Weatherford

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

COMPANY	LARSON ENGINEERING, INC
WELL	KIRSTING-WILLIAMS #1-1
FIELD	WILDCAT
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / KANSAS
LOCATION	330' FSL & 2790' FWL

SEC 1	TWP 26S	RGE 21W
Latitude		
Longitude		
API Number	15-057-20966	

Other Services
MDN/MPD MML
SGS

Permanent Datum GL, Elevation 2263 feet
Log Measured From KB
Drilling Measured From KB @ 9 feet

Elevations:	feet
KB	2272.00
DF	2270.00
GL	2263.00

Date	14-OCT-2015			
Run Number	ONE			
Service Order	7577-131963122			
Depth Driller	4850.00	feet		
Depth Logger	4850.00	feet		
First Reading	4847.00	feet		
Last Reading	265.00	feet		
Casing Driller	265.00	feet		
Casing Logger	265.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	9.30 lb/USg	65.00 CP		
PH / Fluid Loss	9.50	10.00 ml/30Min		
Sample Source	MUD PIT			
Rm @ Measured Temp	0.74 @ 75.0	ohm-m		
Rmf @ Measured Temp	0.59 @ 75.0	ohm-m		
Rmc @ Measured Temp	0.89 @ 75.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.52 @110.0	ohm-m		
Time Since Circulation	4 HOURS			
Max Recorded Temp	110.00	deg F		
Equipment / Base	13096	OKC		
Recorded By	JEFFREY RANDLE			
Witnessed By	VERN SCHRAG		THOMAS LARSON	

BOREHOLE RECORD

Last Edited: 14-OCT-2015 06:42

Bit Size inches	Depth From feet	Depth To feet
12.250	0.00	270.00
7.875	270.00	4850.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	265.00	36.00

REMARKS

- SOFTWARE ISSUE: WLS 15.03.5939.
- TOOL STRING: MCG, SGS, MML, MDN, MPD, MFE, MAI RUN IN COMBINATION.
- HARDWARE: MDN: DUAL BOWSPRING ECCENTRALIZER.
  MPD: 8 INCH PROFILE PLATE FITTED.
  MFE: 1 X 0.5 INCH STANDOFF.
  MAI: 2 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.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING.: 2069 CU. FT.

- ANNULAR HOLE VOLUME WITH 5.5 INCH CASING FROM TD TO SURFACE CASING.: 1312 CU. FT.

- RIG: HD #3.

- ENGINEER: JEFFREY RANDLE.

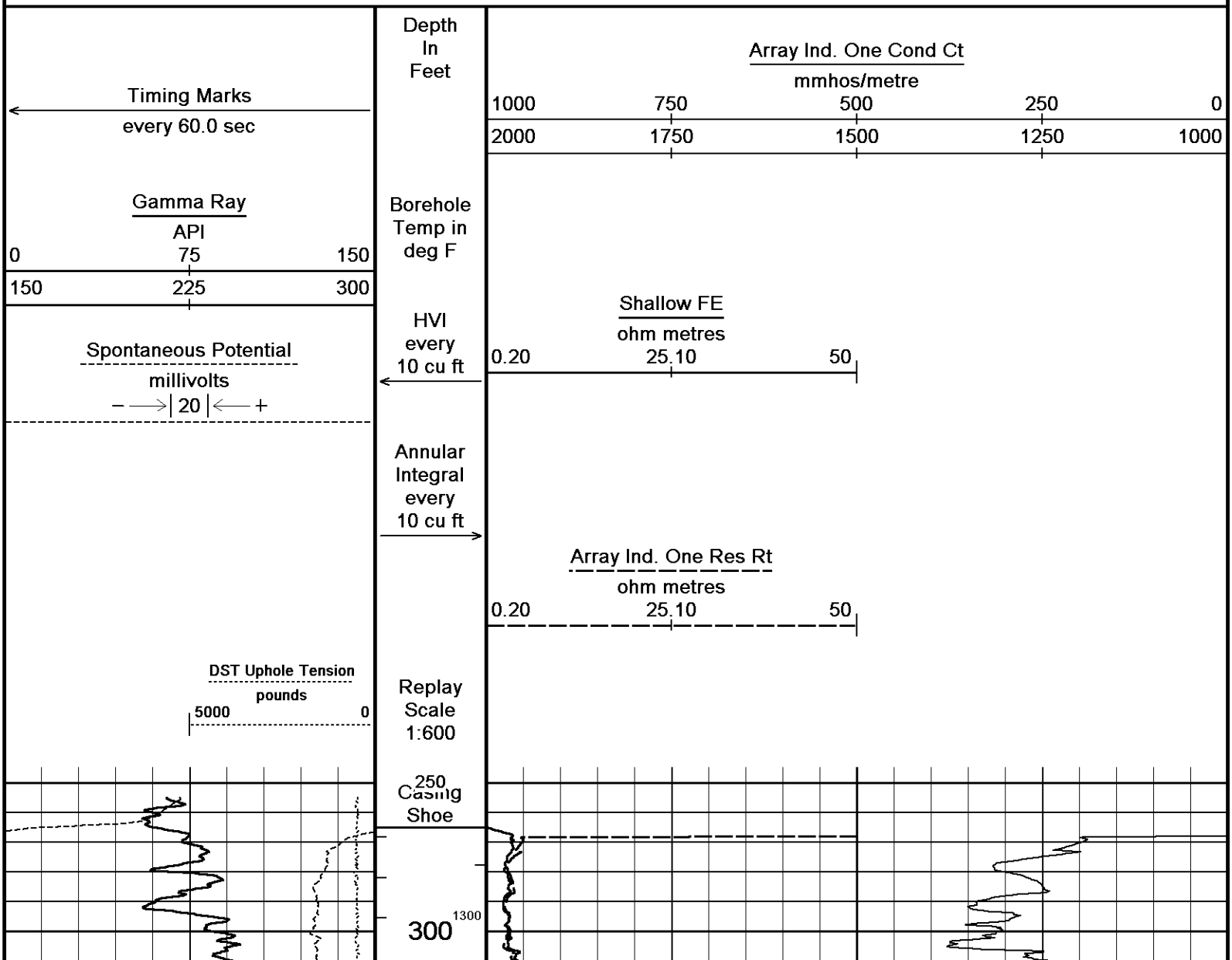
- OPERATOR: JOHN LAPOINT.

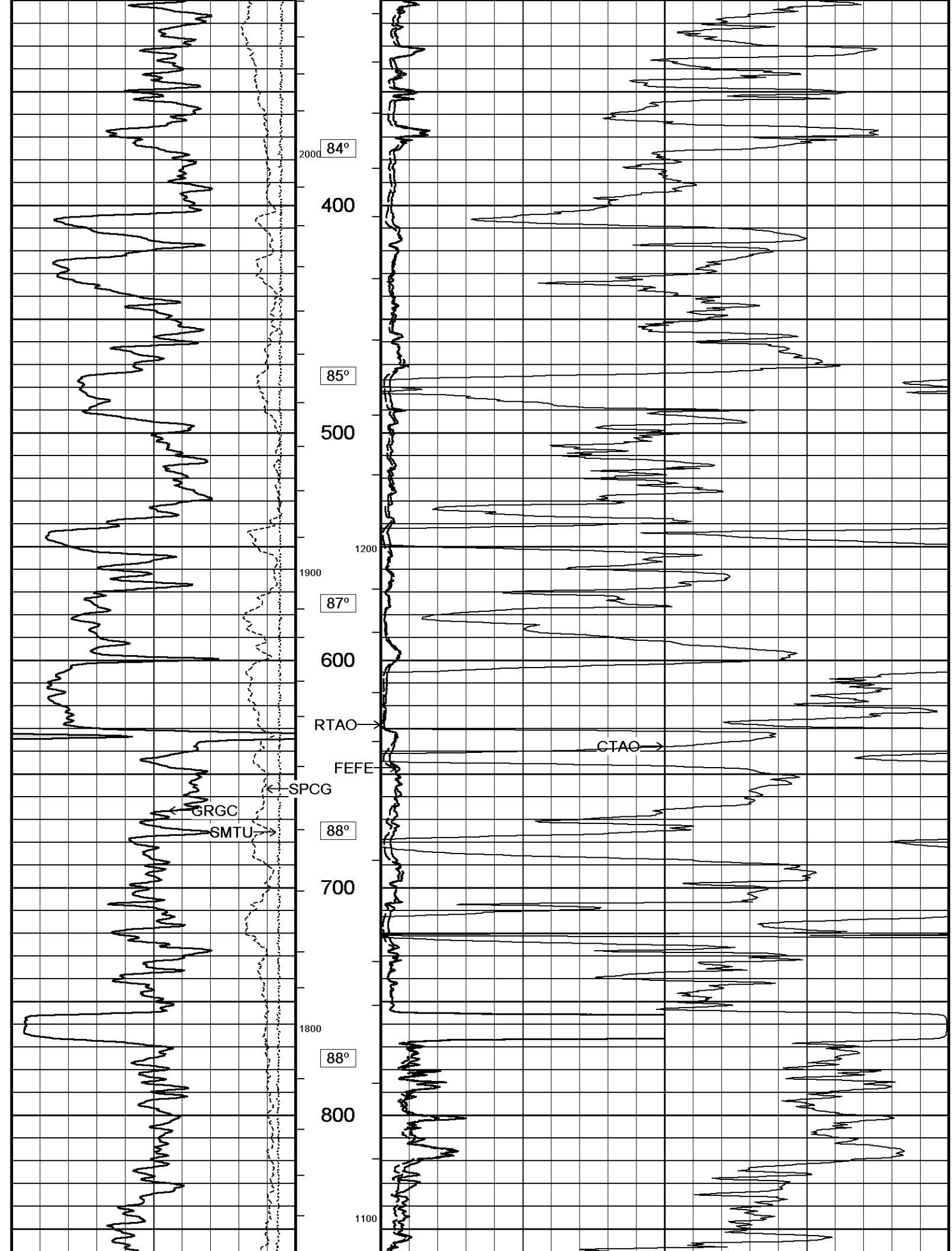
2 INCH MAIN

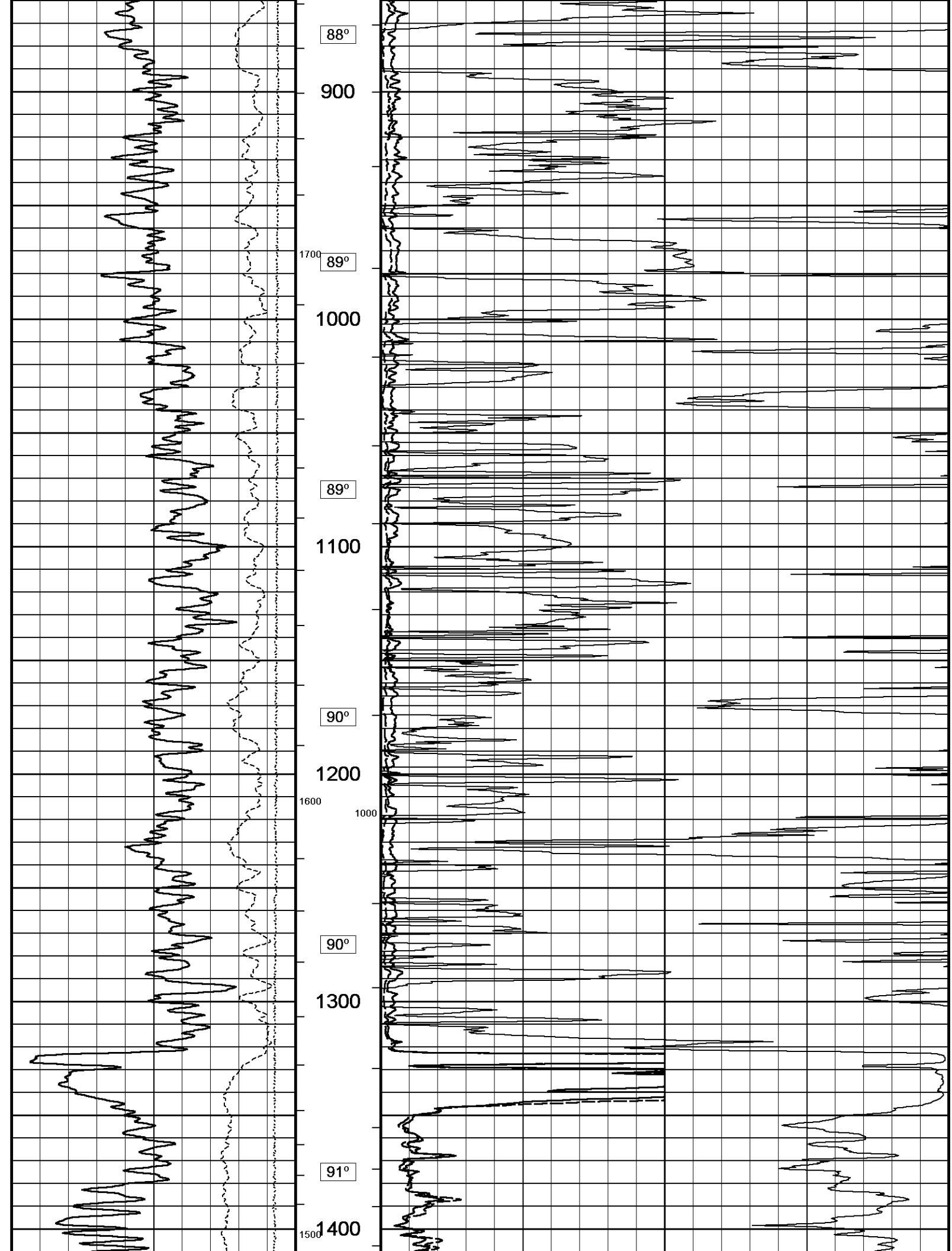
Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 14-OCT-2015 08:32

