

## The 2006 Winter Solstice and the Future of IAQ

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The winter solstice is celebrated by most cultures today as a religious holiday.

Historically, this time of year was celebrated as the start of a new solar cycle that eventually brought warmer days, spring rains and, hopefully, bumper crops. Each year, we use this time to reflect on what we have accomplished and what we hope to see in the coming year.

The start of a new year brings new opportunities for the field of indoor air quality. There are many challenges and unanswered questions still facing this industry.

As a result. There are a number of things we, as IAQ consultants, would like to see happen in the IAQ industry during 2007 to address these challenges.

Often heard at this time of year, the song "Twelve Days of Christmas" lists a dozen gifts. In that spirit, here are 12 gifts for the IAQ industry that we would like to see materialize in 2007. We would love to see consulting firms, laboratories and trade associations working together to make some of these wishes come true

### *1. Resolving the question of whether the use of amended water increases or decreases airborne mold spore levels during the mold remediation*

We would like to see more research conducted on the role of water in controlling airborne spore levels. Mycologists point out that many mold spores are hydrophobic and repel water; hence, they say, the application of water will not wet spores and prevent them from becoming airborne. On the other hand many remediation contractors use water misting during remediation to control dust generation and they hope, mold spore levels. In addition, such a study could determine whether it is best to remove moldy materials when they are wet, damp or dry. The literature on mold growth indicates that when moldy materials are still damp, they are more likely to be in the vegetative state and do not release as many spores. Hence, removing moldy materials when they are damp may release fewer spores than waiting for those materials to dry prior to removal.

These critical issues need to be clarified with some real-world studies to provide guidance to remediators and IAQ consultants on the most appropriate work practices. The data may also better position us to delineate appropriate PPE for remediation workers and situations where containment is warranted.

### *2. Development of interpretive guidelines for particle count data*

Many IAQ professionals use particle counters as a tool when assessing indoor air quality and for monitoring progress or completion of a remediation project. Real-time particulate monitoring of five different sizes of respirable particles can be a powerful tool in the IAQ professionals arsenal. However, there are no published references on how to assess these numbers or what should one expect as "normal" levels in different types of buildings. Given the

recent research on PM 2.5 particles and their potential for causing premature death. This is an important health issue.

We have accumulated nearly 1,000 data points from different environments. However, they are all from the Chicago area. Unfortunately, the Chicago area appears to have a bias in particulates that are small in size. Therefore, we are looking for particle data from other IAQ professionals from other regions across the country and around the world to add to this database. Using this data, we intend to develop a reference document for IAQ professionals to use when making IAQ assessments. (If you would like to add your particle data to this important research project, please contact us directly for free data input and graphing software.)

### *3. Standardization of spore trap counting and analysis methods*

Spore traps have become a very popular method of sampling the air for total mold spores in situations ranging from IAQ investigations to post-remediation verification. IAQ professionals are highly dependent upon the accuracy of spore trap analysis. However, the various labs in the country that analyze spore traps use different analysis methods to count mold spores. Some labs use microscopes set to 400x magnification; others use 600x; and some research microscopists claim that you need to use 1000x to identify spore genera properly. This is not to say that we need only one method; most likely two, or three methods may be sufficiently accurate.

We see a need to establish a method of comparison and consensus amongst the major laboratories to insure counting accuracy. This will add both scientific and legal credibility to spore trap data.

### *4. Qualification and quantification of "normal fungal ecology"*

The creation of the concept of "normal fungal ecology" was a brilliant first step in the acknowledgement that spore levels in the indoor environment are never zero. But what exactly is "normal fungal ecology" in buildings? We could surely use a better scientific delineation of this concept. A simple statement that the major genera should be *Cladosporium* during the warmer months would be a start. A lower or low level of *Penicillium/Aspergillus* spp. may be another guideline. Another aspect of "normal fungal ecology" that needs to be addressed is hyphae levels. Analysis of spore traps often includes this mold-related material.

The literature reports that people can be allergic to airborne hyphal fragments as well as mold spores. Therefore, it would appear that we should be including hyphae levels in all spore trap analysis. However, some labs report hyphae only at extra cost. If hyphae are part of normal fungal ecology and can contribute to occupant symptoms, should this be included as a standard item in all mold spore sample analyses?

