



# DUAL INDUCTION LOG

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

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Location: API #: 15-165-22169-00-00  
 2310' FSL & 2040' FWL  
 SEC 15 TWP 17S RGE 20W  
 Permanent Datum: GROUND LEVEL Elevation 2140'  
 Log Measured From: KELLY BUSHING  
 Drilling Measured From: KELLY BUSHING  
 Other Services: CNL/CDL MEL  
 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	250'
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

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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.  
 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

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[www.pioneerenergy.com](http://www.pioneerenergy.com) 785-625-3858

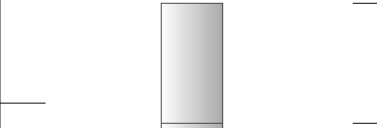
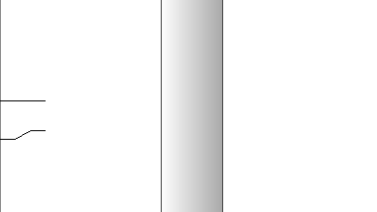
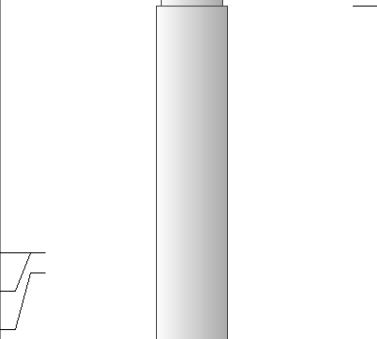
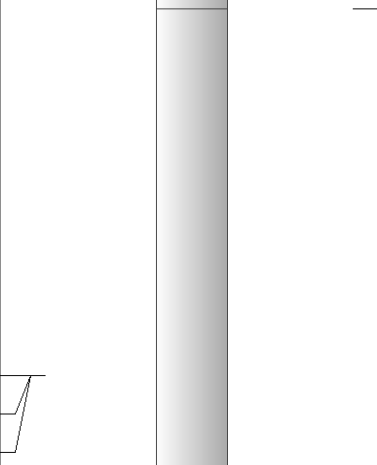
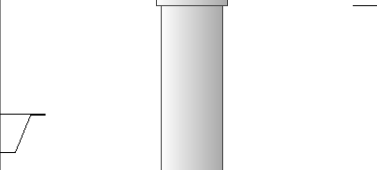
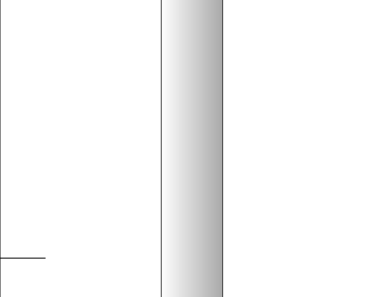
Your Pioneer Energy Services Crew Engineer: J. HENRICKSON Operator: Operator: Operator:	This Log Record Was Witnessed By Primary Witness: JEFF CHRISTIAN Secondary Witness: Secondary Witness: Secondary Witness:
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# Log Variables

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

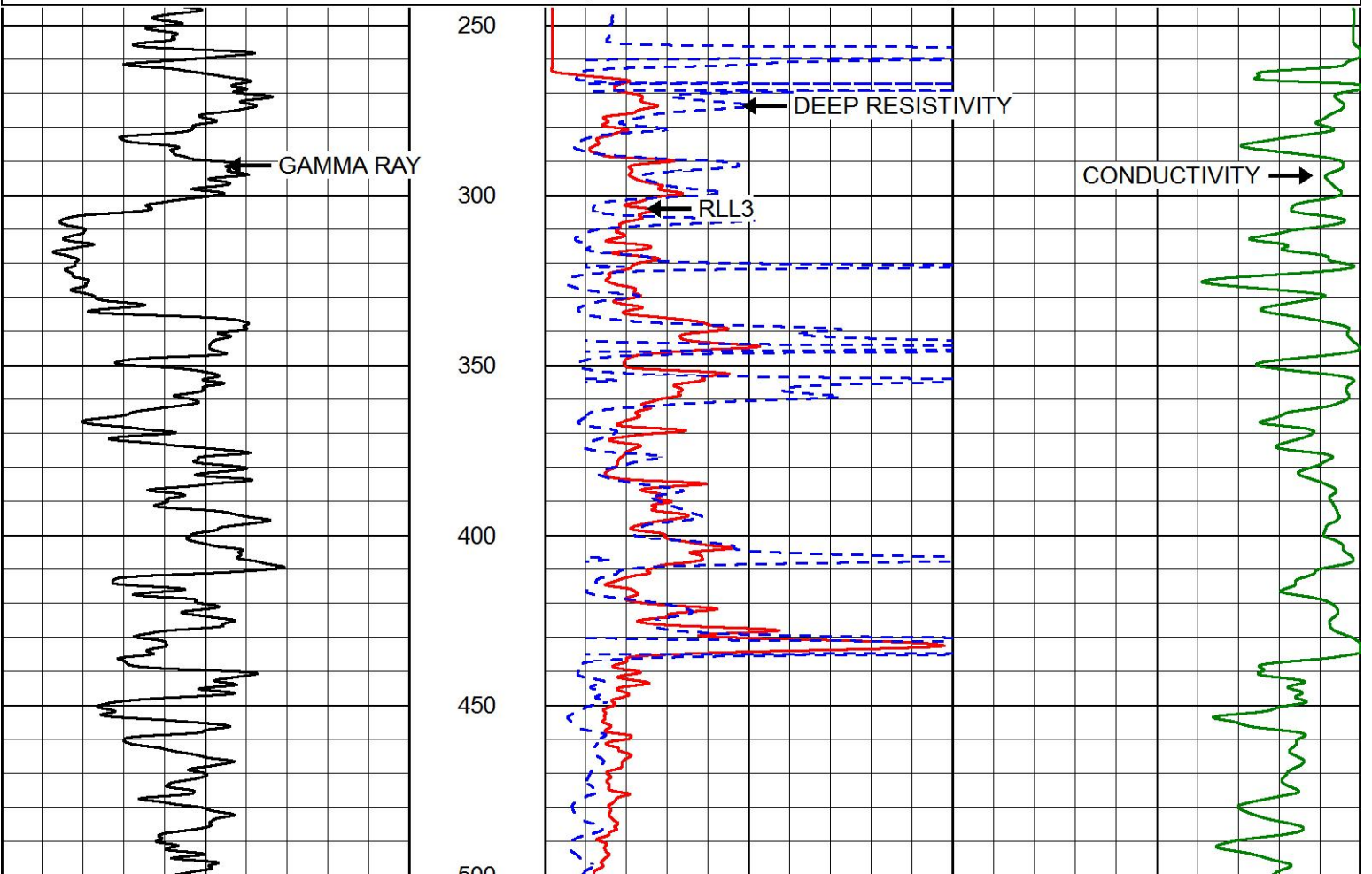
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 Total length: 47.00 ft  
 Total weight: 835.00 lb  
 O.D.: 4.00 in

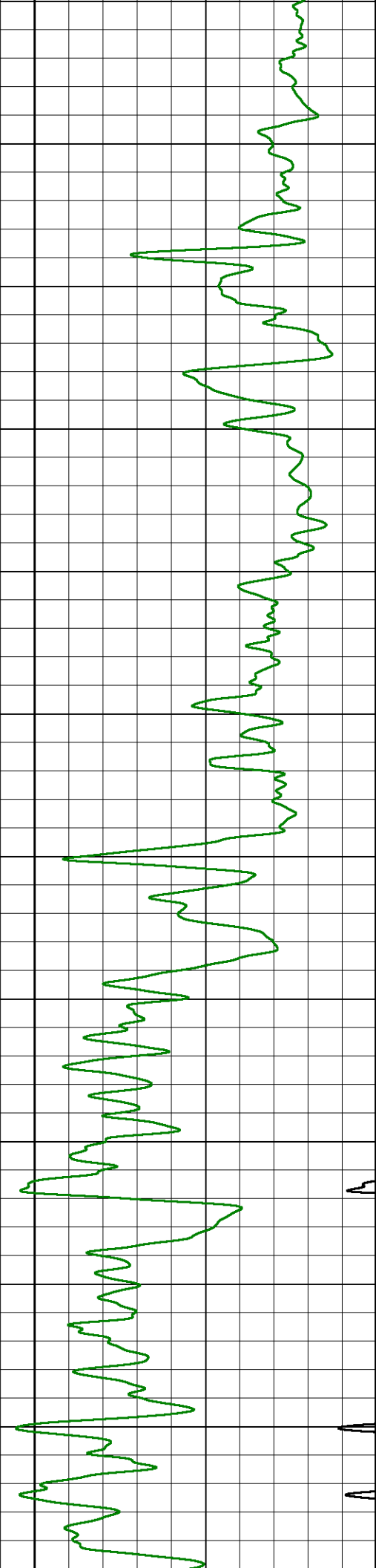
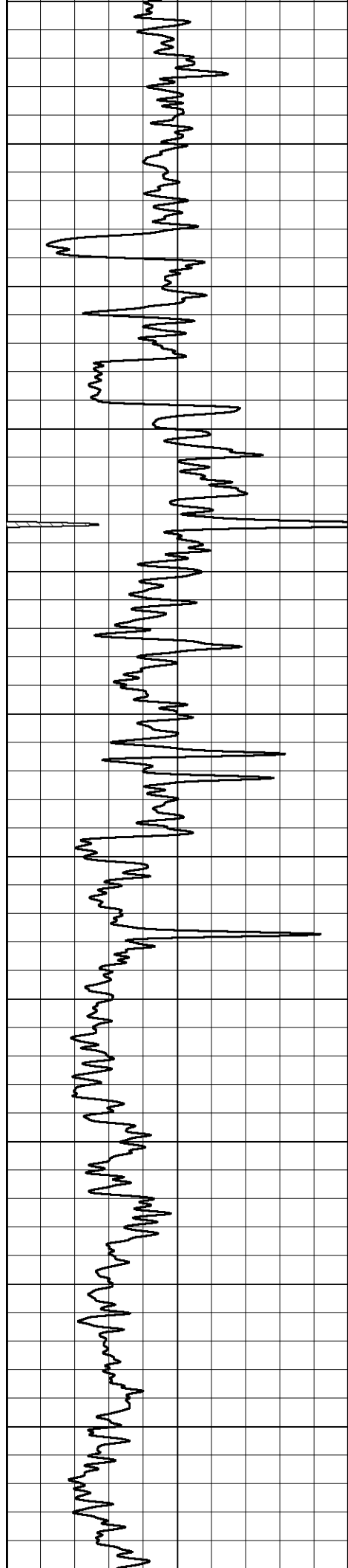