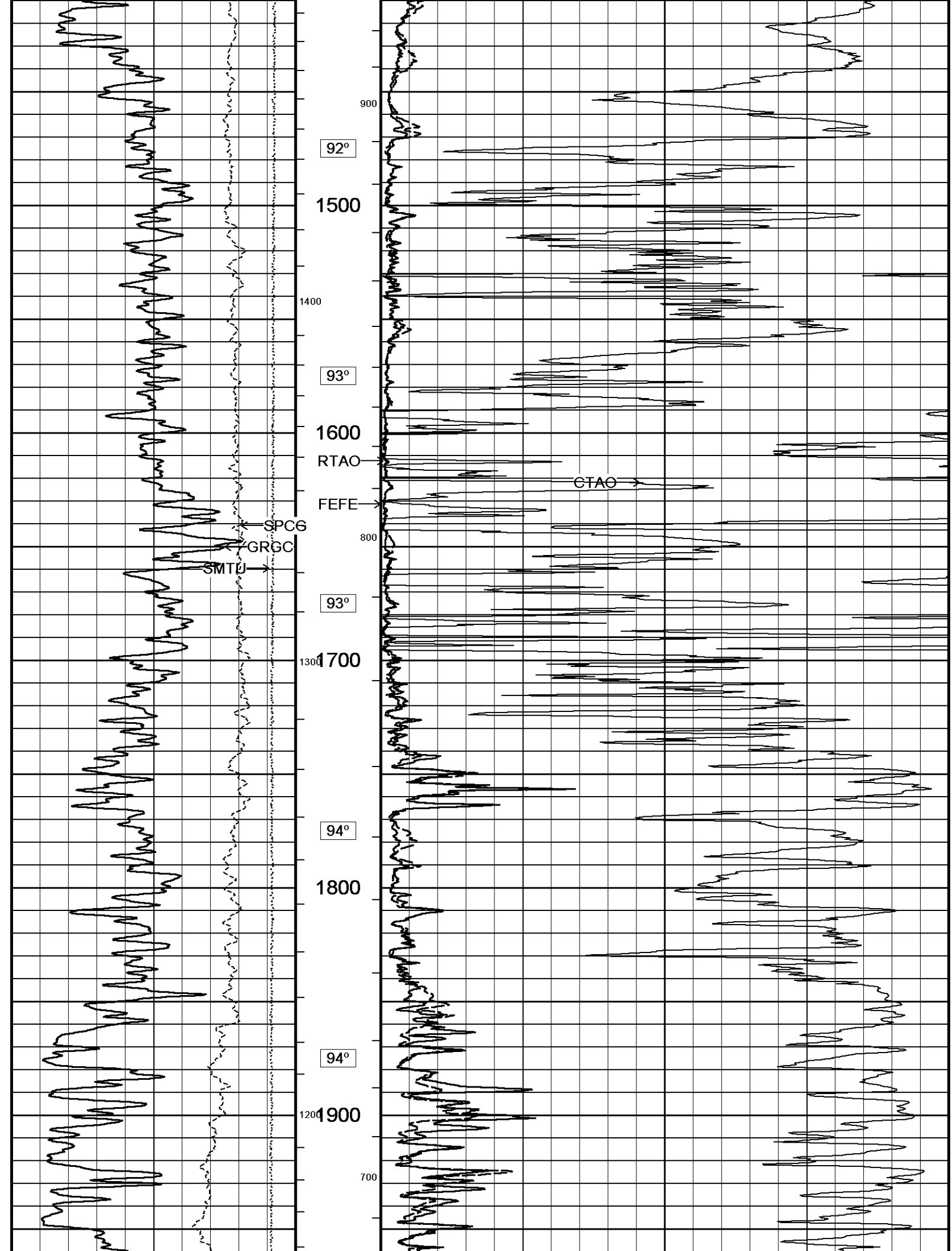
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsting...\Larson Kirsting-Williams #1-1 Merge Main.dta — Recorded on 14-OCT-2015 03:41

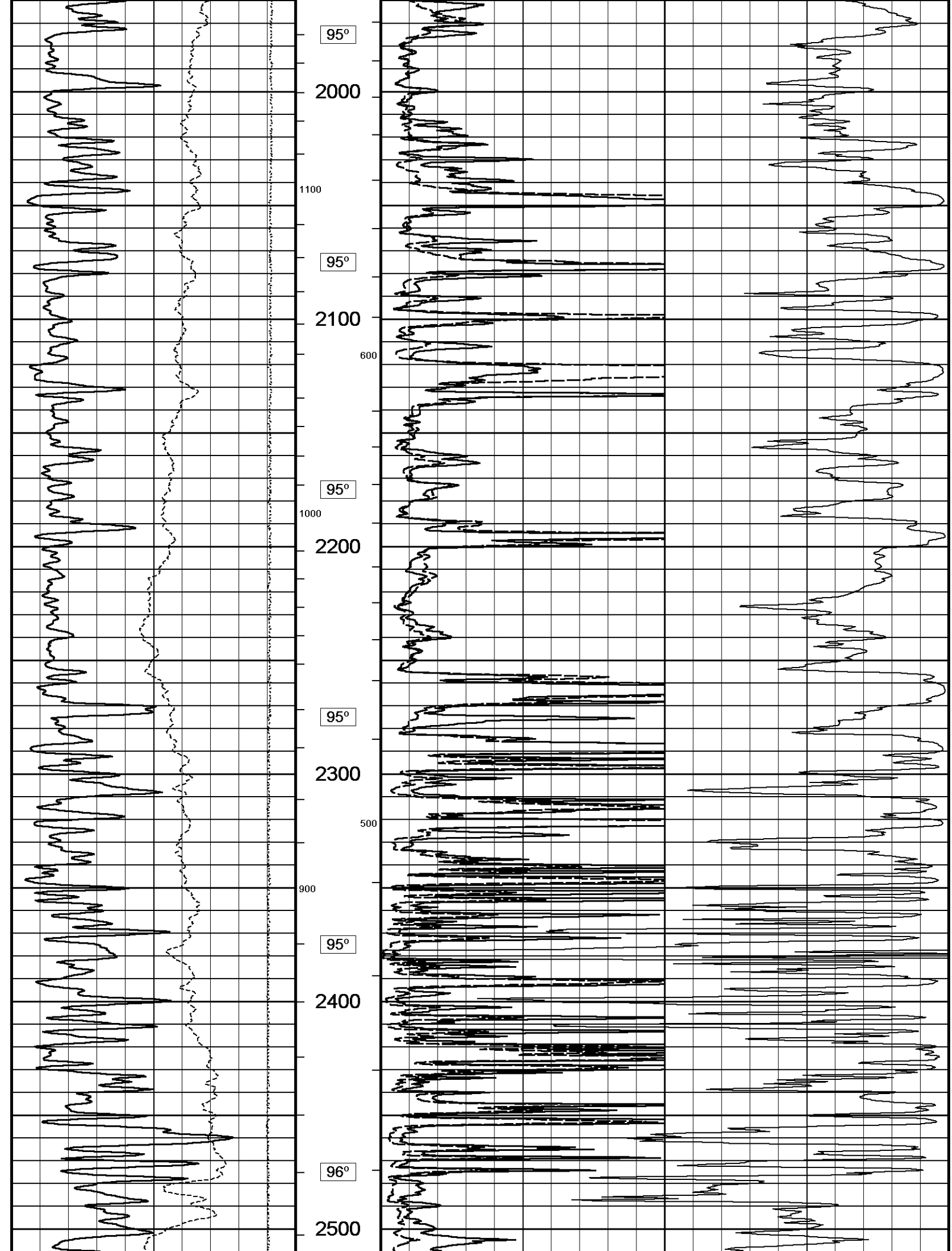
System Versions: Plotted with 15.03.5939

