



Company: **NIGHTHAWK PRODUCTION LLC**

**Well: BLACKCOMB 12-14**

Field: **ARIKARÉE CREEK**

County: **LINCOLN** State: **COLORADO**

County: LINCOLN			
Field: ARIKAREE CREEK			
Location: NW/SW			
Well: BLACKCOMB 12-14			
Company: NIGHTHAWK PRODUCTION LLC			
ARRAY INDUCTION DENSITY / NEUTRON GAMMA RAY MEMORY LOG			
LOCATION			
NW/SW 2245' FSL & 640' FWL	Elev.: K.B. 5210.00 ft G.L. 5195.00 ft D.F. 5210.00 ft		
Permanent Datum: _____ Log Measured From: _____ Drilling Measured From: _____	GROUND LEVEL KELLY BUSHING KELLY BUSHING	Elev.: 5195.00 ft 15.00 ft above Perm. Datum	
API Serial No. 05073066100000	Section 14	Township 6S	Range 54W

[illegible]

Logging Date	12-Aug-2014			
Run Number	1			
Depth Driller	8445 ft			
Schlumberger Depth	8402 ft			
Bottom Log Interval	8392 ft			
Top Log Interval	369 ft			
Casing Driller Size @ Depth	8.625 in @ 368 ft		@	
Casing Schlumberger	369 ft			
Bit Size	7.875 in			
Type Fluid In Hole	WBM			
Density	9.5 lbm/gal	72 s		
Fluid Loss	5.6 cm3	8.44		
Source Of Sample	FLOWLINE			
RM @ Measured Temperature	1.100 ohm.m	@ 119 degF	@	
RMF @ Measured Temperature	0.940 ohm.m	@ 119 degF	@	
RMC @ Measured Temperature	1.380 ohm.m	@ 119 degF	@	
Source RMF	CALCULATED	CALCULATED		
RM @ MRT	0.741 @ 180	0.633 @ 180	@	@
Maximum Recorded Temperatures	180 degF			
Circulation Stopped	12-Aug-2014	19:30		
Logger On Bottom	12-Aug-2014	22:00		
Unit Number	9	BRIGHTON, CO		
Recorded By	BROWNAWELL			
Witnessed By	GIBBS			

	Logging Date				
	Run Number				
	Depth Driller				
	Schlumberger Depth				
	Bottom Log Interval				
	Top Log Interval				
	Casing Driller Size @ Depth	@			
	Casing Schlumberger				
	Bit Size				
	Type Fluid In Hole				
	Density	Viscosity			
	Fluid Loss	PH			
	Source Of Sample				
	RM @ Measured Temperature	@			
	RMF @ Measured Temperature	@			
	RMC @ Measured Temperature	@			
	Source RMF	RMC			
	RM @ MRT	RMF @ MRT	@	@	
	Maximum Recorded Temperatures				
	Circulation Stopped	Time			
	Logger On Bottom	Time			
	Unit Number	Location			
	Recorded By				
	Witnessed By				



TILE-B  
TBN-A 12  
NNLS-EWA  
TBD-A 36  
GGLS-FZ  
TBI-A 28

Gamma-Ray — 44.3

Status — 39.0

Neutron N  
Neutron F — 28.2

Density L 17.2  
Caliper 17.1  
Density S 16.8

Array 5  
Array 4  
Array 3  
Array 2  
Array 1  
Status — 9.3

Tension — 0.0  
TOOL ZERO

MAXIMUM STRING DIAMETER 2.13 IN  
MEASUREMENTS RELATIVE TO TOOL ZERO  
ALL LENGTHS IN FEET



MAIN PASS

MAXIS Field Log

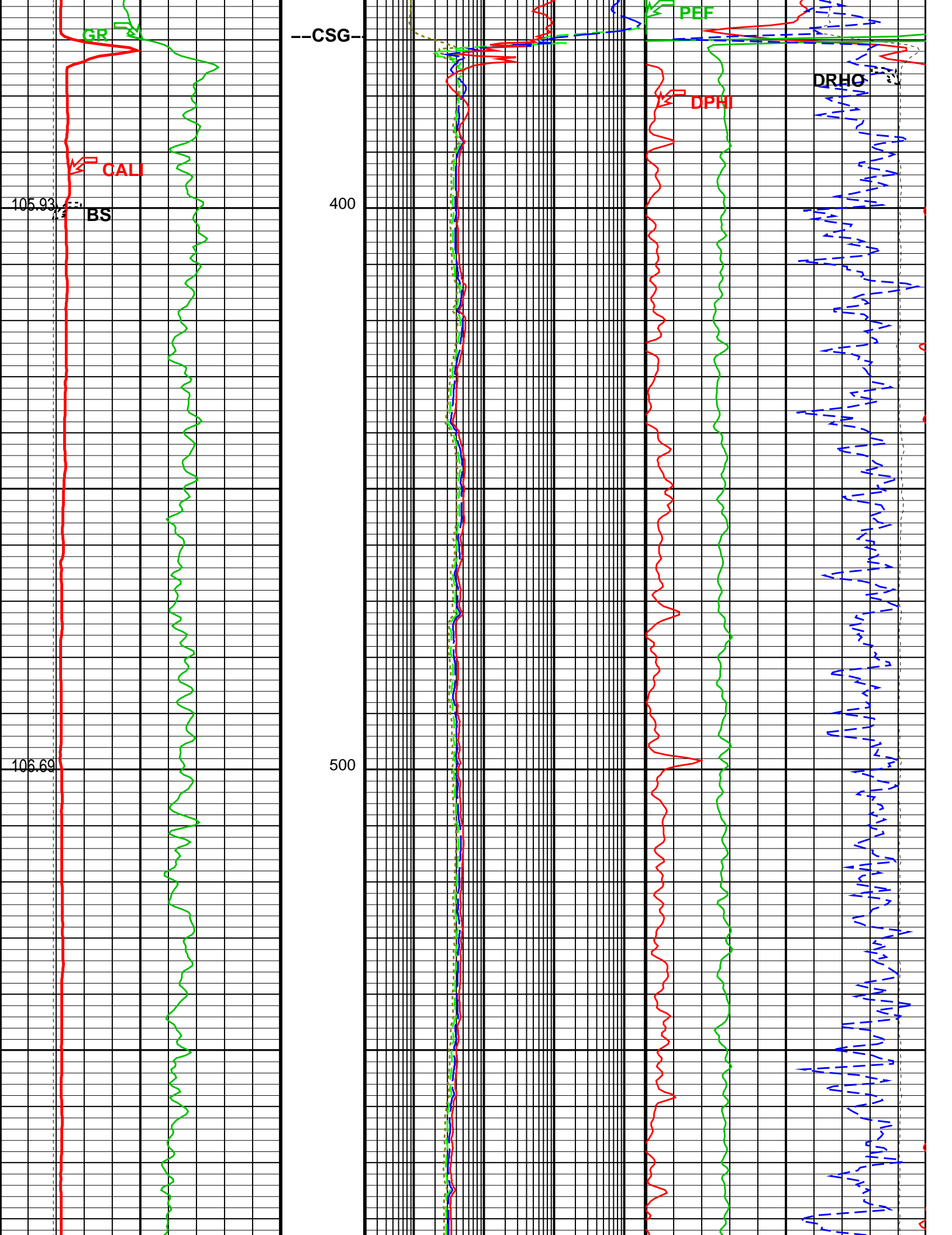
Company: NIGHTHAWK PRODUCTION LLC Well: BLACKCOMB 12-14

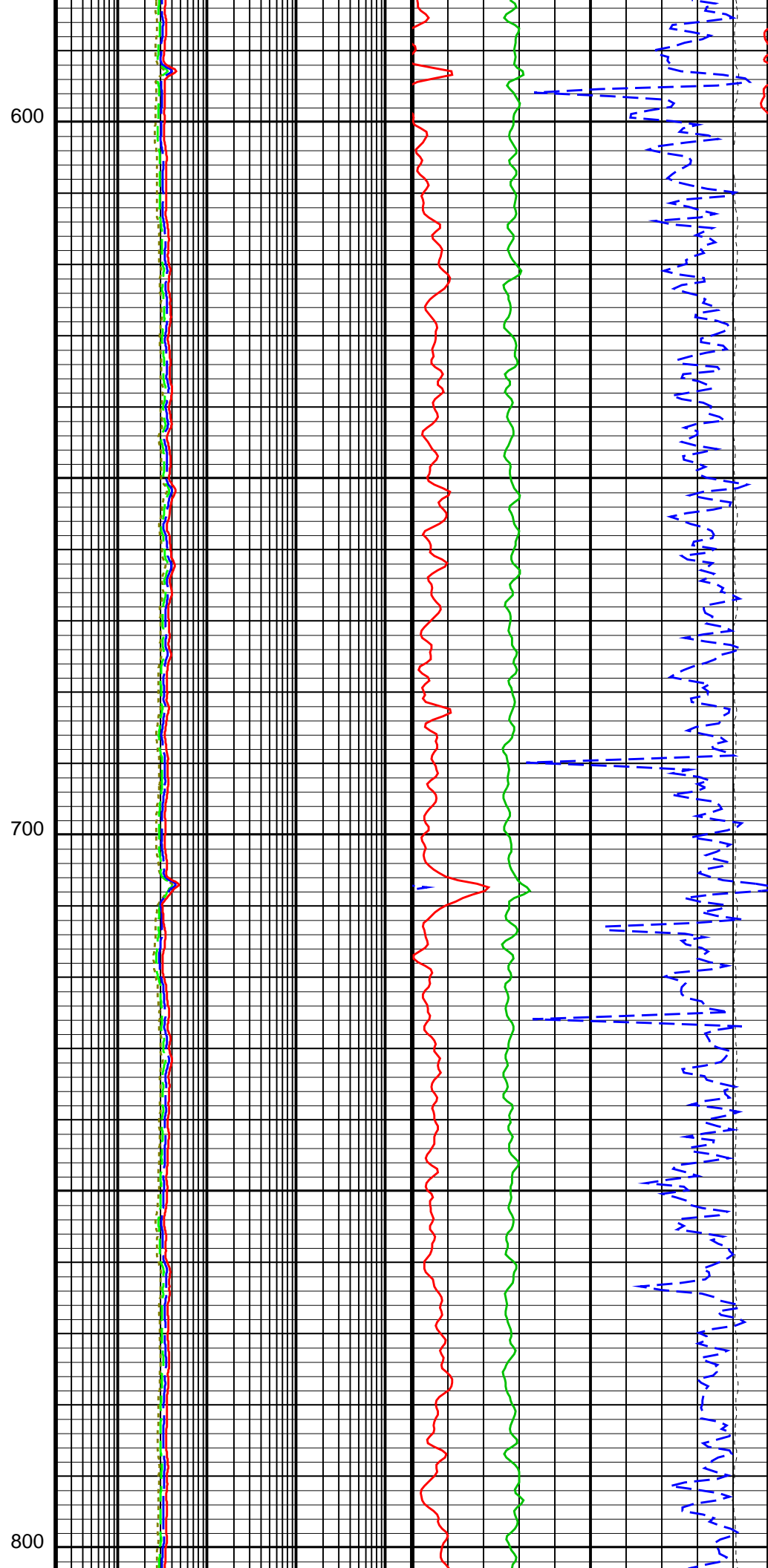
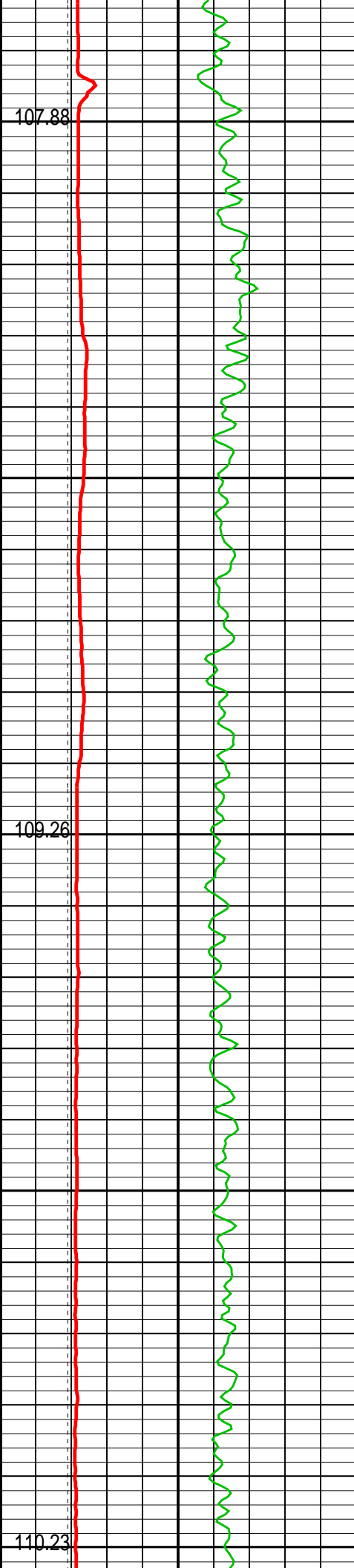
Input DLIS Files						
DEFAULT	ThruBit_005PUP	FN:4	PRODUCER	13-Aug-2014 11:42	8403.3 FT	201.8 FT

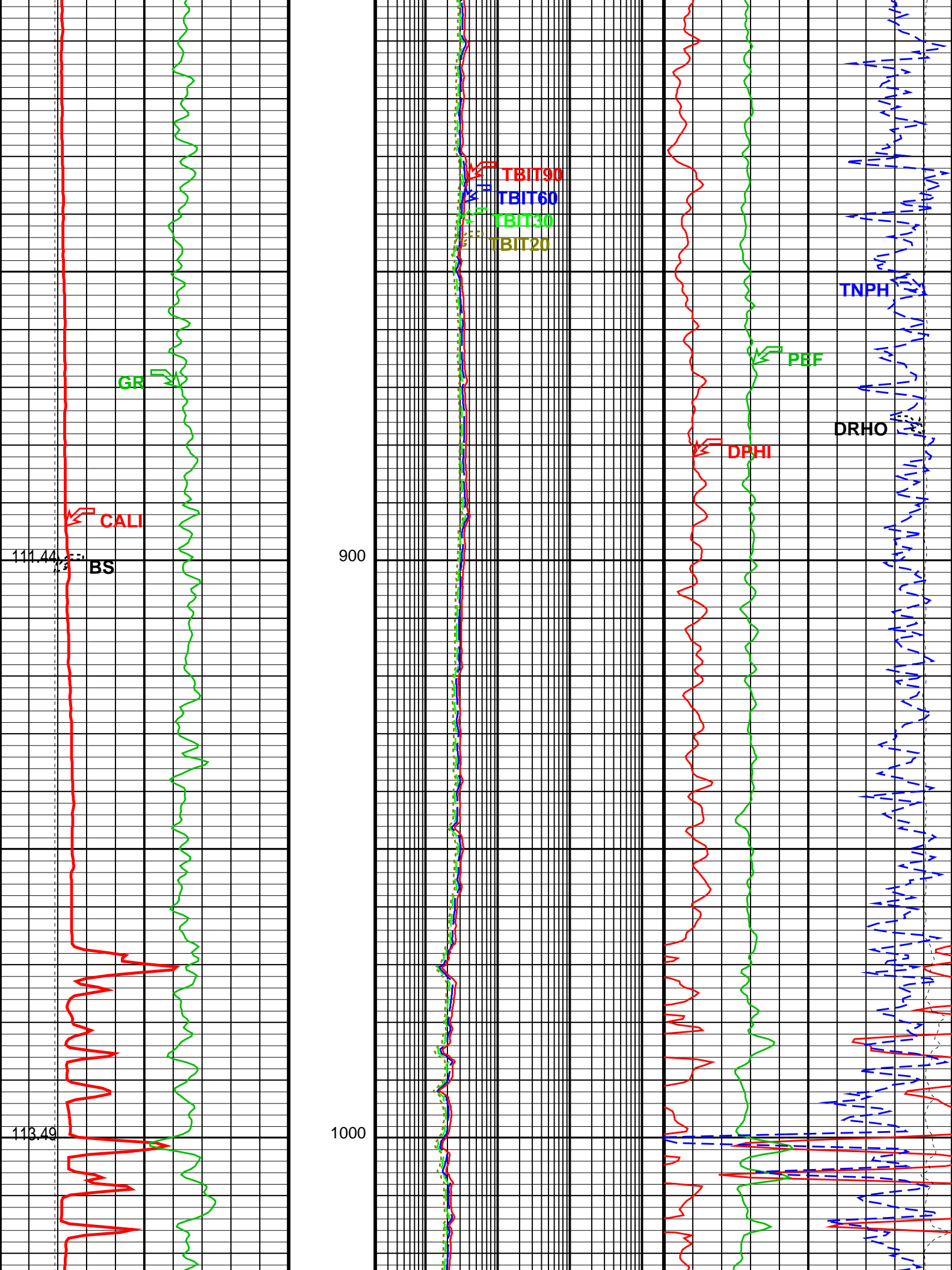
OP System Version: 19C2-270						
TBT	SRPC-5303-ThruBit_b					

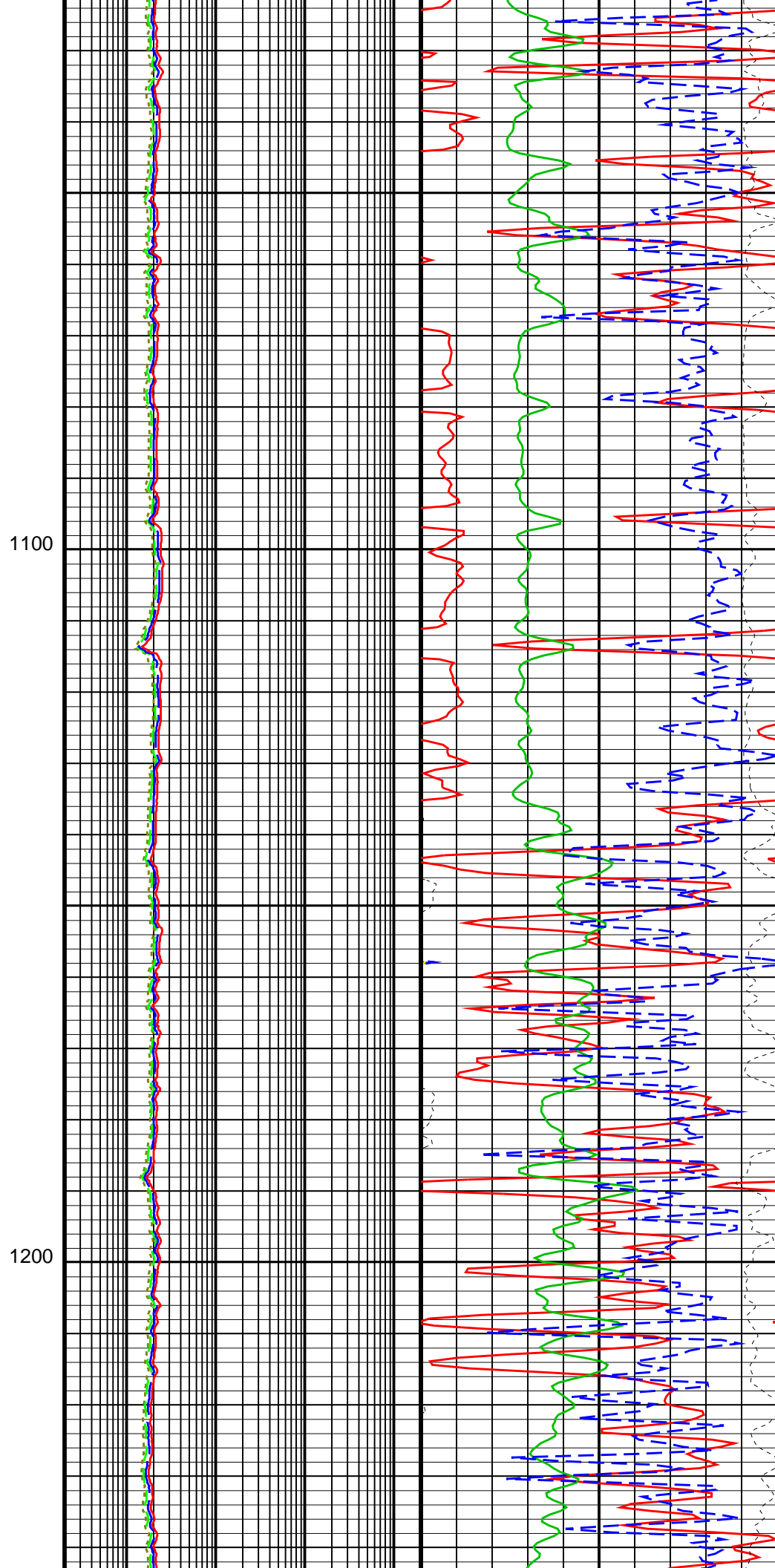
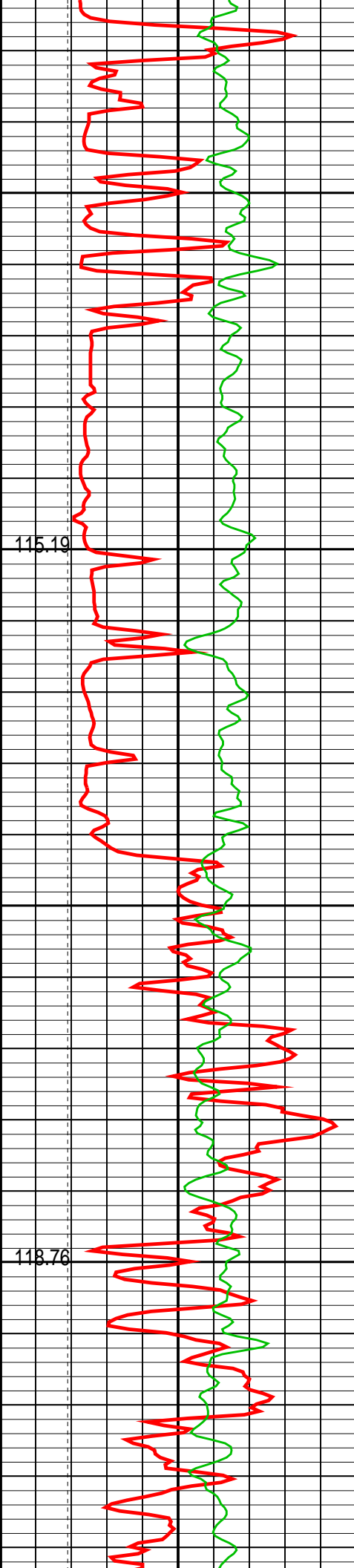
Caliper (CALI) 6 (IN) 16		TBI 90 Inch Investigation (TBIT90) 0.2 (OHMM) 2000		TNPH (TNPH) 0.3 (V/V) -0.1	
Gamma Ray (GR) 0 (GAPI) 150		TBI 60 Inch Investigation (TBIT60) 0.2 (OHMM) 2000		PEF (PEF) 0 (----) 10	
Bit Size (BS) 6 (IN) 16		TBI 30 Inch Investigation (TBIT30) 0.2 (OHMM) 2000		DRHO (DRHO) -1.8 (G/C3) 0.2	
Well Temp (WTEP) (DEGF)		TBI 20 Inch Investigation (TBIT20) 0.2 (OHMM) 2000		DPHI (DPHI) 0.3 (V/V) -0.1	



