

AQS Supports Green Building!

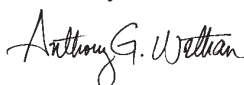
What an exciting time it is for those of us who believe in the importance of creating and maintaining healthy indoor environments! Much of this excitement is driven by the explosive growth of sustainable or green building across the country. Central to green building is taking measures during design and construction that result in healthier indoor environments. These include the selection of materials that emit low levels of volatile organic compounds (VOCs) in the construction and furnishing of the building, appropriate design and operation of the building's ventilation system, and the testing of the building for pollutants prior to occupancy.

While green building has gained tremendous traction in the past five years, let us not forget that many of today's green building indoor environmental quality practices were initially developed and implemented well over a decade ago by the state of Washington for their East Campus Plus Indoor Air Quality Program. Under this program, cutting edge and unique approaches to creating healthy indoor environments were incorporated into the construction of new state office buildings. Terms and procedures that have now become commonplace in green building, such as building "flush-out" and the selection of low-emitting products, originated in these state of Washington buildings.

AQS is proud of the central role that we played in developing the state of Washington program. We continue to take great pride in watching the seeds that were planted in the design and construction industry almost 15 years ago bear fruit as a key component of today's green building construction practices.

This issue of airfAQS will take you more in depth in the green building movement and its focus on the indoor environment. In the end, we hope that you will join AQS in supporting green building efforts across the country. It is these efforts that will ultimately create healthier indoor environments for us all to enjoy.

Sincerely,



Tony Worthan
President & COO, Air Quality Sciences

FROM THE FIELD

Baseline Testing: An Important Tool for Ensuring Good IAQ in New Buildings

With a greater emphasis on green or sustainable building practices, building owners and occupants often request that newly constructed buildings meet specific indoor air quality (IAQ) requirements. These may be expressed as part of an owner specification or as an optional part of a requested certification, such as the Leadership in Energy and Environmental Design (LEED) Green Building Rating System® for New Construction (LEED-NC) IEQ Credit 3.2, Construction IAQ Management Plan Before Occupancy.

To meet these requirements, the owner, designer and construction teams must work together. Owners must be clear about their expectations.



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INSIDE AIR

Apples to Oranges: VOC Content vs. VOC Emissions



When it comes to effectively controlling the source of chemical pollutants in indoor environments, there is a big difference between basing the selection of building materials, furnishings and finishes on their respective volatile organic compound (VOC) content versus their level of VOC emissions. In indoor environments, content is not an

accurate measure of emissions, because the amount of VOC content within a product formulation does not directly

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AQS happenings

Dr. Phil Morey Among Select Group of International Mold Experts to Set Global Agenda

In 1992, a select group of 37 experts in mycology, health exposure, building materials and construction from 11 countries were invited to The Netherlands to discuss the current state-of-knowledge about fungi in indoor environments and to set the direction of future research. Since then, the debate about potential adverse health effects from exposure to indoor mold has mushroomed into a genuine brouhaha. One of the flash points has been the question: At what level(s) of exposure will people become sick?

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For more information go to www.aqs.com

Baseline Testing: An Important Tool for Ensuring Good IAQ in New Buildings

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Designers must specify building materials, furnishings and finishes that emit low levels of volatile organic compounds (VOCs). And, builders must be aware of how scheduling, construction processes, and the choice of furnishings and finishes can impact IAQ. Both owners and builders also should use low-emitting cleaning products, as some cleaning products can be an inadvertent source of elevated VOC levels.

The only way to verify good IAQ in new construction is to conduct baseline IAQ testing. Because each building is unique and comes with its own set of challenges in developing and implementing an appropriate sampling strategy, baseline IAQ testing requires skilled and experienced professionals. The following case study illustrates how AQS helped one builder identify construction, pre-occupancy and cleaning processes that adversely affected IAQ in a newly constructed building.

Case Study

A large building contractor retained AQS to perform pre-occupancy IAQ baseline testing in a newly constructed multi-story office building located on the west coast. The IAQ testing requirement was part of an owner-produced construction specification. The IAQ section required testing for several indoor environmental parameters and potential pollutants, including carbon monoxide (CO), carbon dioxide

(CO₂), VOCs, formaldehyde, 4-phenylcyclohexene (4-PC), particulates, lead, ozone and chlordane (a pesticide). Testing was conducted on three consecutive days during normal business hours and under regular heating, ventilating and air-conditioning (HVAC) system operating conditions. Sampling locations and frequency were determined prior to testing based on the configuration of HVAC system air handling zones. Samples were collected from representative areas of each distinct zone.

