



# MICRORESISTIVITY LOG

Pioneer Energy Services

Company NORTHERN LIGHTS OIL CO.

Well RHONDA #1

Field WILDCAT

County RUSH State KANSAS

Location: API #: 15-165-22169-00-00

2310' FSL & 2040' FWL

SEC 15 TWP 17S RGE 20W

Other Services  
CNL/CDL  
DIL

Permanent Datum GROUND LEVEL Elevation 2140'  
Log Measured From KELLY BUSHING  
Drilling Measured From KELLY BUSHING

Elevation  
K.B. 2150'  
D.F. N/A  
G.L. 2140'

Date	6/13/2019
Run Number	ONE
Depth Driller	4065'
Depth Logger	4064'
Bottom Logged Interval	4063'
Top Log Interval	3400'
Casing Driller	8.625" @ 265'
Casing Logger	263'
Bit Size	7.875"
Type Fluid in Hole	CHEMICAL
Salinity, ppm CL	5000
Density / Viscosity	9.45 60
pH / Fluid Loss	10.0 9.2
Source of Sample	FLOWLINE
Rm @ Meas. Temp	.60 @ 68
Rmt @ Meas. Temp	.45 @ 68
Rmc @ Meas. Temp	.81 @ 68
Source of Rmf / Rmc	CHARTS
Rm @ BHT	.35 @ 117
Operating Rig Time	2 HOURS
Max Rec. Temp. F	117 DEGF
Equipment Number	P-108
Location	HAYS
Recorded By	J. HENRICKSON
Witnessed By	JEFF CHRISTIAN

<<< 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.

MCCRACKEN KANSAS  
SOUTH SIDE OF TOWN, 2 EAST TO 130 ROAD  
1/2 SOUTH, EAST INTO

Log Measured From: KELLY BUSHING 10 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

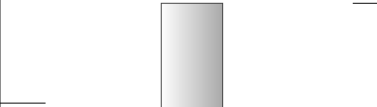
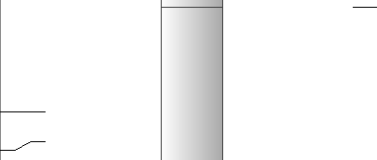
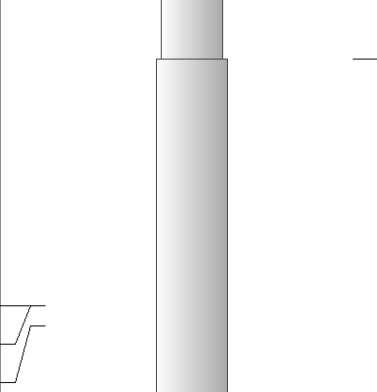
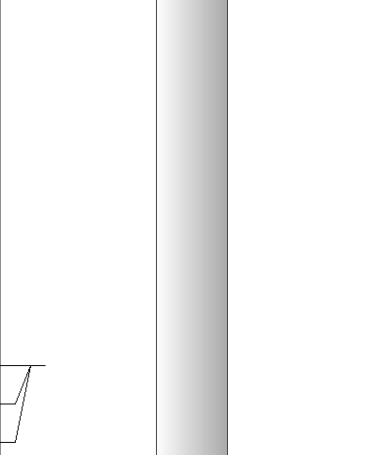
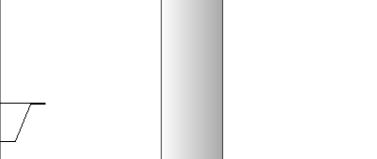
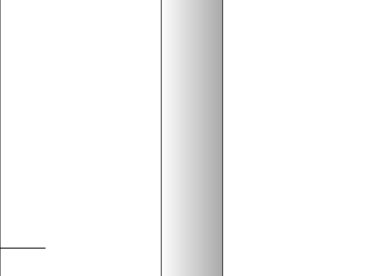
Primary Witness: JEFF CHRISTIAN  
Secondary Witness:  
Secondary Witness:  
Secondary Witness:

# Log Variables

DatabaseC:\ProgramData\Warrior\Data\northern\_lights\_rhonda\_1.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	117	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	53	Off	4064

