

SlimPulse - Gamma Ray

1 in / 100 ft & 5 in / 100 ft Measured Depth

Recorded Mode, Composite Log



Company: Noble Energy Inc.

Well: Heartland G25-73-1HN

Field: Wattenberg

County: Weld

State: Colorado

Country: USA

Section: 25 APIN: 05-123-39551

Township: 04 N Rig Name: PD 829

Range: 65 W Rig Type: Top Drive

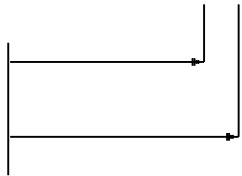
FL: NAD83 Colorado State Plane, Northern Zone, US Feet

FL1: Latitude: N 40° 16' 36.22790", Northing: 1344914.310 ftUS

FL2: Longitude: W 104° 36' 17.96401", Easting: 3249718.560 ftUS

Log Measured From: - Drill Floor: 4851.00 ft  
Ground Level: 4835.00 ft

Permanent Datum: - Mean Sea Level



Acquisition Dates: 26-Sep-2014 -- 02-Oct-2014

Other Services:

Log Interval: 550.00 (ft) -- 17000.00 (ft) Directional Drilling

Index Types: Measured Depth Surveys / Continuous D&I

Index Scales: 1:1200 1" / 100', 1:240 5" / 100' Downhole Temperature

Depth Source: Driller's Depth Downhole Shocks

Depth Sensor: 3rd Party Depth

Print Type: Final

Spud Date: 22-Sep-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.

Contents

- 1. Header
- 2. Disclaimer
- 3. Contents
- 4. Borehole Size/Casing/Tubing Record
- 5. Operational Run Summary
- 6. Borehole Fluids
- 7. Remarks and Equipment Summary
- 8. UDComposite 1 1 in / 100 ft Measured Depth Log
  - 8.1 Integration Summary
  - 8.2 Composite Summary
  - 8.3 Log ( SlimPulse Gamma Ray Final MD )
  - 8.4 Parameter Listing
- 9. UDComposite 1 5 in / 100 ft Measured Depth
  - 9.1 Integration Summary
  - 9.2 Composite Summary
  - 9.3 Log ( SlimPulse Gamma Ray Final MD )
  - 9.4 Parameter Listing

10. Calibration Report  
11. Tail

Borehole Size/Casing Record

Bit						
Bit Size ( in )	8.75	6.125				
Top Driller ( ft )	0	7382				
Bottom Driller ( ft )	7382	16867				
Casing						
Size ( in )	7					
Weight ( lbm/ft )	26					
Inner Diameter ( in )	6.276					
Grade	P110					
Top Driller ( ft )	0					
Bottom Driller ( ft )	7382					

Operational Run Summary

Parameter ( unit )	Lateral1					
Date Log Started	26-Sep-2014					
Time Log Started	00:34:25					
Date Log Finished	02-Oct-2014					
Time Log Finished	07:18:00					
Bit Size ( in )	6.125					
Bit Start Depth ( ft )	7382.00					
Bit Stop Depth ( ft )	16867.00					
Top Log Interval ( ft )	7337.00					
Bottom Log Interval ( ft )	16822.00					
Max Hole Deviation ( deg )	91.79					
Azimuth of Max Deviation ( deg )	359.27					
Logging Unit Number	Command Center					
Logging Unit Location	Zone 2					
Recorded By	ZachBrunson					
Witnessed By	Ty Briggs					
Service Order Number	14CCO0649					

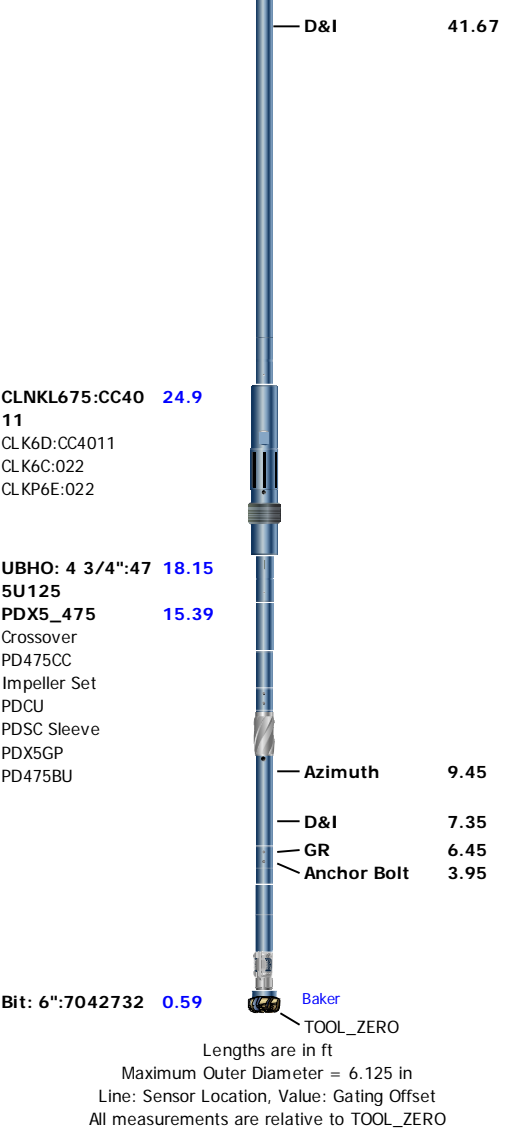
Borehole Fluids

Parameter( unit )	Lateral1					
Fluid Type	Water					
Fluid Name	Fresh Water					
Max Recorded Temperatures ( degF )	276					
Source of Sample	Active Tank					

Salinity ( ppm )	34972.17					
Density ( lbm/gal )	10.1					
Funnel Viscosity ( s )	39					
Fluid Loss ( cm3 )	0					
PH	9.2					
Source RMF						
RMC	Pressed					
RM @ Meas Temp ( ohm.m@degF )	0.2 @ 68					
RMF @ Meas Temp ( ohm.m@degF )	0.15 @ 68					
RMC @ Meas Temp ( ohm.m@degF )						
RM @ BHT ( ohm.m@degF )	0.07 @ 212					
RMF @ BHT ( ohm.m@degF )	0.05 @ 212					
RMC @ BHT ( ohm.m@degF )	NaN @ 212					
Total Solid ( % )	9.4					
High Gravity Solids ( % )	3.2					

## Remarks and Equipment Summary

Lateral1: Toolstring				Lateral1: Remarks	
Equip name	Length	MP name	Offset	Data presented is from tool memory and acquired while drilling from 7382.0 ft MD to 16867.0 ft MD	
X/O: 4 3/4"[2]:D R21913	106.1				
Stab: 4 3/4"[2]: DR27109	102.76				
Motor:106	97.86	Hunting Motor		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.	
				Run Objective: Drill Lateral Section to TD	
				Bit to GR: 44.70 ft Bit to DNI: 41.67 ft	
				Drilled from 7382.0 ft MD to 16867.0 ft MD Logged from 7337.0 ft MD to 16822.0 ft MD	
				SlimPulse Version Software: Version 11 SlimPulse GR Calibrated: 27-Aug-2014 SlimPulse D&I Calibrated: 15-Jul-2014	
				PathFinder, a Schlumberger Co Personnel: DD: Cotton Walker, Tony Butler MWD: Zach Brunson, Ty M. Briggs	
				Reason for POOH: Well TD	
X/O: 4 3/4"[1]:D R4475	67.33				
Filtr Sub: 4 3/4": DR18577	66.21	Filter			
Stab: 4 3/4"[1]: DR27111	62.68				
SPULSE-GEN:DR 28001	57.78	SlimDrive			
FLWSUB:DR2251					
5					
SPCOLLAR:DR2800					
1					
SPMA:623					
SPEC:930					
SPBA:01869					



UDComposite 1

1 in / 100 ft Measured Depth Log

Composite Summary

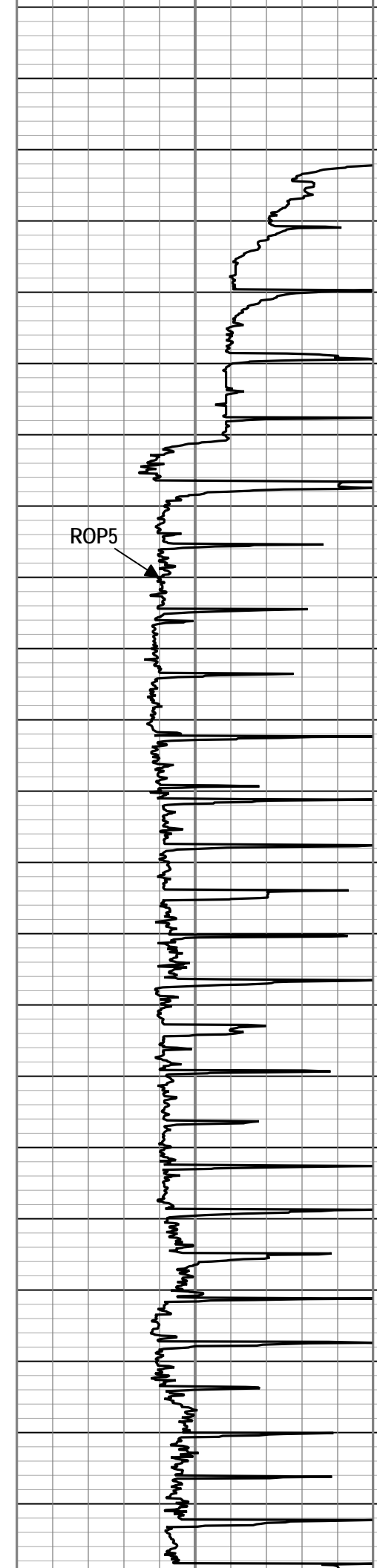
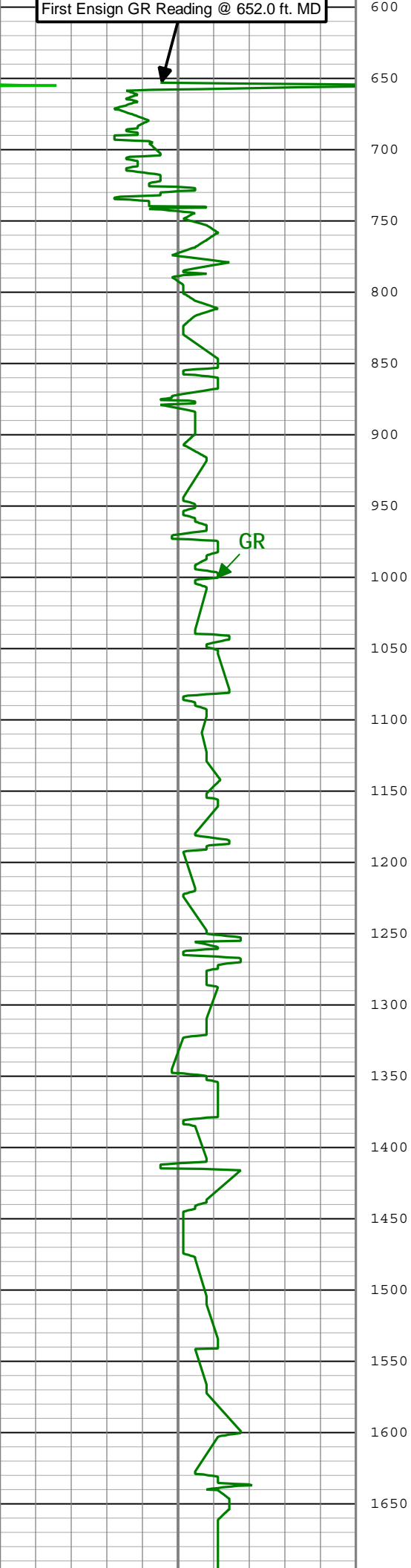
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	Include Parallel Data
Lateral1	Drilling	Down	7300.17 ft	16868.25 ft	26-Sep-2014 9:43:50 AM	02-Oct-2014 7:18:00 AM	No

All depths are referenced to toolstring zero

Log	Company:Noble Energy Inc. Well:Heartland G25-73-1HN UDComposite 1:S528
-----	---

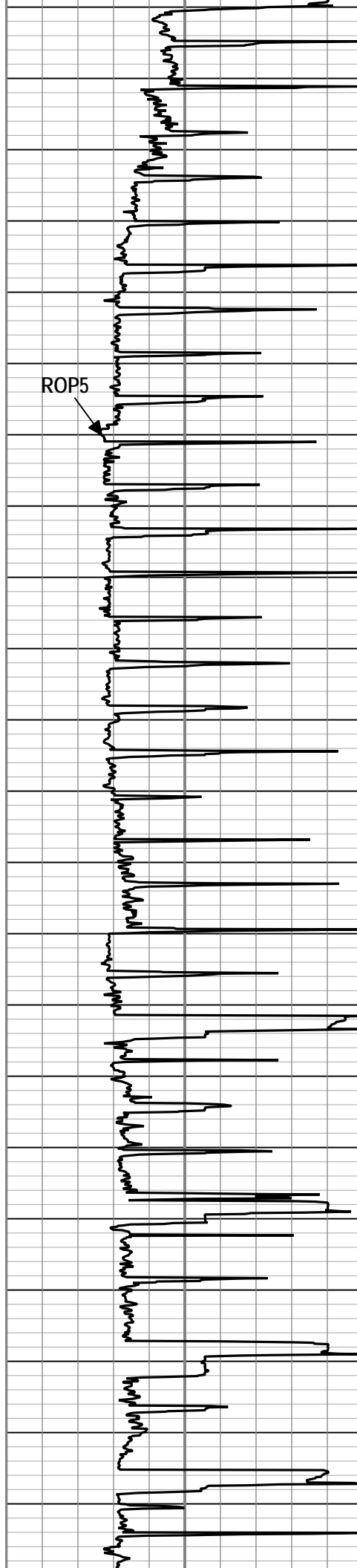
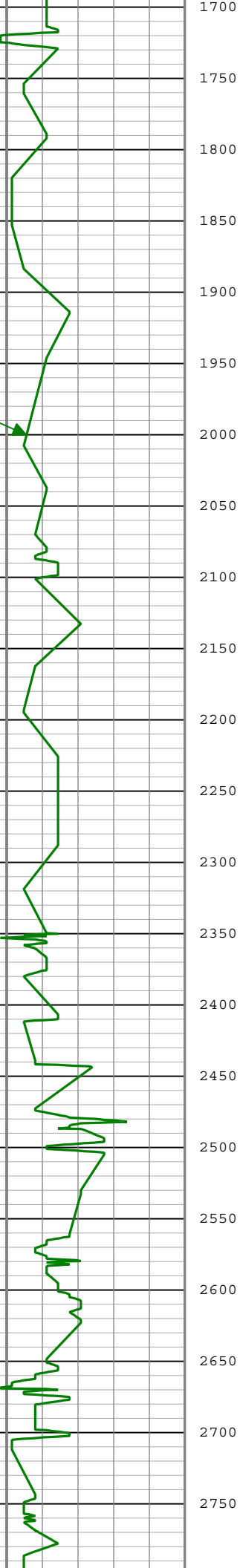
Description: SlimPulse Gamma Ray 1    Format: Log ( SlimPulse Gamma Ray Final MD )    Index Scale: 1 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 03-Oct-2014 12:34:09

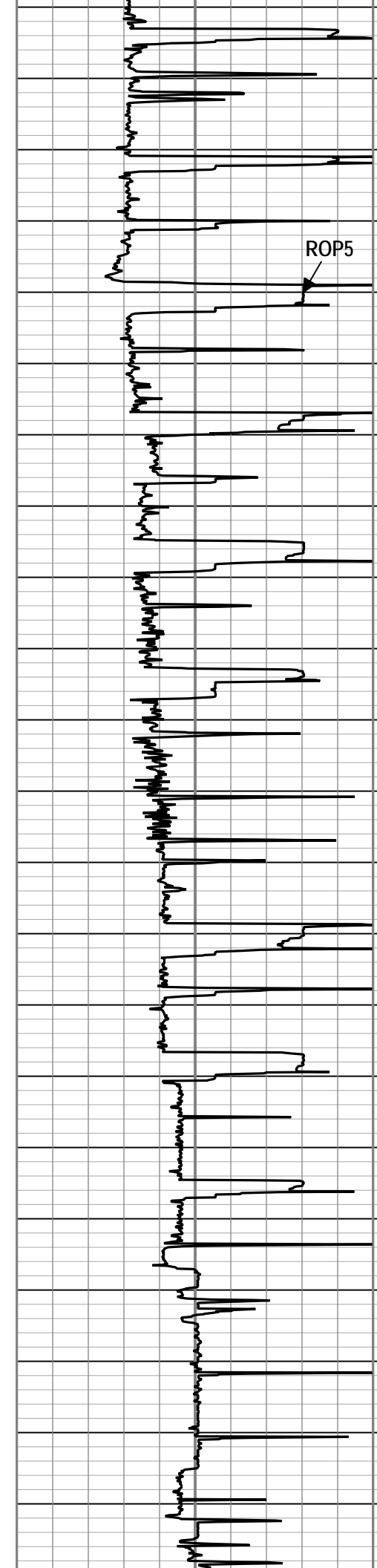
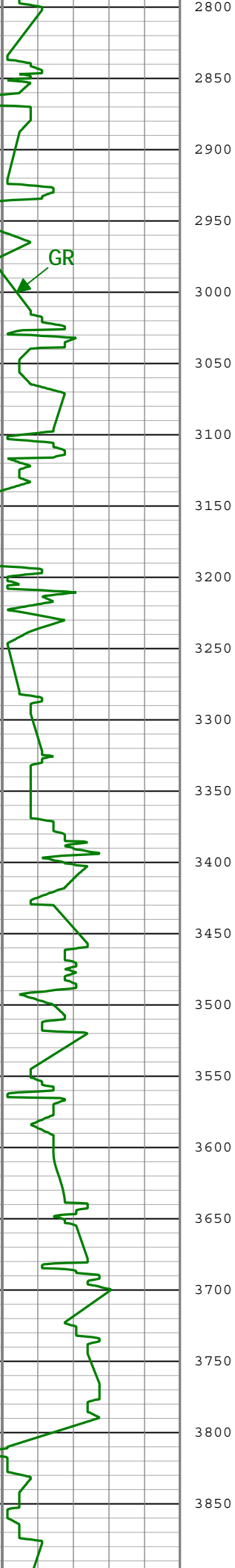
└ TICKS_GR - Gamma Ray Tick Marks SlimPulse[1] RM									
Gamma Ray (GR) SlimPulse[1] RM									
0	gAPI				150	Shock Risk (SHKRSK) SlimPulse[1] RT			
Gamma Ray (GR) SlimPulse[1] RM					30				
150	gAPI				300	Direction and Inclination Sensor Temperature (TEMP_DNI) SlimPulse[1] RT			
Gamma Ray (GR) SlimPulse[1] RM					100				
300	gAPI				450	degF			



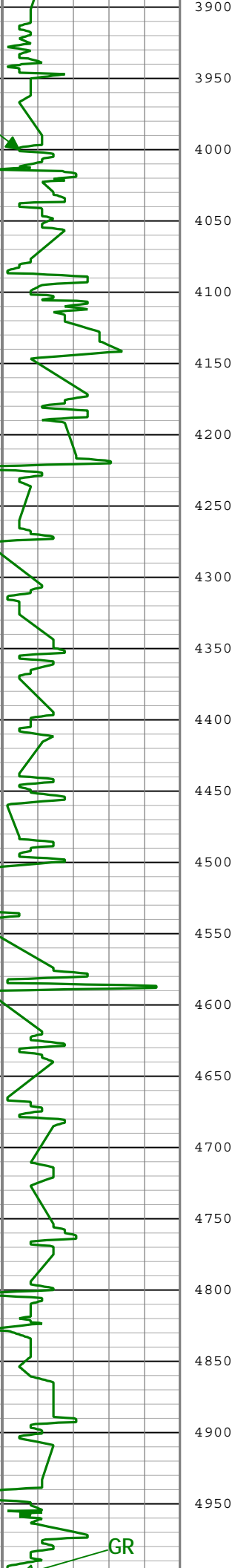
GR

ROP5



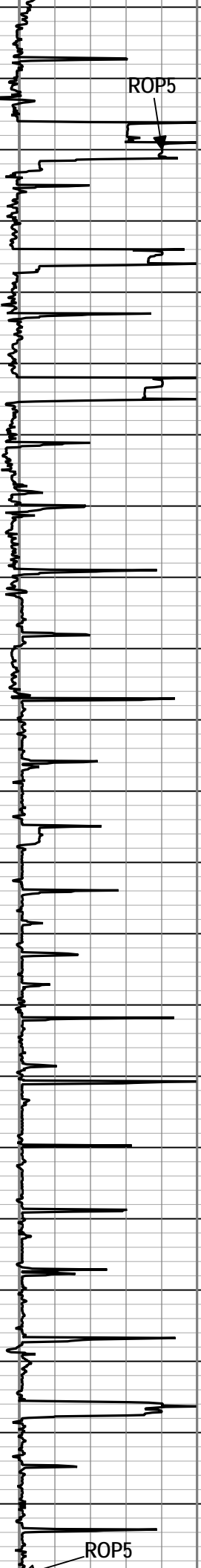


GR



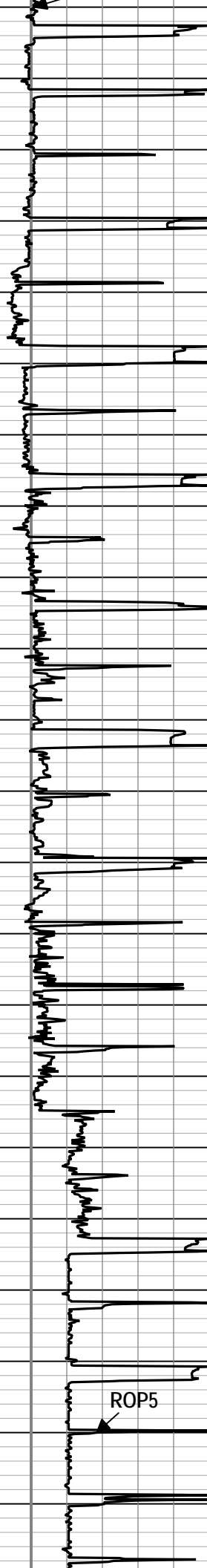
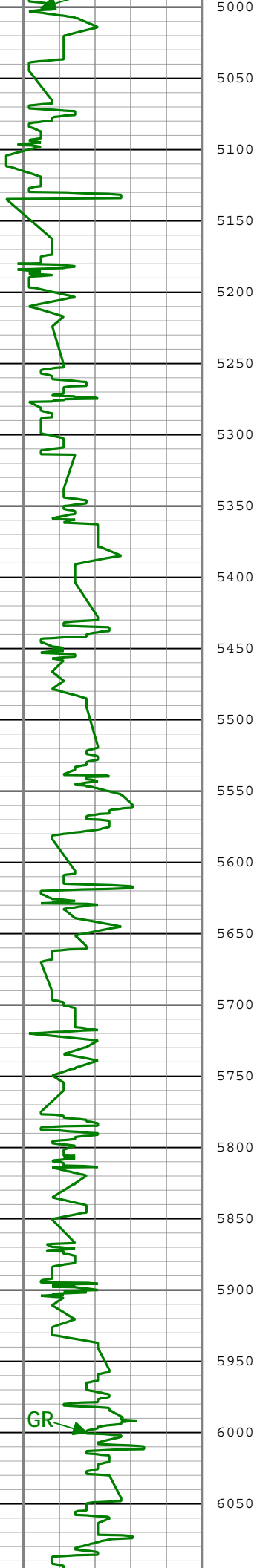
GR

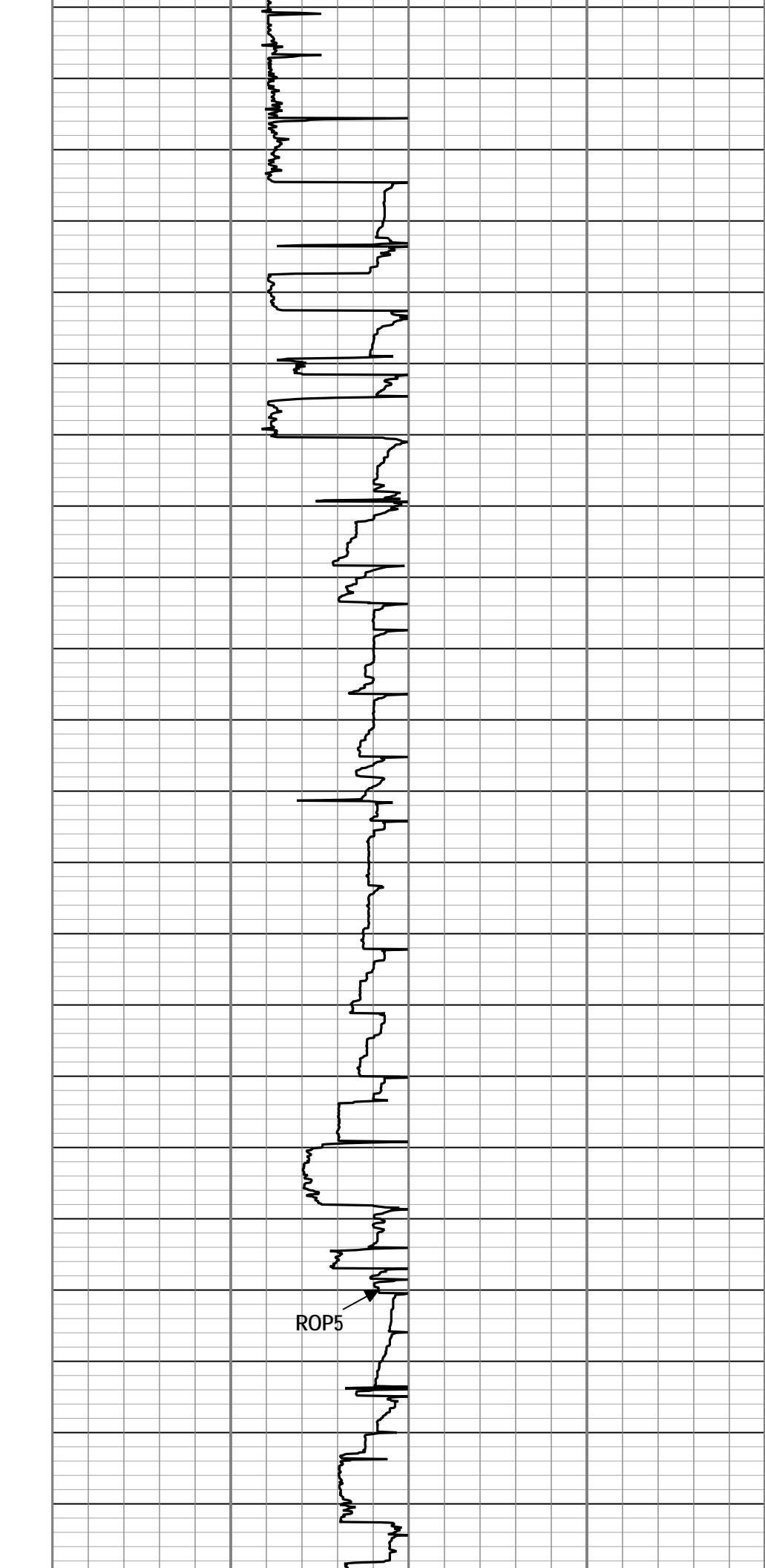
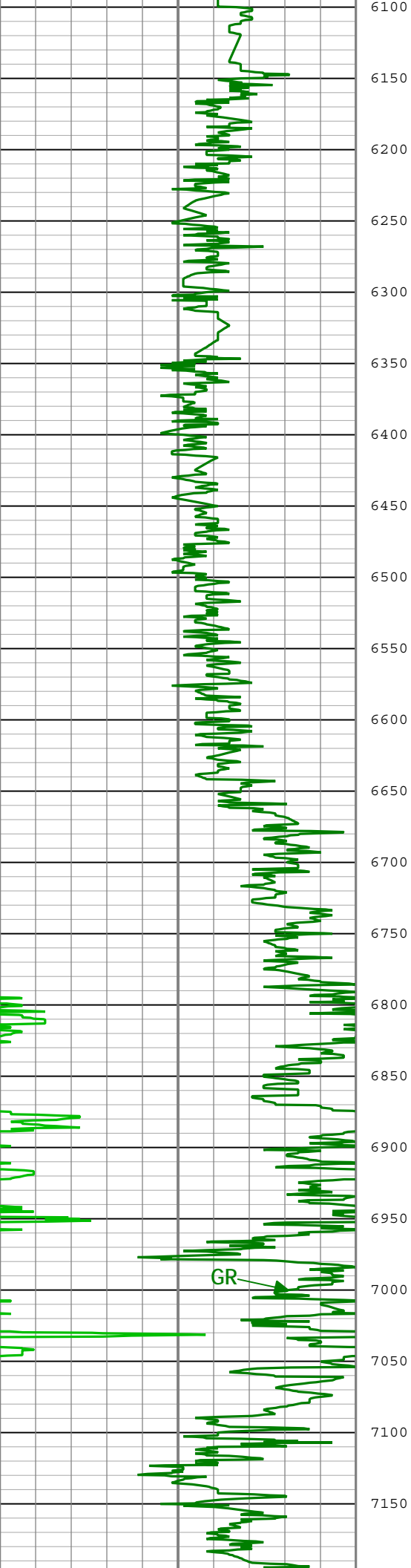
ROP5

