

SlimPulse-Gamma Ray

2 in./ 100 ft and 5 in./ 100 ft True Vertical Depth

Recorded Mode, Composite Log

Schlumberger

Company: Noble Energy INC

Well: Five Rivers K09-66-1AHN

Field: Wattenberg

County: Weld

State: Colorado

Country: USA

Section: 8

APIN: 05-123-39479

Township: 4N

Rig Name: H&P 330

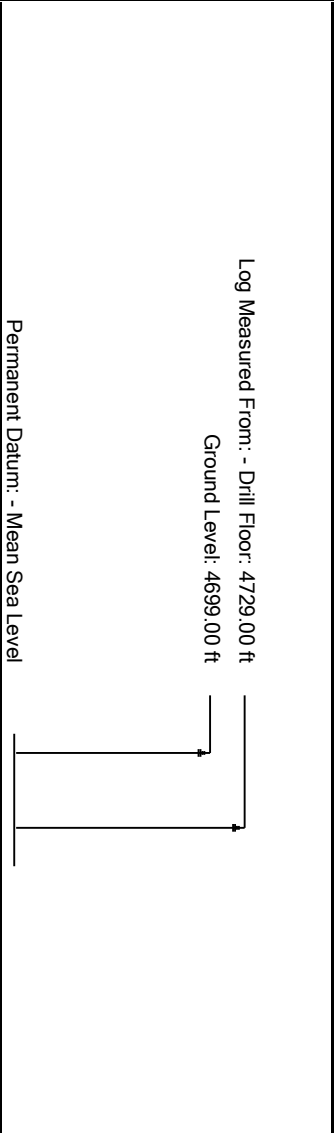
Range: 66W

Rig Type: Top Drive

FL: NAD83 Colorado State Plane, Northern Zone, US Feet

FL1: Latitude: N 40° 19' 39.792", Easting: 1363019.461 ftUS

FL2: Longitude: W 104° 47' 27.600", Northing: 3197672.267 ftUS



Acquisition Dates:	24-Aug-2014 -- 01-Sep-2014	Other Services:
Log Interval:	627(ft)TVD to 7113(ft)TVD	Surveys / Continuous D&I
Index Types:	True Vertical Depth	Downhole Temperature
Index Scales:	1:600    2" / 100', 1:240    5" / 100'	Downhole Shocks
Depth Source:	Driller's Depth	Directional Drilling
Depth Sensor:	PASON	
Print Type:	Final	
Spud Date:	23-Aug-2014	



Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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Borehole Size/Casing Record

Bit						
Bit Size ( in )	8.75	6.125				
Top Driller ( ft )	633	7552				
Bottom Driller ( ft )	7552	12096				
Casing						
Size ( in )	9.625	7				
Weight ( lbm/ft )	36	26				
Inner Diameter ( in )	8.921	6.276				
Grade	J55	P110				
Top Driller ( ft )	0	0				
Bottom Driller ( ft )	623	7541				

Operational Run Summary

Parameter ( unit )	Run001	Run002	Run003	Run004		
Date Log Started	24-Aug-2014	25-Aug-2014	27-Aug-2014	30-Aug-2014		
Time Log Started	12:41:06	00:39:22	16:19:26	05:41:36		
Date Log Finished	24-Aug-2014	26-Aug-2014	28-Aug-2014	01-Sep-2014		
Time Log Finished	22:20:30	15:40:33	21:38:52	19:56:06		
Bit Size ( in )	8.750	8.750	8.750	6.125		
Bit Start Depth ( ft )	633.00	1708.00	6346.00	7552.00		
Bit Stop Depth ( ft )	1708.00	6346.00	7552.00	12096.00		
Top Log Interval ( ft )	577.00	1657.00	6297.00	7493.00		
Bottom Log Interval ( ft )	1657.00	6297.00	7493.00	12028.00		
Max Hole Deviation ( deg )	9.51	10.57	77.52	93.92		
Azimuth of Max Deviation ( deg )	234.59	233.41	93.68	91.03		
Logging Unit Number	Command Center	Command Center	Command Center	Command Center		
Logging Unit Location	Zone 2	Zone 2	Zone 2	Zone 2		
Recorded By	Zach Brunson	Zach Brunson	Zach Brunson	Zach Brunson		
Witnessed By	Lane Fullenwider	Lane Fullenwide	Lane Fullenwide	Derek Dupee		
Service Order Number	14CCO0621	14CCO0621	14CCO0621	14CCO0621		

Borehole Fluids

Parameter( unit )	Run001	Run002	Run003	Run004		
Fluid Type	Water	Water	Water	Water		
Fluid Name	Fresh Water	Fresh Water	Fresh Water	Fresh Water		
Max Recorded Temperatures ( degF )	117.14	212	212	251.6		
Source of Sample	Active Tank	Active Tank	Active Tank	Active Tank		

Salinity ( ppm )	2500	2000	1900	1600		
Density ( lbm/gal )	8.85	Zoned	10.5	Zoned		
Funnel Viscosity ( s )	38	49	40	39		
Fluid Loss ( cm3 )						
PH	9.8	8.6	9	9		
Source RMF						
RMC	Pressed	Pressed	Pressed	Pressed		
RM @ Meas Temp ( ohm.m@degF )	0.2 @ 68	0.2 @ 68	0.2 @ 68	0.2 @ 68		
RMF @ Meas Temp ( ohm.m@degF )	0.15 @ 68	0.15 @ 68	0.15 @ 68	0.15 @ 68		
RMC @ Meas Temp ( ohm.m@degF )						
RM @ BHT ( ohm.m@degF )	0.14 @ 99.5	0.1 @ 141.8	0.09 @ 153.3	0.06 @ 251.6		
RMF @ BHT ( ohm.m@degF )	0.11 @ 99.5	0.08 @ 141.8	0.07 @ 153.3	0.04 @ 251.6		
RMC @ BHT ( ohm.m@degF )	NaN @ 99.5	NaN @ 141.8	NaN @ 153.3	NaN @ 251.6		
Total Solid ( % )	2.9	8.6	10.2	11.6		
High Gravity Solids ( % )	0.9	4.8	6.3	7.2		

Zoned Borehole Fluids

Run002

Parameter	Value	Start
Density	8.8	8/25/2014 12:39:22 AM
Density	9.3	8/25/2014 2:00:00 PM
Density	10.1	8/26/2014 2:30:00 AM

Run004

Parameter	Value	Start
Density	10.6	8/30/2014 5:41:36 AM
Density	10.8	8/31/2014 12:30:00 AM
Density	10.9	8/31/2014 2:00:00 PM
Density	10.8	9/1/2014 12:30:03 AM

Remarks and Equipment Summary

Data presented is from tool memory and acquired while drilling from 633.0 ft MD to 12096.0 ft MD

Depth Reference: Driller's Depth

Environmental Corrections: Gamma Ray is corrected for bit size, mud weight, and tool collar thickness. Barite and Potassium in the mud affect Gamma Ray readings.

Run001: Remarks	Run002: Remarks	Run003: Remarks
Run Objective: Drill Vertical Section to KOP	Run Objective: Drill Vertical Section to KOP	Run Objective: Drill Curve to Landing Point
Bit to GR: 50.45 ft Bit to DNI: 47.42 ft	Bit to GR: 51.47 ft Bit to DNI: 48.44 ft	Bit to GR: 58.48 ft Bit to DNI: 55.45 ft
Drilled from 633.0 ft MD to 1709.0 ft MD Logged from 582.0 ft MD to 1658.0 ft MD	Drilled from 1709.0 ft MD to 6346.0 ft MD Logged from 1658.0 ft MD to 6294.0 ft MD	Drilled from 6346.0 ft MD to 7552.0 ft MD Logged from 6294.0 ft MD to 7493.0 ft MD
SlimPulse Version Software: Version 11 SlimPulse GR Calibrated: 28-May-2014 SlimPulse D&I Calibrated: 19-Apr-2014	SlimPulse Version Software: Version 11 SlimPulse GR Calibrated: 19-Jul-2014 SlimPulse D&I Calibrated: 29-Jan-2014	SlimPulse Version Software: Version 11 SlimPulse GR Calibrated: 19-Jul-2014 SlimPulse D&I Calibrated: 29-Jan-2014
PathFinder, a Schlumberger Co Personnel: DD: Cotton Walker, Mike Hikes MWD: Zach Brunson, Maria Valles	PathFinder, a Schlumberger Co Personnel: DD: Cotton Walker, Mike Hikes MWD: Zach Brunson, Maria Valles	PathFinder, a Schlumberger Co Personnel: DD: Cotton Walker, Mike Hikes MWD: Zach Brunson, Maria Valles
Reason for POOH: MWD Tool Failure	Reason for POOH: Vertical Section TD	Reason for POOH: Curve Section TD

Run001: Toolstring	Run002: Toolstring	Run003: Toolstring
		<div> <div> <div>Equip name</div> <div>Flex DC: 6 3/4":D R18825</div> </div> <div> <div>Length</div> <div>103.38</div> </div> <div> <div>MP name</div> <div>NMFC</div> </div> <div> <div>Offset</div> <div></div> </div> </div>

[illegible]

Flt Sub: 6 3/4":DR 29.51  
18940

Motor:675002 26.35

SLB

Pathfinder

Generic PDC Bit:40 0.84  
07327

Varel

TOOL\_ZERO

Length: 8.75 in ft

Maximum Outer Diameter = 8.750 in

Line: Sensor Location, Value: Gating Offset

All measurements are relative to TOOL\_ZERO

Flt Sub: 6 3/4":DR 29.47  
18940

Motor:675002 26.31

SLB

Pathfinder

Generic PDC Bit:JJ 0.8  
6792

Smith

TOOL\_ZERO

Length: 8.75 in ft

Maximum Outer Diameter = 8.750 in

Line: Sensor Location, Value: Gating Offset

All measurements are relative to TOOL\_ZERO

NMDC: 6 3/4":DR 34.54  
6328

Motor:675007 24.98

NMPC

Pathfinder

Generic PDC Bit:JJ 0.66  
2936

SDi611

TOOL\_ZERO

Length: 8.75 in ft

Maximum Outer Diameter = 8.750 in

Line: Sensor Location, Value: Gating Offset

All measurements are relative to TOOL\_ZERO

Run004: Remarks

Run Objective: Drill Lateral Section to TD

Bit to GR: 67.99 ft

Bit to DNI: 64.96 ft

Drilled from 7552.0 ft MD to 12096.0 ft MD

Logged from 7493.0 ft MD to 12028.0 ft MD

SlimPulse Version Software: Version 11

SlimPulse GR Calibrated: 27-Jun-2014

SlimPulse D&I Calibrated: 15-Jul-2014

PathFinder, a Schlumberger Co Personnel:

DD: Chris Sisseck, Mike Hikes

MWD: Zach Brunson, Maria Valles

Reason for POOH: Well TD

Run004: Toolstring

Equip name	Length	MP name	Offset
NMDC: 4 3/4"[2]:D R27988	113.37	SLB	



SPULSE-GEN:DR27 82.3  
992  
FLOWSUB:DR27636  
SPCOLLAR:DR27992  
SPMA:938  
SPEC:989  
SPBA:Q01496  
UBHO:475U150

GR 67.99

D&I 64.96

Flt Sub: 4 3/4":DR 45.44  
13902

SLB

NMDC: 4 3/4"[1]:D 42.32  
R13743

NMPC

Motor:F50B0070 27.36

PF Motor 5.00 - G2



## Well Composite

## Software Version

Acquisition System		Version	
MaxWell		4.0.9163.3000	
Application Patch		Patch-SP-10767_22480-4.0.9163.3001	
		Patch-NPD_ADN8D_SP3-23661-4.0.9530.3002	
		Patch-Hotfix_rewrite_survey_for_petrolink-23199-4.0.9530.3002	
		Patch-Hotfix_MRT_SP3-23306-4.0.9530.3002	
Tool Elements	Description	Software Version	Firmware Version
DRILLING_SURFACE	DRILLING_SURFACE	4.0.9469.3000	
SPEC	SlimPulse Electronics Cartridge	4.0.9469.3000	

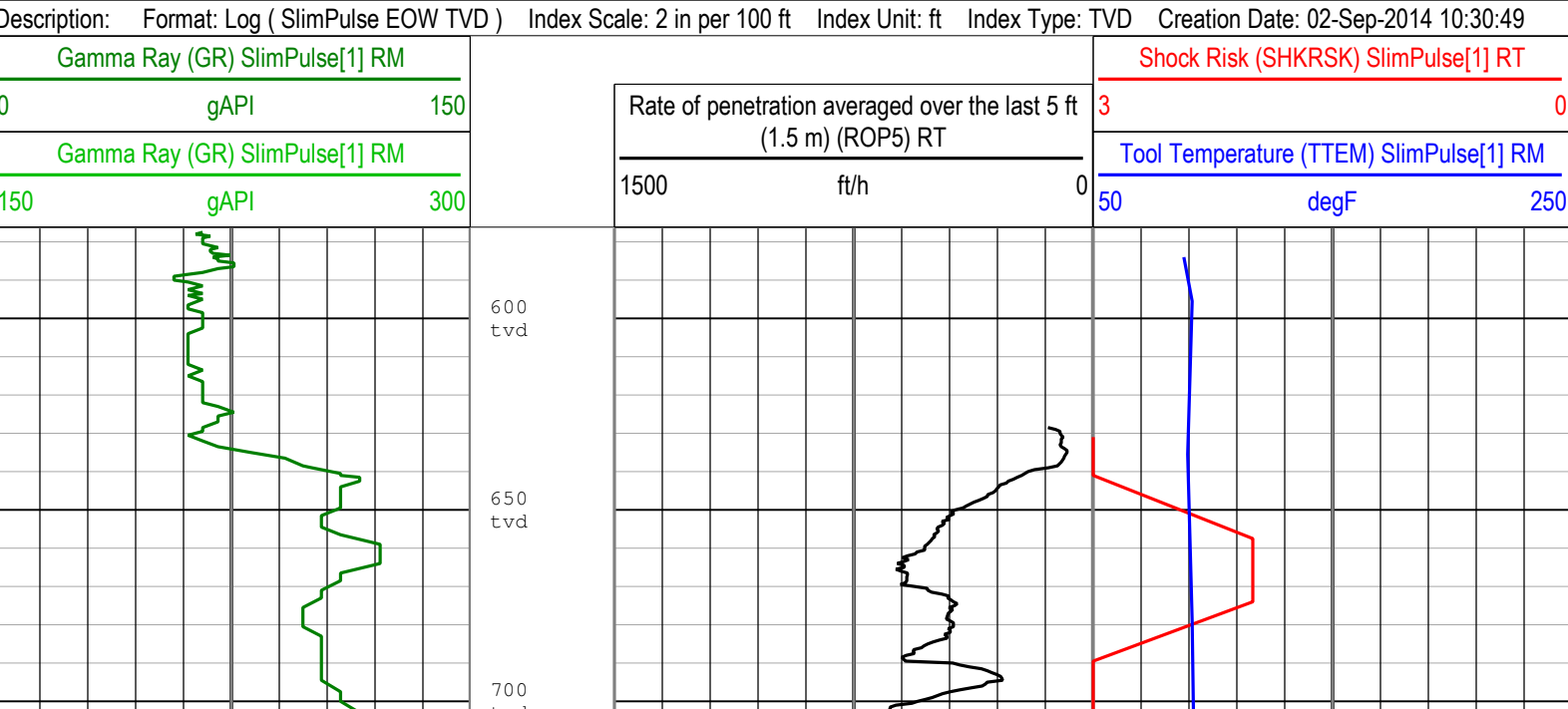
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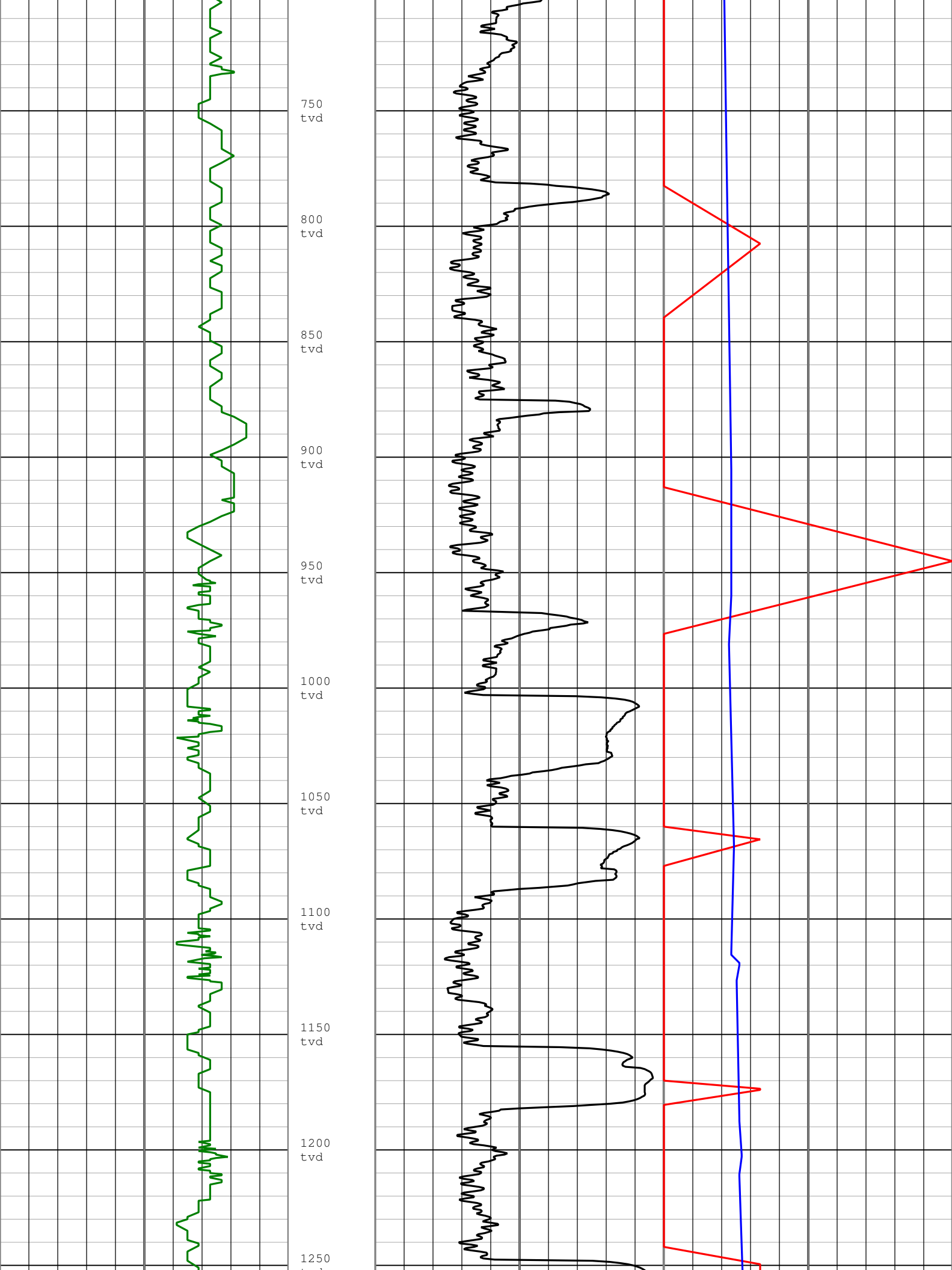
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Include Parallel Data
Run001	Drilling	Down	627.17 ft	1708.92 ft	24-Aug-2014 12:42:28 PM	24-Aug-2014 10:20:30 PM	No
Run002	Drilling	Down	1708.25 ft	6348.00 ft	25-Aug-2014 1:31:16 AM	26-Aug-2014 3:40:33 PM	No
Run003	Drilling	Down	6347.17 ft	7552.92 ft	27-Aug-2014 4:48:18 PM	28-Aug-2014 9:38:52 PM	No
Run004	Drilling	Down	7542.17 ft	12097.17 ft	30-Aug-2014 12:08:50 PM	01-Sep-2014 7:56:06 PM	No

All depths are referenced to toolstring zero

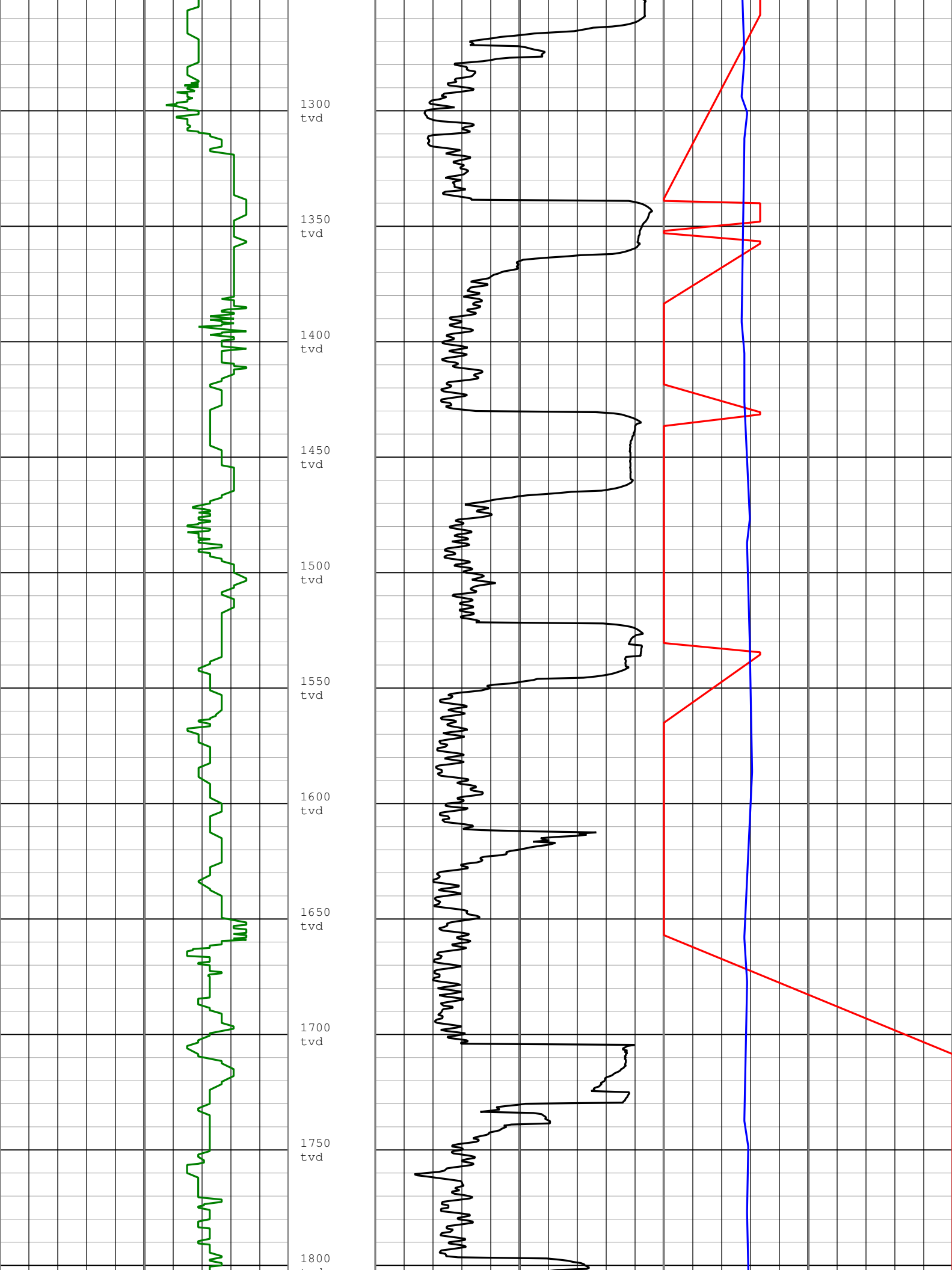
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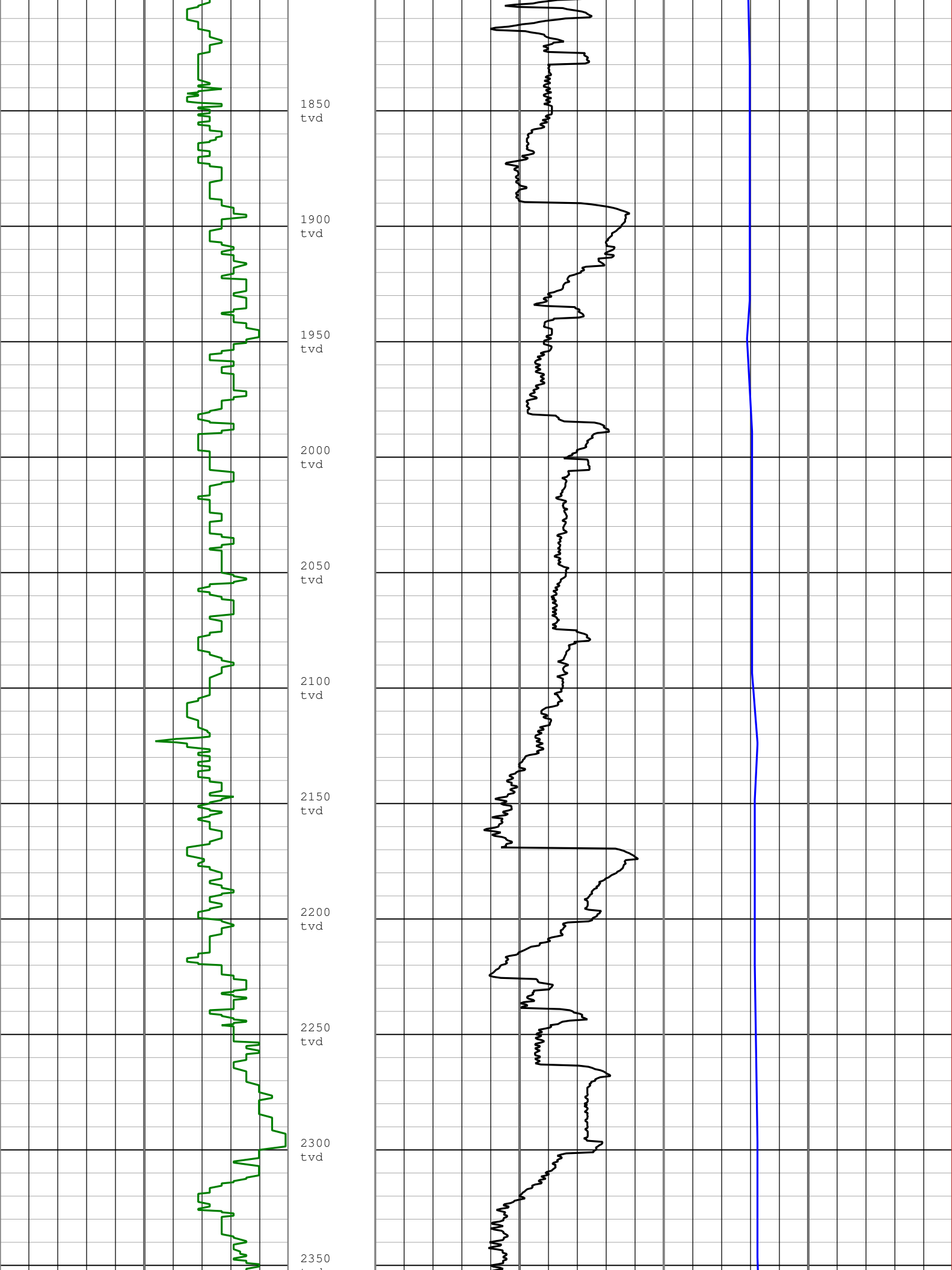
Company:Noble Energy INC Well:Five Rivers K09-66-1AHN  
Well Composite:S258