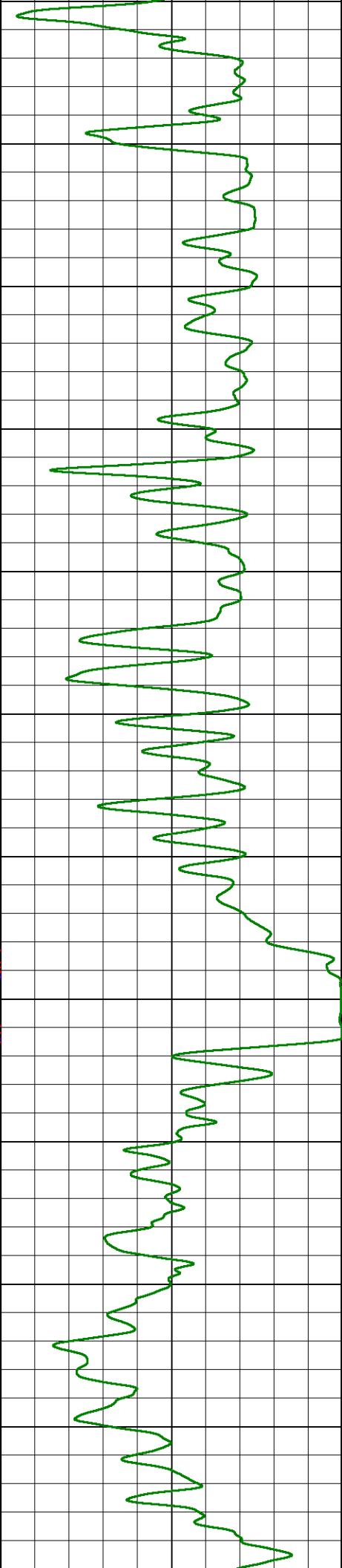
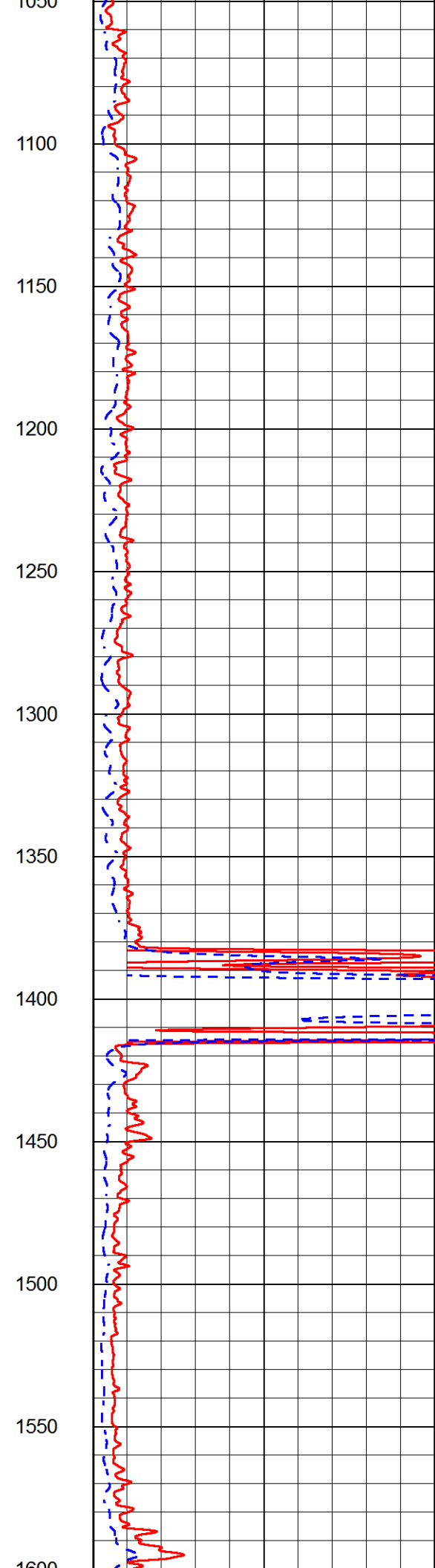
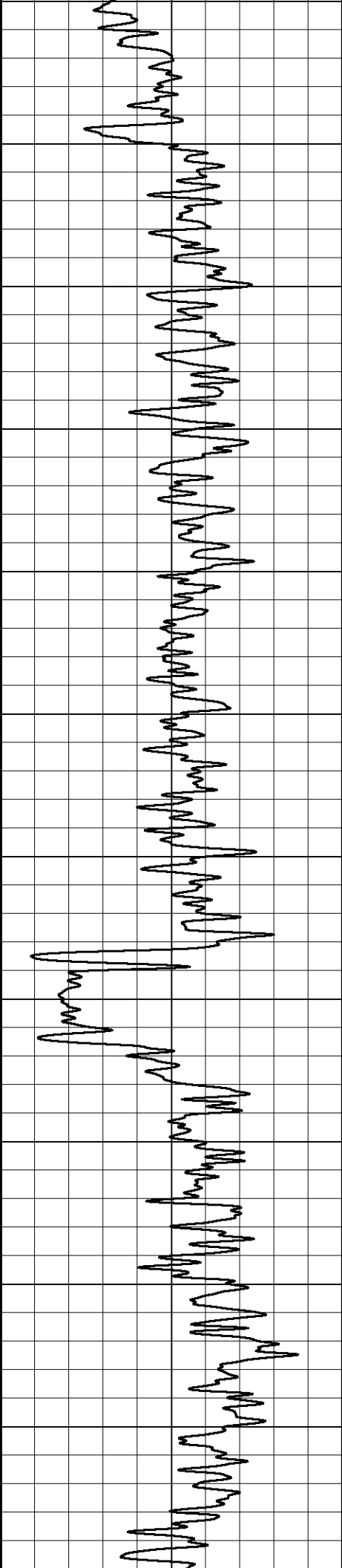
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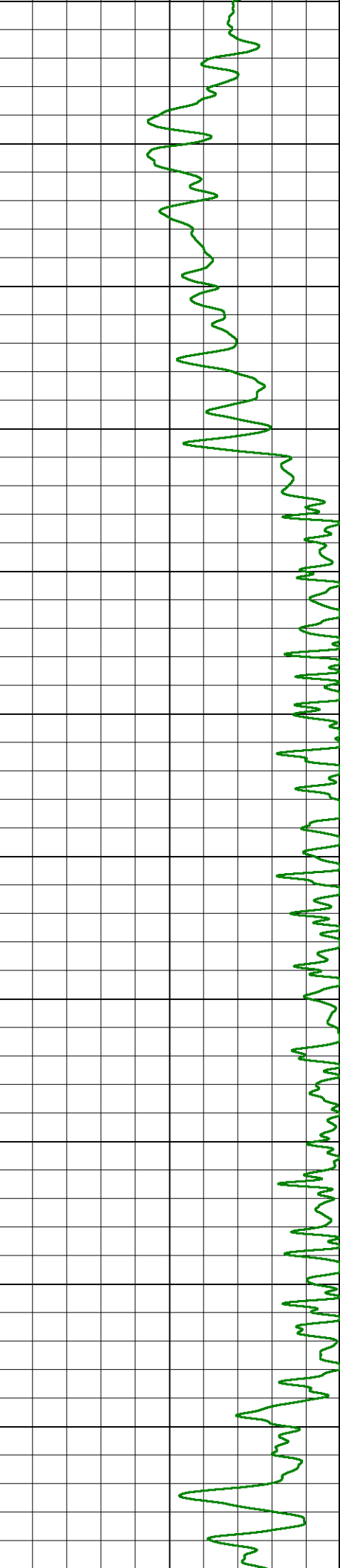
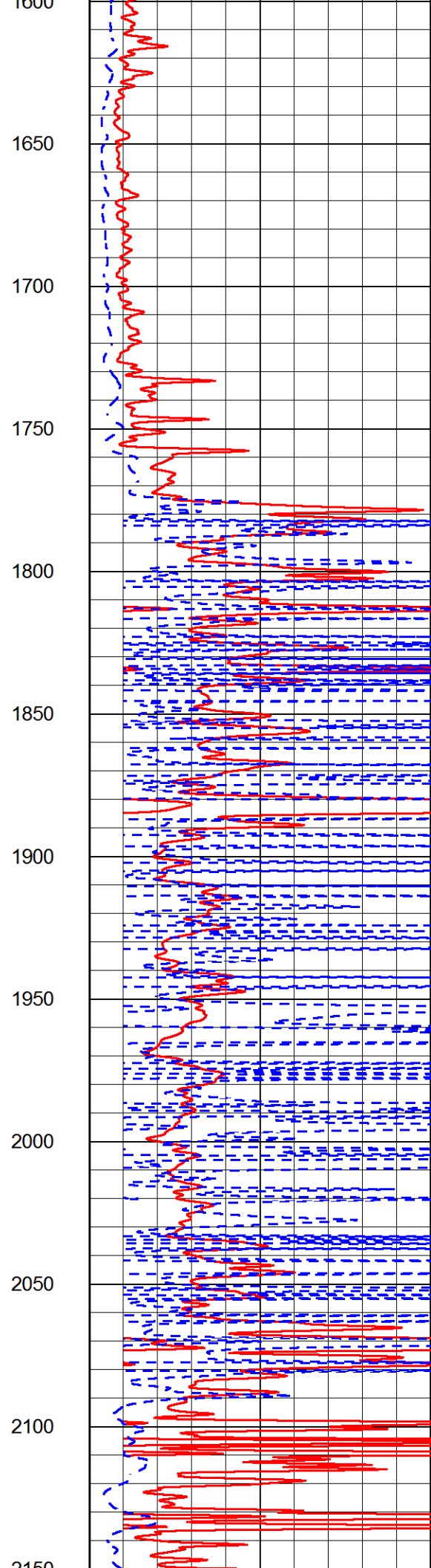
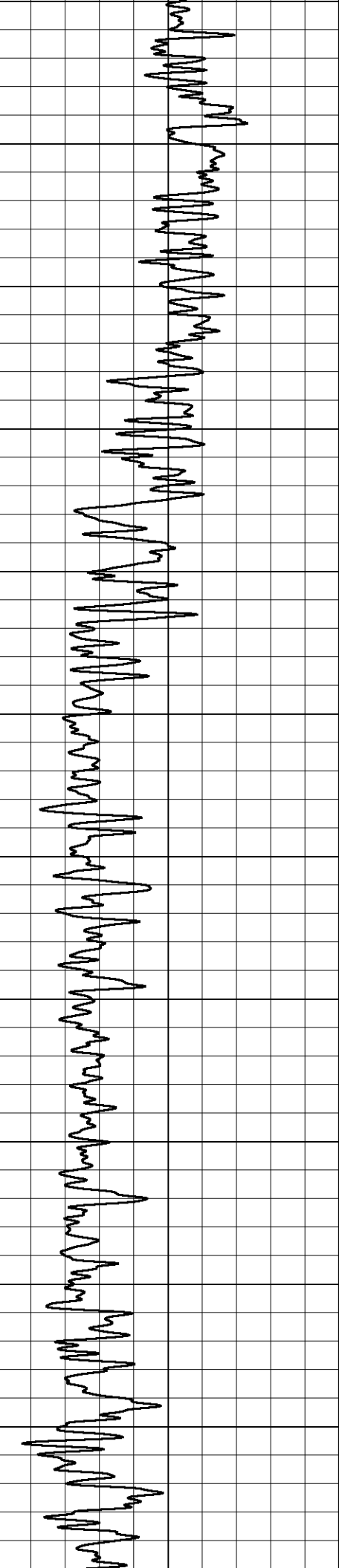
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 Dataset Pathname stackml/pass3.1  
 Presentation Format dil2in  
 Dataset Creation Thu Jun 13 07:34:26 2019  
 Charted by Depth in Feet scaled 1:600