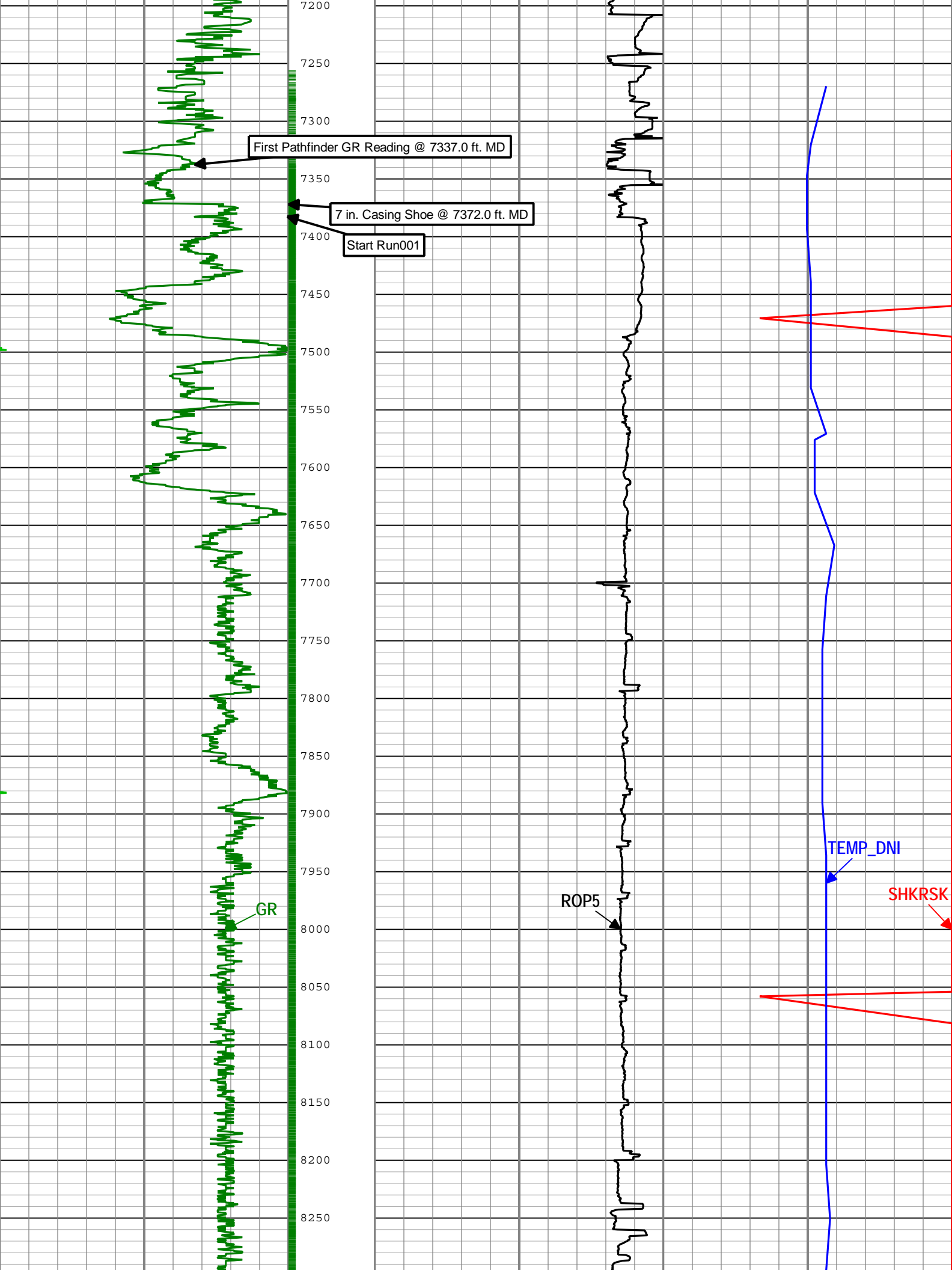


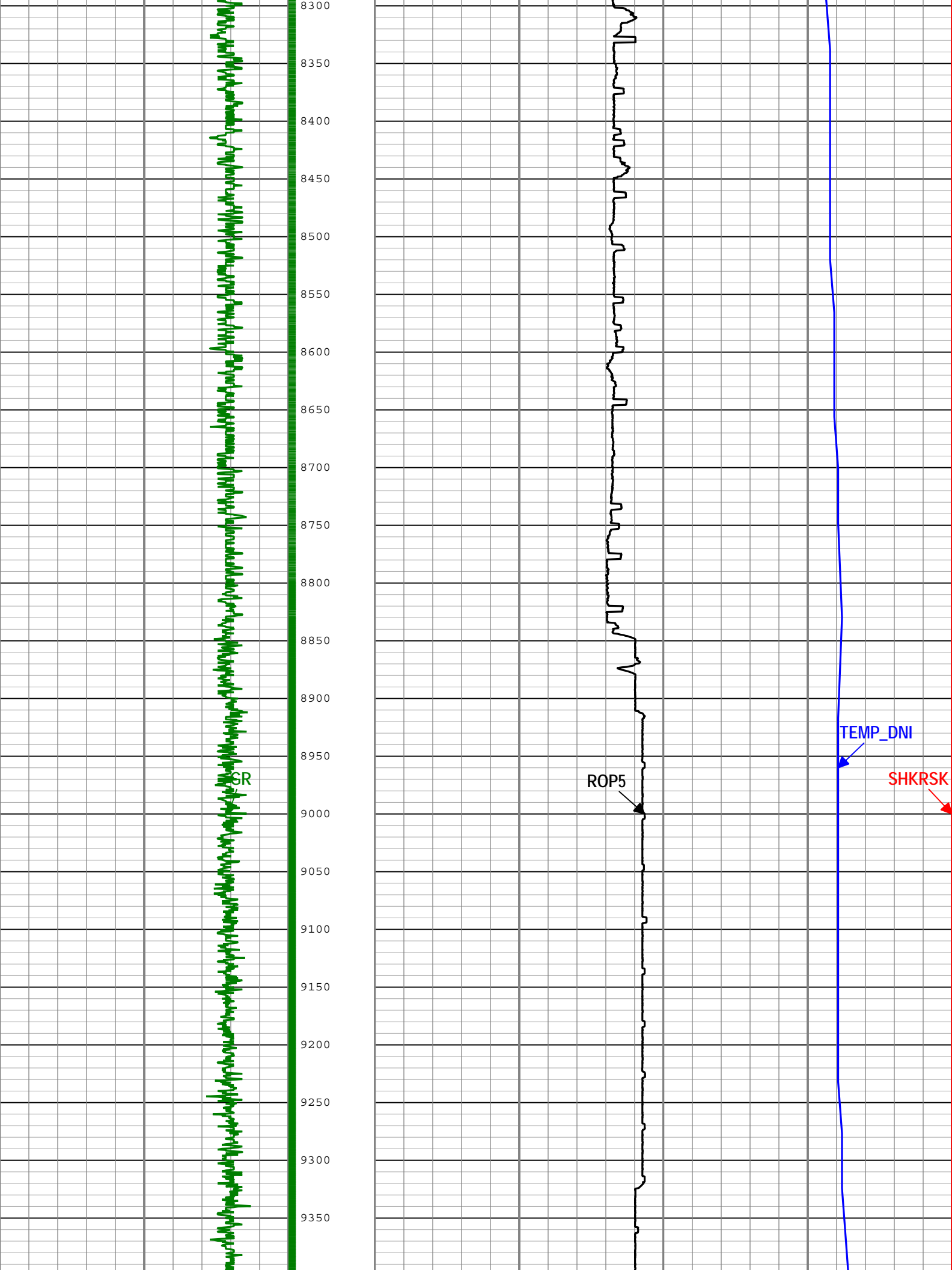
ROP5

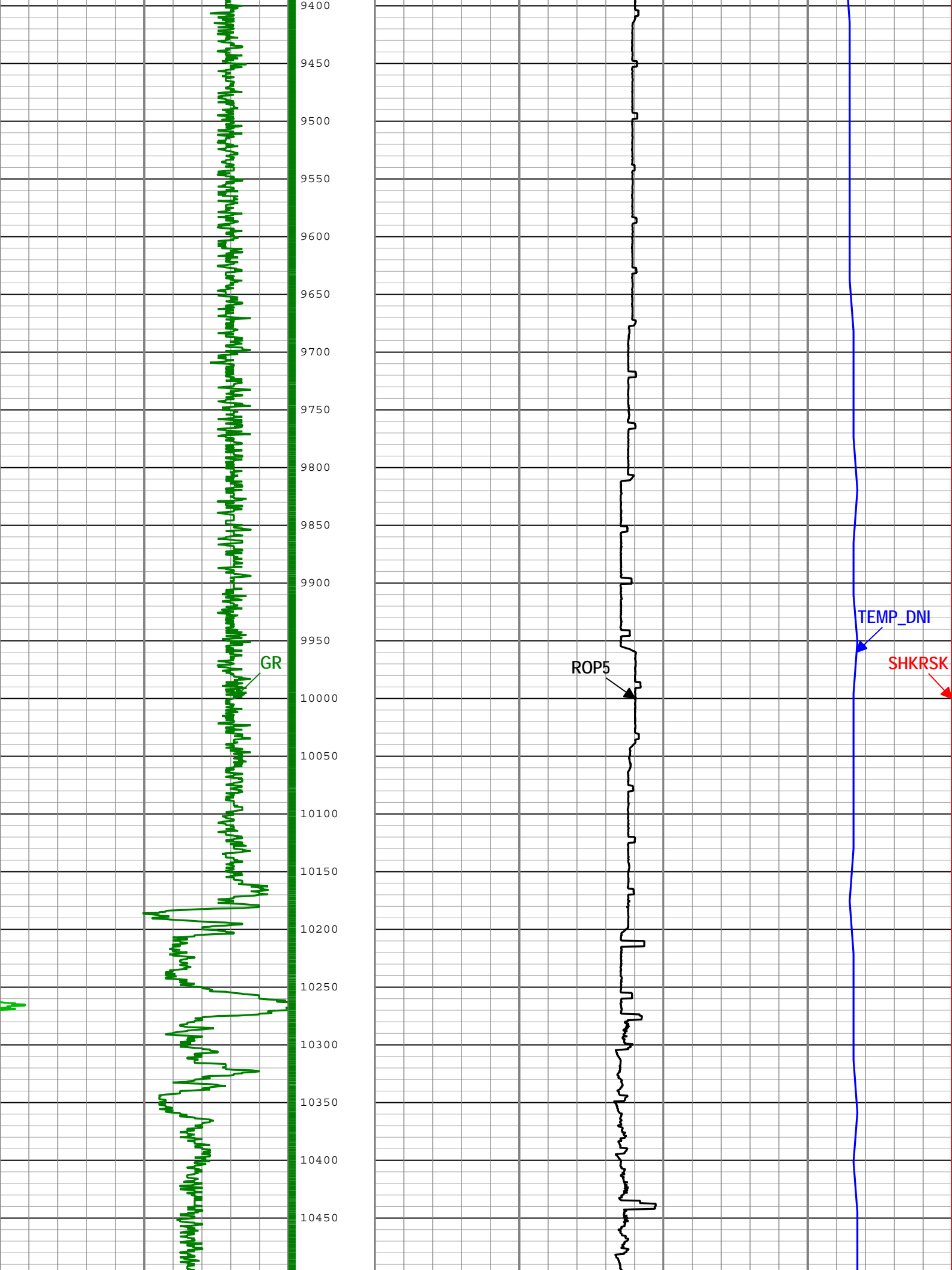


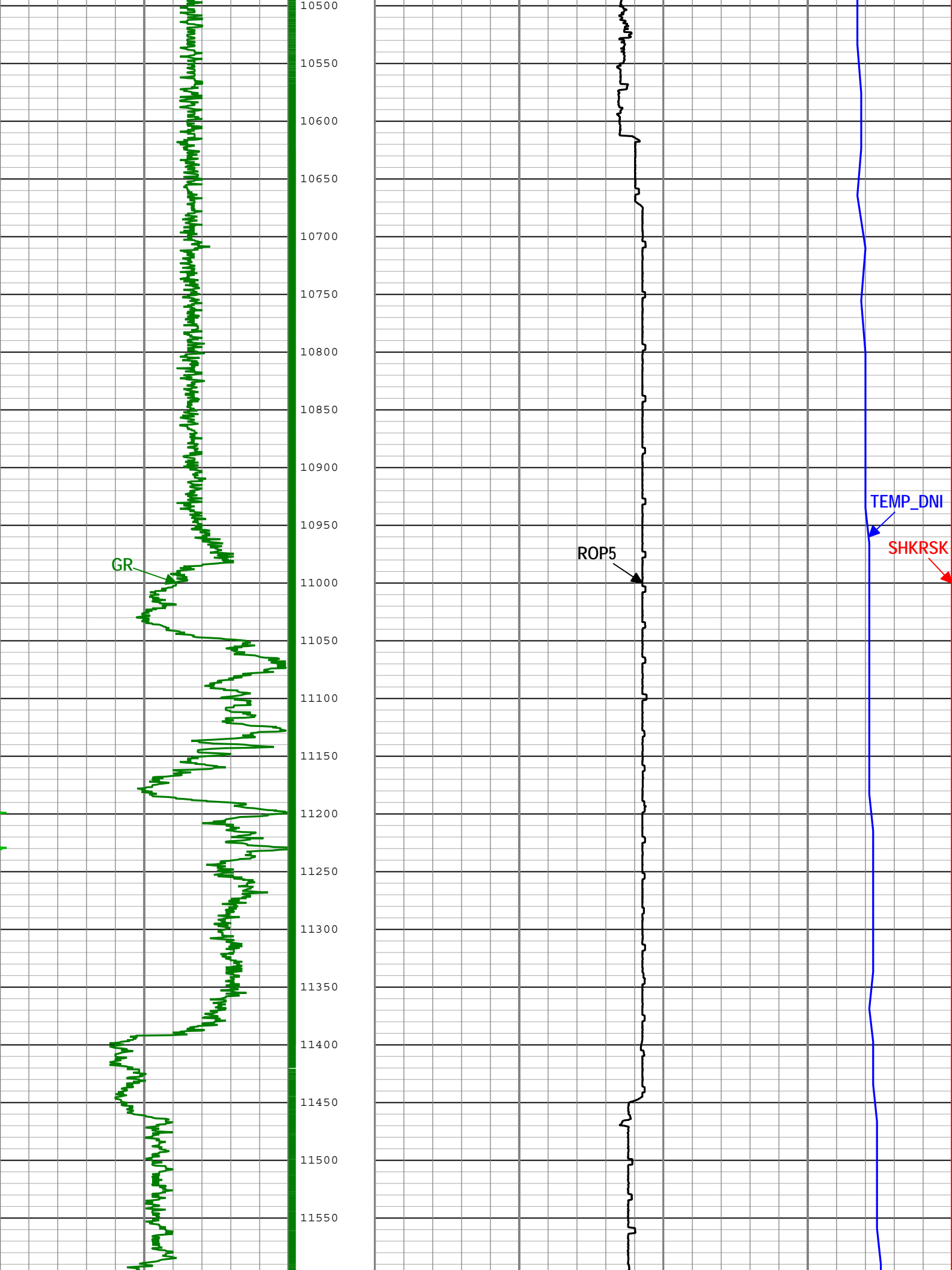


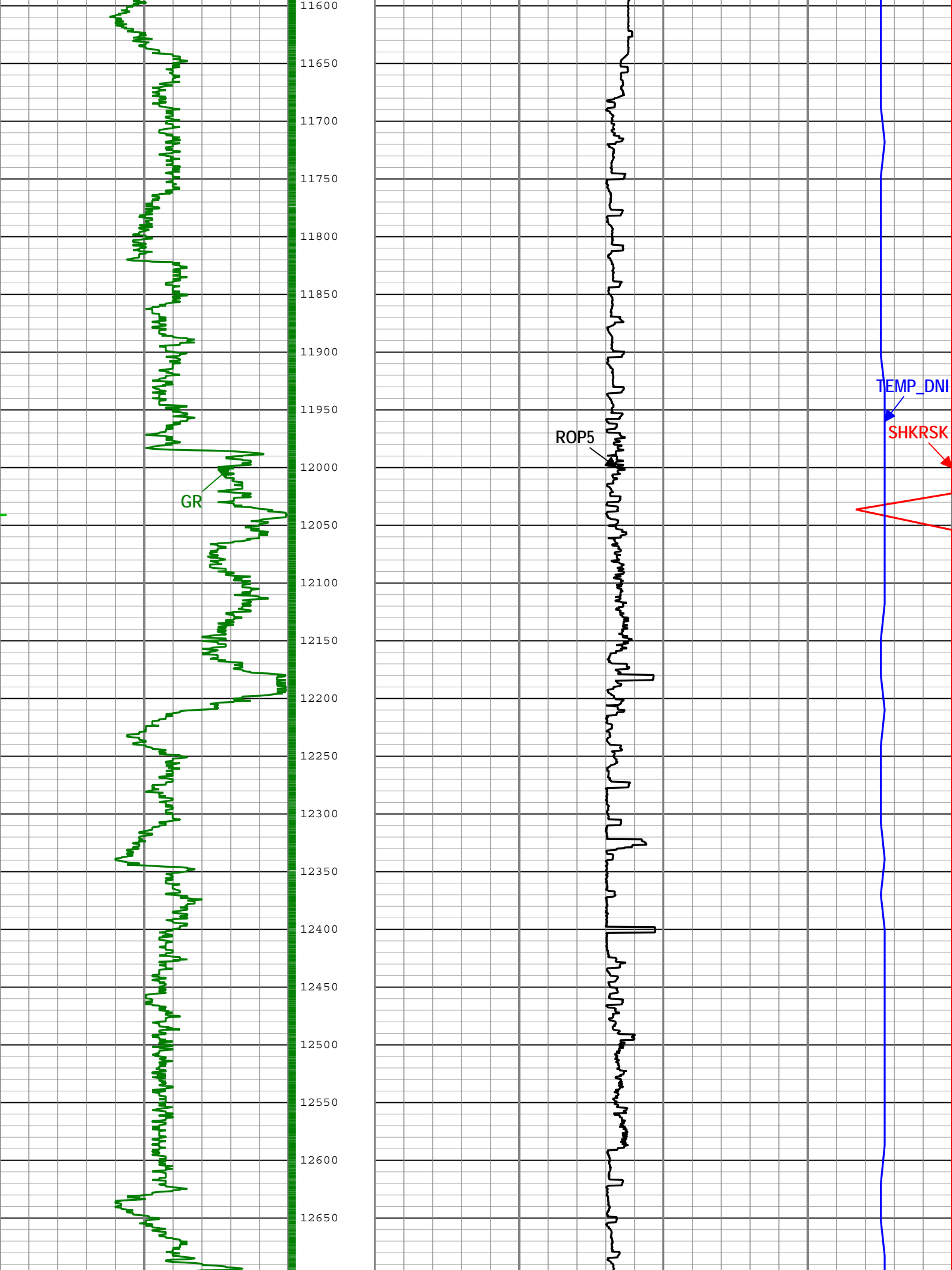


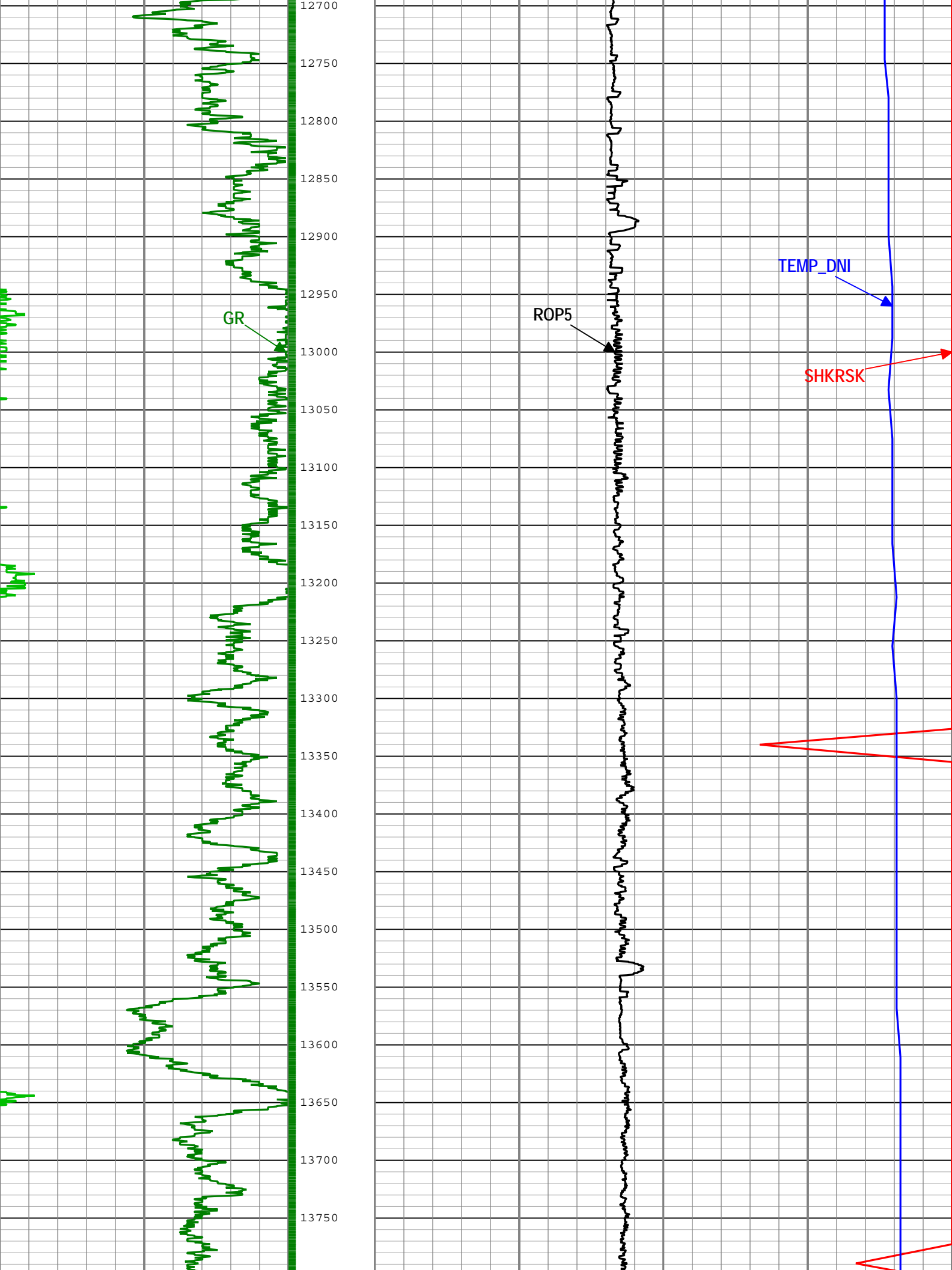




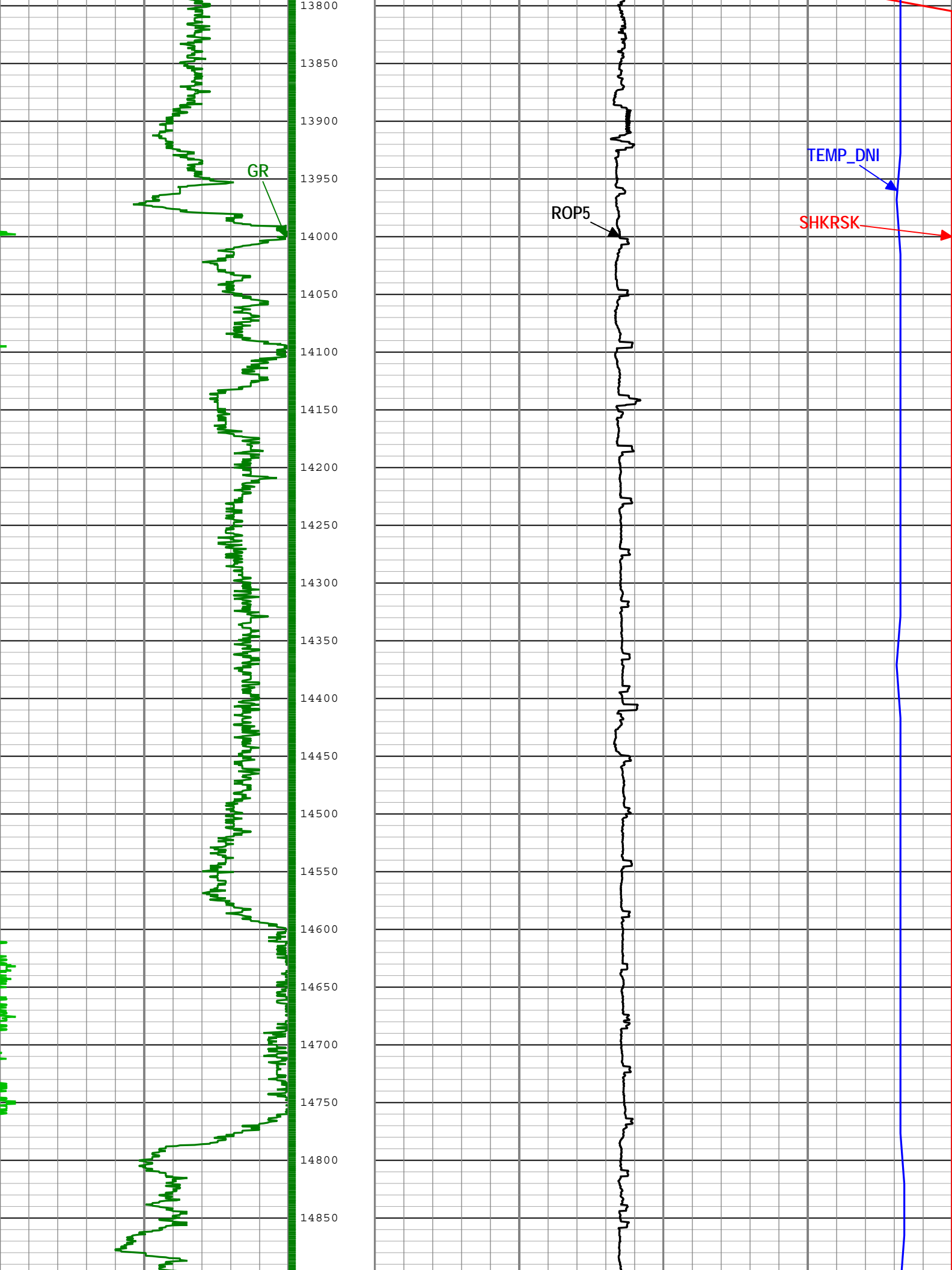


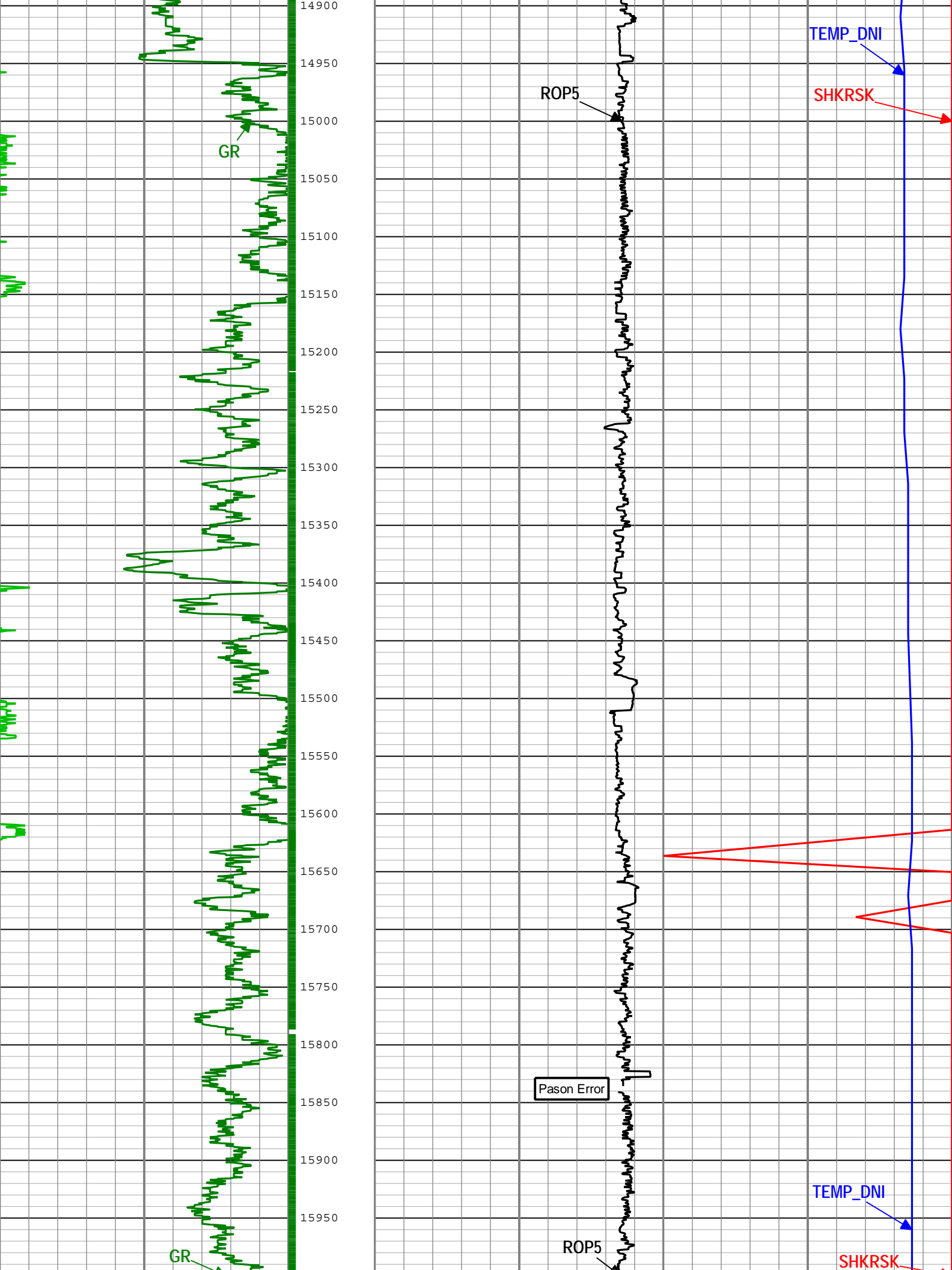


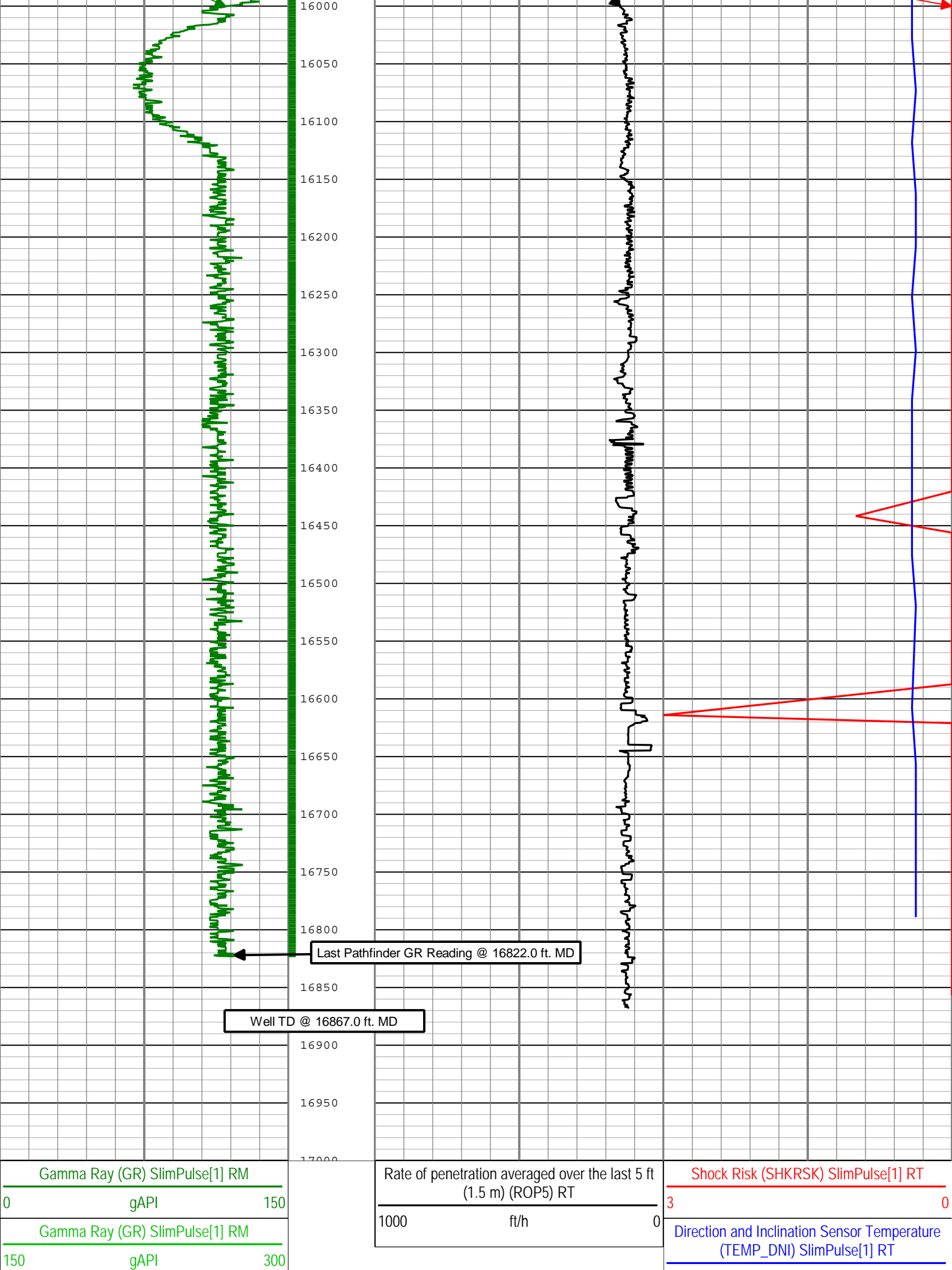












100                      degF                      300

Description: SlimPulse Gamma Ray 1    Format: Log ( SlimPulse Gamma Ray Final MD )    Index Scale: 1 in per 100 ft    Index Unit: ft    Index Type: Measured  
Depth    Creation Date: 03-Oct-2014 12:34:09

## Lateral1: Parameters

## Lateral1Depth Zoned Parameters

All depth are actual.

## UDComposite 1

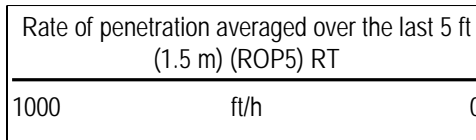
## 5 in / 100 ft Measured Depth

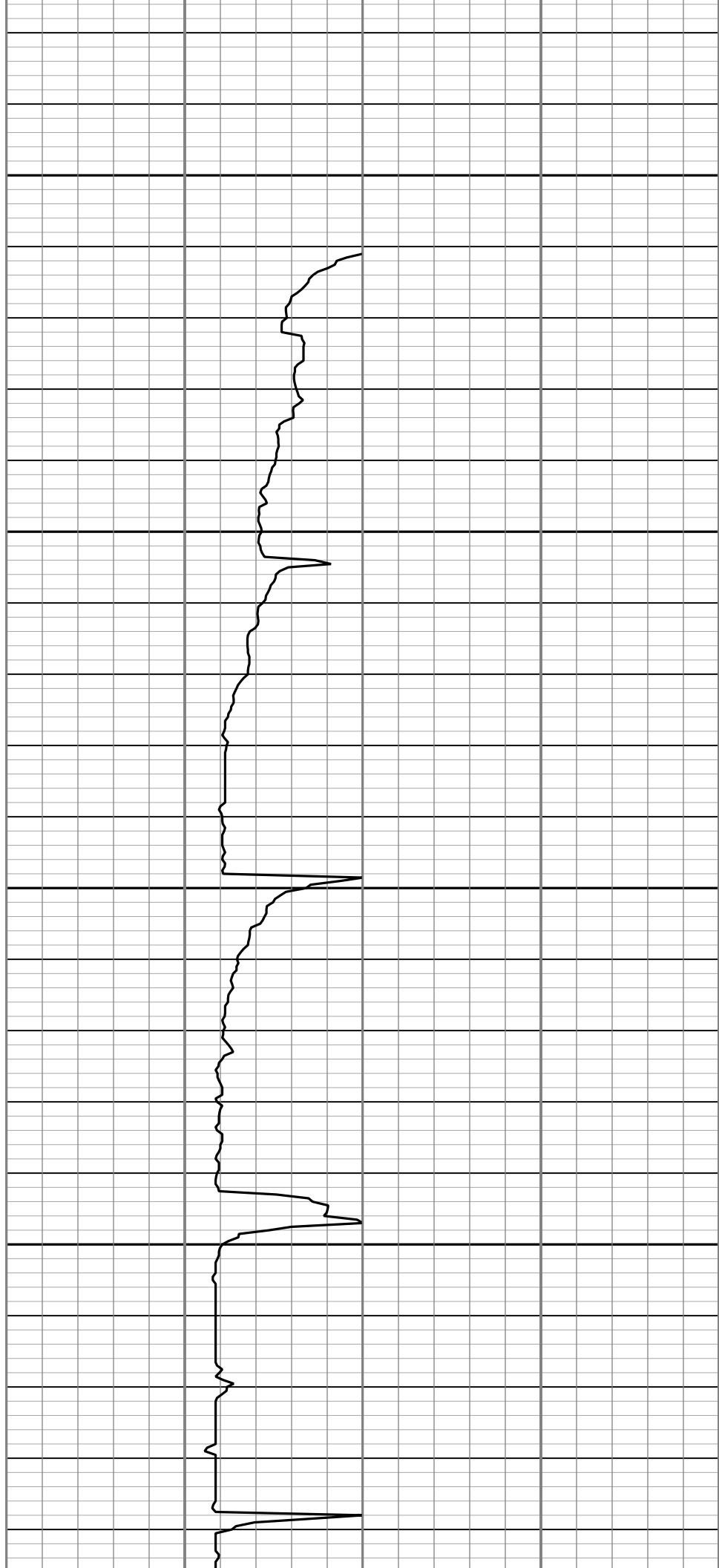
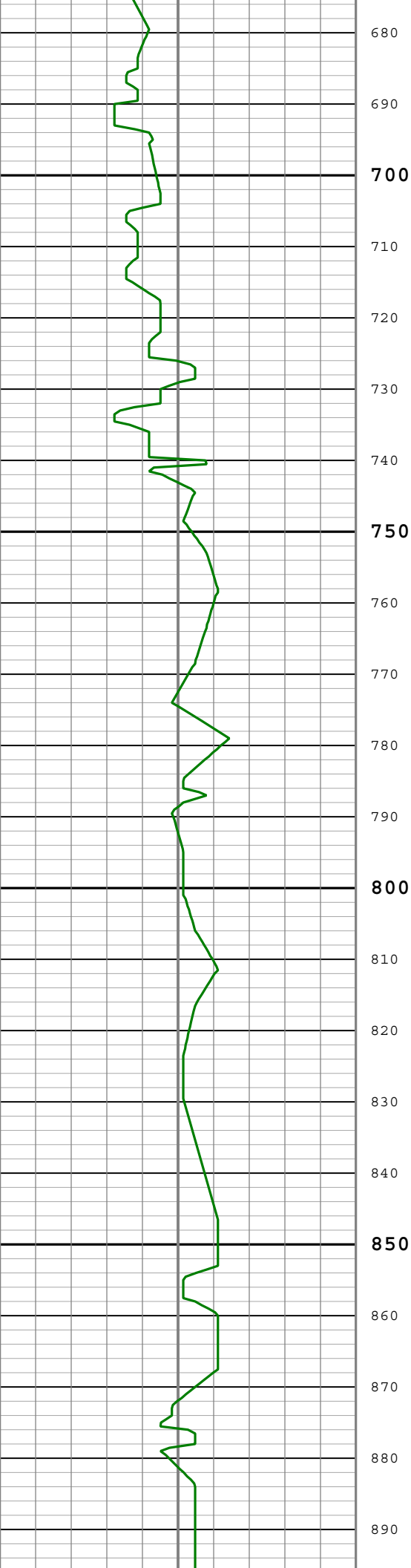
All depths are referenced to toolstring zero

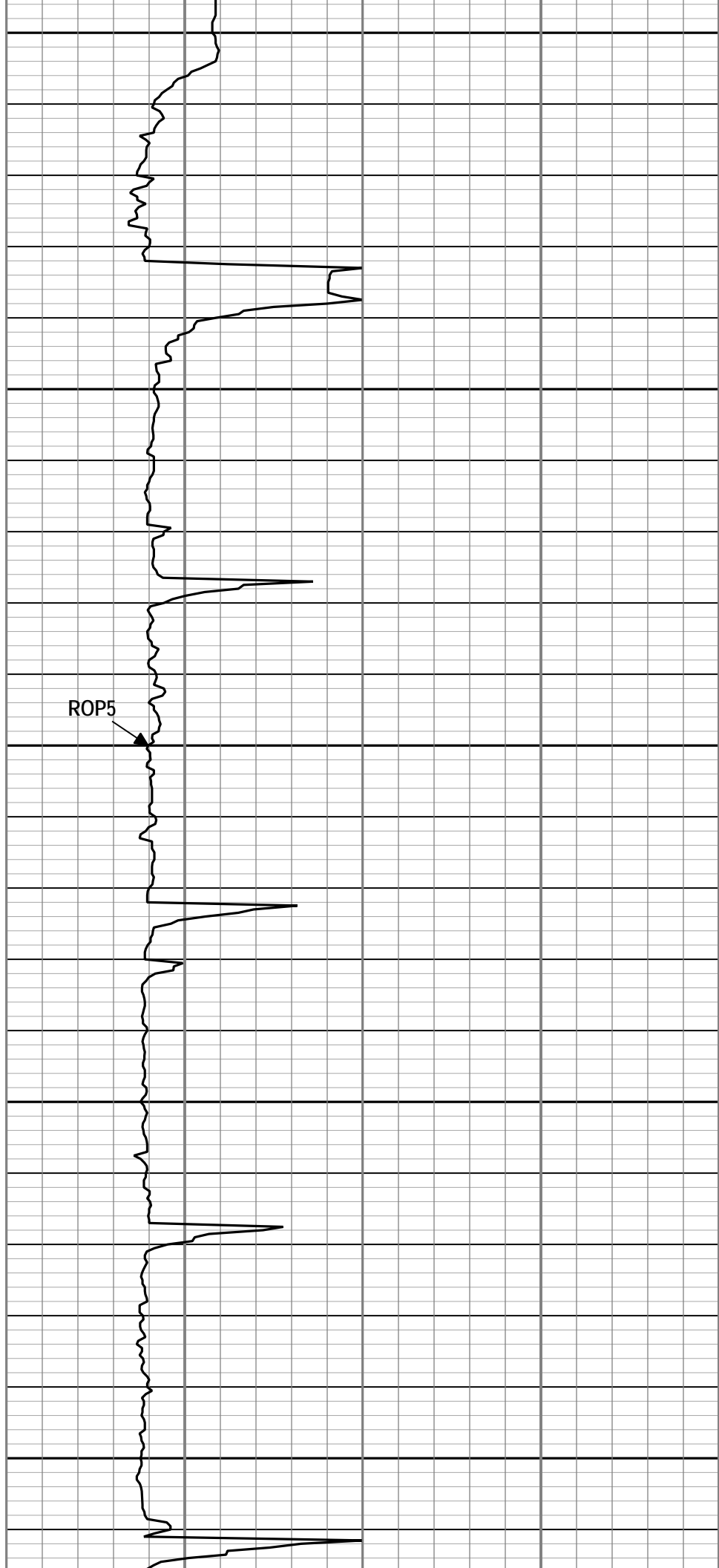
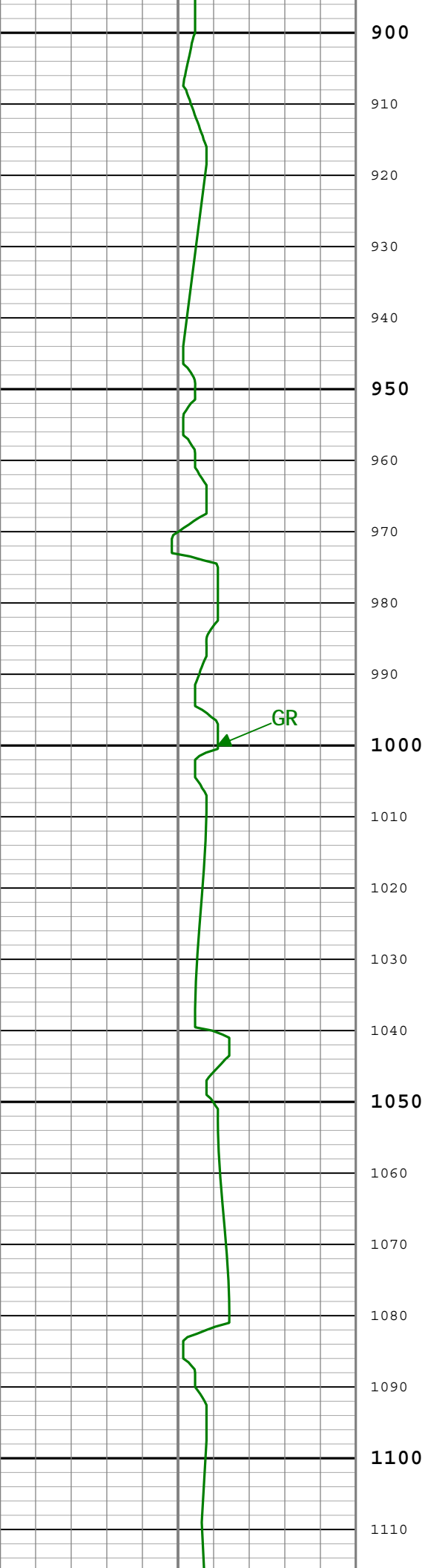
## UDComposite 1:S528

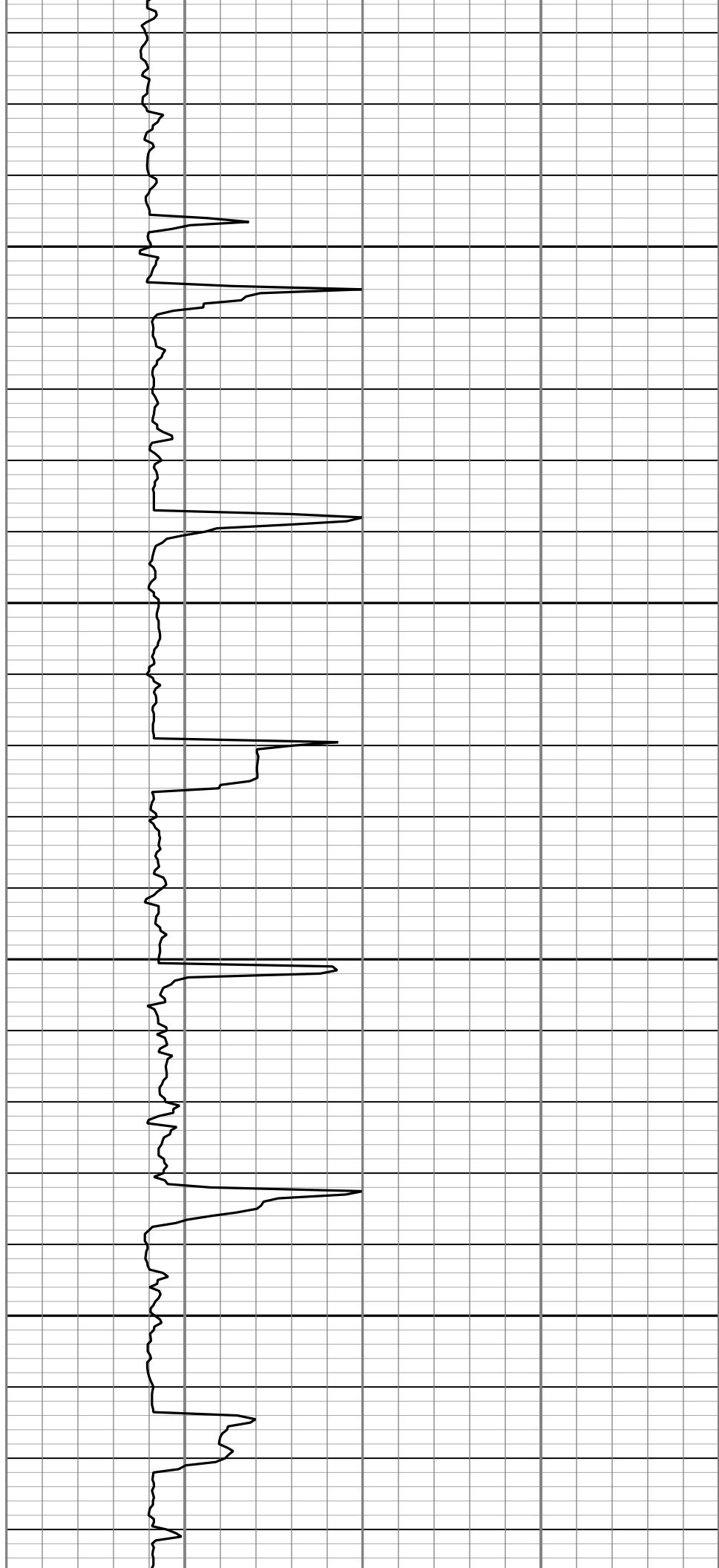
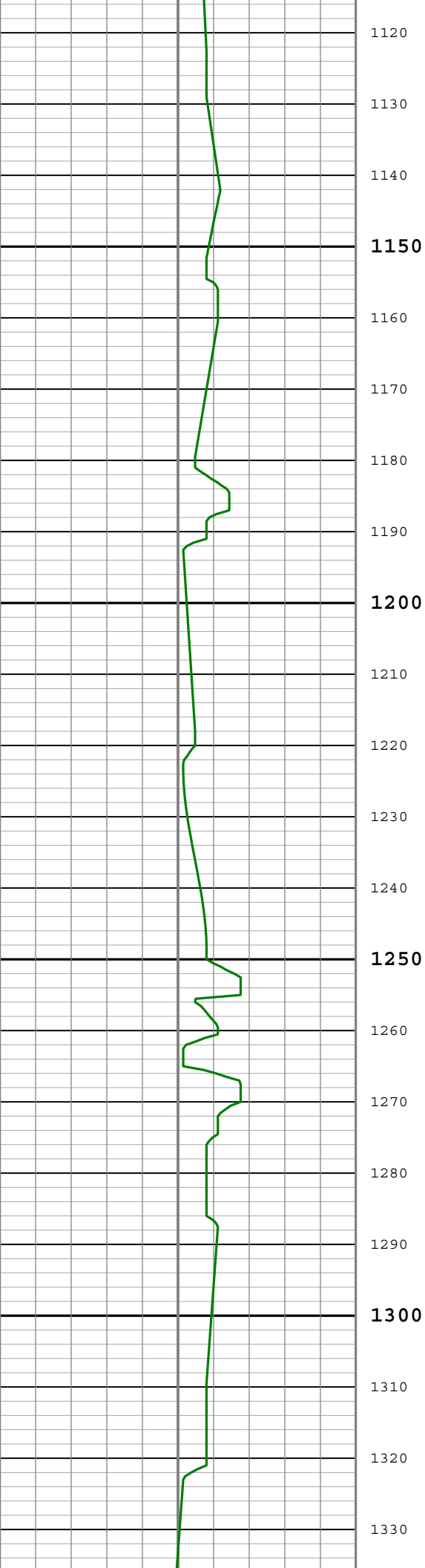
| Ticks\_GR - Gamma Ray Tick Marks SlimPulse[1] RM

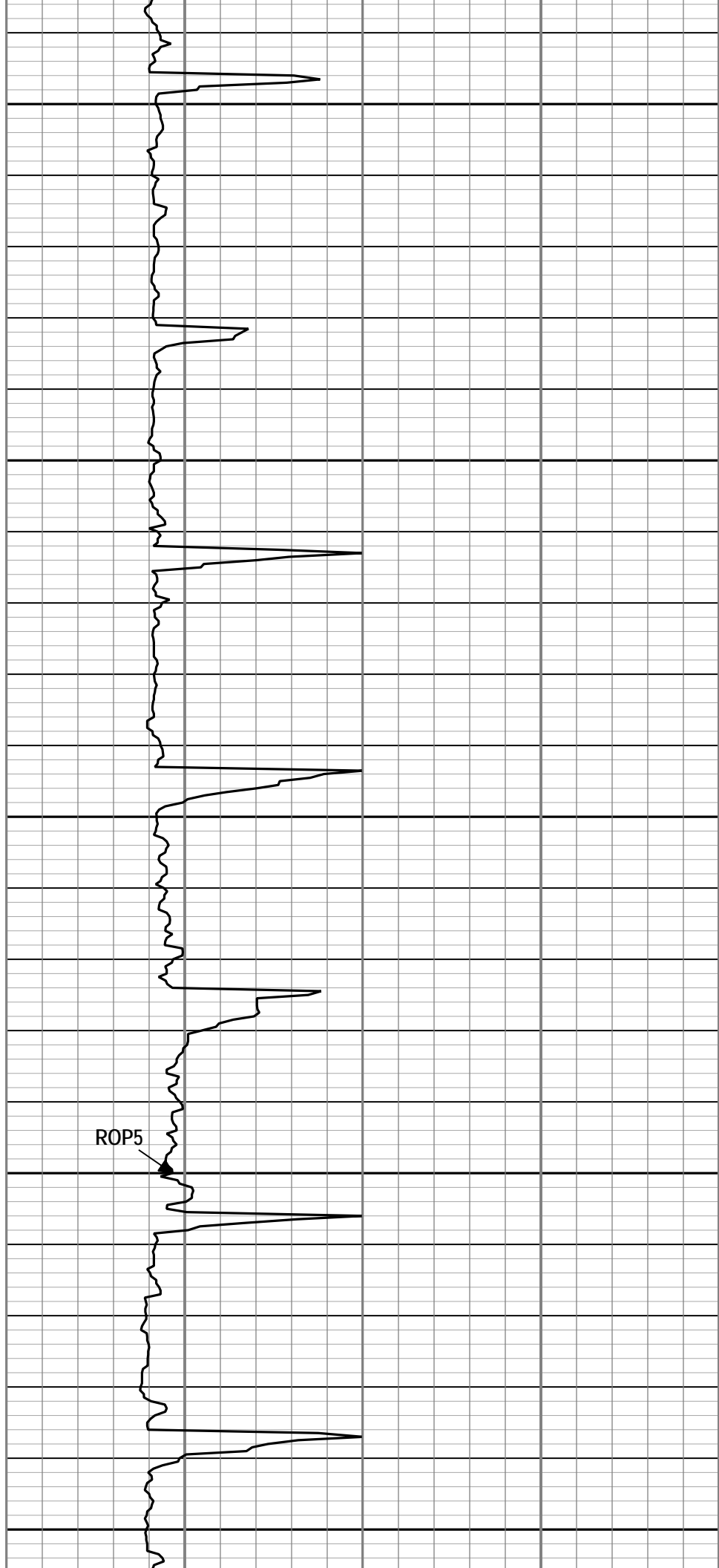
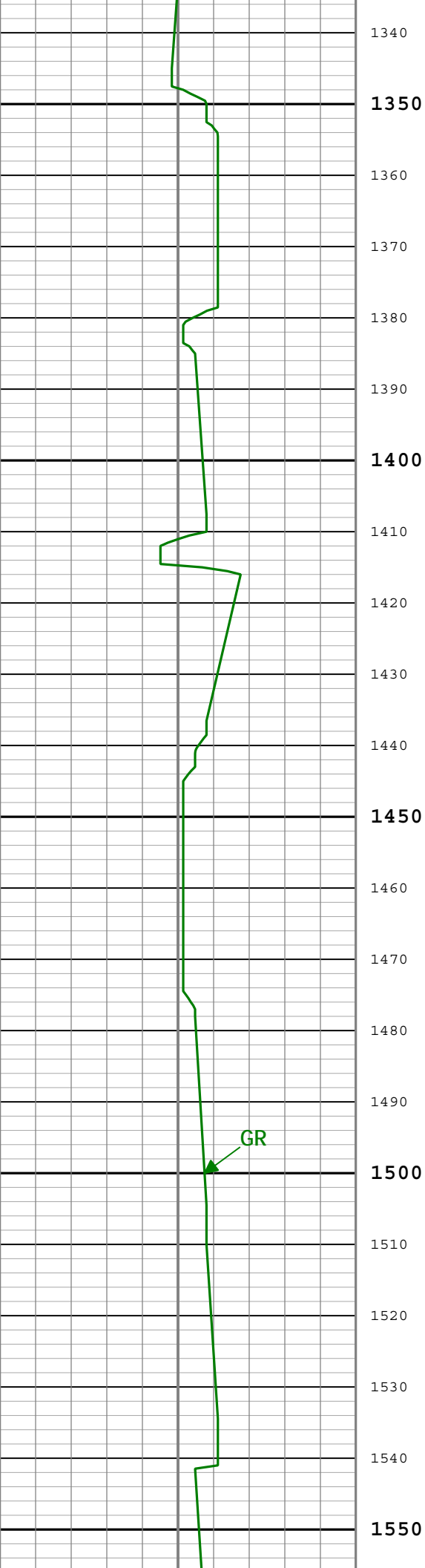
Shock Risk (SHKRSK) SlimPulse[1] RT	
3	0
Direction and Inclination Sensor Temperature (TEMP_DNI) SlimPulse[1] RT	
100	300
degF	

[illegible][illegible]

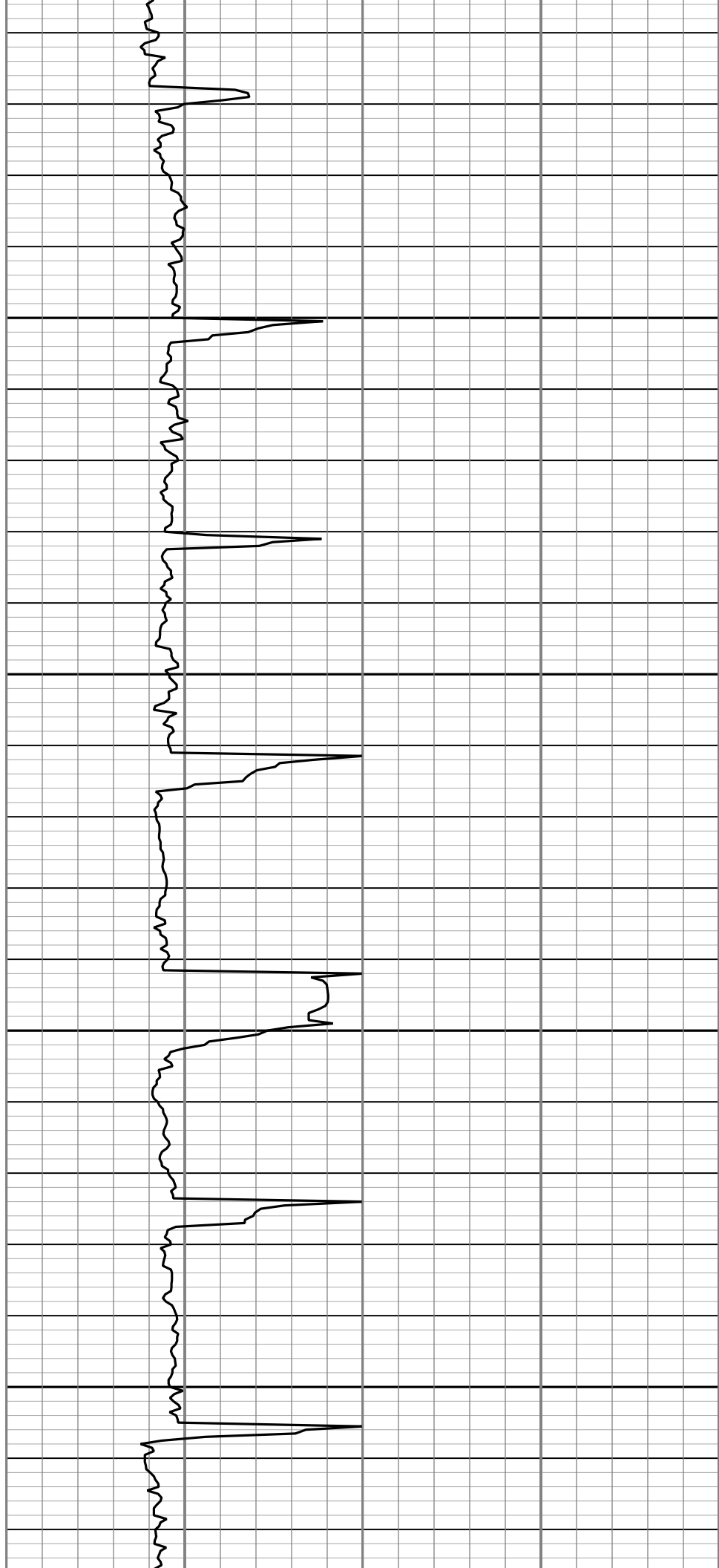
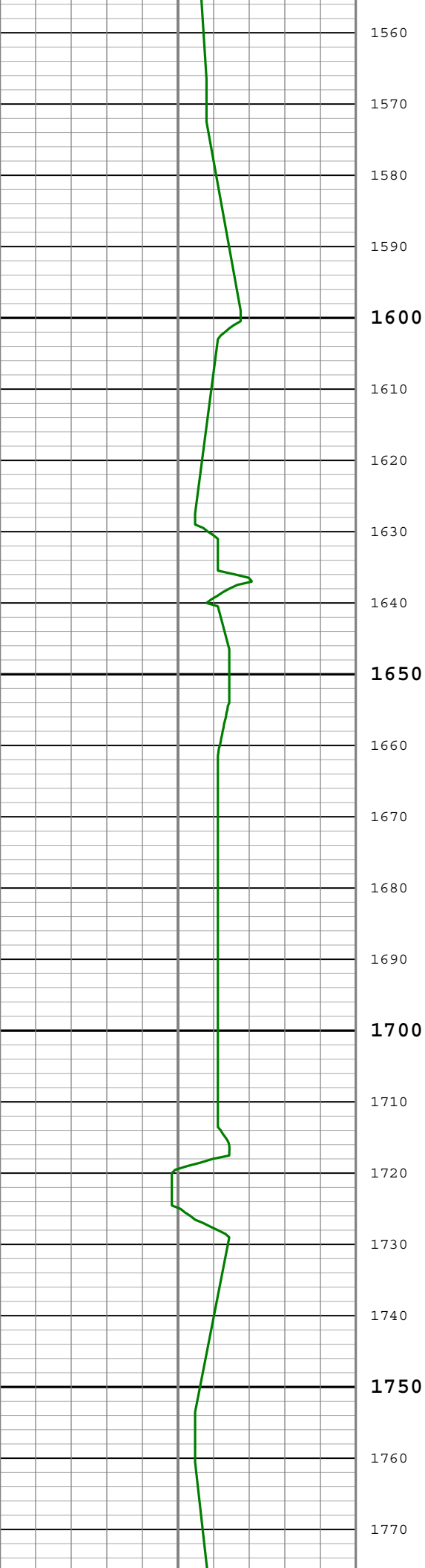


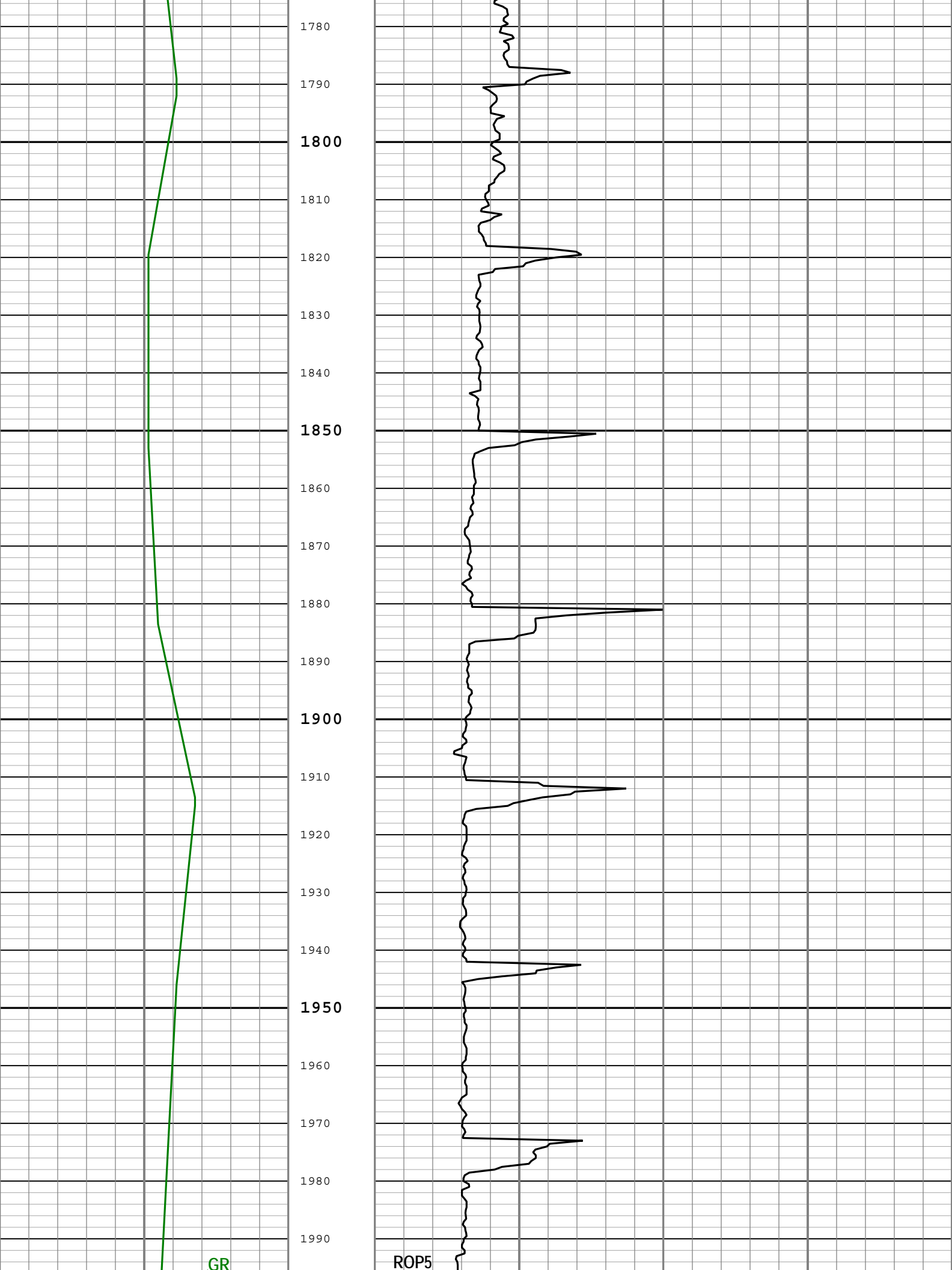


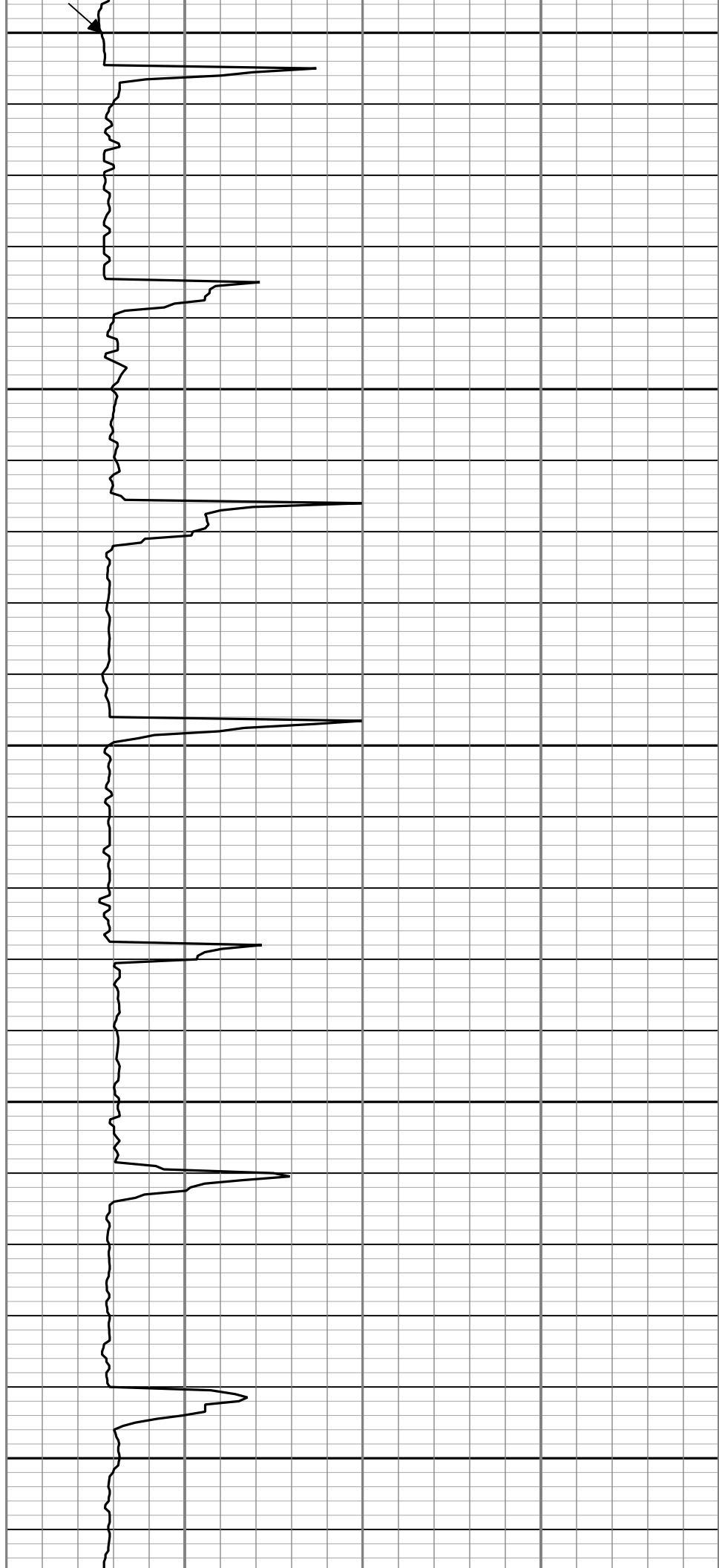
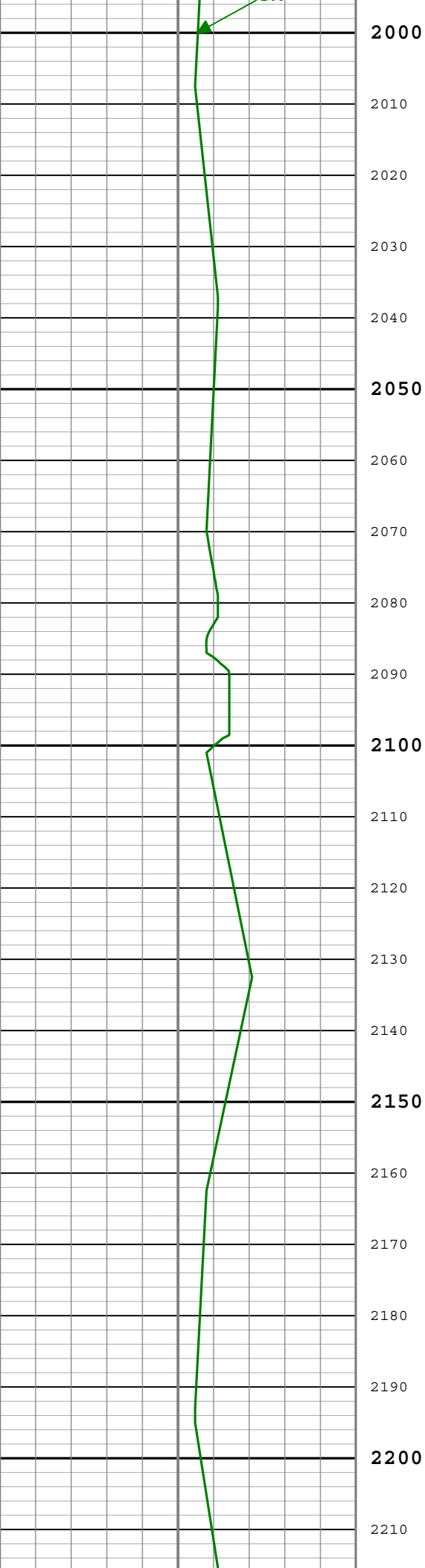


