



Weatherford[®]

**CML MESSENGER SHUTTLE
ARRAY INDUCTION
ELECTRIC LOG**

COMPANY			SANDRIDGE ENERGY		
WELL			TOEWS 2629 2-21H		
FIELD			MONGER		
PROVINCE/COUNTY			GRAY		
COUNTRY/STATE			USA / KANSAS		
LOCATION			N2 NW NW NW		
			220' FNL & 330' FWL		
SEC	TWP	RGE	Other Services		
21	26s	29w	MDN/MPD		
API Number			15-069-20416		
Permit Number					
Permanent Datum GL, Elevation feet					
Log Measured From KB					
Drilling Measured From KB @ 17' AGL					
Date	23-DEC-2012				
Run Number	ONE				
Service Order	3538732				
Depth Driller	9360.00		feet		
Depth Logger	9360.00		feet		
First Reading	9333.00		feet		
Last Reading	5548.00		feet		
Casing Driller	5572.00		feet		
Casing Logger	5568.00		feet		
Bit Size	6.125		inches		
Hole Fluid Type	WBM				
Density / Viscosity	9.20	lb/USg	32.00	CP	
PH / Fluid Loss	11.10		4.40	ml/30Min	
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.75 @ 70.0		ohm-m		
Rmf @ Measured Temp	0.60 @ 70.0		ohm-m		
Rmc @ Measured Temp	0.90 @ 70.0		ohm-m		
Source Rmf / Rmc	CALC		CALC		
Rm @ BHT	0.43 @127.0		ohm-m		
Time Since Circulation	16 HOURS				
Max Recorded Temp	127.00		deg F		
Equipment / Base	18006		OKC		
Recorded By	GUTHMUELLER				
Witnessed By	W SCOTT				
AFE# DC12574					

BOREHOLE RECORD			Last Edited: 23-DEC-2012 17:33
Bit Size inches	Depth From feet	Depth To feet	
12.250	0.00	1553.00	
8.750	1553.00	5572.00	
6.125	5572.00	9360.00	

CASING RECORD				
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURF	9.625	0.00	1553.00	36.00
INTER	7.000	0.00	5572.00	26.00

REMARKS
LOGGED WITH WLS VER 13.04.8492 SOFTWARE
TOOLS RAN: SRT-070; MBS-112;MMSE-167; MTI-067; MGS-135; MCL-060; SKJ-042; SHA-454; MISD-310; MDN-388; MPD-435;MISD-15; SHA-033; SKJ-041; MISE-578; MFE-359; MISB-029; MAI-158
WELL LOGGED USING MESSENGER METHOD OF DEPLOYMENT, AND MEMORY LOGGING SYSTEM
LOGS RESET TO PIPE STRAP AND COMPARED TO MWD LOGS PROVIDED BY CUSTOMER
HARDWARE: MAI:0.5" MISE STANDOFF ABOVE ISA STANDOFF BELOW MFE: 0.5" MISE STANDOFFS ABOVE AND BELOW MPD: 4"PROFILE PLATE, MIS-A SINGLE SPRING DECENTRALIZER BELOW MDN: MISD DOUBLE SPRING DECENTRALIZER RAN ABOVE

2.77 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER REQUEST

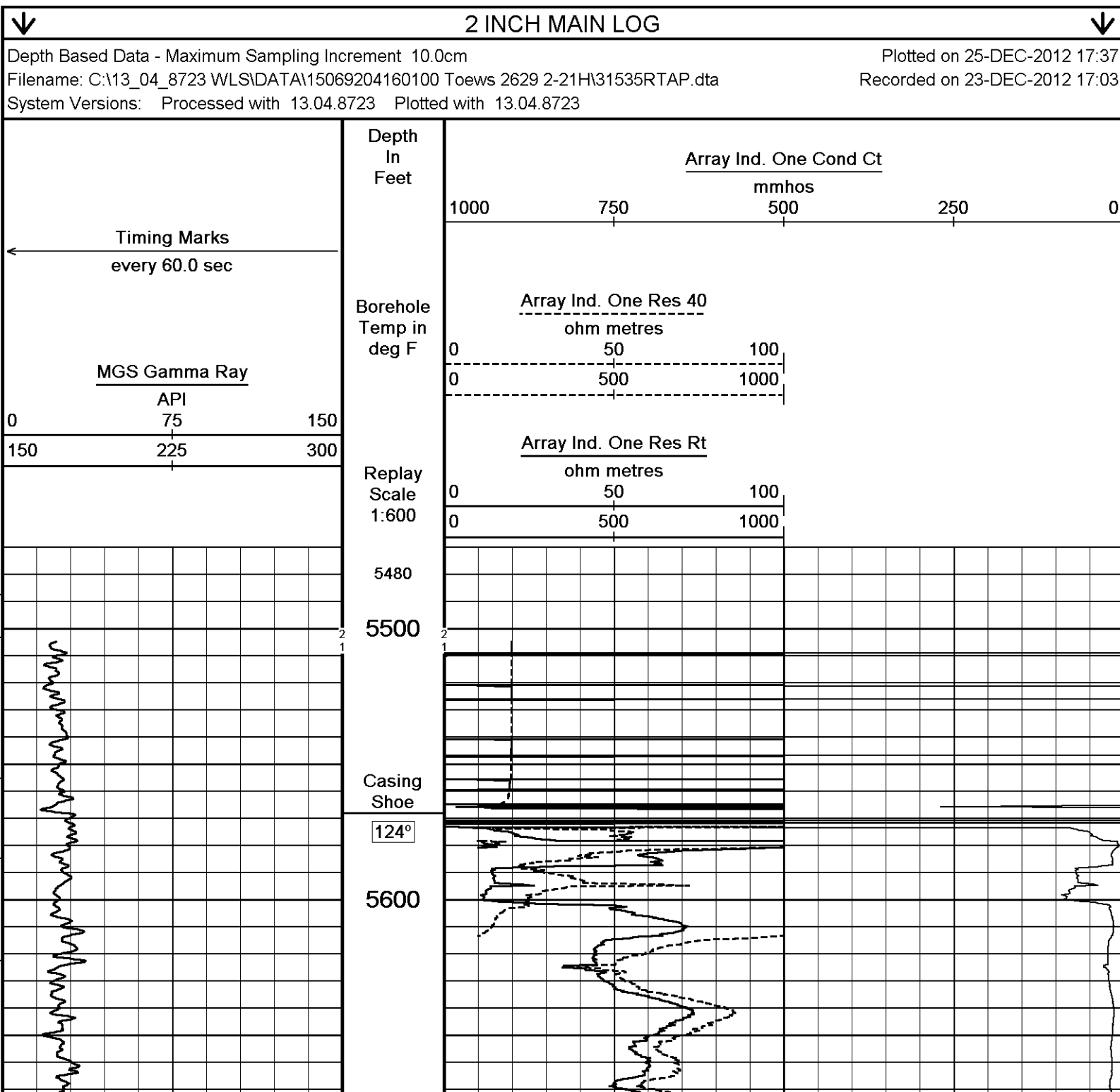
DRILL PIPE DEPTH DURING DEPLOYMENT - 9252
LOGGING TOOL DEPTH AFTER DEPLOYMENT: 9335

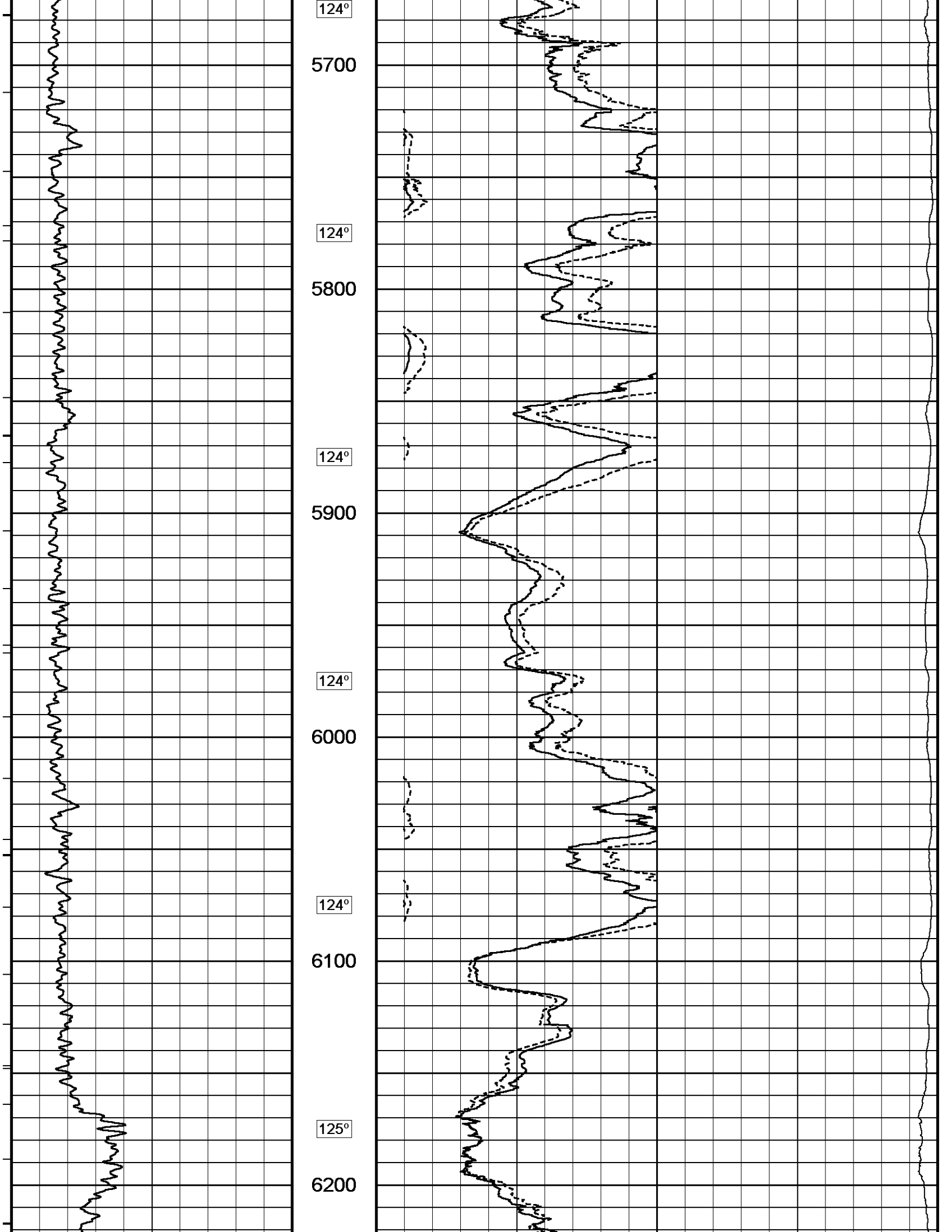
4.5" CASING USED TO CALCULATE AHV

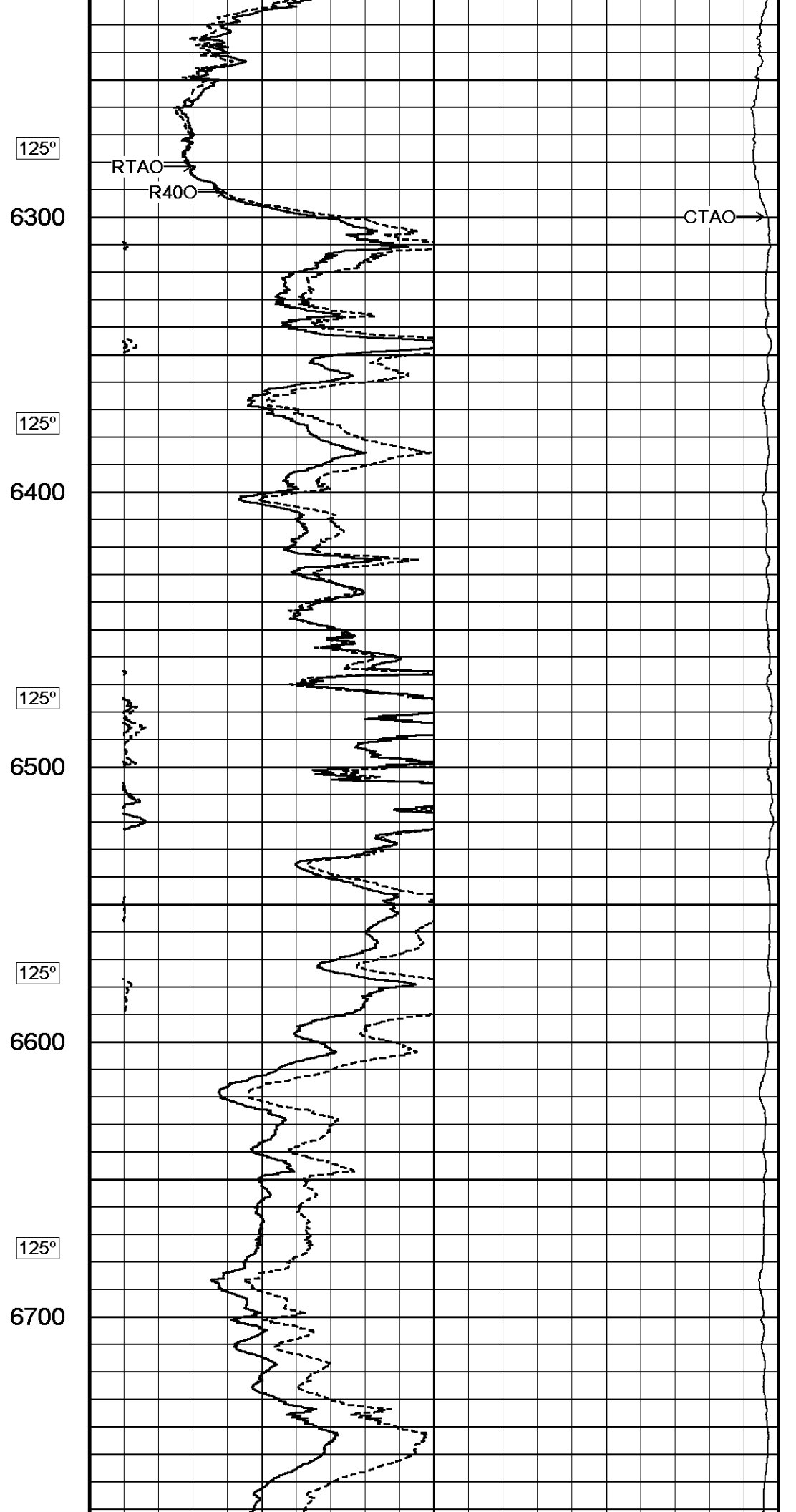
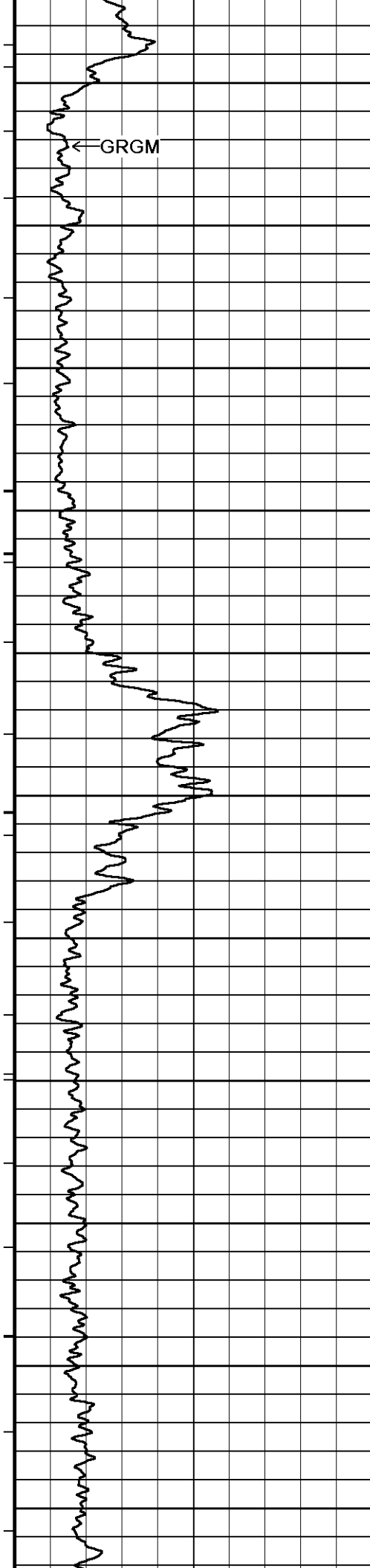
SERVICE ORDER # 3538732
RIG: LARIAT #20

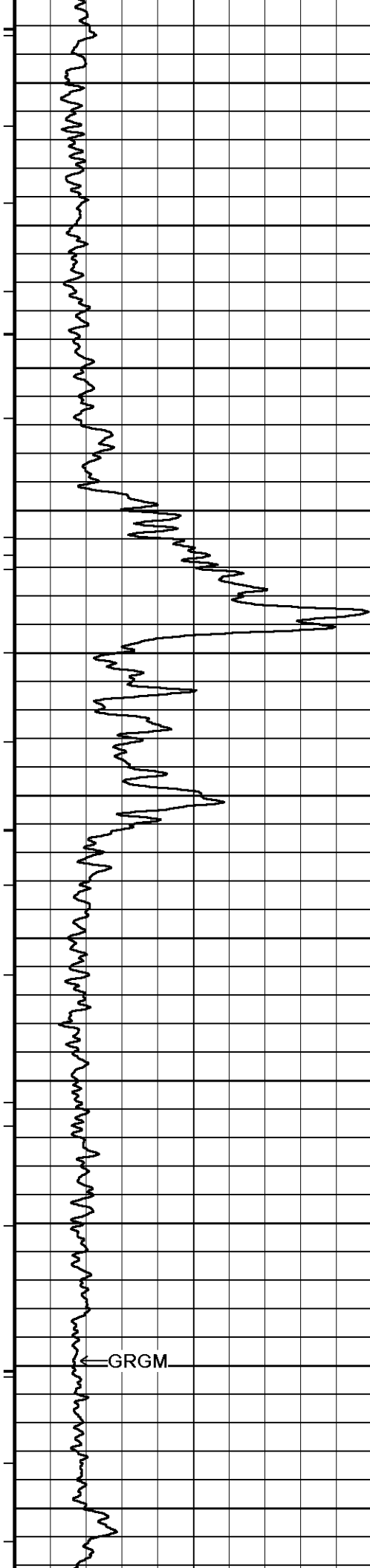
OPERATORS: R CASPARIAN; K CHAFFIN

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions in our price schedule.









