Schlumberger

Company: **Lamont Doherty Earth Observatory**

Well: **Expedition 349, Site U1433B**
Field: **South China Sea Tectonics**
Rig: **JOIDES Resolution** Ocean: **South China Sea**

Hostile Natural Gamma Sonde (HNGS)
Spectroscopy Log

Rig: JOIDES Resolution
Field: South China Sea Tectonics
Location: Latitude: N 12.918855*
Well: Expedition 349, Site U1433B
Company: Lamont Doherty Earth Observatory

LOCATION

Latitude: N 12.918855*
Longitude: E 115.0474733*

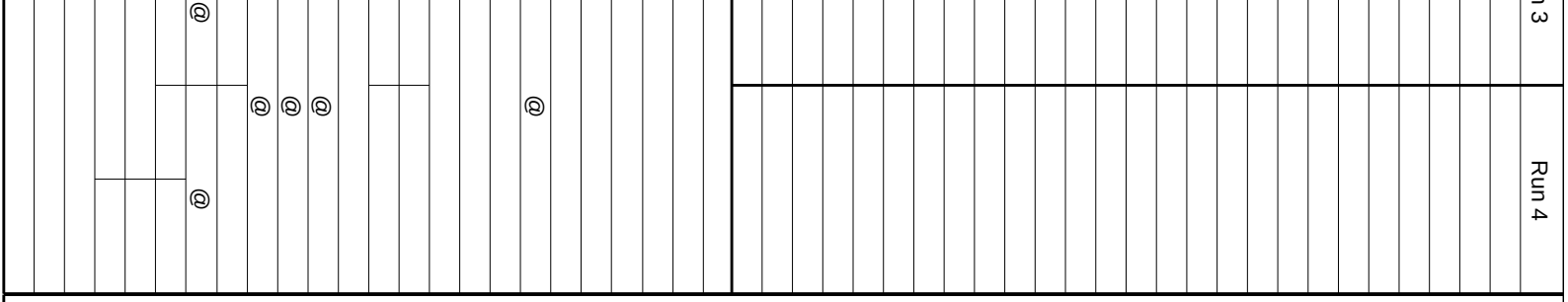
Elev.: K.B. −4391.00 m
G.L. 0.00 m
D.F. −4391.00 m

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

API Serial No.	N 12.918855	E 115.0474733	

	Run 1	Run 2	Run
Logging Date	18−Mar−2014		
Run Number	1		
Depth Driller	858.5 m		
Schlumberger Depth	840 m		
Bottom Log Interval	840 m		
Top Log Interval	0 m		
Casing Driller Size @ Depth	13.375 in @ 100.4 m	@	@
Casing Schlumberger	100 m		
Bit Size	9.875 in		
Type Fluid In Hole	Seawater−Sepiolite		
MUD Density / Viscosity	1.029 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	@ 22 / @ 22	@ / @	@ / @
Maximum Recorded Temperatures	22 degC		
Circulation Stopped / Time	18−Feb−2014 / 8:00		
Logger On Bottom / Time	18−Mar−2014 / 18:00		
Unit Number / Location	625003 / Houston		
Recorded By	K. Swain		
Witnessed By	T. Williams		

	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			



DISCLAIMER

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OTHER SERVICES1	OTHER SERVICES2
OS1: FMS/DSI	OS1:
OS2:	OS2:
OS3: HRLA/HLDS/APS/HNGS	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	
Original log files recorded from drill floor depth reference and later played	
back to sea floor reference which are the reference for these logs.	
Borehole correction assuming bit size (BS) at client request.	
Mud weight assumes 1.03 g/cc at client request as heavy mud not evenly displaced	
2 MCD (mechanical Caliper Device) centralizers run with HRLA. 2 knuckle	
joints and 1 thru wired extension separates the centralized HRLA from	
the eccentered HLDS/APS.	
The RCB bit was dropped at the bottom of the hole prior to logging.	
HNGS run at bottom of toolstring per client request. APS and ILEF eccentralizer	
removed per client request.	
LDEO−MSS tool not utilized due to high temperature expectation.	

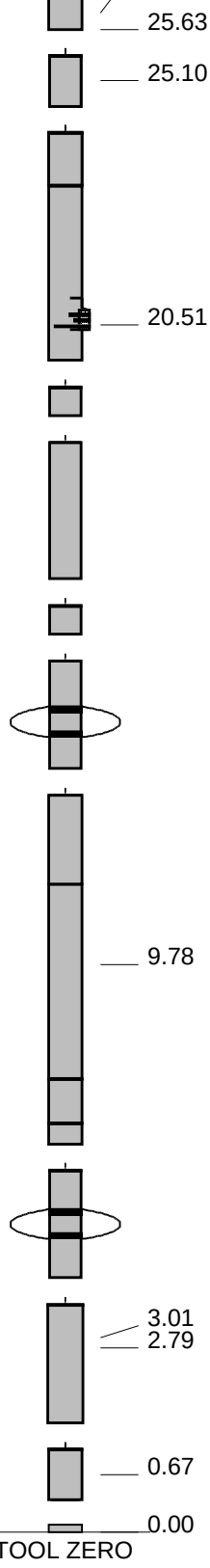
RUN 1			RUN 2		
SERVICE ORDER #:			SERVICE ORDER #:		
PROGRAM VERSION:		19C0−187	PROGRAM VERSION:		
FLUID LEVEL:			FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1	RUN 2
SURFACE EQUIPMENT	
GSR−U 616008 WITM (EDTS)−A 1	
DOWNHOLE EQUIPMENT	
LEH−MT 101 LEH−MT 101 101	29.01
AH−369	28.05
EDTC−B EDTH−B 8303 EDTC−B 8317	27.62

MDSB_EDTC
Mud Tempe
CTEM
Gamma Ray
EFTB DIAG
TelStatus

27.62
26.55
25.98



EDTC−B 8317
EDTG−A/B 8305

LDSC−B 25.63
LDSH−A 303

HLDS 24.57
GSR−Z 8113
HLDV−D 35
HLDS−D 35
HEH−H 35
HLDP−C 35

AH−184 19.75

AH−ECH−MRA 19.14
AH−ECH−MRA 5714

AH−184 16.25

AH−MCD 15.64
AH−MCD 82

HRLT−B 13.36
HRUH−B 768
HRUC−B 764
HRLS−B 768
HRLH−B 968
HRLC−B 974
AH−270 1708

AH−MCD1 5.99
AH−MCD1 1

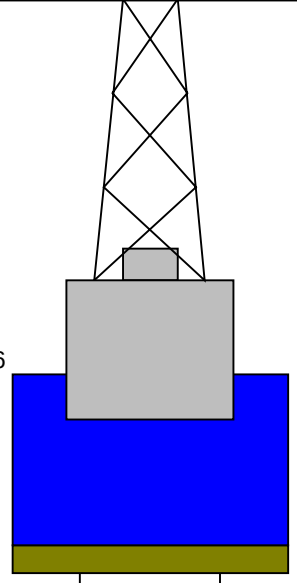
HNGS−BA 3.71
HNGS−BA 194
HNSH−BA 205

HNGC−B 1.21
HNGH−A 115

BNS−CCS 0.14

MAXIMUM STRING DIAMETER 4.50 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	−4390.6			
Derrick Floor Elevation	−4390.6			
Mean Sea Level	−4379.6			
		4.1		
		0	4.1	Sea Floor
		100.43	9.875	Open Hole
		858.5		Total Depth

Input DLIS Files

DEFAULT	NGS_HRLA_LDL_018PUP	FN:24	PRODUCER	18−Mar−2014 13:12	5237.2 M	4384.2 M

Output DLIS Files

DEFAULT	NGS_HRLA_LDL_022PUP	FN:32	PRODUCER	18−Mar−2014 13:53	841.7 M	−11.2 M
BACKUP	NGS_HRLA_LDL_022PUP	FN:33	PRODUCER	18−Mar−2014 13:53	841.7 M	−11.3 M

OP System Version: 19C0−187

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

PIP SUMMARY

Time Mark Every 60 S

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

Main Uplog, Sea Floor Depth Reference

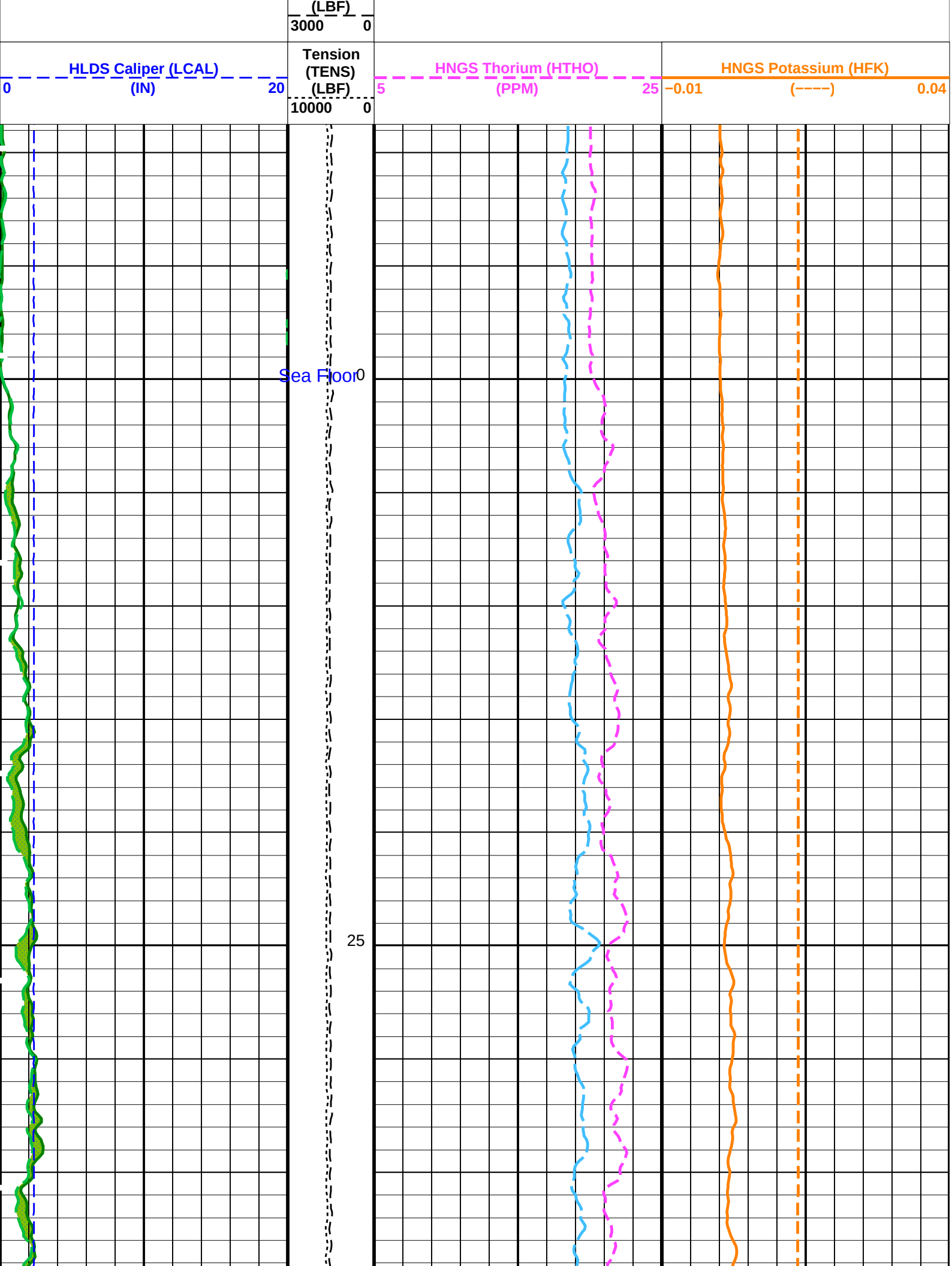
Area1
From HCGR to HSGR

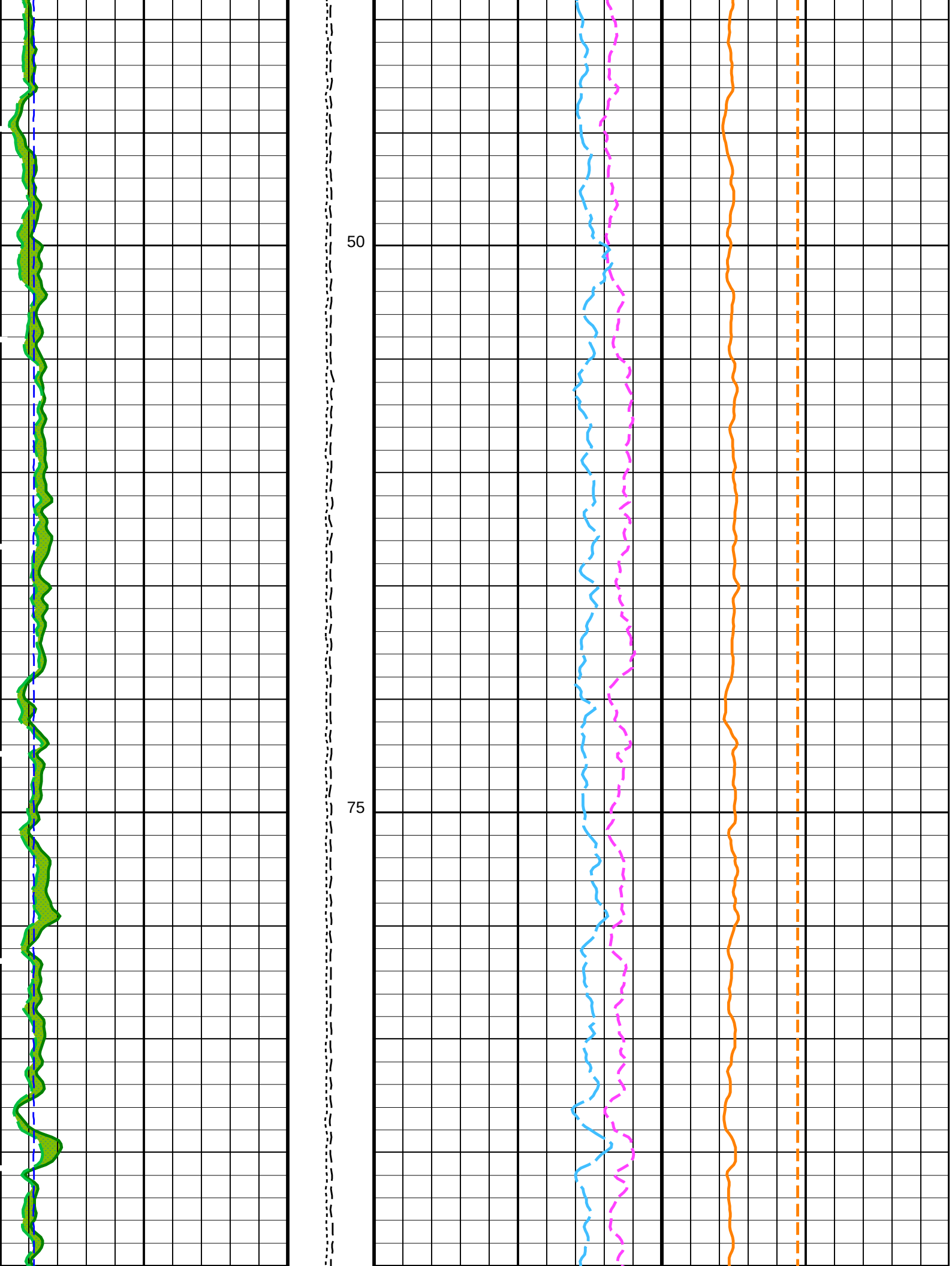
HNGS Borehole Potassium (HBHK)
−0.05 (−−−−) 0.05

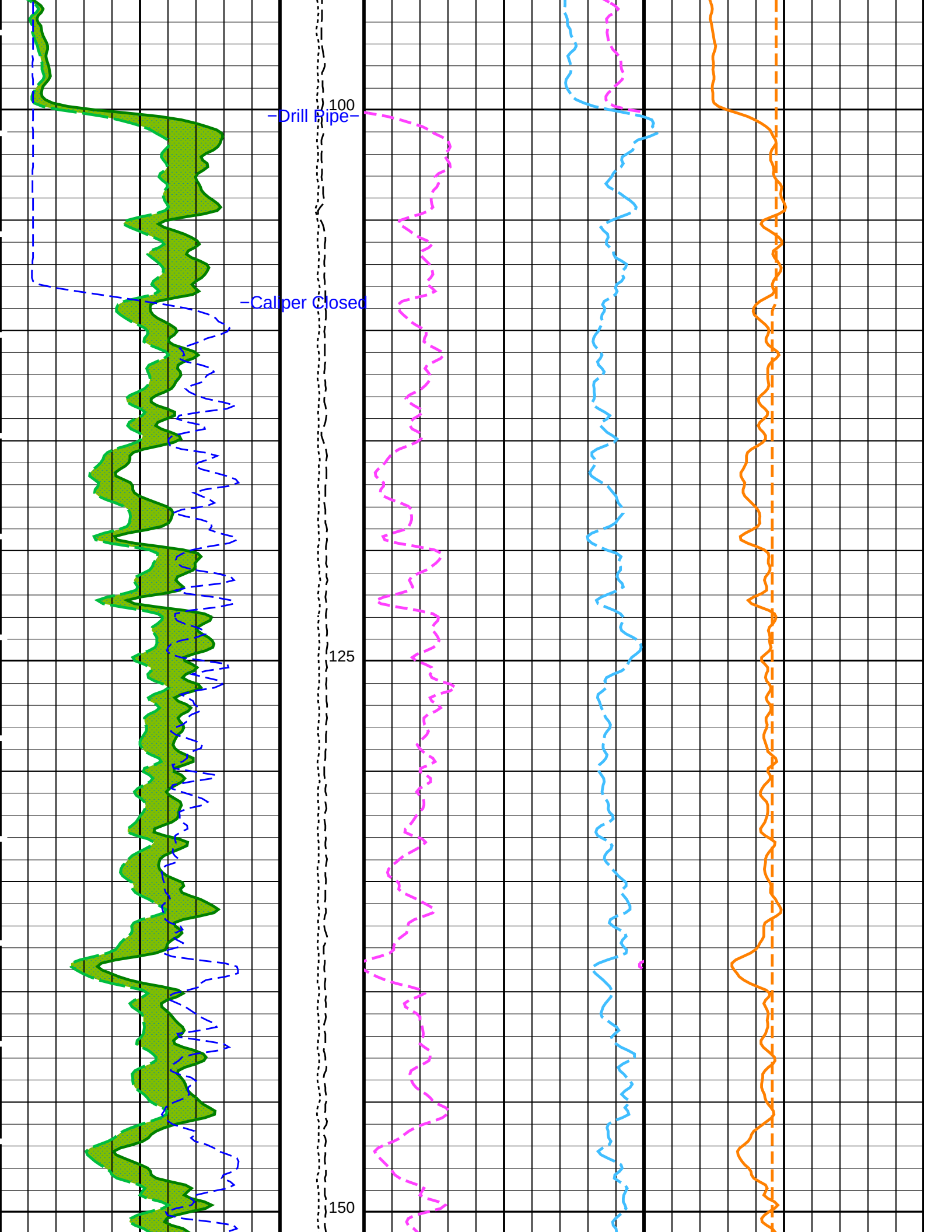
HNGS Computed Gamma Ray (HCGR)
0 (GAPI) 100

