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Welcome to the Family, Introducing our 2nd Resolve[®] Filter

Eichrom Technologies LLC

Terry O'Brien & Larry Jassin

October 28, 2008



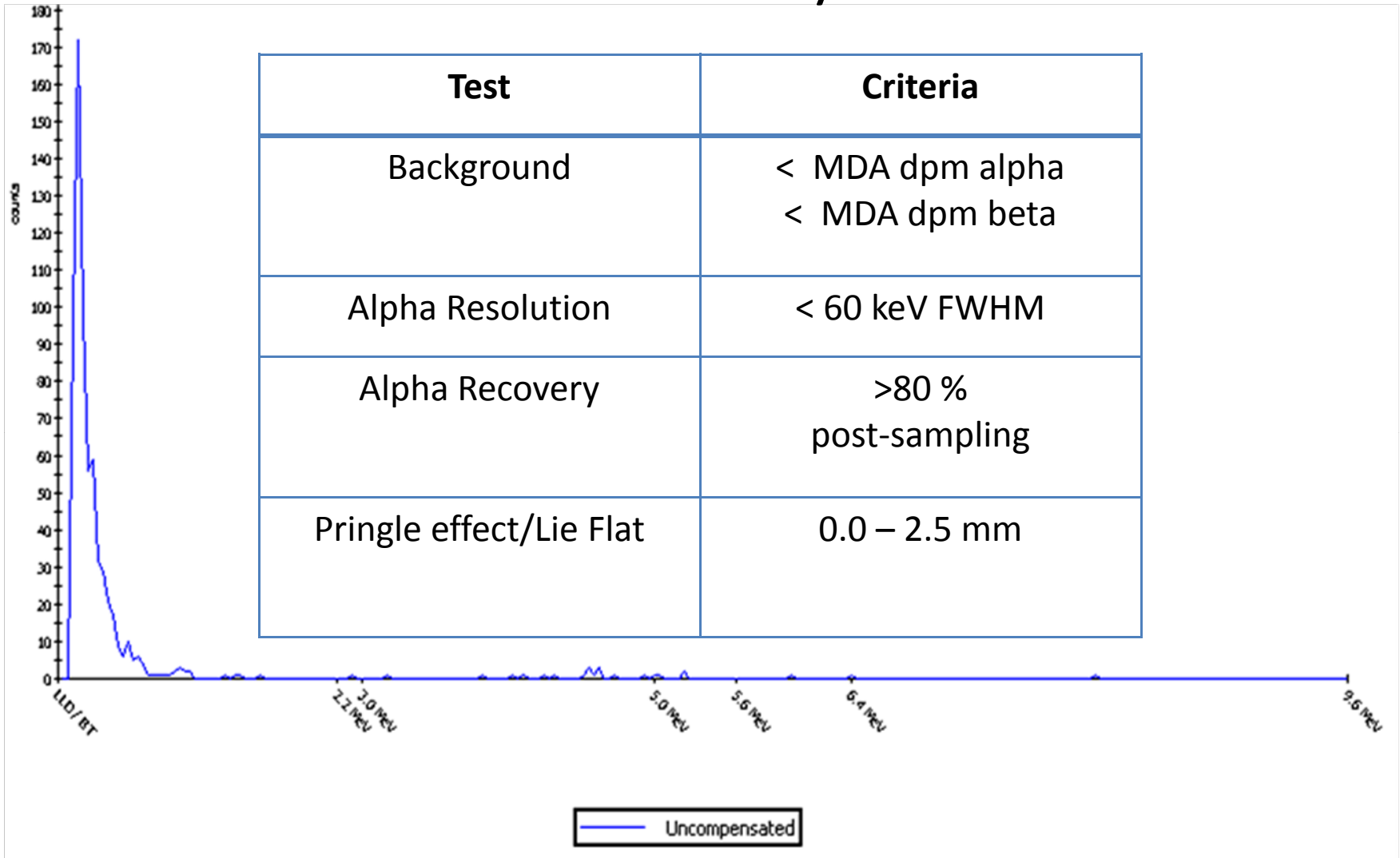
Filters for Radiochemistry

- 2004-Resolve Filters introduced with FWHM specification to address industry concerns
- Air monitoring equipment becoming more sophisticated
- Eichrom looks into applying lessons learned from original alpha spec filter to air monitoring application

Selection Criteria for Air Monitoring Filters

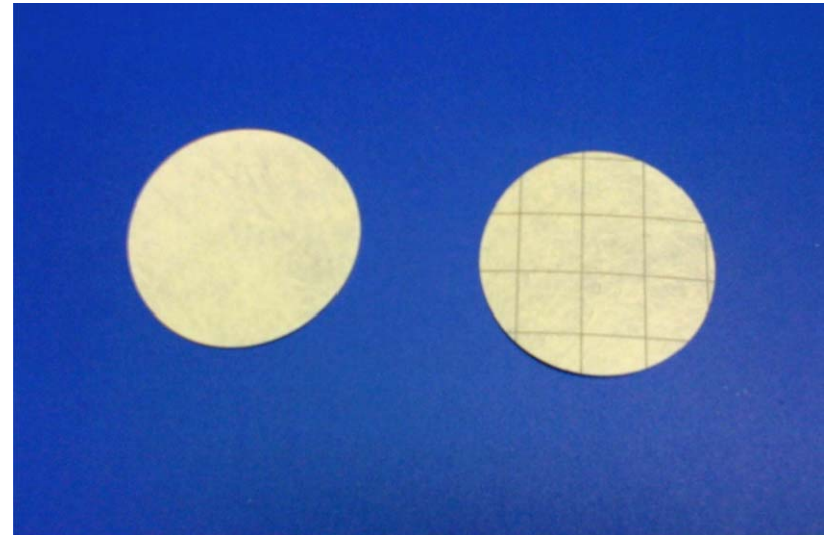
Item	Issue	Characteristic
1	Quality spectra	<ul style="list-style-type: none">•Low self background•Good resolution for alpha emitters• Collection of contamination on Surface (reduce self-adsorption)
2	Easy to Handle	Negligible curling and durable