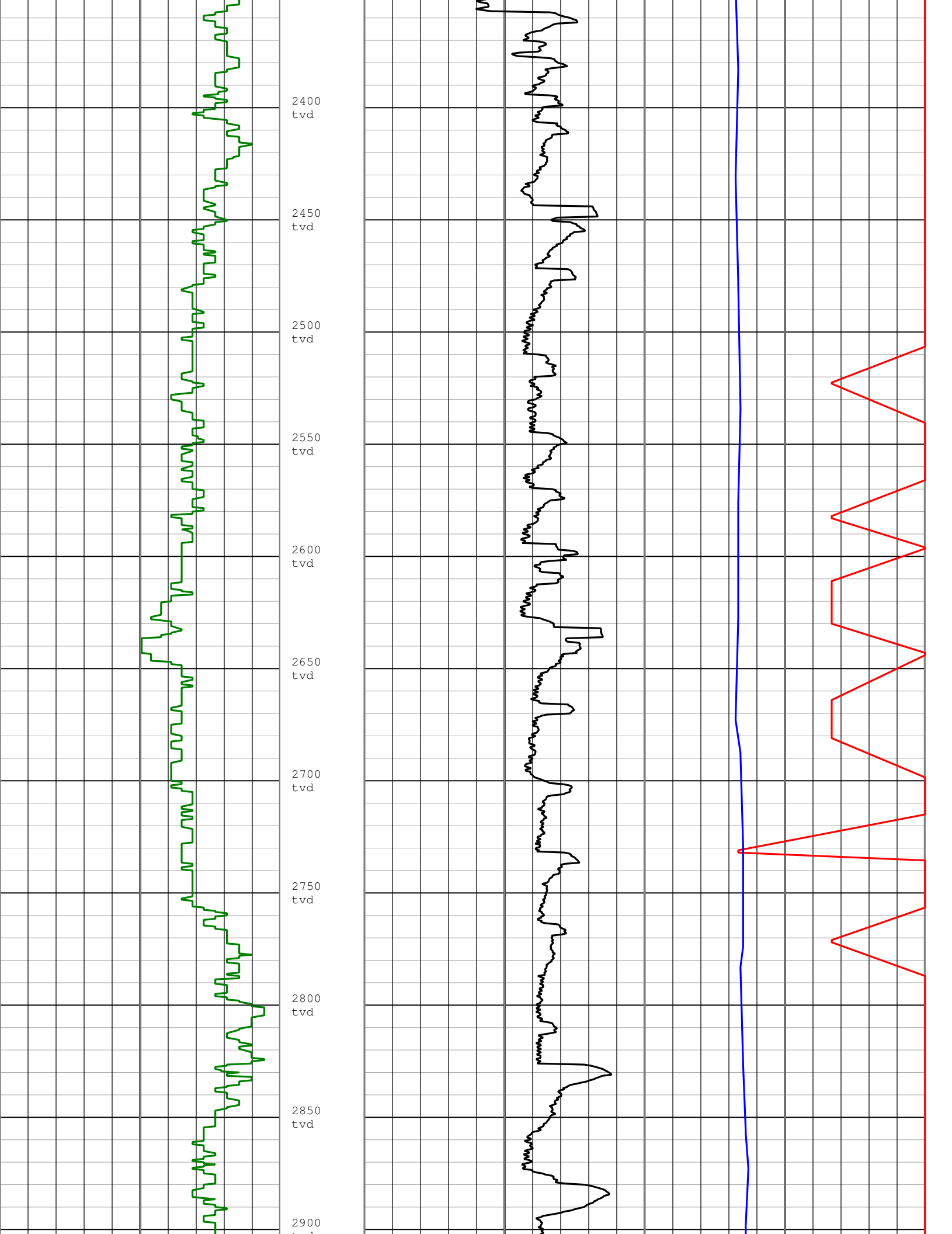


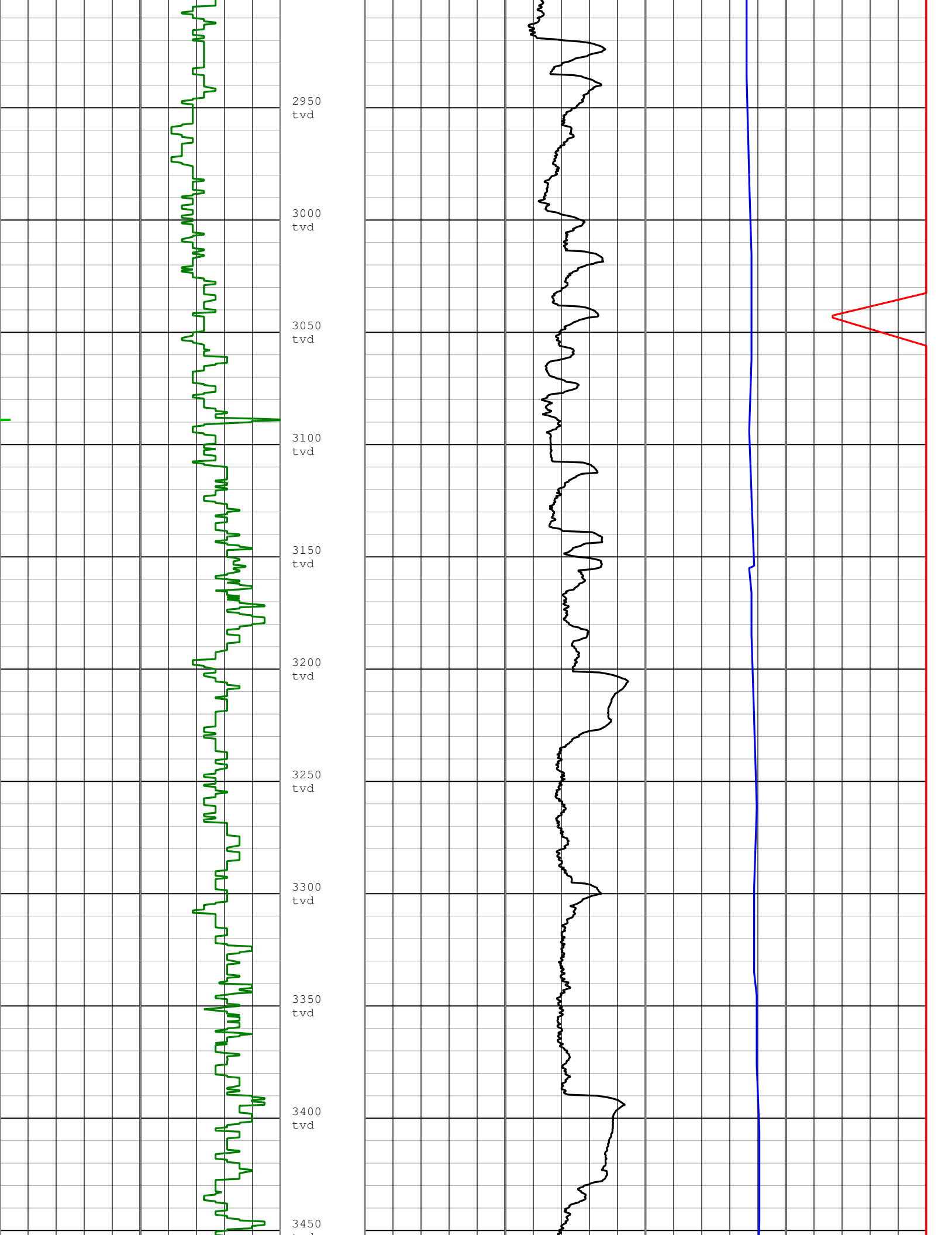


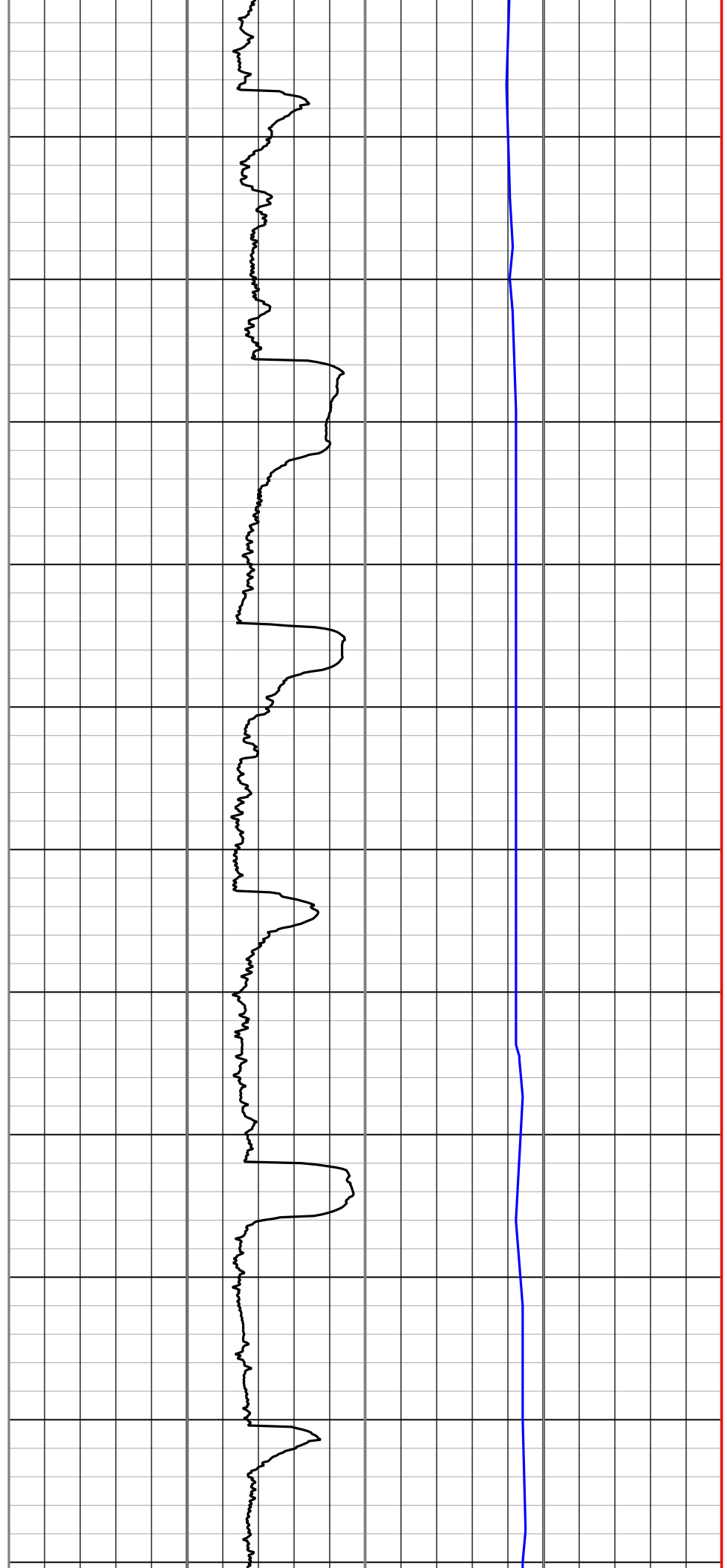
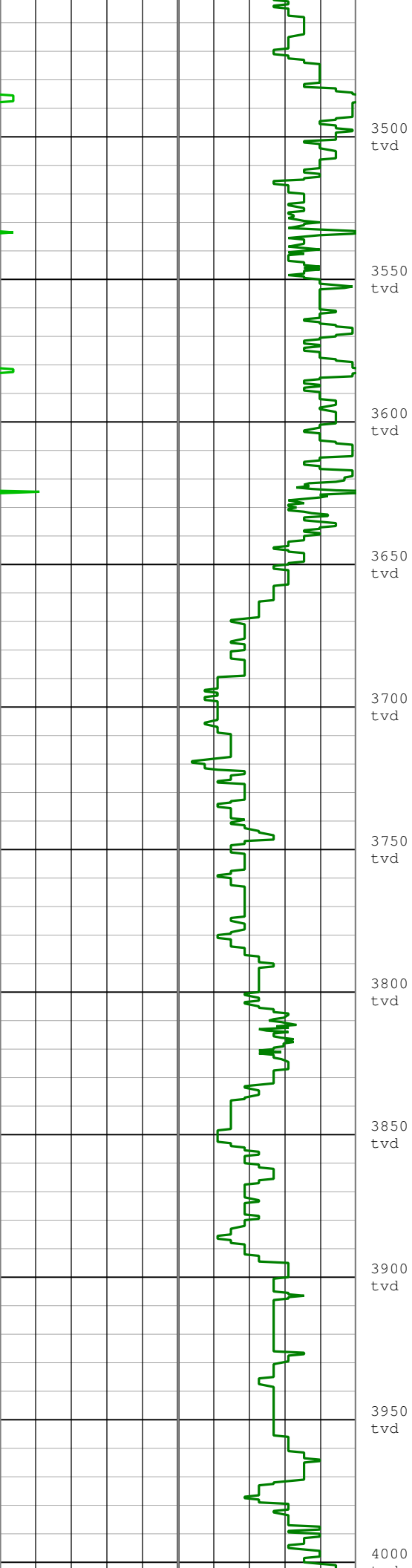


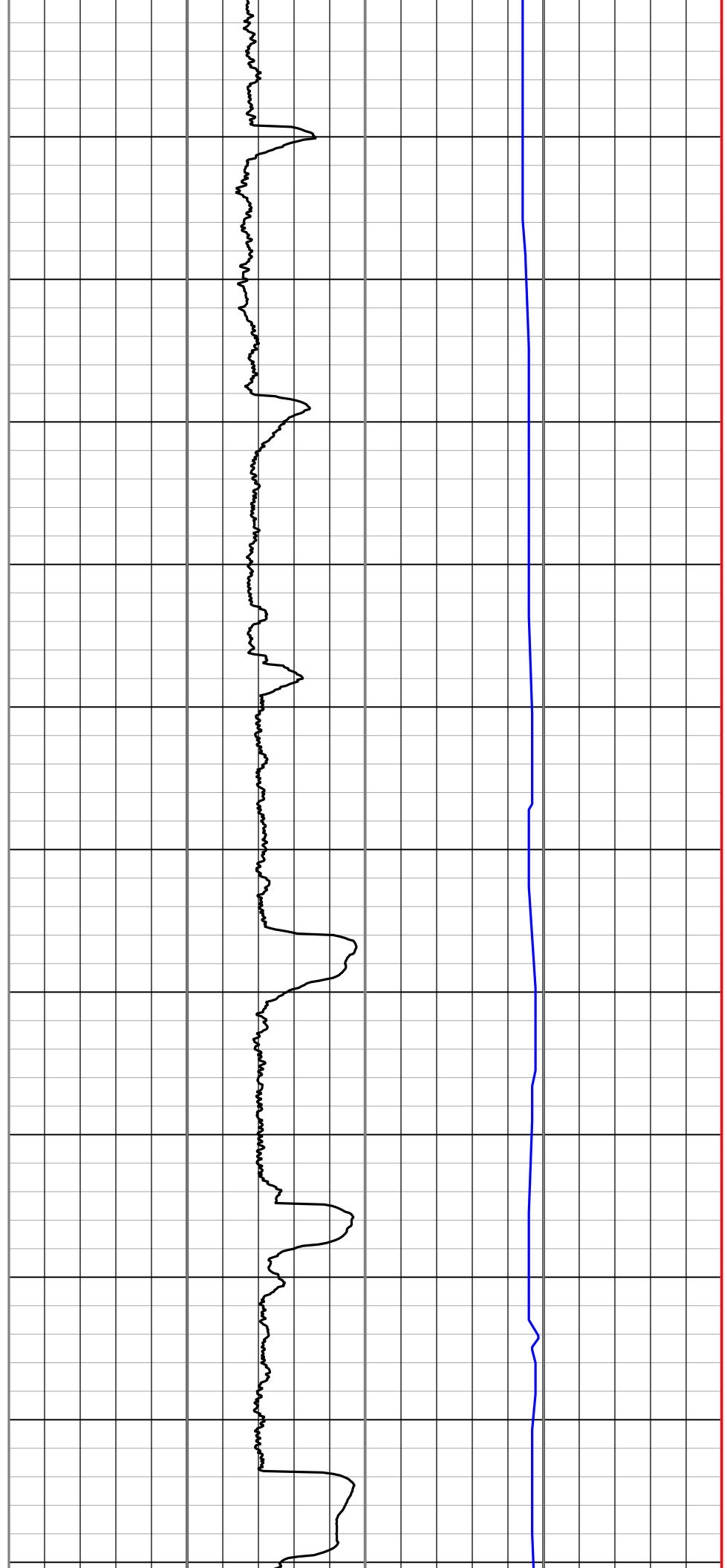
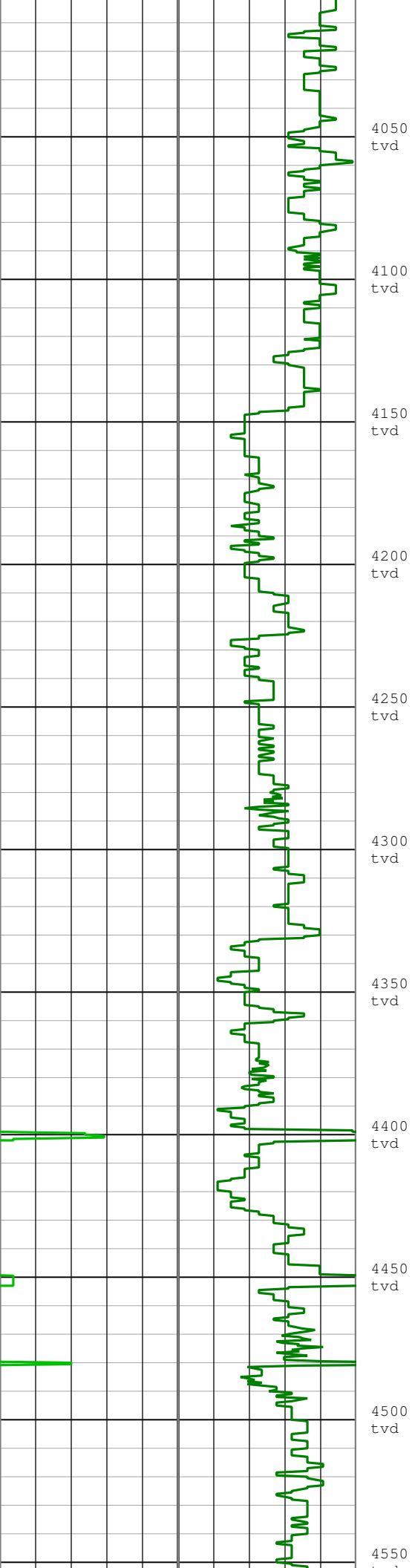


