



ThruBit
A Schlumberger Company

**ARRAY INDUCTION
NEUTRON / DENSITY
GAMMA RAY
MEMORY LOG**

Company SHELL EXP. & PROD. CO. INC.
Well SCHUPBACH 3510 4-1H
Field ARROWHEAD
County BARBER
State KANSAS

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County BARBER State KANSAS

Location: API #: 15-007-23853-01-00
LAT: 37.03481 LONG. : 98.41265
SHL: 310' FNL & 2325' FWL
SEC 04 TWP 35S RGE 10W
Permanent Datum G.L. Elevation 1309'
Log Measured From D.F. 23.5' ABOVE PERM DATUM
Drilling Measured From D.F.
Other Services
THRUBIT
PORTAL BIT
Elevation
K.B. 1332.5'
D.F. 1332.5'
G.L. 1309'

Date	20 SEPTEMBER 2012
Run Number	ONE
Depth Driller	9880'
Depth Logger	9855'
Bottom Logged Interval	9845'
Top Log Interval	5190'
Casing Driller	7.0" @ 5190'
Casing Logger	5190'
Bit Size	6.125"
Type Fluid in Hole	WBM
Density / Viscosity	8.4 / 30
pH / Fluid Loss	7.2 / NA
Source of Sample	MUD PIT
Rim @ Meas. Temp	2.07 ohms @ 74 degf
Rinf @ Meas. Temp	1.55 ohms @ 67 degf
Rimc @ Meas. Temp	2.39 ohms @ 65 degf
Source of Rinf / Rimc	MEASURED
Rim @ BHT	0.49 ohms @ 133 degf
Time Circulation Stopped	8:00 PM
Time Logger on Bottom	9:00 PM
Maximum Recorded Temperature	133 degf
Equipment Number	T004
Location	OKC, OK
Recorded By	DENGLER
Witnessed By	JACK EVERETT

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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: 9797' LOGGED TO: 5190'
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 PIPETALLY (NO MWD PROVIDED)
CL=1500 mg/l NaCl=2060 mg/l NO BARITE
CASING SIZE 7.00" 23.0 LB FT ID 6.366" CALI DIA 6.42" NO CORRECTION MADE
RIG: NABORS 180
CREW: J. DENGLER, J. JONES, K. REED

Service Ticket No. 1439 API No. 15-007-23853-01-00 PGM Ver WARRIOR 7.0

The Well Name, Location, Borehole Description, and / or Cementing Data Furnished by Client

EQUIPMENT DATA

GAMMA RAY	NEUTRON	DENSITY	INDUCTION
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Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	ENP2T	Serial No.	PS5N	Serial No.	PS41D	Serial No.	PS28R
Model No.	ENP	Model No.	PS	Model No.	PS	Model No.	PS
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	9855'	5190'		30			

	GAMMA RAY		NEUTRON		DENSITY		INDUCTION	
Pass	Scale		Scale		Scale		Scale	
No.	L	R	L	R	L	R	L	L
ONE	0 API	150 API	30%	0%	30%	0%	0.2 ohm-m	200 ohm-m

DIRECTIONAL INFORMATION

Maximum Deviation	91.97	deg. @	8288'	KOP	4212'	
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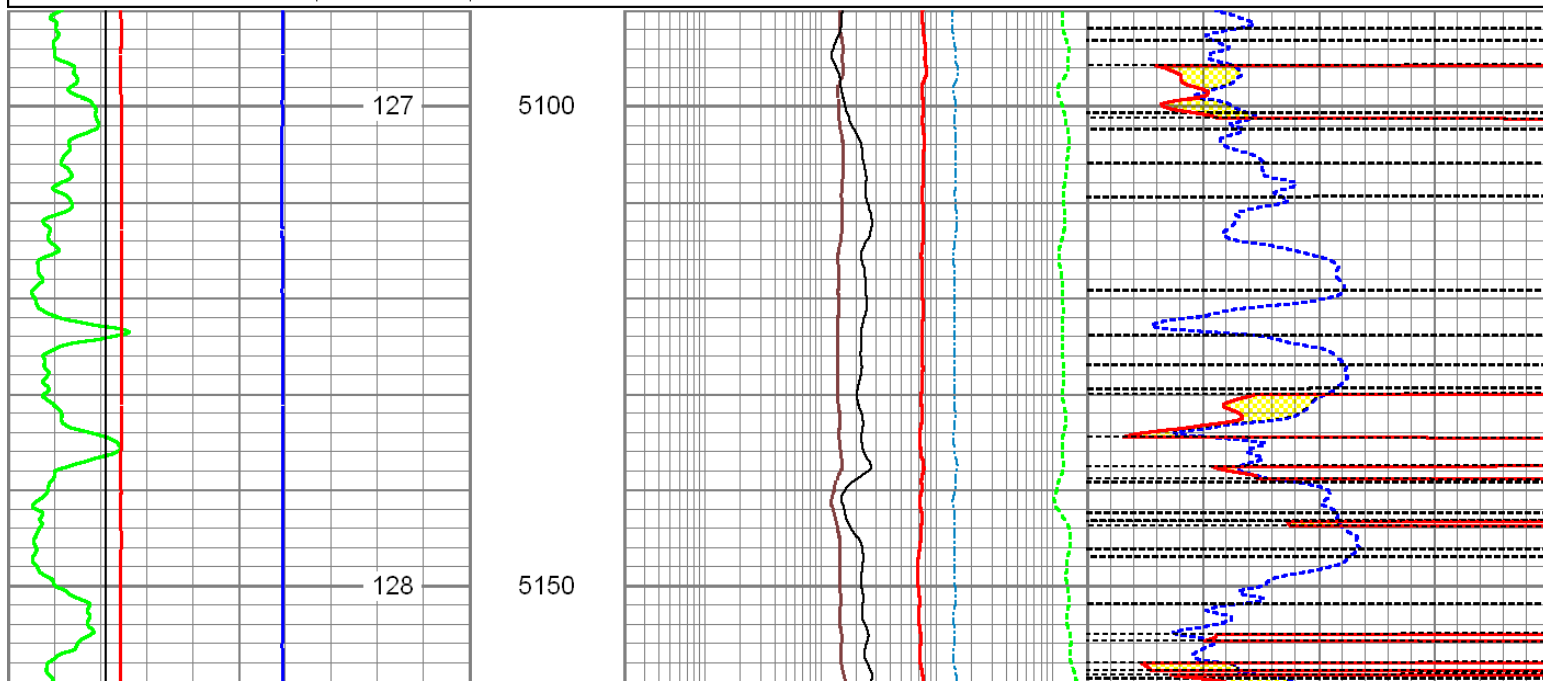


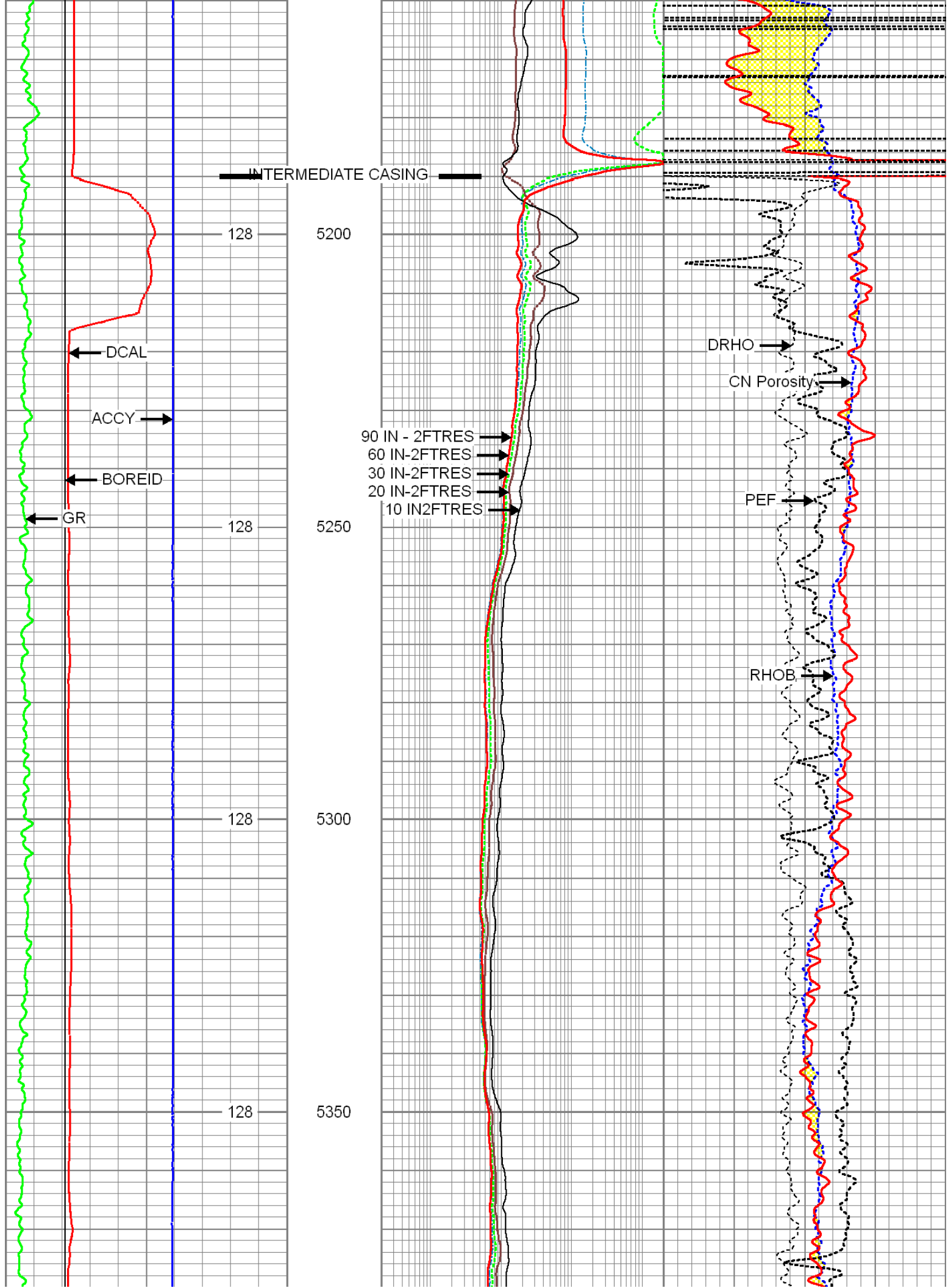
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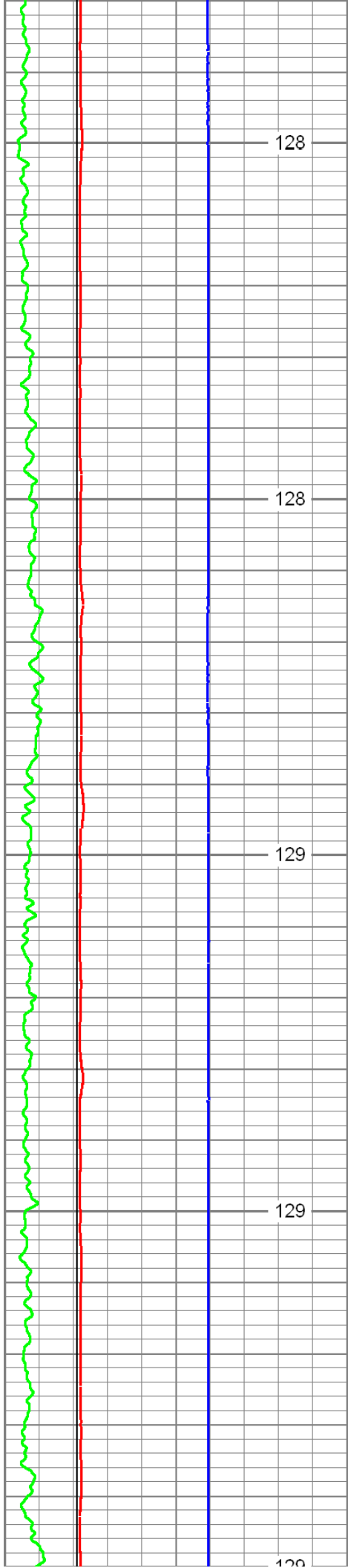
MAIN PASS

Database File: schupbach_mem.db
 Dataset Pathname: proc1/pass1.1
 Presentation Format: 6_sh_tcom
 Dataset Creation: Fri Sep 21 05:25:41 2012 by Calc ThruBit 110523
 Charted by: Depth in Feet scaled 1:240

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	10	PEF (barn)	0
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			







