COMPOSITE LOG

Weatherford

COMPANY	MID-CON ENERGY OPERATING, INC.
WELL	HRMU 14-1
FIELD	HARKER RANCH MORROW UNIT
PROVINCE/COUNTY	CHEYENNE
COUNTRY/STATE	U.S.A. / COLORADO
LOCATION	469' FSL & 1320' FWL OF SW/4

SEC	TWP	RGE	Other Services
1	13S	43W	

Latitude
Longitude
API Number 05-017-0714800

Permanent Datum GL, Elevation 4028.59 feet
Log Measured From KB
Drilling Measured From KB @ 16.6 feet

Elevations:	feet
KB	4045.19
DF	4043.19
GL	4028.59

Date	06-SEP-2014			
Run Number	TWO			
Service Order	7577-97212326			
Depth Driller	5350.00	feet		
Depth Logger	5349.00	feet		
First Reading	5345.85	feet		
Last Reading	632.00	feet		
Casing Driller	626.00	feet		
Casing Logger	632.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	8.50 lb/USg		20.00 CP	
PH / Fluid Loss	11.00		8.80 ml/30Min	
Sample Source	MUD PIT			
Rm @ Measured Temp	1.51 @ 96.0	ohm-m		
Rmf @ Measured Temp	1.21 @ 96.0	ohm-m		
Rmc @ Measured Temp	1.81 @ 96.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	1.12 @131.0	ohm-m		
Time Since Circulation	3.5 HOURS			
Max Recorded Temp	131.00	deg F		
Equipment / Base	13244		LIB	
Recorded By	JEFFREY RANDLE			
Witnessed By	CLINT ARNOLD			
JOB #	LB14-264			

BOREHOLE RECORD

Last Edited: 06-SEP-2014 20:43

Bit Size inches	Depth From feet	Depth To feet
7.875	626.00	5350.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	626.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113.
- RUN ONE: MCG, 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: 2327 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO 4349 FEET: 253 CU.FT.
- RIG: WILDCAT DRILLING #1

- RIG: WILDCAT DRILLING #1.

- ENGINEER: J. RANDLE.

- OPERATOR: J. LaPOINT, S. LARES.

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.

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 07-SEP-2014 01:33

Filename: C:\Minimus 13.08.2113\Logs\Mid-Con HRMU 14-1\Mid-Con HRMU 14-1 Repeat.dta — Recorded on 06-SEP-2014 22:19

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Timing Marks
every 60.0 sec

Gamma Ray
API
0 100 200
200 300 400

Spontaneous Potential
millivolts
– → | 20 | ← +

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

620

Casing Shoe

Array Ind. One Res 40
ohm metres
0.20 2000
1 10 100 1000

Sandstone Neutron Por.
percent
30 10 -10

Array Ind. One Res 60
ohm metres
0.20 2000
1 10 100 1000

Density Correction
grams/cc
-0.50 0 0.50

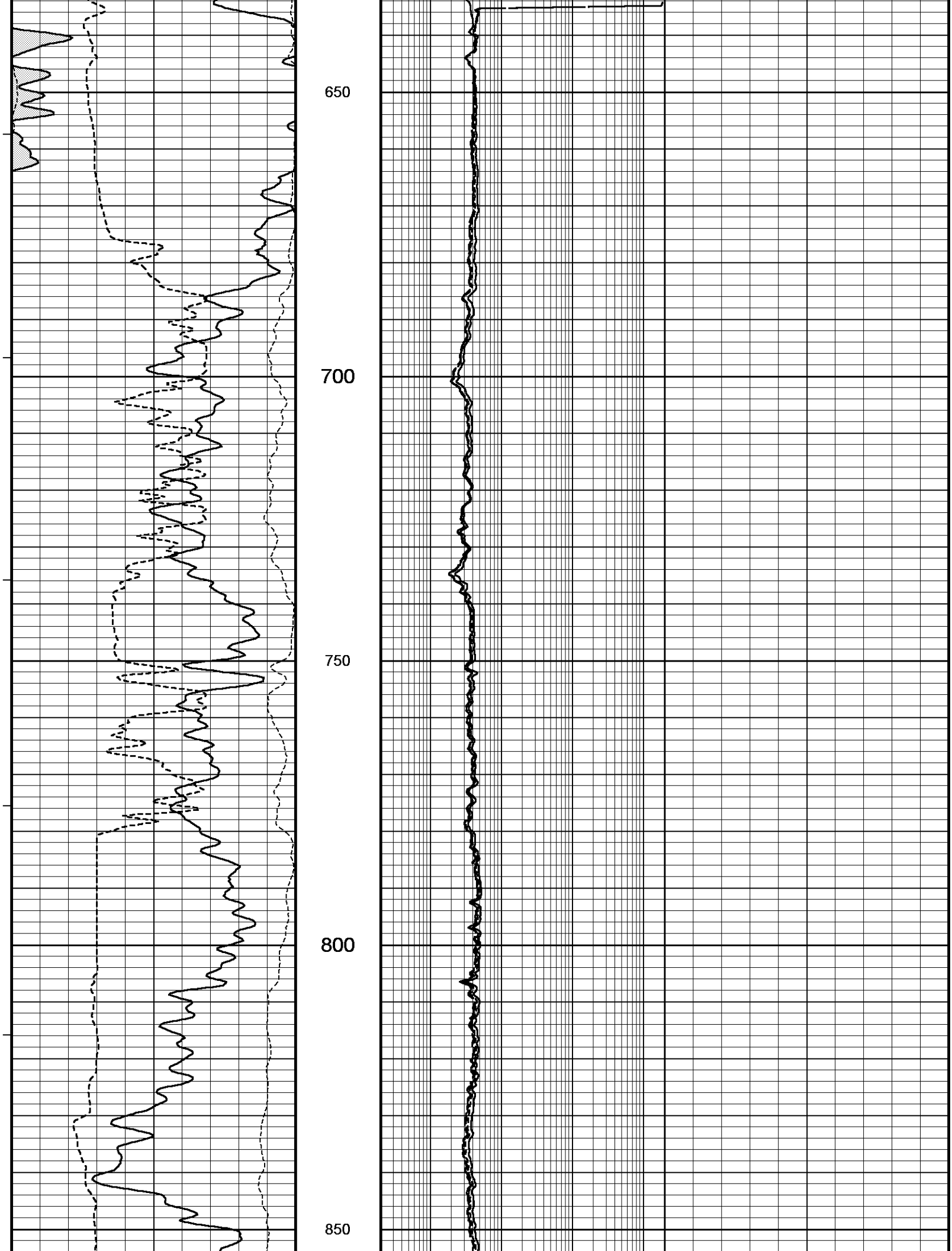
Array Ind. One Res Rt
ohm metres
0.20 2000
1 10 100 1000

