HALLIBURTON

COMPENSATED SPECTRAL NATURAL GAMMA

COMPANY NOBLE ENERGY INC
WELL VIGILANT STATE AC16-07
FIELD/BLOCK WATTENBERG
COUNTY WELD
STATE CO

COMPANY **NOBLE ENERGY INC**
WELL **VIGILANT STATE AC16-07**
FIELD/BLOCK **WATTENBERG**
COUNTY **WELD** STATE **CO**

API No. 05123372480000
Location SHL: 1980' FNL & 1980' FEL SWNE
LATITUDE: 40.576000°
LONGITUDE: -104.439020°
Sect. 16 Twp. 7N Rge. 63W

Other Services:
RWCH
DSNT
SDLT
HFDT
IDT/ICT
WSTT
ACRT

Permanent Datum	GL	Elev. 4850.0 ft	Elev.: K.B. 4863.0 ft
Log measured from	KB	, 13.0 ft above perm. Datum	D.F. 4862.0 ft
Drilling measured from	KB		G.L. 4850.0 ft

Date		08-Jul-13					
Run No.		ONE					
Depth - Driller		8966.00 ft					
Depth - Logger		8941.0 ft					
Bottom - Logged Interval		8822 ft					
Top - Logged Interval		CASING					
Casing - Driller		9.625 in	@ 775.0 ft	@		@	
Casing - Logger		772.0 ft					
Bit Size		8.750 in		@		@	
Type Fluid in Hole		WATER BASED MUD					
Density	Viscosity	8.7 ppg	35.00 s/qt				
PH	Fluid Loss	10.50 pH	7.4 cptm				
Source of Sample		FLOWLINE					
Rm @ Meas. Temperature		0.600 ohmm	@ 74.40 degF	@		@	
Rmf @ Meas. Temperature		0.67 ohmm	@ 64.90 degF	@		@	
Rmc @ Meas. Temperature		1.160 ohmm	@ 65.20 degF	@		@	
Source Rmf	Rmc	MEASURED	MEASURED				
Rm @ BHT		0.21 ohmm	@ 226.0 degF	@		@	
Time Since Circulation		11.0 hr					
Time on Bottom		08-Jul-13 02:37					
Max. Rec. Temperature		226.0 degF	@ 8941.0 ft	@		@	
Equipment	Location	11454566	BRIGHTON				
Recorded By		J. SCHMIDT		J. PINKETT			
Witnessed By		JOHN TAYLOR					

Fold here

Service Ticket No.:
API Serial No.: 05123372480000
PGM Version: WL INSITE R3.8.4 (Build 5)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

	Sample No.					
Date						
Depth-Driller						
Type Fluid in Hole						
Density	Viscosity					
Ph	Fluid Loss					
Source of Sample						
Rm @ Meas. Temp		@	@	@	@	@
Rmf @ Meas. Temp.		@	@	@	@	@
Rmc @ Meas. Temp.		@	@	@	@	@
Source Rmf	Rmc					
Rm @ BHT		@	@	@	@	@
Rmf @ BHT		@	@	@	@	@
Rmc @ BHT		@	@	@	@	@

RESISTIVITY SCALE CHANGES

	Type Log	Depth	Scale Up Hole	Scale Down Hole

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
	@				
	@	ONE ACRT	N/A	CENT	N/A
	@	11302817			
		11294353			
	@	ONE HFDT	HFDT	ADJ.	N/A
	@	11996706			
	@				

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	11812883	Serial No.	90296671	Serial No.	11795867	Serial No.	11812167
Model No.	GTET	Model No.	WSTT	Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.	3.625"	Diameter	4.5"	Diameter	3.625
Detector Model No.	GTET	Spacing	0.5'	Log Type	GAM-GAM	Log Type	NEU-NEU
Type	SCINT			Source Type	Cs-137	Source Type	Am241Be
Length	8"	LSA [Y/N]	YES	Serial No.	5471GW	Serial No.	DSN434
Distance to Source	18'	FWDA [Y/N]	YES	Strength	1.5 Ci	Strength	15 Ci

LOGGING DATA

GENERAL				GAMMA		ACOUSTIC			DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix	Scale		Matrix
No.	From	To	ft/min	L	R	L	R		L	R		L	R	
ONE	TD	CSG	REC	0	250	-15	45	46.6	-15	45	2.71	-15	45	LIME

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks: RWCH-GTET-CSNG-DSNT-SDLT-HFDT-FXIS-IDT-ICT-WSTT-ACRT RUN IN COMBINATION.

ANNULAR HOLE VOLUME CALCULATED USING 7-INCH CASING.

TENSION PULLS, WASHOUTS AND BOREHOLE RUGOSITY AFFECT LOG RESPONSE.

YOUR CREW: A. AXE RIG: ENSIGN 121

THANK YOU FOR USING HALLIBURTON LOGGING SERVICES - BRIGHTON, CO - (303) 825-4346

HALLIBURTON DOES NOT GUARANTEE THE ACCURACY OF ANY INTERPRETATION OF THE LOG DATA, CONVERSION OF LOG DATA TO PHYSICAL ROCK PARAMETERS OR RECOMMENDATIONS WHICH MAY BE GIVEN BY HALLIBURTON PERSONNEL OR WHICH APPEAR ON THE LOG OR IN ANY OTHER FORM. ANY USER OF SUCH DATA, INTERPRETATIONS, CONVERSIONS, OR RECOMMENDATIONS AGREES THAT HALLIBURTON IS NOT RESPONSIBLE EXCEPT WHERE DUE TO GROSS NEGLIGENCE OR WILLFUL MISCONDUCT, FOR ANY LOSS, DAMAGES, OR EXPENSES RESULTING FROM THE USE THEREOF.

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PARAMETERS REPORT

Depth ((ft))	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	8.750	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	8.700	ppg
	SHARED	WAGT	Weighting Agent	Natural	
	SHARED	BSAL	Borehole salinity	900.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
	SHARED	RMUD	Mud Resistivity	0.600	ohmm
	SHARED	TRM	Temperature of Mud	75.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	7.000	in
	SHARED	ST	Surface Temperature	75.0	degF
	SHARED	TD	Total Well Depth	8941.00	ft
	SHARED	BHT	Bottom Hole Temperature	226.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	IDT	
	SHARED	AZTM	High Res Z Accelerometer Master Tool	IDT	
	SHARED	TEMM	Temperature Master Tool	NONE	
	SHARED	BHSM	Borehole Size Master Tool	ICT	
	Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
	Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
	Rwa /	AFAC	Archie A factor	0.6200	

CrossPlot	AFAC	Archie A factor	0.6200	
Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GRSO	Gamma Tool Standoff	0.000	in
GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
CSNG	CGOK	Process CSNG Data?	Yes	
CSNG	CENT	Is Tool Centralized?	No	
CSNG	GBOK	Gamma Enviromental Corrections?	Yes	
CSNG	BARF	Barite Correction Factor	1.00	
CSNG	ORDG	Use Fixed Gain	No	
CSNG	ORDO	Use Fixed Offset	No	
CSNG	ORDR	Use Fixed Resolution Degradation Factor	No	
DSNT	DNOK	Process DSN?	Yes	
DSNT	DEOK	Process DSN EVR?	No	
DSNT	NLIT	Neutron Lithology	Limestone	
DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.250	in
DSNT	DNTP	Temperature Correction Type	None	
DSNT	DPRS	DSN Pressure Correction Type	None	
DSNT	SHCO	View More Correction Options	No	
DSNT	UTVD	Use TVD for Gradient Corrections?	No	
DSNT	LHWT	Logging Horizontal Water Tank?	No	
SDLT	CLOK	Process Caliper Outputs?	Yes	
SDLT Pad	DNOK	Process Density?	Yes	
SDLT Pad	DNOK	Process Density EVR?	No	
SDLT Pad	CB	Logging Calibration Blocks?	No	
SDLT Pad	SPVT	SDLT Pad Temperature Valid?	Yes	
SDLT Pad	DTWN	Disable temperature warning	No	
SDLT Pad	DMA	Formation Density Matrix	2.710	g/cc
SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
HFDT-I	HFOK	Do HFDT Calculations?	Yes	
HFDT-I	RMF	Mud Filtrate Resistivity	0.67	ohmm
HFDT-I	RMFT	Temperature of Mud Filtrate	64.90	degF
HFDT-I	MDIL	Matrix Dielectric Constant	8.000	
HFDT-I	HRTC	HFDT Insite Temperature Correction Source	PADTEMP1	
HFDT-I	CLOK	Process Caliper Outputs?	Yes	
HFDT-I	SAO	SDL Backup Arm Offset	0.00	in
HFDT-I	PAO	Pad Arm Offset	0.00	in
HFDT-I	MLOK	Process MicroLog Outputs?	Yes	
HFDT-I	MINO	Microlog Lateral Offset	0.00	ohmm
HFDT-I	MNOO	Microlog Normal Offset	0.00	ohmm
IDT	WRTI	Survey Writing Interval	30	ft
IDT	SOPT	Smoothing Option	None	
ICT	CLOK	Process Caliper Outputs?	Yes	
ICT	DARM	Disable Caliper Arm	No	
ICT	ATDS	Arm To Disable	0	
ICT	REPM	Method to replace arm?	Caliper Average	
ICT	ARMV	Diameter to use for disabled arm	0.00	in
ICT	DARM	Disable Second Caliper Arm	No	

ICT	ATDS	Second Arm To Disable	0	
ICT	REPM	Method to replace second arm?	Caliper Average	
ICT	ARMV	Diameter to use for second disabled arm	0.00	in
ICT	NAVS	Navigation Source Tool	IDT	
ICT	CL1O	Radius 1 Offset	0.0	in
ICT	CL2O	Radius 2 Offset	0.0	in
ICT	CL3O	Radius 3 Offset	0.0	in
ICT	CL4O	Radius 4 Offset	0.0	in
ICT	CL5O	Radius 5 Offset	0.0	in
ICT	CL6O	Radius 6 Offset	0.0	in
ICT	BHVC	Radius type for borehole volume calcuations	Elliptical	
Wavesonic-I	WSOK	Process WSTT?	Yes	
Wavesonic-I	AFIL	Adaptive Filtering?	No	
Wavesonic-I	PINT	Process 1 Sample and Skip	0	
Wavesonic-I	PROM	Process Mode: M=1,MX=2,MY=3,MXY=4	4	
Wavesonic-I	DTSH	Delta -T Shale	100.00	uspf
Wavesonic-I	DTMT	Delta -T Matrix Type	User define	
Wavesonic-I	DTMA	Delta -T Matrix	47.60	uspf
Wavesonic-I	DTFL	Delta -T Fluid	189.00	uspf
Wavesonic-I	RHOM	Matrix Density	2.7100	g/cc
Wavesonic-I	RHOF	Fluid Density	1.0000	g/cc
Wavesonic-I	SMTH	Semblance Threshold	0.25	
Wavesonic-I	VPVS	VPVS Ratio for Porosity	1.40	
Wavesonic-I	APEQ	Acoustic Porosity Equation	Wylie	
Wavesonic-I	NAVS	Navigation Source Tool	IDT	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.25	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Upr	
ACRt Sonde	TPOS	Tool Position	Free Hanging	
ACRt Sonde	RMOP	Rmud Source	Mud Cell	
ACRt Sonde	RMIN	Minimum Resistivity for MAP	0.20	ohmm
ACRt Sonde	RMIN	Maximum Resistivity for MAP	200.00	ohmm
ACRt Sonde	THQY	Threshold Quality	0.50	
ACRt Sonde	MRFX	Fixed mud resistivity	2000	ohmm

BOTTOM

Data: VIGILANT_16_07\0001 QUAD-CSNG-HFDT-IDT-ICT-WSTT\003.01 08-Jul-13 04:48 Up **Date: 08-Jul-13 04:52:03**

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Plot Time: 08-Jul-13 11:02:35
Plot Range: 6400 ft to 8846.5 ft
Data: VIGILANT_16_07\Well Based\CSNG-HFDT
Plot File: \\CSNG\CSNG-FS - Primary 1_240

MAIN PASS 5" = 100'

