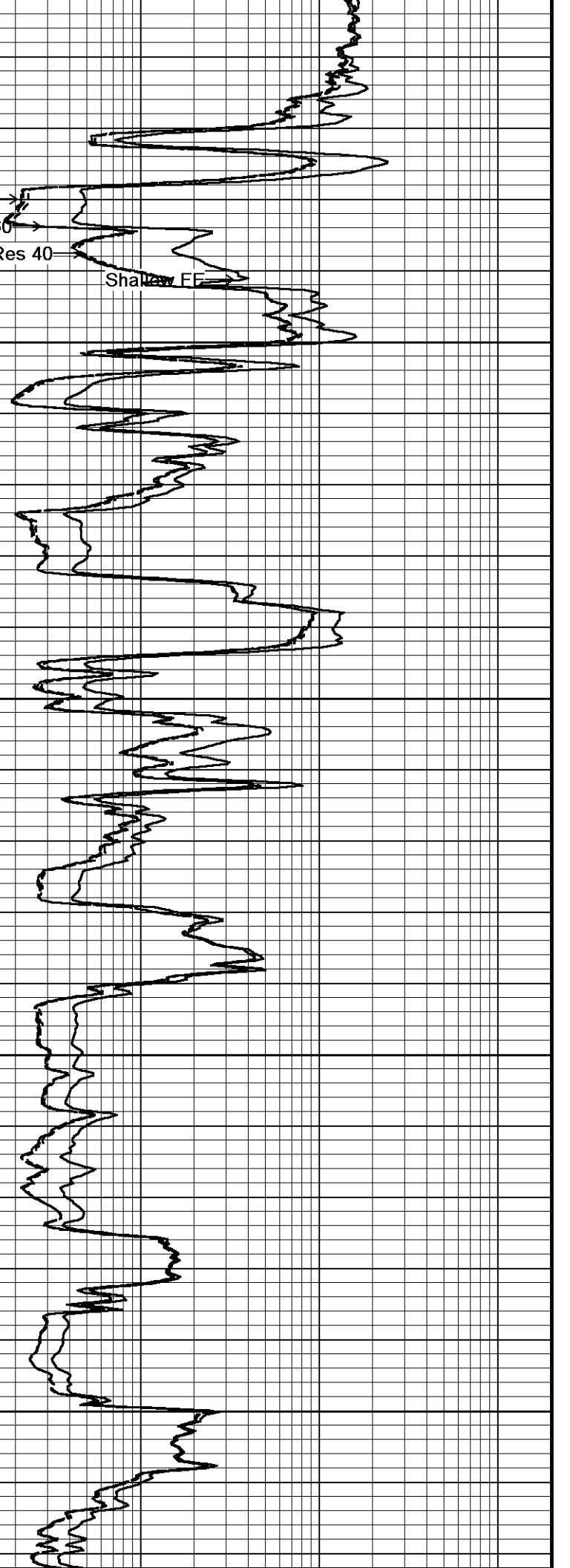
3900  
101°  
3950  
102°  
4000  
102°  
4050