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
GR	44.50		GR-M&W (89-M&W)	3.00	3.50	50.00
CNLSC CNSSC	41.40 40.65		CNT-M&W (tk10-MW)	5.50	3.50	100.00
LSD DCAL SSD	32.35 32.33 31.85		CDL-M&W (144-84)	8.50	4.00	250.00
MCAL MI MN	20.87 20.87 20.87		ML-PSI UDM ML (UDM-01) Stackable Microlog Tools	11.50	4.00	215.00
RLL3 RLL3F	15.80 15.79					
CILD	8.00		DIL-M&W (PSI 988)	18.50	3.50	220.00

CILM 4.70

SP 0.20

Dataset: northern\_lights\_rhonda\_1.db: field/well/stackml/pass3.1  
 Total length: 47.00 ft  
 Total weight: 835.00 lb  
 O.D.: 4.00 in

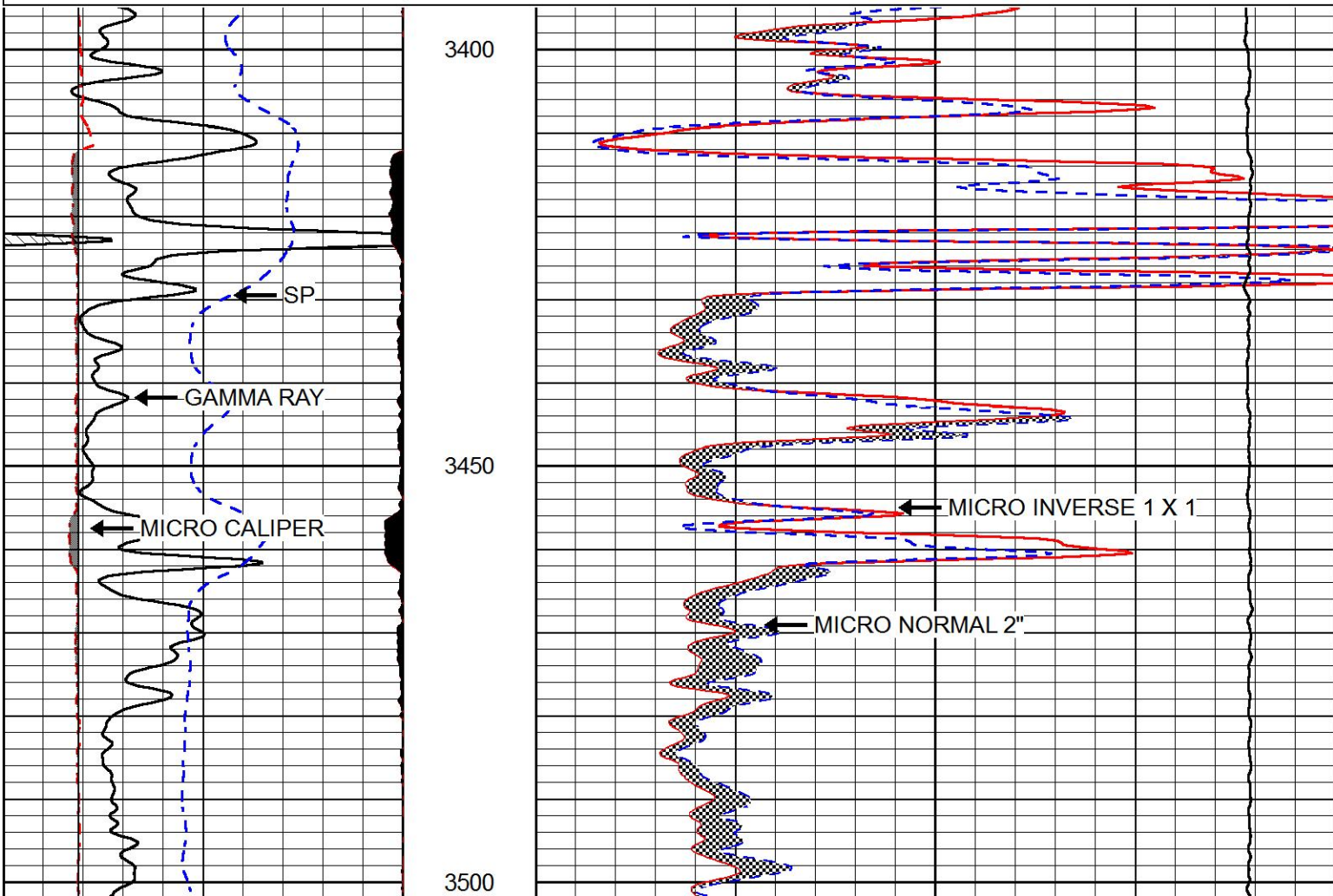


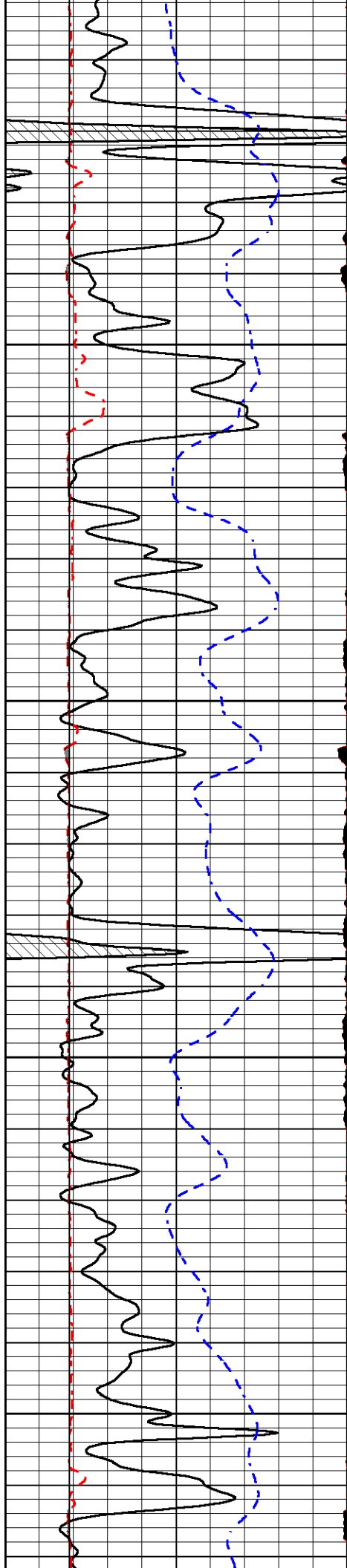
# MAIN PASS

Database File northern\_lights\_rhonda\_1.db  
 Dataset Pathname stackml/pass3.1  
 Presentation Format micro  
 Dataset Creation Thu Jun 13 07:34:26 2019  
 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



