

SlimPulse-Gamma Ray

2 in./ 100 ft and 5 in./ 100 ft Measured Depth

Recorded Mode, Composite Log



Company: Noble Energy INC

Well: Five Rivers K09-67-1HN

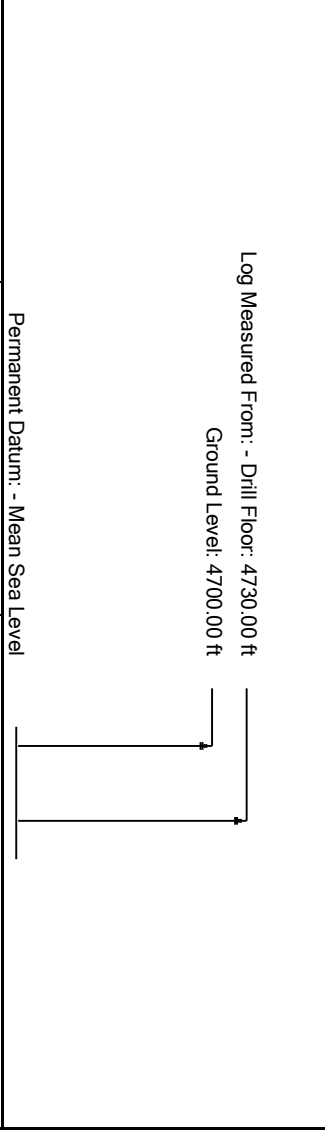
Field: Wattenberg

County: Weld

State: Colorado

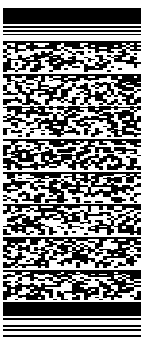
Country: USA

Section:	9	APIN:	05-123-39480
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' 40.692", Easting: 3197665.963 ftUS		
FL2:	Longitude: W 104° 47' 27.672", Northing: 1363110.487 ftUS		



Permanent Datum: - Mean Sea Level

Acquisition Dates:	19-Jul-2014 -- 25-Jul-2014	Other Services:	Surveys / Continuous D&I
Log Interval:	550.00 (ft) -- 12280.00 (ft)		Downhole Temperature
Index Types:	Measured Depth		Downhole Shocks
Index Scales:	1:600 2" / 100'; 1:240 5" / 100'		Directional Drilling
Depth Source:	Driller's Depth		
Depth Sensor:	PASON		
Print Type:	Final		
Spud Date:	18-Jul-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 )	0	7358				
Bottom Driller ( ft )	7358	12260				
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	626				
Bottom Driller ( ft )	626	7347				

Operational Run Summary						
Parameter ( unit )	Run001	Run002	Run003	Run004		
Date Log Started	19-Jul-2014	20-Jul-2014	21-Jul-2014	23-Jul-2014		
Time Log Started	07:39:00	18:14:49	15:12:37	07:57:42		
Date Log Finished	20-Jul-2014	21-Jul-2014	22-Jul-2014	25-Jul-2014		
Time Log Finished	11:34:18	09:04:08	09:30:32	15:48:31		
Bit Size ( in )	8.750	8.750	8.750	6.125		
Bit Start Depth ( ft )	636.00	5955.00	6924.00	7358.00		
Bit Stop Depth ( ft )	5955.00	6924.00	7358.00	12260.00		
Top Log Interval ( ft )	586.00	5904.00	6865.00	7299.00		
Bottom Log Interval ( ft )	5904.00	6865.00	7299.00	12194.00		
Max Hole Deviation ( deg )	12.64	20.76	75.07	94.09		
Azimuth of Max Deviation ( deg )	305.59	85.94	75.58	99.09		
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	Mark Wilson	Mark Wilson	Zach Brunson		
Witnessed By	Lane Fullenwider	Lane Fullenwider	Lane Fullenwider	Lane Fullenwider		
Service Order Number	14CCO0571	14CCO0571	14CCO0571	14CCO0571		

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 )	212	212	199.4	258.8		
Source of Sample	Active Tank	Active Tank	Active Tank	Active Tank		

Salinity ( ppm )	2100	2100	2100	2300		
Density ( lbm/gal )	8.7	10.2	10.5	10.65		
Funnel Viscosity ( s )	29	36	38	35		
Fluid Loss ( cm3 )	0	0	0	0		
PH	11.2	10.1	10	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 )	0.07 @ 212	0.07 @ 212	0.07 @ 212	0.07 @ 212		
RMF @ BHT ( ohm.m@degF )	0.05 @ 212	0.05 @ 212	0.05 @ 212	0.05 @ 212		
RMC @ BHT ( ohm.m@degF )	NaN @ 212	NaN @ 212	NaN @ 212	NaN @ 212		
Total Solid ( % )	2.1	9.3	10.1	4.5		
High Gravity Solids ( % )	0.6	4.6	6.4	2		


Remarks and Equipment Summary

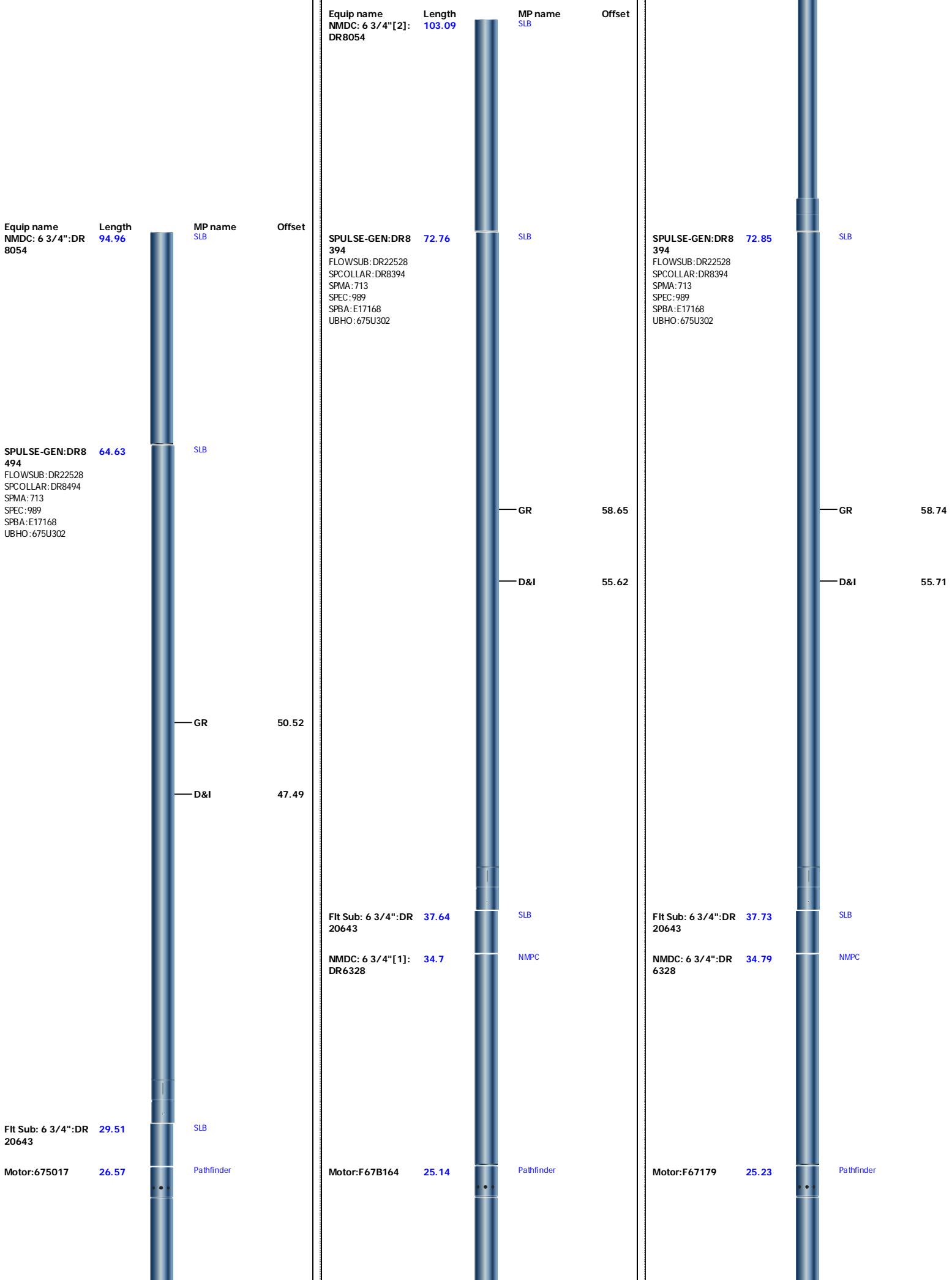
Data presented is from tool memory and acquired while drilling from 636.0 ft MD to 12260.0 ft MD

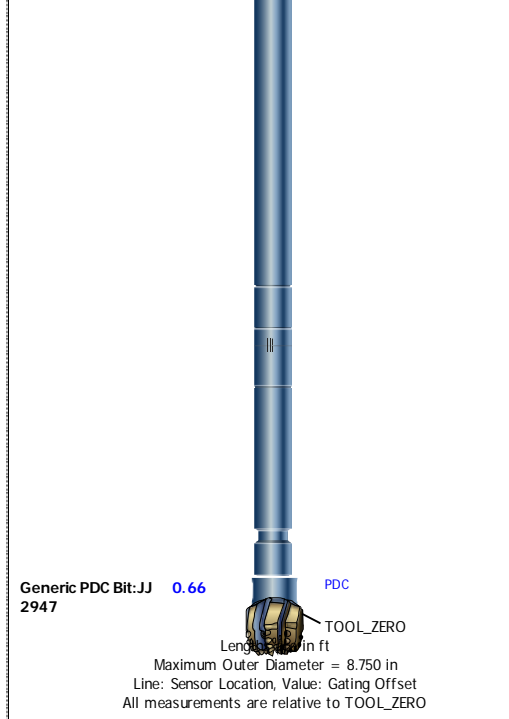
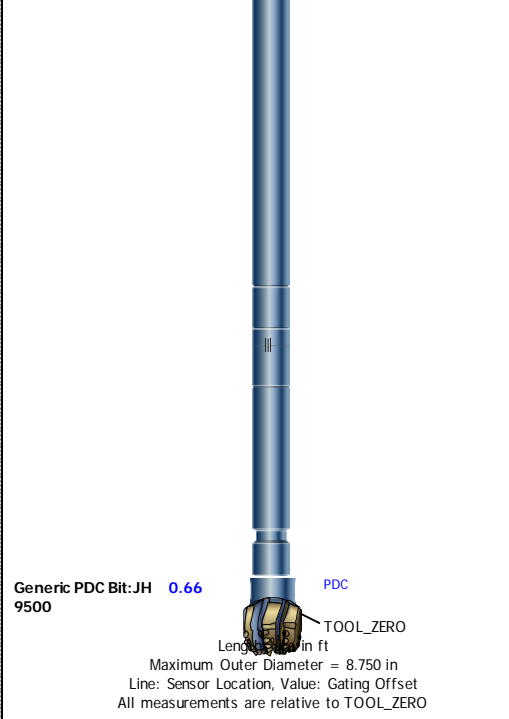
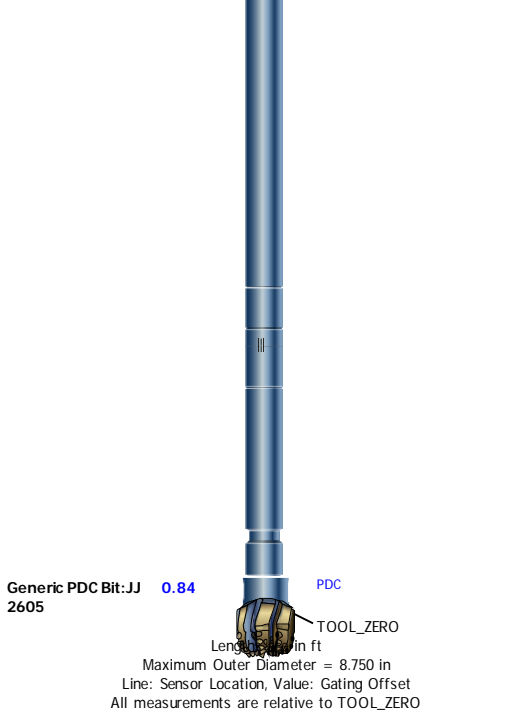
Depth Reference: Driller's Depth

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 Curve to Landing Point	Run Objective: Drill Curve to Landing Point
Bit to GR: 50.52 Bit to DNI: 47.49	Bit to GR: 58.65 Bit to DNI: 55.62	Bit to GR: 58.74 Bit to DNI: 55.71
Drilled from 636.0 ft MD to 5995.0 ft MD Logged from 586.0 ft MD to 5904.0 ft MD	Drilled from 5995.0 ft MD to 6924.0 ft MD Logged from 5904.0 ft MD to 6865.0 ft MD	Drilled from 6924.0 ft MD to 7358.0 ft MD Logged from 6865.0 ft MD to 7299.0 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: 28-May-2014 SlimPulse D&I Calibrated: 19-Apr-2014	SlimPulse Version Software: Version 11 SlimPulse GR Calibrated: 11-Apr-2014 SlimPulse D&I Calibrated: 04-Jan-2013
PathFinder, a Schlumberger Co Personnel: DD: Chris Sisseck, Mike Hikes MWD: Mark Wilson, Zach Brunson	PathFinder, a Schlumberger Co Personnel: DD: Chris Sisseck, Mike Hikes MWD: Mark Wilson, Zach Brunson	PathFinder, a Schlumberger Co Personnel: DD: Chris Sisseck, Mike Hikes MWD: Mark Wilson, Zach Brunson
Reason for POOH: Penetration Rate	Reason for POOH: Hole Problems	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>103.64</div> </div> <div> <div>MP name</div> <div>NMFC</div> </div> <div>Offset</div> </div> 





Run004: Remarks

Run Objective: Drill Lateral Section to TD

Bit to GR: 65.42

Bit to DNI: 62.39

Drilled from 7358.0 ft MD to 12260.0 ft MD

Logged from 7299.0 ft MD to 12194.0 ft MD

SlimPulse Version Software: Version 11

SlimPulse GR Calibrated: 11-Apr-2014

SlimPulse D&I Calibrated: 04-Jan-2013

PathFinder, a Schlumberger Co Personnel:

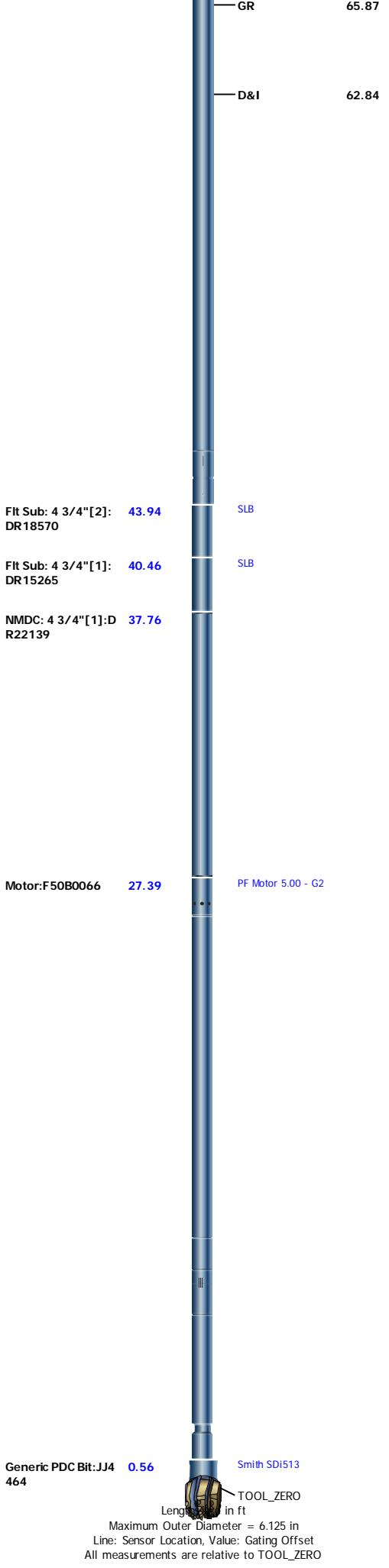
DD: Chris Sisseck, Mike Hikes

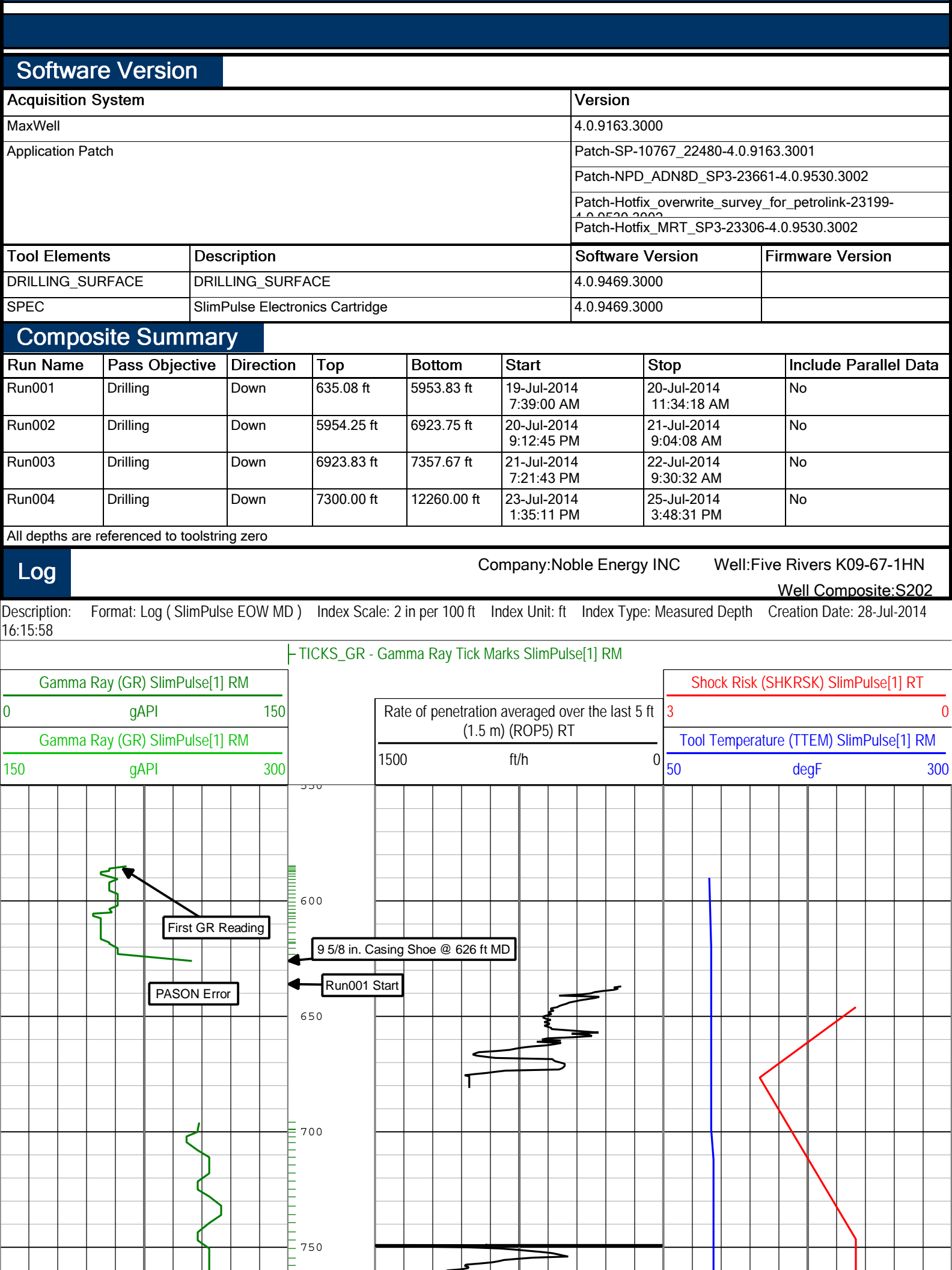
MWD: Mark Wilson, Zach Brunson

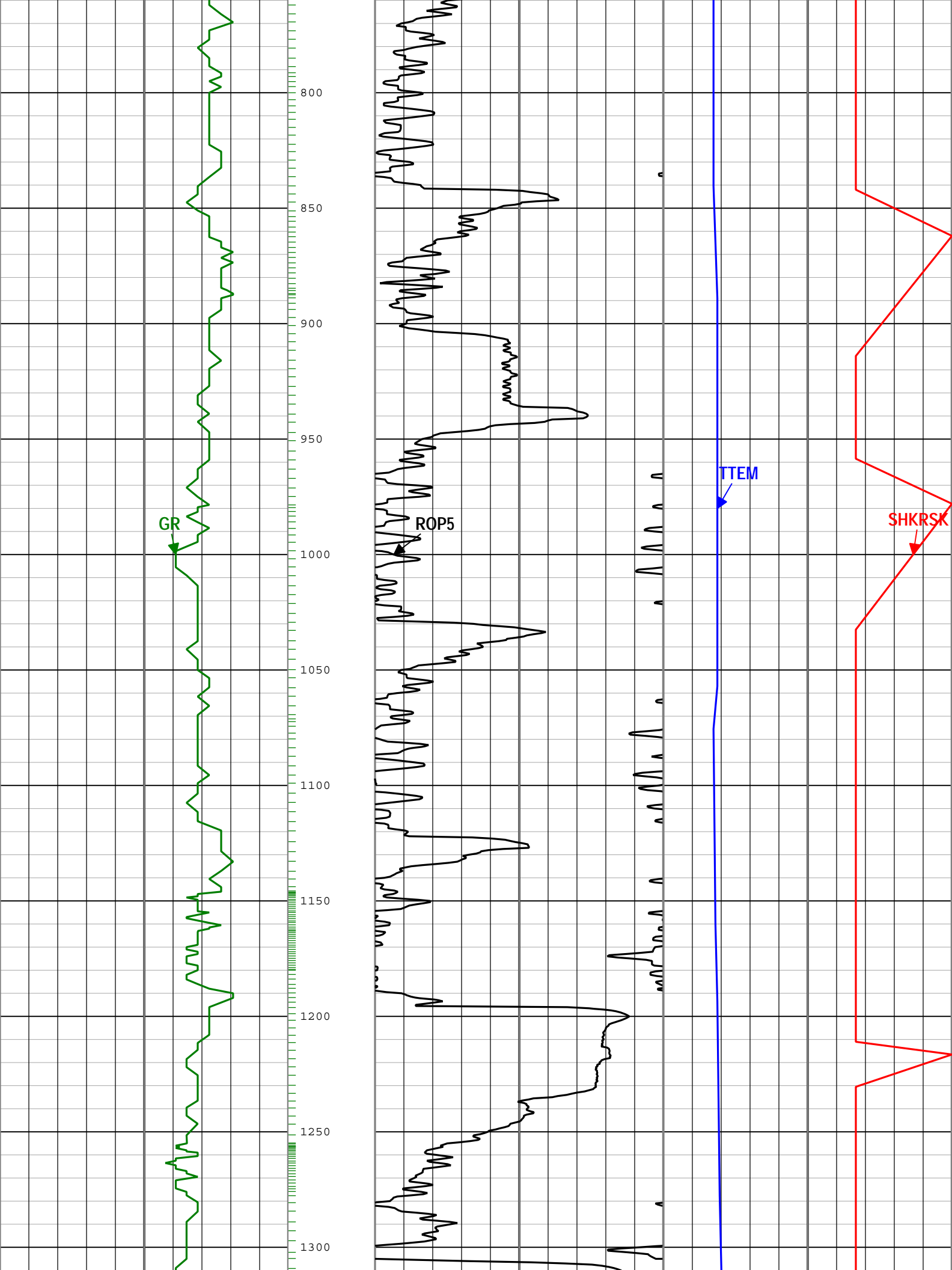
Reason for POOH: Well TD

Run004: Toolstring

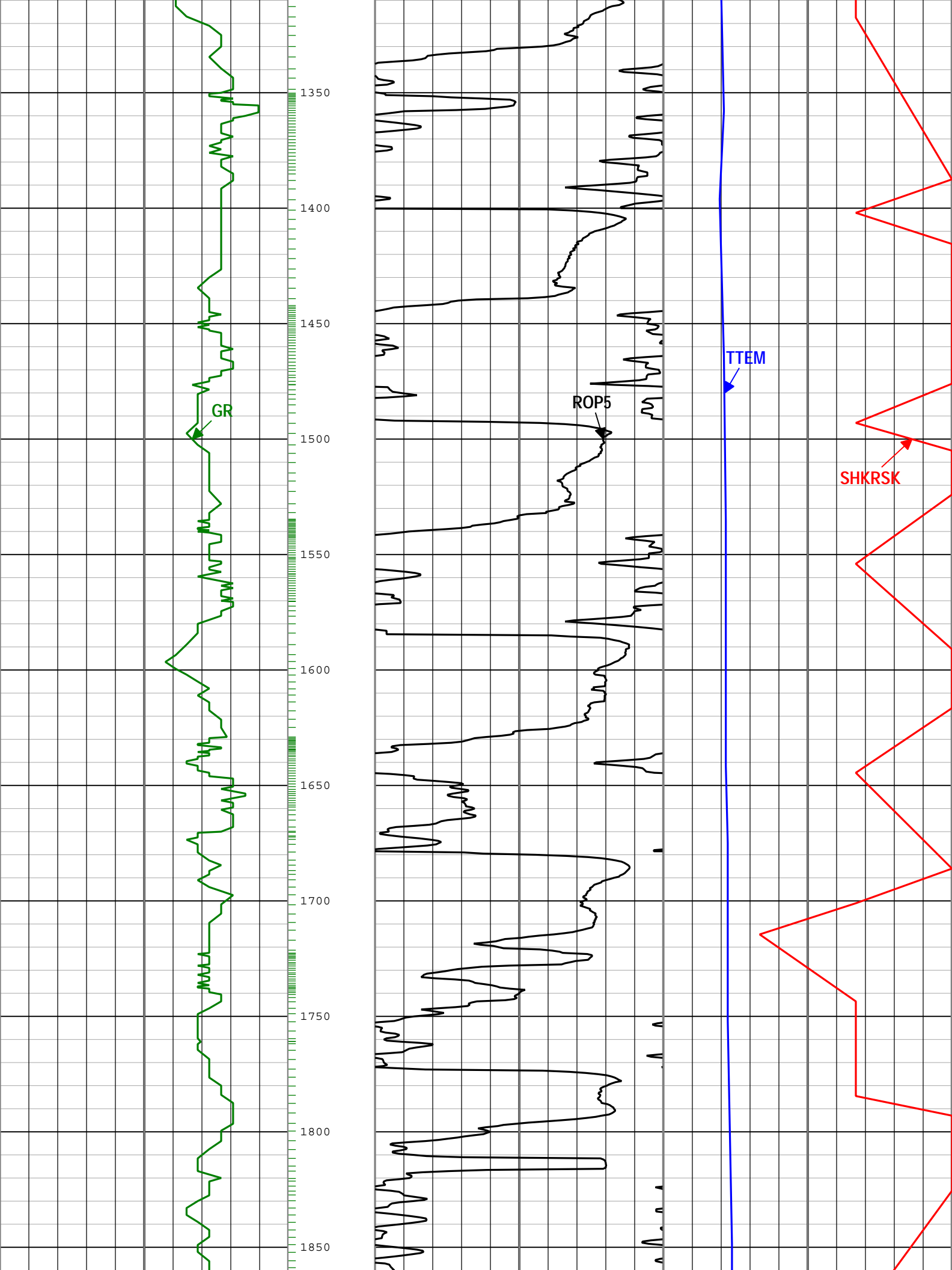
Equip name	Length	MP name	Offset
X/O: 4 3/4":DR194 72	114.23	SLB	
NMDC: 4 3/4"[2]:D R23997	110.81	SLB	
SPULSE-GEN:DR10 035	80.18		
FLWSUB:DR22097			
SPCOLLAR:DR10035			
SPMA:697			
SPEC:6191			
SPBA:Q01490			
UBHO:475U127			

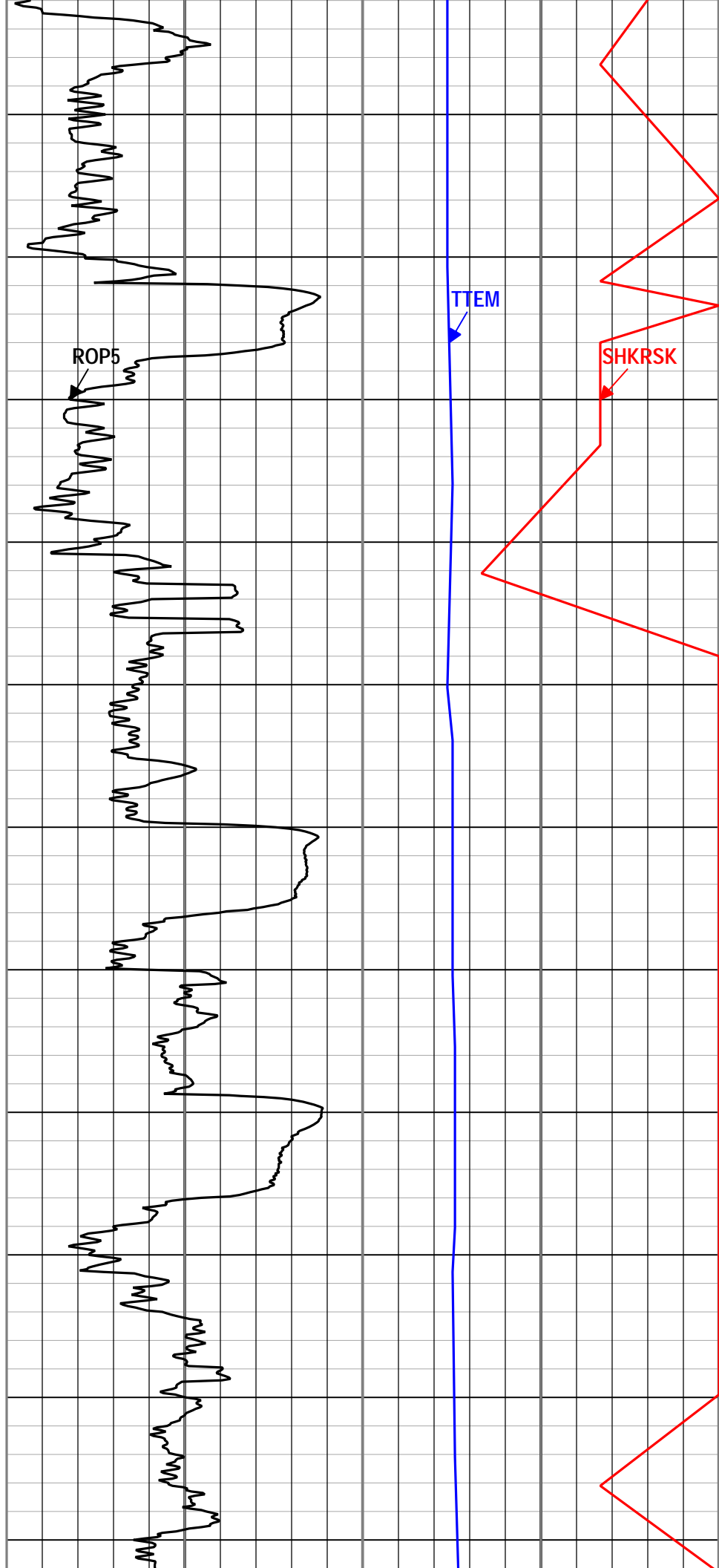
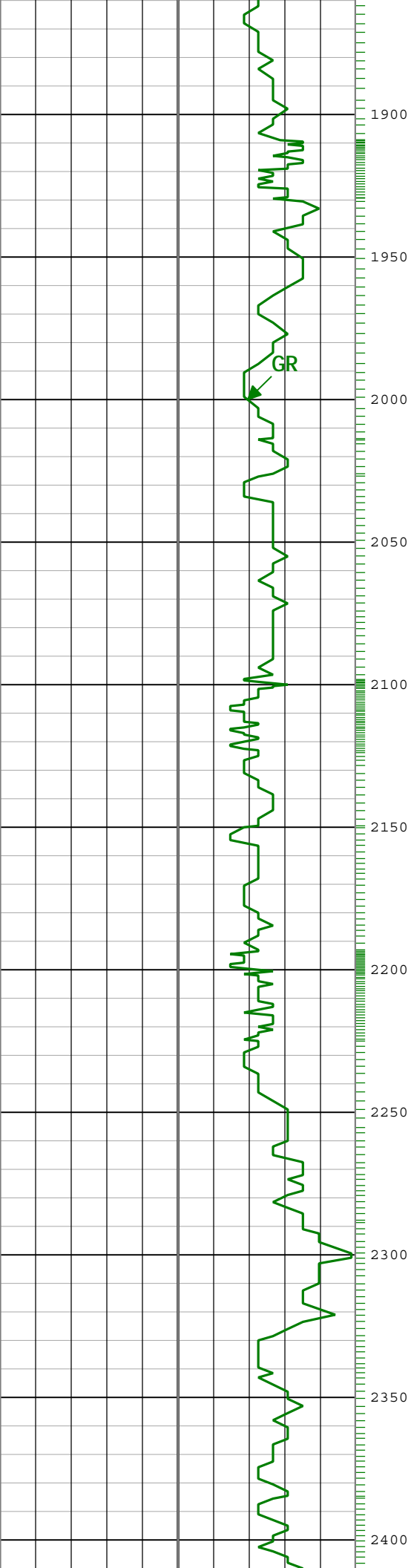


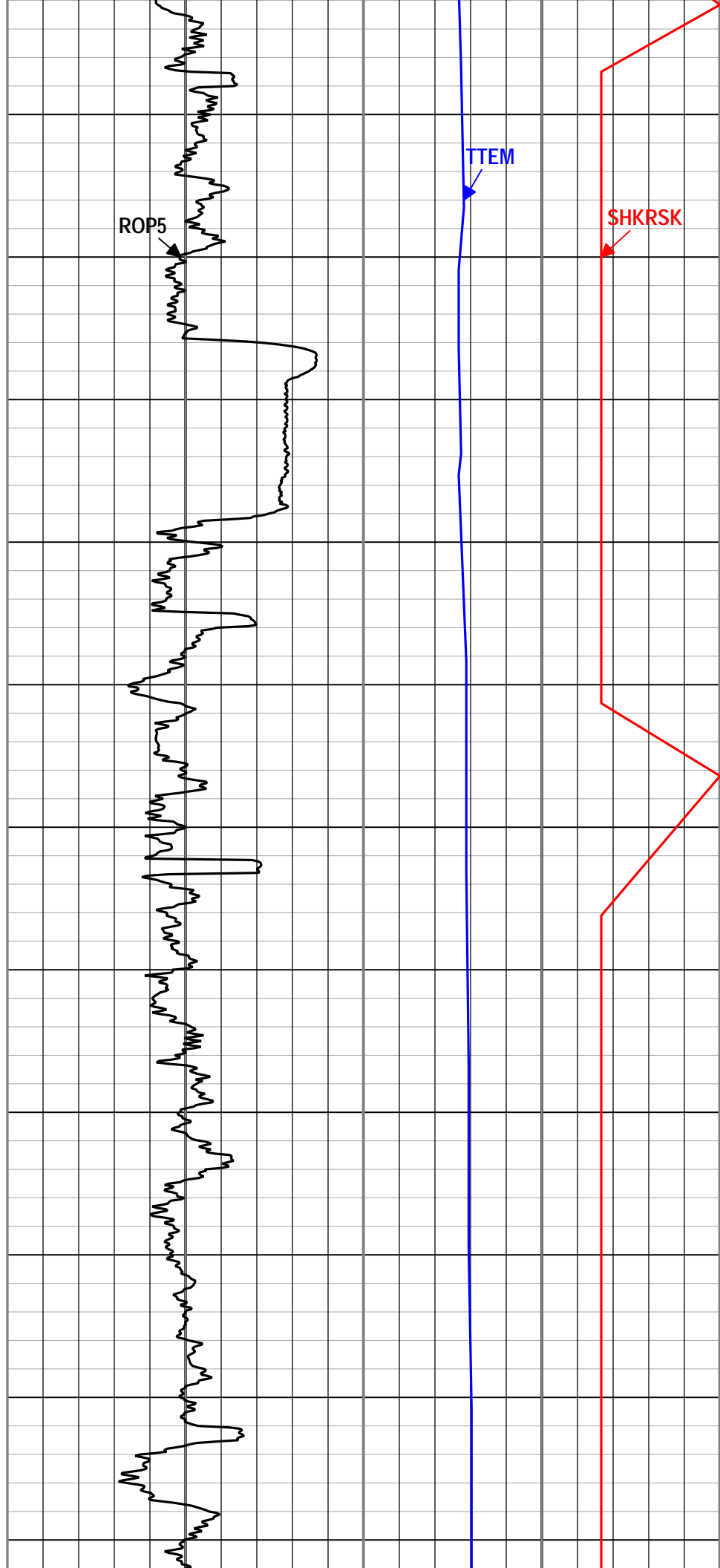
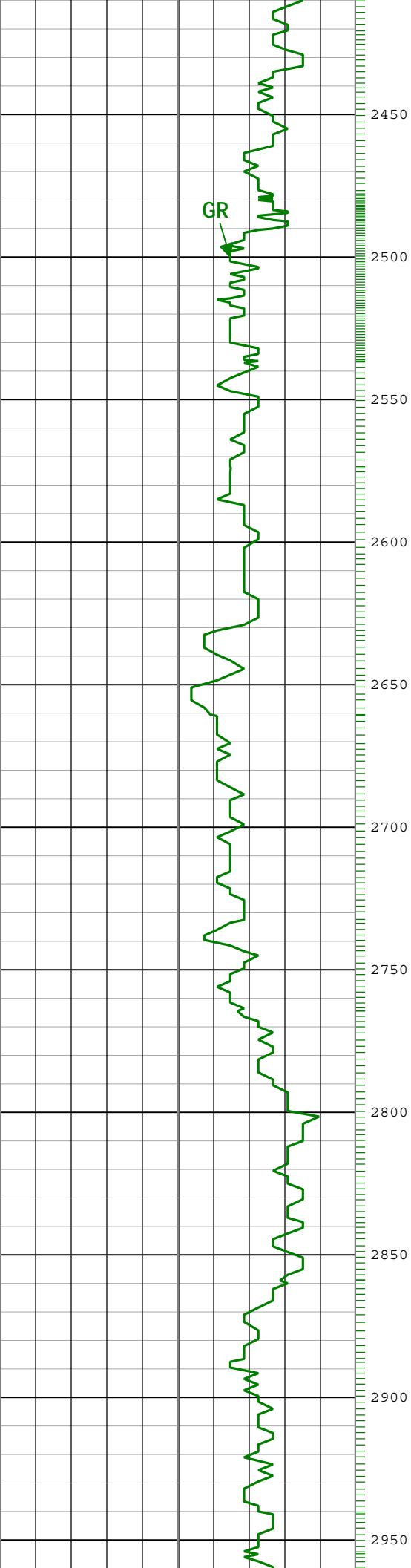


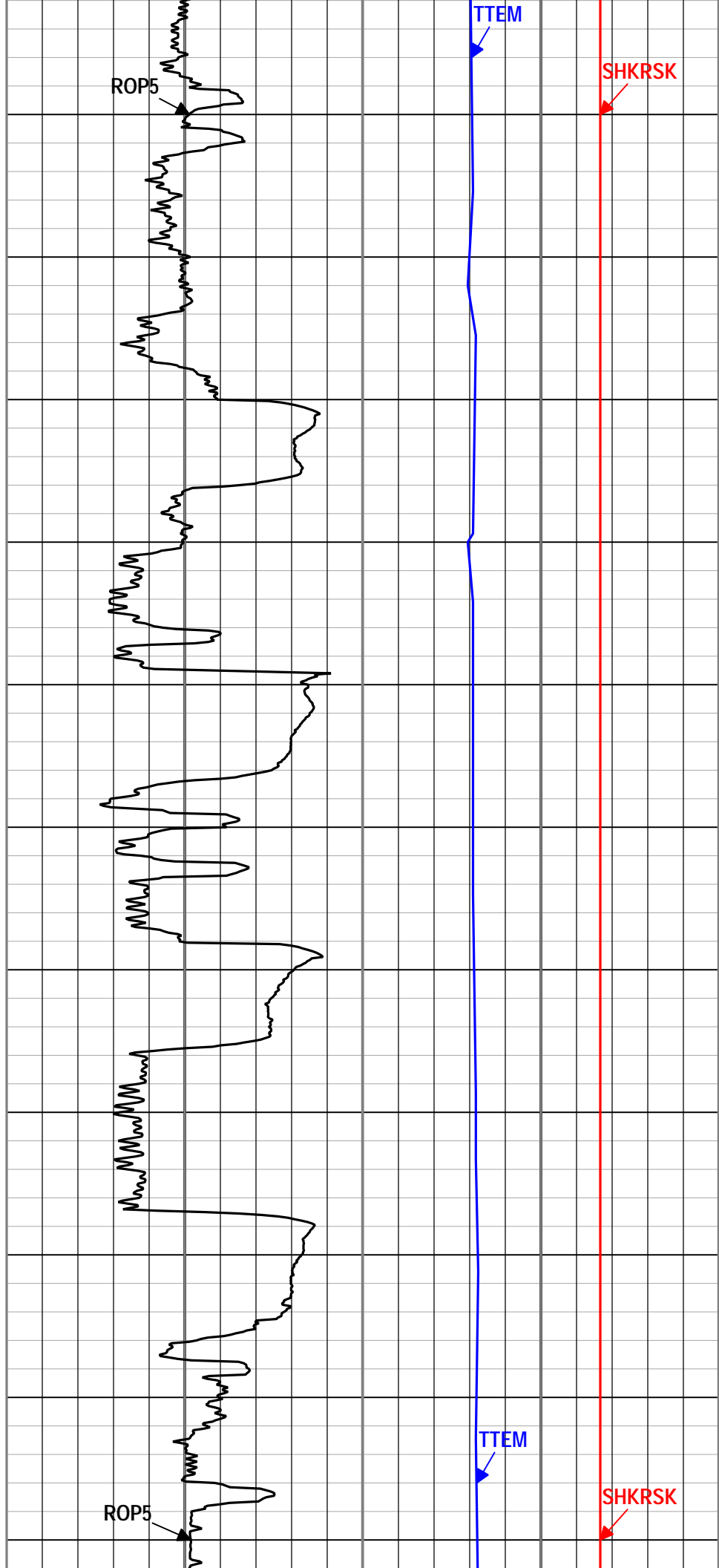
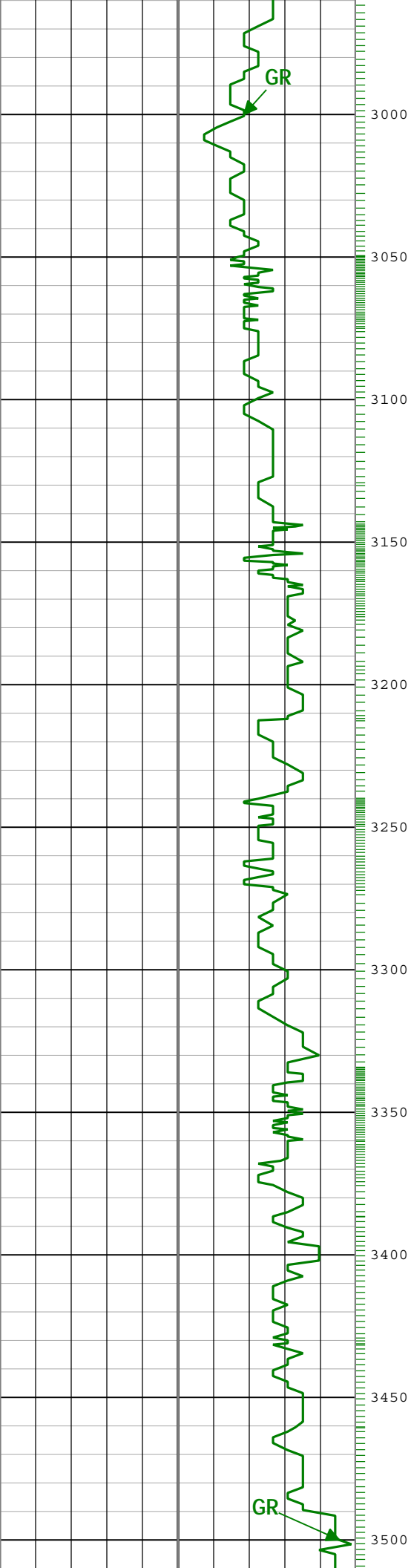


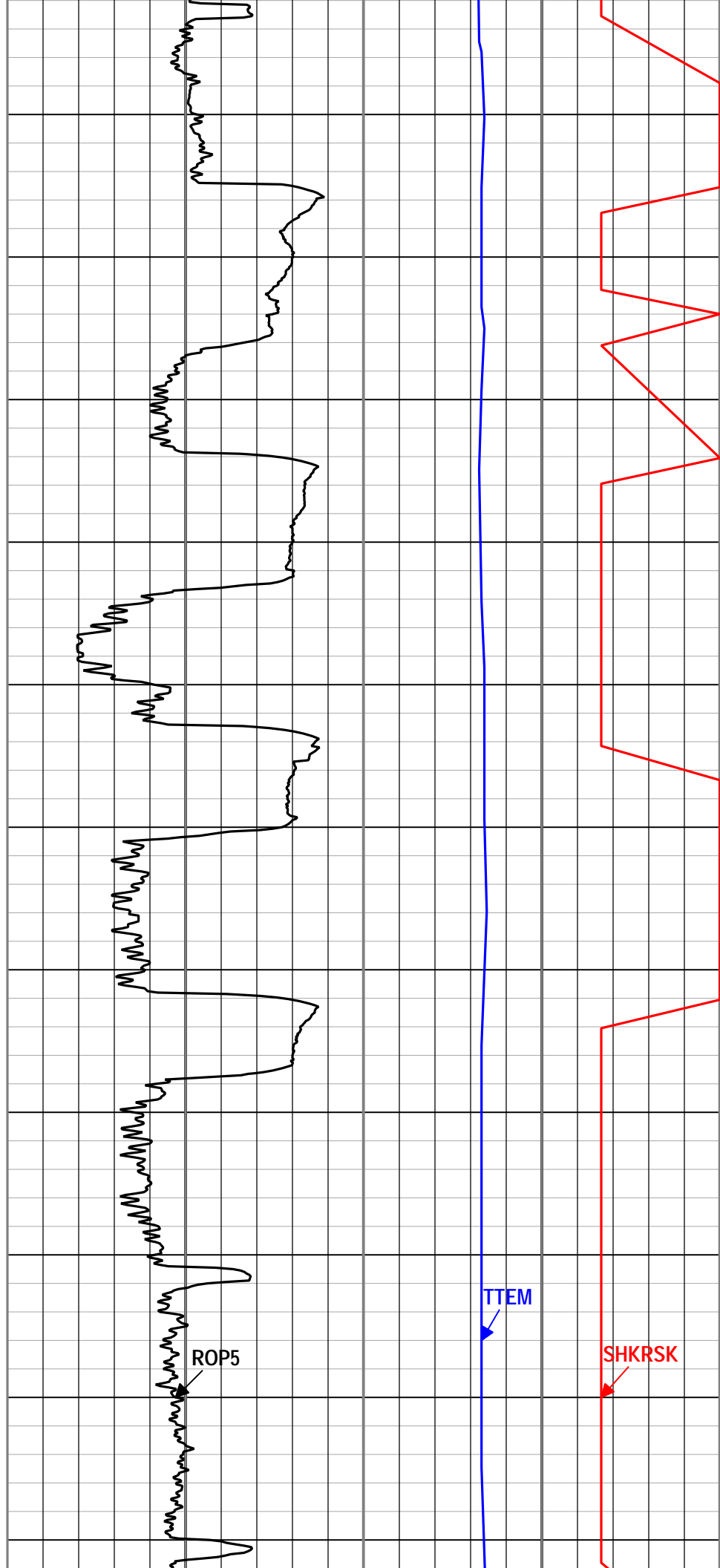
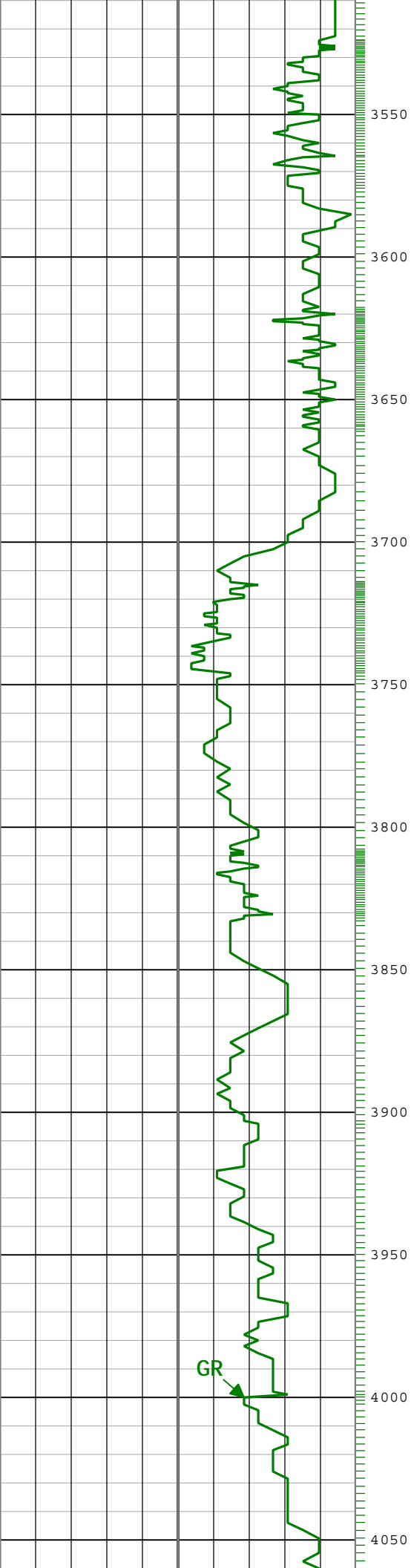