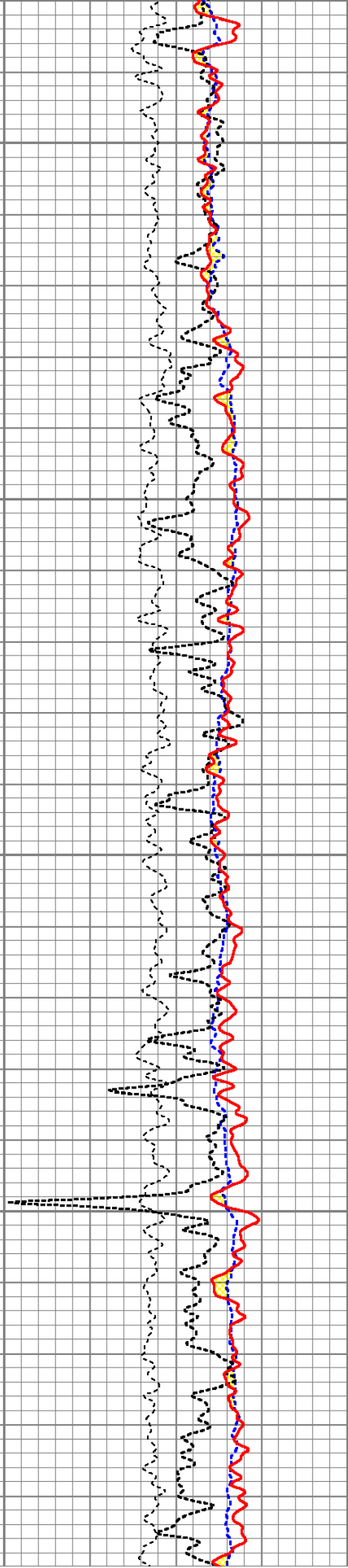
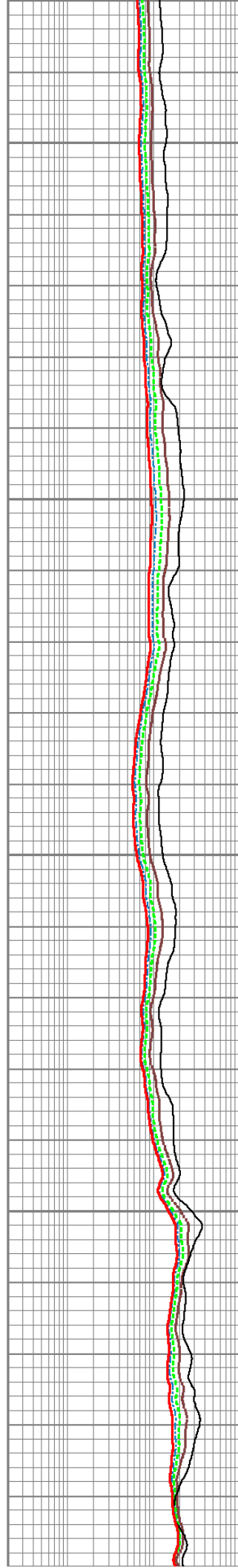
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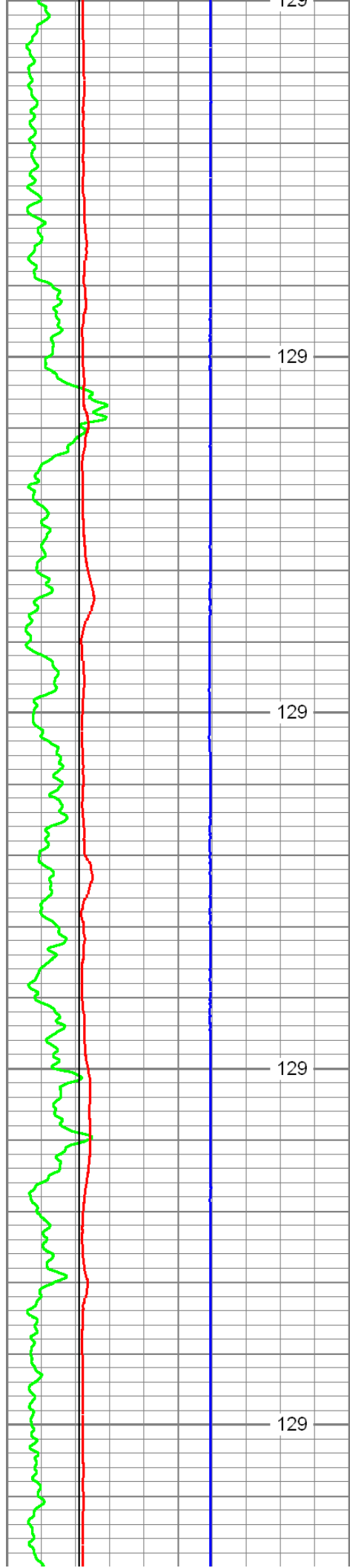
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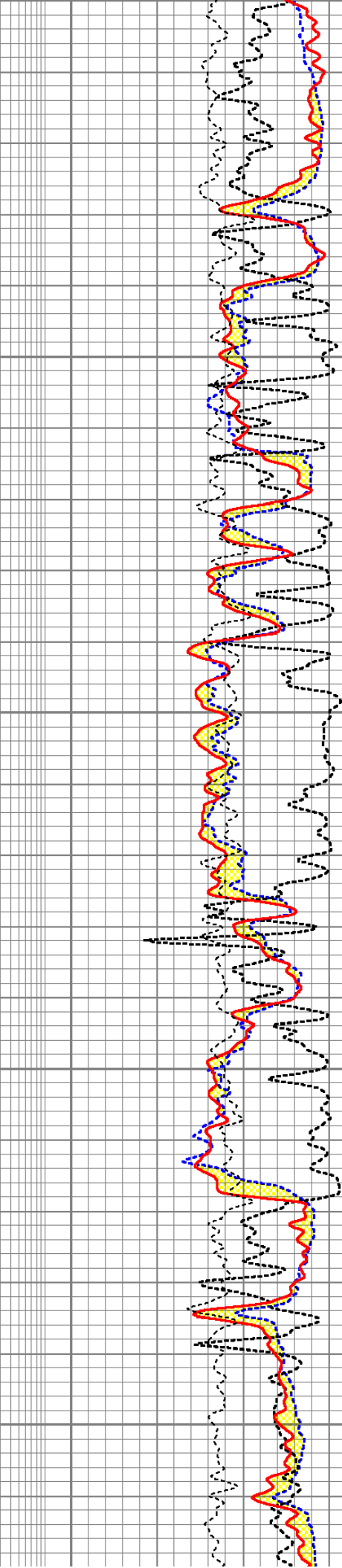
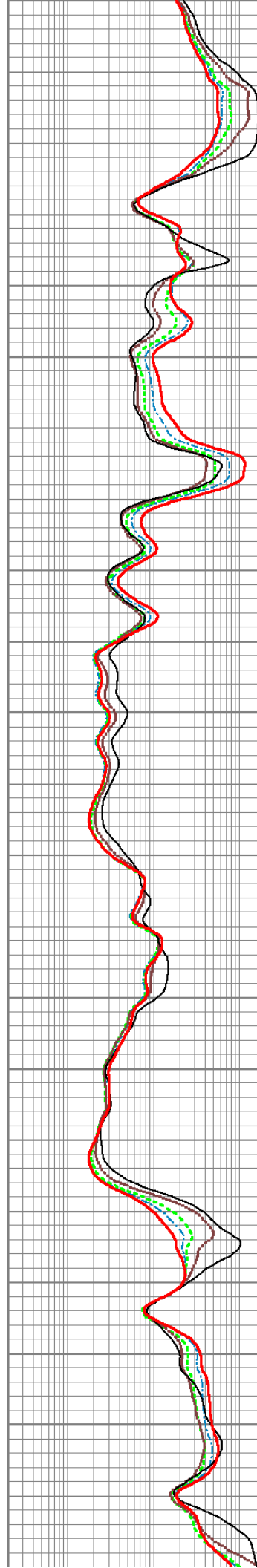
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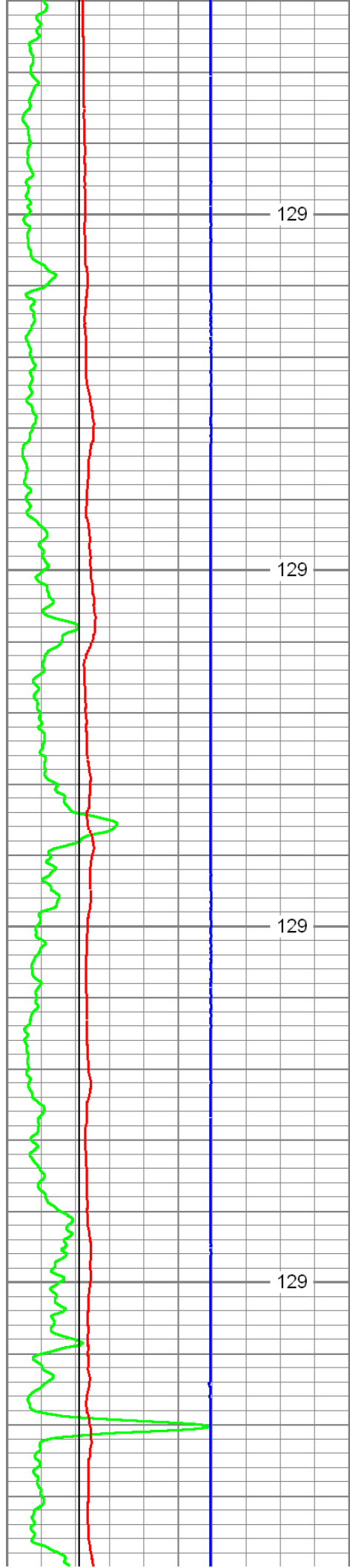
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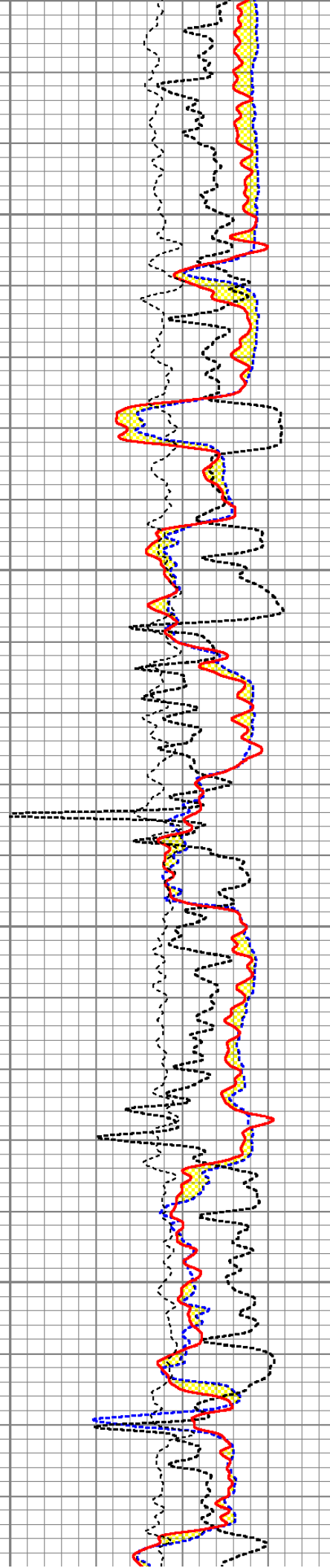
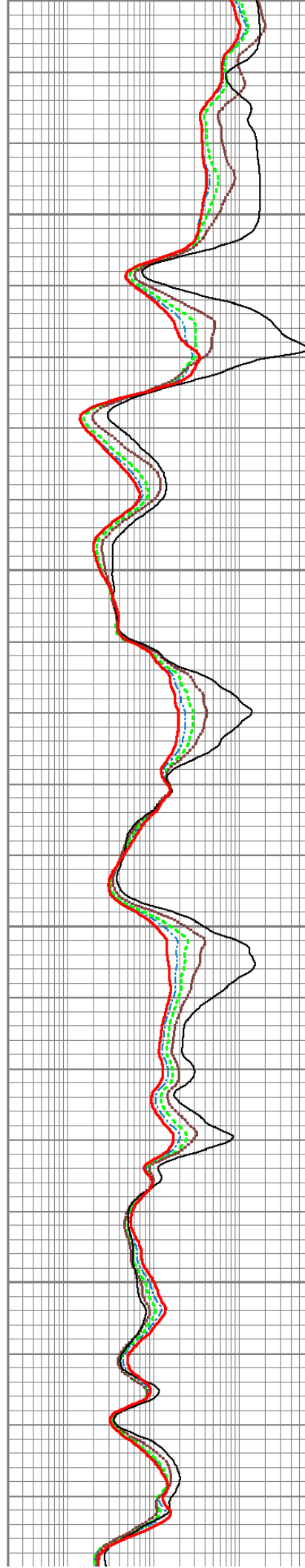
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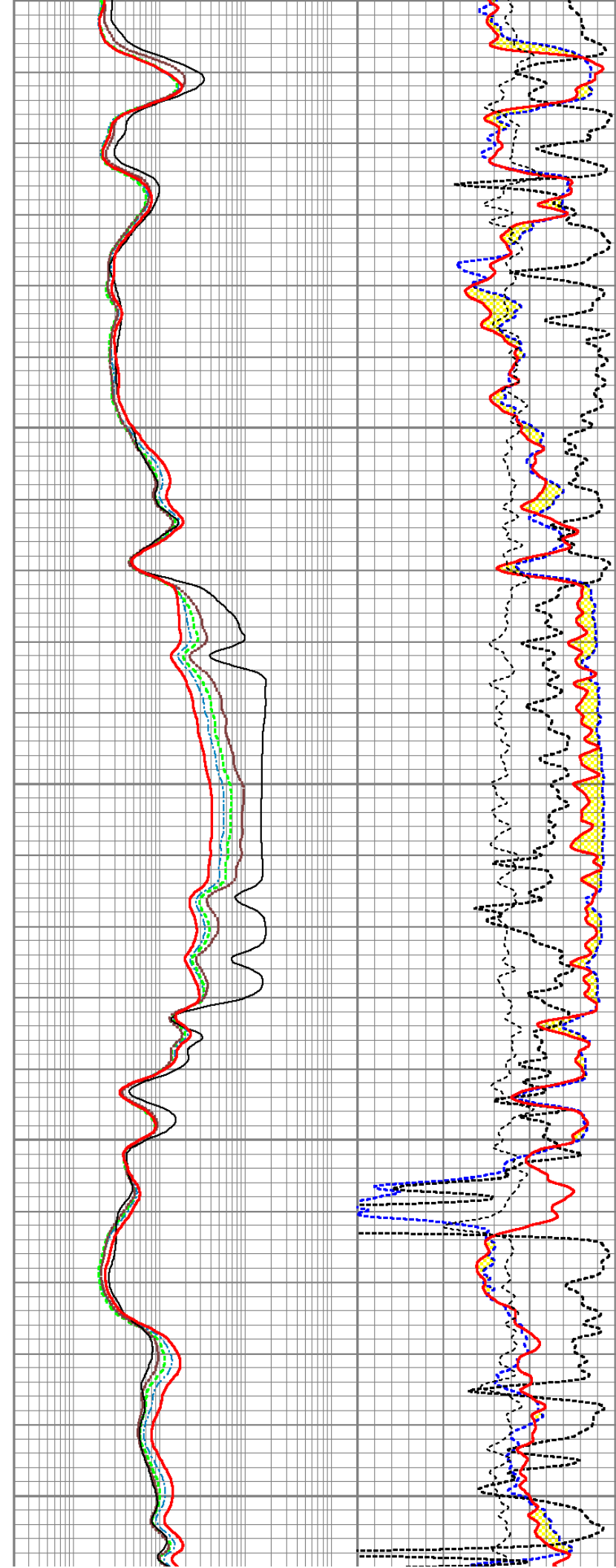
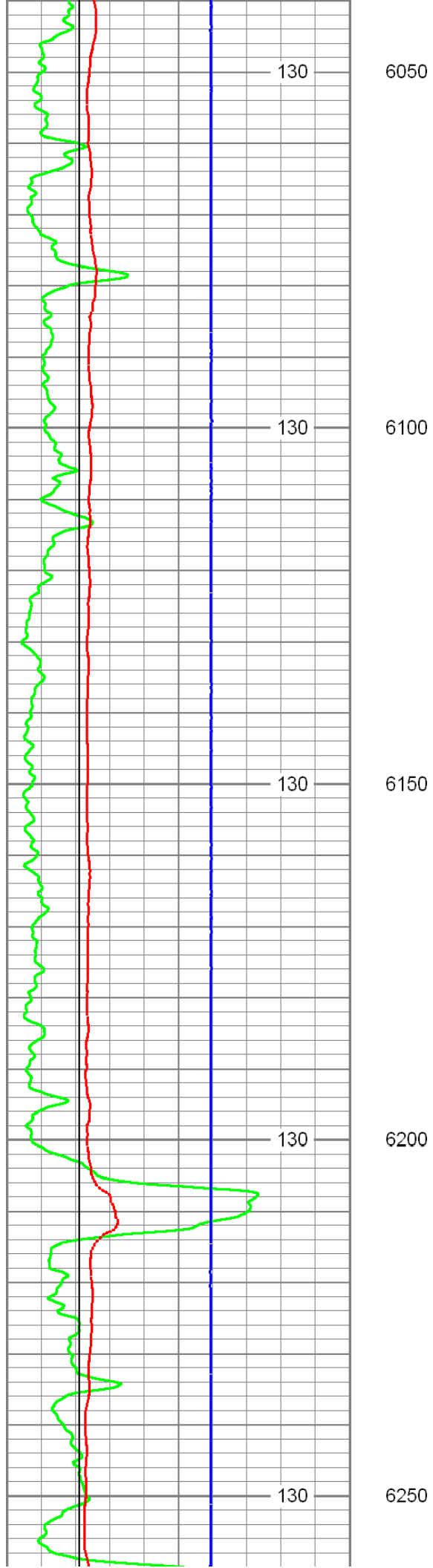
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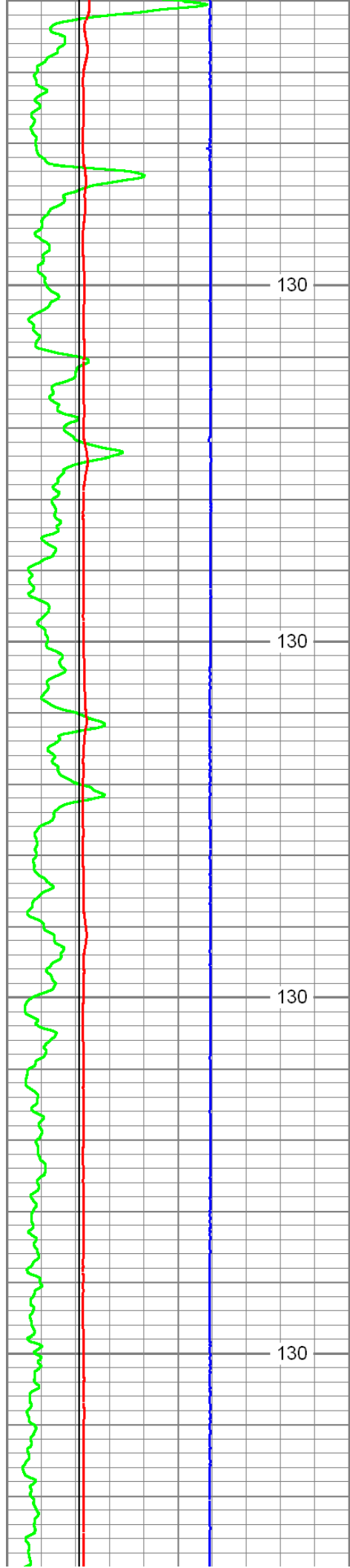
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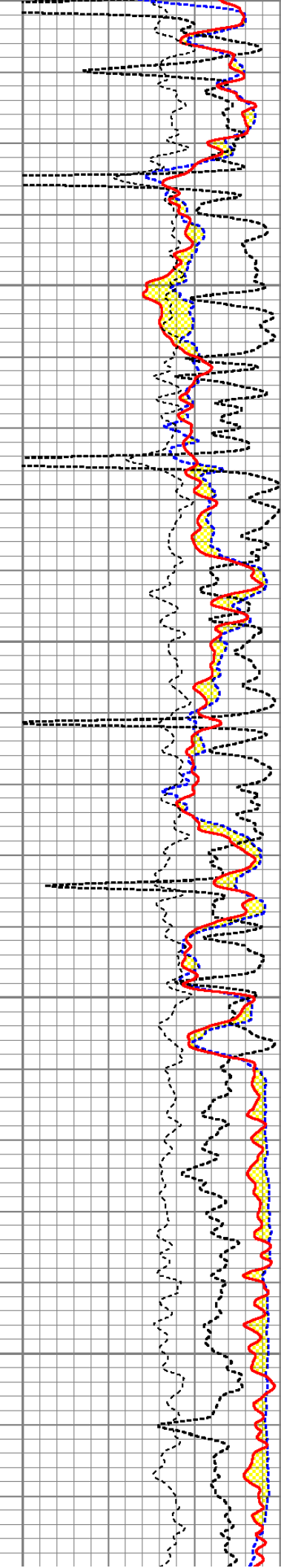


