



# DUAL INDUCTION LOG

Company LARSON ENGINEERING, INC.  
 Well MILLER O #2  
 Field COWDERY  
 County LANE  
 State KANSAS

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 Well MILLER O #2  
 Field COWDERY  
 County LANE State KANSAS

Location: API #: 15-101-22606-00-00  
 SE SW NE NW  
 1140' FNL & 1800' FWL  
 SEC 29 TWP 18S RGE 30W  
 Permanent Datum GROUND LEVEL Elevation 2891'  
 Log Measured From KELLY BUSHING  
 Drilling Measured From KELLY BUSHING  
 Other Services  
 CNL/CDL  
 MEL  
 Elevation  
 K.B. 2901'  
 D.F. 2899'  
 G.L. 2891'

Date	4/28/2018
Run Number	ONE
Depth Driller	4450'
Depth Logger	4448'
Bottom Logged Interval	4447'
Top Log Interval	250'
Casing Driller	8.625" @ 265'
Casing Logger	263'
Bit Size	7.875"
Type Fluid in Hole	CHEMICAL
Salinity, ppm CL	2600
Density / Viscosity	9.2 46
pH / Fluid Loss	10.0 6.8
Source of Sample	FLOWLINE
Rm @ Meas. Temp	0.75 @ 70
Rmt @ Meas. Temp	0.56 @ 70
Rmc @ Meas. Temp	1.01 @ 70
Source of Rmf / Rmc	CHARTS
Rm @ BHT	0.44 @ 121
Operating Rig Time	2 1/2 HOURS
Max Rec. Temp. F	121 DEG F
Equipment Number	108
Location	HAYS
Recorded By	T. MARTIN
Witnessed By	VERN SCHRAG

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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.

DIGHTON, 10 W TO BISON RD, 1 S, 1/2 W, S INTO AT TB

Log Measured From: KELLY BUSHING 10 Ft. Above Permanent Datum

THANK YOU FOR USING PIONEER ENERGY SERVICES  
[www.pioneerenergy.com](http://www.pioneerenergy.com) 785-625-3858

Your Pioneer Energy Services Crew Engineer: T. MARTIN Operator: Operator: Operator:	This Log Record Was Witnessed By Primary Witness: VERN SCHRAG Secondary Witness: Secondary Witness: Secondary Witness:
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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
CILM	4.70					
SP	0.20					

Dataset: laron\_miller o\_#2.db: field/well/stkml/pass3.1  
 Total length: 43.08 ft  
 Total weight: 685.00 lb  
 O.D.: 4.00 in

# Log Variables

DatabaseC:\ProgramData\Warrior\Data\laron\_miller o\_#2.db  
 Dataset field/well/stkml/pass3.1/\_vars\_

## Top - Bottom

A	BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	FLUIDDEN g/cc	M	MATRXDEN g/cc
1	7.875	121	5.5	0	1	2	2.71
NPORSEL	PERFS	SNDERR mmho/m	SNDERRM mmho/m	SPSHIFT mV	SRFTEMP degF	SZCOR	TDEPTH ft
Limestone	0	0	0	-170	-170	Off	4448



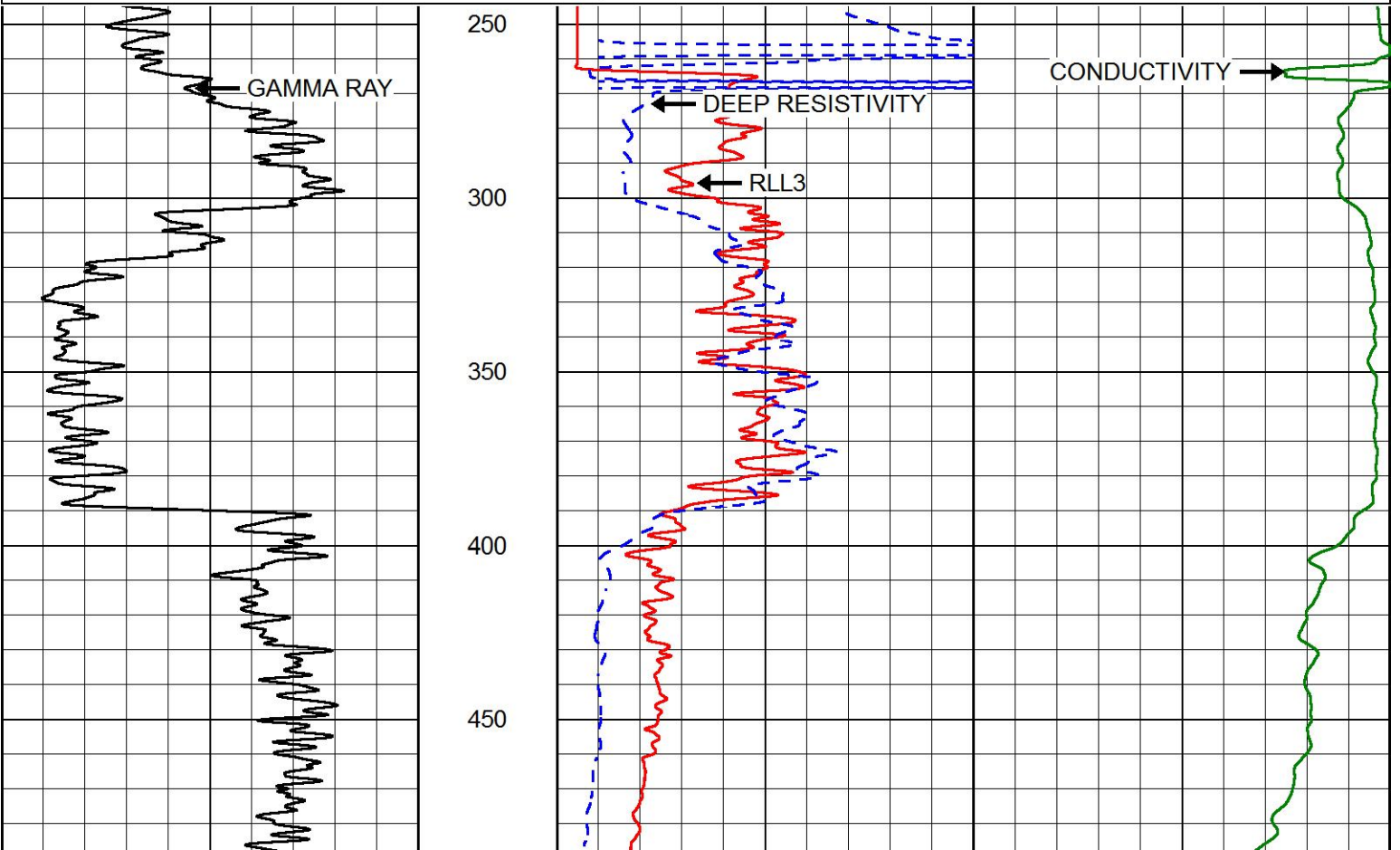
**PIONEER**  
Pioneer Energy Services

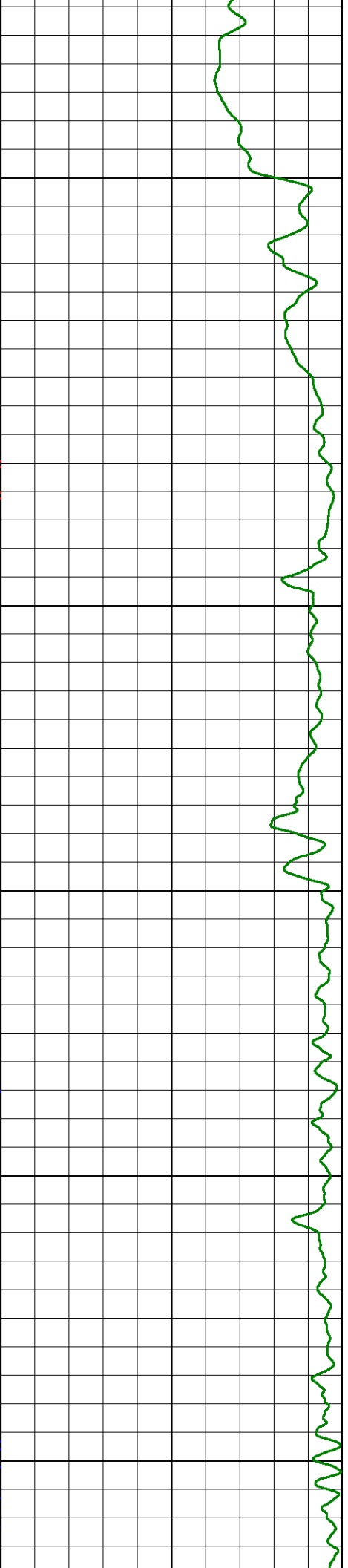
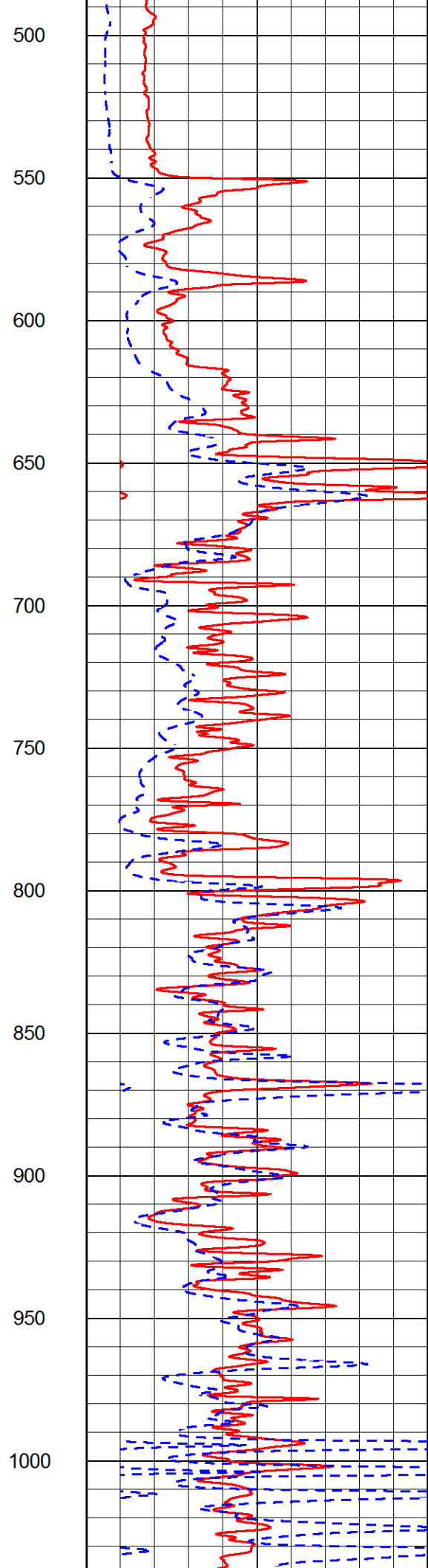
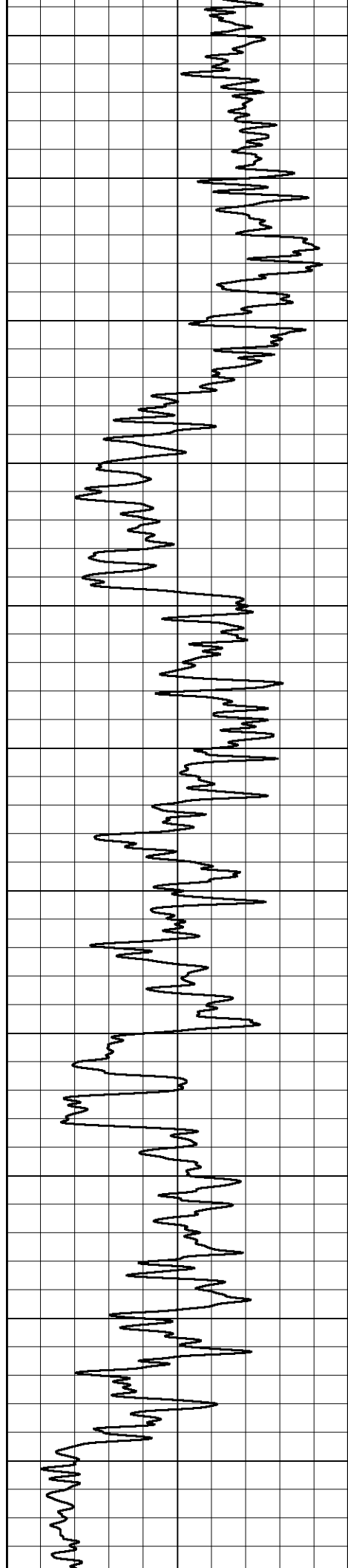
## 2" SCALE RESISTIVITY