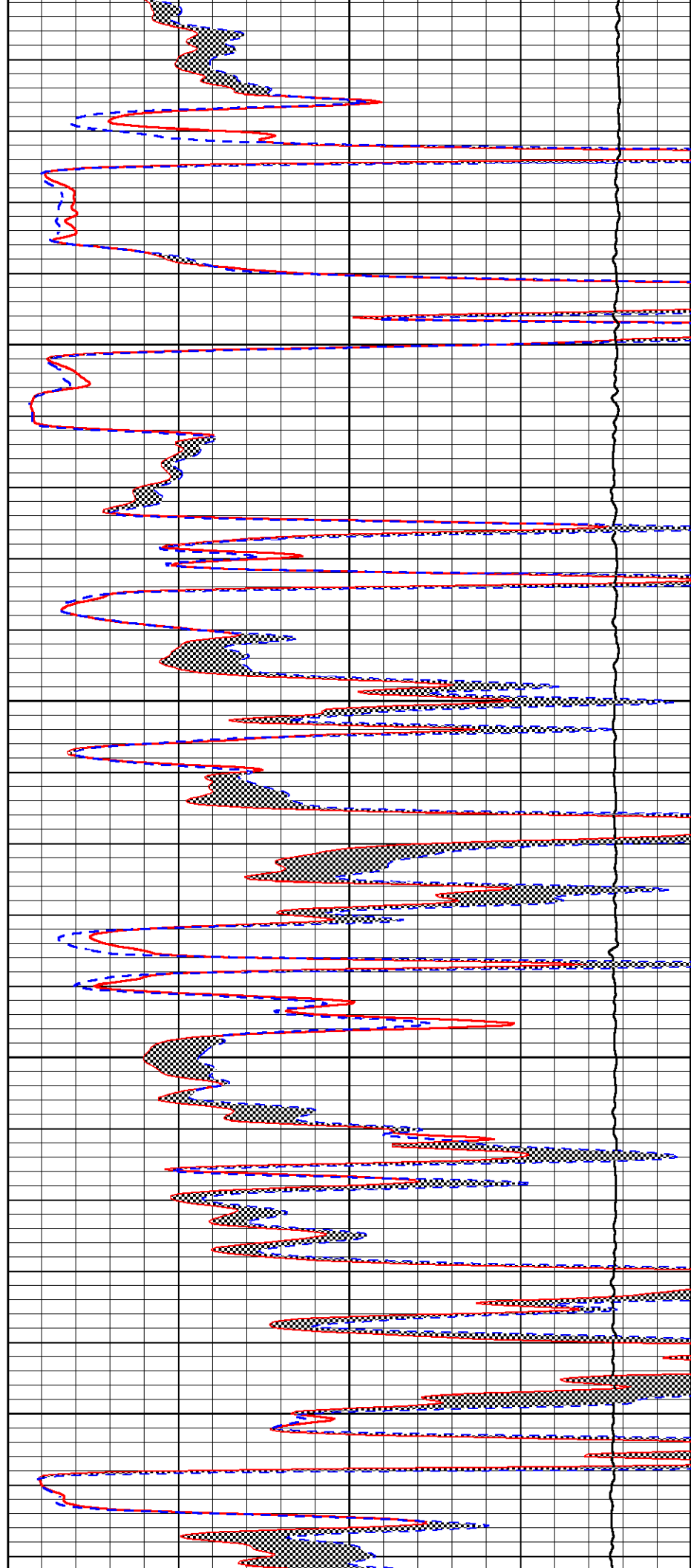


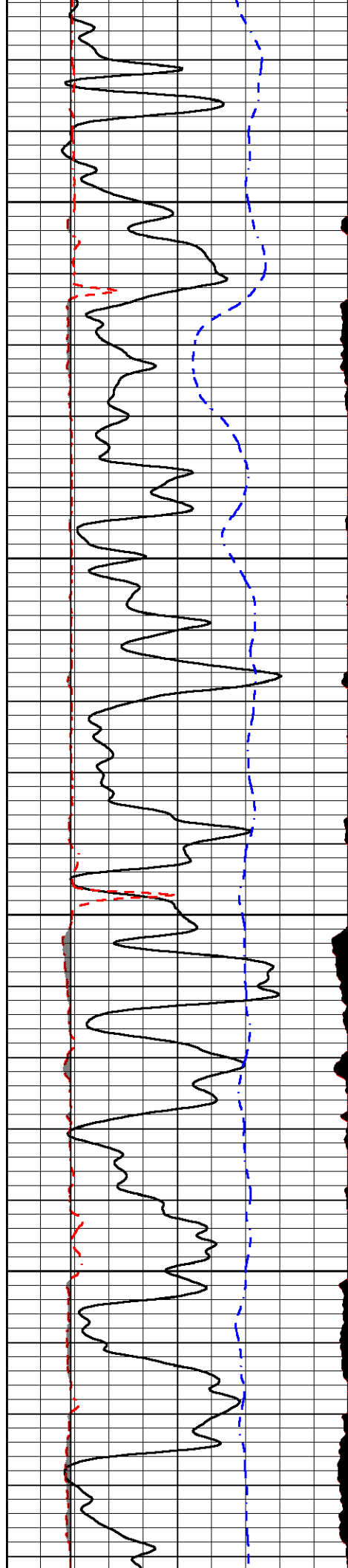
3550

3600

3650