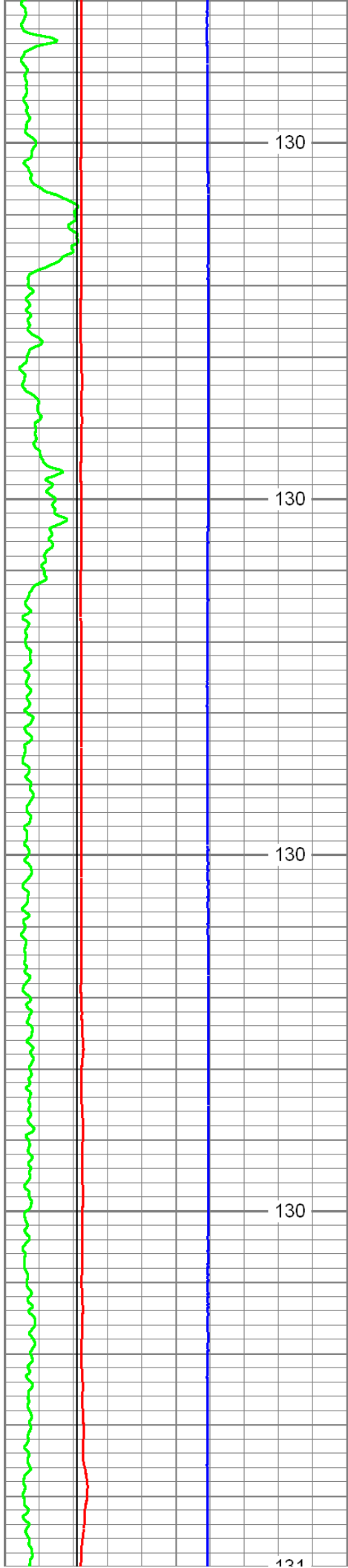
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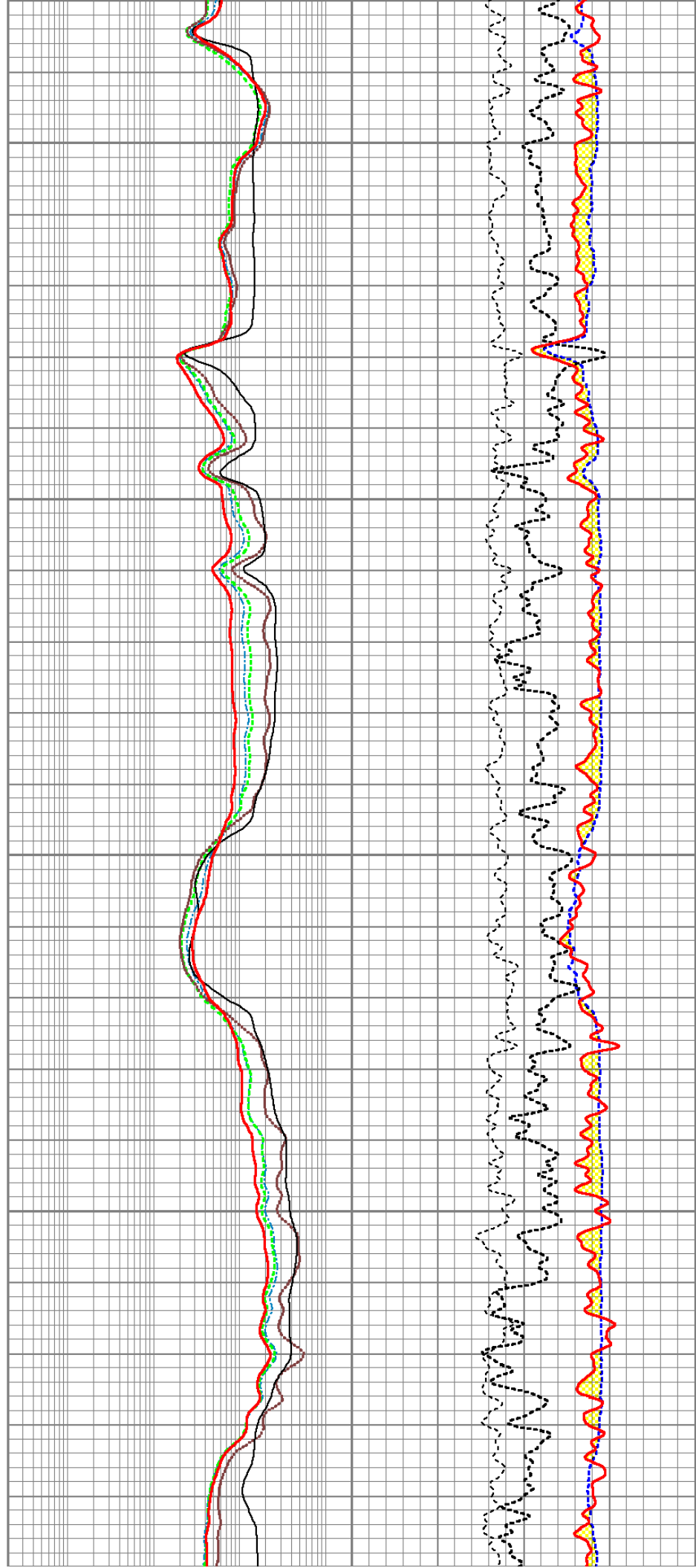
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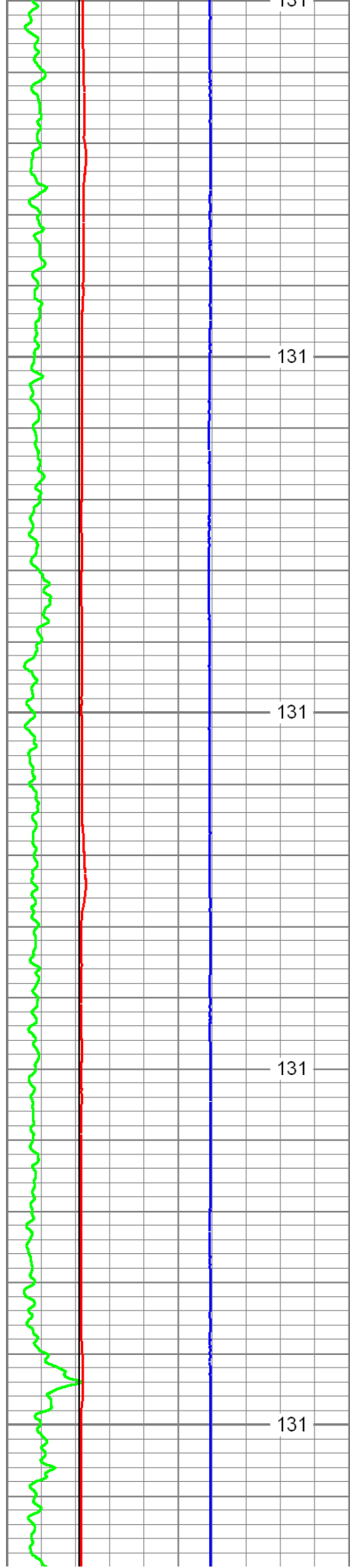
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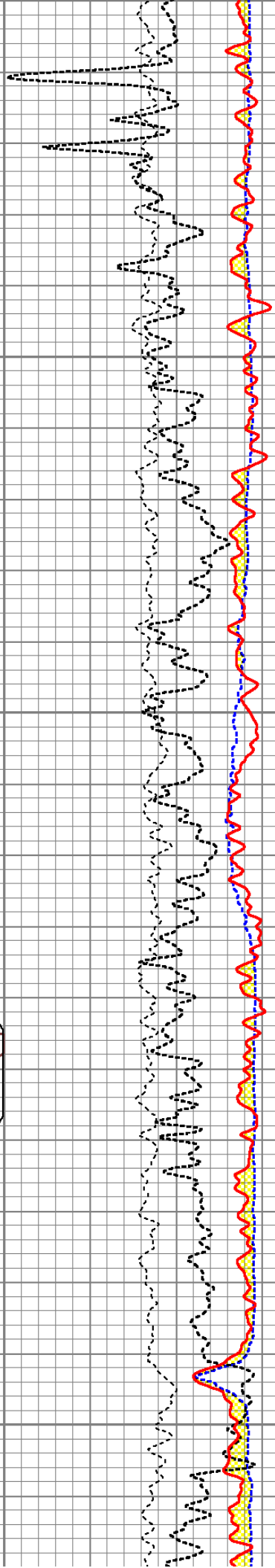
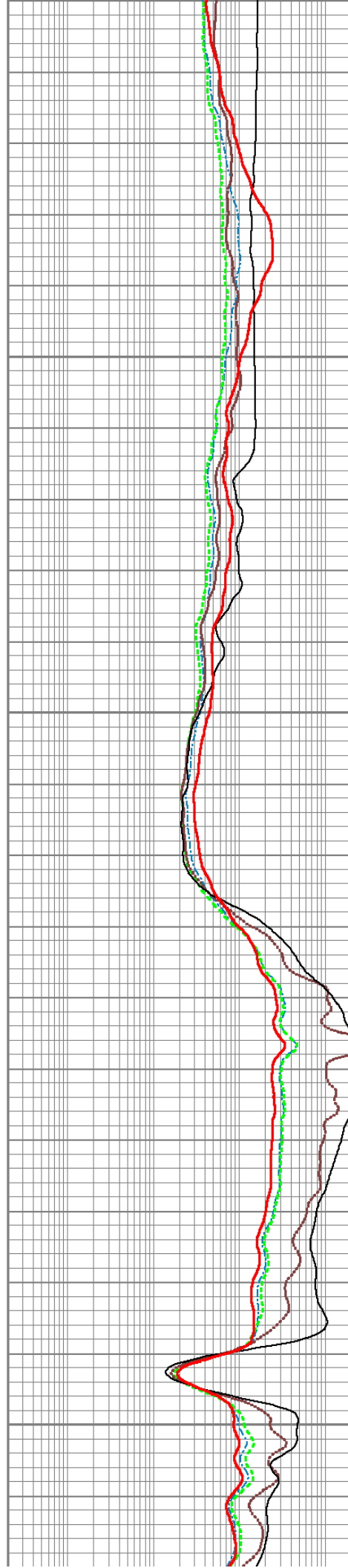
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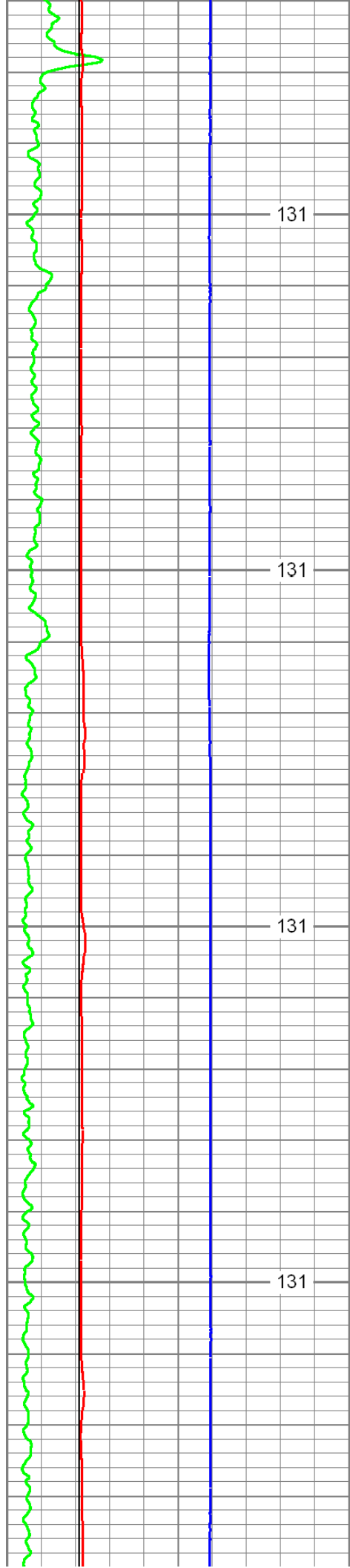