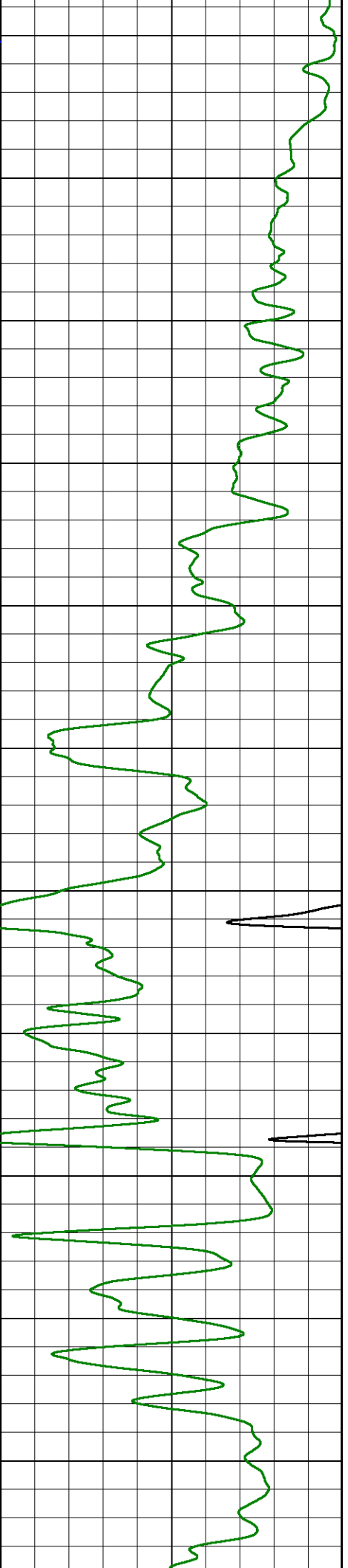
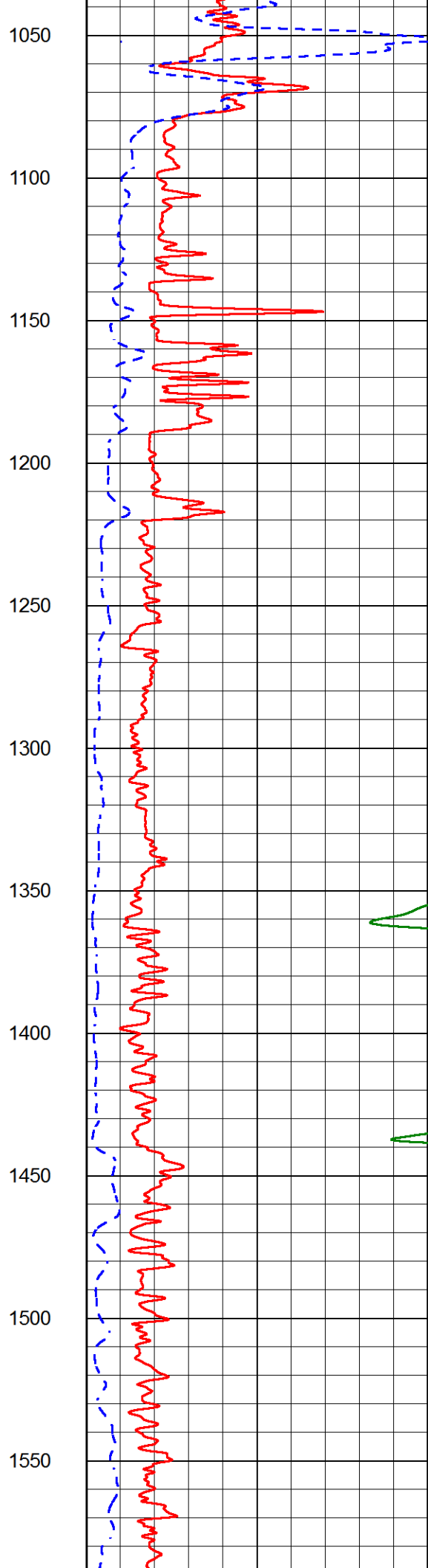
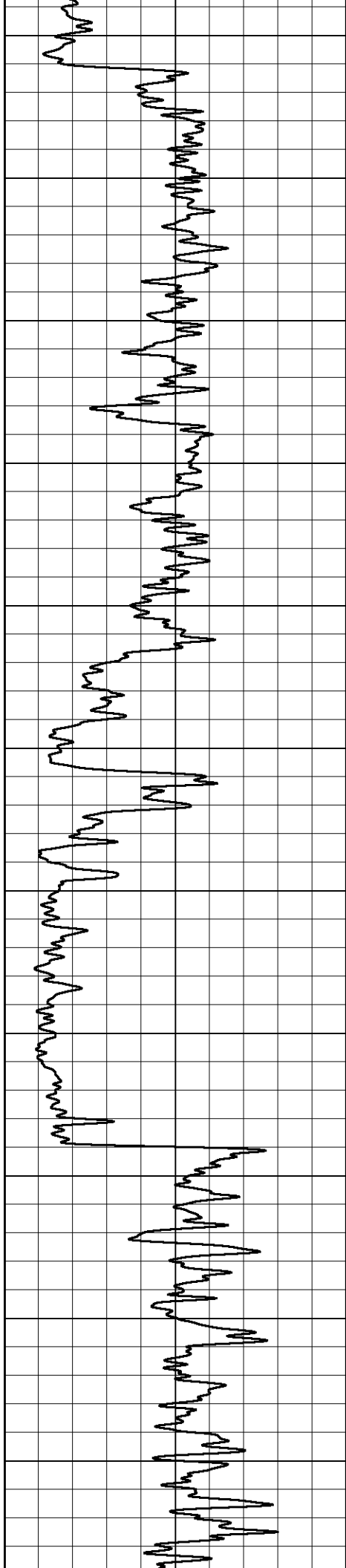
### MAIN PASS

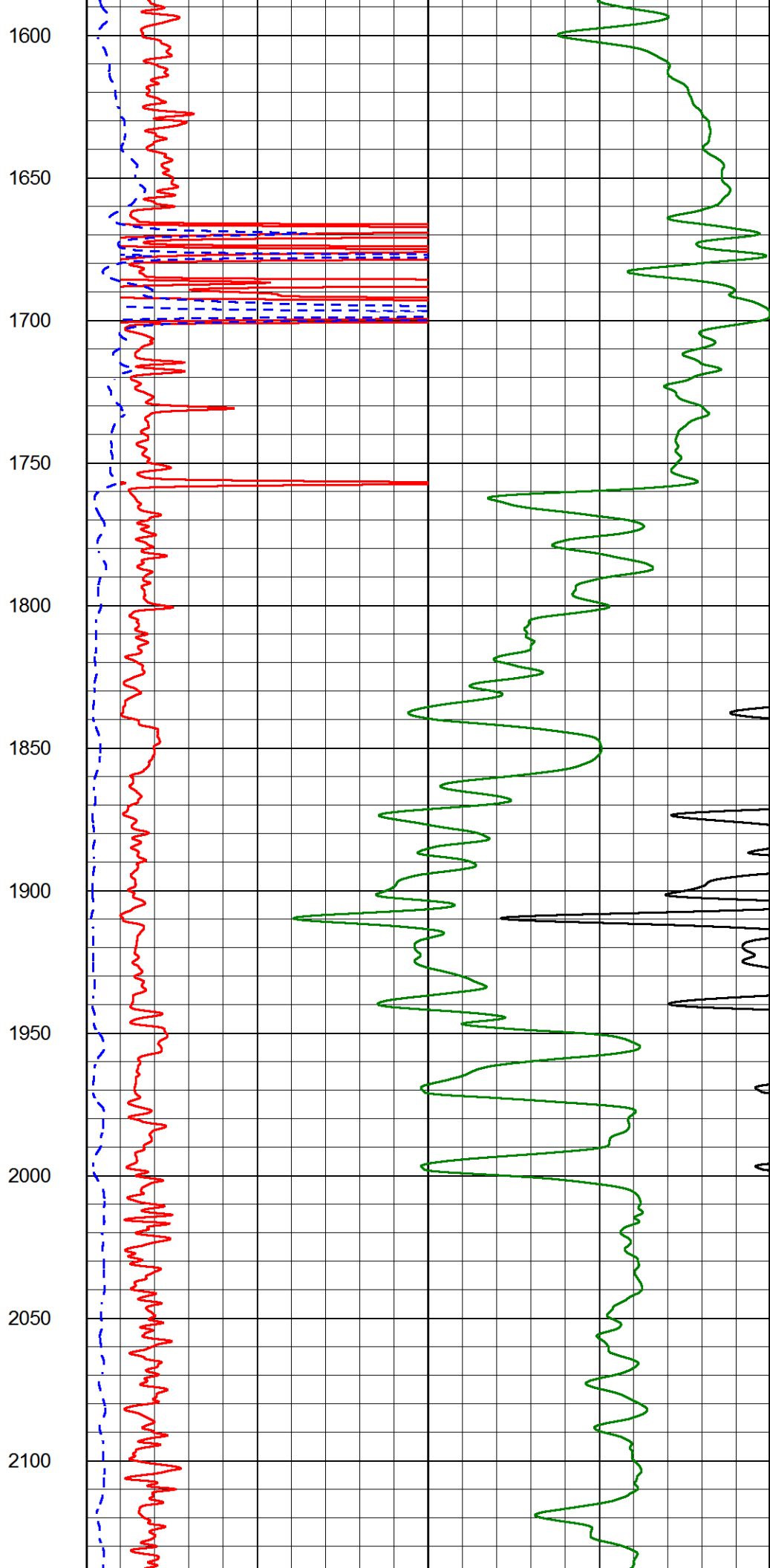
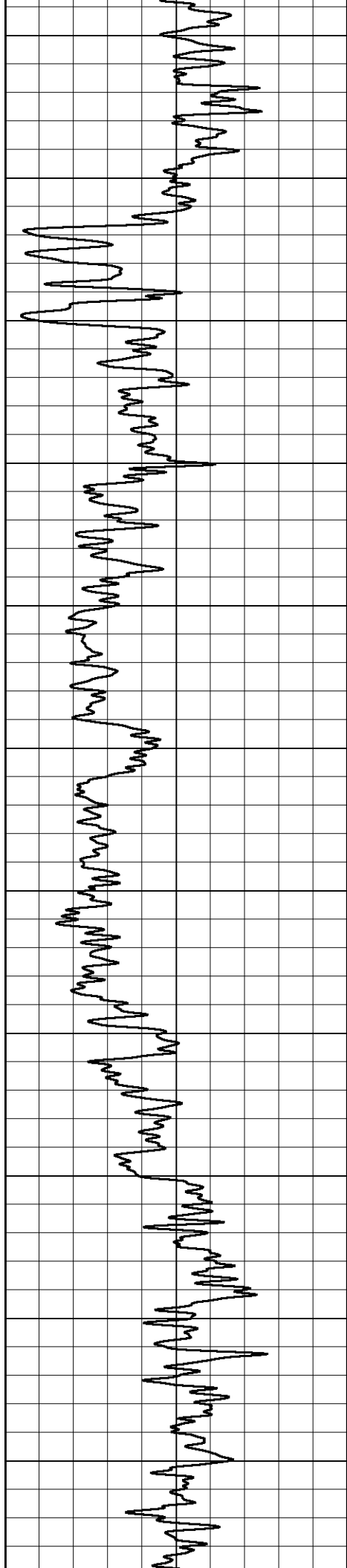
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 Dataset Pathname stkml/pass3.2  
 Presentation Format dil2in  
 Dataset Creation Sat Apr 28 19:50:43 2018  
 Charted by Depth in Feet scaled 1:600