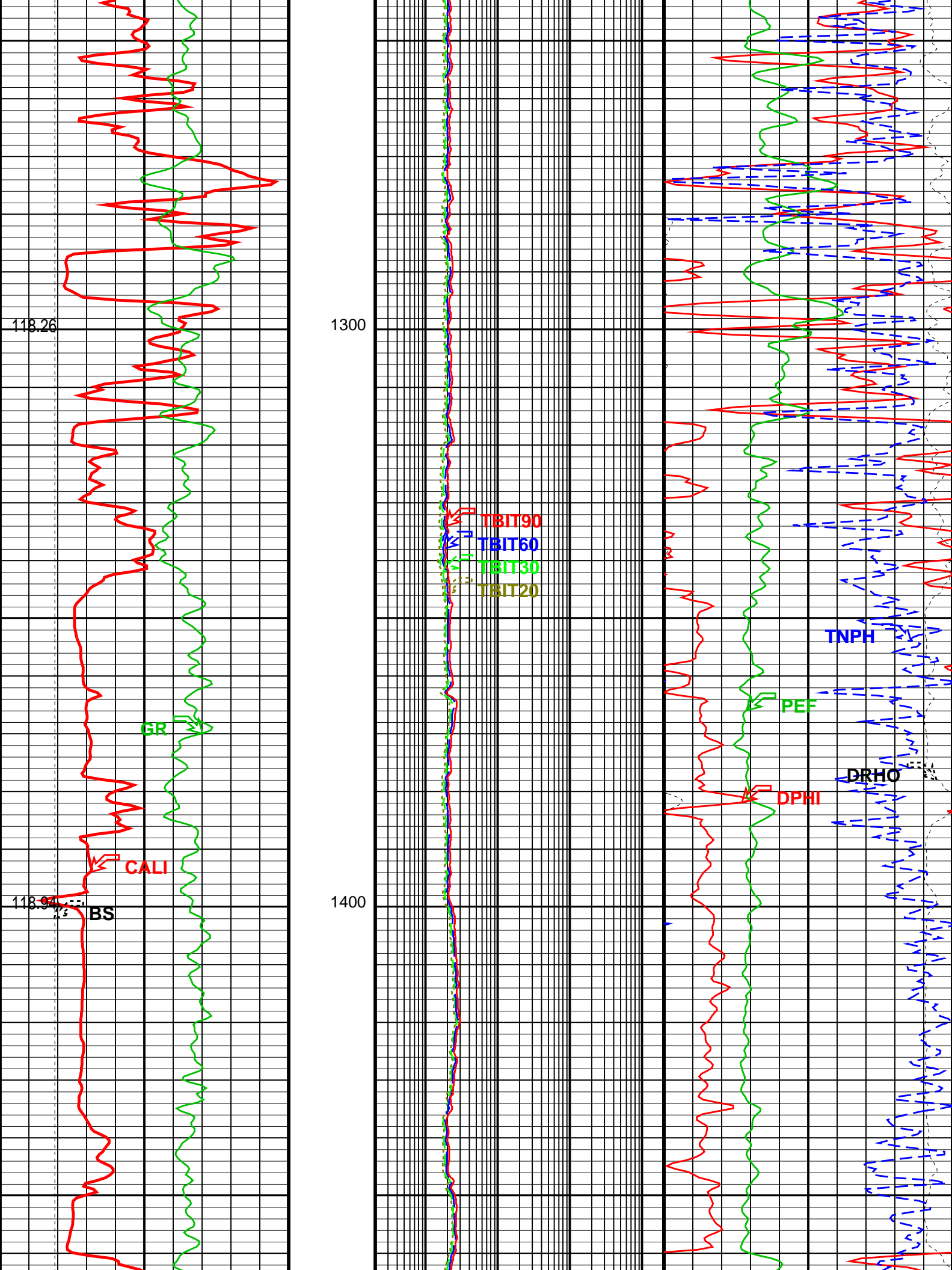


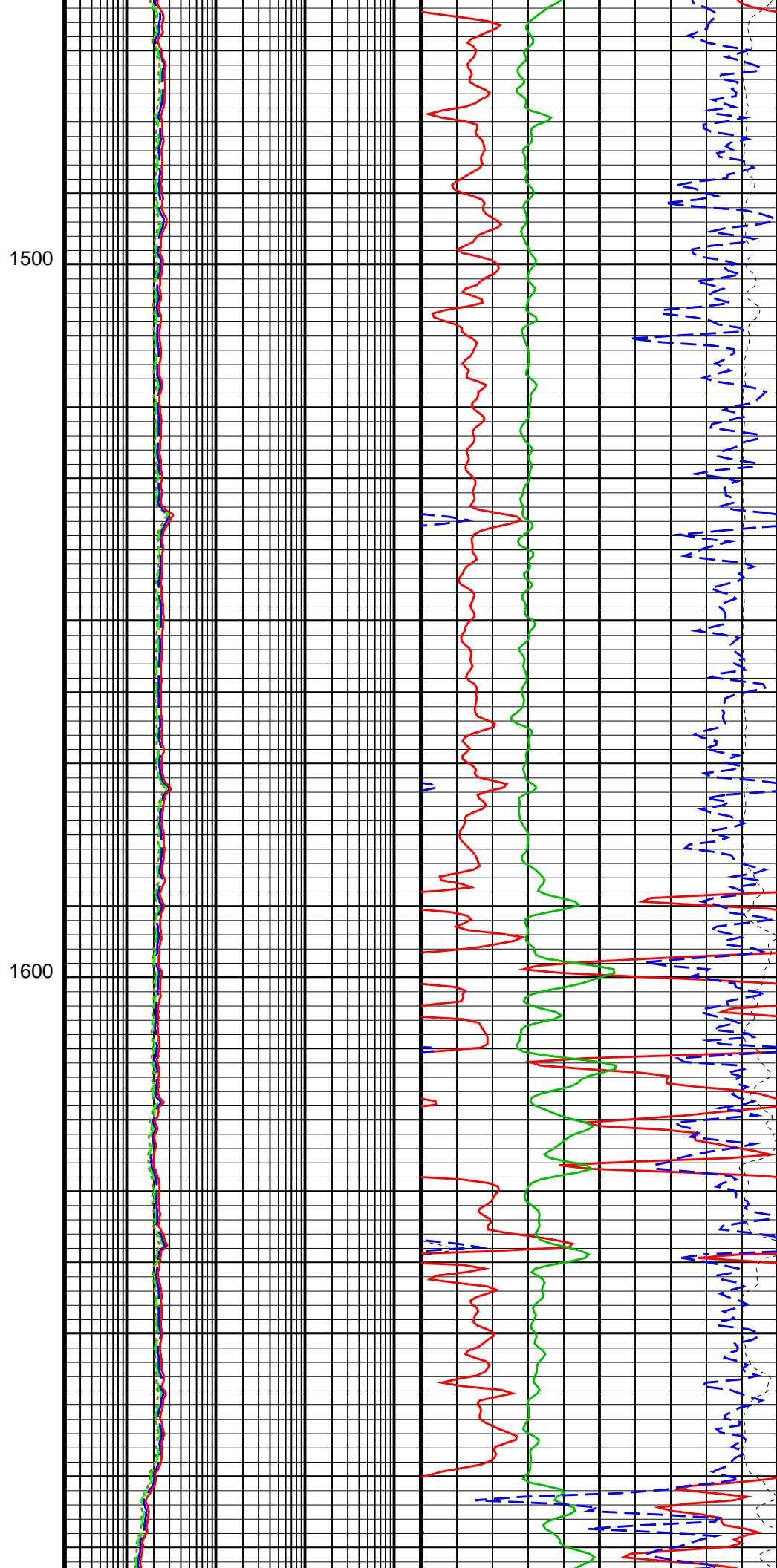
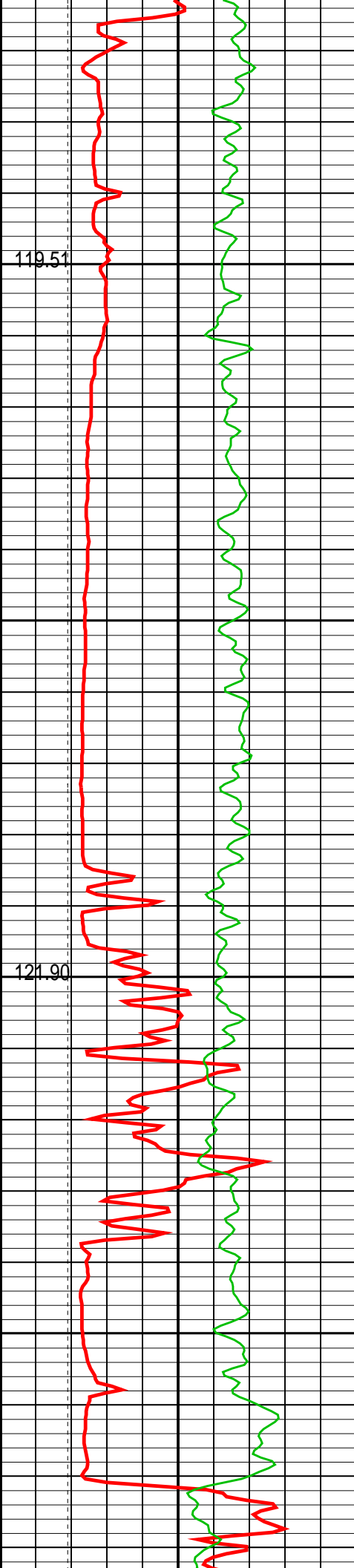


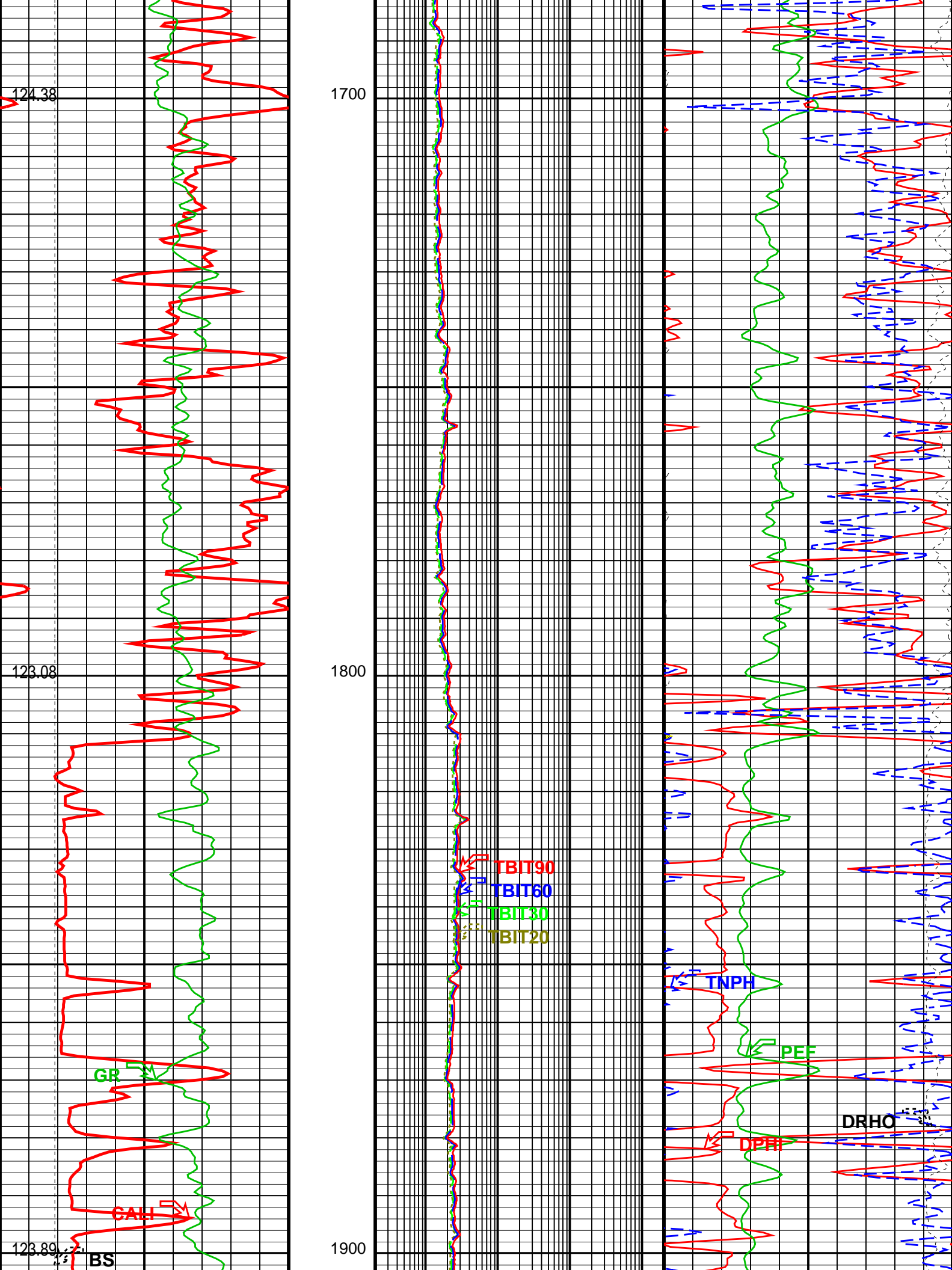


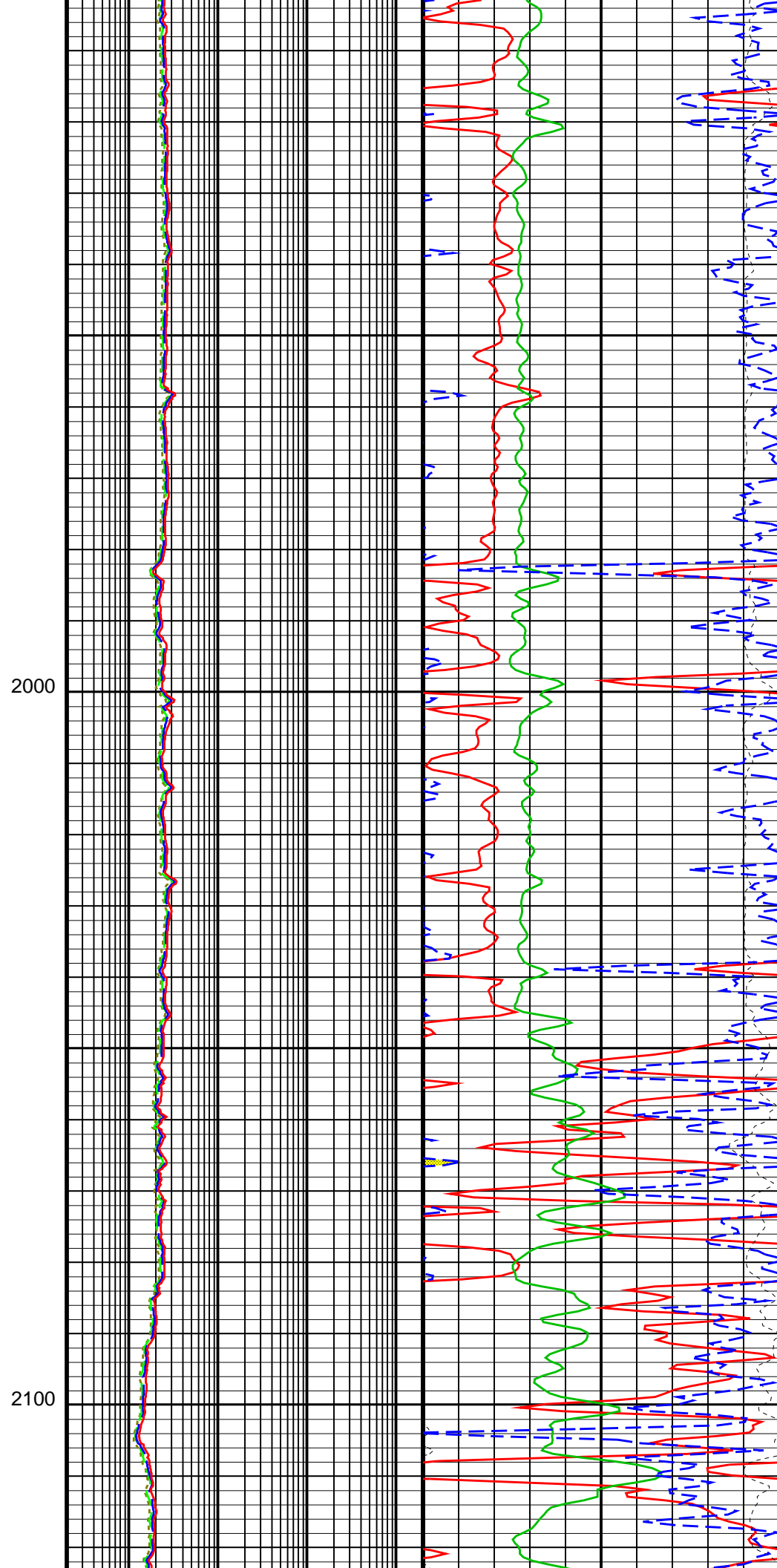
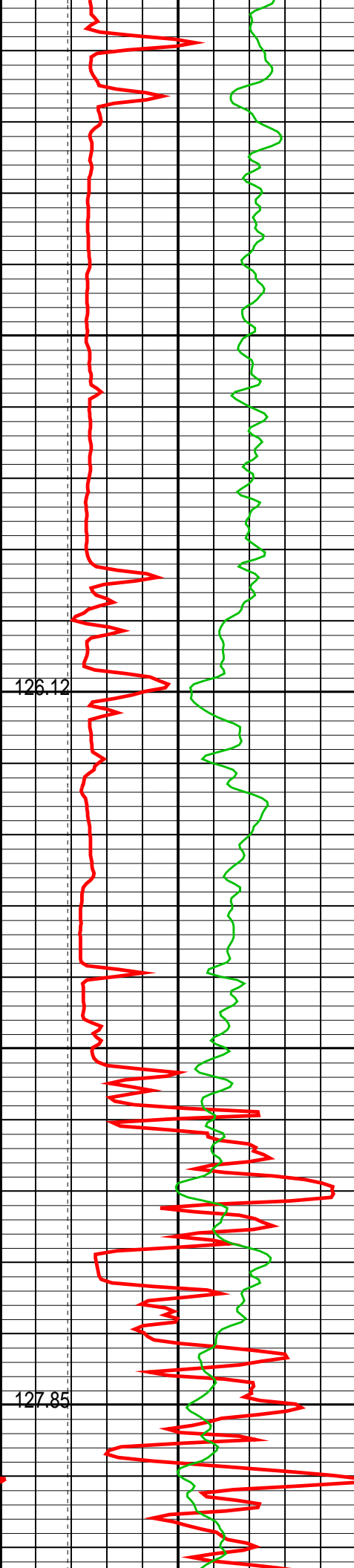


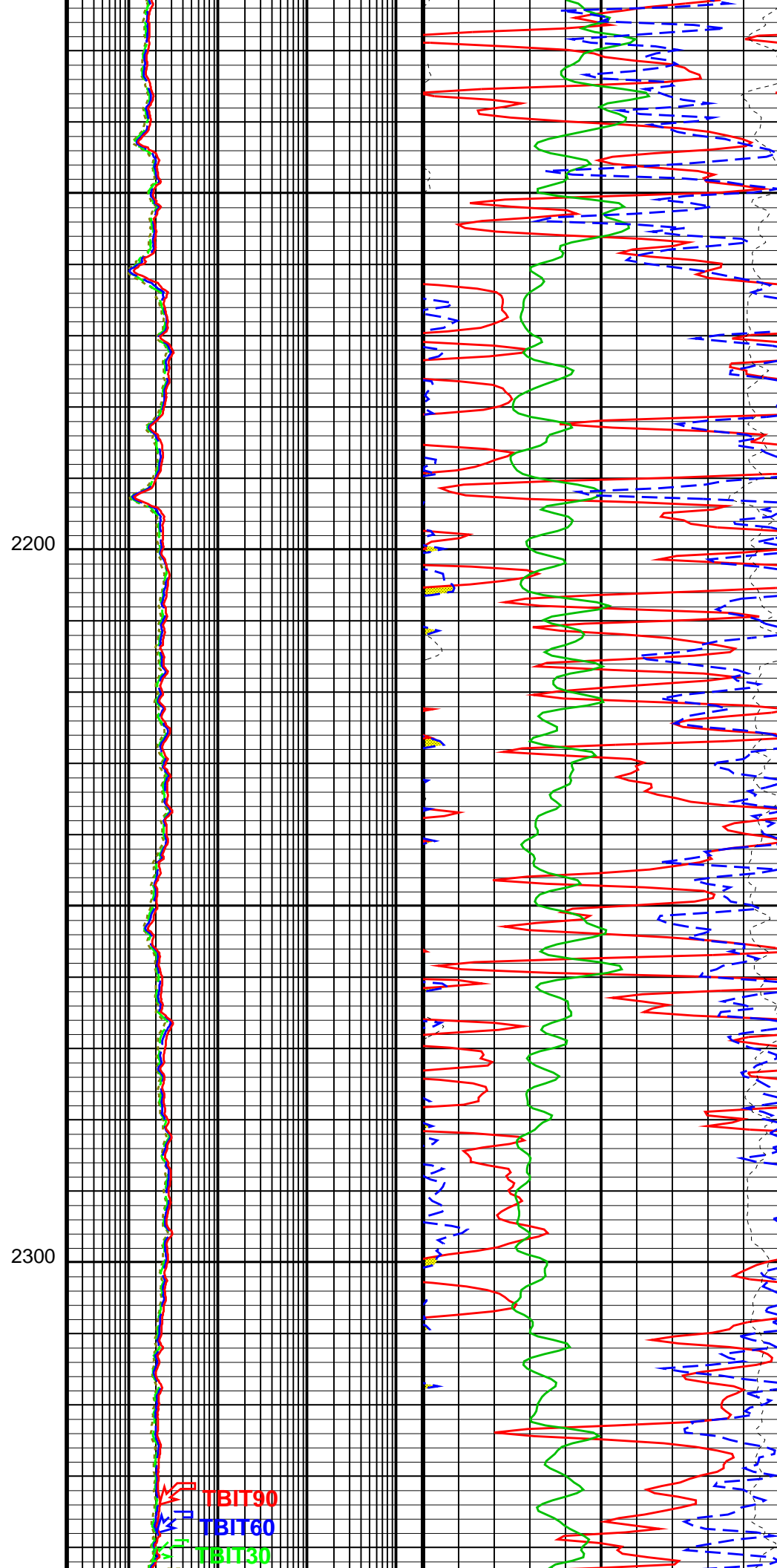
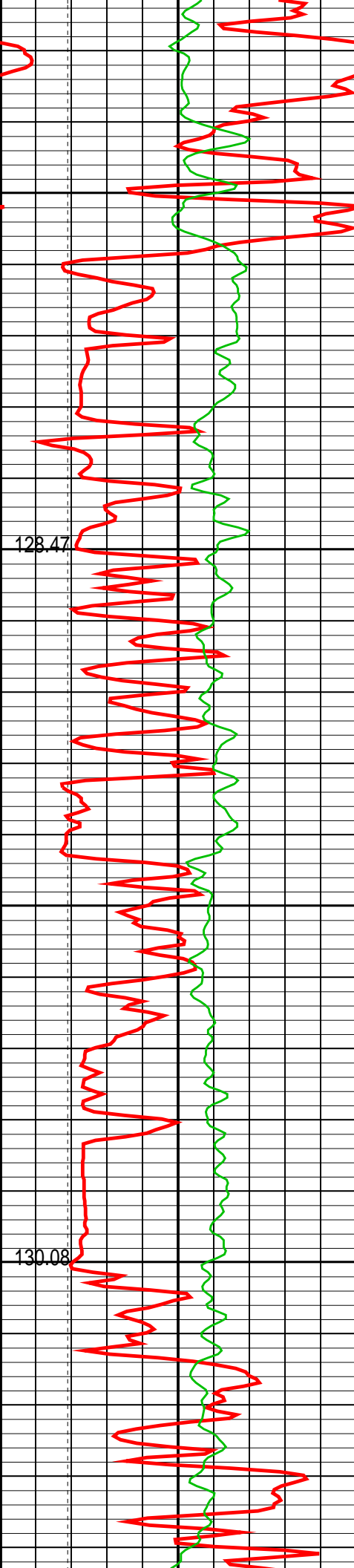


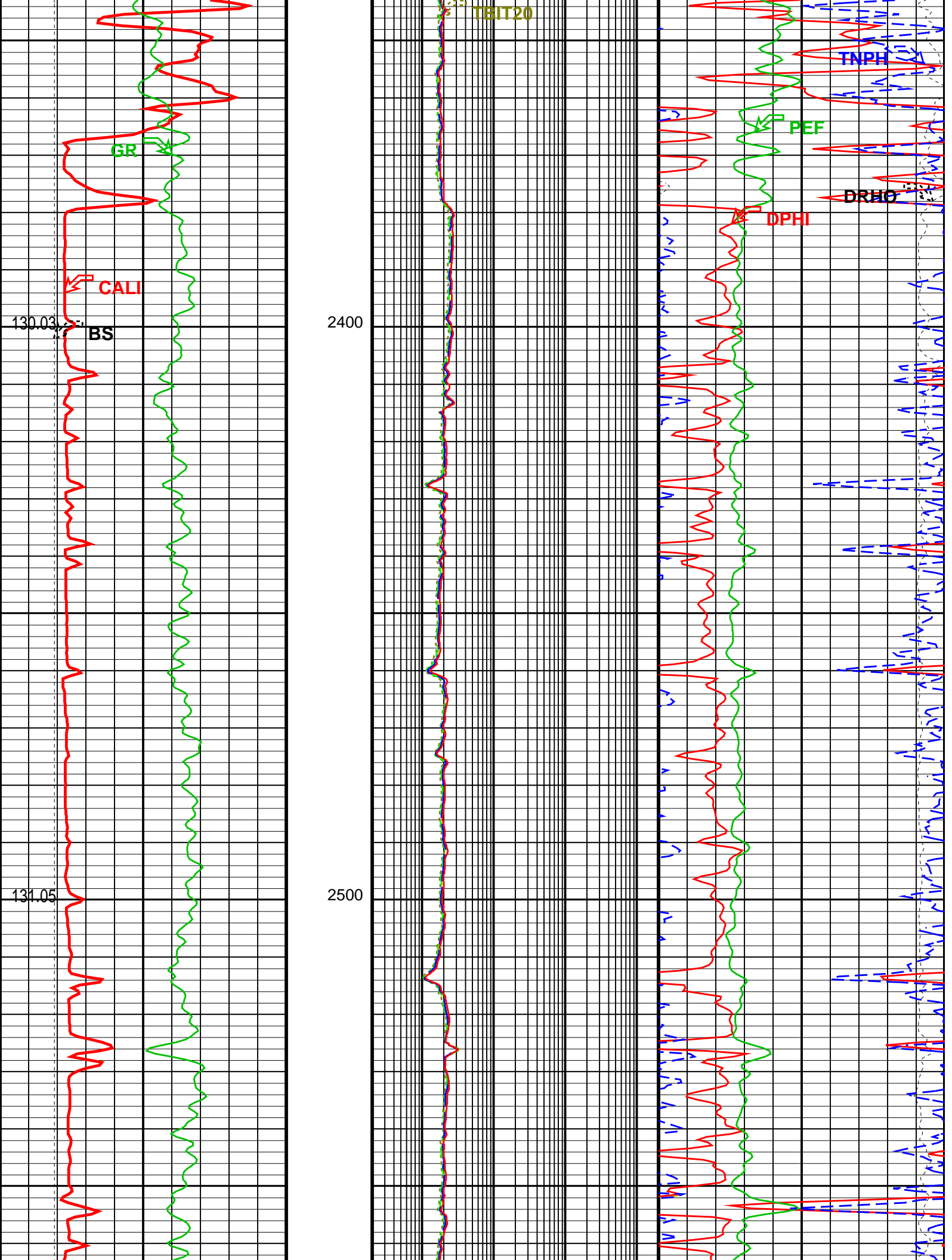


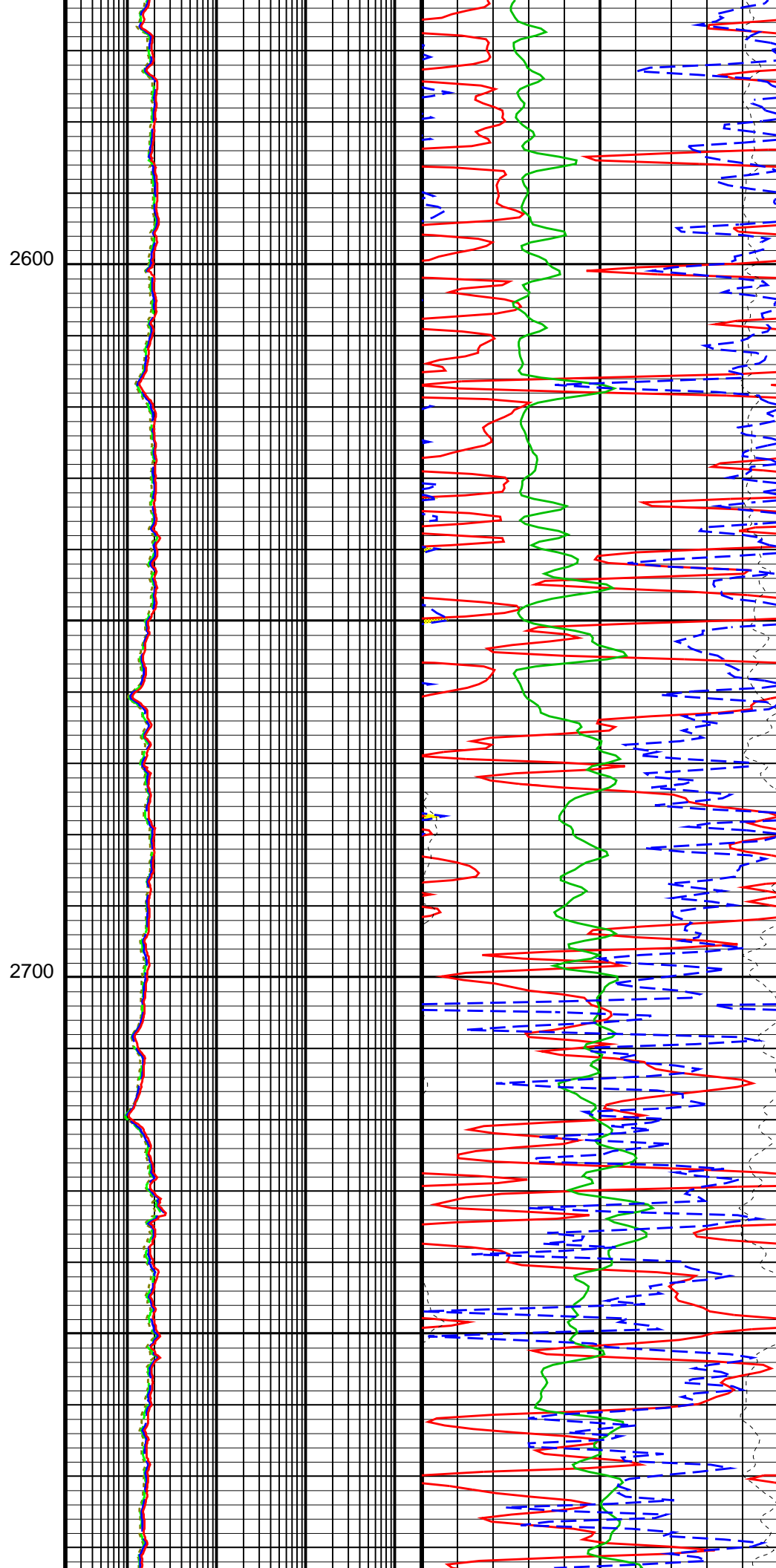
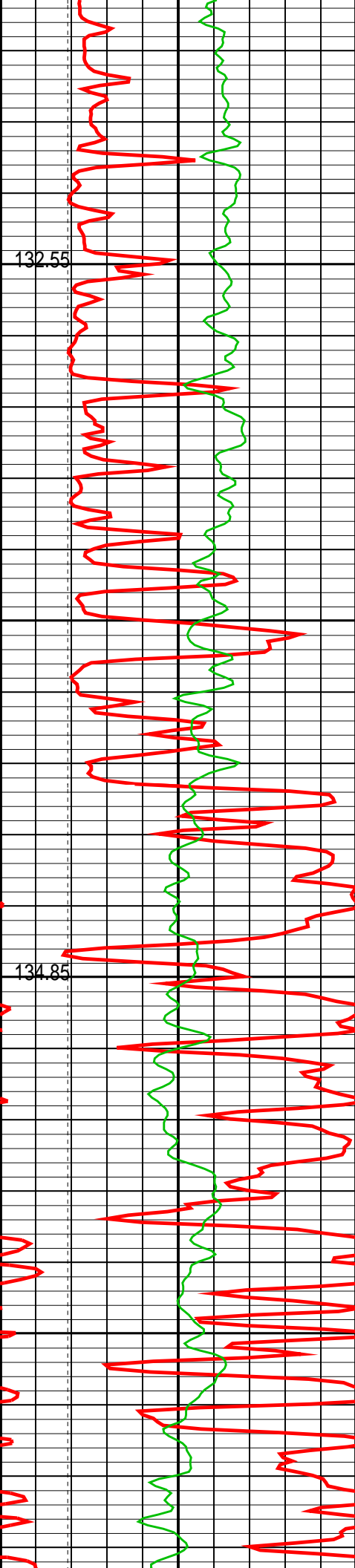


