ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

Weatherford®

COMPANY	GRAND MESA OPERATING COMPANY
WELL	HESS-SMITH #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2414' FNL & 1864' FWL

SEC	TWP	RGE	Other Services
22	12S	32W	MPD/MDN MML

API Number 15-109-21178
Permit Number

Permanent Datum GL, Elevation 3027 feet
Log Measured From KB
Drilling Measured From KB

Elevations:	feet
KB	3037.00
DF	3036.00
GL	3027.00

Date	17-MAY-2013			
Run Number	ONE			
Service Order	3537746			
Depth Driller	4735.00	feet		
Depth Logger	4734.00	feet		
First Reading	4731.00	feet		
Last Reading	224.00	feet		
Casing Driller	225.00	feet		
Casing Logger	224.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.10 lb/USg		57.00 CP	
PH / Fluid Loss	10.00		8.00 ml/30Min	
Sample Source	MUDPIT			
Rm @ Measured Temp	1.64 @ 99.0	ohm-m		
Rmf @ Measured Temp	1.31 @ 99.0	ohm-m		
Rmc @ Measured Temp	1.97 @ 99.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	1.40 @116.0	ohm-m		
Time Since Circulation	5 HOURS			
Max Recorded Temp	116.00	deg F		
Equipment / Base	13096		LIB	
Recorded By	ADAM SILL			
Witnessed By	KENT MATSON			
JOB #	LB13-139			

BOREHOLE RECORD

Last Edited: 17-MAY-2013 17:16

Bit Size inches	Depth From feet	Depth To feet
7.875	225.00	4735.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	225.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.05.9583.
- MCG, 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: 1730 CU. FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO 3734 FEET: 183 CU. FT.
- RIG: VAL #4

- ENGINEER: A. SILL.

- OPERATOR(S): N. ADAME.

**** WHILE RUNNING IN HOLE BRIDGED OFF AT 2560 FEET, CAME UP AND WENT BACK DOWN AND WENT RIGHT THROUGH IT. ****

**** PULLED TIGHT AT 4709 FEET ON THE REPEAT PASS. CLOSED CALIPERS AND PULLED INTO IT 1000 POUNDS OVER. DROPPED DOWN A LITTLE BIT AND PULLED BACK UP AND PULLED THROUGH. REOPENED CALIPERS AND CONTINUED LOGGING. ****

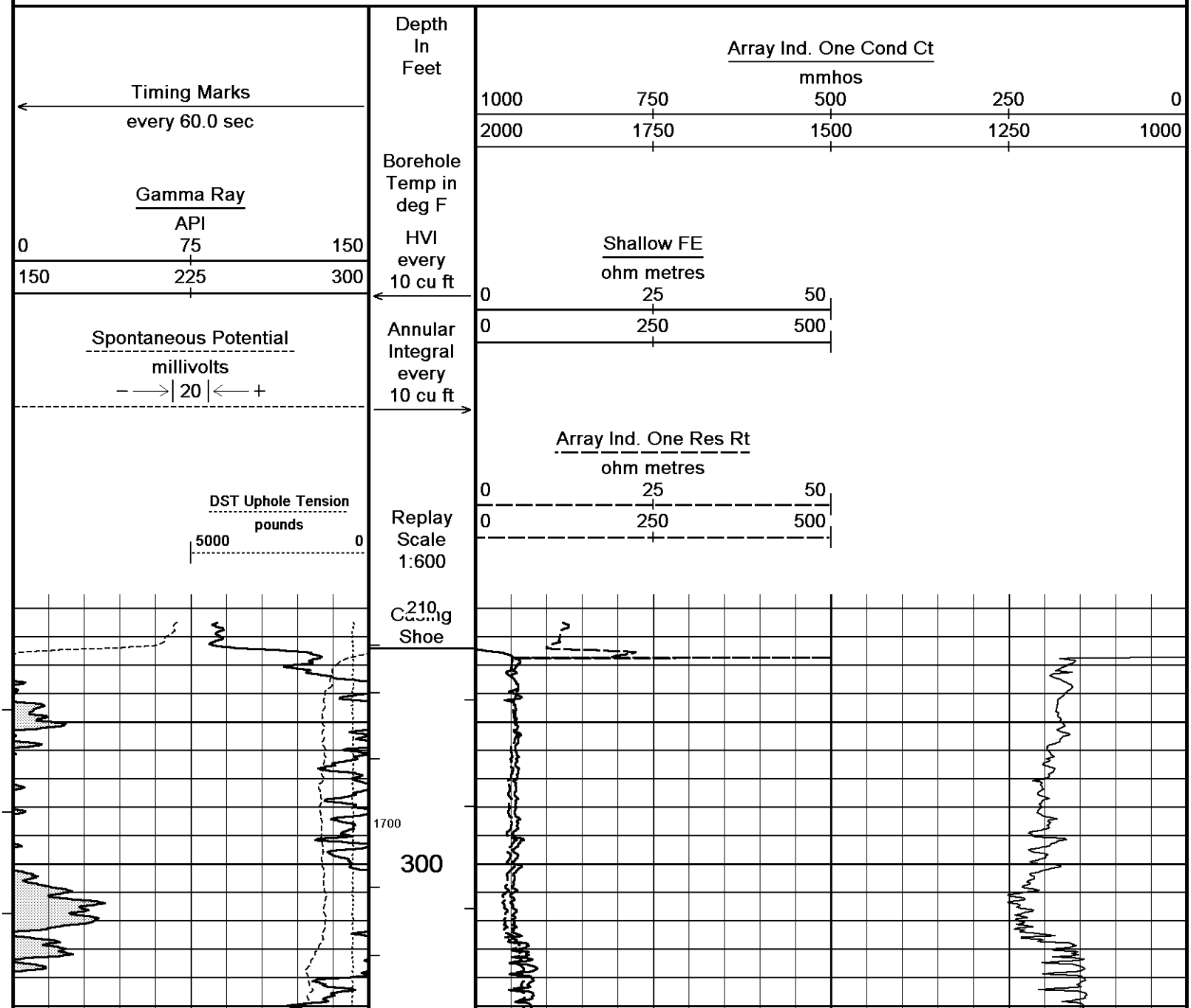
**** AFTER PULLING TIGHT INSTRUCTED TO JUST LOG OUT OF THE HOLE AND NOT ATTEMPT TO DROP BACK DOWN TO LOG THE MAIN PASS. ****

