



ThruBit
A Schlumberger Company

ARRAY INDUCTION
NEUTRON / DENSITY
GAMMA RAY
MEMORY LOG

Company	SHELL EXP. & PROD. CO., INC	Company	SHELL EXP. & PROD. CO., INC
Well	PREISSER 2509 8-1H	Well	PREISSER 2509 8-1H
Field	ARROWHEAD	Field	ARROWHEAD
County	RENO	County	RENO
State	KANSAS	State	KANSAS
Location:	API #: 15-155-21605-01-00 SHL: 330' FSL & 390' FWL LONG -98.3421196 & LAT 37.8834827 SEC 8 TWP 25S RGE 09W	Other Services THRUBIT PORTAL BIT	
Permanent Datum	G.L	Elevation	1709'
Log Measured From	K.B. 23' ABOVE PERM DATUM	K.B. 1732'	
Drilling Measured From	K.B.	D.F. 1732'	
		G.L. 1709'	
Date	16 FEBRUARY 2013		
Run Number	ONE		
Depth Driller	8301'		
Depth Logger	8268'		
Bottom Logged Interval	8258'		
Top Log Interval	4194'		
Casing Driller	7.00" @ 4193'		
Casing Logger	4194'		
Bit Size	6.125		
Type Fluid in Hole	WBM		
Density / Viscosity	8.40 / 29		
pH / Fluid Loss	7.6 / NA		
Source of Sample	MUD PIT		
Rim @ Meas. Temp	3.30 ohms @ 53 degf		
Rinf @ Meas. Temp	2.48 ohms @ 44 degf		
Rmc @ Meas. Temp	4.12 ohms @ 42 degf		
Source of Rinf / Rmc	MEASURED		
Rim @ BHT	2.74 ohms @ 118 degf		
Time Circulation Stopped	00:30		
Time Logger on Bottom	01:30		
Maximum Recorded Temperature	118 degf		
Equipment Number	T004		
Location	OKC. OK		
Recorded By	DENGLER		
Witnessed By	RAY HAWKINS		

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, 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. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

SERVICE: HORIZONTAL PUMP DOWN MEMORY BIT DEPTH: 8204' LOGGED TO: 4194'
ALL SCALES AND PRESENTATIONS PER CLIENT REQUEST
LIMESTONE MATRIX, 2.71 g/cc. USED FOR POROSITY MEASUREMENTS
TOOLSTING RAN WITH SMALL DE-CENTRALIZER, SWIVEL, AND NO STANDOFFS
TBHV REPRESENTS TOTAL BORHOLE VOLUME, ft3
ABHV REPRESENTS ANNULAR HOLE VOLUME, CALCULATED FOR 4.5" CSG., ft3
RIGMINDER USED TO ACQUIRE LOG DEPTH
LOG CORRELATED TO MWD GR
CI= 2600 mg/L NaCl= 3750 mg/L NO BARITE
CASING ID 7.00" 23.00 LB/FT ID 6.3466" CALI DIA 6.313" NO CORRECTION
RIG: NABORS 180
CREW: J. DENGLER, J. HIRST, K. REED

Service Ticket No.	1757	API No.	15-155-21605-01-00	PGM Ver	WARRIOR 7.0
The Well Name, Location, Borehole Description, and / or Cementing Data Furnished by Client					
EQUIPMENT DATA					
GAMMA RAY		NEUTRON		INDUCTION	

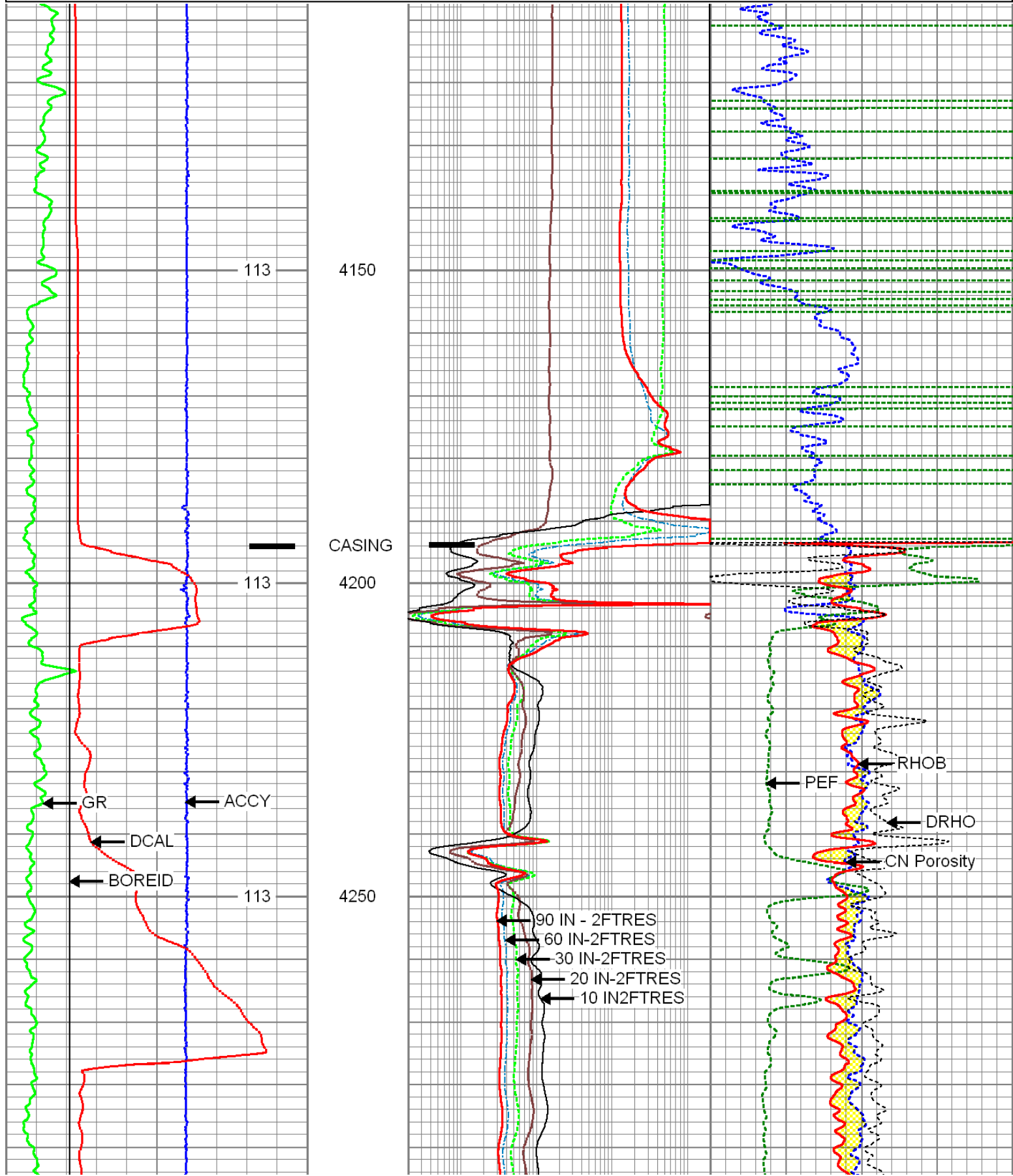
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	PS35T	Serial No.	PS6N	Serial No.	PS03D	Serial No.	ENP6R
Model No.	PS	Model No.	PS	Model No.	PS	Model No.	ENP
Diameter	2.125"	Diameter	2.125"	Diameter	2.125"	Diameter	2.125"
LOGGING DATA							
General Data							
Pass	Depths		Well Head	Speed	Logging Run Comments		
No.	From	To	Pressure	Ft/Min			
ONE	8268'	4194'		30			
	GAMMA RAY		NEUTRON		DENSITY		INDUCTION
Pass	Scale		Scale		Scale		Scale
No.	L	R	L	R	L	R	L
ONE	0 API	150 API	45 %	-15 %	1.95 g/cc	2.95 g/cc	0.2 OHM-M 2000 OHM-M
DIRECTIONAL INFORMATION							
Maximum Deviation		93.1	deg. @	4874'	KOP	3343'	

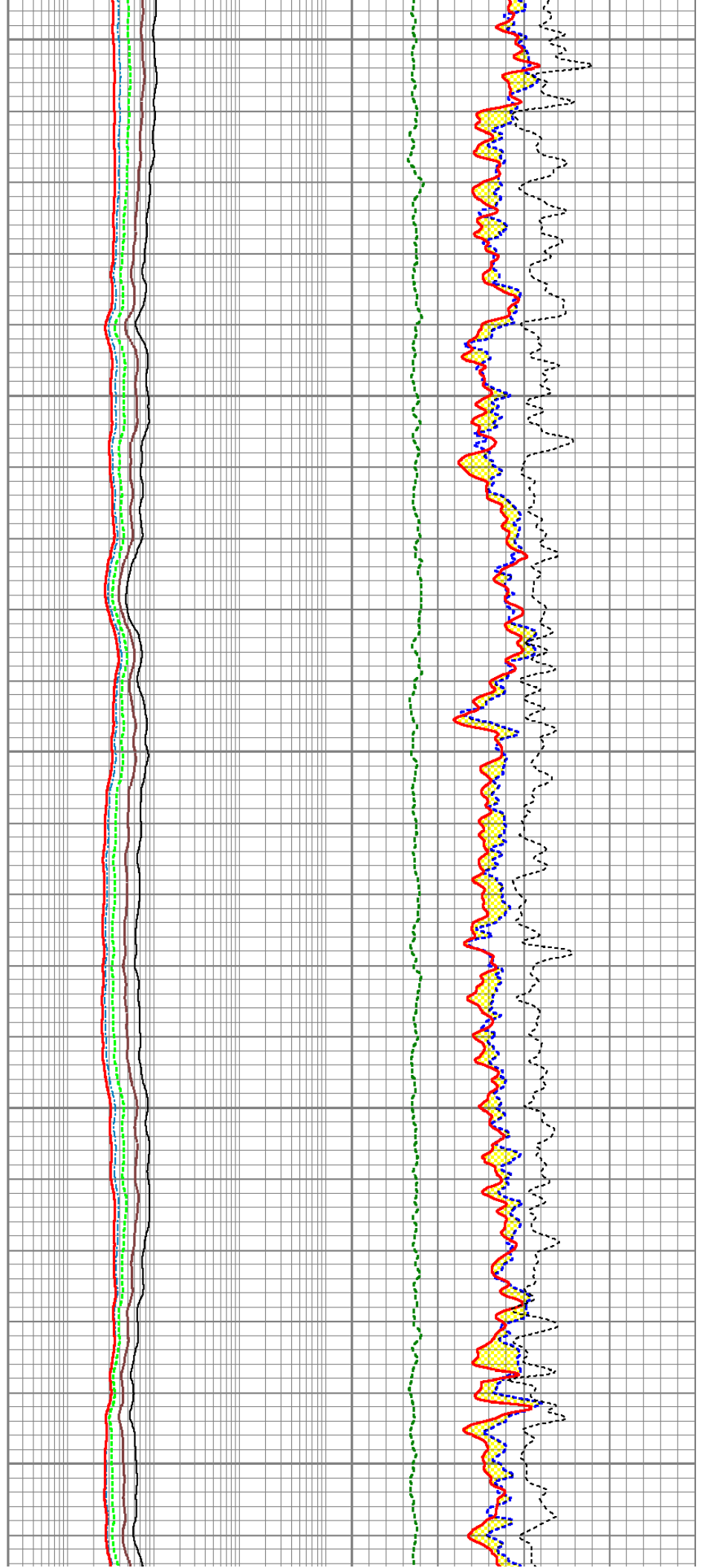
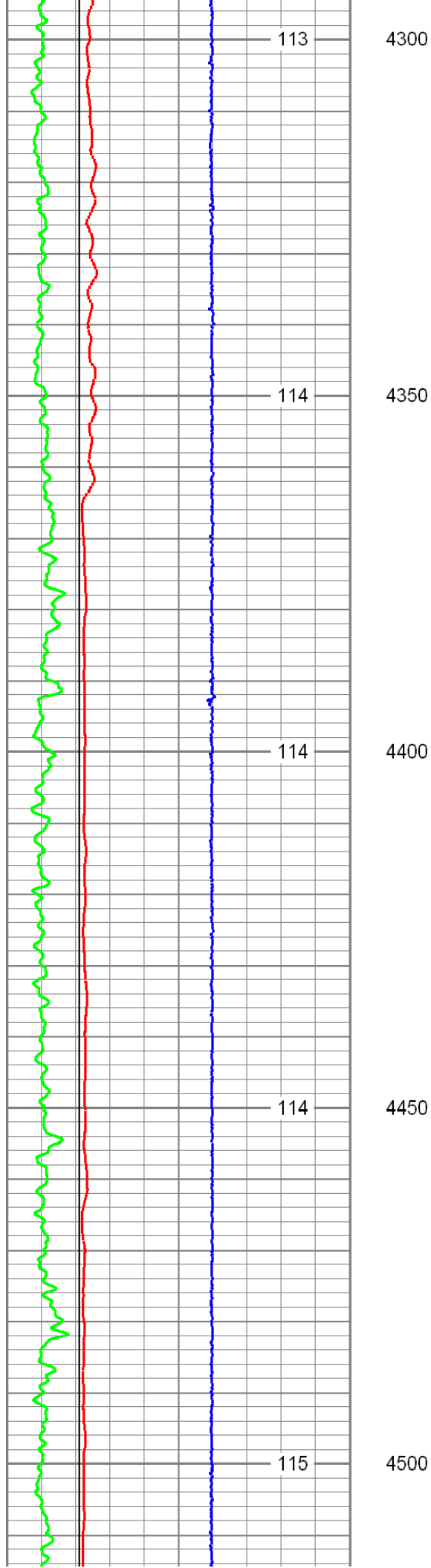
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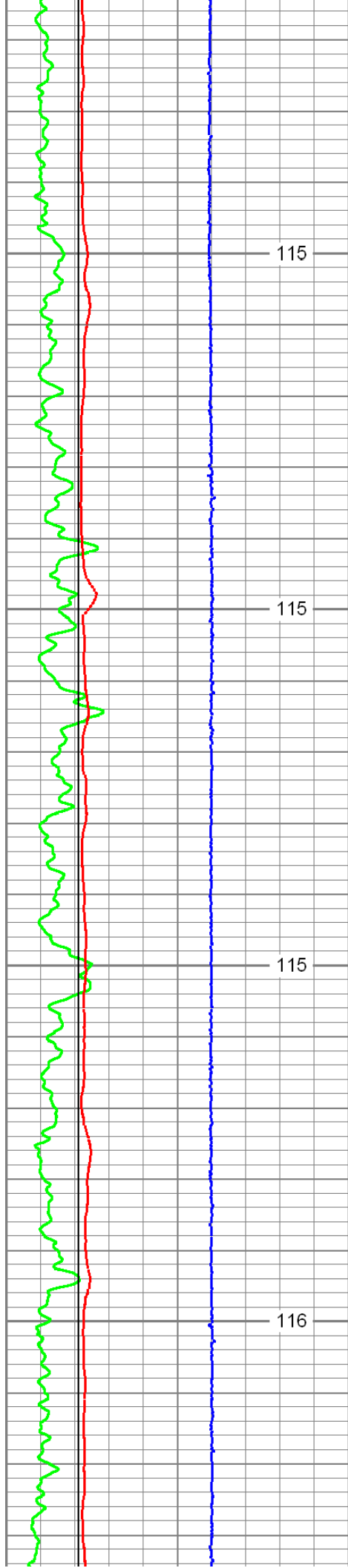
Job Times
Job # : 1757
Operator : Shell Oil
Well name : PREISSER 2509 8-1H
Job level : Level 4
TimelIne of Bit Times
DateStart TimeElapsed Time (HH:MM)Time CodeNotes
TimelIne of Crew / Logging Equipment Times
DateStart TimeElapsed Time (HH:MM)Time CodeNotes
14 FEB 2013 21:00 L00 : Time stamp - activity start
14 FEB 2013 22:00 01:00 L03 : Job preparation
15 FEB 2013 02:00 04:00 L01 : Logging eqt travel time
16 FEB 2013 00:30 22:30 L20 : Logging eqt standby time
16 FEB 2013 01:00 00:30 L31 : Logging rig up / down time
16 FEB 2013 02:00 01:00 L30 : Logging operating time "run in hole, release tools a
16 FEB 2013 02:30 00:30 L31 : Logging rig up / down time
16 FEB 2013 07:30 05:00 L30 : Logging operating time pull pipe from 8301 to 3300 a
16 FEB 2013 08:00 00:30 L30 : Logging operating time "run in hole, retrieve tools
16 FEB 2013 08:30 00:30 L31 : Logging rig up / down time rig down tools abd equipm
16 FEB 2013 11:00 02:30 L80 : Data processing time processed logs and emailed data
16 FEB 2013 15:30 04:30 L01 : Logging eqt travel time return to shop
16 FEB 2013 19:00 03:30 L90 : Job cleanup

