Air Particulate Gross Beta Decay

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Back to Basics

How long do ***you*** allow air particulate to decay prior to gross beta analysis?

We cannot expect people to do the right thing unless they know the right thing to do.

Gross Beta

- Increases could indicate plant airborne release
- Important to establish consistency in field data
- Must allow short-lived natural activity to decay
  - But how long does that take?

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Test Method

- Air particulate gross beta decay study
  - Each day for 7 days
  - Final 2 week decayed count
- Plot the data
  - Observe where plateau occurs
- Statistical analysis
  - Validate observations from plot

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Select Plant Site

- Desire initial analysis on day 0
- Harris Nuclear Plant
  - Samples collected and analyzed by same individuals

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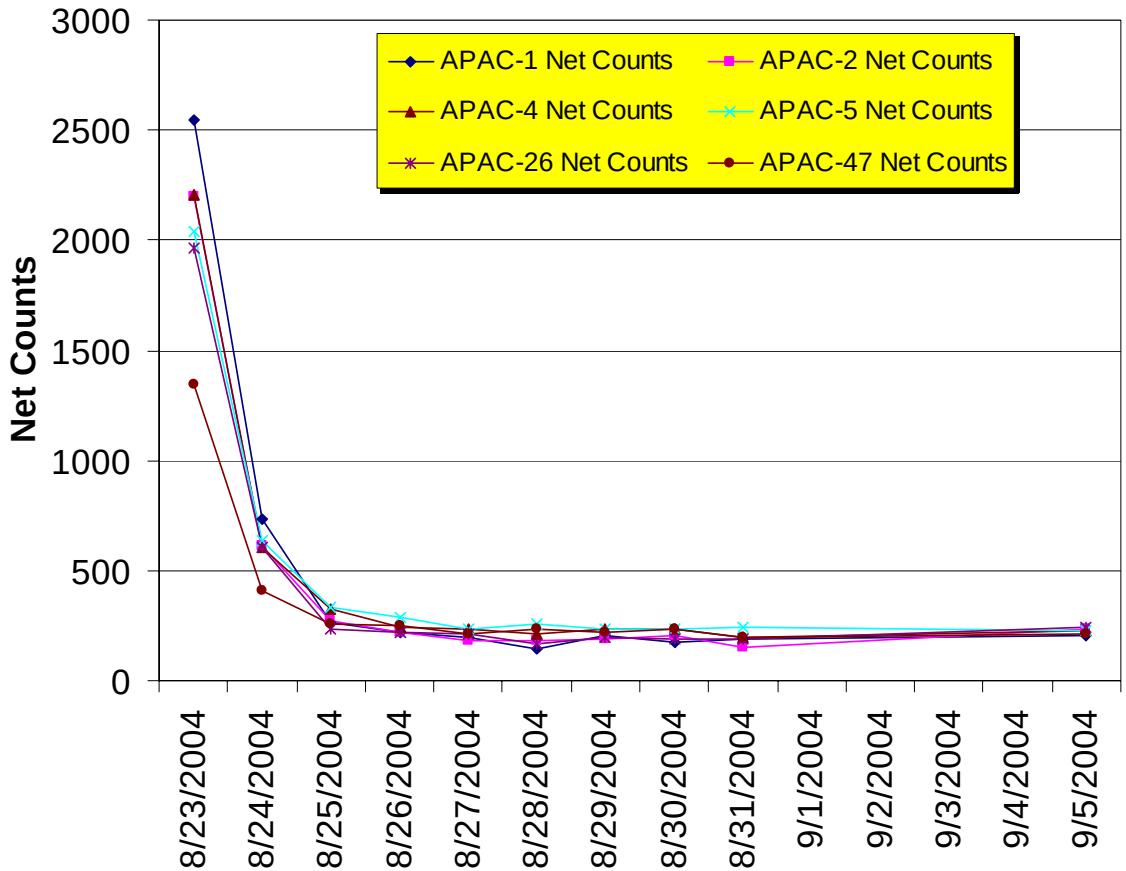
When to Test