0	GAMMA RAY (GAPI)	150	2000	CILD (mmho/m)	0
			0	RLL3 (Ohm-m)	50
			0	DEEP RESISTIVITY (Ohm-m)	50
			50	RLL3 (Ohm-m)	200
			50	RILD (Ohm-m)	200

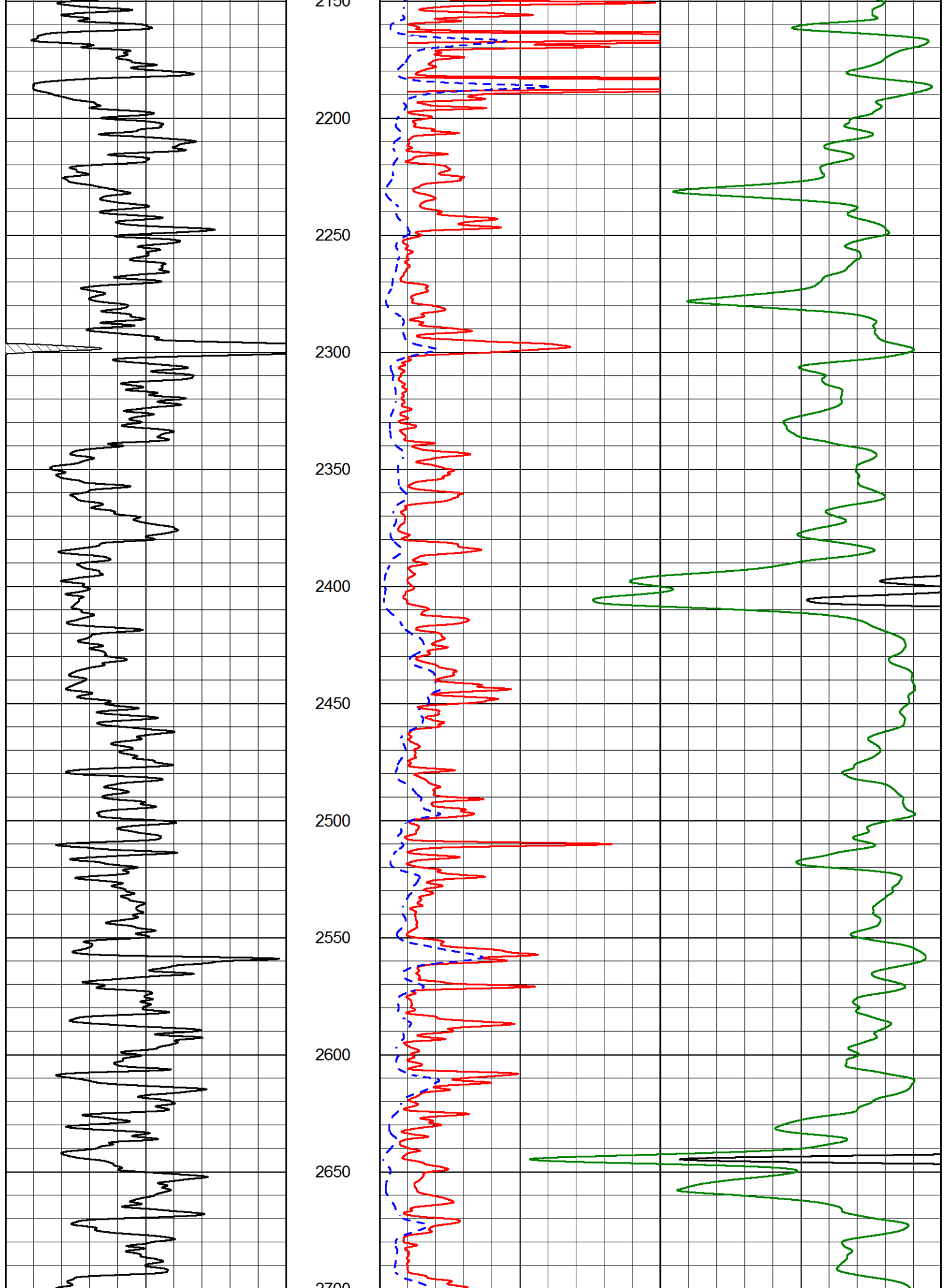


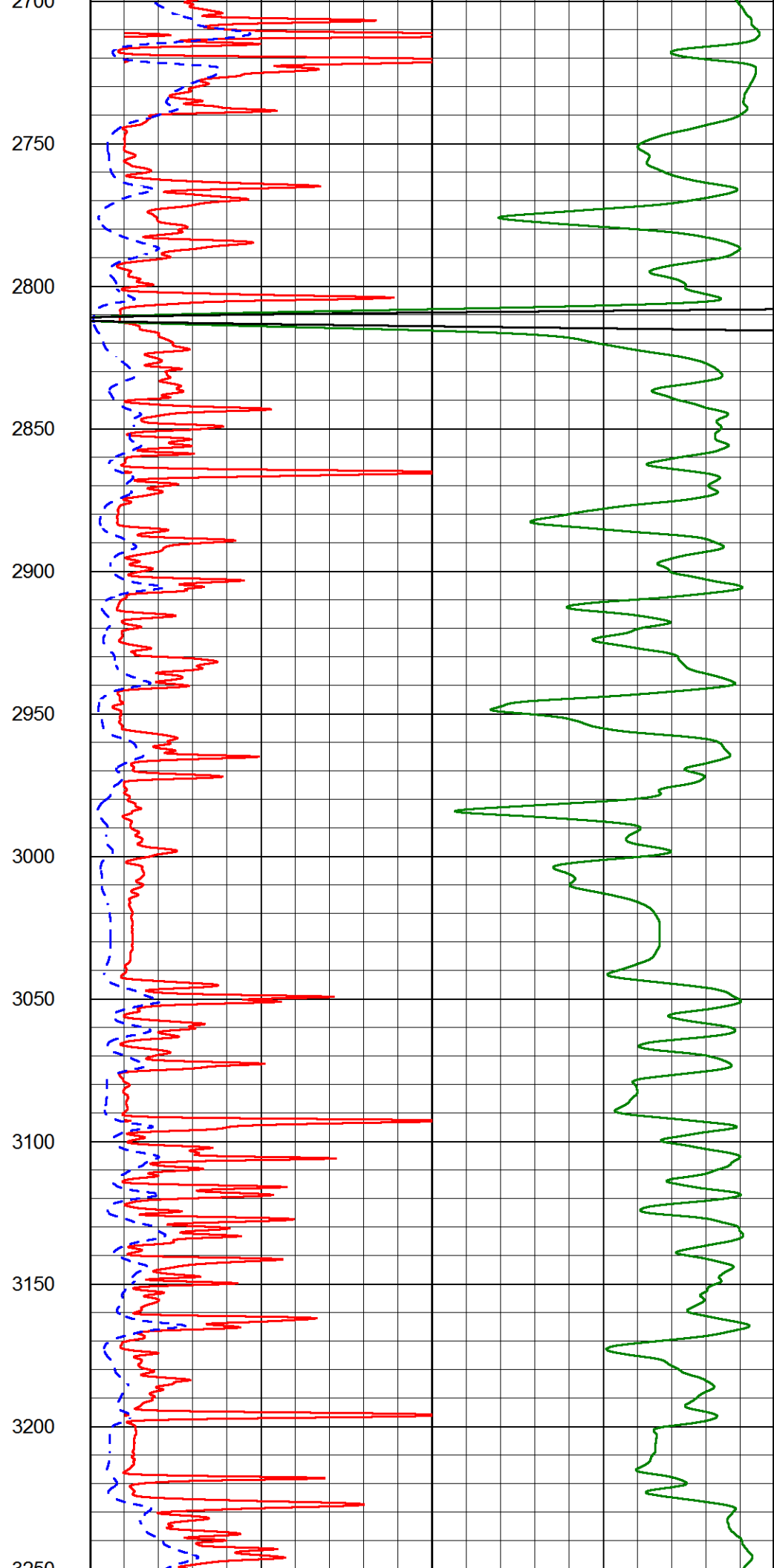
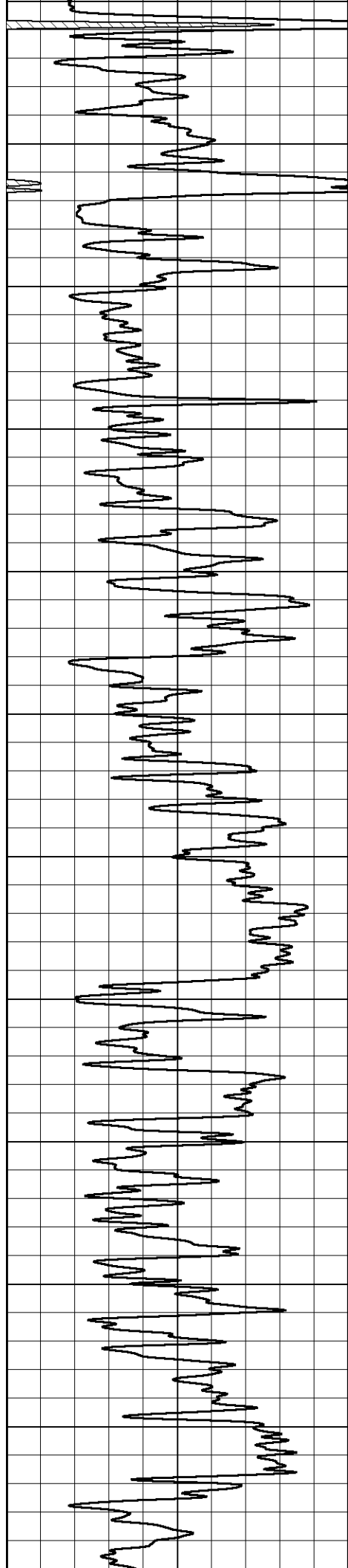