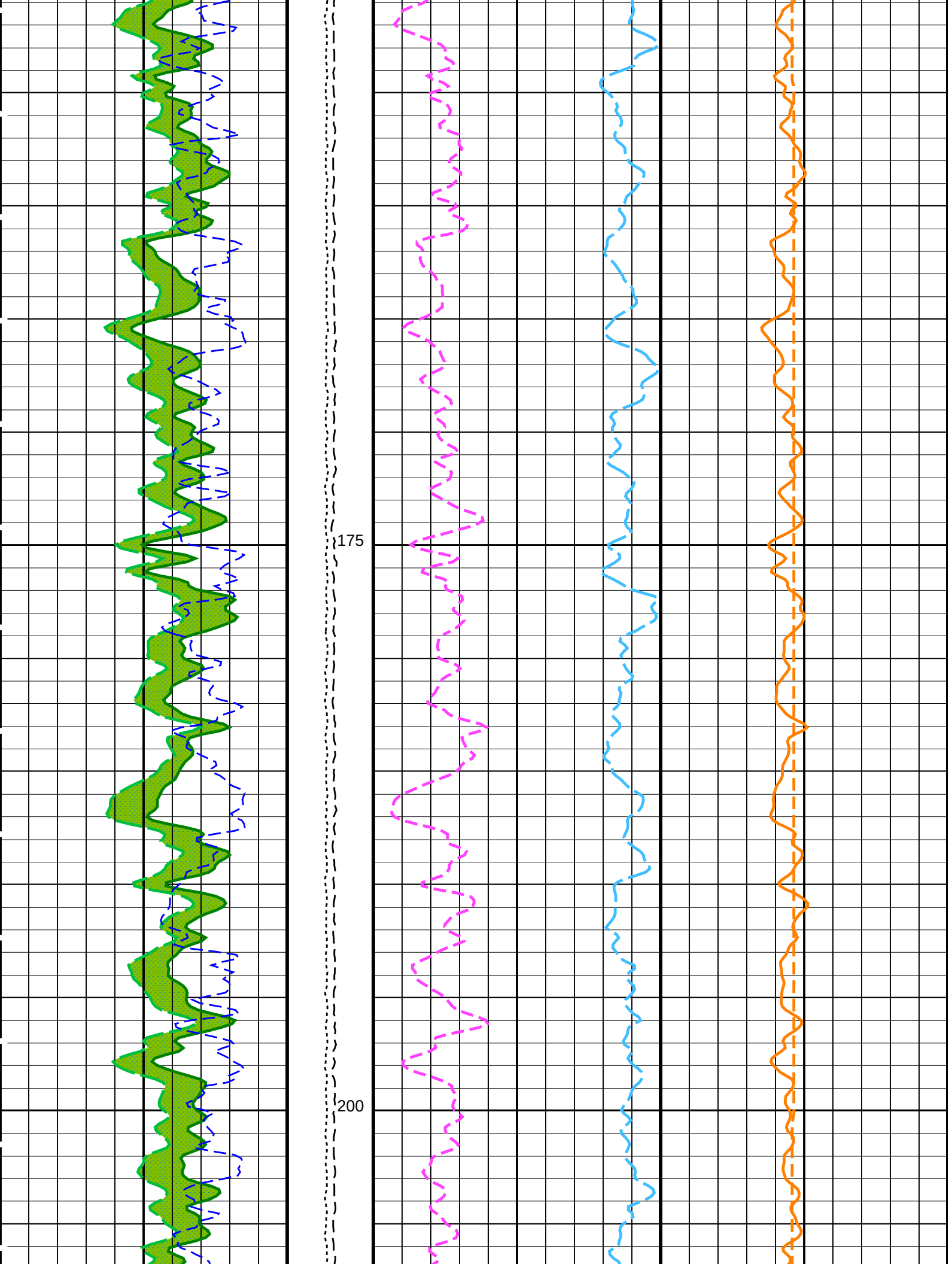
Calibrated Downhole Force (CDF)

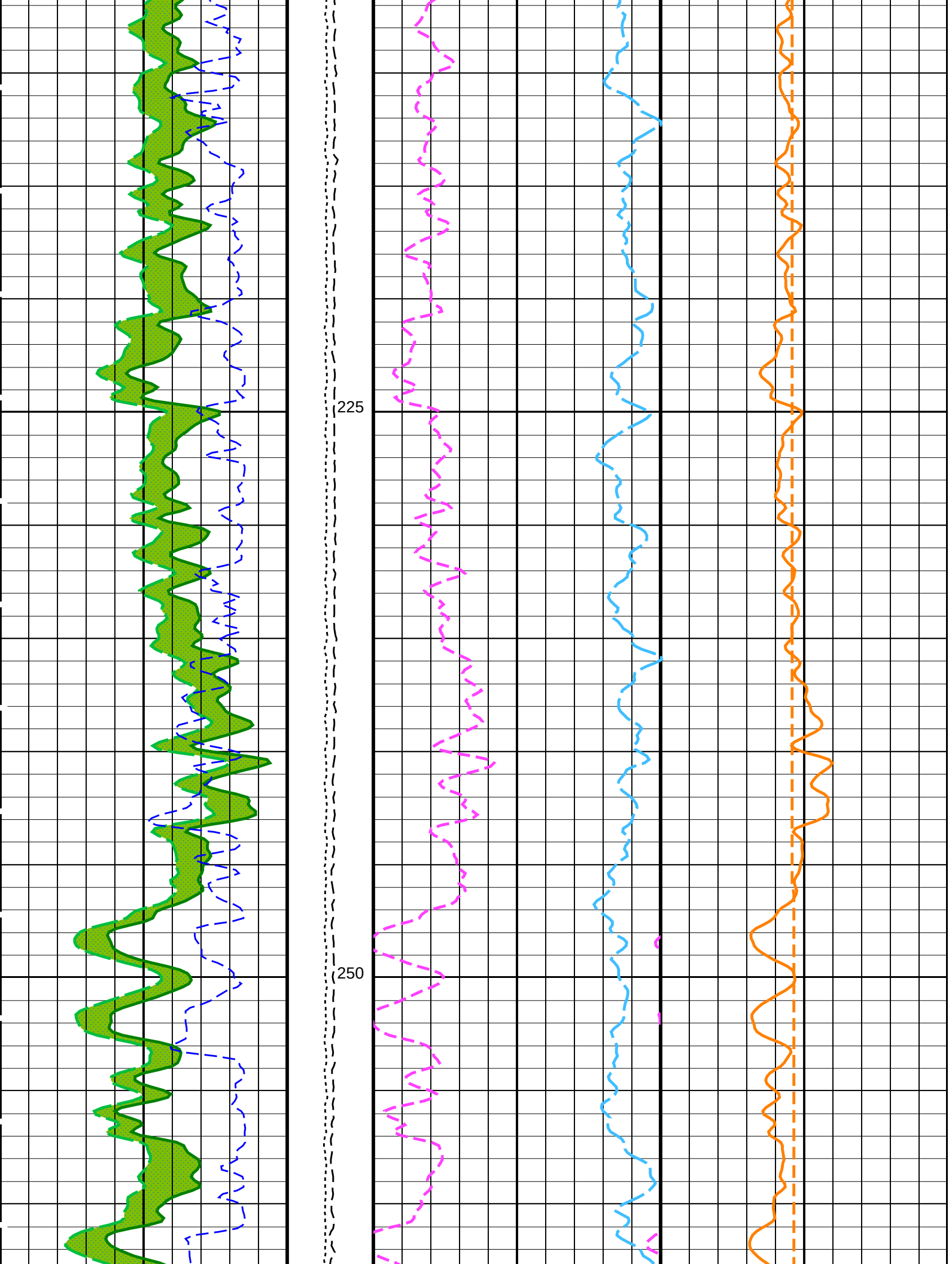
HNGS Uranium (HURA)
−5 (PPM) 10

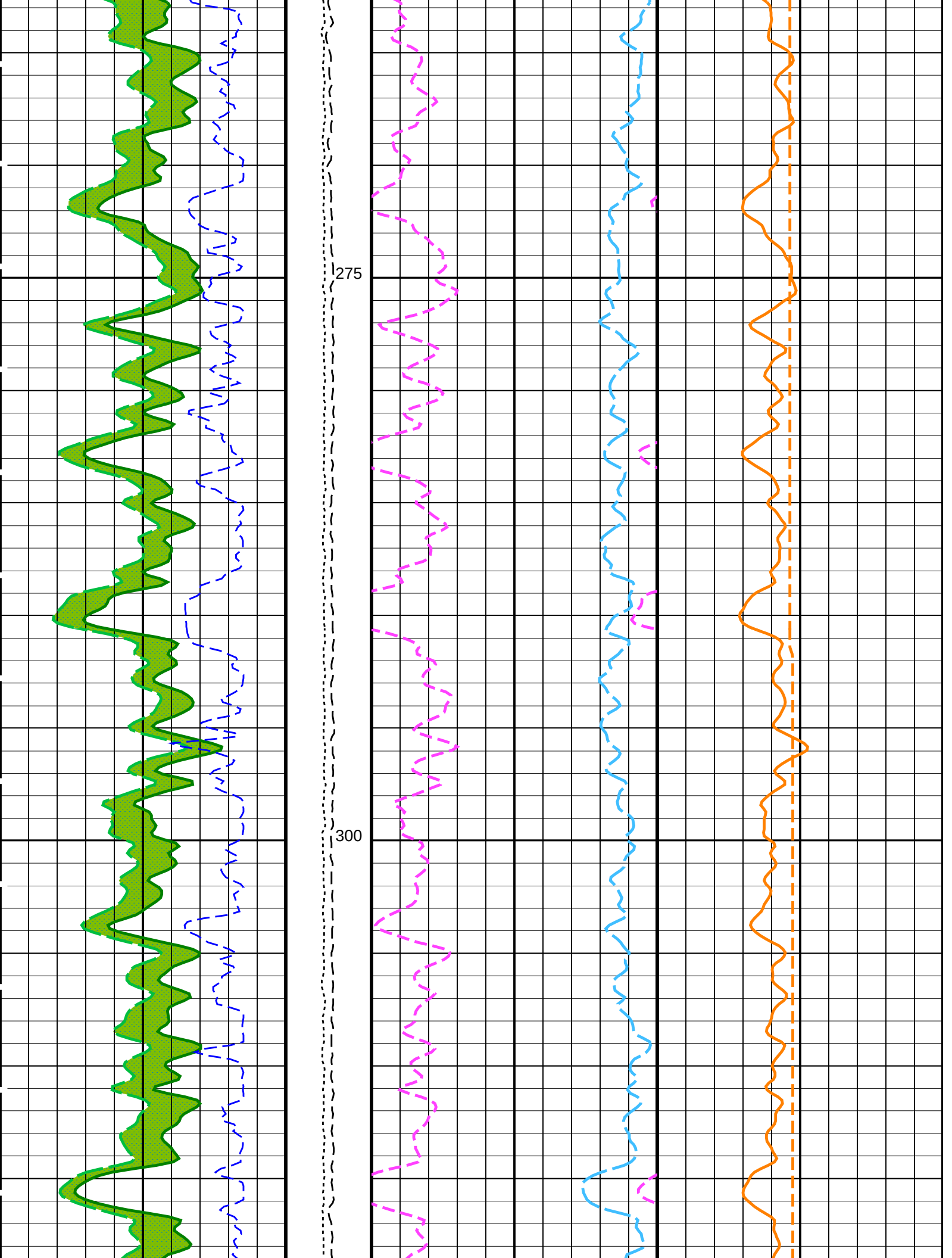

(LBF)
3000
0
HLDS Caliper (LCAL)
0
(IN)
20
Tension
(TENS)
(LBF)
10000
0
HNGS Thorium (HTHO)
5
(PPM)
25
HNGS Potassium (HFK)
−0.01
(−−−−)
0.04
Sea Floor
0
25