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0	GR (GAPI)	150	0.2	60 IN-2FTRES (Ohm-m)	2000	45	CN Porosity (pu)	-15
-5	ACCY	5	0.2	30 IN-2FTRES (Ohm-m)	2000	0	PEF (barn)	10
4	DCAL (in)	14	0.2	20 IN-2FTRES (Ohm-m)	2000	1.95	RHOB (g/cc)	2.95
4	BOREID (in)	14	0.2	10 IN2FTRES (Ohm-m)	2000	-0.25	DRHO (g/cc)	0.25
	GRTEMP (degF)		0.2	90 IN - 2FTRES (Ohm-m)	2000			







4550

4600

4650

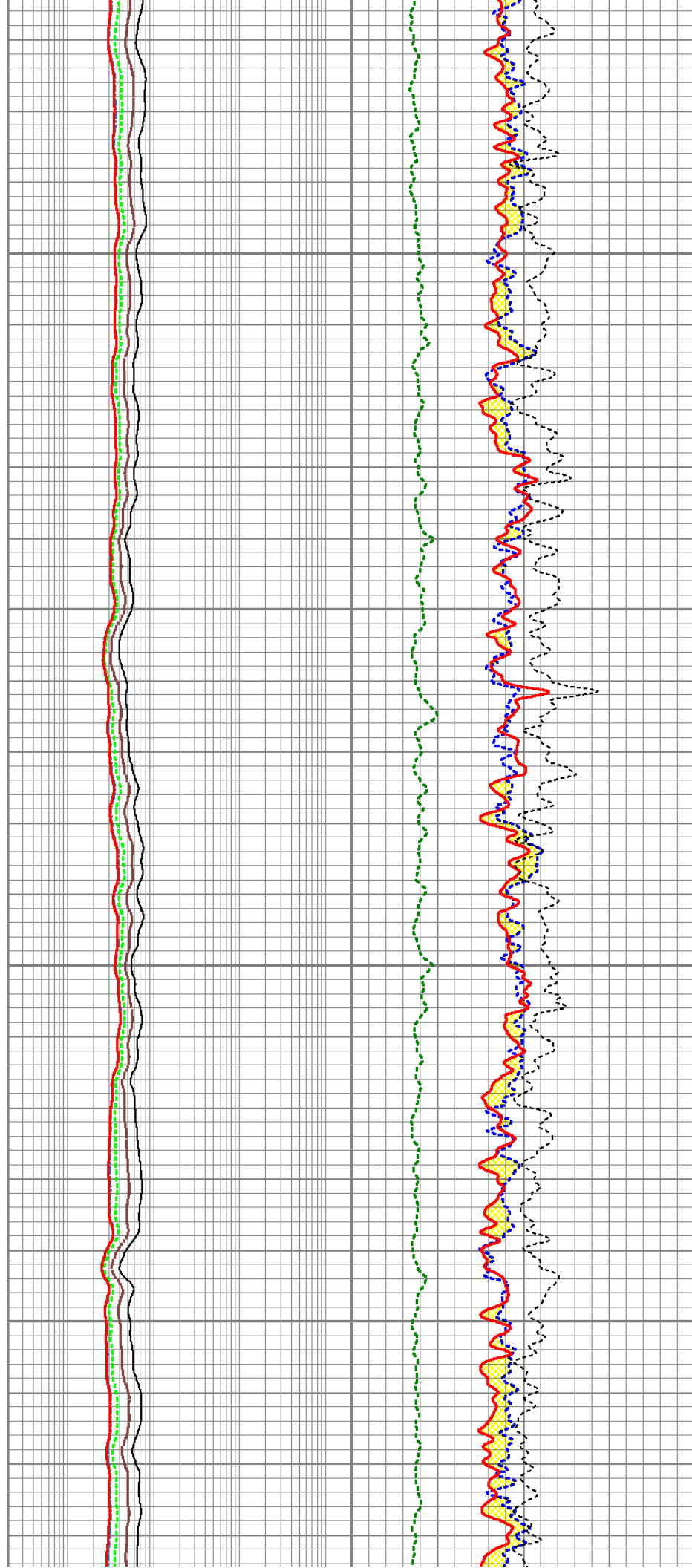
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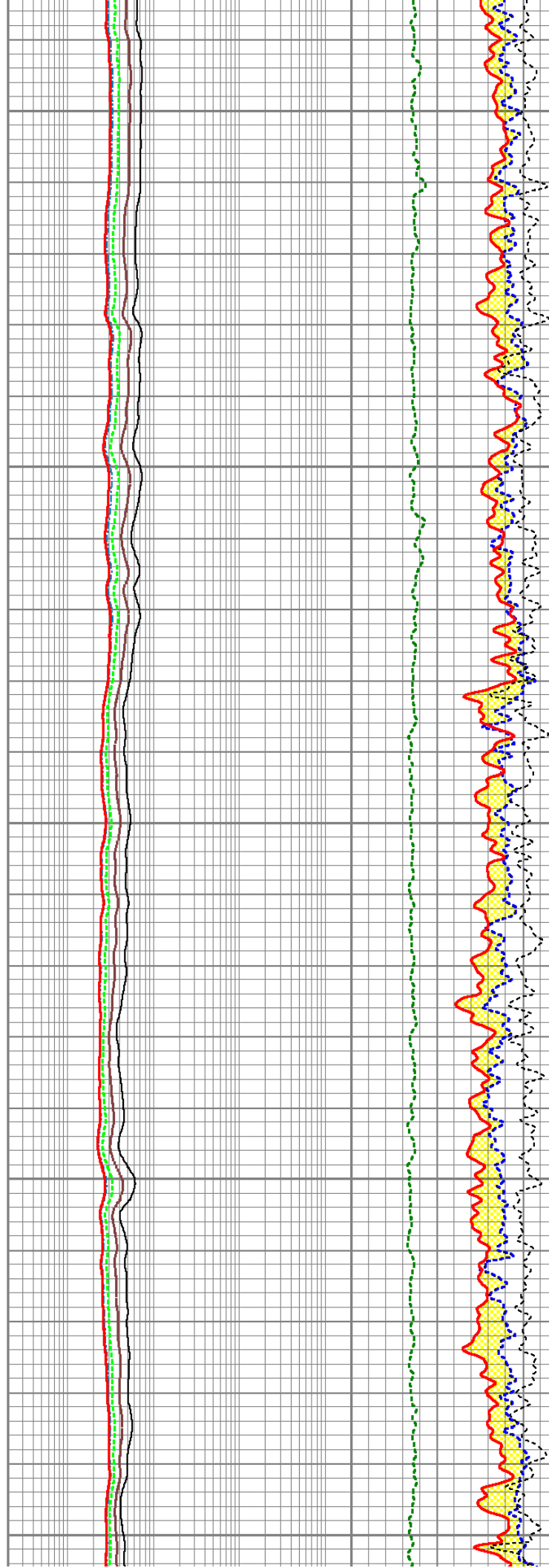
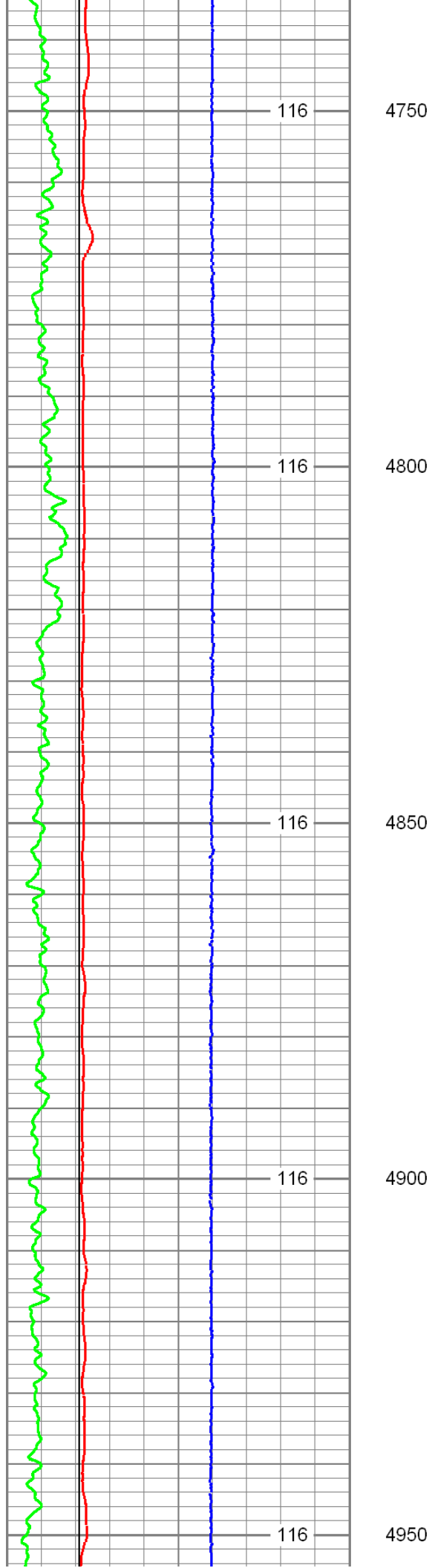
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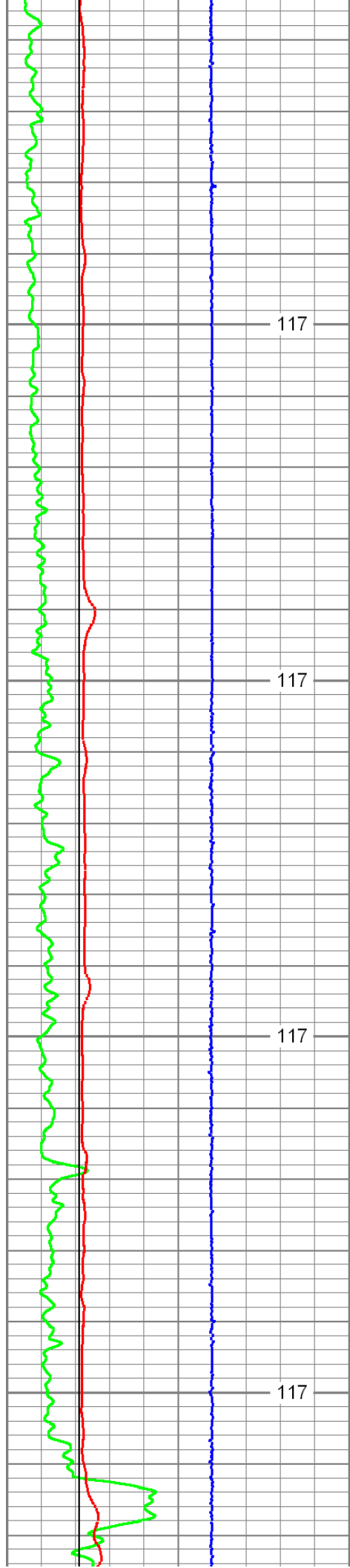
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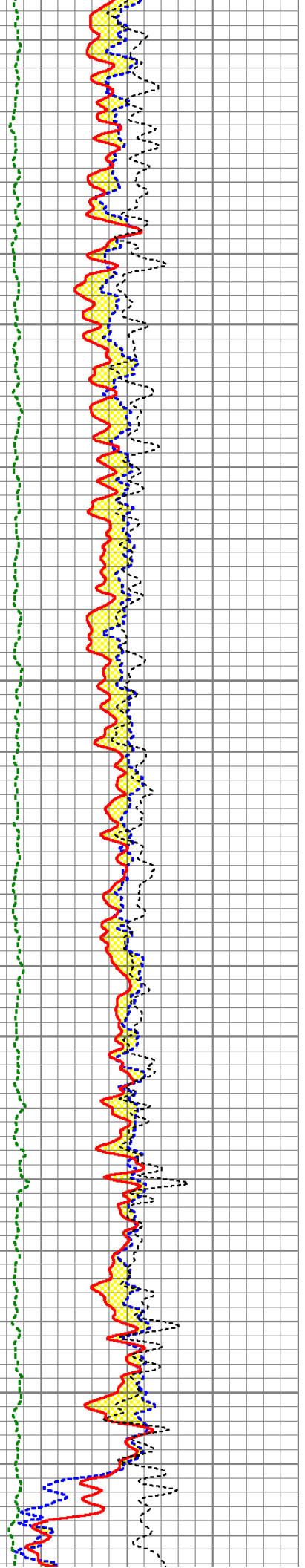
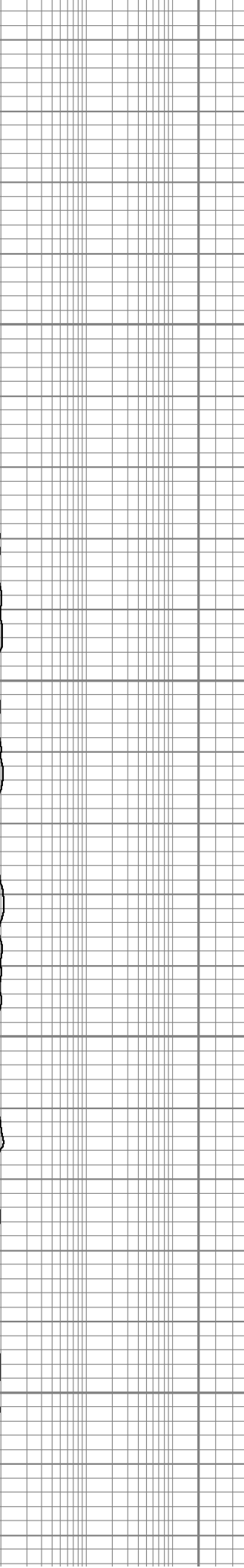
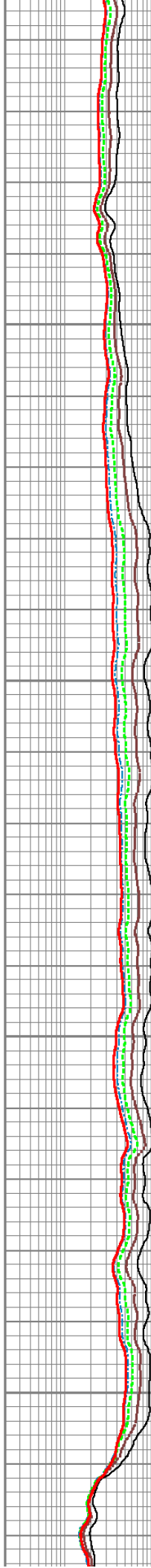


