



# DUAL COMP POROSITY LOG

Company RITCHIE EXPLORATION, INC.  
 Well ZACHMAN AP NO.4  
 Field STAR SOUTHEAST  
 County ELLIS  
 State KANSAS

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Location: API #: 15-051-26900-00-00  
 800' FSL & 1735' FEL  
 SEC 5 TWP 12S RGE 19W  
 Permanent Datum GROUND LEVEL Elevation 2155'  
 Log Measured From KELLY BUSHING  
 Drilling Measured From KELLY BUSHING  
 Other Services  
 DIL MEL  
 Elevation  
 K.B. 2163'  
 D.F. N/A  
 G.L. 2155'

Date	12/14/2017						
Run Number	ONE						
Type Log	CNL/CDL						
Depth Driller	3800'						
Depth Logger	3796'						
Bottom Logged Interval	3767'						
Top Logged Interval	3000'						
Type Fluid In Hole	CHEMICAL						
Salinity, PPM CL	3000						
Density	9.2						
Level	FULL						
Max. Rec. Temp. F	114 DEG/F						
Operating Rig Time	2 HOURS						
Equipment -- Location	108 HAYS						
Recorded By	J. HENRICKSON						
Witnessed By	MAX LOVELLY						
Borehole Record		Casing Record					
Run No.	Bit	From	To	Size	Wgt.	From	To
ONE	12.25"	0	220'	8.625"	23#	0	220'
TWO	7.875"	220'	TD				

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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 KANSAS  
 NORTH TO BUCKEYE ROAD, 7 WEST TO 180 RD, 2 NORTH  
 1/3 WEST, NORTH INTO

Log Measured From: KELLY BUSHING 8 Ft. Above Permanent Datum

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

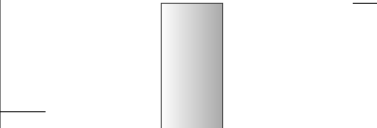
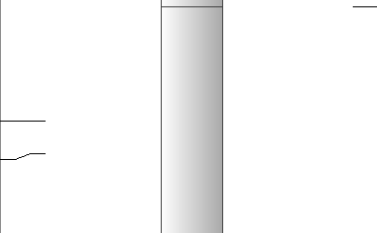
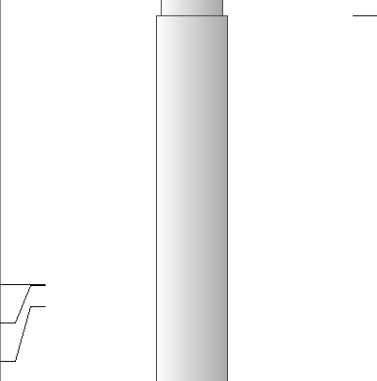
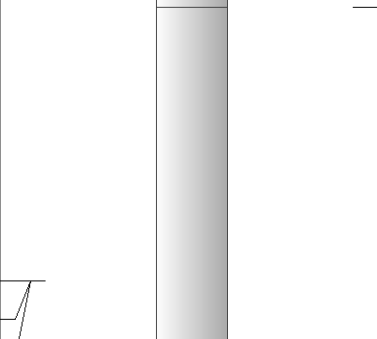
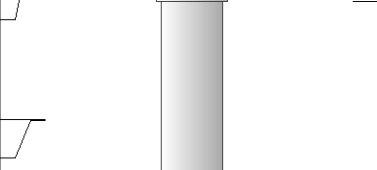
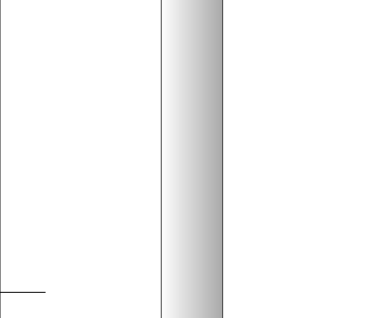
Your Pioneer Energy Services Crew		This Log Record Was Witnessed By	
Engineer: J. HENRICKSON	Operator:	Primary Witness: MAX LOVELLY	Secondary Witness:
Operator:	Operator:	Secondary Witness:	Secondary Witness:
Operator:		Secondary Witness:	

# Log Variables

DatabaseC:\ProgramData\Warrior\Data\ritchie\_zachman\_ap\_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	114	4.5	0	1	2	2.71
NPORSEL	PERFS	SNDERR mmho/m	SNDERRM mmho/m	SPSHIFT mV	SRFTEMP degF	SZCOR	TDEPTH ft
Limestone	0	0	0	-365	52	Off	3796

