

# Schlumberger

Company: **Battelle Pacific Northwest Lab**

Well: **Wallula Basalt Pilot #1**

Field: **Wildcat**

County: **Walla Walla**

State: **Washington**

## RESERVOIR SATURATION TOOL SIGMA PASS

County: Walla Walla  
 Field: Wildcat  
 Location: SOUTHWEST 1/4 OF SECTION  
 Well: Wallula Basalt Pilot #1  
 Company: Battelle Pacific Northwest Lab

LOCATION		SOUTHWEST 1/4 OF SECTION 10		Elev.: K.B. 5.50 ft G.L. D.F.	
Permanent Datum:	GROUND LEVEL	Elev.:	above Perm. Datum		
Log Measured From:	FLANGE TOP				
Drilling Measured From:	KELLY BUSHING				
API Serial No.	Section 10	Township 7	Range 31E		

Logging Date	Run 1	Run 2	Run
Run Number			
Depth Driller			
Schlumberger Depth			
Bottom Log Interval			
Top Log Interval			
Casing Driller Size @ Depth			
Casing Schlumberger			
Bit Size			
Type Fluid In Hole			
Density			
Fluid Loss			
Source Of Sample			
RM @ Measured Temperature			
RMF @ Measured Temperature			
RMC @ Measured Temperature			
Source RMF			
RM @ MRT			
RMF @ MRT			
Maximum Recorded Temperatures			
Circulation Stopped			
Logger On Bottom			
Unit Number			
Recorded By			
Witnessed By			

Logging Date	19-Apr-2009
Run Number	TWO
Depth Driller	4105 ft
Schlumberger Depth	4105 ft
Bottom Log Interval	4103 ft
Top Log Interval	1108 ft
Casing Driller Size @ Depth	14,000 in @ 1108 ft
Casing Schlumberger	1108 ft
Bit Size	12.250 in
Type Fluid In Hole	FRESH WATER

Logging Date	
Run Number	
Depth Driller	
Schlumberger Depth	
Bottom Log Interval	
Top Log Interval	
Casing Driller Size @ Depth	
Casing Schlumberger	
Bit Size	
Type Fluid In Hole	

MUD		Density		Viscosity	
Fluid Loss		8.4 lbm/gal			
PH					
Source Of Sample		MUD TANK			
RM @ Measured Temperature	23.100 ohm.m	@	64 degF	@	
RMF @ Measured Temperature		@		@	
RMC @ Measured Temperature		@		@	
Source RMF	RMC				
RM @ MRT	RMF @ MRT	@	@	@	@
Maximum Recorded Temperatures					
Circulation Stopped		Time			
Logger On Bottom	Time	19-Apr-2009	4:51		
Unit Number	Location	3152	SACRAMENTO		
Recorded By		BEN GRAU			
Witnessed By		CHARLOTTE SULLIVAN			

MUD		Density		Viscosity	
Fluid Loss					
PH					
Source Of Sample					
RM @ Measured Temperature		@		@	
RMF @ Measured Temperature		@		@	
RMC @ Measured Temperature		@		@	
Source RMF	RMC				
RM @ MRT	RMF @ MRT	@	@	@	@
Maximum Recorded Temperatures					
Circulation Stopped		Time			
Logger On Bottom	Time				
Unit Number	Location				
Recorded By					
Witnessed By					

## DEPTH SUMMARY LISTING

Date Created: 19-APR-2009 2:22:51

### Depth System Equipment

Depth Measuring Device	Tension Device	Logging Cable
Type: IDW-B Serial Number: 6347 Calibration Date: Calibrator Serial Number: 1 Calibration Cable Type: 7-39Z LXS Wheel Correction 1: -4 Wheel Correction 2: -3	Type: CMTD-B/A Serial Number: 2205 Calibration Date: Calibrator Serial Number: 185 Number of Calibration Points: 0	Type: 7-39Z LXS Serial Number: 3152 Length: 17700 FT Conveyance Method: Wireline Rig Type: LAND

### Depth Control Parameters

Log Sequence: Subsequent Log In the Well
Reference Log Name:
Reference Log Run Number:
Reference Log Date:

### Depth Control Remarks

1. ALL SCHLUMBERGER DEPTH CONTROL PROCEDURES FOLLOWED
2.
3.
4.
5.
6.

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OTHER SERVICES1	OTHER SERVICES2
OS1:	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
TOOL STRING RAN AS PER TOOL SKETCH	
MATRIX: LIMESTONE	
DENSITY: 2.71 G/CC	
SIGMA PASS RUN AT 3600 FT/HR	

THANK YOU FOR USING SCHLUMBERGER!!

RUN 1			RUN 2		
SERVICE ORDER #:		AZJT00051	SERVICE ORDER #:		
PROGRAM VERSION:		17C0-154	PROGRAM VERSION:		
FLUID LEVEL:			FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

## EQUIPMENT DESCRIPTION

RUN 1

RUN 2

### SURFACE EQUIPMENT

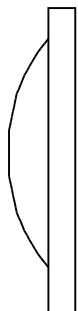
WITM-A  
PSC\_16MHZ

### DOWNHOLE EQUIPMENT

LEH-QT 43.5  
LEH-QT



ILE-F 40.5  
ILE-F



AH-ADAPTER 32.5  
AH-ADAPTER

Detail MT  
TelStatus  
CTEM



PSPT-A/B 31.3  
PSC-A  
PSPT-A  
PSTC

31.3

PBMS-A 27.6  
10k\_Sapphire\_Mano  
RTD\_Thermometer  
GR  
GR  
CCL  
PBMS  
Well\_Temp  
Manometer  
CCL  
PBMS PSTC

GR

27.6

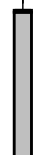
24.5

24.4

23.8

23.0

RST-C 23.0  
RSCH-A 25  
RSC-C 29  
RSS-A 34  
RSXH-A 269  
RSX-C 264



RSC-A Far  
 RSC-A PNG  
 RSC-A Nea  
 RSX-A PNG

13.9

13.4

Tension HV 0.0  
 TOOL ZERO

MAXIMUM STRING DIAMETER 3.63 IN  
 MEASUREMENTS RELATIVE TO TOOL ZERO  
 ALL LENGTHS IN FEET

Production String

(in) (ft)  
 OD ID MD

Well Schematic

(ft) (in)  
 MD OD ID

Casing String

0.0

13.325

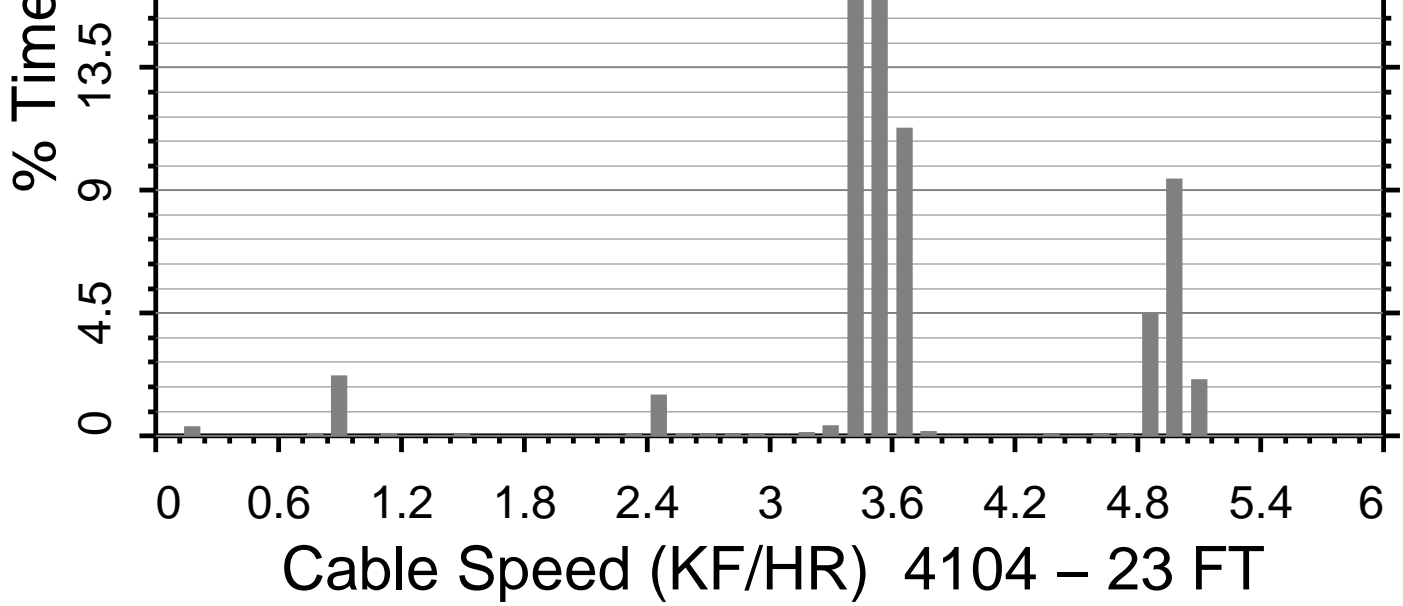
Casing String

1108.0  
 1108.0

13.325  
 12.250

Casing Shoe  
 Borehole Segment





**Schlumberger**

**MAIN PASS 5 IN=100 FT**

MAXIS Field Log

Company: Battelle Pacific Northwest Lab Well: Wallula Basalt Pilot #1

**Input DLIS Files**

DEFAULT	RST_PSP_059LUP	FN:77	PRODUCER	19-Apr-2009 04:51	4105.0 FT	24.0 FT
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**Output DLIS Files**