125°

6800

126°

6900

126°

7000

126°

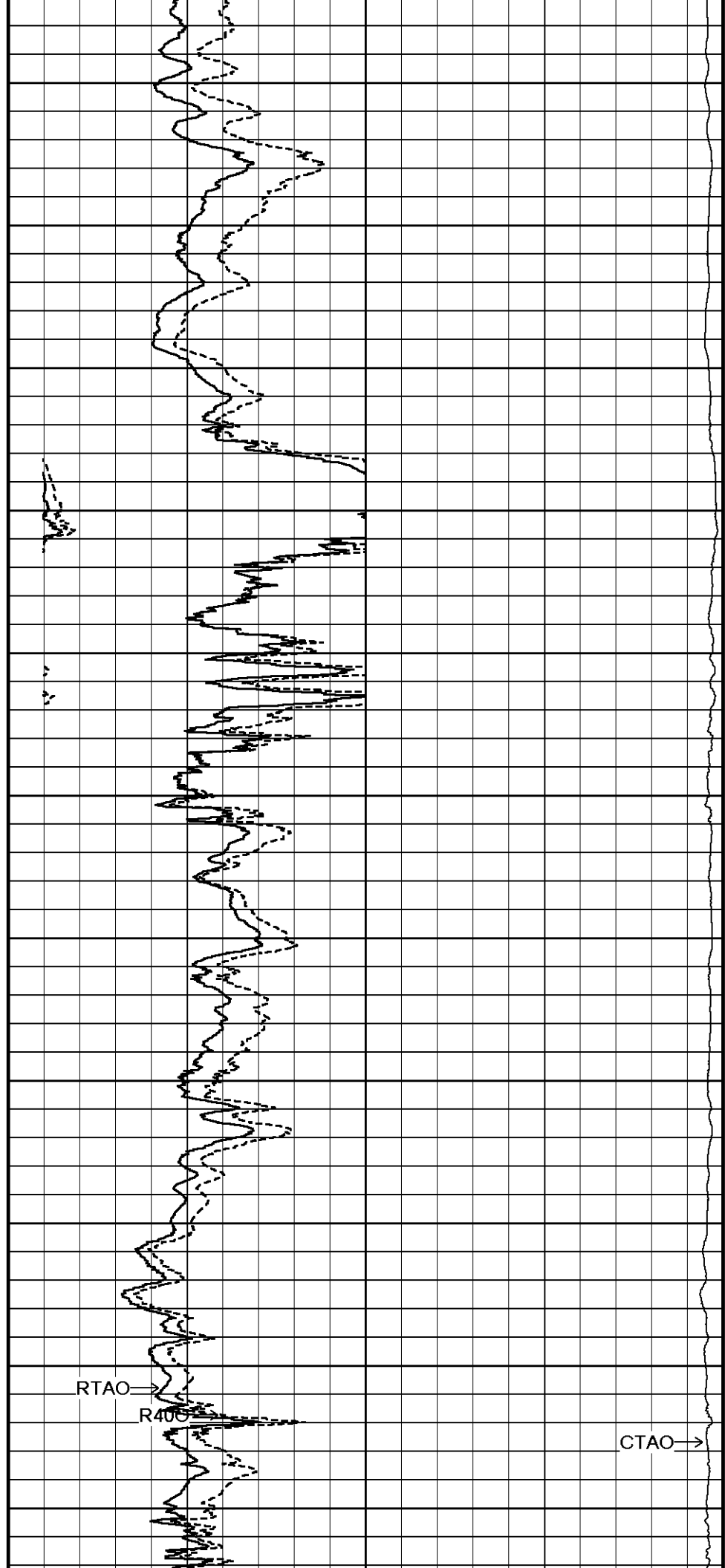
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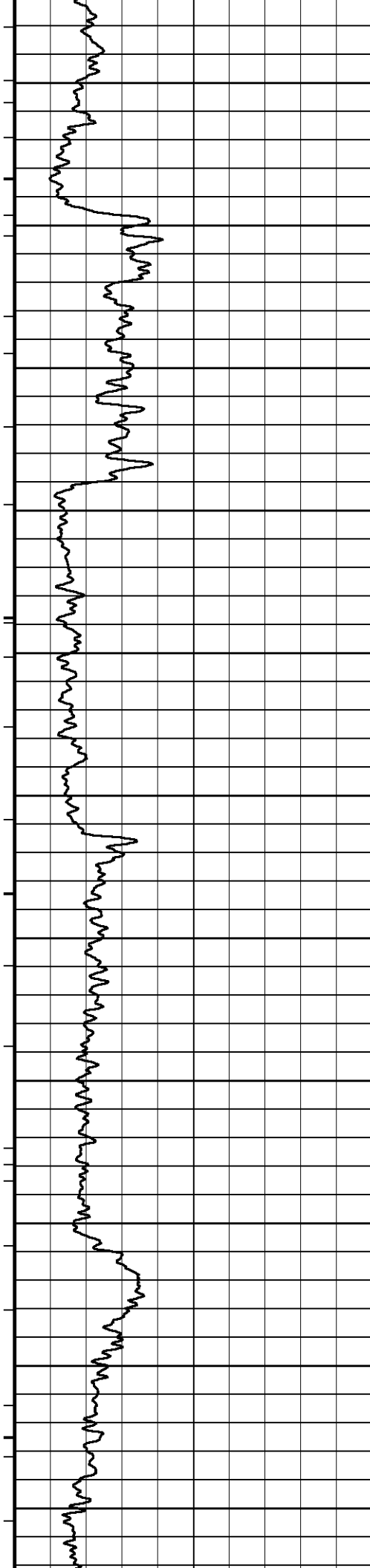
126°

7200

126°

7300





126°

7400

126°

7500

127°

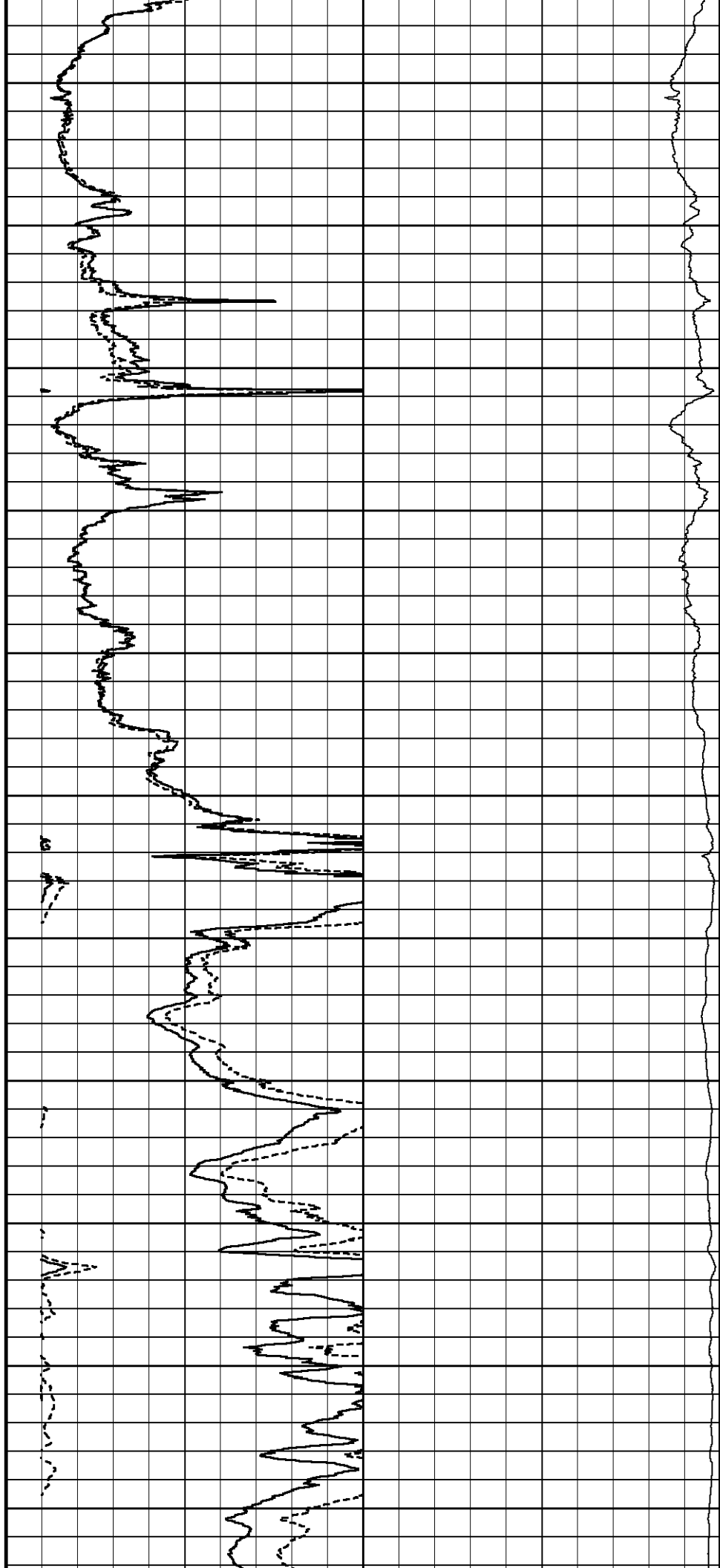
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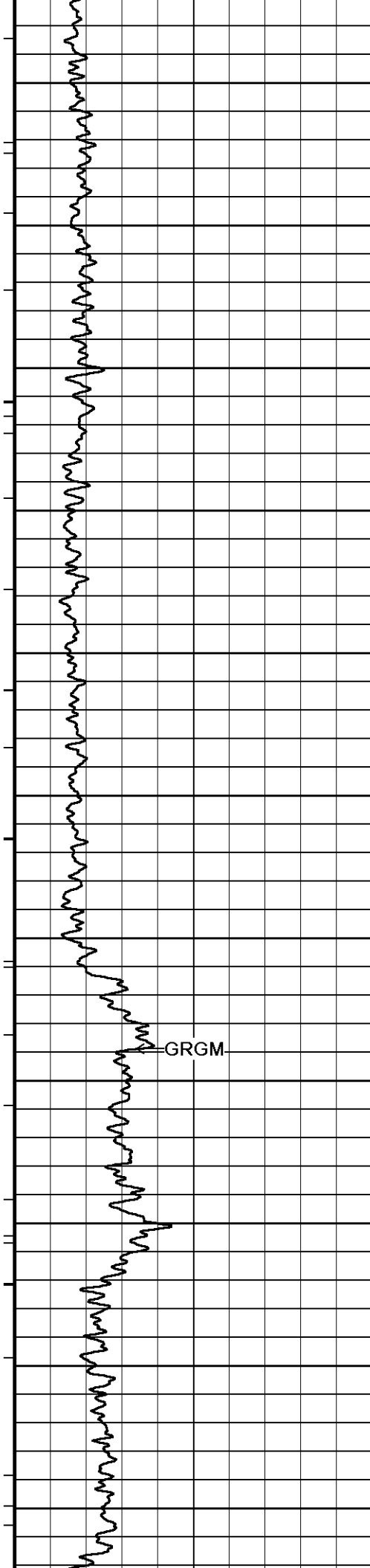
127°

7700

127°

7800





GRGM

127°

7900

127°

8000

127°

8100

127°

8200

127°

8300

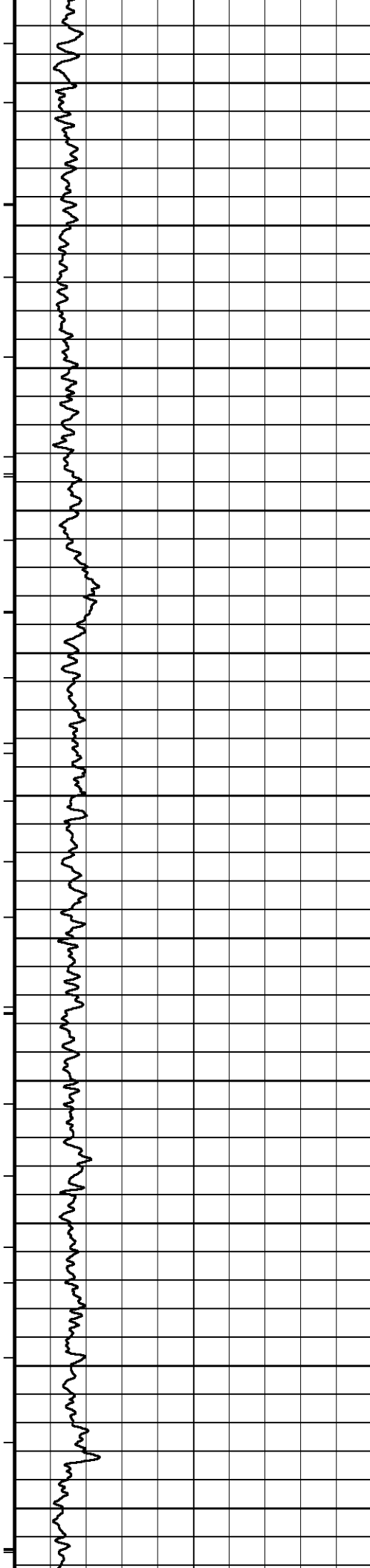
127°

8400

RTAO

R400

CTAO →



127°

8500

127°

8600

127°

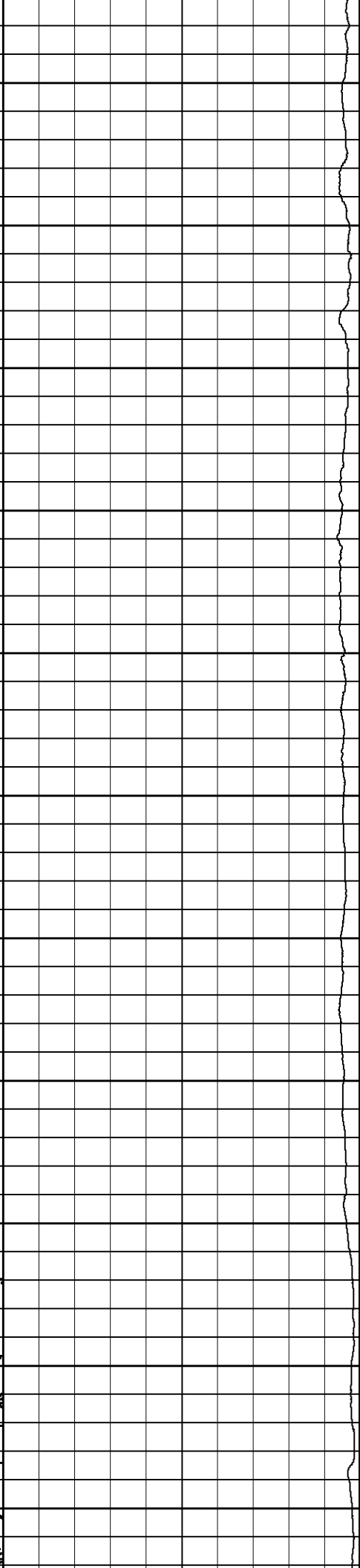
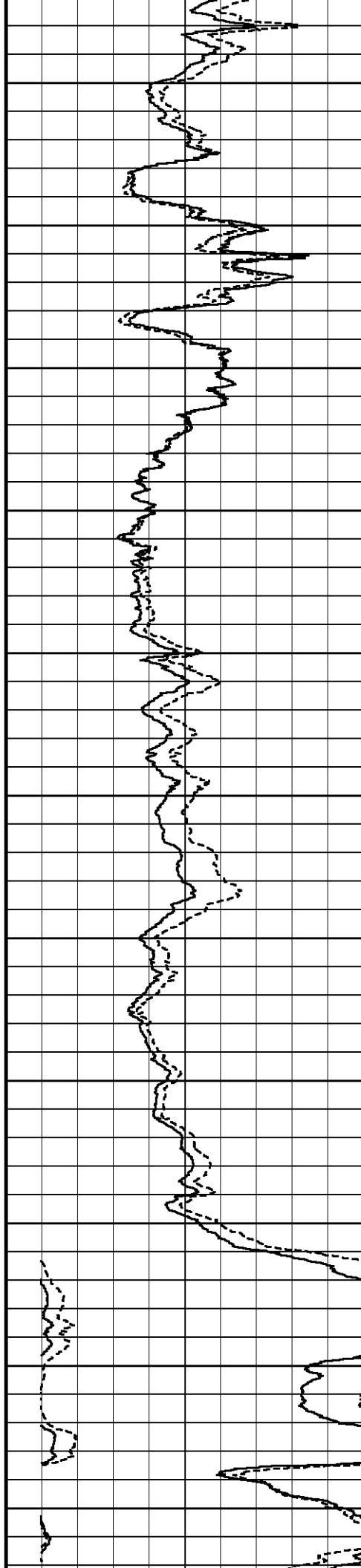
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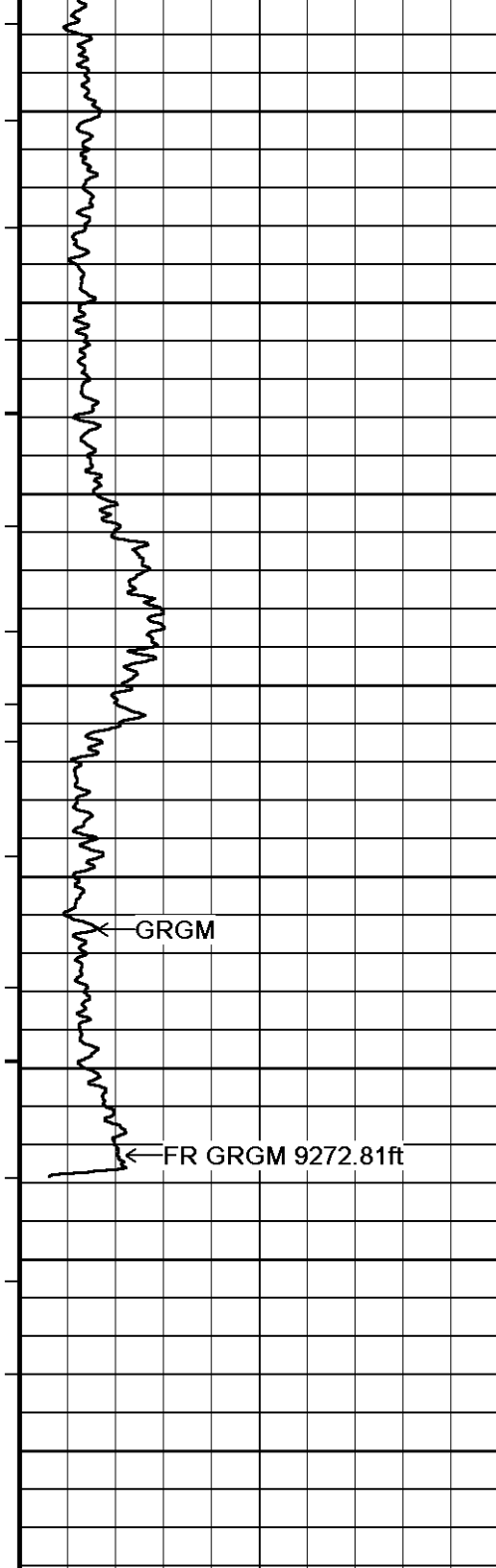
127°

8800

127°

8900





127°

9000

127°

9100

127°

9200

128°

9300

9370

Depth
In
Feet

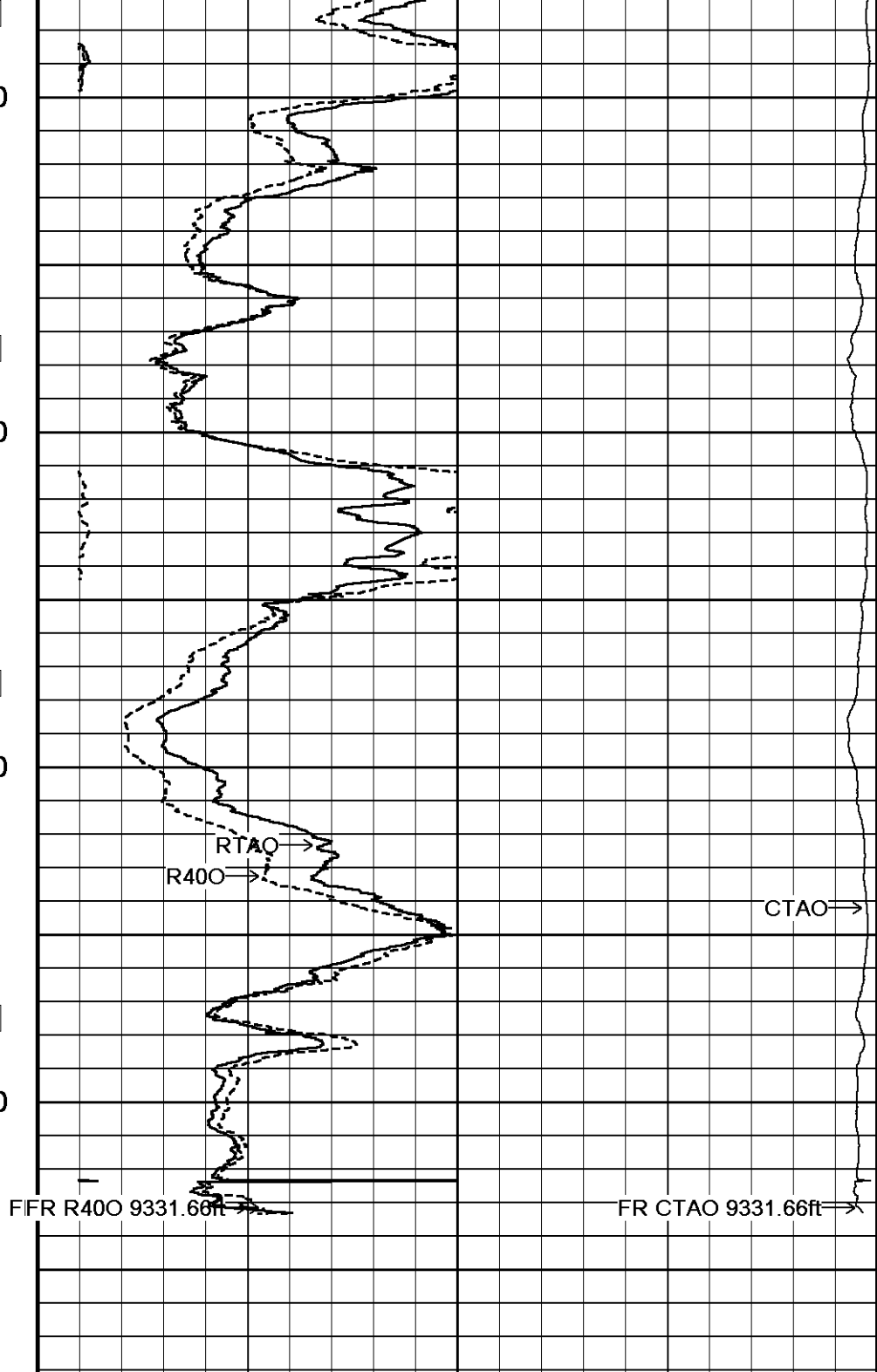
Timing Marks
every 60.0 sec

MGS Gamma Ray

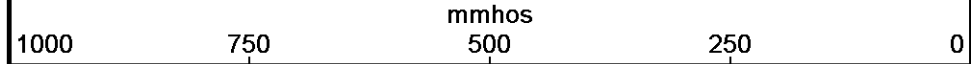
0	API	150
75		
150	225	300

Borehole
Temp in
deg F

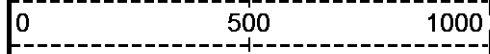
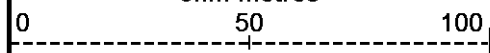
Replay
Scale