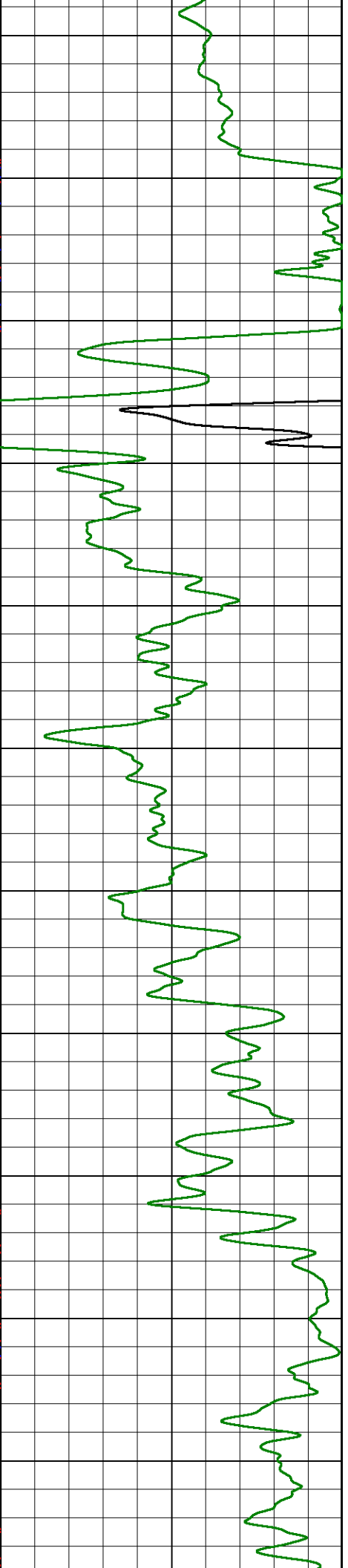
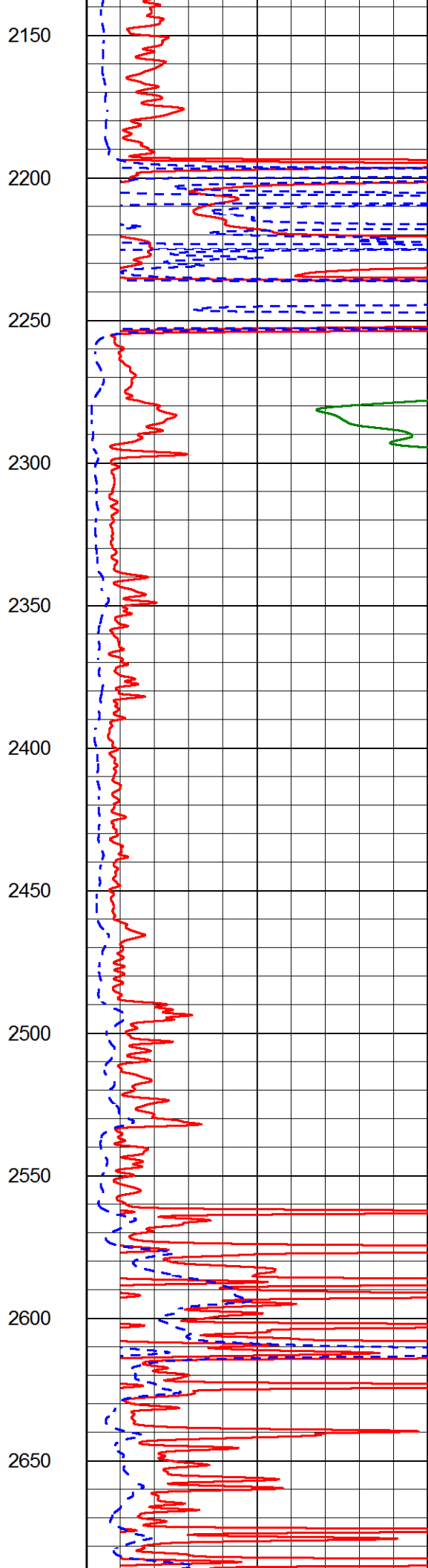
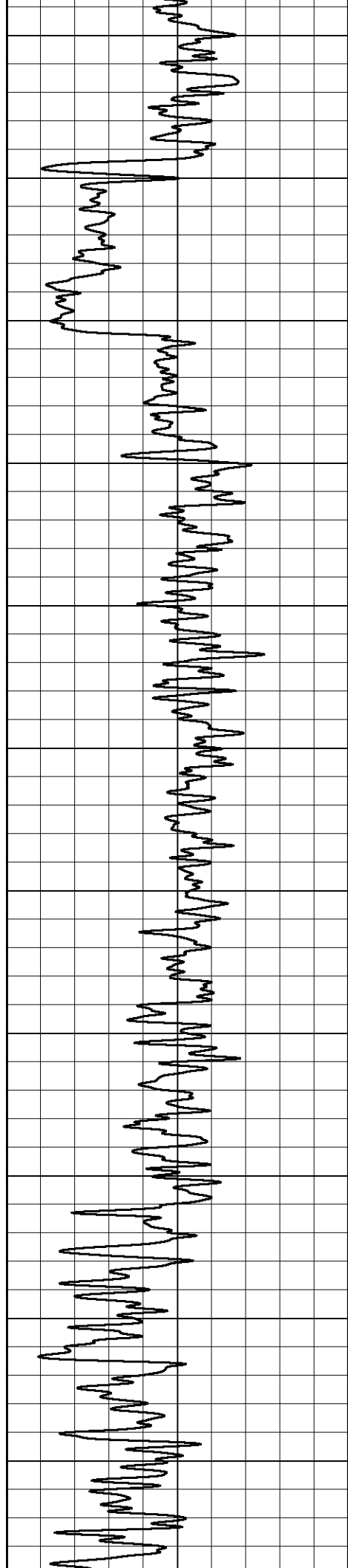
0	GAMMA RAY (GAPI)	150	2000	CONDUCTIVITY (mmho/m)	0
0	RLL3 (Ohm-m)	50	50	DEEP RESISTIVITY (Ohm-m)	50
50	RLL3 (Ohm-m)	500	500	DEEP RESISTIVITY (Ohm-m)	500

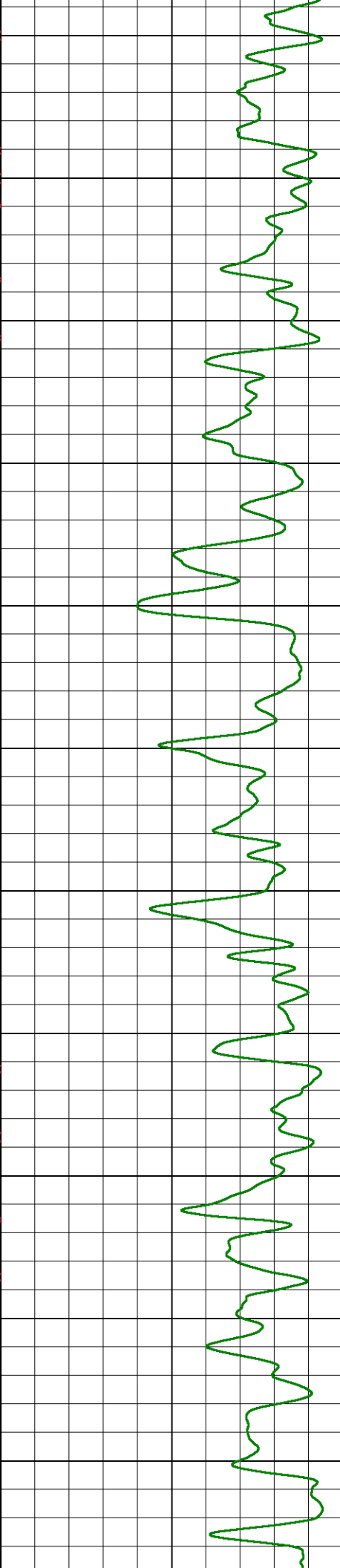
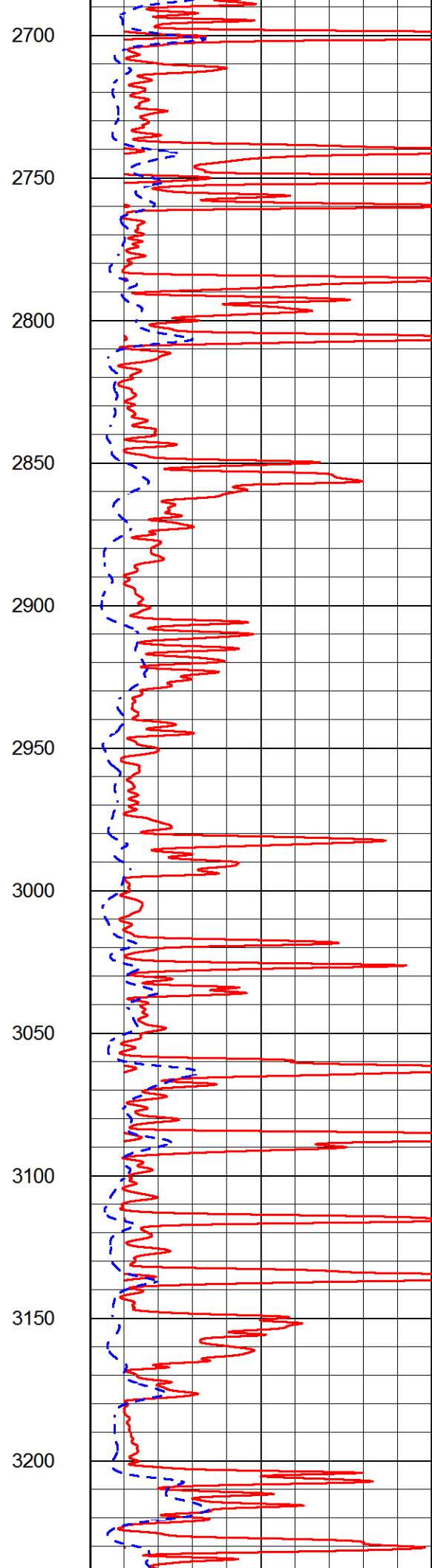
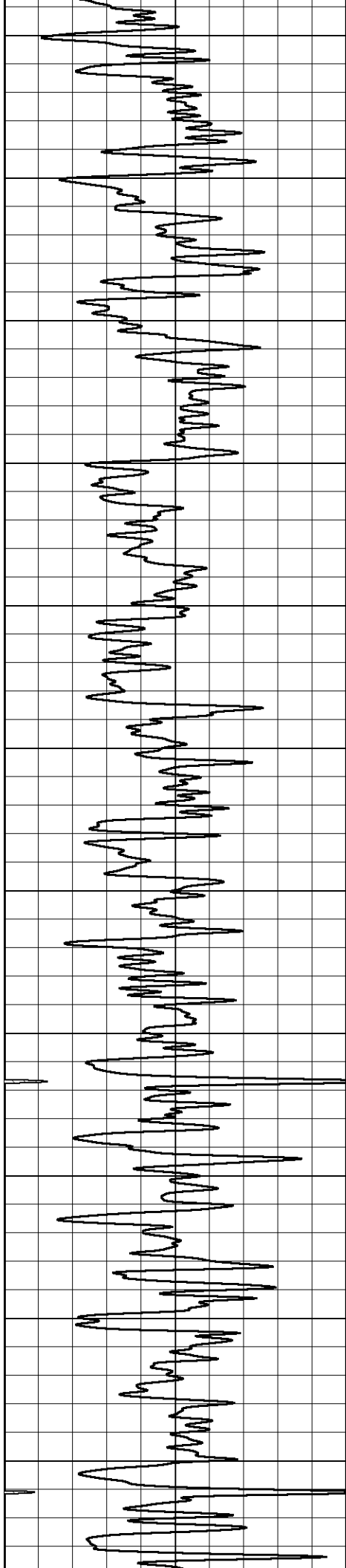


