

## TIPS ON THE INTERPRETATION OF SPORE TRAP COUNT ANALYSIS

Currently there are no numeric standards for airborne or surface microbial contamination indoors. Suggested guidelines are constantly being reviewed and edited as more information surrounding microbial IAQ issues surface.

Some common denominators should be considered when interpreting results:

1. Comparison of indoor/outdoor concentration ratios.
2. Complaint vs. non-complaint areas or affected vs. non-affected areas.
3. Consider air exchange rates and activity levels in a building structure, weather, and season of the year.
4. Rank order assessment and concentration (e.g. Spores/m<sup>3</sup> of air) of the fungi.
5. Predominant fungal genera: Is there water indicator microorganisms present such as but not limited to: *Chaetomium*, *Stachybotrys*, *Rhodotorula*, *Trichoderma*, and *Scopulariopsis*.
6. Generally fungal counts indoors should be lower than outdoor counts and the types of fungi found indoors should be similar to outdoors.
7. There is always a potential bias from infiltration of outdoor air, poor housekeeping, excessive indoor relative humidity or potential contamination sources (e.g. water intrusion thru a basement wall) that may negatively influence post remedial verification (PRV) or clearance levels.
8. The investigator should look for various patterns among the indoor types of moulds detected:
  - a. Increased levels of primary (1st) colonizers in damp or moisture intrusion areas of homes or commercial buildings: ***Aspergillus/Penicillium*** or ***Cladosporium*** are usually noted.
  - b. ***Chaetomium*** or ***Stachybotrys*** are tertiary (3rd) colonizers of indoor materials and are usually associated with chronic long standing water/moisture issues in a building.
  - c. The presence of **hyphal fragments** or **fruiting structures** noted on spore trap samples usually indicates amplification (growth) of fungi on building substrates.
  - d. **Ascospores** and **basidiospores** noted on indoor spore trap samples most often represent the entrance of inadequately filtered outdoor air. During inclement weather, remember to note time, temperature, and season. Most indoor materials will not support the growth of these fungi.
9. When unidentified **hyaline** (clear) or **dematiaceous** (dark-pigmented) conidia are noted on a spore trap sample, it indicates that no particular fungus can be identified. These fungal conidia may represent such yeast-like fungi as *Aureobasidium*, *Sporidiobolus*, unidentifiable *Acremonium* species, Basidiomycetes (basidiospores), and Ascomycetes (ascospores).
10. Keep in mind when interpreting spore trap sample reports, that outdoor levels may be lower than corresponding indoor levels (winter time in the northern U.S.) with a predominance of *Aspergillus/Penicillium* or *Cladosporium* conidia with no significant amplification of any moulds.
11. For example, the total outdoor spore count is 15,000 spores/m<sup>3</sup> of air with an *Aspergillus/Penicillium* spore count of 195 and a total indoor spore count of 5,000 with an *Aspergillus/Penicillium* count of 2,500 spores/m<sup>3</sup> of air. Look for moisture intrusion or some cryptic source fungal contamination.

# SPORE TRAP - GUIDELINES FOR INDOOR MICROBIAL CONTAMINATION

These guidelines are intended to be a “reactionary threshold” to incite further investigation. They are not intended for use of health significance nor are they necessarily representative of unacceptable indoor environments.<sup>†</sup> It should be noted that identification of the Spore Trap is based on the spore alone. This procedure is presumptive and the viability of the spores is unknown.<sup>‡</sup>

*Note: Results are reported as calculated. For interpreted purposes of biological data, the first and/or second digit generally should be considered significant.*

TYPE OF SAMPLE	LOW LEVELS OF FUNGAL CONTAMINATION	ELEVATED LEVELS OF FUNGAL CONTAMINATION
Non-Culturable Bioaerosol (Spore Trap Samples)	<1,000 Spores/m <sup>3</sup> of air *	>2,000 Spores/m <sup>3</sup> of air

\* Spore Trap counts should be less than 1,000 Spore/m<sup>3</sup> of air provided no significant increase in any one fungal genera. No moisture indicator moulds such as *Stachybotrys* or *Chaetomium* should be detected. It should also be noted that basidiospores and ascospores detected in the indoor environment most always represent outdoor air infiltration.

<b>CHART DEBRIS RATING –SPORE TRAP ANALYSIS USING 1000X (Air-O-Cell, Micro 5, Allergenco D, Cyclex d, VersaTrap, etc.)</b>		
DEBRIS RATING	CONDITIONS FOR REPORTING DEBRIS RATING	SIGNIFICANCE
0	A visible trace, including particulates and debris, is not observed.	Indicates the sample was a blank or that improper sampling occurred.
1	Debris is present and <10% of the average viewing field is obscured.	Minimal amount of debris is observed.
2	Debris is present and 10% to <40% of the average viewing field is obscured.	Low amount of debris is observed, counts may be affected.
3***	Debris is present and 40% to 75% of the average viewing field is obscured.	Moderate amount of debris is observed, relative amounts of conidia/hyphal fragments may be underestimated.
4***	Debris is present and >75% of the average viewing field is obscured.	High amount of debris is observed, counts are estimated.
5****	Debris is present and the entire viewing field is obscured.	Periphery of trace is the area analyzed. Presence of conidia/hyphal fragments noted. Suggest recollect.

\*\*\*A rating of 3 or greater indicates that the accuracy of the analysis is likely affected.

\*\*\*\*A rating of 5 indicates that only the presence of conidia/hyphal fragments was noted. Recollection of the sample is suggested.

<b>CHART FOR SKIN CELLS–QUALITATIVE ANALYSIS USING 630X</b>	
REPORT DESCRIPTIVELY AS:	RELATIVE AMOUNTS OF OBSERVED SKIN CELLS/hpf (630 X)
0	No skin cells present
1	<2 per high power field
2	2 to 5 per high power field
3	6 to 10 per high power field
4	11 to 15 per high power field
5	≥16 per high power field

## REFERENCES

<sup>†</sup> *Recommended Guidelines for Indoor Environments*, Indoor Air Quality Association, Inc., 10400 Connecticut Avenue, Suite 510, Kensington, MD 20895, IAQA 01-2000.

<sup>‡</sup> *Bioaerosols Assessment and Control*, Macher,J., ACGIH 1999.