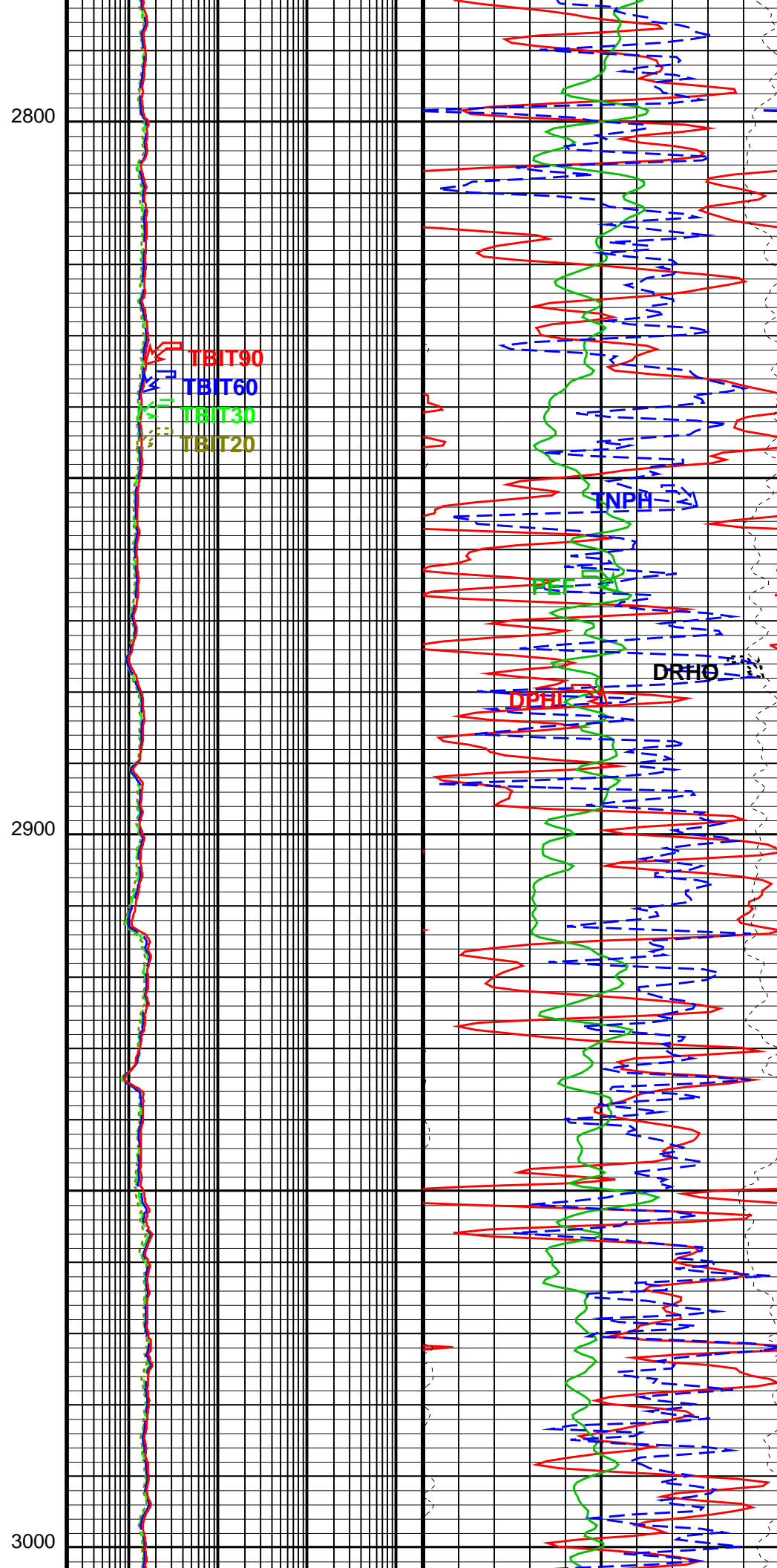
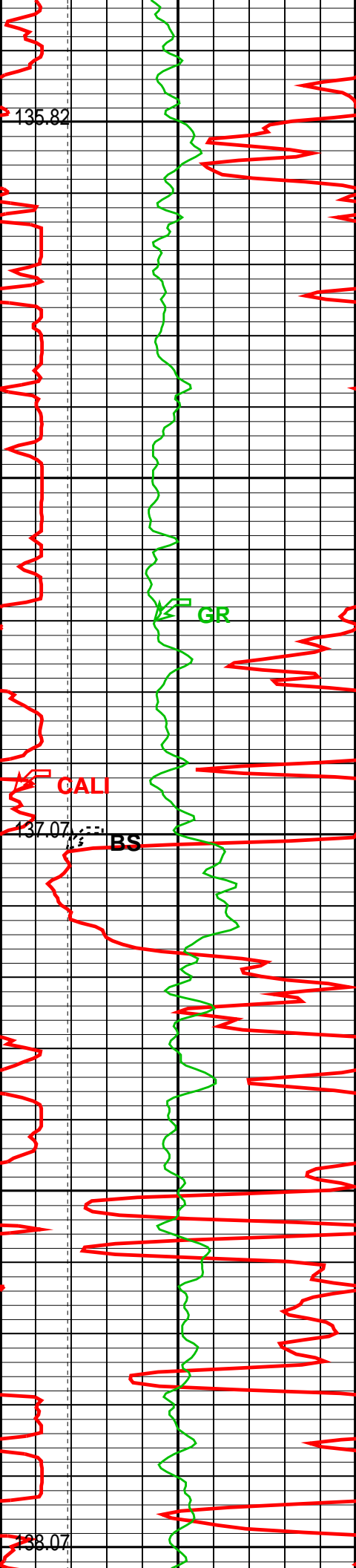




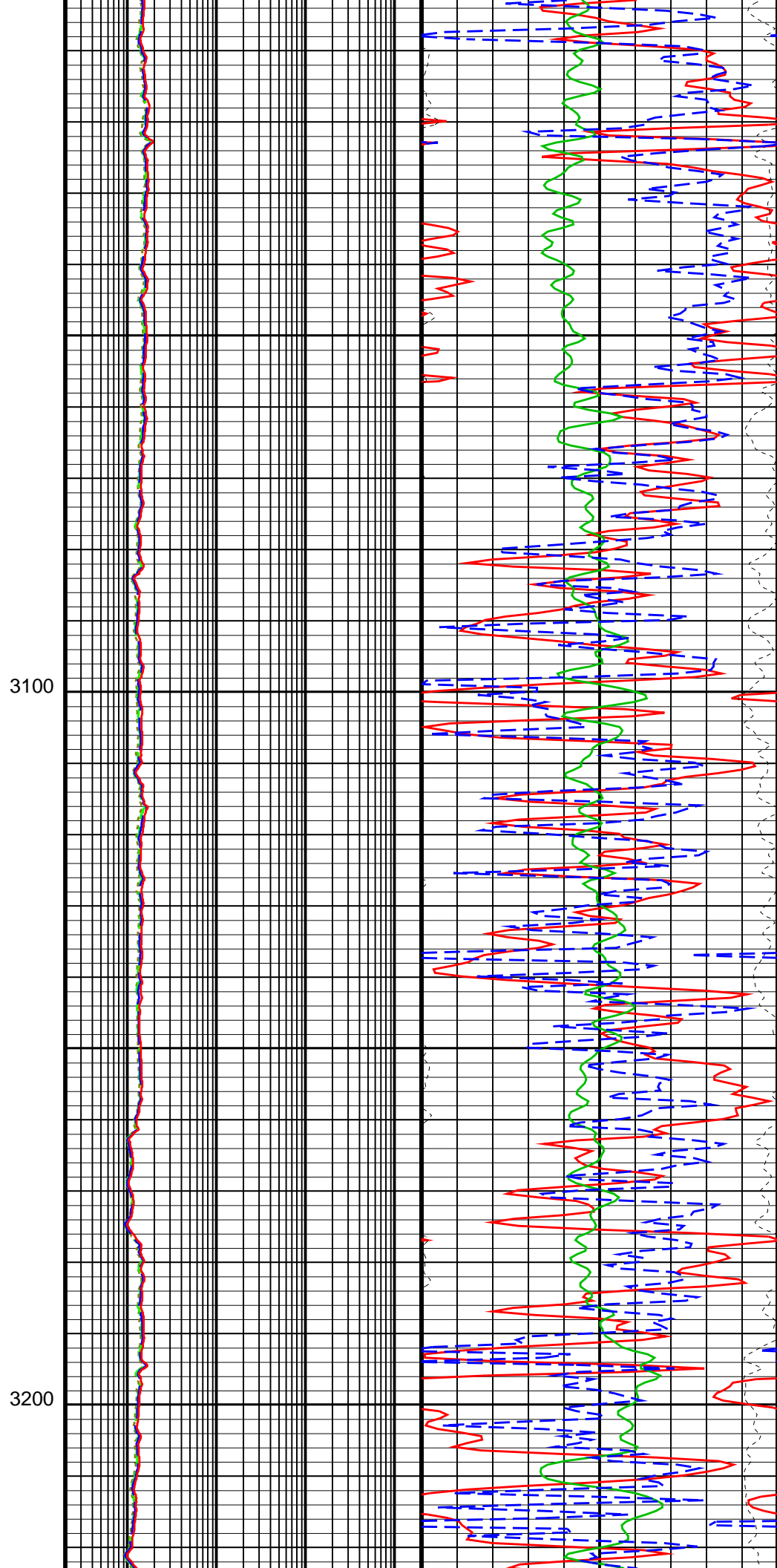
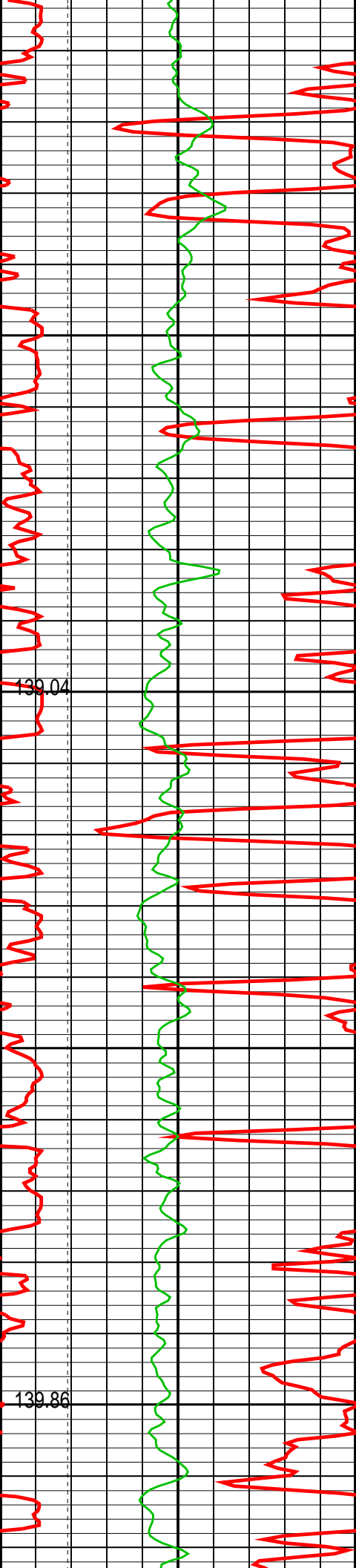


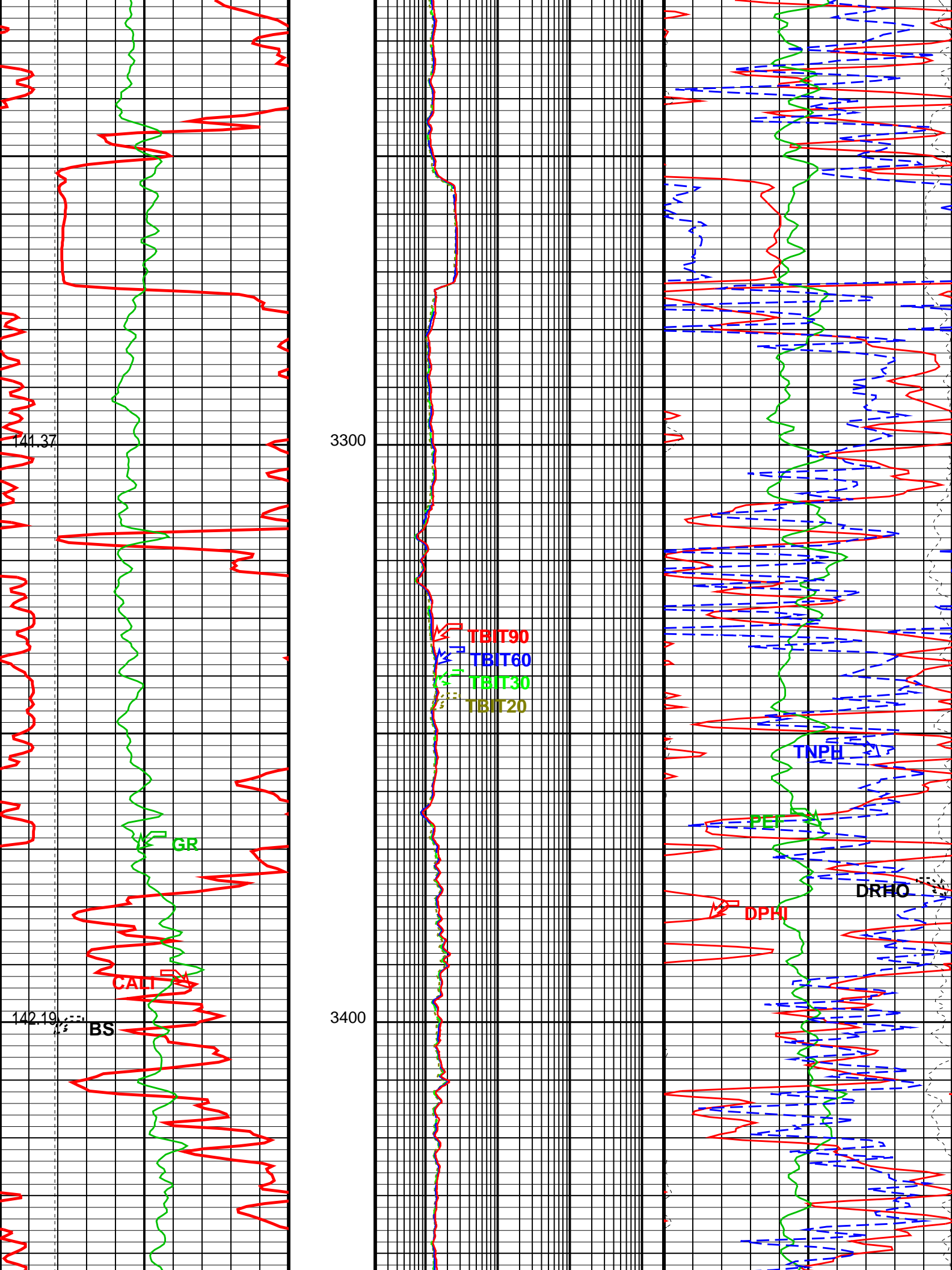


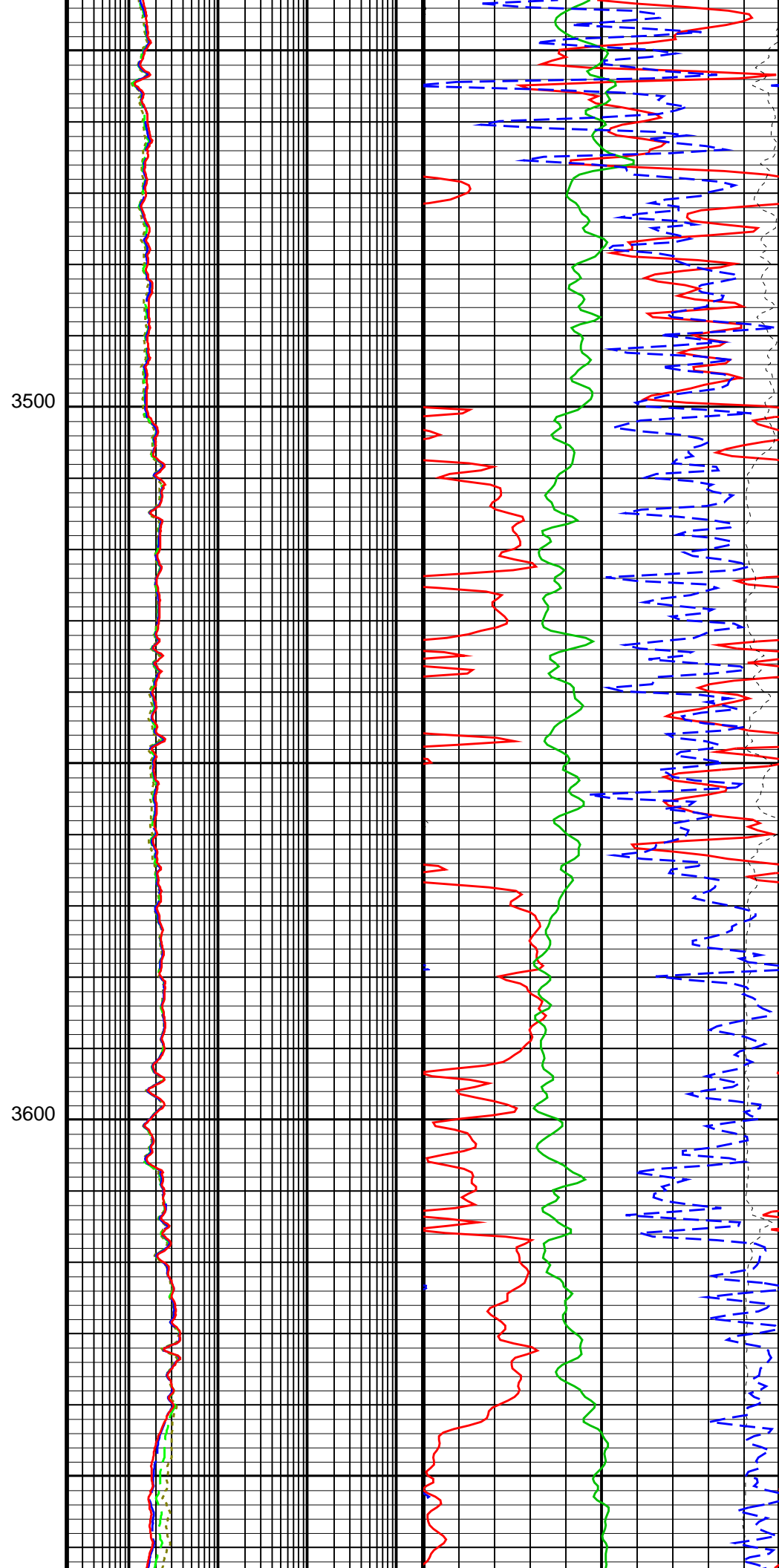
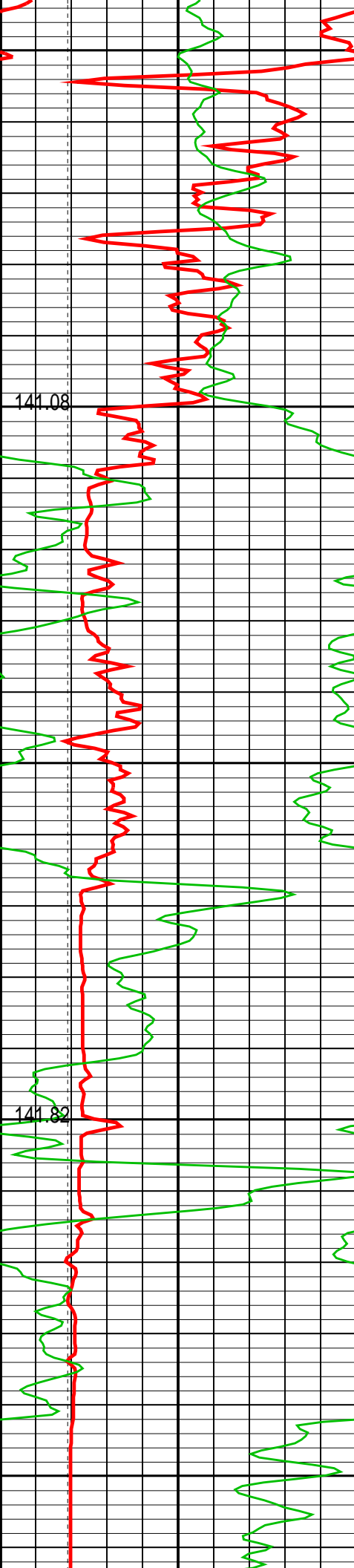


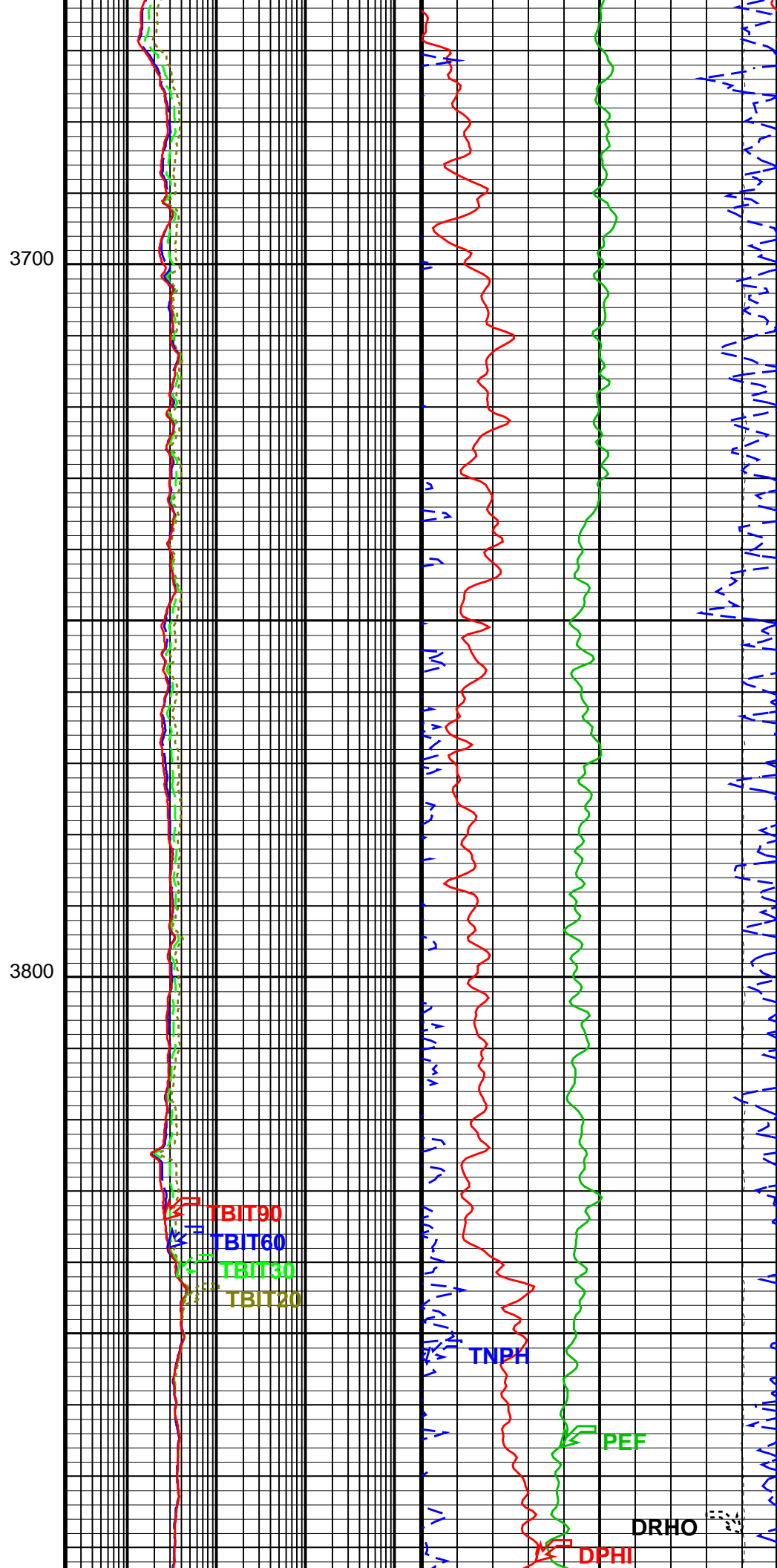
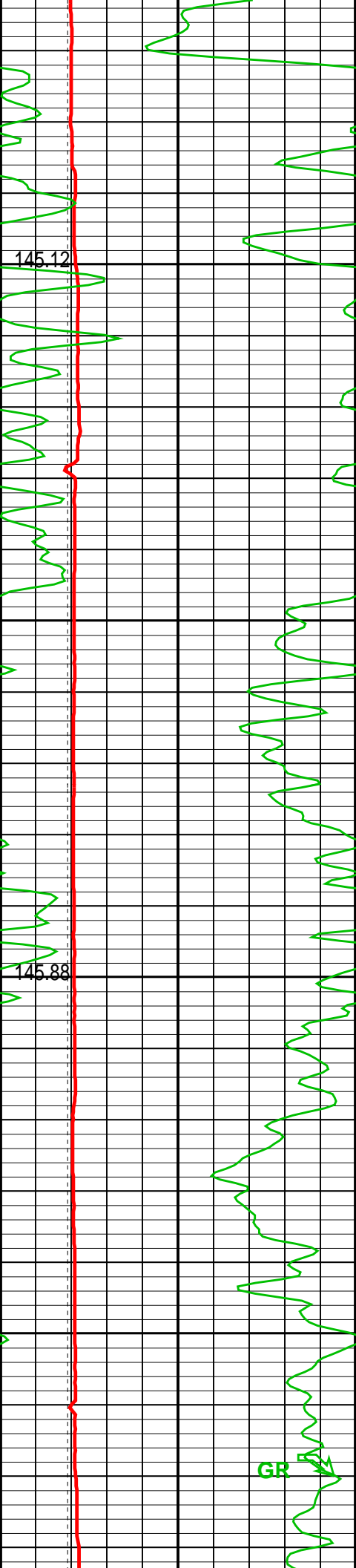


