



DUAL INDUCTION LOG

Company RITCHEE EXPLORATION, INC.
 Well ZACHMAN AP NO.4
 Field STAR SOUTHEAST
 County ELLIS
 State KANSAS

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 County ELLIS State KANSAS

Location: API #: 15-051-26900-00-00
 800' FSL & 1735' FEL
 SEC 5 TWP 12S RGE 19W
 Permanent Datum GROUND LEVEL Elevation 2155'
 Log Measured From KELLY BUSHING
 Drilling Measured From KELLY BUSHING
 Other Services CNL/CDL MEL
 Elevation K.B. 2163'
 D.F. N/A
 G.L. 2155'

Date	12/14/2017
Run Number	ONE
Depth Driller	3800'
Depth Logger	3796'
Bottom Logged Interval	3795'
Top Log Interval	200'
Casing Driller	8.625" @ 220'
Casing Logger	218'
Bit Size	7.875"
Type Fluid in Hole	CHEMICAL
Salinity, ppm CL	3000
Density / Viscosity	9.2 55
pH / Fluid Loss	10.5 7.2
Source of Sample	FLOWLINE
Rm @ Meas. Temp	.85 @ 58
Rmt @ Meas. Temp	.64 @ 58
Rmc @ Meas. Temp	1.15 @ 58
Source of Rmf / Rmc	CHARTS
Rm @ BHT	.43 @ 114
Operating Rig Time	2 HOURS
Max Rec. Temp. F	114 DEGF
Equipment Number	108
Location	HAYS
Recorded By	J. HENRICKSON
Witnessed By	MAX LOVELY

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All interpretations are opinions based on inferences from electrical or other measurements and Pioneer Wireline Services, LLC cannot and does not guarantee the accuracy or correctness of any interpretation, and Pioneer Wireline Services, LLC will not 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.

Comments

N/A DENOTES NOT AVAILABLE OR NON-APPLICABLE.

HAYS KANSAS
 NORTH TO BUCKEYE ROAD, 7 WEST TO 180 RD, 2 NORTH
 1/3 WEST, NORTH INTO

Log Measured From: KELLY BUSHING 8 Ft. Above Permanent Datum

THANK YOU FOR USING PIONEER ENERGY SERVICES
www.pioneerenergy.com 785-625-3858

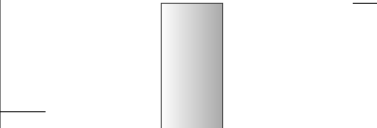
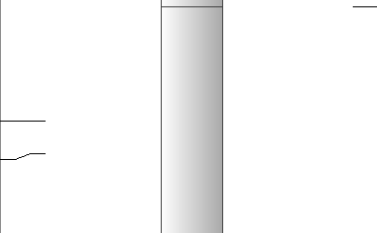
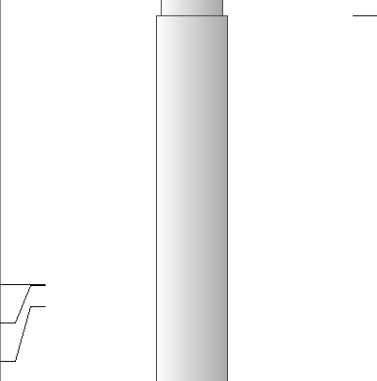
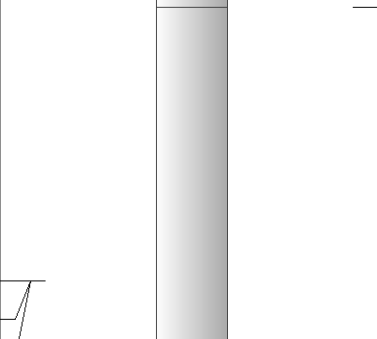
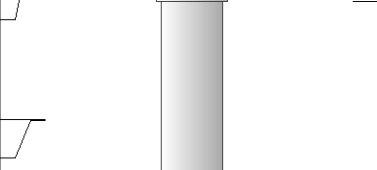
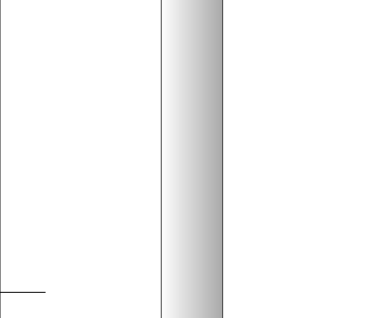
Your Pioneer Energy Services Crew Engineer: J. HENRICKSON Operator: Operator: Operator:	This Log Record Was Witnessed By Primary Witness: MAX LOVELY Secondary Witness: Secondary Witness: Secondary Witness:
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Log Variables

DatabaseC:\ProgramData\Warrior\Data\ritchie_zachman_ap_4.db
 Dataset field/well/stackml/pass3.1/_vars_

Top - Bottom

A	BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	FLUIDDEN g/cc	M	MATRXDEN g/cc
1	7.875	114	4.5	0	1	2	2.71
NPORSEL	PERFS	SNDERR mmho/m	SNDERRM mmho/m	SPSHIFT mV	SRFTEMP degF	SZCOR	TDEPTH ft
Limestone	0	0	0	-365	52	Off	3796

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
GR	40.58		GR-M&W (89-M&W)	3.00	3.50	50.00
CNLSC CNSSC	37.48 36.73		CNT-M&W (tk10-MW)	5.50	3.50	100.00
LSD DCAL SSD	28.43 28.42 27.93		CDL-M&W (168-986)	8.50	4.00	250.00
MCAL MI MN	19.83 19.83 19.83		ML-PSI STKBL ML (PSI-02) Stackable Microlog Tools	7.58	4.00	65.00
RLL3 RLL3F	15.80 15.79					
CILD	8.00		DIL-M&W (PSI 978)	18.50	3.50	220.00

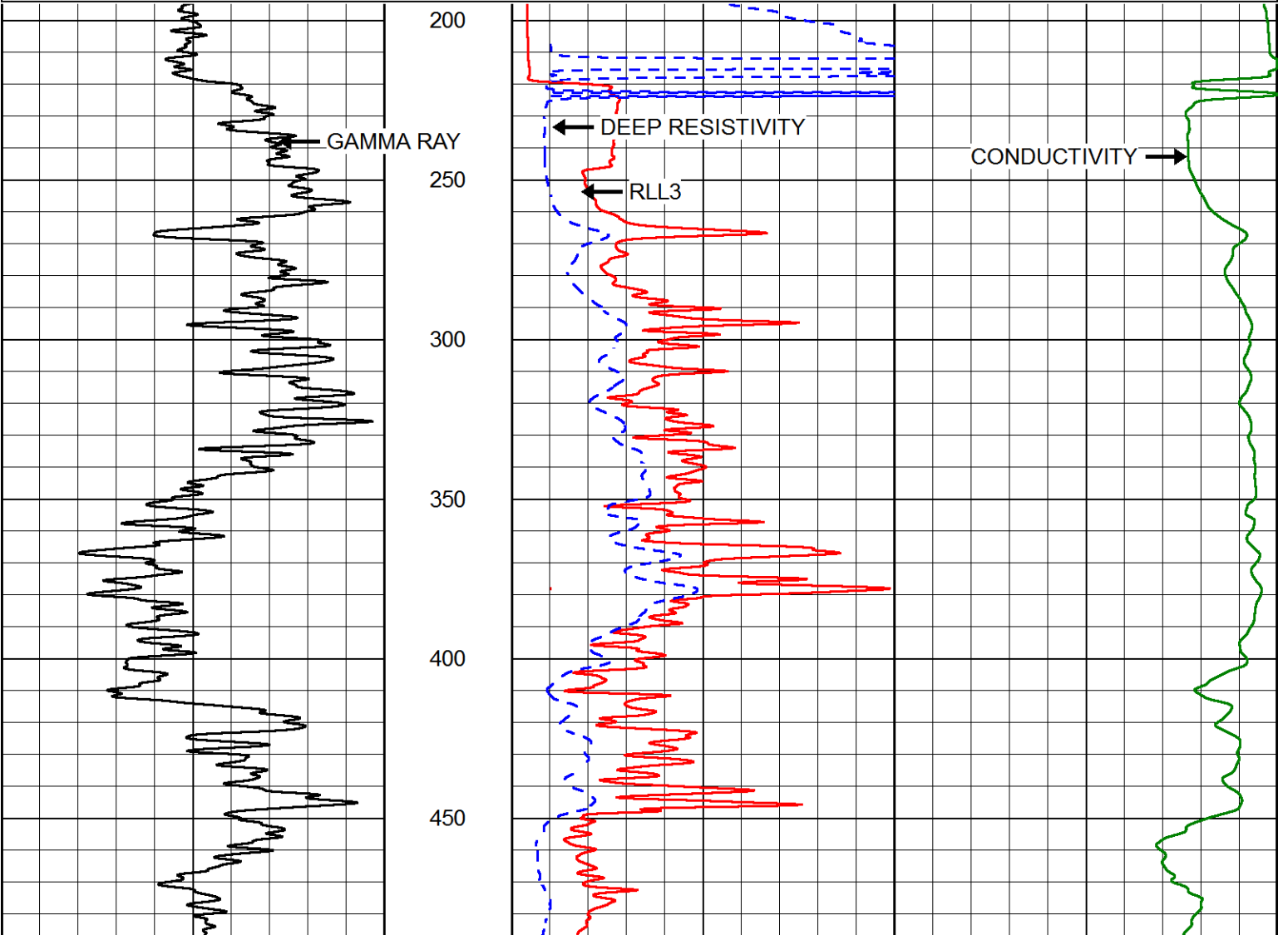
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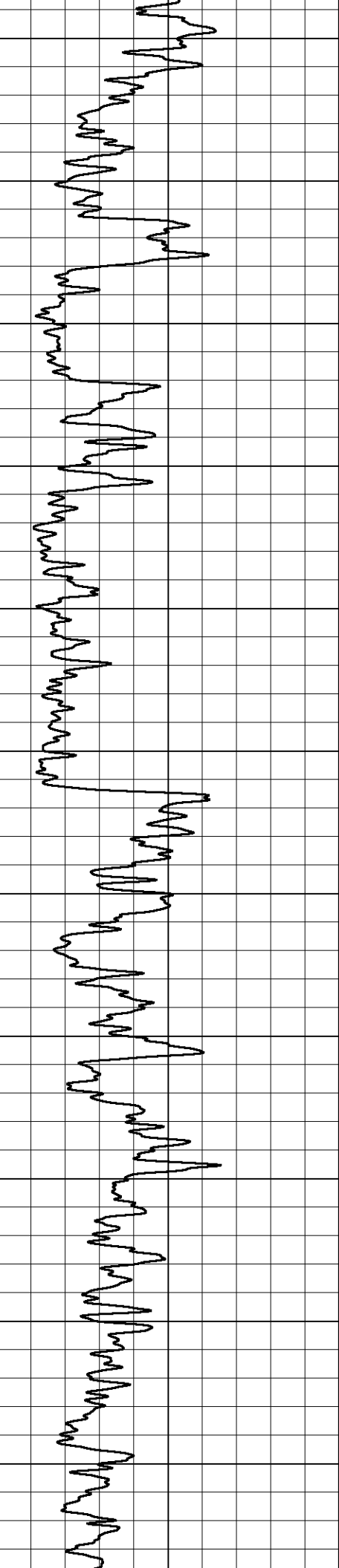
SP 0.20

