Weatherford

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

COMPANY	BEREXCO LLC
WELL	TIMOTHY #2-16
FIELD	WILDCAT
PROVINCE/COUNTY	FINNEY
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	1644' FSL & 351' FWL

SEC 16	TWP 22S	RGE 34W
Latitude		38.13861
Longitude		101.0653
API Number		15-055-22311

Other Services
MPD/MDN, MML, MSS, CMI

Permanent Datum GL, Elevation 2957 feet
Log Measured From KB
Drilling Measured From KB @ 12 FEET

Elevations:	feet
KB	2969.00
DF	2967.00
GL	2957.00

Date	23-JUN-2014			
Run Number	ONE			
Service Order	7606-90684489			
Depth Driller	4850.00	feet		
Depth Logger	4847.00	feet		
First Reading	4843.53	feet		
Last Reading	1696.00	feet		
Casing Driller	1700.00	feet		
Casing Logger	1696.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.00 lb/USg	54.00 CP		
PH / Fluid Loss	11.00	8.80 ml/30Min		
Sample Source	MUD PIT			
Rm @ Measured Temp	0.85 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.68 @ 75.0	ohm-m		
Rmc @ Measured Temp	1.02 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.617 @105.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	105.00	deg F		
Equipment / Base	13096	LIB		
Recorded By	BEN WELDIN		DEREK CARTER	
Witnessed By	ED GRIEVES			
JOB #	LB14-186			

BOREHOLE RECORD

Last Edited: 23-JUN-2014 03:05

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	1700.00
7.875	1700.00	4850.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1700.00	24.00

REMARKS

- SOFTWARE ISSUE: WLS 13.08.2113
- TOOL STRING:
  - RUN 1: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION
  - RUN 2: SHA, MCG, MIM, MIE RUN IN COMBINATION
- HARDWARE:
  - MDN: DUAL BOWSPRING ECCENTRALIZER
  - MFE: 1 X 0.5 INCH STANDOFF
  - MSS: 2 X 0.5 INCH STANDOFF
  - MAI: 2 X 0.5 INCH STANDOFF
  - MIM: 6 LEAF CENTRALIZER
  - MIE: 1 X 0.5 INCH STANDOFF
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY
- BOREHOLE RUGOSITY, TIGHT PULLS AND WASHOUTS WILL AFFECT DATA QUALITY

- BOREHOLE ROUGHNESS, 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: 1470 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING: 960 CU. FT.

- SERVICE ORDER # 7606-90684489

- RIG: BEREDCO #1

- ENGINEER: DEREK CARTER

- JUNIOR FIELD ENGINEER: BEN WELDIN

- OPERATORS: CARLOS RAMIREZ

- LATITUDE: 38.13861

- LONGITUDE: -101.0653

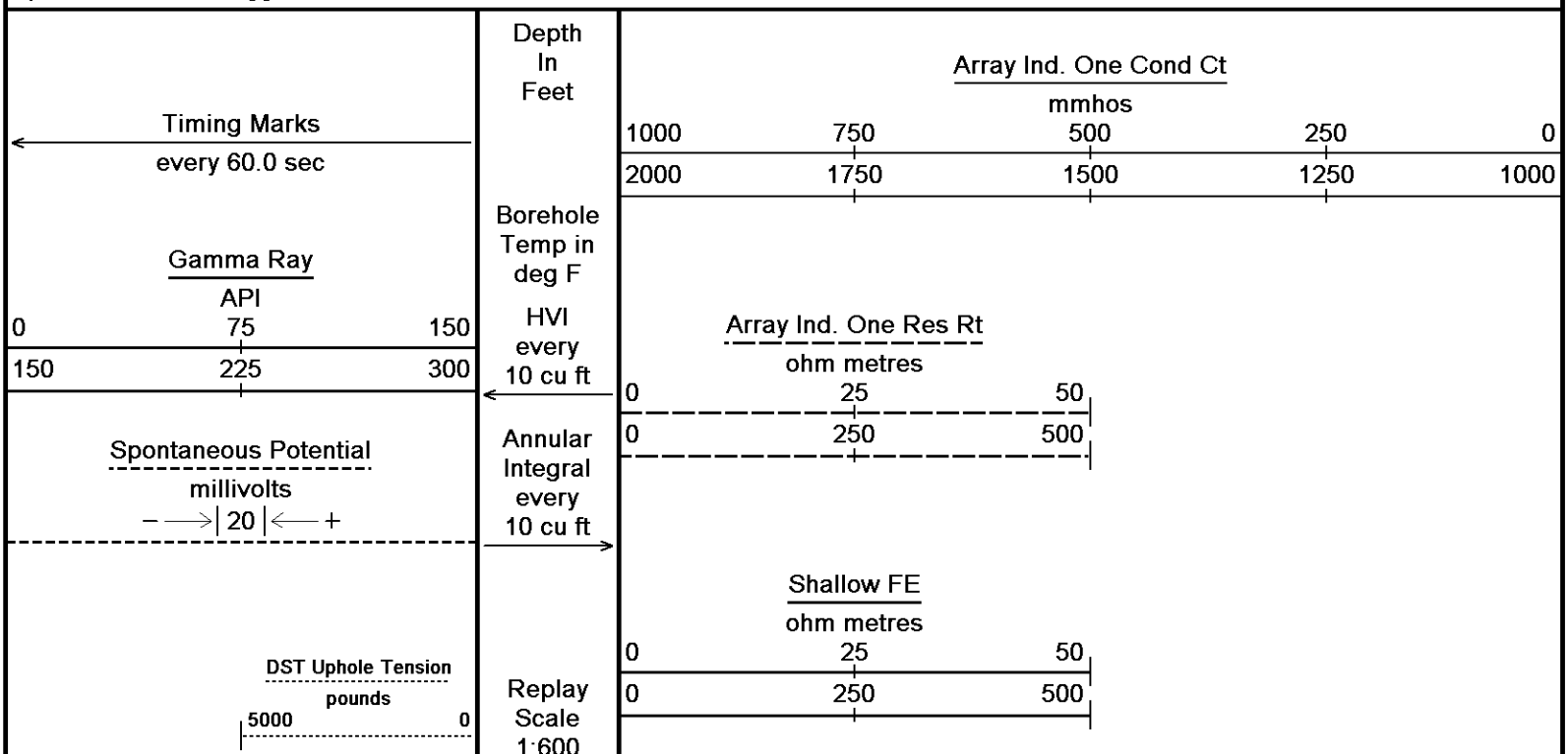
- MAGNETIC DECLINATION: 6.23 DEGREES EAST

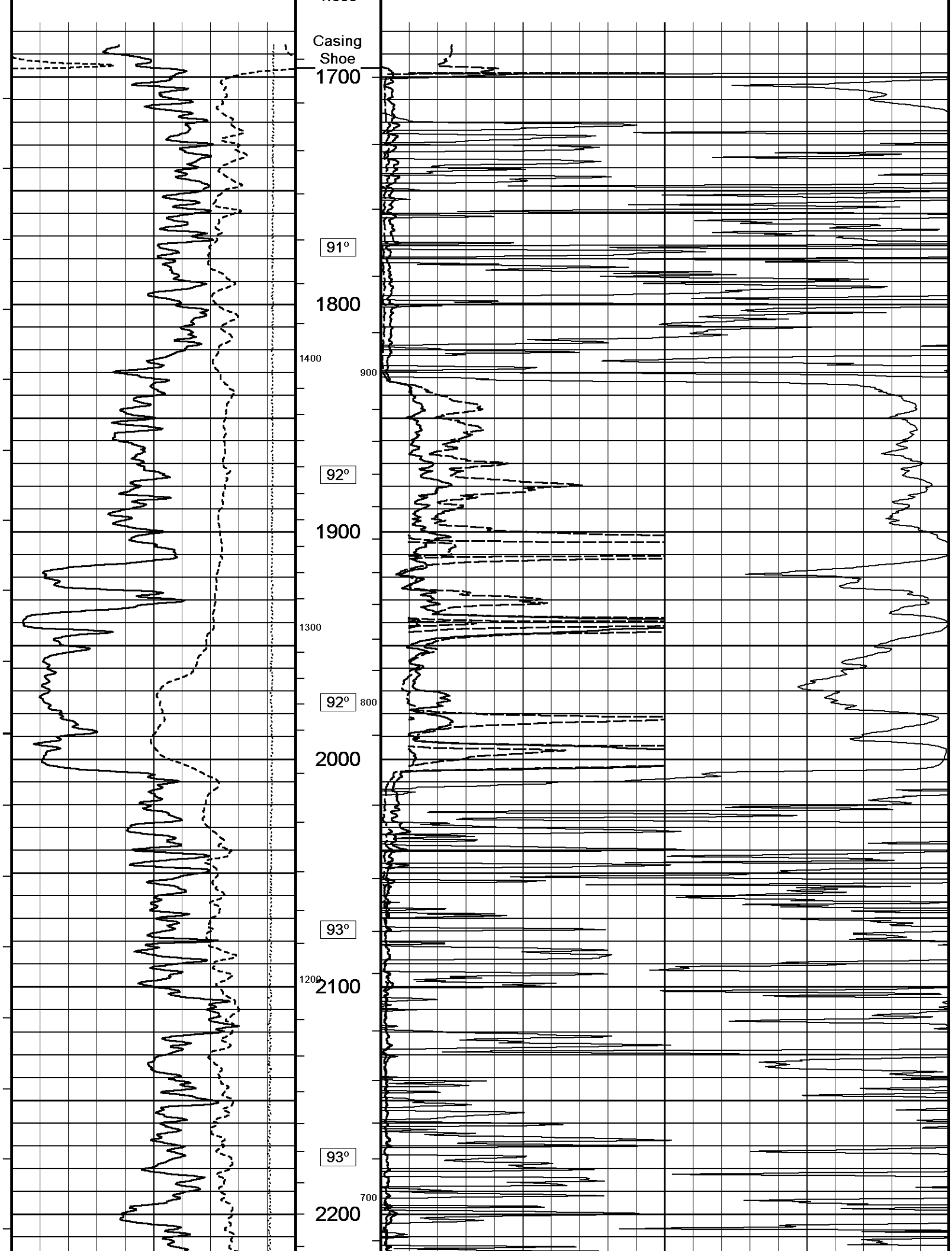
2 INCH MAIN

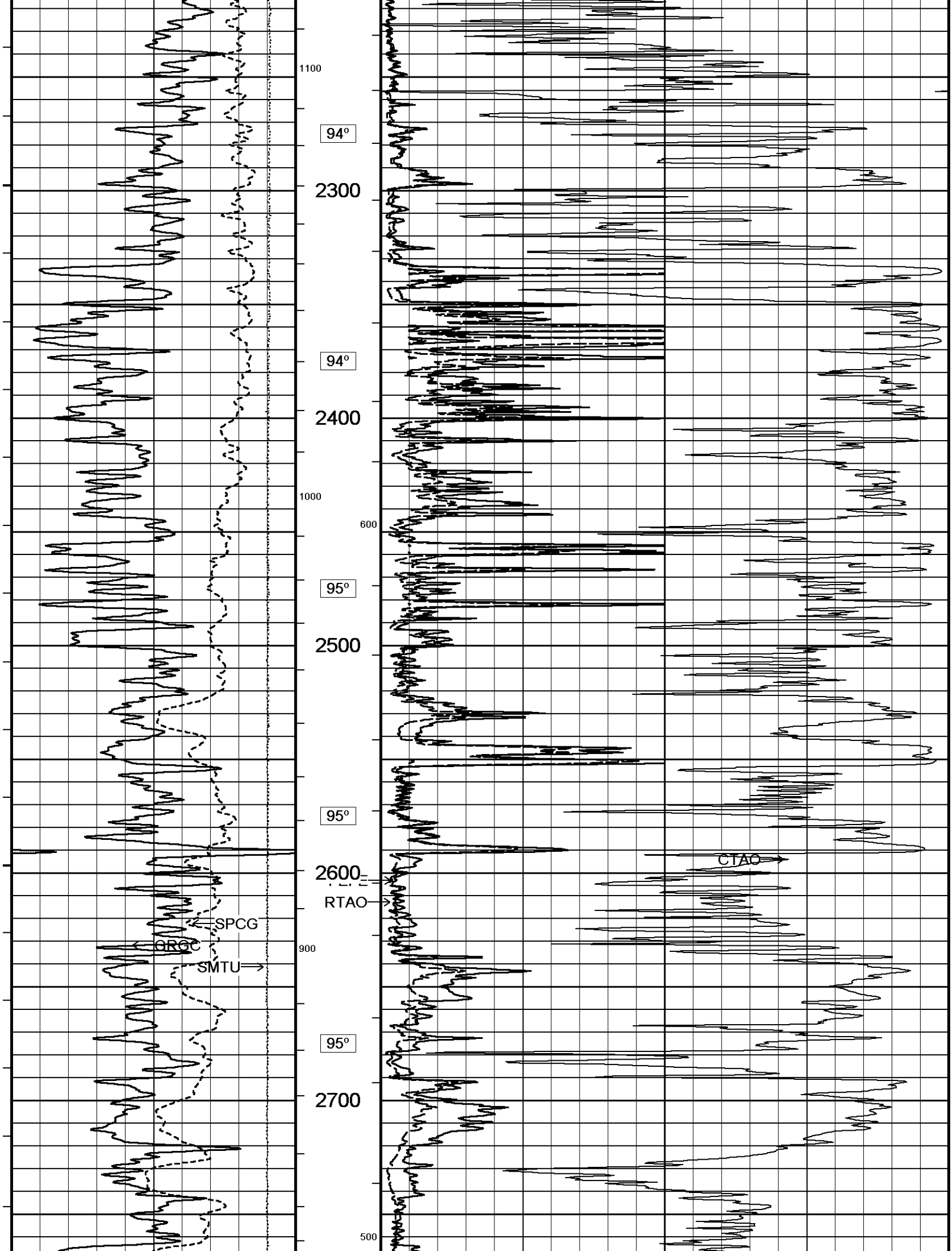
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-JUN-2014 11:15

