



Model 3030P – Radon Reduction Methodology

The M3030P alpha beta sample counter was used to measure the radon daughters present on an air sample filter. Shortly after the filter was received a 1 minute count was conducted with the alpha threshold and window set to 1000mV and 3000mV (transuranic region). Afterwards, a second 1 minute count was conducted with the alpha threshold and window set to 1000mV and 5000mV (full spectrum). The difference in the counts present in the full spectrum and the counts present in the transuranic region is the counts rejected as a result of the alpha window. Taking the number of counts rejected and comparing that value with the original full spectrum count value gives the percent radon reduction of radon daughters as illustrated in Equation 1.0.

Equation 1.0

$$\frac{(Full\ Spectrum\ Counts - Transuranic\ Region\ Counts)}{Full\ Spectrum\ Counts} \times 100\% = Percent\ Radon\ Reduction$$

The collected data for the analysis is presented in Table 1. A spectrum analysis was conducted, in Figure 1, using the sample filter to determine the approximate position of the peak for the radon daughters PO_{218} , Bi_{212} , PO_{214} , and PO_{212} . Figure 2 illustrates how the radon daughters PO_{218} , Bi_{212} , PO_{214} , and PO_{212} can be present in the range of PU_{239} because the tail of the radon daughters extends far beyond the peak. The average reduction of counts due to radon daughters using the alpha window to focus the detection region was 79%.

Table 1

Time Filter Removed	Reading Time	Threshold (mV)	Window (mV)	Alpha Counts	Count Time (Minutes)	Radon Reduction
10:54am	10:55am	1000	3000	150	1	80%
	10:57am		5000	760		
	11:26am		3000	92		81%
	11:27am		5000	480		
	1:50pm		3000	18		73%
	1:52pm		5000	67		
	5:09pm		3000	12		75%
	5:10pm		5000	48		
	9:12am		3000	3		80%
	9:13am		5000	15		
2:25pm	2:28pm	1000	3000	22	1	88%
	2:26pm		5000	180		
	3:56pm		3000	15		79%
	3:55pm		5000	71		



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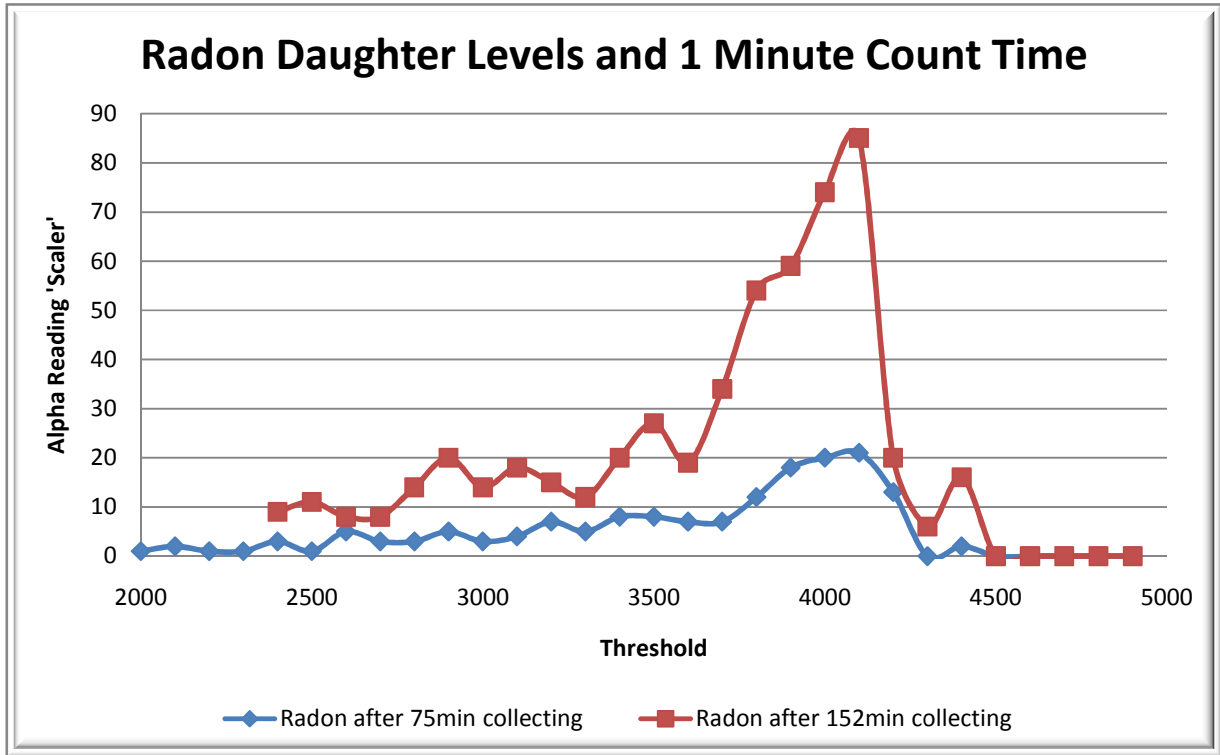