3700



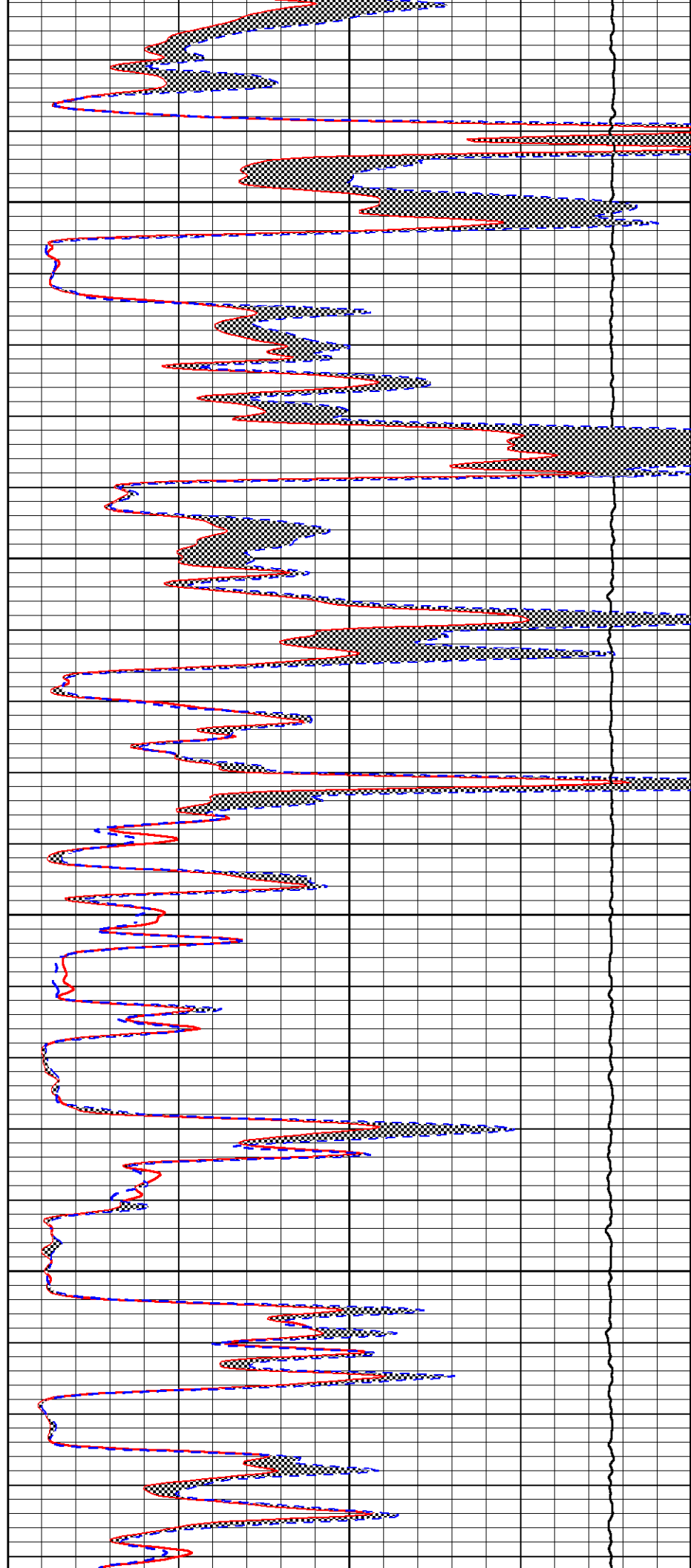


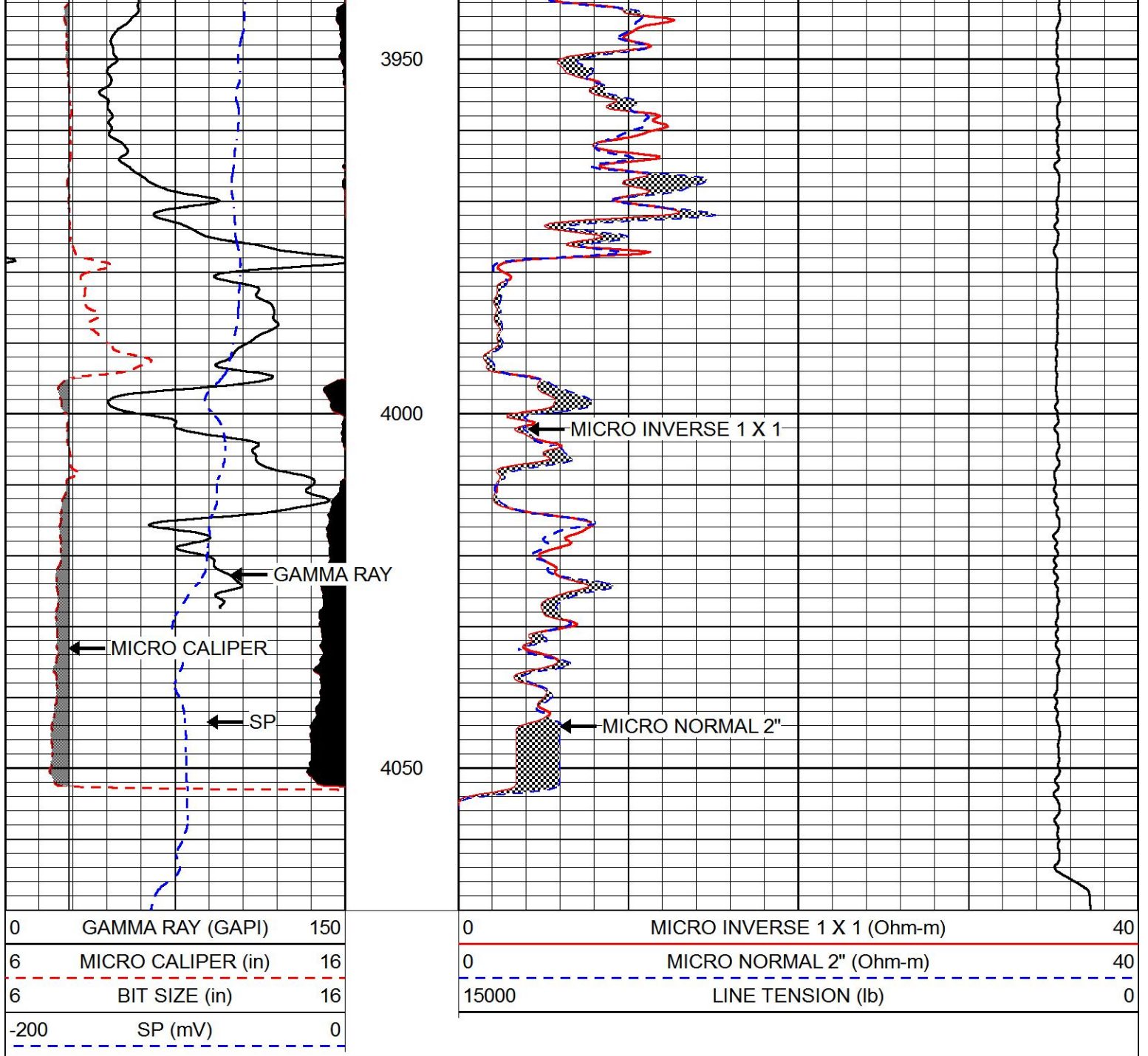
3750