DEFAULT	RST_PSP_064PUP	FN:82	PRODUCER	19-Apr-2009 06:06	4104.0 FT	5.0 FT
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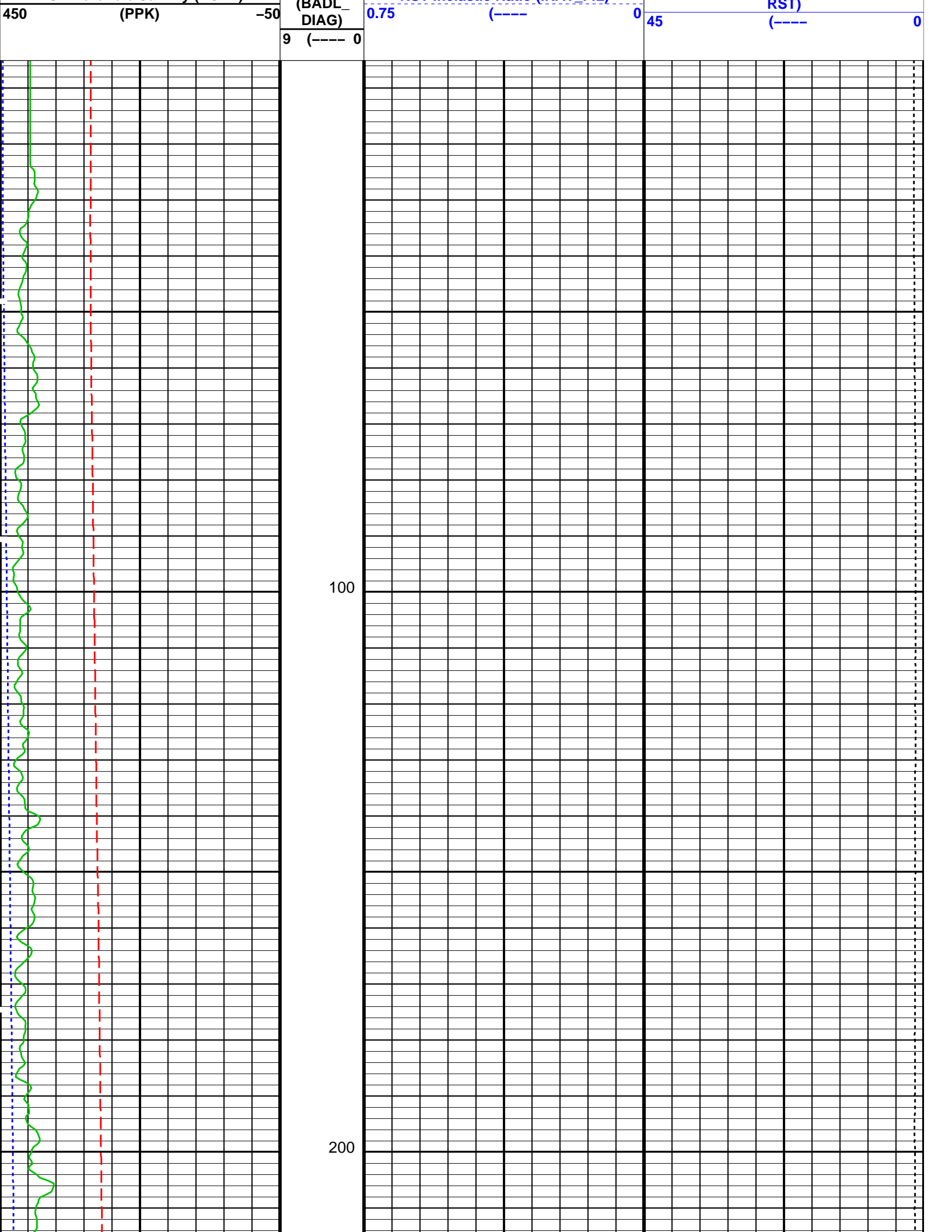
**OP System Version: 17C0-154**

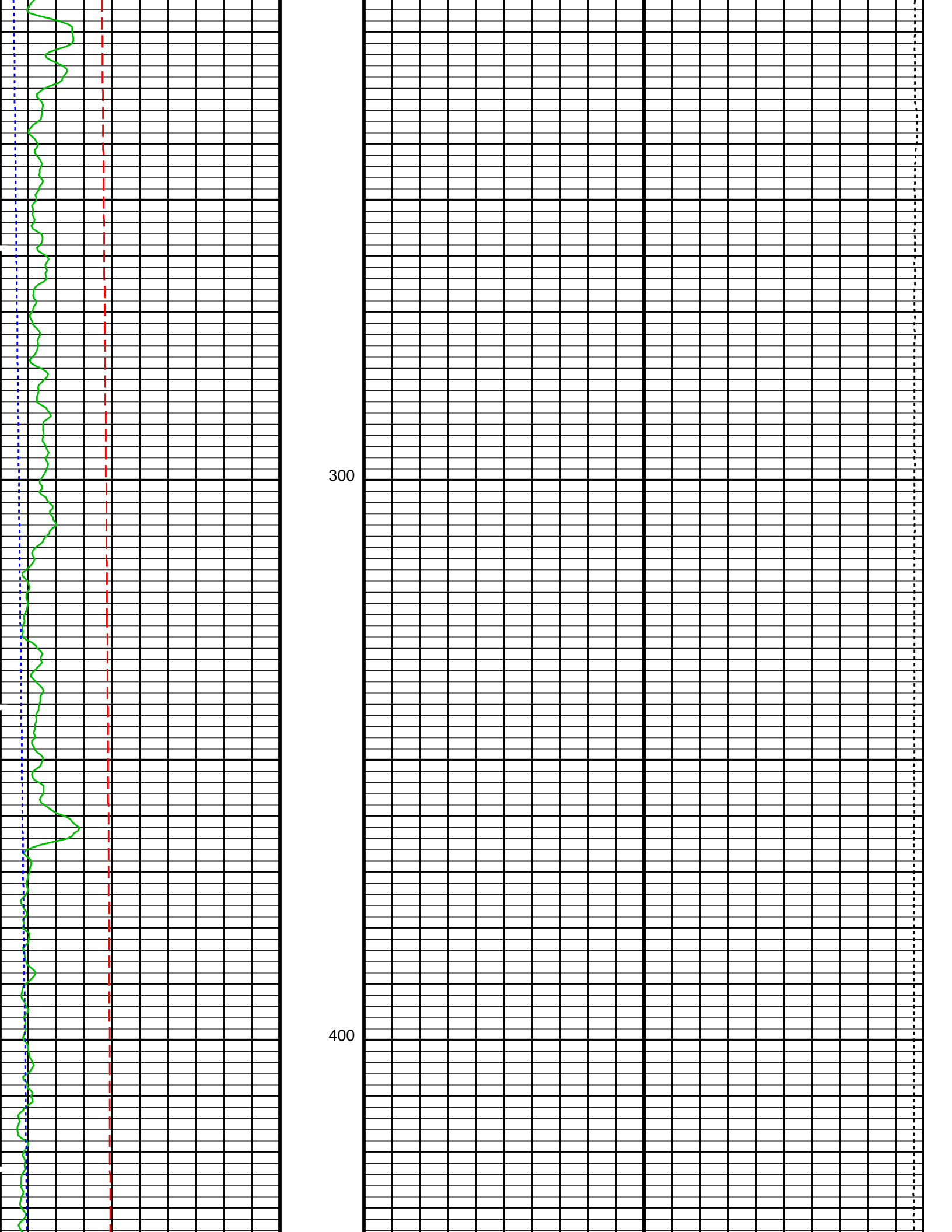
RST-C	17C0-154	PSPT-A/B	17C0-154
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**PIP SUMMARY**

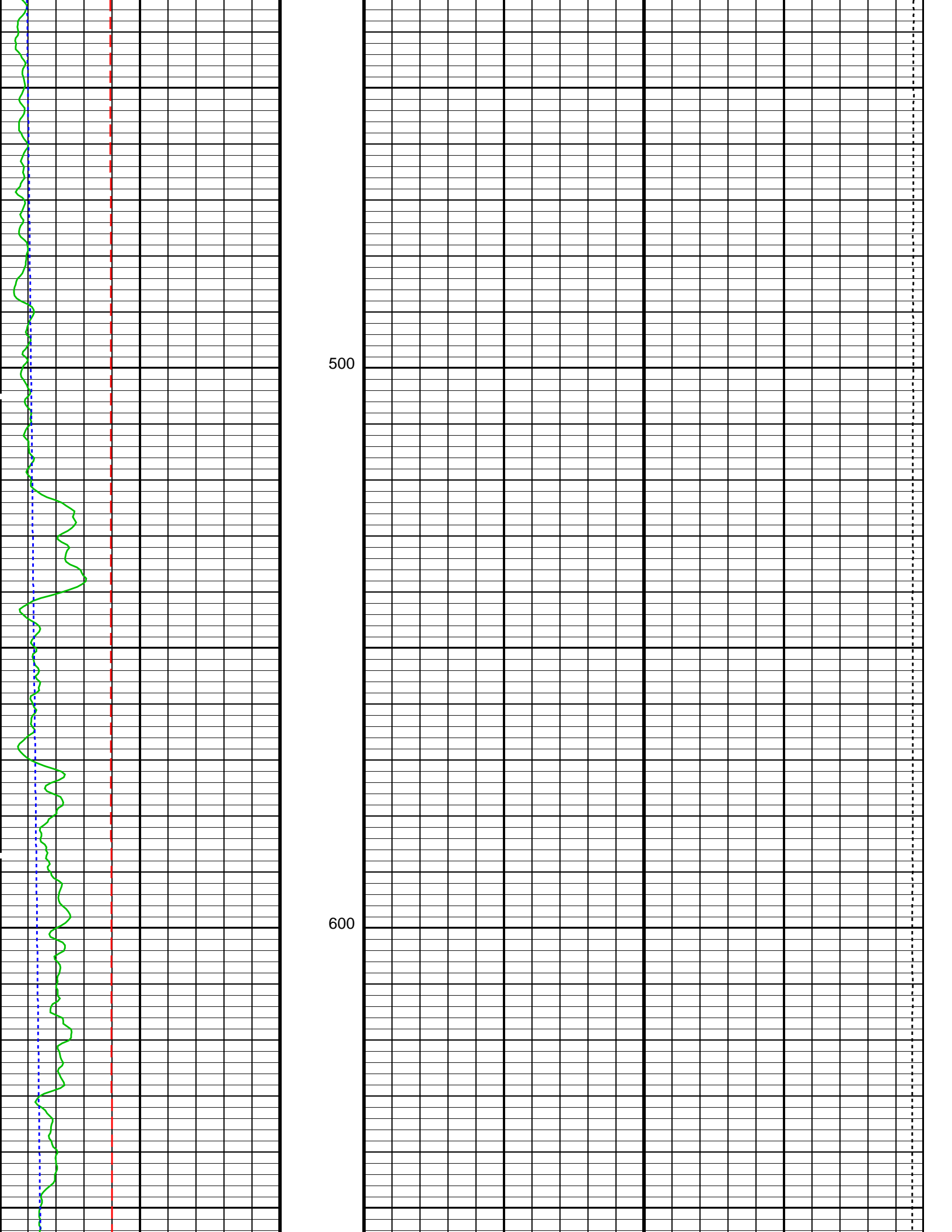
Time Mark Every 60 S

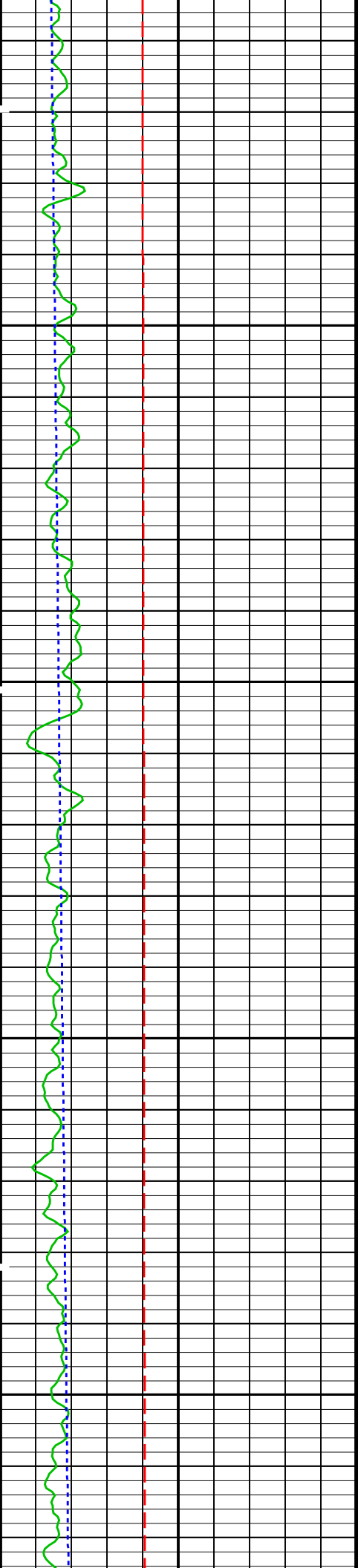
		Tension (TENS) (LBF)	
		10000	0
Well Temperature (WTEP) (DEGF)	0 --- 200	RST Weighted Inelastic Ratio (WINR_RST)	
		0	0.4
Well Pressure (WPRES) (PSIA)	0 --- 2000	RST Porosity (TPHI) (V/V)	
		0.6	0
Gamma Ray (GR) (GAPI)	0 --- 150	RST Far Effective Capture CR (RSCF_RST)	
		45	0
Minitron Arc Detection (MARC)	0 (----) 5	RST Sigma (SIGM) (CU)	
		60	0
RST Borehole Salinity (BSAL)		RST Inelastic Ratio (IRAT_FIL)	RST Near Effective Capture CR (RSCN_RST)