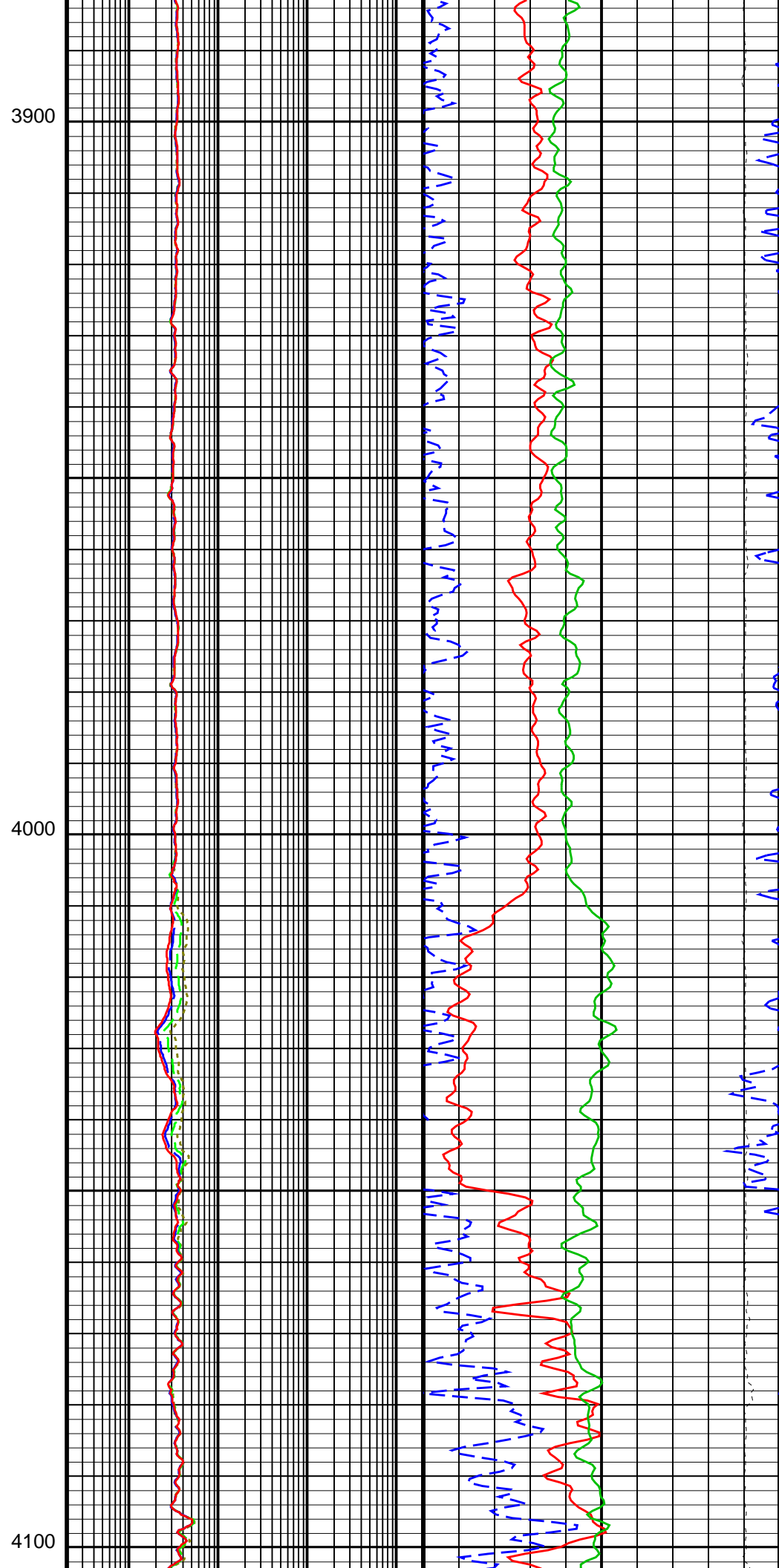
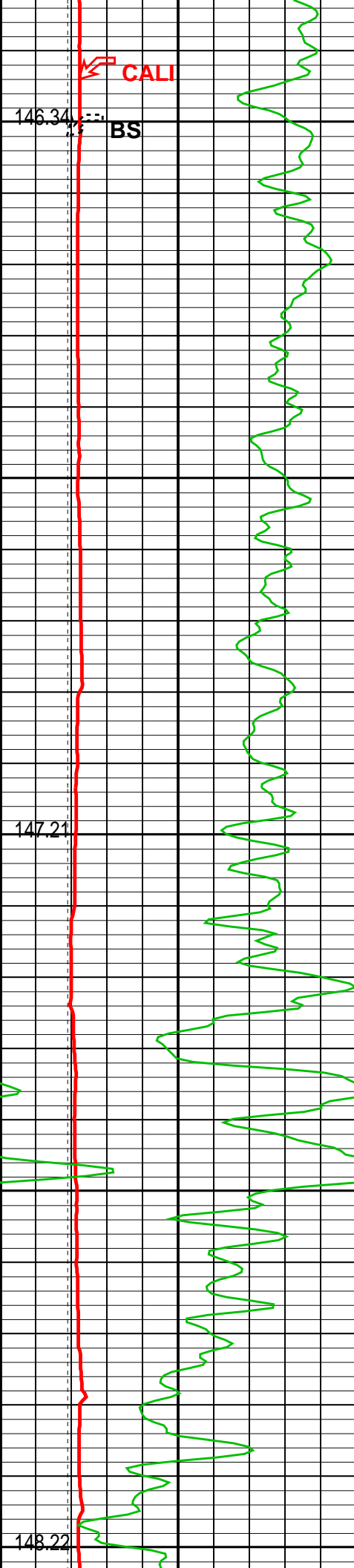


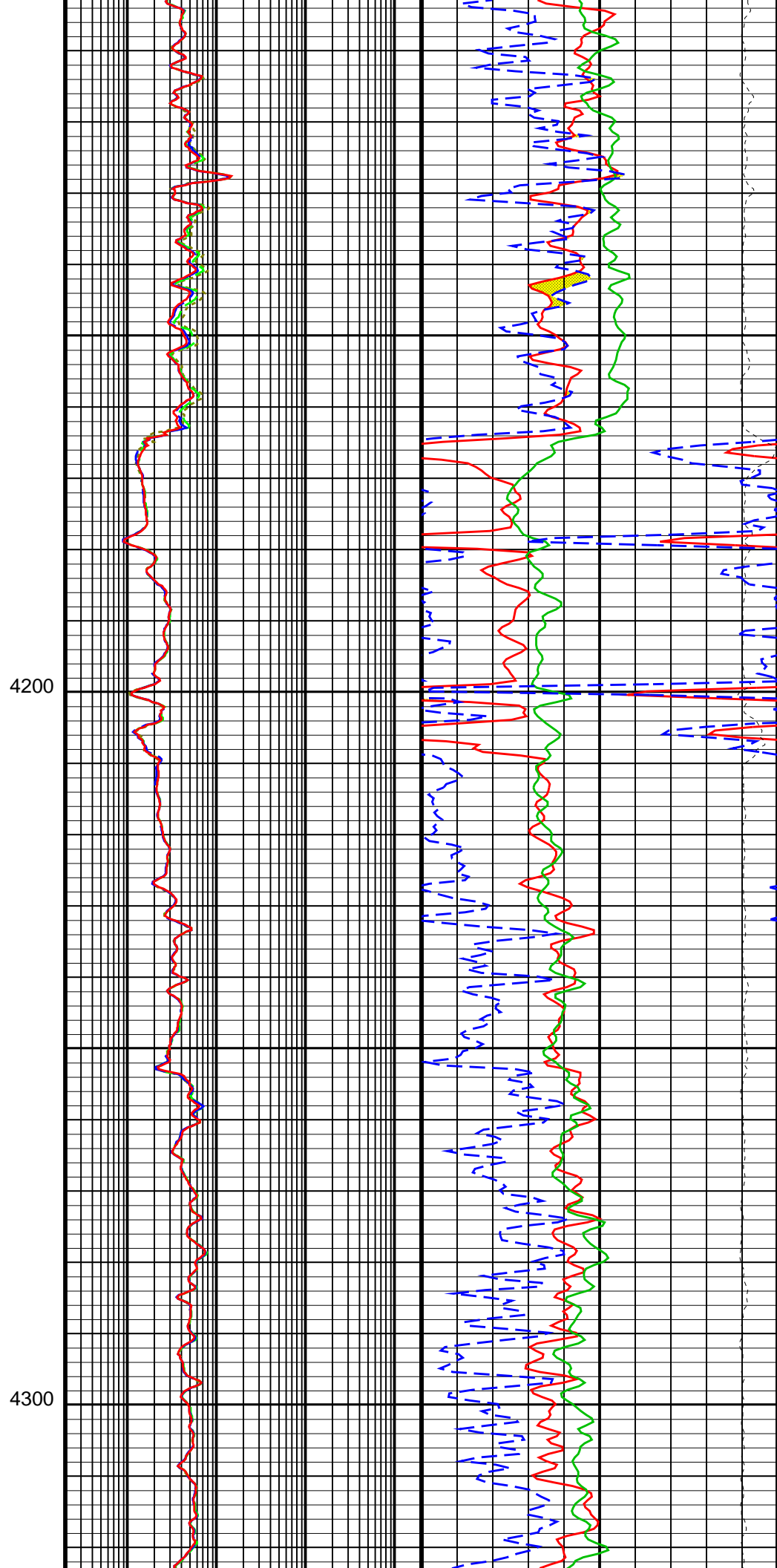
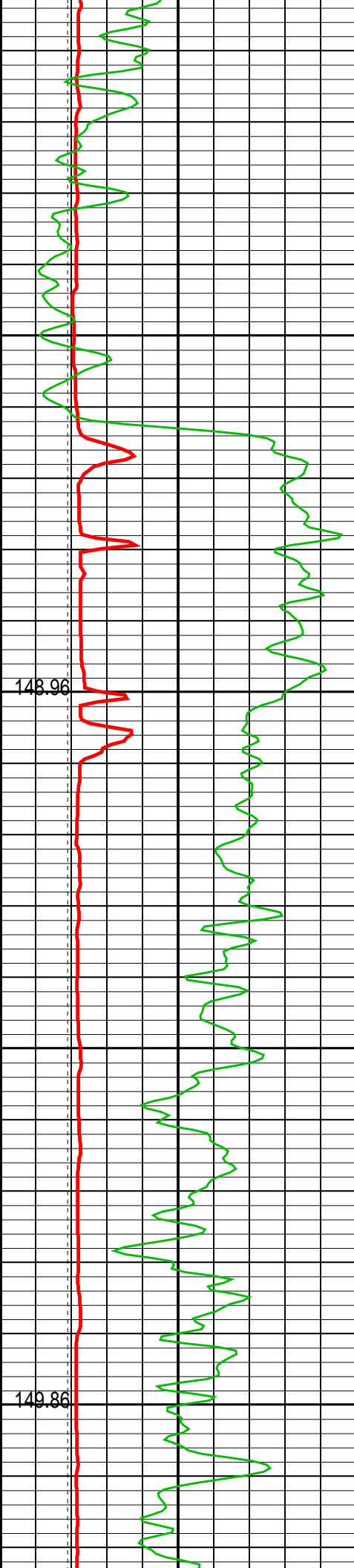


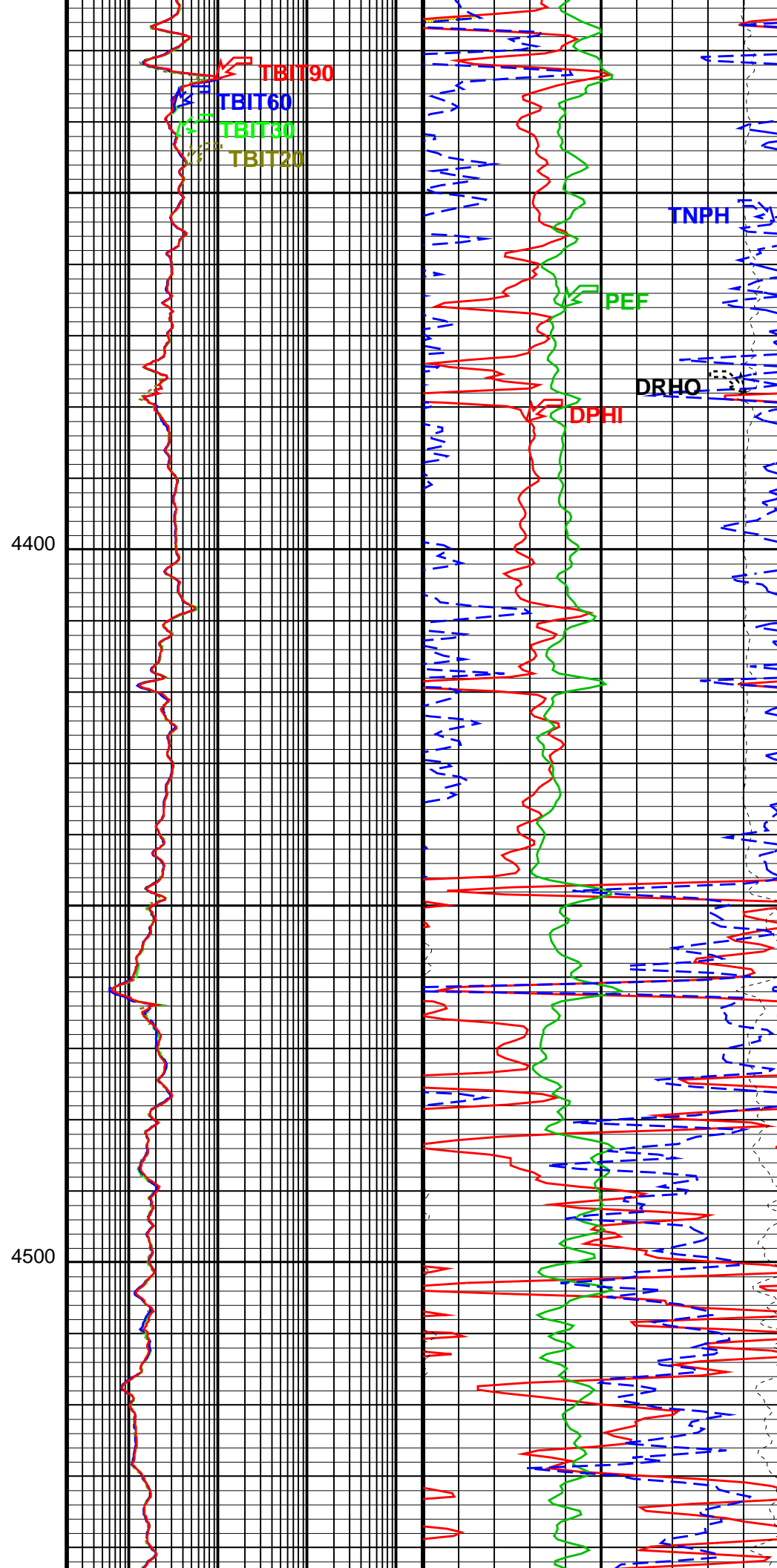
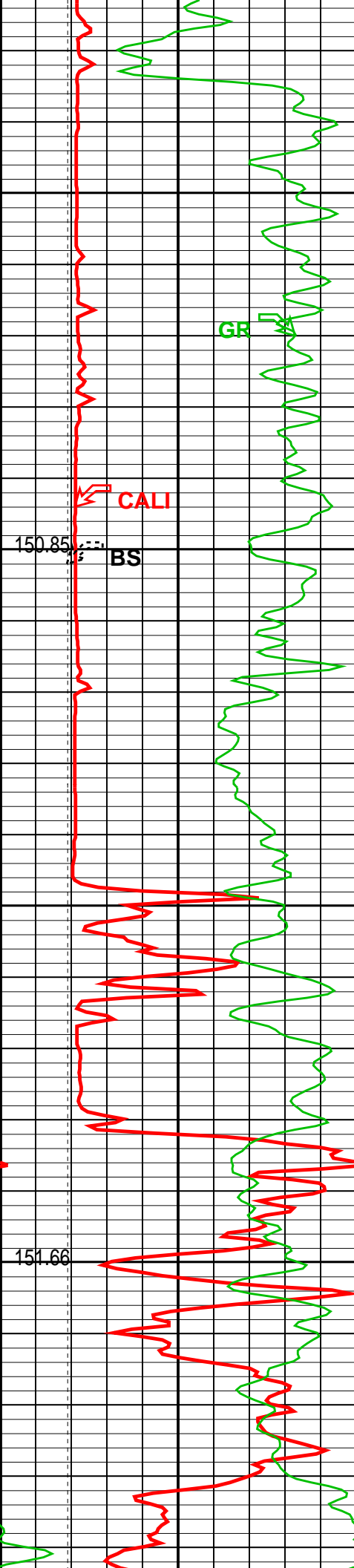


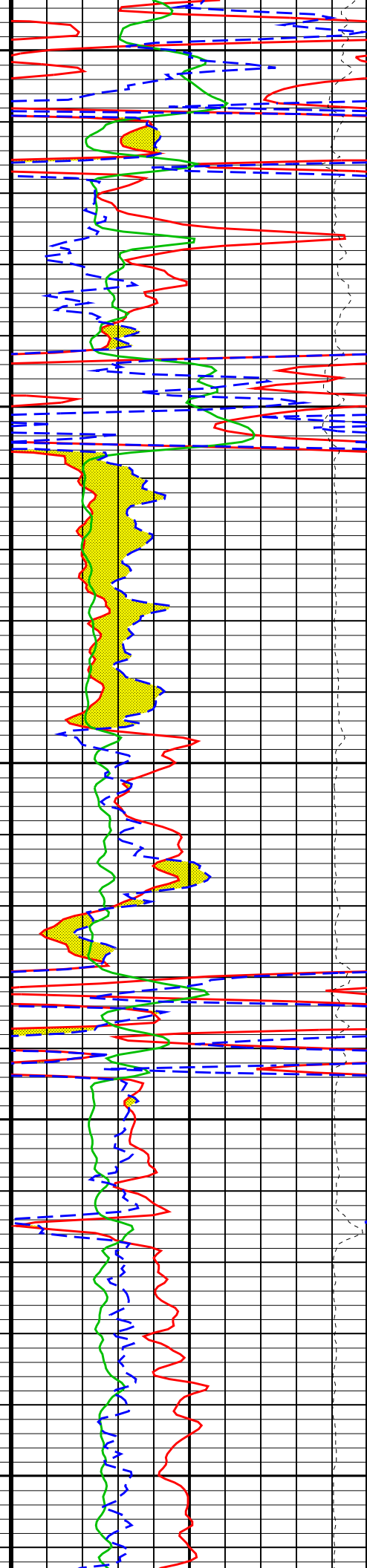
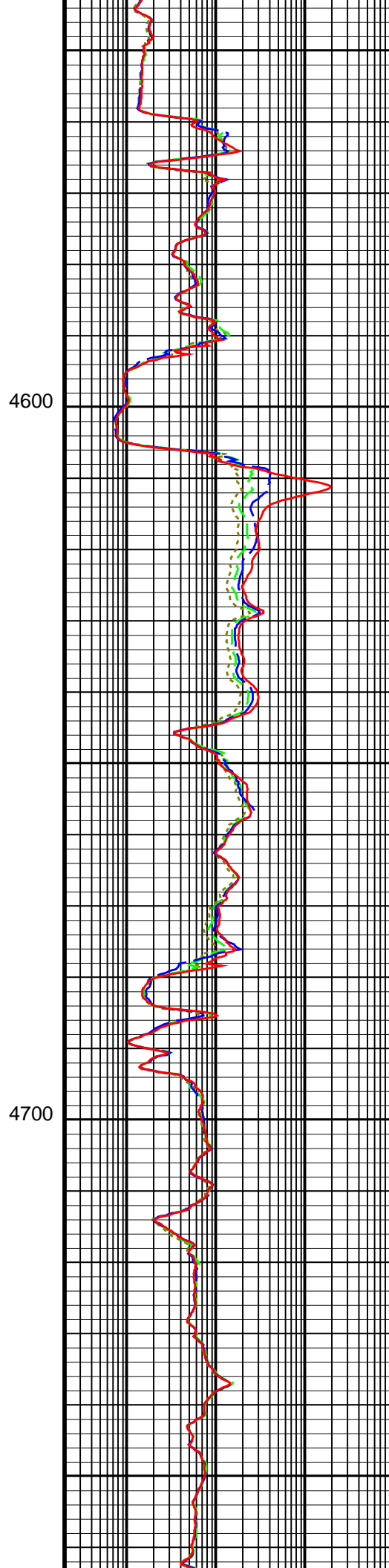
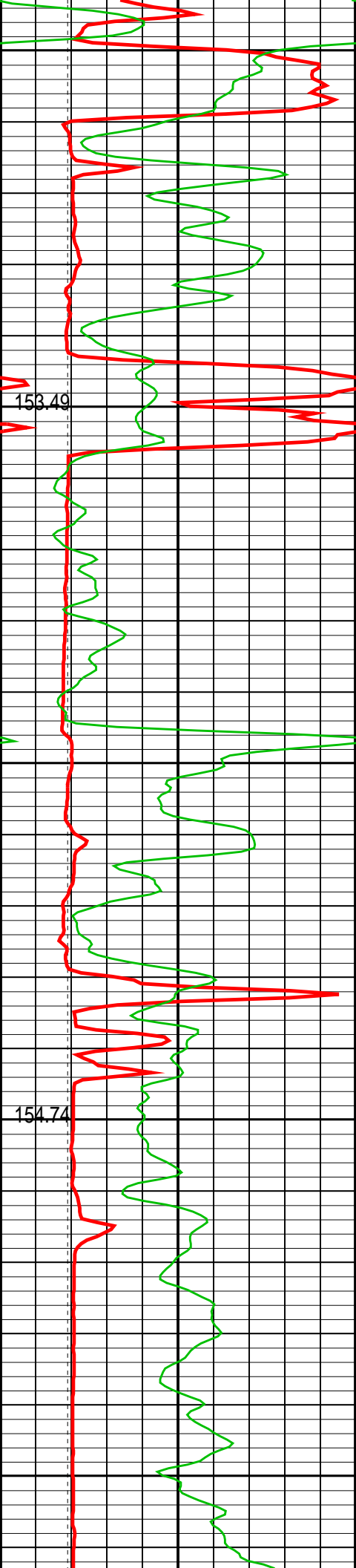




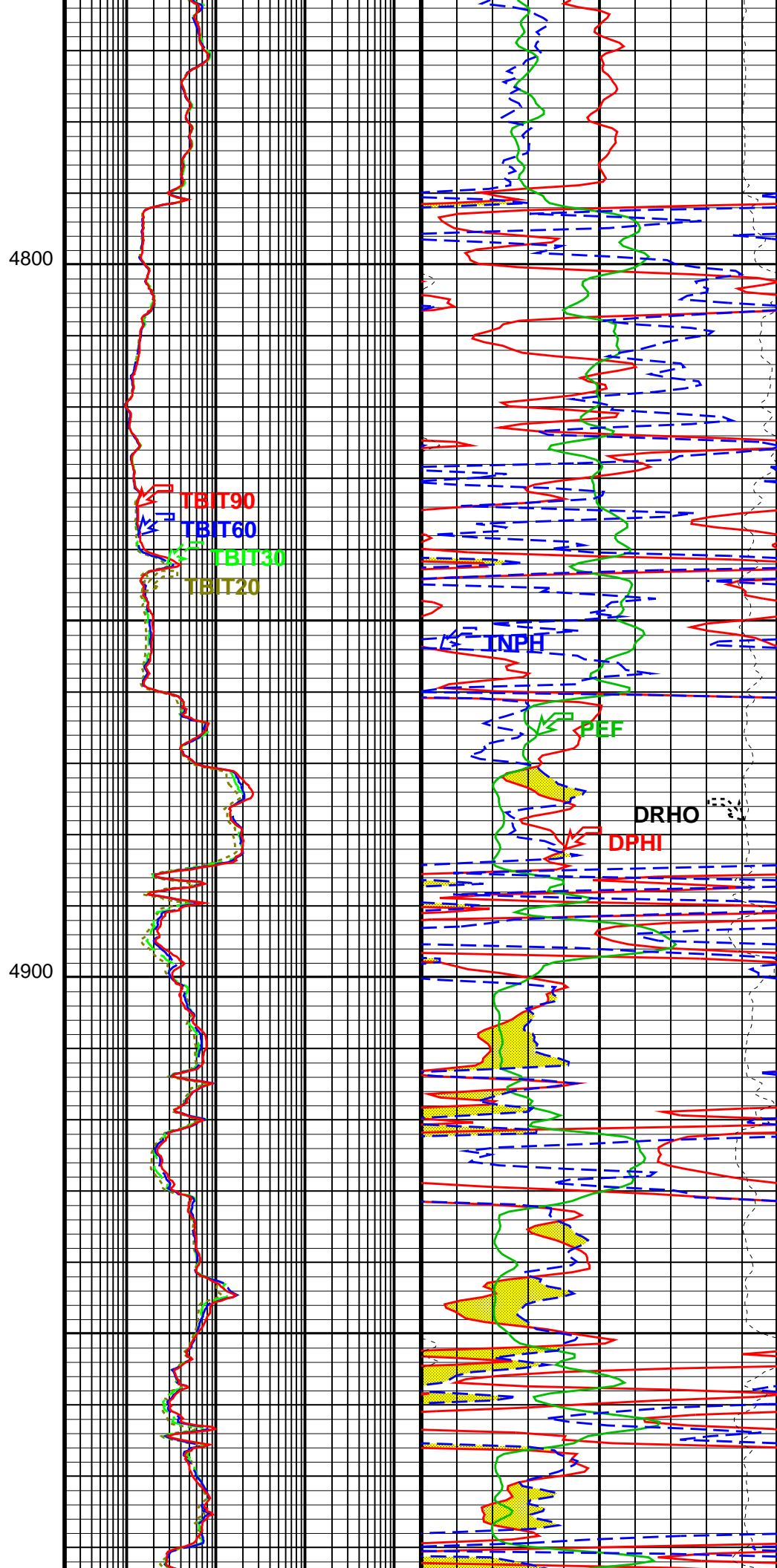
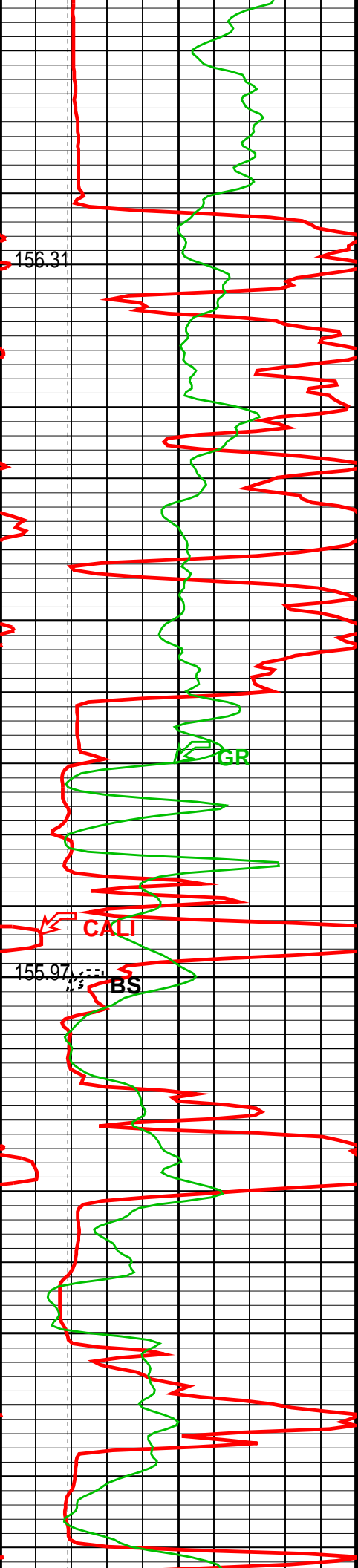


