Schlumberger

Company: **Lamont Doherty Earth Observatory**

Well: **Expedition 351, Site U1438E**
Field: **IBM Arc Origins**
Rig: **JOIDES Resolution** Ocean: **Pacific**

Rig: JOIDES Resolution
Field: IBM Arc Origins
Location: Latitude: N 27.383588*
Well: Expedition 351, Site U1438E
Company: Lamont Doherty Earth Observatory

High Resolution Laterolog Array (HRLA)
Caliper / Magnetic Susceptibility
Natural Gamma Ray

LOCATION

Latitude: N 27.383588*
Longitude: E 134.318163*

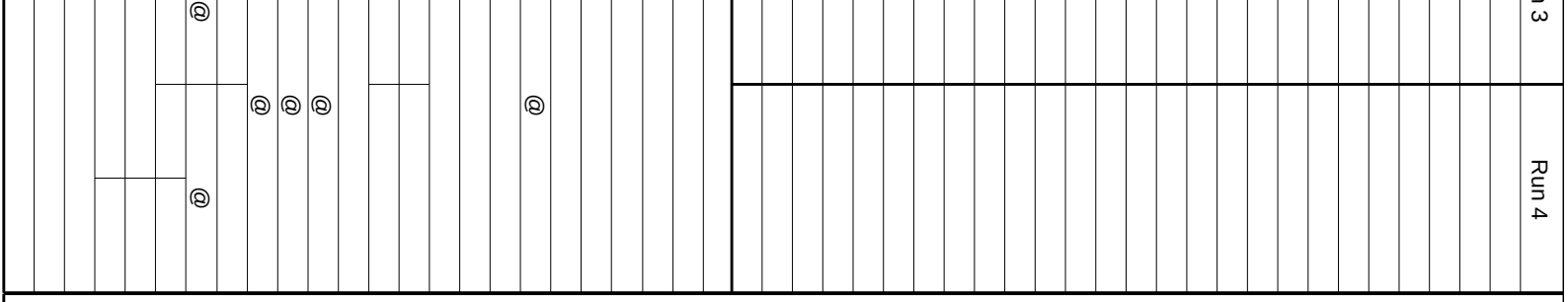
Elev.: K.B. −4711.00 m
G.L. 0.00 m
D.F. −4711.00 m

Permanent Datum: Sea Floor — Elev.: 0.00 m
Log Measured From: Sea Floor — 0.00 m above Perm. Datum
Drilling Measured From: Drill Floor

API Serial No.	N 27.383588	E 134.318163	

	Run 1	Run 2	Run
Logging Date	21−Jul−2014		
Run Number	1		
Depth Driller	1611 m		
Schlumberger Depth	1187 m		
Bottom Log Interval	1187 m		
Top Log Interval	0 m		
Casing Driller Size @ Depth	5.500 in @ 190 m	@	@
Casing Schlumberger	187 m		
Bit Size	9.875 in		
Type Fluid In Hole	Seawater		
MUD Density / Viscosity	1.03 g/cm3		
MUD Fluid Loss / PH			
MUD Source Of Sample	N/A		
RM @ Measured Temperature	@	@	@
RMF @ Measured Temperature	@	@	@
RMC @ Measured Temperature	@	@	@
Source RMF / RMC	N/A / N/A		
RM @ MRT / RMF @ MRT	@ 30 / @ 30	@ / @	@ / @
Maximum Recorded Temperatures	30 degC		
Circulation Stopped / Time	21−Jul−2014 / 14:00		
Logger On Bottom / Time	21−Jul−2014 /	22:28	
Unit Number / Location	627314 / Houston		
Recorded By	K. Swain		
Witnessed By	L. Drab		

	Run 1	Run 2	Run
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			
MUD Fluid Loss / PH			
MUD 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			



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OTHER SERVICES1	OTHER SERVICES2
OS1:	OS1:
OS2: GBM	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:

REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
Hole drilled with RCB coring bit and bottom hole assembly (BHA). 9 7/8 " BS	
Drill pipe set at 190mbsf and coring BHA to facilitate wireline logging.	
Lower part of toolstring (MSS and HRLA) centralized using modified MCD inline centralizers.	
Upper part of toolstring (HLDS, HNGS) eccentered using HLDS caliper, as per toolsketch.	
Fluid type was sea water, as used to drill, so no barite corrections were required.	
All logs presented in measured depth below sea floor (MDBSF).	
Maximum observed temperature on the HRLA temperature was 30degC.	
Original log data acquired with drill floor as the reference but later	
played back to sea floor depth as the primary depth reference.	
**No Gamma Ray source installed in HLDS, so no DENSITY curves	
are available in logs or data as requested by IODP Ops.**	

RUN 1			RUN 2		
SERVICE ORDER #:			SERVICE ORDER #:		
PROGRAM VERSION:		19C0−187	PROGRAM VERSION:		
FLUID LEVEL:			FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

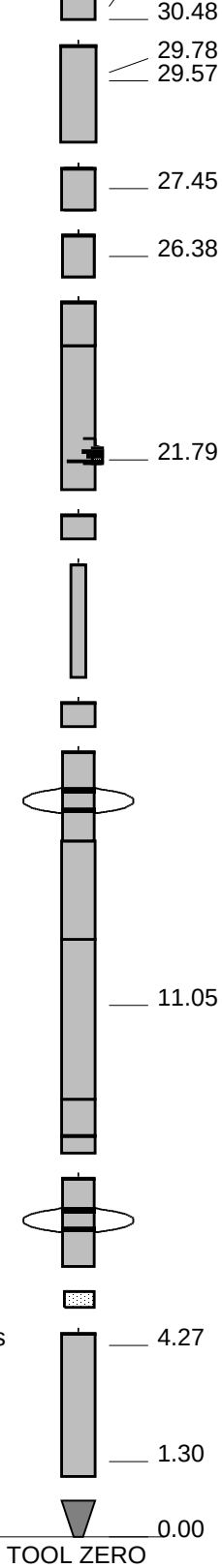
EQUIPMENT DESCRIPTION

RUN 1	RUN 2

SURFACE EQUIPMENT

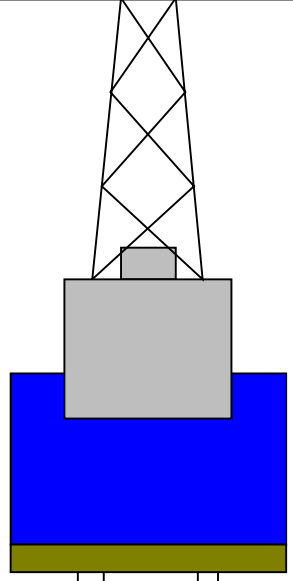
GSR−U 616008
WITM (EDTS)−A 1

DOWNHOLE EQUIPMENT



MAXIMUM STRING DIAMETER 3.75 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN METERS

Production String	(in) OD	(in) ID	(M) MD	Well Schematic	(M) MD	(in) OD	(in) ID	Casing String



Kelly Bushing Elevation −4711

Derrick Floor Elevation −4711

Mean Sea Level −4700

4.1

Sea Floor 0 4.1

Drill pipe + BHA 190.2

10 3/4" casing 605 10.75

Open Hole 9.875

Total Depth 1611

Input DLIS Files

DEFAULT	MSS_LDEO_HRLA_LDL_027PUP	FN:33	PRODUCER	21−Jul−2014 15:48	5902.5 M	4700.9 M

Output DLIS Files

DEFAULT	MSS_LDEO_HRLA_LDL_040PUP	FN:47	PRODUCER	23−Jul−2014 00:16	1191.5 M	−10.1 M

OP System Version: 19C0−187

MSS_LDEO−A	19C0−187	HRLT−B	19C0−187
HLDS	19C0−187	LDSC−B	19C0−187
HNGC−B	19C0−187	HNGS−BA	19C0−187
EDTC−B	SKK−5169−EDTCB	BSP	19C0−187

PIP SUMMARY

Time Mark Every 60 S

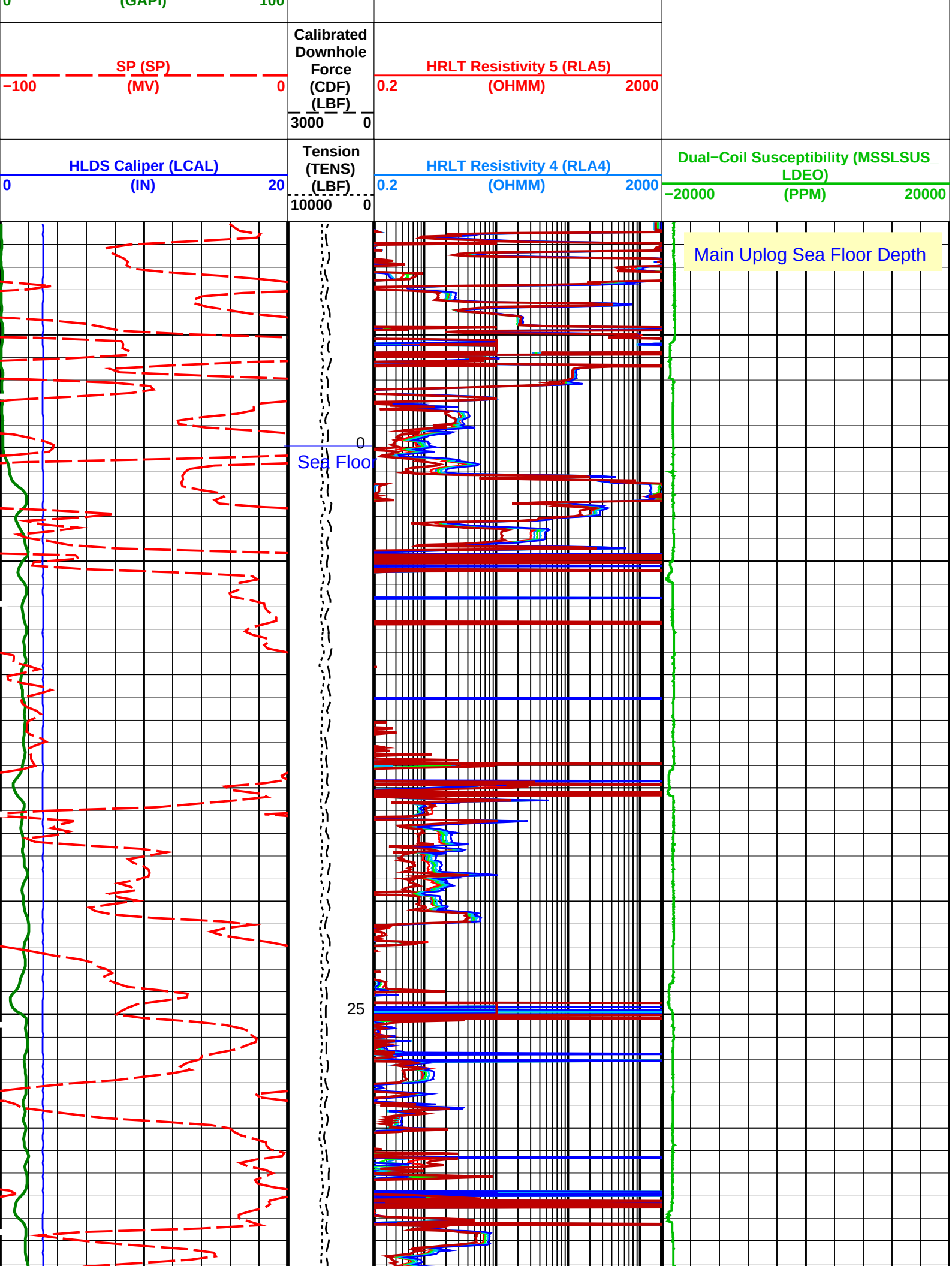
HRLT True Resistivity (RT_HRLT)		
0.2	(OHMM)	2000

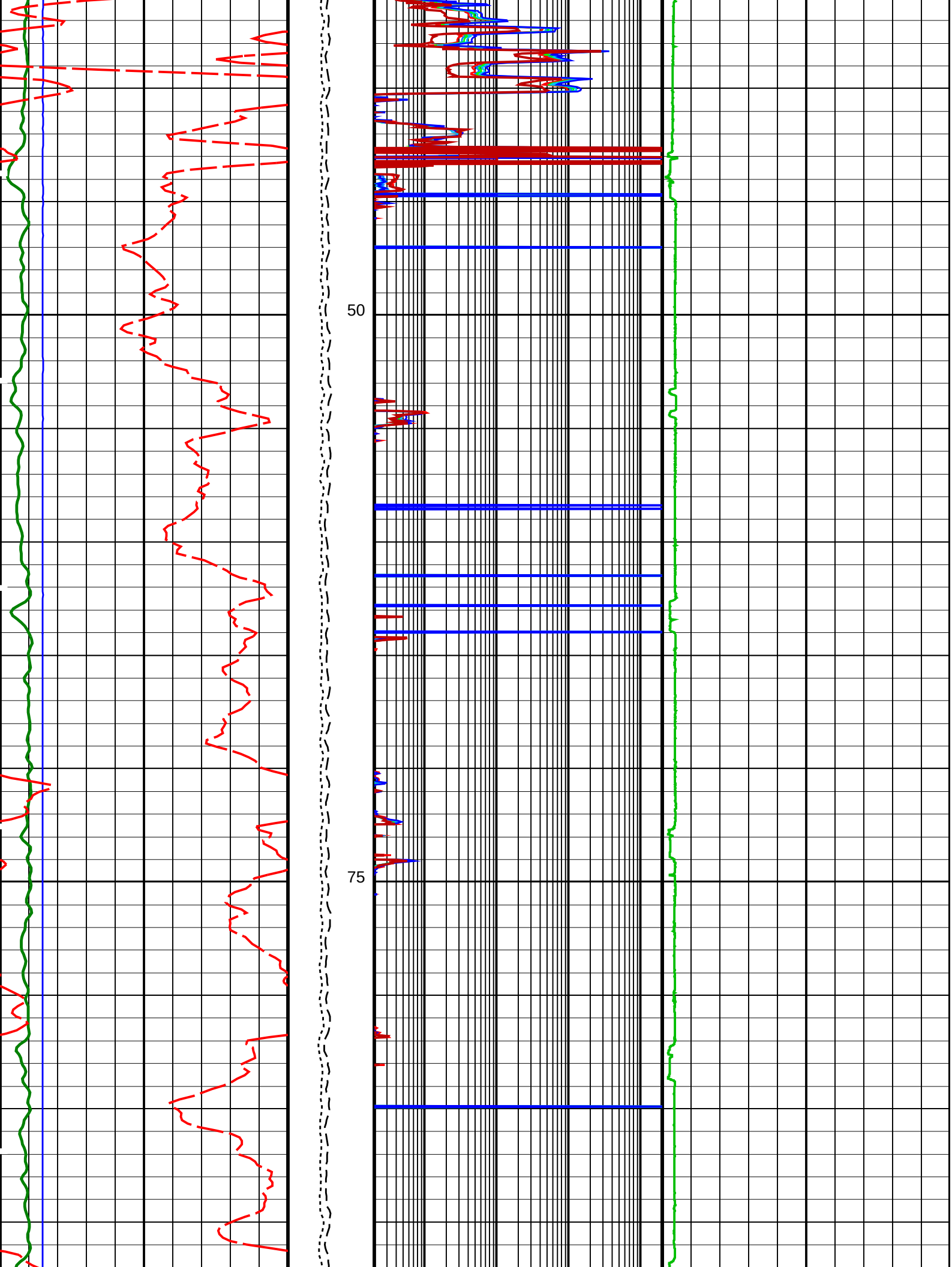
HRLT Resistivity 1 (RLA1)		
0.2	(OHMM)	2000

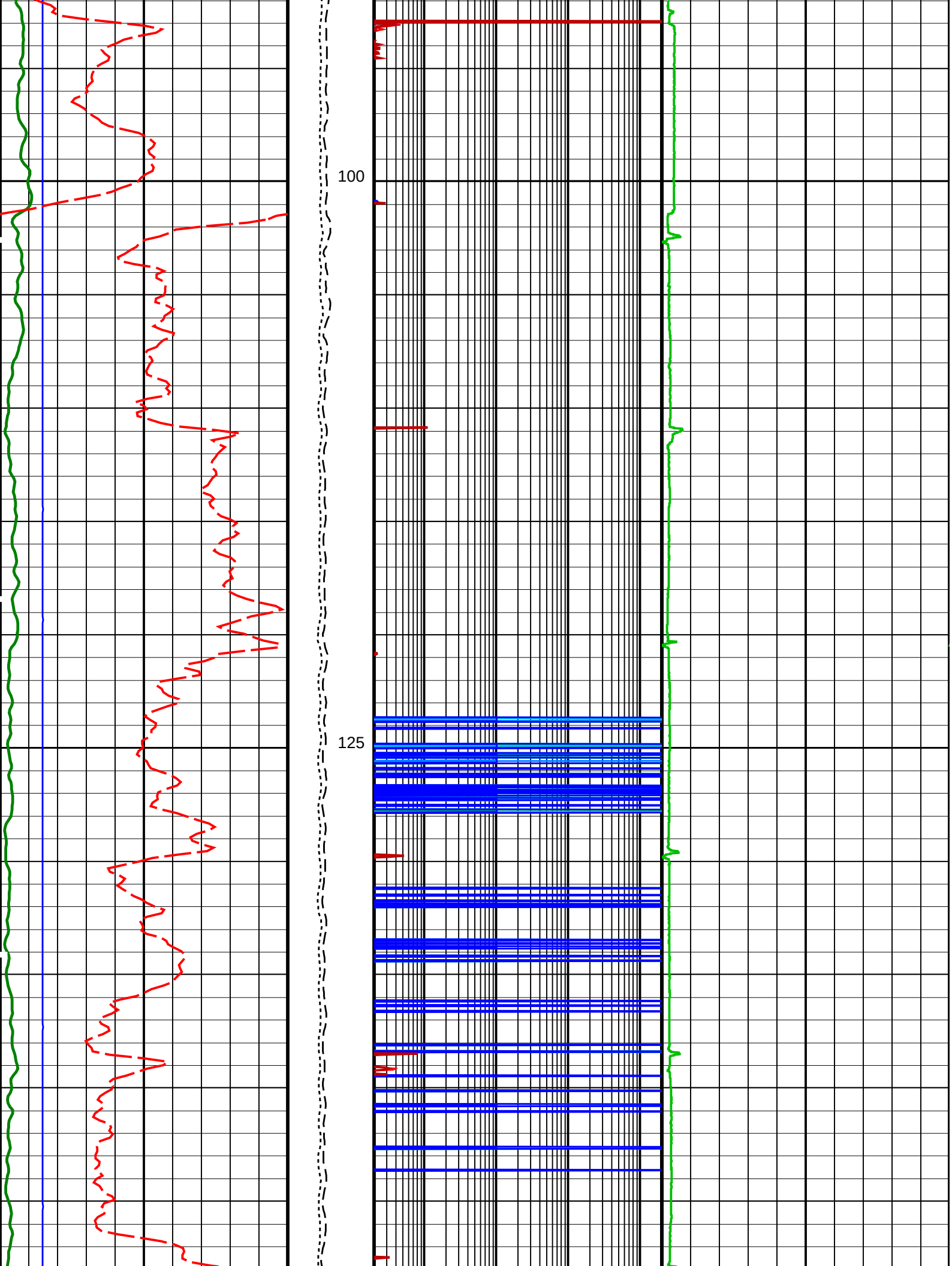
HRLT Resistivity 2 (RLA2)		
0.2	(OHMM)	2000

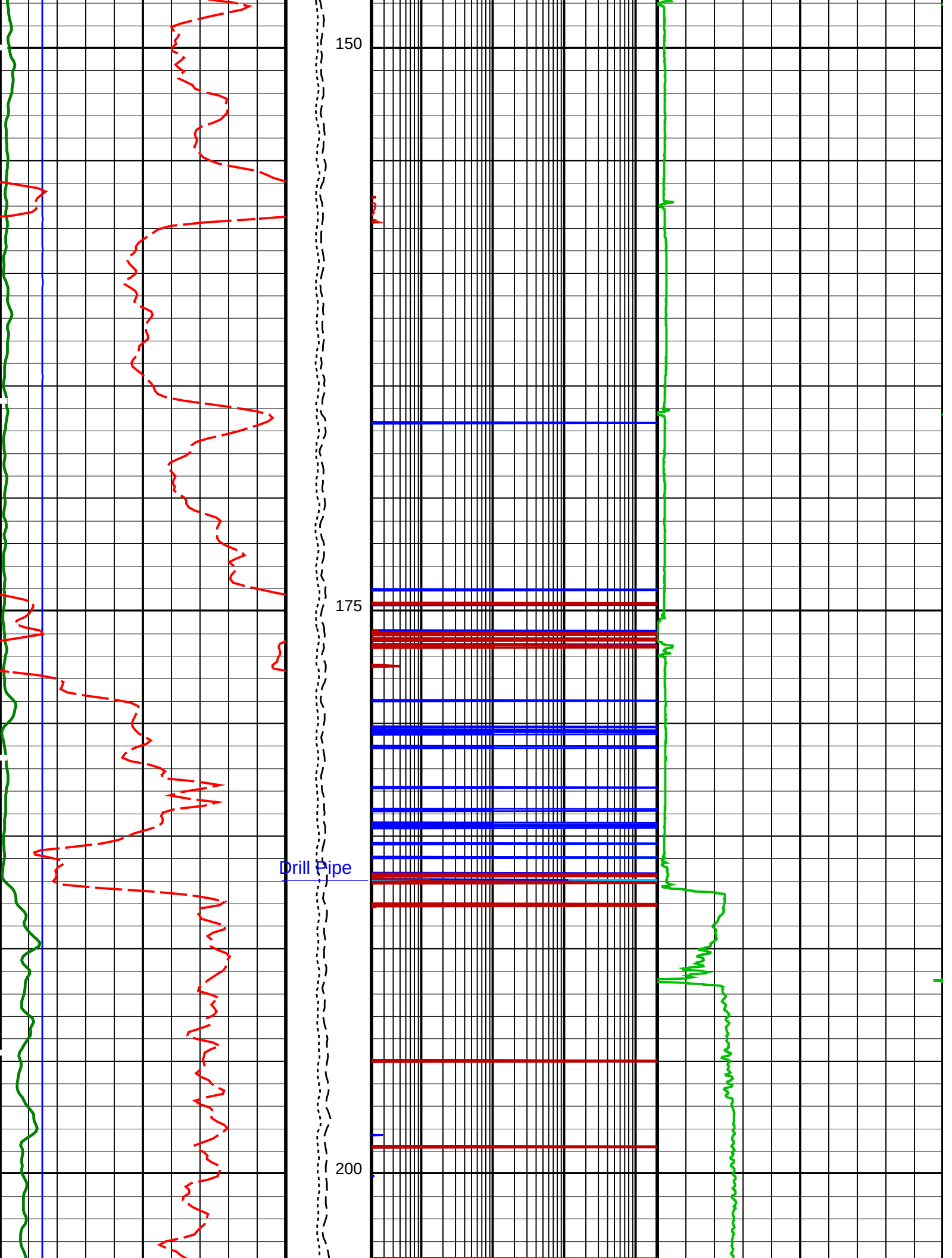
HRLT Resistivity 3 (RLA3)		
0.2	(OHMM)	2000

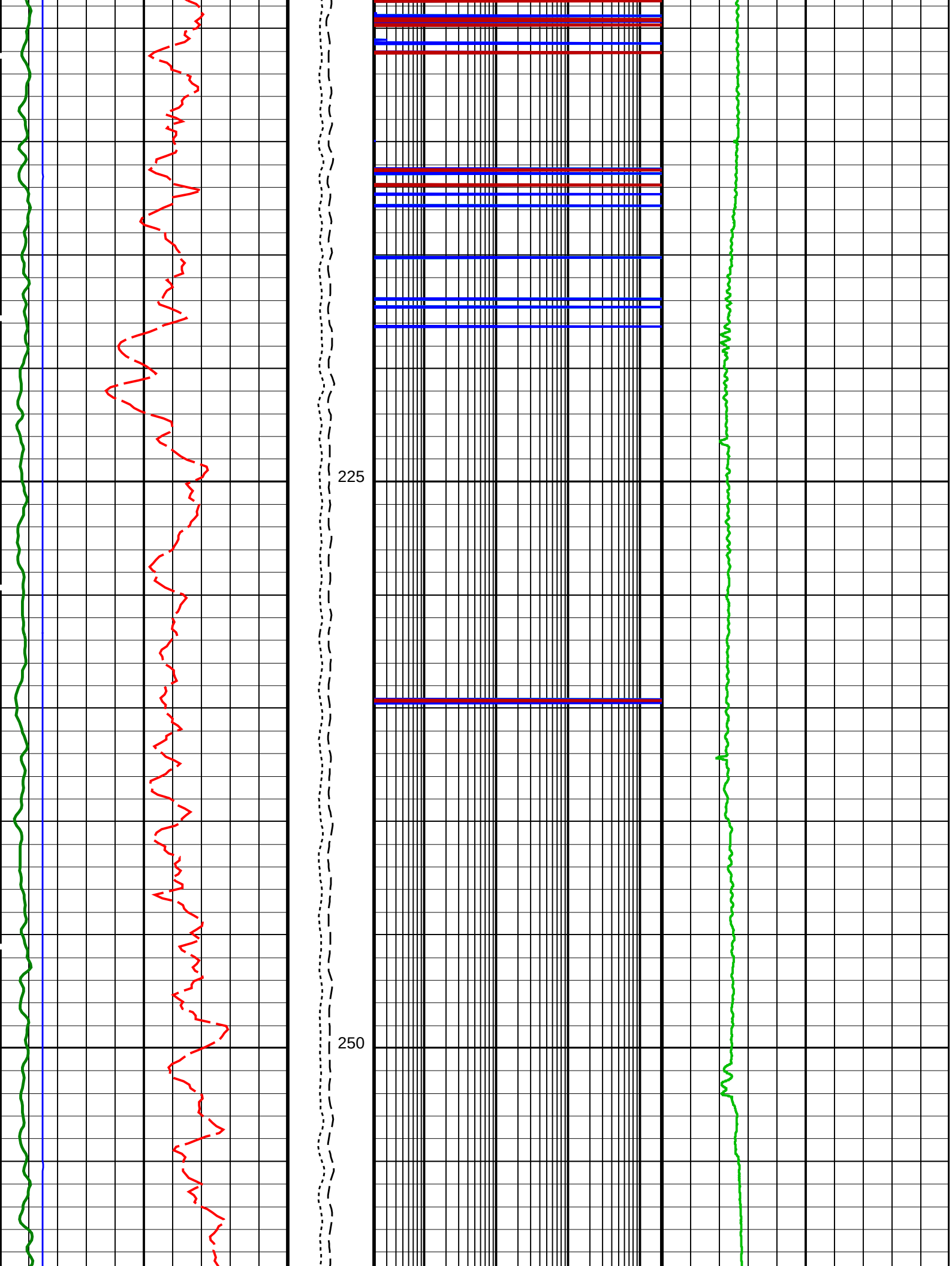
HNGS Spectroscopy Gamma Ray (HSGR)		
0	(GAPI)	100