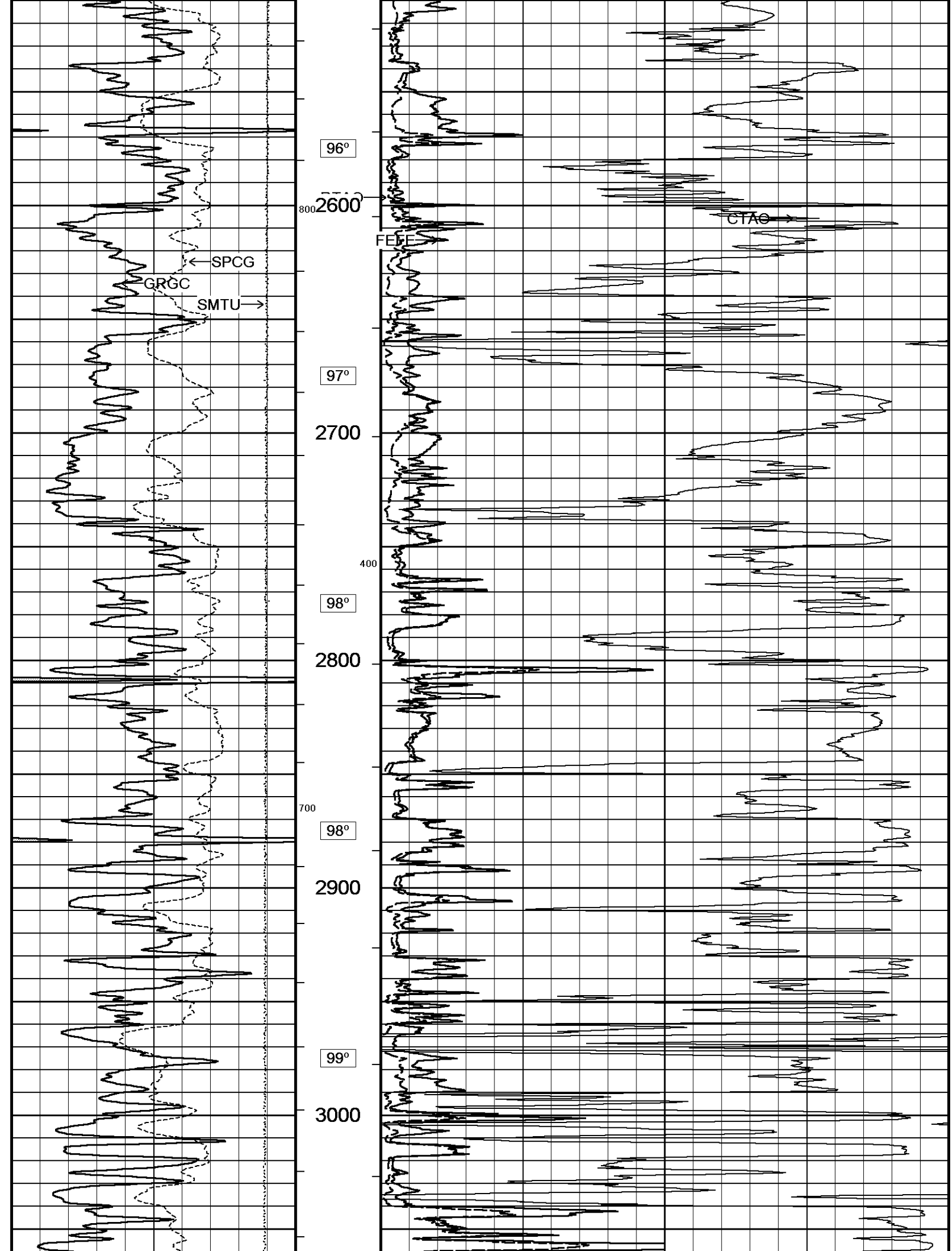


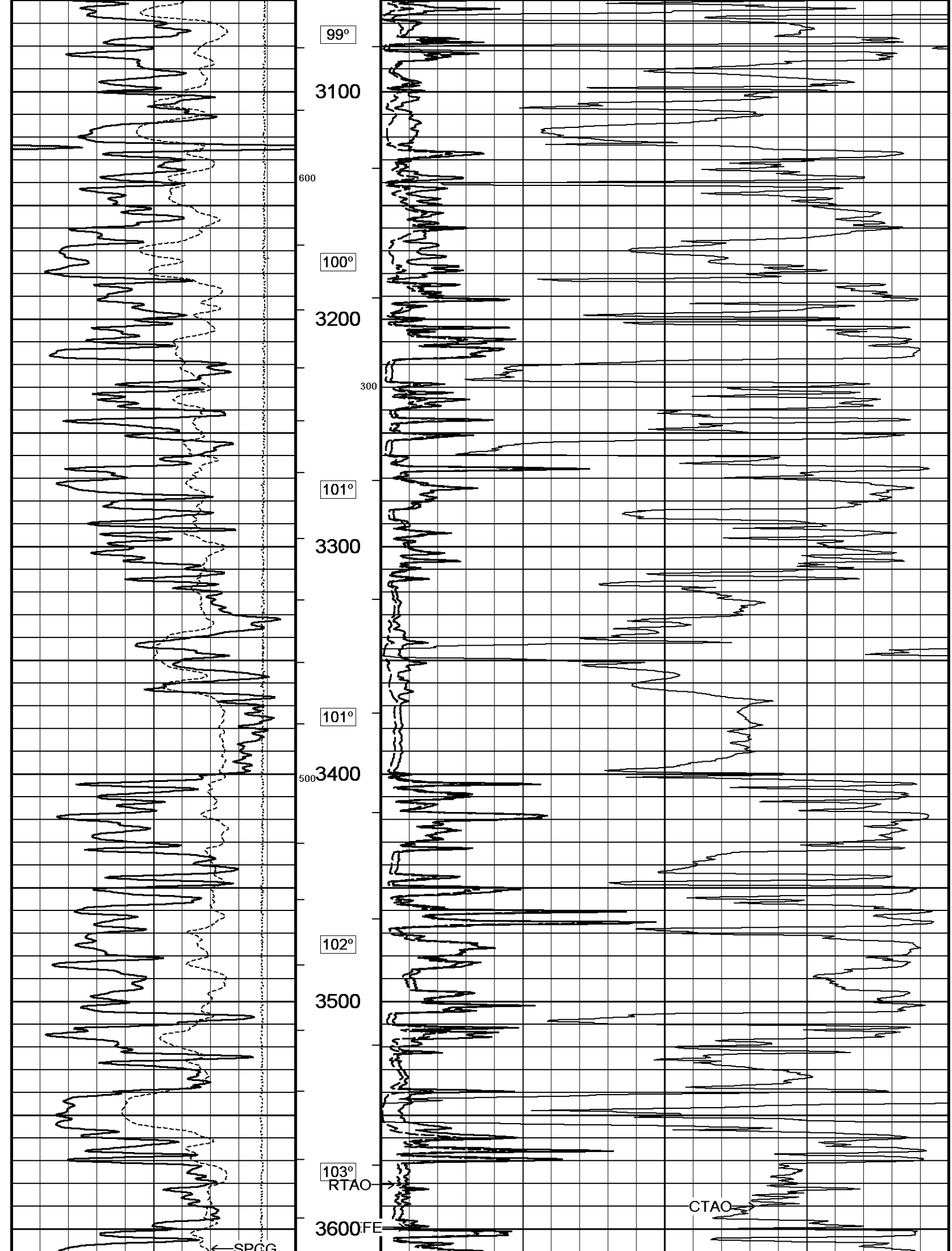

2000
84°
400
85°
500
1200
1900
87°
600
RTAO
CTAO
FEFE
SPCG
GRGC
SMTU
88°
700
1800
88°
800
1100

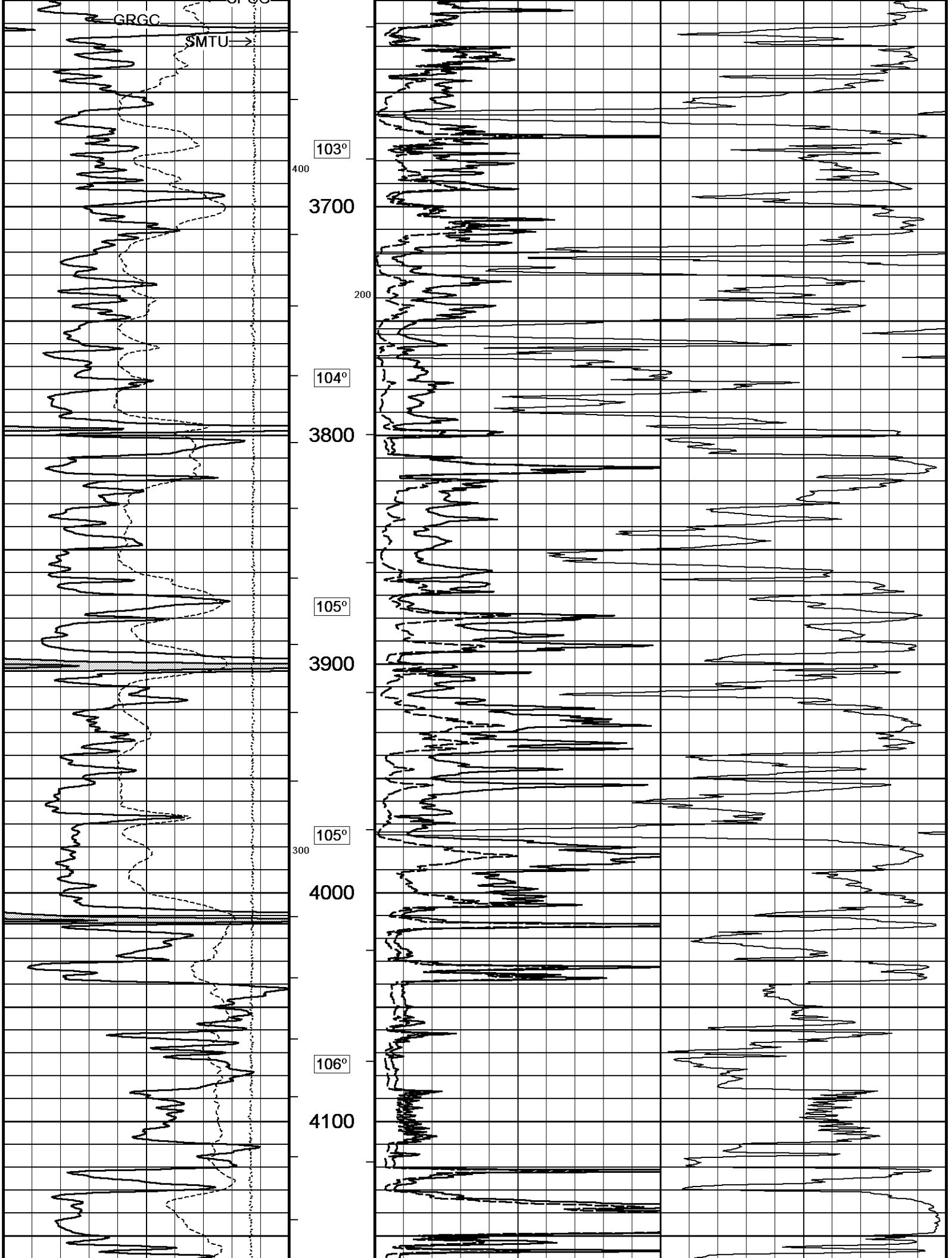

88°
900
1700
89°
1000
89°
1100
90°
1200
1600
1000
90°
1300
91°
1500
1400

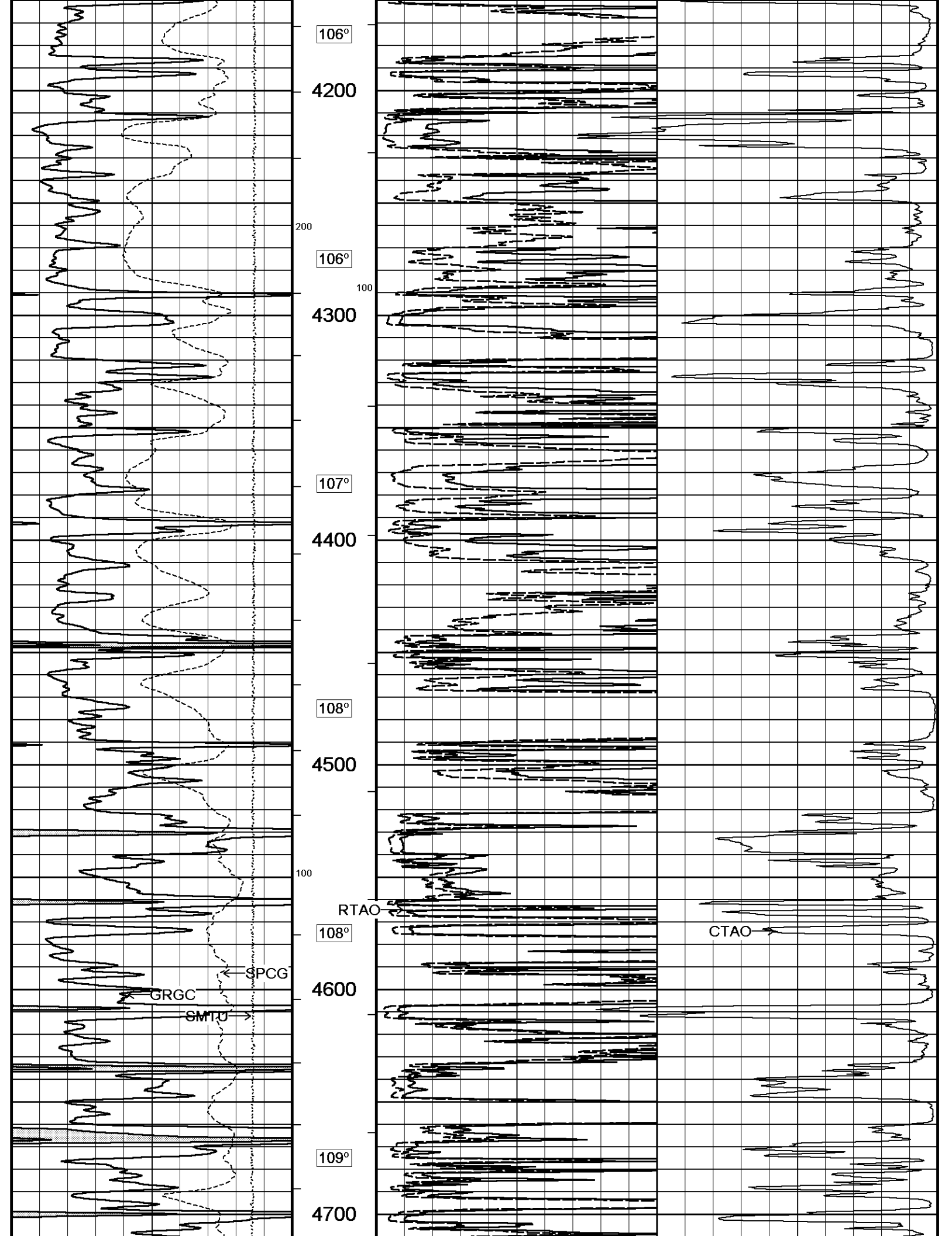

900
92°
1500
1400
93°
1600
RTAO
CTAO
FEFE
SPCG
GRGC
SMTU
800
93°
1300
1700
94°
1800
94°
1200
1900
700

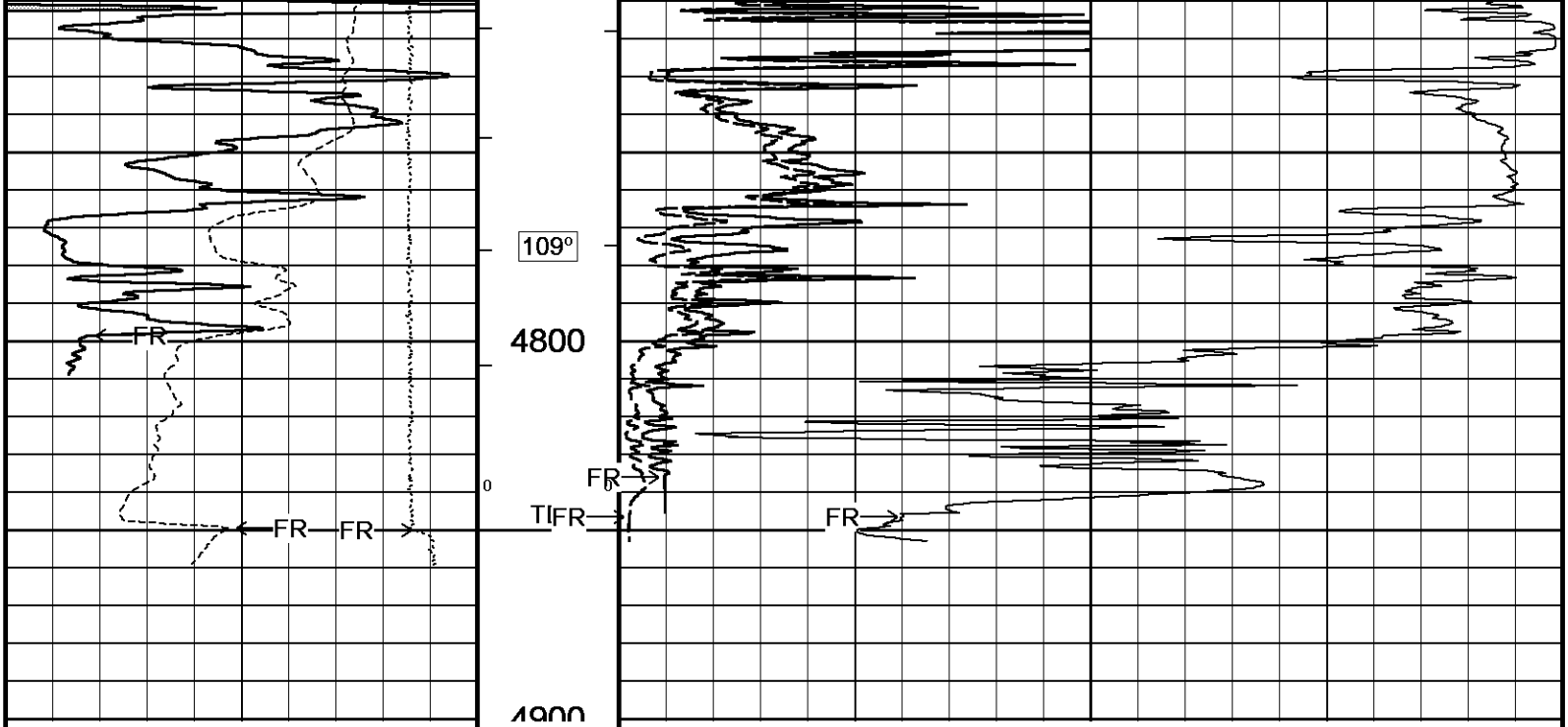

95°
2000
1100
95°
2100
600
95°
1000
2200
95°
2300
500
900
95°
2400
96°
2500


96°
800
2600
CTAO
FEFE
SPCG
GRGC
SMTU
97°
2700
400
98°
2800
700
98°
2900
99°
3000


99°
3100
600
100°
3200
300
101°
3300
101°
500
3400
102°
3500
103°
RTAO
CTAO
3600
FE
SPCG


GRGC
SMTU
103°
400
3700
200
104°
3800
105°
3900
105°
300
4000
106°
4100


106°
4200
200
106°
100
4300
107°
4400
108°
4500
100
RTAO
108°
CTAO
SPCG
4600
GRGC
SMTU
109°
4700



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 1:600

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

Shallow FE
ohm metres
0.20 25.10 50

Array Ind. One Res Rt
ohm metres
0.20 25.10 50

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 14-OCT-2015 08:32
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsting...\Larson Kirsting-Williams #1-1 Merge Main.dta
Recorded on 14-OCT-2015 03:41
System Versions: Plotted with 15.03.5939