Dataset: ritchie_zachman_ap_4.db: field/well/stackml/pass3.1
 Total length: 43.08 ft
 Total weight: 685.00 lb
 O.D.: 4.00 in

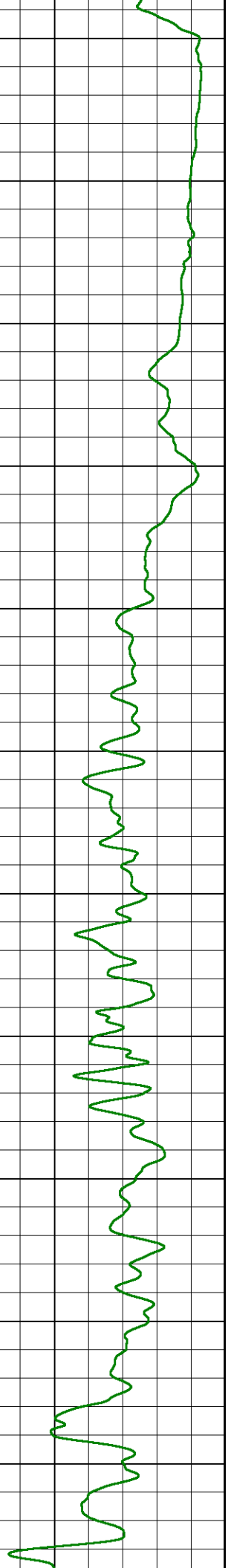
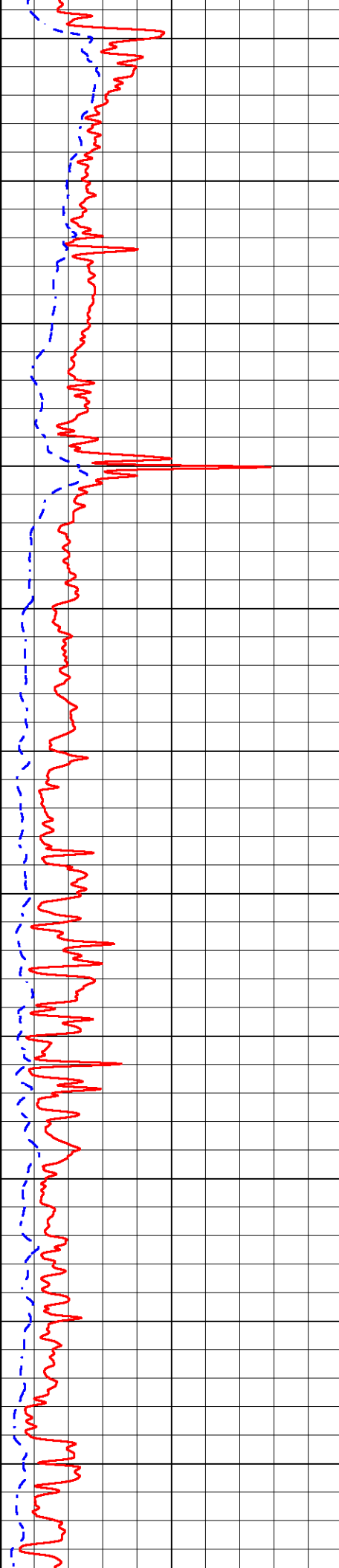
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 Presentation Format dil2in
 Dataset Creation Thu Dec 14 16:53:38 2017
 Charted by Depth in Feet scaled 1:600

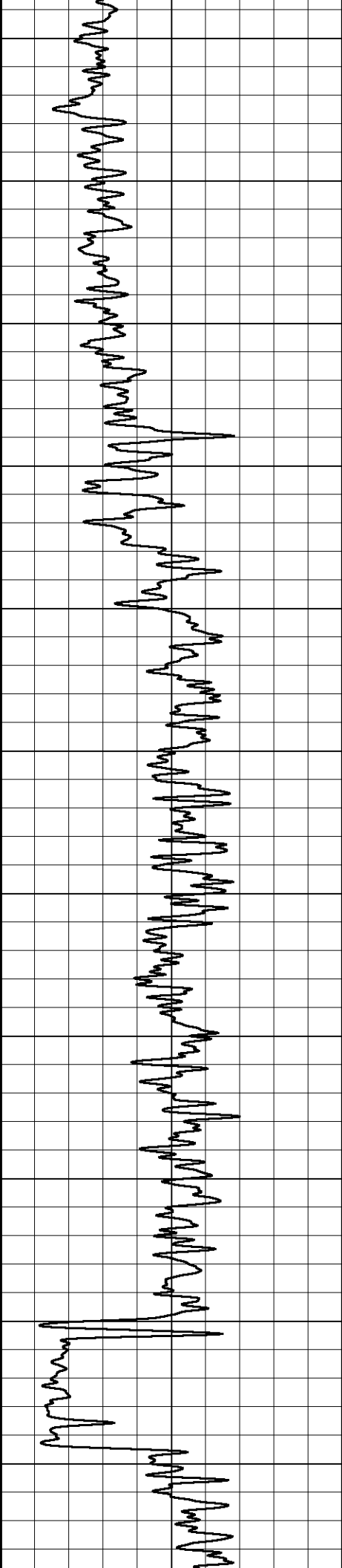
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0			0	RLL3 (Ohm-m)	50
0			0	DEEP RESISTIVITY (Ohm-m)	50
			50	RLL3 (Ohm-m)	500
			50	DEEP RESISTIVITY (Ohm-m)	500



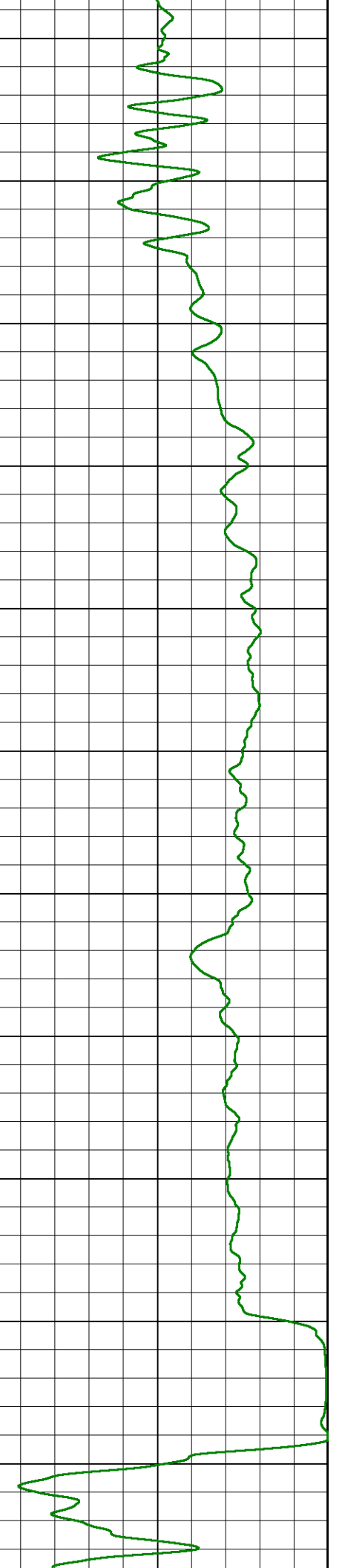
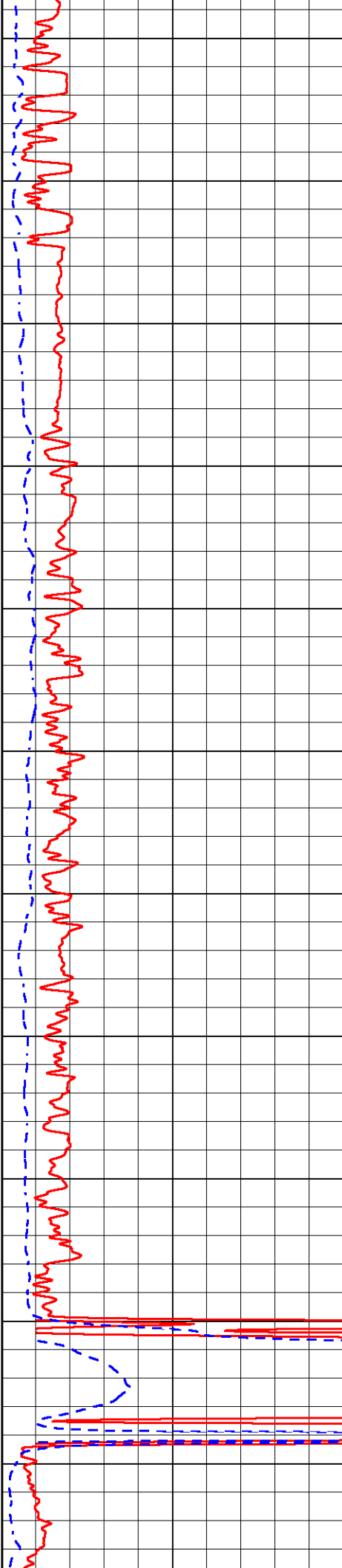