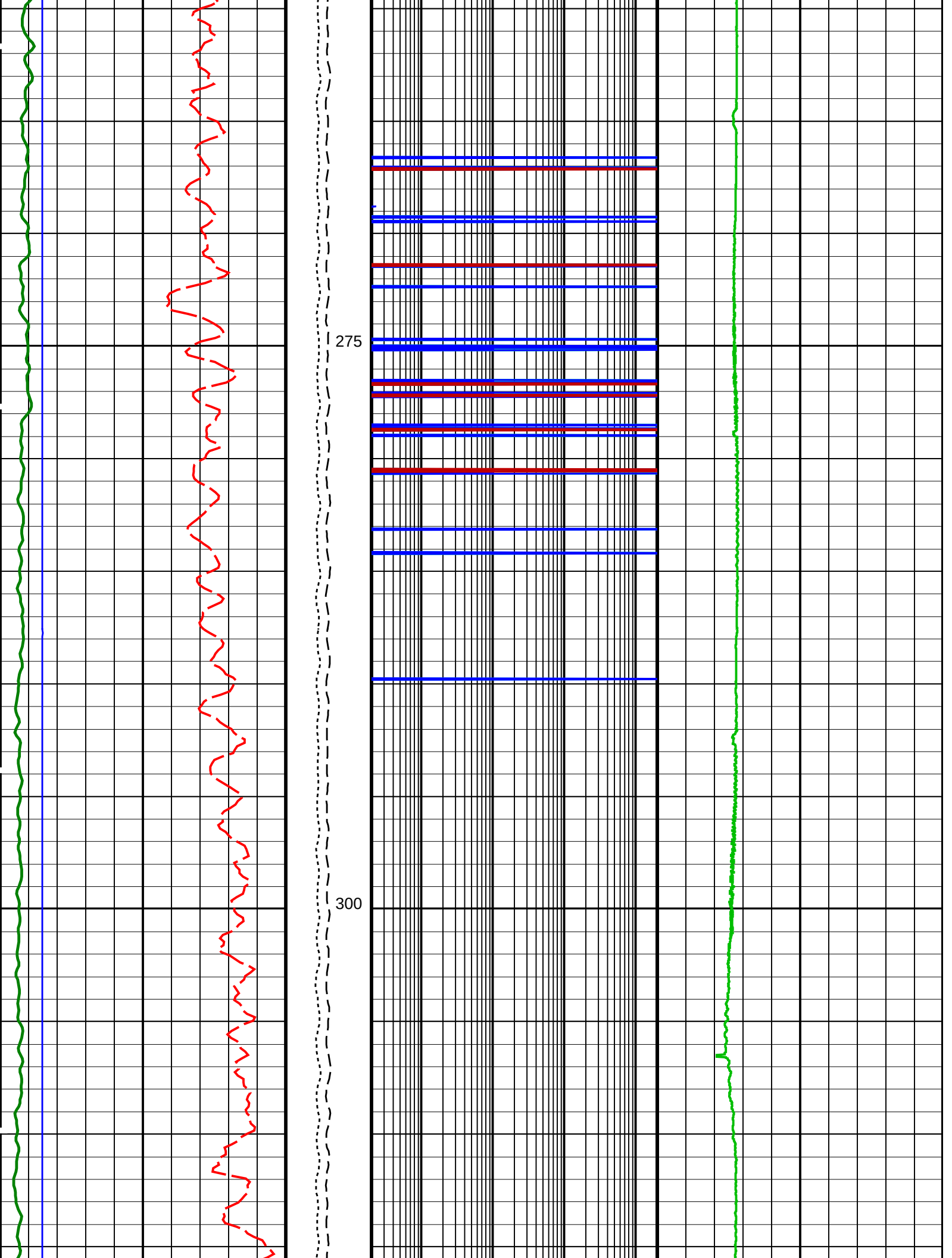

0
(GAPI)
100
SP (SP)
−100
(MV)
0
Calibrated Downhole Force (CDF) (LBF)
3000
0
HRLT Resistivity 5 (RLA5)
0.2
(OHMM)
2000
HLDS Caliper (LCAL)
0
(IN)
20
Tension (TENS) (LBF)
10000
0
HRLT Resistivity 4 (RLA4)
0.2
(OHMM)
2000
Dual−Coil Susceptibility (MSSLSUS_LDEO)
−20000
(PPM)
20000
Main Uplog Sea Floor Depth
0
Sea Floor
25