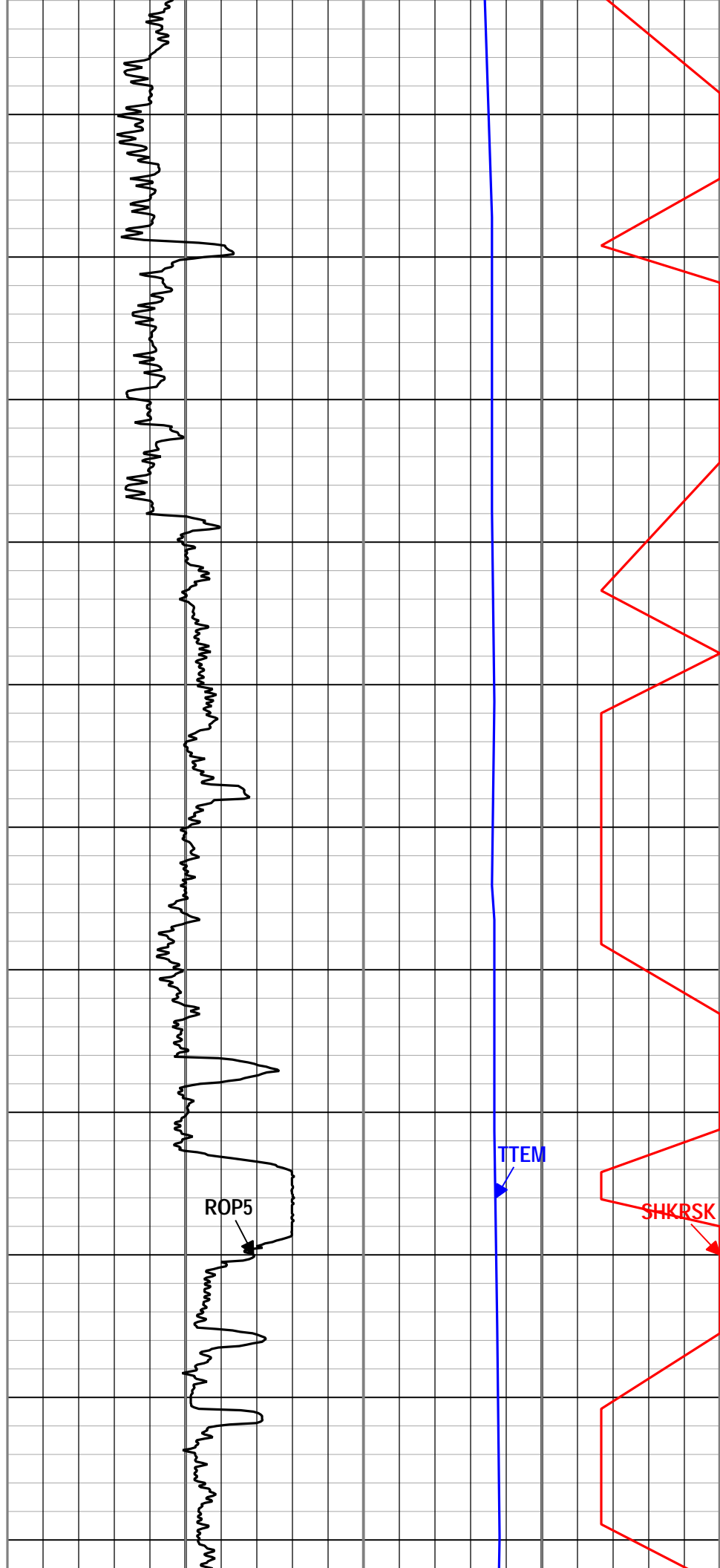
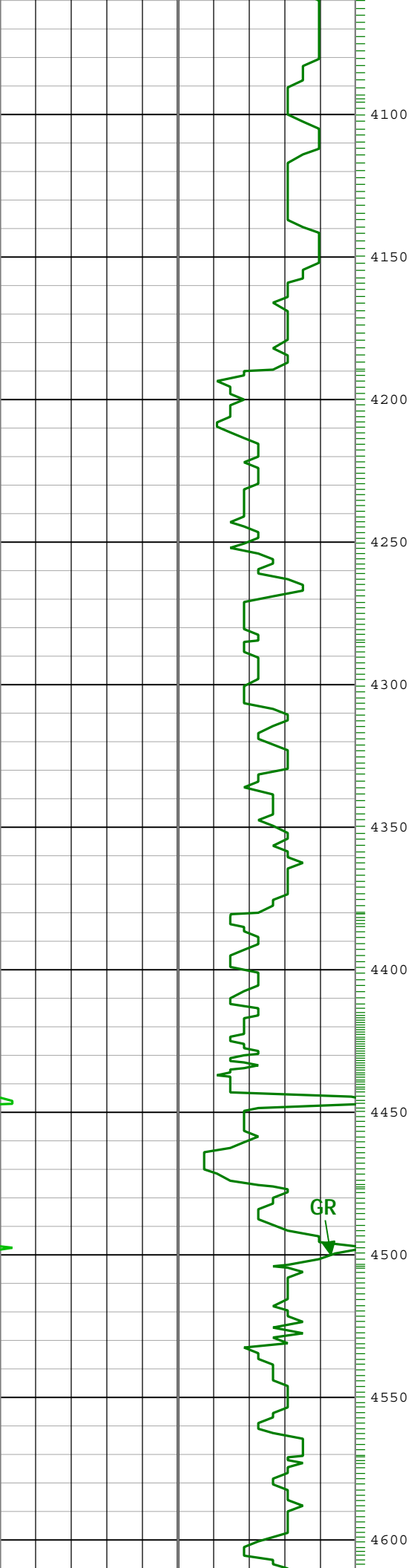


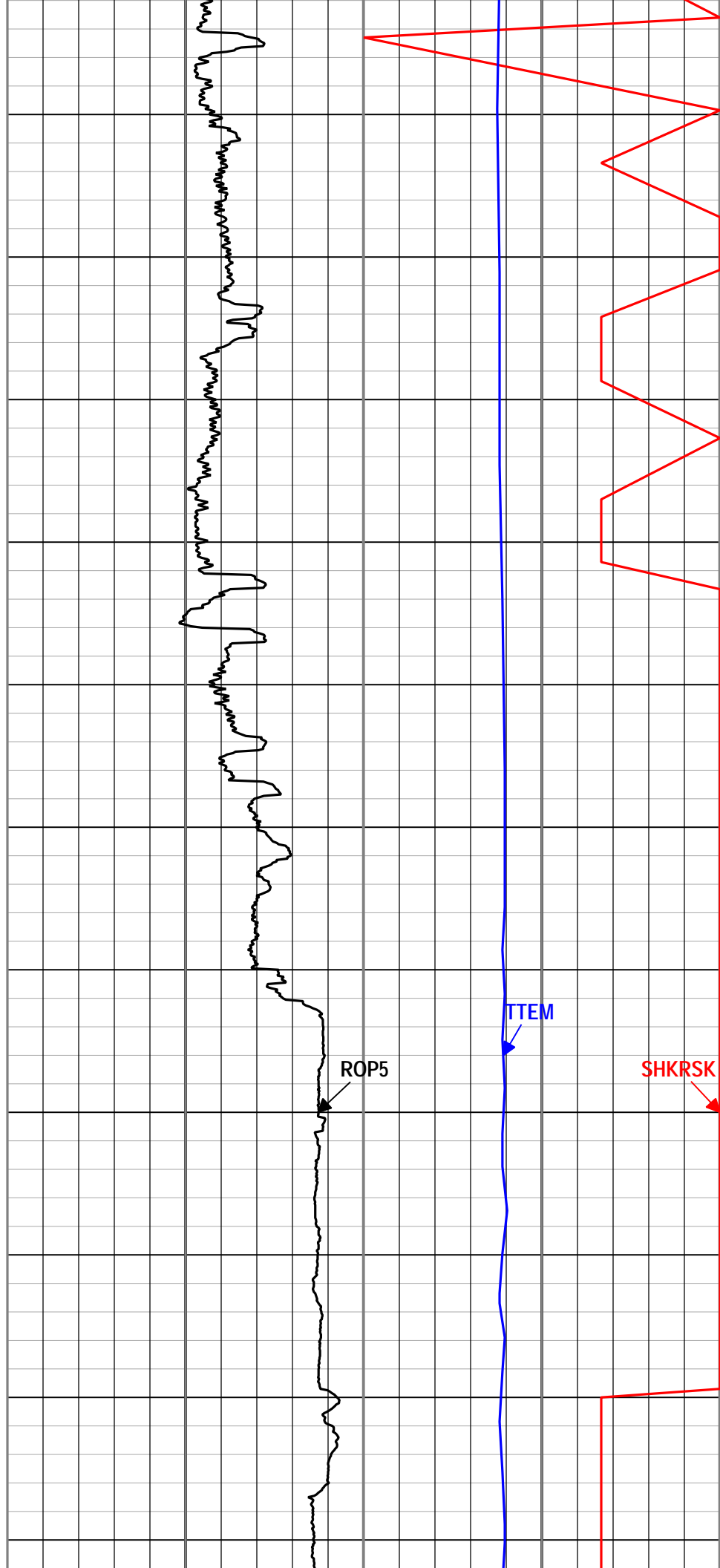
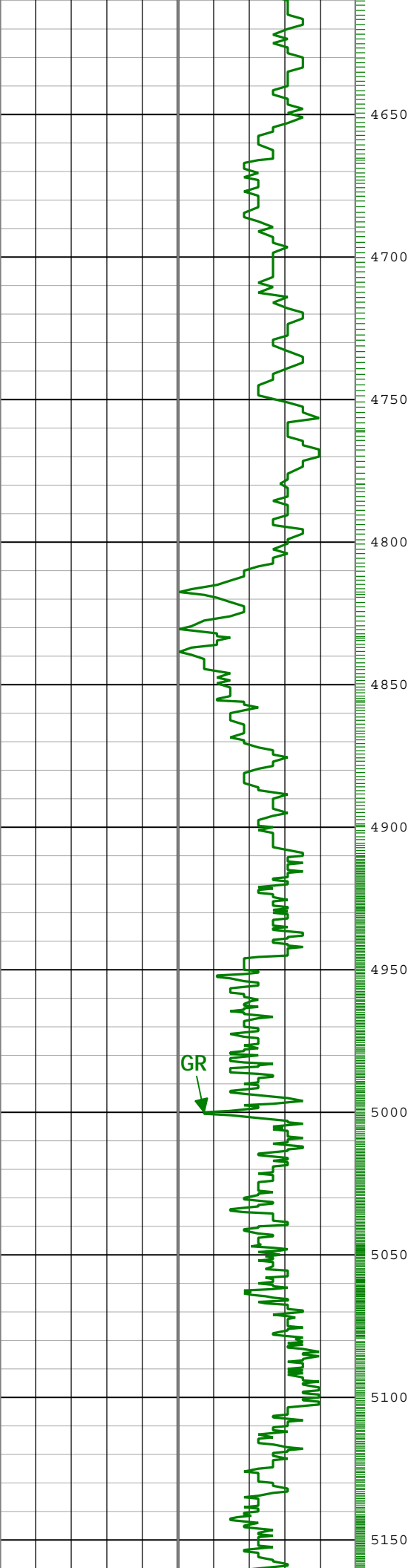


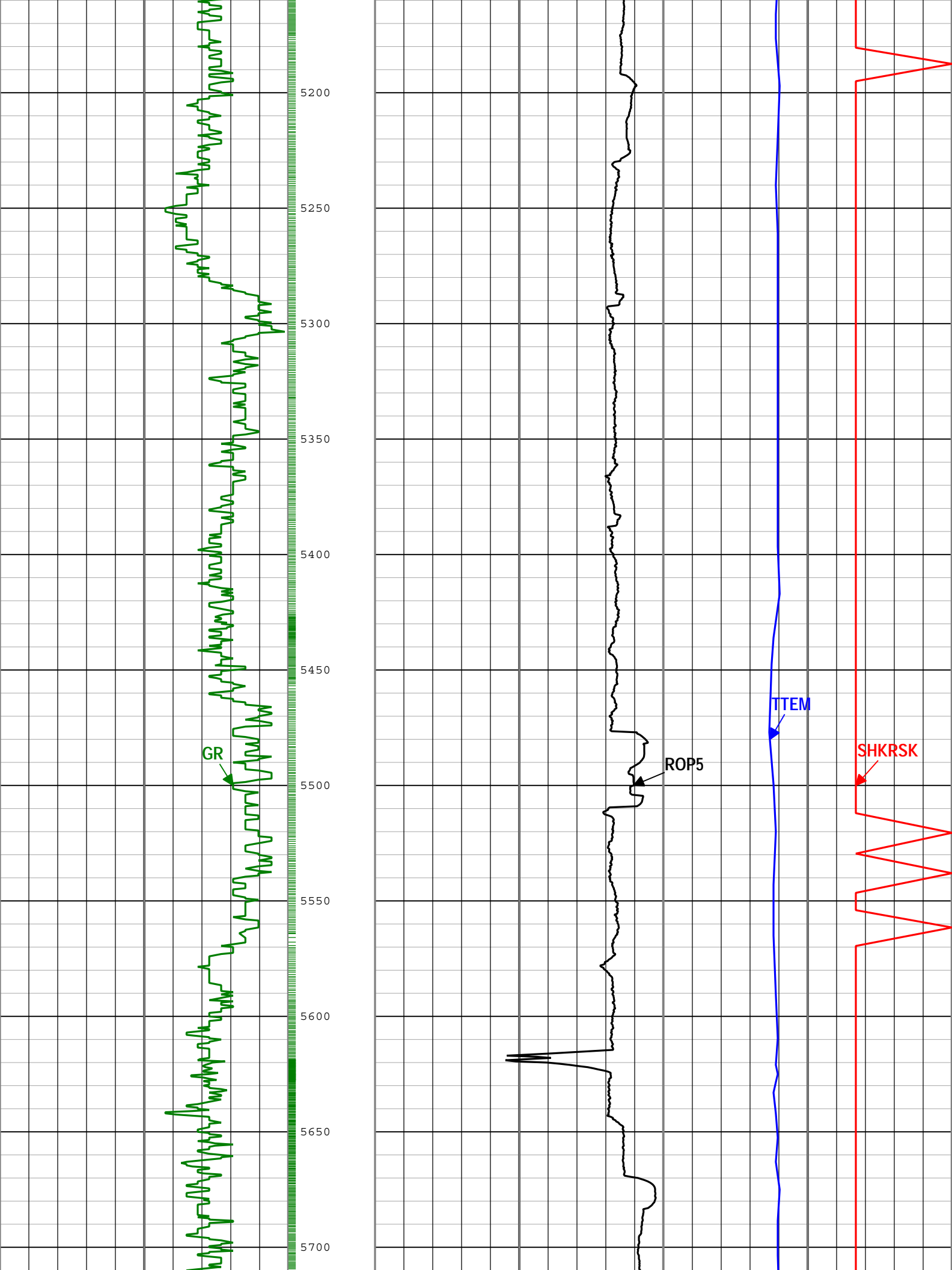




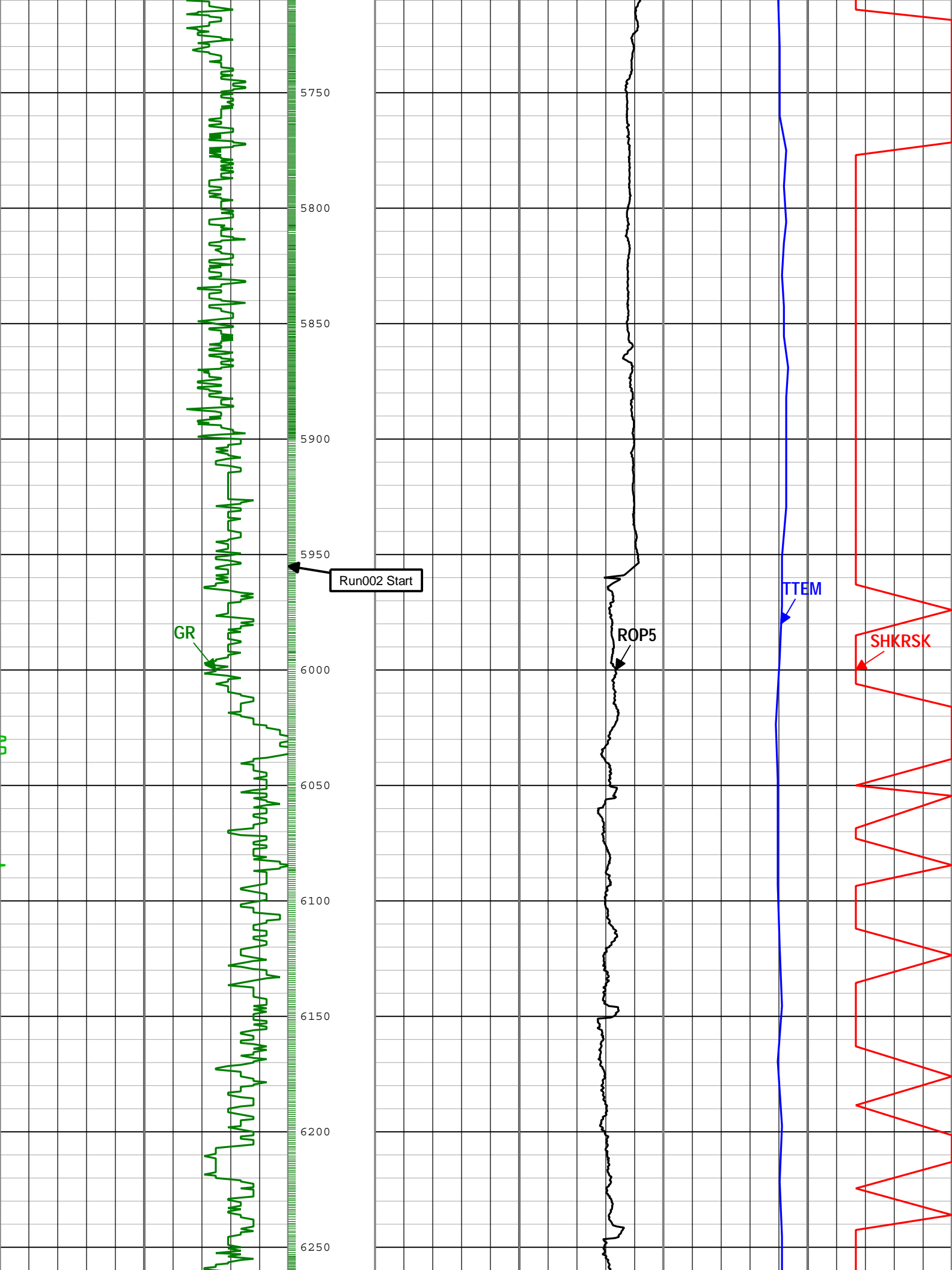


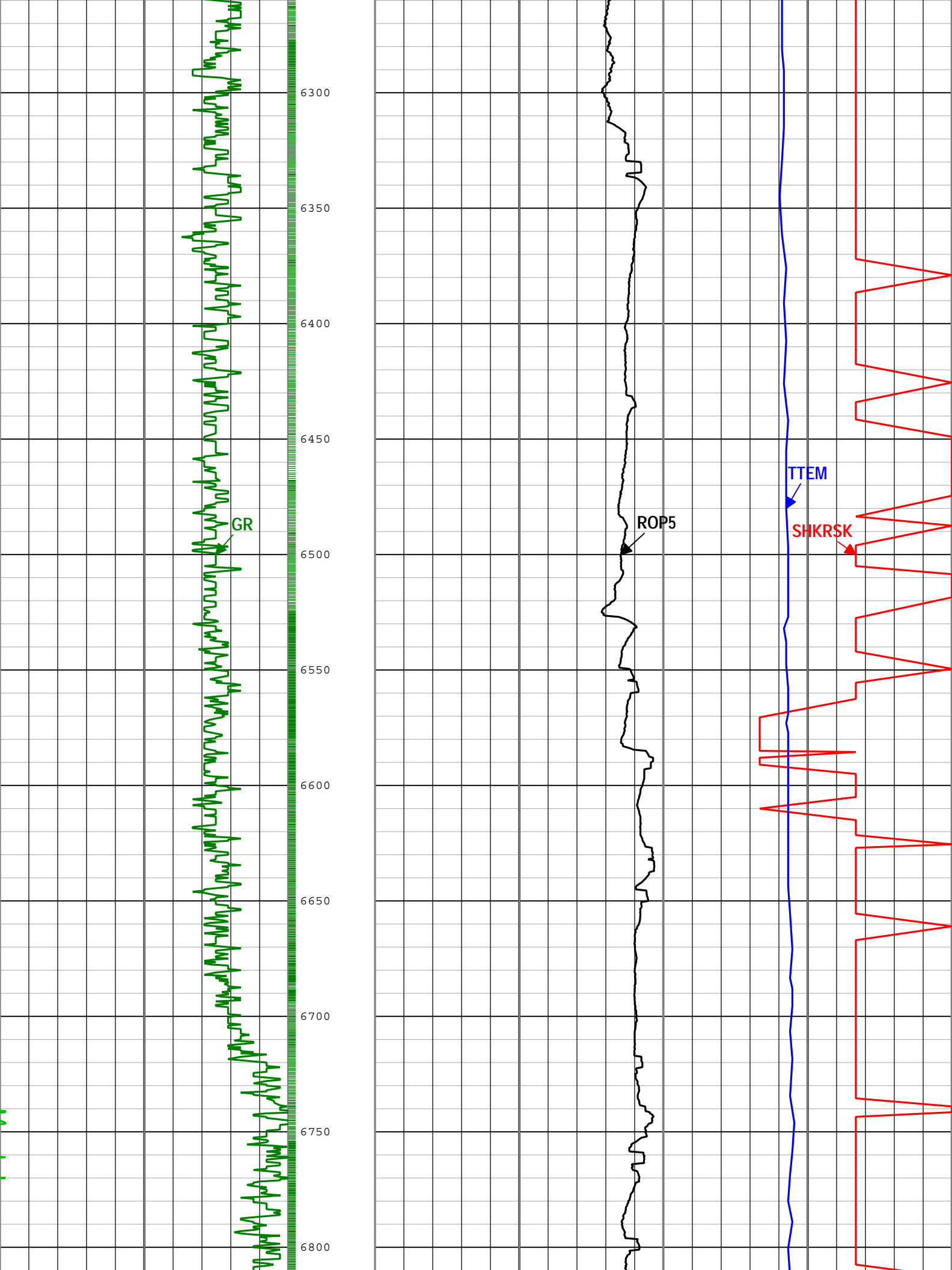


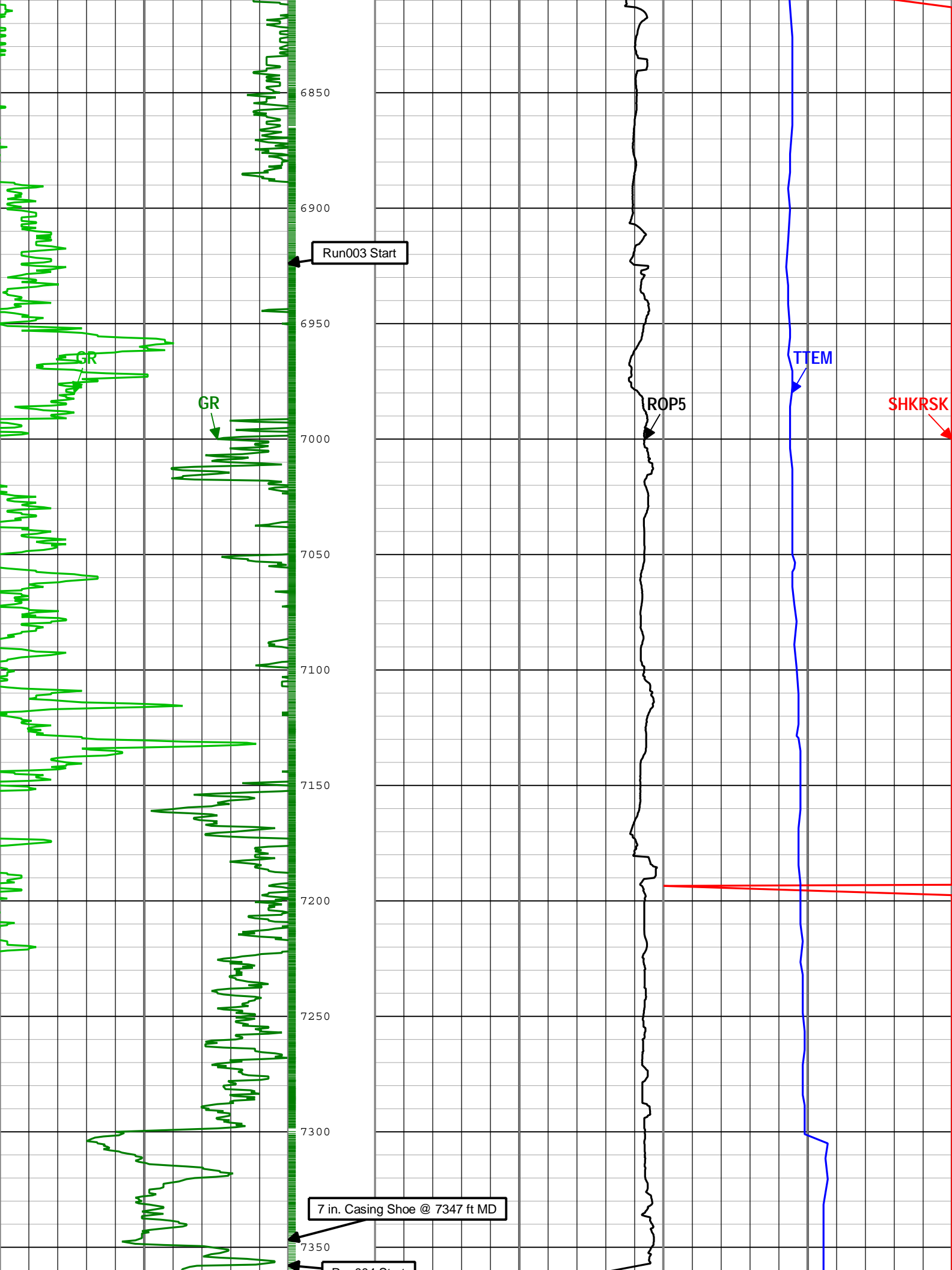












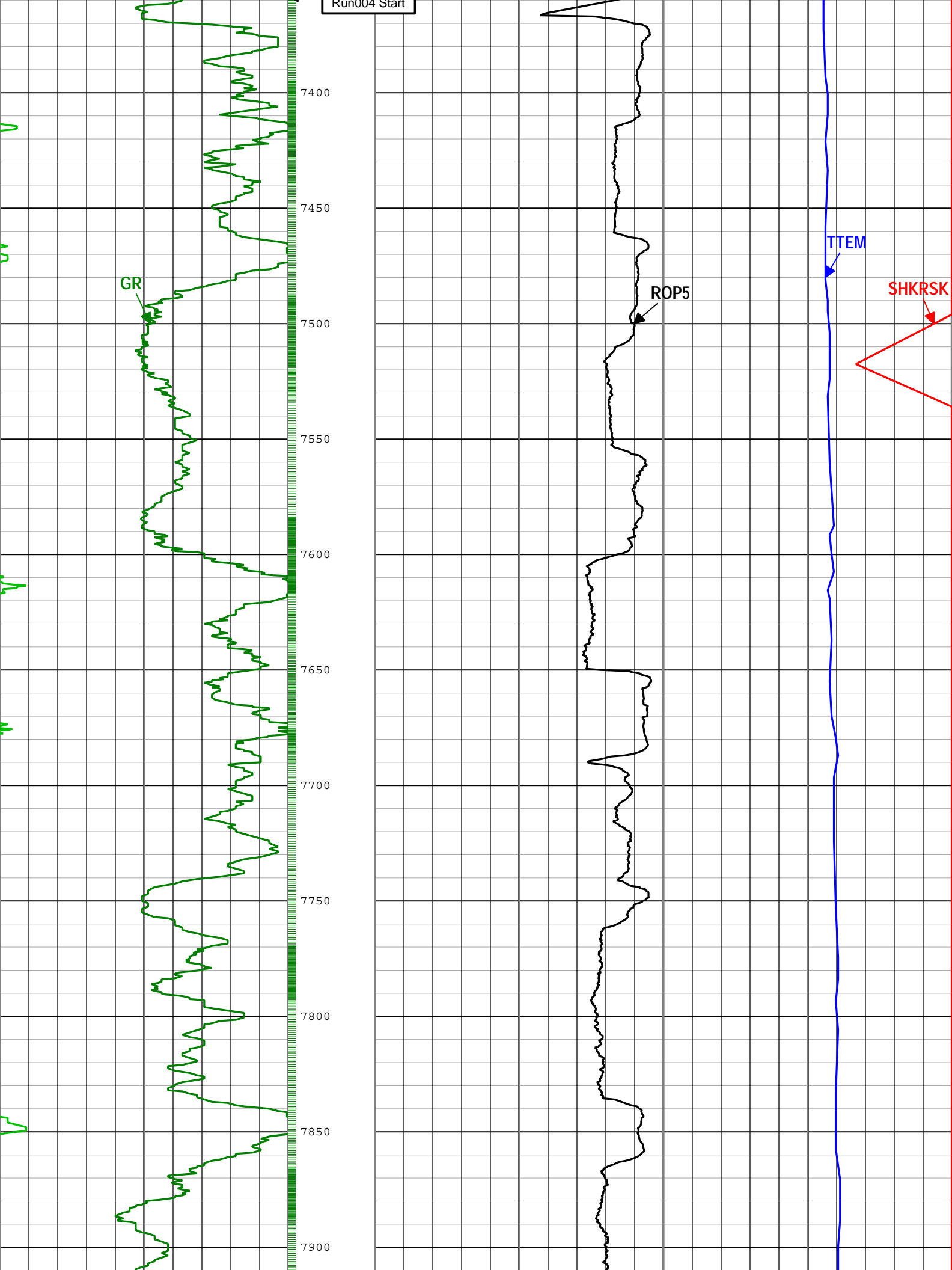
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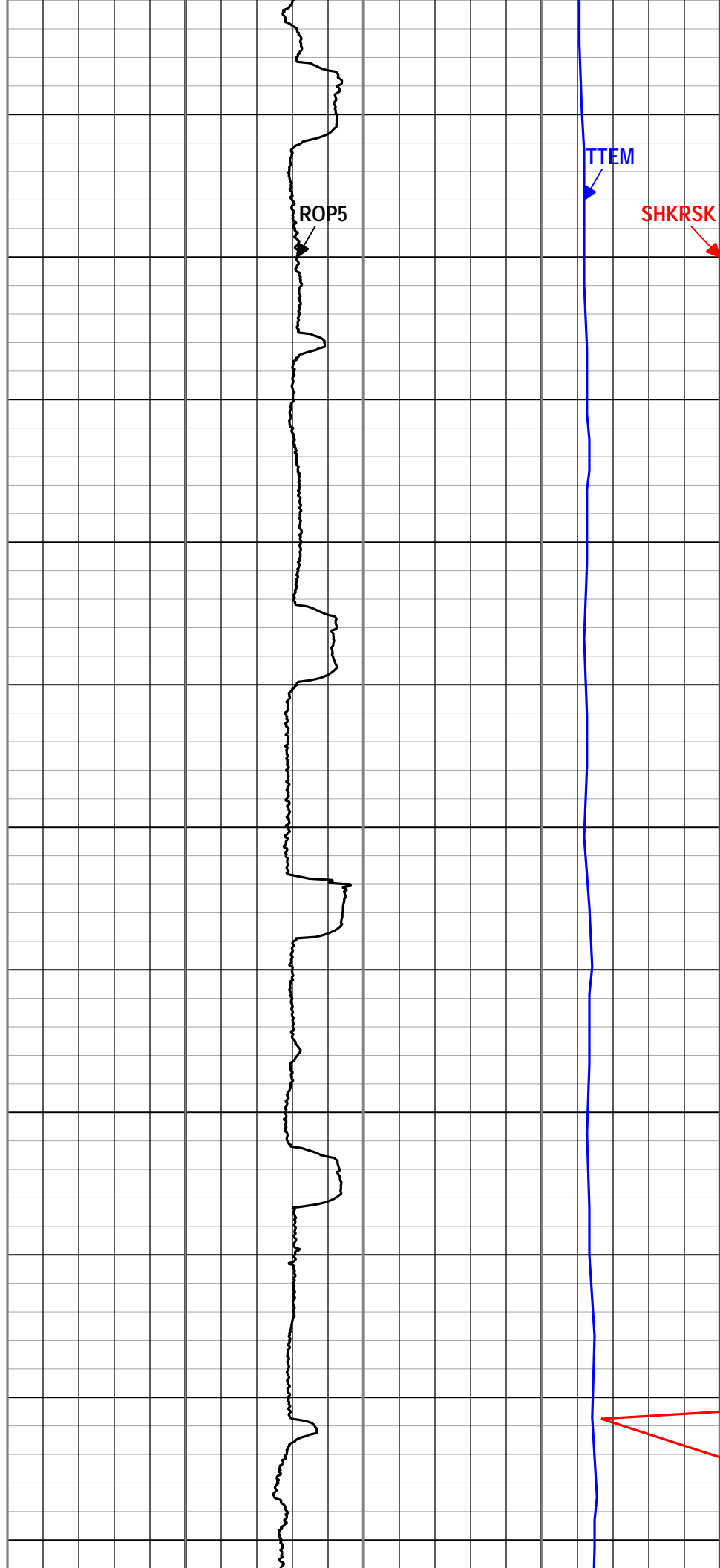
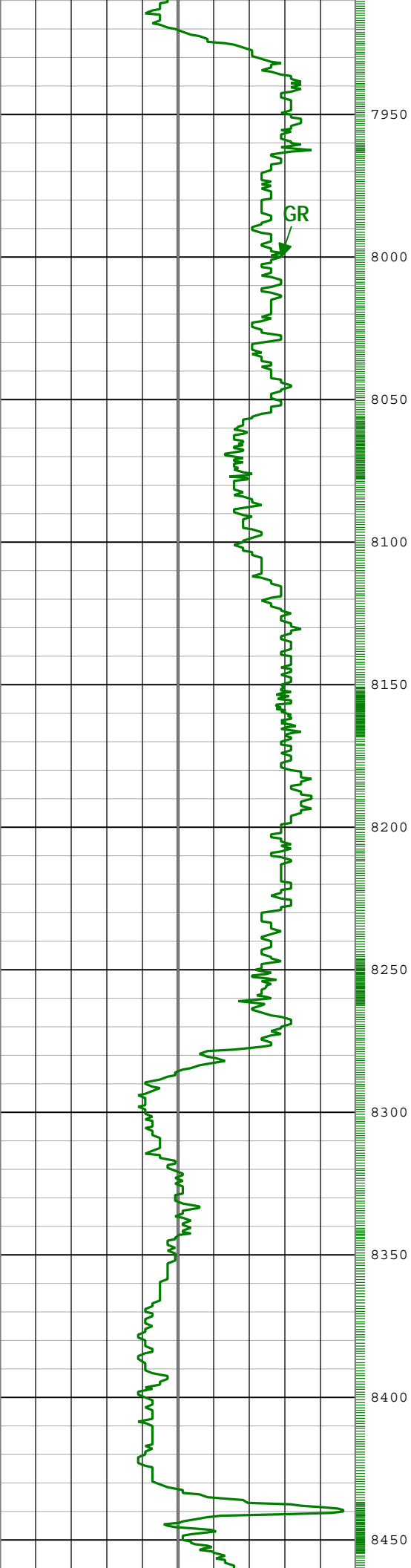
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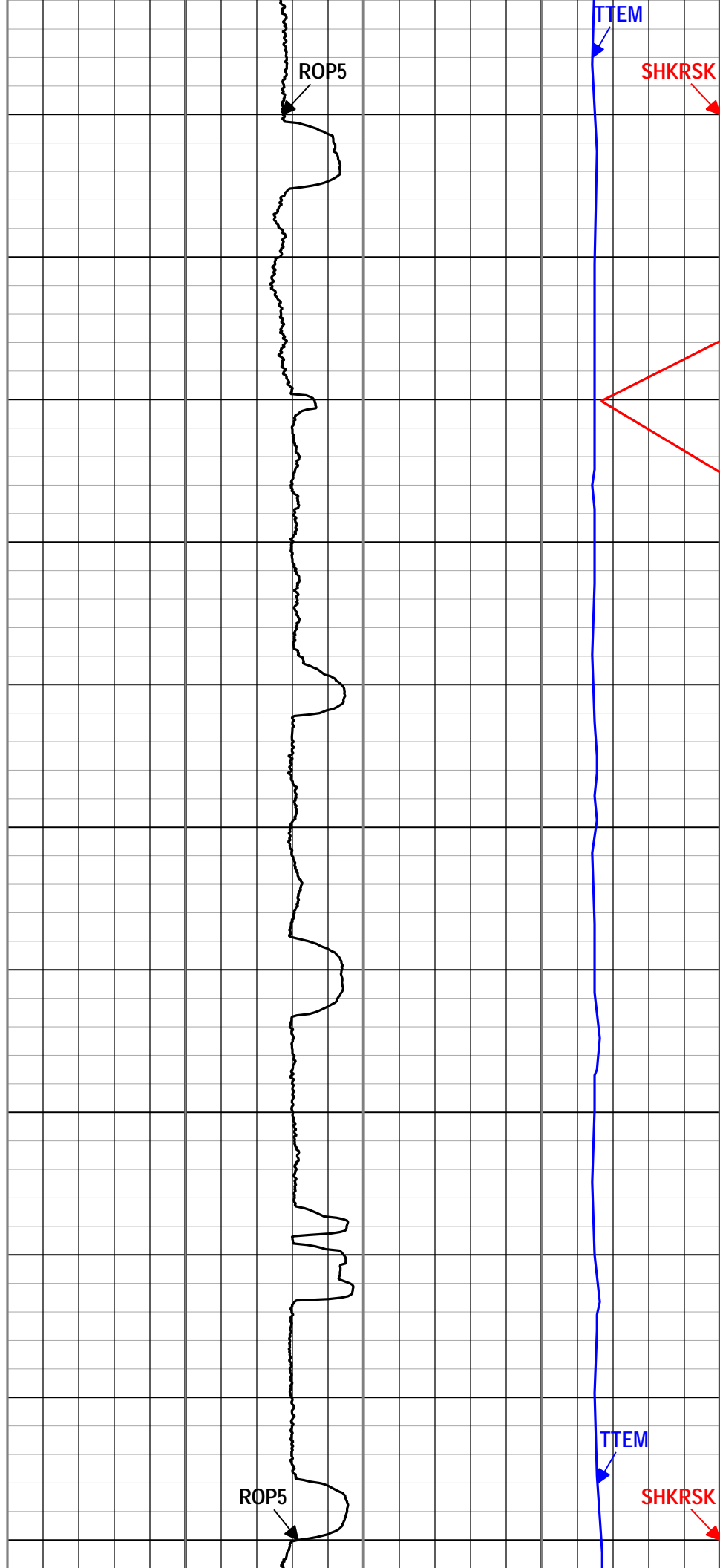
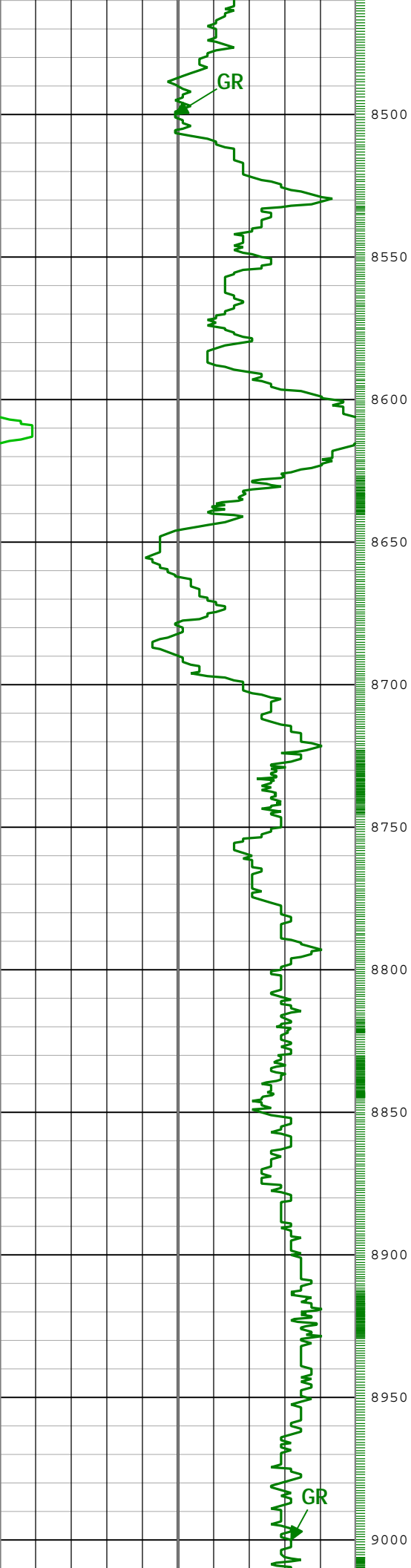
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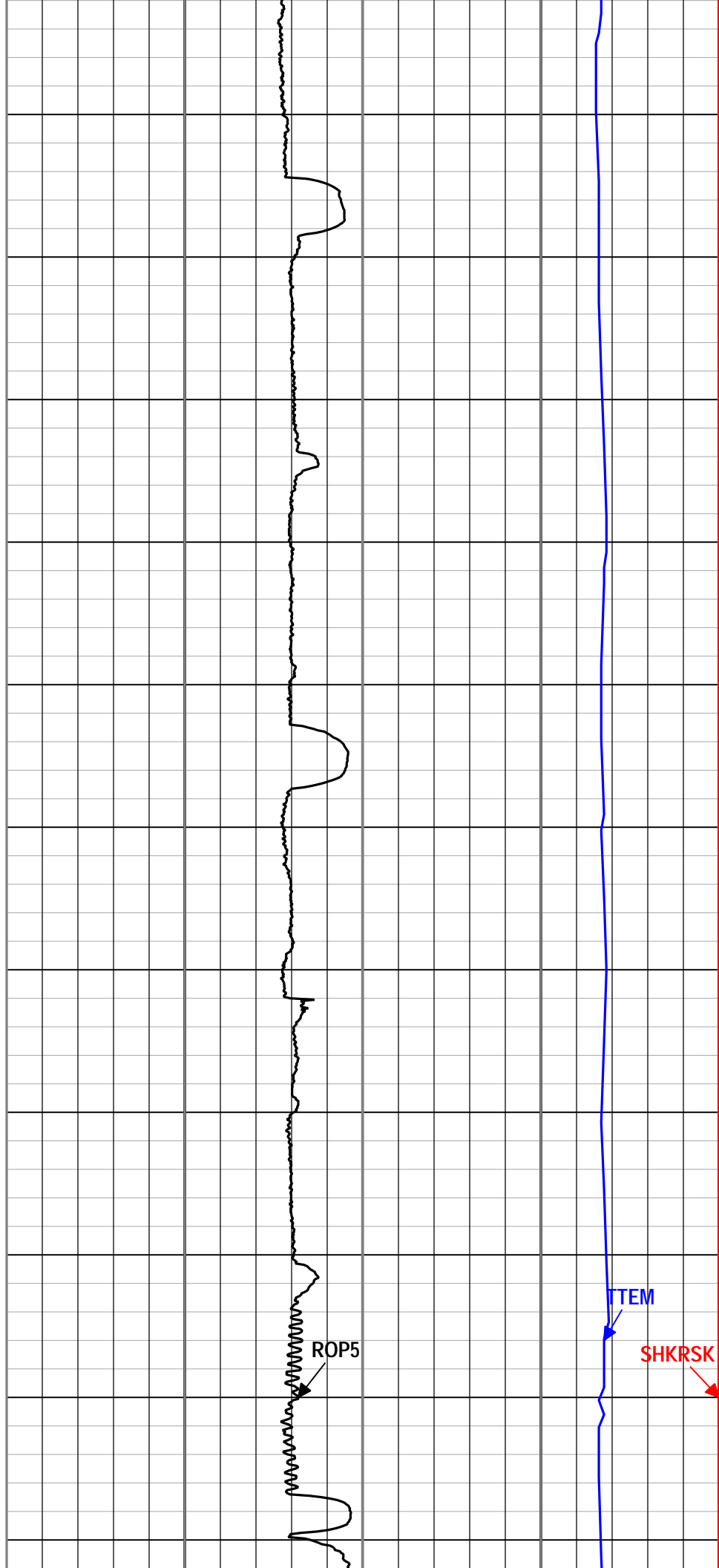
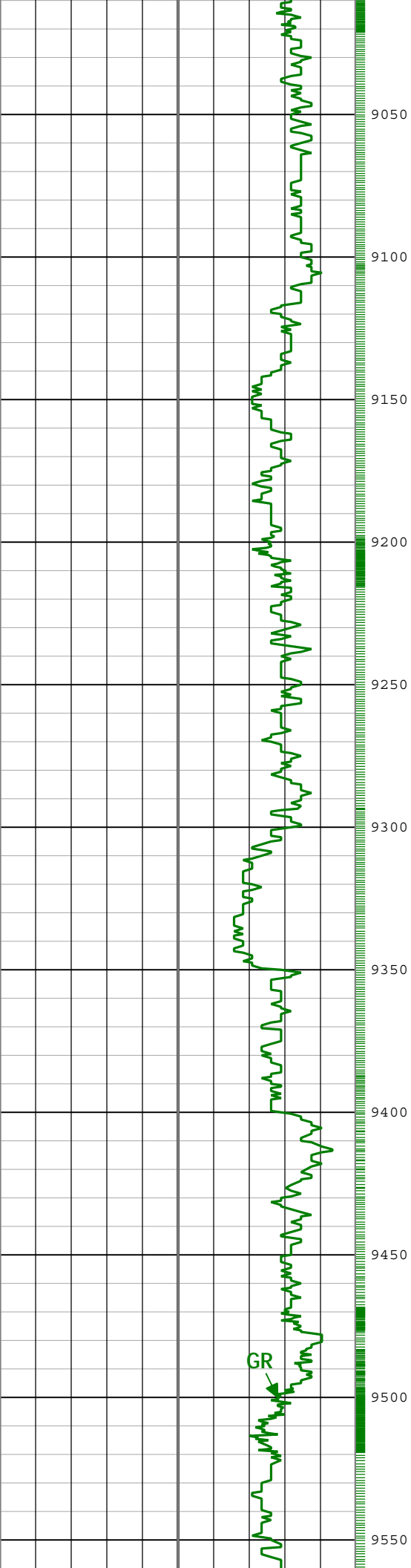
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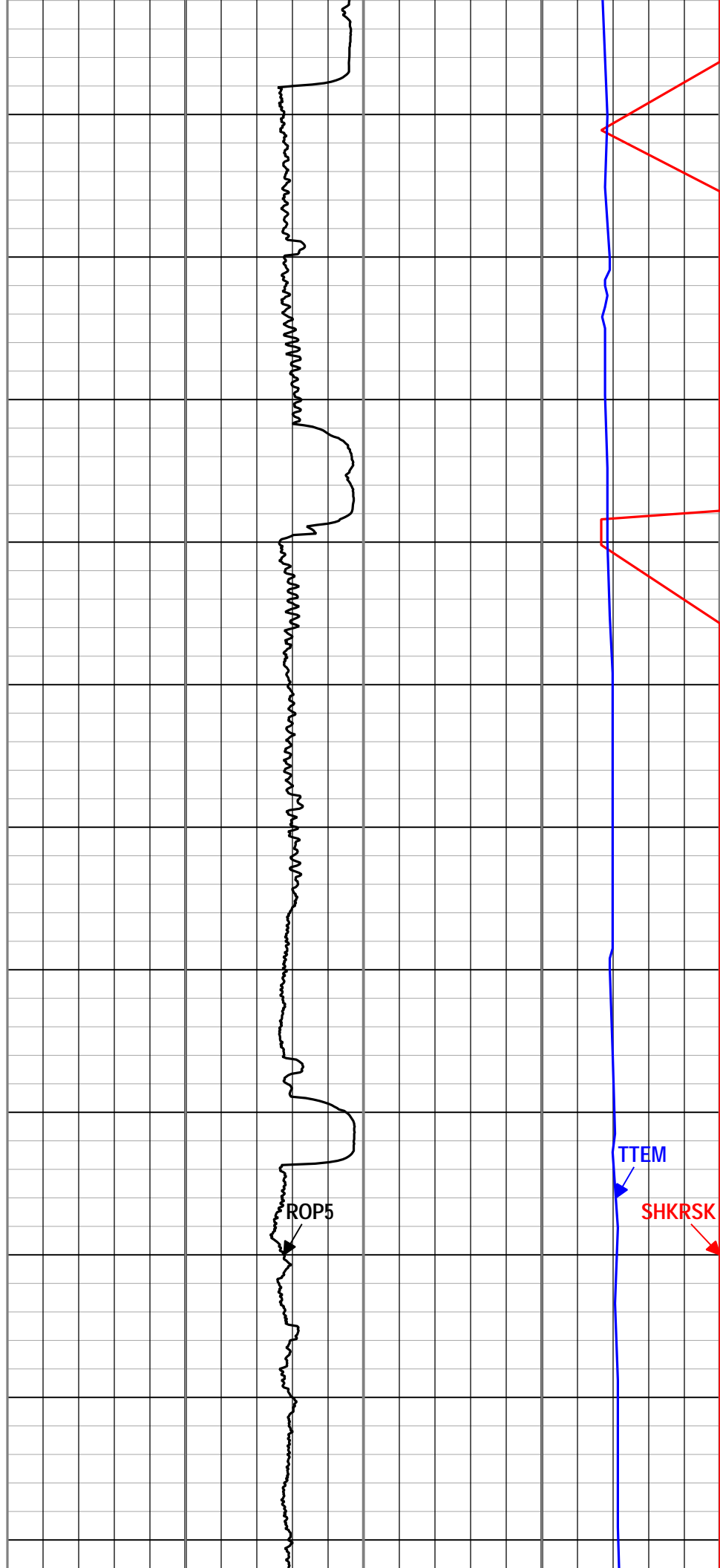
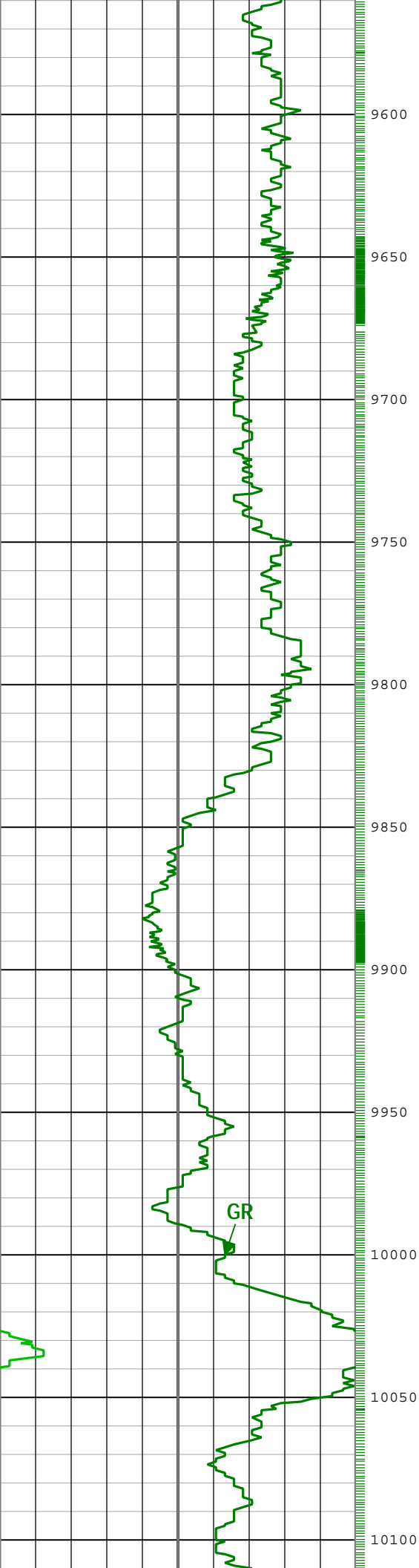
SHKRSK