There is sufficient data among the various laboratories to determine what is "normal fungal ecology." There is precedent in this area. The United States possess a rather extensive database of radon levels, and Germany archives all of their occupational hygiene data for both chemical and microbial sampling in a single national database. In this way, chemical exposure levels can be compared to employee health data in the national health care system. To date, the German database has over 1.2 million records.

We would like to see the development of a

database of indoor sampling data that is representative of the air quality in buildings with and without an ongoing mold problem. This would be a worthwhile effort and an invaluable tool in indoor air quality investigations.

#### 5. *Quantifying bacterial contamination levels in Categories 1, 2 and 3 water*

The definitions of the three water categories are designed to be qualitative. These broad categories allow the IAQ consultant, restorer or remediator to make a fairly quick judgment call as to what needs to be done in situations when time is generally of the essence.

However, there may be times when the situation doesn't fit easily into one of these general categories or when very costly decisions need to be made. Water quality standards and other data exist to better define these three categories of water.

Use of these comparative standards can help to better quantify risk to occupants and workers. In situations where the source of the intruding water is a mixture of more than one category, testing could delineate which category of water was involved and the appropriate restoration or remediation methods. Testing can also provide clearer information to justify insurance coverage and remediation costs. We would like to see the adoption of quantifiable ranges for Category 1, 2 and 3 water to be used by the IAQ professional when the situation warrants it.

#### 6. *Use of established, long-term air quality exposure standards in assessing IAQ*

Three U.S. governmental agencies have established long-term exposure limits for almost 1,000 chemicals. These standards are designed to apply to lifetime exposures of 70 years for 24 hours a day. They are typically used in assessing risk from long-term outdoor air exposure.

Since a significant number of people spend most of their time indoors, these long-term exposure standards should be equally applicable to indoor air quality situations. We would like to see IAQ professionals consider using these same risk assessment levels when doing indoor air exposure assessments, especially in residential and long-term care facilities.

#### 7. *Expansion of IAQA'S global reach to the occupational setting*

Many IAQ consultants focus mainly on mold and other biogenic contaminants in residential and commercial buildings. However, many indoor exposure problems are chemical-related. We need to expand the training of IAQ consultants to be able to handle these exposure assessments as well. Making this level of training available to the CMCs, CIEs and CIECs can strengthen an IAQ consultant's abilities in these areas. There is significant IAQ and chemical exposure information available from countries other than the United States. The American Conference of Governmental Industrial Hygienists has chemical exposure standards for about 600 chemicals. Other countries and other countries and governmental agencies now have chemical exposure standards for over 5,500 chemicals.

It is important for IAQ consultants to take a global approach to evaluating microbial and chemical exposures. This global perspective will put IAQ consultants ahead of other consultants who only look at the limited information available in the United States. Standard setting organizations such as the Indoor Environmental Standards Organization could play a fundamental role in helping to expand

the role of the IAQ consultant. We would like to see the development of IESO standards for the measurement of indoor chemical exposures as well as guidelines for the use of global chemical standards in indoor air quality assessments.

#### *8. Expansion and better recognition of the IAQ consultants areas of expertise*

We need to increase awareness within the public and business communities of the expertise that many IAQ consultants have in dealing with indoor air pollution issues. A possible way to do this is to differentiate ourselves by having a broader global perspective on IAQ and IAQ evaluations. For example, we should be knowledgeable of IAQ standards in Hong Kong, Germany and other countries. We should be aware of chemicals that are banned in the European Union, Japan and other nations because their toxicologists have found that these cause disease. We should be knowledgeable about energy conservation and green building techniques.

There is also a wealth of information on mold and bacteria exposure standards in other countries. Clearly, if toxicologists outside the United States feel that exposure above a certain level of chemicals or biological agents is a health risk, it is a starting point for us in the United States. Not acknowledging their existence and the potential guidance they could provide is a disservice to the population we wish to protect.

Many people just automatically call upon industrial hygienists when they have indoor air quality problems. If we possess more comprehensive and up-to-date information on IAQ, then we can market ourselves as being more effective than typical industrial hygienists who use the outdated OSHA PEL's as their chemical exposure standards.

Both IAQA and the American Indoor Air Quality Council should take leadership roles in bringing this global information to IAQA members to keep Council-certified individuals the leaders in their field.