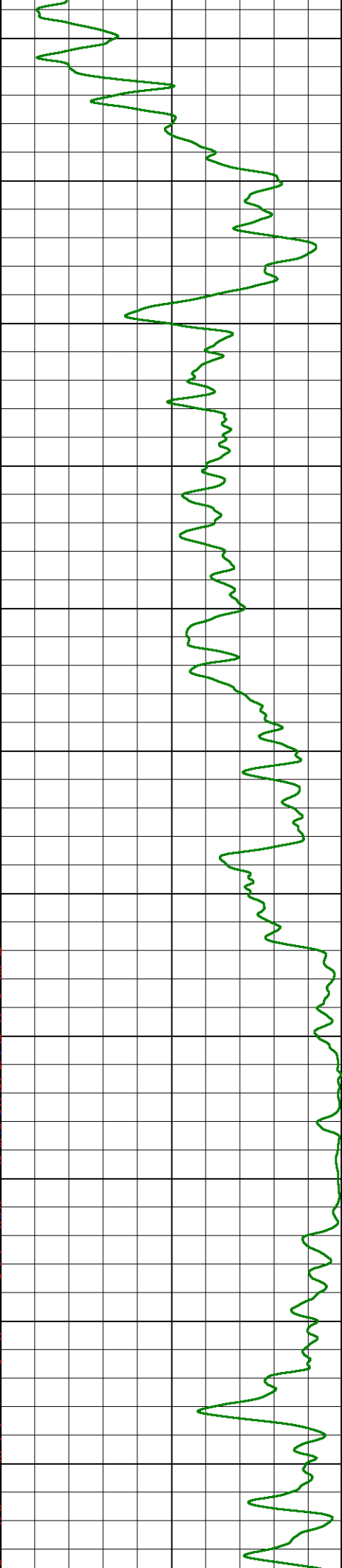
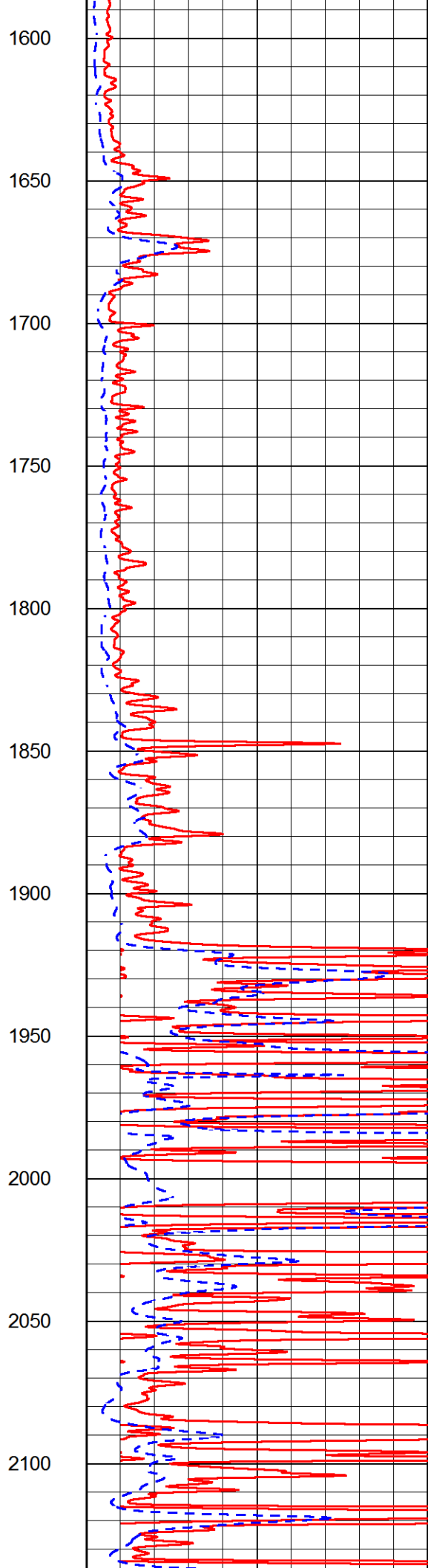
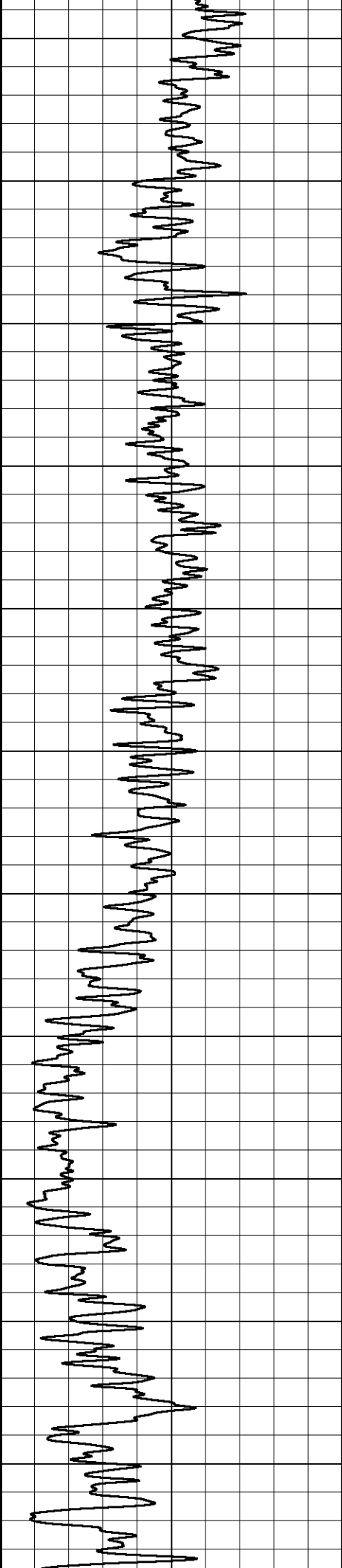
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900
950
1000

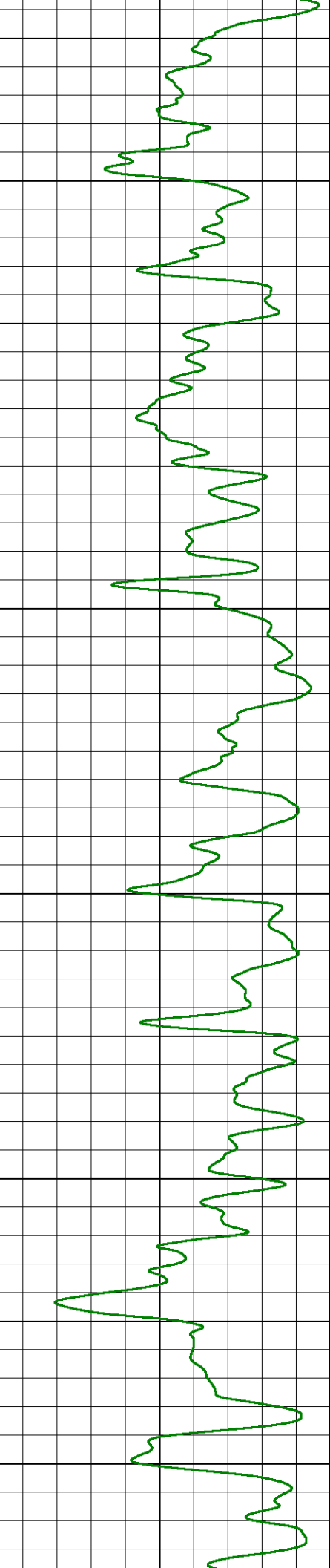
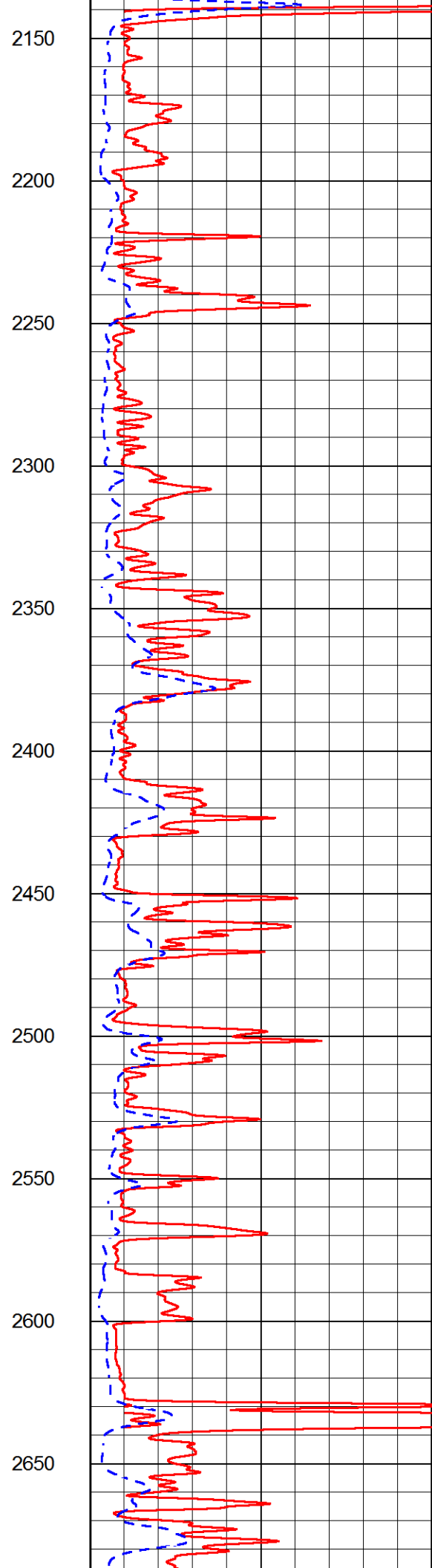
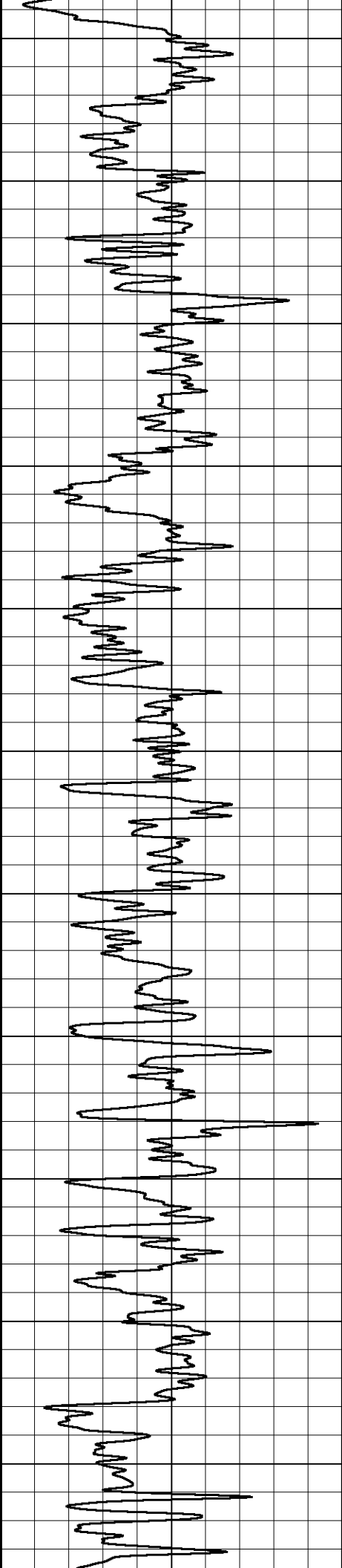