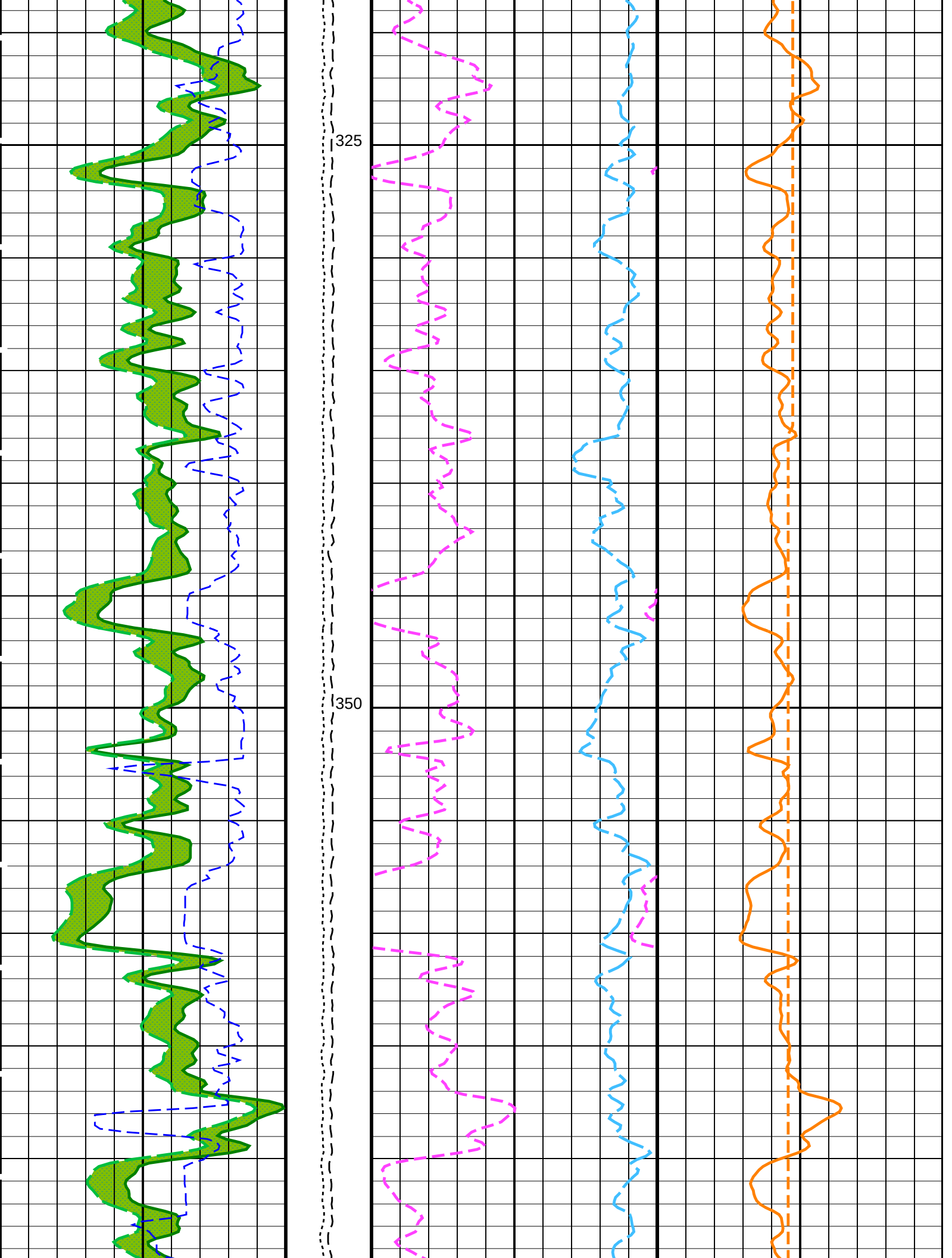

50
75

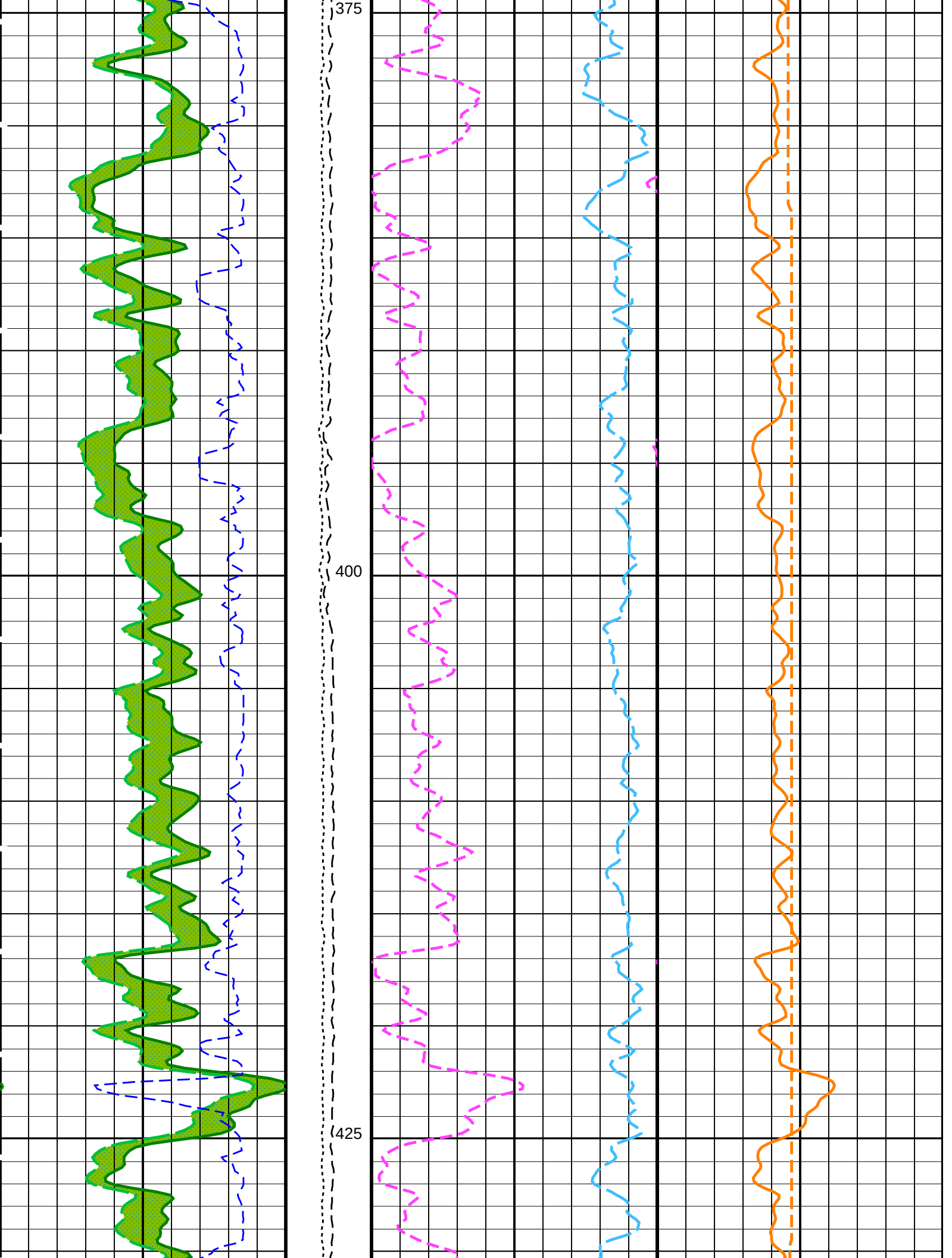

100
−Drill Pipe−
−Caliper Closed
125
150

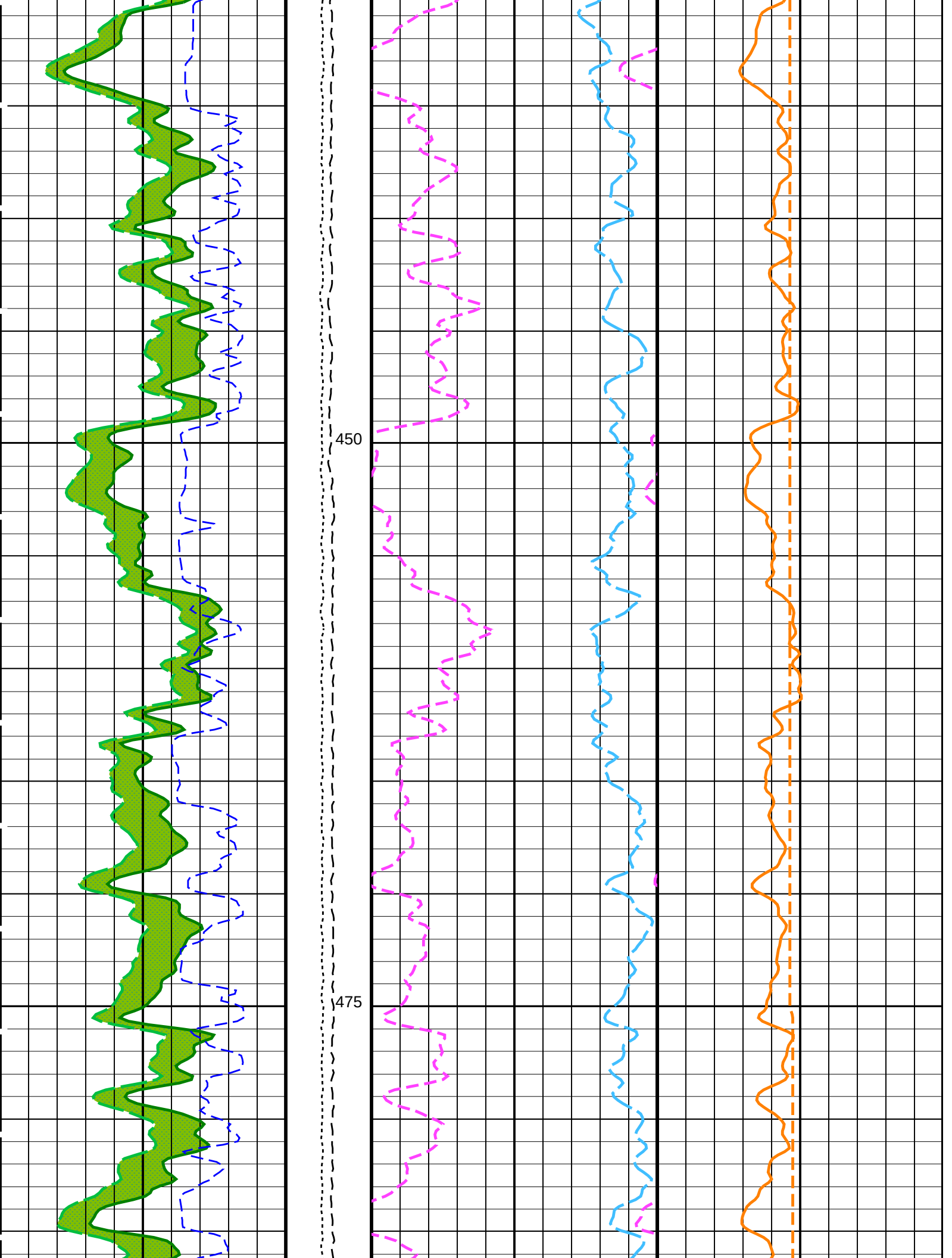

175
200

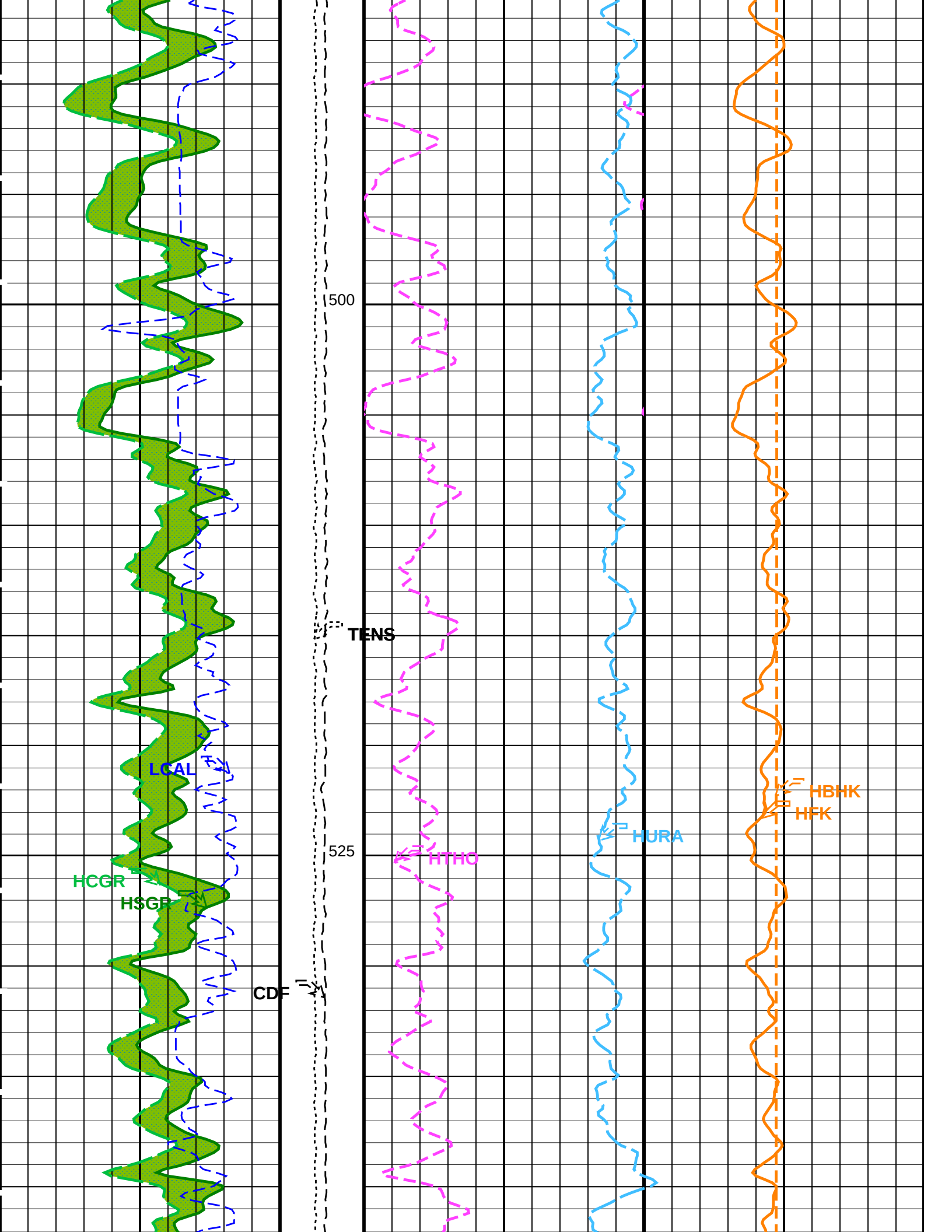

225
250

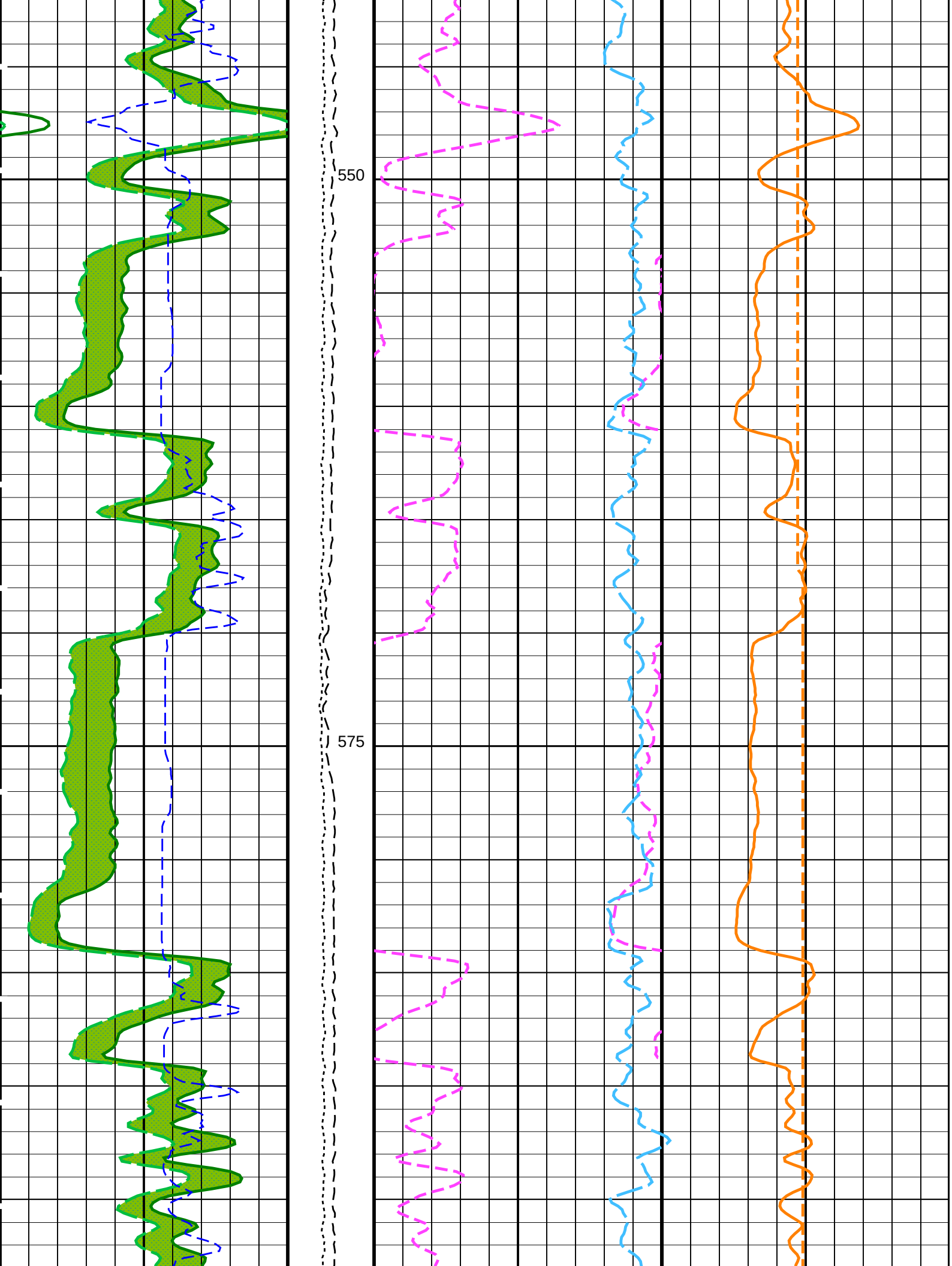

275
300

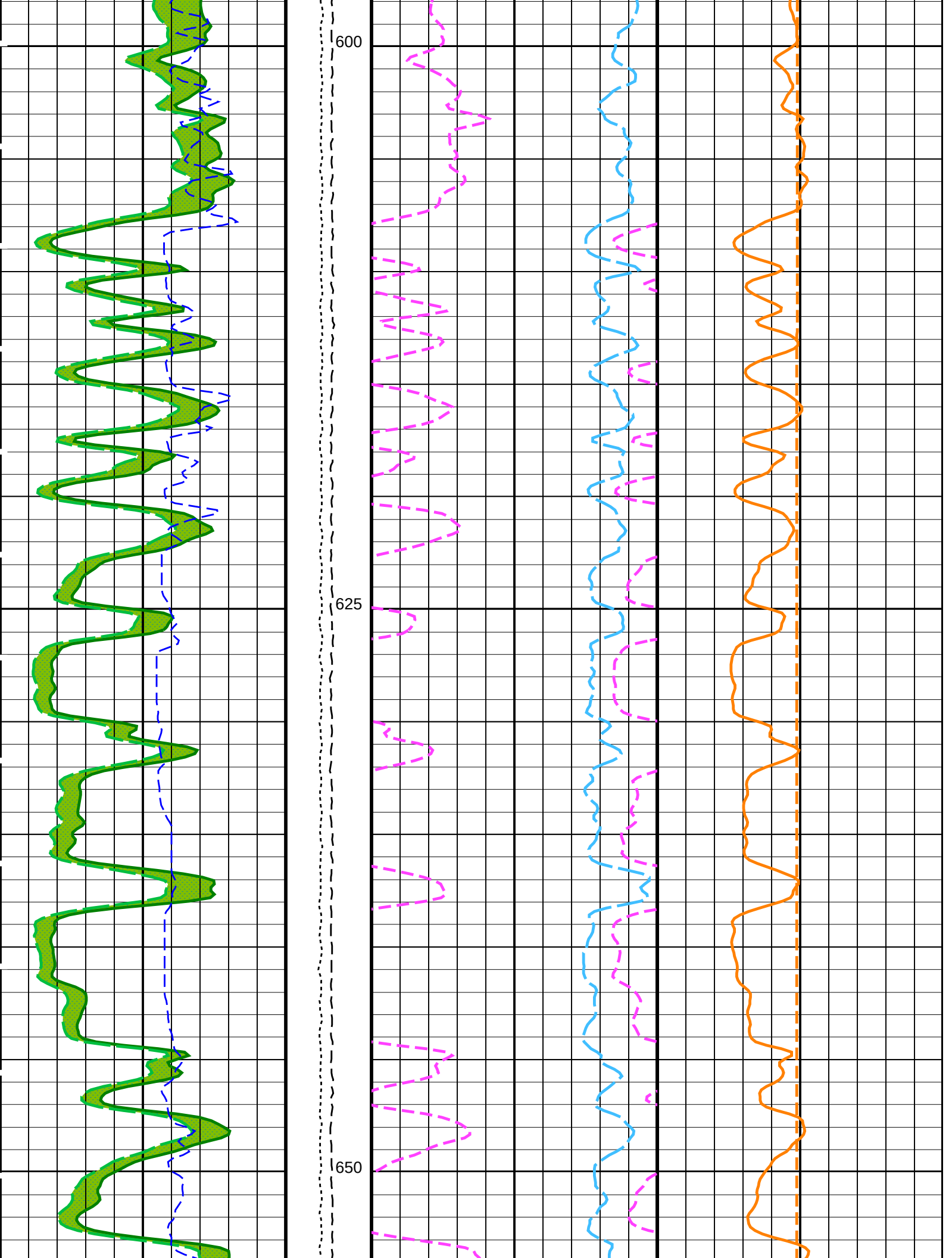

325
350

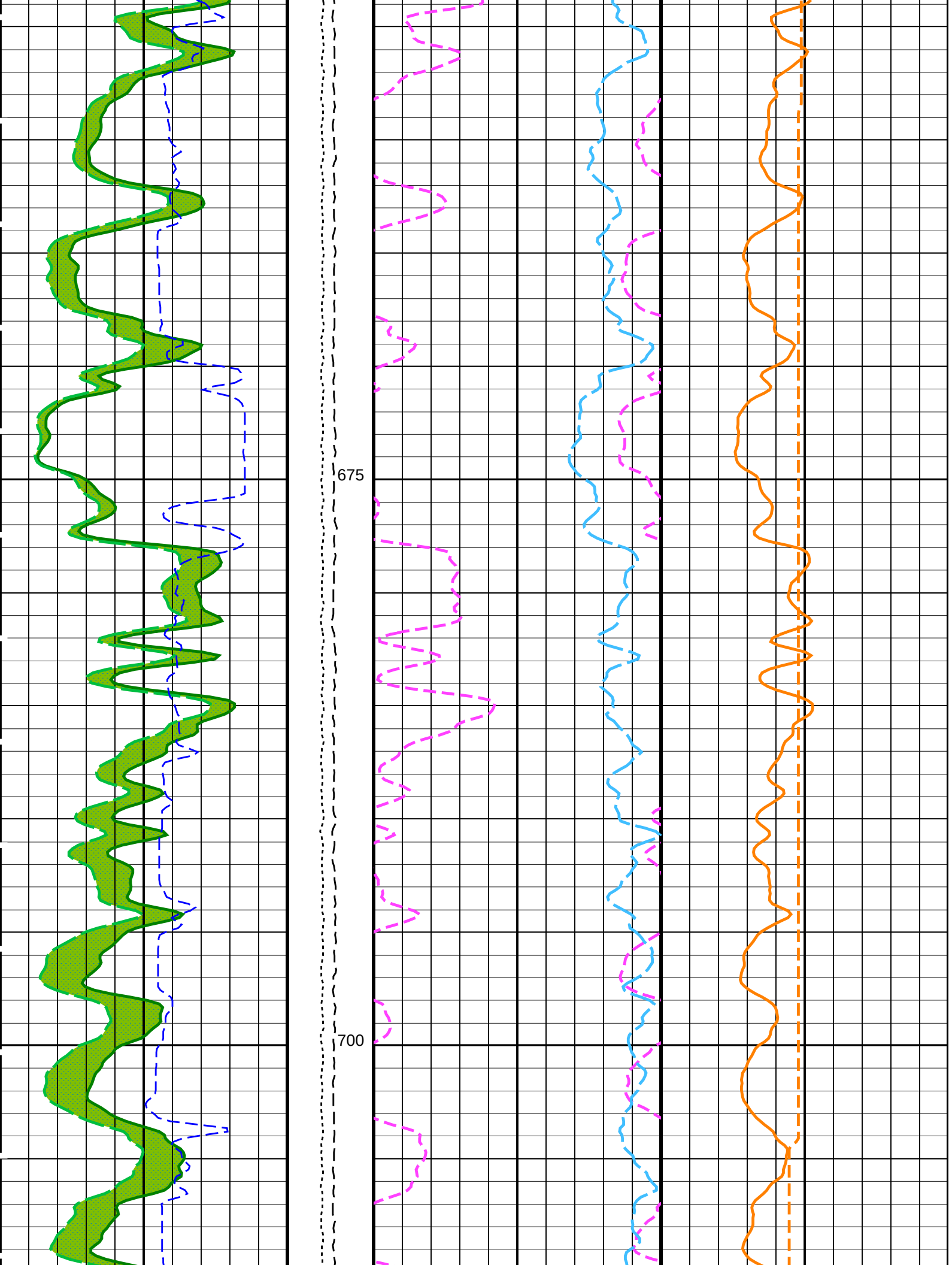

375
400
425

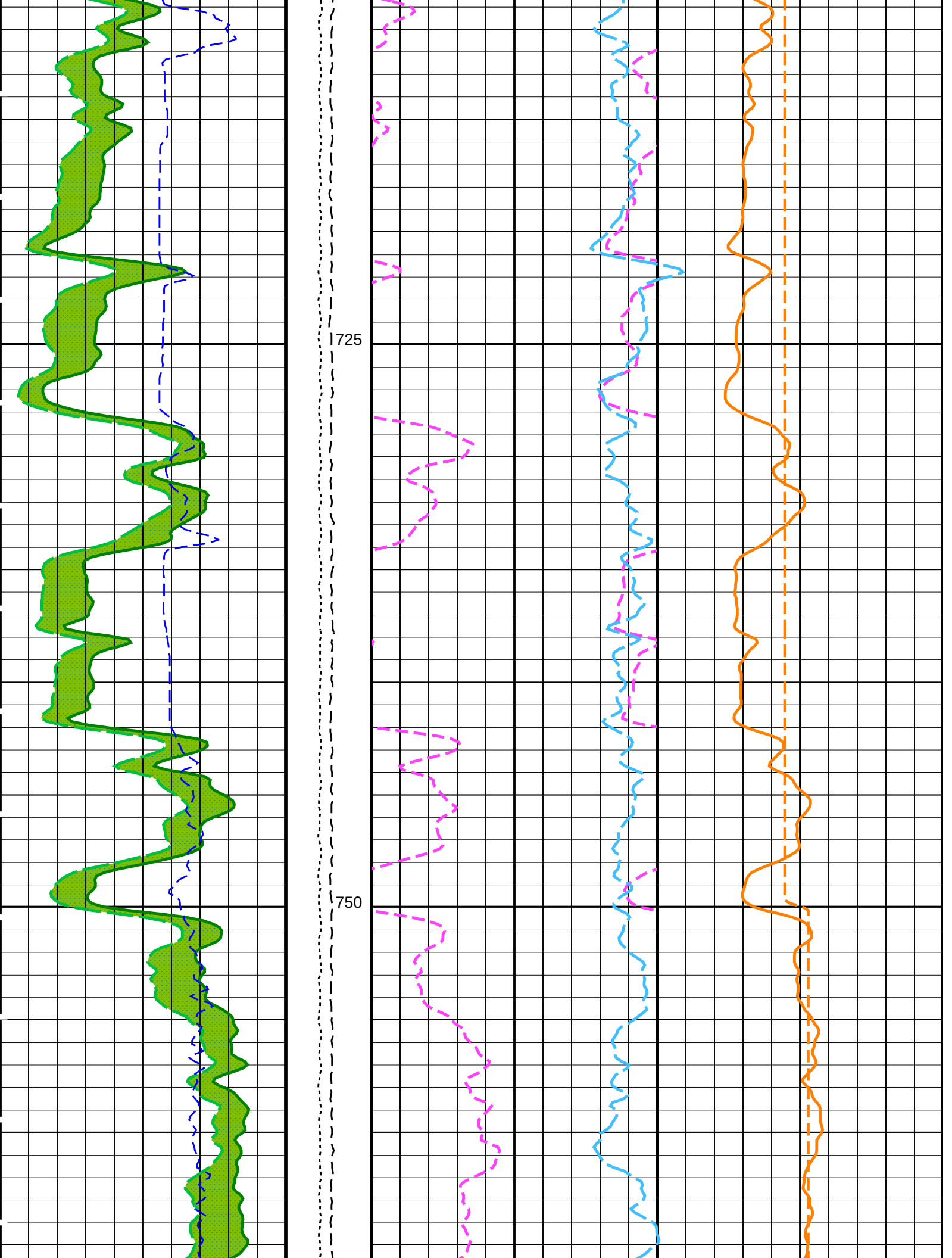

450
475

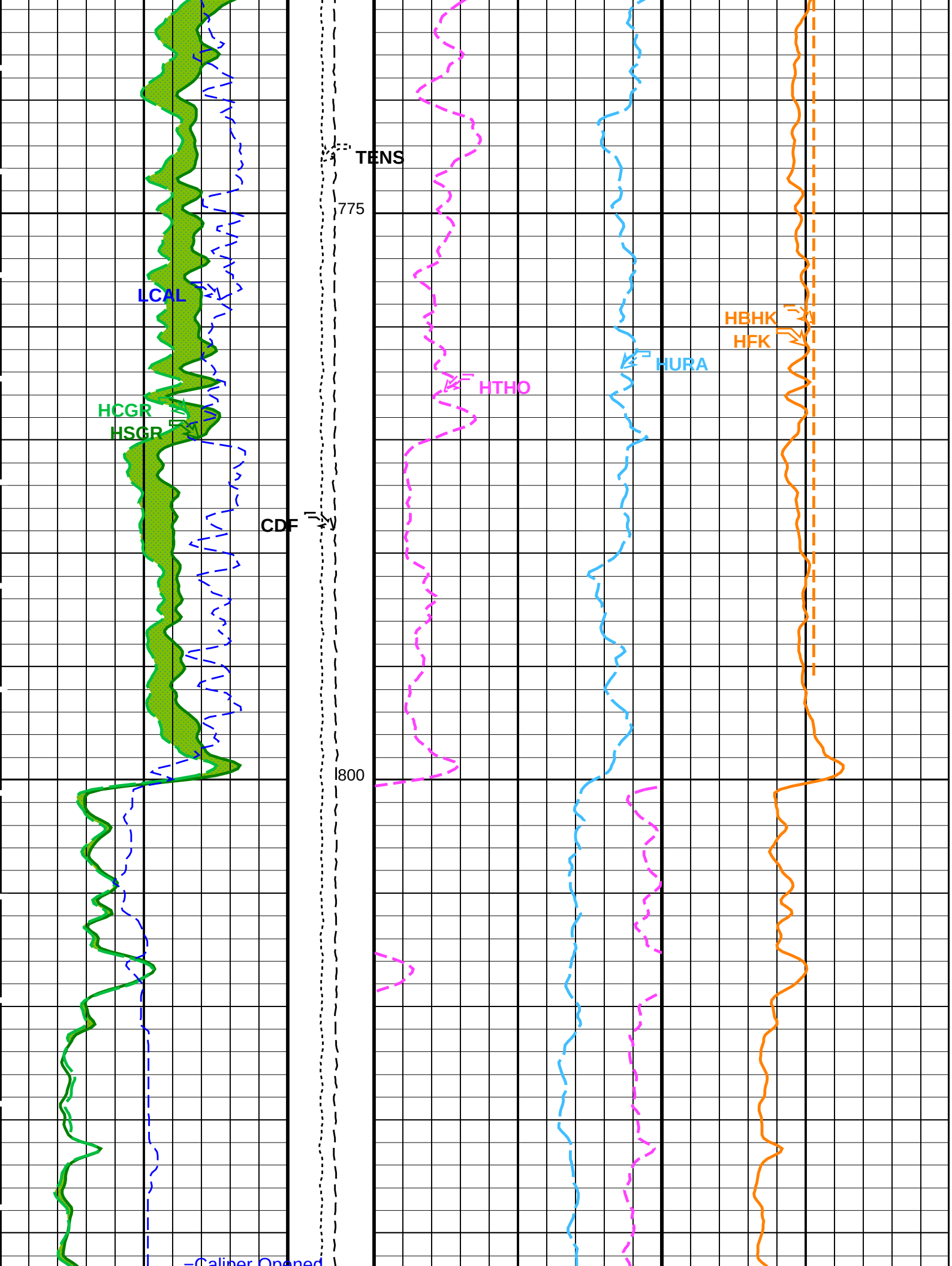

500
525
TENS
LCAL
HCGR
HSGR
CDF
HTHO
HURA
HBHK
HFK

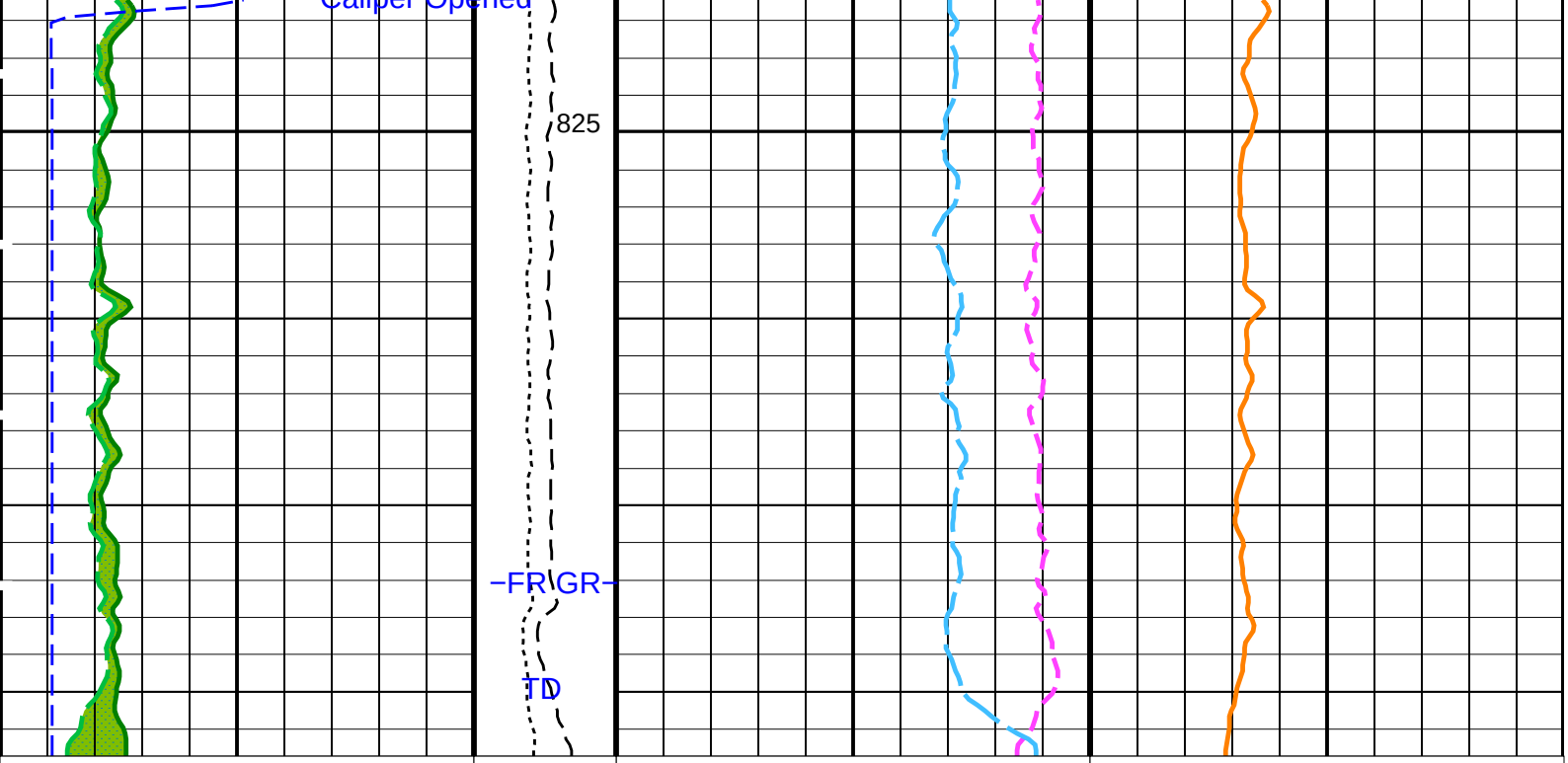

550
575


600
625
650


675
700


725
750


TENS
775
LCAL
HBHK
HFK
HURA
HTHO
HCGR
HSGR
CDF
800
-Caliper Opened



HLDS Caliper (LCAL)
0 (IN) 20

Tension (TENS) (LBF)
10000 0

HNGS Thorium (HTHO)
5 (PPM) 25

HNGS Potassium (HFK)
−0.01 (−−−−) 0.04

HNGS Computed Gamma Ray (HCGR)
0 (GAPI) 100

Calibrated Downhole Force (CDF) (LBF)
3000 0

HNGS Uranium (HURA)
−5 (PPM) 10

Area1
From HCGR to HSGR

Main Uplog, Sea Floor Depth Reference

HNGS Borehole Potassium (HBHK)
−0.05 (−−−−) 0.05

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

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	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	
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	
H1P	HNGS Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGS Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGS Borehole Potassium Running Average	−0.00292136	