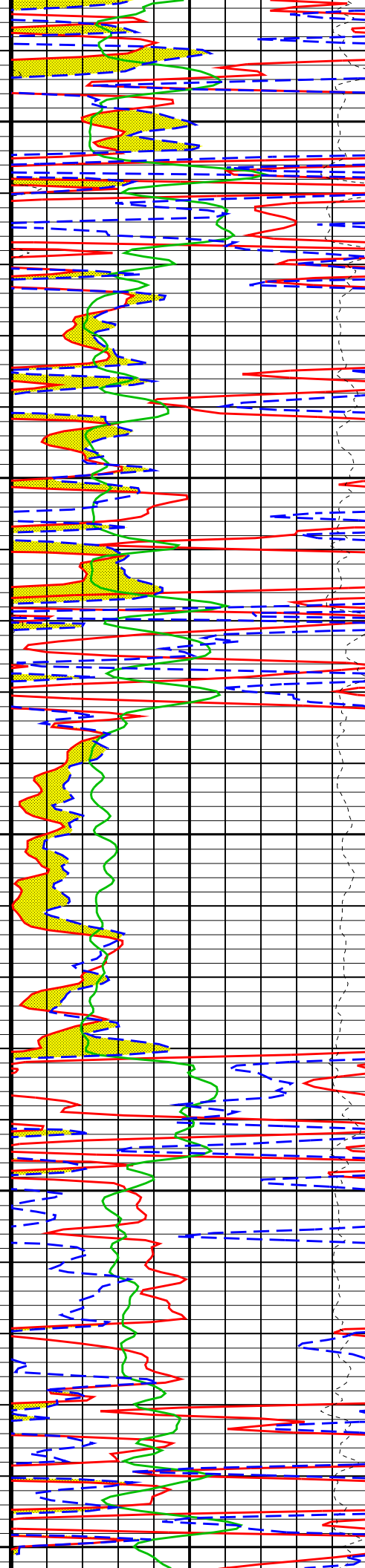
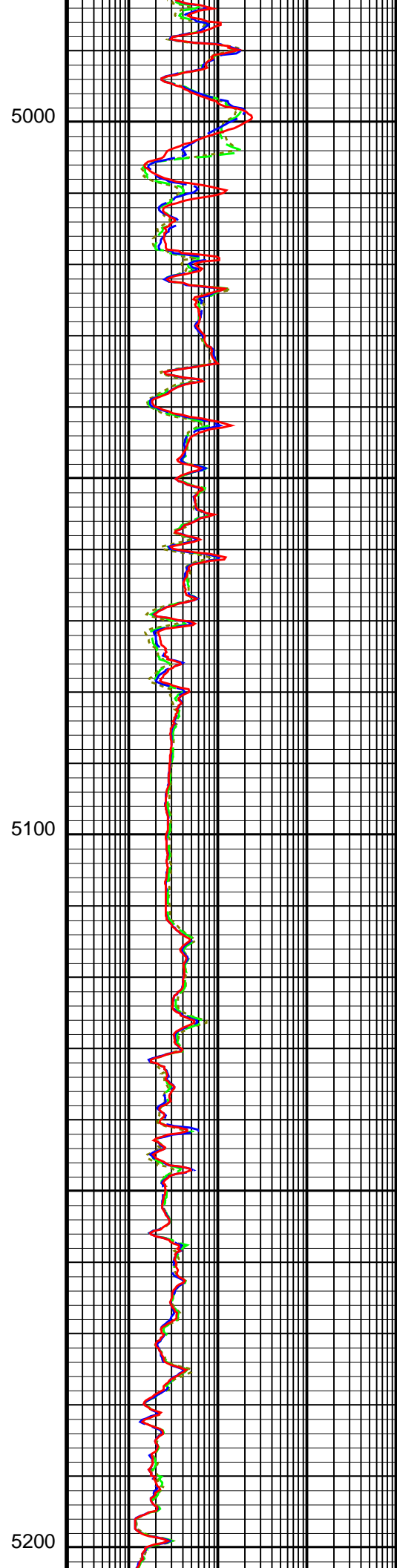
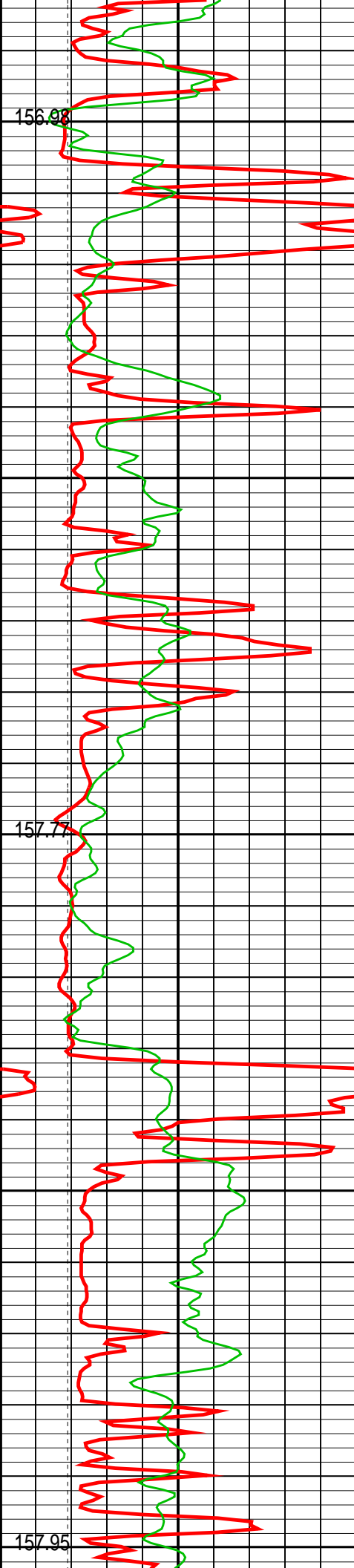


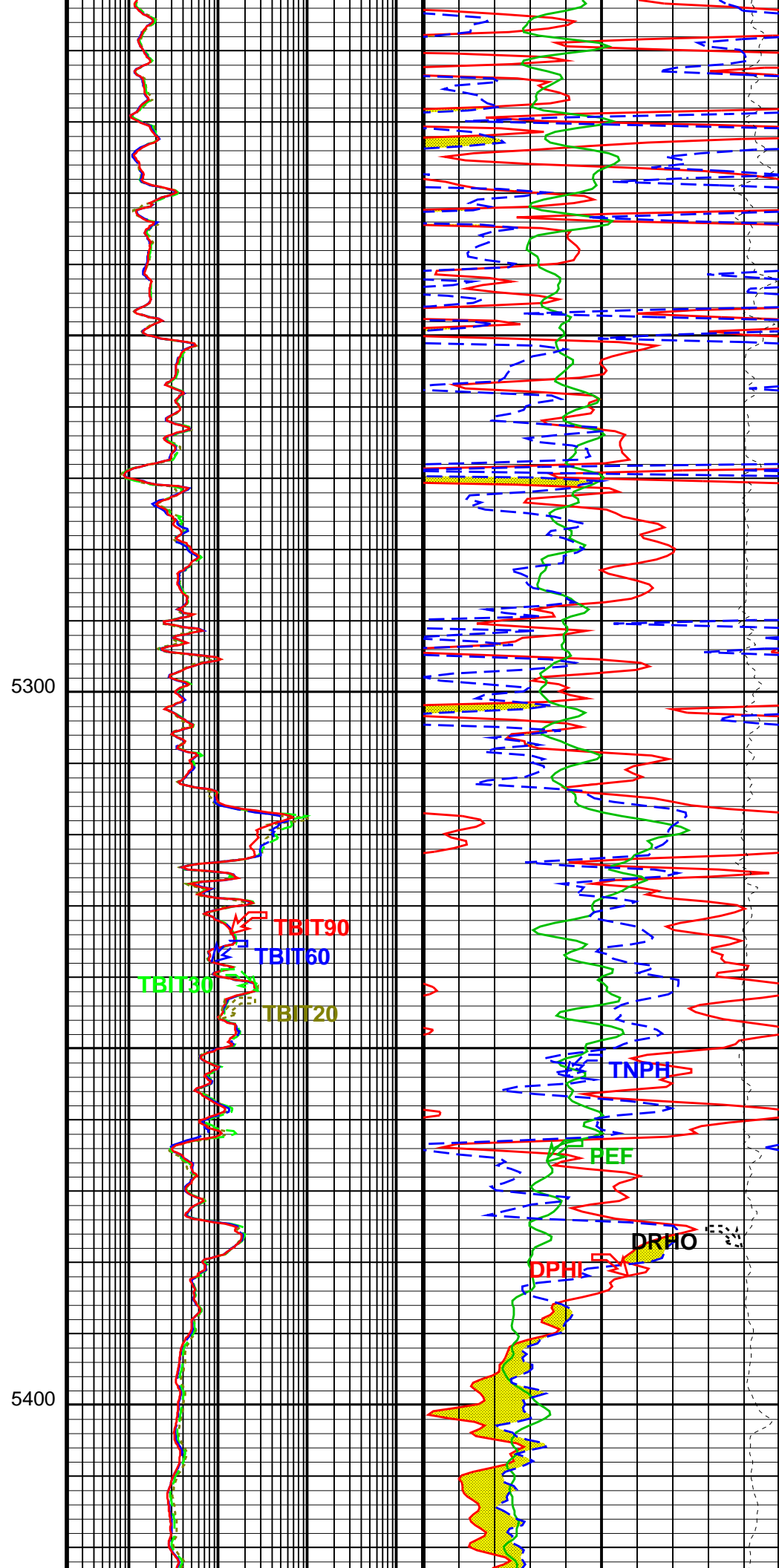
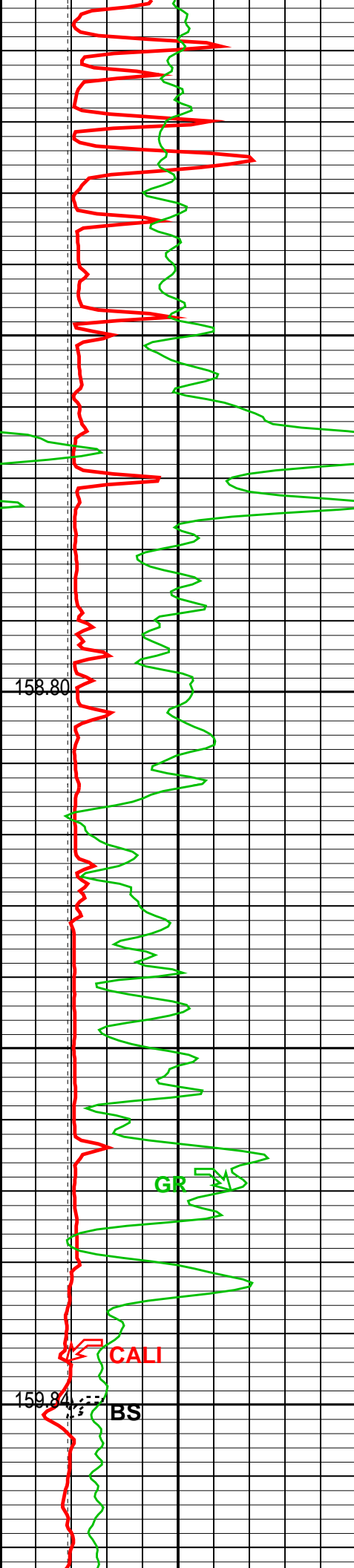


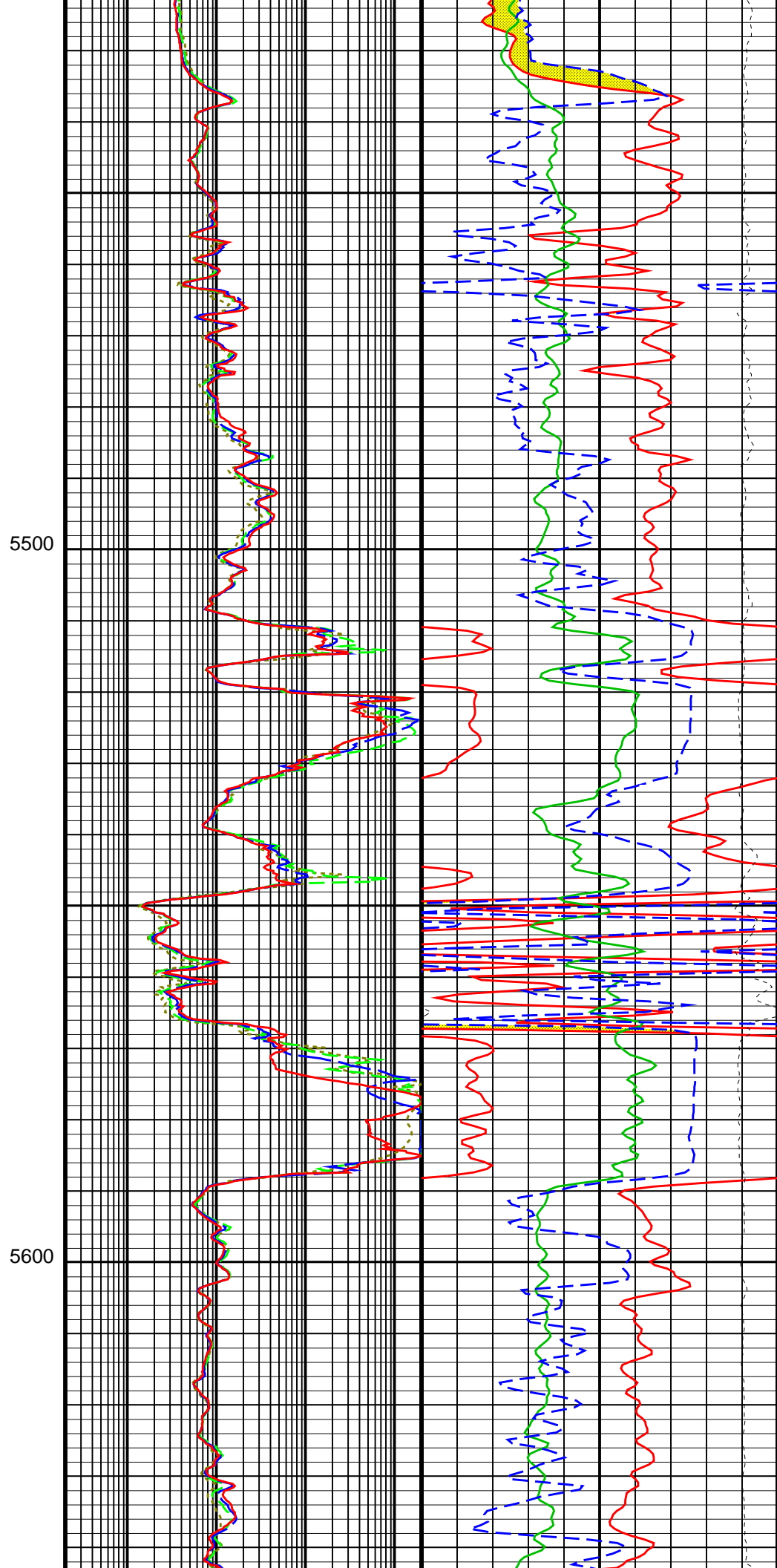
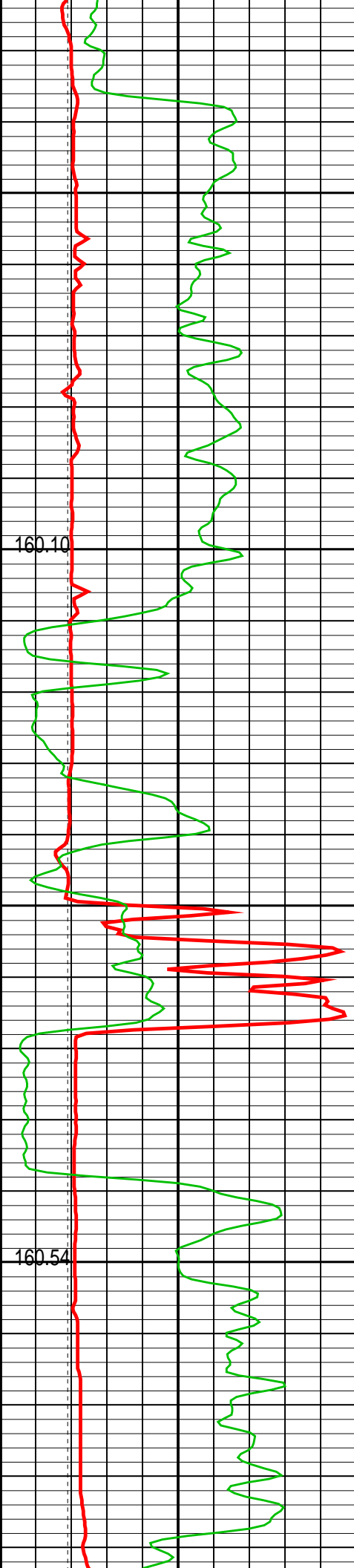


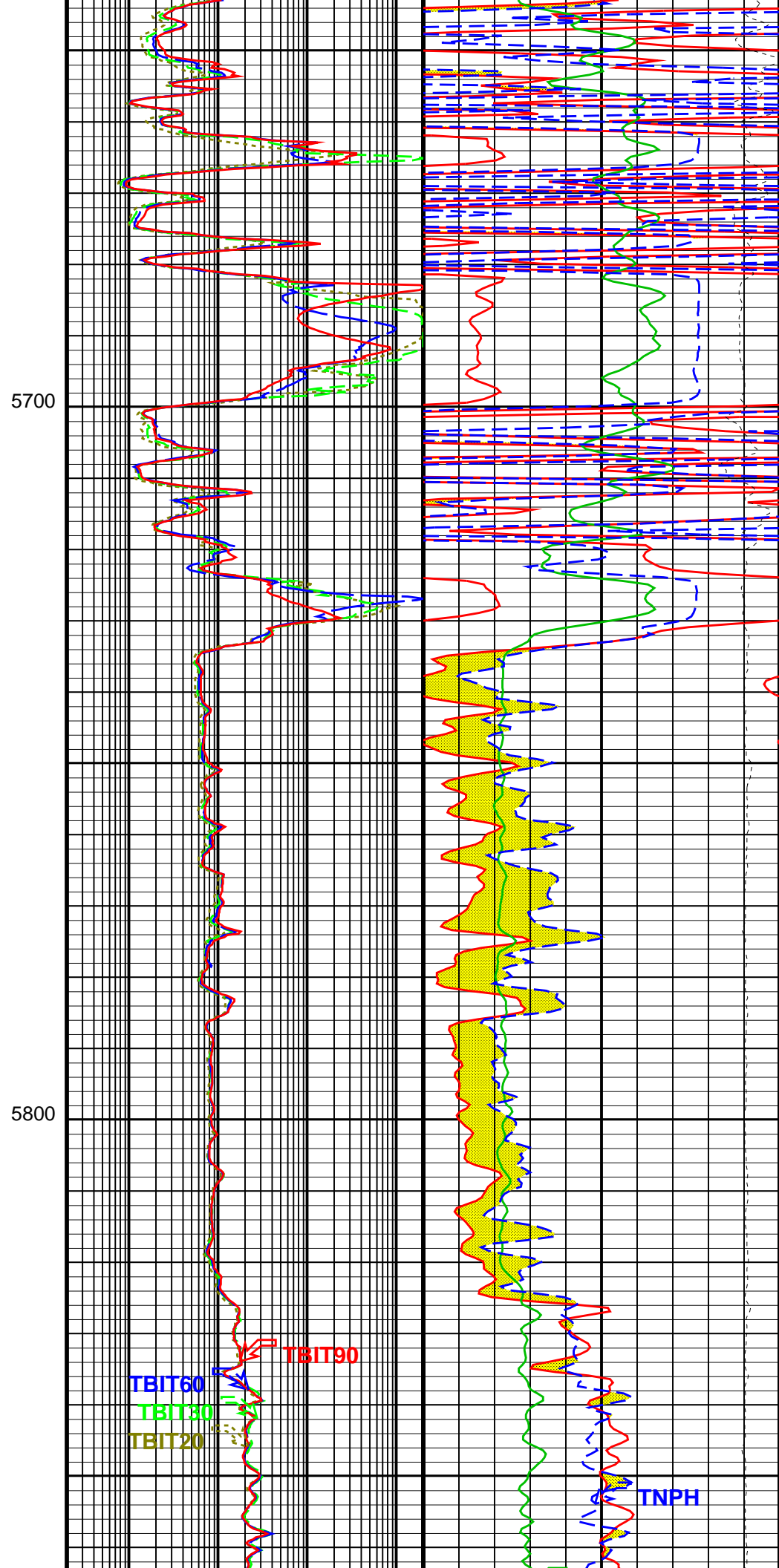
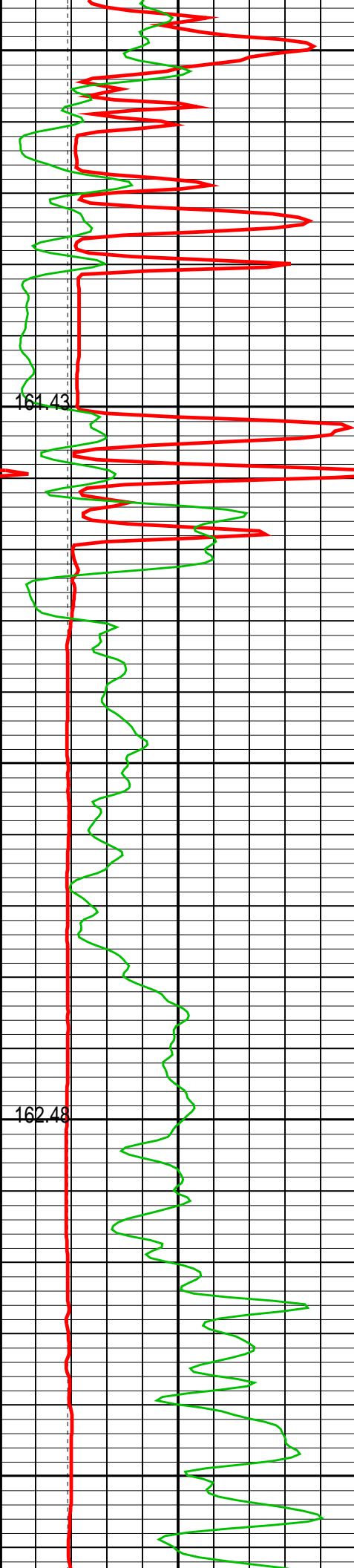