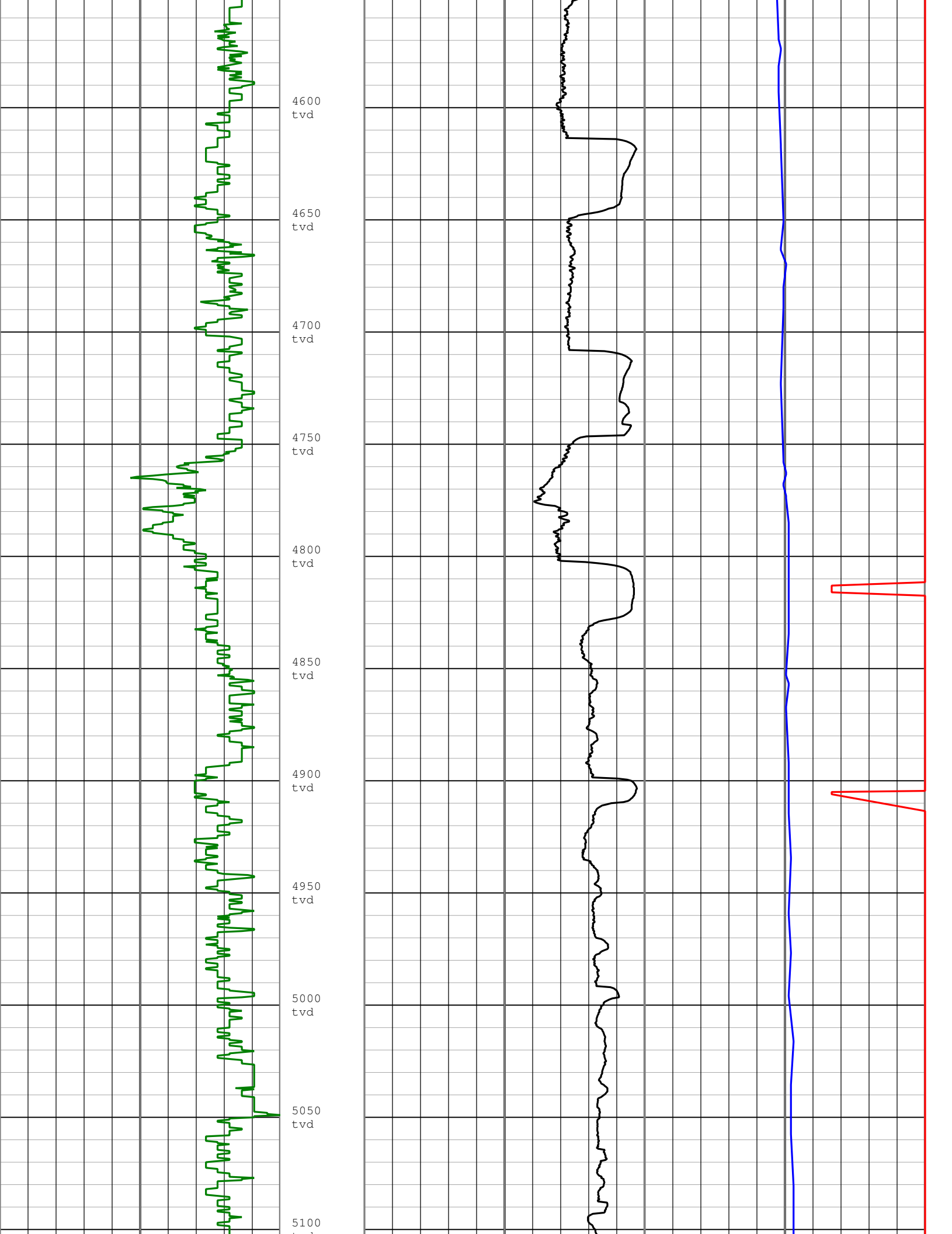


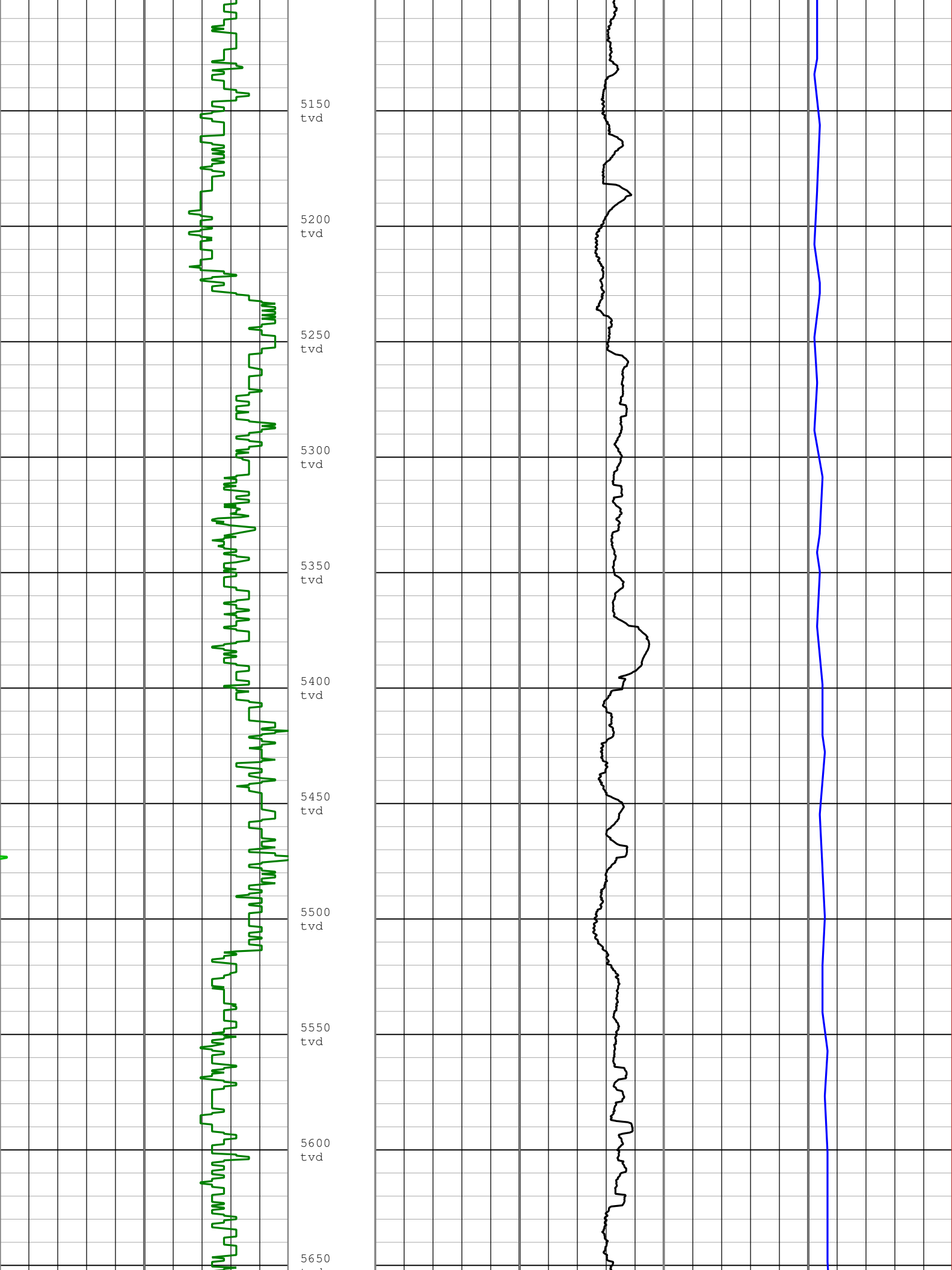




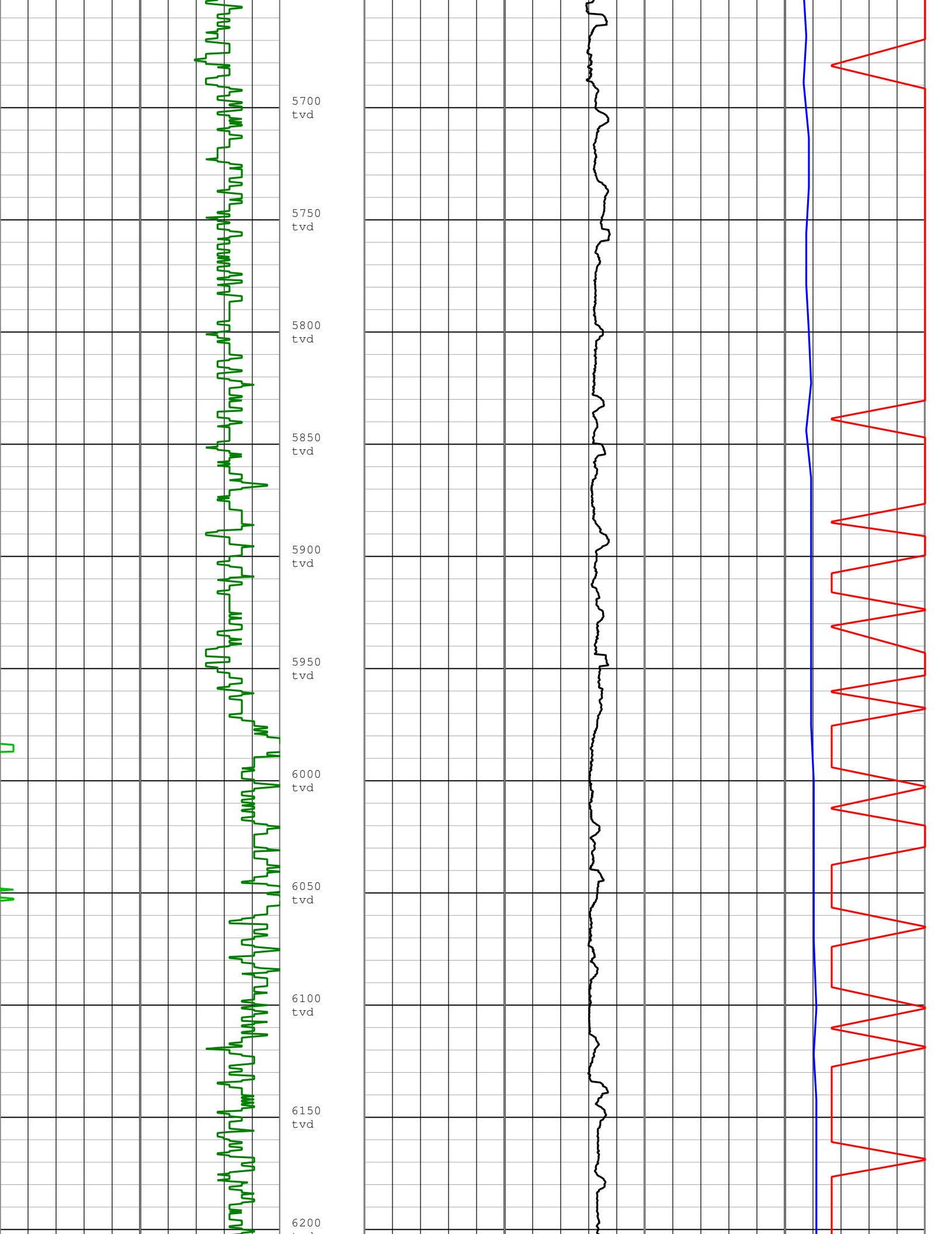


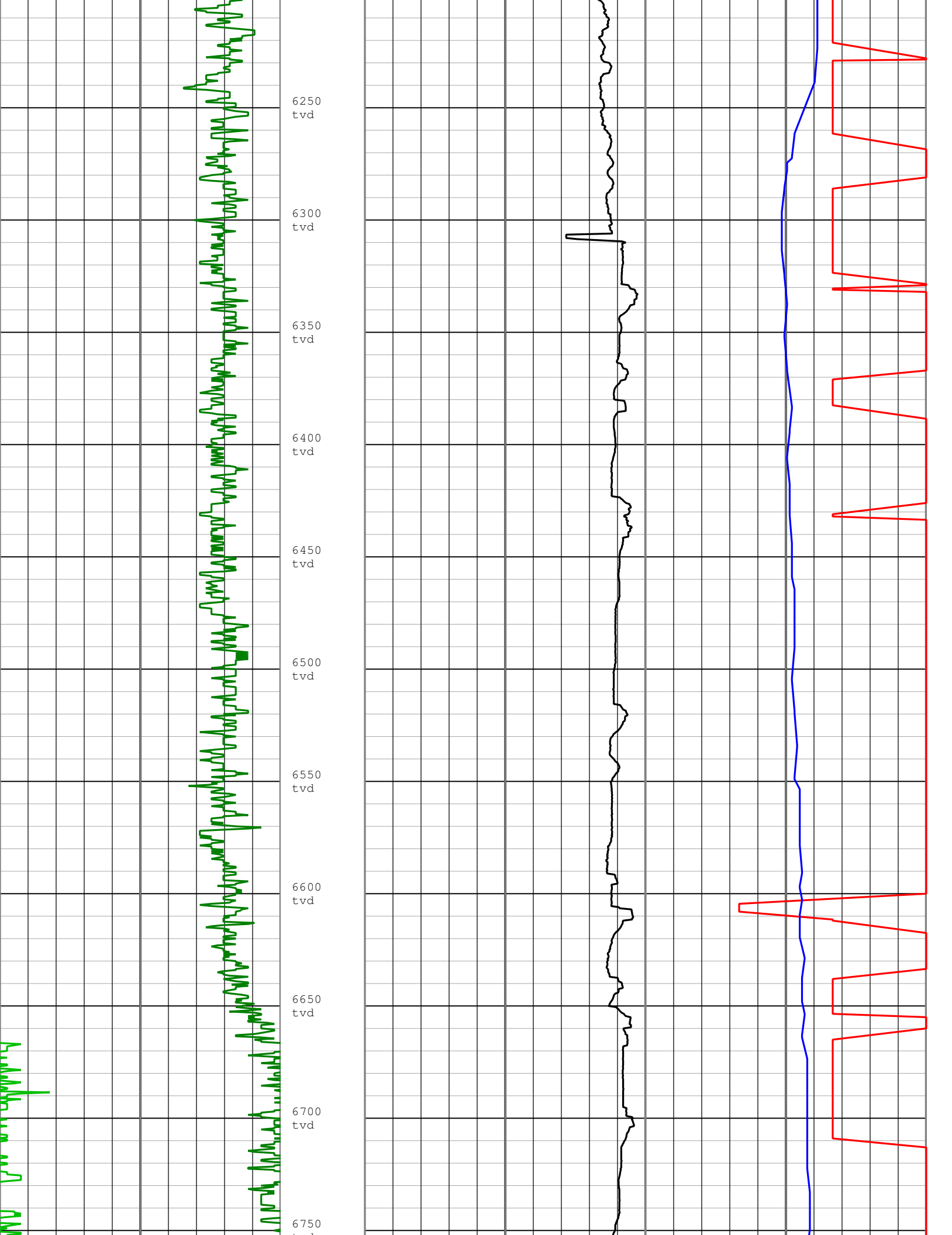


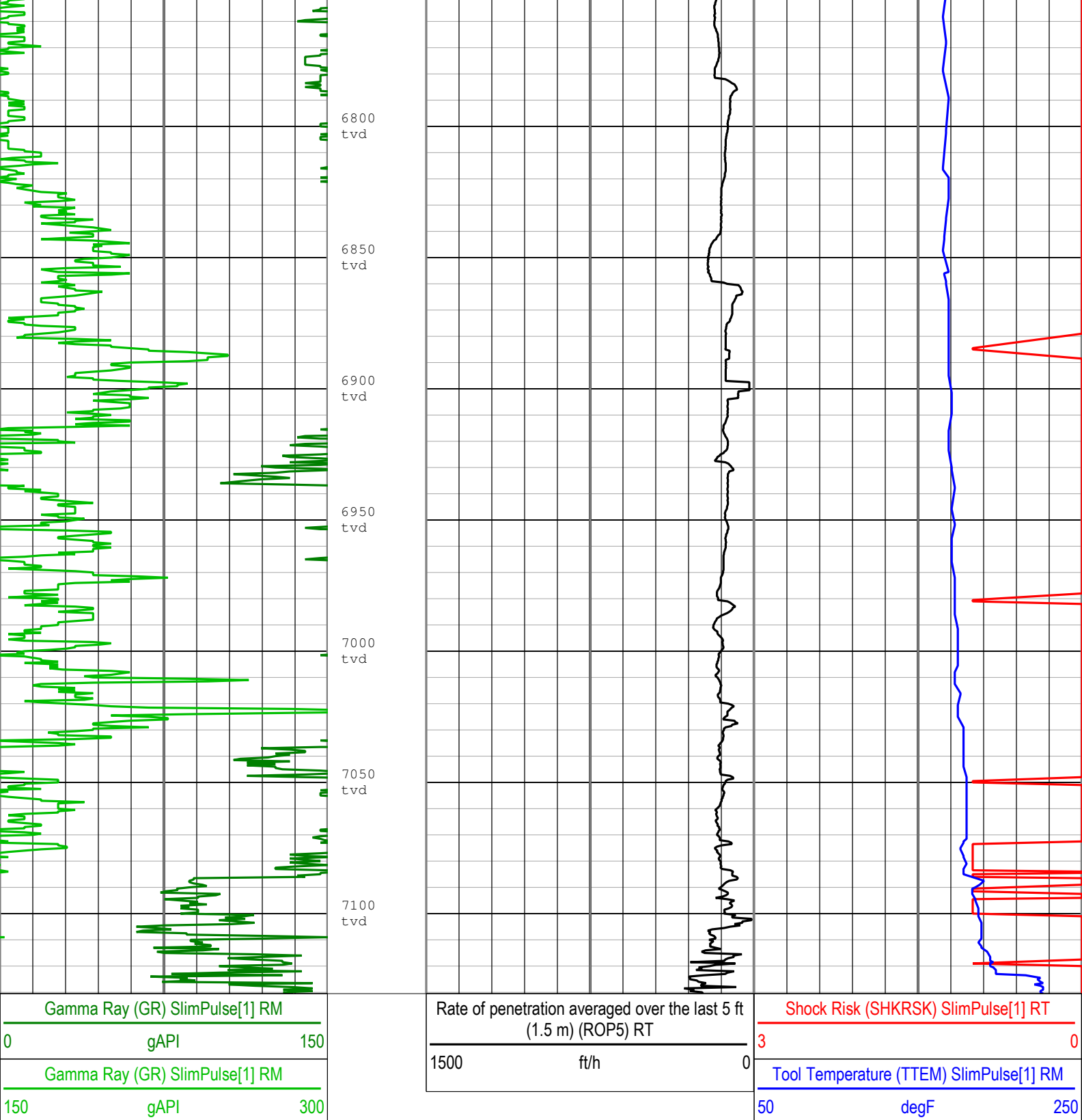












Description: Format: Log ( SlimPulse EOW TVD ) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: TVD Creation Date: 02-Sep-2014 10:30:49

## Channel Processing Parameters

### Run001: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	8.85	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

### Run002: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in

DFD	Drilling Fluid Density	Borehole	Time Zoned	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

Run002Time Zoned Parameters

Pass Drilling

Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
DFD	8.8	25-Aug-2014 01:31:16	25-Aug-2014 14:00:00	1708.25	4558.25
DFD	9.3	25-Aug-2014 14:00:00	26-Aug-2014 02:30:00	4558.25	6345.75
DFD	10.1	26-Aug-2014 02:30:00	26-Aug-2014 15:40:33	6345.75	6348

All depth are at tool zero.

Run003: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	10.5	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

Run004: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	Time Zoned	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

Run004Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	8.75	7075.45	7101.83
BS	6.125	7101.83	7130.6

All depth are actual.

Run004Time Zoned Parameters

Pass Drilling

Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
DFD	10.6	30-Aug-2014 12:08:50	31-Aug-2014 00:30:00	7542.17	9174
DFD	10.8	31-Aug-2014 00:30:00	31-Aug-2014 14:00:00	9174	10647.42
DFD	10.9	31-Aug-2014 14:00:00	01-Sep-2014 00:30:03	10647.42	11564.83
DFD	10.8	01-Sep-2014 00:30:03	01-Sep-2014 19:56:06	11564.83	12097.17

All depth are at tool zero.

Tool Control Parameters

Well Composite

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_22480-4.0.9163.3001
	Patch-NPD_ADN8D_SP3-23661-4.0.9530.3002
	Patch-Hotfix_overwrite_survey_for_petrolink-23199-4.0.9530.3002
	Patch-Hotfix_MRT_SP3-23306-4.0.9530.3002

Tool Elements	Description	Software Version	Firmware Version
DRILLING SURFACE	DRILLING SURFACE	4.0.9460.3000	

DRILLING_SURFACE	DRILLING_SURFACE	4.0.9469.3000	
SPEC	SlimPulse Electronics Cartridge	4.0.9469.3000	

## Composite Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Include Parallel Data
Run001	Drilling	Down	627.17 ft	1708.92 ft	24-Aug-2014 12:42:28 PM	24-Aug-2014 10:20:30 PM	No
Run002	Drilling	Down	1708.25 ft	6348.00 ft	25-Aug-2014 1:31:16 AM	26-Aug-2014 3:40:33 PM	No
Run003	Drilling	Down	6347.17 ft	7552.92 ft	27-Aug-2014 4:48:18 PM	28-Aug-2014 9:38:52 PM	No
Run004	Drilling	Down	7542.17 ft	12097.17 ft	30-Aug-2014 12:08:50 PM	01-Sep-2014 7:56:06 PM	No

All depths are referenced to toolstring zero

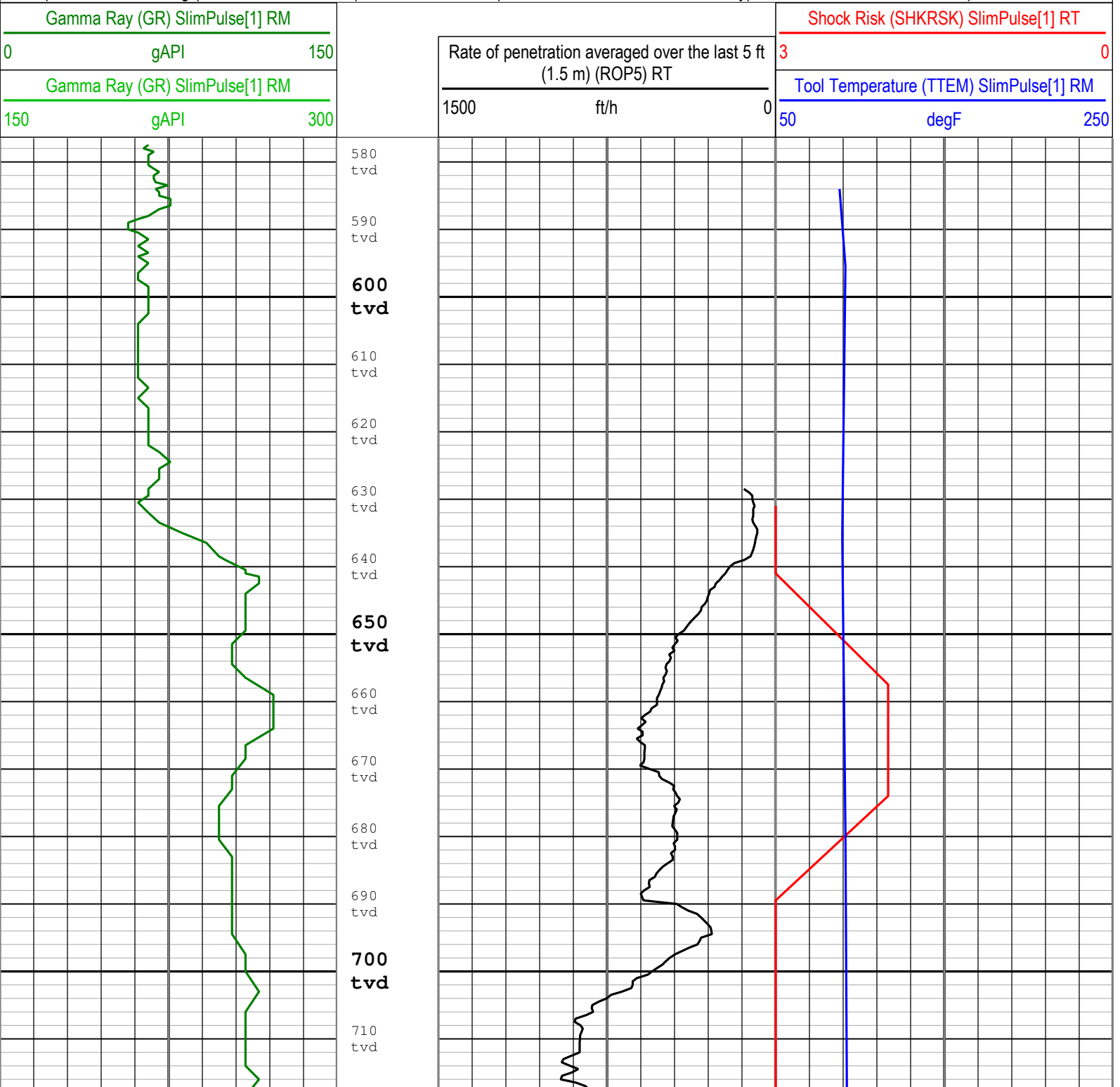
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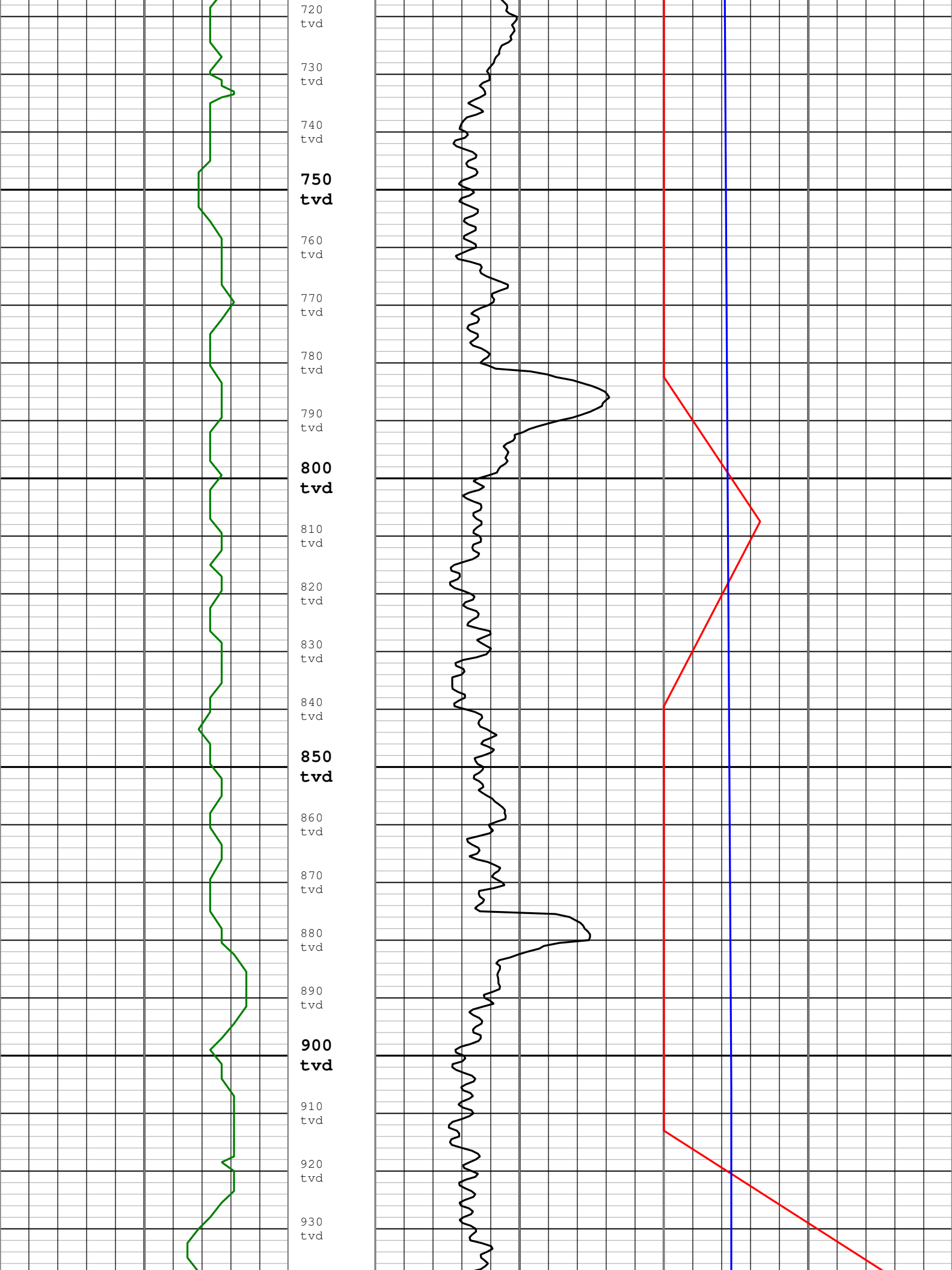
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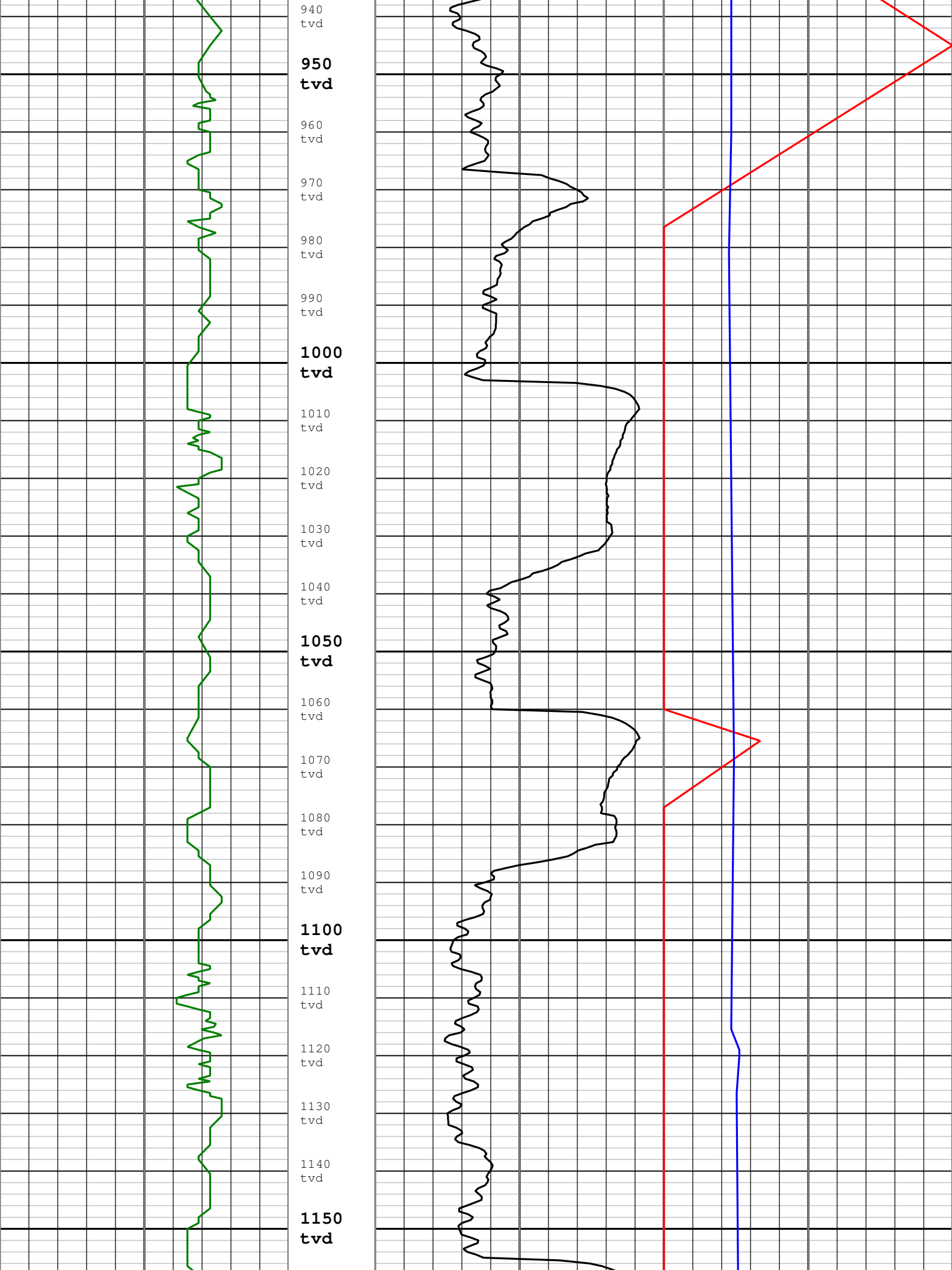
Well:Five Rivers K09-66-1AHN

