Weatherford®

CML MESSENGER SHUTTLE
ARRAY INDUCTION

COMPANY	SANDRIDGE ENERGY
WELL	MARKS 1-24H
FIELD	MINNEOLA
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / OKLAHOMA
LOCATION	250' FNL & 520' FEL

40 Years of Wireline 1970 2010

SEC	TWP	RGE
24	29S	25W

Other Services
MPD/MDN
CMI

API Number 15-057-20820
Permit Number

Permanent Datum G.L., Elevation 2618 feet
Log Measured From KB
Drilling Measured From K.B. @ 18.5 FEET

Elevations:	feet
KB	2638.50
DF	2637.50
GL	2618.00

Date	17-AUG-2012			
Run Number	ONE			
Depth Driller	9803.00	feet		
Depth Logger	9803.00	feet		
First Reading	9735.00	feet		
Last Reading	5695.00	feet		
Casing Driller	5695.00	feet		
Casing Logger	5695.00	feet		
Bit Size	6.125	inches		
Hole Fluid Type	WBM			
Density / Viscosity	9.40 g/c3		43.00 CP	
PH / Fluid Loss	9.50		4.50 ml/30Min	
Sample Source	FLOWLINE			
Rm @ Measured Temp	1.18 @ 78.0	ohm-m		
Rmf @ Measured Temp	0.94 @ 78.0	ohm-m		
Rmc @ Measured Temp	1.42 @ 78.0	ohm-m		
Source Rmf / Rmc	CALC		CALC	
Rm @ BHT	0.74 @124.0	ohm-m		
Time Since Circulation	1 HOUR			
Max Recorded Temp	124.00	deg F		
Equipment Name	COMPACT			
Equipment / Base	18006		OKC	
Recorded By	STEVEN TOTTEY			
Witnessed By	J. CLARK			
S.O. # / JOB #	3531686			

BOREHOLE RECORD

Last Edited: 18-AUG-2012 08:57

Bit Size inches	Depth From feet	Depth To feet
6.125	5695.00	9803.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
INTER	7.000	0.00	5695.00	26.00

REMARKS

LOGGED WITH WLS VER 13.02.6600 SOFTWARE

WELL LOGGED USING MESSAGER METHOD OF DEPLOYMENT, AND MEMORY LOGGING SYSTEM

HARDWARE: MPD: 4"PROFILE PLATE, MIS-A SINGLE SPRING DECENTRALIZER BELOW
MDN: MISD DOUBLE SPRING DECENTRALIZER RAN ABOVE

2.71 G/CC DENSITY MATRIX USED TOCALCULATE POROSITY
ALL INTERVALS LOGGED AND SCALED PER CUSTOMER REQUEST

DRILL PIPE DEPTH DURING DEPLOYMENT - 9635
LOGGING TOOL DEPTH AFTER DEPLOYMENT: 9738

4.5 INCH CASING USED TO CALCULATE AHV

2600 CHLORIDES
BOREHOLE VOLUME TD TO INTERMEDIATE CASING = 820 CUFT

ANNULAR VOLUME FROM TD TO INTERMEDIATE CASING = 380 CU FT

SERVICE ORDER # 3531686
RIG: LARIAT 41

OPERATORS: M. SLOBODKIN AND P BURGER

2 INCH MAIN LOG DSC

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 19-AUG-2012 04:23
Filename: C:\Program Files\Weatherford\WLS 13.01\data...\MARKS 1-24H MMS 167 DEPTH RTAP.dta — Recorded on 19-AUG-2012 01:17
System Versions: Processed with 12.02.4401 Plotted with 12.02.4401