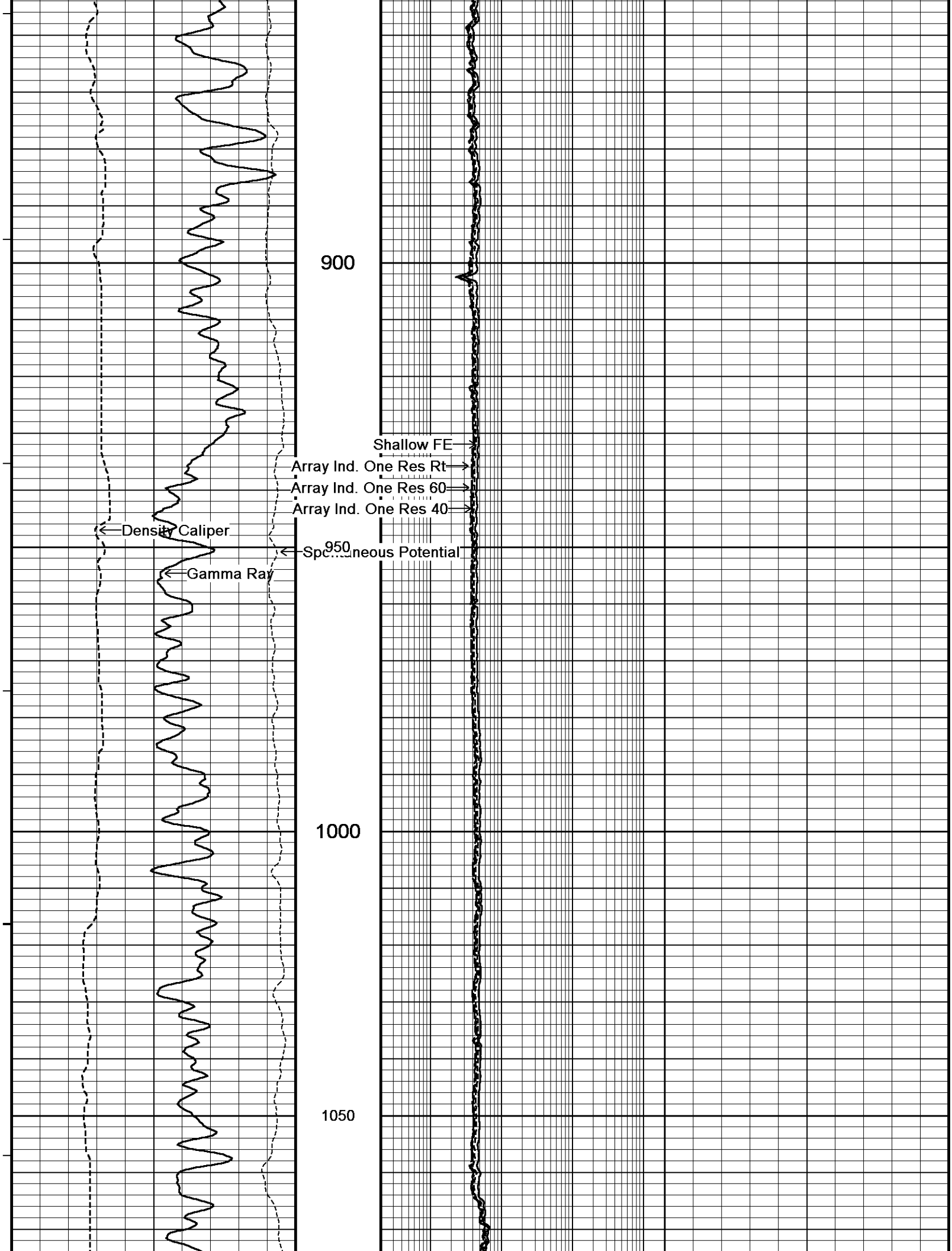
Compensated Density
grams/cc
2 2.50 3

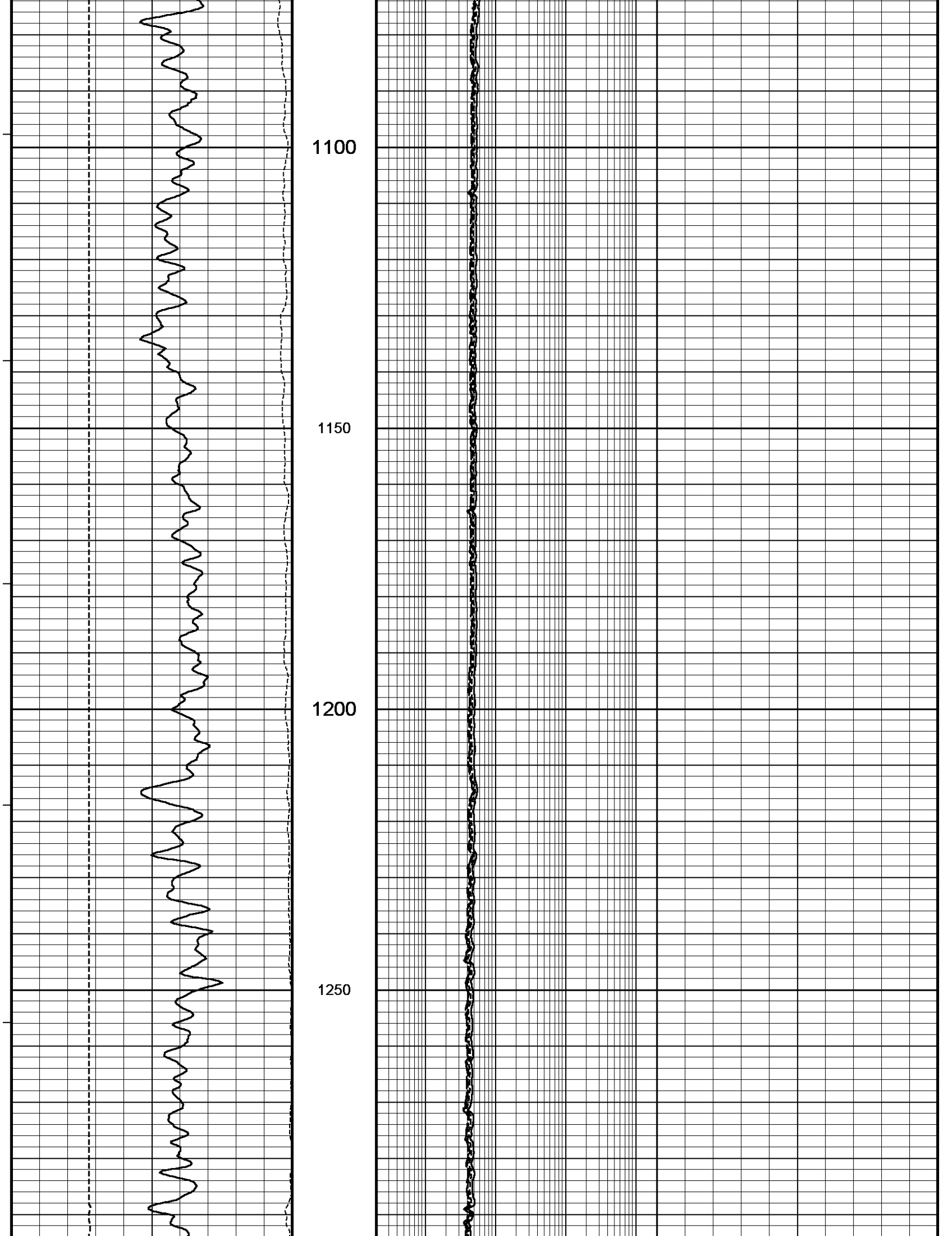
Shallow FE
ohm metres
0.20 2000
1 10 100 1000

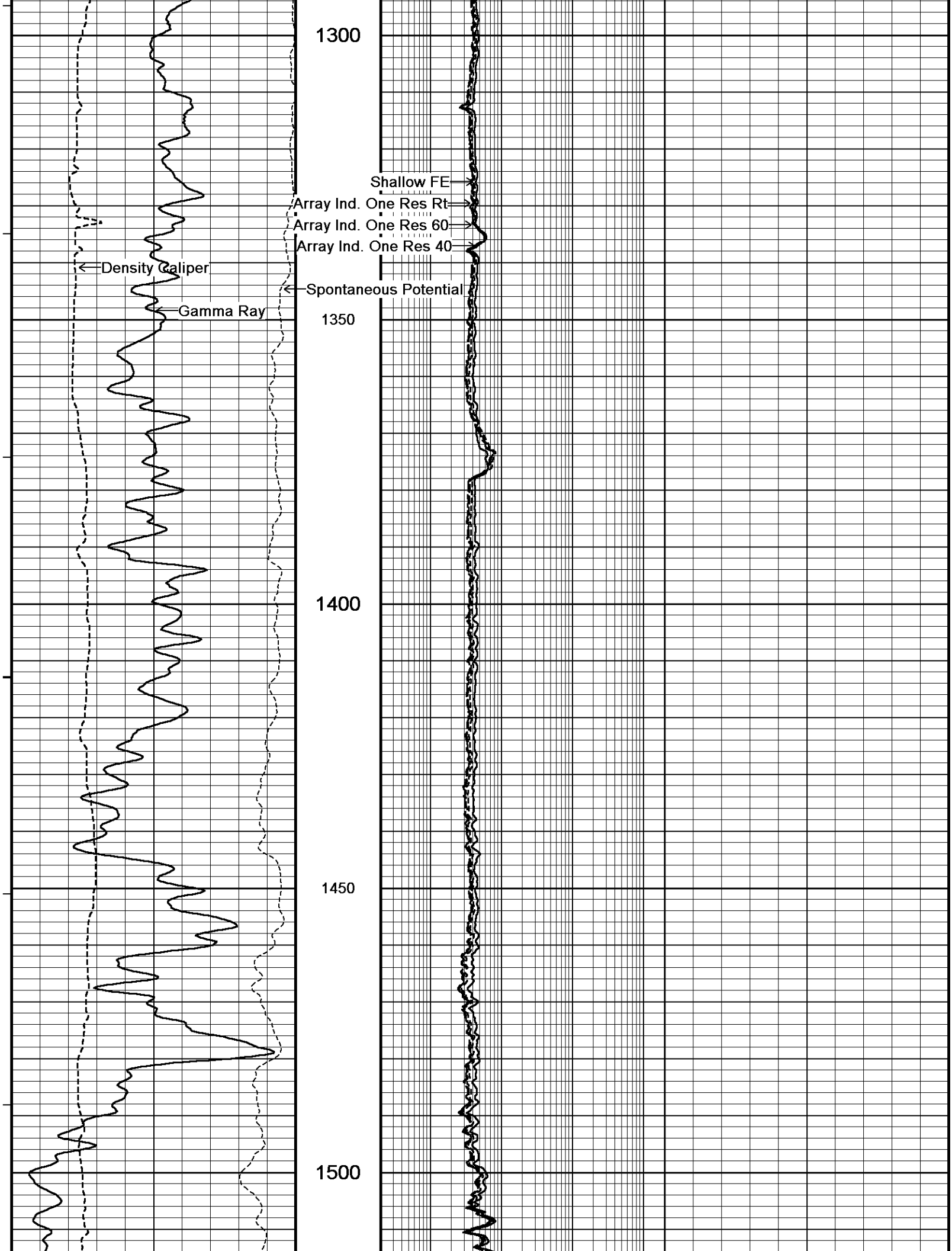
PE
barns/electron
0 5 10

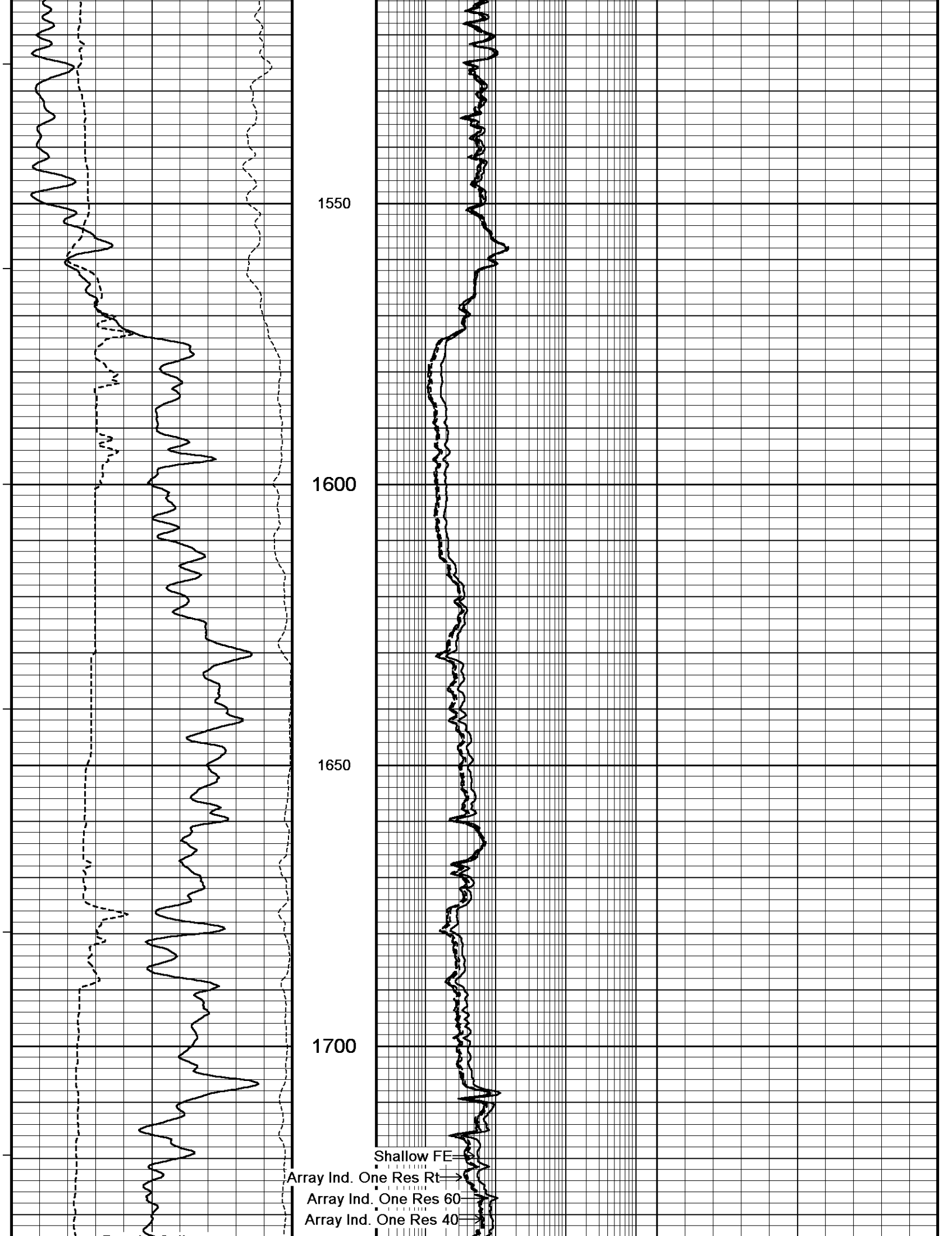
Sandstone Density Por.
percent
30 10 -10