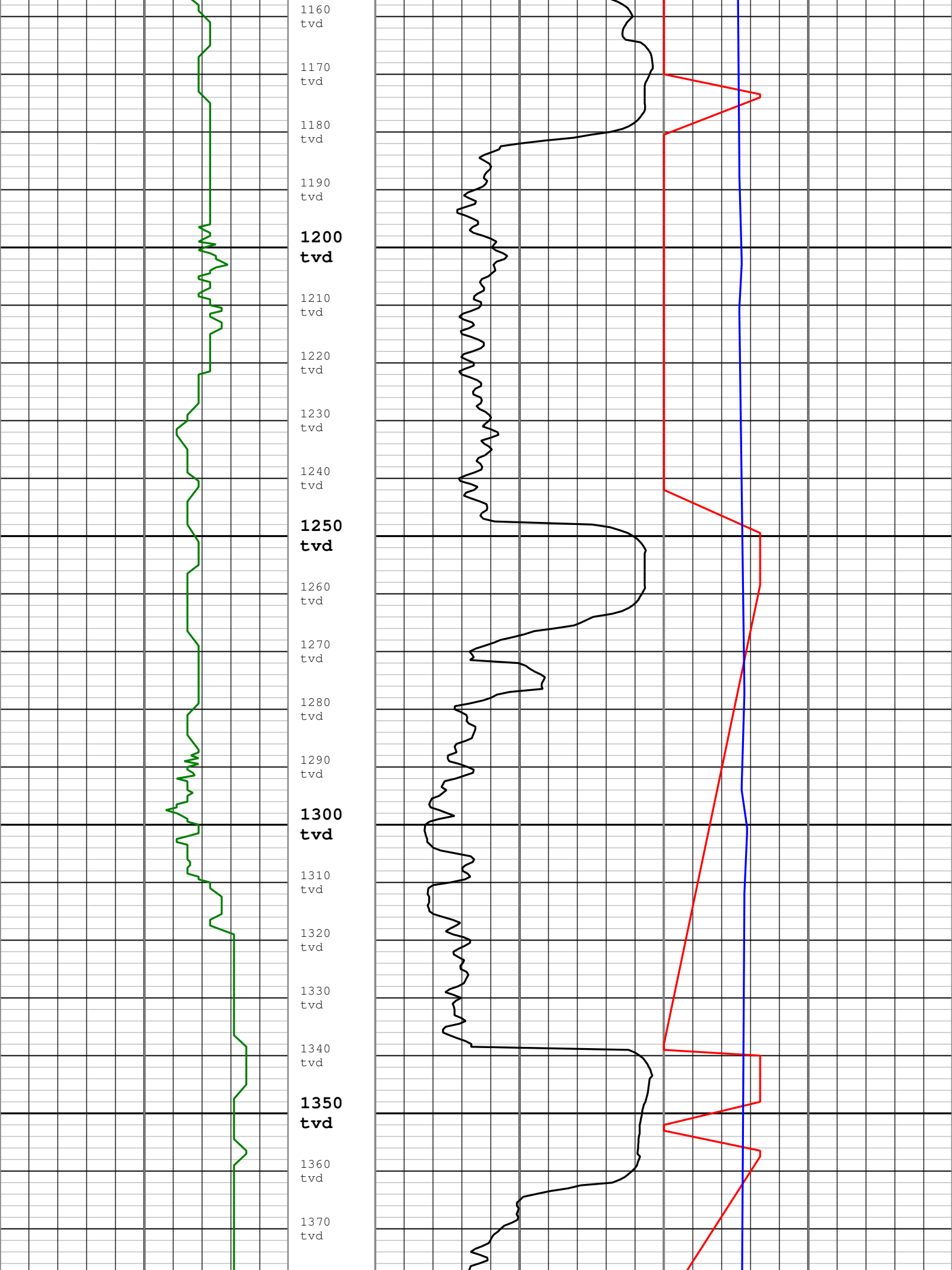
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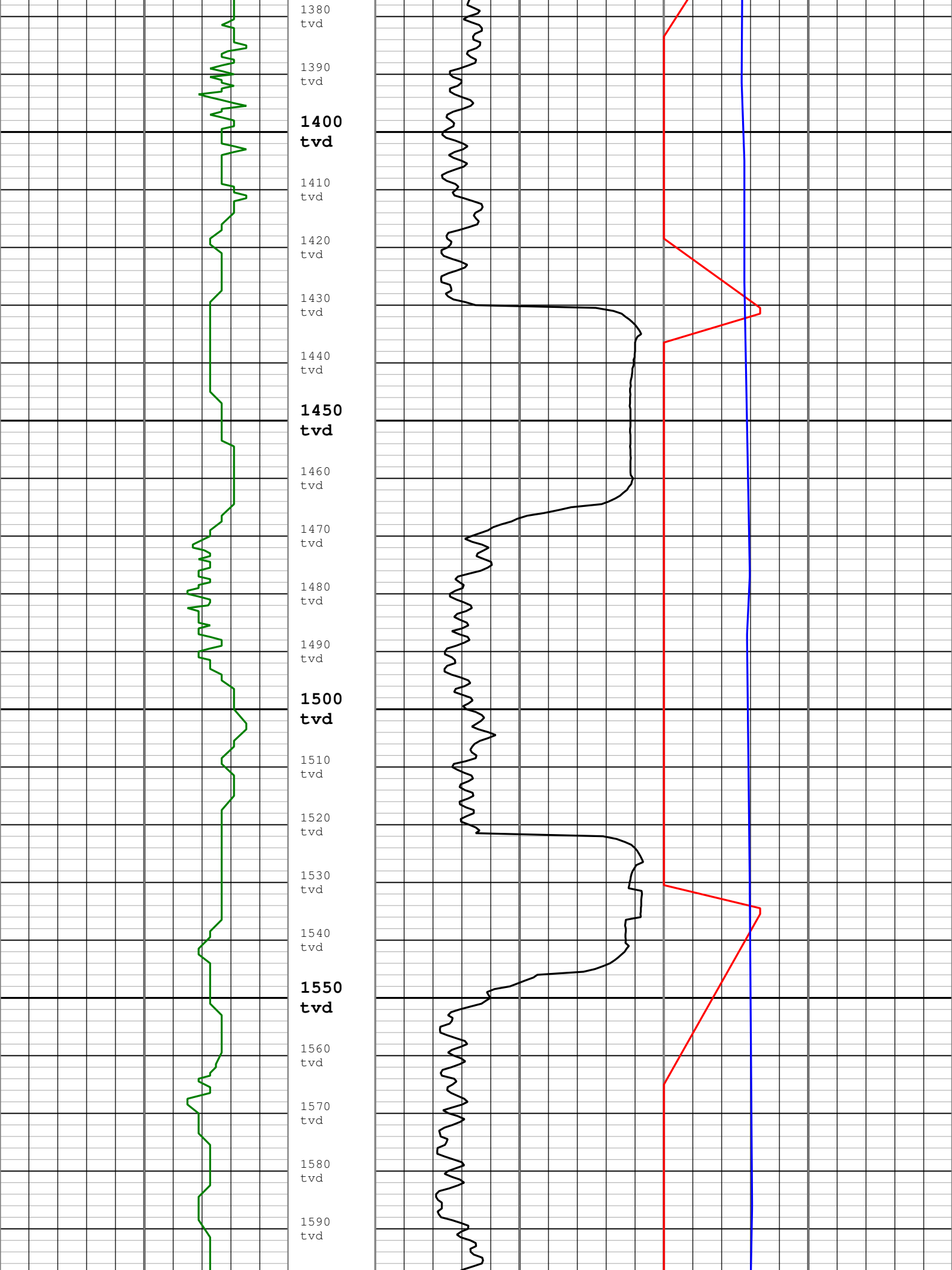