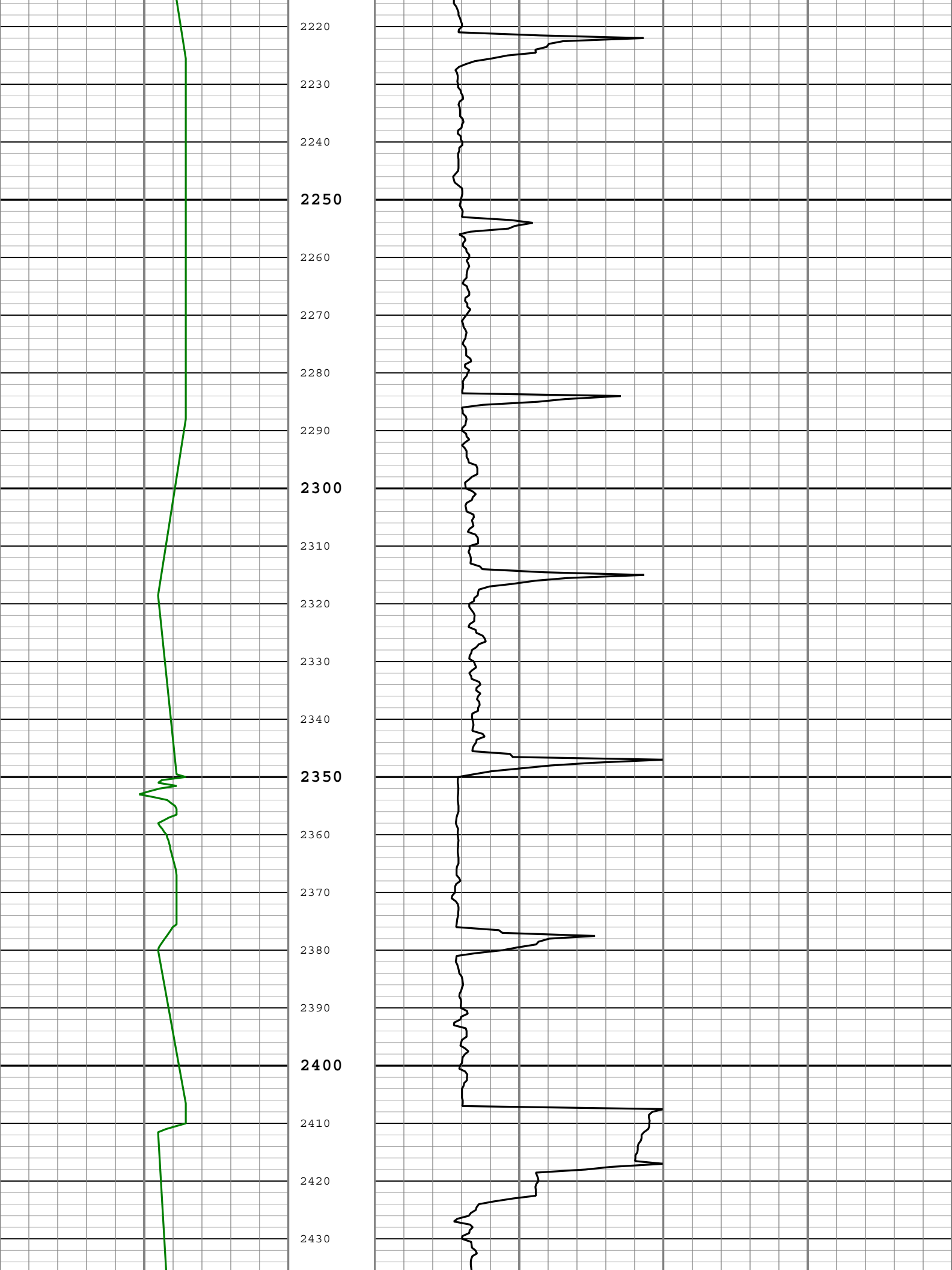


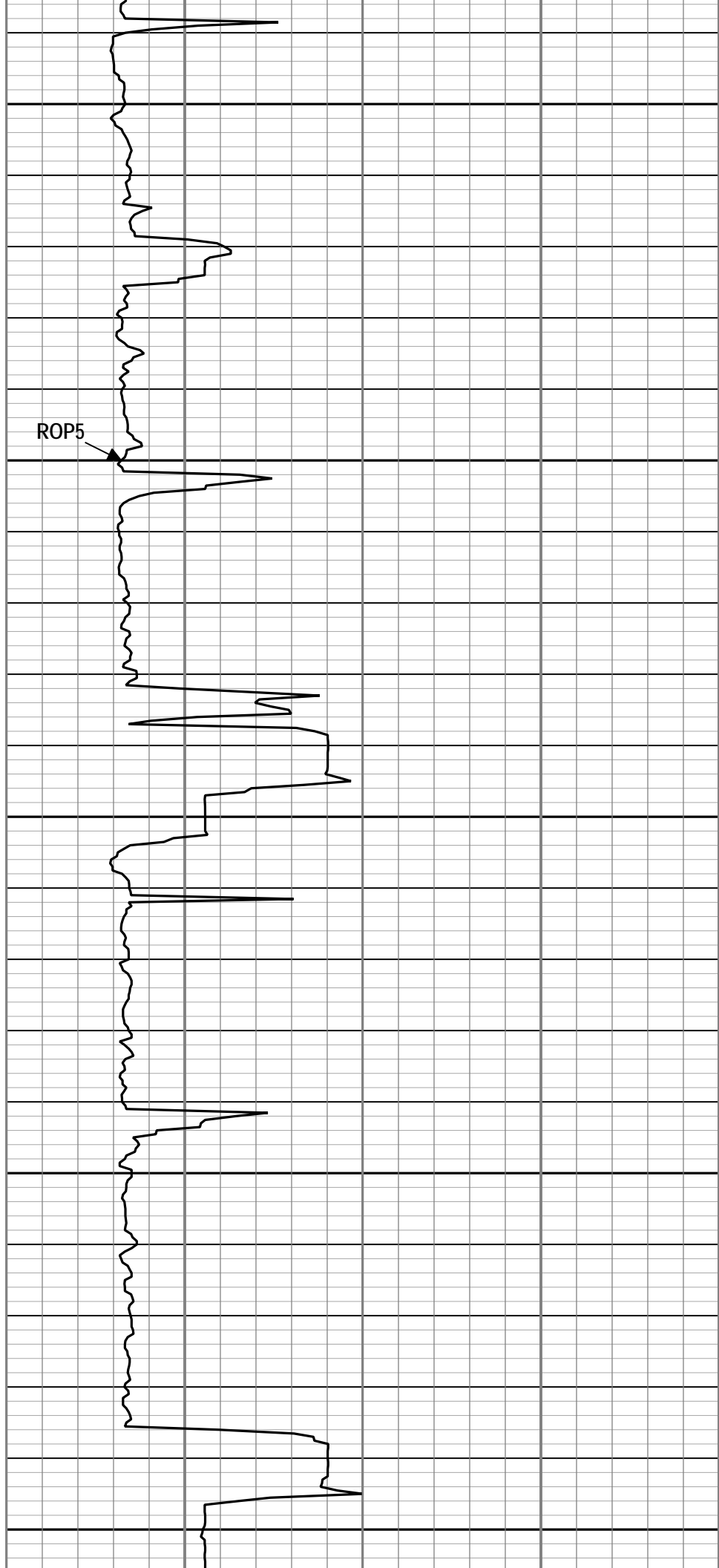
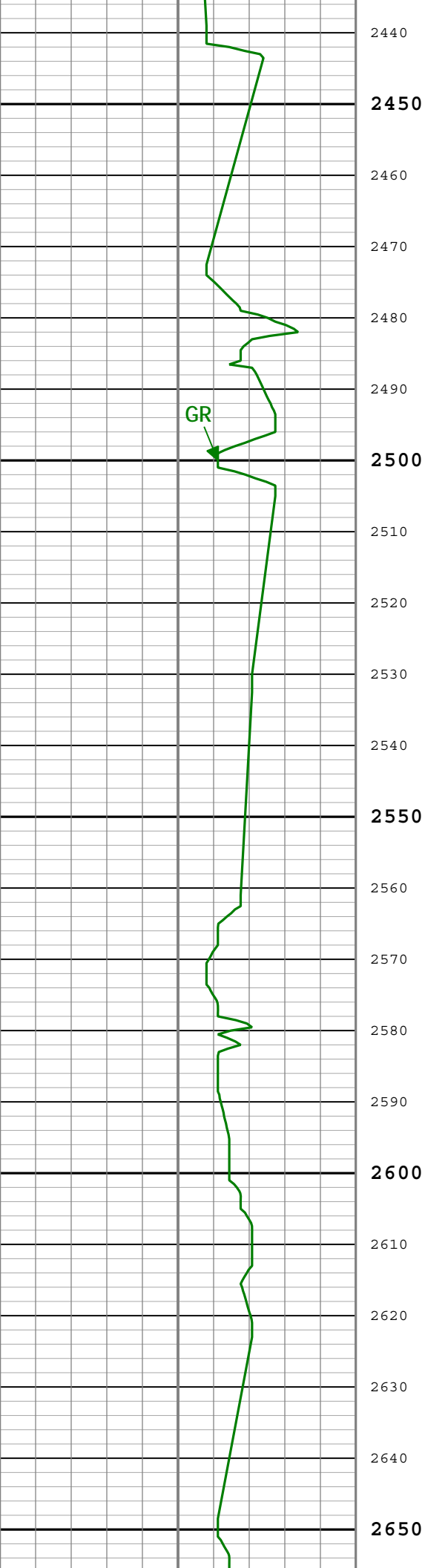


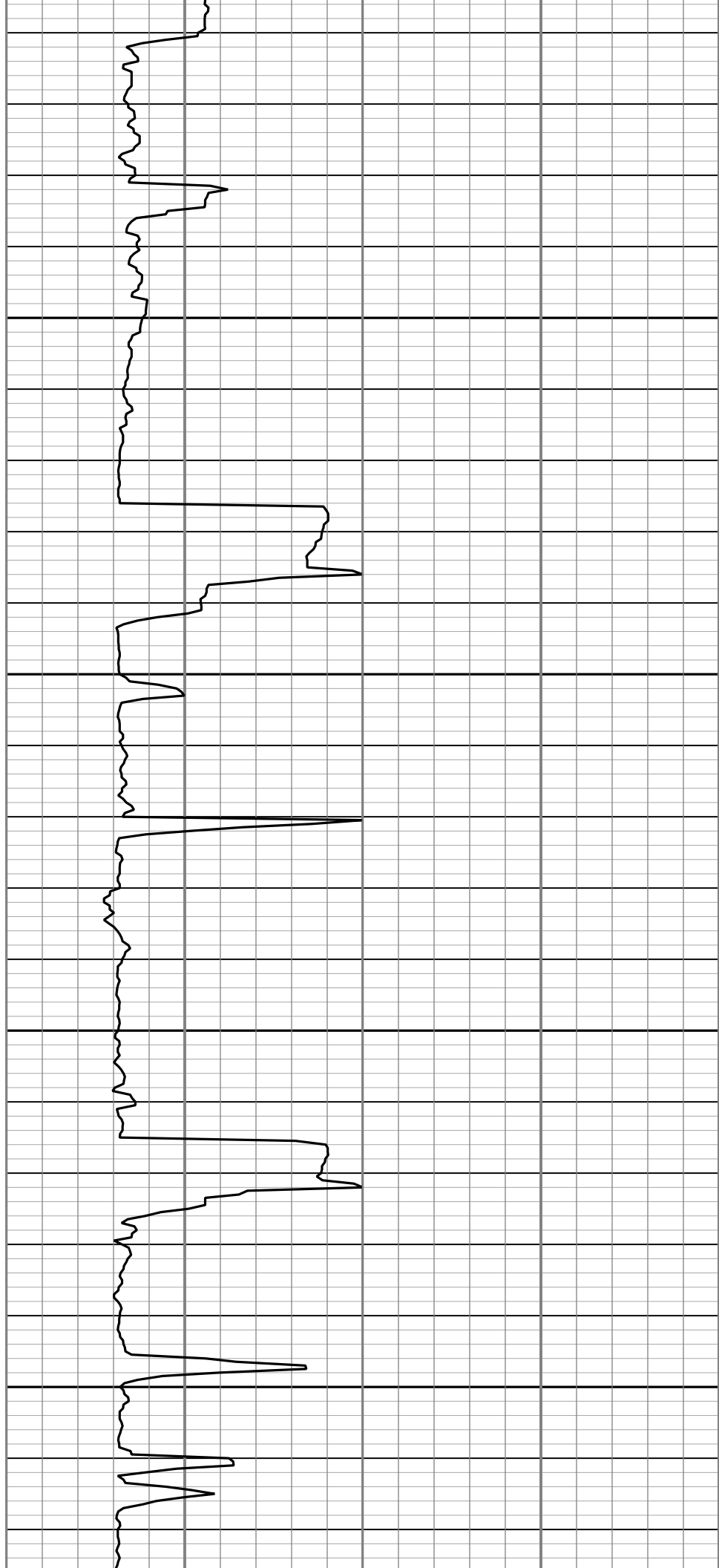
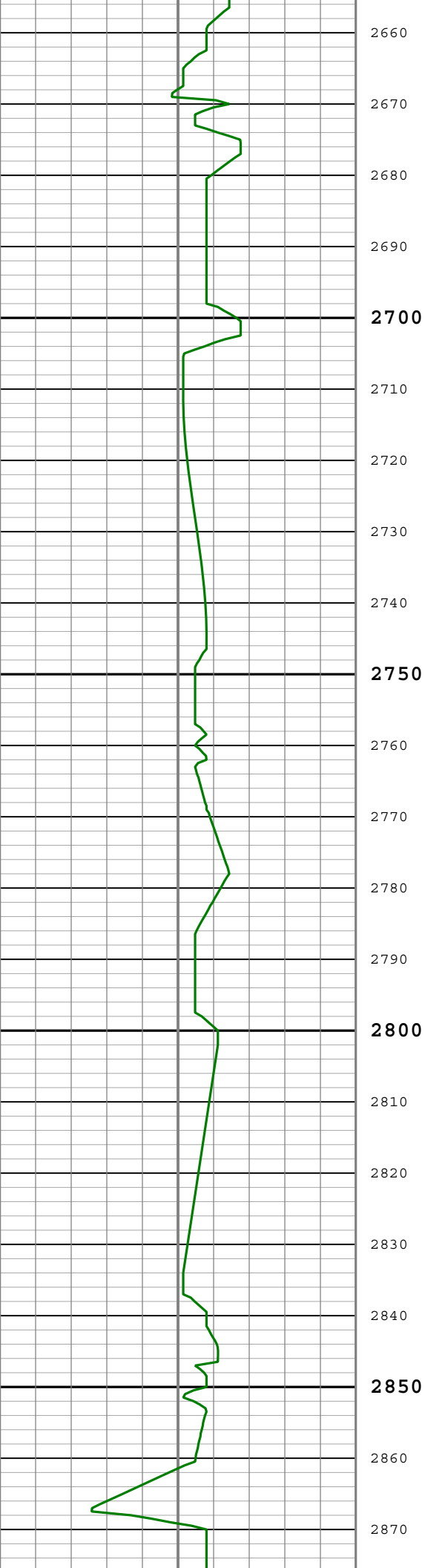


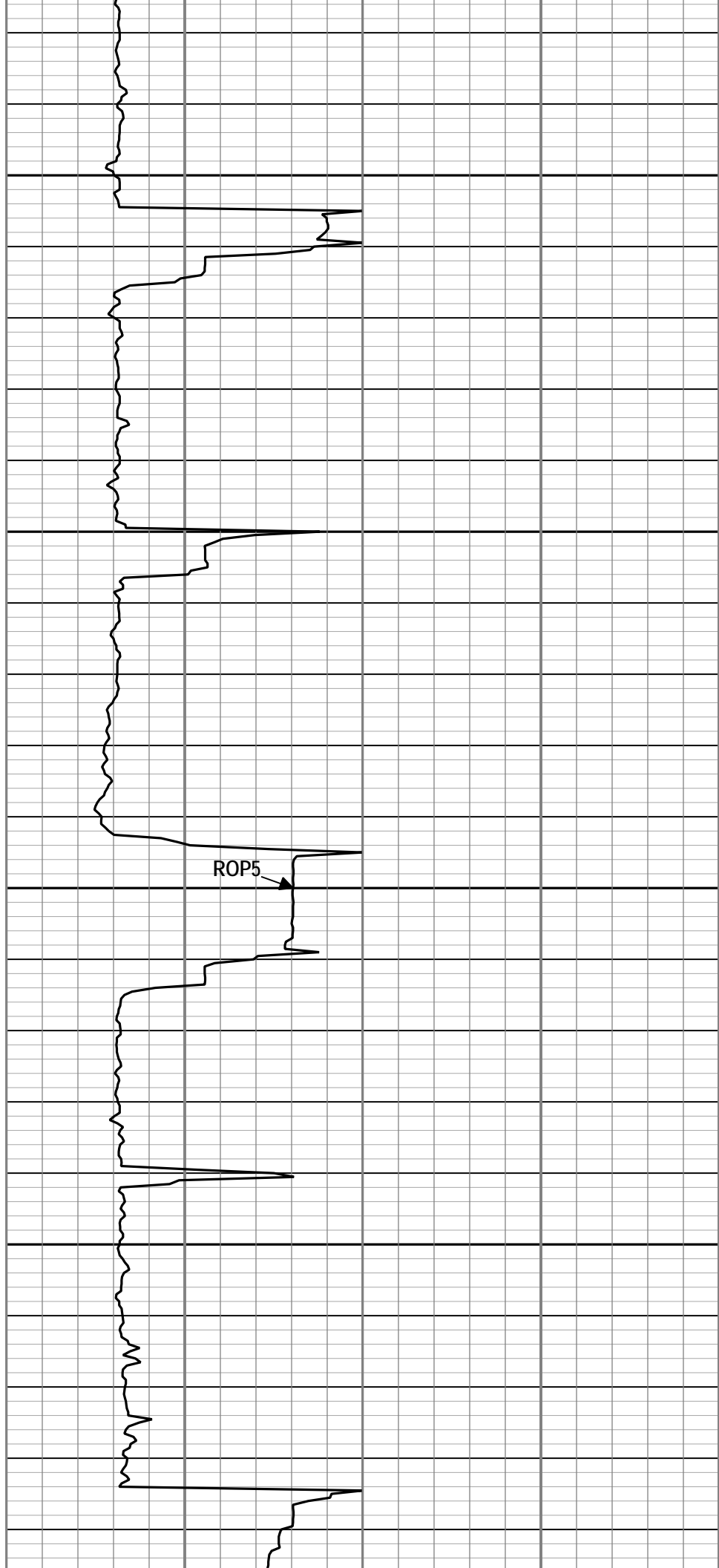
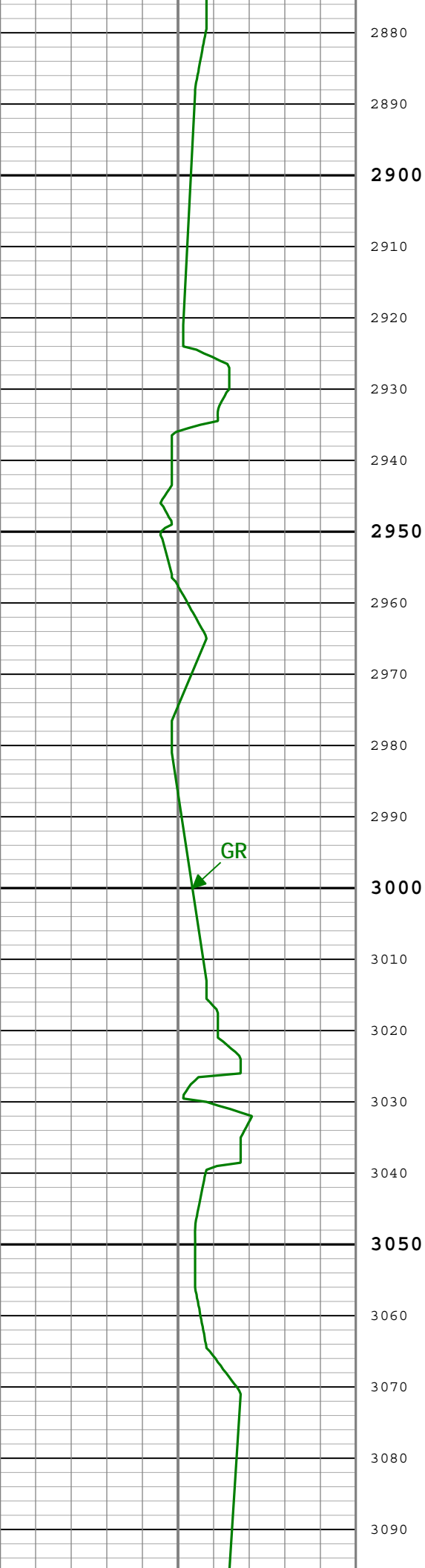


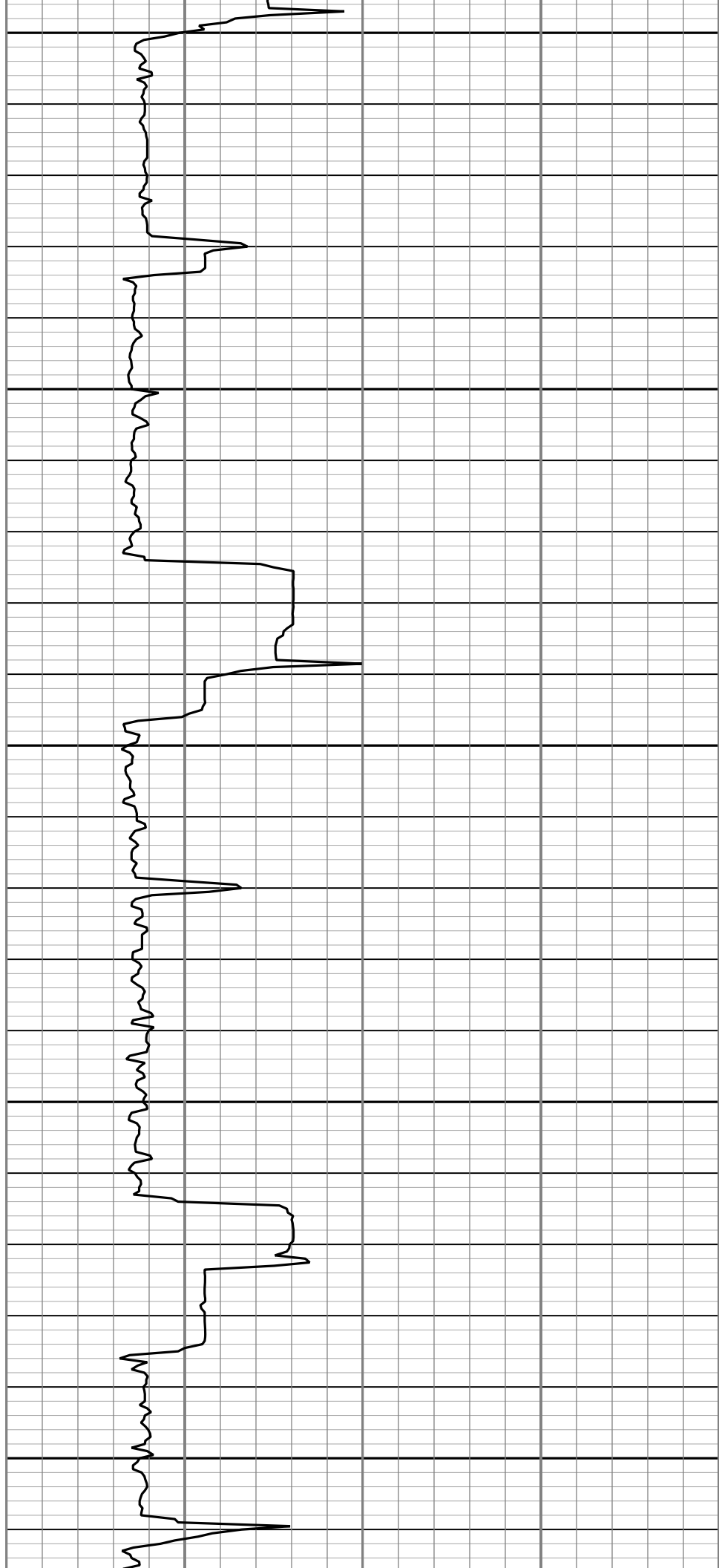
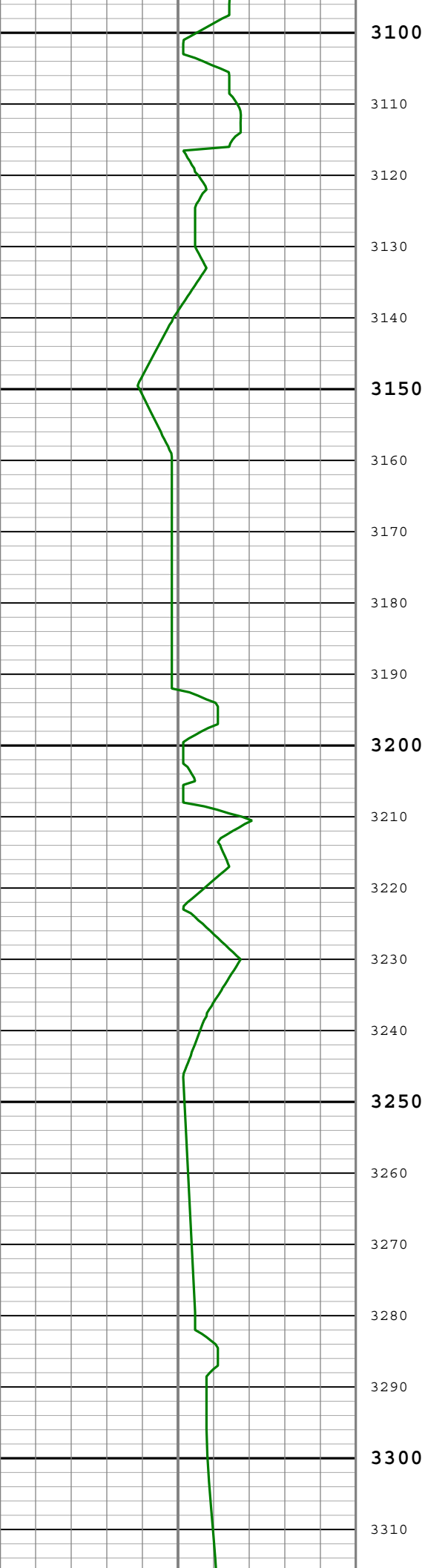




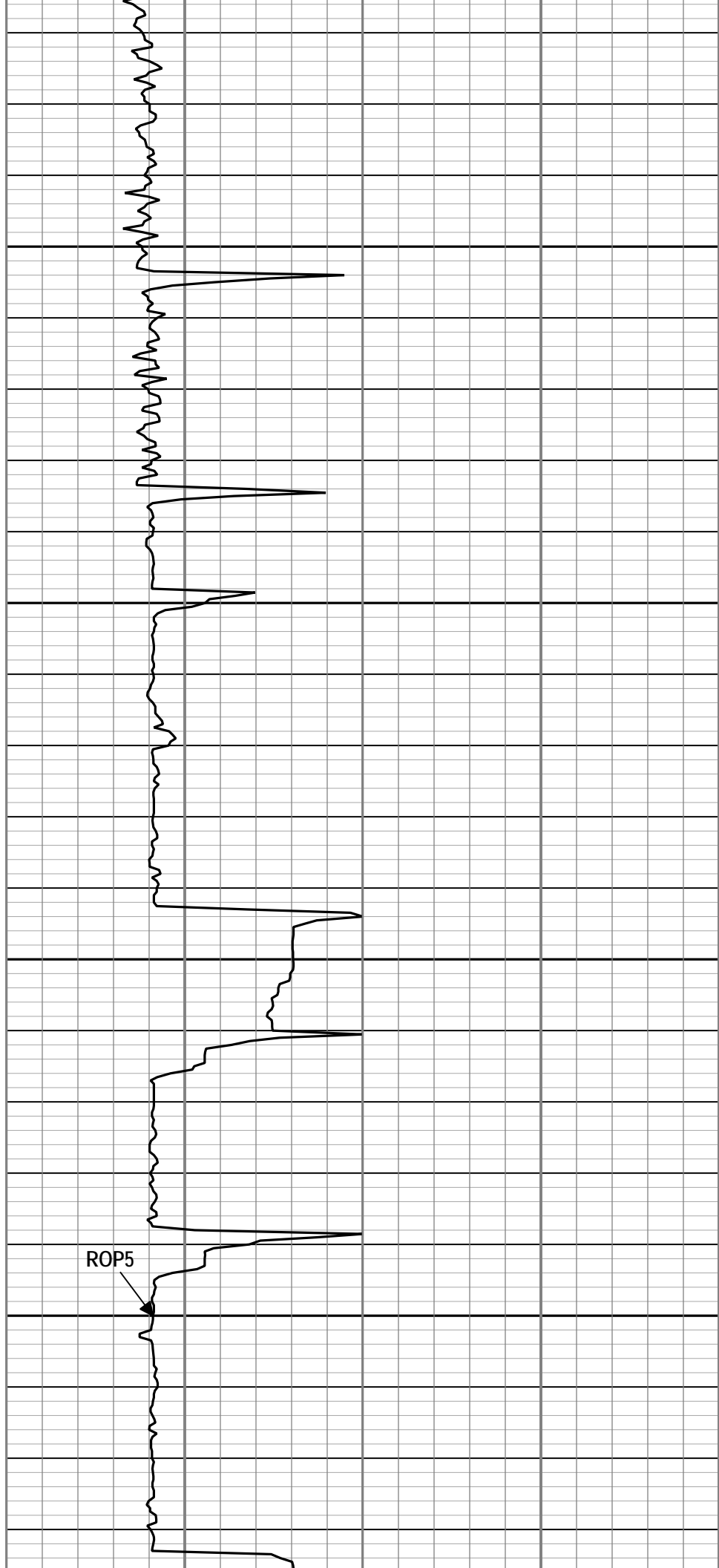
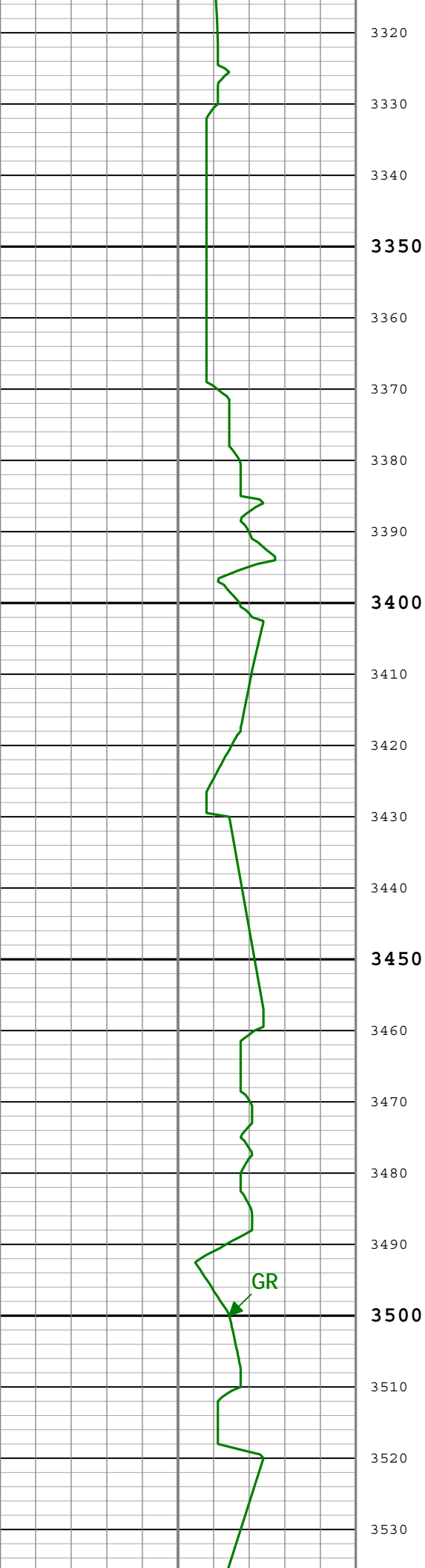


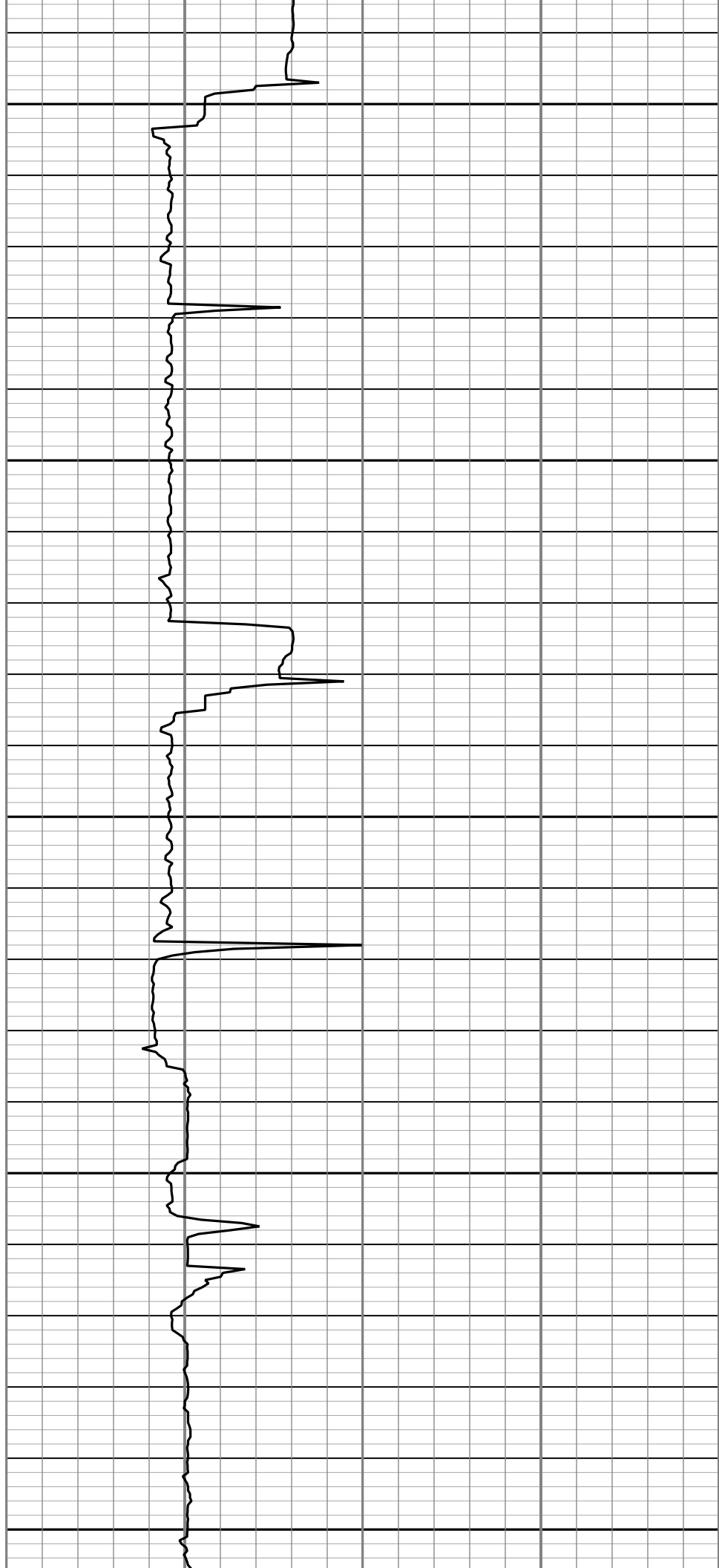
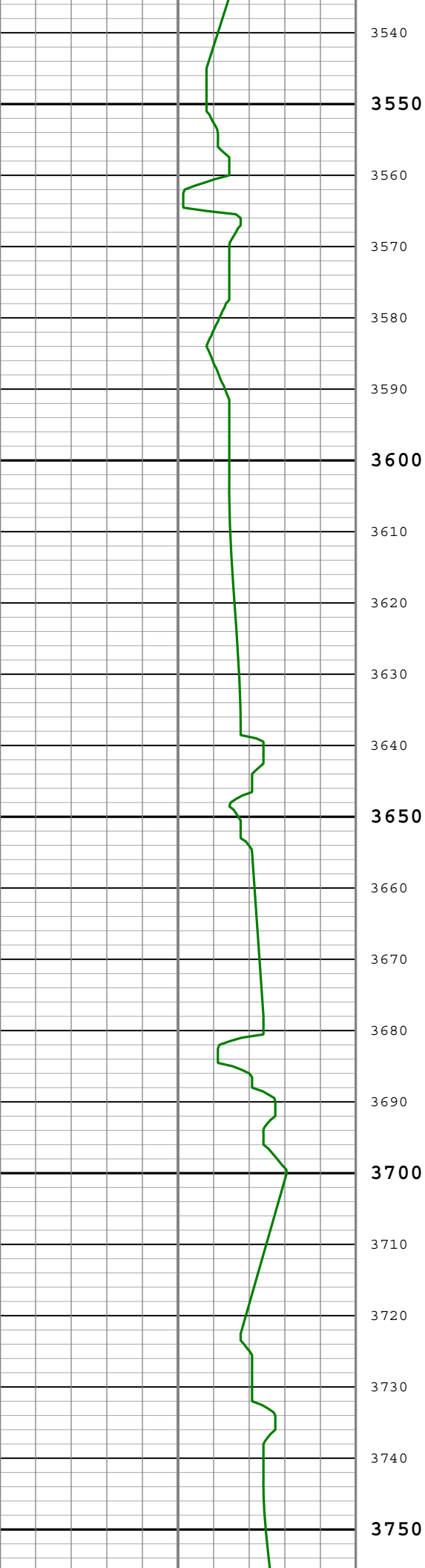


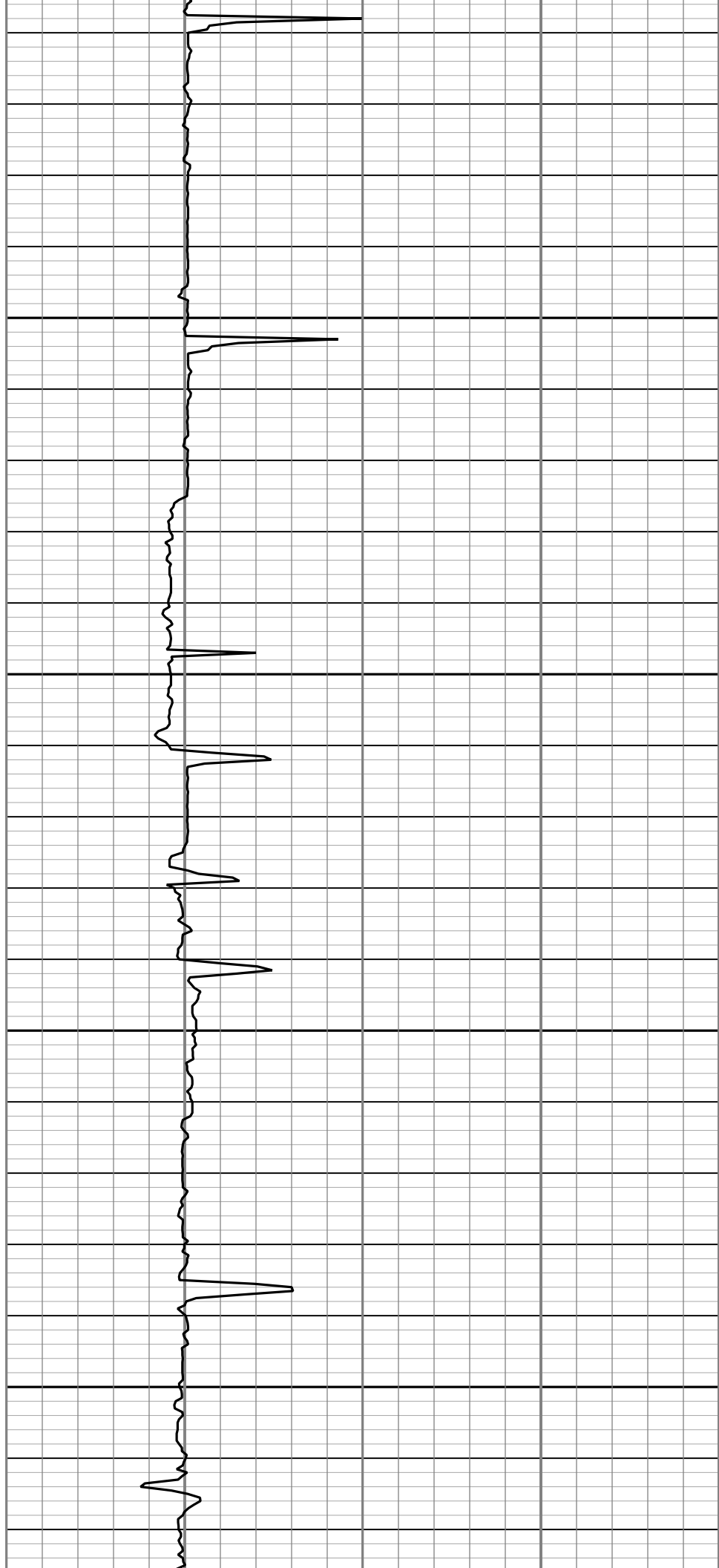
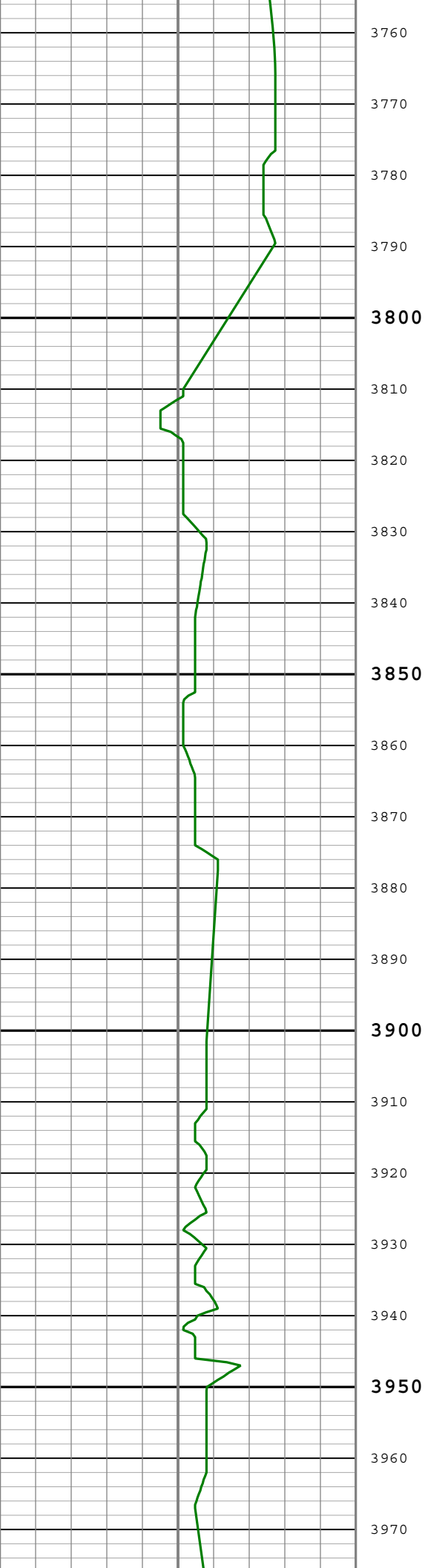


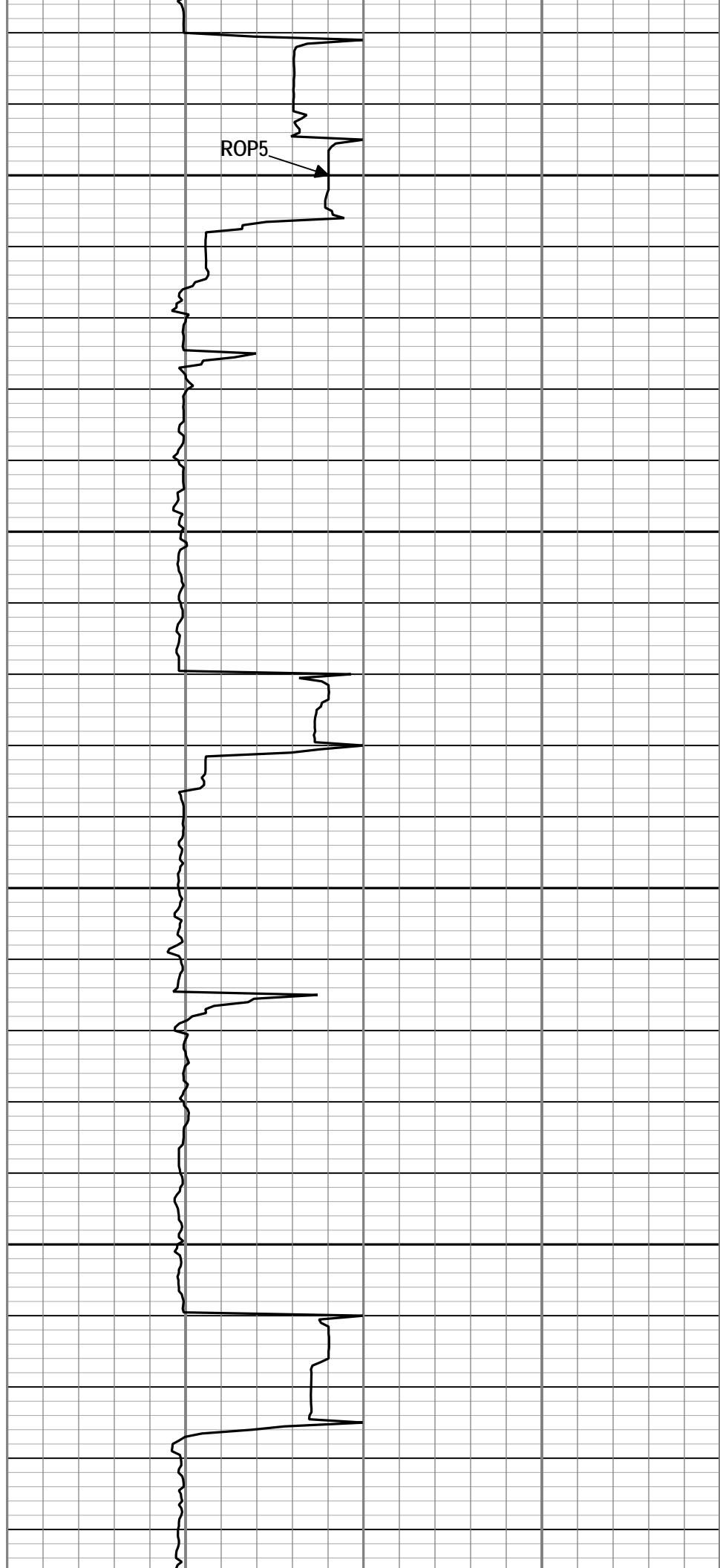
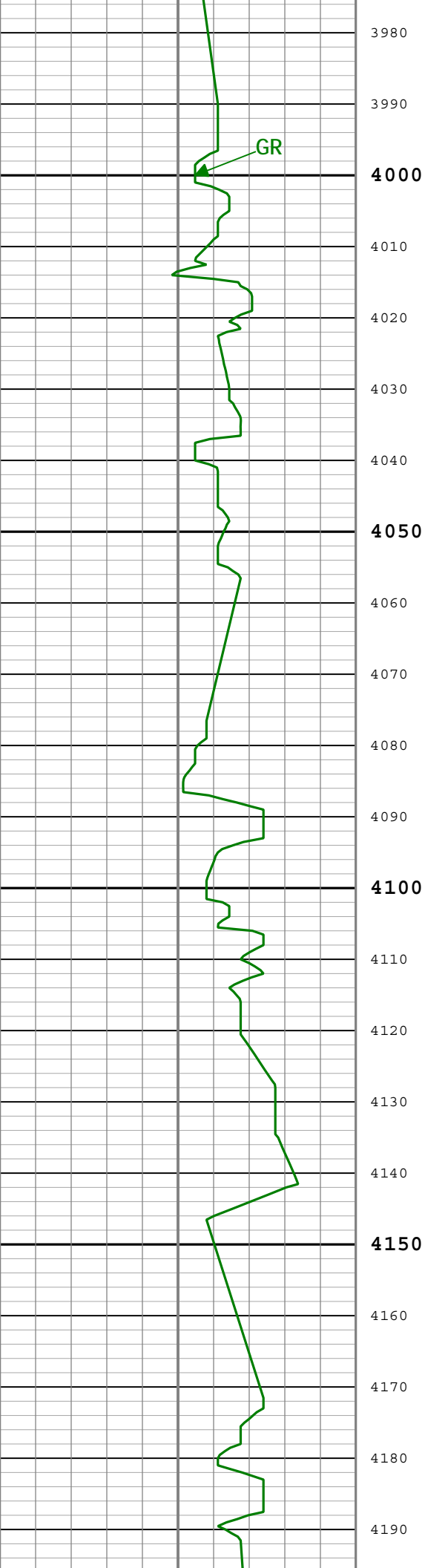


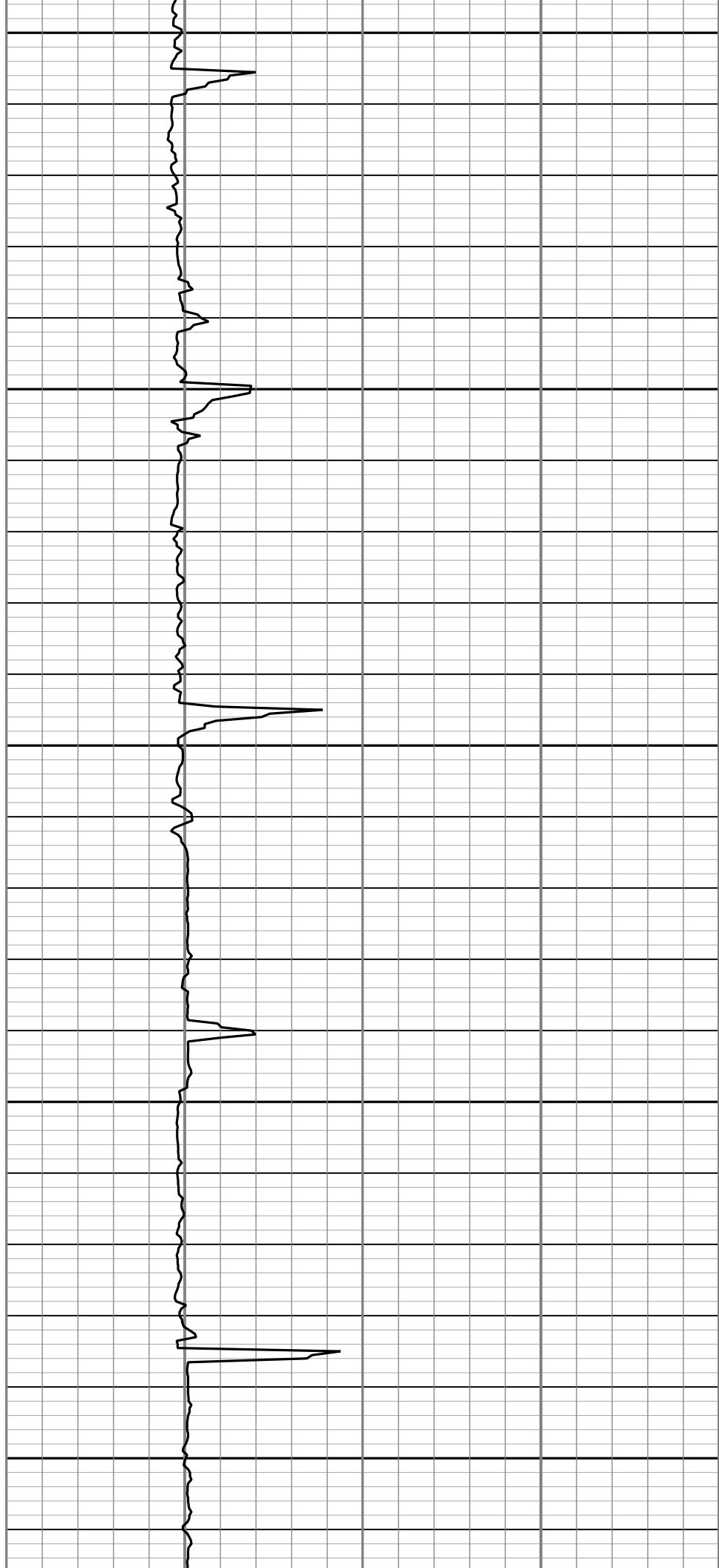
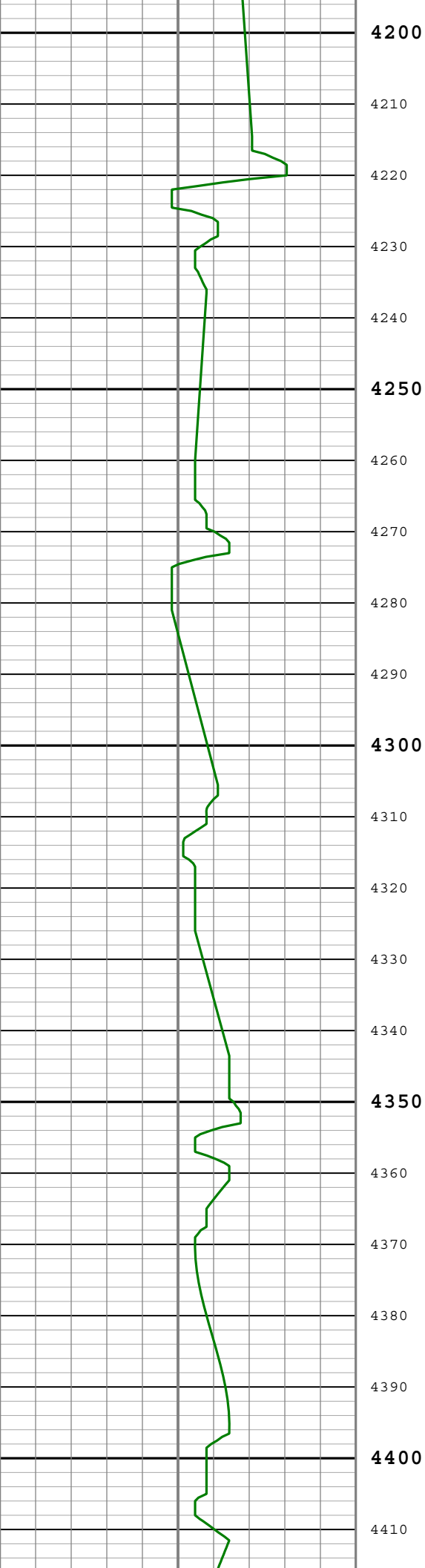