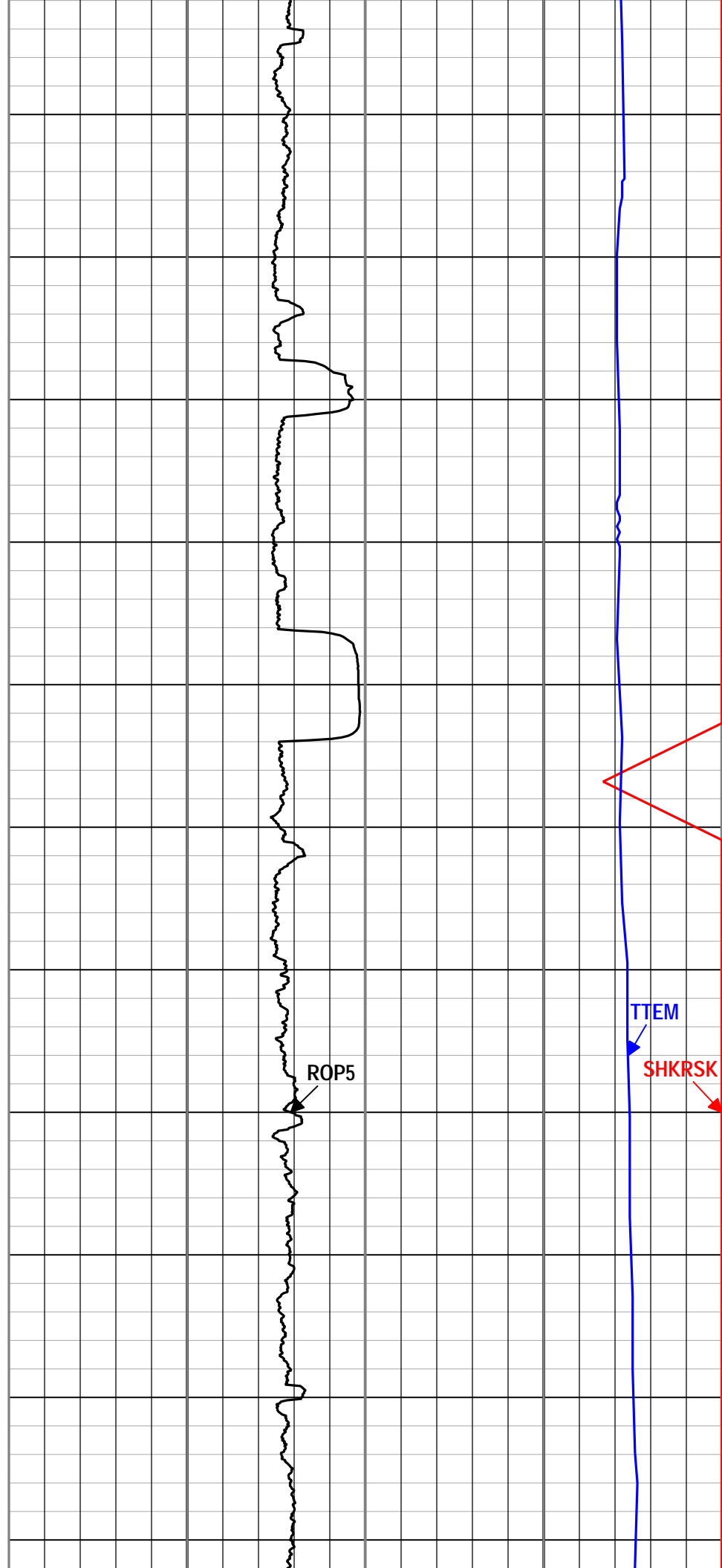
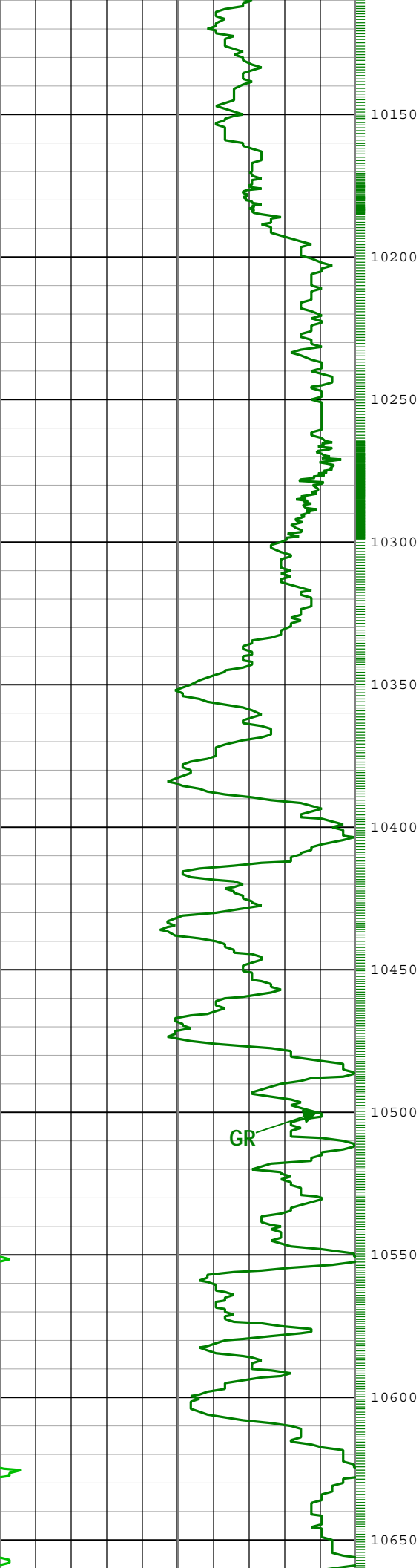


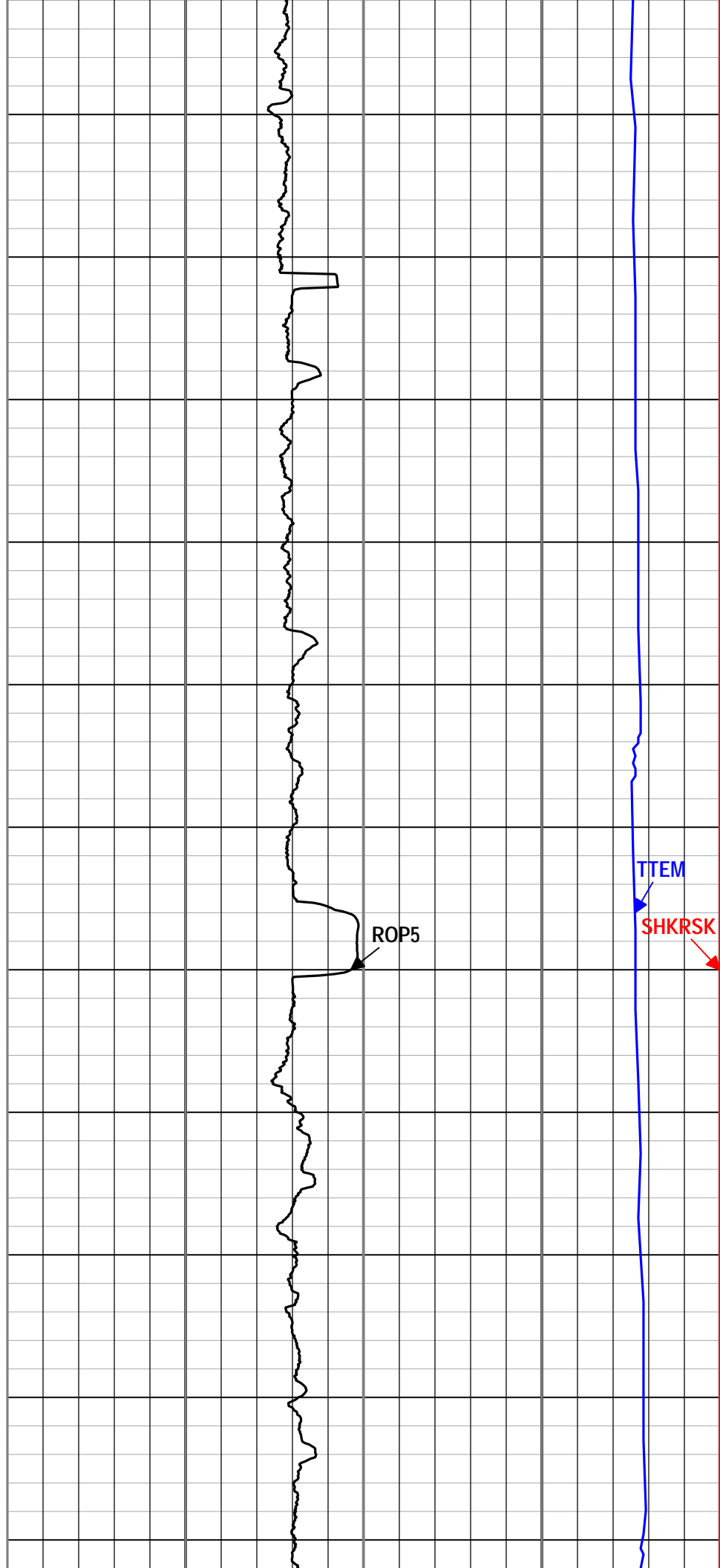
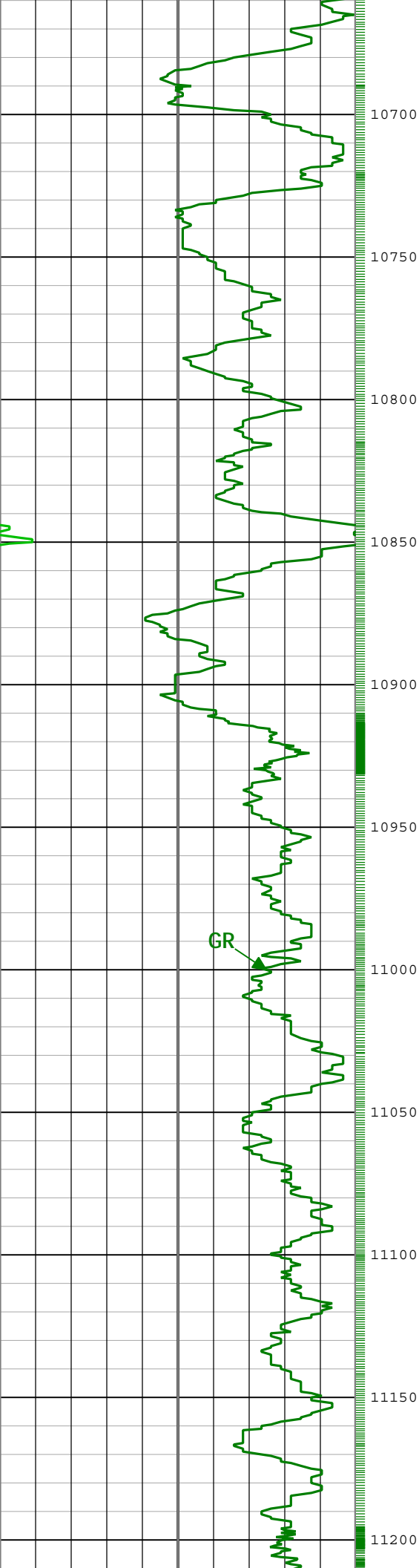


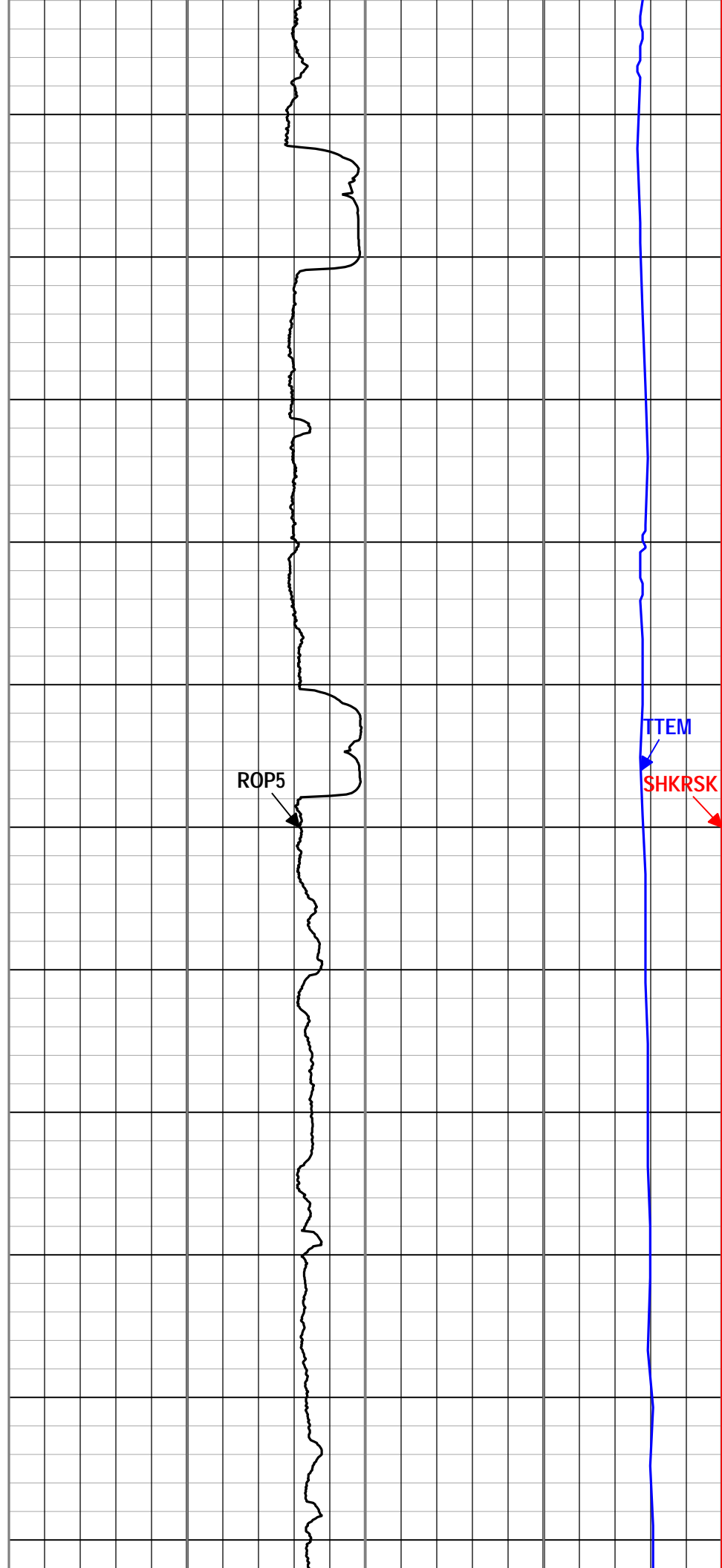
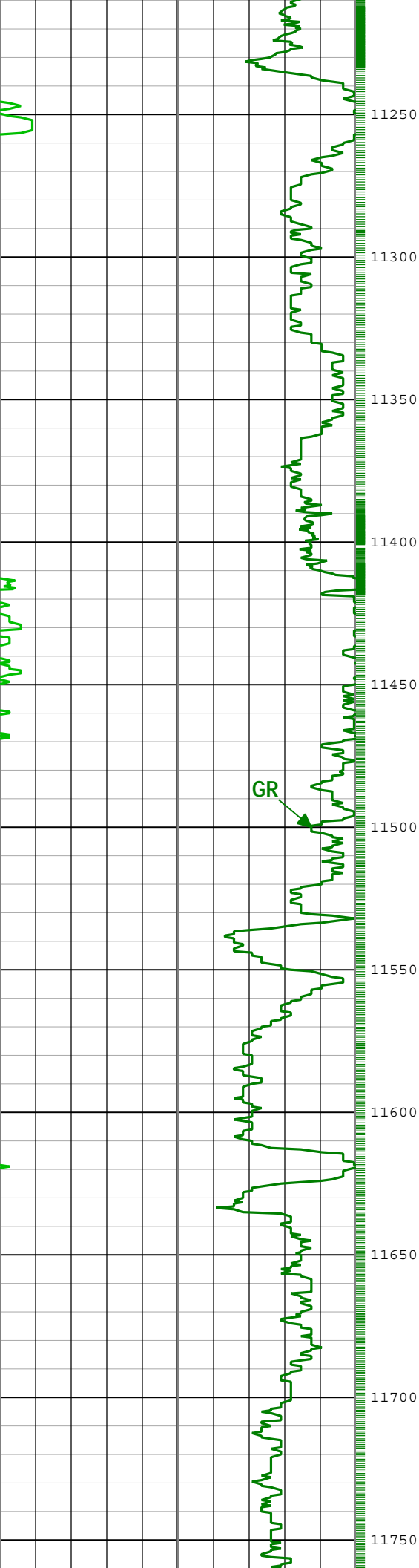


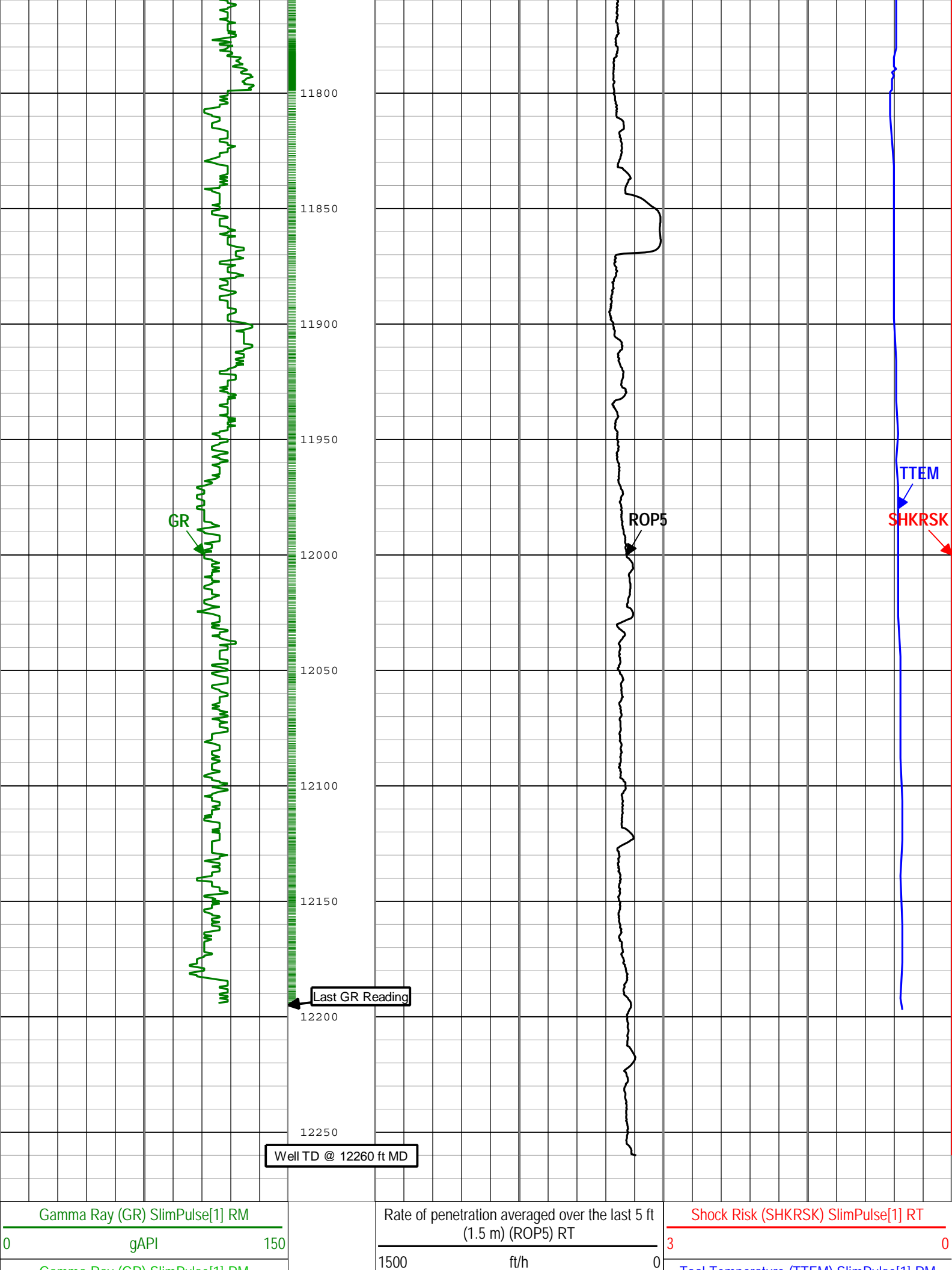












Gamma Ray (GR) SlimPulse[1] RM	Tool Temperature (TEM) SlimPulse[1] RM
150gAPI300	50degF300

TICKS\_GR - Gamma Ray Tick Marks SlimPulse[1] RM

Description: Format: Log ( SlimPulse EOW MD ) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Jul-2014 16:15:58

Channel Processing Parameters

Run001: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	8.7	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	10.2	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

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	10.65	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

Run004Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	8.75	7185.77	7358
BS	6.125	7358	12260

All depth are actual.

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	4.0.9469.3000	
SPEC	SlimPulse Electronics Cartridge	4.0.9469.3000	

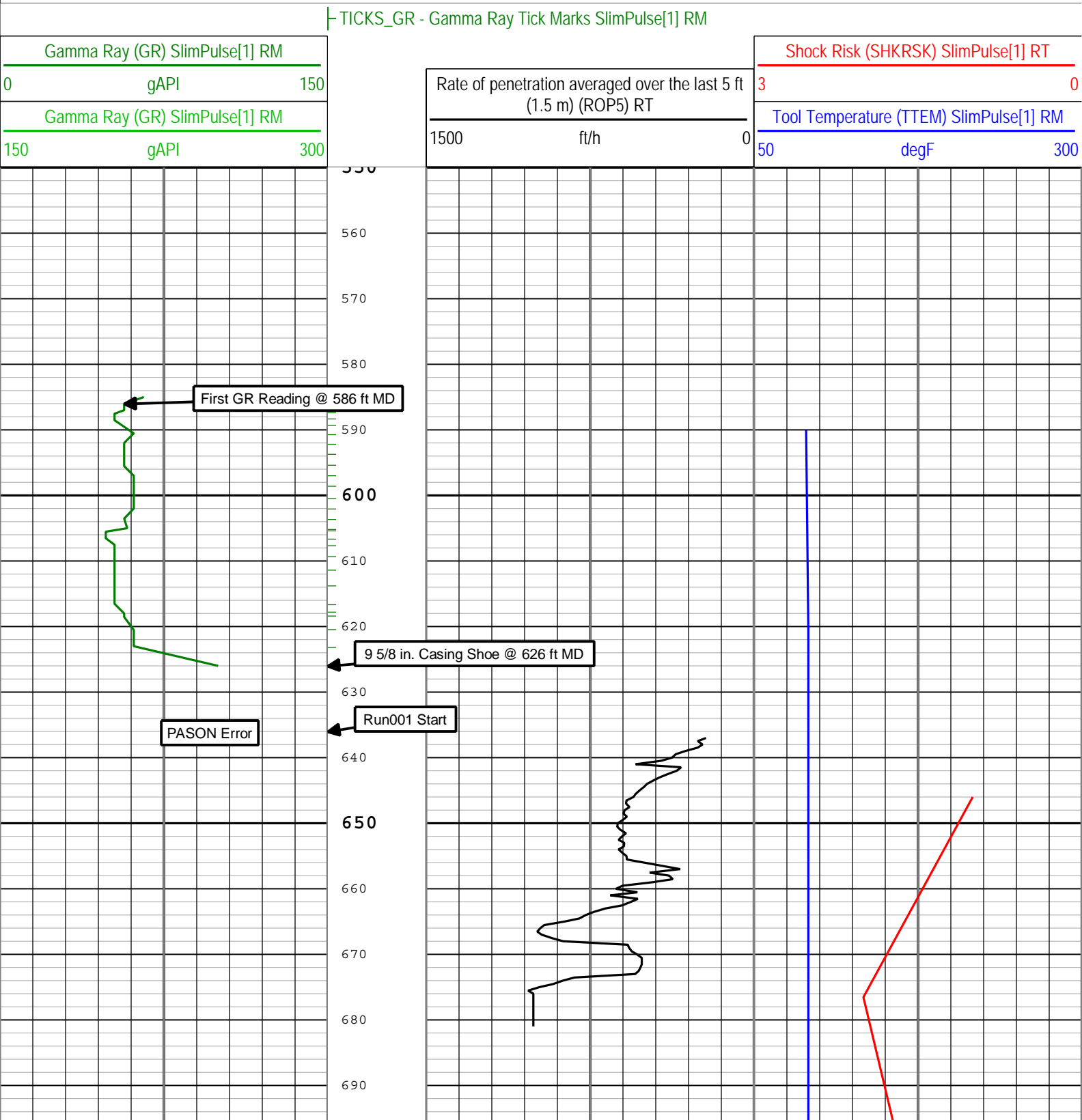
Composite Summary

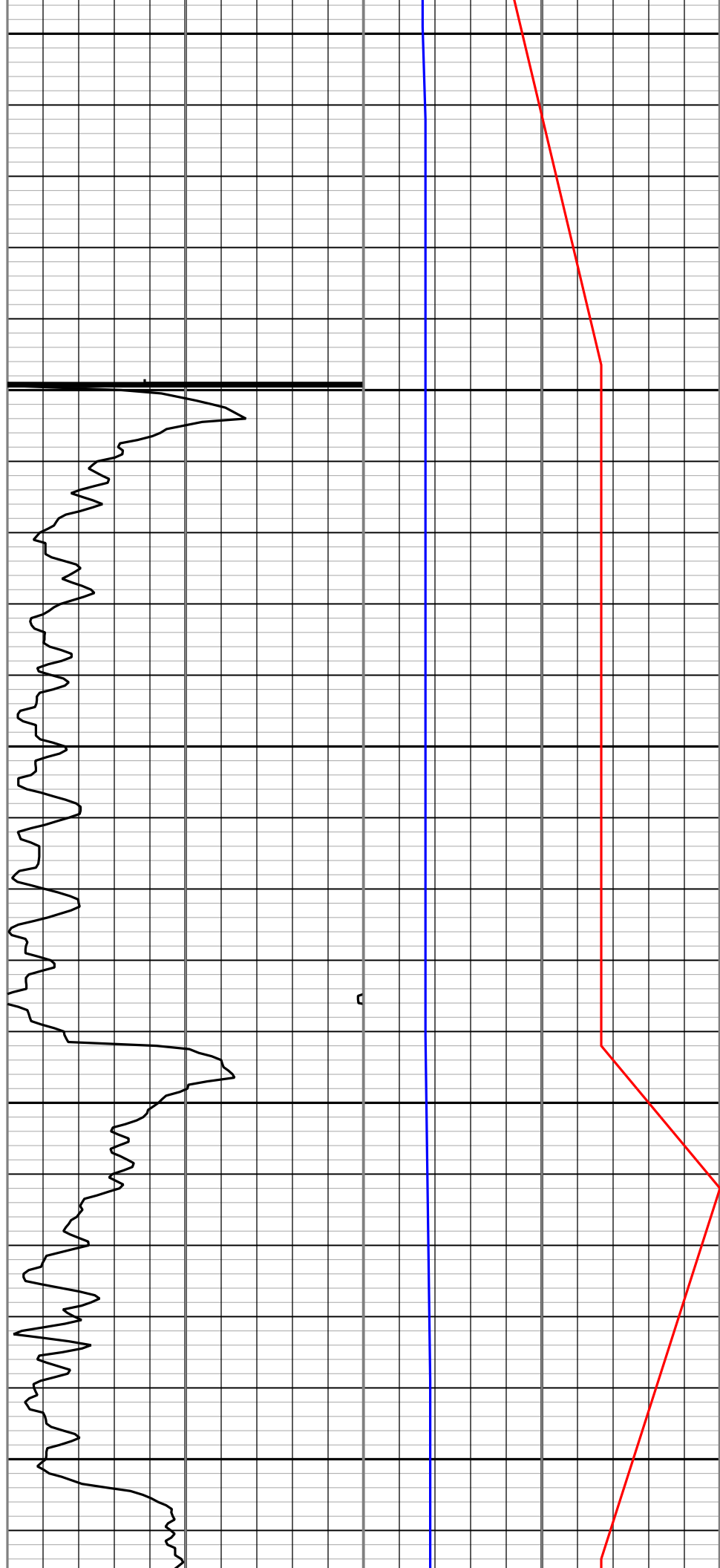
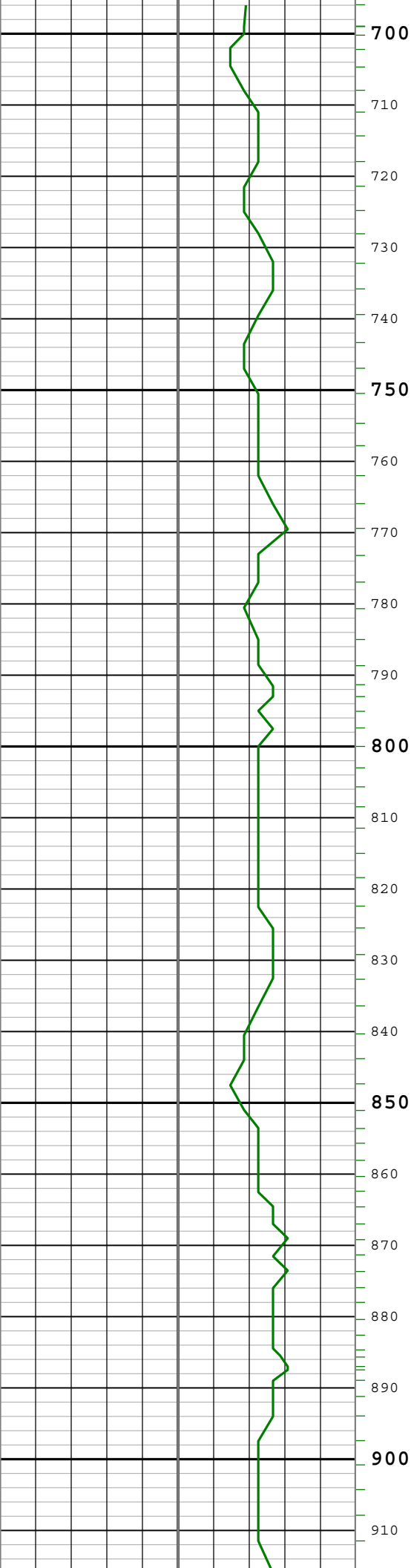
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Include Parallel Data
Run001	Drilling	Down	635.08 ft	5953.83 ft	19-Jul-2014 7:39:00 AM	20-Jul-2014 11:34:18 AM	No
Run002	Drilling	Down	5954.25 ft	6923.75 ft	20-Jul-2014 9:12:45 PM	21-Jul-2014 9:04:08 AM	No
Run003	Drilling	Down	6923.83 ft	7357.67 ft	21-Jul-2014 7:21:43 PM	22-Jul-2014 9:30:32 AM	No
Run004	Drilling	Down	7300.00 ft	12260.00 ft	23-Jul-2014 1:35:11 PM	25-Jul-2014 3:48:31 PM	No

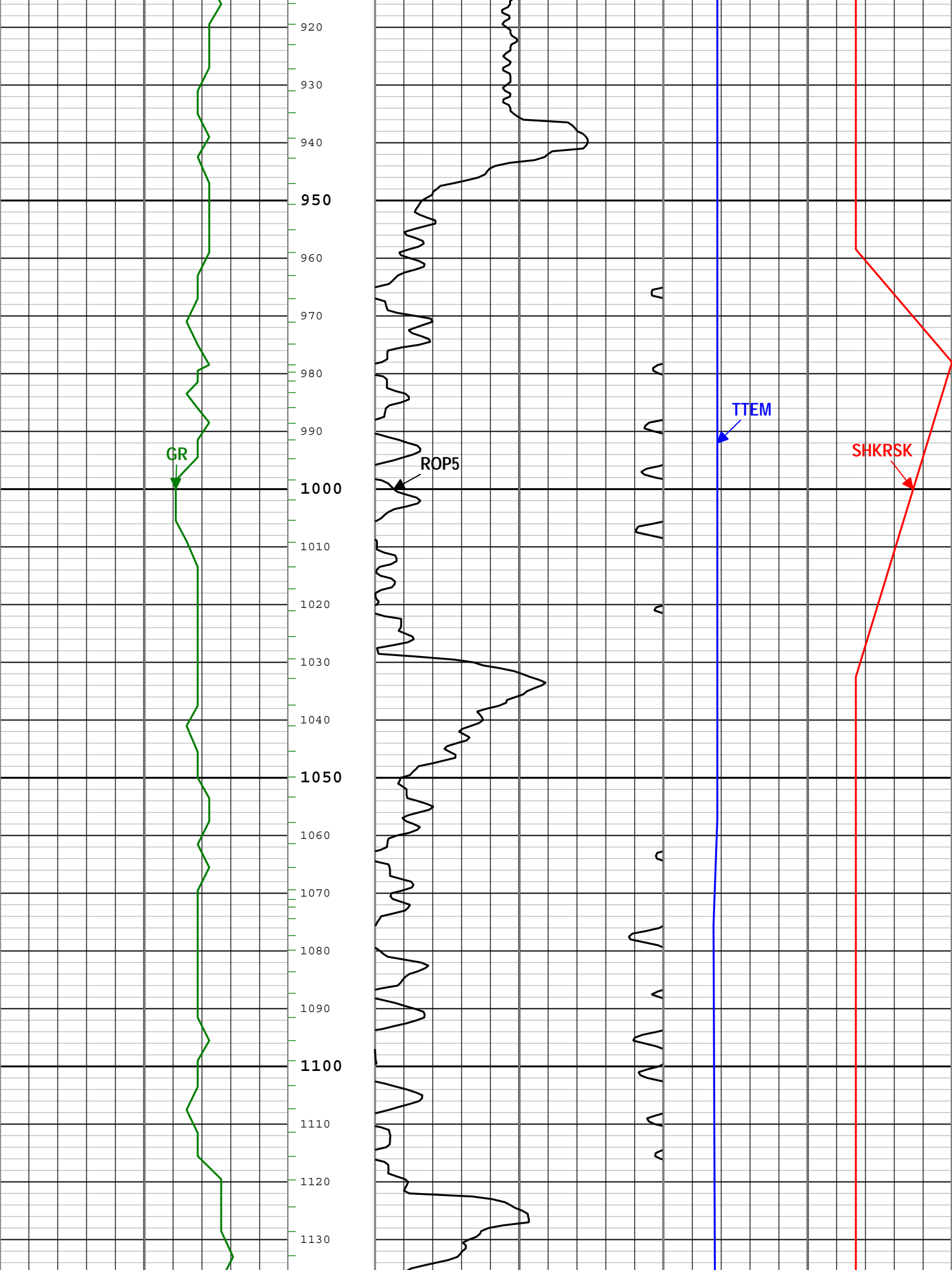
All depths are referenced to toolstring zero

Log	Company:Noble Energy INC	Well:Five Rivers K09-67-1HN
		Well Composite:S202

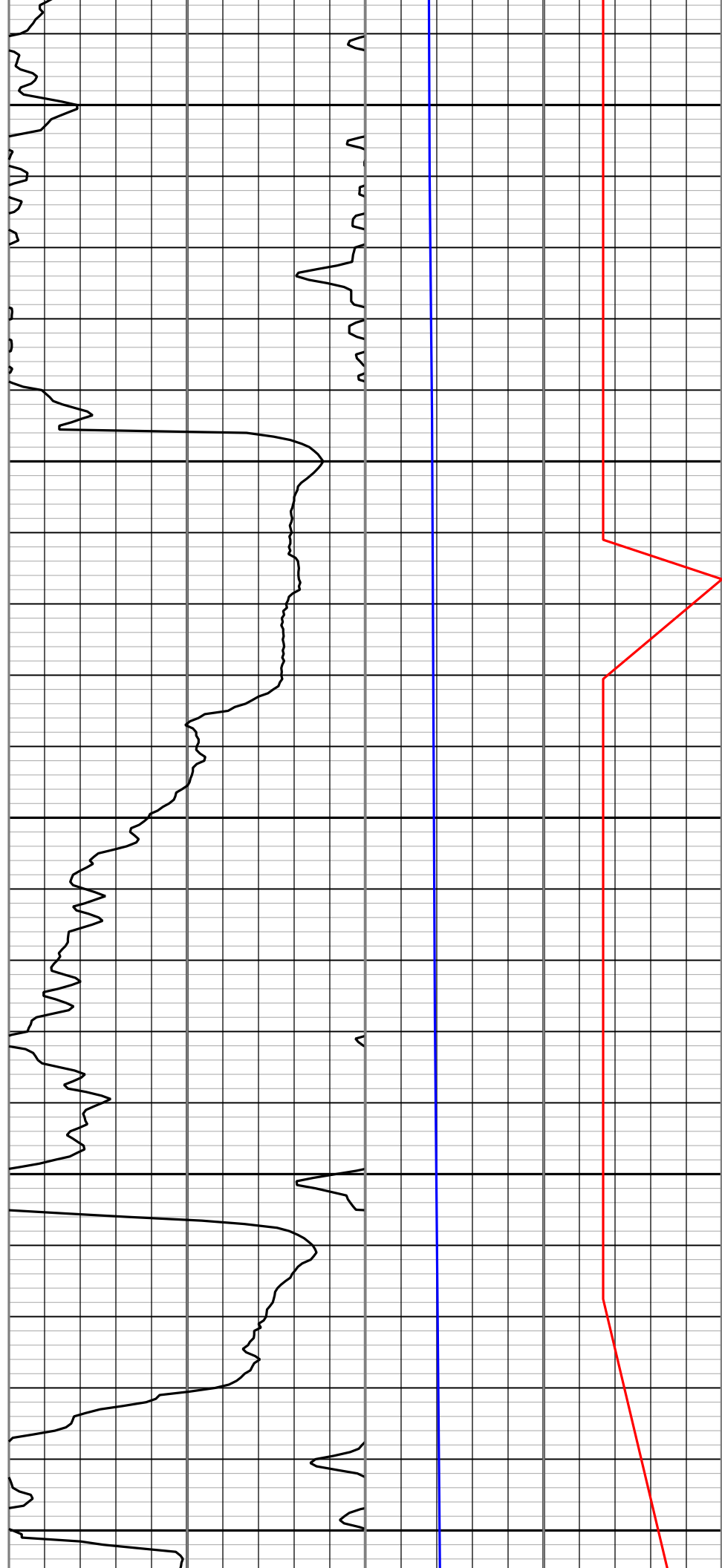
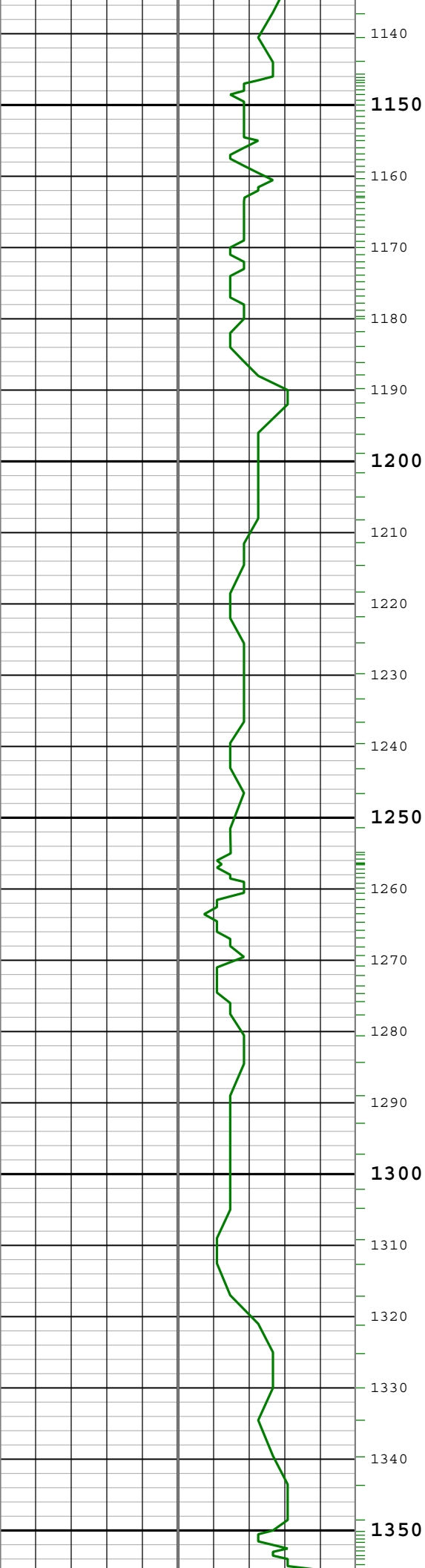
Description: Format: Log ( SlimPulse EOW MD ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Jul-2014 16:16:01

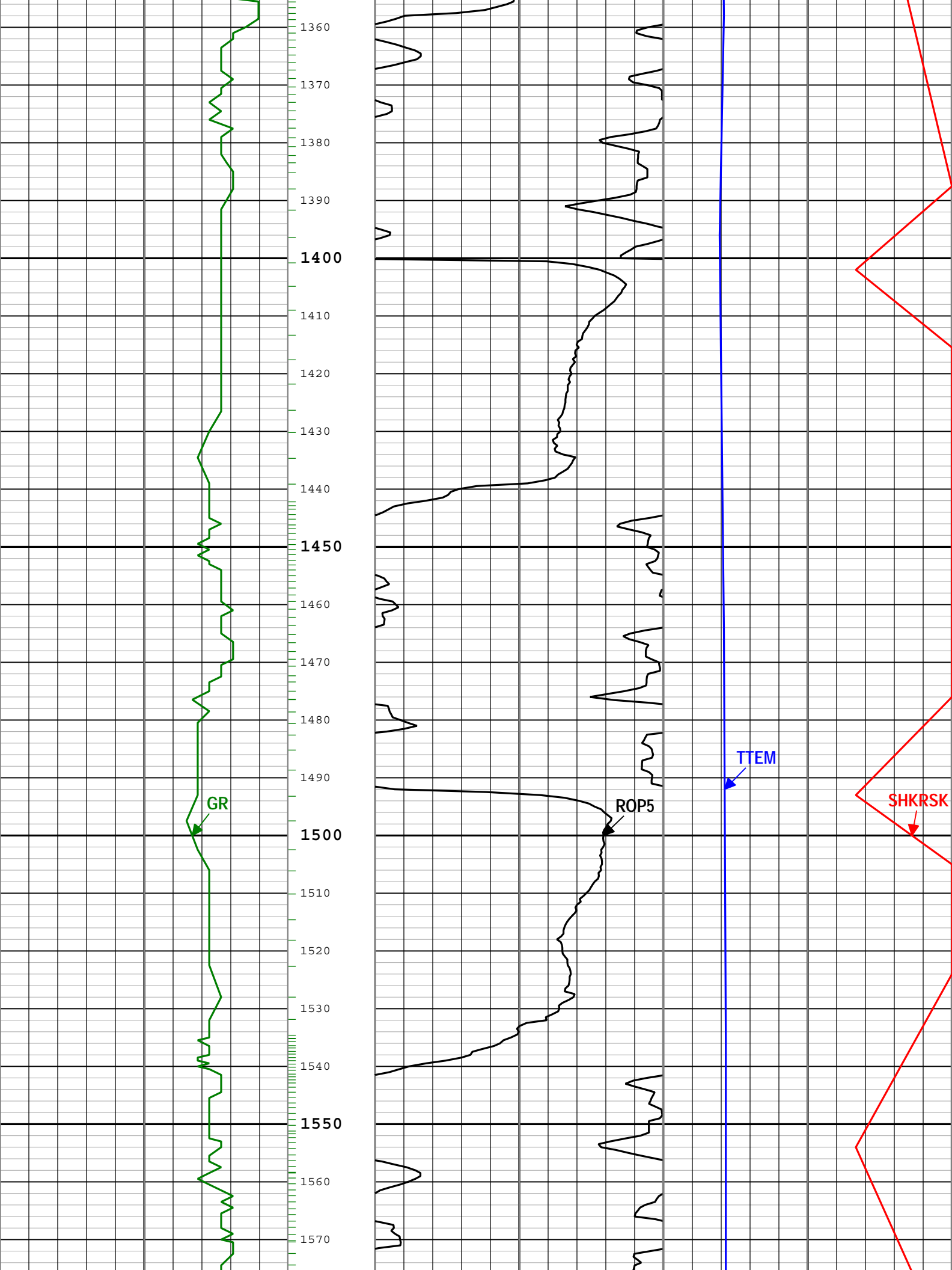


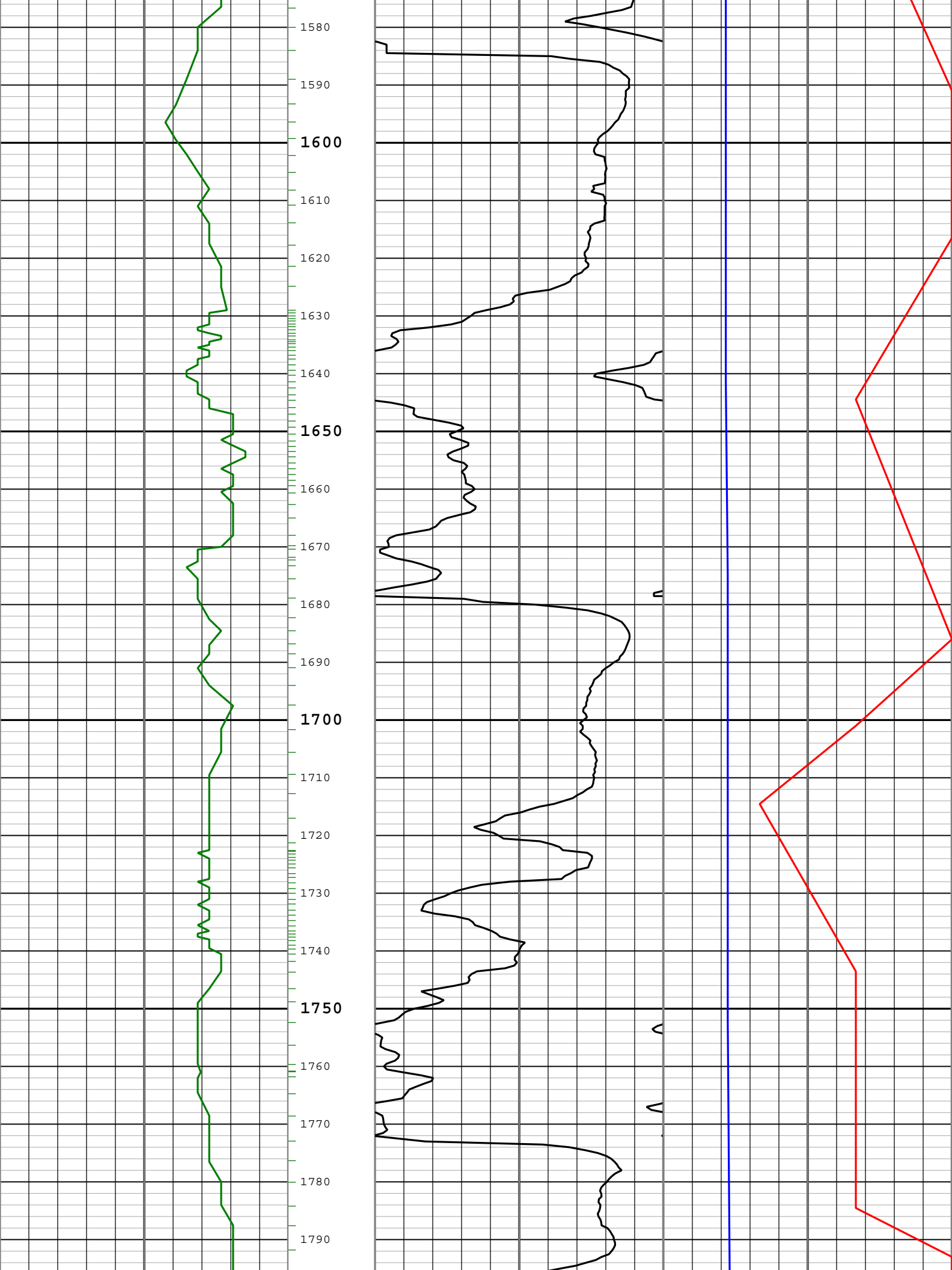


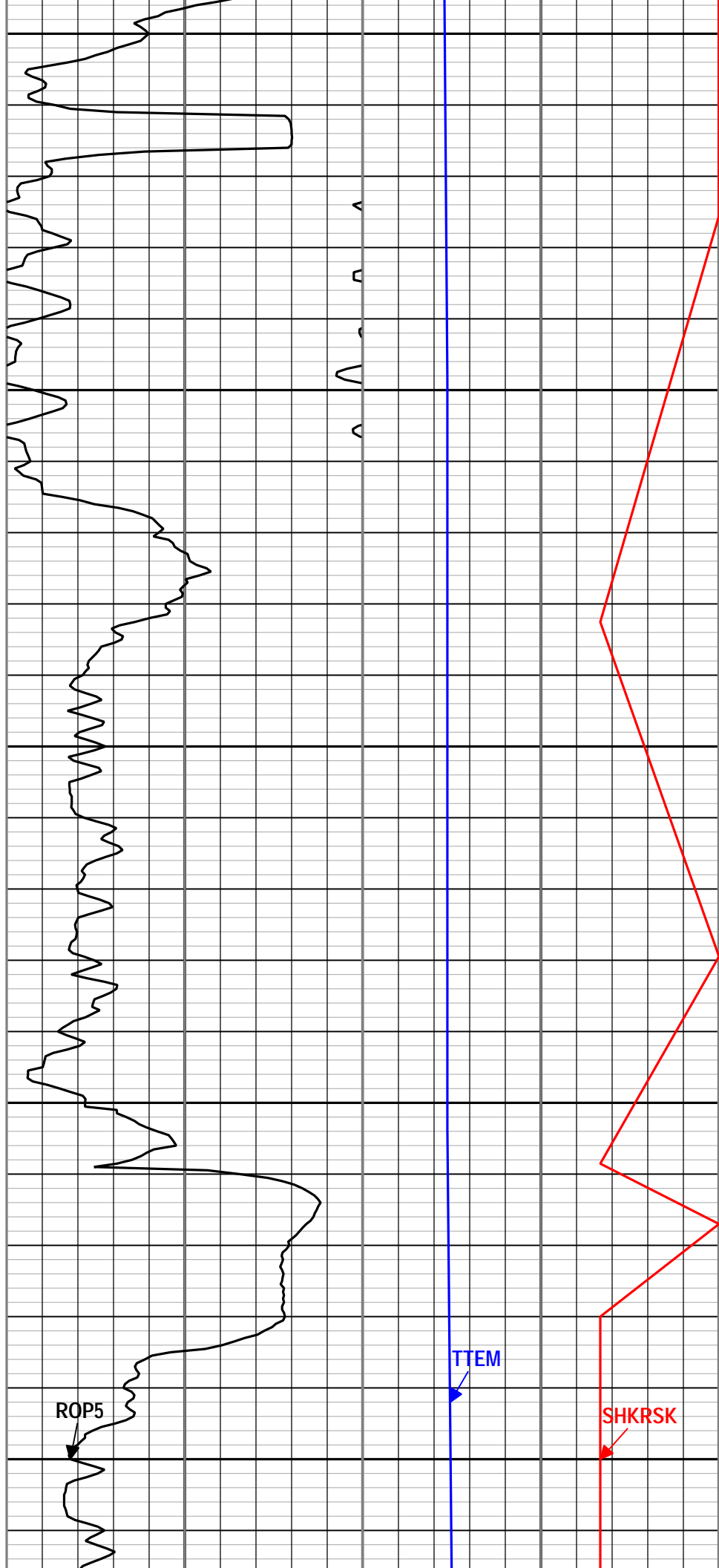
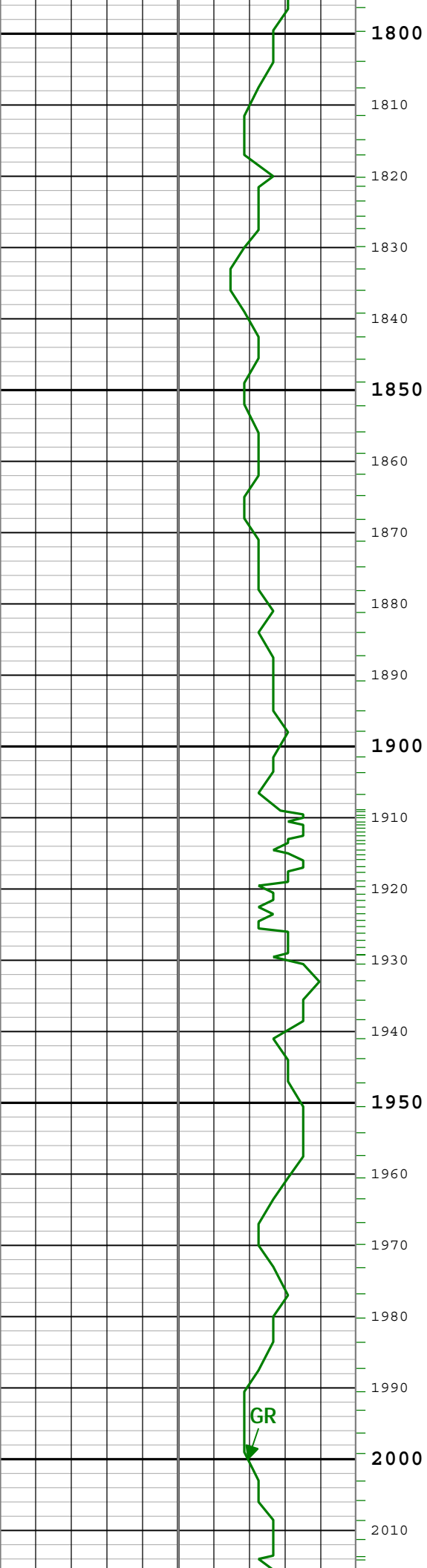