Gamma KT Err		**Uranium Err**
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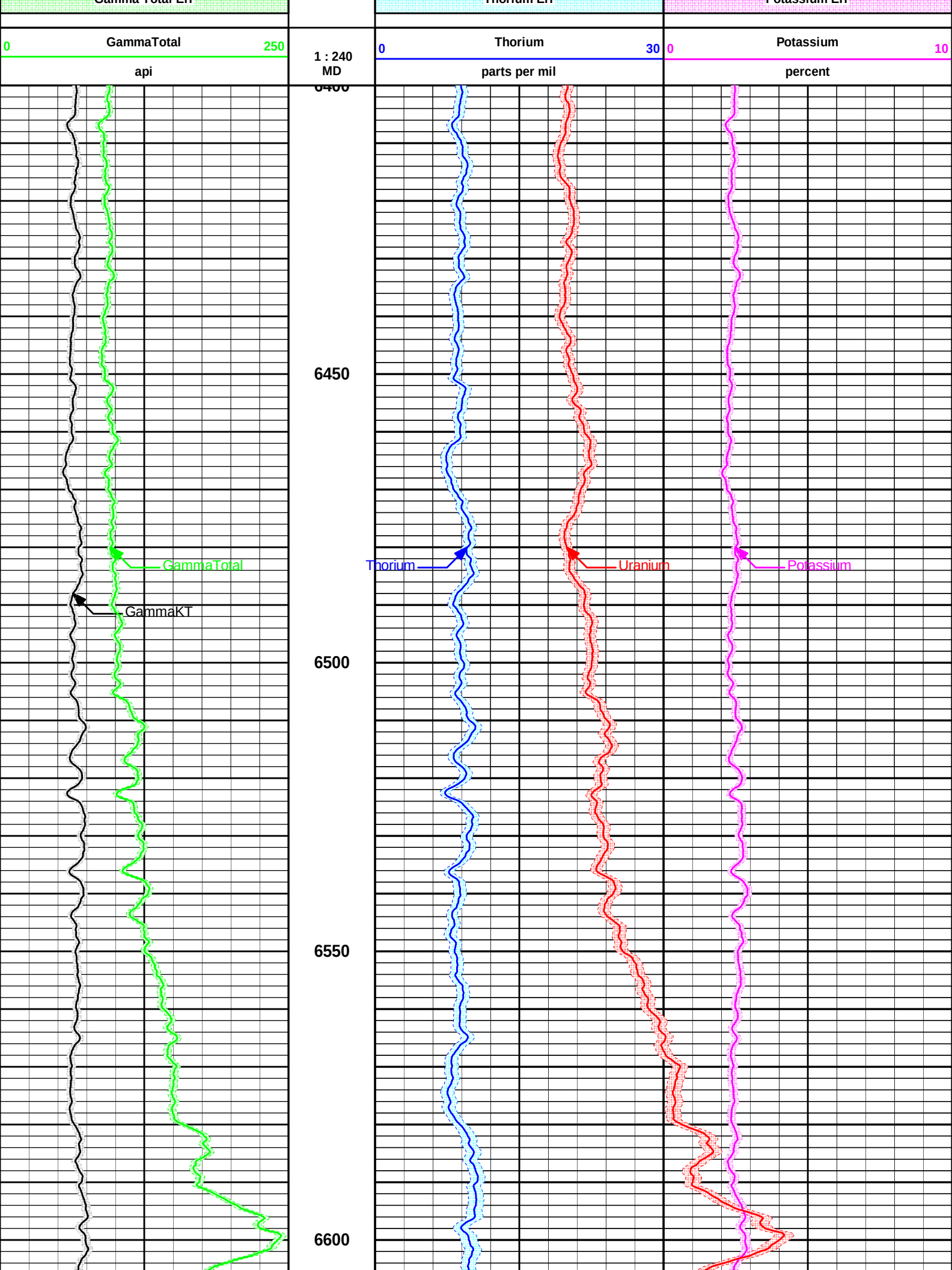
api		**parts per mil**
Gamma Total Err	**Thorium Err**	**Potassium Err**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0
250
api
1 : 240
MD
Thorium
0
30
parts per mil
Potassium
0
10
percent
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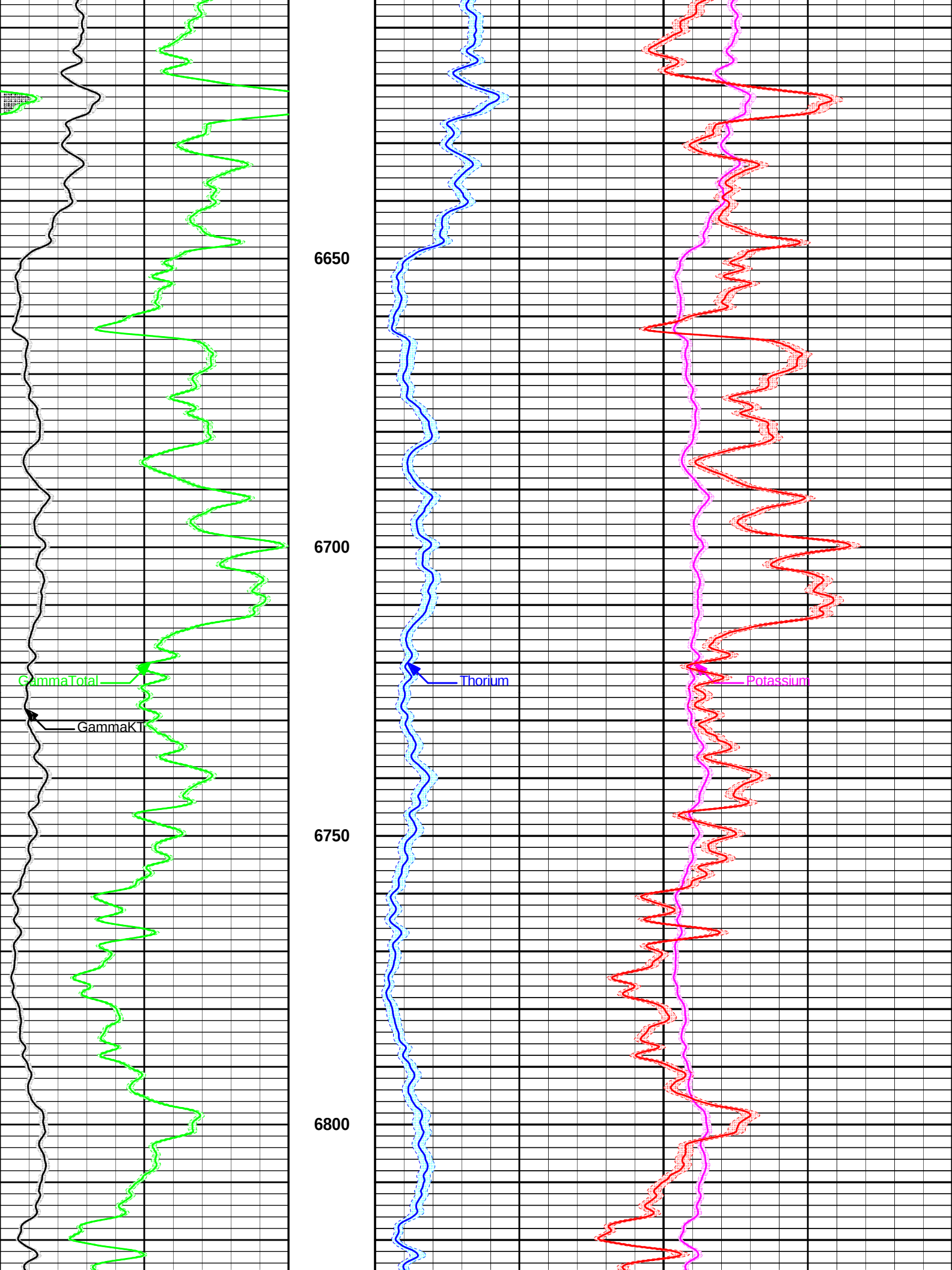
6550
6600
GammaTotal
GammaKT
Thorium
Uranium
Potassium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6800
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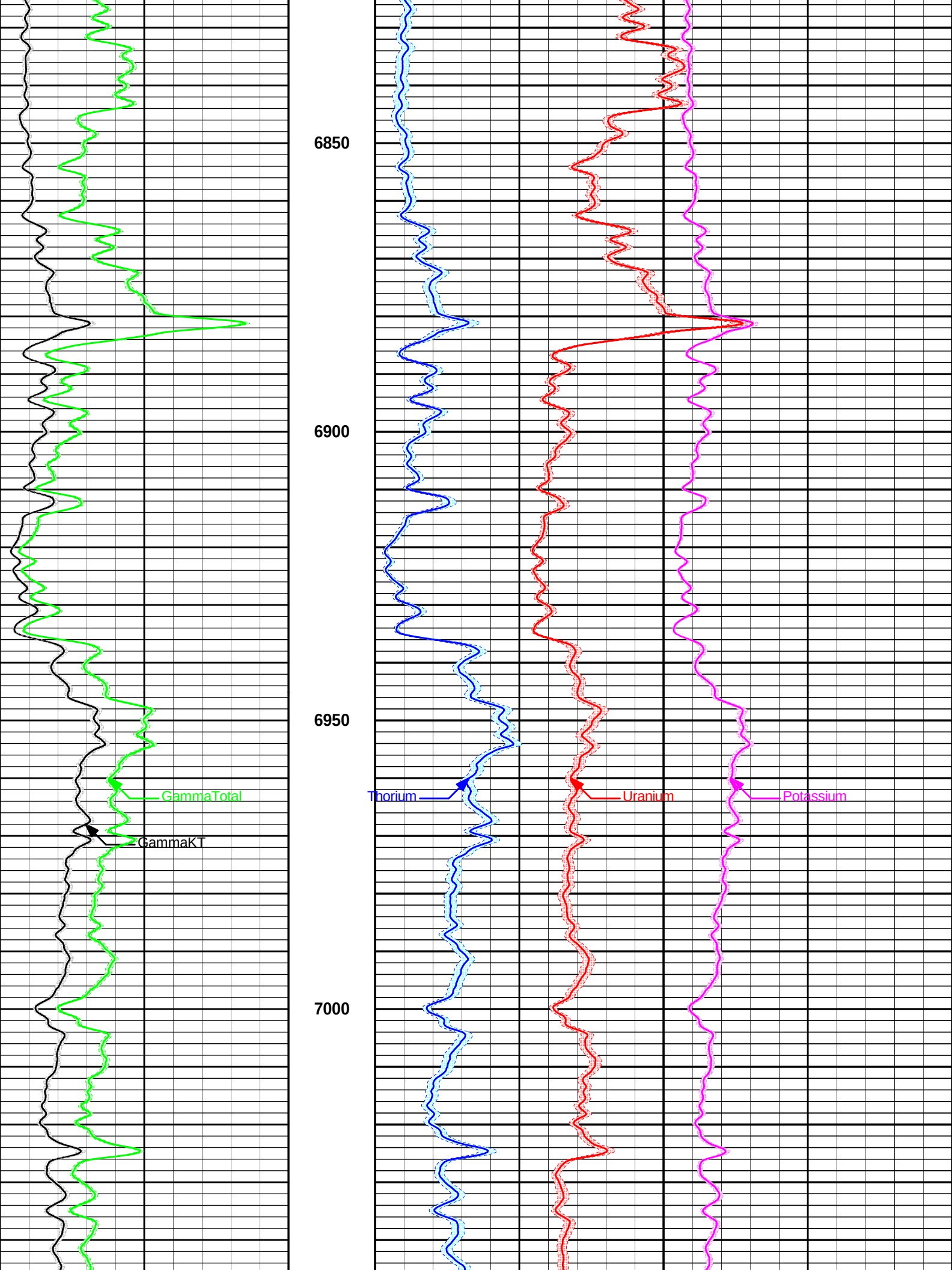
GammaKT
Thorium
Potassium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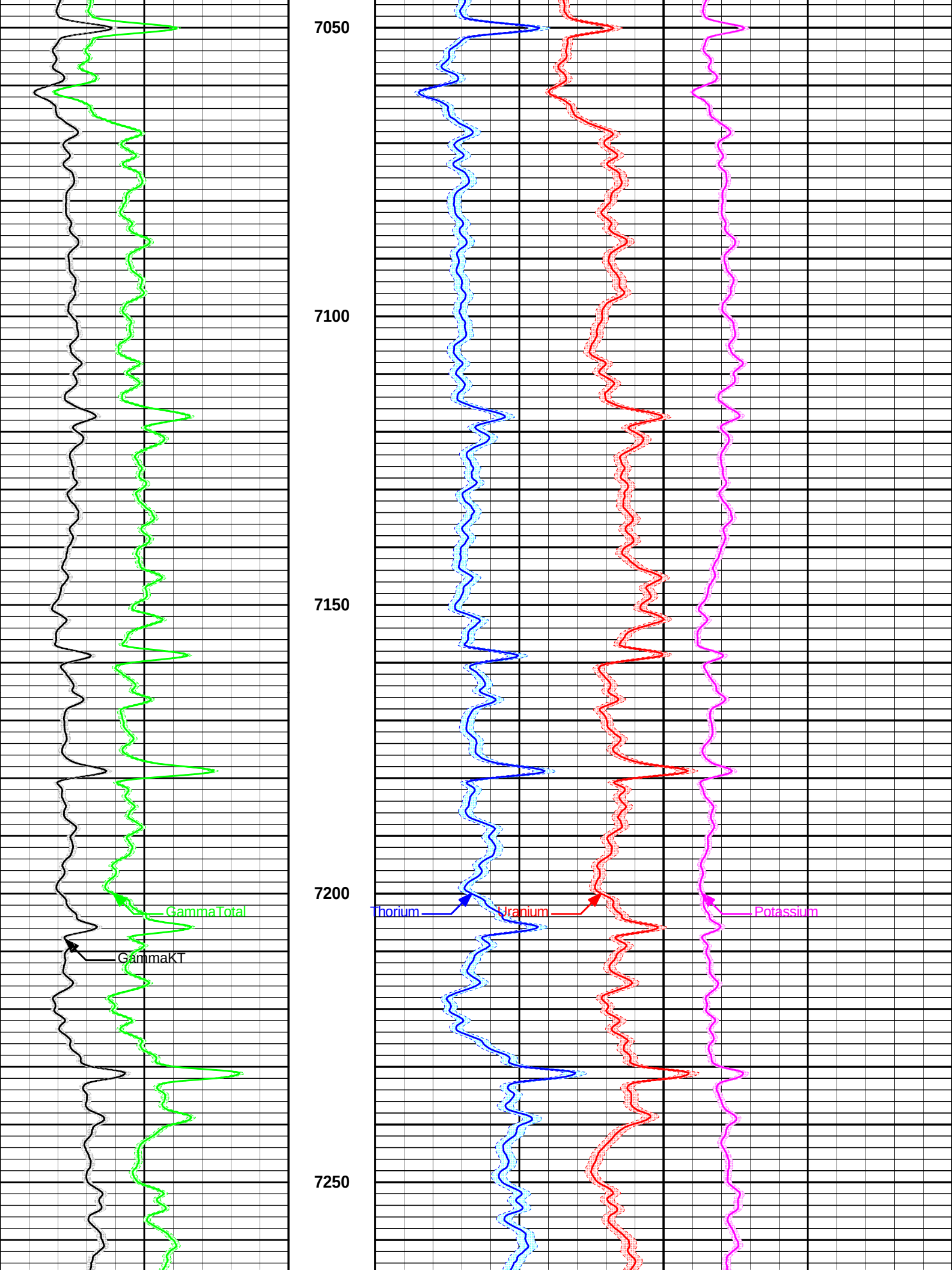
GammaKT
Thorium
Uranium
Potassium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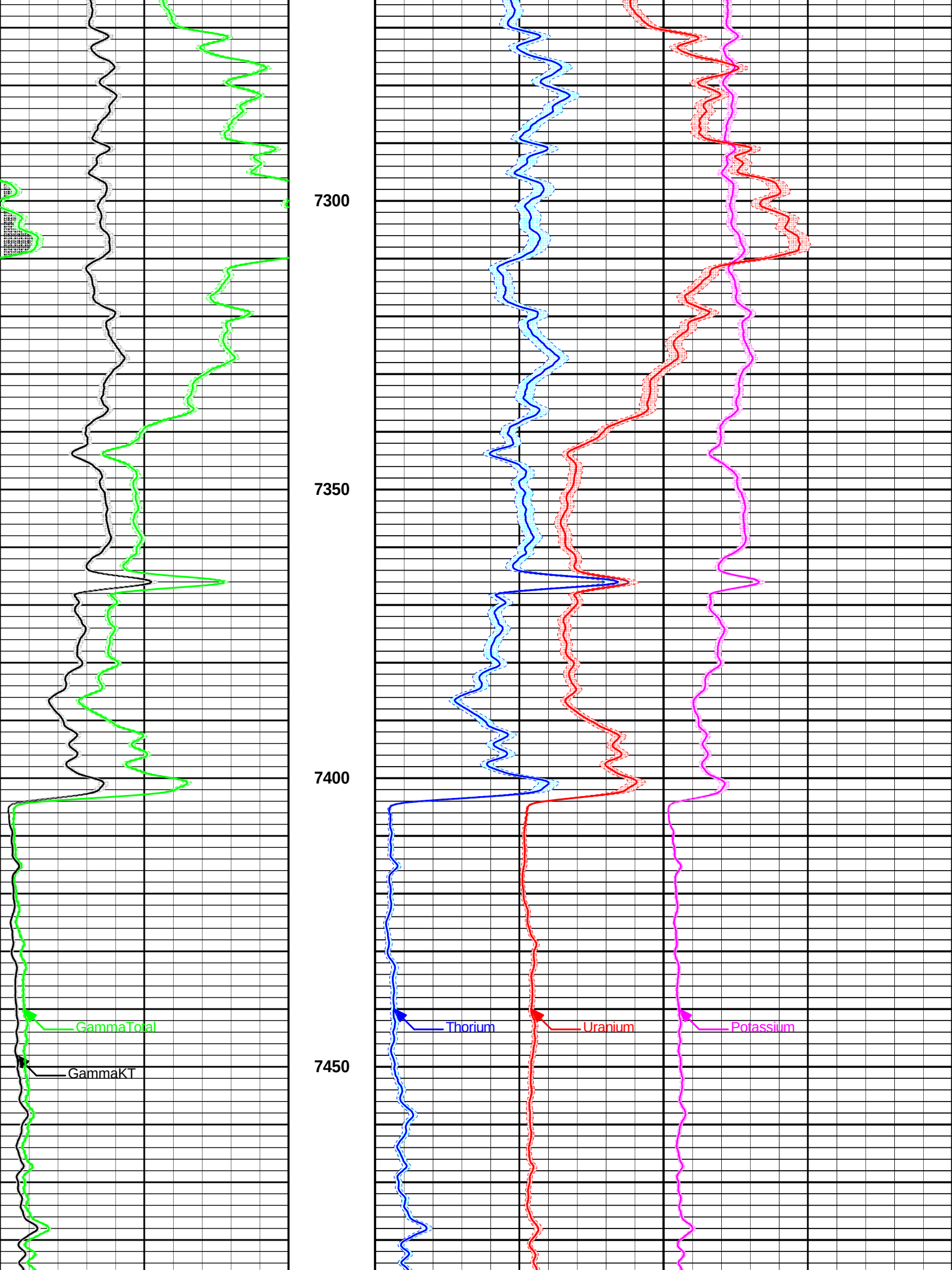