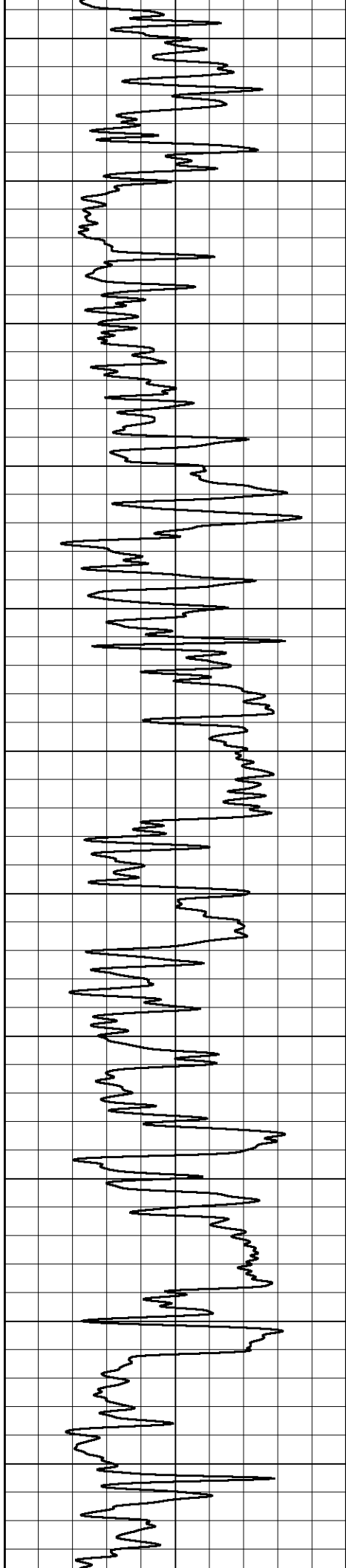


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1550

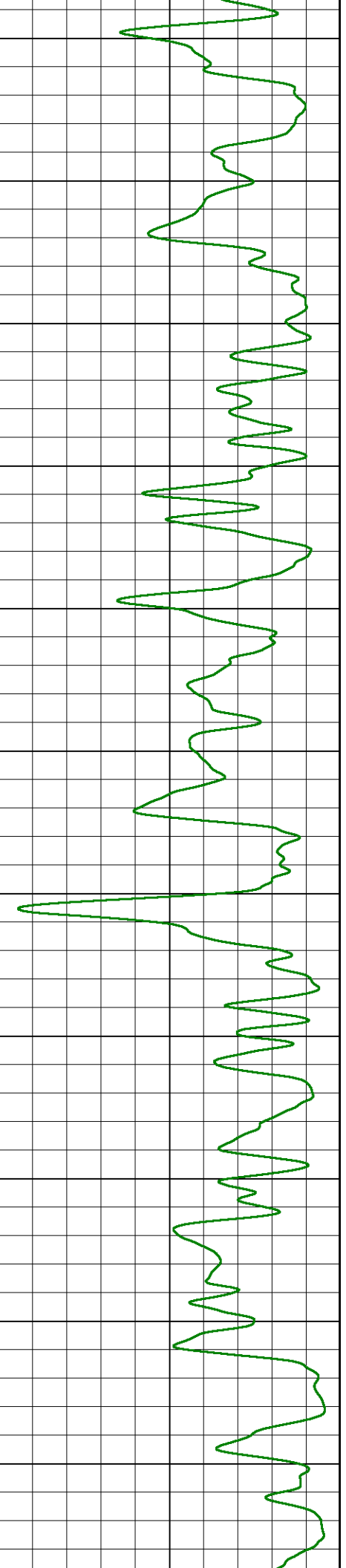
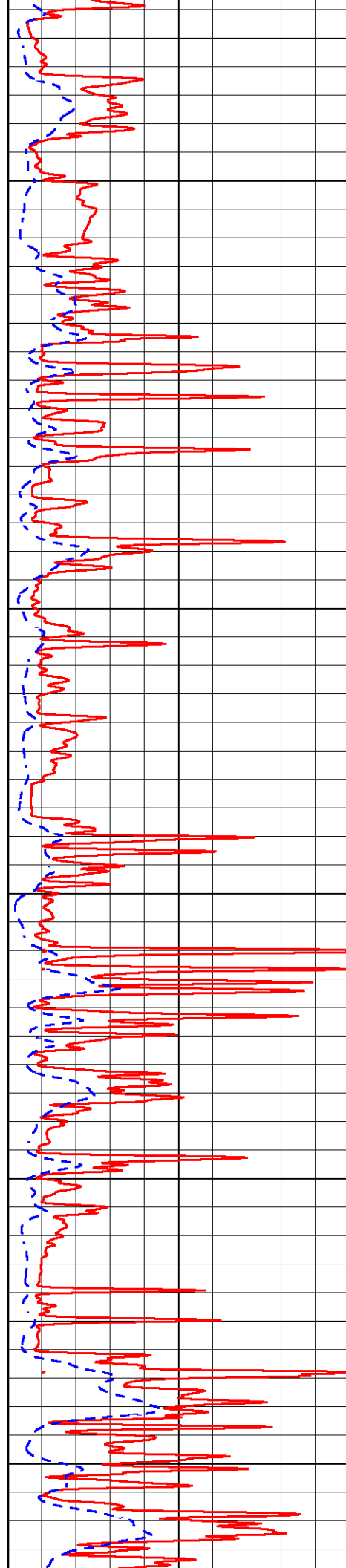