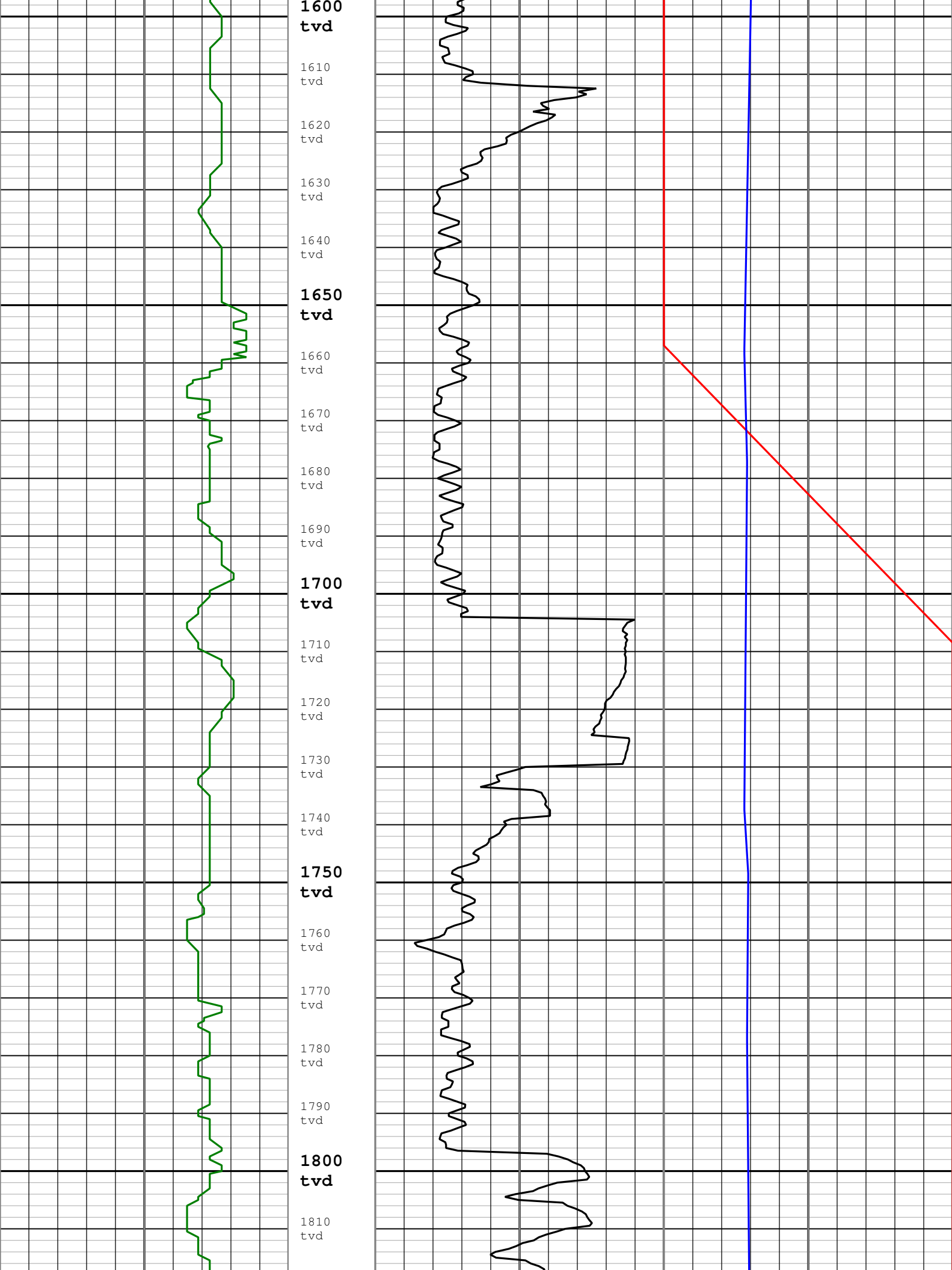


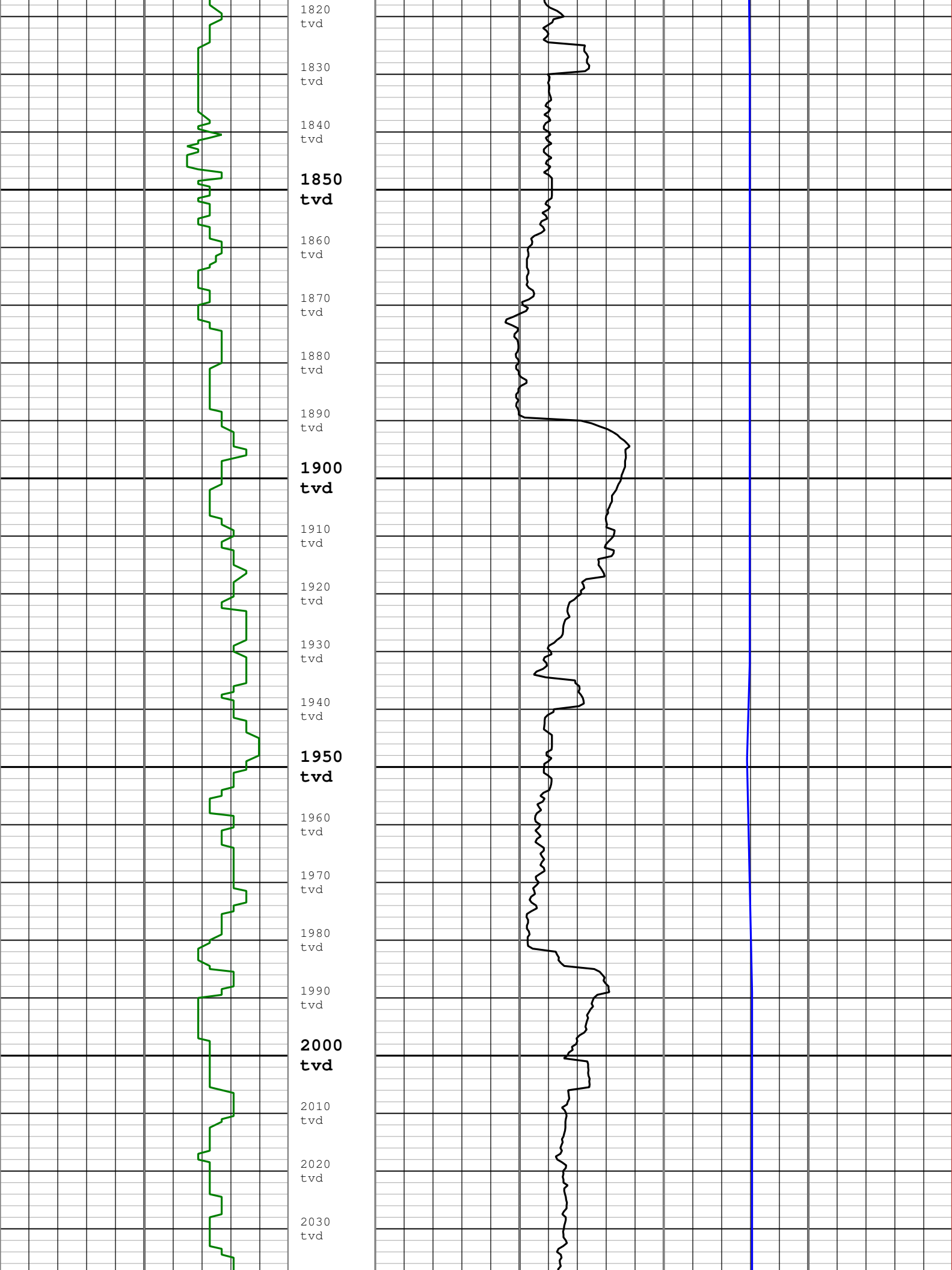


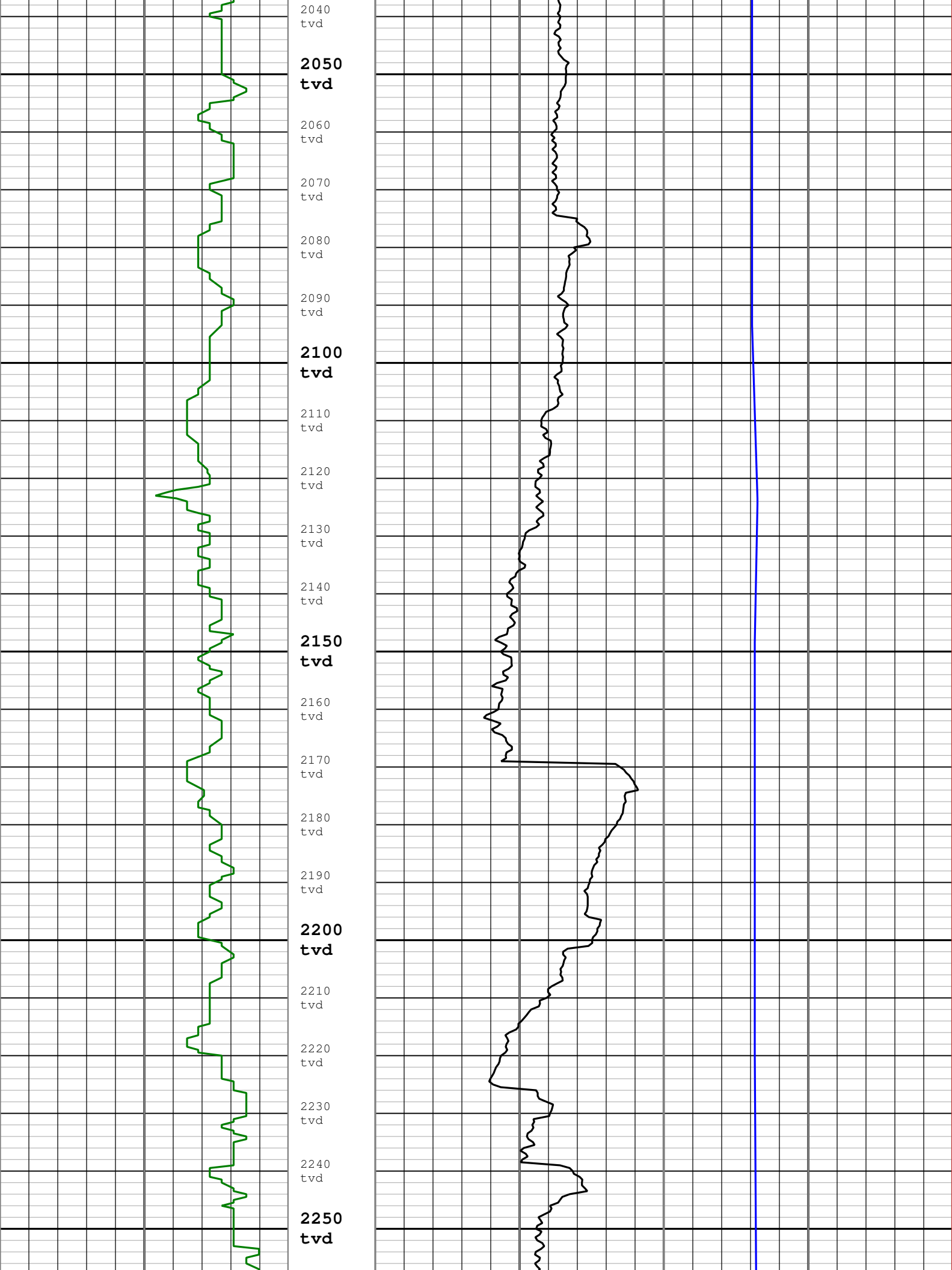


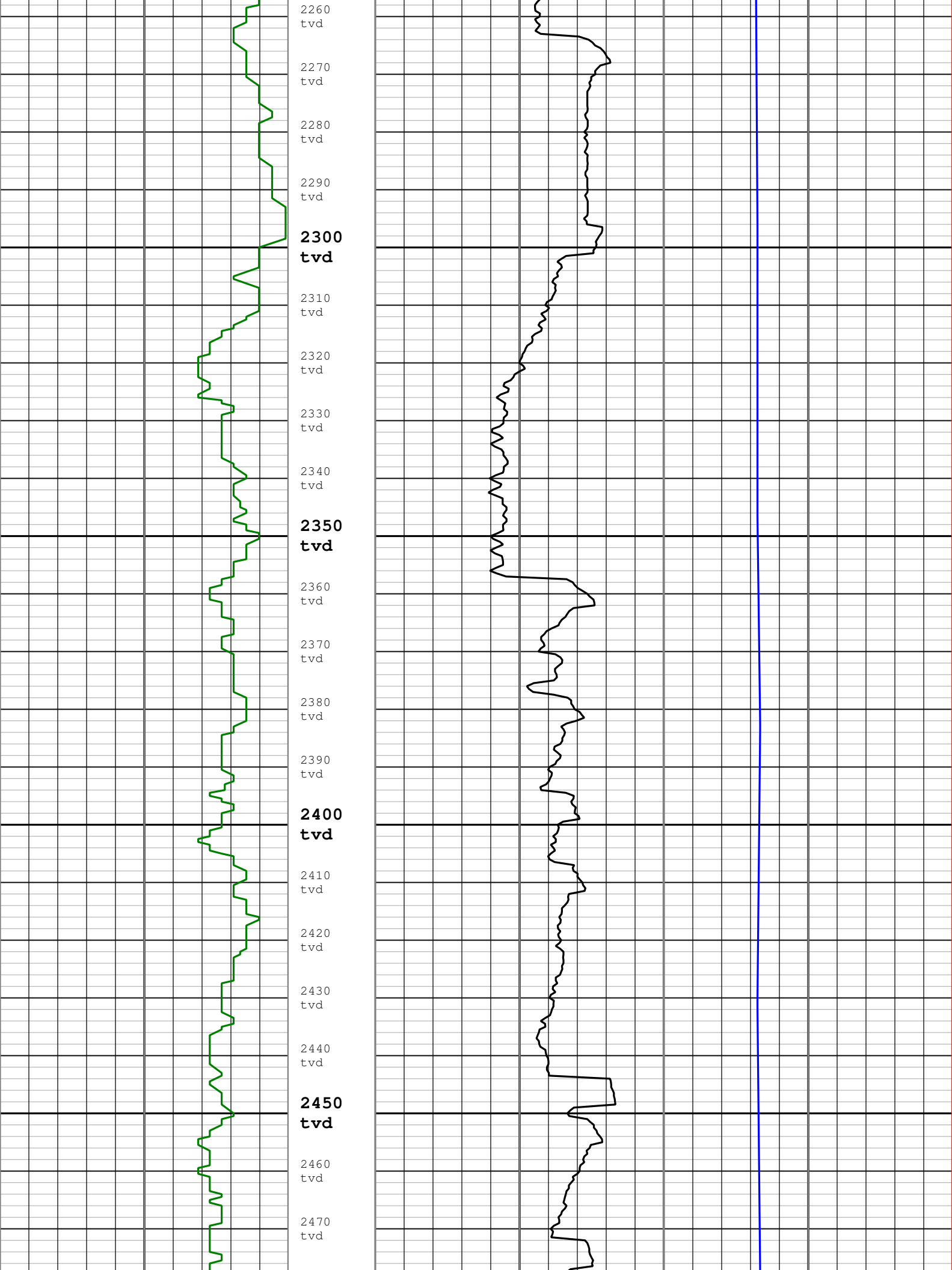


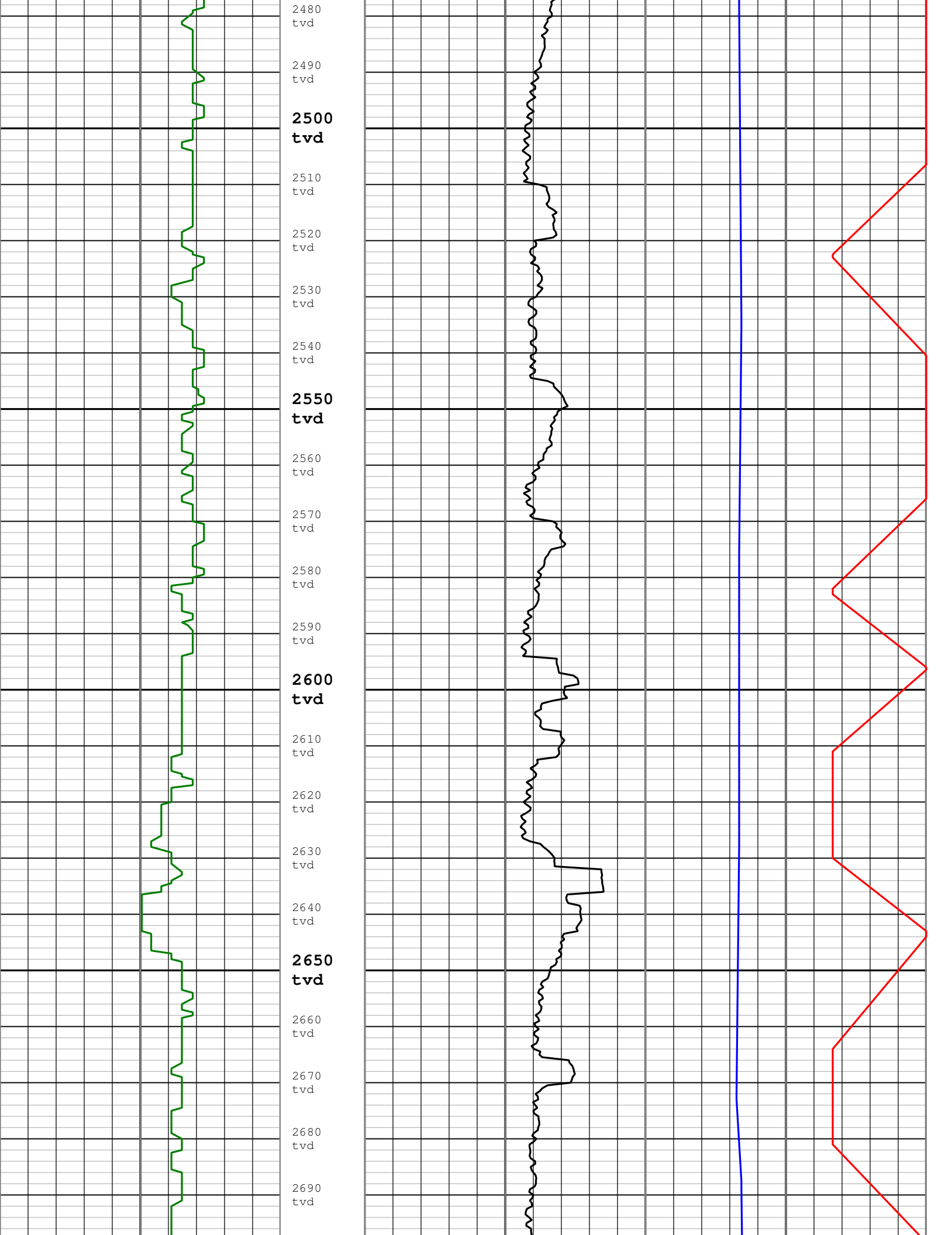


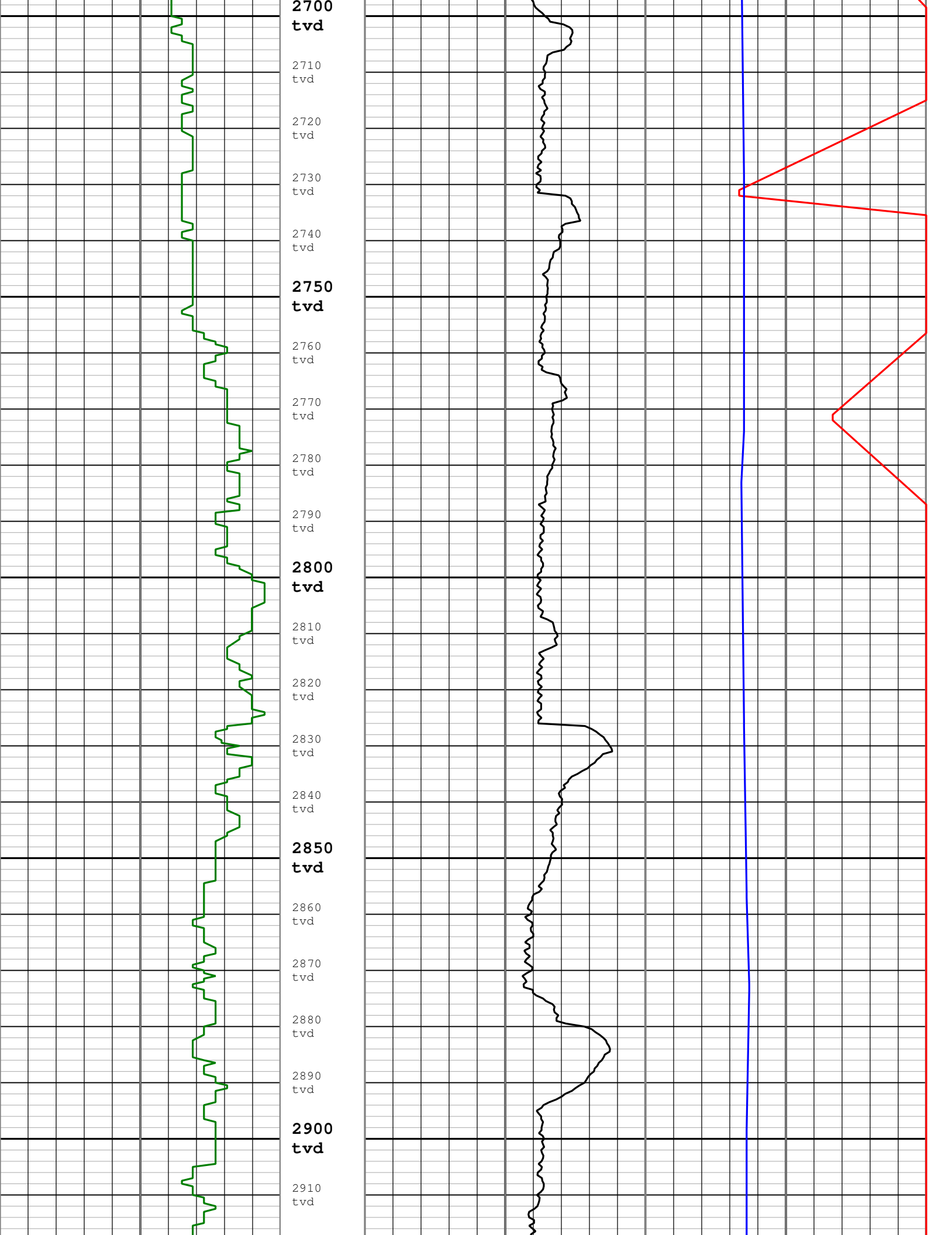


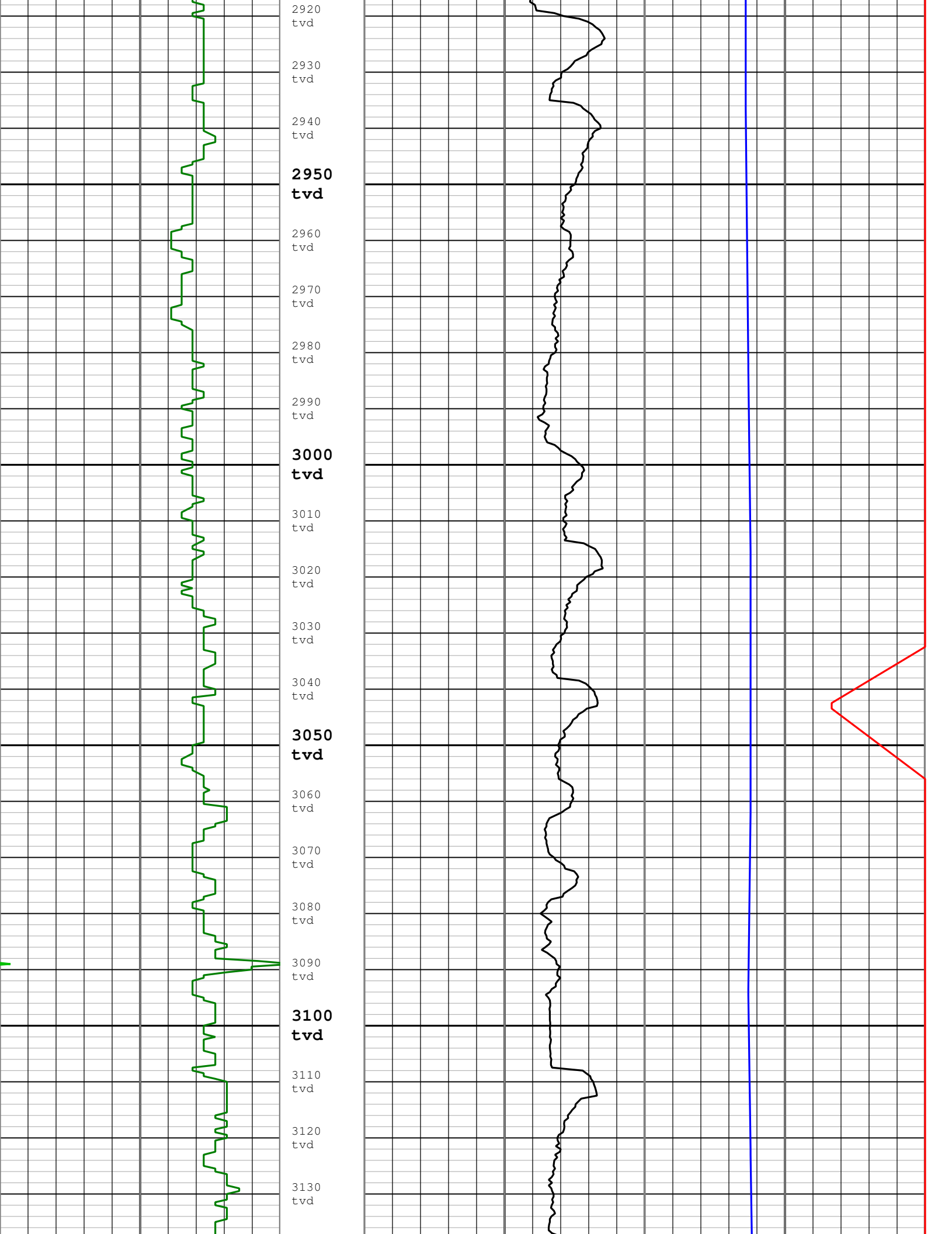




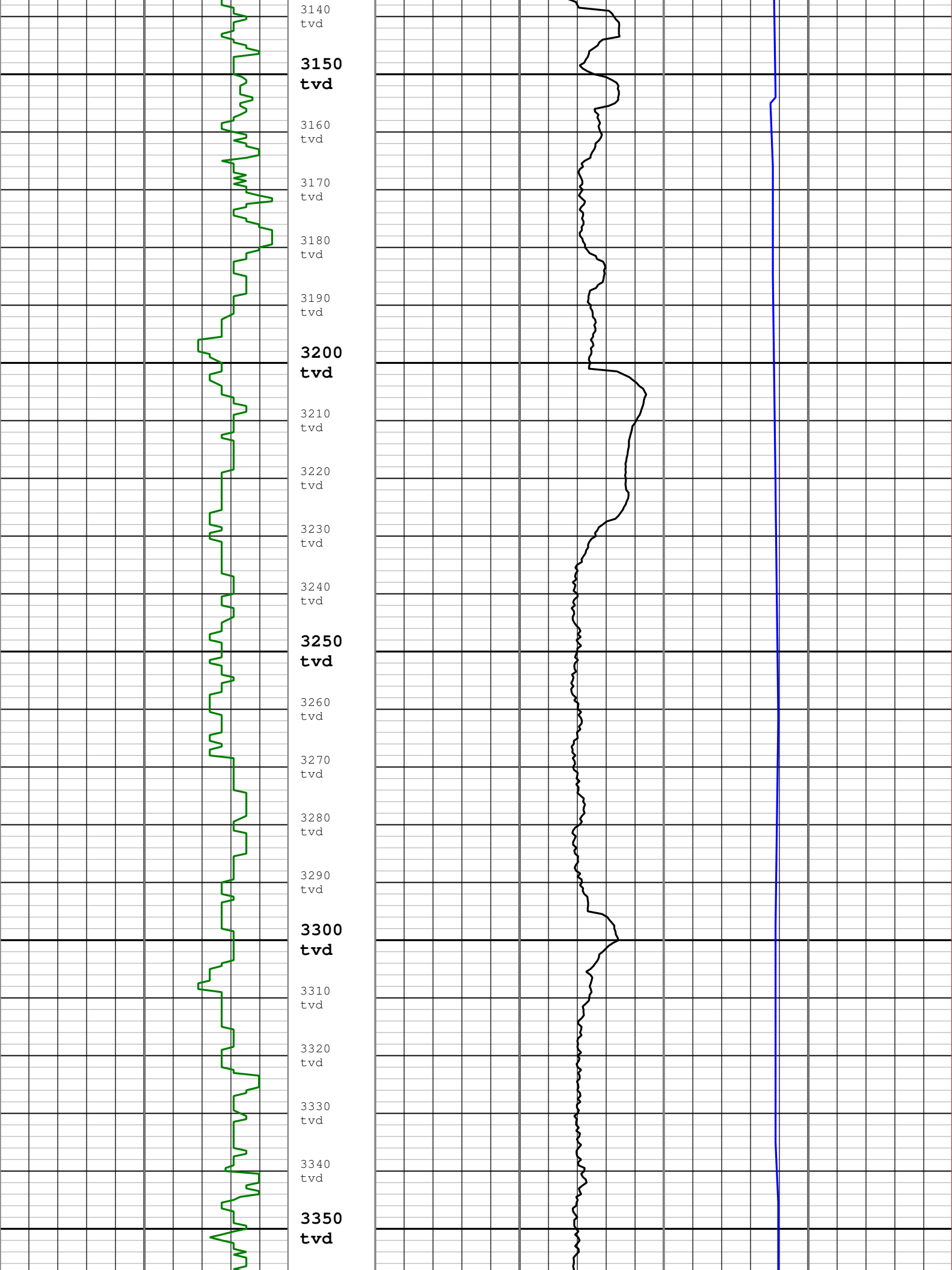


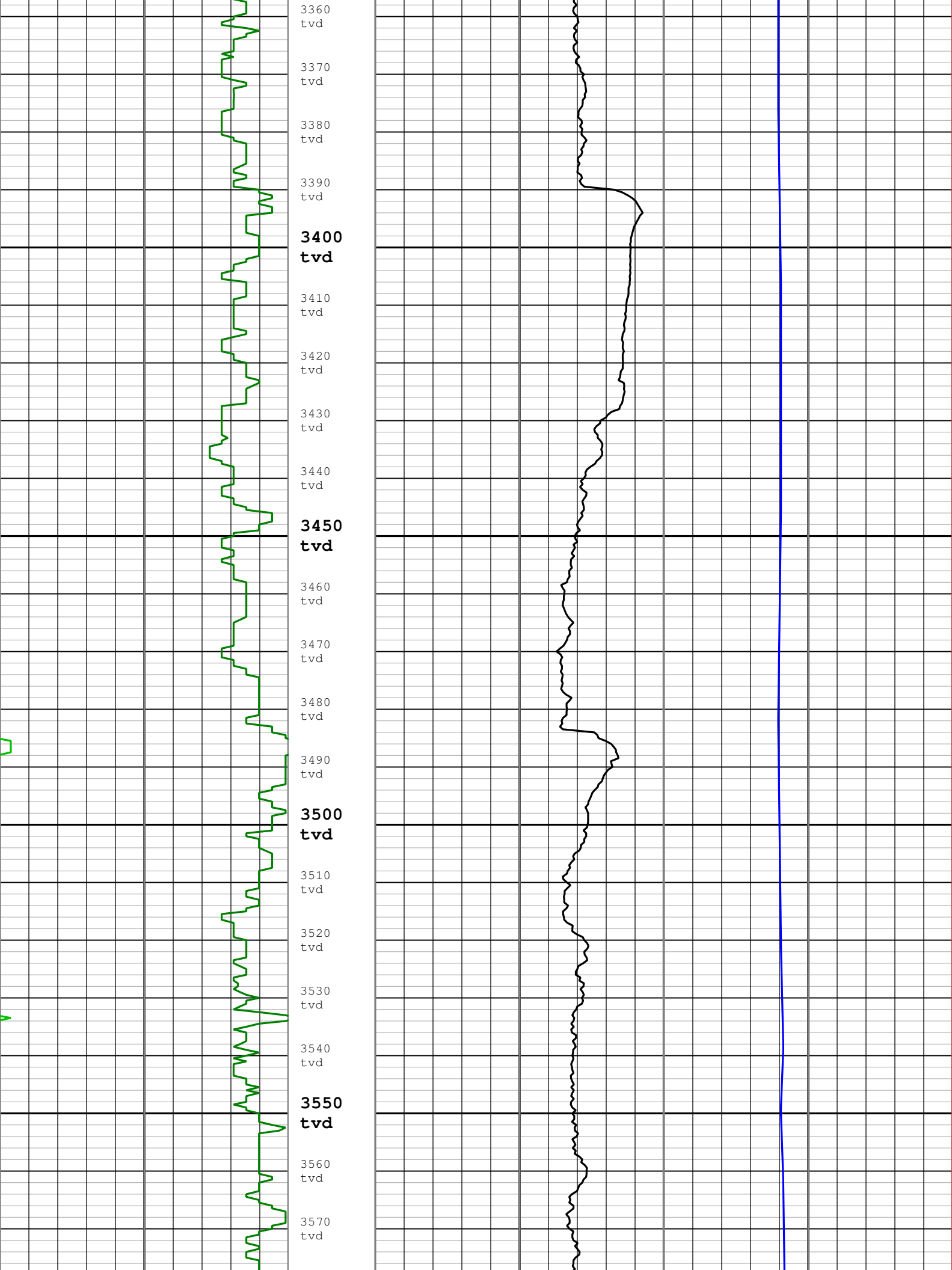


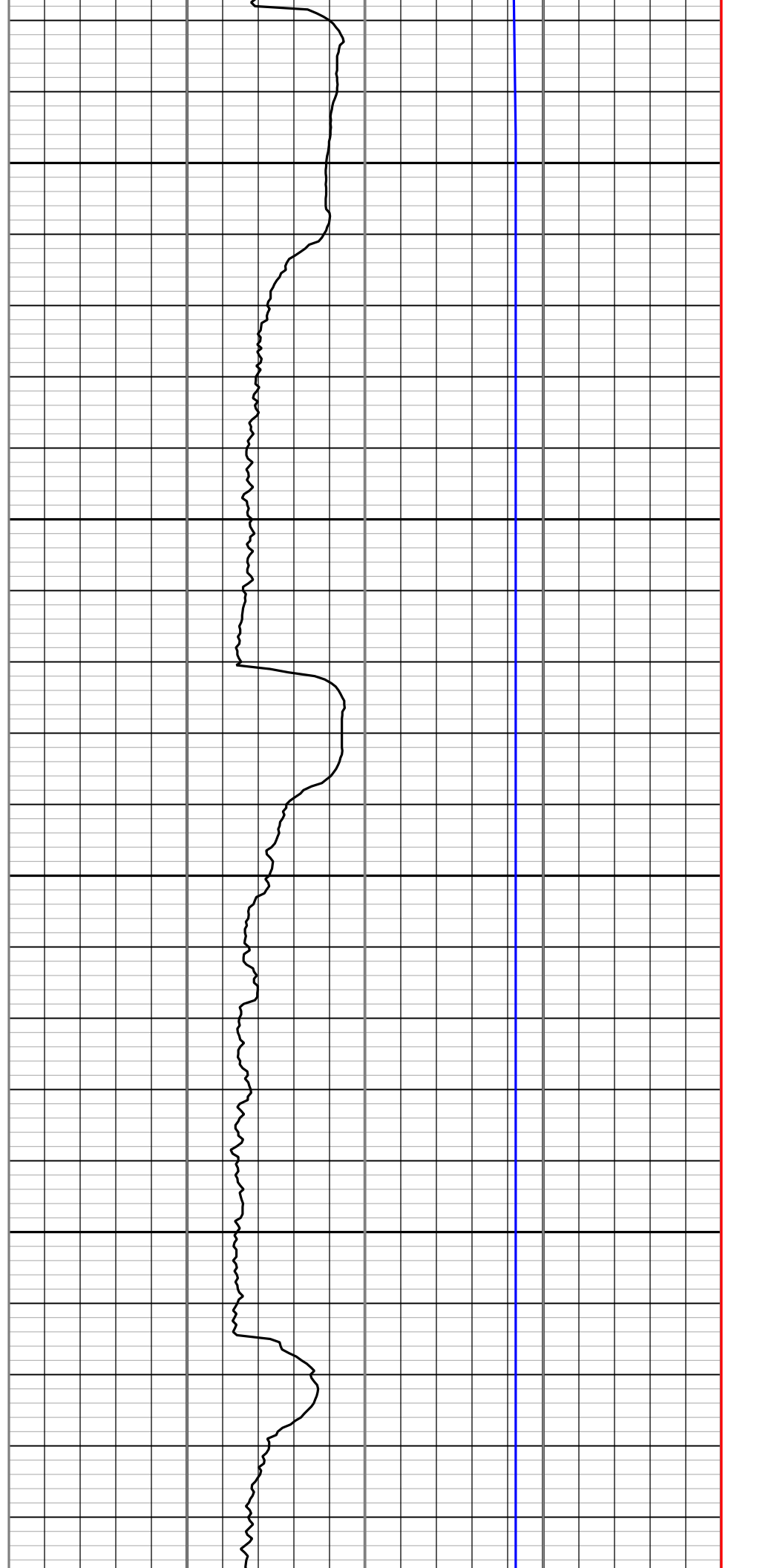
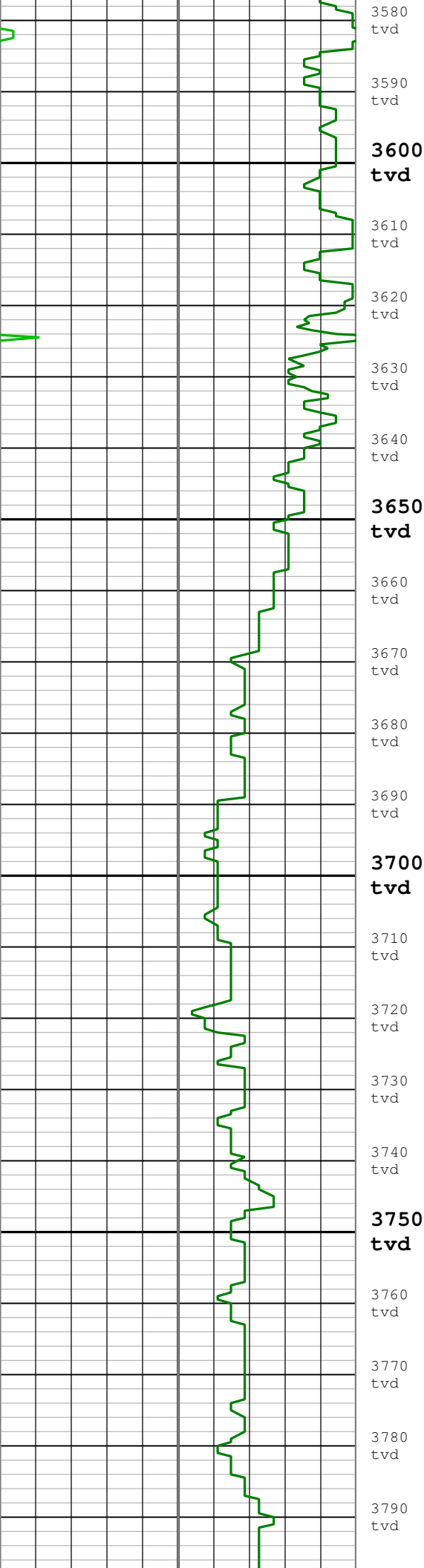


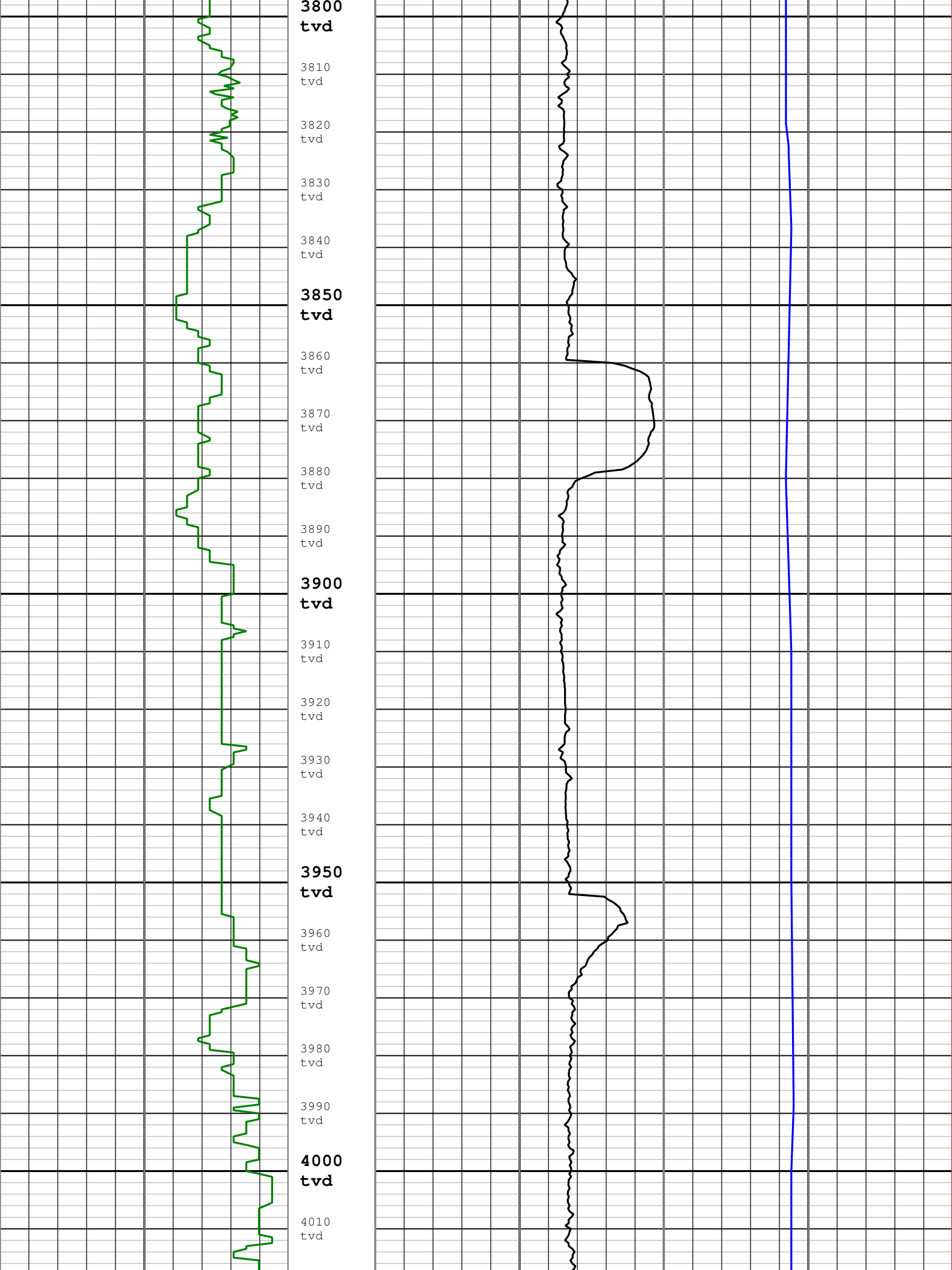


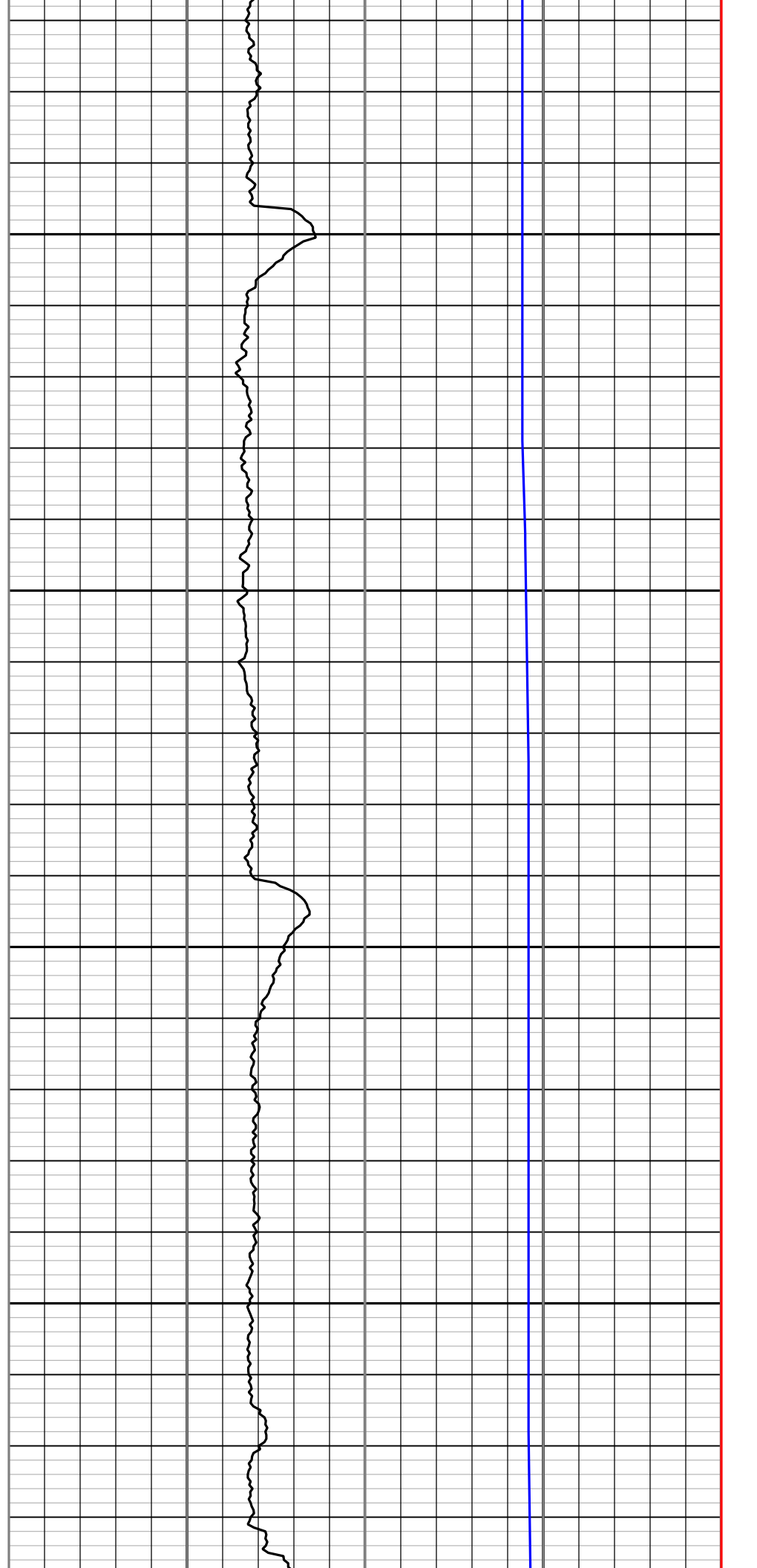
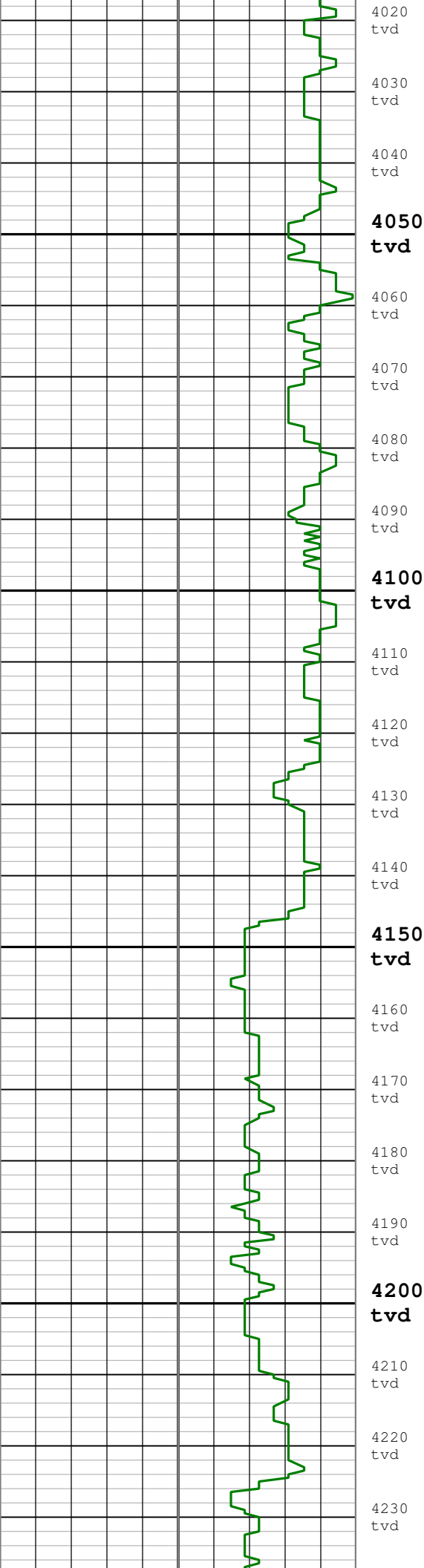