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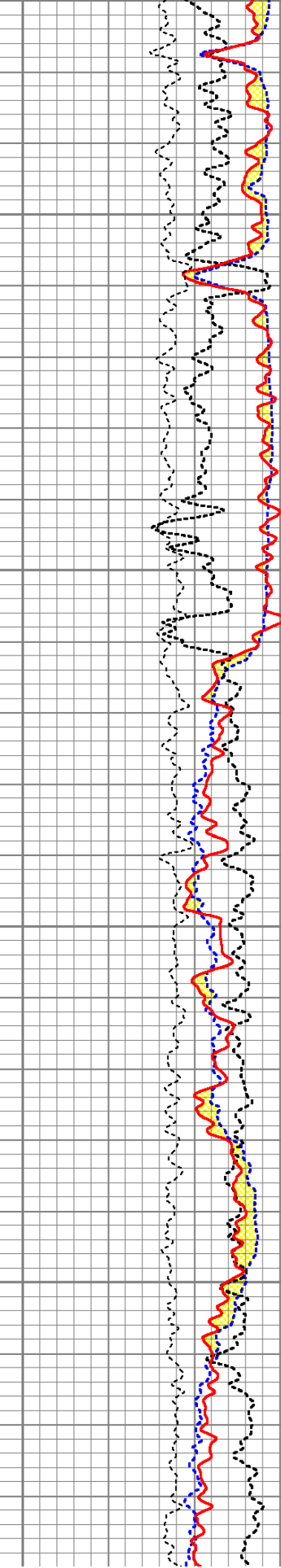
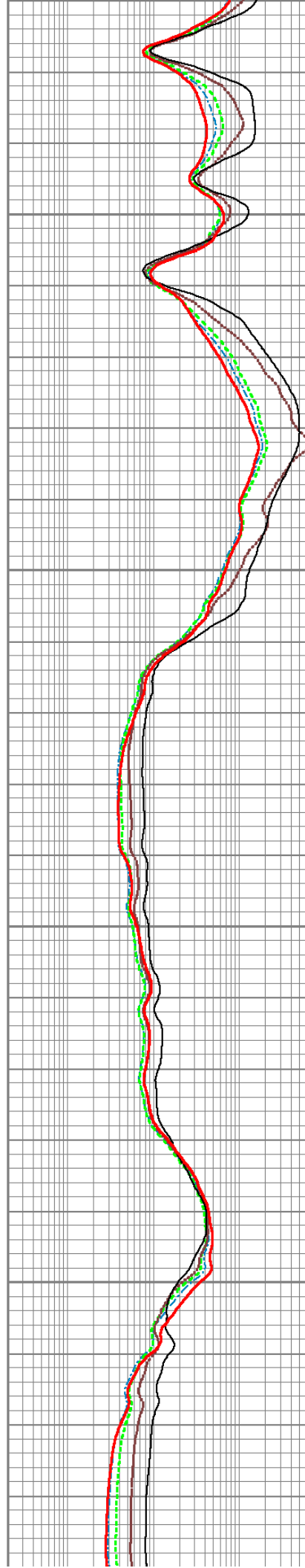
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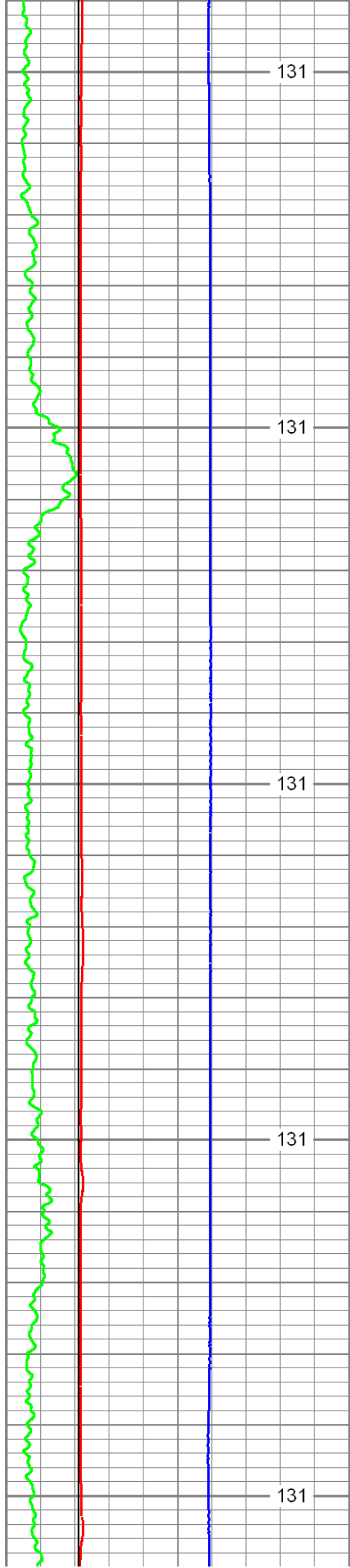
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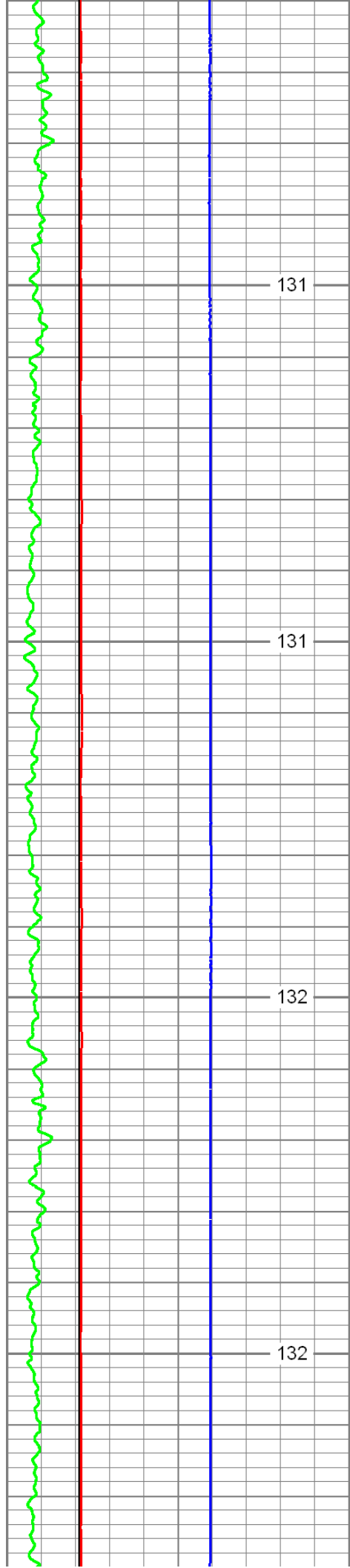
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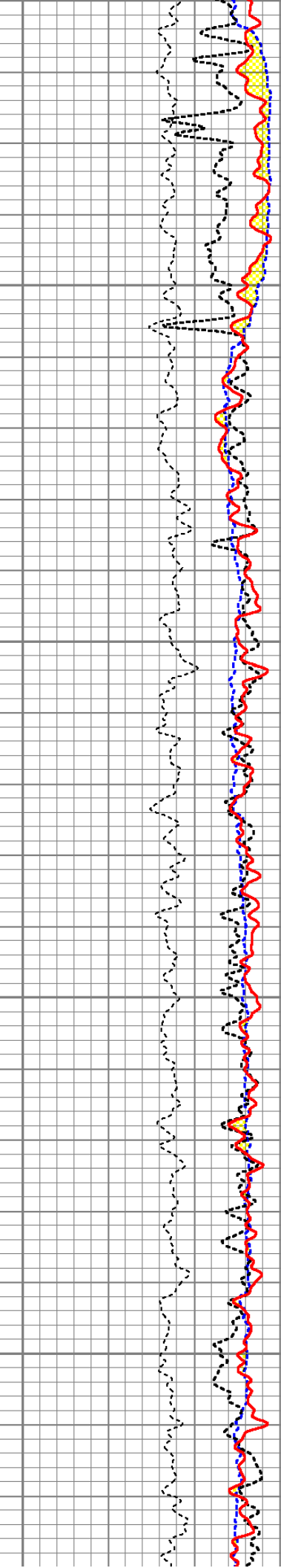
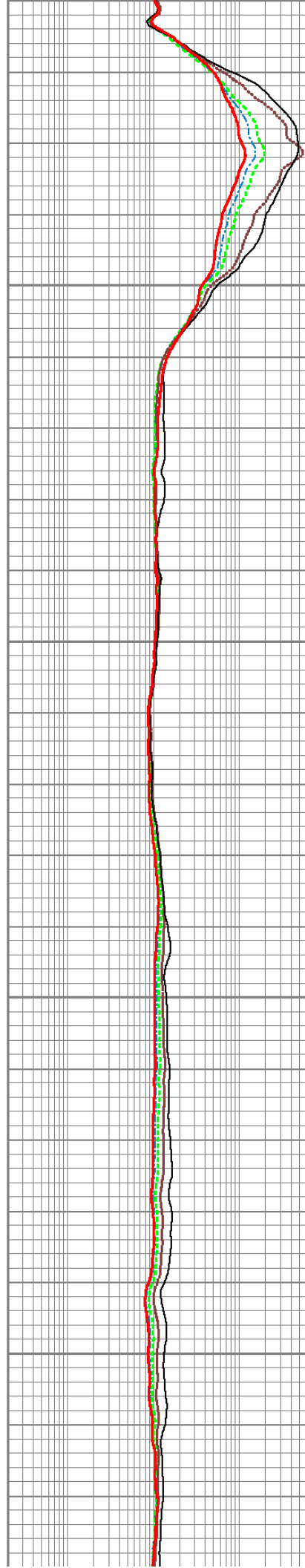