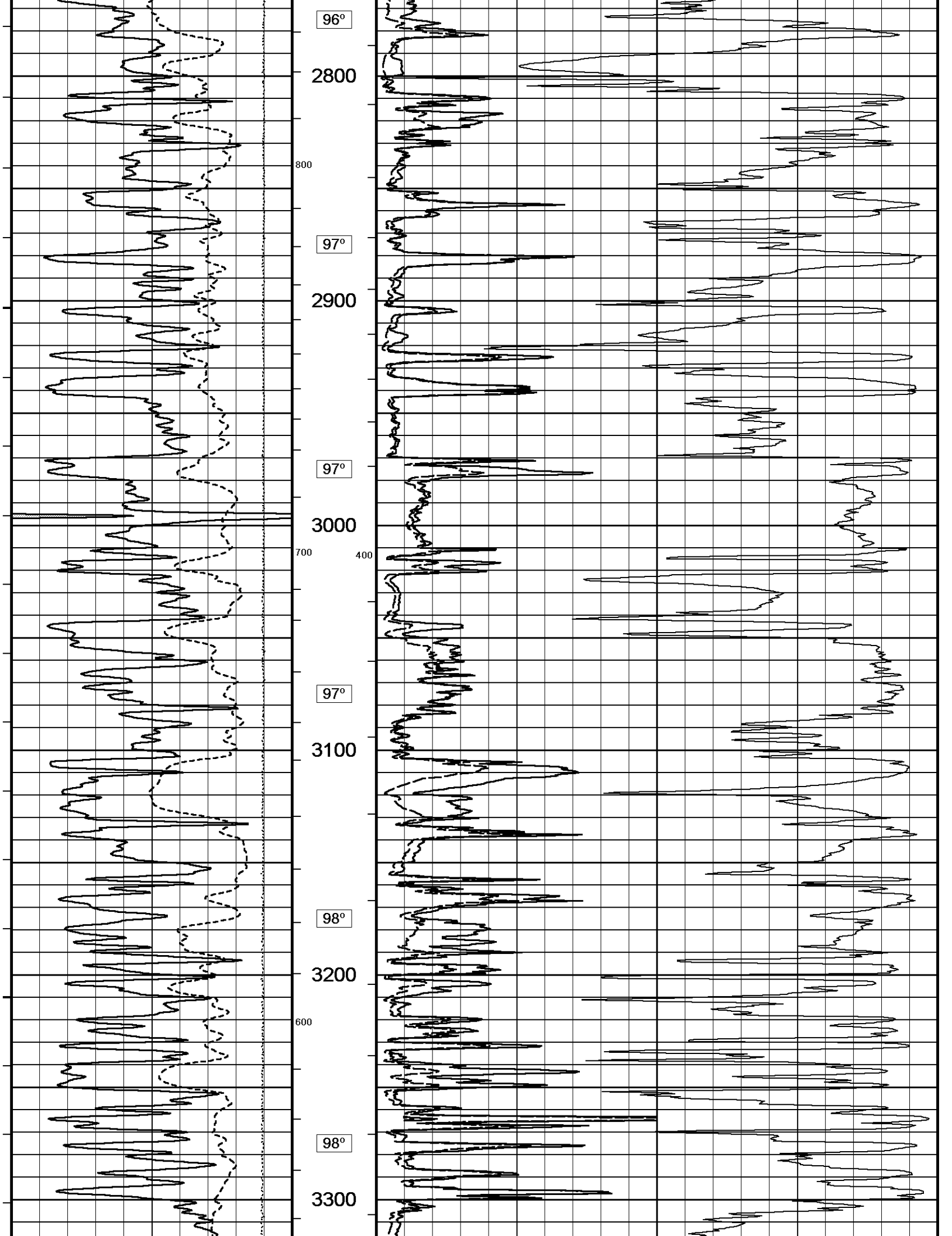
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta — Recorded on 23-JUN-2014 06:05

System Versions: Logged with 13.08.2113 Plotted with 13.08.2113




Casing
Shoe
1700
91°
1800
1400
900
92°
1900
1300
92° 800
2000
93°
1200
2100
93°
700
2200


1100
94°
2300
94°
2400
1000
600
95°
2500
95°
2600
CTAO
RTAO
SPCG
GRGC
900
SMTU
95°
2700
500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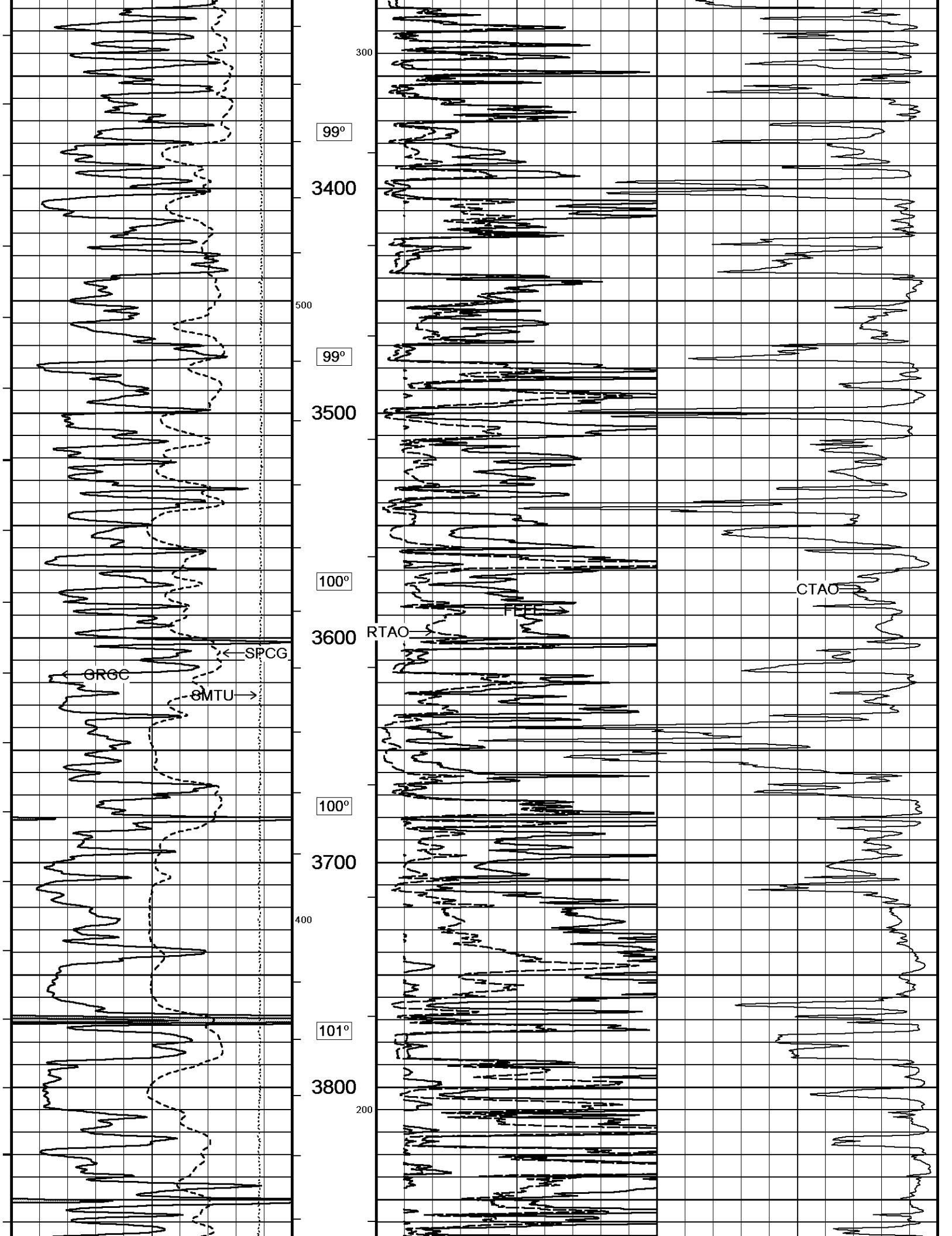
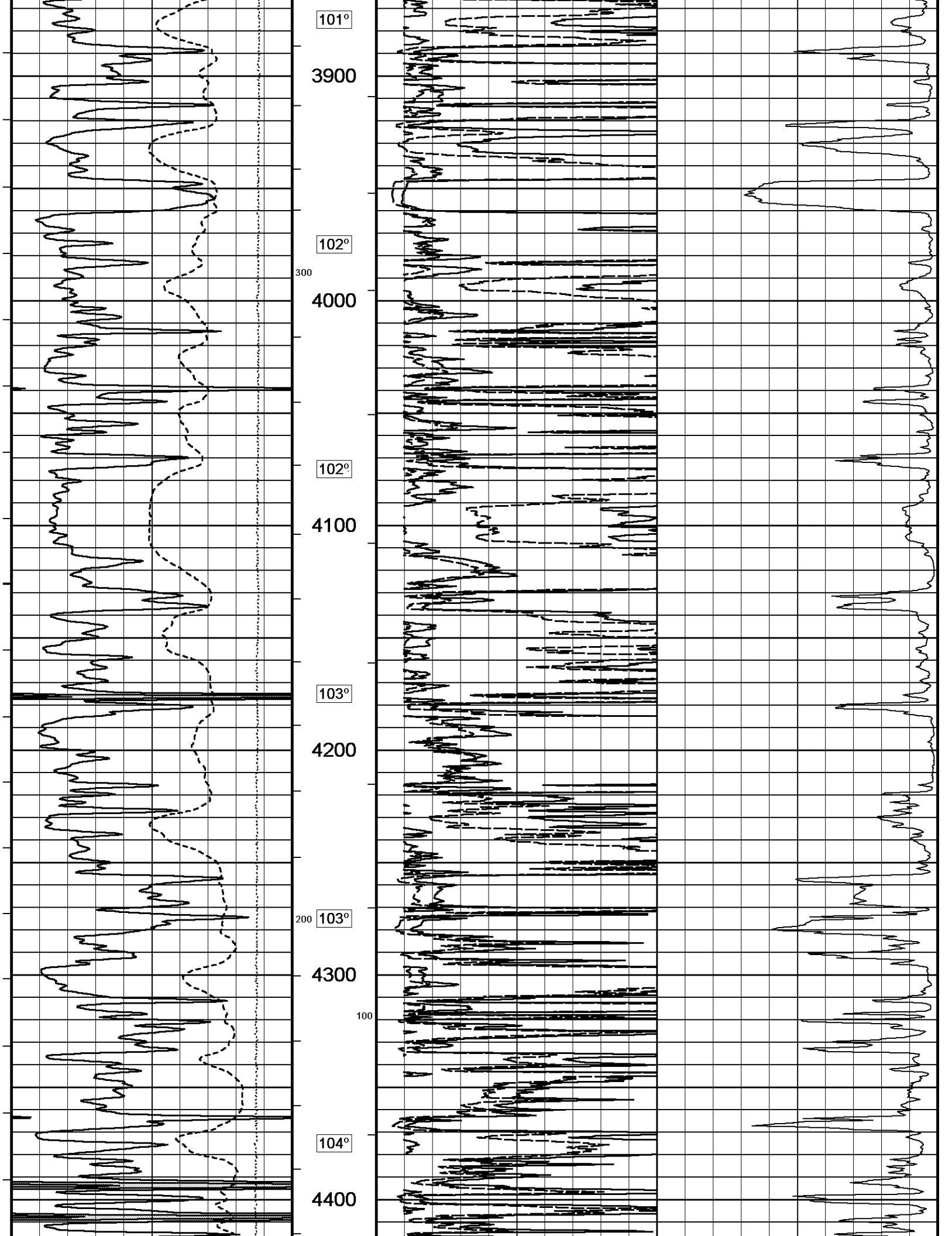
2800
800
97°
2900
97°
3000
700
400
97°
3100
98°
3200
600
98°
3300


300
99°
3400
500
99°
3500
100°
CTAO
FEET
RTAO
3600
SPCG
GRGC
GMTU
100°
3700
400
101°
3800
200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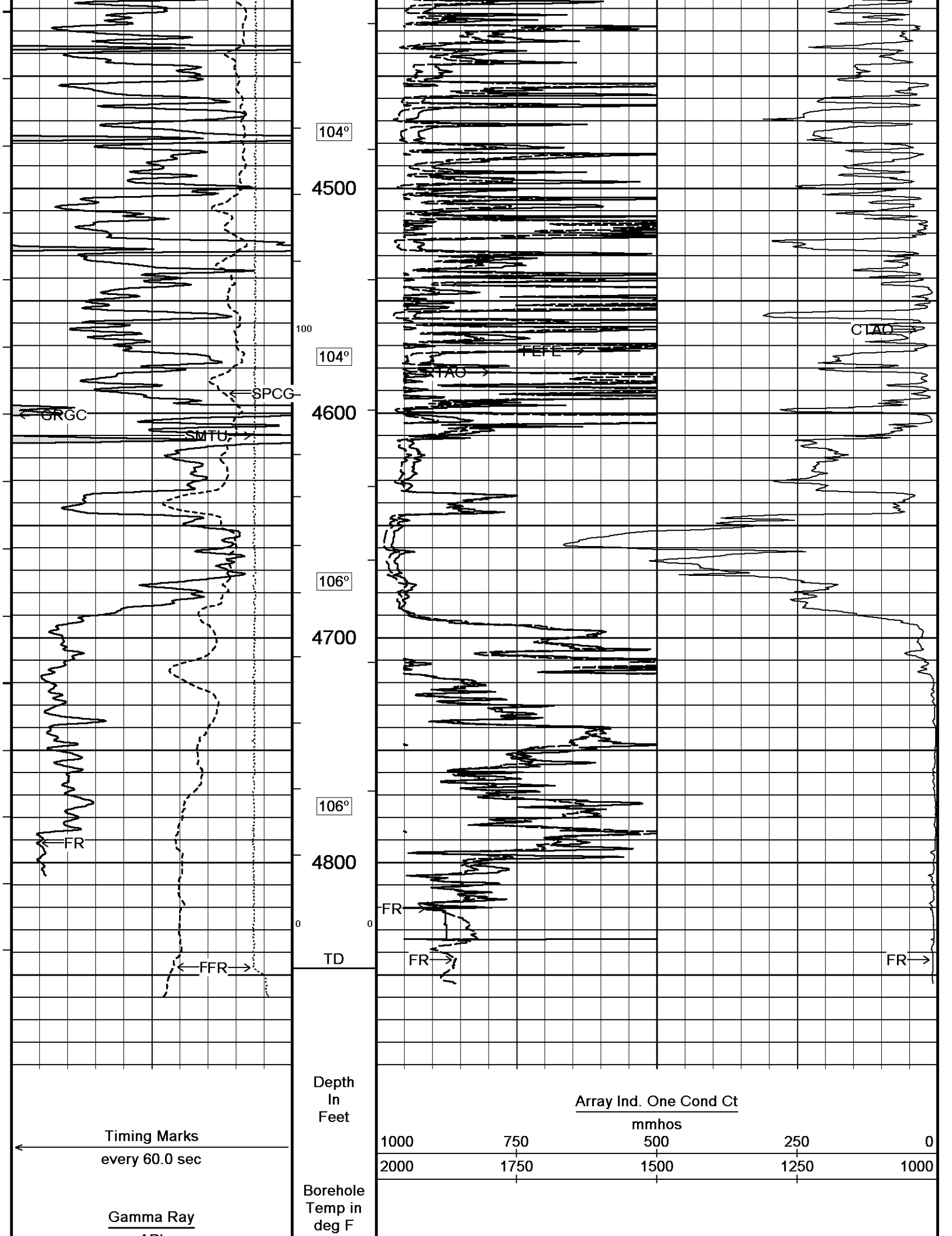
102°
300
4000
102°
4100
103°
4200
200
103°
4300
100
104°
4400