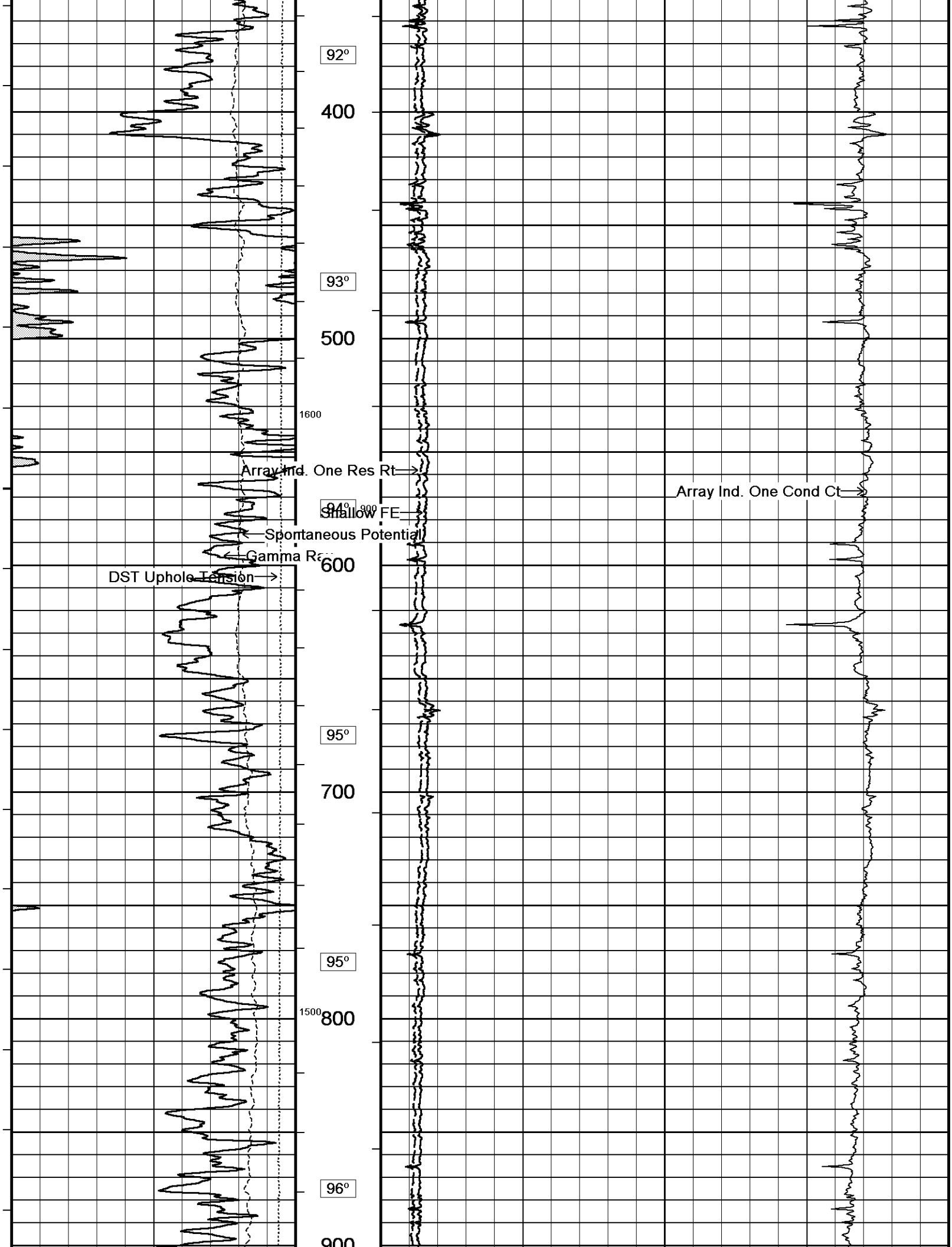
2 INCH MAIN

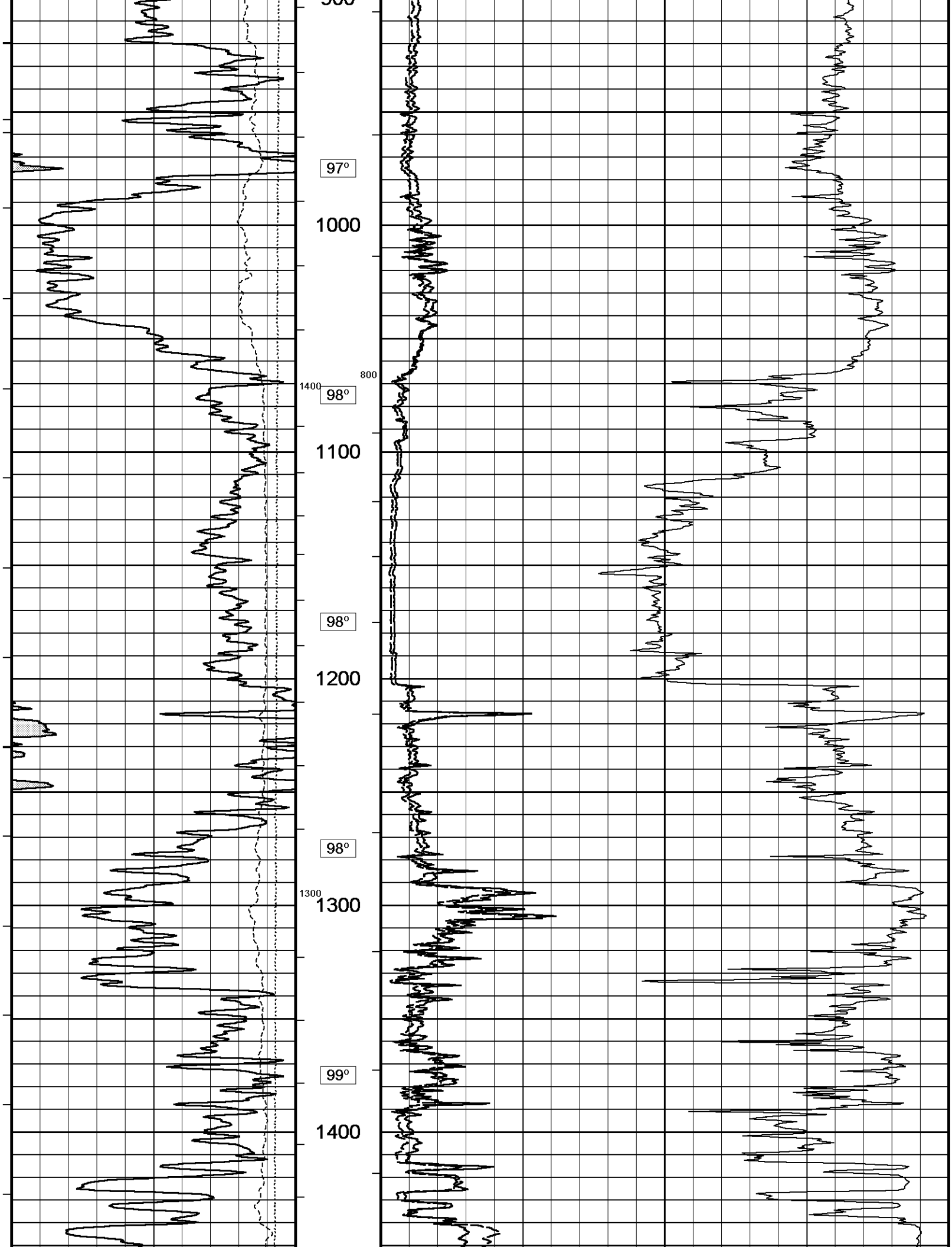
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-JUN-2013 16:07

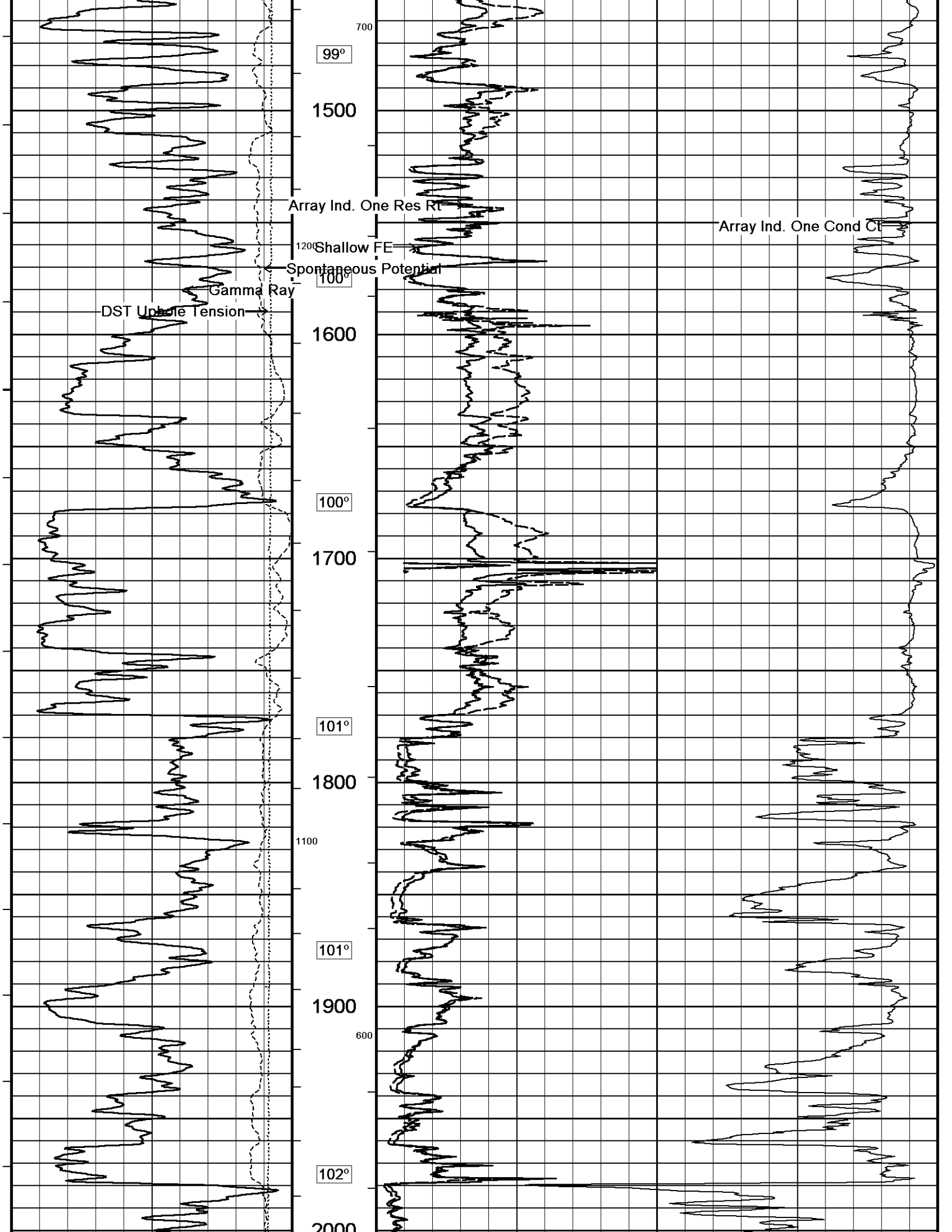
Filename: C:\Minimus 13.05.9583\Data\Grand Mesa Hess S...\Grand Mesa Hess-Smith #1-22 Main.dta — Recorded on 17-MAY-2013 19:48

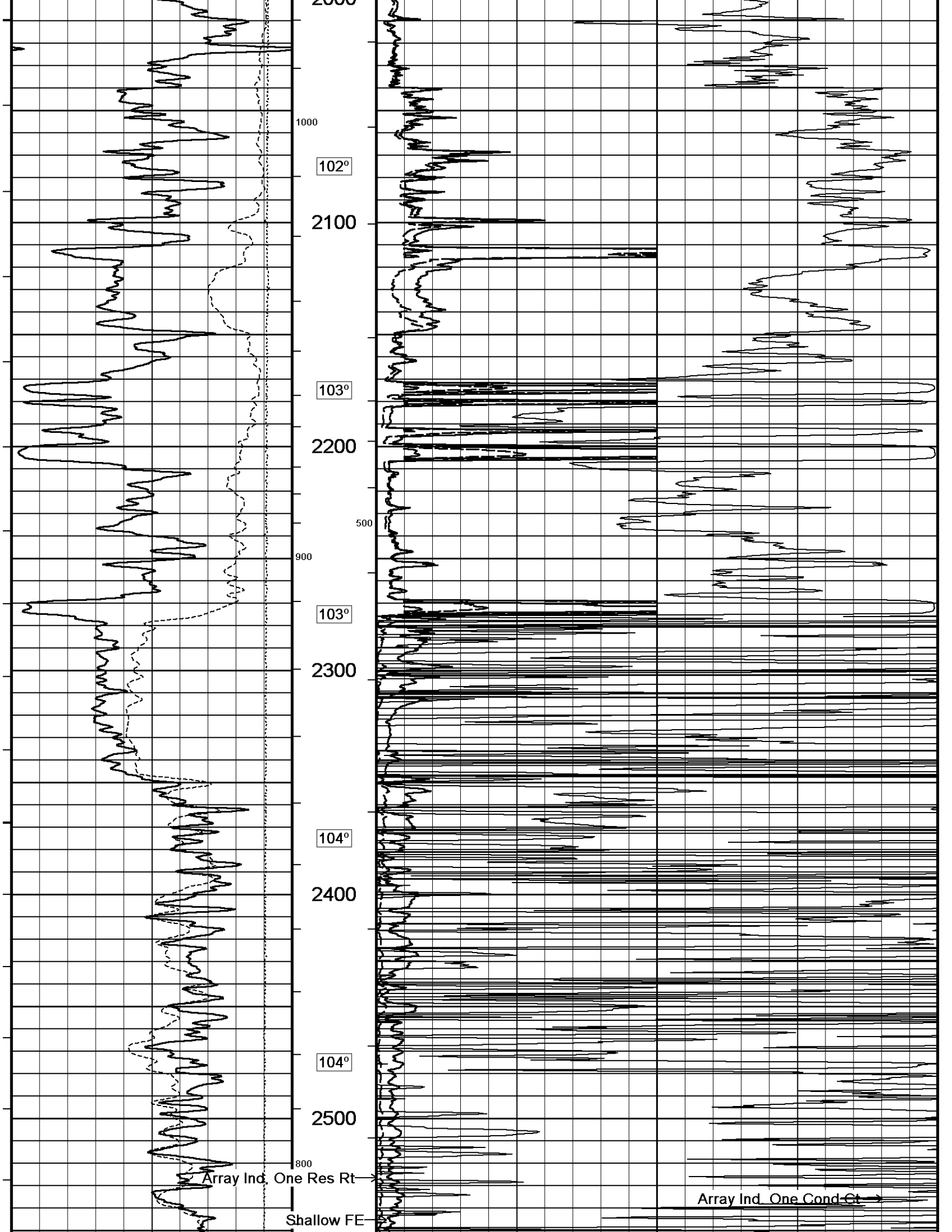
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583