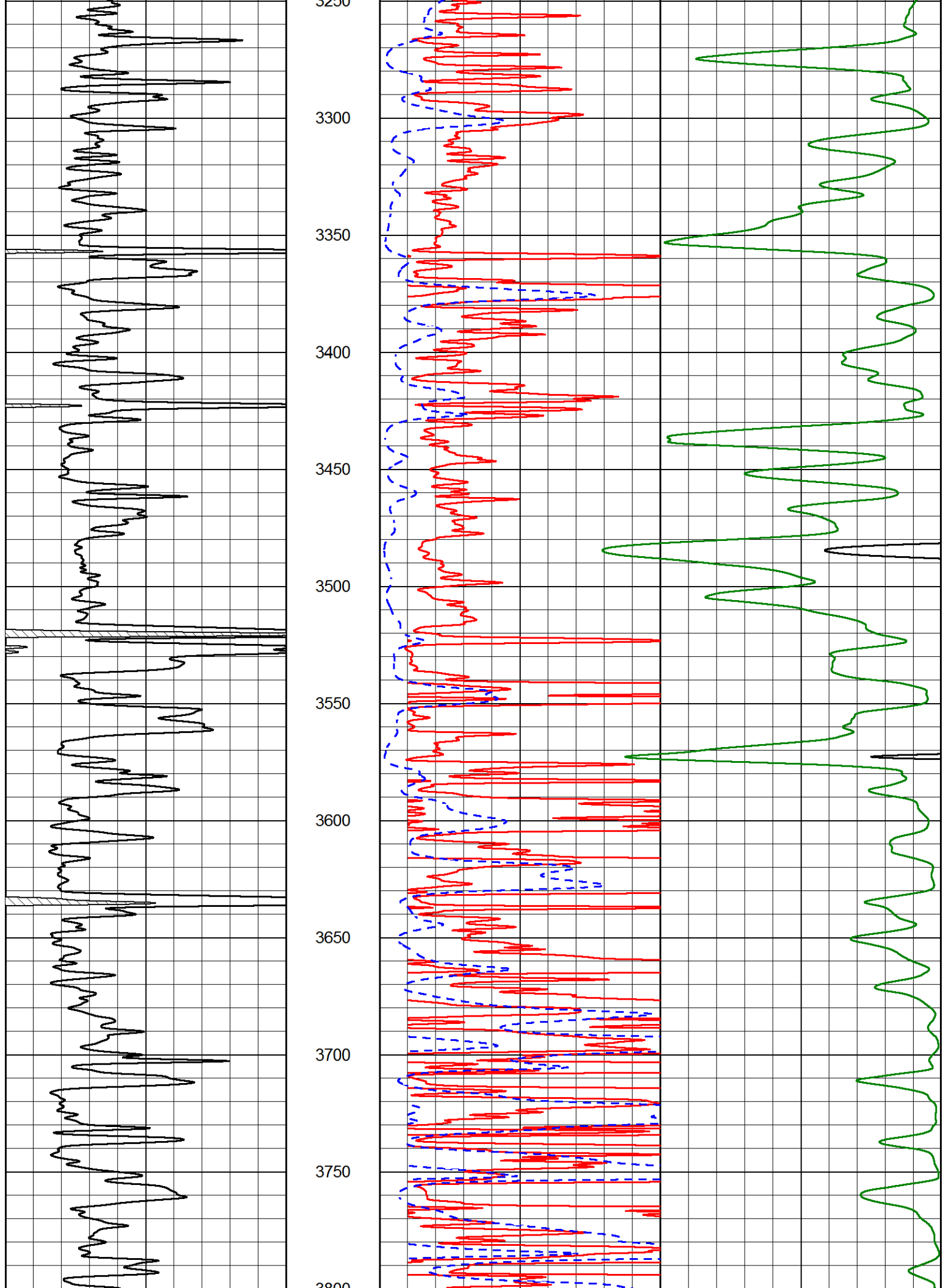


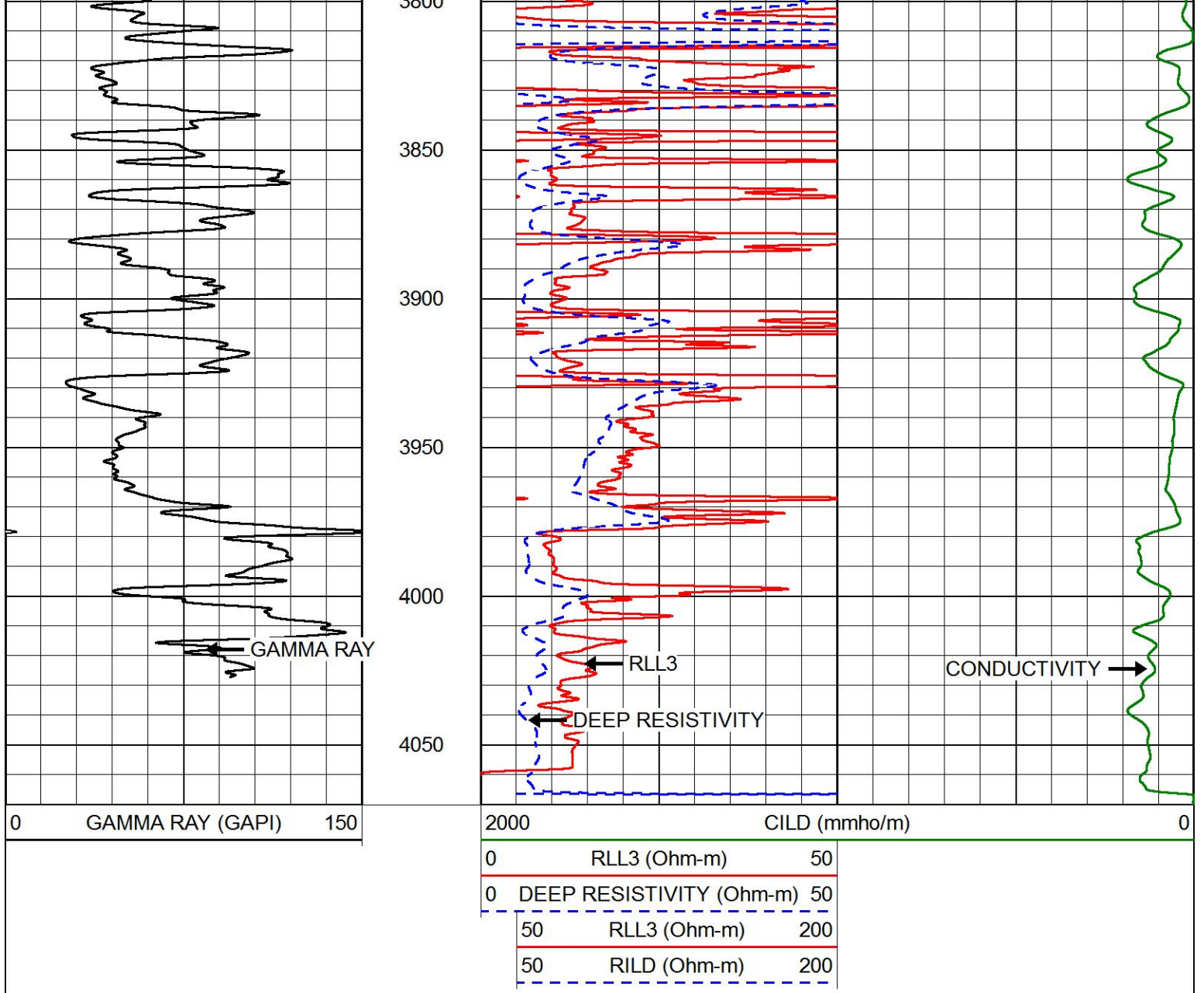








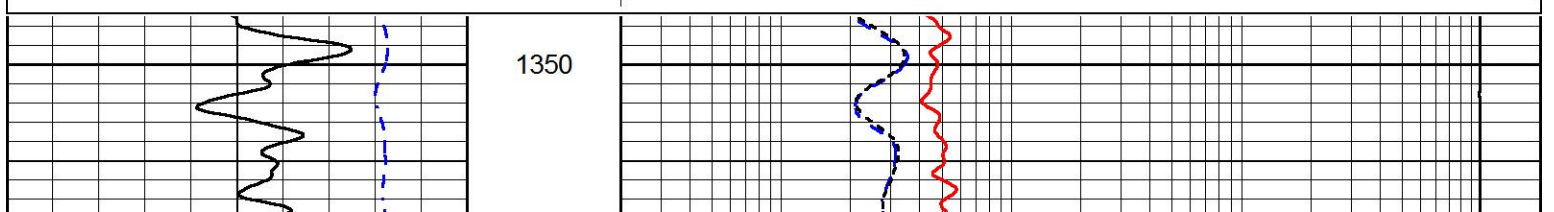


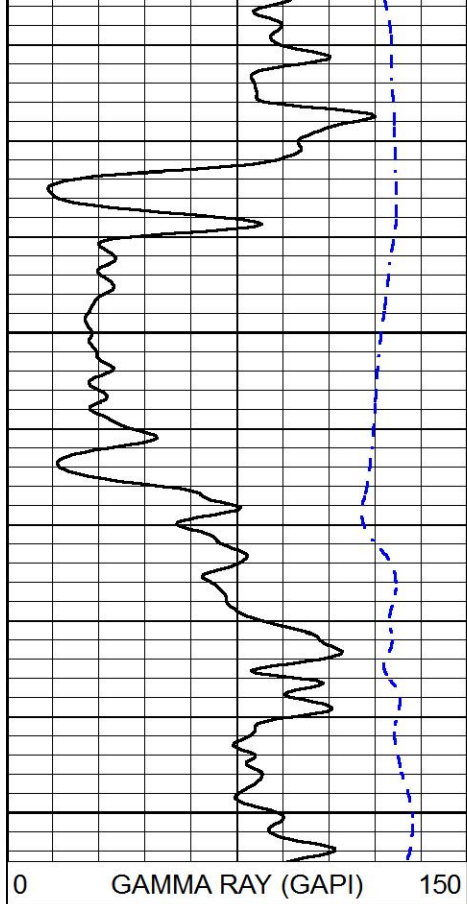



# MAIN PASS

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

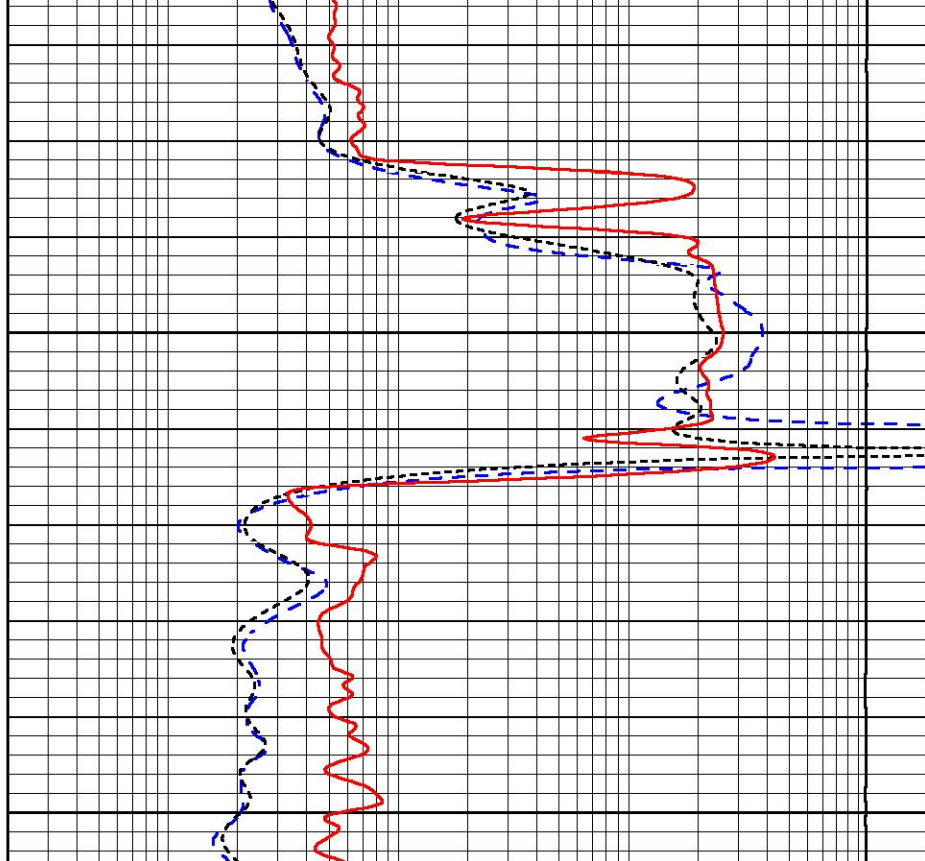




1400