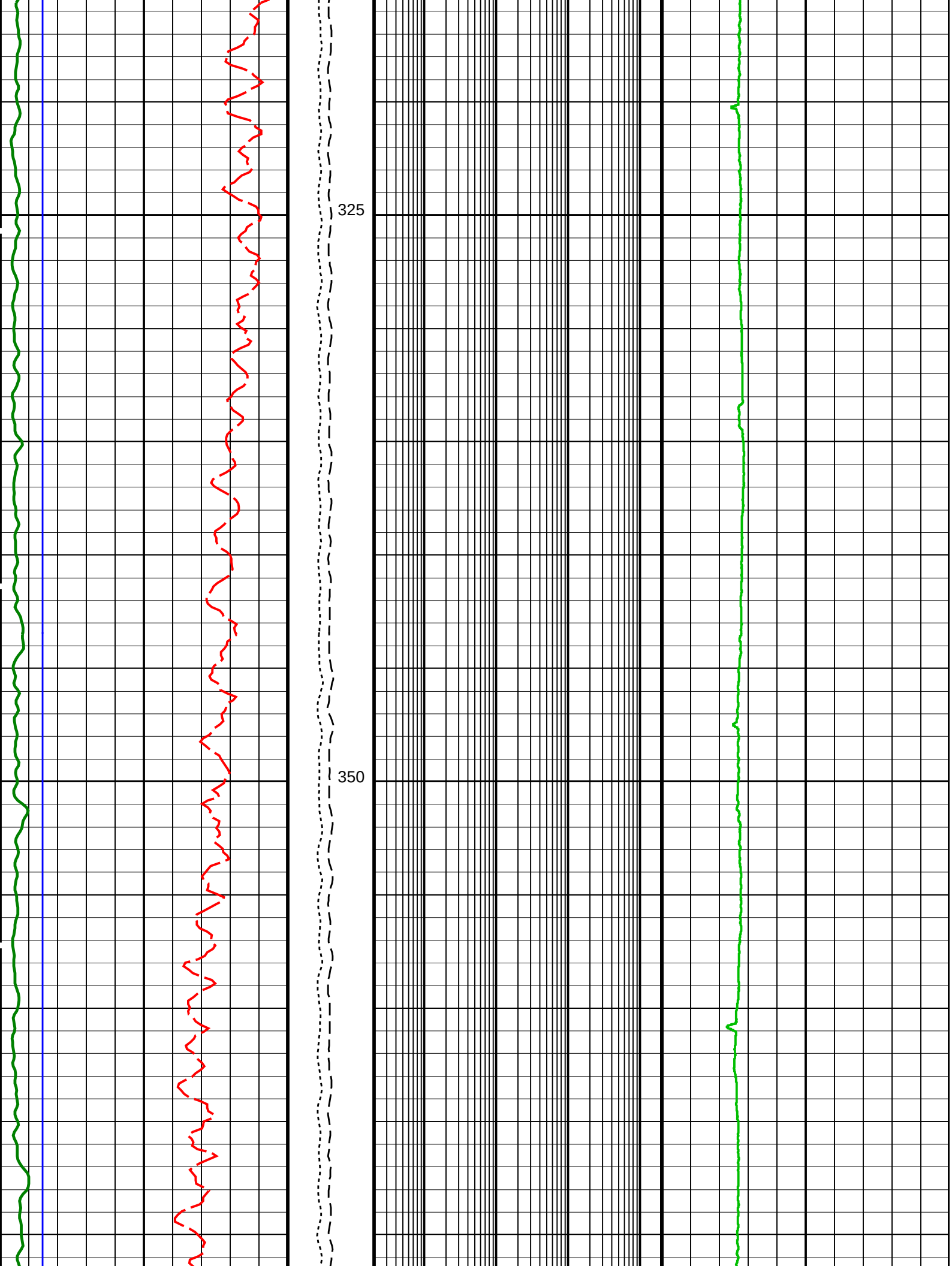

50
75

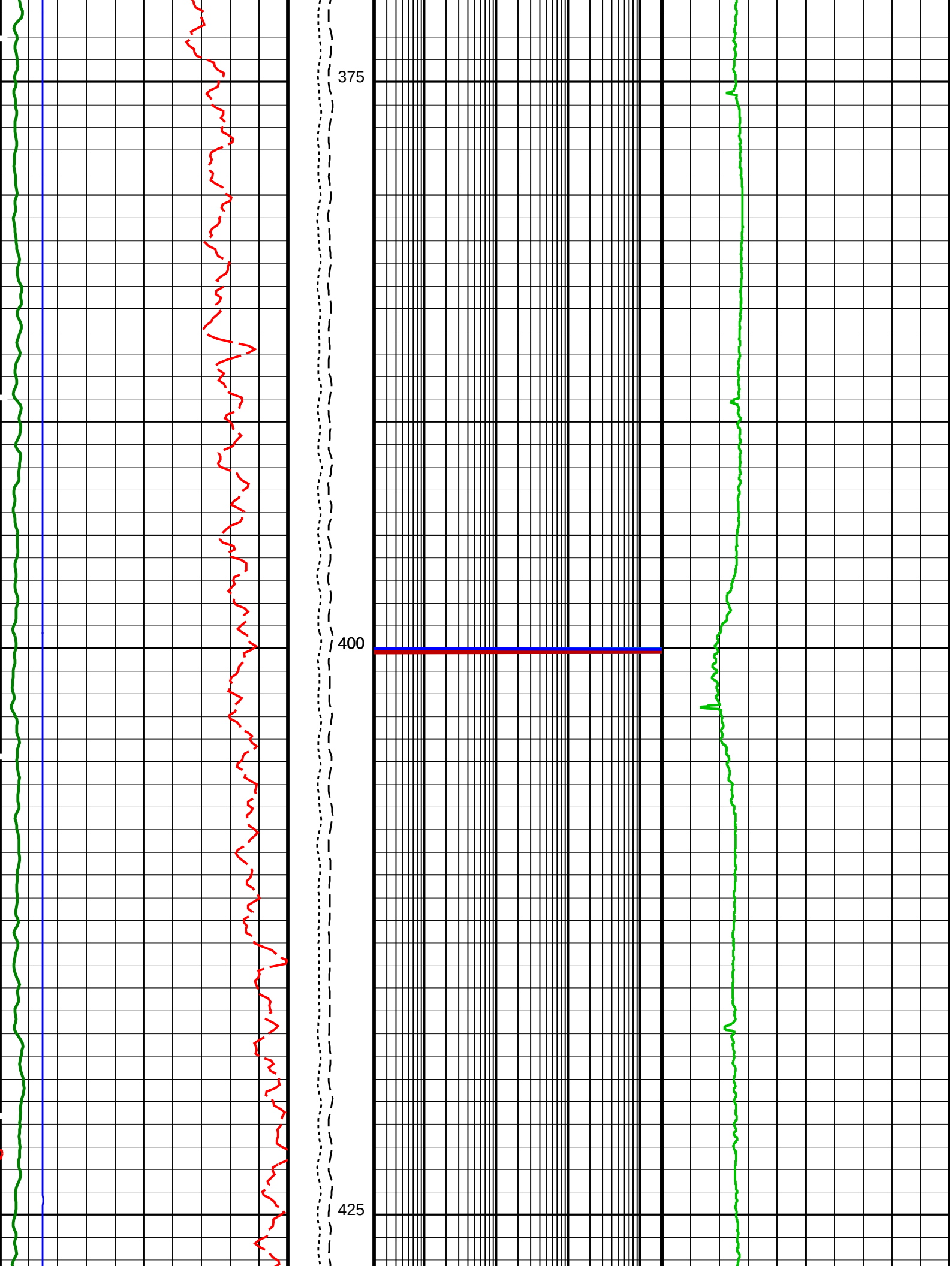

100
125

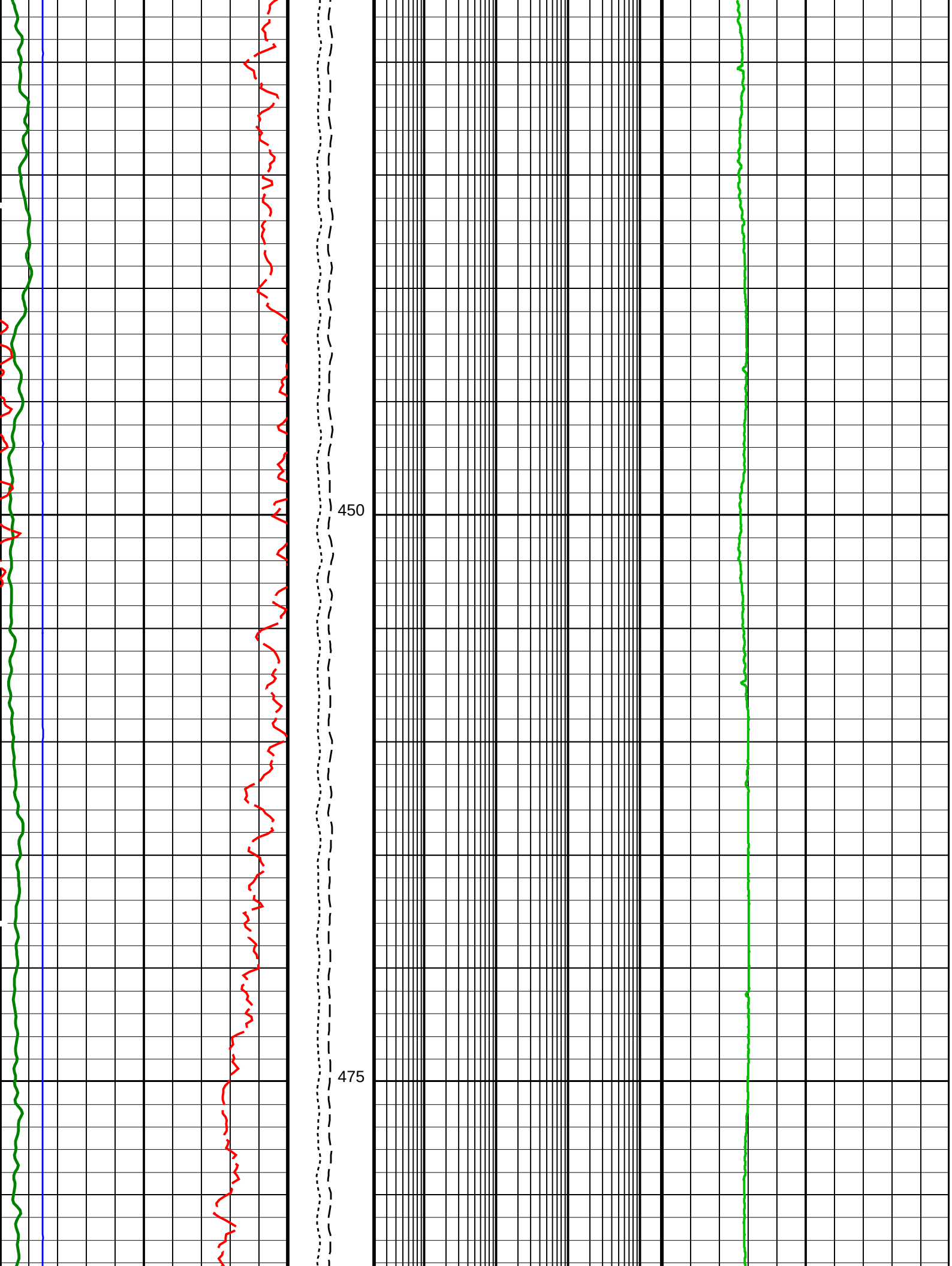

150
175
Drill Pipe
200

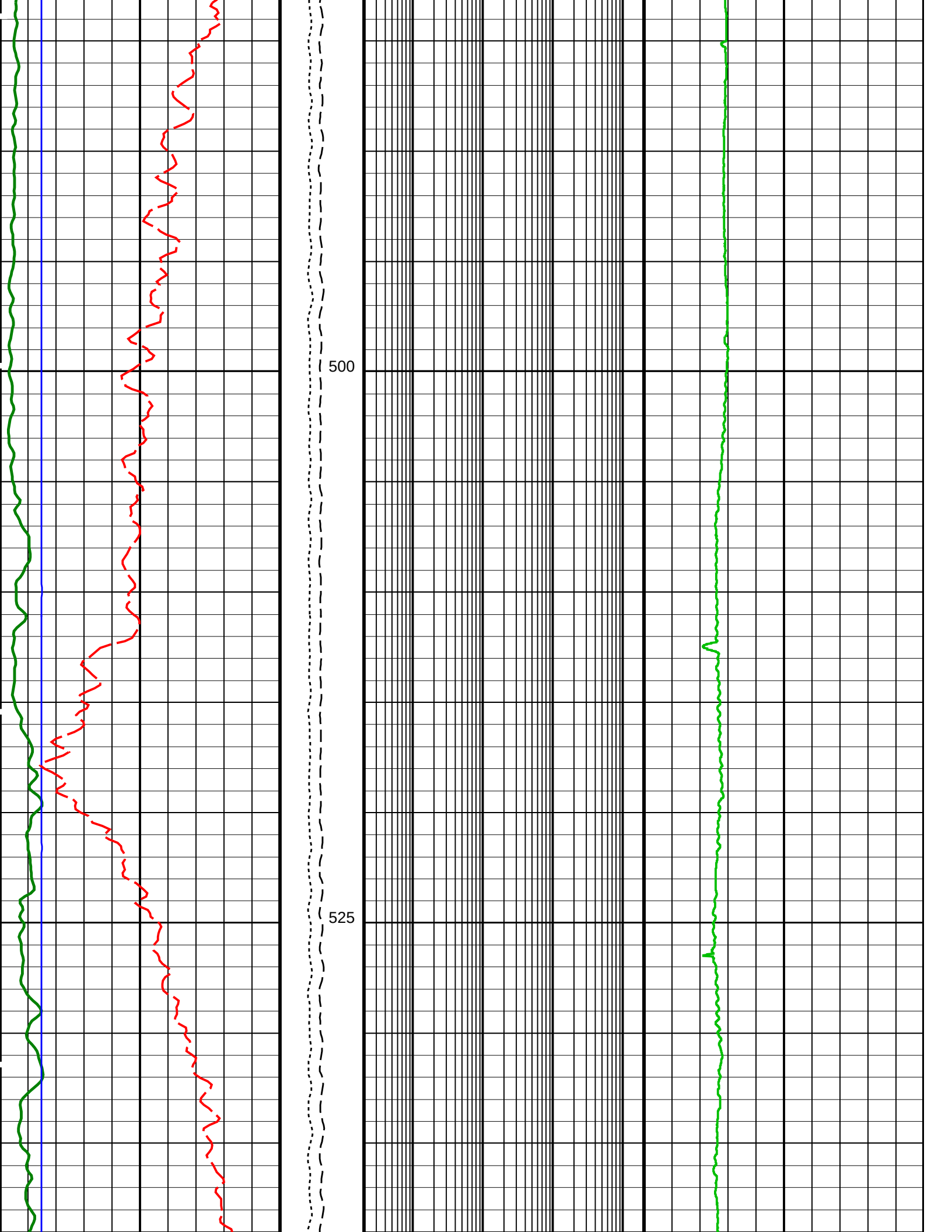

225
250

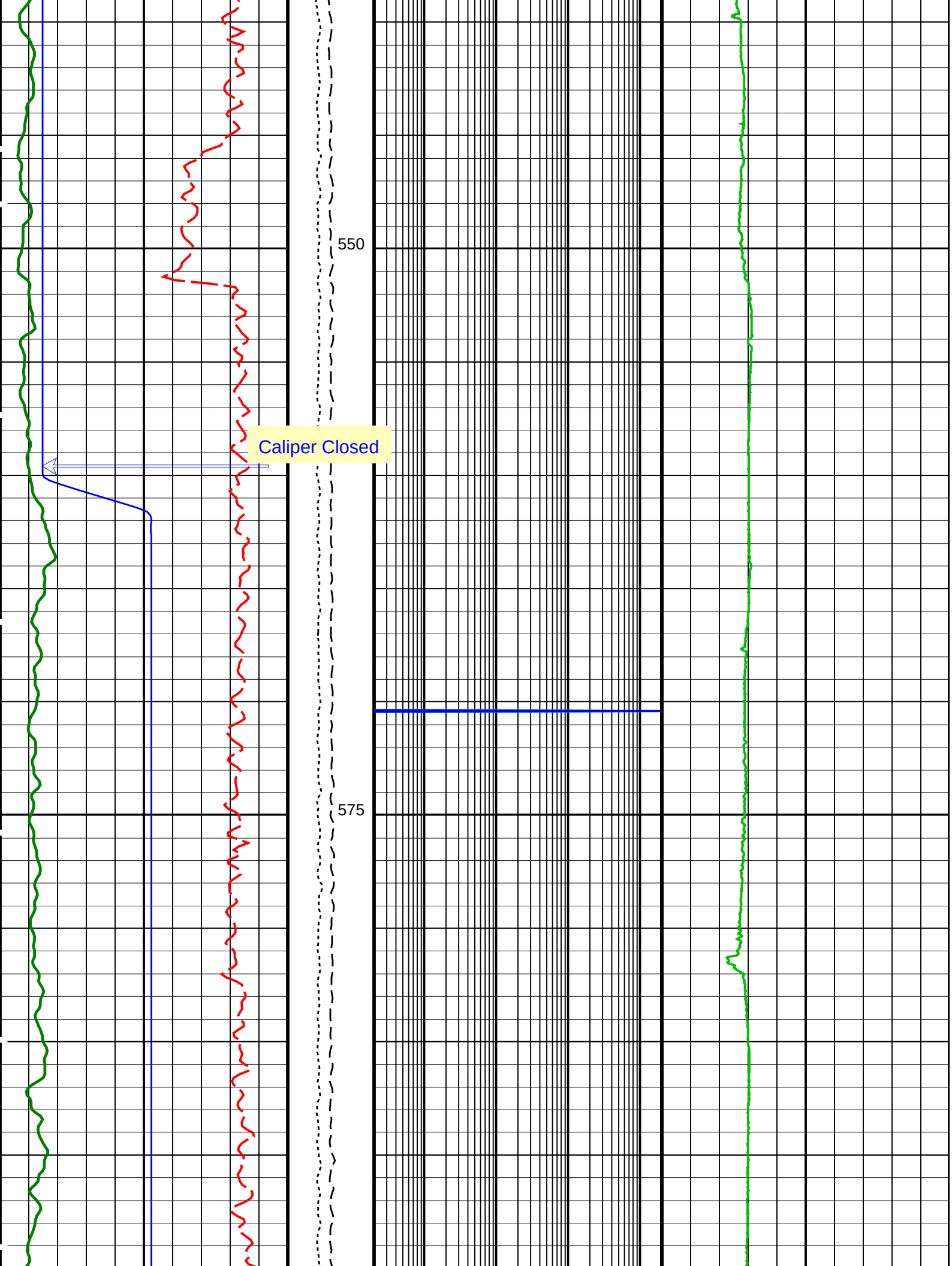

275
300

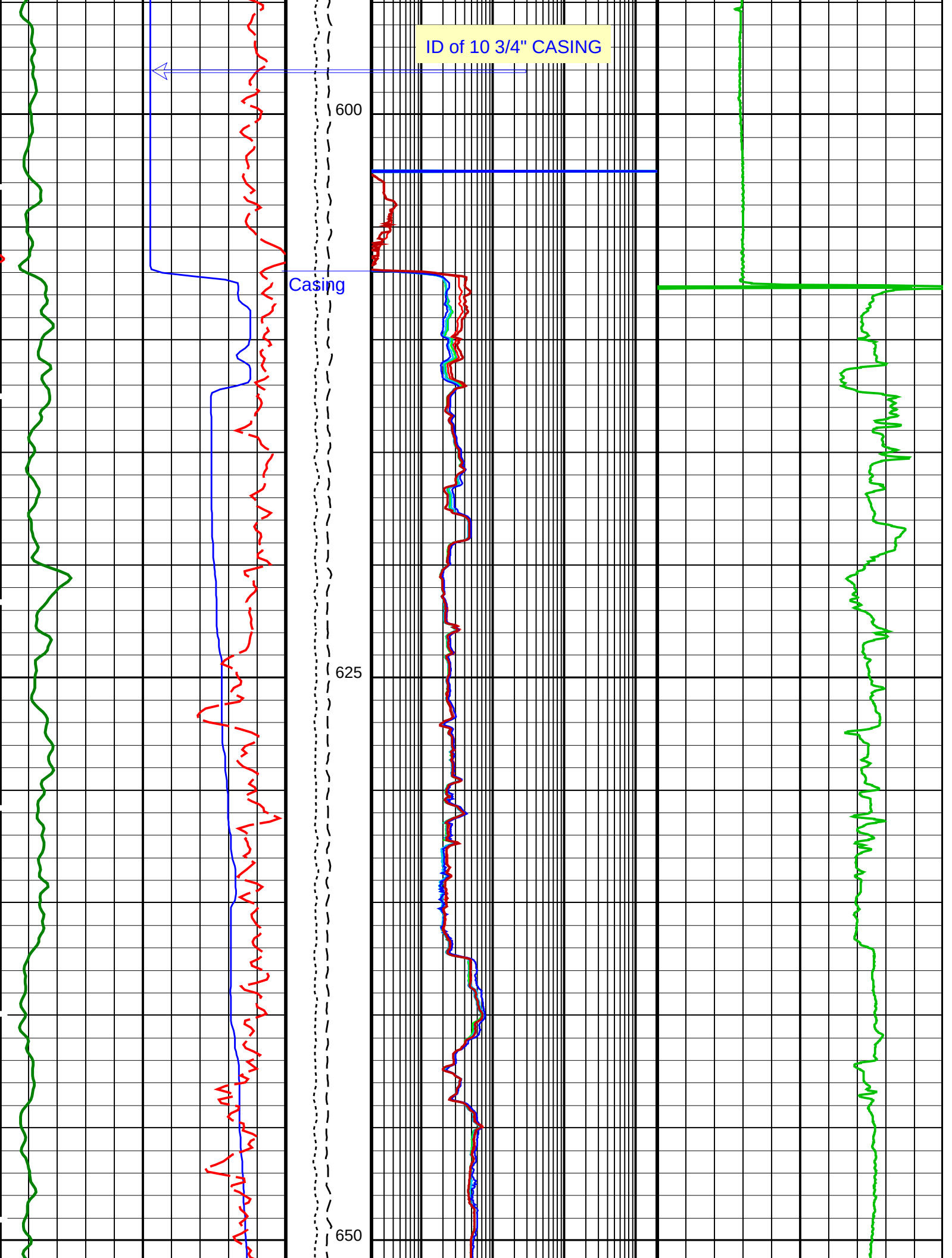

325
350

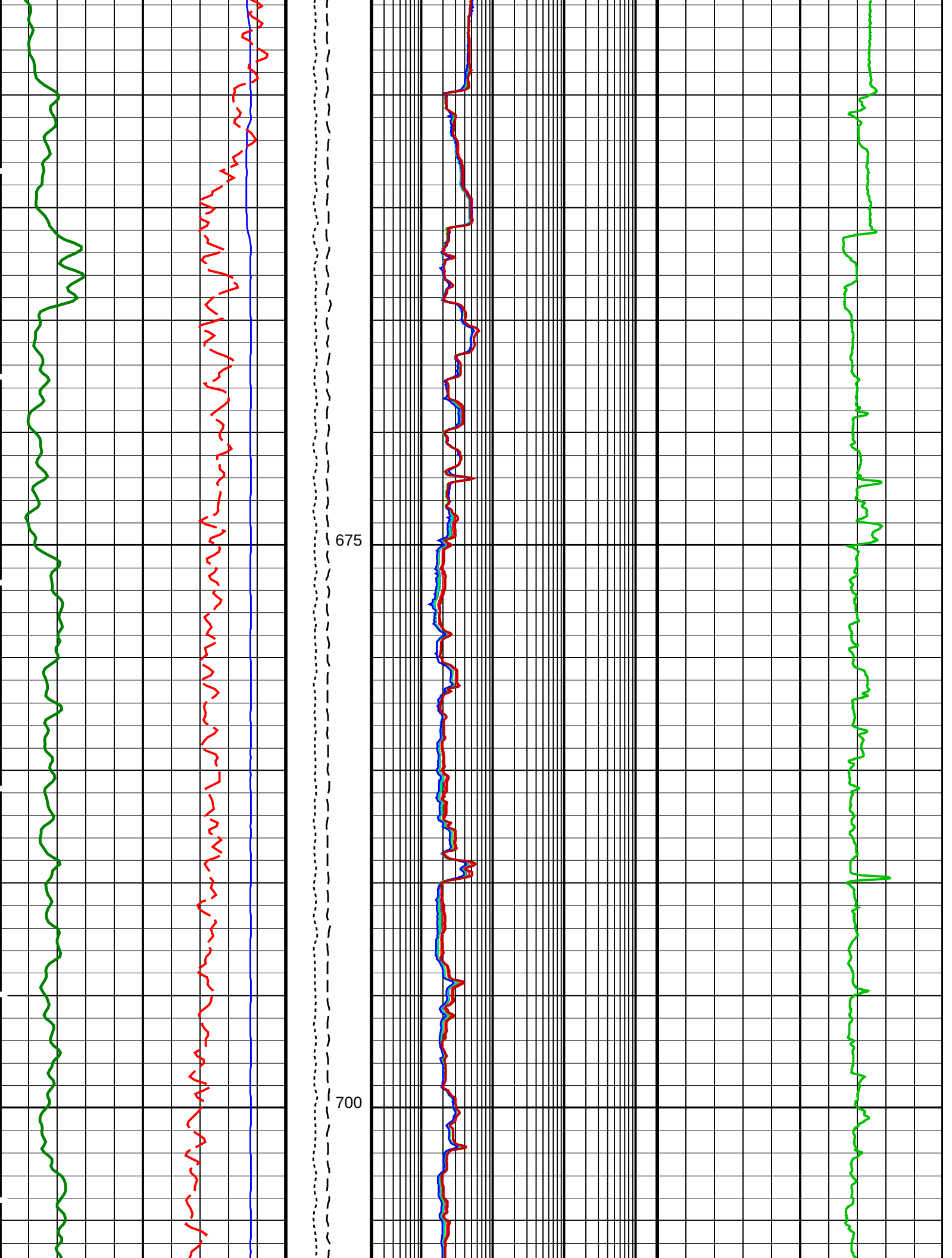

375
400
425

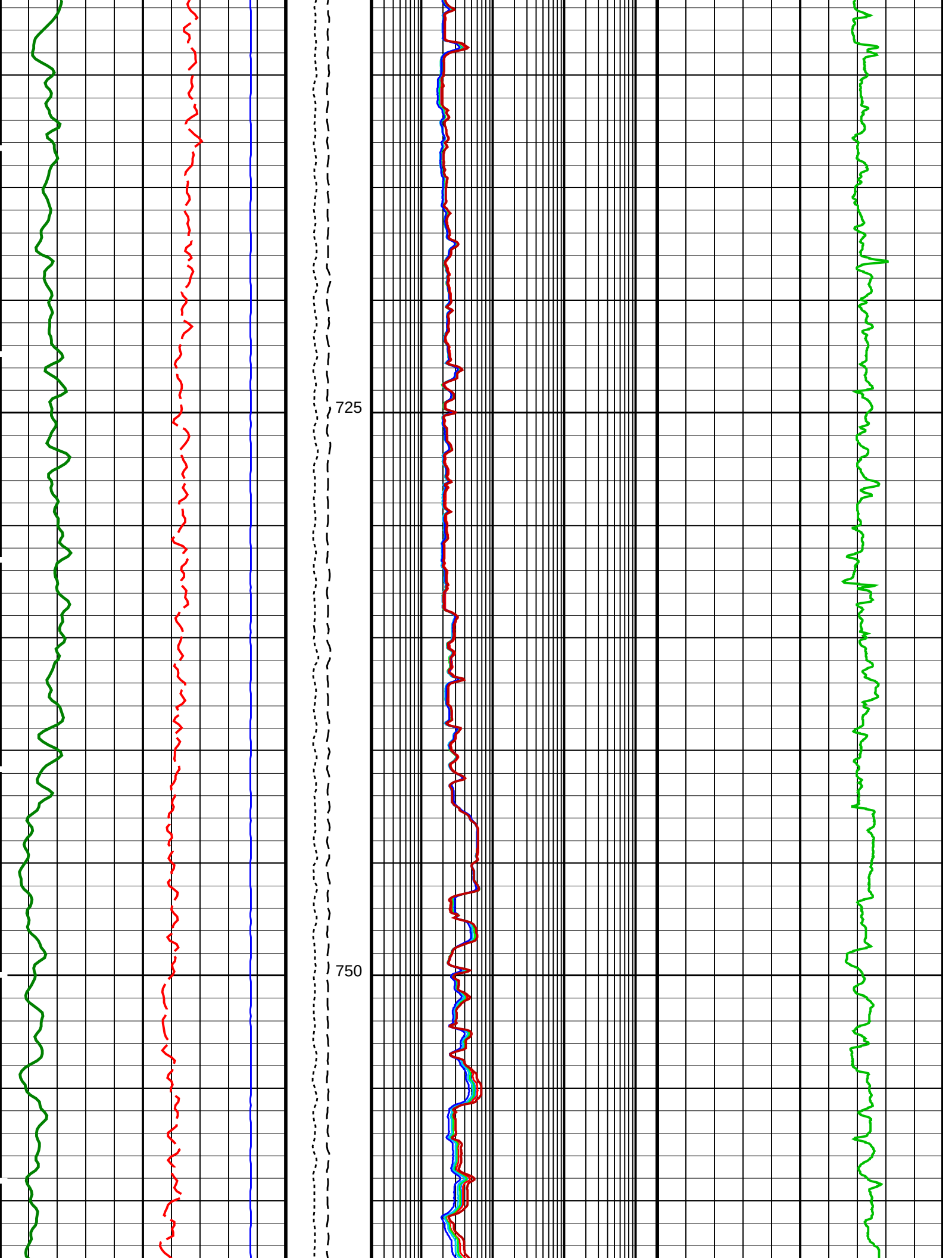

450
475

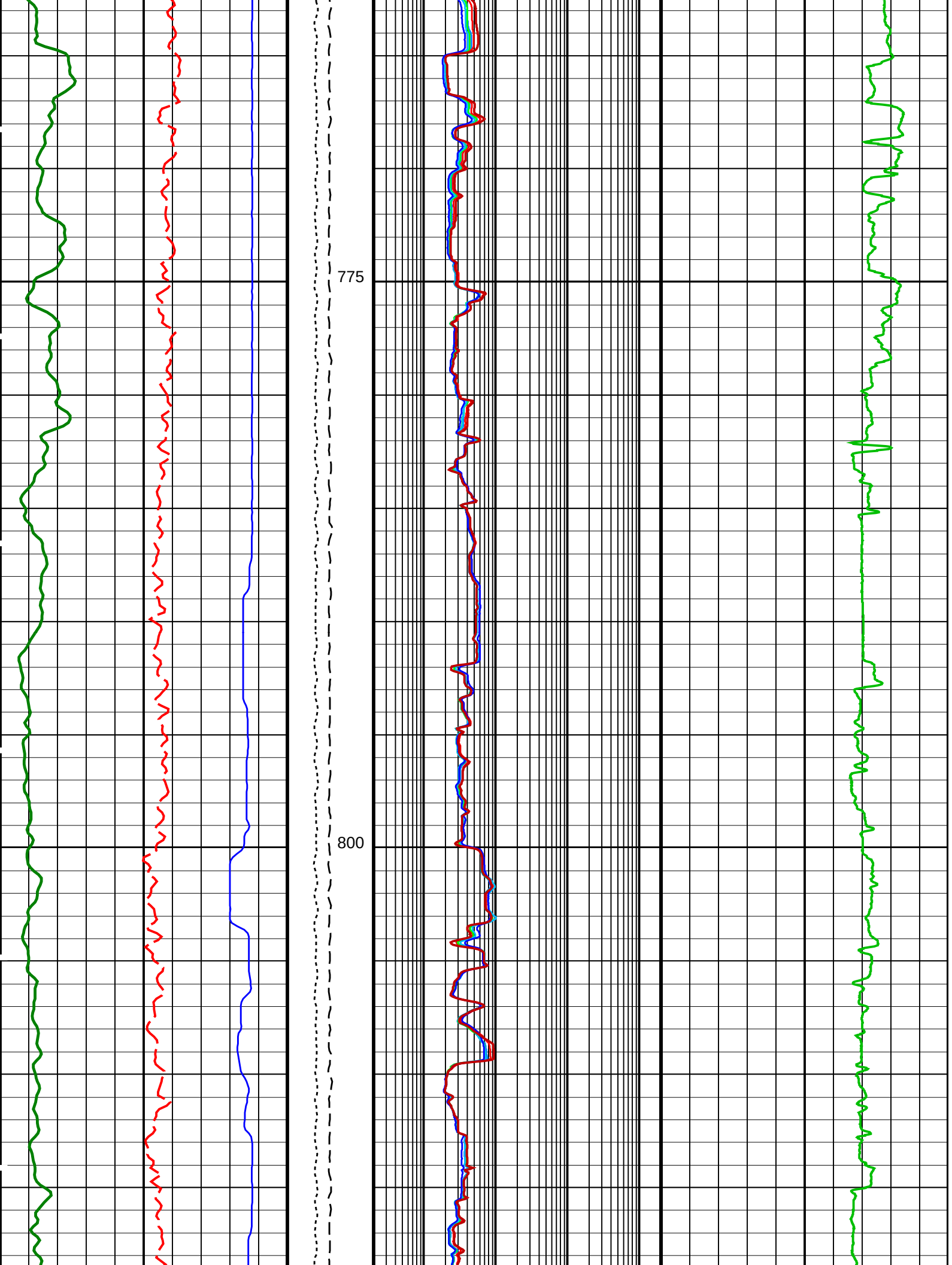

500
525

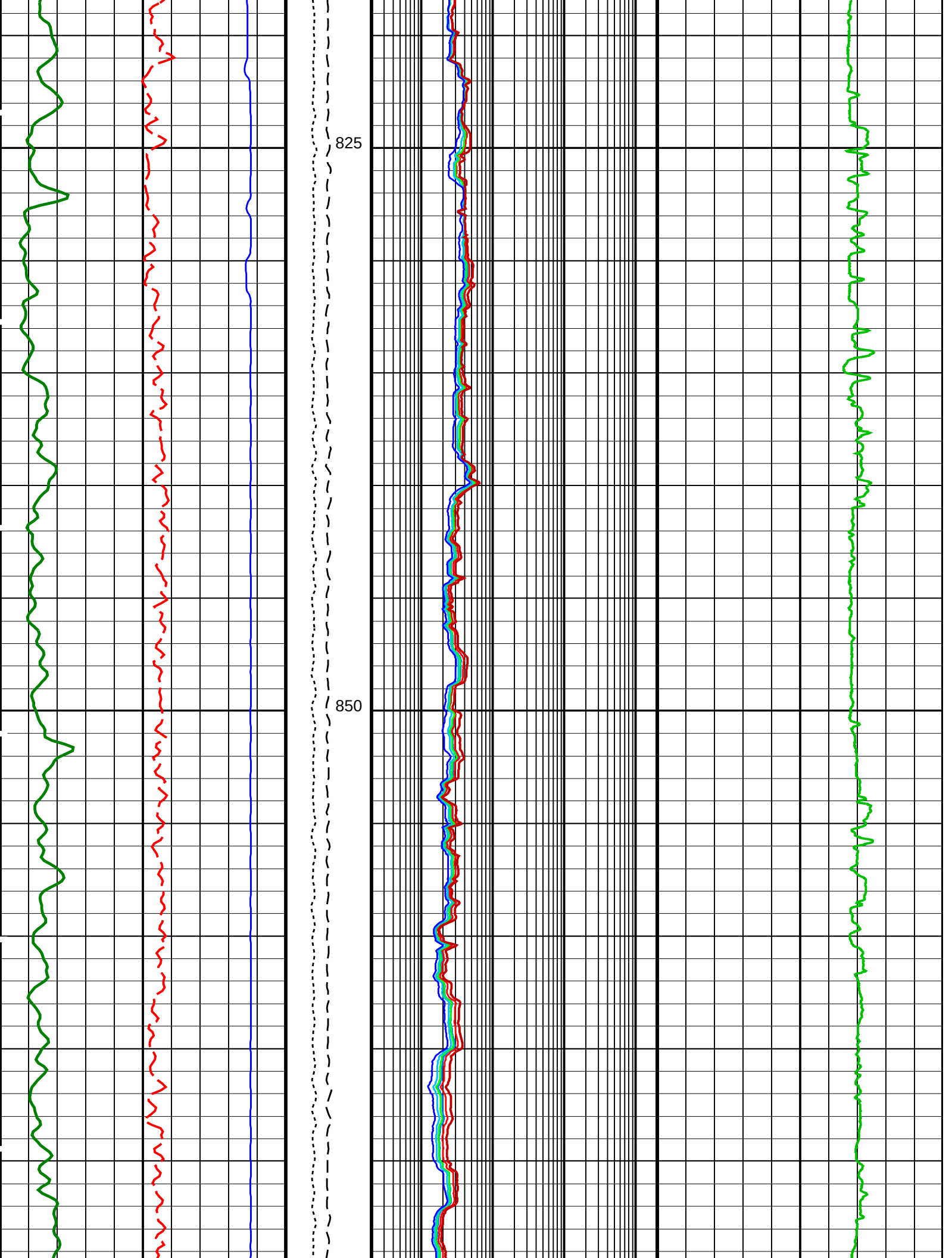

550
Caliper Closed
575

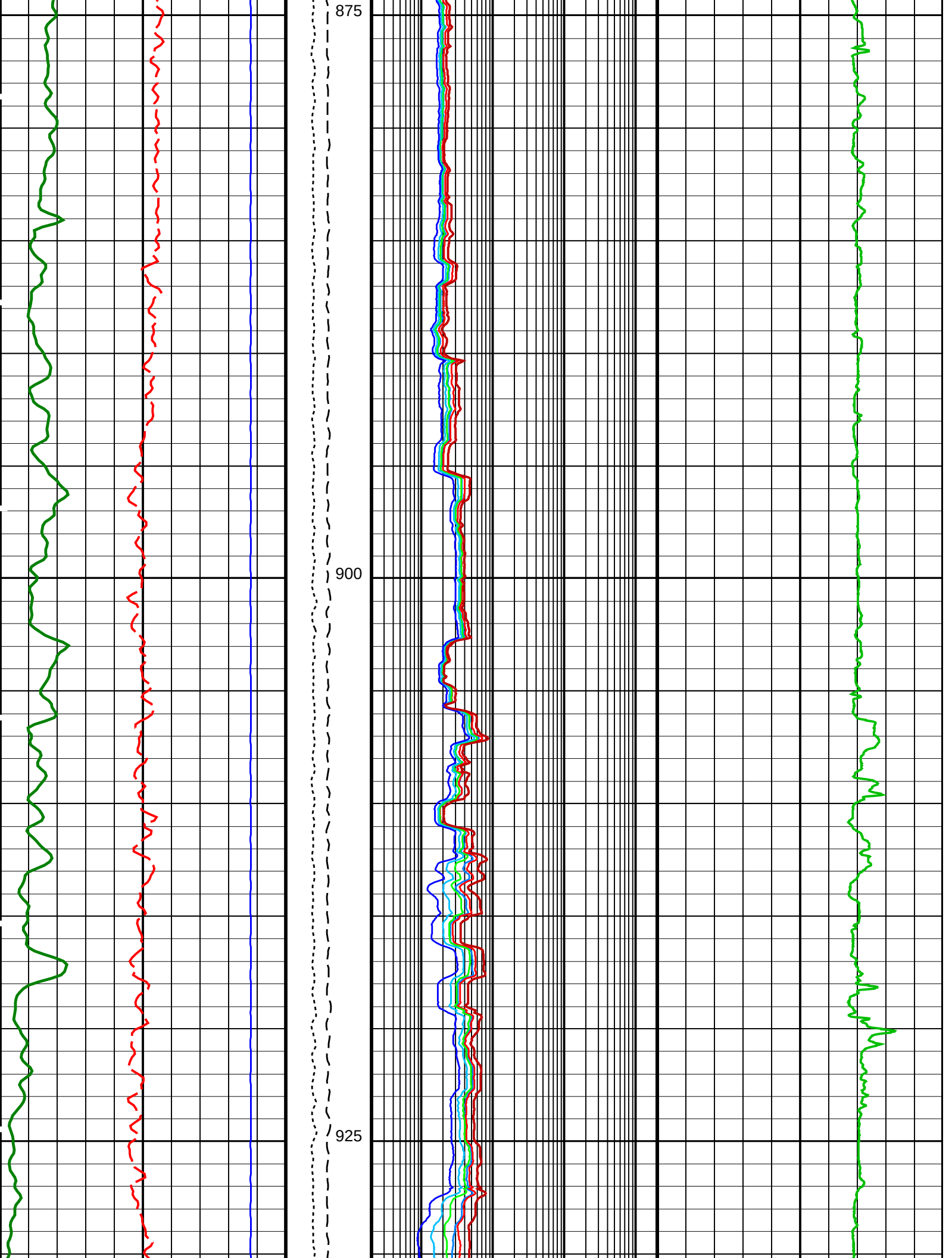

ID of 10 3/4" CASING
600
Casing
625
650

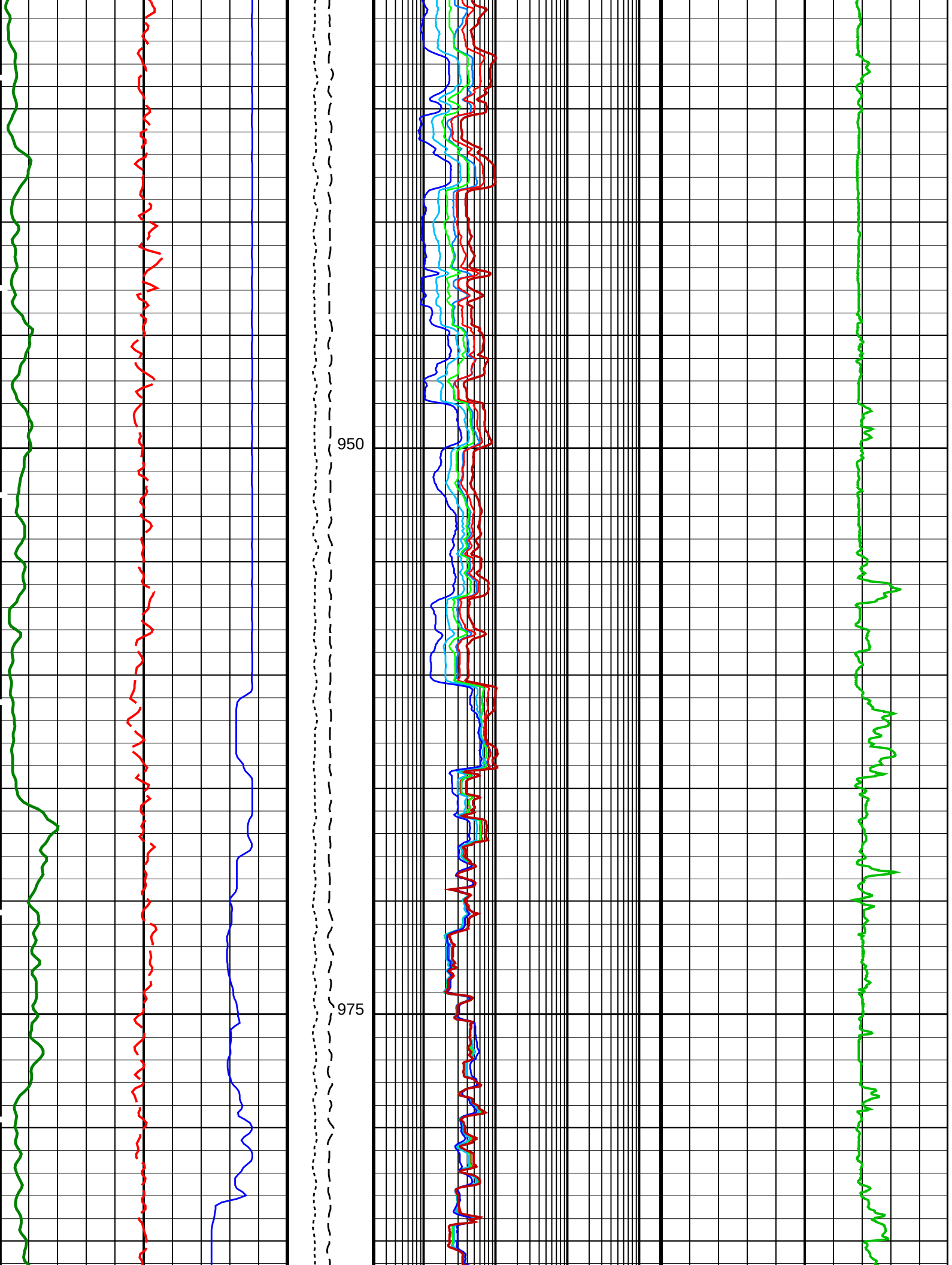

675
700

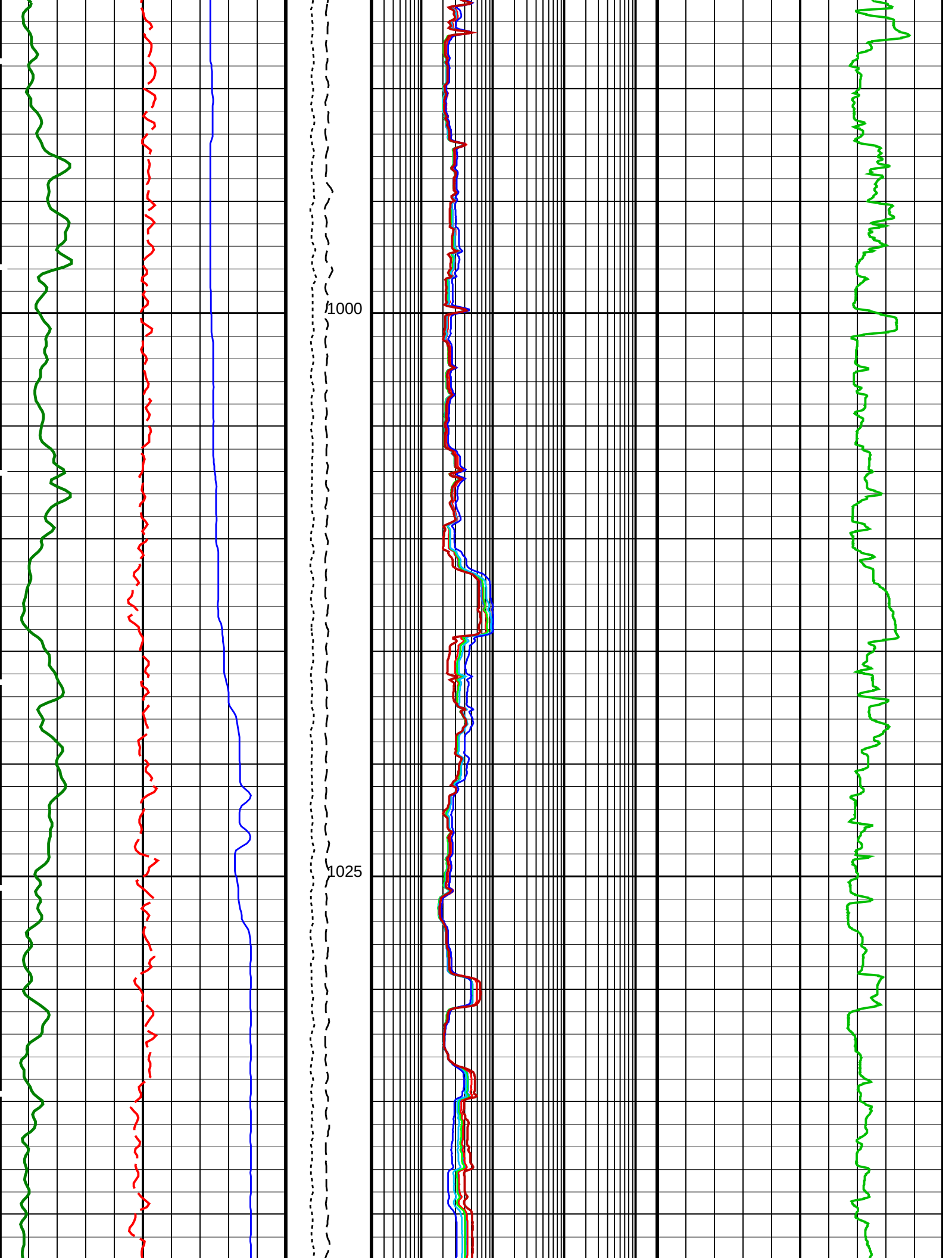

725
750

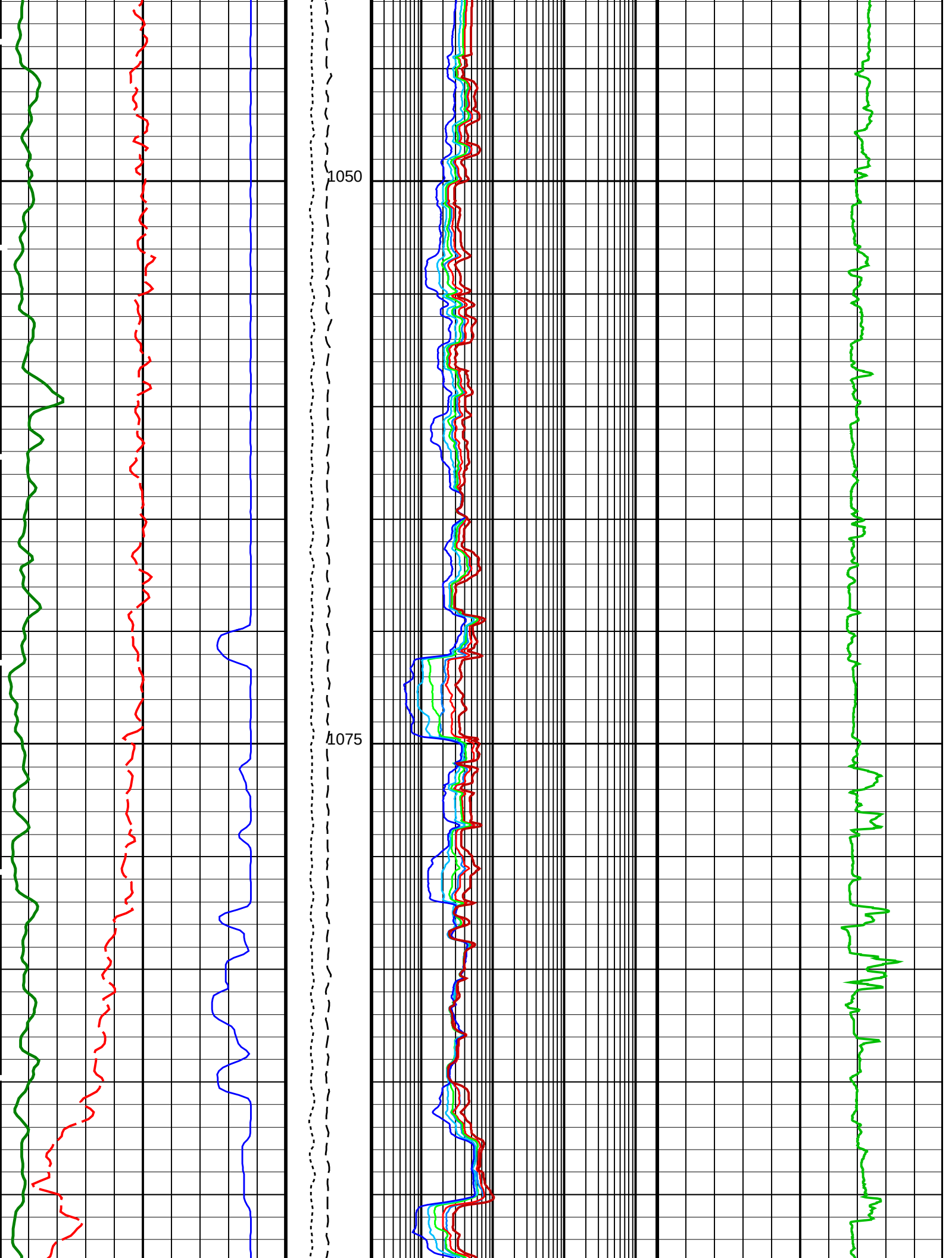

775
800

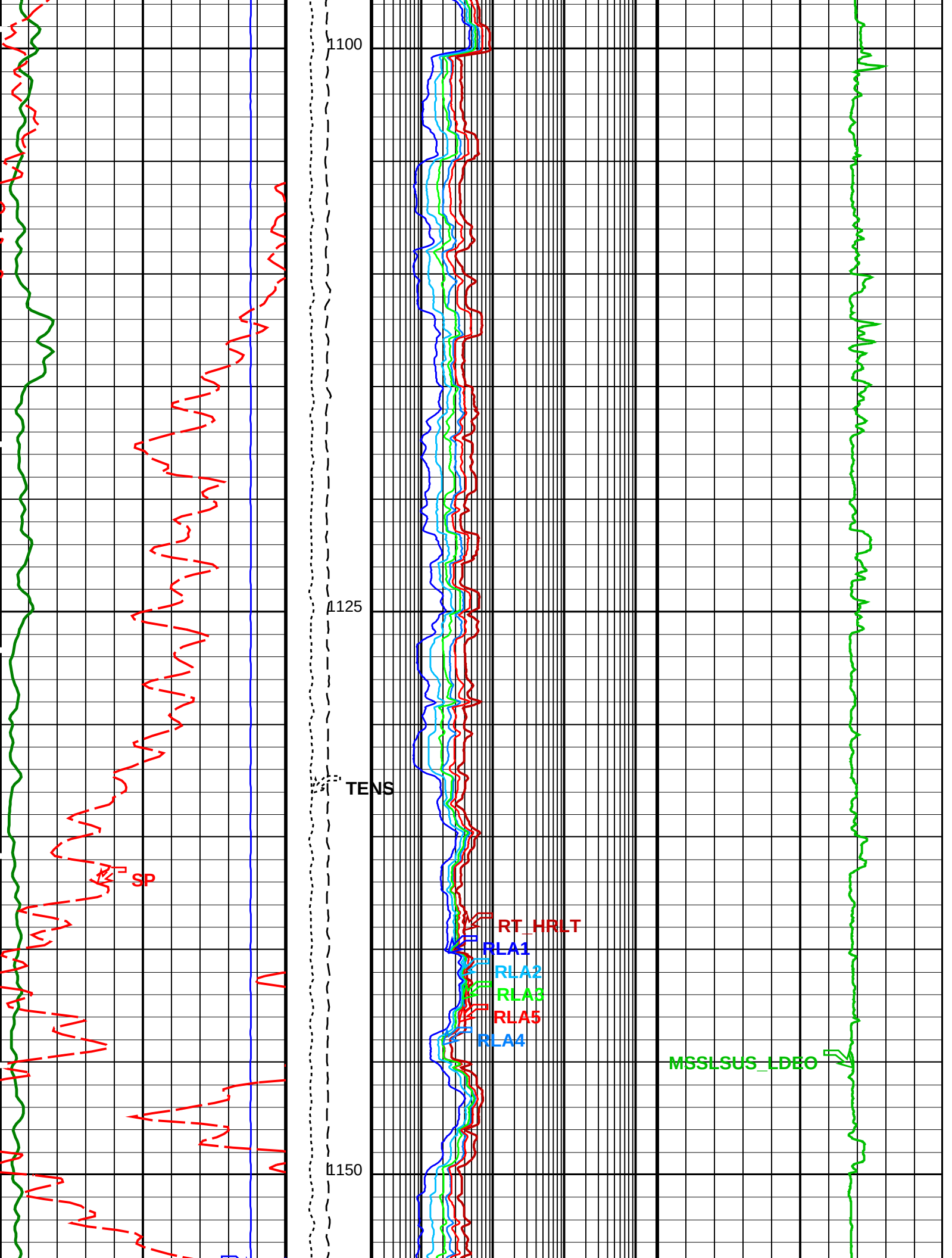

825
850

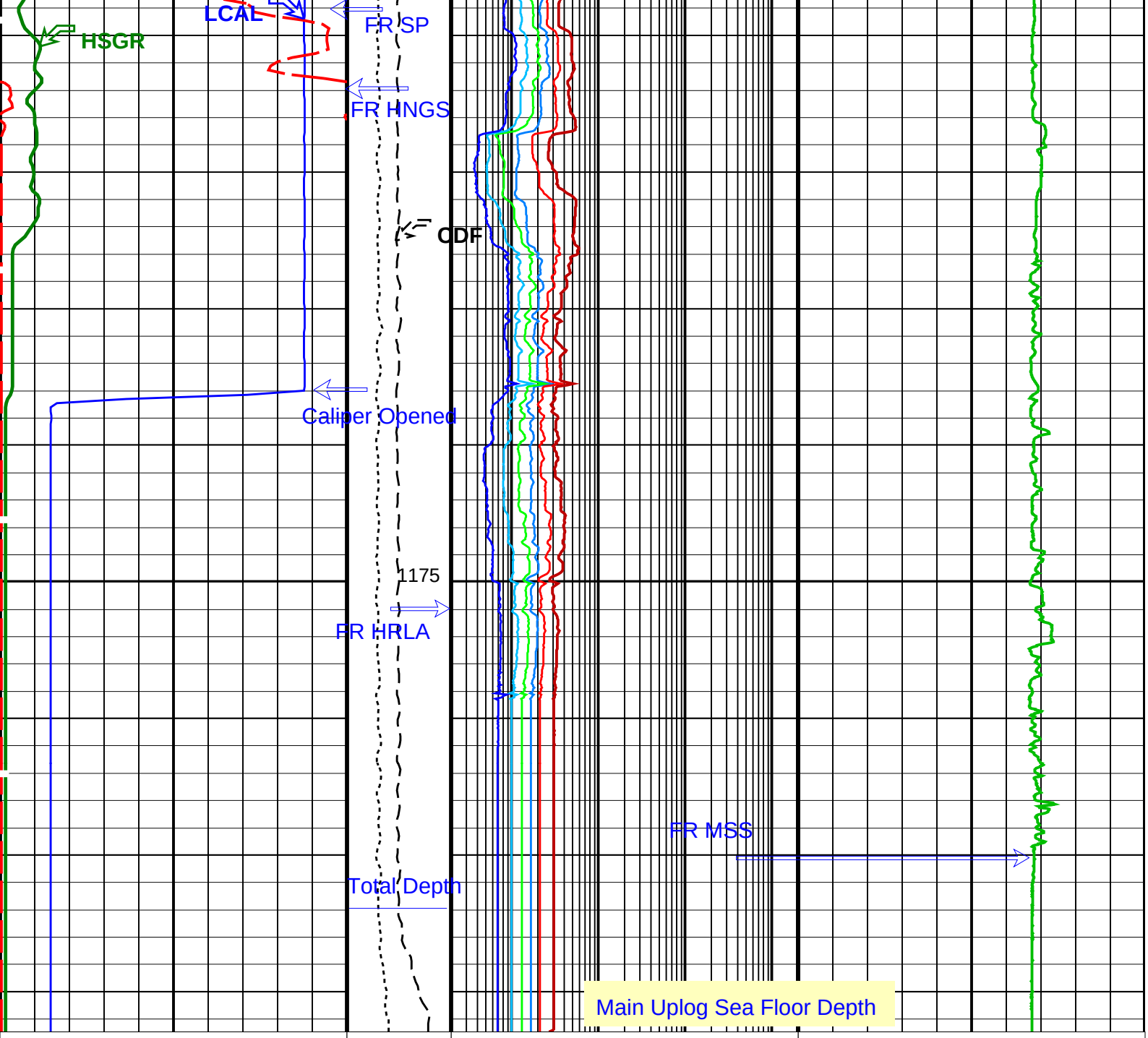

875
900
925


950
975


1000
1025


1050
1075


1100
1125
1150
TENS
SP
RT_HRLT
RLA1
RLA2
RLA3
RLA5
RLA4
MSSLSUS_LDEO



HLDS Caliper (LCAL) 0 (IN) 20	Tension (TENS) (LBF) 10000 0	HRLT Resistivity 4 (RLA4) 0.2 (OHMM) 2000	Dual−Coil Susceptibility (MSSLSUS_LDEO) −20000 (PPM) 20000
SP (SP) −100 (MV) 0	Calibrated Downhole Force (CDF) (LBF) 3000 0	HRLT Resistivity 5 (RLA5) 0.2 (OHMM) 2000	
HNGS Spectroscopy Gamma Ray (HSGR) 0 (GAPI) 100		HRLT Resistivity 3 (RLA3) 0.2 (OHMM) 2000	
		HRLT Resistivity 2 (RLA2) 0.2 (OHMM) 2000	
		HRLT Resistivity 1 (RLA1) 0.2 (OHMM) 2000	
		HRLT True Resistivity (RT_HRLT) 0.2 (OHMM) 2000	

0.2	(OHMM)	2000

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	HRLT−B: High Resolution Laterolog Array − B		
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
CALSTAT	HRLTB Calibration Status	SHALLOW_DONE	
CALTEMP	HRLTB Calibration Temperature	12.6447	DEGC
FREQ0	HRLT Frequency Index for Mode 0	32	
FREQ1	HRLT Frequency Index for Mode 1	128	
FREQ2	HRLT Frequency Index for Mode 2	104	
FREQ3	HRLT Frequency Index for Mode 3	86	
FREQ4	HRLT Frequency Index for Mode 4	56	
FREQ5	HRLT Frequency Index for Mode 5	44	
FREQ6	HRLT Frequency Index for Mode 6	116	
GCSE	Generalized Caliper Selection	LCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	
KFAC_HRLT	HRLT K Factor Option	SONDE	
LOOPCOEF_S	HRLT Loop Coefficient for Shallow Modes	LOW	
LOOPMOD0	HRLT Mode 0 Loop Mode	OFF	
LOOPMOD1	HRLT Mode 1 Loop Mode	OFF	
LOOPMOD2	HRLT Mode 2 Loop Mode	OFF	
LOOPMOD3	HRLT Mode 3 Loop Mode	OFF	
LOOPMOD4	HRLT Mode 4 Loop Mode	OFF	
LOOPMOD5	HRLT Mode 5 Loop Mode	OFF	
LOOPMOD6	HRLT Mode 6 Loop Mode	OFF	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
PROCINV	Inversion Selection	ON	
PROCMFL	Inversion Micro−Resistivity Selection	NO_EXTERNAL_RXO	
PROCMSO	Mechanical Standoff Fin Size	0	IN
PROCRM	Processing Mud Resistivity Select	HRLT_Compute	
PROCSPO	Sonde Position	Centered	
SHT	Surface Hole Temperature	20	DEGC
	HLDS: Hostile Litho−Density Sonde		
CLCL	HLDS LS Control Loop Controller Mode	AUTO_DEFAULT	
CLCS	HLDS SS Control Loop Controller Mode	AUTO_DEFAULT	
CLLS	HLDS Mode Loop Long Spacing	AUTO	
CLSS	HLDS Mode Loop Short Spacing	AUTO	
DHC	Density Hole Correction	BS	
DPPM	Density Porosity Processing Mode	HIRS	
FD	Fluid Density	1	G/C3
LATC	HLDS Activation Correction	ON	
LLDL	HLDS LS Low Level Discriminator DAC	14000	
LLDS	HLDS SS Low Level Discriminator DAC	14000	
LLML	HLDS LS Low Level Discriminator Mode	AUTO	
LLMS	HLDS SS Low Level Discriminator Mode	AUTO	
MDEN	Matrix Density	2.71	G/C3
PHVL	HLDS Long Spacing High Voltage Setting	1000	V
PHVS	HLDS Short Spacing High Voltage Setting	1000	V
PSDL	HLDS LS Pulse Shape Compensation DAC	30000	
PSDS	HLDS SS Pulse Shape Compensation DAC	30000	
PSML	HLDS LS Pulse Shape Compensation Mode	AUTO	
PSMS	HLDS SS Pulse Shape Compensation Mode	AUTO	
	HNGS−BA: Hostile Natural Gamma Ray Sonde		
BAR1	HNGS Detector 1 Barite Constant	1	
BAR2	HNGS Detector 2 Barite Constant	1	