↑ 2 INCH MAIN ↑

↓ 5 INCH MAIN ANHYDRITE ↓

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 14-OCT-2015 08:32
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Recorded on 14-OCT-2015 03:41
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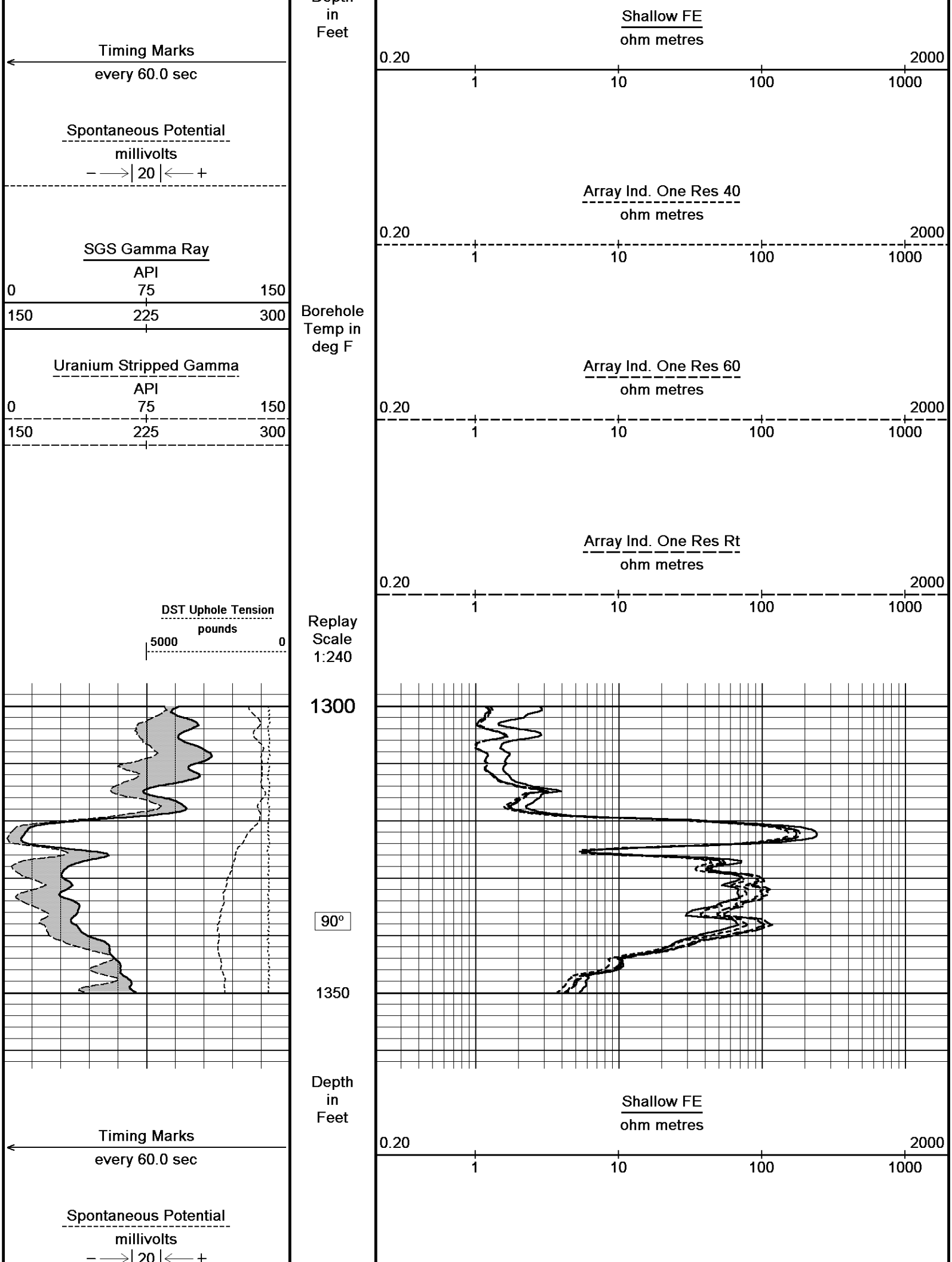
Depth


Depth in Feet
Timing Marks
every 60.0 sec
Spontaneous Potential
millivolts
− 20 +
SGS Gamma Ray
API
0 75 150
150 225 300
Uranium Stripped Gamma
API
0 75 150
150 225 300
DST Uphole Tension
pounds
5000 0
Replay Scale 1:240
1300
90°
1350
Depth in Feet
Timing Marks
every 60.0 sec
Spontaneous Potential
millivolts
− 20 +
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
Borehole Temp in deg F
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

SGS Gamma Ray
API
0 75 150
150 225 300

Uranium Stripped Gamma
API
0 75 150
150 225 300

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

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

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 14-OCT-2015 08:32
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5 INCH MAIN ANHYDRITE

5 INCH MAIN

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 14-OCT-2015 08:32
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Recorded on 14-OCT-2015 03:41
System Versions: Plotted with 15.03.5939

Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
− → | 20 | ← +

SGS Gamma Ray
API
0 75 150
150 225 300

Uranium Stripped Gamma
API
0 75 150
150 225 300

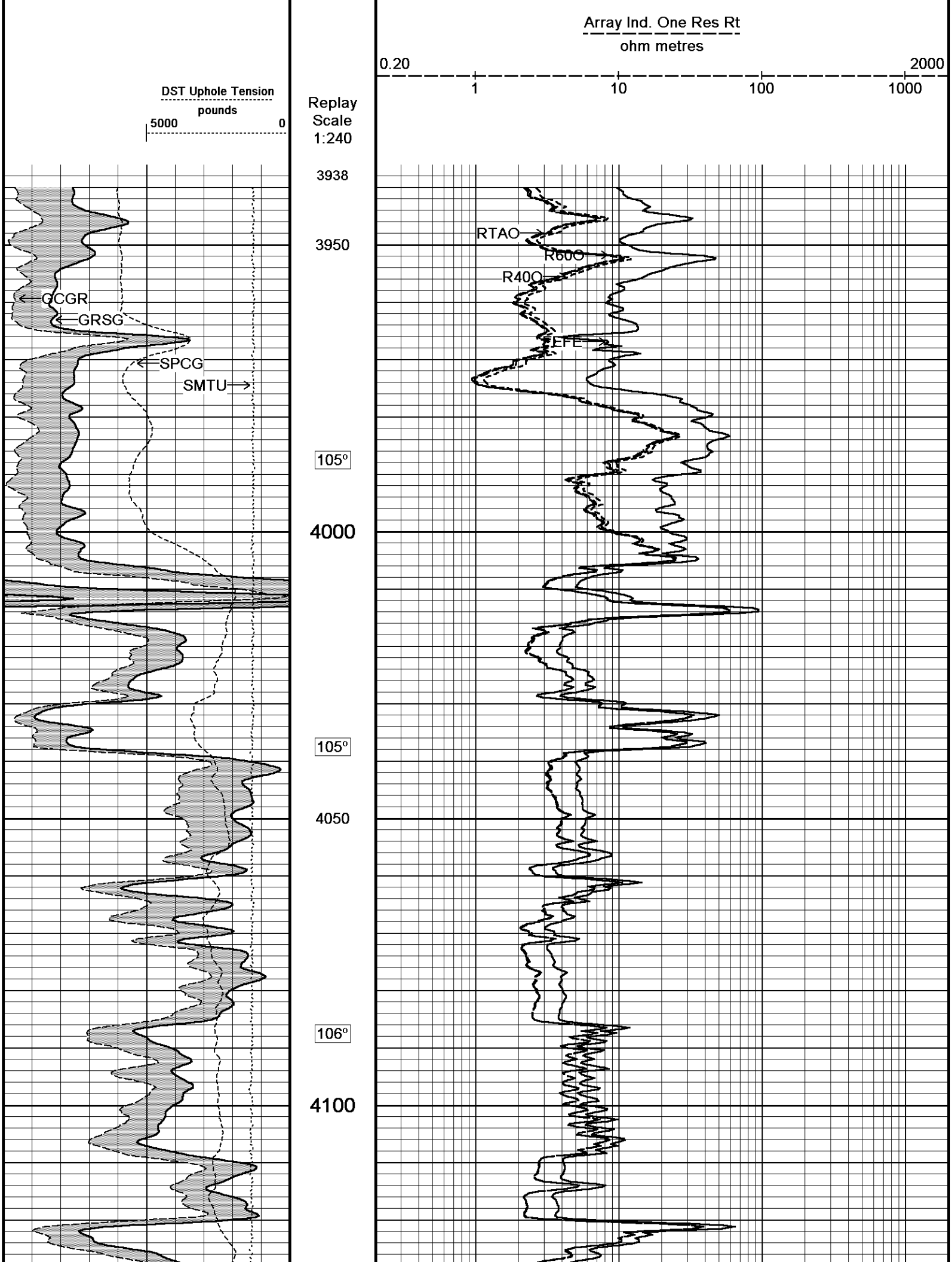
Depth in Feet

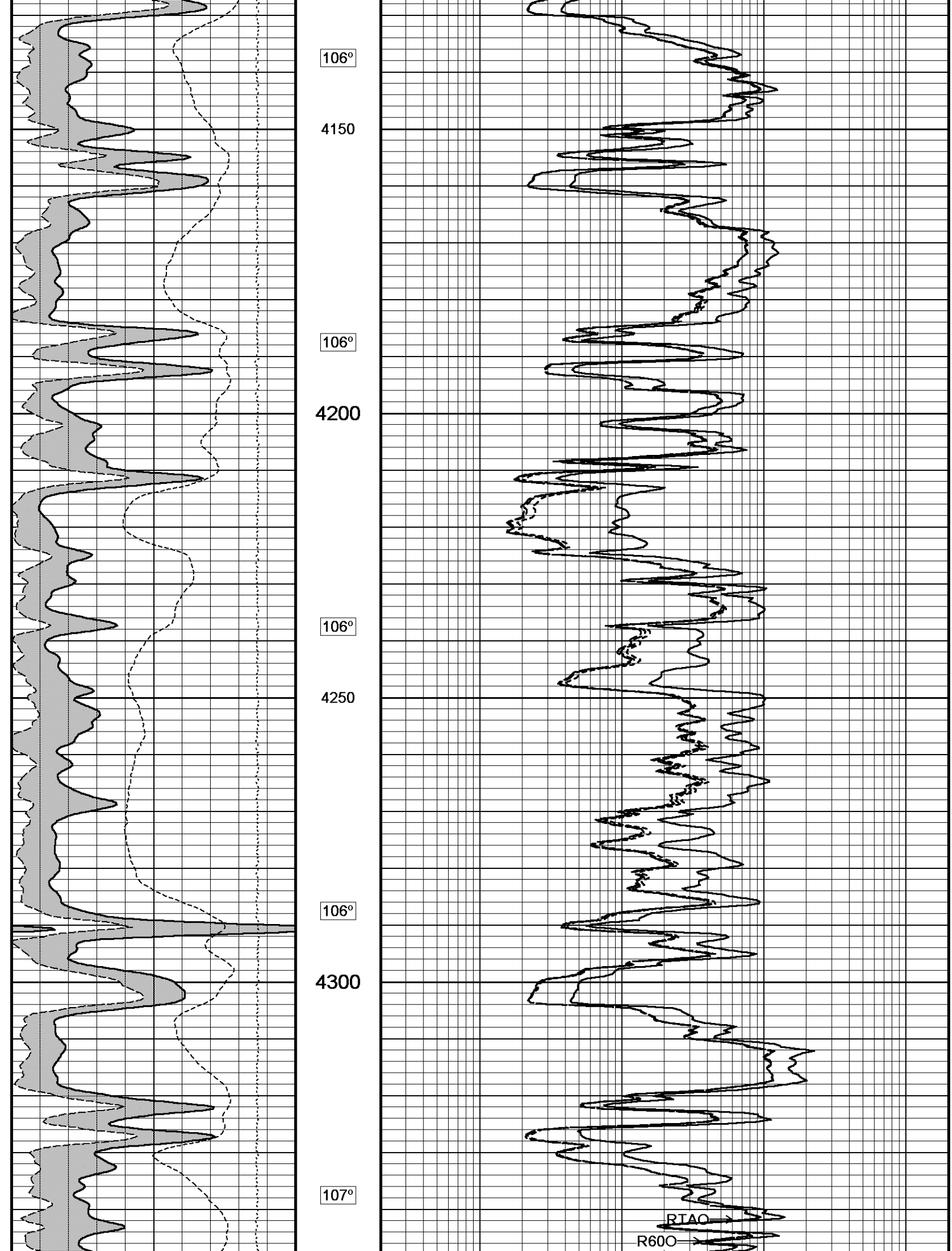
Borehole Temp in deg F

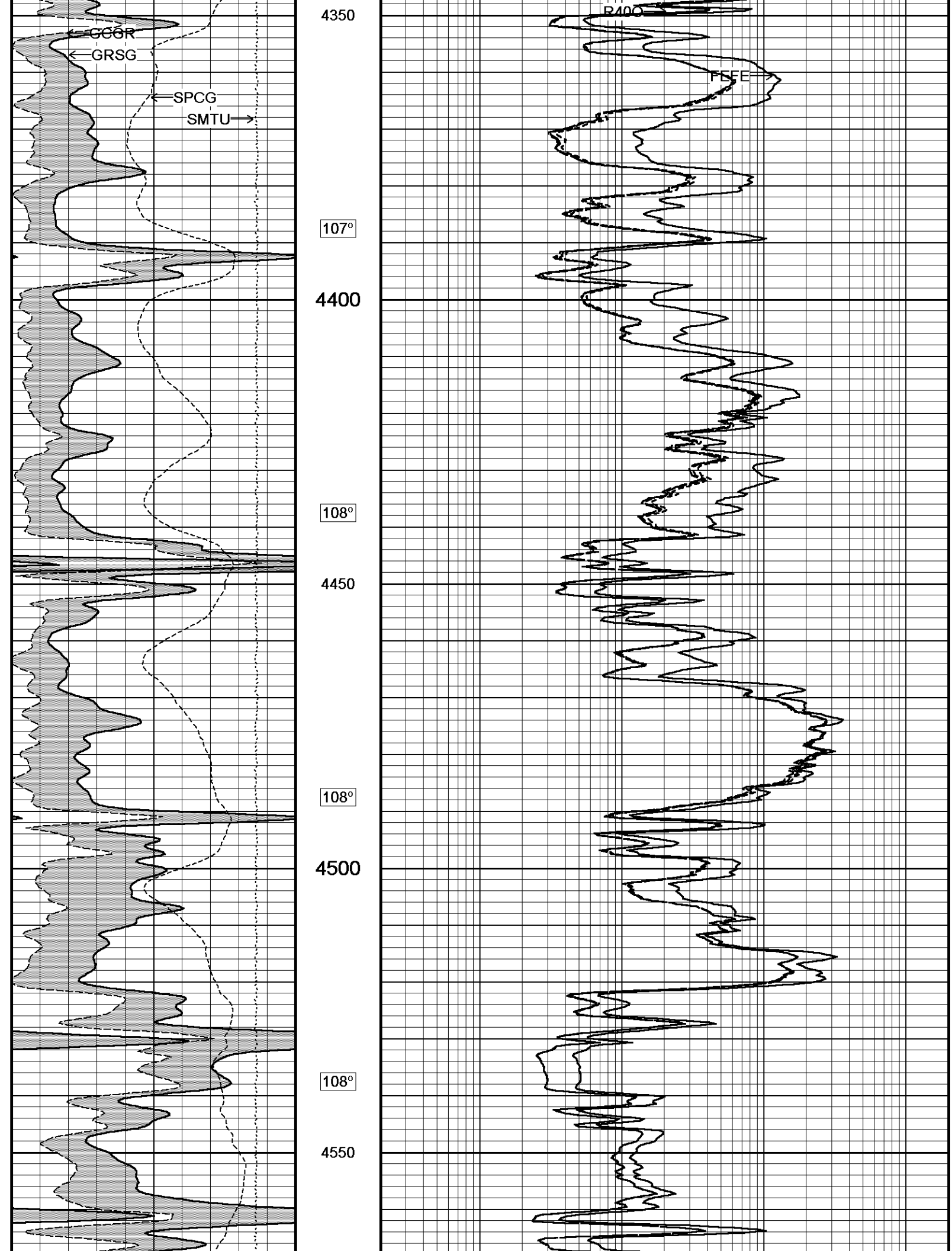
Shallow FE
ohm metres
0.20 1 10 100 2000

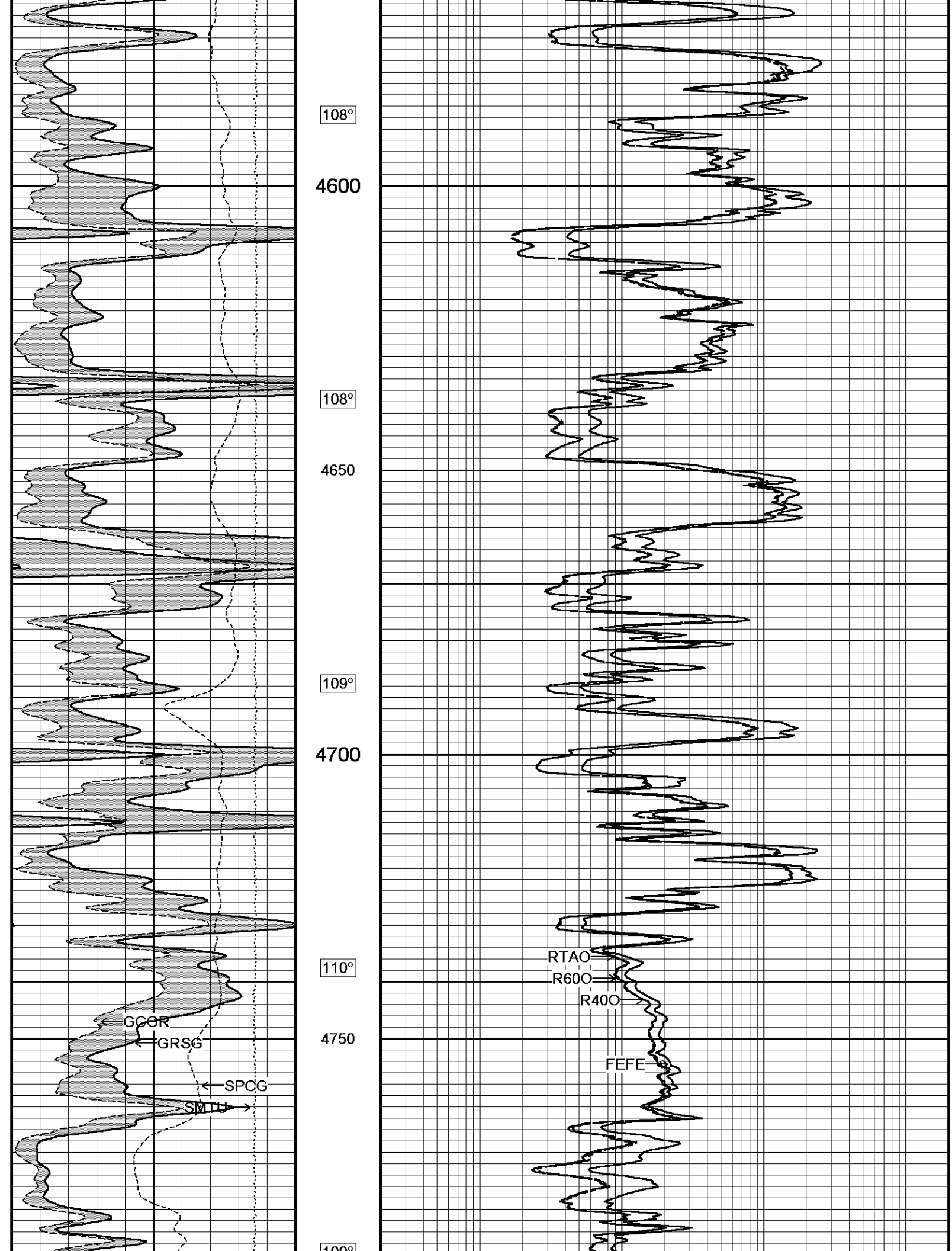
Array Ind. One Res 40
ohm metres
0.20 1 10 100 2000

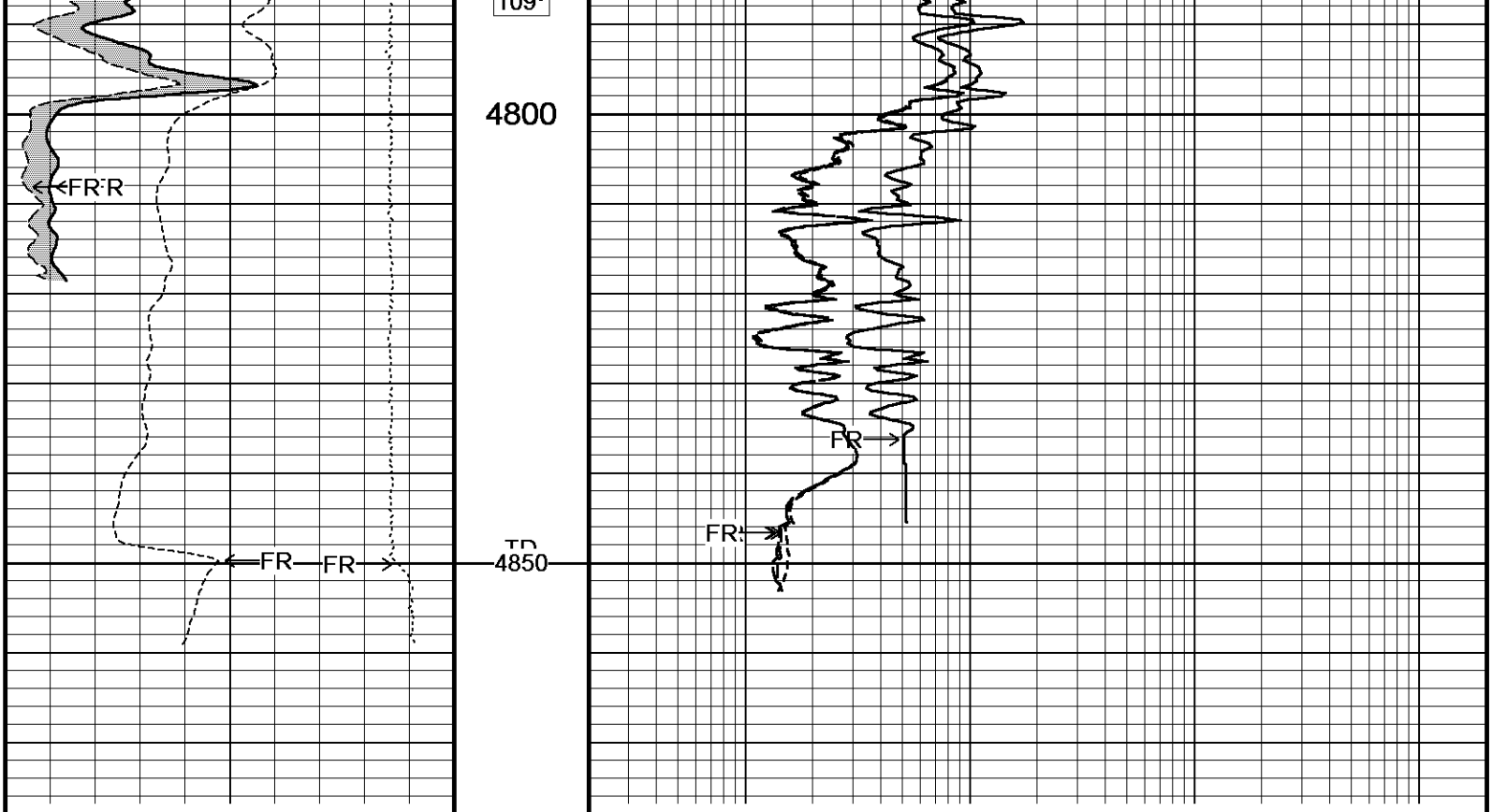
Array Ind. One Res 60
ohm metres
0.20 1 10 100 2000


DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
3938
3950
GCGR
GRSG
SPCG
SMTU
105°
4000
105°
4050
106°
4100
Array Ind. One Res Rt
ohm metres
0.20
2000
1
10
100
1000
RTAO
R60O
R40O
EFE


106°
4150
106°
4200
106°
4250
106°
4300
107°
RTAO
R60O


CCGR
GRSG
SPCG
SMTU
R400
FEFE
4350
107°
4400
108°
4450
108°
4500
108°
4550


108°
4600
108°
4650
109°
4700
110°
4750
GCOR
GRSG
SPCG
SMTU
RTAO
R60O
R40O
FEFE



Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
– → | 20 | ← +

SGS Gamma Ray
API
0 75 150
150 225 300

Uranium Stripped Gamma
API
0 75 150
150 225 300

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

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
0.20 2000
1 10 100 1000

Depth Based Data - Maximum Sampling Increment 10.0cm
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5 INCH MAIN

REPEAT SECTION

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 14-OCT-2015 08:32
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsti...\Larson Kirsting-Williams #1-1 Merge Repeat.dta
Recorded on 14-OCT-2015 03:21
System Versions: Plotted with 15.03.5939