Timing Marks
every 60.0 sec

MGS Gamma Ray
API
0 75 150
150 225 300

Depth In Feet

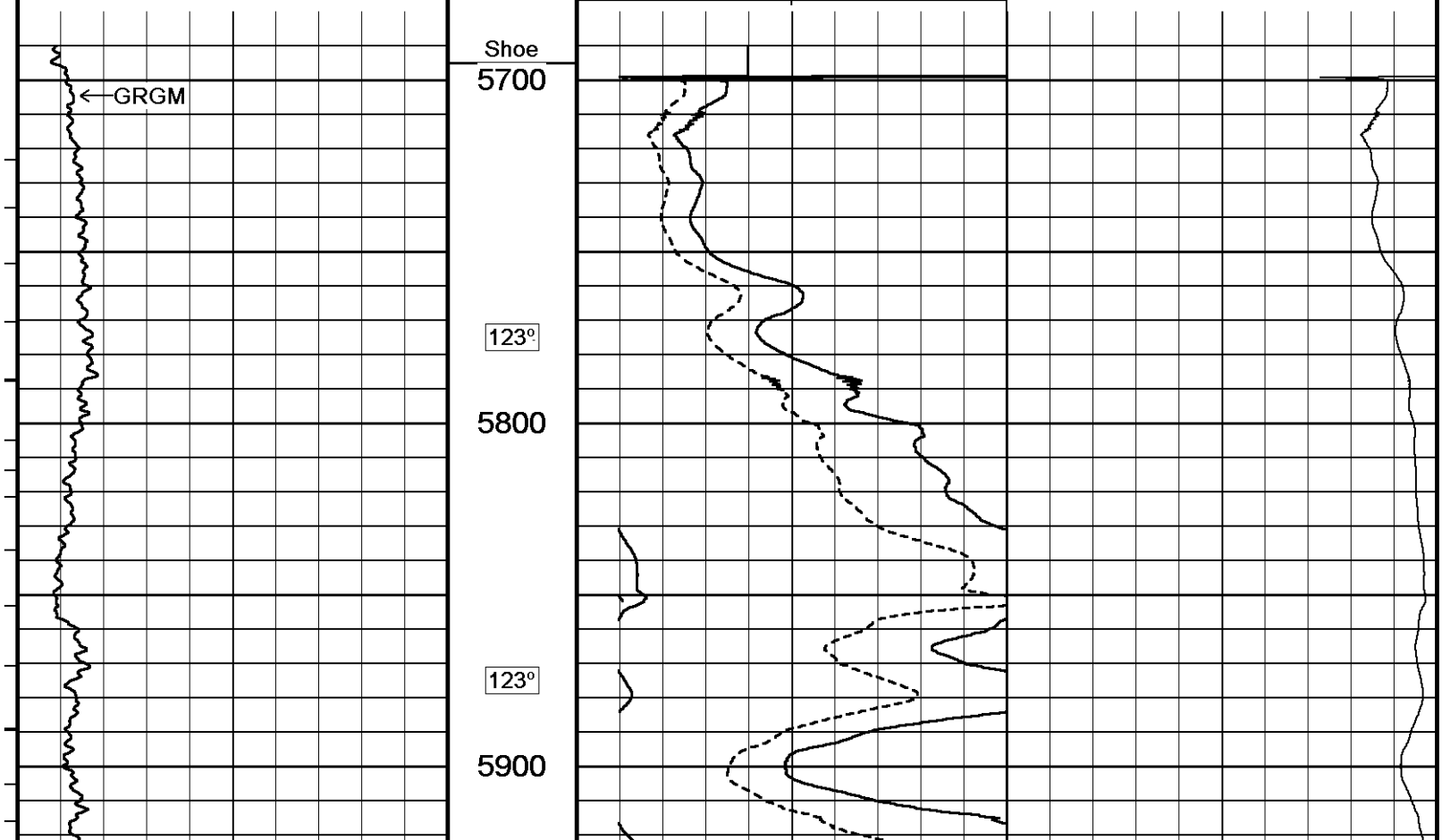
Borehole Temp in deg F

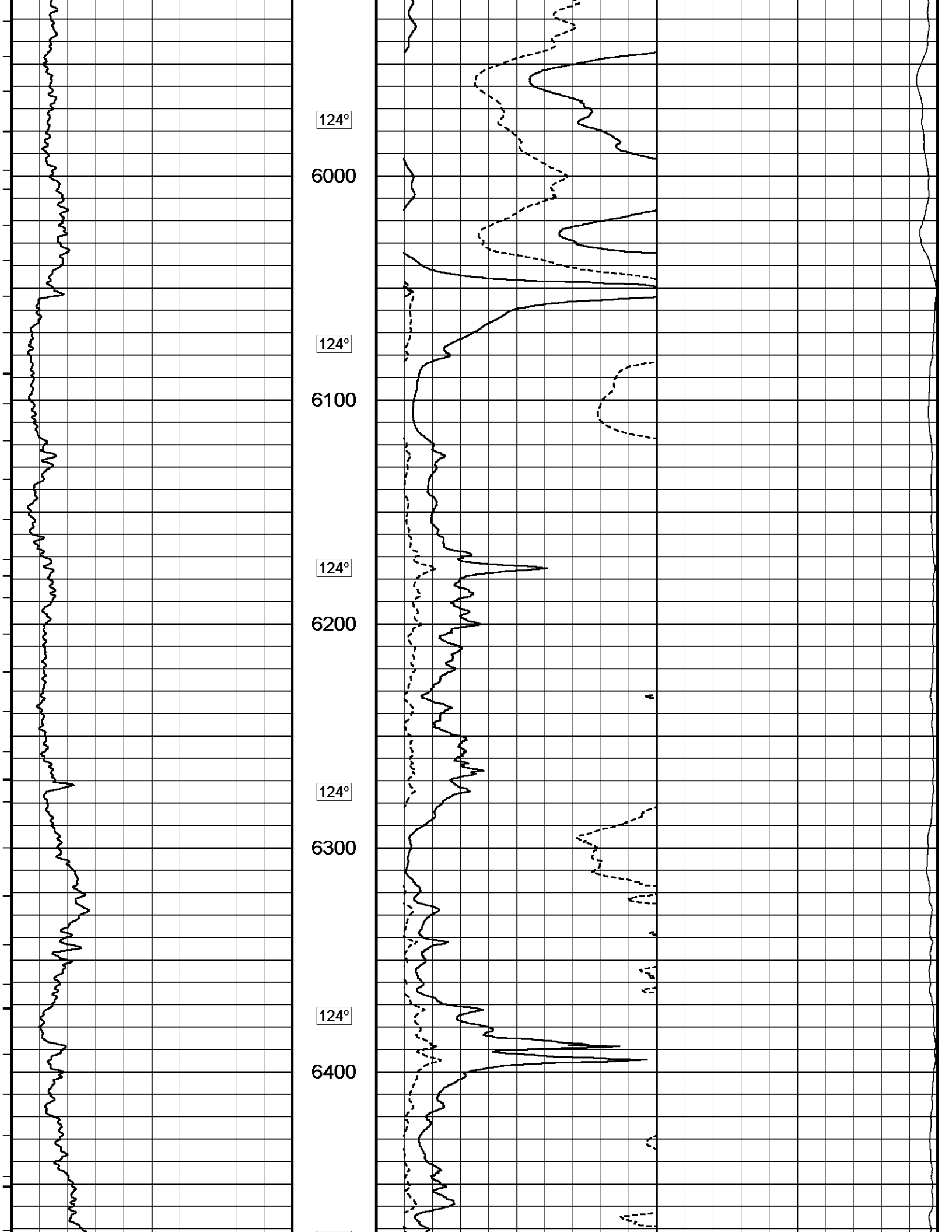
Replay Scale 1:600

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

Array Ind. Six Res 40
ohm metres
0 25 50
0 250 500

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

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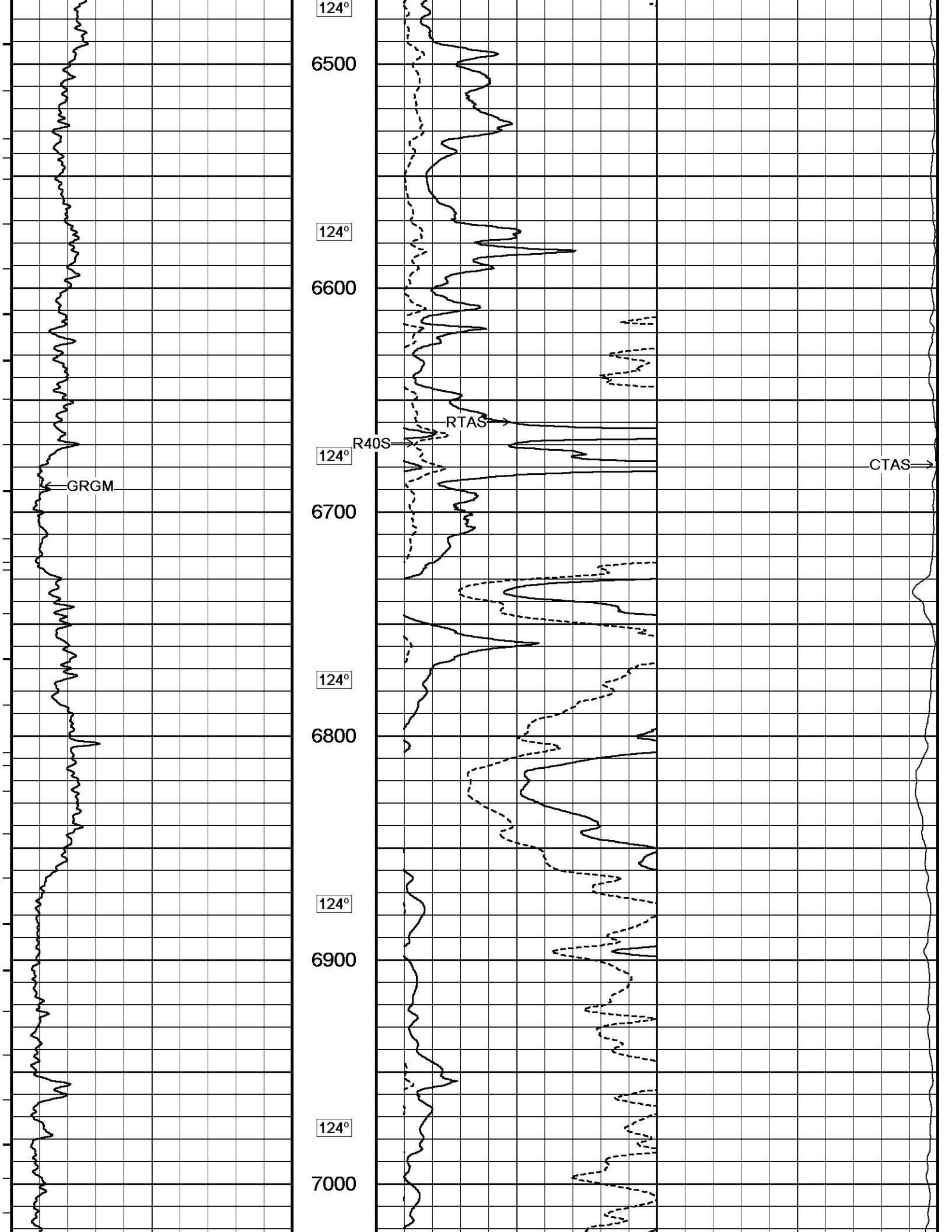
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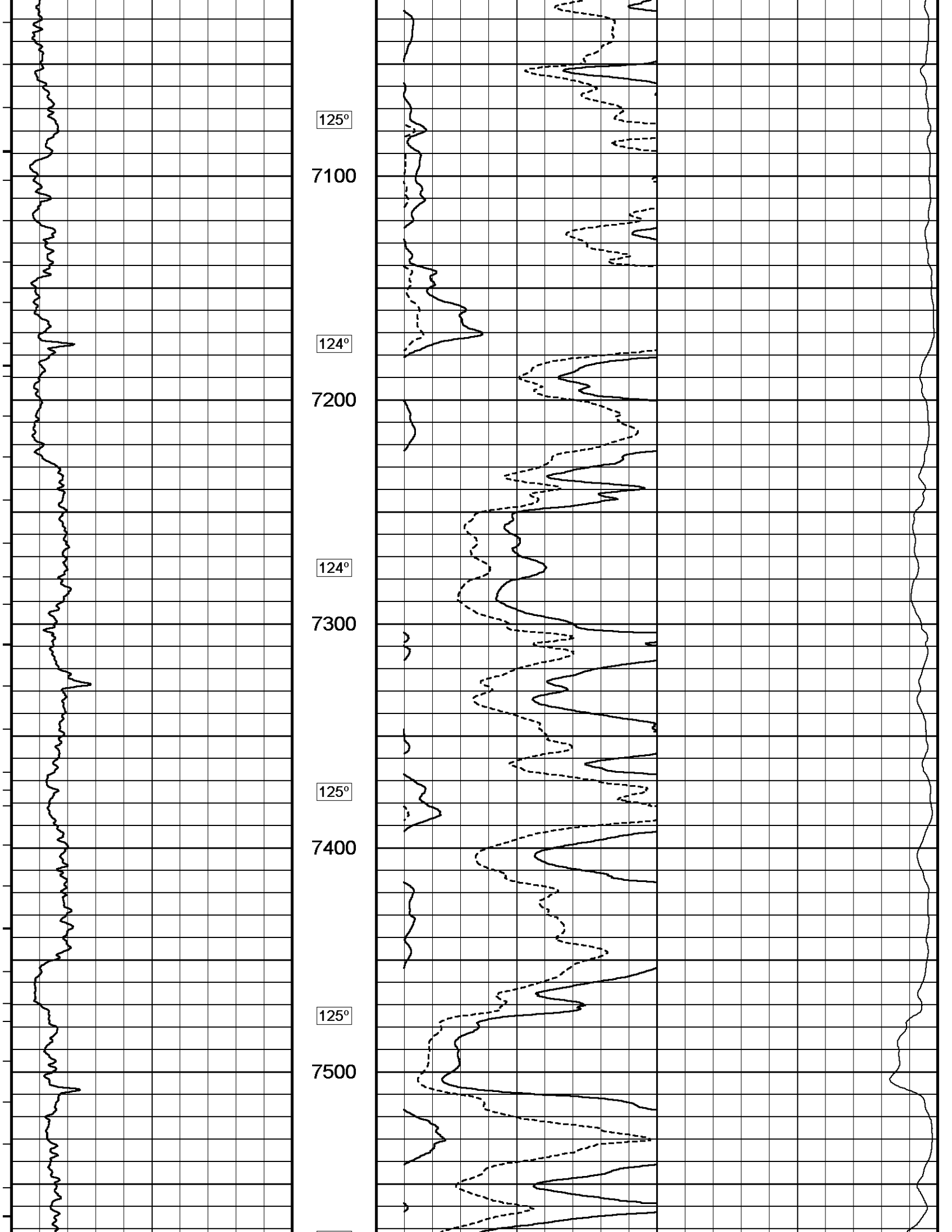
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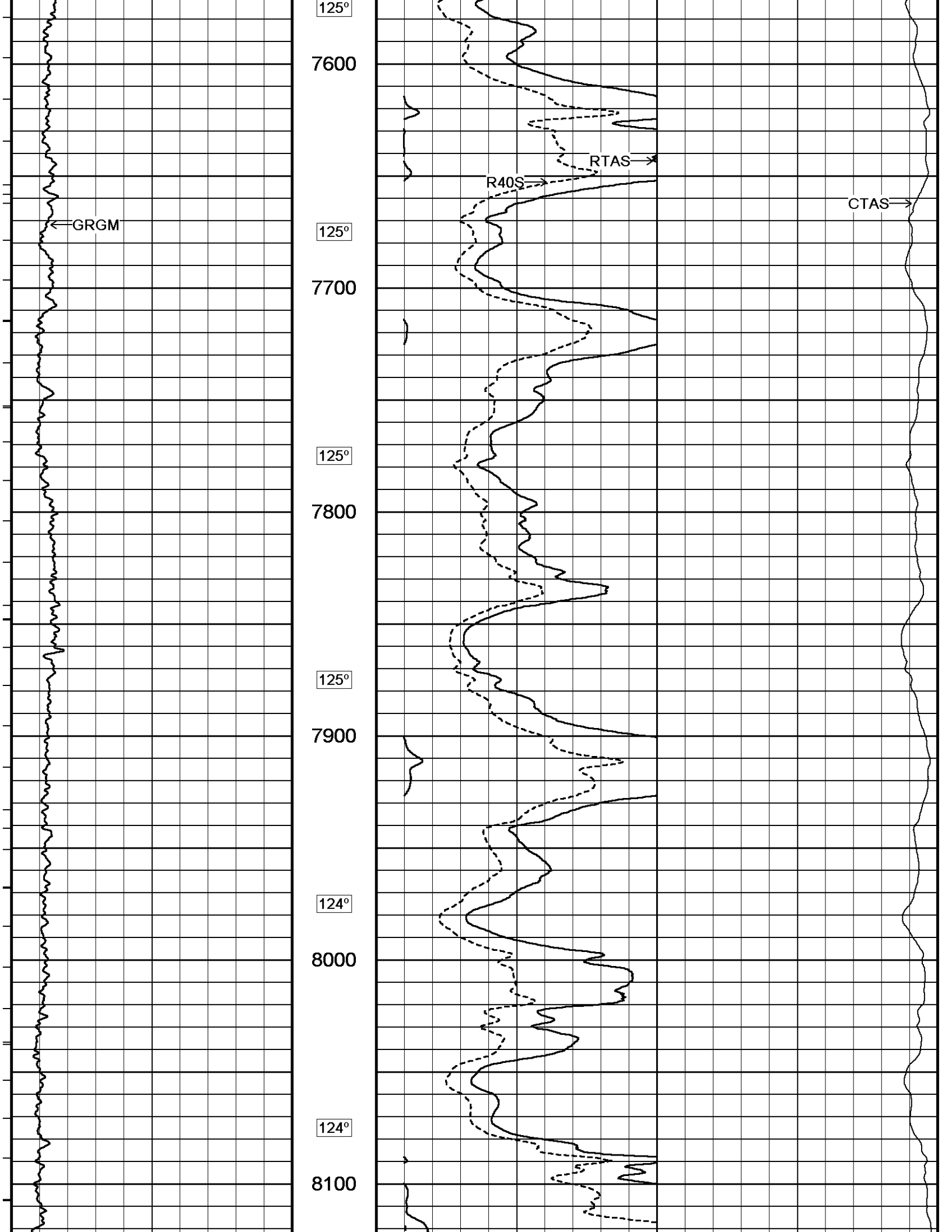
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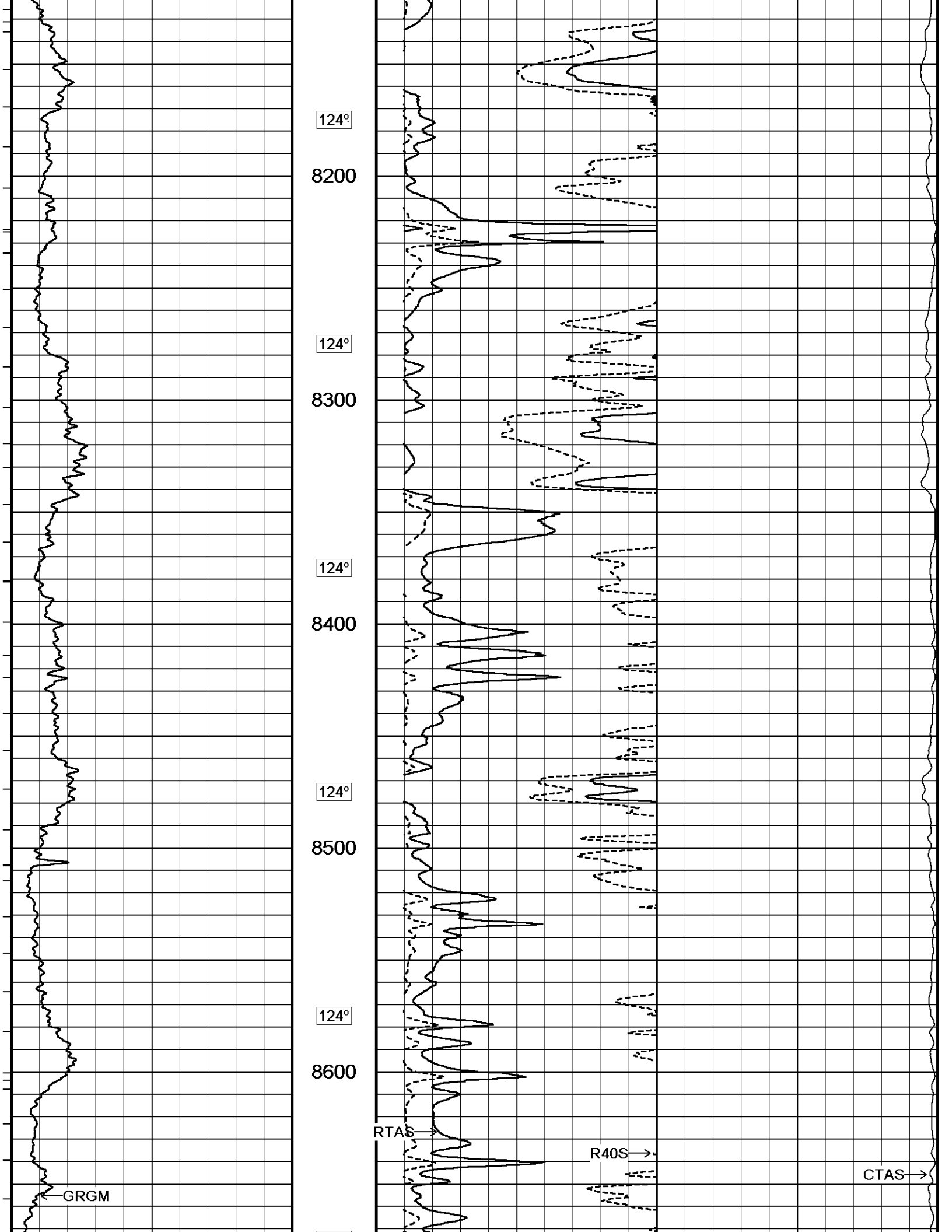
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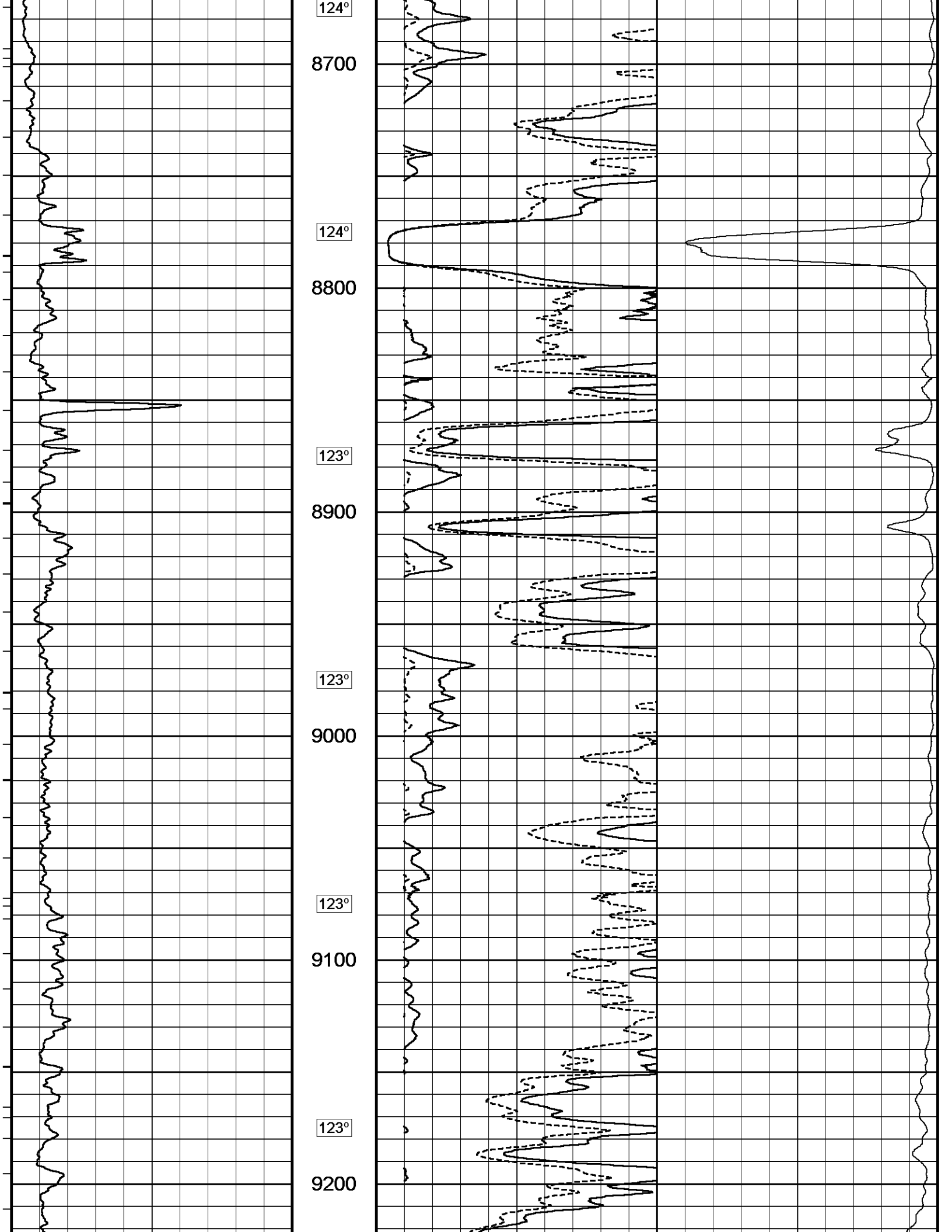
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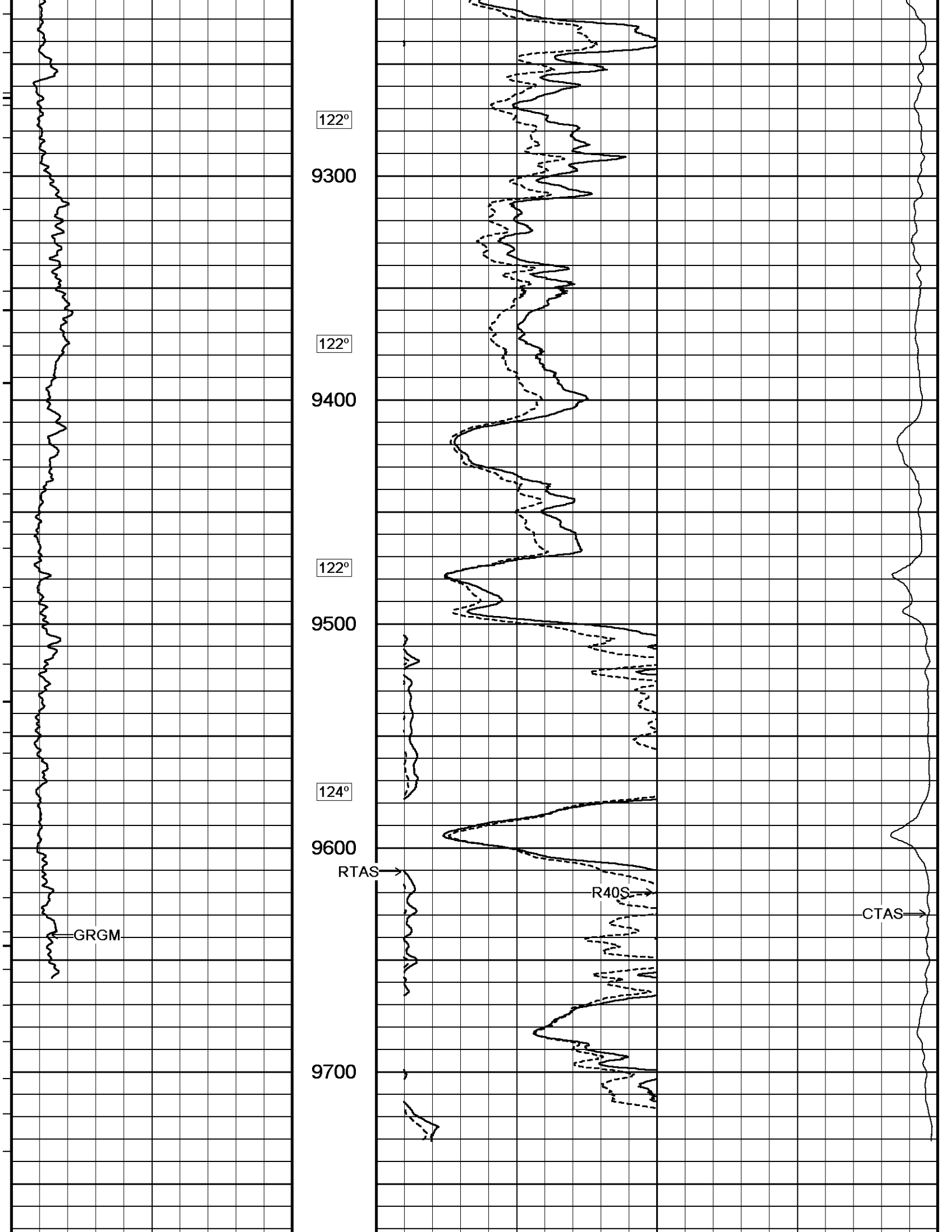
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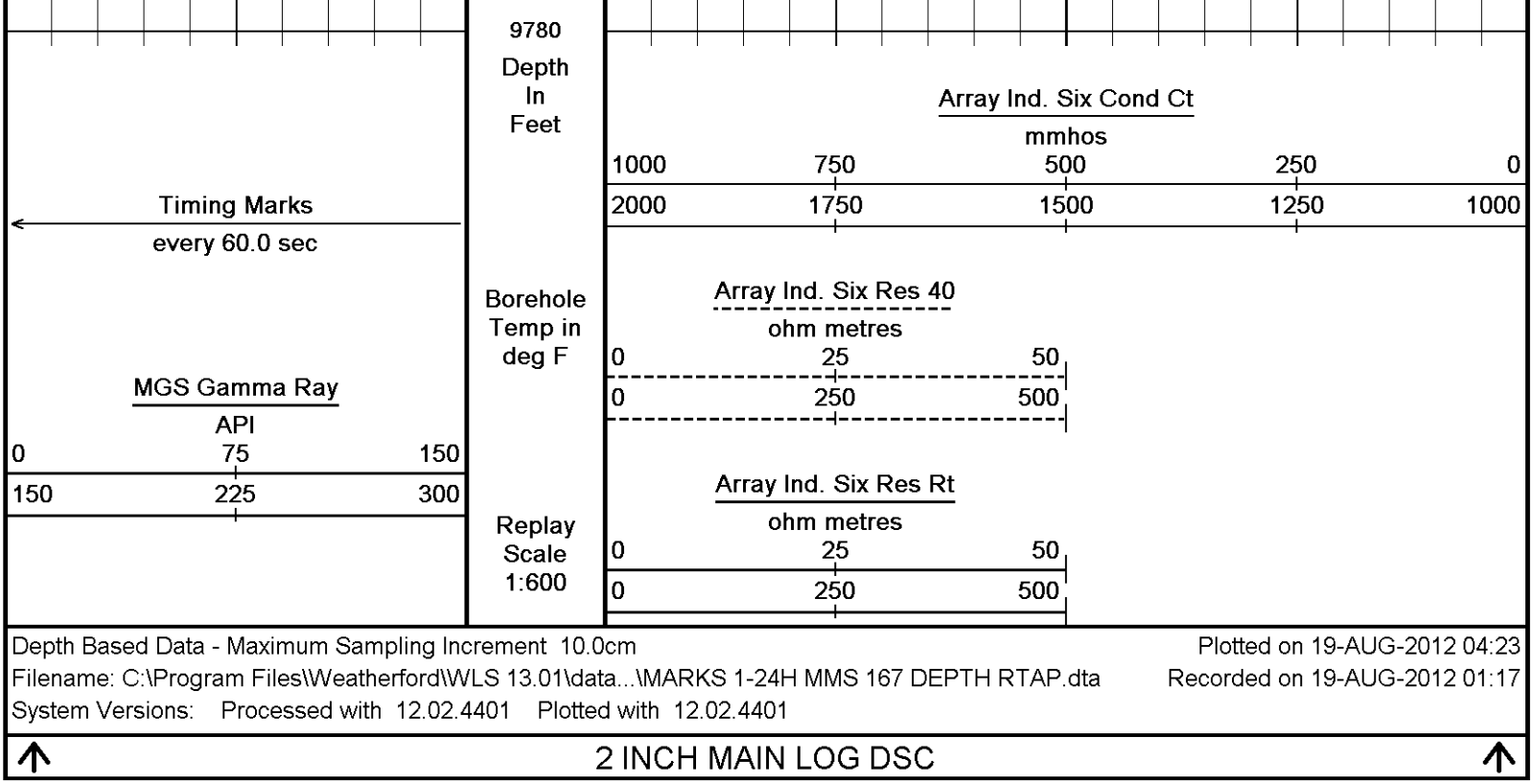