BHK	HNGS Borehole Potassium Correction Concentration	0	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
CSD1	Inner Casing Outer Diameter	0	IN
CSD2	Outer Casing Outer Diameter	0	IN
CSW1	Inner Casing Weight	0	LB/F
CSW2	Outer Casing Weight	0	LB/F
DBCC	HNGS Barite Constant Correction Flag	NONE	
GCSE	Generalized Caliper Selection	LCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
H1P	HNGS Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGS Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGS Borehole Potassium Running Average	−0.00711471	
HALF	HNGS Alpha Filter Length	60	IN
HCPR	HNGS Apply Borehole Potassium Correction	NONE	

HCRB	HNGS Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGS Processing Enable	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
S1BI	HNGS Detector 1 Calibration Bismuth Count Rate	1.3	CPS
S2BI	HNGS Detector 2 Calibration Bismuth Count Rate	1.3	CPS
SGRC	HNGS Standard Gamma−Ray Correction Flag	YES	
SHT	Surface Hole Temperature	20	DEGC
TPOS	Tool Position	CENT	
VBA1	HNGS Detector 1 Variable Barite Factor Running Average	1.06202	
VBA2	HNGS Detector 2 Variable Barite Factor Running Average	1.06032	
EDTC−B: Enhanced DTS Cartridge			
BHFL	Borehole Fluid Type	WATER	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
BSCO	Borehole Salinity Correction Option	NO	
CCCO	Casing & Cement Thickness Correction Option	NO	
DPPM	Density Porosity Processing Mode	HIRS	
FSAL	Formation Salinity	−50000	PPM
FSCO	Formation Salinity Correction Option	NO	
GCSE	Generalized Caliper Selection	LCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
HSCO	Hole Size Correction Option	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
ISSBAR_EDTC	Nuclear Mud Type	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
MCCO	Mud Cake Correction Option	NO	
MCOR	Mud Correction	NATU	
MWCO	Mud Weight Correction Option	NO	
PTCO	Pressure/Temperature Correction Option	NO	
SDAT	Standoff Data Source	SOCN	
SHT	Surface Hole Temperature	20	DEGC
SOCN	Standoff Distance	0.5	IN
SOCO	Standoff Correction Option	NO	
TPOS_EDTC	EDTC Tool Centered/Eccentered	Eccentered	
U−ETELM_EDTS	Telemetry Mode for eWAFE	Standard_EDTS	
U−TELM_EDTS	Telemetry Mode for WAFE	Standard_EDTS	
BSP: Bridle SP			
SPNV	SP Next Value	0	MV
System and Miscellaneous			
ALTDPCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	9.875	IN
BSAL	Borehole Salinity	−50000.00	PPM
CSIZ	Current Casing Size	5.500	IN
CWEI	Casing Weight	168.00	LB/F
DFD	Drilling Fluid Density	1.03	G/C3
DO	Depth Offset for Playback	−4711.0	M
FLEV	Fluid Level	−50000.00	M
MST	Mud Sample Temperature	−50000.00	DEGC
PBVSADP	Use alternate depth channel for playback	NO	
PP	Playback Processing	NORMAL	
RMFS	Resistivity of Mud Filtrate Sample	−50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	1189	M
TDD	Total Depth − Driller	1184.00	M
TDL	Total Depth − Logger	1184.00	M
TWS	Temperature of Connate Water Sample	37.78	DEGC

Format: TripleCombo **Vertical Scale: 1:200** **Graphics File Created: 23−Jul−2014 00:16**

OP System Version: 19C0−187

MSS_LDEO−A	19C0−187	HRLT−B	19C0−187
HLDS	19C0−187	LDSC−B	19C0−187
HNGC−B	19C0−187	HNGS−BA	19C0−187
EDTC−B	SKK−5169−EDTCB	BSP	19C0−187

Input DLIS Files

DEFAULT	MSS_LDEO_HRLA_LDL_027PUP	FN:33	PRODUCER	21−Jul−2014 15:48	5902.5 M	4700.9 M

Output DLIS Files

DEFAULT	MSS_LDEO_HRLA_LDL_040PUP	FN:47	PRODUCER	23−Jul−2014 00:16

Input DLIS Files

DEFAULT	Flip_MSS_LDEO_HRLA_036PUP		PRODUCER	23−Jul−2014 00:04	1149.7 M	−49.5 M

Output DLIS Files

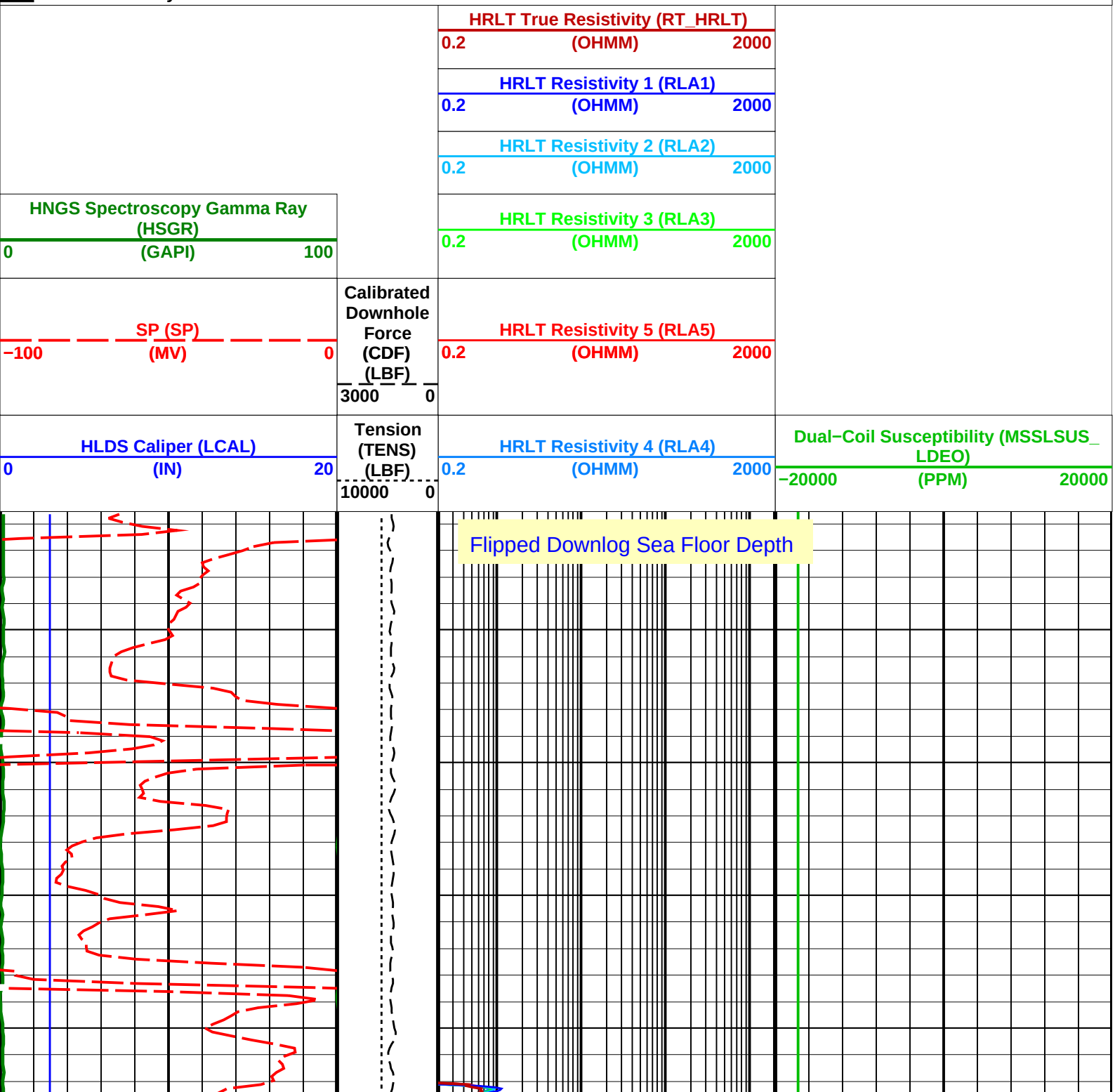
DEFAULT	MSS_LDEO_HRLA_LDL_038PUP	FN:45	PRODUCER	23−Jul−2014 00:09	1149.7 M	−49.5 M

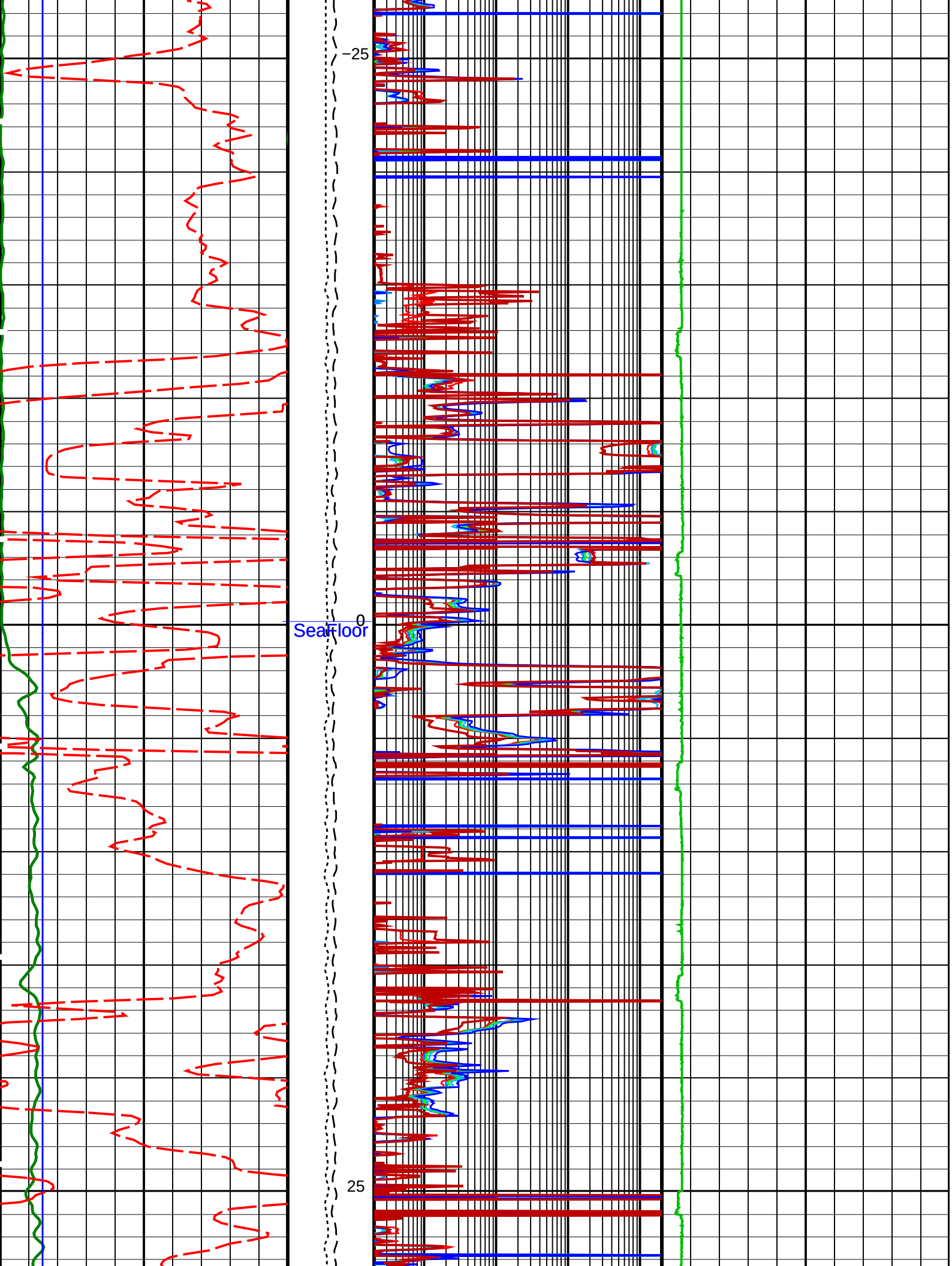
OP System Version: 19C0−187

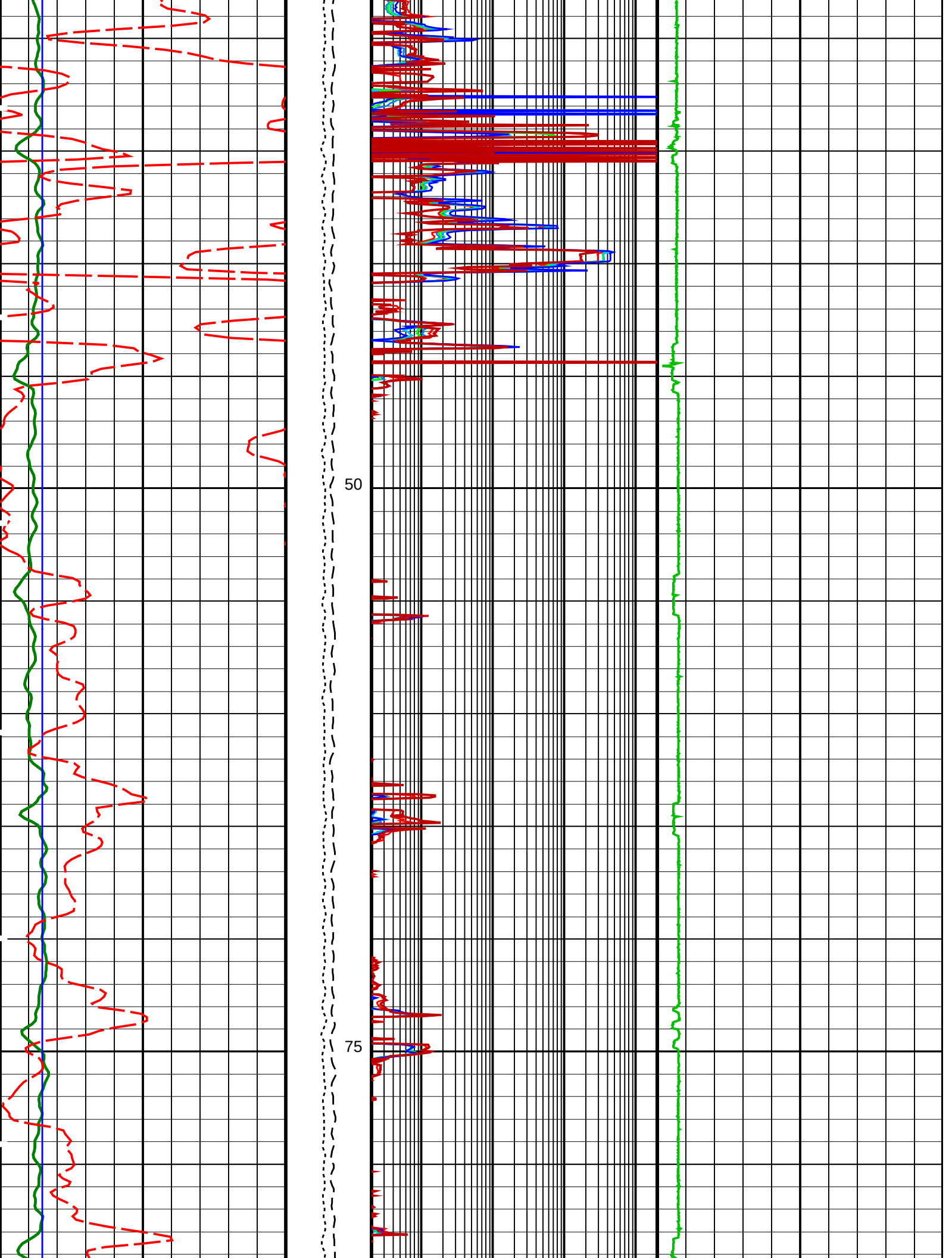
MSS_LDEO−A	19C0−187	HRLT−B	19C0−187
HLDS	19C0−187	LDSC−B	19C0−187
HNGC−B	19C0−187	HNGS−BA	19C0−187
EDTC−B	SKK−5169−EDTCB	BSP	19C0−187