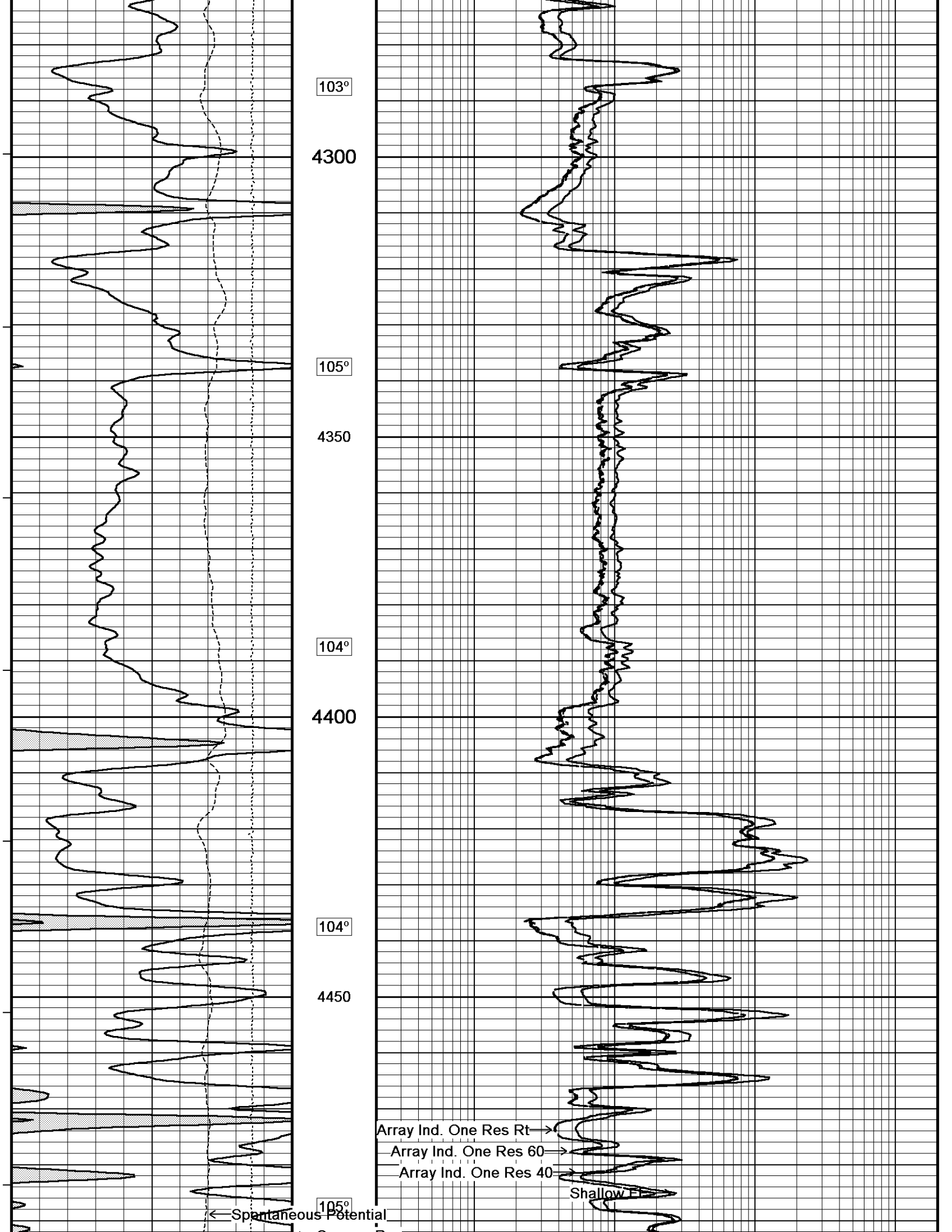


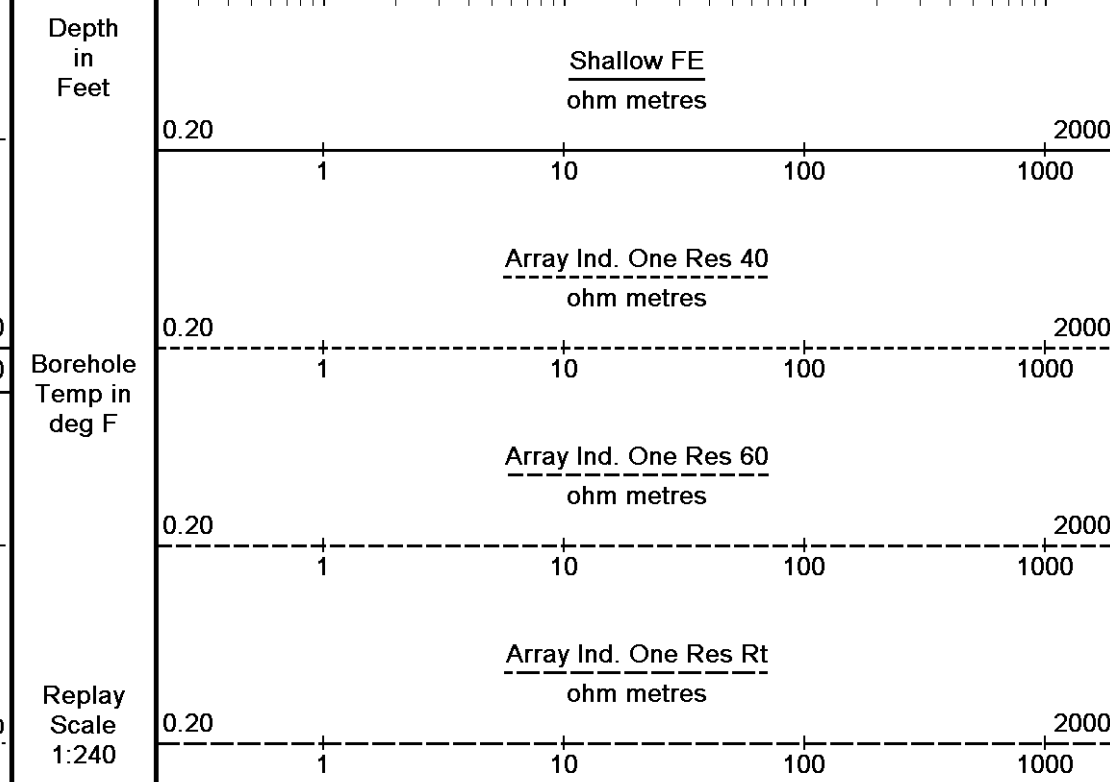
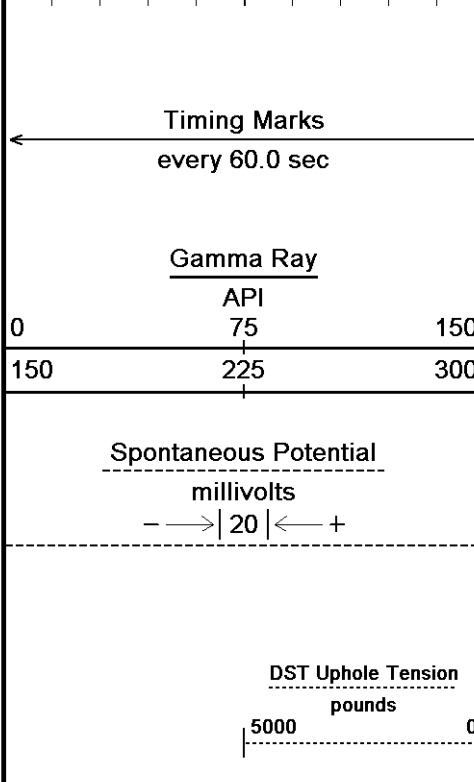
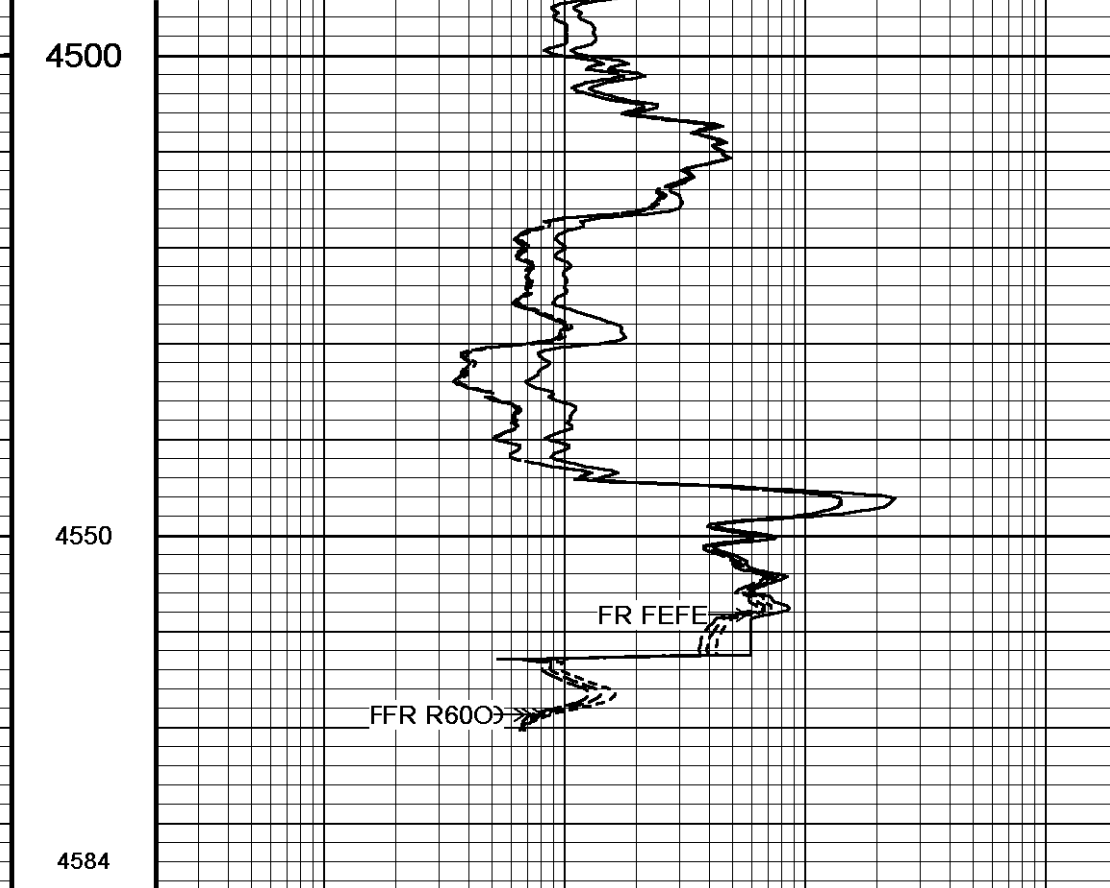
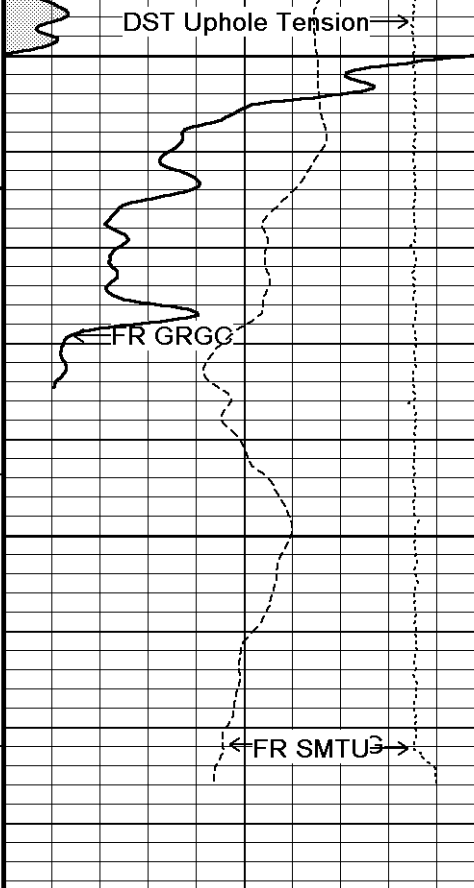
102°  
4100  
102°  
4150  
102°  
4200  
103°  
4250

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



Shallow FF





Depth Based Data - Maximum Sampling Increment 10.0cm  
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 System Versions: Logged with 13.04.8492 Plotted with 13.04.8492  
 Plotted on 27-MAR-2013 15:14  
 Recorded on 27-MAR-2013 11:13

↑ REPEAT SECTION ↑

BEFORE SURVEY CALIBRATION  
 C:\Minimus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_001.dta

General Constants All 000 Last Edited on 27-MAR-2013,10:41

General Parameters

Mud Resistivity	1.300	ohm-metres
Mud Resistivity Temperature	54.000	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	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	

Down-hole Tension Calibration SMS 0

Field Calibration on 26-MAR-2013 22:09

Reading No	Measured	Calibrated (lbs)
1	15789.74	0.00
2	16297.35	399.00

High Resolution Temperature Calibration MCG-B 34

Field Calibration on 14-MAR-2013,12:12

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

High Resolution Temperature Constants MCG-B 34

Last Edited on 14-MAR-2013,12:12

Pre-filter Length	11
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SP Calibration MCG-B 34