Timing Marks
every 60.0 sec

Spontaneous Potential
millivolts
– → | 20 | ← +

SGS Gamma Ray
API
0 75 150
150 225 300

Uranium Stripped Gamma
API
0 75 150
150 225 300

DST Uphole Tension
pounds
5000 0

Depth in Feet

Borehole Temp in deg F

Replay Scale 1:240

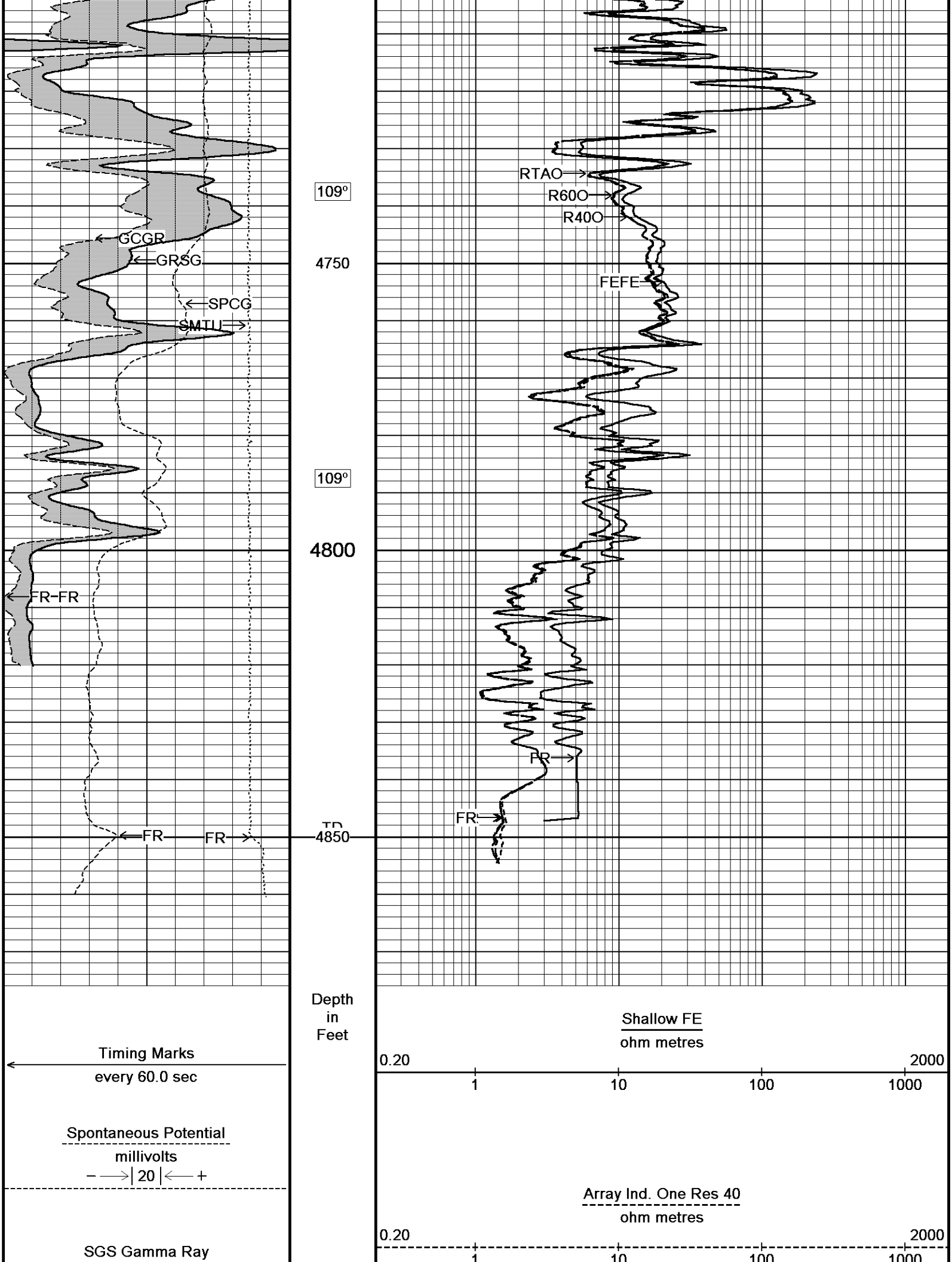
Shallow FE
ohm metres
0.20 1 10 100 1000 2000

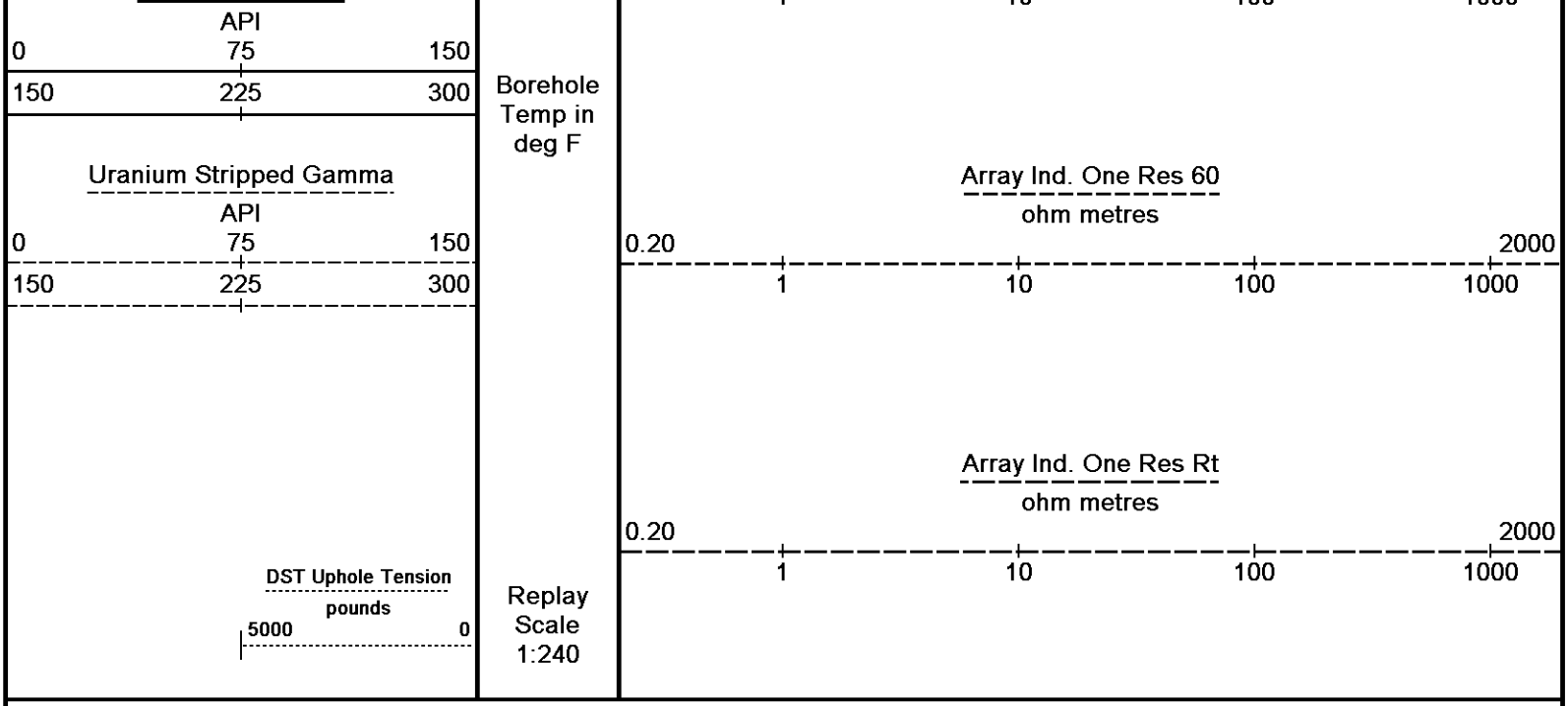
Array Ind. One Res 40
ohm metres
0.20 1 10 100 1000 2000

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

4638
4650
108°
4700


RTAO
R60O
R40O
FEFE
GCGR
GRSG
SPCG
SMTU
FR-FR
FR
FR
FR
FR
109°
4750
109°
4800
TD
4850
Depth
in
Feet
Timing Marks
every 60.0 sec
Spontaneous Potential
millivolts
– 20 +
SGS Gamma Ray
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



Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 14-OCT-2015 08:32

Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsti...\Larson Kirsting-Williams #1-1 Merge Repeat.dta — Recorded on 14-OCT-2015 03:21

System Versions: Plotted with 15.03.5939

REPEAT SECTION

BEFORE SURVEY CALIBRATION

C:\Minimus 15.03.5939\Logs\Larson Kirsting-Williams #1-1\Larson Kirsting-Williams #1-1 Repeat.dta

General Constants All 000

Last Edited on 14-OCT-2015,01:36

General Parameters		
Mud Resistivity	0.740	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	MMR Caliper	
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 14-OCT-2015 02:38

Reading No	Measured	Calibrated (lbs)
1	13223.31	0.00
2	14120.71	513.70

Gamma Calibration MCG-C 123

Field Calibration on 13-OCT-2015 21:52

	Measured	Calibrated (API)
Background	68	46
Calibrator (Gross)	742	502
Calibrator (Net)	674	456

Gamma Calibration Tolerances MCG-C 123

1.40 1.475 1.55

Ratio	1.479	Counts/API

Gamma Constants MCG-C 123

Last Edited on 14-OCT-2015,01:23

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-C 123

Field Calibration on 22-SEP-2015,11:43

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

High Resolution Temperature Constants MCG-C 123

Last Edited on 22-SEP-2015,11:43

Pre-filter Length	11

SP Calibration MCG-C 123

Field Calibration on 13-OCT-2015,21:26

	Measured	Calibrated (mV)
Reference 1	100.6	100.3
Reference 2	-99.7	-99.9

Caliper Calibration MMR-A 11

Base Calibration on 28-SEP-2015 11:47
Field Calibration on 13-OCT-2015 21:23

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14179	5.98
2	17353	7.97
3	20653	9.86
4	24559	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
8.09	7.97

Caliper Calibration Tolerances MMR-A 11

Short Arm Field Cal.	8.09	7.77	7.97	8.17	in

Micro Normal and Micro Inverse Calibration MMR-A 11

Base Calibration on 28-SEP-2015 11:37
Field Check on 13-OCT-2015 21:21

Base Calibration

	Measured		Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Micro Normal	10.0	48.9	5.1	25.6
Micro Inverse	9.8	48.6	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	95.5	95.5
Micro Inverse	63.3	63.3

Micro Normal & Micro Inverse Calibration Tolerance MMR-A 11

Micro Normal Res. 1	10.0	-5%	10.0	+5%	ohm	Micro Normal Res. 2	48.9	-5% 50.0 +5%	ohm
Micro Inverse Res. 1	9.8	-5%	10.0	+5%	ohm	Micro Inverse Res. 2	48.6	-5% 50.0 +5%	ohm

Micro Normal Base Check	95.5	-2%	95.16	+2%	ohm-m
Micro Inverse Base Check	63.3	-2%	63.27	+2%	ohm-m
Micro Normal Field Check	95.5	-2%	95.5	+2%	ohm-m
Micro Inverse Field Check	63.3	-2%	63.3	+2%	ohm-m

Micro Normal and Micro Inverse Constants MMR-A 11

Last Edited on 31-AUG-2015,10:25

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	0.0000	inches

Micro-Resistivity Caliper Constants MMR-A 11

Last Edited on

Sonde Configuration	Resistivity Mode

Neutron Calibration MDN-A.B 114

Base Calibration on 09-OCT-2015 17:26
Field Check on 13-OCT-2015 21:57

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	3115	97	3714	110
Ratio	32.183		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	2099	3004
Ratio	0.699	

Field Check

	Calibrated (cps)	
	2082	3047
Ratio	0.684	

Neutron Calibration Tolerances MDN-A.B 114

Ratio	32.183	-5% 33 +5%
Base Check	0.699	0.65 0.7 0.75
Field Check	0.684	0.679 0.699 0.719

Neutron Constants MDN-A.B 114

Last Edited on 13-OCT-2015,21:53

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Legacy	
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	Constant Value	
Temperature	68.00	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-A.A 135

Base Calibration on 10-SEP-2015 11:35
Field Check on 13-OCT-2015 21:15

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	963.2	126.8
Base Check		281.2
Field Check		281.2

FE Calibration Tolerances MFE-A.A 135

Reference 2	963.2	-3% 980.0 +3% ohm

Base Check	281.2	-2% 277.0 +2%	ohm-m
Field Check	281.2	-2% 281.2 +2%	ohm-m

FE Constants MFE-A.A 135

Last Edited on 13-OCT-2015,21:14

Running Mode	No Sleeve	
MFE K Factor	0.1268	
Borehole Correction Constants		
Sonde Position	0.5	inches
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 24-NOV-2014,10:23

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

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length	11

Induction Calibration MAI-A.A 111

Base Calibration on 05-AUG-2014,09:34
Field Check on 13-OCT-2015 21:13

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	

Test Loop Calibration Verified 09-SEP-2015 14:21

Channel	Base Check (mmho/m) Low	Base Check (mmho/m) High	Field Check (mmho/m) Low	Field Check (mmho/m) High	
1	0.0	0.0	11.6	3872.1	
2	0.0	0.0	28.8	3526.4	
3	0.0	0.0	28.2	3019.8	
4	0.0	0.0	18.5	2057.0	
Deep			17.1	1960.9	
Medium			41.8	3974.7	
Shallow			42.9	5230.6	
Array Temperature		0.0		77.9	Deg F

Induction Calibration Tolerances MAI-A.A 111

Low Conductivity 1	17.6	13.0 17.0 21.0	mmho/m	High Conductivity 1	473.6	430.0 475.0 520.0 mmho/m
Low Conductivity 2	6.4	4.5 6.0 7.5	mmho/m	High Conductivity 2	385.9	345.0 385.0 425.0 mmho/m
Low Conductivity 3	3.2	1.0 3.5 6.0	mmho/m	High Conductivity 3	264.0	240.0 260.0 280.0 mmho/m
Low Conductivity 4	2.1	0.0 2.0 4.0	mmho/m	High Conductivity 4	135.5	120.0 135.0 150.0 mmho/m
Background Vx 1	0.0	-110.0 -32.5 45.0	mmho/m	Phase Check Loop 1	0.0	-2.0 0.0 2.0 %
Background Vx 2	0.0	-35.0 20.0 75.0	mmho/m	Phase Check Loop 2	0.0	-2.0 0.0 2.0 %
Background Vx 3	0.0	-60.0 2.5 65.0	mmho/m	Phase Check Loop 3	0.0	-2.0 0.0 2.0 %
Background Vx 4	0.0	-50.0 -17.5 15.0	mmho/m	Phase Check Loop 4	0.0	-2.0 0.0 2.0 %