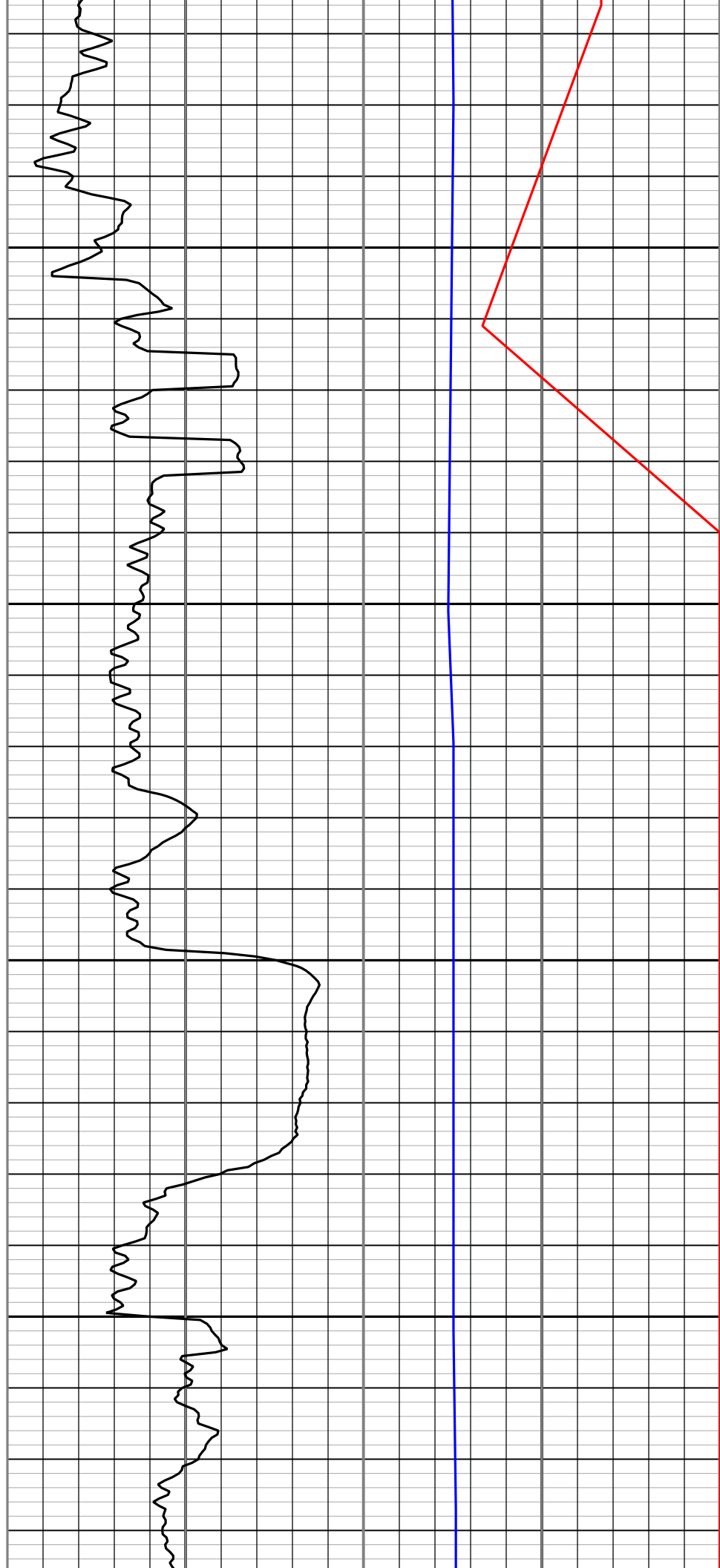
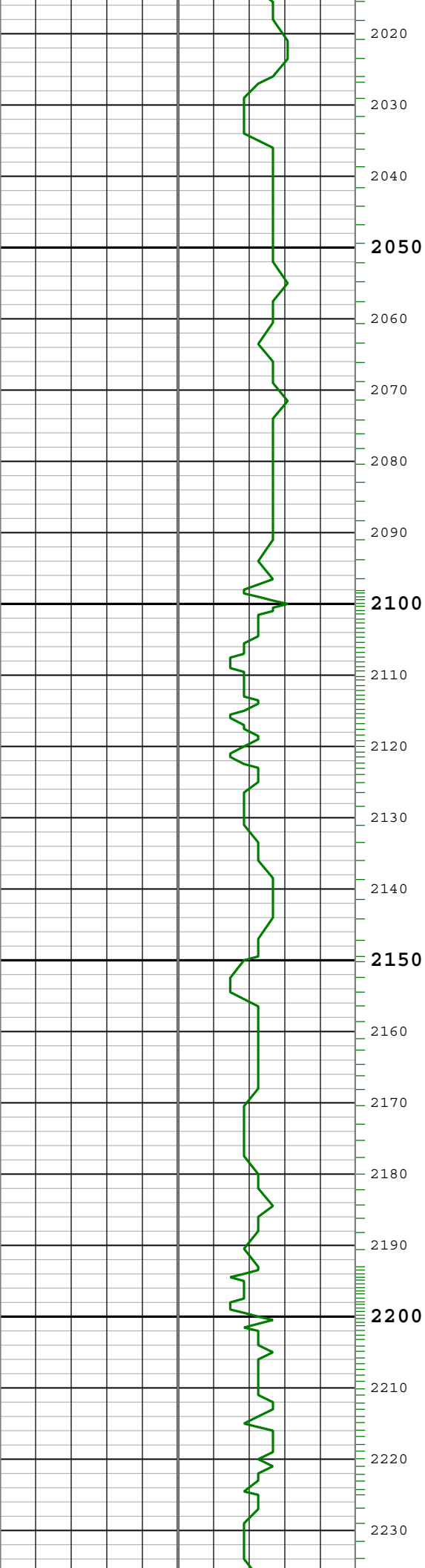


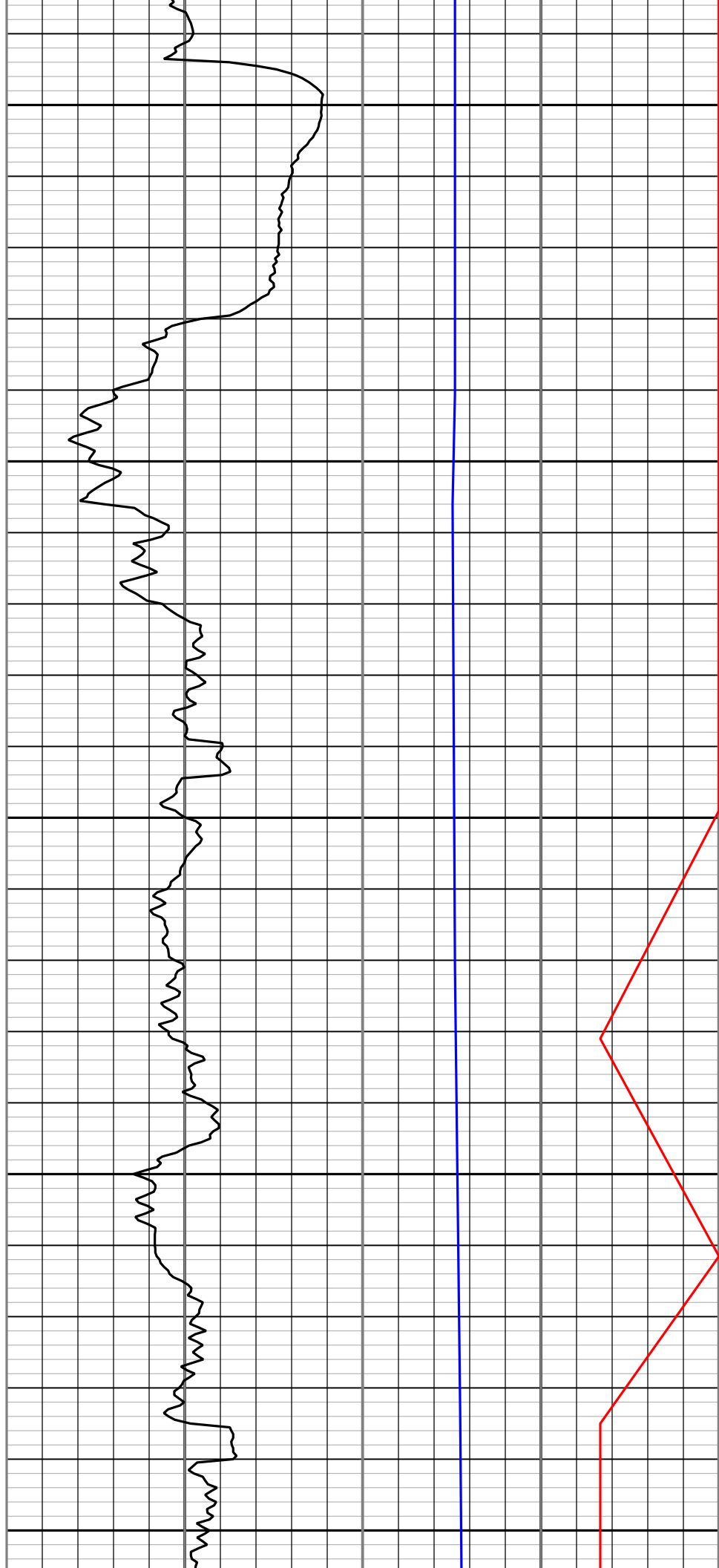
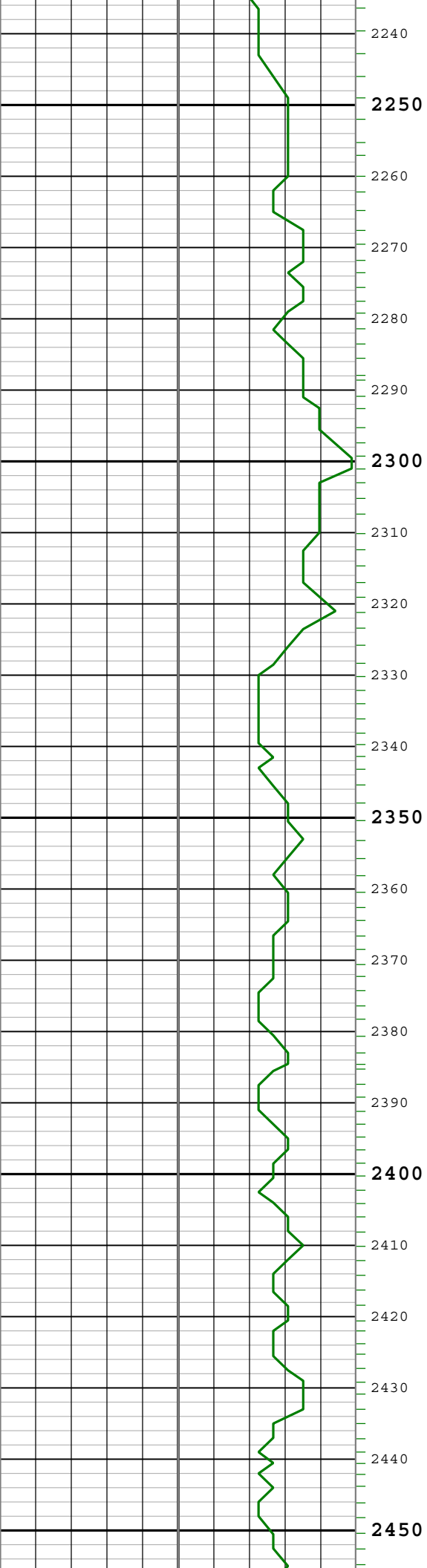


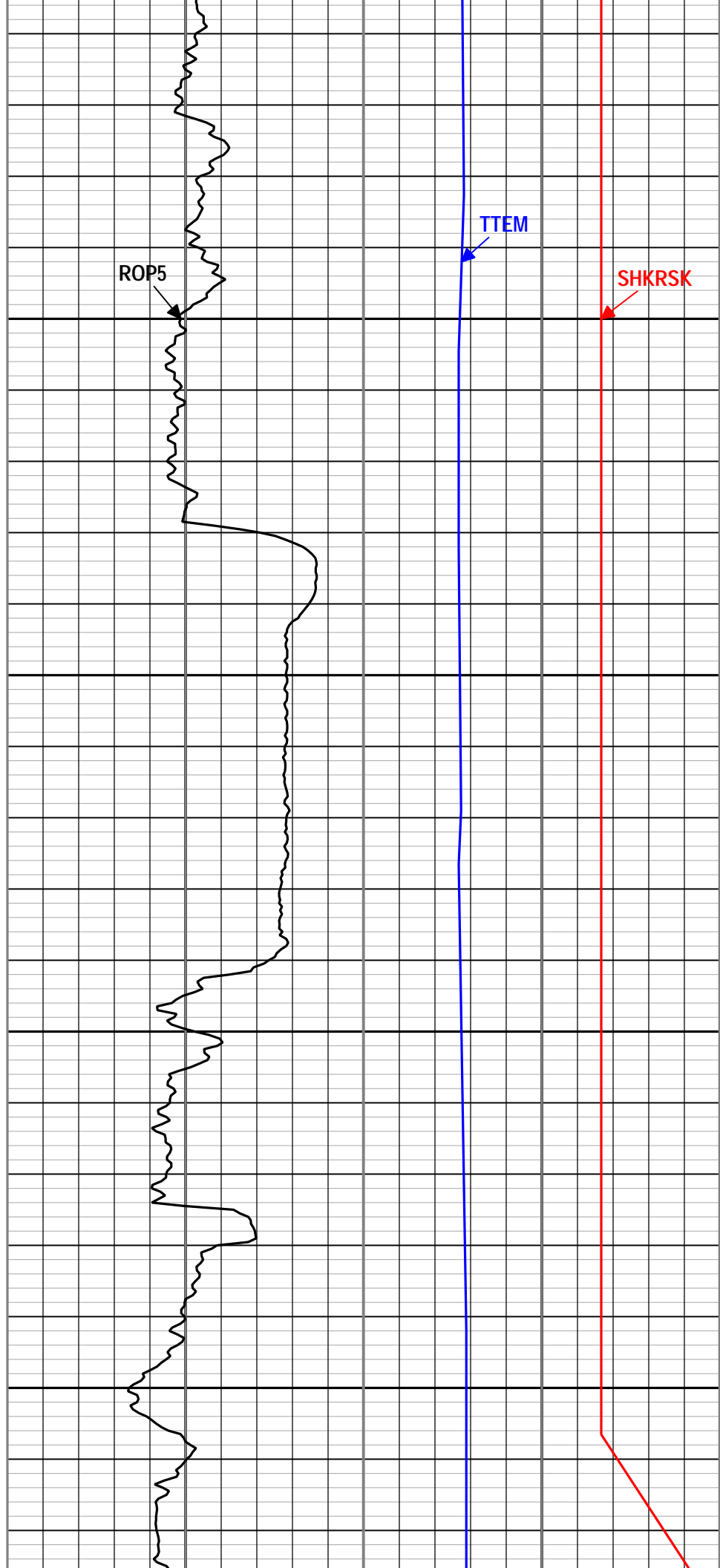
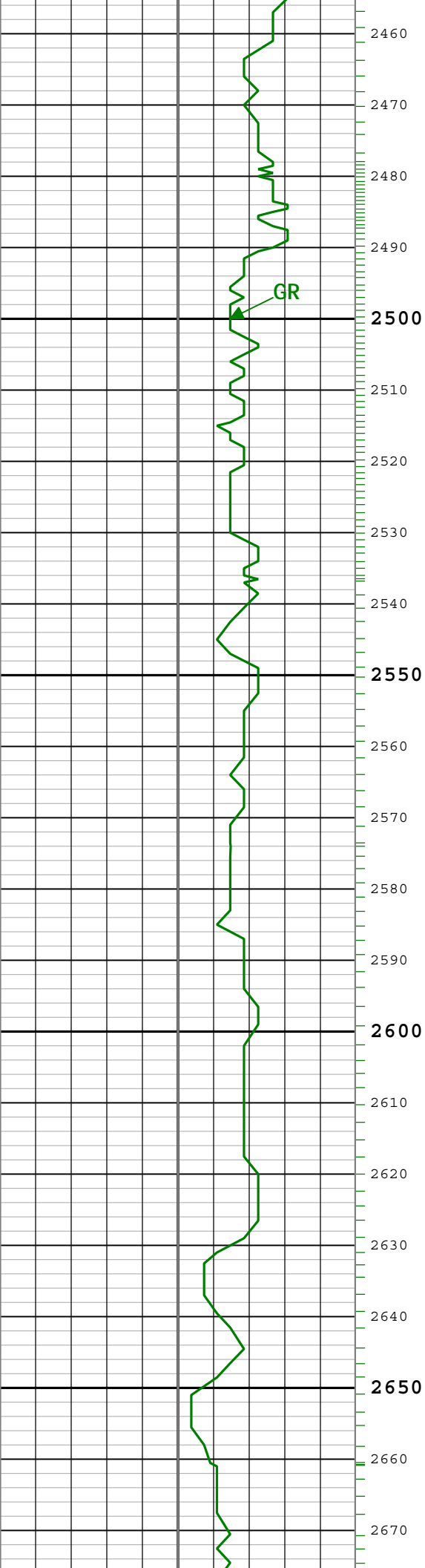


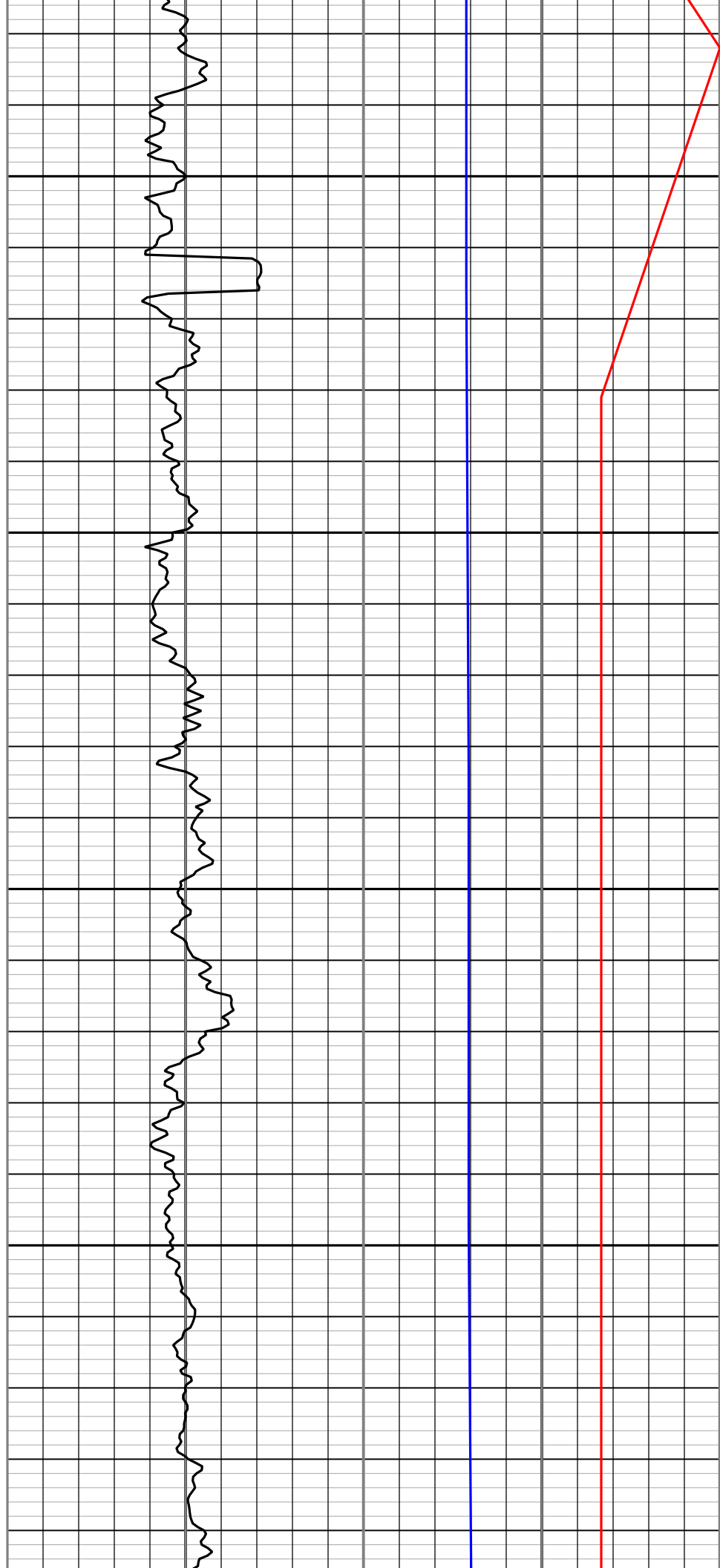
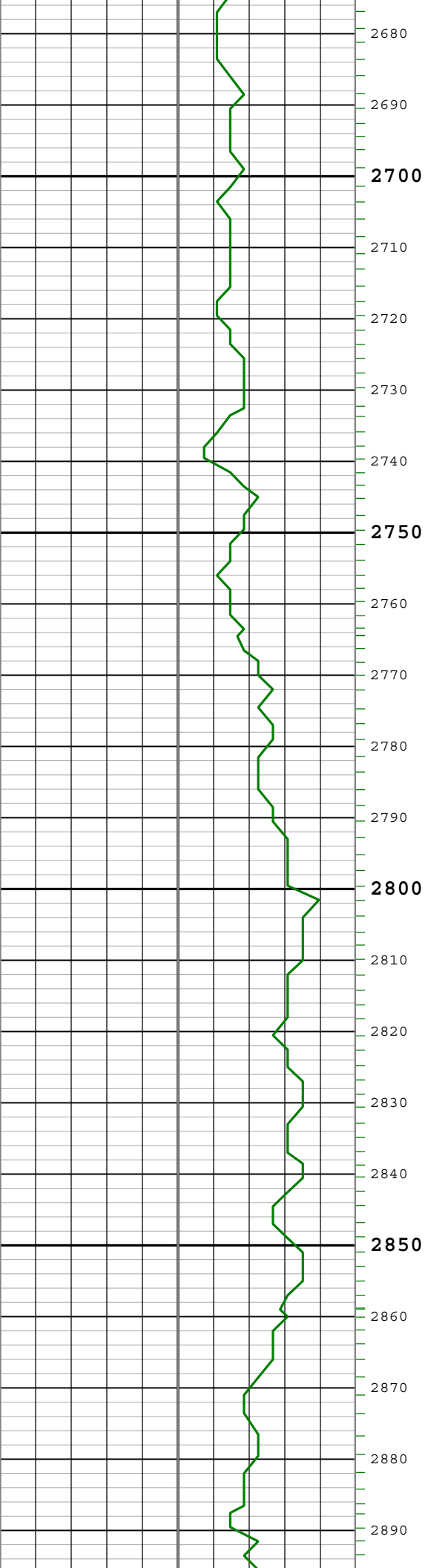




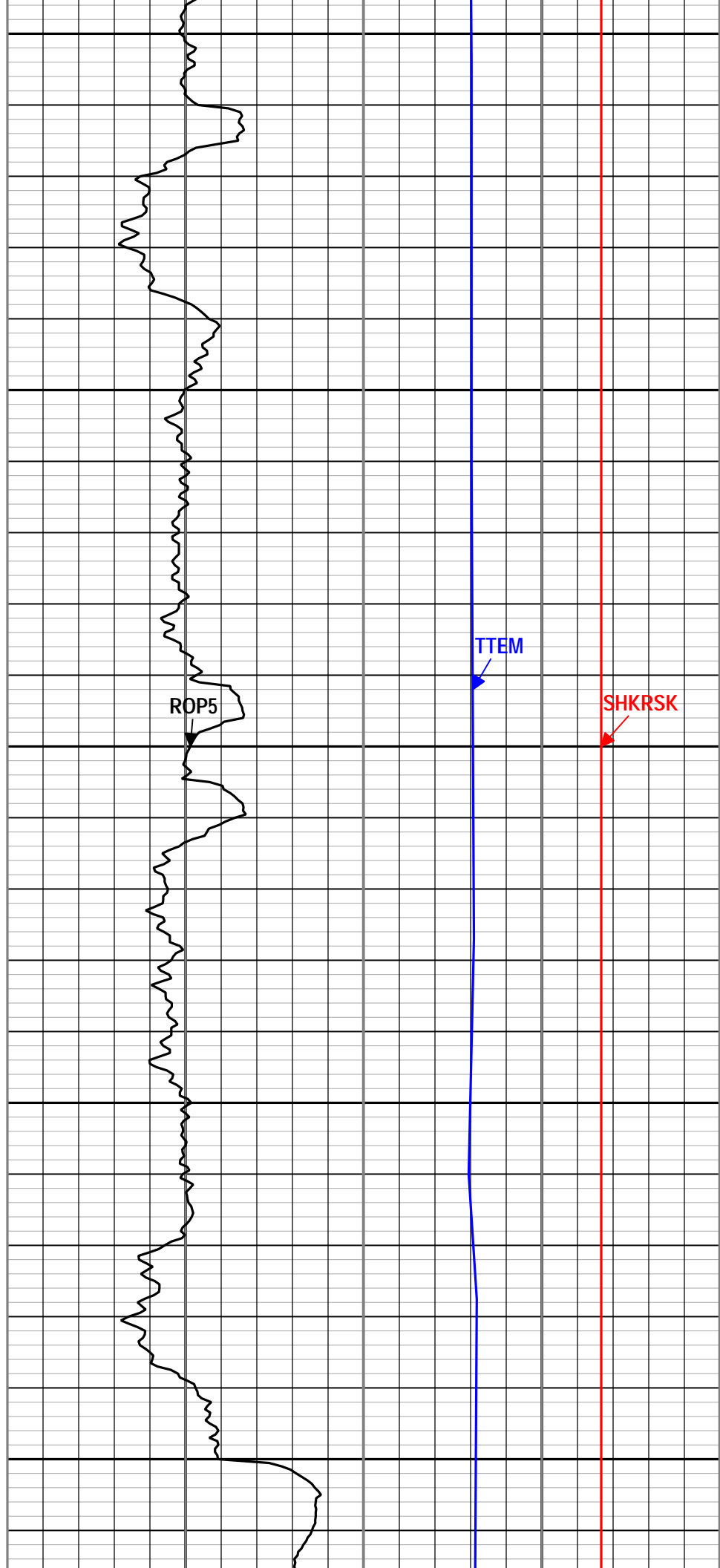
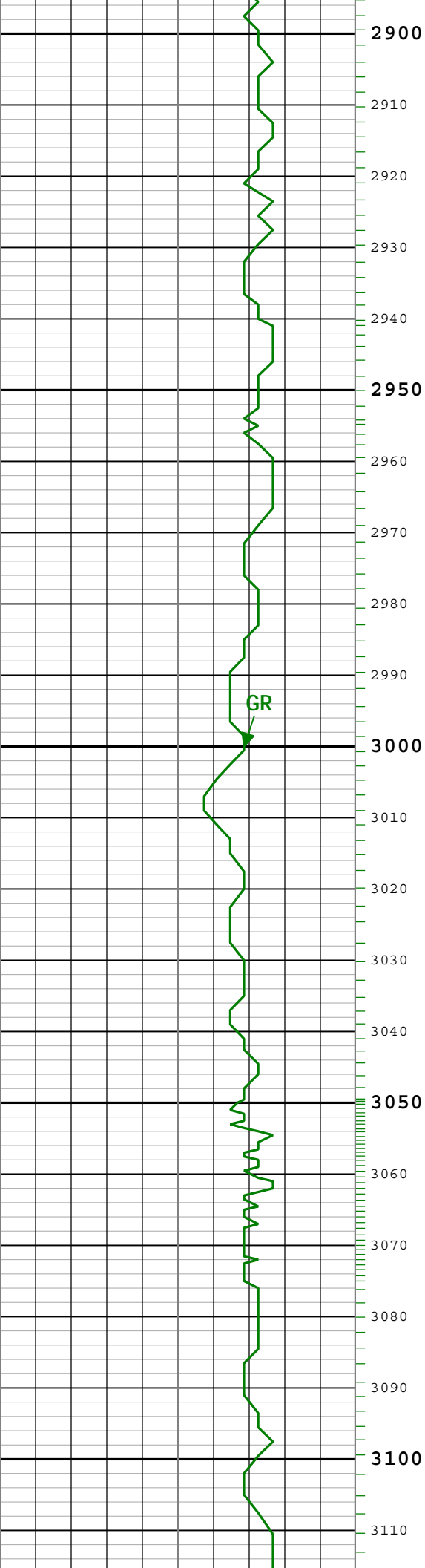


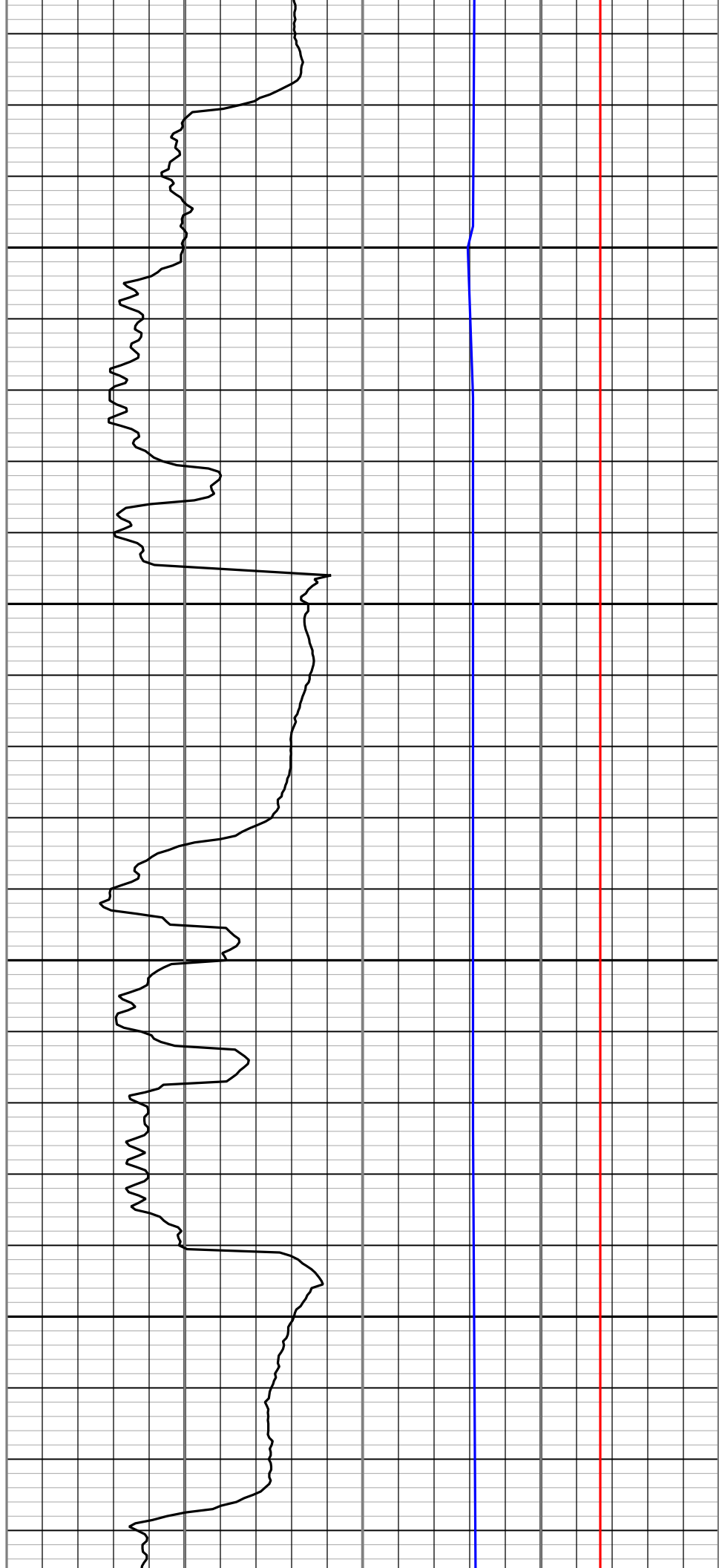
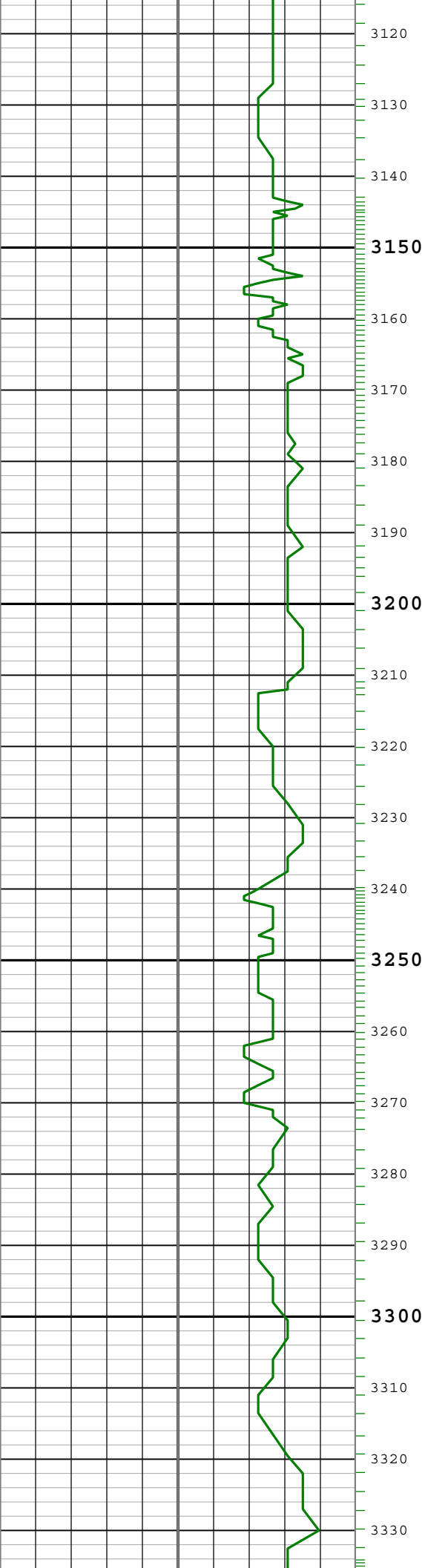


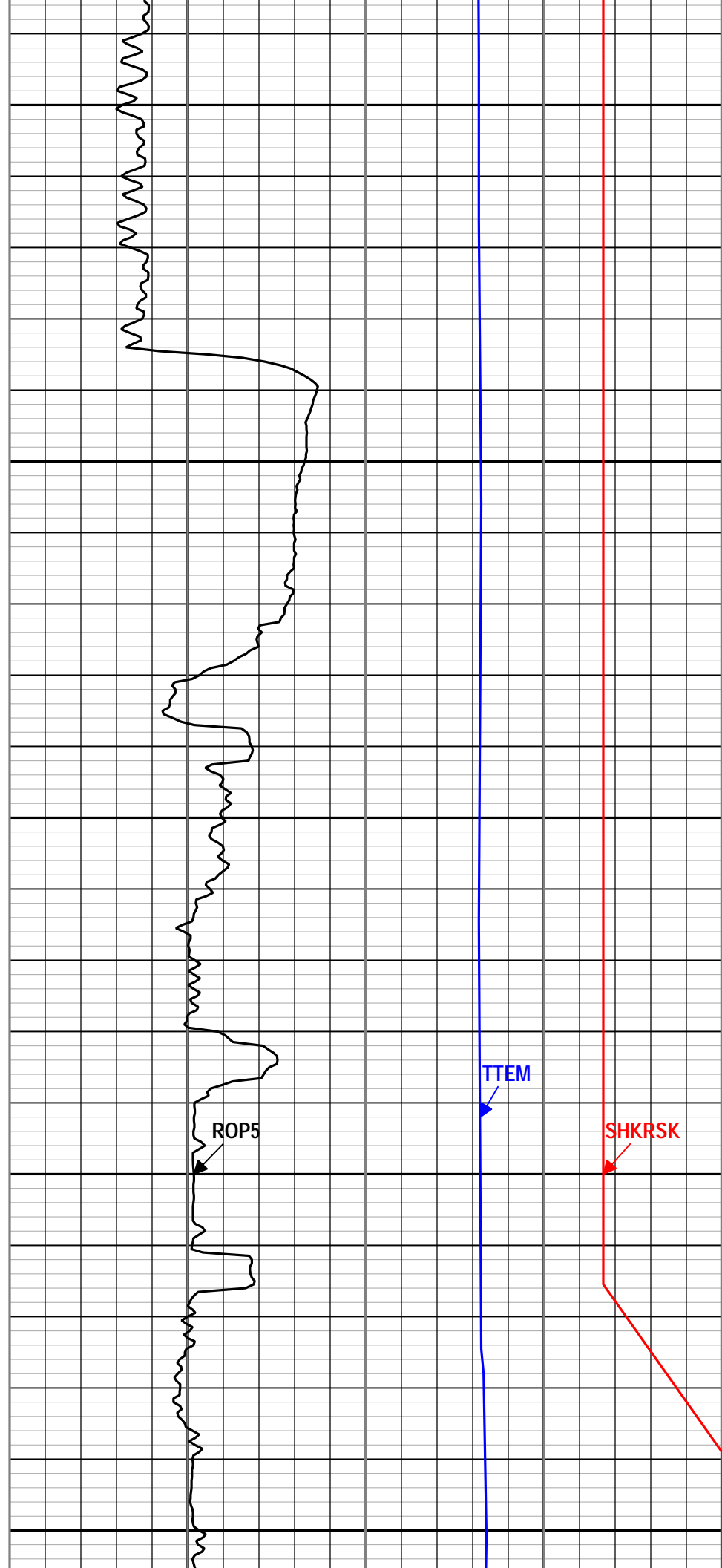
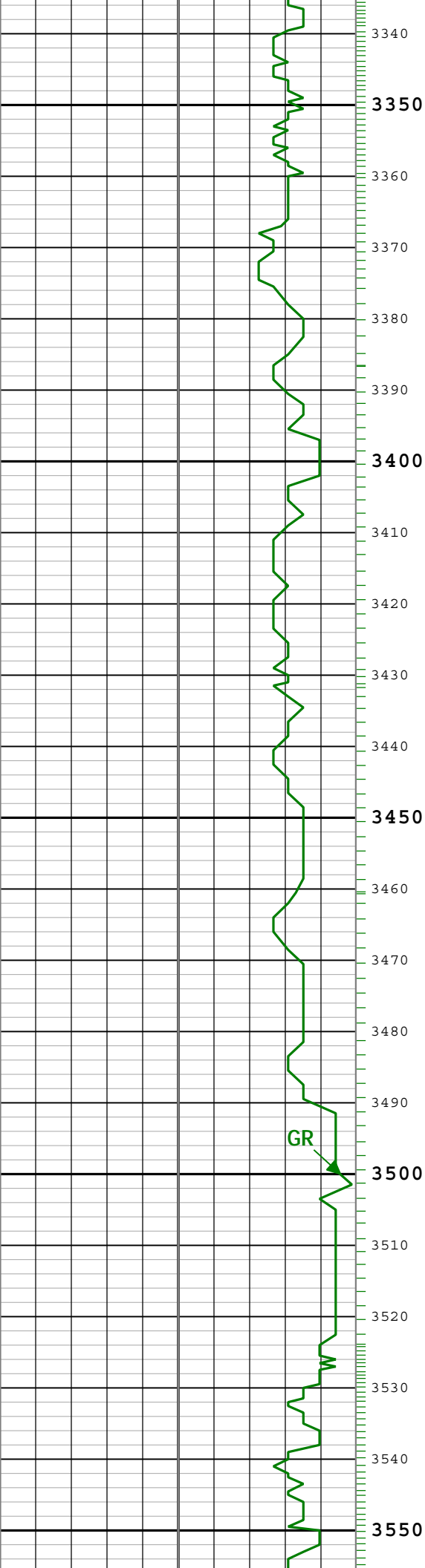


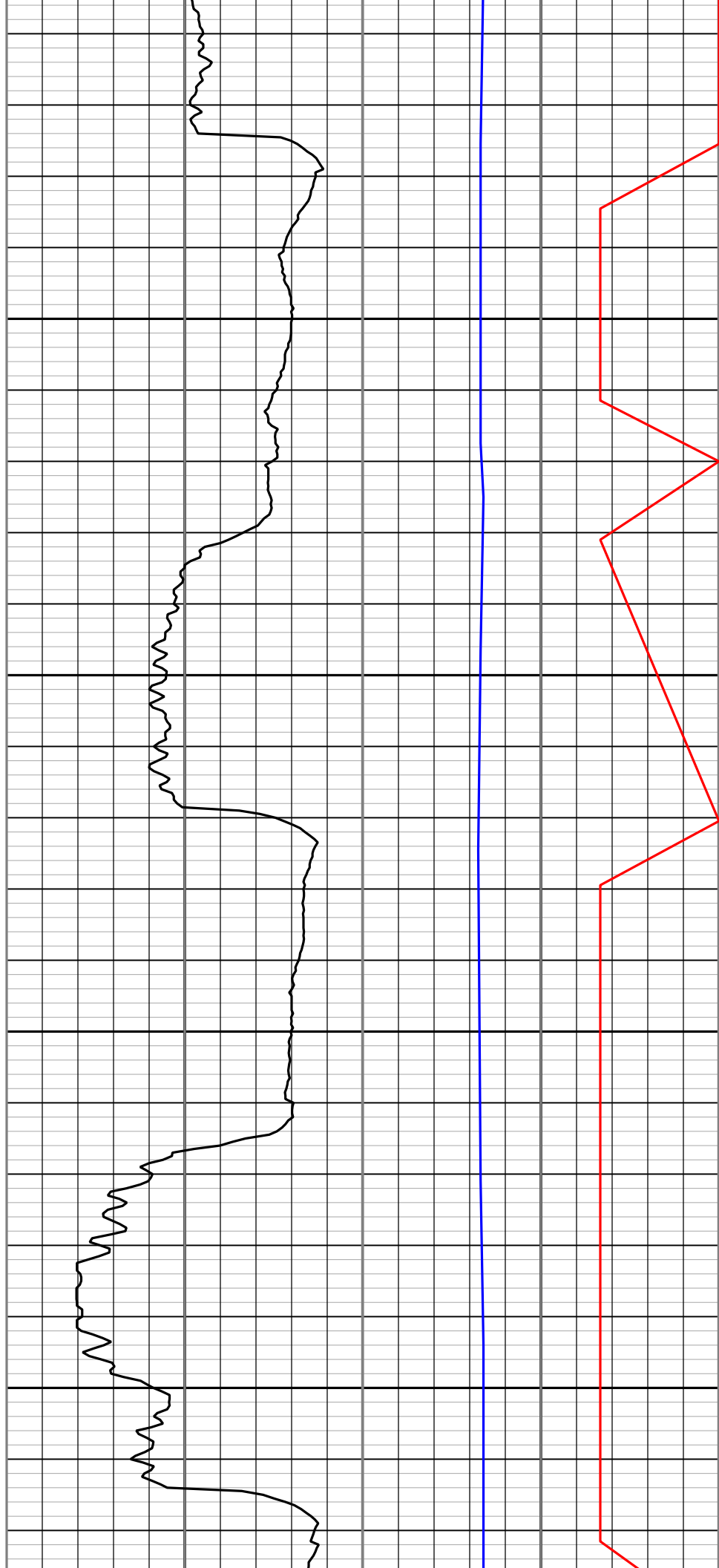
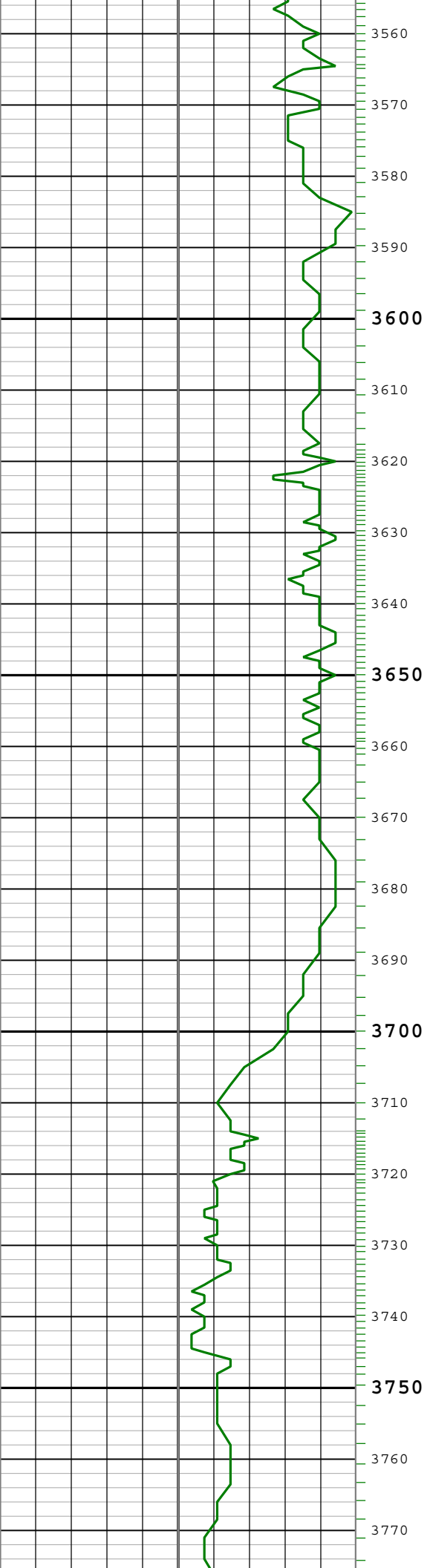


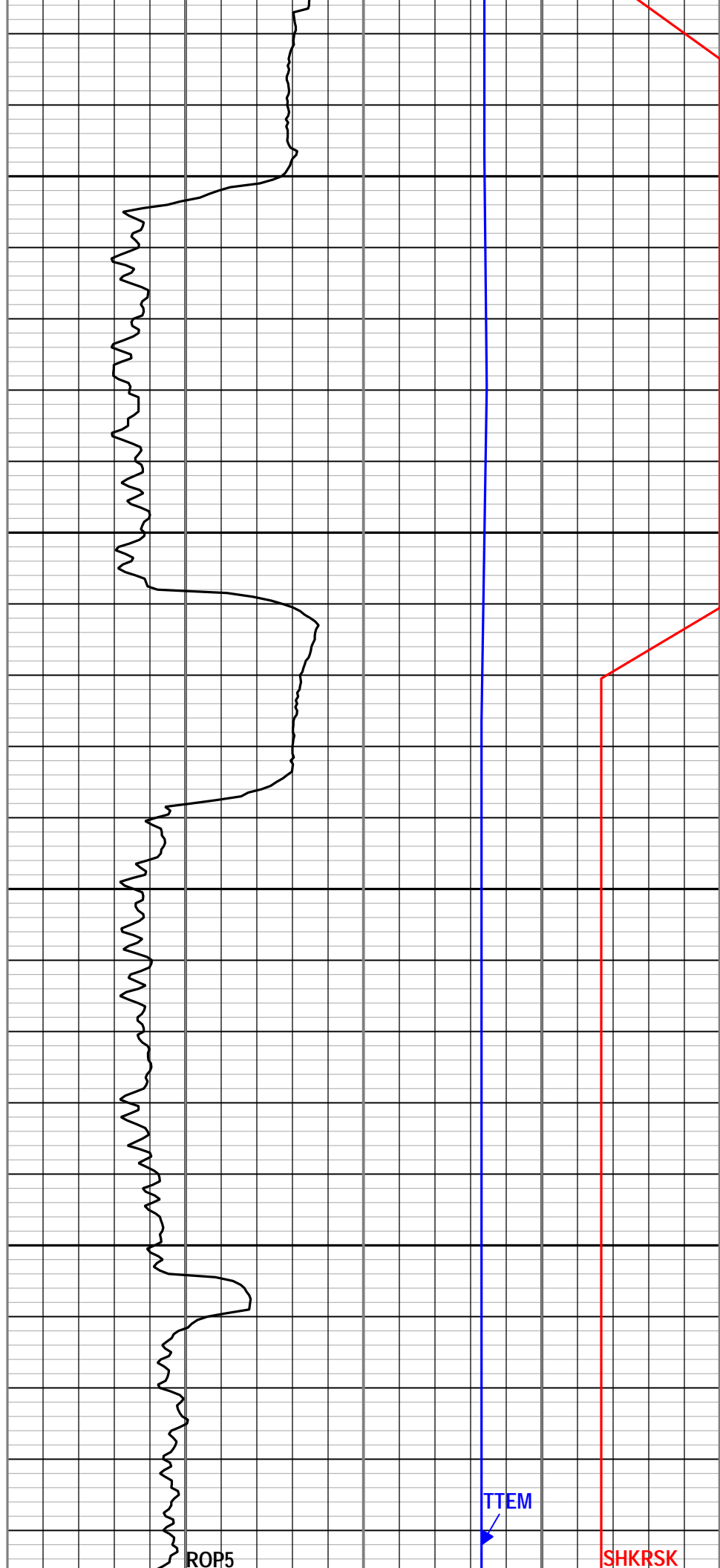
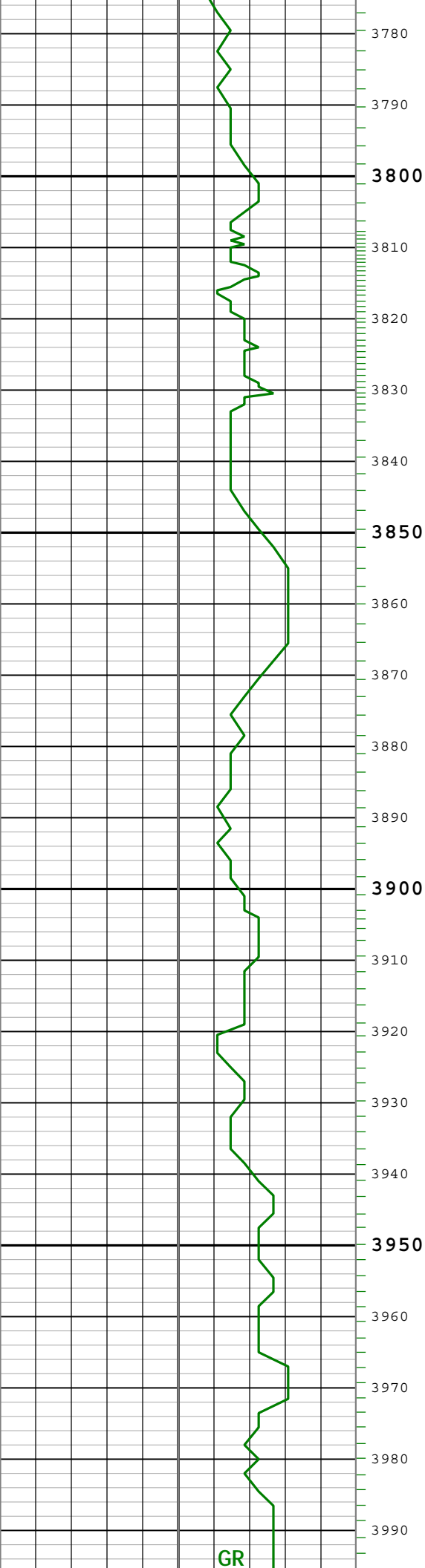