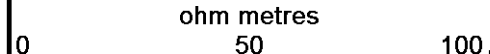
Array Ind. One Cond Ct

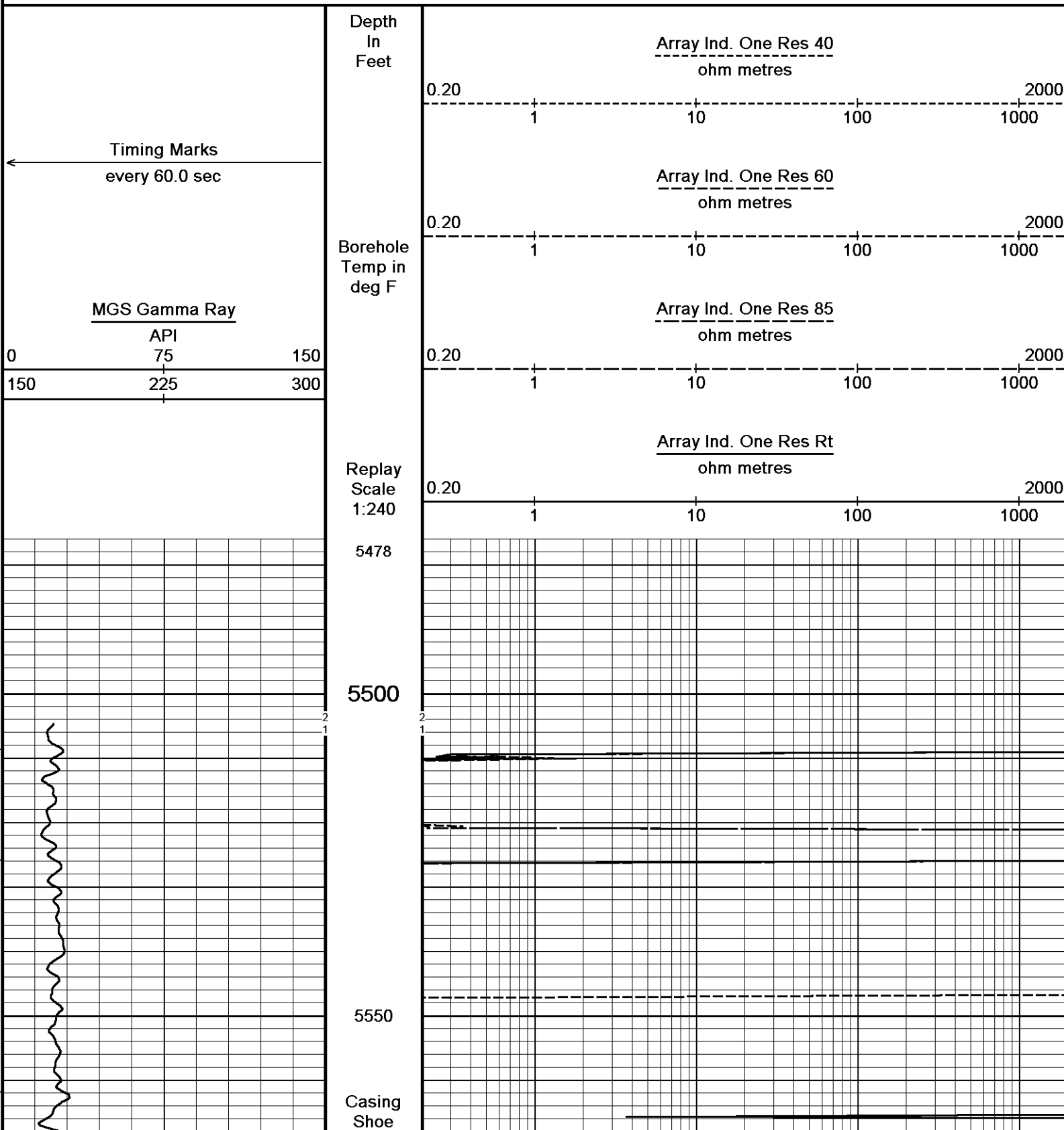


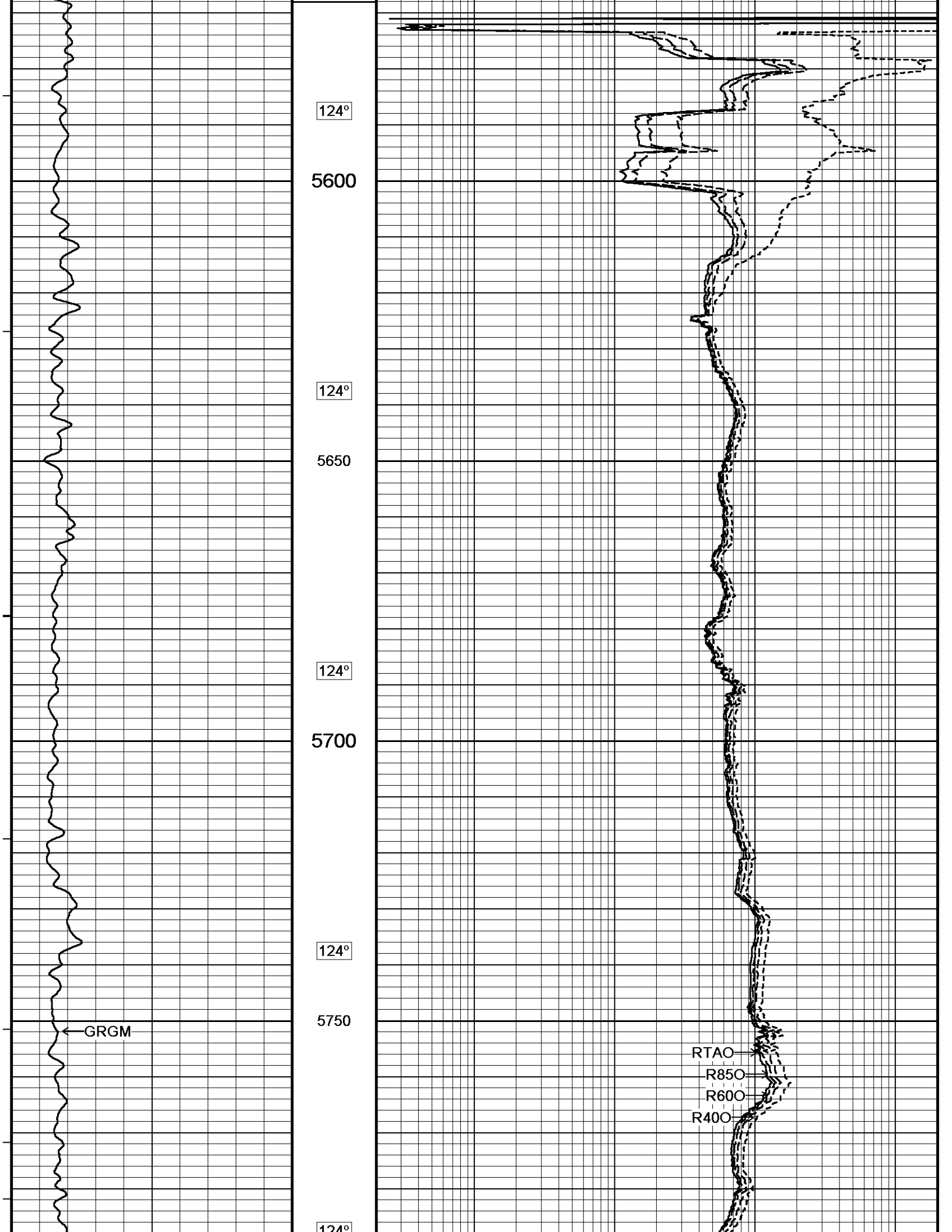
Array Ind. One Res 40
ohm metres

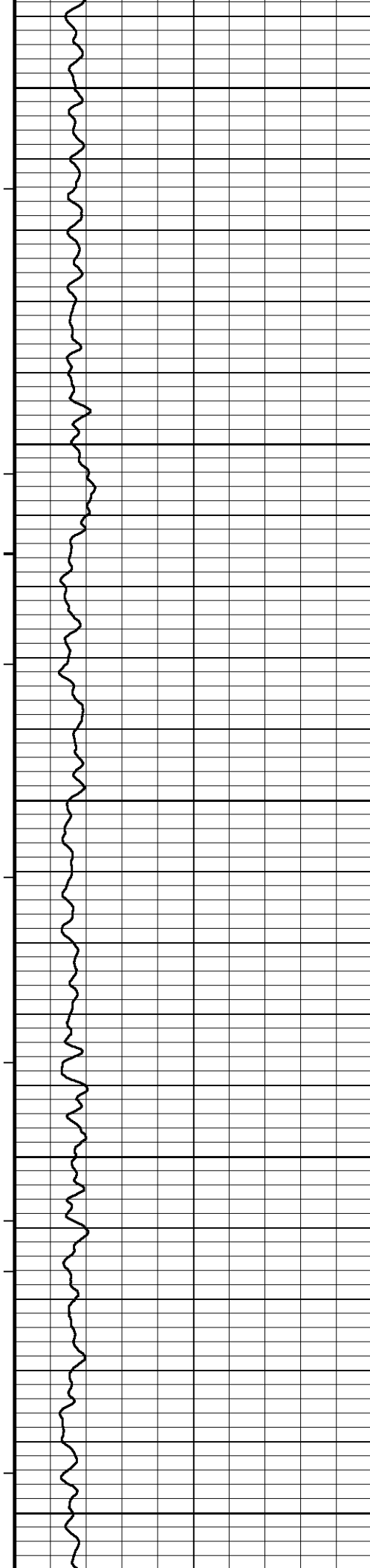


Array Ind. One Res Rt
ohm metres









124°

5800

124°

5850

124°

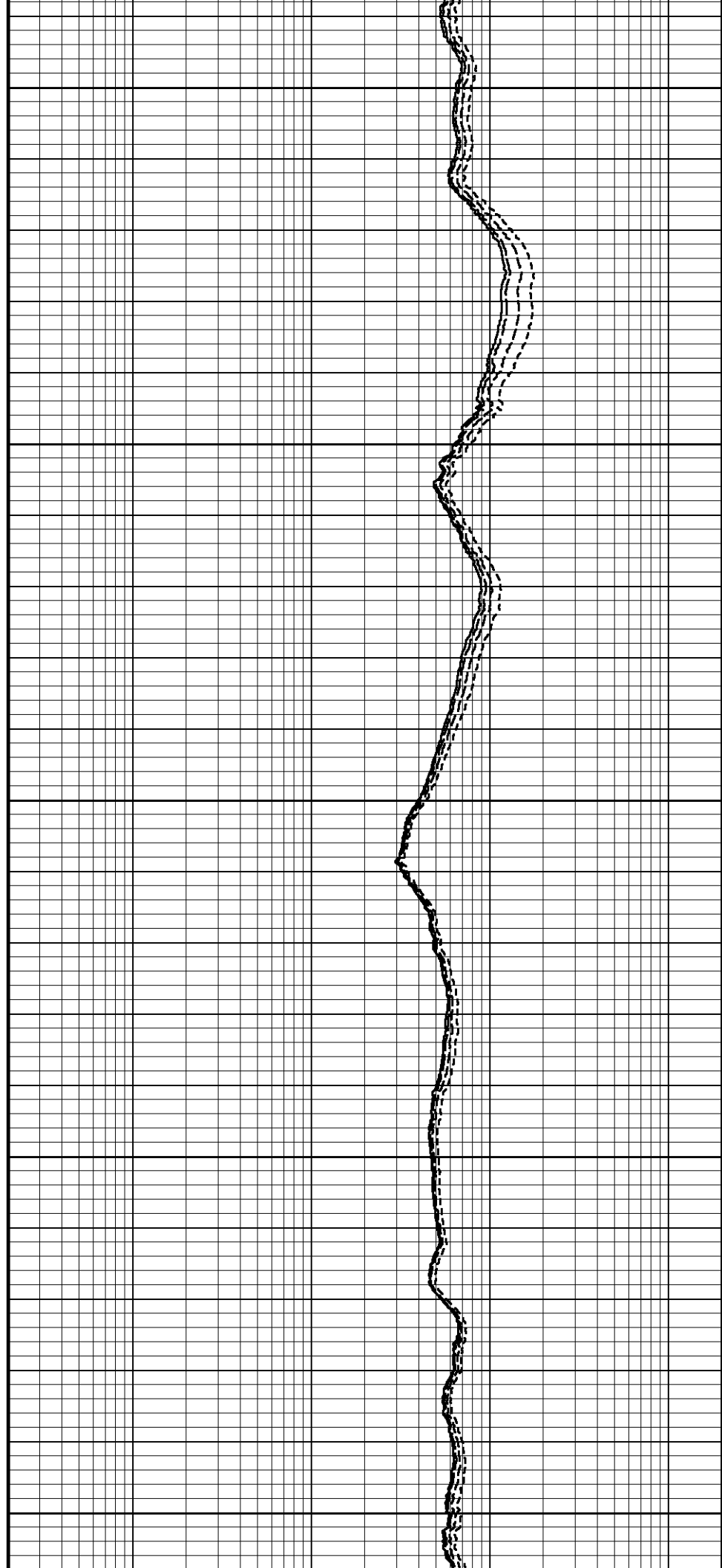
5900

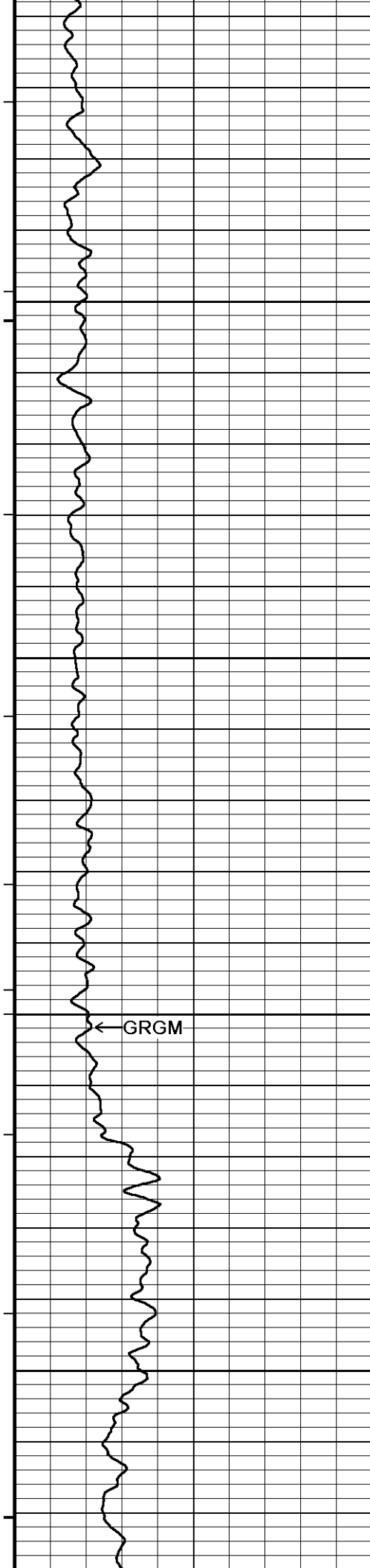
124°

5950

124°

6000





124°

6050

124°

6100

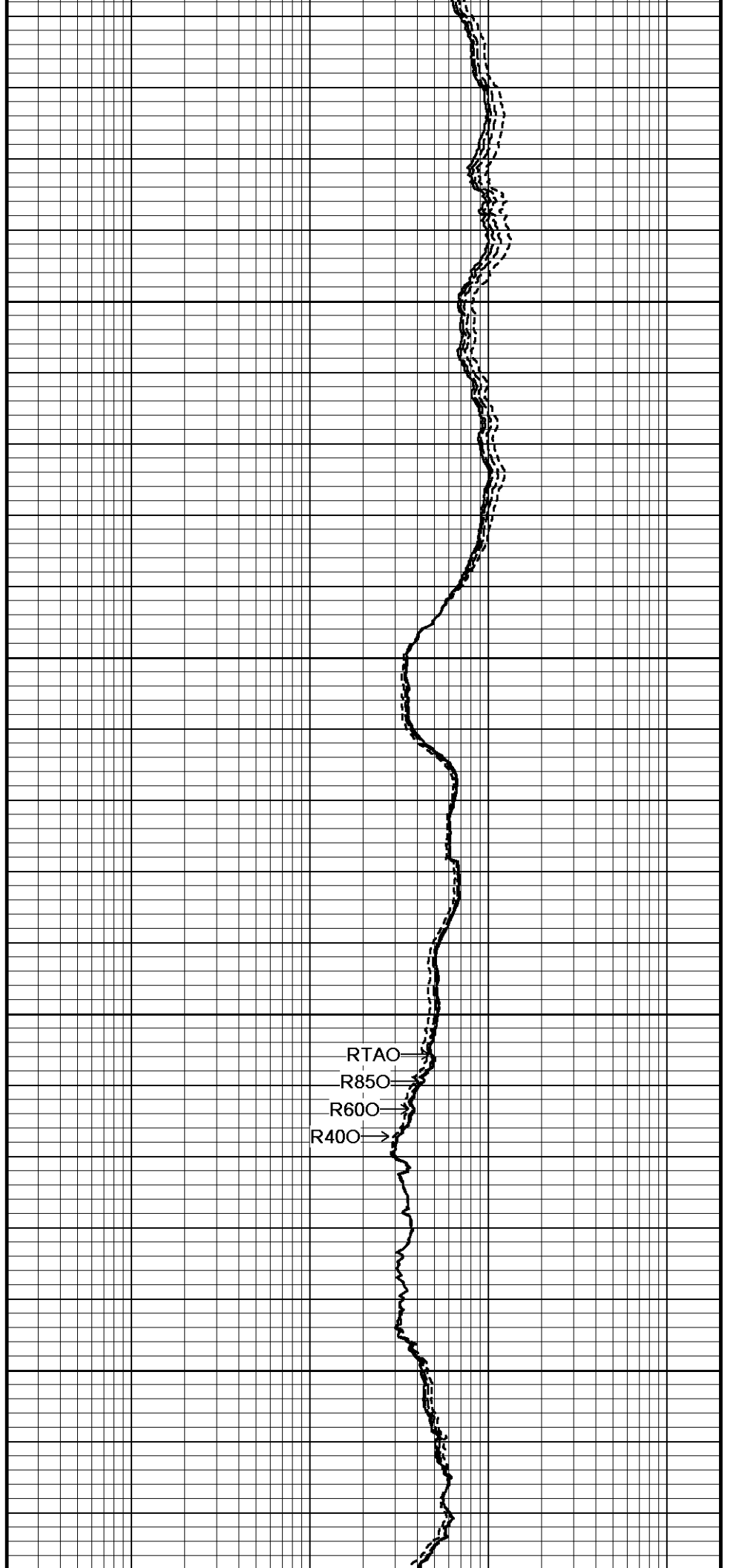