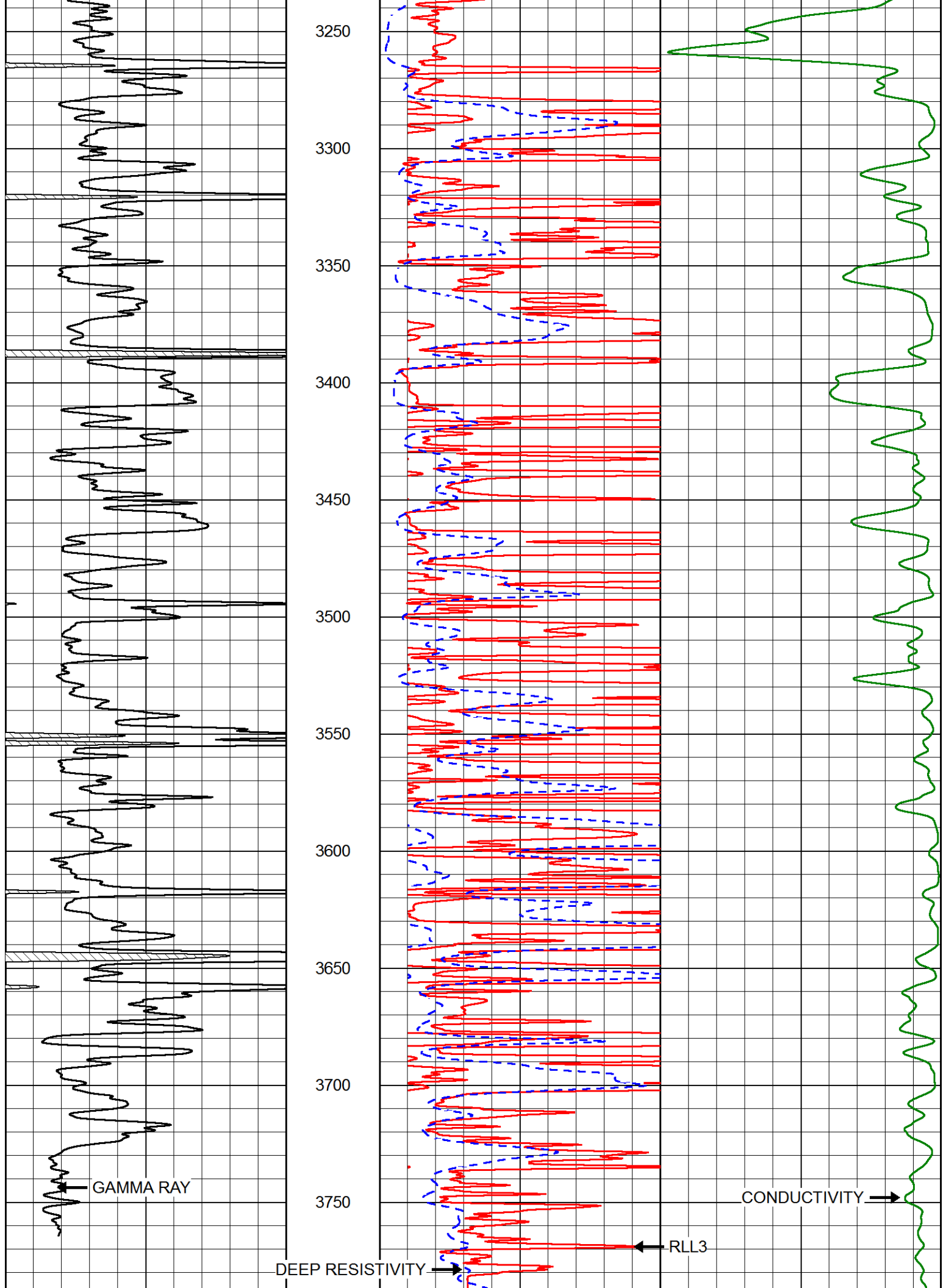


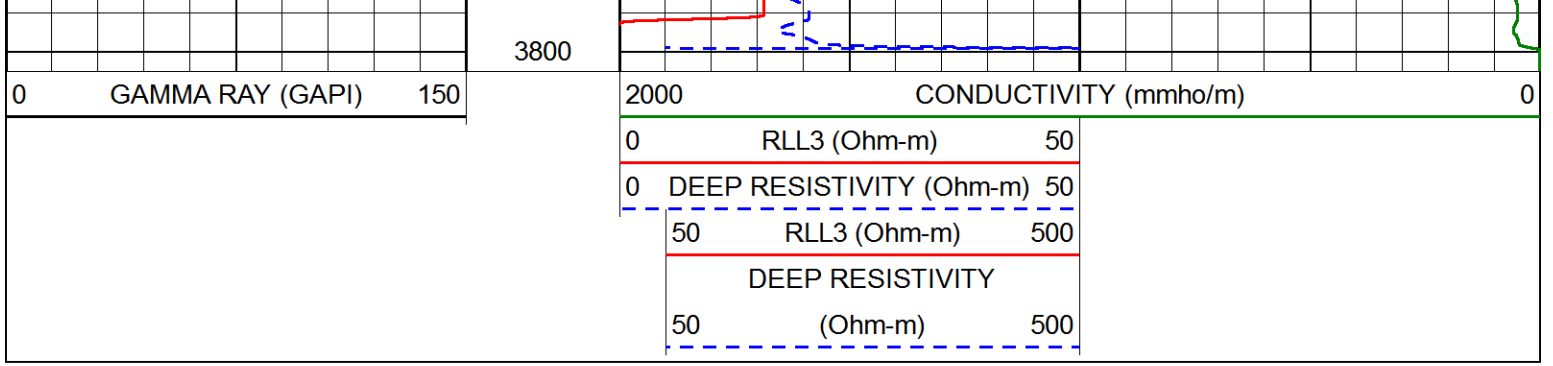




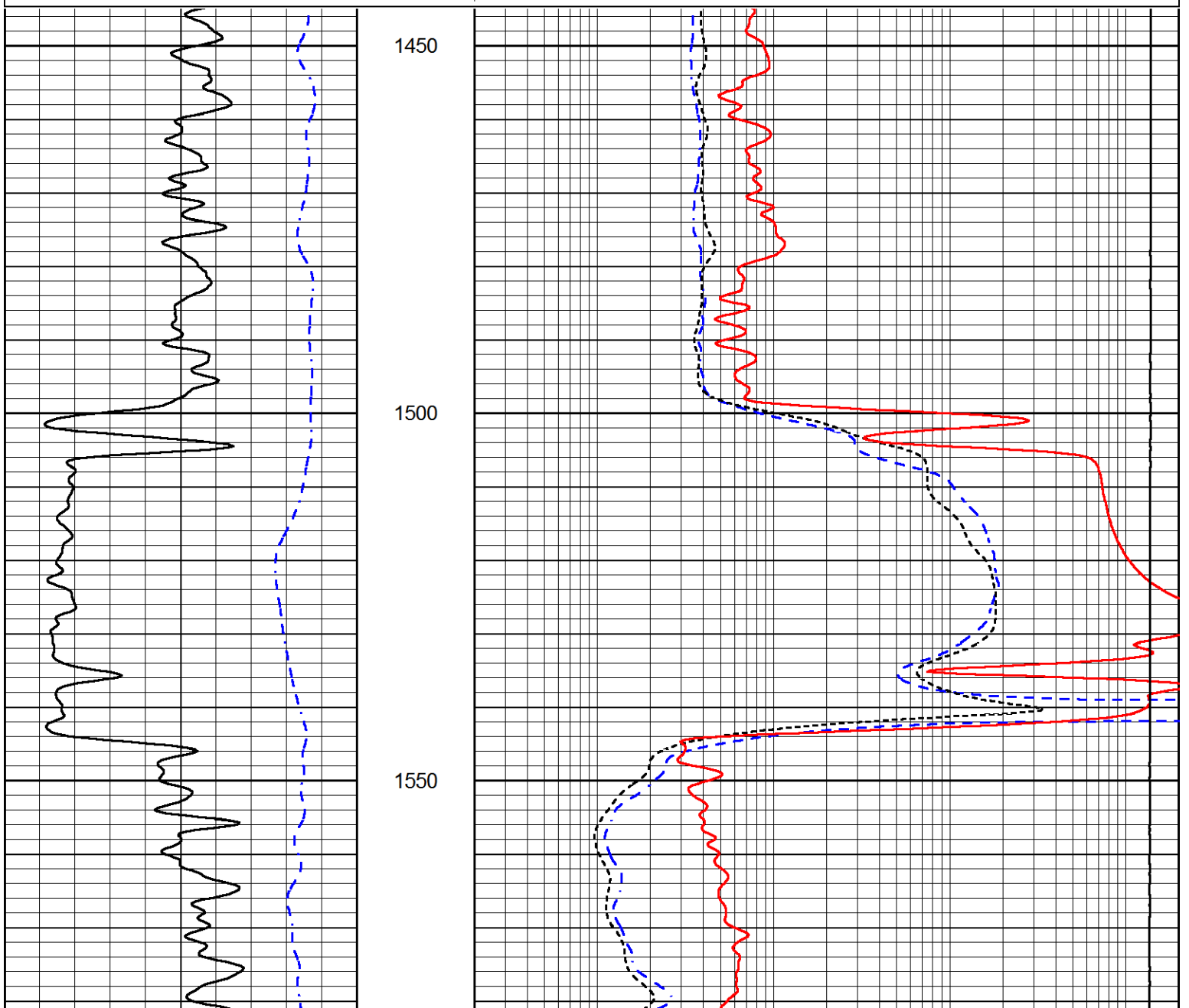
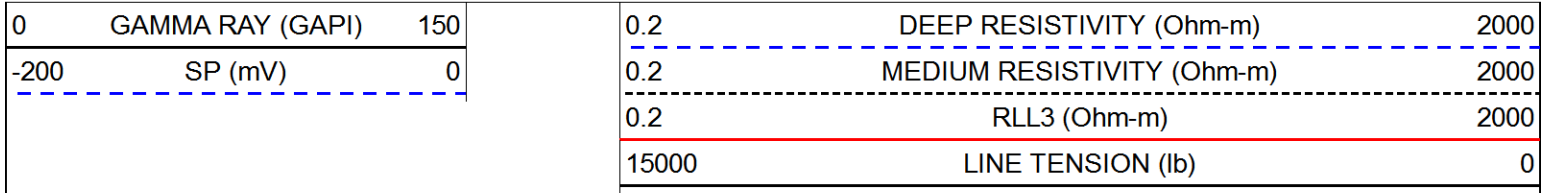
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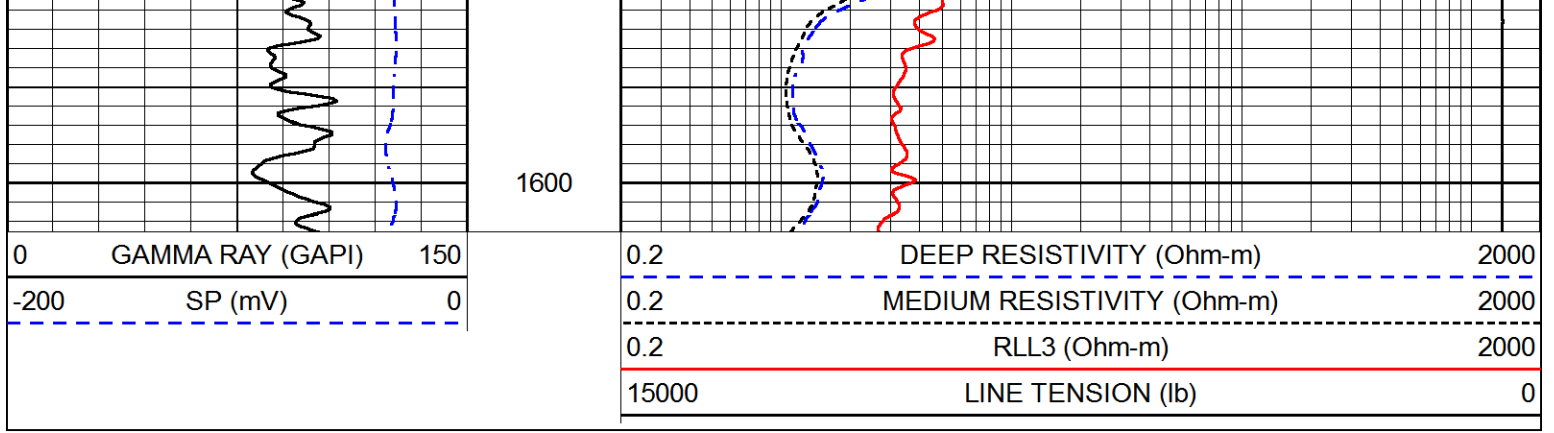




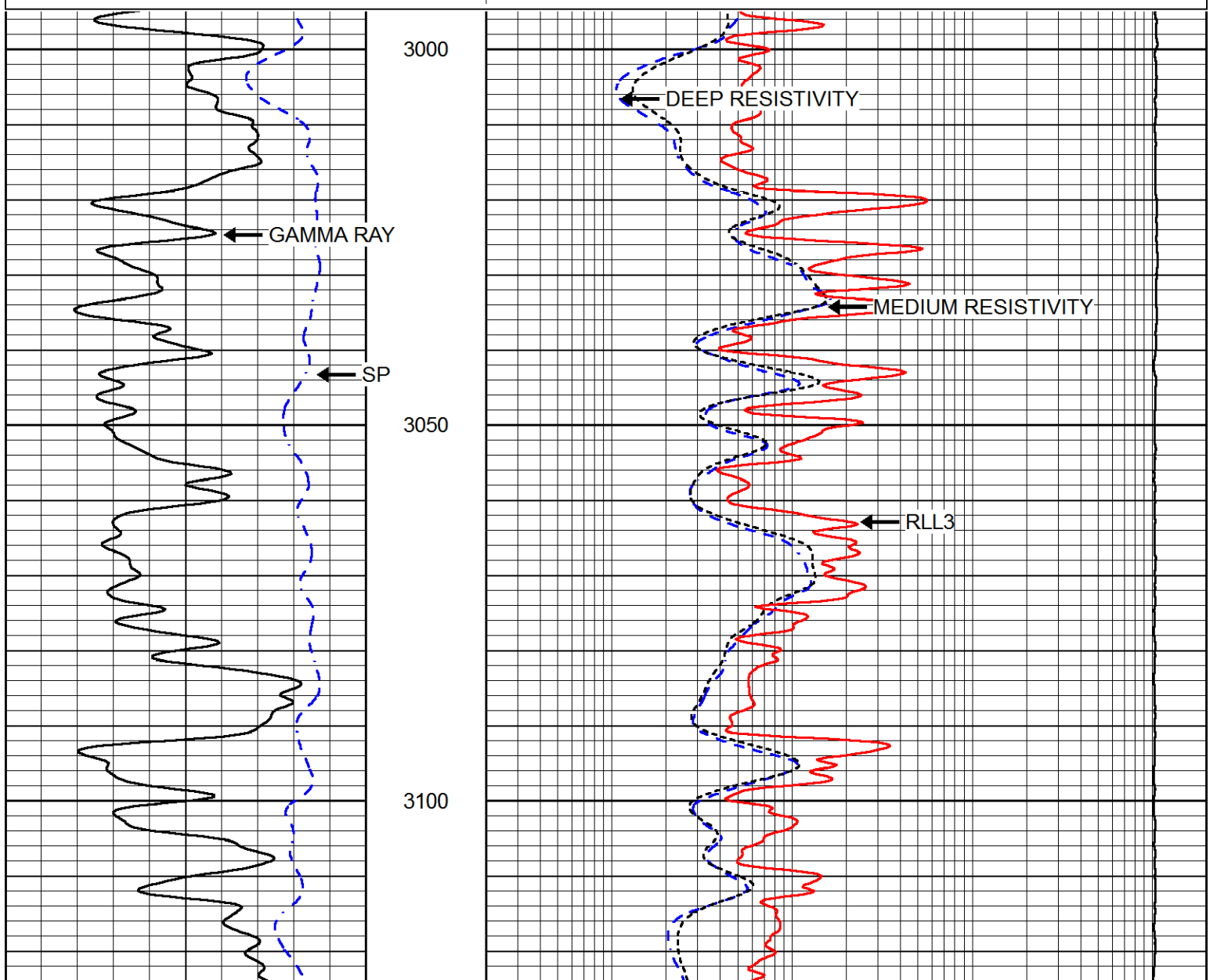
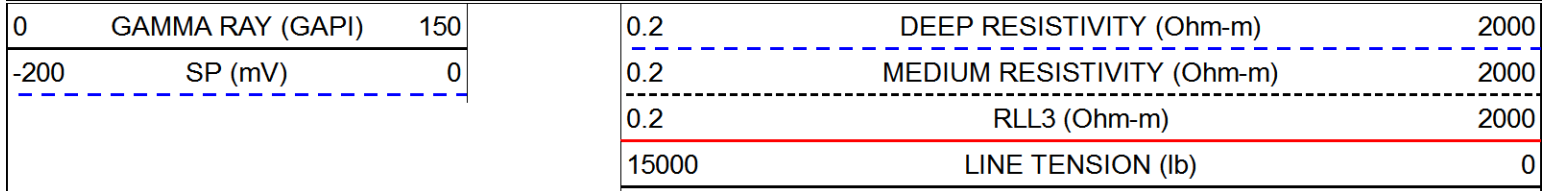