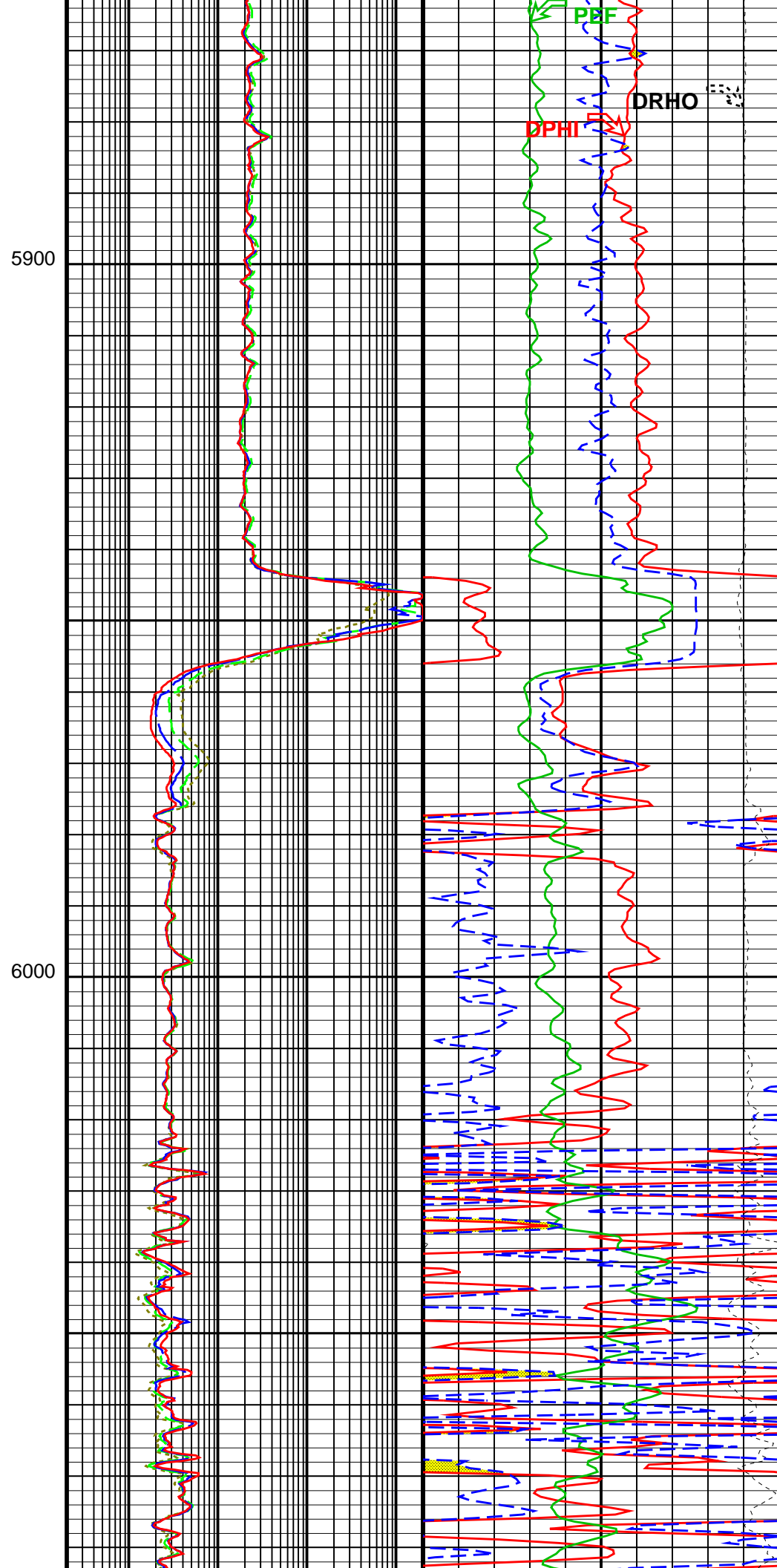


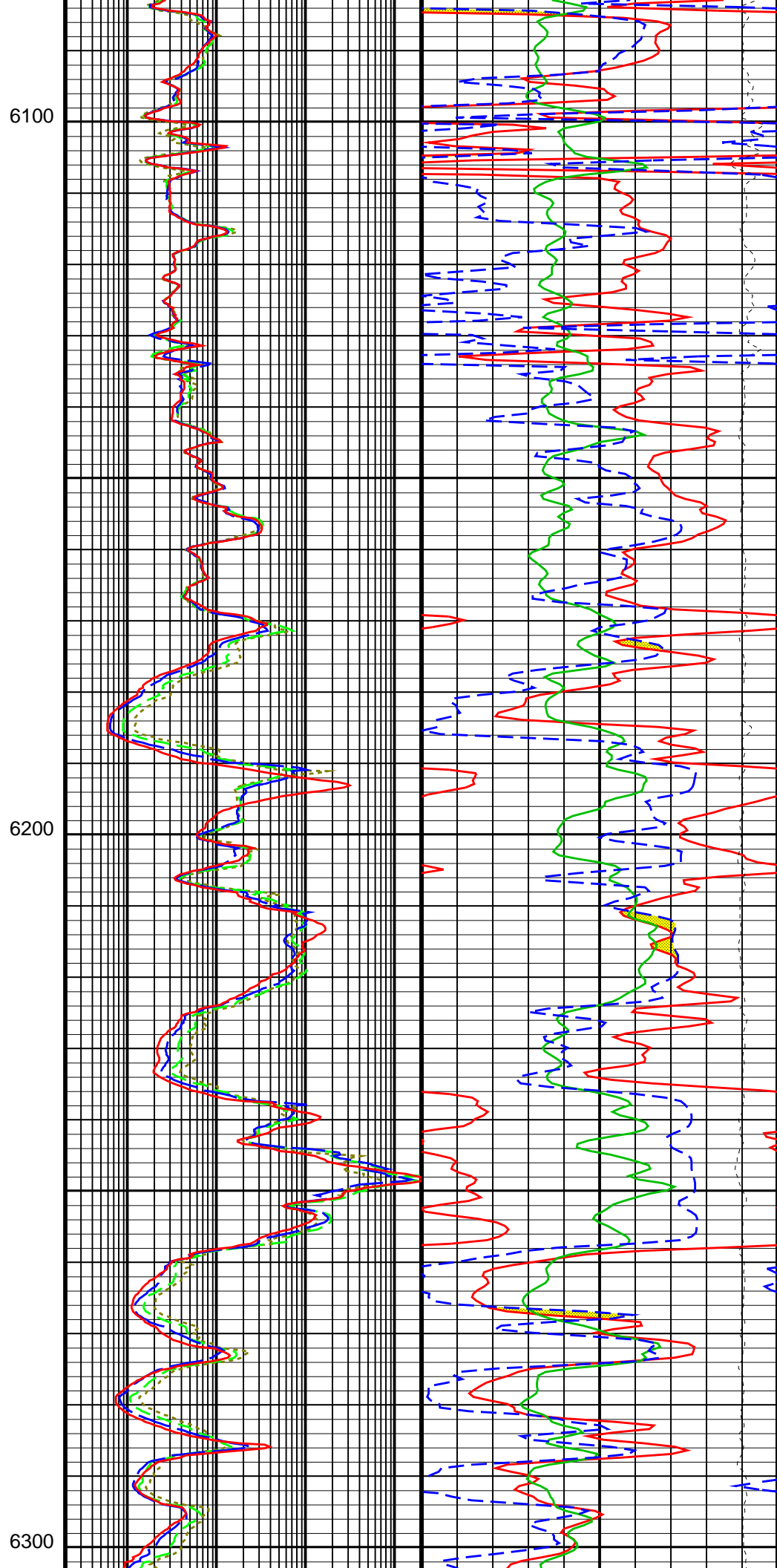




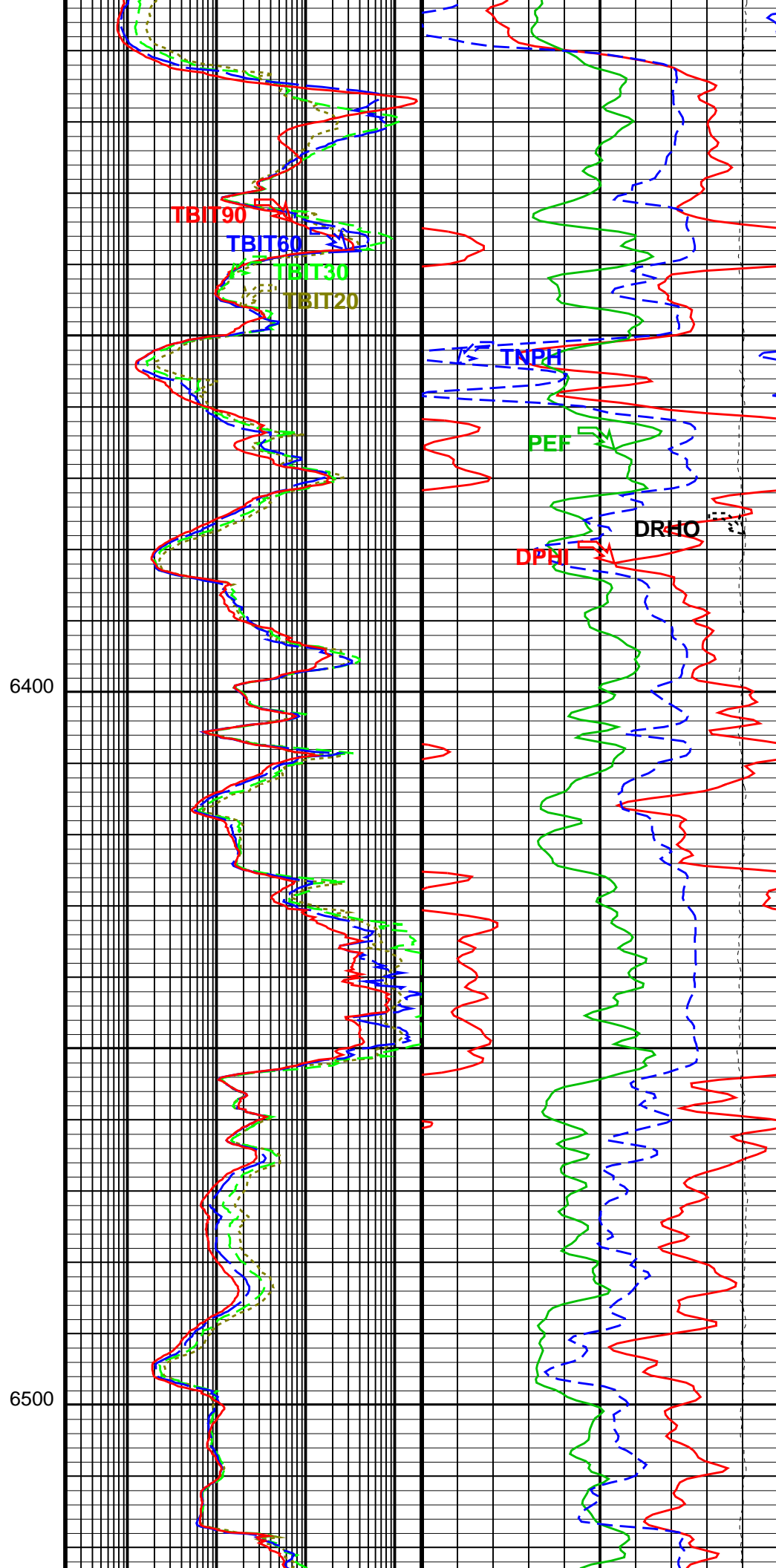
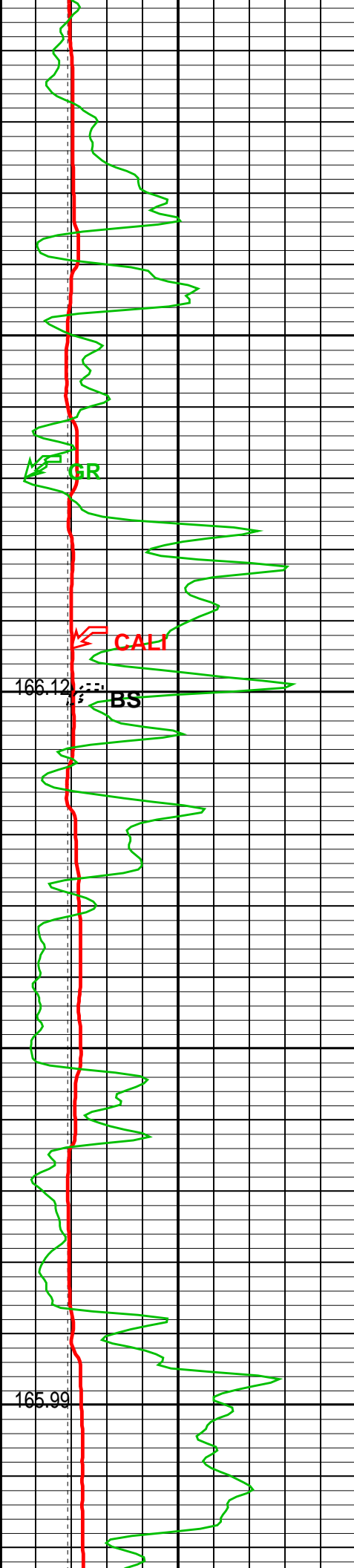




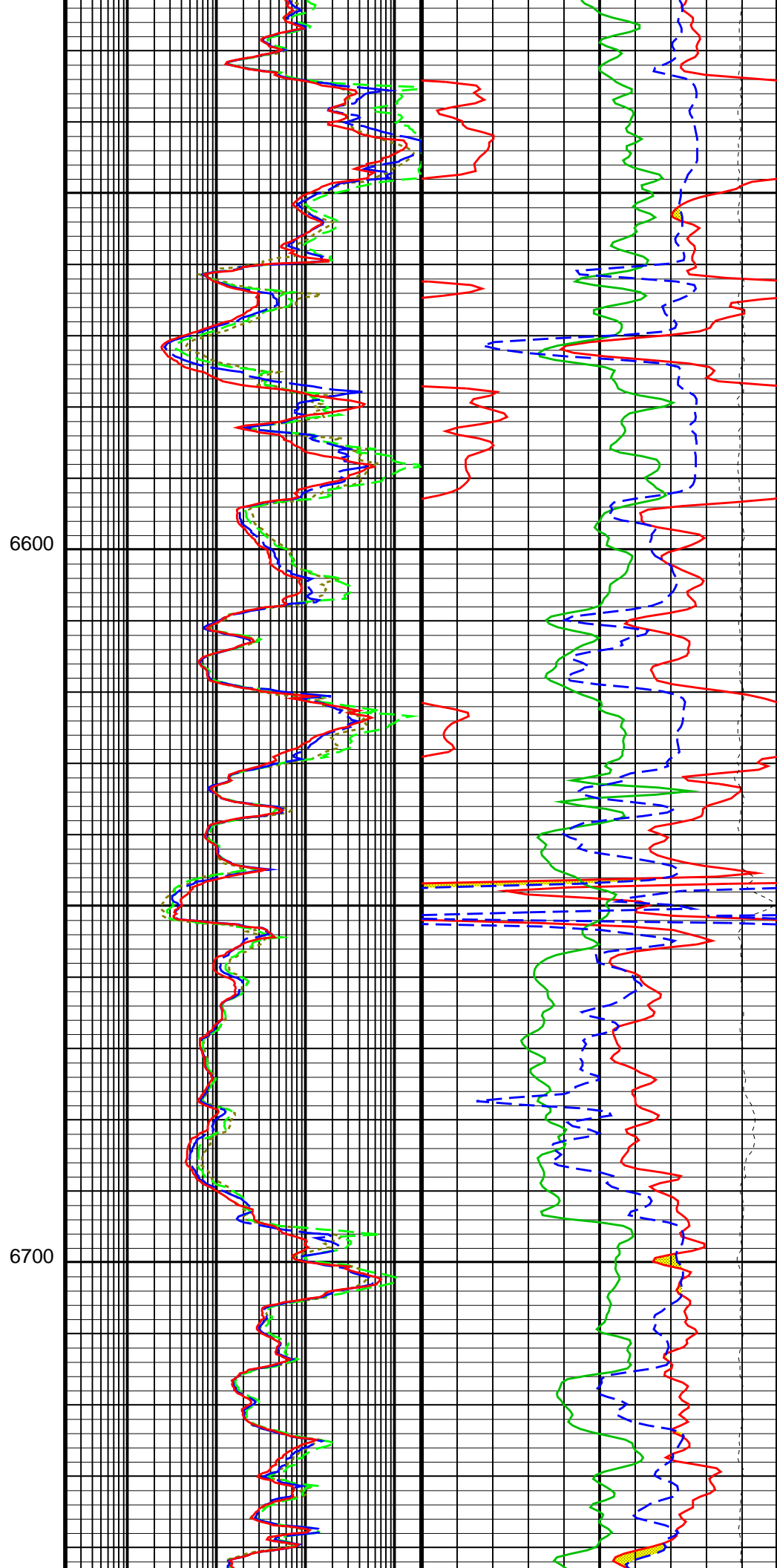
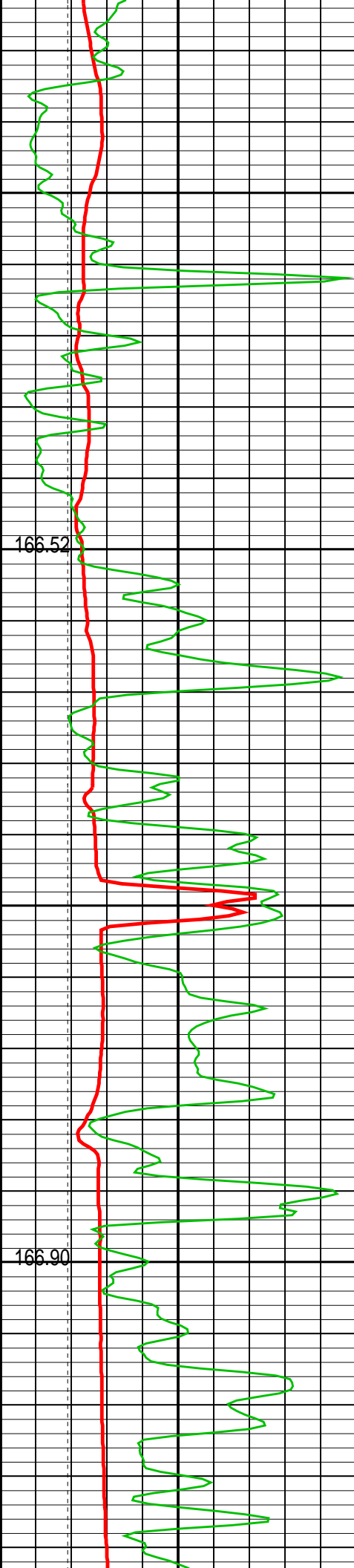


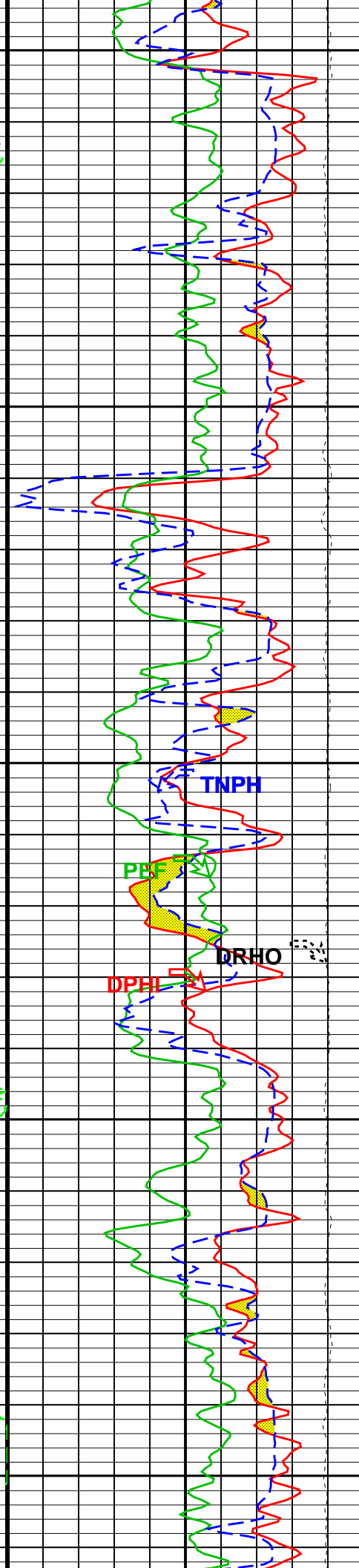
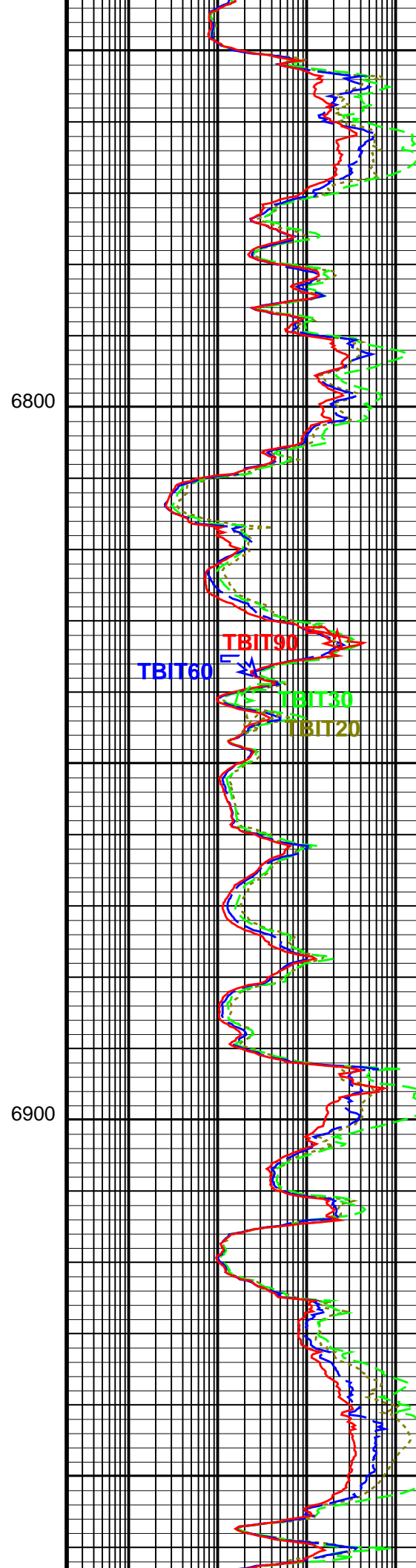
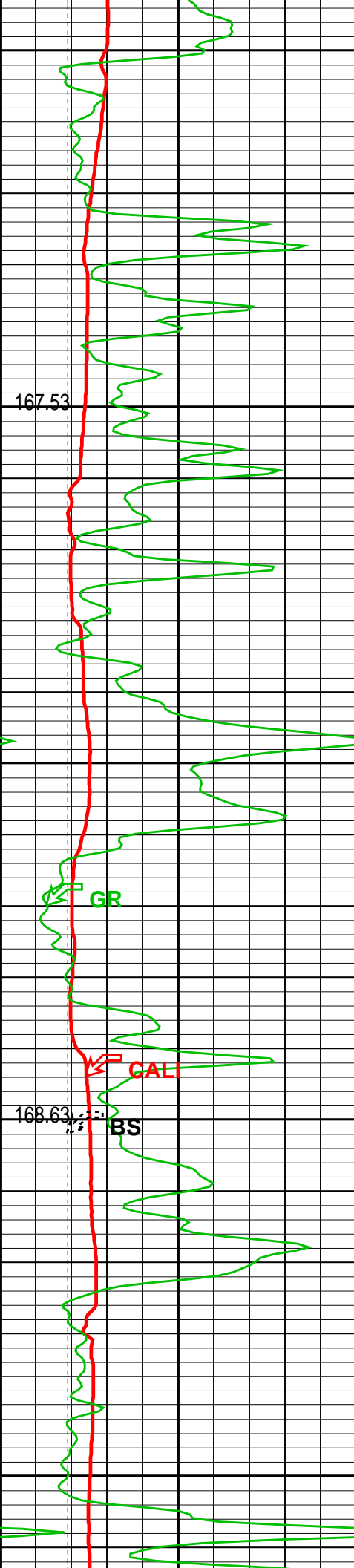


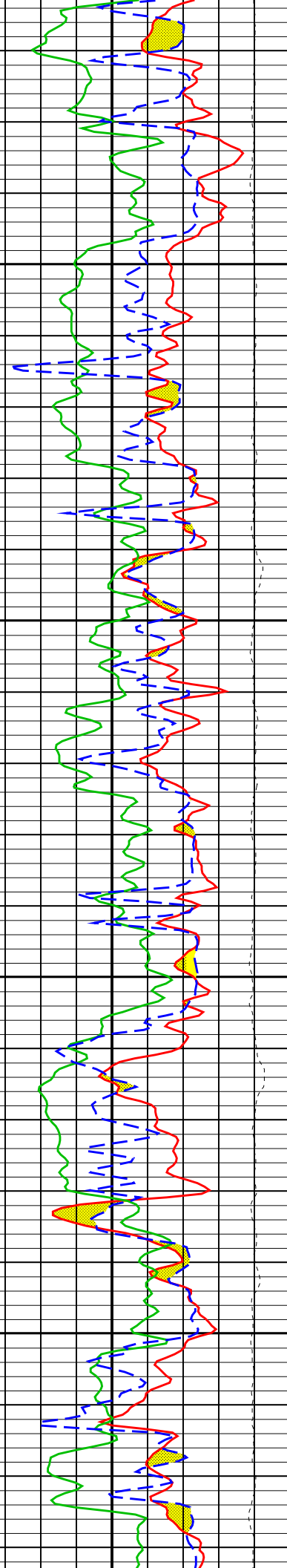
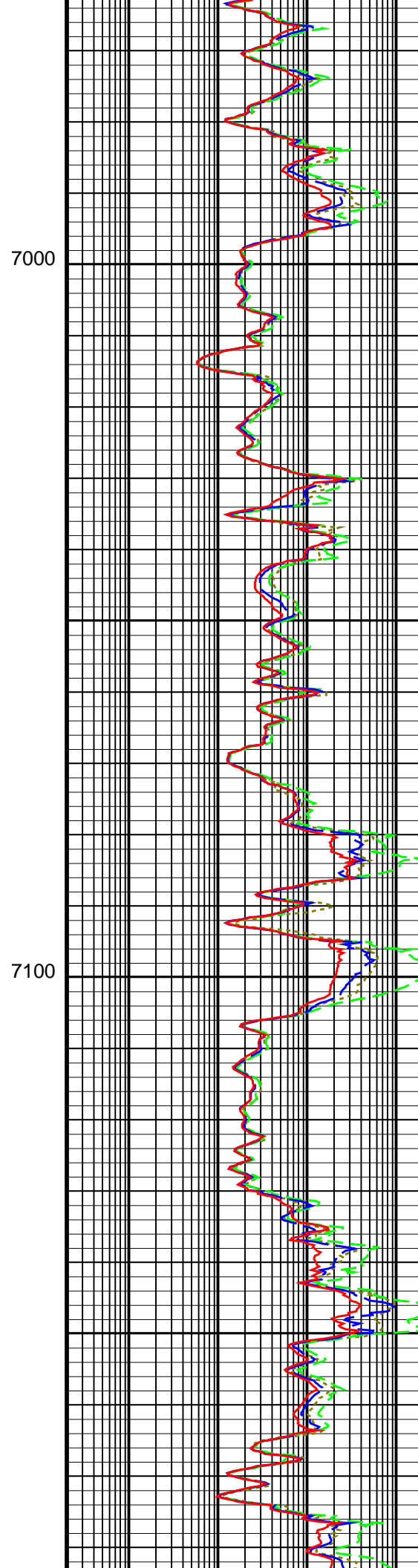
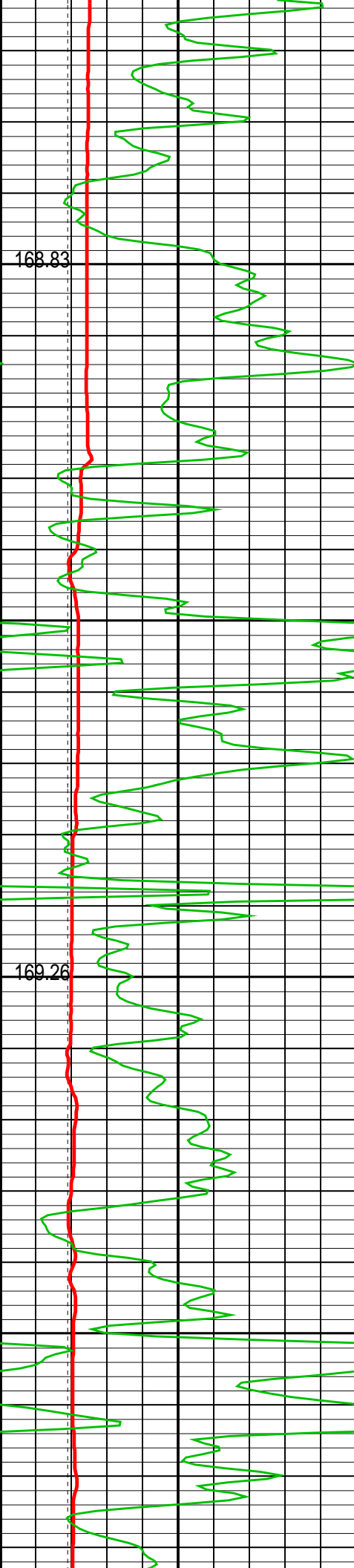


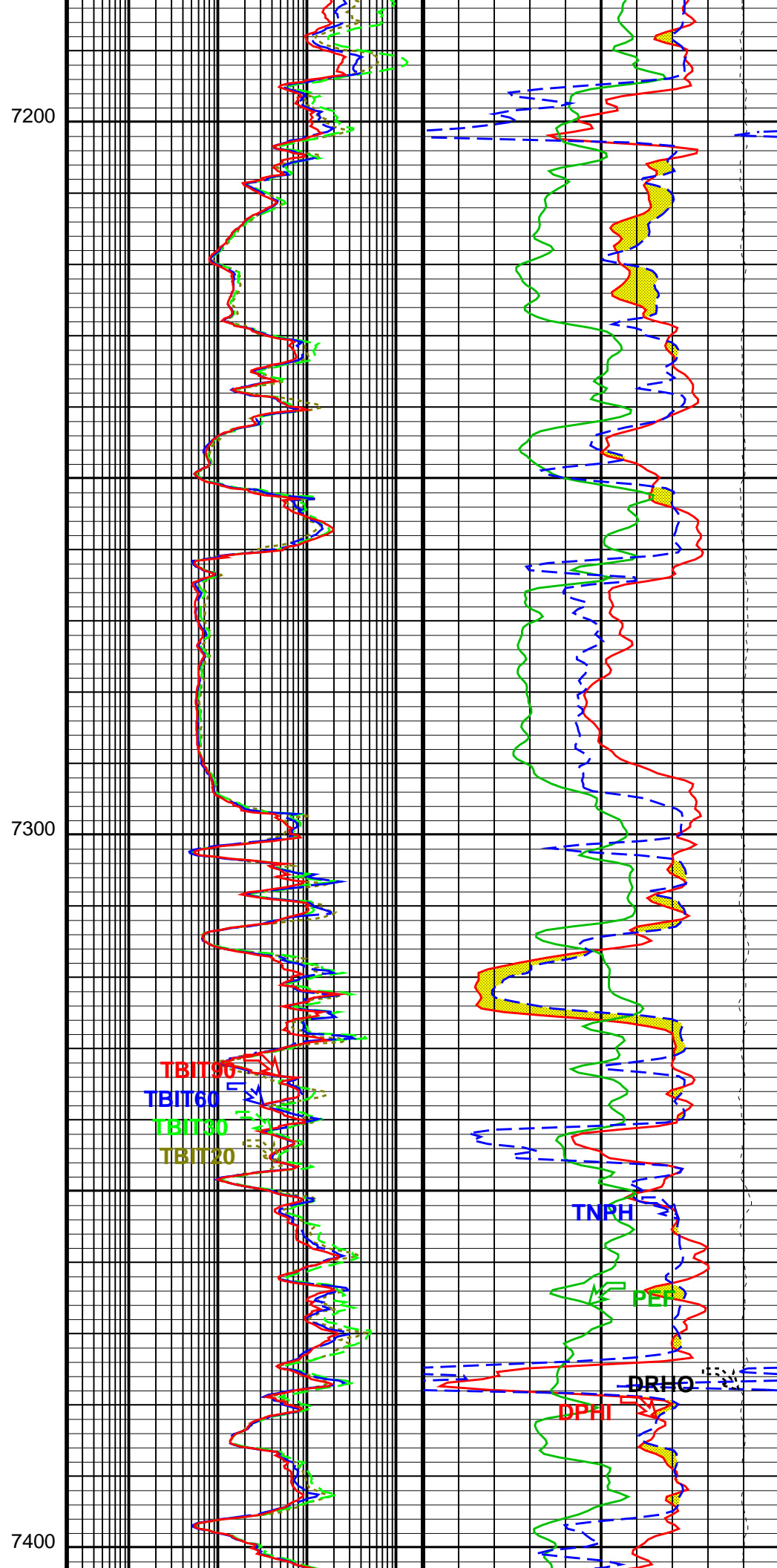
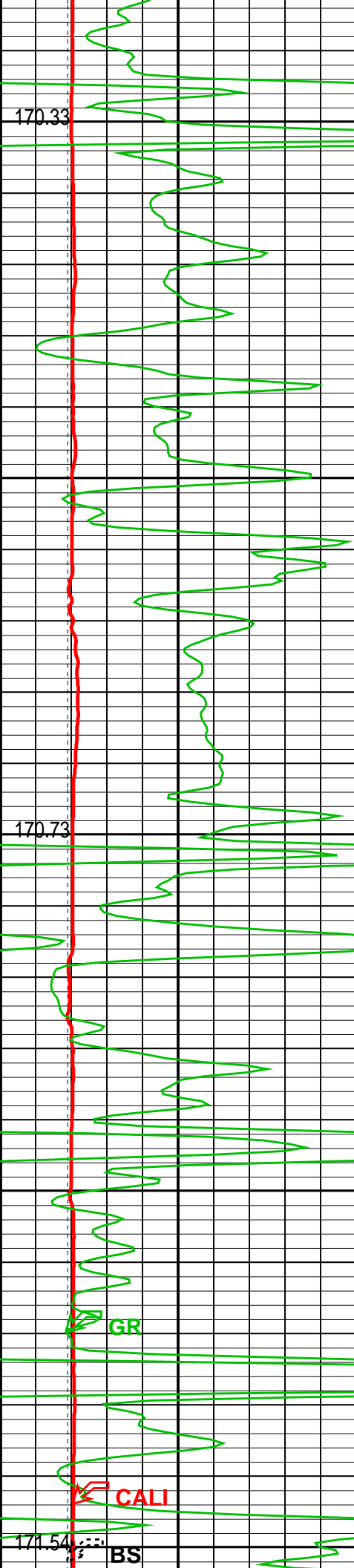