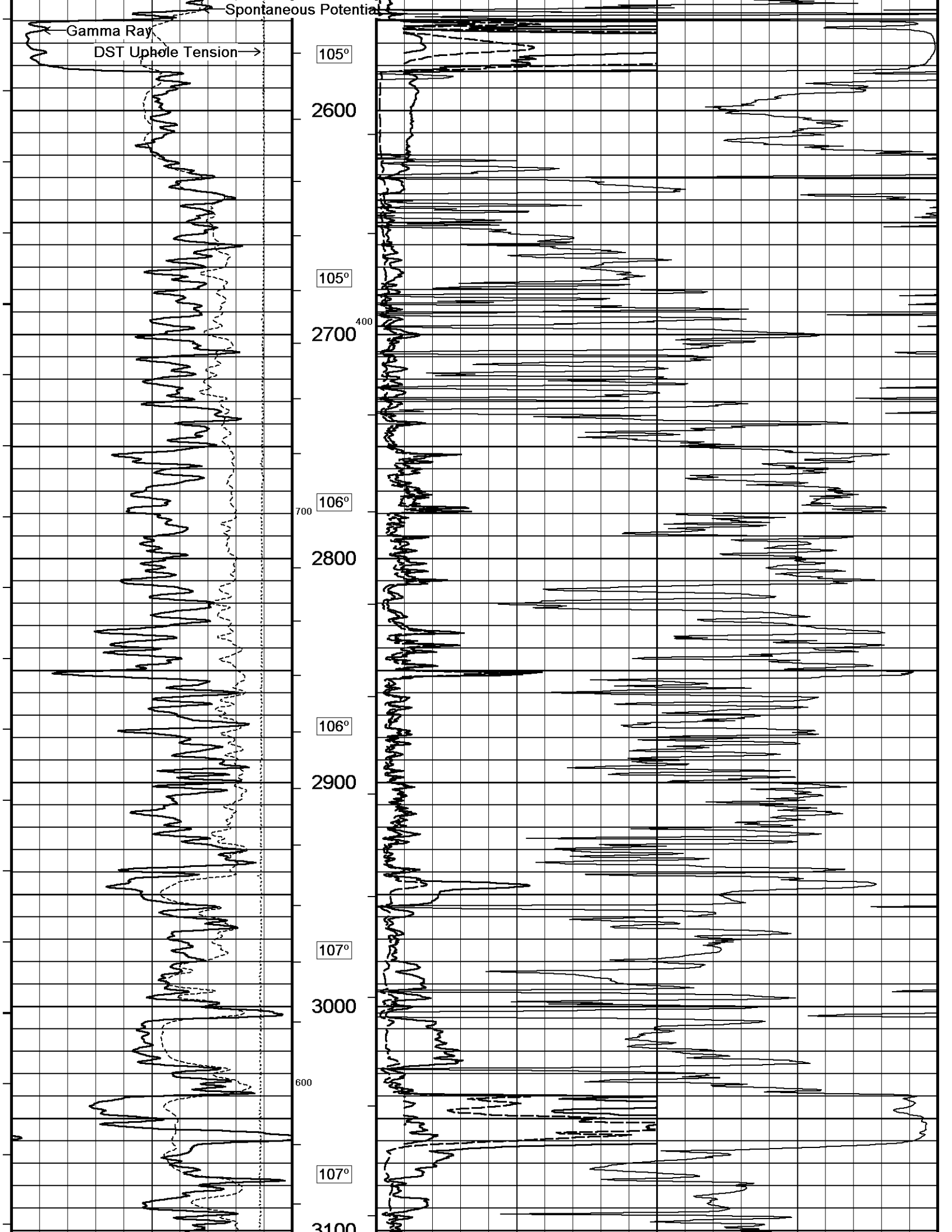


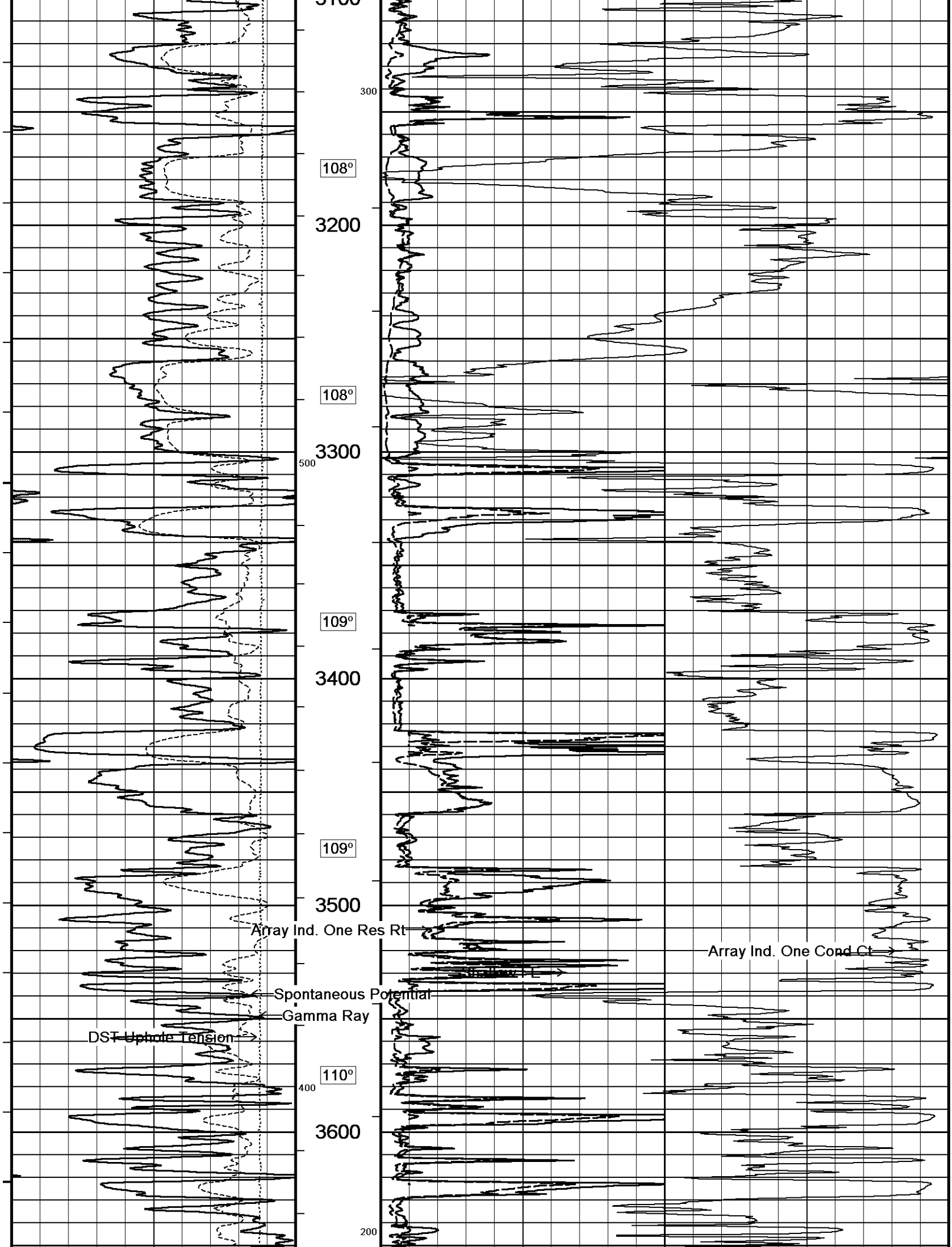

92°
400
93°
500
1600
Array Ind. One Res Rt
94°
900
Shallow FE
Spontaneous Potential
Gamma Ra
600
DST Uphole Tension
Array Ind. One Cond Ct
95°
700
95°
1500
800
96°
900