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

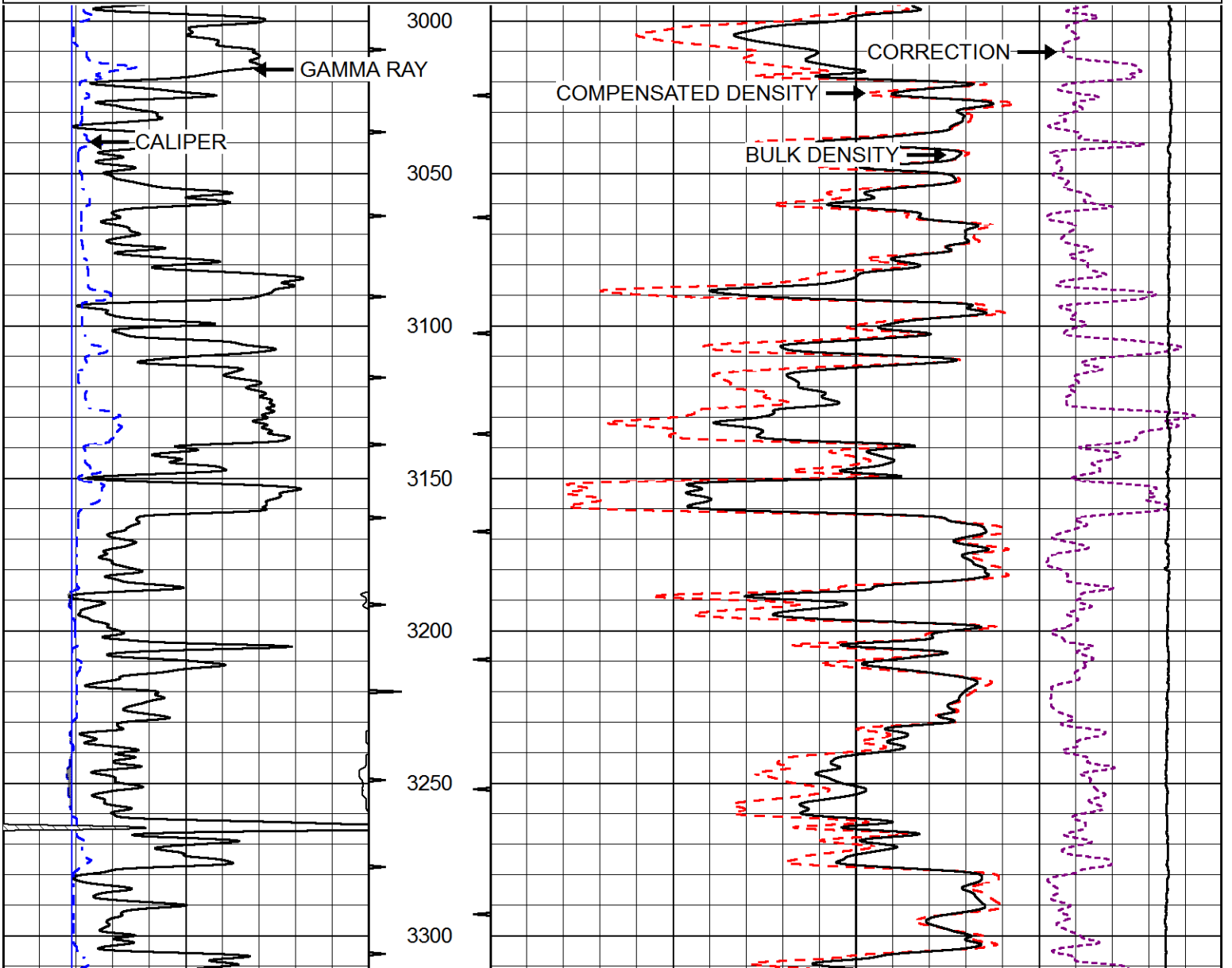
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