

## Mold Sampling Techniques

### NON-CULTURABLE SAMPLING

Non-culturable spore trap samples draw measured volumes of air through the sampling device for a specified length of time. The collection surface is a coated glass slide. Particles in the air (spores, dust, etc) impact onto the sticky surface and are trapped for a later analysis. Allergenco/Blewstone Press and Burkard Manufacturing both make spore trap sampling devices which accept standard glass slides which are greased by the user. Another company, Zefon Analytical Accessories, manufactures disposable spore trap Air-O-Cell Cassettes. Zefon Air-O-Cell cassettes cost more than spore trap samplers per sample, but require a much lower initial capital expense. They are also small, making them easy to use in small spaces. All of these devices have excellent aerodynamic characteristics and are very effective in monitoring airborne particles and organisms.

Spore trap samples are capable of capturing all spores and particle matter in the air. Consequently, it is possible to accurately characterize problem environments where spores are present but either are no longer viable or are species that do not culture well (e.g. *Stachybotrys*). These are two situations where culturable sampling techniques, if used alone, may miss a potential IAQ problem that non-culturable techniques may identify. While many mold spores have a unique morphology and are identifiable by direct microscopic examination, others do not and are more difficult to identify. These latter types must be counted in broader spore groups.

### AIR SAMPLING

Our philosophy regarding the interpretation of biological air samples is formed primarily by two guiding principles. First, an effective interpretation is based on the comparison of indoor and outdoor samples. There are currently no guidelines or regulations to indicate "safe" or "normal" spore levels, however, we typically expect indoor counts to be 30 to 80% of outdoor counts, with the same general distribution of spore types present. Indoor and outdoor spore level comparisons should also be evaluated with an awareness of the building types, activity level, and weather conditions present at the time of sampling. And second, variation is an inherent part of biological air sampling. The presence or absence of a few genera in small numbers should not be considered abnormal.

### SURFACE SAMPLING

The primary purpose of a direct microscopic examination of a surface is to determine whether or not mold is growing on the surface sampled, and if so, what kinds of mold are present. Secondly, most surfaces collect a mix of spores, which are normally present in the environment. At times it is possible to note a skewing of the normal distribution of spore types, and also to note "marker" genera, which may indicate indoor mold growth. A direct microscopic examination of a surface shows exactly what is there, without any skewing by laboratory procedures. Surface sampling is inexpensive, usually requires no special equipment, and (for a direct examination) may be analyzed immediately.

Surface sampling may also reveal indoor reservoirs of spores that have not yet become airborne. The presence of biological materials on a particular surface is not a direct indication of what may be in the air. Health problems related to indoor microbial growth are generally caused by the inhalation of substantial numbers of airborne spores, sometimes a very substantial period of time (exceptions being, for example situations involving small children or immune-compromised individuals).

Mold growth is quickly and accurately identified by a direct microscopic examination of the surface. Growth is determined by noting the presence of clumps or chains of spores accompanied by underlying mycelial fragments and sporulating structures. The appearance resembles that of a "culture". When mold growth is present indoors, many more spores of a particular type will be found trapped on surfaces. These spores may be in forms, which indicate recent spore release (close proximity), such as spores in chains or clumps. Marker genera are those spore types which are present normally in a very small numbers, but which multiply indoors when conditions are favorable for growth. These would include cellulose digesters such as *Chaetomium*, *Stachybotrys*, and *Torula*. While a single *Stachybotrys* spore is occasionally seen as part of the normal outdoor flora, finding 5 or 6 of these spores on a single tape lift from a duct surface is an indicator that *Stachybotrys* may be growing indoors.