3800

3850

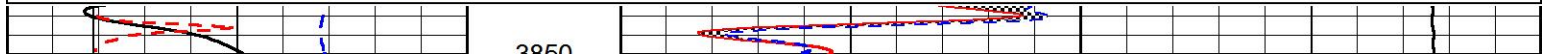
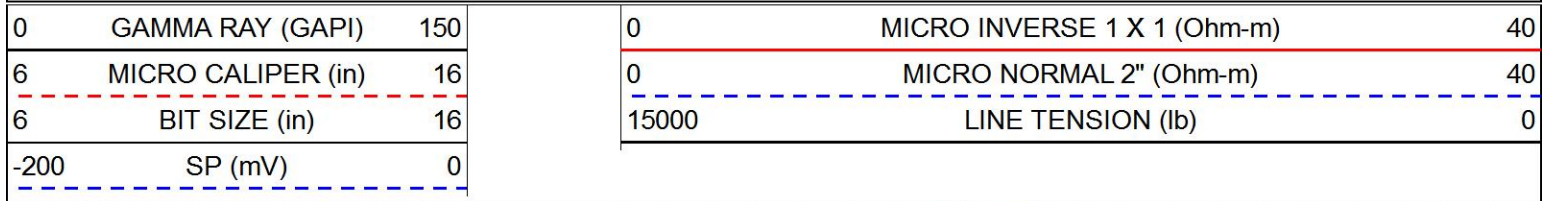
3900