125°

6150

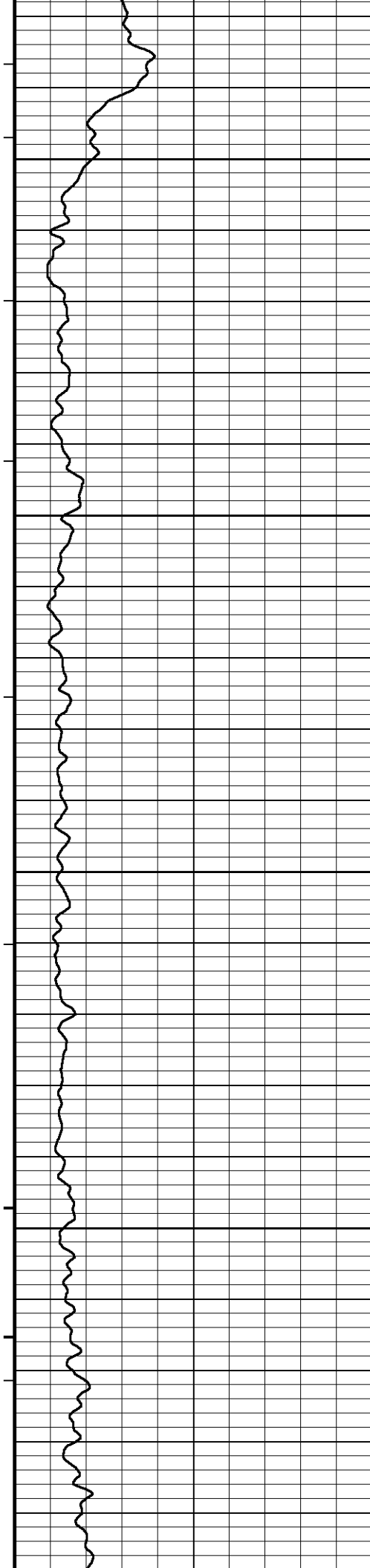
125°

6200

← GRGM



RTAO
R850
R600
R400 →



125°

6250

125°

6300

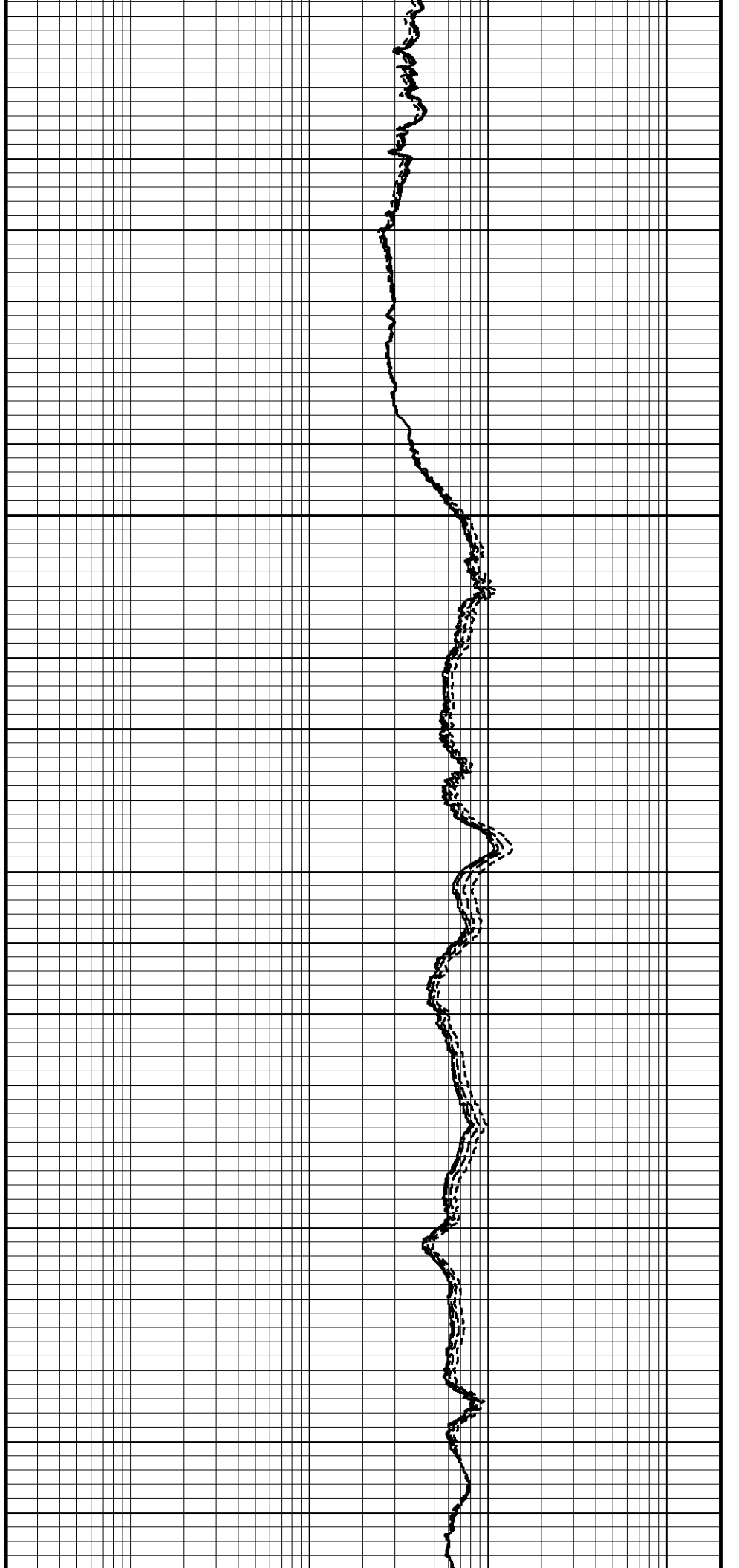
125°

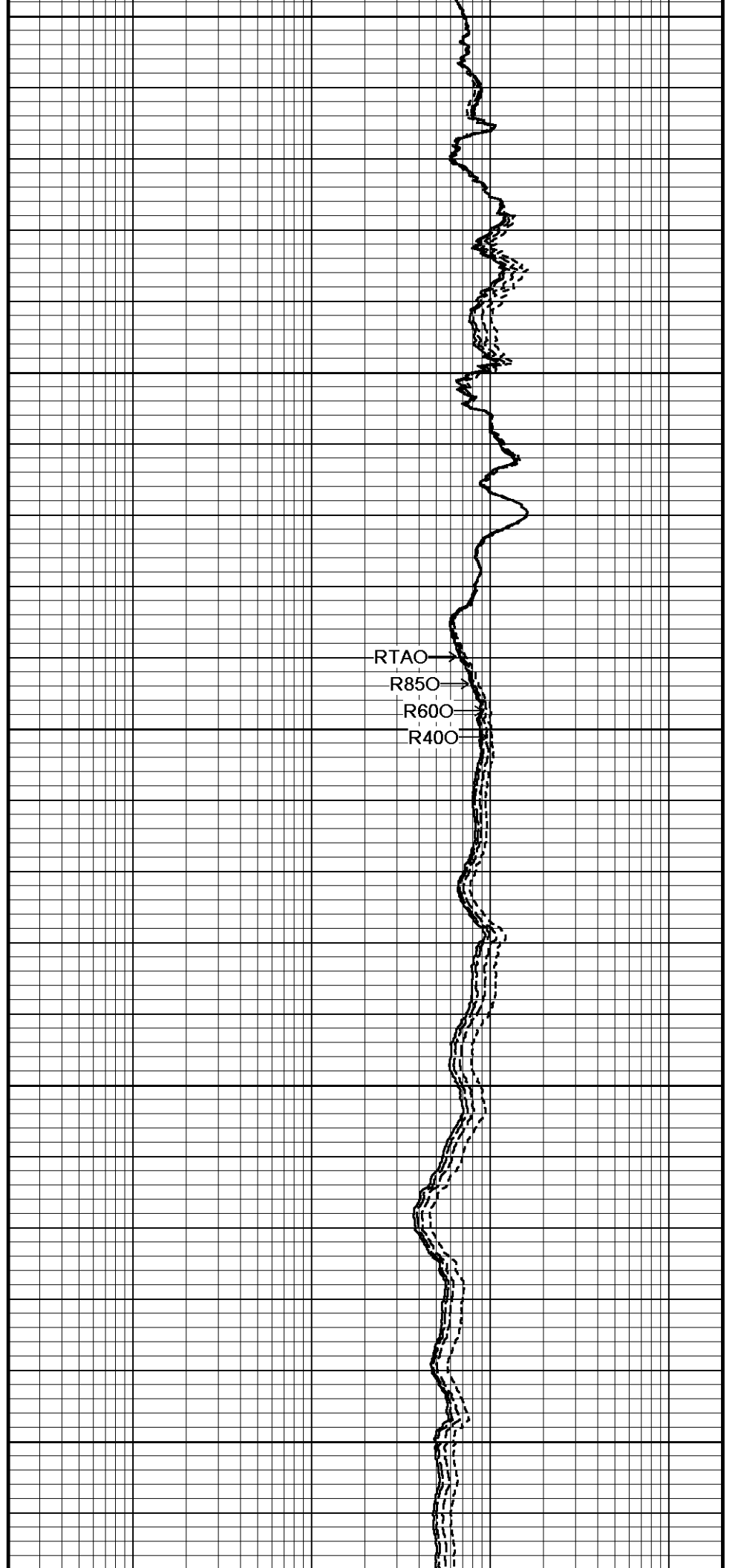
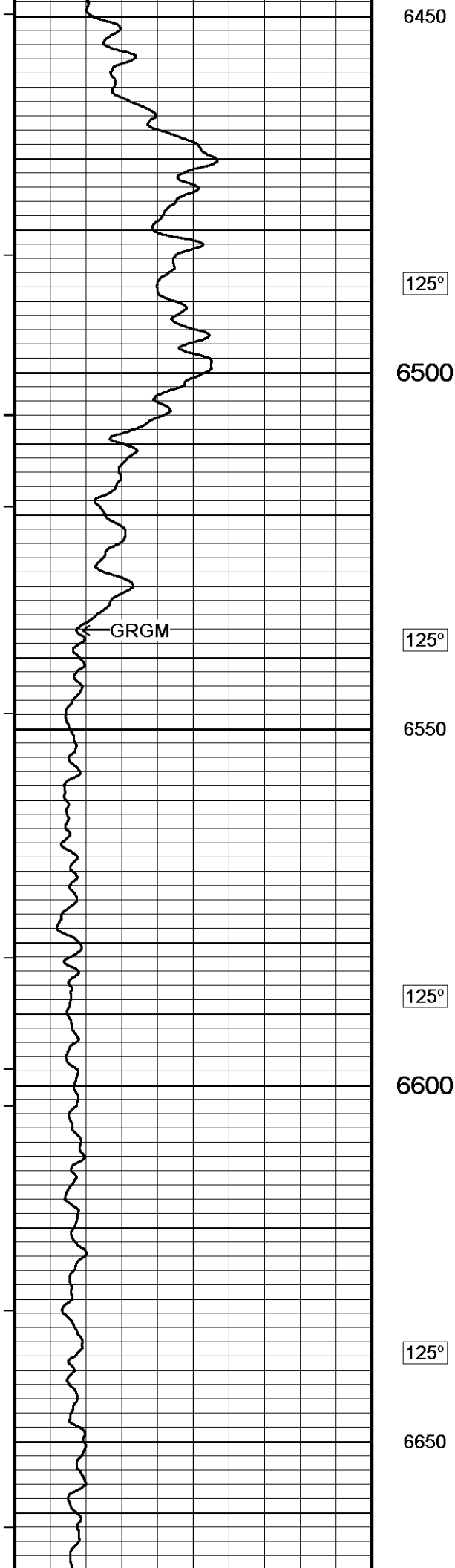
6350

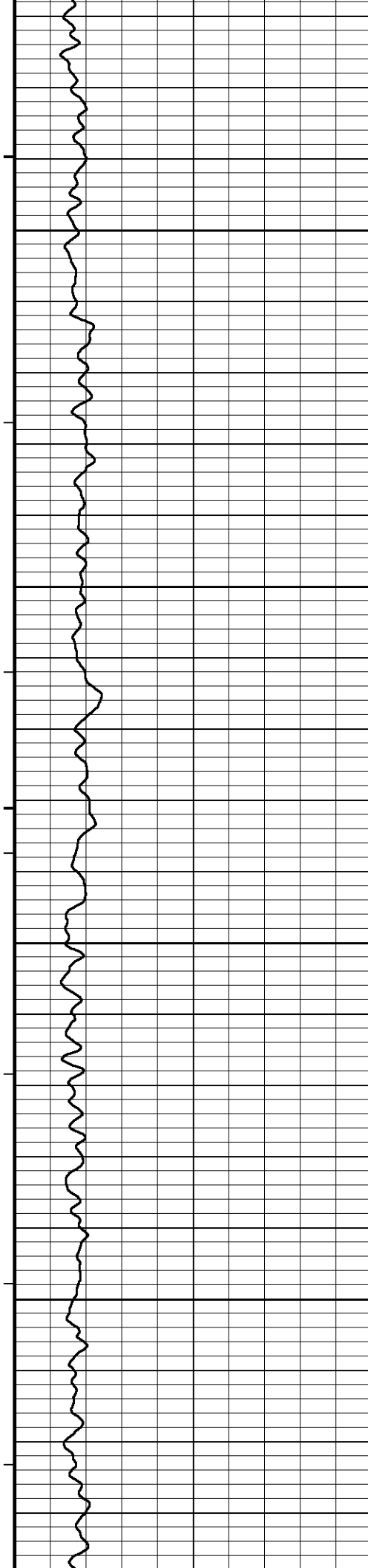
125°

6400

125°







125°

6700

125°

6750

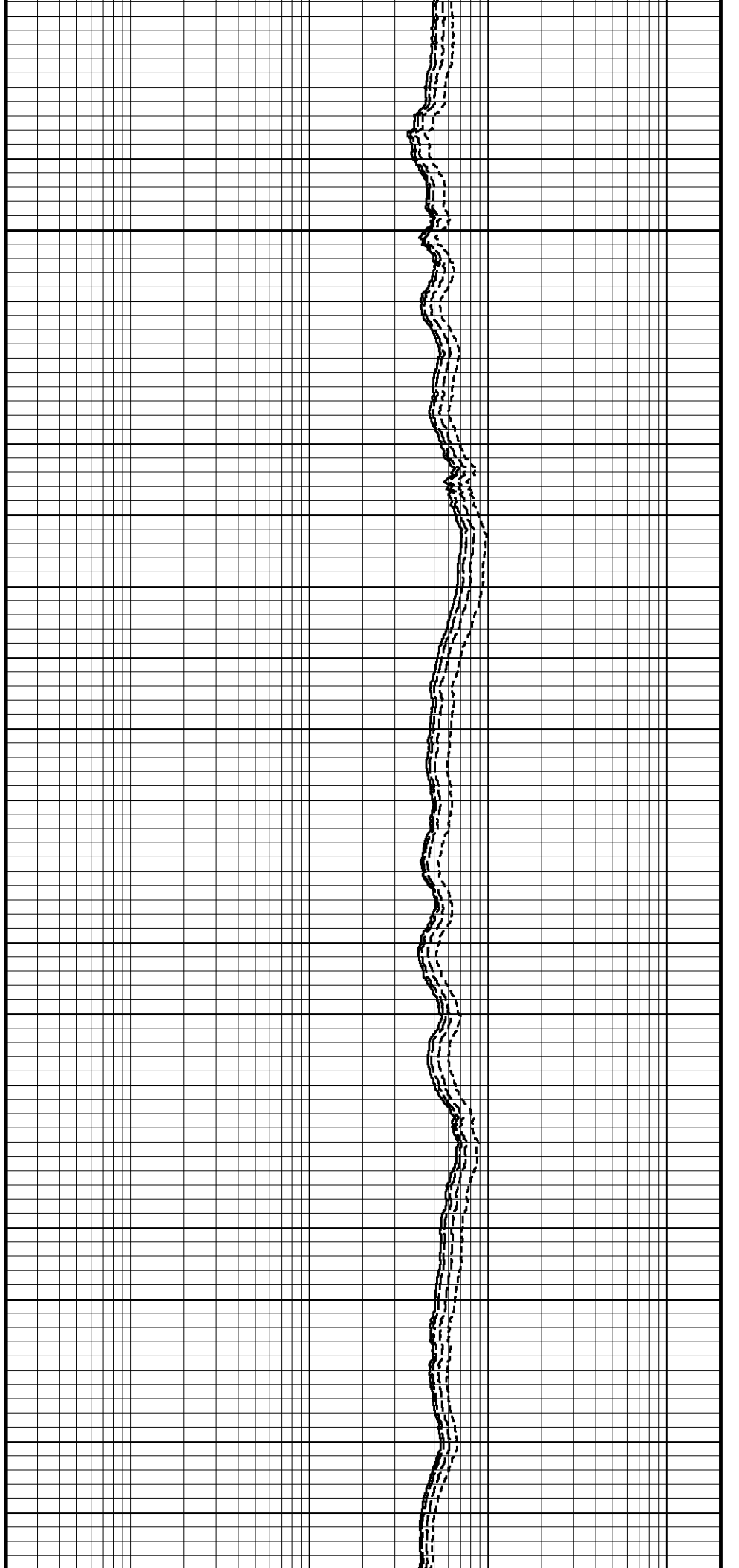
125°

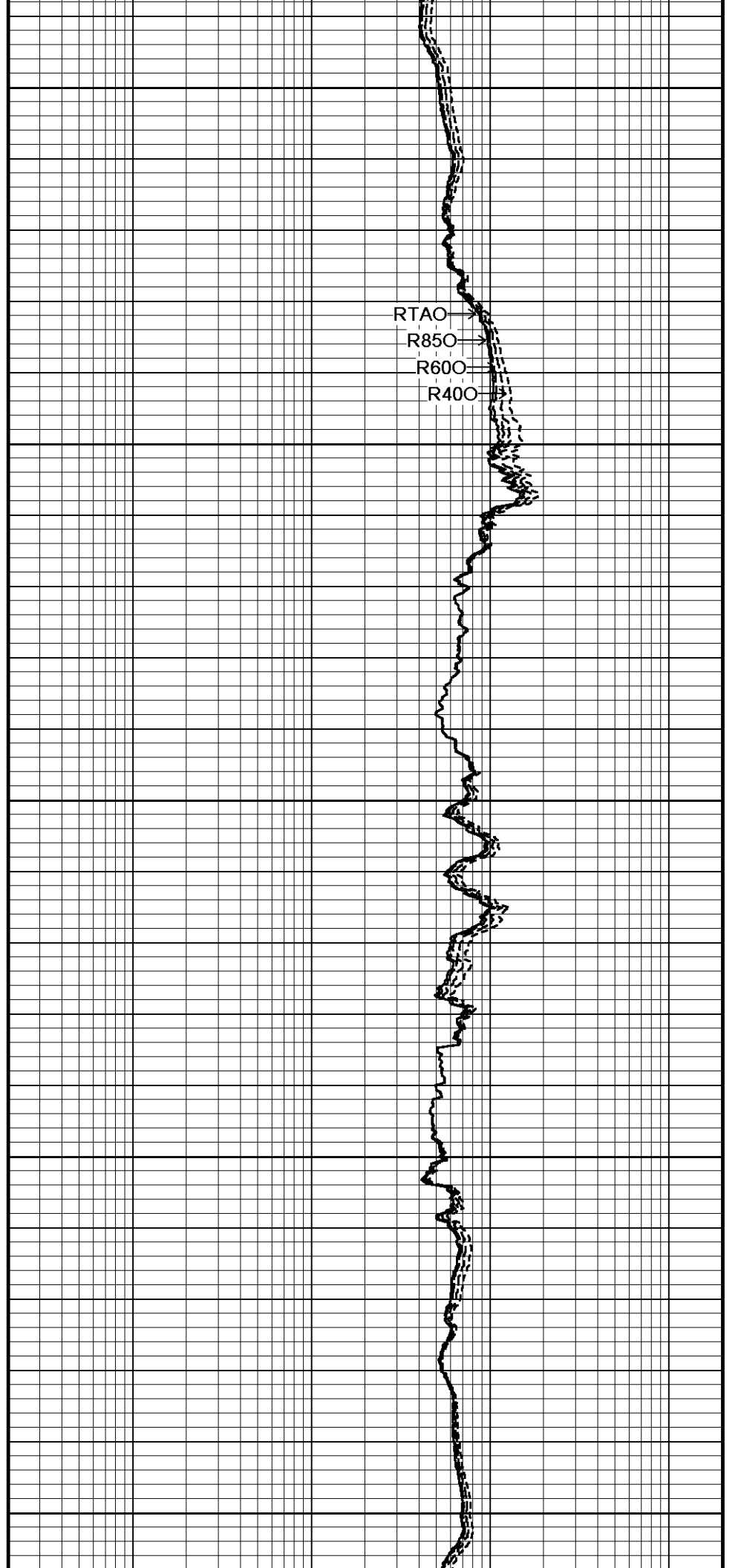
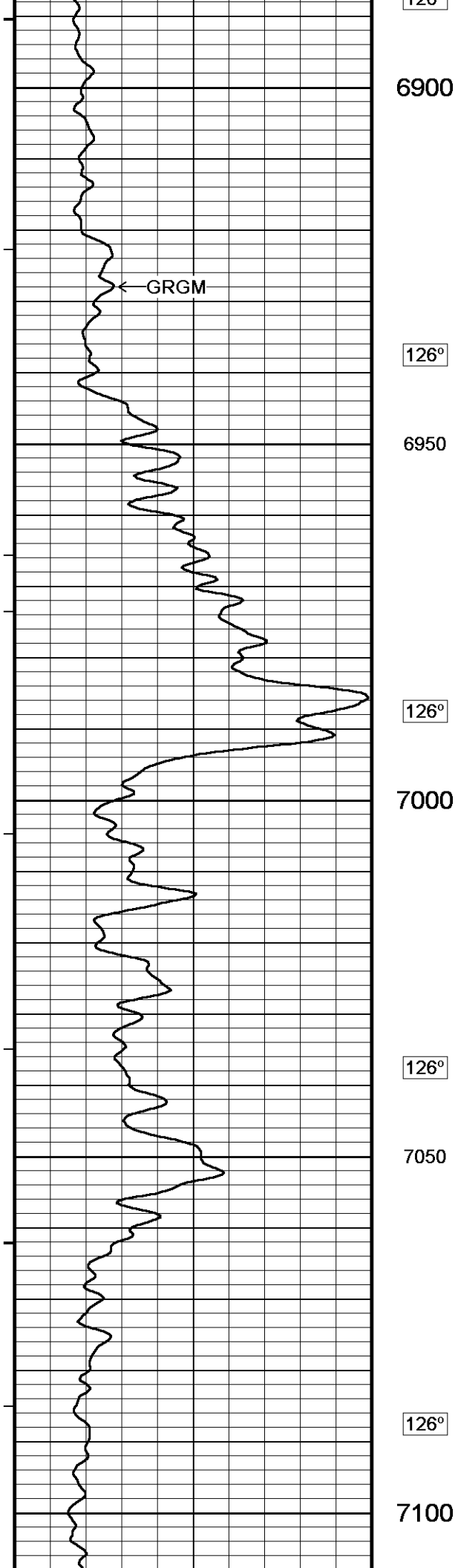
6800