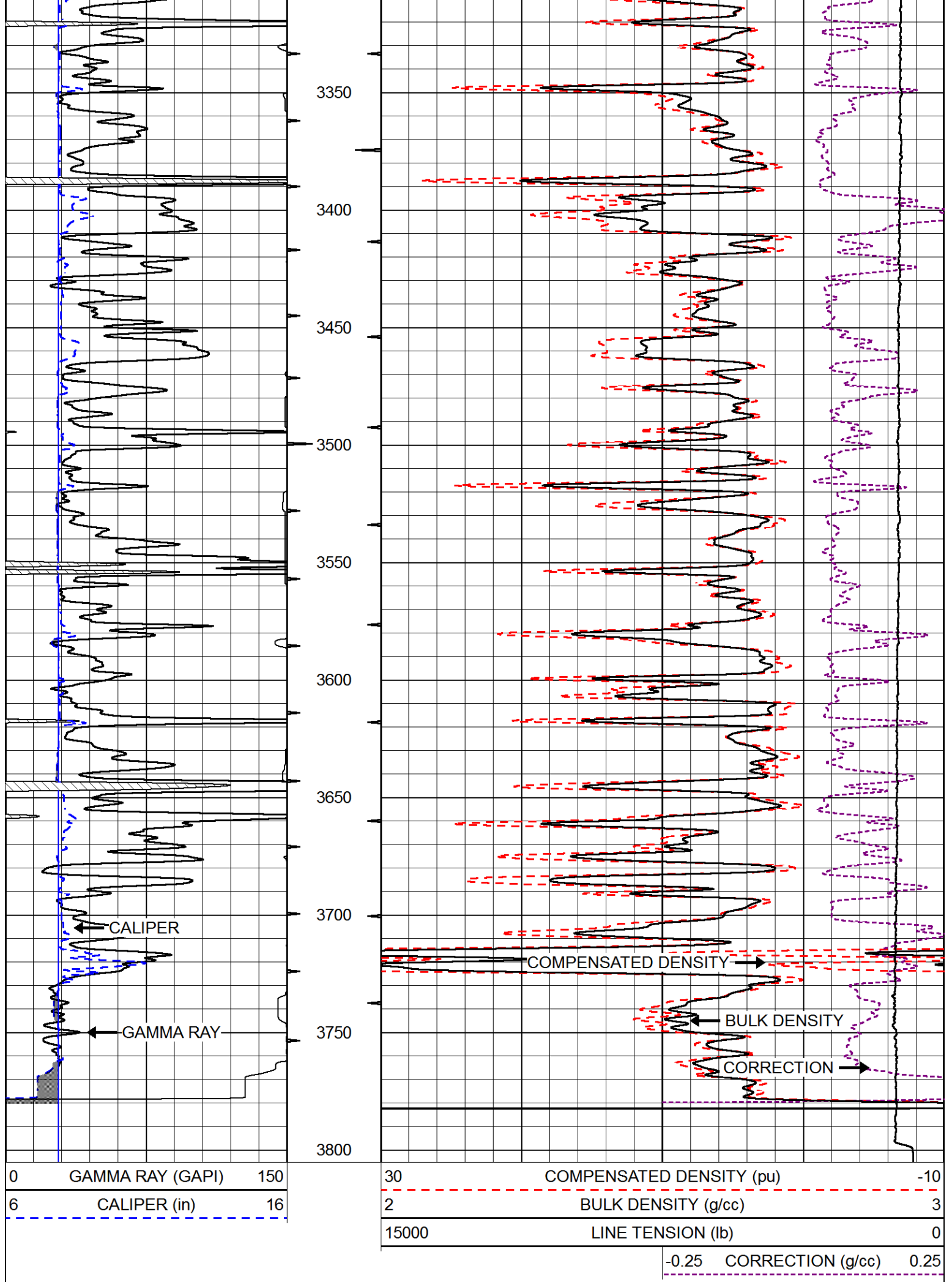
Dataset: ritchie\_zachman\_ap\_4.db: field/well/stackml/pass3.1  
 Total length: 43.08 ft  
 Total weight: 685.00 lb  
 O.D.: 4.00 in