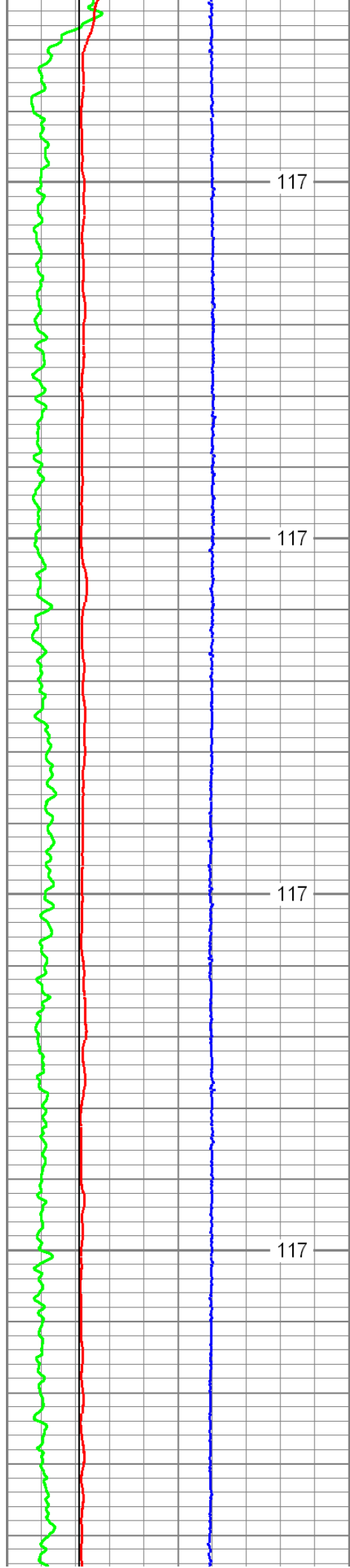
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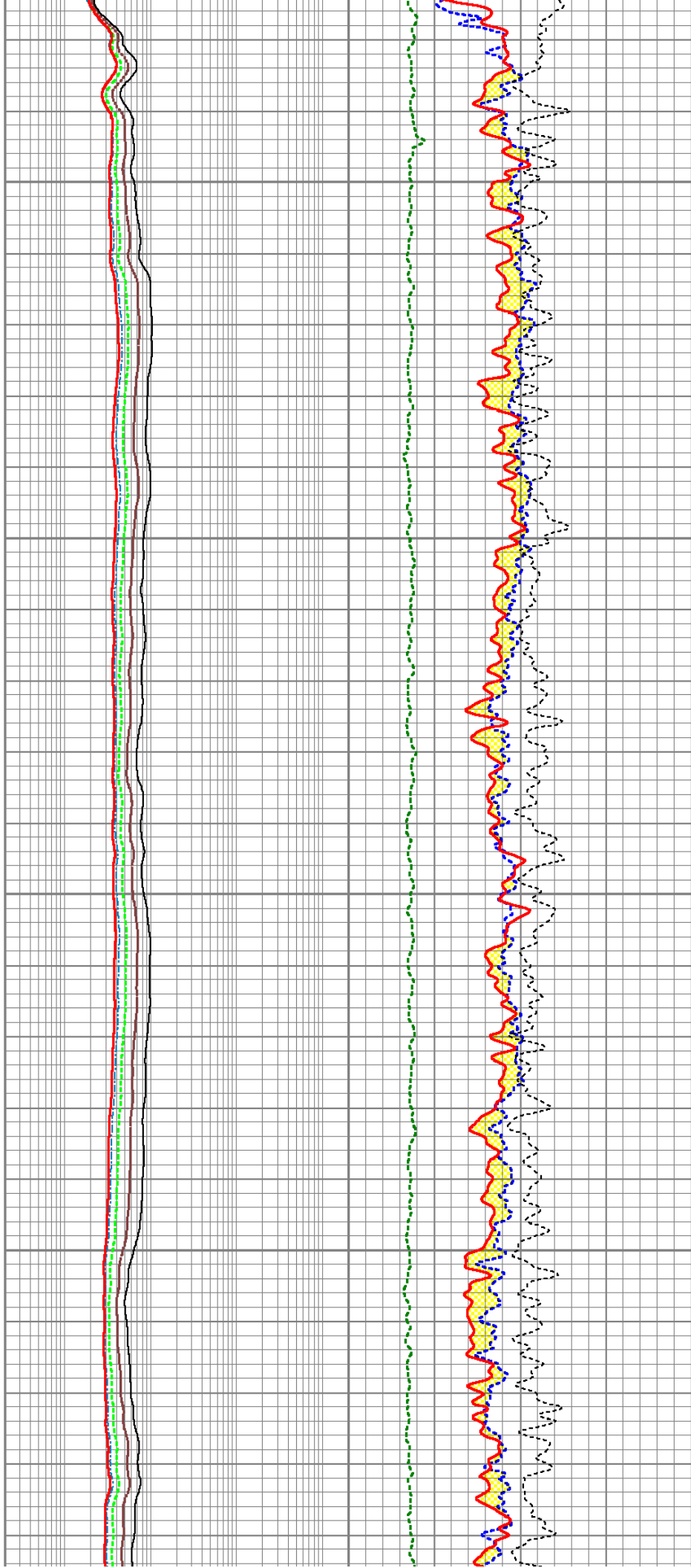
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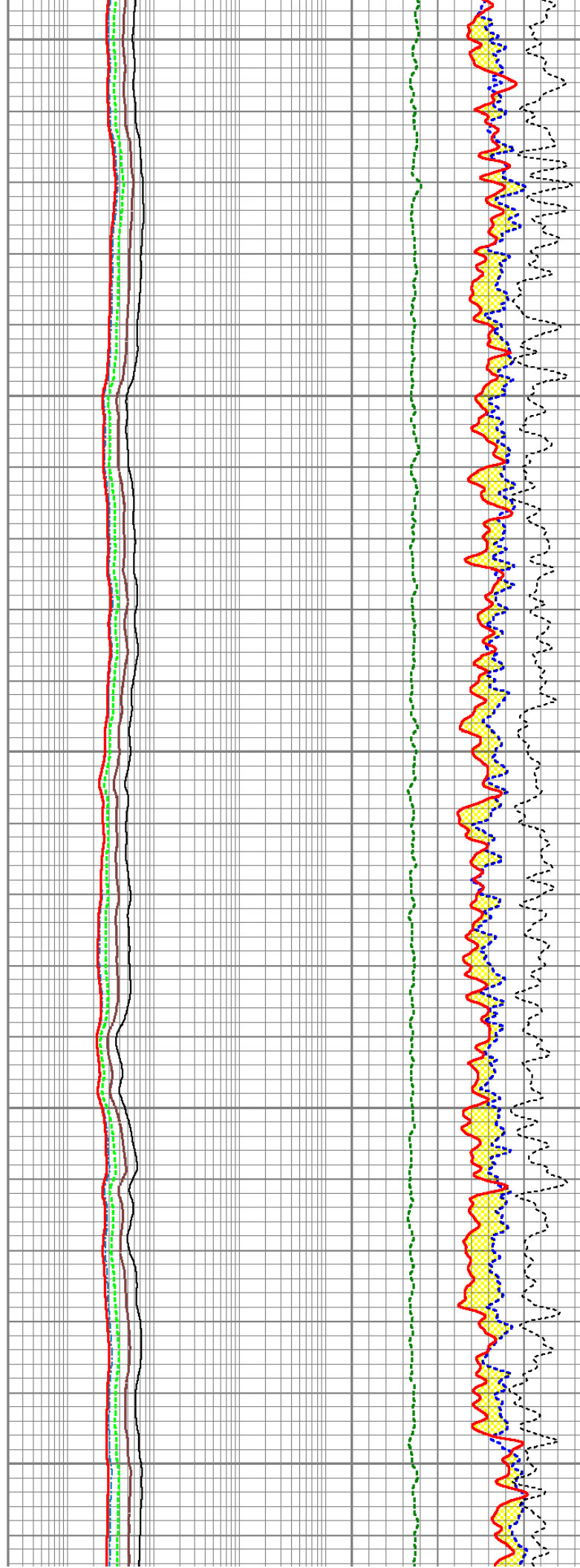
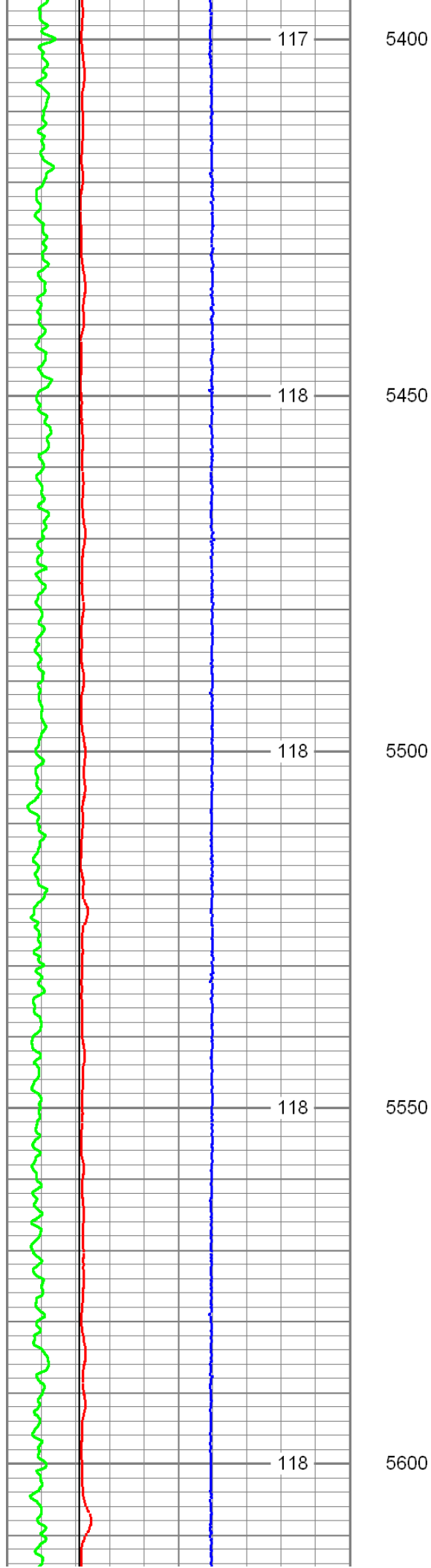
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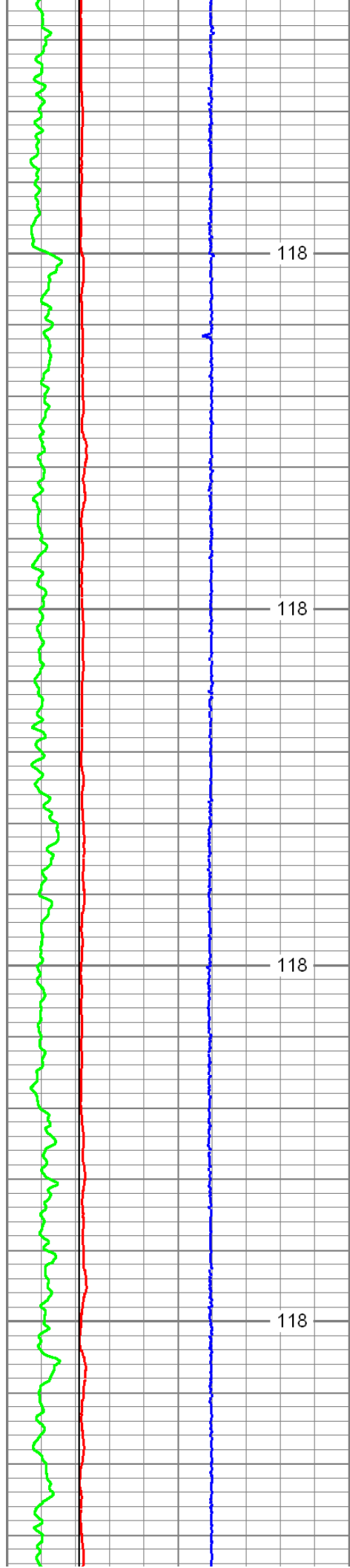
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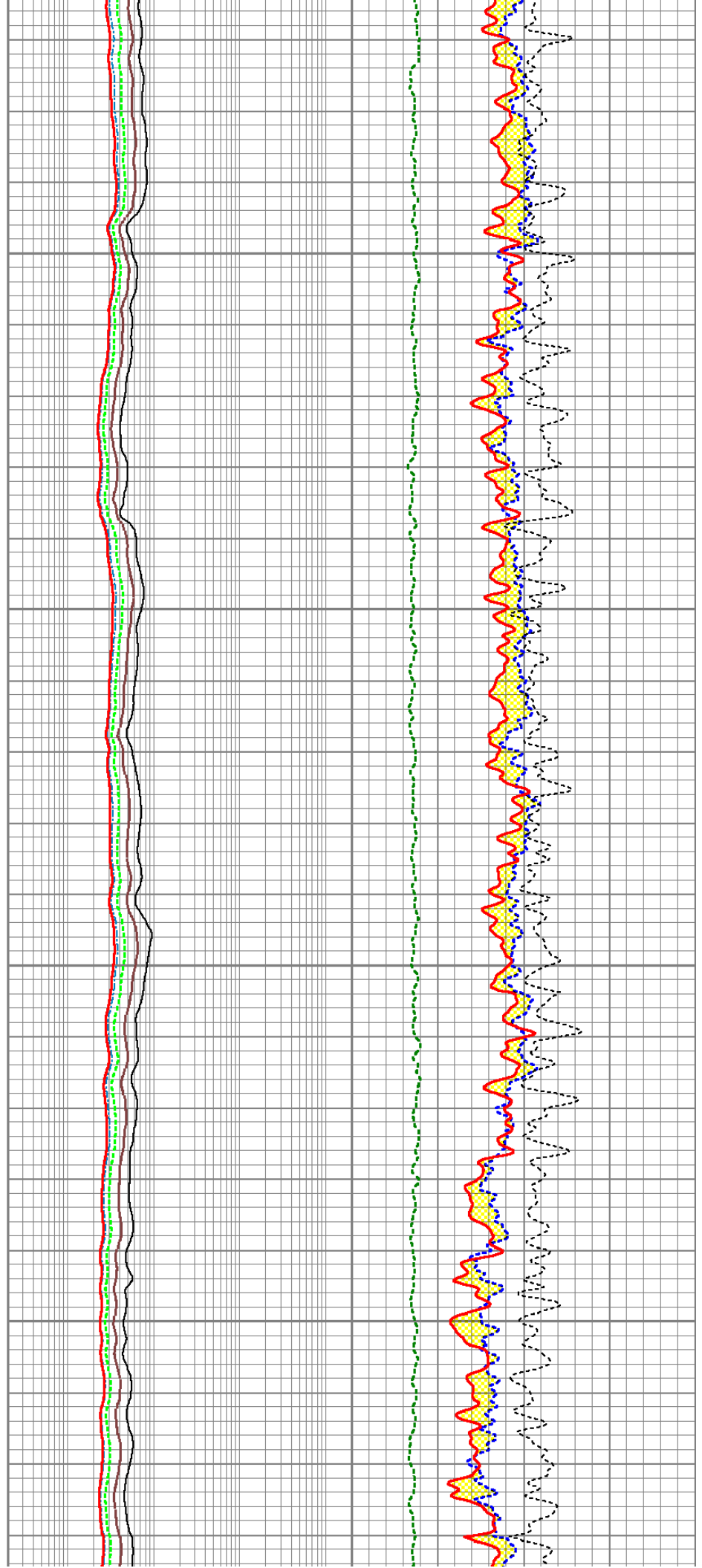