HALF	HNGS Alpha Filter Length	60	IN
HCRB	HNGS Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGS Processing Enable	YES	
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	
TPOS	Tool Position	CENT	
VBA1	HNGS Detector 1 Variable Barite Factor Running Average	1.00477	

VBA2	HNGS Detector 2 Variable Barite Factor Running Average	1.0061	
	HRLT−B: High Resolution Laterolog Array − B		
BHS	Borehole Status	OPEN	
GCSE	Generalized Caliper Selection	BS	
	EDTC−B: Enhanced DTS Cartridge		
BHS	Borehole Status	OPEN	
GCSE	Generalized Caliper Selection	BS	
	System and Miscellaneous		
BS	Bit Size	9.875	IN
DO	Depth Offset for Playback	−4395.5	M
PP	Playback Processing	NORMAL	

Format: HNGSYields Vertical Scale: 1:200 Graphics File Created: 18−Mar−2014 13:53

OP System Version: 19C0−187

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

Input DLIS Files

DEFAULT	NGS_HRLA_LDL_018PUP	FN:24	PRODUCER	18−Mar−2014 13:12	5237.2 M	4384.2 M

Output DLIS Files

DEFAULT	NGS_HRLA_LDL_022PUP	FN:32	PRODUCER	18−Mar−2014 13:53		
BACKUP	NGS_HRLA_LDL_022PUP	FN:33	PRODUCER	18−Mar−2014 13:53		

Input DLIS Files

DEFAULT	NGS_HRLA_LDL_017PUP	FN:22	PRODUCER	18−Mar−2014 13:10	5226.4 M	4329.7 M

Output DLIS Files

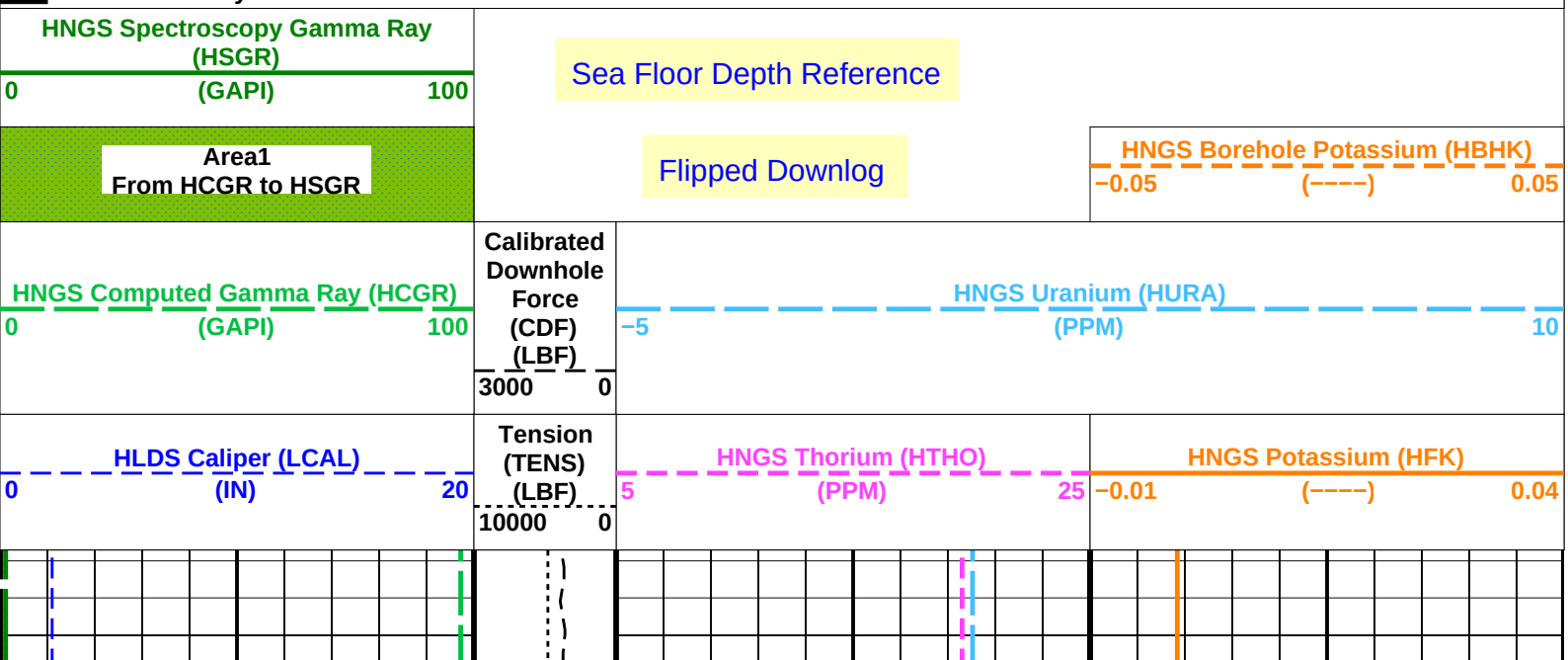
DEFAULT	NGS_HRLA_LDL_021PUP	FN:30	PRODUCER	18−Mar−2014 13:50	839.7 M	−57.3 M
BACKUP	NGS_HRLA_LDL_021PUP	FN:31	PRODUCER	18−Mar−2014 13:50	839.7 M	−57.3 M