Filter Material – Quality Control Goals



Resolve PTFE Filters
3 μm , PTFE Laminate
47mm Diameter

Polytetrafluoroethylene (PTFE) material
With a laminated stiff polymeric backing

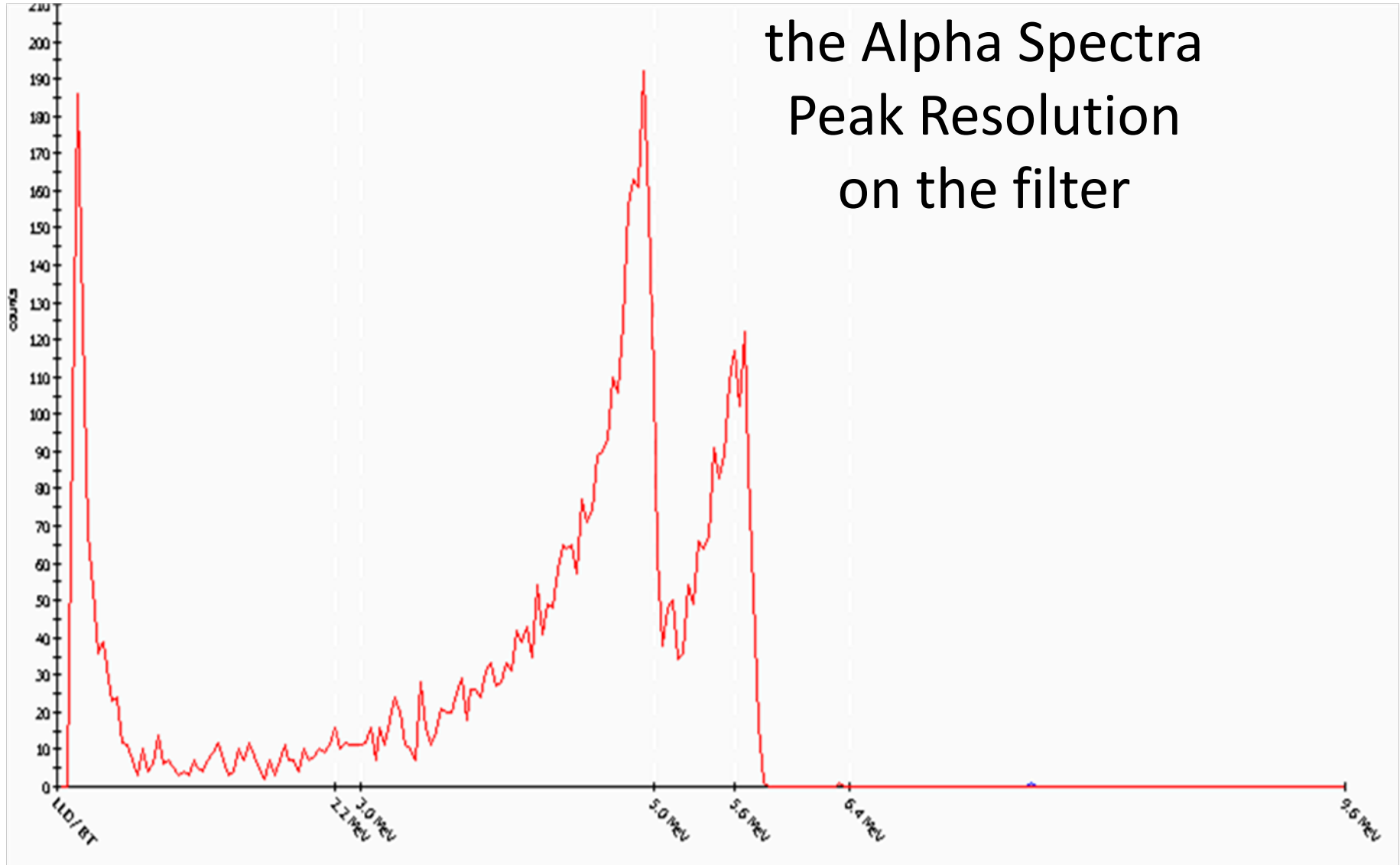


Properties	
Diameter	47 mm
Reference Pore Size	3.0 μ nominal
Thickness	0.15 –0. 4 mm thick
DOP Efficiency	>99.99 % 0.3 um @5.33 cm/sec
Chemical Compatibility	Resistant to most chemicals and solvents
Air Permeability	6 ft ³ /ft ² /min @ 0.5" H ₂ O minimum

Filter Backgrounds Via Gas Flow proportional counting

	α - alpha Background MDA=2.24 (dpm)	β - beta Background MDA=4.20 (dpm)
Cellulose	0.78 ± 1.12	0.17 ± 1.30
Glass Fiber	2.00 ± 1.56	4.52 ± 3.44
Resolve PTFE Filter	0.24 ± 0.70	0.31 ± 3.54

Determination of the Alpha Spectra Peak Resolution on the filter



Alpha Spec Filter

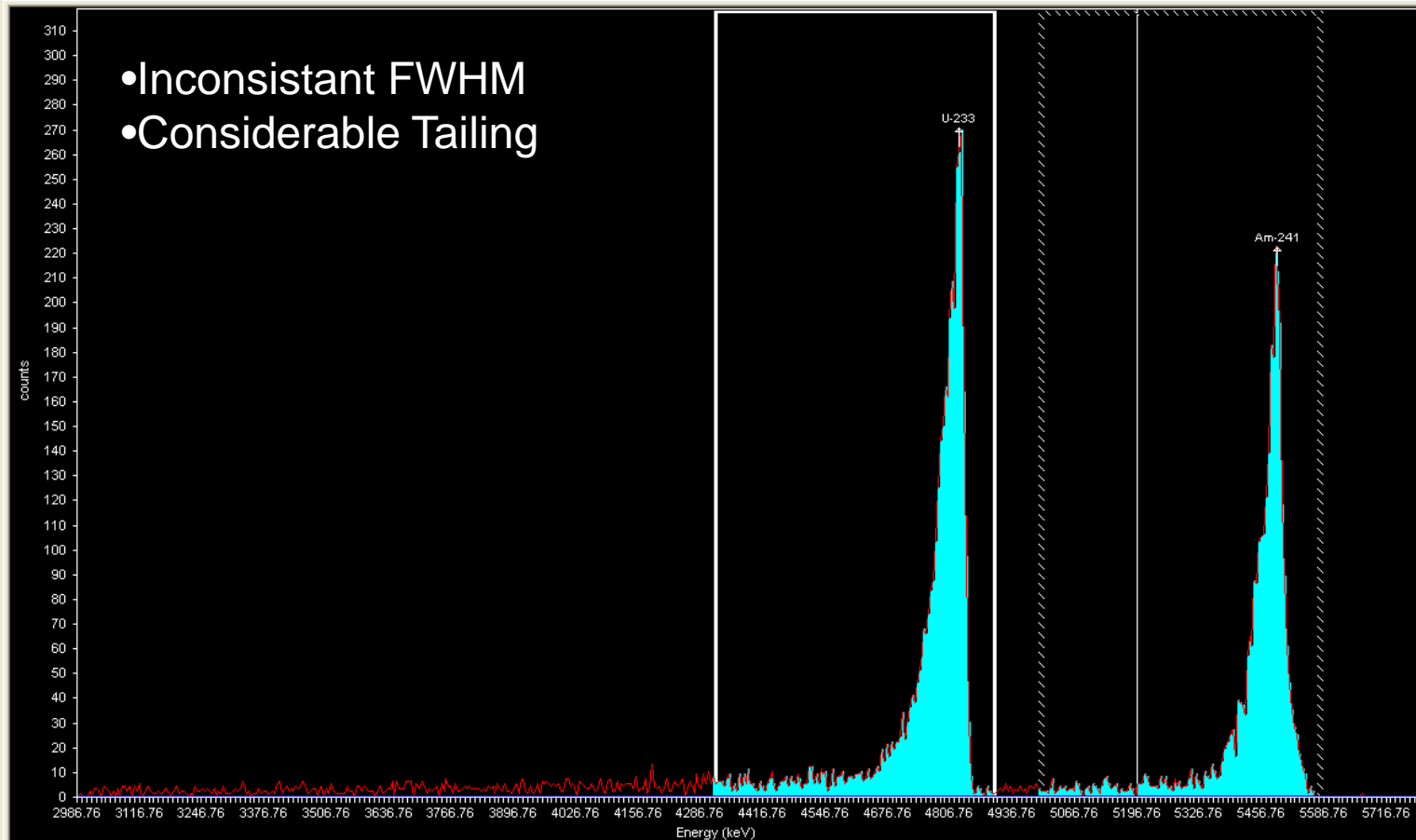
Evaporated Spike Peak Resolution-Contamination Simulation