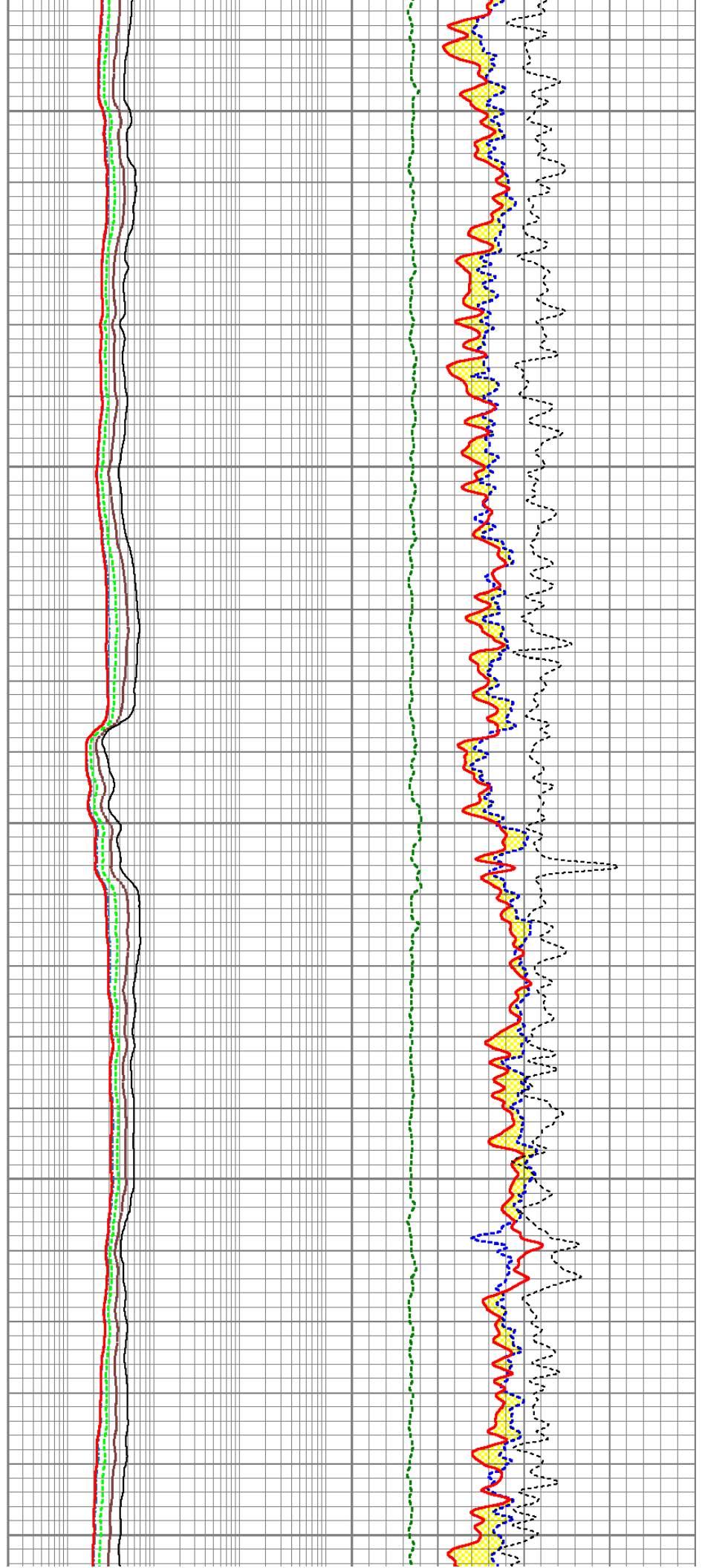
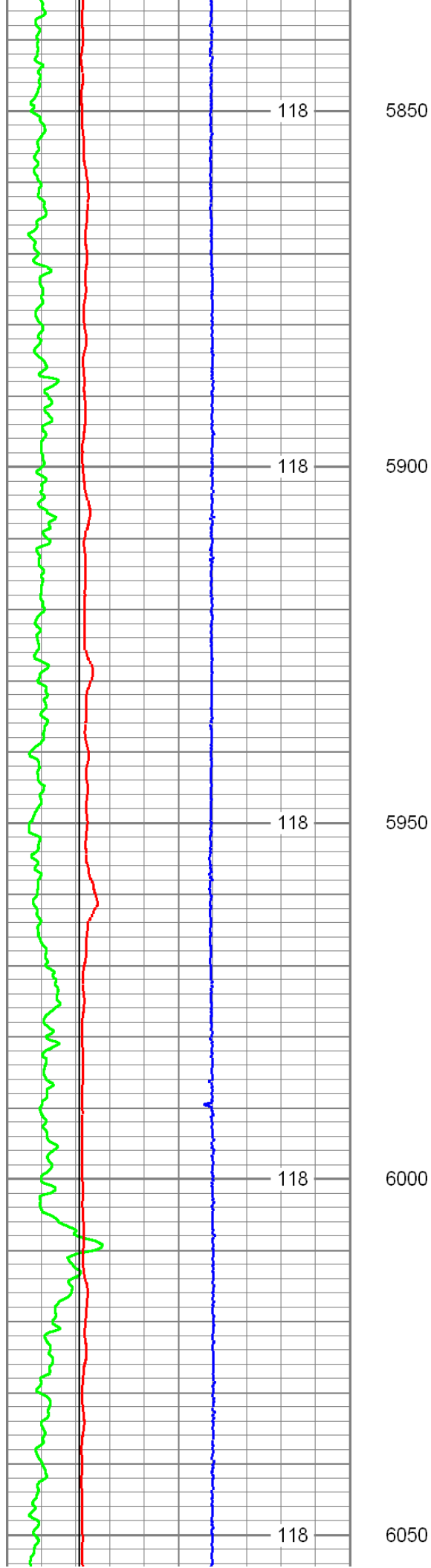
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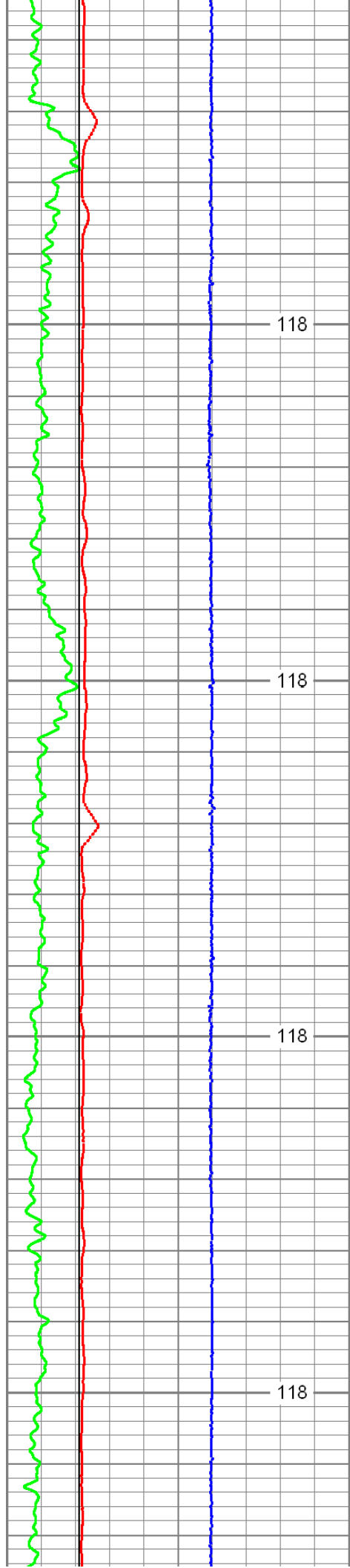
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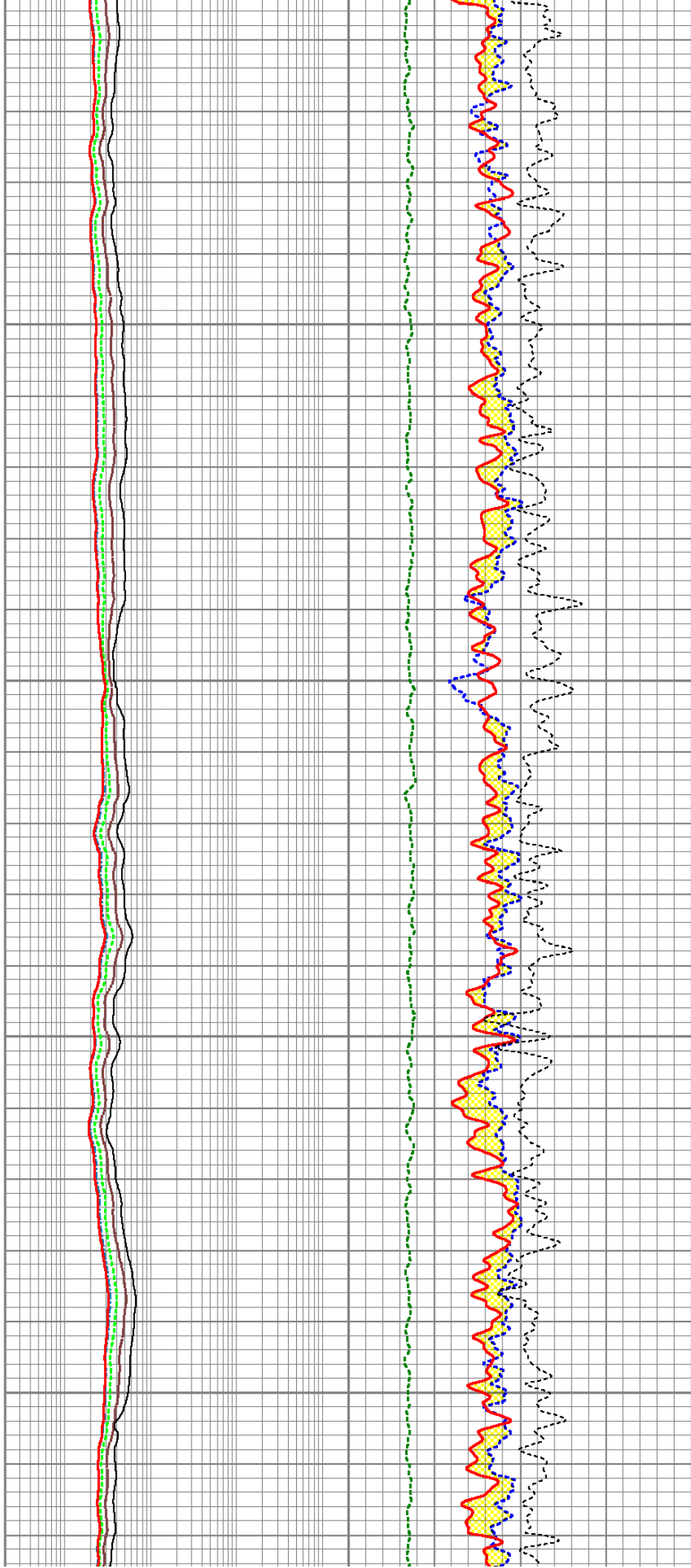