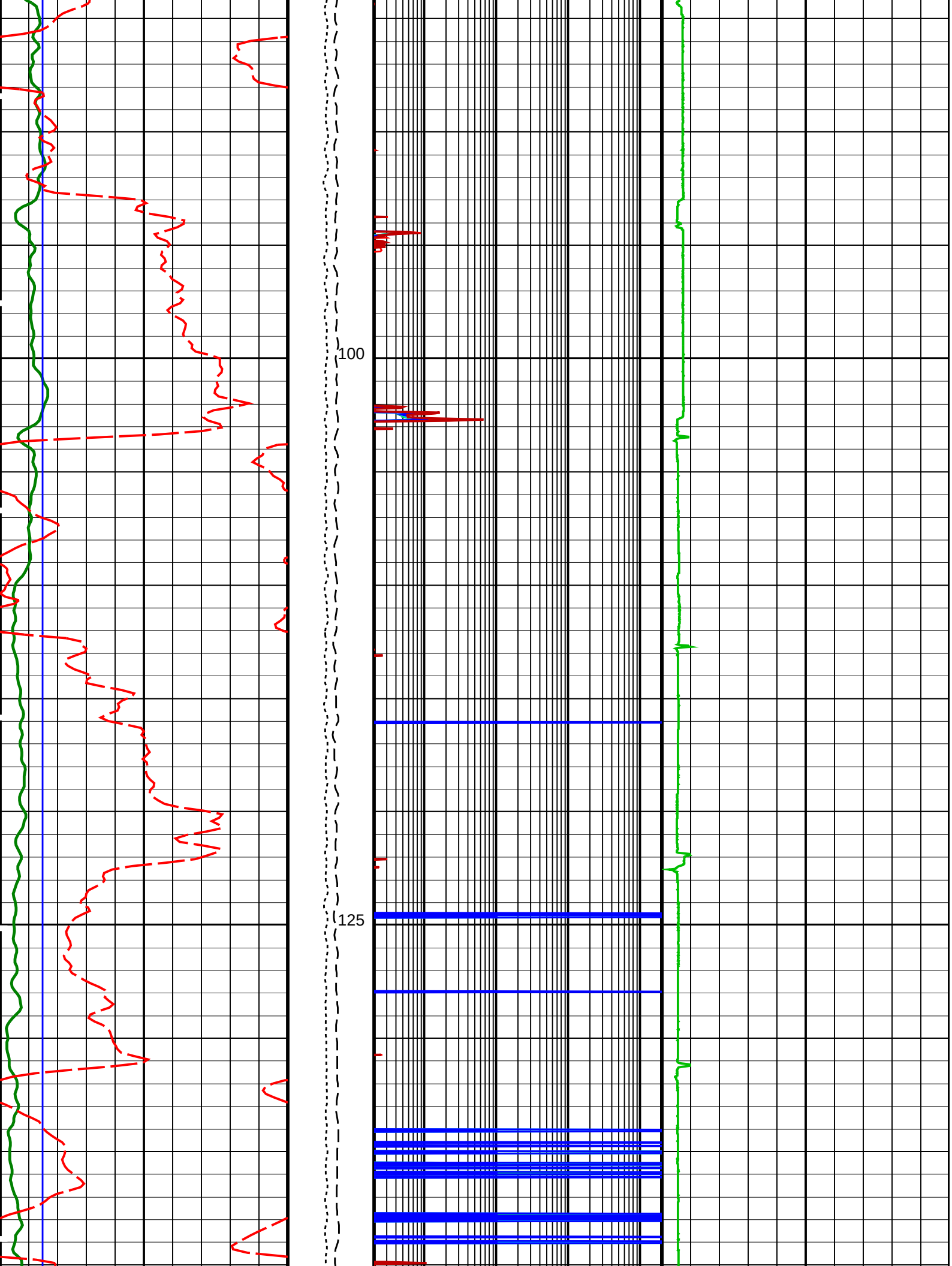
PIP SUMMARY

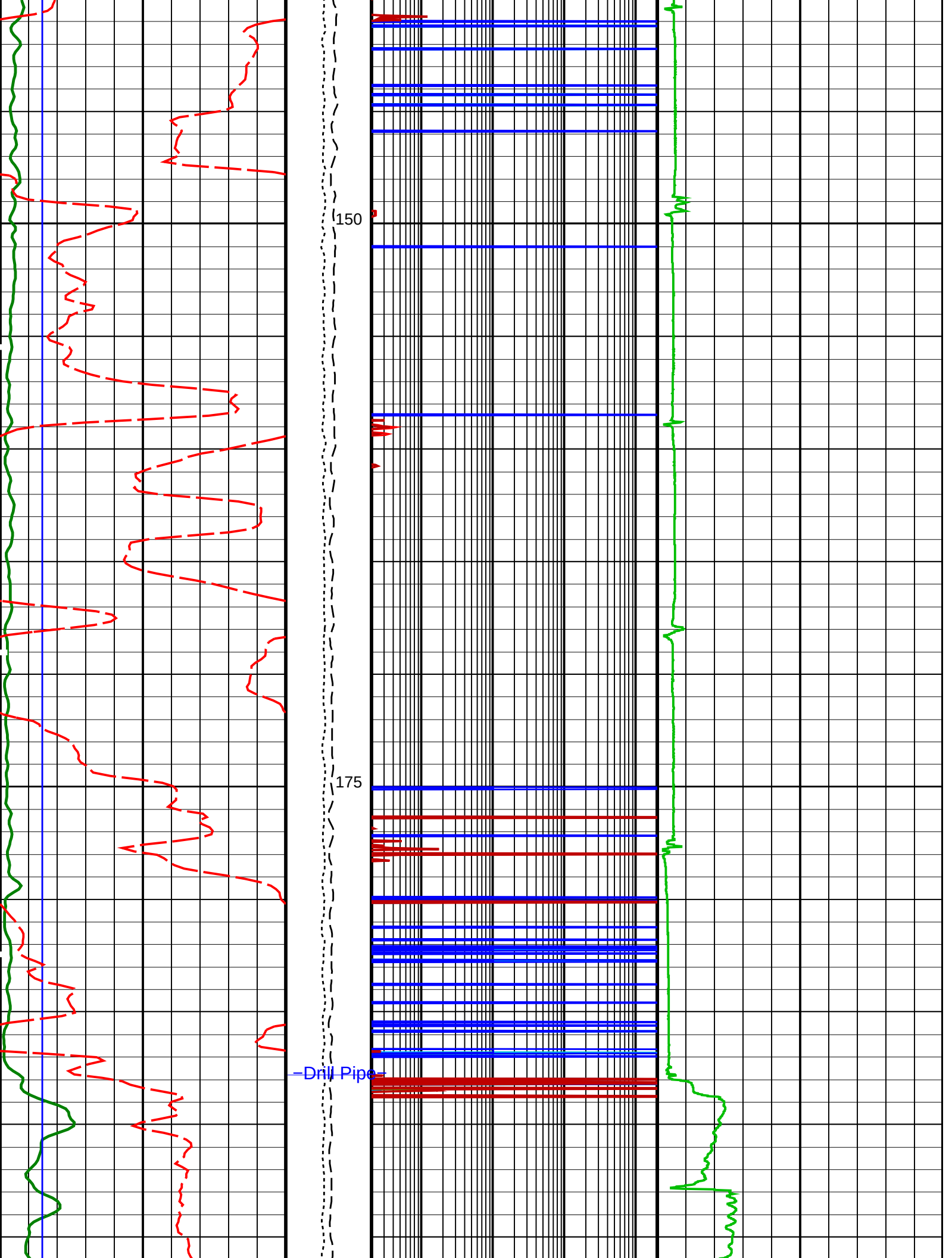
Time Mark Every 60 S

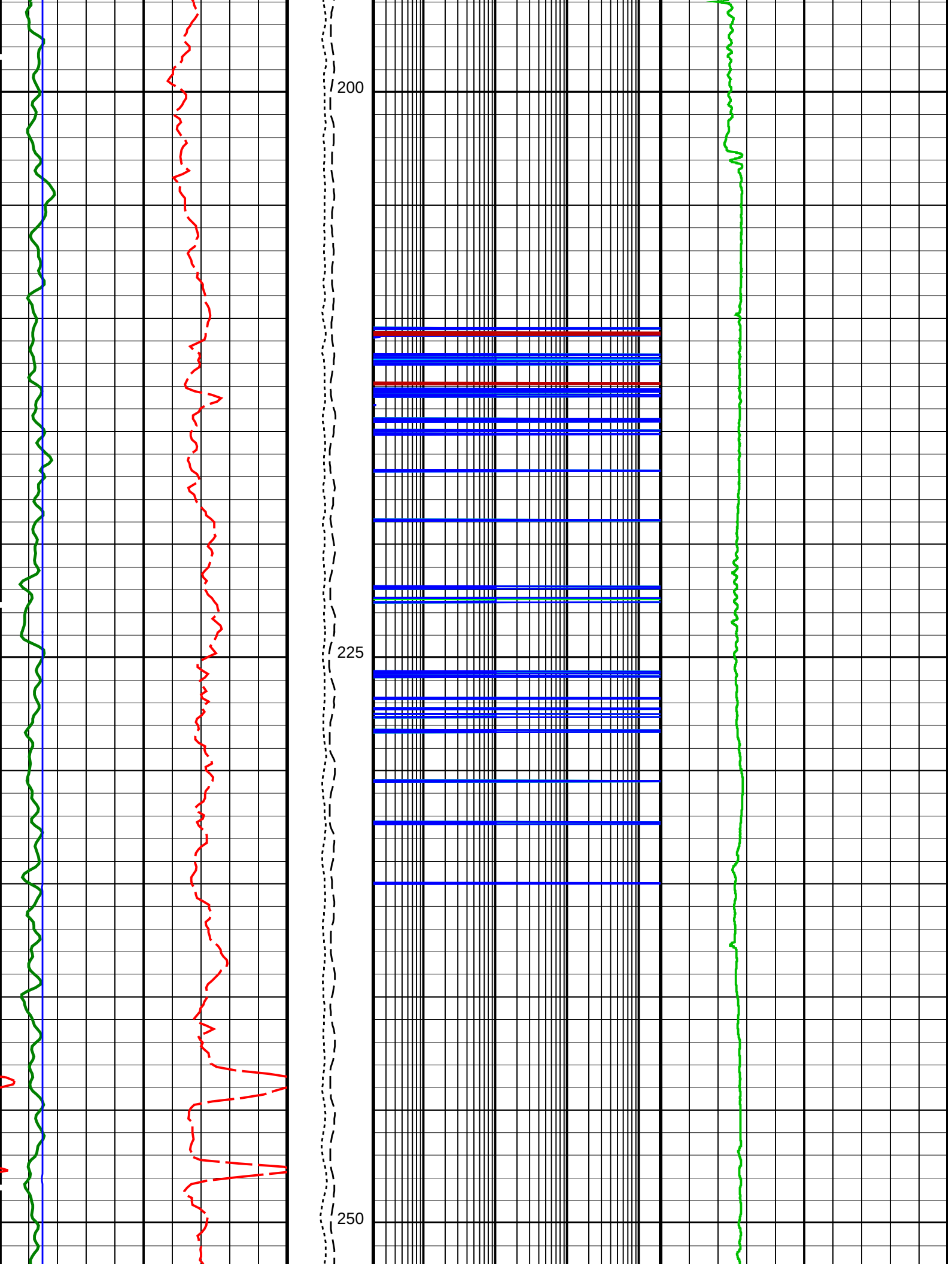


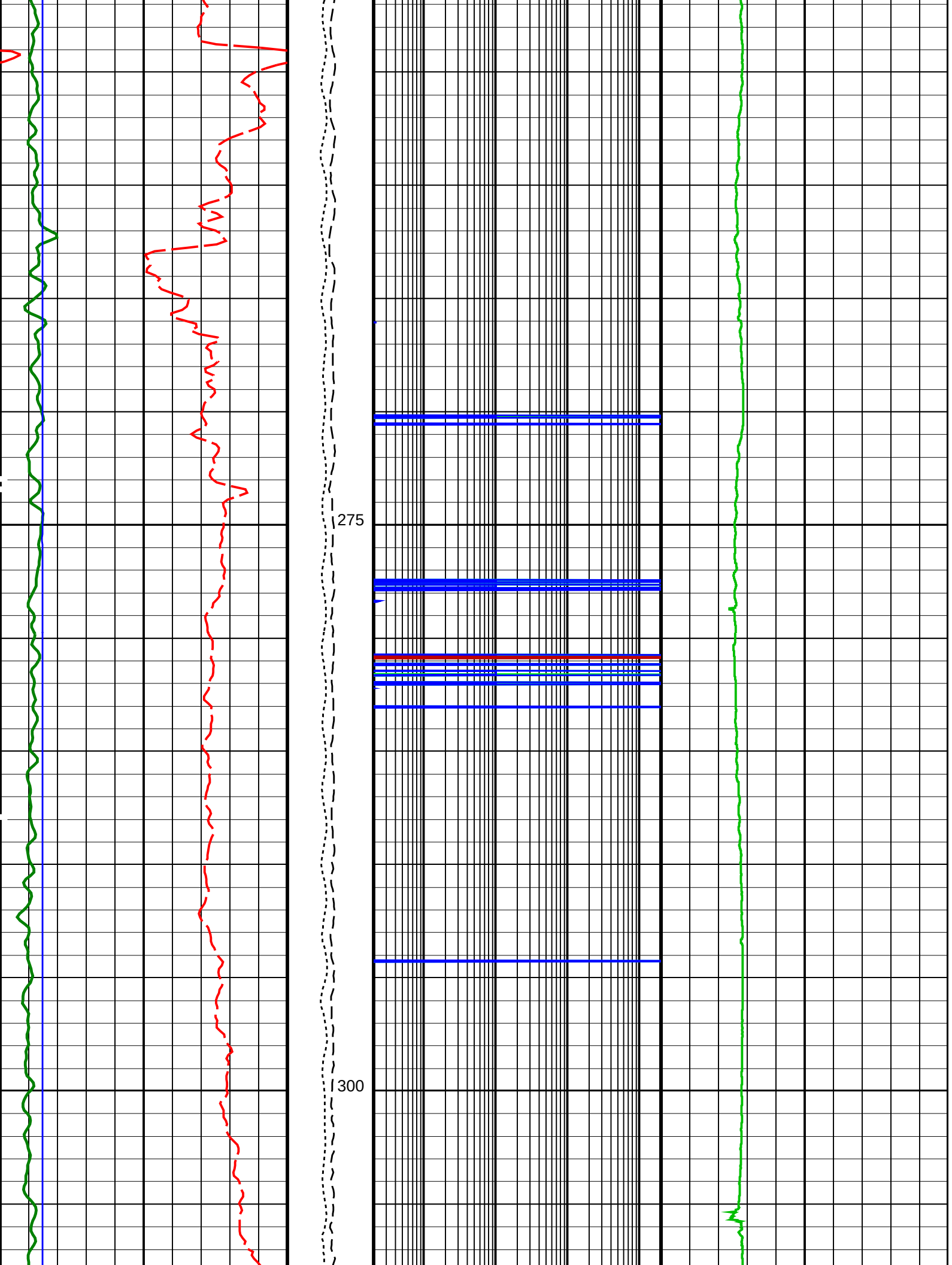

−25
0
Sea Floor
25

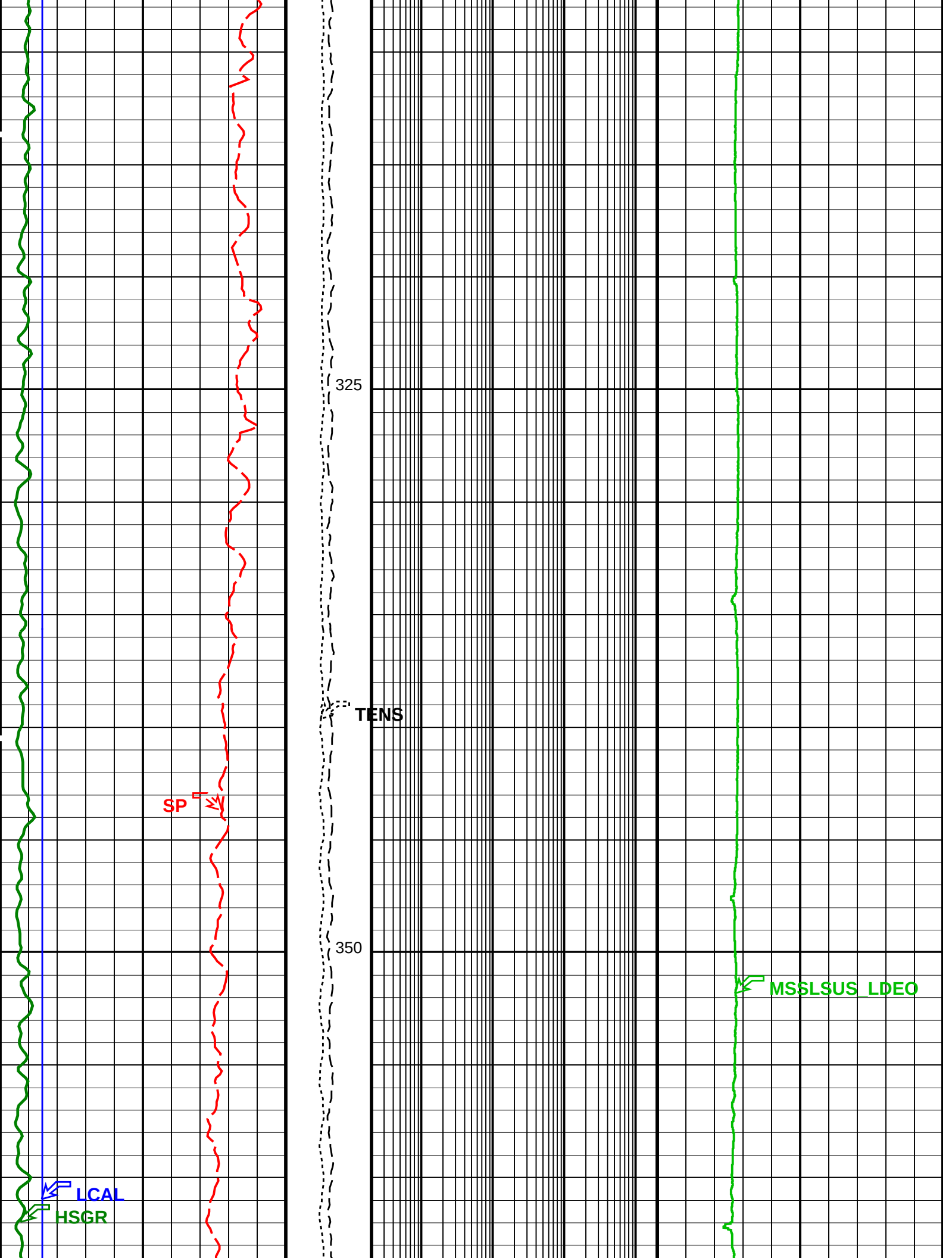

50
75

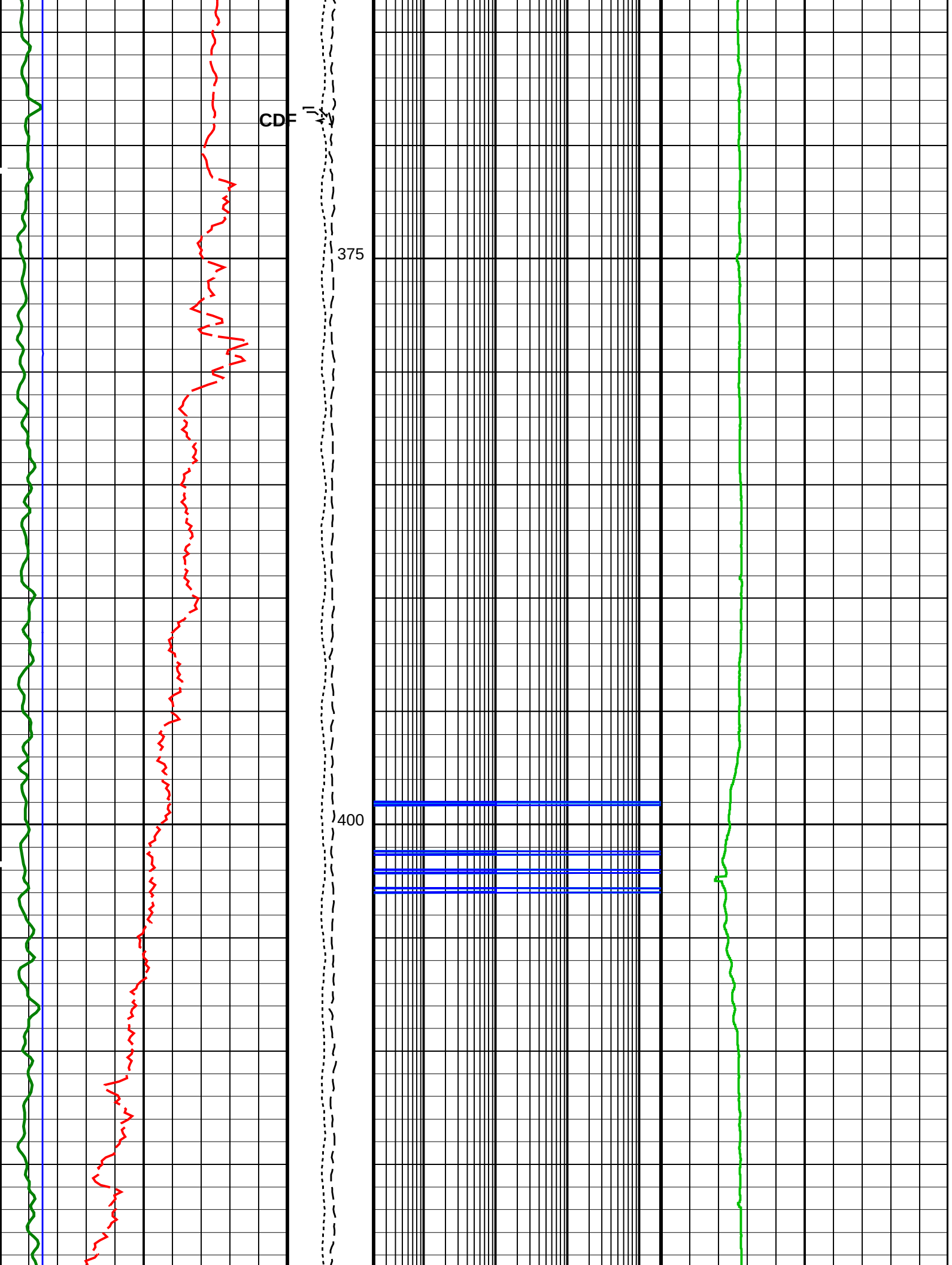

100
125

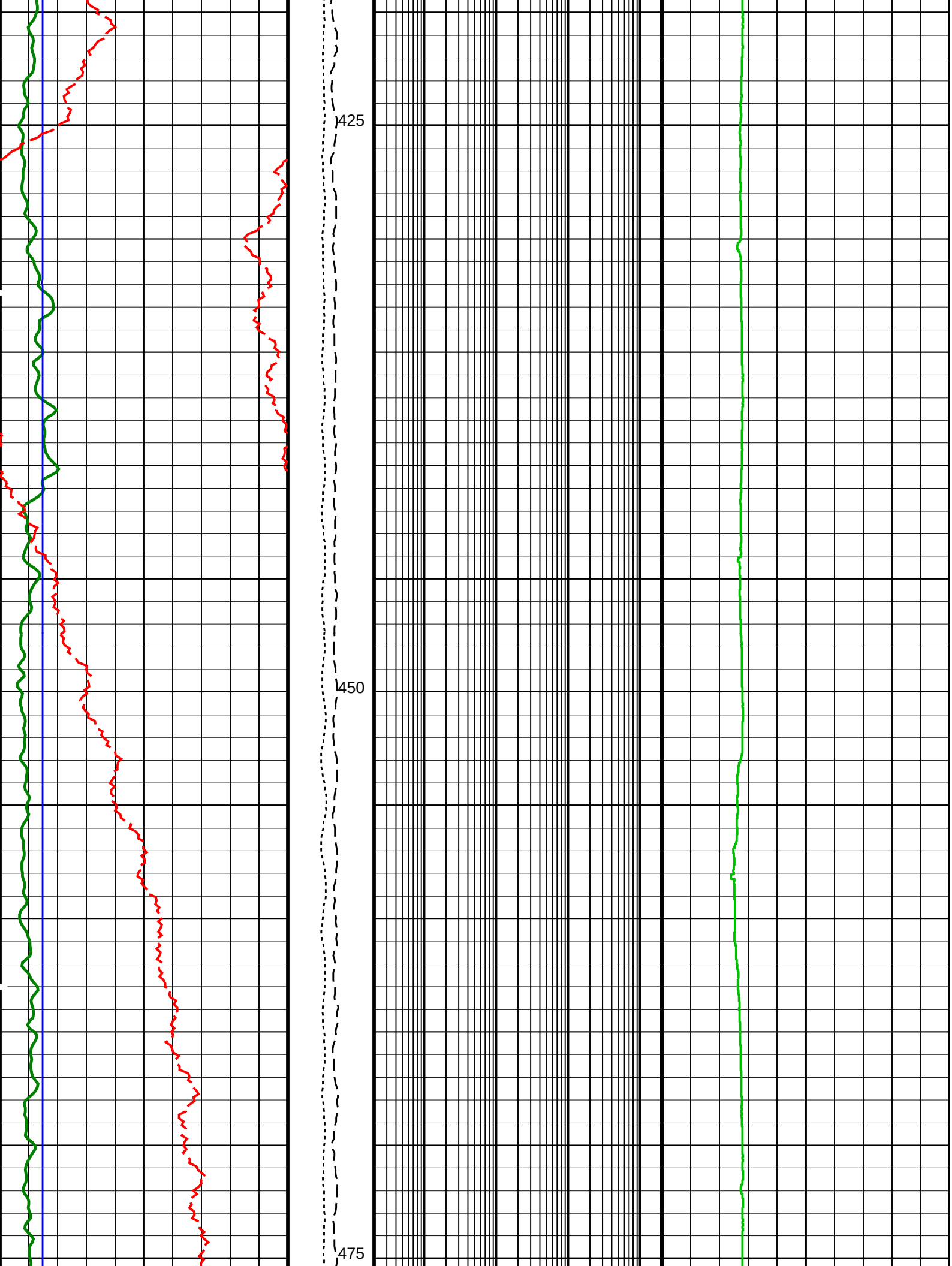

150
175
–Drill Pipe–

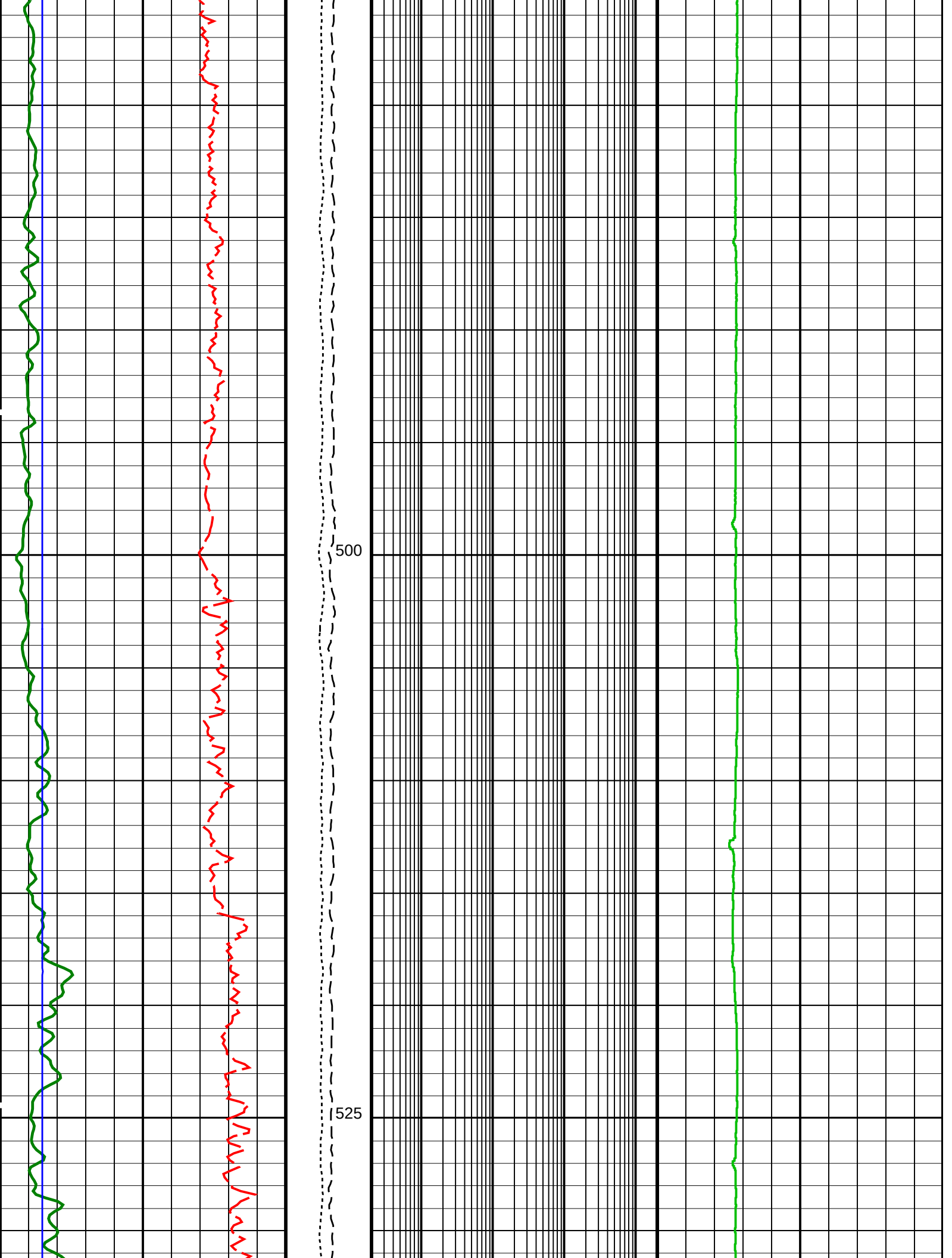

200
225
250


275
300


325
TENS
SP
350
MSSLSUS_LDEO
LCAL
HSGR