Field Calibration on 14-MAR-2013,12:12

	Measured	Calibrated (mV)
Reference 1	105.8	100.0
Reference 2	-94.3	-100.0

Gamma Calibration MCG-B 34

Field Calibration on 25-MAR-2013 17:22

	Measured	Calibrated (API)
Background	70	48
Calibrator (Gross)	1125	773
Calibrator (Net)	1055	725

Gamma Constants MCG-B 34

Last Edited on 27-MAR-2013,10:27

Gamma Calibrator Number	GRC38	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

Caliper Calibration MML-A 3

Base Calibration on 14-MAR-2013 12:18  
Field Calibration on 25-MAR-2013 17:12

Base Calibration		
Reading No	Measured	Calibrator Size (in)
1	14700	5.98
2	17863	7.97
3	21143	9.86
4	24990	11.92
5	0	0.00
6	N/A	N/A

Field Calibration		
	Measured Caliper (in)	Actual Caliper (in)
	6.02	5.98

Micro Normal and Micro Inverse Calibration MML-A 3

Base Calibration on 14-MAR-2013 12:10  
Field Check on 25-MAR-2013 17:16

Base Calibration		
	Measured	Calibrated (ohm-m)

Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	12.1	60.1	5.0	25.0
Micro Inverse	15.6	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 3

Last Edited on 25-MAR-2013,17:12

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	

Neutron Calibration MDN-A.B 66

Base Calibration on 14-MAR-2013,12:32

Field Check on 25-MAR-2013 17:27

Base Calibration					
		Measured		Calibrated (cps)	
	Near	Far	Near	Far	
	2998	94	3714	110	
Ratio	31.811		33.764		
Field Calibrator at Base					
			Calibrated (cps)		
			1692	2389	
Ratio	0.708				
Field Check					
			Calibrated (cps)		
			1718	2418	
Ratio	0.697				

Neutron Constants MDN-A.B 66

Last Edited on 25-MAR-2013,17:23

Neutron Source Id	P0204NN			
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	None			
Formation Pressure	0.00	kpsi		
Temperature Source	None			
Temperature	20.00	degrees F		
Mud Salinity	0.00	kppm		
Salinity Correction	Not Applied			
Formation Fluid Salinity Source	None			
Formation Fluid Salinity	0.00	kppm		
Barite Mud Correction	Not Applied			

FE Calibration MFE-B.J 353

Base Calibration on 14-MAR-2013 11:59

Field Check on 25-MAR-2013 17:03

Base Calibration					
		Measured		Calibrated (ohm-m)	
Reference 1	0.0		0.0		
Reference 2	966.2		126.8		
Base Check	280.5				
Field Check	280.6				

FE Constants MFE-B.J 353

Last Edited on 26-MAR-2013,20:52

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		

High Resolution Temperature Calibration MAI-A.A 167

Field Calibration on 14-MAR-2013,14:23

	Measured	Calibrated(Deg F)
Lower	1.00	33.80
Upper	11.00	51.80

High Resolution Temperature Constants MAI-A.A 167

Last Edited on 15-MAR-2013,23:04

Pre-filter Length 11

Induction Calibration MAI-A.A 167

Base Calibration on 14-MAR-2013,14:52  
Field Check on 25-MAR-2013 17:02

Base Calibration

Test Loop Calibration

Channel	Measured		Calibrated (mmho/m)	
	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			12.1	3840.8
2			29.3	3478.5
3			29.0	3054.5
4			19.8	2082.8
Deep			18.5	2050.1
Medium			42.2	3993.1
Shallow			42.6	5056.2

Array Temperature 58.4 Deg F

Induction Constants MAI-A.A 167

Last Edited on 26-MAR-2013,20:51

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





# DOWNHOLE EQUIPMENT

C:\Minimus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_001.dta

CBH-C, Cablehead, 11 pin  
 CBH-C 234 LG: 2.40 ft WT: 24.3 lb OD: 2.24 in

Compact Comms Gamma  
 MCG-B 34 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

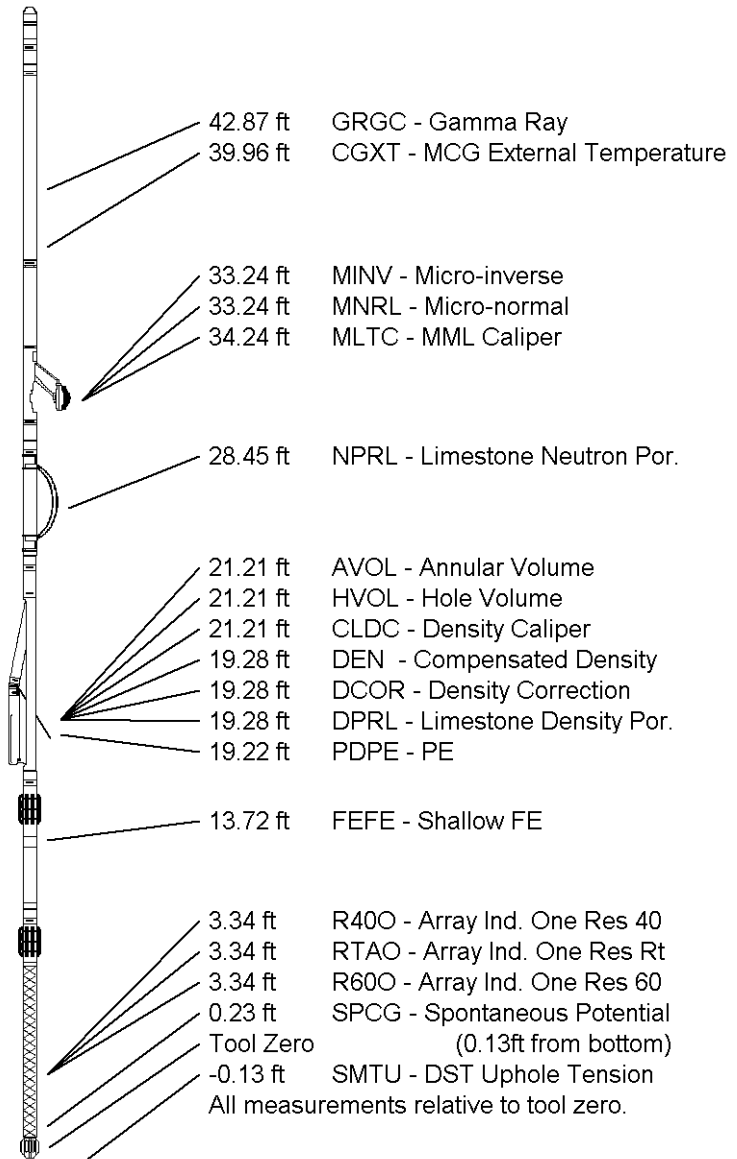
Compact Neutron  
 MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