Database File ritchie\_zachman\_ap\_4.db  
 Dataset Pathname stackml/pass3.1  
 Presentation Format cdl  
 Dataset Creation Thu Dec 14 16:53:38 2017  
 Charted by Depth in Feet scaled 1:600

0	GAMMA RAY (GAPI)	150
6	CALIPER (in)	16

30	COMPENSATED DENSITY (pu)	-10
2	BULK DENSITY (g/cc)	3
15000	LINE TENSION (lb)	0
-0.25	CORRECTION (g/cc)	0.25

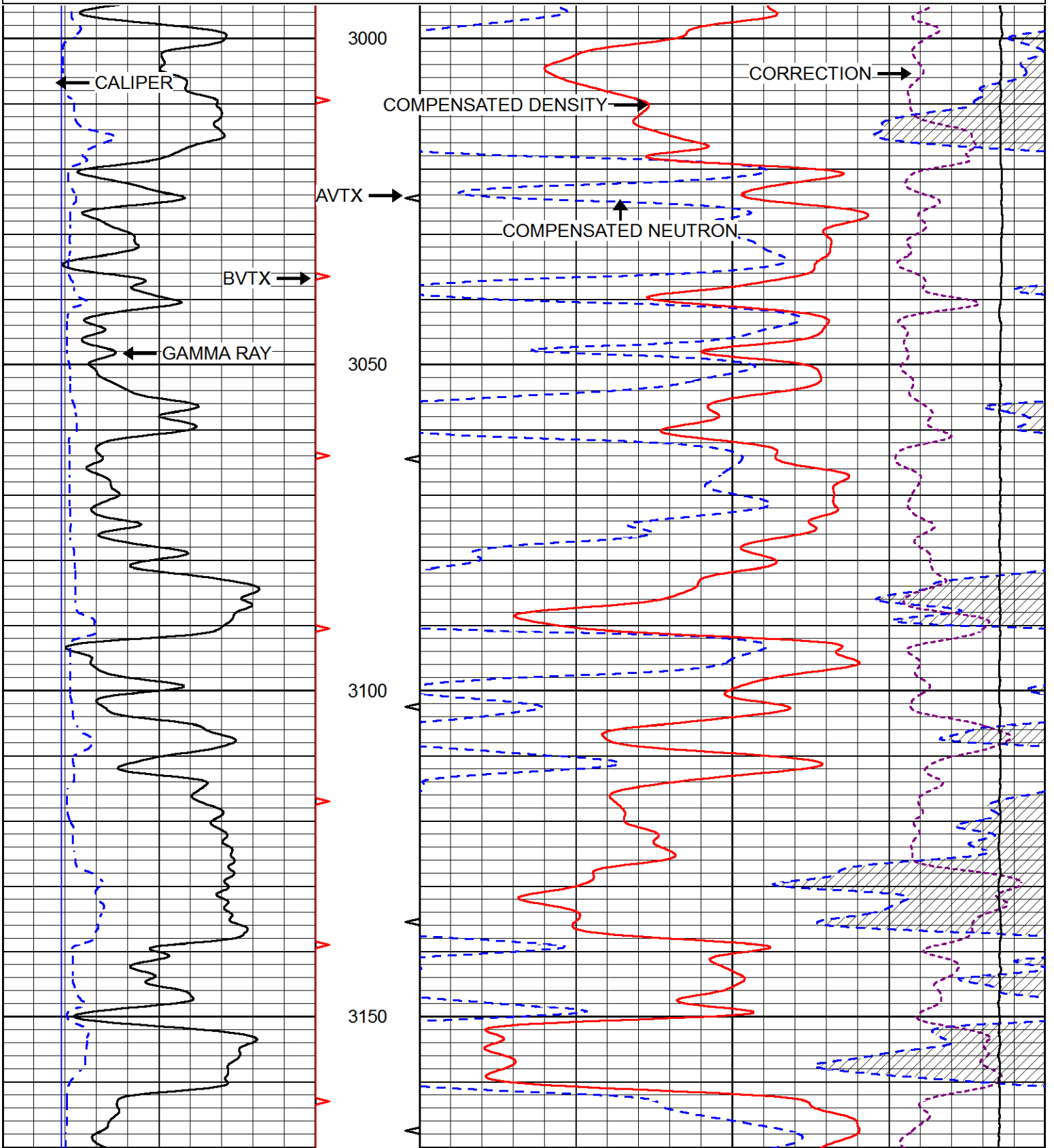


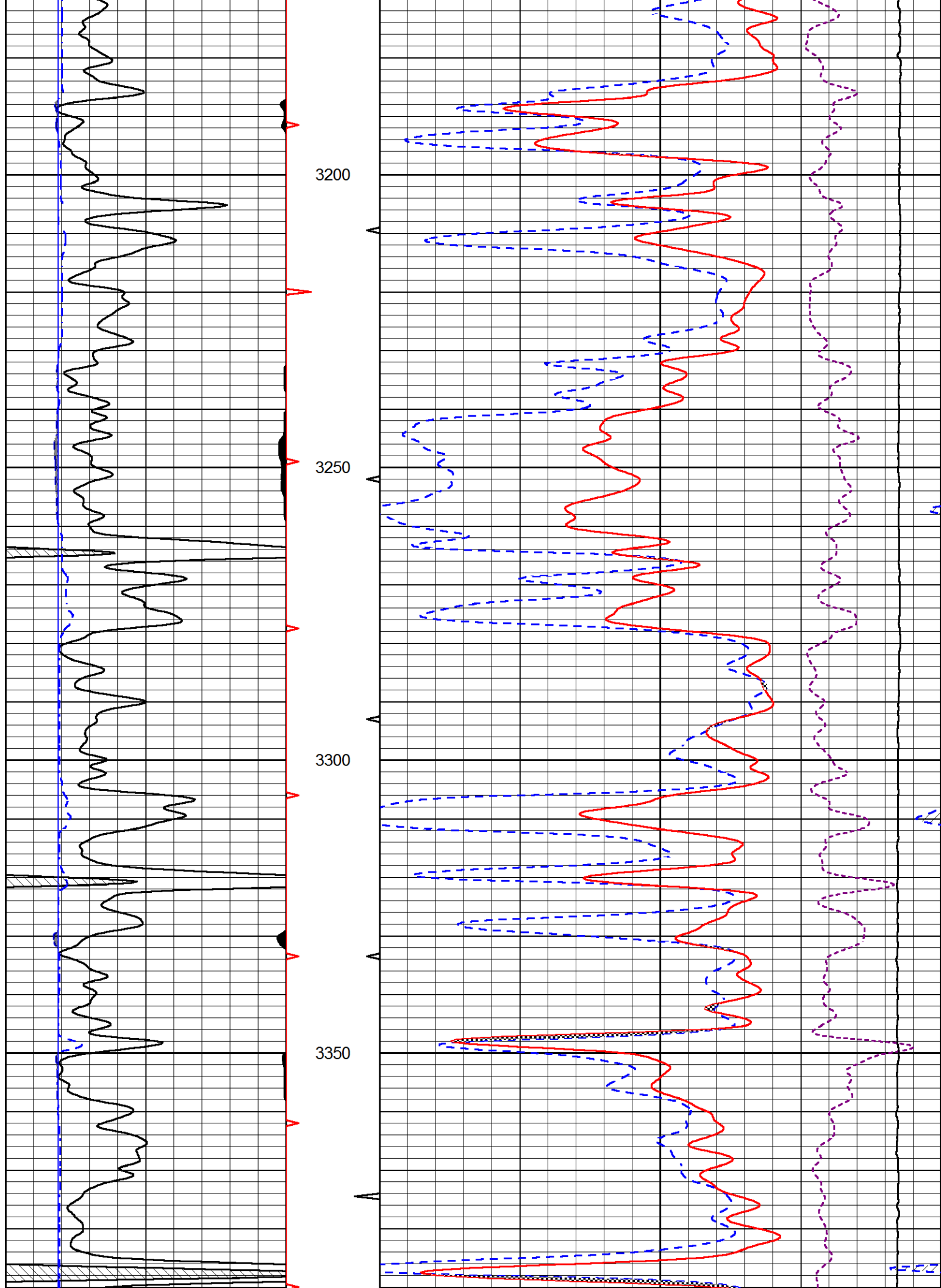


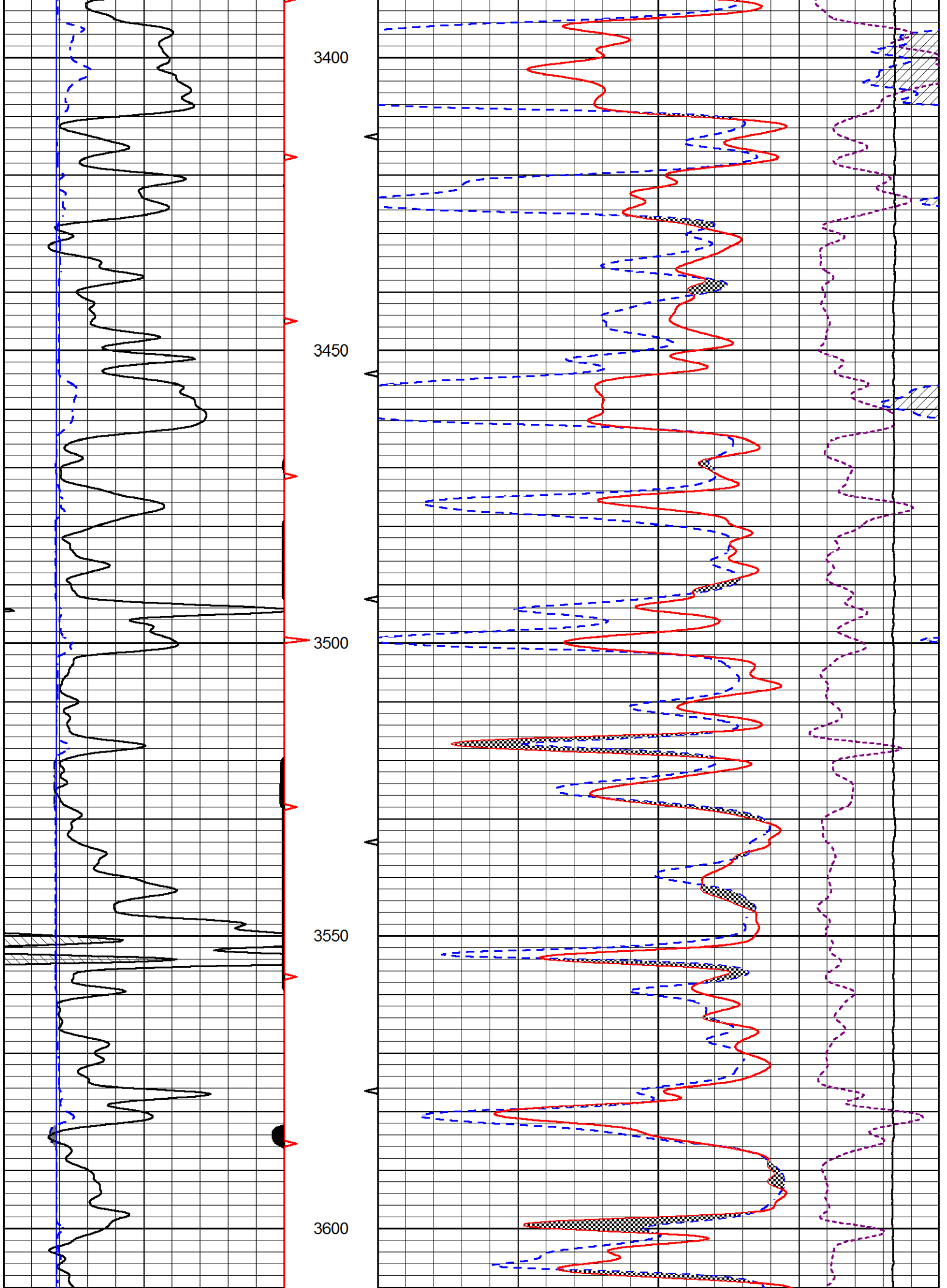
Database File      ritchie\_zachman\_ap\_4.db  
 Dataset Pathname   stackml/pass3.1  
 Presentation Format  cndlspec  
 Dataset Creation   Thu Dec 14 16:53:38 2017  
 Charted by         Depth in Feet scaled 1:240