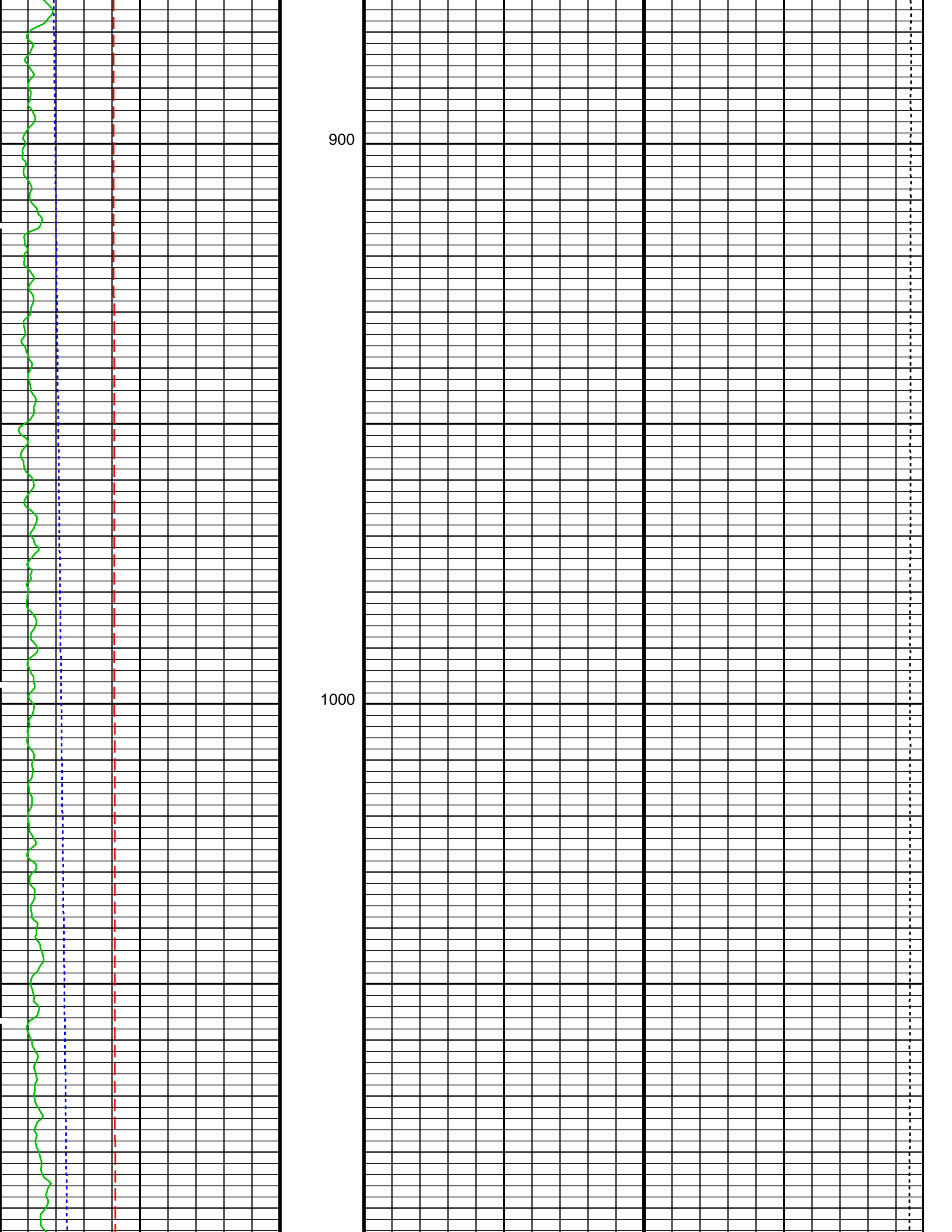






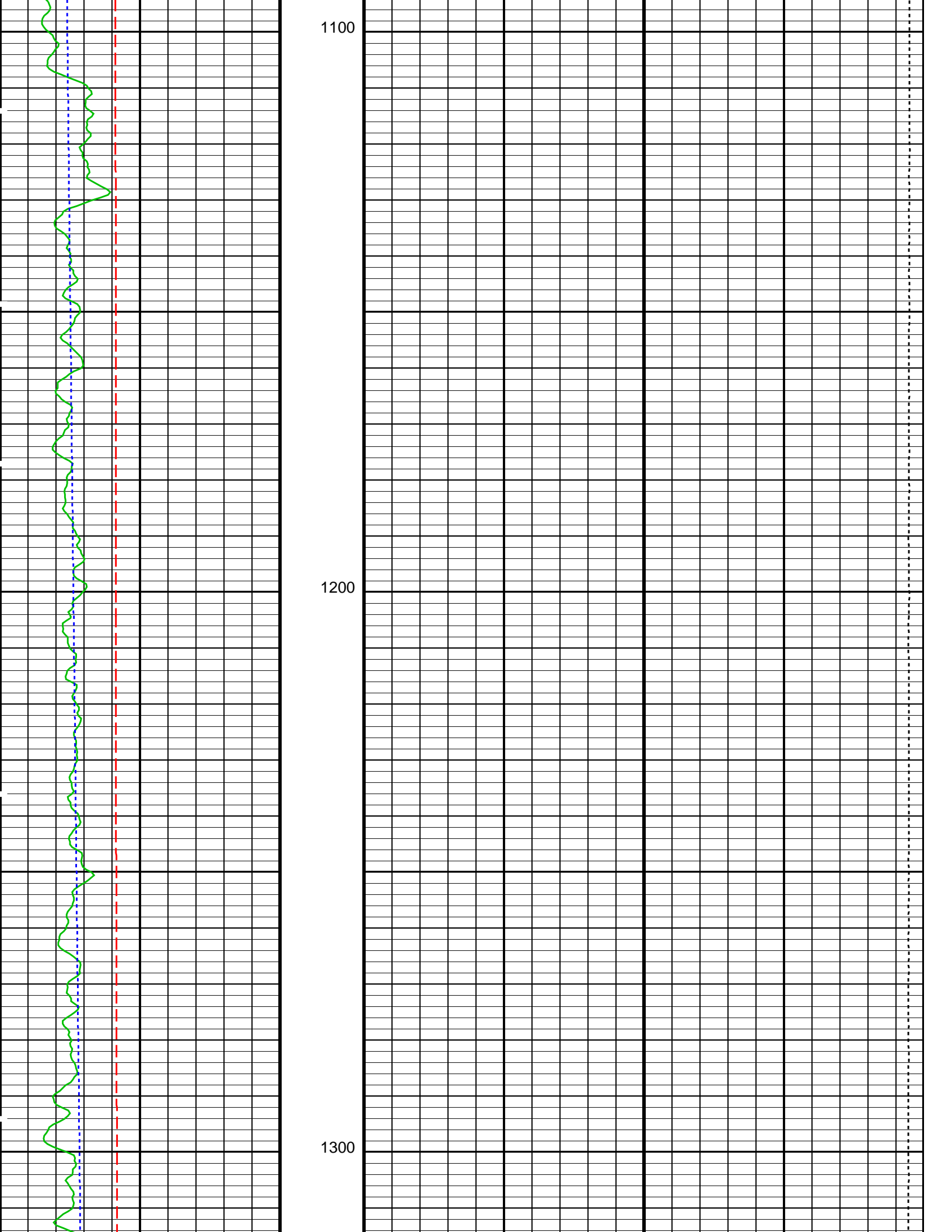
700

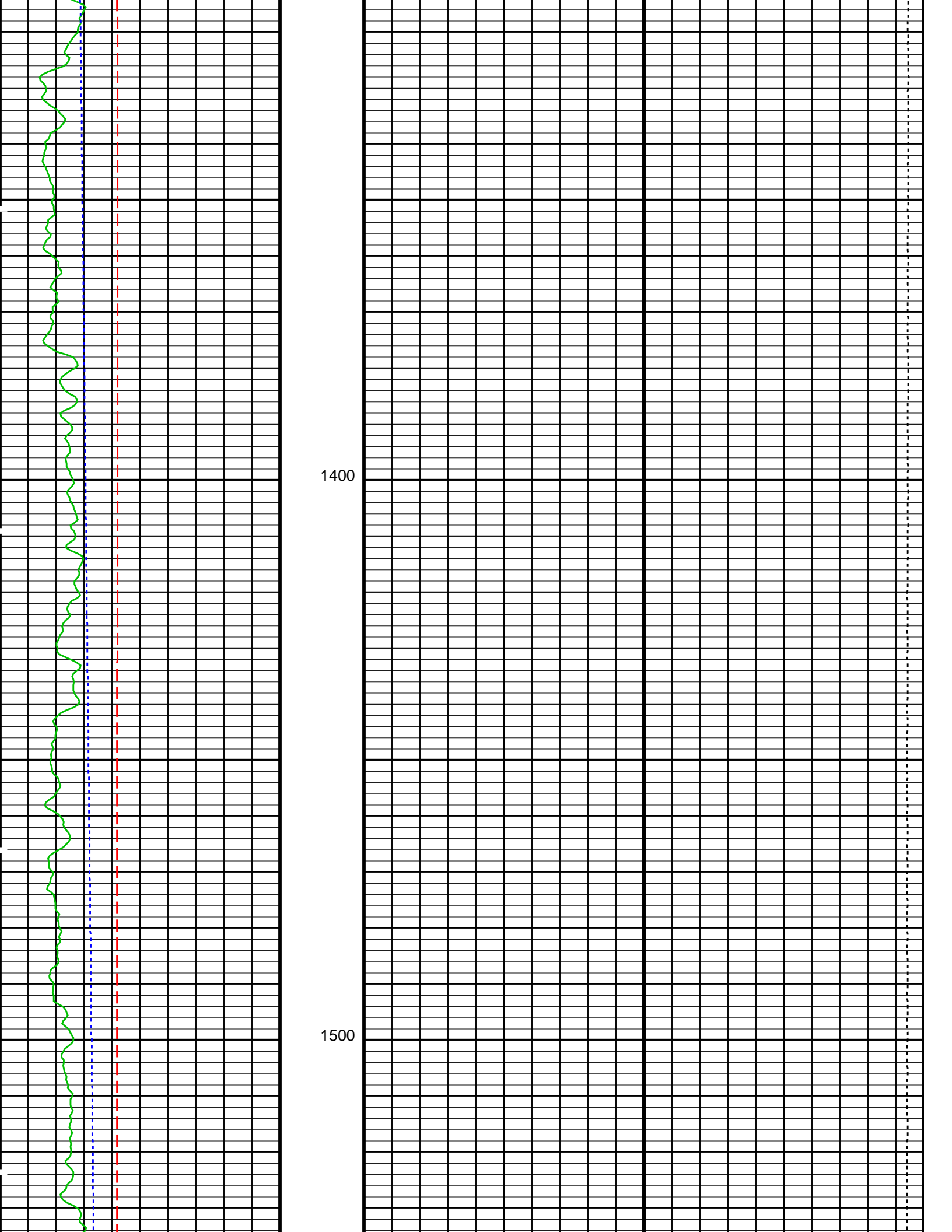
800



900

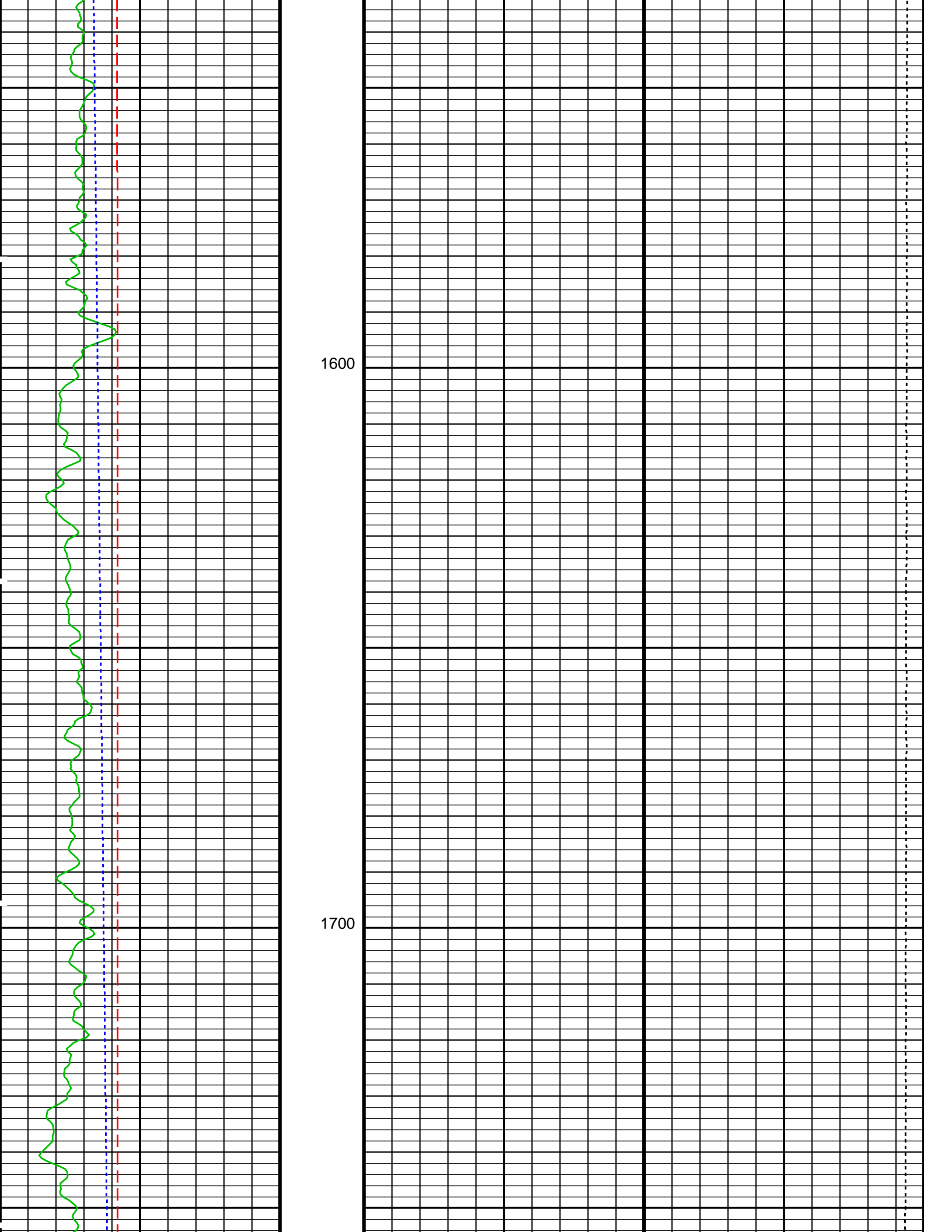
1000