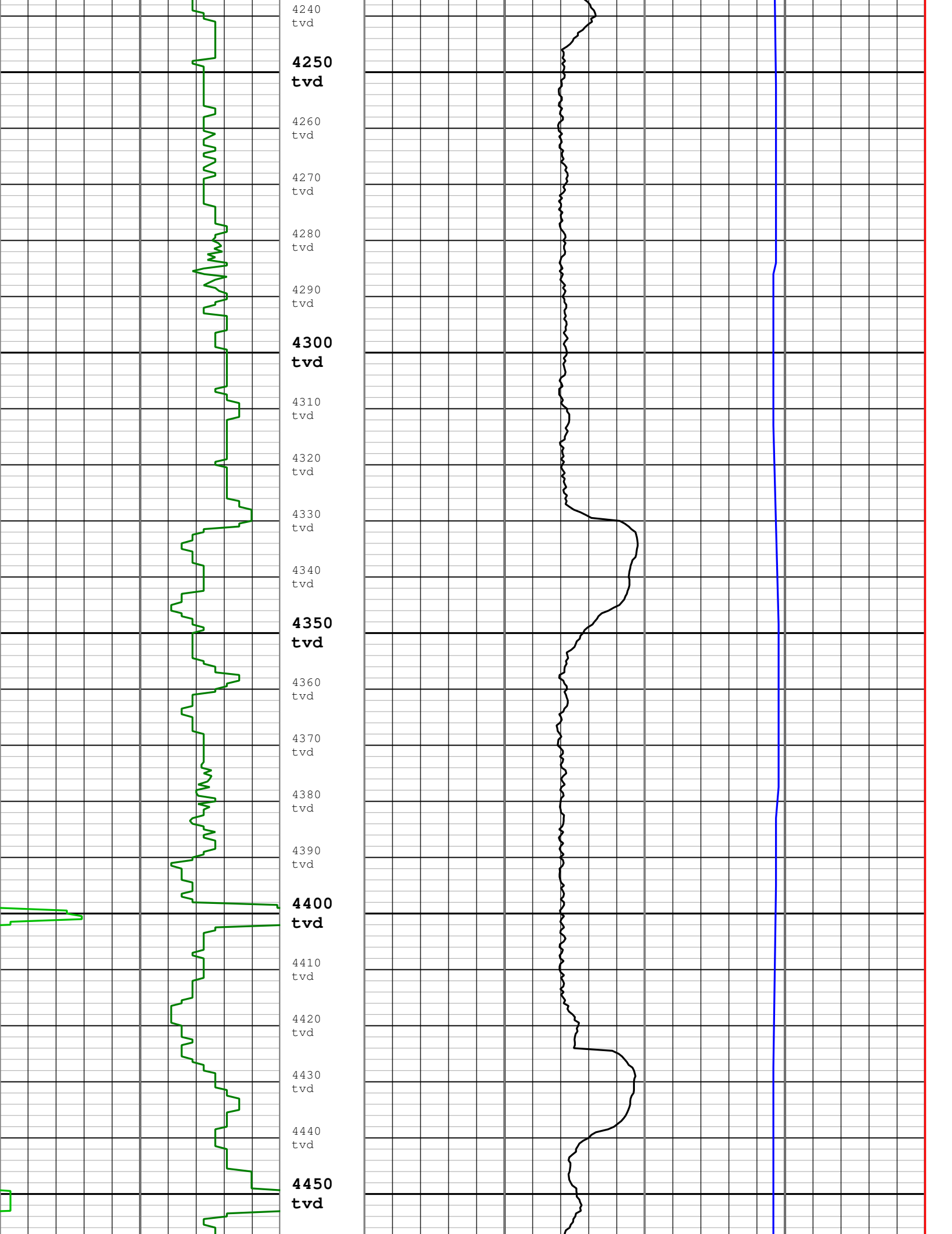


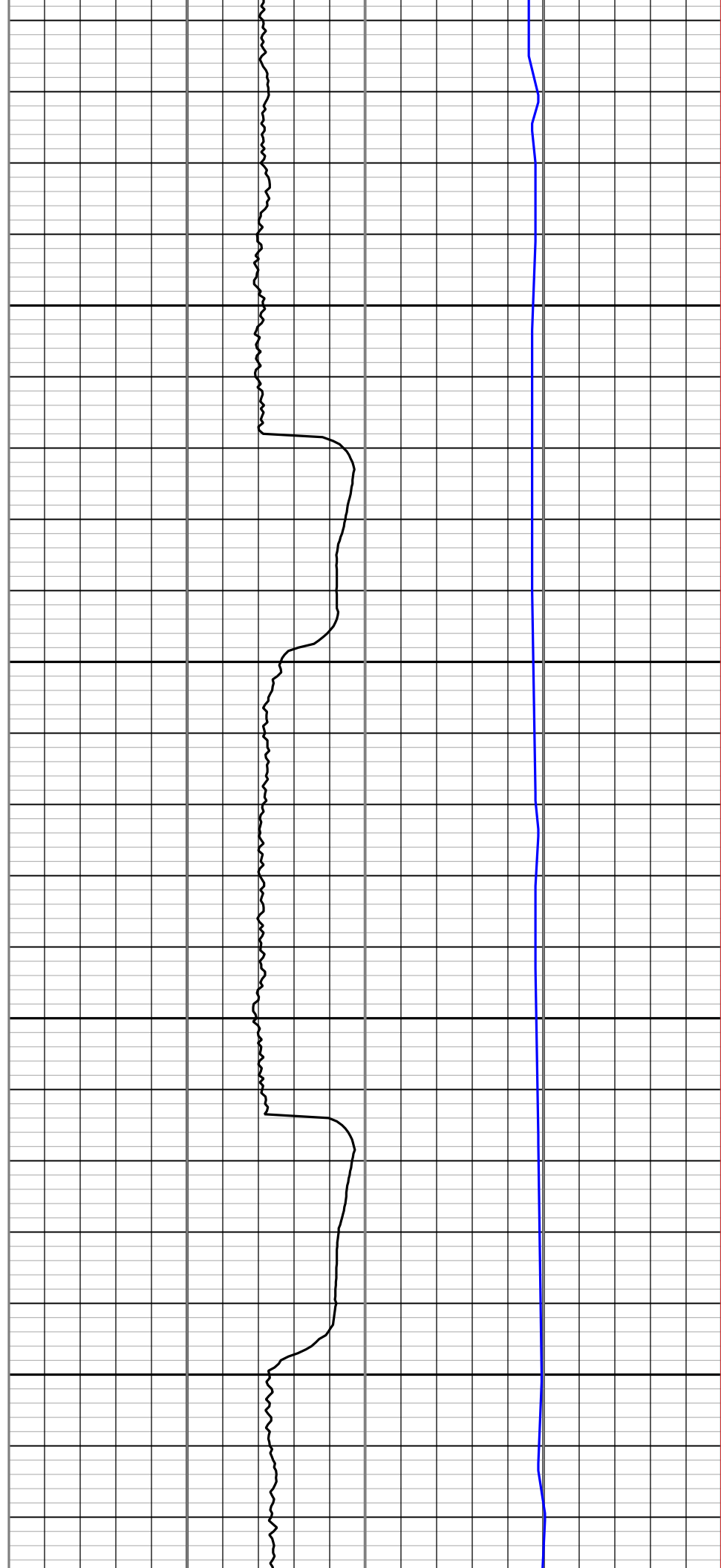
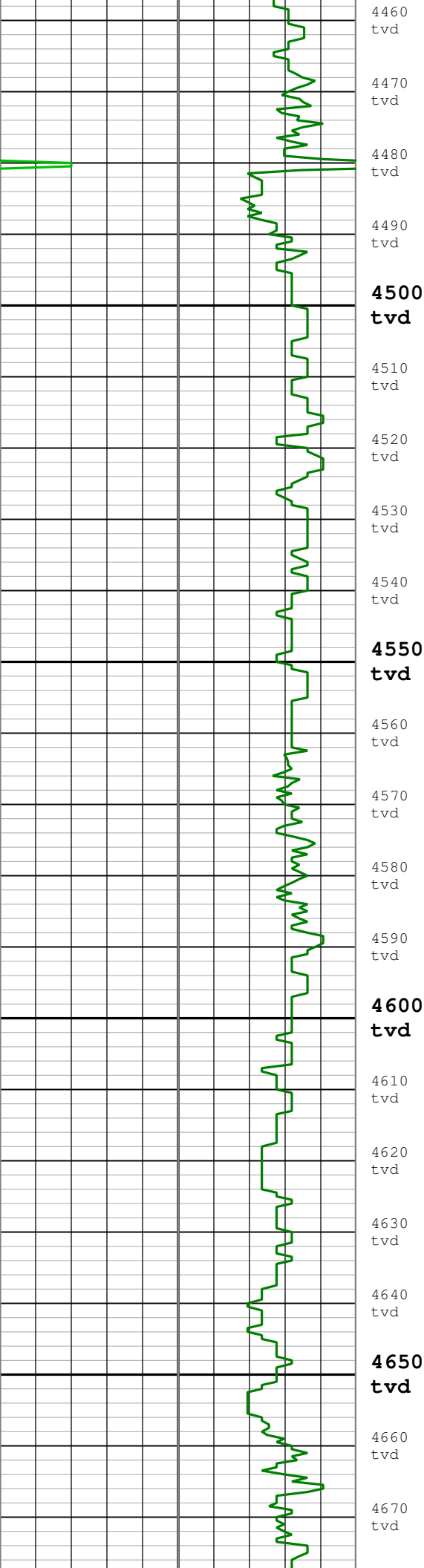


