



# DUAL INDUCTION LOG

**Company** TDI, INC.  
**Well** ENGEL NORTH #3  
**Field** SCHOENCHEN  
**County** ELLIS **State** KANSAS

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**Location:** API #: 15-051-26880-00-00  
 530' FNL & 1970' FEL  
 SEC 21 TWP 15S RGE 18W  
 Permanent Datum GROUND LEVEL Elevation 2027'  
 Log Measured From KELLY BUSHING  
 Drilling Measured From KELLY BUSHING

Other Services  
 CNL/CDL  
 MEL

Elevation  
 K.B. 2037'  
 D.F. N/A  
 G.L. 2027'

Date	7/24/2017
Run Number	ONE
Depth Driller	3640'
Depth Logger	3639'
Bottom Logged Interval	3638'
Top Log Interval	1150'
Casing Driller	8.625" @ 1189'
Casing Logger	1192'
Bit Size	7.875"
Type Fluid in Hole	CHEMICAL
Salinity, ppm CL	4800
Density / Viscosity	9.1 52
pH / Fluid Loss	10.5 6.8
Source of Sample	FLOWLINE
Rm @ Meas. Temp	0.45 @ 80
Rmt @ Meas. Temp	0.34 @ 80
Rmc @ Meas. Temp	0.61 @ 80
Source of Rmf / Rmc	CHARTS
Rm @ BHT	0.32 @ 80
Operating Rig Time	3 HOURS
Max Rec. Temp. F	112
Equipment Number	91
Location	HAYS
Recorded By	D. SCHMIDT
Witnessed By	TOM DENNING

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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,  
 SOUTH TO CHETOLAH GOLD RD, 1/2 WEST, 1/8 SOUTH,  
 EAST INTO

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

<b>Your Pioneer Energy Services Crew</b> Engineer: D. SCHMIDT Operator: Operator: Operator:	<b>This Log Record Was Witnessed By</b> Primary Witness: TOM DENNING Secondary Witness: HERB DEINES Secondary Witness: Secondary Witness:
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Top - Bottom

M	A	SZCOR	NPORSEL	FLUIDDEN g/cc	MATRXDEN g/cc	SPSHIFT mV	SNDERRM mmho/m
2	1	Off	Limestone	1	2.71	0	0
SNDERR mmho/m	SRFTEMP degF	CASETHCK in	CASEOD in	PERFS	TDEPTH ft	BOTTEMP degF	BOREID in
0	0	0	5.5	0	0	100	7.875

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
GR	40.58		GR-M&W (89)	3.00	3.50	50.00
CNLSC	37.48		CNT-M&W (207-MW)	5.50	3.50	100.00
CNSSC	36.73					
LSD	28.43		CDL-M&W (90-1031)	8.50	4.00	250.00
DCAL	28.42					
SSD	27.93					
MCAL	19.83		ML-PSIML (PSI-01) GO Micro log tools converted to Simplec electronics	7.58	4.00	65.00
MI	19.83					
MN	19.83					
RLL3F	15.80		RLL3	15.80		
RLL3	15.80					

CILD	8.00	
CILM	4.70	
SP	0.20	

DIL-M&W (PSI 91)

18.50

3.50

220.00

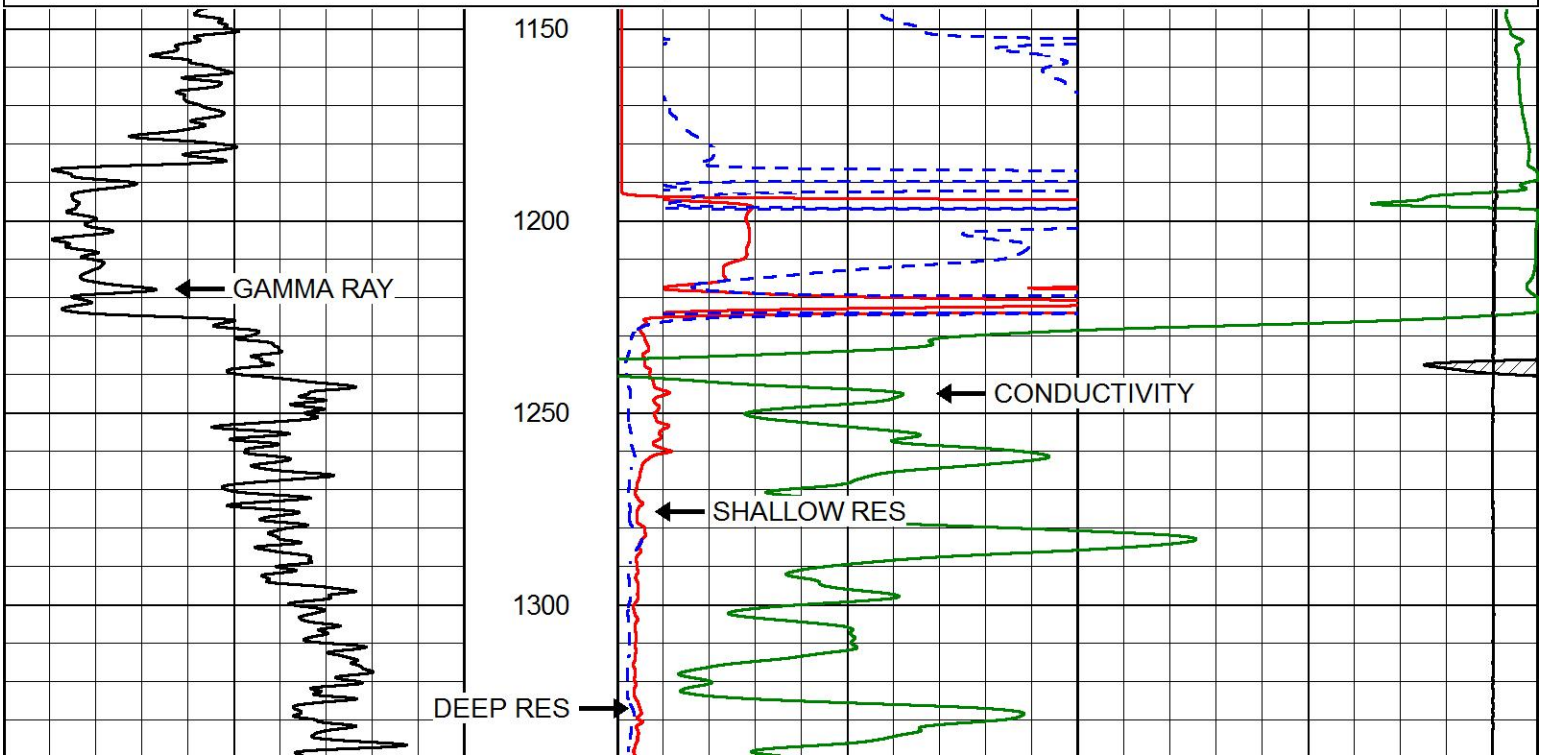
Dataset: tdi\_engel north\_3.db: field/well/STKML/pass3.3  
 Total length: 43.08 ft  
 Total weight: 685.00 lb  
 O.D.: 4.00 in

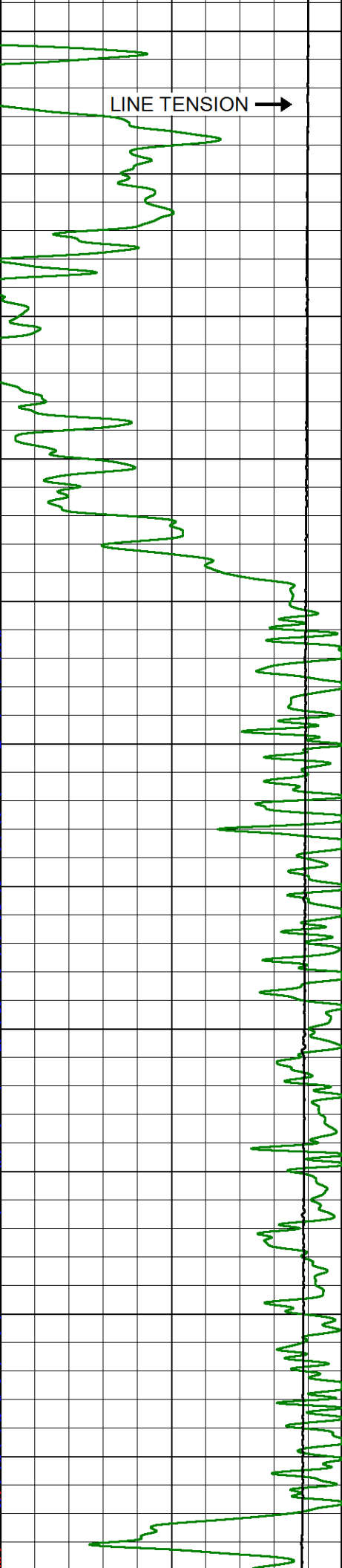
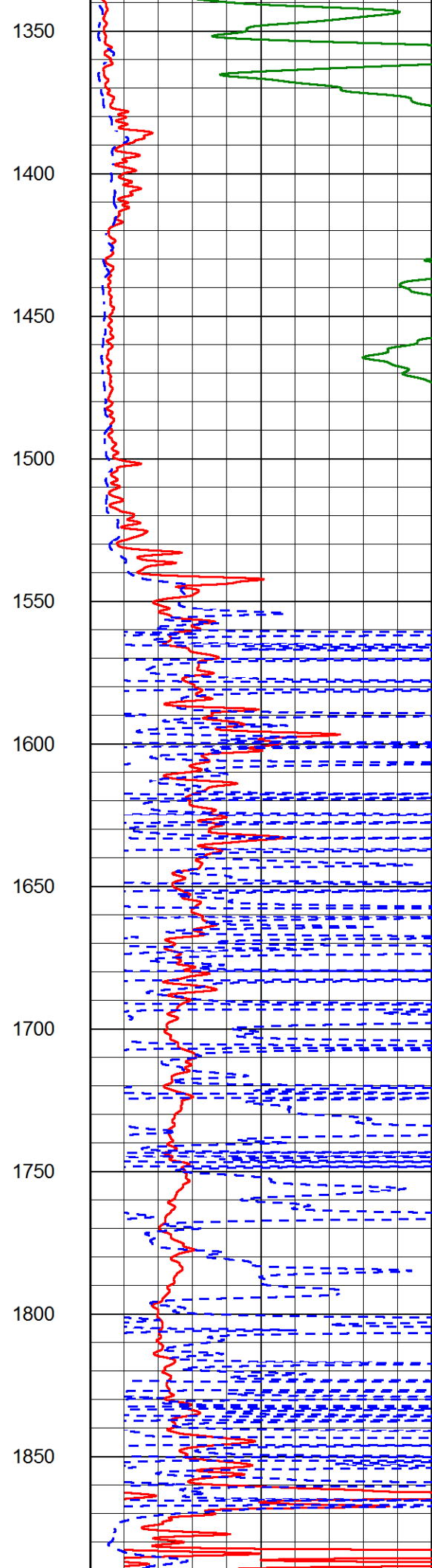
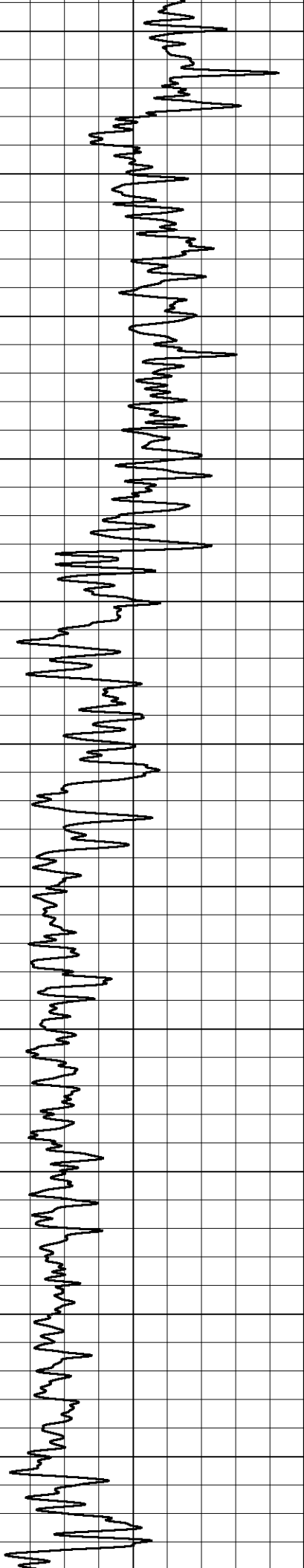


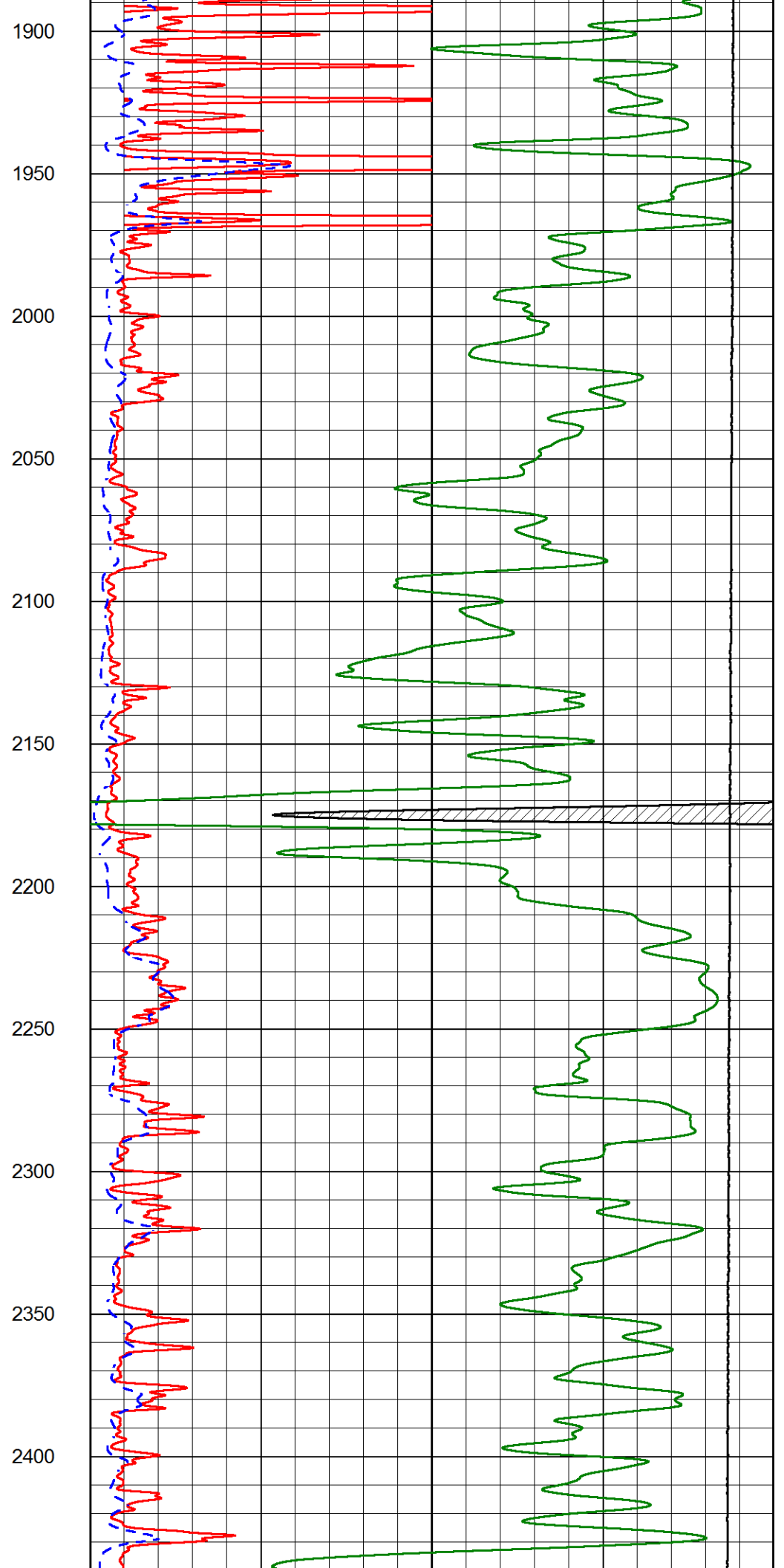
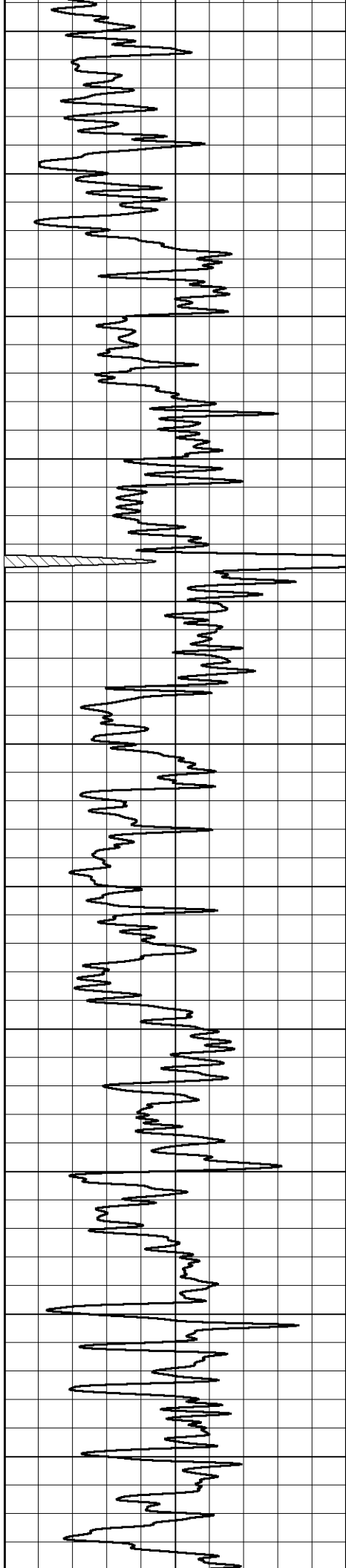
# MAIN PASS

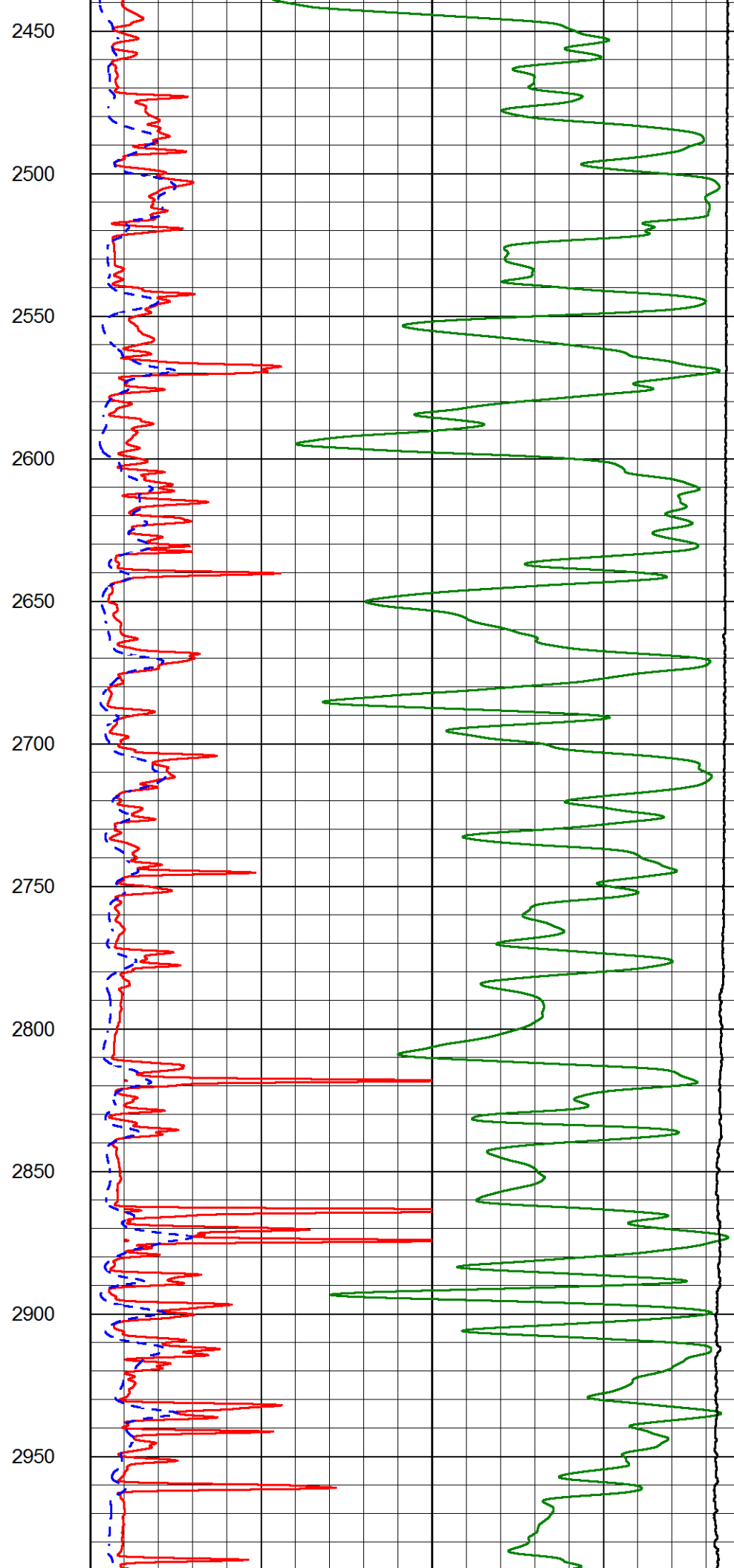
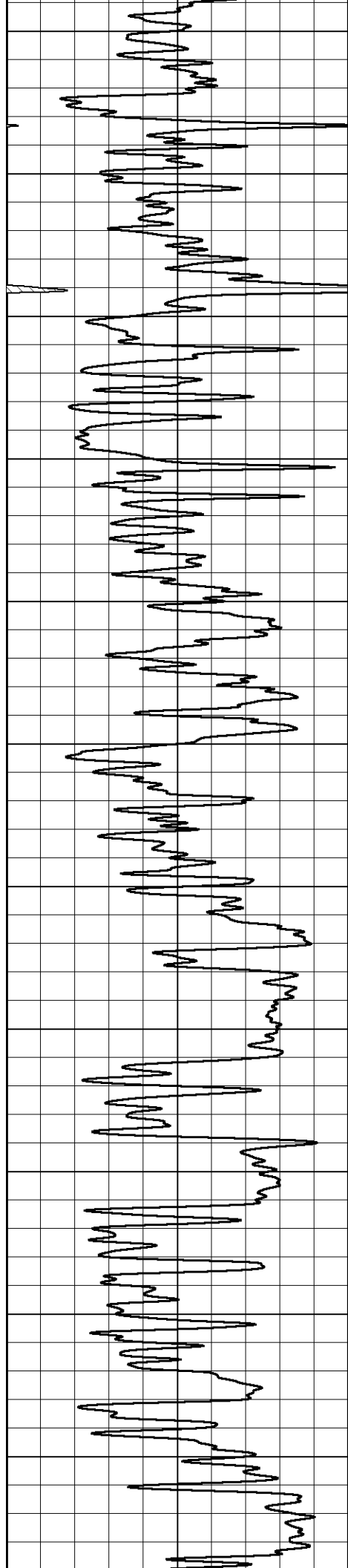
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 Presentation Format: dil2in  
 Dataset Creation: Mon Jul 24 02:47:03 2017  
 Charted by: Depth in Feet scaled 1:600

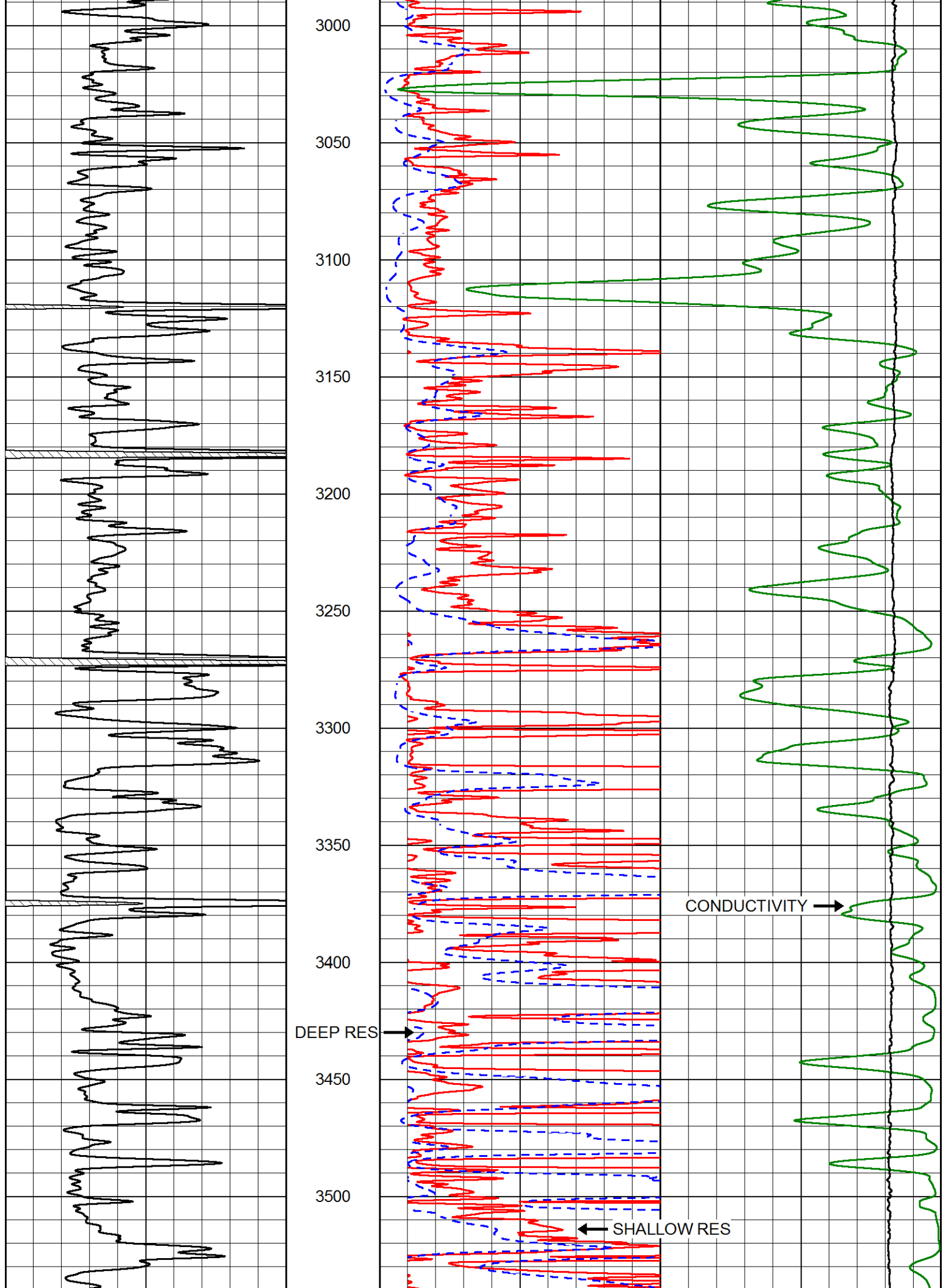
0	Gamma Ray (GAPI)	150	1000	Conductivity (mmho/m)	0
			15000	Line Tension (lb)	0
			0	Shallow Resistivity (Ohm-m)	50
			0	Deep Resistivity (Ohm-m)	50
				Shallow Resistivity	
			50	(Ohm-m)	500
			50	Deep Resistivity (Ohm-m)	500

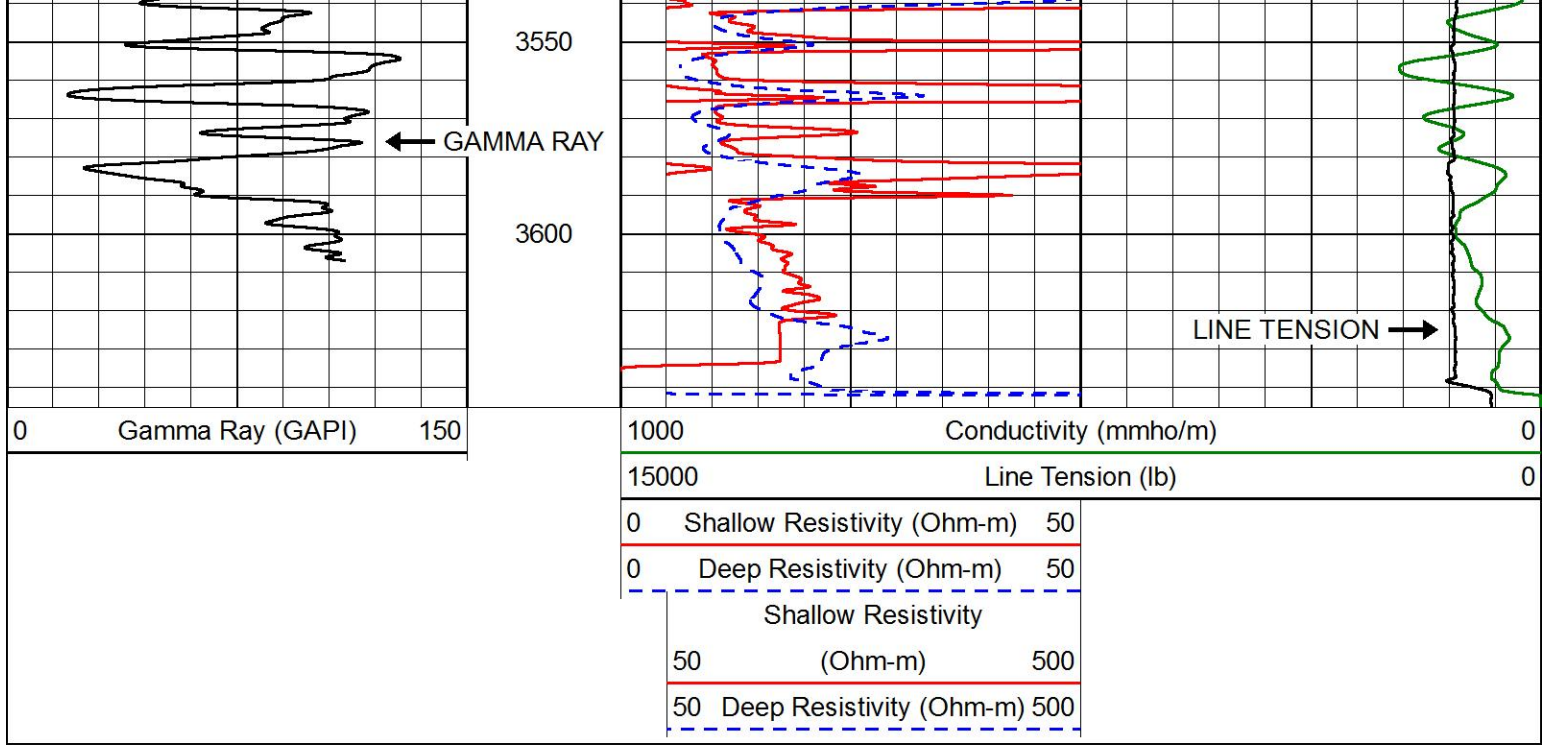






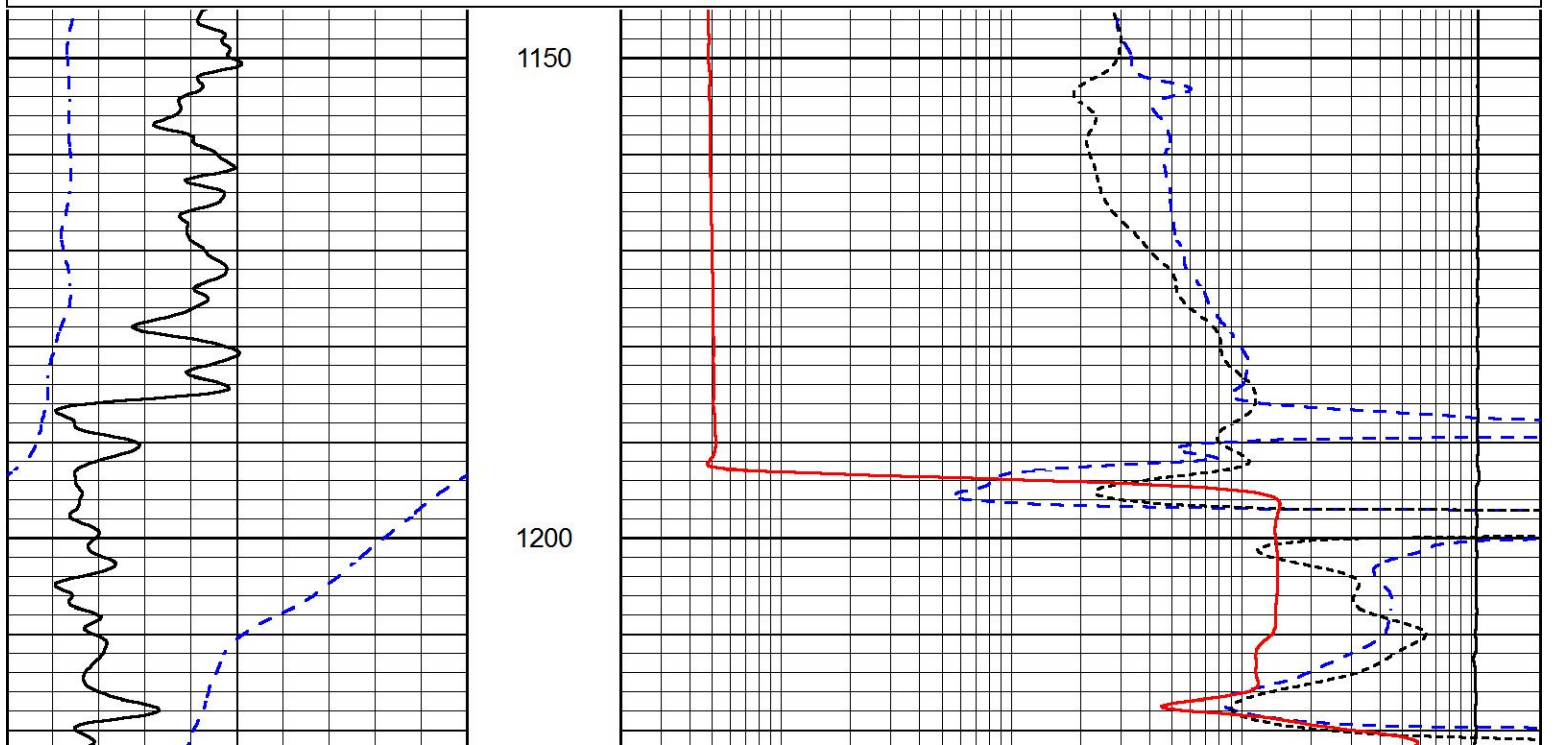


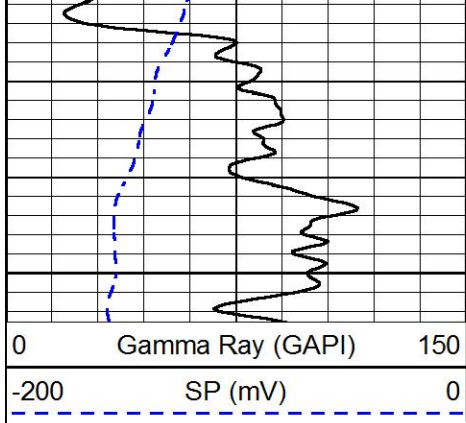




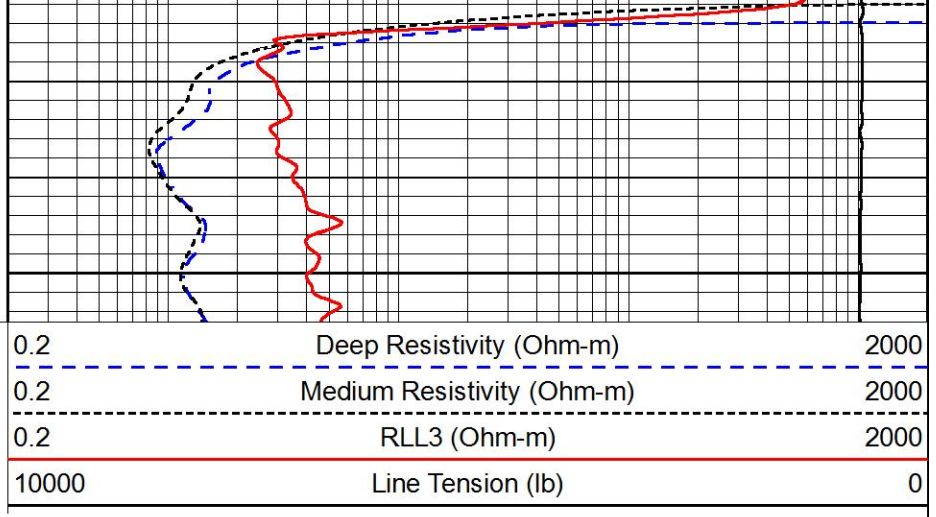
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 Presentation Format dil  
 Dataset Creation Mon Jul 24 02:47:03 2017  
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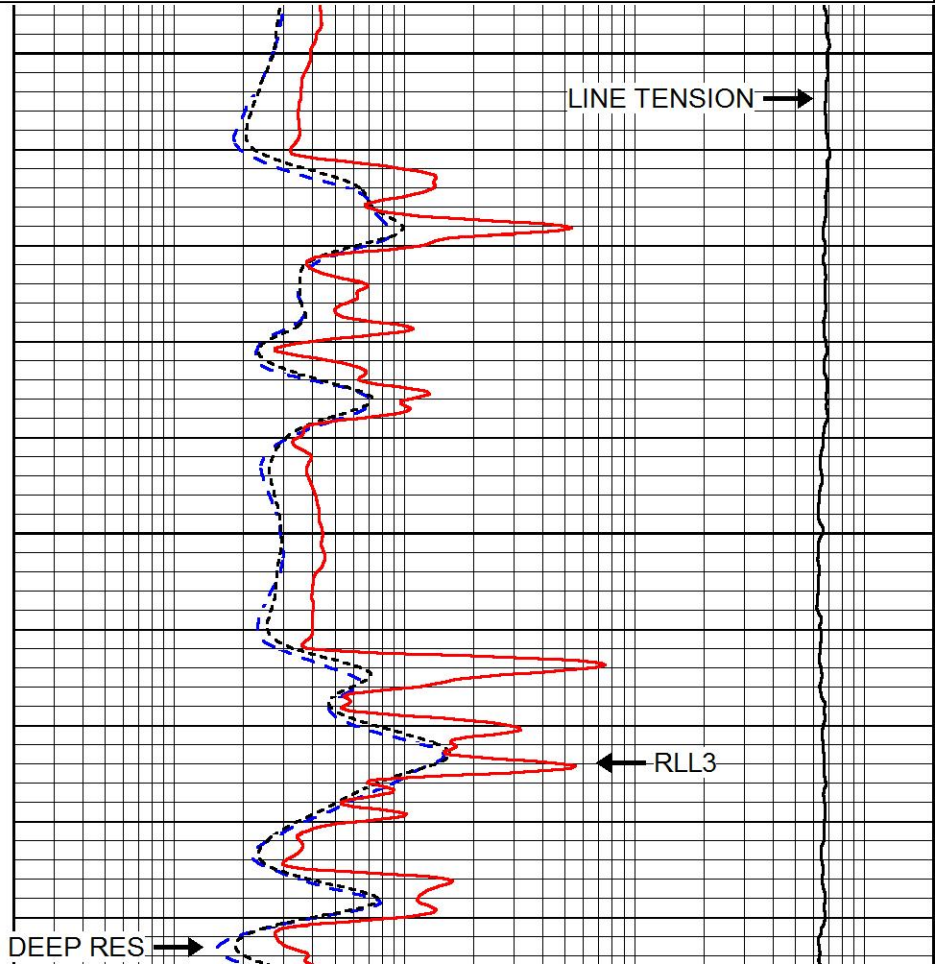
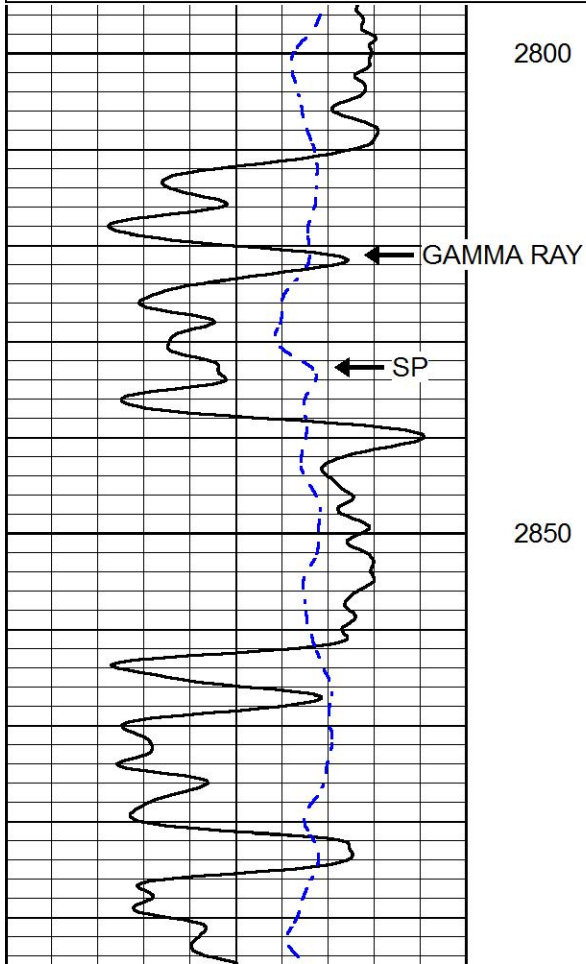
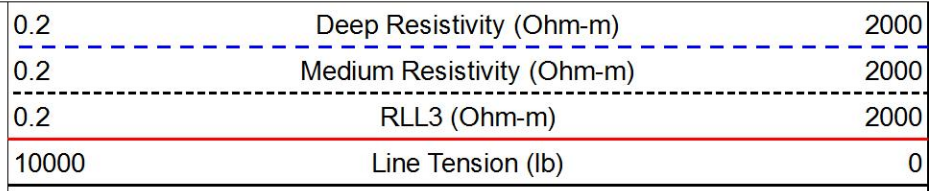
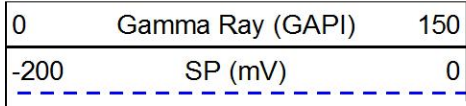


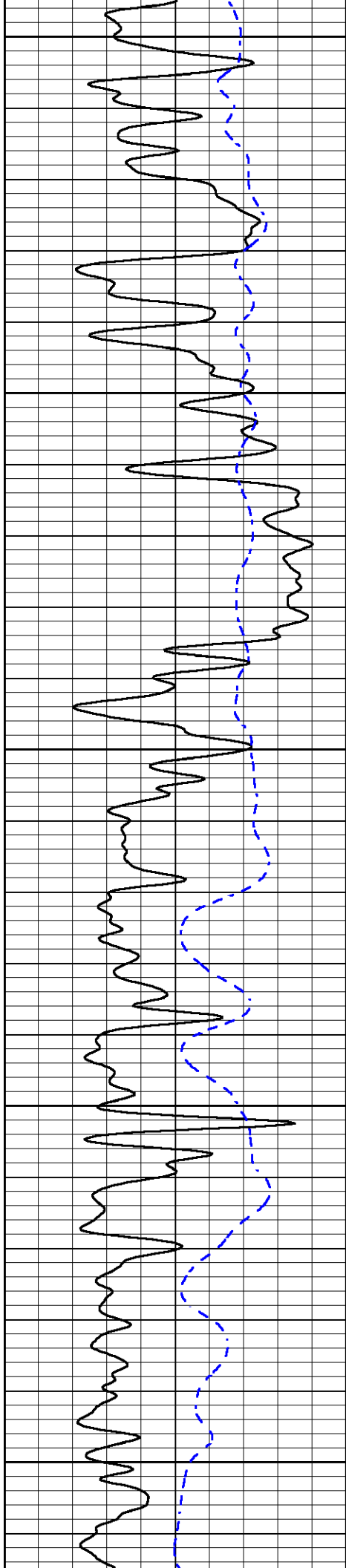
1250



# MAIN PASS

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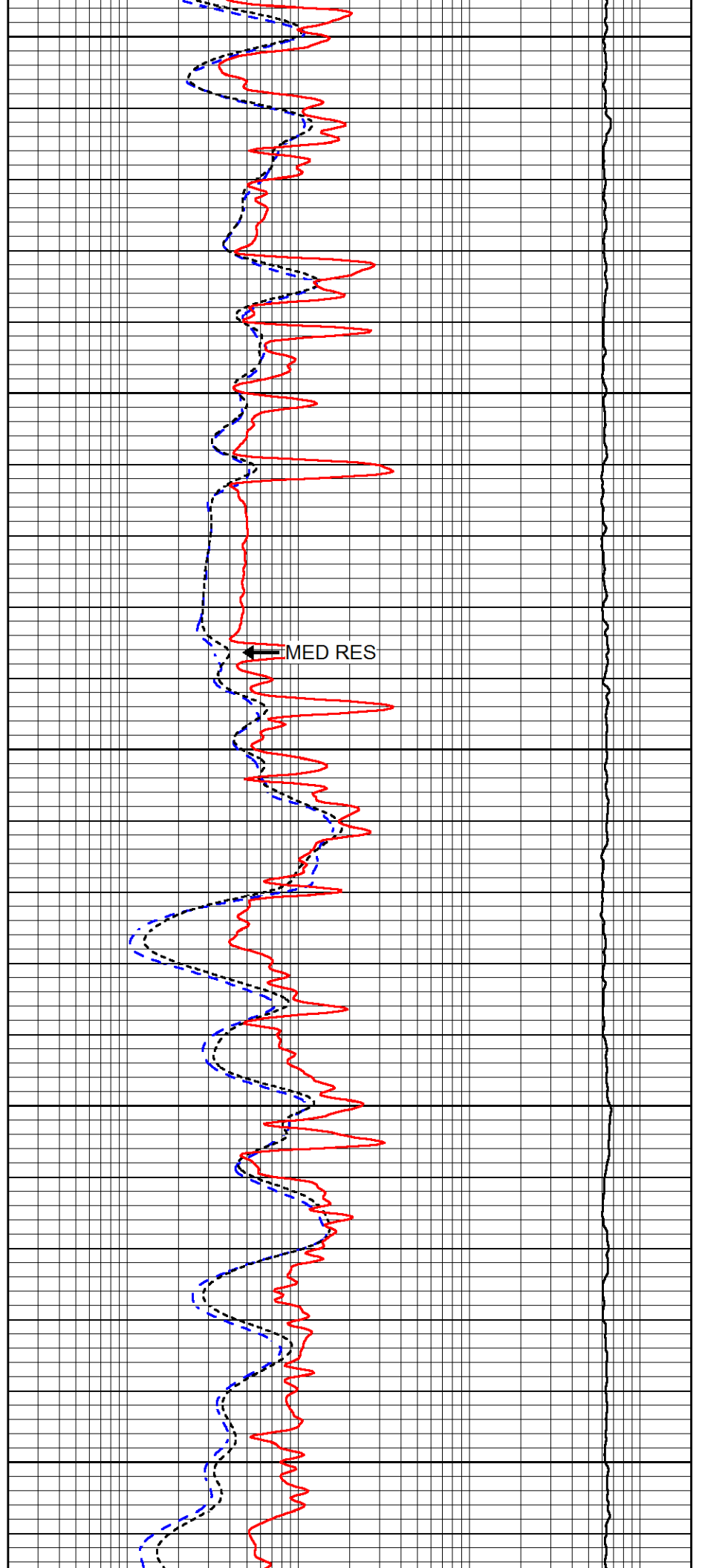
2900

2950

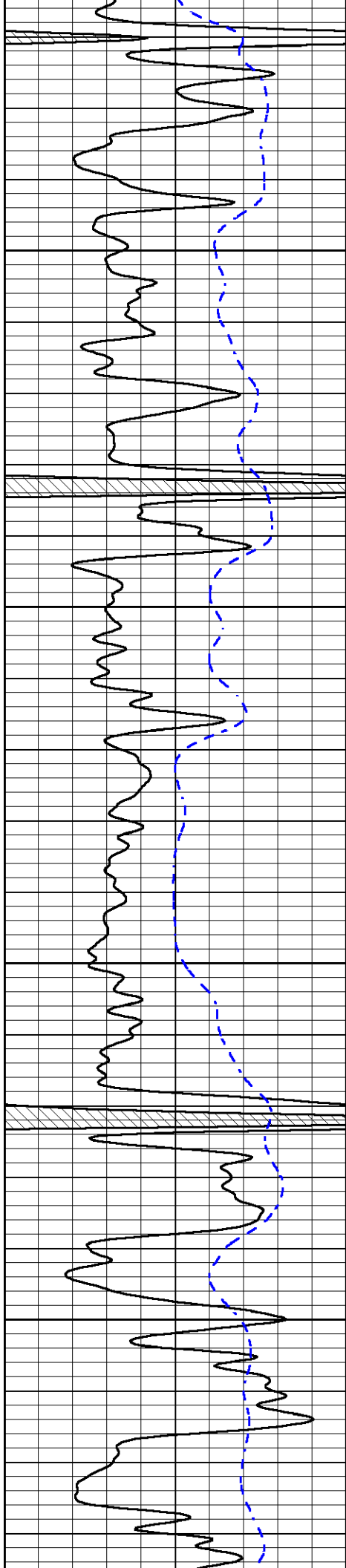
3000

3050

3100



MED RES

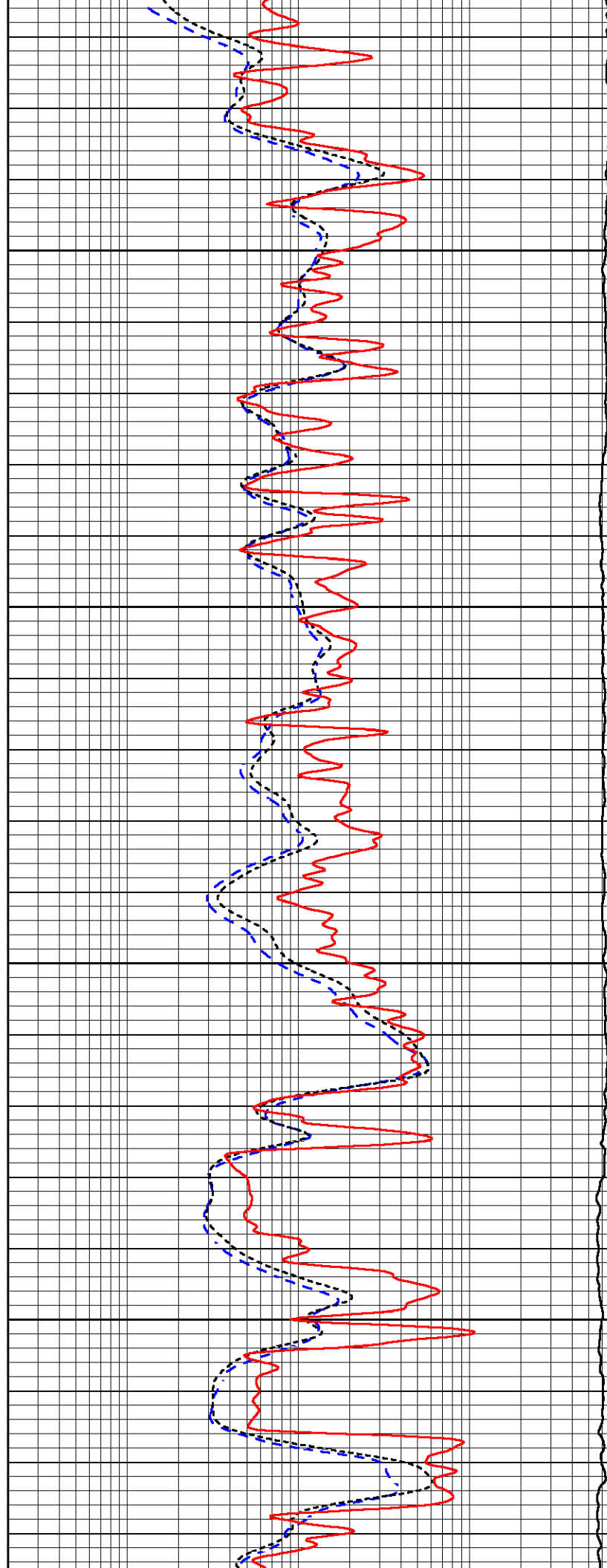


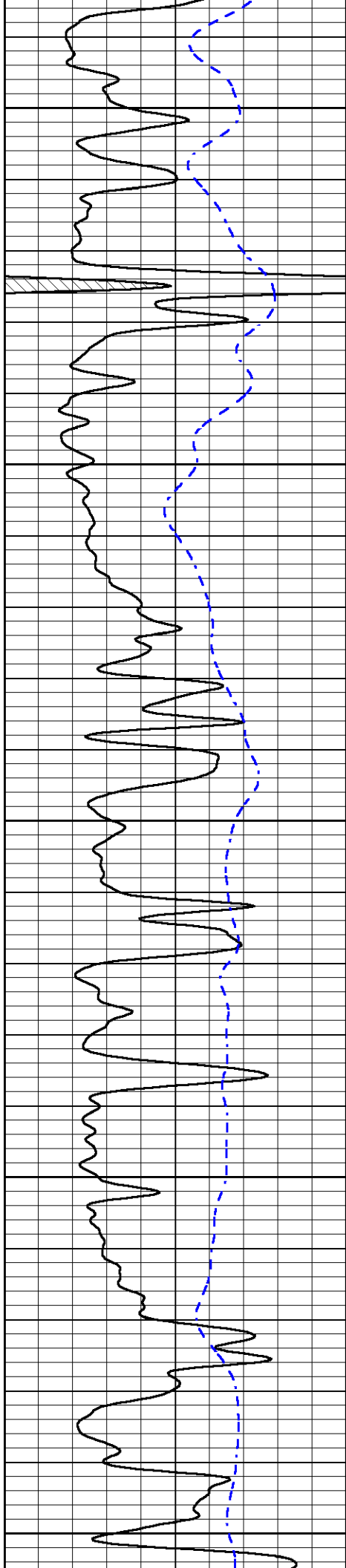
3150

3200

3250

3300





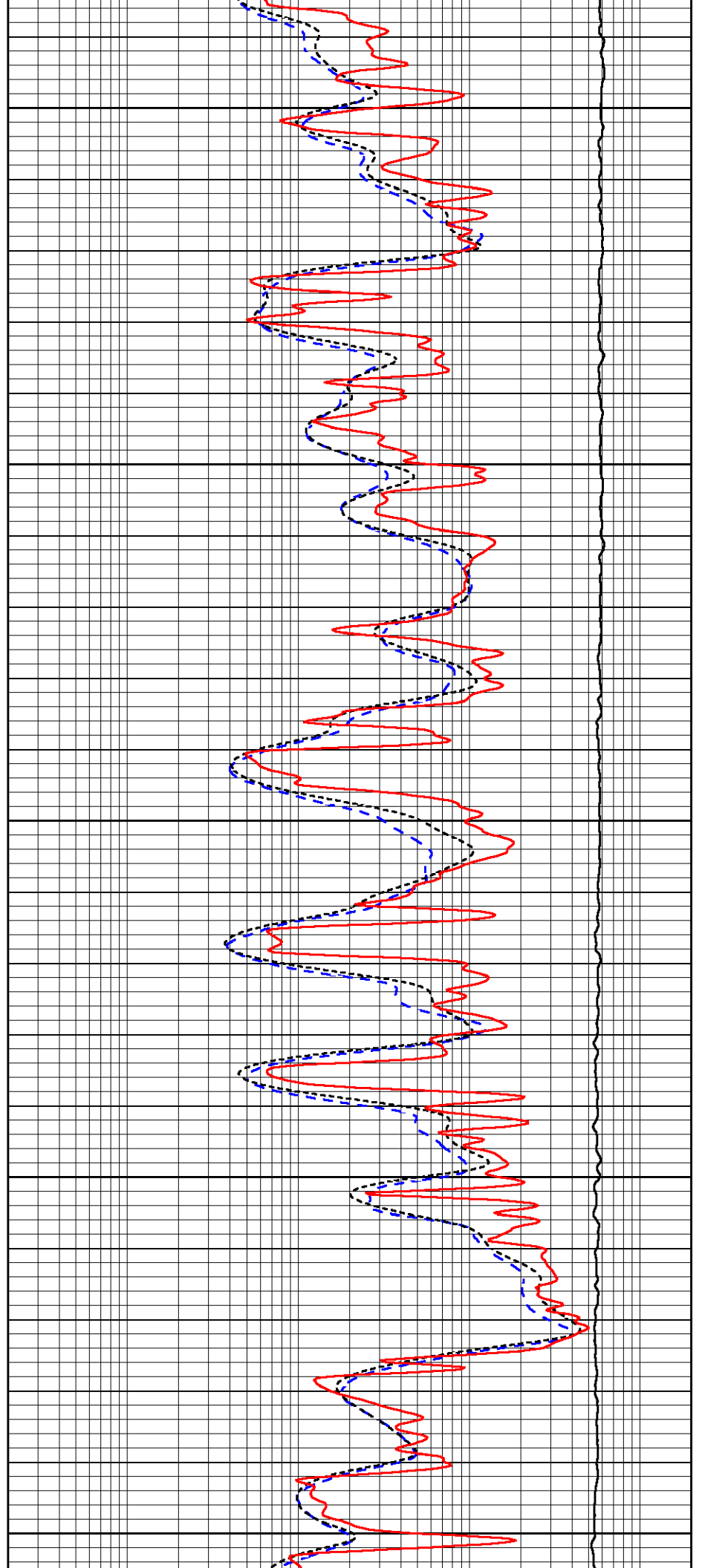
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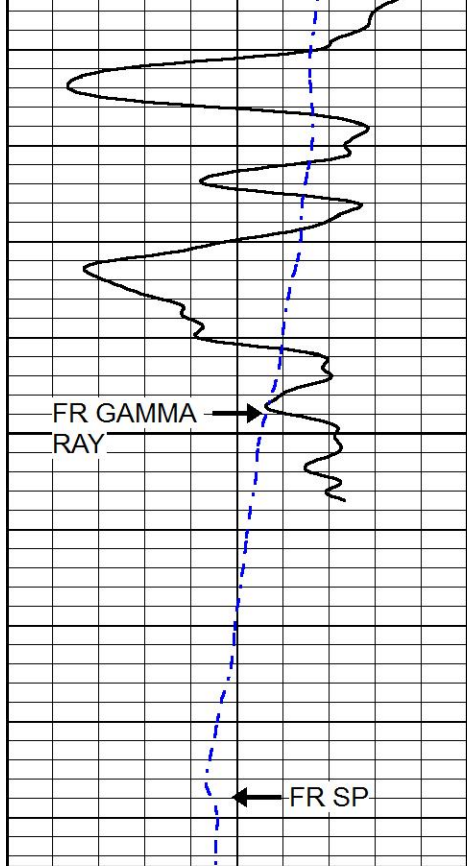
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3450

3500

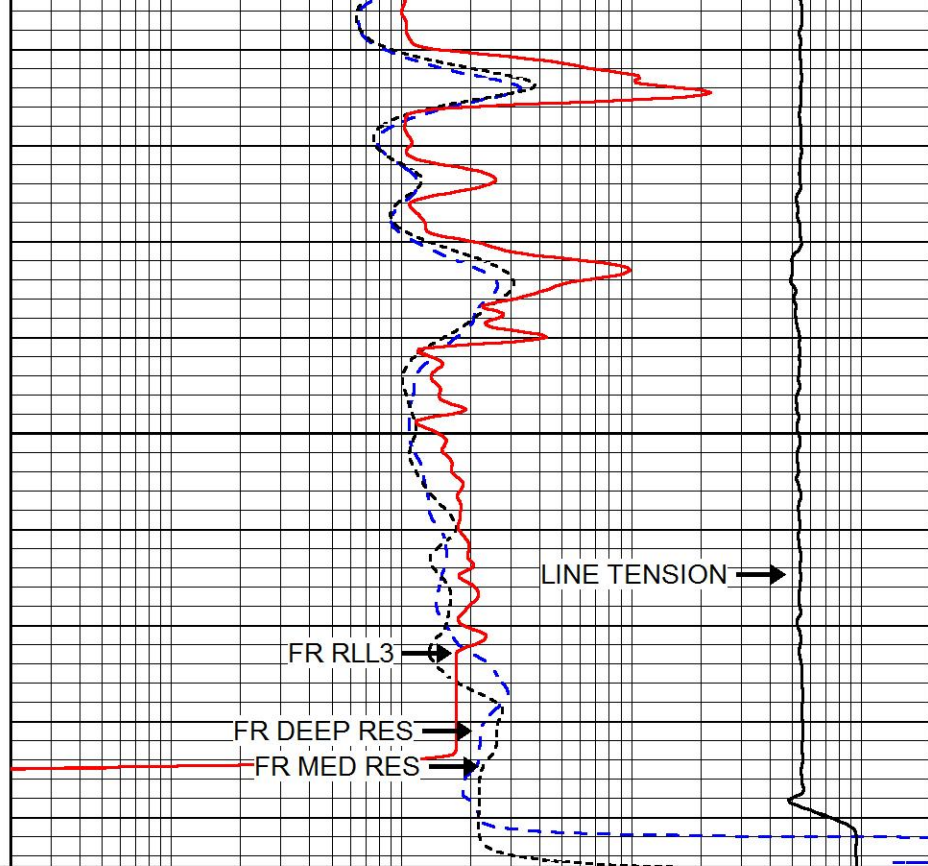
3550





3600

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
10000	Line Tension (lb)	0

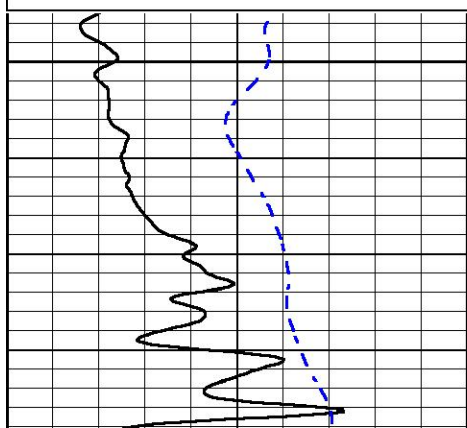


# REPEAT SECTION

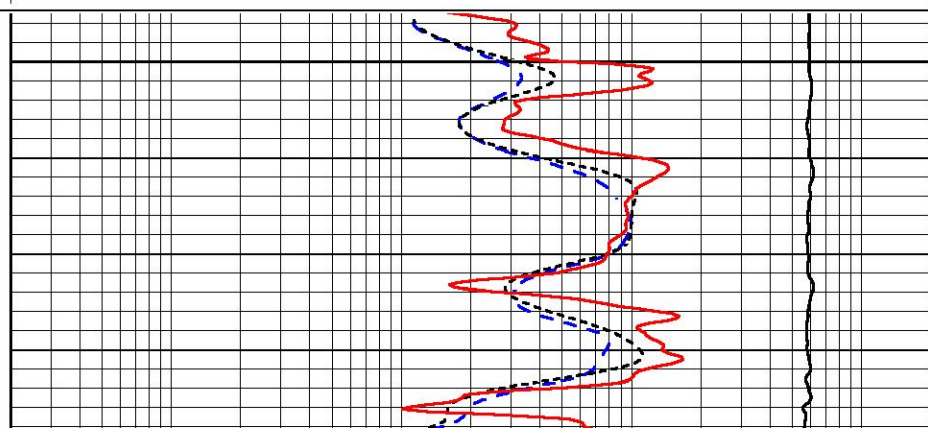
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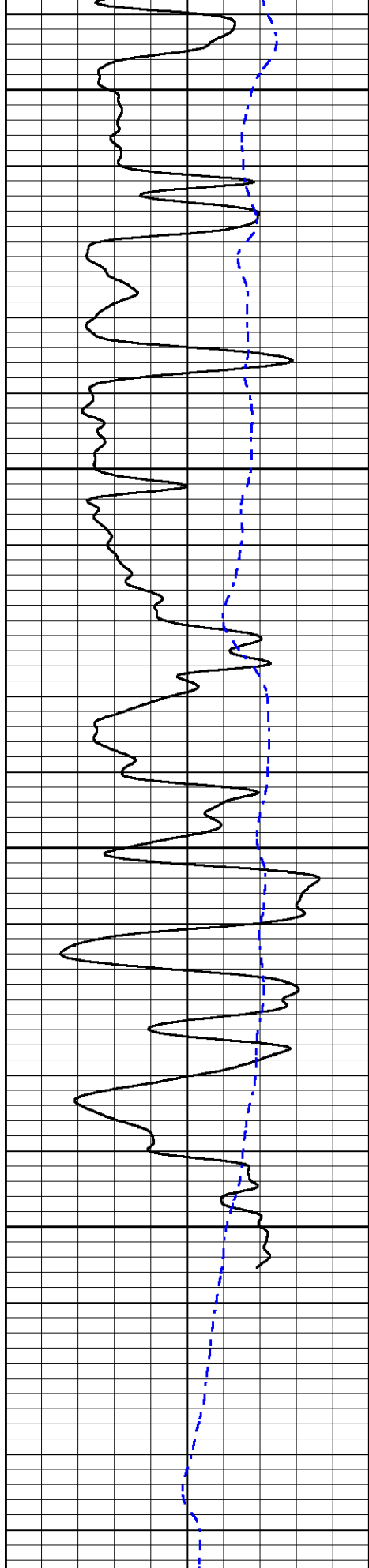
0	Gamma Ray (GAPI)	150
-200	SP (mV)	0

0.2	Deep Resistivity (Ohm-m)	2000
0.2	Medium Resistivity (Ohm-m)	2000
0.2	RLL3 (Ohm-m)	2000
10000	Line Tension (lb)	0



3400





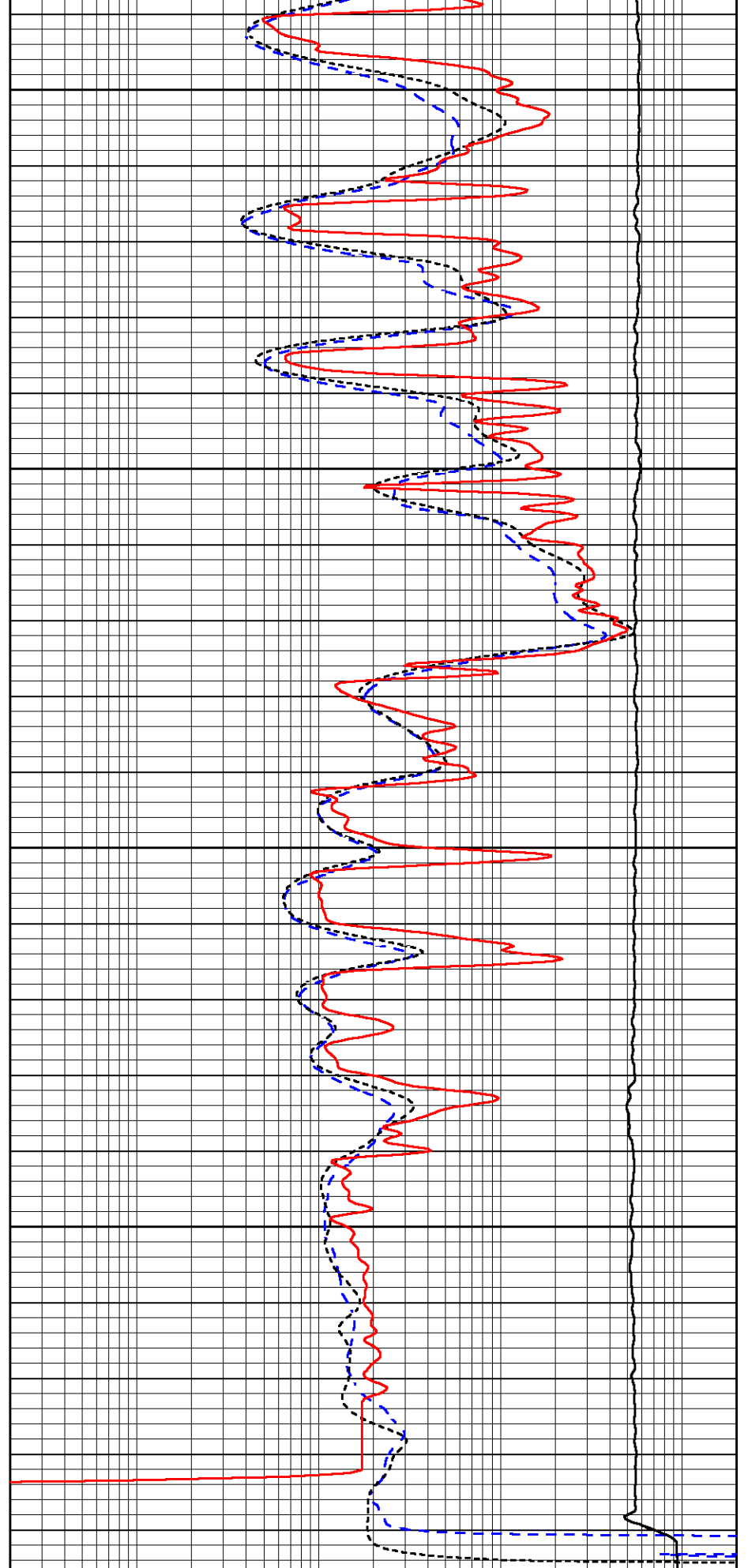
3450

3500

3550

3600

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

## Calibration Report

Database File tdi\_engel north\_3.db  
 Dataset Pathname STKML/pass3.3  
 Dataset Creation Mon Jul 24 02:01:45 2017

## Dual Induction Calibration Report

Serial-Model: PSI 91-M&W  
 Calibration Performed: Thu Jul 13 13:00:25 2017

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop		Gain	Offset
Deep	166.796	835.089	0.000	255.800	mmho/m	0.430	-30.500
Medium	142.009	1348.560	0.000	255.800	mmho/m	0.360	-30.000

## Microlog Calibration Report

Serial-Model: PSI-01-PSIML  
 Performed: Thu Jul 13 13:00:38 2017

	Readings		References			Results	
	Zero	Cal	Zero	Cal		m	b
Normal	0.0000	1.0000	0.0000	1.0000	Ohm-m	30000.0000	-1.0000
Inverse	0.0000	1.0000	0.0000	1.0000	Ohm-m	30000.0000	-0.3000
Caliper	1.0001	1.1397	6.5000	18.5000	in	100.0000	-97.2500

## Compensated Density Calibration Report

Serial-Model: 90-1031-M&W  
 Source / Verifier: 16955B / 2ci  
 Master Calibration Performed: Thu Jul 13 13:00:48 2017

## Master Calibration

	Density		Far Detector	Near Detector	
Magnesium	1.755	g/cc	4903.44	6153.79	cps
Aluminum	2.685	g/cc	934.50	4021.31	cps
Spine Angle = 75.61			Density/Spine Ratio = 0.543		
	Size		Reading		
Small Ring	8.00	in	1.84		
Large Ring	22.00	in	1.46		

## Compensated Neutron Calibration Report

Serial Number: 207-MW  
 Tool Model: M&W  
 Calibration Performed: Sat Jun 17 10:30:30 2017

Detector	Readings	Target	Normalization
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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	
Tool Model:	M&W	
Calibration Performed:	Thu Jul 13 13:01:02 2017	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	cps
Calibrator Reading:	1.0	cps
Sensitivity:	0.6000	GAPI/cps



**PIONEER**

Pioneer Energy Services

Company	TDI, INC.
Well	ENGEL NORTH #3
Field	SCHOENCHEN
County	ELLIS
State	KANSAS