	Material Pore Size	FWHM ²³³ U	FWHM ²⁴¹ Am
Drop Evaporation			
Laminated PTFE	3.0 μ	28.1	75.2
Laminated PTFE	3.0 μ	26.9	86.0
Laminated PTFE	3.0 μ	22.8	93.1
Stainless Steel Planchet			
	--	52.5	48.6

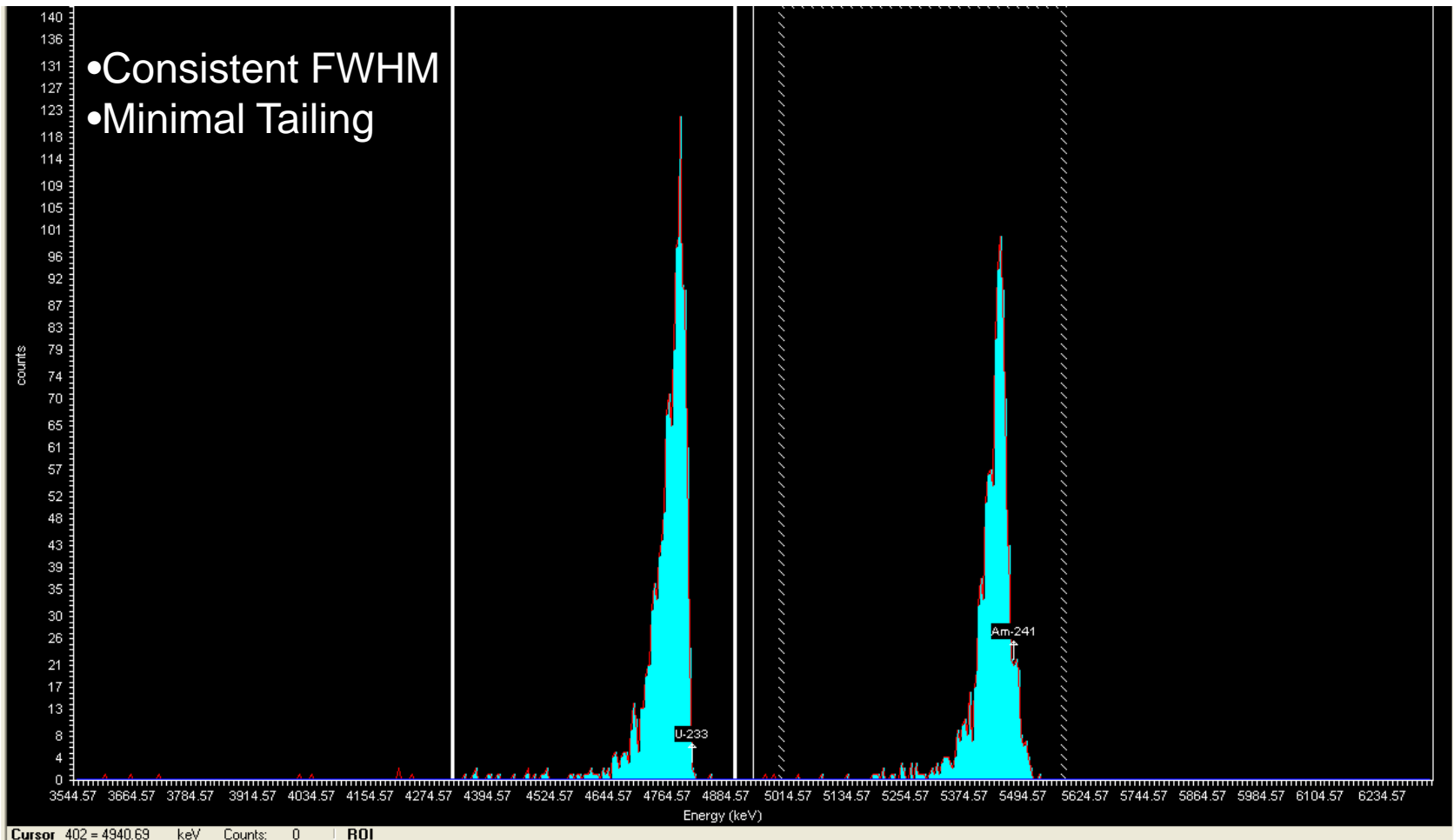
Establishing QC criteria?

Determining **Filter** Spectra Resolution

Evaporated Drop: ^{233}U + ^{241}Am



Determining **Filter** Spectra Resolution CeF₃ microprecipitation: ²³³U + ²⁴¹Am



Alpha Spectroscopy Filter

CeF₃ Microprecipitation Spike Peak Resolution

	Material Pore Size	FWHM ²³³ U	FWHM ²⁴¹ Am
Drop Evaporation			
Laminated PTFE	3.0 μ	25.9	84.8
SS Planchet	--	52.5	48.6
CeF ₃ Precipitation			
Polypropylene	0.1 μ	35.1	33.8
Laminated PTFE	3.0 μ	46.7	40.4

Alpha U+Am Spike Recovery on Gasless alpha beta counter Part 1: Initial Spike Recovery of filter material (3 replicates)

Filter type	Alpha spike (dpm)	Compensated Alpha before air sampling (dpm)	% Recovery
Cellulose	474	106 ± 3.4	22 %
Glass	474	237 ± 5.1	50 %
Resolve PFTE	474	415 +6.9	88 %

Spiked U+Am Alpha Comparison Part 2: Post-Air Sampling Spike Recovery (3 replicates)

Filter type	Alpha spike (dpm)	Measured before air sampling Alpha (dpm)	Initial % Recovery	Measured Alpha (dpm) after air sampling	% Recovery
Cellulose	474	106 ± 3.4	22 %	35.9 ± 20.2	8 %
Glass	474	237 ± 5.1	50 %	225 ± 18.8	47 %
Resolve PFTE	474	415 ± 6.9	88 %	397.8 ± 14.2	84 %

Spiked Cellulose filter

Pre Air Sampling

Unit ID: ISolo
 Unit SN: 36797
 Batch ID: 1519
 Sample ID: 1631
 User Sample ID: n/a

MAC Address: 00:00:AF:80:00:28 / 2944401448
 Start Date/Time: 10/18/2008 1:53:55 PM
 Count Time: 30.00 min
 Bar Code: n/a
 Calibration Used: Th230-Sr90

Select View:

Rn Compensated and Uncompensated

Rn Compensated

Uncompensated

Display Options:

Scale (Manual - 256):

Output:

Key:

LLD / BT = lower limit of detection / beta threshold

2.2 MeV = beta upper level

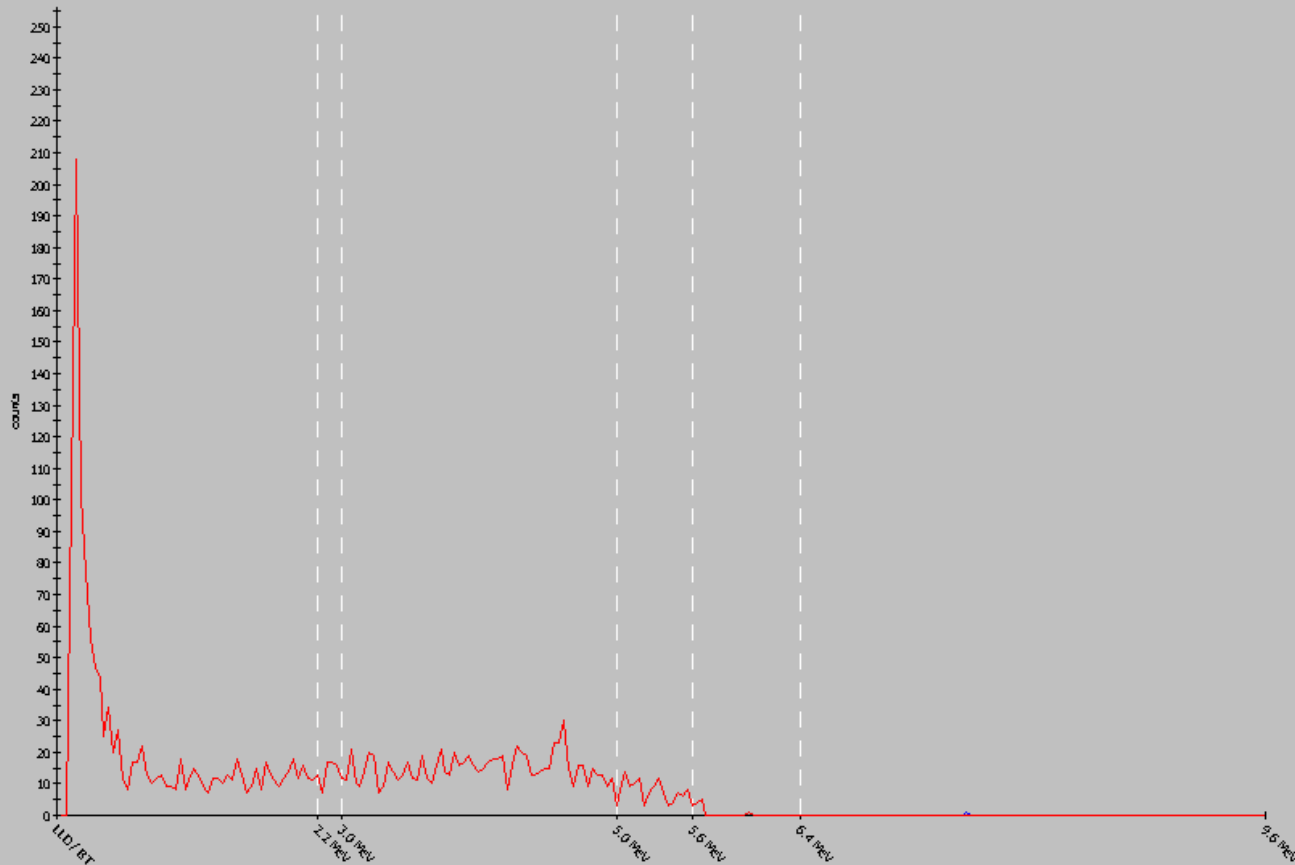
3.0 MeV = alpha lower level

5.0 MeV = low energy alpha upper level

5.6 MeV = mid energy alpha upper level

6.4 MeV = alpha upper level

9.6 MeV = upper limit of detection



— Uncompensated
 — Radon Compensated

Spiked Cellulose filter

Post Air Sampling

Unit ID: iSolo
 Unit SN: 36797
 Batch ID: 1522
 Sample ID: 1640
 User Sample ID: n/a

MAC Address: 00:00:AF:80:00:28 / 2944401448
 Start Date/Time: 10/20/2008 9:51:28 AM
 Count Time: 10.00 min
 Bar Code: n/a
 Calibration Used: Th230-Sr90

Select View:

- Rn Compensated and Uncompensated
- Rn Compensated
- Uncompensated

Display Options:

Graph as Points

Log Scale

Scale (Manual - 128):

Auto

Up

Down

Output:

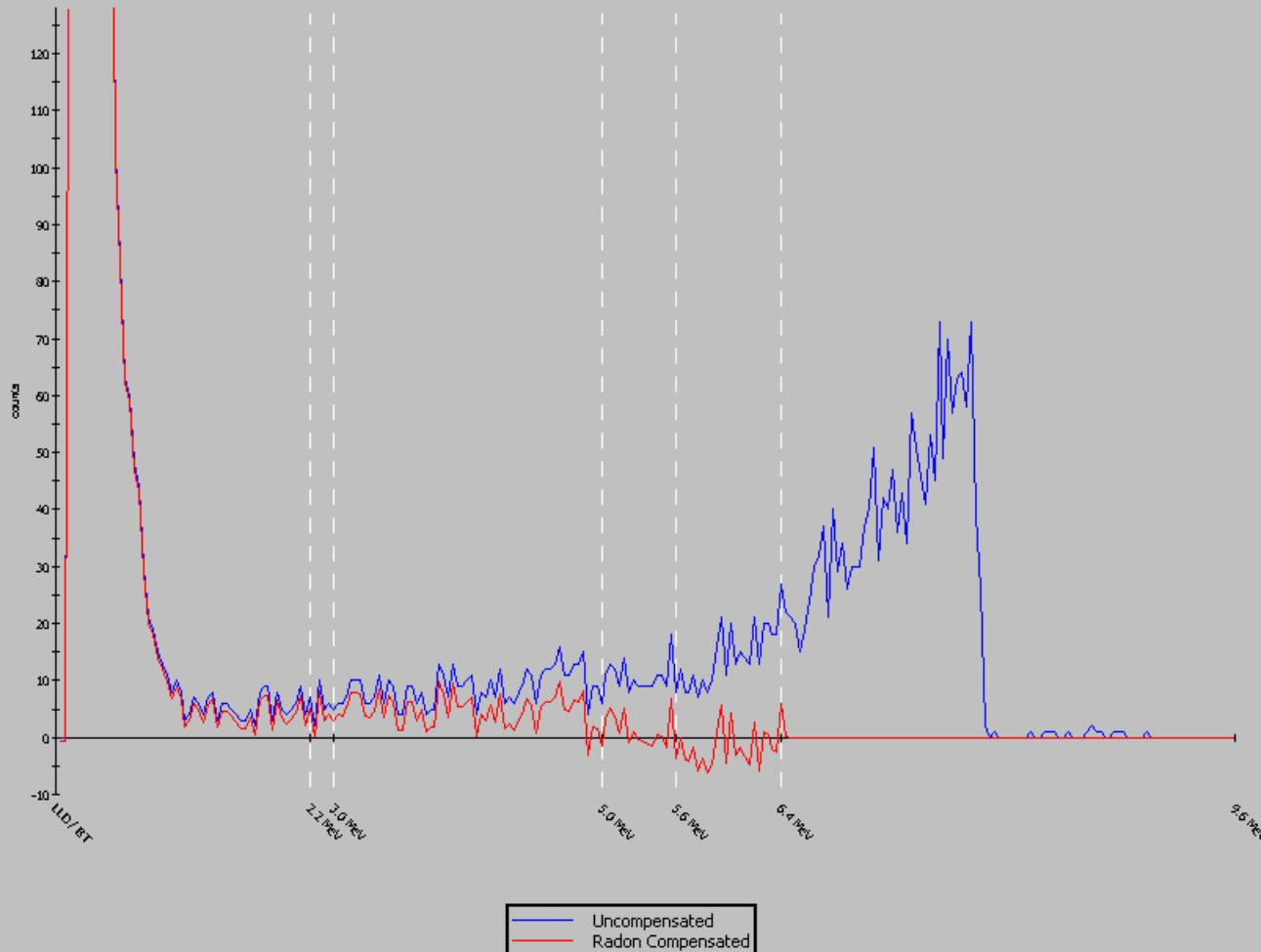
Print

Export as CSV

Export as Tab-Delimited

Key:

- LLD / BT = lower limit of detection / beta threshold
- 2.2 MeV = beta upper level
- 3.0 MeV = alpha lower level
- 5.0 MeV = low energy alpha upper level
- 5.6 MeV = mid energy alpha upper level
- 6.4 MeV = alpha upper level
- 9.6 MeV = upper limit of detection



Spiked Glass Fiber Filter

Pre Air Sampling

Unit ID: iSolo
 Unit SN: 36797
 Batch ID: 1521
 Sample ID: 1636
 User Sample ID: n/a

MAC Address: 00:00:AF:80:00:28 / 2944401448
 Start Date/Time: 10/20/2008 8:40:13 AM
 Count Time: 30.00 min
 Bar Code: n/a
 Calibration Used: Th230-Sr90

Select View:

- Rn Compensated and Uncompensated
- Rn Compensated
- Uncompensated

Display Options:

Graph as Points

Log Scale

Scale (Manual - 256):

Auto

Up

Down

Output:

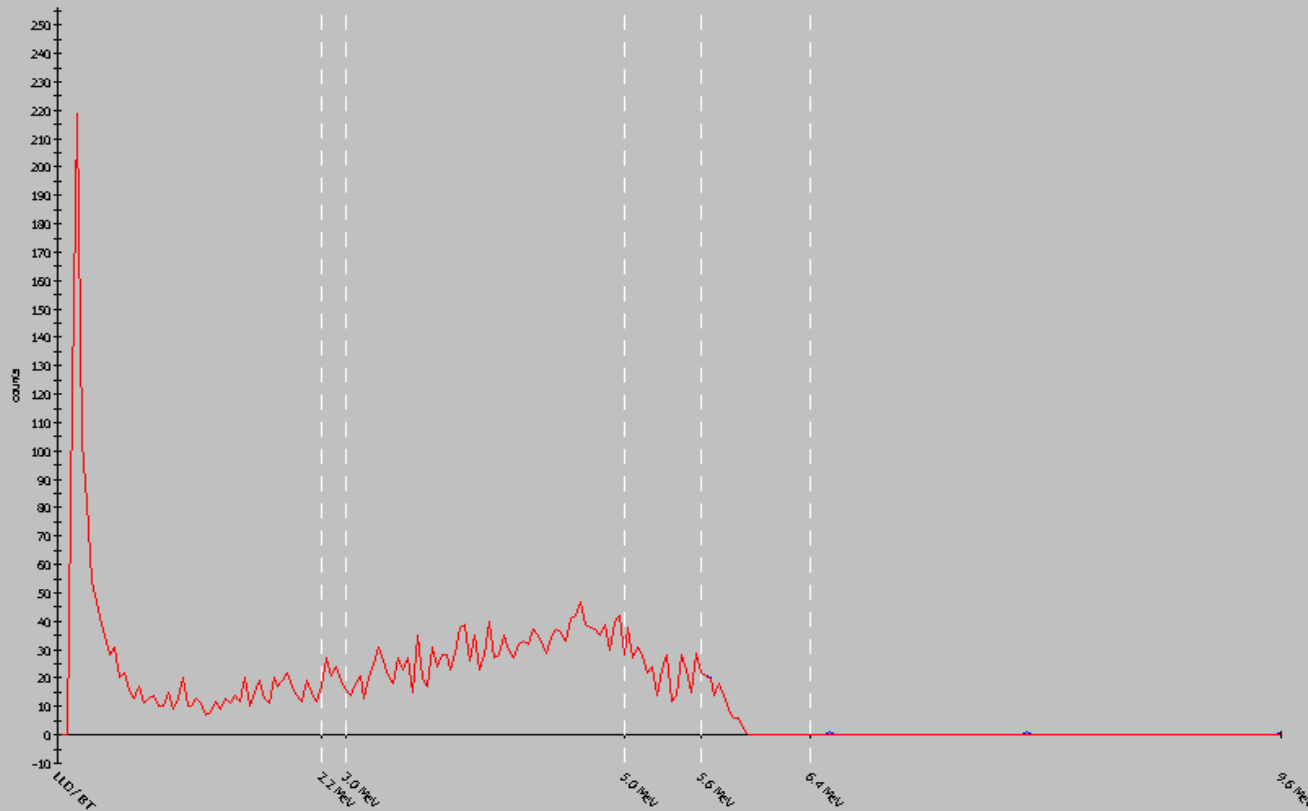
Print

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Key:

- LLD / BT = lower limit of detection / beta threshold
- 2.2 MeV = beta upper level
- 3.0 MeV = alpha lower level
- 5.0 MeV = low energy alpha upper level
- 5.6 MeV = mid energy alpha upper level
- 6.4 MeV = alpha upper level
- 9.6 MeV = upper limit of detection



— Uncompensated
 — Radon Compensated

Spiked Glass Fiber Filter

Post Air Sampling

Unit ID: iSolo
 Unit SN: 36797
 Batch ID: 1523
 Sample ID: 1644
 User Sample ID: n/a

MAC Address: 00:00:AF:80:00:28 / 2944401448
 Start Date/Time: 10/20/2008 10:33:12 AM
 Count Time: 10.00 min
 Bar Code: n/a
 Calibration Used: Th230-Sr90

Select View:

Rn Compensated and Uncompensated

Rn Compensated

Uncompensated

Display Options:

Scale (Manual - 128):

Output:

Key:

LLD / BT = lower limit of detection / beta threshold

2.2 MeV = beta upper level

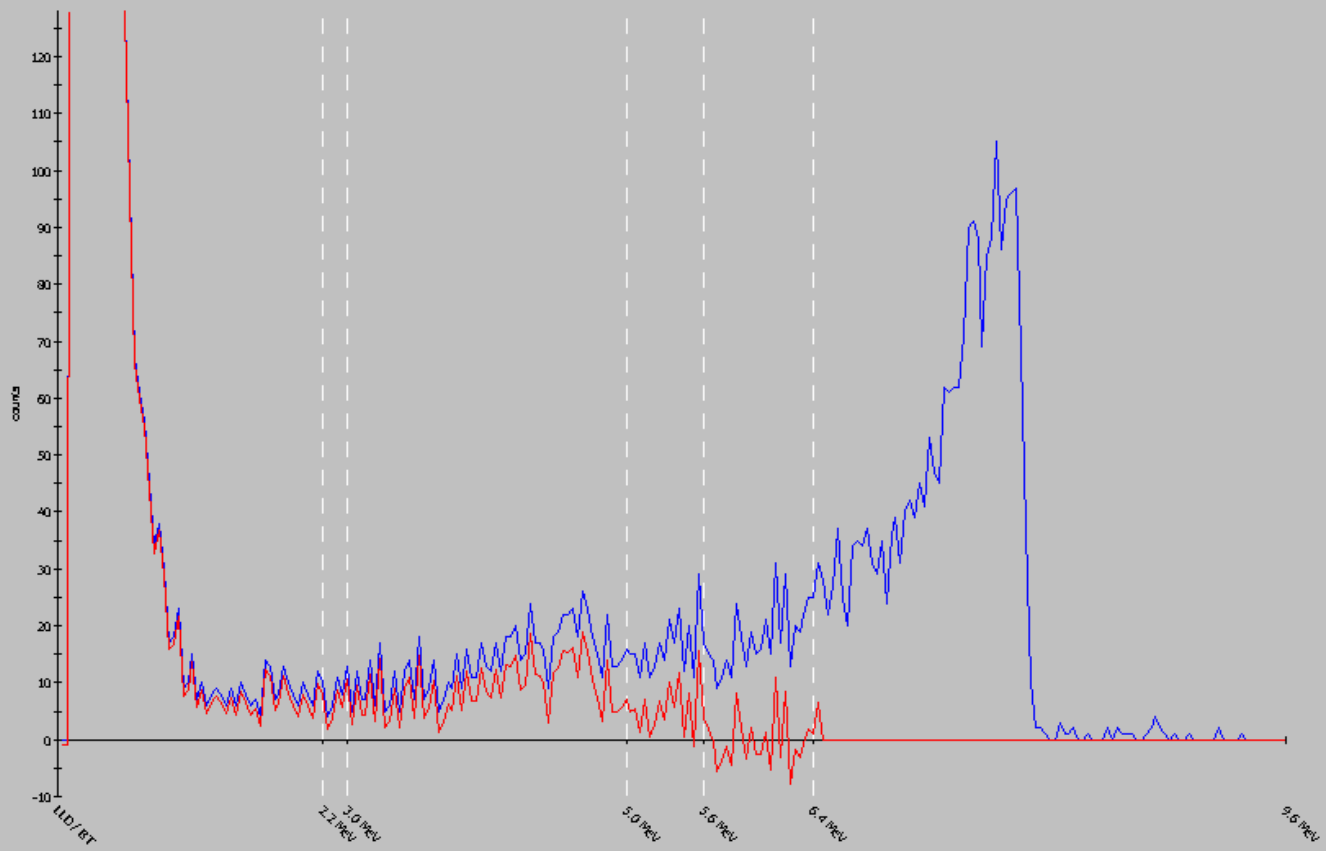
3.0 MeV = alpha lower level

5.0 MeV = low energy alpha upper level

5.6 MeV = mid energy alpha upper level

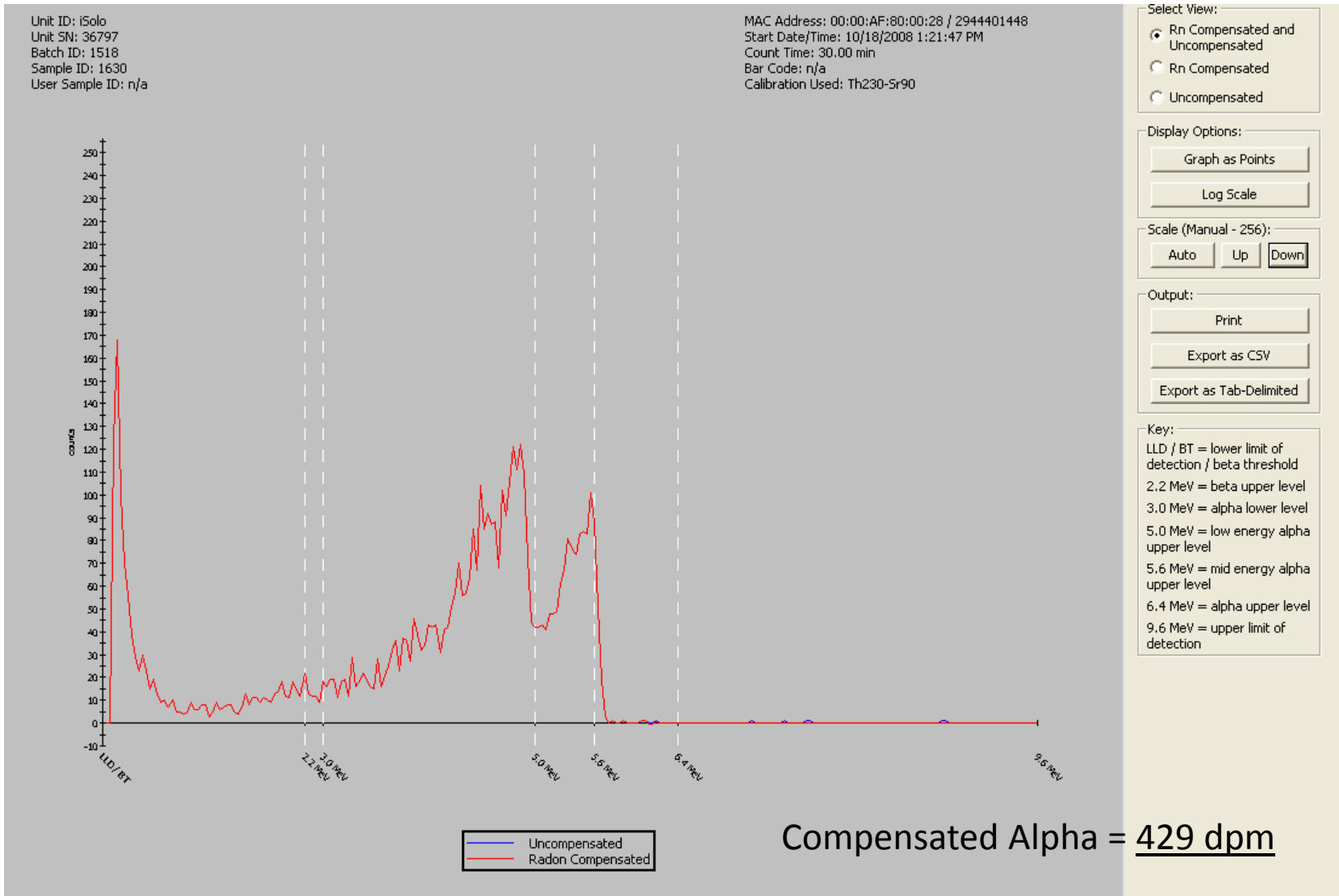