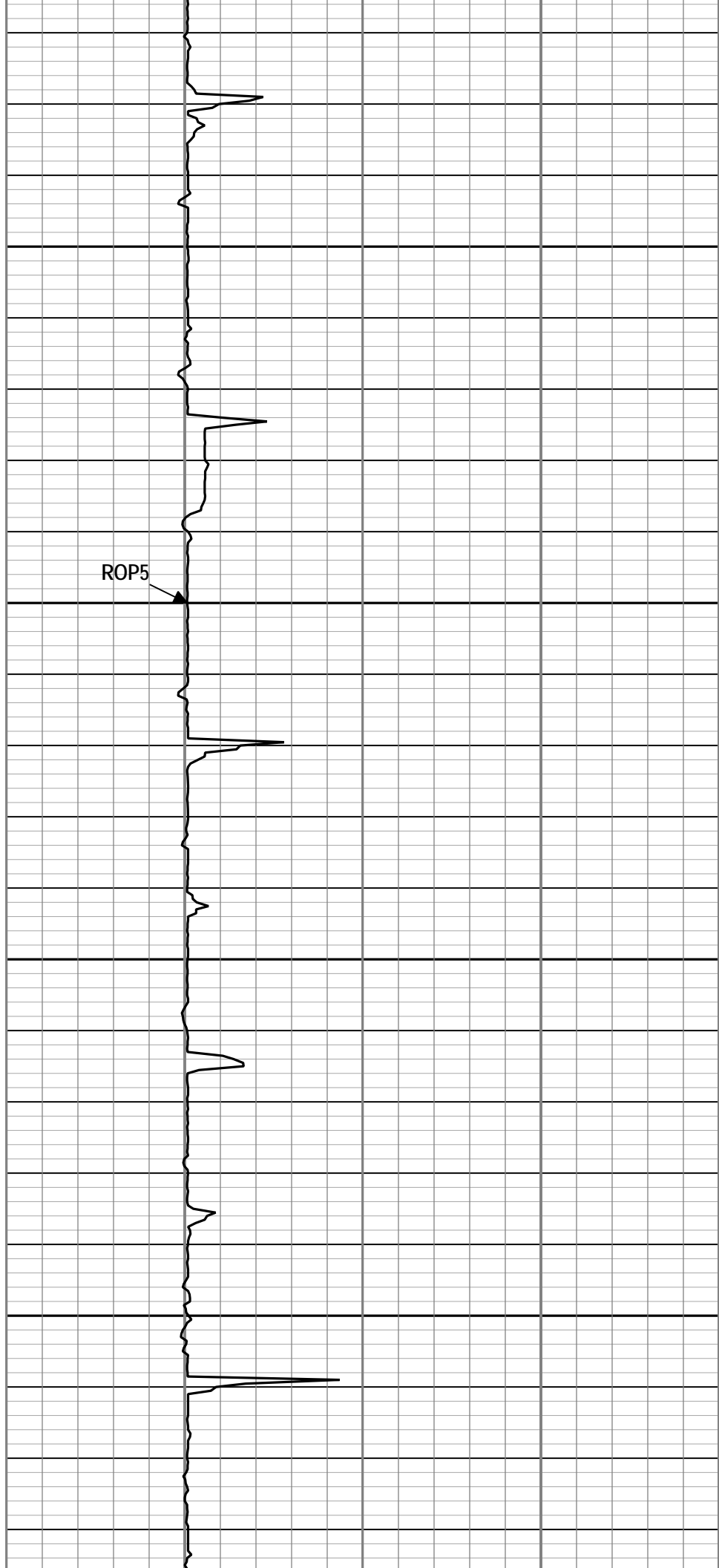
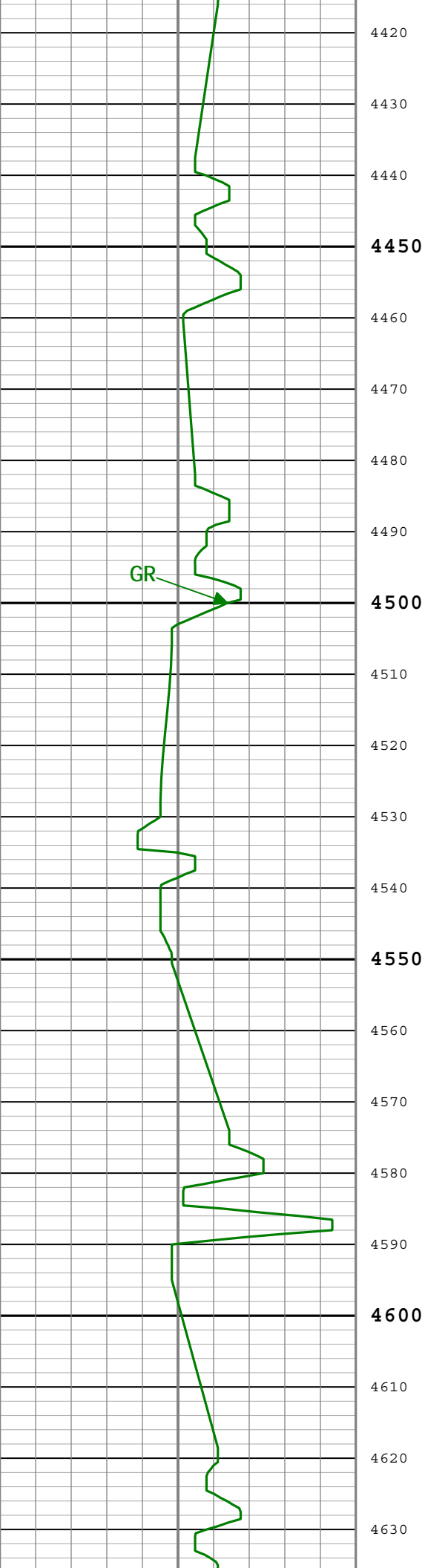


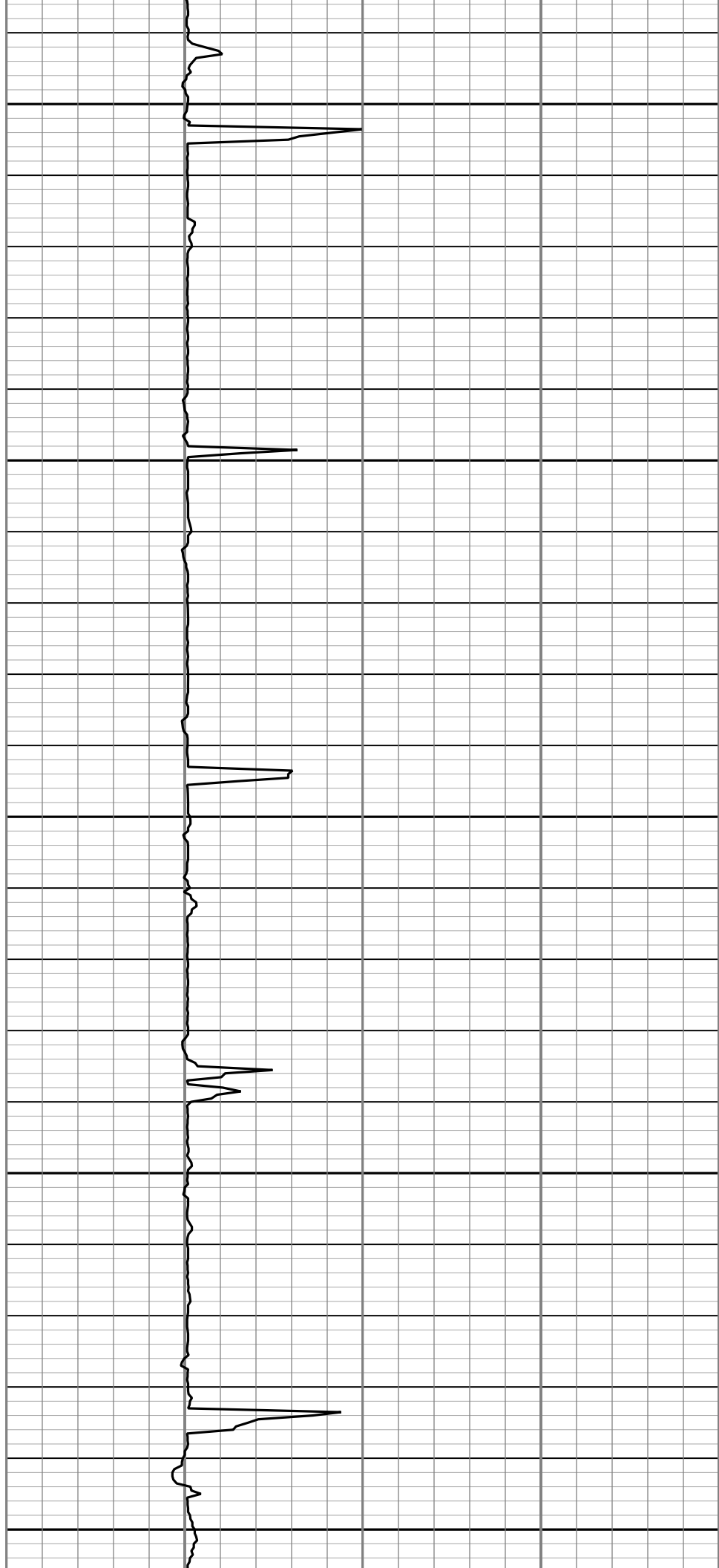
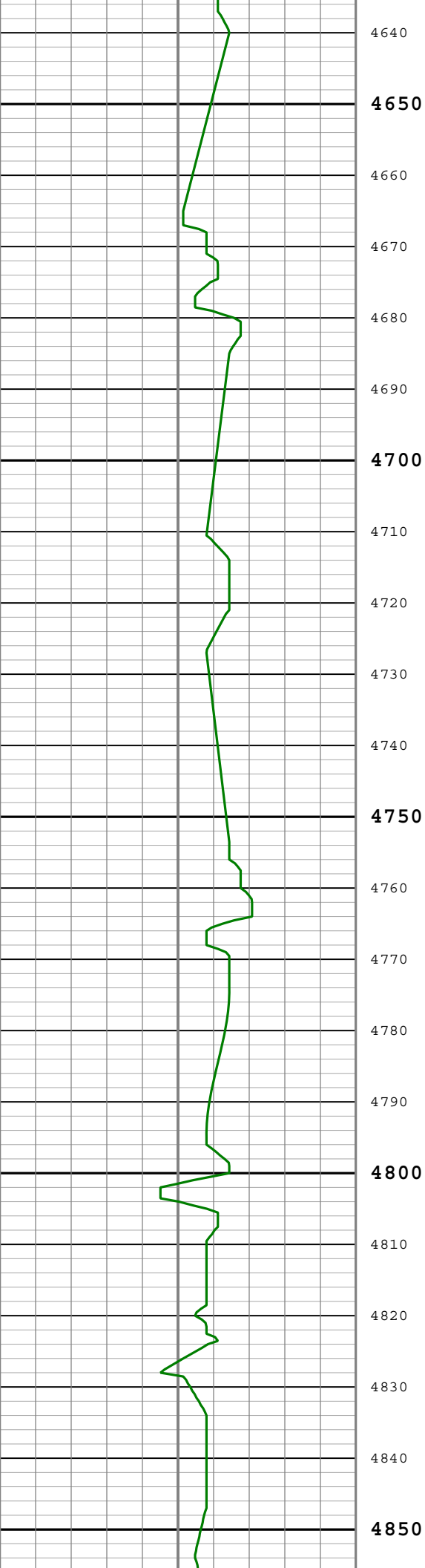


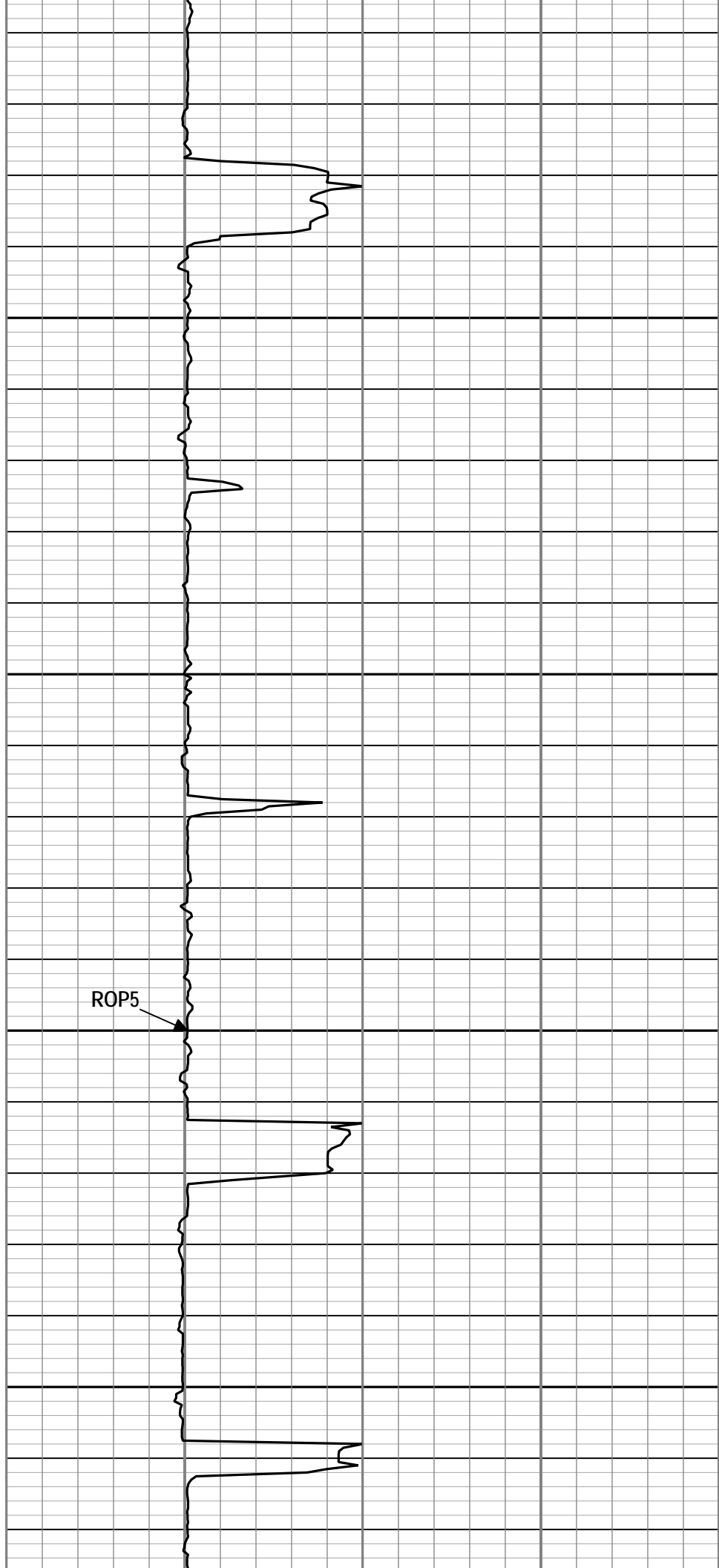
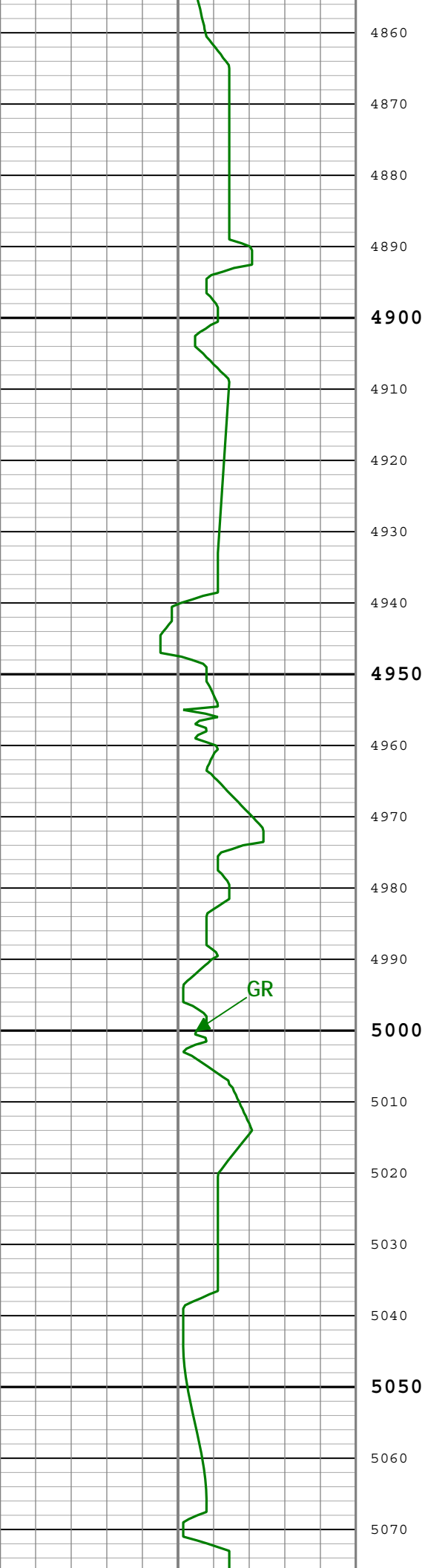




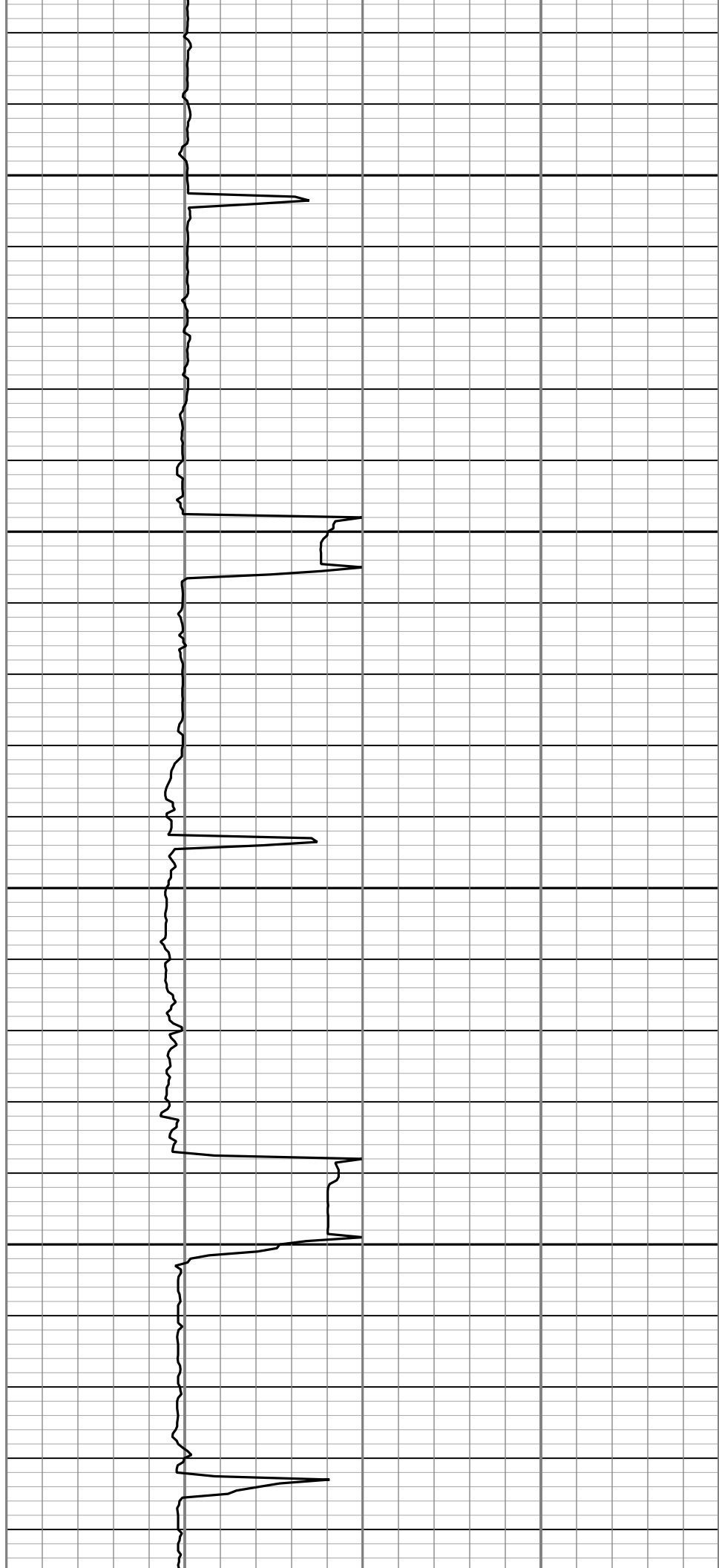
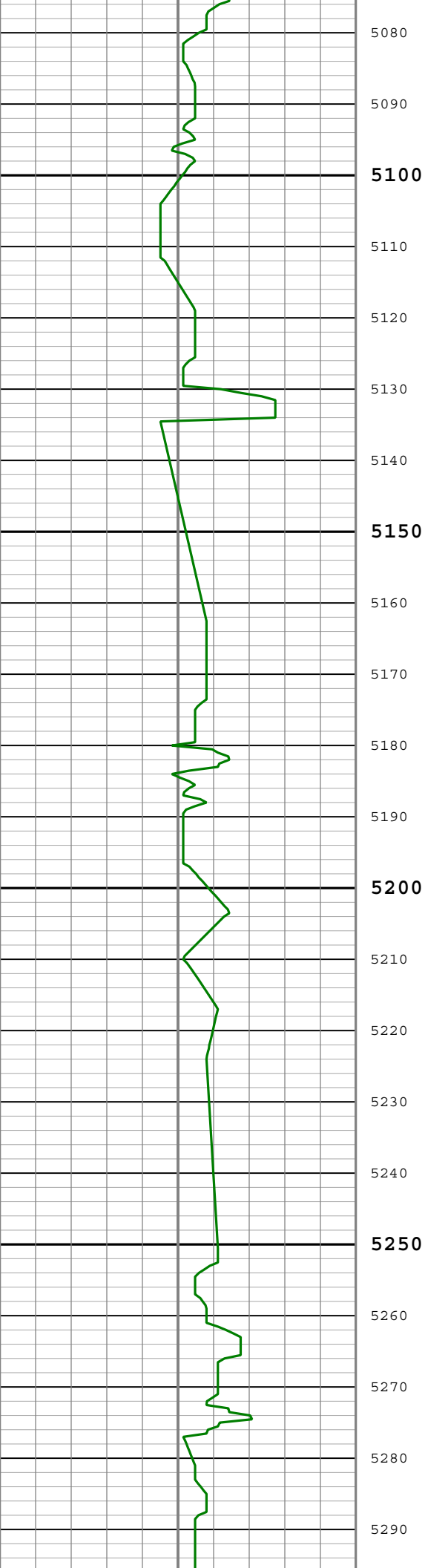


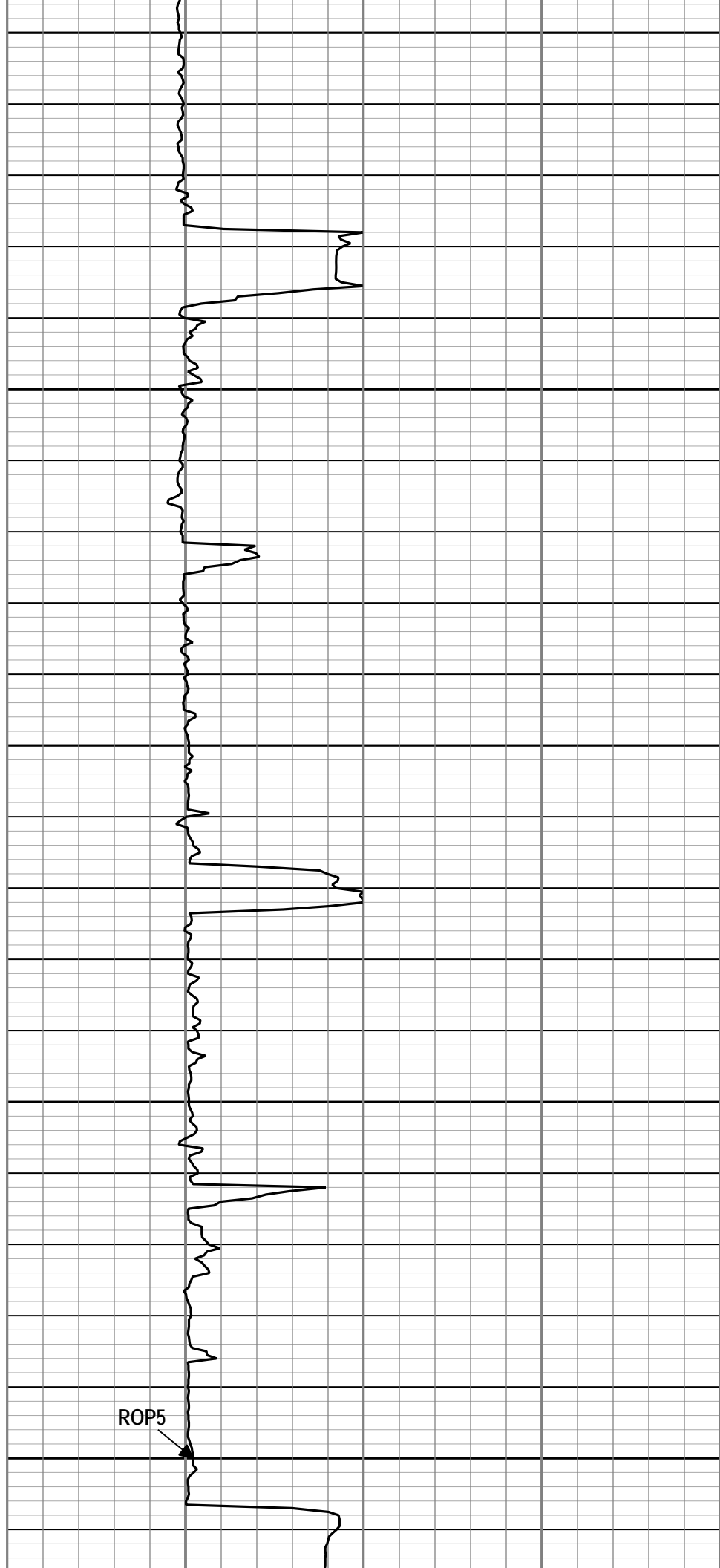
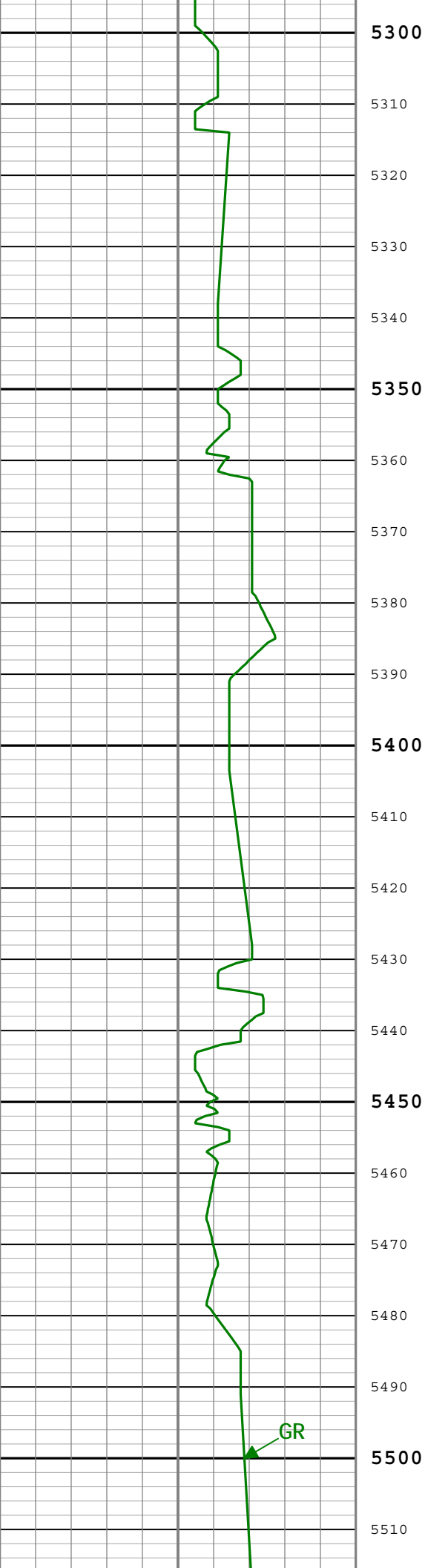


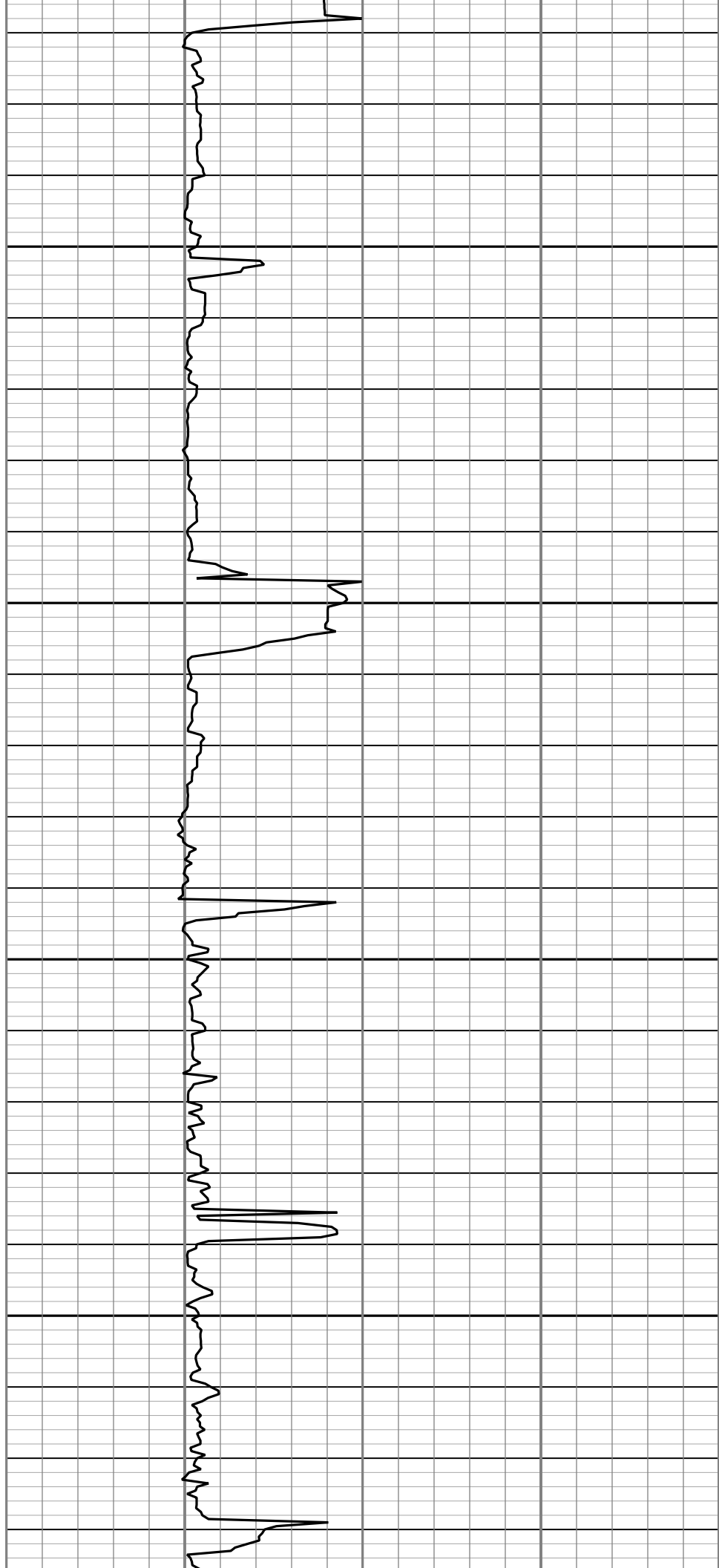
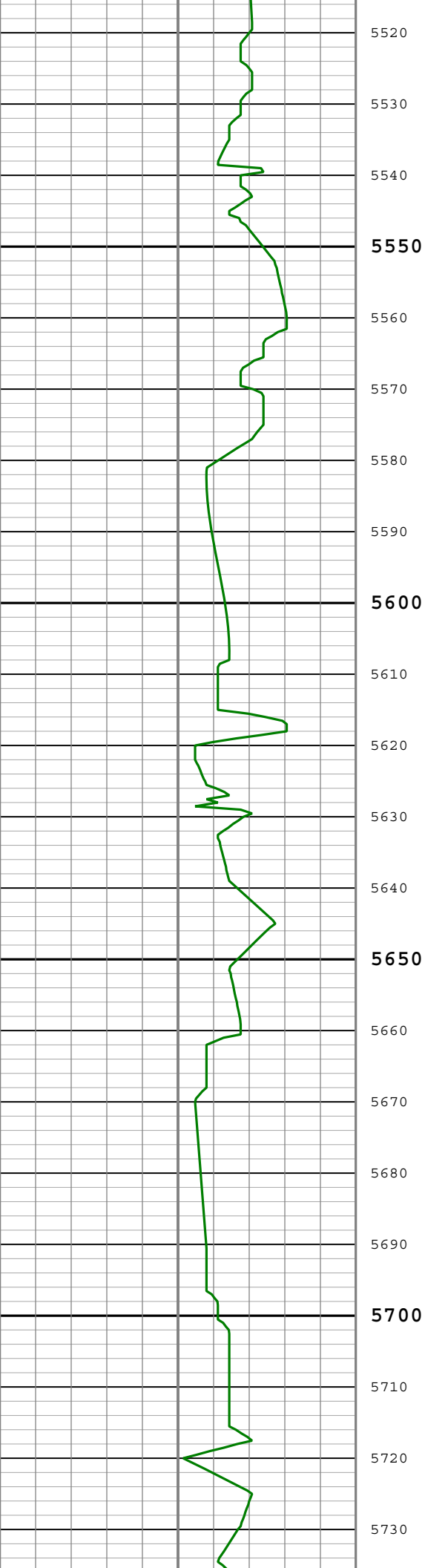


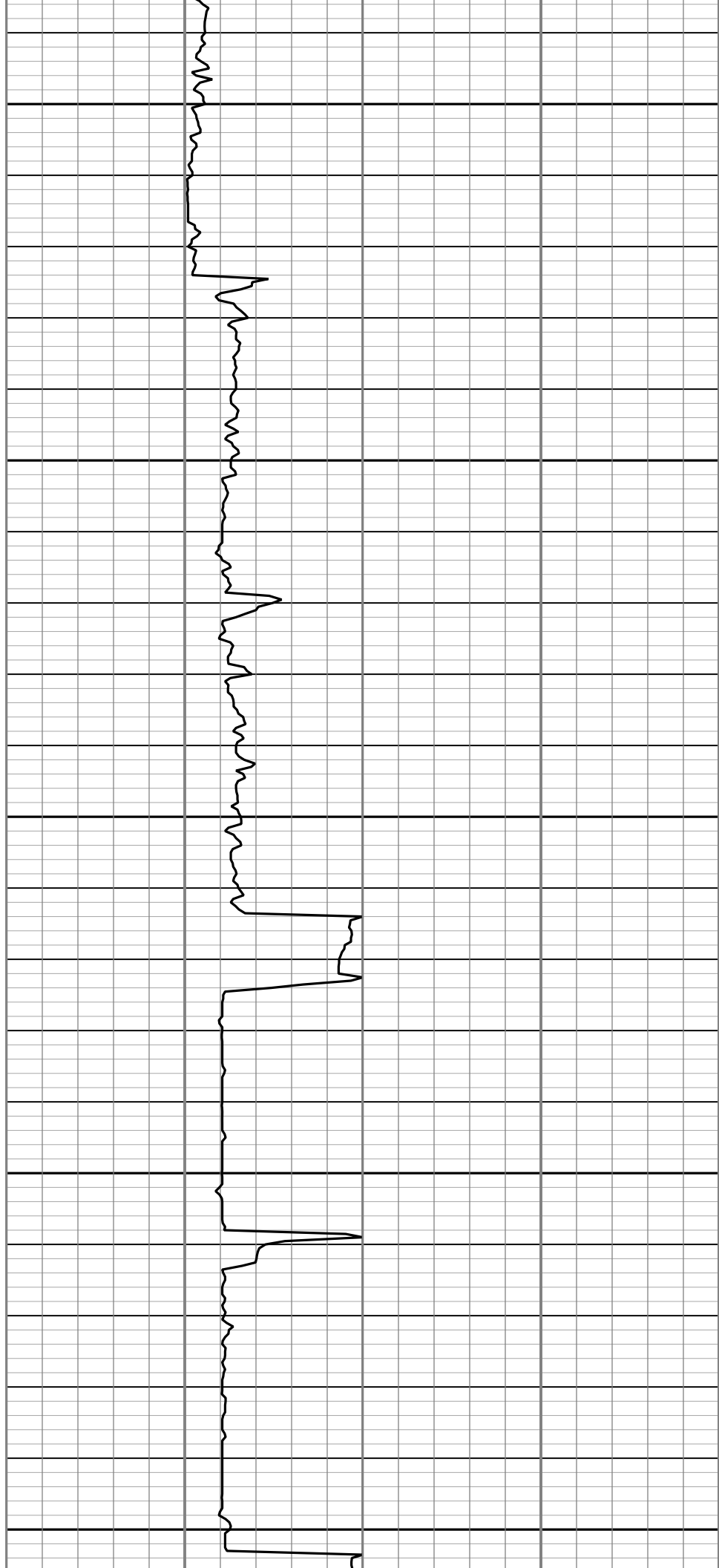
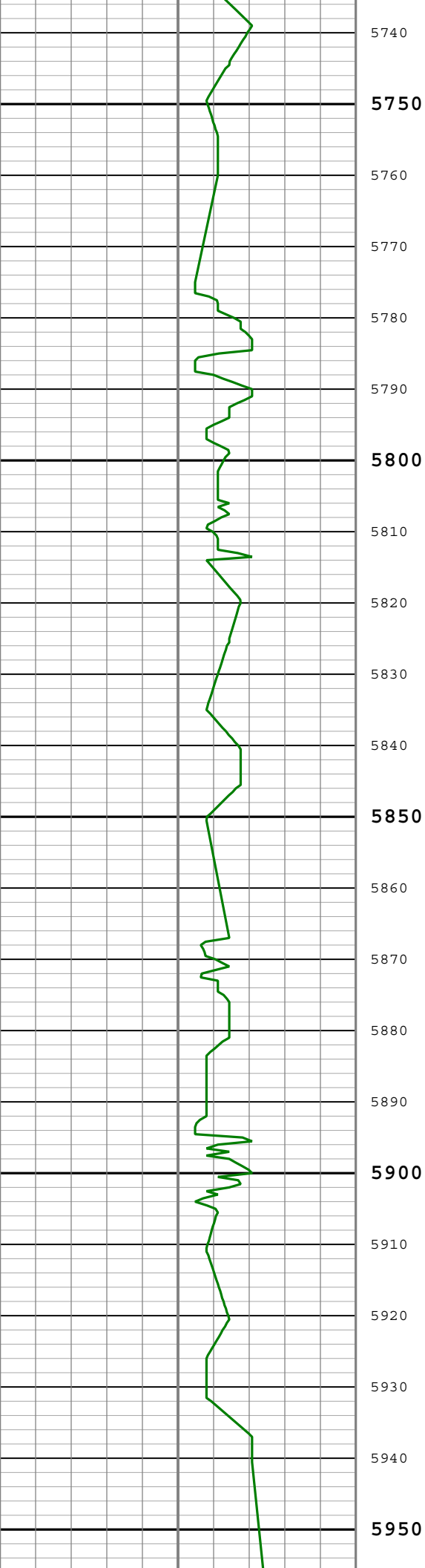










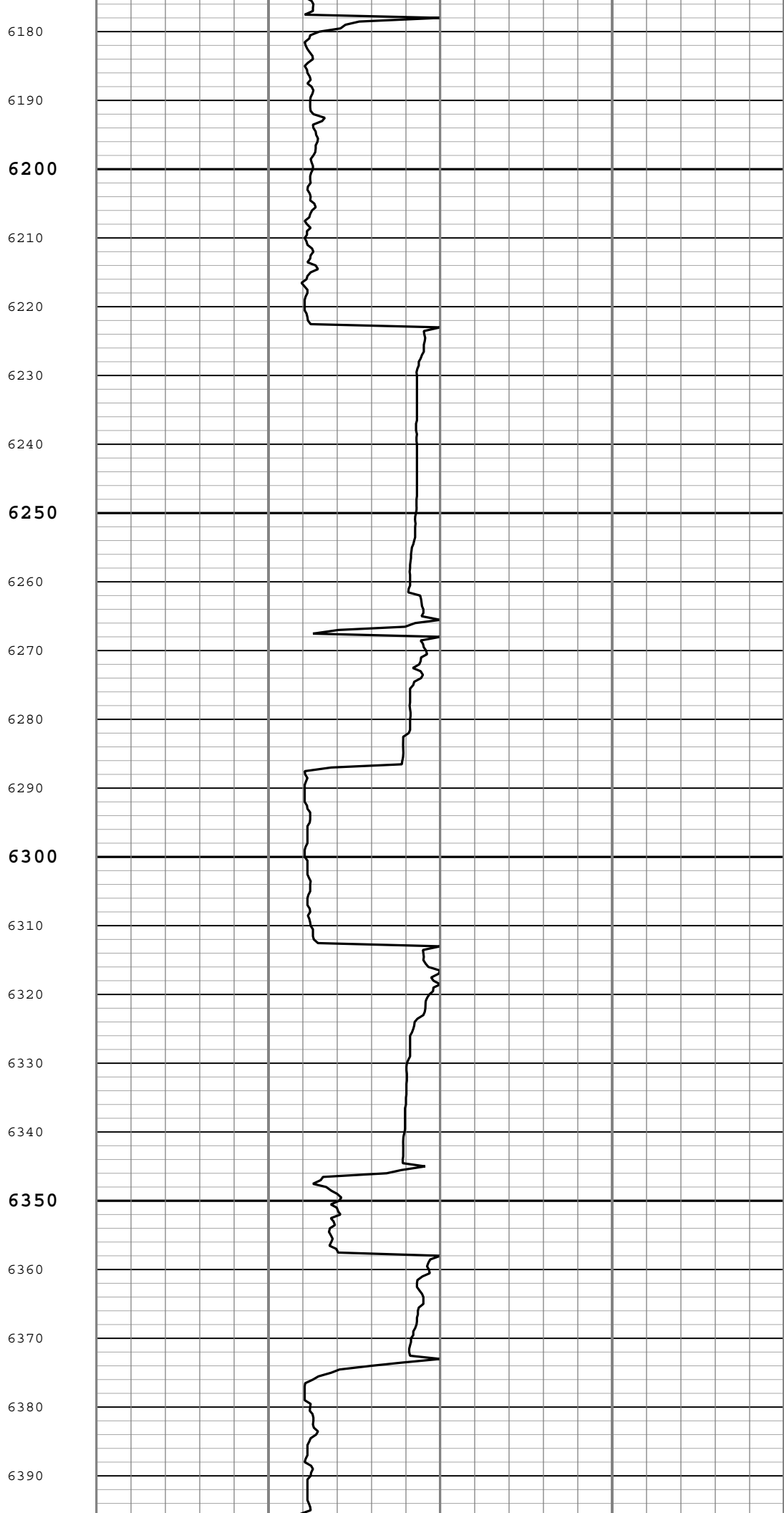
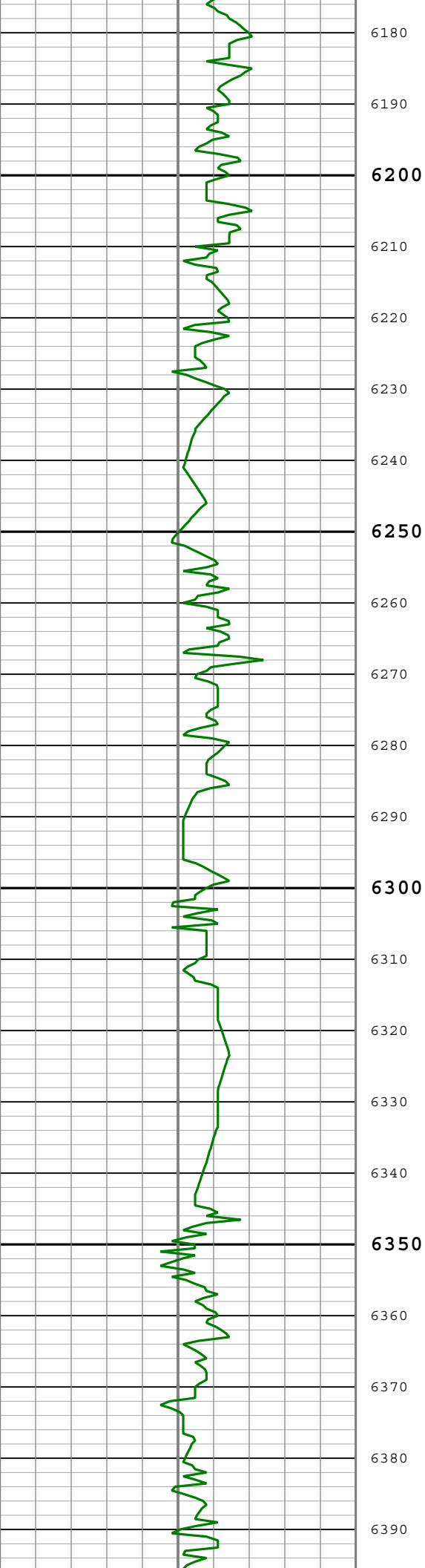


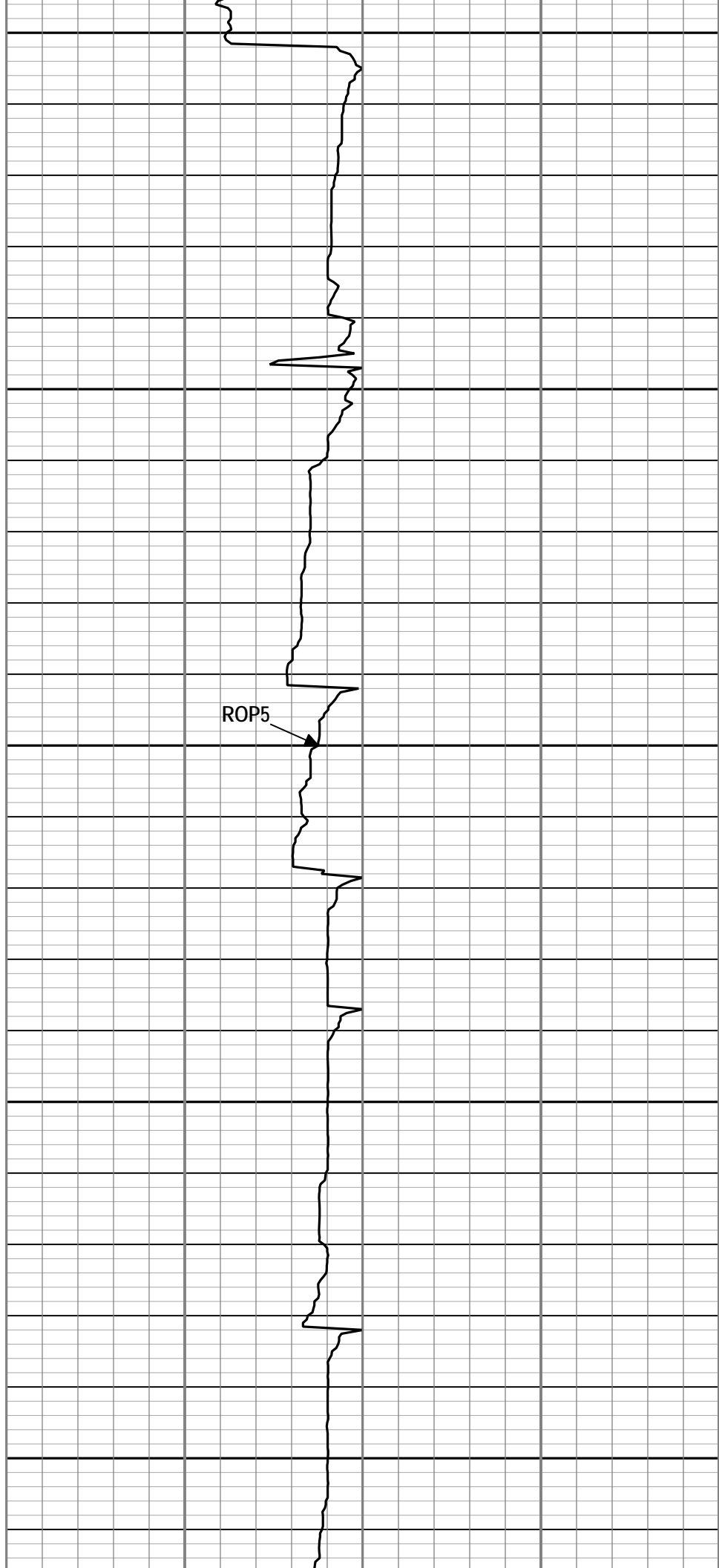
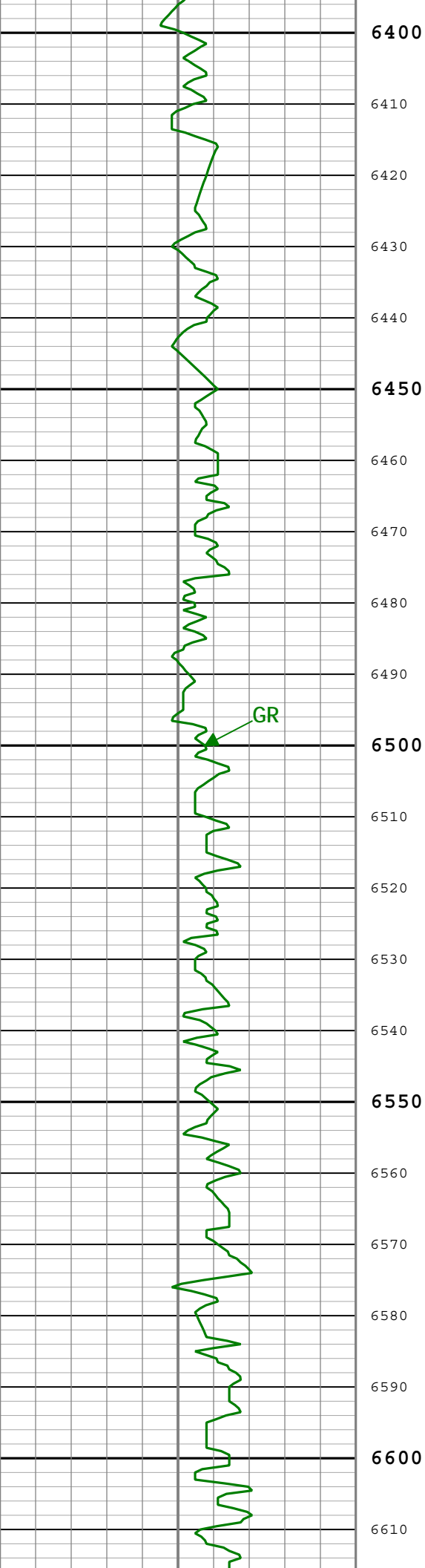
GR