Thorium
Uranium
Potassium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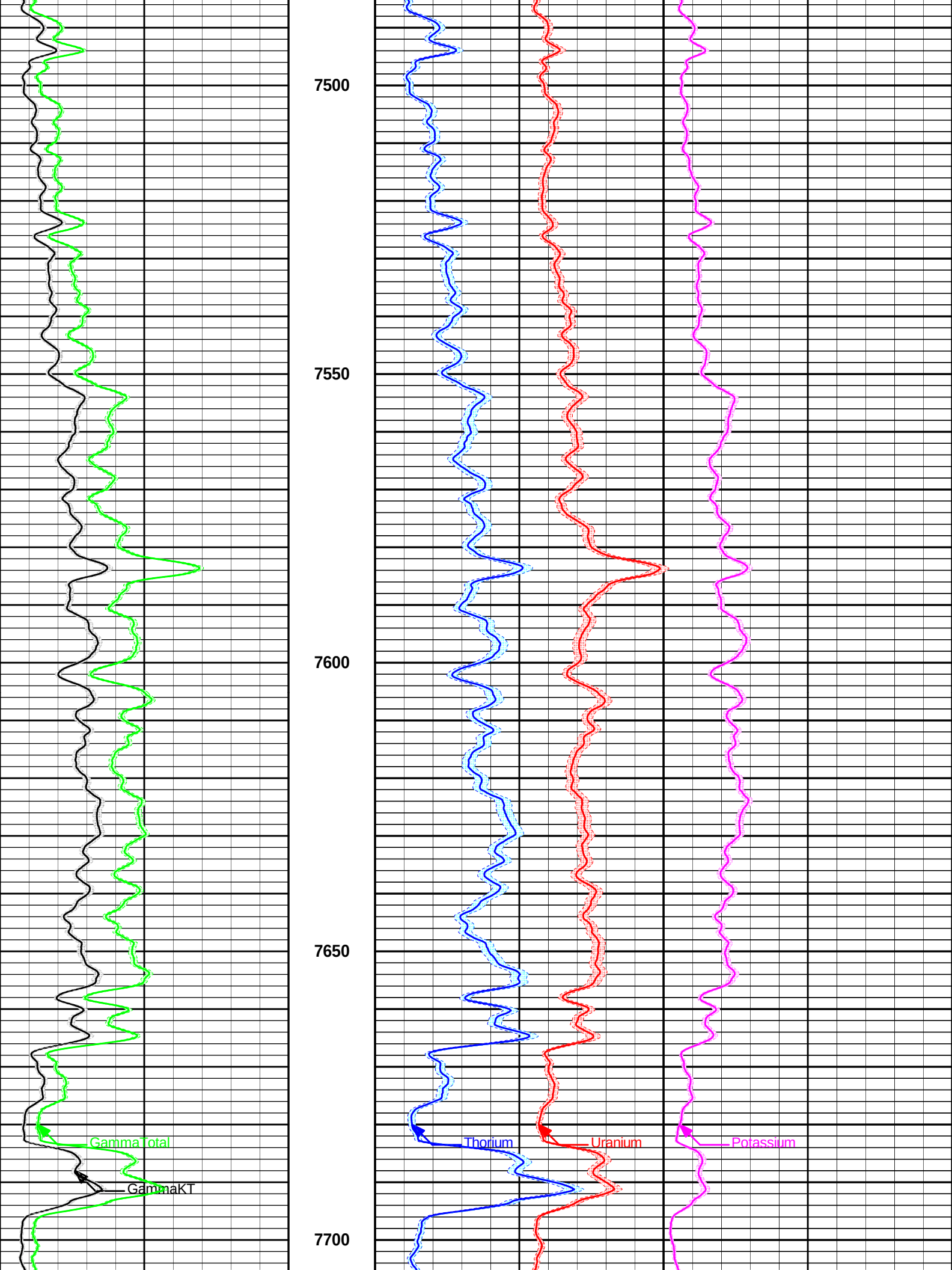
Thorium
Uranium
Potassium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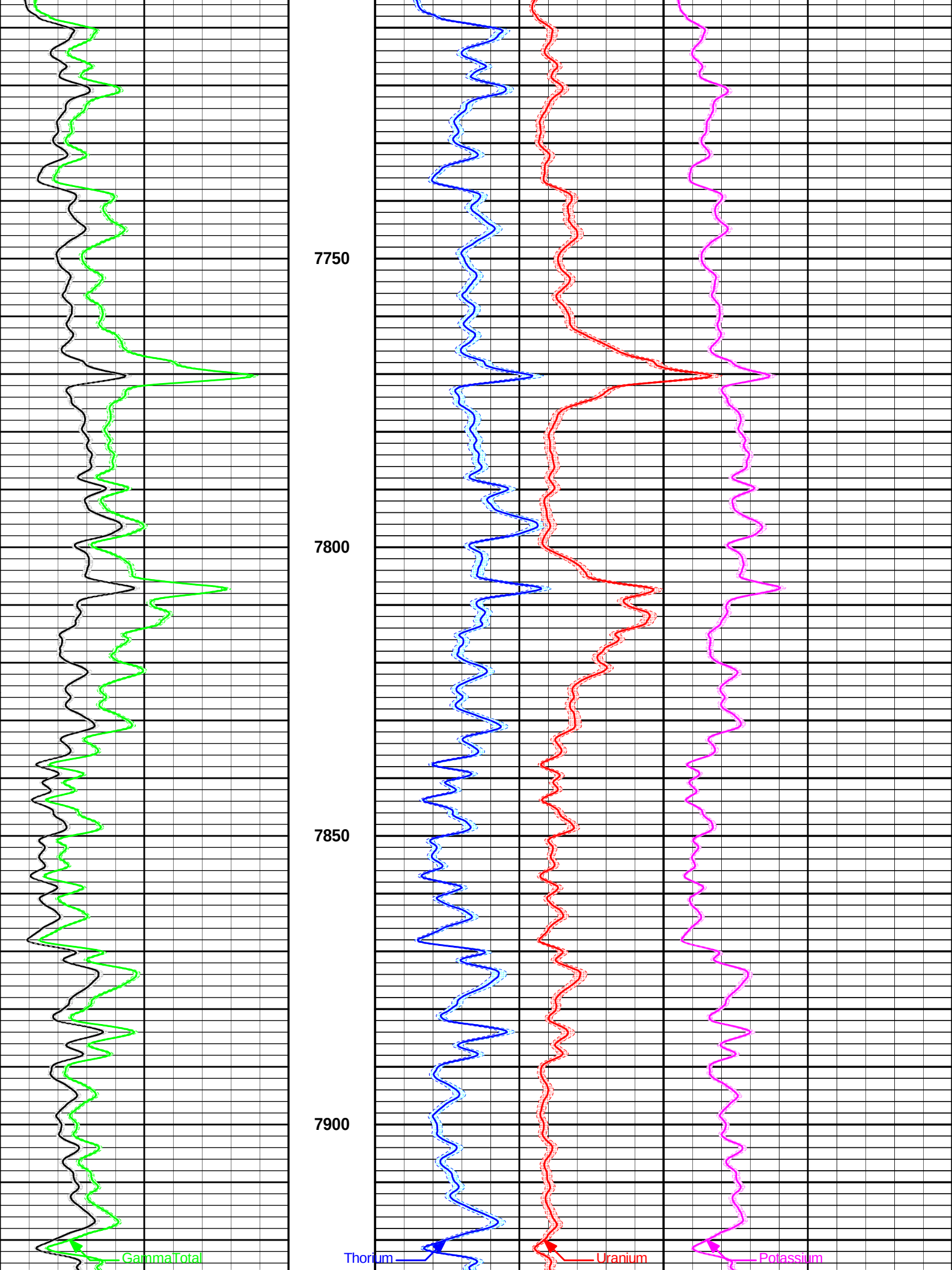
Uranium
Potassium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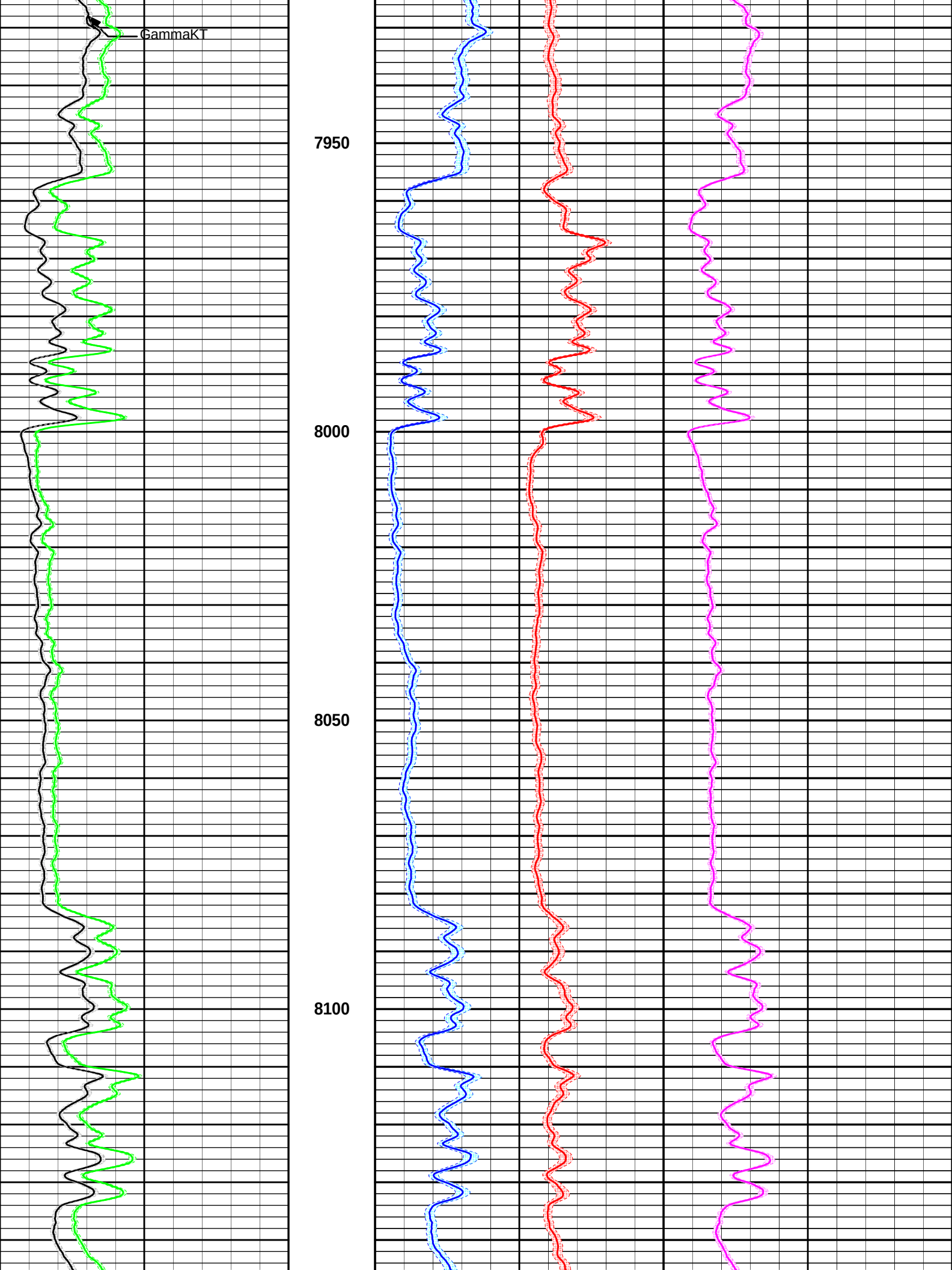
Uranium
Potassium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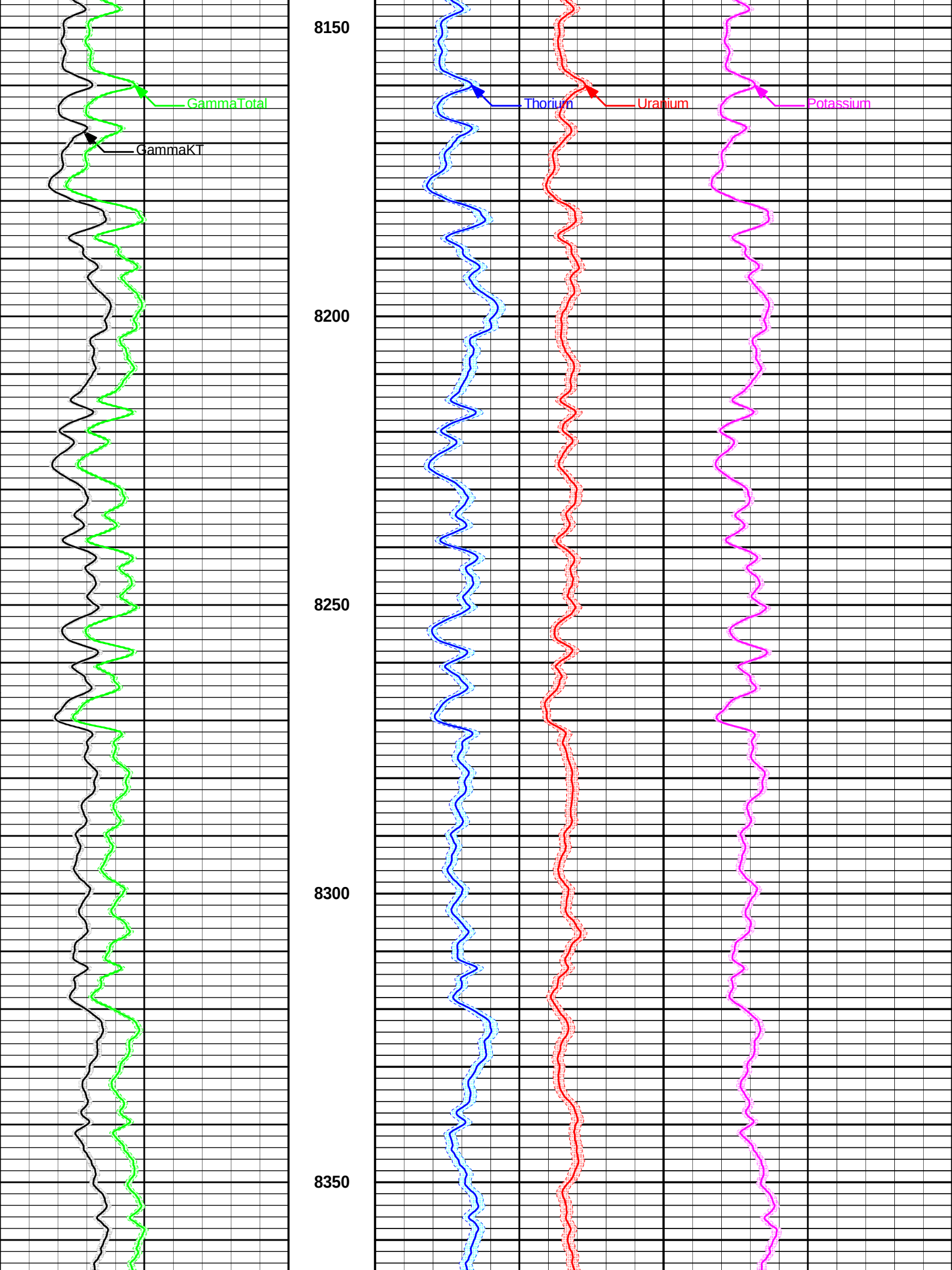
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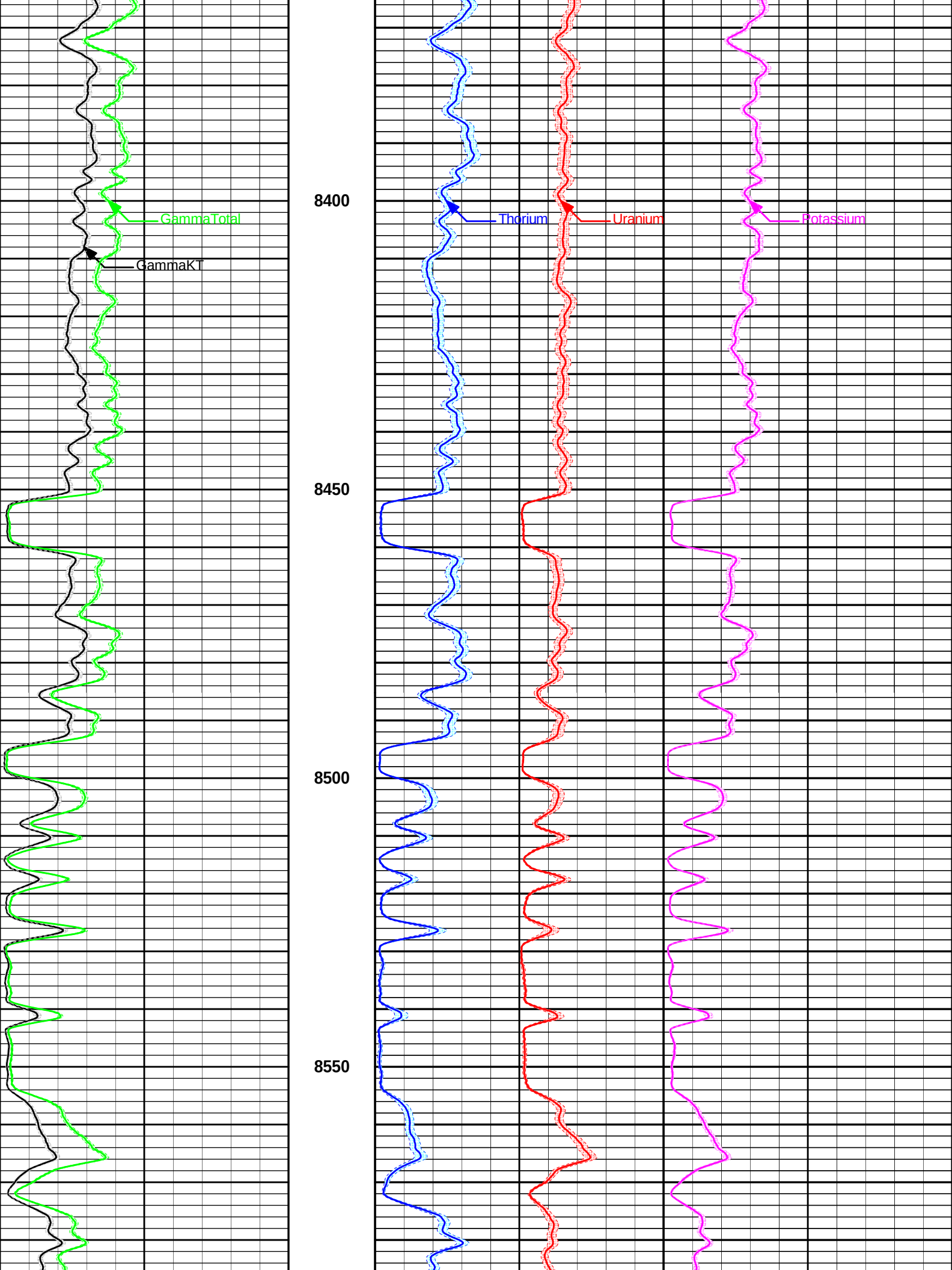
Thorium
Uranium
Potassium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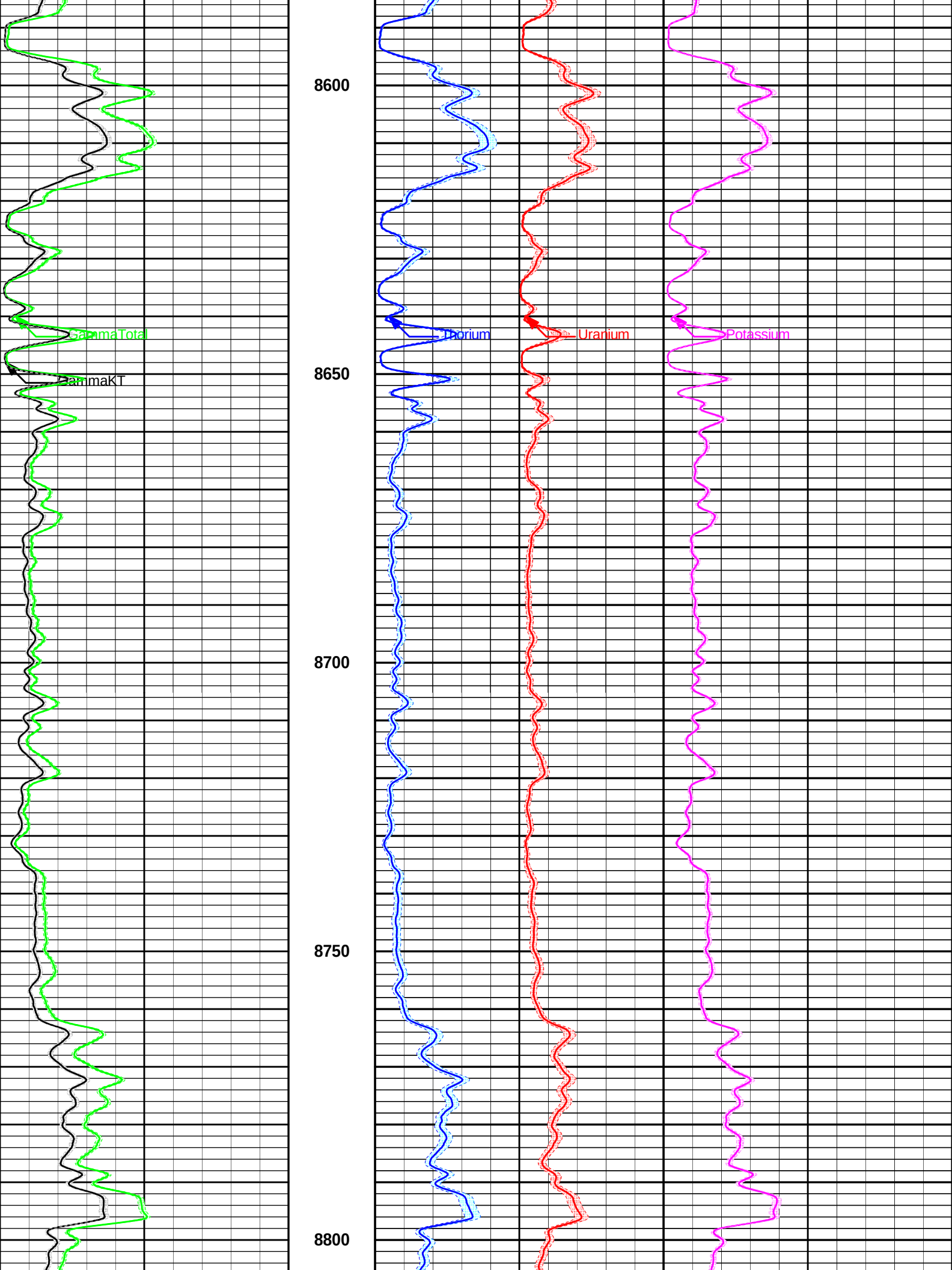
8500
8550
Thorium
Uranium
Potassium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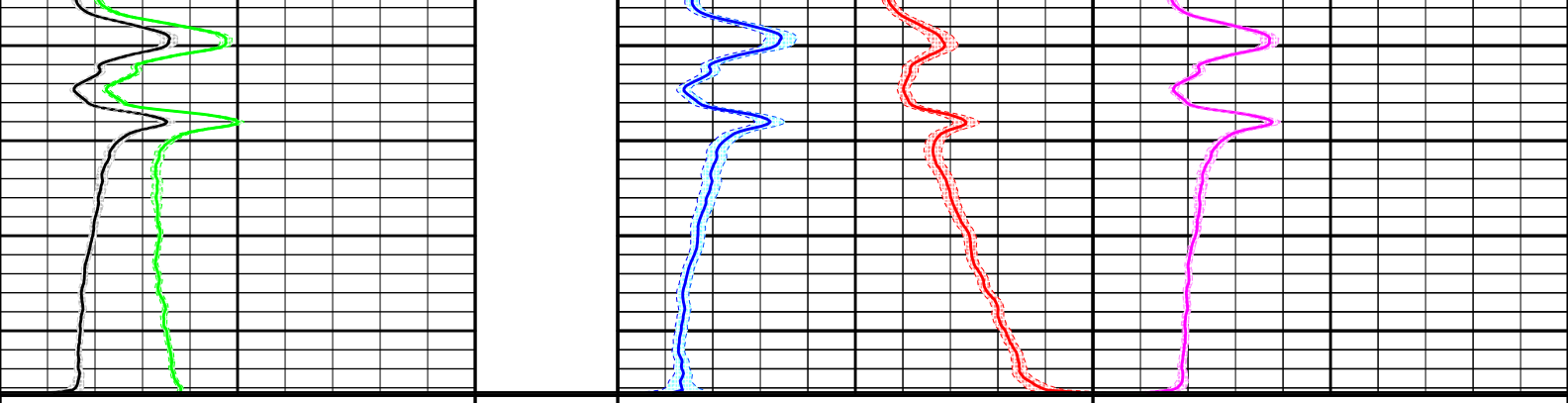
Uranium
Potassium