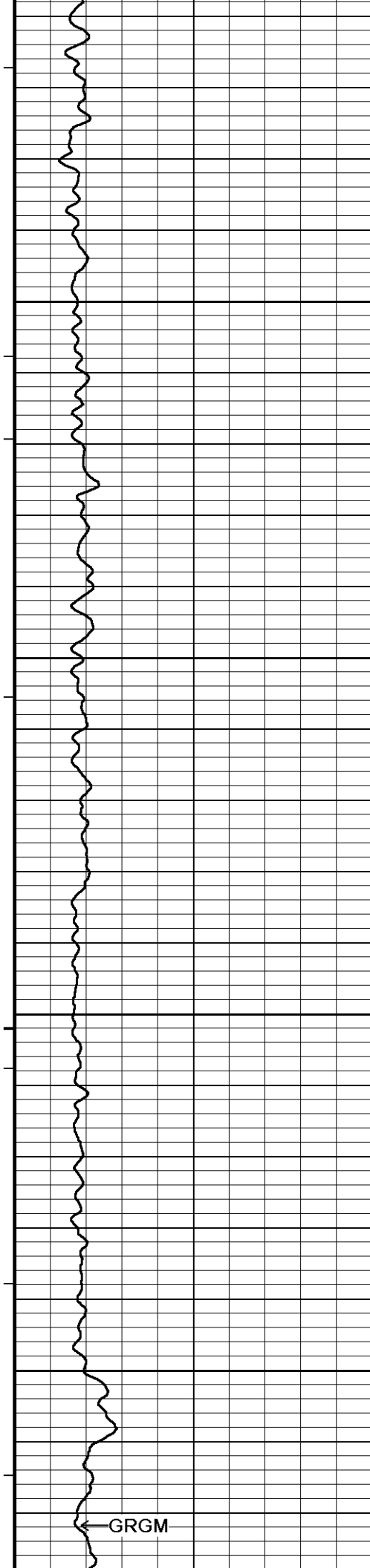
126°

6850

126°







126°

7150

126°

7200

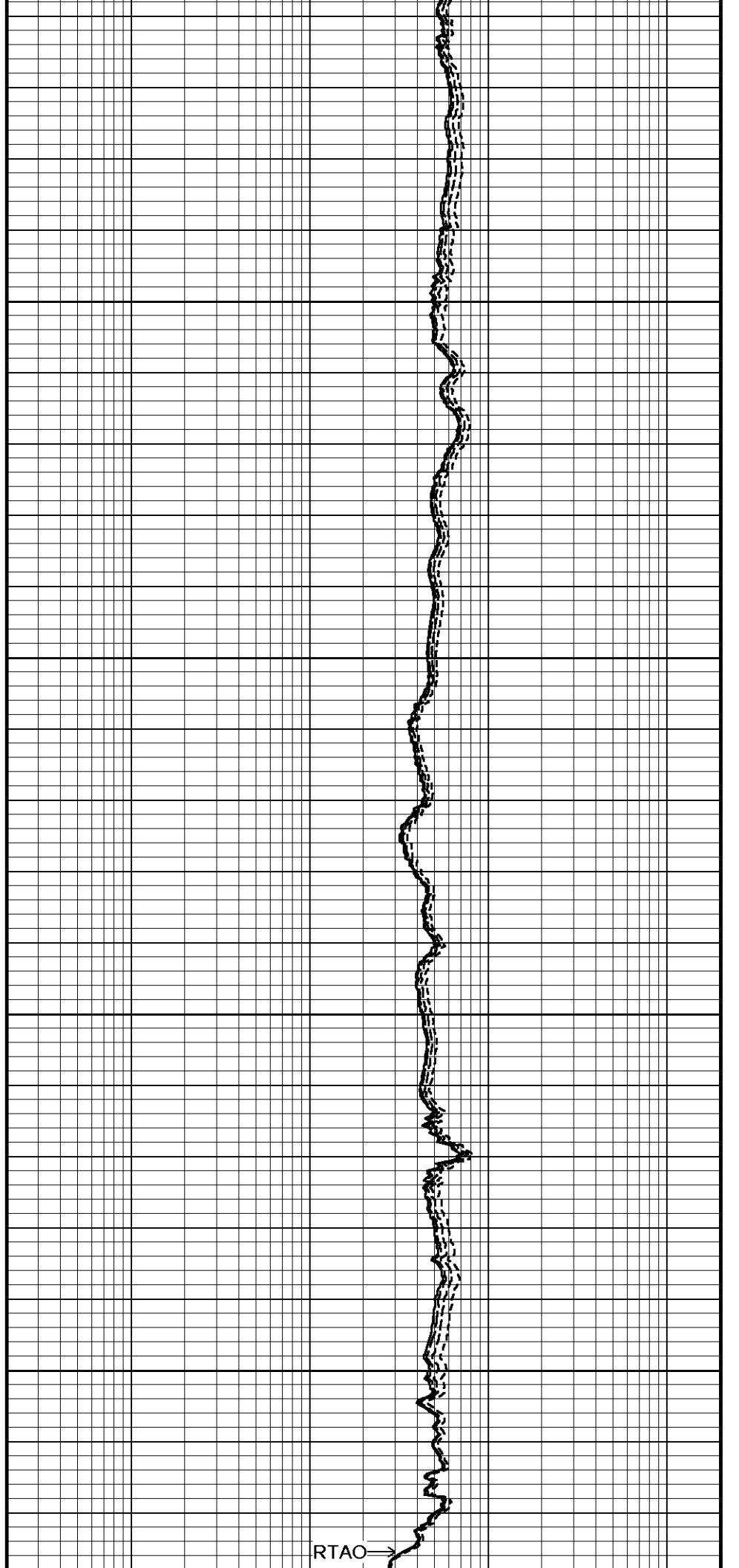
126°

7250

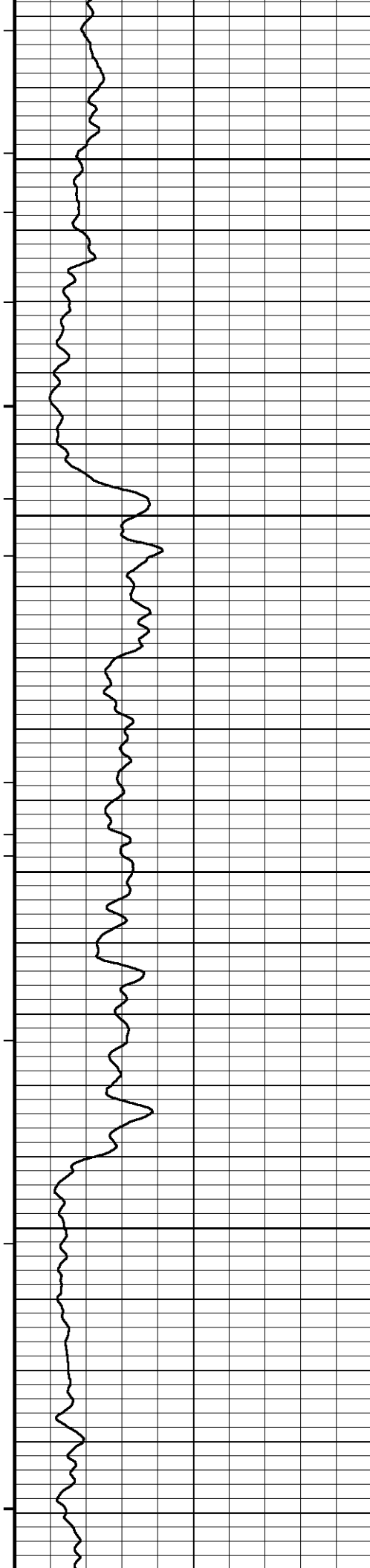
126°

7300

GRGM



RTAO



126°

7350

126°

7400

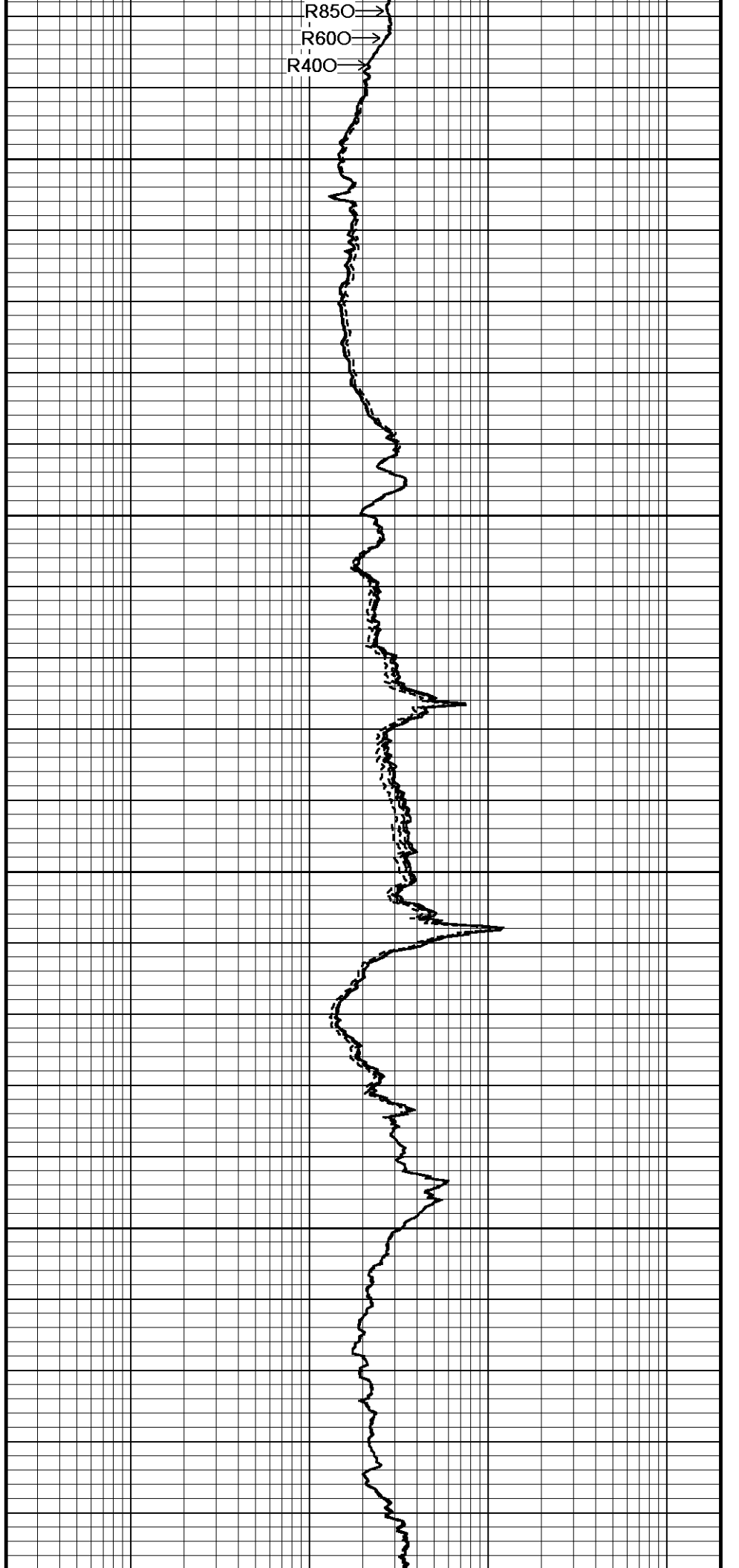
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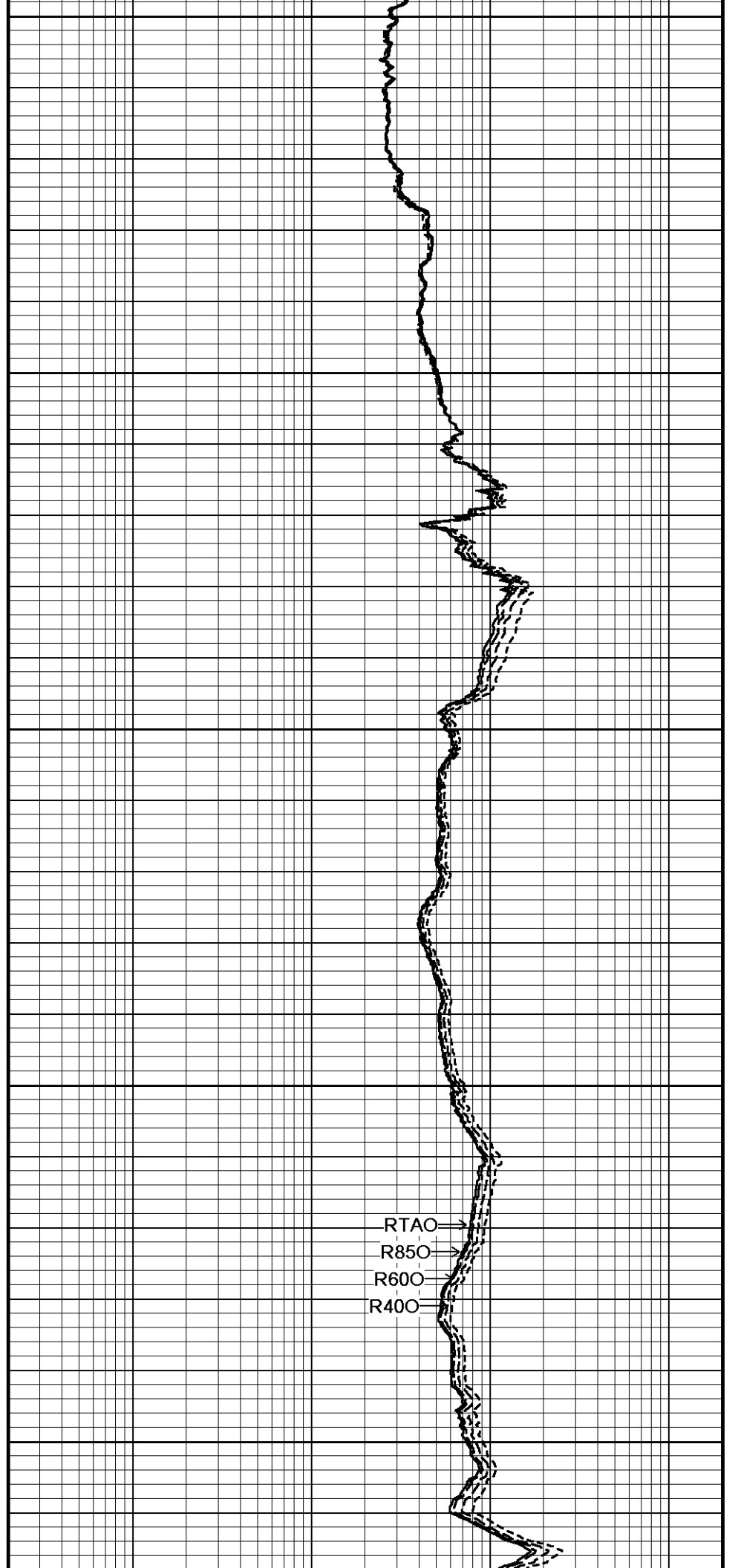
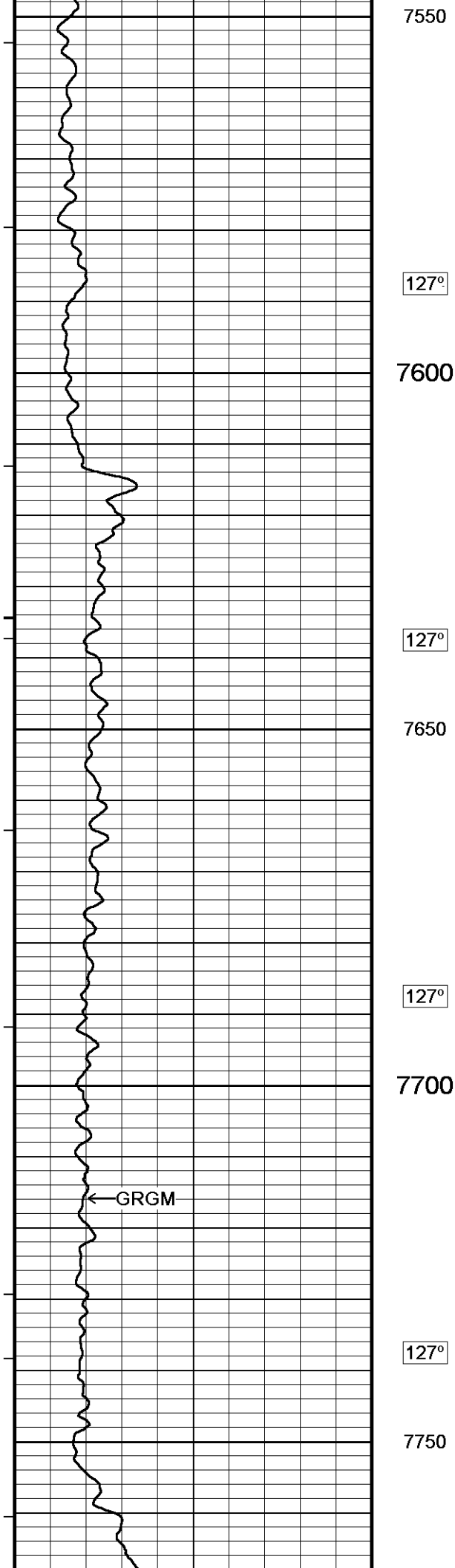
7450