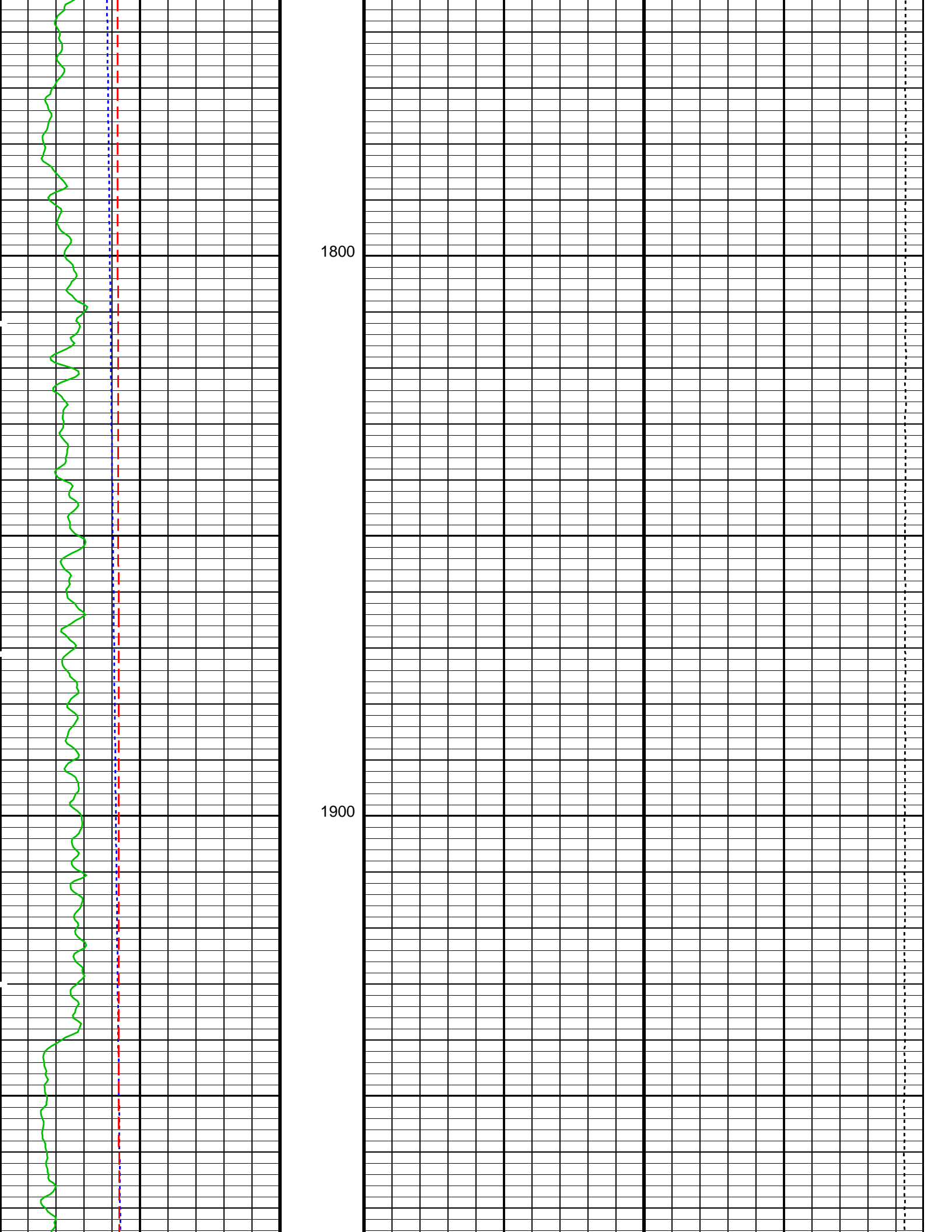
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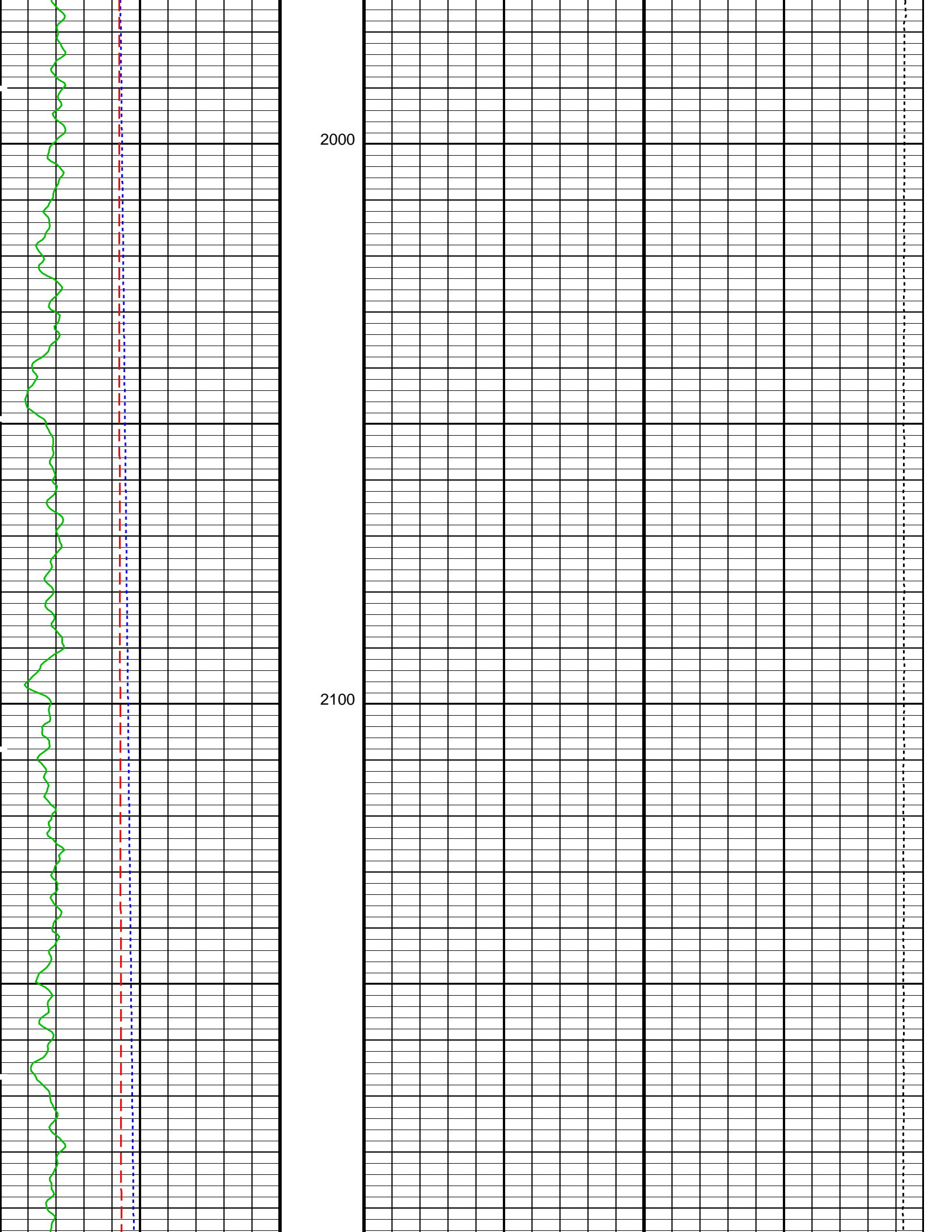
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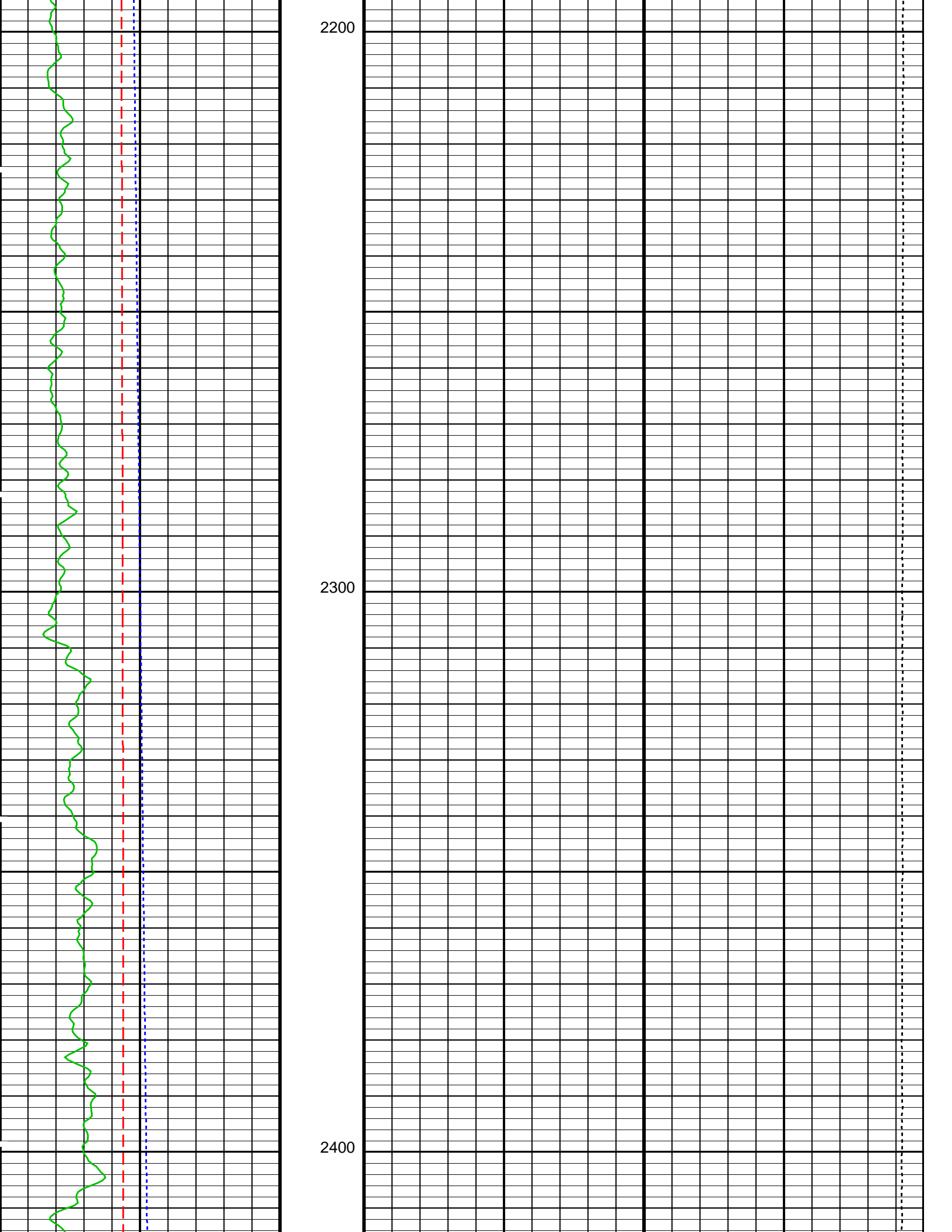
1600