104°
4500
100
104°
SPCG
ORGC
SMTU
4600
106°
4700
106°
4800
FR
0
0
TD
FFR
FR
FR
FR
TEFE
STAO
CTAO
Depth
In
Feet
Timing Marks
every 60.0 sec
Gamma Ray
Array Ind. One Cond Ct
mmhos
1000
750
500
250
0
2000
1750
1500
1250
1000
Borehole
Temp in
deg F

API
0 75 150
150 225 300

HVI every 10 cu ft

Array Ind. One Res Rt
ohm metres
0 25 50
0 250 500

Spontaneous Potential
millivolts
− → | 20 | ← +

Annular Integral every 10 cu ft

Shallow FE
ohm metres
0 25 50
0 250 500

DST Uphole Tension
pounds
5000 0

Replay Scale 1:600

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta — Recorded on 23-JUN-2014 06:05
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

2 INCH MAIN

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta — Recorded on 23-JUN-2014 06:05
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

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

Depth In Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

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

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

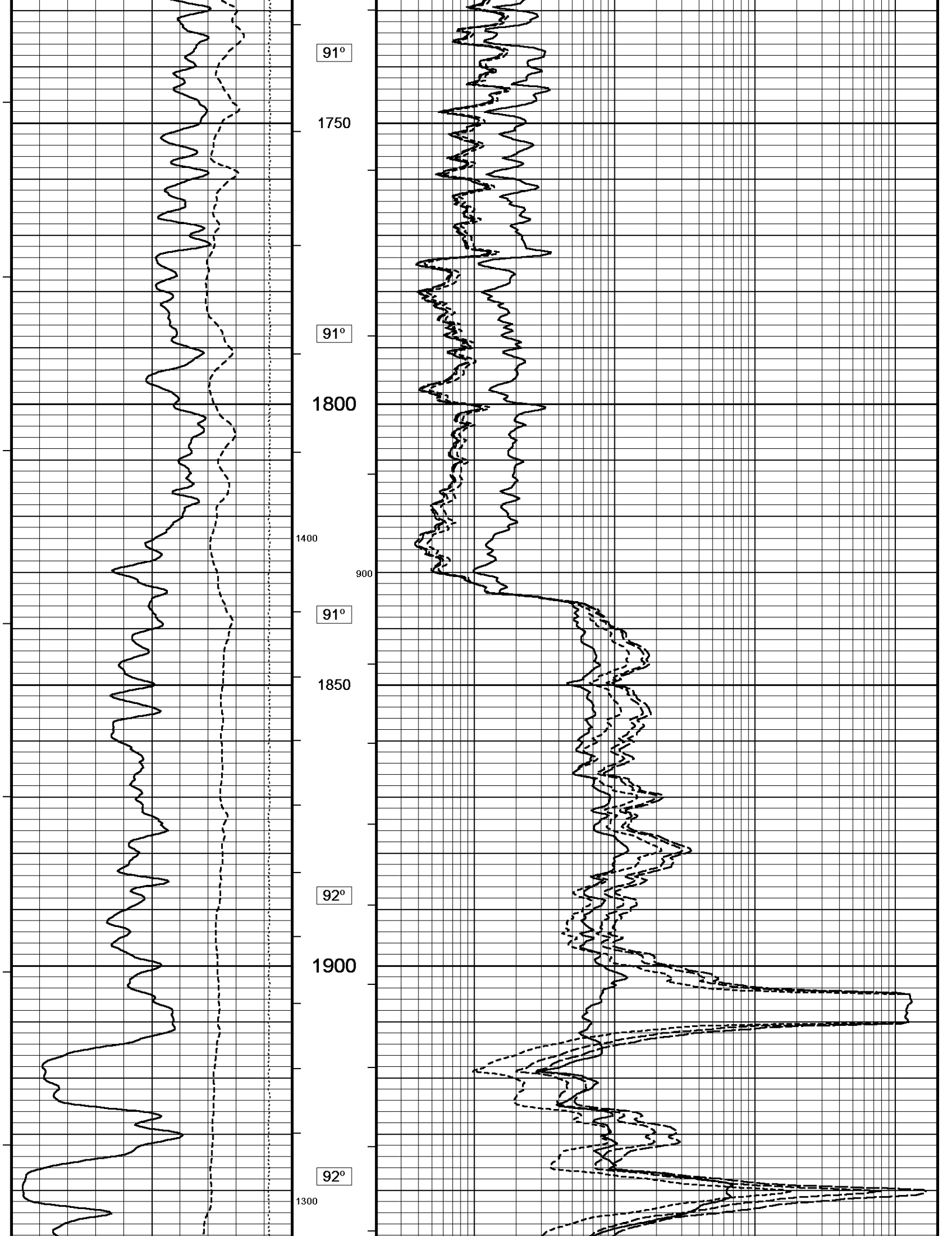
Array Ind. One Res Rt
ohm metres
0.20 1 10 100 2000