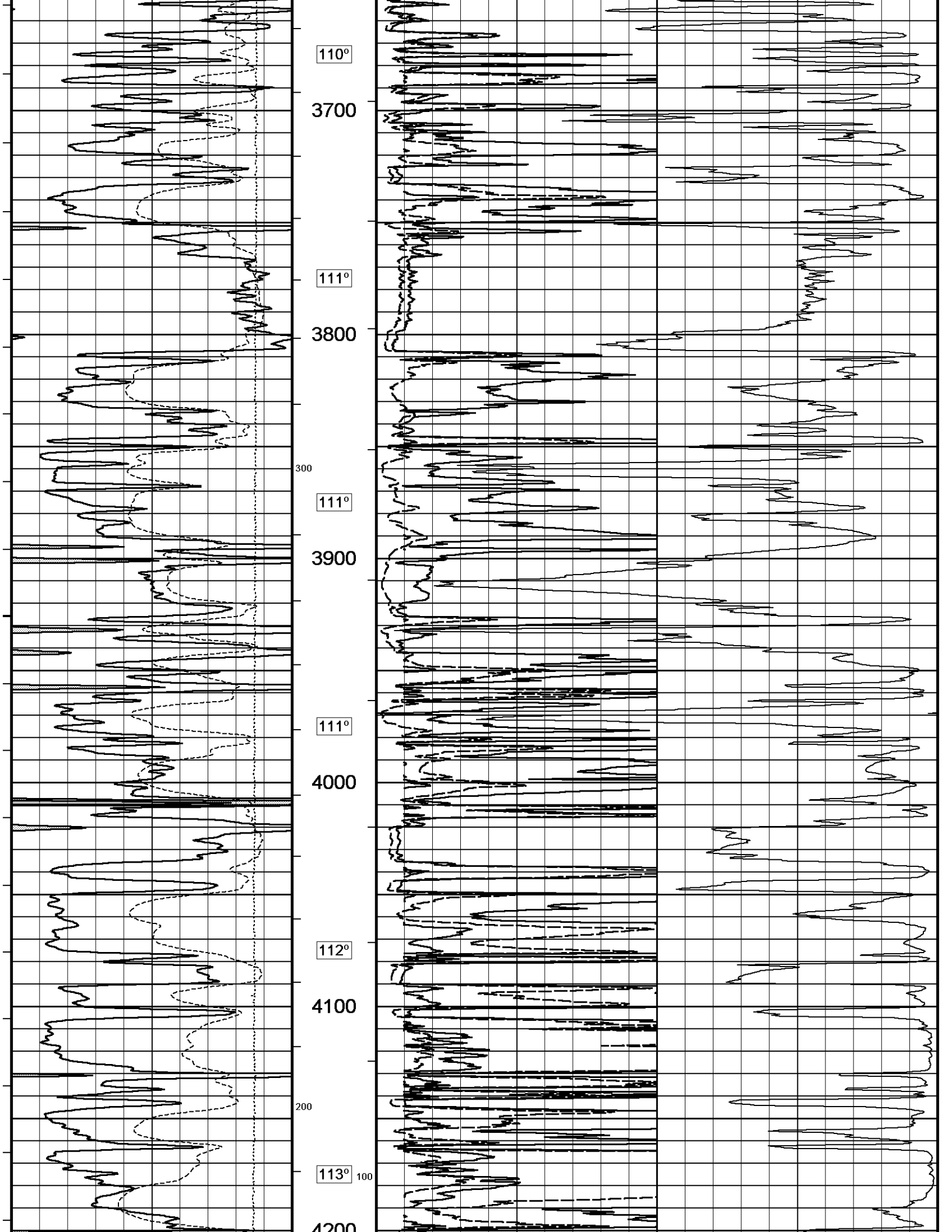

97°
1000
1400
800
98°
1100
98°
1200
98°
1300
99°
1400

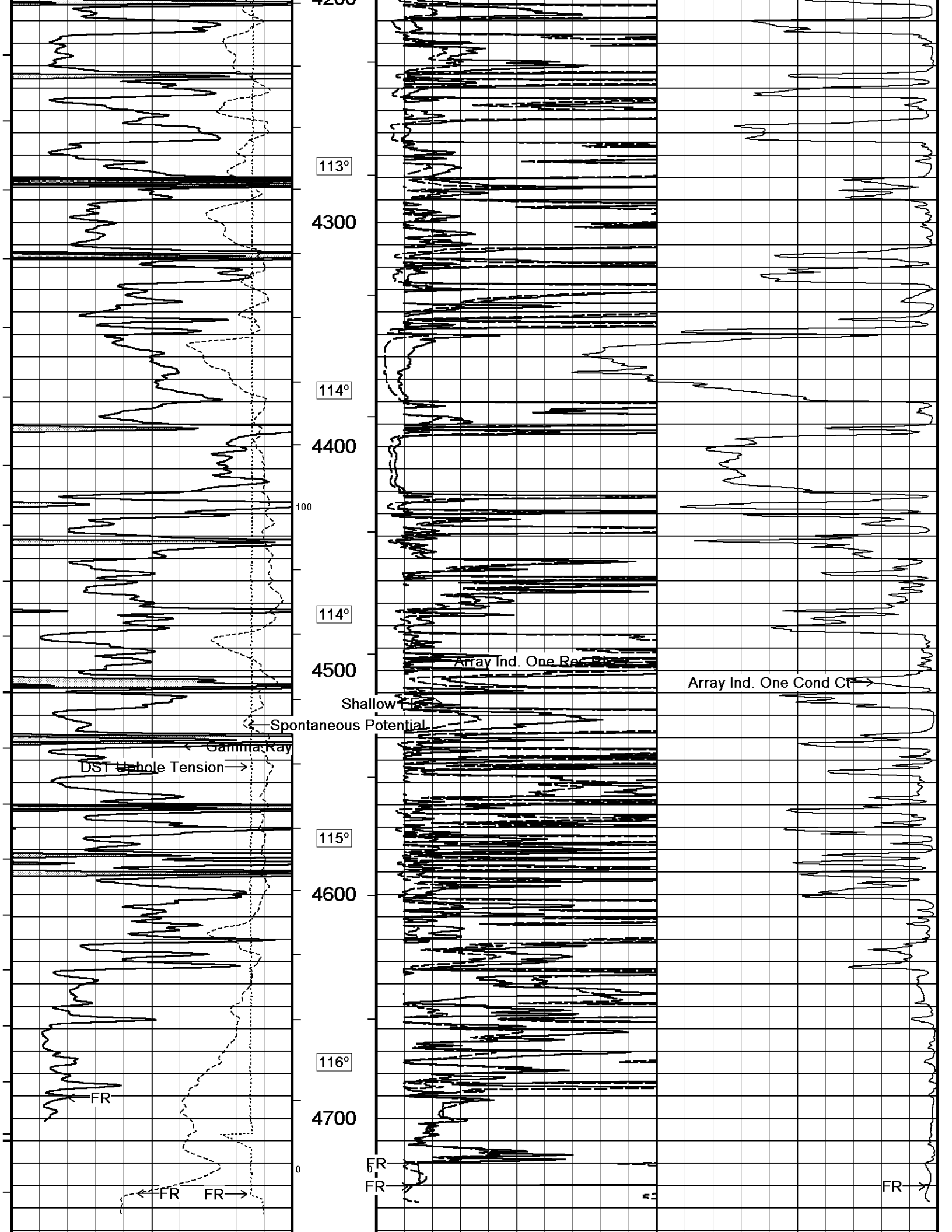

700
99°
1500
Array Ind. One Res Rt
Array Ind. One Cond Ct
120
Shallow FE
Spontaneous Potential
100°
Gamma Ray
DST Uphole Tension
1600
100°
1700
101°
1800
1100
101°
1900
600
102°
2000

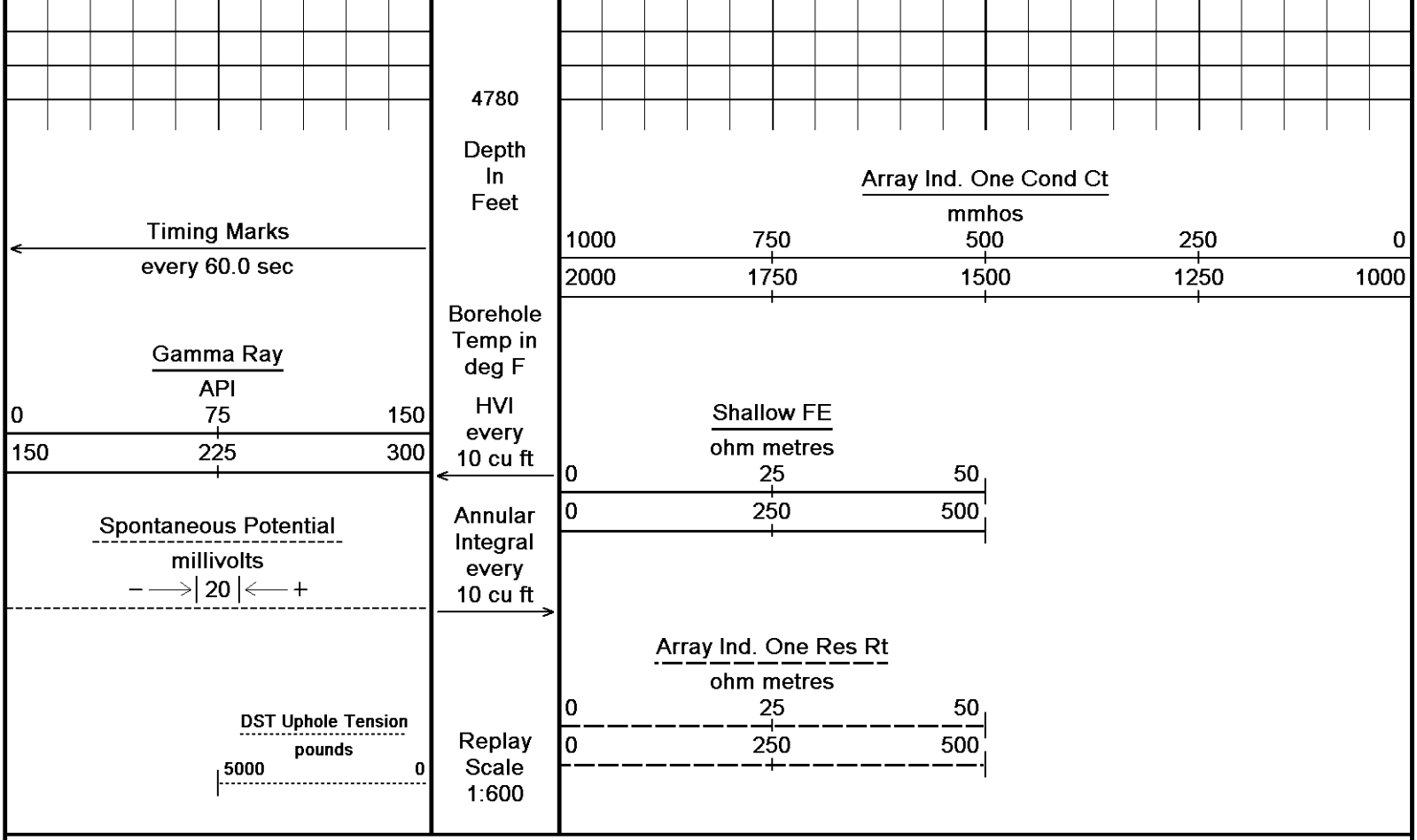

1000
102°
2100
103°
2200
500
900
103°
2300
104°
2400
104°
2500
800
Array Ind. One Res Rt
Shallow FE
Array Ind. One Cond Ct


Spontaneous Potential
Gamma Ray
DST Uphole Tension
105°
2600
105°
2700
400
700
106°
2800
106°
2900
107°
3000
600
107°
3100


300
108°
3200
108°
3300
500
109°
3400
109°
3500
Array Ind. One Res Rt
Array Ind. One Cond Ct
Spontaneous Potential
Gamma Ray
DST Uphole Tension
110°
400
3600
200


110°
3700
111°
3800
300
111°
3900
111°
4000
112°
4100
200
113°
100
4200


113°
4300
114°
4400
100
114°
4500
Array Ind. One Rec Rt
Array Ind. One Cond Ct
Shallow Ht
Spontaneous Potential
Gamma Ray
DST Uphole Tension
115°
4600
116°
FR
4700
0
FR
FR
FR
FR
FR



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-JUN-2013 16:07
Filename: C:\Minimus 13.05.9583\Data\Grand Mesa Hess S...\Grand Mesa Hess-Smith #1-22 Main.dta — Recorded on 17-MAY-2013 19:48
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2 INCH MAIN