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api		parts per mil	percent
Gamma Total Err		Thorium Err	Potassium Err
0 GammaKT 250		-10 Uranium 30	
api		parts per mil	
Gamma KT Err		Uranium Err	

HALLIBURTON

Plot Time: 08-Jul-13 11:02:43
Plot Range: 6400 ft to 8846.5 ft
Data: VIGILANT_16_07\Well Based\CSNG-HFDT\
Plot File: \\CSNG\CSNG-FS - Primary 1_240

MAIN PASS 5" = 100'

HALLIBURTON

Plot Time: 08-Jul-13 11:02:43
Plot Range: 6400 ft to 8846.5 ft
Data: VIGILANT_16_07\Well Based\CSNG-HFDT\
Plot File: \\CSNG\CSNG-FS - Quality 1_240

MAIN PASS 5" = 100'

Gamma KT Err					
Gamma Total Err					
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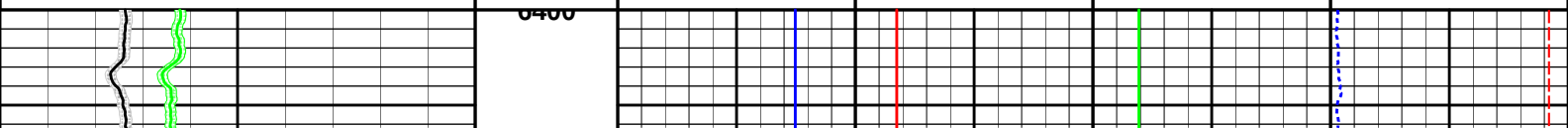
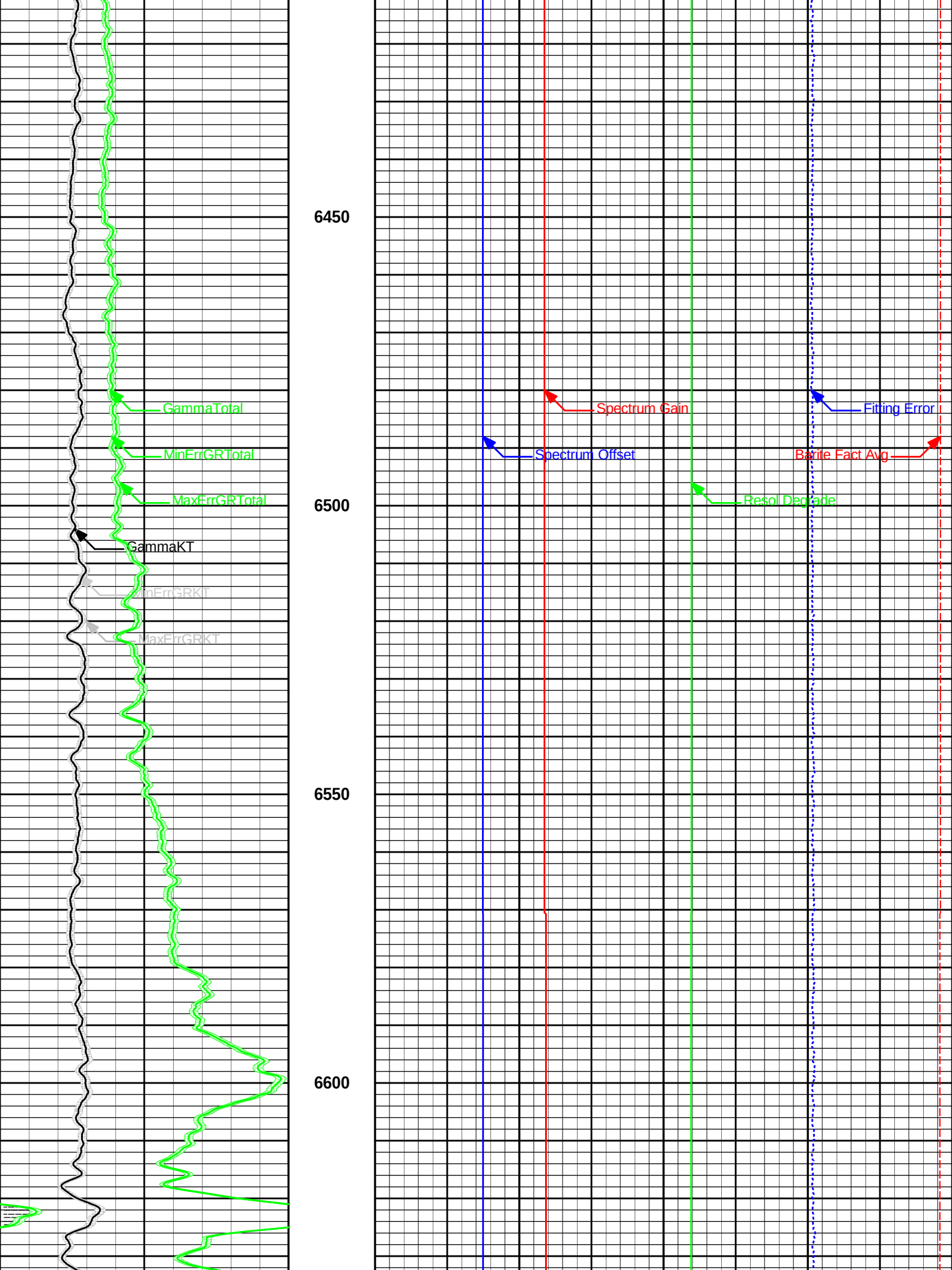
api					
0 GammaKT 250	1 : 240 MD	-10 Spectrum Offset 10	0.9 Spectrum Gain 1.1	0 Resol Degrade 20	0 Fitting Error 2
api					