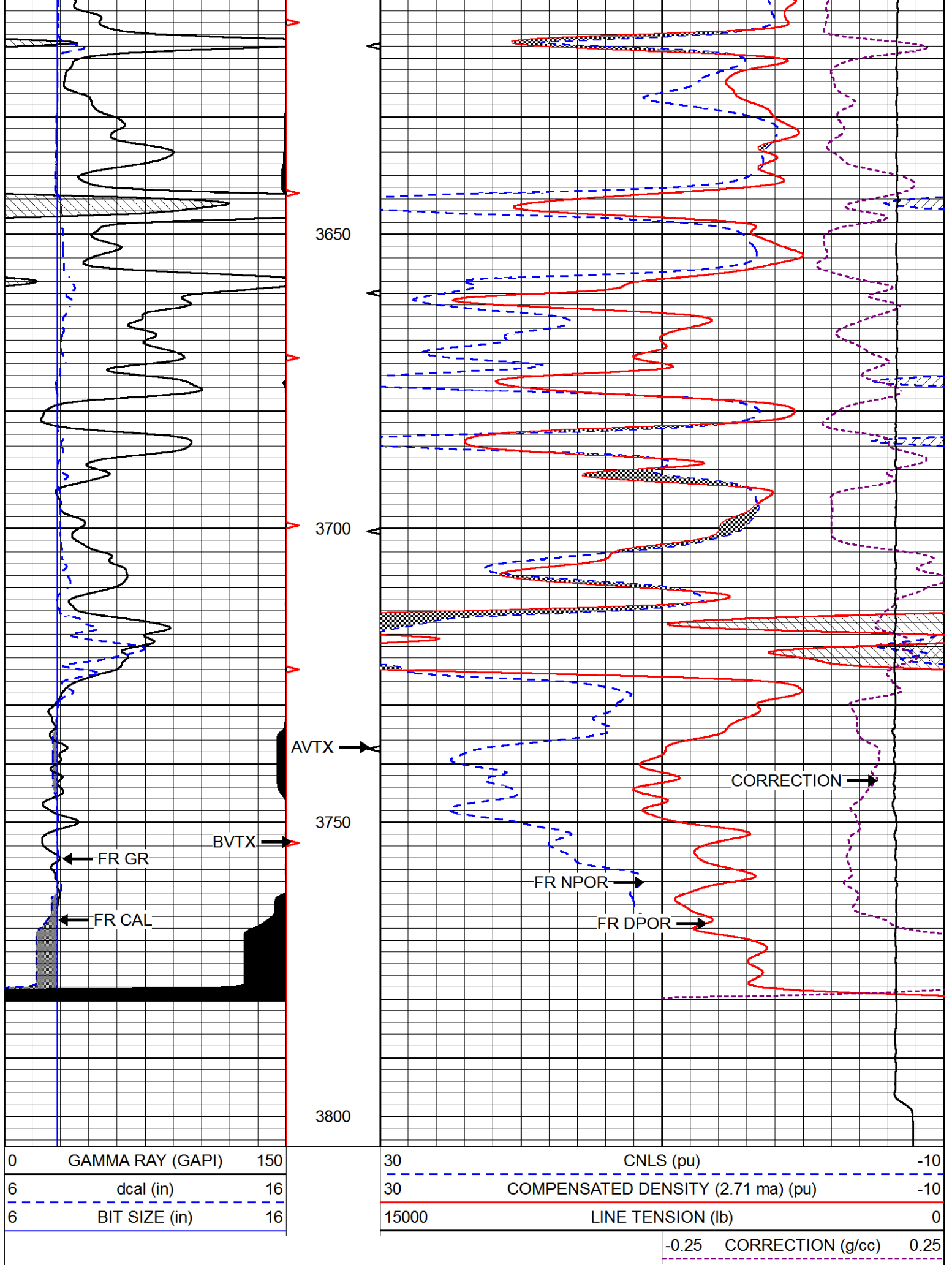
0	GAMMA RAY (GAPI)	150
6	dcal (in)	16
6	BIT SIZE (in)	16