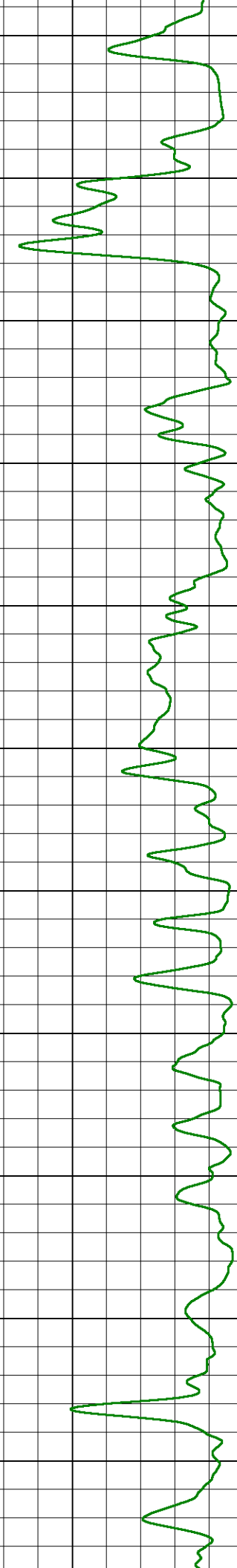
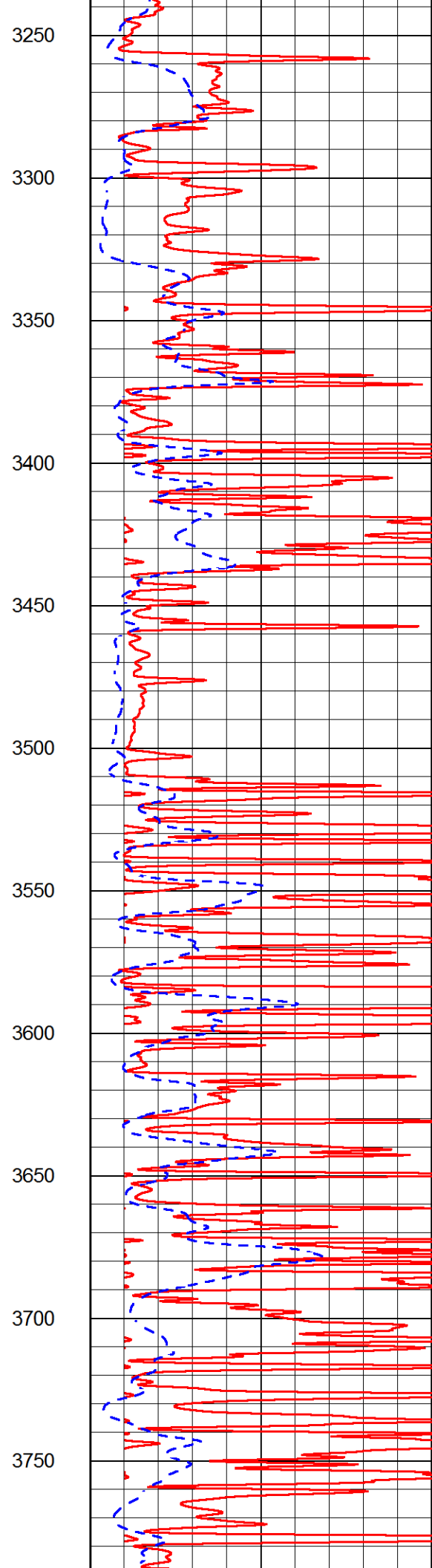
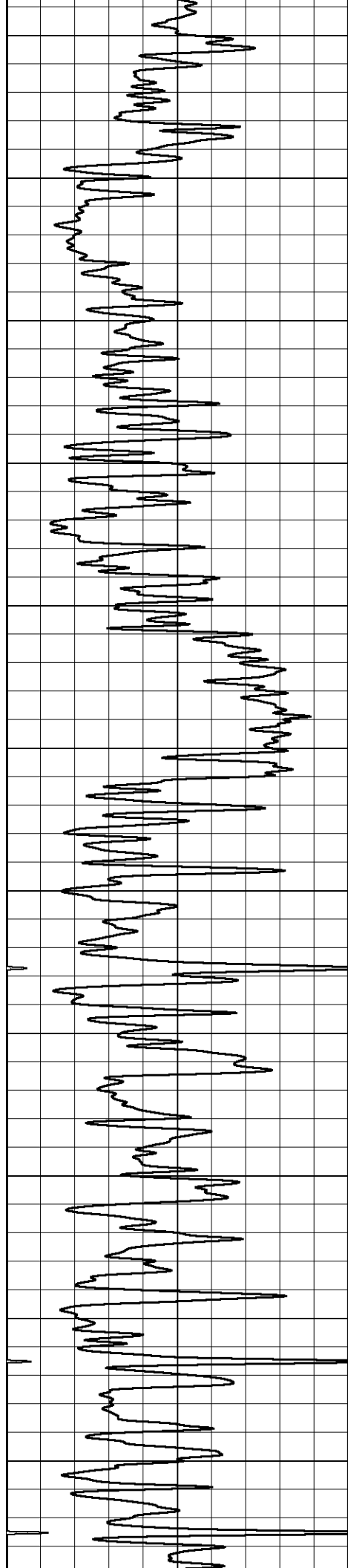