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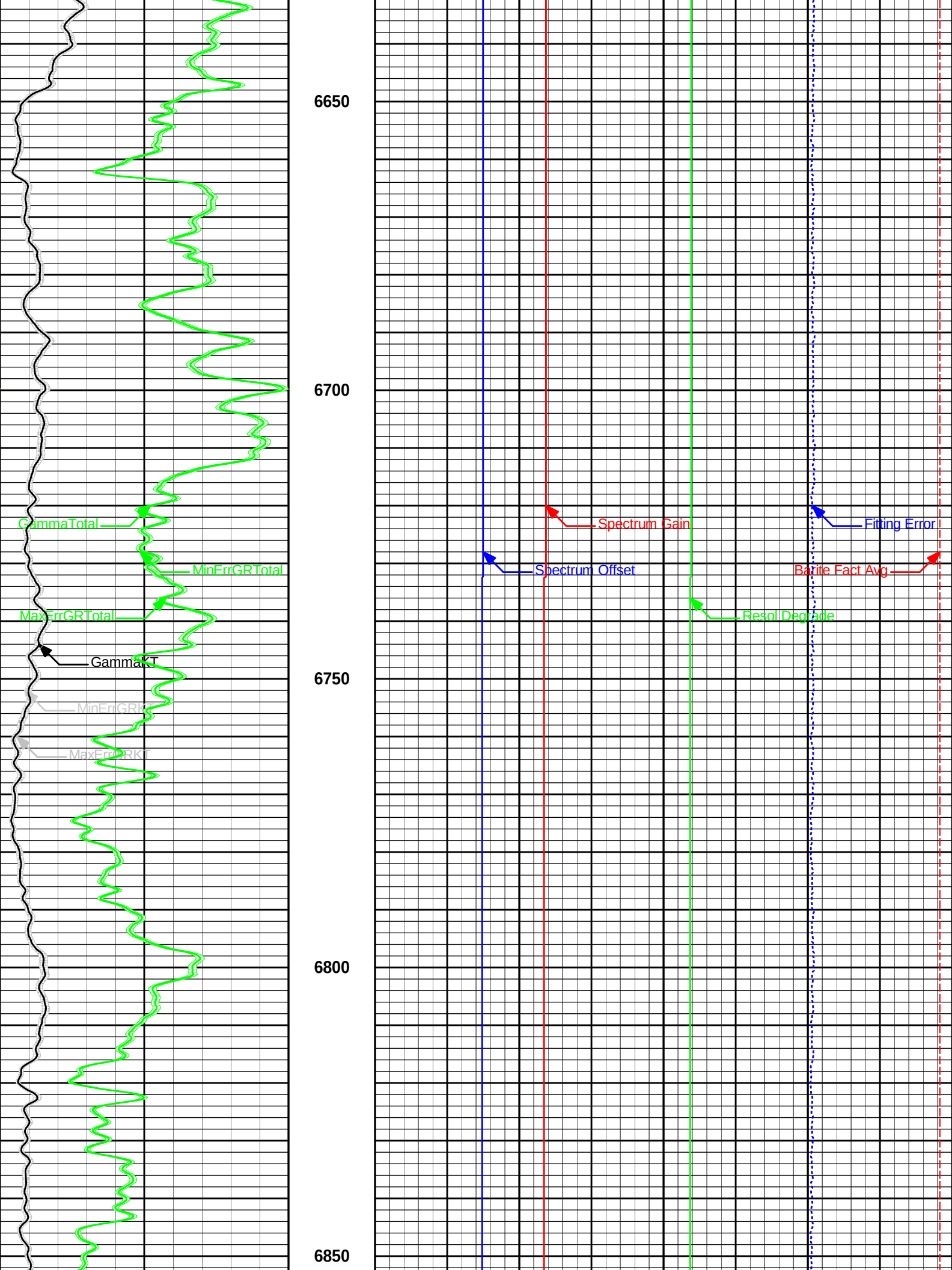
Spectrum Gain
Spectrum Offset
Resol Degrade
Fitting Error
Barite Fact Avg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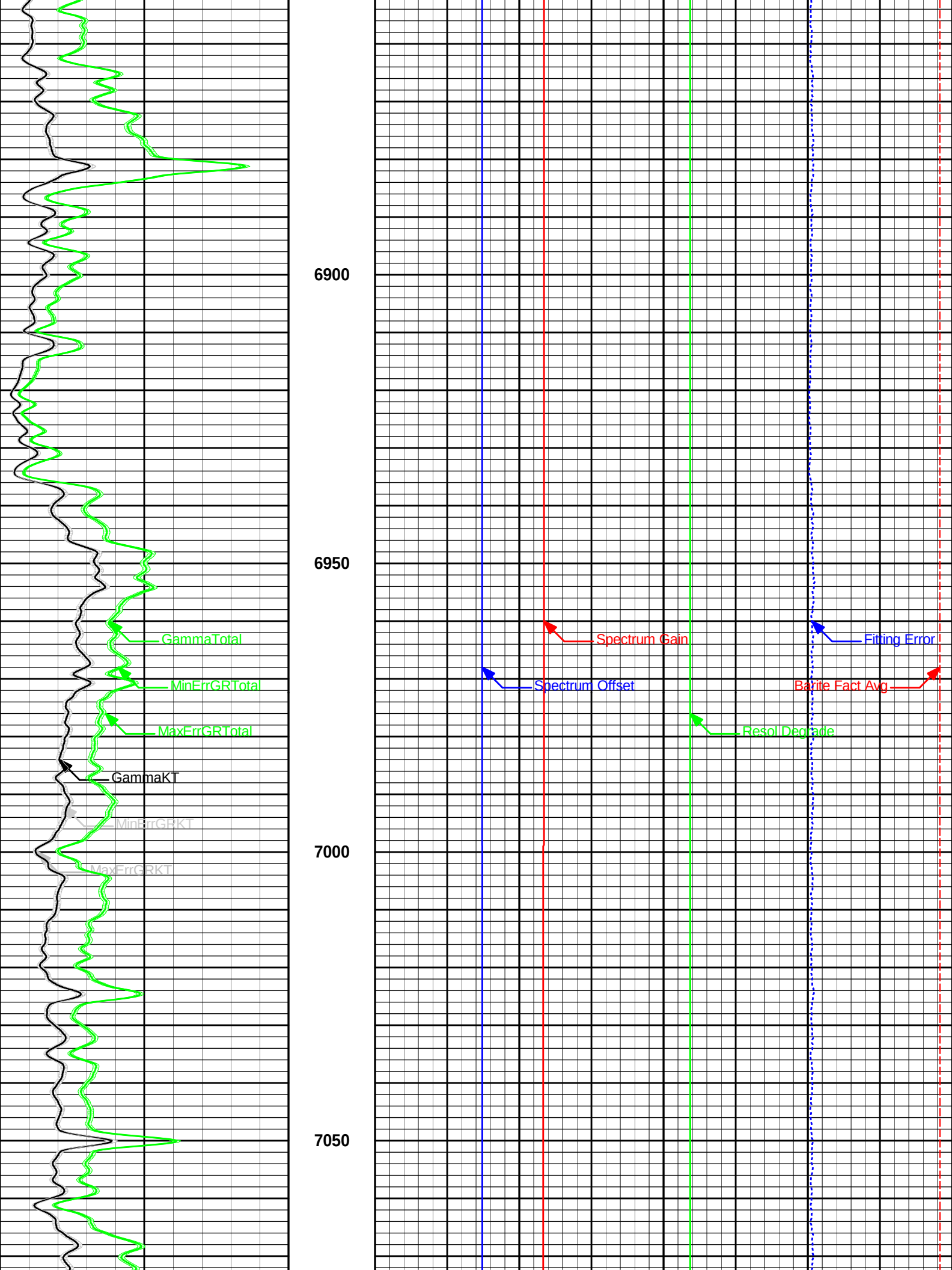
Barite Fact Avg
Resol Degrade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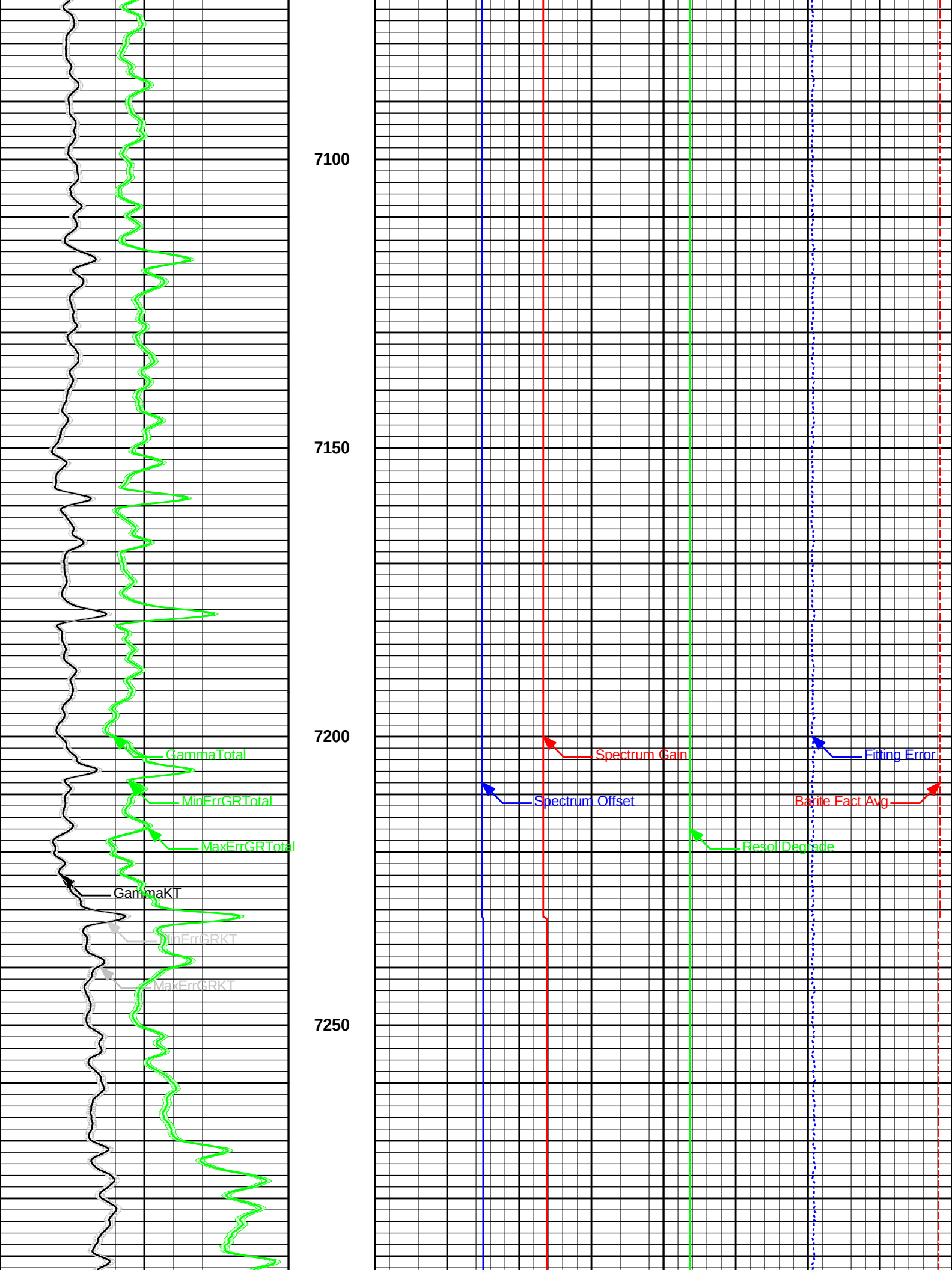
Barite Fact Avg
Resol Degrade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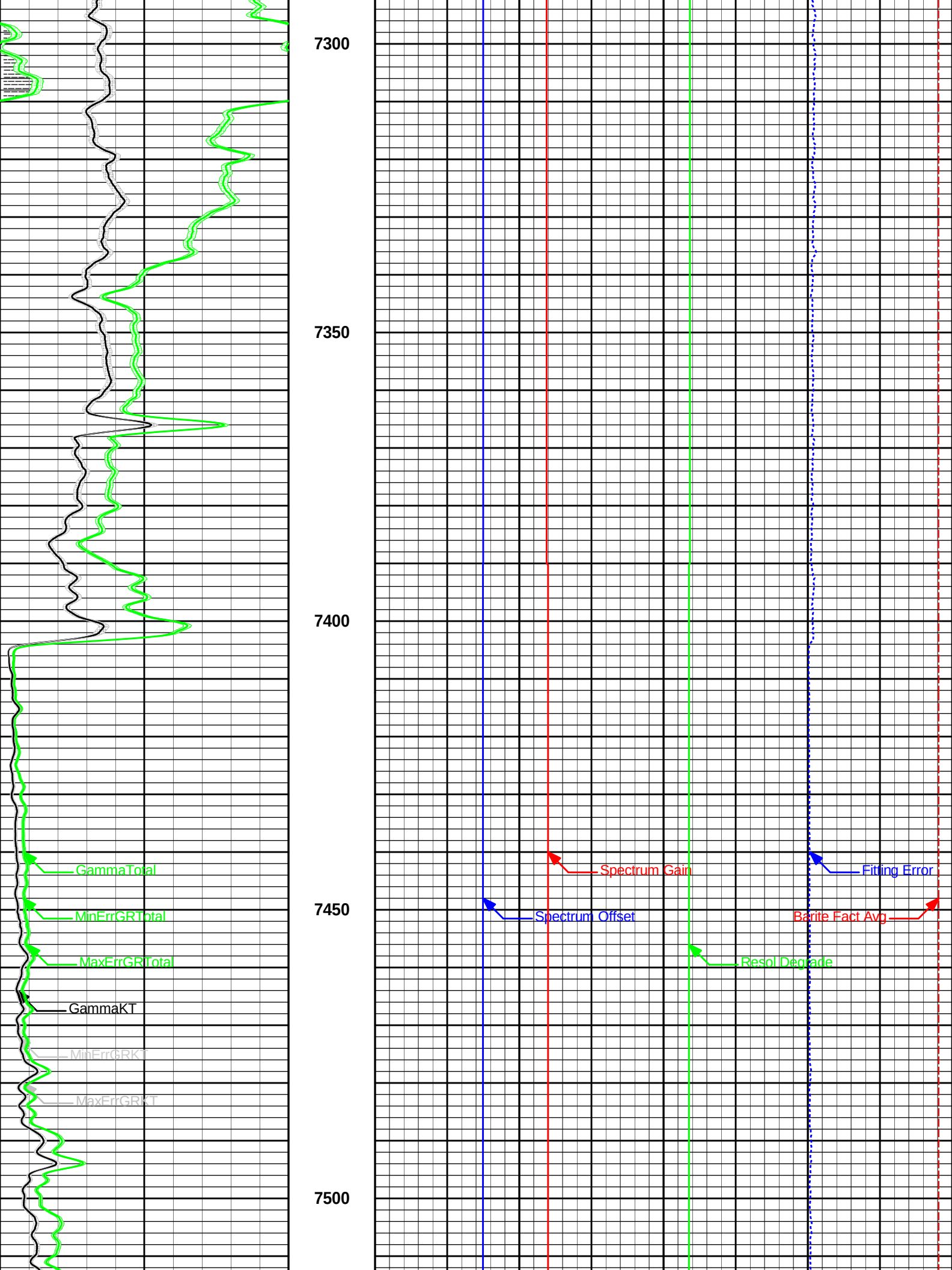
Barite Fact Avg
Resol Degrade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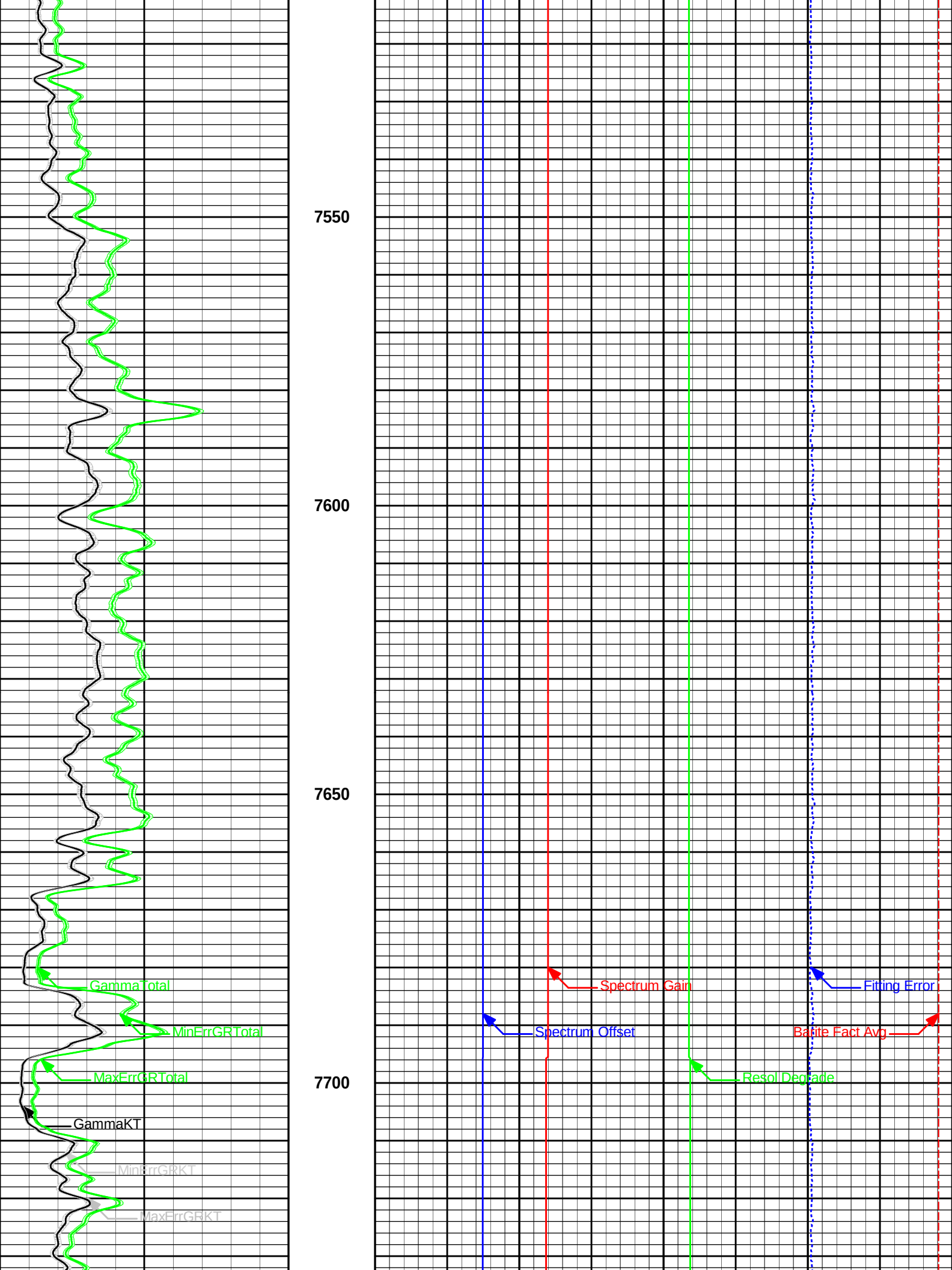
Barite Fact Avg
Resol Degrade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GammaKT
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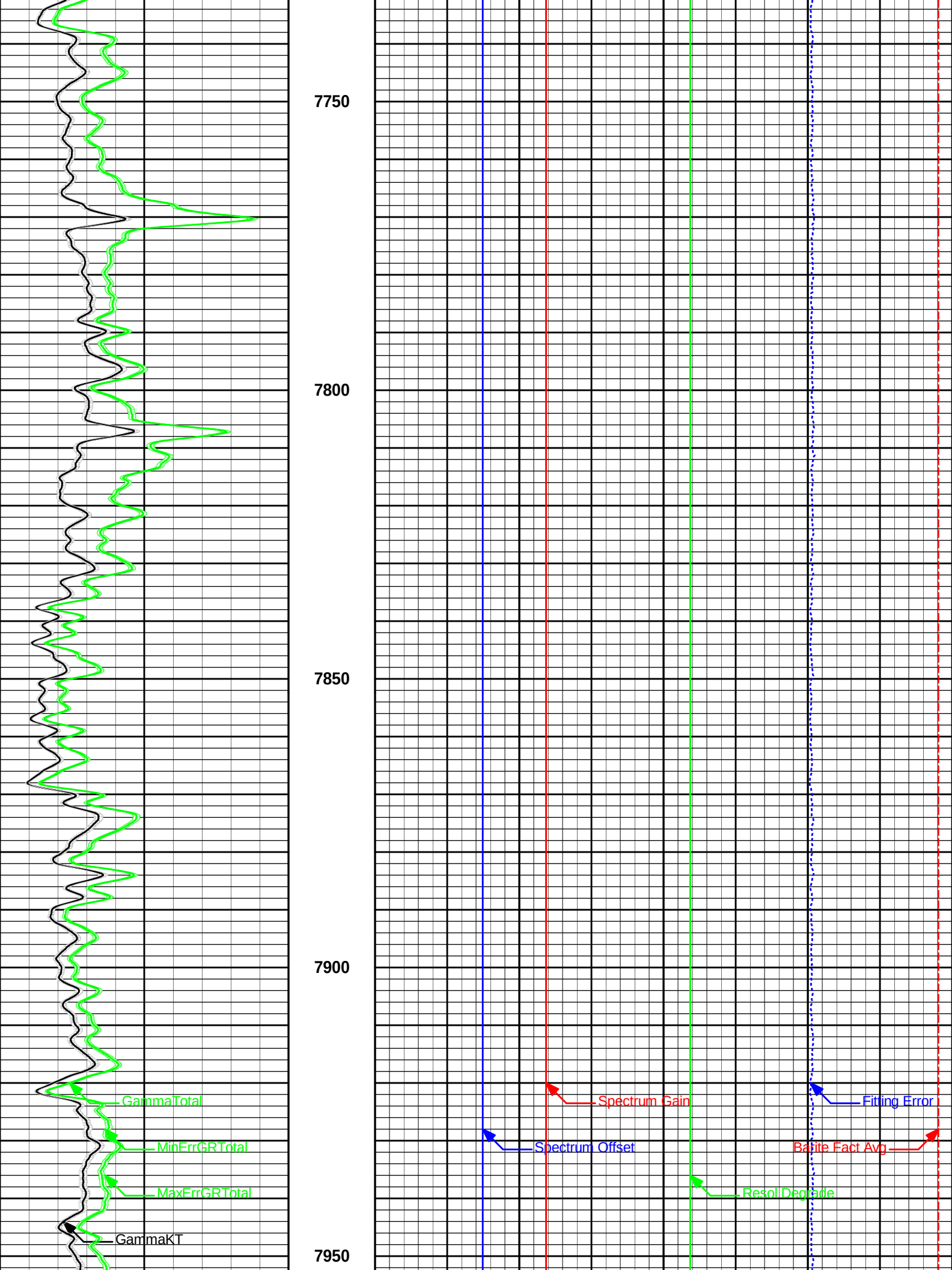
Barite Fact Avg
Resol Degrade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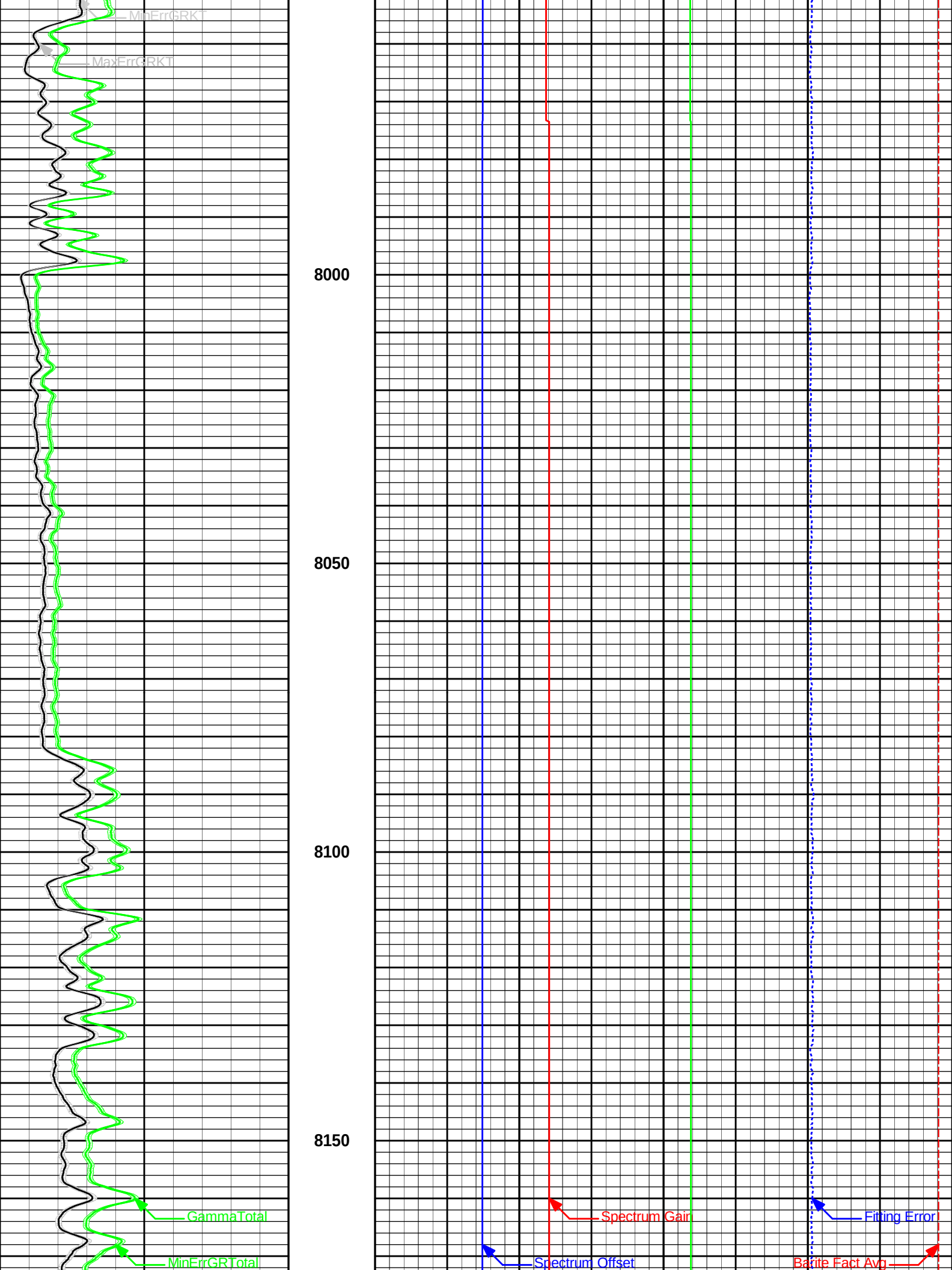
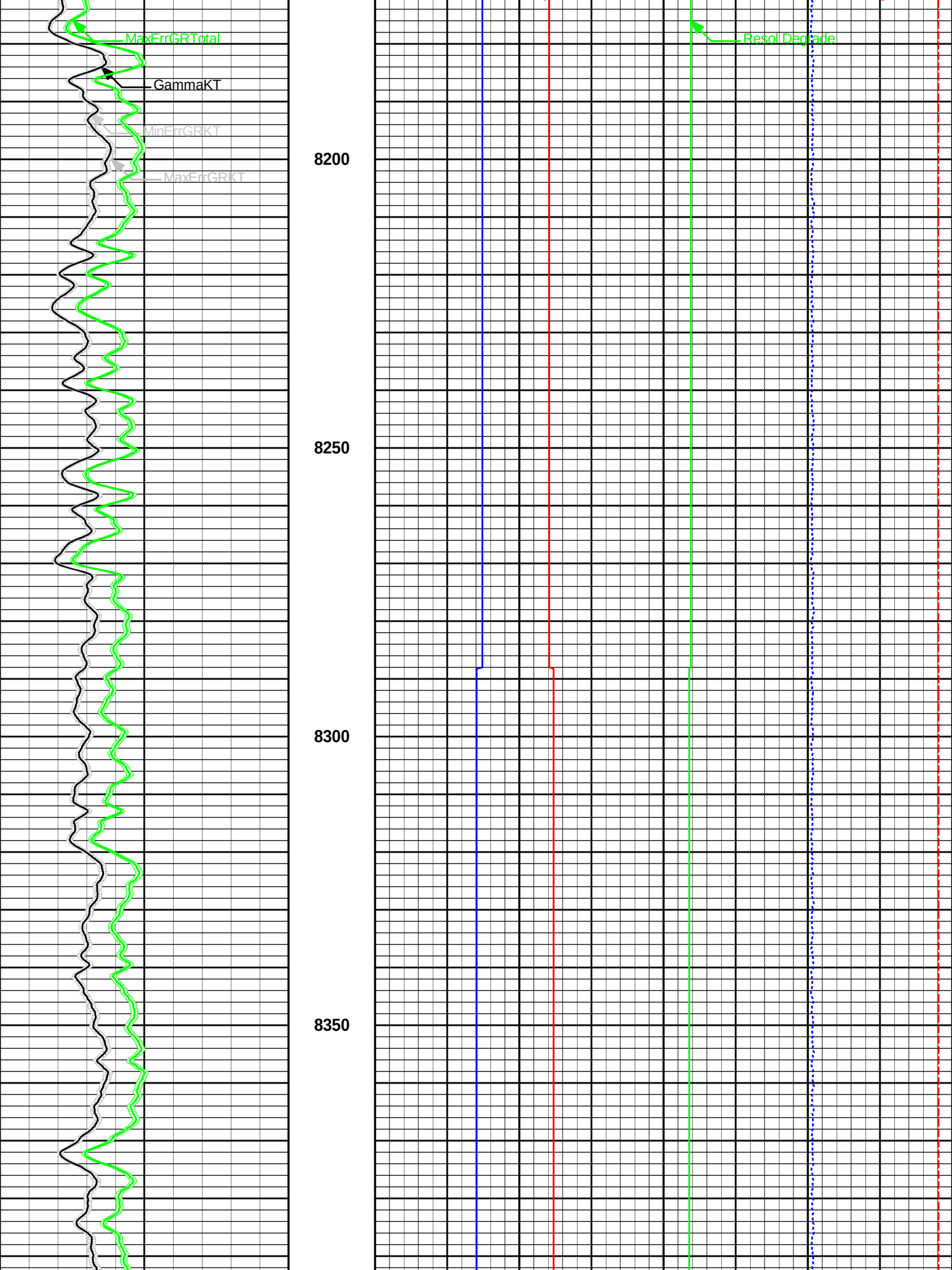
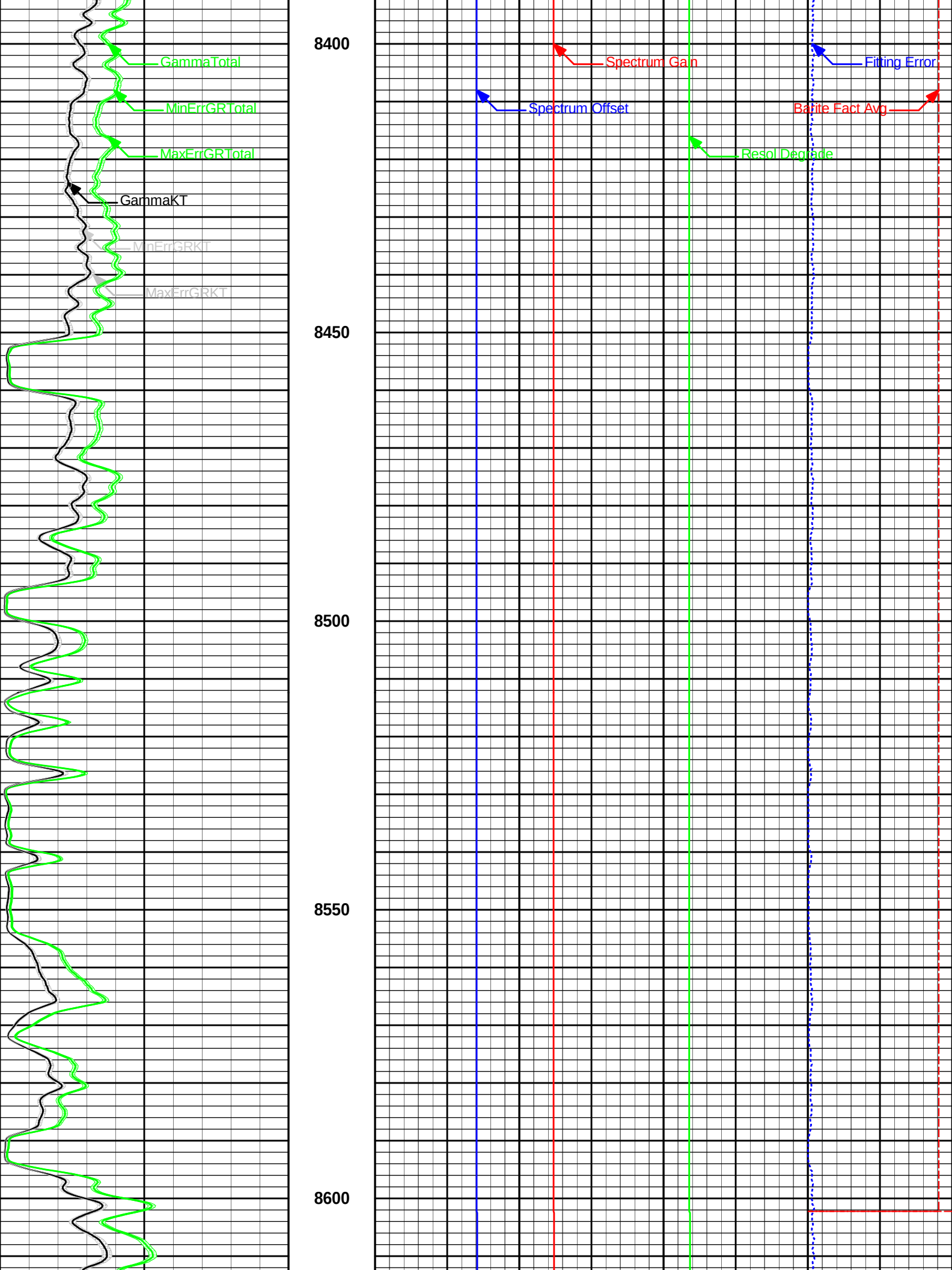
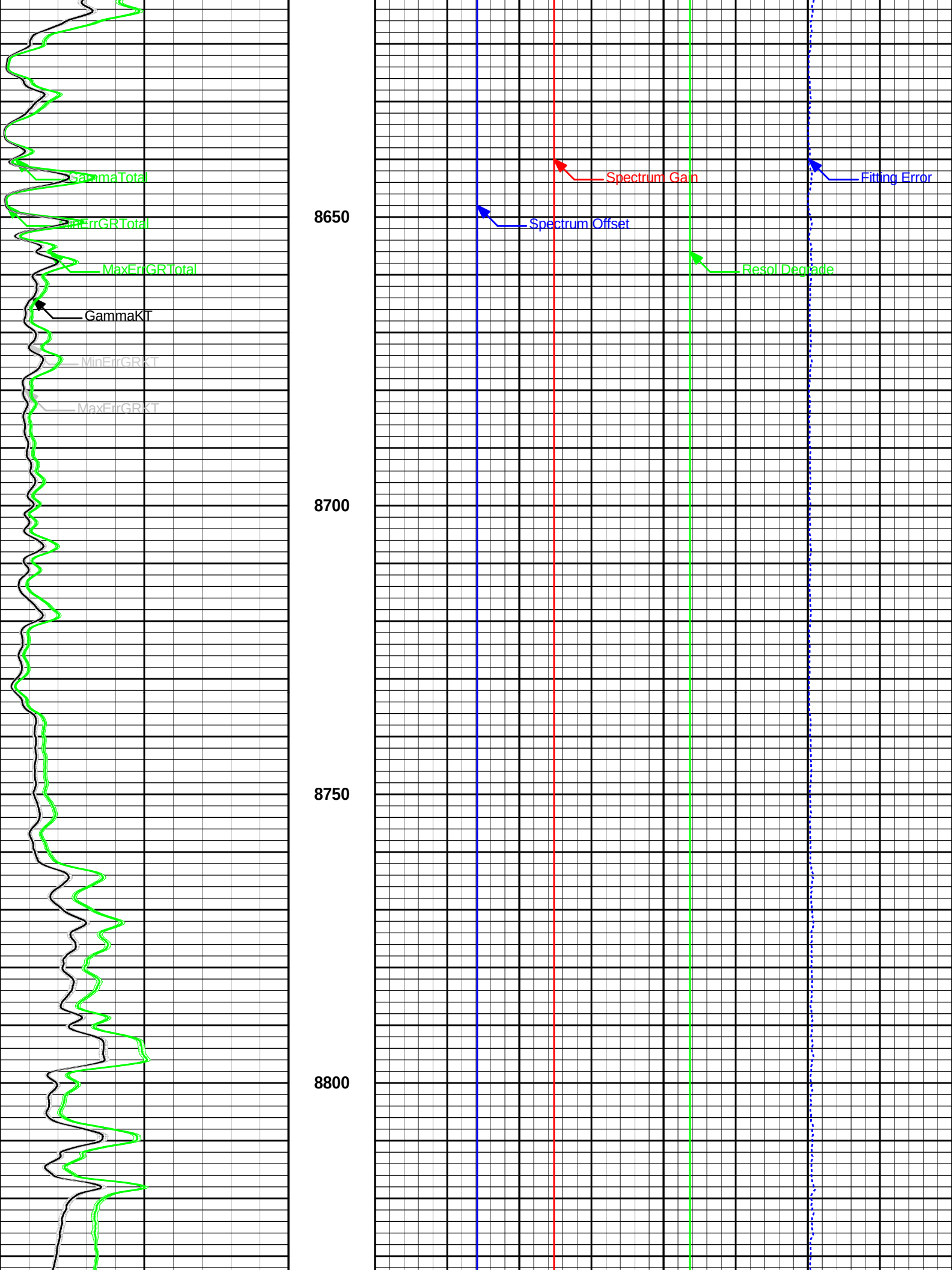
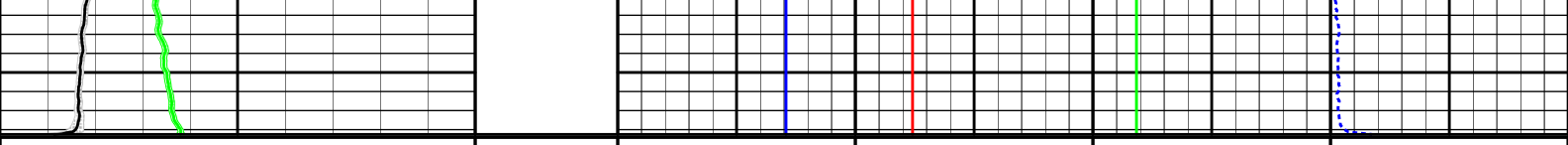
Fitting Error
Barite Fact Avg
Resol Degrade