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 19-AUG-2012 04:23
Filename: C:\Program Files\Weatherford\WLS 13.01\data...\MARKS 1-24H MMS 167 DEPTH RTAP.dta
Recorded on 19-AUG-2012 01:17
System Versions: Processed with 12.02.4401 Plotted with 12.02.4401

2 INCH MAIN LOG DSC

5 INCH MAIN LOG DSC

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 19-AUG-2012 04:23
Filename: C:\Program Files\Weatherford\WLS 13.01\data...\MARKS 1-24H MMS 167 DEPTH RTAP.dta
Recorded on 19-AUG-2012 01:17
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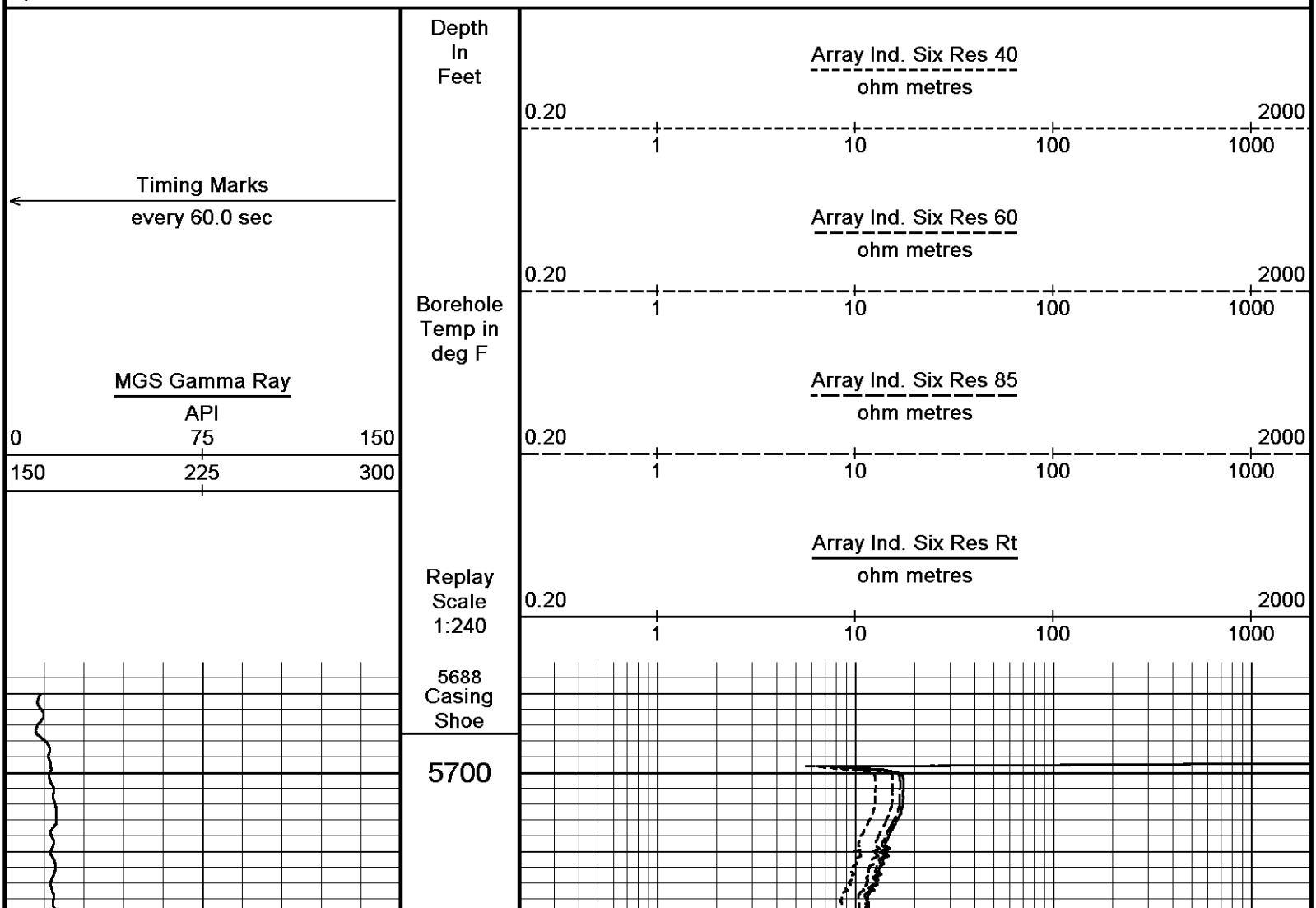