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: 50.55 ft Weight: 407.9 lb**



<b>COMPANY</b>	<b>GRAND MESA OPERATING COMPANY</b>
<b>WELL</b>	<b>BROOKS #1-18</b>
<b>FIELD</b>	<b>WILDCAT</b>
<b>PROVINCE/COUNTY</b>	<b>GOVE</b>
<b>COUNTRY/STATE</b>	<b>UNITED STATES / KANSAS</b>

Elevation Kelly Bushing	2669.00	feet	First Reading	4569.00	feet
Elevation Drill Floor	2664.00	feet	Depth Driller	4568.00	feet
Elevation Ground Level	2664.00	feet	Depth Logger	4572.00	feet



# Weatherford®

ARRAY INDUCTION  
 SHALLOW FOCUSED  
 ELECTRIC LOG

COMPANY	WELL	FIELD	PROVINCE/COUNTY	COUNTRY/STATE	LOCATION
SEC	TIME	DATE	LOG NUMBER	PERMANENT DATUM (G.L., E.L., F.L.)	LOG MEASURED FROM (KB)
18	11:5	15-08-2	15-08-2		
Print Number	Drilling Measured From	Drilling Measured From	Drilling Measured From	Drilling Measured From	Drilling Measured From
Form Number	Service Order	Depth Driller	Depth Logger	First Reading	Fast Reading
Caseing Driller	Caseing Logger	Flow Fluid Type	Flow Fluid Type	PH / Fluid Loss	Density / Viscosity
Sample Source	Form @ Measured Temp	Form @ Measured Temp	Form @ Measured Temp	Form @ Measured Temp	Form @ Measured Temp
Form @ BHT	Time since Circulation	Time since Circulation	Time since Circulation	Time since Circulation	Time since Circulation
Equipment / Base	Equipment / Base	Equipment / Base	Equipment / Base	Equipment / Base	Equipment / Base
Witnessed by	Witnessed by	Witnessed by	Witnessed by	Witnessed by	Witnessed by
DOB #	DOB #	DOB #	DOB #	DOB #	DOB #

**ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG**

**ford**

SRAND MESA OPERATING COMPANY  
BROOKS #1-18  
WILD CAT

GOVE  
UNITED STATES / KANSAS  
2219' FNL & 1761' FWL  
NE SW SE NW

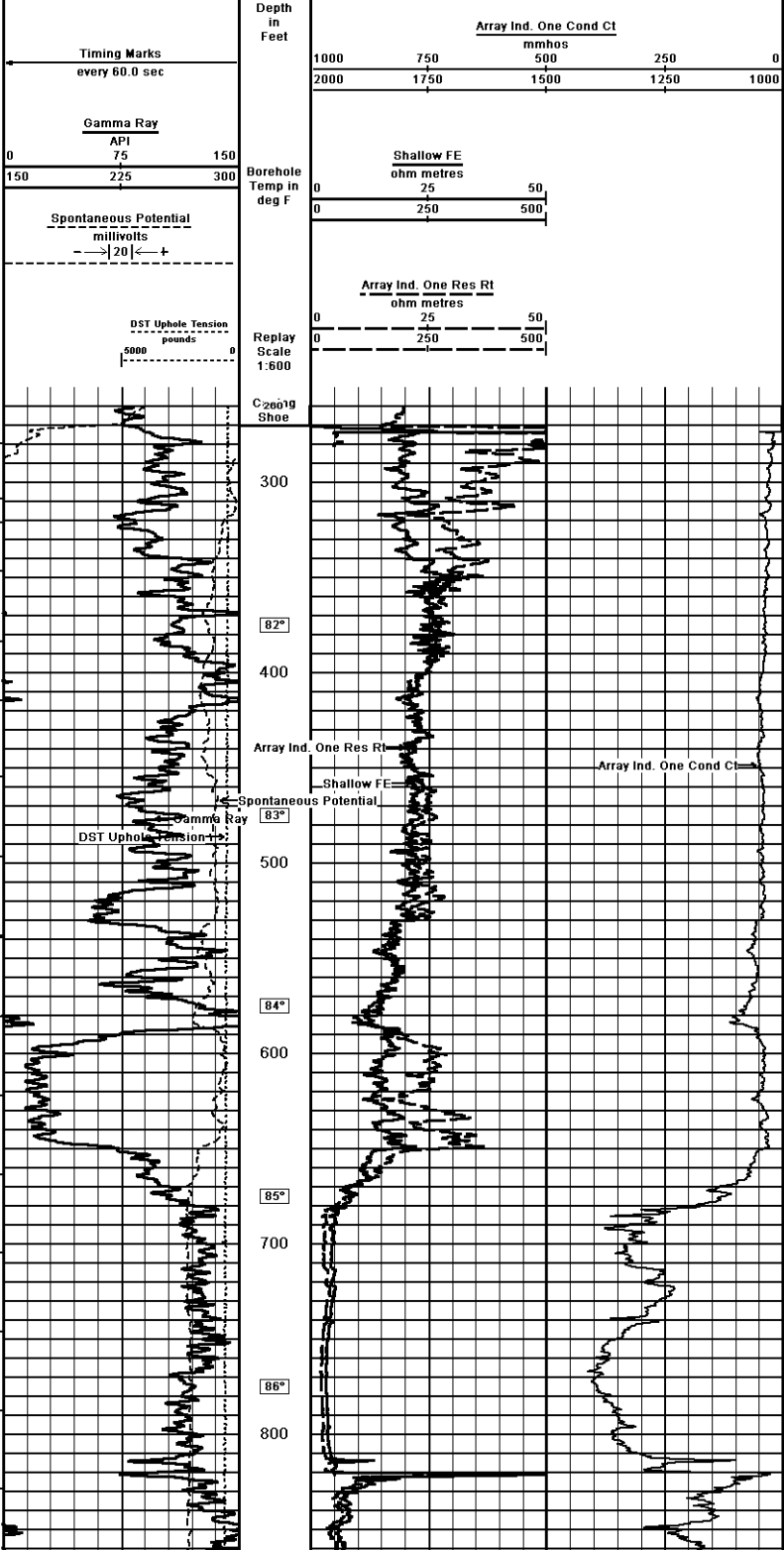
RSE  
18W  
2089  
Other Services  
MTC/MCN  
MHL