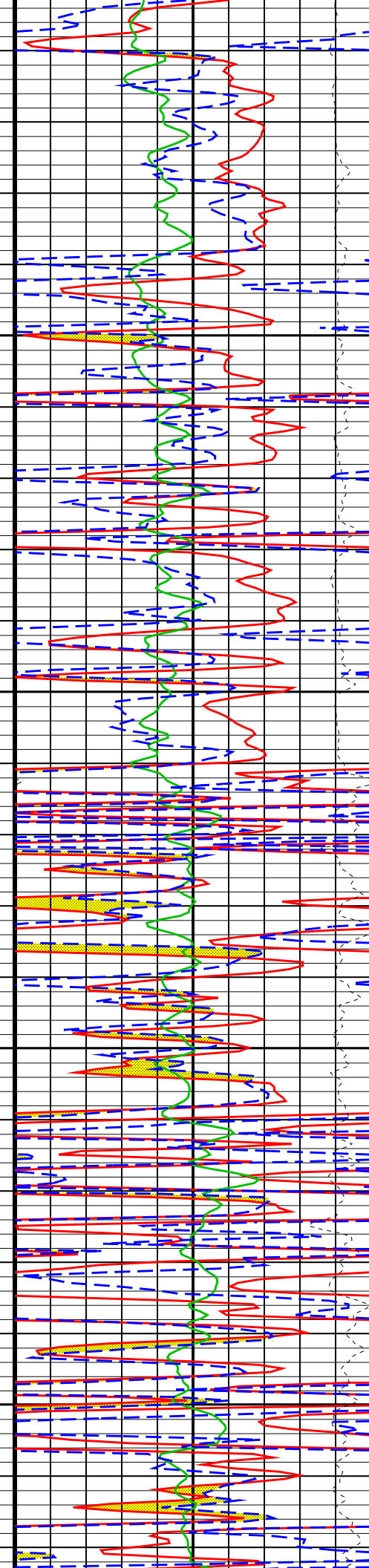
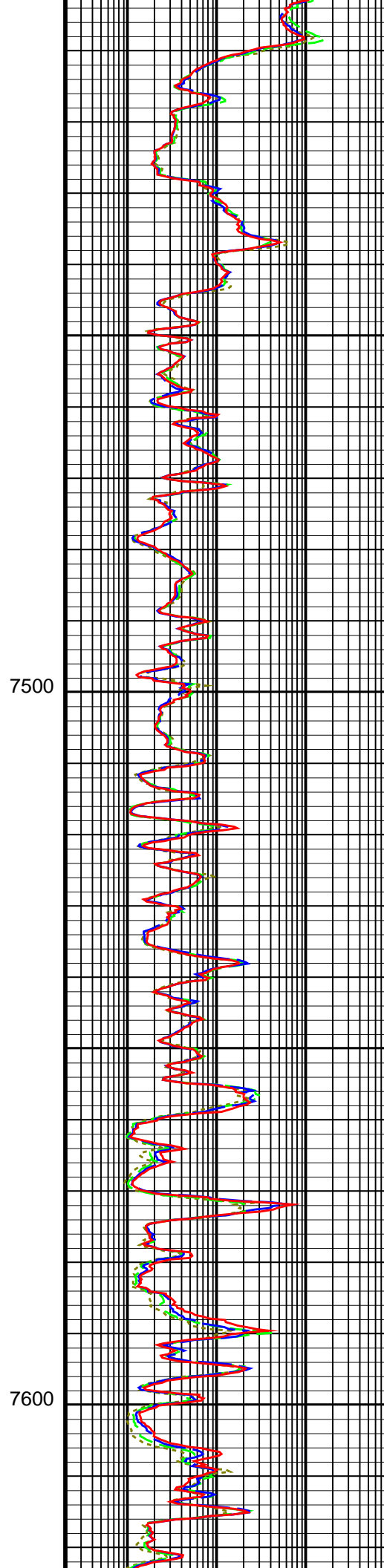
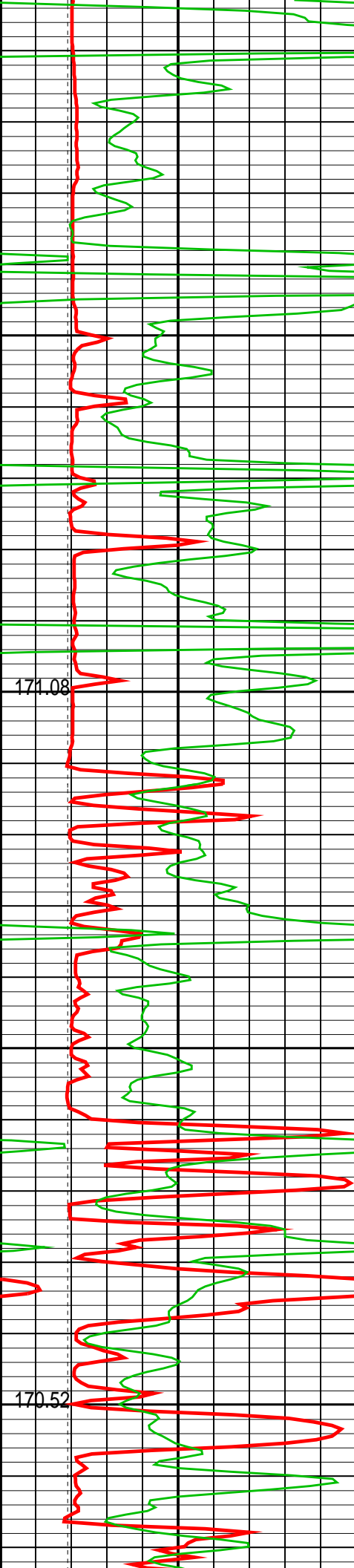


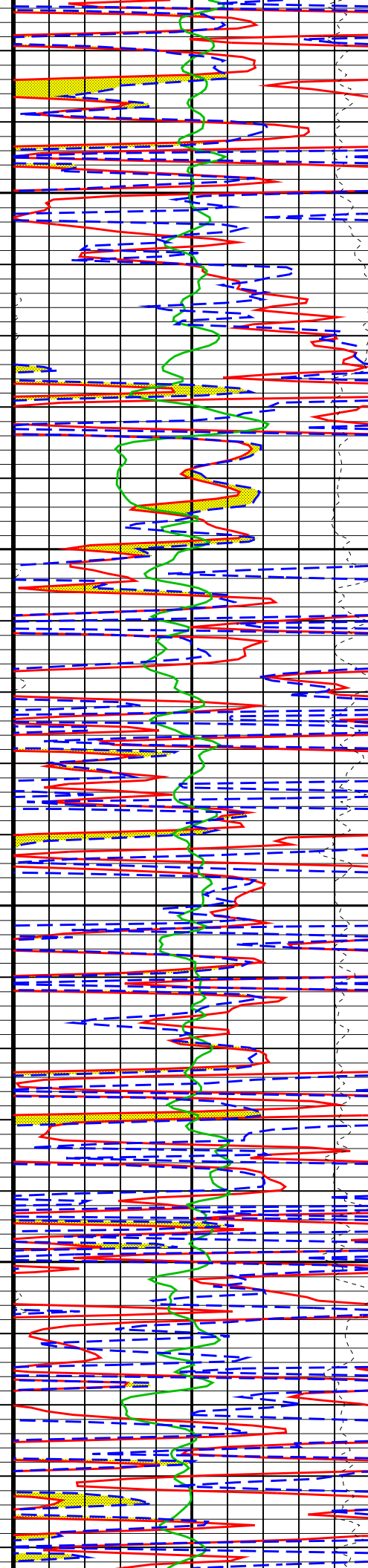
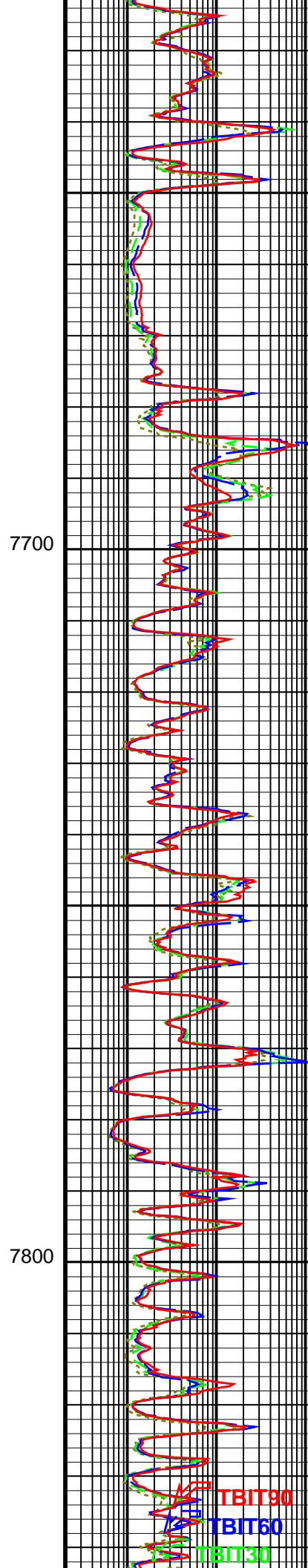
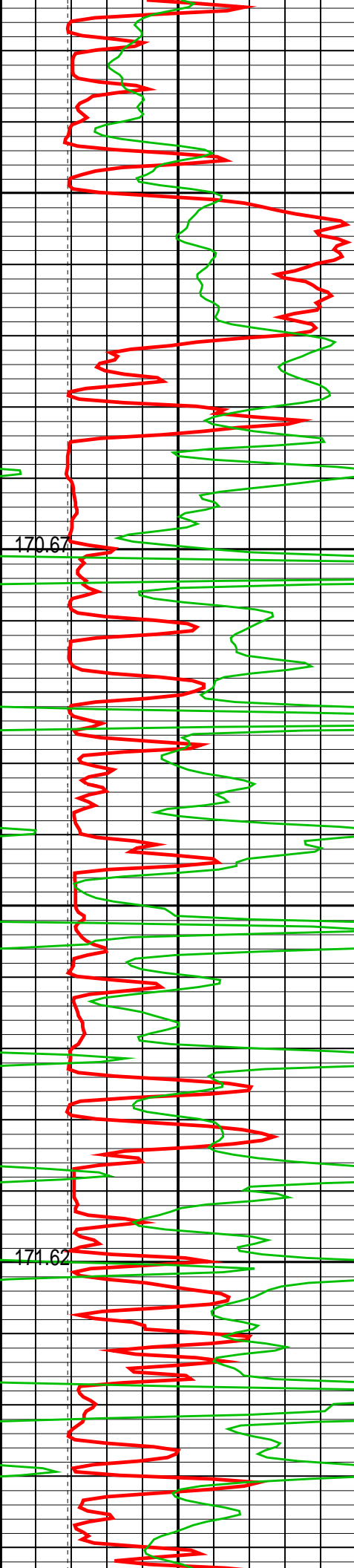


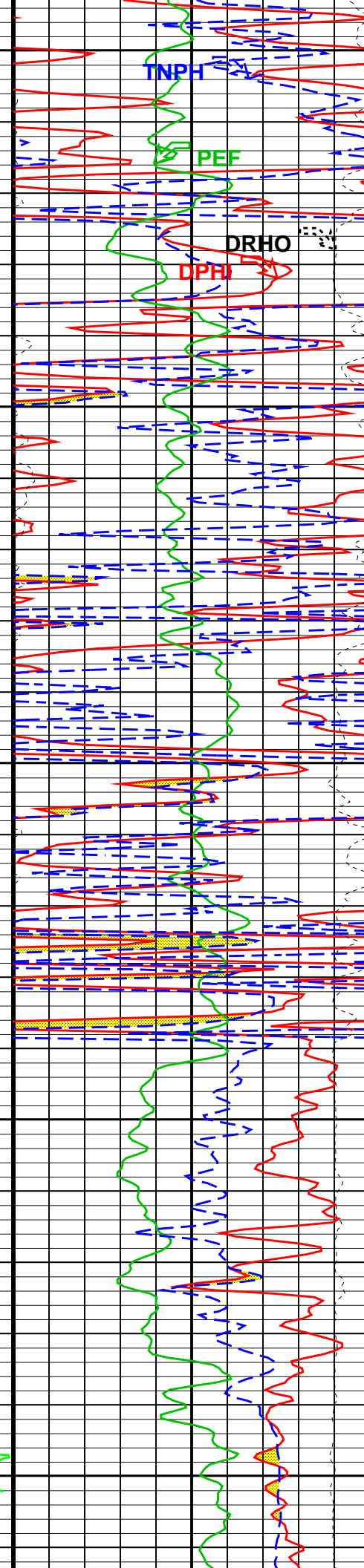
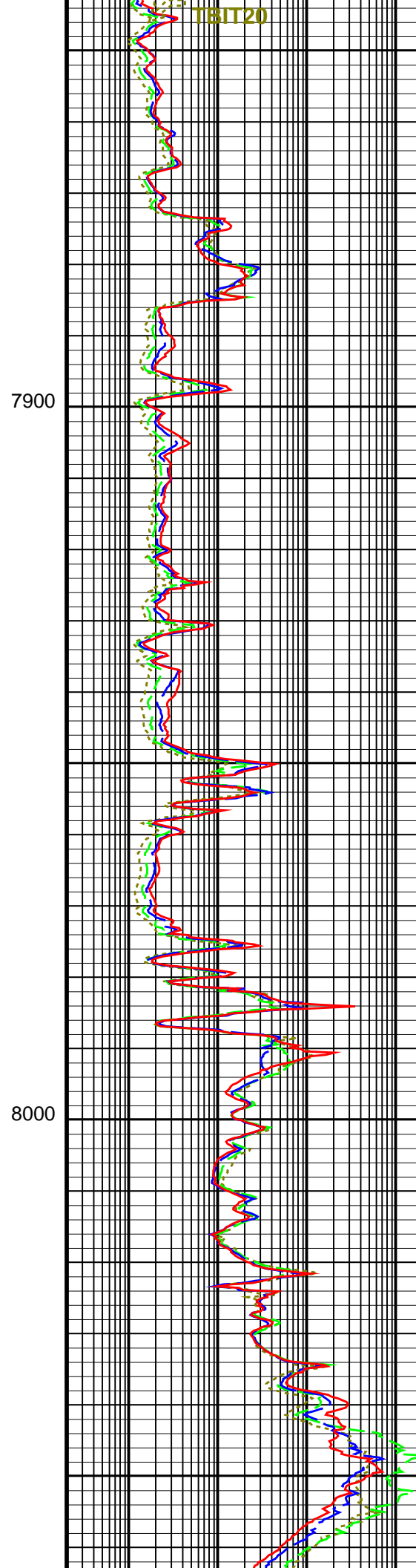
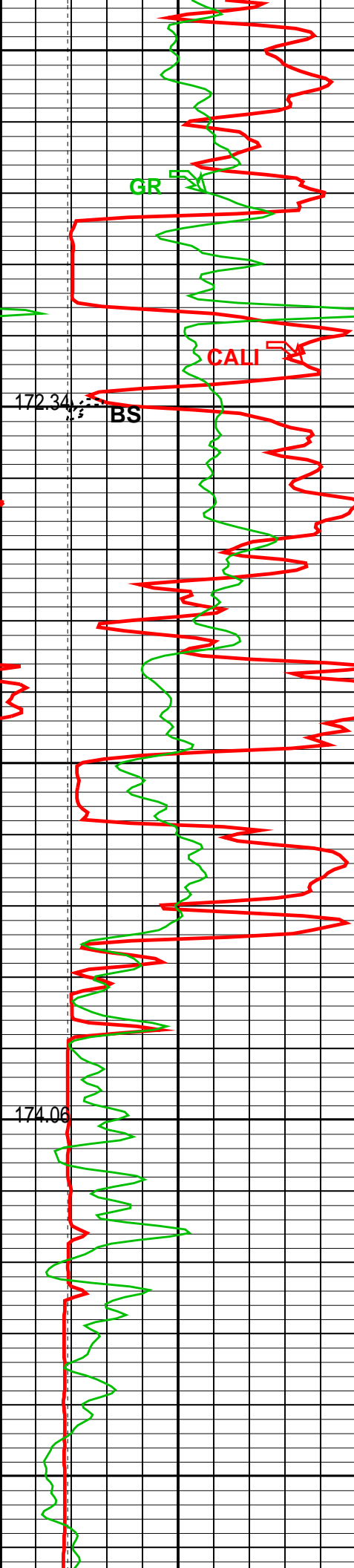




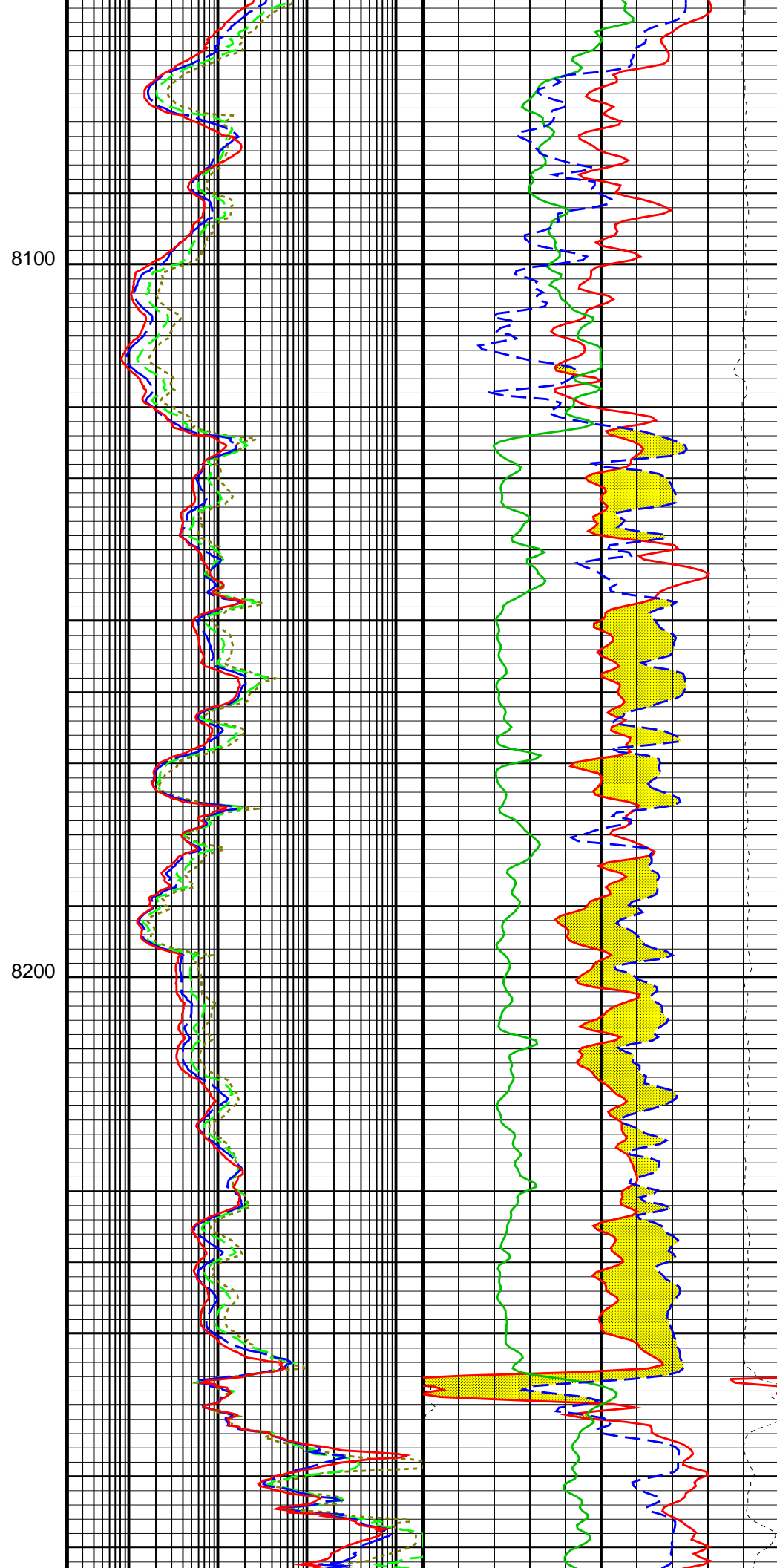
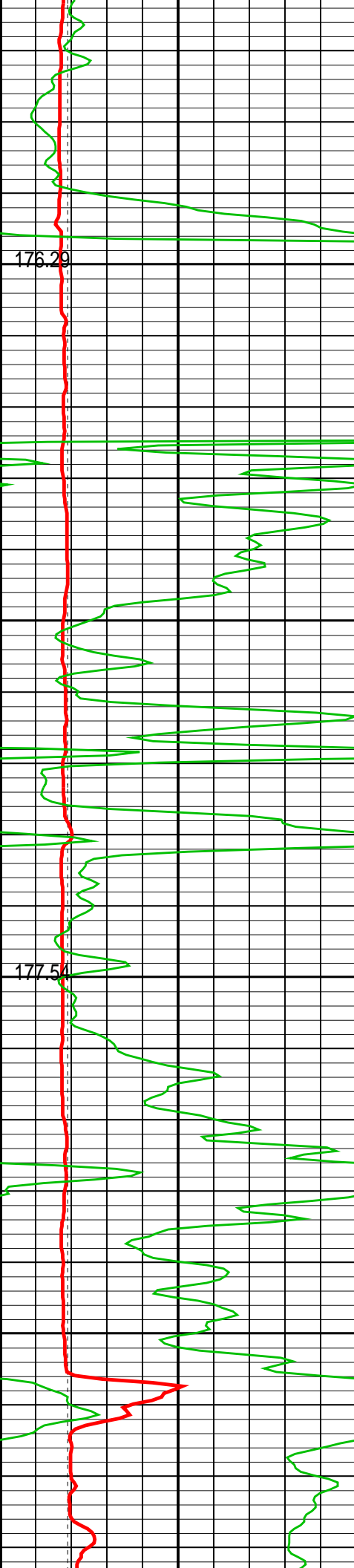




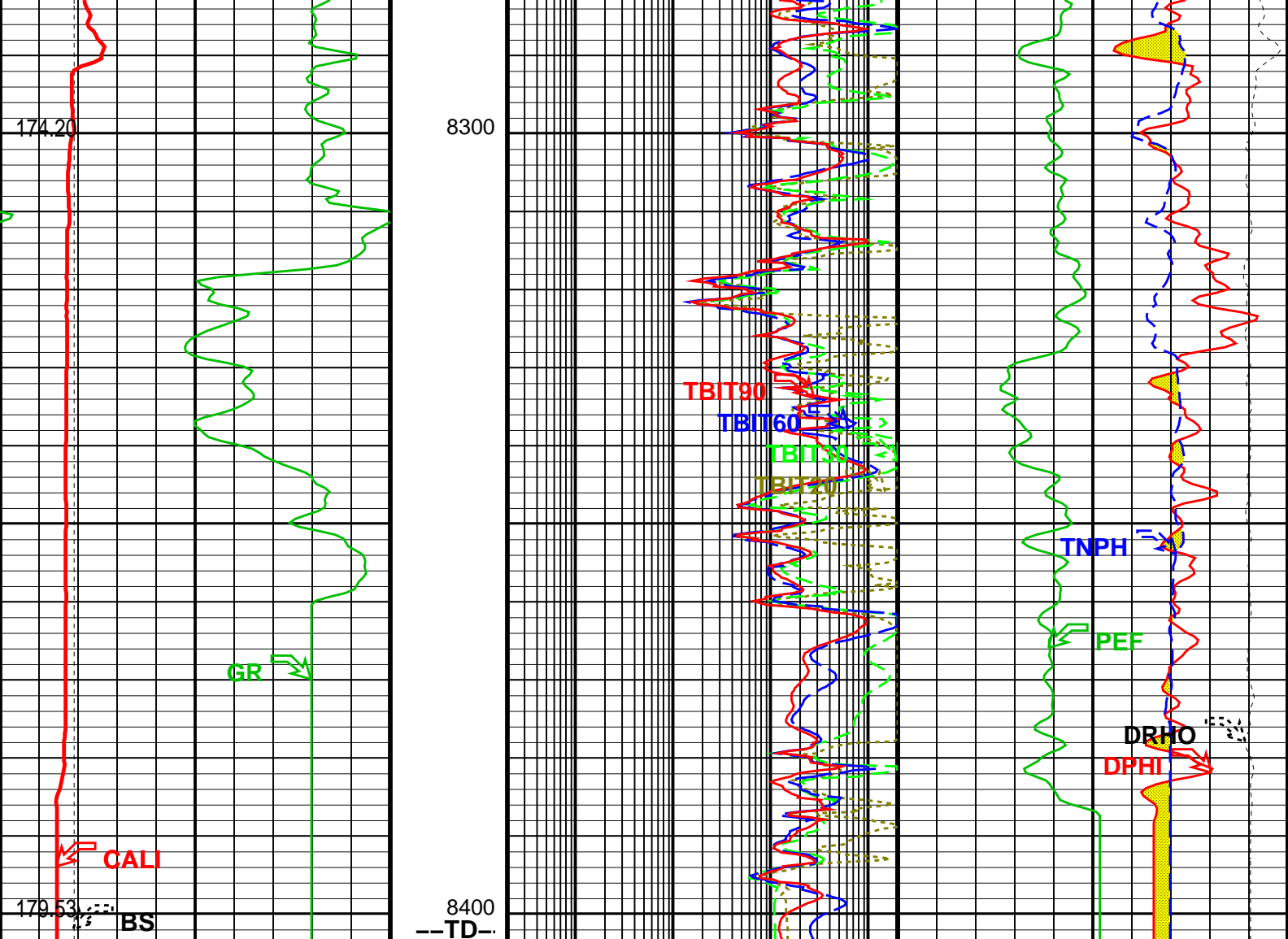












Well Temp (WTEP) (DEGF)		TBI 20 Inch Investigation (TBIT20) (OHMM)		DPHI (DPHI) (V/V)	
6		0.2		0.3	
Bit Size (BS) (IN)		TBI 30 Inch Investigation (TBIT30) (OHMM)		DRHO (DRHO) (G/C3)	
16		0.2		-1.8	
Gamma Ray (GR) (GAPI)		TBI 60 Inch Investigation (TBIT60) (OHMM)		PEF (PEF) (-----)	
0		0.2		0	
Caliper (CALI) (IN)		TBI 90 Inch Investigation (TBIT90) (OHMM)		TNPH (TNPH) (V/V)	
16		0.2		0.3	

## Parameters

DLIS Name	Description	Value	
TBT-A: ThruBit String			
BHS	Borehole Status	OPEN	
CSAL	Cement Salinity	0.000	ppm
CSID	Casing Size I.D.	8.097	in
DHC	Density Hole Correction	CALIPER	
FD	Fluid Density	1.000	g/cm3
FSAL	Formation Salinity	0.000	ppm
FSCO	Formation Salinity Correction Enabled? (for TBN)	NO	
MATR	Rock Matrix for Neutron Porosity Corrections	LIME	
MDEN	Matrix Density	2.710	g/cm3
MT	Mud Type (for TBN and TBI correction)	WBM	
MWCO	Mud-Weight Correction Enabled? (for TBN)	NO	
SOCO	Stand-Off Correction Enabled? (for TBN)	NO	
SOFF	TBN Standoff	0.000	in
TBD_CAL_BLOCK	TBD Calibration Block Type	THRUBIT	
TBD_SPIKE_REJECT	TBD Spike Detection Option	CORRECT	
TBD_SPIKE_THRESHOLD	TBD Attenuation Change Threshold for Spike Detection	5.000	%
TBI_ALGO	TBI Algorithm Selection	AIT	