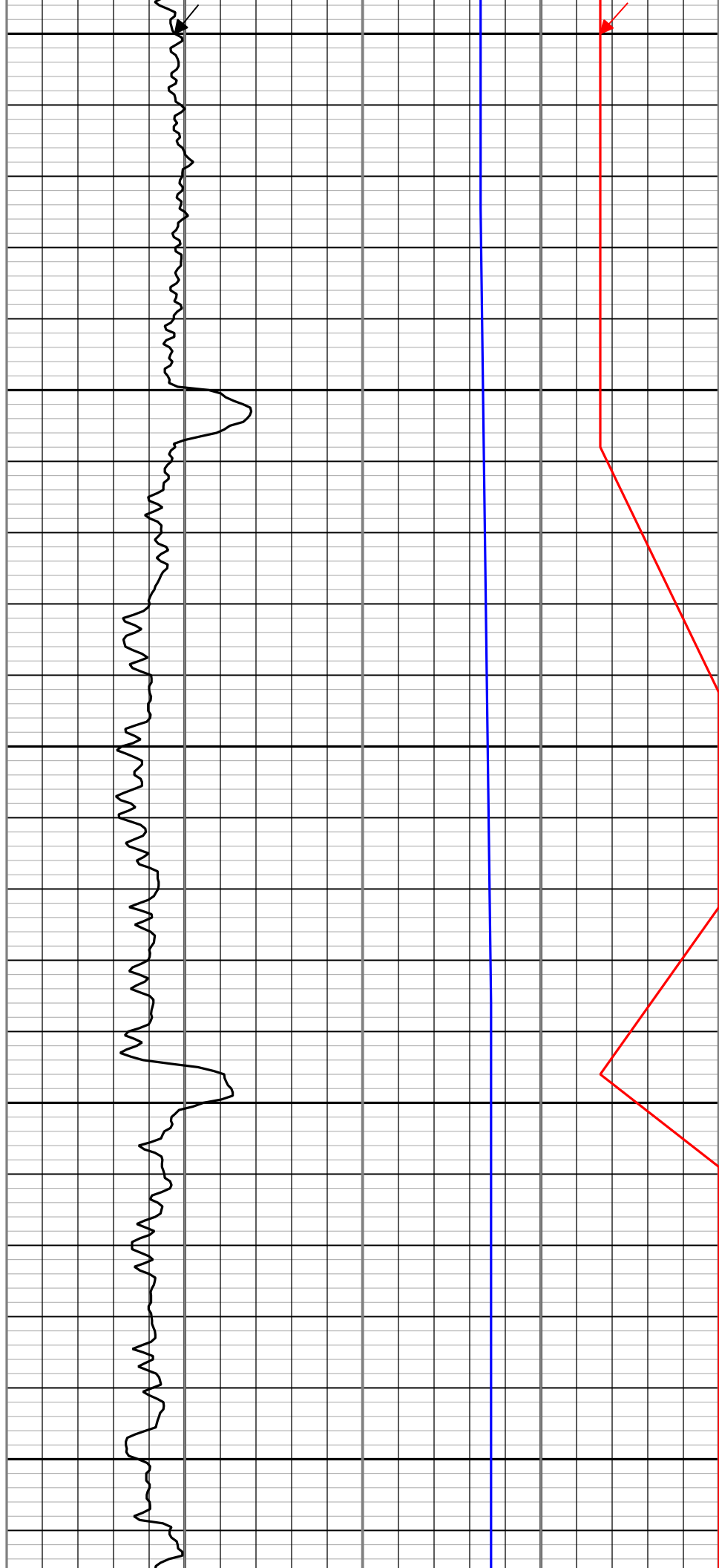
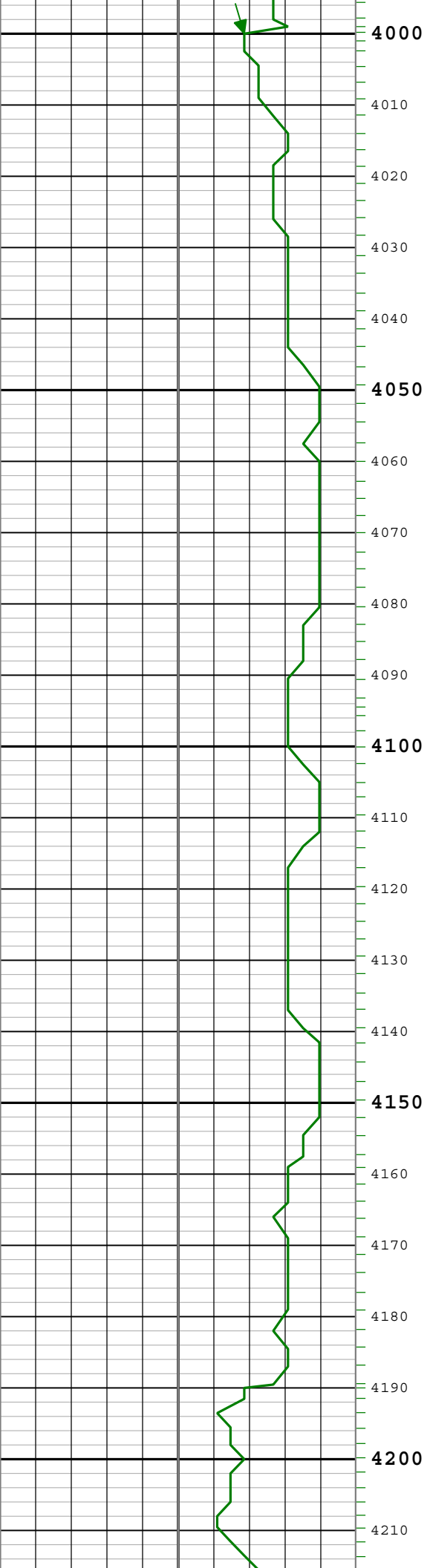


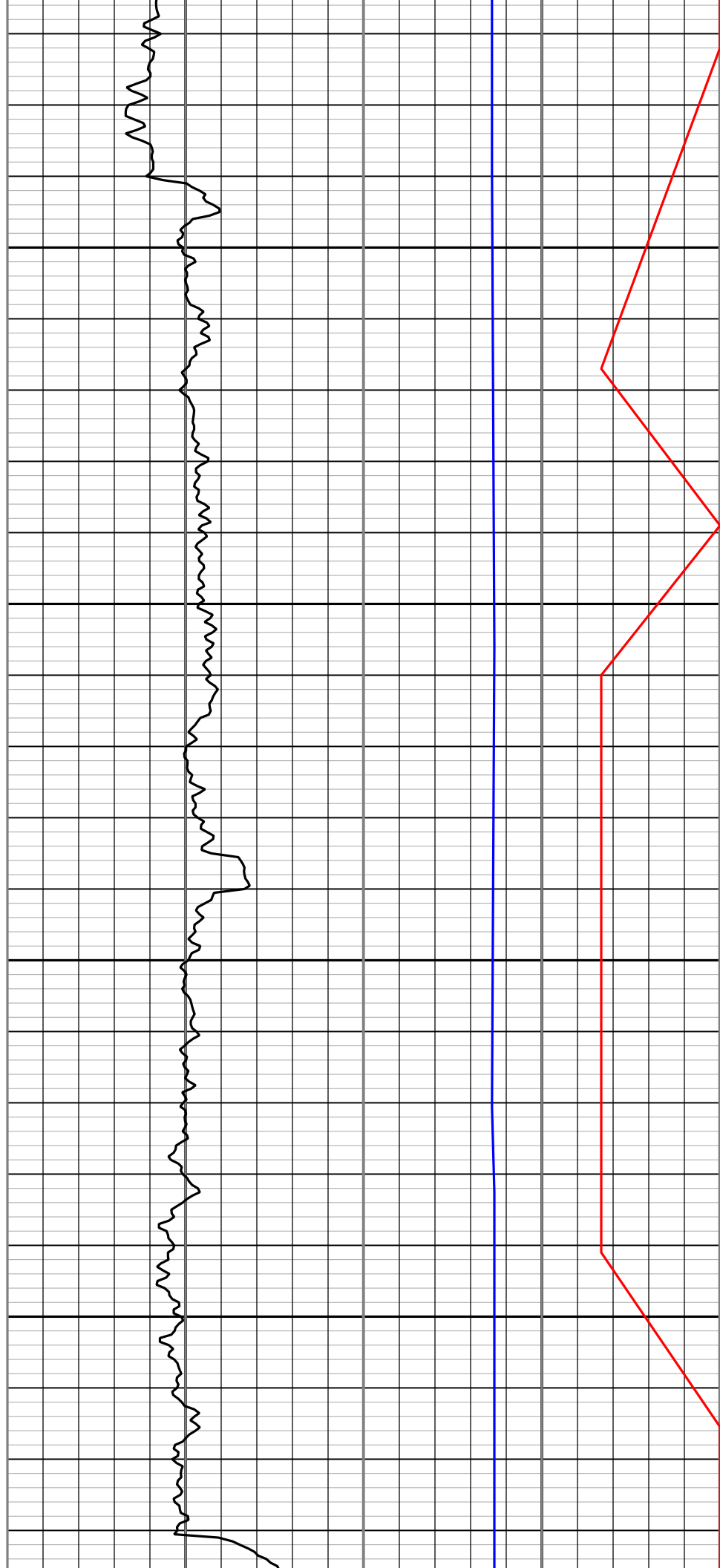
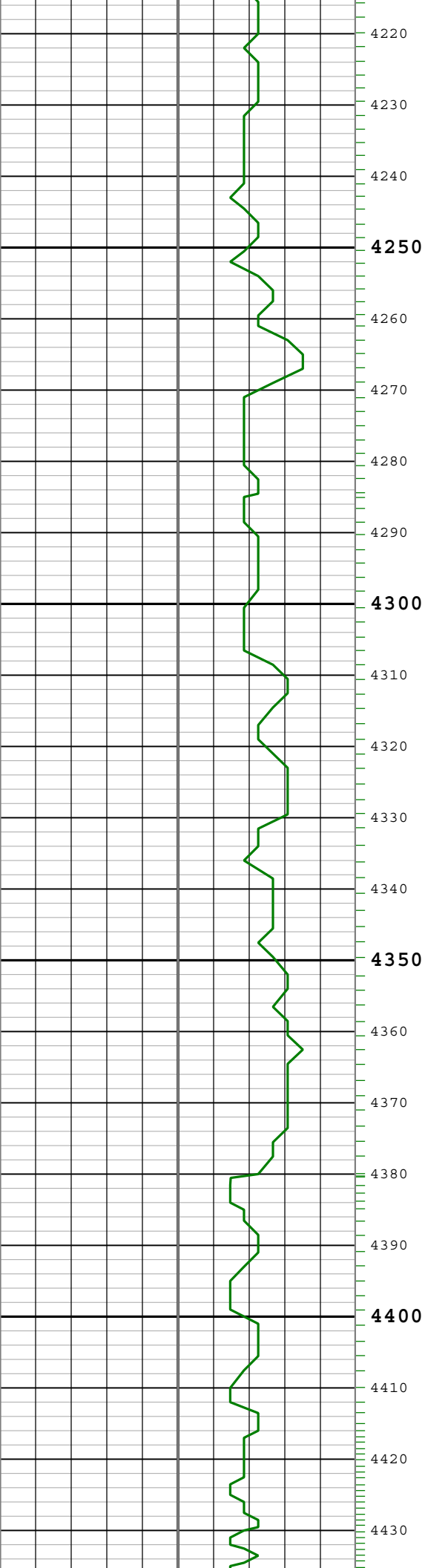


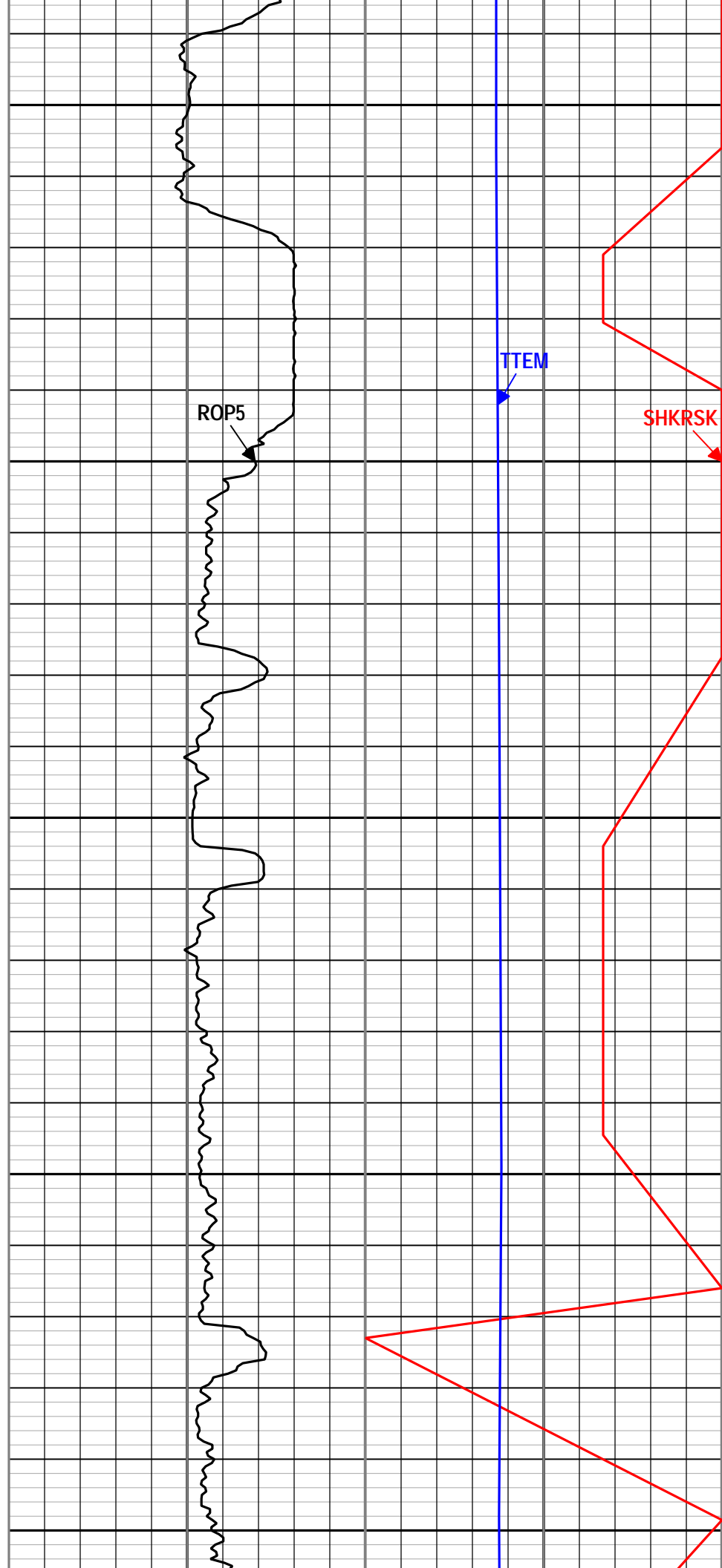
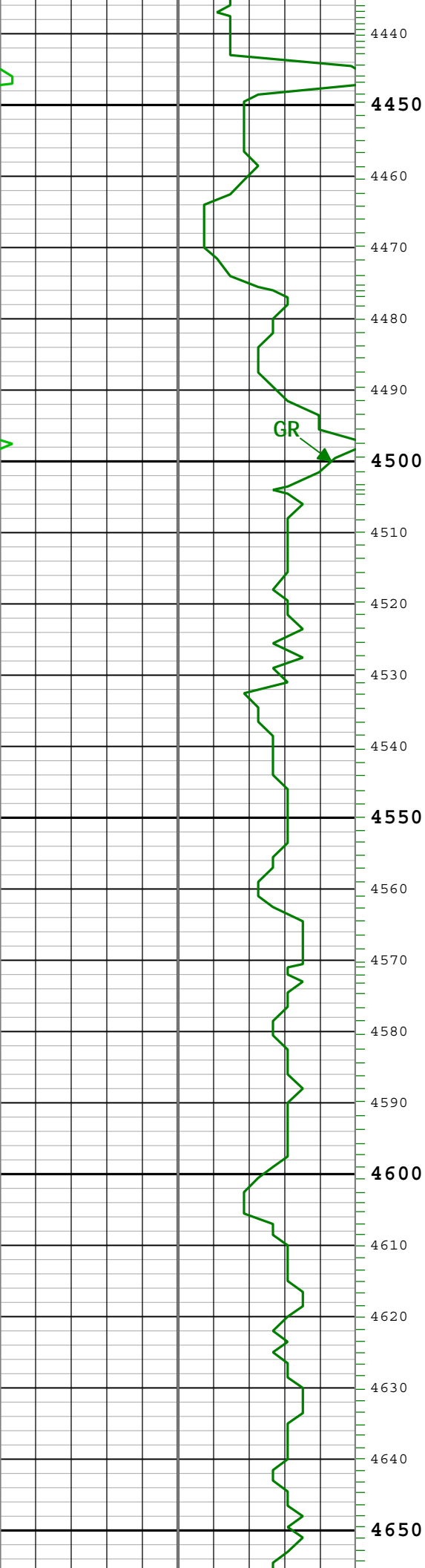




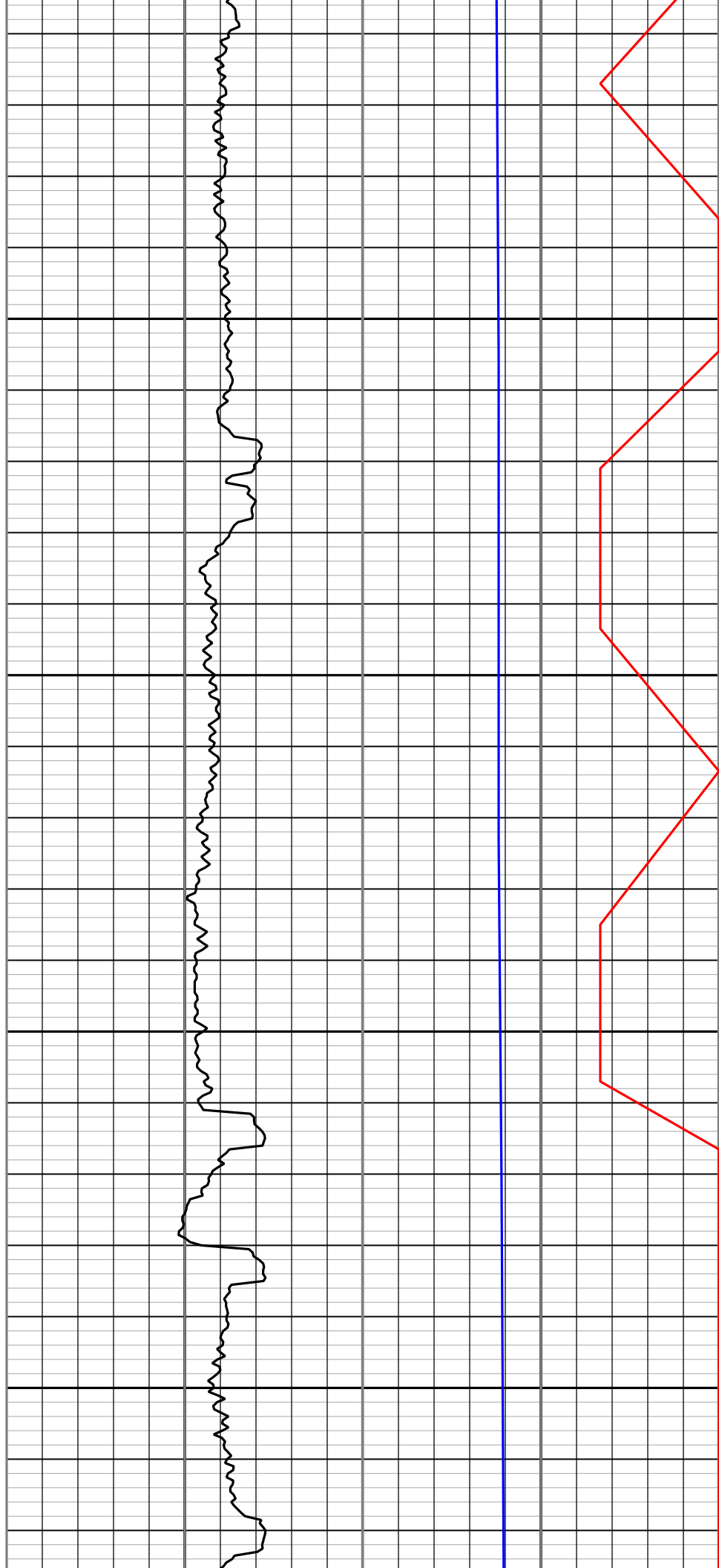
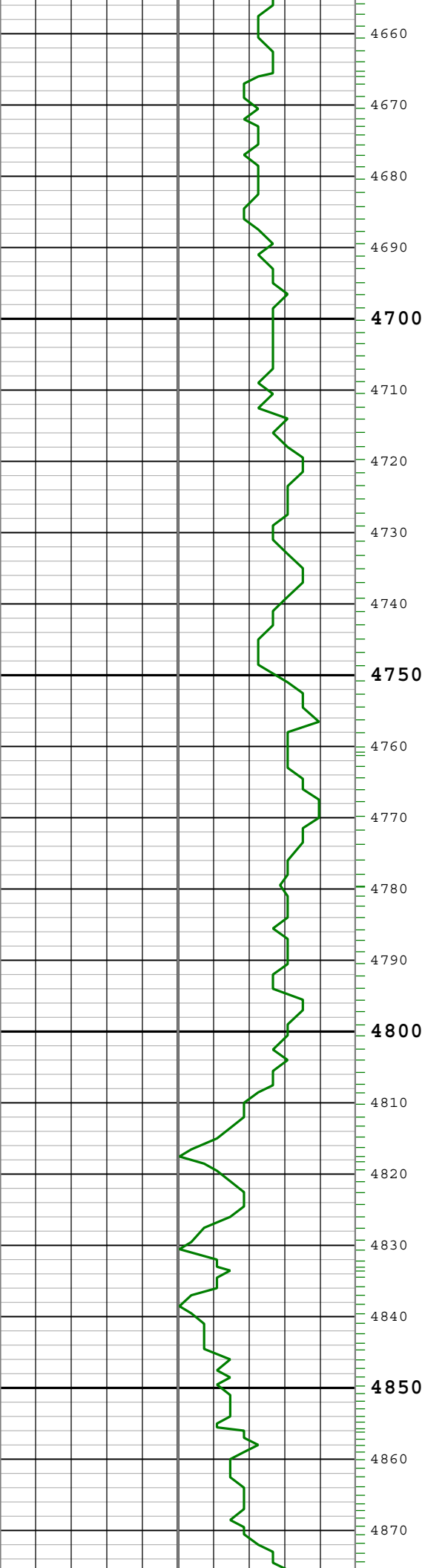


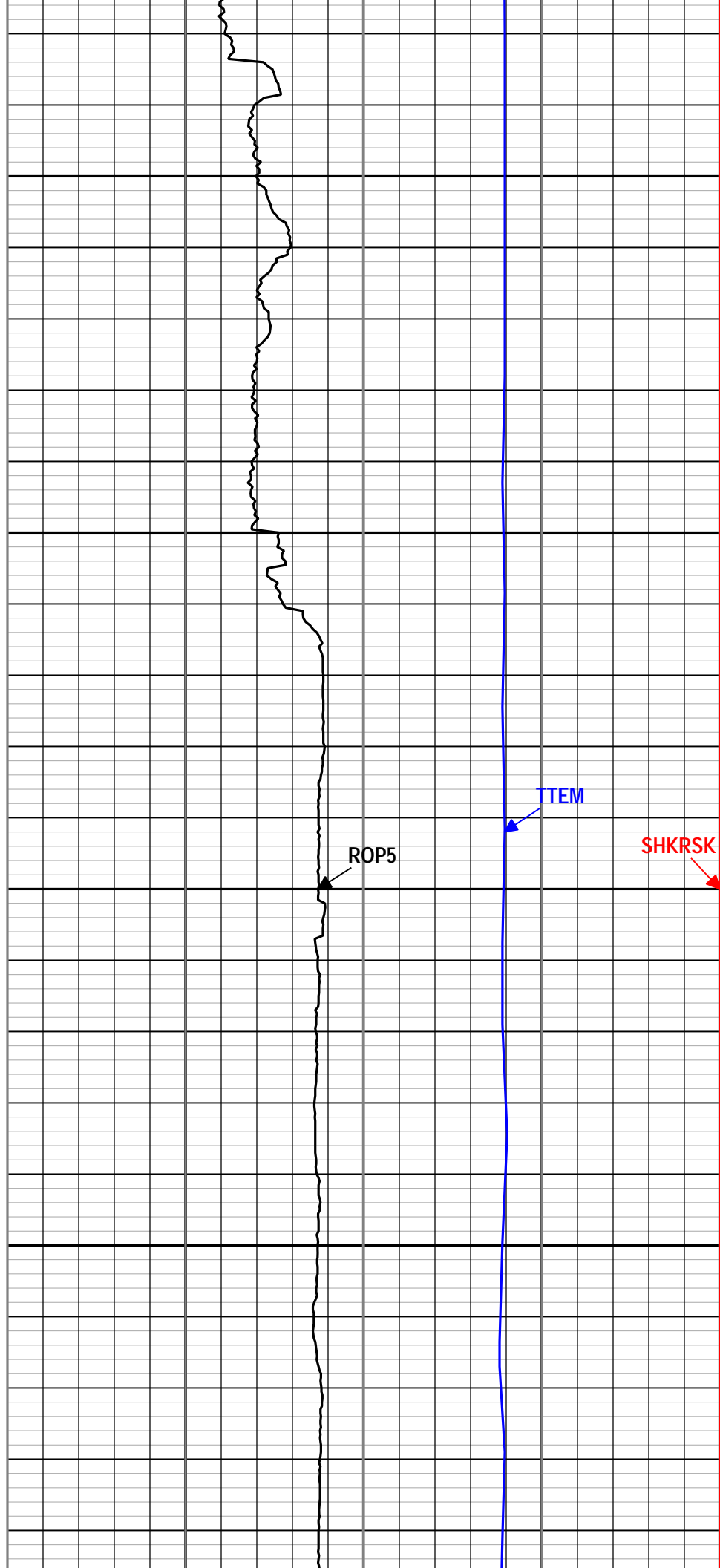
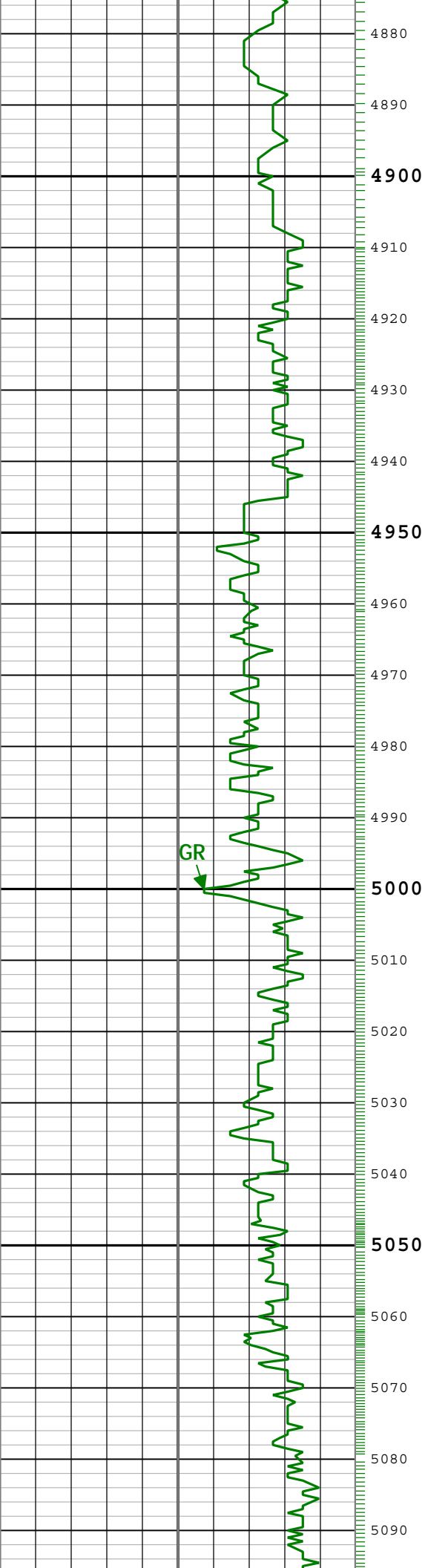


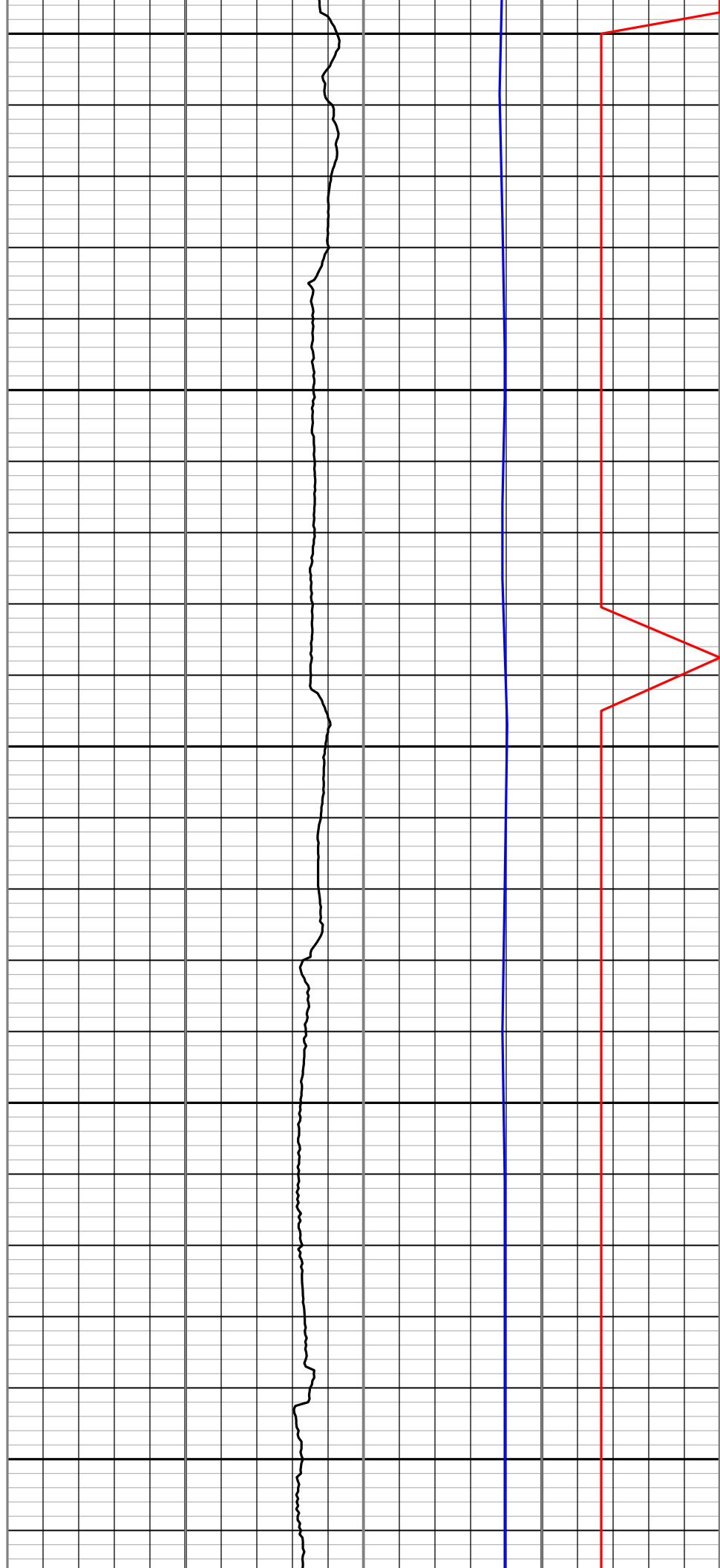
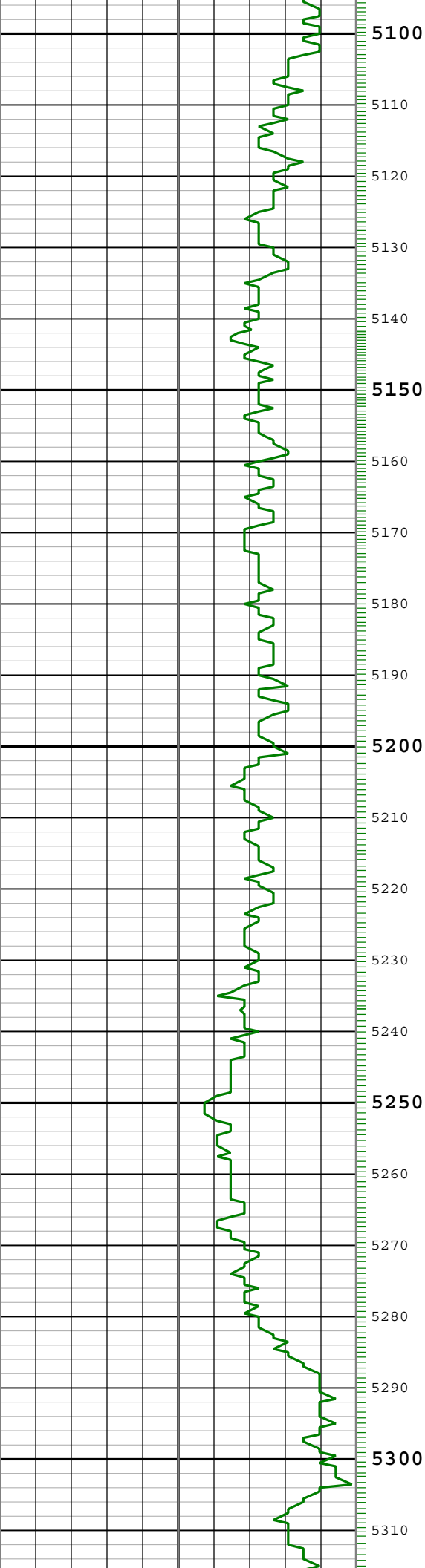


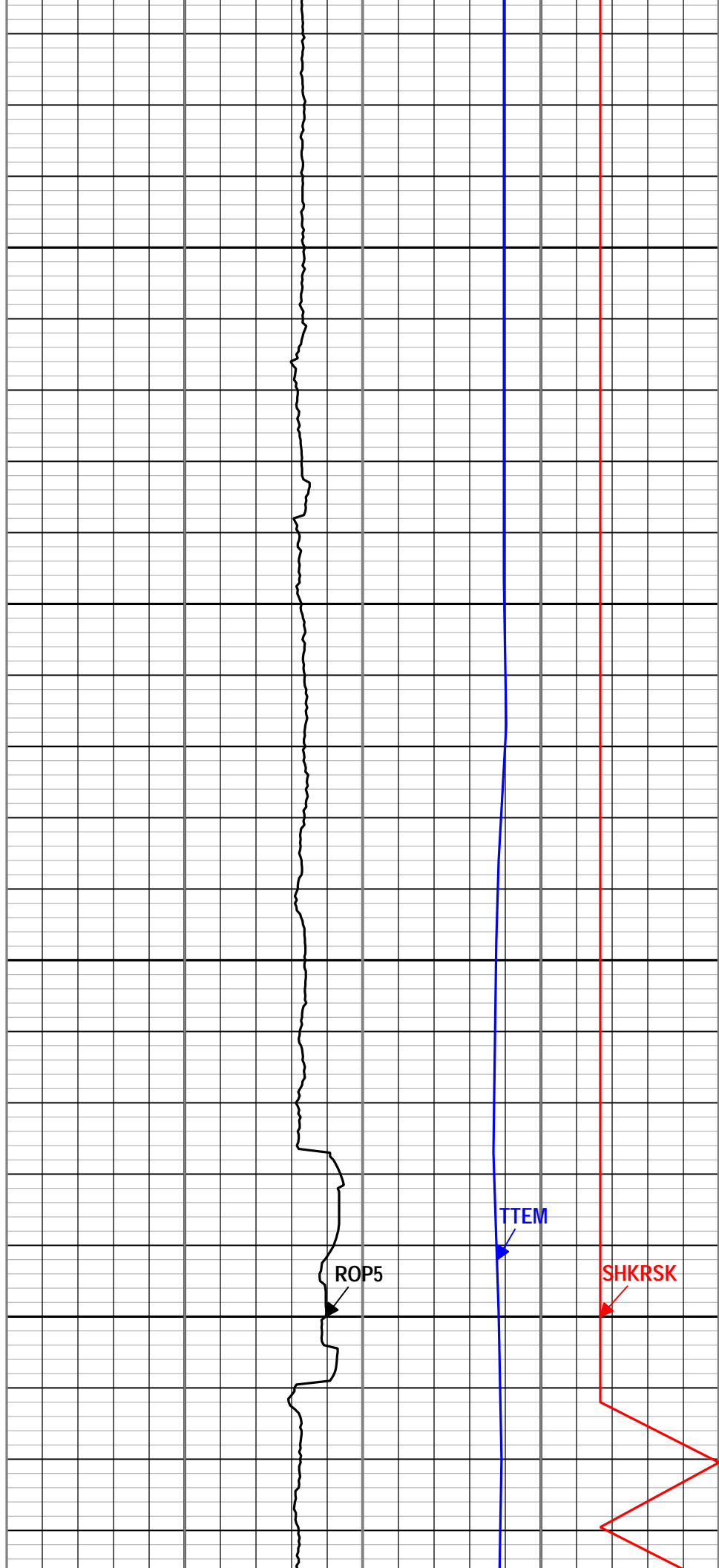
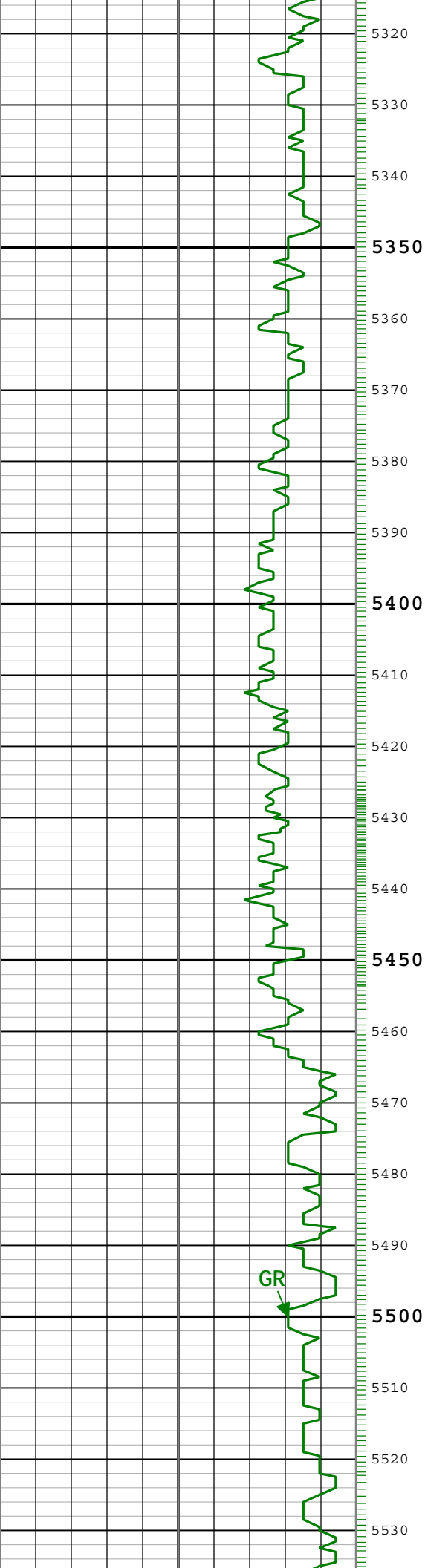




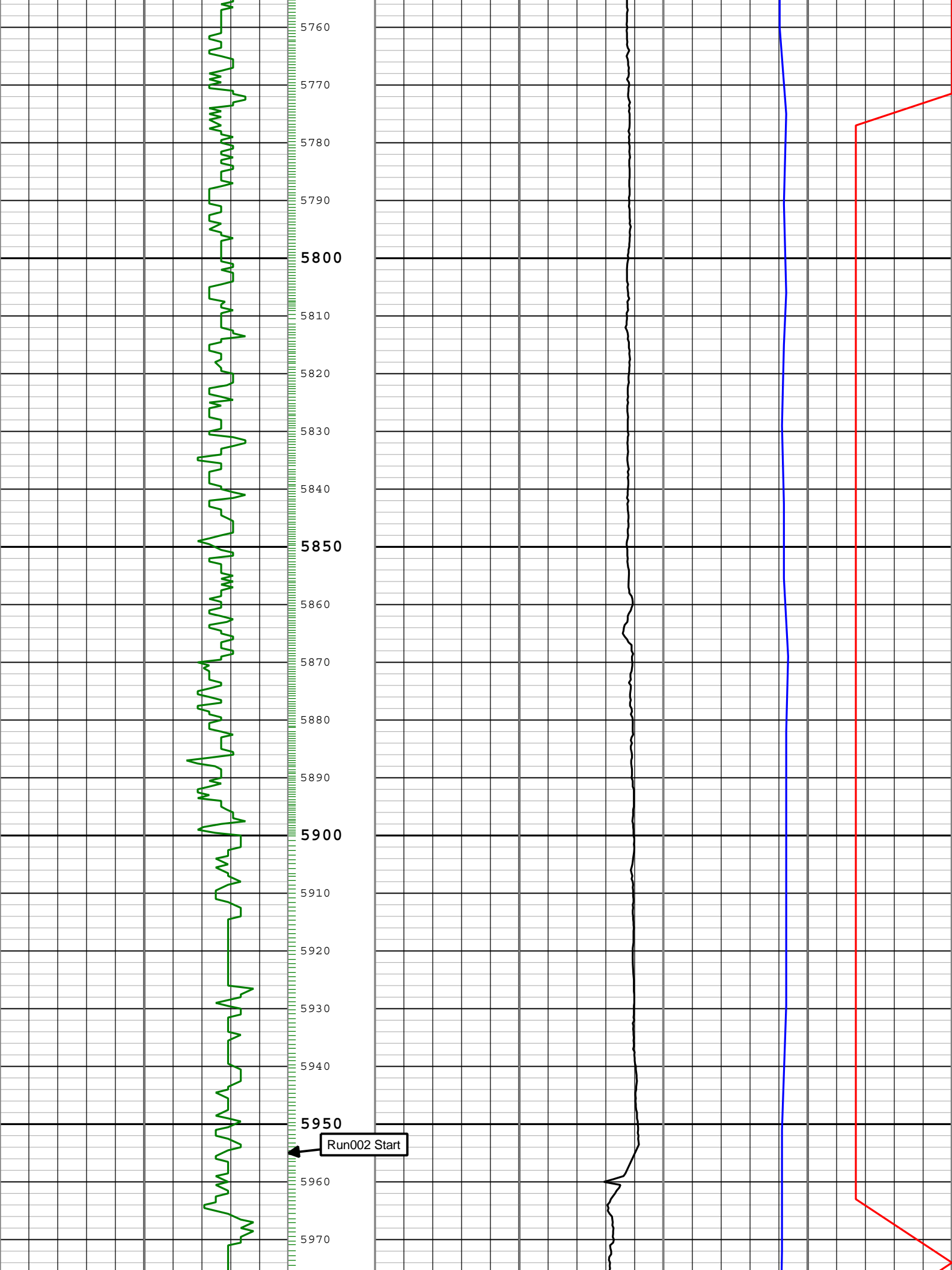


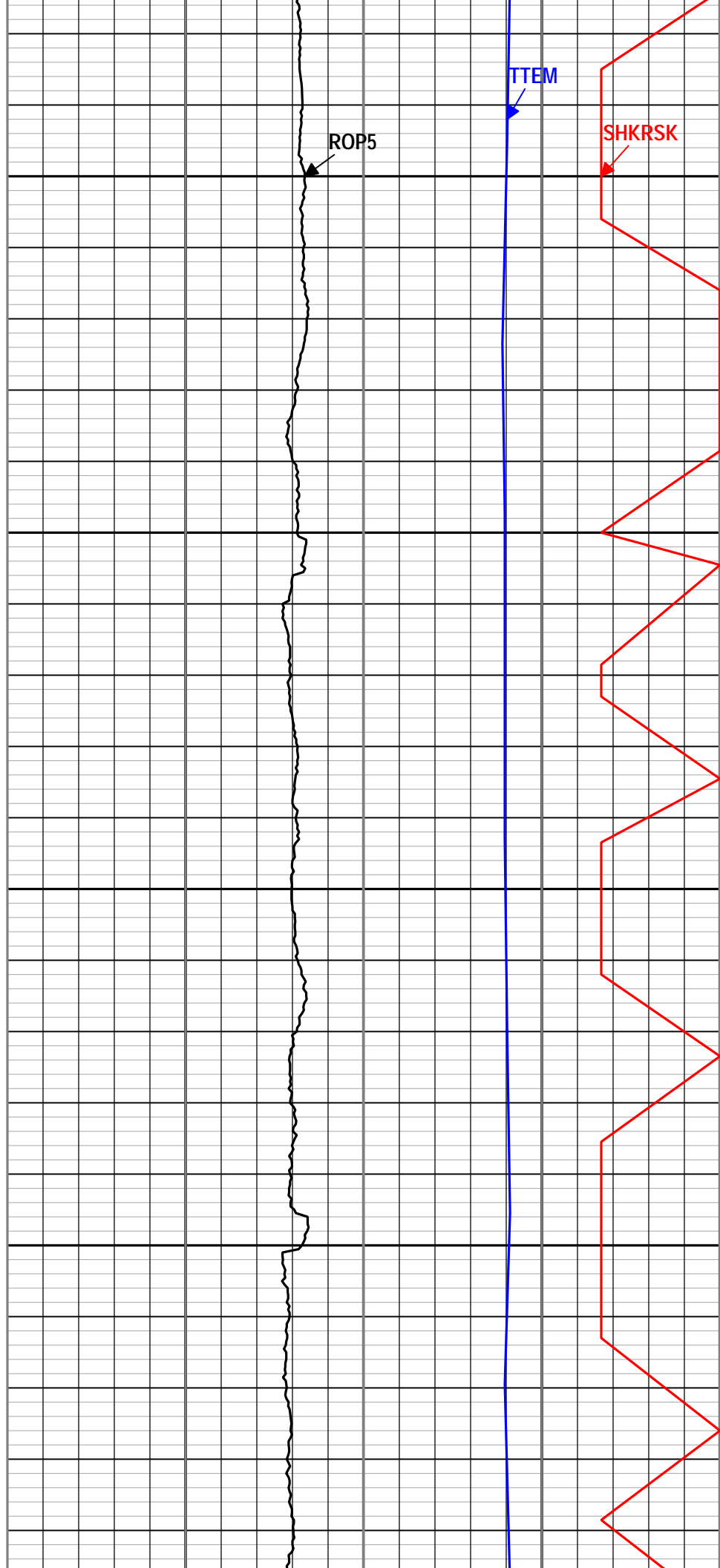
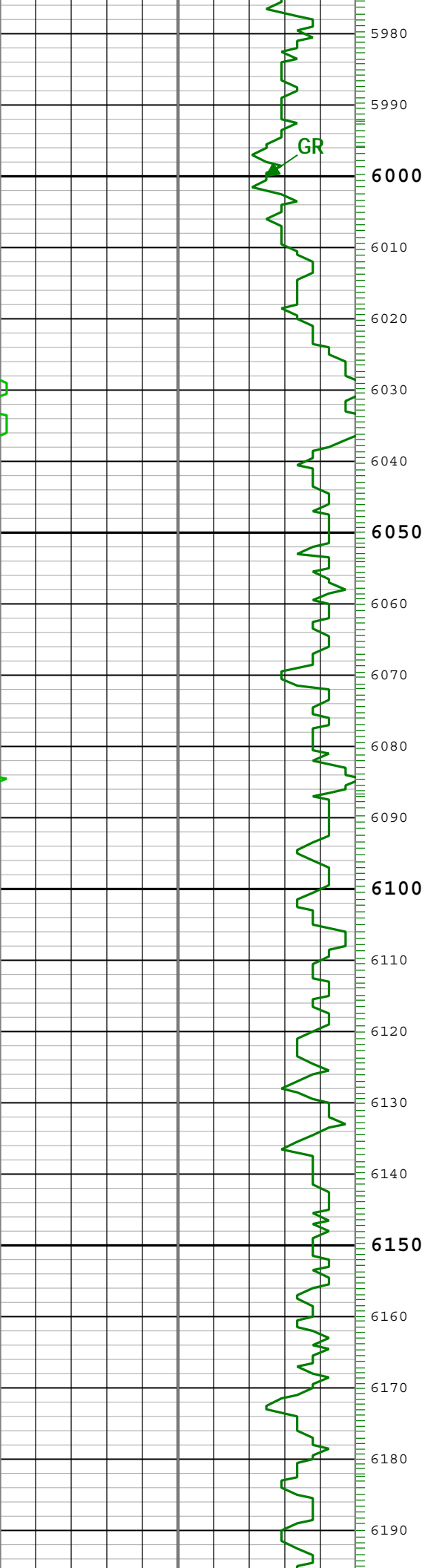