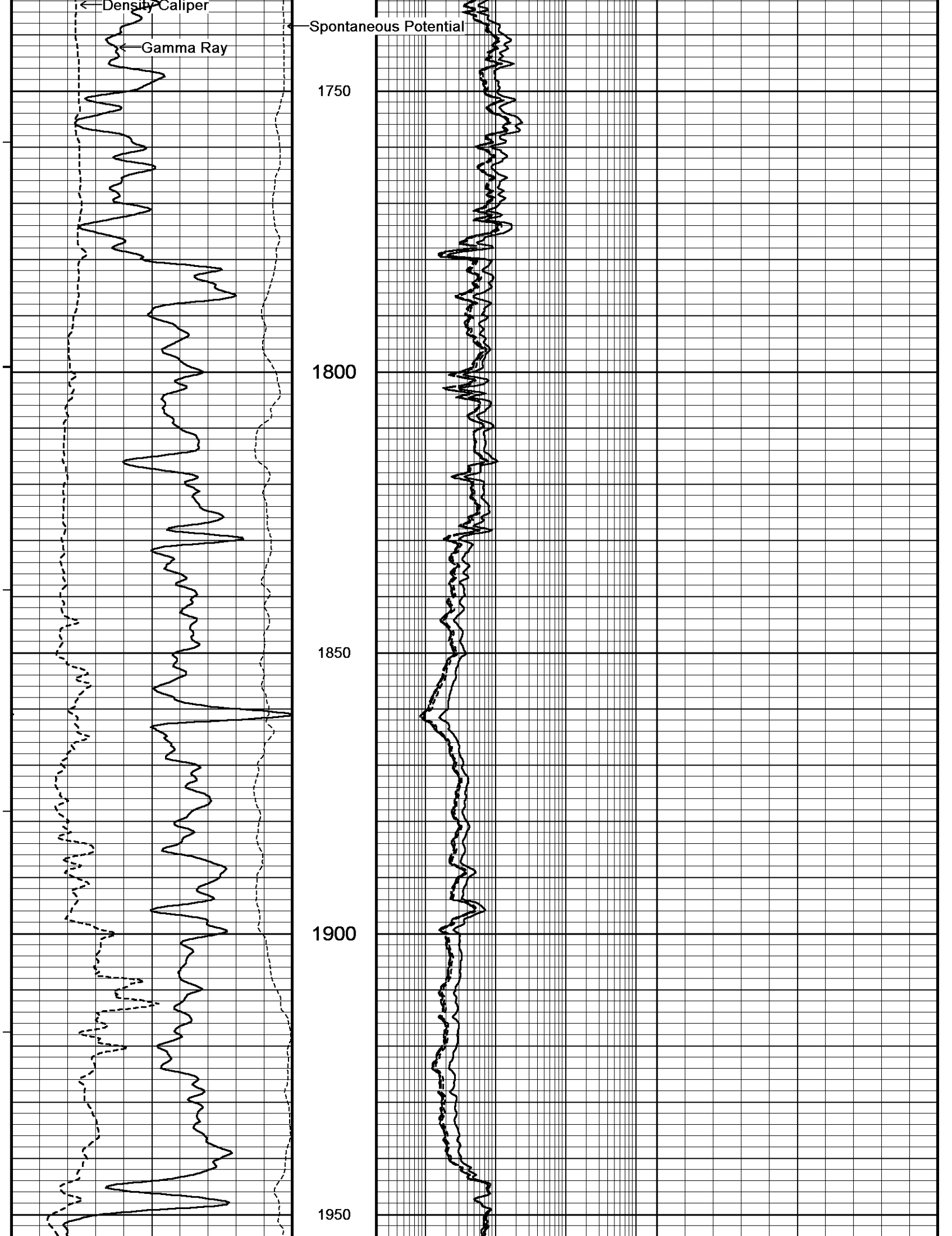

650
700
750
800
850

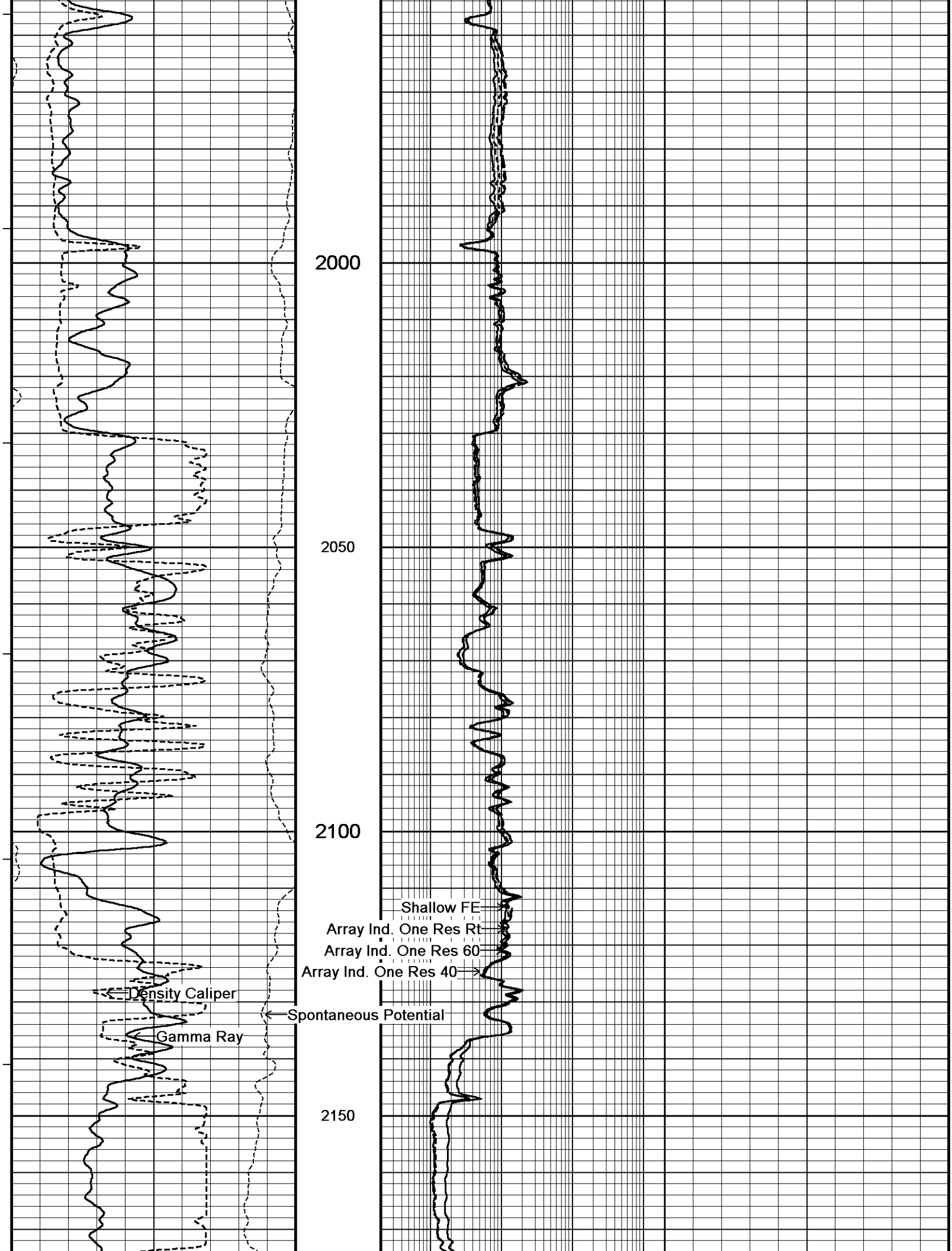

900
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
950
Spontaneous Potential
Gamma Ray
1000
1050

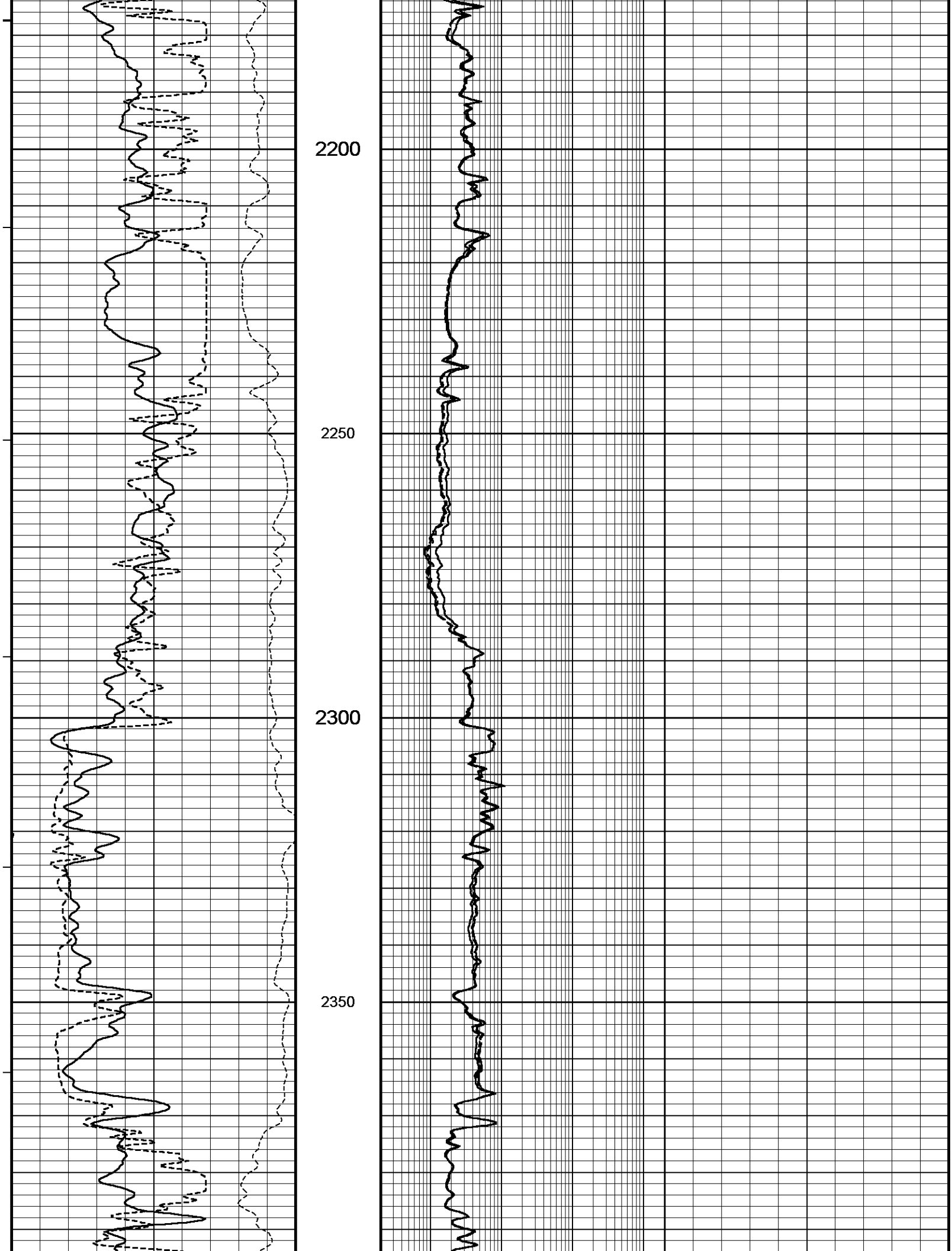

1100
1150
1200
1250

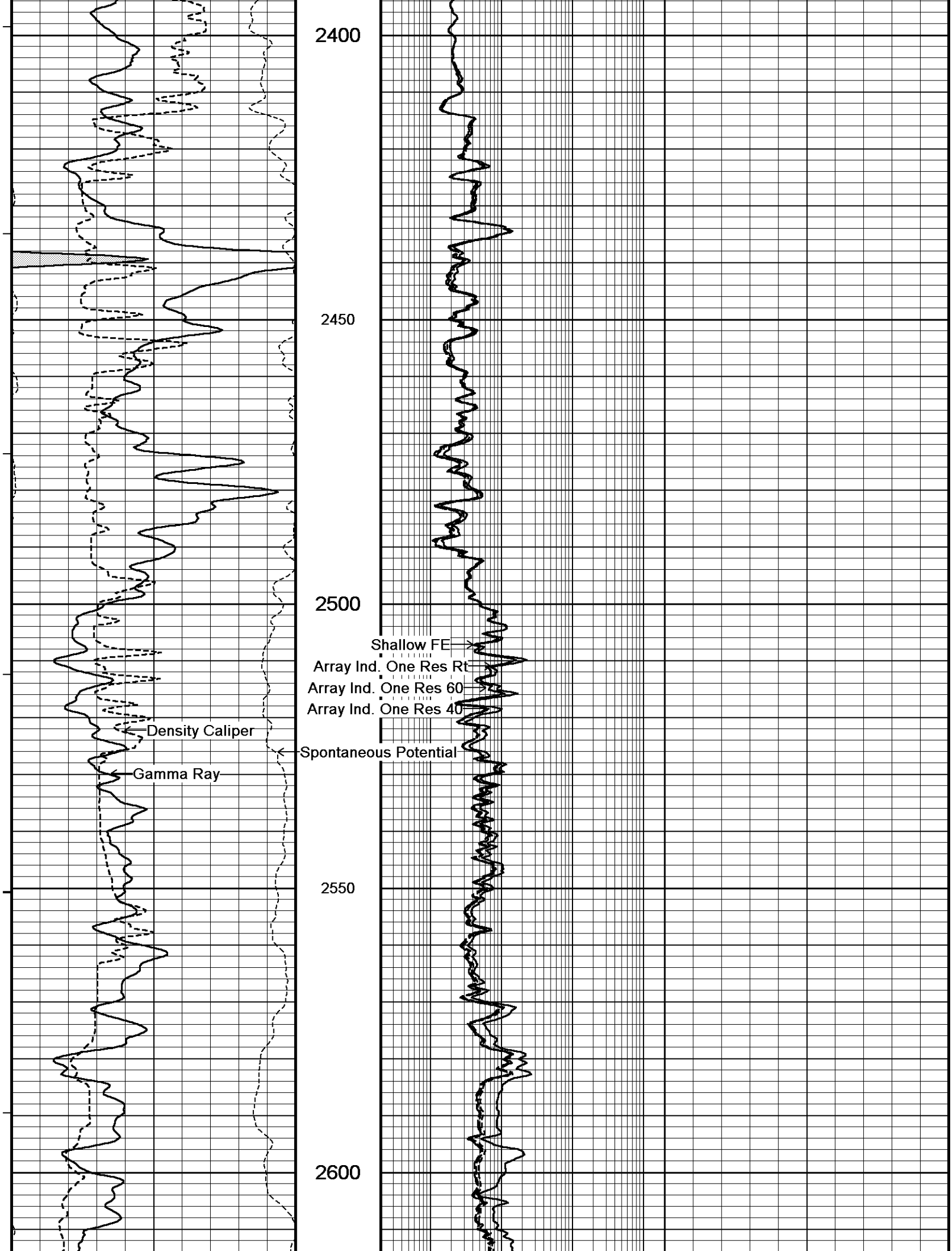

1300
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray
1350
1400
1450
1500