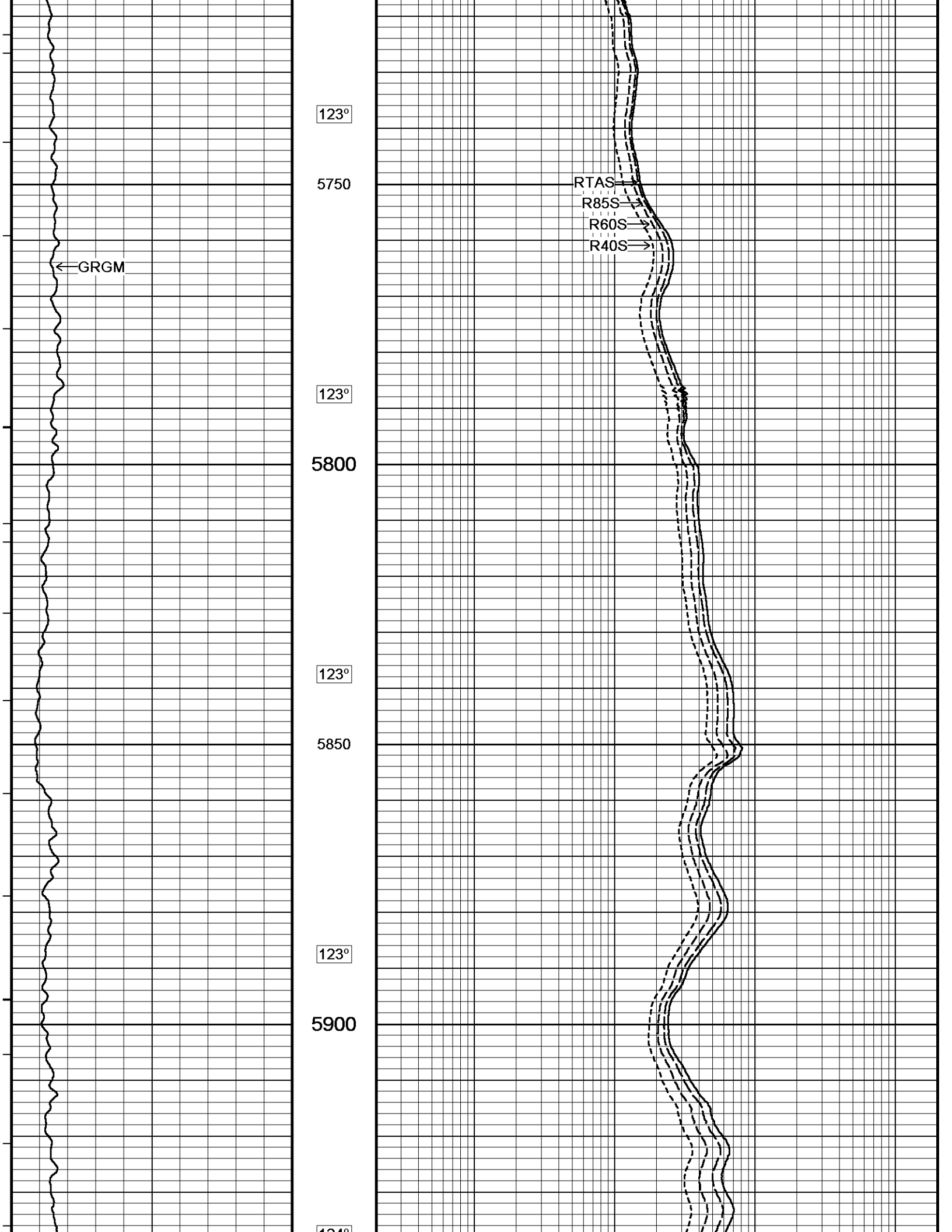
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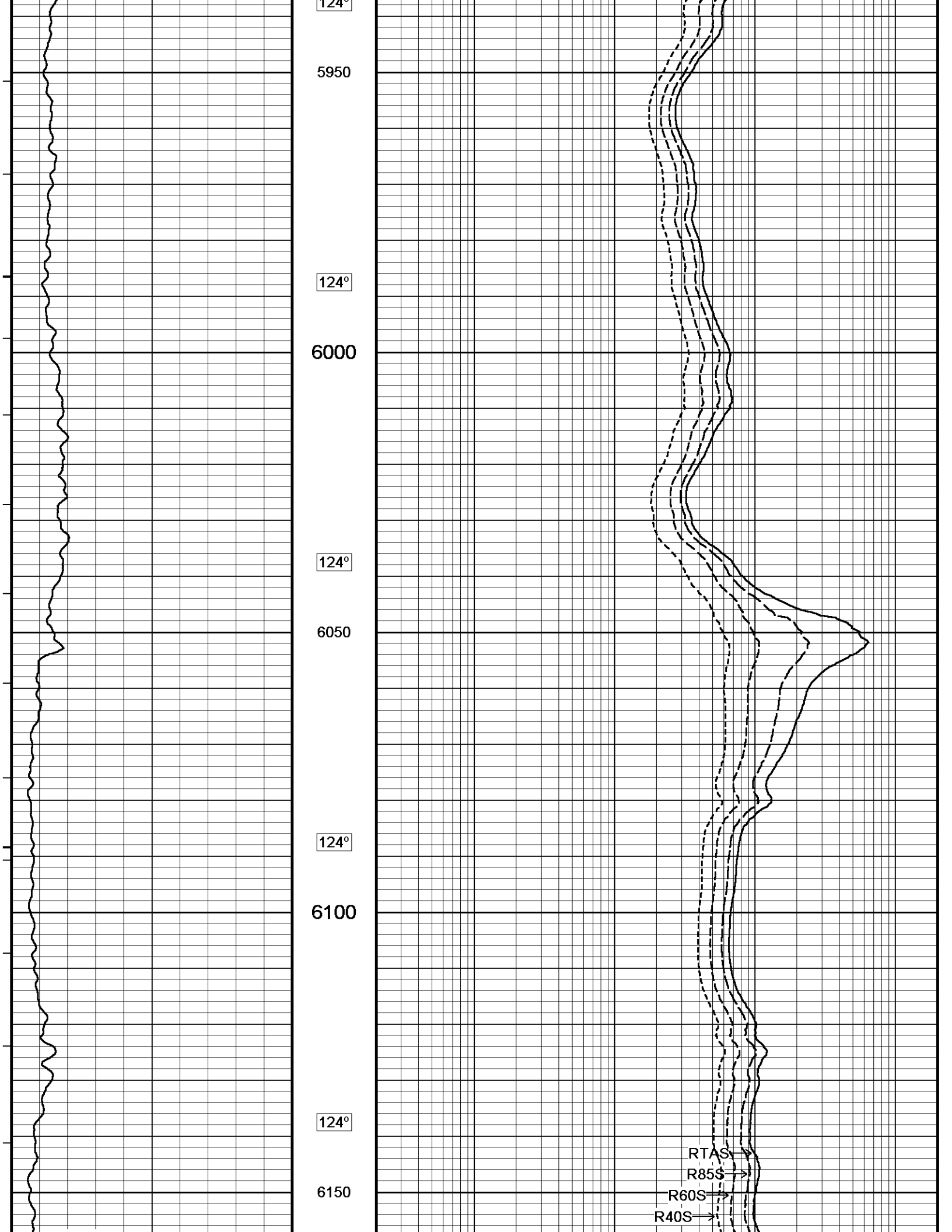
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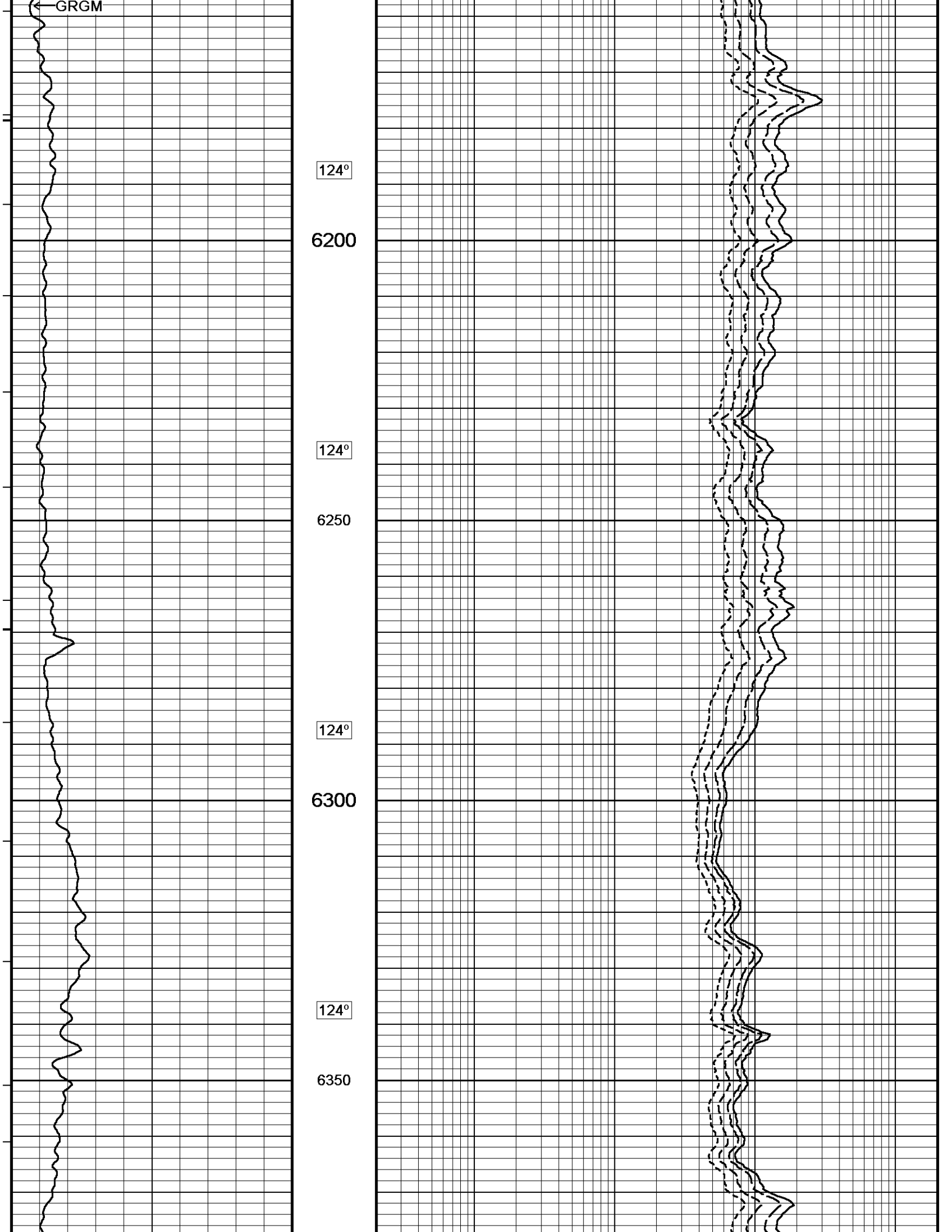
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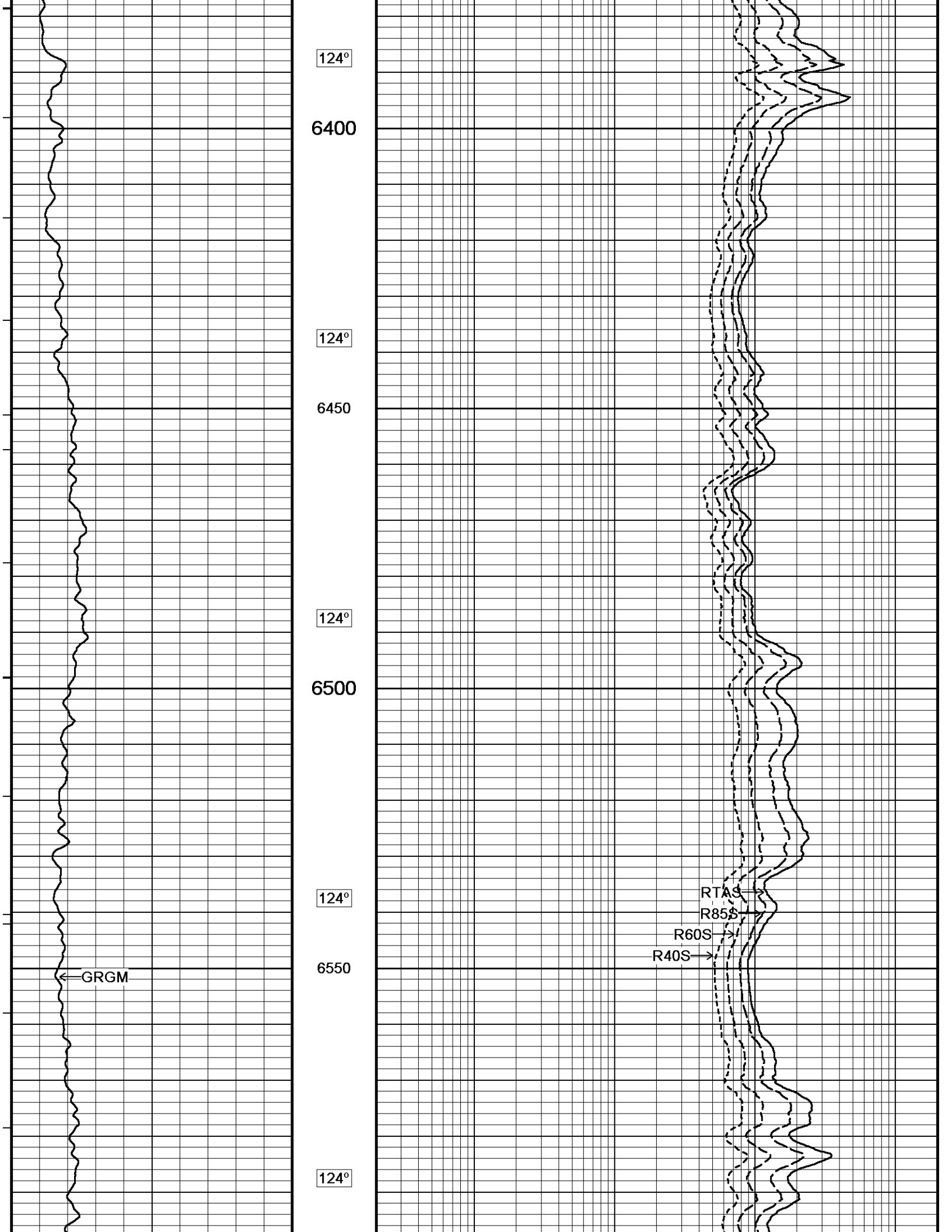
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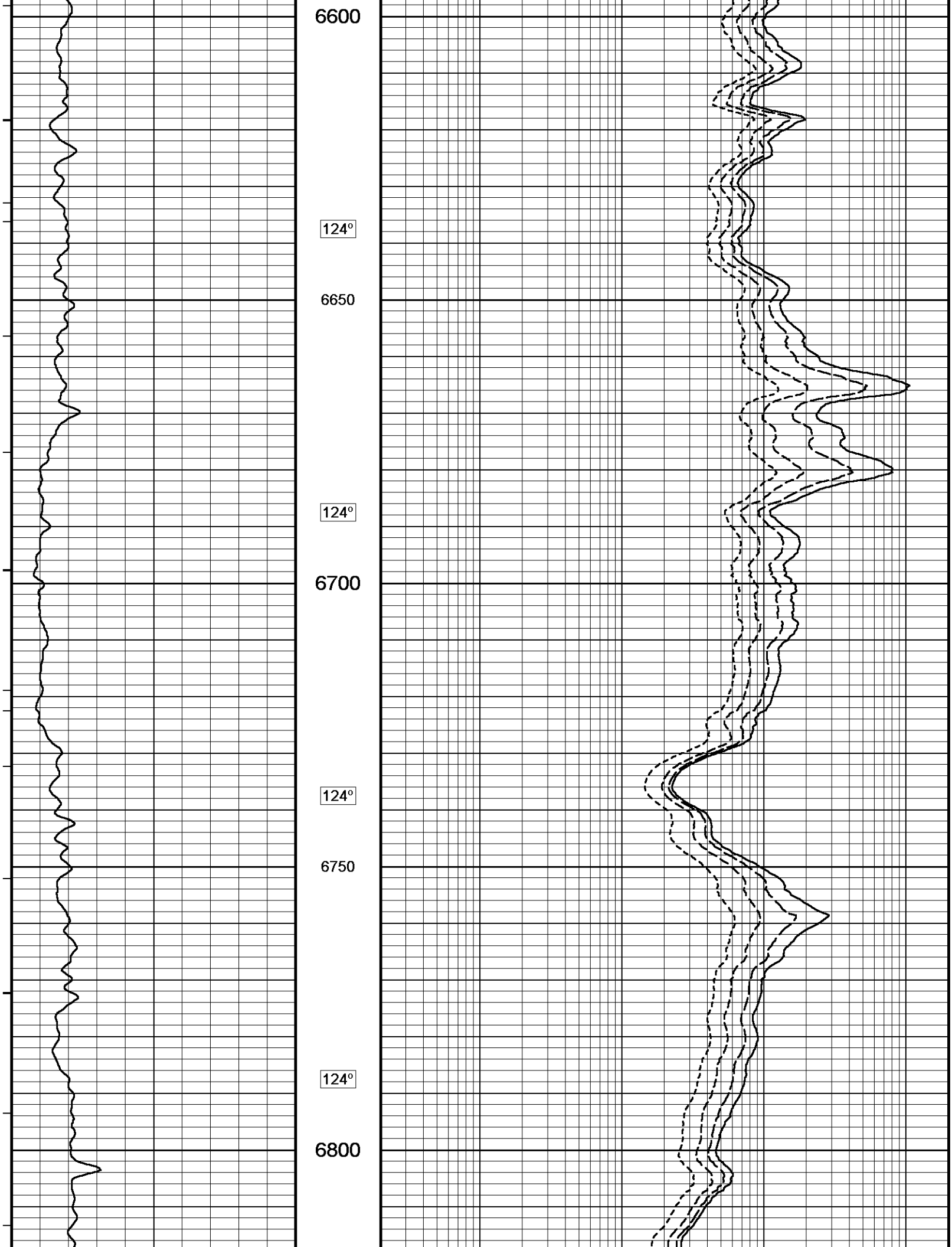
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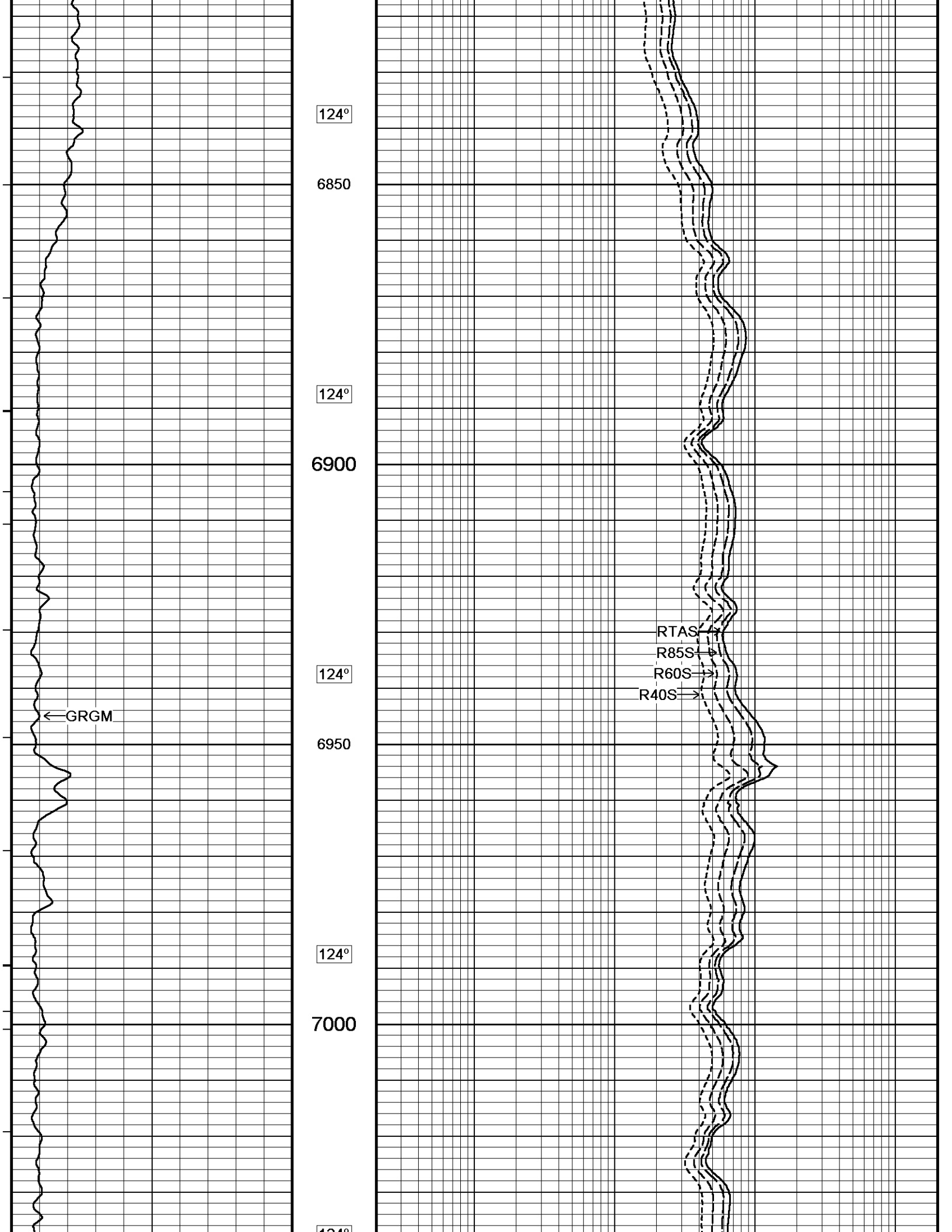
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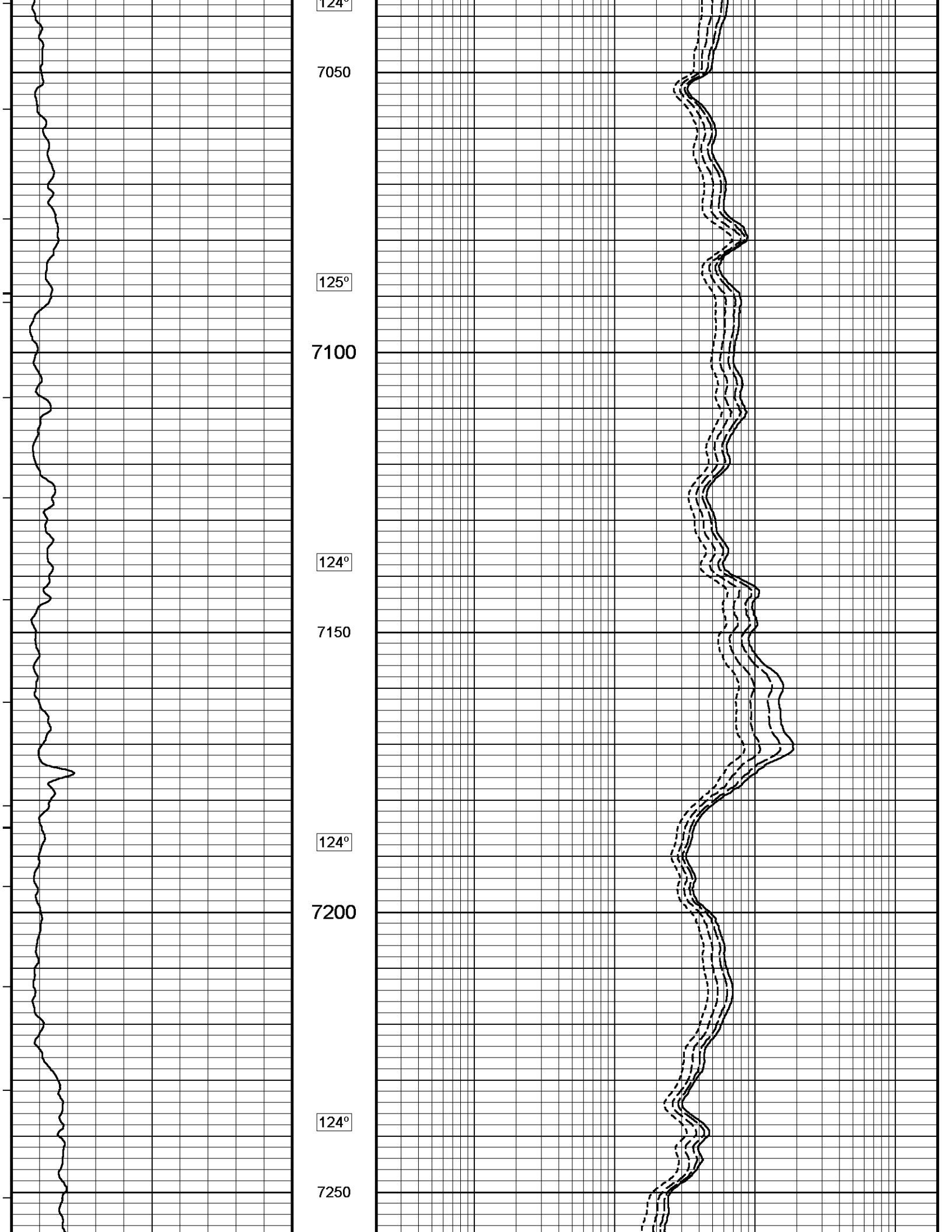