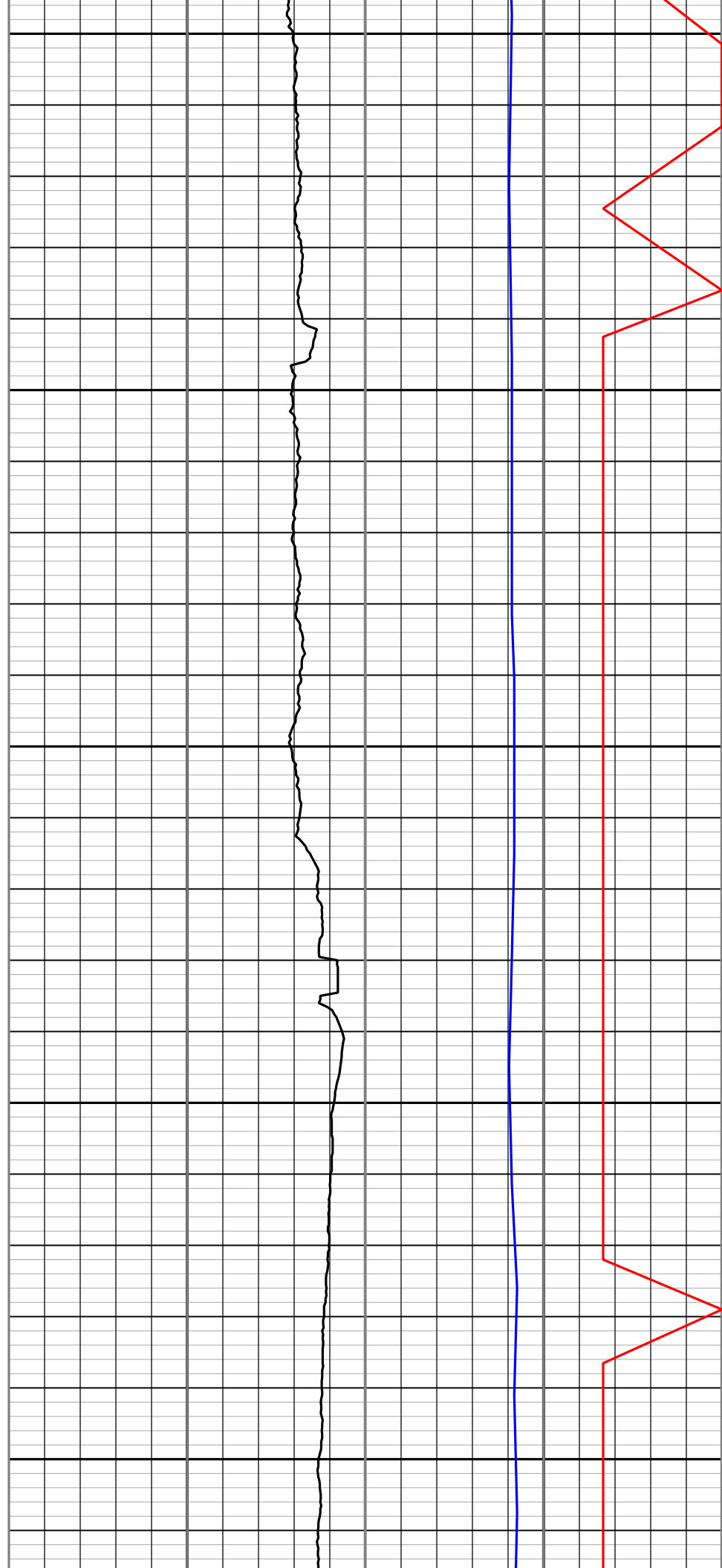
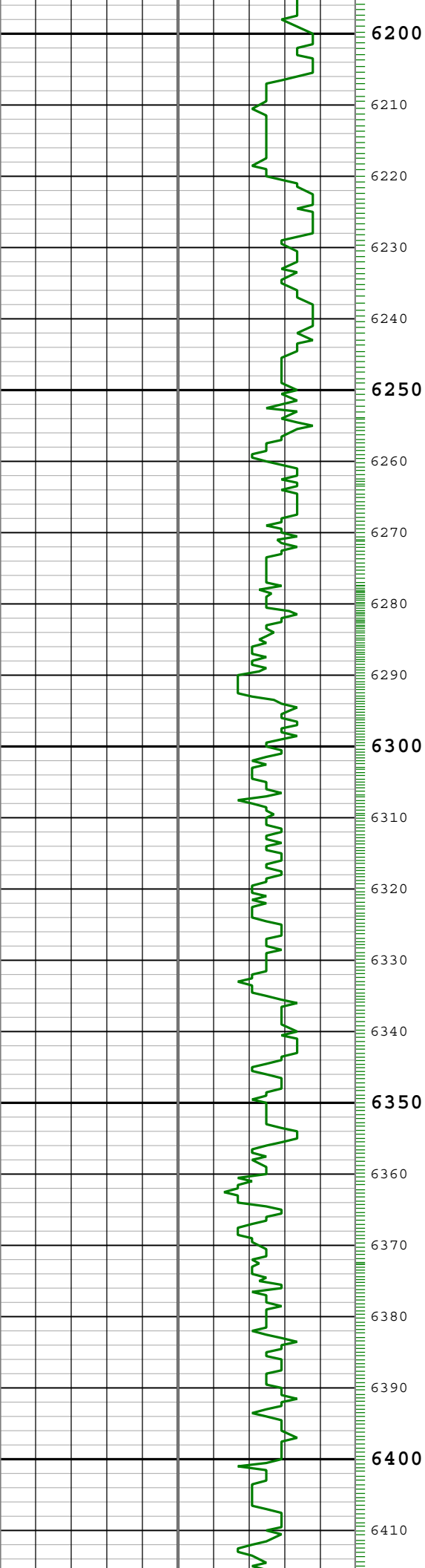




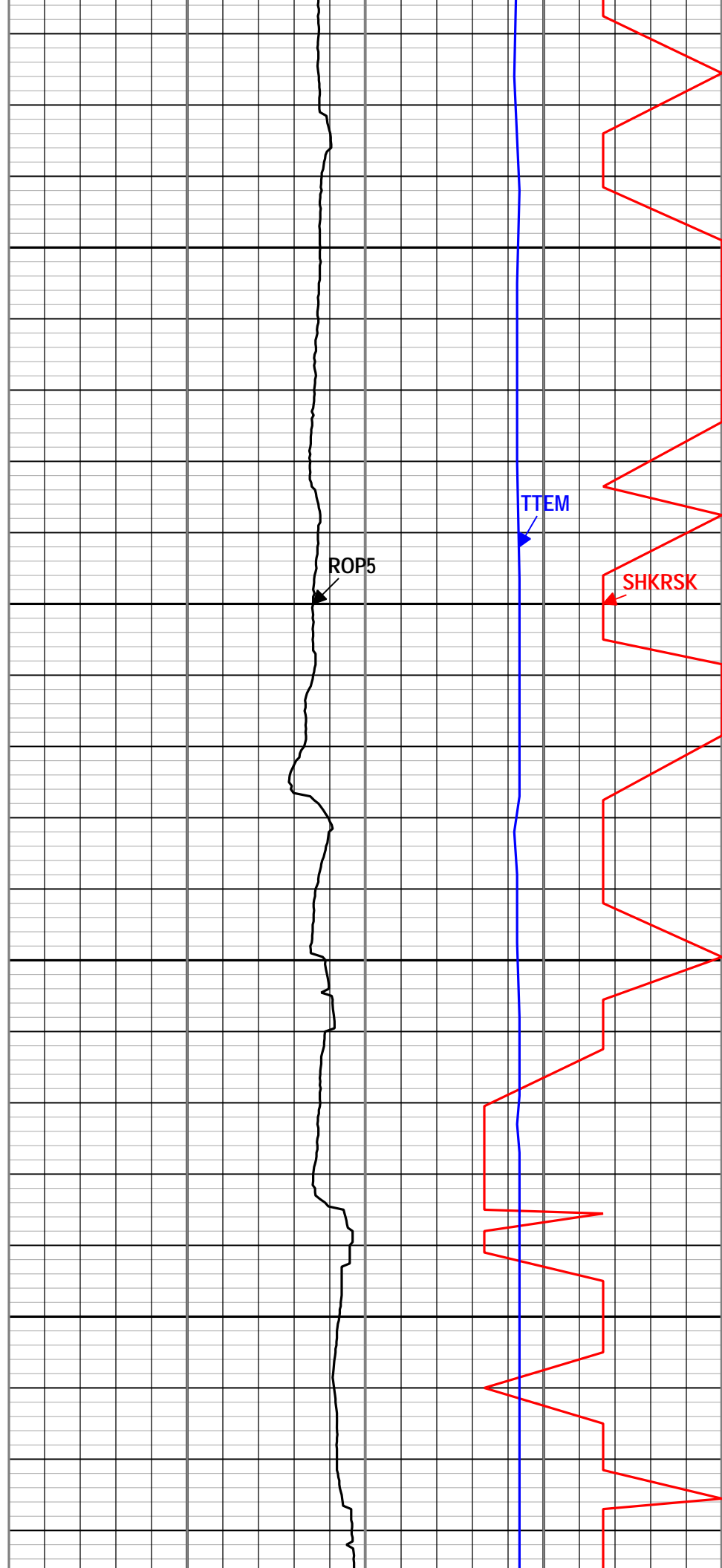
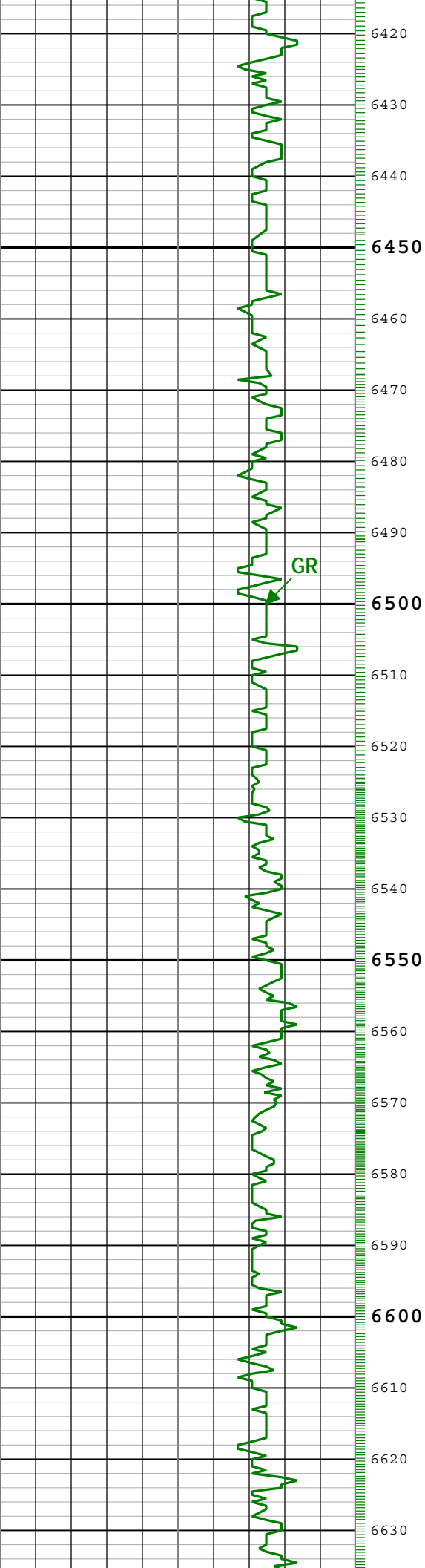


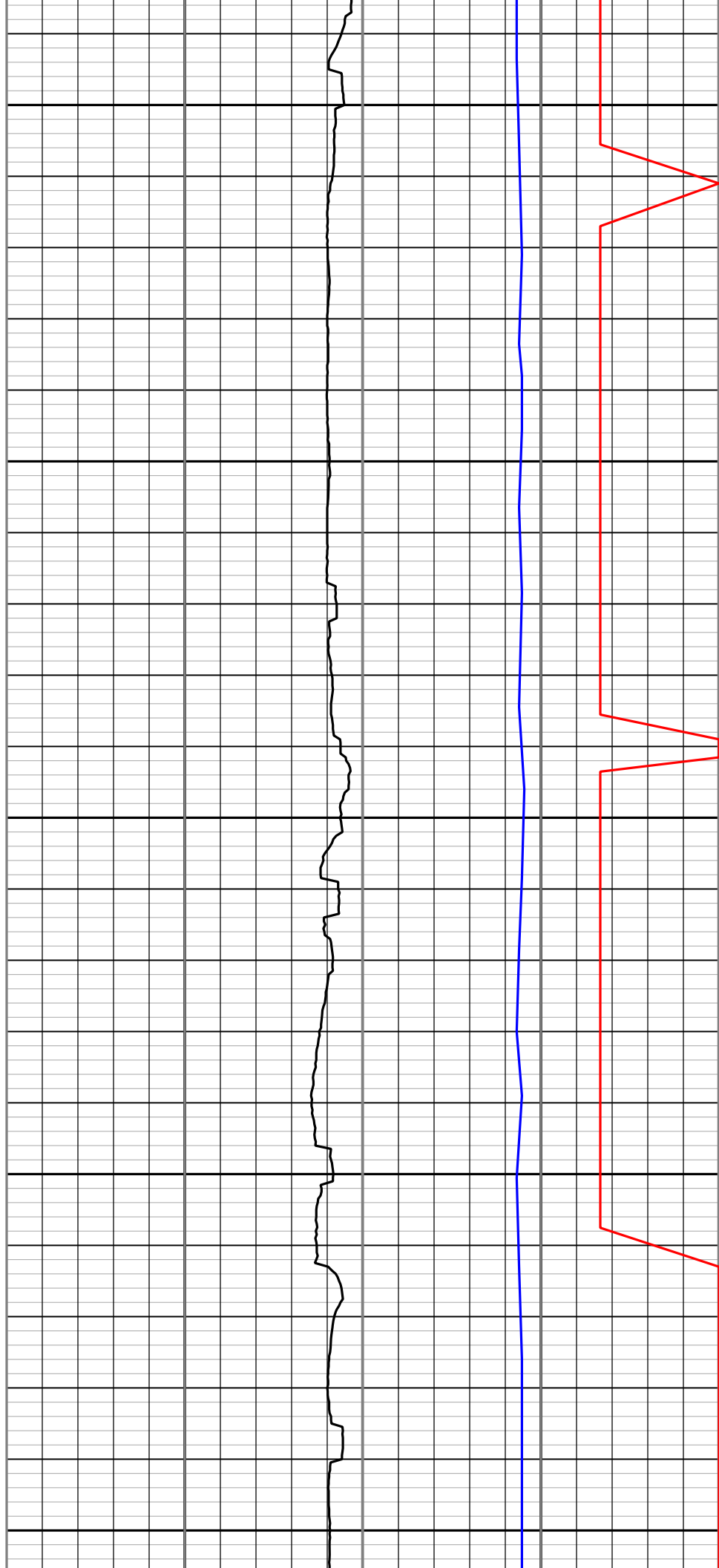
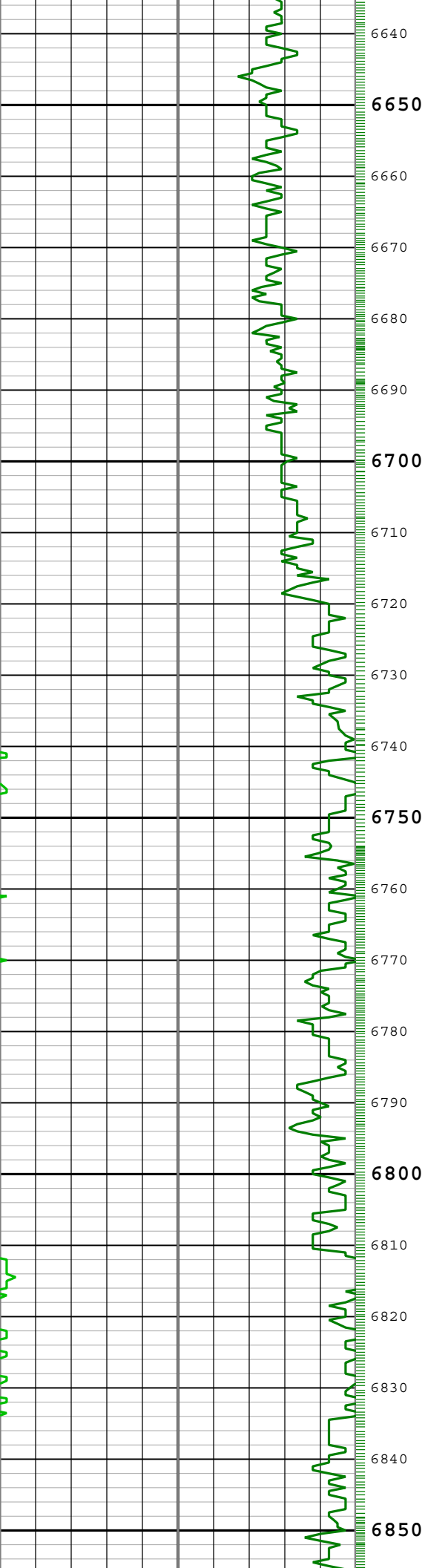


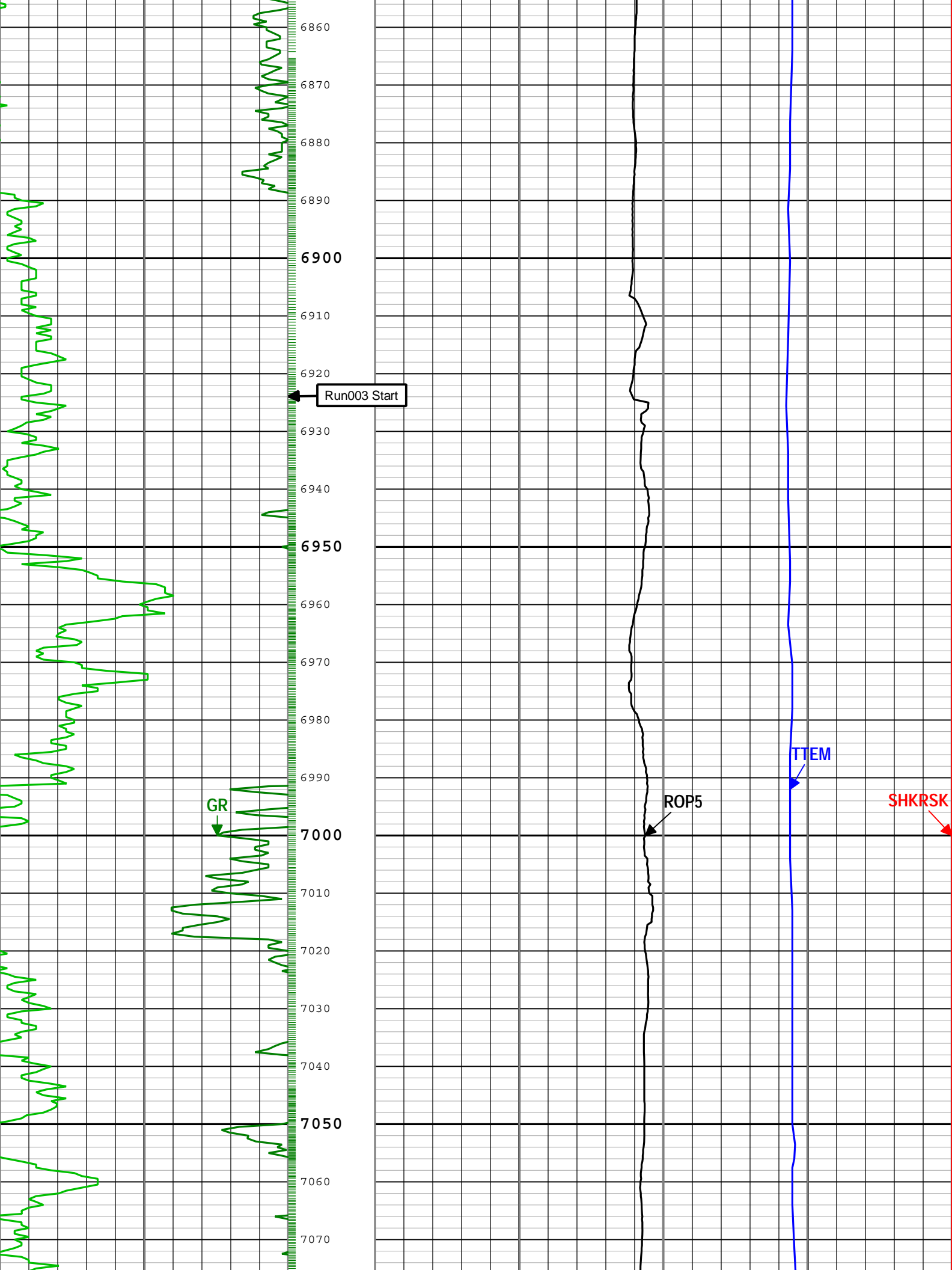


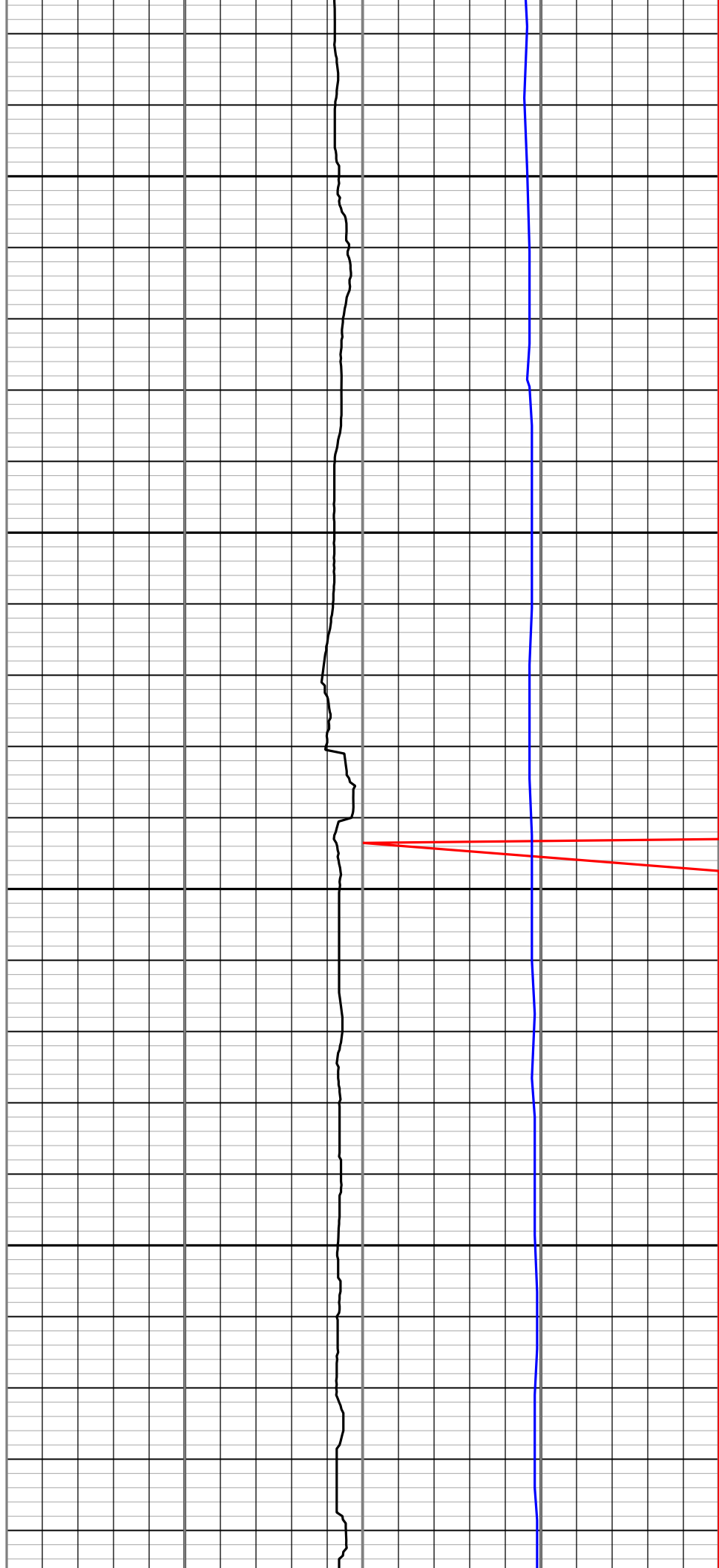
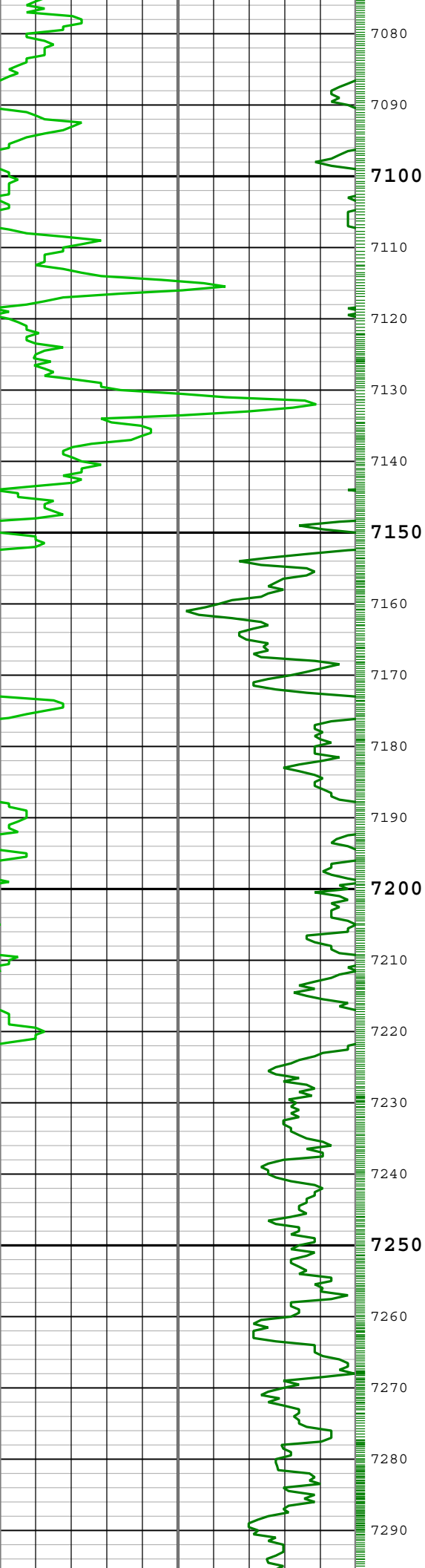


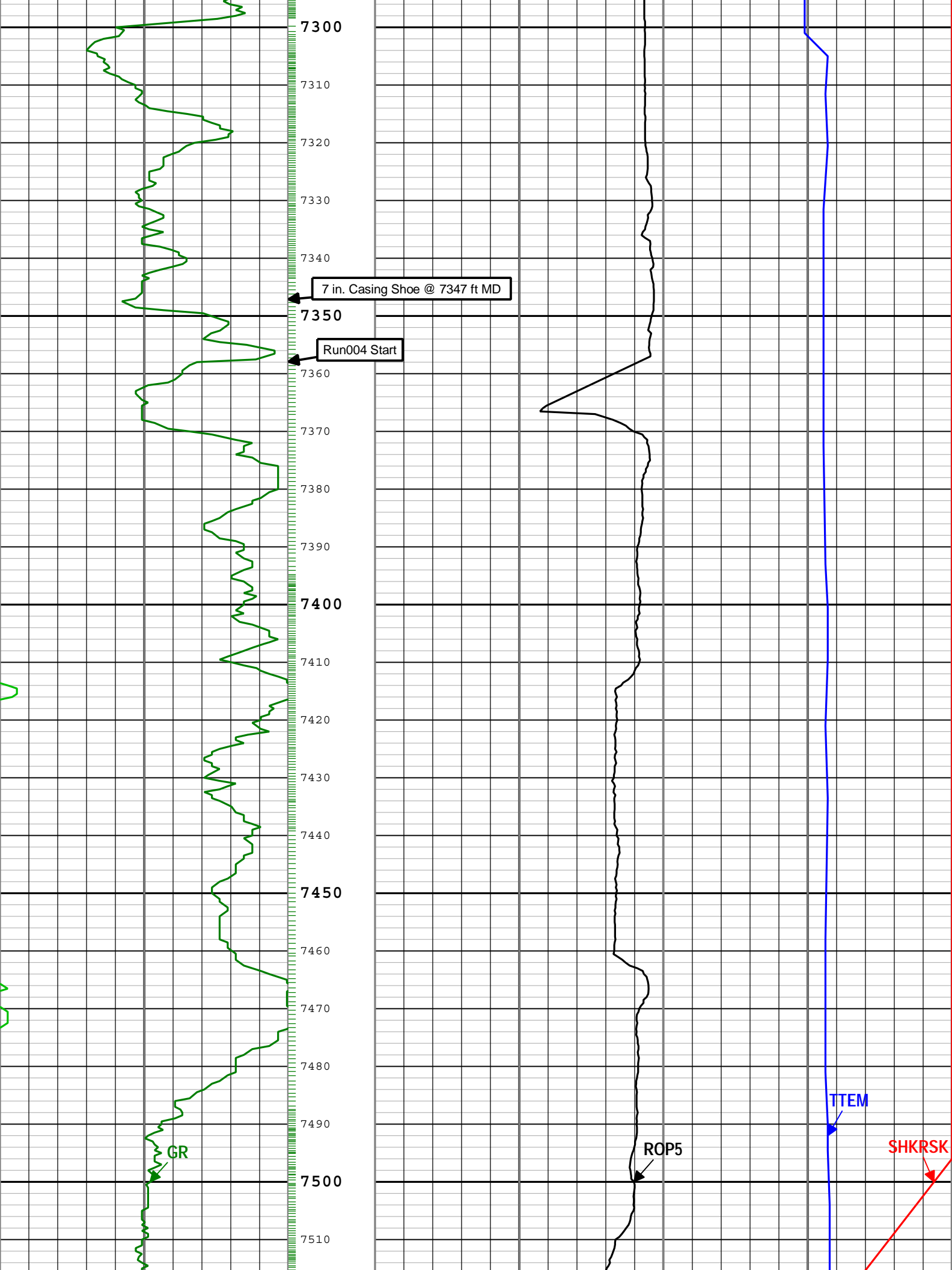


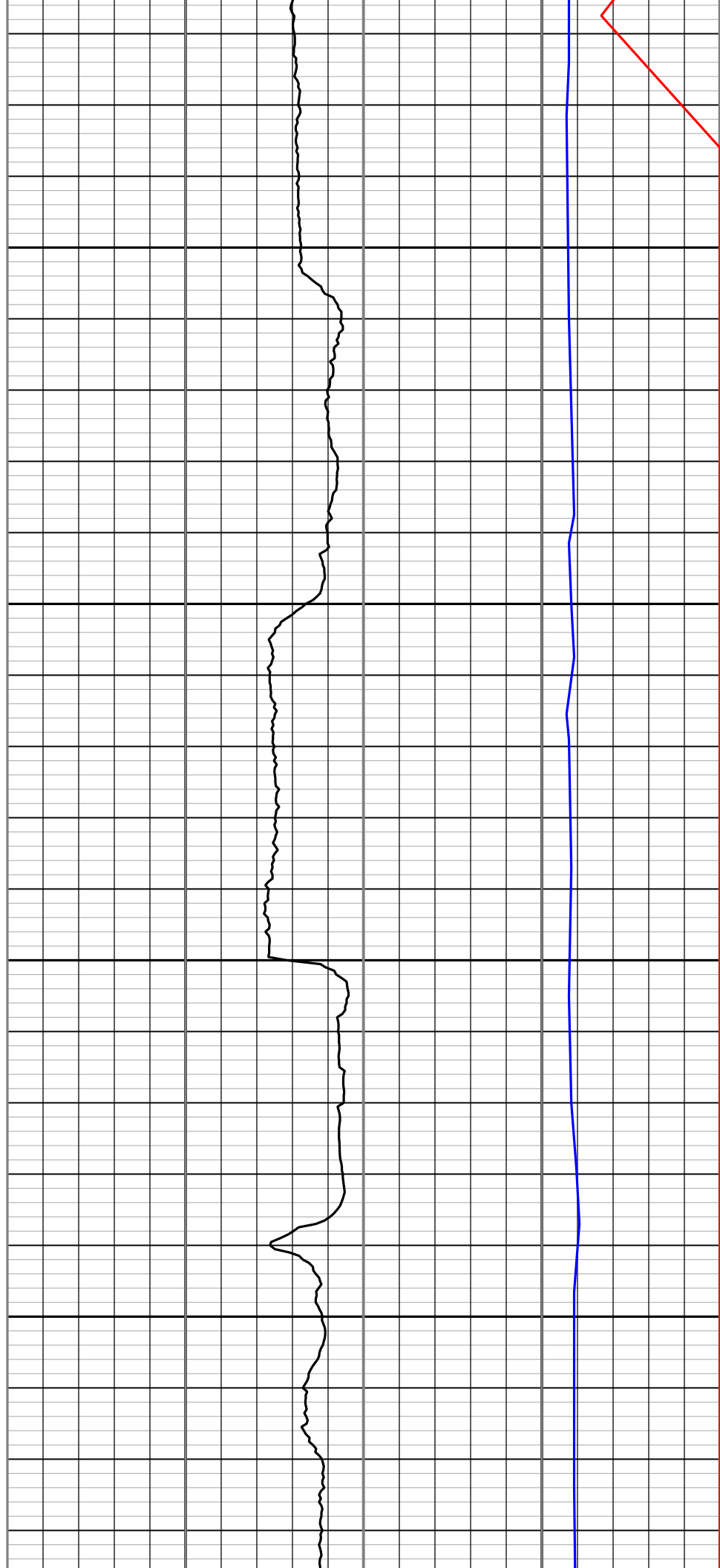
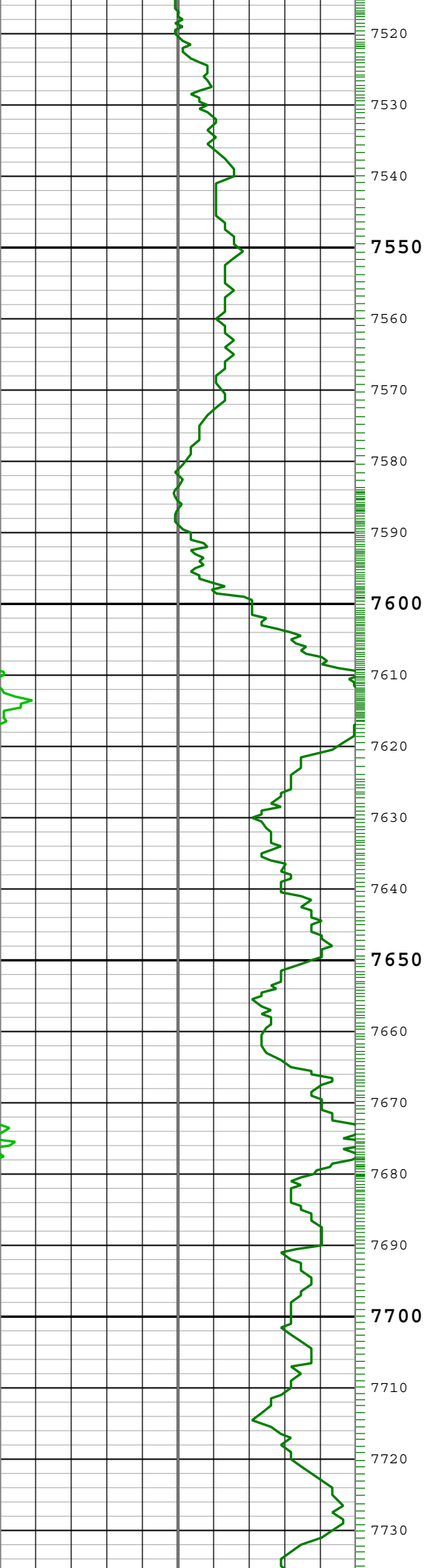


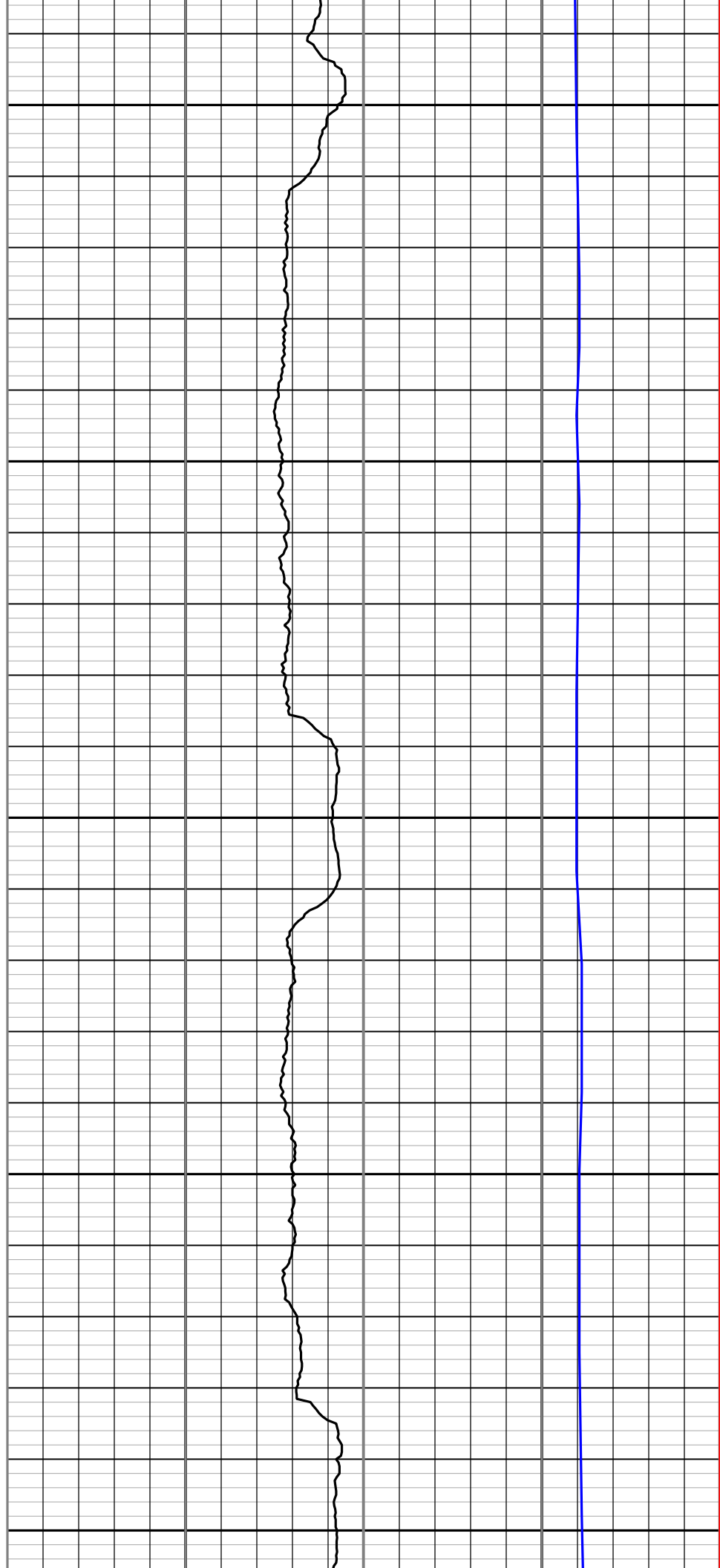
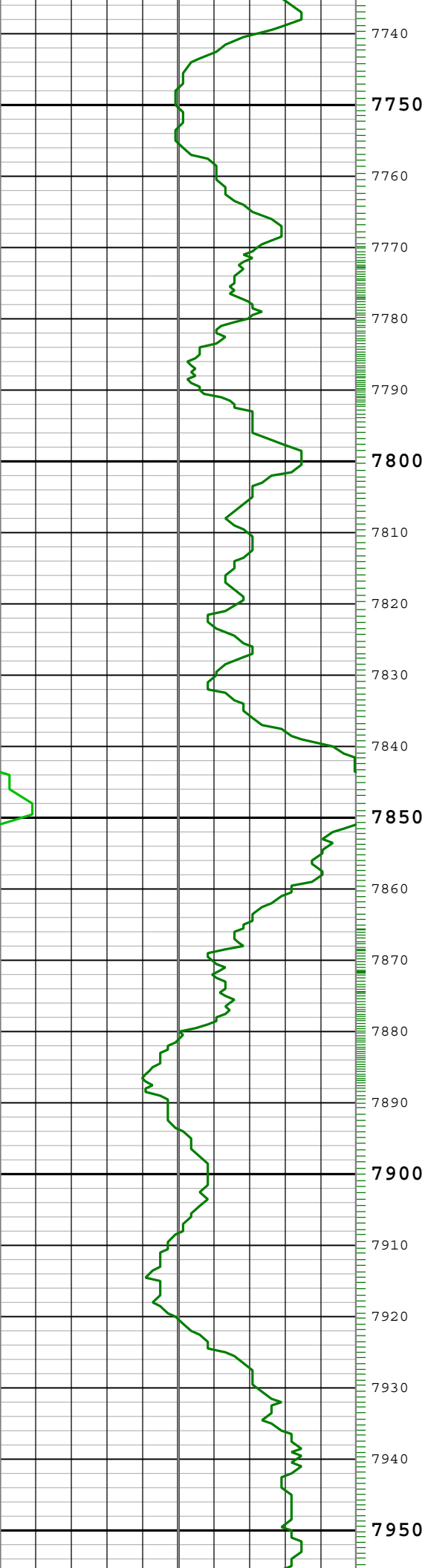


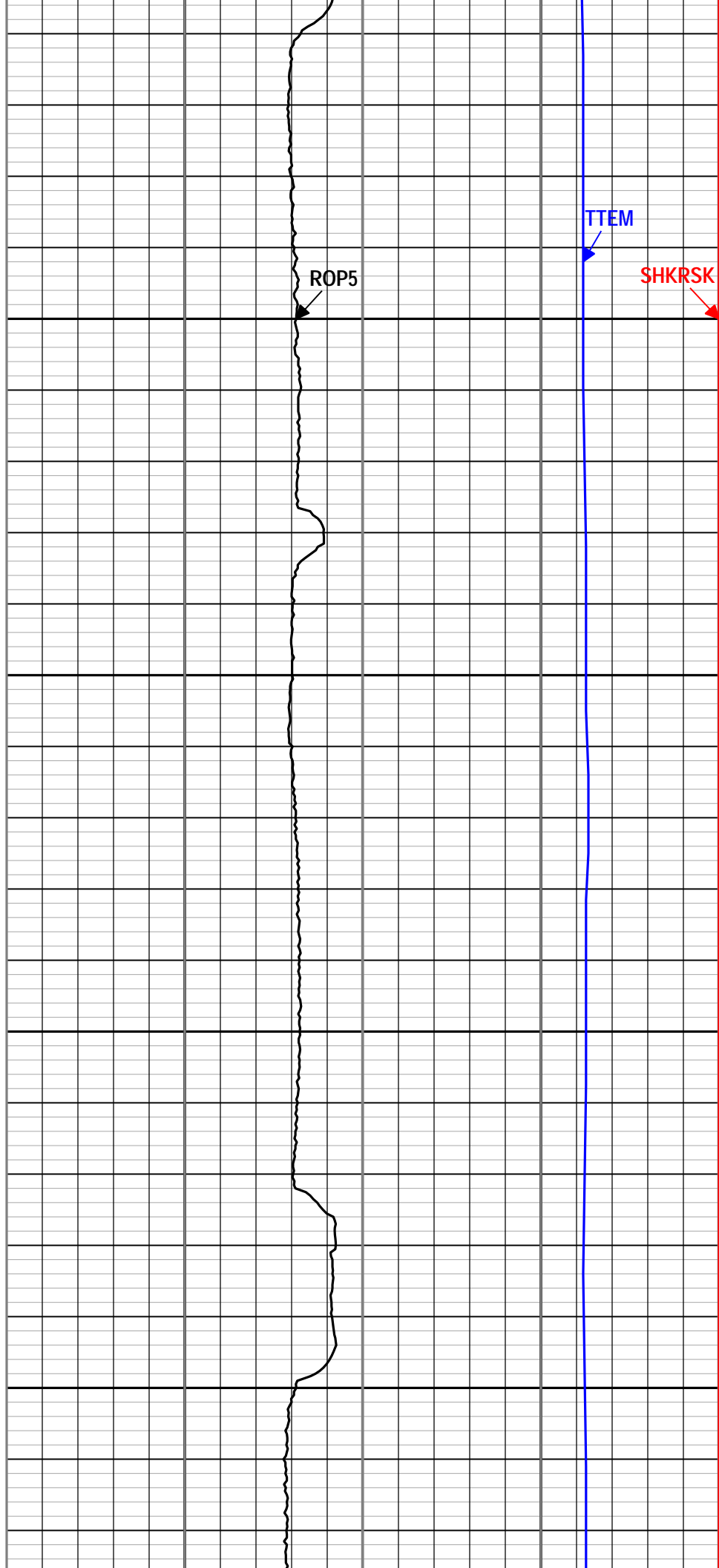
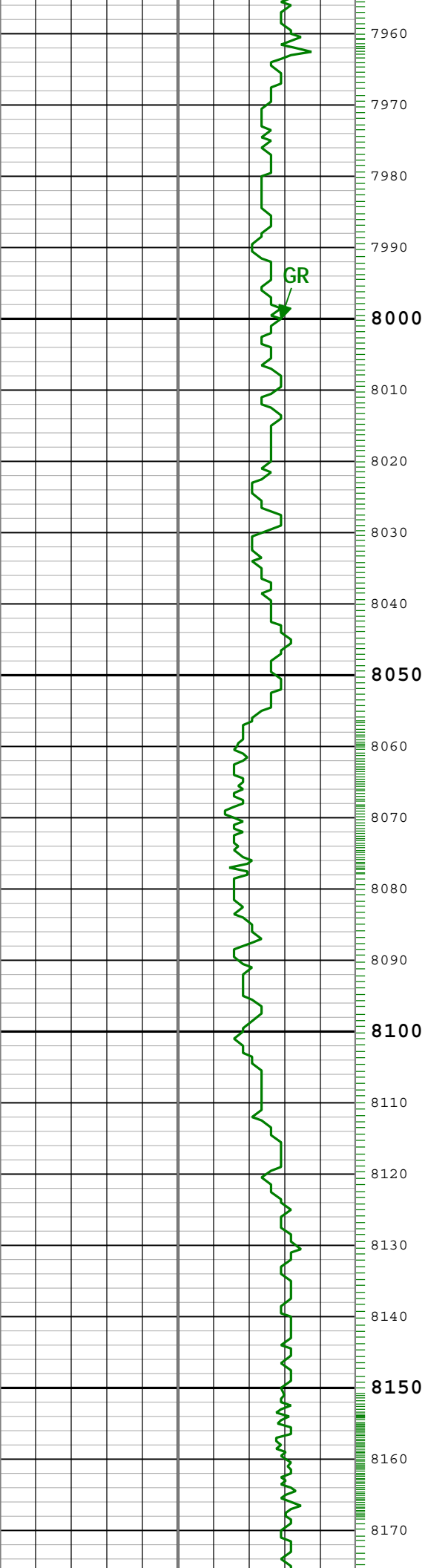




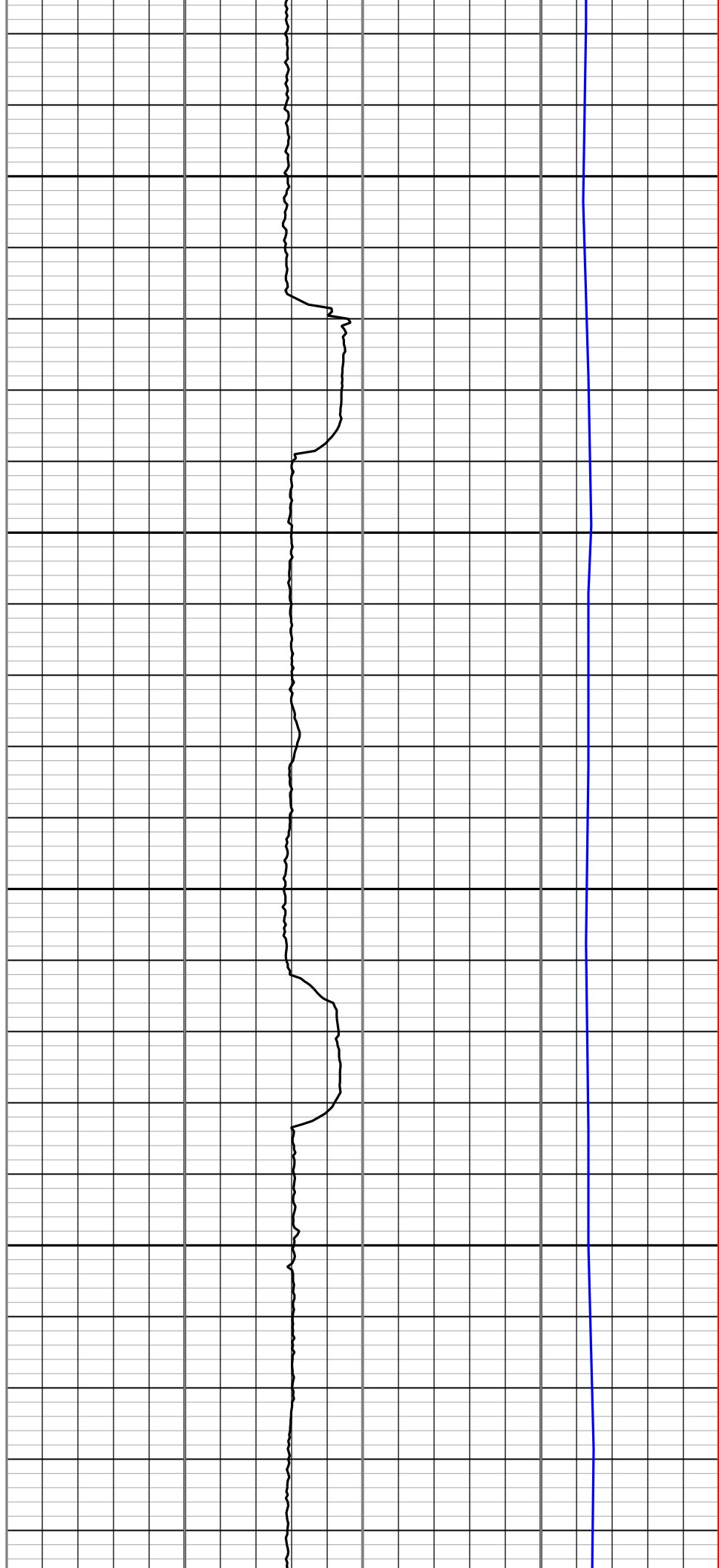
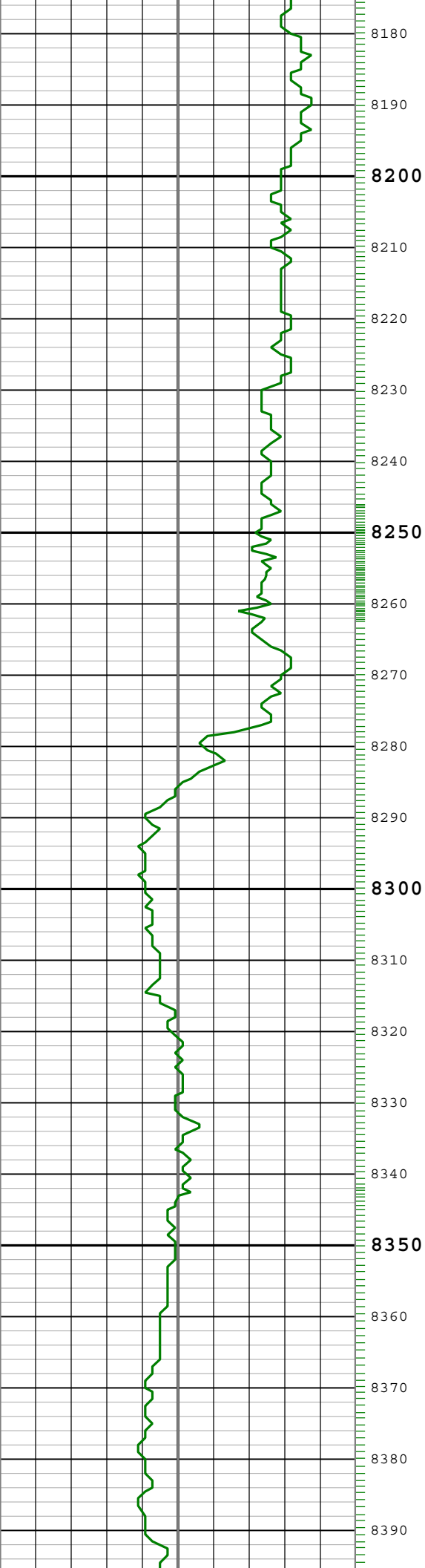