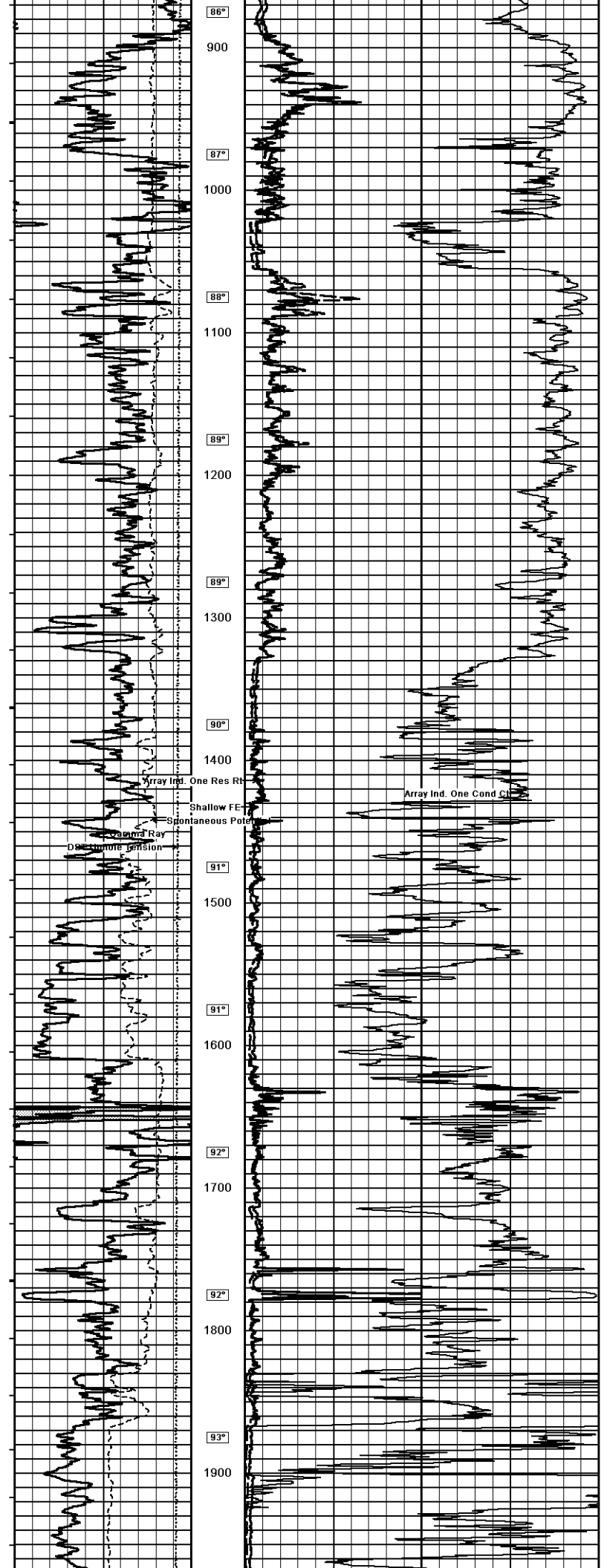
Elevation 2664 feet  
Elevations:  
Top 2664.00  
CP 2664.00  
CL 2664.00