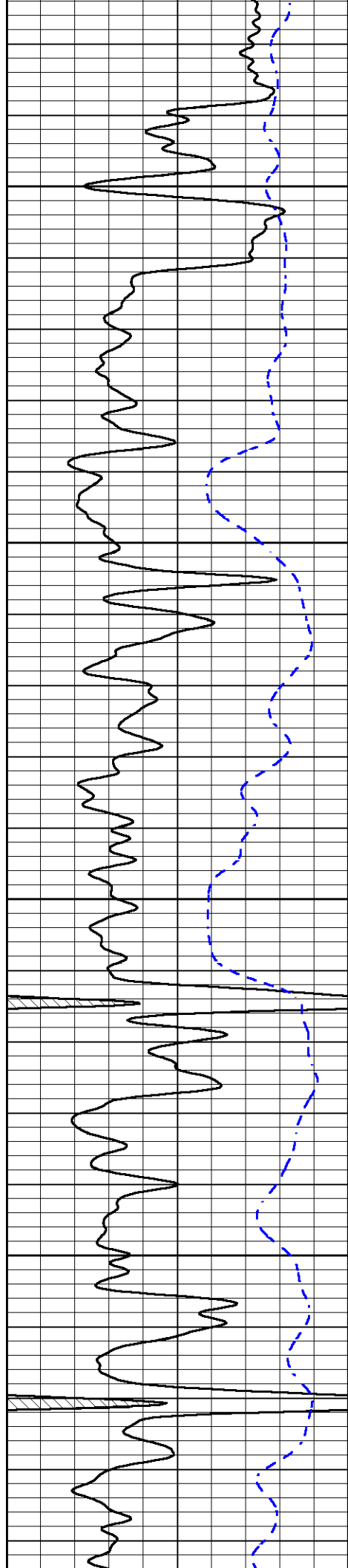
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Dataset Pathname	stackml/pass3.1
Presentation Format	dil
Dataset Creation	Thu Dec 14 16:53:38 2017
Charted by	Depth in Feet scaled 1:240





Database File ritchie_zachman_ap_4.db
 Dataset Pathname stackml/pass3.1
 Presentation Format dil
 Dataset Creation Thu Dec 14 16:53:38 2017
 Charted by Depth in Feet scaled 1:240