6.4 MeV = alpha upper level

9.6 MeV = upper limit of detection

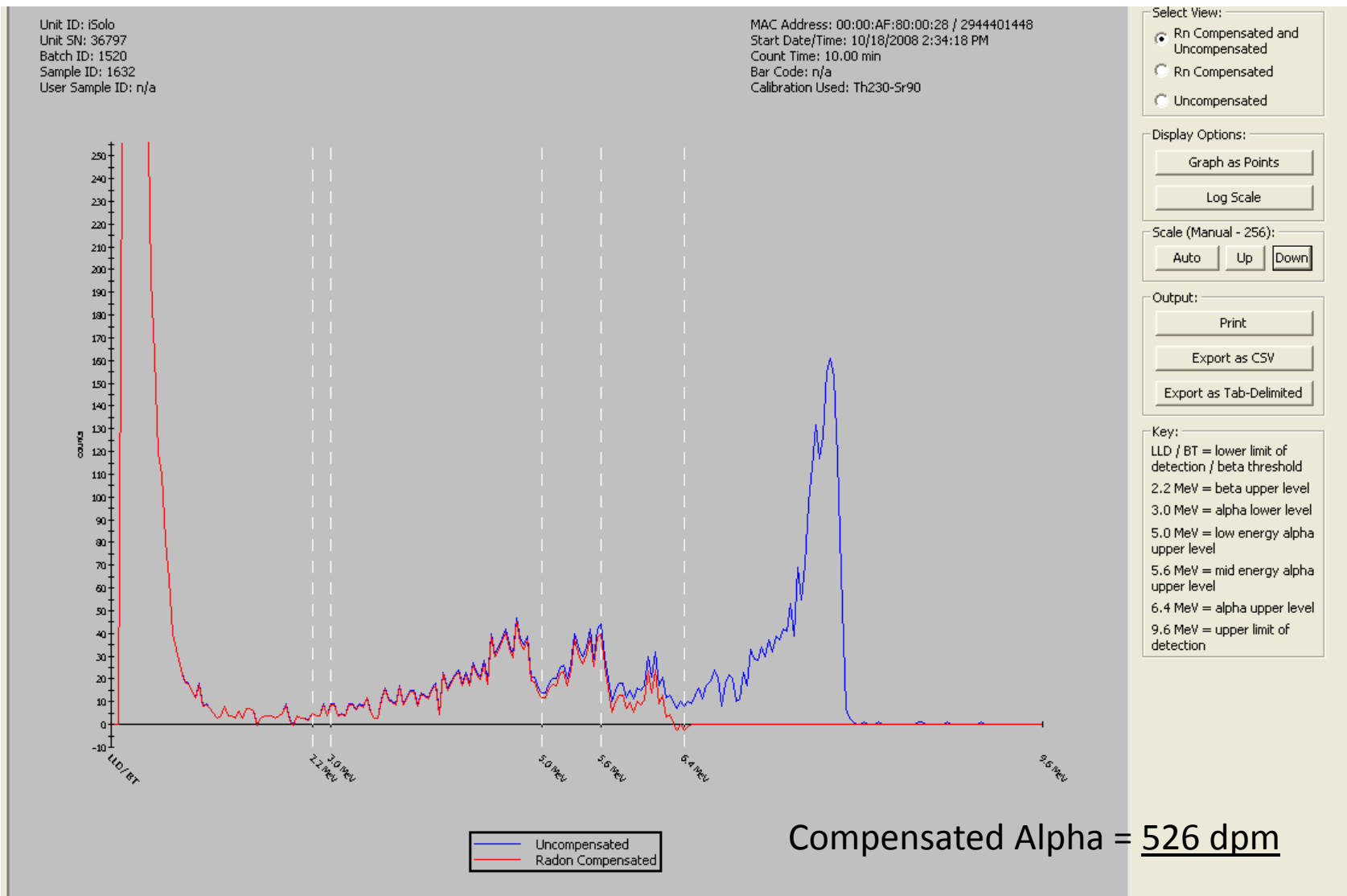


— Uncompensated
 — Radon Compensated

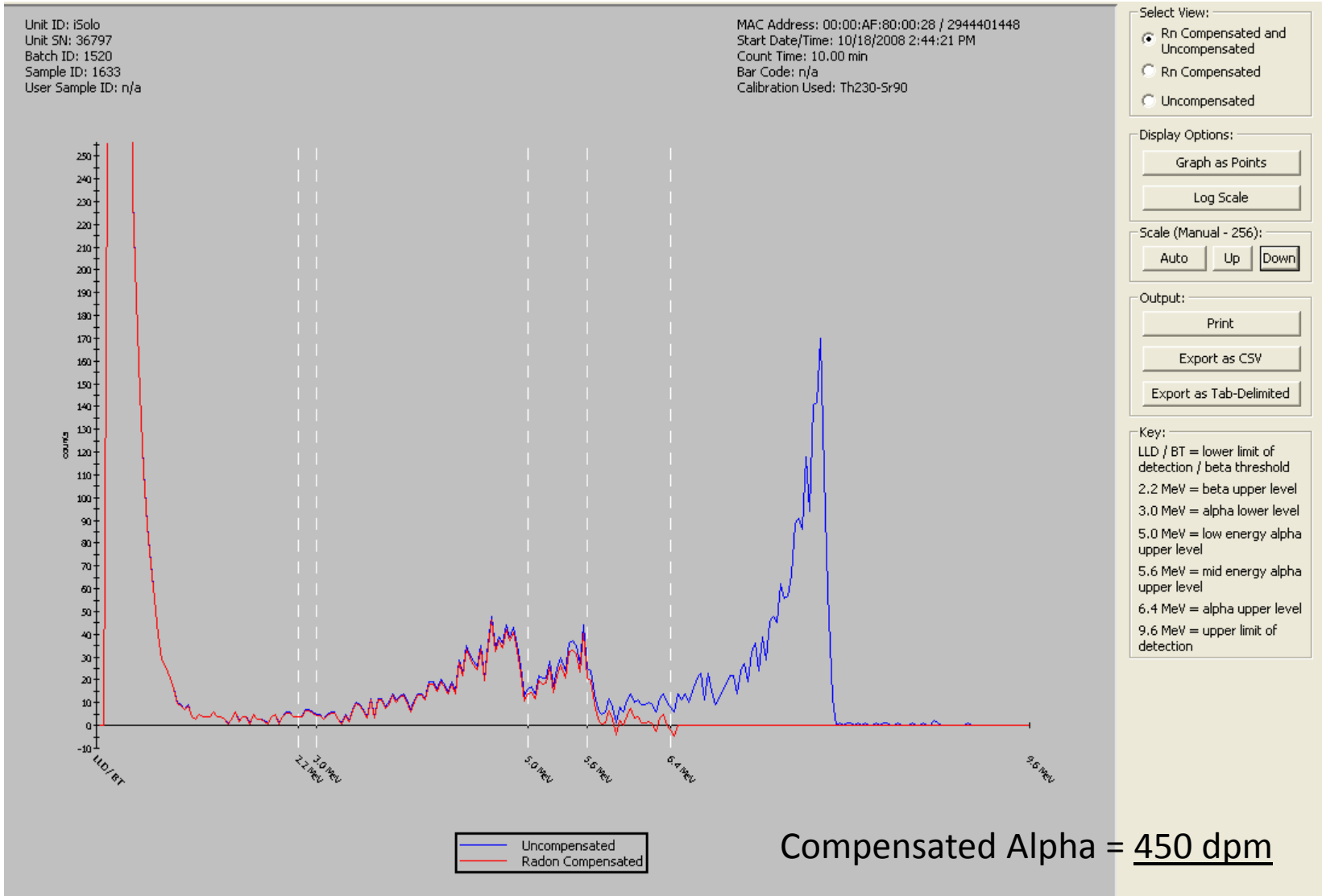
Spiked Resolve PTFE Filter Pre Air Sampling