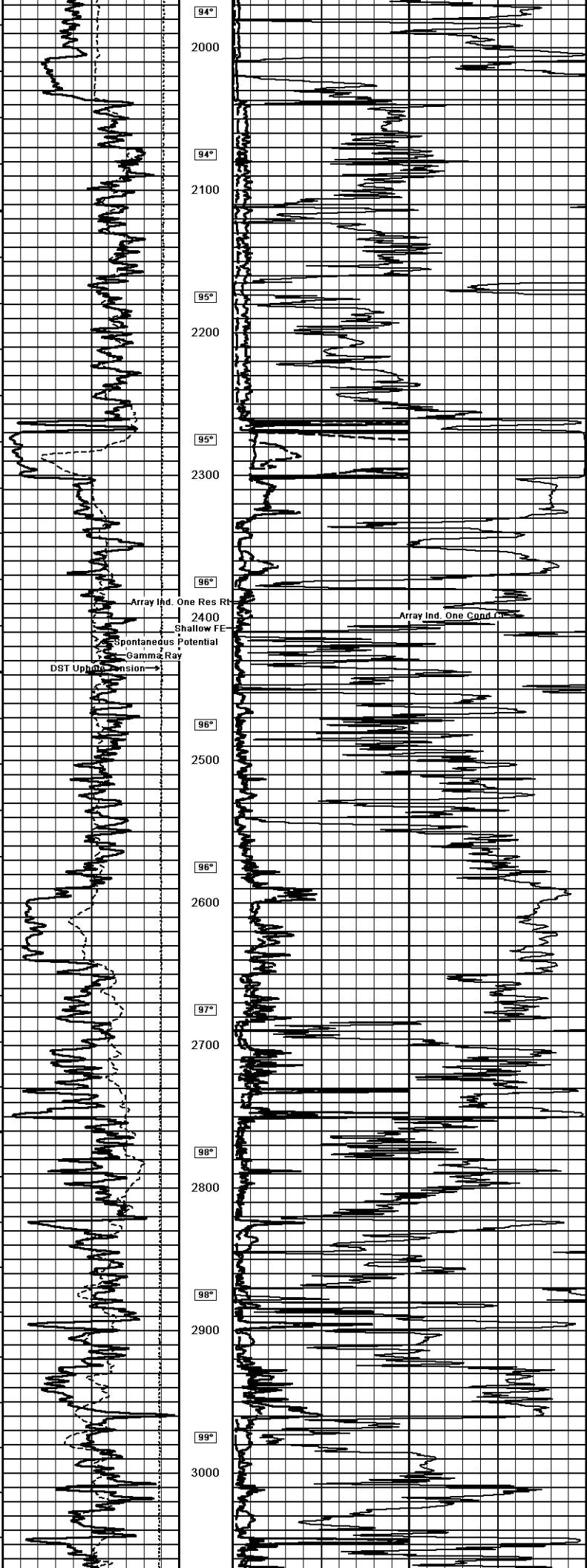
ONE	27-MAR-2013	
3538989	feet	
4568.00	feet	
4572.00	feet	
4569.00	feet	
2693.00	feet	
2693.00	feet	
2703.00	inches	
7.880		
CHEMICAL	IBU/Sg	
9.30	IBU/Sg	63.00 CP
10.50		
MUDPIT		
1.30 @ 54.0	ohm-m	
1.04 @ 54.0	ohm-m	
1.56 @ 54.0	ohm-m	
CALC		
0.65 @ 108.0	ohm-m	
4 HOURS		
108.00	deg F	
13006		
IN STRANBLUGH		
BOB SCHREIBER		
LBI-3481		