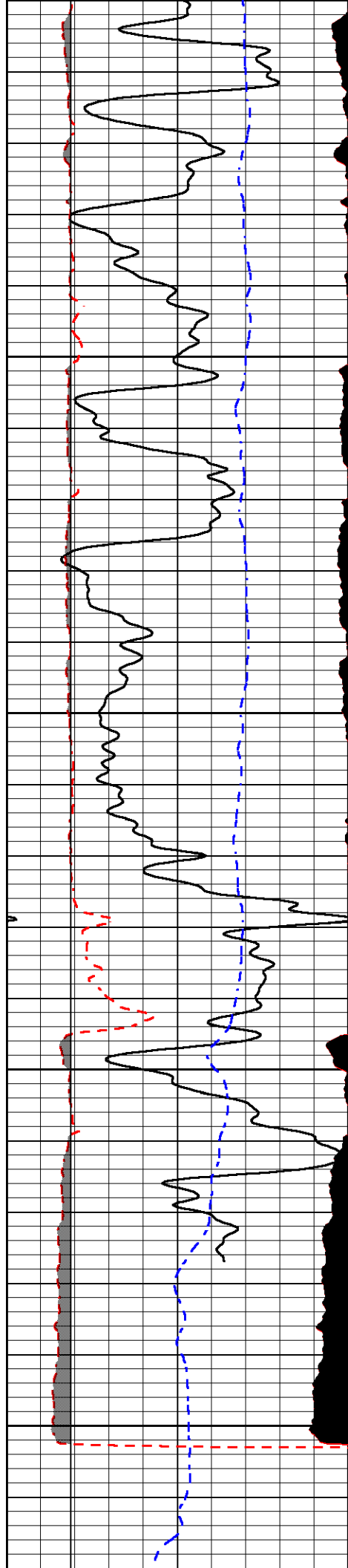




# REPEAT SECTION

Database File: northern\_lights\_rhonda\_1.db  
 Dataset Pathname: stackml/pass2.1  
 Presentation Format: micro  
 Dataset Creation: Thu Jun 13 06:45:51 2019  
 Charted by: Depth in Feet scaled 1:240