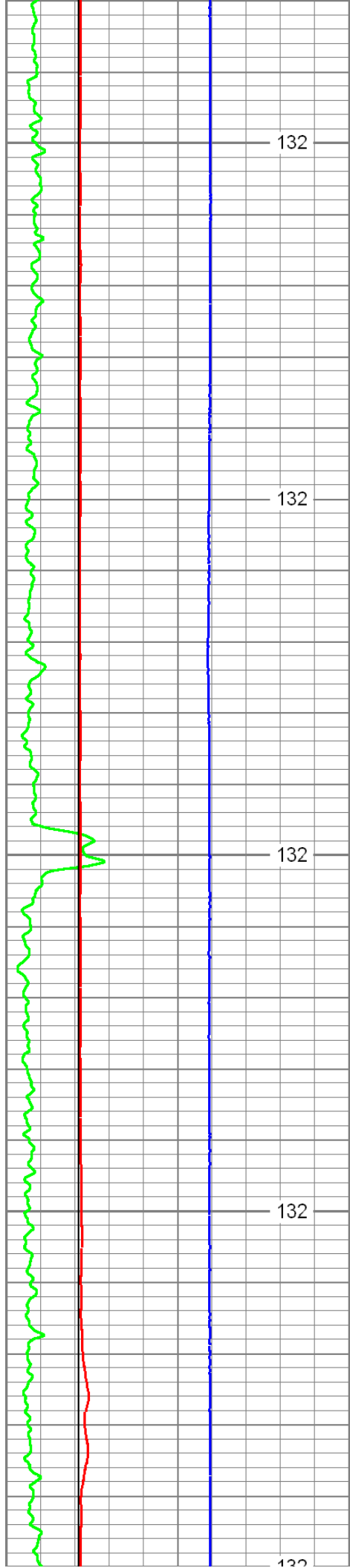
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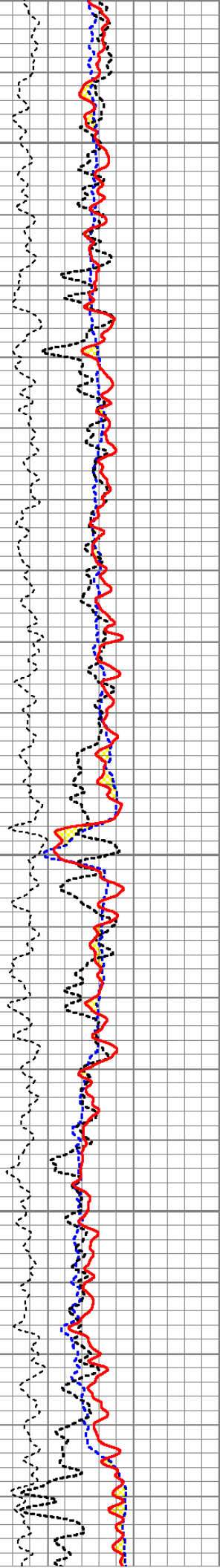
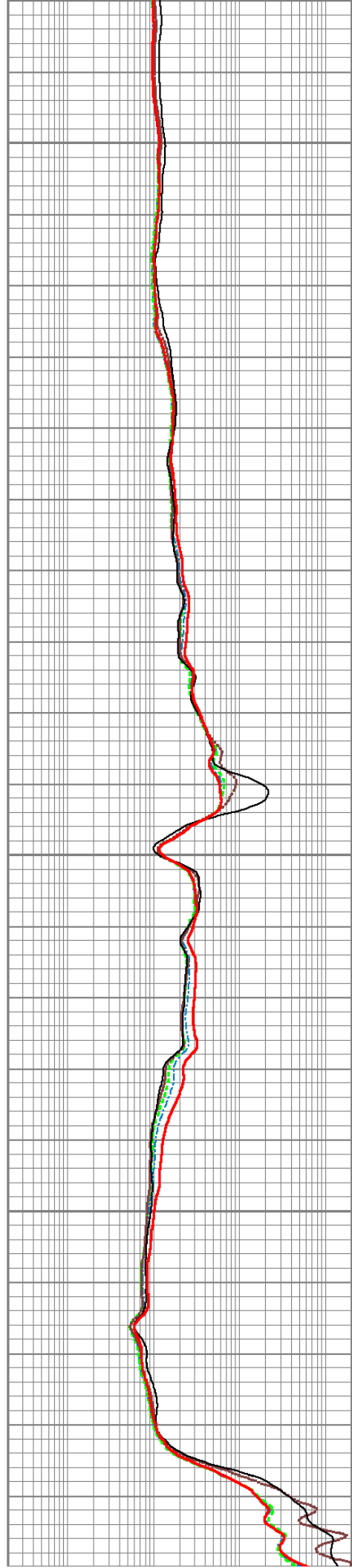
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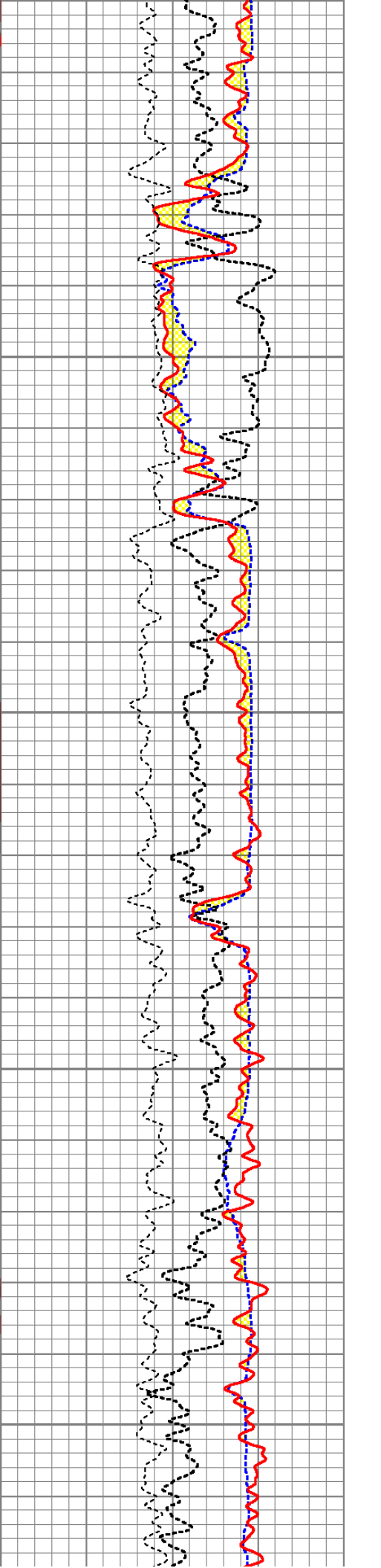
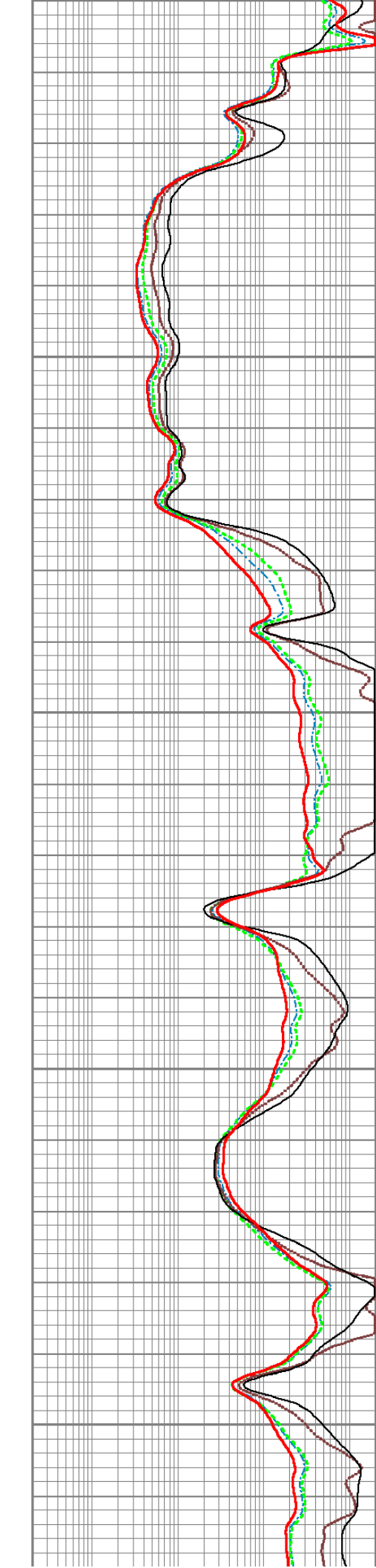
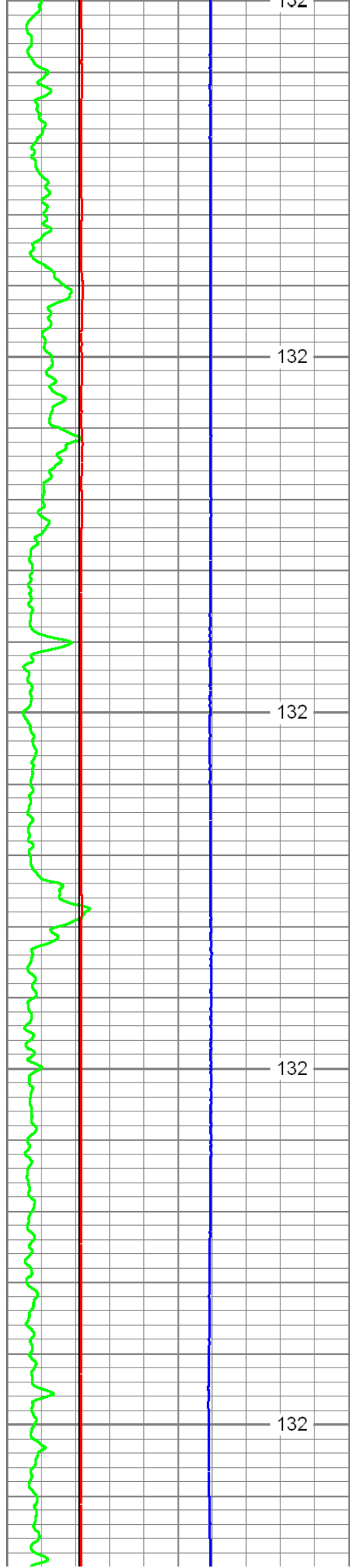
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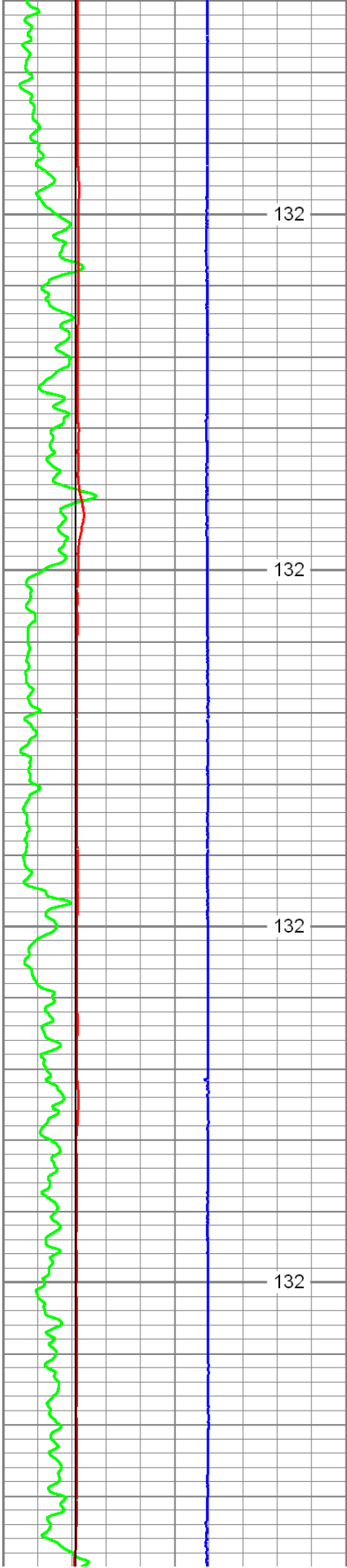




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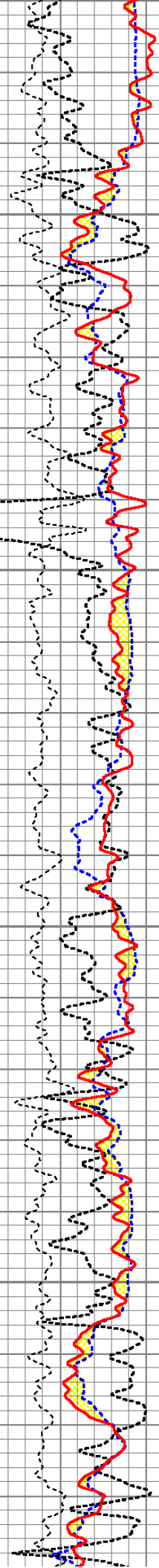
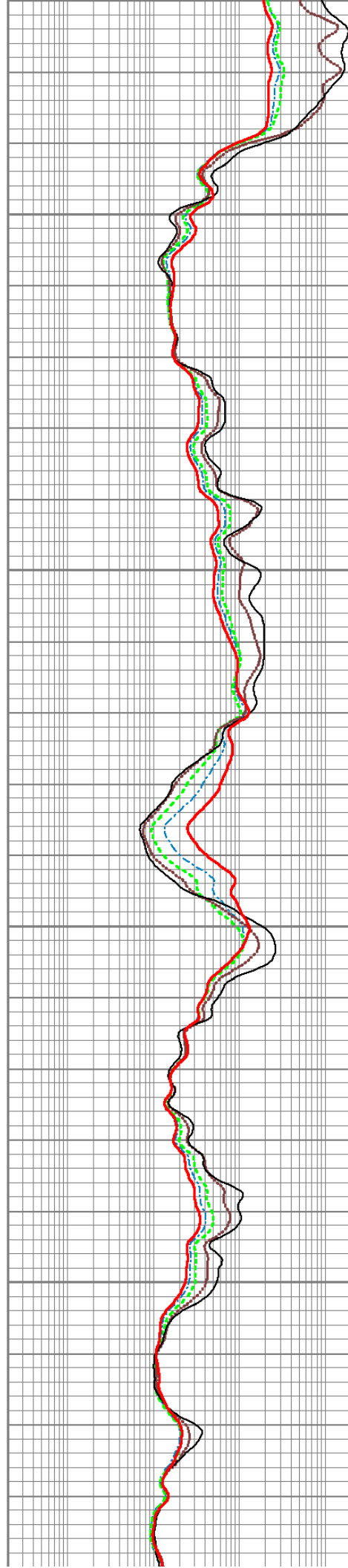