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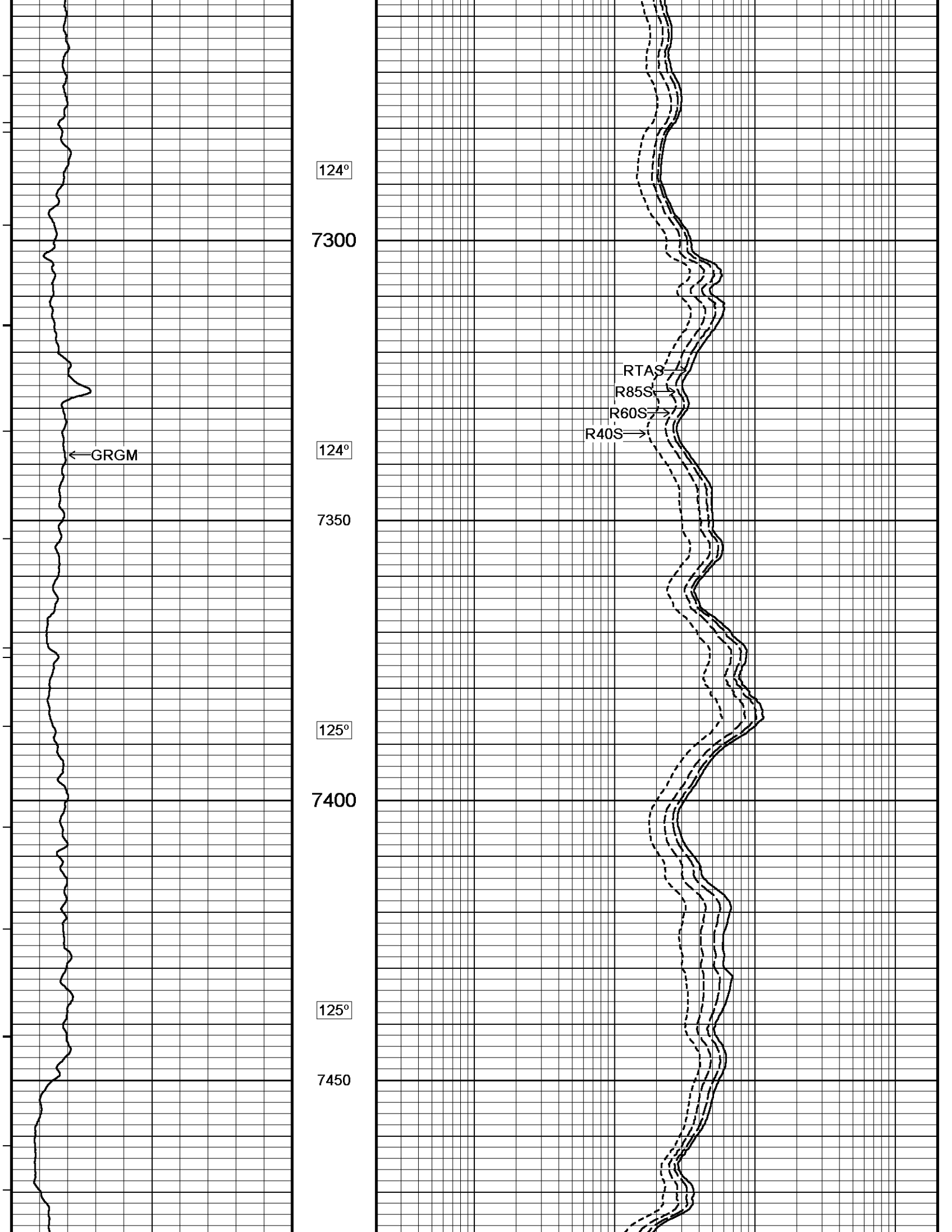
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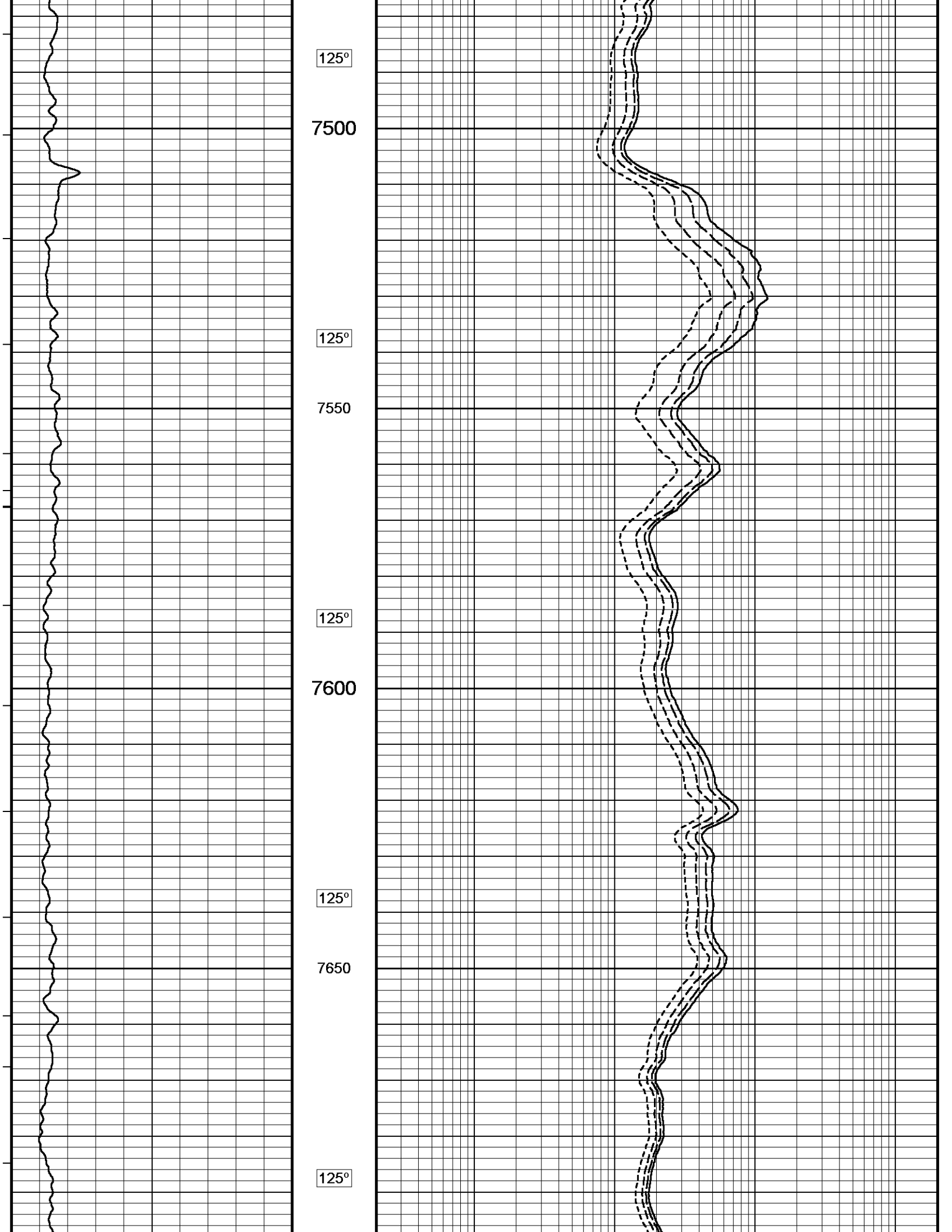
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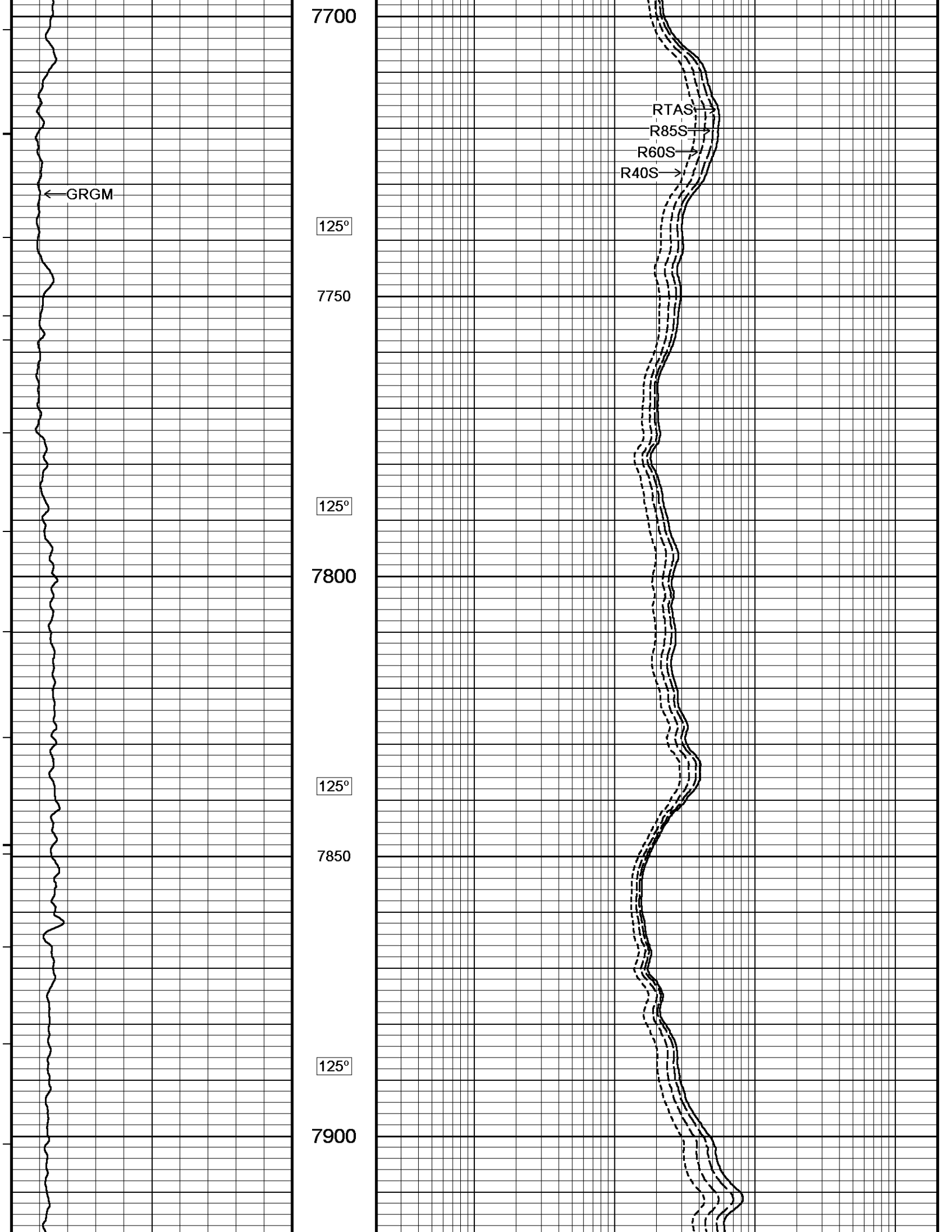
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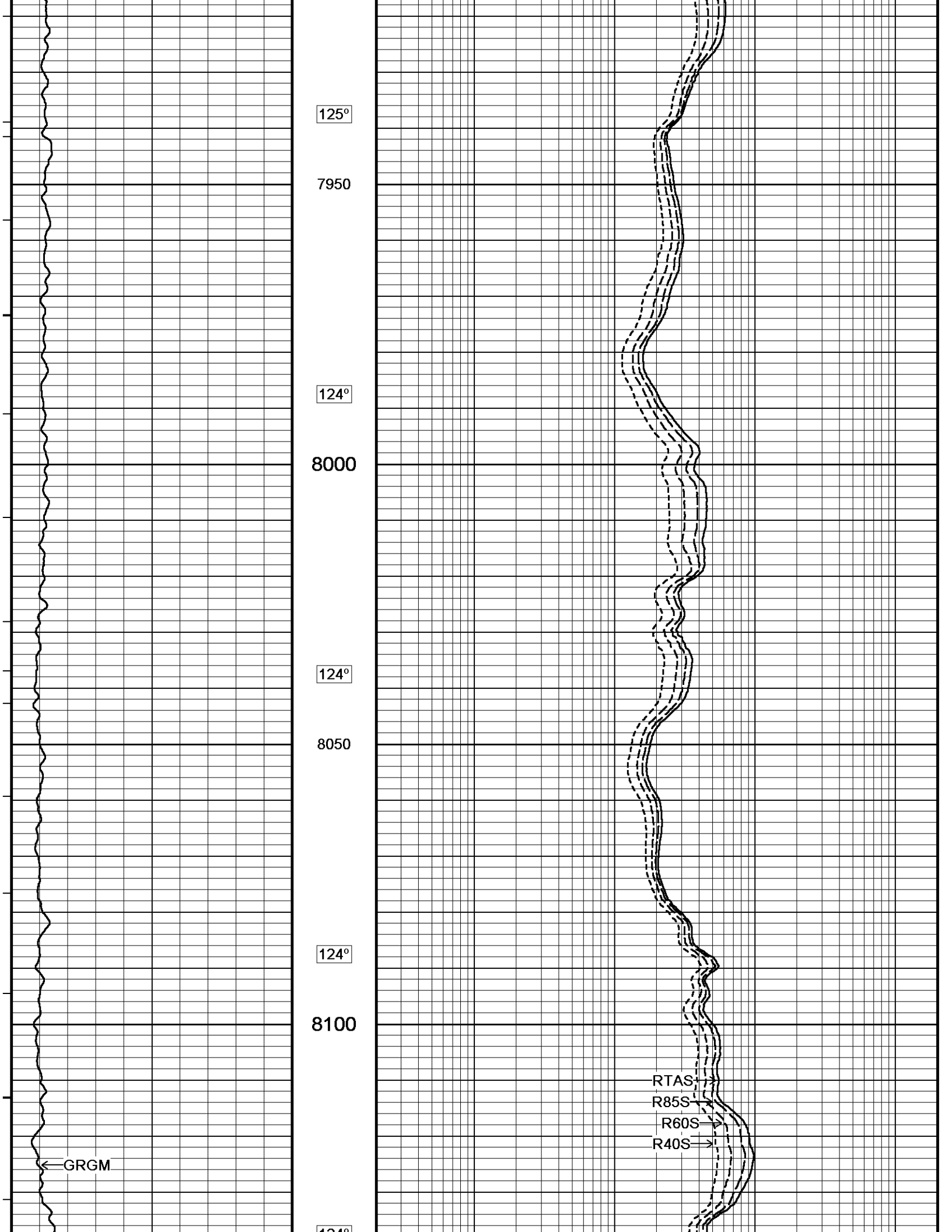
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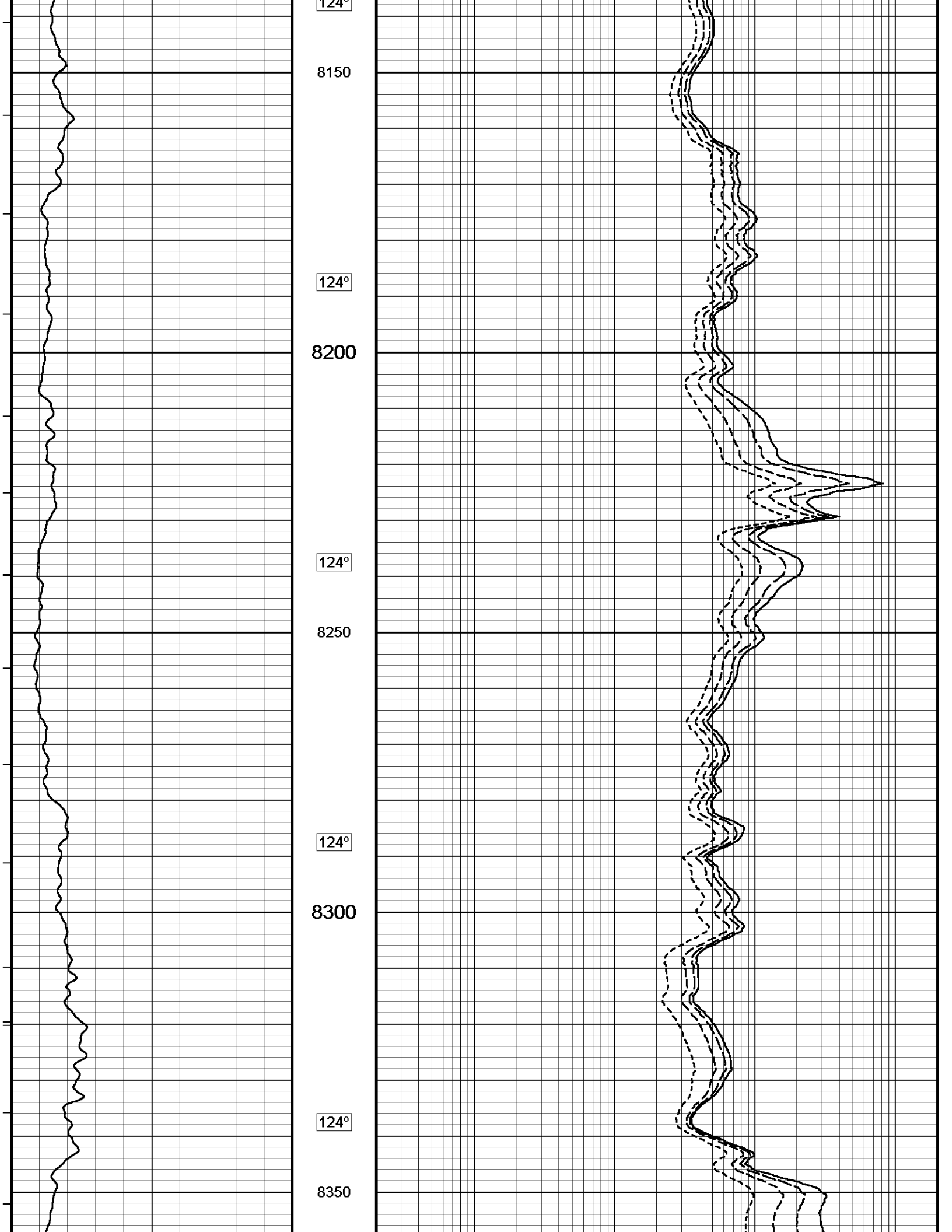
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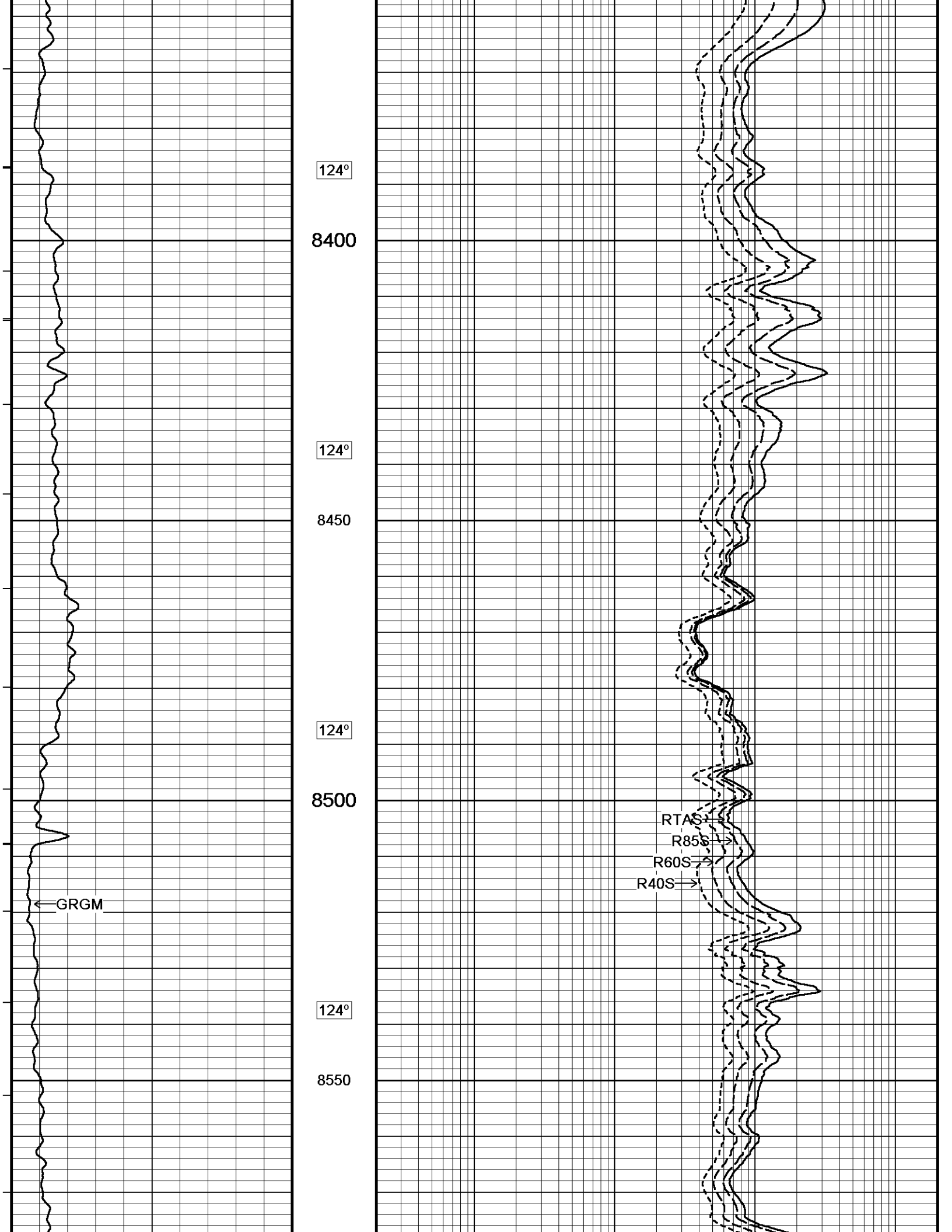