Induction Constants MAI-A.A 111

Last Edited on 13-OCT-2015,21:12

Induction Model	RtAP-WBM

Borehole Correction Constants

Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
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
Rm Source	Global Value: Temperature Corrected	
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

Symmetrised Receiver Gains

Receiver 1	1.00
Receiver 2	1.00
Receiver 3	1.00
Receiver 4	1.00

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-C.A 216

Base Calibration on 09-OCT-2015 16:05
Field Calibration on 13-OCT-2015 21:25

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	20385	3.99
2	30496	5.98
3	40608	7.97
4	50415	9.86
5	61185	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.91	7.97

Caliper Calibration Tolerances MPD-C.A 216

Short Arm Field Cal. 7.91 in

Photo Density Calibration MPD-C.A 216

Base Calibration on 09-OCT-2015 16:45
Field Check on 13-OCT-2015 21:20

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1073	1261		
Reference 1	53333	25886	59556	30836
Reference 2	21281	2450	24941	2541

Reference 2	21281	2450	24941	2541

Field Check at Base

	1073.3	1260.9

Field Check

	1074.9	1261.8

PE Calibration

Base Calibration

	WS	WH	Ratio	Calibrated Ratio
		Measured		
Background	195	952		
Reference 1	21614	53145	0.410	0.371
Reference 2	6037	21153	0.289	0.272

Field Check at Base

	194.8	951.8

Field Check

	195.9	956.2

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.59	-5% 2.52 +5%	Far Density Ratio	20.70	-5% 21.00 +5%
PE Calibration	0.112	0.089 0.110 0.131			
Near Den. Field Check	1074.9	-3% 1073.3 +3%	Far Den. Field Check	1261.8	-3% 1260.9 +3%
PE WS Field Check	195.9	-6% 194.8 +6%	PE WH Field Check	956.2	-6% 951.8 +6%

Density Constants MPD-C.A 216

Last Edited on 14-OCT-2015,01:23

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	1.11	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	0.00
0.00	

Spectral Gamma Calibration SGS-E.J 150

Base Calibration on 10-SEP-2015 11:04
Field Calibration on 13-OCT-2015 21:37

Base Calibration

Potassium Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	125.1	45.8	5.4	1.1	2.0
Calibrator (Gross)	255.7	133.8	28.8	1.1	1.9
Calibrator (Net)	130.7	88.0	23.4	0.0	-0.1

	K %	U ppm	Th ppm
Concentrations	5.8	0.0	0.0

Uranium Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	125.1	45.8	5.4	1.1	2.0

Calibrator (Gross)	521.6	188.0	17.4	9.3	5.0
Calibrator (Net)	396.5	142.3	12.0	8.2	3.0

	K %	U ppm	Th ppm
Concentrations	0.0	14.8	0.0

Thorium Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	125.1	45.8	5.4	1.1	2.0
Calibrator (Gross)	461.2	171.3	14.3	7.1	17.3
Calibrator (Net)	336.1	125.6	8.9	6.0	15.3

	K %	U ppm	Th ppm
Concentrations	0.0	0.0	44.3

Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	125.1	45.8	5.4	1.1	2.0
Calibrator (Gross)	971.7	397.8	50.7	14.9	19.6
Calibrator (Net)	846.6	352.0	45.3	13.8	17.6

Field Calibration

Gamma Ray

	Measured	Calibrated (API)
Background	163	32
Calibrator (Gross)	1445	282
Calibrator (Net)	1282	250

Mixture Calibrator

	Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
Background	112.4	38.6	4.7	0.8	1.6
Calibrator (Gross)	958.9	395.6	50.3	15.4	20.2
Calibrator (Net)	846.5	357.0	45.6	14.5	18.6

Spectral Gamma Check Tolerances SGS-E.J 150

Base Check K	6.2	-13.8% 5.80 +13.8%	%
Base Check U	14.2	-13.8% 14.80 +13.8%	ppm
Base Check T	43.1	-13.8% 44.30 +13.8%	ppm
Field Check K	6.4	-13.8% 5.80 +13.8%	%
Field Check U	13.3	-13.8% 14.80 +13.8%	ppm
Field Check T	46.3	-13.8% 44.30 +13.8%	ppm

Spectral Gamma Constants SGS-E.J 150

Last Edited on 14-OCT-2015,01:23

Background Calibrator Number	002	
Mixture Calibrator Number	006	
Potassium Calibrator Number	002	
Uranium Calibrator Number	001	
Thorium Calibrator Number	001	
Mud Density	1.11	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

DOWNHOLE EQUIPMENT

C:\Minimus 15.03.5939\Logs\Larson Kirsting-Williams #1-1\Larson Kirsting-Williams #1-1 Repeat.dta

Cablehead, 11 pin
CBH-CA 155 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Comms Gamma
MCG-C 123 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

51.27 ft GRGC - MCG Gamma Ray

Spectral Gamma Ray Sub
SGS-E.J 150 LG: 7.78 ft WT: 105.8 lb OD: 3.543 in

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

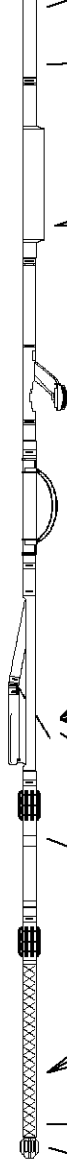
Compact Neutron
MDN-A.B 114 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

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

Total Length: 58.95 ft Weight: 513.7 lb



48.37 ft	CGXT - MCG External Temperature
41.81 ft	GCGR - Uranium Stripped Gamma
41.81 ft	GRSG - SGS Gamma Ray
34.24 ft	MBTC - MMR Caliper
33.24 ft	MINV - MMR MicroLog Inverse
33.24 ft	MNRL - MMR MicroLog Normal
28.45 ft	NPRL - Limestone Neutron Por.
21.21 ft	AVOL - Annular Volume
21.21 ft	HVOL - Hole Volume
21.21 ft	CLDC - Density Caliper
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	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	RTAO - Array Ind. One Res Rt
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	LARSON ENGINEERING, INC
WELL	KIRSTING-WILLIAMS #1-1
FIELD	WILDCAT
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2272.00	feet	First Reading	4847.00	feet
Elevation Drill Floor	2270.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	2263.00	feet	Depth Logger	4850.00	feet

Weatherford®

ARRAY INDUCTION
SHALLOW FOCUSED
ELECTRIC LOG

COMPANY	
WELL	
FIELD	
PROVINCE/COUNTY	
COUNTRY/STATE	
LOCATION	
SEC 1	TWP 2
Latitude	
Longitude	
API Number	
Permanent Datum	
Log Measured From	
Drilling Measured From	
Date	
Run Number	
Service Order	
Depth Driller	
Depth Logger	
First Reading	
Last Reading	
Casing Driller	
Casing Logger	
Bit Size	
Hole Fluid Type	
Density/Viscosity	
PH/Fluid Loss	
Sample Source	
Rm @ Measured Te	
Rmf @ Measured Te	
Rmc @ Measured T	
Source Rmf/ Rmc	
Rm @ BHT	
Time Since Circulati	
Max Recorded Temp	
Equipment/ Base	
Recorded By	
Witnessed By	

erford

ARRAY INDUCTION SHALLOW FOCUSED ELECTRIC LOG

LARSON ENGINEERING, INC
KIRSTING-WILLIAMS #1-1
WILDCAT
FORD
U.S.A. / KANSAS
330' FSL & 2790' FWL

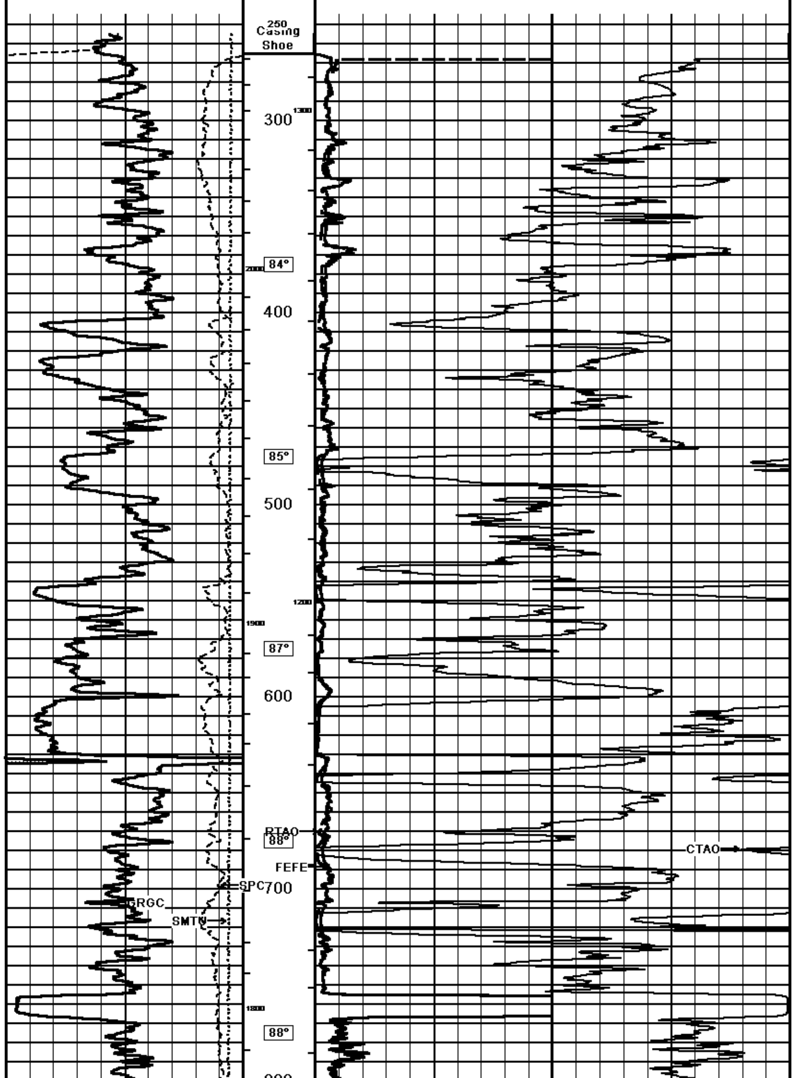
26S RGE 21W	Other Services MDN/MPD SGS	MML	
15-057-20966			
GL, Elevation 2263 feet		Elevations:	feet
KB		KB	2272.00
rom KB @ 9 feet		DF	2270.00
		GL	2263.00
	14-OCT-2015		
	ONE		
	7577-131963122		
	4850.00 feet		
	4850.00 feet		
	4847.00 feet		
	265.00 feet		
	265.00 feet		
	265.00 feet		
	7.875 inches		
	CHEMICAL		
	9.30 lb/USg	65.00 CP	
	9.50	10.00 ml/30Min	
	MUD PIT		
mp	0.74 @ 75.0 ohm-m		
emp	0.59 @ 75.0 ohm-m		
emp	0.89 @ 75.0 ohm-m		
	CALC	CALC	
	0.52 @110.0 ohm-m		
on	4 HOURS		
p	110.00 deg F		
	13096	OKC	
	JEFFREY RANDLE		
	VERN SCHRAG	THOMAS LARSON	