Shallow FE
ohm metres
0.20 1 10 100 2000

1684

Casing Shoe

1700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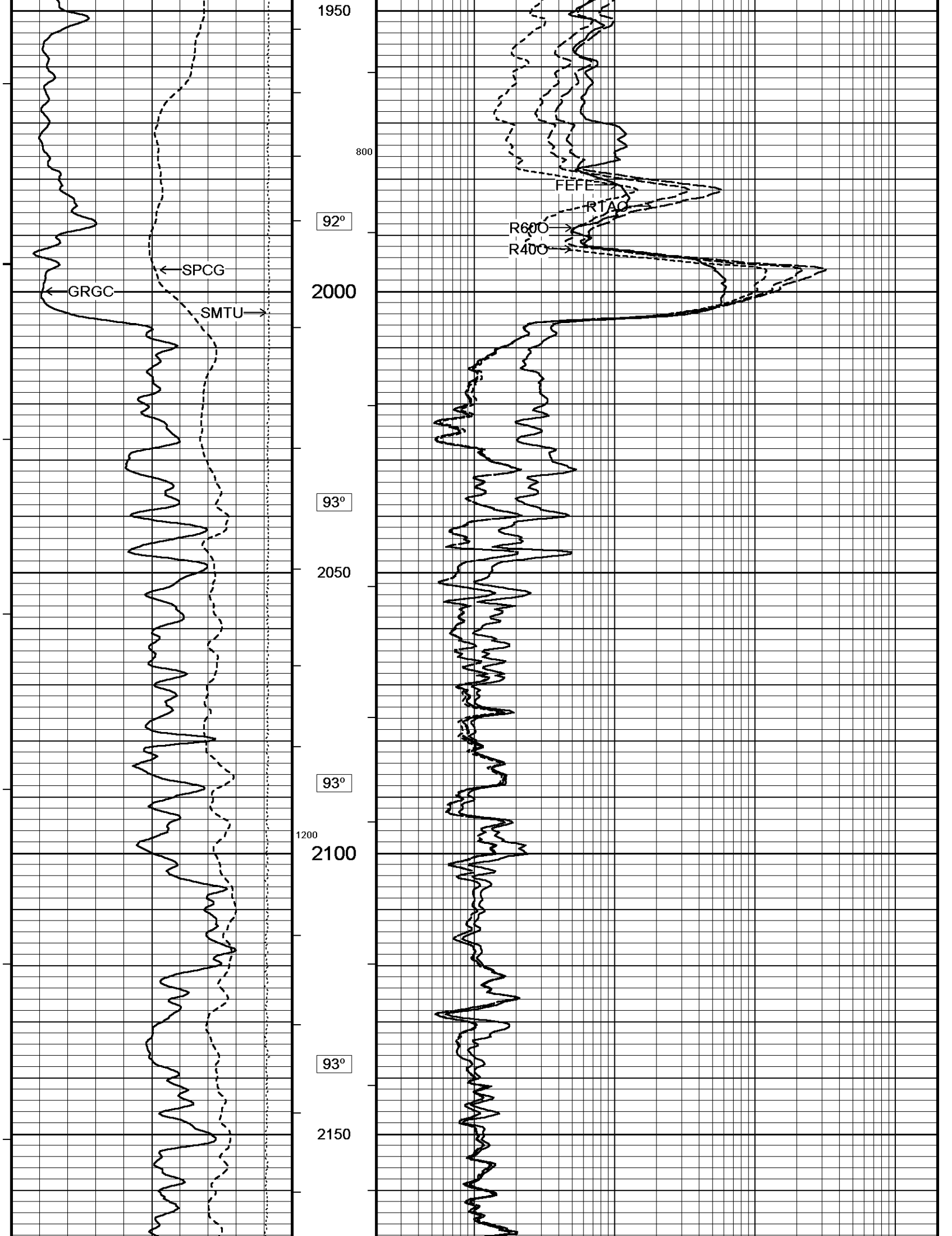
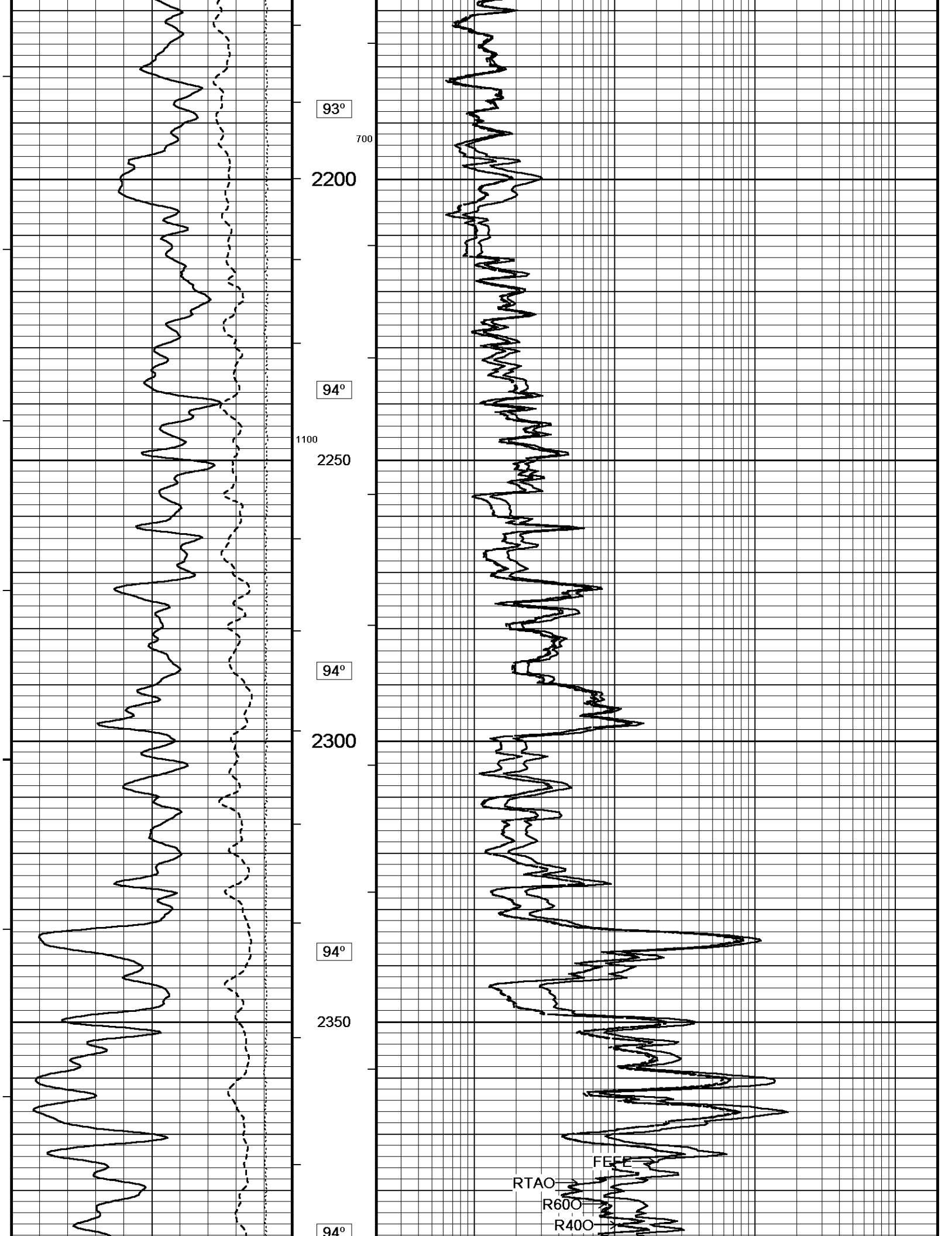
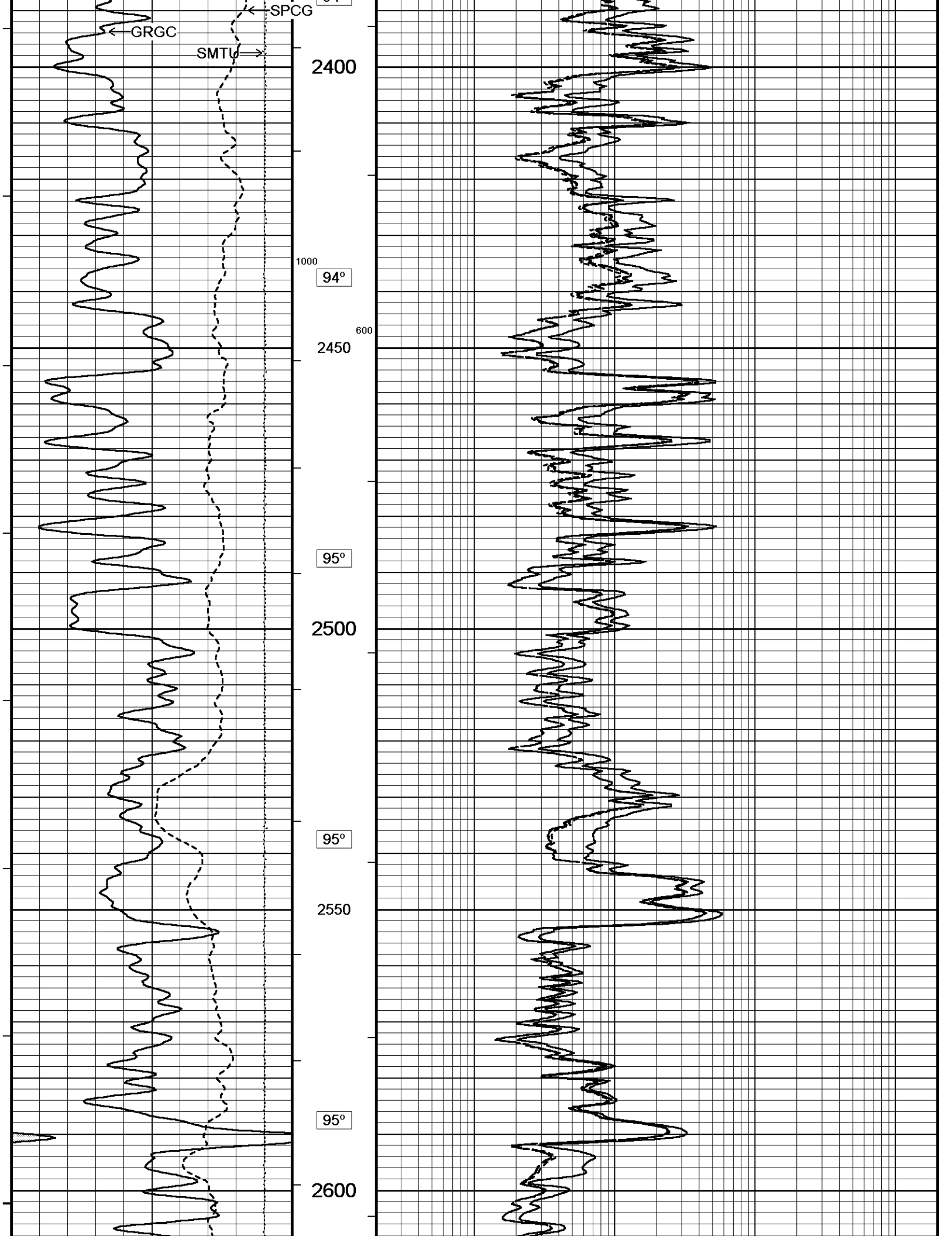
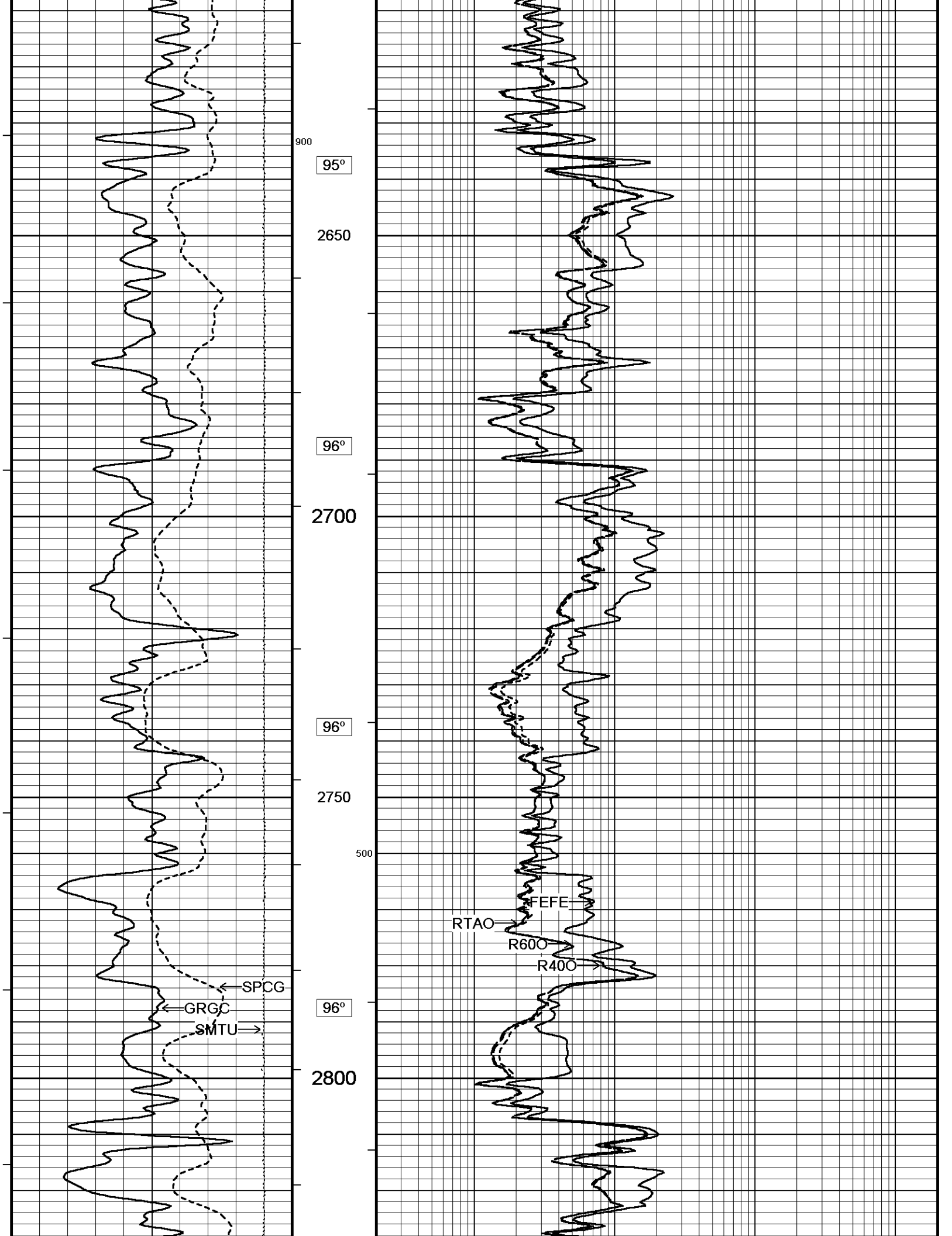
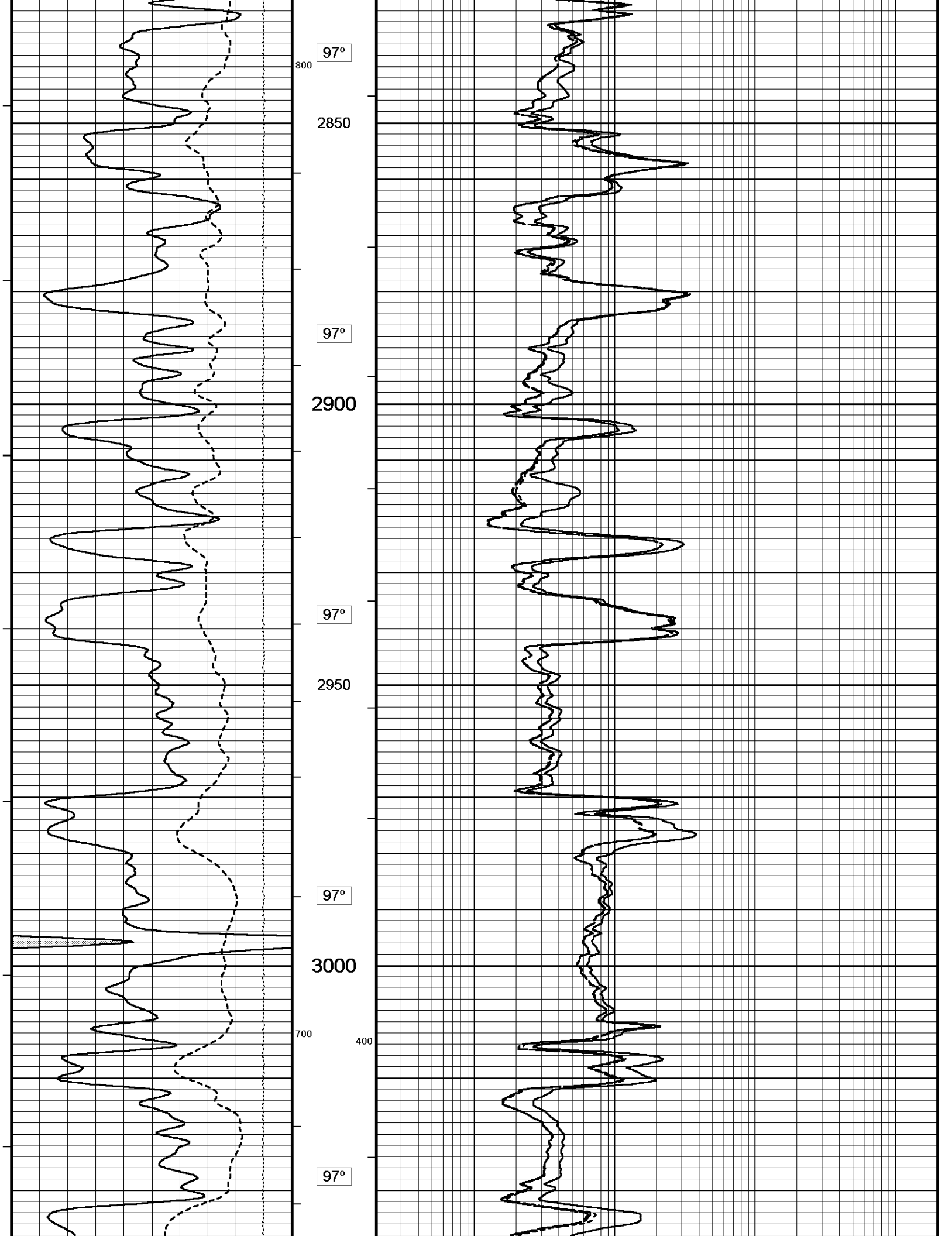
1750
91°
1800
1400
900
91°
1850
92°
1900
92°
1300