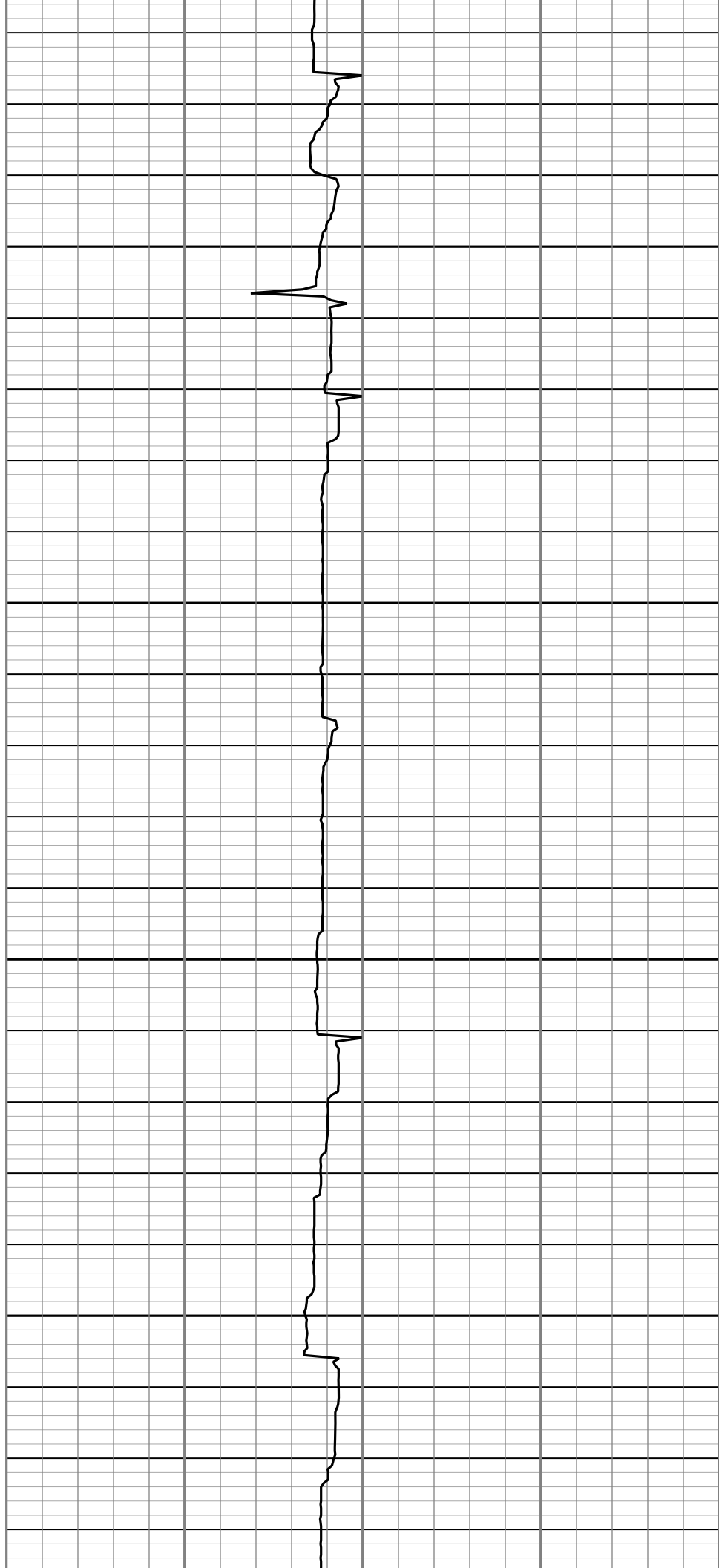
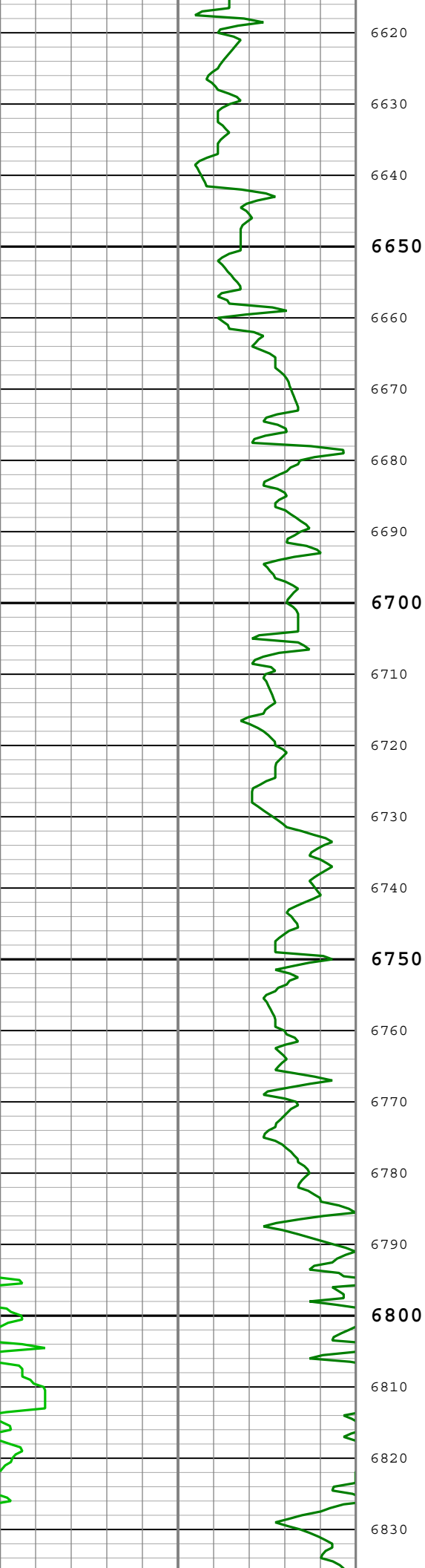


ROP5

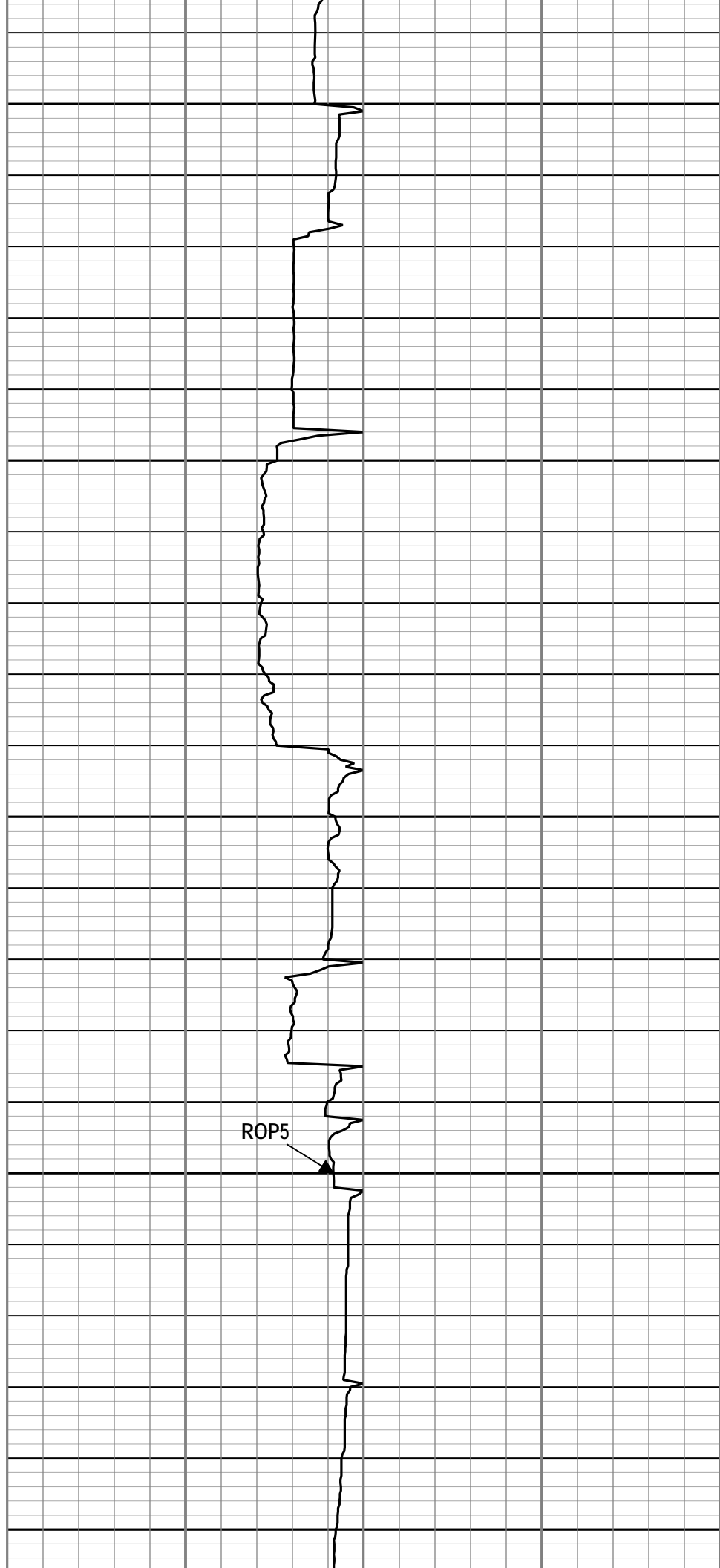
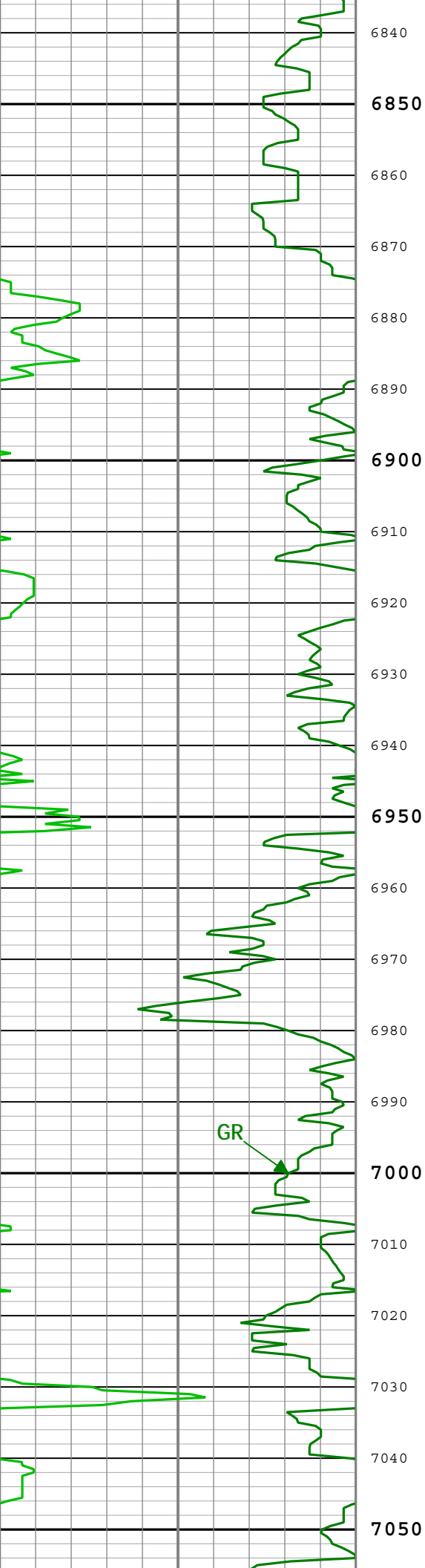


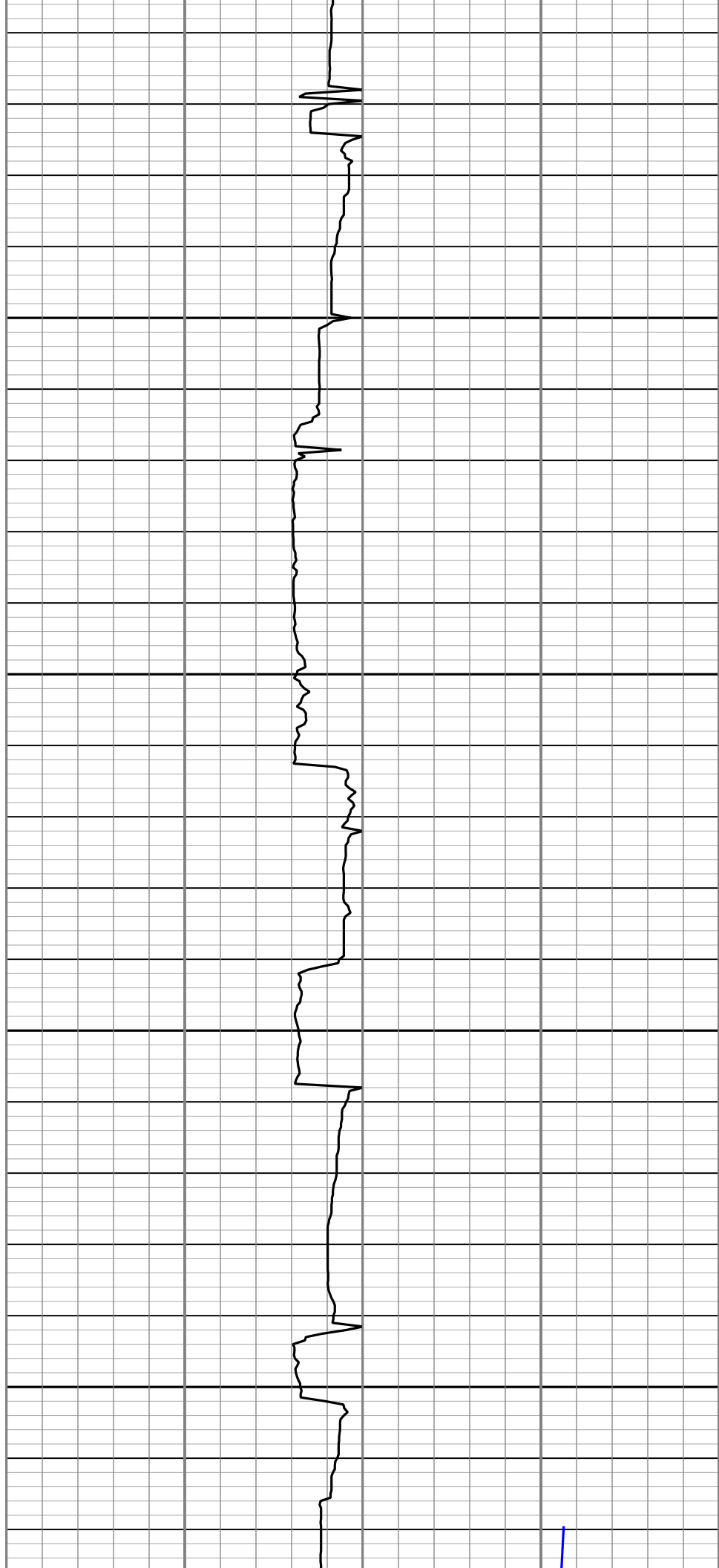
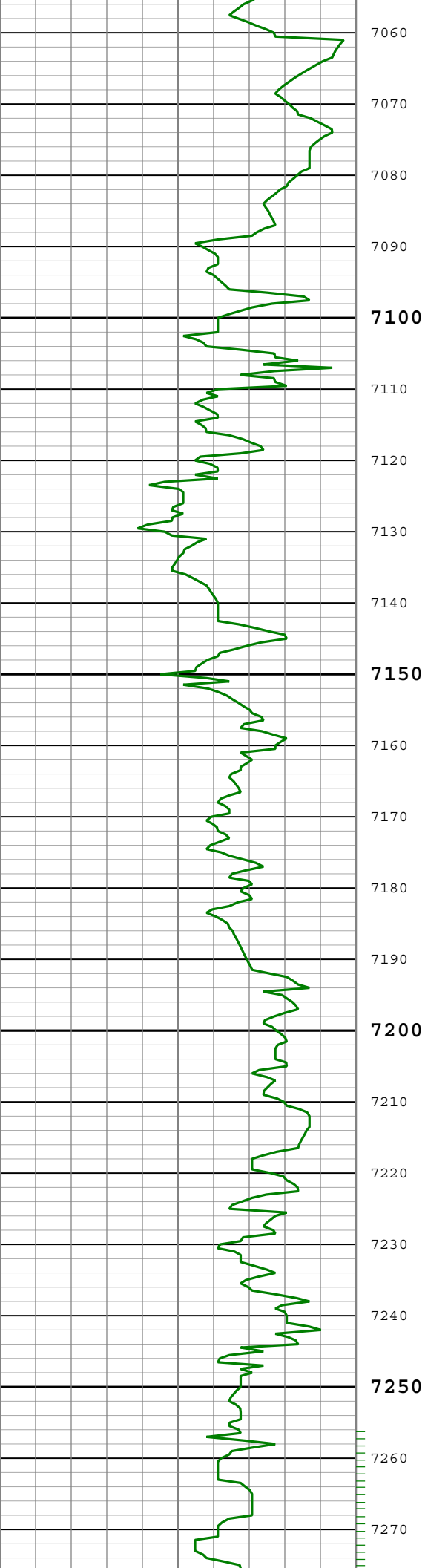


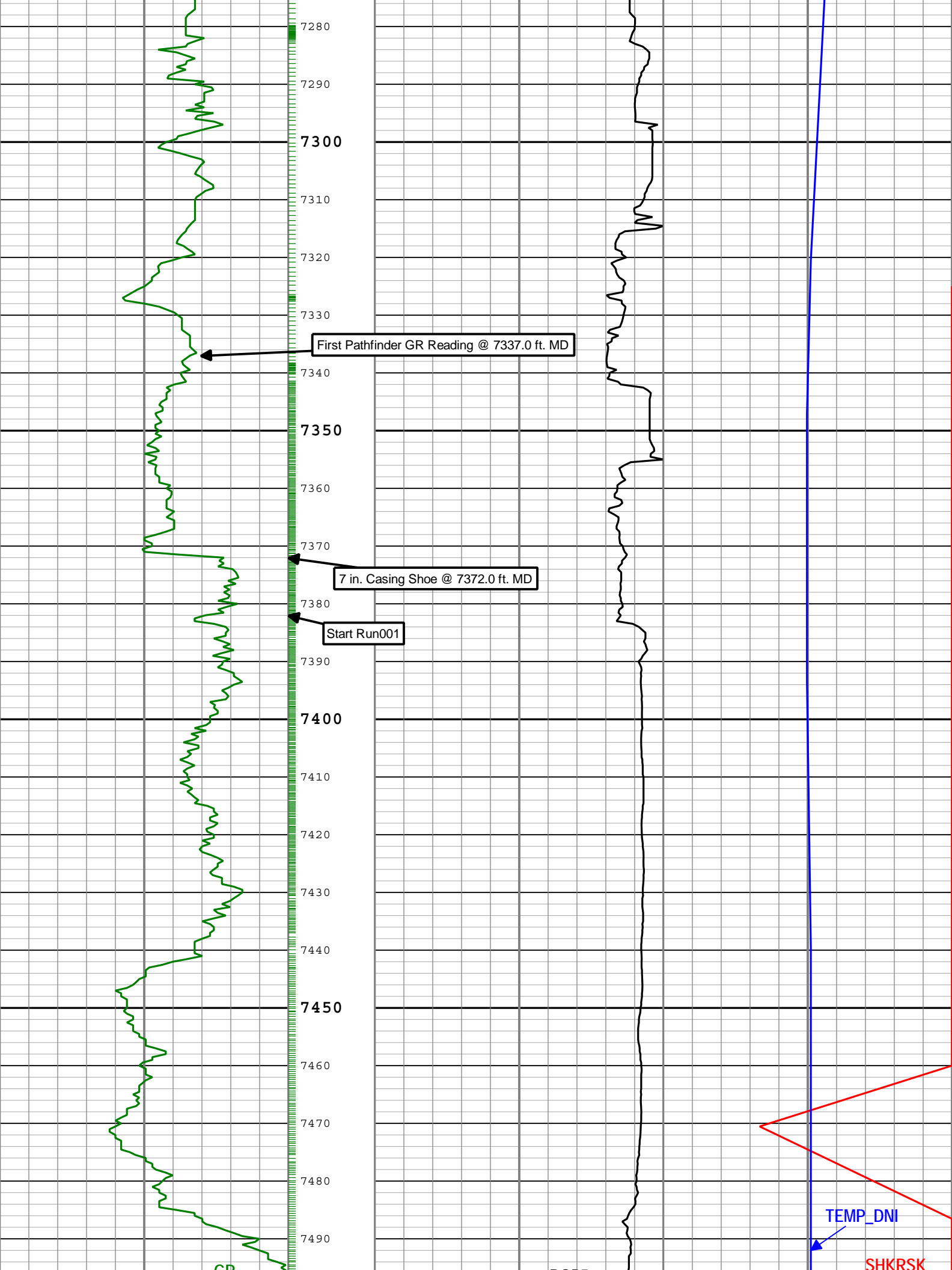


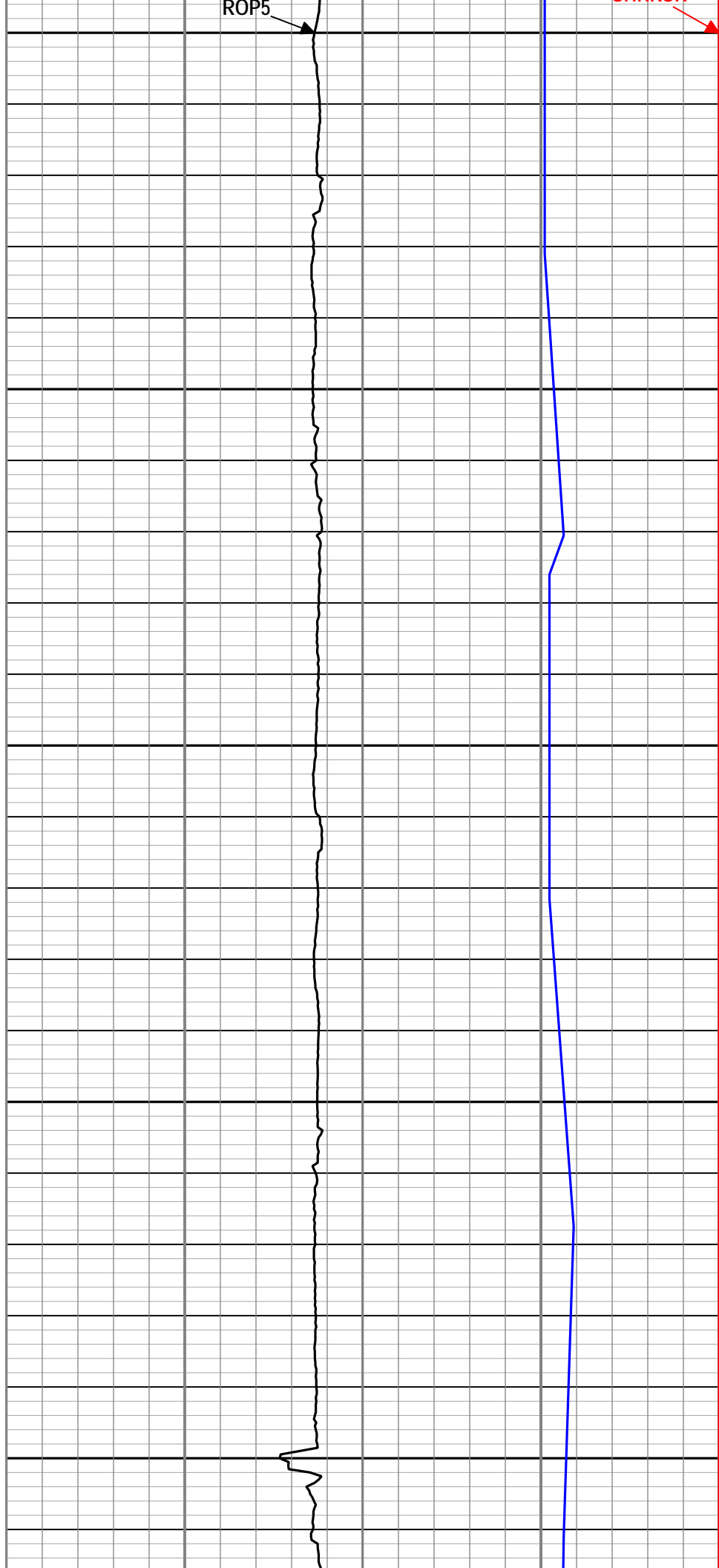
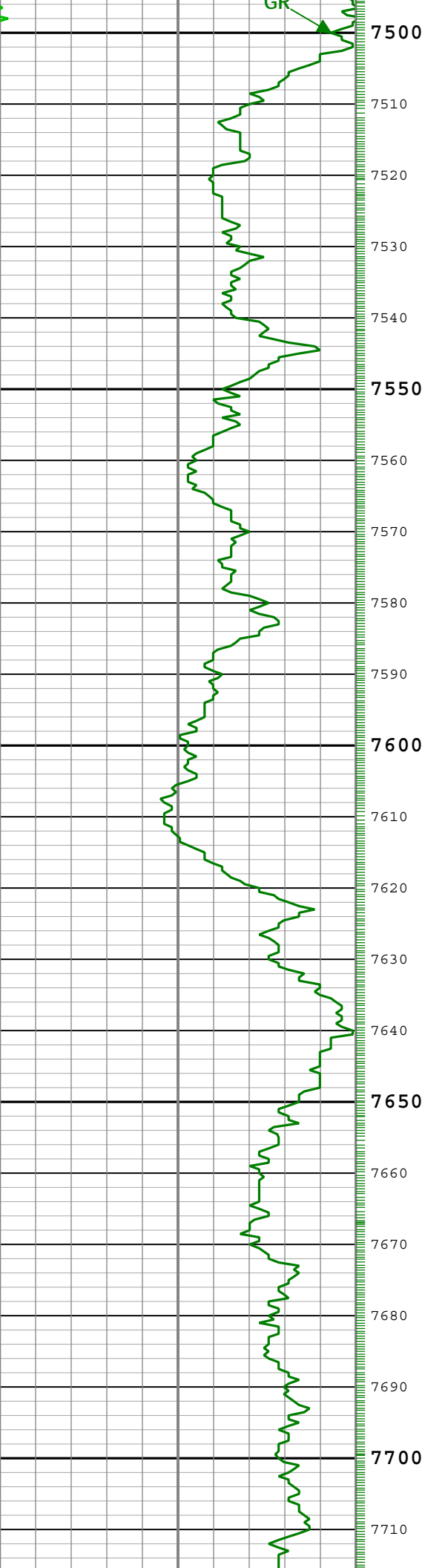


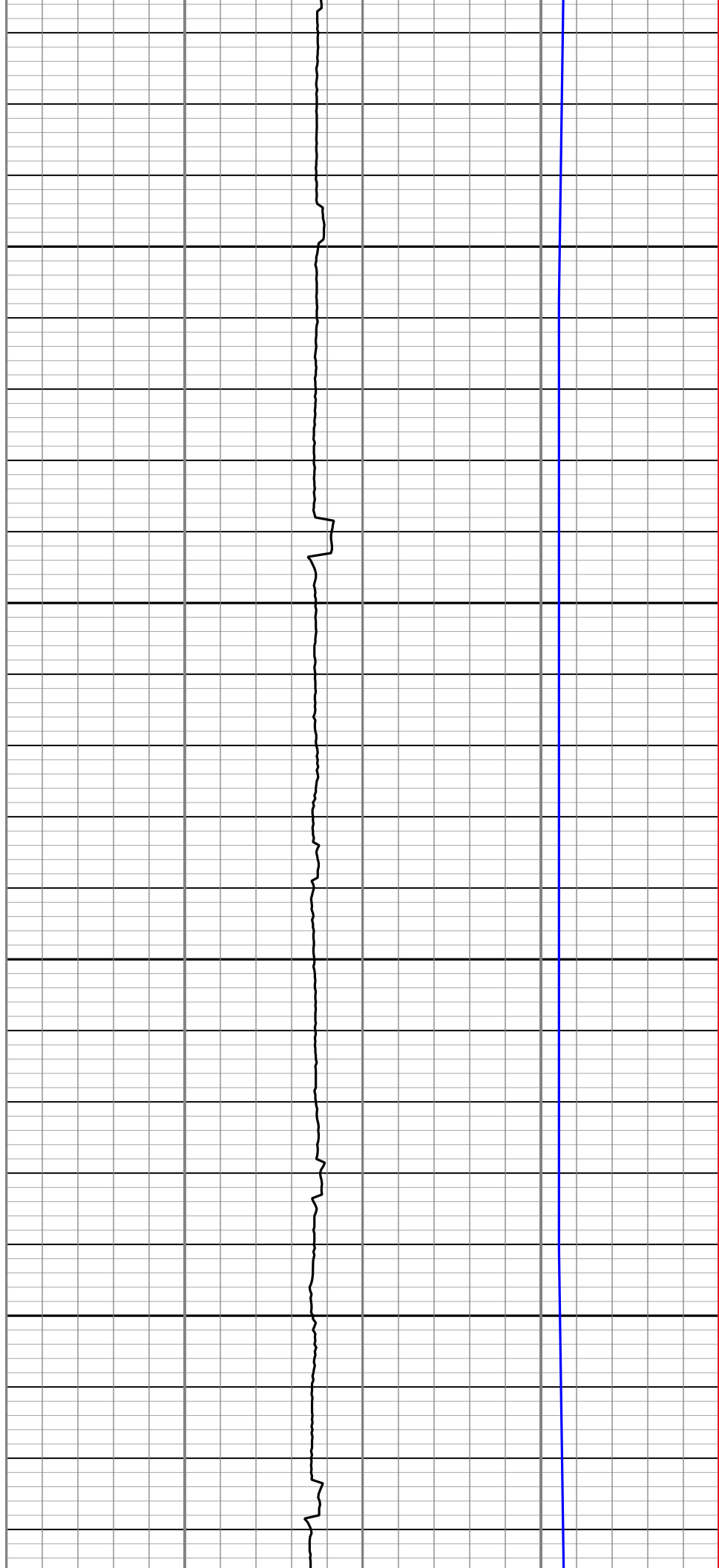
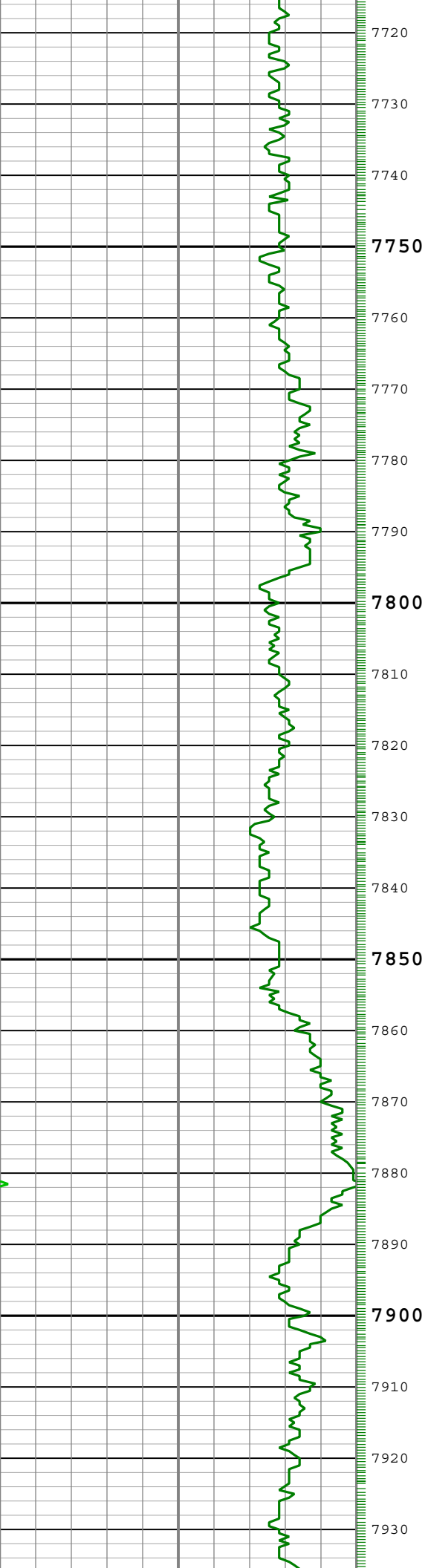


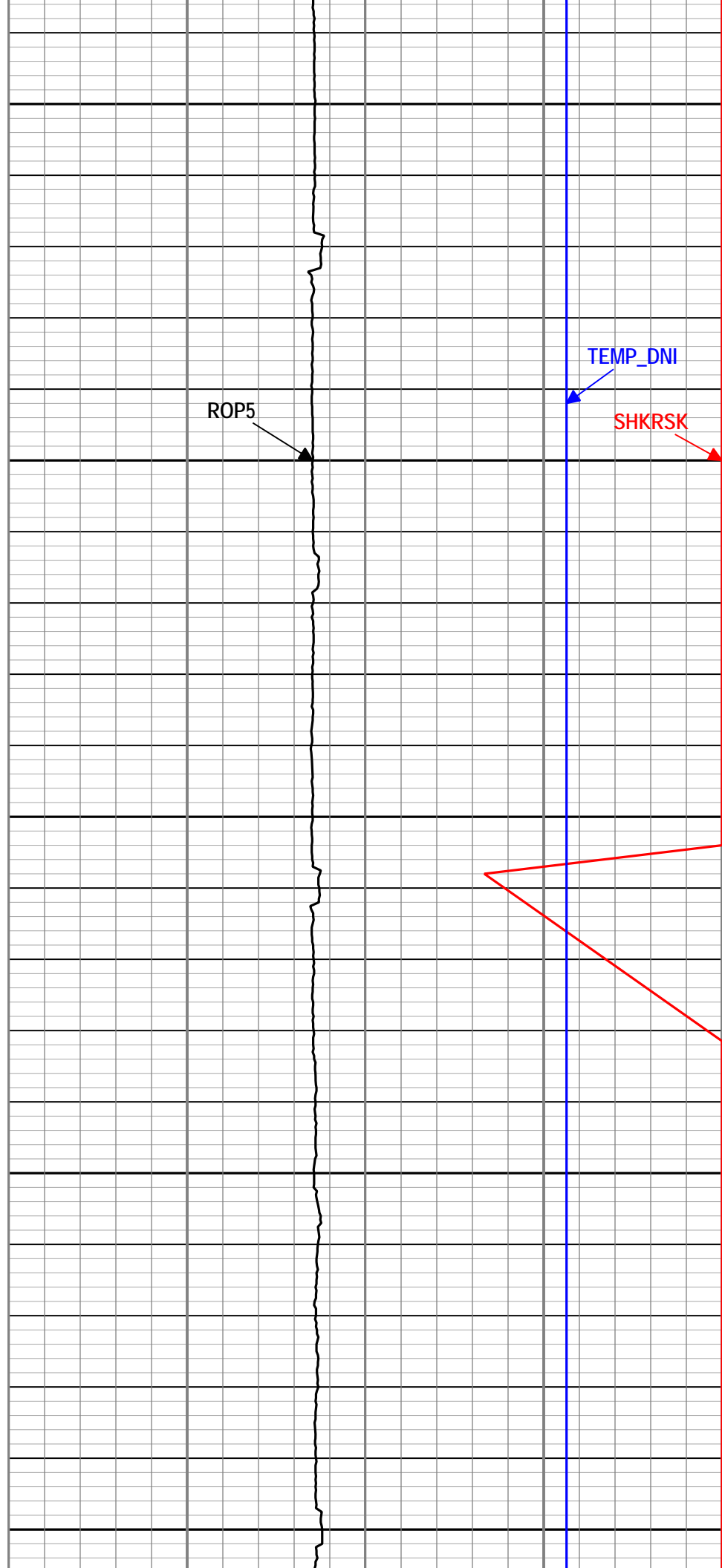
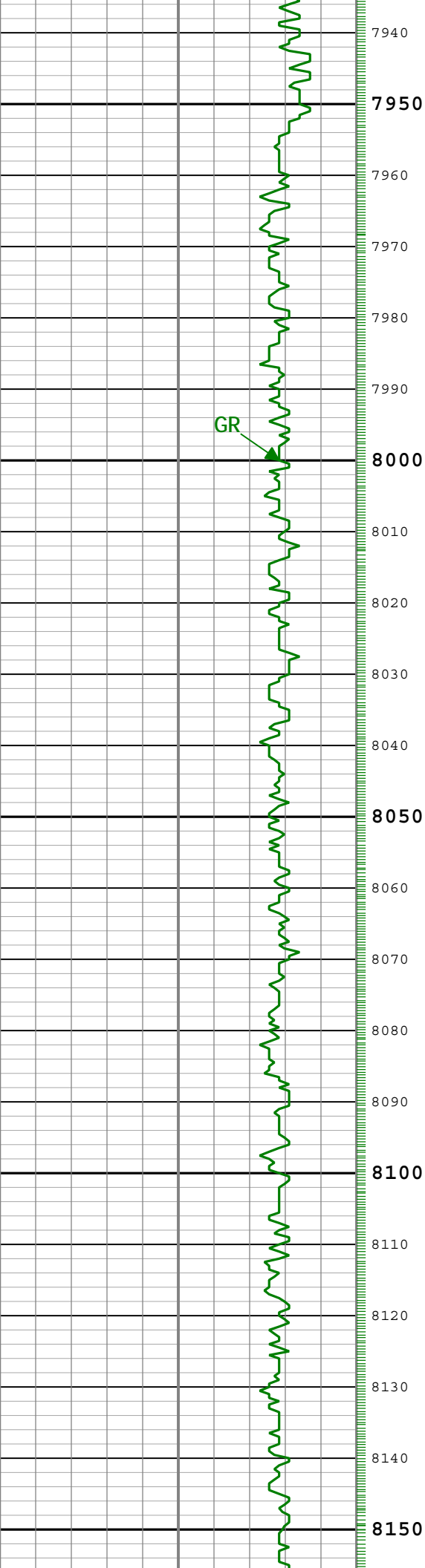


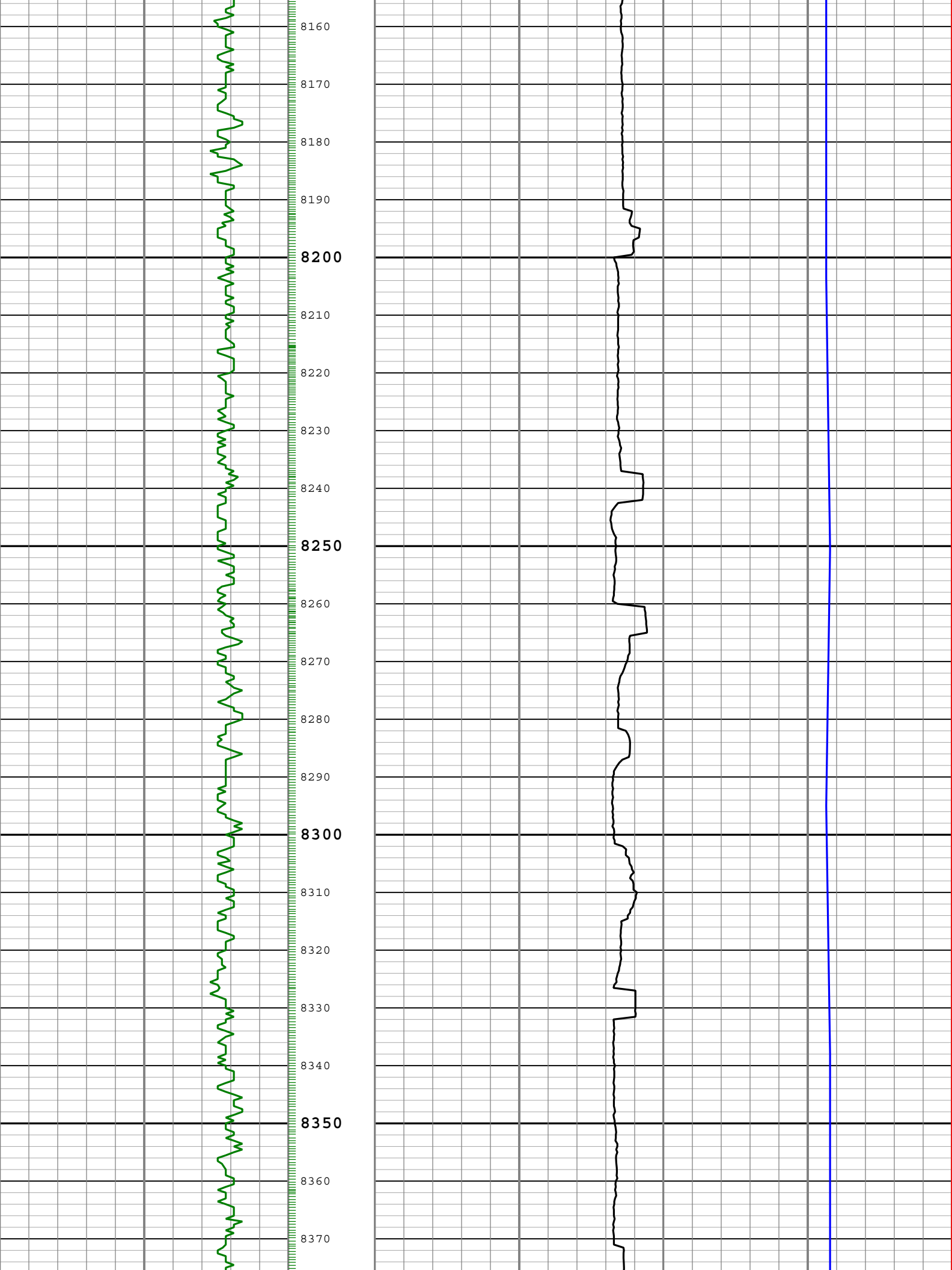


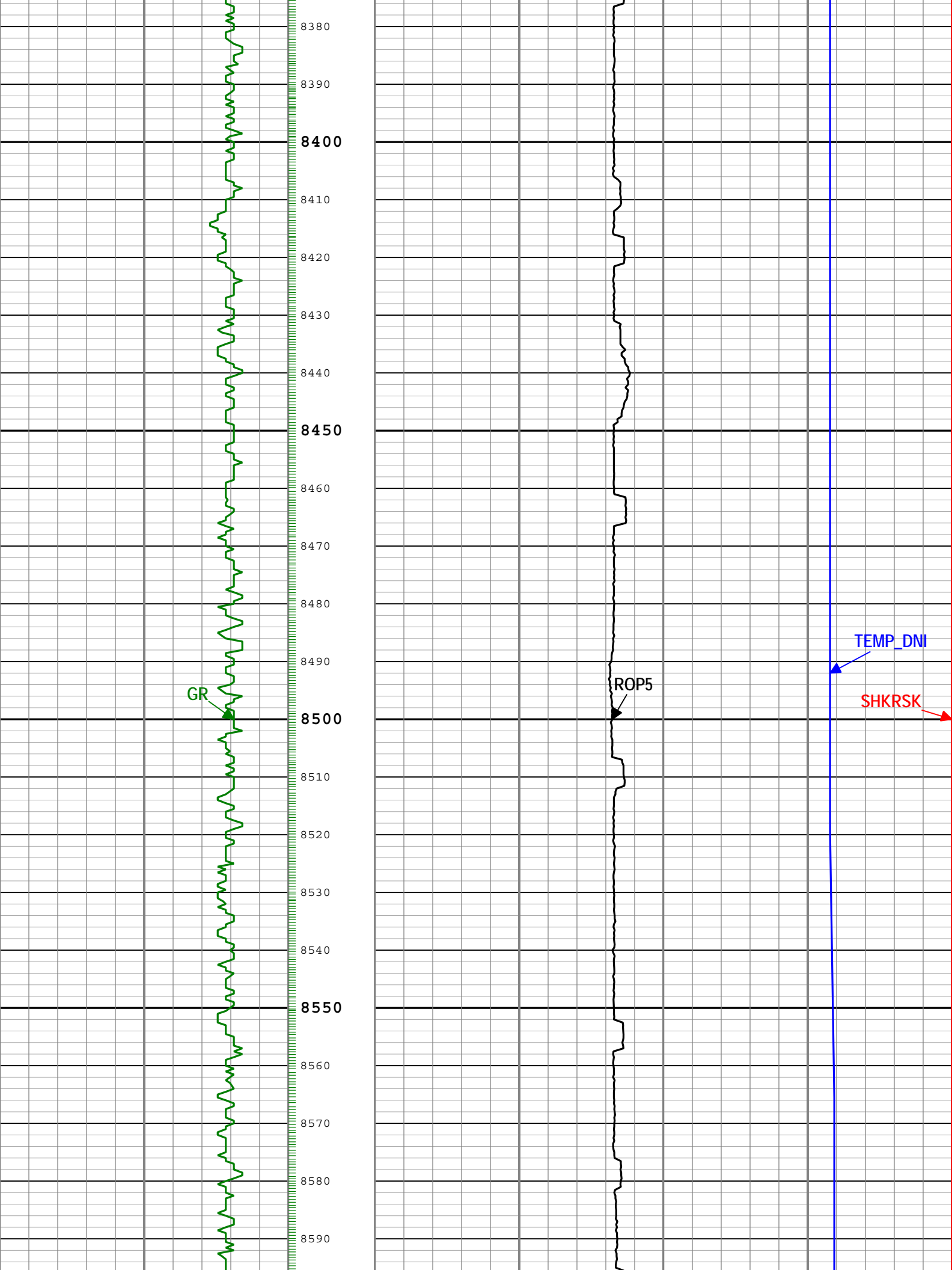




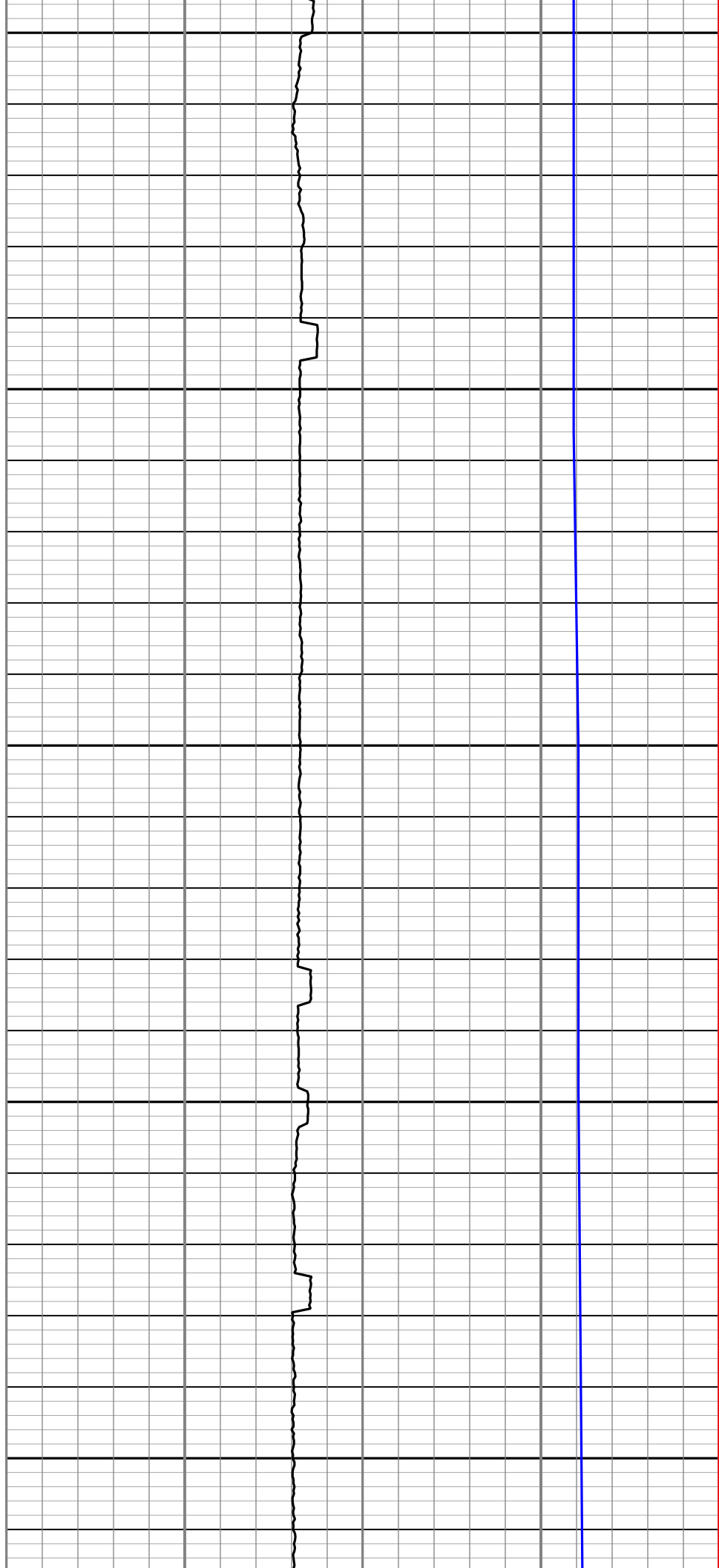
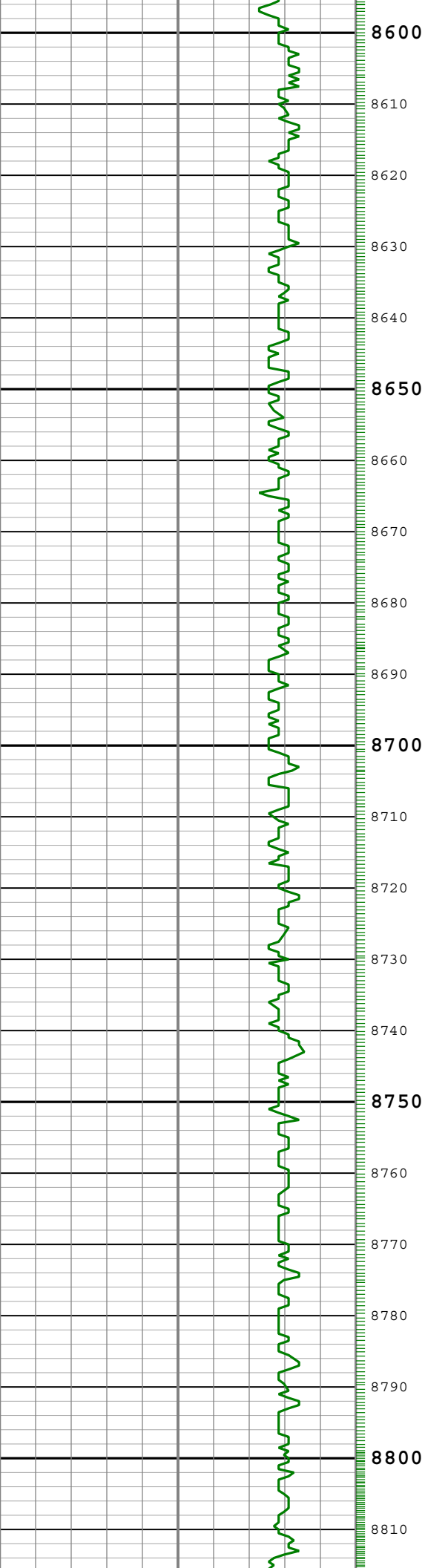