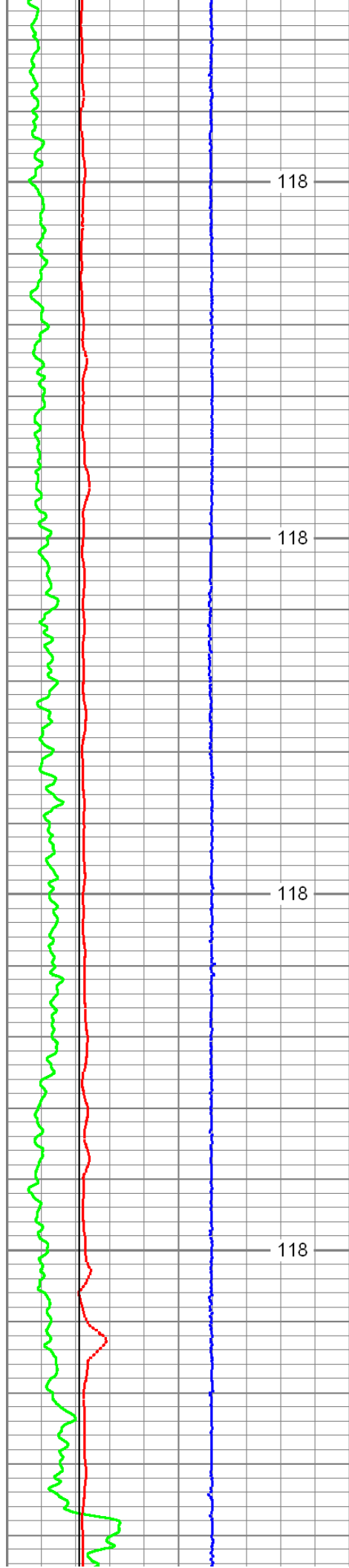
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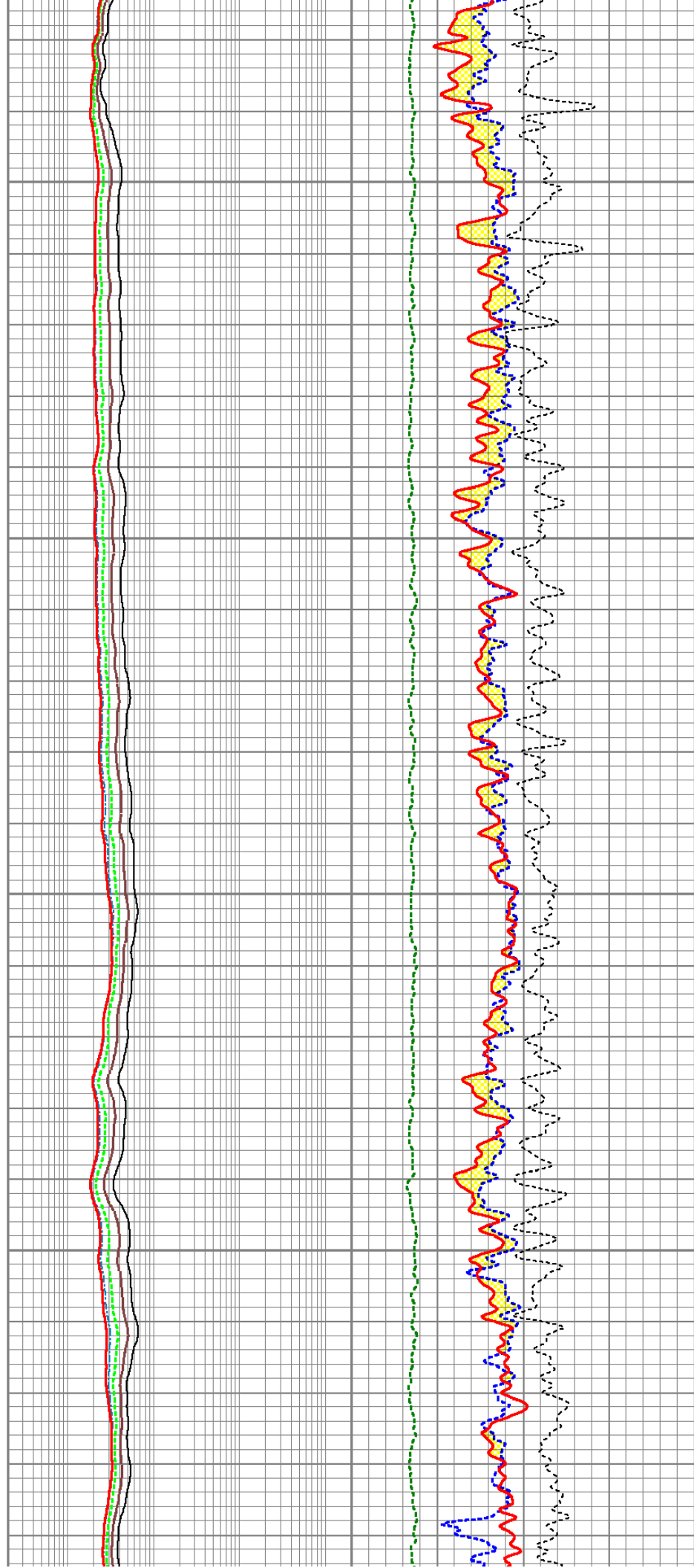
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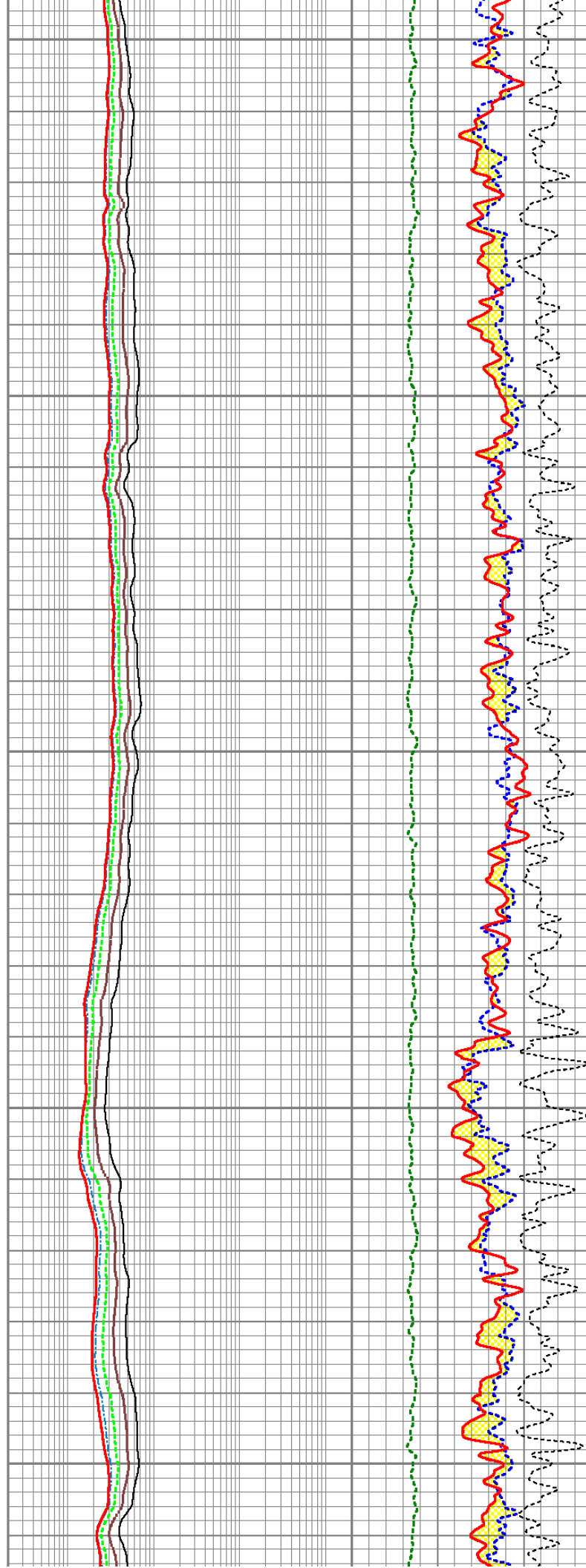
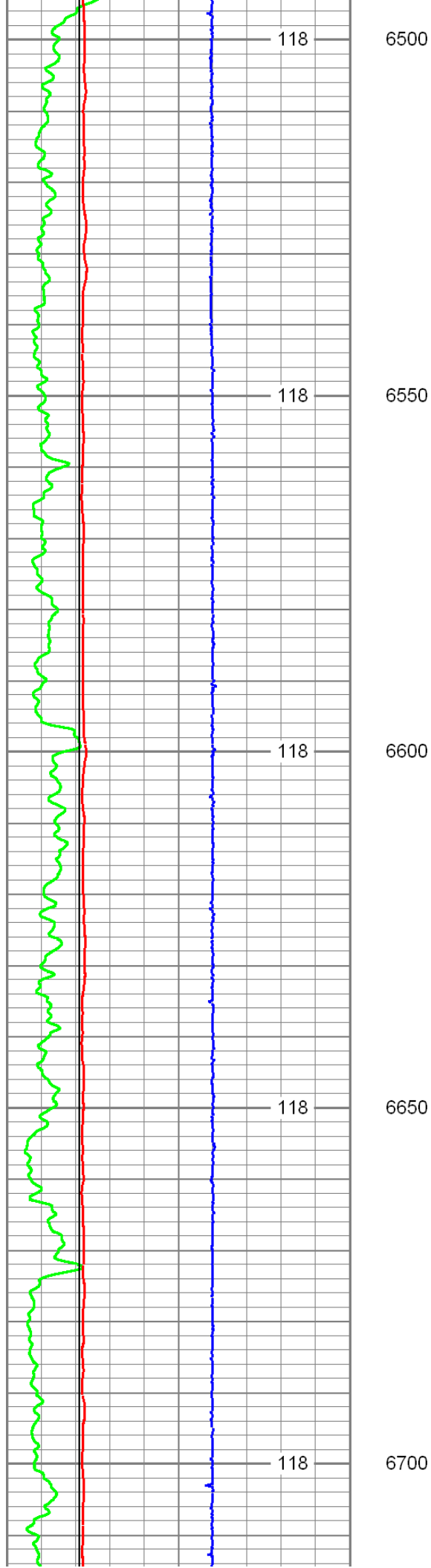
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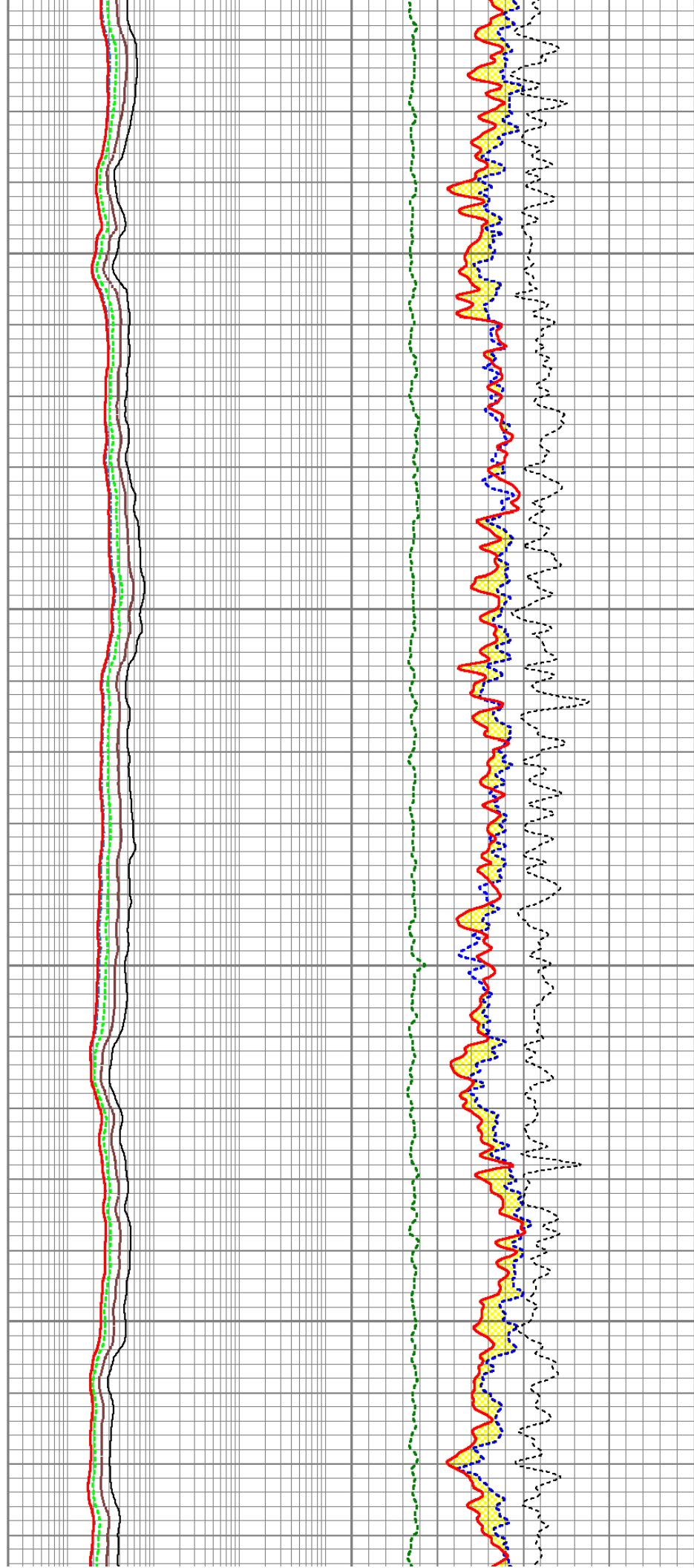