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-JUN-2013 16:07
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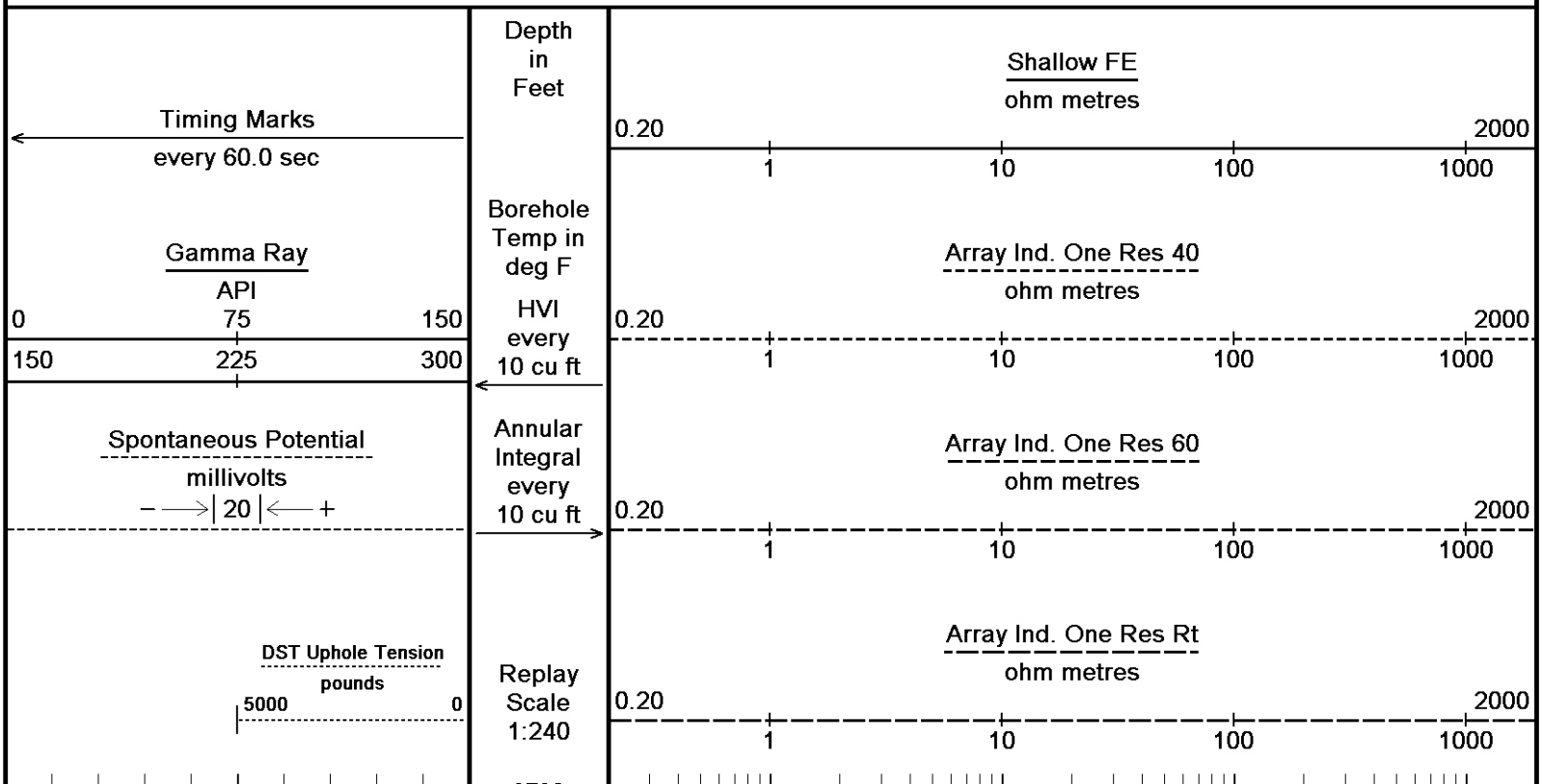
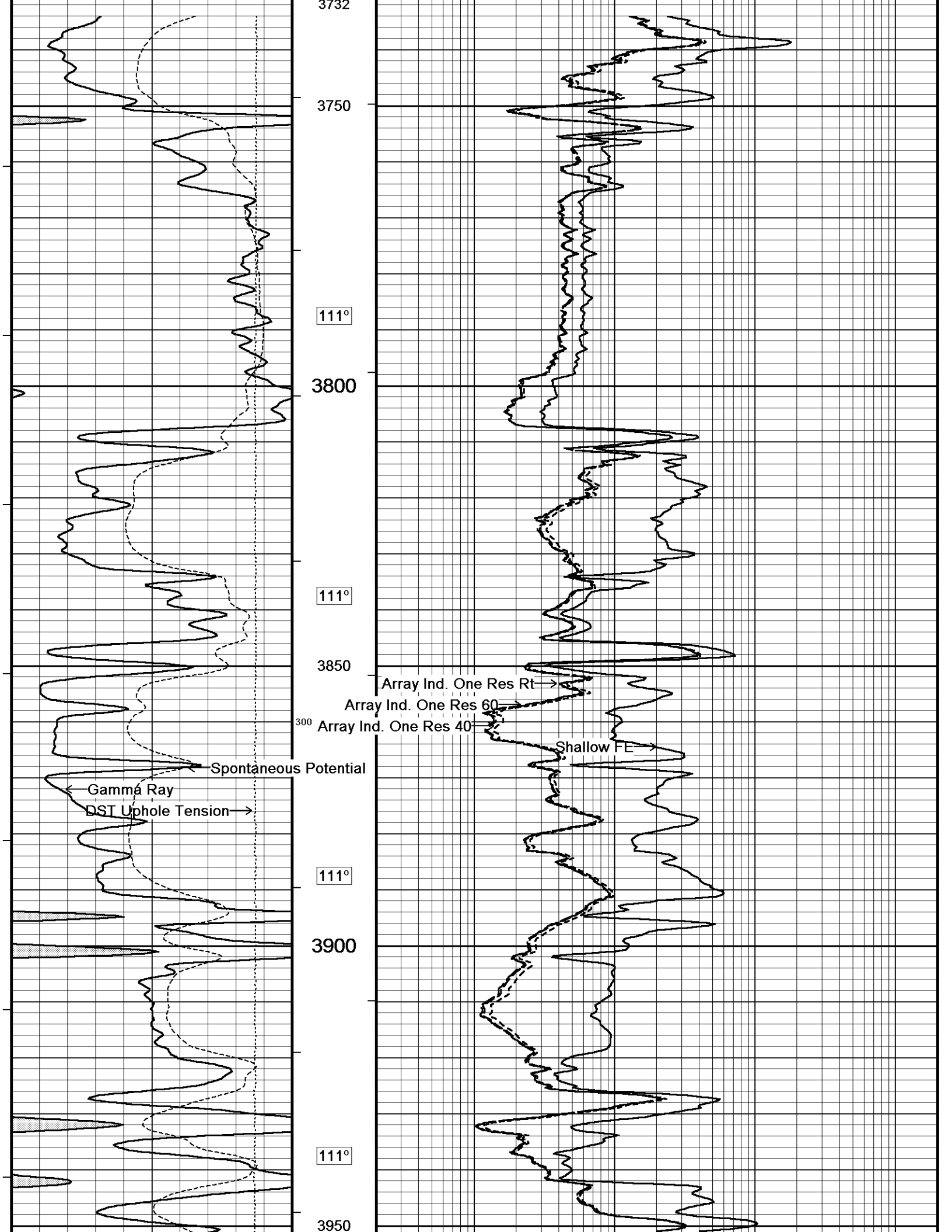
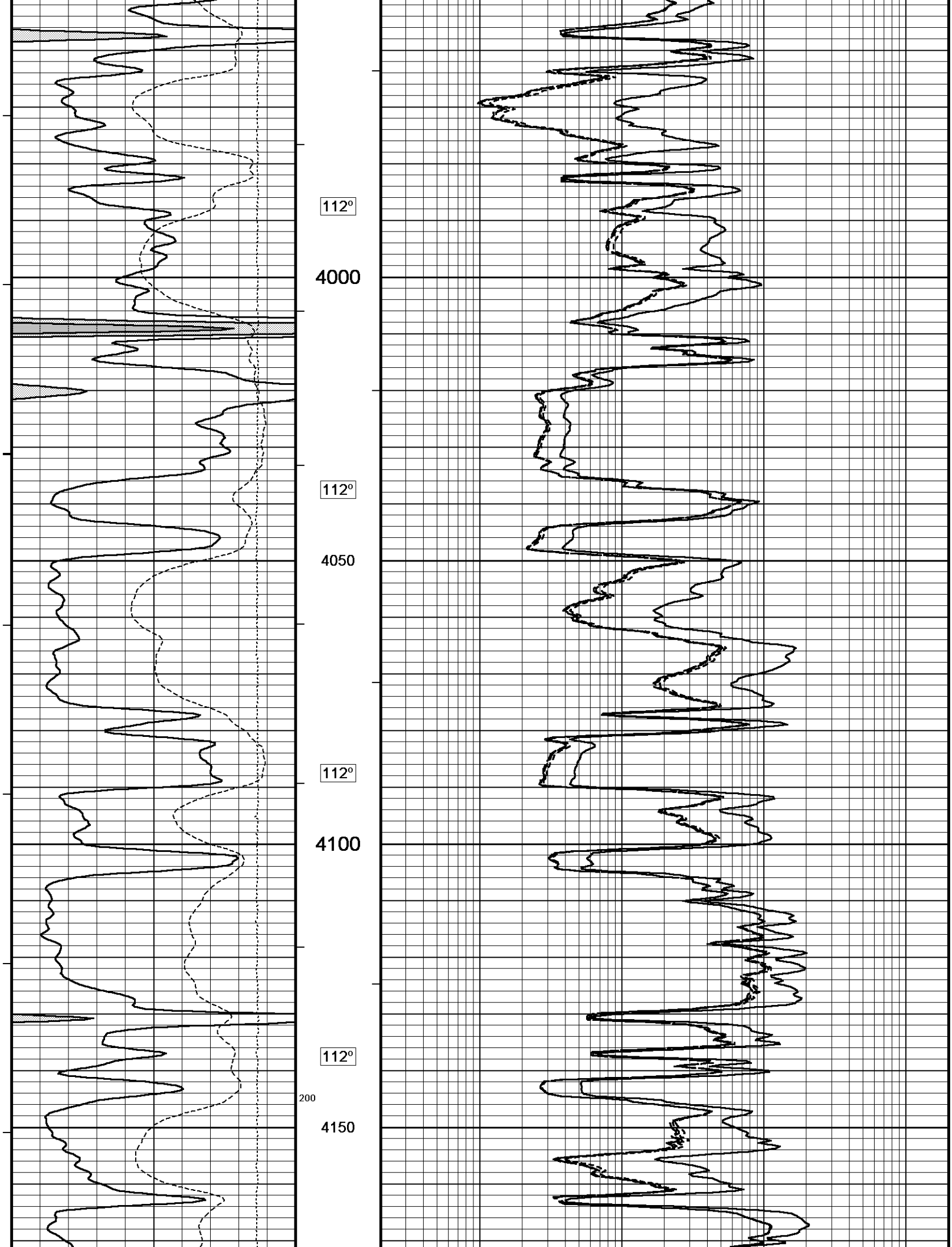
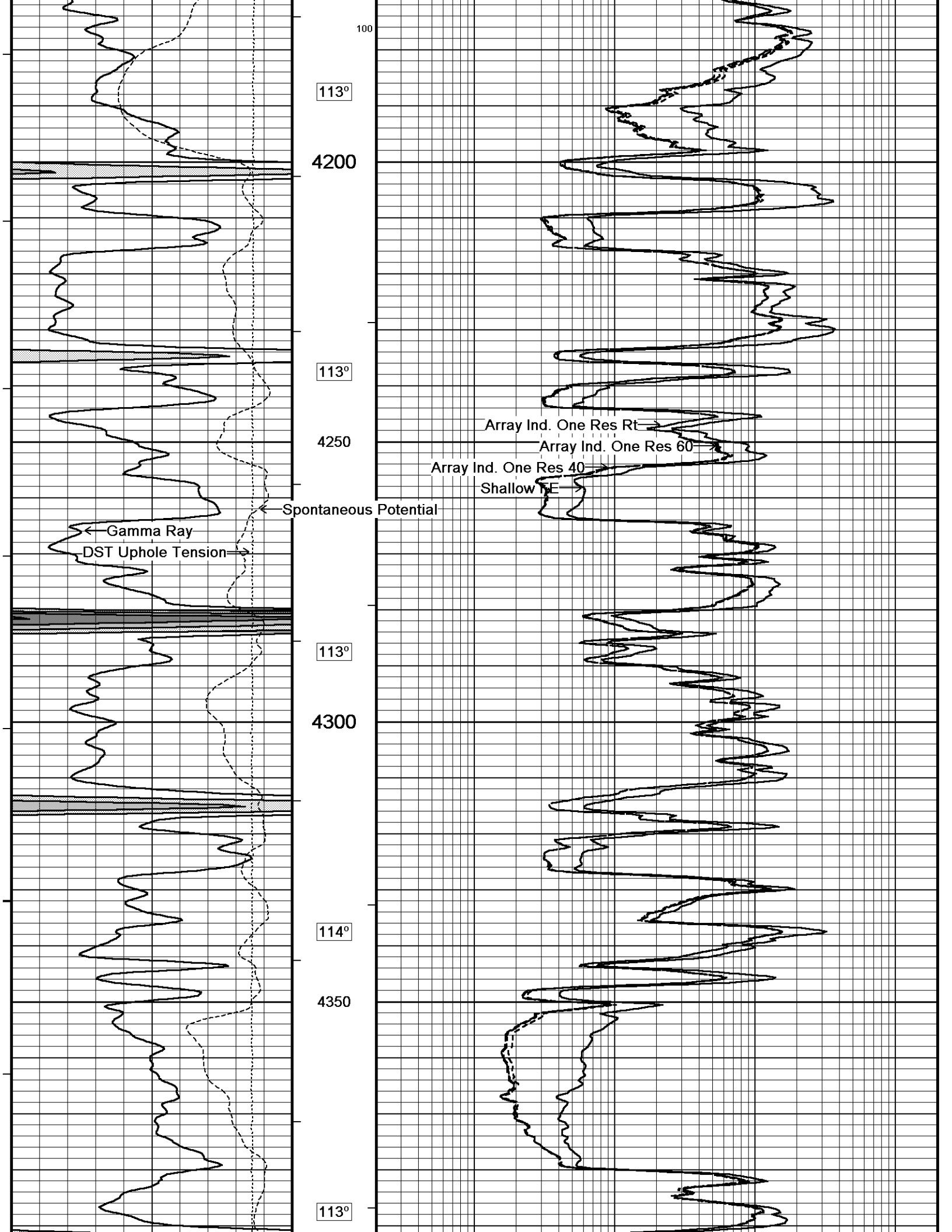
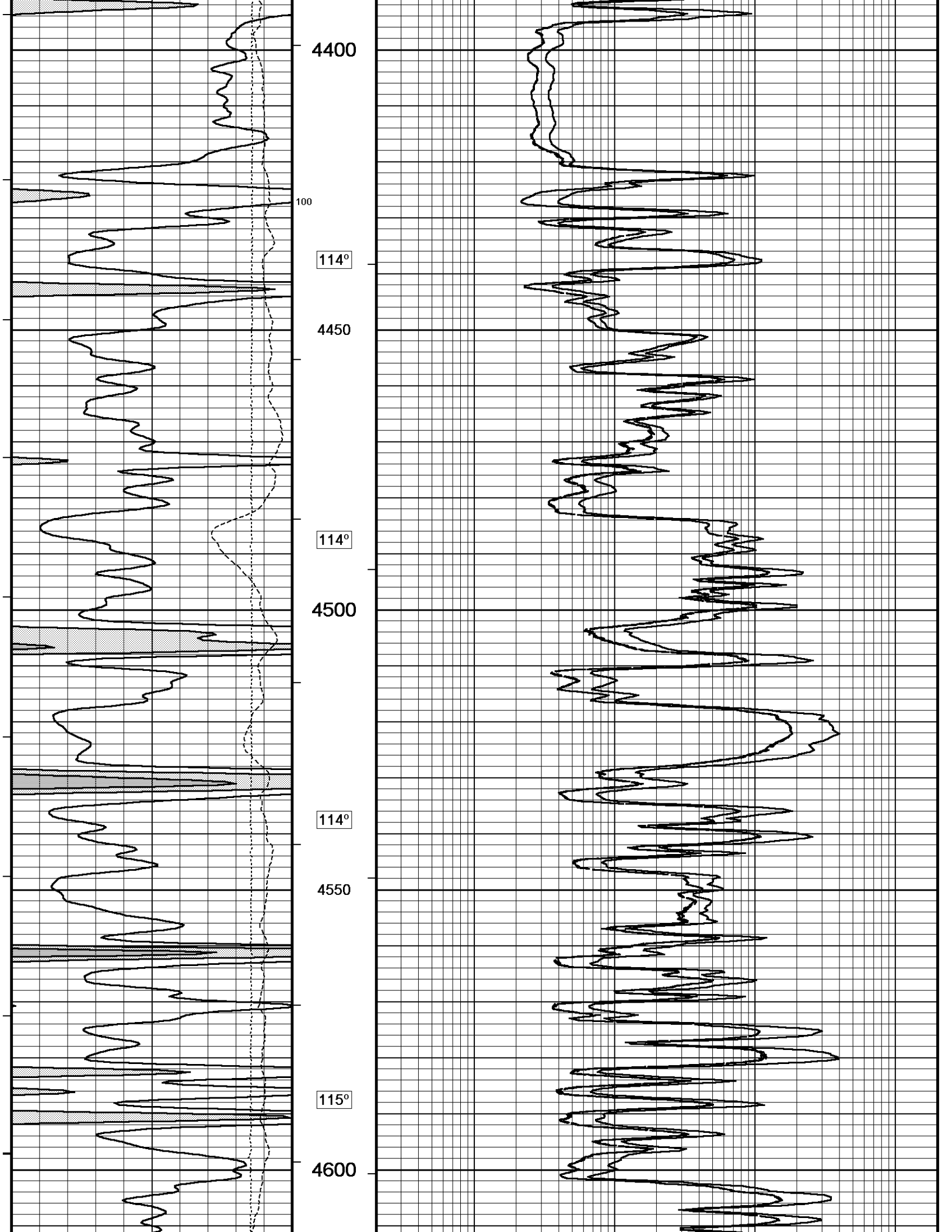
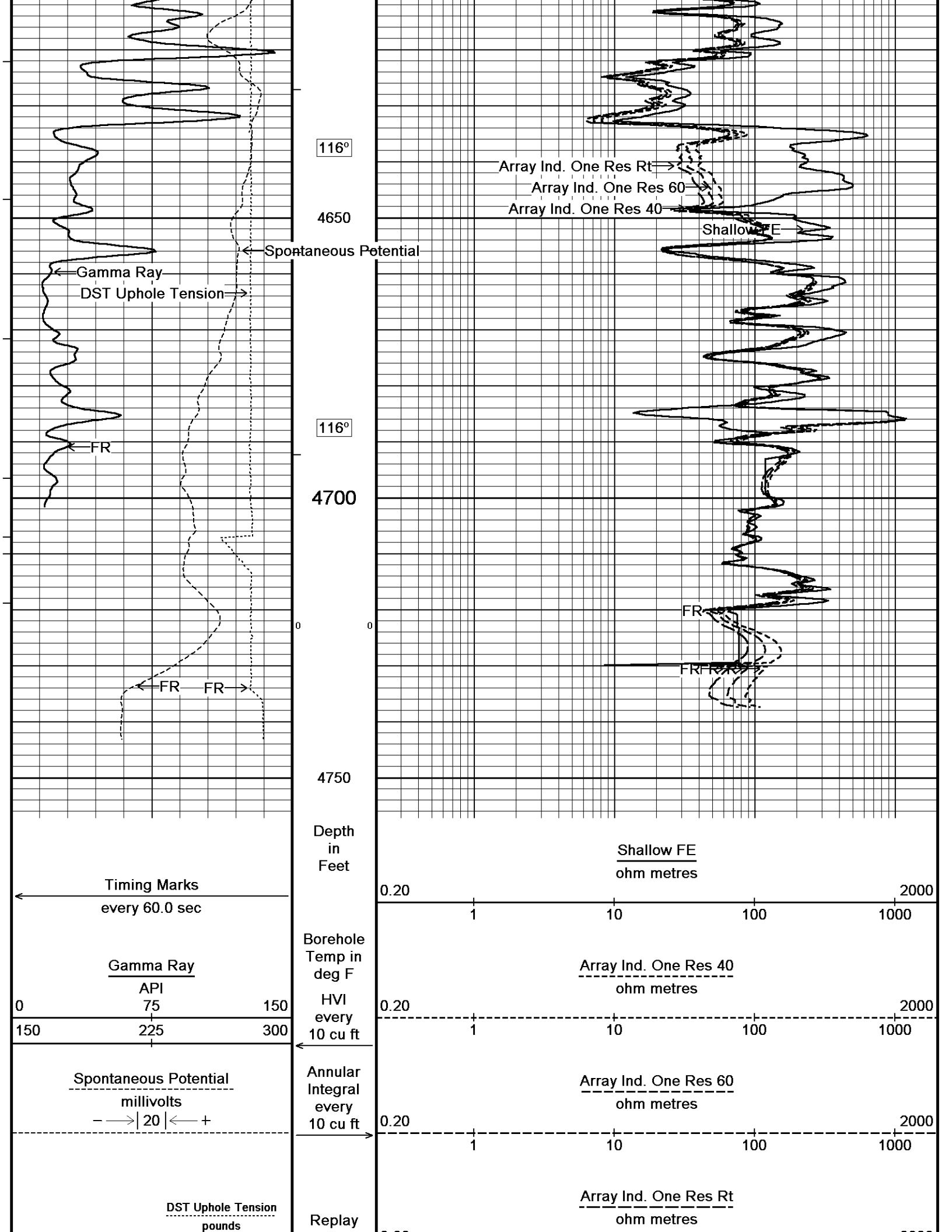