MinErrGRKT
MaxErrGRKT
8000
8050
8100
8150
GammaTotal
MinErrGRTotal
Spectrum Gain
Spectrum Offset
Fitting Error
Barite Fact Avg


MaxErrGRTotal
GammaKT
MinErrGRKT
MaxErrGRKT
Resol Degrade
8200
8250
8300
8350


GammaTotal
MinErrGRTotal
MaxErrGRTotal
GammaKT
MinErrGRKT
MaxErrGRKT
8400
8450
8500
8550
8600
Spectrum Gain
Fitting Error
Spectrum Offset
Barite Fact Avg
Resol Degrade


GammaTotal
MinErrGRTotal
MaxErrGRTotal
GammaKT
MinErrGRKT
MaxErrGRKT
8650
8700
8750
8800
Spectrum Gain
Fitting Error
Spectrum Offset
Resol Degrade



GammaKT		Spectrum Offset	Spectrum Gain	Resol Degrade	Fitting Error
0 — 250	1 : 240 MD	-10 — 10	0.9 — 1.1	0 — 20	0 — 2
api					

GammaTotal	Barite Fact Avg
0 — 250	0 — 1
api	

Gamma Total Err

Gamma KT Err

HALLIBURTON

Plot Time: 08-Jul-13 11:02:46
Plot Range: 6400 ft to 8846.5 ft
Data: VIGILANT_16_07\Well Based\CSNG-HFDT\
Plot File: \\CSNG\CSNG-FS - Quality 1_240

MAIN PASS 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11812883**	**Reference Calibration Date:**	**04-Jun-13 10:44:28**
Engineer:	**J. PINKETT**	**Calibration Date:**	**03-Jul-13 12:28:58**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-289
Calibrator API Reference:243.00 api
Equivalent Calibrator API Reference:247.3 api

Measurement	Measured	Calibrated	Units
Background	73.5	73.3	api
Background + Calibrator	321.3	320.6	api
Calibrator	247.8	247.3	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 11812883**	**Reference Calibration Date:**	**03-Jul-13 12:28:58**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**07-Jul-13 21:18:30**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-289
Calibrator API Reference:243.00 api
Equivalent Calibrator API Reference:247.3 api

Field Verification	Shop	Field	Units
Background	73.3	73.1	api
Background + Calibrator	320.6	316.3	api
Calibrator	247.3	243.2	api

Shop	Field	Difference	Tolerance
247.3	243.2	4.1	+/- 9.00

CSNG-FS SHOP CALIBRATION

Tool Name: CSNG - 10846351
Reference Calibration Date: 04-Jun-13 11:35:17
Engineer: J. PINKETT
Calibration Date: 03-Jul-13 13:45:32
Software Version: WL INSITE R3.8.4 (Build 5)
Calibration Version: 1
Source SN: TB-289

TITANIUM CASE	Measured	Calibrated	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.7	23.8	Channel #
583 KEV Peak Channel #	53.1	53.6	Channel #
2614 KEV Peak Channel #	219.7	220.5	Channel #
Calibrate Temperature	74.2	81.8	degF

Pass/Fail Summary	Centroid
239 KEV Peak	Passed
583 KEV Peak	Passed
2614 KEV Peak	Passed

Blanket Reference Value: 243.00 API
Calibrator Value: 276.0 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1845.8	CPS	337.4	342.0	API
Background	356.4	CPS	61.4	66.0	API

Gamma Ray Gain: 0.93
Expected Gain Range: 0.85 - 1.15
Gamma Gain Check: Passed

CSNG-FS FIELD CALIBRATION

Tool Name: CSNG - 10846351
Reference Calibration Date: 03-Jul-13 13:45:32
Engineer: J. SCHMIDT
Calibration Date: 07-Jul-13 21:29:04
Software Version: WL INSITE R3.8.4 (Build 5)
Calibration Version: 1
Source SN:

TITANIUM CASE	Shop	Field	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.8	23.8	Channel #
583 KEV Peak Channel #	53.6	53.5	Channel #
2614 KEV Peak Channel #	220.5	220.7	Channel #
Calibrate Temperature	81.8	75.4	degF

Pass/Fail Summary	Centroid
239 KEV Peak	Passed
583 KEV Peak	Passed
2614 KEV Peak	Passed

Blanket Reference Value: 243.00 API
Calibrator Value: 276.0 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1797.4	CPS	342.0	336.8	API
Background	324.5	CPS	66.0	60.8	API

Gamma Ray Gain: 0.94
Expected Gain Range: 0.85 - 1.15
Gamma Gain Check: Passed

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name: DSNT - 11812167 **Reference Calibration Date:** 04-Jun-13 11:44:03
Engineer: J. PINKETT **Calibration Date:** 03-Jul-13 13:14:28
Software Version: WL INSITE R3.8.4 (Build 5) **Calibration Version:** 1

Logging Source S/N: DSN434
Tank Serial Number: 11068236
Reference value assigned to Tank: 53.720
Snow Block S/N: BRIGHTON
Calibration Tank Water Temperature: 65 degF
Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	1.005	1.001	0.900 - 1.100

WATER TANK SUMMARY (Horizontal Water Tank)

Measurement	Current Reading (Previous Coef.)	Calibrated (New Coef.)	Change	Control Limit On Change
Porosity (decp):	0.2236	0.2224	0.0013	+/- 0.0020
Calibrated Ratio:	10.15	10.11	0.043	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0744	0.02000 - 0.09000

PASS/FAIL SUMMARY

Background Check:	Passed
Gain-Range Check:	Passed
Snow-Block Check:	Passed

DUAL SPACED NEUTRON FIELD CALIBRATION

Tool Name: DSNT - 11812167 **Reference Calibration Date:** 03-Jul-13 13:14:28
Engineer: J. SCHMIDT **Calibration Date:** 07-Jul-13 21:35:07
Software Version: WL INSITE R3.8.4 (Build 5) **Calibration Version:** 1

Logging Source S/N: DSN434
Snow Block S/N: BRIGHTON

NEUTRON FIELD-CHECK SUMMARY

	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0744	0.0792	0.0048	+/- 0.0150

PASS/FAIL SUMMARY

Block Change Check:	Passed

Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	**SDLT - 11812177**	**Reference Calibration Date:**	**04-Jun-13 15:08:56**
Engineer:	**J. PINKETT**	**Calibration Date:**	**03-Jul-13 14:28:03**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**
Host Tool Name:	**DSNT - 11812167**		

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-3909.07	-3660.76	-7000.00 - -1000.00
Pad Gain	0.0003892	0.0003813	0.000200 - 0.000600
Arm Offset	-4240.54	-4402.43	-5000.00 - 3000.00
Arm Gain	0.0005484	0.0005632	0.000300 - 0.000700
Arm Power	-0.000003727	-0.000004890	-0.000010000 - 0.000010000

The ring diameter is computed from: DIAMETER = PAD EXTENSION + ARM EXTENSION + TOOL DIAMETER

Tool Diameter: 4.50 in

CALIBRATION RINGS

Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Change	Control Limit On New Value
PAD EXTENSION:				
Small Ring (in)	1.94	2.00	0.06	+/- 0.20
Medium Ring (in)	3.73	3.75	0.02	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.45	6.50	0.05	+/- 0.20
Medium Ring (in)	8.17	8.25	0.08	+/- 0.20
Large Ring (in)	14.98	15.00	0.02	+/- 0.20

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed

SDLT CALIPER FIELD CALIBRATION

Tool Name:	**SDLT - 11812177**	**Reference Calibration Date:**	**03-Jul-13 14:28:03**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**07-Jul-13 21:23:09**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.76	0.01	+/- 0.10
Ring Diameter	8.25	8.25	-0.00	+/- 0.15

PASS/FAIL SUMMARY

Pad Extension Check:	Passed
Diameter Check:	Passed

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	**SDLT Pad - 11795867**	**Reference Calibration Date:**	**04-Jun-13 12:34:43**
Engineer:	**J. PINKETT**	**Calibration Date:**	**03-Jul-13 14:06:34**