30	CNLS (pu)	-10
30	COMPENSATED DENSITY (2.71 ma) (pu)	-10
15000	LINE TENSION (lb)	0
-0.25	CORRECTION (g/cc)	0.25





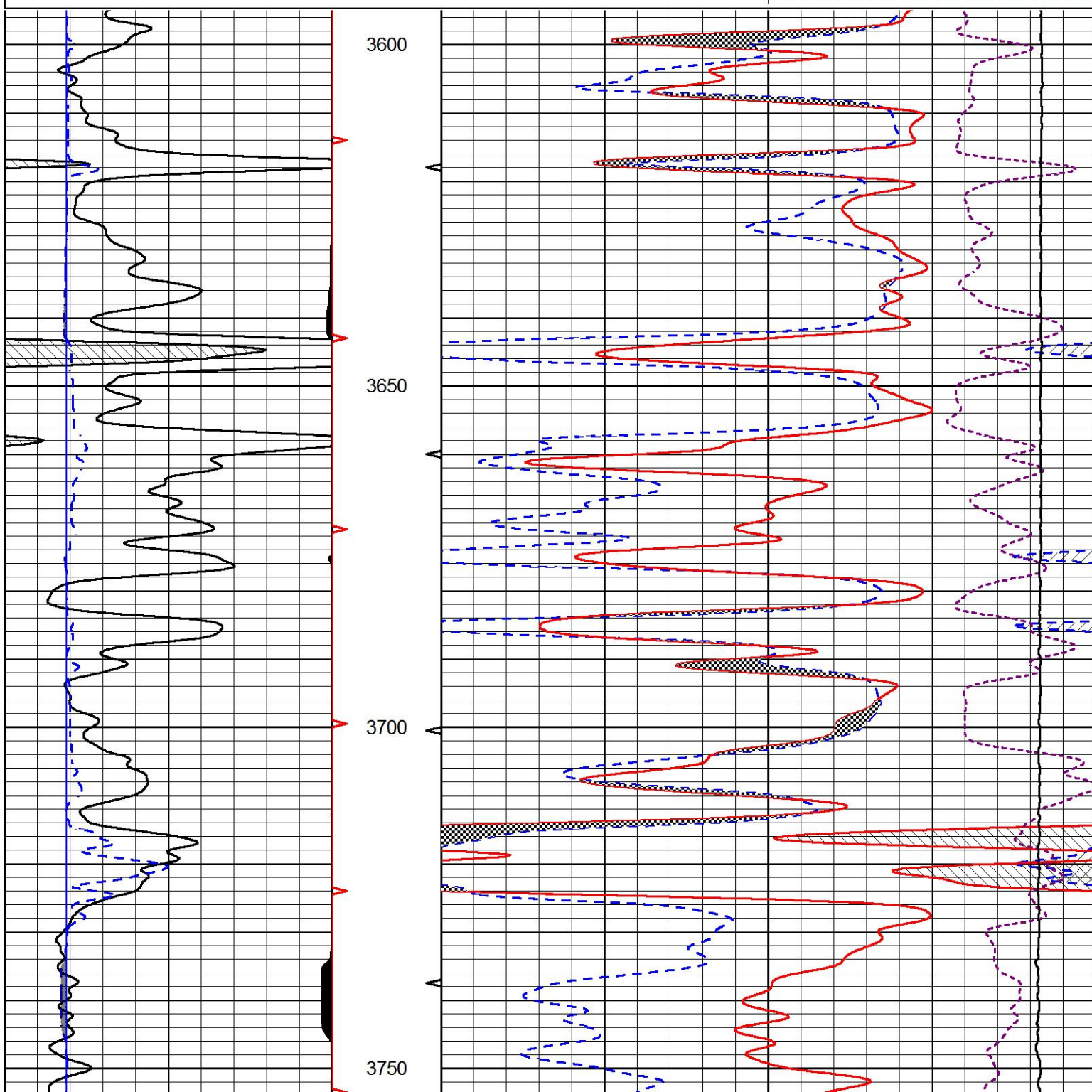


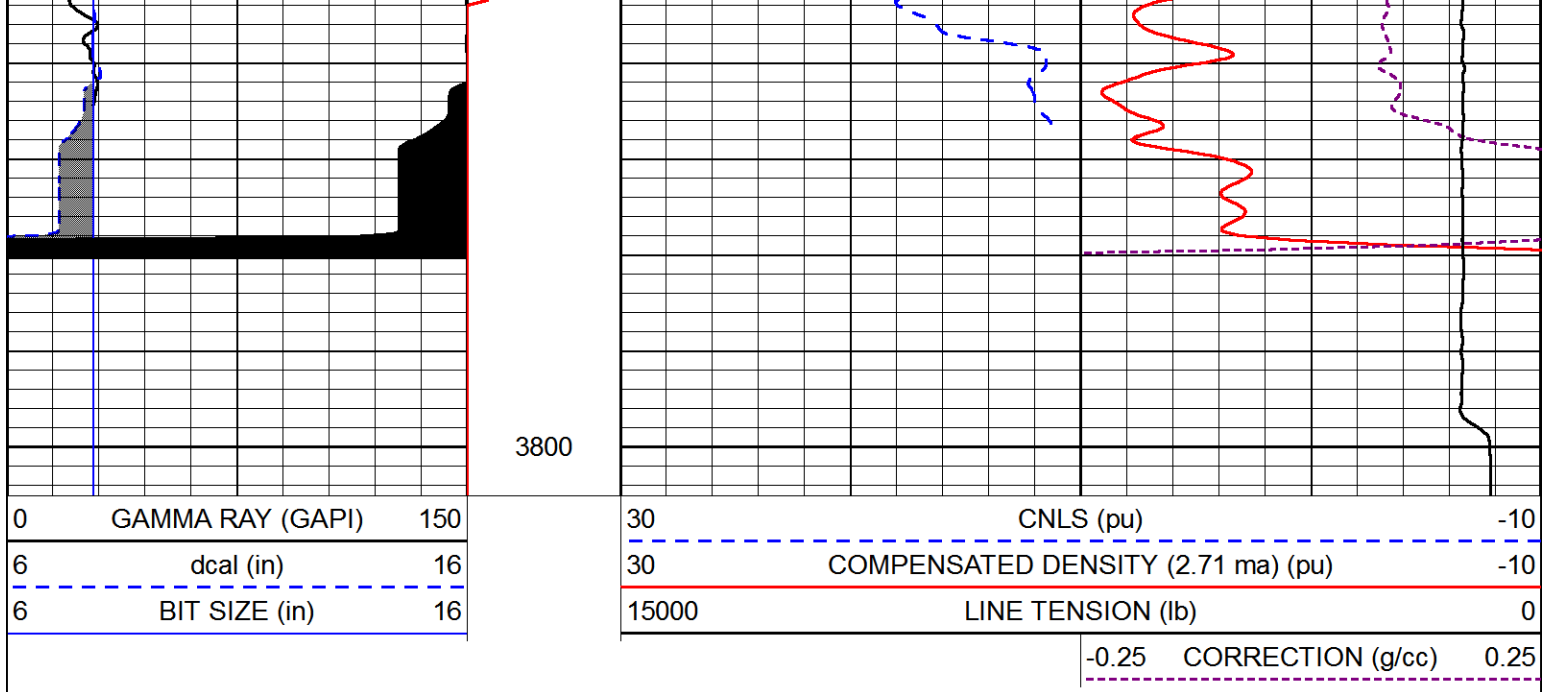


# REPEAT SECTION

Database File      ritchie\_zachman\_ap\_4.db  
 Dataset Pathname    stackml/pass2.1  
 Presentation Format    cndlspec  
 Dataset Creation      Thu Dec 14 16:54:04 2017  
 Charted by            Depth in Feet scaled 1:240

0	GAMMA RAY (GAPI)	150	30	CNLS (pu)	-10
6	dcal (in)	16	30	COMPENSATED DENSITY (2.71 ma) (pu)	-10
6	BIT SIZE (in)	16	15000	LINE TENSION (lb)	0
				-0.25 CORRECTION (g/cc)	0.25





### Calibration Report

Database File     ritchie\_zachman\_ap\_4.db  
 Dataset Pathname stackml/pass3.1  
 Dataset Creation  Thu Dec 14 16:53:38 2017

### Dual Induction Calibration Report

Serial-Model:                   PSI 978-M&W  
 Calibration Performed:        Wed Dec 13 12:45:09 2017

Loop:	Readings		References			Results	
	Air	Loop	Air	Loop		Gain	Offset
Deep	178.615	710.235	0.000	255.800	mmho/m	0.570	-36.500
Medium	161.982	1441.110	0.000	255.800	mmho/m	0.420	-35.000

### Microlog Calibration Report

Serial-Model:                   PSI-02-PSI STKBL ML  
 Performed:                      Fri Jun 23 01:25:19 2017

	Readings		References			Results	
	Zero	Cal	Zero	Cal		m	b
Normal	0.0031	0.0043	0.0000	10.0000	Ohm-m	12000.0000	-0.3000
Inverse	0.0000	0.0013	0.0000	10.0000	Ohm-m	12000.0000	0.0000
Caliper	1.0020	1.0834	5.5000	16.5000	in	135.1560	-131.3500

### 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

	<u>Density</u>		<u>Far Detector</u>	<u>Near Detector</u>	
Magnesium	1.755	g/cc	4691.86	4818.19	cps
Aluminum	2.690	g/cc	859.57	3020.22	cps

Spine Angle = 74.61

Density/Spine Ratio = 0.531

	<u>Size</u>		<u>Reading</u>
Small Ring	4.00	in	1.03
Large Ring	14.00	in	1.23

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



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