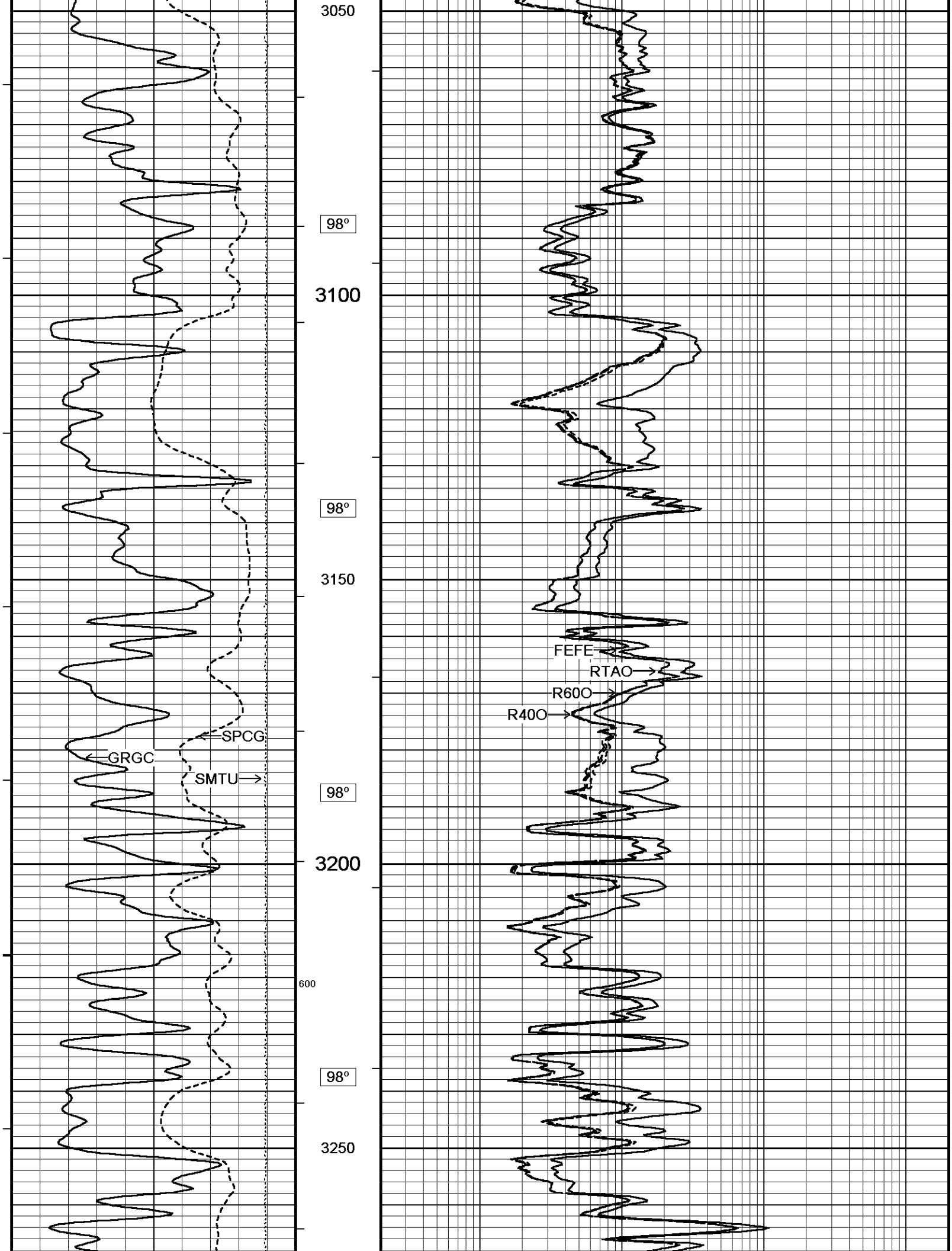

1950
800
FEFE
R1AO
92°
R60O
R40O
SPCG
GRGC
2000
SMTU
93°
2050
93°
1200
2100
93°
2150

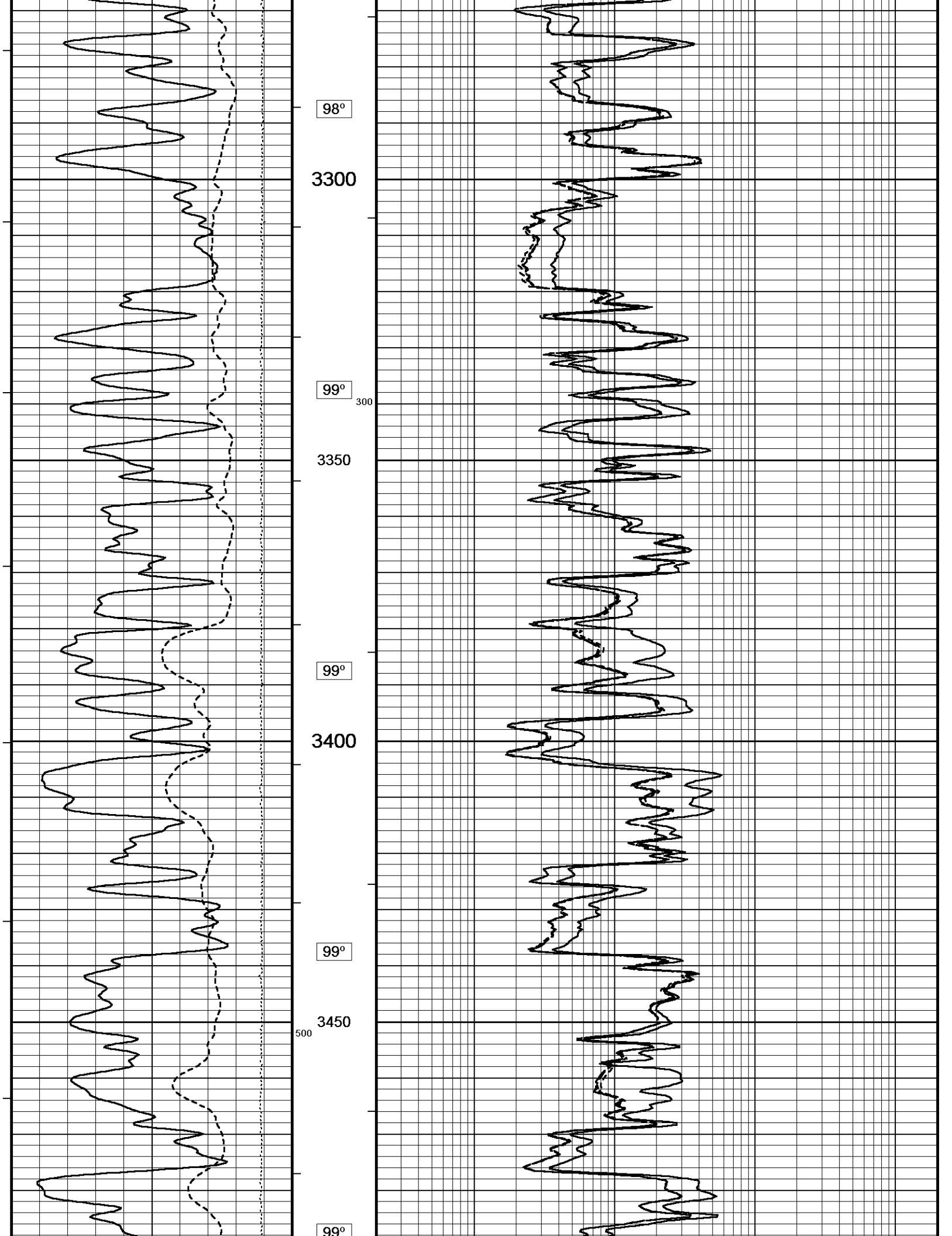

93°
700
2200
94°
1100
2250
94°
2300
94°
2350
94°
FEFE
RTAO
R60O
R40O

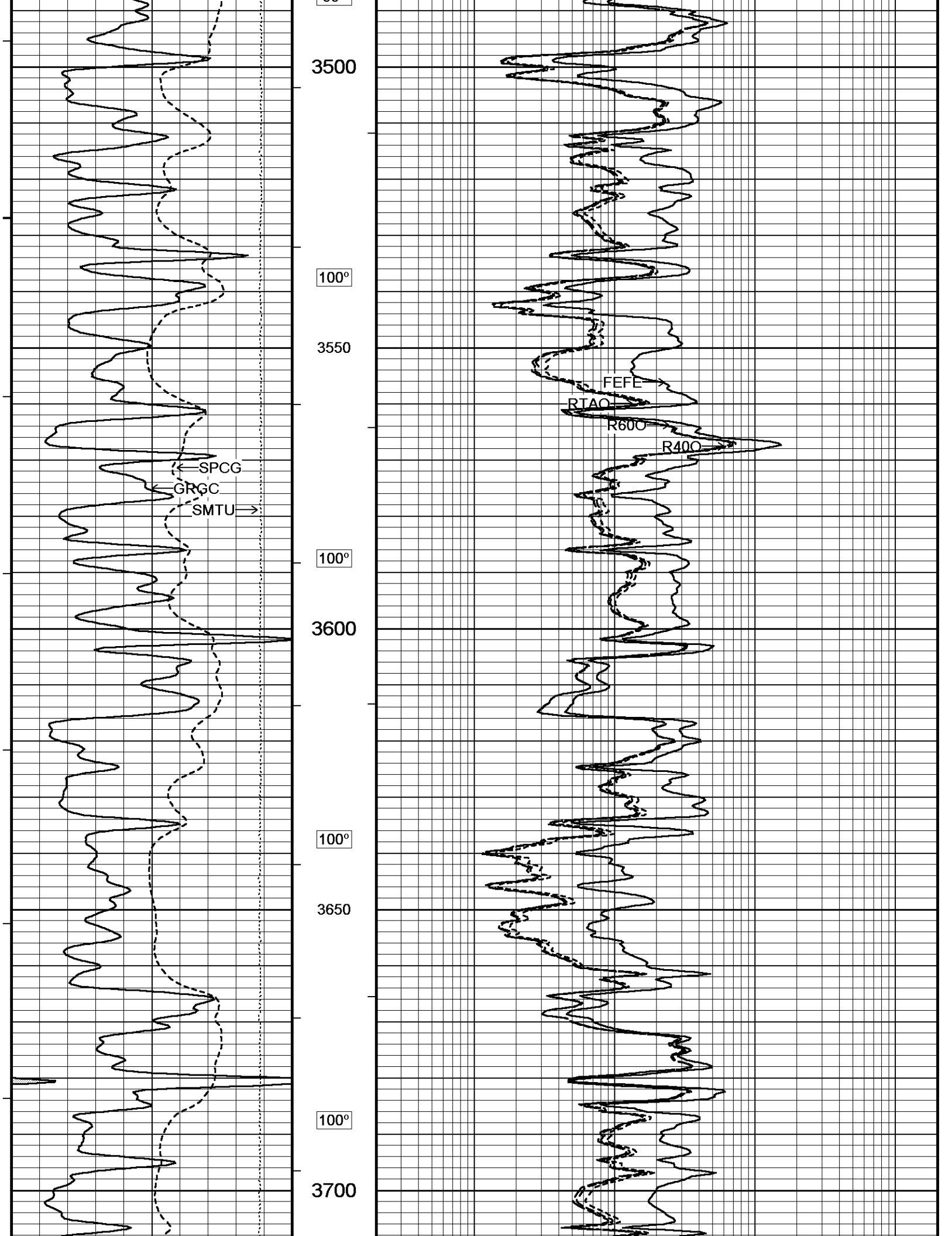

SPCG
GRGC
SMTU
2400
1000
94°
600
2450
95°
2500
95°
2550
95°
2600

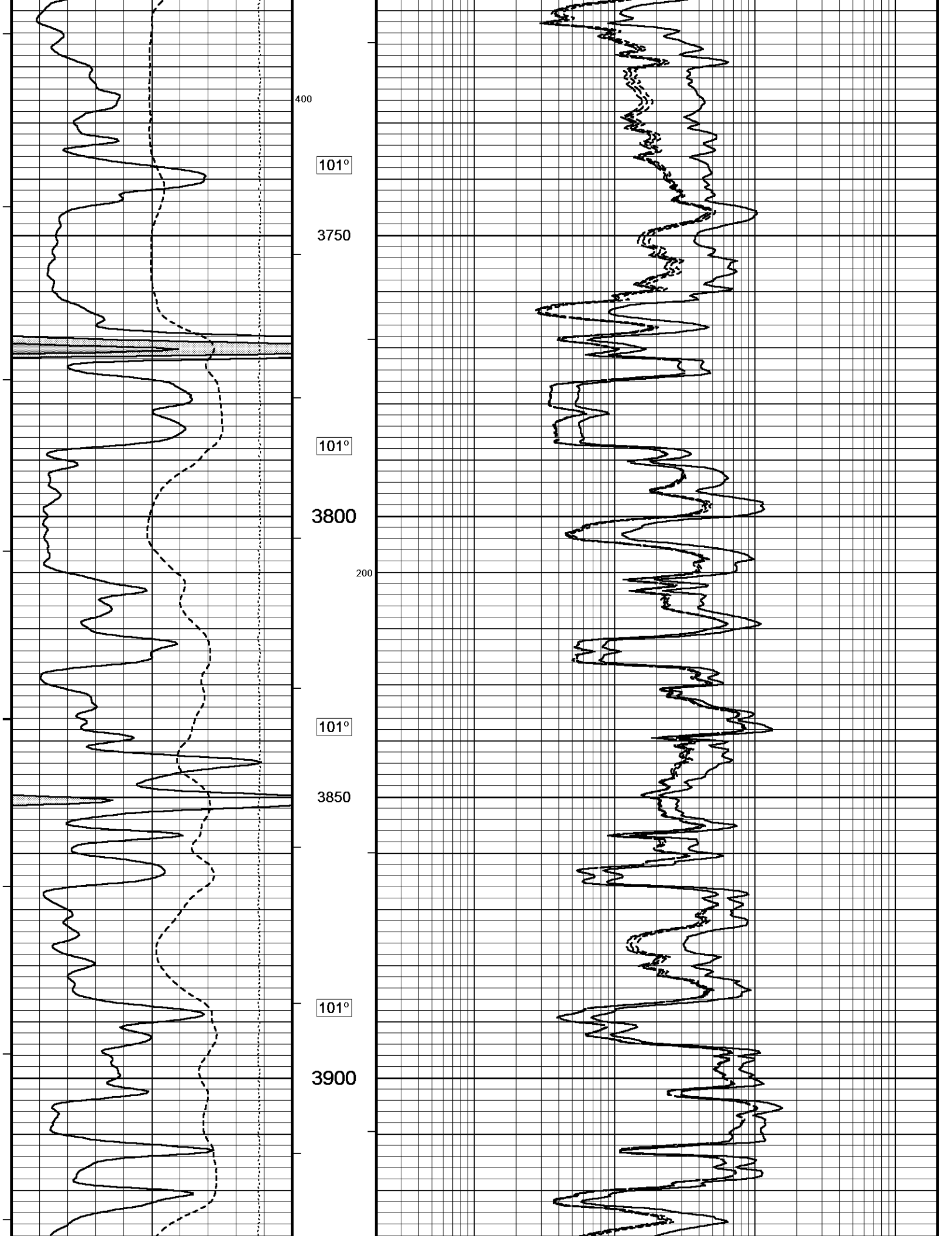

900
95°
2650
96°
2700
96°
2750
500
96°
2800
SPCG
GRGC
SMTU
FEFE
RTAO
R60O
R40O

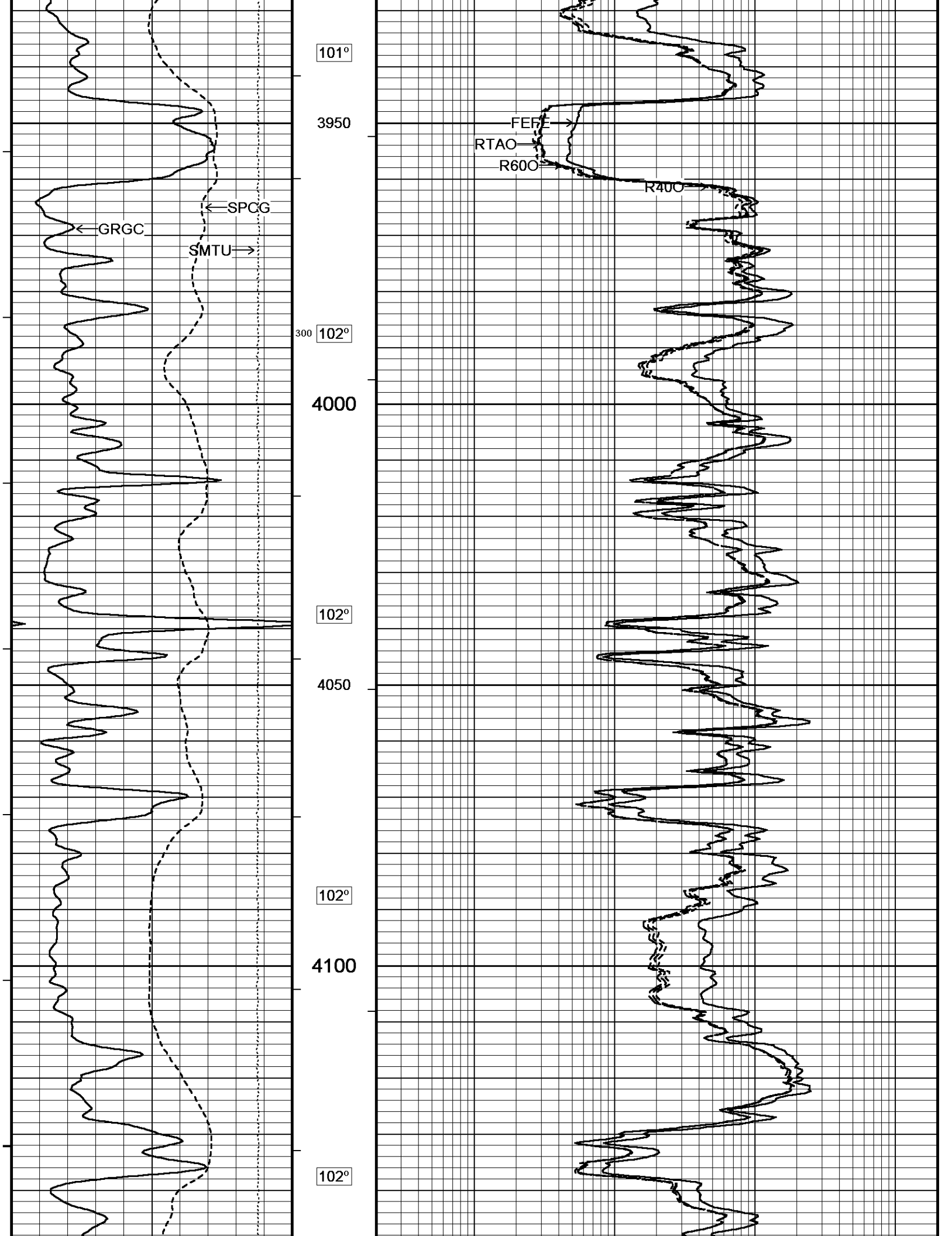

800
97°
2850
97°
2900
97°
2950
97°
3000
700
400
97°

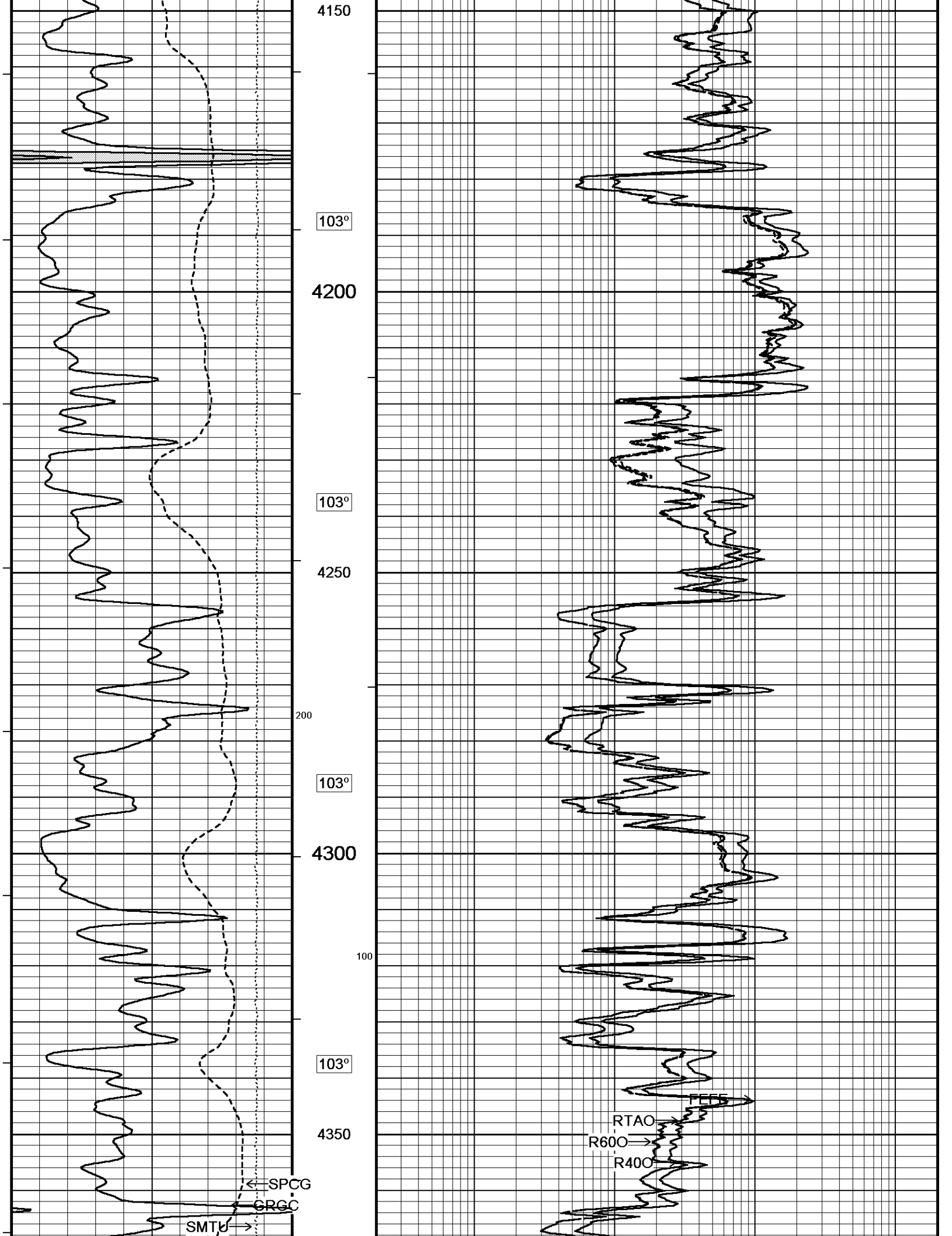

3050
98°
3100
98°
3150
98°
3200
600
98°
3250
SPCG
GRGC
SMTU
FEFE
RTAO
R60O
R40O

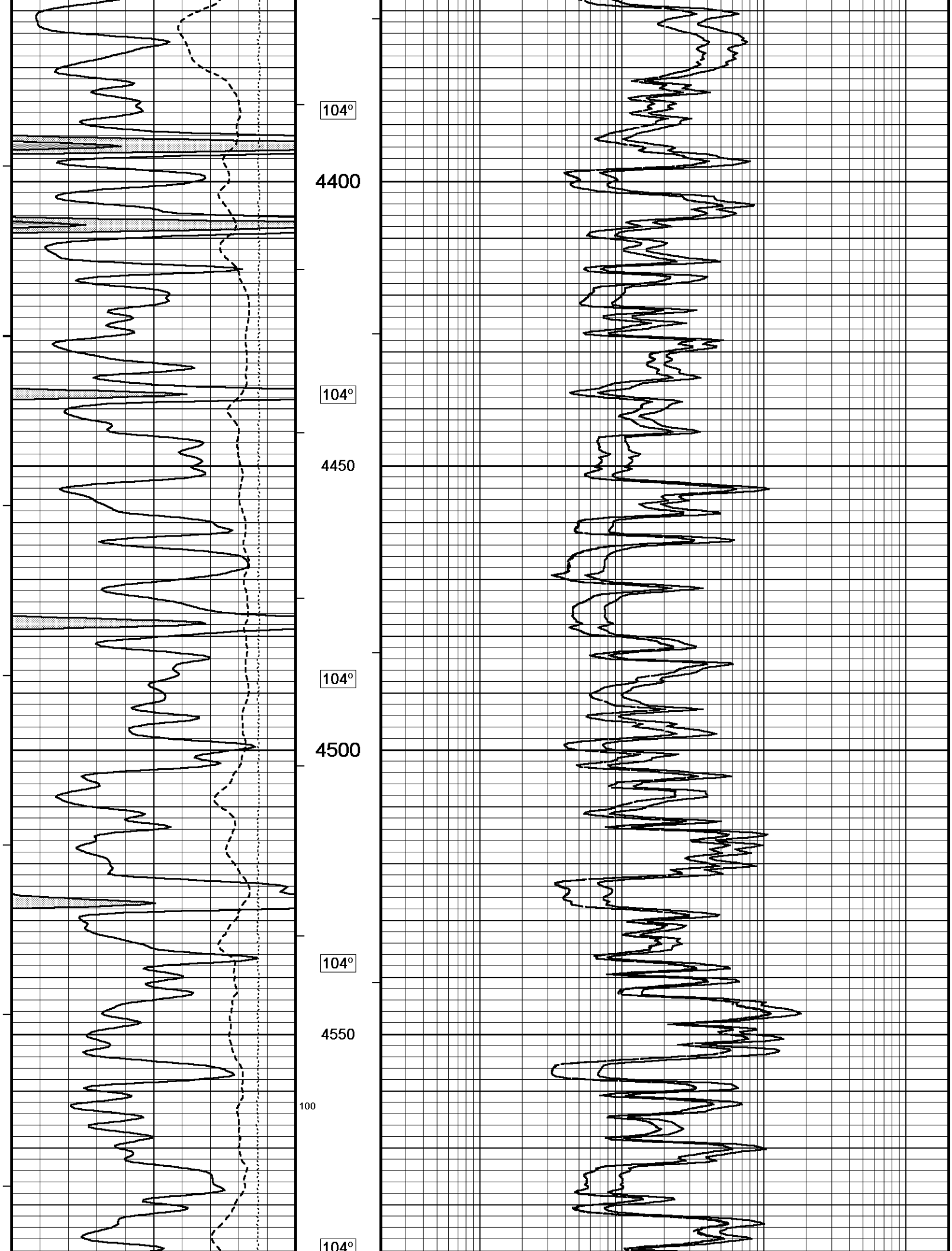

98°
3300
99°
300
3350
99°
3400
99°
3450
500
99°

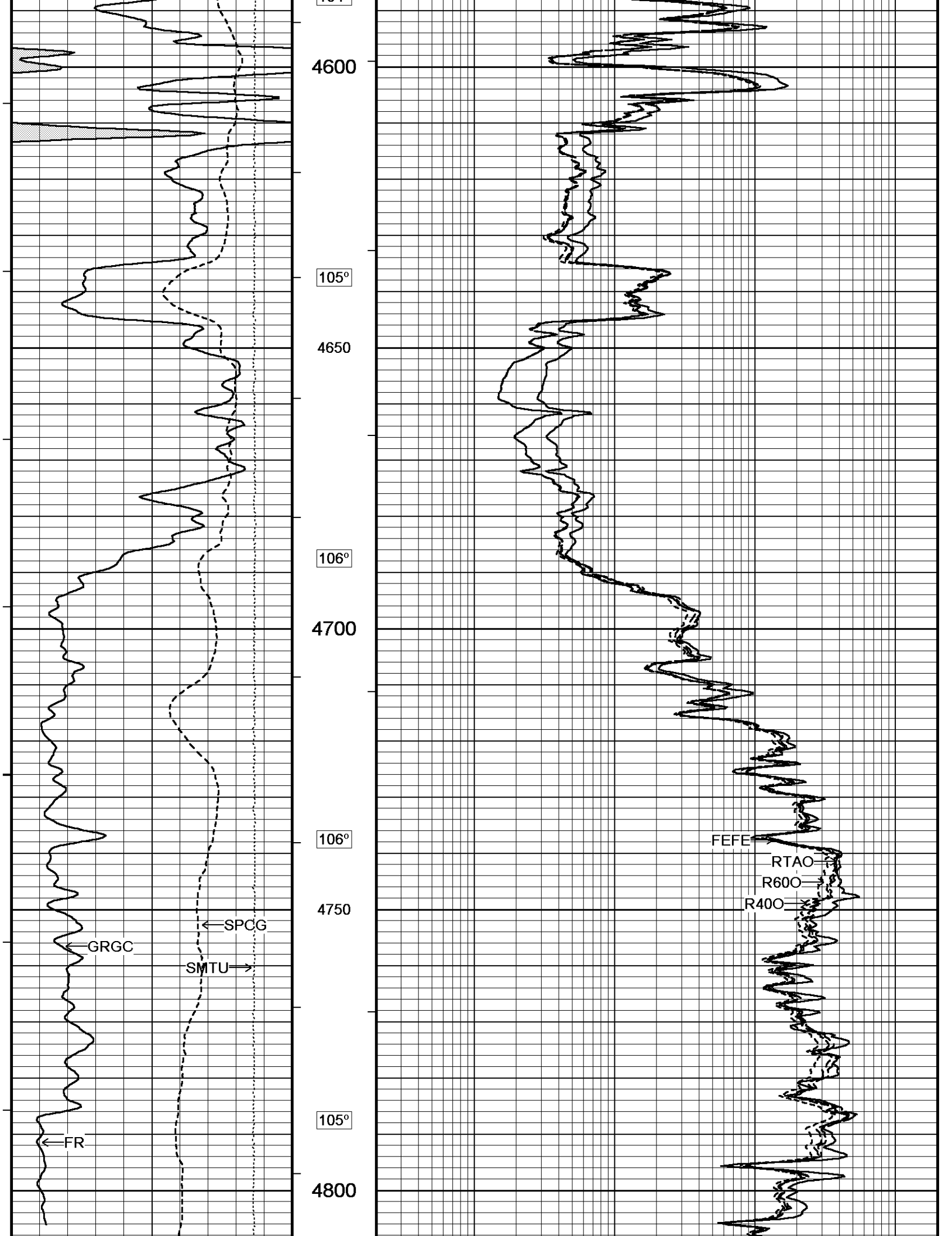

3500
100°
3550
FEFE
