

SAMPLING AIRBORNE SPORES IN CONTAINMENT FOLLOWING A MOLD REMEDIATION

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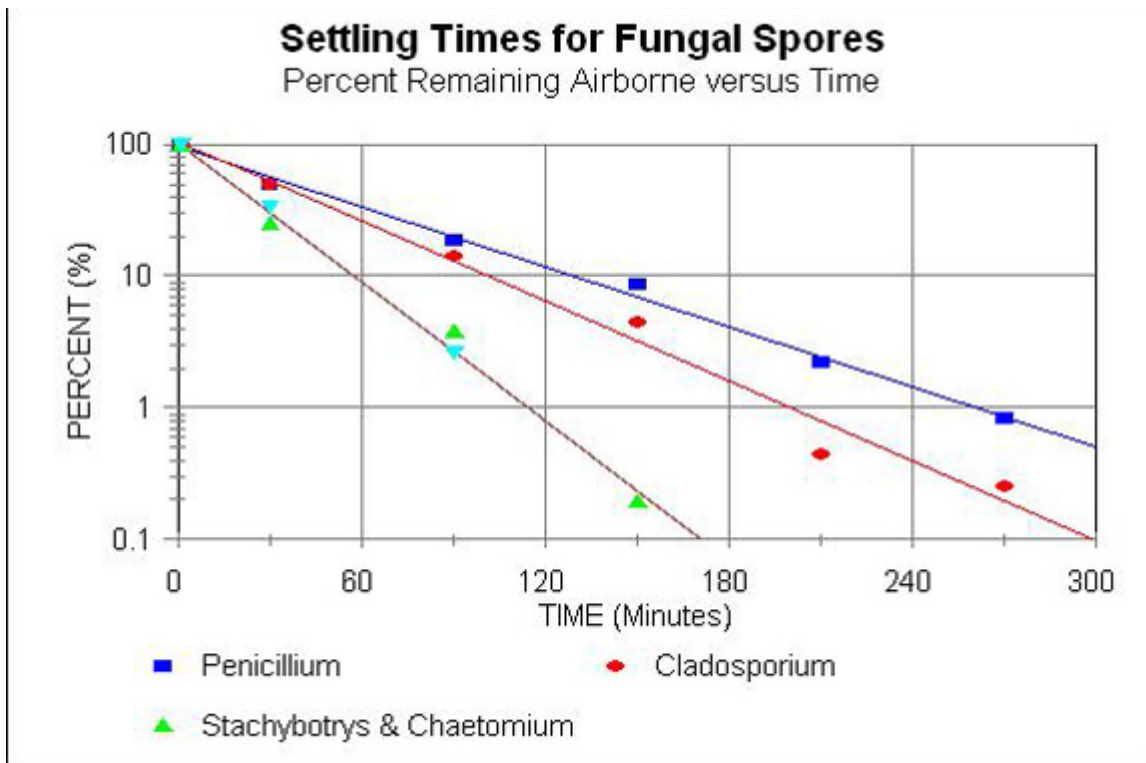
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There are two basic approaches used by Indoor Environmental Professionals (IEP) for collecting airborne post-remediation verification (PRV) samples. Some IEP's prefer the Air Filtration Units (AFU) inside containment to remain in operation before and during sample collection. The logic to this approach is that the AFU continues to efficiently remove spores from containment throughout the period of operation. Therefore, it is thought that better results will be achieved with the AFU operating. However, if the AFU short-circuits (just keeps cleaning the same portion of air over and over), then all the AFU will do if left in operation is to keep any residual spores airborne due to the turbulence created by the AFU itself.

Other IEP's prefer that the AFU be turned off for some specified time prior to sample collection. This approach assumes that the AFU may short-circuit, in which case the turbulence created by the circulating air may actually result in artificially high concentrations of airborne spores inside containment. If this occurs, the PRV samples will fail, and the remediation contractor may be needlessly penalized. This article addresses one of the primary issues confronting this particular group of IEP's – after the AFU is turned off, how long should the IEP wait to sample?

Aemtek, Inc. personnel have attempted to provide an answer this question by measuring the rates at which various-size fungal spores settle out of the air. A mixture of two smaller spores (*Penicillium brevicompactum* and *Cladosporium sphaerospermum*) and two larger spores (*Chaetomium globosum* and *Stachybotrys chartarum*) were injected into a room-size exposure chamber which was located at the Aemtek, Inc. facility. The airborne concentrations of these four spores were then measured over a period of several hours. Using these data, it was possible to measure the settling rates for these four spores, which are contaminant spores that are frequently detected in airborne PRV samples.

The settling rates for the spores are illustrated in Figure 1. The fractions of the spores remaining airborne, as percentages of the original concentrations, are plotted versus the time since they were injected into the chamber. It was assumed that "time = 0" was equivalent to the time the AFU was turned off inside containment. Note that the percentage data are presented on a logarithmic scale. This is just a simple "trick" to make the plot a straight line, which is easier to interpret.



Chaetomium and *Stachybotrys* are both larger, heavier spores, and, as indicated in Figure 1, they had almost identical settling times. The airborne concentrations of these spores were reduced to 10 % of the original concentration in about one hour; and to 1 % of the original concentration in about two hours. It was assumed that these two percentages were most relevant as guidelines for airborne PRV sampling. For example, it was assumed that the IEP would not want to collect a PRV sample if they expected the airborne concentration to exceed 10 % of the original spore concentration, and would prefer to wait until the concentration could be expected to decrease to 1 % of the original concentration.

These data also impact another issue involving PRV inspections - should containment be failed if a single *Stachybotrys* spore is detected in an airborne PRV sample? Clearly, if the AFU had been turned off at least two hours prior to sample collection, then this result would represent an unusual condition; and failing the containment may be appropriate. However, if the AFU had been left on during sample collection, then such a result would be more difficult to interpret.

The data for *P. brevicompactum* is probably representative of *Asp/Pen* like spores, in general. As indicated in Figure 1, *P. brevicompactum*, which was the smallest, lightest spore, took the longest time to settle out of the air. The airborne concentration of this spore was reduced to 10 % of the original concentration in about 2 hours; and to 1 % of the original concentration in about 4.5 hours. Therefore, since *Asp/Pen* like spores are probably most often responsible for failed PRV inspections, the IEP should probably not sample for at least two hours after the AFU was turned off; and should wait at least five hours whenever possible.