- Late summer
- Winter
- Spring Pollen

August 2004



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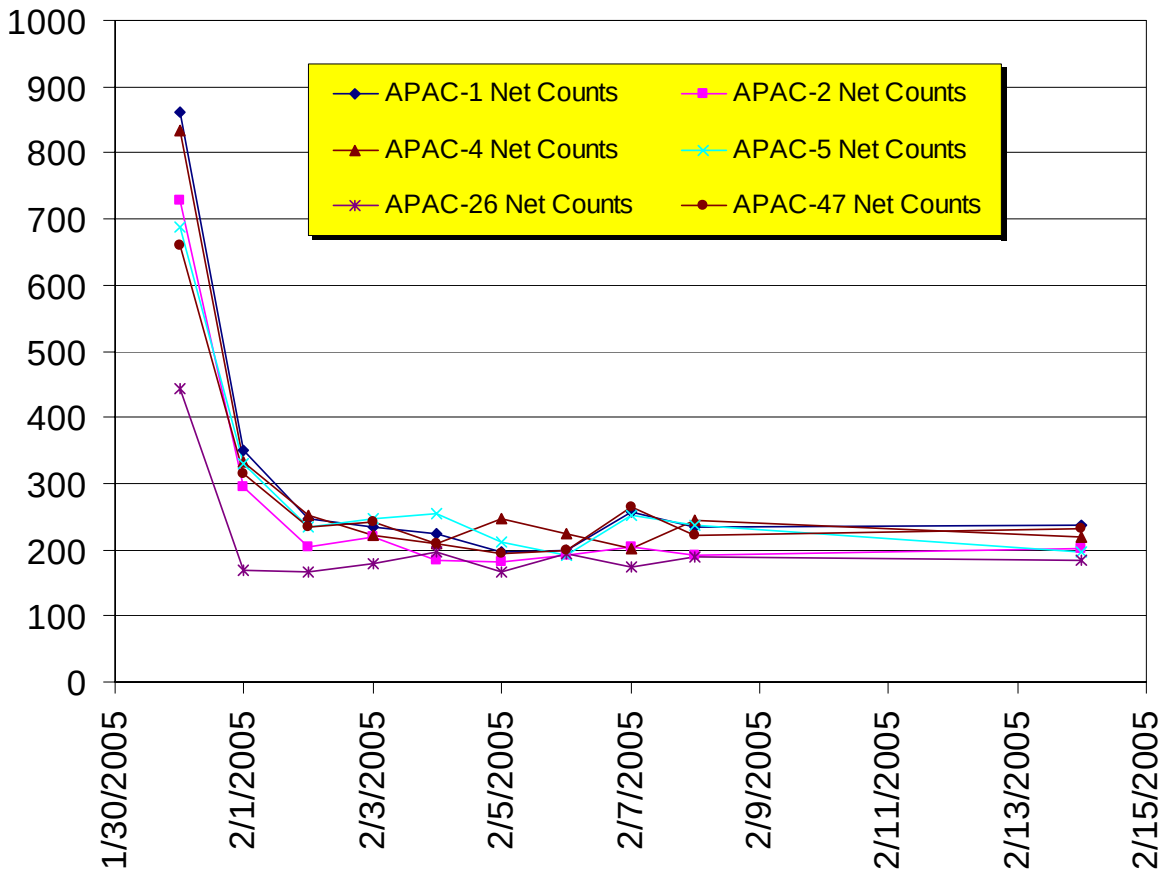
January 2005



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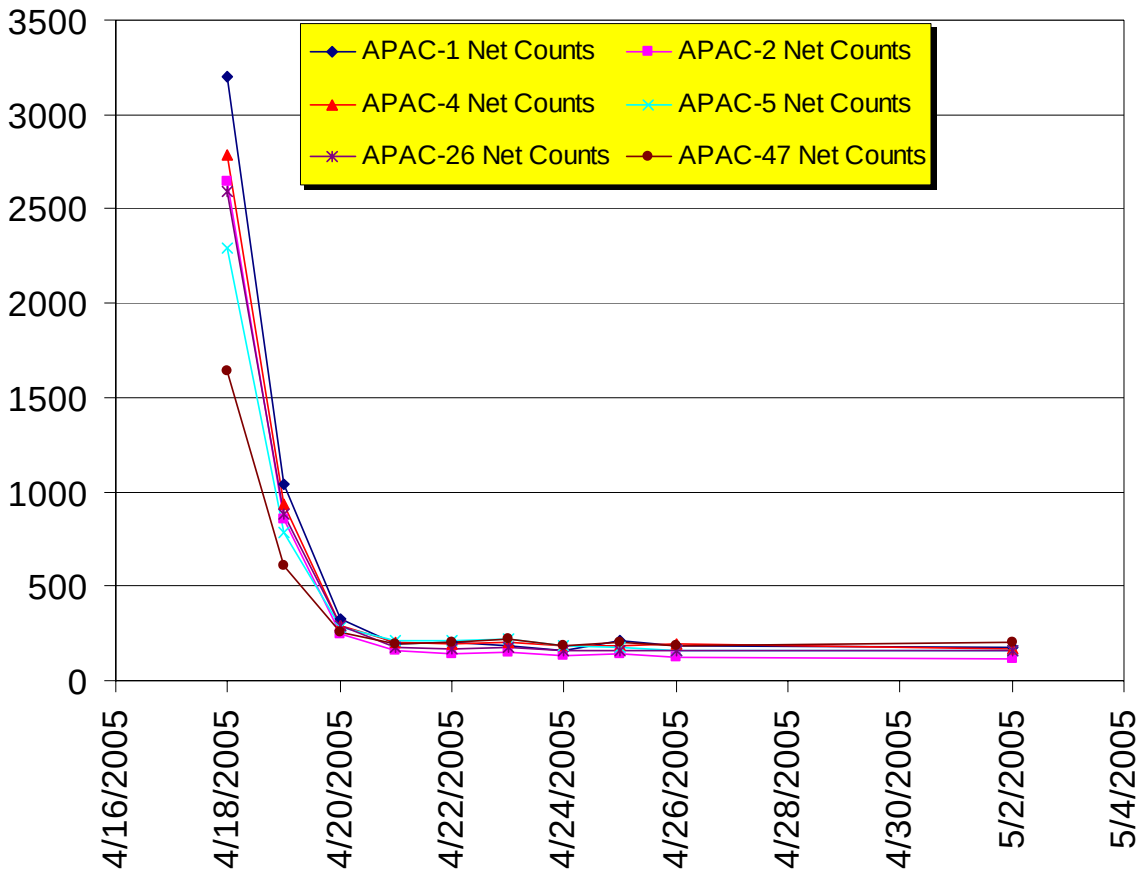
April 2005