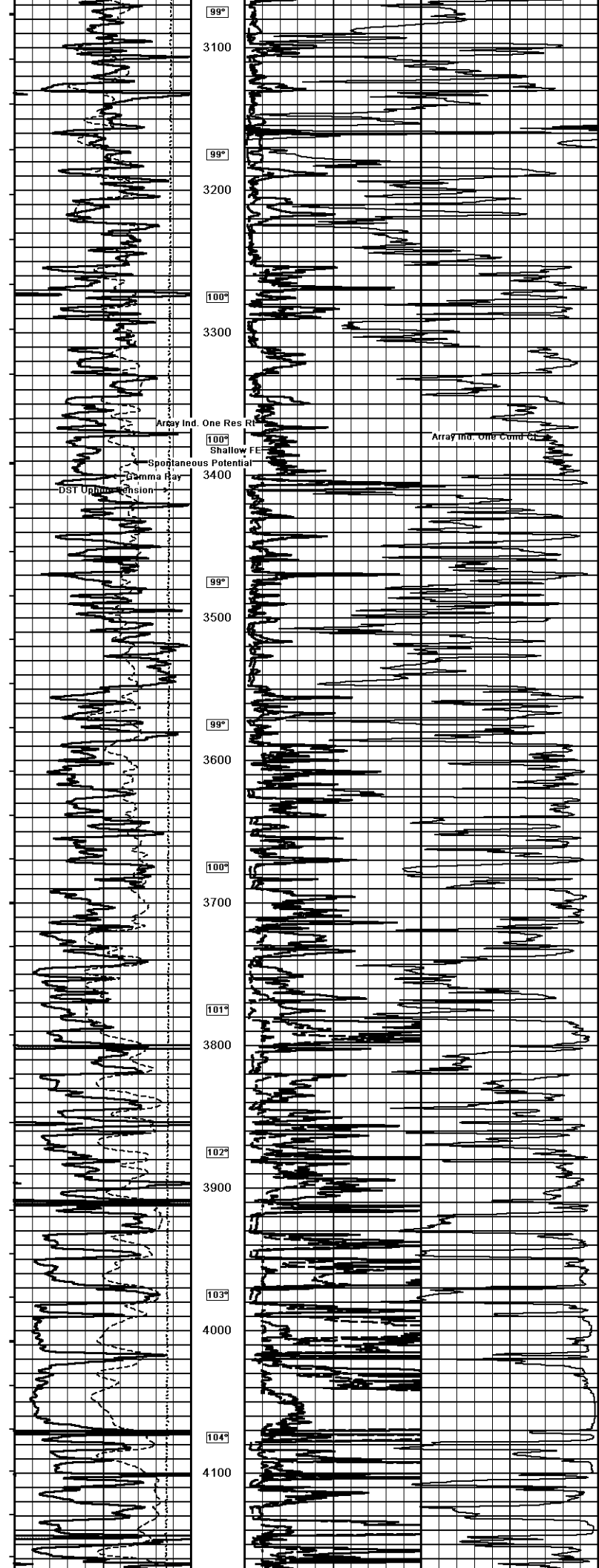
**1 INCH MAIN**

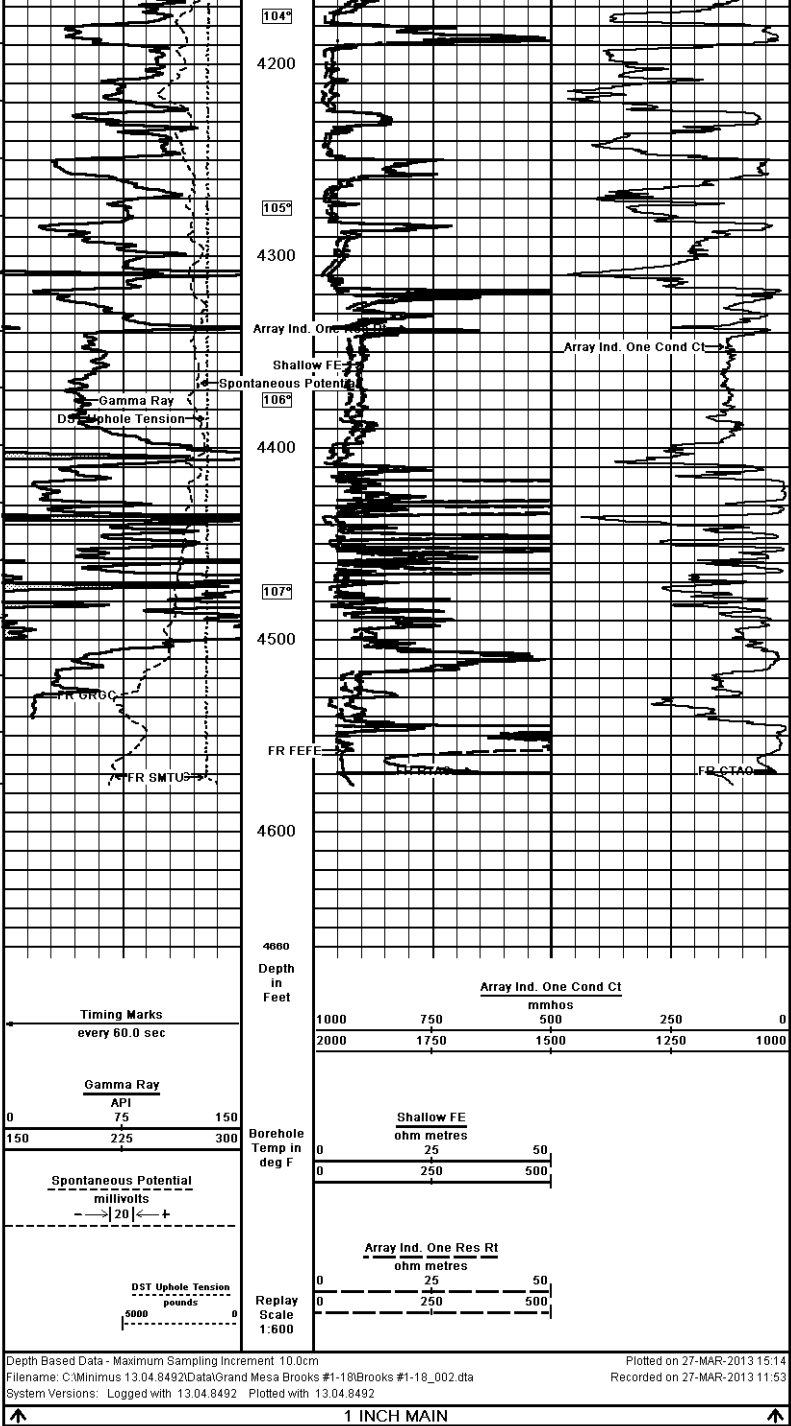
Depth Based Data - Maximum Sampling Increment 10.0cm  
 Plotted on 27-MAR-2013 15:14  
 Filename: C:\Minus 13.04.8492\Data\Grand Mesa Brooks #1-18\Brooks #1-18\_002.dta  
 Recorded on 27-MAR-2013 11:53  
 System Versions: Logged with 13.04.8492 Plotted with 13.04.8492












COMPANY	GRAND MESA OPERATING COMPANY				
WELL	BROOKS #1-18				
FIELD	WILDCAT				
PROVINCE/COUNTY	GOVE				
COUNTRY/STATE	UNITED STATES / KANSAS				
Elevation Kelly Bushing	2669.00	feet	First Reading	4569.00	feet
Elevation Drill Floor	2664.00	feet	Depth Driller	4568.00	feet
Elevation Ground Level	2664.00	feet	Depth Logger	4572.00	feet

 ARRAY INDUCTION  
SHALLOW FOCUSED  
ELECTRIC LOG