1450

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

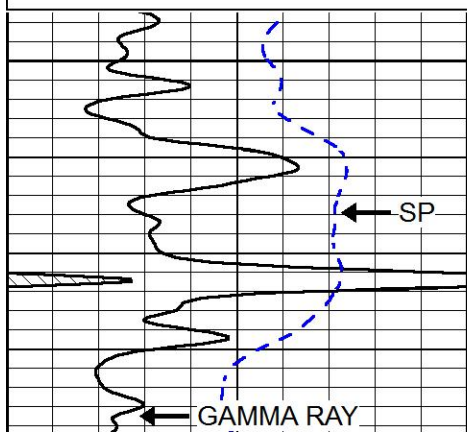


# MAIN PASS

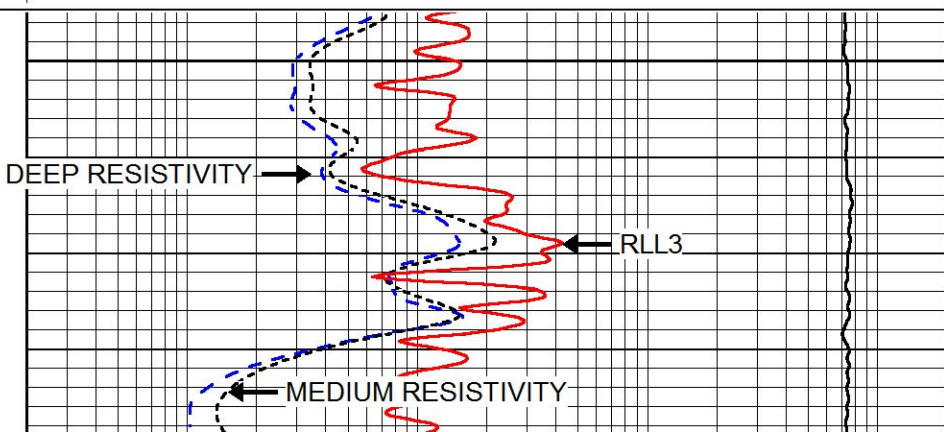
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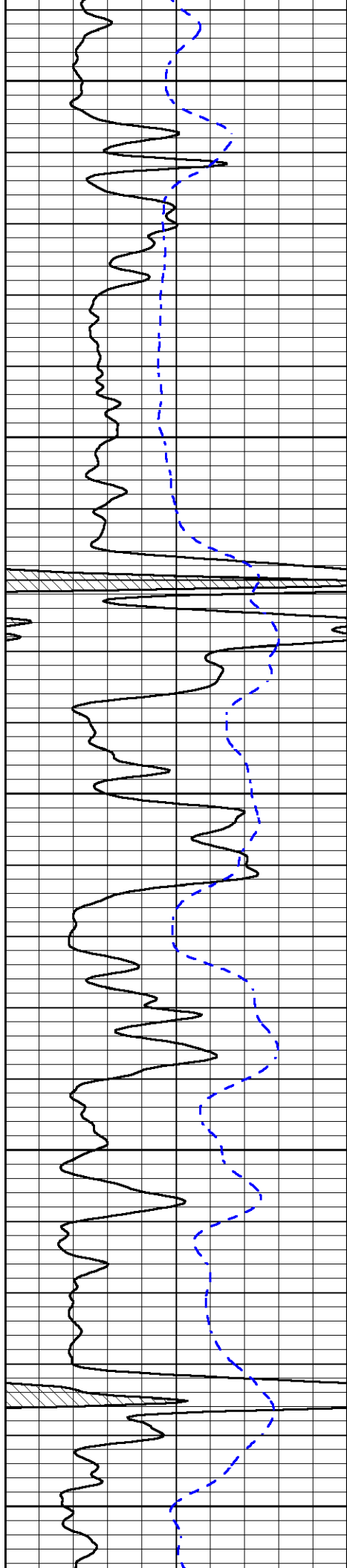
0 GAMMA RAY (GAPI) 150  
 -200 SP (mV) 0