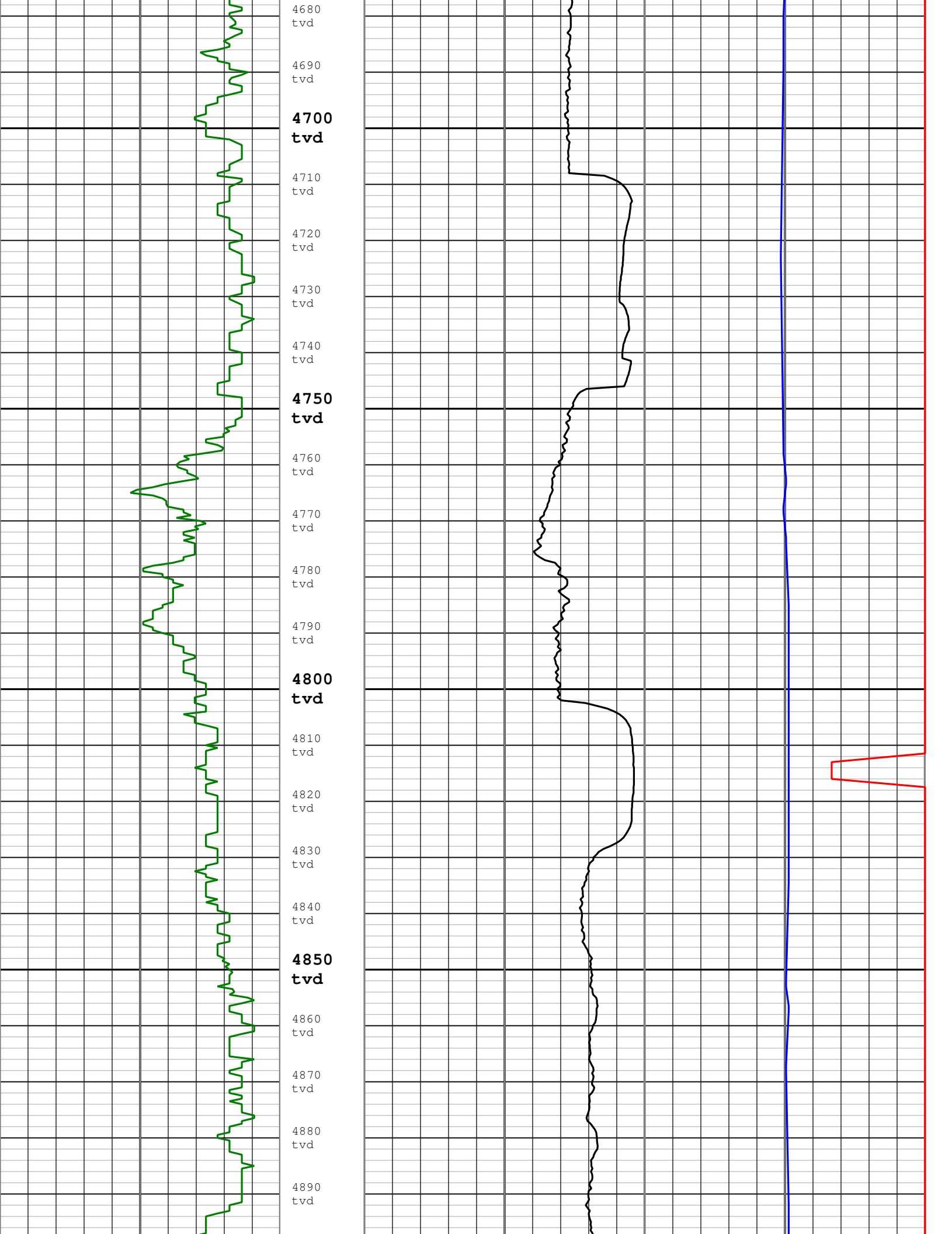




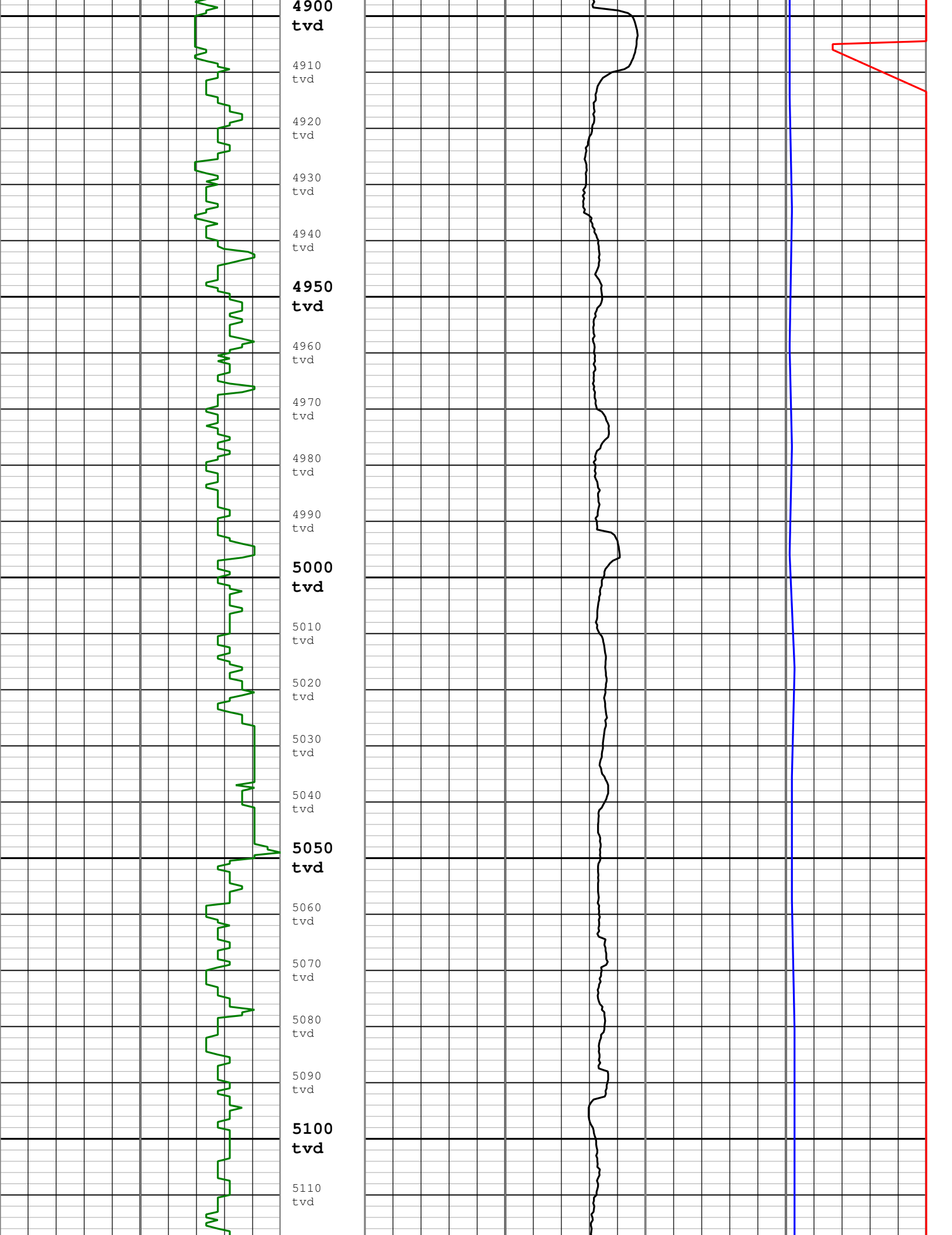


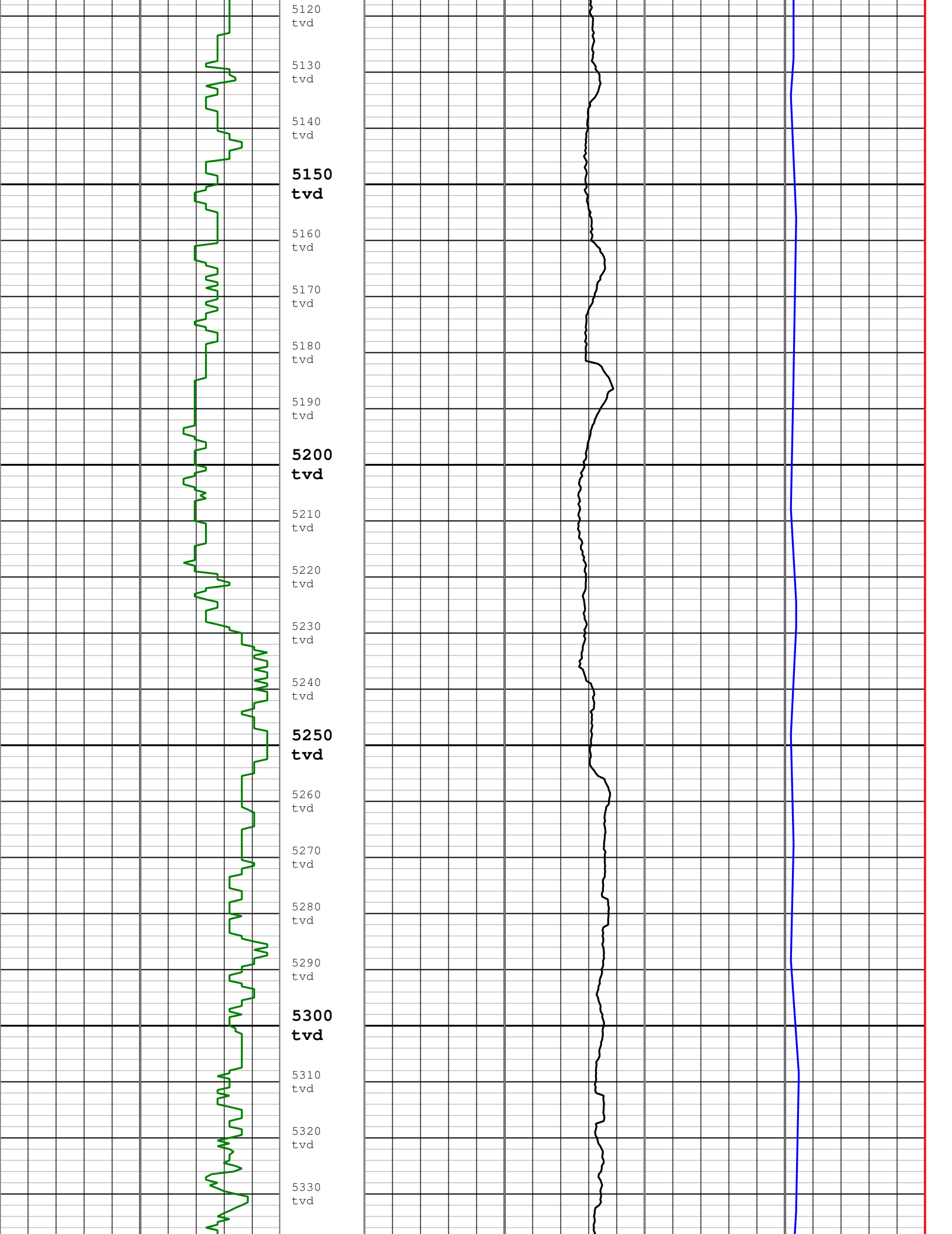


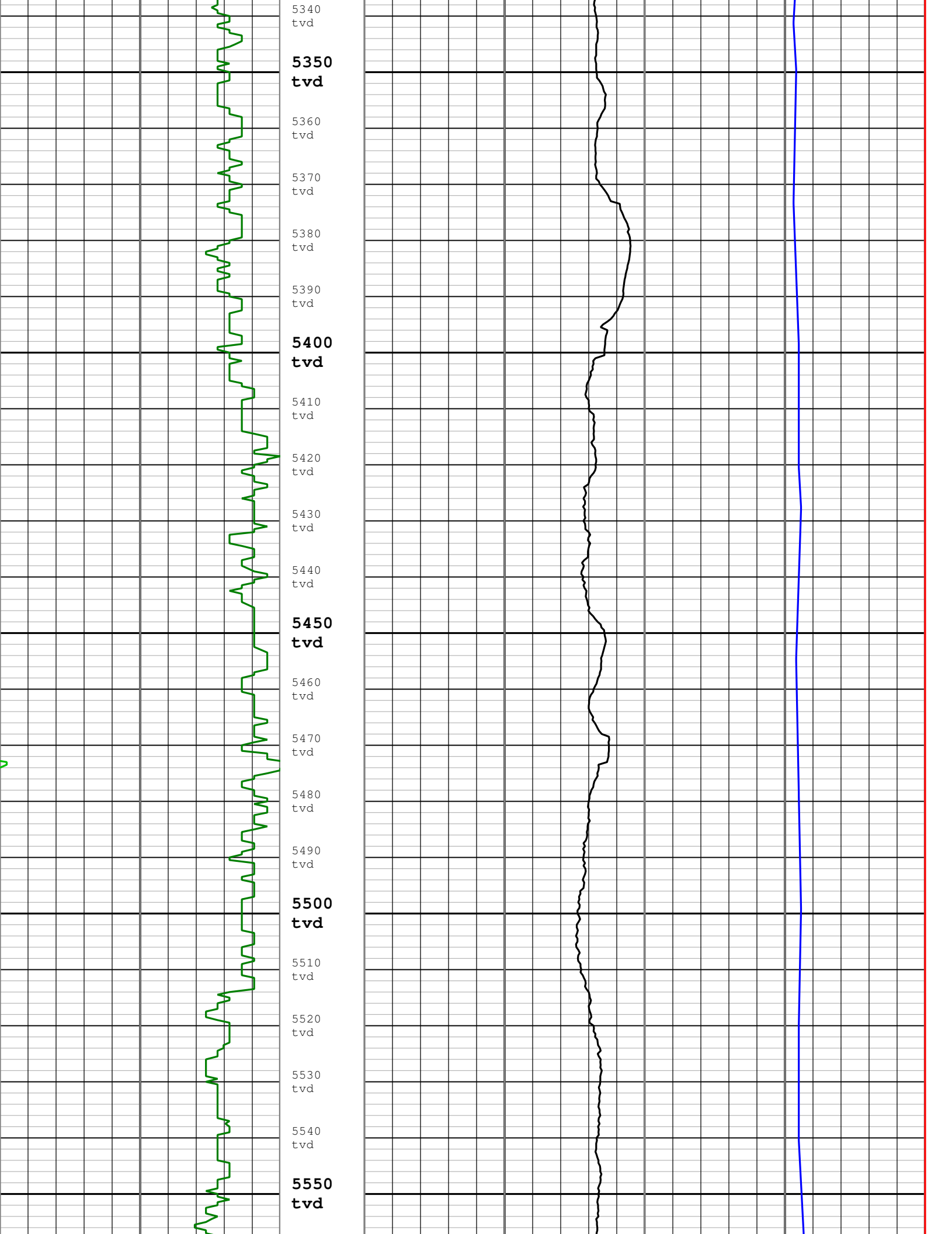


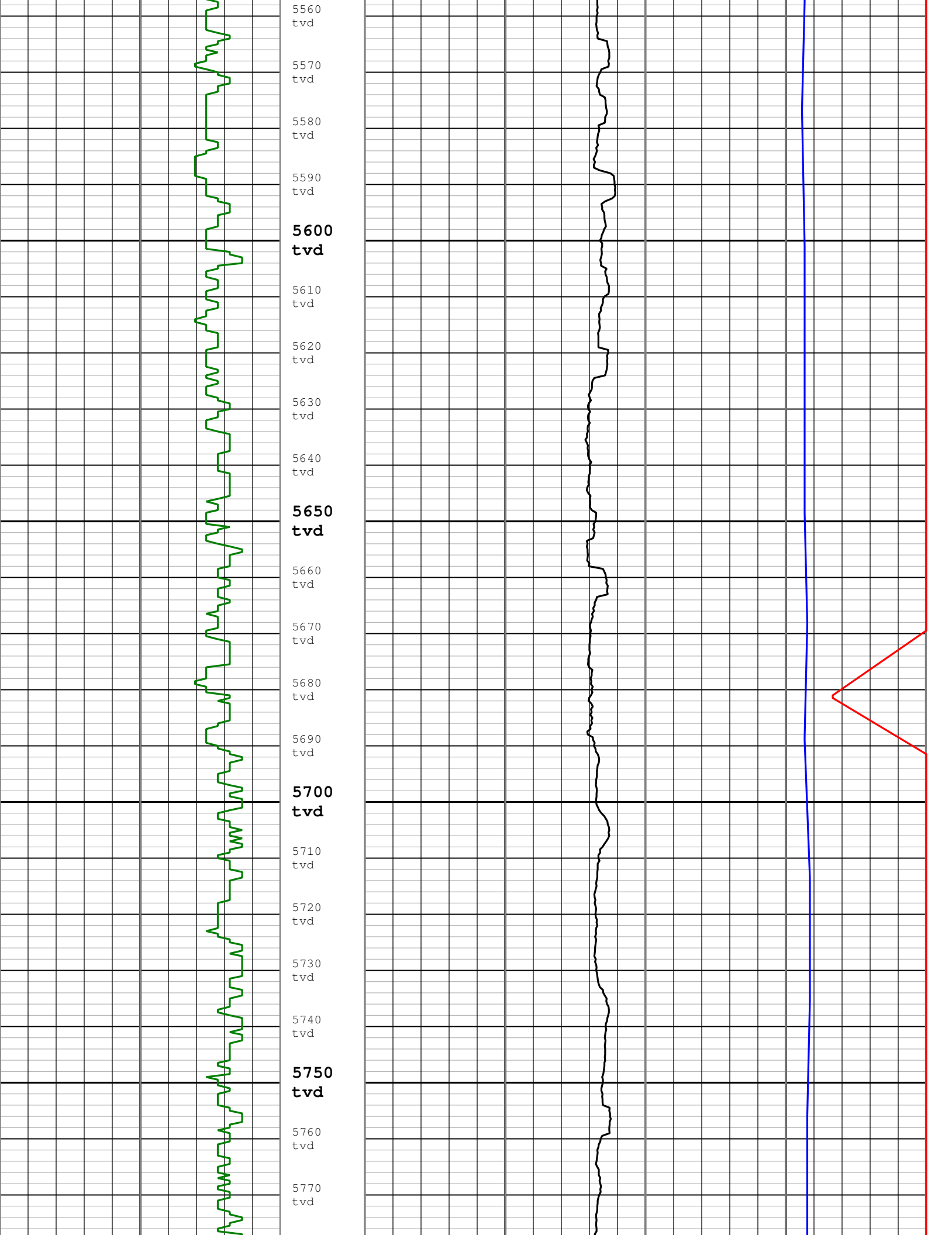


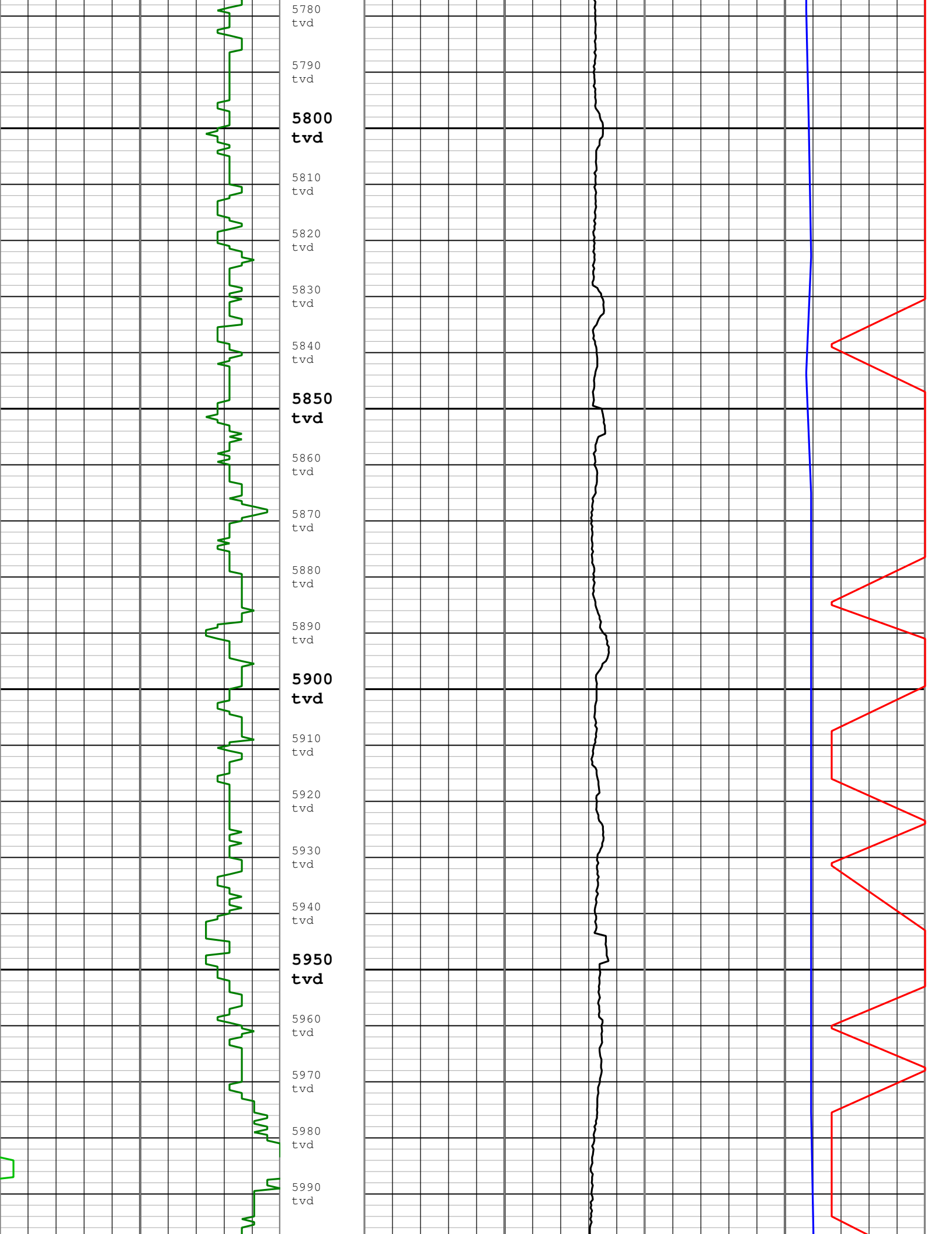


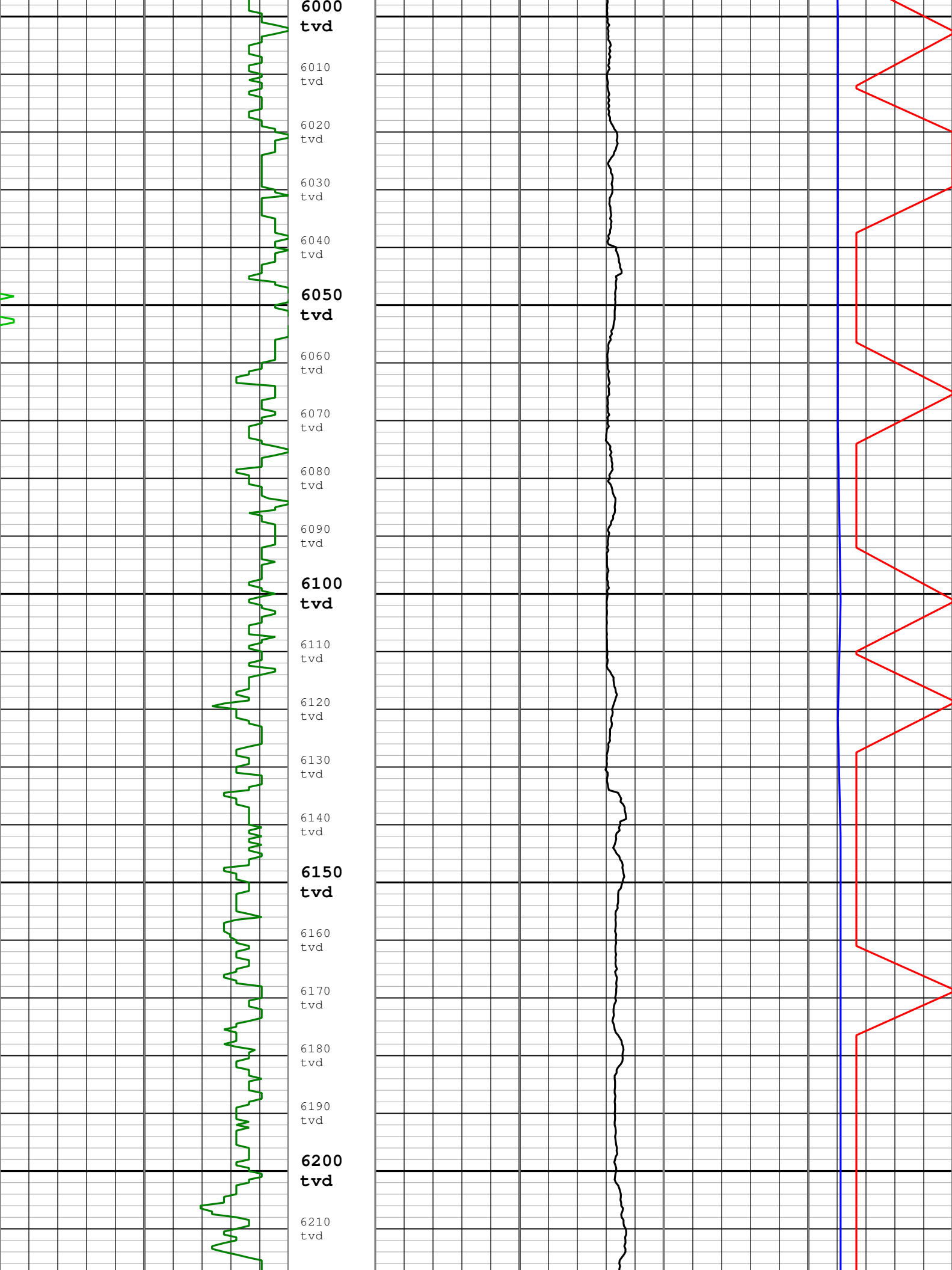


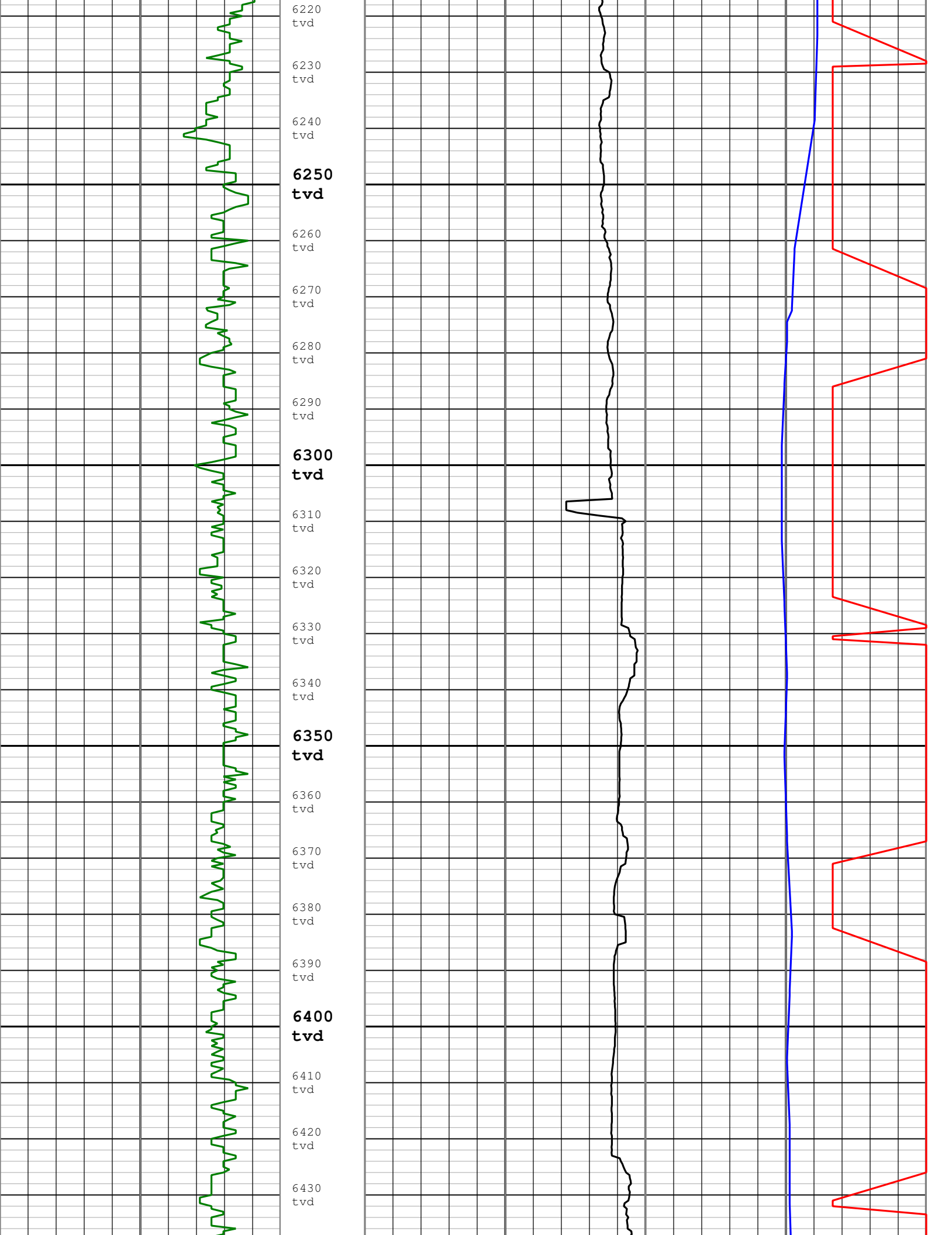


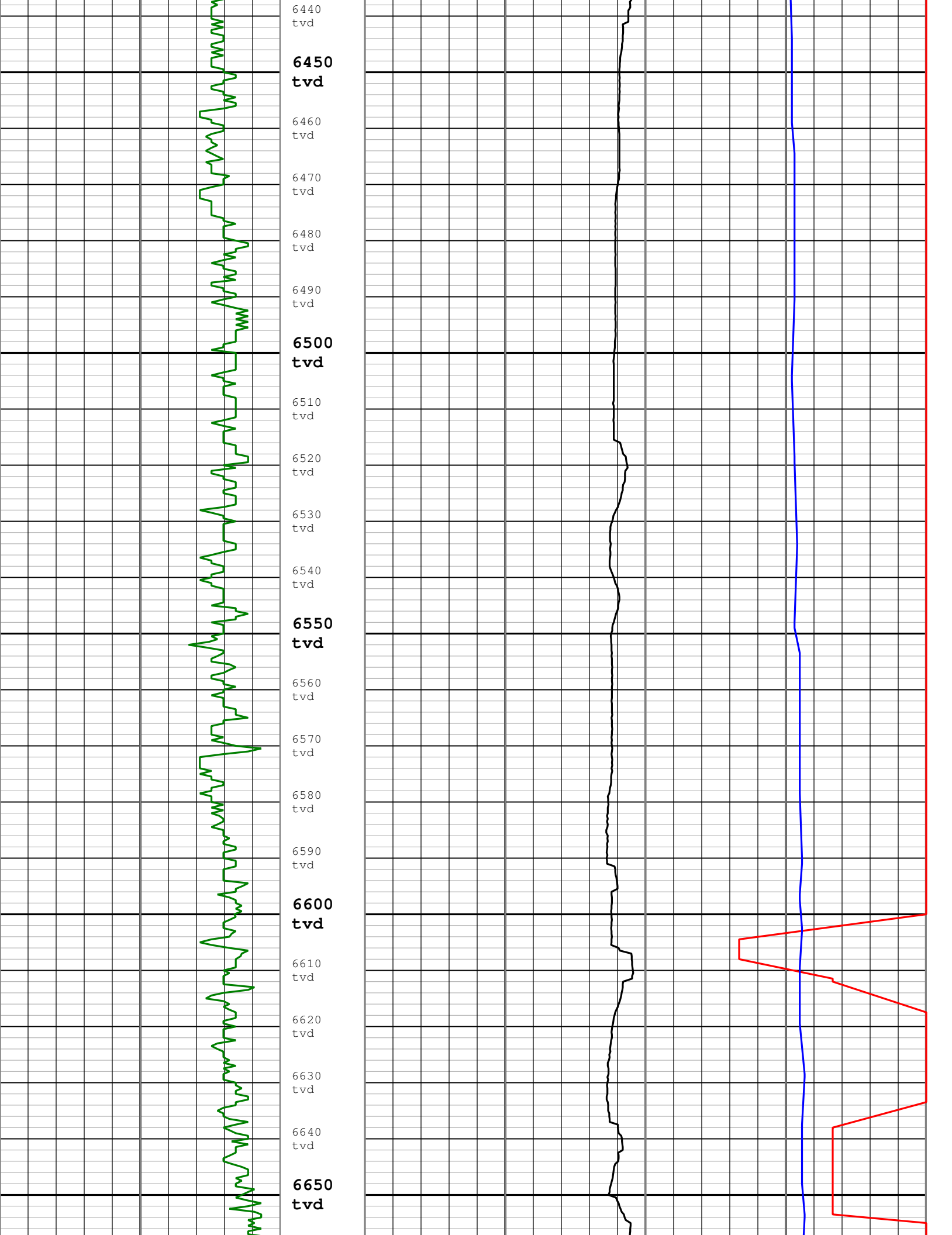




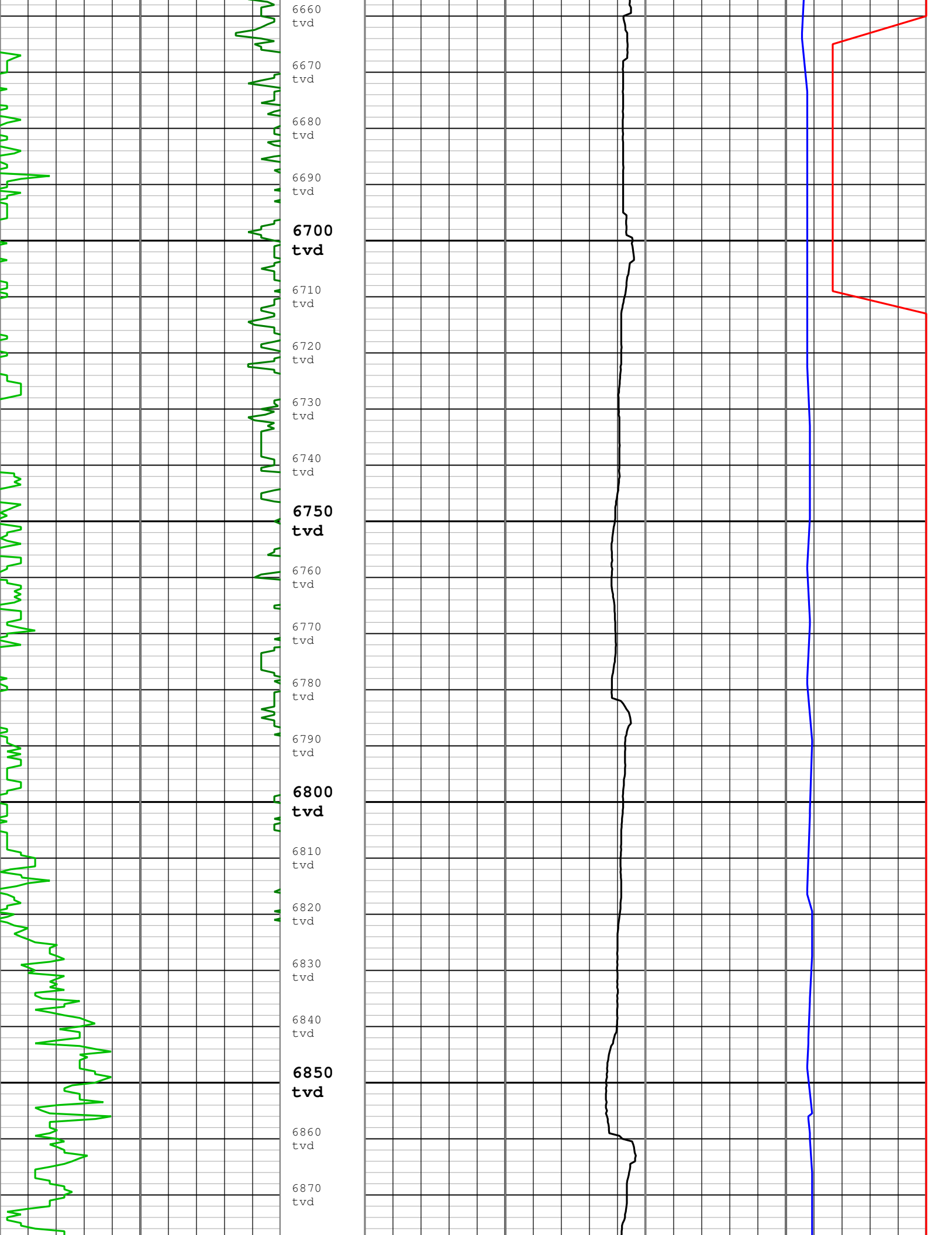


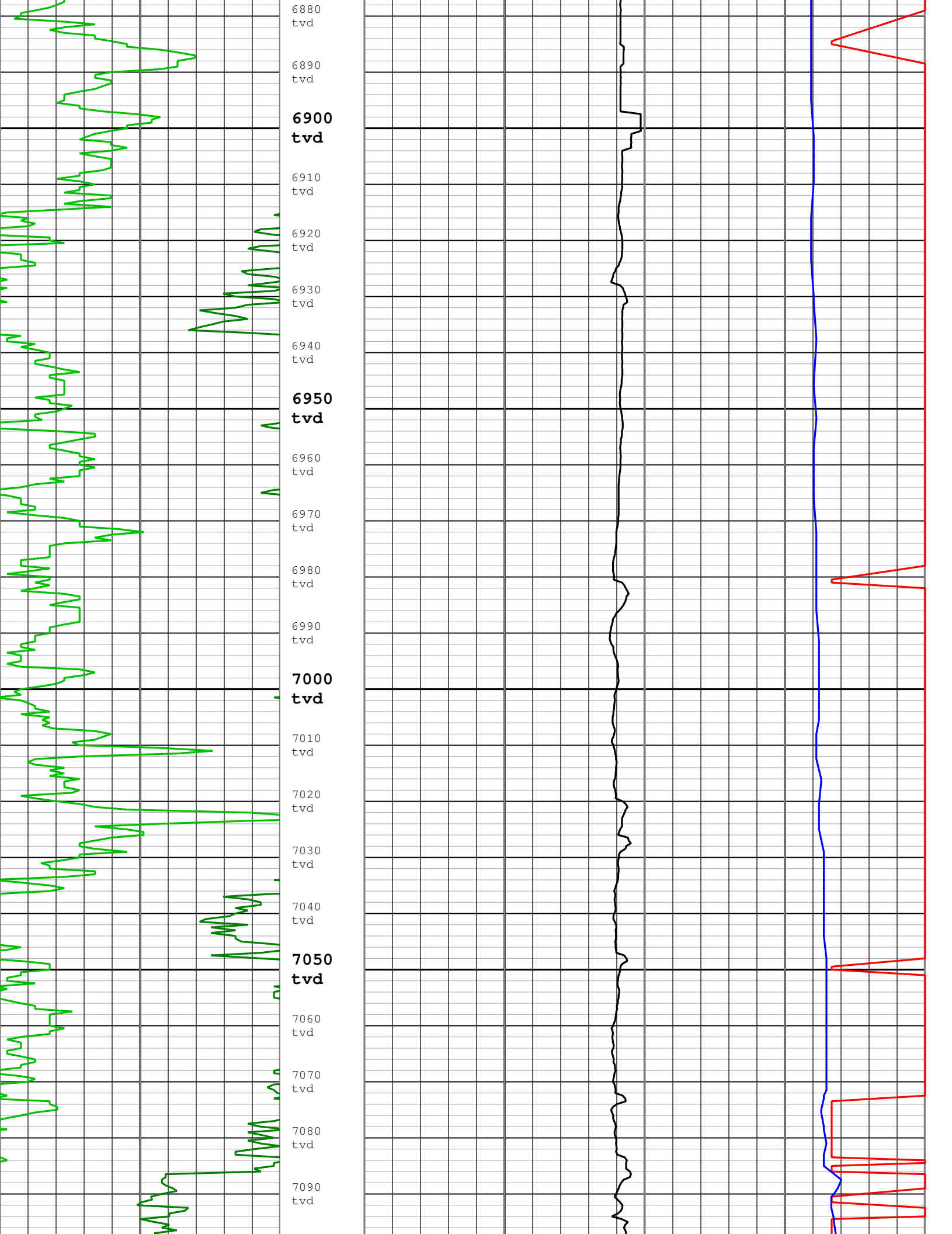


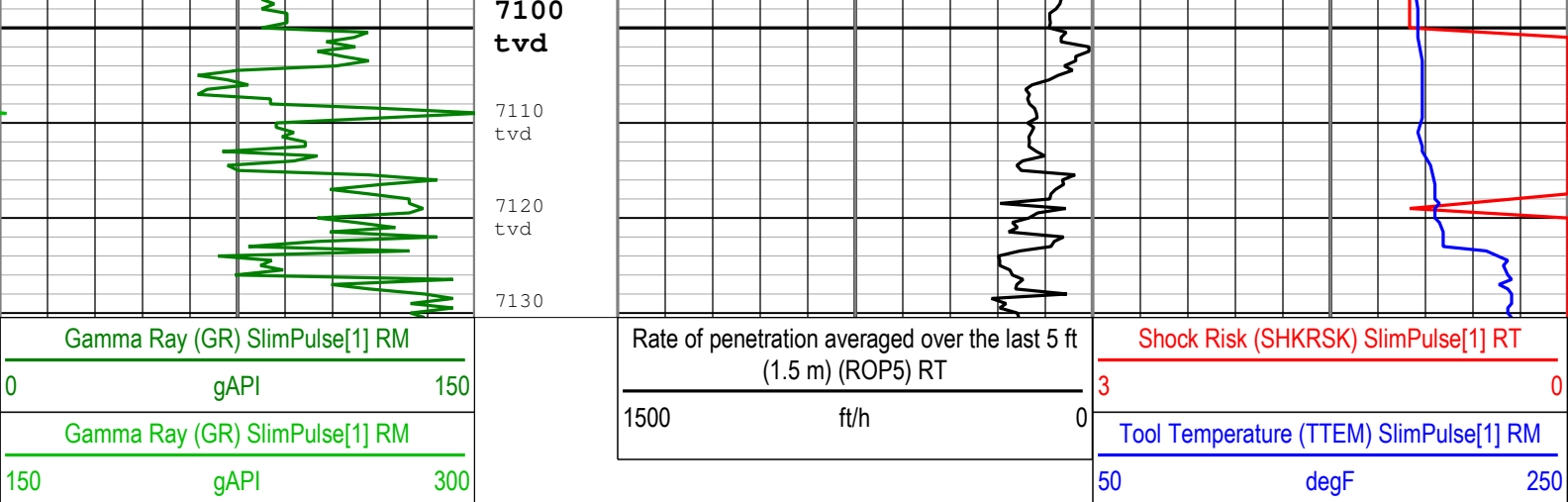












Description: Format: Log ( SlimPulse EOW TVD ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: TVD Creation Date: 02-Sep-2014 10:30:54

## Channel Processing Parameters

### Run001: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	8.85	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

### Run002: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	Time Zoned	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

### Run002Time Zoned Parameters

#### Pass Drilling

Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
DFD	8.8	25-Aug-2014 01:31:16	25-Aug-2014 14:00:00	1708.25	4558.25
DFD	9.3	25-Aug-2014 14:00:00	26-Aug-2014 02:30:00	4558.25	6345.75
DFD	10.1	26-Aug-2014 02:30:00	26-Aug-2014 15:40:33	6345.75	6348

All depth are at tool zero.