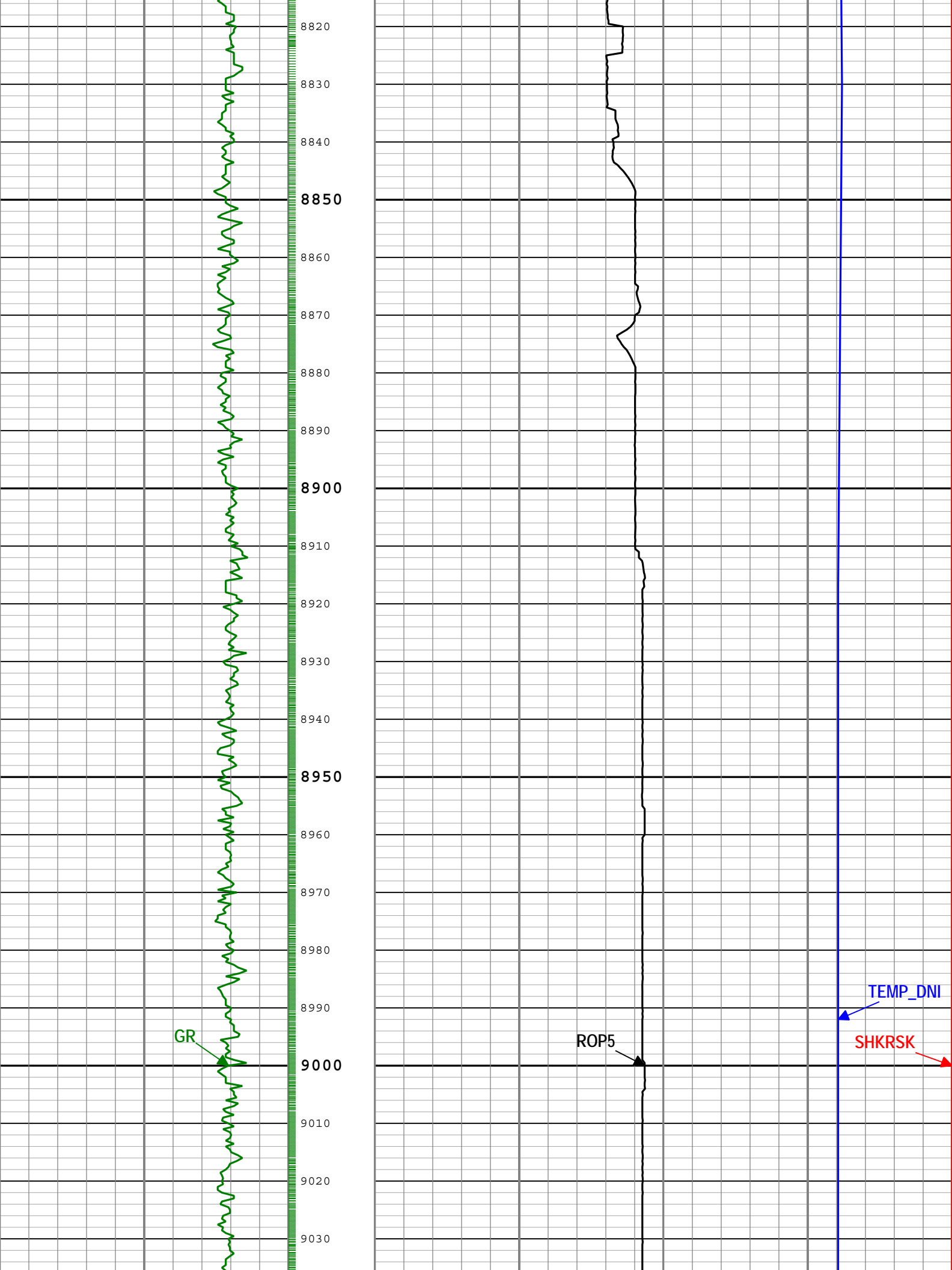


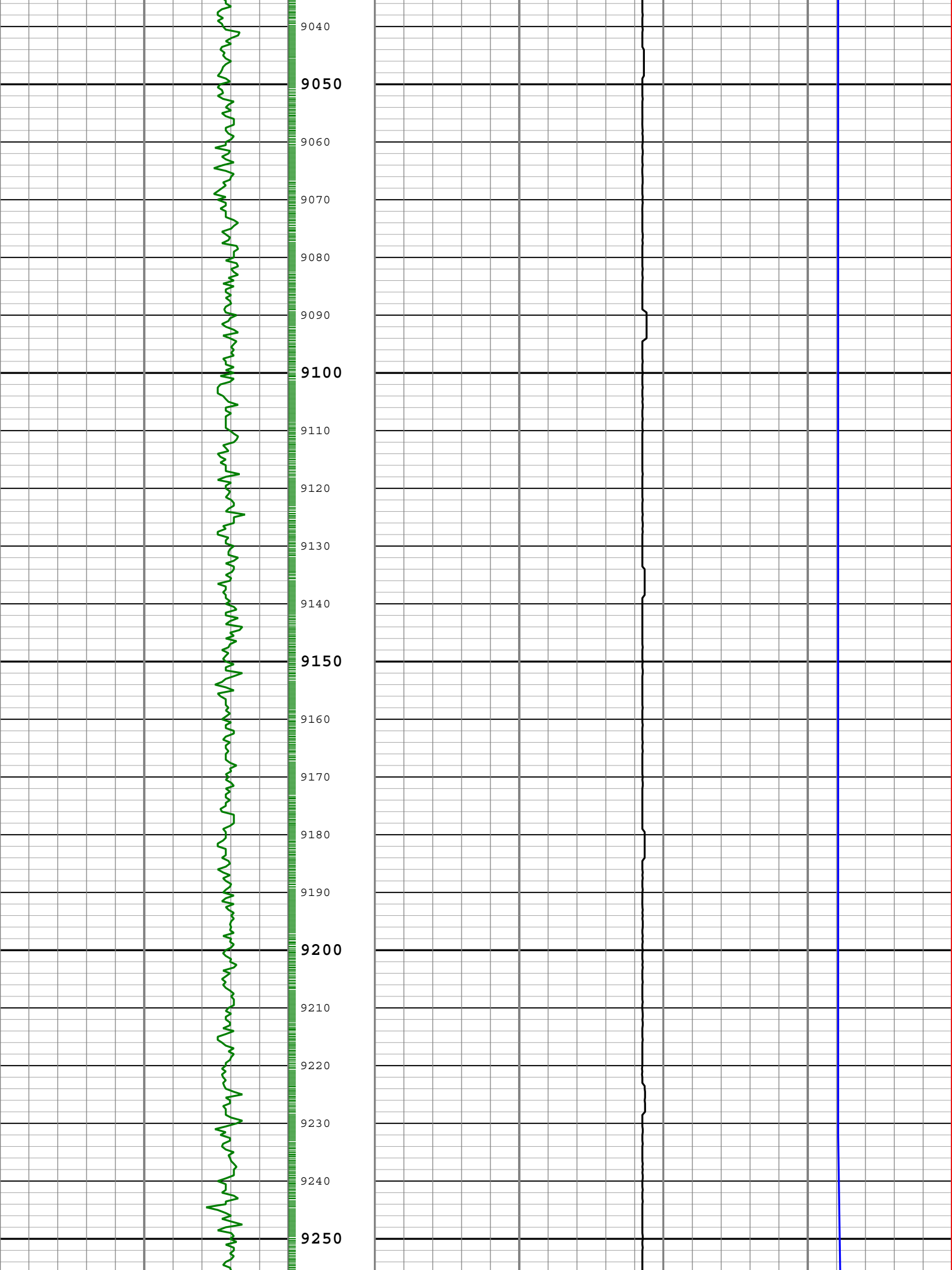


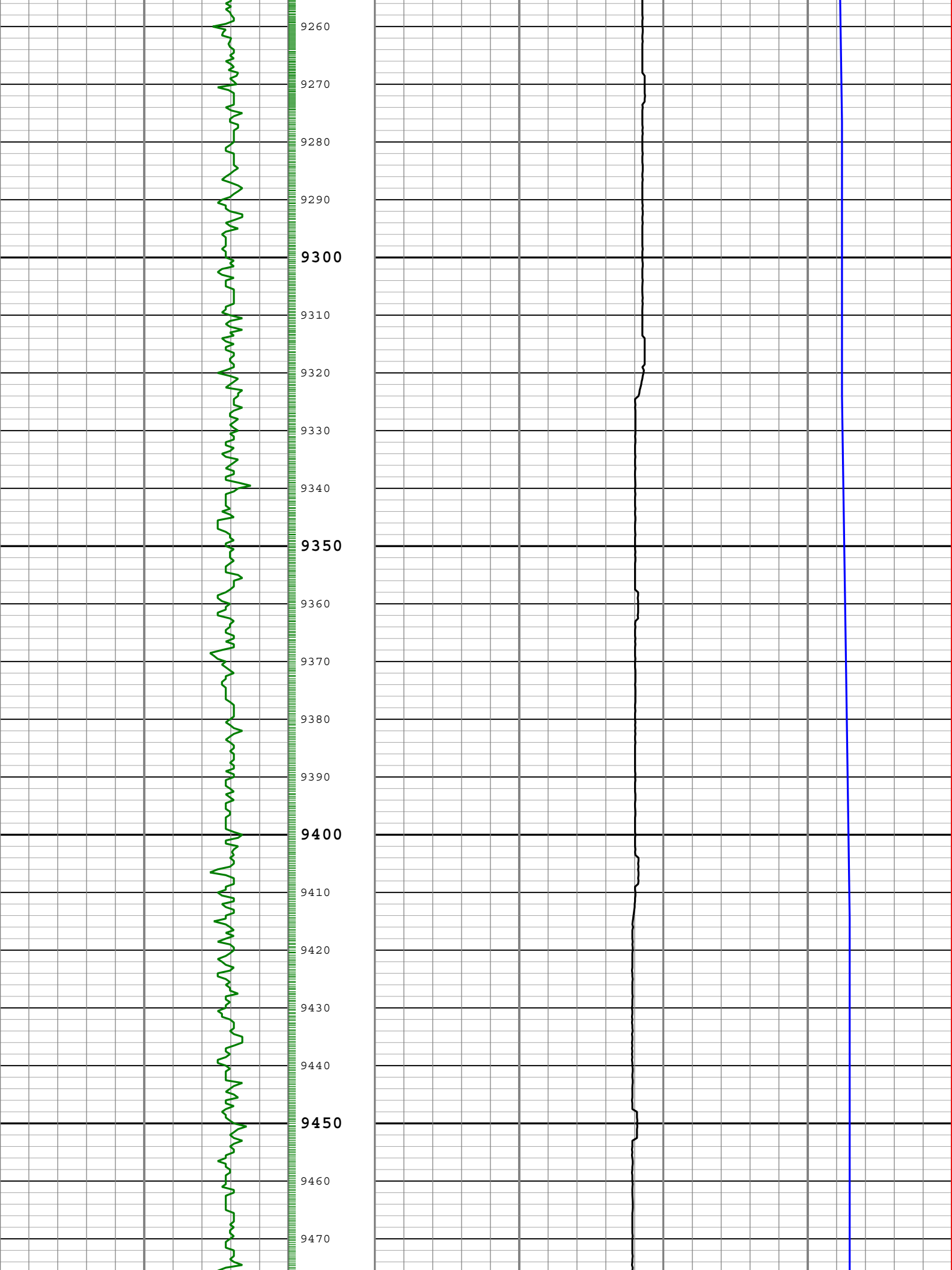


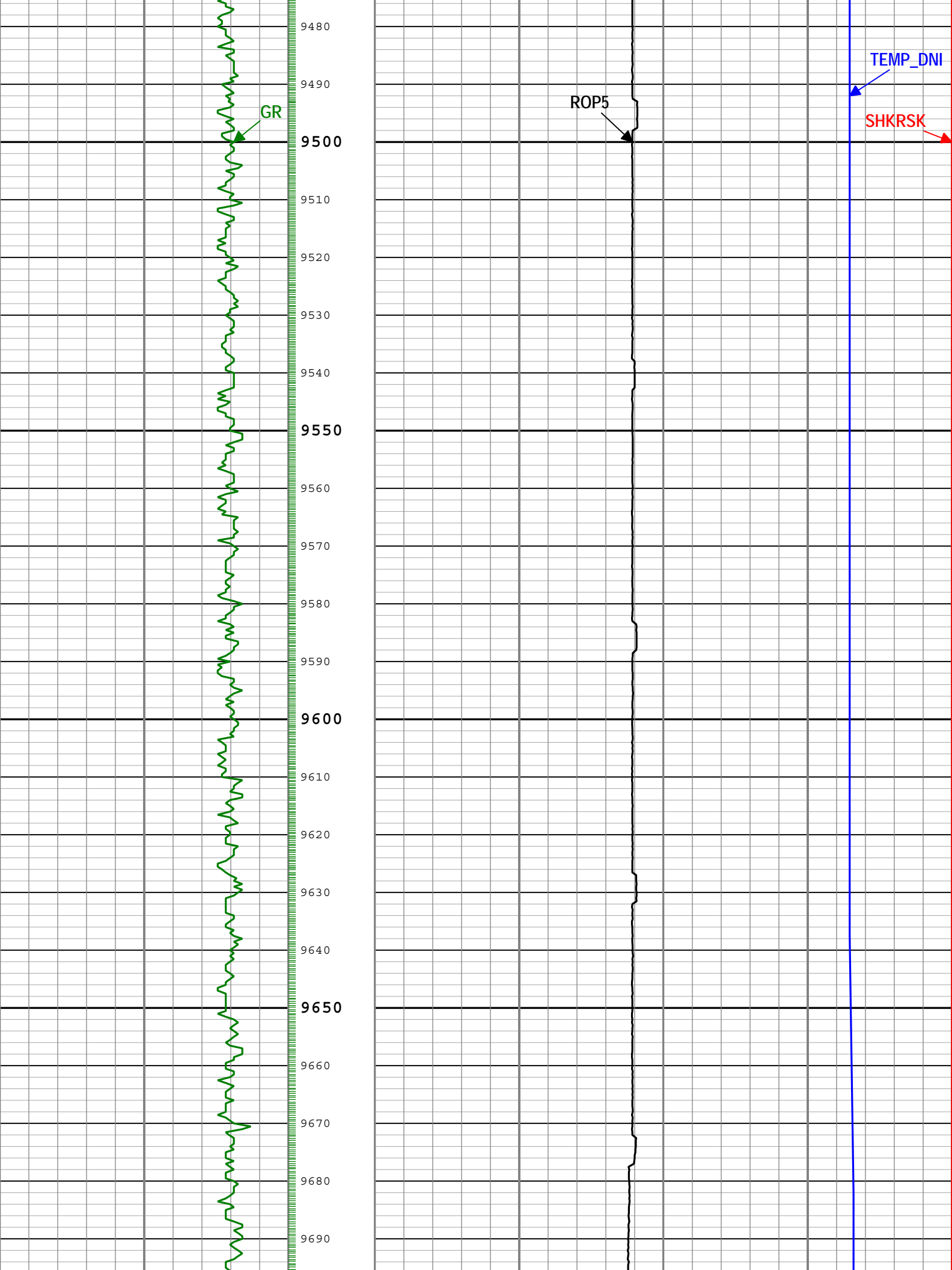


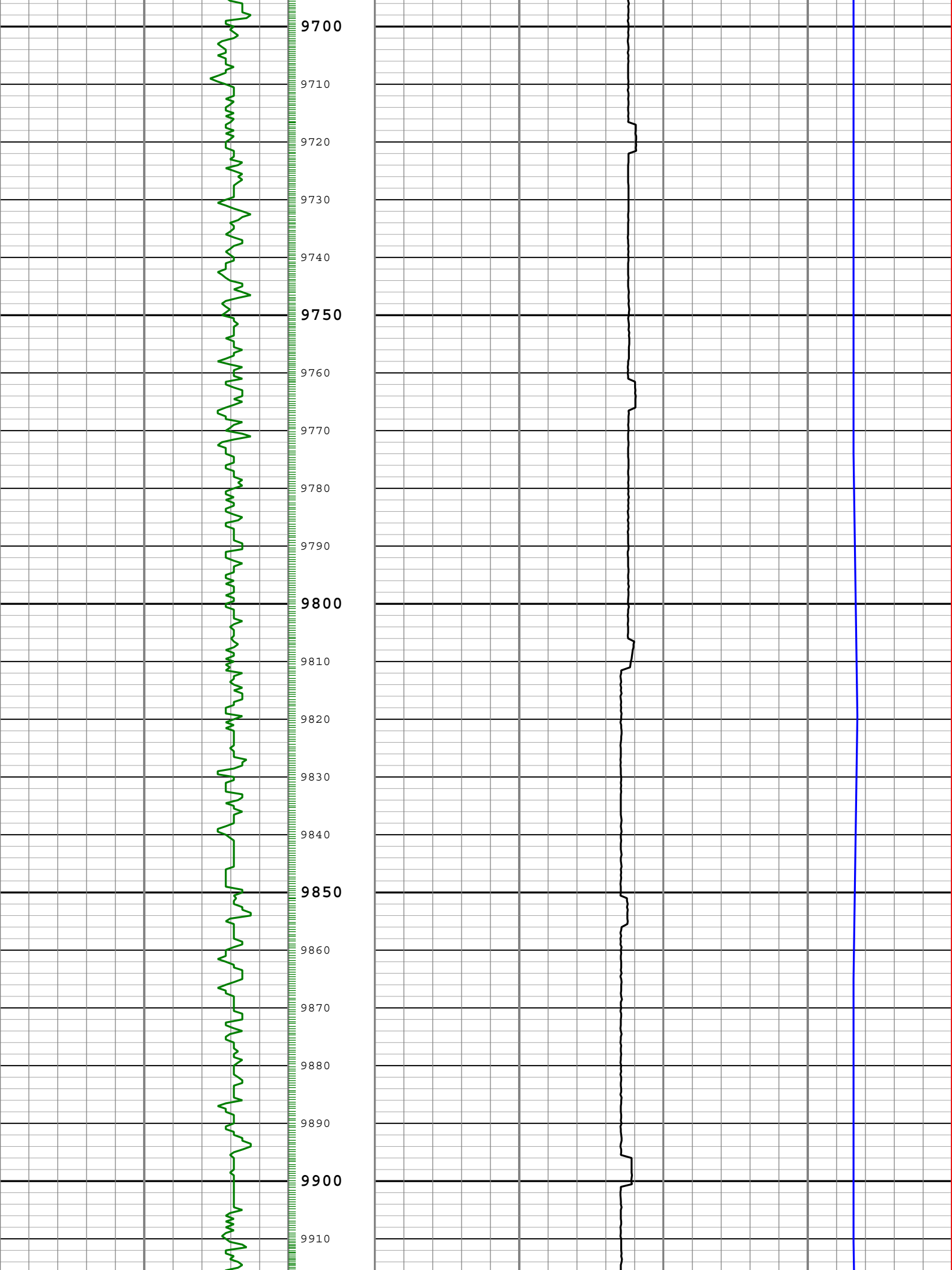


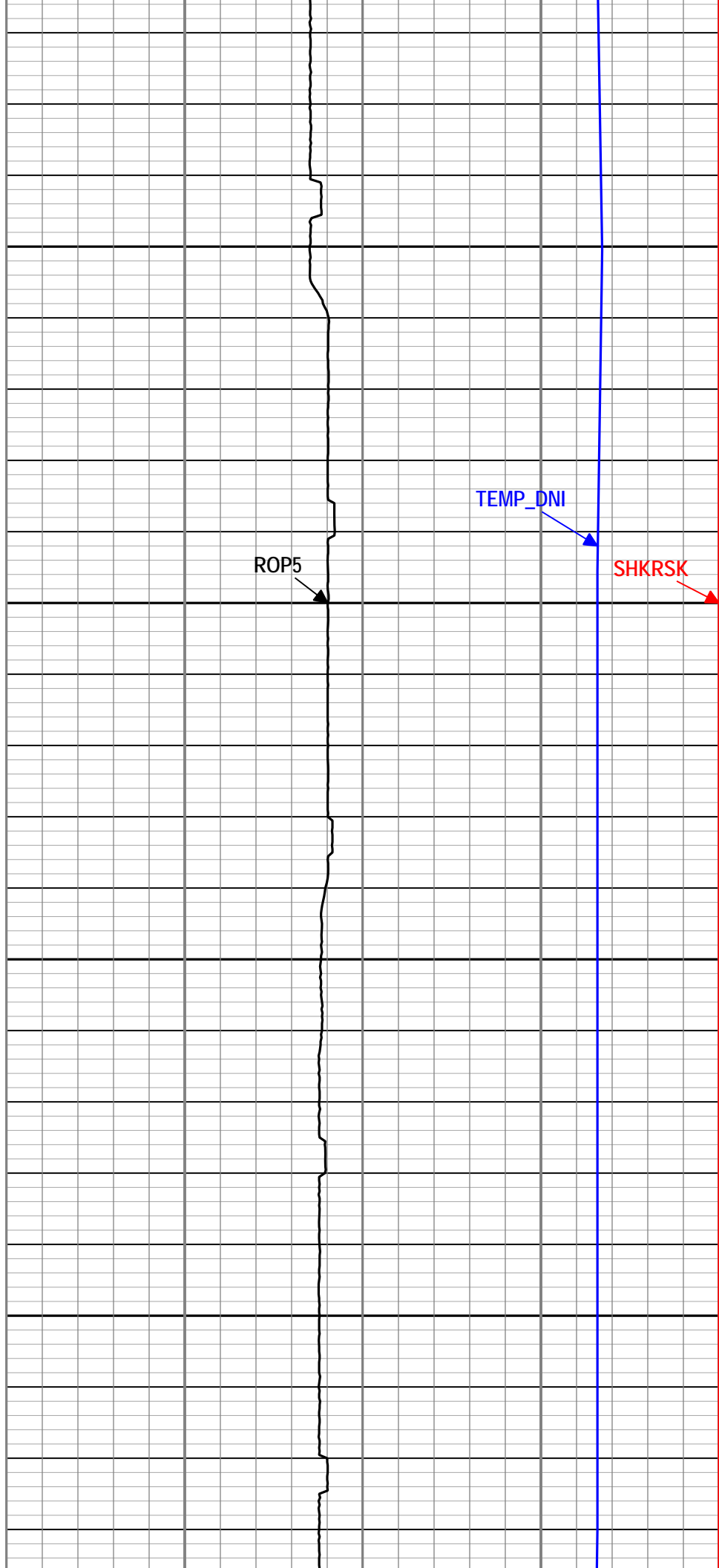
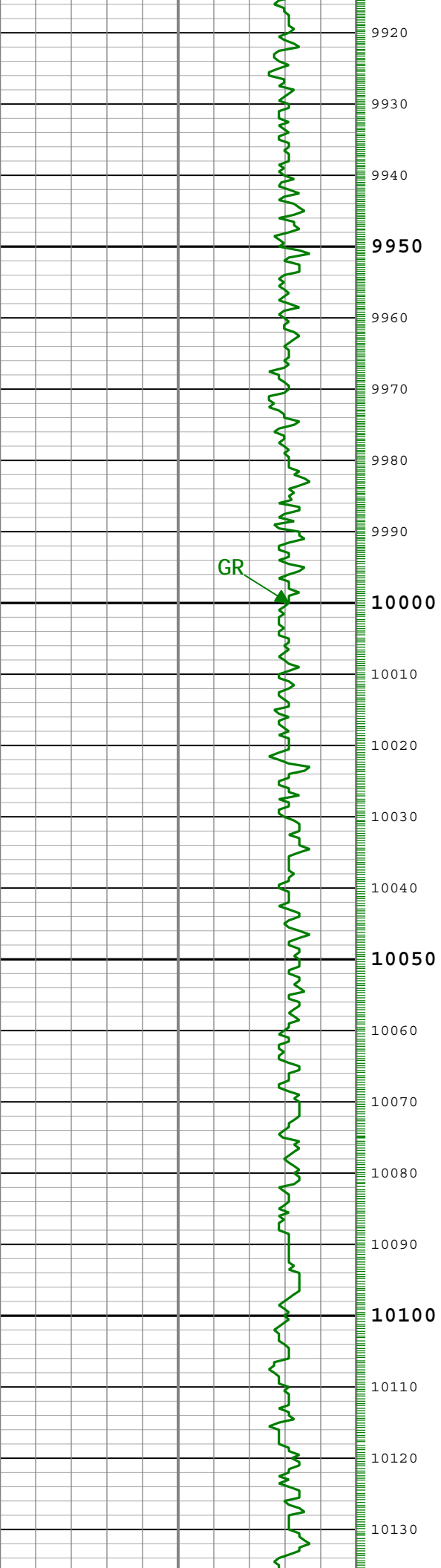


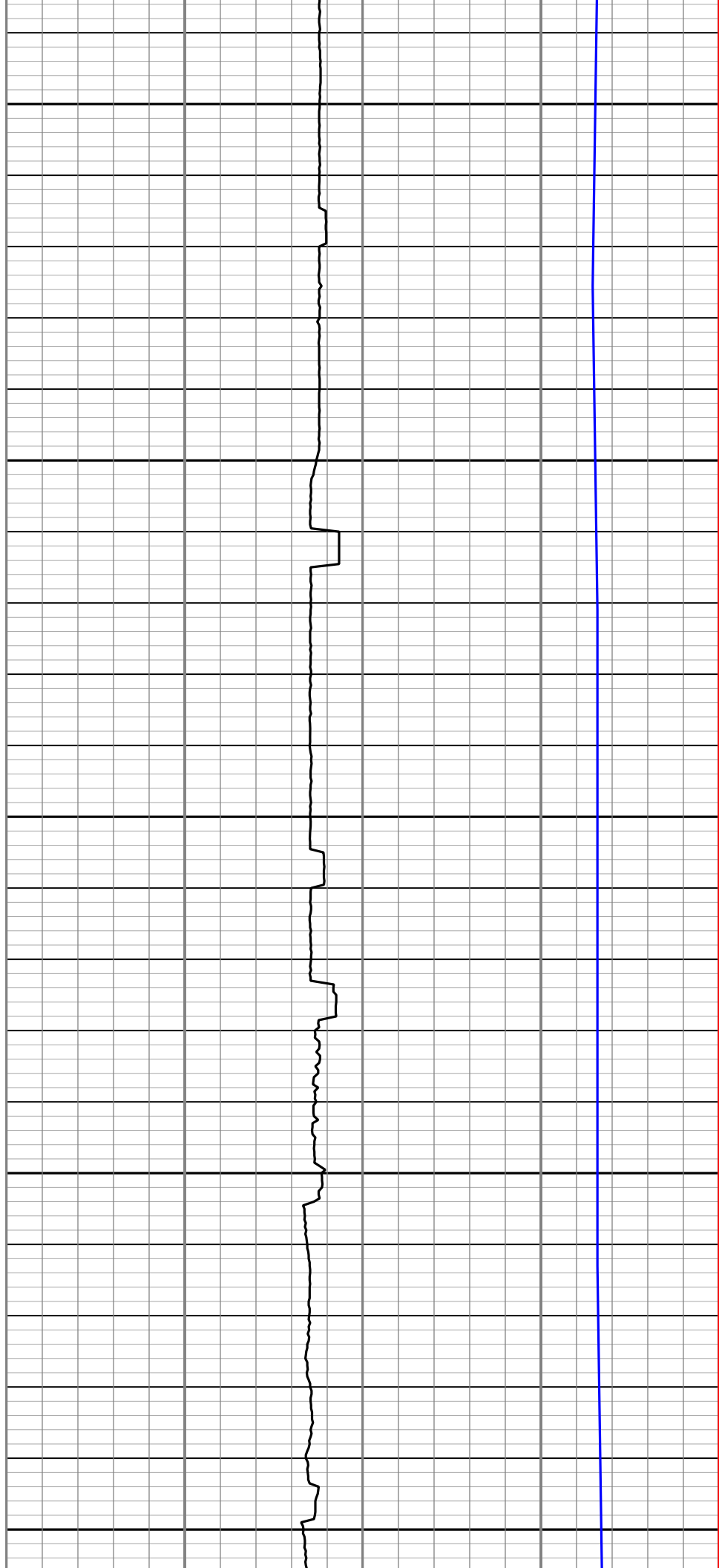
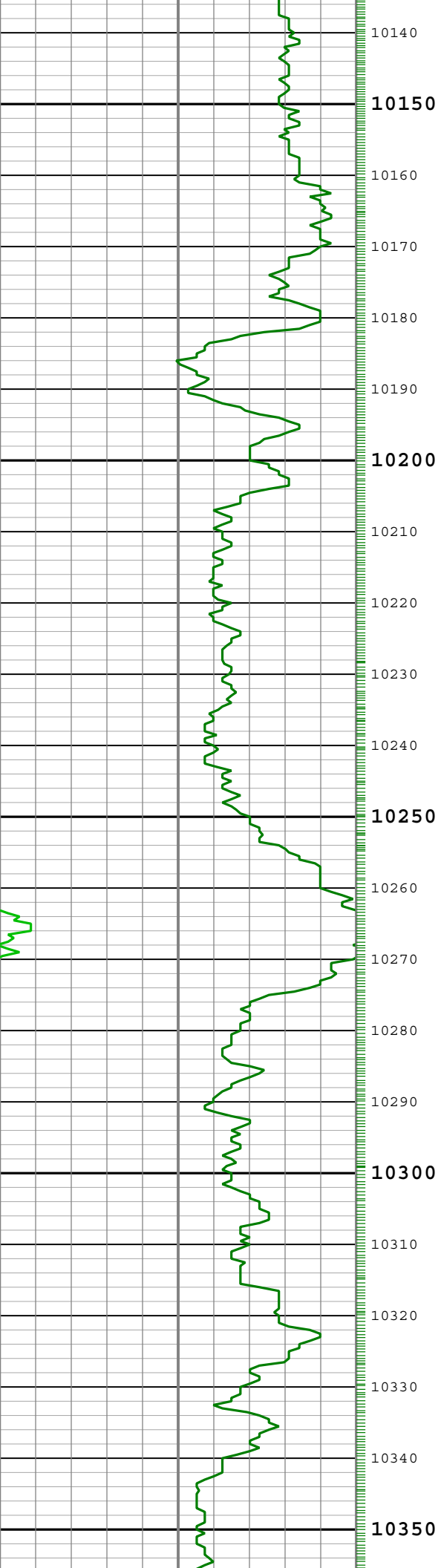




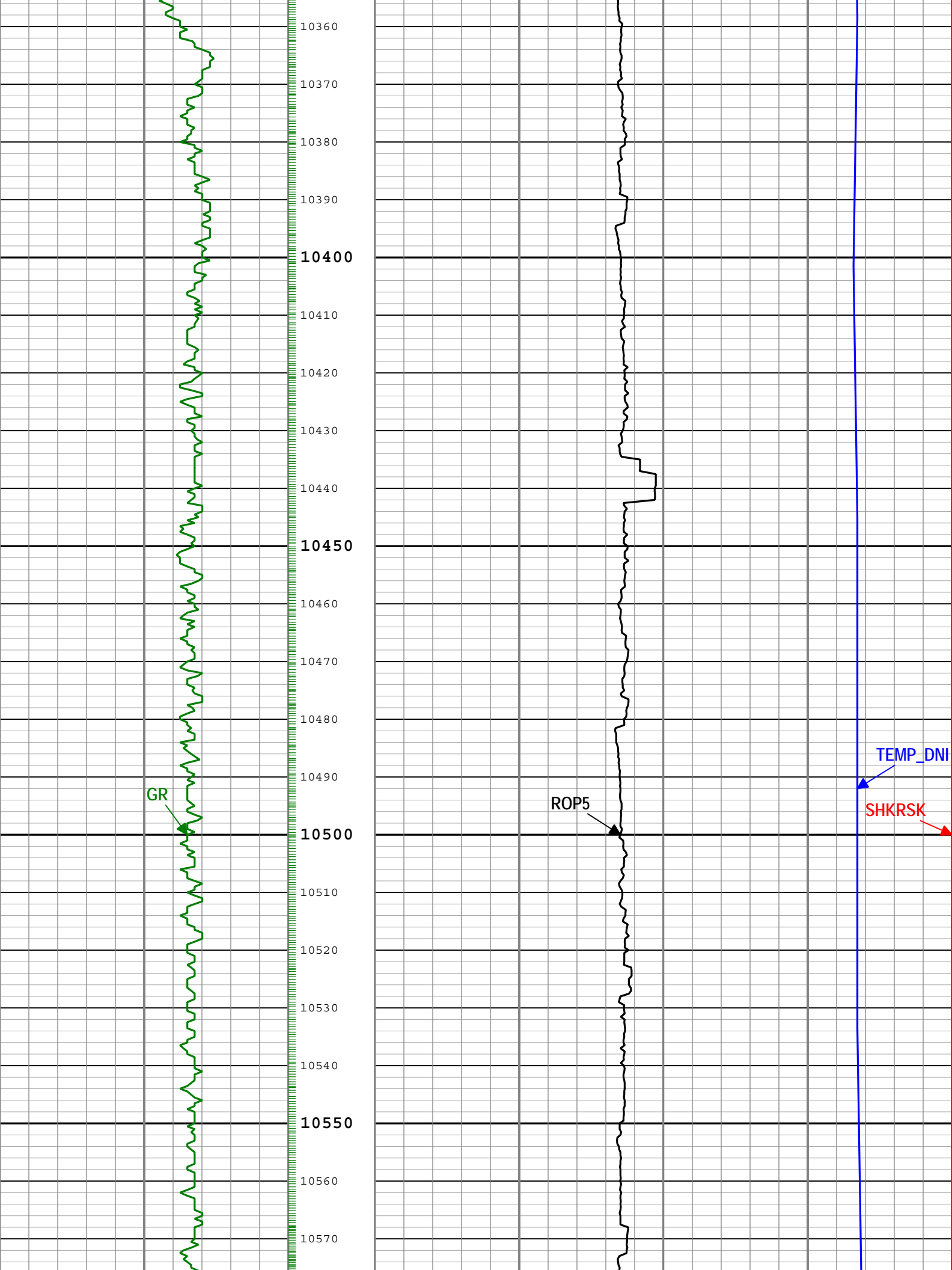


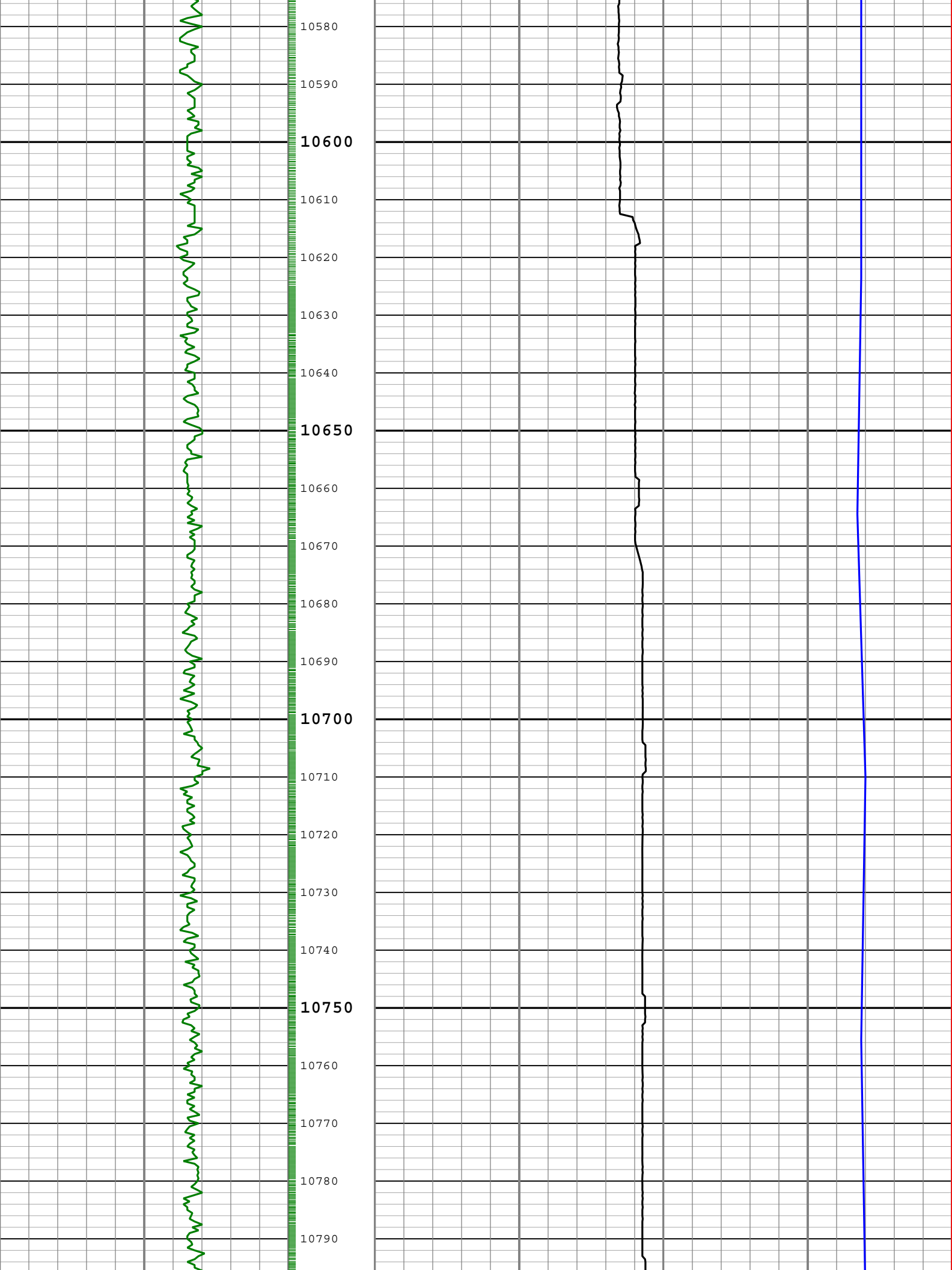


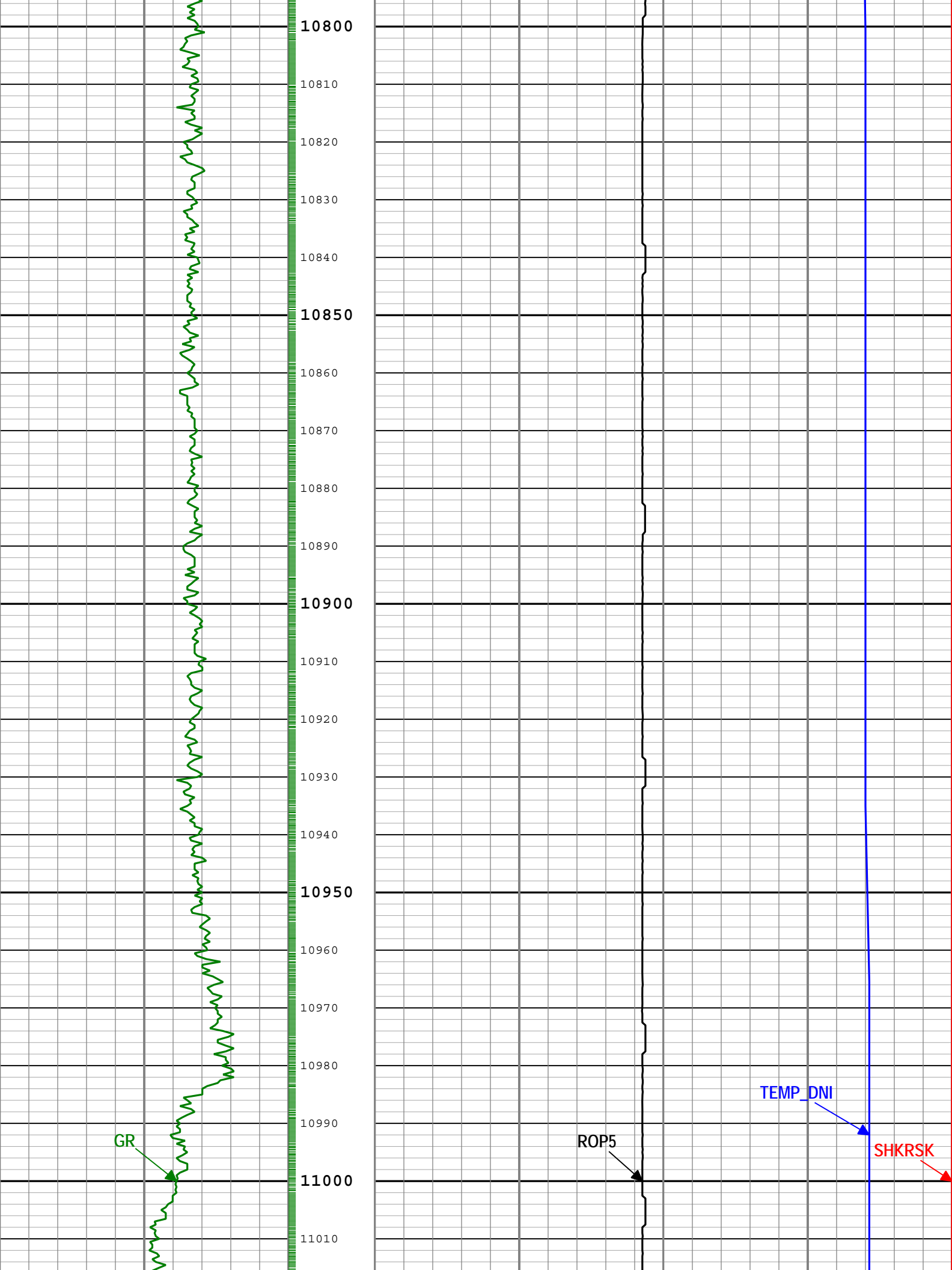


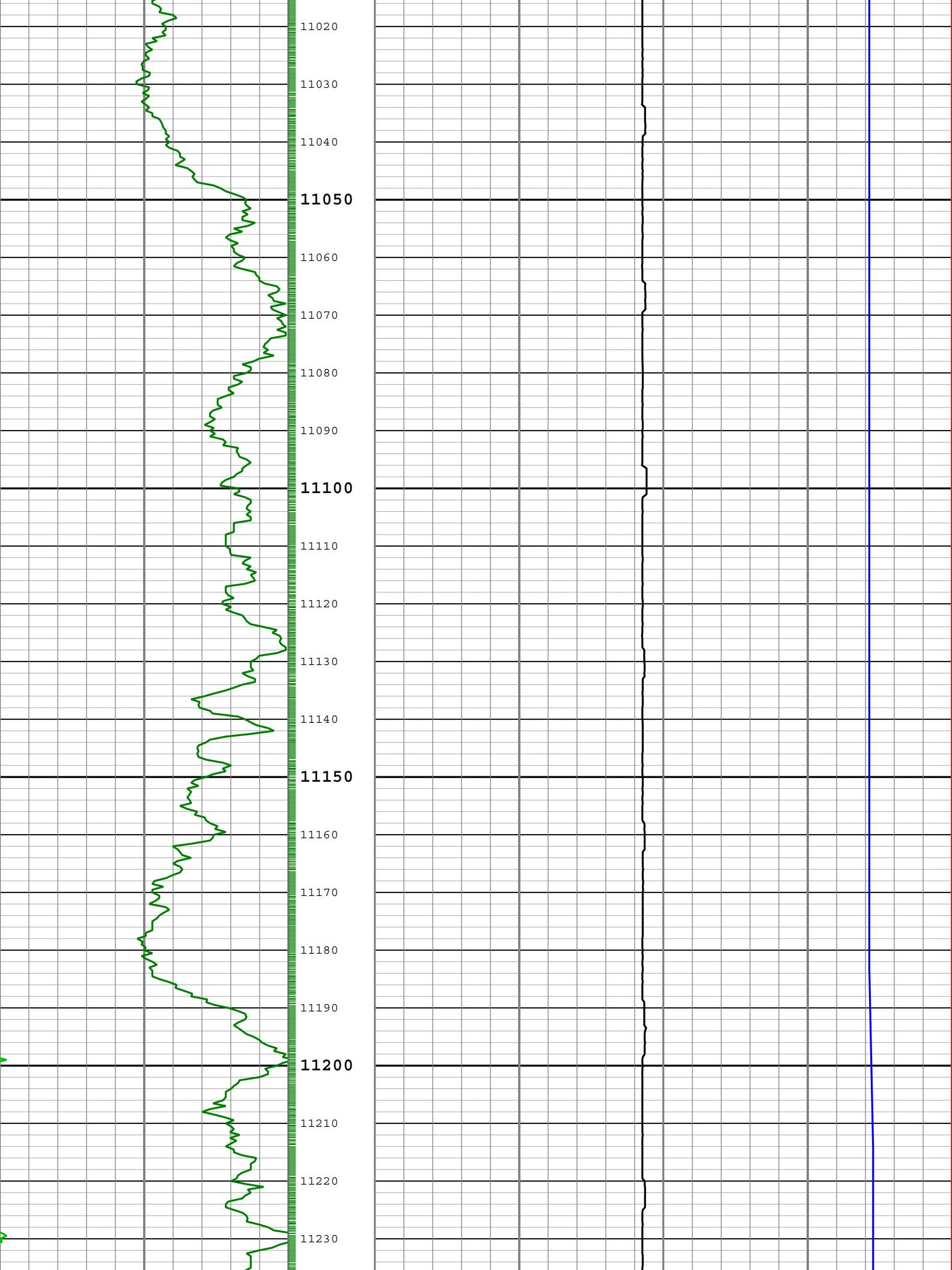


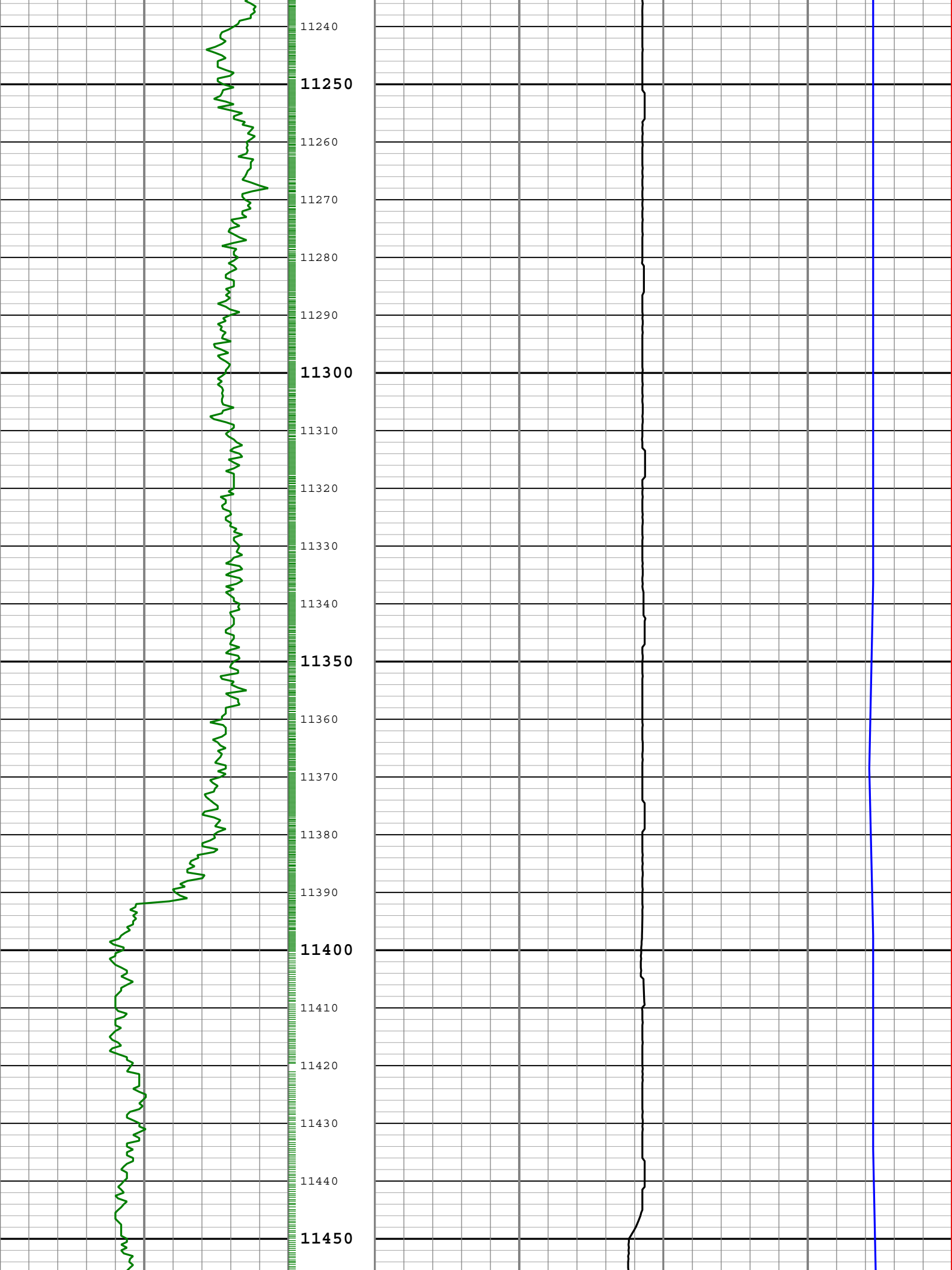


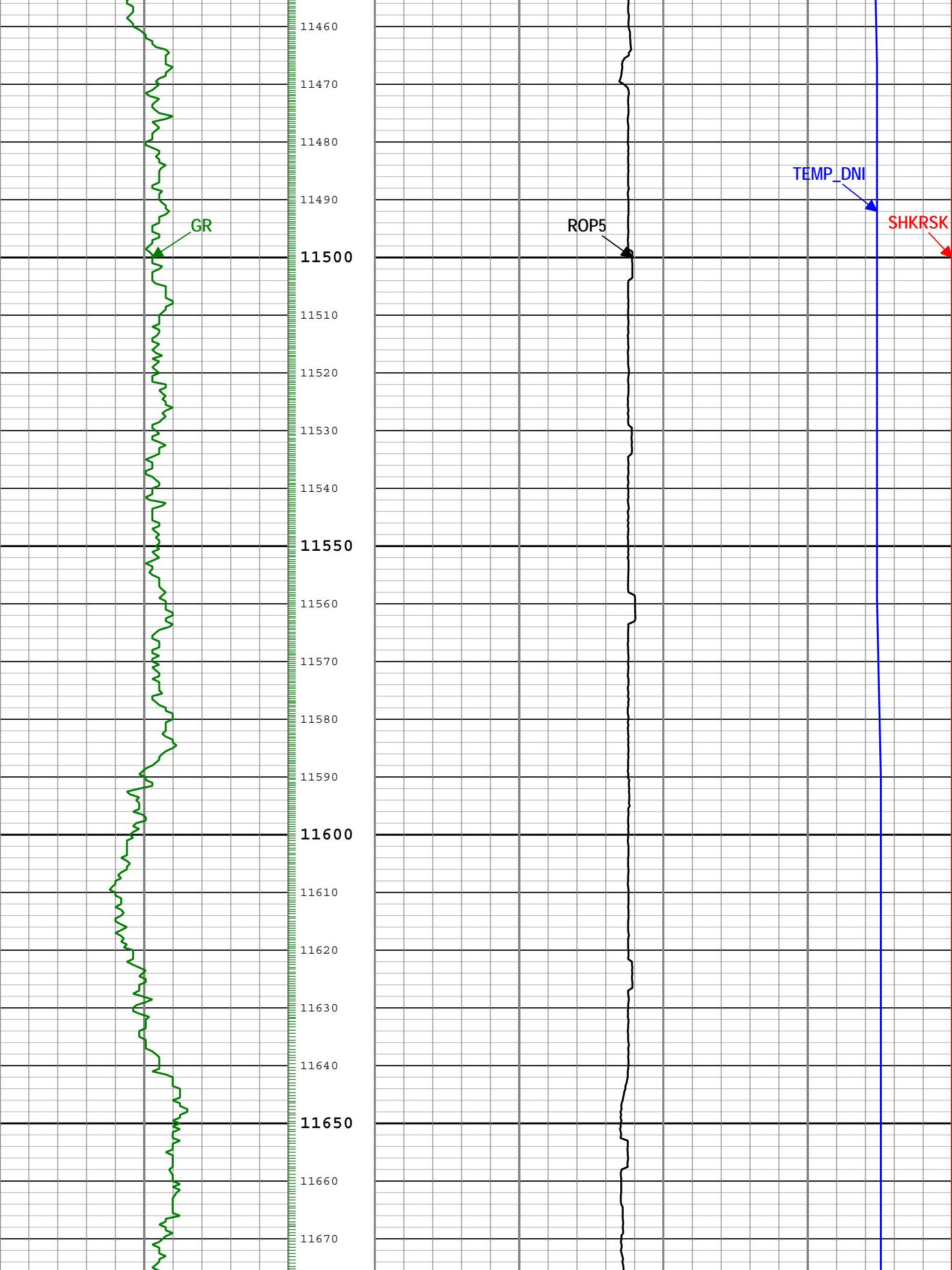


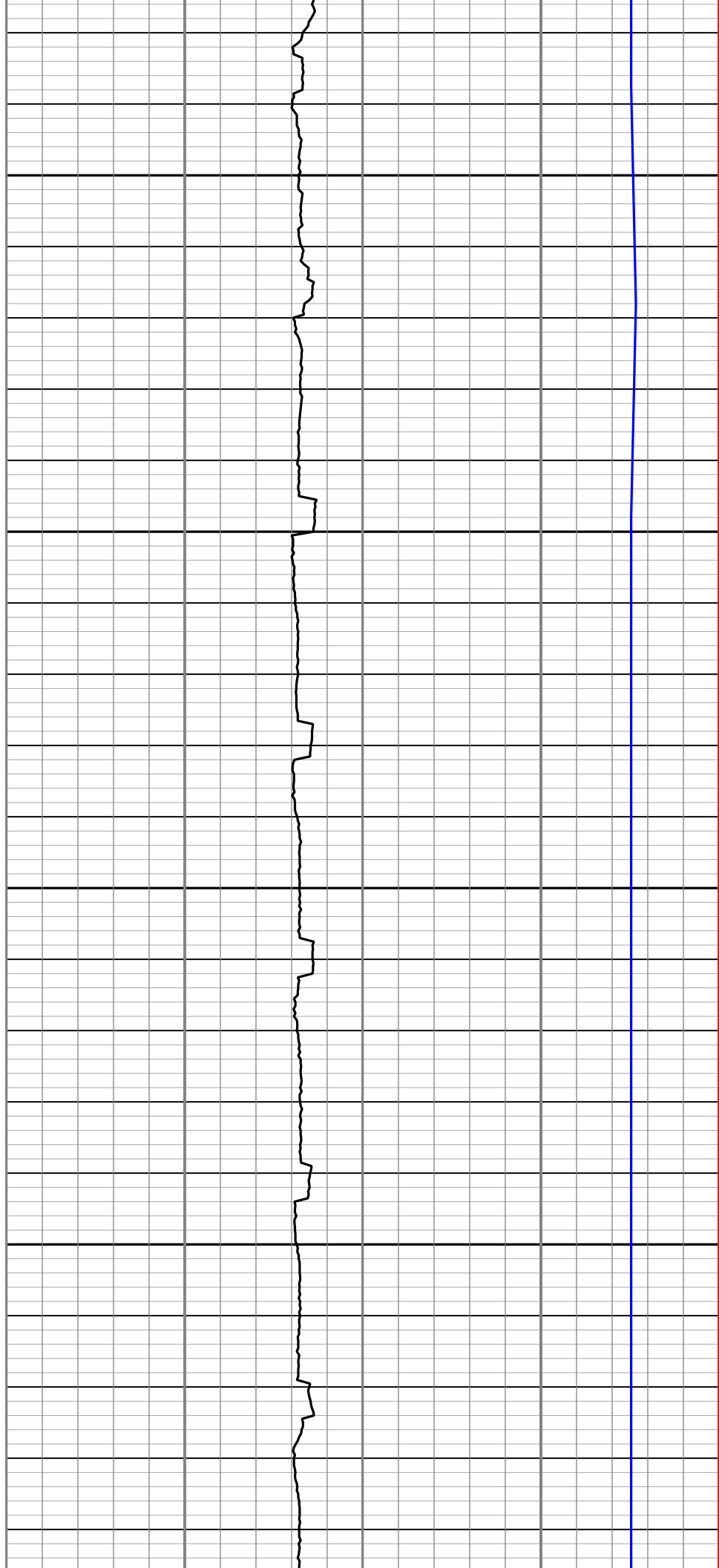
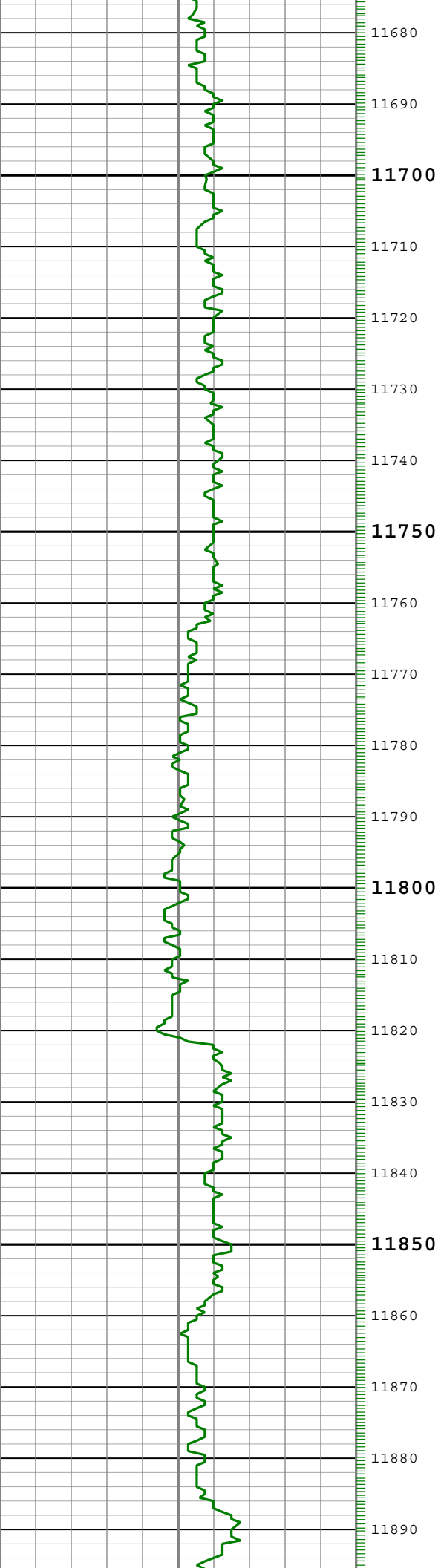