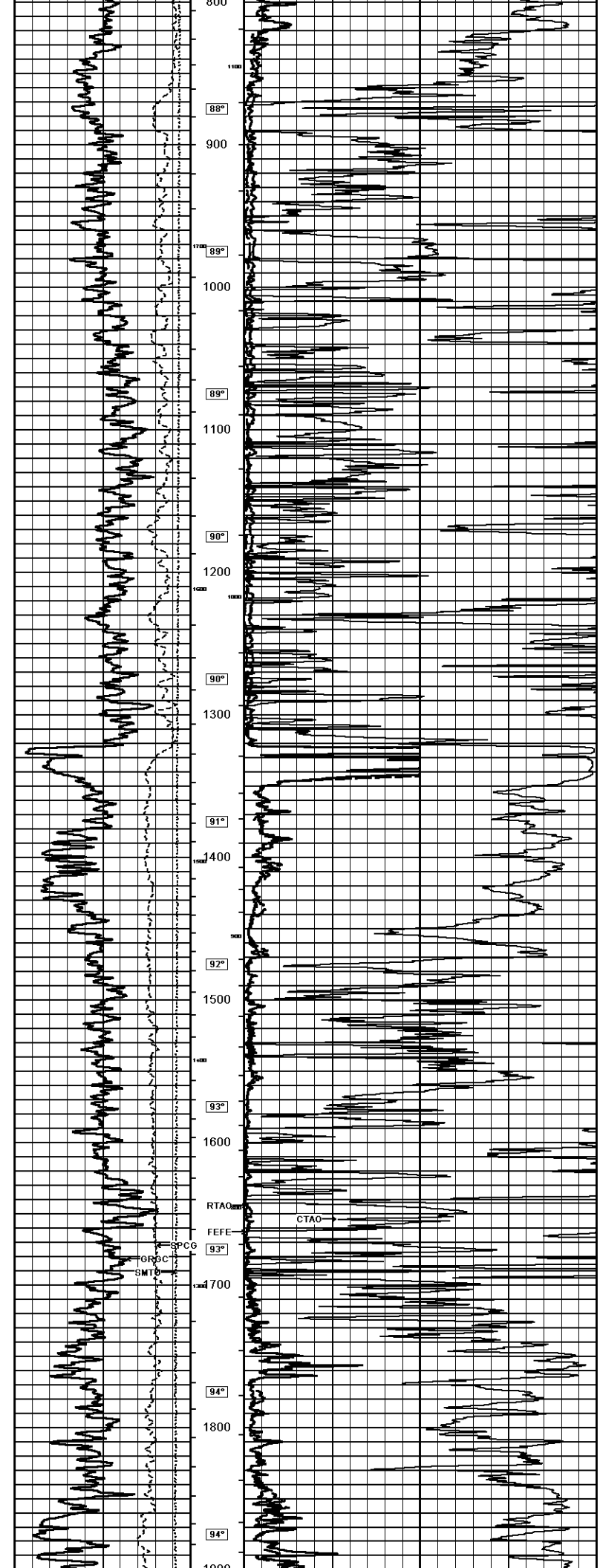
1 INCH MAIN

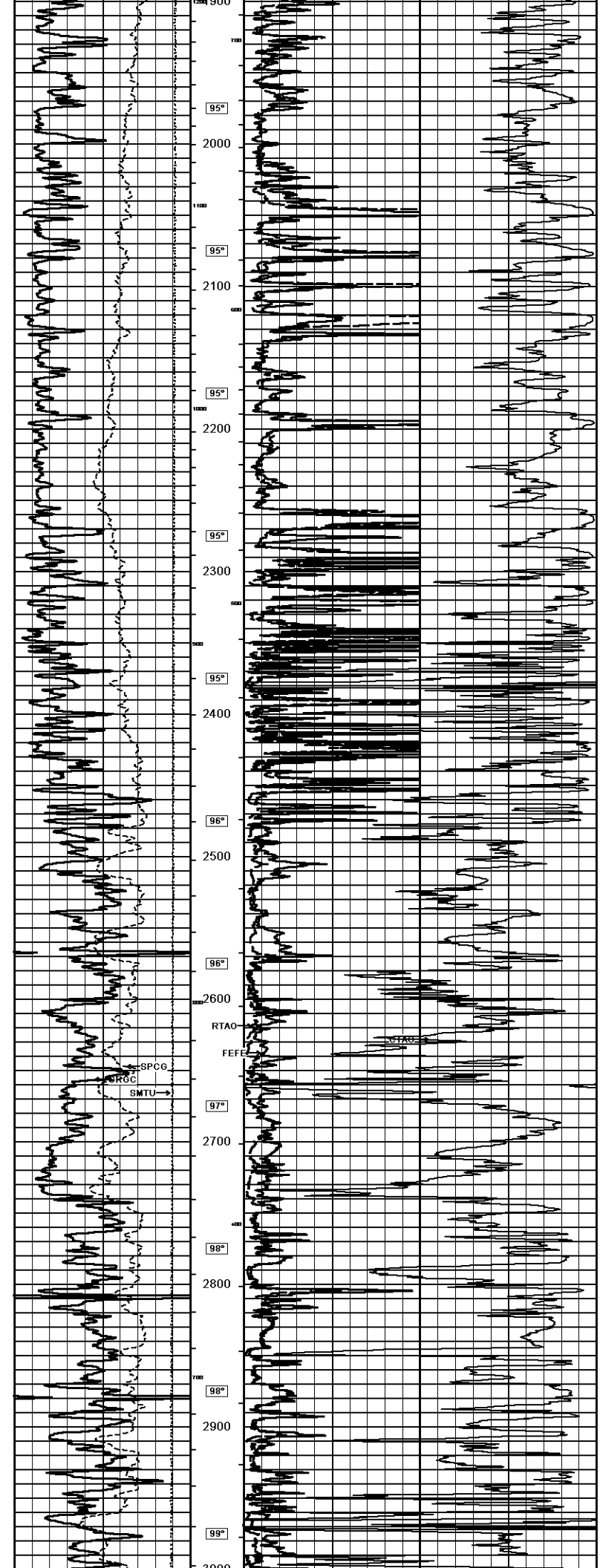
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsting-Wi...\Larson Kirsting-Williams #1-1 Merge Main.dta
System Versions: Plotted with 15.03.5939

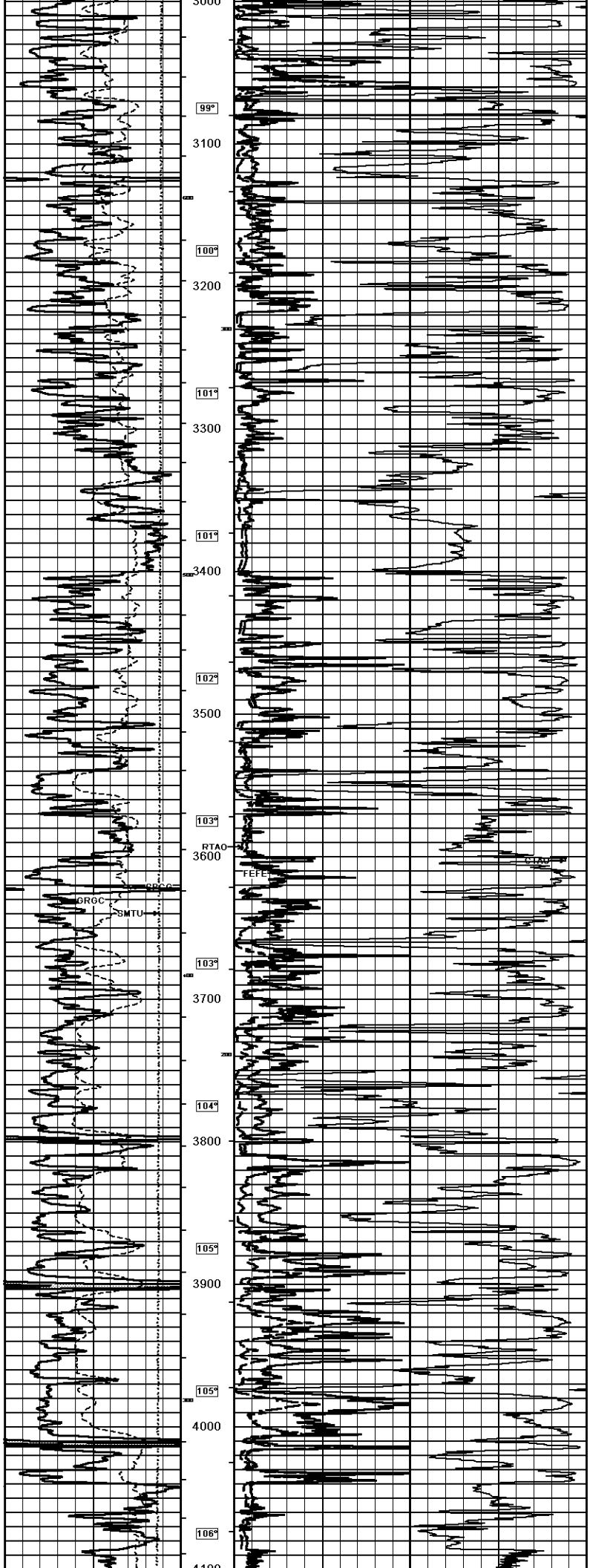
Plotted on 14-OCT-2015 08:32
Recorded on 14-OCT-2015 03:41

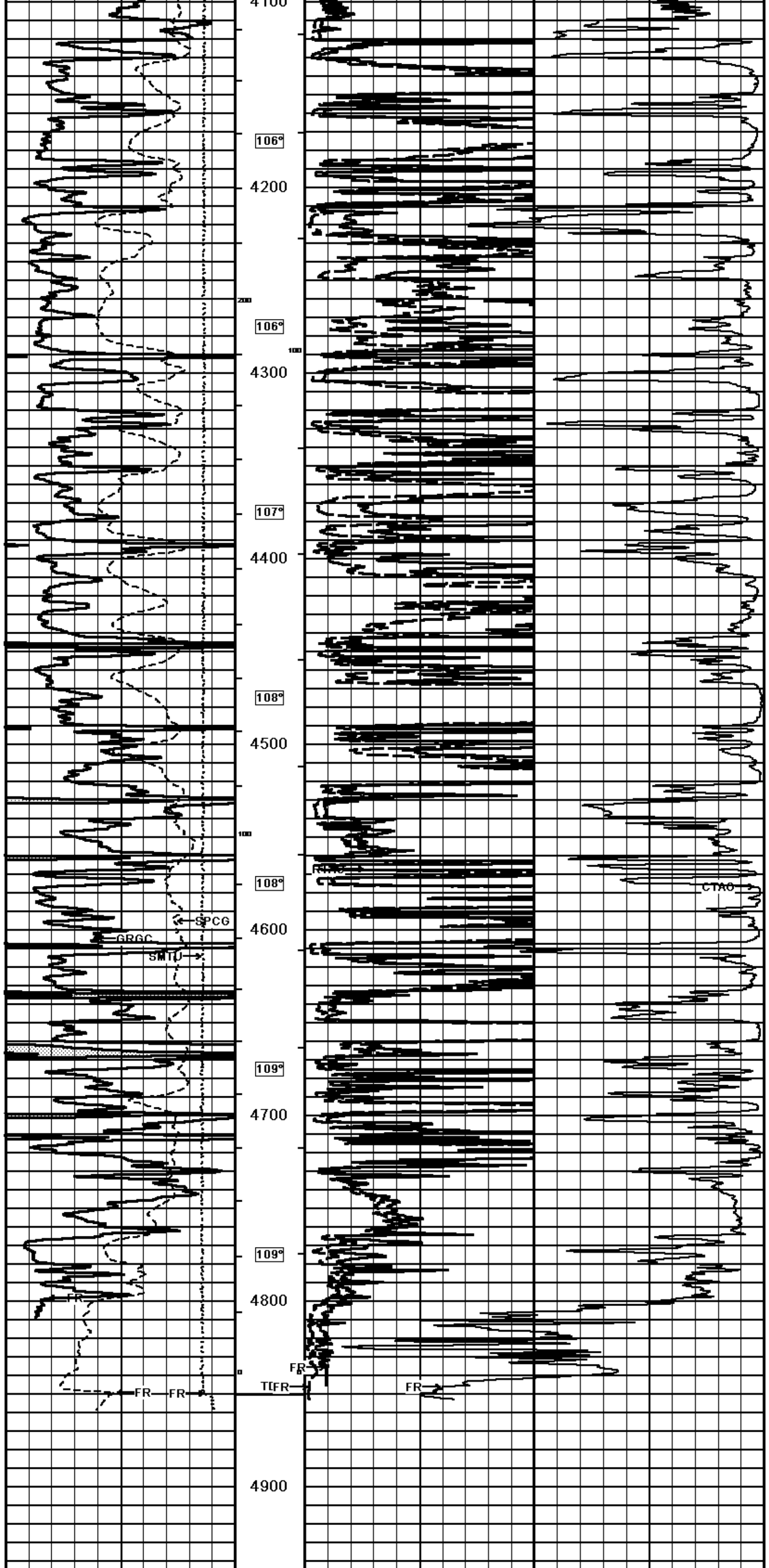
Timing Marks every 60.0 sec	Depth In Feet	Array Ind. One Cond Ct mmhos/metre 1000 750 500 250 0 / 2000 1750 1500 1250 1000
Gamma Ray API 0 75 150 / 150 225 300	Borehole Temp in deg F	
Spontaneous Potential millivolts – 20 +	HVI every 10 cu ft	Shallow FE ohm metres 0.20 25.10 50
	Annular Integral every 10 cu ft	Array Ind. One Res Rt ohm metres 0.20 25.10 50
DST Uphole Tension pounds 5000 0	Replay Scale 1:600	




800
88°
900
89°
1000
89°
1100
90°
1200
90°
1300
91°
1400
92°
1500
93°
1600
RTAO
CTAO
FEFE
SPCG
93°
GRGC
SMTG
1700
94°
1800
94°


95°
2000
95°
2100
95°
2200
95°
2300
95°
2400
96°
2500
96°
2600
RTAO
FEFE
SPCG
SROC
SMTU
97°
2700
98°
2800
98°
2900
99°


3000
99°
3100
100°
3200
101°
3300
101°
3400
102°
3500
103°
RTAO
3600
FEFE
GRGC
SMTU
103°
3700
104°
3800
105°
3900
105°
4000
106°



Depth In Feet

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

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Borehole Temp in deg F

Spontaneous Potential
millivolts
– →| 20 |← +

HVI every 10 cu ft

Shallow FE
ohm metres
0.20 25.10 50

Annular Integral every 10 cu ft

Array Ind. One Res Rt
ohm metres
0.20 25.10 50

DST Uphole Tension
pounds
5000 0

Replay Scale 1:600

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 14-OCT-2015 08:32
Filename: C:\Minimus 15.03.5939\Logs\Larson Kirsting-Wi...\Larson Kirsting-Williams #1-1 Merge Main.dta — Recorded on 14-OCT-2015 03:41
System Versions: Plotted with 15.03.5939

1 INCH MAIN

COMPANY	LARSON ENGINEERING, INC
WELL	KIRSTING-WILLIAMS #1-1
FIELD	WILDCAT
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / KANSAS

Elevation Kelly Bushing	2272.00	feet	First Reading	4847.00	feet
Elevation Drill Floor	2270.00	feet	Depth Driller	4850.00	feet
Elevation Ground Level	2263.00	feet	Depth Logger	4850.00	feet

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