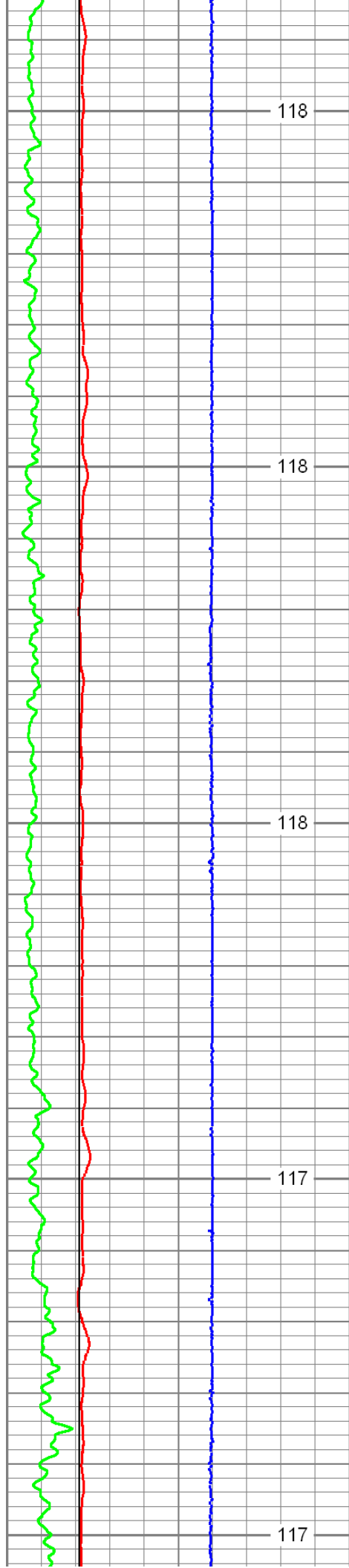
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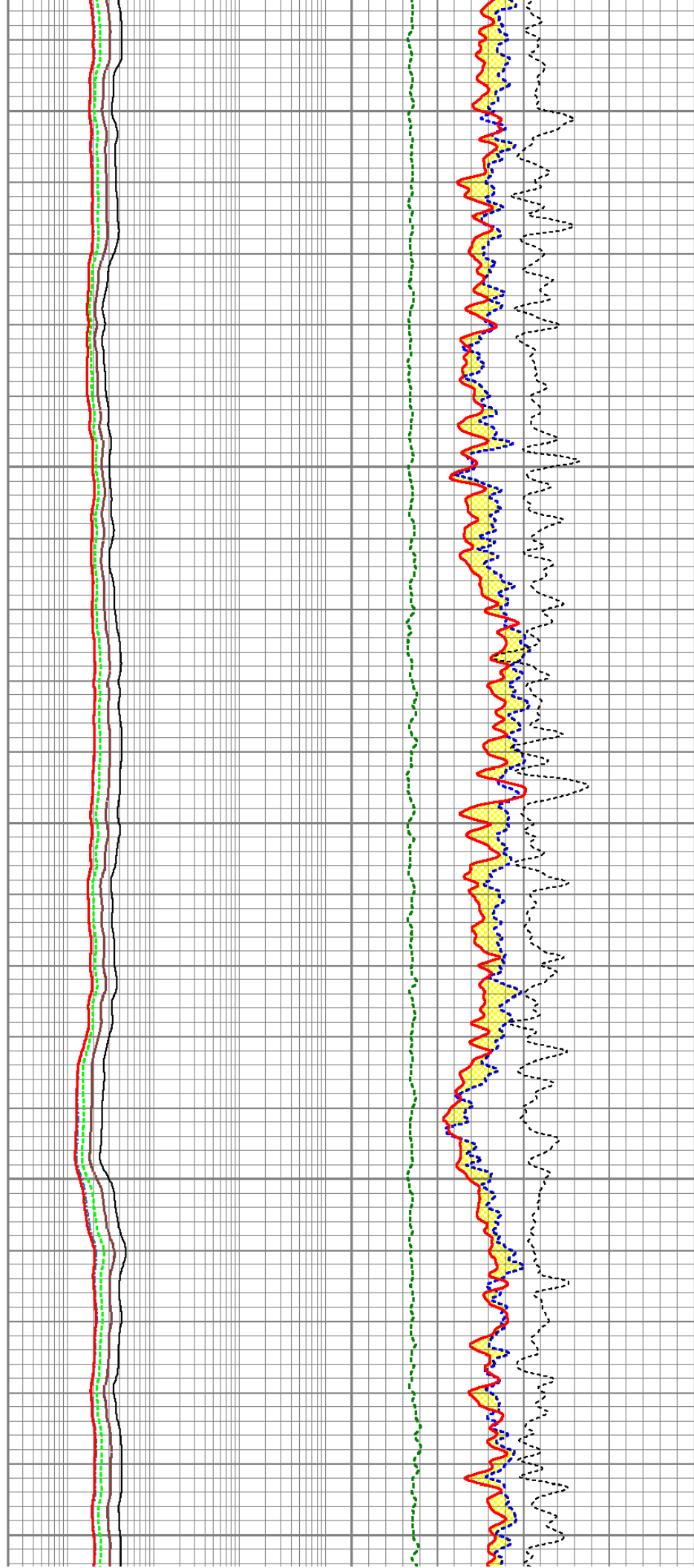
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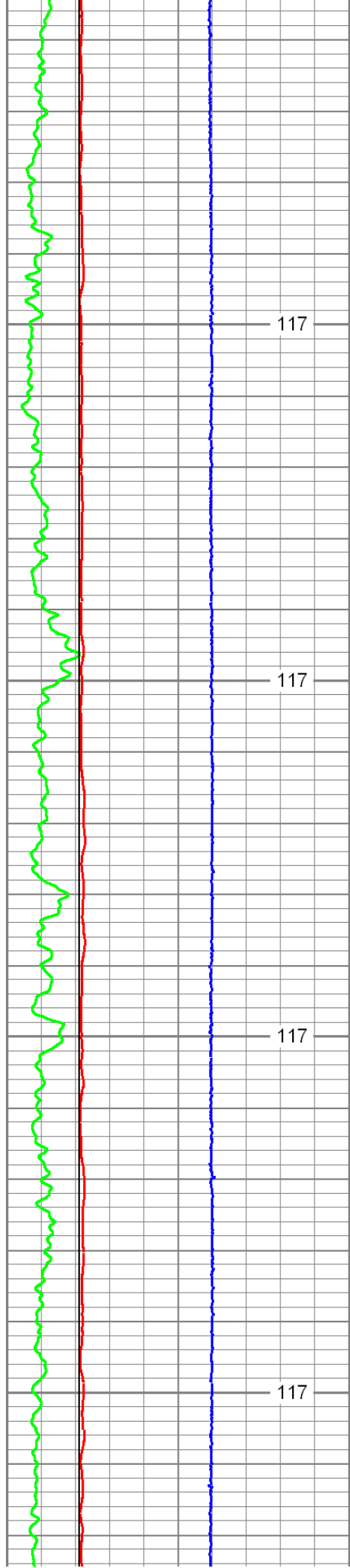
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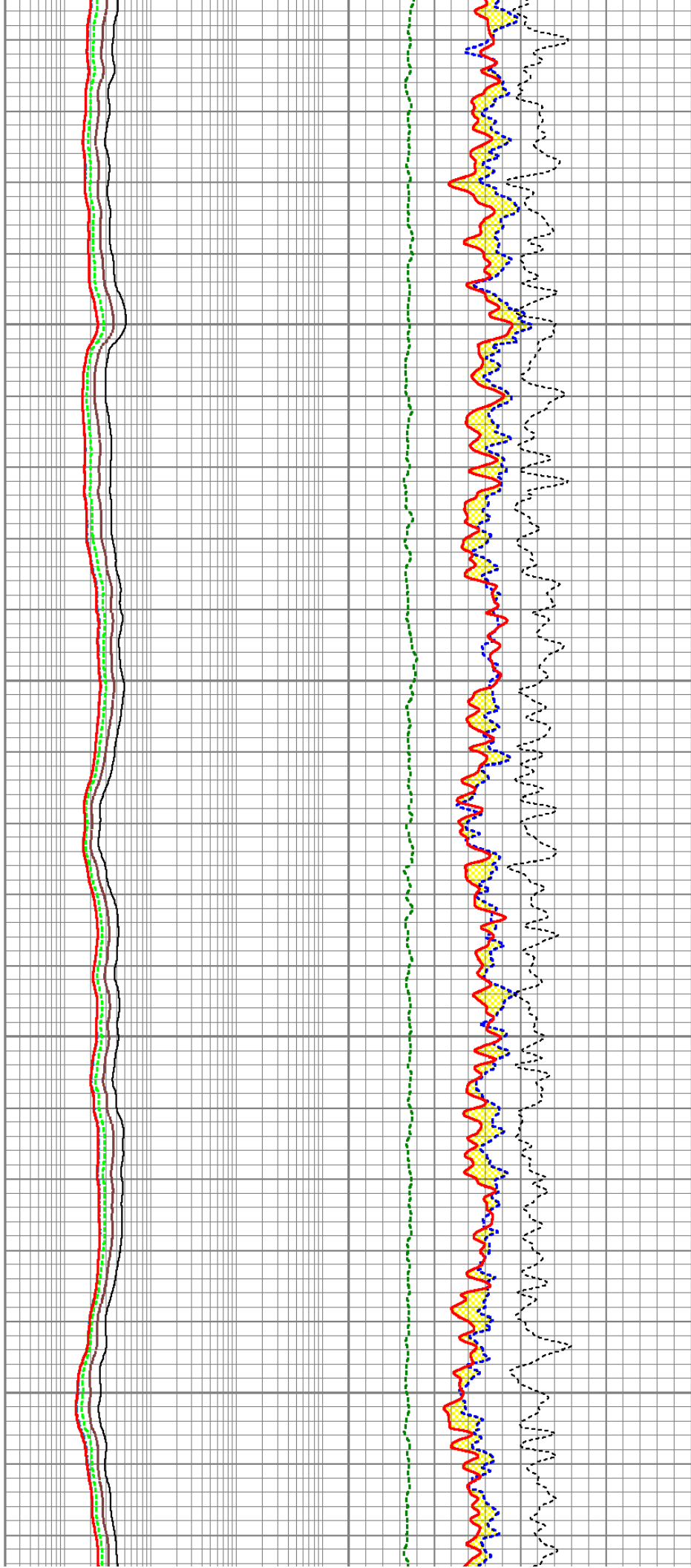


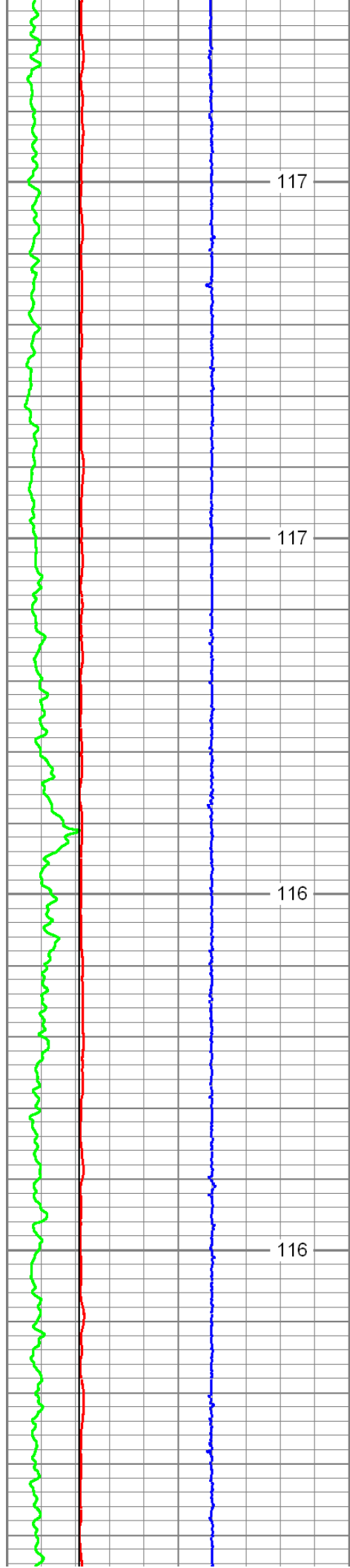
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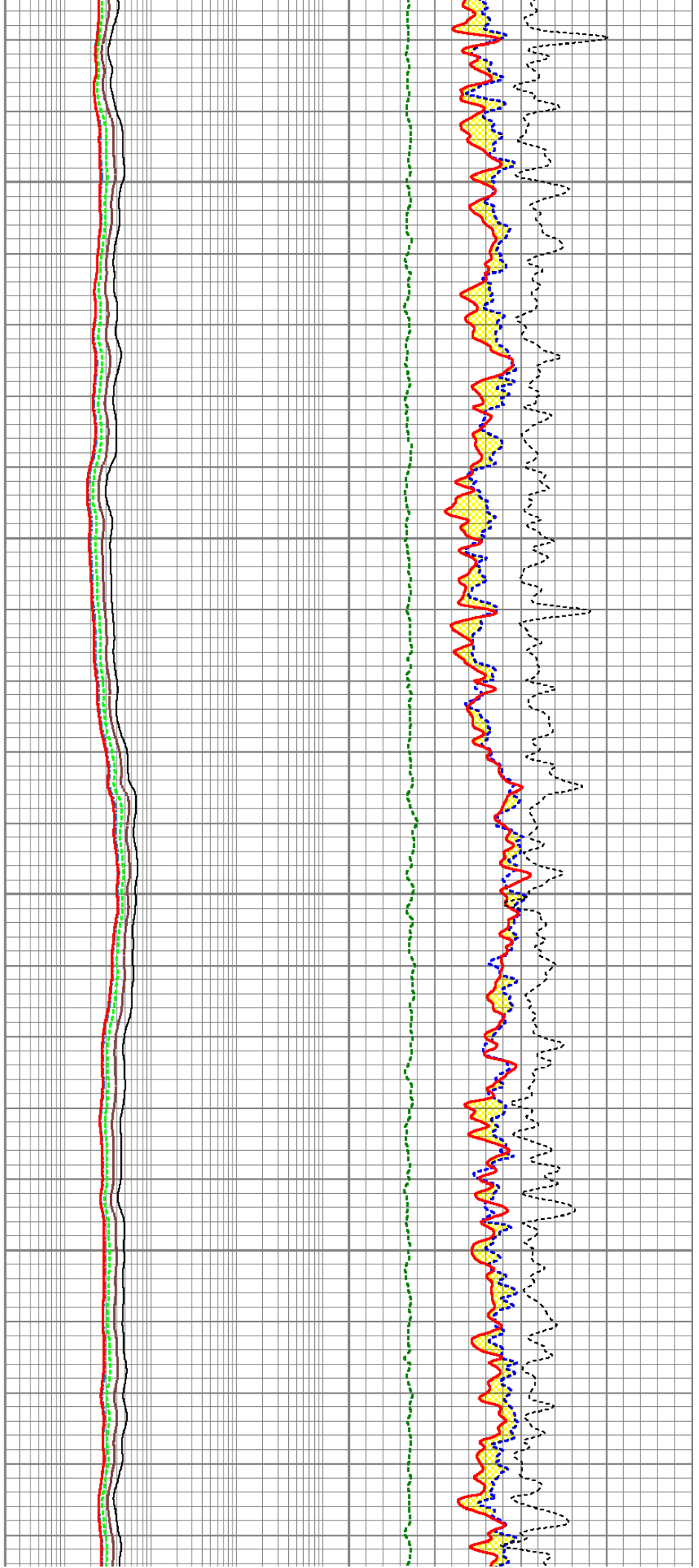