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



3400





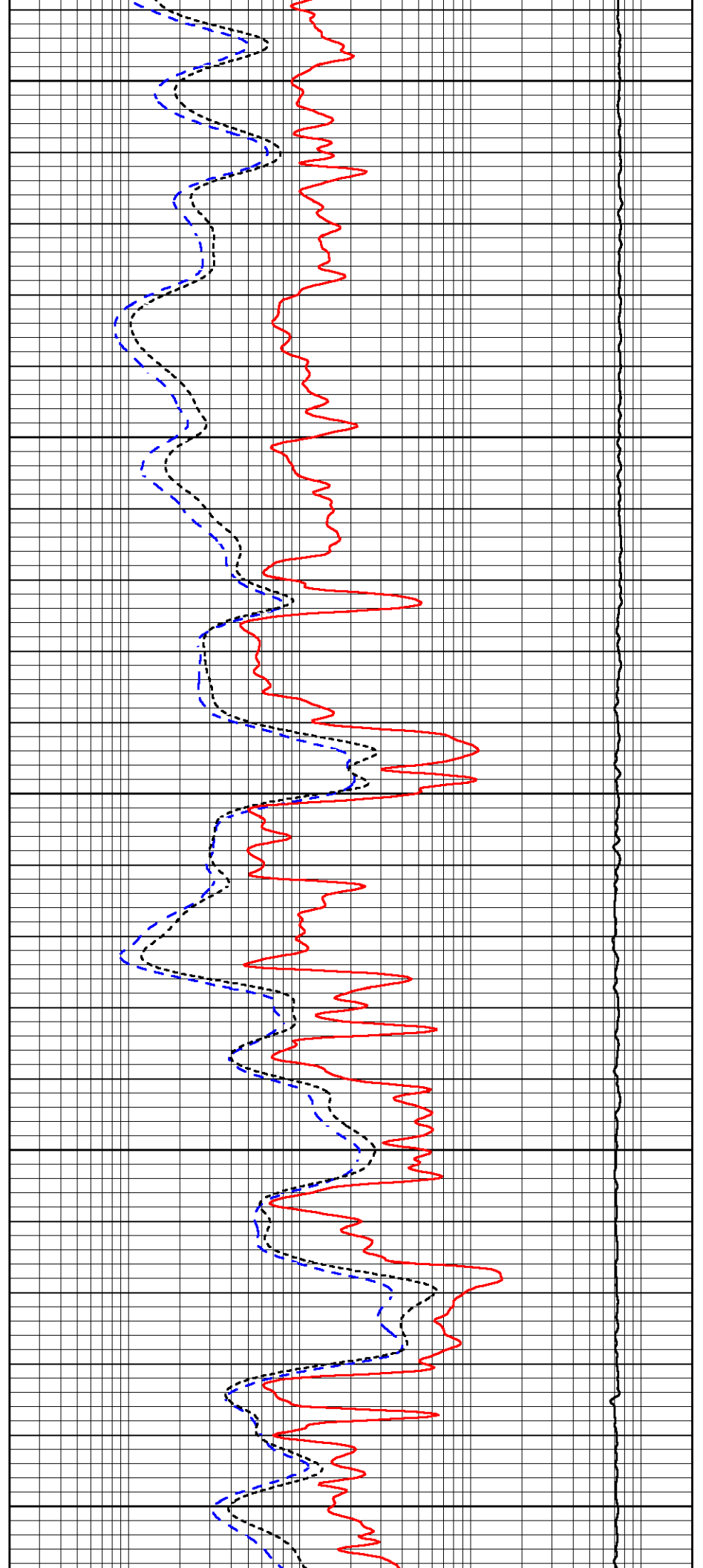
3450

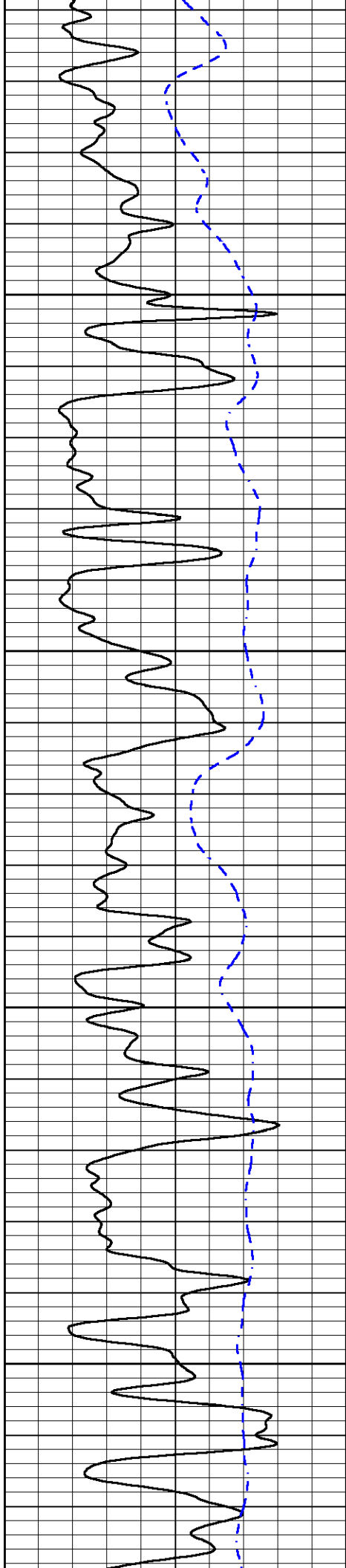
3500

3550

3600

3650



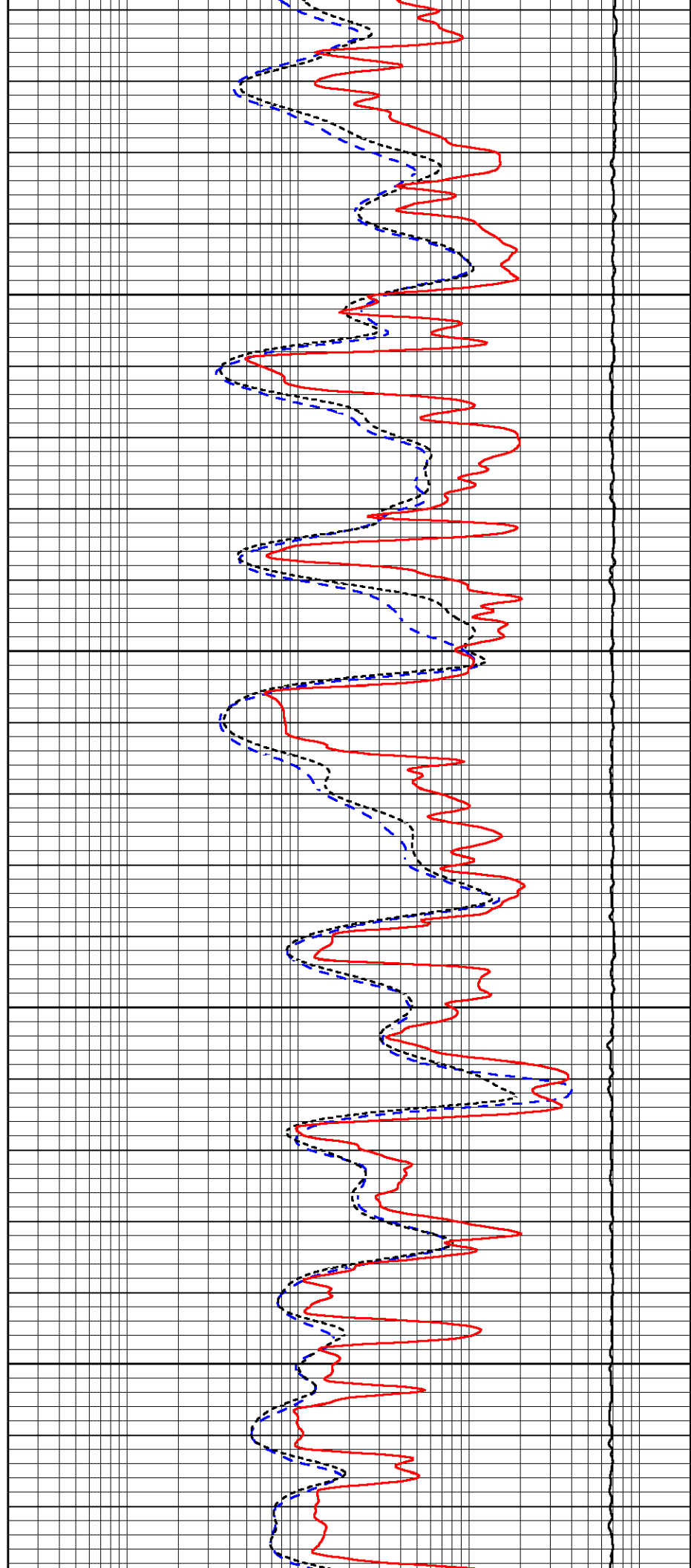


3700

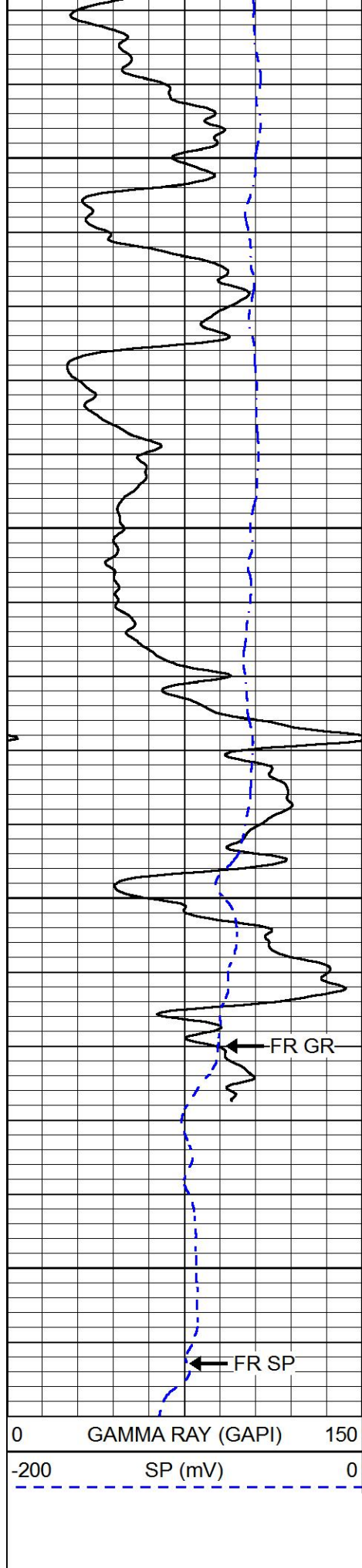
3750

3800

3850





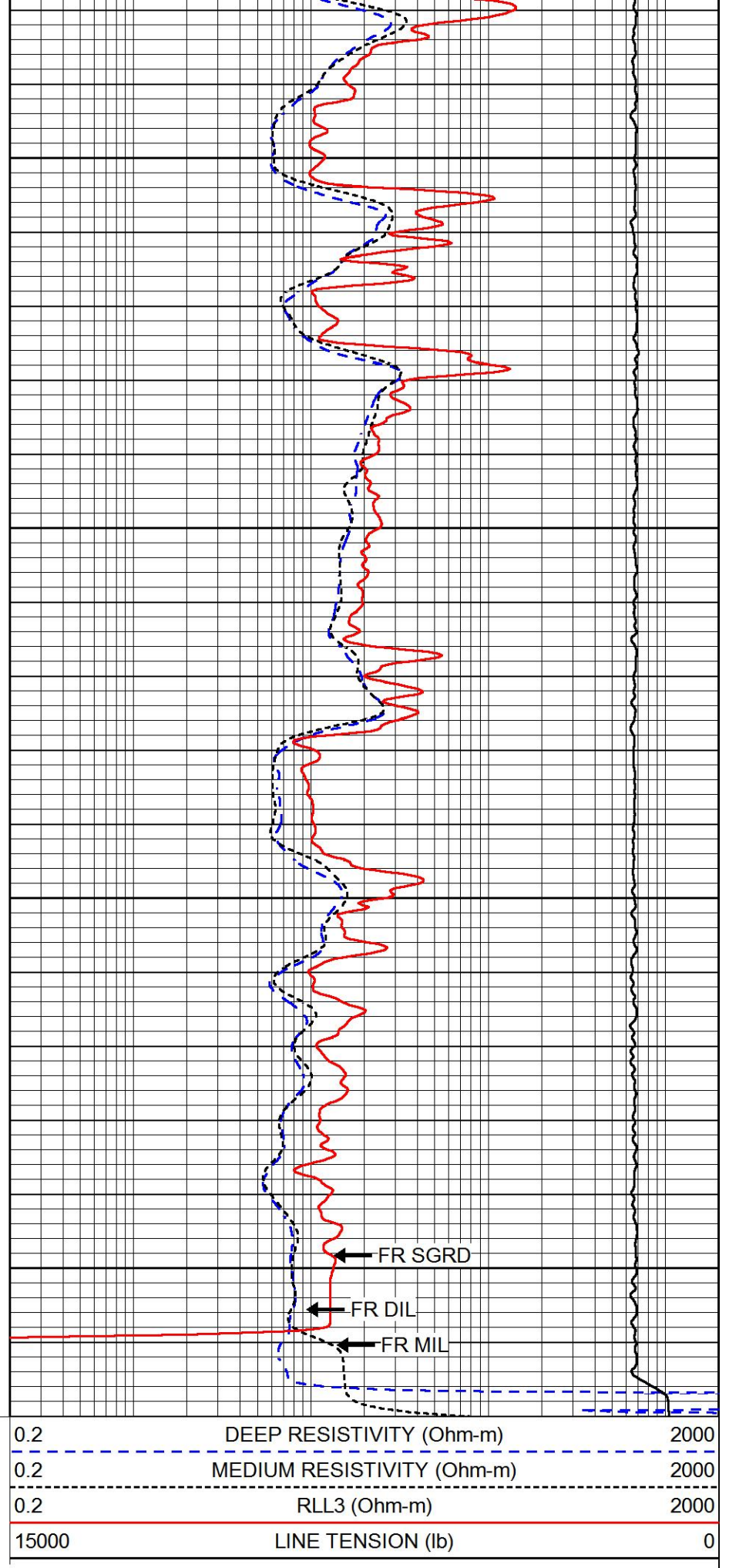