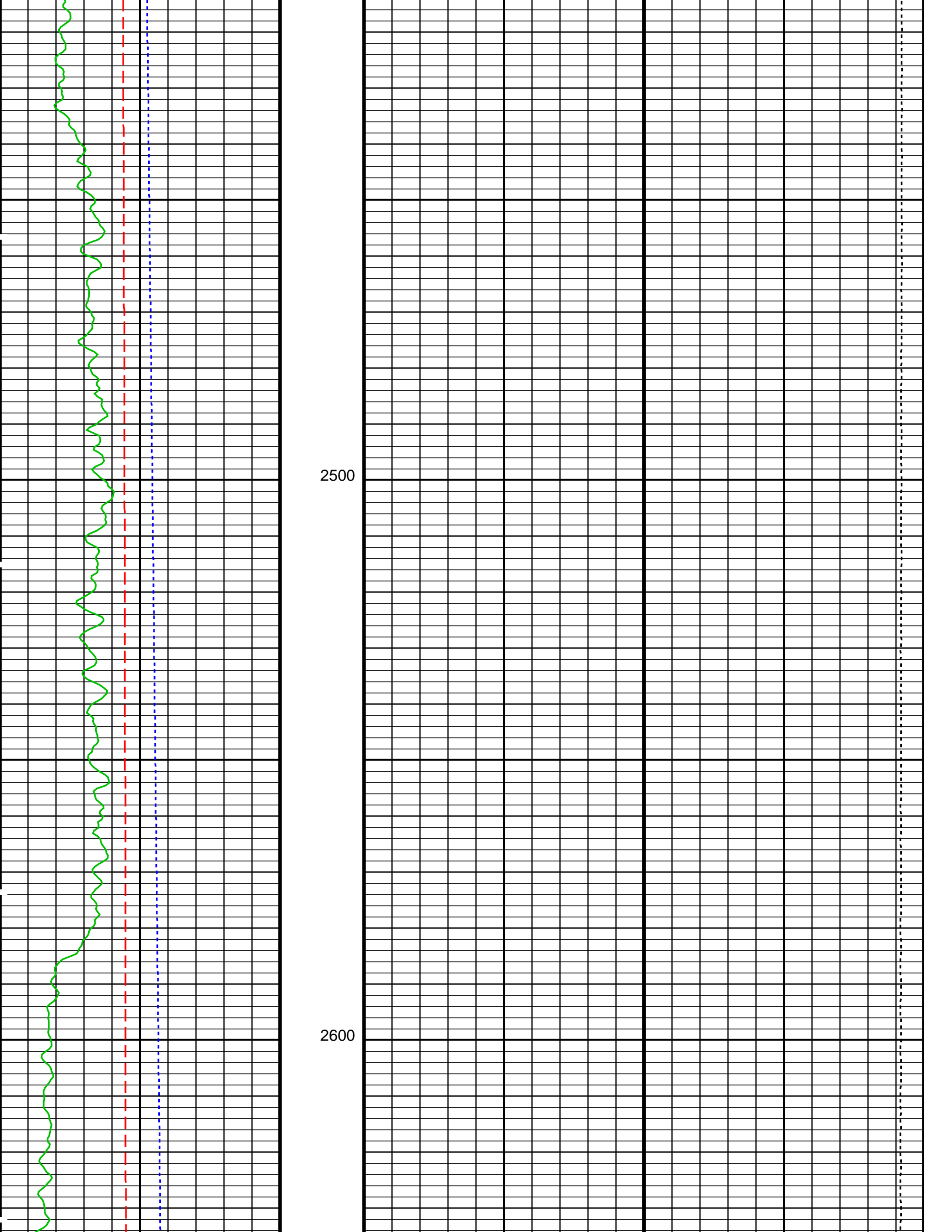
1700

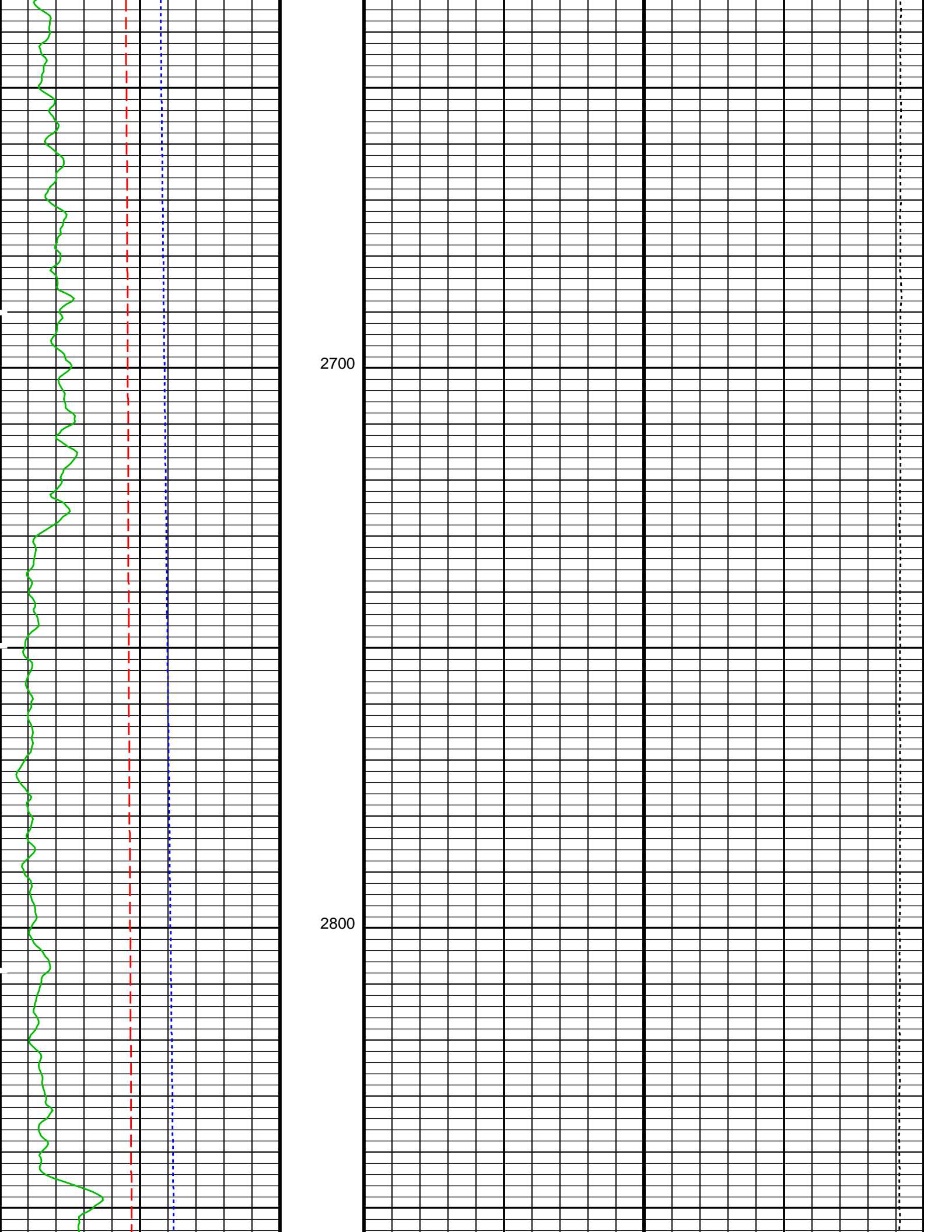


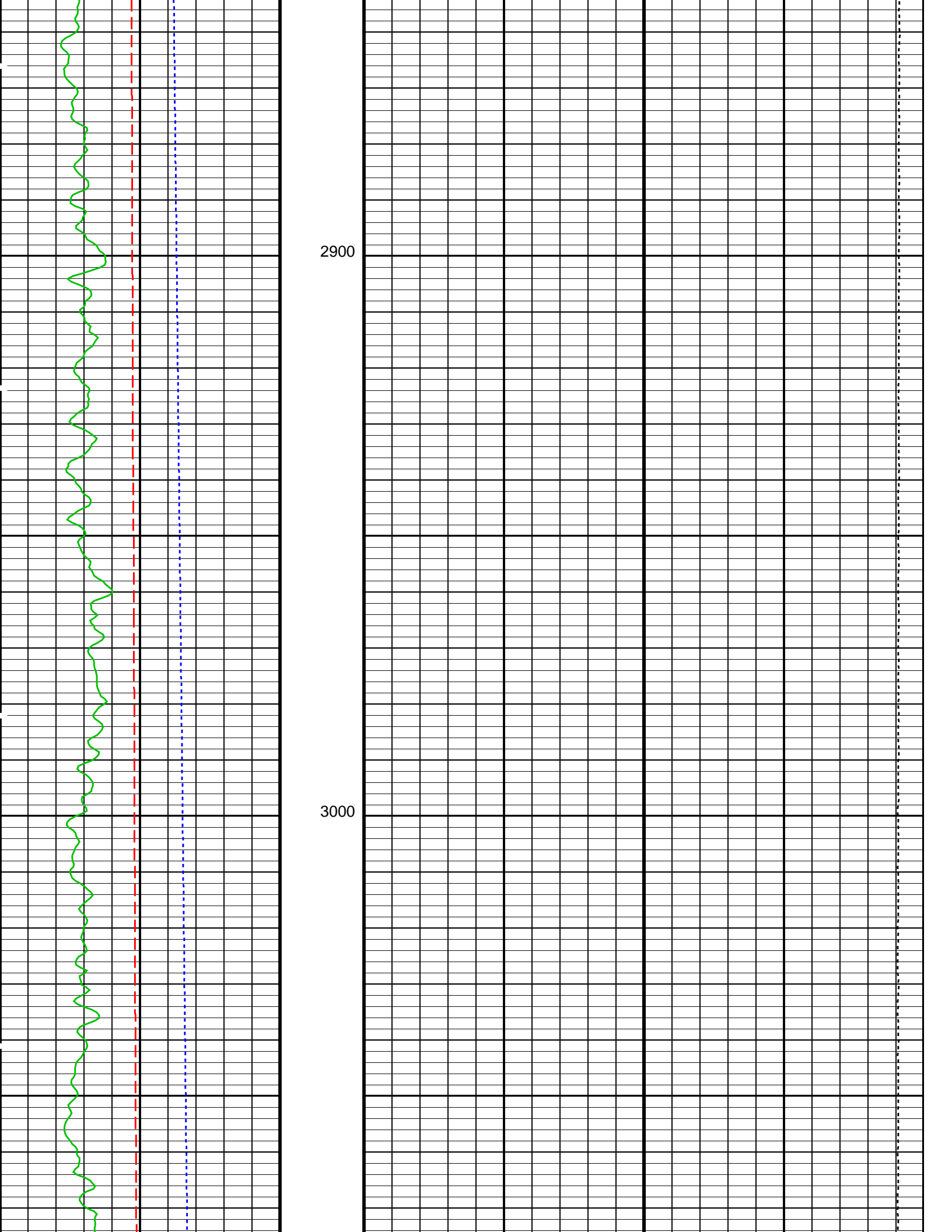


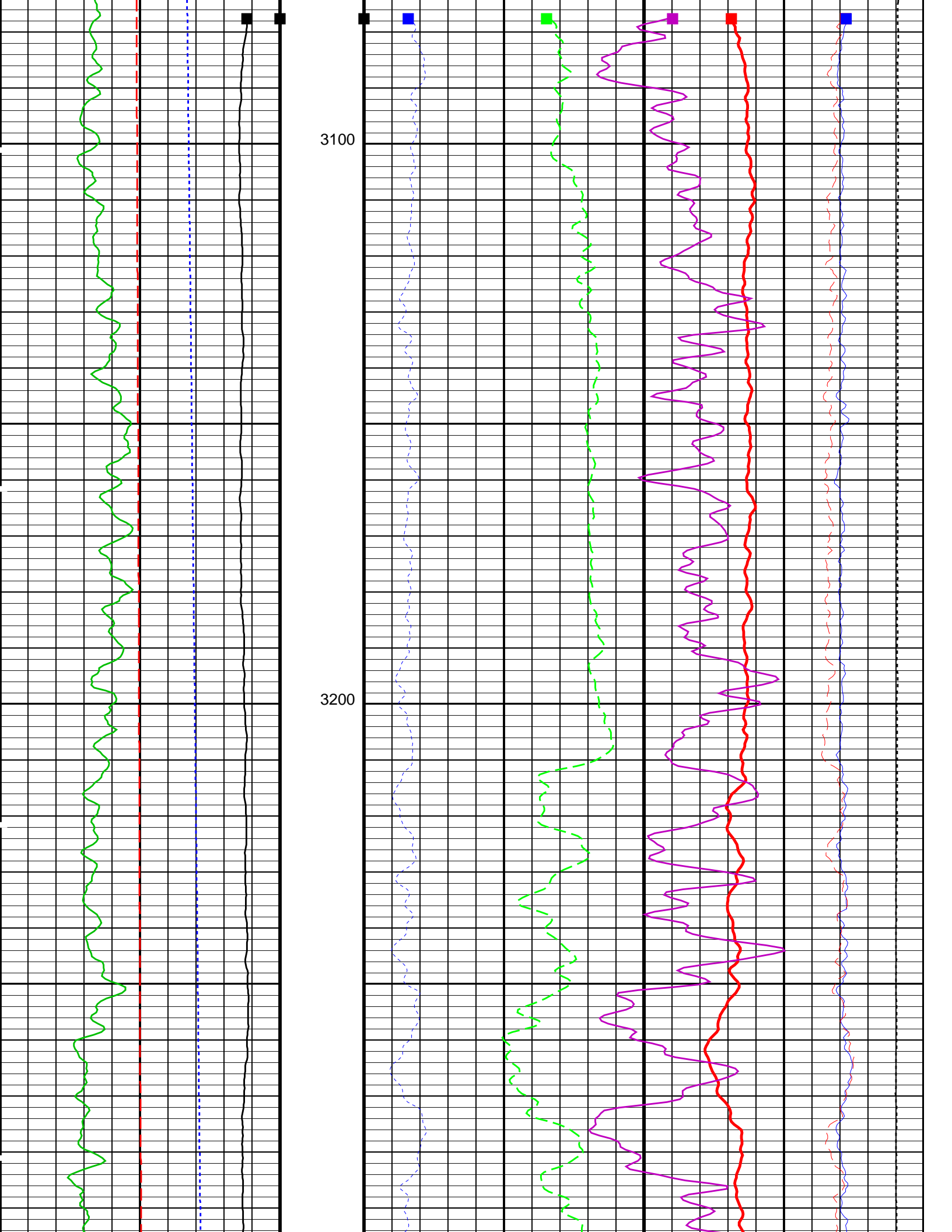


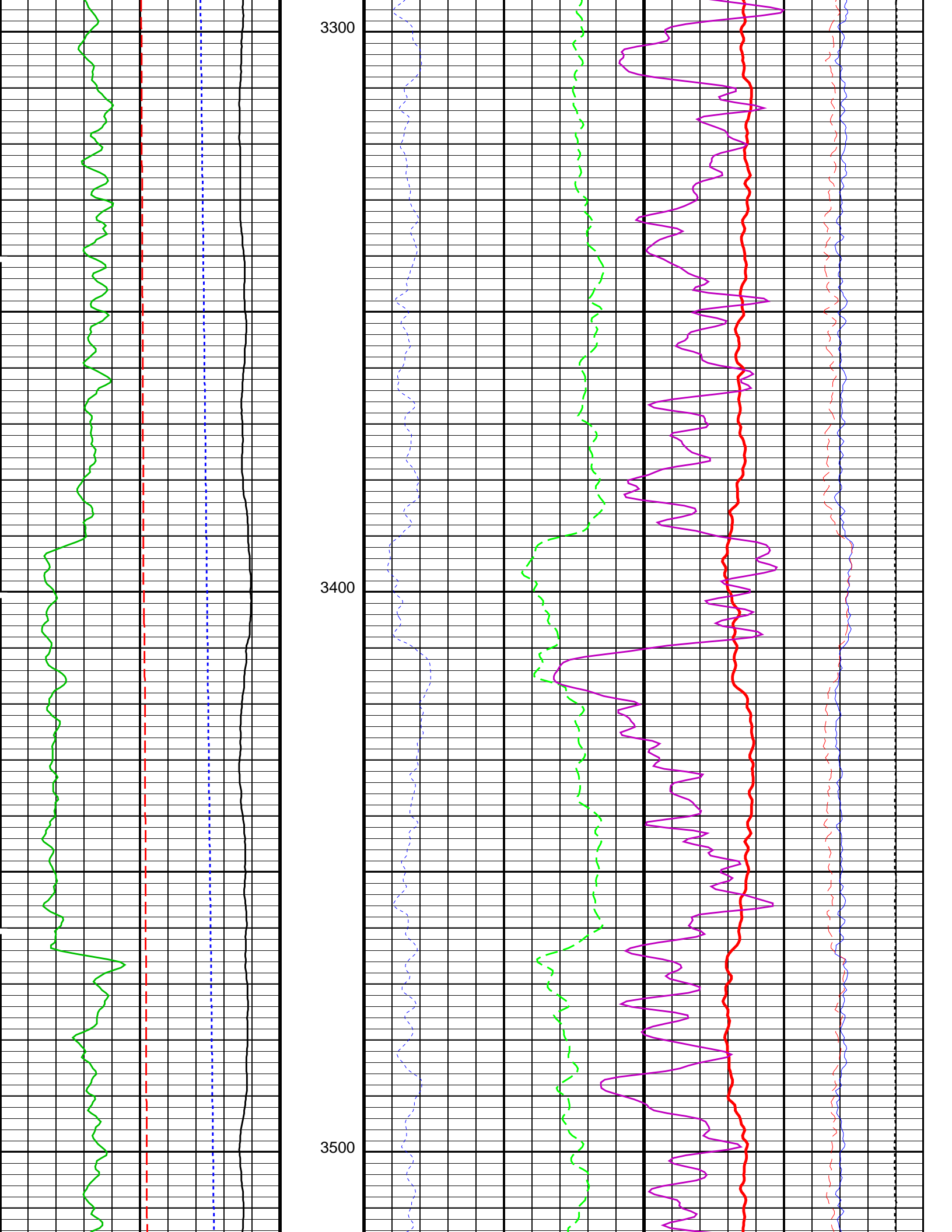


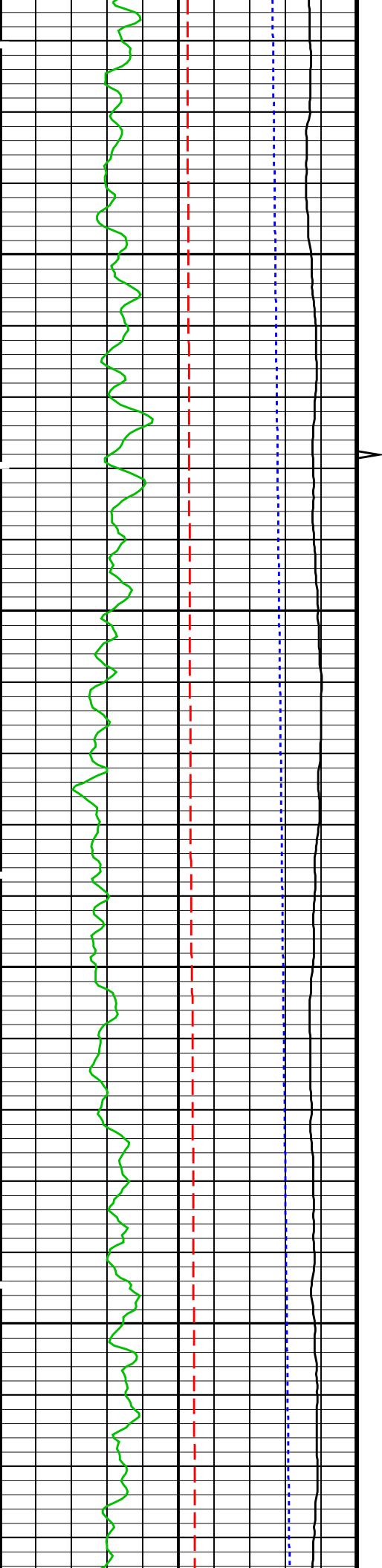






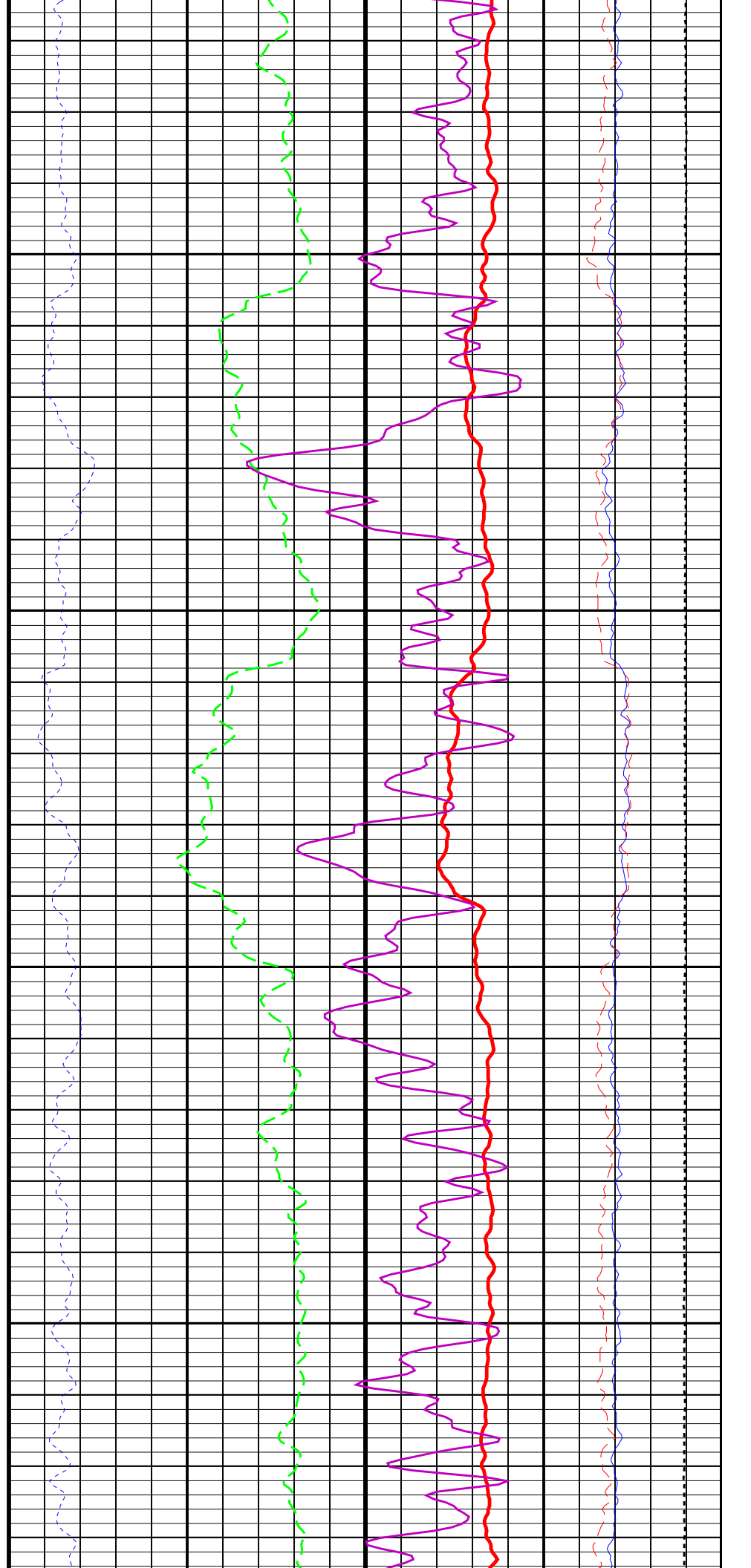


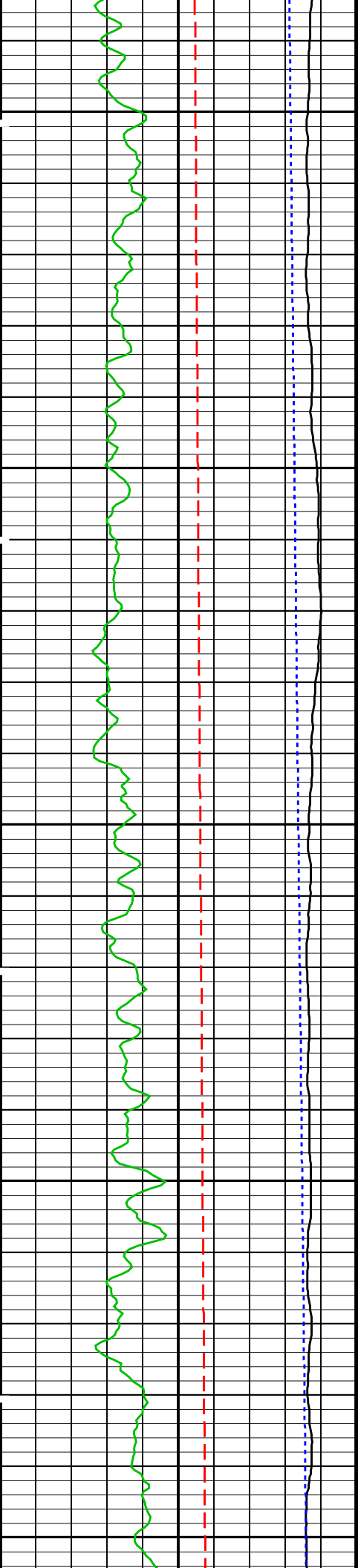




3600

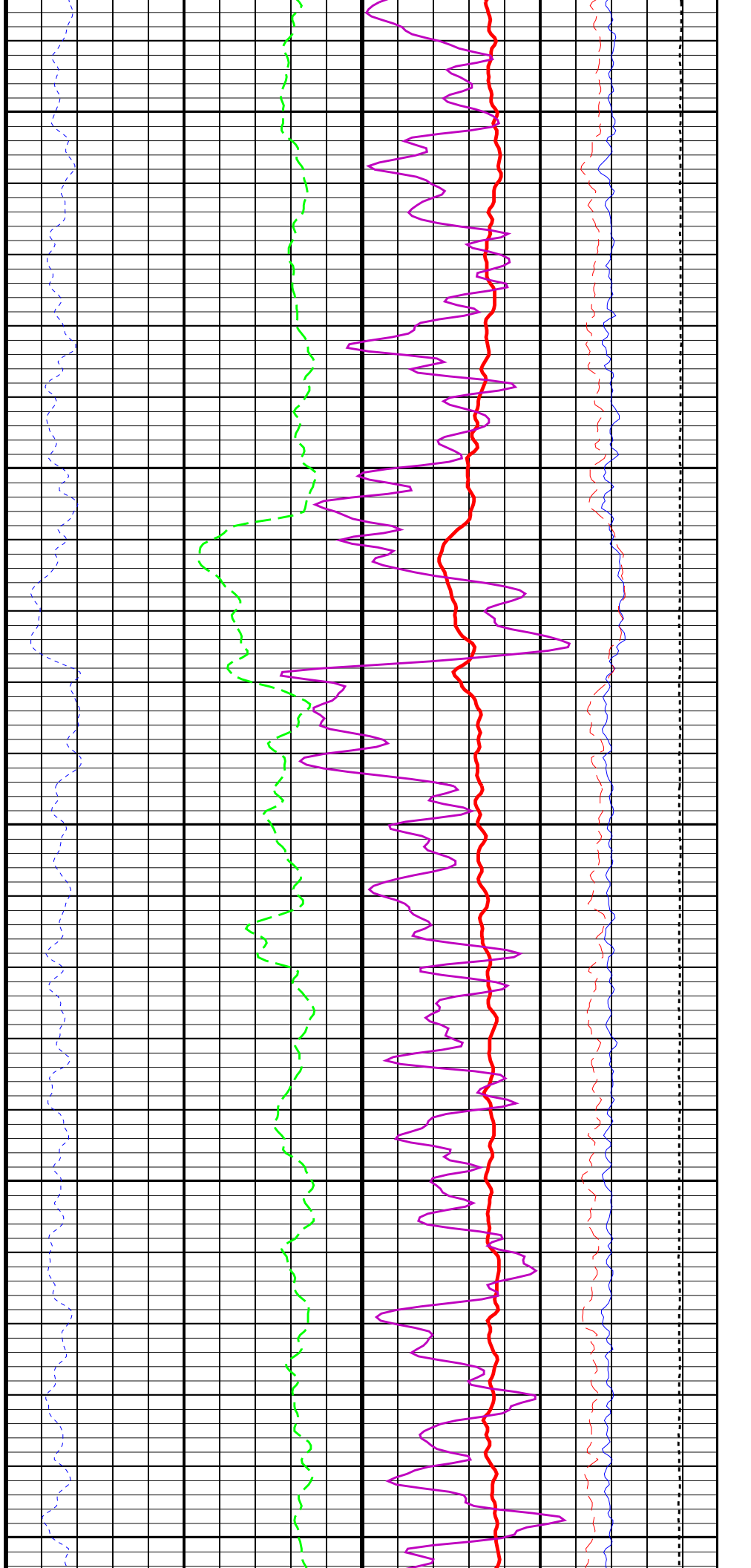
3700



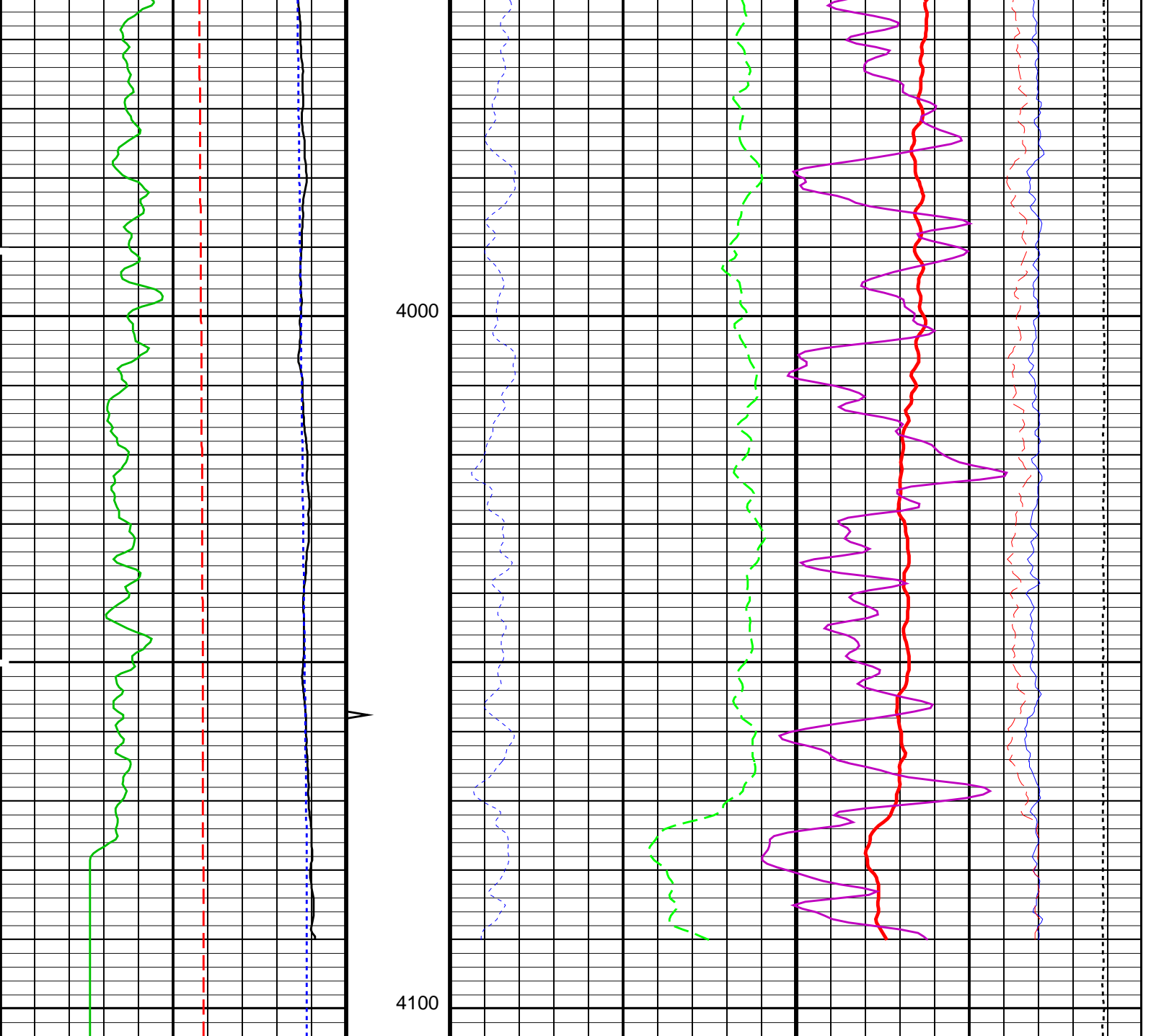


3800

3900







<p><b>RST Borehole Salinity (BSAL)</b> (PPK)</p> <p>450 -50</p>	<p><b>Bad Level Diagnostic (BADL_DIAG)</b></p> <p>9 (---- 0)</p>	<p><b>RST Inelastic Ratio (IRAT_FIL)</b></p> <p>0.75 (----)</p>	<p><b>RST Near Effective Capture CR (RSCN_RST)</b></p> <p>45 (---- 0)</p>
<p><b>Gamma Ray (GR)</b> (GAPI)</p> <p>0 150</p>	<p><b>Minitron Arc Detection (MARC)</b></p> <p>0 (---- 5)</p>	<p><b>RST Sigma (SIGM)</b> (CU)</p> <p>60 0</p>	
<p><b>Well Pressure (WPRE)</b> (PSIA)</p> <p>0 2000</p>	<p><b>RST Porosity (TPHI)</b> (V/V)</p> <p>0.6 0</p>	<p><b>RST Far Effective Capture CR (RSCF_RST)</b></p> <p>45 (---- 0)</p>	
<p><b>Well Temperature (WTEP)</b> (DEGF)</p> <p>0 200</p>	<p><b>RST Weighted Inelastic Ratio (WINR_RST)</b></p> <p>0 (---- 0.4)</p>		
		<p><b>Tension (TENS)</b> (LBF)</p> <p>10000 0</p>	

### Parameters

DLIS Name	Description	Value
<b>RST-C: Reservoir Saturation Pro Tool C</b>		
AIRB	RST Air Borehole	No
BHS	Borehole Status	OPEN
BSALOPT	RST Borehole Salinity Option	Unknown
BSFL	RST Borehole Salinity Filter Length	51