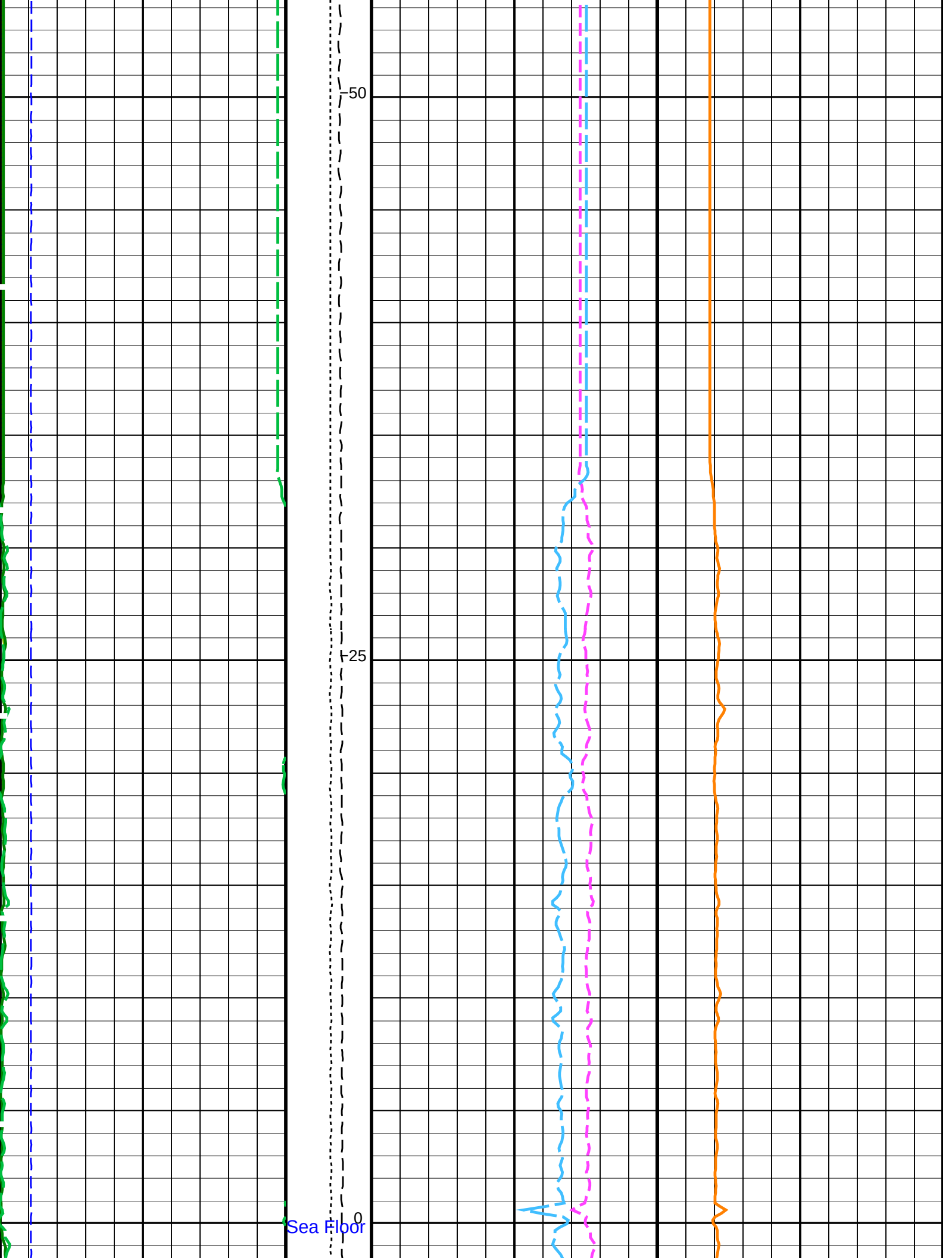
OP System Version: 19C0−187

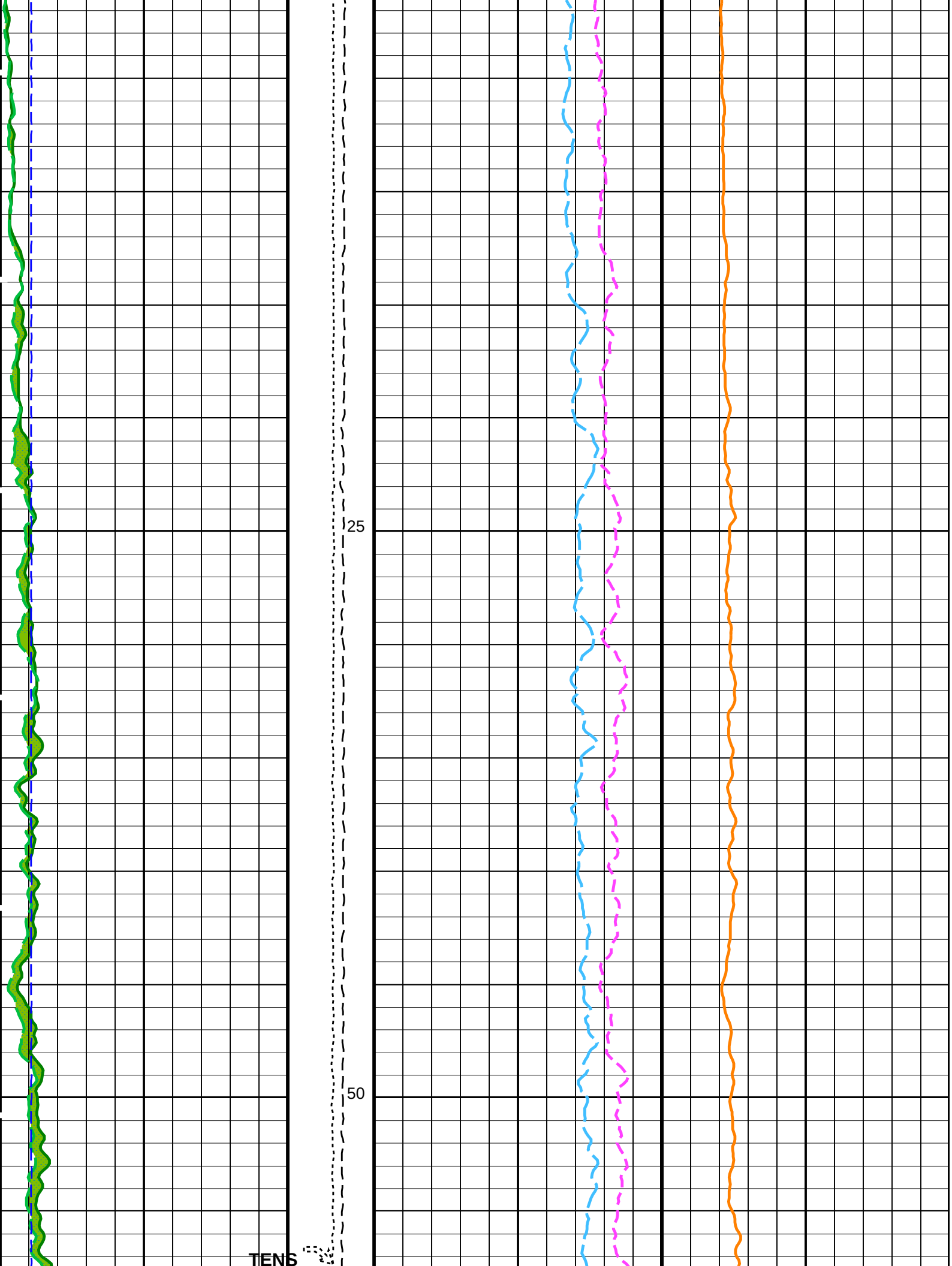
HNGC−B	19C0−187	HNGS−BA	19C0−187
HRLT−B	19C0−187	HLDS	19C0−187
LDSC−B	19C0−187	EDTC−B	SKK−5169−EDTCB