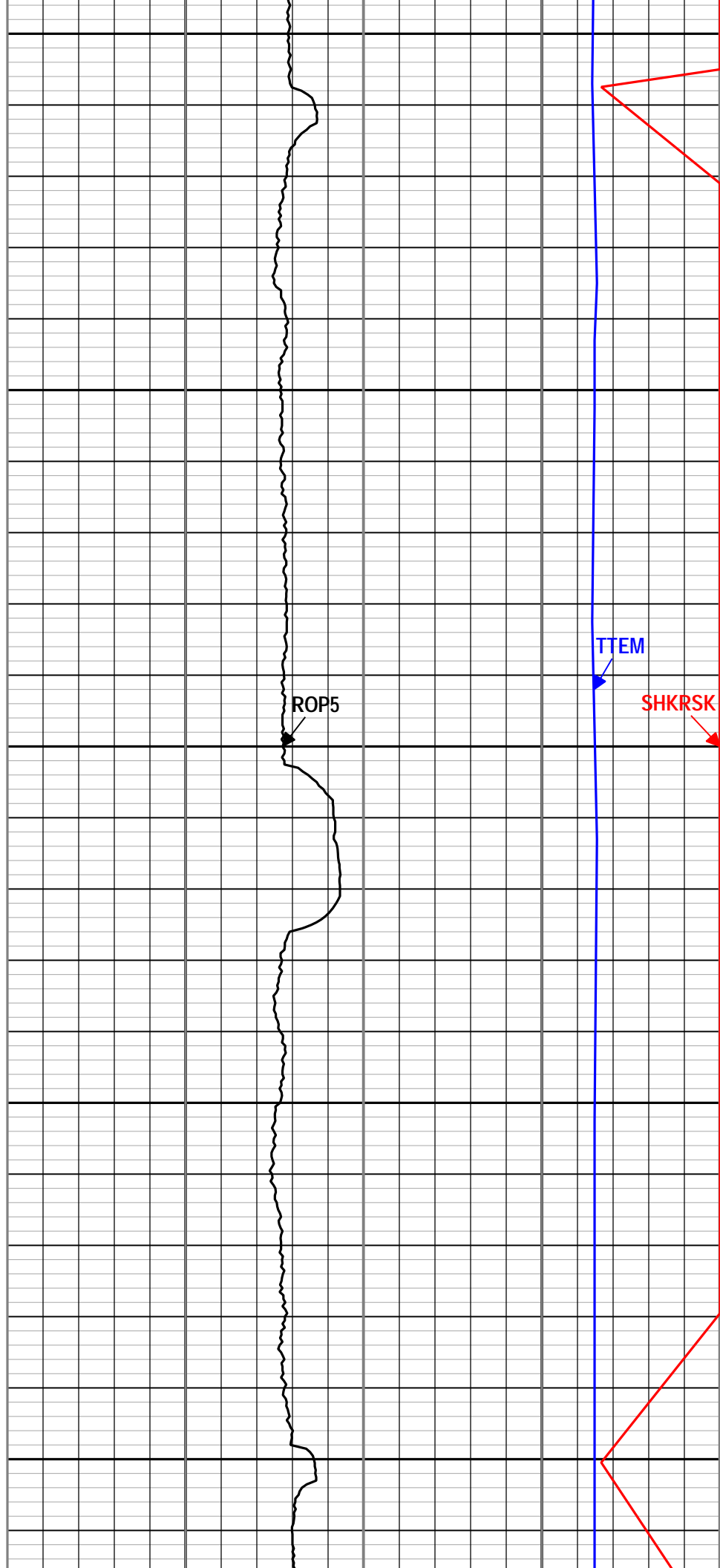
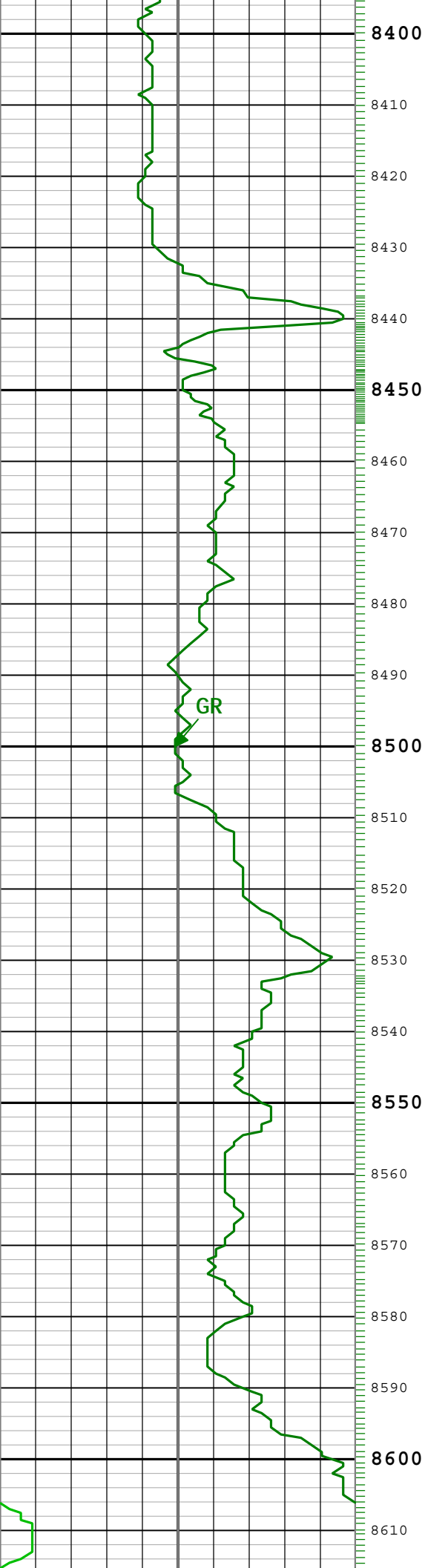


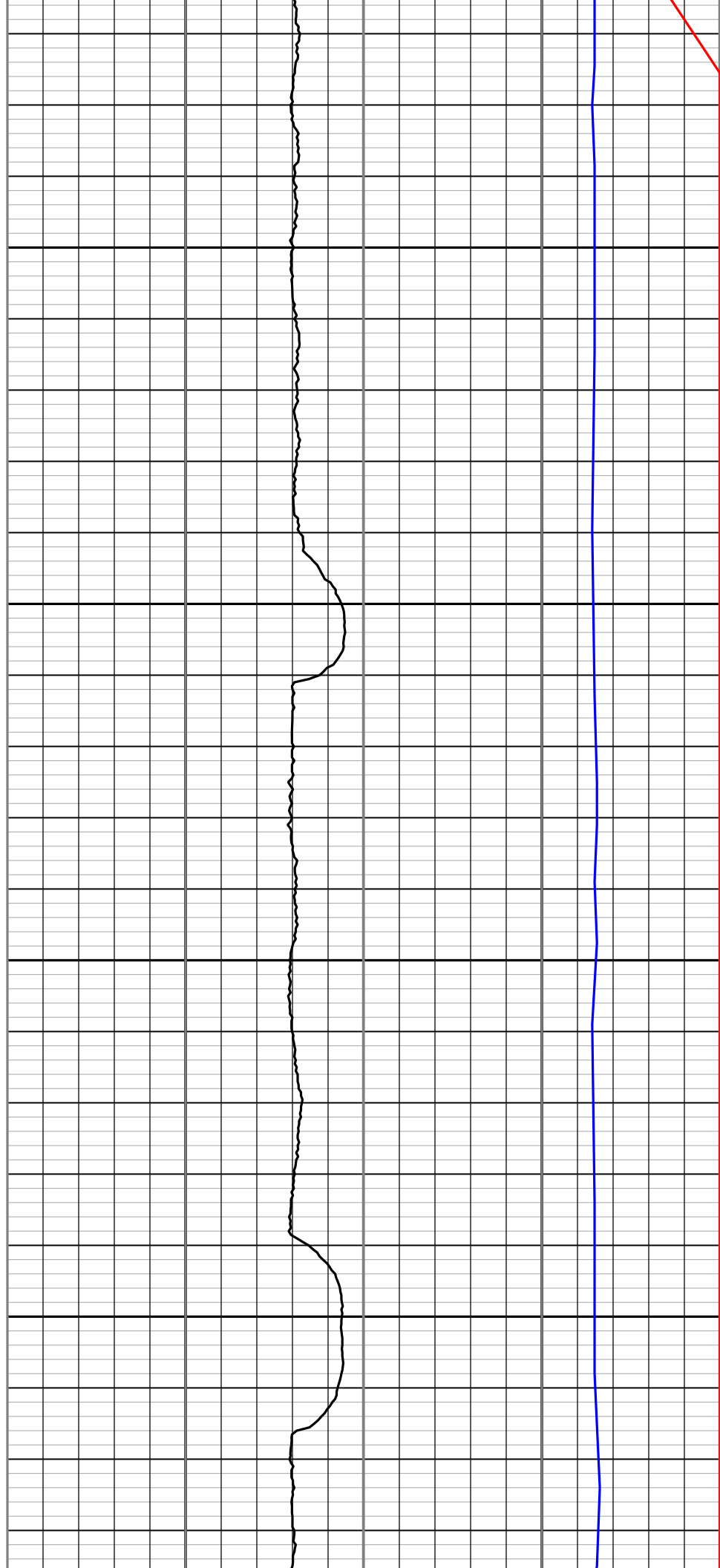
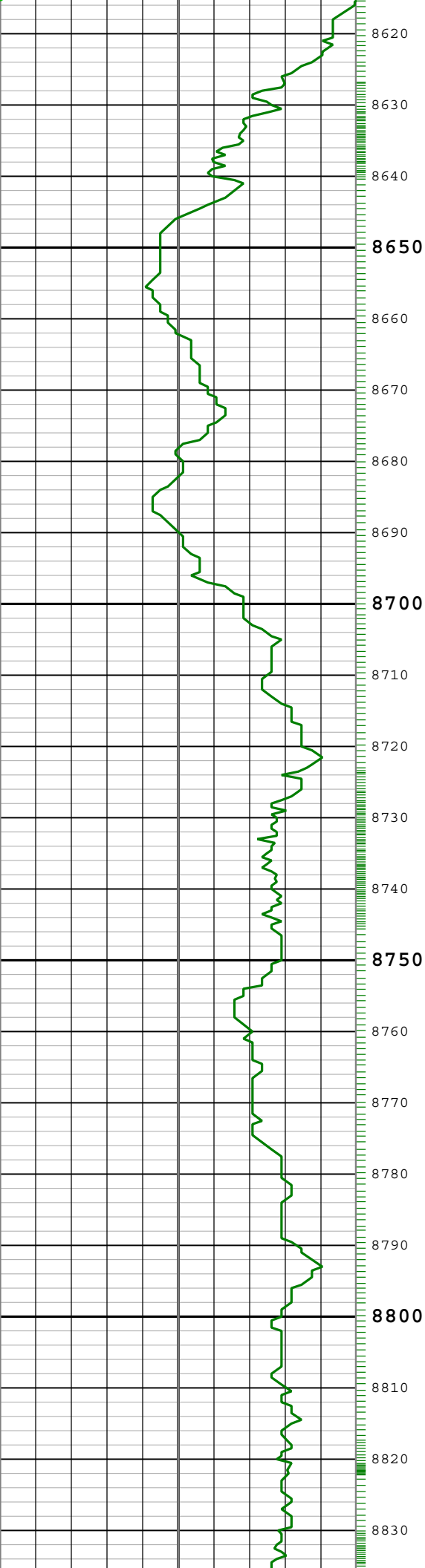


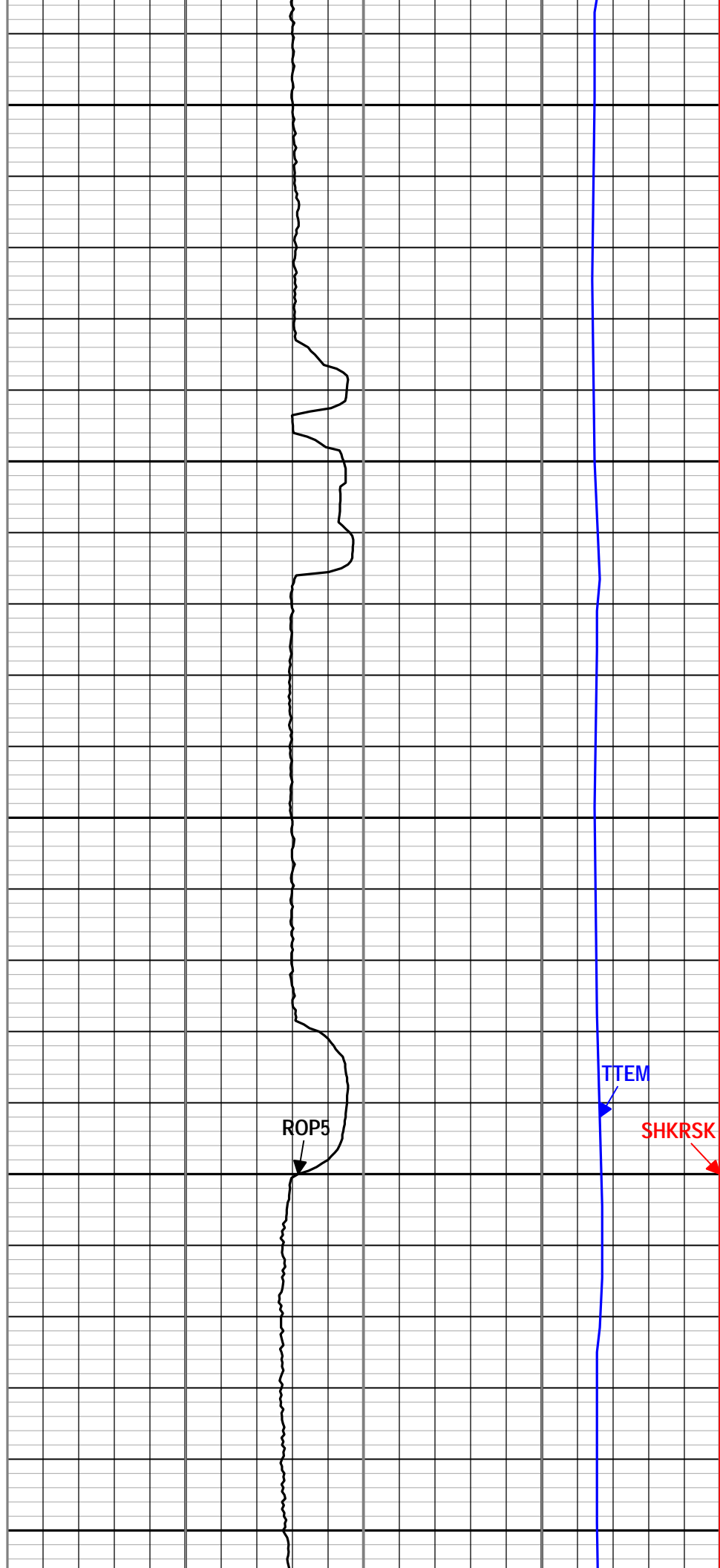
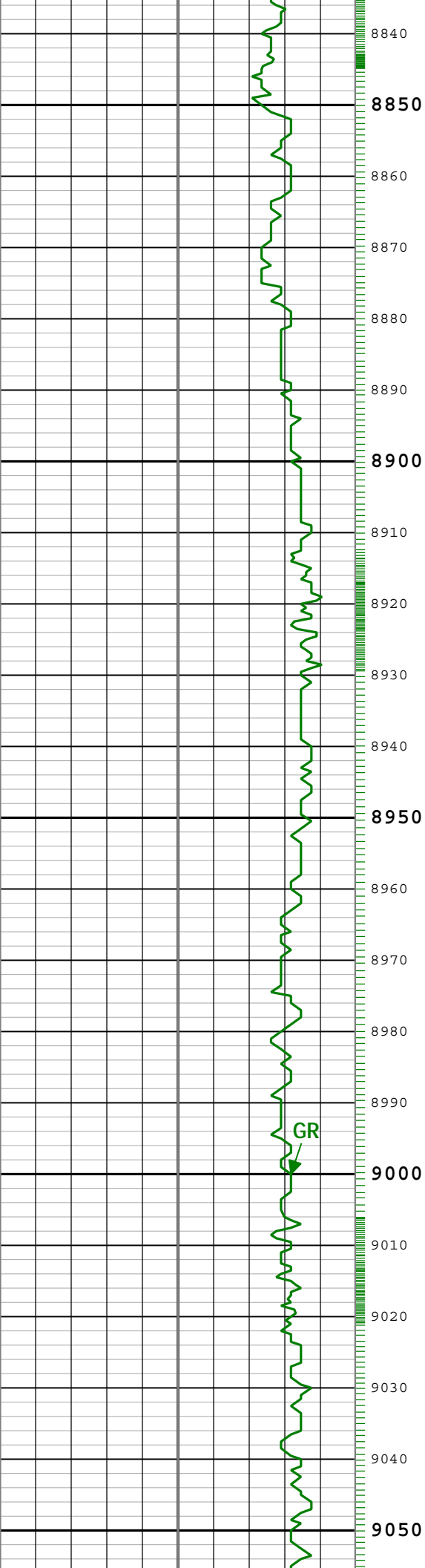


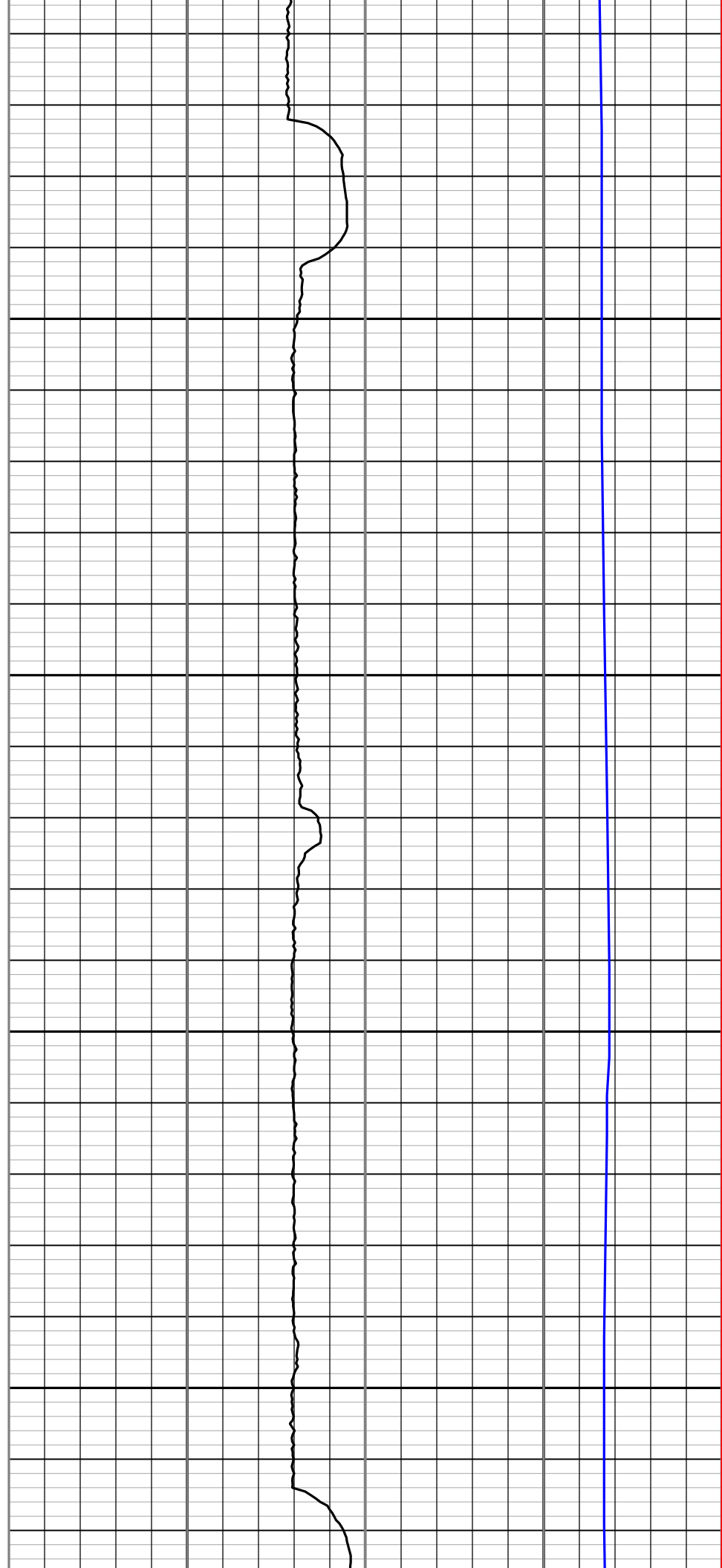
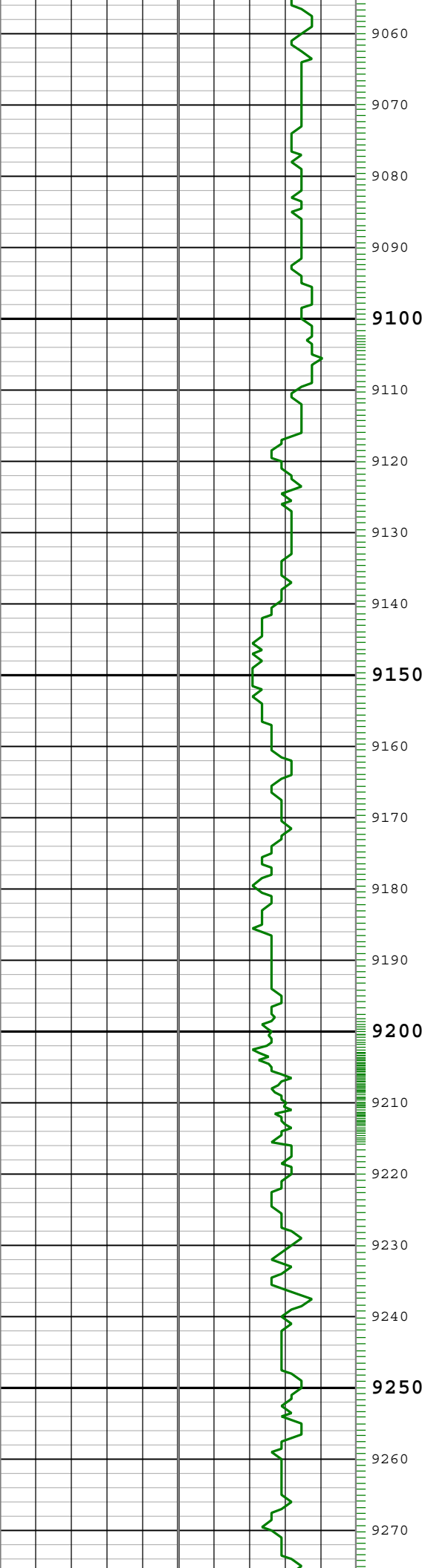


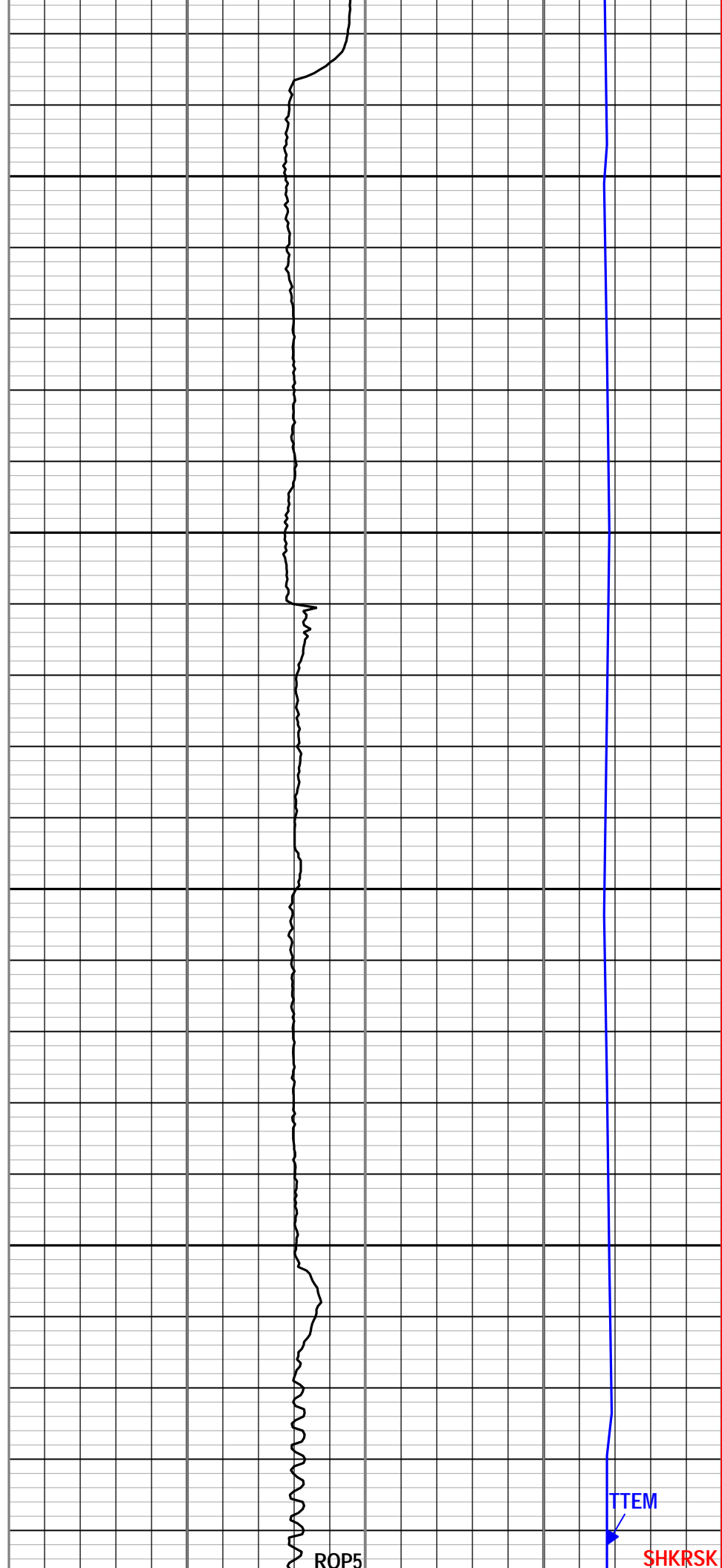
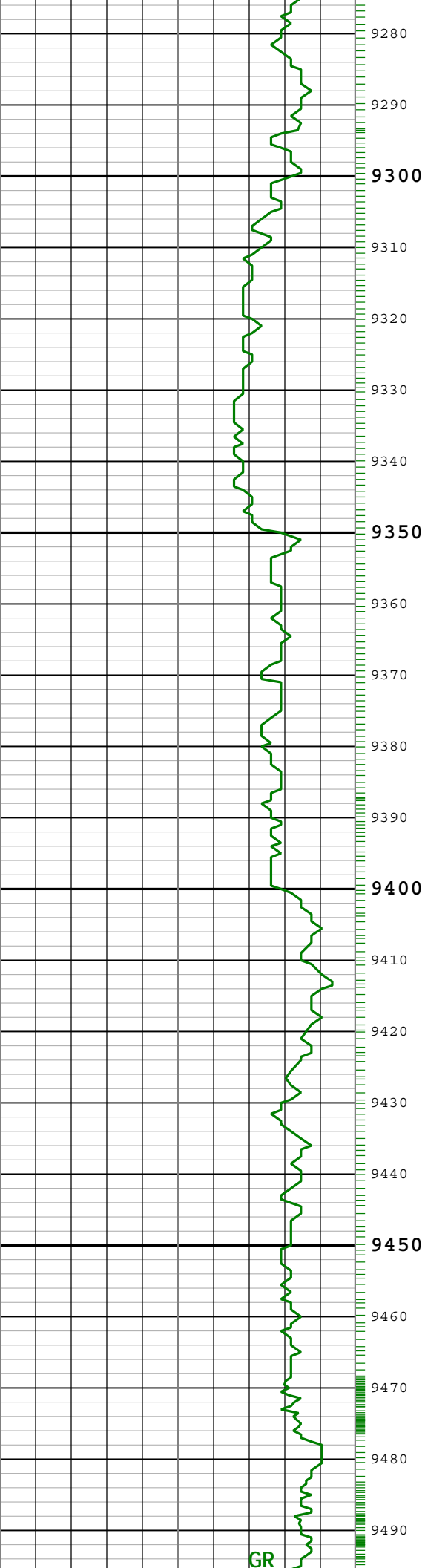


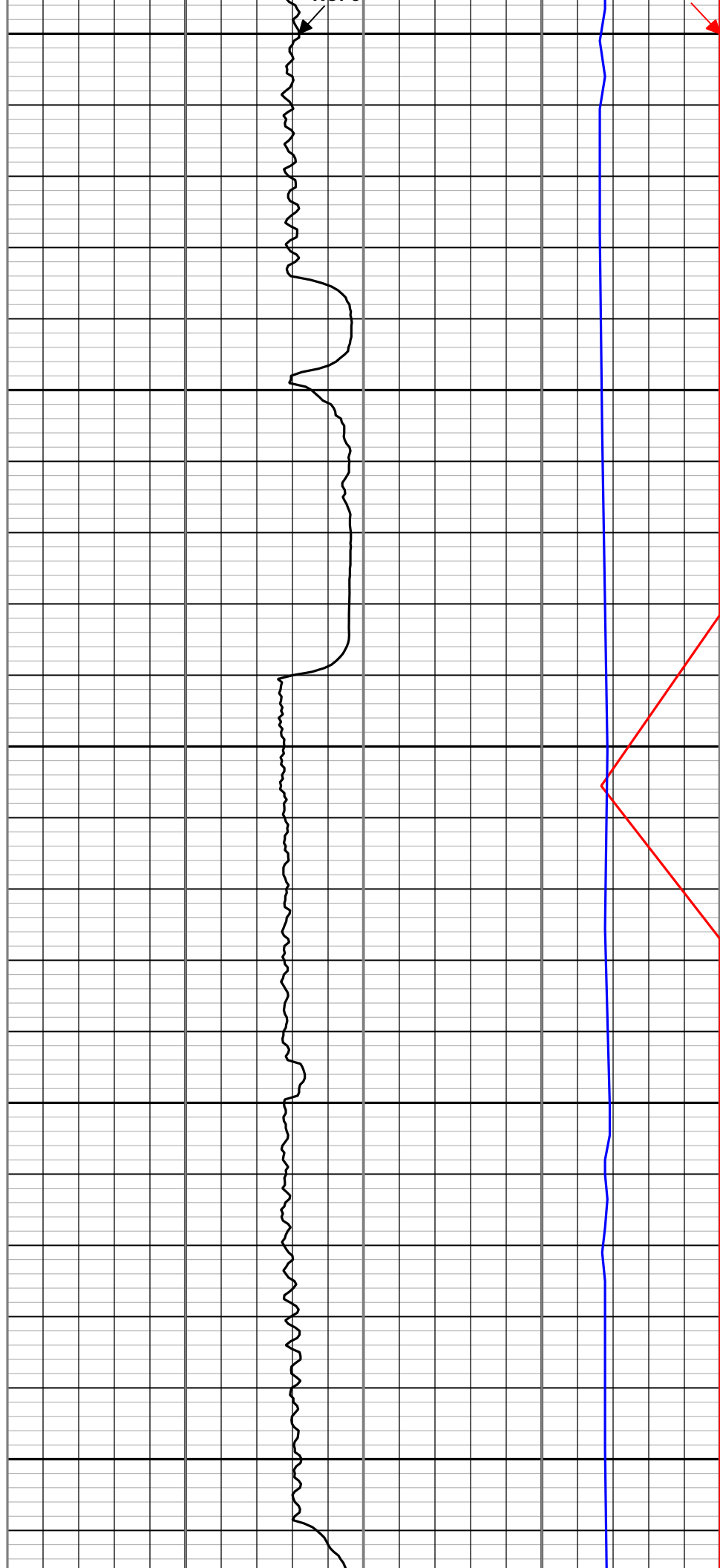
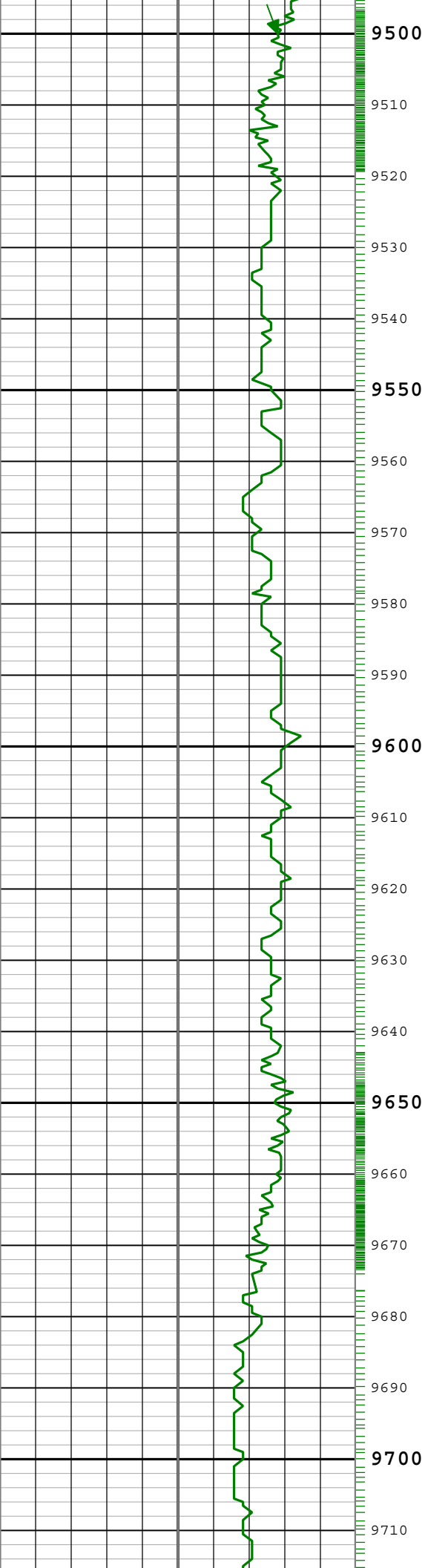


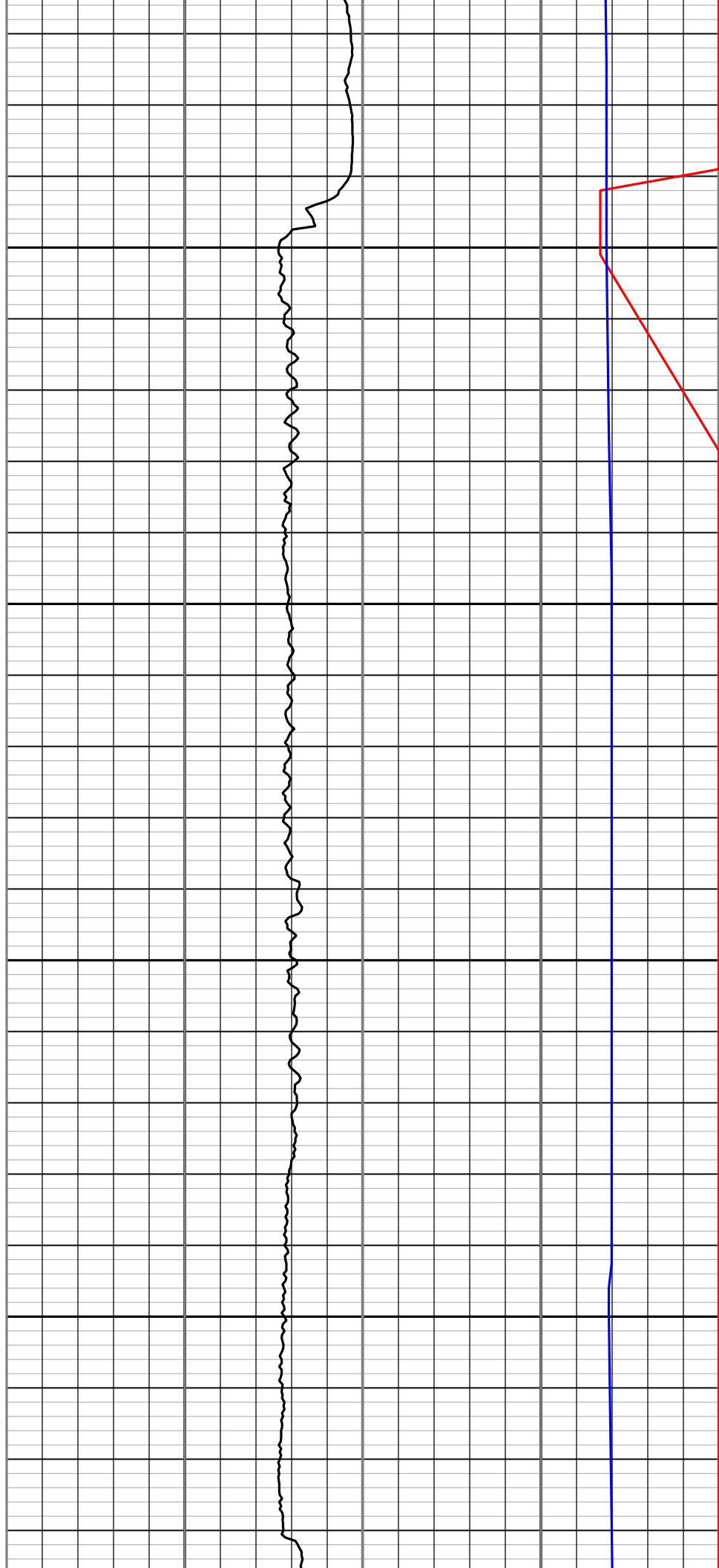
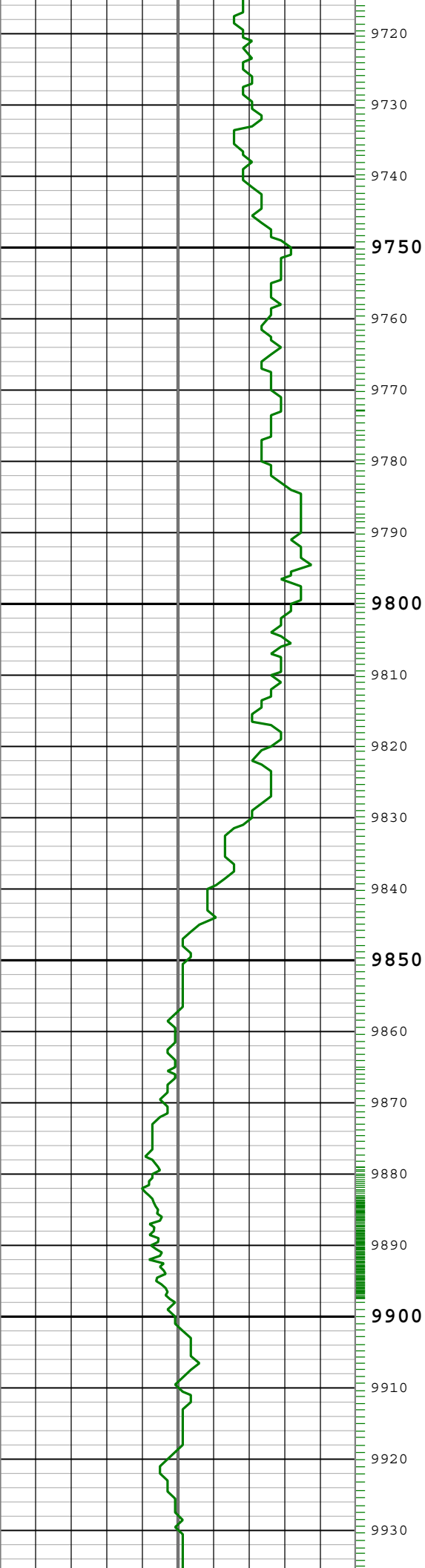




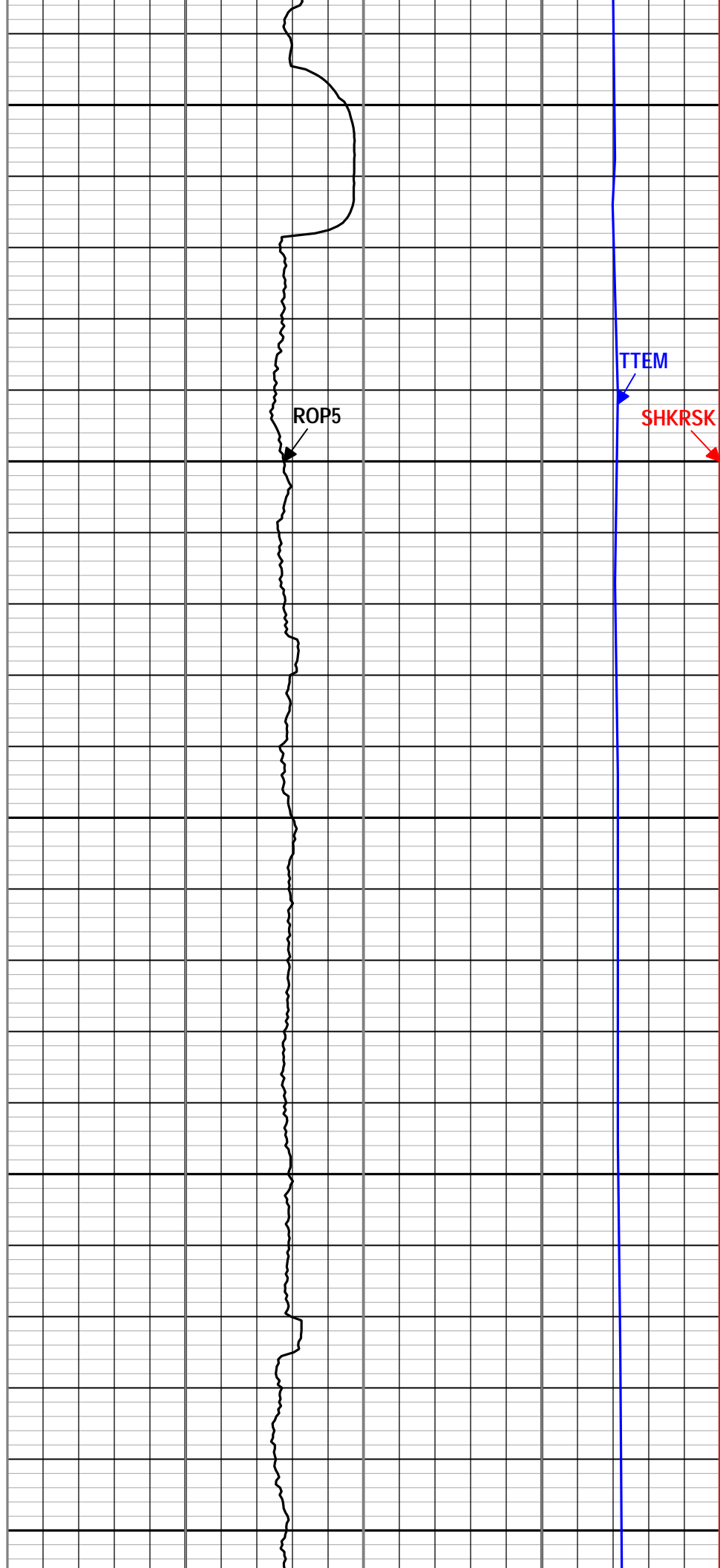
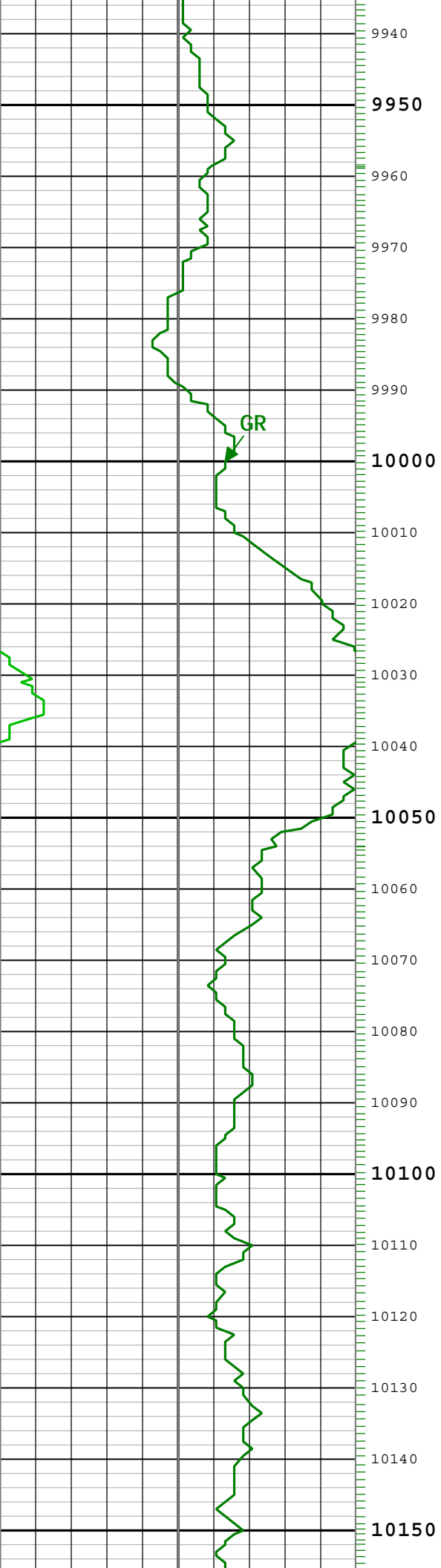


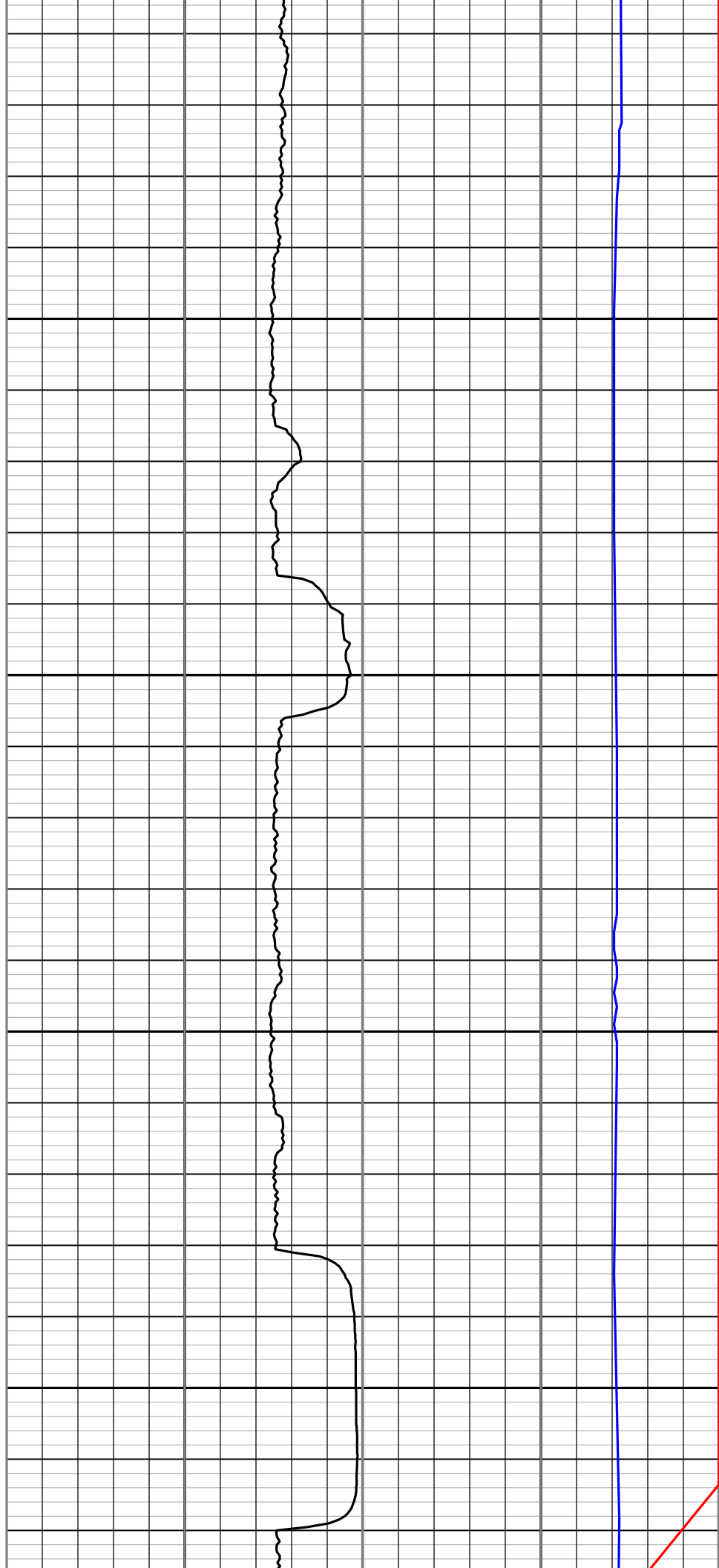
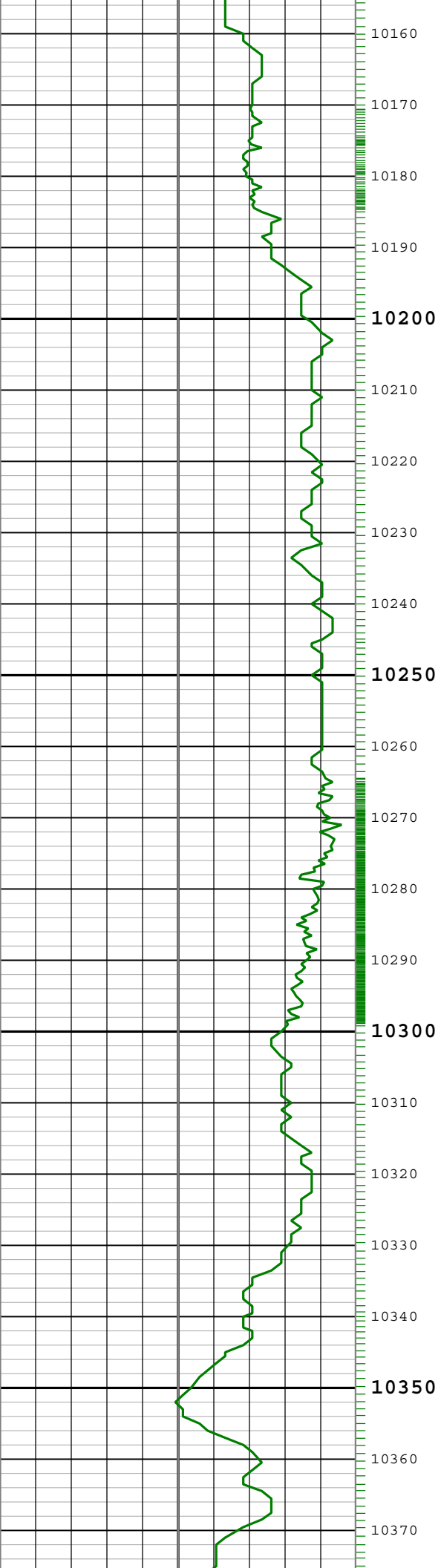


