



## Indoor Air Quality Tools for Schools Program

Indoor Air Quality (IAQ)

### Questions and Answers from the Virtual School Walkthrough Webinar

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#### **HVAC**

*Q: Why would you block off fresh air, even temporarily, from coming into a school? What if the weather conditions that a school district believes requires blocking off of outdoor air intakes lasts for weeks and/or months? How does this serve occupant health and comfort?*

A: Blocking fresh air for a couple days instead of freezing pipes in heating units or other areas, keeping dust out during intense storms, fumes from roofing and asphalt streets and parking lot finishing, and other temporary outdoor sources is a fair trade off. Elevated carbon dioxide (CO<sub>2</sub>) levels for a couple days should not pose a problem. Short term reductions of outside air will be a minor issue if the school has adopted effective policies to eliminate, reduce and contain indoor pollutants. If freshness becomes an issue in the short term then there are some options: windows can be opened for a brief blow out of the classroom during freezing weather and better filters can be temporarily installed for dust storms. In climates where it stays bitter cold for weeks and months, permanent mechanical solutions are necessary to protect against frozen pipes and comfort issues.

#### **Mold/Moisture**

*Q: Does mold on the interior surfaces of a gypsum wall – that is not visible – affect the occupants of a room?*

A: Yes, mold growing or contained within wall cavities can affect occupants in a room. A typical wall is not sealed tight and depending on the pressure differential in the room (positive or negative with respect to spaces outside the room envelope), the mold spores can hitchhike with air getting sucked out of wall cavities – when the room is under negative pressure with respect to the wall cavity. A thorough investigation is recommended. This often means some intrusive visual checks such as moisture meters will not always be sufficient and dry molds are also a problem – and dry molds are more likely airborne and can cause problems. Be sure to use protective gear for personnel and during any intrusive sawing or drilling to prevent exposures and making a bad situation worse by inadvertently spreading the mold spores.

## **Integrated Pest Management (IPM)**

*Q: What is Integrated Pest Management (IPM)?*

A: IPM is a concept that involves careful identification of the targeted pests and selection of the least toxic (hopefully non-toxic) alternatives to deal with that pest specifically, without taking out a bunch of good critters that happen to be in the line of fire. The first principle of IPM is reducing the attraction and entry areas to school buildings – keep the building clean and tight and reduce pest habitats near the building.

*Q: If animal cages are regularly and thoroughly cleaned, then why is it such a problem to have them in the classrooms?*

A: As a rule of thumb, animals should be visitors, not permanent residents. Any furry animal, including dogs, cats and others, could be potential trouble for asthmatic or allergic individuals.

*Q: Can plants cause IAQ problems?*

A: Plants can be overwatered, get messy and become mold issues, especially if placed in wicker baskets and not managed carefully. Too many plants – some classrooms can look like a jungle – can present moisture and mold issues simply from the volume of wet soil. Plants also harbor creatures (e.g. mites, aphids) and produce pollens and other allergens. A few well-managed plants should not present a problem, however, do not be misled by the myth that plants can clean the air in a school. It would take way too many plants to make a difference.

## **Cleaning and Maintenance**

*Q: Beyond the appropriateness of having a couch with pillows in a school, what are the health-related problems associated with furniture in a school?*

A: Fleecy, overstuffed furniture can hold and accumulate allergens, asthma triggers, irritants and even harmful chemicals. Furniture, area rugs, pillows and other items from unknown origins could easily expose school occupants to dust mites, animal dander, pesticides, molds, lice, fleas, pollens, fiberglass, asbestos, lead, dust and other serious pollutants. It is suggested that only district-supplied furnishings be used, and they should ideally have little or no fabric covering to allow custodial staff to keep it clean.

*Q: How many feet of walk-off mats do you recommend at major entrance ways?*

A: It is recommended to allow for at least four steps on the mat, so 12 feet or so would be appropriate.

## **Source Control**

*Q: What are some key safety considerations in respect to asbestos in schools?*

A: All asbestos-containing materials should be in good condition/repair. Workers need to be trained to be familiar with existing asbestos-containing materials in their school so they can monitor their condition over time and not accidentally disturb and release asbestos during maintenance activities.

*Q: What are acceptable levels for particulates?*

A: Similar to many other aspects of IAQ, there is no specific number; it depends on a lot of different factors. In general, by using a particle counter, we look for a level half of outside levels, which is around the 0.3 to 0.5 micrometer range. In the larger range, approaching 10 micrometers, there are commonly few or none outside and almost always more inside. Note that particle counters do not provide meaningful evidence of the particle type – a room with a relative low number of particles of an irritating or harmful nature can have a problem.

*Q: Given the maxim, "What gets measured gets fixed," what about when measurements vary depending on building occupancy? How critical is it to correct these issues?*

A: It is recommended to take measurements with a fully occupied school doing normal activities. Compare all zones and outdoor levels and put these on a floor plan map in order to help visualize patterns or sources. If the measurements are part of a problem or issue diagnosis or testing regime, data logging 24/7 is likely a high priority to identify patterns.

### **Measurement Instruments**

*Q: Our program and schools do not have a lot of money to purchase testing tools. If you had to choose three tools that give the best bang for the buck, what would they be?*

A: The three tools would be a CO<sub>2</sub> meter, moisture meter and a chemical tracer smoke tube.

*Q: What is a particle meter?*

A: Laser particle counters collect a known volume of air and count the particles in the air sample and sorts these by size in 6 ranges: 0.3, 0.5, 1.0, 3.0, 5.0 and 10.0 micrometers on a Fluke meter. Some particle counters collect particles by weight, micrograms per cubic meter. Some guidelines for particle exposures use micrograms per cubic meter as the units. Personally, we find actual particle counts in the 6 size range is much more useful compared to meters with the micrograms per cubic meter output.

*Q: What are good and bad numbers when using a particle counter? Or do you just compare indoor numbers to outside numbers?*

A: What we do is compare inside air to outside air, compare air from room to room, spank the carpet and other fleecy materials to see how full of particles are they and how many are easily released, and check incoming airstreams from the air systems to get an idea of filter effectiveness. Particle counters are useful for problem diagnostics and inspections to help rule-in or rule-out sources of particle exposure.

*Q: Why do you not recommend ozone machines?*

A: Ozone is a strong respiratory irritant but can be marketed as an indoor air quality cure-all. Ozone is not an effective air cleaning strategy in concentrations that are appropriate for human exposures. If these devices are used, operate only in unoccupied zones and thoroughly flush-out the zone prior to occupancy.

*Q: What are some points of caution in regards to chemical smoke tracers?*

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A: Titanium tetrachloride, the liquid used in the handy smoke tubes, turns into a fine powder when it contacts air. This product is the same irritant smoke used to fit-test high efficiency particulate air (HEPA) face masks (if the mask leaks, you know because you can gag or choke). Other tracer smoke materials are available other than the titanium tetrachloride but have their own down-sides or are prohibitively expensive for general use. You may wish to investigate other options.

Should you choose to use titanium tetrachloride, you will want to reduce exposure by using very small puffs and keep the smoke away from your face or other people's breathing zones. The chemical is also highly corrosive and should not be stored with valuable tools or electronic equipment (like your phone and other IAQ gear). We keep our puffers in vitamin bottles or in foil pouches. Like other small particles, the smoke will set off smoke alarms at higher concentrations. Do not puff near these sensors. Another tip is to conduct your particle measurements prior to using any smoke tracer – the smoke will negate any meaningful samples in these zones.