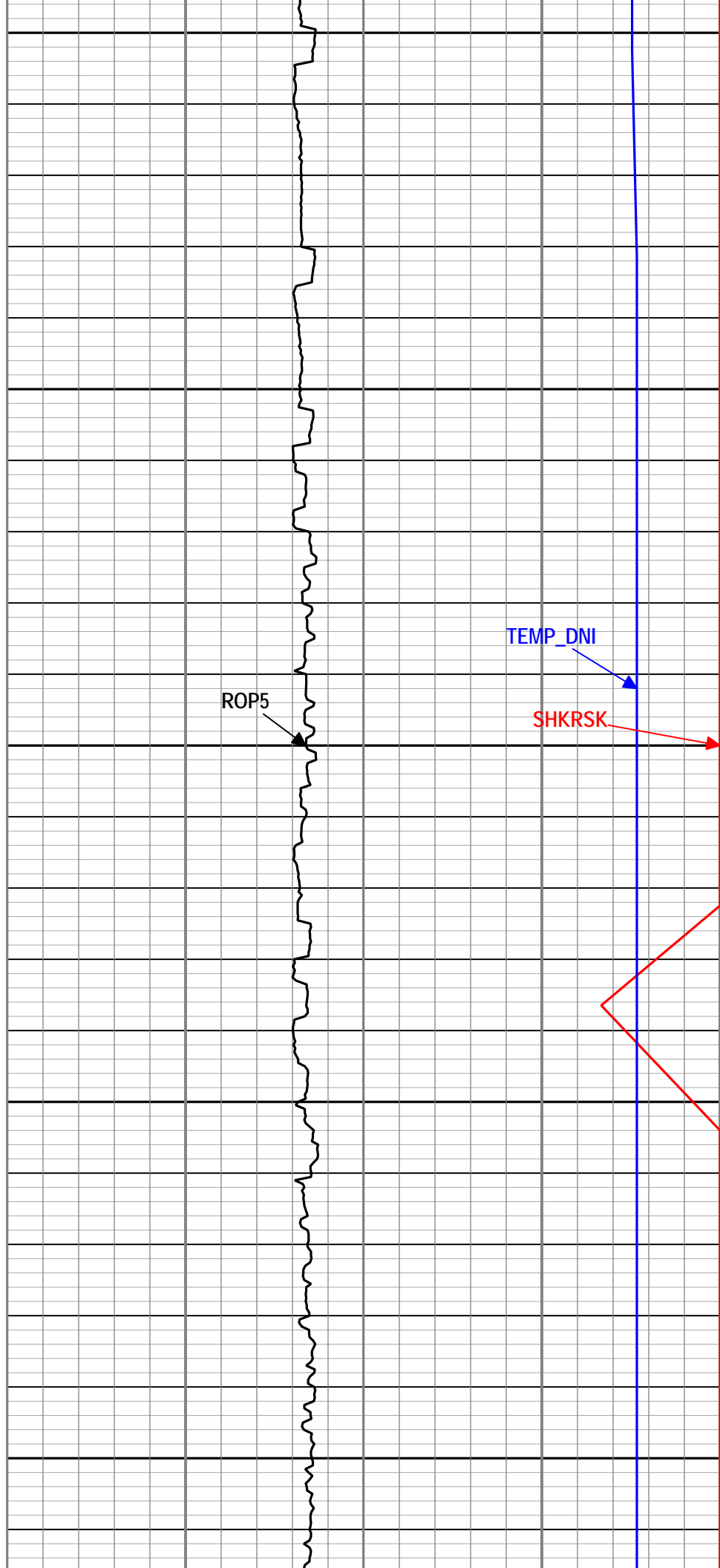
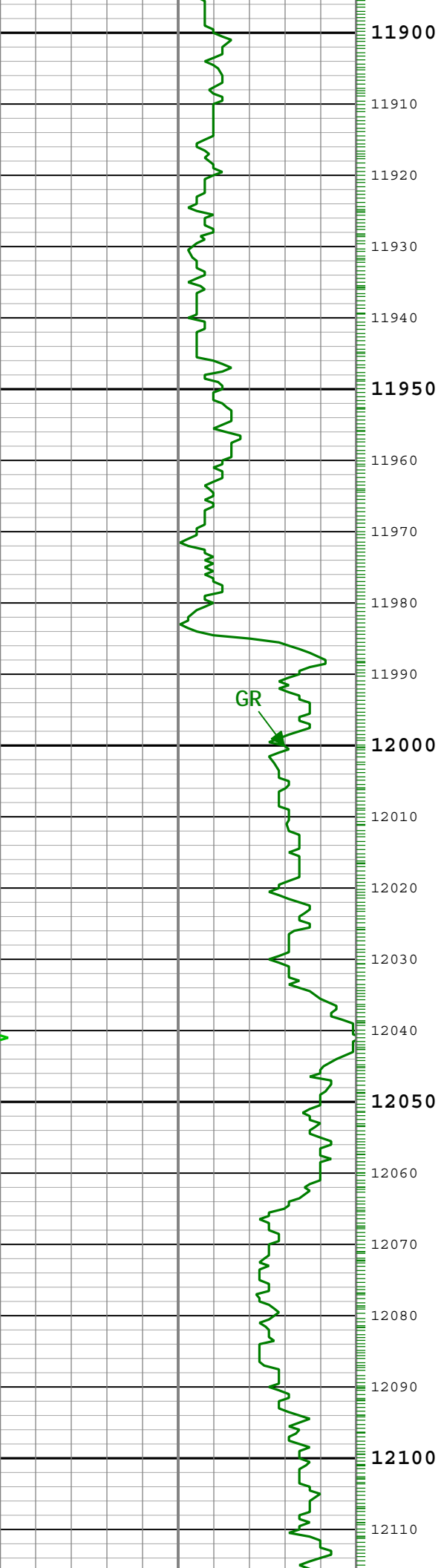




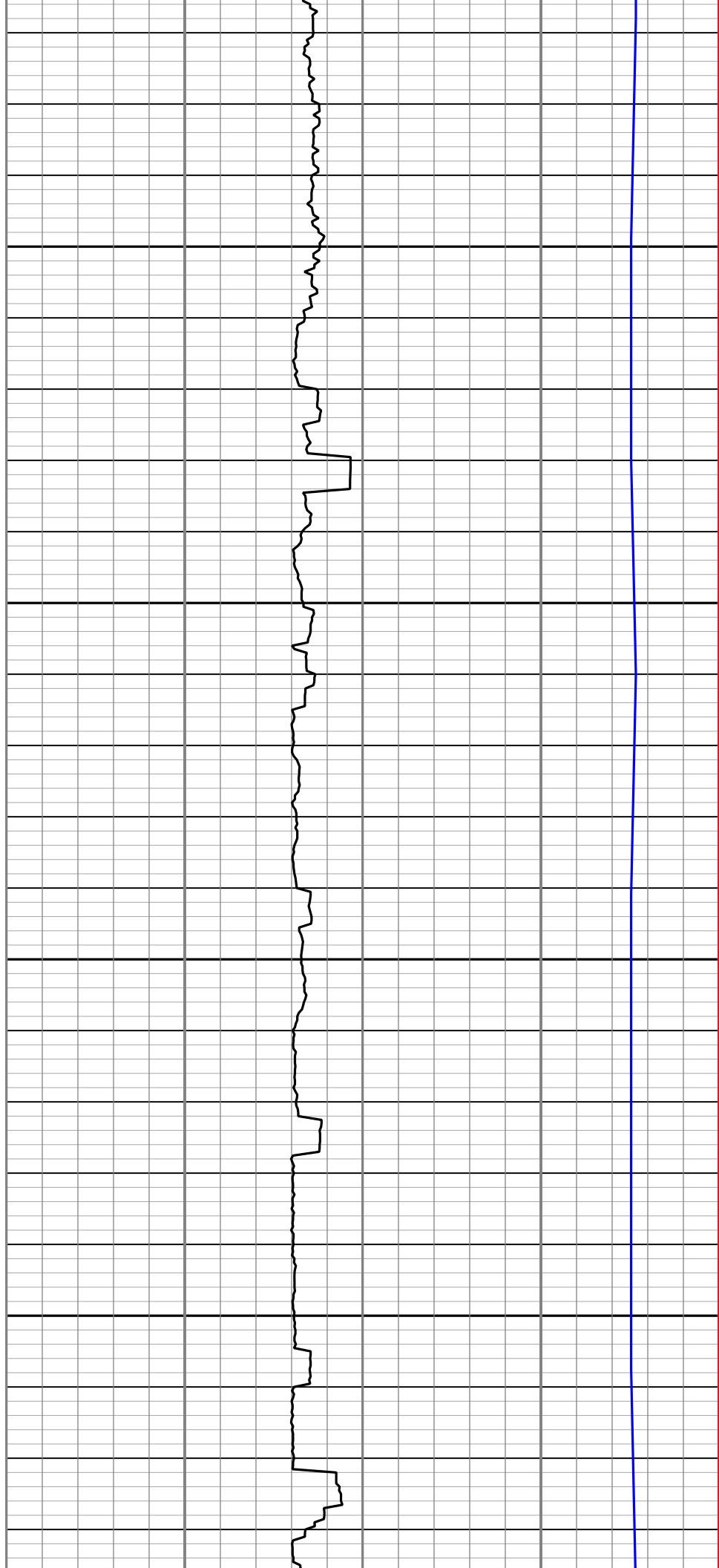
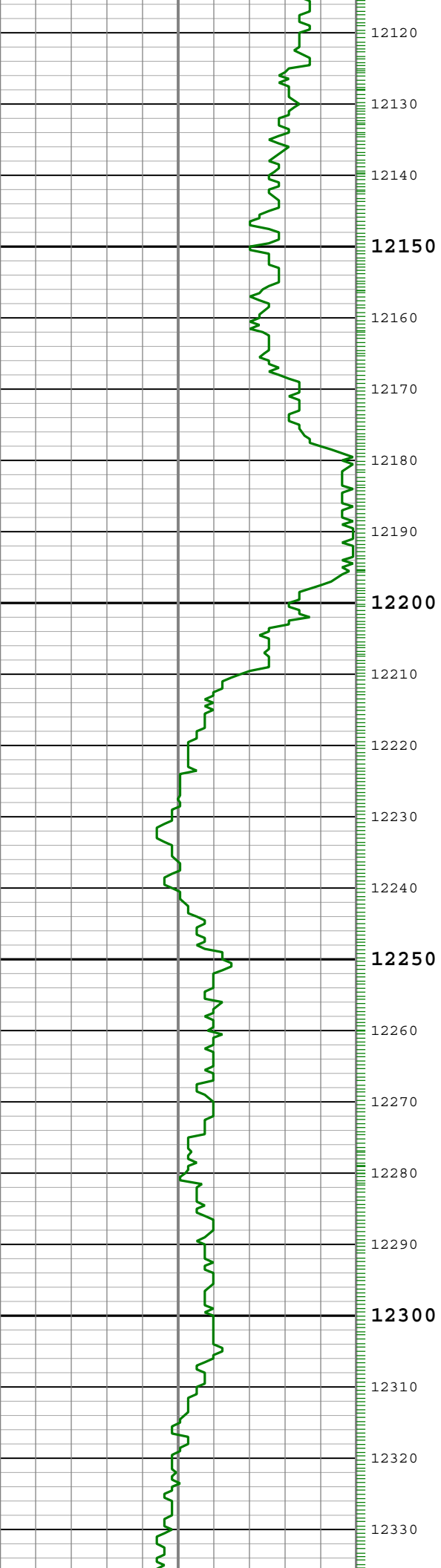


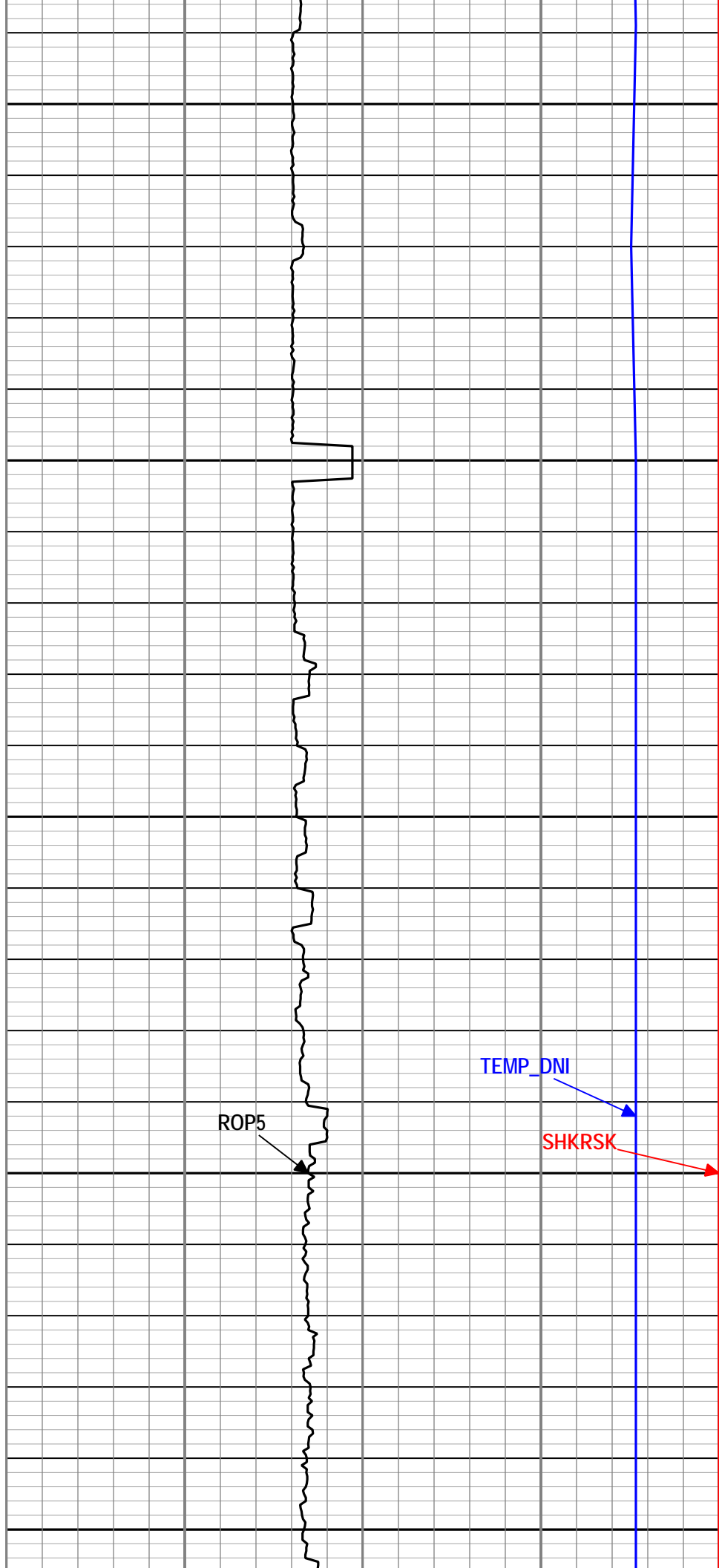
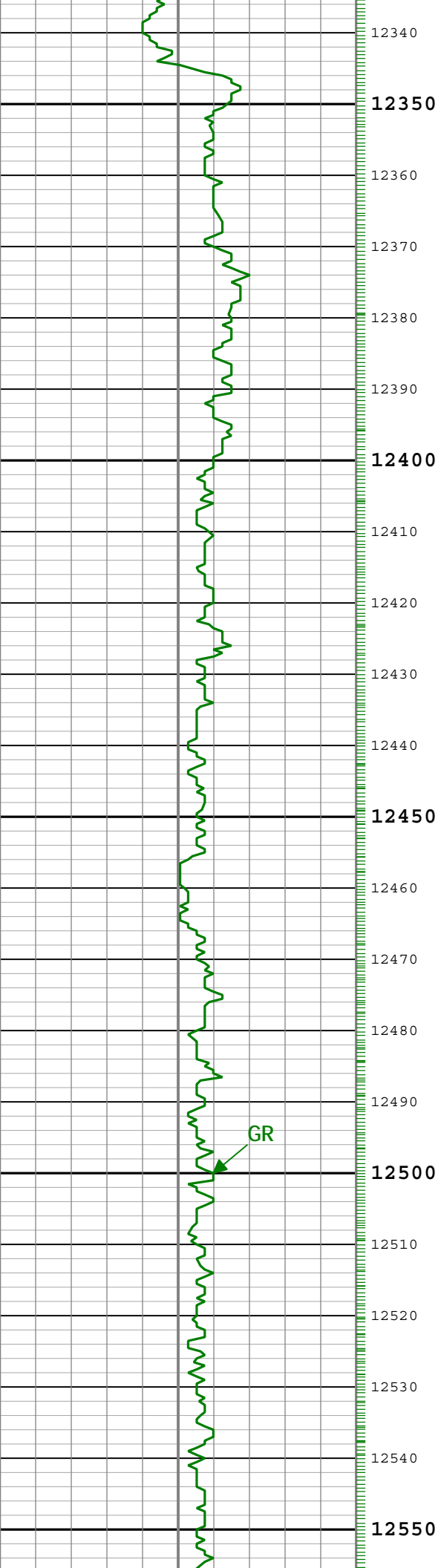


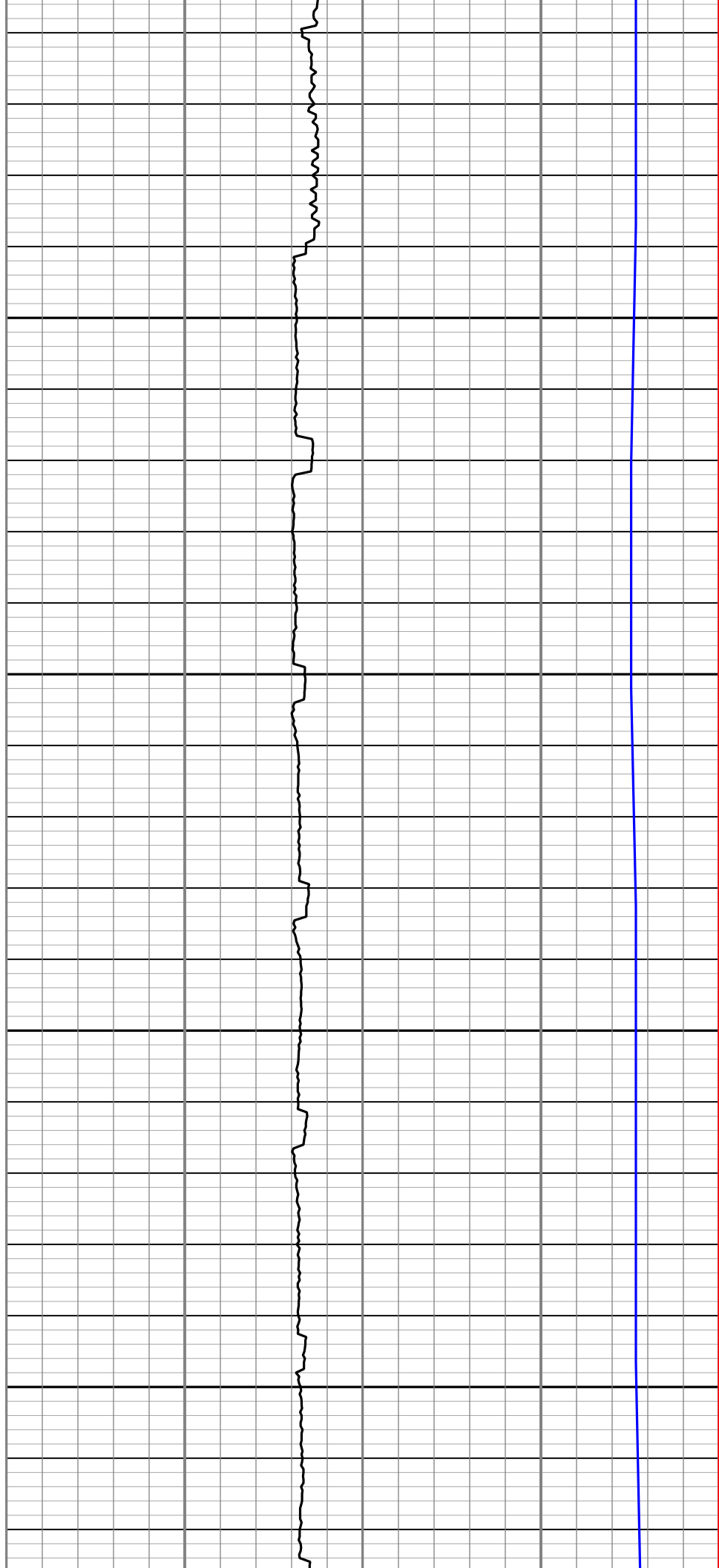
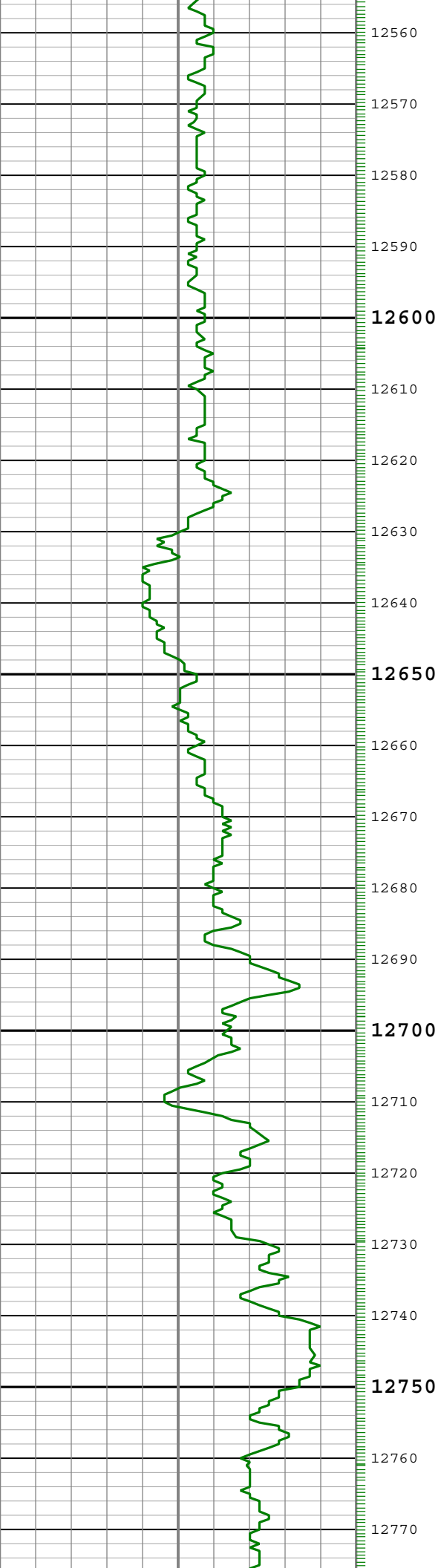


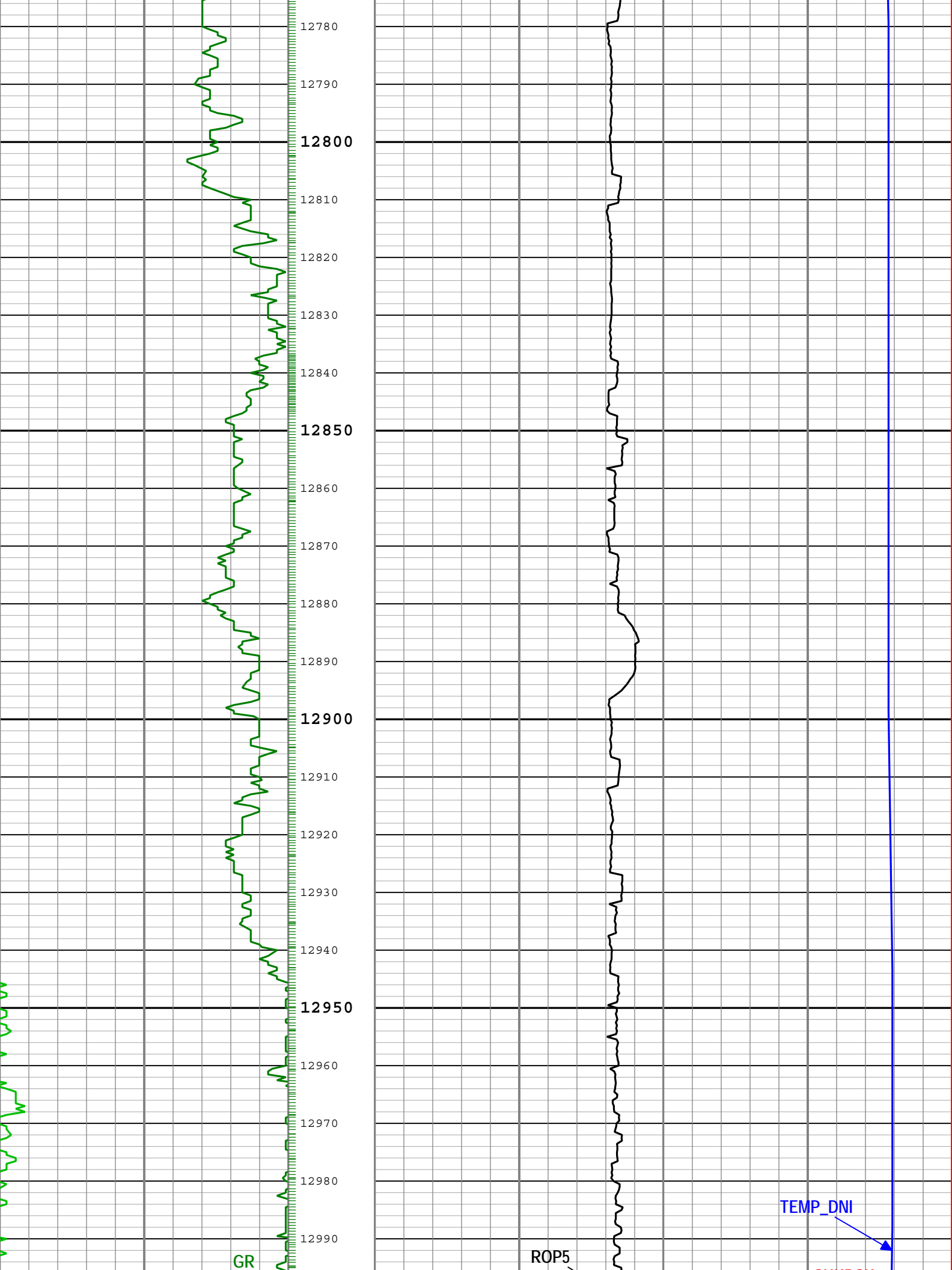


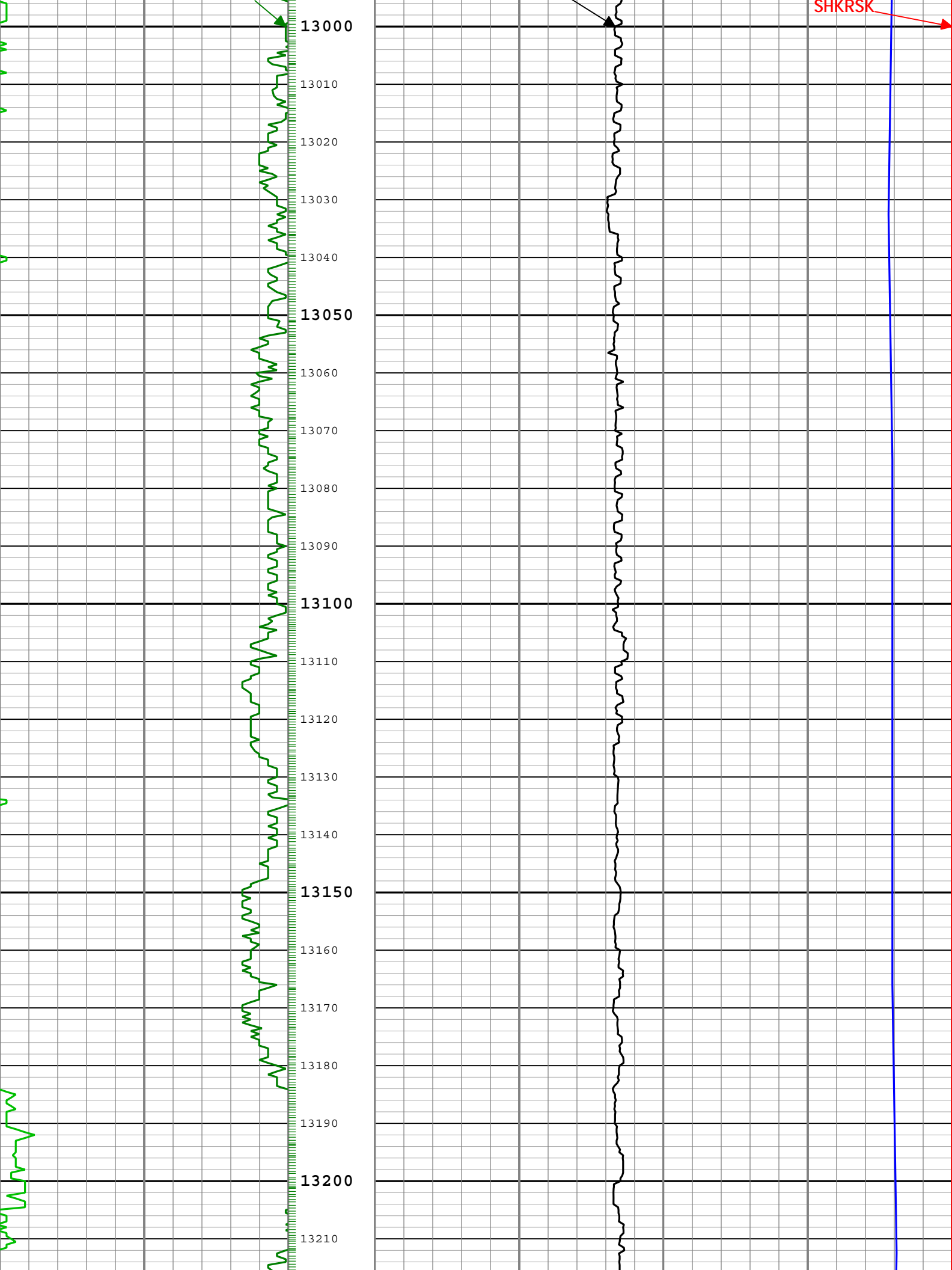


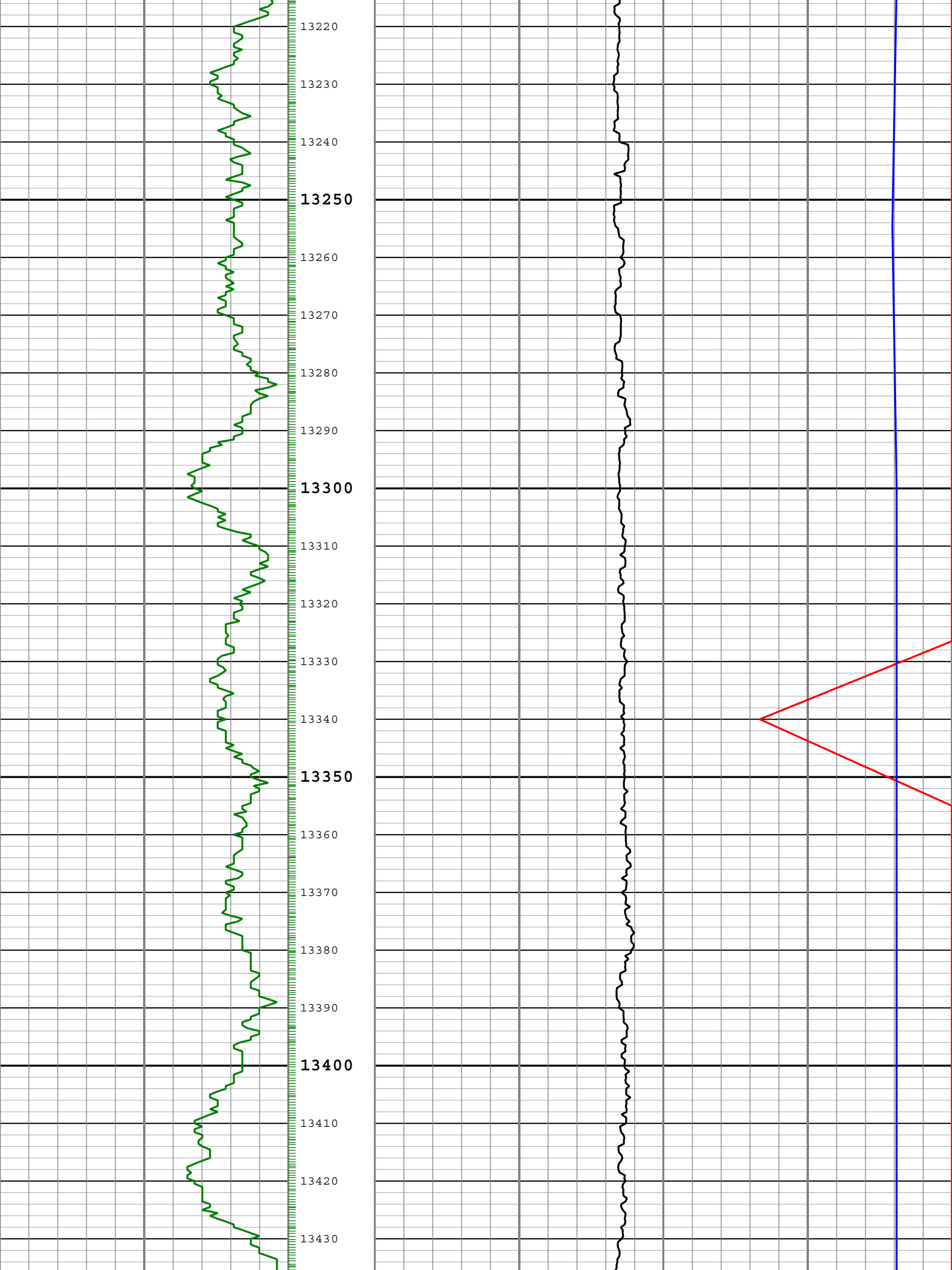


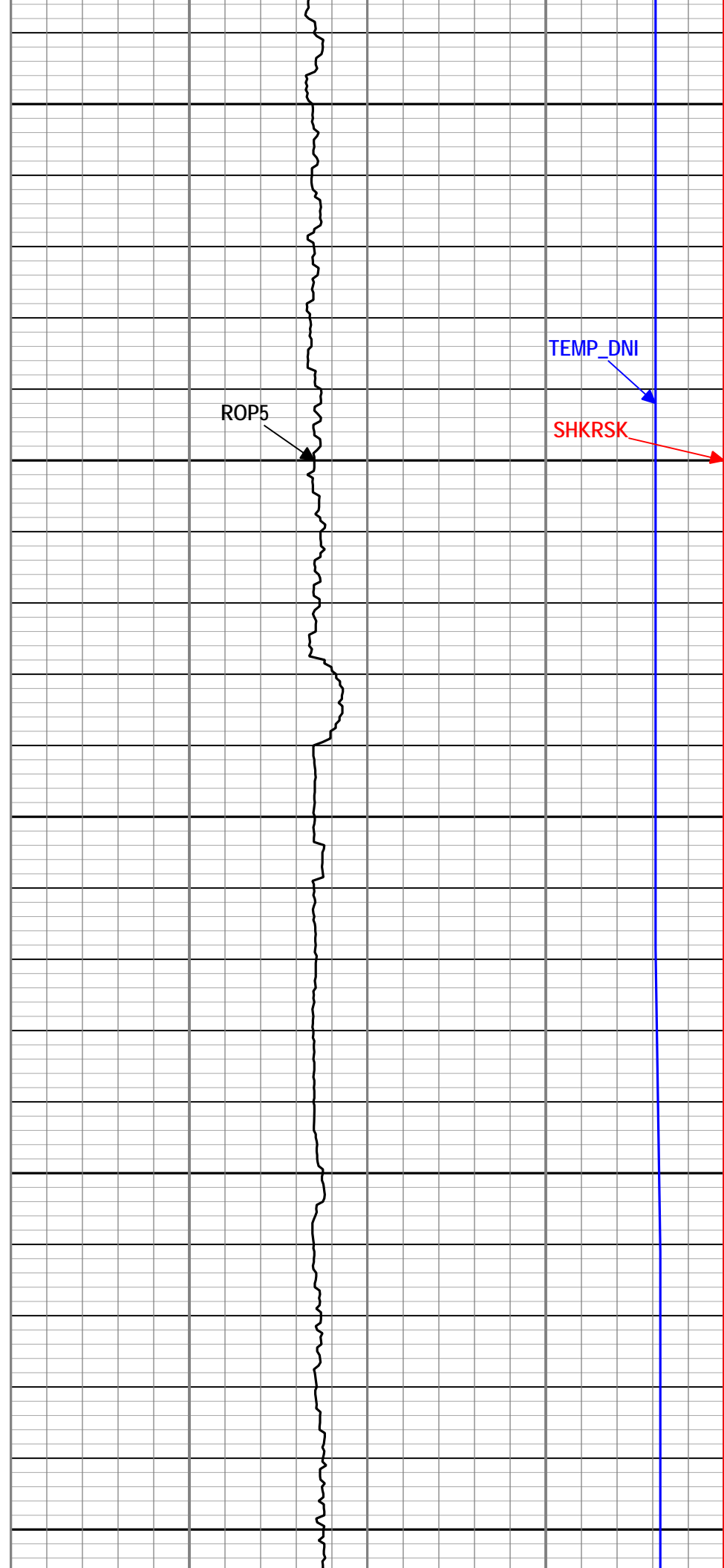
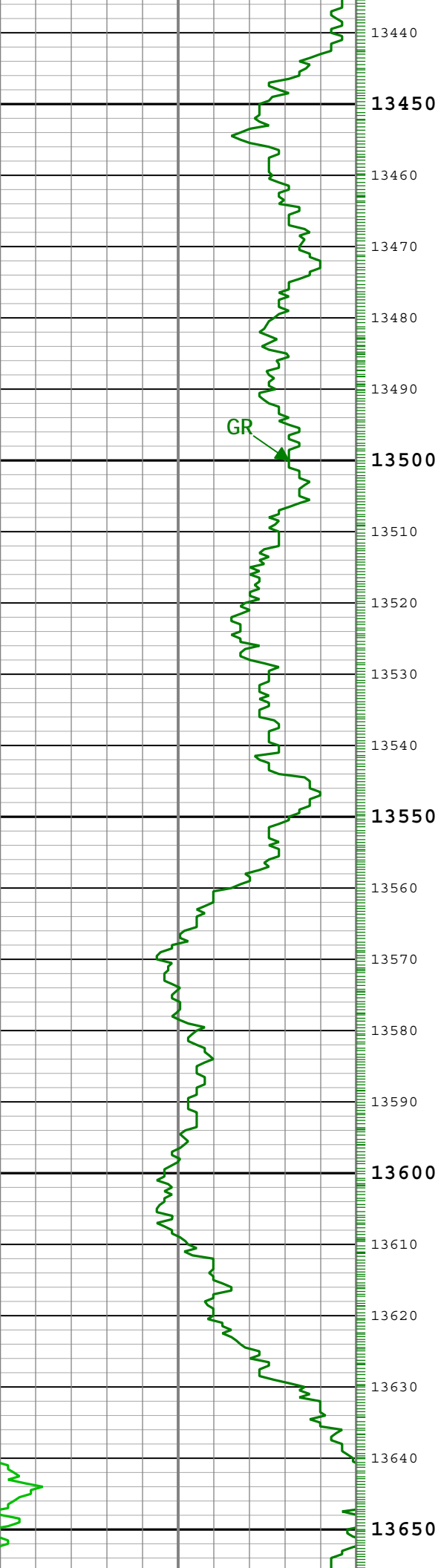


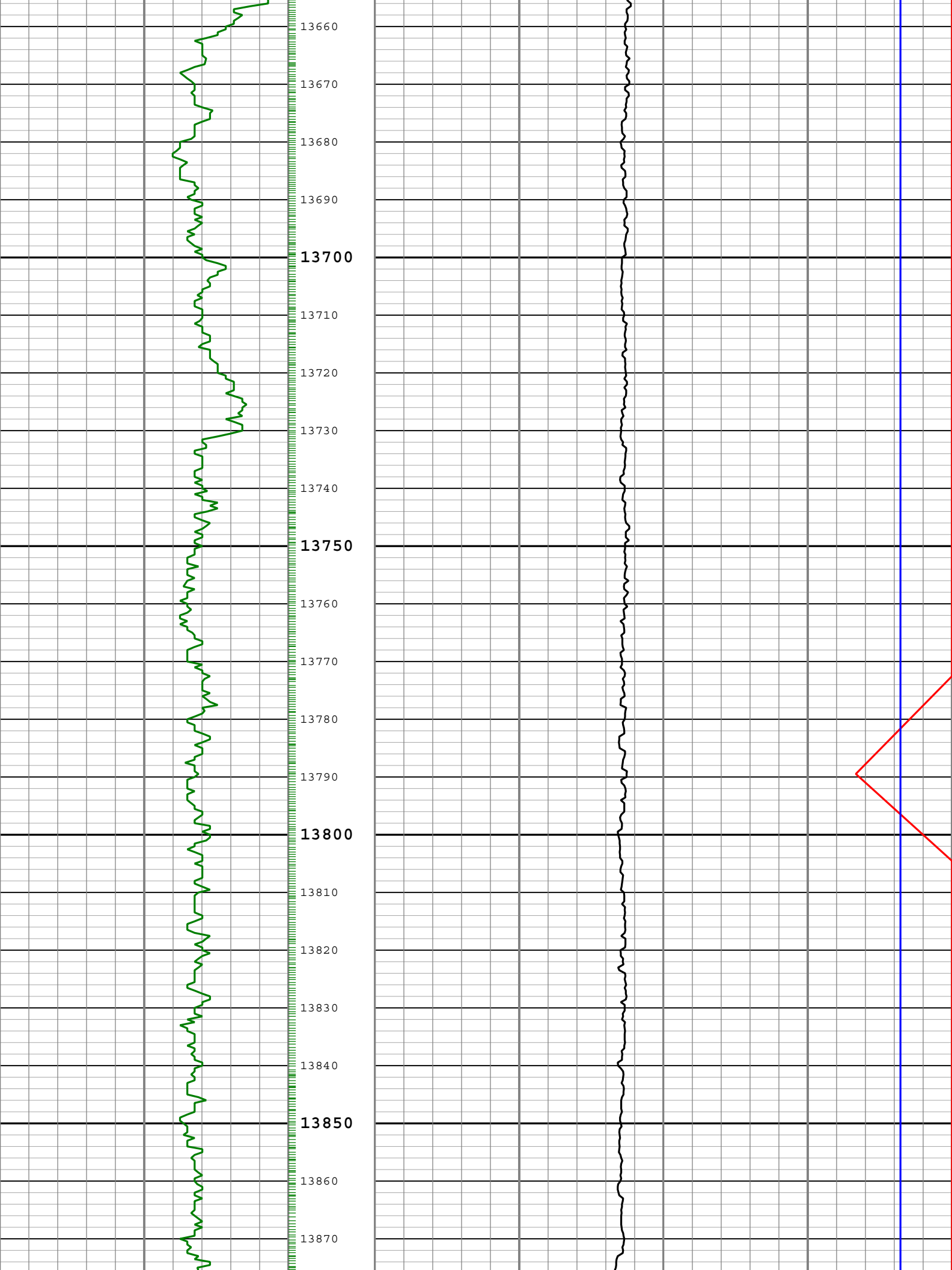




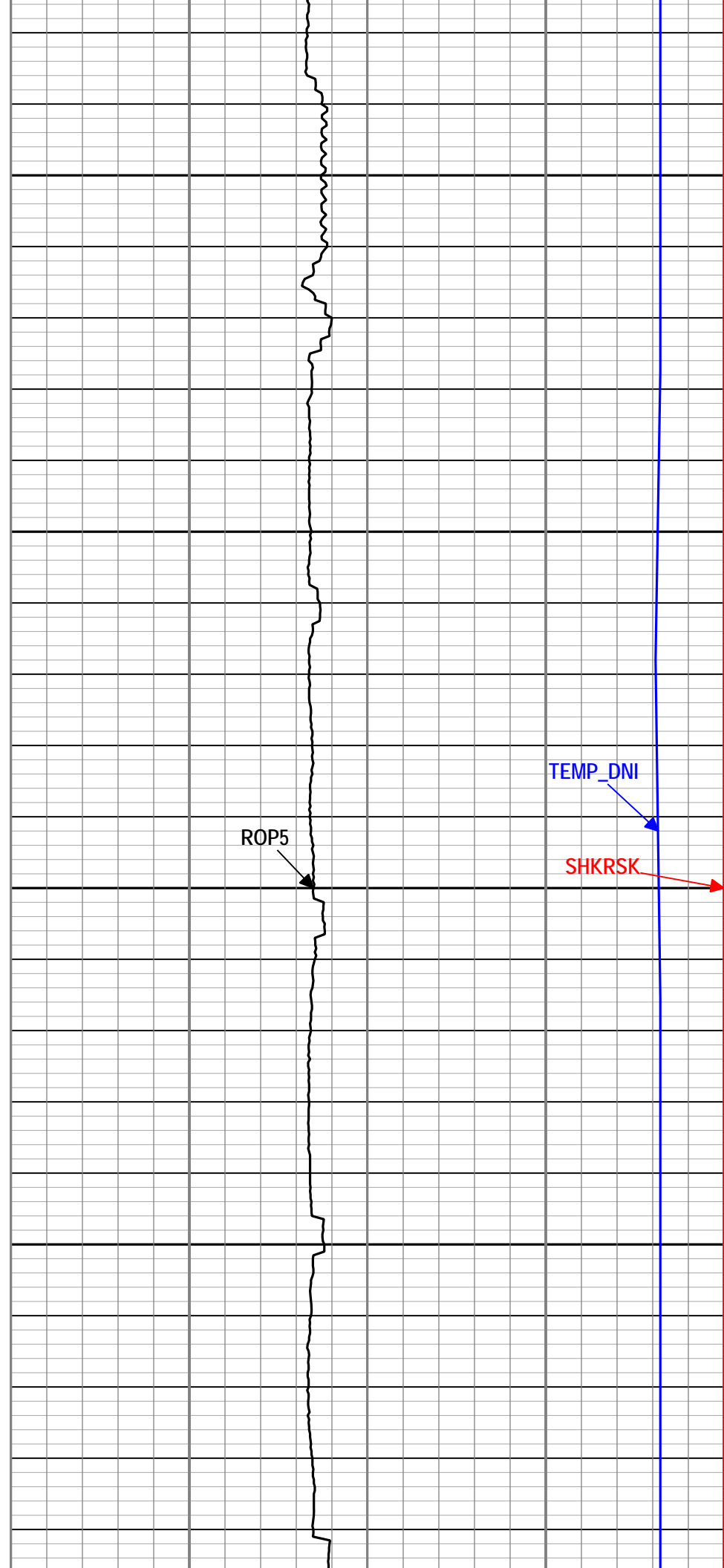
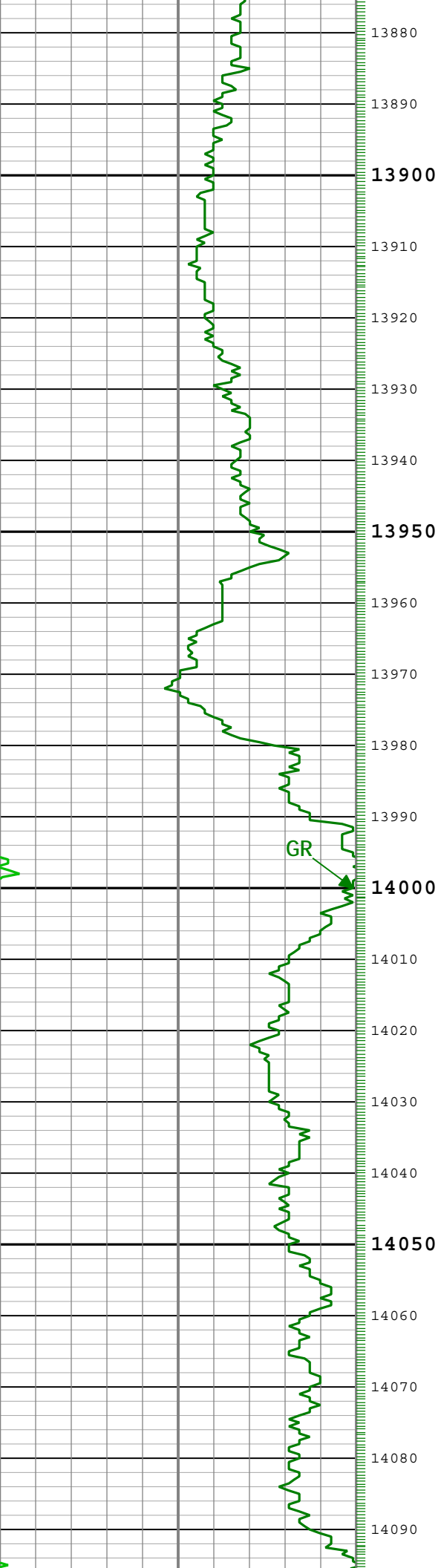