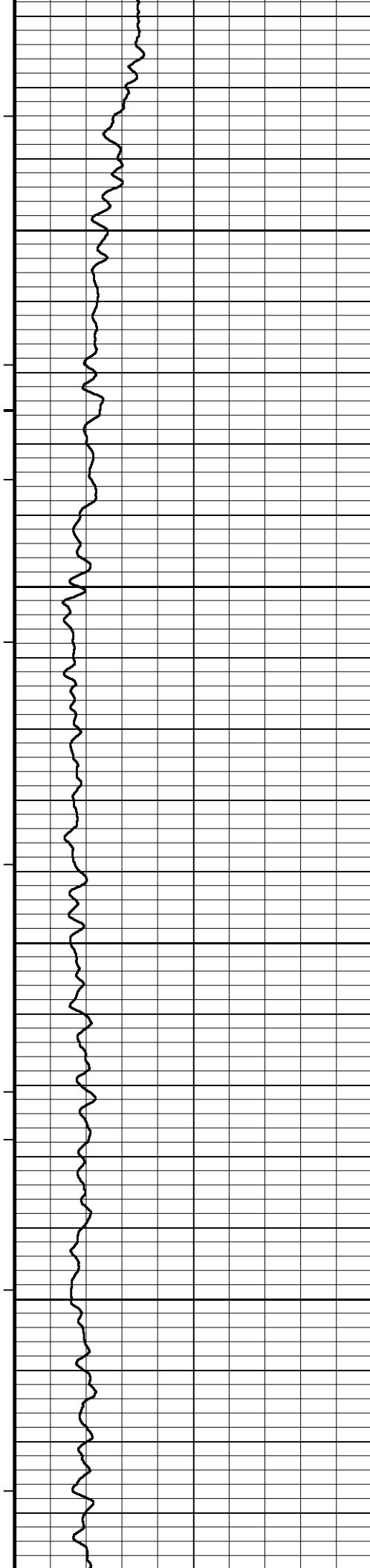
126°

7500

127°







127°

7800

127°

7850

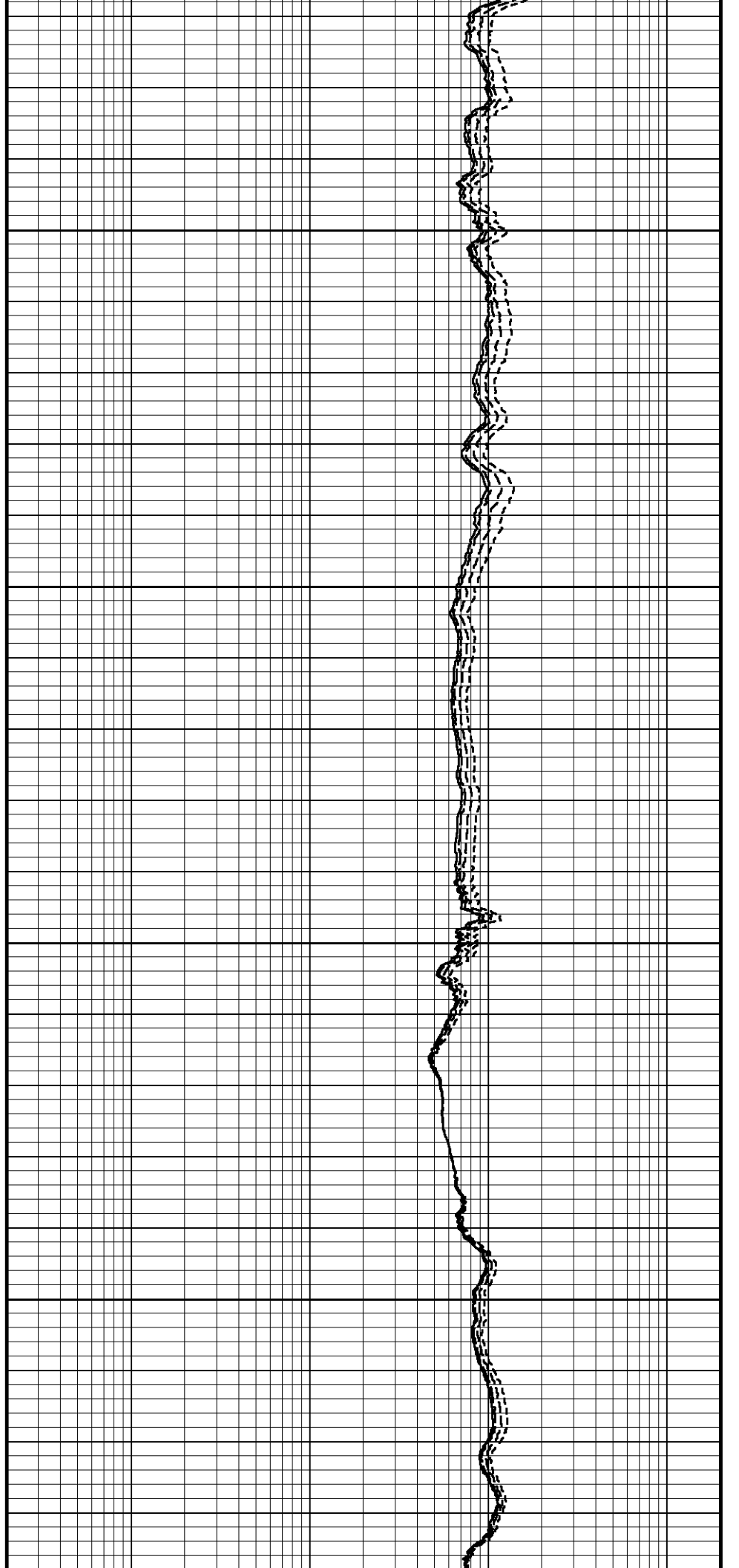
127°

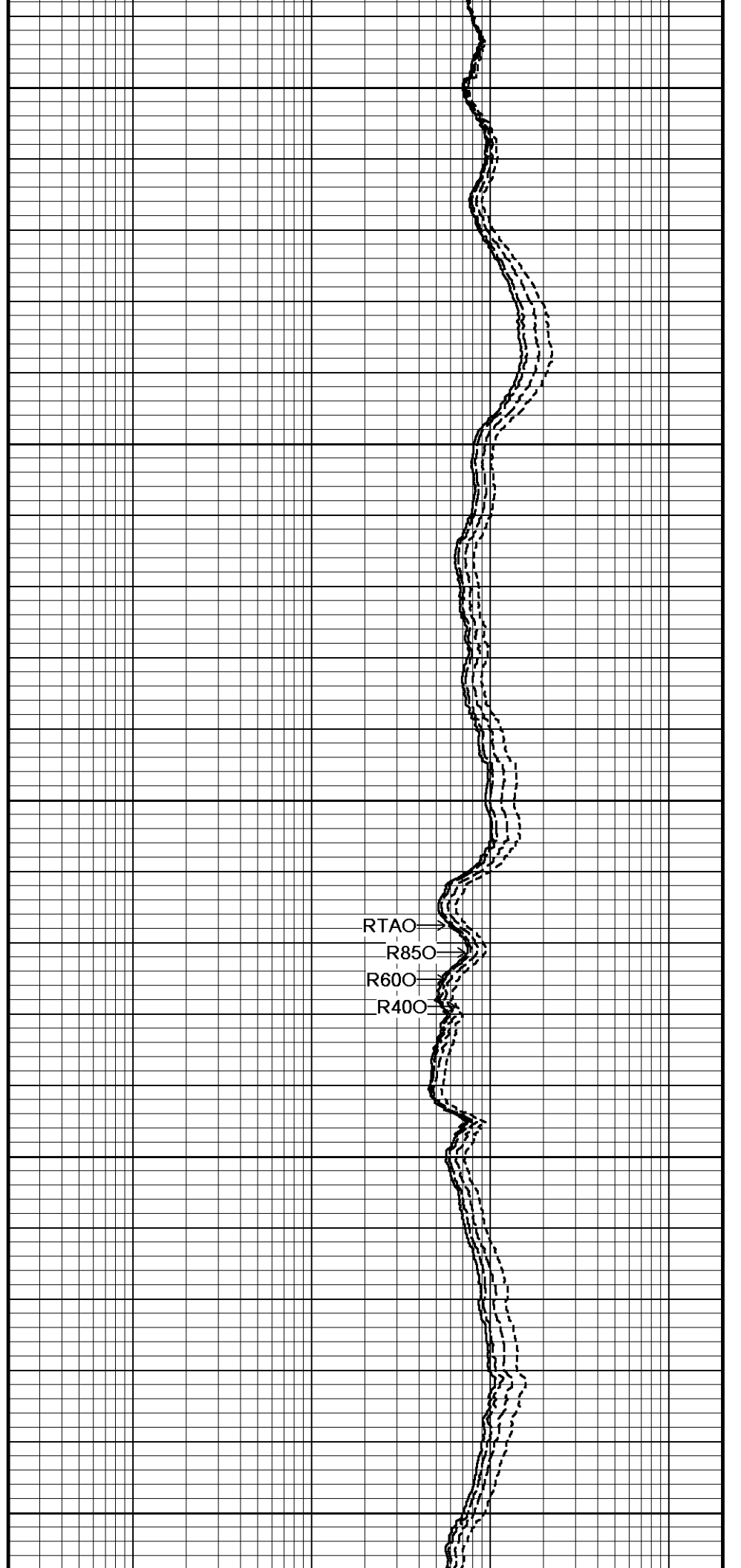
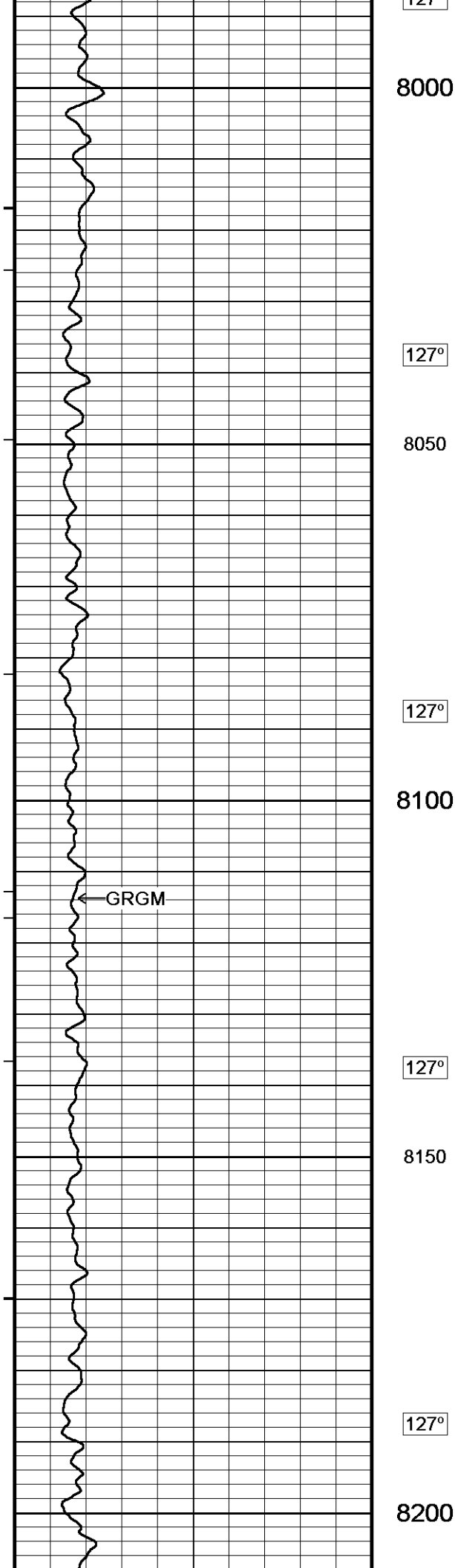
7900

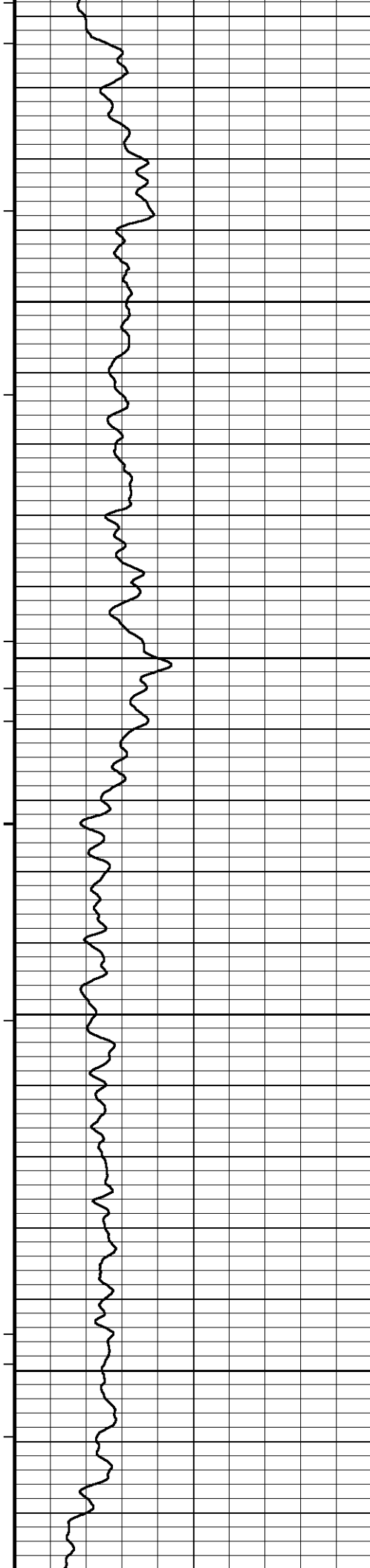
127°

7950

127°







127°

8250

127°

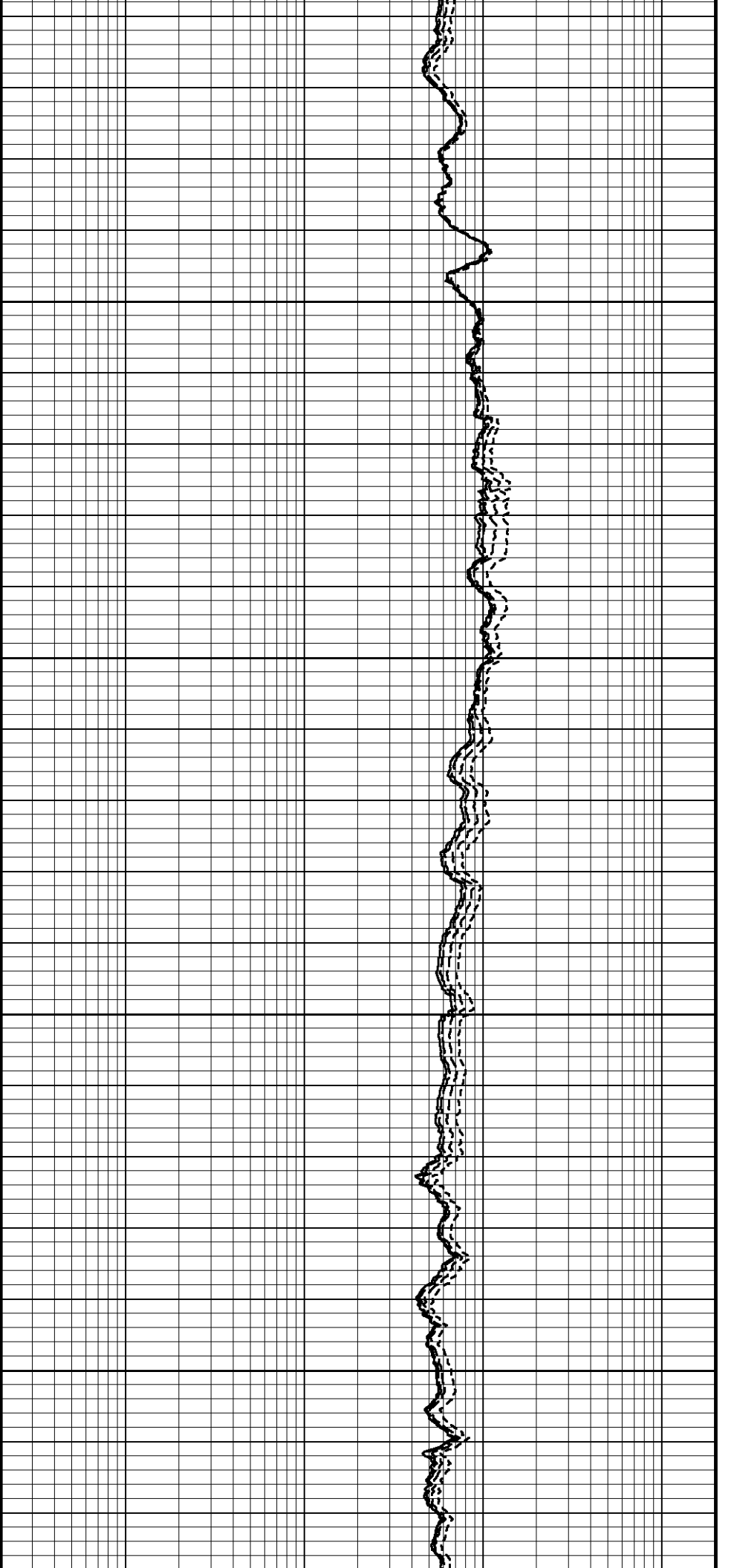
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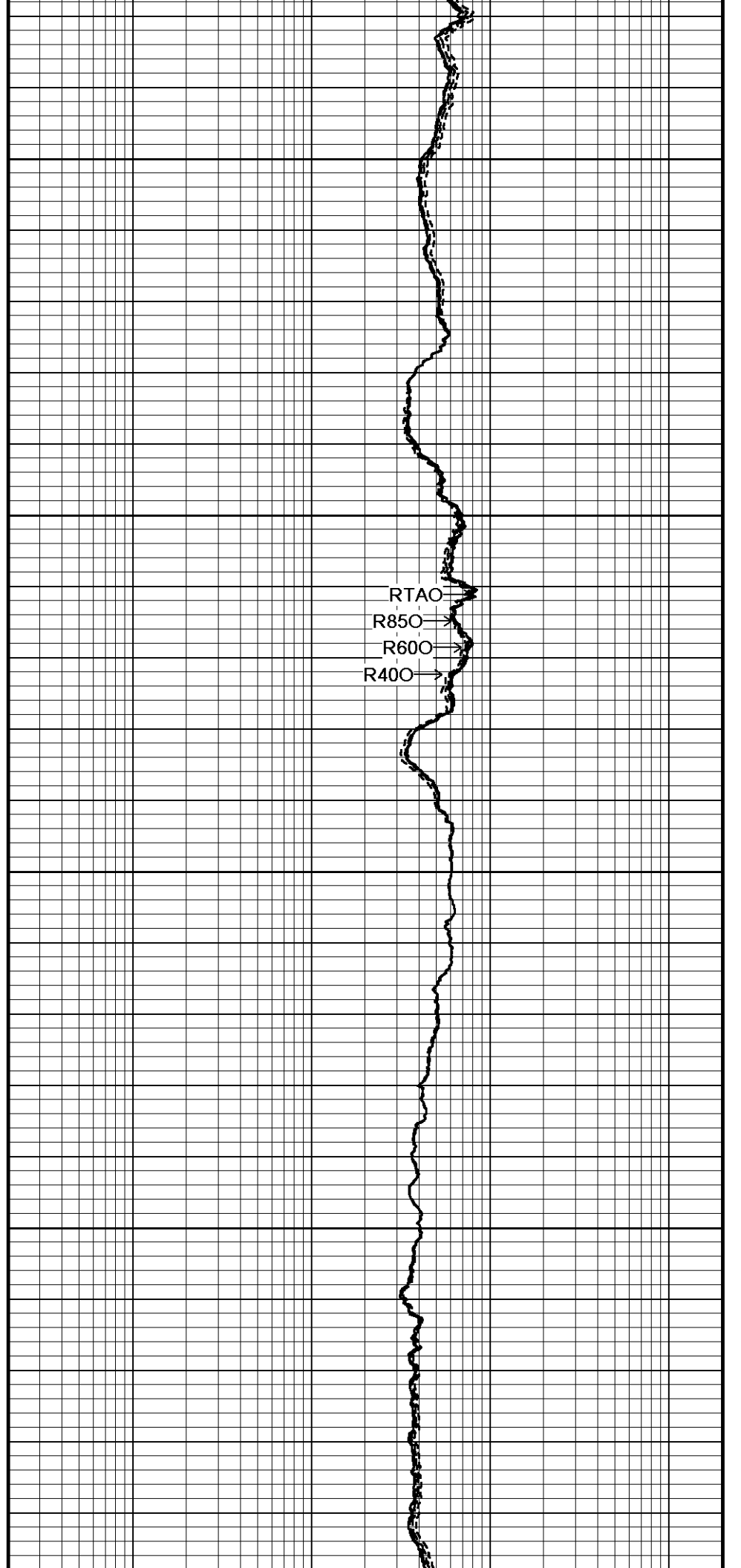
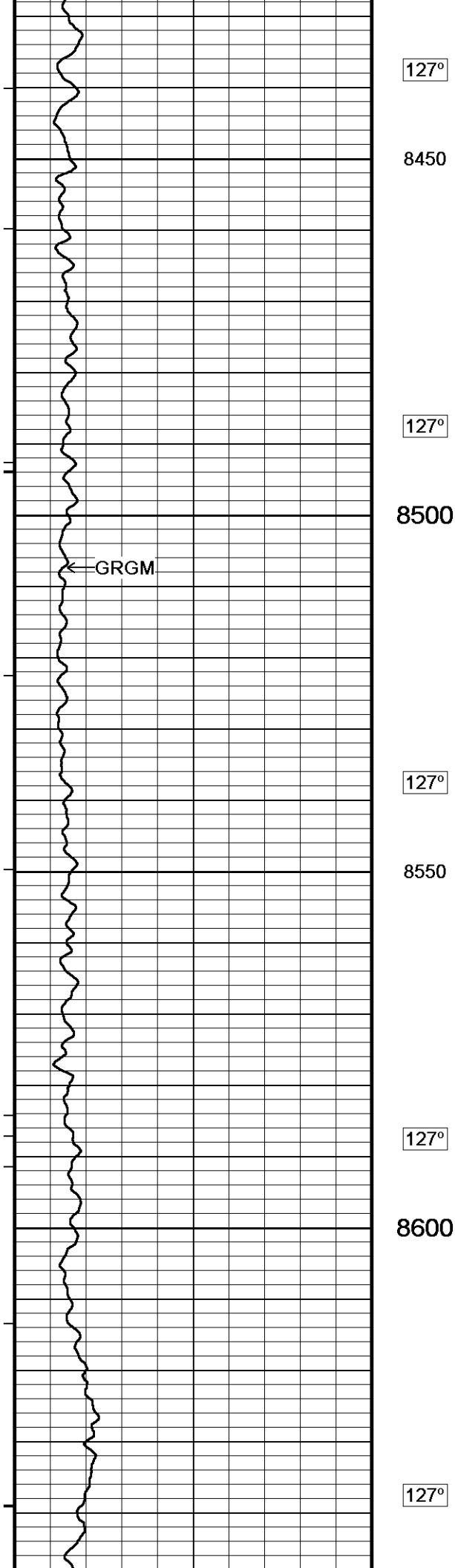
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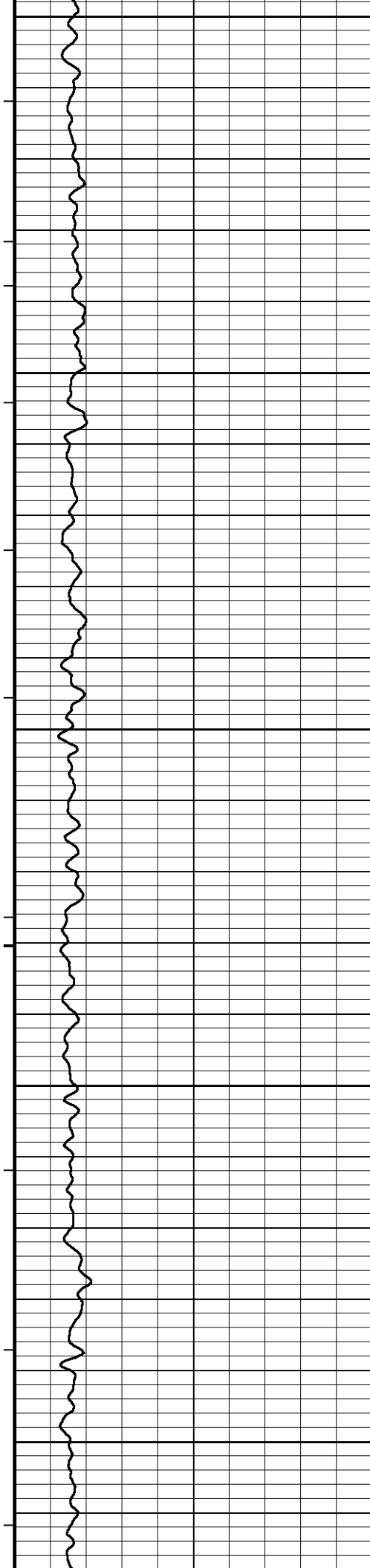
8350