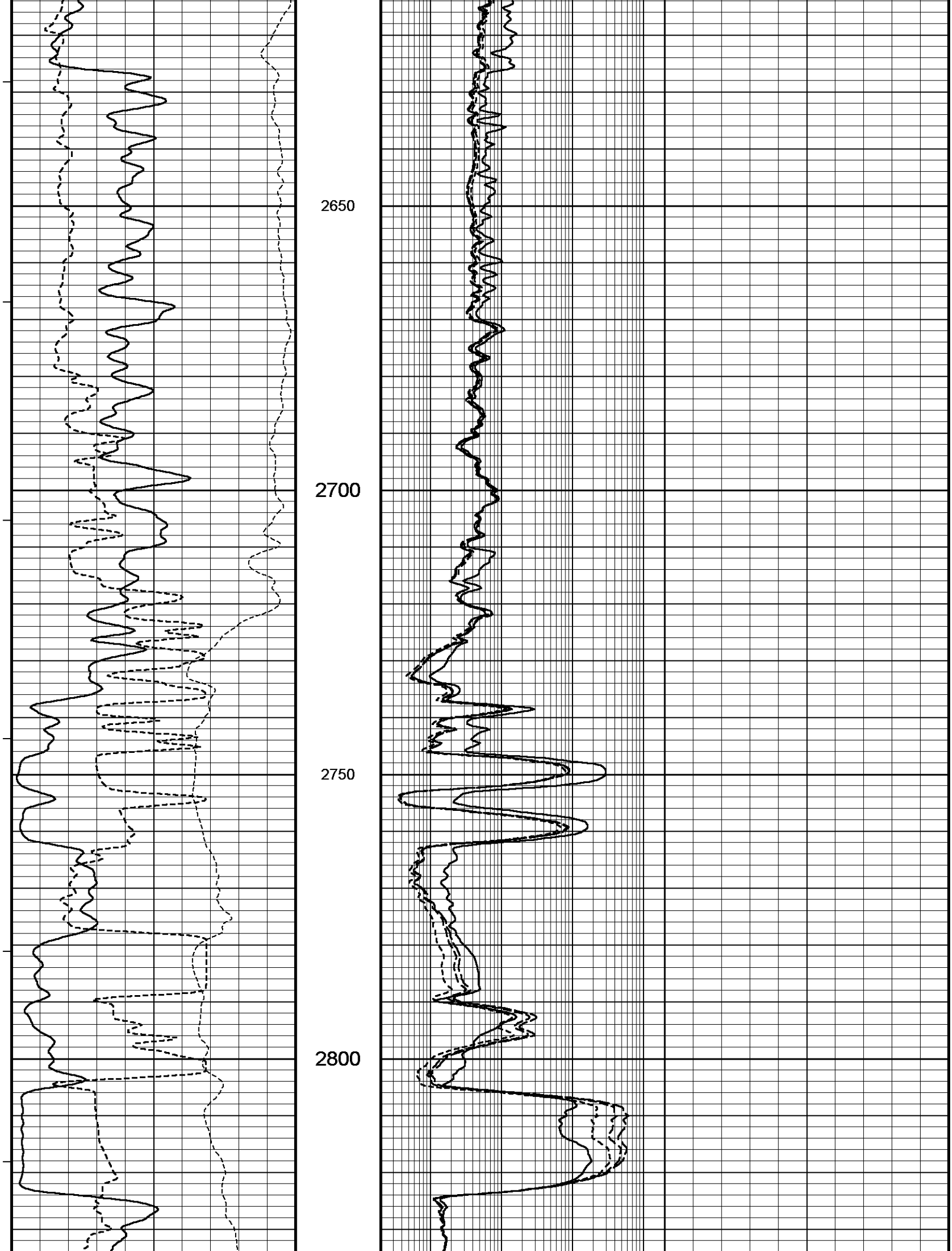

1550
1600
1650
1700
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40

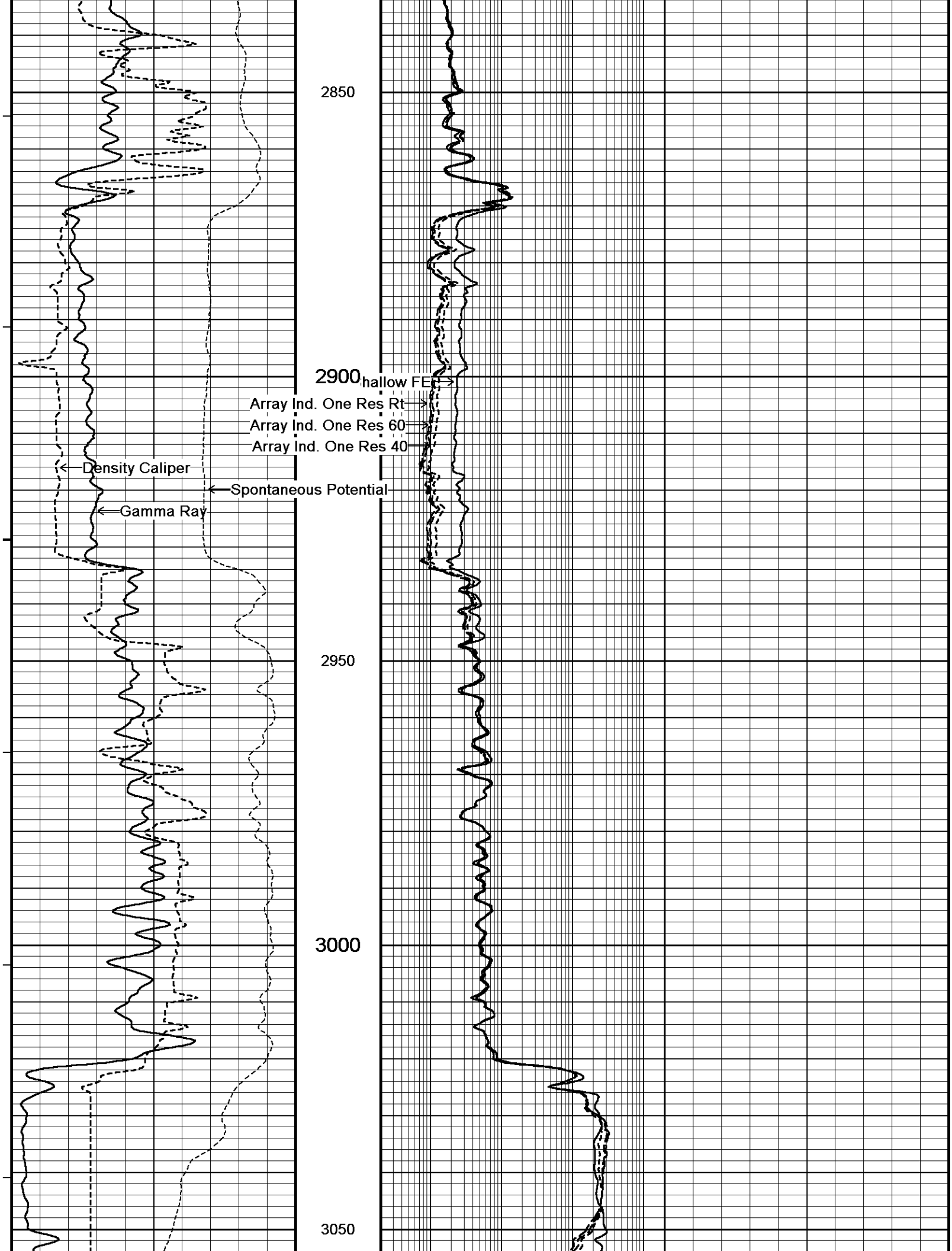

Density Caliper
Gamma Ray
Spontaneous Potential
1750
1800
1850
1900
1950

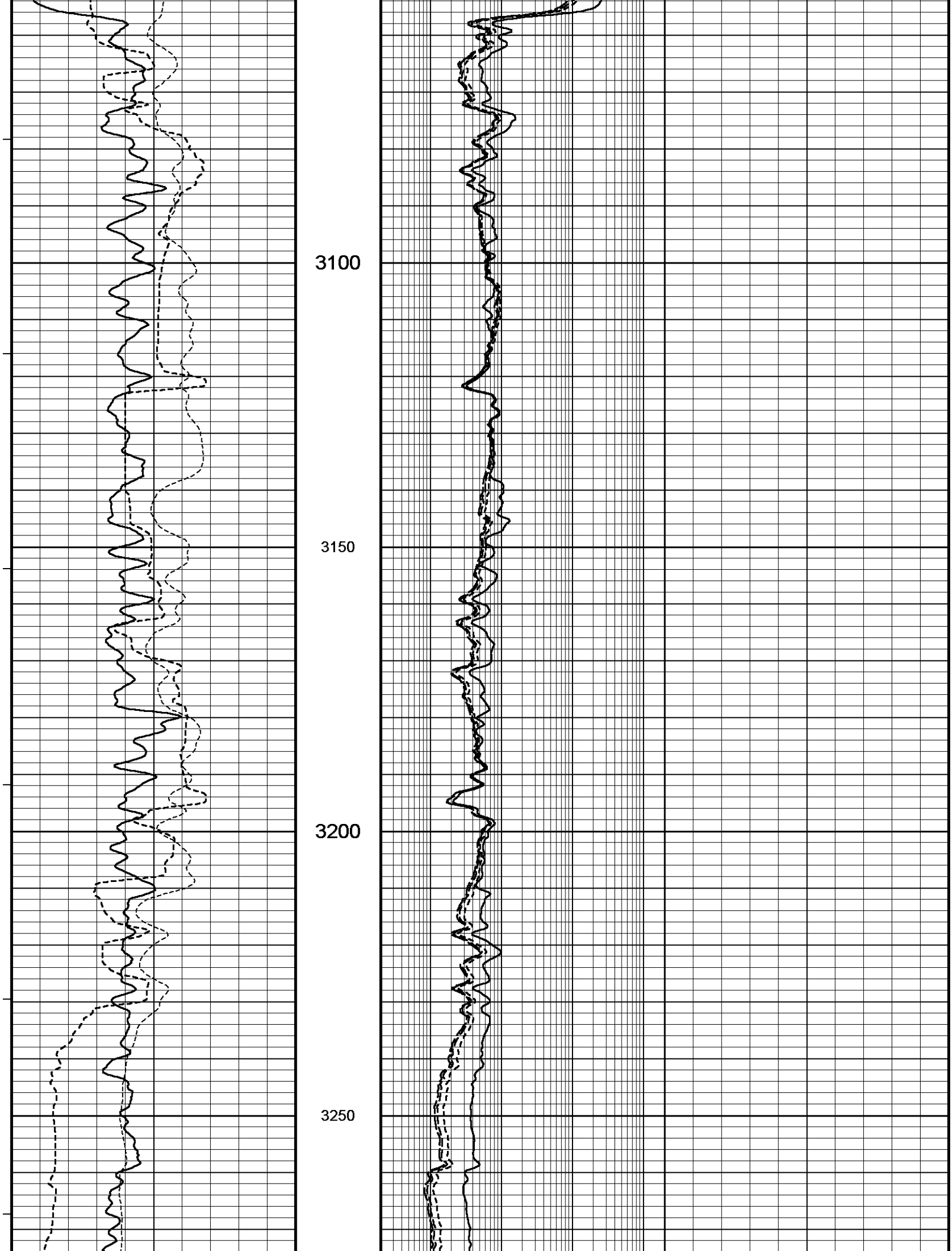