Figure 1

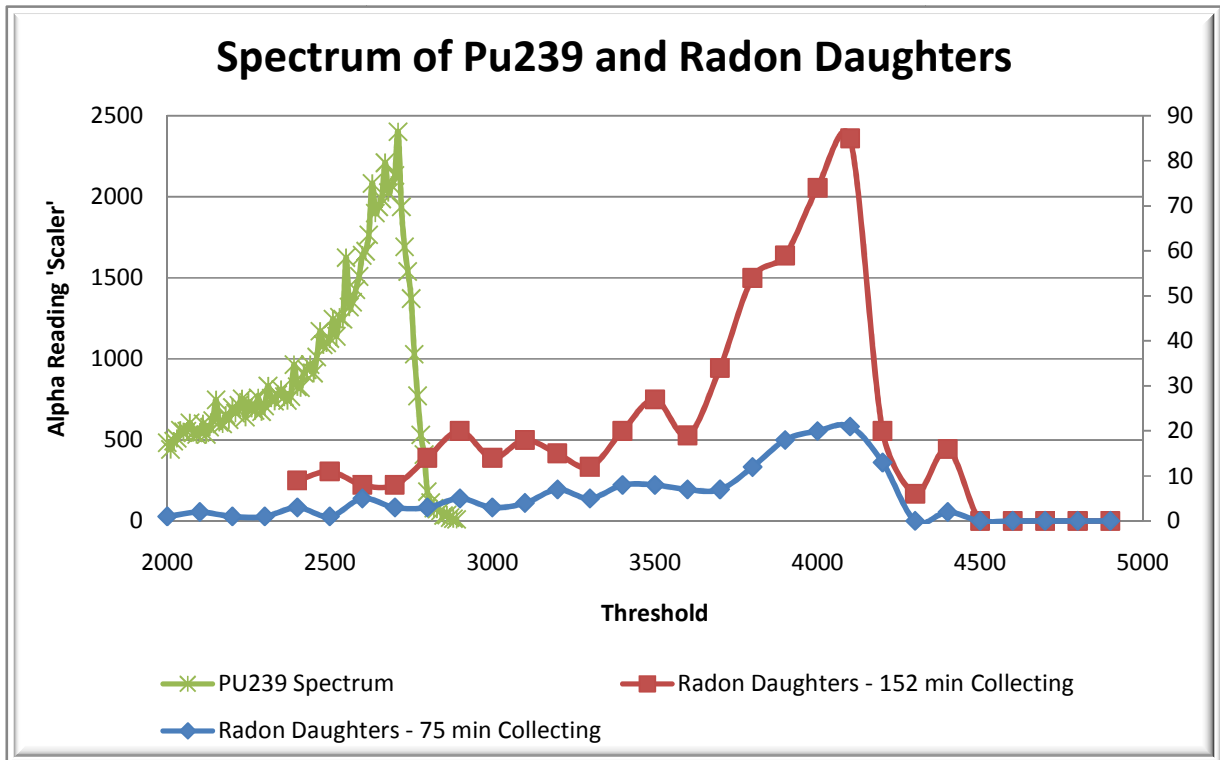


Figure 2



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The energy levels associated with the various daughters of Radon are provided in Table 2 along with the energy level for Pu₂₃₉.

Table 2

Radon Daughter Alpha Emitters						Plutonium
Element	Po 210	Po 218	Bi 212	Po 214	Po 212	Pu 239
Energy (MeV)	5.30	6.00	6.05	7.69	8.78	5.16