DFPC	RST Depth Filter Processing Constant	One
DFPC_TDTL	RST Depth Filter Processing Constant (TDT-like)	Two
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE
NORM_IRAT_RST	RST Normalized Inelastic Ratio	0.48
NORM_SIGM_RST	RST Normalized Sigma	30
RGAI	Near/Far Gain Calibration Ratio	1
TIER_IC	RST IC Acquisition Mode	0_CO_Yield_and_Spectrolith
TIER_SIGM	RST Sigma Acquisition Mode	0_RST_Sigma
<b>PSPT-A/B: Production Services Logging Platform</b>		
BHS	Borehole Status	OPEN
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE
<b>System and Miscellaneous</b>		
BS	Bit Size	12.250 IN
BSAL	Borehole Salinity	-50000.00 PPM
CSIZ	Current Casing Size	14.000 IN
CWEI	Casing Weight	54.57 LB/F
DO	Depth Offset for Playback	-1.0 FT
PP	Playback Processing	RECOMPUTE

Format: RST\_SIG\_ANSW    Vertical Scale: 5" per 100'    Graphics File Created: 19-Apr-2009 06:06

### OP System Version: 17C0-154

RST-C                      17C0-154                                      PSPT-A/B                      17C0-154

#### Input DLIS Files

DEFAULT                      RST\_PSP\_059LUP                      FN:77    PRODUCER    19-Apr-2009 04:51    4105.0 FT                      24.0 FT

#### Output DLIS Files

DEFAULT                      RST\_PSP\_064PUP                      FN:82    PRODUCER    19-Apr-2009 06:06



## CALIBRATIONS

MAXIS Field Log

Client: Battelle Pacific Northwest Lab	Tool: PSP
Field: Wildcat	Sub Type: PBMS
Well: Wallula Basalt Pilot #1	Sensor: Clock Model
Run date: 18-Apr-2009	