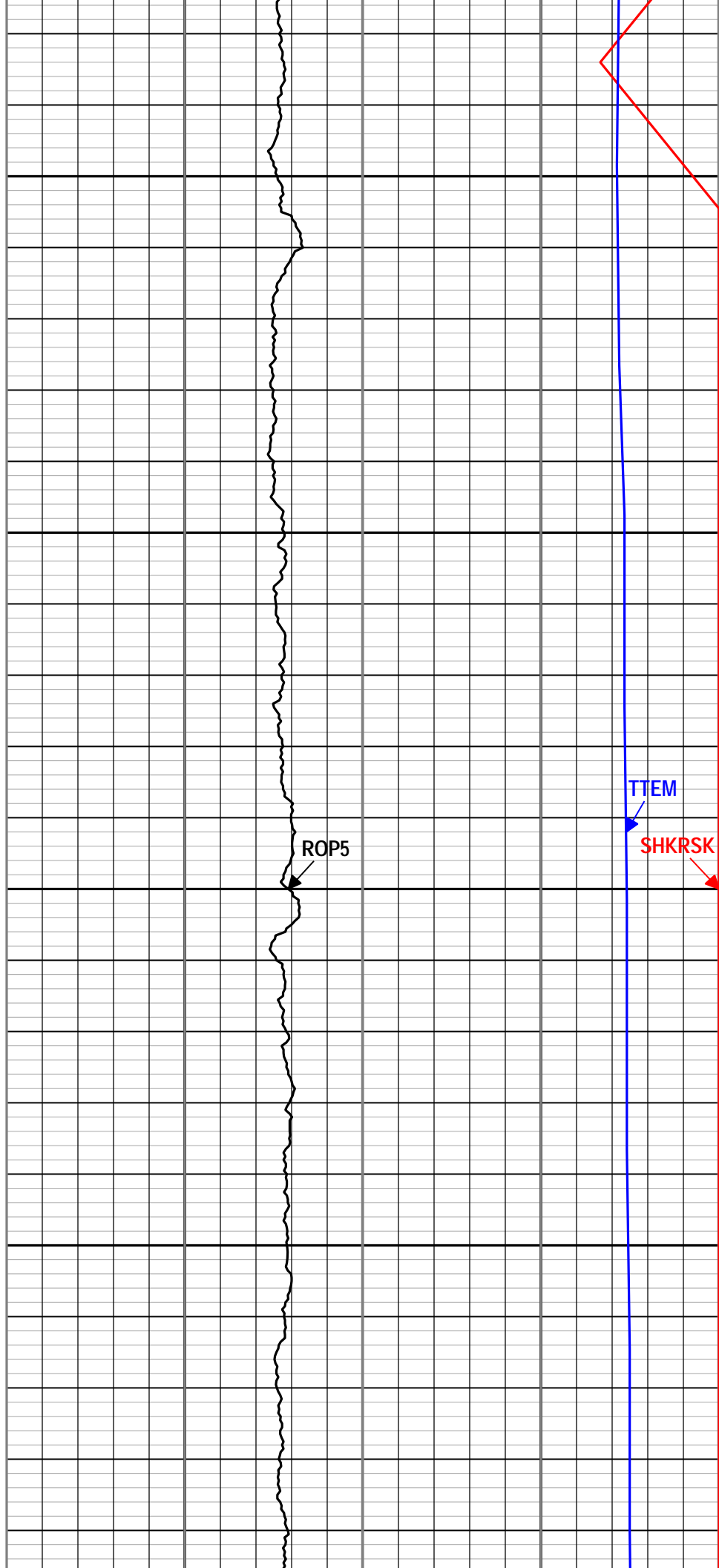
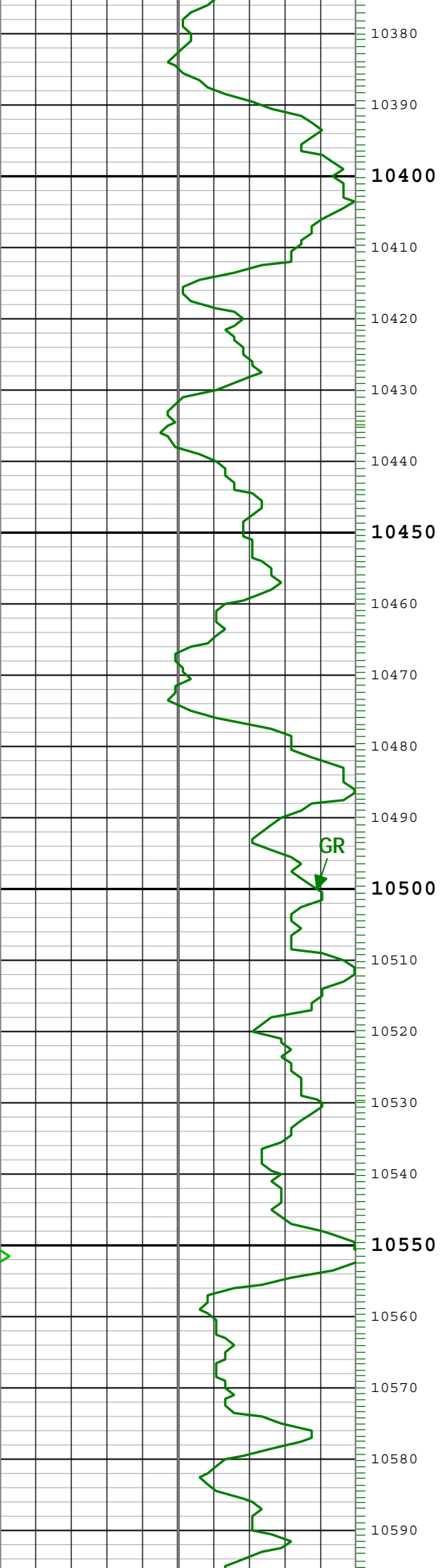


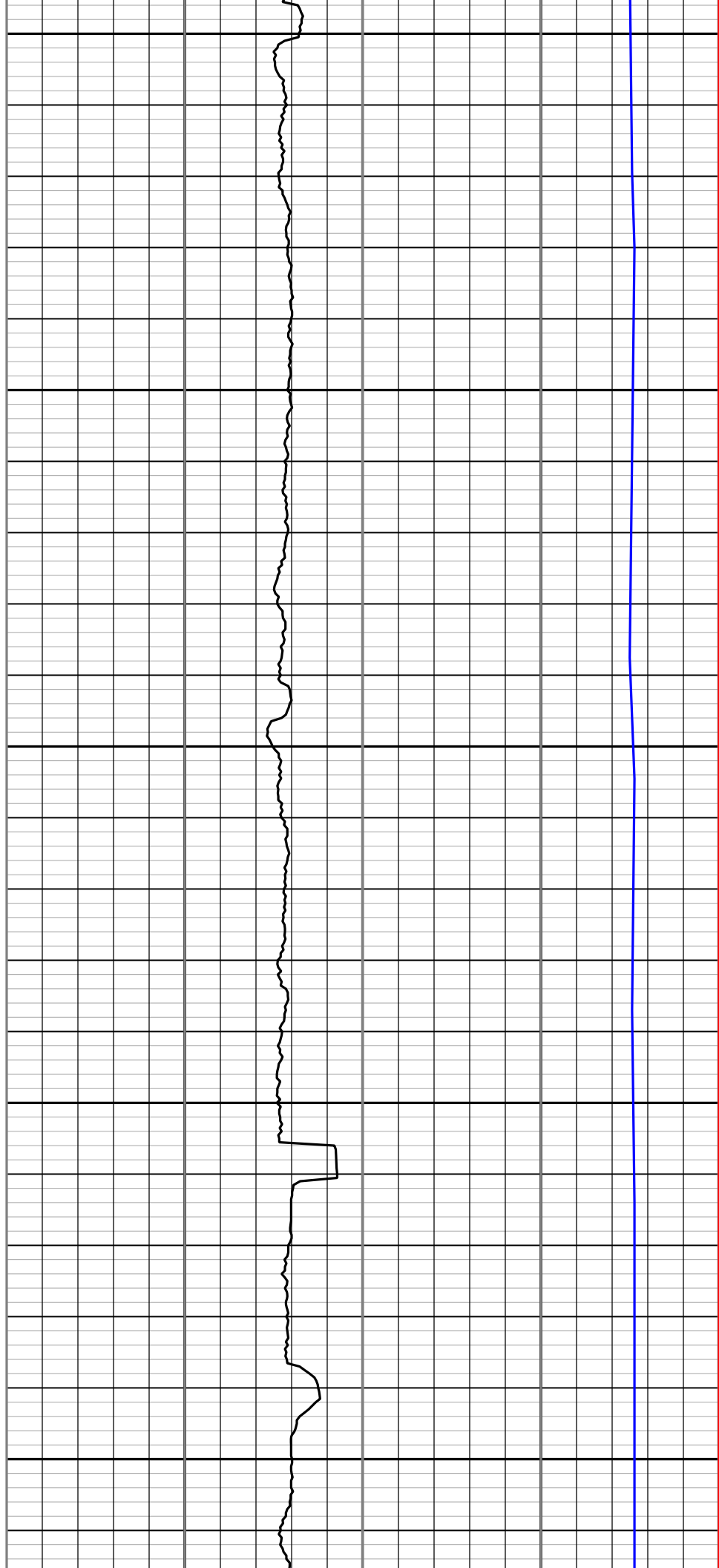
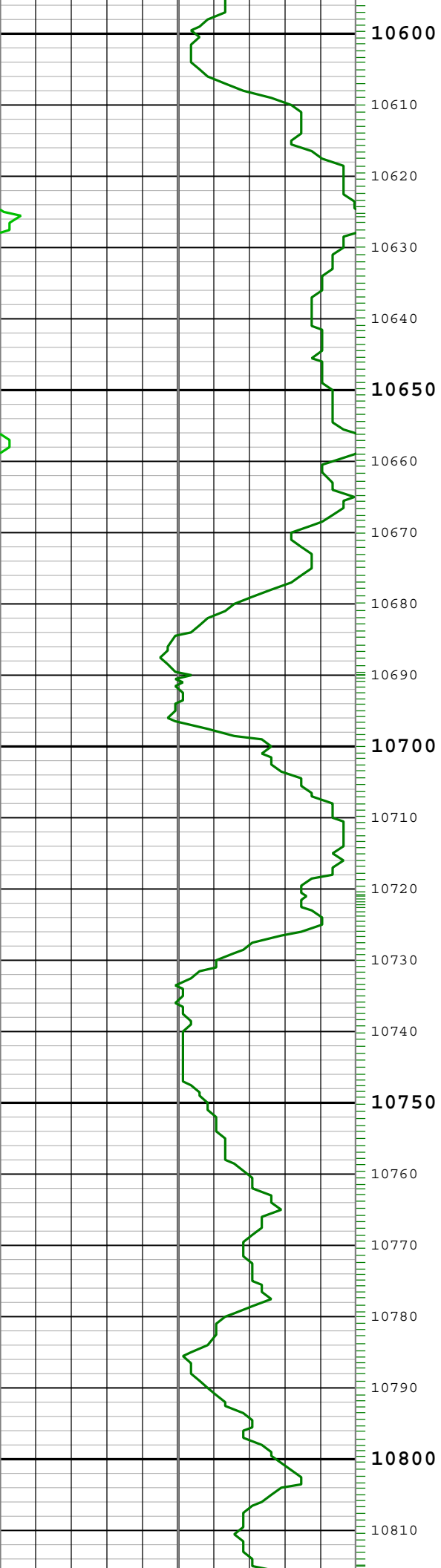


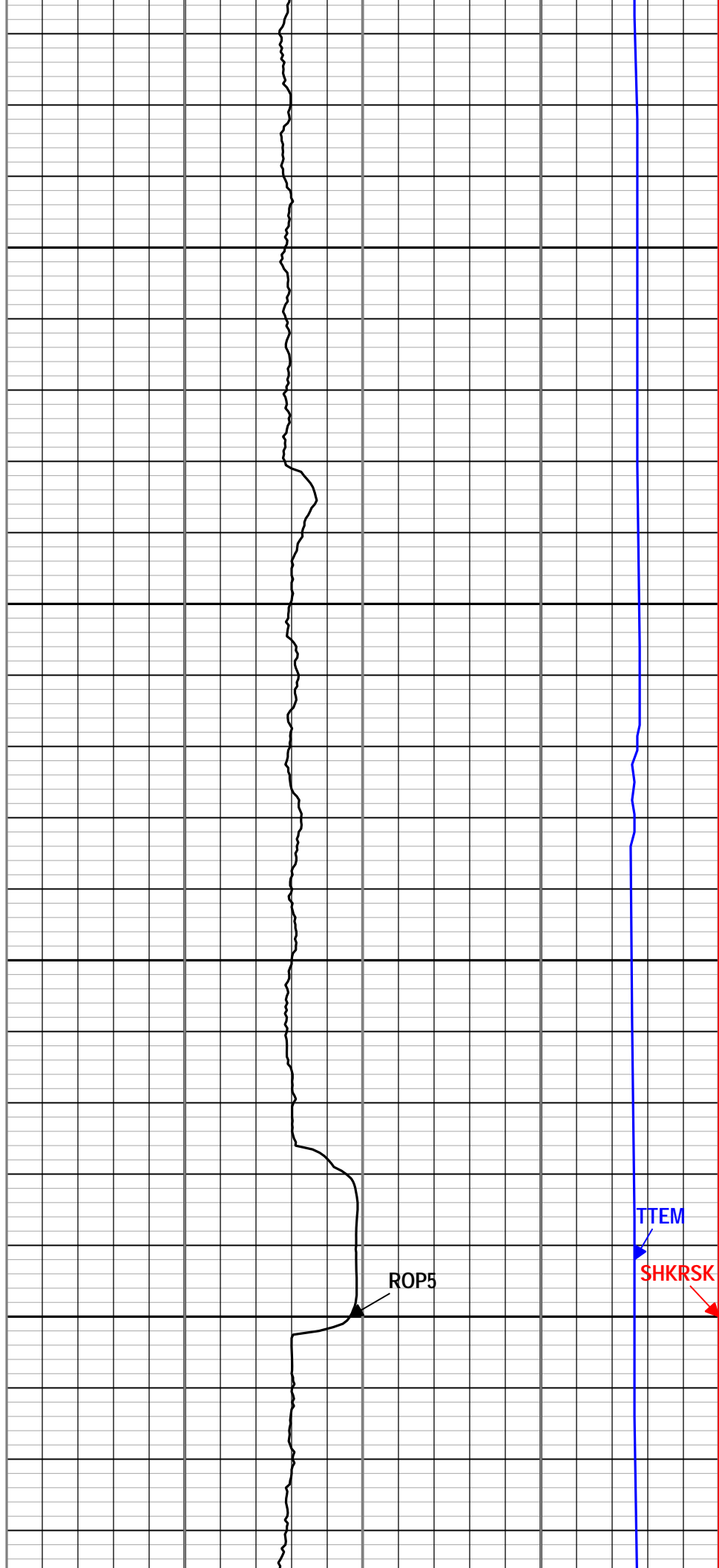
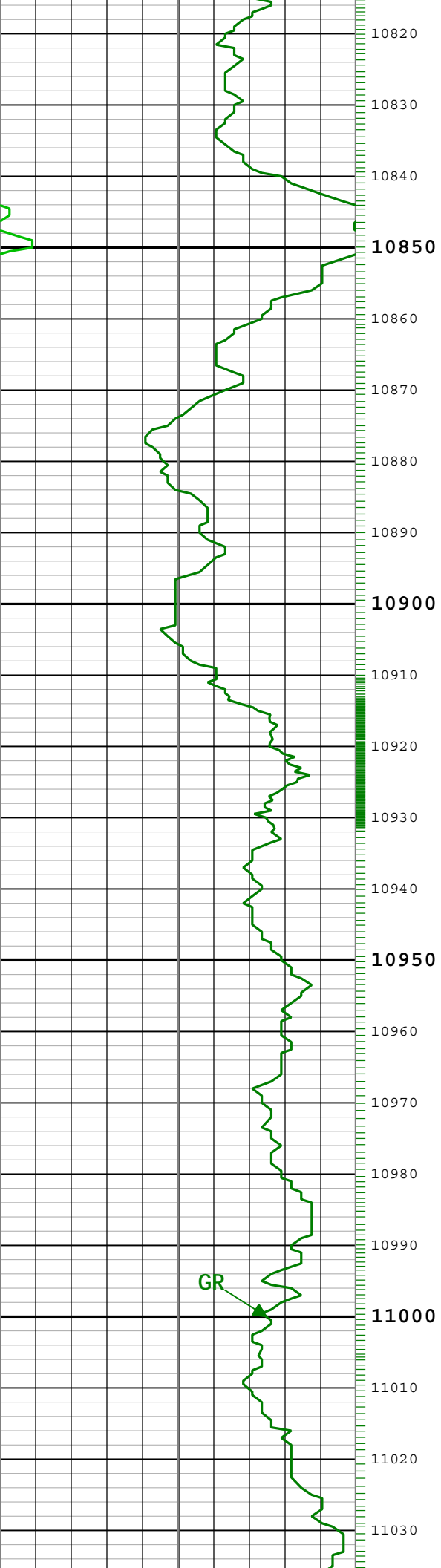


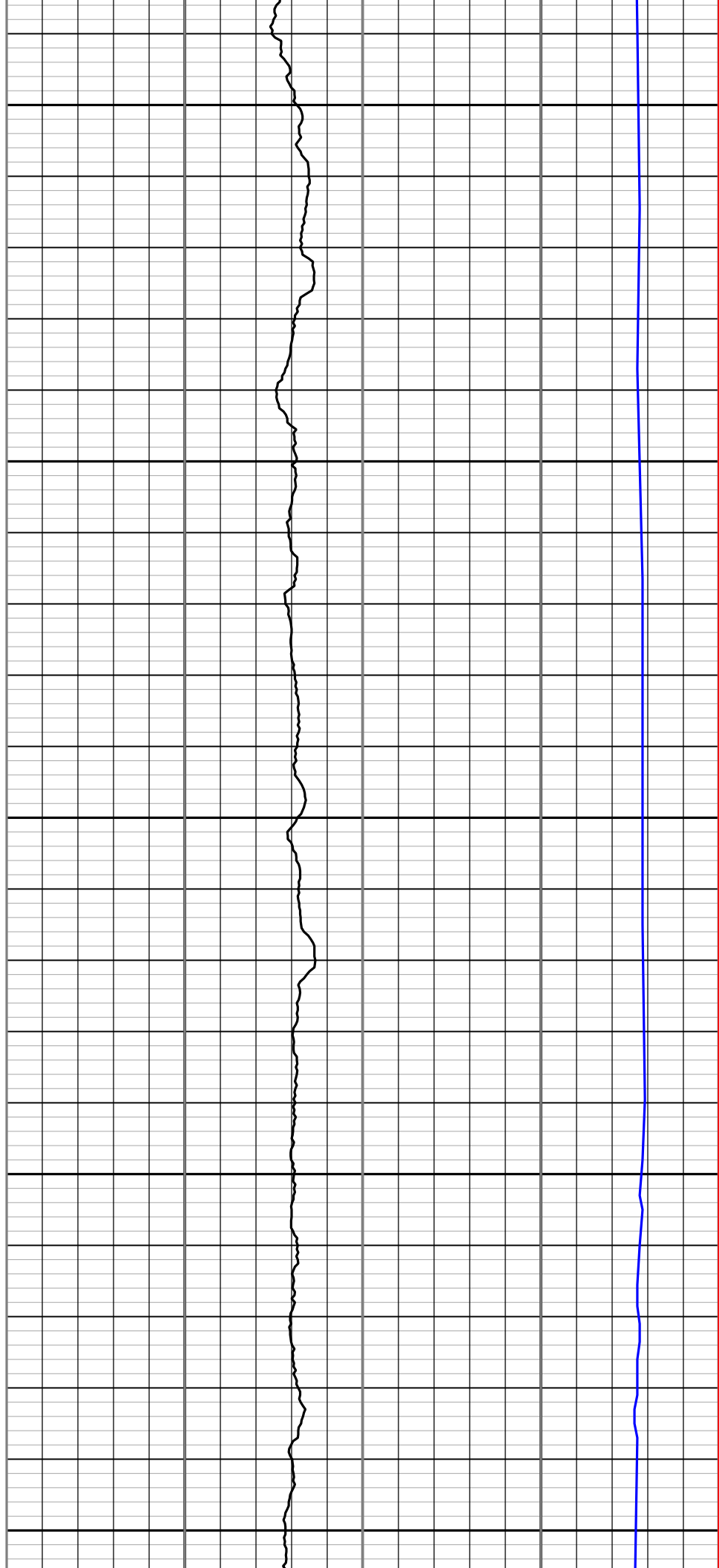
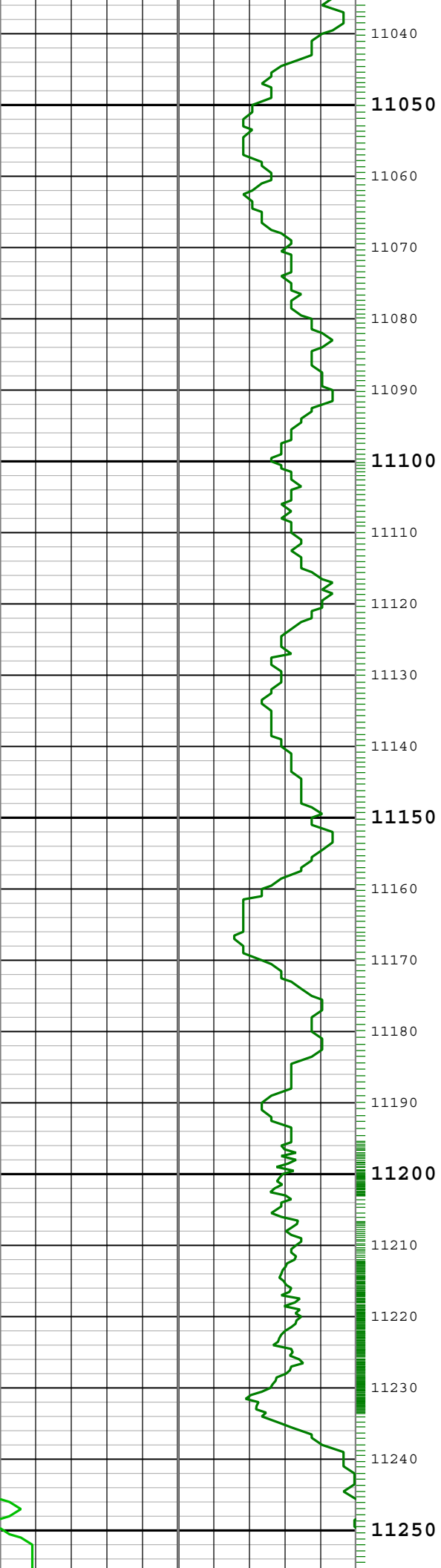


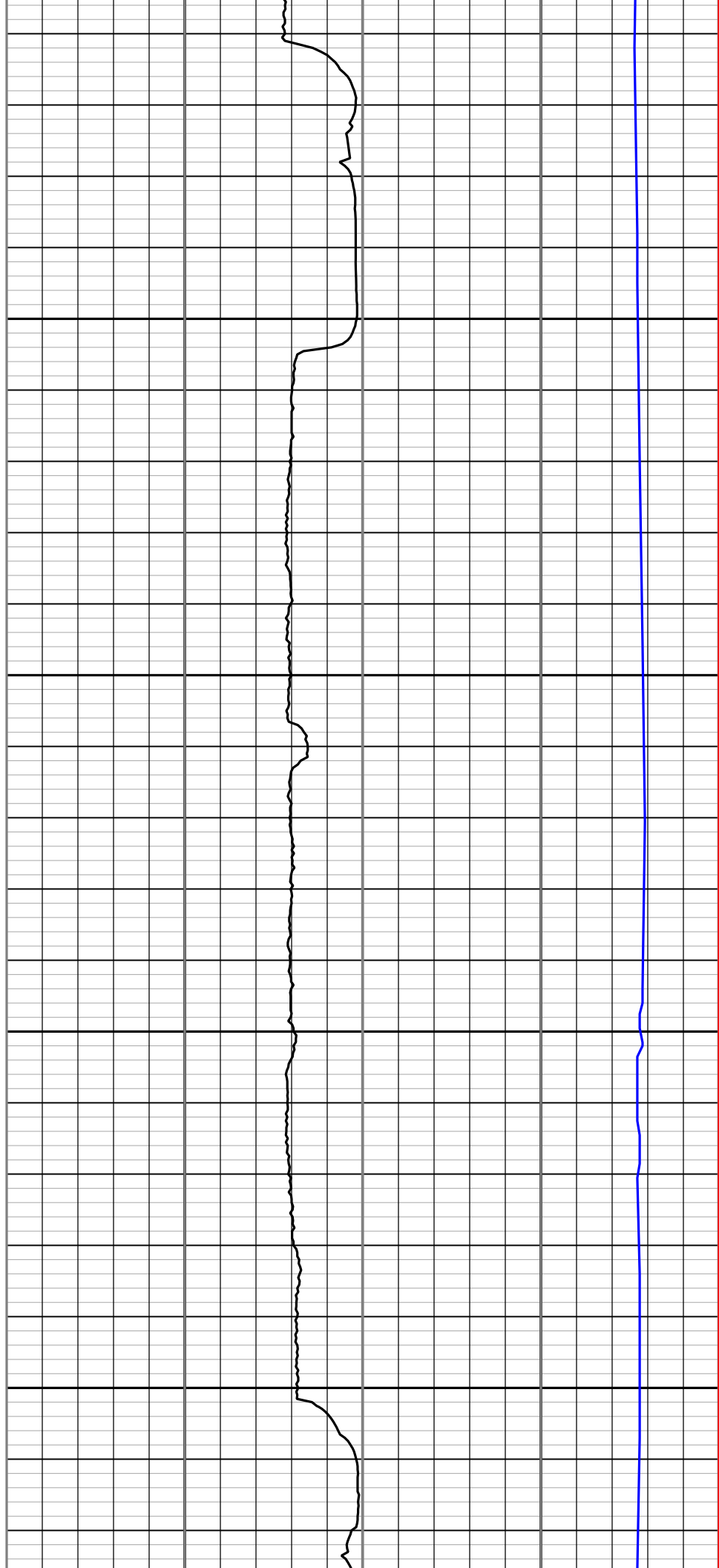
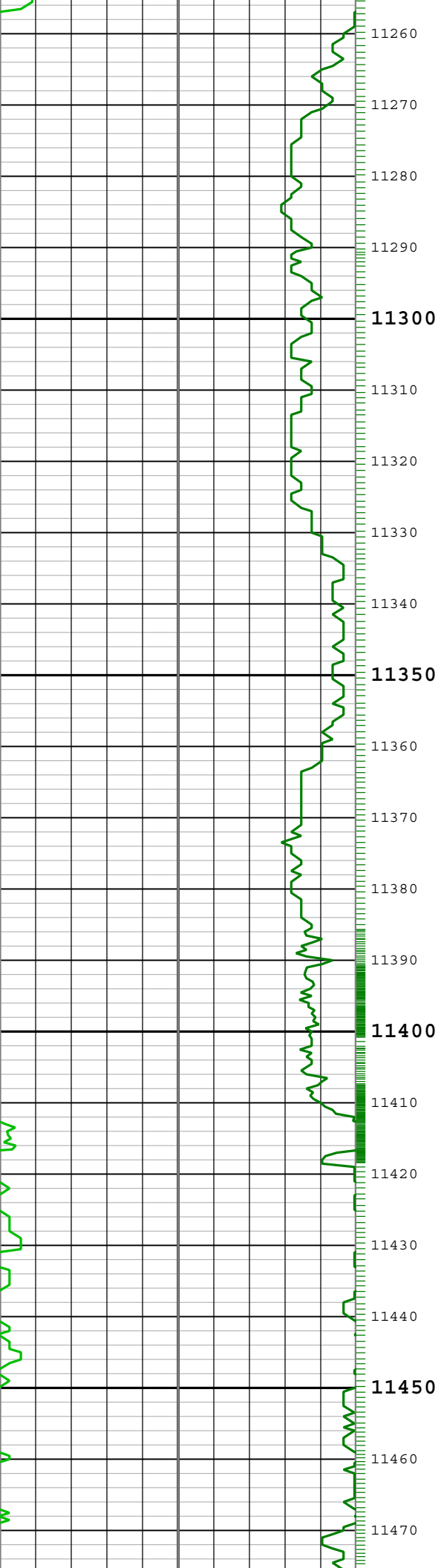


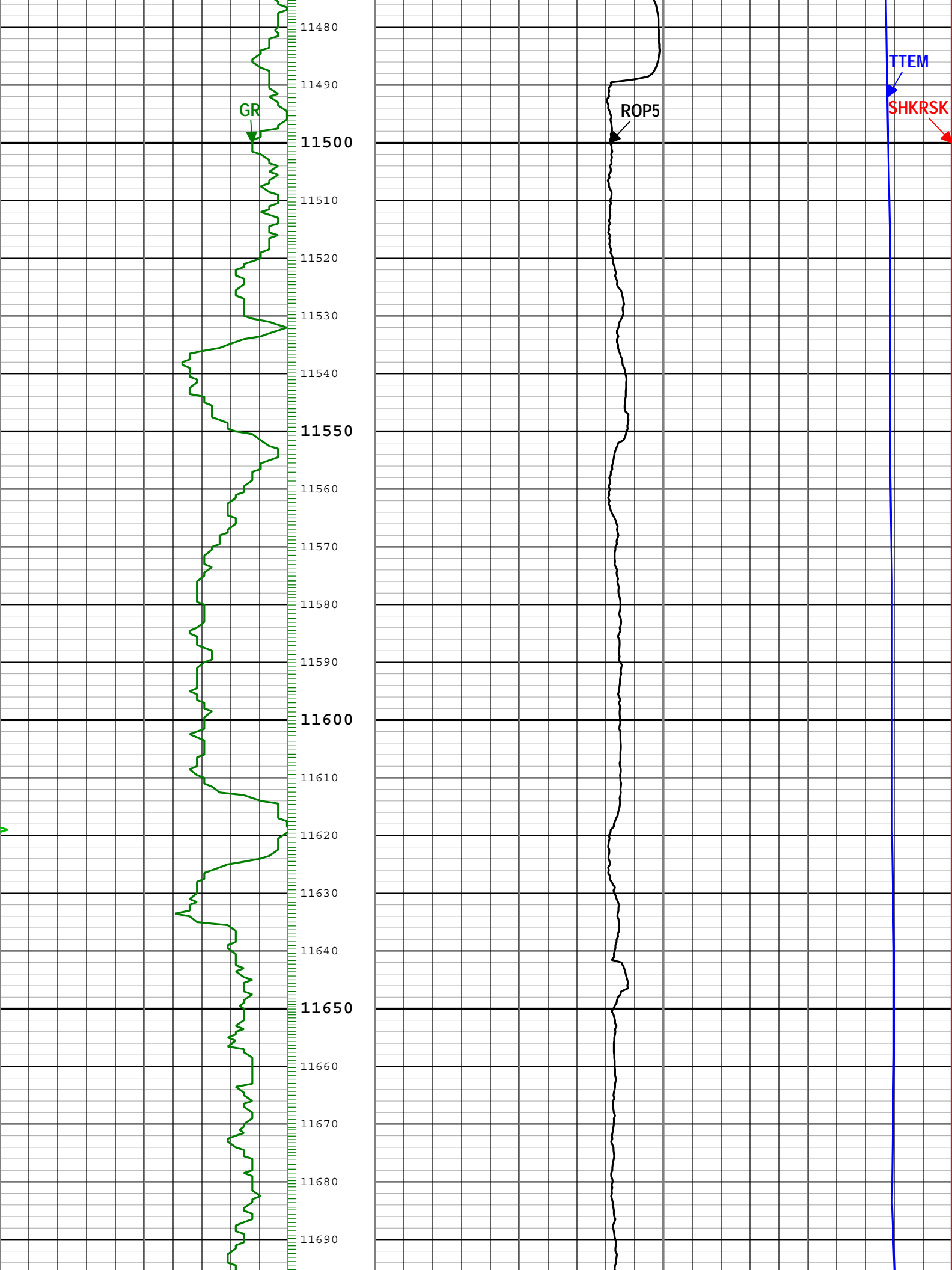




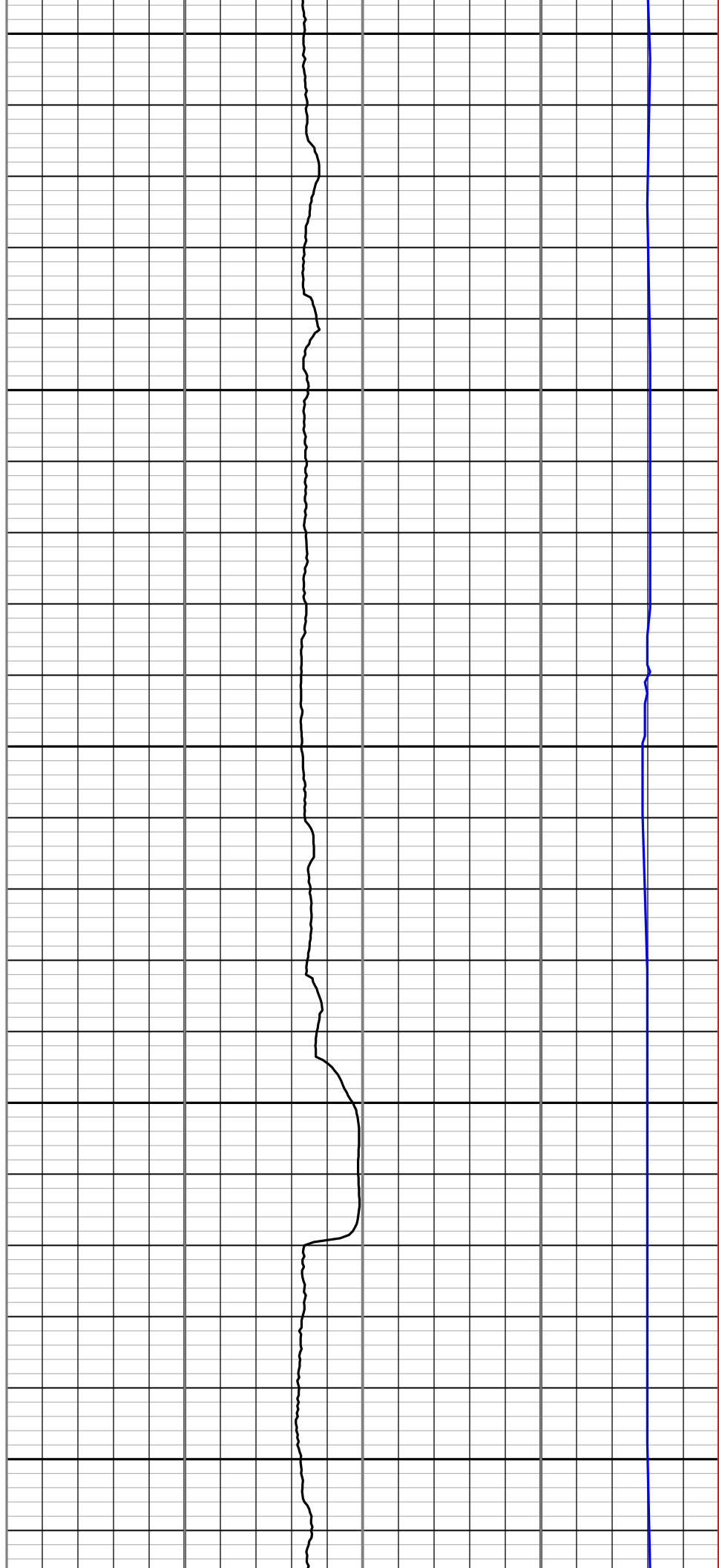
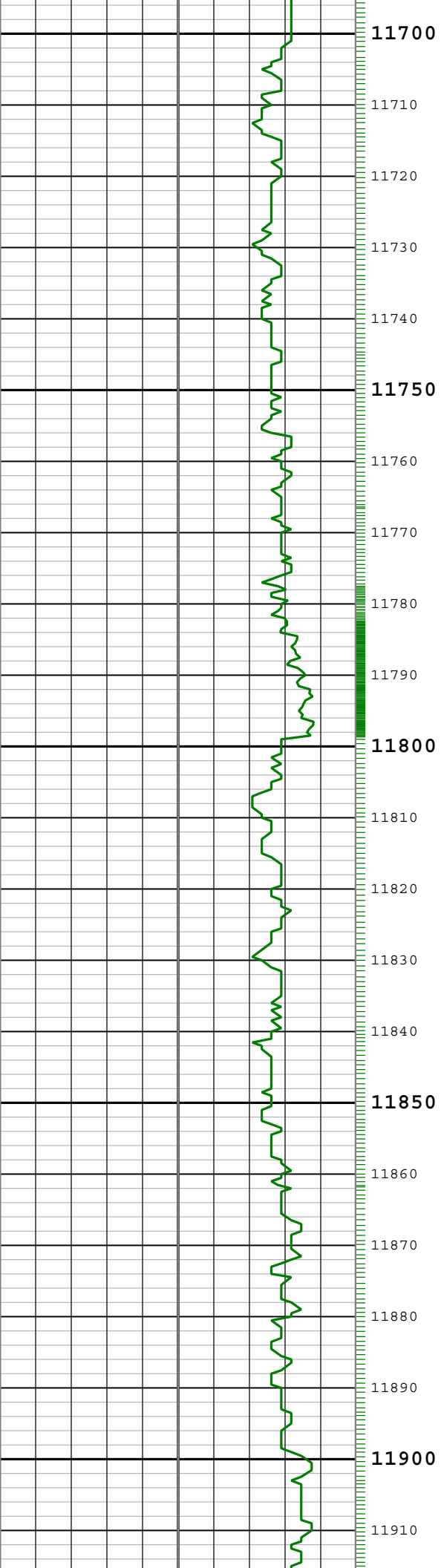


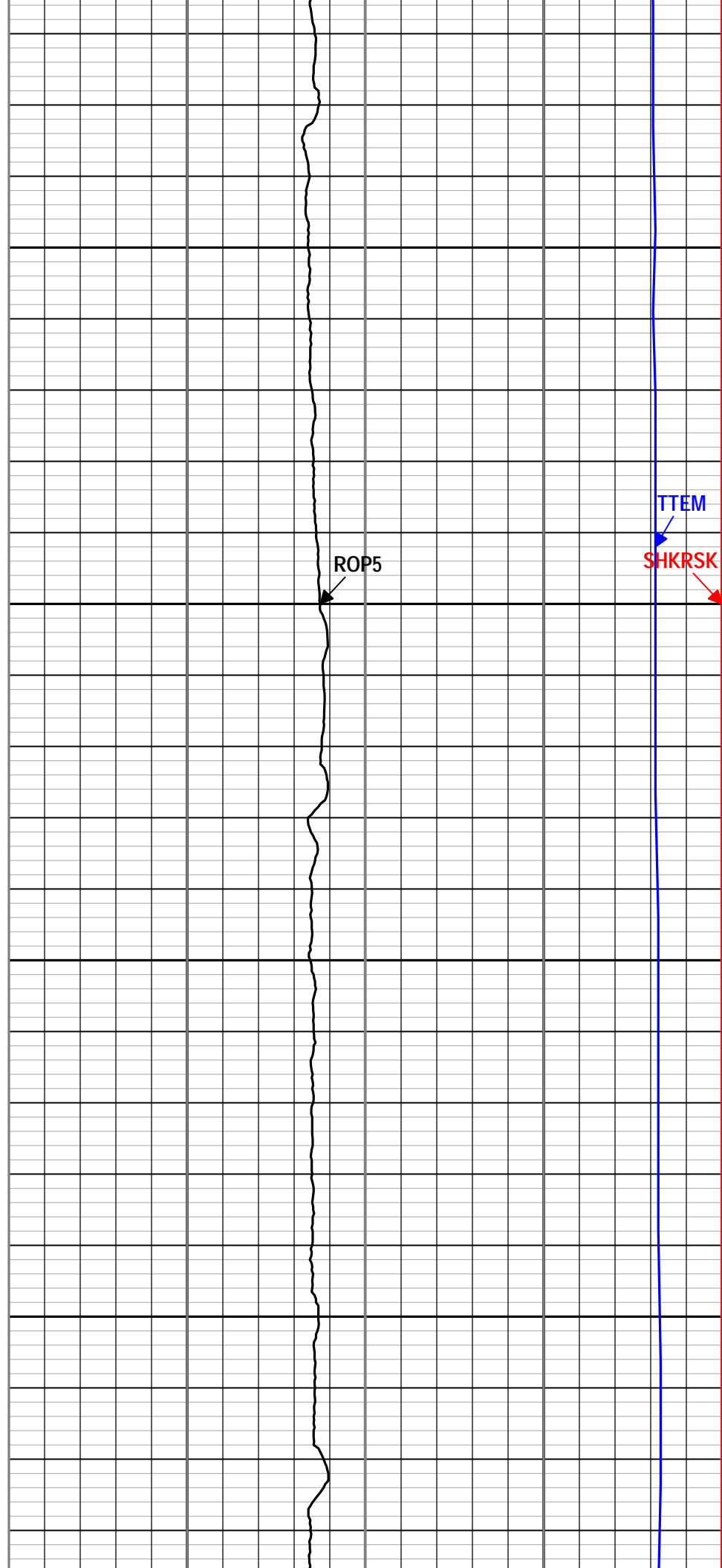
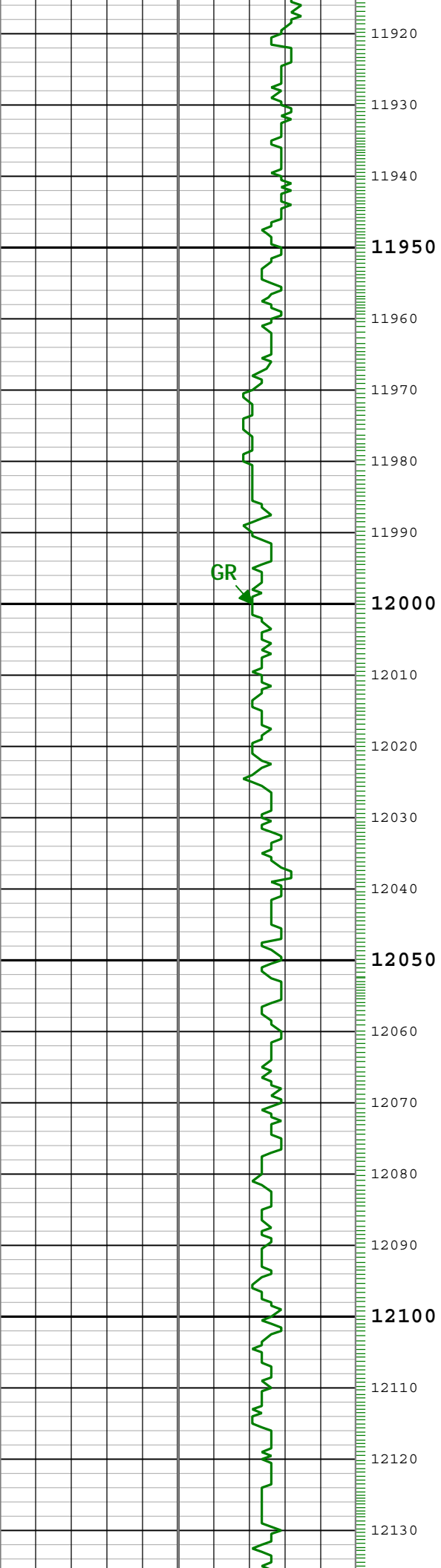


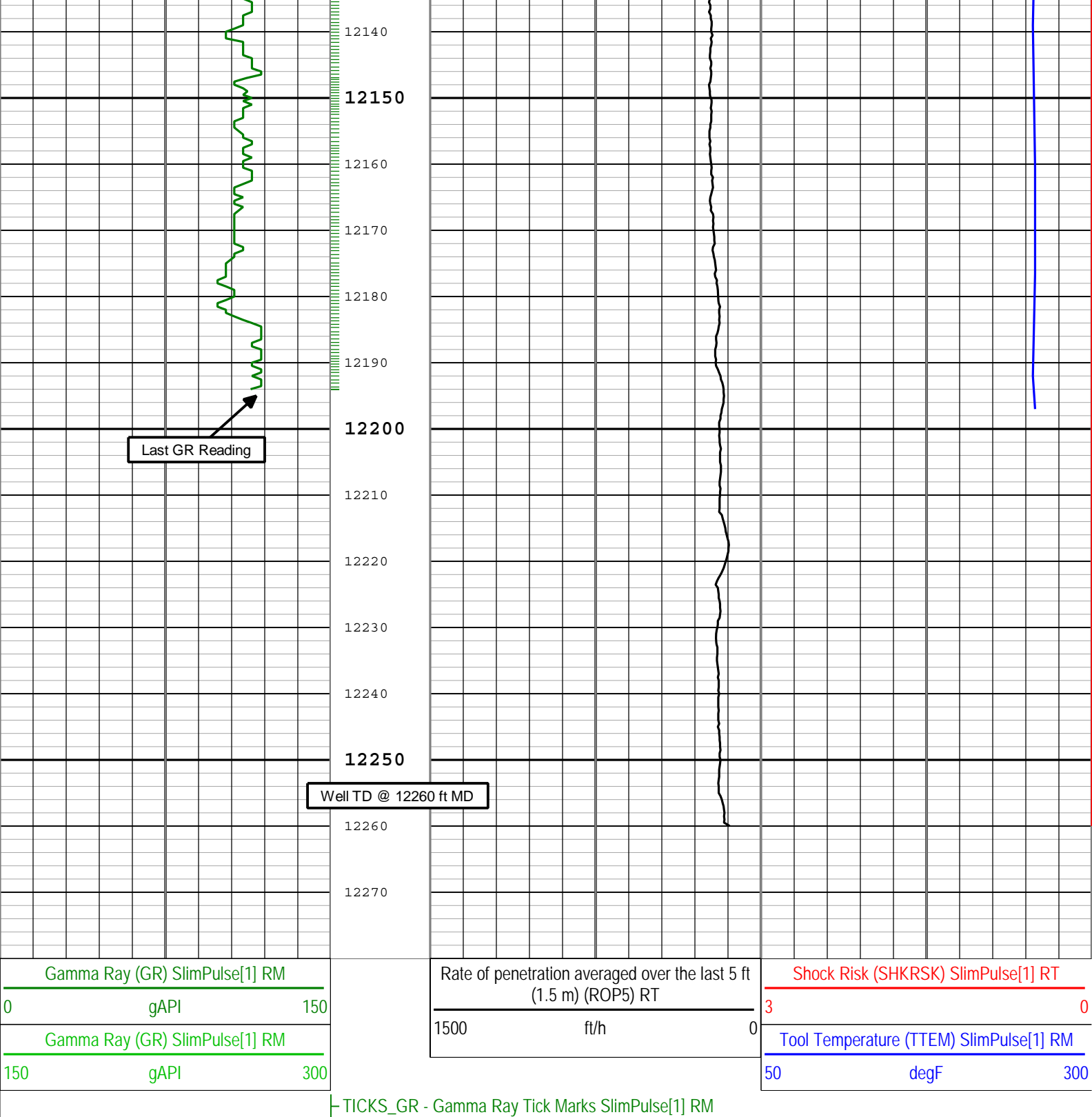












Description: Format: Log ( SlimPulse EOW MD ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 28-Jul-2014 16:16:01

Channel Processing Parameters				
Run001: Parameters				
Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	8.75	in
DFD	Drilling Fluid Density	Borehole	8.7	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

Bit Size	DNMSESSION	0.75	in	
DFD	Drilling Fluid Density	Borehole	10.2	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

## 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	10.65	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

## Run004Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	8.75	7185.77	7358
BS	6.125	7358	12260

All depth are actual.

## Tool Control Parameters

## Calibration Report

### SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run001

Primary Equipment :	Elec. cartridge, 150C max with GR	SPEC	989
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### GRGain - Gamma Ray: Blanket

Master (Time Frame File): 12:00:00 28-May-2014							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0395	1.1000	

### SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run002

Primary Equipment :	Elec. cartridge, 150C max with GR	SPEC	989
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### GRGain - Gamma Ray: Blanket

GRGain - Gamma Ray: Blanket							
Master (Time Frame File):		12:00:00 28-May-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0395	1.1000	

### SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run003

Primary Equipment :	Elec. cartridge, 150C max with GR	SPEC	989
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### GRGain - Gamma Ray: Blanket

GRGain - Gamma Ray: Blanket							
Master (Time Frame File):		12:00:00 11-Apr-2014					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0258	1.1000	

### SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Run004

Primary Equipment :	Elec. cartridge, 150C max with GR	SPEC	6191
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### GRGain - Gamma Ray: Blanket

Master (Time Frame File):	12:00:00 11-Apr-2014
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Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div></div>
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0258	1.1000	<div><div></div></div>

Company:	Noble Energy INC
Well:	Five Rivers K09-67-1HN
Field:	Wagon Wheel

Field: Wattenberg  
County: Weld  
State: Colorado  
Country: USA



SlimPulse-Gamma Ray

2 in./ 100 ft and 5 in./ 100 ft Measured Depth

Recorded Mode, Composite Log