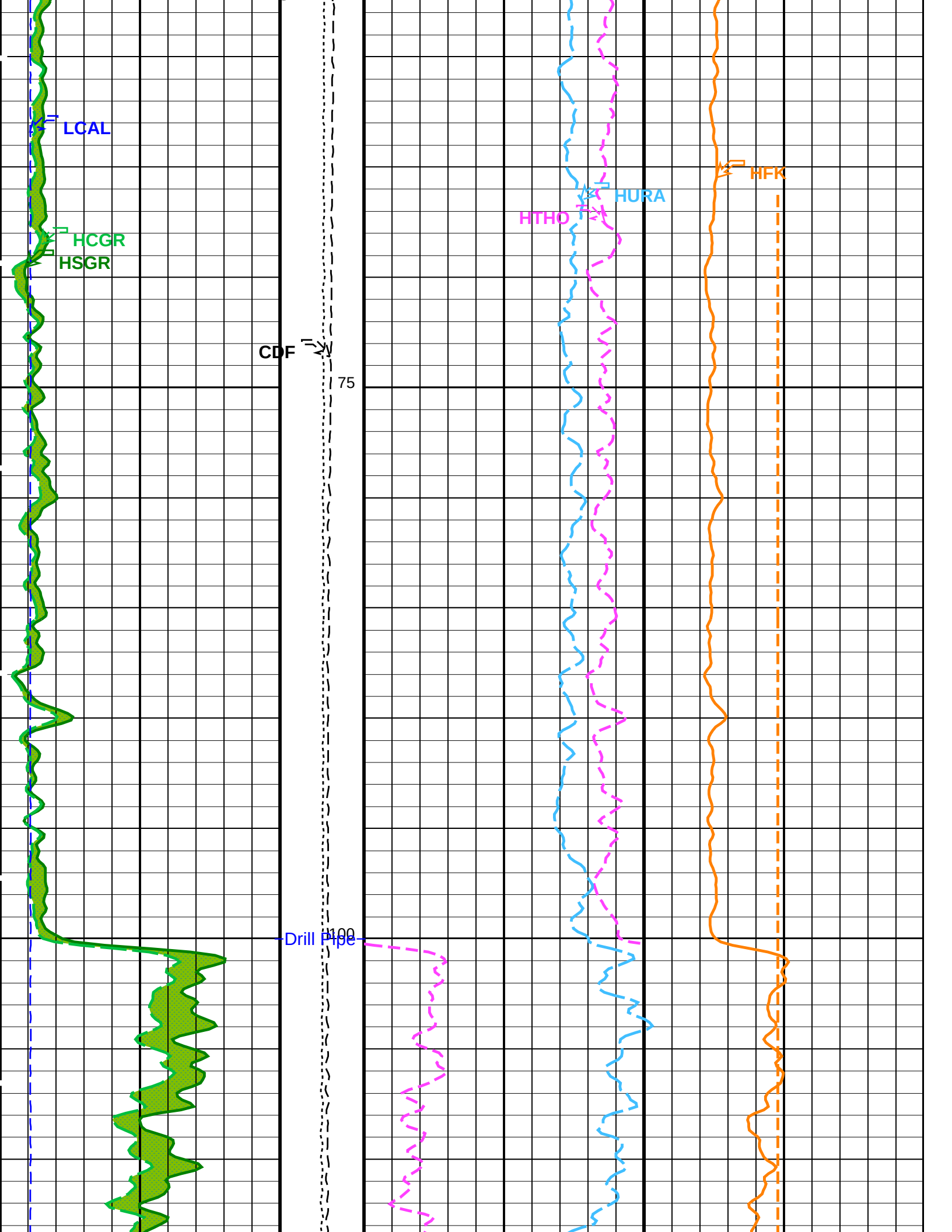
PIP SUMMARY

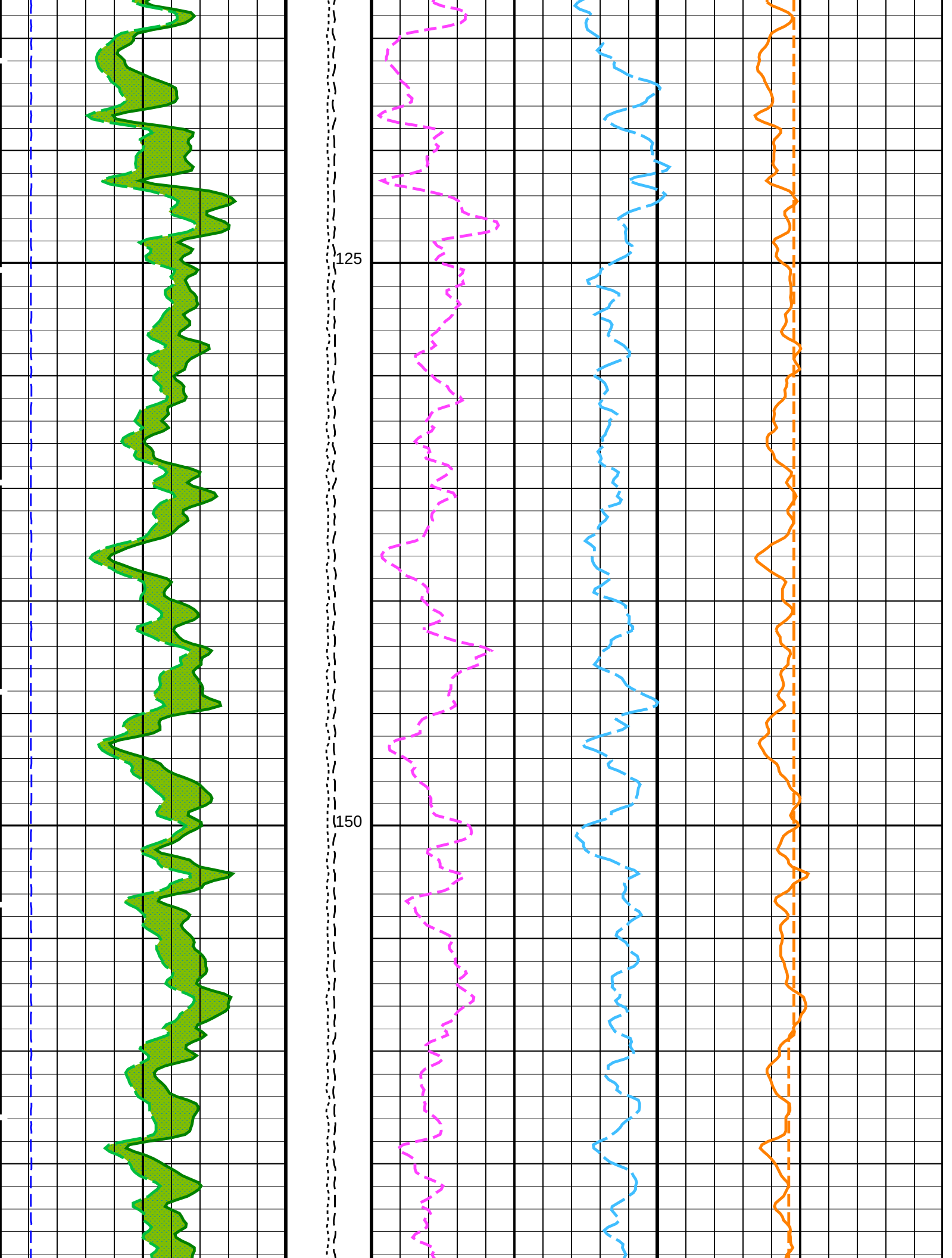
Time Mark Every 60 S

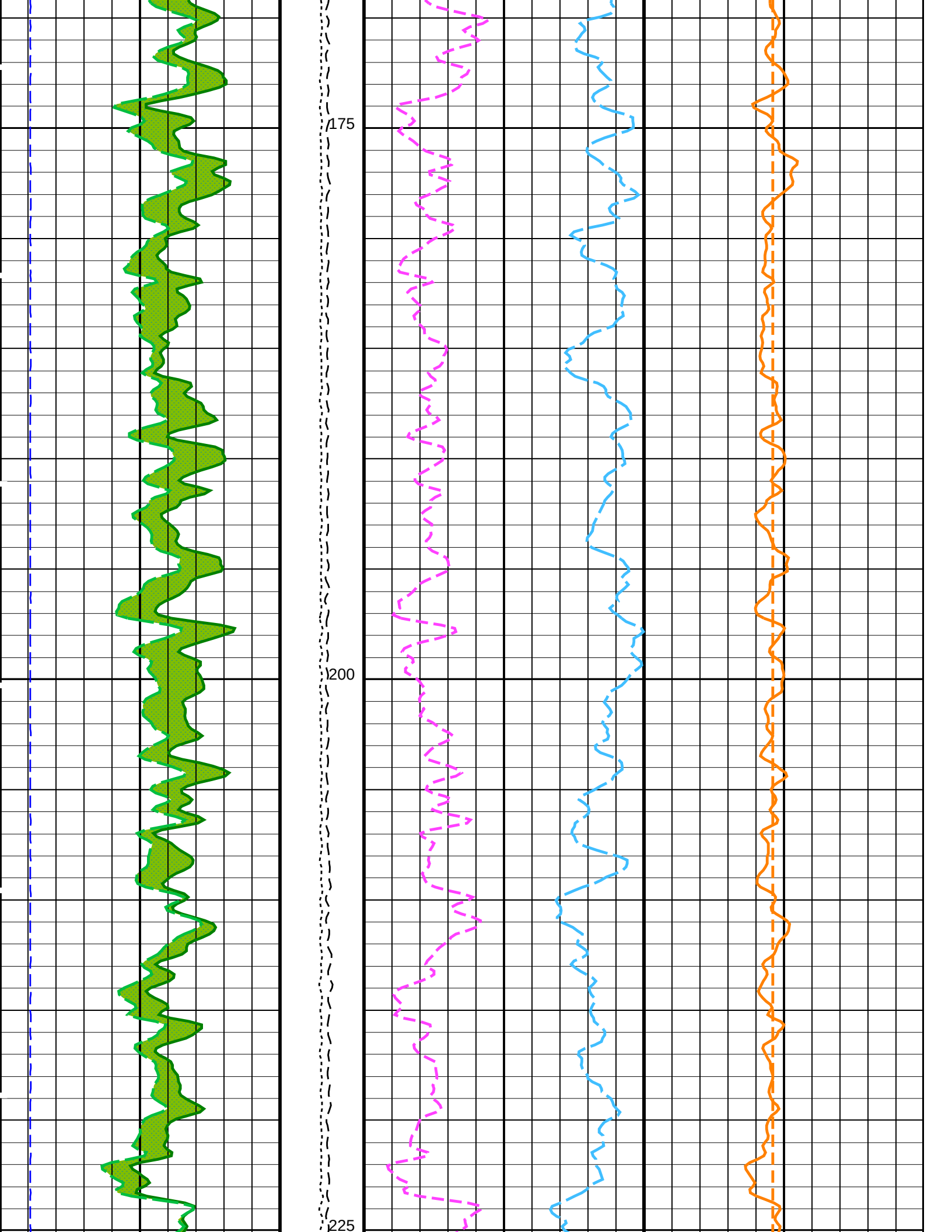


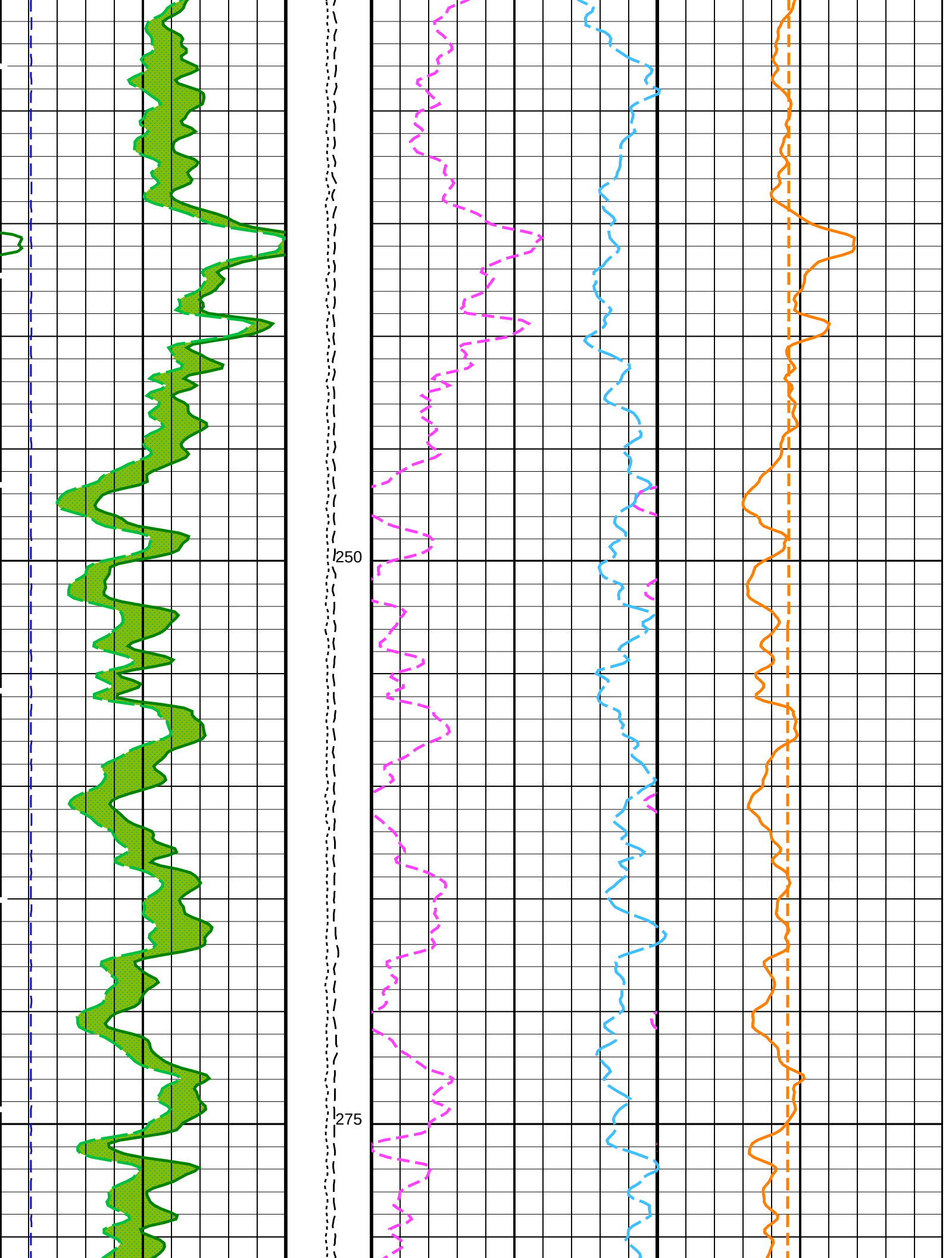

50
25
0
Sea Floor

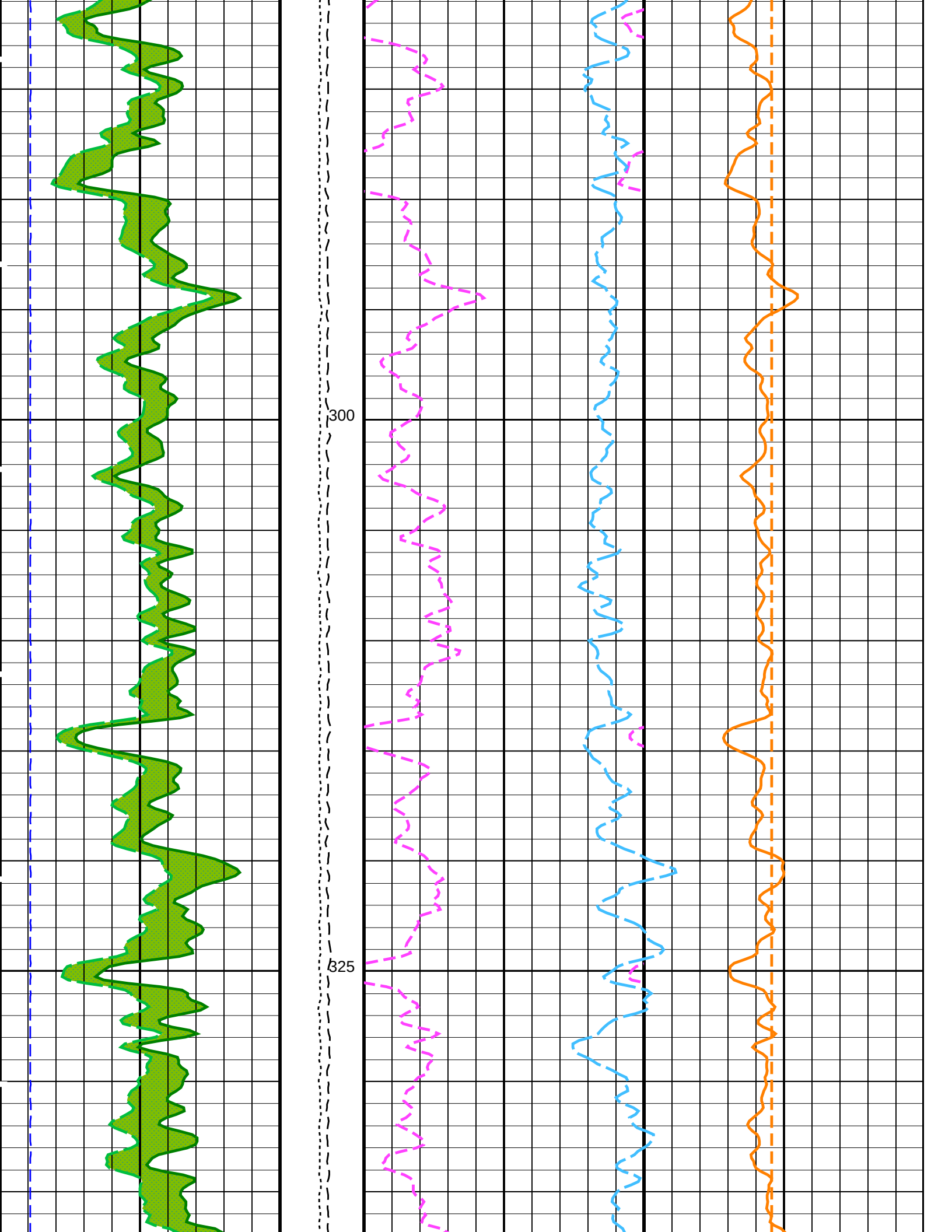

25
50
TENS

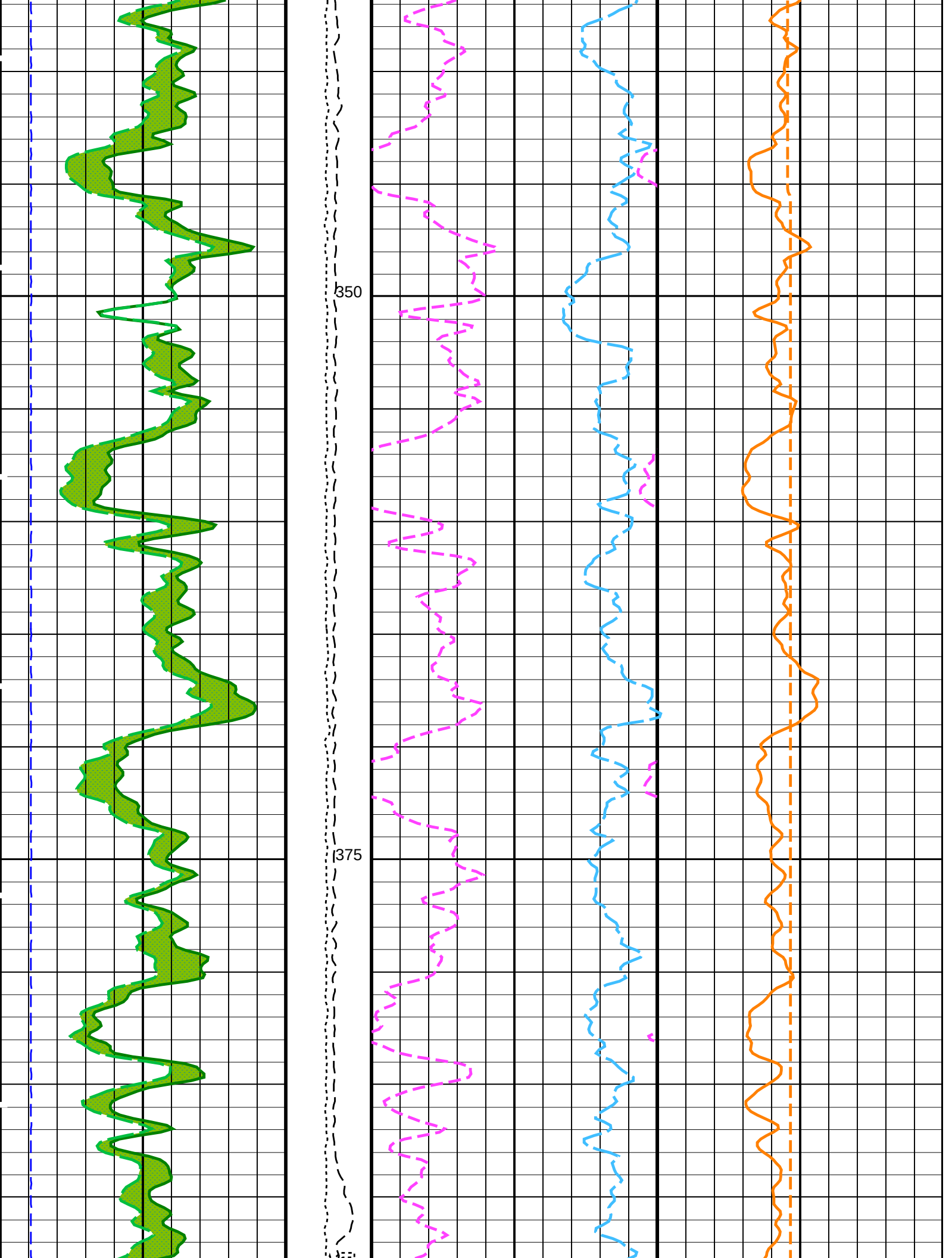

LCAL
HCGR
HSGR
CDF
75
HTHO
HURA
HFK
Drill Pipe
100

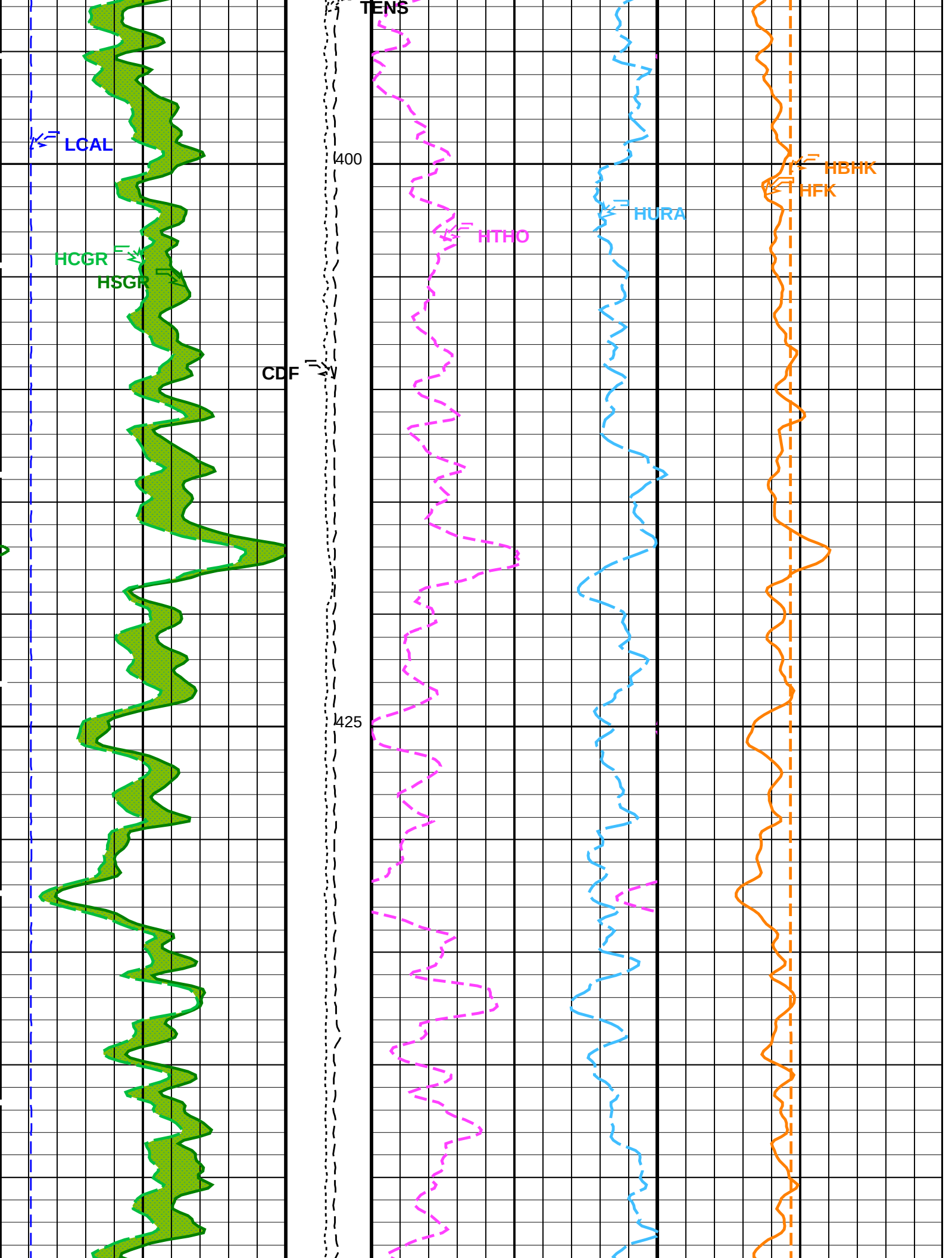

125
150

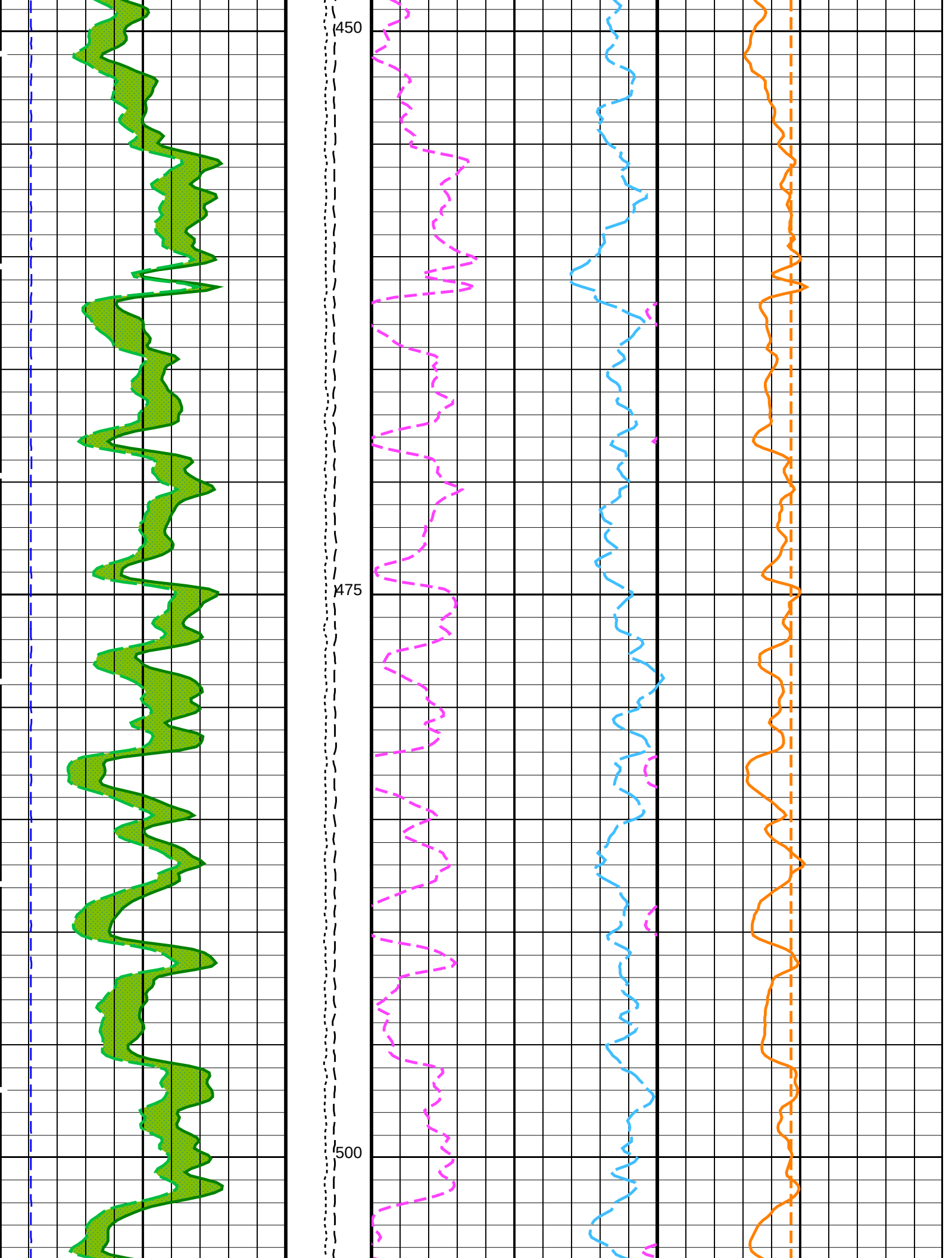

175
200
225

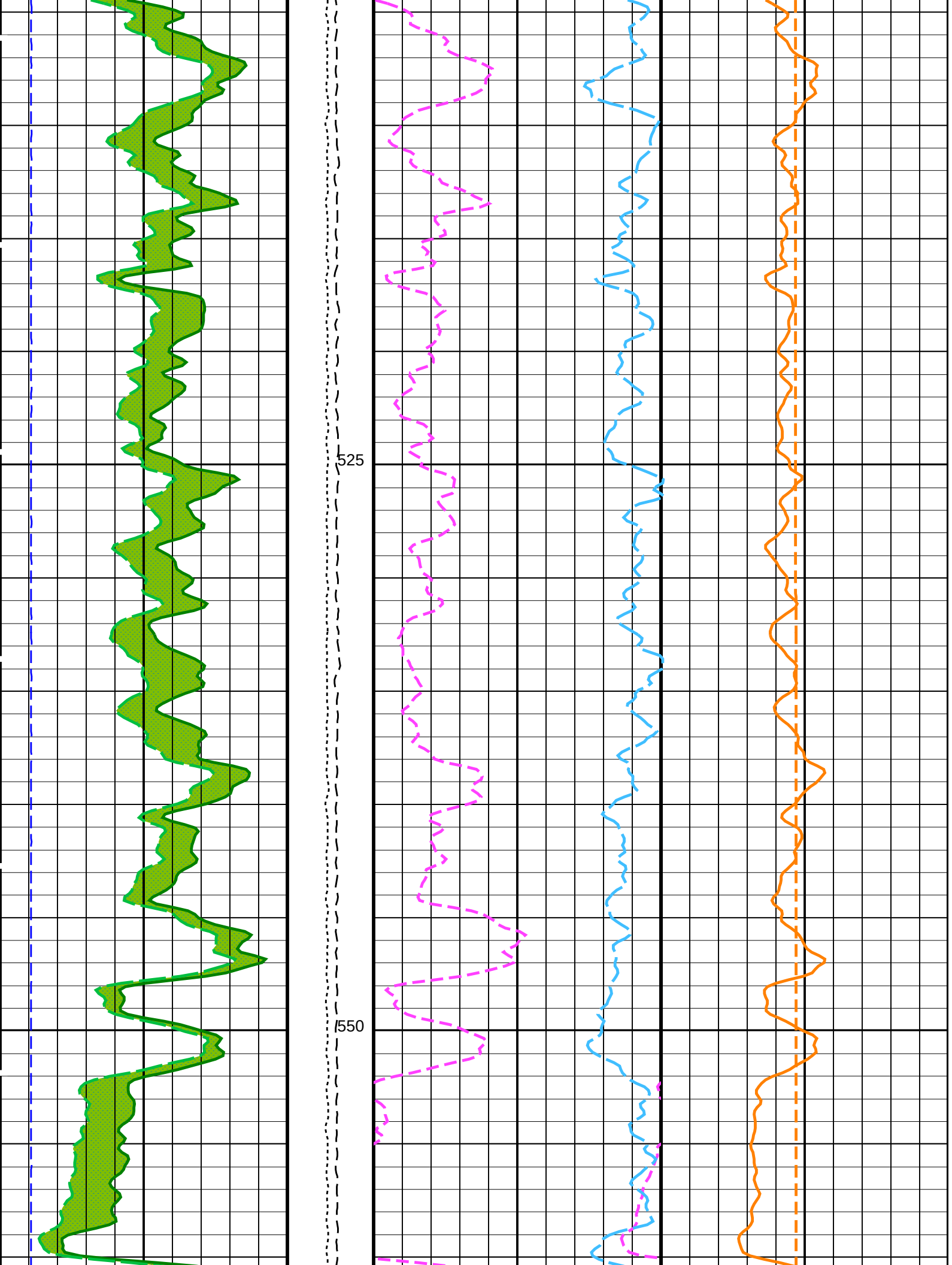

250
275

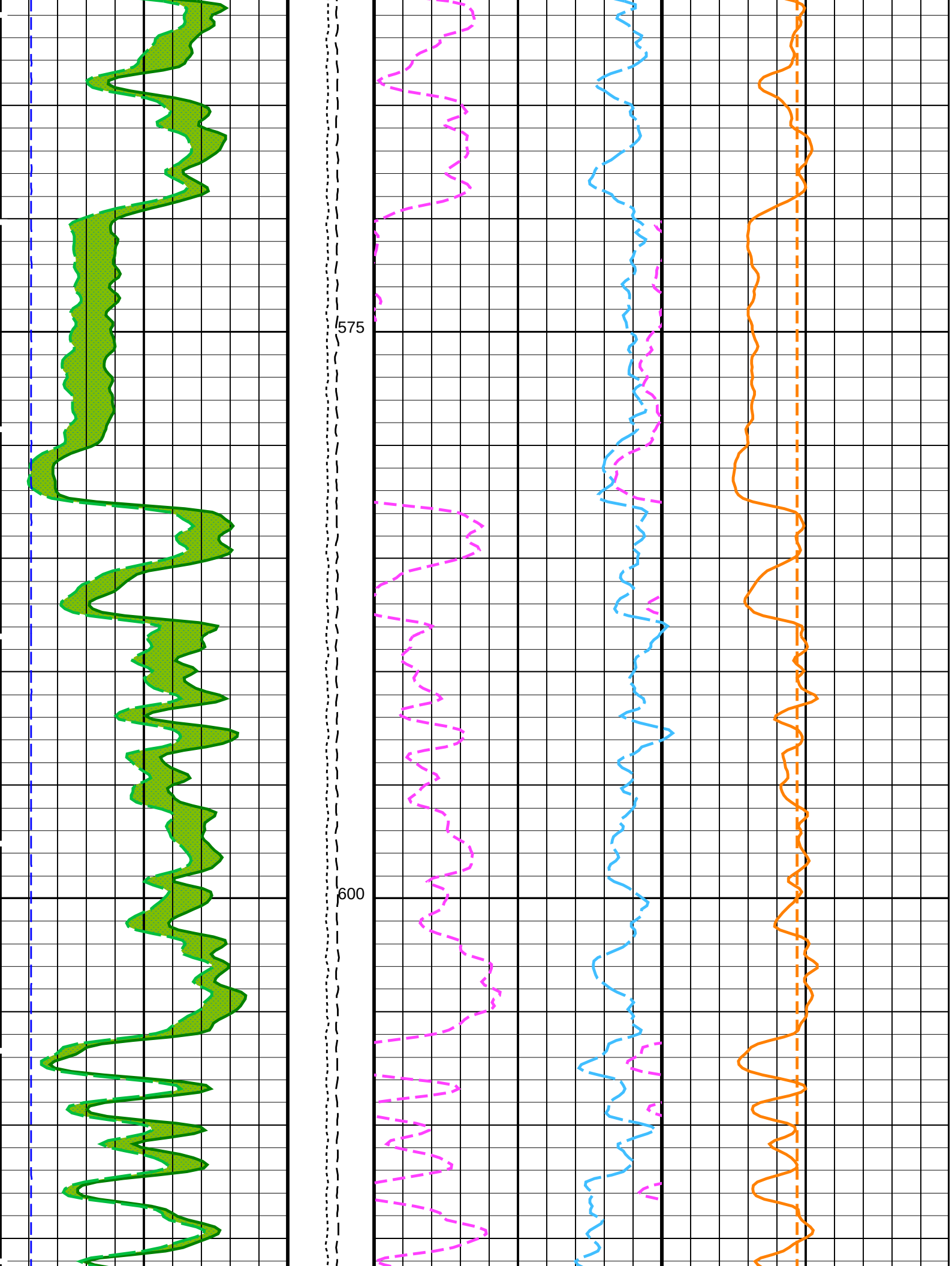

300
325

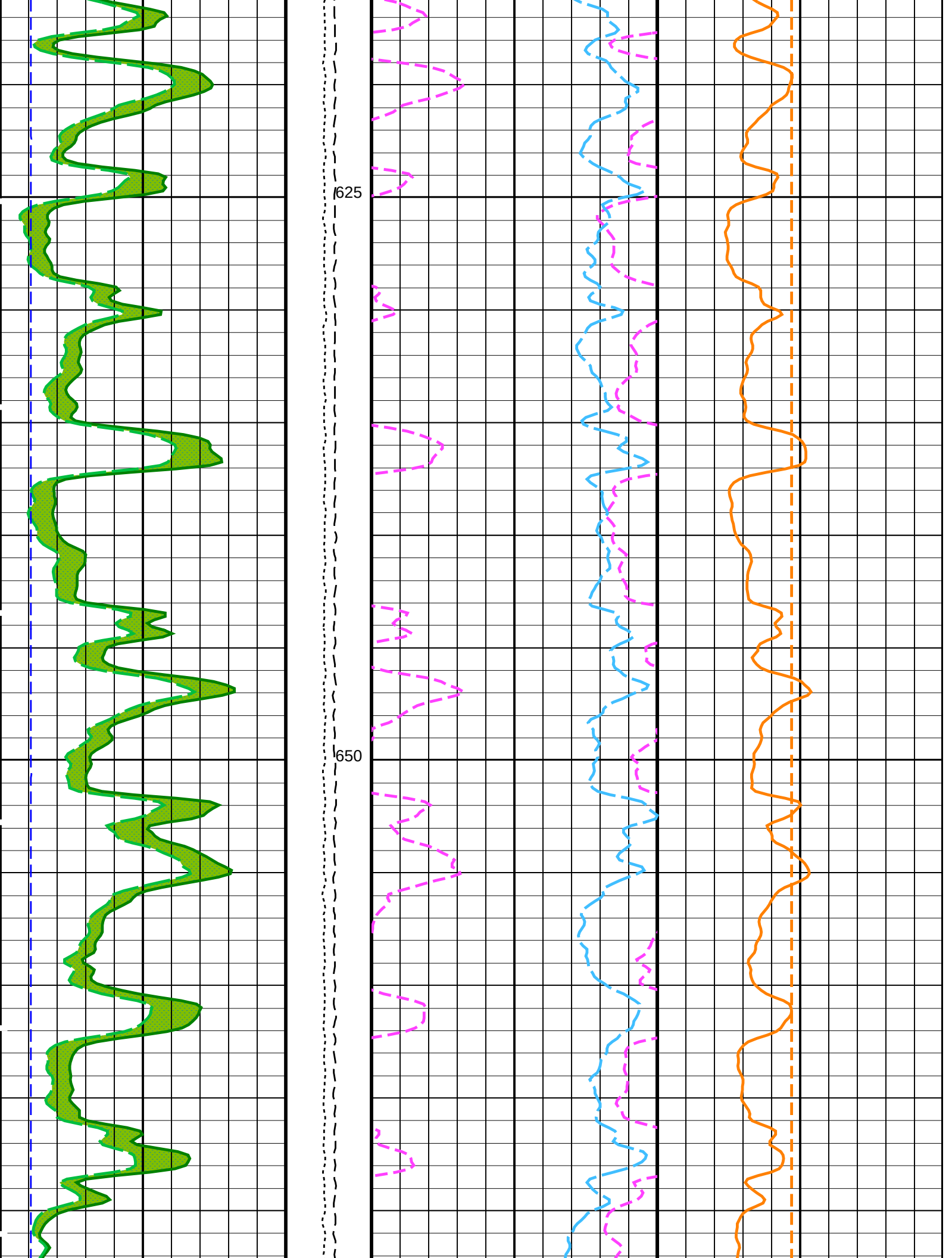

350
375

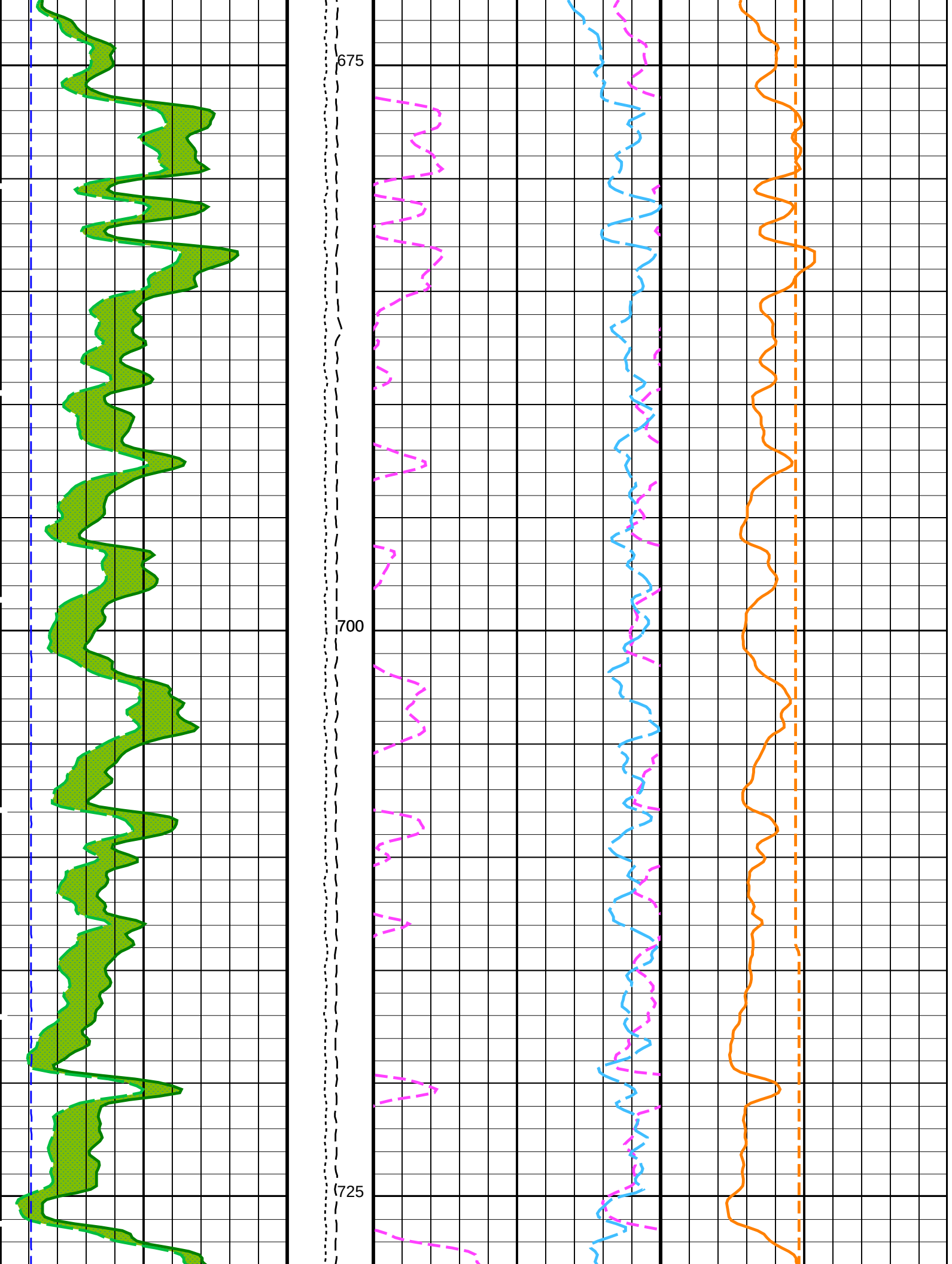

TENS
LCAL
400
HBHK
HFK
HURA
HTHO
HCGR
HSGR
CDF
425

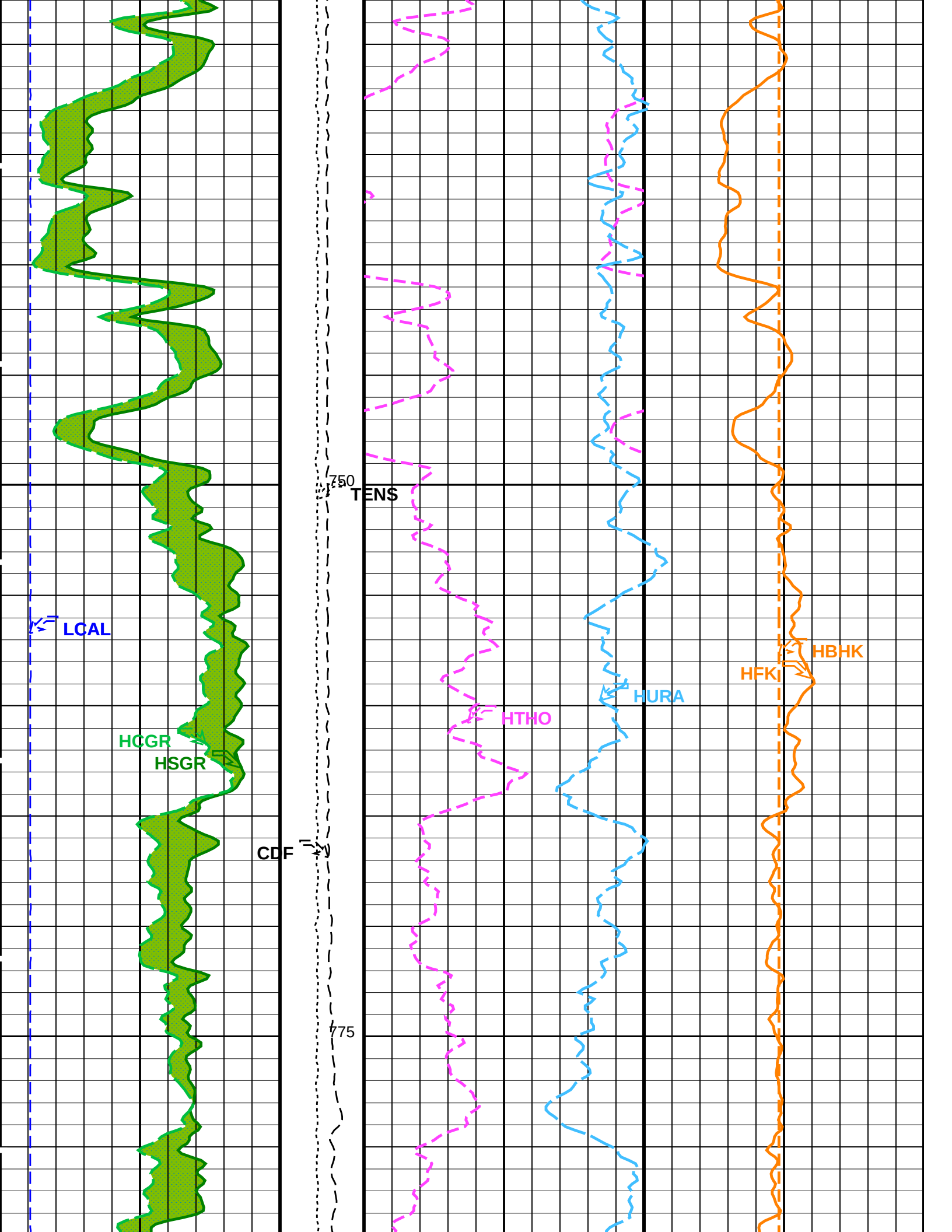

450
475
500

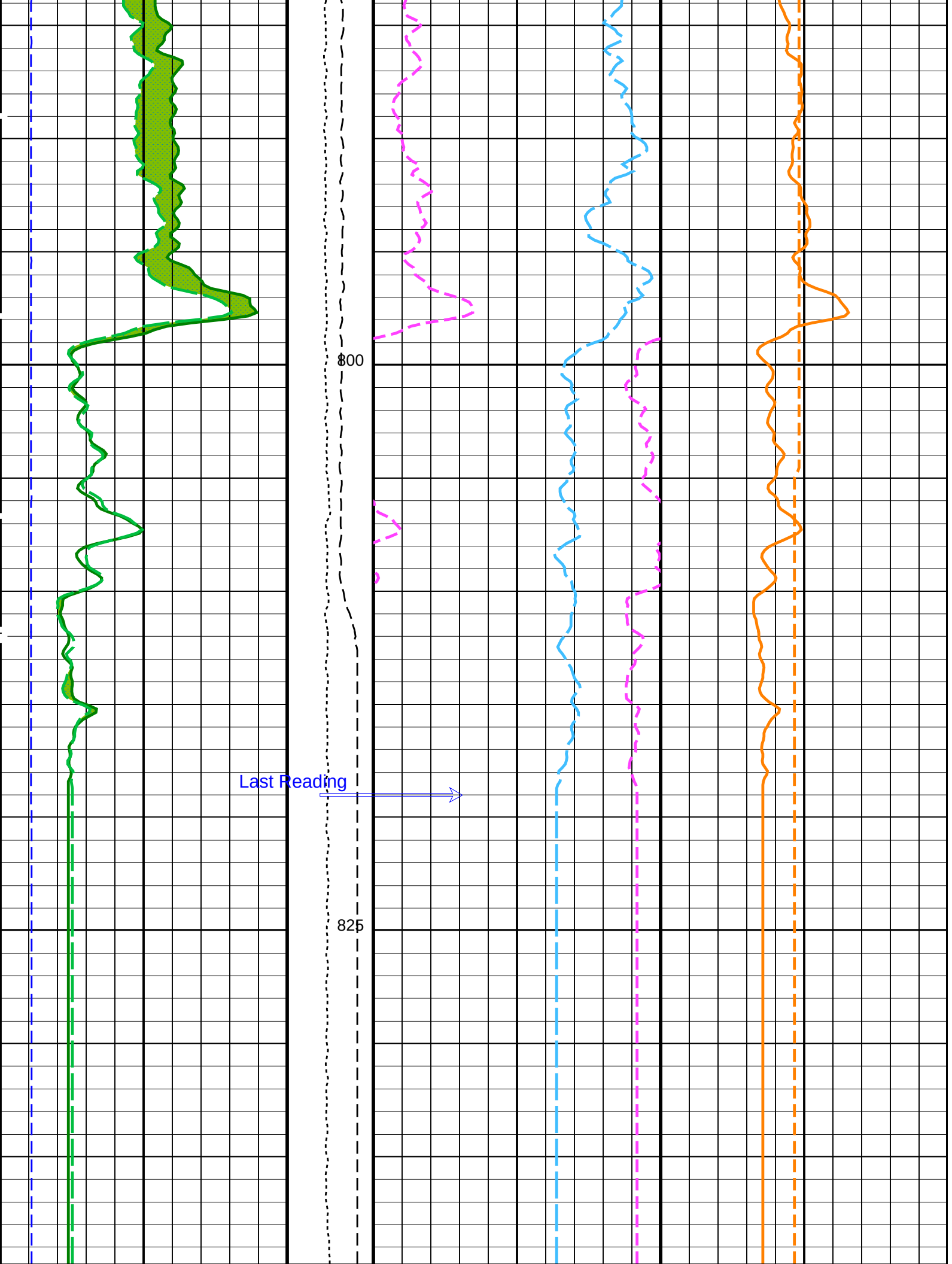

525
550

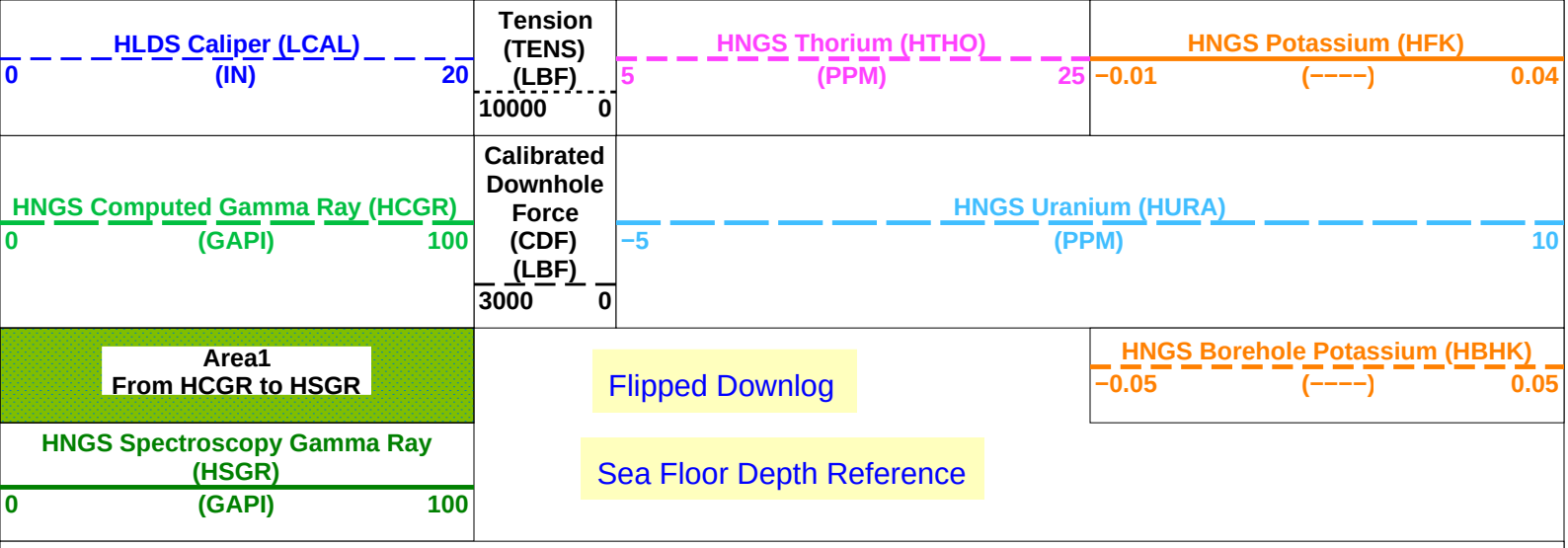

575
600


625
650


675
700
725


750
TENS
LCAL
HCGR
HSGR
CDF
HTHO
HURA
HFK
HBHK
775


800
Last Reading
825



PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	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	
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	
H1P	HNGS Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGS Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGS Borehole Potassium Running Average	−0.00292136	
HALF	HNGS Alpha Filter Length	60	IN
HCRB	HNGS Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGS Processing Enable	YES	
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	
TPOS	Tool Position	CENT	
VBA1	HNGS Detector 1 Variable Barite Factor Running Average	1.00477	
VBA2	HNGS Detector 2 Variable Barite Factor Running Average	1.0061	
	HRLT−B: High Resolution Laterolog Array − B		
BHS	Borehole Status	OPEN	
GCSE	Generalized Caliper Selection	BS	
	EDTC−B: Enhanced DTS Cartridge		
BHS	Borehole Status	OPEN	
GCSE	Generalized Caliper Selection	BS	
	System and Miscellaneous		
BS	Bit Size	9.875	IN
DO	Depth Offset for Playback	−4387.0	M
PP	Playback Processing	NORMAL	