RTAO
R60O
R40O
SPCG
GRGC
SMTU
100°
3600
100°
3650
100°
3700

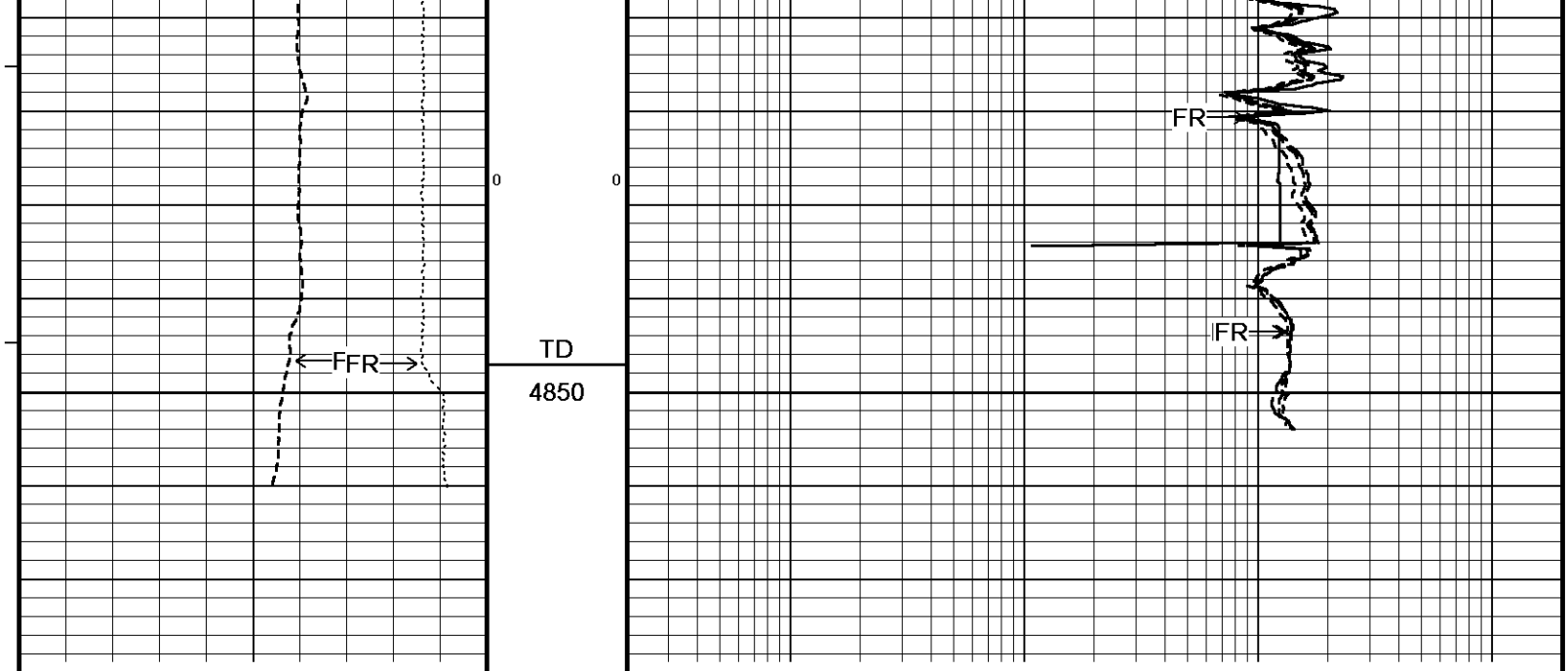

400
101°
3750
101°
3800
200
101°
3850
101°
3900


101°
3950
FERE
RTAO
R60O
R40O
SPCG
GRGC
SMTU
300
102°
4000
102°
4050
102°
4100
102°


4150
103°
4200
103°
4250
200
103°
4300
100
103°
4350
SPCG
GRGC
SMTU
FEFE
RTAO
R60O
R40O


104°
4400
104°
4450
104°
4500
104°
4550
100
104°


4600
105°
4650
106°
4700
106°
4750
105°
4800
SPCG
GRGC
SMTU
FR
FEFE
RTAO
R60O
R40O



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

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

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
0.20 2000
1 10 100 1000

Shallow FE
ohm metres
0.20 2000
1 10 100 1000

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta
Recorded on 23-JUN-2014 06:05
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