127°

8400







8650

127°

8700

127°

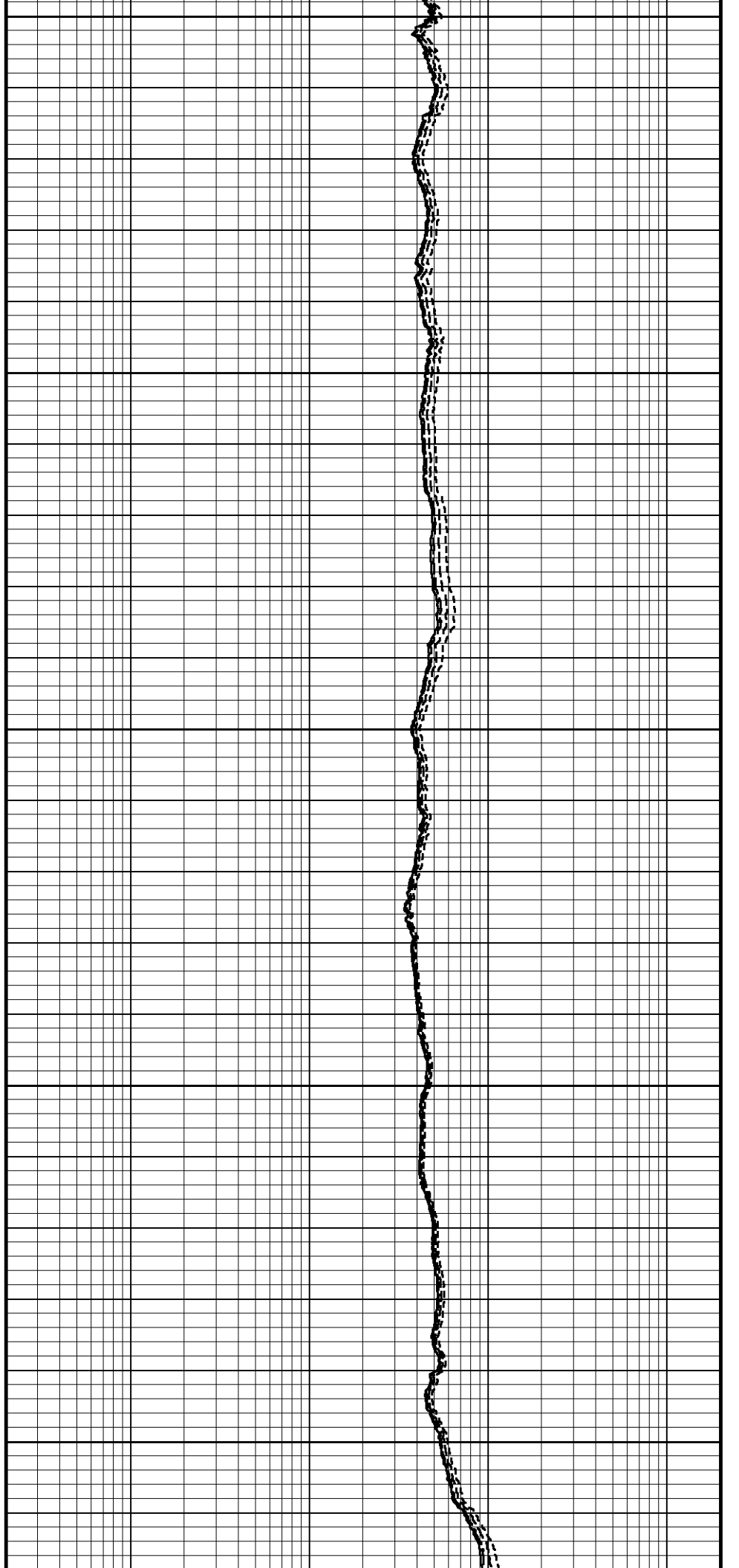
8750

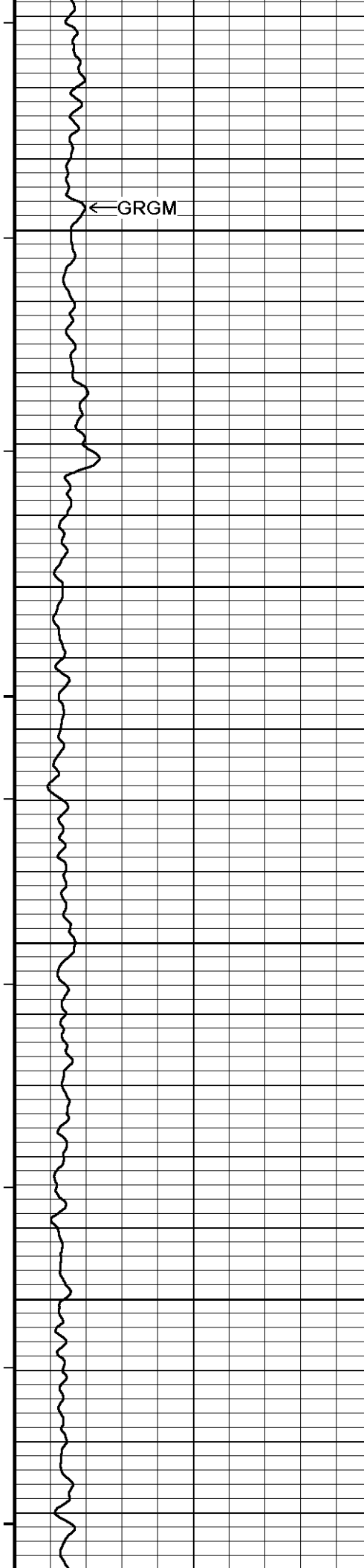
127°

8800

127°

8850





127°

8900

← GRGM

127°

8950

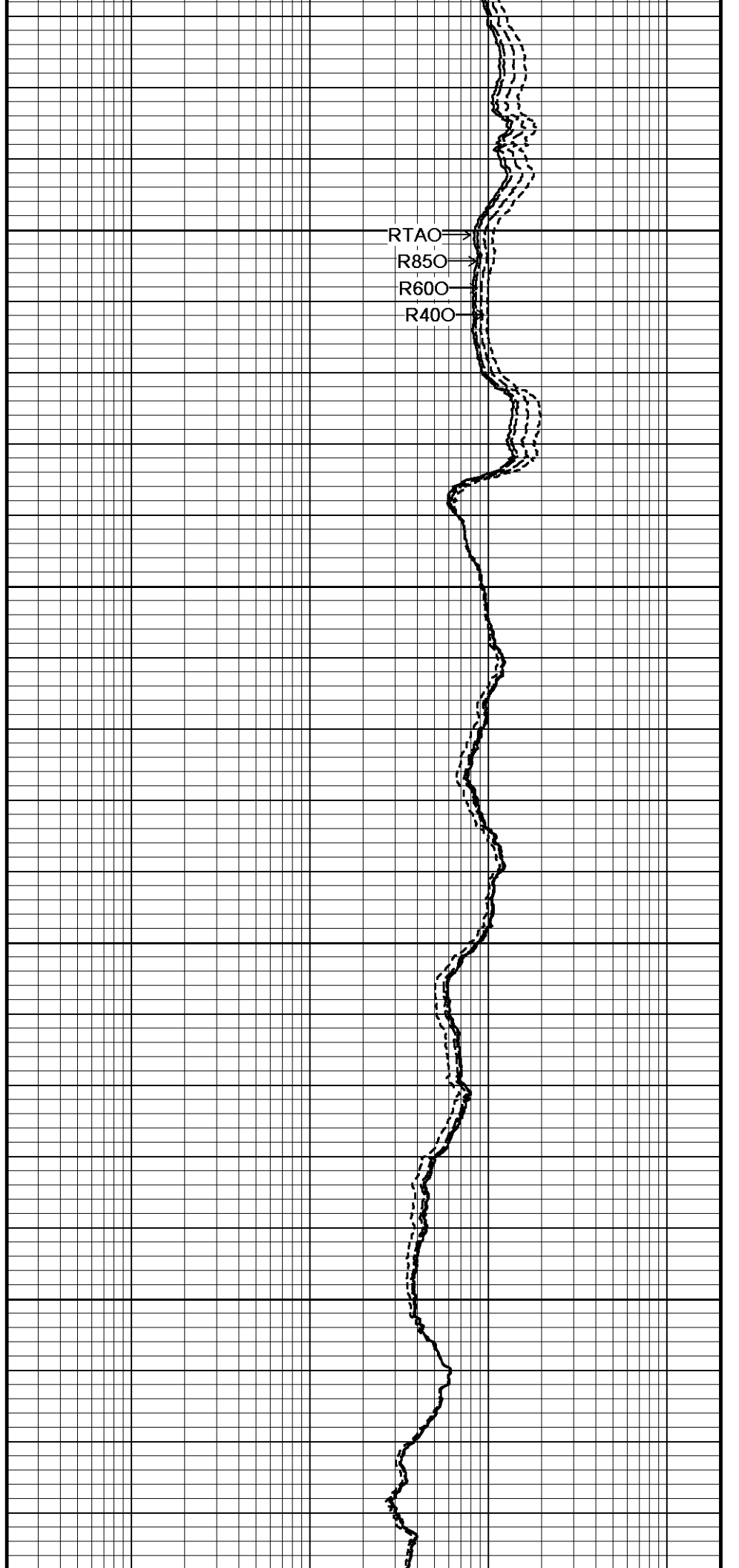
127°

9000

127°

9050

127°

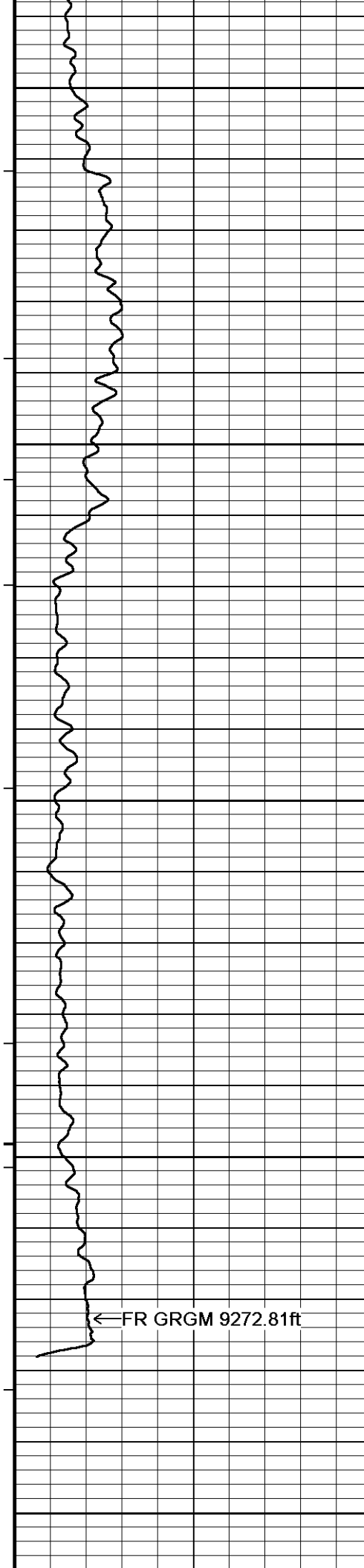


RTAO

R850

R600

R400



127

9100

127°

9150

127°

9200

128°

9250

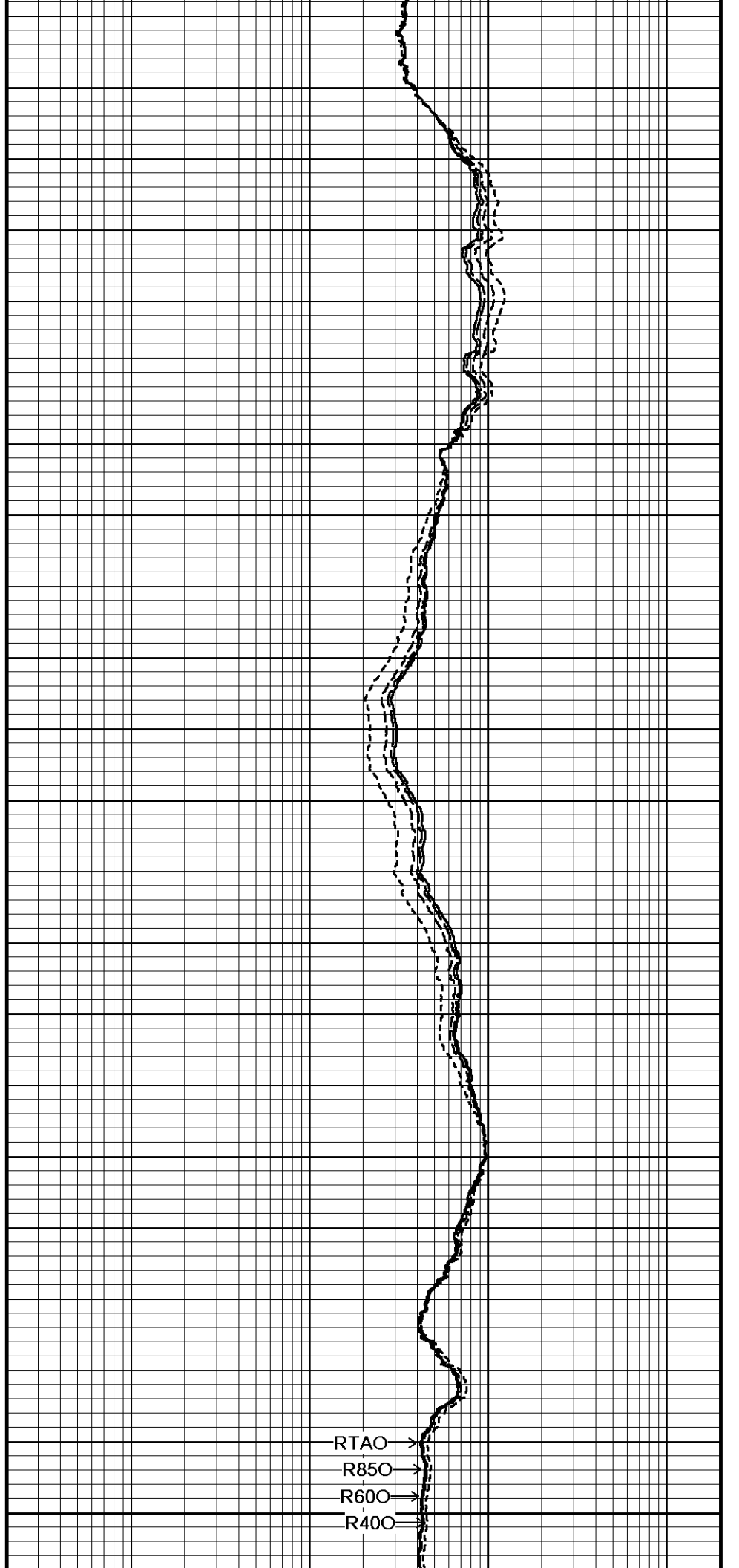
9300

RTAO →

R850 →

R600 →

R400 →



Caliper for Differential Caliper			Density Caliper		
Rwa Parameters					
Porosity used		Limestone Density Por.			
Resistivity used		Array Ind. One Res Rt			
RWA Constant A		0.610			
RWA Constant M		2.150			
Down-hole Tension Calibration SMS 0					
Field Calibration on 05-SEP-2012,13:01					
Reading No		Measured		Calibrated (lbs)	
1		15152.07		0.00	
2		18386.74		2000.00	
Strain Gauge Constants MMS-E.B 167					
Last Edited on 20-DEC-2012,14:02					
Atmospheric Pressure		14.70		psi	
Serial Number		262784			
Calibration Date		21-Jan-2011			
Base Check Date					
Dead Weight Serial Number		0			
Dead Weight Gravitational Correction		1.0			
Temperature		75.0		150.0	
				250.0	
				350.0	
		degrees F			
Pressure psia		Inc.		Dec.	
0.0		0.038		0.038	
3000.0		5.218		5.220	
6000.0		10.409		10.412	
9000.0		15.610		15.615	
12000.0		20.823		20.826	
15000.0		26.048		26.064	
				26.081	
				26.093	
SP Calibration MGS-C.J 138					
Field Calibration on 20-DEC-2012,13:54					
		Measured		Calibrated (mV)	
Reference 1		100.0		100.0	
Reference 2		-100.0		-100.0	
Gamma Calibration MGS-C.J 138					
Field Calibration on 22-DEC-2012 15:59					
		Measured		Calibrated (API)	
Background		48		35	
Calibrator (Gross)		1810		1296	
Calibrator (Net)		1762		1261	
Gamma Constants MGS-C.J 138					
Last Edited on 23-DEC-2012,06:16					
Gamma Calibrator Number		blue			
Mud Density		1.10		gm/cc	
Caliper Source for Processing		Density Caliper			
Tool Position		Eccentred			
Concentration of KCl		0.00		kppm	
High Resolution Temperature Calibration MGS-C.J 138					
Field Calibration on 20-DEC-2012,13:54					
		Measured		Calibrated(Deg F)	
Lower		0.00		0.00	
Upper		0.00		0.00	
High Resolution Temperature Constants MGS-C.J 138					
Last Edited on 20-DEC-2012,13:54					
Pre-filter Length		11			
Neutron Calibration MDN-B.J 388					
Base Calibration on 04-DEC-2012 13:04					
Field Check on 22-DEC-2012 16:04					
Base Calibration					
		Measured		Calibrated (cps)	
		Near		Near	
		Far		Far	
		2996		3714	
		90		110	
Ratio		33.133		33.764	
Field Calibrator at Base					
		Calibrated (cps)			
		1256			
		1840			
Ratio		0.682			

Field Check	Calibrated (cps)			
Ratio	0.674			
Neutron Constants MDN-B.J 388				Last Edited on 23-DEC-2012,17:13
Neutron Source Id	p31112b			
Neutron Jig Number	blue			
Epithermal Neutron	No			
Caliper Source for Processing	Density Caliper			
Stand-off	0.00	inches		
Mud Density	1.10	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	MGS External Temperature			
Temperature	N/A	degrees F		
Mud Salinity	10.00	kppm		
Salinity Correction	Not Applied			
Formation Fluid Salinity Source	None			
Formation Fluid Salinity	N/A	kppm		
Barite Mud Correction	Not Applied			
FE Calibration MFE-B.J 359				Base Calibration on 19-DEC-2012 15:21 Field Check on 22-DEC-2012 15:46
Base Calibration				
	Measured	Calibrated (ohm-m)		
Reference 1	0.0	0.0		
Reference 2	966.8	126.8		
Base Check		279.0		
Field Check		279.0		
FE Constants MFE-B.J 359				Last Edited on 22-DEC-2012,15:45
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.	MGS External Temperature			
Stand-off	0.5	inches		
Induction Calibration MAI-A.A 158				Base Calibration on 19-DEC-2012 14:59 Field Check on 22-DEC-2012 15:45
Base Calibration				
Test Loop Calibration		Measured	Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	17.2	475.3	9.3	966.2
2	6.1	381.2	7.6	821.4
3	3.8	265.2	5.2	566.0
4	2.7	132.2	2.6	279.2
Array Temperature		22.3	Deg F	
Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1			12.2	3815.7
2			30.2	3532.0
3			27.5	2983.2
4			18.2	2098.6
Deep			15.1	1945.1
Medium			41.5	3889.8
Shallow			47.5	5238.0
Array Temperature			57.4	Deg F
Induction Constants MAI-A.A 158				Last Edited on 23-DEC-2012,17:12

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	0.0000		
Stand-off Fin Angle	60.00	degrees	
Stand-off Fin Width	0.0000	inches	
Borehole Corr. Rm Source	Temperature Corr		
Temp. for Rm Corr.	MGS 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 158

Field Calibration on 20-DEC-2012,13:35

	Measured	Calibrated(Deg F)
Lower	0.00	0.00
Upper	0.00	0.00

High Resolution Temperature Constants MAI-A.A 158

Last Edited on 20-DEC-2012,13:34

Pre-filter Length	11
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Caliper Calibration MPD-C.J 435

Base Calibration on 04-DEC-2012 08:44
Field Calibration on 22-DEC-2012 15:49

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	16676	4.01
2	26160	5.96
3	36224	7.98
4	45984	9.86
5	56714	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.93	5.96

Photo Density Calibration MPD-C.J 435

Base Calibration on 04-DEC-2012 08:31
Field Check on 22-DEC-2012 15:54

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	56804	27743	59869	31110
Reference 2	23495	2647	24557	2522

Field Check at Base

1290.9 1338.1

Field Check

1296.7 1341.5

PE Calibration

Base Calibration

Measured

Calibrated

WS

WH

Ratio

Ratio

Background

235

1153

Reference 1

22843

56596

0.408

0.369

Reference 2

6376

23345

0.277

0.271

Field Check at Base

234.5

1153.0

Field Check

234.8

1159.3

Density Constants MPD-C.J 435

Last Edited on 23-DEC-2012,06:15

Density Source Id

p21137b

Nylon Calibrator Number

633

Aluminium Calibrator Number

633

Density Shoe Profile

4 inch

Caliper Source for Processing

Density Caliper

PE Correction to Density

Not Applied

Mud Density

1.10

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

DOWNHOLE EQUIPMENT

C:\13_04_8723 WLS\DATA\15069204160100 Toews 2629 2-21H\31535RTAP.dta

Shuttle Running Tool 3.5")

SRT-A.A 70 LG: 6.62 ft WT: 37.5 lb OD: 2.52 in

MBS-F.A 200v Compact Battery Sub

MBS-F.A 112 LG: 10.61 ft WT: 70.5 lb OD: 2.24 in



Compact Memory Sub E.B

MMS-E.B 167 LG: 5.20 ft WT: 37.5 lb OD: 2.24 in

Compact Tool Isolator sub.

MTI-B.A 67 LG: 1.54 ft WT: 13.2 lb OD: 2.24 in

Compact Short Gamma

MGS-C.J 138 LG: 3.41 ft WT: 24.3 lb OD: 2.24 in

Compact Collar Locator

MCL-B.J 60 LG: 3.17 ft WT: 26.5 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint

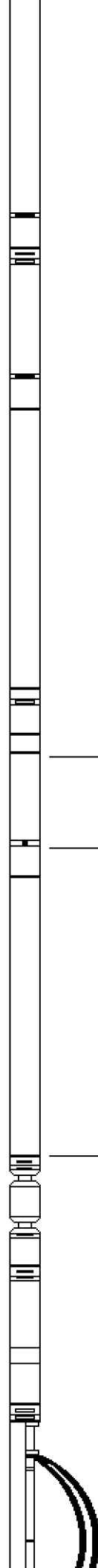
SKJ-D.A 42 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

SHA-J.A Compact Swivel Head Adaptor

SHA-J.A 454 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

MIS-D.A Compact Inline Bowspring sub

MIS-D.A 310 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in



62.19 ft

GRGM - MGS Gamma Ray

60.21 ft

GSXT - MGS External Temperature

58.19 ft

GCSL - MCL C. Collar Locator

Compact Neutron
MDN-B.J 388 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-C.J 435 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in

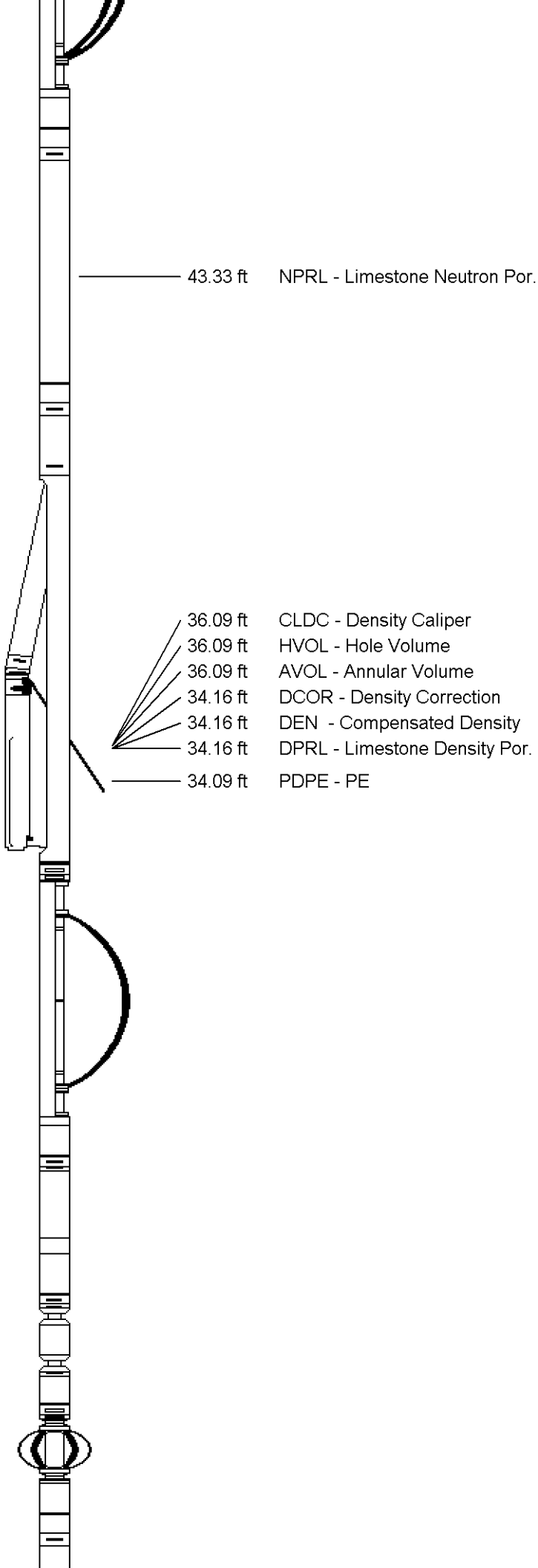
MIS-A.A Compact Inline Bowspring sub
MIS-A.A 15 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SHA-F Compact Swivel Head Adaptor
SHA-F 33 LG: 2.74 ft WT: 26.5 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint
SKJ-D.A 41 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-E.B Compact Inline Standoff sub
MIS-E.B 578 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