Software Version: WL INSITE R3.8.4 (Build 5) **Calibration Version:** 1

Logging Source S/N: 5471GW

Aluminum Block S/N: 63066 Density: 2.602g/cc Pe: 3.100

Magnesium Block S/N: 12345 Density: 1.690g/cc Pe: 2.650

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0527	1.0851	0.90 - 1.10
Near Dens Gain	1.0116	1.0470	0.90 - 1.10
Near Peak Gain	0.9900	1.0318	0.90 - 1.10
Near Lith Gain	0.9513	0.9908	0.90 - 1.10
Far Bar Gain	1.0118	1.0153	0.90 - 1.10
Far Dens Gain	0.9981	1.0018	0.90 - 1.10
Far Peak Gain	0.9911	0.9946	0.90 - 1.10
Far Lith Gain	0.9748	0.9822	0.90 - 1.10
Near Bar Offset	-0.5444	-0.8458	NONE
Near Dens Offset	-0.1479	-0.4663	NONE
Near Peak Offset	0.0436	-0.3118	NONE
Near Lith Offset	0.3424	0.0002	NONE
Far Bar Offset	-0.2155	-0.2435	NONE
Far Dens Offset	-0.0811	-0.1113	NONE
Far Peak Offset	-0.0290	-0.0577	NONE
Far Lith Offset	0.1158	0.0502	NONE
Near Bar Background	833.57	834.39	700 - 1450
Near Dens Background	278.07	276.52	230 - 480
Near Peak Background	121.14	119.68	100 - 210
Near Lith Background	146.92	147.05	125 - 260
Far Bar Background	653.89	651.14	450 - 900
Far Dens Background	255.60	255.84	175 - 345
Far Peak Background	101.21	102.54	70 - 140
Far Lith Background	105.04	103.28	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.686	1.690	0.004	+/- 0.015
Pe	2.582	2.609	0.027	+/- 0.150
ALUMINUM				
Density (g/cc)	2.603	2.602	-0.001	+/- 0.01500
Pe	3.019	3.069	0.050	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0009	+/- 0.0110	-0.0002	+/- 0.0140
Magnesium Block	-0.0011	+/- 0.0110	-0.0029	+/- 0.0140
Aluminum Block	0.0000	+/- 0.0110	-0.0003	+/- 0.0140
Resolution	8.46	6.00 - 11.50	8.71	6.00 - 11.50
Internal Verifier(B+D+P+L)	1378	1200 - 2700	1113	800 - 1700

PASS/FAIL SUMMARY	
Background Quality Check:	Passed
Background Range Check:	Passed
Background Resolution Check:	Passed
Background Verification Check:	Passed
Magnesium Quality Check:	Passed
Aluminum Quality Check:	Passed
Gains Check:	Passed
Changes in Calibration Blocks:	Passed

SPECTRAL DENSITY FIELD CHECK

Tool Name:	**SDLT Pad - 11795867**	**Reference Calibration Date:**	**03-Jul-13 14:06:34**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**07-Jul-13 21:19:06**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

Pad Temperature: 87.6 degF

DENSITY FIELD CALIBRATION SUMMARY				
Measurement	**Shop**	**Field**	**Change**	**Control Limit +/-**
Near (B+D+P+L) cps	1377.635	1378.906	1.271	14.998
Far (B+D+P+L) cps	1112.797	1114.486	1.689	17.580
Near Resolution	8.46	8.52	0.060	0.50
Far Resolution	8.71	8.81	0.100	1.00

PASS/FAIL SUMMARY	
Bkg Quality Check:	Passed
Bkg Resolution Check:	Passed
Bkg Verification Check:	Passed

INSITE HIGH FREQUENCY DIELECTRIC SHOP CALIBRATION

Tool Name:	**HFDT-I - 90319162**	**Reference Calibration Date:**	**08-Jun-13 13:48:55**
Engineer:	**J. PINKETT**	**Calibration Date:**	**03-Jul-13 18:33:02**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

RATIO - AIR HANG ELECTRONICS CALIBRATION			
Measurement	**Previous Value**	**New Value**	**Control Limit**
UM_TXU	1.5379	1.4801	None
ML_TXU	1.0185	1.0013	None
UL_TXU	1.5535	1.4695	None
UM_TXL	1.7196	1.3959	None
ML_TXL	3.2619	2.0050	None
UL_TXL	5.5631	2.7751	None

DPHASE - AIR HANG ELECTRONICS CALIBRATION			
Measurement	**Previous Value**	**New Value**	**Control Limit**
UM_TXU	78.9148	78.0395	None
ML_TXU	80.1436	74.5857	None
UL_TXU	159.0583	152.6251	None
UM_TXL	-85.0350	-98.1449	None
ML_TXL	-86.9585	-84.8669	None
UL_TXL	185.0557	173.9373	None

RATIO - VERIFYING with MANDREL AIR HANG CALIBRATED CONSTANTS			
Measurement	**Previous Value**	**New Value**	**Control Limit**

UM_TXU	1.8307	1.7307	None
ML_TXU	1.8308	1.8548	None
UL_TXU	3.3241	3.1828	None
UM_TXL	1.8224	1.7185	None
ML_TXL	1.8119	1.6713	None
UL_TXL	3.2748	2.8480	None
UM_COM	1.9204	1.7118	1.3613 - 2.2688
ML_COM	1.7103	1.7694	1.3613 - 2.2688
UL_COM	3.2752	3.0067	2.4698 - 4.1163

DPHASE - VERIFYING with MANDREL AIR HANG CALIBRATED CONSTANTS

Measurement	Previous Value	New Value	Control Limit
UM_TXU	29.4571	27.7632	None
ML_TXU	29.4289	24.2672	None
UL_TXU	58.8830	52.0372	None
UM_TXL	30.9750	23.7859	None
ML_TXL	30.7486	32.5309	None
UL_TXL	58.7640	53.2694	None
UM_COM	30.0424	28.2307	22.5000 - 37.5000
ML_COM	30.2624	25.9430	22.5000 - 37.5000
UL_COM	58.8235	52.6533	44.7750 - 74.6250

INSITE HIGH FREQUENCY DIELECTRIC FIELD CALIBRATION

Tool Name: HFDT-I - 90319162 **Reference Calibration Date:** 03-Jul-13 18:33:02

Engineer: J. SCHMIDT **Calibration Date:** 07-Jul-13 21:59:29

Software Version: WL INSITE R3.8.4 (Build 5) **Calibration Version:** 1

RATIO - VERIFYING with MANDREL AIR HANG CALIBRATED CONSTANTS

Measurement	Shop Value	Field Value	Control Limit
UM_TXU	1.7307	1.7785	None
ML_TXU	1.8548	1.8935	None
UL_TXU	3.1828	3.3388	None
UM_TXL	1.7185	1.8013	None
ML_TXL	1.6713	1.6911	None
UL_TXL	2.8480	3.0057	None
UM_COM	1.7118	1.7705	1.3613 - 2.2688
ML_COM	1.7694	1.7956	1.3613 - 2.2688
UL_COM	3.0067	3.1519	2.4698 - 4.1163

DPHASE - VERIFYING with MANDREL AIR HANG CALIBRATED CONSTANTS

Measurement	Shop Value	Field Value	Control Limit
UM_TXU	27.7632	27.5551	None
ML_TXU	24.2672	25.8253	None
UL_TXU	52.0372	53.3720	None
UM_TXL	23.7859	23.6387	None
ML_TXL	32.5309	29.3672	None
UL_TXL	53.2694	50.1229	None
UM_COM	28.2307	28.0530	22.5000 - 37.5000
ML_COM	25.9430	25.1401	22.5000 - 37.5000
UL_COM	52.6533	51.7475	44.7750 - 74.6250

CONTACT TEMPERATURE TOOL SHOP CALIBRATION

Tool Name: HFDT-I - 90319162 **Reference Calibration Date:** 01-Jan-70 00:00:00

Engineer: B. RIDDEL **Calibration Date:** 08-Jun-13 14:40:55

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

CALIBRATION COEFFICIENT SUMMARY

	Measured Temp	Calibrated Temp	Units
Low Value	82.78	77.00	degF
Middle Value	147.40	150.00	degF
High Value	207.10	213.00	degF

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	Reference Temp	Units
Calibration Point Low Ref	77.00	degF
Calibration Point Middle Ref	150.00	degF
Calibration Point High Ref	213.00	degF

	Calibration Coefficient
Pwr2	-0.00
Gain	1.23
Offset	-8.82

DENSITY CALIPER SHOP CALIBRATION

Tool Name: HFDT-I - 90319162
Reference Calibration Date: 15-Jun-13 18:30:07
Engineer: J. PINKETT
Calibration Date: 03-Jul-13 18:43:15
Software Version: WL INSITE R3.8.4 (Build 5)
Calibration Version: 1
Host Tool Name: --- - ---

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-3085.25	-2820.29	-7000.00 - -1000.00
Pad Gain	0.0003954	0.0003883	0.000200 - 0.000600
Arm Offset	-3480.88	-3644.88	-5000.00 - 3000.00
Arm Gain	0.0005450	0.0005541	0.000300 - 0.000700
Arm Power	-0.000003681	-0.000004691	-0.000010000 - 0.000010000

The ring diameter is computed from: DIAMETER = PAD EXTENSION + ARM EXTENSION + TOOL DIAMETER

Tool Diameter: 4.50 in

CALIBRATION RINGS

Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Change	Control Limit On New Value
PAD EXTENSION:				
Small Ring (in)	1.93	2.00	0.07	+/- 0.20
Medium Ring (in)	3.71	3.75	0.04	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.46	6.50	0.04	+/- 0.20
Medium Ring (in)	8.20	8.25	0.05	+/- 0.20
Large Ring (in)	15.04	15.00	-0.04	+/- 0.20

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed

SDLT CALIPER FIELD CALIBRATION

Tool Name: HFDT-I - 90319162
Reference Calibration Date: 03-Jul-13 18:43:15
Engineer: J. SCHMIDT
Calibration Date: 07-Jul-13 21:55:10
Software Version: WL INSITE R3.8.4 (Build 5)
Calibration Version: 1

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.75	0.00	+/- 0.10
Ring Diameter	8.25	8.33	0.08	+/- 0.15

PASS/FAIL SUMMARY	
Pad Extension Check:	Passed
Diameter Check:	Passed

ACCELEROMETER AND MAGNETOMETER SHOP CALIBRATION

Tool Name:	**IDT - 11238313**	**Reference Calibration Date:**	**19-Apr-13 12:46:54**
Engineer:	**V. CREWS**	**Calibration Date:**	**21-May-13 10:53:23**
Software Version:	**WL INSITE R3.6.0 (Build 3)**	**Calibration Version:**	**1**

Reference Gravity Field: 1.0000 g

Reference Magnetic Field: 53000.0000 nT

* QF : value of 0 is shown for bad quality if | data - reference | > (2 * standard deviation) and > (0.5% of reference value)

ACCELEROMETER CALIBRATION RAW DATA VALUE

Raw Acc X	Raw Acc Y	Raw Acc Z	Quality(Gravity)	Quality Error(%)	QF
0.1621	-0.6908	-0.0036	1.0014	99.8615	1
-0.7099	-0.1901	-0.0040	0.9992	99.9170	1
-0.3109	0.6812	-0.0041	1.0004	99.9634	1
0.7003	0.1123	-0.0036	0.9996	99.9646	1
-0.0108	0.7440	-0.0112	1.0001	99.9939	1
-0.1626	0.7118	0.0678	0.9997	99.9679	1
-0.0028	0.7438	-0.0107	0.9999	99.9947	1
0.7068	-0.0089	-0.0100	1.0001	99.9860	1
-0.0482	-0.7108	-0.0100	0.9988	99.8834	1
-0.7386	0.0722	-0.0110	1.0008	99.9185	1
-0.5998	0.0887	0.2045	1.0001	99.9942	1
0.1919	0.6939	-0.0919	0.9999	99.9886	1

ACCELEROMETER QUALITY SUMMARY

Average Calculated Gravity Field	1.0000	g
Standard Deviation Calculated Gravity Field	0.0007	g

ACCELEROMETER GAIN AND OFFSET

	GAIN	OFFSET
ACC X	1.3819339275	0.0228626542
ACC Y	1.3732980490	-0.0216761213
ACC Z	2.7194406986	0.0273711104

* QF : value of 0 is shown for bad quality if | data - reference | > (3 * standard deviation) and > (1% of reference value)

MAGNETOMETER CALIBRATION RAW DATA VALUE

Raw Mag X	Raw Mag Y	Raw Mag Z	Quality(Magnetic)	Quality Error(%)	QF
0.1807	1.2798	-0.1231	52846.3164	99.7100	1
1.2868	-0.1367	-0.1196	52909.9961	99.8302	1
0.0432	-1.3060	-0.1160	52699.4258	99.4329	1
-1.2418	0.3189	-0.1132	53105.8906	99.8002	1
-0.1665	-1.2117	0.4807	52975.2305	99.9533	1
0.4150	-1.2408	-0.2356	53390.4336	99.2633	1
0.1488	-1.2169	-0.4923	53011.7734	99.9778	1
-1.1861	-0.1350	-0.4863	52915.2930	99.8402	1

-0.1105	1.2064	-0.4892	53146.2539	99.7241	1
1.2025	0.0686	-0.4950	52933.7266	99.8750	1
1.2590	0.0718	0.3212	53086.9063	99.8360	1
-0.1491	-1.0779	-0.7445	52963.2500	99.9307	1

MAGNETOMETER QUALITY SUMMARY		
Average Calculated Magnetic Field	52998.7070	nT
Standard Deviation Calculated Magnetic Field	172.7606	nT

MAGNETOMETER GAIN AND OFFSET		
	GAIN	OFFSET
MAG X	41007.3789062500	-315.0777893066
MAG Y	40467.3554687500	362.0441894531
MAG Z	40428.0625000000	227.0514068604

Noise Level Value: 0.000195 cnts

Noise Level Cal Value: 0.0005 g

ICT SHOP CALIBRATION

Tool Name:	**ICT - 11294351**	**Reference Calibration Date:**	**12-Jun-13 11:56:52**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**05-Jul-13 23:34:50**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

CALIPERS AND RINGS

Ring	Measured	Calibrated	Units
CALIPER 1:			
Small Ring	3.67	3.65	in
Medium Ring	8.00	8.00	in
Large Ring	15.01	15.00	in
X-Large Ring	20.99	21.00	in
CALIPER 2:			
Small Ring	3.71	3.65	in
Medium Ring	8.01	8.00	in
Large Ring	15.12	15.00	in
X-Large Ring	21.06	21.00	in
CALIPER 3:			
Small Ring	3.70	3.65	in
Medium Ring	8.02	8.00	in
Large Ring	15.09	15.00	in
X-Large Ring	21.08	21.00	in
CALIPER 4:			
Small Ring	3.75	3.65	in
Medium Ring	8.07	8.00	in
Large Ring	15.11	15.00	in
X-Large Ring	21.02	21.00	in
CALIPER 5:			
Small Ring	3.66	3.65	in
Medium Ring	7.98	8.00	in
Large Ring	14.93	15.00	in
X-Large Ring	21.01	21.00	in
CALIPER 6:			
Small Ring	3.62	3.65	in
Medium Ring	7.96	8.00	in
Large Ring	14.92	15.00	in
X-Large Ring	20.94	21.00	in

X-Large Ring 20.94 21.00 in

ICT FIELD CALIBRATION

Tool Name:	**ICT - 11294351**	**Reference Calibration Date:**	**05-Jul-13 23:34:50**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**07-Jul-13 21:42:12**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

CALIPERS

Caliper	Shop	Field	Units
Caliper 1	8.00	8.02	in
Caliper 2	8.00	8.04	in
Caliper 3	8.00	8.02	in
Caliper 4	8.00	7.93	in
Caliper 5	8.00	7.95	in
Caliper 6	8.00	8.00	in

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name:	**ACRt Sonde - 11294353**	**Reference Calibration Date:**	**02-Jun-13 16:44:14**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**05-Jul-13 15:38:14**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**
Host Tool Name:	**ACRt Instrument - 11302817**		

TYPICAL GAIN RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.02	1.05	0.95	1.01	1.05	0.95	1.01	1.05
A2 (50")	0.95	1.02	1.05	0.95	1.02	1.05	0.95	1.02	1.05
A3 (29")	0.95	1.01	1.05	0.95	1.01	1.05	0.95	1.01	1.05
A4 (17")	0.95	1.02	1.05	0.95	1.02	1.05	0.95	1.02	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.01	1.05	0.95	1.01	1.05
A6 (6")	N/A	N/A	N/A	0.95	1.00	1.05	0.95	1.00	1.05

TYPICAL SONDE OFFSET RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	-5	-1.77	2	-6	-4.96	-2	-8	-5.42	-2
A2 (50")	-7	-1.27	0	-7	-3.07	0	-7	-4.98	0
A3 (29")	-27	-13.13	-9	-9	-3.78	-3	-7	-3.85	-1
A4 (17")	-180	-91.35	-60	-45	-29.41	-15	-39	-25.47	-13
A5 (10")	N/A	N/A	N/A	-150	-100.09	-50	-80	-47.86	-10
A6 (6")	N/A	N/A	N/A	175	350.07	525	90	178.75	270

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.97	1.3
36K	1.0	1.85	2.0
72K	1.0	1.21	2.0