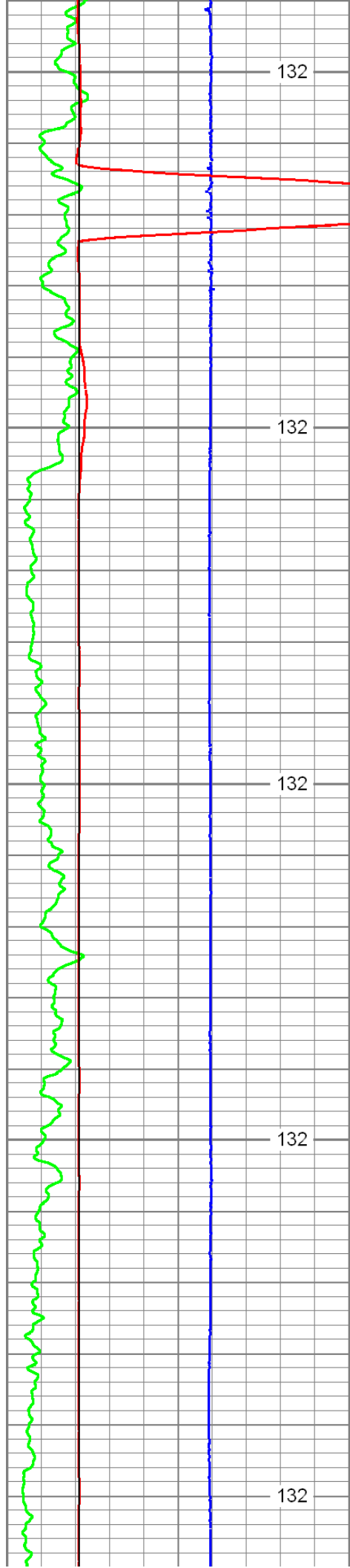
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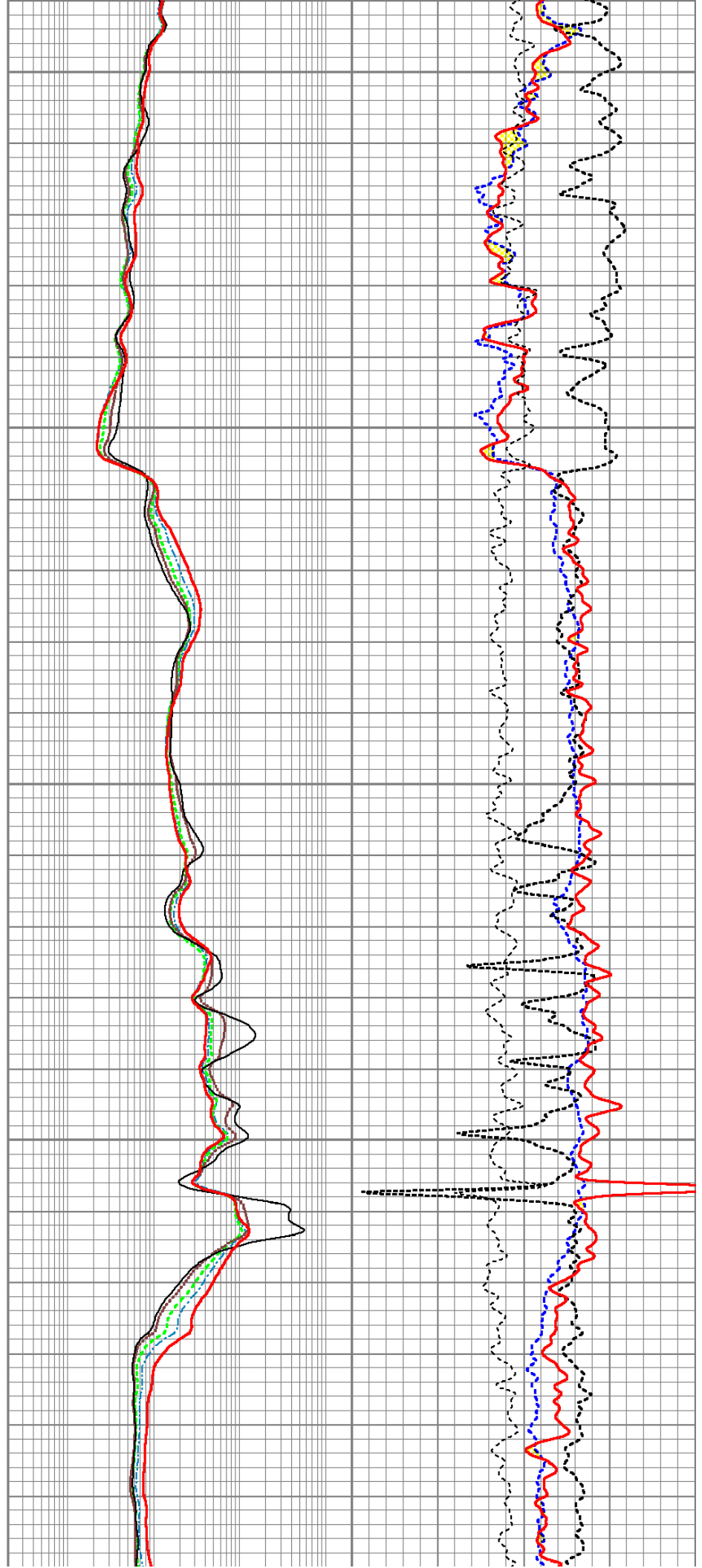
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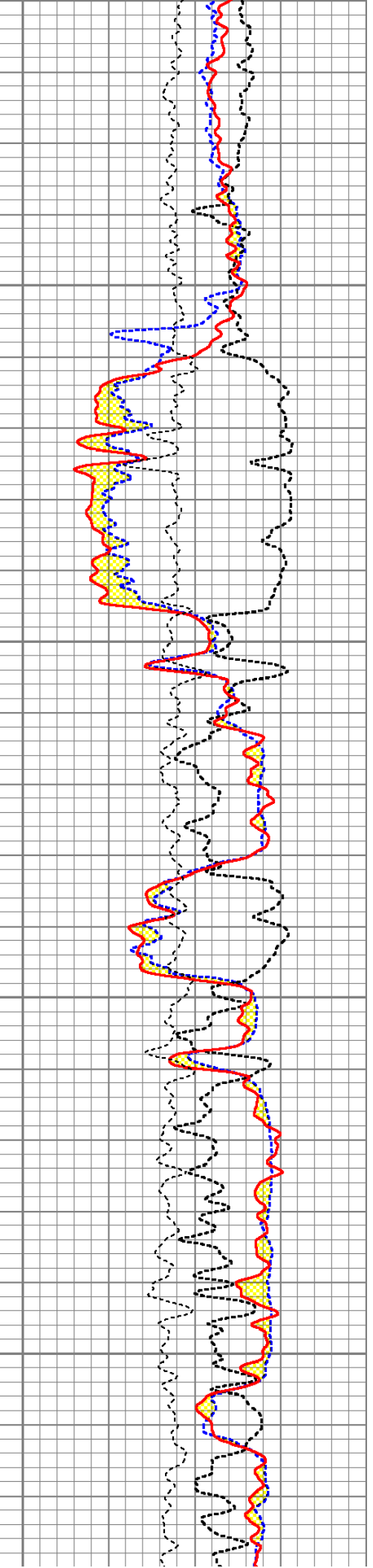
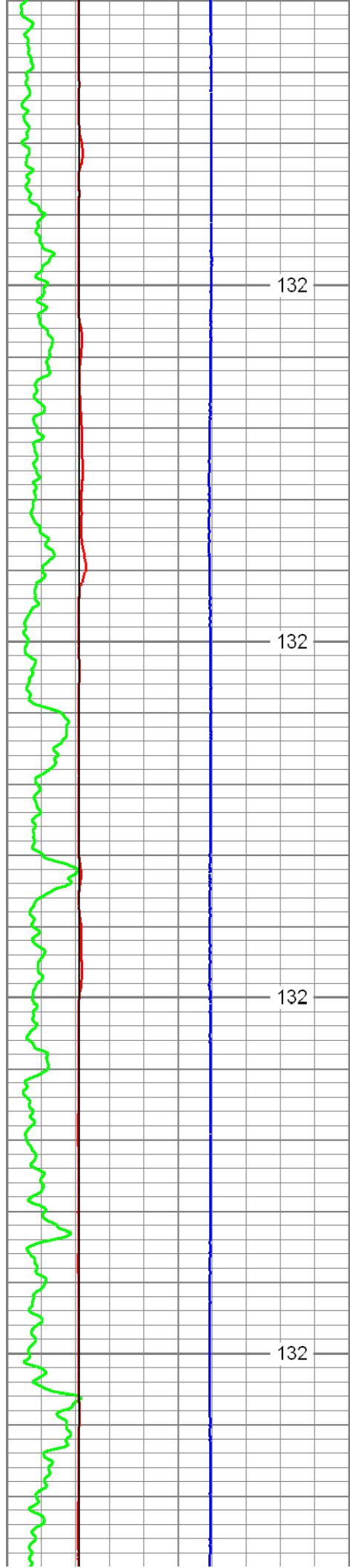
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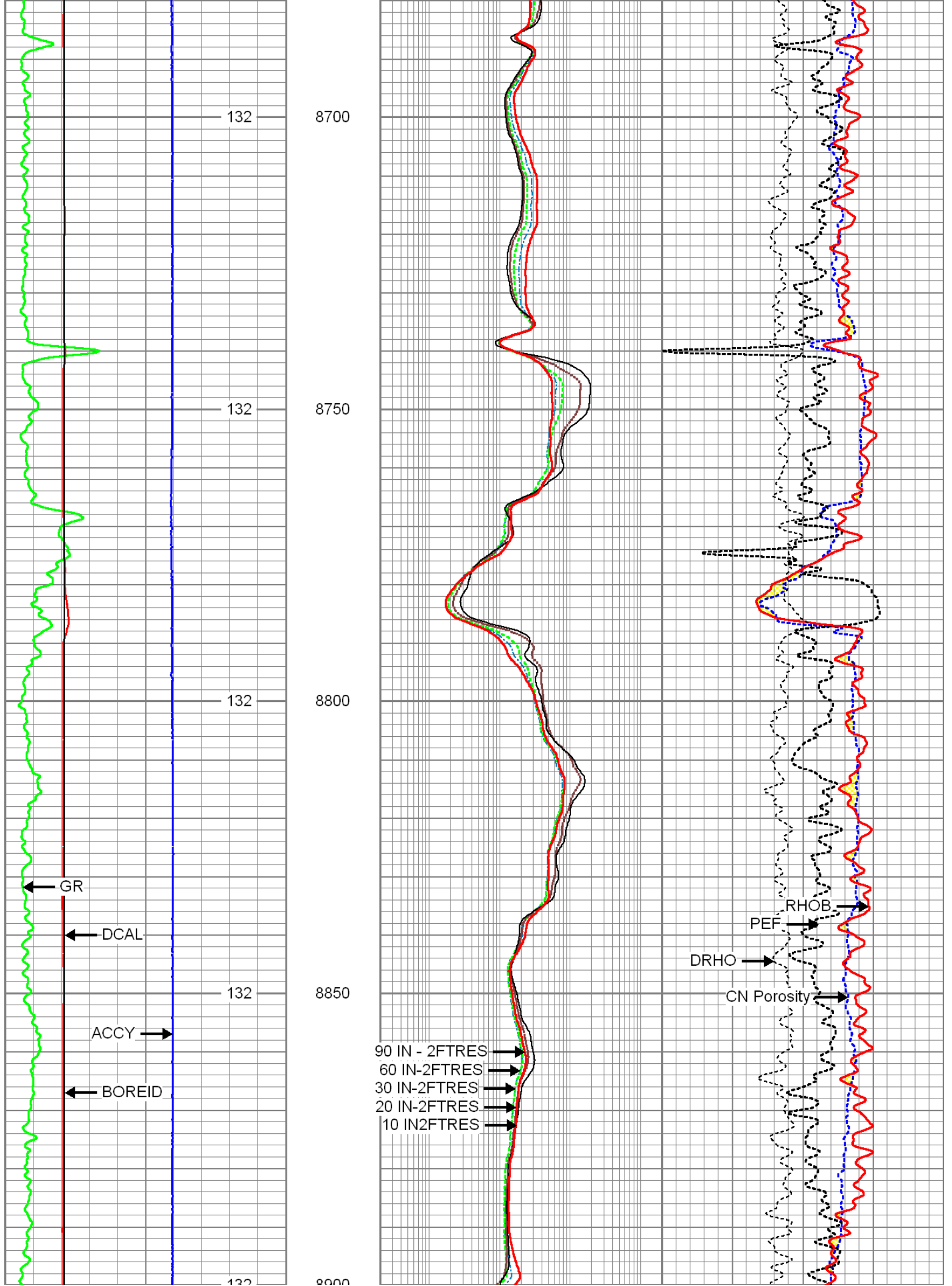


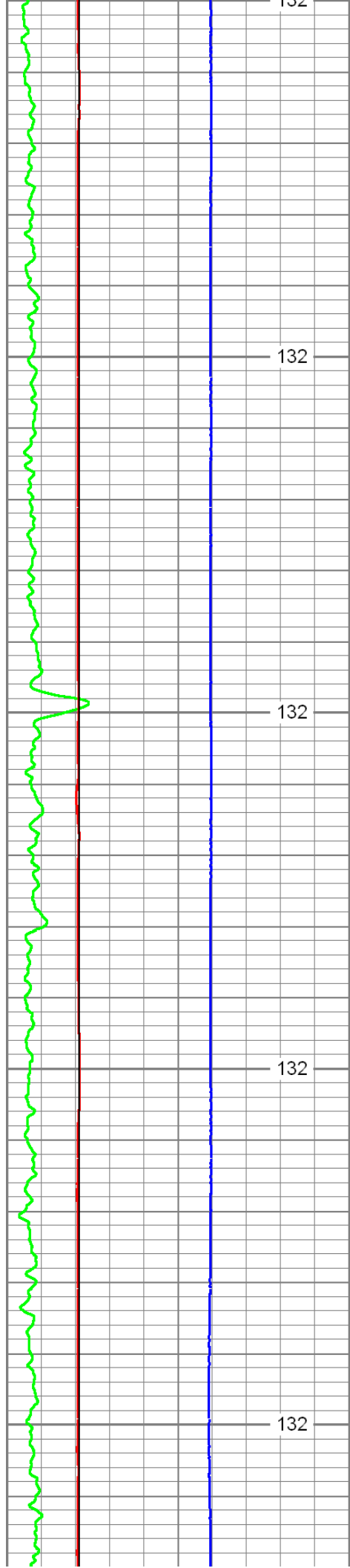


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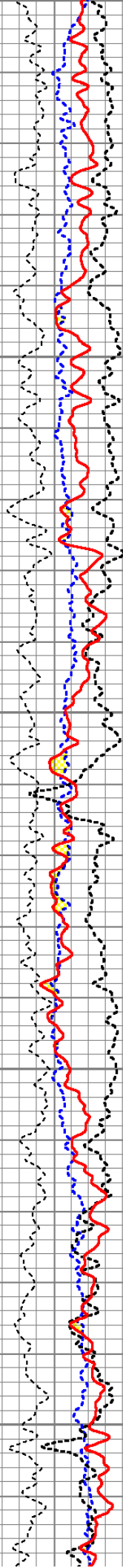
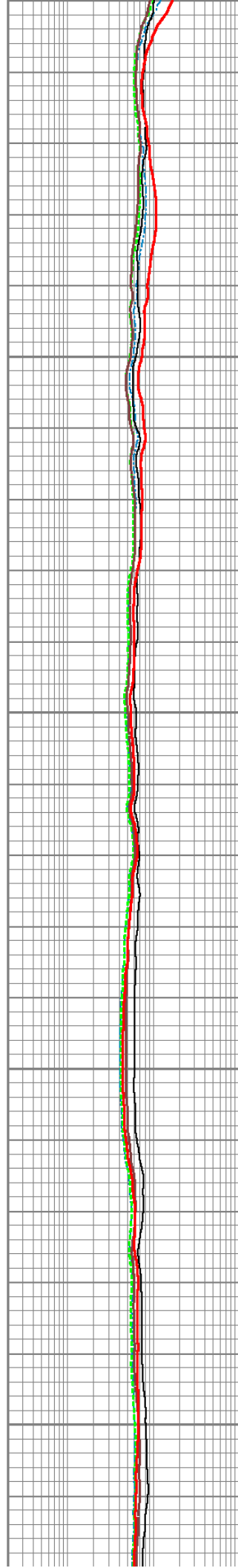