PBMS Digitalization Clock  
 Sonde Serial NB  
 Sensor Serial NB                      2705  
 Calib Date ddmmyy                      200804

Matrix Size 16  
Coeff CRC 845A

Clock Coeff

	Temp**0	Temp**1	Temp**2
Temp**0	-.221754467647E+03	-.351331923284E+01	-.122418608085E+00
	Temp**3	Temp**4	Temp**5
Temp**0	+1.100911375746E-02	+1.139106891837E-05	0.0

Client: Battelle Pacific Northwest Lab  
Field: Wildcat  
Well: Wallula Basalt Pilot #1  
Run date: 18-Apr-2009

Tool: PSP  
Sub Type: PBMS  
Sensor: Sapphire

PBMS Sapphire 10kPsi Gauge

Sonde Serial NB COEFFICIENTS FOR SAPPHIRE PBMS-A.2705 S/N:  
Sensor Serial NB 2705  
Calib Date ddmmyy 200804  
Matrix Size 66  
Coeff CRC CA4C

Pres Coeff

	Tt**0	Tt**1	Tt**2
Tp**0	-.362868111935E+04	+4.37654534645E+04	-.209727319048E+04
Tp**1	+4.497053747631E+04	-.377645721345E+04	+1.160909227913E+04
Tp**2	-.202651131341E+01	+6.11045267569E+01	-.235600057258E+01
Tp**3	-.197671661433E+01	+5.50845008993E+00	0.0
Tp**4	0.0	0.0	0.0
Tp**5	0.0	0.0	0.0

	Tt**3	Tt**4	Tt**5
Tp**0	+3.349460250477E+03	-.212722874393E+02	0.0
Tp**1	-.262898858168E+03	+1.159560053106E+02	0.0
Tp**2	0.0	0.0	0.0
Tp**3	0.0	0.0	0.0
Tp**4	0.0	0.0	0.0

0.0	0.0	0.0
Tp**4		
0.0	0.0	0.0
Tp**5		

**PBMS Sapphire 10kPsi Gauge**

Sonde Serial NB :  
 Sensor Serial NB 2705  
 Calib Date ddmmyy 200804  
 Matrix Size 66  
 Coeff CRC 1476

**Temp Coeff**

	Tp**0	Tp**1	Tp**2
Tt**0	-.657437579497E+03	+.437054171241E+01	-.622544121497E+01
Tt**1	+.319356173686E+03	+.253008166840E+01	+.168427875618E+01