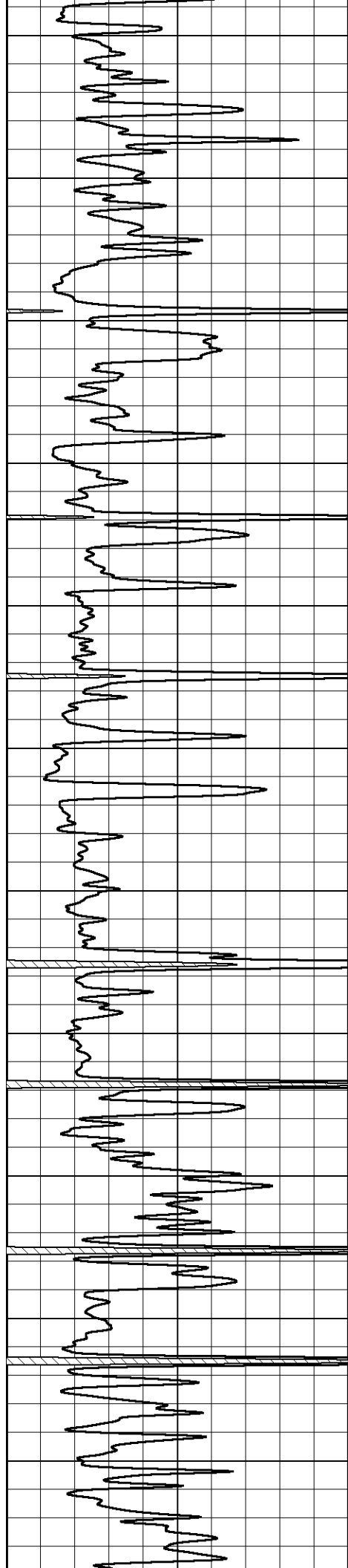












3800

3850

3900

3950

4000

4050

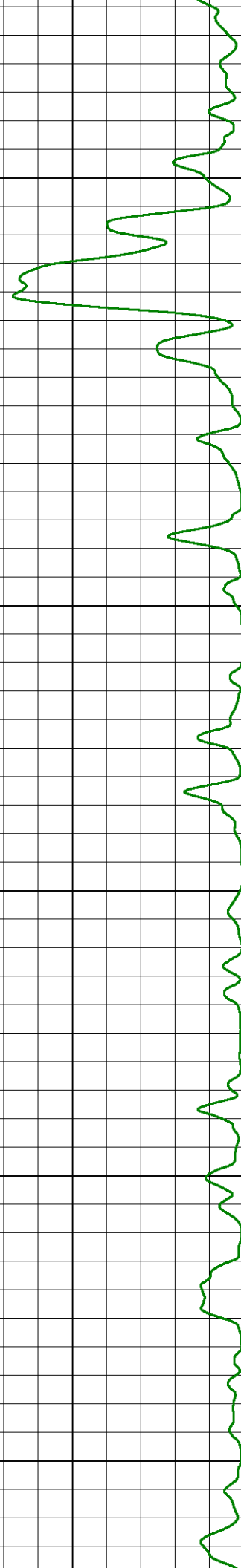
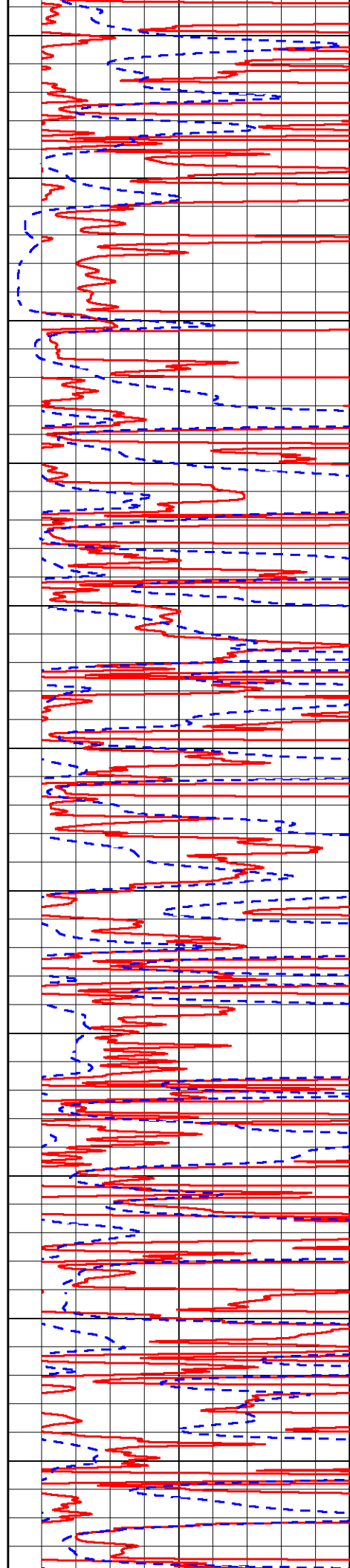
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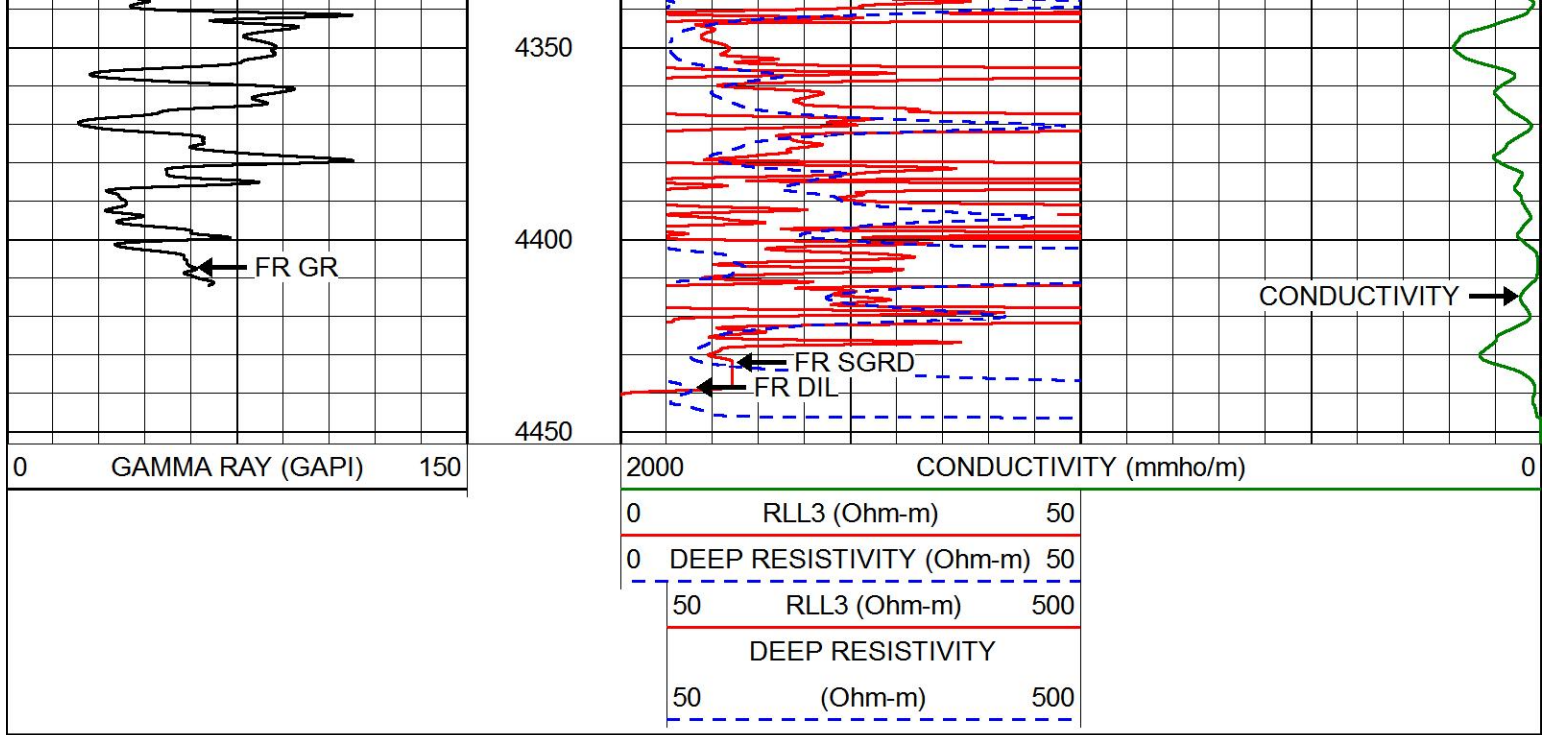

4150

4200

4250

4300



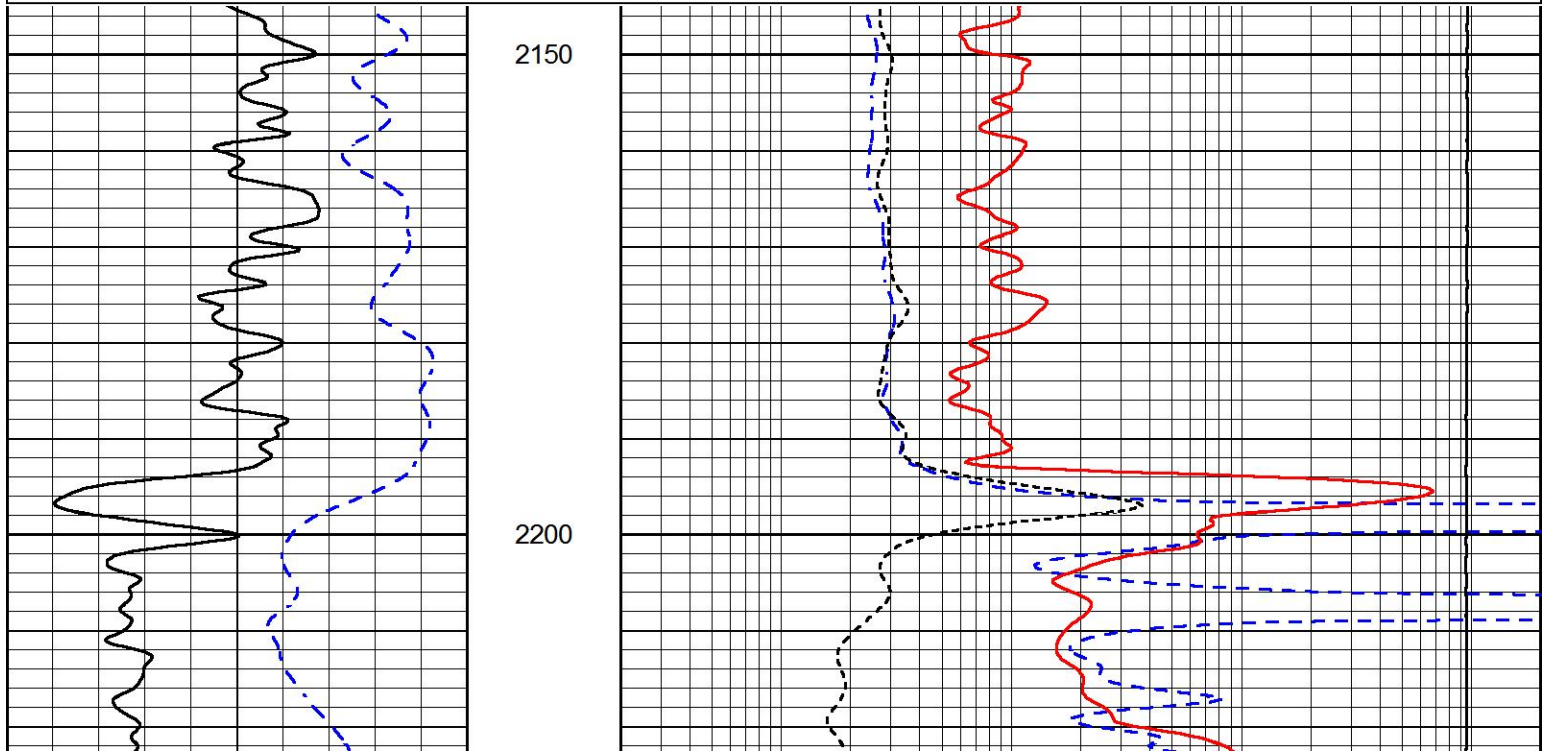



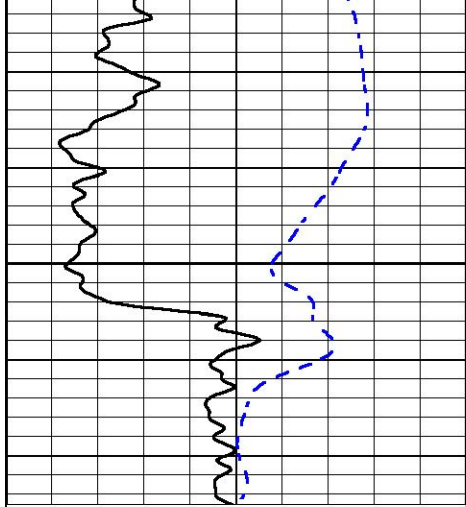
# ANHYDRITE SECTION

## MAIN PASS

Database File      laron\_miller o\_#2.db  
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 Presentation Format    dil  
 Dataset Creation      Sat Apr 28 19:30:12 2018  
 Charted by            Depth in Feet scaled 1:240

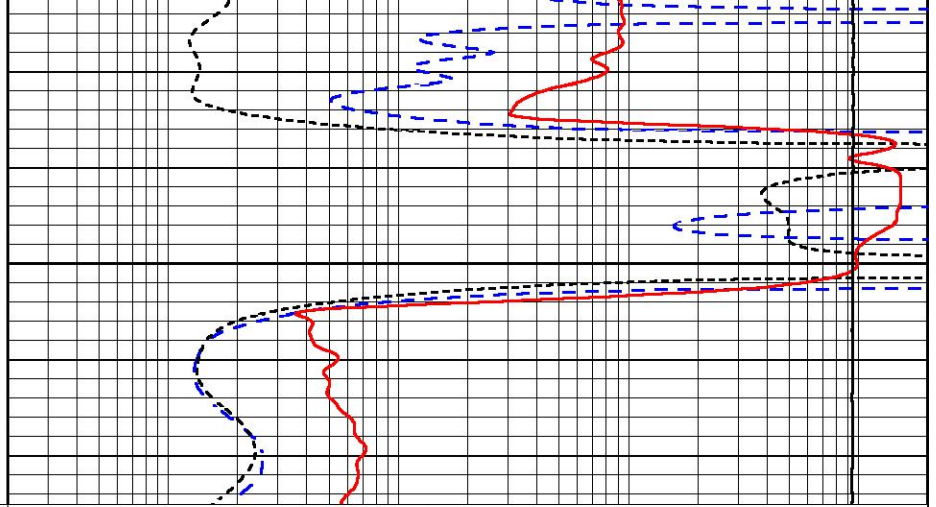
0	GAMMA RAY (GAPI)	150	0.2	DEEP RESISTIVITY (Ohm-m)	2000
-200	SP (mV)	0	0.2	MEDIUM RESISTIVITY (Ohm-m)	2000
			0.2	RLL3 (Ohm-m)	2000
			15000	LINE TENSION (lb)	0