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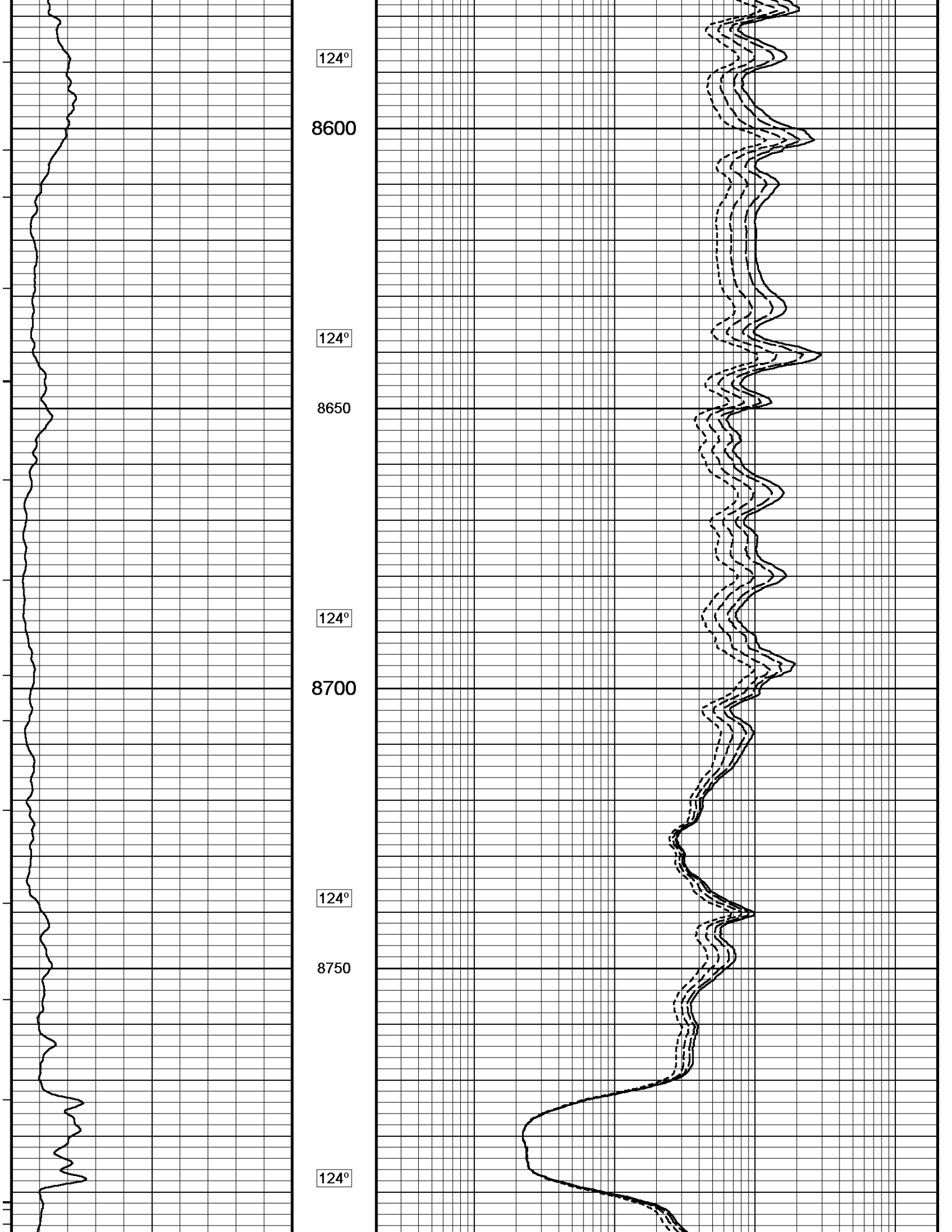
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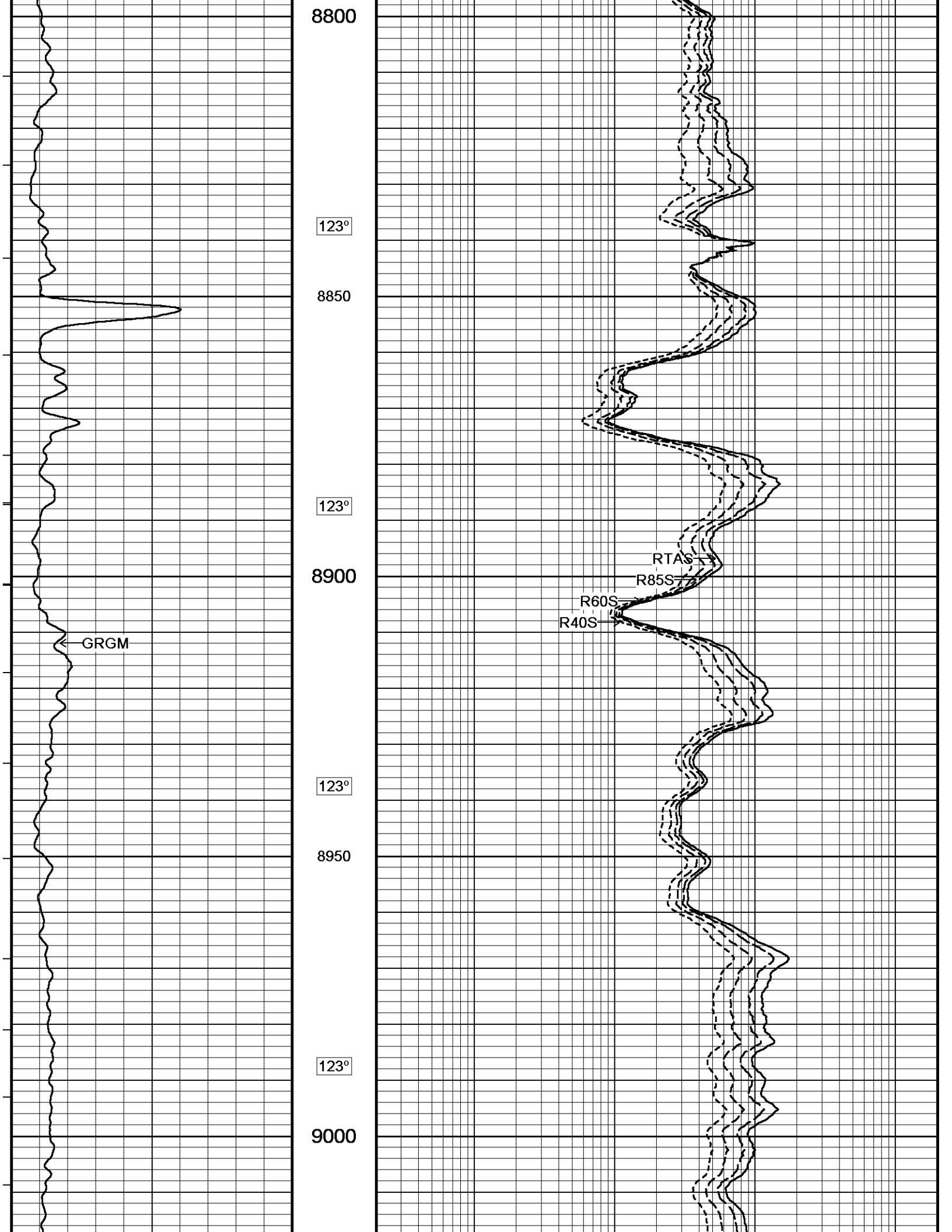
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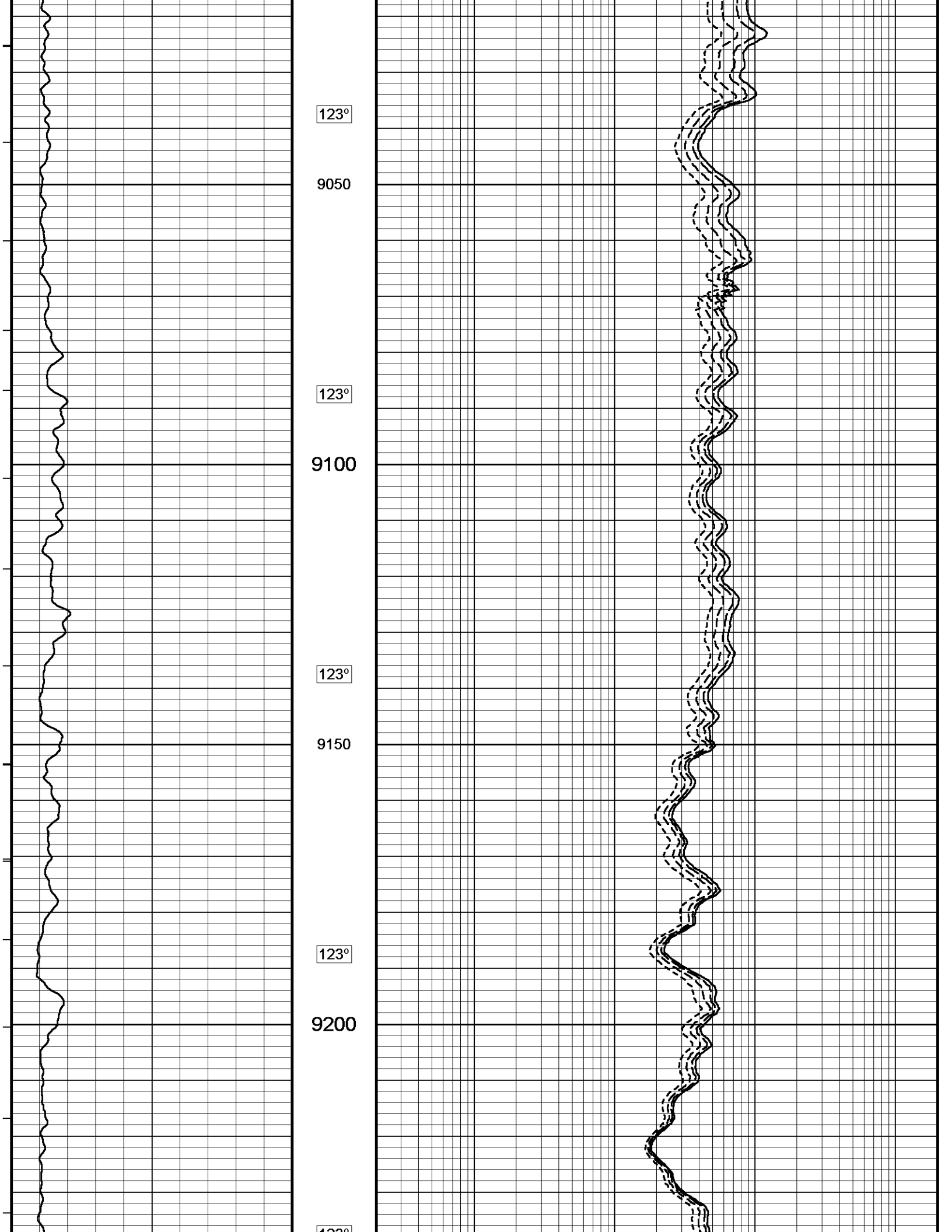
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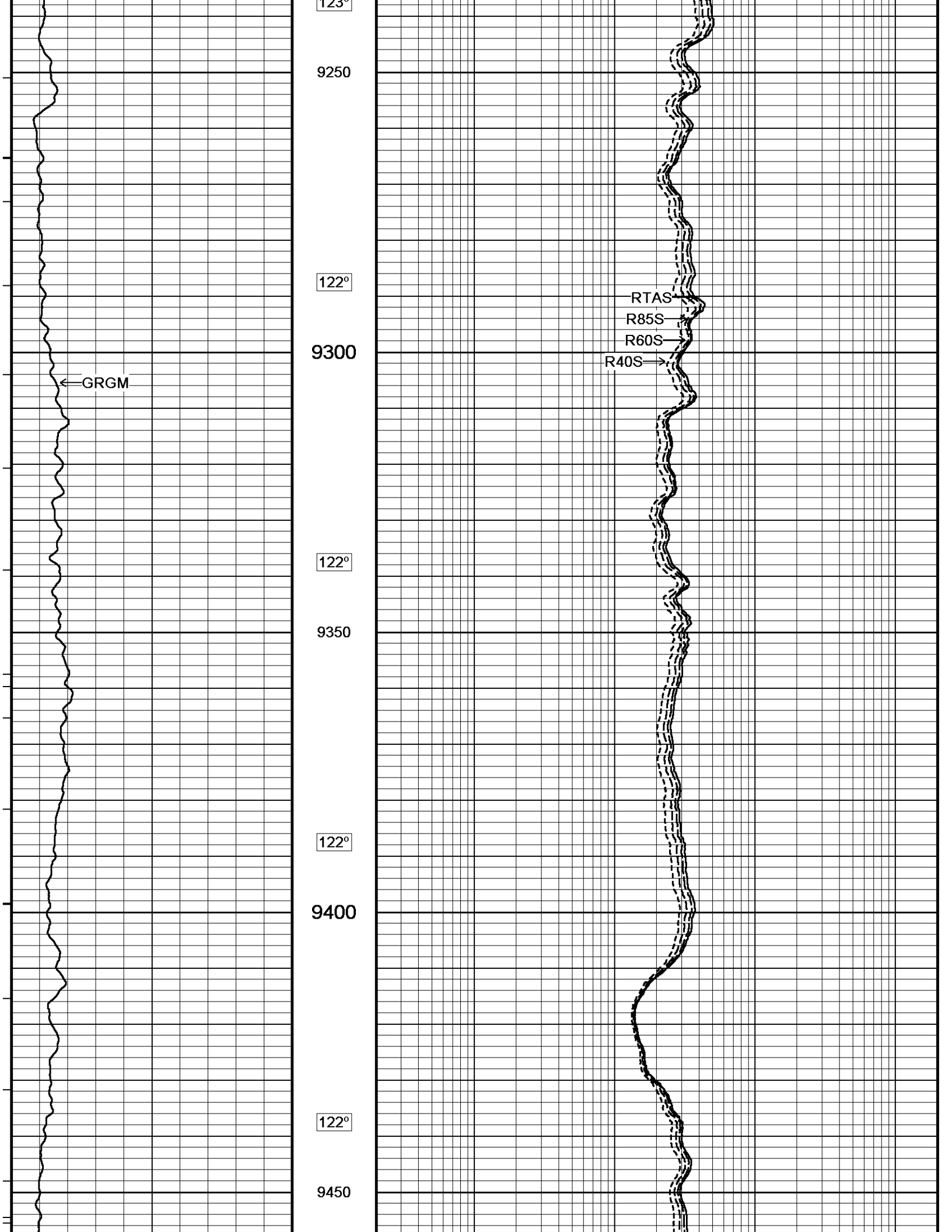
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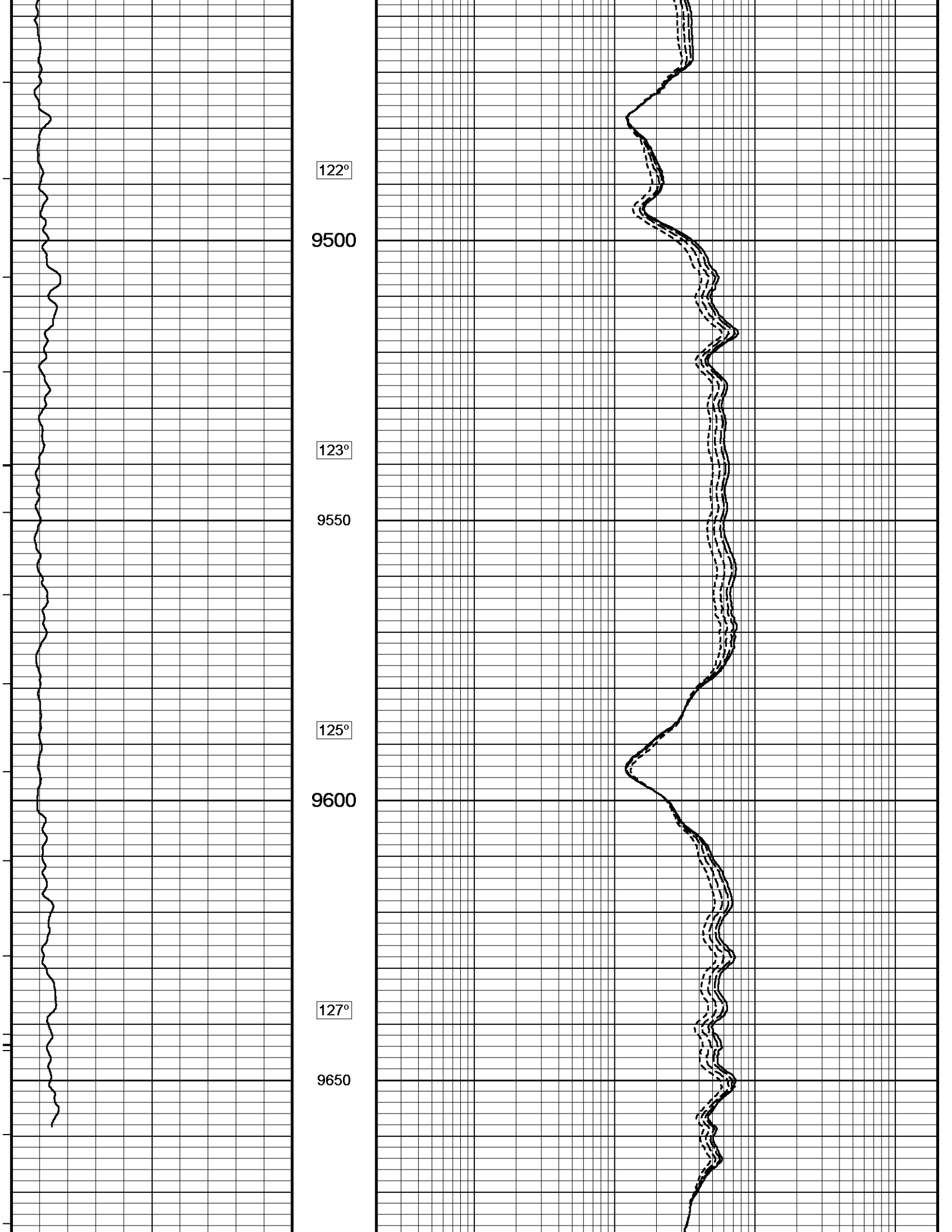
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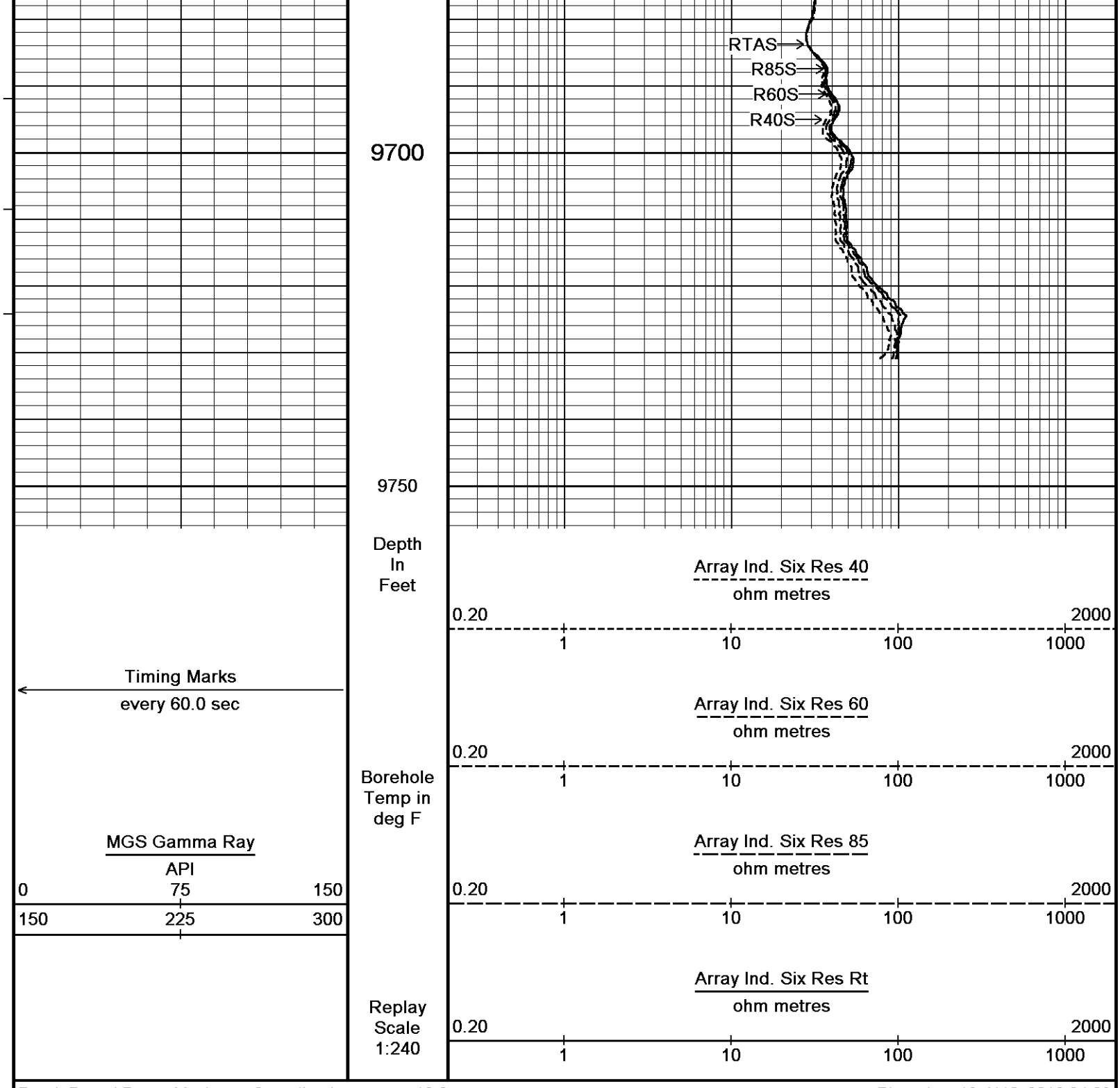


Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 19-AUG-2012 04:23

Filename: C:\Program Files\Weatherford\WLS 13.01\data...\MARKS 1-24H MMS 167 DEPTH RTAP.dta — Recorded on 19-AUG-2012 01:17

System Versions: Processed with 12.02.4401 Plotted with 12.02.4401

5 INCH MAIN LOG DSC

BEFORE SURVEY CALIBRATION

C:\Program Files\Weatherford\WLS 13.01\data\sandridge marks 1-24h\MARKS 1-24H MMS 167 DEPTH RTAP.dta

Down-hole Tension Calibration All 000

Field Calibration on 24-FEB-2009 00:00

Reading No	Measured	Calibrated (lbs)
1	14953.75	0.00
2	17846.38	1500.00

General Constants All 000 — Last Edited on 16-AUG-2012 11:00

General Parameters

Mud Resistivity	1.200	ohm-metres
Mud Resistivity Temperature	96.000	degrees F
Water Level	0.000	feet
Density/Neutron 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	4.500	inches
Caliper for Differential Caliper	Density Caliper	

Rwa Parameters

Porosity used	Limestone Density Por.	
Resistivity used	Array Ind. Six Res Rt	
RWA Constant A	0.610	
RWA Constant M	2.150	

Down-hole Tension Calibration SMS 0

Field Calibration on 29-MAR-2011 00:00

Reading No	Measured	Calibrated (lbs)
1	15152.07	0.00
2	19175.97	2000.00

Strain Gauge Constants MMS-E.B 167

Last Edited on 03-AUG-2012 11:54

Atmospheric Pressure	14.70	psi
Serial Number	0	
Calibration Date	000000000000	
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.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10000.0	0.000		0.000		0.000		0.000	

Gamma Calibration MGS-C.J 135

Field Calibration on 17-AUG-2012 22:28

	Measured	Calibrated (API)
Background	42	14
Calibrator (Gross)	1203	403
Calibrator (Net)	1160	389

Gamma Constants MGS-C.J 135

Last Edited on 22-JUN-2012 20:19

Gamma Calibrator Number	389	
Mud Density	1.13	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Concentration of KCl	0.00	kppm

High Resolution Temperature Constants MGS-C.J 135

Last Edited on

Pre-filter Length	11

Neutron Calibration MDN-B.J 390

Base Calibration on 10-AUG-2012 02:10
Field Check on 16-AUG-2012 11:36

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2974	91	3714	110
Ratio	32.653		33.764	

Field Calibrator at Base

	Calibrated (cps)	
	1236	1843
Ratio	0.671	

Field Check	Calibrated (cps)	
	1290	1898
Ratio	0.680	

Neutron Constants MDN-B.J 390

Last Edited on 10-AUG-2012 02:05

Neutron Source Id	P31112B	
Neutron Jig Number	5917NC	
Epithermal Neutron	No	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.03	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	20.00	degrees F
Mud Salinity	1.00	kppm
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	
Salinity Correction	Applied	

Imager Pad Check MIE-A.A 113

Field Check on 16-AUG-2008 11:45

Pad 1	Pad Not Tested	Pad 5	Pad Not Tested
Pad 2	Pad Not Tested	Pad 6	Pad Not Tested
Pad 3	Pad Not Tested	Pad 7	Pad Not Tested
Pad 4	Pad Not Tested	Pad 8	Pad Not Tested

Compact Micro Imager Constants MIE-A.A 113

Last Edited on 19-AUG-2012 01:29

Sonde Configuration	Imager Mode	degrees
Arm-Pad Kit	Normal Pads (12.25 in)	
Centre Pad 1 Rotational Offset	0.00	
Image/Borehole Ovality Reference	Relative Bearing	degrees
Non Active Buttons	Omit	feet
Search Angle	0.00	feet
Correlation Interval	3.28	mAmp
Correlation Step	1.64	mAmp
Current Offset	0.0000	
Squasher Start	N/A	
Image Processing	Enabled	

Navigation Constants MIE-A.A 113

Last Edited on 29-DEC-2009 15:28

Magnetic Declination	6.00	degrees	East

Magnetometer Parameters MIE-A.A 113

Date Of Last Magnetometer Calibration 01-JAN-1998

	X Magnetometer	Y Magnetometer	Z Magnetometer
Slope	-1.000000	-1.016573	-1.003898
Offset	0.006568	-0.015949	0.006438

Magnetometer Constants MIE-A.A 113

Last Edited on

Magnetometer Calibrator Number 000

Accelerometer Parameters MIE-A.A 113

Date Of Last Accelerometer Calibration 01-JAN-1998

	X Accelerometer	Y Accelerometer	Z Accelerometer
Slope	-1.105490	-1.103970	-1.107420
Offset	0.000458	0.006135	0.003353

Accelerometer Constants MIE-A.A 113

Last Edited on 11-JUN-2009 17:18

Accelerometer Calibrator Number 000

Accelerometer Temperature Characterisation

X Accelerometer

Serial Number	282			
Calibration Date	18-Jul-2007			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	3.41234e-005	-1.69705e-008	1.28660e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.70372e-004	8.31146e-007	-1.22715e-009

Y Accelerometer

Serial Number	284			
Calibration Date	18-Jul-2007			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.41306e-005	-2.62559e-009	9.20272e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.83655e-004	6.88154e-007	-5.98912e-010

Z Accelerometer

Serial Number	287			
Calibration Date	20-Jul-2007			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	2.30753e-005	-5.40650e-010	3.42223e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.66160e-004	7.47858e-007	-1.03559e-009

Caliper Calibration MIE-A.A 113

Base Calibration on 23-JUN-2008 12:29
Field Calibration on

Base Calibration

Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)
1	24856	25276	5.97
2	35545	35312	7.99
3	44370	44687	9.86
4	55326	56381	11.93
5	0	0	0.00

Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	23517	25136	25351	23970	5.97
2	32111	33147	34289	33287	7.99
3	39601	41110	42395	41619	9.86
4	49214	50836	52775	51339	11.93
5	0	0	0	0	0.00

Field Calibration

Measured Pads 1-5 Caliper(in)	Measured Pads 3-7 Caliper(in)	Actual Caliper(in)
0.00	0.00	0.00

Measured Pad 2 Caliper(in)	Measured Pad 4 Caliper(in)	Measured Pad 6 Caliper(in)	Measured Pad 8 Caliper(in)	Actual Caliper(in)
0.00	0.00	0.00	0.00	0.00

Caliper Constants MIE-A.A 113

Last Edited on 19-AUG-2012 01:29

Caliper Difference for BRKT	0.120	inches

High Resolution Temperature Calibration MAI-B.J 389

Field Calibration on 19-OCT-2011 09:44

	Measured	Calibrated(Deg F)
Lower	10.00	50.00
Upper	100.00	212.00

High Resolution Temperature Constants MAI-B.J 389

Last Edited on

Pre-filter Length	11

Induction Calibration MAI-B.J 389

Base Calibration on 10-AUG-2012 01:34
Field Check on 17-AUG-2012 22:27

Base Calibration

Test Loop Calibration Channel	Measured Low	Measured High	Calibrated (mmho/m) Low	Calibrated (mmho/m) High
1	16.7	465.5	9.3	966.2
2	6.4	384.0	7.6	821.4
3	3.1	258.9	5.2	566.0
4	1.8	133.7	2.6	279.2

Array Temperature	78.1	Deg F	

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	14.1	3896.4	
2	0.0	0.0	29.7	3508.2	
3	0.0	0.0	29.6	3049.1	
4	0.0	0.0	19.9	2063.0	
Deep	0.0	0.0	19.2	2012.9	
Medium	0.0	0.0	42.8	4003.7	
Shallow	0.0	0.0	42.6	5151.3	
Array Temperature	0.0		68.4		Deg F

Induction Constants MAI-B.J 389

Last Edited on 19-AUG-2012 01:32

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	6.0000	
Stand-off Fin Angle	60.00	degrees
Stand-off Fin Width	0.5000	inches
Borehole Corr. Rm Source	Temperature Corr	
Temp. for Rm Corr.	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	

Caliper Calibration MPD-C.J 393

Base Calibration on 10-AUG-2012 02:02
Field Calibration on 10-AUG-2012 02:04

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	18800	4.01
2	26177	5.96
3	34564	7.98
4	42768	9.86
5	51949	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
5.94	5.96

Photo Density Calibration MPD-C.J 393

Base Calibration on 10-AUG-2012 01:56
Field Check on 16-AUG-2012 11:35

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Reference 1	54678	26470	59869	31110
Reference 2	23479	2726	24557	2522
Field Check at Base	1229.7	1344.0		
Field Check	1225.0	1338.6		

PE Calibration

Base Calibration	WS	Measured WH	Measured Ratio	Calibrated Ratio
Background	227	1110		
Reference 1	22306	54489	0.414	0.369
Reference 2	6605	23344	0.287	0.271
Field Check at Base	227.5	1110.5		
Field Check	224.8	1104.5		

Density Constants MPD-C.J 393

Last Edited on 14-AUG-2012 10:35

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	1.05	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	-0.03	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:\Program Files\Weatherford\WLS 13.01\data\sandridge marks 1-24h\MARKS 1-24H MMS 167 DEPTH RTAP.dta

Shuttle Running Tool 3.5")
SRT-A.A 70 LG: 6.62 ft WT: 37.5 lb OD: 2.52 in

SKJ-E.B Compact Knuckle Joint
SKJ-E.B 480 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

Spacer - Empty Battery
MLK-A 2 LG: 14.23 ft WT: 30.9 lb OD: 2.24 in

Spacer - Empty Battery
MLK-A 250 LG: 6.05 ft WT: 30.9 lb OD: 2.24 in

Spacer - Empty Battery

MLK-A 3 LG: 14.23 ft WT: 30.9 lb OD: 2.24 in

MBS-G.A 200v Compact Battery Sub
MBS-G.A 115 LG: 17.06 ft WT: 123.5 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 135 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 167 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

SHA-H Compact Swivel Head Adaptor
SHA-H 167 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

Compact Neutron
MDN-B.J 390 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

MIS-D.B Compact Inline Bowspring sub
MIS-D.B 607 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact Density/Caliper
MPD-C.J 393 LG: 9.59 ft WT: 90.4 lb OD: 2.24 in

SHA-H Compact Swivel Head Adaptor
SHA-H 185 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

SKJ-E.B Compact Knuckle Joint
SKJ-E.B 472 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-D.B Compact Inline Bowspring sub
MIS-D.B 603 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

Compact MMI Memory Section
MIM-A.A 157 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

Compact MMI Electrode Section
MIE-A.A 113 LG: 13.96 ft WT: 99.2 lb OD: 4.09 in

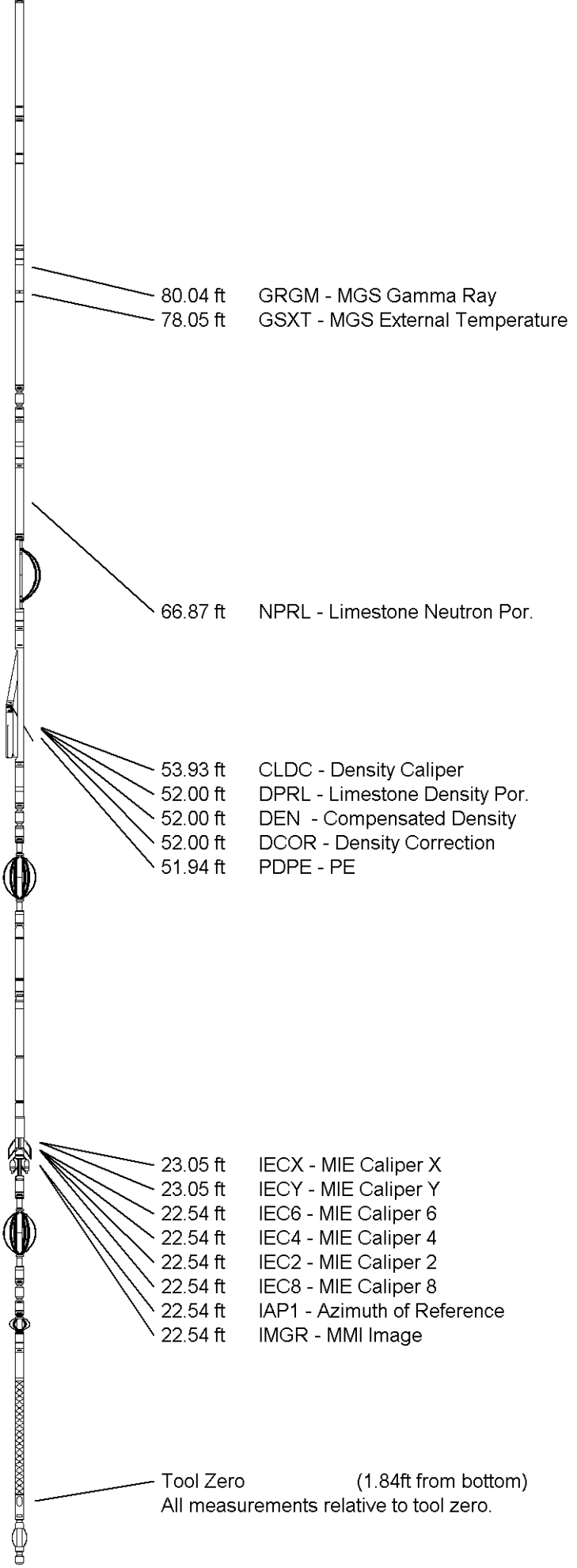
MIS-D.B Compact Inline Bowspring sub
MIS-D.B 593 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SKJ-E.B Compact Knuckle Joint
SKJ-E.B 478 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-E.B Compact Inline Standoff sub
MIS-E.B 573 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