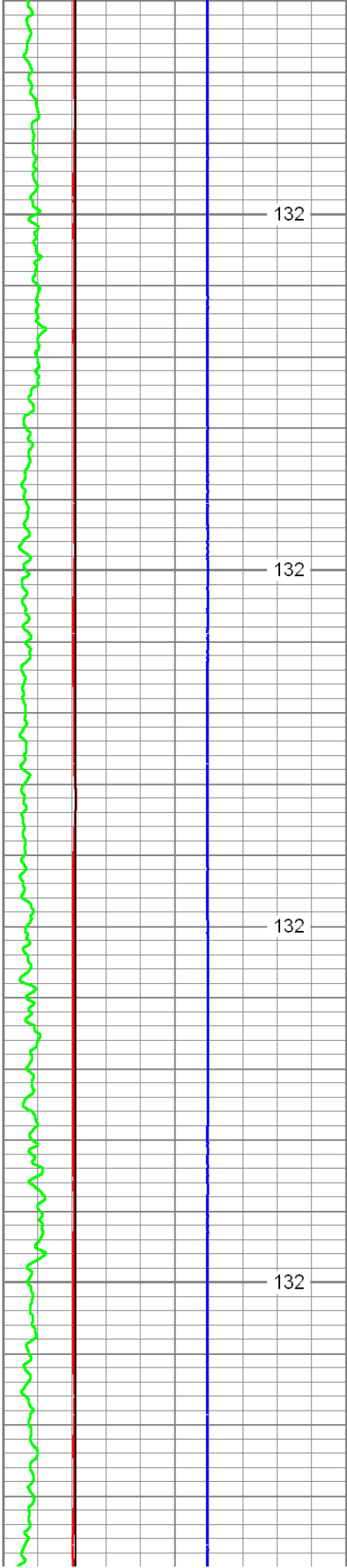




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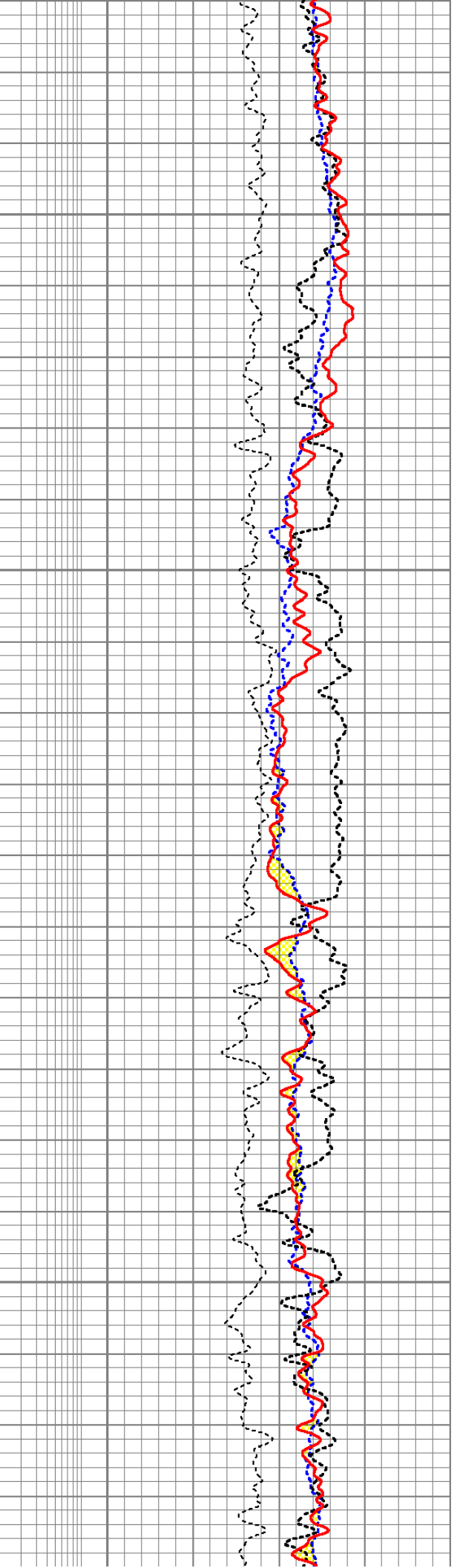
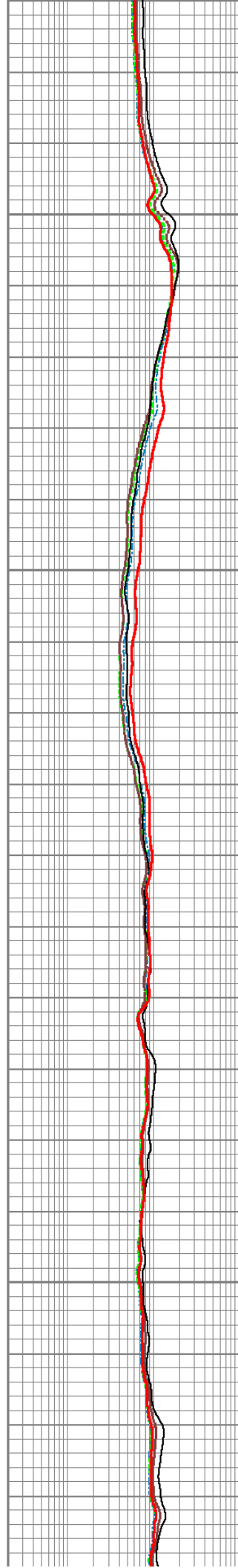
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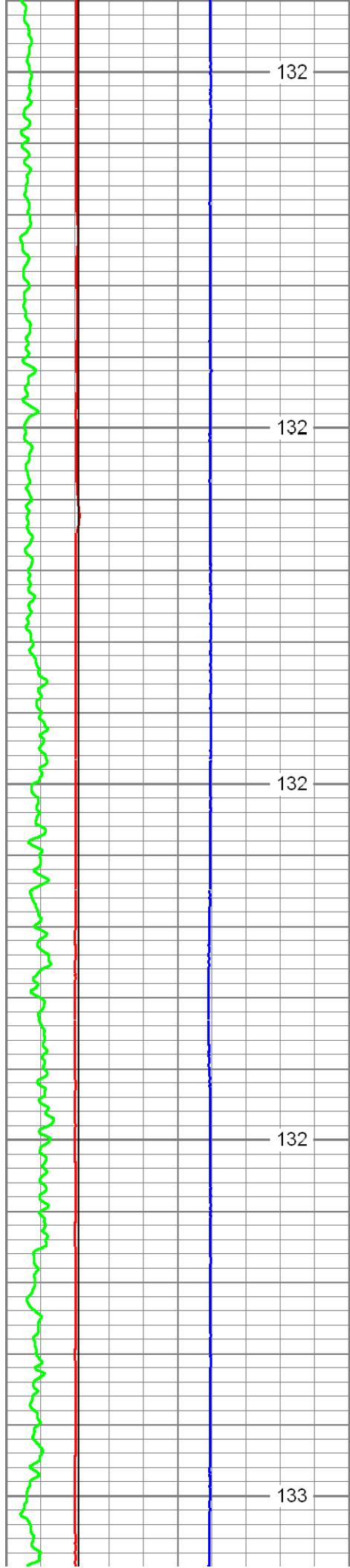
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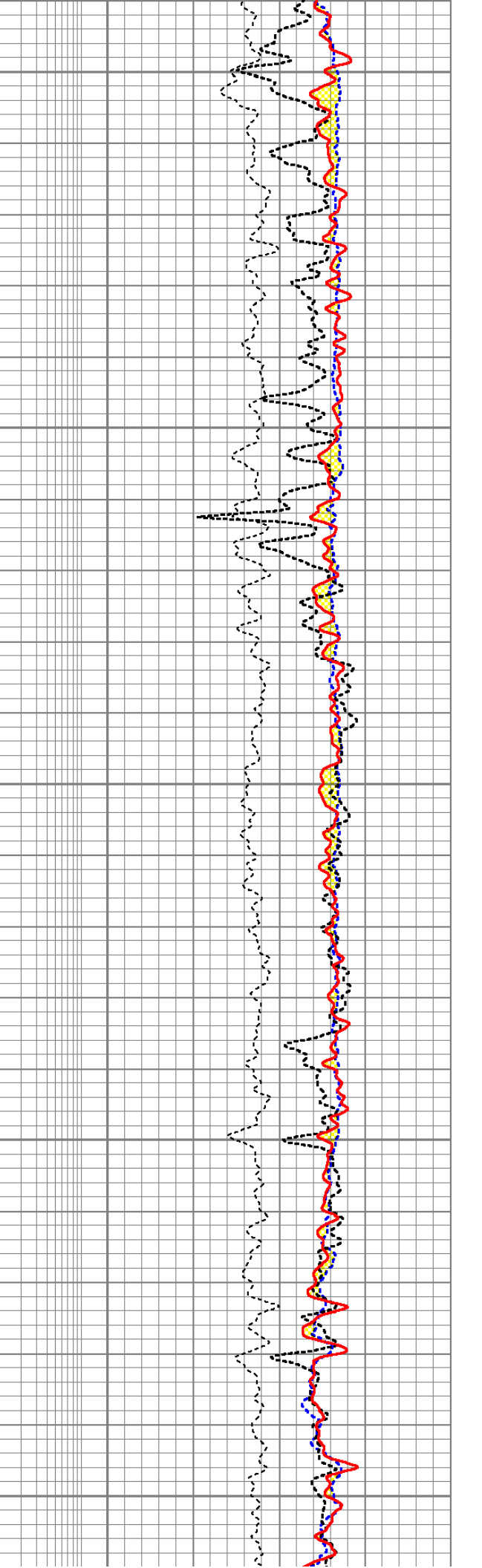
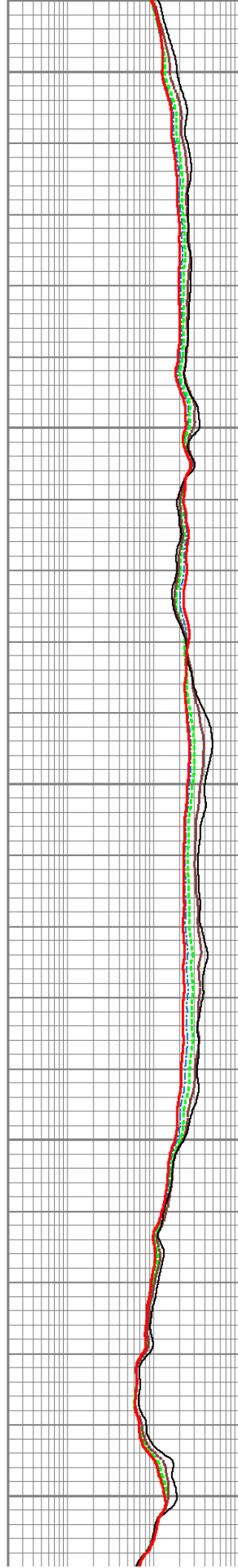
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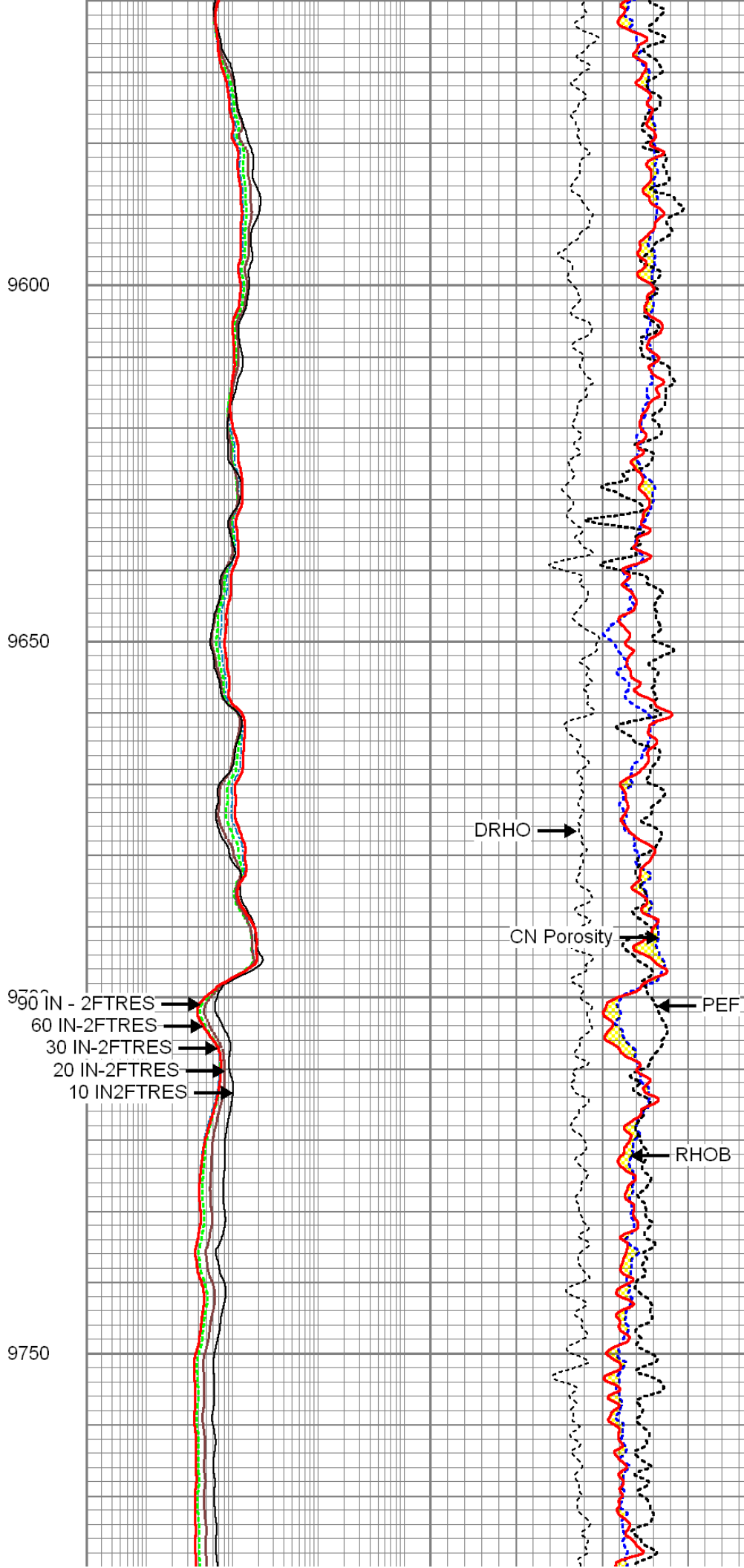
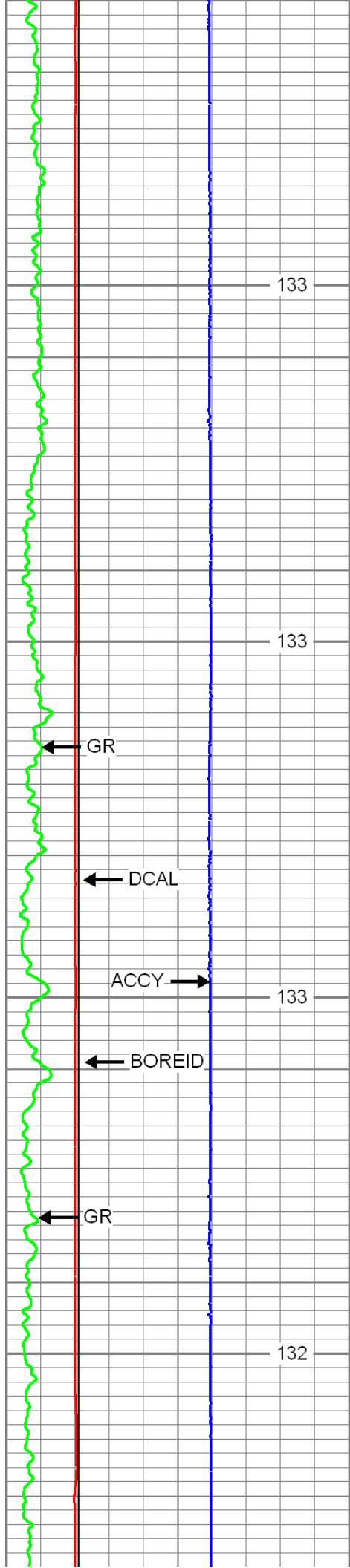
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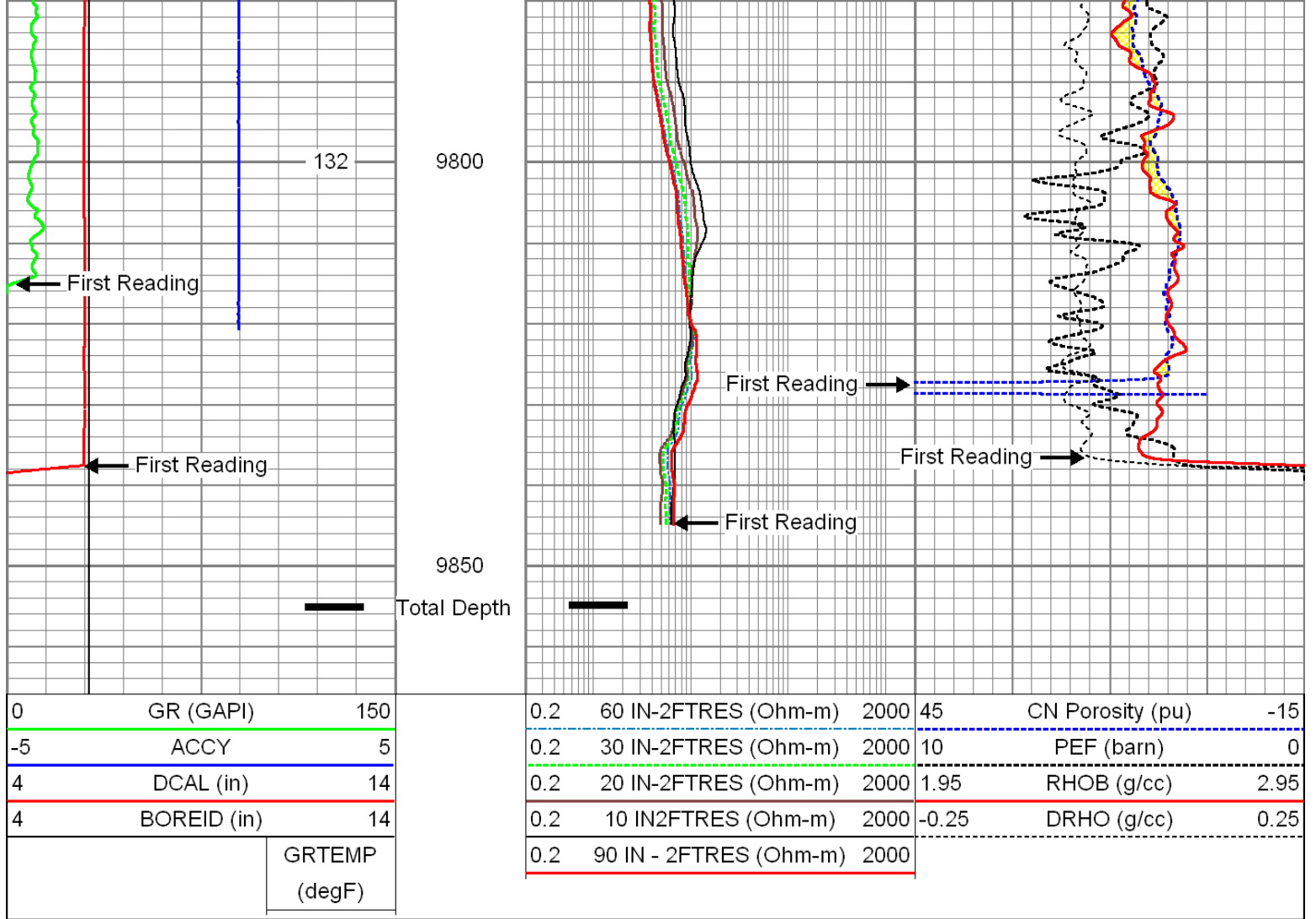
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Log Variables