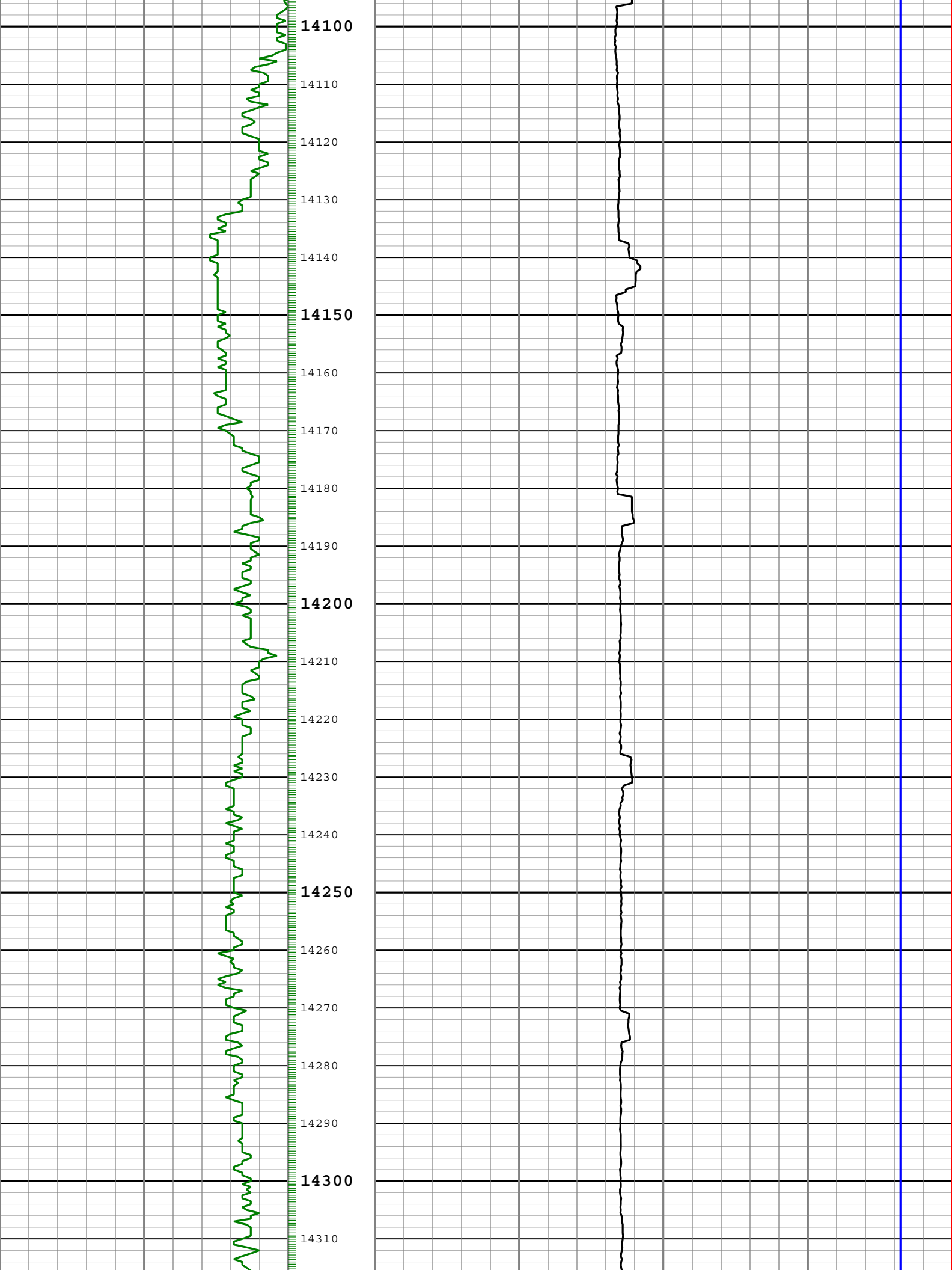


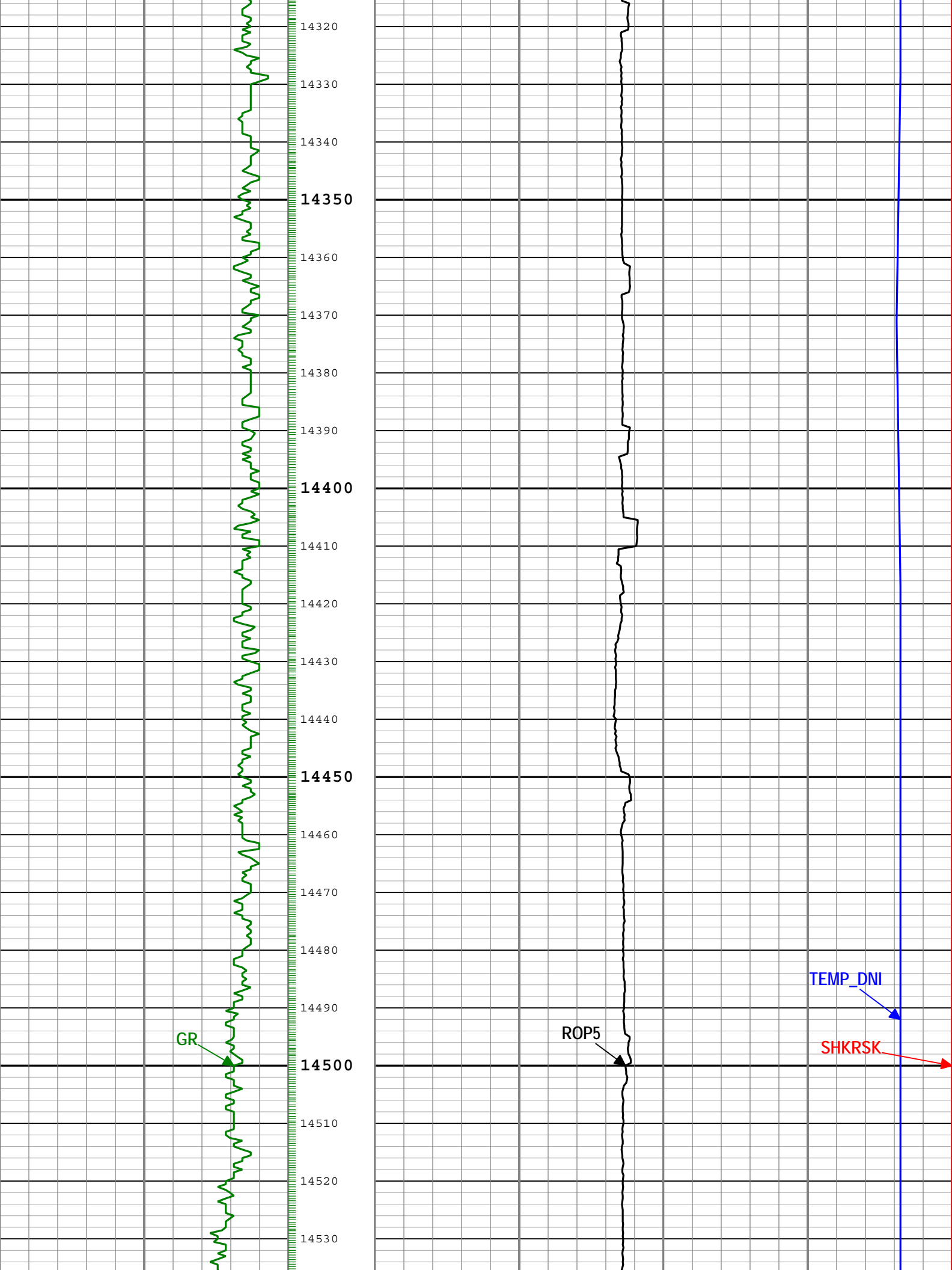


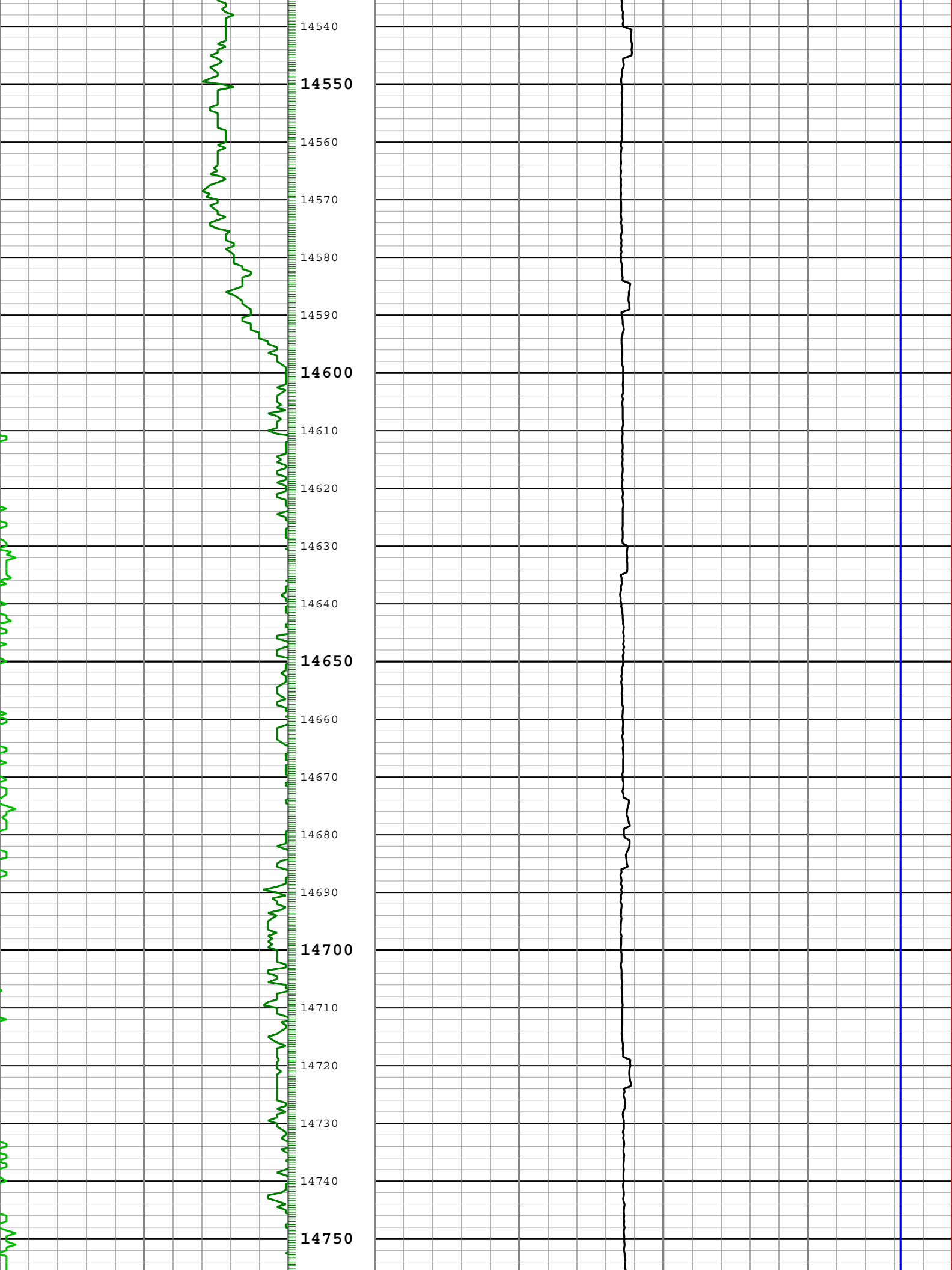


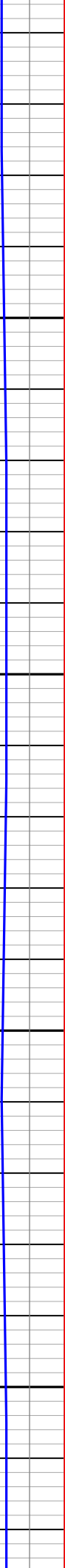
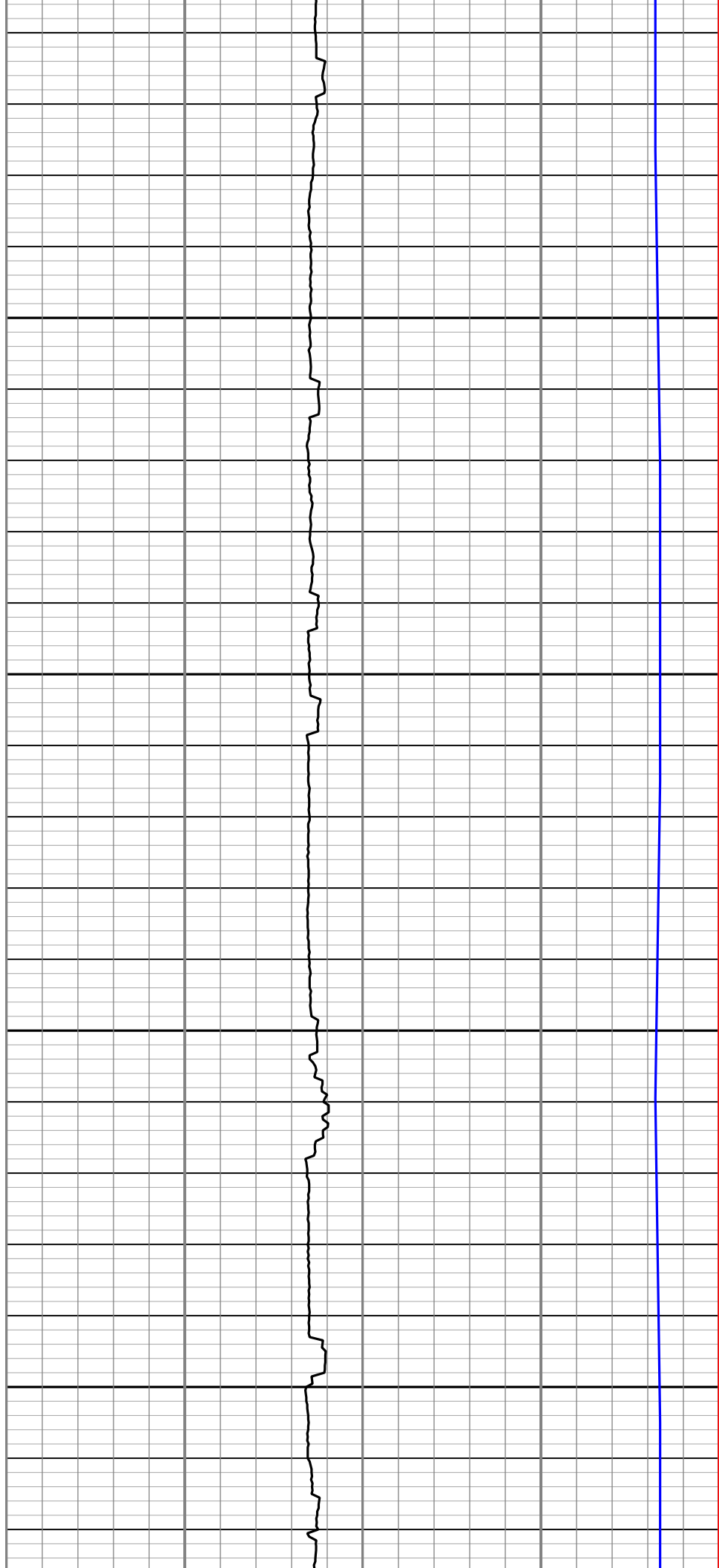
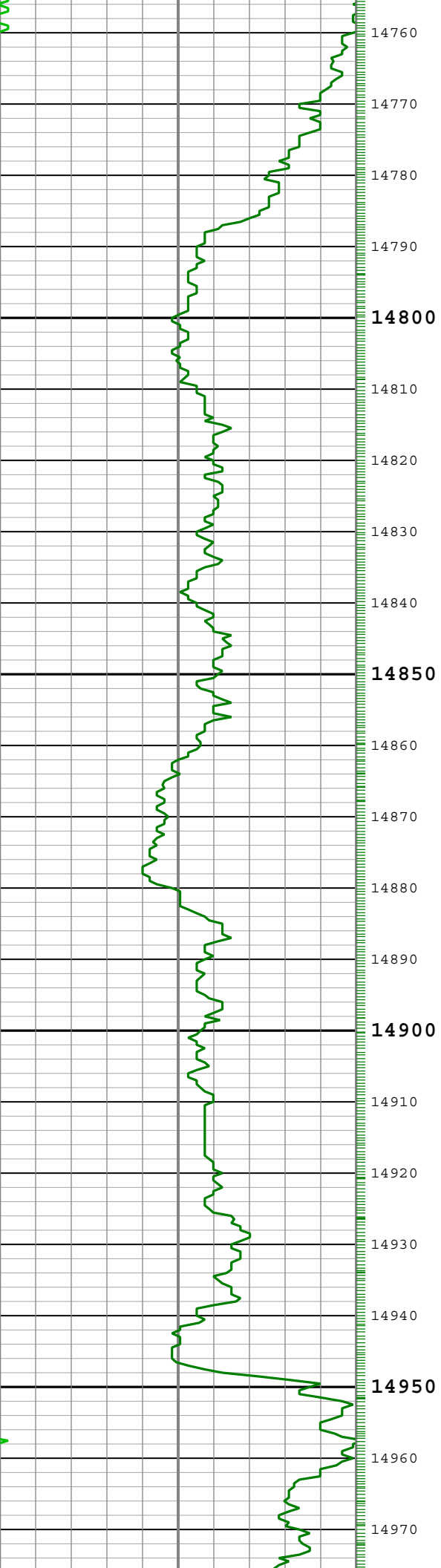


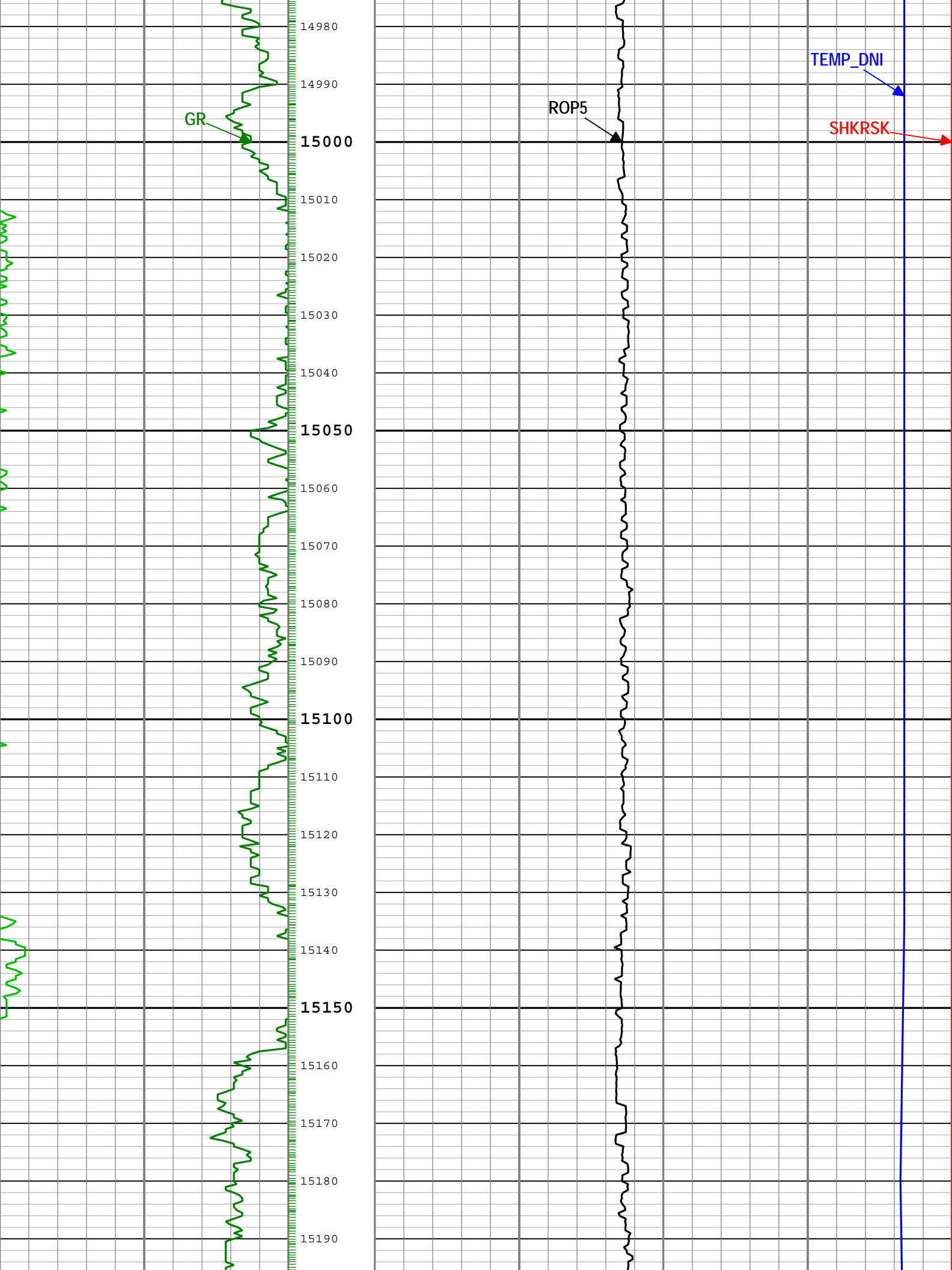


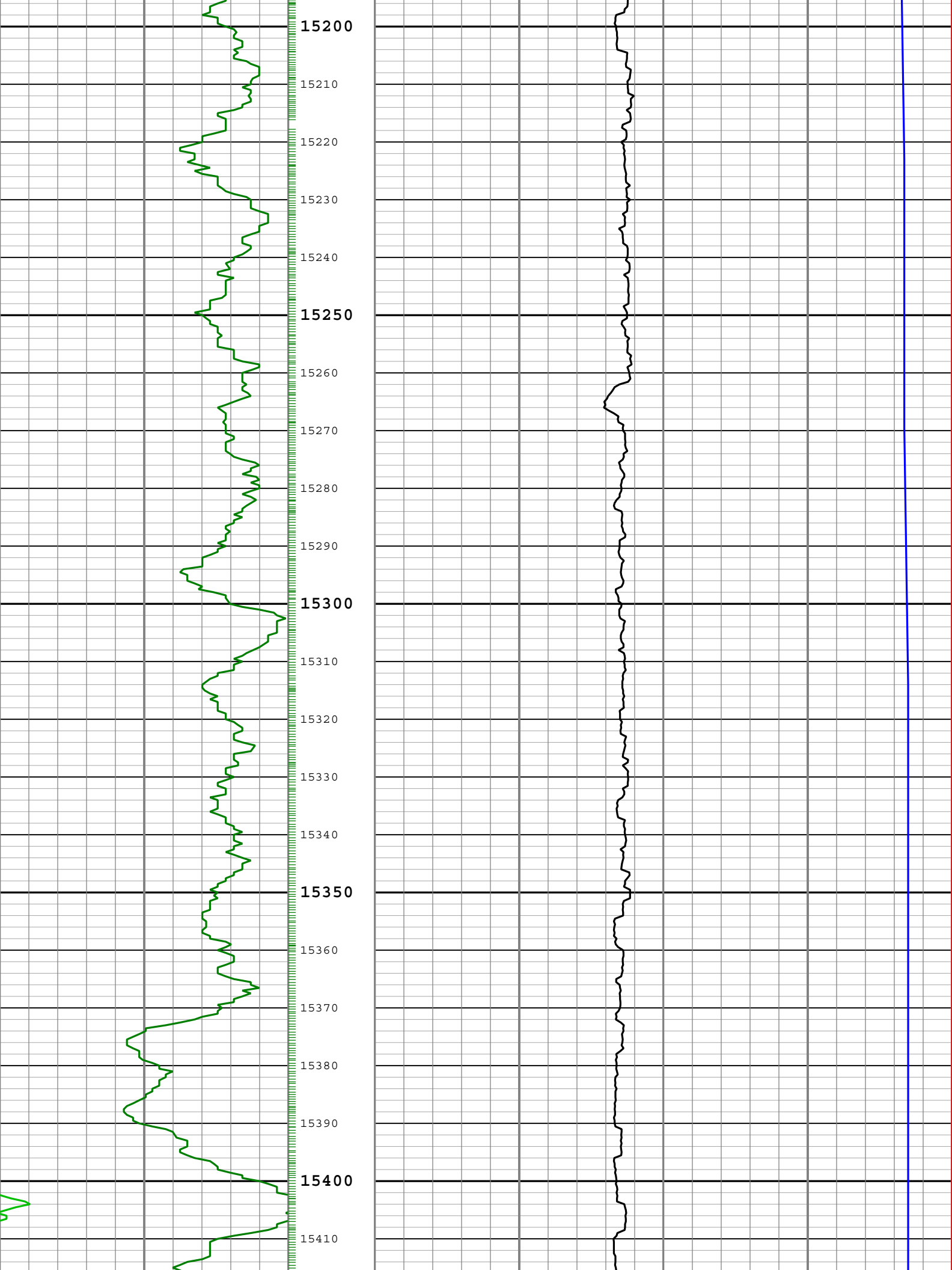


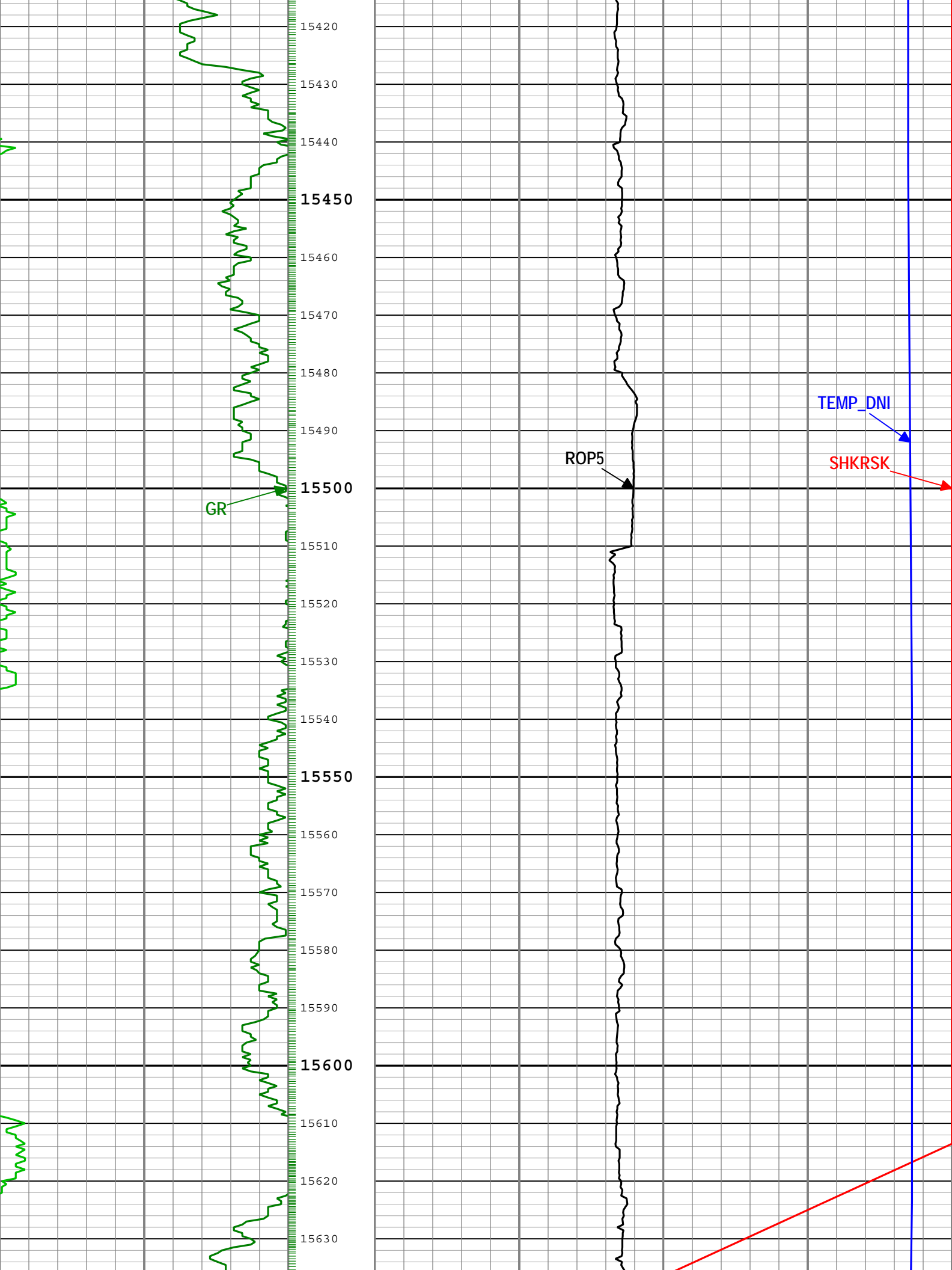




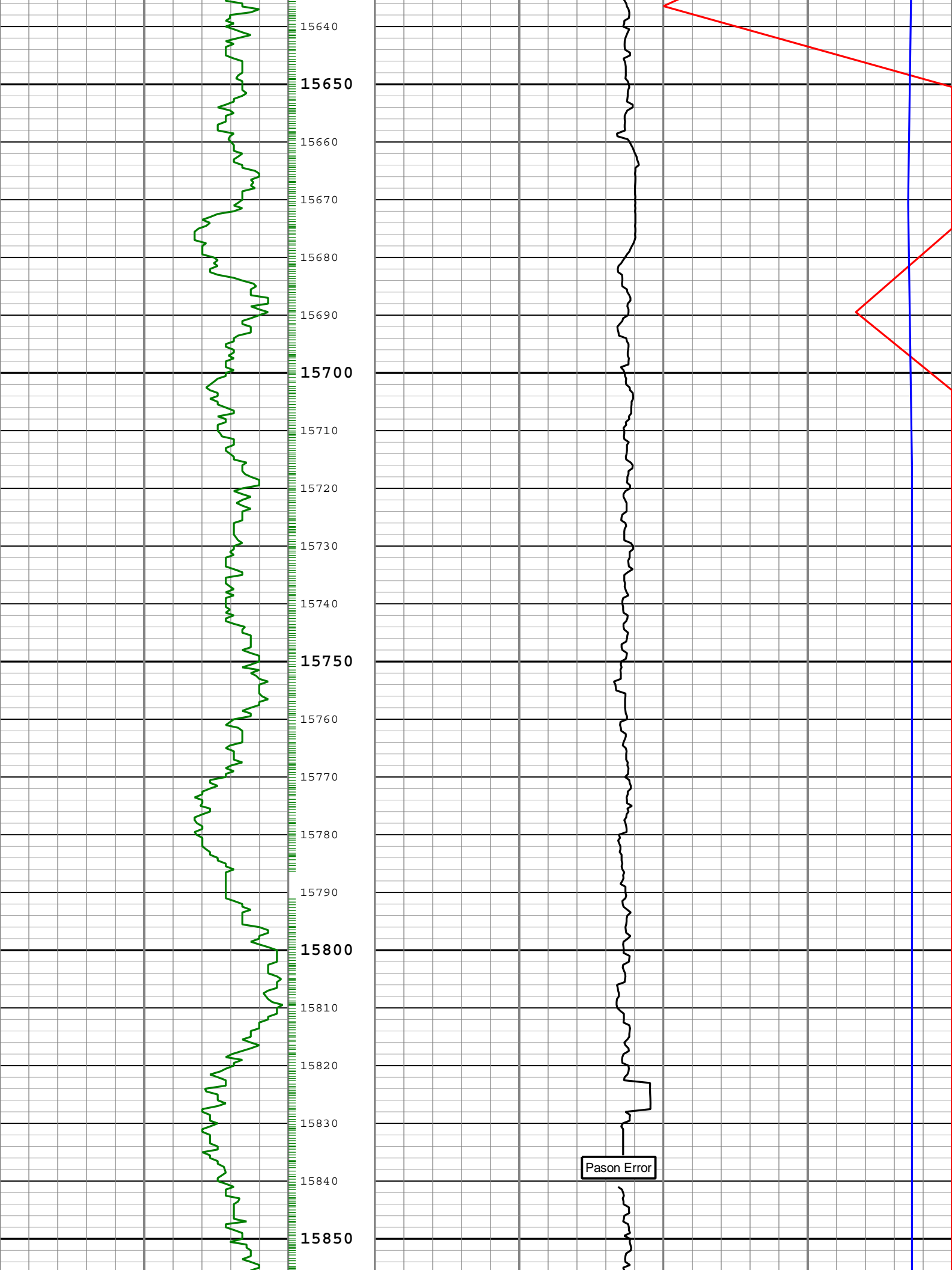


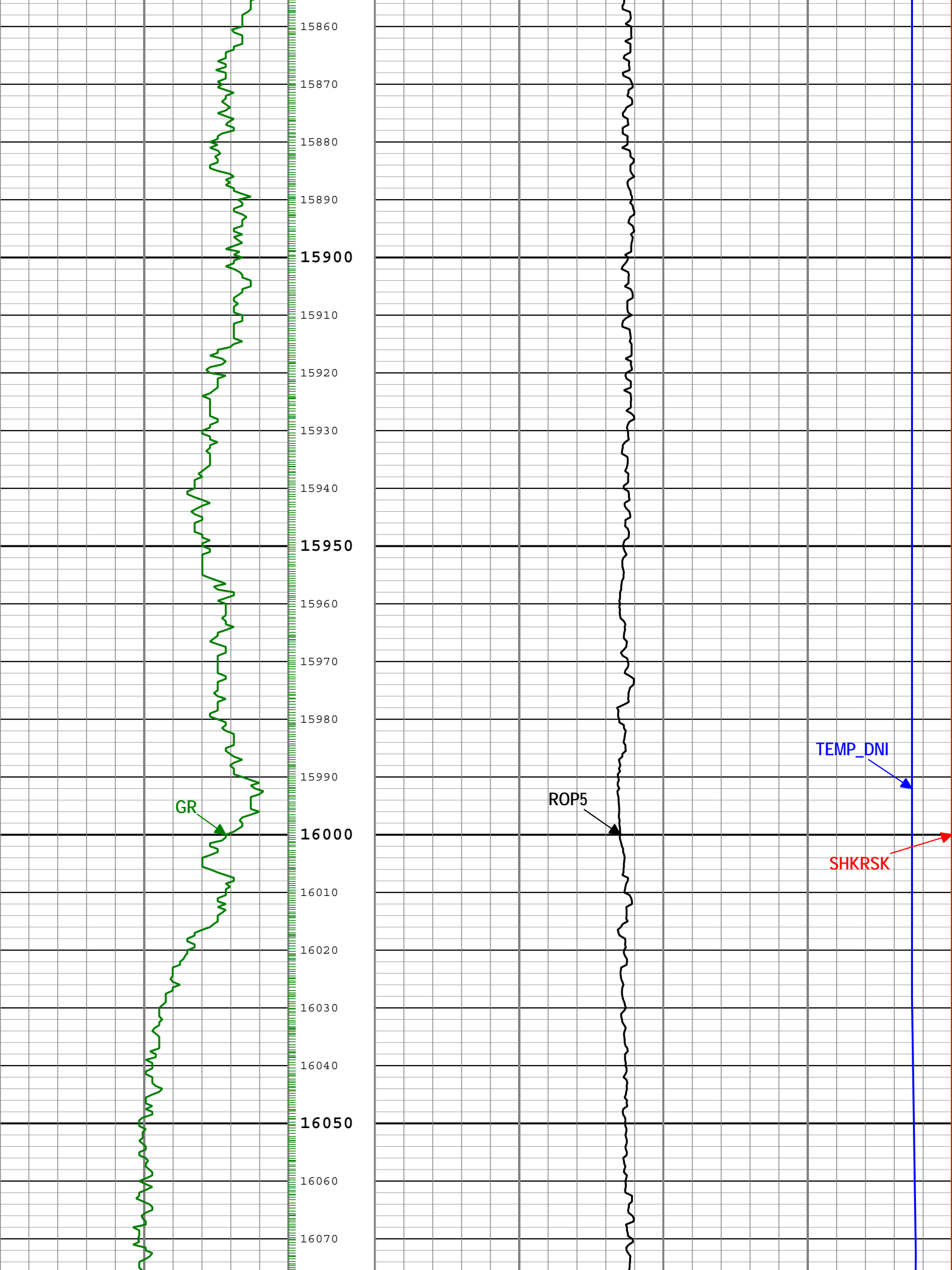


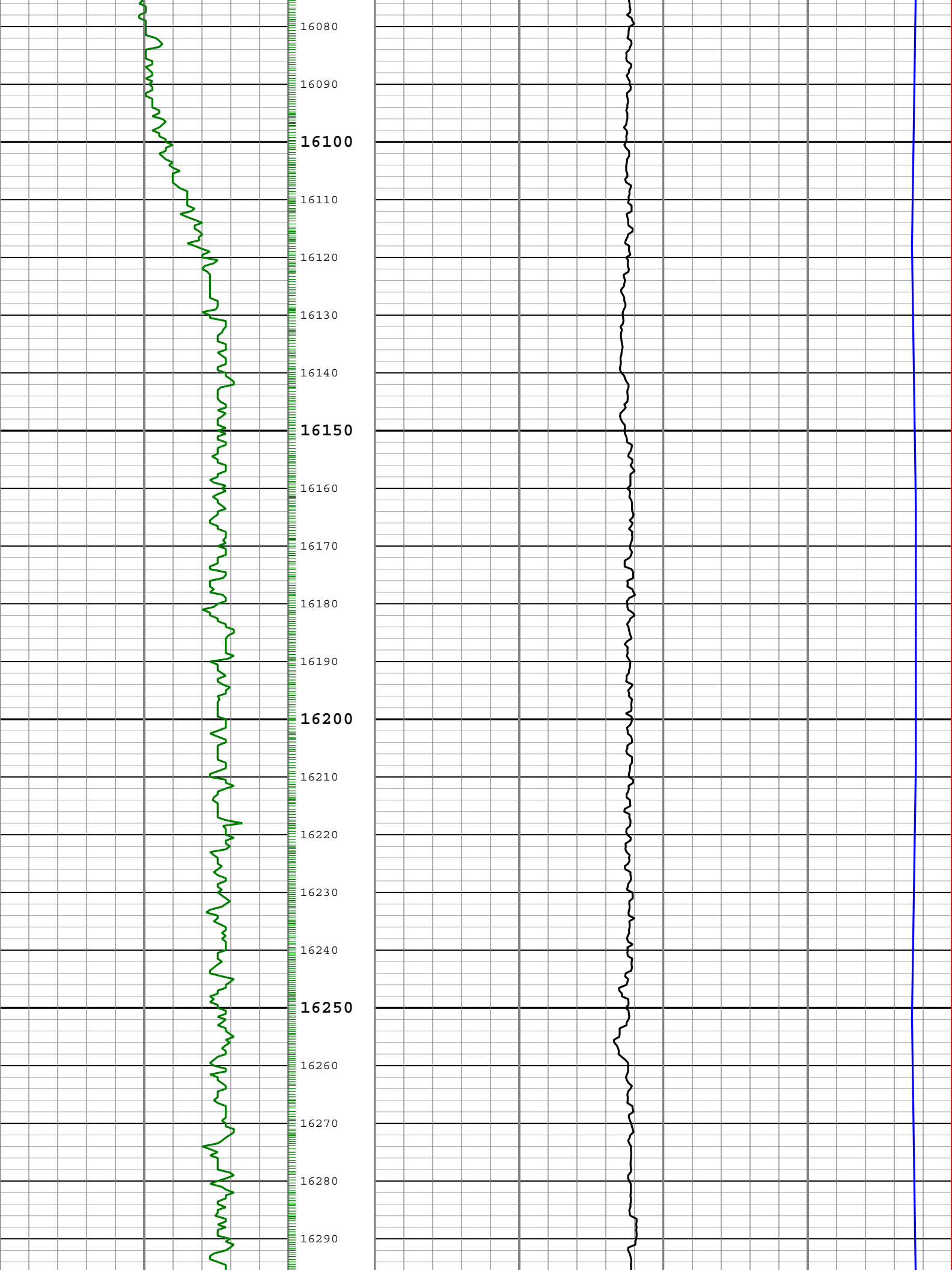


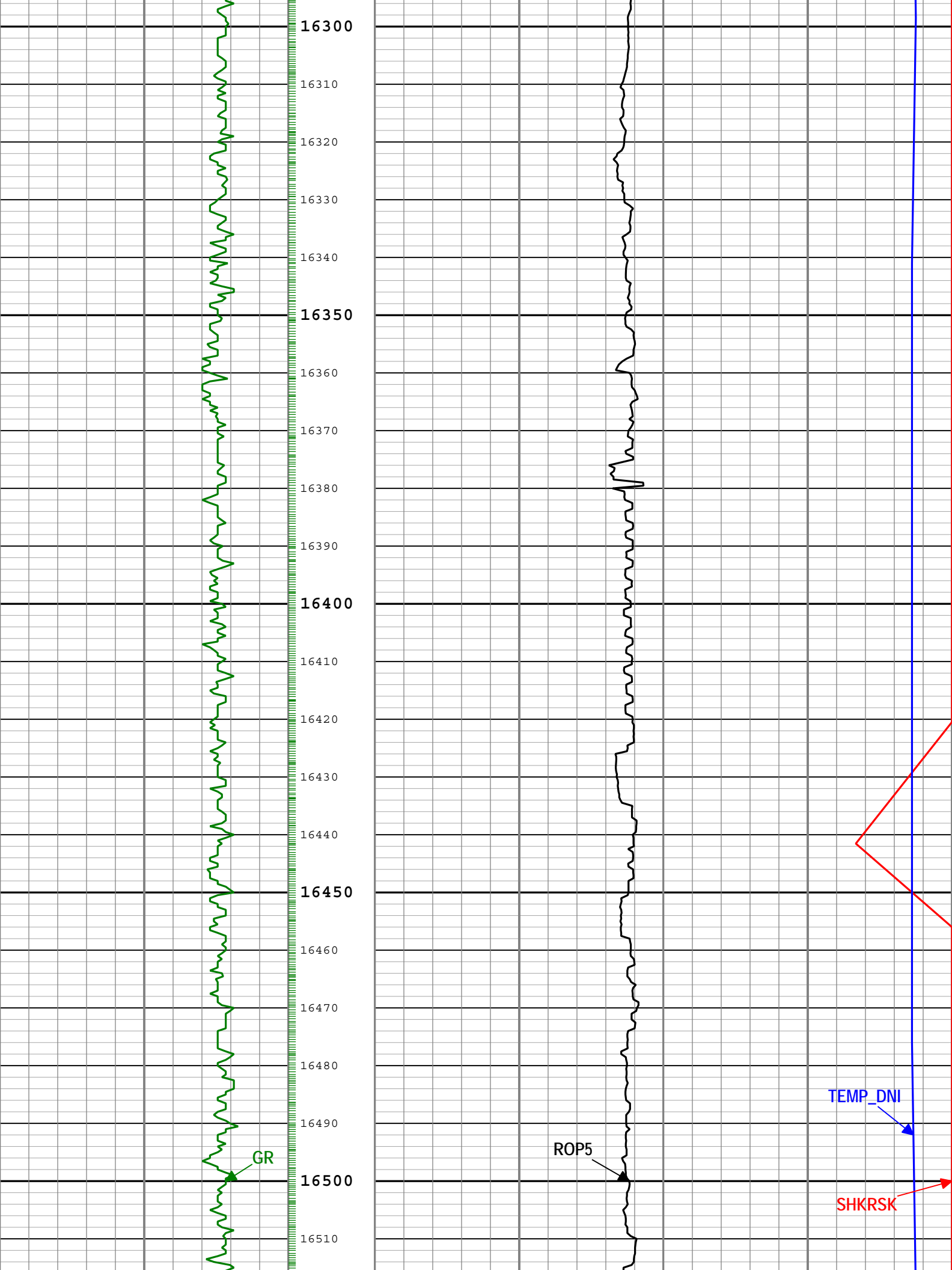


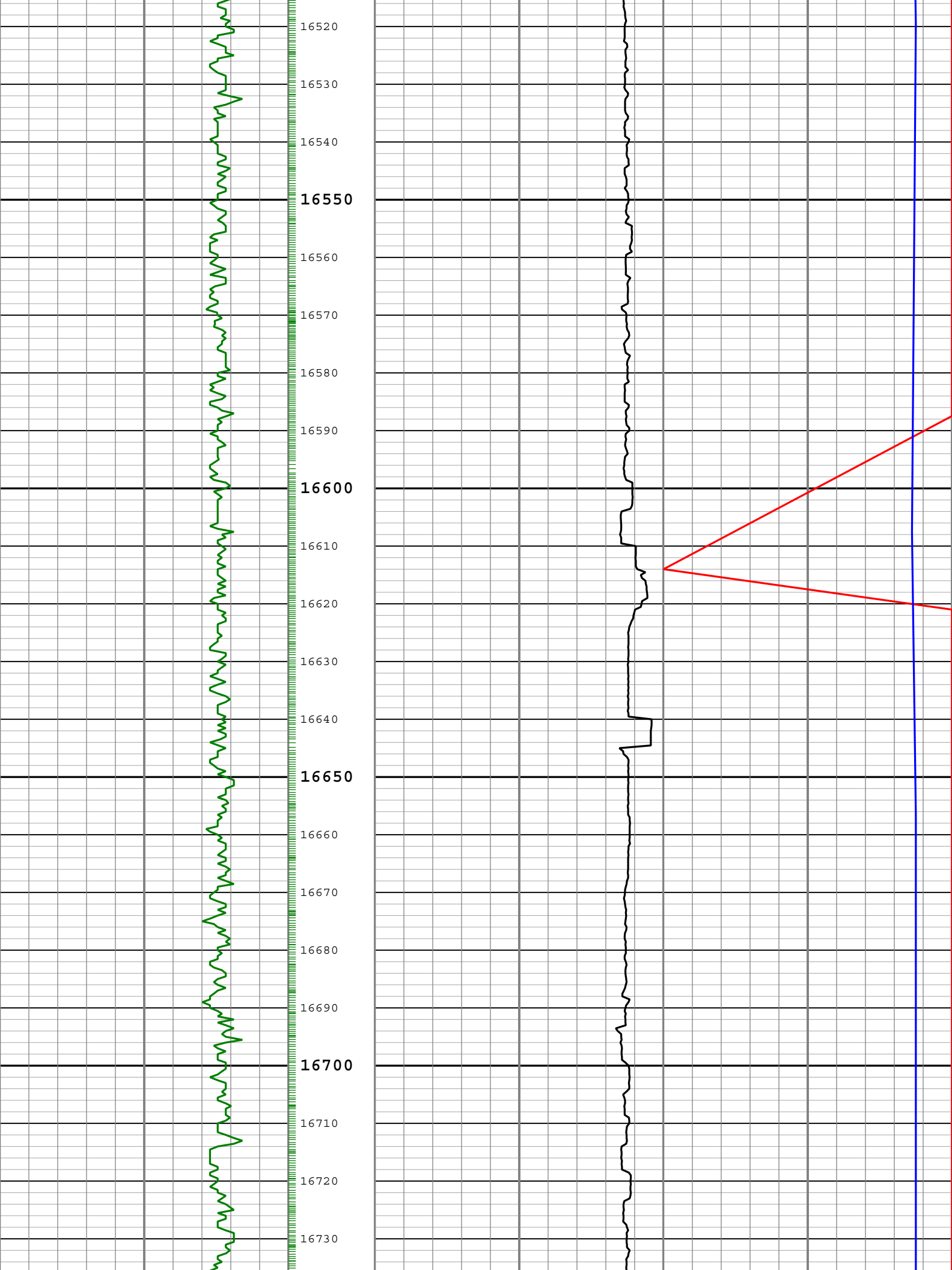


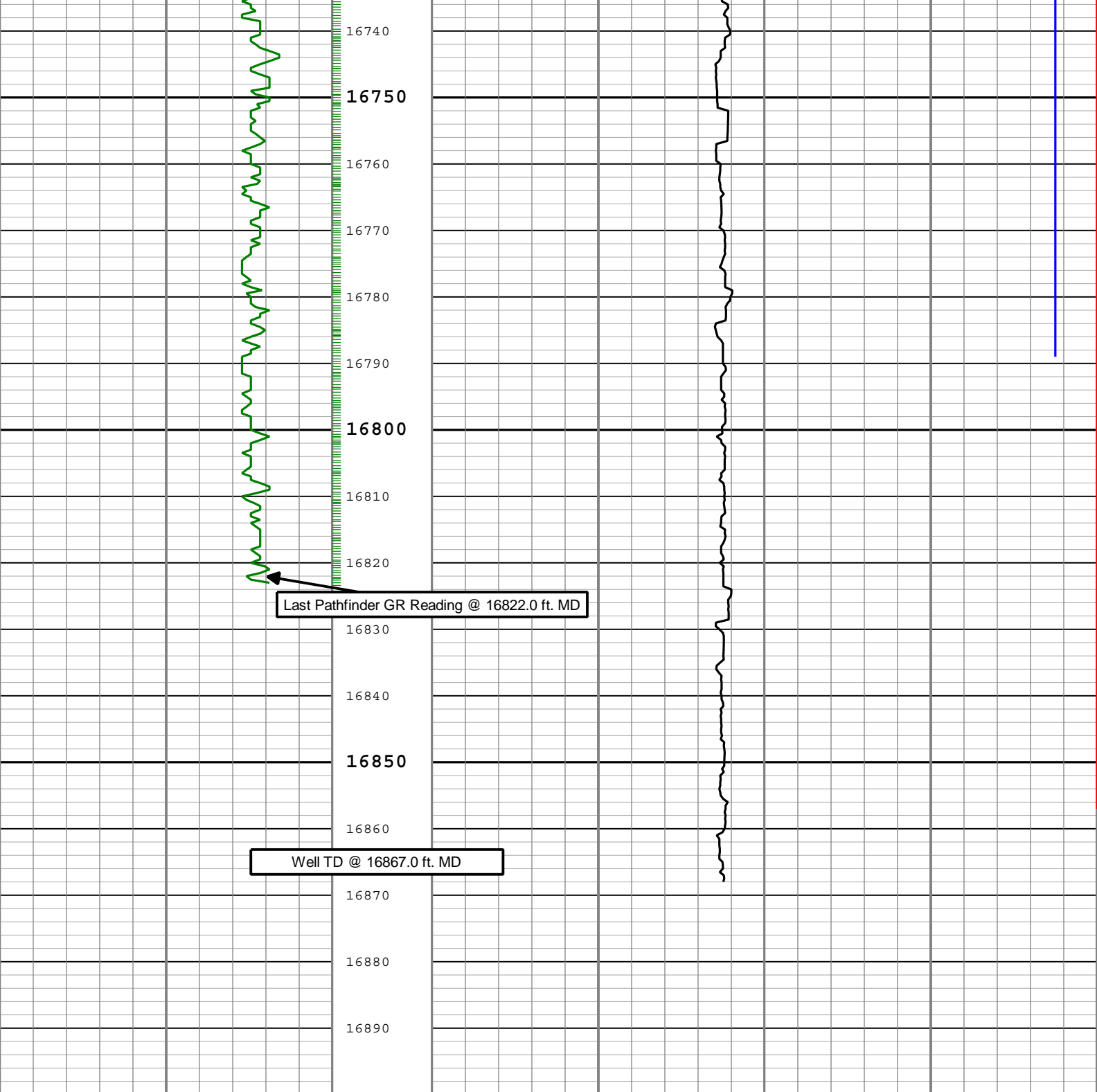












Gamma Ray (GR) SlimPulse[1] RM		
0	gAPI	150
Gamma Ray (GR) SlimPulse[1] RM		
150	gAPI	300
Gamma Ray (GR) SlimPulse[1] RM		
300	gAPI	450

Rate of penetration averaged over the last 5 ft (1.5 m) (ROP5) RT		
1000	ft/h	0

Shock Risk (SHKRSK) SlimPulse[1] RT		
3		0
Direction and Inclination Sensor Temperature (TEMP_DNI) SlimPulse[1] RT		
100	degF	300

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

Description: SlimPulse Gamma Ray 1   Format: Log ( SlimPulse Gamma Ray Final MD )   Index Scale: 5 in per 100 ft   Index Unit: ft   Index Type: Measured  
Depth   Creation Date: 03-Oct-2014 12:34:12

## Channel Processing Parameters

### Lateral1: Parameters

Parameter	Description	Tool	Value	Unit
BS	Bit Size	DNMSESSION	Depth Zoned	in
DFD	Drilling Fluid Density	Borehole	10.1	lbm/gal
GR_SRC	GR Source Selection	SPULSE-GEN	GAMMA_EXT	

## Lateral1Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	8.75	7194.07	7382
BS	6.125	7382	16867

All depth are actual.

## Tool Control Parameters

## Calibration Report

### SPULSE-GEN (SlimPulse with Generic Collar) Calibration - Run Lateral1

Primary Equipment :	Elec. cartridge, 150C max with GR	SPEC	930
---------------------	-----------------------------------	------	-----

### GRGain - Gamma Ray: Blanket

Master (Time Frame File):	12:00:00 27-Jun-2014						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Calibration Gain		Master	1.0000	0.9000	1.0774	1.1000	

**Company:** Noble Energy Inc.

**Well:** Heartland G25-73-1HN

**Field:** Wattenberg

**County:** Weld

**State:** Colorado

**Country:** USA



**SlimPulse - Gamma Ray**

1 in / 100 ft & 5 in / 100 ft Measured Depth

**Recorded Mode, Composite Log**