5 INCH MAIN

REPEAT SECTION

Depth based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Repeat.dta
Recorded on 23-JUN-2014 05:27
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

Depth in Feet

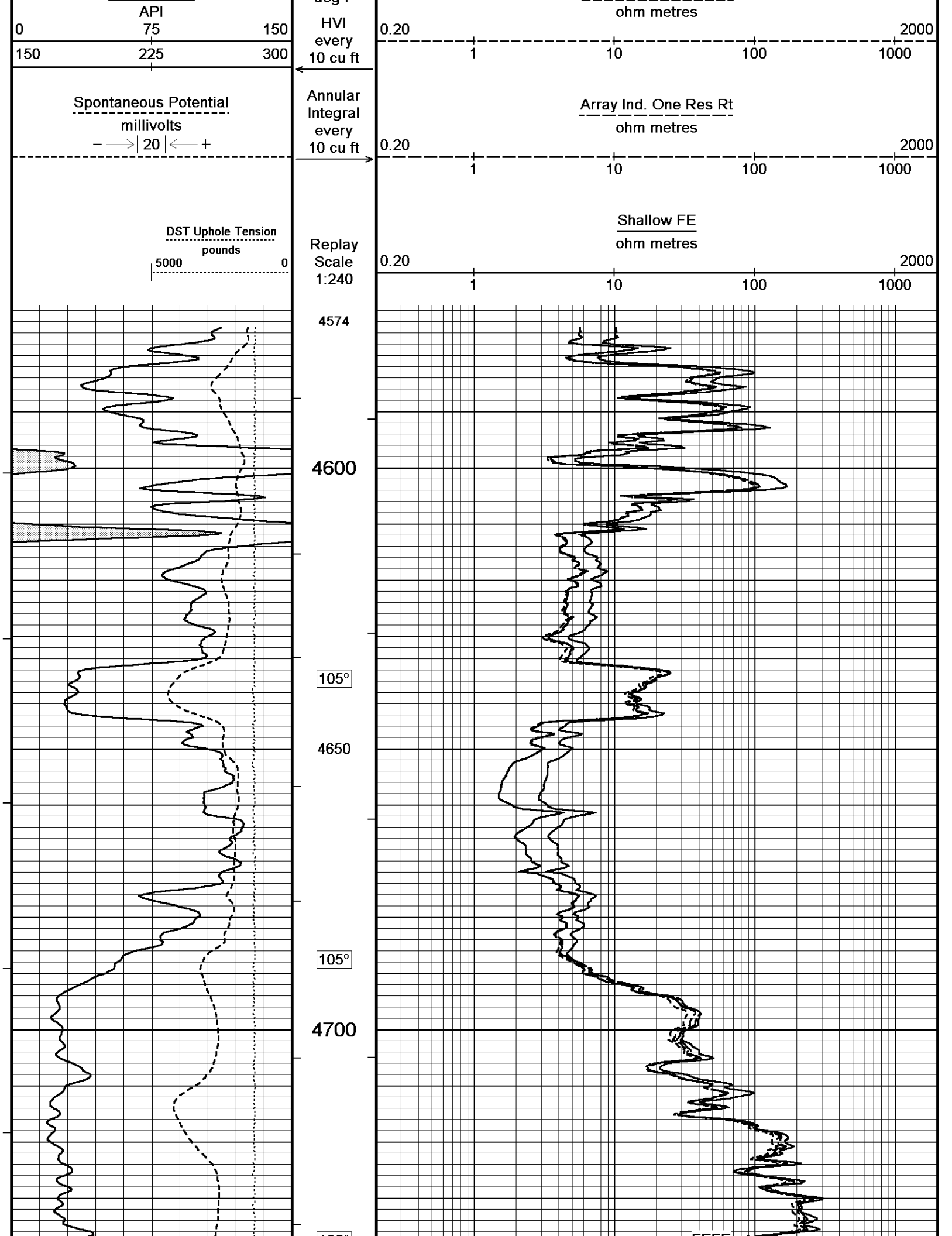
Timing Marks
every 60.0 sec

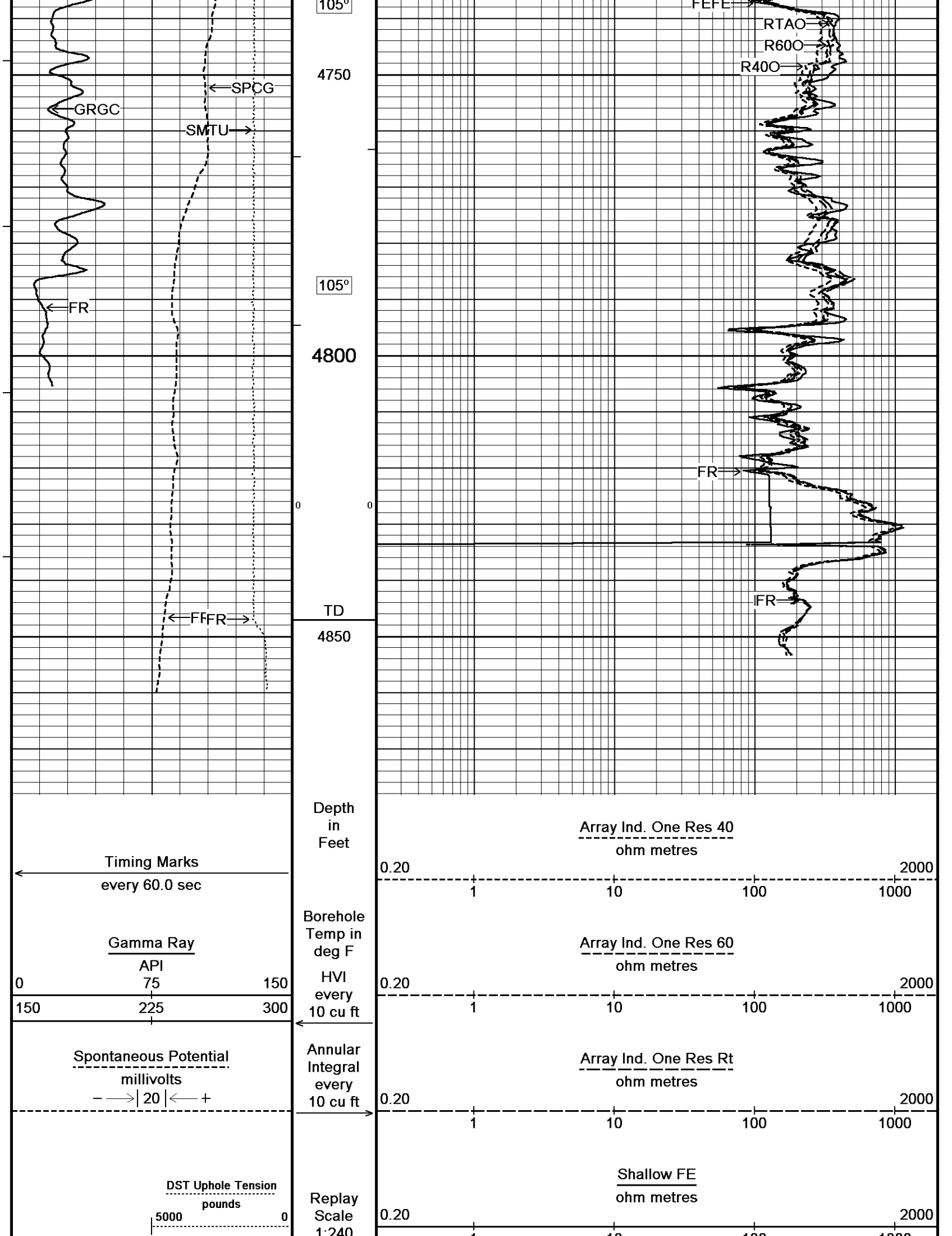
Gamma Ray

Borehole Temp in deg F

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

Array Ind. One Res 60


API
0
75
150
150
225
300
HVI
every
10 cu ft
Annular
Integral
every
10 cu ft
Spontaneous Potential
millivolts
– 20 +
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
ohm metres
0.20
2000
1
10
100
1000
Array Ind. One Res Rt
Shallow FE
4574
4600
105°
4650
105°
4700


105°
4750
SPCG
GRGC
SMTU
105°
FR
4800
0
0
FF
FR
TD
4850
FEFE
RTAO
R60O
R40O
FR
IFR
Depth in Feet
Timing Marks
every 60.0 sec
Gamma Ray
API
0
75
150
150
225
300
Borehole Temp in deg F
HVI every 10 cu ft
Spontaneous Potential
millivolts
20
Annular Integral every 10 cu ft
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
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
0.20
2000
1
10
100
1000
Shallow FE
ohm metres
0.20
2000

1:240	1	10	100	1000

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Repeat.dta — Recorded on 23-JUN-2014 05:27
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta

General Constants All 000

Last Edited on 23-JUN-2014,03:06

General Parameters		
Mud Resistivity	0.850	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	5.500	inches
Caliper for Differential Caliper	MML Caliper	
Rwa Parameters		
Porosity used	Wyllie Lime. Sonic Por.	
Resistivity used	Array Ind. One 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 22-JUN-2014 22:28

	Measured	Calibrated (API)
Background	77	51
Calibrator (Gross)	1163	776
Calibrator (Net)	1086	725

Gamma Constants MCG-D.K 469

Last Edited on 23-JUN-2014,02:57

Gamma Calibrator Number	GRC038	
Mud Density	1.08	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 12-MAY-2014,02:16

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 469

Last Edited on 12-JUN-2014,06:51

Pre-filter Length	11

FE Calibration MFE-A.A 135

Base Calibration on 03-JUN-2014 20:44
Field Check on 22-JUN-2014 22:08

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.0	126.8
Base Check		281.2
Field Check		281.3

FE Constants MFE-A.A 135

Last Edited on 23-JUN-2014,03:06

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 111

Base Calibration on 26-MAY-2010,08:56
Field Check on 22-JUN-2014 22:05

Base Calibration

Test Loop Calibration

Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	17.6	473.6	9.3	966.2
2	6.4	385.9	7.6	821.4
3	3.2	264.0	5.2	566.0
4	2.1	135.5	2.6	279.2

Array Temperature 23.0 Deg F

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High
1	13.8	3868.8	13.1	3868.9
2	30.1	3522.6	29.9	3523.7
3	29.1	3016.3	29.1	3017.4
4	19.1	2055.0	19.1	2055.8
Deep	17.8	1958.9	17.7	1959.5
Medium	43.0	3969.5	43.0	3971.3
Shallow	44.8	5224.6	44.7	5226.3

Array Temperature 89.1 76.0 Deg F

Induction Constants MAI-A.A 111

Last Edited on 23-JUN-2014,03:06

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	

Source for Rxo 0.00

Caliper Calibration MPD-C.A 216

Base Calibration on 18-JUN-2014 10:39
Field Calibration on 22-JUN-2014 22:12

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16948	3.99
2	27088	5.98
3	37015	7.97
4	46800	9.86
5	58001	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.93	7.97

DOWNHOLE EQUIPMENT

C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 469 LG: 8.70 ft WT: 63.9 lb OD: 2.240 in

Compact Micro-log
MML-A 3 LG: 7.97 ft WT: 81.6 lb OD: 2.240 in

Compact Neutron
MDN-A.B 66 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.449 in

Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Sonic
MSS-C.K 330 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 62.25 ft Weight: 471.8 lb

55.39 ft	GRGC - Gamma Ray
52.48 ft	CGXT - MCG External Temperature
45.76 ft	MINV - Micro-inverse
45.76 ft	MNRL - Micro-normal
46.76 ft	MLTC - MML Caliper
40.97 ft	NPRL - Limestone Neutron Por.
33.73 ft	CLDC - Density Caliper
33.73 ft	AVOL - Annular Volume
33.73 ft	HVOL - Hole Volume
31.80 ft	DPRL - Limestone Density Por.
31.80 ft	DEN - Compensated Density
31.80 ft	DCOR - Density Correction
31.74 ft	PDPE - PE
26.24 ft	FEFE - Shallow FE
12.96 ft	DT35 - 3-5' Compensated Sonic
12.96 ft	SPRL - Wyllie Lime. Sonic Por.
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	RTAO - Array Ind. One Res Rt
3.34 ft	R60O - Array Ind. One Res 60
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension

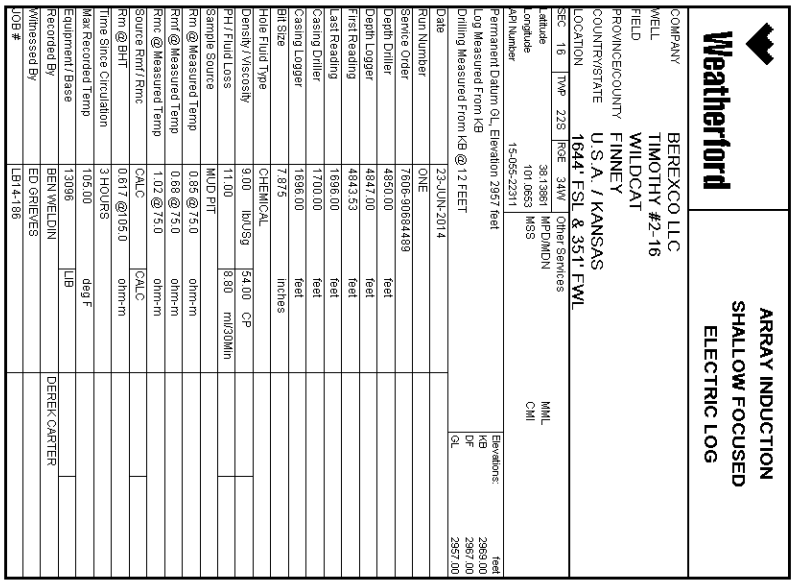
All measurements relative to tool zero.