Upon arrival, AQS building consultants observed the presence of a cleaning crew that had been scheduled concurrently by another part of the construction team. Cleaning was being conducted on the first floor and included floor waxing and polishing. In addition, new furnishings had been installed the day before sampling was to begin. The consultants noted a "new furniture" odor.



Air Quality Sciences'
LEED accredited professionals
can help owners and contractors
achieve a healthy sustainable
environment for building
occupants

Based on the sampling results, all areas met established criteria with the exception of the first floor. Results of first floor test-

ing showed elevated levels of VOCs and formaldehyde. The use of cleaning products and floor wax were obvious sources of these chemicals in addition to emissions from the new furniture, which was not certified as low emitting.

This study demonstrates the need for careful communication among the project design, construction and management staff. It also illustrates the adverse IAQ impact of cleaning processes that emit high levels of VOCs and formaldehyde.

"Flushing the building provides no assurance that concentrations of potential pollutants or irritants are within acceptable levels. Depending on the materials and the processes used during construction or renovation, further mitigation methods may be required and only testing can confirm that concentrations are at acceptable levels. Also, using low-emitting materials, furnishings and finishes, such as those certified by the GREENGUARD Environmental Institute, can help ensure acceptable testing results and a continued healthy and comfortable environment," said Michael Andrew, AQS scientist and LEED accredited professional.

AQS continues to support the green building movement by providing IAQ baseline testing services and IAQ management plans. The AQS building consulting group presently employs four LEED accredited professionals that can provide guidance on the proper sampling strategies and help owners and contractors achieve a healthy sustainable environment for building occupants.

Did You Know ? VOCs: You Can't See or Feel Them, But They Can Cause Havoc!!

Although they are invisible, anywhere from 200 to 1,000 different volatile organic compounds (VOCs) may be floating about in the indoor air where building occupants can easily inhale them. Health scientists are still uncertain as to the health impact of being exposed to such a "chemical cocktail," but what is certain is that many of these VOCs have toxic properties. Tetrachloroethylene and benzene, for example, are known carcinogens. Other VOCs are odorants and irritants that can lead to eye and throat irritation, headaches and dizziness.

Volatile organic compounds are organic chemicals that evaporate into the air at normal environmental conditions. Their sources are numerous and include flooring, adhesives, ceilings, paints and coatings, furniture, textiles, office machines, cleaning agents, consumer products, deodorizers and pesticides.

Recent reports indicate that construction and facility managers do not want buildings that "smell like a chemical plant," and building occupants do not want to breathe in air that can make them sick. As a result, current green building programs such as LEED®, the Green Guide for Health Care™ and NAHB's Model Green Home Building

Did You Know?

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Guidelines, call for the selection and use of low-emitting construction and furnishing materials in the design, construction and furnishing of today's buildings. These building programs award certification points for choosing and using low emitting products.

What are some of the common VOCs that plague today's buildings? A recent review of the AQS building database of VOCs found that in more than 2000 buildings, the following chemicals are most frequently found:

- Acetic acid
- Benzene
- Cyclopentasiloxane
- Dodecane
- Ethylbenzene
- Formaldehyde
- Pentadecane
- Pinene

- Toluene
- Xylene

In 20 recently tested buildings following LEED principles, the most frequently found VOCs include:

- 4-phenylcyclohexene
- Acetaldehyde
- Butoxyethanol
- Butyl acetate
- Ethylene glycol
- Formaldehyde
- Hexanal
- Texanol
- Toluene
- Xylene

In clearance testing of newly constructed building, construction managers are finding that the VOC baseline requirement of 500 ug/m³ used in these building programs is difficult to achieve. Failure is often the result of using high-emitting construction materials and furnishings and improper construction sequencing of chemical producing processes.

AQS advocates a two-fold solution:

- Require that qualified low-emitting materials be used
- Ensure that construction and project facilitators have implemented an indoor environmental quality (IAQ) management plan that verifies third party validation of the low-emitting products and the implementation of construction principles to minimize building contamination

A comprehensive IAQ management plan can be obtained from AQS by contacting info@aq.com. This plan is being used in the construction of Southface's Eco commercial building project in Atlanta, GA, which should be finished this fall, in time for the US Green Building Council's Greenbuild Conference also in Atlanta. A full case study will be available in the fall, highlighting the low-emitting materials used and additional IEQ principles that are key to achieving good indoor environmental quality.