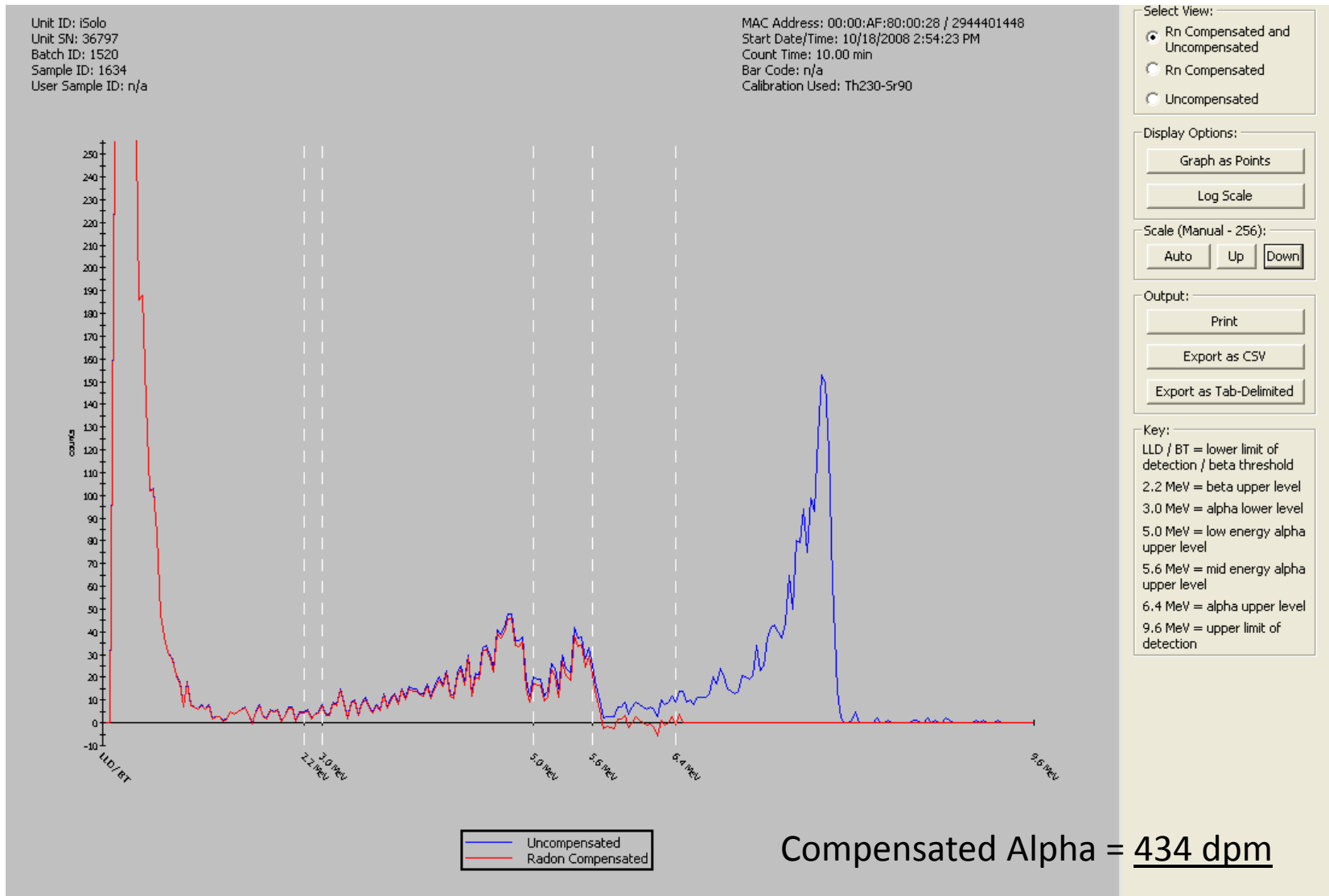
Spiked Resolve PTFE Filter Post Air Sampling – 1st 10 min



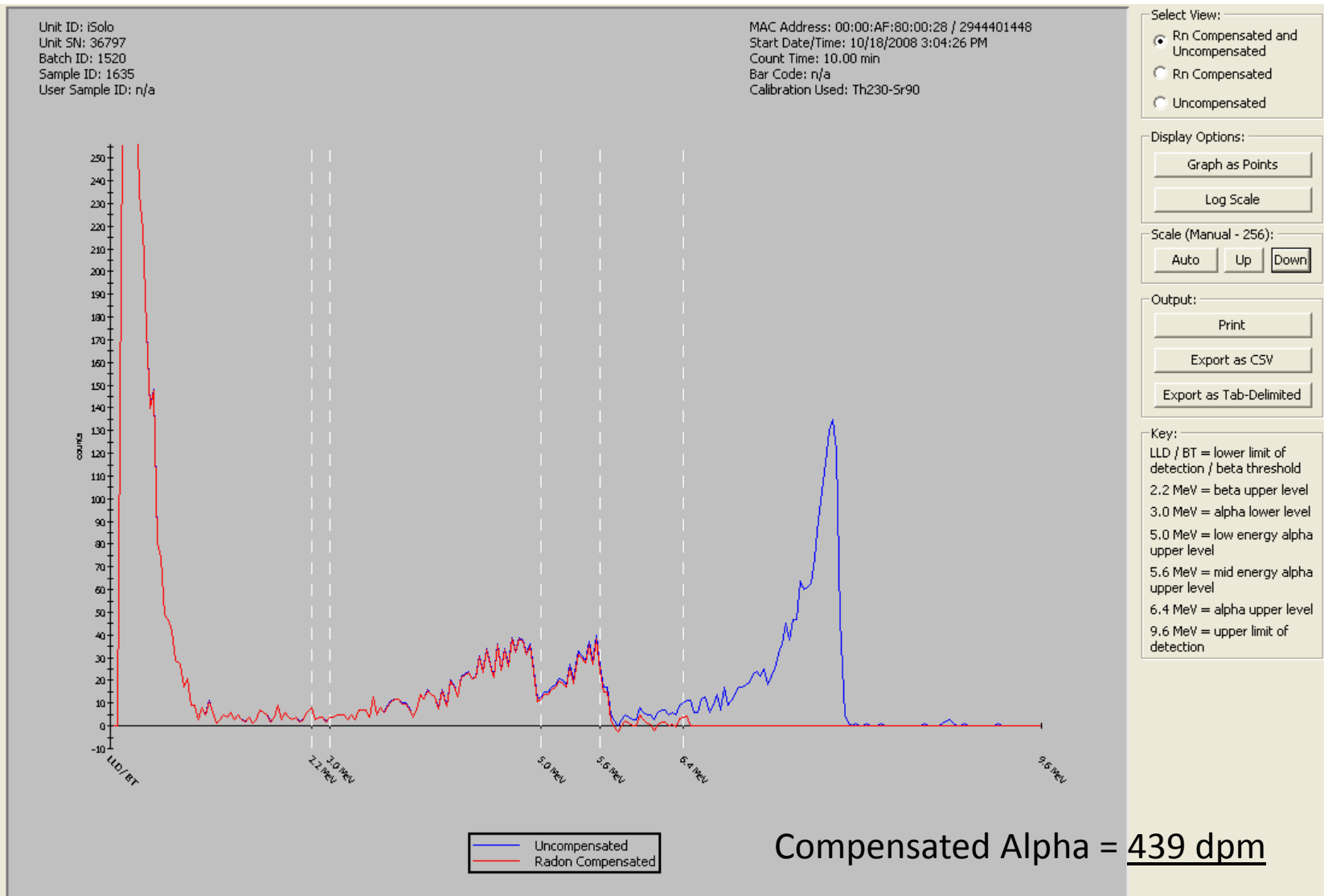
Spiked Resolve PTFE Filter Post Air Sampling – 2nd 10 min



Spiked Resolve PTFE Filter Post Air Sampling – 3rd 10 min



Spiked Resolve PTFE Filter Post Air Sampling – 4th 10 min



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Resolve PTFE Filters... Bringing High Definition to your Air Filter Spectra and Results



Conclusion

- Resolve PTFE Filter
3.0 μ PTFE Laminate
47mm dia. (50 to a package)
- Quality Control Specification:
 - Background < MDA for α & β
 - Resolution verified <60 KeV FWHM
 - Minimal curling <2.5 mm deflection
- The filters have a easy to determine orientation:
“Grid side down, Opposite Air flow”
- Performance demonstrated at Eichrom and externally
 - Lee Reagan of Canberra,
 - Peter Olsen of Washington Closure Hanford



Acknowledgements

Eichrom	
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