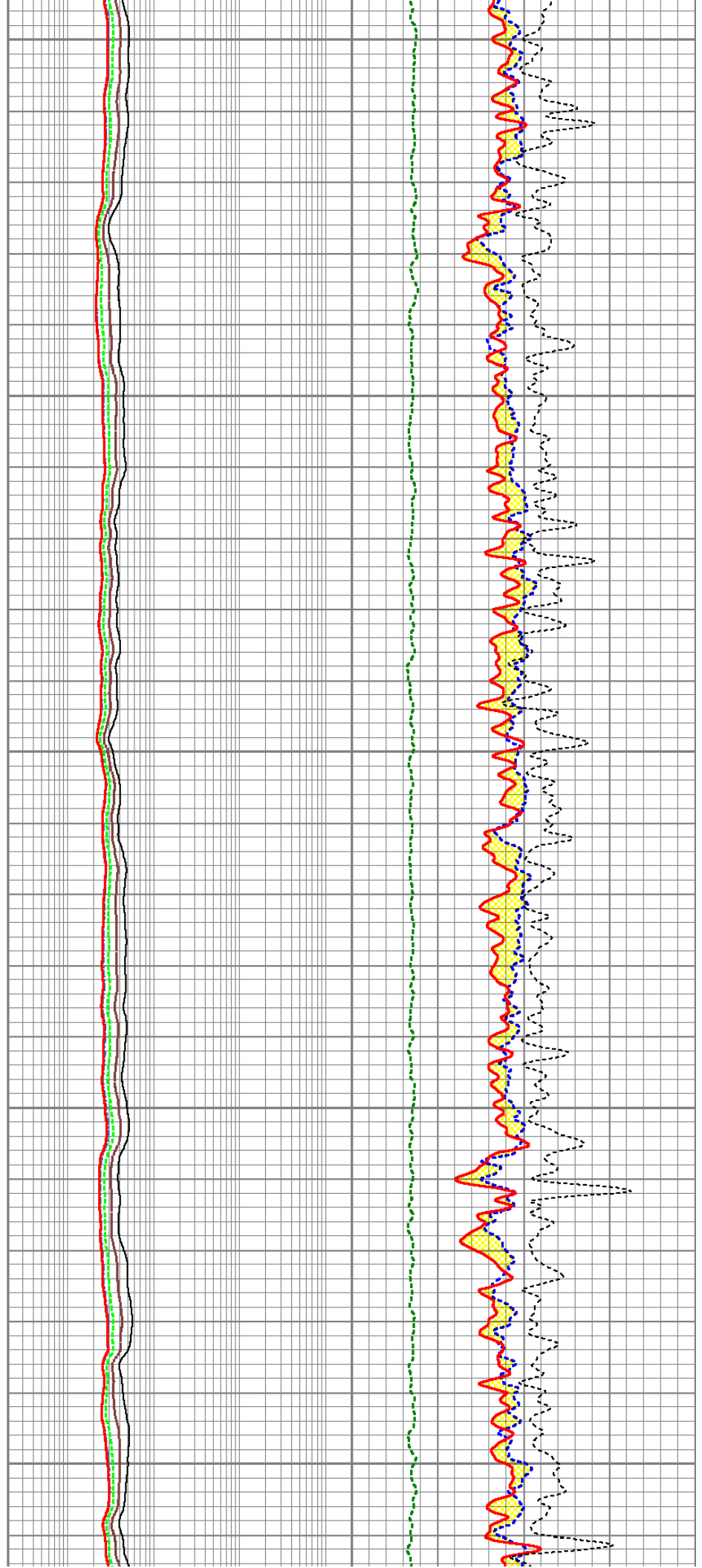
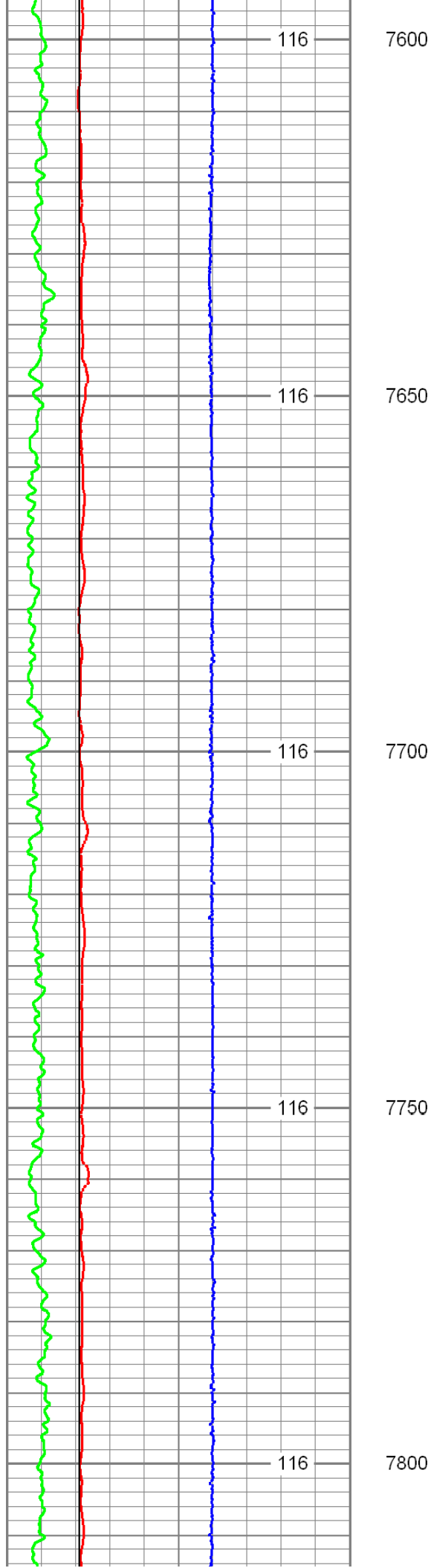
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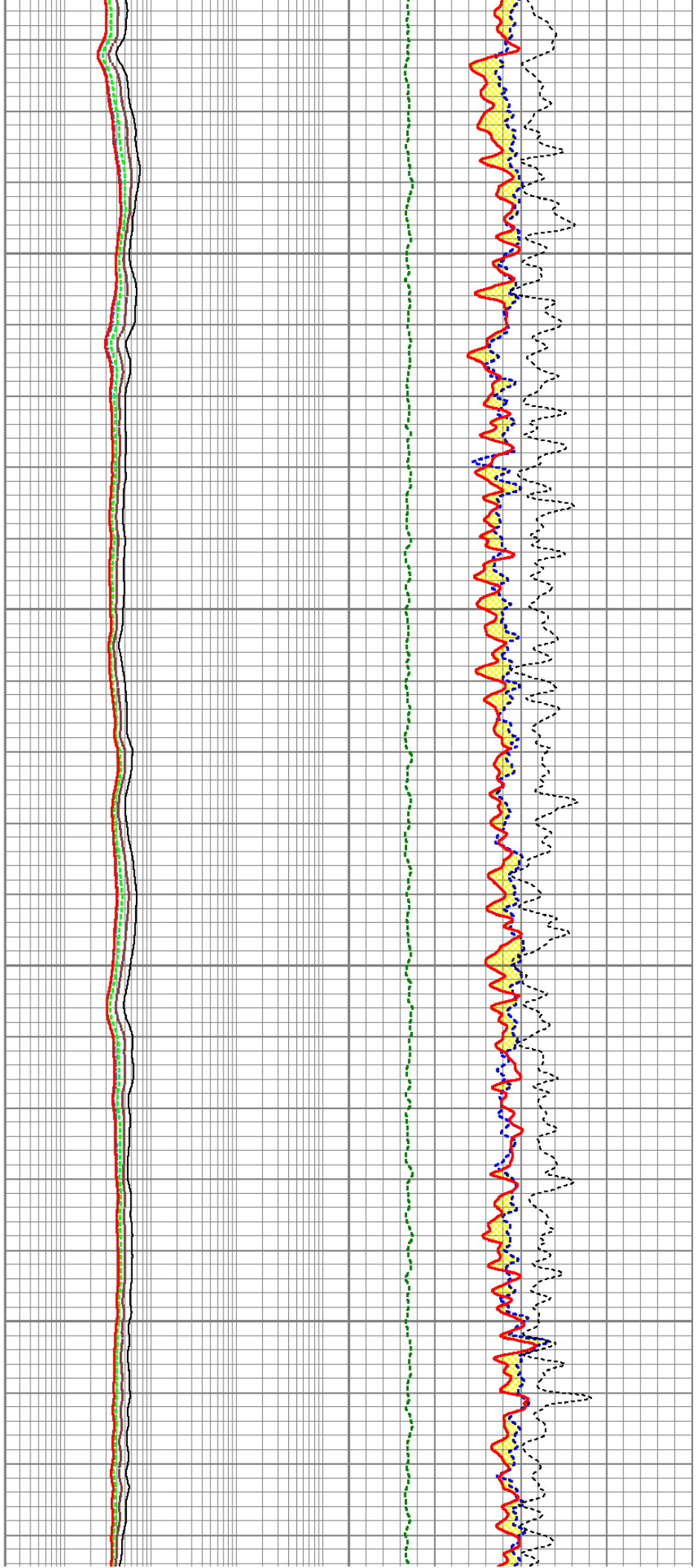
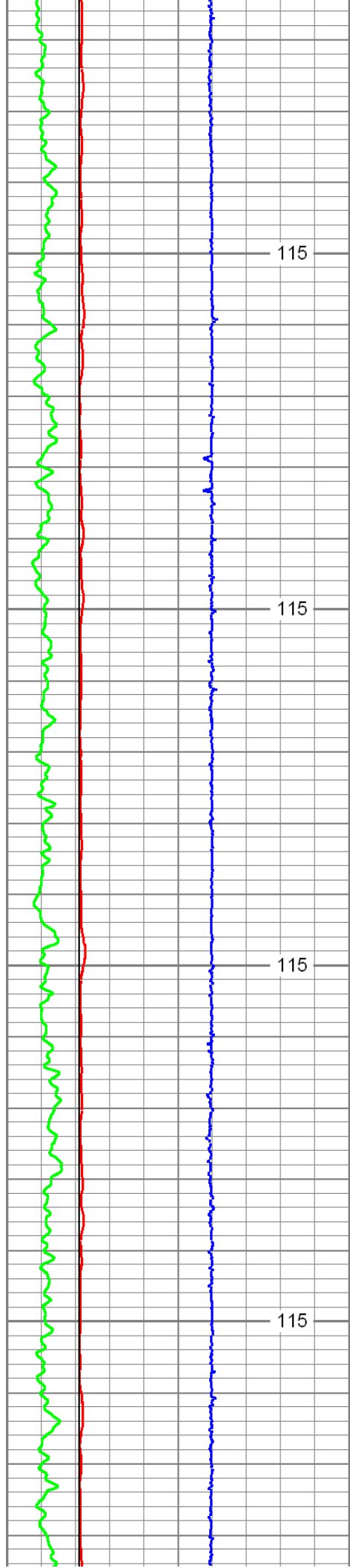
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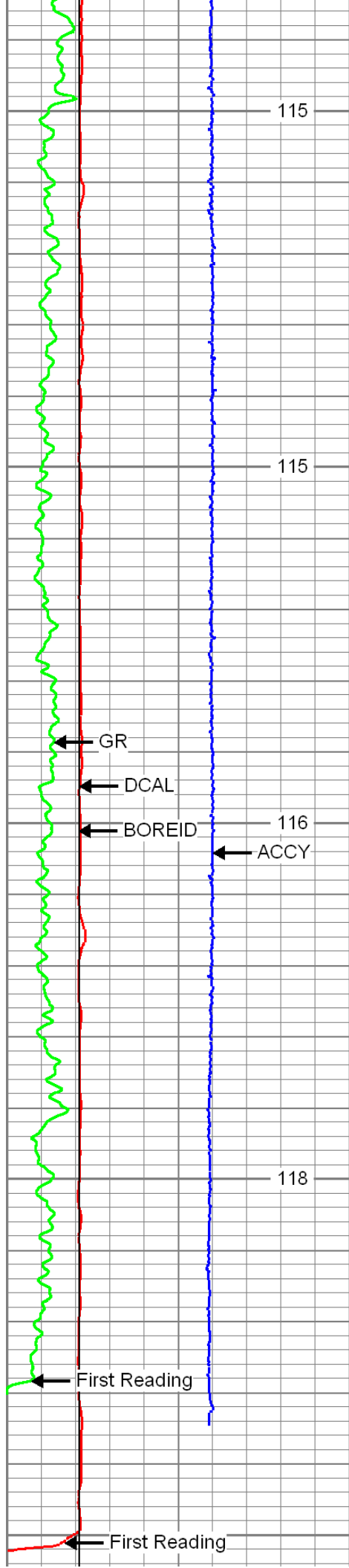
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GR

