Evaluation of Fixed Air Sample Filter Cross-Contamination And Radioactivity Loss

Randy Redmond
B&W Y-12
Oak Ridge, TN

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Background

- The Y-12 National Security Complex NNSA Health Physicist had observed Fixed head air sample collection cards being placed into Ziploc bags – the cards were in contact with each other.

- A concern was raised concerning the possibility of Fixed Air Sample (FAS) filter cross-contamination.

- Anytime our customer has a concern, we have an opportunity to address it.

Issues

- There were actually two issues:

  1) potential cross contamination

  2) Potential activity loss

Potential Cross Contamination

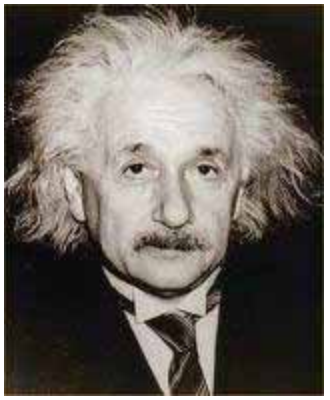
- Primary issue; however, it is not the real problem.
  - The cards are collected front (contaminated side; side of interest; side that is counted) to back (non-contaminated side).
  - Our exposure concern is with alpha emitters and alpha emitters cannot penetrate the filter.
  - Cross-contamination is not a valid concern.

Activity Loss

- The real problem
- Not only affects Fixed Air Samples, it affects any filter that is placed into a sample container (bag, coin envelope).

Method

- Misery loves company - Ask AMUG members how they would approach this problem.



Method

- Collect 30 FAS cards from locations most likely to have positive results [*Population 1*]; place the FAS cards in individual sample envelopes during collection;
- Remove the FAS cards from the envelopes while being careful not to contaminate them, e.g., use tweezers.
- Seal each envelope to prevent any loss of contamination;
- Use wet chemistry to digest each envelope and 30 identical, unused, uniquely numbered [*Population 2*] control envelopes, and place elluent from each onto a planchet.
- Count the planchettes using low background gas proportional counters;
- Use SADISTICS

(Wilcoxon Rank Sum Test) to compare Population 1 to Population 2 . If statistically different, then determine an activity loss factor.

Findings

- The activity in envelopes used to collect the FAS filters was statistically different than the Control envelopes.
- Sample results can be under-reported – an average of 3%.
- There is so much conservatism built into our calculations that we disregard the 3%.