2250

0	GAMMA RAY (GAPI)	150
-200	SP (mV)	0



0.2	DEEP RESISTIVITY (Ohm-m)	2000
0.2	MEDIUM RESISTIVITY (Ohm-m)	2000
0.2	RLL3 (Ohm-m)	2000
15000	LINE TENSION (lb)	0

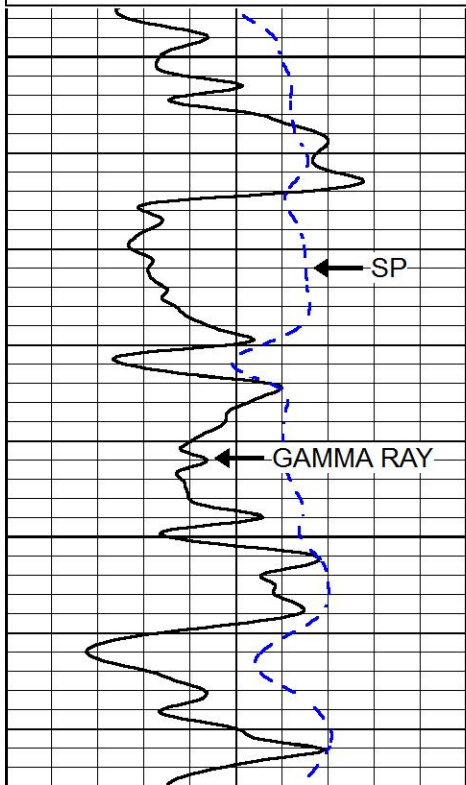


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Database File      laron\_miller o\_#2.db  
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 Presentation Format    dil  
 Dataset Creation      Sat Apr 28 19:50:34 2018  
 Charted by            Depth in Feet scaled 1:240

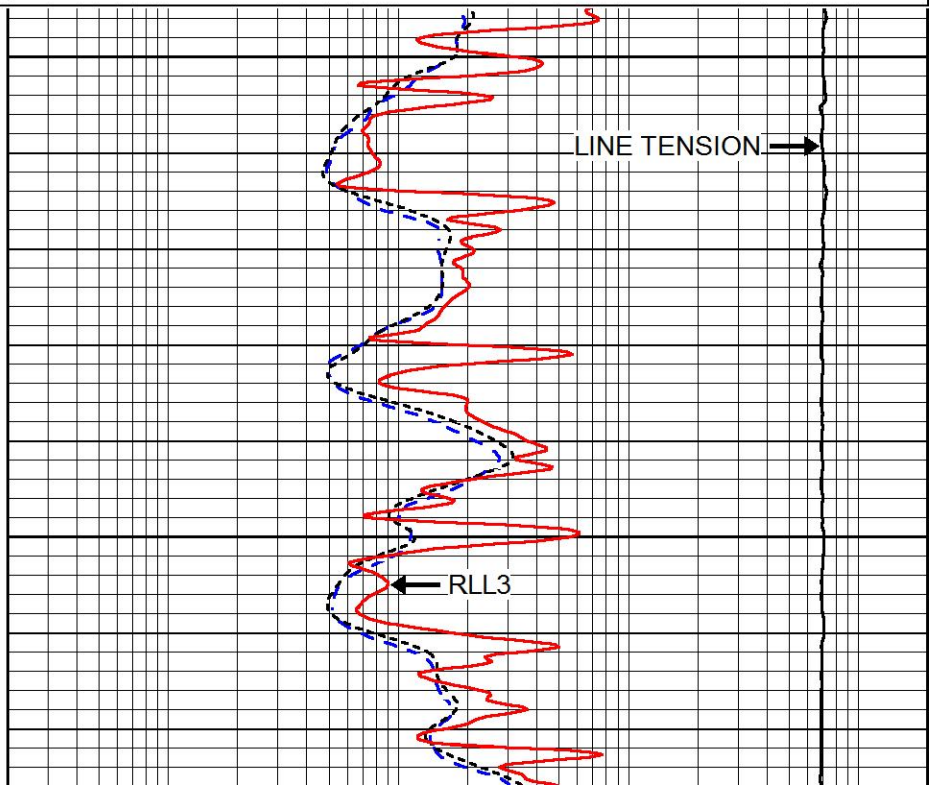
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-200	SP (mV)	0

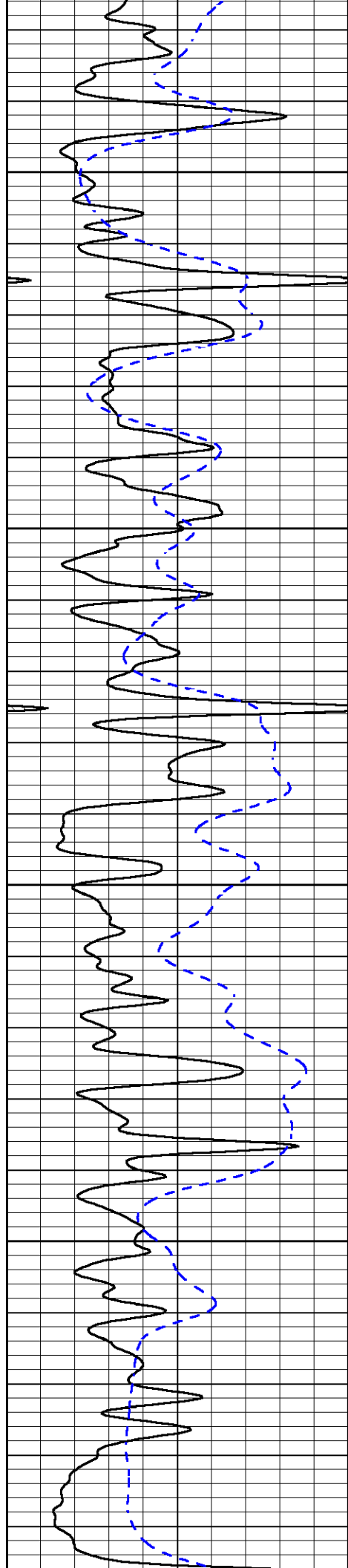
0.2	DEEP RESISTIVITY (Ohm-m)	2000
0.2	MEDIUM RESISTIVITY (Ohm-m)	2000
0.2	RLL3 (Ohm-m)	2000
15000	LINE TENSION (lb)	0