CDF
375
400


425
450
475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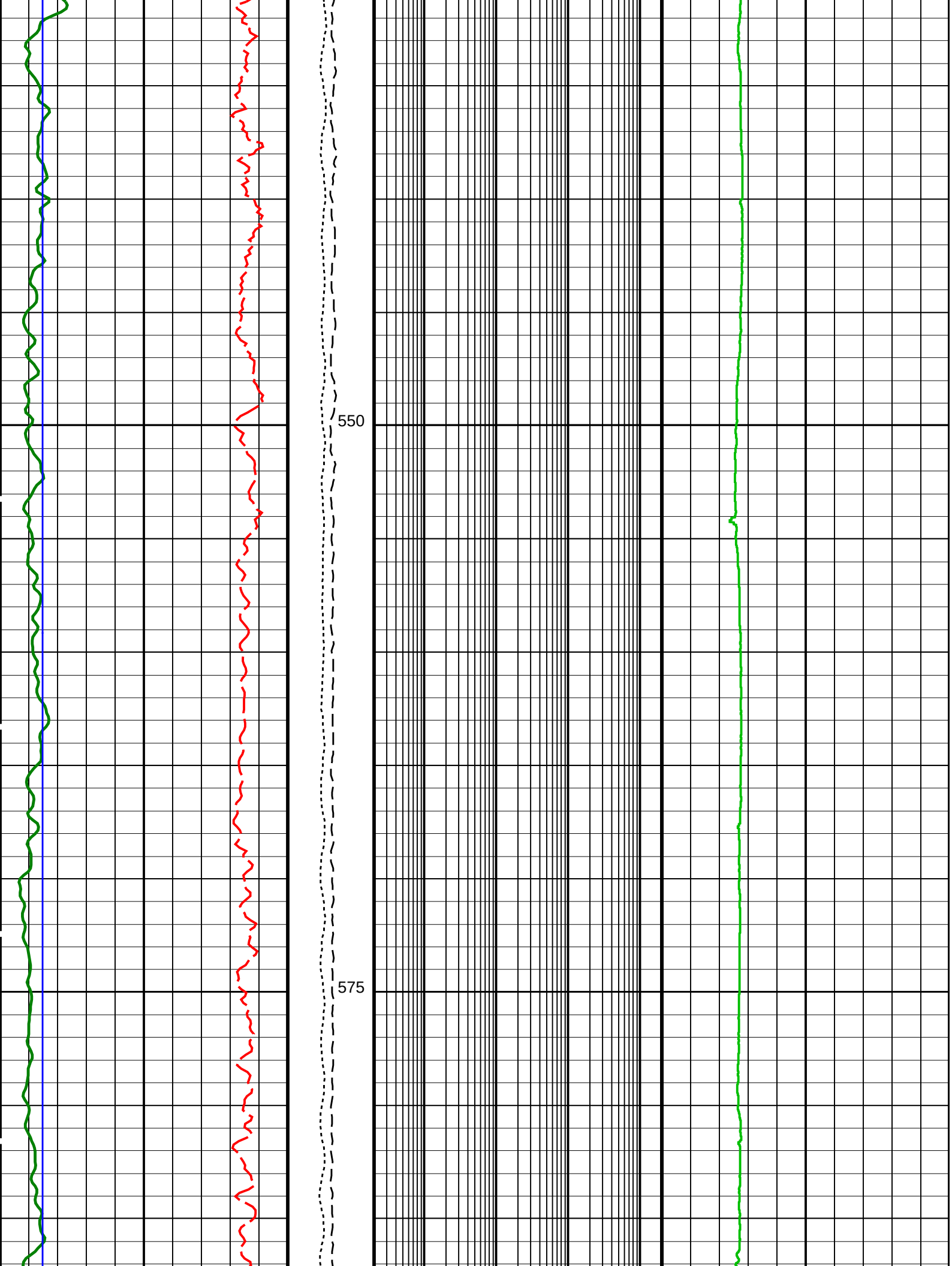
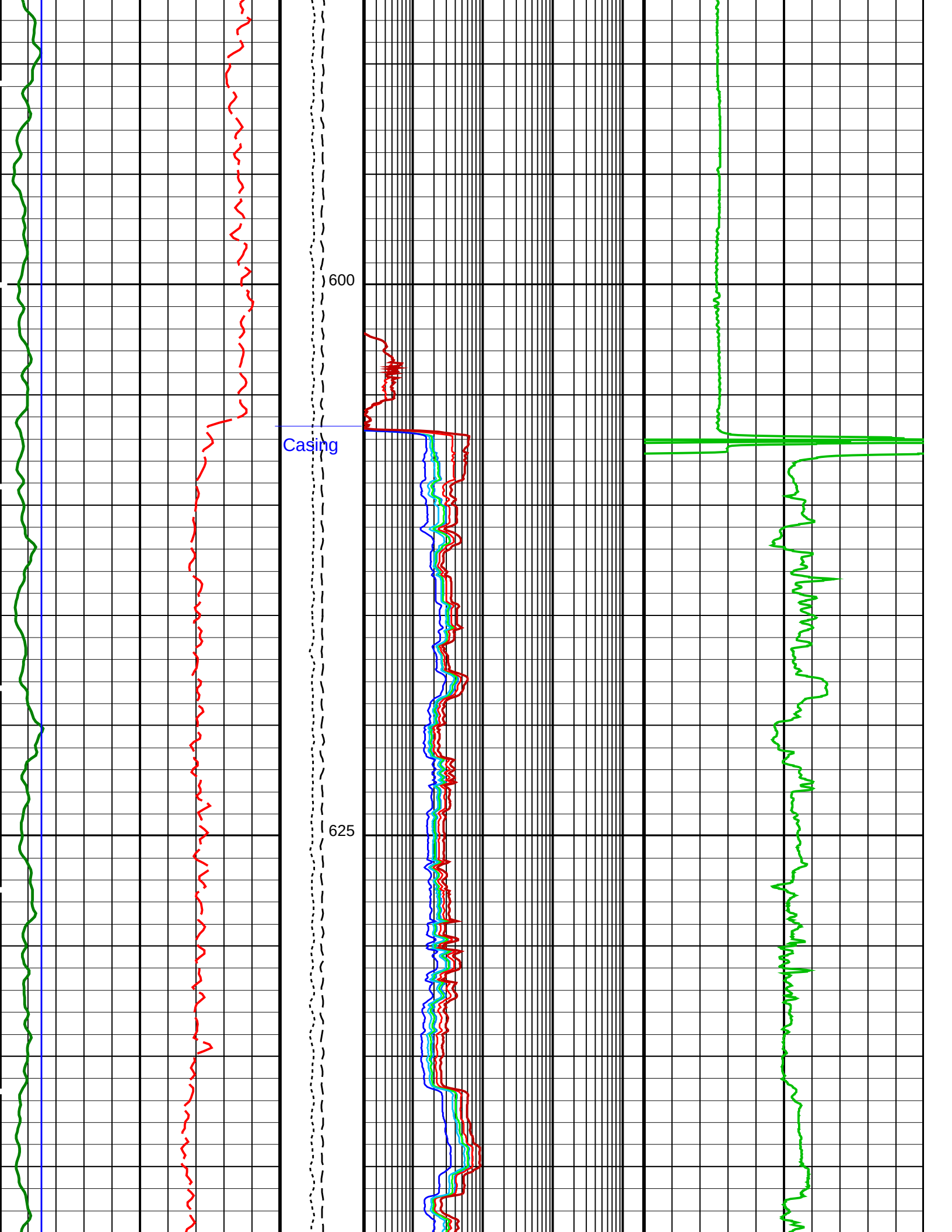
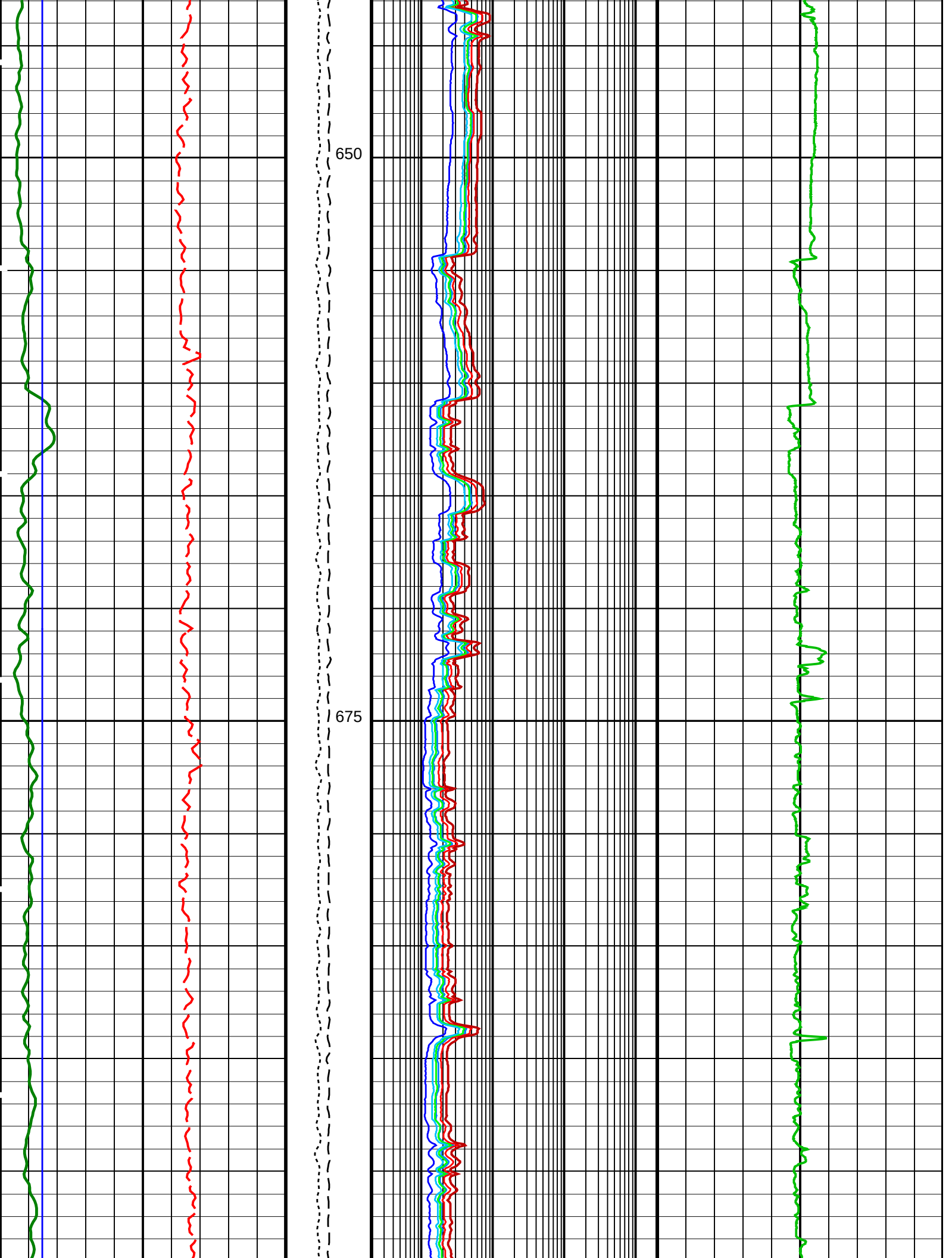
525


550
575


600
Casing
625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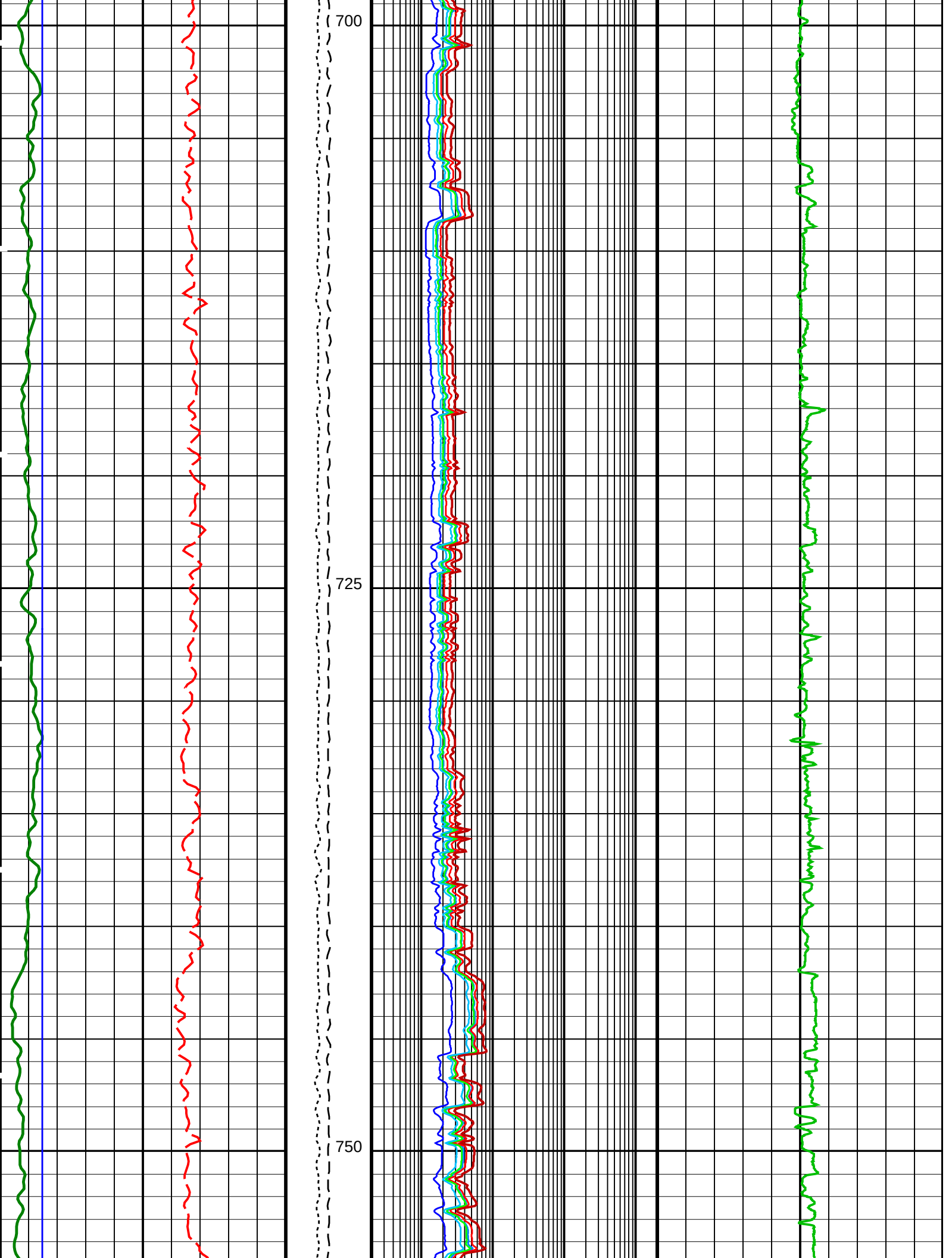
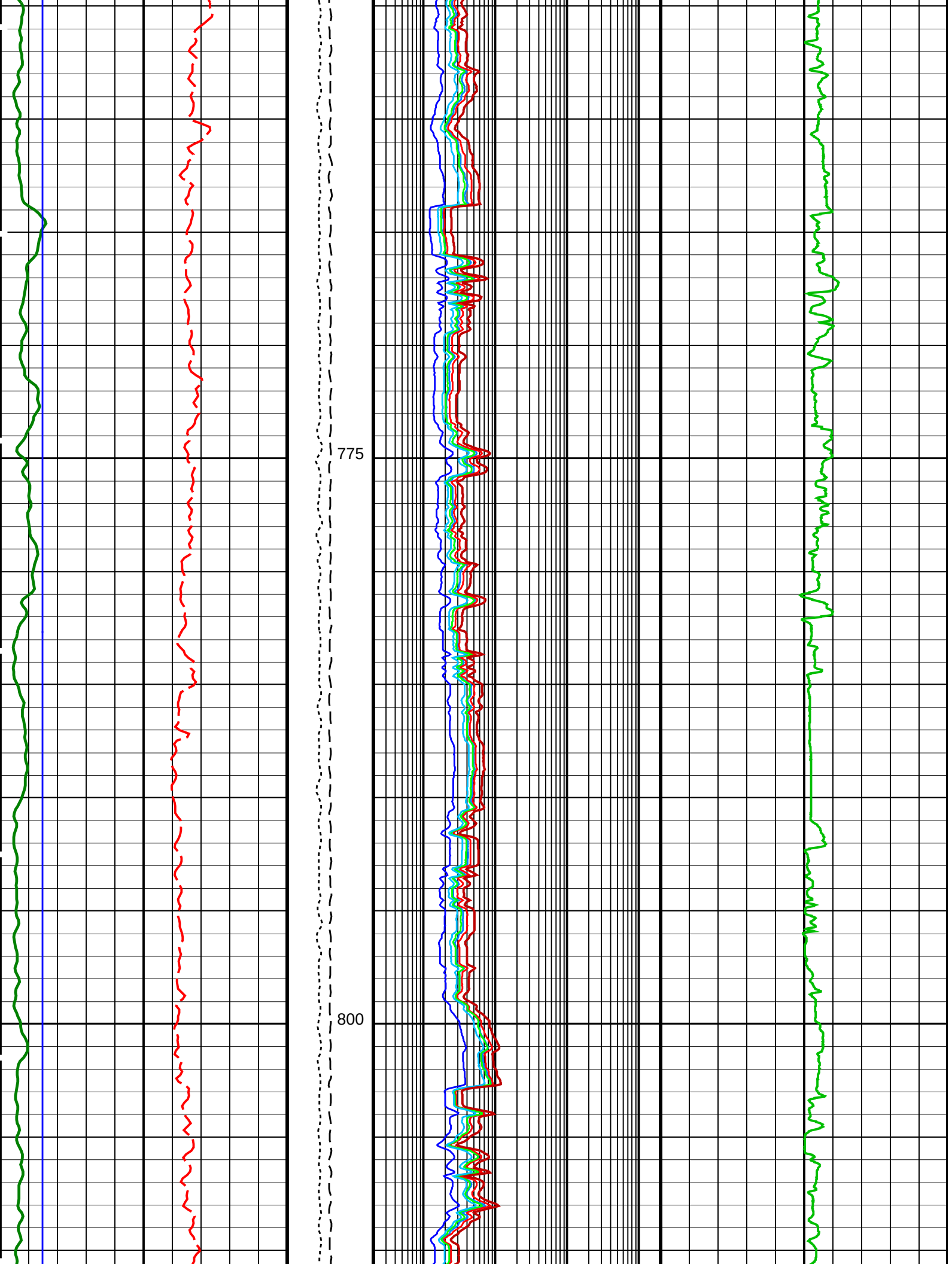
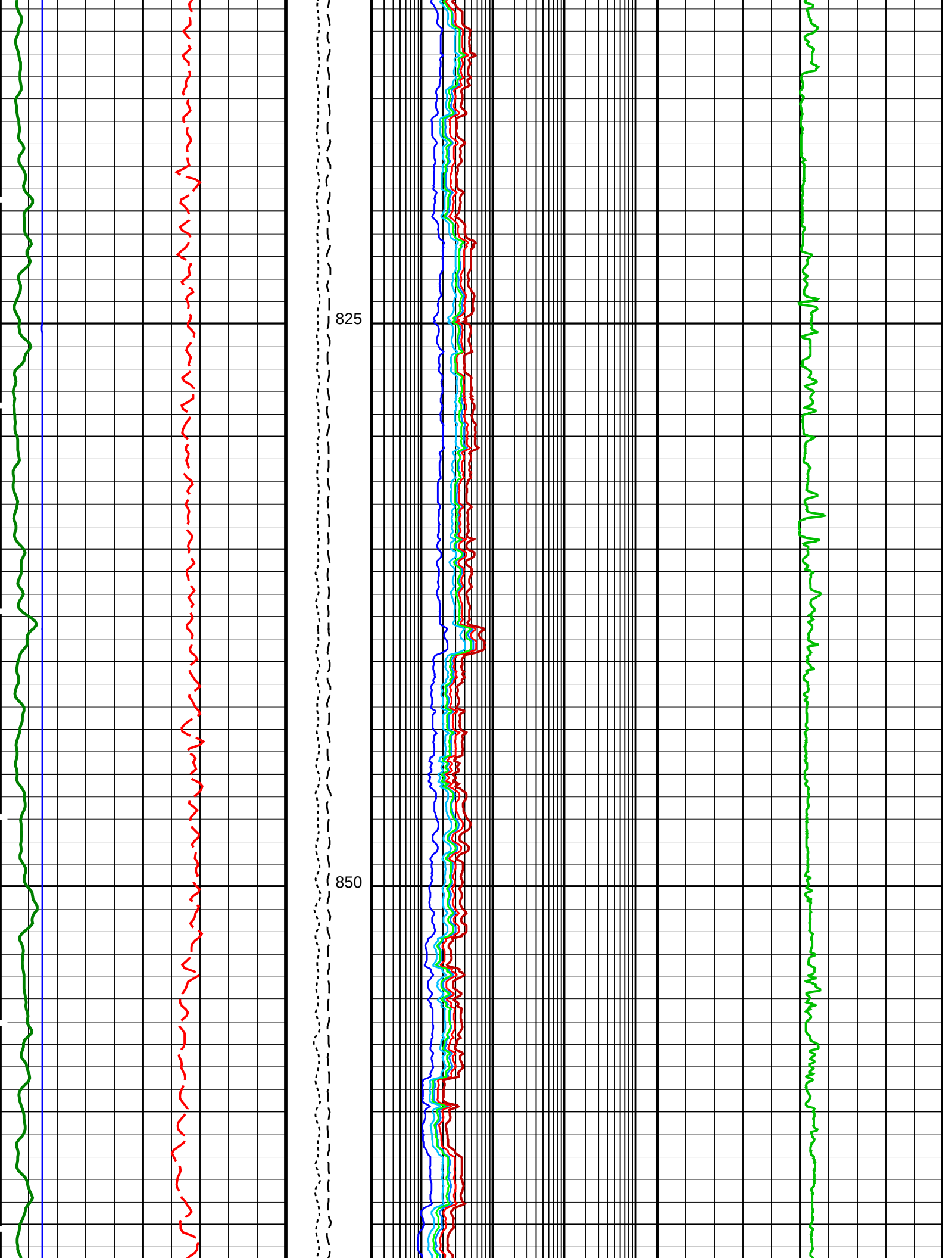
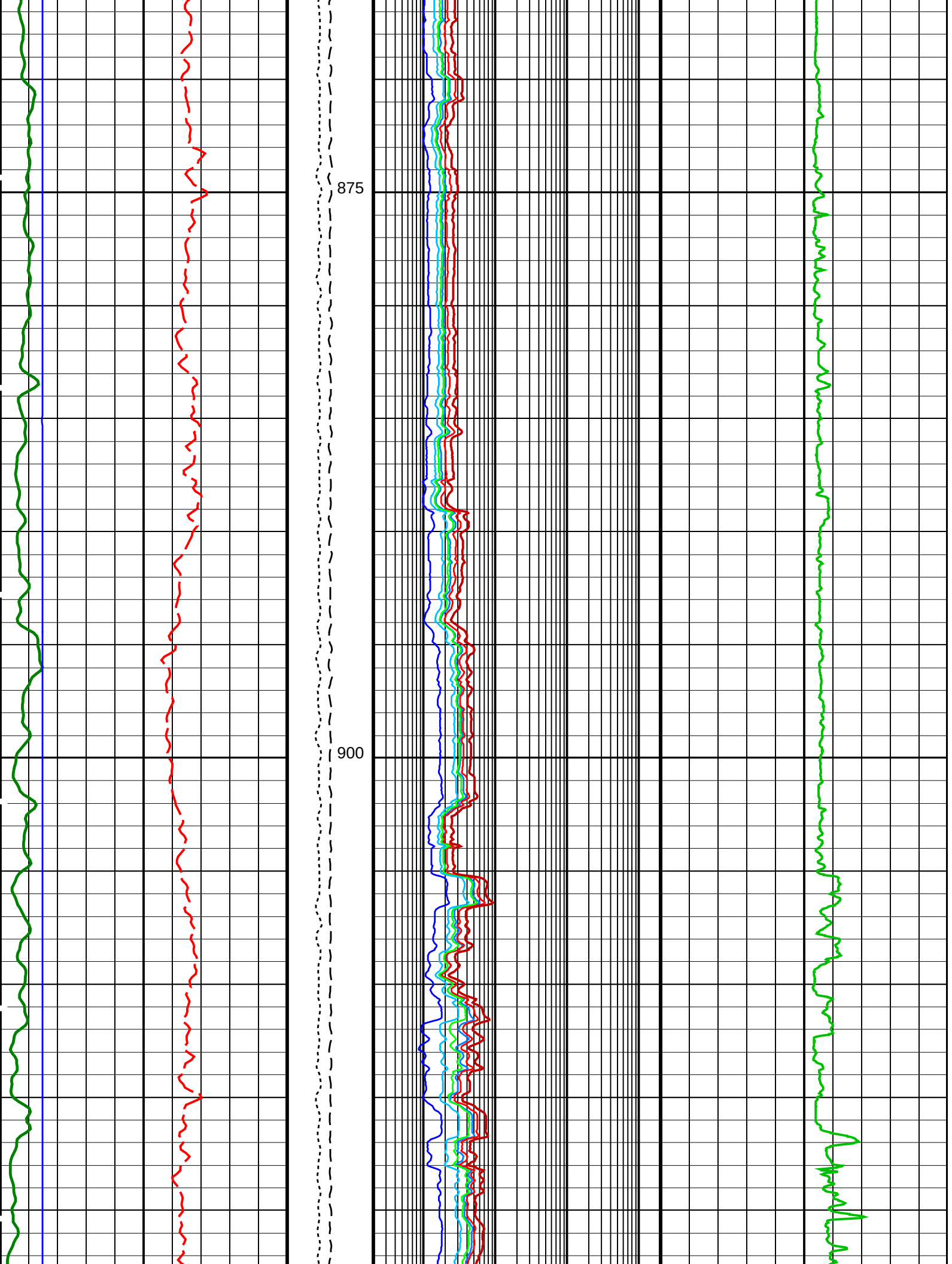
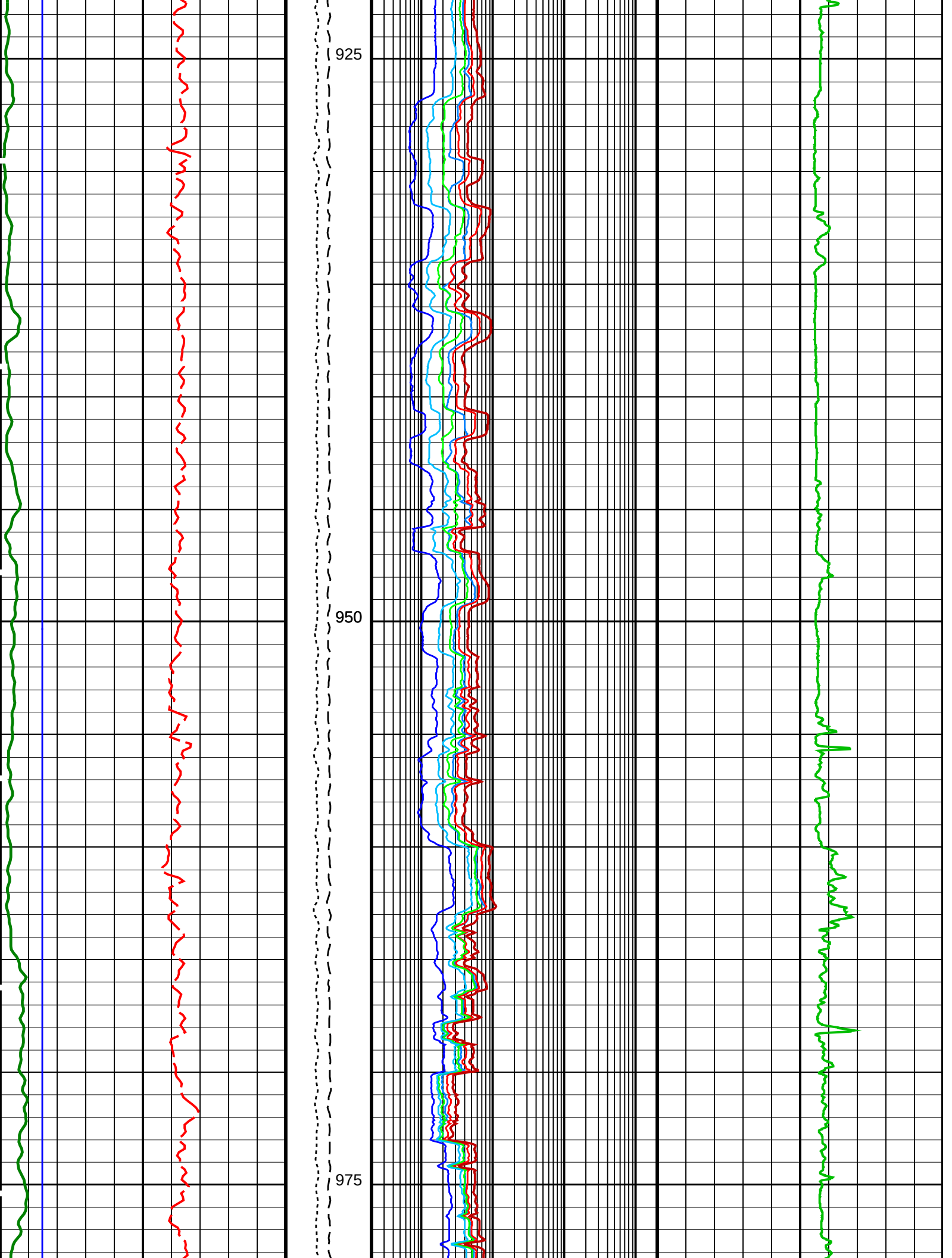
675