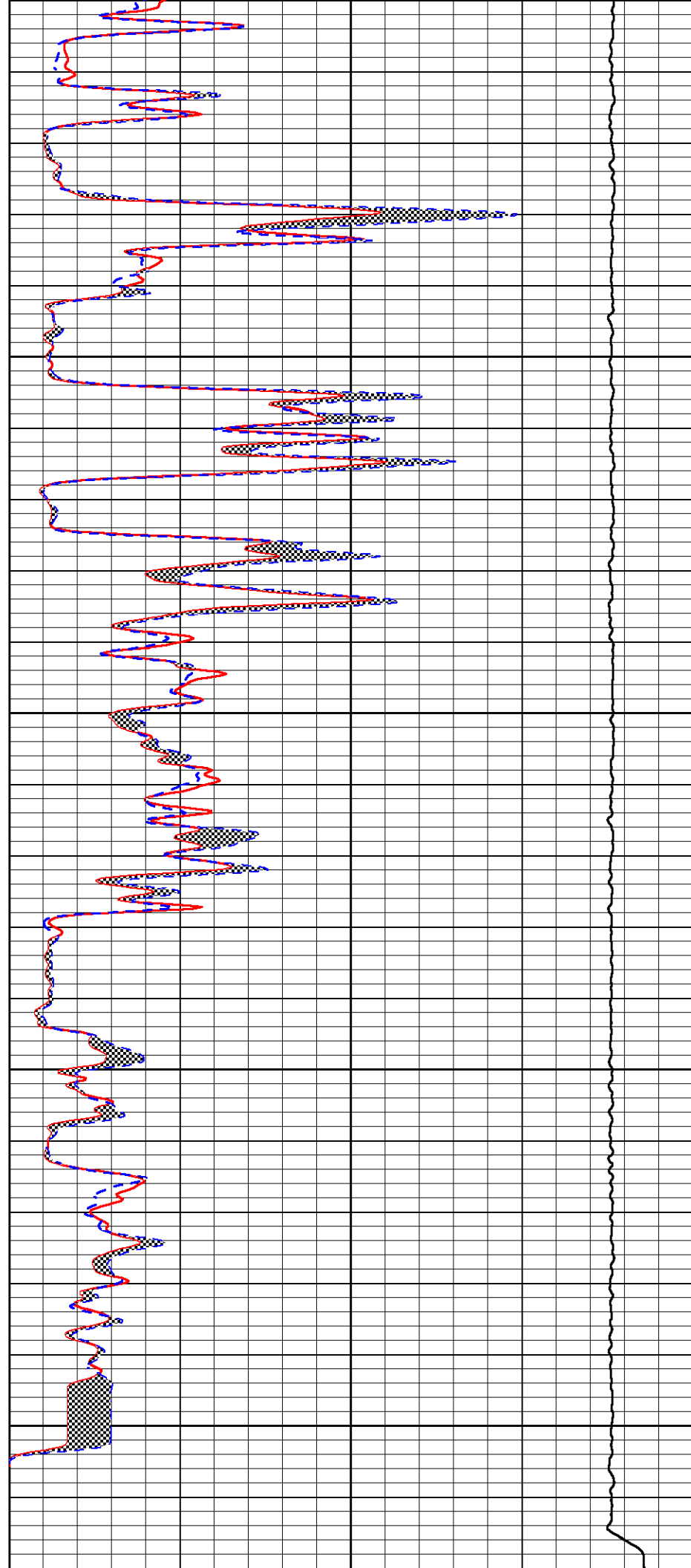
3850

3900

3950

4000

4050



0	GAMMA RAY (GAPI)	150	0	MICRO INVERSE 1 X 1 (Ohm-m)	40
6	MICRO CALIPER (in)	16	0	MICRO NORMAL 2" (Ohm-m)	40
6	BIT SIZE (in)	16	15000	LINE TENSION (lb)	0
-200	SP (mV)	0			

### Calibration Report

Database File northern\_lights\_rhonda\_1.db  
Dataset Pathname stackml/pass3.1  
Dataset Creation Thu Jun 13 07:34:26 2019

### Dual Induction Calibration Report

Serial-Model: PSI 988-M&W  
Calibration Performed: Tue Nov 20 10:50:19 2018

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop		Gain	Offset
Deep	178.615	710.235	0.000	255.800	mmho/m	0.525	-44.000
Medium	161.982	1441.110	0.000	255.800	mmho/m	0.380	-17.000

### Microlog Calibration Report

Serial-Model: UDM-01-PSI UDM ML  
Performed: Fri May 31 06:10:42 2019

	Readings		References			Results	
	Zero	Cal	Zero	Cal		m	b
Normal	0.0000	1.0000	0.0000	1.0000	Ohm-m	28000.0000	0.0000
Inverse	0.0000	1.0000	0.0000	1.0000	Ohm-m	25000.0000	0.0000
Caliper	1.3170	1.1585	8.0000	22.0000	in	-88.3214	123.6000

### Compensated Density Calibration Report

Serial-Model: 144-84-M&W  
Source / Verifier: /  
Master Calibration Performed: Mon Jan 07 15:00:31 2019

### Master Calibration

	Density		Far Detector	Near Detector	
Magnesium	1.755	g/cc	4315.49	5309.89	cps
Aluminum	2.675	g/cc	825.26	3443.46	cps
Spine Angle = 75.33			Density/Spine Ratio = 0.538		
	Size		Reading		
Small Ring	4.00	in	0.69		
Large Ring	14.00	in	0.04		

### Compensated Neutron Calibration Report

Serial Number: tk10-MW  
Tool Model: M&W



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 NORTHERN LIGHTS OIL CO.  
 Well RHONDA #1  
 Field WILDCAT  
 County RUSH  
 State KANSAS