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Observations

- Variability in initial activity levels
  - Highest initial counts during spring pollen season
  - Does not seem to impact count rate through beta self absorption
  - Does pollen enhance radon/thoron daughter capture?
- 48 hours decay insufficient

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Analysis Summary Table

Analysis Day	08/23/04 Samples		01/31/05 Samples		04/18/05 Samples	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
0	2049	398	703	150	2525	526
1	602	106	298	66	850	147
2	281	41	223	33	282	31
3	239	27	223	25	192	20
4	212	20	213	25	187	28
5	199	43	200	27	193	25
6	213	20	200	12	167	21
7	212	27	226	37	178	28
8	195	30	219	24	170	26
14	225	14	212	21	164	28

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Statistical Analysis

- Ken Sejkora
- t-Test
  - Performed standard Student's t-test to compare daily means… basically, testing whether or not the means are the same
  - Subtract t-Test probability from 1.00
  - Probability that the means are different

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August 2004

08/23/04 Samples									
Day	0	1	2	3	4	5	6	7	8
1	100%								
2	100%	100%							
3	100%	100%	93%						
4	100%	100%	99%	93%					
5	100%	100%	99%	92%	47%				
6	100%	100%	99%	91%	9%	51%			
7	100%	100%	99%	90%	1%	44%	8%		
8	100%	100%	100%	98%	73%	16%	76%	68%	
14	100%	100%	98%	71%	80%	80%	75%	71%	95%
Average	100%	100%	98%	89%	42%	48%	53%	69%	95%

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January 2005

01/31/05 Samples									
Day	0	1	2	3	4	5	6	7	8
1	100%								
2	100%	96%							
3	100%	96%	2%						
4	100%	98%	43%	51%					
5	100%	99%	78%	85%	59%				
6	100%	99%	85%	93%	73%	2%			
7	100%	95%	11%	11%	49%	80%	85%		
8	100%	97%	16%	21%	34%	78%	89%	26%	
14	100%	98%	49%	58%	6%	59%	76%	54%	42%
Average	100%	97%	40%	53%	44%	55%	83%	40%	42%

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April 2005

04/18/05 Samples									
Day	0	1	2	3	4	5	6	7	8
1	100%								
2	100%	100%							
3	100%	100%	100%						
4	100%	100%	100%	24%					
5	100%	100%	100%	7%	27%				
6	100%	100%	100%	94%	82%	92%			
7	100%	100%	100%	66%	44%	66%	53%		
8	100%	100%	100%	87%	72%	85%	15%	38%	
14	100%	100%	100%	92%	82%	91%	17%	59%	28%
Average	100%	100%	100%	62%	61%	84%	28%	48%	28%

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Summary

- Significant reduction in count rates from day 0 through day 3 is attributed to decay of radon/thoron daughters
- Two data sets indicate additional decay after day 2, with no appreciable additional decay after day 4
- Highest initial counts during spring pollen season… may indicate that pollen acts as ‘condensation’ nuclei and enhance radon/thoron daughter capture

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Conclusion

- Recommend that samples be allowed to decay at least 3 days following collection before analyzing for gross beta… 48 hour ‘standard’ probably is not adequate

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Questions, comments?

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