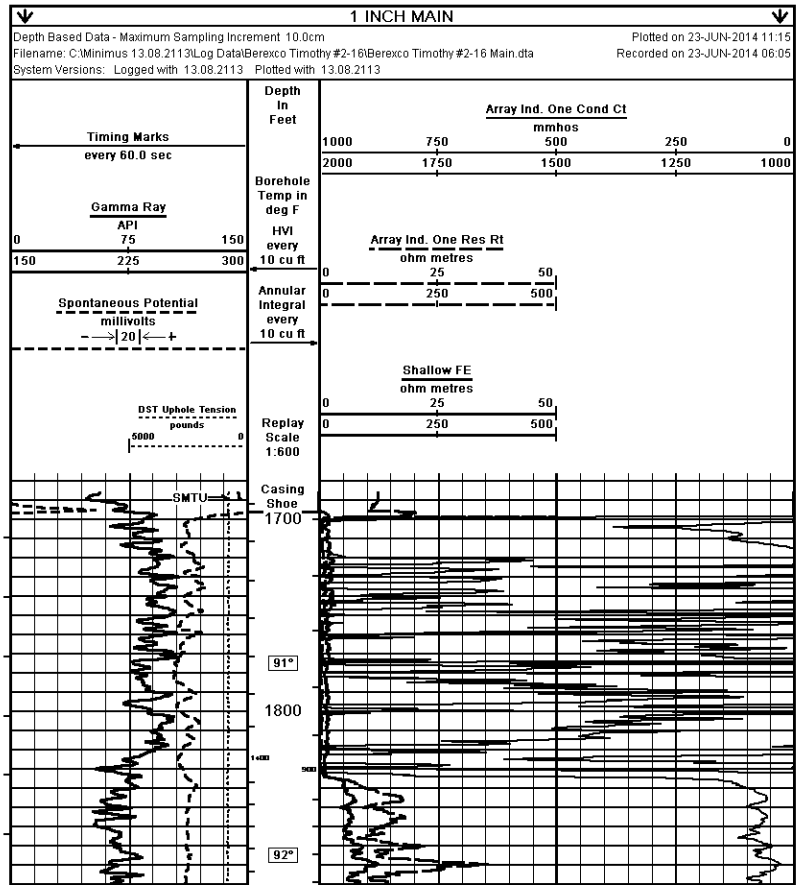
COMPANY	BEREXCO LLC
WELL	TIMOTHY #2-16
FIELD	WILDCAT
PROVINCE/COUNTY	FINNEY
COUNTRY/STATE	U.S.A. / KANSAS

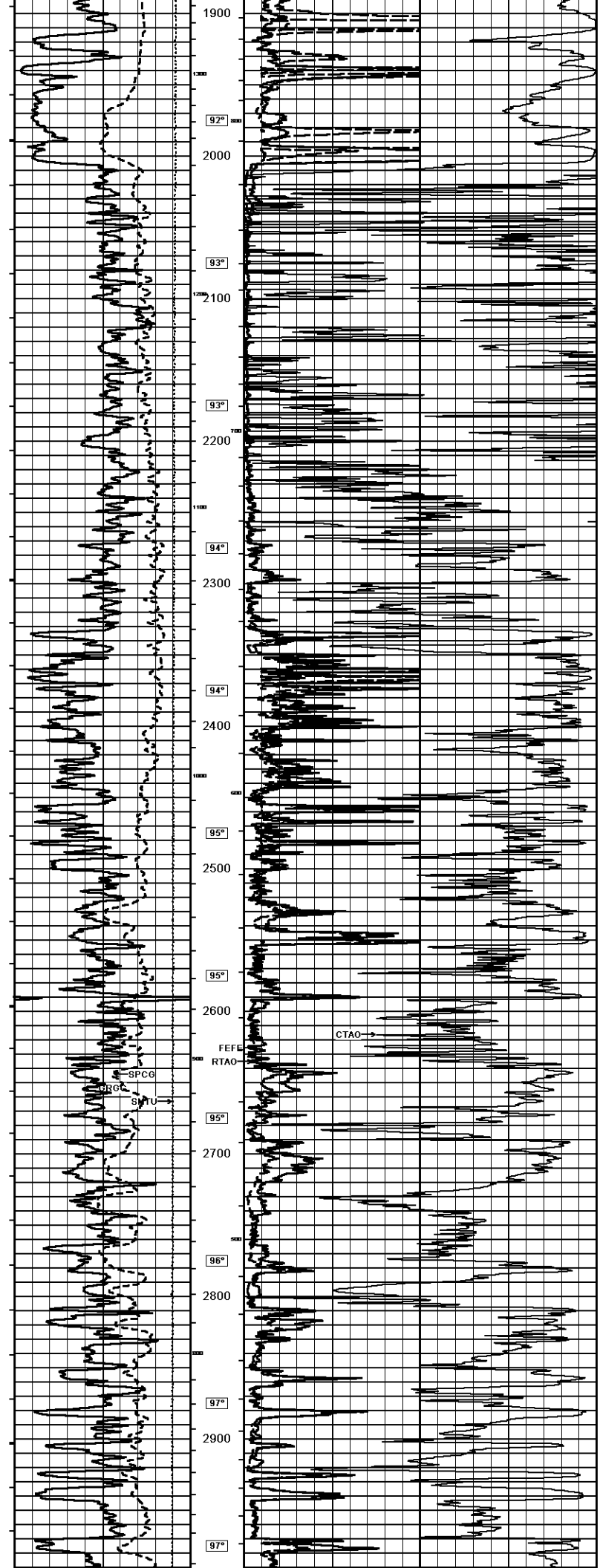
Elevation Kelly Bushing	2969.00	feet	First Reading	4843.53	feet
Elevation Drill Floor	2967.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	2957.00	feet	Depth Logger	4847.00	feet

Weatherford®

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG



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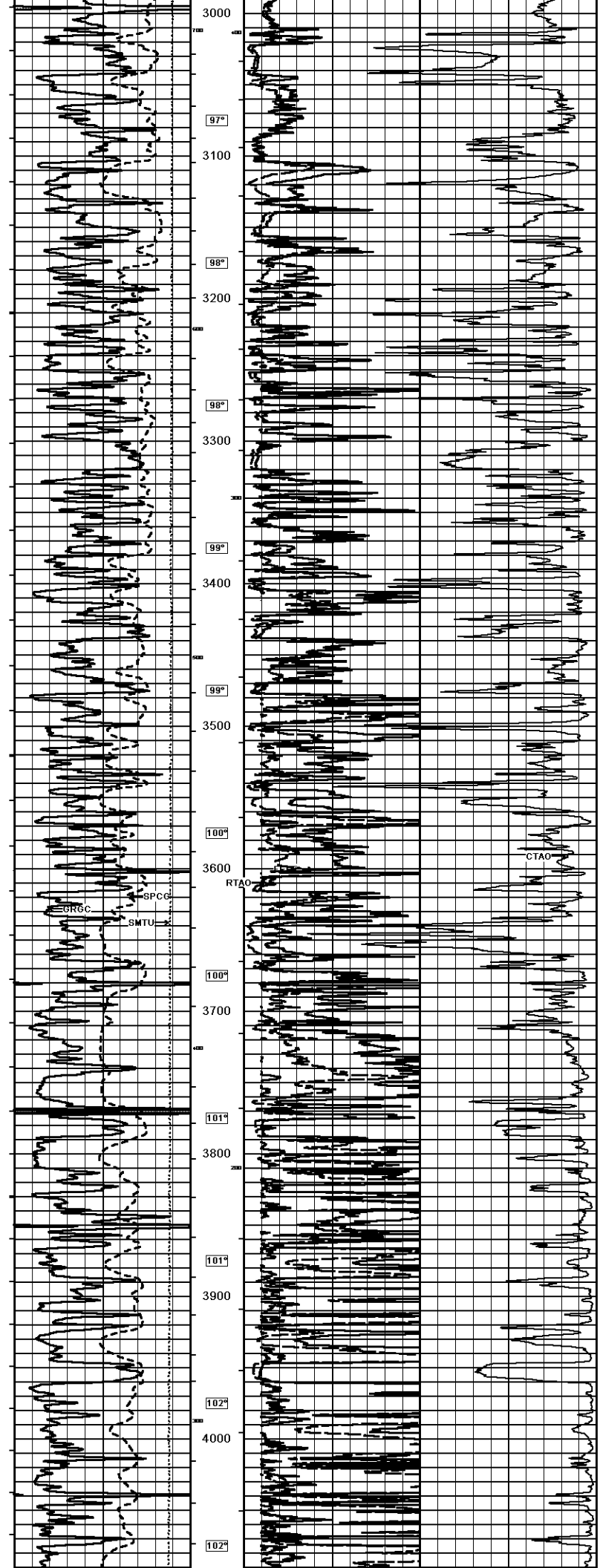
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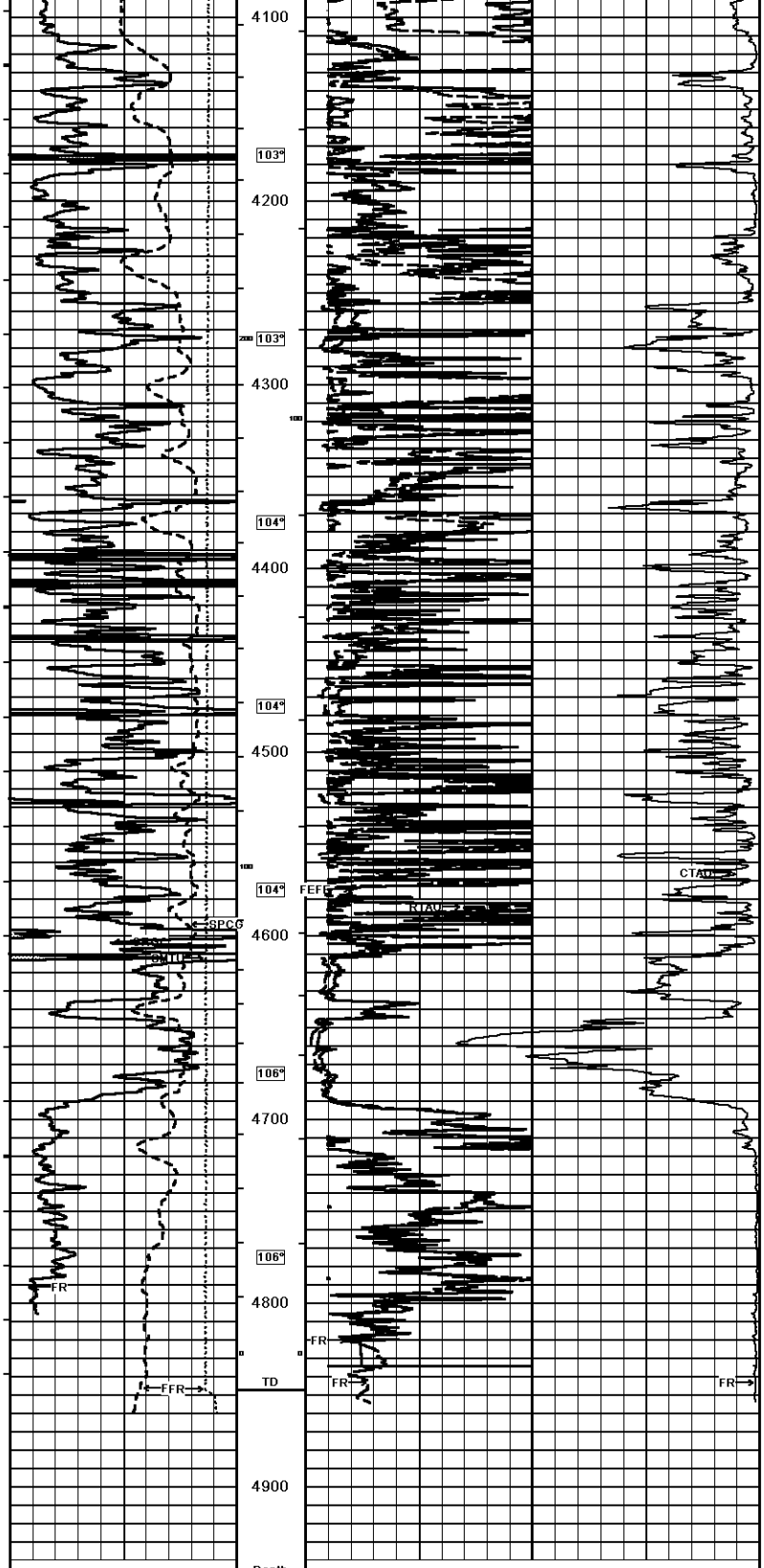
4000
102°
RTAO
CTAO
SPCG
GRGC
SMTU



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

Depth In Feet

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:600

Array Ind. One Cond Ct
mmhos
1000 750 500 250 0
2000 1750 1500 1250 1000

Array Ind. One Res Rt
ohm metres
0 25 50
0 250 500

Shallow FE
ohm metres
0 25 50
0 250 500

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 23-JUN-2014 11:15
Filename: C:\Minimus 13.08.2113\Log Data\Berexco Timothy #2-16\Berexco Timothy #2-16 Main.dta
Recorded on 23-JUN-2014 06:05
System Versions: Logged with 13.08.2113 Plotted with 13.08.2113

1 INCH MAIN

COMPANY	BEREXCO LLC
WELL	TIMOTHY #2-16
FIELD	WILDCAT
PROVINCE/COUNTY	FINNEY
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2969.00	feet	First Reading	4843.53	feet
Elevation Drill Floor	2967.00	feet	Depth Driller	4850.00	feet
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Weatherford

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ELECTRIC LOG