INSIDE AIR



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correlate with VOC emission levels. It's like comparing apples to oranges.

The US Green Building Council, through its Leadership for Energy and Environmental Design (LEED®) programs, is one of the major drivers behind the rapidly growing green building efforts, including increasing awareness of the importance of source control in indoor environments. Indoor environmental quality (IEQ) accounts for 23 percent of the achievable credit points in LEED for New Construction (NC) and 30 percent in LEED for Commercial Interiors (CI).

But even within LEED, IEQ requirements are based primarily on VOC content and not on tested or verified VOC emissions.

Presently, only two credit points within the LEED programs require actual chemical emissions performance data: EQ Credit 4.3 for carpet systems in LEED NC and LEED CI and EQ Credit 4.5 for systems furniture in LEED CI.

Volatile organic compound content specifications, such as those adopted or further amended in IEQ standards, such as GreenSeal or the South Coast Air Quality Management District, are based on outdoor air quality requirements set by the US Environmental Protection Agency. These requirements are intended to measure only VOCs that react with sunlight to form ground-level ozone; not levels of VOCs emitted indoors.

Contrary to what some green building programs and manufacturers say, products that meet content-based requirements can neither be qualified as low-emitting materials nor can their IAQ performance be verified without chemical emissions data.

Caution also needs to be used when choosing products containing urea- or phenol-formaldehyde, such as insulation or composite wood. As with other VOCs, even if the amount of formaldehyde in the product formulation is low, it does mean

the product emits low levels of formaldehyde. Products containing phenol-formaldehyde, for example, can have high formaldehyde emissions, while some products made with urea-formaldehyde emit low levels.

A golden rule is to select products that have been certified to meet VOC emission- (rather than VOC content-) based requirements. Also, merely avoiding products that use a few specific chemicals of concern, such as formaldehyde, is not a good idea. Even so-called formaldehyde-free products may emit other VOCs directly or as a by-product of their application.

A growing number of manufacturers realize the benefits of including emissions testing in their R&D and quality control programs, and third party tested or certified low-emitting products are becoming more readily available. Free online resources such as the GREENGUARD Product Guide™, which currently features more than 3,500 low-emitting brand name products at www.greenguard.org, make it easier than ever to find and specify products for superior indoor environments.

AQS happenings

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In March, a second international workshop was convened in The Netherlands to continue the discussions started in 1992. In addition to setting the direction of future work, the goal was to develop recommendations that would pave the way for developing strategies for living in healthy buildings.

The participants also tackled the dicey question of whether or not there is enough solid information from which to derive numerical guidelines for exposure to indoor mold. The consensus was there is no scientific basis as yet to develop these guidelines.

AQS Vice President of Microbiology and Indoor Air Quality Phil Morey, PhD, CIH, was among five experts from the US invited to participate. Dr. Morey's paper, "Moisture Failures and Mold Growth in USA Buildings," described the most common types of moisture failures found in US problem buildings. In addition, 31 scientists and policy workers from 10 other countries were asked to take part.

Besides an overview of indoor air problems, the participants reviewed the role of damp conditions and other factors that influence mold growth in indoor environments, how to prevent mold growth on building materials and various building materials' sensitivities to dampness and moisture problems. A good deal of time also was devoted to strategies for living in healthy buildings.

The invitation to participate in this prestigious international workshop affirms that Dr. Morey and the AQS Building Consulting Group are on the cutting edge of the arts and sciences of diagnosing, resolving and preventing indoor mold growth and moisture problems. You can depend on AQS to efficiently and accurately diagnose your building, create workable solutions and advise you on how to prevent future problems.

On the Speaker Circuit

Michael Andrew, AQS Scientist, will be speaking at NeoCon® World's Trade Fair in Chicago, IL on June 14, 2005. The topic is "Designing for Good IAQ."

Dr. Phil Morey will be presenting on "The Dos and Don'ts of Testing" at Mealey's Mold Litigation Conference in Los Angeles, CA on June 16, 2005.

Dr. Morey is also speaking at the National Environmental Health Association's 69th Annual Education Conference & Exhibition in Providence, RI June 26-29, 2005. His presentation will be "General Principles and New Trends in Mold Remediation."

Dr. Elliott Horner is speaking at a seminar, Construction Defects: Water Intrusion & Other Calamities hosted by The Seminar Group on July 15, 2005 in Atlanta, GA. His presentation will be "Construction Defects and Water Intrusion: Understanding What Really Goes On."

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