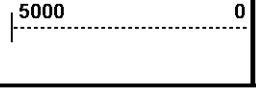

3732
3750
111°
3800
111°
3850
Array Ind. One Res Rt
Array Ind. One Res 60
300
Array Ind. One Res 40
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
111°
3900
111°
3950


112°
4000
112°
4050
112°
4100
112°
200
4150

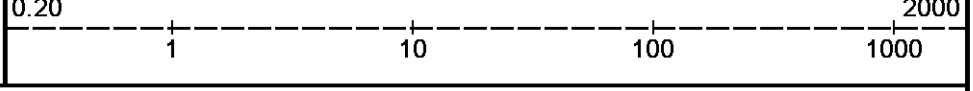

100
113°
4200
113°
4250
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow ILE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
113°
4300
114°
4350
113°


4400
100
114°
4450
114°
4500
114°
4550
115°
4600


116°
4650
Spontaneous Potential
Gamma Ray
DST Uphole Tension
116°
FR
4700
0
0
FR
FR
4750
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Shallow FE
FR
FR
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
Borehole Temp in deg F
HVI every 10 cu ft
Annular Integral every 10 cu ft
Replay
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



Scale 1:240



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-JUN-2013 16:07
Filename: C:\Minimus 13.05.9583\Data\Grand Mesa Hess S...\Grand Mesa Hess-Smith #1-22 Main.dta — Recorded on 17-MAY-2013 19:48
System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583

5 INCH MAIN

BEFORE SURVEY CALIBRATION

C:\Minimus 13.05.9583\Data\Grand Mesa Hess Smith #1-22\Grand Mesa Hess-Smith #1-22.dta

General Constants All 000

Last Edited on 17-MAY-2013,17:26

General Parameters		
Mud Resistivity	1.640	ohm-metres
Mud Resistivity Temperature	99.000	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. Four 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 17-MAY-2013 10:01

	Measured	Calibrated (API)
Background	68	47
Calibrator (Gross)	1128	772
Calibrator (Net)	1060	725

Gamma Constants MCG-D.K 469

Last Edited on 17-MAY-2013,17:25

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 07-MAY-2013,09:42

	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 07-MAY-2013,09:42

Pre-filter Length	11

FE Calibration MFE-B.J 353

Base Calibration on 19-APR-2013 16:39
Field Check on 17-MAY-2013 09:30

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	965.3	126.8
Base Check		280.7
Field Check		280.7

FE Constants MFE-B.J 353

Last Edited on 17-MAY-2013,17:24

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 19-APR-2013,13:41
Field Check on 17-MAY-2013 09:28

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) 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) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1			12.7	3840.3
2			29.6	3478.3
3			29.1	3054.4
4			19.8	2082.7
Deep			18.6	2050.0
Medium			42.3	3992.9
Shallow			42.9	5055.8