2000
2050
2100
2150
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray

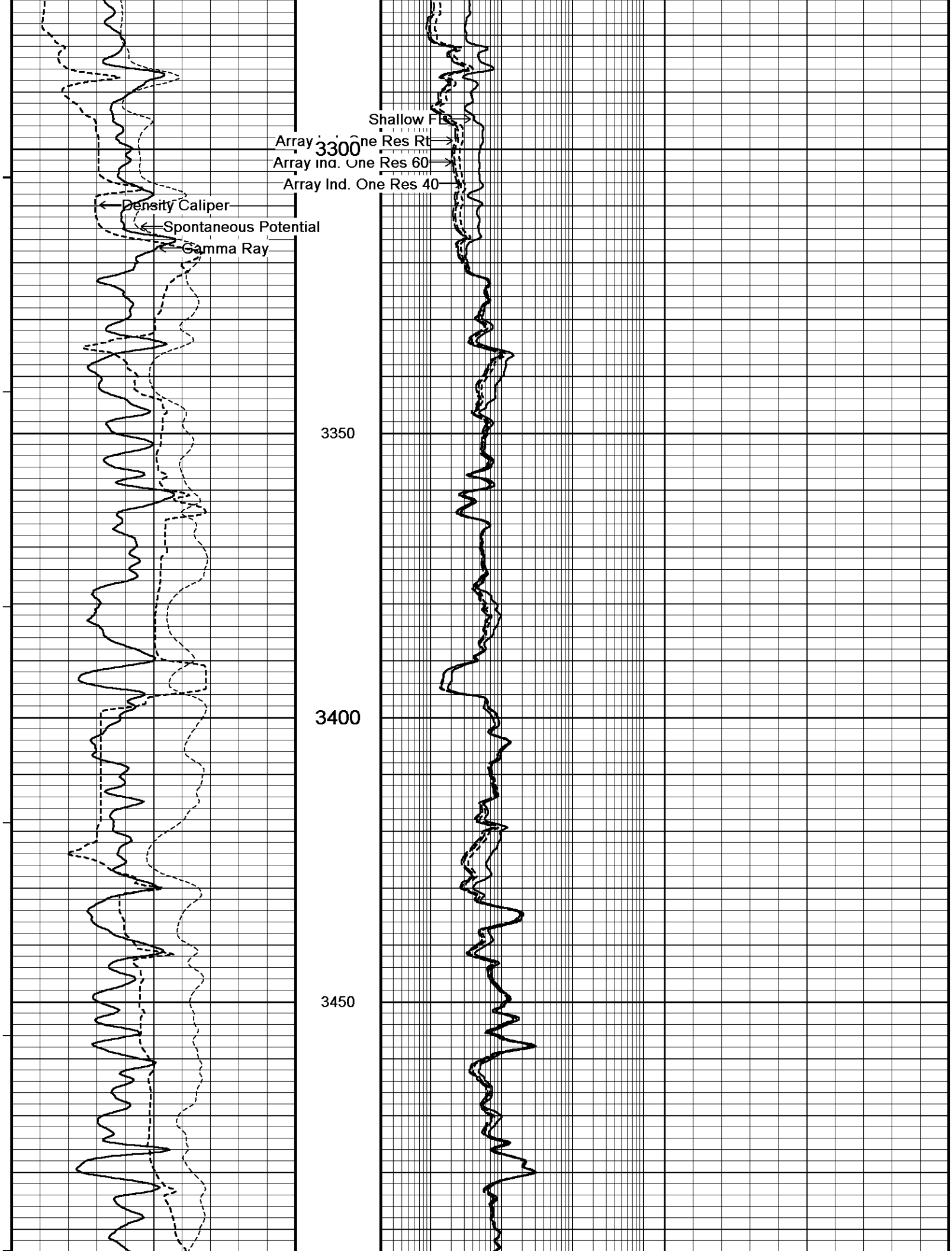

2200
2250
2300
2350

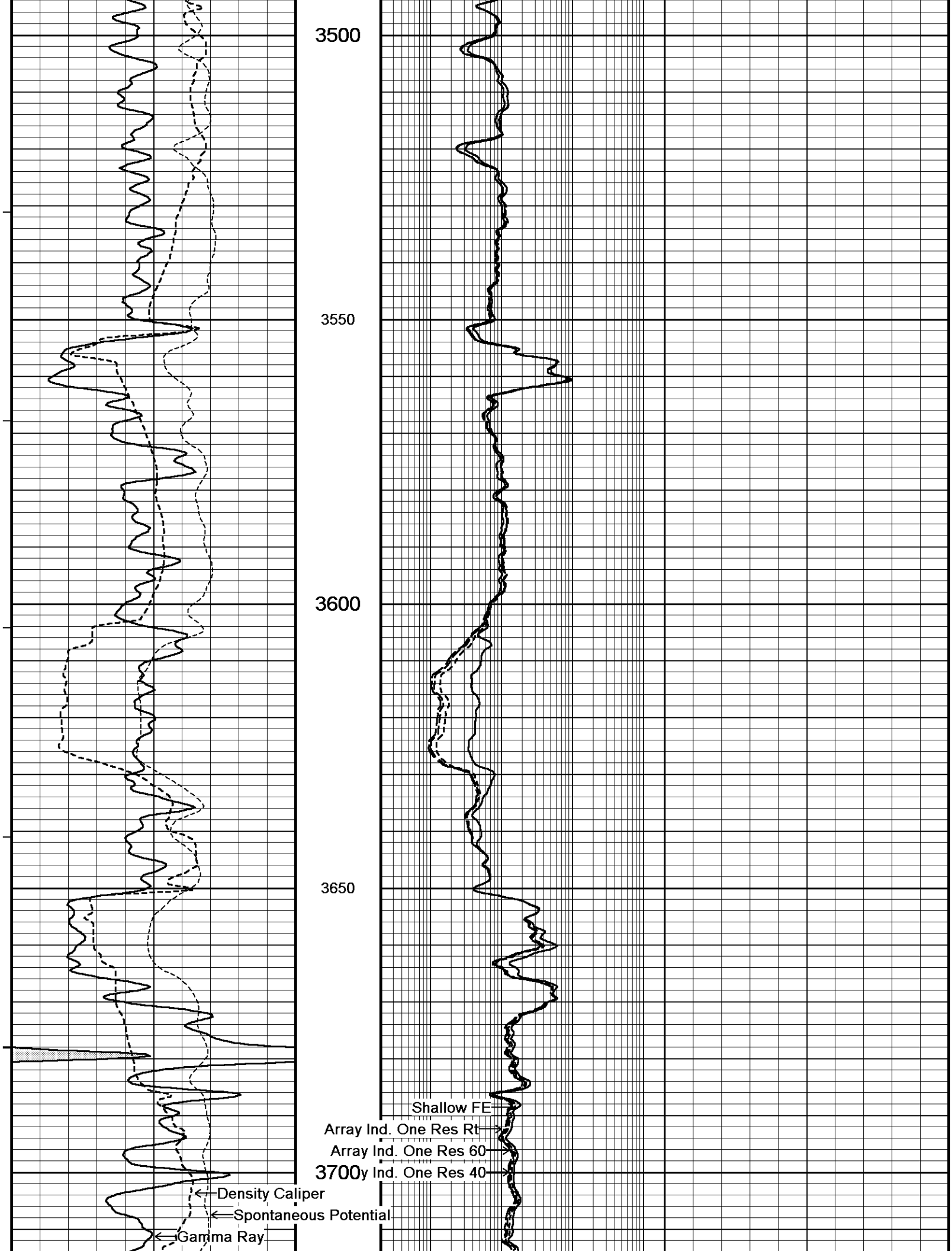

2400
2450
2500
2550
2600
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray

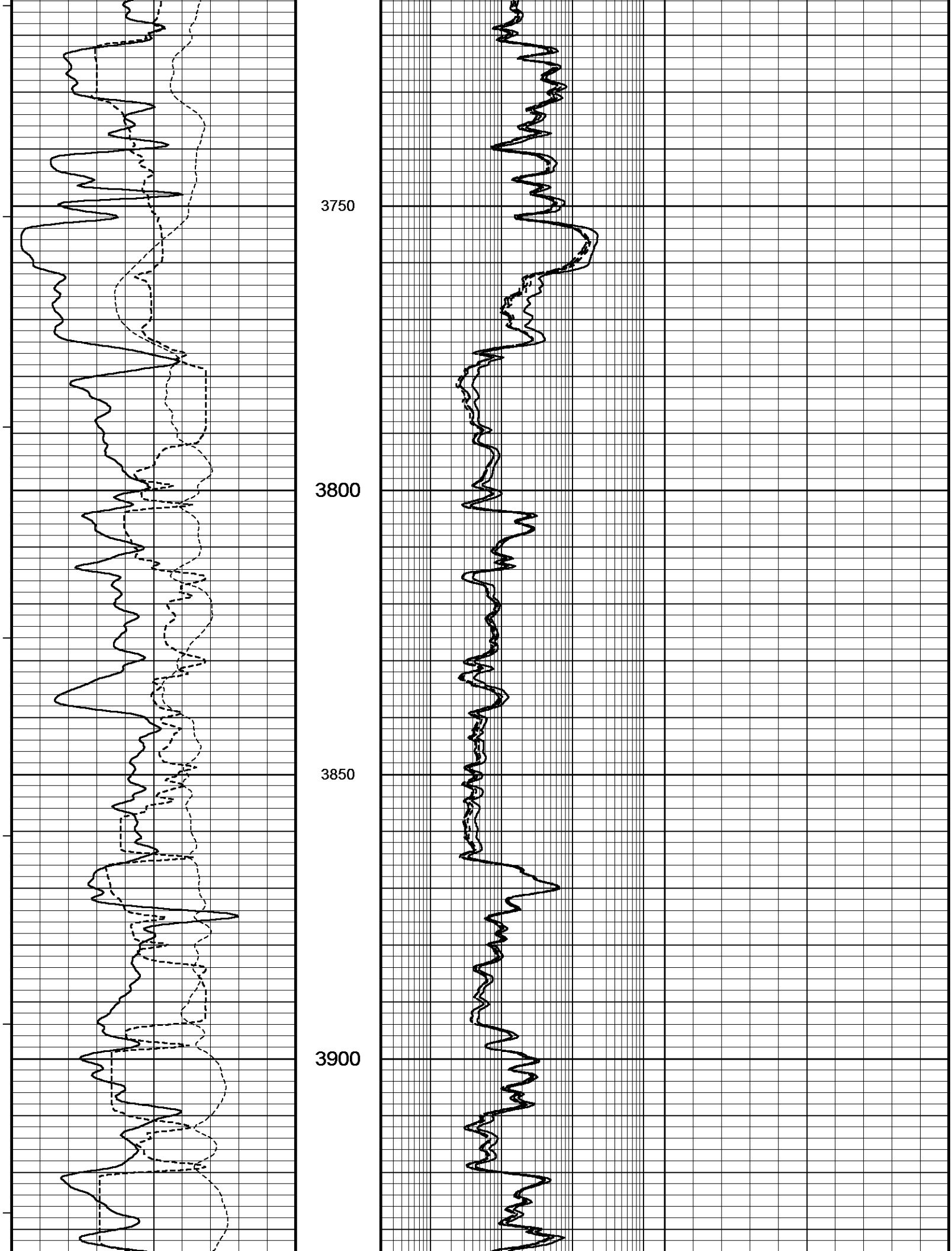

2650
2700
2750
2800

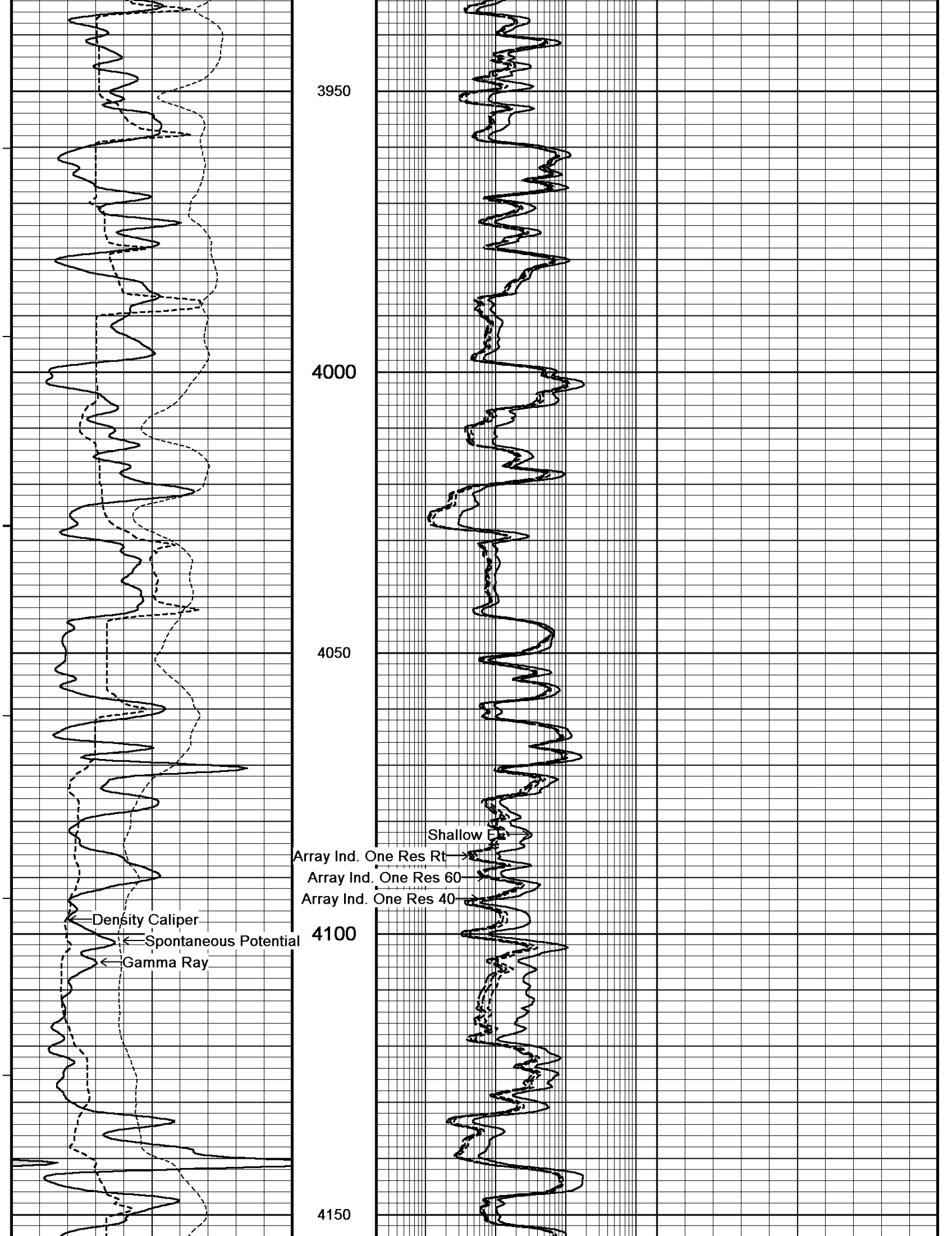

2850
2900
hallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray
2950
3000
3050

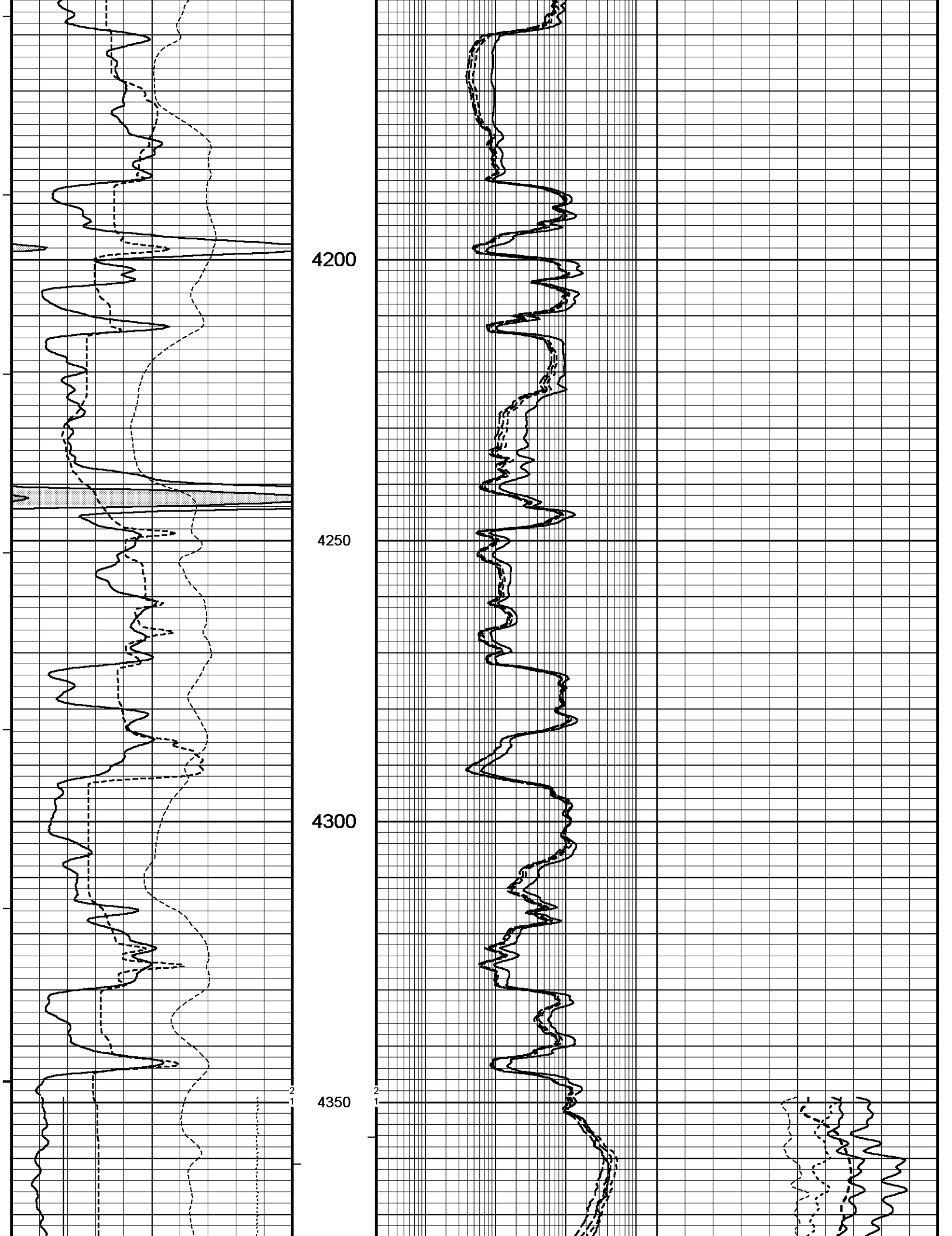

3100
3150
3200
3250

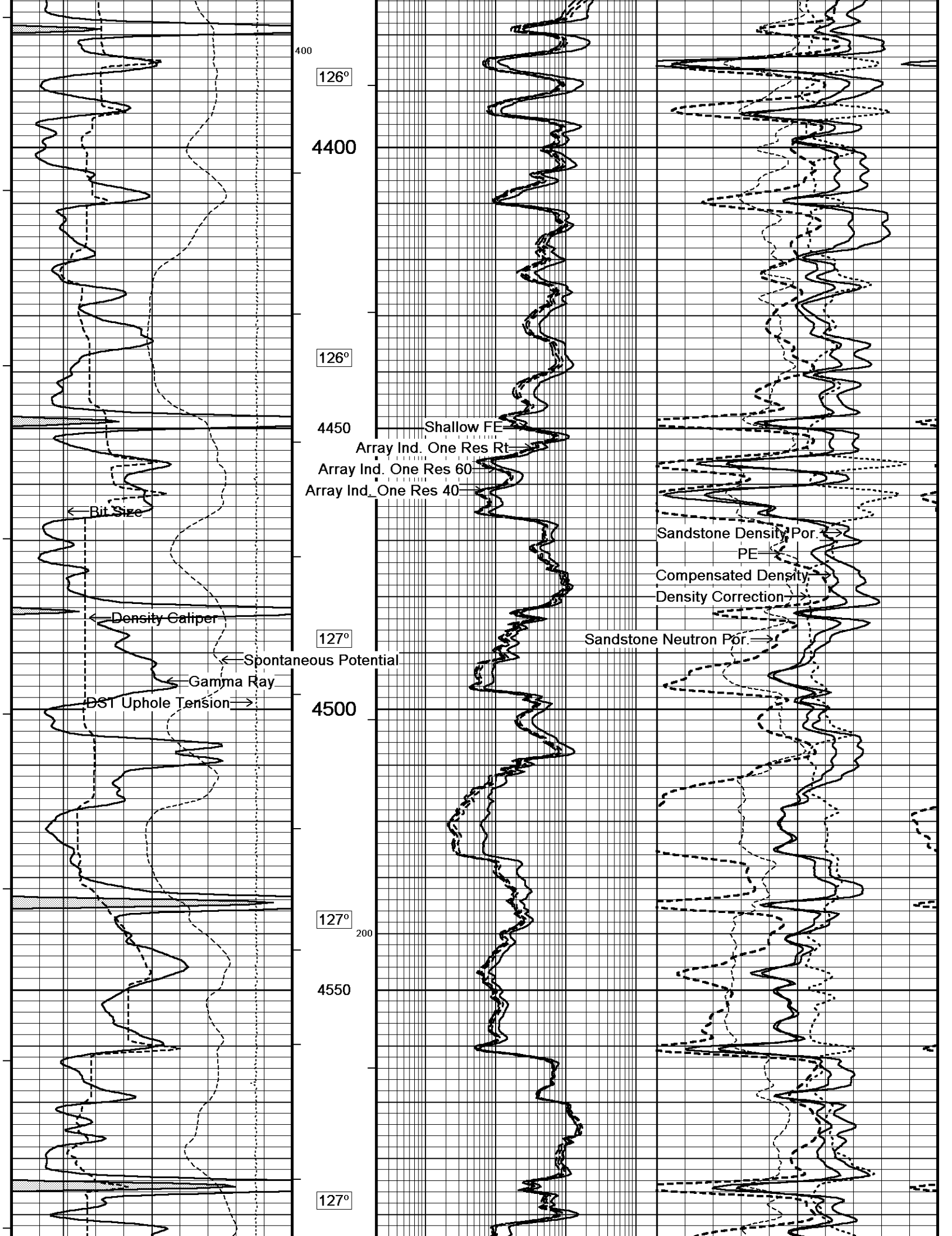

Shallow Fl
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray
3300
3350
3400
3450