Format: HNGSYields **Vertical Scale: 1:200** **Graphics File Created: 18−Mar−2014 13:50**

OP System Version: 19C0−187

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

Input DLIS Files

DEFAULT	NGS_HRLA_LDL_017PUP	FN:22	PRODUCER	18−Mar−2014 13:10	5226.4 M	4329.7 M

Output DLIS Files

DEFAULT	NGS_HRLA_LDL_021PUP	FN:30	PRODUCER	18−Mar−2014 13:50		

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
Hostile Natural Gamma Ray Sonde Wellsite Calibration − Detector 1 Check							
Master: 4−Feb−2014 23:51 Before: 5−Feb−2014 0:02 After: 14−Feb−2014 22:49							
Na 511 Peak Loc	40.00	39.52	39.48	39.40	−0.08661	1.000	
Na 511 Peak Res	15.50	15.96	16.77	17.49	0.7250	2.000	%
High Voltage	1150	1194	1193	1178	−14.73	N/A	V
Na 1785 Peak Loc	142.6	142.1	141.8	143.3	1.589	7.000	
Na 1785 Peak Res	8.500	9.703	8.709	9.053	0.3436	2.000	%
Temperature	15.50	35.74	35.71	29.22	−6.490	N/A	DEGC
Na Count Rate	45.00	11.77	12.16	12.00	−0.1618	8.000	CPS
Hostile Natural Gamma Ray Sonde Wellsite Calibration − Detector 2 Check							
Master: 4−Feb−2014 23:51 Before: 5−Feb−2014 0:02 After: 14−Feb−2014 22:49							
Na 511 Peak Loc	40.00	39.56	39.51	39.31	−0.1972	1.000	
Na 511 Peak Res	15.50	16.07	16.56	18.46	1.905	2.000	%
High Voltage	1150	1126	1128	1111	−16.18	N/A	V
Na 1785 Peak Loc	142.6	142.3	143.1	141.7	−1.305	7.000	
Na 1785 Peak Res	8.500	8.959	9.953	9.256	−0.6973	2.000	%
Temperature	15.50	36.60	36.88	30.79	−6.093	N/A	DEGC
Na Count Rate	45.00	12.28	12.68	12.14	−0.5404	8.000	CPS
Hostile Natural Gamma Ray Sonde Wellsite Calibration − Ratio Of Detector 1 To Detector 2							
Master: 4−Feb−2014 23:51 Before: 5−Feb−2014 0:02 After: 14−Feb−2014 22:49							
Coincidence Count Rate Ratio	1.000	0.9624	0.9606	0.9838	0.02323	0.05000	
Hostile Natural Gamma Ray Sonde Master Calibration − Detector 1 Calibration							
Master: 4−Feb−2014 20:09							
Na 511 Peak Set Point	40.00	41.00	−−	−−	−−	−−	
Th Peak Loc	209.6	210.4	−−	−−	−−	−−	
Th Peak Res	7.000	7.207	−−	−−	−−	−−	%
Background Count Rate	142.5	16.20	−−	−−	−−	−−	CPS
Gain Ratio	1.000	1.012	−−	−−	−−	−−	
Hostile Natural Gamma Ray Sonde Master Calibration − Detector 2 Calibration							
Master: 4−Feb−2014 20:09							
Na 511 Peak Set Point	40.00	41.00	−−	−−	−−	−−	
Th Peak Loc	209.6	208.9	−−	−−	−−	−−	
Th Peak Res	7.000	7.337	−−	−−	−−	−−	%
Background Count Rate	142.5	16.52	−−	−−	−−	−−	CPS
Gain Ratio	1.000	1.004	−−	−−	−−	−−	
High Resolution Laterolog Array − B Wellsite Calibration − HRLT M01							
Before: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41							
HRLT M0−M1 Voltage Plus − 0	0	N/A	−319.0	−319.3	−0.3503	9.681	UV
HRLT M0−M1 Voltage Plus − 1	0	N/A	−331.8	−335.6	−3.834	9.681	UV
HRLT M0−M1 Voltage Plus − 2	0	N/A	−333.5	−336.0	−2.552	9.681	UV
HRLT M0−M1 Voltage Plus − 3	0	N/A	−337.1	−339.4	−2.229	9.681	UV
HRLT M0−M1 Voltage Plus − 4	0	N/A	−325.8	−327.0	−1.148	9.681	UV
HRLT M0−M1 Voltage Plus − 5	0	N/A	−322.0	−323.0	−0.9915	9.681	UV
HRLT M0−M1 Voltage Plus − 6	0	N/A	321.9	326.3	4.420	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41							
HRLT M1−M2 Voltage Plus − 0	0	N/A	1754	1755	1.182	53.42	UV
HRLT M1−M2 Voltage Plus − 1	0	N/A	1826	1847	21.22	53.42	UV
HRLT M1−M2 Voltage Plus − 2	0	N/A	1829	1843	13.83	53.42	UV
HRLT M1−M2 Voltage Plus − 3	0	N/A	1848	1860	11.55	53.42	UV
HRLT M1−M2 Voltage Plus − 4	0	N/A	1786	1791	5.250	53.42	UV
HRLT M1−M2 Voltage Plus − 5	0	N/A	1766	1770	3.955	53.42	UV
HRLT M1−M2 Voltage Plus − 6	0	N/A	−1779	−1805	−25.27	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41							
HRLT M2−M3 Voltage Plus − 0	0	N/A	1739	1741	1.428	53.42	UV
HRLT M2−M3 Voltage Plus − 1	0	N/A	1823	1844	21.04	53.42	UV
HRLT M2−M3 Voltage Plus − 2	0	N/A	1828	1841	13.37	53.42	UV
HRLT M2−M3 Voltage Plus − 3	0	N/A	1851	1862	11.76	53.42	UV
HRLT M2−M3 Voltage Plus − 4	0	N/A	1782	1787	5.438	53.42	UV
HRLT M2−M3 Voltage Plus − 5	0	N/A	1763	1767	4.339	53.42	UV

HRLT M2−M3 Voltage Plus − 6	0	N/A	−1766	−1791	−24.53	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT A3−A4 Voltage Plus − 0	0	N/A	68400	68480	77.78	2100	UV
HRLT A3−A4 Voltage Plus − 1	0	N/A	71470	72330	854.0	2100	UV
HRLT A3−A4 Voltage Plus − 2	0	N/A	71970	72500	531.6	2100	UV
HRLT A3−A4 Voltage Plus − 3	0	N/A	73100	73600	501.7	2100	UV
HRLT A3−A4 Voltage Plus − 4	0	N/A	70390	70610	223.9	2100	UV
HRLT A3−A4 Voltage Plus − 5	0	N/A	69620	69810	183.2	2100	UV
HRLT A3−A4 Voltage Plus − 6	0	N/A	−68260	−69230	−969.1	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT A4−A5 Voltage Plus − 0	0	N/A	68680	68760	84.69	2100	UV
HRLT A4−A5 Voltage Plus − 1	0	N/A	71880	72710	833.9	2100	UV
HRLT A4−A5 Voltage Plus − 2	0	N/A	72320	72870	548.8	2100	UV
HRLT A4−A5 Voltage Plus − 3	0	N/A	73440	73950	504.8	2100	UV
HRLT A4−A5 Voltage Plus − 4	0	N/A	70670	70900	225.3	2100	UV
HRLT A4−A5 Voltage Plus − 5	0	N/A	69900	70100	195.5	2100	UV
HRLT A4−A5 Voltage Plus − 6	0	N/A	−68620	−69610	−989.0	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT A5−A6 Voltage Plus − 0	0	N/A	68580	68660	86.56	2100	UV
HRLT A5−A6 Voltage Plus − 1	0	N/A	71600	72430	839.4	2100	UV
HRLT A5−A6 Voltage Plus − 2	0	N/A	72090	72630	537.3	2100	UV
HRLT A5−A6 Voltage Plus − 3	0	N/A	73260	73720	461.5	2100	UV
HRLT A5−A6 Voltage Plus − 4	0	N/A	70540	70780	239.3	2100	UV
HRLT A5−A6 Voltage Plus − 5	0	N/A	69780	69980	190.3	2100	UV
HRLT A5−A6 Voltage Plus − 6	0	N/A	−68350	−69310	−958.7	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT Torpedo−M0 Voltage − 0	0	N/A	−68250	−68330	−79.06	2100	UV
HRLT Torpedo−M0 Voltage − 1	0	N/A	−71920	−72780	−861.5	2100	UV
HRLT Torpedo−M0 Voltage − 2	0	N/A	−72380	−72940	−554.5	2100	UV
HRLT Torpedo−M0 Voltage − 3	0	N/A	−73560	−74040	−484.6	2100	UV
HRLT Torpedo−M0 Voltage − 4	0	N/A	−70740	−70970	−229.8	2100	UV
HRLT Torpedo−M0 Voltage − 5	0	N/A	−69950	−70130	−178.7	2100	UV
HRLT Torpedo−M0 Voltage − 6	0	N/A	68620	69610	982.9	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT Bridle#9−M0 Voltage − 0	0	N/A	−68240	−68320	−79.68	2100	UV
HRLT Bridle#9−M0 Voltage − 1	0	N/A	−71890	−72770	−876.3	2100	UV
HRLT Bridle#9−M0 Voltage − 2	0	N/A	−72350	−72910	−560.8	2100	UV
HRLT Bridle#9−M0 Voltage − 3	0	N/A	−73520	−74020	−492.6	2100	UV
HRLT Bridle#9−M0 Voltage − 4	0	N/A	−70720	−70970	−246.4	2100	UV
HRLT Bridle#9−M0 Voltage − 5	0	N/A	−69950	−70130	−180.5	2100	UV
HRLT Bridle#9−M0 Voltage − 6	0	N/A	68600	69580	985.4	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT Source Current Plus − 0	0	N/A	284.6	284.9	0.3229	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: 18−Mar−2014 10:09 After: 18−Mar−2014 13:41

HRLT Vertical Voltage Pl − 0	0	N/A	−321.6	−321.6	0.01349	9.681	UV
HRLT Vertical Voltage Pl − 1	0	N/A	−326.7	−330.2	−3.518	9.681	UV
HRLT Vertical Voltage Pl − 2	0	N/A	−327.2	−329.7	−2.427	9.681	UV
HRLT Vertical Voltage Pl − 3	0	N/A	−329.1	−331.0	−1.846	9.681	UV
HRLT Vertical Voltage Pl − 4	0	N/A	−315.2	−316.0	−0.7322	9.681	UV
HRLT Vertical Voltage Pl − 5	0	N/A	−326.5	−327.0	−0.5164	9.681	UV
HRLT Vertical Voltage Pl − 6	0	N/A	329.7	334.2	4.464	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: 18−Jan−2014 7:12 Before: 7−Feb−2014 4:38 After: 14−Feb−2014 22:48

SS Cs Resolution Bkg	9.000	7.743	7.765	7.784	0.01945	1.800	%
LS Cs Resolution Bkg	9.000	8.077	8.064	7.987	−0.07712	1.800	%
LSW1 Background	100.0	83.87	83.87	83.39	−0.4825	0.03000	CPS
LSW2 Background	100.0	76.15	75.58	75.59	0.01392	0.03000	CPS
LSW3 Background	200.0	173.7	172.8	171.4	−1.385	0.03000	CPS
LSW4 Background	250.0	211.2	209.8	211.2	1.347	0.03000	CPS
LSW5 Background	600.0	497.9	497.1	495.6	−1.479	0.03000	CPS
SSW1 Background	100.0	80.53	80.61	81.41	0.8050	0.03000	CPS
SSW2 Background	200.0	138.8	140.3	139.5	−0.7699	0.03000	CPS
SSW3 Background	500.0	394.3	393.6	391.1	−2.484	0.03000	CPS
SSW4 Background	270.0	209.8	210.8	209.5	−1.301	0.03000	CPS
SSW5 Background	200.0	149.8	150.6	149.0	−1.583	0.03000	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Aluminum Measurement
Master: 18−Jan−2014 8:04

LSW1 Aluminum	600.0	441.7	N/A	N/A	N/A	N/A	CPS
LSW2 Aluminum	900.0	643.8	N/A	N/A	N/A	N/A	CPS
LSW3 Aluminum	1100	765.2	N/A	N/A	N/A	N/A	CPS
LSW4 Aluminum	580.0	389.9	N/A	N/A	N/A	N/A	CPS
LSW5 Aluminum	570.0	349.1	N/A	N/A	N/A	N/A	CPS
SSW1 Aluminum	2800	2085	N/A	N/A	N/A	N/A	CPS
SSW2 Aluminum	8000	5782	N/A	N/A	N/A	N/A	CPS
SSW3 Aluminum	11600	8168	N/A	N/A	N/A	N/A	CPS
SSW4 Aluminum	5000	3220	N/A	N/A	N/A	N/A	CPS
SSW5 Aluminum	660.0	353.1	N/A	N/A	N/A	N/A	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Lithology Measurement
Master: 18−Jan−2014 7:59

LSW1 Iron	400.0	327.2	N/A	N/A	N/A	N/A	CPS
LSW2 Iron	730.0	553.4	N/A	N/A	N/A	N/A	CPS
LSW3 Iron	1000	724.2	N/A	N/A	N/A	N/A	CPS
LSW4 Iron	520.0	374.0	N/A	N/A	N/A	N/A	CPS
LSW5 Iron	470.0	335.9	N/A	N/A	N/A	N/A	CPS
SSW1 Iron	2100	1575	N/A	N/A	N/A	N/A	CPS
SSW2 Iron	6800	4944	N/A	N/A	N/A	N/A	CPS
SSW3 Iron	10800	7631	N/A	N/A	N/A	N/A	CPS
SSW4 Iron	4600	3018	N/A	N/A	N/A	N/A	CPS
SSW5 Iron	580.0	325.4	N/A	N/A	N/A	N/A	CPS

Hostile Litho−Density Sonde Wellsite Calibration − Caliper Calibration
Before: 7−Feb−2014 4:54

HLDS Caliper Small Ring	12.00	N/A	14.61	N/A	N/A	N/A	IN
HLDS Caliper Large Ring	15.19	N/A	18.22	N/A	N/A	N/A	IN

Enhanced DTS Cartridge Wellsite Calibration − EDTC Accelerometer Calibration
Before: 18−Mar−2014 5:14

EDTC Z−Axis Acceleration	9.810	N/A	9.739	N/A	N/A	N/A	M/S2

Enhanced DTS Cartridge Wellsite Calibration − Detector Calibration
Before: Calibration out of date 4−Feb−2014 5:11 After: Calibration out of date 5−Feb−2014 0:10

Gamma Ray (Jig − Bkg)	158.1	N/A	158.1	159.9	1.758	0.09091	GAPI
Gamma Ray (Calibrated)	164.0	N/A	164.0	165.8	1.823	15.00	GAPI

Hostile Natural Gamma Ray Cartridge − B / Equipment Identification

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		39.52
Before		39.48
After		39.40

37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)

Phase	Na 511 Peak Res %	Value
Master		15.96
Before		16.77
After		17.49

12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)

Phase	High Voltage V	Value
Master		1194
Before		1193
After		1178

900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)

Phase	Na 1785 Peak Loc	Value
Master		142.1
Before		141.8
After		143.3

135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)

Phase	Na 1785 Peak Res %	Value
Master		9.703
Before		8.709
After		9.053

7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)

Phase	Temperature DEGC	Value
Master		35.74
Before		35.71
After		29.22

−28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)

Phase	Na Count Rate CPS	Value
Master		11.77
Before		12.16
After		12.00

10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)

Master: 4−Feb−2014 23:51 Before: 5−Feb−2014 0:02 After: 14−Feb−2014 22:49

Hostile Natural Gamma Ray Sonde Wellsite Calibration

Detector 2 Check

Phase	Na 511 Peak Loc	Value
Master		39.56
Before		39.51
After		39.31

37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)

Phase	Na 511 Peak Res %	Value
Master		16.07
Before		16.56
After		18.46

12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)

Phase	High Voltage V	Value
Master		1126
Before		1128
After		1111

900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)

Phase	Na 1785 Peak Loc	Value
Master		142.3
Before		143.1
After		141.7

135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)

Phase	Na 1785 Peak Res %	Value
Master		8.959
Before		9.953
After		9.256

7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)

Phase	Temperature DEGC	Value
Master		36.60
Before		36.88
After		30.79

−28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)

Phase	Na Count Rate CPS	Value
Master		12.28
Before		12.68
After		12.14

10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)

Master: 4−Feb−2014 23:51 Before: 5−Feb−2014 0:02 After: 14−Feb−2014 22:49

Hostile Natural Gamma Ray Sonde Wellsite Calibration

Ratio Of Detector 1 To Detector 2

Phase	Coincidence Count Rate Ratio	Value
Master		0.9624
Before		0.9606
After		0.9838

0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)

Master: 4−Feb−2014 23:51
Before: 5−Feb−2014 0:02
After: 14−Feb−2014 22:49

Hostile Natural Gamma Ray Sonde Master Calibration

Detector 1 Calibration

Phase	Na 511 Peak Set Point	Value
Master		41.00

Phase	Th Peak Loc	Value
Master		210.4

Phase	Th Peak Res %	Value
Master		7.207

	38.00 (Minimum)	40.00 (Nominal)	43.00 (Maximum)		201.0 (Minimum)	209.6 (Nominal)	218.3 (Maximum)		5.000 (Minimum)	7.000 (Nominal)	9.000 (Maximum)

Phase	Background Count Rate CPS	Value	Phase	Gain Ratio	Value
Master		16.20	Master		1.012
	10.00 (Minimum) 142.5 (Nominal) 265.0 (Maximum)			0.9400 (Minimum) 1.000 (Nominal) 1.060 (Maximum)	

Master: 4−Feb−2014 20:09

Hostile Natural Gamma Ray Sonde Master Calibration

Detector 2 Calibration

Phase	Na 511 Peak Set Point	Value	Phase	Th Peak Loc	Value	Phase	Th Peak Res %	Value
Master		41.00	Master		208.9	Master		7.337
	38.00 (Minimum) 40.00 (Nominal) 43.00 (Maximum)			201.0 (Minimum) 209.6 (Nominal) 218.3 (Maximum)			5.000 (Minimum) 7.000 (Nominal) 9.000 (Maximum)	

Phase	Background Count Rate CPS	Value	Phase	Gain Ratio	Value
Master		16.52	Master		1.004
	10.00 (Minimum) 142.5 (Nominal) 265.0 (Maximum)			0.9400 (Minimum) 1.000 (Nominal) 1.060 (Maximum)	

Master: 4−Feb−2014 20:09

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	768
HRLT Upper Cartridge	HRUC − B	764

Hostile Litho−Density Sonde / Equipment Identification

Primary Equipment:		
Hostile Litho Density Sonde	HLDS − D	35
Hostile Litho Density High Voltage	HLDV − D	35
Gamma Source Radioactive	GSR − Z	8113
Auxiliary Equipment:		
Hostile Litho Density Pad	HLDP − C	35
Hostile Litho Density High Voltage Housi	HEH − H	35

Litho−Density Spectroscopy Cartridge − B / Equipment Identification

Primary Equipment:		
LDSC Cartridge	LDSC − B	326
Auxiliary Equipment:		
LDSC Housing	LDSH − A	303

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

Company:	**Lamont Doherty Earth Observatory**
Well:	**Expedition 349, Site U1433B**
Field:	**South China Sea Tectonics**
Rig:	**JOIDES Resolution**
Ocean:	**South China Sea**

Schlumberger

Hostile Natural Gamma Sonde (HNGS)
Spectroscopy Log