Compact Induction
MAI-B.J 389 LG: 12.52 ft WT: 48.5 lb OD: 2.24 in

Total Length: 149.76 ft Weight: 925.9 lb



COMPANY	SANDRIDGE ENERGY

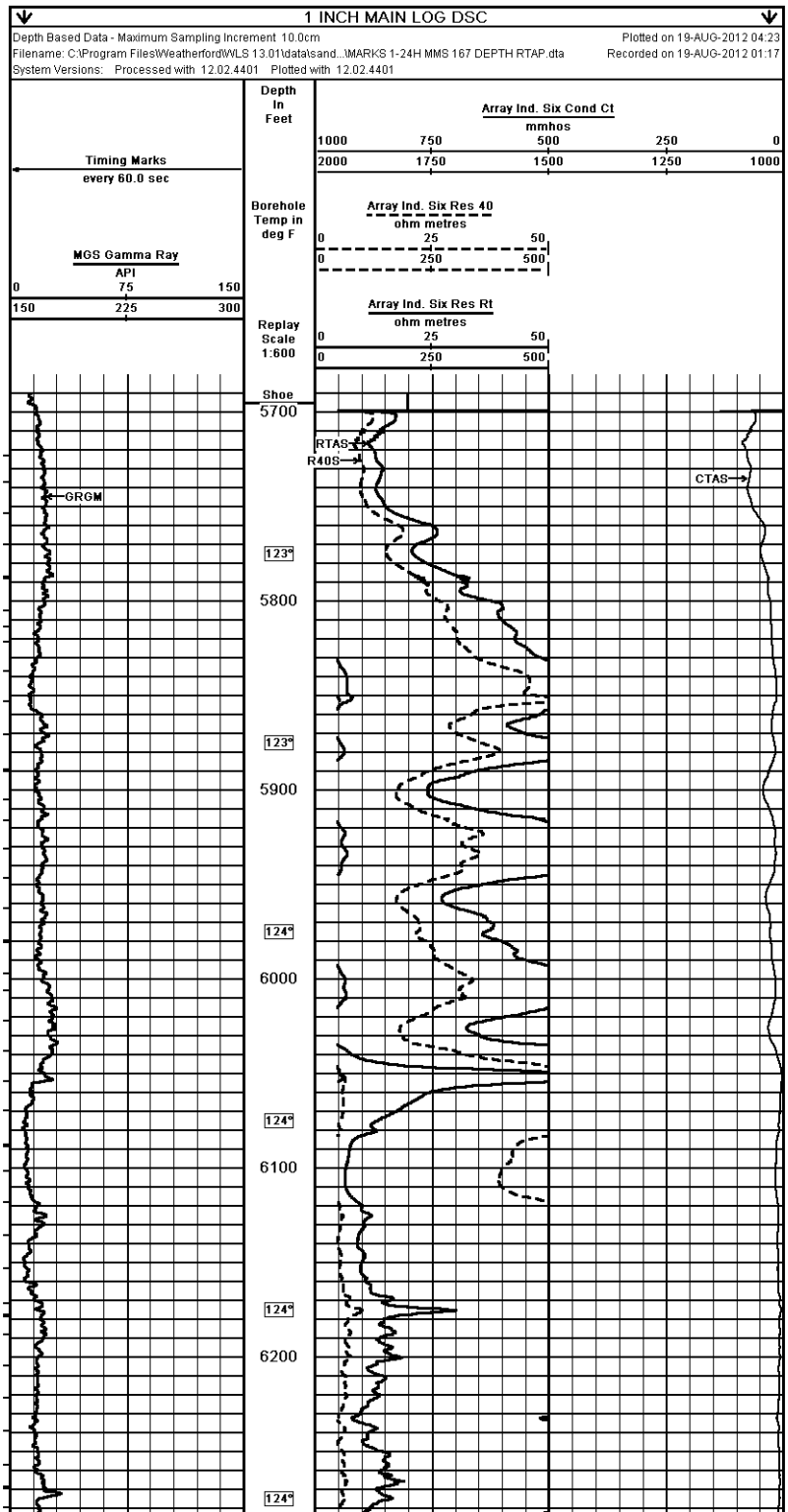
WELL	MARKS 1-24H
FIELD	MINNEOLA
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / OKLAHOMA

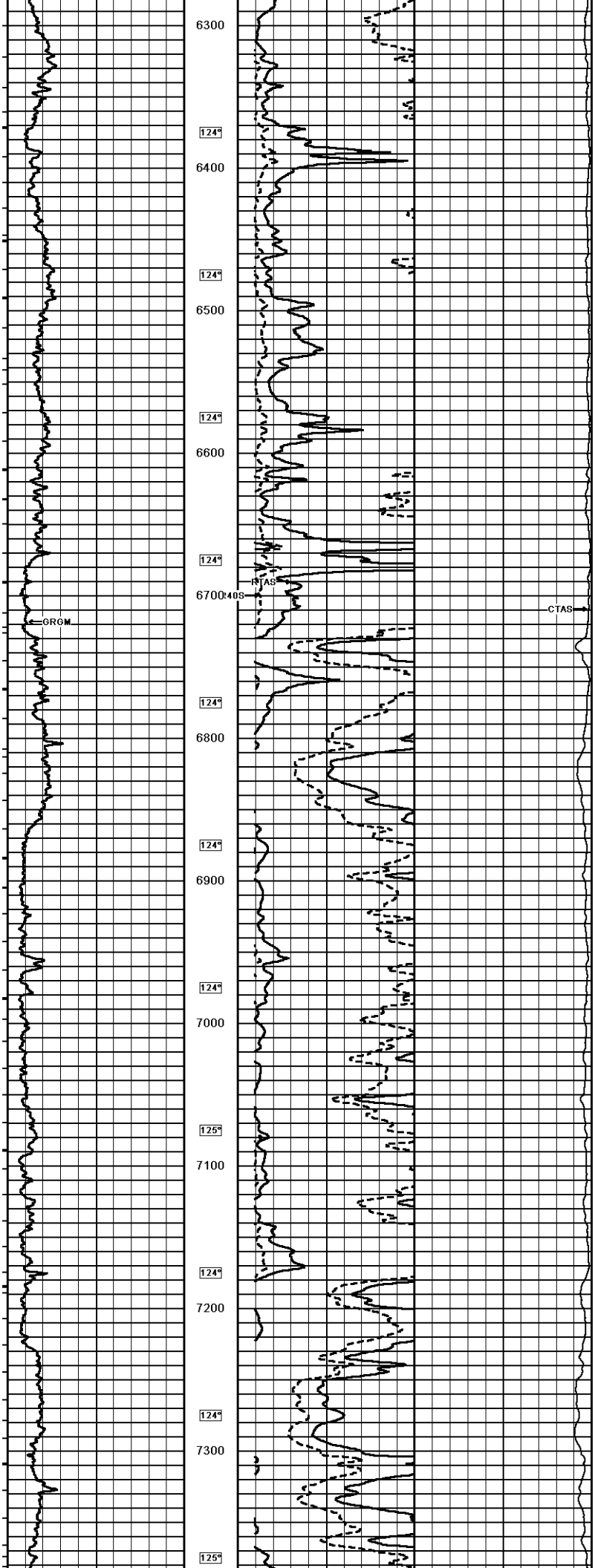
Elevation Kelly Bushing	2638.50	feet	First Reading	9735.00	feet
Elevation Drill Floor	2637.50	feet	Depth Driller	9803.00	feet
Elevation Ground Level	2618.00	feet	Depth Logger	9803.00	feet

Weatherford®

CML MESSENGER SHUTTLE
ARRAY INDUCTION

40 Years of Wireline 1970 2010

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6500
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124°
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40S
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7100
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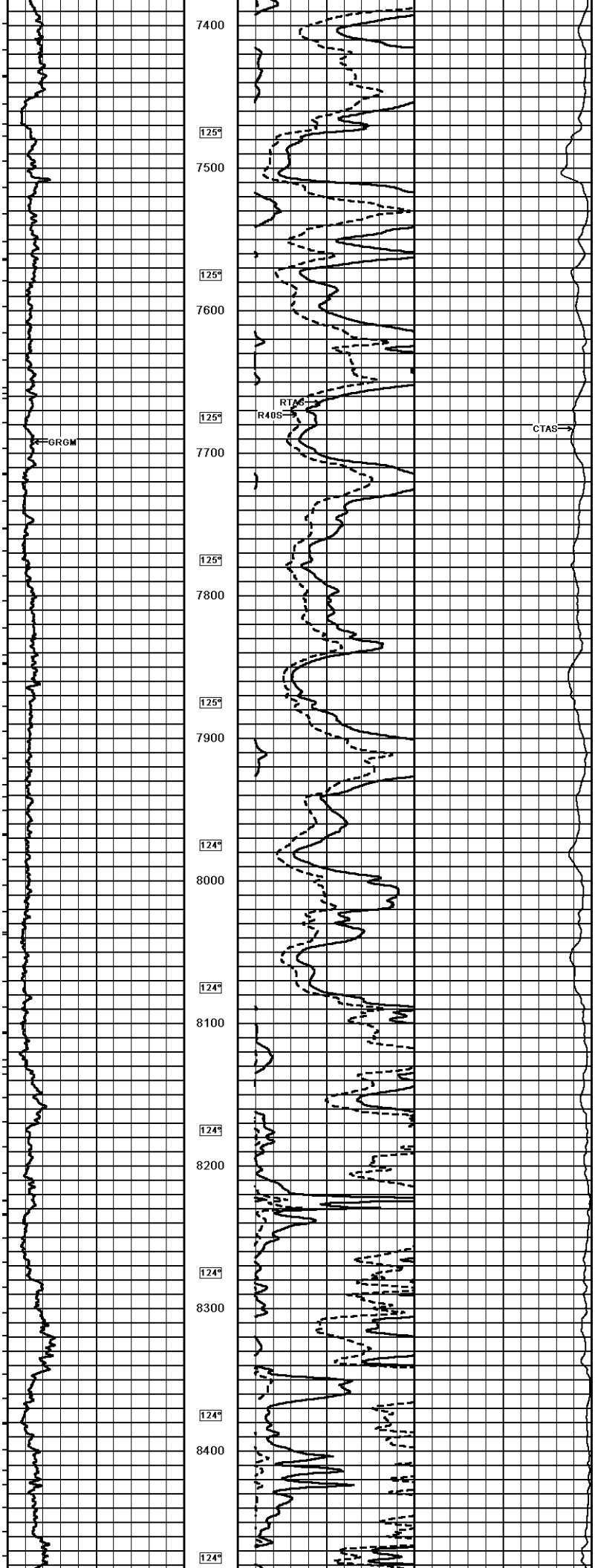
7200
124°
7300
125°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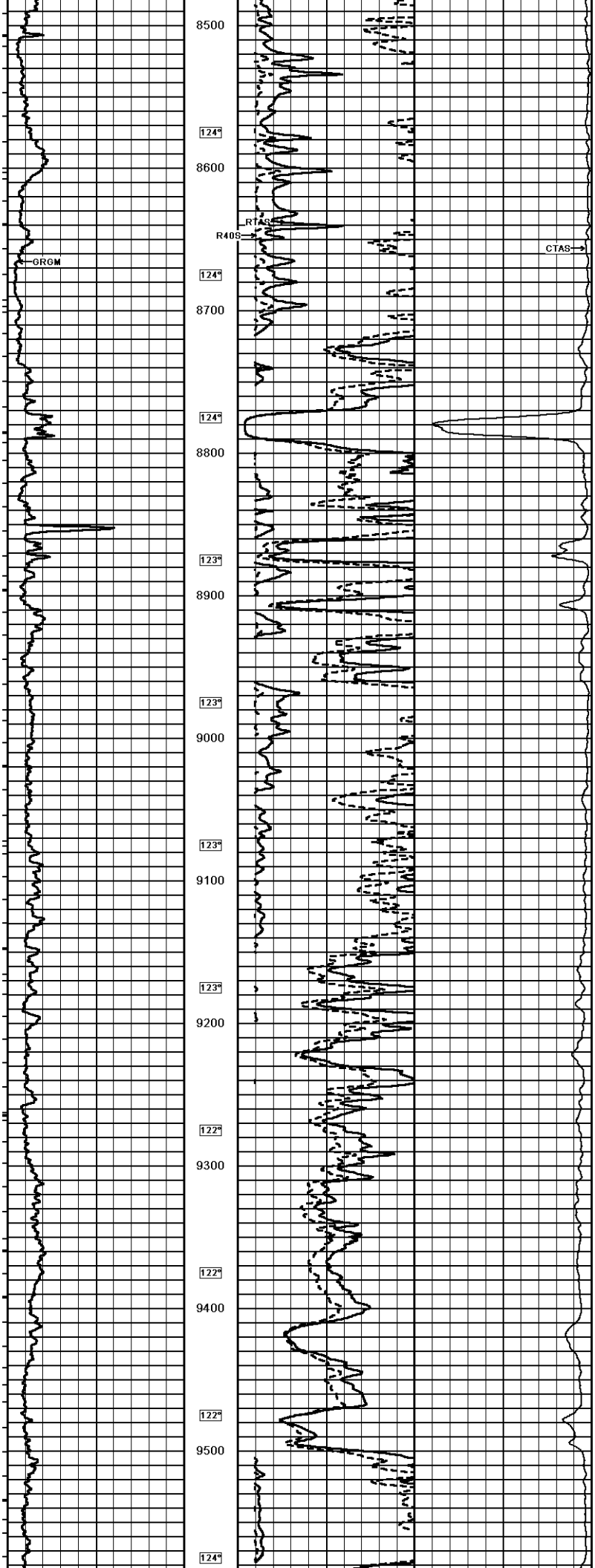
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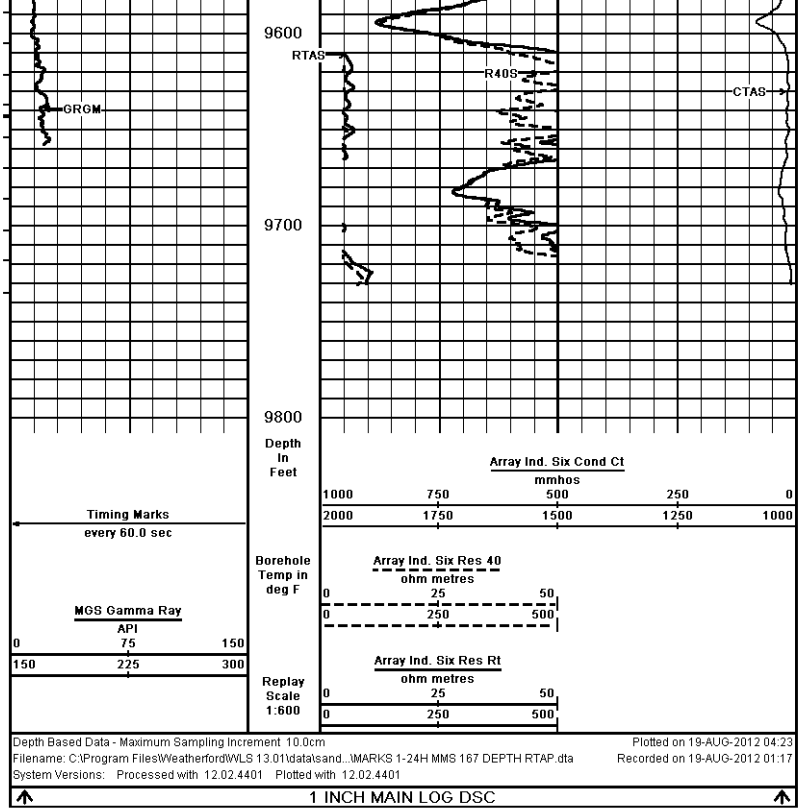

Depth Based Data - Maximum Sampling Increment 10.0cm — Plotted on 19-AUG-2012 04:23
Filename: C:\Program Files\Weatherford\WLS 13.01\data\sand...\MARKS 1-24H MMS 167 DEPTH RTAP.dta — Recorded on 19-AUG-2012 01:17
System Versions: Processed with 12.02.4401 Plotted with 12.02.4401

1 INCH MAIN LOG DSC

COMPANY	SANDRIDGE ENERGY
WELL	MARKS 1-24H
FIELD	MINNEOLA
PROVINCE/COUNTY	FORD
COUNTRY/STATE	U.S.A. / OKLAHOMA

Elevation Kelly Bushing	2638.50	feet	First Reading	9735.00	feet
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Weatherford

CML MESSENGER SHUTTLE
ARRAY INDUCTION