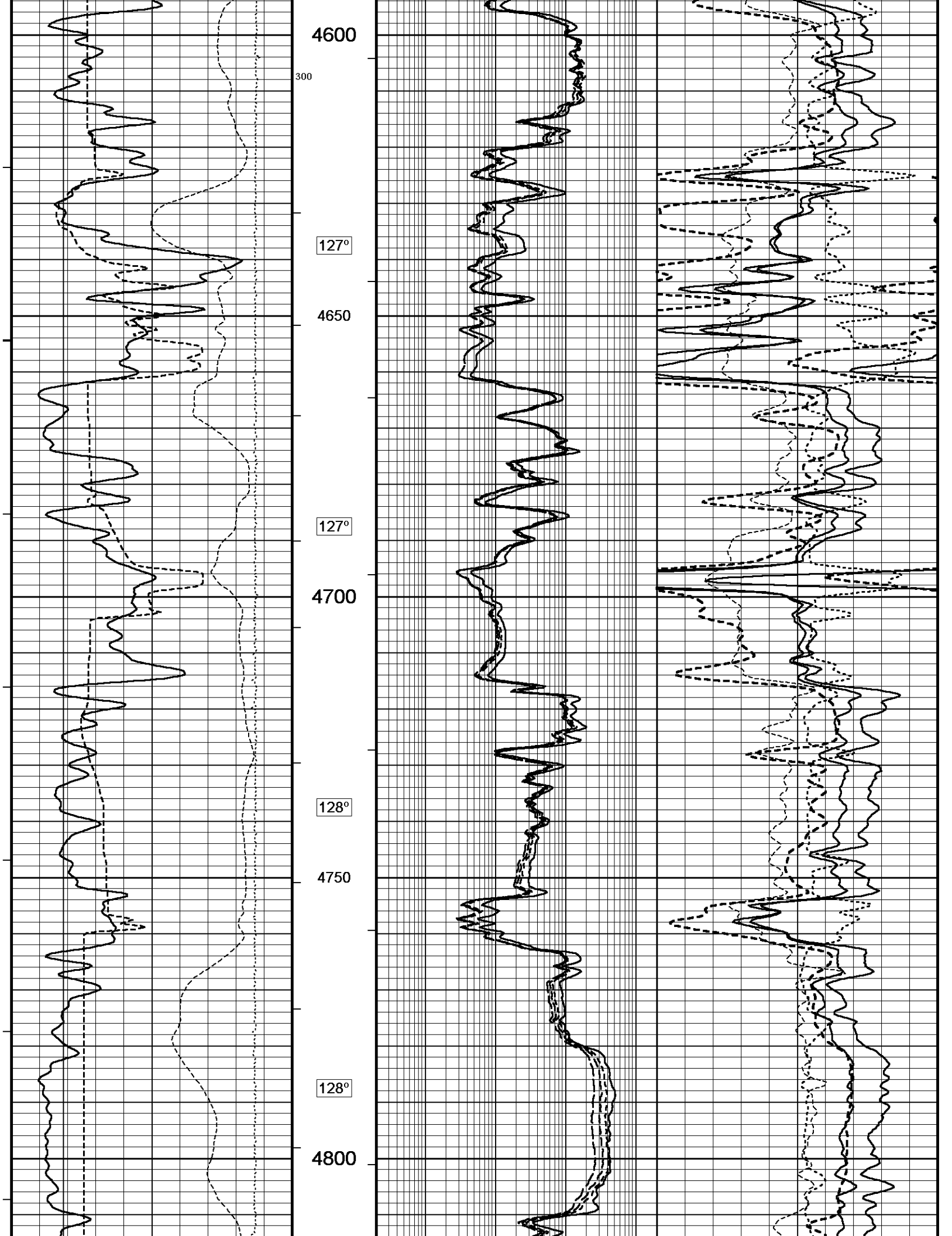

3500
3550
3600
3650
3700
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
y Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray

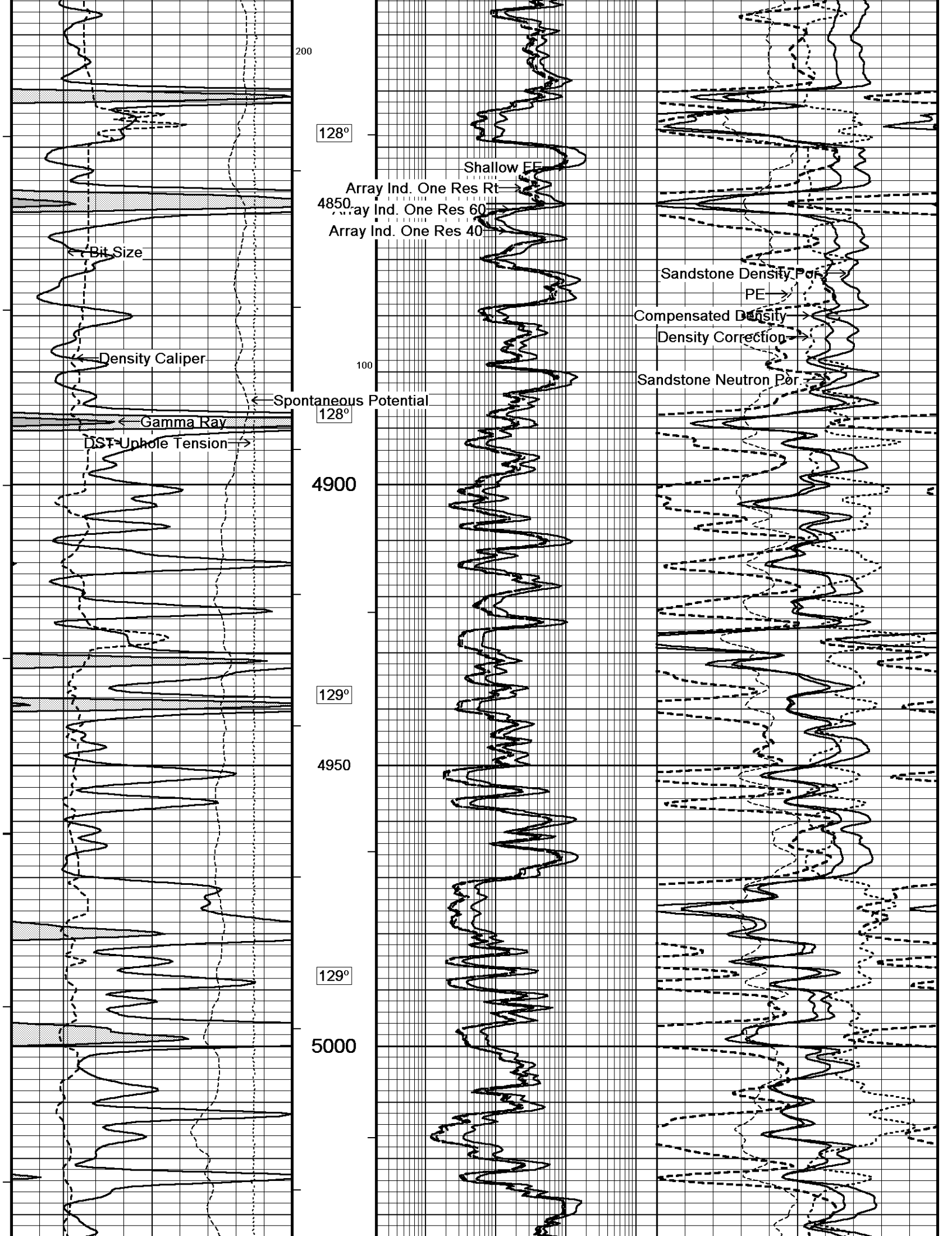

3750
3800
3850
3900

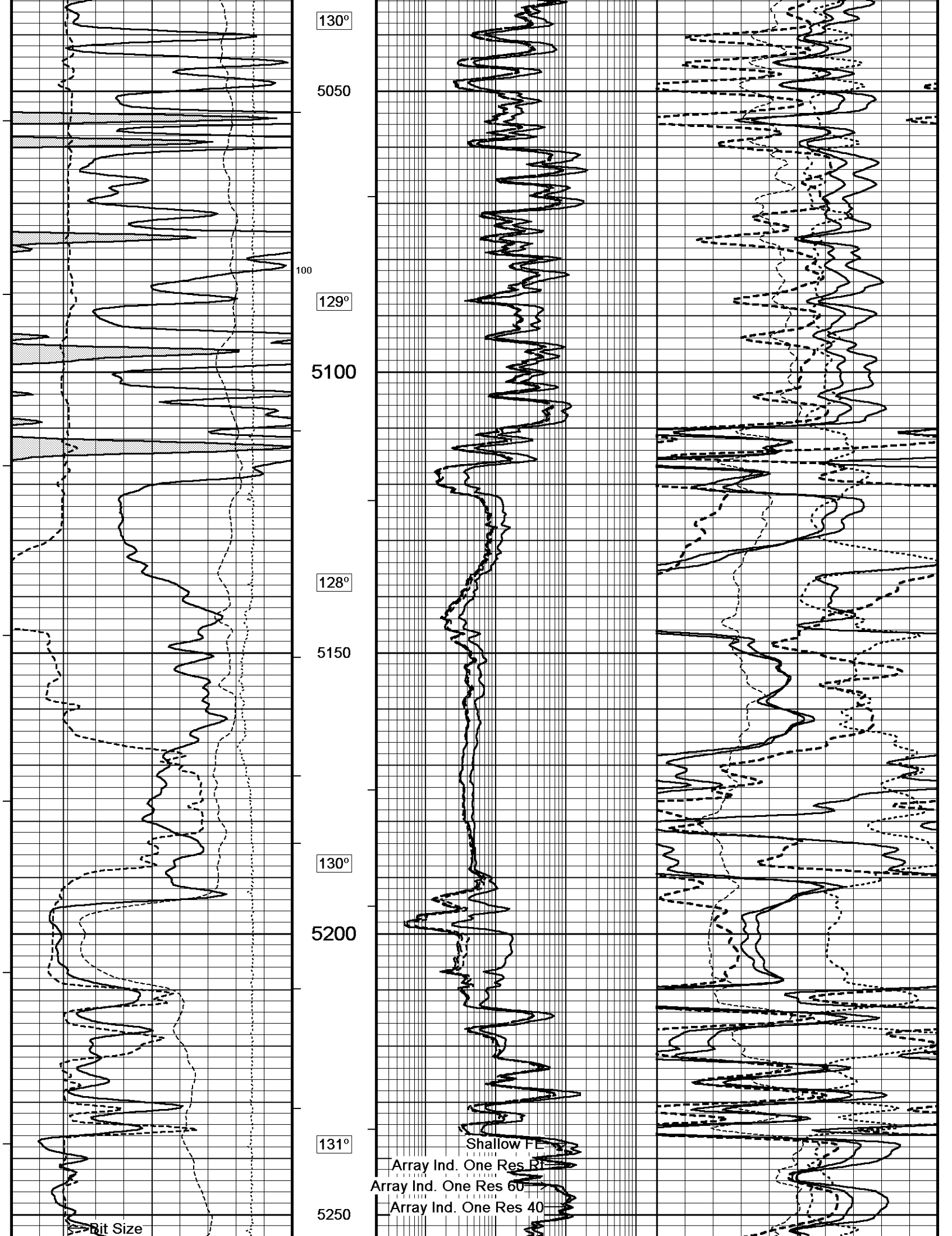

3950
4000
4050
Shallow Rt
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Density Caliper
Spontaneous Potential
Gamma Ray
4100
4150