Database: C:\Warrior\Data\schupbach_mem.db
 Dataset: field/well/proc1/pass1.1

Top - Bottom

M	A	SZCOR	CASED?	NPORSEL	FRMSALIN kppm	MUDSALIN kppm
2	1	On	No	Limestone	0	1.5
CEMWATERSA kppm	CMNTTHCK in	CASETHCK in	PEBHC?	DNBHC?	MudWgt lb/gal	DPORSEL
0	0	0	YES	NO	8.4	RHOB
FLUIDDEN g/cc	MATRXDEN g/cc	BHFLRESSRC MUDCELL	BHFLRES Ohm-m	SRFTEMP degF	RESTMP SRC INTERNAL	BHID SRC CURVE
1	2.71		1	65		
SO in	TOOLPOS	BHFL_TYPE	TMPCOR	LATNOR	BHCOR	CASEOD in
0.5	Free	WBM	On	Off	On	4.5
PERFS	TDEPTH ft	BOTTEMP degF	BOREID in			
0	9880	133	6.125			

Calibration Report

Database File: schupbach_mem.db
 Dataset Pathname: proc1/pass1.1

ThruBit Induction Calibration Report

Tool Model-Serial Number: PS-PS28R

Shop Calibration Performed: Wed Jul 18 08:34:18 2012

BASELINE

	R	Expected	X	Expected
Freq 1				
A1	-470.6010	[-500.00, -400.00]	431.3580	[-500.00, 500.00]
A2	-132.1350	[-180.00, -100.00]	324.4270	[-500.00, 500.00]
A3	-22.8796	[-50.00, -10.00]	120.7910	[-500.00, 500.00]
A4	-13.5561	[-30.00, -10.00]	253.5500	[-500.00, 500.00]
A5	-12.3674	[-30.00, -10.00]	118.4800	[-500.00, 500.00]
Freq 2				
A1	-245.4520	[-280.00, -180.00]	255.0510	[-500.00, 500.00]
A2	-84.9942	[-130.00, -50.00]	181.0010	[-500.00, 500.00]
A3	-17.6024	[-50.00, -10.00]	27.4555	[-500.00, 500.00]
A4	-16.9413	[-30.00, -10.00]	79.3693	[-500.00, 500.00]
A5	-17.1391	[-30.00, -10.00]	-18.1150	[-500.00, 500.00]
Freq 3				
A1	-154.6260	[-180.00, -80.00]	114.8480	[-500.00, 500.00]
A2	-64.9929	[-130.00, -30.00]	89.0047	[-500.00, 500.00]
A3	-13.6178	[-50.00, -10.00]	-36.1076	[-500.00, 500.00]
A4	-18.2614	[-30.00, -10.00]	-34.9519	[-500.00, 500.00]
A5	-18.7199	[-30.00, -10.00]	-117.8370	[-500.00, 500.00]
Freq 4				
A1	-83.3030	[-120.00, -40.00]	-82.4238	[-500.00, 500.00]
A2	-47.3494	[-110.00, -10.00]	-31.3377	[-500.00, 500.00]
A3	-11.7928	[-50.00, -10.00]	-130.2940	[-500.00, 500.00]
A4	-22.0521	[-30.00, -10.00]	-204.6810	[-500.00, 500.00]
A5	-24.7190	[-30.00, -10.00]	-286.7100	[-500.00, 500.00]

CALIBRATION COEFFICIENTS

	R	Expected	X	Expected
Freq 1				
A1	0.9892	[0.95, 1.05]	0.0017	[-0.05, 0.05]
A2	0.9915	[0.95, 1.05]	0.0036	[-0.05, 0.05]
A3	0.9962	[0.95, 1.05]	-0.0037	[-0.05, 0.05]
A4	0.9881	[0.95, 1.05]	0.0052	[-0.05, 0.05]
A5	0.9891	[0.95, 1.05]	0.0031	[-0.05, 0.05]
Freq 2				
A1	0.9832	[0.95, 1.05]	-0.0065	[-0.05, 0.05]
A2	0.9849	[0.95, 1.05]	-0.0051	[-0.05, 0.05]
A3	0.9838	[0.95, 1.05]	-0.0053	[-0.05, 0.05]
A4	0.9828	[0.95, 1.05]	-0.0039	[-0.05, 0.05]
A5	0.9822	[0.95, 1.05]	-0.0054	[-0.05, 0.05]
Freq 3				
A1	1.0029	[0.95, 1.05]	-0.0058	[-0.05, 0.05]
A2	1.0053	[0.95, 1.05]	-0.0043	[-0.05, 0.05]
A3	1.0006	[0.95, 1.05]	-0.0023	[-0.05, 0.05]
A4	1.0023	[0.95, 1.05]	-0.0028	[-0.05, 0.05]
A5	1.0053	[0.95, 1.05]	-0.0038	[-0.05, 0.05]
Freq 4				
A1	0.9934	[0.95, 1.05]	-0.0036	[-0.05, 0.05]

A2	0.9954	[0.95, 1.05]	-0.0025	[-0.05, 0.05]
A3	0.9956	[0.95, 1.05]	-0.0046	[-0.05, 0.05]
A4	0.9952	[0.95, 1.05]	-0.0015	[-0.05, 0.05]
A5	1.0041	[0.95, 1.05]	-0.0046	[-0.05, 0.05]

Temperature 31.0160 degC

ThruBit Density Calibration Report

Tool Model-Serial Number: PS-PS41D
 Source Number:
 Shop Calibration Performed: Mon Sep 17 12:15:02 2012

REFERENCE

	Density	Units
Aluminium	2.607	g/cc
Magnesium	1.752	g/cc

READINGS

Outputs	Counts	Units	Expected
SS1 Background	144.02	cps	[130.00, 170.00]
LS1 Background	160.64	cps	[130.00, 170.00]
LS4 Background	33.25	cps	[27.00, 35.00]
SS1 Aluminium	4608.35	cps	[4500.00, 5500.00]
LS1 Aluminium	839.19	cps	[750.00, 950.00]
LS4 Aluminium	902.92	cps	[843.00, 1068.00]
SS1 Magnesium	7683.51	cps	[7000.00, 9000.00]
LS1 Magnesium	5402.56	cps	[5250.00, 6250.00]
LS1 Al + Fe	729.52	cps	[650.00, 800.00]
LS4 Al + Fe	412.65	cps	[382.00, 471.00]

RESULTS

SS Slope	1.63	[1.52, 1.77]
LS Slope	0.42	[0.38, 0.45]
PEF K Factor	4.909	[3.510, 6.170]
PEF B Factor	-0.525	[-0.700, -0.410]

Caliper Shop Calibration performed: Mon Sep 17 12:15:02 2012

RESULTS

Reference	Reading	Units
12.00	1851.79	in
9.00	2020.34	in
6.00	2185.40	in

DENSITY PRE-SURVEY CHECK Performed: Mon Sep 17 12:52:36 2012

Outputs	Counts	Units	Expected
SS1 Background	143.34	cps	[139.70, 148.34]
LS1 Background	159.89	cps	[155.82, 165.46]
LS4 Background	33.31	cps	[31.25, 35.24]

CALIPER PRE-SURVEY CHECK Performed: Mon Sep 17 12:50:20 2012

Reference	Readings	Units	Expected
6.00	6.05	in	[5.80, 6.20]

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Compensated Neutron Calibration Report

Tool Model-Serial Number:	PS-PS05N
Source Number:	
Calibration Tank Temperature:	90.6 degF
Shop Calibration Performed:	Thu Sep 06 13:38:31 2012

BACKGROUND MEASUREMENT				
Outputs	Measured	Units		Expected
SS Counts	0.0	cps		<10
LS Counts	0.1	cps		<4

WATER TANK REFERENCE				
Outputs	Measured	Units		Expected
SS Counts	856.4	cps		
LS Counts	28.4	cps		
Tank Ratio Ref	30.9580	SS/LS		
Tank Ratio	30.1747	SS/LS		
Tank Ratio Gain	1.0260			[0.85, 1.15]

ALUMINUM SLEEVE REFERENCE				
Outputs	Measured	Units		Expected
SS Counts	9376.9	cps		
LS Counts	906.5	cps		
Al Ratio Ref	10.797	SS/LS		
Al Ratio	10.613	SS/LS		
Al Ratio Gain	1.02			[0.90, 1.10]
Sleeve Porosity	14.46	pu		

PRE-SURVEY BACKGROUND CHECK Performed:	Mon Sep 17 12:57:08 2012			
Outputs	Measured	Units		Expected
SS Counts	0.0	cps		<10
LS Counts	0.1	cps		<4

Gamma Ray Calibration Report

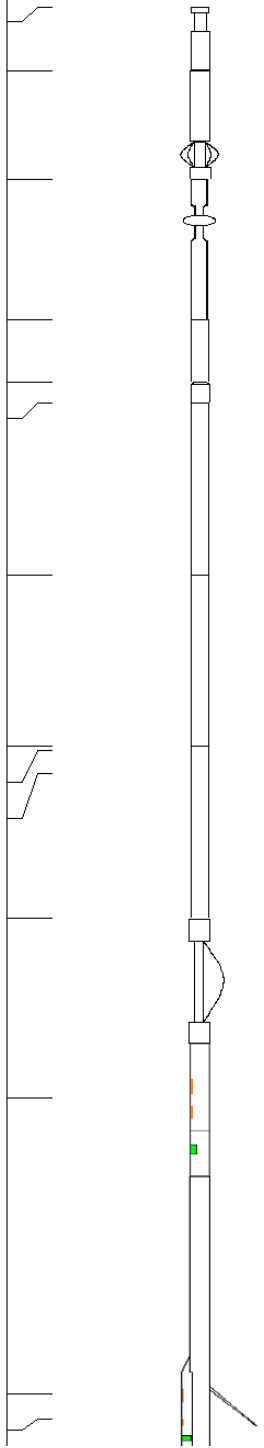
Tool Model-Serial Number:	ENP-ENP2T
Performed:	Thu Sep 06 14:53:24 2012

Calibrator Value: 170.8 GAPI
 Background Reading: 62.6 cps
 Calibrator Reading: 476.3 cps
 Sensitivity: 0.3850 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	2.31	2.13	5.00
Thrubit	65.28		Solid Weakpoint			
			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 (PS13B) Thrubit Battery	6.13	2.13	40.00
TMG	41.16		TMG-ENP (ENP2T) ThruBit Telemetry Gamma Ray			
GR	41.04					
GRTEMP	40.20					
Thrubit	35.04		Decentralizer Decentralizer (Small)	4.50	2.13	70.00
CNLSC	28.60		TBN-PS (PS05N) ThruBit Neutron	4.77	2.13	63.00
			TBD-PS (PS41D) Thrubit Density	10.48	2.13	91.00
LSW1	18.04					
DCAL	17.13					

A1_P	10.60		TBI-PS (PS28R) ThruBit Induction	15.29	2.13	94.00
A2_P	10.10					
A3_P	9.35					
A4_P	8.35					
A5_P	6.60					
Dataset: schupbach_mem.db: field/well/proc1/pass1.1 Total Length: 67.59 ft Total Weight: 570.15 lb O.D.: 2.38 in						

	Company	SHELL EXP. & PROD. CO. INC.
	Well	SCHUPBACH 3510 4-1H
	Field	ARROWHEAD
	County	BARBER
	State	KANSAS