#### *9. Better understanding by hospitals of the need to use qualified IAQ professionals*

Last year, we saw a presentation at a professional conference where spore traps were used as the method of post-remediation verification for a large mold remediation job in a hospital. The consultant sampled only 141 liters of air and took no culturable samples.

We were shocked that this presentation was even permitted. The literature is full of cases of fatal aspergillosis directly traceable to viable mold spores that are released from building renovations in hospitals. Not testing for culturable mold spores in these situations borders on negligence. And the need to always sample at least one cubic meter in any mold evaluation in a hospital is not new information.

The whole point of infection control risk assessments as part of construction activities is the potential for the spread of viable mold spores. The situation above was an example of a lack of knowledge on two fronts - the hospital and the consultant.

We would like to see IAQA take an active role in approaching the American Hospital Association to establish minimum requirements for sampling in hospitals and to educate hospital administration, interested IAQ consultants and remediators in the appropriate protocols for hospitals

## *10 Research into the mold infection rate in people who are not immunocompromised*

There are so many questions about fungal related disease. thousands of people die prematurely each year due to fungal infections. However, we do not fully know or understand the etiology of these infections.

Even if you are not immunocompromised, viable mold spores are entering your lungs and sinuses and starting to grow. It is assumed that a healthy person's immune system responds to this infection and controls it. But we really don't know this with any scientific certainty.

It may be that many of the cases where people claim mold-related disease are actually sub-acute infections that lead to permanent health deficits.

One way to establish a scientific framework around this issue would be to look at the immunological parameters in cystic fibrosis patients and compare them to symptomatic "mold-injured" individuals.

A good start would be comparing the indicator parameters of Dr. Ritchie Shoemaker's and others' research and how this compares to cystic fibrosis patients, of whom 95 percent develop aspergillosis at one time or another in their lifetime.

Perhaps Dr. Michael G. Rinaldi, with his extensive experience in unique mold infection cases, can also add some of his immune system response data to this research. Even if no correlation is found, it would indicate that some other mechanism is involved other than active infection. We would like to see more research on how the daily fungal "assault" of background spores in the environment affects otherwise healthy normal individuals.

## *11. Increased use of political activism*

As much as we are concerned about IAQ and public health, this is not a national political priority in the United States. Consequently, as professionals, we have to recognize our role and responsibility of educating both the media and our politicians about the importance of IAQ in disease prevention and ultimately reducing health care costs. Political activism involves writing letters or commenting on blogs about the importance of IAQ in maintaining overall health. We all have dealt with people who have had their lives severely and permanently changed as a result of poor IAQ. This is no small issue

We also need to make the public, the media and the government aware of the fact that we are falling behind the rest of the world in health and environmental standards, and it is time for the United States to catch up with the rest of the industrialized world.

We hope that IAQ professionals will take the time to promote a better understanding of IAQ issues in the media, government and the public.

## *12. Which type of impact sampler is better at detecting smaller spores?*

Many water intrusion incidents involve elevated levels of *Penicillium* and *Aspergillus* species. These spores are relatively small and can evade easy detection by some spore trap media. Fortunately, research on this topic is already in the works – as a gift to IAQ professionals for

2007.

During 2006, a Penicillium-contaminated environment was identified that provided an excellent opportunity to explore this question. A number of major analytical laboratories graciously agreed to donate the sampling media and provide the analysis for this study as a research gift to the industry.

This study compares Zefon, Micro 5, Cyclex D, and Allergenco D spore trap samplers. Simultaneous samples were collected with each type of sampler at three different airborne mold spore concentrations. This provided a total of 28 samples. Analysis of the laboratory data and development of an article for IE Connections is planned for mid 2007. We hope this will shed some light on the pros and cons of each type of sampler at various Penicillium levels.

As one can see, 2007 poses many challenges and opportunities for IAQ professionals. We need to work together to continue to advance our industry and give it a large voice both nationally and locally.

If each of us does our part, it will have an impact. We encourage you to embrace one of the challenges our industry faces and to work together with others to find answers. This will help the industry evolve and will have a positive impact on our livelihood, the public health and the welfare of future generations.

Best wishes for an enjoyable and fruitful 2007!