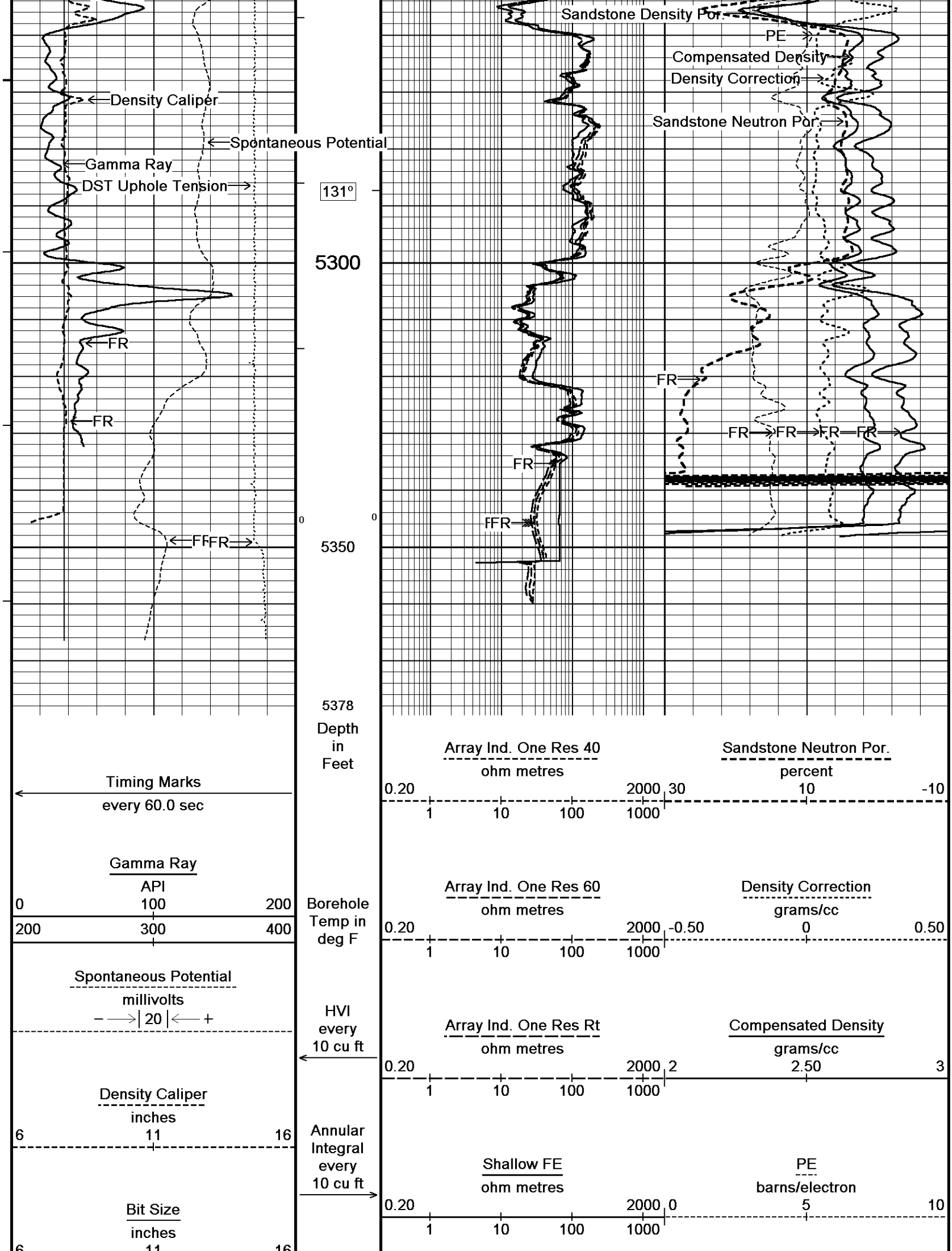

4200
4250
4300
4350


400
126°
4400
126°
4450
Shallow FE
Array Ind. One Res Rt
Array Ind. One Res 60
Array Ind. One Res 40
Bit Size
Sandstone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
127°
Sandstone Neutron Por.
Spontaneous Potential
Gamma Ray
DST Uphole Tension
4500
127°
200
4550
127°


4600
300
127°
4650
127°
4700
128°
4750
128°
4800


200
128°
Shallow FE
Array Ind. One Res Rt
4850
Array Ind. One Res 60
Array Ind. One Res 40
Bit Size
Sandstone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
100
Sandstone Neutron Por.
Spontaneous Potential
128°
Gamma Ray
DST Uphole Tension
4900
129°
4950
129°
5000


130°
5050
100
129°
5100
128°
5150
130°
5200
131°
5250
Shallow FE
Array Ind. One Res RT
Array Ind. One Res 60
Array Ind. One Res 40
Bit Size


Sandstone Density Por.
PE
Compensated Density
Density Correction
Sandstone Neutron Por.
Density Caliper
Spontaneous Potential
Gamma Ray
DST Uphole Tension
131°
5300
FR
FR
FR
FR
FR
FR
FR
FR
FR
FFR
FFR
0
0
5350
5378
Depth in Feet
Timing Marks
every 60.0 sec
Array Ind. One Res 40
ohm metres
0.20
2000
1
10
100
1000
Sandstone Neutron Por.
percent
30
10
-10
Gamma Ray
API
0
100
200
200
300
400
Borehole Temp in deg F
Array Ind. One Res 60
ohm metres
0.20
2000
1
10
100
1000
Density Correction
grams/cc
-0.50
0
0.50
Spontaneous Potential
millivolts
− 20 +
HVI every 10 cu ft
Array Ind. One Res Rt
ohm metres
0.20
2000
1
10
100
1000
Compensated Density
grams/cc
2
2.50
3
Density Caliper
inches
6
11
16
Annular Integral every 10 cu ft
Shallow FE
ohm metres
0.20
2000
1
10
100
1000
PE
barns/electron
0
5
10
Bit Size
inches
6
11
16

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 07-SEP-2014 01:33
Filename: C:\Minimus 13.08.2113\Logs\Mid-Con HRMU 14-1\Mid-Con HRMU 14-1 Repeat.dta — Recorded on 06-SEP-2014 22:19
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH MAIN

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Logs\Mid-Con HRMU 14-1\Mid-Con HRMU 14-1 Repeat.dta

General Constants All 000

Last Edited on 06-SEP-2014,20:43

General Parameters		
Mud Resistivity	1.510	ohm-metres
Mud Resistivity Temperature	96.000	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	None	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. One Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 06-SEP-2014 21:23

Reading No	Measured	Calibrated (lbs)
1	15737.84	0.00
2	16034.73	326.30

SP Calibration MCG-C 208

Field Calibration on 05-SEP-2014 13:40

	Measured	Calibrated (mV)
Reference 1	99.8	98.7
Reference 2	-97.8	-98.9

High Resolution Temperature Calibration MCG-C 208

Field Calibration on 23-JAN-2014,17:11

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

High Resolution Temperature Constants MCG-C 208

Last Edited on 23-JAN-2014,17:11

Pre-filter Length	11

Gamma Calibration MCG-C 208

Field Calibration on 05-SEP-2014 13:53

	Measured	Calibrated (API)
Background	66	45
Calibrator (Gross)	1122	770
Calibrator (Net)	1056	725

Gamma Constants MCG-C 208

Last Edited on 06-SEP-2014,20:43

Gamma Calibrator Number	GRC038

Gamma Calibrator Number	GRC058	
Mud Density	1.02	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl		kppm
K Mud Type	Chloride	
K Mud Concentration	0.00	%

Neutron Calibration MDN-B.J 387

Base Calibration on 31-JUL-2014 11:36
Field Check on 05-SEP-2014 13:58

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2985	92	3714	110
Ratio	32.470		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1675	2460
Ratio	0.681	

Field Check

	Calibrated (cps)	
	1683	2443
Ratio	0.689	

Neutron Constants MDN-B.J 387

Last Edited on 06-SEP-2014,20:42

Neutron Source Id	P58125B	
Neutron Jig Number	5824NE	
Epithermal Neutron		
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	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-A.A 55

Base Calibration on 05-SEP-2014 14:08
Field Check on 05-SEP-2014 14:12

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	951.0	126.8
Base Check		281.6
Field Check		281.6

FE Constants MFE-A.A 55

Last Edited on 06-SEP-2014,20:42

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 5

Base Calibration on 21-JAN-2014,09:50
Field Check on 05-SEP-2014 13:23

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	16.3	470.8	9.3	966.2
2	5.6	376.1	7.6	821.4

3	2.6	266.1	5.2	566.0
4	1.6	130.0	2.6	279.2

Array Temperature 71.1 Deg F

Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	0.0	0.0	15.2	3862.7
2	0.0	0.0	31.8	3591.0
3	0.0	0.0	29.8	2971.7
4	0.0	0.0	20.8	2126.4
Deep			18.5	1912.4
Medium			43.1	3861.6
Shallow			47.4	5372.8
Array Temperature		0.0		73.9 Deg F

Induction Constants MAI-A.A 5

Last Edited on 06-SEP-2014,20:42

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 5

Field Calibration on 21-JAN-2014,15:43

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

High Resolution Temperature Constants MAI-A.A 5

Last Edited on 27-JUN-2014,14:12

Pre-filter Length 11

Caliper Calibration MPD-D.A 481

Base Calibration on 23-AUG-2014 13:39
Field Calibration on 05-SEP-2014 13:28

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	17257	3.99

2	27352	5.98
3	37398	7.97
4	47224	9.86
5	58327	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.95	7.97

Photo Density Calibration MPD-D.A 481

Base Calibration on 23-AUG-2014 14:06
Field Check on 05-SEP-2014 13:32

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1216	1426		
Reference 1	55706	26385	59556	30836
Reference 2	22306	2607	24941	2541

Field Check at Base

1215.9	1425.6

Field Check

1213.8	1423.6

PE Calibration

Base Calibration	Measured			Calibrated
	WS	WH	Ratio	Ratio
Background	232	1087		
Reference 1	24125	55503	0.439	0.371
Reference 2	6847	22166	0.314	0.272

Field Check at Base

232.2	1087.0

Field Check

230.3	1084.6

Density Constants MPD-D.A 481

Last Edited on 06-SEP-2014,20:42

Density Source Id	P50557B	
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	1.02	gm/cc
Mud Density Z/A Multiplier	1.11	
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 (ft)
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	

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Logs\Mid-Con HRMU 14-1\Mid-Con HRMU 14-1 Repeat.dta

CBH-C, Cablehead, 11 pin
CBH-C 265 LG: 2.40 ft WT: 24.3 lb OD: 2.240 in

Compact Comms Gamma
MCG-C 208 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

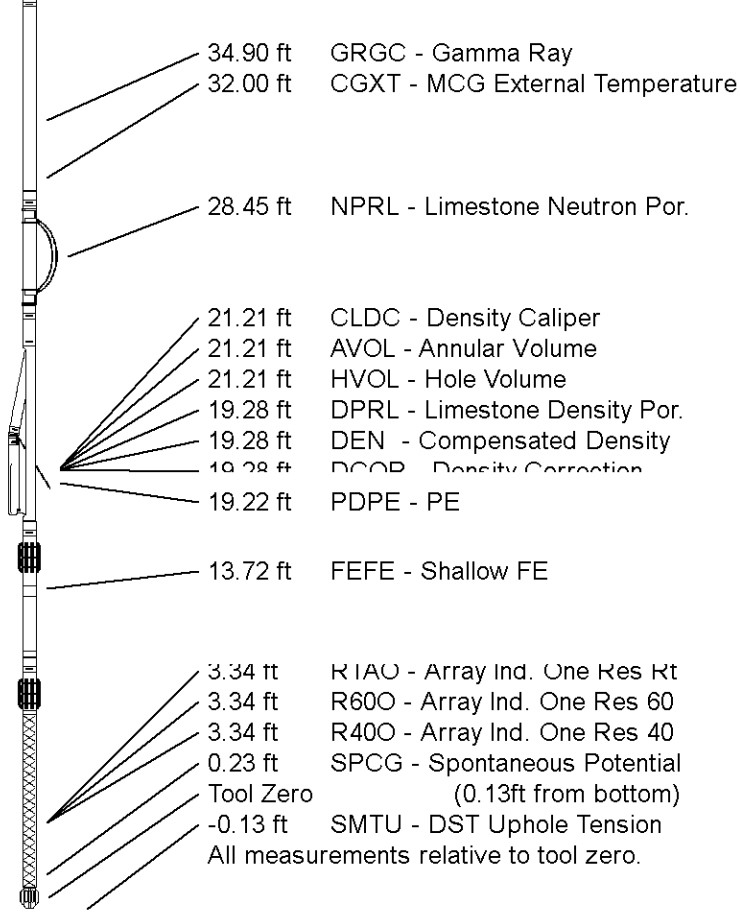
Compact Neutron
MDN-B.J 387 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-D.A 481 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-A.A 55 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 5 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 42.59 ft Weight: 326.3 lb



34.90 ft	GRGC - Gamma Ray
32.00 ft	CGXT - MCG External Temperature
28.45 ft	NPRL - Limestone Neutron Por.
21.21 ft	CLDC - Density Caliper
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
19.28 ft	DPRL - Limestone Density Por.
19.28 ft	DEN - Compensated Density
19.28 ft	DCOR - Density Correction
19.22 ft	PDPE - PE
13.72 ft	FEFE - Shallow FE
3.34 ft	R10O - Array Ind. One Res Rt
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	R40O - Array Ind. One Res 40
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension

All measurements relative to tool zero.

COMPANY	MID-CON ENERGY OPERATING, INC.
WELL	HRMU 14-1
FIELD	HARKER RANCH MORROW UNIT
PROVINCE/COUNTY	CHEYENNE
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	4045.19	feet	First Reading	5345.85	feet
Elevation Drill Floor	4043.19	feet	Depth Driller	5350.00	feet
Elevation Ground Level	4028.59	feet	Depth Logger	5349.00	feet

Weatherford®

COMPOSITE LOG