### Run003: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	10.5	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

### Run004: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	Time Zoned	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

### Run004Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	8.75	7075.45	7101.83
BS	6.125	7101.83	7130.6

All depth are actual.

Run004Time Zoned Parameters					
Pass Drilling					
Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
DFD	10.6	30-Aug-2014 12:08:50	31-Aug-2014 00:30:00	7542.17	9174
DFD	10.8	31-Aug-2014 00:30:00	31-Aug-2014 14:00:00	9174	10647.42
DFD	10.9	31-Aug-2014 14:00:00	01-Sep-2014 00:30:03	10647.42	11564.83
DFD	10.8	01-Sep-2014 00:30:03	01-Sep-2014 19:56:06	11564.83	12097.17
All depth are at tool zero.					
Tool Control Parameters					
Survey Record					
Survey Calculation					
Method :		Minimum Radius of Curvature	DLS Method :		Lubinski
North Reference :		Grid North	Total Correction Formula :		Magnetic Dec - Grid Convergence
Grid Convergence :		0.46 deg			
Rig Location					
Latitude :		40° 19' 39.792" N	Longitude :		104° 47' 27.6" W
Tie In Point					
Measured Depth:	0.00 ft	Inclination:	0.00 deg	Azimuth:	0.00 deg
True Vertical Depth:	0.00 ft	North Displacement:	0.00 ft	East Displacement:	0.00 ft
N-S VSec Origin:	0.00 ft	E/-W VSec Origin:	0.00 ft	Vertical Section Azimuth:	93.74 deg
D&I Inits Computed and Values Used - Run001					
Geomagnetic Model :		BGGM 2014	Geomagnetic Date :		23-Aug-2014
Computed Location B :		52654.01 nT +/- 300.00nT	Used Location B :		52598.00 nT +/- 300.00nT
Computed Location G :		999.54 mgn +/- 2.50mgn	Used Location G :		999.02 mgn +/- 2.50mgn
Computed Magnetic Dip :		66.87 deg +/- 0.45deg	Used Magnetic Dip :		66.79 deg +/- 0.45deg
Computed Magnetic Dec :		8.53 deg	Used Magnetic Dec :		8.47 deg
Computed Total Correction :		8.07 deg	Used Total Correction :		8.01 deg
D&I Inits Computed and Values Used - Run002					
Geomagnetic Model :		BGGM 2014	Geomagnetic Date :		23 Aug 2014
Computed Location B :		52654.01 nT +/- 300.00nT	Used Location B :		52598.00 nT +/- 300.00nT
Computed Location G :		999.54 mgn +/- 2.50mgn	Used Location G :		999.02 mgn +/- 2.50mgn
Computed Magnetic Dip :		66.87 deg +/- 0.45deg	Used Magnetic Dip :		66.79 deg +/- 0.45deg
Computed Magnetic Dec :		8.53 deg	Used Magnetic Dec :		8.47 deg
Computed Total Correction :		8.07 deg	Used Total Correction :		8.01 deg
D&I Inits Computed and Values Used - Run003					
Geomagnetic Model :		BGGM 2014	Geomagnetic Date :		27-Aug-2014
Computed Location B :		52652.53 nT +/- 300.00nT	Used Location B :		52598.00 nT +/- 300.00nT
Computed Location G :		999.54 mgn +/- 2.50mgn	Used Location G :		999.02 mgn +/- 2.50mgn
Computed Magnetic Dip :		66.87 deg +/- 0.45deg	Used Magnetic Dip :		66.79 deg +/- 0.45deg
Computed Magnetic Dec :		8.53 deg	Used Magnetic Dec :		8.47 deg
Computed Total Correction :		8.07 deg	Used Total Correction :		8.01 deg
D&I Inits Computed and Values Used - Run004					
Geomagnetic Model :		BGGM 2014	Geomagnetic Date :		29-Aug-2014
Computed Location B :		52651.79 nT +/- 300.00nT	Used Location B :		52564.00 nT +/- 300.00nT
Computed Location G :		999.54 mgn +/- 2.50mgn	Used Location G :		999.02 mgn +/- 2.50mgn
Computed Magnetic Dip :		66.87 deg +/- 0.45deg	Used Magnetic Dip :		66.79 deg +/- 0.45deg
Computed Magnetic Dec :		8.53 deg	Used Magnetic Dec :		8.40 deg
Computed Total Correction :		8.07 deg	Used Total Correction :		7.94 deg
Survey Quality Index					
2 : Long Survey failed mag criteria		9 : Manual		28 : Tie-In Point	
Survey Correction Index					
0 : No correction					
Survey Description Index					
0 : Not Flagged Survey		1 : DMAG Corrected Survey		7 : Projection to Bit	

Seq	MD (ft)	Incl (deg)	Azim (deg)	Course (ft)	TVD (ft)	V Sec (ft)	N/ -S (ft)	E/ -W (ft)	Closure (ft)	at Azim (deg)	DLS deg/100ft	Tool Type	QI	CI	DI
1	0.00	0.00	0.00	----	0.00	0.00	0.00	0.00	0.00	90.00	0.00	TIP	28	0	0
2	290.00	0.40	74.71	290.00	290.00	0.96	0.27	0.98	1.02	74.71	0.14	SingleShot	9	0	0
3	569.00	0.60	189.41	279.00	568.99	1.73	-0.92	1.68	1.90	118.68	0.30	SingleShot	9	0	0
4	640.00	0.28	240.99	71.00	639.99	1.55	-1.37	1.46	2.00	133.11	0.67	SlimPulse	2	0	13
5	731.00	0.40	231.33	91.00	730.99	1.12	-1.68	1.02	1.97	148.78	0.14	SlimPulse	2	0	13
6	825.00	0.49	242.98	94.00	824.99	0.53	-2.07	0.40	2.10	169.04	0.14	SlimPulse	2	0	0
7	919.00	0.89	229.90	94.00	918.98	-0.34	-2.72	-0.52	2.76	190.82	0.46	SlimPulse	2	0	0
8	1013.00	1.77	230.77	94.00	1012.95	-1.93	-4.11	-2.21	4.66	208.21	0.93	SlimPulse	2	0	0
9	1106.00	3.77	240.32	93.00	1105.84	-5.53	-6.53	-5.97	8.86	222.43	2.19	SlimPulse	2	0	0
10	1197.00	4.58	232.70	91.00	1196.60	-10.77	-10.21	-11.46	15.35	228.28	1.08	SlimPulse	2	0	0
11	1290.00	5.88	229.43	93.00	1289.21	-16.98	-15.56	-18.03	23.82	229.20	1.44	SlimPulse	2	0	0
12	1383.00	6.70	229.69	93.00	1381.65	-24.29	-22.17	-25.79	34.02	229.31	0.89	SlimPulse	2	0	0
13	1475.00	8.67	233.59	92.00	1472.82	-33.45	-29.76	-35.46	46.29	229.99	2.21	SlimPulse	2	0	0
14	1568.00	9.51	234.59	93.00	1564.65	-44.77	-38.38	-47.37	60.96	230.99	0.93	SlimPulse	2	0	0
15	1661.00	8.35	230.93	93.00	1656.52	-55.68	-47.09	-58.88	75.39	231.35	1.39	SlimPulse	2	0	0
16	1755.00	9.32	234.81	94.00	1749.40	-66.61	-55.78	-70.40	89.83	231.61	1.21	SlimPulse	2	0	0
17	1849.00	8.83	230.13	94.00	1842.23	-77.76	-64.79	-82.16	104.63	231.74	0.95	SlimPulse	2	0	0
18	1942.00	10.08	230.89	93.00	1933.96	-88.90	-74.50	-93.95	119.91	231.59	1.36	SlimPulse	2	0	0
19	2036.00	9.46	228.32	94.00	2026.60	-100.35	-84.82	-106.10	135.83	231.36	0.81	SlimPulse	2	0	0
20	2131.00	7.87	225.88	95.00	2120.51	-110.19	-94.54	-116.60	150.10	230.96	1.71	SlimPulse	2	0	0
21	2226.00	8.60	231.21	95.00	2214.53	-119.79	-103.52	-126.80	163.68	230.77	1.11	SlimPulse	2	0	0
22	2322.00	10.20	232.95	96.00	2309.24	-131.52	-113.14	-139.18	179.36	230.89	1.69	SlimPulse	2	0	0
23	2417.00	9.45	233.71	95.00	2402.85	-143.86	-122.82	-152.18	195.57	231.09	0.80	SlimPulse	2	0	0
24	2512.00	9.26	232.80	95.00	2496.59	-155.61	-132.06	-164.56	210.99	231.25	0.26	SlimPulse	2	0	0
25	2607.00	9.62	234.31	95.00	2590.30	-167.51	-141.31	-177.09	226.57	231.41	0.46	SlimPulse	2	0	0
26	2702.00	10.22	233.85	95.00	2683.88	-180.11	-150.91	-190.34	242.91	231.59	0.63	SlimPulse	2	0	0
27	2797.00	10.57	233.41	95.00	2777.32	-193.22	-161.08	-204.14	260.04	231.73	0.38	SlimPulse	2	0	0
28	2892.00	8.97	231.53	95.00	2870.94	-205.35	-170.88	-216.94	276.15	231.77	1.71	SlimPulse	2	0	0
29	2988.00	8.66	233.31	96.00	2965.80	-216.40	-179.86	-228.60	290.88	231.81	0.43	SlimPulse	2	0	0
30	3083.00	8.86	233.55	95.00	3059.70	-227.43	-188.48	-240.22	305.35	231.88	0.21	SlimPulse	2	0	0
31	3178.00	7.93	229.04	95.00	3153.68	-237.68	-197.12	-251.05	319.19	231.86	1.20	SlimPulse	2	0	0
32	3273.00	8.86	232.20	95.00	3247.66	-247.81	-205.90	-261.78	333.04	231.81	1.09	SlimPulse	2	0	0
33	3368.00	7.58	231.13	95.00	3341.68	-257.90	-214.31	-272.44	346.62	231.81	1.36	SlimPulse	2	0	0
34	3463.00	9.43	234.81	95.00	3435.63	-268.57	-222.73	-283.68	360.66	231.86	2.03	SlimPulse	2	0	0
35	3558.00	7.96	238.16	95.00	3529.54	-279.97	-230.69	-295.63	374.97	232.03	1.64	SlimPulse	2	0	0
36	3653.00	9.65	224.91	95.00	3623.43	-290.57	-239.80	-306.84	389.44	231.99	2.77	SlimPulse	2	0	0
37	3748.00	9.66	229.11	95.00	3717.08	-301.48	-250.65	-318.48	405.28	231.80	0.74	SlimPulse	2	0	0
38	3844.00	10.30	228.67	96.00	3811.63	-313.27	-261.59	-331.01	421.88	231.68	0.67	SlimPulse	2	0	0
39	3939.00	9.86	232.58	95.00	3905.16	-325.39	-272.14	-343.85	438.52	231.64	0.85	SlimPulse	2	0	0
40	4034.00	9.49	232.34	95.00	3998.81	-337.39	-281.87	-356.51	454.49	231.67	0.39	SlimPulse	2	0	0
41	4129.00	8.65	232.40	95.00	4092.62	-348.63	-291.01	-368.37	469.46	231.69	0.89	SlimPulse	2	0	0
42	4224.00	8.38	231.57	95.00	4186.58	-359.12	-299.67	-379.45	483.53	231.70	0.31	SlimPulse	2	0	0
43	4320.00	8.10	228.82	96.00	4281.59	-369.10	-308.47	-390.02	497.28	231.66	0.50	SlimPulse	2	0	0
44	4415.00	7.26	235.14	95.00	4375.74	-378.53	-316.31	-399.99	509.94	231.66	1.25	SlimPulse	2	0	0
45	4510.00	6.72	230.75	95.00	4470.03	-387.29	-323.26	-409.21	521.49	231.69	0.80	SlimPulse	2	0	0
46	4605.00	4.66	229.08	95.00	4564.56	-394.10	-329.31	-416.44	530.91	231.66	2.17	SlimPulse	2	0	0
47	4700.00	2.98	236.94	95.00	4659.34	-398.83	-333.18	-421.43	537.24	231.67	1.85	SlimPulse	2	0	0
48	4795.00	1.43	187.79	95.00	4754.28	-400.89	-335.70	-423.66	540.55	231.61	2.43	SlimPulse	2	0	0
49	4889.00	1.07	137.73	94.00	4848.26	-400.34	-337.52	-423.22	541.34	231.43	1.18	SlimPulse	2	0	0
50	4984.00	0.84	95.72	95.00	4943.24	-399.01	-338.24	-421.94	540.78	231.28	0.75	SlimPulse	2	0	0
51	5079.00	0.94	96.16	95.00	5038.23	-397.53	-338.39	-420.47	539.73	231.17	0.11	SlimPulse	2	0	0
52	5174.00	0.90	105.00	95.00	5123.22	-396.02	-338.67	-418.08	538.75	231.05	0.16	SlimPulse	2	0	0

52	5174.00	0.90	105.00	95.00	5133.22	-396.02	-338.67	-418.98	538.75	231.05	0.16	SlimPulse	2	0	0
53	5270.00	0.72	113.23	96.00	5229.21	-394.72	-339.10	-417.70	538.02	230.93	0.22	SlimPulse	2	0	0
54	5365.00	0.80	131.99	95.00	5324.20	-393.63	-339.78	-416.65	537.63	230.80	0.27	SlimPulse	2	0	0
55	5460.00	0.35	356.86	95.00	5419.20	-393.15	-339.94	-416.18	537.37	230.76	1.13	SlimPulse	2	0	0
56	5555.00	0.42	26.15	95.00	5514.20	-393.05	-339.34	-416.04	536.88	230.80	0.21	SlimPulse	2	0	0
57	5650.00	0.32	28.38	95.00	5609.20	-392.81	-338.80	-415.76	536.32	230.82	0.10	SlimPulse	2	0	0
58	5746.00	0.15	71.89	96.00	5705.20	-392.59	-338.53	-415.52	535.96	230.83	0.24	SlimPulse	2	0	0
59	5840.00	0.29	108.16	94.00	5799.20	-392.25	-338.56	-415.18	535.73	230.80	0.21	SlimPulse	2	0	0
60	5936.00	0.24	115.05	96.00	5895.19	-391.82	-338.72	-414.77	535.50	230.76	0.06	SlimPulse	2	0	0
61	6031.00	0.40	106.52	95.00	5990.19	-391.31	-338.90	-414.26	535.24	230.71	0.17	SlimPulse	2	0	0
62	6126.00	0.40	86.89	95.00	6085.19	-390.65	-338.98	-413.61	534.78	230.66	0.14	SlimPulse	2	0	0
63	6221.00	0.33	82.82	95.00	6180.19	-390.06	-338.93	-413.01	534.28	230.63	0.08	SlimPulse	2	0	0
64	6296.00	0.42	93.99	75.00	6255.19	-389.57	-338.92	-412.52	533.89	230.59	0.16	SlimPulse	2	0	0
65	6312.00	0.19	106.53	16.00	6271.19	-389.48	-338.93	-412.44	533.83	230.59	1.49	SlimPulse	2	0	0
66	6408.00	4.60	63.30	96.00	6367.08	-386.00	-337.25	-408.84	529.99	230.48	4.65	SlimPulse	9	0	1
67	6503.00	12.78	74.66	95.00	6460.92	-372.76	-332.75	-395.28	516.70	229.91	8.76	SlimPulse	9	0	1
68	6598.00	19.23	89.10	95.00	6552.22	-347.20	-329.72	-369.47	495.21	228.25	7.93	SlimPulse	9	0	1
69	6693.00	19.45	98.66	95.00	6641.88	-315.84	-331.86	-338.18	473.82	225.54	3.34	SlimPulse	9	0	1
70	6788.00	24.52	88.02	95.00	6729.98	-280.43	-333.56	-302.80	450.49	222.23	6.77	SlimPulse	9	0	1
71	6884.00	33.56	89.06	96.00	6813.82	-234.07	-332.43	-256.27	419.75	217.63	9.43	SlimPulse	9	0	1
72	6979.00	43.74	88.52	95.00	6887.92	-175.04	-331.15	-197.03	385.33	210.75	10.72	SlimPulse	9	0	1
73	7074.00	53.83	85.79	95.00	6950.44	-104.16	-327.48	-125.76	350.79	201.01	10.84	SlimPulse	9	0	1
74	7169.00	65.59	90.33	95.00	6998.29	-22.69	-324.90	-43.95	327.85	187.70	13.04	SlimPulse	9	0	1
75	7264.00	73.58	94.75	95.00	7031.42	66.23	-328.93	44.89	331.99	172.23	9.47	SlimPulse	9	0	1
76	7359.00	74.50	95.43	95.00	7057.54	157.54	-337.04	135.87	363.39	158.04	1.19	SlimPulse	9	0	1
77	7454.00	76.23	96.04	95.00	7081.54	249.39	-346.22	227.32	414.17	146.71	1.92	SlimPulse	9	0	1
78	7494.00	77.52	93.68	40.00	7090.62	288.34	-349.52	266.13	439.30	142.71	6.59	SlimPulse	9	0	1
79	7585.00	81.79	87.52	91.00	7106.98	377.66	-350.43	355.58	499.25	134.58	8.14	Other	9	0	0
80	7680.00	85.32	88.03	95.00	7117.64	471.53	-346.76	449.90	568.01	127.62	3.75	Other	9	0	0
81	7775.00	88.42	90.68	95.00	7122.83	566.09	-345.70	544.73	645.18	122.40	4.29	Other	9	0	0
82	7870.00	92.92	91.48	95.00	7121.71	660.96	-347.49	639.68	727.99	118.51	4.81	Other	9	0	0
83	7966.00	93.92	91.03	96.00	7115.99	756.70	-349.59	735.49	814.34	115.42	1.14	Other	9	0	0
84	8061.00	92.10	91.93	95.00	7111.00	851.49	-352.04	830.32	901.87	112.98	2.14	Other	9	0	0
85	8156.00	91.55	91.63	95.00	7107.97	946.38	-354.99	925.22	990.98	110.99	0.66	Other	9	0	0
86	8251.00	88.18	88.23	95.00	7108.20	1041.15	-354.87	1020.20	1080.15	109.18	5.04	Other	9	0	0
87	8346.00	88.18	87.94	95.00	7111.22	1135.64	-351.70	1115.09	1169.23	107.51	0.31	Other	9	0	0
88	8442.00	88.25	87.13	96.00	7114.21	1231.03	-347.57	1210.96	1259.84	106.01	0.85	Other	9	0	0
89	8537.00	90.07	88.62	95.00	7115.60	1325.51	-344.05	1305.88	1350.43	104.76	2.48	Other	9	0	0
90	8632.00	91.17	88.97	95.00	7114.57	1420.15	-342.05	1400.85	1441.99	103.72	1.22	Other	9	0	0
91	8727.00	89.93	87.86	95.00	7113.66	1514.74	-339.42	1495.80	1533.83	102.78	1.75	Other	9	0	0
92	8822.00	88.63	89.66	95.00	7114.85	1609.37	-337.37	1590.77	1626.15	101.97	2.34	Other	9	0	0
93	8917.00	88.80	88.64	95.00	7116.98	1704.04	-335.96	1685.73	1718.90	101.27	1.09	Other	9	0	0
94	9013.00	89.24	87.99	96.00	7118.62	1799.59	-333.14	1781.68	1812.57	100.59	0.82	Other	9	0	0
95	9108.00	91.07	88.67	95.00	7118.37	1894.17	-330.37	1876.63	1905.48	99.98	2.05	Other	9	0	0
96	9203.00	90.62	89.05	95.00	7116.97	1988.81	-328.48	1971.60	1998.79	99.46	0.62	Other	9	0	0
97	9298.00	87.46	87.01	95.00	7118.56	2083.31	-325.22	2066.51	2091.96	98.94	3.96	Other	9	0	0
98	9393.00	87.46	86.82	95.00	7122.77	2177.55	-320.11	2161.28	2184.88	98.42	0.20	Other	9	0	0
99	9488.00	88.56	87.78	95.00	7126.07	2271.89	-315.64	2256.12	2278.08	97.96	1.54	Other	9	0	0
100	9583.00	88.45	89.58	95.00	7128.55	2366.48	-313.45	2351.06	2371.85	97.59	1.90	Other	9	0	0
101	9679.00	89.42	89.84	96.00	7130.33	2462.23	-312.96	2447.04	2466.96	97.29	1.05	Other	9	0	0
102	9774.00	90.45	90.74	95.00	7130.44	2557.05	-313.44	2542.03	2561.29	97.03	1.44	Other	9	0	0
103	9869.00	90.79	90.22	95.00	7129.41	2651.89	-314.24	2637.02	2655.68	96.80	0.65	Other	9	0	0
104	9964.00	90.62	90.22	95.00	7128.24	2746.71	-314.60	2732.02	2750.07	96.57	0.18	Other	9	0	0
105	10059.00	90.10	89.43	95.00	7127.64	2841.48	-314.31	2827.01	2844.42	96.34	1.00	Other	9	0	0
106	10154.00	89.52	88.88	95.00	7128.88	2936.25	-314.64	2922.04	2939.57	96.11	1.42	Other	9	0	0

106	10154.00	90.72	90.36	95.00	7126.96	2936.27	-314.14	2922.01	2938.85	96.14	1.18	Other	9	0	0
107	10249.00	91.27	90.14	95.00	7125.31	3031.08	-314.55	3016.99	3033.33	95.95	0.62	Other	9	0	0
108	10344.00	91.93	90.62	95.00	7122.66	3125.88	-315.18	3111.95	3127.89	95.78	0.86	Other	9	0	0
109	10439.00	90.03	91.41	95.00	7121.04	3220.75	-316.87	3206.92	3222.54	95.64	2.17	Other	9	0	0
110	10534.00	90.86	91.37	95.00	7120.30	3315.67	-319.17	3301.89	3317.29	95.52	0.87	Other	9	0	0
111	10630.00	90.52	90.59	96.00	7119.14	3411.55	-320.81	3397.87	3412.99	95.39	0.89	Other	9	0	0
112	10725.00	87.77	91.78	95.00	7120.56	3506.43	-322.78	3492.82	3507.71	95.28	3.15	Other	9	0	0
113	10820.00	88.28	91.49	95.00	7123.84	3601.31	-325.49	3587.73	3602.46	95.18	0.62	Other	9	0	0
114	10915.00	89.59	91.25	95.00	7125.60	3696.21	-327.76	3682.68	3697.24	95.09	1.40	Other	9	0	0
115	11011.00	90.48	91.58	96.00	7125.54	3792.13	-330.13	3778.65	3793.04	94.99	0.99	Other	9	0	0
116	11105.00	88.63	93.21	94.00	7126.27	3886.10	-334.05	3872.56	3886.94	94.93	2.62	Other	9	0	0
117	11201.00	89.38	92.02	96.00	7127.94	3982.06	-338.43	3968.44	3982.84	94.87	1.47	Other	9	0	0
118	11296.00	90.58	91.72	95.00	7127.97	4077.01	-341.53	4063.39	4077.72	94.80	1.30	Other	9	0	0
119	11391.00	91.58	89.73	95.00	7126.18	4171.86	-342.74	4158.36	4172.47	94.71	2.34	Other	9	0	0
120	11486.00	92.34	89.41	95.00	7122.93	4266.55	-342.02	4253.30	4267.03	94.60	0.87	Other	9	0	0
121	11581.00	91.61	89.91	95.00	7119.66	4361.25	-341.46	4348.24	4361.61	94.49	0.93	Other	9	0	0
122	11676.00	89.79	88.31	95.00	7118.50	4455.93	-339.98	4443.22	4456.20	94.38	2.55	Other	9	0	0
123	11771.00	90.48	88.14	95.00	7118.27	4550.49	-337.04	4538.17	4550.66	94.25	0.75	Other	9	0	0
124	11867.00	90.62	88.40	96.00	7117.35	4646.05	-334.14	4634.12	4646.16	94.12	0.31	Other	9	0	0
125	11962.00	90.82	88.00	95.00	7116.16	4740.60	-331.16	4729.07	4740.65	94.01	0.47	Other	9	0	0
126	12029.00	91.03	87.81	67.00	7115.08	4807.24	-328.71	4796.01	4807.25	93.92	0.42	Other	9	0	0
127	12096.00	91.03	87.81	67.00	7113.87	4873.87	-326.15	4862.95	4873.88	93.84	0.00	Other	9	0	7

Calibration Report

SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run001									
Primary Equipment :									
Elec. cartridge, 150C max with GR				SPEC			989		
GRGain - Gamma Ray: Blanket									
Master (Time Frame File):		12:00:00 28-May-2014							
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>	
Gamma Ray Calibration Gain			Master	1.0000	0.9000	1.0395	1.1000	<div><div></div><div></div><div></div><div></div></div>	


SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run002									
Primary Equipment :									
Elec. cartridge, 150C max with GR				SPEC			893		
GRGain - Gamma Ray: Blanket									
Master (Time Frame File):		12:00:00 19-Jul-2014							
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>	
Gamma Ray Calibration Gain			Master	1.0000	0.9000	1.0483	1.1000	<div><div></div><div></div><div></div><div></div></div>	


SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run003									
Primary Equipment :									
Elec. cartridge, 150C max with GR				SPEC			893		
GRGain - Gamma Ray: Blanket									
Master (Time Frame File):		12:00:00 19-Jul-2014							
Measurement		Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>	
Gamma Ray Calibration Gain			Master	1.0000	0.9000	1.0483	1.1000	<div><div></div><div></div><div></div><div></div></div>	

SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run004									
Primary Equipment :									
Elec. cartridge, 150C max with GR					SPEC		989		
GRGain - Gamma Ray: Blanket									
Master (Time Frame File): 12:00:00 27-Jun-2014									
Measurement			Unit	Phase	Nominal	Low Limit	Actual	High Limit	

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0774	1.1000	

<b>Company:</b>	Noble Energy INC	
<b>Well:</b>	Five Rivers K09-66-1AHN	
<b>Field:</b>	Wattenberg	
<b>County:</b>	Weld	
<b>State:</b>	Colorado	
<b>Country:</b>	USA	





SlimPulse-Gamma Ray

2 in./ 100 ft and 5 in./ 100 ft True Vertical Depth

Recorded Mode, Composite Log