3900

3950

4000

4050



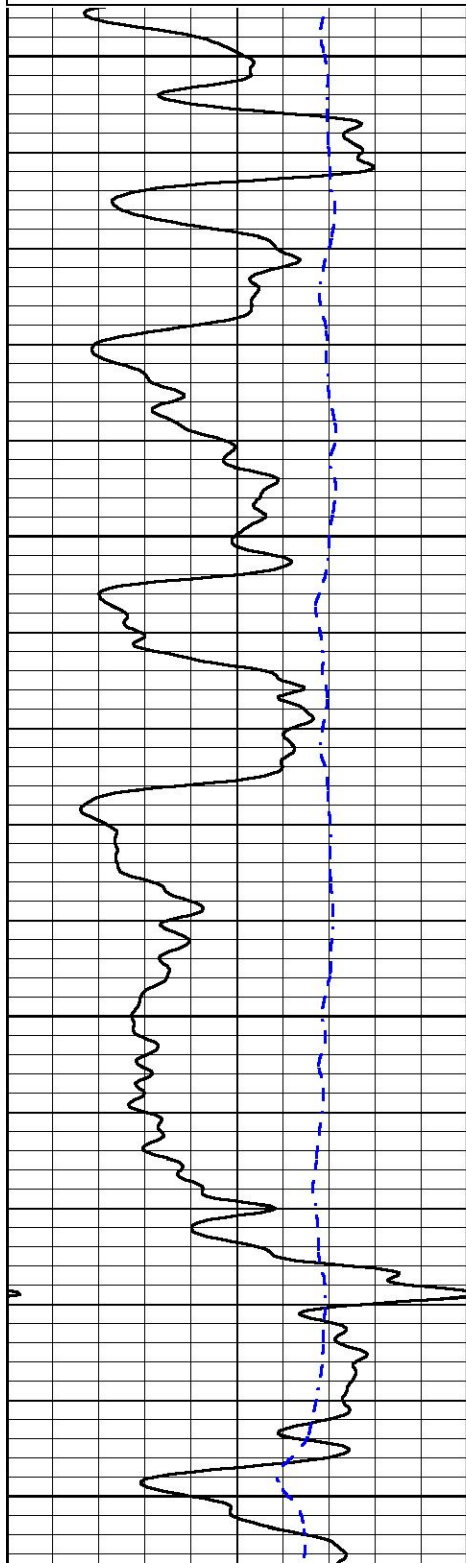


# REPEAT SECTION

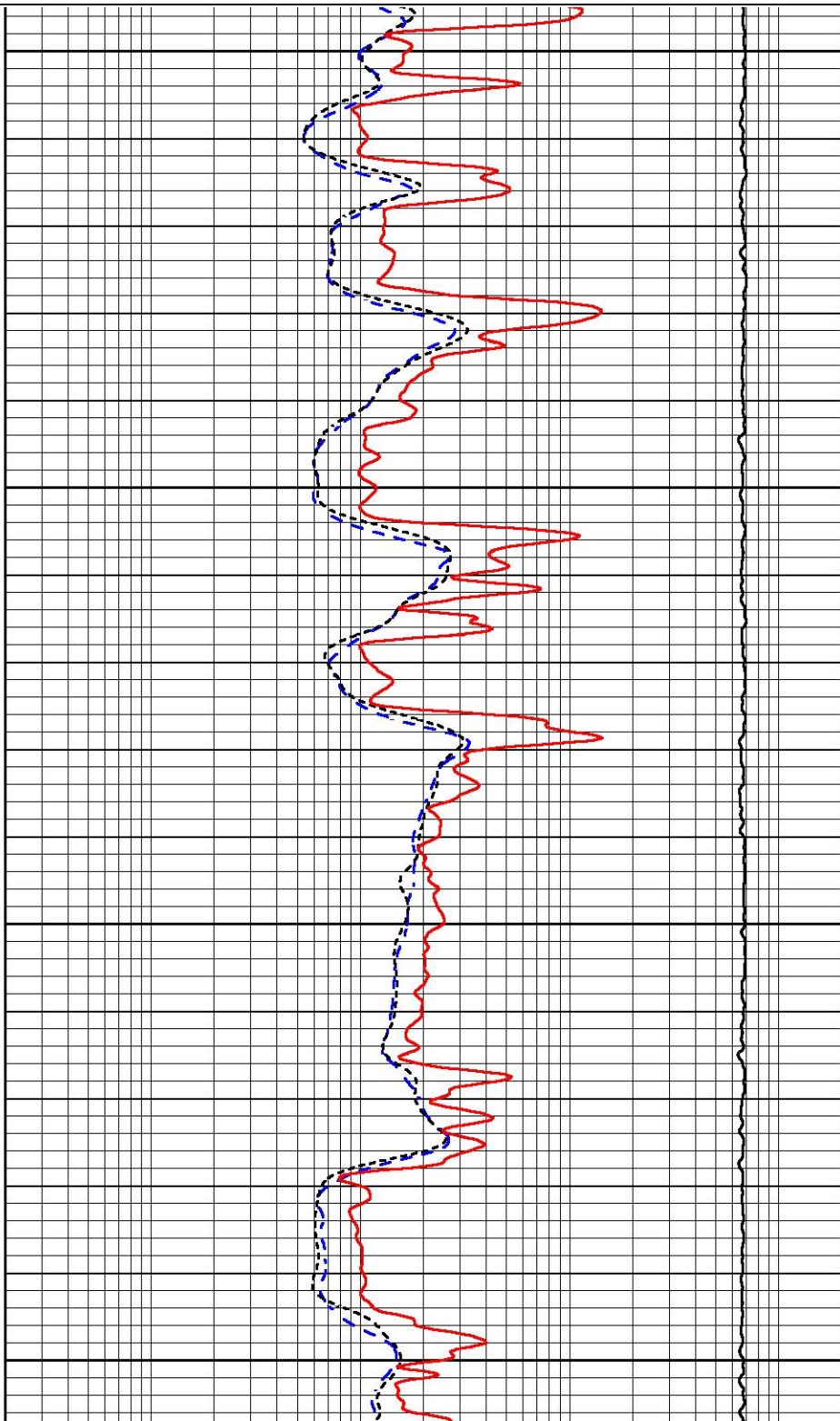
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 Presentation Format dil  
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 Charted by Depth in Feet scaled 1:240

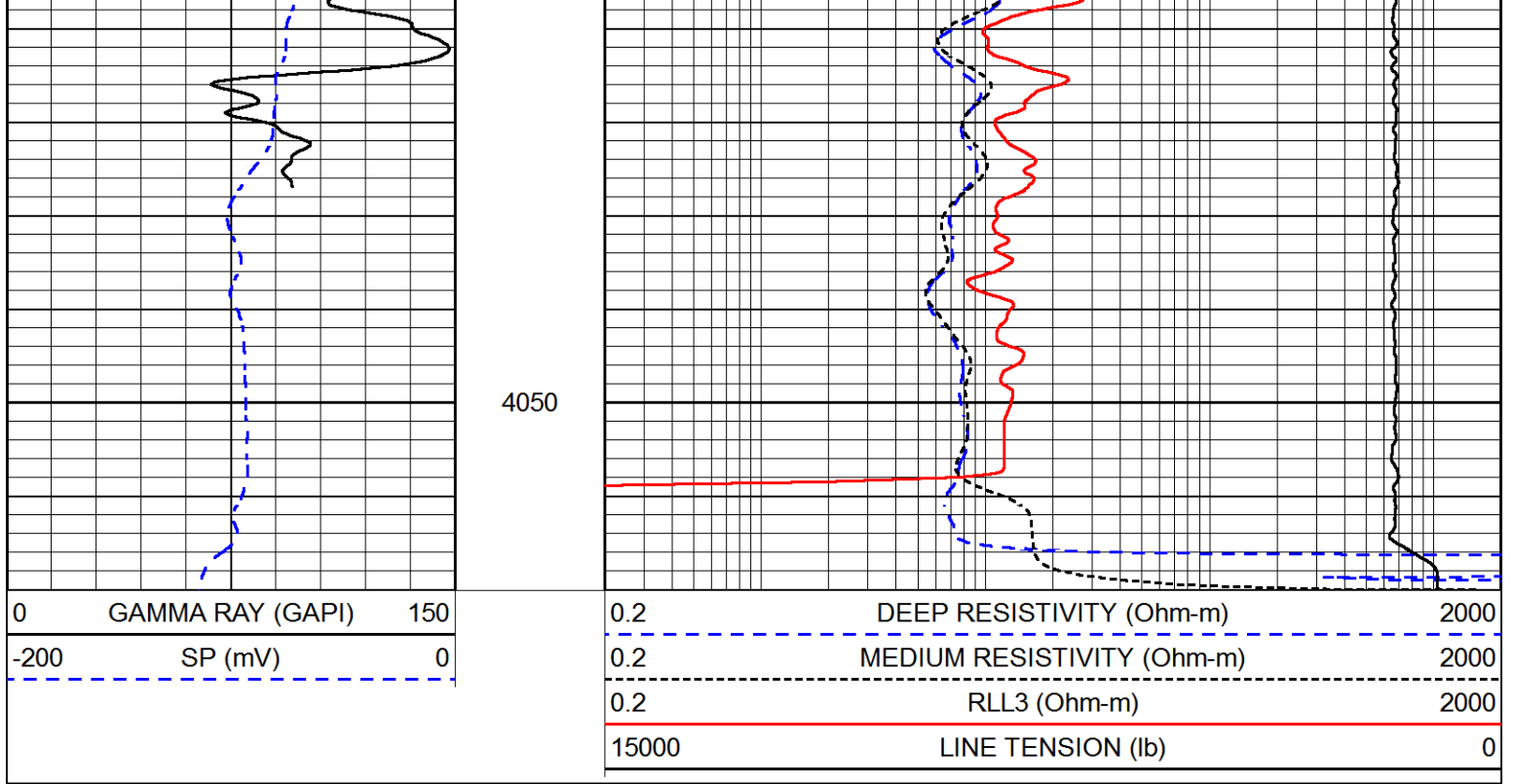
0	GAMMA RAY (GAPI)	150
-200	SP (mV)	0

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



3850  
3900  
3950  
4000





### 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  
 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 NORTHERN LIGHTS OIL CO.  
 Well RHONDA #1  
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