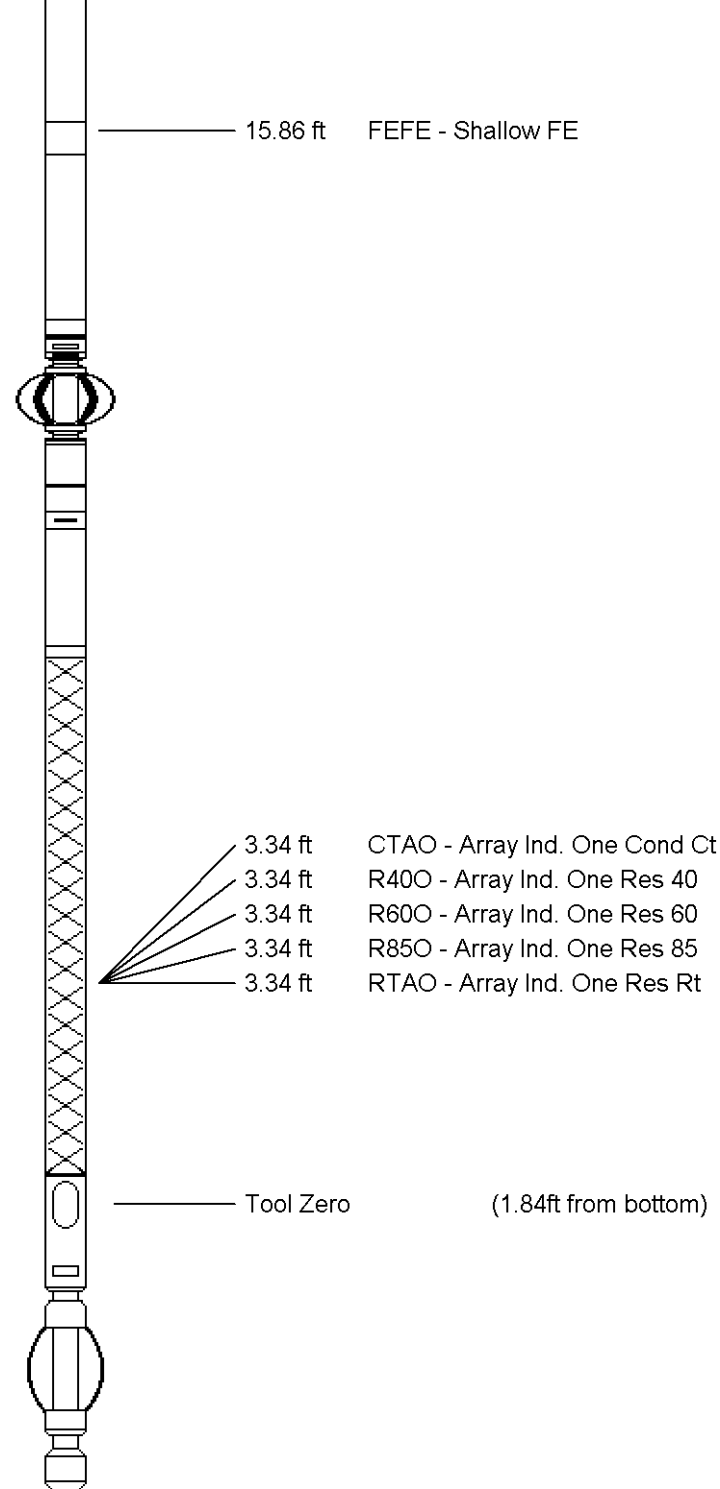
Compact Focussed Electric



MFE-B.J 359 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

MIS-B Compact Inline Standoff sub
MIS-B 29 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

Compact Induction
MAI-A.A 158 LG: 12.52 ft WT: 48.5 lb OD: 2.24 in



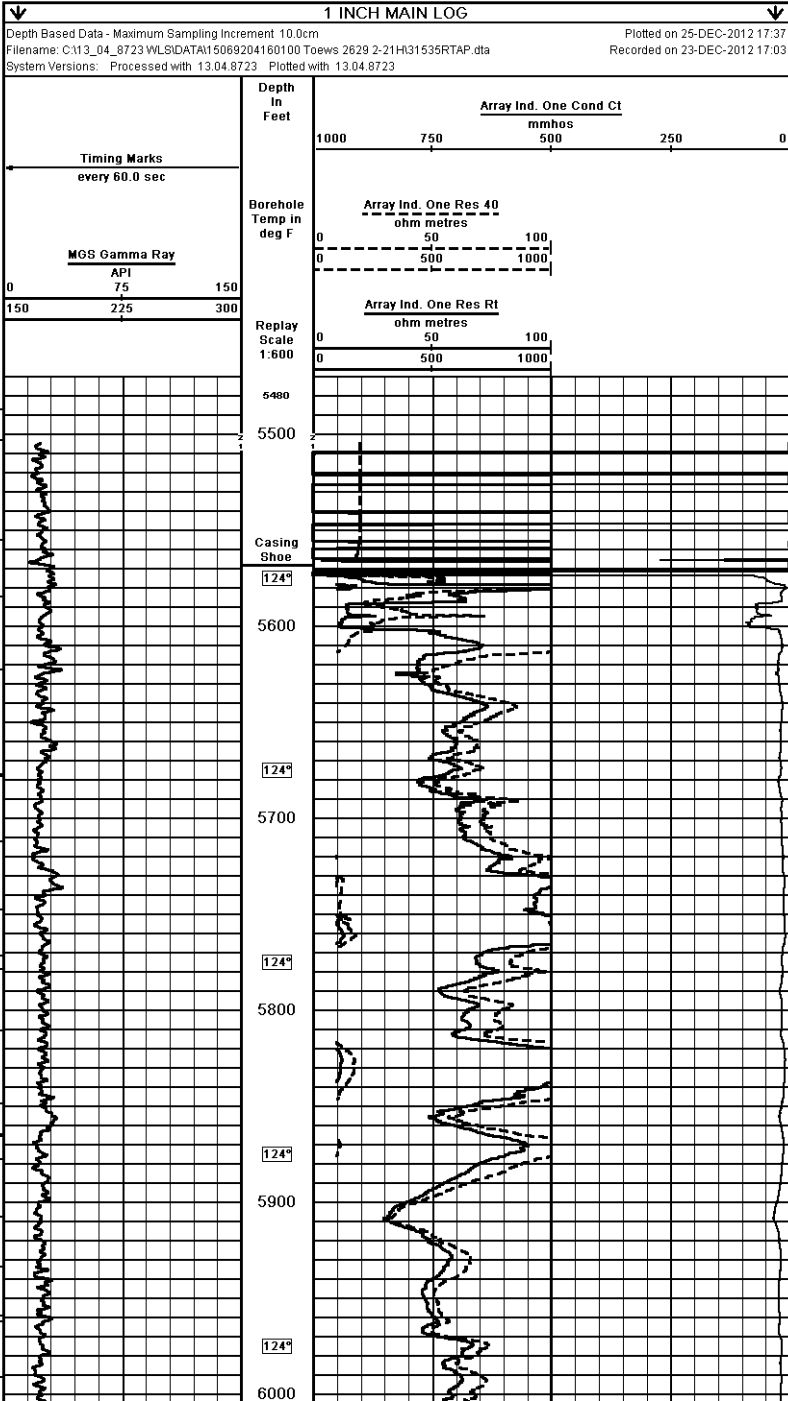
Total Length: 88.80 ft Weight: 641.5 lb All measurements relative to tool zero.

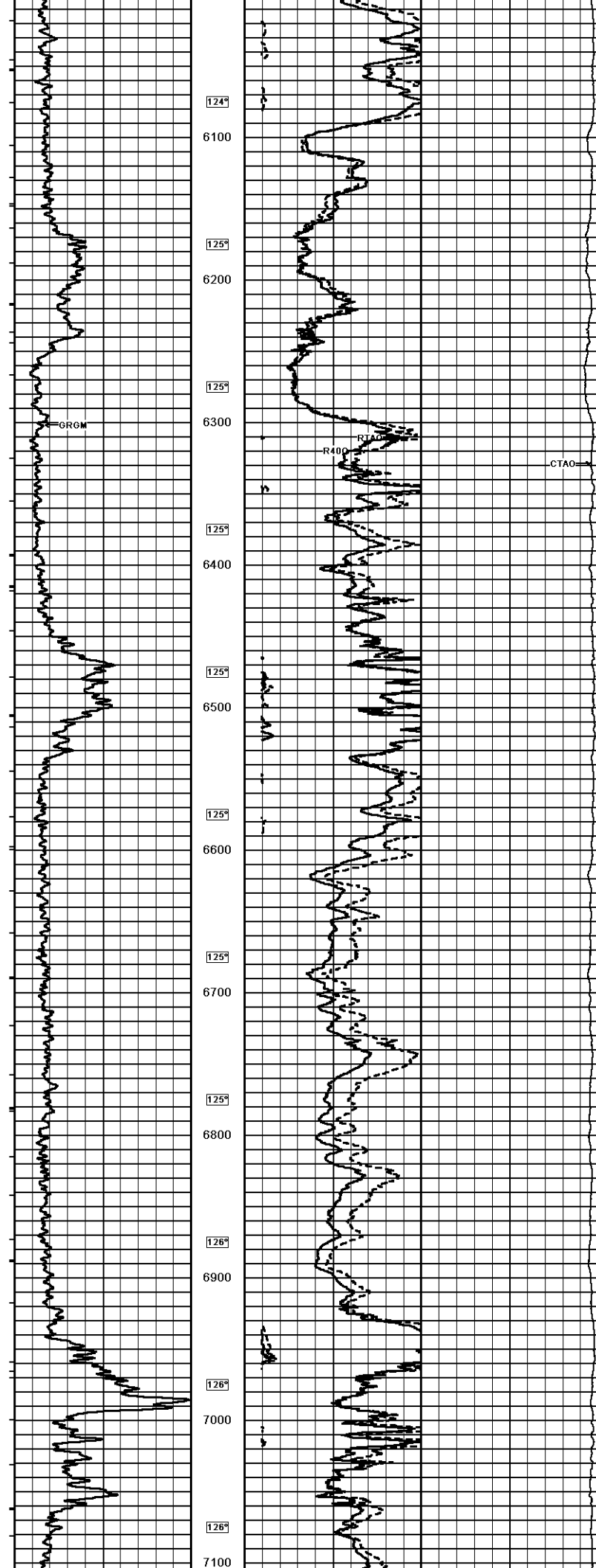
COMPANY		SANDRIDGE ENERGY			
WELL		TOEWS 2629 2-21H			
FIELD		MONGER			
PROVINCE/COUNTY		GRAY			
COUNTRY/STATE		USA / KANSAS			
Elevation Kelly Bushing	2765.00	feet	First Reading	9333.00	feet
Elevation Drill Floor	2765.00	feet	Depth Driller	9360.00	feet
Elevation Ground Level	2748.00	feet	Depth Logger	9360.00	feet

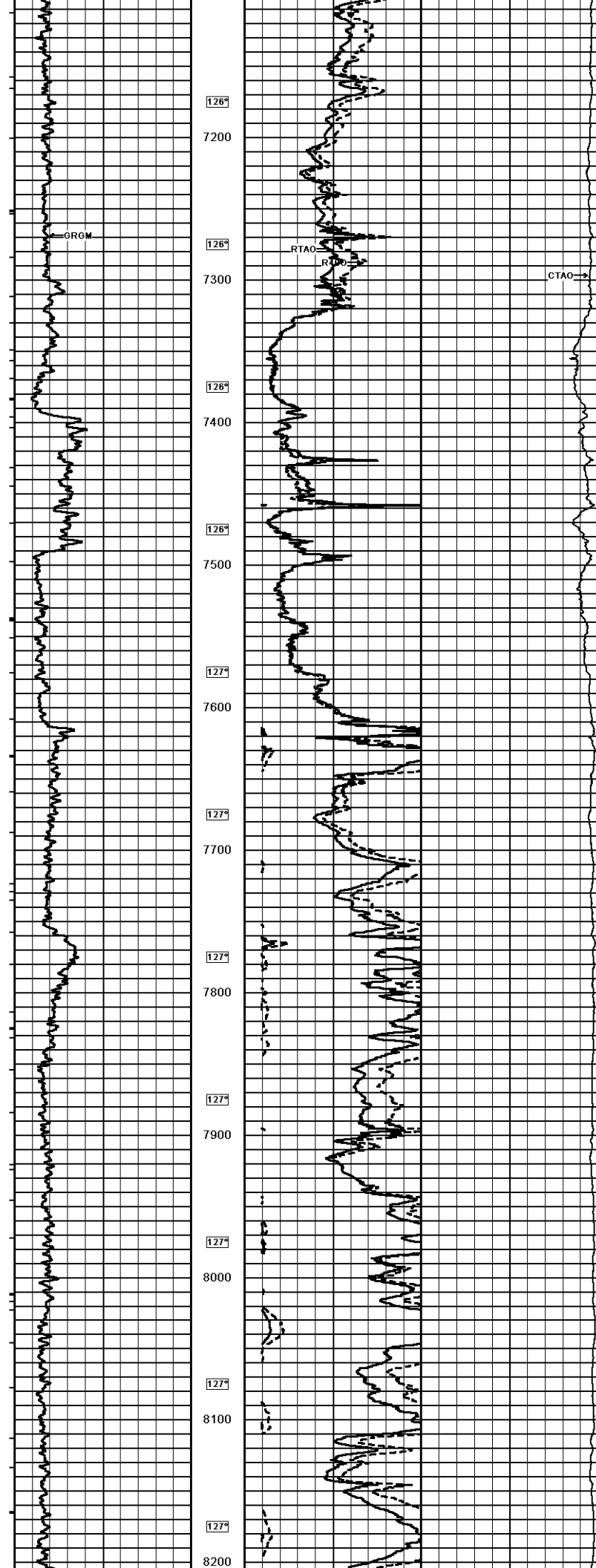


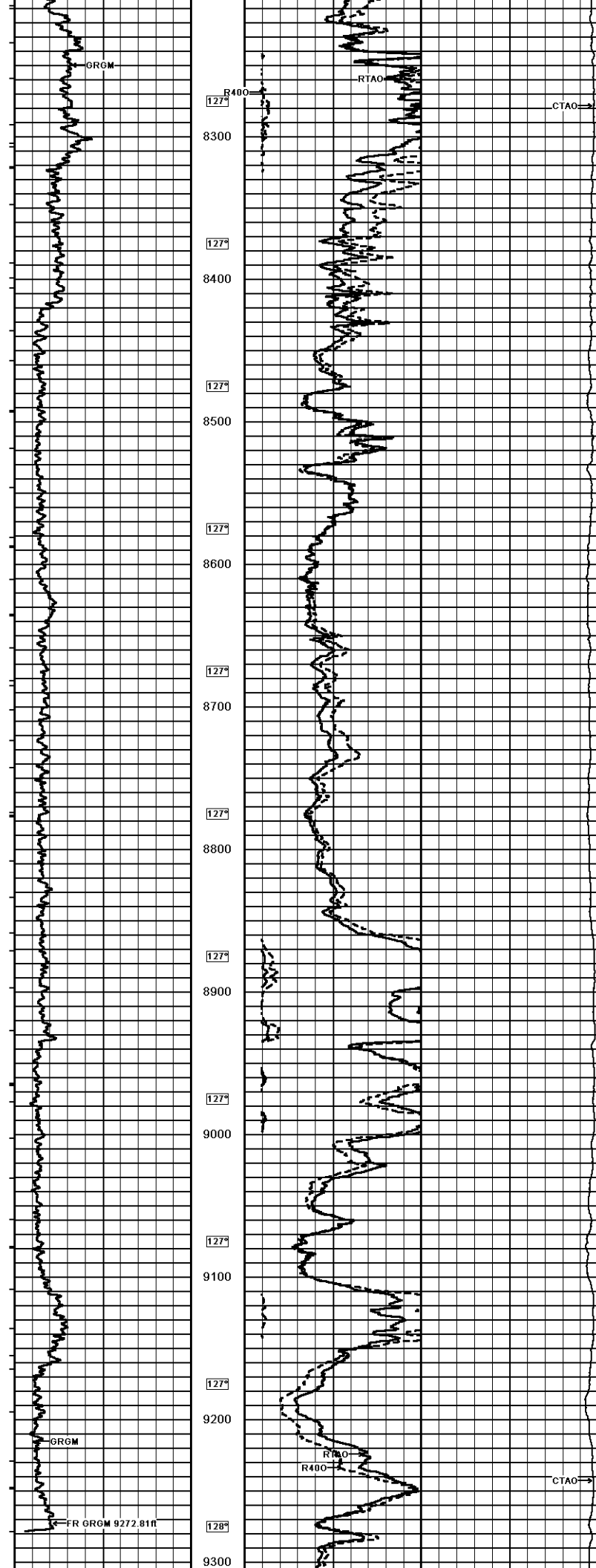
CML MESSENGER SHUTTLE
ARRAY INDUCTION

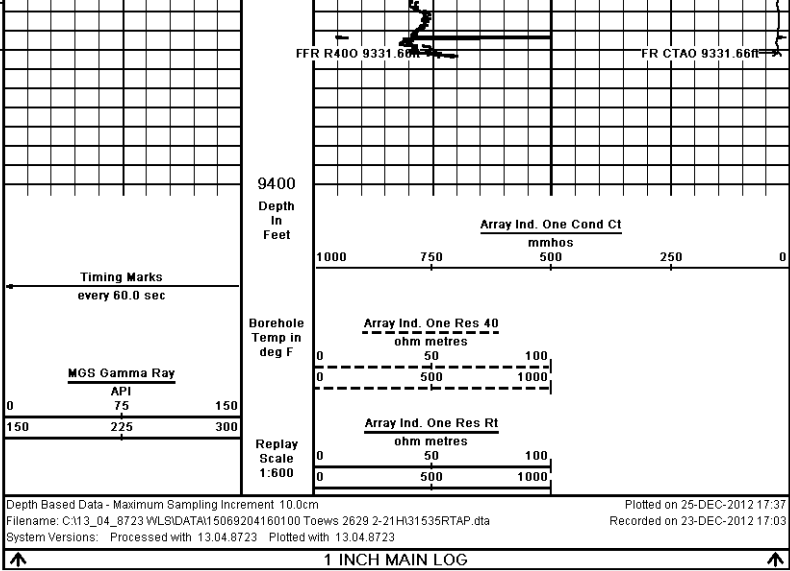
		CML MESSENGER SHUTTLE	
Weatherford		ARRAY INDUCTION	
ELECTRIC LOG			
COMPANY SANDRIDGE ENERGY			
WELL TOEWS 2629 2-21H			
FIELD MONGER			
PROVINCE/COUNTY GRAY			
COUNTRY/STATE USA / KANSAS			
LOCATION N2 NW NW NW			
220' FWL & 330' FWL			
SEC	TYPE	LOG	Other Services
21	26s	28w	MD/VMD
API Number	15-069-20416		
Permament Datum OL, Elevation	feet	Elevation:	
Log Measured From KB		Top 2755.00	
Drilling Measured From KB @ 17' AOL		CP 2755.00	
		OL 2749.00	
Date	23-DEC-2012		
Run Number	ONE		
Service Order	3328732		
Depth Driller	9360.00	feet	
Depth Logger	9360.00	feet	
First Reading	9333.00	feet	
Last Reading	6443.00	feet	
Casing Driller	5972.00	feet	
Casing Logger	5968.00	feet	
Bit Size	6.125	inches	
Hole Fluid Type	WBM		
Density Viscosity	9.20 lb/USg	32.00 CP	
PH / Fluid Loss	11.10	4.40 ml/30min	
Sample Source	FLOWLINE		
Rm @ Measured Temp	0.75 @ 70.0	ohm-m	
Rm @ Measured Temp	0.60 @ 70.0	ohm-m	
Rm @ Measured Temp	0.90 @ 70.0	ohm-m	
Source Rmt/Rmc	CALC	CALC	
Rm @ BHT	0.43 @ 127.0	ohm-m	
Time Since Circulation	18 HOURS		
Max Recorded Temp	127.00	deg F	
Equipment / Base	15006	OKC	
Recorded by	GUTHRIE/ELLER		
Witnessed by	W/SCOTT		
REF: DCT2674			











COMPANY		SANDRIDGE ENERGY			
WELL		TOEWS 2629 2-21H			
FIELD		MONGER			
PROVINCE/COUNTY		GRAY			
COUNTRY/STATE		USA / KANSAS			
Elevation Kelly Bushing	2765.00	feet	First Reading	9333.00	feet
Elevation Drill Floor	2765.00	feet	Depth Driller	9360.00	feet
Elevation Ground Level	2748.00	feet	Depth Logger	9360.00	feet
		CML MESSENGER SHUTTLE			
		ARRAY INDUCTION			
		ELECTRIC LOG			