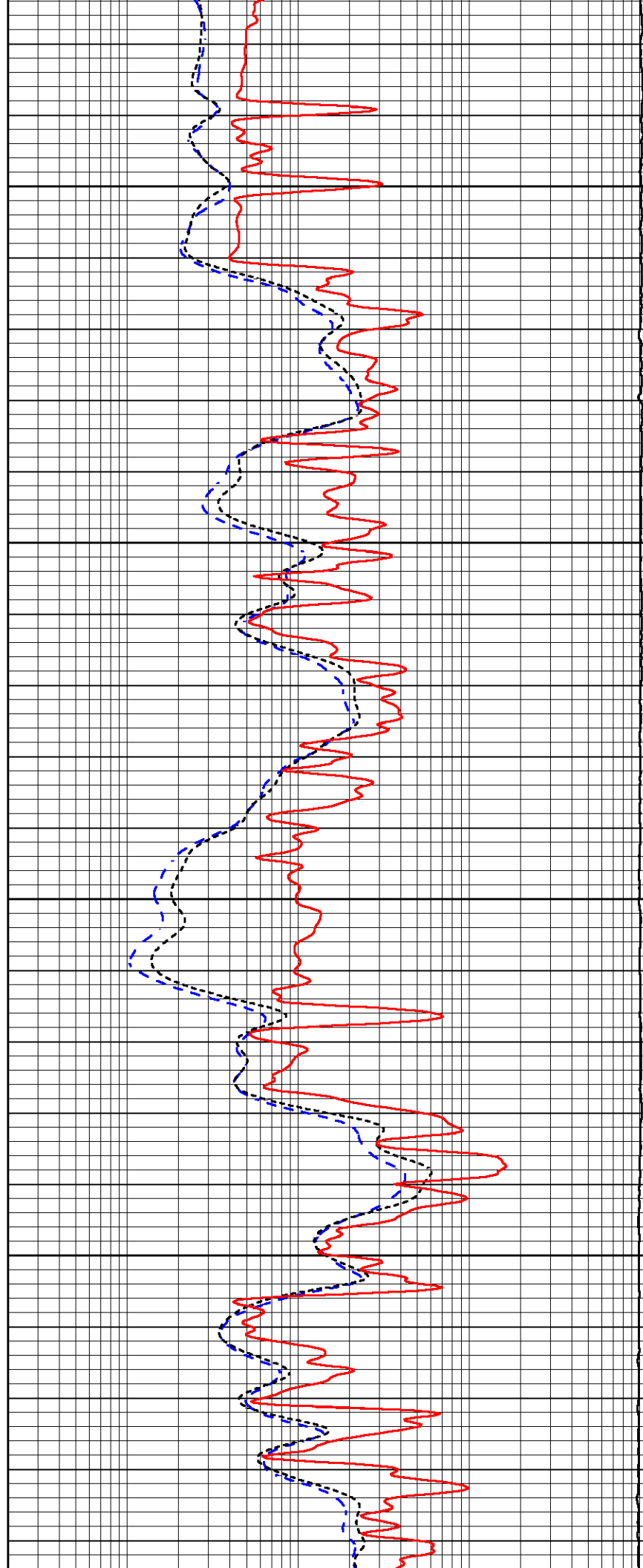


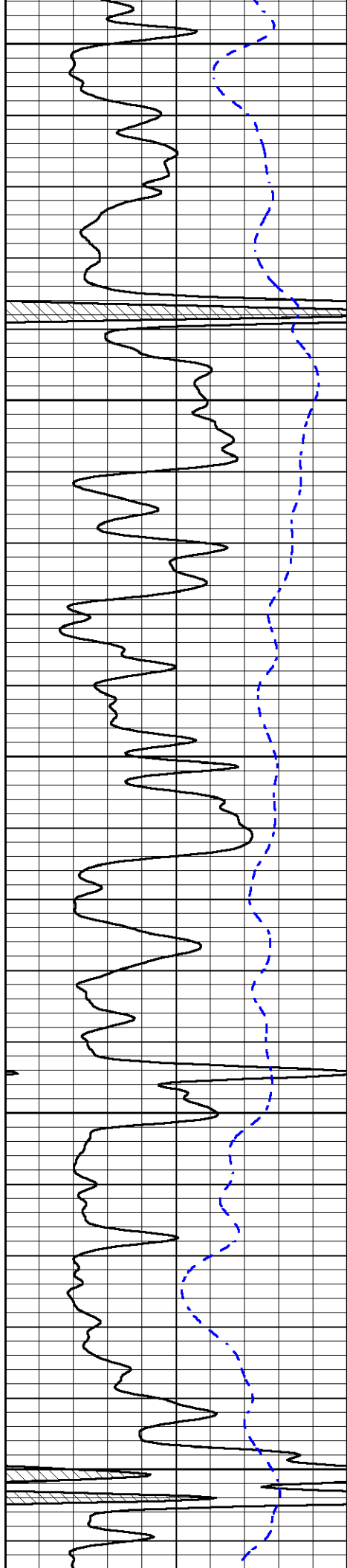
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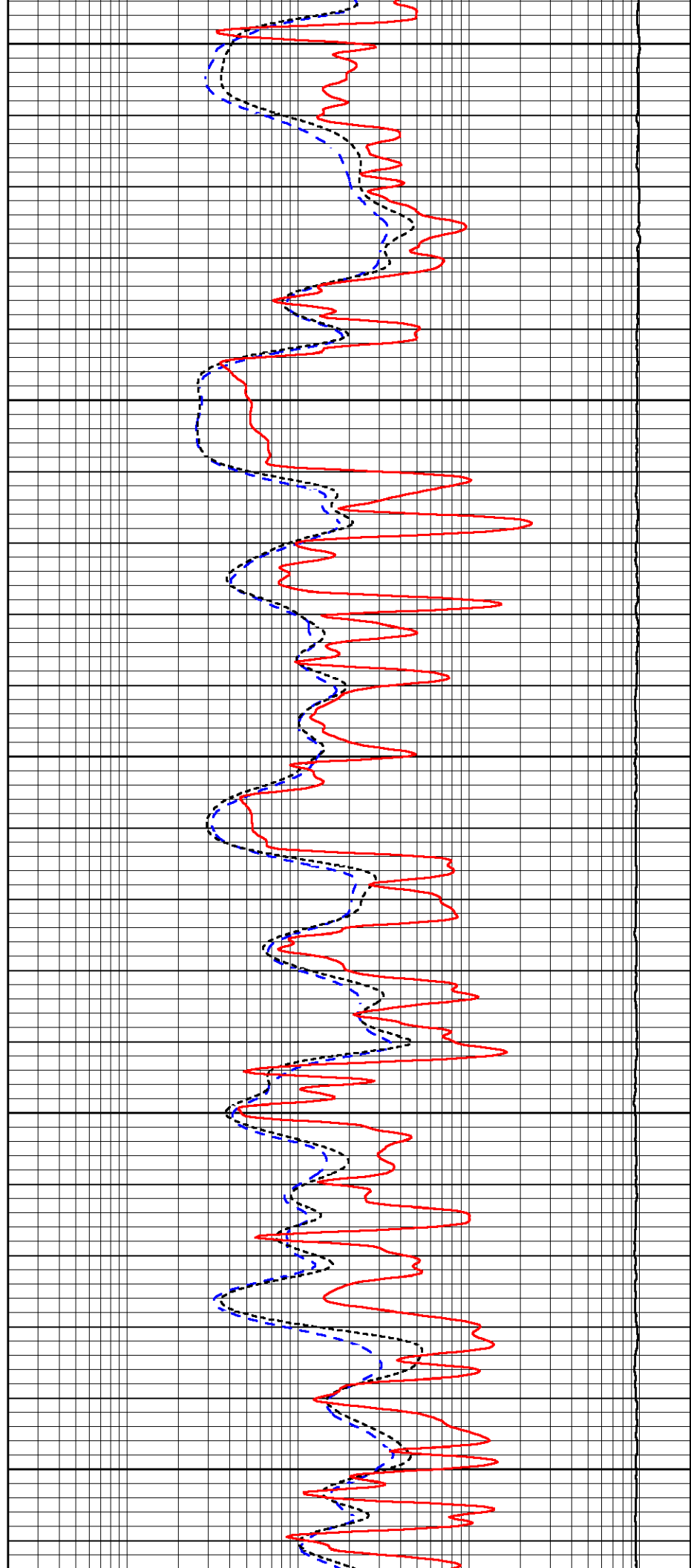
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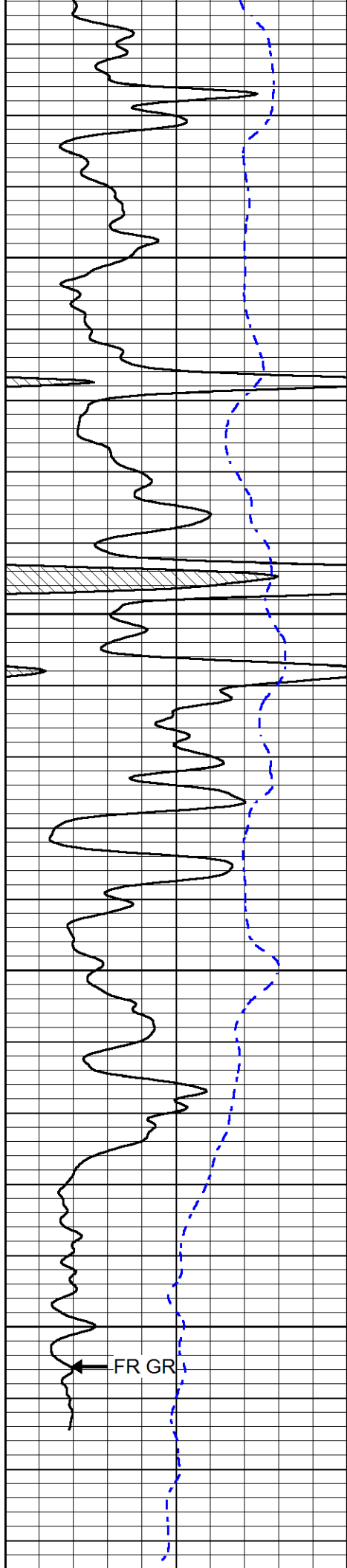
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3500

3550



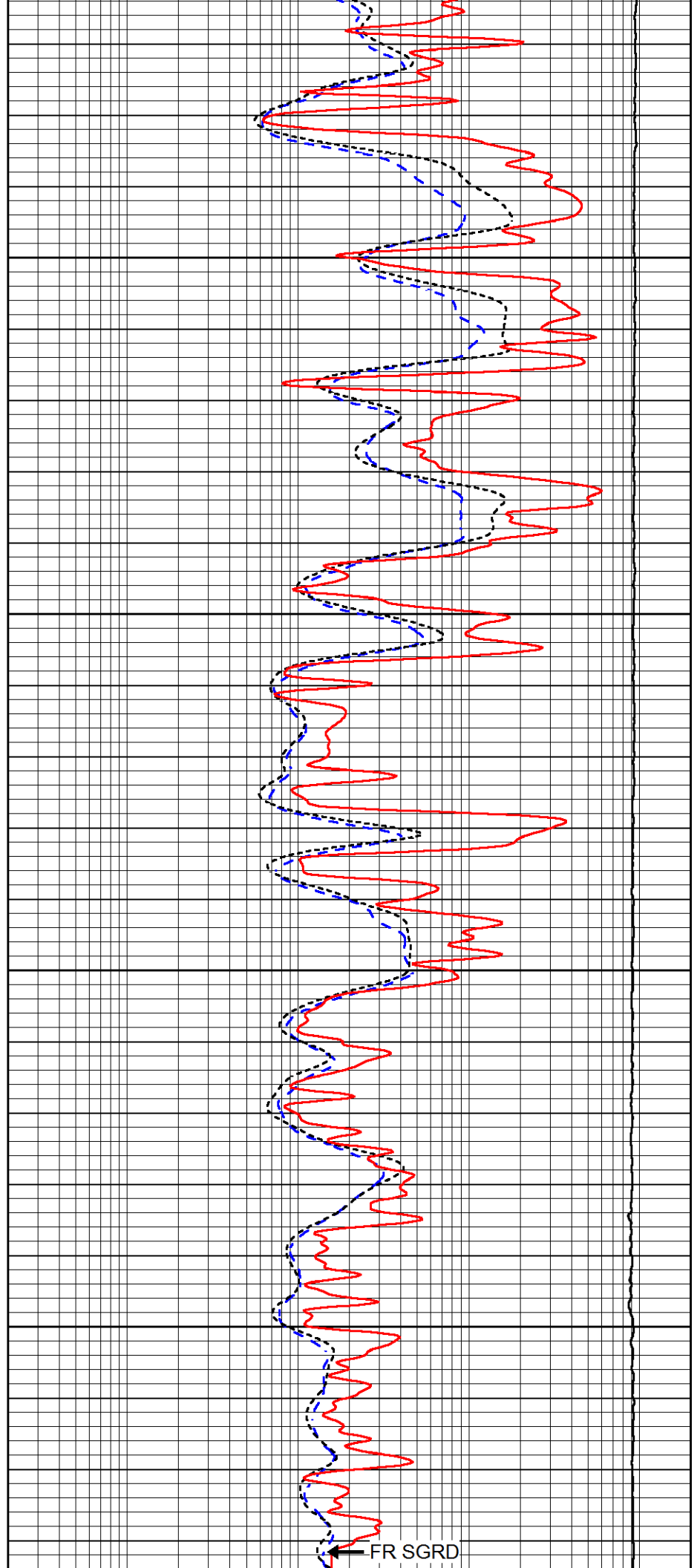


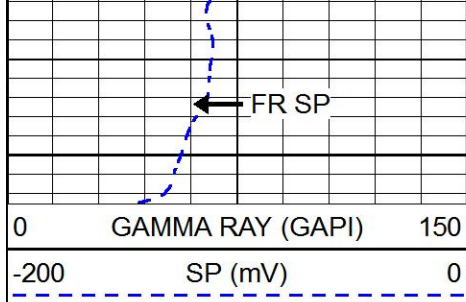
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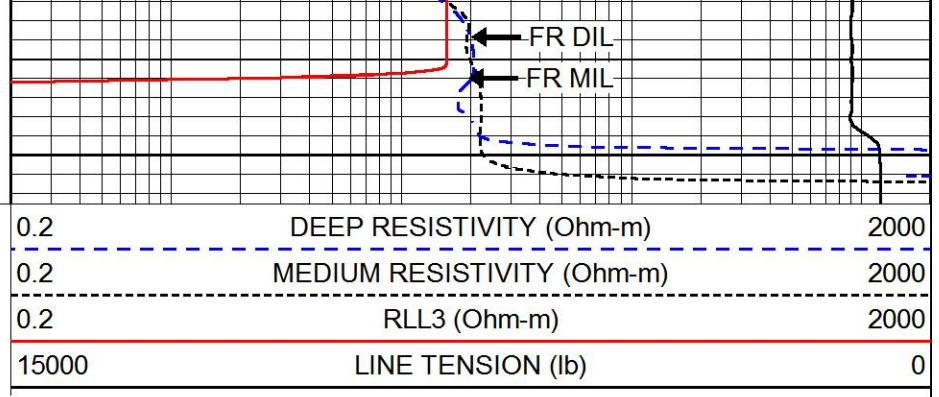
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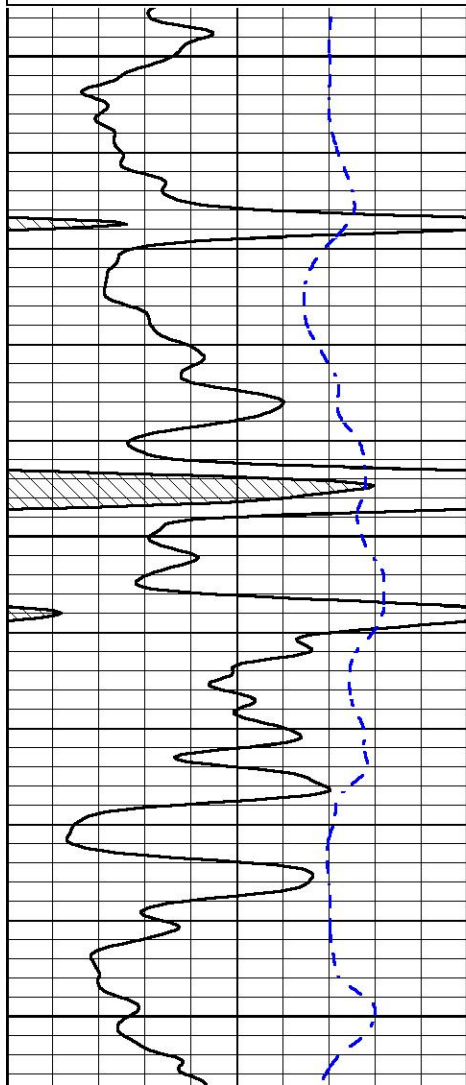
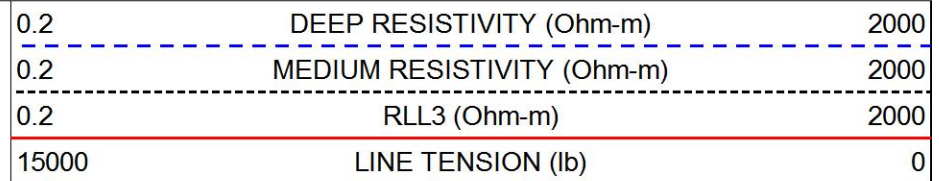
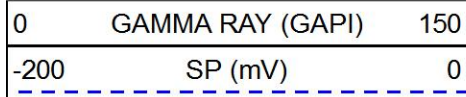