3600

3650



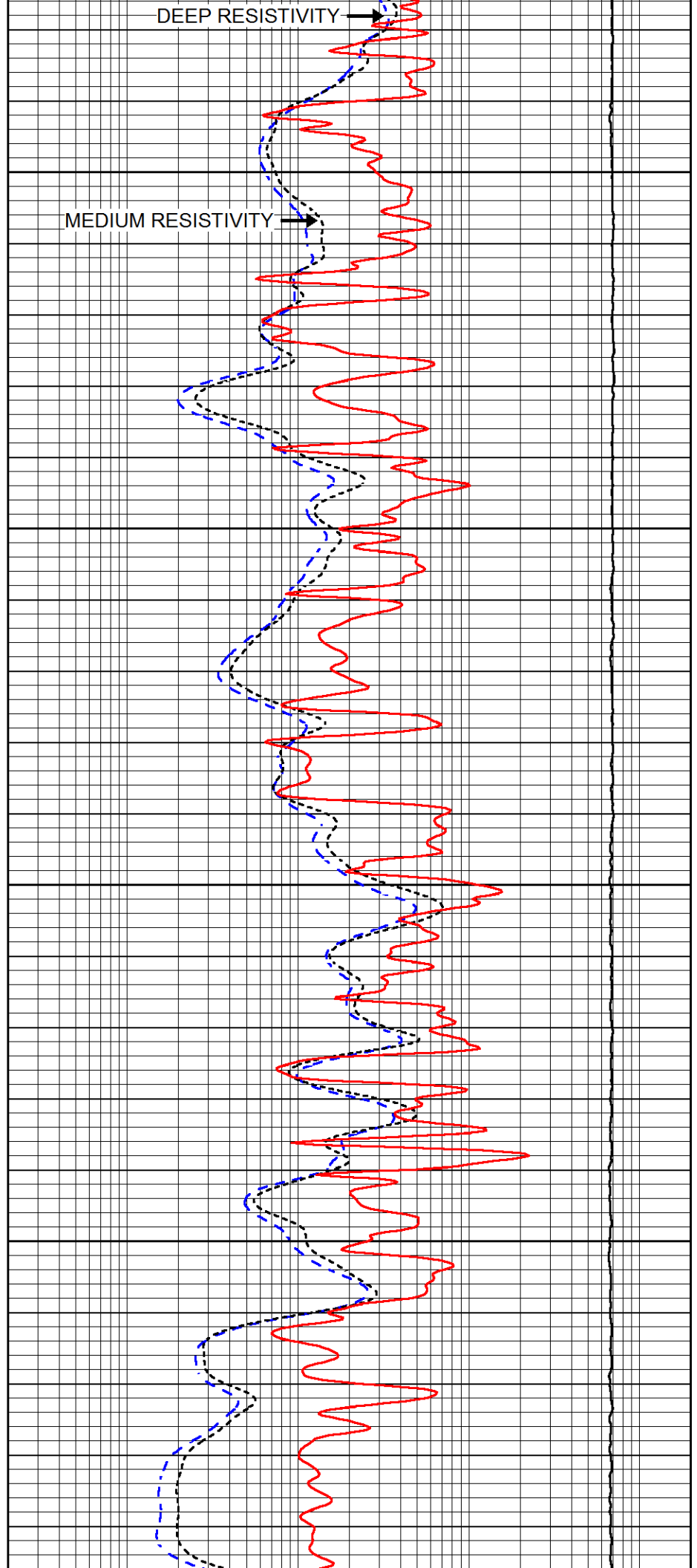


3700

3750

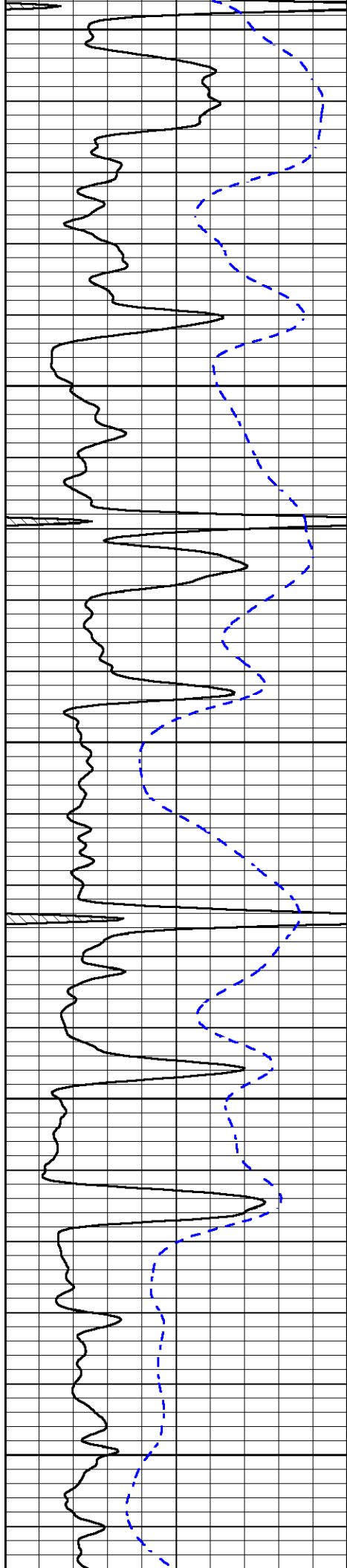
3800

3850



DEEP RESISTIVITY →

MEDIUM RESISTIVITY →



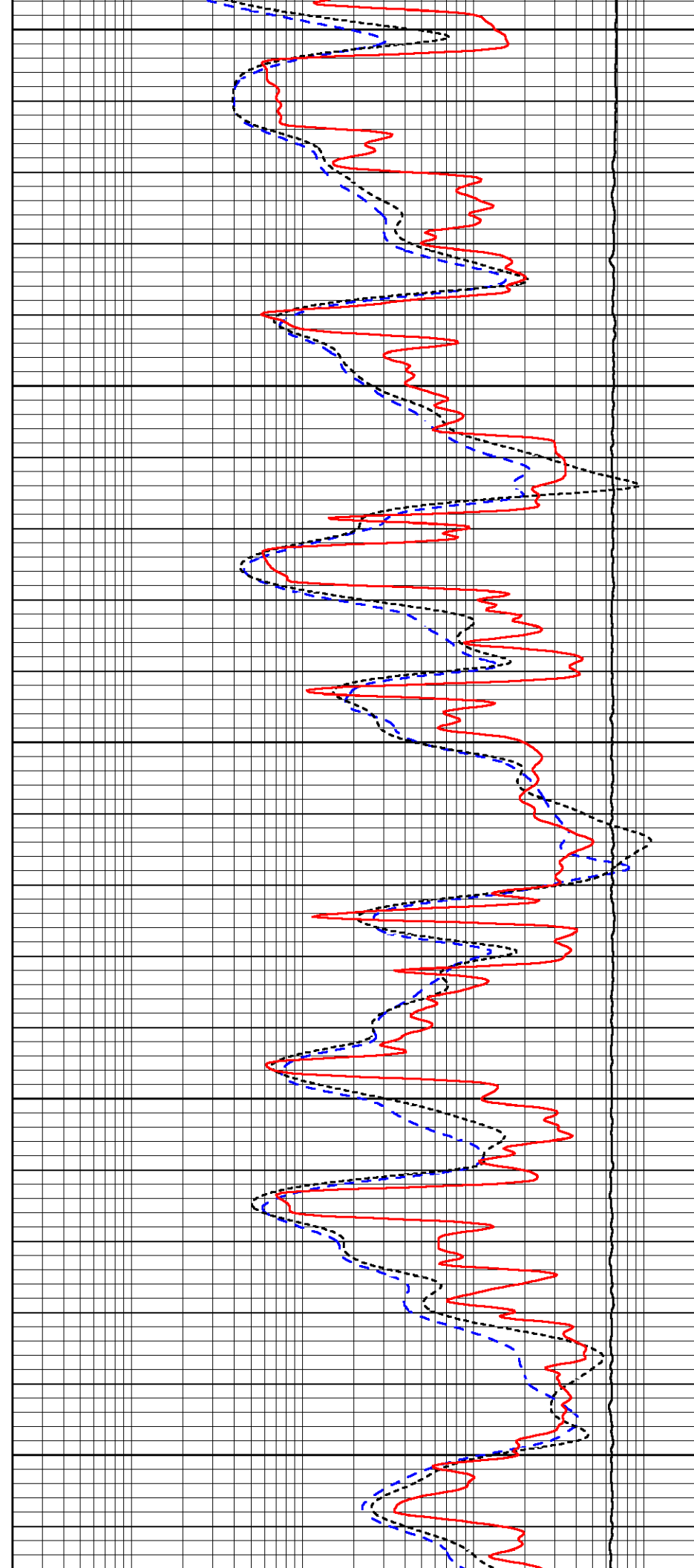
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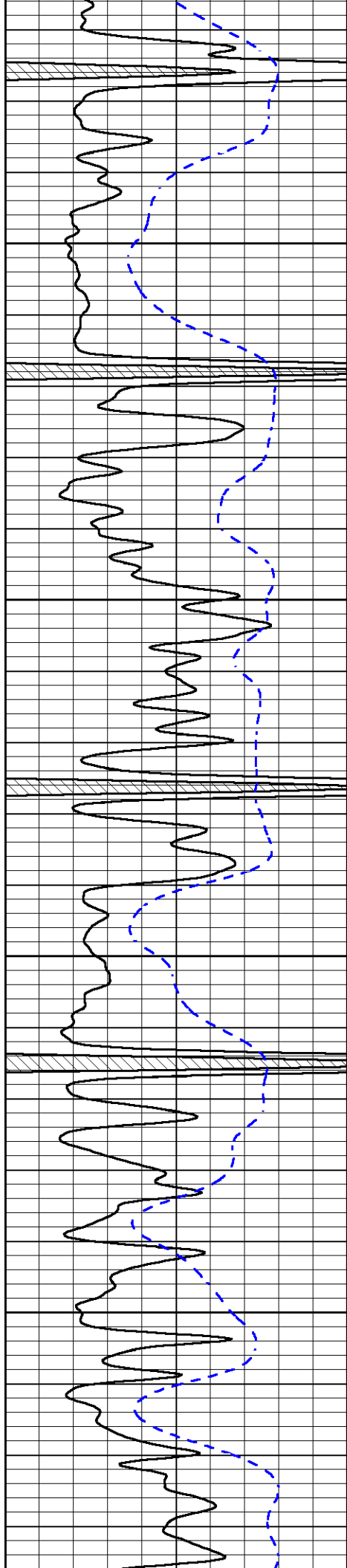
3950

4000

4050

4100



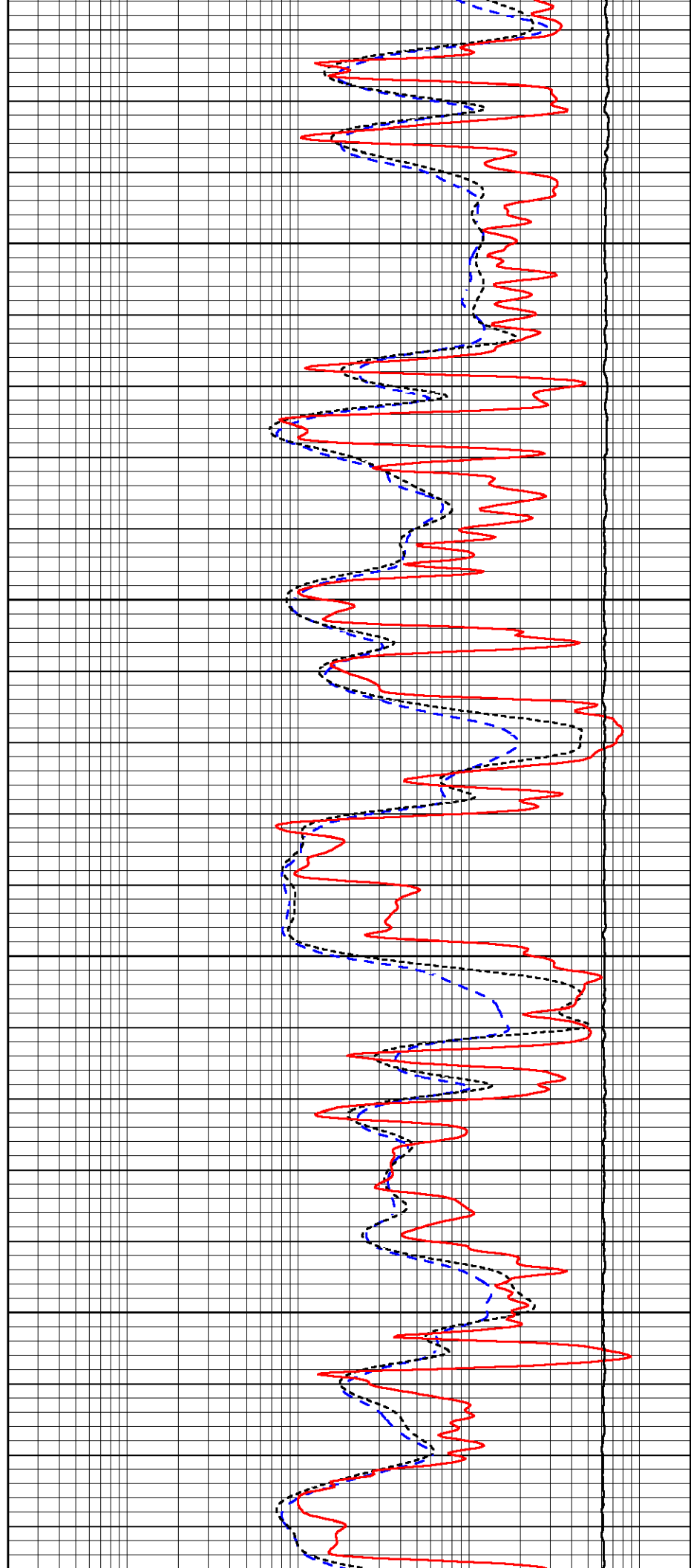


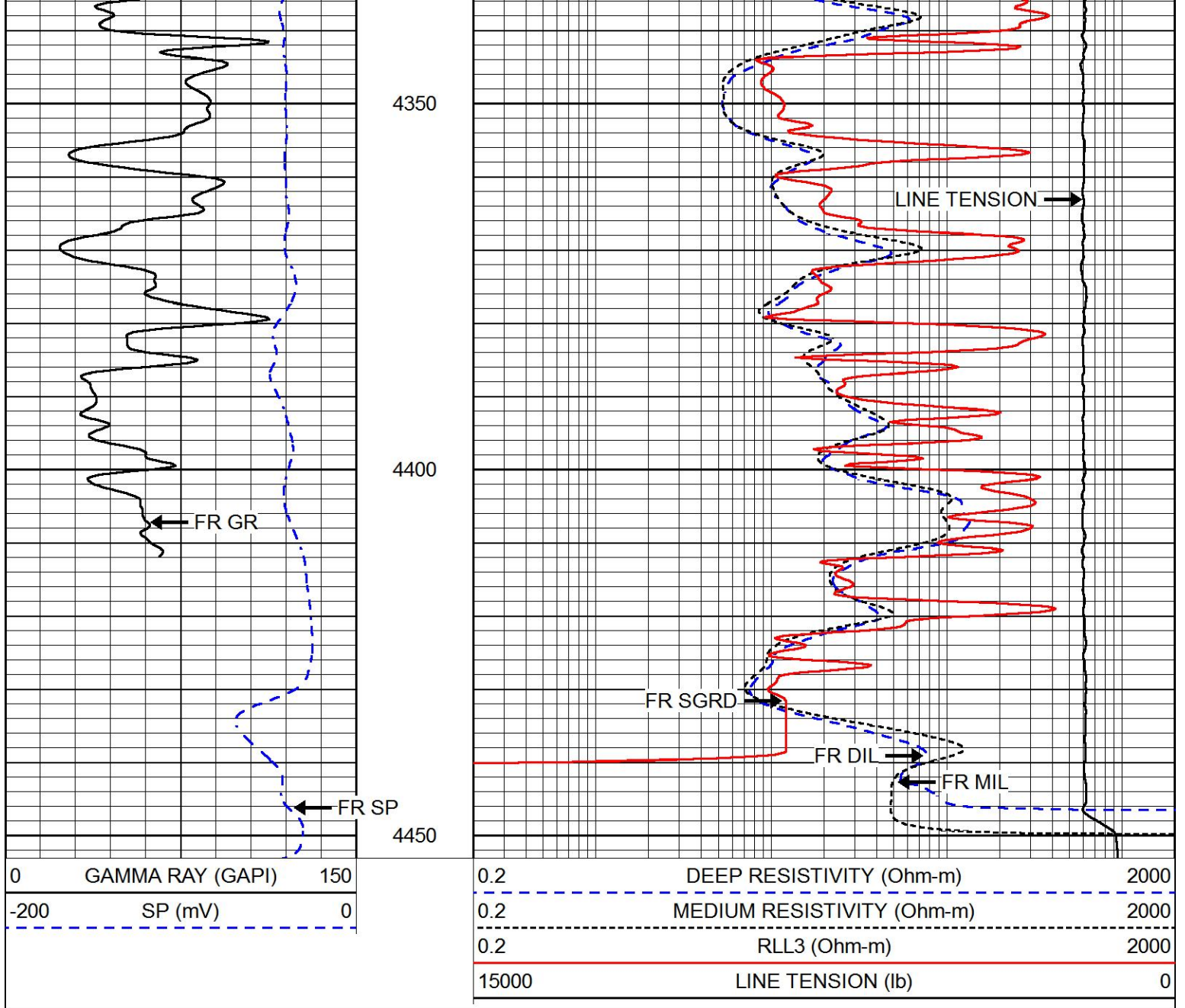
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4200

4250

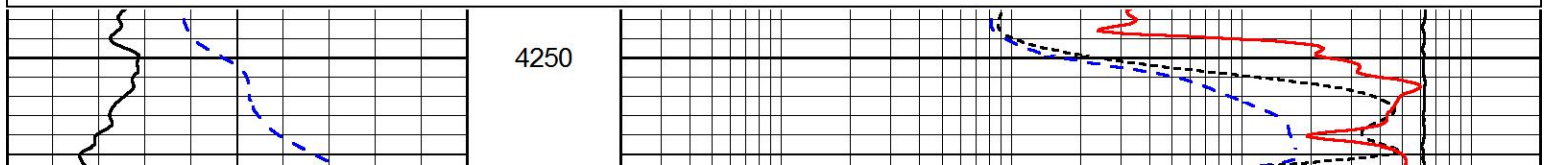
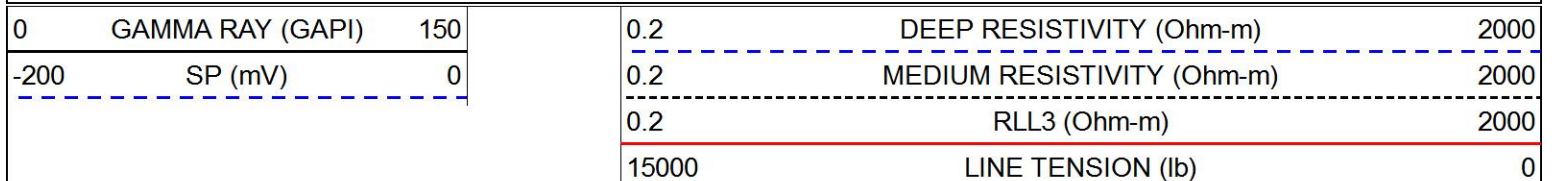
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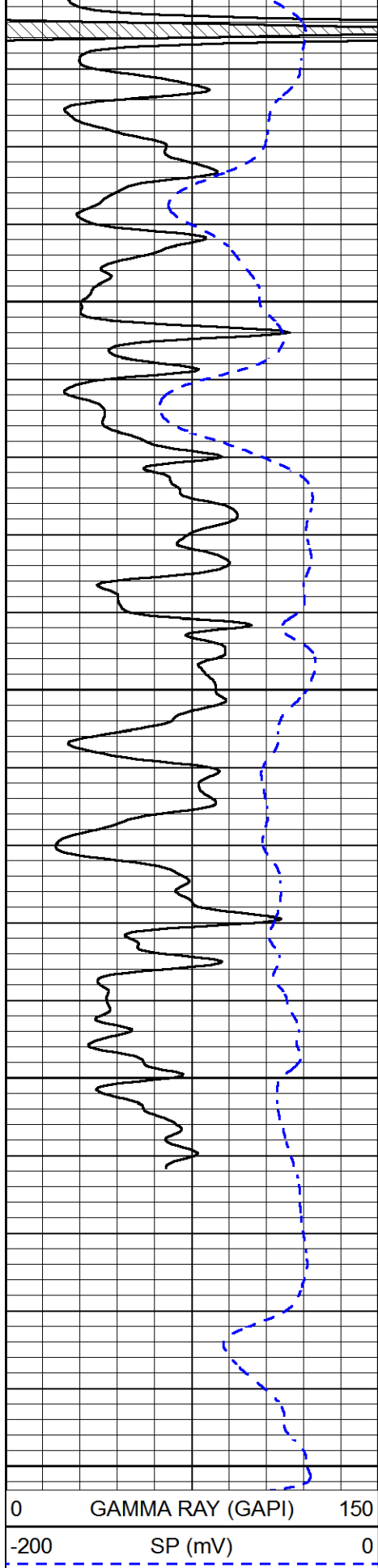




# REPEAT SECTION

Database File      laron\_miller o\_#2.db  
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 Presentation Format    dil  
 Dataset Creation      Sat Apr 28 19:04:56 2018  
 Charted by            Depth in Feet scaled 1:240





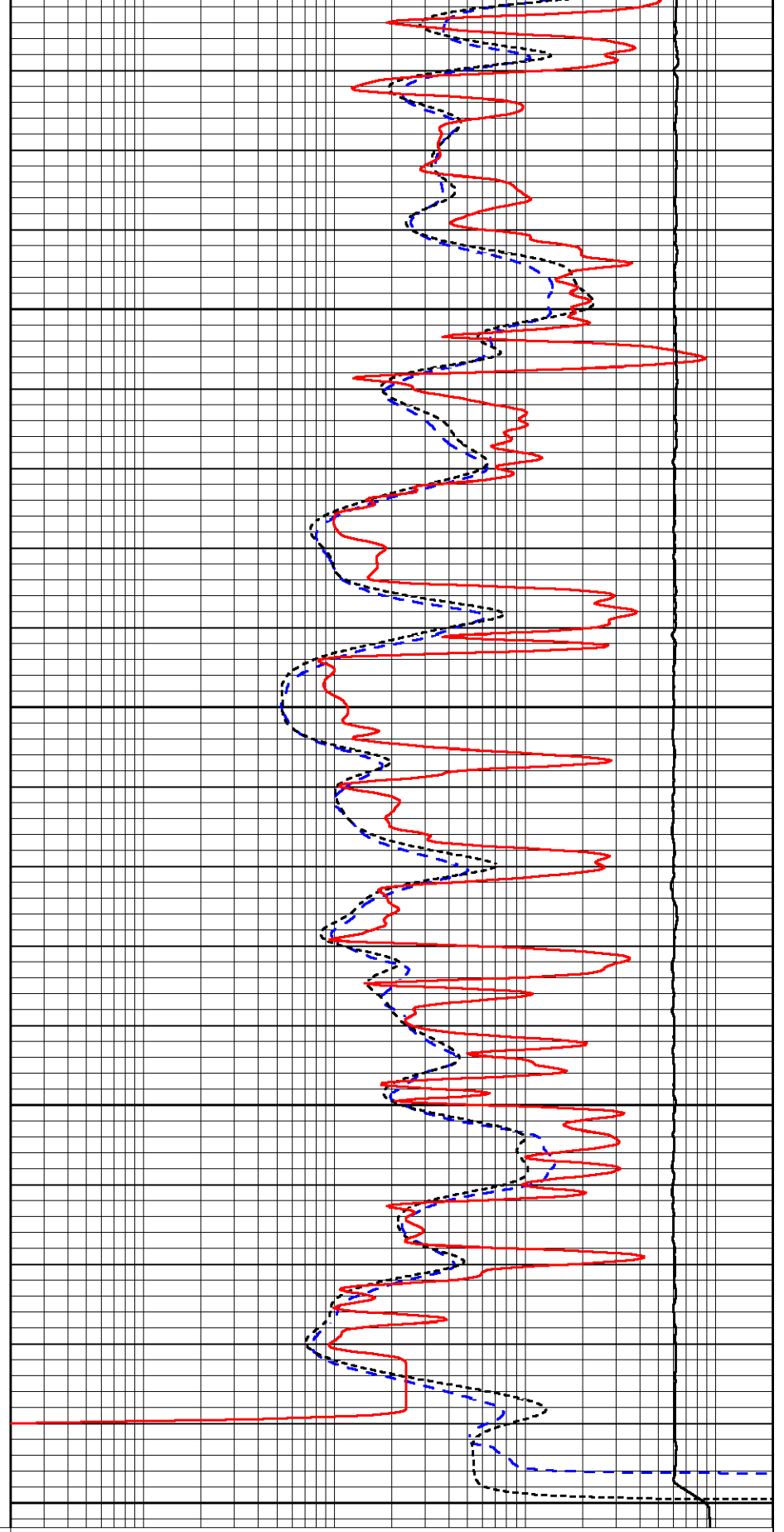
4300

4350

4400

4450

0 GAMMA RAY (GAPI) 150  
 -200 SP (mV) 0



0.2 DEEP RESISTIVITY (Ohm-m) 2000  
 0.2 MEDIUM RESISTIVITY (Ohm-m) 2000  
 0.2 RLL3 (Ohm-m) 2000  
 15000 LINE TENSION (lb) 0

Calibration Report

Database File      larsen\_miller o\_#2.db  
 Dataset Pathname    stkml/pass3.1  
 Dataset Creation    Sat Apr 28 19:50:34 2018

Dual Induction Calibration Report

Serial-Model:                      PSI 978-M&W  
 Calibration Performed:            Sun Feb 04 11:50:02 2018

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop		Gain	Offset
Deep	178.615	710.235	0.000	255.800	mmho/m	0.570	-43.500
Medium	161.982	1441.110	0.000	255.800	mmho/m	0.400	-36.500

Microlog Calibration Report

Serial-Model:                      PSI-02-PSI STKBL ML  
 Performed:                         Sat Apr 07 12:01:20 2018

	Readings		References			Results	
	Zero	Cal	Zero	Cal		m	b
Normal	0.0031	0.0043	0.0000	10.0000	Ohm-m	12000.0000	-1.0000
Inverse	0.0000	0.0013	0.0000	10.0000	Ohm-m	10000.0000	0.0000
Caliper	1.0020	1.0834	5.5000	16.5000	in	135.1560	-131.7500

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	2.675	g/cc	859.57	3020.22	cps
Spine Angle = 74.61			Density/Spine Ratio = 0.523		
	Size		Reading		
Small Ring	4.00	in	1.00		
Large Ring	14.00	in	1.20		

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	LARSON ENGINEERING, INC.
Well	MILLER O #2
Field	COWDERY
County	LANE
State	KANSAS