TBI_BHC_OP	Borehole Correction Option (for TBI)	CALIPER	
TBI_CALTYP	TBI Mastercal Type	THRUBIT	
TBI_REPL_ARRAY_DEST	TBI: Replace This Array	NONE	
TBI_REPL_ARRAY_SOURCE	TBI: With This Array	NONE	
TBI_TC_OP	Induction Temperature Correction Option	LOWER	
TBN_BHC_OP	Borehole Correction Option (for TBN)	CALIPER	
TBN_CAL_TANK	TBN Calibration Tank Type	THRUBIT	
TBN_PRES_OP	Pressure Correction Enabled? (for TBN)	NO	
TBN_TEMP_OP	Temperature Correction Enabled? (for TBN)	NO	
TBN_WPRE	Well Pressure (for TBN)	14.696	psi
WMUD	Mud Weight	9.500	lbm/gal
HOLEV: Integrated Hole/Cement Volume			
BHS	Borehole Status	OPEN	
MATR	Rock Matrix for Neutron Porosity Corrections	LIME	
System and Miscellaneous			
BS	Bit Size	7.875	in
BSAL	Borehole Salinity	1500.0	ppm
CSIZ	Current Casing Size	8.625	in

Format: TB\_TCOM    Vertical Scale: 5" per 100'    Graphics File Created: 13-Aug-2014 11:50

## OP System Version: 19C2-270

TBT    SRPC-5303-ThruBit\_b

### Input DLIS Files

DEFAULT	ThruBit_005PUP	FN:4	PRODUCER	13-Aug-2014 11:42	8403.3 FT	201.8 FT
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### Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
ThruBit String Master Calibration – TBI Master Calibration Sonde Errors							
Master: 17-Jun-2014 7:35							
Freq 1, A1, R	-457.000	-456.898	--	--	--	--	
Freq 1, A1, X	300.000	-98.3795	--	--	--	--	
Freq 1, A2, R	-141.000	-148.961	--	--	--	--	
Freq 1, A2, X	320.000	11.8015	--	--	--	--	
Freq 1, A3, R	-28.0000	-28.4668	--	--	--	--	
Freq 1, A3, X	50.0000	-78.4892	--	--	--	--	
Freq 1, A4, R	-16.0000	-15.3238	--	--	--	--	
Freq 1, A4, X	300.000	231.406	--	--	--	--	
Freq 1, A5, R	-14.0000	-13.5560	--	--	--	--	
Freq 1, A5, X	150.000	115.891	--	--	--	--	
Freq 2, A1, R	-237.000	-235.364	--	--	--	--	
Freq 2, A1, X	150.000	-102.418	--	--	--	--	
Freq 2, A2, R	-92.0000	-96.1500	--	--	--	--	
Freq 2, A2, X	160.000	-21.6378	--	--	--	--	
Freq 2, A3, R	-21.0000	-20.7695	--	--	--	--	
Freq 2, A3, X	-20.0000	-104.294	--	--	--	--	
Freq 2, A4, R	-20.0000	-18.5844	--	--	--	--	
Freq 2, A4, X	100.000	66.1898	--	--	--	--	
Freq 2, A5, R	-20.0000	-18.6638	--	--	--	--	
Freq 2, A5, X	-25.0000	-18.4877	--	--	--	--	
Freq 3, A1, R	-149.000	-145.653	--	--	--	--	
Freq 3, A1, X	25.0000	-152.283	--	--	--	--	
Freq 3, A2, R	-70.0000	-72.5751	--	--	--	--	
Freq 3, A2, X	70.0000	-58.5200	--	--	--	--	
Freq 3, A3, R	-17.0000	-17.0791	--	--	--	--	
Freq 3, A3, X	-90.0000	-136.128	--	--	--	--	
Freq 3, A4, R	-22.0000	-20.5310	--	--	--	--	
Freq 3, A4, X	-50.0000	-44.3374	--	--	--	--	
Freq 3, A5, R	-22.0000	-21.4762	--	--	--	--	
Freq 3, A5, X	-110.000	-117.307	--	--	--	--	
Freq 4, A1, R	-80.0000	-78.3716	--	--	--	--	
Freq 4, A1, X	-190.000	-266.391	--	--	--	--	
Freq 4, A2, R	-50.0000	-52.1732	--	--	--	--	
Freq 4, A2, X	-75.0000	-125.718	--	--	--	--	
Freq 4, A3, R	-14.0000	-13.6750	--	--	--	--	
Freq 4, A3, X	-190.000	-200.702	--	--	--	--	
Freq 4, A4, R	-25.0000	-23.5566	--	--	--	--	
Freq 4, A4, X	-235.000	-209.711	--	--	--	--	
Freq 4, A5, R	-28.0000	-27.1384	--	--	--	--	
Freq 4, A5, X	-300.000	-284.972	--	--	--	--	

ThruBit String Master Calibration – TBI Master Calibration COMPLEX GAINS

Master: 17-Jun-2014 7:35

Freq 1, R – 0	1.000	0.9971	--	--	--	--
Freq 1, R – 1	1.000	0.9916	--	--	--	--
Freq 1, R – 2	1.000	0.9985	--	--	--	--
Freq 1, R – 3	1.000	0.9860	--	--	--	--
Freq 1, R – 4	1.000	0.9951	--	--	--	--
Freq 1, X – 0	0	-0.005077	--	--	--	--
Freq 1, X – 1	0	-0.0001806	--	--	--	--
Freq 1, X – 2	0	-0.006362	--	--	--	--
Freq 1, X – 3	0	0.01510	--	--	--	--
Freq 1, X – 4	0	0.0004968	--	--	--	--
Freq 2, R – 0	1.000	0.9914	--	--	--	--
Freq 2, R – 1	1.000	0.9856	--	--	--	--
Freq 2, R – 2	1.000	0.9868	--	--	--	--
Freq 2, R – 3	1.000	0.9817	--	--	--	--
Freq 2, R – 4	1.000	0.9923	--	--	--	--
Freq 2, X – 0	0	-0.01297	--	--	--	--
Freq 2, X – 1	0	-0.009472	--	--	--	--
Freq 2, X – 2	0	-0.008611	--	--	--	--
Freq 2, X – 3	0	0.001065	--	--	--	--
Freq 2, X – 4	0	-0.01000	--	--	--	--
Freq 3, R – 0	1.000	0.9970	--	--	--	--
Freq 3, R – 1	1.000	0.9917	--	--	--	--
Freq 3, R – 2	1.000	0.9926	--	--	--	--
Freq 3, R – 3	1.000	0.9863	--	--	--	--
Freq 3, R – 4	1.000	0.9989	--	--	--	--
Freq 3, X – 0	0	-0.001220	--	--	--	--
Freq 3, X – 1	0	0.001593	--	--	--	--
Freq 3, X – 2	0	0.002038	--	--	--	--
Freq 3, X – 3	0	0.009428	--	--	--	--
Freq 3, X – 4	0	0.0009417	--	--	--	--
Freq 4, R – 0	1.000	0.9888	--	--	--	--
Freq 4, R – 1	1.000	0.9830	--	--	--	--
Freq 4, R – 2	1.000	0.9855	--	--	--	--
Freq 4, R – 3	1.000	0.9777	--	--	--	--
Freq 4, R – 4	1.000	0.9996	--	--	--	--
Freq 4, X – 0	0	-0.005971	--	--	--	--
Freq 4, X – 1	0	-0.003925	--	--	--	--
Freq 4, X – 2	0	-0.005729	--	--	--	--
Freq 4, X – 3	0	0.001326	--	--	--	--
Freq 4, X – 4	0	-0.008338	--	--	--	--

ThruBit String Master Calibration – TBD Caliper Master Calibration

Master: 31-Jul-2014 15:01

Caliper 12in Ring	1949.8	1842.2	--	--	--	--	IN
Caliper 9in Ring	2096.7	2007.1	--	--	--	--	IN
Caliper 6in Ring	2285.7	2167.2	--	--	--	--	IN

ThruBit String Master Calibration – TBD Density Master Calibration. Be Window, Thrubit blocks

Master: 31-Jul-2014 14:58

Aluminium Density	2.607	2.607	--	--	--	--	G/C3
Magnesium Density	1.752	1.752	--	--	--	--	G/C3
LS1 Background	140.00	126.98	--	--	--	--	CPS
SS1 Background	140.00	128.25	--	--	--	--	CPS
LS4 Background	29.00	27.71	--	--	--	--	CPS
SS1 Aluminium	4850.00	4656.72	--	--	--	--	CPS
LS1 Aluminium	870.00	800.50	--	--	--	--	CPS
SS1 Magnesium	8000.00	7881.68	--	--	--	--	CPS
LS4 Aluminium	955.00	917.12	--	--	--	--	CPS
SS Slope	1.645	1.572	--	--	--	--	
LS1 Al + Sleeve	725.00	665.11	--	--	--	--	CPS
LS Slope	0.4150	0.4132	--	--	--	--	
LS4 Al + Sleeve	426.50	401.78	--	--	--	--	CPS
Pef K Factor	4.840	5.019	--	--	--	--	
LS1 Magnesium	5800.00	5381.45	--	--	--	--	CPS
Pef B Factor	-0.5550	-0.5546	--	--	--	--	

ThruBit String Master Calibration – TBD Density Master Calibration

Master: Calibration not done

SS1 Background	140.00	128.25	--	--	--	--	CPS
SS2 Background	0	33.4847	--	--	--	--	CPS
SS3 Background	0	20.1297	--	--	--	--	CPS
SS4 Background	0	28.4953	--	--	--	--	CPS
LS1 Background	140.00	126.98	--	--	--	--	CPS
LS2 Background	0	31.8679	--	--	--	--	CPS
LS3 Background	0	19.6248	--	--	--	--	CPS
LS4 Background	29.00	27.71	--	--	--	--	CPS
SS1 Aluminium	4850.00	4656.72	--	--	--	--	CPS
SS2 Aluminium	0	2450.29	--	--	--	--	CPS
SS3 Aluminium	0	2054.48	--	--	--	--	CPS

SS4 Aluminium	0	1991.1958	--	--	--	--	CPS
LS1 Aluminium	870.00	800.50	--	--	--	--	CPS
LS2 Aluminium	0	792.241	--	--	--	--	CPS
LS3 Aluminium	0	865.289	--	--	--	--	CPS
LS4 Aluminium	955.00	917.12	--	--	--	--	CPS
SS1 Al + Sleeve	0	N/A	--	--	--	--	CPS
SS2 Al + Sleeve	0	N/A	--	--	--	--	CPS
SS3 Al + Sleeve	0	N/A	--	--	--	--	CPS
SS4 Al + Sleeve	0	N/A	--	--	--	--	CPS
LS1 Al + Sleeve	725.00	665.11	--	--	--	--	CPS
LS2 Al + Sleeve	0	596.337	--	--	--	--	CPS
LS3 Al + Sleeve	0	535.125	--	--	--	--	CPS
LS4 Al + Sleeve	426.50	401.78	--	--	--	--	CPS
SS1 Magnesium	8000.00	7881.68	--	--	--	--	CPS
SS2 Magnesium	0	4198.35	--	--	--	--	CPS
SS3 Magnesium	0	3421.26	--	--	--	--	CPS
SS4 Magnesium	0	3390.76	--	--	--	--	CPS
LS1 Magnesium	5800.00	5381.45	--	--	--	--	CPS
LS2 Magnesium	0	5593.82	--	--	--	--	CPS
LS3 Magnesium	0	6051.46	--	--	--	--	CPS
LS4 Magnesium	0	6508.15	--	--	--	--	CPS

#### ThruBit String Master Calibration – Thermal Neutron Master Calibration

Master: 31-Jul-2014 12:52

TNF, Background	1.0	1.0	--	--	--	--	CPS
TNN, Background	1.0	0.43	--	--	--	--	CPS
TNF, Tank	96.00	57.09	--	--	--	--	CPS
TNN, Tank	2860.0	1759.5	--	--	--	--	CPS
TNF, Tank + Al Sleeve	3040.0	1847.0	--	--	--	--	CPS
TNN, Tank + Al Sleeve	32350.0	19678.0	--	--	--	--	CPS
Tank + Al Sleeve Ratio	10.797	10.701	--	--	--	--	
Tank + Al Sleeve Porosity	14.40	14.46	--	--	--	--	PU
Tank, Ratio	30.958	30.822	--	--	--	--	
Tank, Temperature	70.0	73.0	--	--	--	--	DEGF

#### ThruBit String Master Calibration – TMG Accelerometer Calibration

Master: Calibration not done

Minimum Ax, m/s2	-9.810	N/A	--	--	--	--	
Maximum Ax, m/s2	9.810	N/A	--	--	--	--	
Minimum Ay, m/s2	-9.810	N/A	--	--	--	--	
Maximum Ay, m/s2	9.810	N/A	--	--	--	--	
Minimum Az, m/s2	0	N/A	--	--	--	--	
Maximum Az, m/s2	9.810	N/A	--	--	--	--	
RB Offset, degrees	0	N/A	--	--	--	--	

#### ThruBit String Master Calibration – TMG Gamma-Ray Calibration

Master: Calibration not done


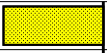

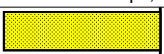
GR Background	30.00	N/A	--	--	--	--	GAPI
GR Jig-Background	152.0	N/A	--	--	--	--	GAPI

































#### ThruBit String / Equipment Identification





##### Primary Equipment:









































Induction Resistivity	TBI – A	28
Density	TBD – A	36
Gamma-Ray Logging Source	GGLS – FZ	
Thermal Neutron	TBN – A	12
Neutron Logging Source	NNLS – EWA	
Telemetry Memory GR	TMG – A	49
Battery	TBAT –	14
Battery	TBAT –	21




##### Auxiliary Equipment:



ThruBit String Master Calibration					
TBI Master Calibration Sonde Errors					
Freq 1, A1, R	Value	Nominal	Freq 1, A1, X	Value	Nominal
	-456.898	-457.000		-98.3795	300.000
-556.000 (Minimum)	-387.000 (Maximum)		-500.000 (Minimum)	1100.00 (Maximum)	
(Nominal)			(Nominal)		
Freq 1, A2, R	Value	Nominal	Freq 1, A2, X	Value	Nominal
	-148.961	-141.000		11.8015	320.000
-182.000 (Minimum)	-120.000 (Maximum)		-75.0000 (Minimum)	700.000 (Maximum)	
(Nominal)			(Nominal)		









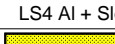
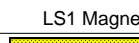
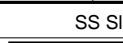



Freq 1, A3, R			Value	Nominal	Freq 1, A3, X			Value	Nominal
			-28.4668	-28.0000				-78.4892	50.0000
-38.0000 (Minimum)	(Nominal)		-18.0000 (Maximum)		-375.000 (Minimum)	(Nominal)		475.000 (Maximum)	
Freq 1, A4, R			Value	Nominal	Freq 1, A4, X			Value	Nominal
			-15.3238	-16.0000				231.406	300.000
-24.0000 (Minimum)	(Nominal)		-8.00000 (Maximum)		25.0000 (Minimum)	(Nominal)		575.000 (Maximum)	
Freq 1, A5, R			Value	Nominal	Freq 1, A5, X			Value	Nominal
			-13.5560	-14.0000				115.891	150.000
-21.0000 (Minimum)	(Nominal)		-7.00000 (Maximum)		25.0000 (Minimum)	(Nominal)		300.000 (Maximum)	
Freq 2, A1, R			Value	Nominal	Freq 2, A1, X			Value	Nominal
			-235.364	-237.000				-102.418	150.000
-313.000 (Minimum)	(Nominal)		-186.000 (Maximum)		-375.000 (Minimum)	(Nominal)		675.000 (Maximum)	
Freq 2, A2, R			Value	Nominal	Freq 2, A2, X			Value	Nominal
			-96.1500	-92.0000				-21.6378	160.000
-126.000 (Minimum)	(Nominal)		-76.0000 (Maximum)		-100.000 (Minimum)	(Nominal)		425.000 (Maximum)	
Freq 2, A3, R			Value	Nominal	Freq 2, A3, X			Value	Nominal
			-20.7695	-21.0000				-104.294	-20.0000
-28.0000 (Minimum)	(Nominal)		-13.0000 (Maximum)		-325.000 (Minimum)	(Nominal)		250.000 (Maximum)	
Freq 2, A4, R			Value	Nominal	Freq 2, A4, X			Value	Nominal
			-18.5844	-20.0000				66.1898	100.000
-28.0000 (Minimum)	(Nominal)		-10.0000 (Maximum)		-75.0000 (Minimum)	(Nominal)		275.000 (Maximum)	
Freq 2, A5, R			Value	Nominal	Freq 2, A5, X			Value	Nominal
			-18.6638	-20.0000				-18.4877	-25.0000
-27.0000 (Minimum)	(Nominal)		-10.0000 (Maximum)		-125.000 (Minimum)	(Nominal)		100.000 (Maximum)	
Freq 3, A1, R			Value	Nominal	Freq 3, A1, X			Value	Nominal
			-145.653	-149.000				-152.283	25.0000
-213.000 (Minimum)	(Nominal)		-108.000 (Maximum)		-375.000 (Minimum)	(Nominal)		425.000 (Maximum)	
Freq 3, A2, R			Value	Nominal	Freq 3, A2, X			Value	Nominal
			-72.5751	-70.0000				-58.5200	70.0000
-101.000 (Minimum)	(Nominal)		-57.0000 (Maximum)		-125.000 (Minimum)	(Nominal)		250.000 (Maximum)	
Freq 3, A3, R			Value	Nominal	Freq 3, A3, X			Value	Nominal
			-17.0791	-17.0000				-136.128	-90.0000
-23.0000 (Minimum)	(Nominal)		-11.0000 (Maximum)		-300.000 (Minimum)	(Nominal)		125.000 (Maximum)	
Freq 3, A4, R			Value	Nominal	Freq 3, A4, X			Value	Nominal
			-20.5310	-22.0000				-44.3374	-50.0000
-31.0000 (Minimum)	(Nominal)		-11.0000 (Maximum)		-200.000 (Minimum)	(Nominal)		100.000 (Maximum)	
Freq 3, A5, R			Value	Nominal	Freq 3, A5, X			Value	Nominal
			-21.4762	-22.0000				-117.307	-110.000
-32.0000 (Minimum)	(Nominal)		-11.0000 (Maximum)		-250.000 (Minimum)	(Nominal)		0 (Maximum)	
Freq 4, A1, R			Value	Nominal	Freq 4, A1, X			Value	Nominal
			-78.3716	-80.0000				-266.391	-190.000
-128.000 (Minimum)	(Nominal)		-54.0000 (Maximum)		-450.000 (Minimum)	(Nominal)		75.0000 (Maximum)	
Freq 4, A2, R			Value	Nominal	Freq 4, A2, X			Value	Nominal
			-52.1732	-50.0000				-125.718	-75.0000
-80.0000 (Minimum)	(Nominal)		-41.0000 (Maximum)		-200.000 (Minimum)	(Nominal)		50.0000 (Maximum)	
Freq 4, A3, R			Value	Nominal	Freq 4, A3, X			Value	Nominal
			-13.6750	-14.0000				-200.702	-190.000
-19.0000 (Minimum)	(Nominal)		-8.00000 (Maximum)		-350.000 (Minimum)	(Nominal)		-25.0000 (Maximum)	


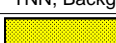






Freq 4, A4, R		Value	Nominal	Freq 4, A4, X		Value	Nominal
		-23.5566	-25.0000			-209.711	-235.000
-37.0000 (Minimum)	(Nominal)	-11.0000 (Maximum)		-400.000 (Minimum)	(Nominal)	-75.0000 (Maximum)	
Freq 4, A5, R		Value	Nominal	Freq 4, A5, X		Value	Nominal
		-27.1384	-28.0000			-284.972	-300.000
-43.0000 (Minimum)	(Nominal)	-12.0000 (Maximum)		-475.000 (Minimum)	(Nominal)	-100.000 (Maximum)	
Master: 17-Jun-2014 7:35							





ThruBit String Master Calibration							
TBI Master Calibration COMPLEX GAINS							
Freq 1, R		Value	Nominal	Freq 1, X		Value	Nominal
		0.9971	1.000			-0.005077	0
		0.9916	1.000			-0.0001806	0
		0.9985	1.000			-0.006362	0
		0.9860	1.000			0.01510	0
		0.9951	1.000			0.0004968	0
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
Freq 2, R		Value	Nominal	Freq 2, X		Value	Nominal
		0.9914	1.000			-0.01297	0
		0.9856	1.000			-0.009472	0
		0.9868	1.000			-0.008611	0
		0.9817	1.000			0.001065	0
		0.9923	1.000			-0.01000	0
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
Freq 3, R		Value	Nominal	Freq 3, X		Value	Nominal
		0.9970	1.000			-0.001220	0
		0.9917	1.000			0.001593	0
		0.9926	1.000			0.002038	0
		0.9863	1.000			0.009428	0
		0.9989	1.000			0.0009417	0
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
0.9500 (Minimum)		1.050 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
Freq 4, R		Value	Nominal	Freq 4, X		Value	Nominal
		0.9888	1.000			-0.005971	0
		0.9830	1.000			-0.003925	0
		0.9855	1.000			-0.005729	0
		0.9777	1.000			0.001326	0
		0.9996	1.000			-0.008338	0
0.9300 (Minimum)		1.070 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
0.9300 (Minimum)		1.070 (Maximum)		-0.05000 (Minimum)		0.05000 (Maximum)	
Master: 17-Jun-2014 7:35							

ThruBit String Master Calibration								
TBD Caliper Master Calibration								
Caliper 12in Ring IN	Value	Nominal	Caliper 9in Ring IN	Value	Nominal	Caliper 6in Ring IN	Value	Nominal
	1842.2	1949.8		2007.1	2096.7		2167.2	2285.7
1799.8 (Minimum)	(Nominal)	2099.8 (Maximum)	1946.7 (Minimum)	(Nominal)	2246.7 (Maximum)	2135.7 (Minimum)	(Nominal)	2435.7 (Maximum)
Master: 31-Jul-2014 15:01								

ThruBit String Master Calibration					
TBD Density Master Calibration. Be Window, Thrubit blocks					
Aluminium Density G/C3	Value	Nominal	Magnesium Density G/C3	Value	Nominal
					

		2.607			1.752	1.752
2.557 (Minimum)	(Nominal)	2.657 (Maximum)		1.702 (Minimum)	(Nominal)	1.802 (Maximum)
LS1 Background CPS		Value	Nominal	SS1 Background CPS		Value
		126.98	140.00			128.25
100.00 (Minimum)	(Nominal)	187.00 (Maximum)		100.00 (Minimum)	(Nominal)	185.00 (Maximum)
LS4 Background CPS		Value	Nominal	SS1 Aluminium CPS		Value
		27.71	29.00			4656.72
20.00 (Minimum)	(Nominal)	38.00 (Maximum)		4076.00 (Minimum)	(Nominal)	5613.00 (Maximum)
LS1 Aluminium CPS		Value	Nominal	SS1 Magnesium CPS		Value
		800.50	870.00			7881.68
750.00 (Minimum)	(Nominal)	982.00 (Maximum)		6695.00 (Minimum)	(Nominal)	9269.00 (Maximum)
LS4 Aluminium CPS		Value	Nominal			
		917.12	955.00			
796.00 (Minimum)	(Nominal)	1169.0 (Maximum)				
LS1 Al + Sleeve CPS		Value	Nominal			
		665.11	725.00			
650.00 (Minimum)	(Nominal)	838.00 (Maximum)				
LS4 Al + Sleeve CPS		Value	Nominal			
		401.78	426.50			
382.00 (Minimum)	(Nominal)	638.00 (Maximum)				
LS1 Magnesium CPS		Value	Nominal			
		5381.45	5800.00			
5158.00 (Minimum)	(Nominal)	6486.00 (Maximum)				
SS Slope		Value	Nominal			
		1.572	1.645			
1.520 (Minimum)	(Nominal)	1.770 (Maximum)				
LS Slope		Value	Nominal			
		0.4132	0.4150			
0.3800 (Minimum)	(Nominal)	0.4500 (Maximum)				
Pef K Factor		Value	Nominal			
		5.019	4.840			
3.510 (Minimum)	(Nominal)	6.170 (Maximum)				
Pef B Factor		Value	Nominal			
		-0.5546	-0.5550			
-0.7000 (Minimum)	(Nominal)	-0.4100 (Maximum)				
Master: 31-Jul-2014 14:58						

ThruBit String Master Calibration					
Thermal Neutron Master Calibration					
TNF, Background CPS		Value	Nominal	TNN, Background CPS	
		1.0	1.0		
0 (Minimum)	2.0 (Nominal)	2.0 (Maximum)		0 (Minimum)	2.0 (Nominal)
TNF, Tank CPS		Value	Nominal	TNN, Tank CPS	
		57.09	96.00		
25.00 (Minimum)	200.0 (Nominal)	200.0 (Maximum)		750.00 (Minimum)	5700.0 (Nominal)
TNF, Tank + Al Sleeve CPS		Value	Nominal	TNN, Tank + Al Sleeve CPS	
		1847.0	3040.0		
727.00 (Minimum)	6080.0 (Nominal)	6080.0 (Maximum)		8000.00 (Minimum)	64700.0 (Nominal)
Tank + Al Sleeve Ratio		Value	Nominal	Tank + Al Sleeve Porosity PU	
		10.701	10.707		

	10.701	10.797		14.40	14.40
10.300 (Minimum)	11.300 (Maximum)		13.40 (Minimum)	15.40 (Maximum)	
Tank, Ratio		Value	Tank, Temperature DEGF		Value
	30.822	30.958		73.0	70.0
28.000 (Minimum)	34.000 (Maximum)		20.0 (Minimum)	120 (Maximum)	
Master: 31-Jul-2014 12:52					

ThruBit String Master Calibration							
TMG Accelerometer Calibration							
Minimum Ax, m/s2		Value	Nominal	Maximum Ax, m/s2		Value	Nominal
NOT DONE		N/A	-9.810	NOT DONE		N/A	9.810
-10.81 (Minimum)		-8.810 (Maximum)		8.810 (Minimum)		10.81 (Maximum)	
Minimum Ay, m/s2		Value	Nominal	Maximum Ay, m/s2		Value	Nominal
NOT DONE		N/A	-9.810	NOT DONE		N/A	9.810
-10.81 (Minimum)		-8.810 (Maximum)		8.810 (Minimum)		10.81 (Maximum)	
Minimum Az, m/s2		Value	Nominal	Maximum Az, m/s2		Value	Nominal
NOT DONE		N/A	0	NOT DONE		N/A	9.810
-1.000 (Minimum)		1.000 (Maximum)		8.810 (Minimum)		10.81 (Maximum)	
RB Offset, degrees		Value	Nominal				
NOT DONE		N/A	0				
-360.0 (Minimum)		360.0 (Maximum)					
Master: Calibration not done							

ThruBit String Master Calibration							
TMG Gamma-Ray Calibration							
GR Background GAPI		Value	Nominal	GR Jig-Background GAPI		Value	Nominal
<div>NOT DONE</div>		N/A	30.00	<div>NOT DONE</div>		N/A	152.0
0 (Minimum)	(Nominal)	120.0 (Maximum)		121.6 (Minimum)	(Nominal)	182.4 (Maximum)	
Master: Calibration not done							

Company: **NIGHTHAWK PRODUCTION LLC**

Well: **BLACKCOMB 12-14**  
Field: **ARIKAREE CREEK**  
County: **LINCOLN**  
State: **COLORADO**



ARRAY INDUCTION  
DENSITY / NEUTRON  
GAMMA RAY MEMORY LOG