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REPEAT SECTION

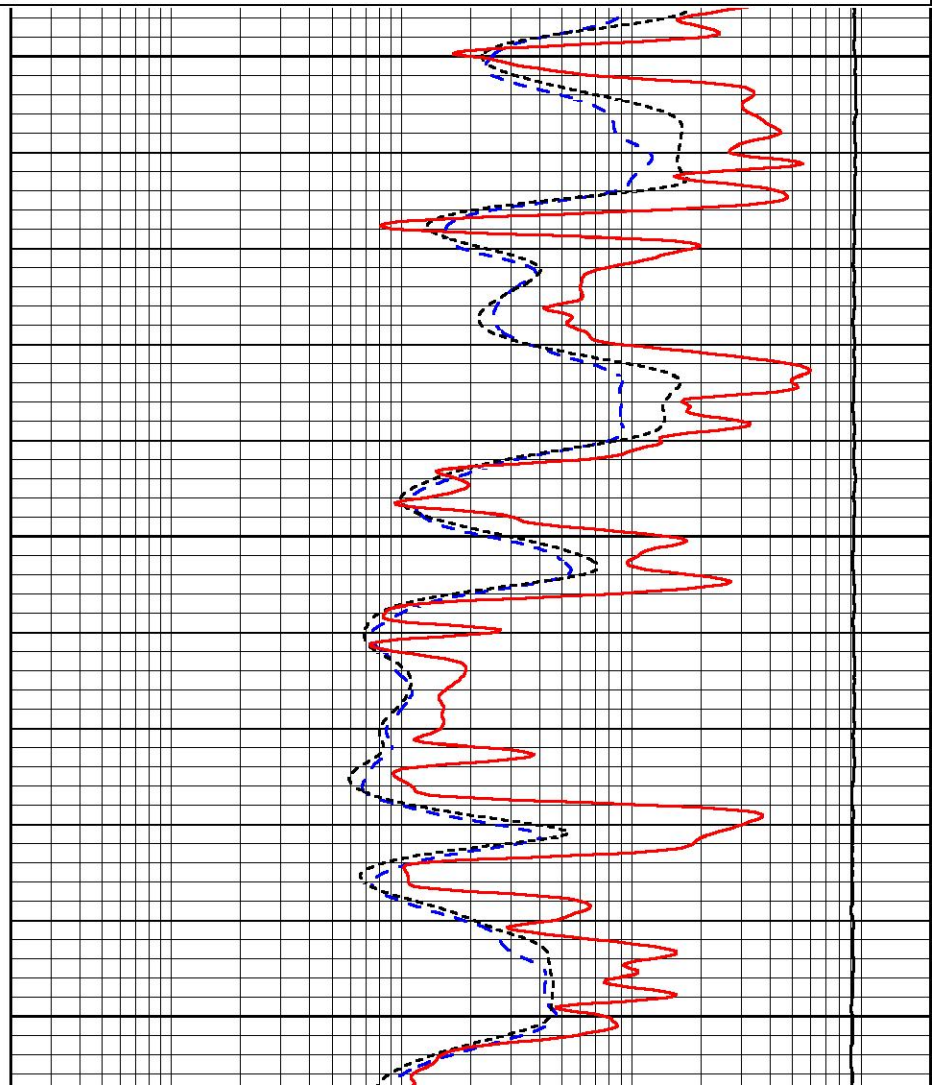
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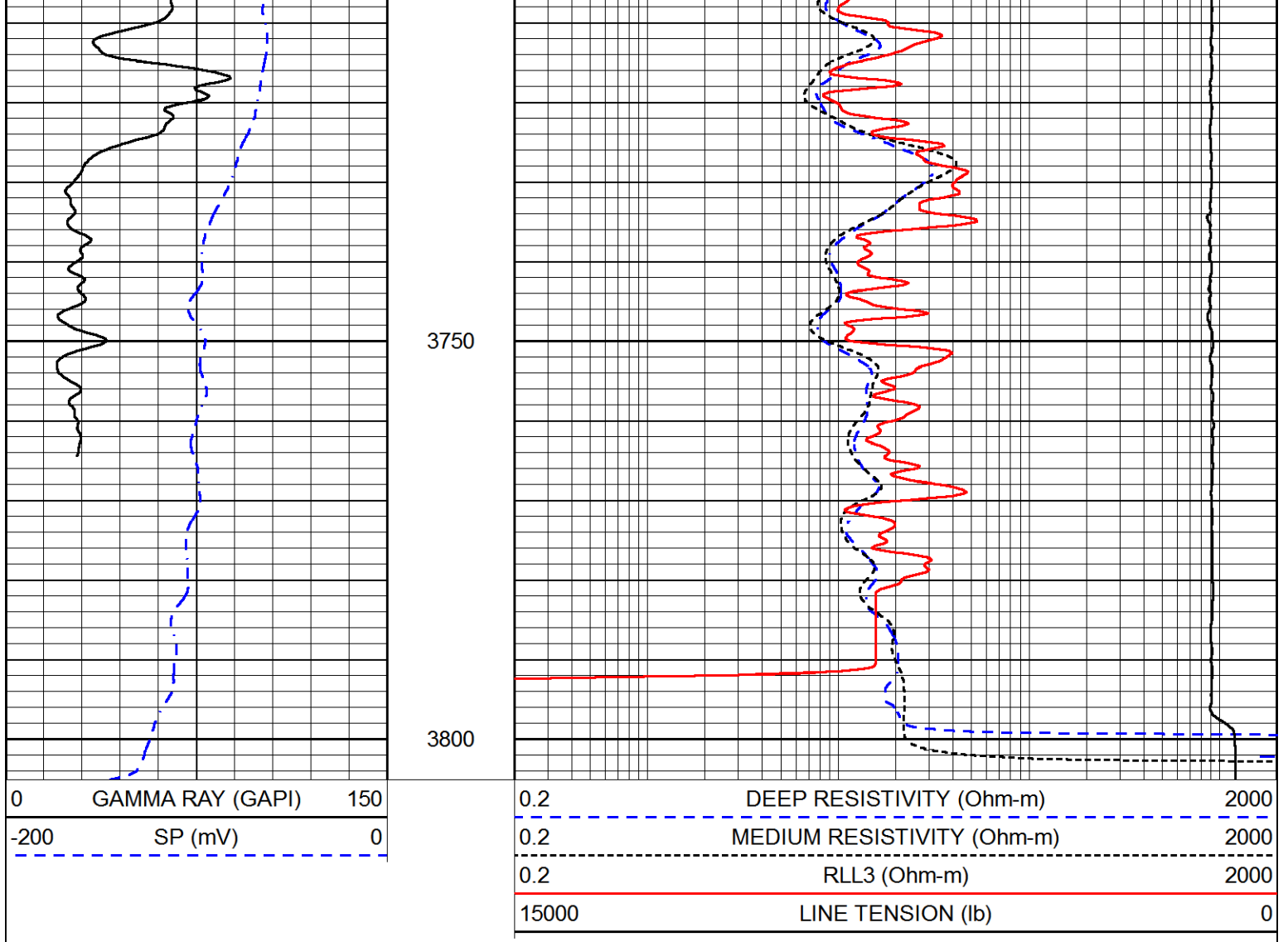


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3650

3700





Calibration Report

Database File ritchie_zachman_ap_4.db
 Dataset Pathname stackml/pass3.1
 Dataset Creation Thu Dec 14 16:53:38 2017

Dual Induction Calibration Report

Serial-Model: PSI 978-M&W
 Calibration Performed: Wed Dec 13 12:45:09 2017

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop	mmho/m	Gain	Offset
Deep	178.615	710.235	0.000	255.800	mmho/m	0.570	-36.500
Medium	161.982	1441.110	0.000	255.800	mmho/m	0.420	-35.000

Microlog Calibration Report

Serial-Model: PSI-02-PSI STKBL ML
 Performed: Fri Jun 23 01:25:19 2017

	Readings		References			Results	
	Zero	Cal	Zero	Cal	Ohm-m	m	b
Normal	0.0031	0.0043	0.0000	10.0000	Ohm-m	12000.0000	-0.3000

Inverse	0.0000	0.0013	0.0000	10.0000	Ohm-m	12000.0000	0.0000
Caliper	1.0020	1.0834	5.5000	16.5000	in	135.1560	-131.3500

Compensated Density Calibration Report

Serial-Model:	168-986-M&W
Source / Verifier:	/
Master Calibration Performed:	Tue Apr 11 17:07:47 2017

Master Calibration

	Density		Far Detector	Near Detector	
Magnesium	1.755	g/cc	4691.86	4818.19	cps
Aluminum	2.690	g/cc	859.57	3020.22	cps
Spine Angle = 74.61			Density/Spine Ratio = 0.531		
	Size		Reading		
Small Ring	4.00	in	1.03		
Large Ring	14.00	in	1.23		

Compensated Neutron Calibration Report

Serial Number:	tk10-MW
Tool Model:	M&W
Calibration Performed:	Wed Nov 16 11:21:36 2016

Detector	Readings	Target	Normalization
Short Space	6240.00 cps	1000.00 cps	1.6025
Long Space	460.00 cps	1000.00 cps	1.9500

Gamma Ray Calibration Report

Serial Number:	89-M&W	
Tool Model:	M&W	
Calibration Performed:	Tue Apr 11 17:08:01 2017	
Calibrator Value:	1000.0	GAPI
Background Reading:	0.0	cps
Calibrator Reading:	6.2	cps
Sensitivity:	0.5200	GAPI/cps



PIONEER
Pioneer Energy Services

Company	RITCHIE EXPLORATION, INC.
Well	ZACHMAN AP NO.4
Field	STAR SOUTHEAST
County	ELLIS
State	KANSAS