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The following are the primary points made by Brad Prezant in his e-mail of 06-13-25 to Joe Hughes concerning Dennis Derrick's recent podcast on wildfires.

PARAGRAPH 1

Using soot, char and ash analysis can create both false positives and false negatives and can result in "misclassification".

Using soot "counting" is bad science.

Defending soot counting in court against assemblage analysis is problematic (difficult to do).

PARAGRAPH 2

The intended message of the second paragraph is not very clear and is never actually stated. It seems to be an argument that light microscopy cannot be used to reliably identify particulate wildfire smoke residues for samples collected using tape lifts.

PARAGRAPH 3

Char can be misidentified using light microscopy.

• That's why other methods (RL/PLM/SEM/TEM) are also used.

PARAGRAPHY 4

The definitions of "Soot" and "Char" are no more well defined than "Ash" which results in the inclusion of many more possible interferences when using light microscopy.

• I believe these are defined by ASTM

Many sources produce charred plant biomass that are not wildfire related. [Charred wood from fireplaces, Field burning, Burning of candles (soot)]

• Except for candles they also produce ash/inorganic assemblages

The results are unreliable in that any change in the method could produce very different results of at least equal validity.

There are no "published standard methods" for wildfire analysis.

PARAGRAPH 5

A Common Precaution Attached to "SC&A analysis" Results.

Wildfire Smoke Exposure: A Comparative Study

Assemblage Analysis" Quantification is based on the area of a tape lift that must be examined to see the required wildfire assemblage.

It has the advantage of being independent of the particles that are not related to wildfire.

The most common method for SC&A analysis is "Visual Estimate".

- Estimating the relative amount of area covered by SC&A compared to the area covered by other types of particles.
- A notoriously inaccurate method when percentages are under ten percent.
- Differences of at least a factor of two are not uncommon between experts at a level of ten percent.

Some laboratories perform SC&A analysis by counting particles and generating a percentage based on count.

It is not any better than Visual Estimation.

Use a random point array as the basis for SC&A counting. More problems.

Assemblage analysis is the only approach that actually identifies the emissions from a specific wildfire as being present in an indoor environment.

This study demonstrated that false positives and false negatives can dominate the results of a SC&A analysis.

• The chart on page 20 shows that values of 5% SC&A are possible when the presence of the wildfire assemblage is absent.

The sample typically used for SC&A analysis is of inferior quality.

RESPONSE BY SPURGEON 06-15-25

Note (JCS): The two referenced articles were not published in curated journals. The only peer reviewed articles I have been able to find that discuss assemblages reference the use of assemblage analysis for archeology research.

First, we need to distinguish between relevant facts, justifiable concerns, and "red herrings" or misleading and irrelevant arguments.



The figures are data provided by Dr. Tianbo Bai at Eurofins Labs.

Figure 1.



Figure 2.

Prezant: "The chart on page 20 shows that values of 5% SC&A are possible when the presence of the wildfire assemblage is absent."

• Figures 1 and 2 are for interior samples sampled with wipes and micro-vacs. The number of tape lift samples were insufficient for comparison. Char was detected in about 95%-98% of samples, Ash in about 75% of samples, and Soot in about 20% of samples. The graphs for exteriors, HVAC, etc. were similar. Clearly, if the intent was to assess the impact of particulate wildfire smoke residues, then using Char as the primary indicator would result in the fewest false negatives. Relying on Assemblage Analysis based on Ash is expected to underestimate the impact wildfire particupates have on residential properties by about 25%.

Using soot, char and ash analysis can create both false positives and false negatives and can result in "misclassification".

- Probably so, just like for any method. Is it the claim that Assemblage Analysis is such a pristine method that it is not subject to these issues like other methods of analysis?
- This is an issue of analyst training, competence, and laboratory quality assurance rather than methodology.

The most common method for SC&A analysis is "Visual Estimate": A notoriously inaccurate method when percentages are under ten percent.

• EPA/600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials [Visual Area Estimation (VAE) method]

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% Area	Acceptable Mean Result	Relative Error			
1%	0%-3%	<u>+</u> 200% - ???%			
5%	1% - 9%	<u>+</u> 80% - 400%			
10%	5% - 15%	<u>+</u> 50% - 100%			
20%	10% - 30%	+ 50% - 100%			

Table 1. Suggested Acceptable Errors for PLM Analysis.

- The VAE method represents the best available methodology the EPA, with all its scientists and resources, was able to develop. What is not discussed is the Relative Error of Assemblage Analysis. How can it possibly be any better than for SC&A analysis?
- Table 2 contains the relative standard deviations for airborne mold spore trap samples of various sample collection times. For a typical 5-minute sample time the RSD for a sample collected from a minimally contaminated indoor environment is expected to be about 130%. Is it suggested that we stop collecting 5-minute airborne mold samples because they are too variable?

TIME	CONTROL	CONTAMINANT
5 Minute	77%	131%
30 Minute	28%	64%
60 Minute	7%	51%

 Table 2. Relative Standard Deviations for airborne mold spore trap samples.

- There is a lower limit to the variability of environmental samples, which have an expected geometric standard deviation (GSD) of about 3 for a well-behaved (typical) lognormal distribution of concentrations. Arguing that environmental samples are variable lacks technical sophistication.
- If the average *Asp/Pen* spore concentration in a room were 2,000 spores/m³ and the GSD wa 3, then 95 out of 100 5-minute samples would be expected to be between 200 spores/m³ and 20,000 spores/m³. That's a statistical fact, and that's the level of variability we deal with every day in IAQ.

Using soot "counting" is bad science.

Defending soot counting in court against assemblage analysis is problematic (difficult to do).

- These are "red herrings" or misleading and irrelevant arguments.
- AIHA Wildfire Guide
 - [1] "Wildfire debris contains minimal soot. Soot is more important for residential and industrial fires".
 - [2] "Soot is not a primary indicator of a wildfire event. It is rarely found and not diagnostic of a wildfire event".
- Figures 1 and 2: Soot was not detected in about 80% of the interior samples using wipes and micro-vacs (sufficient tape lift data were not available for comparison).

The results are unreliable in that any change in the method could produce very different results of at least equal validity.

There are no "published standard methods" for wildfire analysis.

• Yes, agree. Whether the analysis is for mold or wildfire smoke residues, each laboratory has their own SOP's; and the reported results can be expected to differ between labs. That's why it is industry practice to recommend that the inspector choose a lab and send all their samples to the one lab for consistency between results.

Assemblage analysis is the only approach that actually identifies the emissions from a specific wildfire as being present in an indoor environment.

• It is my opinion that this is entirely a personal opinion. I have not seen any peer reviewed data published in a curated journal that supports this position.

The sample typically used for SC&A analysis is of inferior quality.

• What does this even mean? Based on which parameters? How do SC&A samples differ from Assemblage Analysis samples?

Direct Comparison of Wipe, Tape Lift, and Micro-vac Samples

Assemblage Analysis requires the detection of Ash/inorganic-based structures. The data from the CO wild fire supplied by Dr. Tianbo Bai allows a direct comparison of the tape lift, wipe, and micro-vac methods for the collection and analysis of soot, char and ash.

METHOD	Source	Char	Ash	Soot
Wipe	СО	55%	25%	5%
Micro-Vac	СО	50%	30%	10%
Tape Lift	СО	60%	25%	0%
Wipe	CA	98%	75%	18%
Micro-Vac	CA	95%	65%	22%

Table 3. Detection rate of particulate wildfire smoke residues by sampling method.



Figure 3.



Figure 4.



Figure 5.