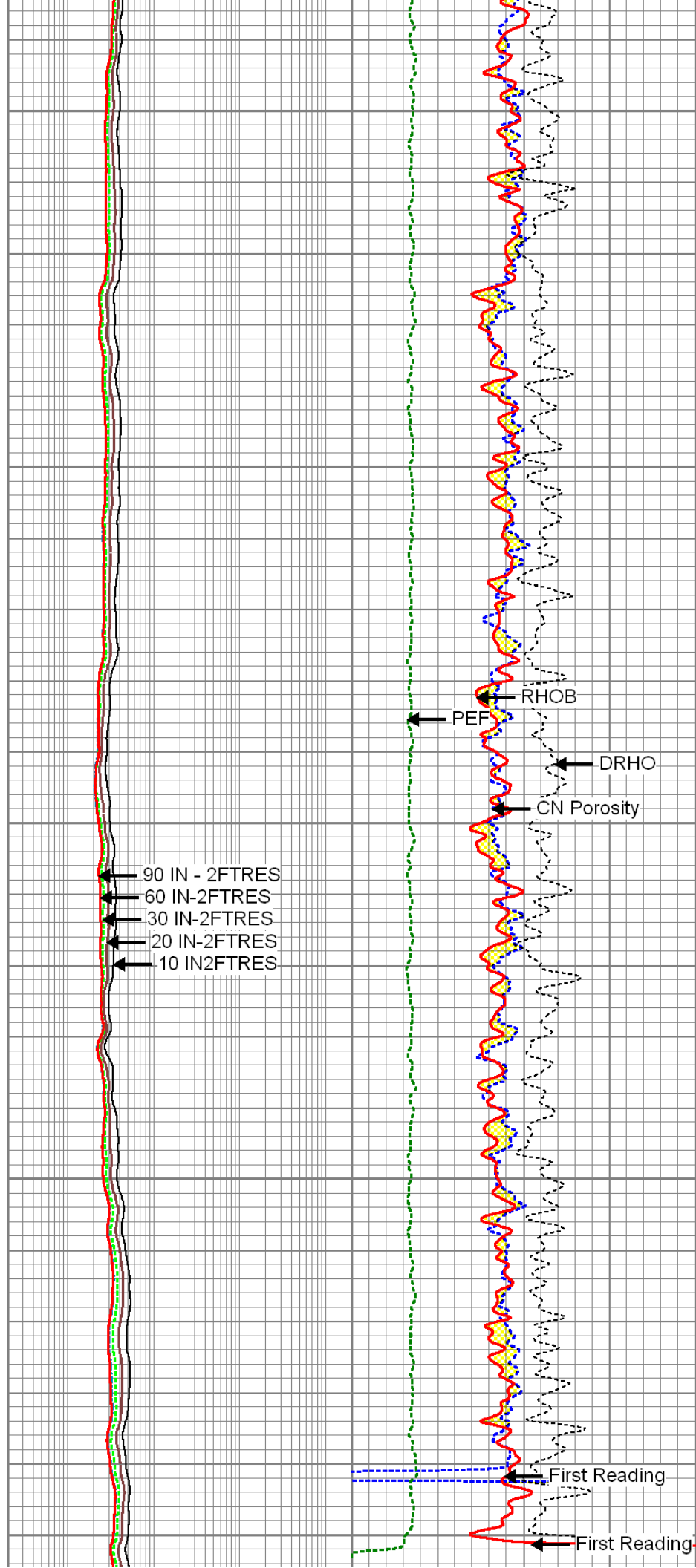
DCAL

BOREID

ACCY

First Reading

First Reading



PEF

RHOB

DRHO

CN Porosity

90 IN - 2FTRES

60 IN-2FTRES

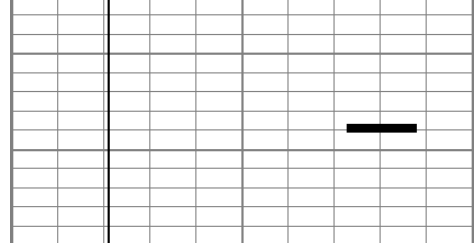
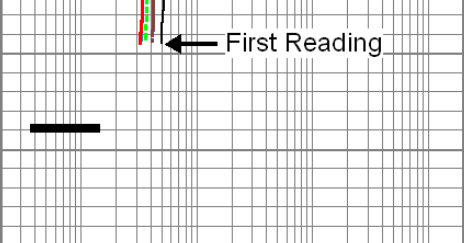
30 IN-2FTRES

20 IN-2FTRES

10 IN2FTRES

First Reading

First Reading

								
0	GR (GAPI)	150	0.2	60 IN-2FTRES (Ohm-m)	2000	45	CN Porosity (pu)	-15
-5	ACCY	5	0.2	30 IN-2FTRES (Ohm-m)	2000	0	PEF (barn)	10
4	DCAL (in)	14	0.2	20 IN-2FTRES (Ohm-m)	2000	1.95	RHOB (g/cc)	2.95
4	BOREID (in)	14	0.2	10 IN2FTRES (Ohm-m)	2000	-0.25	DRHO (g/cc)	0.25
		GRTEMP (degF)	0.2	90 IN - 2FTRES (Ohm-m)	2000			

Log Variables						
Database: C:\Warrior\Data\preisser_mem.db						
Dataset: field/well/proc1/pass1.3						
Top - Bottom						
A	BHCOR	BHFL_TYPE	BHFLRES Ohm-m	BHFLRESSRC	BHIDSRC	BOREID in
1	On	WBM	1	MUDCELL	CURVE	6.125
BOTTEMP degF 118	CASED? No	CASEOD in 4.5	CASETHCK in 0	CEMWATERSA kppm 0	CMNTTHCK in 0	DNBHC? NO
DPORSEL RHOB	FLUIDDEN g/cc 1	FRMSALIN kppm 0	LATNOR Off	M 2	MATRXDEN g/cc 2.71	MUDSALIN kppm 2.6
MudWgt lb/gal 8.4	NPORSEL Limestone	PEBHC? YES	PERFS 0	RESTMP SRC INTERNAL	SO in 0.5	SRFTEMP degF 65
SZCOR On	TDEPTH ft 8301	TMPCOR On	TOOLPOS Ec-centered			

Calibration Report				
Database File:	preisser_mem.db			
Dataset Pathname:	proc1/pass1.3			
Dataset Creation:	Sat Feb 16 10:38:19 2013			
ThruBit Induction Calibration Report				
Tool Model-Serial Number:		ENP-ENP6R		
Shop Calibration Performed:		Fri Jan 11 13:29:57 2013		
BASELINE				
	R	Expected	X	Expected
Freq 1				
A1	-470.1520	[-500.00, -400.00]	277.7640	[-500.00, 500.00]
A2	-136.2750	[-180.00, -100.00]	272.7460	[-500.00, 500.00]
A3	-28.8302	[-50.00, -10.00]	116.1660	[-500.00, 500.00]
A4	-14.9210	[-30.00, -10.00]	269.3470	[-500.00, 500.00]
A5	-12.3449	[-30.00, -10.00]	139.1730	[-500.00, 500.00]

Freq 2				
A1	-247.3840	[-280.00, -180.00]	157.7290	[-500.00, 500.00]
A2	-86.2367	[-130.00, -50.00]	151.0320	[-500.00, 500.00]
A3	-21.1861	[-50.00, -10.00]	28.7889	[-500.00, 500.00]
A4	-18.0336	[-30.00, -10.00]	98.5082	[-500.00, 500.00]
A5	-17.2337	[-30.00, -10.00]	6.0911	[-500.00, 500.00]
Freq 3				
A1	-158.6900	[-180.00, -80.00]	51.9287	[-500.00, 500.00]
A2	-65.3752	[-130.00, -30.00]	71.1079	[-500.00, 500.00]
A3	-16.9573	[-50.00, -10.00]	-32.2877	[-500.00, 500.00]
A4	-19.6522	[-30.00, -10.00]	-12.4078	[-500.00, 500.00]
A5	-19.5998	[-30.00, -10.00]	-88.9966	[-500.00, 500.00]
Freq 4				
A1	-88.0041	[-120.00, -40.00]	-113.4070	[-500.00, 500.00]
A2	-46.8848	[-110.00, -10.00]	-36.3872	[-500.00, 500.00]
A3	-13.3532	[-50.00, -10.00]	-121.8090	[-500.00, 500.00]
A4	-22.4069	[-30.00, -10.00]	-172.7230	[-500.00, 500.00]
A5	-24.3034	[-30.00, -10.00]	-244.0490	[-500.00, 500.00]

CALIBRATION COEFFICIENTS				
	R	Expected	X	Expected
Freq 1				
A1	0.9813	[0.95, 1.05]	0.0025	[-0.05, 0.05]
A2	0.9888	[0.95, 1.05]	0.0028	[-0.05, 0.05]
A3	0.9894	[0.95, 1.05]	-0.0037	[-0.05, 0.05]
A4	0.9837	[0.95, 1.05]	0.0053	[-0.05, 0.05]
A5	0.9923	[0.95, 1.05]	0.0014	[-0.05, 0.05]
Freq 2				
A1	0.9763	[0.95, 1.05]	-0.0061	[-0.05, 0.05]
A2	0.9833	[0.95, 1.05]	-0.0054	[-0.05, 0.05]
A3	0.9777	[0.95, 1.05]	-0.0058	[-0.05, 0.05]
A4	0.9803	[0.95, 1.05]	-0.0028	[-0.05, 0.05]
A5	0.9899	[0.95, 1.05]	-0.0075	[-0.05, 0.05]
Freq 3				
A1	0.9829	[0.95, 1.05]	-0.0031	[-0.05, 0.05]
A2	0.9906	[0.95, 1.05]	-0.0025	[-0.05, 0.05]
A3	0.9844	[0.95, 1.05]	-0.0040	[-0.05, 0.05]
A4	0.9871	[0.95, 1.05]	-0.0000	[-0.05, 0.05]
A5	0.9986	[0.95, 1.05]	-0.0047	[-0.05, 0.05]
Freq 4				
A1	0.9889	[0.95, 1.05]	0.0060	[-0.05, 0.05]
A2	0.9965	[0.95, 1.05]	0.0067	[-0.05, 0.05]
A3	0.9886	[0.95, 1.05]	0.0033	[-0.05, 0.05]
A4	0.9954	[0.95, 1.05]	0.0092	[-0.05, 0.05]
A5	1.0158	[0.95, 1.05]	0.0017	[-0.05, 0.05]
Temperature	34.1472 degC			

ThruBit Density Calibration Report	
Tool Model-Serial Number:	PS-PS03D
Source Number:	
Shop Calibration Performed:	Wed Feb 06 10:00:07 2013

REFERENCE	
Density	Units

Aluminium	2.607	g/cc	
Magnesium	1.752	g/cc	
READINGS			
Outputs	Counts	Units	Expected
SS1 Background	142.57	cps	[130.00, 170.00]
LS1 Background	154.98	cps	[130.00, 170.00]
LS4 Background	32.54	cps	[27.00, 35.00]
SS1 Aluminium	4664.78	cps	[4500.00, 5500.00]
LS1 Aluminium	847.37	cps	[750.00, 950.00]
LS4 Aluminium	914.25	cps	[843.00, 1068.00]
SS1 Magnesium	7697.75	cps	[7000.00, 9000.00]
LS1 Magnesium	5378.37	cps	[5250.00, 6250.00]
LS1 Al + Fe	728.12	cps	[650.00, 800.00]
LS4 Al + Fe	420.59	cps	[382.00, 471.00]
RESULTS			
SS Slope	1.67		[1.52, 1.77]
LS Slope	0.42		[0.38, 0.45]
PEF K Factor	4.783		[3.510, 6.170]
PEF B Factor	-0.564		[-0.700, -0.410]

RESULTS			Caliper Shop Calibration performed:	Wed Feb 06 10:00:07 2013
Reference	Reading	Units		
12.00	1965.82	in		
9.00	2133.31	in		
6.00	2294.06	in		

DENSITY PRE-SURVEY CHECK Performed:		Wed Feb 13 13:09:39 2013	
Outputs	Counts	Units	Expected
SS1 Background	142.60	cps	[138.30, 146.85]
LS1 Background	153.94	cps	[150.33, 159.63]
LS4 Background	31.95	cps	[30.59, 34.49]

CALIPER PRE-SURVEY CHECK Performed:		Wed Feb 13 13:07:07 2013	
Reference	Readings	Units	Expected
6.00	5.98	in	[5.80, 6.20]

Compensated Neutron Calibration Report			
Tool Model-Serial Number:		PS-PS06N	
Source Number:			
Calibration Tank Temperature:		61.3 degF	
Shop Calibration Performed:		Wed Feb 06 13:27:37 2013	

BACKGROUND MEASUREMENT			
Outputs	Measured	Units	Expected

SS Counts	0.0	cps	<10		
LS Counts	0.0	cps	<4		
WATER TANK REFERENCE					
Outputs	Measured	Units	Expected		
SS Counts	775.2	cps			
LS Counts	27.0	cps			
Tank Ratio Ref	30.9580	SS/LS			
Tank Ratio	28.7125	SS/LS			
Tank Ratio Gain	1.0782		[0.85, 1.15]		
ALUMINUM SLEEVE REFERENCE					
Outputs	Measured	Units	Expected		
SS Counts	8554.5	cps			
LS Counts	836.3	cps			
Al Ratio Ref	10.797	SS/LS			
Al Ratio	11.029	SS/LS			
Al Ratio Gain	0.98		[0.90, 1.10]		
Sleeve Porosity	14.46	pu			
PRE-SURVEY BACKGROUND CHECK Performed: Wed Feb 13 13:14:55 2013					
Outputs	Measured	Units	Expected		
SS Counts	0.1	cps	<10		
LS Counts	0.1	cps	<4		
Gamma Ray Calibration Report					
Tool Model-Serial Number:	PS-PS35T				
Performed:	Wed Feb 06 12:50:54 2013				
Calibrator Value:	170.8	GAPI			
Background Reading:	73.8	cps			
Calibrator Reading:	461.7	cps			
Sensitivity:	0.3750	GAPI/cps			
Inclinometer Calibration Report					
Performed:	Sun Jun 13 14:33:21 1993				
	Low Read.	High Read.	Low Ref.	High Ref.	
X Accelerometer	0.00	1.00	0.00	1.00	gee
Y Accelerometer	0.00	1.00	0.00	1.00	gee
Z Accelerometer	0.00	1.00	0.00	1.00	gee

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
Thrubit	67.59		Cablehead-S Solid Weakpoint	2.31	2.13	5.00
Thrubit	65.28		PSBDOT	3.87	2.25	35.00
Thrubit	61.41		HangOff_Tool	5.00	2.38	60.00
Thrubit	56.41		Swivel	2.25	2.06	25.00
Thrubit	54.16		10-1	0.75	2.13	3.95
TBBAT	53.41		TBBAT-A (PS07B) Thrubit Battery	6.13	2.13	38.20
TBBAT2	47.29		TBBAT2-A (PS40B) Thrubit Battery	6.13	2.13	40.00
TMG	41.16		TMG-PS (PS35T) ThruBit Telemetry Gamma Ray	6.13	2.13	45.00
GR	41.04					
GRTEMP	40.20					
Thrubit	35.04		Decentralizer Decentralizer (Small)	4.50	2.13	70.00
CNLSC	28.60		TBN-PS (PS06N) ThruBit Neutron	4.77	2.13	63.00
LSW1	18.04		TBD-PS (PS03D) Thrubit Density	10.48	2.13	91.00
DCAL	17.13					
A1_P	10.60		TBI-ENP (ENP6R) Thrubit Induction	15.29	2.13	94.00
A2_P	10.10					
A3_P	9.35					
A4_P	8.35					
A5_P	6.60					

O.D.

2.38 in



ThruBit

A Schlumberger Company

Company

SHELL EXP. & PROD. CO., INC

Well

PREISSER 2509 8-1H

Field

ARROWHEAD

County

RENO

State

KANSAS