Array Temperature 68.1 Deg F

Induction Constants MAI-A.A 167

Last Edited on 17-MAY-2013,17:24

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 19-APR-2013 14:25
Field Calibration on 17-MAY-2013 09:31

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13997	3.99
2	22559	5.98
3	31072	7.97
4	39474	9.86
5	48864	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
6.10	5.98

DOWNHOLE EQUIPMENT

C:\Minimus 13.05.9583\Data\Grand Mesa Hess Smith #1-22\Grand Mesa Hess-Smith #1-22.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

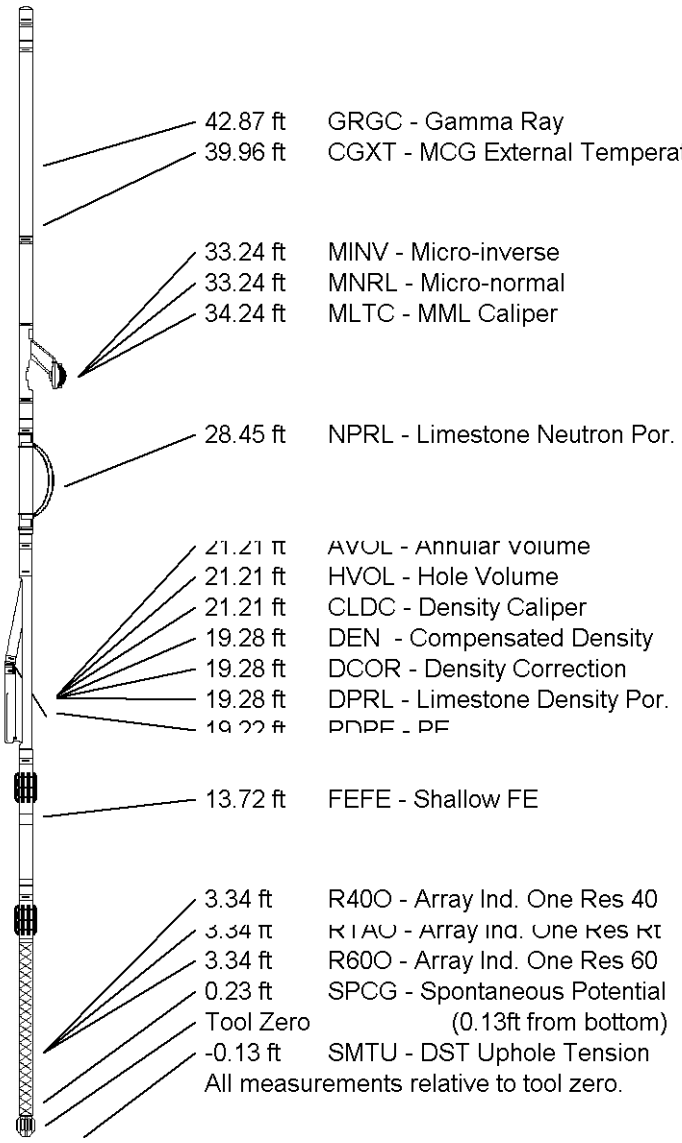
Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

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	GRAND MESA OPERATING COMPANY
WELL	HESS-SMITH #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN

COUNTRY/STATE		U.S.A. / KANSAS			
Elevation Kelly Bushing	3037.00	feet	First Reading	4731.00	feet
Elevation Drill Floor	3036.00	feet	Depth Driller	4735.00	feet
Elevation Ground Level	3027.00	feet	Depth Logger	4734.00	feet

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

Weatherford®

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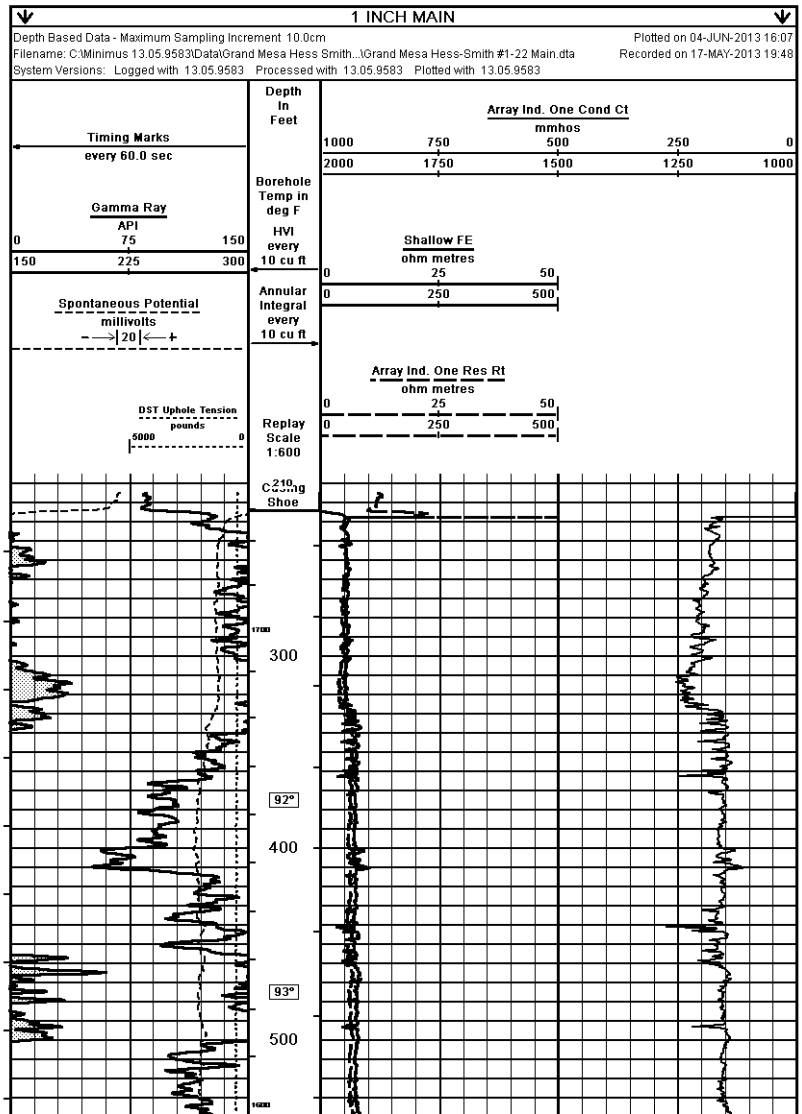
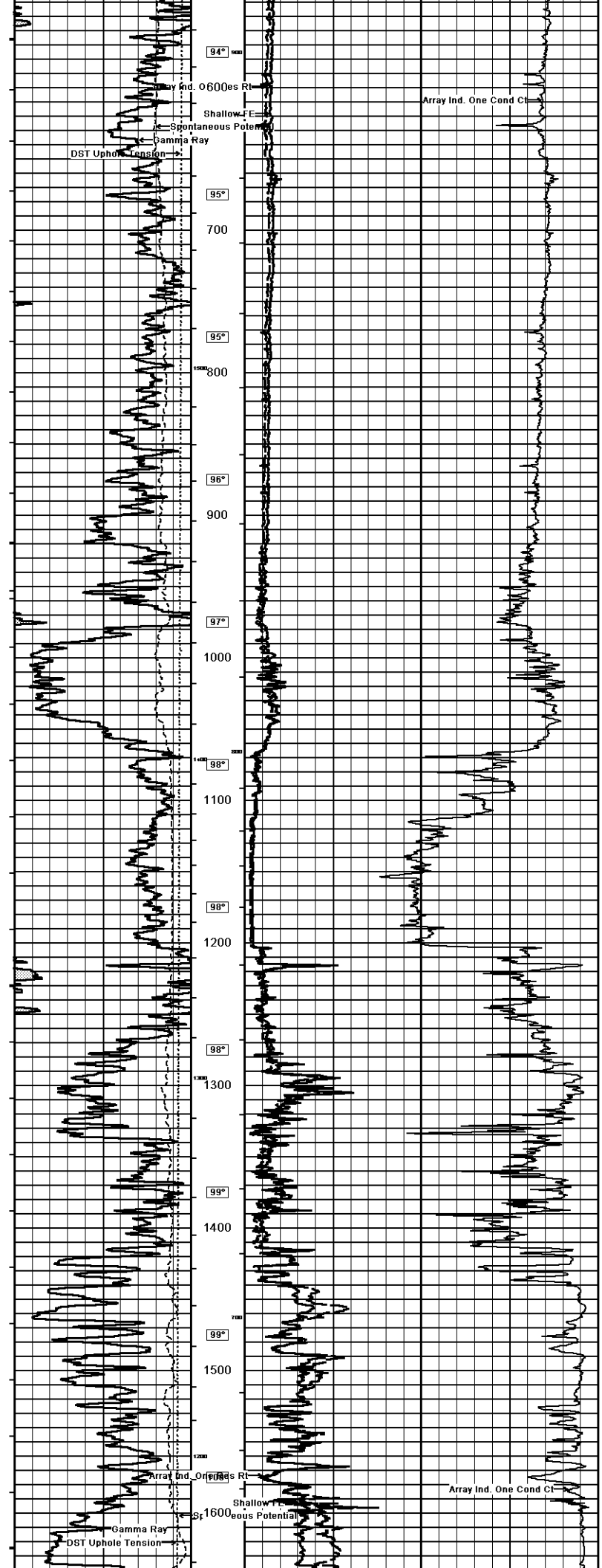
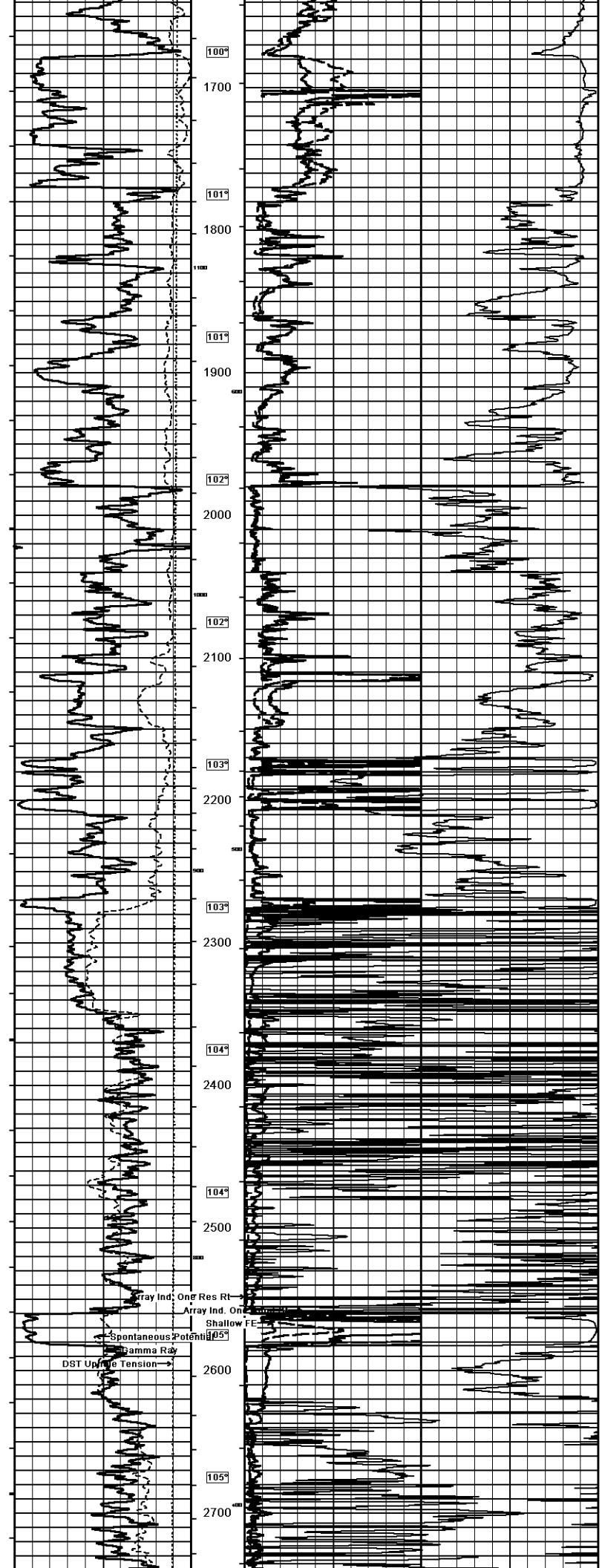
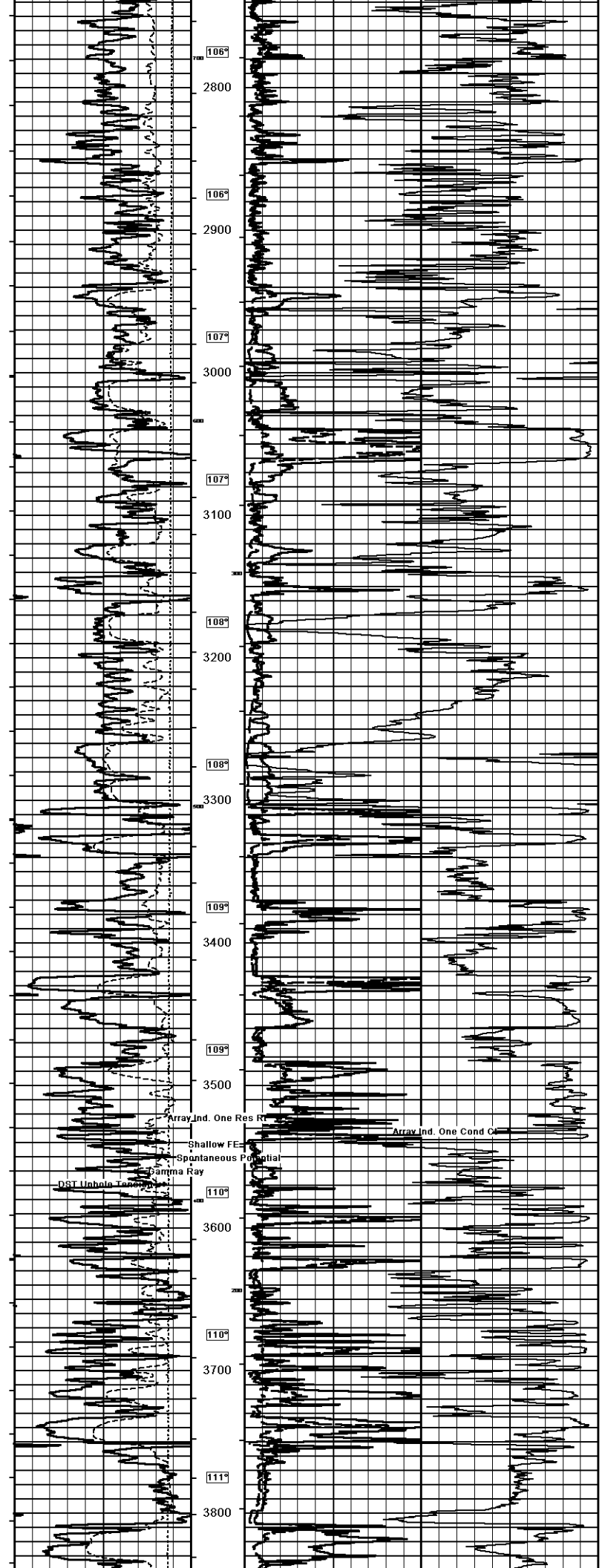
WELL	HESS-SMITH #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	2414' FNL & 1864' FWL
SEC	22
TWP	12S
RGE	32W
API Number	15-109-21178
Permit Number	
Other Services	MFD/MDN
	MML
Permanent Datum GL, Elevation 3027 feet	
Log Measured From KB	
Drilling Measured From KB	
Elevations: KB	3037.00 feet
DF	3036.00
GL	3027.00
Date	17-MAY-2013
Run Number	ONE
Service Order	3537746
Depth Driller	4735.00 feet
Depth Logger	4734.00 feet
First Reading	4731.00 feet
Last Reading	224.00 feet
Casing Driller	225.00 feet
Casing Logger	224.00 feet
Bit Size	7.875 inches
Hole Fluid Type	CHEMICAL
Density / Viscosity	9.10 lb/USg 57.00 CP
PH / Fluid Loss	10.00 8.00 ml/30Min
Sample Source	MUDPIT
Rm @ Measured Temp	1.64 @ 99.0 ohm-m
Rmf @ Measured Temp	1.31 @ 99.0 ohm-m
Rmc @ Measured Temp	1.97 @ 99.0 ohm-m
Source Rmf / Rmc	CALC CALC
Rm @ BHT	1.40 @ 116.0 ohm-m
Time Since Circulation	5 HOURS
Max Recorded Temp	116.00 deg F
Equipment / Base	LIB
Recorded By	13096 ADAM SILL
Witnessed By	KENT MATSON
JOB #	LB13-139