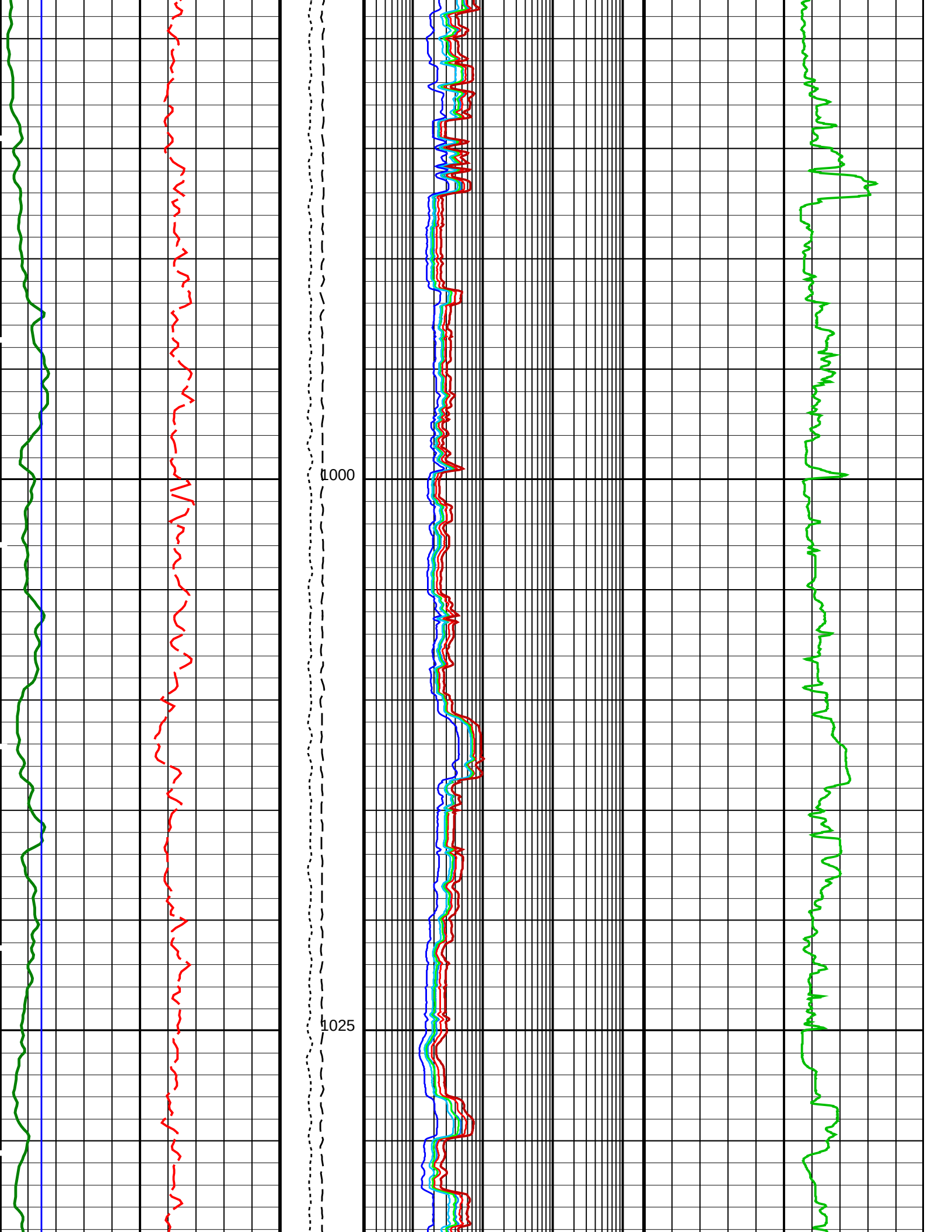

700
725
750

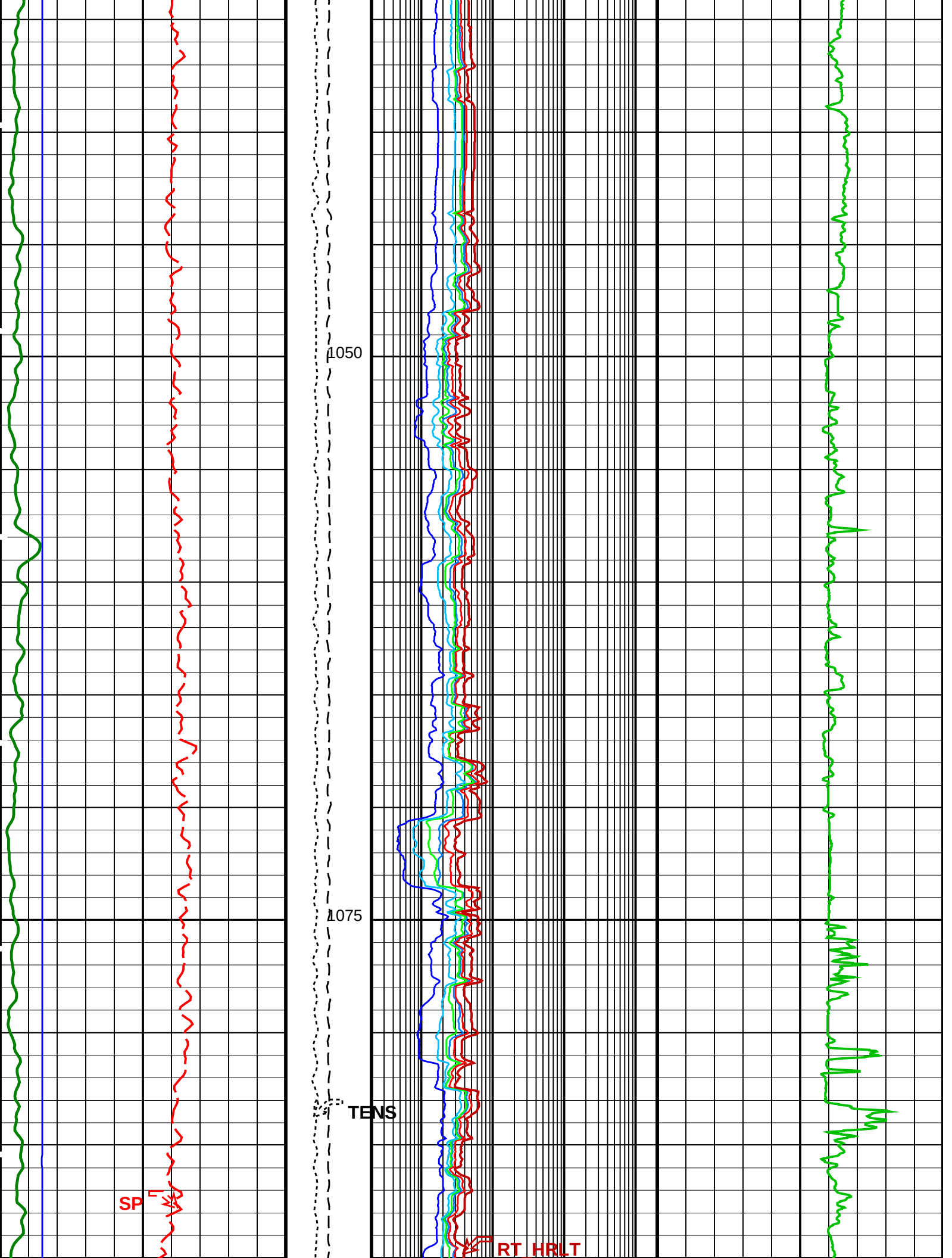

775
800

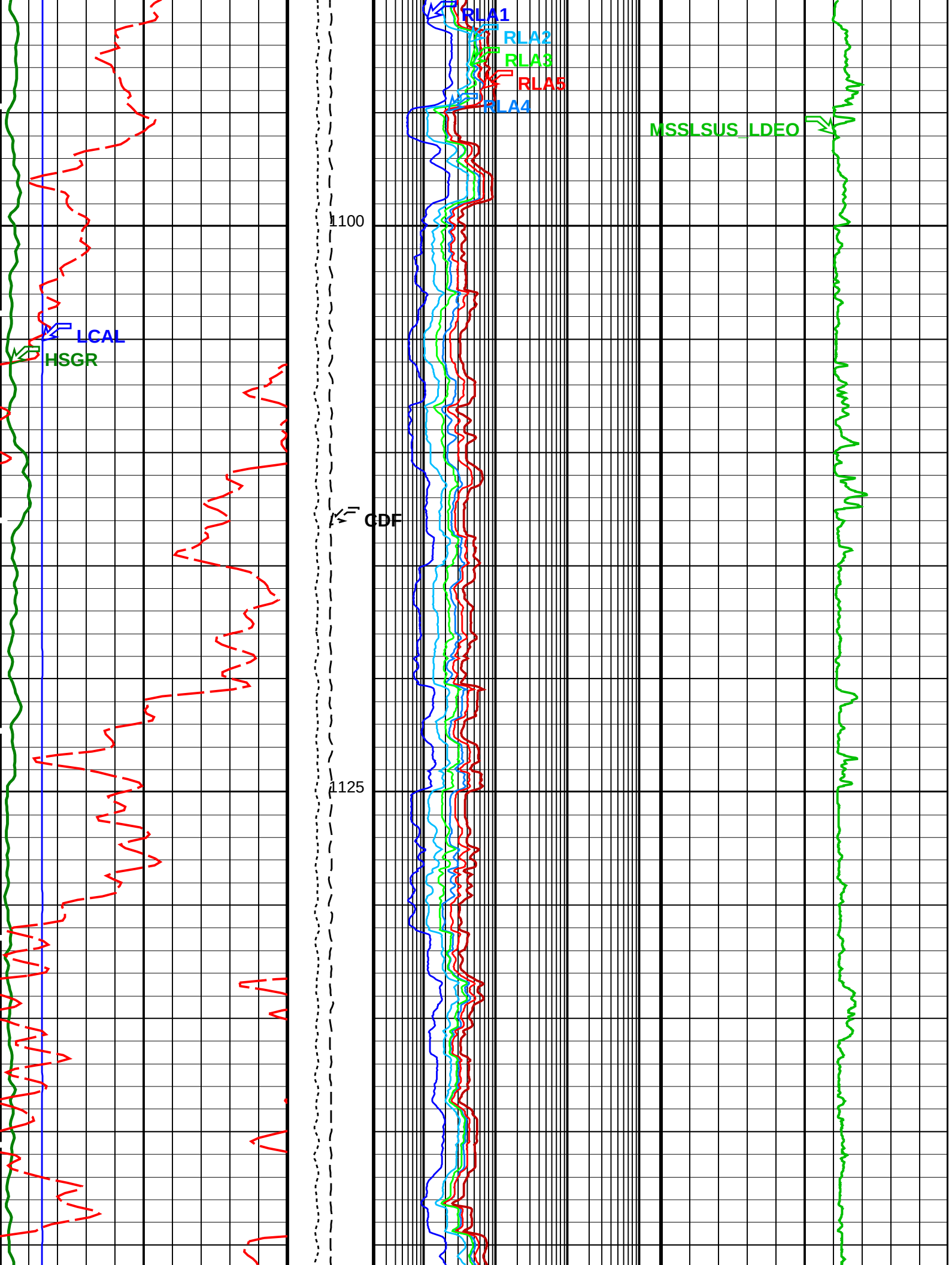

825
850

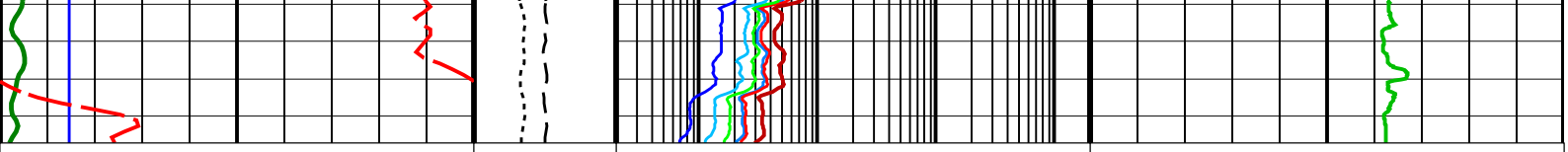

875
900


925
950
975


1000
1025


1050
1075
TENS
SP
RT_HRLT


RLA1
RLA2
RLA3
RLA5
RLA4
MSSLSUS_LDEO
1100
LCAL
HSGR
CDF
1125



HLDS Caliper (LCAL) 0 (IN) 20	Tension (TENS) (LBF) 10000 0	HRLT Resistivity 4 (RLA4) 0.2 (OHMM) 2000
		Dual−Coil Susceptibility (MSSLSUS_LDEO) −20000 (PPM) 20000
SP (SP) −100 (MV) 0	Calibrated Downhole Force (CDF) (LBF) 3000 0	HRLT Resistivity 5 (RLA5) 0.2 (OHMM) 2000
HNGS Spectroscopy Gamma Ray (HSGR) 0 (GAPI) 100		HRLT Resistivity 3 (RLA3) 0.2 (OHMM) 2000
		HRLT Resistivity 2 (RLA2) 0.2 (OHMM) 2000
Flipped Downlog		HRLT Resistivity 1 (RLA1) 0.2 (OHMM) 2000
Sea Floor Depth Reference		HRLT True Resistivity (RT_HRLT) 0.2 (OHMM) 2000

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	HRLT−B: High Resolution Laterolog Array − B		
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
CALSTAT	HRLTB Calibration Status	SHALLOW_DONE	
CALTEMP	HRLTB Calibration Temperature	12.6447	DEGC
FREQ0	HRLT Frequency Index for Mode 0	32	
FREQ1	HRLT Frequency Index for Mode 1	128	
FREQ2	HRLT Frequency Index for Mode 2	104	
FREQ3	HRLT Frequency Index for Mode 3	86	
FREQ4	HRLT Frequency Index for Mode 4	56	
FREQ5	HRLT Frequency Index for Mode 5	44	
FREQ6	HRLT Frequency Index for Mode 6	116	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	
KFAC_HRLT	HRLT K Factor Option	SONDE	
LOOPCOEF_S	HRLT Loop Coefficient for Shallow Modes	LOW	
LOOPMOD0	HRLT Mode 0 Loop Mode	OFF	
LOOPMOD1	HRLT Mode 1 Loop Mode	OFF	
LOOPMOD2	HRLT Mode 2 Loop Mode	OFF	
LOOPMOD3	HRLT Mode 3 Loop Mode	OFF	
LOOPMOD4	HRLT Mode 4 Loop Mode	OFF	
LOOPMOD5	HRLT Mode 5 Loop Mode	OFF	
LOOPMOD6	HRLT Mode 6 Loop Mode	OFF	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
PROCINV	Inversion Selection	ON	
PROCMFL	Inversion Micro−Resistivity Selection	NO_EXTERNAL_RXO	
PROCMSO	Mechanical Standoff Fin Size	0	IN
PROCRM	Processing Mud Resistivity Select	HRLT_Compute	
PROCSPO	Sonde Position	Centered	
SHT	Surface Hole Temperature	20	DEGC
	HLDS: Hostile Litho−Density Sonde		
CLCL	HLDS LS Control Loop Controller Mode	AUTO_DEFAULT	
CLCS	HLDS SS Control Loop Controller Mode	AUTO_DEFAULT	
CLLS	HLDS Mode Loop Long Spacing	AUTO	
CLSS	HLDS Mode Loop Short Spacing	AUTO	
DHC	Density Hole Correction	BS	
DPPM	Density Porosity Processing Mode	HIRS	

FD	Fluid Density	1	G/C3
LATC	HLDS Activation Correction	ON	
LLDL	HLDS LS Low Level Discriminator DAC	14000	
LLDS	HLDS SS Low Level Discriminator DAC	14000	
LLML	HLDS LS Low Level Discriminator Mode	AUTO	
LLMS	HLDS SS Low Level Discriminator Mode	AUTO	
MDEN	Matrix Density	2.71	G/C3
PHVL	HLDS Long Spacing High Voltage Setting	1000	V
PHVS	HLDS Short Spacing High Voltage Setting	1000	V
PSDL	HLDS LS Pulse Shape Compensation DAC	30000	
PSDS	HLDS SS Pulse Shape Compensation DAC	30000	
PSML	HLDS LS Pulse Shape Compensation Mode	AUTO	
PSMS	HLDS SS Pulse Shape Compensation Mode	AUTO	
HNGS−BA: Hostile Natural Gamma Ray Sonde			
BAR1	HNGS Detector 1 Barite Constant	1	
BAR2	HNGS Detector 2 Barite Constant	1	
BHK	HNGS Borehole Potassium Correction Concentration	0	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
CSD1	Inner Casing Outer Diameter	0	IN
CSD2	Outer Casing Outer Diameter	0	IN
CSW1	Inner Casing Weight	0	LB/F
CSW2	Outer Casing Weight	0	LB/F
DBCC	HNGS Barite Constant Correction Flag	NONE	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
H1P	HNGS Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGS Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGS Borehole Potassium Running Average	−0.00711471	
HALF	HNGS Alpha Filter Length	60	IN
HCRB	HNGS Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGS Processing Enable	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
S1BI	HNGS Detector 1 Calibration Bismuth Count Rate	1.3	CPS
S2BI	HNGS Detector 2 Calibration Bismuth Count Rate	1.3	CPS
SGRC	HNGS Standard Gamma−Ray Correction Flag	YES	
SHT	Surface Hole Temperature	20	DEGC
TPOS	Tool Position	CENT	
VBA1	HNGS Detector 1 Variable Barite Factor Running Average	1.06202	
VBA2	HNGS Detector 2 Variable Barite Factor Running Average	1.06032	
EDTC−B: Enhanced DTS Cartridge			
BHFL	Borehole Fluid Type	WATER	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	30	DEGC
BSCO	Borehole Salinity Correction Option	NO	
CCCO	Casing & Cement Thickness Correction Option	NO	
DPPM	Density Porosity Processing Mode	HIRS	
FSAL	Formation Salinity	−50000	PPM
FSCO	Formation Salinity Correction Option	NO	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
HSCO	Hole Size Correction Option	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
ISSBAR_EDTC	Nuclear Mud Type	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
MCCO	Mud Cake Correction Option	NO	
MCOR	Mud Correction	NATU	
MWCO	Mud Weight Correction Option	NO	
PTCO	Pressure/Temperature Correction Option	NO	
SDAT	Standoff Data Source	SOCN	
SHT	Surface Hole Temperature	20	DEGC
SOCN	Standoff Distance	0.5	IN
SOCO	Standoff Correction Option	NO	
TPOS_EDTC	EDTC Tool Centered/Eccentered	Eccentered	
U−ETELM_EDTS	Telemetry Mode for eWAFE	Standard_EDTS	
U−TELM_EDTS	Telemetry Mode for WAFE	Standard_EDTS	
BSP: Bridle SP			
SPNV	SP Next Value	0	MV
System and Miscellaneous			
ALTDPCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	9.875	IN
BSAL	Borehole Salinity	−50000.00	PPM
CSIZ	Current Casing Size	5.500	IN
CWEI	Casing Weight	168.00	LB/F
DFD	Drilling Fluid Density	1.03	G/C3
DO	Depth Offset for Playback	0.0	M
FLEV	Fluid Level	−50000.00	M

MST	**Mud Sample Temperature**	**−50000.00**	**DEGC**
PBVSADP	**Use alternate depth channel for playback**	**NO**	
PP	**Playback Processing**	**NORMAL**	
RMFS	**Resistivity of Mud Filtrate Sample**	**−50000.0000**	**OHMM**
RW	**Resistivity of Connate Water**	**1.0000**	**OHMM**
TD	**Total Depth**	**1184**	**M**
TDD	**Total Depth − Driller**	**1184.00**	**M**
TDL	**Total Depth − Logger**	**1184.00**	**M**
TWS	**Temperature of Connate Water Sample**	**37.78**	**DEGC**

Format: TripleCombo **Vertical Scale: 1:200** **Graphics File Created: 23−Jul−2014 00:09**

OP System Version: 19C0−187

MSS_LDEO−A	**19C0−187**	**HRLT−B**	**19C0−187**
HLDS	**19C0−187**	**LDSC−B**	**19C0−187**
HNGC−B	**19C0−187**	**HNGS−BA**	**19C0−187**
EDTC−B	**SKK−5169−EDTCB**	**BSP**	**19C0−187**

Input DLIS Files

DEFAULT	**Flip_MSS_LDEO_HRLA_036PUP**	**PRODUCER**	**23−Jul−2014 00:04**	**1149.7 M**	**−49.5 M**

Output DLIS Files

DEFAULT	**MSS_LDEO_HRLA_LDL_038PUP**	**FN:45**	**PRODUCER**	**23−Jul−2014 00:09**

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
High Resolution Laterolog Array − B Wellsite Calibration − HRLT M01							
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38							
HRLT M0−M1 Voltage Plus − 0	0	N/A	−319.0	−319.0	0.008270	9.681	UV
HRLT M0−M1 Voltage Plus − 1	0	N/A	−328.9	−332.6	−3.709	9.681	UV
HRLT M0−M1 Voltage Plus − 2	0	N/A	−331.0	−334.3	−3.314	9.681	UV
HRLT M0−M1 Voltage Plus − 3	0	N/A	−335.6	−337.9	−2.299	9.681	UV
HRLT M0−M1 Voltage Plus − 4	0	N/A	−325.2	−326.2	−0.9919	9.681	UV
HRLT M0−M1 Voltage Plus − 5	0	N/A	−321.7	−322.3	−0.6901	9.681	UV
HRLT M0−M1 Voltage Plus − 6	0	N/A	320.9	324.6	3.659	9.681	UV
HRLT M0−M1 Voltage Plus − 7	0	N/A	−322.7	−322.7	0	9.681	UV
High Resolution Laterolog Array − B Wellsite Calibration − HRLT M12							
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38							
HRLT M1−M2 Voltage Plus − 0	0	N/A	1755	1753	−2.365	53.42	UV
HRLT M1−M2 Voltage Plus − 1	0	N/A	1814	1830	15.92	53.42	UV
HRLT M1−M2 Voltage Plus − 2	0	N/A	1819	1833	13.87	53.42	UV
HRLT M1−M2 Voltage Plus − 3	0	N/A	1843	1851	8.708	53.42	UV
HRLT M1−M2 Voltage Plus − 4	0	N/A	1785	1787	2.206	53.42	UV
HRLT M1−M2 Voltage Plus − 5	0	N/A	1766	1767	0.5416	53.42	UV
HRLT M1−M2 Voltage Plus − 6	0	N/A	−1778	−1794	−15.82	53.42	UV
HRLT M1−M2 Voltage Plus − 7	0	N/A	1781	1781	0	53.42	UV
High Resolution Laterolog Array − B Wellsite Calibration − HRLT M23							
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38							
HRLT M2−M3 Voltage Plus − 0	0	N/A	1741	1738	−2.458	53.42	UV
HRLT M2−M3 Voltage Plus − 1	0	N/A	1811	1827	15.69	53.42	UV
HRLT M2−M3 Voltage Plus − 2	0	N/A	1818	1832	13.78	53.42	UV
HRLT M2−M3 Voltage Plus − 3	0	N/A	1845	1854	8.537	53.42	UV
HRLT M2−M3 Voltage Plus − 4	0	N/A	1781	1783	2.287	53.42	UV
HRLT M2−M3 Voltage Plus − 5	0	N/A	1763	1764	0.5970	53.42	UV
HRLT M2−M3 Voltage Plus − 6	0	N/A	−1766	−1781	−14.98	53.42	UV
HRLT M2−M3 Voltage Plus − 7	0	N/A	1781	1781	0	53.42	UV
High Resolution Laterolog Array − B Wellsite Calibration − HRLT V34							
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38							
HRLT A3−A4 Voltage Plus − 0	0	N/A	68420	68390	−29.48	2100	UV
HRLT A3−A4 Voltage Plus − 1	0	N/A	71000	71650	651.0	2100	UV
HRLT A3−A4 Voltage Plus − 2	0	N/A	71540	72120	585.8	2100	UV
HRLT A3−A4 Voltage Plus − 3	0	N/A	72880	73260	387.9	2100	UV
HRLT A3−A4 Voltage Plus − 4	0	N/A	70320	70440	126.3	2100	UV
HRLT A3−A4 Voltage Plus − 5	0	N/A	69620	69700	79.61	2100	UV
HRLT A3−A4 Voltage Plus − 6	0	N/A	−68220	−68850	−623.2	2100	UV

HRLT A3−A4 Voltage Plus − 7	0	N/A	70000	70000	0	2100	UV

High Resolution Laterolog Array − B Wellsite Calibration − HRLT V45
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT A4−A5 Voltage Plus − 0	0	N/A	68690	68660	−28.23	2100	UV
HRLT A4−A5 Voltage Plus − 1	0	N/A	71380	72020	645.5	2100	UV
HRLT A4−A5 Voltage Plus − 2	0	N/A	71900	72480	573.4	2100	UV
HRLT A4−A5 Voltage Plus − 3	0	N/A	73210	73610	400.8	2100	UV
HRLT A4−A5 Voltage Plus − 4	0	N/A	70600	70740	142.4	2100	UV
HRLT A4−A5 Voltage Plus − 5	0	N/A	69900	69970	68.60	2100	UV
HRLT A4−A5 Voltage Plus − 6	0	N/A	−68570	−69230	−654.4	2100	UV
HRLT A4−A5 Voltage Plus − 7	0	N/A	70000	70000	0	2100	UV

High Resolution Laterolog Array − B Wellsite Calibration − HRLT V56
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT A5−A6 Voltage Plus − 0	0	N/A	68590	68550	−38.27	2100	UV
HRLT A5−A6 Voltage Plus − 1	0	N/A	71100	71740	642.8	2100	UV
HRLT A5−A6 Voltage Plus − 2	0	N/A	71660	72250	585.8	2100	UV
HRLT A5−A6 Voltage Plus − 3	0	N/A	73030	73410	379.5	2100	UV
HRLT A5−A6 Voltage Plus − 4	0	N/A	70470	70600	129.0	2100	UV
HRLT A5−A6 Voltage Plus − 5	0	N/A	69780	69850	71.20	2100	UV
HRLT A5−A6 Voltage Plus − 6	0	N/A	−68310	−68940	−629.3	2100	UV
HRLT A5−A6 Voltage Plus − 7	0	N/A	70000	70000	0	2100	UV

High Resolution Laterolog Array − B Wellsite Calibration − HRLT VTP
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT Torpedo−M0 Voltage − 0	0	N/A	−68280	−68240	33.55	2100	UV
HRLT Torpedo−M0 Voltage − 1	0	N/A	−71430	−72100	−672.0	2100	UV
HRLT Torpedo−M0 Voltage − 2	0	N/A	−71940	−72550	−610.8	2100	UV
HRLT Torpedo−M0 Voltage − 3	0	N/A	−73300	−73710	−407.2	2100	UV
HRLT Torpedo−M0 Voltage − 4	0	N/A	−70670	−70810	−143.0	2100	UV
HRLT Torpedo−M0 Voltage − 5	0	N/A	−69940	−70010	−75.42	2100	UV
HRLT Torpedo−M0 Voltage − 6	0	N/A	68570	69220	648.9	2100	UV
HRLT Torpedo−M0 Voltage − 7	0	N/A	−70000	−70000	0	2100	UV

High Resolution Laterolog Array − B Wellsite Calibration − HRLT VBD
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT Bridle#9−M0 Voltage − 0	0	N/A	−68270	−68240	36.54	2100	UV
HRLT Bridle#9−M0 Voltage − 1	0	N/A	−71410	−72070	−663.3	2100	UV
HRLT Bridle#9−M0 Voltage − 2	0	N/A	−71930	−72530	−601.4	2100	UV
HRLT Bridle#9−M0 Voltage − 3	0	N/A	−73290	−73680	−389.1	2100	UV
HRLT Bridle#9−M0 Voltage − 4	0	N/A	−70660	−70800	−137.2	2100	UV
HRLT Bridle#9−M0 Voltage − 5	0	N/A	−69930	−70010	−80.99	2100	UV
HRLT Bridle#9−M0 Voltage − 6	0	N/A	68550	69200	649.8	2100	UV
HRLT Bridle#9−M0 Voltage − 7	0	N/A	−70000	−70000	0	2100	UV

High Resolution Laterolog Array − B Wellsite Calibration − HRLT ISO
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT Source Current Plus − 0	0	N/A	284.7	284.5	−0.2152	8.520	UA
HRLT Source Current Plus − 1	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 2	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 3	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 4	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 5	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 6	0	N/A	281.1	281.1	0	8.520	UA
HRLT Source Current Plus − 7	0	N/A	281.1	281.1	0	8.520	UA

High Resolution Laterolog Array − B Wellsite Calibration − HRLT MV
Before: 21−Jul−2014 8:50 After: 21−Jul−2014 15:38

HRLT Vertical Voltage Pl − 0	0	N/A	−321.4	−321.5	−0.1011	9.681	UV
HRLT Vertical Voltage Pl − 1	0	N/A	−324.1	−327.5	−3.353	9.681	UV
HRLT Vertical Voltage Pl − 2	0	N/A	−325.2	−328.2	−2.906	9.681	UV
HRLT Vertical Voltage Pl − 3	0	N/A	−327.7	−329.8	−2.080	9.681	UV
HRLT Vertical Voltage Pl − 4	0	N/A	−314.6	−315.5	−0.9247	9.681	UV
HRLT Vertical Voltage Pl − 5	0	N/A	−326.1	−326.7	−0.5971	9.681	UV
HRLT Vertical Voltage Pl − 6	0	N/A	329.1	332.6	3.496	9.681	UV
HRLT Vertical Voltage Pl − 7	0	N/A	−322.7	−322.7	0	9.681	UV

Hostile Litho−Density Sonde Wellsite Calibration − Background Measurement
Master: 16−Jul−2014 4:36 Before: 17−Jul−2014 5:36 After: 17−Jul−2014 5:45

SS Cs Resolution Bkg	9.000	8.061	8.076	7.968	−0.1079	1.800	%
LS Cs Resolution Bkg	9.000	8.137	8.180	8.175	−0.005135	1.800	%
LSW1 Background	100.0	69.74	68.24	70.48	2.248	3.000	CPS
LSW2 Background	100.0	63.61	64.16	63.74	−0.4206	3.000	CPS
LSW3 Background	200.0	141.8	137.9	141.1	3.244	6.000	CPS
LSW4 Background	250.0	172.4	171.0	170.7	−0.2442	7.500	CPS
LSW5 Background	600.0	395.0	391.5	393.4	1.954	18.00	CPS
SSW1 Background	100.0	78.54	77.29	78.86	1.570	3.000	CPS
SSW2 Background	200.0	139.1	138.0	138.2	0.2109	6.000	CPS
SSW3 Background	500.0	371.9	374.7	371.5	−3.237	15.00	CPS
SSW4 Background	270.0	195.4	192.7	195.5	2.744	8.100	CPS
SSW5 Background	200.0	142.5	140.4	142.0	1.542	6.000	CPS