Tt**2	-.508349956583E+02	-.144467158014E+01	-.457268492521E-01
Tt**3	+.410200401725E+01	+.140832324236E+00	0.0
Tt**4	0.0	0.0	0.0
Tt**5	0.0	0.0	0.0

	Tp**3	Tp**4	Tp**5
Tt**0	+.132212511328E+01	-.112239297988E+00	0.0
Tt**1	-.313781779386E+00	+.263847389681E-01	0.0
Tt**2	0.0	0.0	0.0
Tt**3	0.0	0.0	0.0
Tt**4	0.0	0.0	0.0
Tt**5	0.0	0.0	0.0

Client: Battelle Pacific Northwest Lab  
 Field: Wildcat  
 Well: Wallula Basalt Pilot #1  
 Run date: 18-Apr-2009

Tool: PSP  
 Sub Type: PBMS  
 Sensor: GR

**PBMS Gamma Ray**

Sonde Serial NB RESISTORS FOR GR SENSOR N.33751, TOOL PBMS-AA2705. SENSOR S/N:  
 Sensor Serial NB 33751  
 Calib Date ddmmyy 100404  
 Matrix Size 12  
 Coeff CRC AEEF

GR HV Rt

Rt\*\*0

Rt\*\*1

Rt\*\*0

+.200000000000e+04

+.247000000000e+04

Client: Battelle Pacific Northwest Lab  
Field: Wildcat  
Well: Wallula Basalt Pilot #1  
Run date: 18-Apr-2009

Tool: PSP  
Sub Type: PBMS  
Sensor: WellTemp RTD

PBMS RTD Well Thermometer

Sonde Serial NB

COEFFICIENTS FOR RTD THERMOMETER PBMS-A.2705 S/N:

Sensor Serial NB

2705

Calib Date ddmmyy

200804

Matrix Size

16

Coeff CRC

C2D2

WTemp Coeff

Tt\*\*0

Tt\*\*1

Tt\*\*2

Tt\*\*0

-.516221871699E+04

+.483024521702E+04

-.173383959046E+04

Tt\*\*3

Tt\*\*4

Tt\*\*5

Tt\*\*0

+.281957309828E+03

-.171250606947E+02

0.0

Company: Battelle Pacific Northwest Lab

**Schlumberger**

Well: Wallula Basalt Pilot #1

Field: Wildcat

County:

**Walla Walla**

State:

**Washington**

RESERVOIR SATURATION TOOL

SIGMA PASS