R-MUD VERIFICATION

Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
Mud Cell	0.95	1.00	1.05

PASS/FAIL SUMMARY

GAIN RANGE CHK	PASS
SONDE OFFSET RANGE CHK	PASS
Tx CURRENT GAIN	PASS
Rmud VERIFICATION	PASS

Rmud VERIFICATION PASS

TOOL OK TO LOG

CALIBRATION SUMMARY

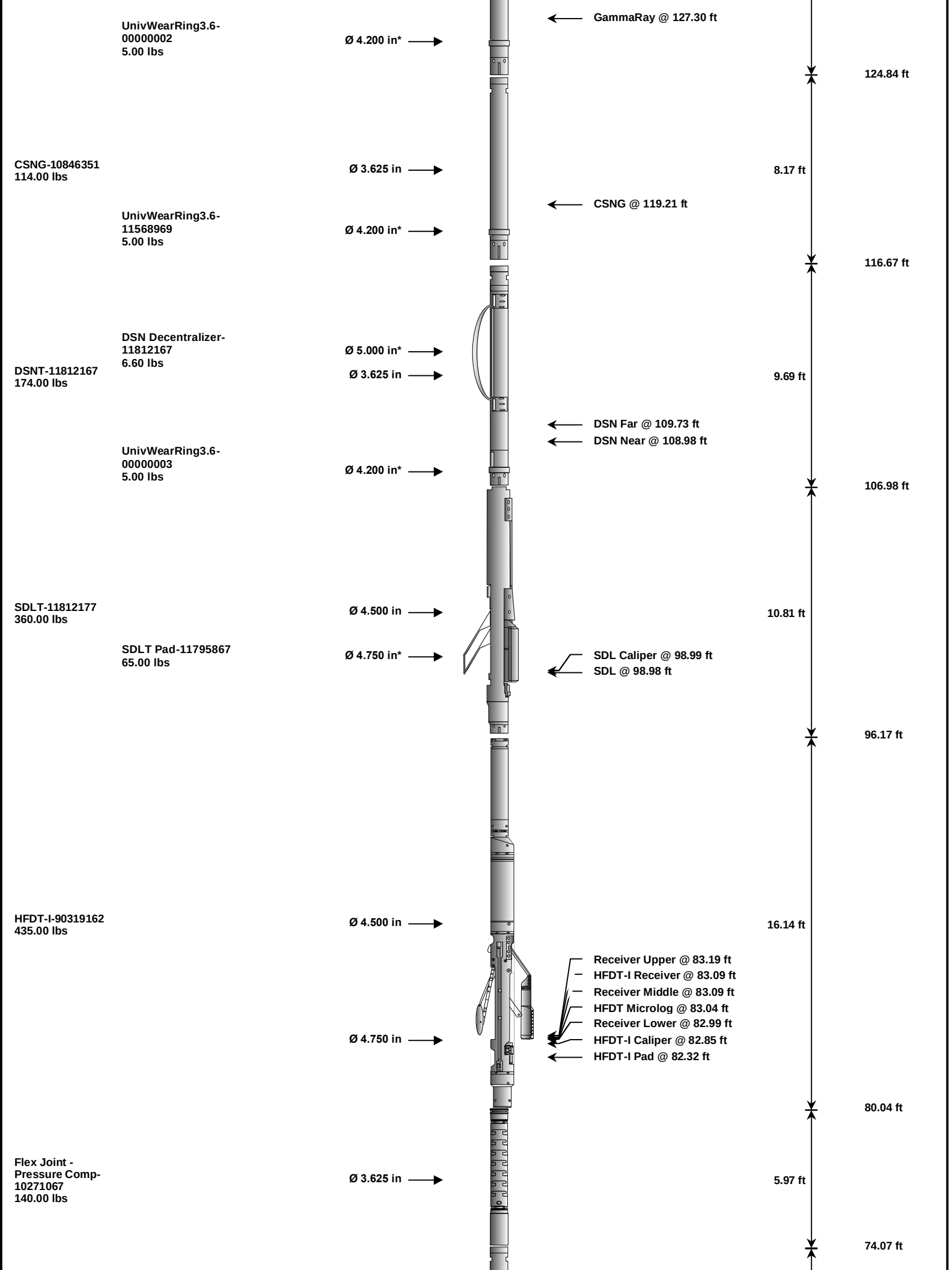
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11812883						
Gamma Ray Calibrator	247.3	243.2	----------	4.1	+/- 9.00	api
CSNG-10846351						
60 KEV Peak Channel #	48.0	48.0	----------	0.0	----------	Channel #
239 KEV Peak Channel #	23.8	23.8	----------	0.0	----------	Channel #
583 KEV Peak Channel #	53.6	53.5	----------	0.1	----------	Channel #
2614 KEV Peak Channel #	220.5	220.7	----------	-0.2	----------	Channel #
DSNT-11812167						
Snow-Block Porosity	0.0744	0.0792	----------	-0.0048	+/- 0.0150	decp
SDLT-11812177						
Pad Extension	3.75	3.76	----------	-0.01	+/-0.10	in
Ring Diameter	8.25	8.25	----------	0.00	+/-0.15	in
SDLT Pad-11795867						
Near(B+D+P+L)	1377.635	1378.906	----------	-1.271	+/-14.998	cps
Far(B+D+P+L)	1112.797	1114.486	----------	-1.689	+/-17.580	cps
HFDT-I-90319162						
Pad Extension	3.75	3.75	----------	0.00	+/-0.10	in
Ring Diameter	8.25	8.33	----------	-0.08	+/-0.15	in
ICT-11294351						
Caliper 1	8.00	8.02	----------	-0.02	+/-0.25	in
Caliper 2	8.00	8.04	----------	-0.04	+/-0.25	in
Caliper 3	8.00	8.02	----------	-0.02	+/-0.25	in
Caliper 4	8.00	7.93	----------	0.07	+/-0.25	in
Caliper 5	8.00	7.95	----------	0.05	+/-0.25	in
Caliper 6	8.00	8.00	----------	0.00	+/-0.25	in
ACRt Sonde-11294353						
Mud Cell	1.00	----------	----------	0.00	----------	ohm-m

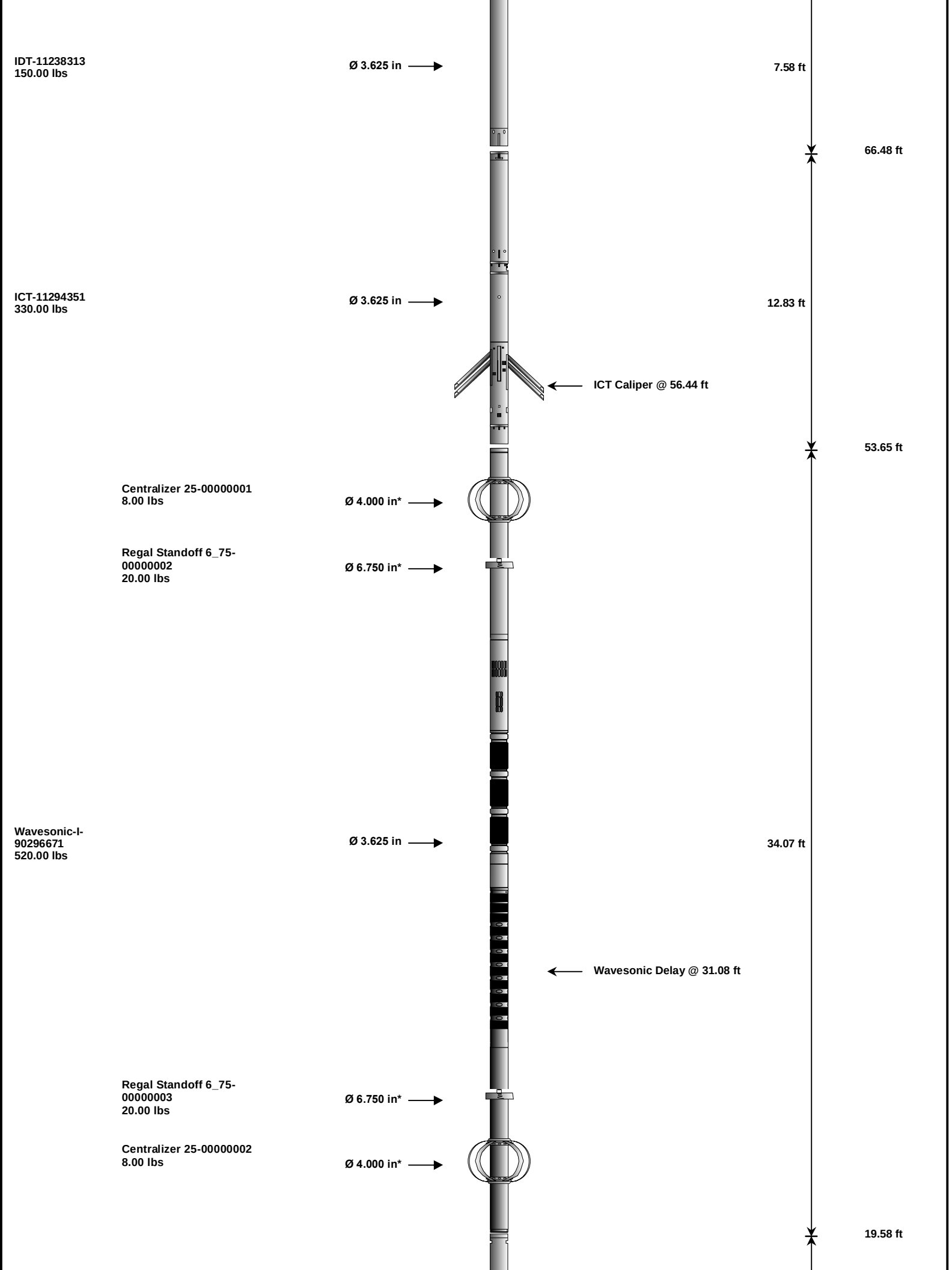
Data: VIGILANT_16_07\0001 QUAD-CSNG-HFDT-IDT-ICT-WSTT\IDLE **Date: 08-Jul-13 04:42:42**

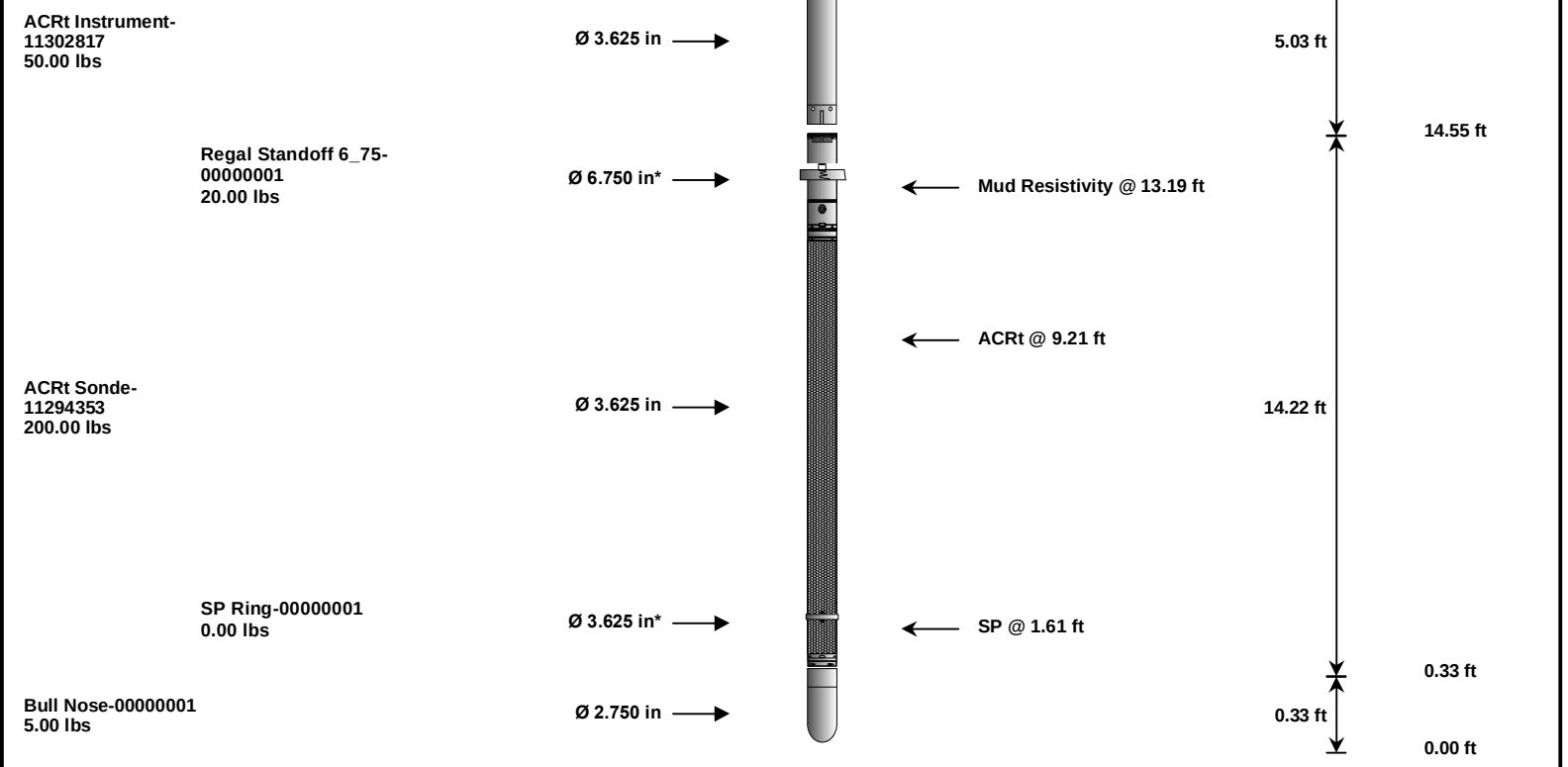
HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
						139.61 ft
RWCH-10409638 135.00 lbs		Ø 3.625 in		Load Cell @ 135.92 ft BH Temperature @ 135.36 ft	6.25 ft	
						133.36 ft
GTET-11812883 165.00 lbs		Ø 3.625 in			8.52 ft	


GammaRay @ 127.30 ft
UnivWearRing3.6-
00000002
5.00 lbs
Ø 4.200 in*
124.84 ft
CSNG-10846351
114.00 lbs
Ø 3.625 in
8.17 ft
CSNG @ 119.21 ft
UnivWearRing3.6-
11568969
5.00 lbs
Ø 4.200 in*
116.67 ft
DSN Decentralizer-
11812167
6.60 lbs
Ø 5.000 in*
DSNT-11812167
174.00 lbs
Ø 3.625 in
9.69 ft
DSN Far @ 109.73 ft
DSN Near @ 108.98 ft
UnivWearRing3.6-
00000003
5.00 lbs
Ø 4.200 in*
106.98 ft
SDLT-11812177
360.00 lbs
Ø 4.500 in
10.81 ft
SDLT Pad-11795867
65.00 lbs
Ø 4.750 in*
SDL Caliper @ 98.99 ft
SDL @ 98.98 ft
96.17 ft
HFDT-I-90319162
435.00 lbs
Ø 4.500 in
16.14 ft
Receiver Upper @ 83.19 ft
HFDT-I Receiver @ 83.09 ft
Receiver Middle @ 83.09 ft
HFDT Microlog @ 83.04 ft
Receiver Lower @ 82.99 ft
Ø 4.750 in
HFDT-I Caliper @ 82.85 ft
HFDT-I Pad @ 82.32 ft
80.04 ft
Flex Joint -
Pressure Comp-
10271067
140.00 lbs
Ø 3.625 in
5.97 ft
74.07 ft


IDT-11238313
150.00 lbs
Ø 3.625 in
7.58 ft
66.48 ft
ICT-11294351
330.00 lbs
Ø 3.625 in
12.83 ft
ICT Caliper @ 56.44 ft
53.65 ft
Centralizer 25-00000001
8.00 lbs
Ø 4.000 in*
Regal Standoff 6_75-00000002
20.00 lbs
Ø 6.750 in*
Wavesonic-I-90296671
520.00 lbs
Ø 3.625 in
34.07 ft
Wavesonic Delay @ 31.08 ft
Regal Standoff 6_75-00000003
20.00 lbs
Ø 6.750 in*
Centralizer 25-00000002
8.00 lbs
Ø 4.000 in*
19.58 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	10409638	135.00	6.25		133.36	300.00
GTET	Gamma Telemetry Tool	11812883	165.00	8.52		124.84	60.00
UWR3P6	Universal Wear Ring 3 5-8 inch	00000002	5.00	0.35	*	126.11	300.00
CSNG	Compensated Spectral Natural Gamma	10846351	114.00	8.17		116.67	15.00
UWR3P6	Universal Wear Ring 3 5-8 inch	11568969	5.00	0.35	*	117.91	300.00
DSNT	Dual Spaced Neutron	11812167	174.00	9.69		106.98	60.00
DCNT	DSN Decentralizer	11812167	6.60	5.13	*	110.31	300.00
UWR3P6	Universal Wear Ring 3 5-8 inch	00000003	5.00	0.35	*	107.49	300.00
SDLT	Spectral Density Tool	11812177	360.00	10.81		96.17	60.00
SDLP	Density Insite Pad	11795867	65.00	2.55	*	98.38	60.00
HFDT	High Frequency Dielectric Tool	90319162	435.00	16.14		80.04	30.00
FLEX	Flex Joint - Pressure Compensated	10271067	140.00	5.97		74.07	300.00
IDT	Insite Directional Tool	11238313	150.00	7.58		66.48	30.00
ICT	Six Independent Arm Caliper	11294351	330.00	12.83		53.65	30.00
WSTT	WaveSonic Insite	90296671	520.00	34.07		19.58	30.00
RSOF	Regal Standoff 6.75in	00000003	20.00	0.52	*	25.23	300.00
OBCEN	Centralizer - 25 in. Overbody	00000002	8.00	2.08	*	21.64	300.00
RSOF	Regal Standoff 6.75in	00000002	20.00	0.52	*	48.27	300.00
OBCEN	Centralizer - 25 in. Overbody	00000001	8.00	2.08	*	50.33	300.00
ACRt	Array Compensated True Resistivity Instrument Section	11302817	50.00	5.03		14.55	300.00
ACRt	Array Compensated True Resistivity Sonde Section	11294353	200.00	14.22		0.33	300.00
SP	SP Ring	00000001	0.00	0.25	*	1.61	300.00
RSOF	Regal Standoff 6.75in	00000001	20.00	0.52	*	13.18	300.00
BLNS	Bull Nose	00000001	5.00	0.33		0.00	300.00
Total			**2,940.60**	**139.61**			

* Not included in Total Length and Length Accumulation.

Data: VIGILANT_16_07\0001 QUAD-CSNG-HFDT-IDT-ICT-WSTT\IDLE **Date: 08-Jul-13 04:41:14**

COMPANY	**NOBLE ENERGY INC**
WELL	**VIGILANT STATE AC16-07**
FIELD	**WATTENBERG**
COUNTY	**WELD** STATE **CO**

COUNTY	**WELD**	STATE	**CO**

HALLIBURTON

COMPENSATED SPECTRAL NATURAL GAMMA