SSW5 Background	200.0	142.5	140.4	142.0	1.542	6.000	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Aluminum Measurement
Master: 16−Jul−2014 5:05

LSW1 Aluminum	600.0	508.4	N/A	N/A	N/A	N/A	CPS
LSW2 Aluminum	900.0	733.7	N/A	N/A	N/A	N/A	CPS
LSW3 Aluminum	1100	883.4	N/A	N/A	N/A	N/A	CPS
LSW4 Aluminum	580.0	447.4	N/A	N/A	N/A	N/A	CPS
LSW5 Aluminum	570.0	407.5	N/A	N/A	N/A	N/A	CPS
SSW1 Aluminum	2800	2389	N/A	N/A	N/A	N/A	CPS
SSW2 Aluminum	8000	6455	N/A	N/A	N/A	N/A	CPS
SSW3 Aluminum	11600	8951	N/A	N/A	N/A	N/A	CPS
SSW4 Aluminum	5000	3637	N/A	N/A	N/A	N/A	CPS
SSW5 Aluminum	660.0	442.1	N/A	N/A	N/A	N/A	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Lithology Measurement
Master: 16−Jul−2014 4:57

LSW1 Iron	400.0	349.8	N/A	N/A	N/A	N/A	CPS
LSW2 Iron	730.0	590.1	N/A	N/A	N/A	N/A	CPS
LSW3 Iron	1000	785.3	N/A	N/A	N/A	N/A	CPS
LSW4 Iron	520.0	408.9	N/A	N/A	N/A	N/A	CPS
LSW5 Iron	470.0	376.5	N/A	N/A	N/A	N/A	CPS
SSW1 Iron	2100	1743	N/A	N/A	N/A	N/A	CPS
SSW2 Iron	6800	5378	N/A	N/A	N/A	N/A	CPS
SSW3 Iron	10800	8163	N/A	N/A	N/A	N/A	CPS
SSW4 Iron	4600	3323	N/A	N/A	N/A	N/A	CPS
SSW5 Iron	580.0	390.1	N/A	N/A	N/A	N/A	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Caliper Calibration
Before: 17−Jul−2014 5:38

HLDS Caliper Small Ring	12.00	N/A	15.84	N/A	N/A	N/A	IN
HLDS Caliper Large Ring	15.19	N/A	19.69	N/A	N/A	N/A	IN

Hostile Natural Gamma Ray Sonde Wellsite Calibration − Detector 1 Check
Master: 15−Jul−2014 0:16 Before: 15−Jul−2014 8:28 After: 15−Jul−2014 8:42

Na 511 Peak Loc	40.00	39.57	39.75	39.77	0.02731	1.000	
Na 511 Peak Res	15.50	15.78	15.47	15.60	0.1276	2.000	%
High Voltage	1150	1197	1198	1197	−0.5396	N/A	V
Na 1785 Peak Loc	142.6	142.4	143.3	142.8	−0.5427	7.000	
Na 1785 Peak Res	8.500	9.334	9.234	8.659	−0.5749	2.000	%
Temperature	15.50	37.42	37.47	37.56	0.09754	N/A	DEGC
Na Count Rate	45.00	10.91	10.93	10.90	−0.02571	8.000	CPS

Hostile Natural Gamma Ray Sonde Wellsite Calibration − Detector 2 Check
Master: 15−Jul−2014 0:16 Before: 15−Jul−2014 8:28 After: 15−Jul−2014 8:42

Na 511 Peak Loc	40.00	39.46	39.66	39.81	0.1556	1.000	
Na 511 Peak Res	15.50	16.20	15.73	15.53	−0.2004	2.000	%
High Voltage	1150	1129	1129	1130	1.742	N/A	V
Na 1785 Peak Loc	142.6	141.8	140.1	143.7	3.554	7.000	
Na 1785 Peak Res	8.500	10.06	10.03	8.567	−1.463	2.000	%
Temperature	15.50	38.37	38.33	38.34	0.006504	N/A	DEGC
Na Count Rate	45.00	11.54	11.55	11.30	−0.2470	8.000	CPS

Hostile Natural Gamma Ray Sonde Wellsite Calibration − Ratio Of Detector 1 To Detector 2
Master: 15−Jul−2014 0:16 Before: 15−Jul−2014 8:28 After: 15−Jul−2014 8:42

Coincidence Count Rate Ratio	1.000	0.9495	0.9508	0.9685	0.01775	0.05000	

Hostile Natural Gamma Ray Sonde Master Calibration − Detector 1 Calibration
Master: 14−Jul−2014 23:07

Na 511 Peak Set Point	40.00	41.00	−−	−−	−−	−−	
Th Peak Loc	209.6	210.1	−−	−−	−−	−−	
Th Peak Res	7.000	7.101	−−	−−	−−	−−	%
Background Count Rate	142.5	15.67	−−	−−	−−	−−	CPS
Gain Ratio	1.000	1.010	−−	−−	−−	−−	

Hostile Natural Gamma Ray Sonde Master Calibration − Detector 2 Calibration
Master: 14−Jul−2014 23:07

Na 511 Peak Set Point	40.00	41.00	−−	−−	−−	−−	
Th Peak Loc	209.6	207.2	−−	−−	−−	−−	
Th Peak Res	7.000	7.470	−−	−−	−−	−−	%
Background Count Rate	142.5	15.79	−−	−−	−−	−−	CPS
Gain Ratio	1.000	0.9988	−−	−−	−−	−−	

Enhanced DTS Cartridge Wellsite Calibration − EDTC Accelerometer Calibration
Before: 21−Jul−2014 8:50

EDTC Z−Axis Acceleration	9.810	N/A	9.759	N/A	N/A	N/A	M/S2

Enhanced DTS Cartridge Wellsite Calibration − Detector Calibration
Before: 15−Jul−2014 8:25 After: 15−Jul−2014 8:38

Gamma Ray (Jig − Bkg)	154.0	N/A	154.0	158.6	4.600	14.00	GAPI
Gamma Ray (Calibrated)	164.0	N/A	164.0	168.9	4.899	15.00	GAPI

High Resolution Laterolog Array − B / Equipment Identification

Primary Equipment:		
HRLT Sonde	HRLS − B	768
Auxiliary Equipment:		
HRLT lower Housing	HRLH − B	968
HRLT Lower Cartridge	HRLC − B	974
HRLT upper Housing	HRUH − B	978
HRLT Upper Cartridge	HRUC − B	764

High Resolution Laterolog Array − B Wellsite Calibration

HRLT M01

Idx	Phase	HRLT M0−M1 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		−319.0	−322.7	−280.7	−379.7
	After		−319.0			
1	Before		−328.9	−322.7	−280.7	−379.7
	After		−332.6			
2	Before		−331.0	−322.7	−280.7	−379.7
	After		−334.3			
3	Before		−335.6	−322.7	−280.7	−379.7
	After		−337.9			
4	Before		−325.2	−322.7	−280.7	−379.7
	After		−326.2			
5	Before		−321.7	−322.7	−280.7	−379.7
	After		**−322.3**			
6	Before		320.9	322.7	379.7	280.7
	After		324.6			
7	Before		−322.7	−322.7	−280.7	−379.7
	After		−322.7			
		(Minimum) (Nominal) (Maximum)				

Before: 21−Jul−2014 8:50

After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT M12

Idx	Phase	HRLT M1−M2 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		1755	1781	2095	1549
	After		1753			
1	Before		1814	1781	2095	1549
	After		1830			
2	Before		1819	1781	2095	1549
	After		1833			
3	Before		1843	1781	2095	1549
	After		1851			
4	Before		1785	1781	2095	1549
	After		1787			
5	Before		1766	1781	2095	1549
	After		1767			

6	Before	−1778	−1781	−1549	−2095
	After	−1794			
7	Before	1781	1781	2095	1549
	After	1781			
	(Minimum) (Nominal) (Maximum)				

Before: 21−Jul−2014 8:50
After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT M23

Idx	Phase	HRLT M2−M3 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		1741	1781	2095	1549
	After		1738			
1	Before		1811	1781	2095	1549
	After		1827			
2	Before		1818	1781	2095	1549
	After		1832			
3	Before		1845	1781	2095	1549
	After		1854			
4	Before		1781	1781	2095	1549
	After		1783			
5	Before		1763	1781	2095	1549
	After		1764			
6	Before		−1766	−1781	−1549	−2095
	After		**−1781**			
7	Before		1781	1781	2095	1549
	After		1781			
	(Minimum) (Nominal) (Maximum)					

Before: 21−Jul−2014 8:50
After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT V34

Idx	Phase	HRLT A3−A4 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		68420	70000	82360	60900
	After		68390			
1	Before		71000	70000	82360	60900
	After		71650			
2	Before		71540	70000	82360	60900
	After		72120			
3	Before		72880	70000	82360	60900
	After		73260			
4	Before		70320	70000	82360	60900
	After		70440			
5	Before		69620	70000	82360	60900
	After		69700			
6	Before		−68220	−70000	−60900	−82360
	After		−68850			
	(Minimum) (Nominal) (Maximum)					

7	Before		70000	70000	82360	60900
	After		70000			
	(Minimum)	(Nominal)	(Maximum)			

Before: 21−Jul−2014 8:50

After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT V45

Idx	Phase	HRLT A4−A5 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		68690	70000	82360	60900
	After		68660			
1	Before		71380	70000	82360	60900
	After		72020			
2	Before		71900	70000	82360	60900
	After		72480			
3	Before		73210	70000	82360	60900
	After		73610			
4	Before		70600	70000	82360	60900
	After		70740			
5	Before		69900	70000	82360	60900
	After		69970			
6	Before		−68570	−70000	−60900	−82360
	After		−69230			
7	Before		70000	70000	82360	60900
	After		70000			
	(Minimum)	(Nominal)	(Maximum)			

Before: 21−Jul−2014 8:50

After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT V56

Idx	Phase	HRLT A5−A6 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		68590	70000	82360	60900
	After		68550			
1	Before		71100	70000	82360	60900
	After		71740			
2	Before		71660	70000	82360	60900
	After		72250			
3	Before		73030	70000	82360	60900
	After		73410			
4	Before		70470	70000	82360	60900
	After		70600			
5	Before		69780	70000	82360	60900
	After		69850			
6	Before		−68310	−70000	−60900	−82360
	After		−68940			
7	Before		70000	70000	82360	60900
	After		70000			

		(Minimum)	(Nominal)	(Maximum)				
Before: 21−Jul−2014 8:50								
After: 21−Jul−2014 15:38								

High Resolution Laterolog Array − B Wellsite Calibration

HRLT VTP

Idx	Phase	HRLT Torpedo−M0 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		−68280	−70000	−60900	−82360
	After		−68240			
1	Before		−71430	−70000	−60900	−82360
	After		−72100			
2	Before		−71940	−70000	−60900	−82360
	After		−72550			
3	Before		−73300	−70000	−60900	−82360
	After		−73710			
4	Before		−70670	−70000	−60900	−82360
	After		−70810			
5	Before		−69940	−70000	−60900	−82360
	After		−70010			
6	Before		68570	70000	82360	60900
	After		69220			
7	Before		−70000	−70000	−60900	−82360
	After		−70000			
		(Minimum) (Nominal) (Maximum)				

Before: 21−Jul−2014 8:50

After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration

HRLT VBD

Idx	Phase	HRLT Bridle#9−M0 Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		−68270	−70000	−60900	−82360
	After		−68240			
1	Before		−71410	−70000	−60900	−82360
	After		−72070			
2	Before		−71930	−70000	−60900	−82360
	After		−72530			
3	Before		−73290	−70000	−60900	−82360
	After		−73680			
4	Before		−70660	−70000	−60900	−82360
	After		−70800			
5	Before		−69930	−70000	−60900	−82360
	After		−70010			
6	Before		68550	70000	82360	60900
	After		69200			
7	Before		−70000	−70000	−60900	−82360
	After		−70000			
		(Minimum) (Nominal) (Maximum)				

Before: 21−Jul−2014 8:50

After: 21−Jul−2014 15:38

High Resolution Laterolog Array − B Wellsite Calibration						
HRLT ISO						
Idx	Phase	HRLT Source Current Plus UA	Value	Nominal	Maximum	Minimum
0	Before		284.7	284.0	334.1	247.0
	After		284.5			
1	Before		281.1	281.1	330.7	244.4
	After		281.1			
2	Before		281.1	281.1	330.7	244.4
	After		281.1			
3	Before		281.1	281.1	330.7	244.4
	After		281.1			
4	Before		281.1	281.1	330.7	244.4
	After		281.1			
5	Before		281.1	281.1	330.7	244.4
	After		281.1			
6	Before		281.1	281.1	330.7	244.4
	After		281.1			
7	Before		281.1	281.1	330.7	244.4
	After		281.1			
		(Minimum) (Nominal) (Maximum)				
Before: 21−Jul−2014 8:50						
After: 21−Jul−2014 15:38						

High Resolution Laterolog Array − B Wellsite Calibration						
HRLT MV						
Idx	Phase	HRLT Vertical Voltage Plus UV	Value	Nominal	Maximum	Minimum
0	Before		−321.4	−322.7	−280.7	−379.7
	After		−321.5			
1	Before		−324.1	−322.7	−280.7	−379.7
	After		−327.5			
2	Before		−325.2	−322.7	−280.7	−379.7
	After		−328.2			
3	Before		−327.7	−322.7	−280.7	−379.7
	After		−329.8			
4	Before		−314.6	−322.7	−280.7	−379.7
	After		−315.5			
5	Before		−326.1	−322.7	−280.7	−379.7
	After		−326.7			
6	Before		329.1	322.7	379.7	280.7
	After		332.6			
7	Before		−322.7	−322.7	−280.7	−379.7
	After		−322.7			
		(Minimum) (Nominal) (Maximum)				
Before: 21−Jul−2014 8:50						
After: 21−Jul−2014 15:38						

Hostile Litho−Density Sonde / Equipment Identification

Primary Equipment:		
Hostile Litho Density Sonde	HLDS − D	45
Hostile Litho Density High Voltage	HLDV − D	45
Gamma Source Radioactive	GSR − Z	8113
Auxiliary Equipment:		
Hostile Litho Density Pad	HLDP − C	45
Hostile Litho Density High Voltage Housi	HEH − H	47

Hostile Litho−Density Sonde Wellsite Calibration

Background Measurement

Phase	SS Cs Resolution Bkg %	Value
Master		8.061
Before		8.076
After		7.968
	7.000 (Minimum) 9.000 (Nominal) 11.00 (Maximum)	

Phase	LS Cs Resolution Bkg %	Value
Master		8.137
Before		8.180
After		8.175
	7.000 (Minimum) 9.000 (Nominal) 11.00 (Maximum)	

Phase	LSW1 Background CPS	Value
Master		69.74
Before		68.24
After		70.48
	55.00 (Minimum) 100.0 (Nominal) 150.0 (Maximum)	

Phase	LSW2 Background CPS	Value
Master		63.61
Before		64.16
After		63.74
	50.00 (Minimum) 100.0 (Nominal) 140.0 (Maximum)	

Phase	LSW3 Background CPS	Value
Master		141.8
Before		137.9
After		141.1
	110.0 (Minimum) 200.0 (Nominal) 290.0 (Maximum)	

Phase	LSW4 Background CPS	Value
Master		172.4
Before		171.0
After		170.7
	140.0 (Minimum) 250.0 (Nominal) 360.0 (Maximum)	

Phase	LSW5 Background CPS	Value
Master		395.0
Before		391.5
After		393.4
	330.0 (Minimum) 600.0 (Nominal) 830.0 (Maximum)	

Phase	SSW1 Background CPS	Value
Master		78.54
Before		77.29
After		78.86
	55.00 (Minimum) 100.0 (Nominal) 150.0 (Maximum)	

Phase	SSW2 Background CPS	Value
Master		139.1
Before		138.0
After		138.2
	100.0 (Minimum) 200.0 (Nominal) 260.0 (Maximum)	

Phase	SSW3 Background CPS	Value
Master		371.9
Before		374.7
After		371.5
	280.0 (Minimum) 500.0 (Nominal) 700.0 (Maximum)	

Phase	SSW4 Background CPS	Value
Master		195.4
Before		192.7
After		195.5
	150.0 (Minimum) 270.0 (Nominal) 380.0 (Maximum)	

Phase	SSW5 Background CPS	Value
Master		142.5
Before		140.4
After		142.0
	110.0 (Minimum) 200.0 (Nominal) 270.0 (Maximum)	

Master: 16−Jul−2014 4:36 Before: 17−Jul−2014 5:36 After: 17−Jul−2014 5:45

Hostile Litho−Density Sonde Master Calibration

Detector Background Measurement

Phase	LSW1 Background CPS	Value
Master		69.74
	55.00 (Minimum) 100.0 (Nominal) 150.0 (Maximum)	

Phase	LSW2 Background CPS	Value
Master		63.61
	50.00 (Minimum) 100.0 (Nominal) 140.0 (Maximum)	

Phase	LSW3 Background CPS	Value
Master		141.8
	110.0 (Minimum) 200.0 (Nominal) 290.0 (Maximum)	

Phase	LSW4 Background CPS	Value
Master		172.4
	140.0 (Minimum) 250.0 (Nominal) 360.0 (Maximum)	

Phase	LSW5 Background CPS	Value
Master		395.0
	330.0 (Minimum) 600.0 (Nominal) 830.0 (Maximum)	

Phase	LS Cs Resolution Bkg %	Value
Master		8.137
	7.000 (Minimum) 9.000 (Nominal) 11.00 (Maximum)	

Phase	SSW1 Background CPS	Value
Master		78.54
	55.00 (Minimum) 100.0 (Nominal) 150.0 (Maximum)	

Phase	SSW2 Background CPS	Value
Master		139.1
	100.0 (Minimum) 200.0 (Nominal) 260.0 (Maximum)	

Phase	SSW3 Background CPS	Value
Master		371.9
	280.0 (Minimum) 500.0 (Nominal) 700.0 (Maximum)	

Phase	SSW4 Background CPS	Value
Master		195.4
	150.0 (Minimum) 270.0 (Nominal) 380.0 (Maximum)	

Phase	SSW5 Background CPS	Value
Master		142.5
	110.0 (Minimum) 200.0 (Nominal) 270.0 (Maximum)	

Phase	SS Cs Resolution Bkg %	Value
Master		8.061
	7.000 (Minimum) 9.000 (Nominal) 11.00 (Maximum)	

Master: 16−Jul−2014 4:36

Hostile Litho−Density Sonde Master Calibration

Detector Aluminum Measurement (bkgd−subtracted)

Phase	LSW1 Aluminum CPS	Value

Phase	LSW2 Aluminum CPS	Value

Phase	LSW3 Aluminum CPS	Value

Phase	LSW4 Aluminum CPS	Value
Master		447.4
	410.0 (Minimum) 580.0 (Nominal) 740.0 (Maximum)	

Phase	LSW5 Aluminum CPS	Value
Master	EXCEEDS LIMIT	407.5
	410.0 (Minimum) 570.0 (Nominal) 740.0 (Maximum)	

Phase	SSW1 Aluminum CPS	Value
Master		2389
	2000 (Minimum) 2800 (Nominal) 3200 (Maximum)	

Phase	SSW2 Aluminum CPS	Value
Master		6455
	5800 (Minimum) 8000 (Nominal) 9300 (Maximum)	

Phase	SSW3 Aluminum CPS	Value
Master		8951
	8300 (Minimum) 11600 (Nominal) 13500 (Maximum)	

Phase	SSW4 Aluminum CPS	Value
Master		3637
	3500 (Minimum) 5000 (Nominal) 5800 (Maximum)	

Phase	SSW5 Aluminum CPS	Value
Master		442.1
	430.0 (Minimum) 660.0 (Nominal) 770.0 (Maximum)	

Master: 16−Jul−2014 5:05

Hostile Litho−Density Sonde Master Calibration

Detector Litholog Measurement (bkgd−subtracted)

Phase	LSW1 Iron CPS	Value
Master		349.8
	290.0 (Minimum) 400.0 (Nominal) 560.0 (Maximum)	

Phase	LSW2 Iron CPS	Value
Master		590.1
	520.0 (Minimum) 730.0 (Nominal) 950.0 (Maximum)	

Phase	LSW3 Iron CPS	Value
Master		785.3
	720.0 (Minimum) 1000 (Nominal) 1350 (Maximum)	

Phase	LSW4 Iron CPS	Value
Master		408.9
	370.0 (Minimum) 520.0 (Nominal) 700.0 (Maximum)	

Phase	LSW5 Iron CPS	Value
Master		376.5
	340.0 (Minimum) 470.0 (Nominal) 750.0 (Maximum)	

Phase	SSW1 Iron CPS	Value
Master		1743
	1500 (Minimum) 2100 (Nominal) 2400 (Maximum)	

Phase	SSW2 Iron CPS	Value
Master		5378
	4900 (Minimum) 6800 (Nominal) 7900 (Maximum)	

Phase	SSW3 Iron CPS	Value
Master		8163
	7800 (Minimum) 10800 (Nominal) 12600 (Maximum)	

Phase	SSW4 Iron CPS	Value
Master		3323
	3300 (Minimum) 4600 (Nominal) 5400 (Maximum)	

Phase	SSW5 Iron CPS	Value
Master	EXCEEDS LIMIT	390.1
	420.0 (Minimum) 580.0 (Nominal) 680.0 (Maximum)	

Master: 16−Jul−2014 4:57

Hostile Litho−Density Sonde Master Calibration

Quality Ratios

Phase	AL CALIBRATION RATIO 1	Value
Master		1.033
	0.9000 (Minimum) 1.000 (Nominal) 1.100 (Maximum)	

Phase	AL CALIBRATION RATIO 2	Value
Master		2.194
	1.900 (Minimum) 2.100 (Nominal) 2.300 (Maximum)	

Phase	AL CALIBRATION RATIO 3	Value
Master		0.5947
	0.4500 (Minimum) 0.5500 (Nominal) 0.6500 (Maximum)	

Phase	AL CALIBRATION RATIO 4	Value
Master		0.5857
	0.4000 (Minimum) 0.5500 (Nominal) 0.6500 (Maximum)	

Phase	Pad−Wear SS Ratio	Value
Master		0.9884
	0.9800 (Minimum) 0.9880 (Nominal) 0.9960 (Maximum)	

Phase	Pad−Wear LS Ratio	Value
Master	EXCEEDS LIMIT	0.9786
	0.9800 (Minimum) 0.9880 (Nominal) 0.9960 (Maximum)	

Phase	Pad−Position SS Ratio	Value
Master		0.9978
	0.9900 (Minimum) 0.9940 (Nominal) 1.015 (Maximum)	

Phase	Pad−Position LS Ratio	Value
Master		0.9850
	0.9850 (Minimum) 0.9940 (Nominal) 1.010 (Maximum)	

Master: 16−Jul−2014 4:51

Litho−Density Spectroscopy Cartridge − B / Equipment Identification

Primary Equipment:		
LDSC Cartridge	LDSC − B	521
Auxiliary Equipment:		
LDSC Housing	LDSH − A	319

Hostile Natural Gamma Ray Cartridge − B / Equipment Identification

Primary Equipment:

Primary Equipment:		
HNGC Cartridge	HNGC − B	300
Auxiliary Equipment:		
HNGC Housing	HNGH − A	115

Hostile Natural Gamma Ray Sonde / Equipment Identification

Primary Equipment:		
HNGS Sonde	HNGS − BA	194
Auxiliary Equipment:		
HNGS Sonde Housing	HNSH − BA	205
Gamma Source Radioactive	GSR − U	616008

Hostile Natural Gamma Ray Sonde Wellsite Calibration

Detector 1 Check

Phase	Na 511 Peak Loc	Value
Master		39.57
Before		39.75
After		39.77
	37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)	

Phase	Na 511 Peak Res %	Value
Master		15.78
Before		15.47
After		15.60
	12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)	

Phase	High Voltage V	Value
Master		1197
Before		1198
After		1197
	900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)	

Phase	Na 1785 Peak Loc	Value
Master		142.4
Before		143.3
After		142.8
	135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)	

Phase	Na 1785 Peak Res %	Value
Master		9.334
Before		9.234
After		8.659
	7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)	

Phase	Temperature DEGC	Value
Master		37.42
Before		37.47
After		37.56
	−28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)	

Phase	Na Count Rate CPS	Value
Master		10.91
Before		10.93
After		10.90
	10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)	

Master: 15−Jul−2014 0:16 Before: 15−Jul−2014 8:28 After: 15−Jul−2014 8:42

Hostile Natural Gamma Ray Sonde Wellsite Calibration

Detector 2 Check

Phase	Na 511 Peak Loc	Value
Master		39.46
Before		39.66
After		39.81
	37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)	

Phase	Na 511 Peak Res %	Value
Master		16.20
Before		15.73
After		15.53
	12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)	

Phase	High Voltage V	Value
Master		1129
Before		1129
After		1130
	900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)	

Phase	Na 1785 Peak Loc	Value
Master		141.8
Before		140.1
After		143.7
	135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)	

Phase	Na 1785 Peak Res %	Value
Master		10.06
Before		10.03
After		8.567
	7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)	

Phase	Temperature DEGC	Value
Master		38.37
Before		38.33
After		38.34
	−28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)	

Phase	Na Count Rate CPS	Value
Master		11.54
Before		11.55
After		11.30
	10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)	

Master: 15−Jul−2014 0:16 Before: 15−Jul−2014 8:28 After: 15−Jul−2014 8:42

Hostile Natural Gamma Ray Sonde Wellsite Calibration

Ratio Of Detector 1 To Detector 2

Phase	Coincidence Count Rate Ratio	Value
Master	EXCEEDS LIMIT	0.9495
Before		0.9508
After		0.9685
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)	

Master: 15−Jul−2014 0:16
Before: 15−Jul−2014 8:28
After: 15−Jul−2014 8:42

Hostile Natural Gamma Ray Sonde Master Calibration

Detector 1 Calibration

Phase	Na 511 Peak Set Point	Value
Master		41.00
	38.00 (Minimum) 40.00 (Nominal) 43.00 (Maximum)	

Phase	Th Peak Loc	Value
Master		210.1
	201.0 (Minimum) 209.6 (Nominal) 218.3 (Maximum)	

Phase	Th Peak Res %	Value
Master		7.101
	5.000 (Minimum) 7.000 (Nominal) 9.000 (Maximum)	

Phase	Background Count Rate CPS	Value
Master		15.67
	10.00 (Minimum) 142.5 (Nominal) 265.0 (Maximum)	

Phase	Gain Ratio	Value
Master		1.010
	0.9400 (Minimum) 1.000 (Nominal) 1.060 (Maximum)	

Master: 14−Jul−2014 23:07

Hostile Natural Gamma Ray Sonde Master Calibration

Detector 2 Calibration

Phase	Na 511 Peak Set Point	Value
Master		41.00
	38.00 (Minimum) 40.00 (Nominal) 43.00 (Maximum)	

Phase	Th Peak Loc	Value
Master		207.2
	201.0 (Minimum) 209.6 (Nominal) 218.3 (Maximum)	

Phase	Th Peak Res %	Value
Master		7.470
	5.000 (Minimum) 7.000 (Nominal) 9.000 (Maximum)	

Phase	Background Count Rate CPS	Value
Master		15.79
	10.00 (Minimum) 142.5 (Nominal) 265.0 (Maximum)	

Phase	Gain Ratio	Value
Master		0.9988
	0.9400 (Minimum) 1.000 (Nominal) 1.060 (Maximum)	

Master: 14−Jul−2014 23:07

Enhanced DTS Cartridge / Equipment Identification

Primary Equipment:

EDTC Gamma Ray Detector	EDTG − A/B	8305
Enhanced DTS Cartridge	EDTC − B	8317

Auxiliary Equipment:

EDTC Housing	EDTH − B	8303

Enhanced DTS Cartridge Wellsite Calibration

EDTC Accelerometer Calibration

Phase	EDTC Z−Axis Acceleration M/S2	Value
Before		9.759
	9.610 (Minimum) 9.810 (Nominal) 10.01 (Maximum)	

Before: 21−Jul−2014 8:50

Enhanced DTS Cartridge Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background GAPI	Value
Before		6.019
After		5.723
	0 (Minimum) 30.00 (Nominal) 120.0 (Maximum)	

Phase	Gamma Ray (Jig − Bkg) GAPI	Value
Before		154.0
After		158.6
	140.0 (Minimum) 154.0 (Nominal) 168.0 (Maximum)	

Phase	Gamma Ray (Calibrated) GAPI	Value
Before		164.0
After		168.9
	149.0 (Minimum) 164.0 (Nominal) 179.0 (Maximum)	

Before: 15−Jul−2014 8:25 After: 15−Jul−2014 8:38

Company:	**Lamont Doherty Earth Observatory**
Well:	**Expedition 351, Site U1438E**
Field:	**IBM Arc Origins**
Rig:	**JOIDES Resolution**
Ocean:	**Pacific**

Schlumberger

High Resolution Laterolog Array (HRLA)
Caliper / Magnetic Susceptibility
Natural Gamma Ray