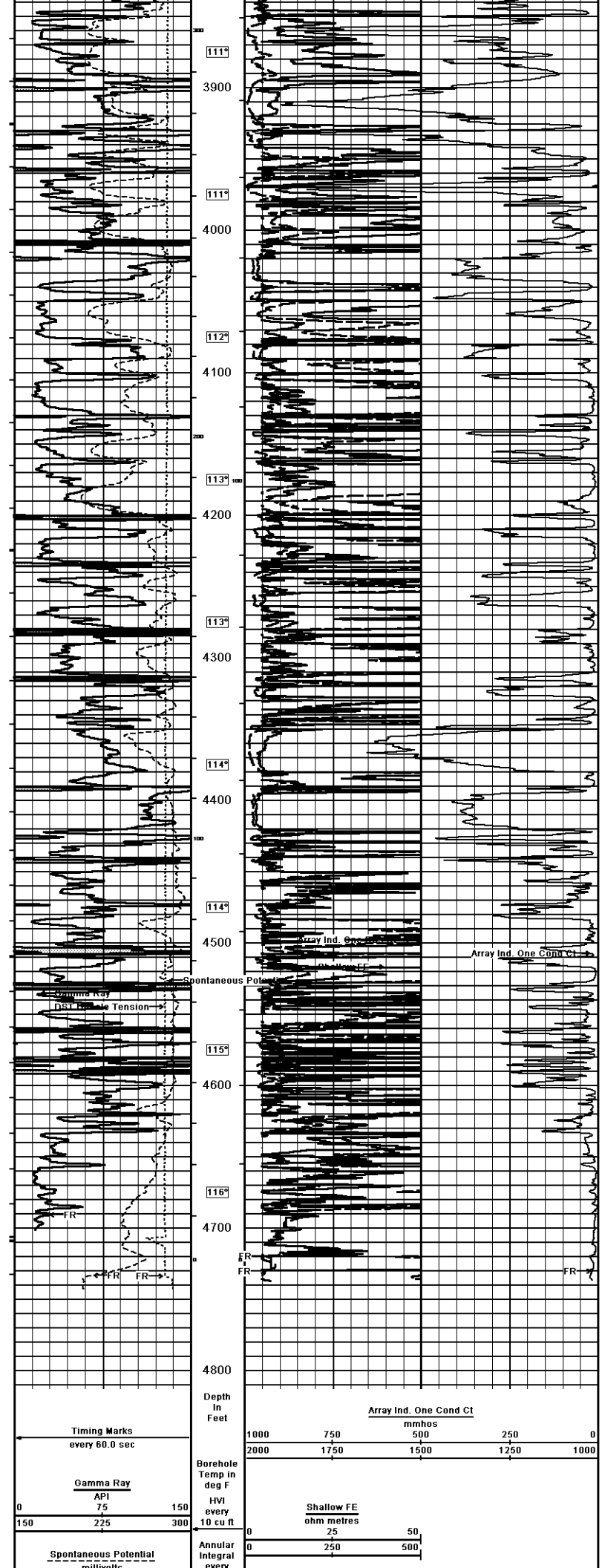
ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

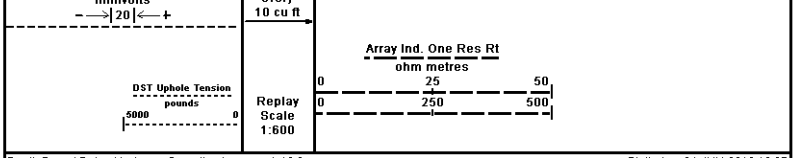



94°
Array Ind. One Cond Cl
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension
95°
700
95°
800
96°
900
97°
1000
98°
1100
98°
1200
98°
1300
99°
1400
99°
1500
Array Ind_One Cond Cl
Gamma Ray
DST Uphole Tension


100°
1700
101°
1800
101°
1900
102°
2000
102°
2100
103°
2200
103°
2300
104°
2400
104°
2500
105°
2600
105°
2700
Array Ind. One Res Rt
Array Ind. One
Shallow FE
Spontaneous Potential
Gamma Ray
DST Uphole Tension


106°
2800
106°
2900
107°
3000
107°
3100
108°
3200
108°
3300
109°
3400
109°
3500
Array Ind. One Res Rt
Array Ind. One Cond Ct
Shallow FE
Spontaneous Potential
Gamma Ray
DST Unhole Temp
110°
3600
110°
3700
111°
3800


111°
3900
111°
4000
112°
4100
113°
4200
113°
4300
114°
4400
114°
4500
Array Ind. One Cond Ct
Spontaneous Potential
Gamma Ray
Dist Remote Tension
115°
4600
116°
FR
4700
FR
FR
FR
FR
4800
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 every
Array Ind. One Cond Ct mmhos
1000 750 500 250 0
2000 1750 1500 1250 1000
Shallow FE ohm metres
0 25 50
0 250 500



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 04-JUN-2013 16:07

Filename: C:\Minimus 13.05.9583\Data\Grand Mesa Hess Smith...\Grand Mesa Hess-Smith #1-22 Main.dta — Recorded on 17-MAY-2013 19:48

System Versions: Logged with 13.05.9583 Processed with 13.05.9583 Plotted with 13.05.9583

1 INCH MAIN

COMPANY	GRAND MESA OPERATING COMPANY
WELL	HESS-SMITH #1-22
FIELD	WILDCAT
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	3037.00	feet	First Reading	4731.00	feet
Elevation Drill Floor	3036.00	feet	Depth Driller	4735.00	feet
Elevation Ground Level	3027.00	feet	Depth Logger	4734.00	feet

Weatherford

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG