



# MICRORESISTIVITY LOG

**Company** TDI, INC.  
**Well** FURTHMYER #4  
**Field** DREILING EAST  
**County** ELLIS **State** KANSAS

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**Location:** API #: 15-051-26935-00-00  
 330' FSL & 1190' FWL  
 SEC 23 TWP 14S RGE 16W  
 Permanent Datum GROUND LEVEL Elevation 1888'  
 Log Measured From KELLY BUSHING  
 Drilling Measured From KELLY BUSHING  
 Other Services CNL/CDL DIL  
 Elevation K.B. 1893'  
 D.F. N/A  
 G.L. 1888'

Date	11/15/2018
Run Number	TWO
Depth Driller	3510'
Depth Logger	3502'
Bottom Logged Interval	3501'
Top Log Interval	2500'
Casing Driller	8.625" @ 215'
Casing Logger	213'
Bit Size	7.875"
Type Fluid in Hole	CHEMICAL
Salinity, ppm CL	4600
Density / Viscosity	9.0 53
pH / Fluid Loss	10.5 6.0
Source of Sample	FLOWLINE
Rm @ Meas. Temp	.65 @ 65
Rmt @ Meas. Temp	.49 @ 65
Rmc @ Meas. Temp	.88 @ 65
Source of Rmf / Rmc	CHARTS
Rm @ BHT	.38 @ 111
Operating Rig Time	2 HOURS
Max Rec. Temp. F	111 DEGF
Equipment Number	108
Location	HAYS
Recorded By	J. HENRICKSON
Witnessed By	TOM DENNING

<<< Fold Here >>>

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.

WALKER EXIT I 70  
3 1/2 SOUTH, 1/2 EAST, NORTH INTO

Log Measured From: KELLY BUSHING 5 Ft. Above Permanent Datum

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www.pioneerenergy.com 785-625-3858

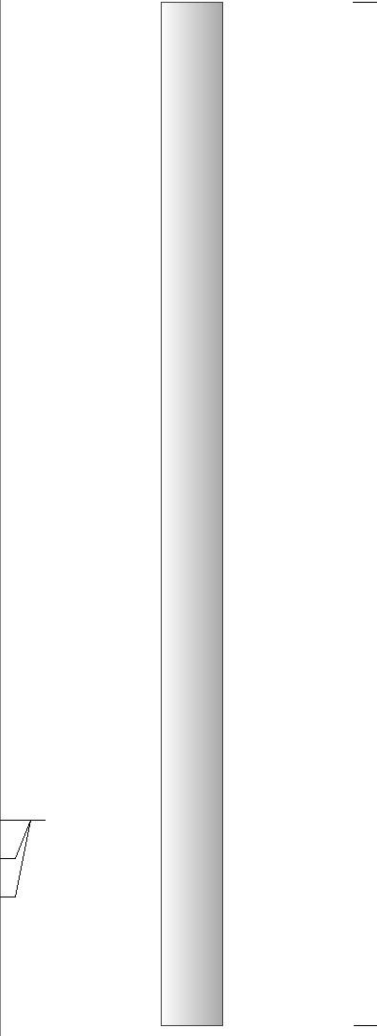

<b>Your Pioneer Energy Services Crew</b> Engineer: J. HENRICKSON Operator: Operator: Operator:	<b>This Log Record Was Witnessed By</b> Primary Witness: TOM DENNING Secondary Witness: HERB DEINES Secondary Witness: Secondary Witness:
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# Log Variables

DatabaseC:\ProgramData\Warrior\Data\tdi\_furthmyer\_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	111	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	390	47	Off	0

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
						
			ML-Armadillo (Armadillo-1) Pengo micro log tool mandrel with Armadillo Electronics	5.00	3.50	100.00
MCAL	1.00					
MI	1.00					
MN	1.00					

Dataset: tdi\_furthmyer\_4.db: field/well/MICRO/pass2  
Total length: 5.00 ft  
Total weight: 100.00 lb  
O.D.: 3.50 in

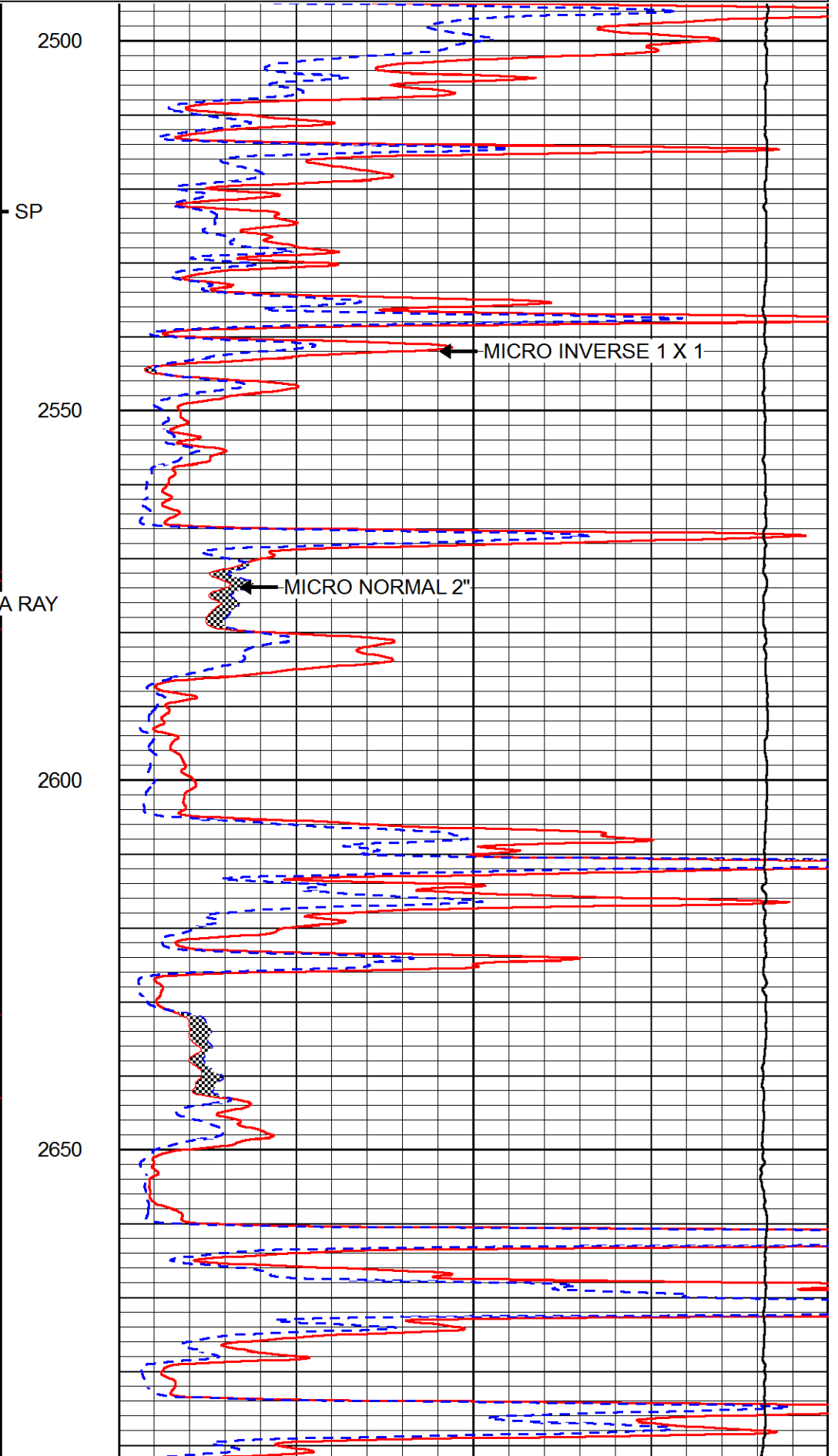
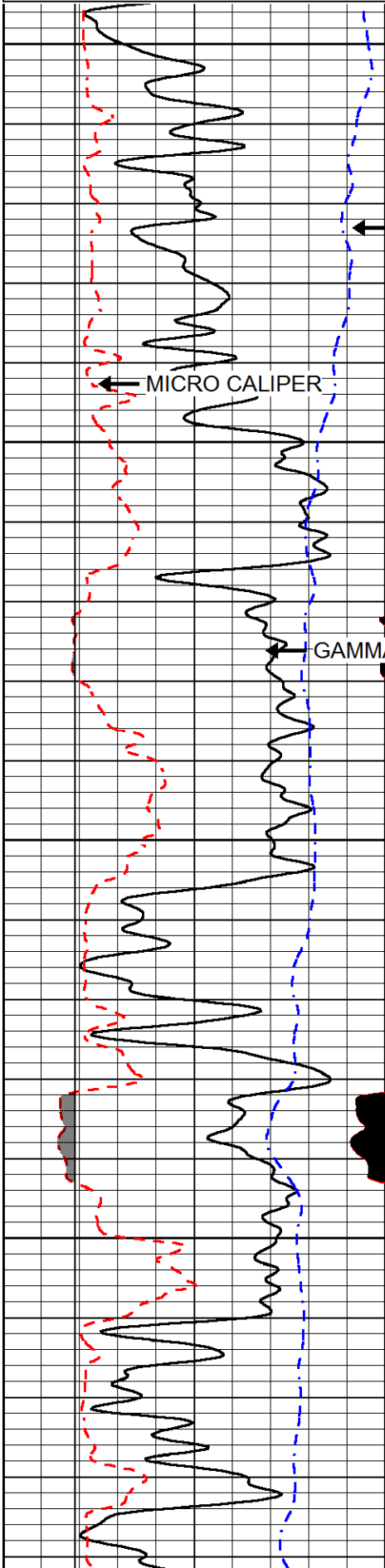


# MAIN PASS

Database File tdi\_furthmyer\_4.db  
Dataset Pathname stackml/pass3.1  
Presentation Format micro  
Dataset Creation Thu Nov 15 23:44:11 2018  
Charted by Depth in Feet scaled 1:240

0	GAMMA RAY (GAPI)	150
6	MICRO CALIPER (in)	16
6	BIT SIZE (in)	16
-200	SP (mV)	0

0	MICRO INVERSE 1 X 1 (Ohm-m)	40
0	MICRO NORMAL 2" (Ohm-m)	40
15000	LINE TENSION (lb)	0



2500

2550

2600

2650

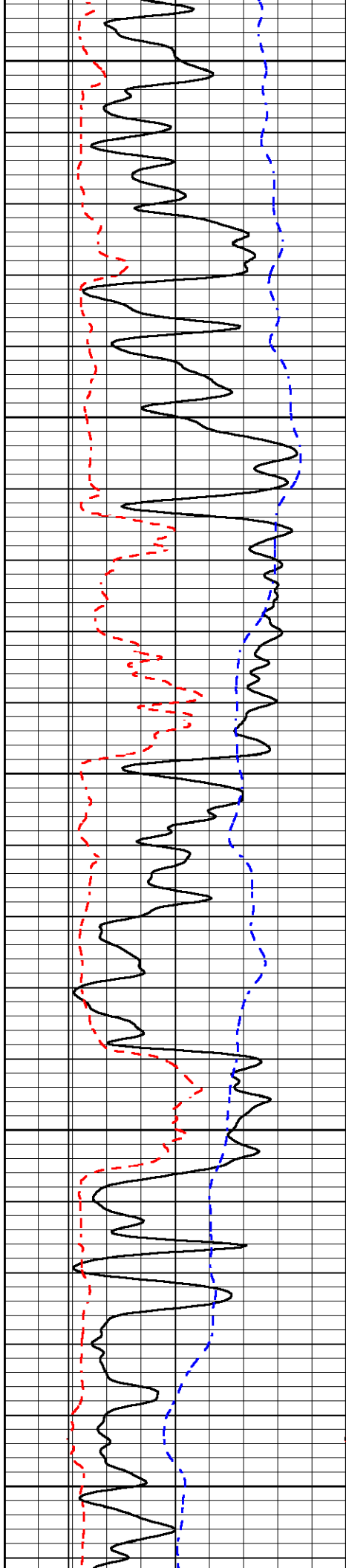
SP

MICRO CALIPER

GAMMA RAY

MICRO INVERSE 1 X 1

MICRO NORMAL 2"



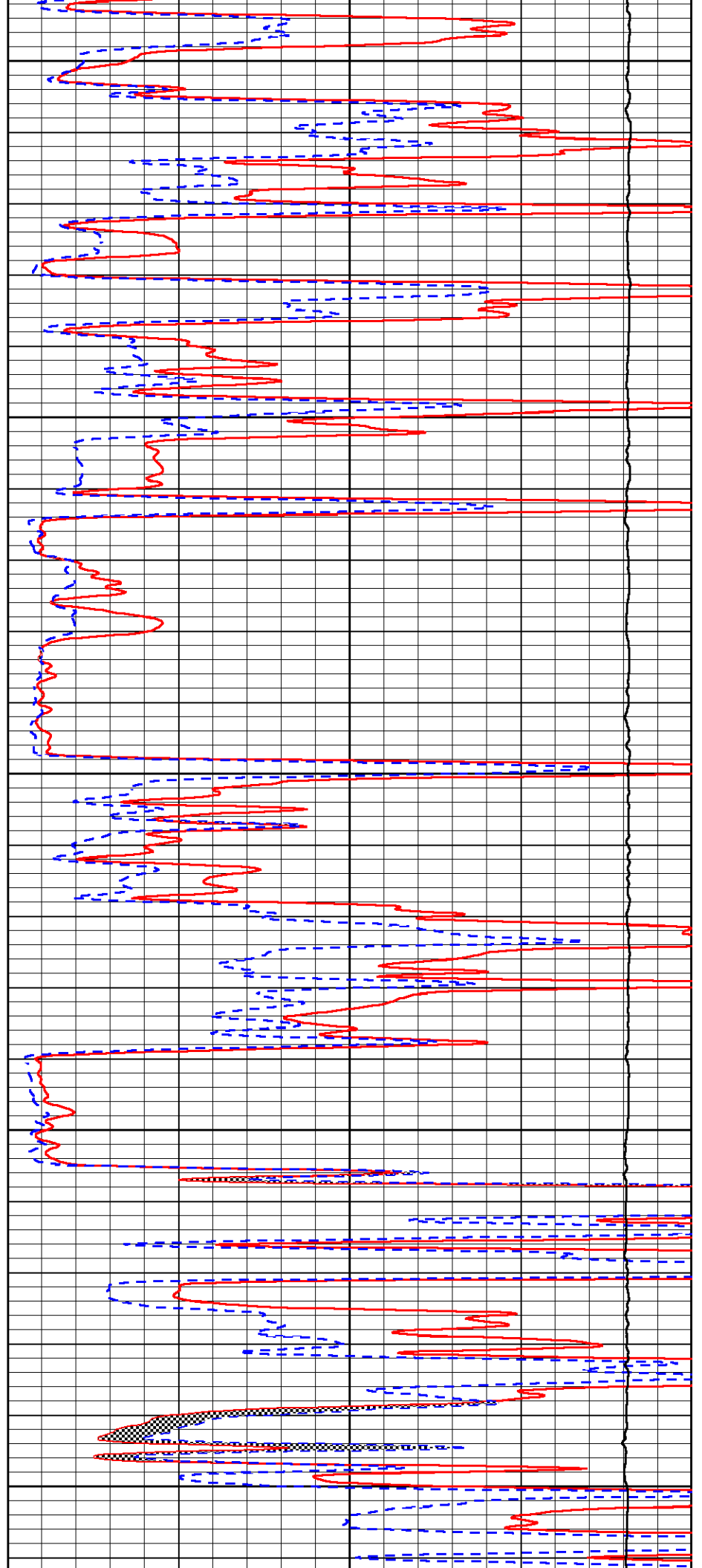
2700

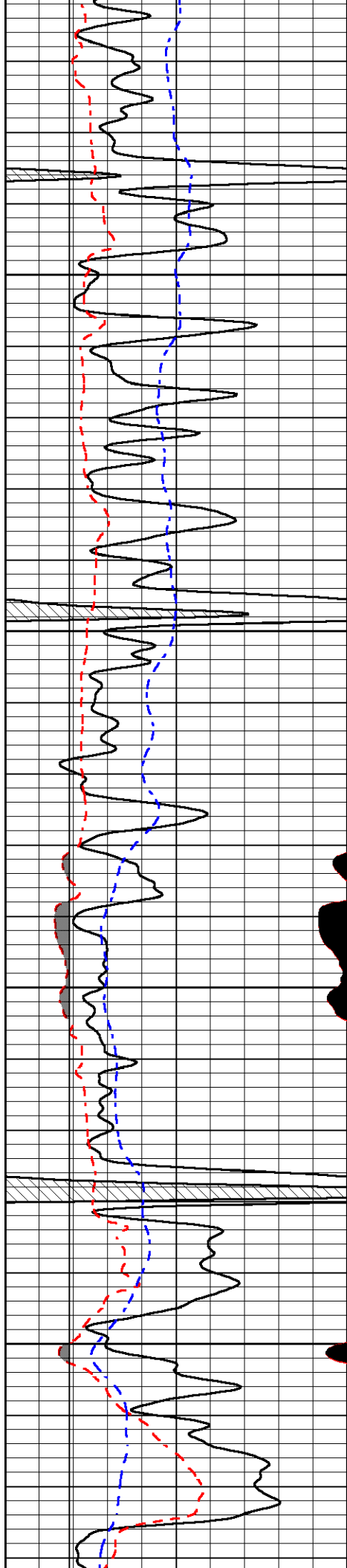
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2800

2850

2900



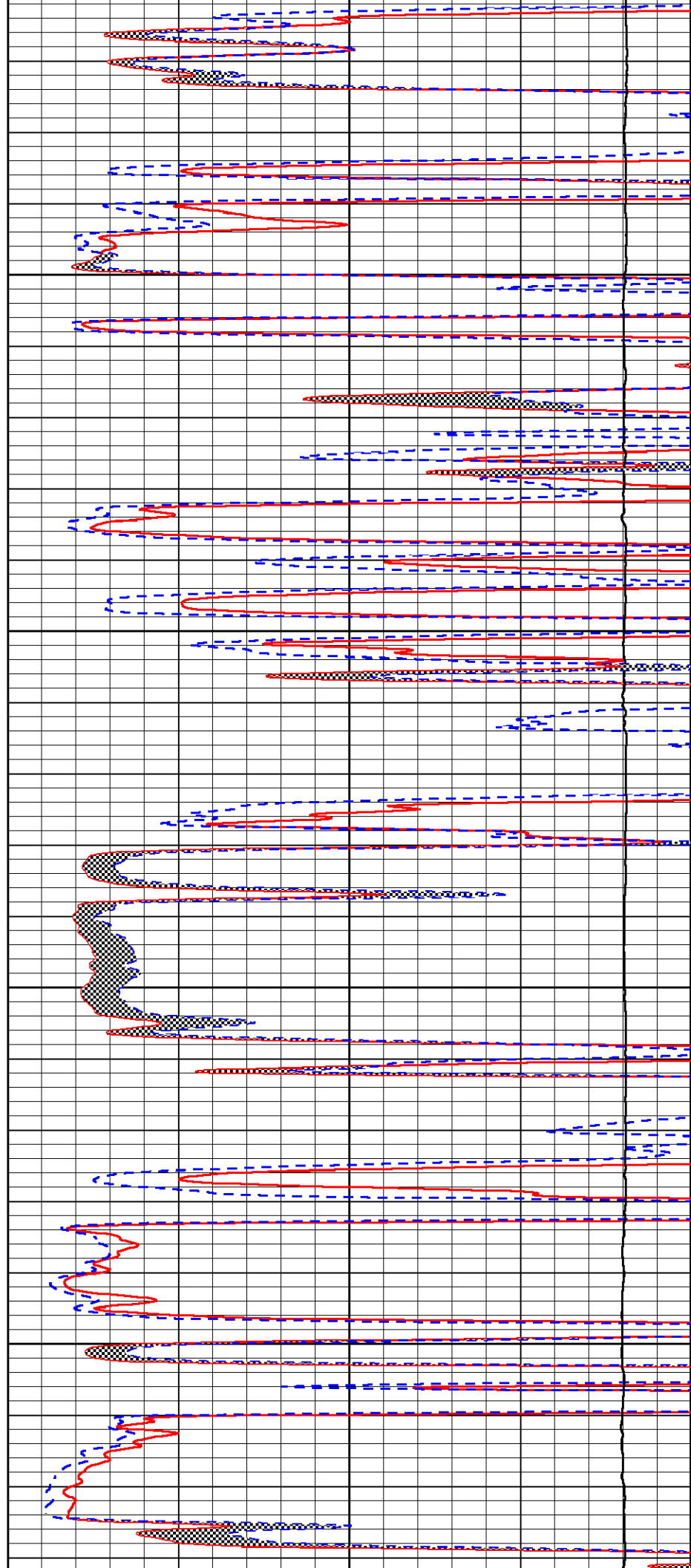


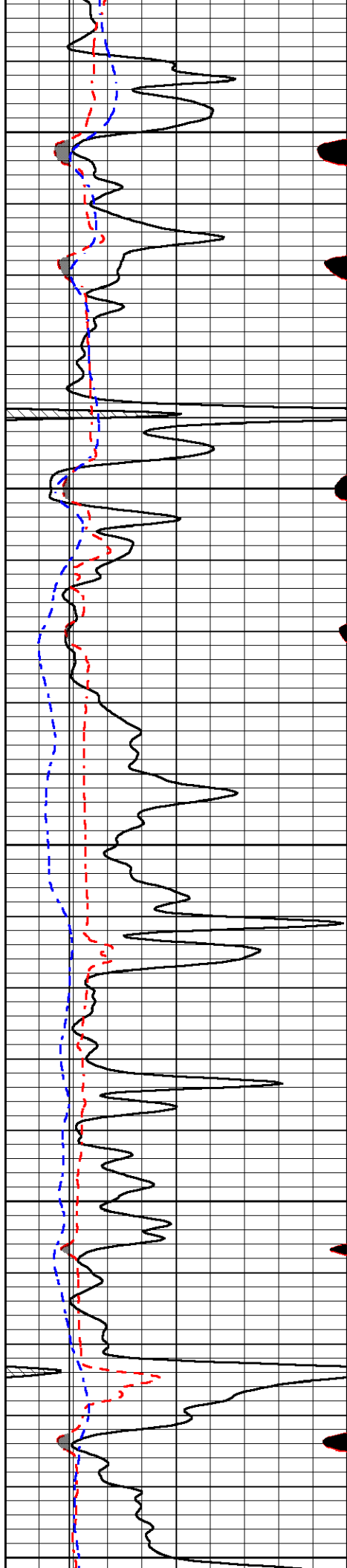
2950

3000

3050

3100





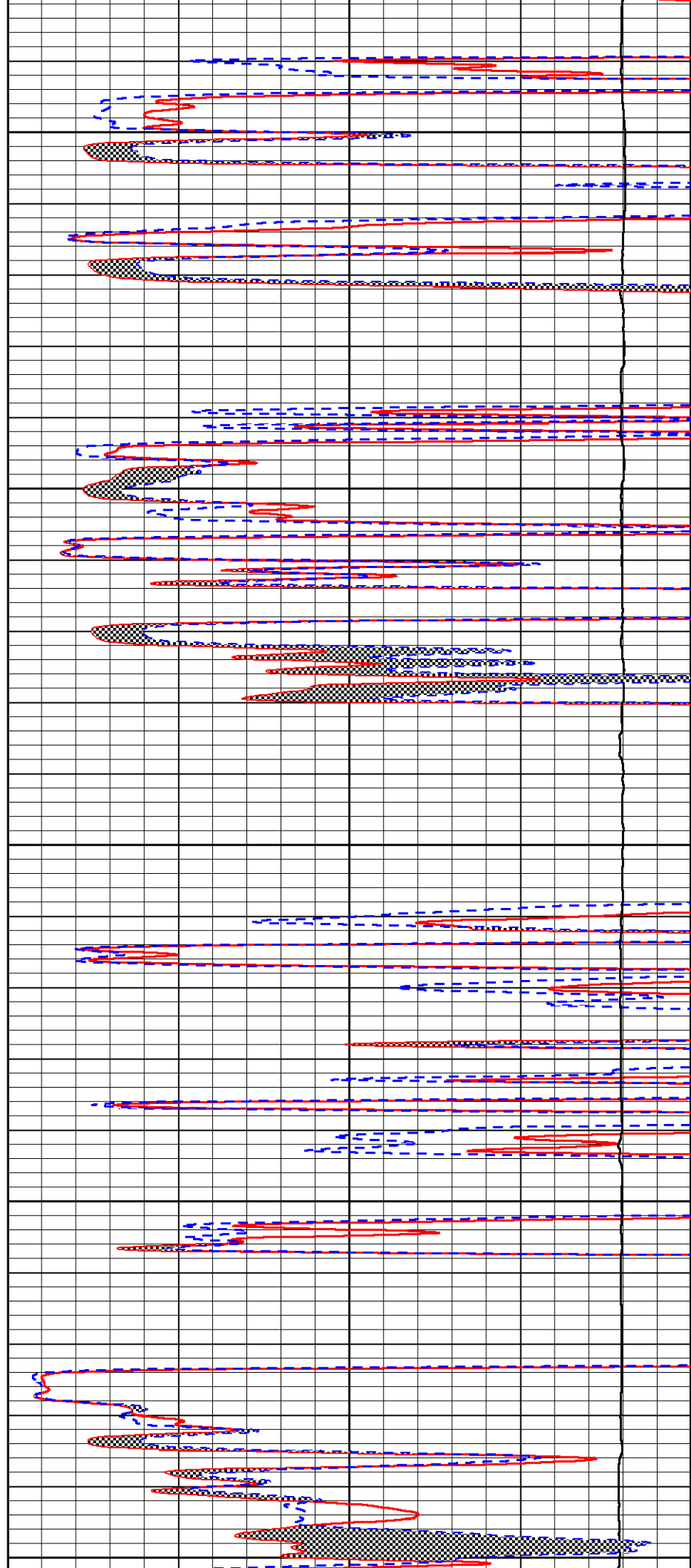
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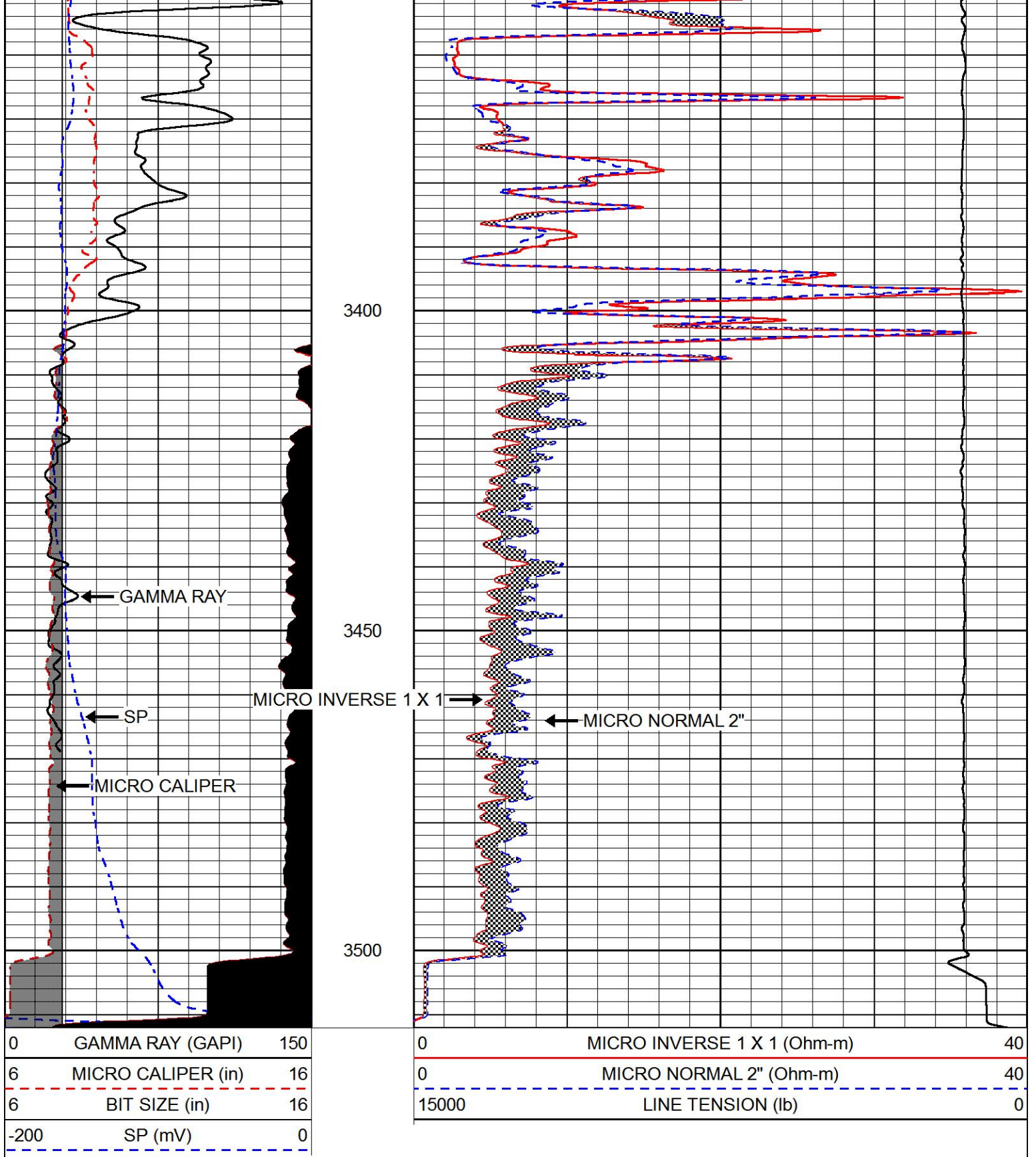
3200

3250

3300

3350



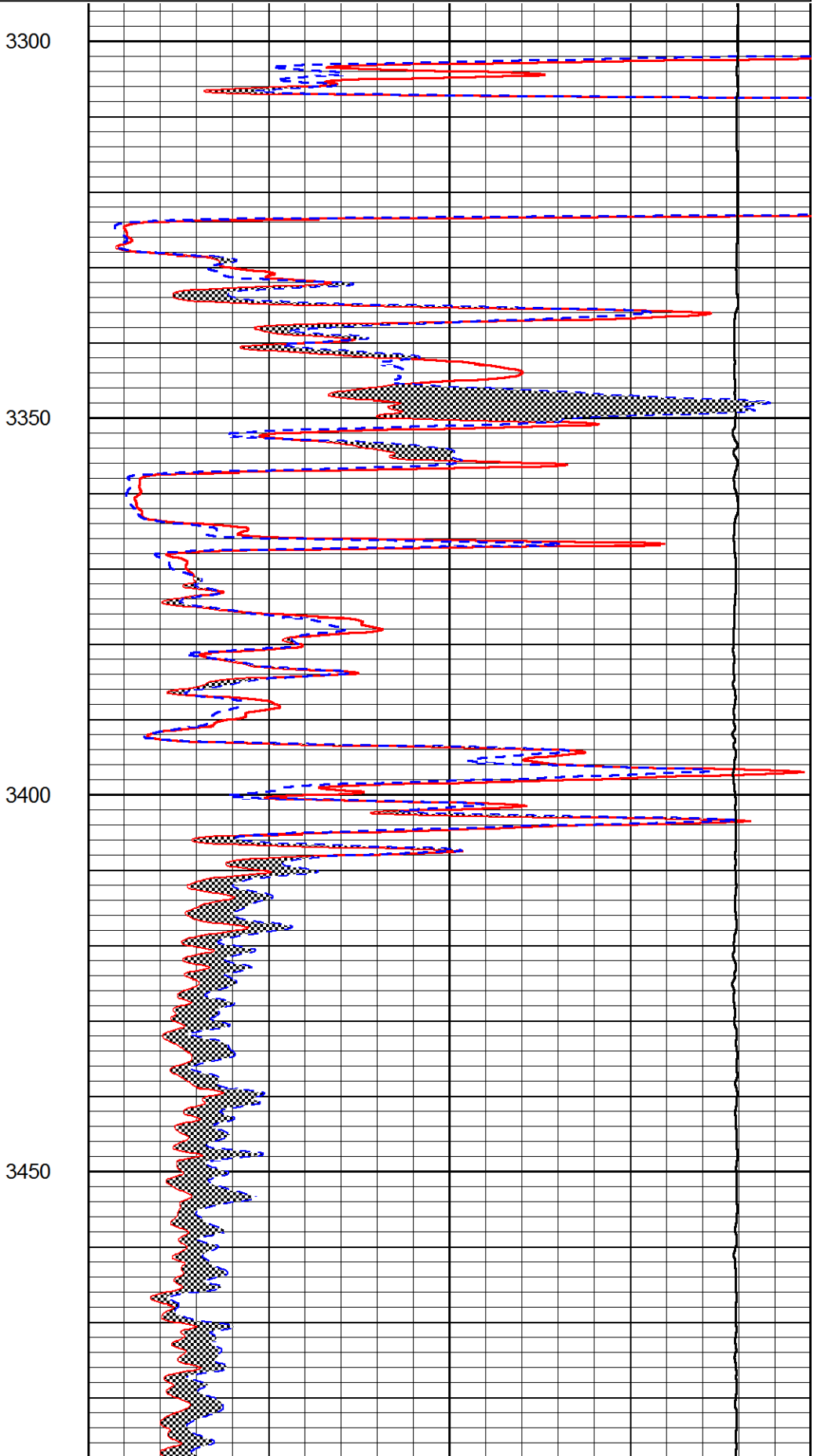
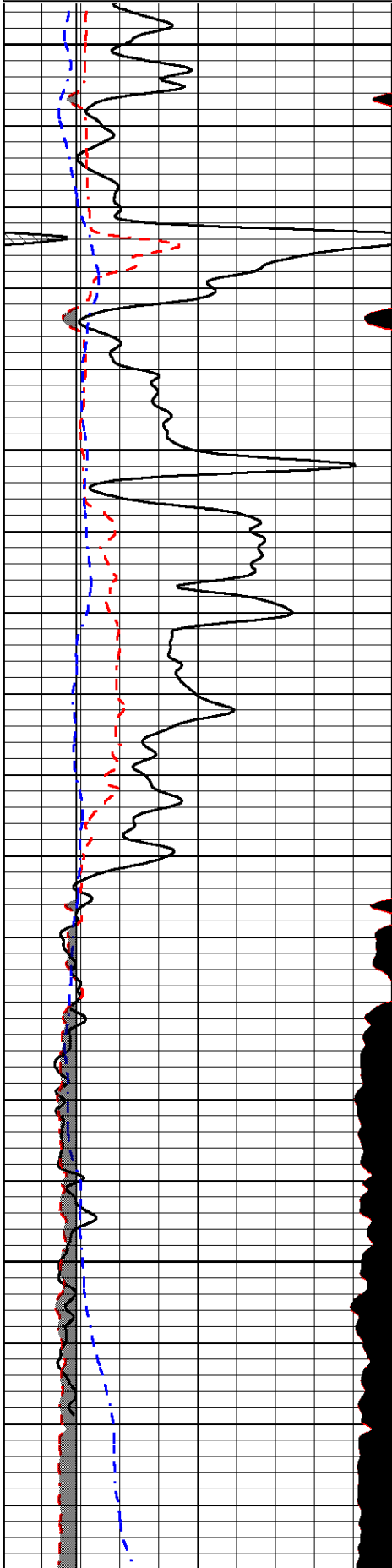


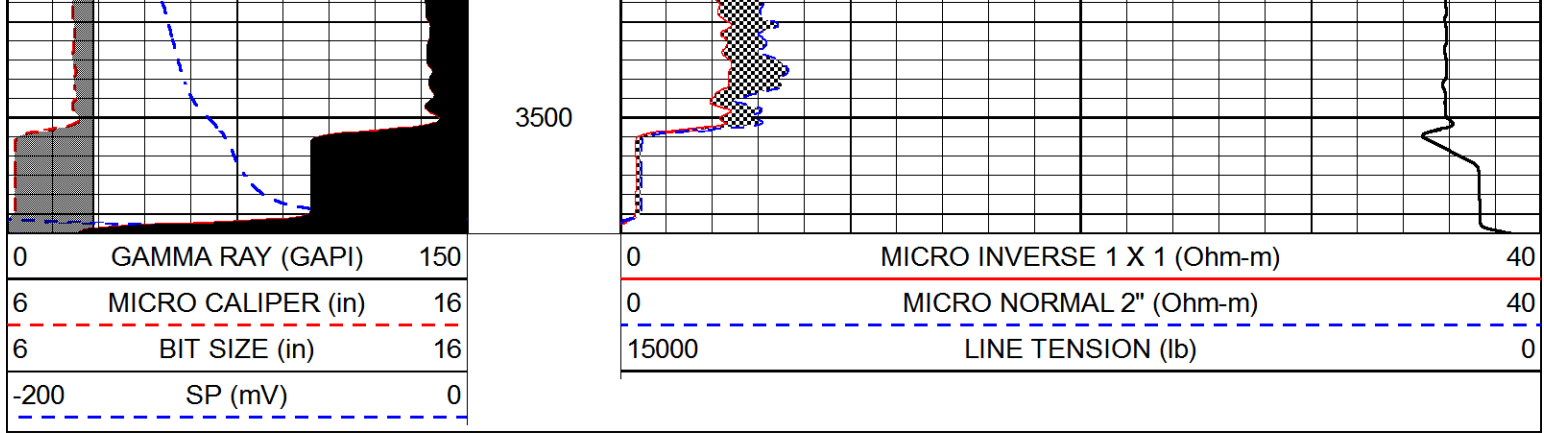
# REPEAT SECTION

Database File tdi\_furthmyer\_4.db  
 Dataset Pathname stackml/pass2.1  
 Presentation Format micro  
 Dataset Creation Thu Nov 15 23:51:08 2018

0	GAMMA RAY (GAPI)	150
6	MICRO CALIPER (in)	16
6	BIT SIZE (in)	16
-200	SP (mV)	0

0	MICRO INVERSE 1 X 1 (Ohm-m)	40
0	MICRO NORMAL 2" (Ohm-m)	40
15000	LINE TENSION (lb)	0





### Calibration Report

Database File tdi\_furthmyer\_4.db  
 Dataset Pathname stackml/pass3.1  
 Dataset Creation Thu Nov 15 23:44:11 2018

### Dual Induction Calibration Report

Serial-Model: 976-M&W  
 Calibration Performed: Thu Nov 15 20:52:51 2018

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop		Gain	Offset
Deep	167.000	835.000	0.000	255.800	mmho/m	0.620	-17.500
Medium	0.000	1348.000	142.000	255.800	mmho/m	0.430	-40.000

### Microlog Calibration Report

Serial-Model: PSI-01-PSI STKBL ML  
 Performed: Thu Mar 31 18:14:32 2016

	Readings		References			Results	
	Zero	Cal	Zero	Cal		m	b
Normal	0.0000	1.0000	0.0000	1.0000	Ohm-m	22500.0000	-1.0000
Inverse	0.0000	1.0000	0.0000	1.0000	Ohm-m	29500.0000	-1.0000
Caliper	1.0001	1.1397	6.5000	18.5000	in	86.0000	-82.4800

### Compensated Density Calibration Report

Serial-Model: 96-916-M&W  
 Source / Verifier: /  
 Master Calibration Performed: Wed Nov 14 15:40:42 2018

### Master Calibration

	Density		Far Detector	Near Detector	
Magnesium	1.755	g/cc	7965.66	8750.45	cps
Aluminum	2.635	g/cc	1433.52	5335.67	cps
Spine Angle = 73.91			Density/Spine Ratio = 0.493		
	Size		Reading		

Small Ring	4.00	in	2.61
Large Ring	14.00	in	1.67

**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

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Well	FURTHMYER #4
Field	DREILING EAST
County	ELLIS
State	KANSAS