



## Indoor Air Quality Tools for Schools Program

Indoor Air Quality (IAQ)

### Finding Solutions: The Virtual Walkthrough

#### Webinar Q&A

Answers provided by IAQ technical experts Richard Prill, Washington State University, and David Blake, Northwest Clean Air Agency, as they virtually guided webinar participants through a comprehensive facility walk-through.

**Q1: What do you see as the role of health and safety committees in IAQ walkthroughs?**

**A:** Health and safety committees are often the source of engaged individuals who can be tapped to form the core group of an IAQ program. They are typically the first people to approach if an individual wants to get something going re: IAQ in a school district. Then the committee can approach administrators and the school board with suggestions. When and if walkthroughs are arranged for the schools, reps from the health and safety committees would be good choices for walkthrough team participation.

**Q2: What special training should *IAQ Tools for Schools* Program implementers have to ensure appropriate background?**

**A:** Attending the annual National *IAQ Tools for Schools* National Symposium in January would be an excellent start. The NEA has an [online training program](http://sites.nea.org/academy/onlinecourses/envirom-quality.html) for school IAQ (<http://sites.nea.org/academy/onlinecourses/envirom-quality.html>). One does not have to have expertise in building science, just a good handle on some basic concepts and the ability to apply them in the field: CO<sub>2</sub> diagnostics for ventilation efficiency and the importance of air flow direction within a school are two examples. Most people get their experience “on the job.” I think our DVD of the Virtual Walkthrough presentation, downloadable from [www.nwcleanair.org](http://www.nwcleanair.org) or available in hard copy by e-mailing me [dave@nwcleanair.org](mailto:dave@nwcleanair.org) also contains most of the basic information a person needs to conduct a meaningful walkthrough, though you may have to listen to the key parts a few times to really get it down.

**Q3: Who are the most appropriate personnel in a school district to teach IAQ techniques?**

**A:** Those individuals with the best knowledge of the facilities and their systems, coupled with a talent for communicating and motivating with a positive attitude. This person could use the Virtual Walkthrough DVD, viewed and discussed chapter by chapter, to get the learning started, with the *IAQ Tools for Schools* Kit as a powerful reference and resource.

**Q4: What basic equipment do people need to complete an IAQ walkthrough? And what is the cost of this equipment?**

**A:** You can actually use the *IAQ Tools for Schools* [Walkthrough Inspection Checklist](http://www.epa.gov/iaq/schools/actionkit.html#Checklists) and your senses of sight, smell, touch and hearing to gather information on factors that affect IAQ (<http://www.epa.gov/iaq/schools/actionkit.html#Checklists>). However, if you are thinking about buying additional equipment, a very basic package will be around \$1,000. A CO<sub>2</sub> meter will run about \$600. For an additional \$100-150, you can add a data logger. Surface moisture meters, which read four inches deep into material, are roughly \$300. You definitely want a temperature/RH meter, which cost between \$60-100. Chemical smoke pencils or a smoke puffer kit (\$50 from the Energy Conservatory in MN) is important for determining air flow direction. Our complete kits can realistically cost \$8-10,000 if you include a laser particle counter and data-logging CO<sub>2</sub>, CO,

Temp, RH meter. Consider pooling resources as an ESD to get a kit that can be shared around, calibrated and maintained from a central location. 20 schools mean 20 days of regular kit use on walkthrough, there is no sense in letting the kit sit on the shelf the other 345 days of the year if there is work to be done. Getting data is important when you are trying to get buy-in for a program. Remember: you can't argue with numbers!

**Q5: Where can you buy the equipment for a basic walkthrough kit?**

**A:** It is difficult to find a 1-stop shop for IAQ gear. However, there are some suppliers of IAQ and building performance testing and monitoring equipment that provide a wide selection of equipment. Often the most complete selections are from those suppliers that cater to home inspectors and building investigators. Many manufacturers of specialty equipment have a range of equipment from inexpensive to top of the line. You may find, for example, it's best to buy a moisture meter from a specialty manufacturer, a carbon dioxide and temperature/relative meter from a second supplier, and data recording equipment from a third. I always recommend getting testimonials from those with similar buildings, resources, and needs in order to find equipment that works for your situation. It may be mutually beneficial to share the cost of more expensive items with other organizations.

**Q6: How do you calibrate air testing equipment?**

**A:** Calibration for a CO<sub>2</sub> meter, for example, involves first feeding the sensor a "zero" gas (containing zero CO<sub>2</sub>), often nitrogen, to set the zero point accurately. Then you feed the sensor a known concentration "span" gas (purchased solely for the purpose of calibration), at say 1000 parts per million CO<sub>2</sub>, and ensure that the meter is reading higher levels as accurately as it senses zero. Different meters "drift" out of calibration at different rates, so it is important to do a daily check before collecting data...such as simply testing outside air to ensure the meter is reading somewhere near 390 or 400 ppm CO<sub>2</sub>, the world's current ambient average. Other instruments such as thermometers and moisture meters can simply be checked against other instruments as a sort of field-calibration to ensure these are still performing within tolerance.

**Q7: What do you recommend using to measure particulates?**

**A:** A laser particle counter. There are several manufacturers out there. Cost around \$4000.

**Q8: How useful of a diagnostic tool is a moisture meter?**

**A:** We use moisture meters every day. It takes the guess work out of diagnosing moisture issues. Is the sheetrock wet or dry? It is very tough to tell by looking or touching, but easy with a moisture meter. There are still tricks to be learned and their usefulness increases with experience. There are pad or penetrating pin types, or combo units. This is really a great tool.

**Q9: What is an acceptable moisture reading?**

**A:** That depends on where you are taking the reading. Whether, for example, you are measuring the moisture content of a surface or material or the relative humidity (RH) of air. Your RH target should be 30-50 percent. The moisture content of materials such as wood or should be below 14 percent. If the levels are above 18 percent, you may develop a mold problem. This is why you want to avoid cold spots – when temperatures drop, RH increases, causing condensation (moisture) to form on surfaces.

**Q10: One of the common problems we find when retro-commissioning is that the interior building static pressure is often negative in relationship to the outside air. Is this something you typically measure?**

**A:** We always determine if a structure is under generally positive or negative pressure with respect to the outside, usually with chemical smoke at the entry. We just barely crack the door and put a little slipstream of smoke at the crack and see which way it goes. If the smoke goes out the door, we have a positively pressurized building; if the smoke is coming in, the building is negative.

**Q11: Do you ever measure relative volatile organic compound (VOC) levels?**

**A:** We never measure VOCs unless we are invited to investigate a special case in a specific school where the situation demands the test. In that case, we typically collect air samples in special vacuum cylinders that suck the air into sterilized containers to be shipped to a qualified laboratory for analysis. This approach can be expensive. Now, if you find a big “spike” of a particular VOC in the report, you still have to go back into the field to determine the source. We prefer to use our noses whenever possible to find and eliminate strong VOC sources.

**Q12: Should CO<sub>2</sub> levels be different in urban areas compared to more rural areas?**

**A:** Yes; CO<sub>2</sub> levels vary depending on your location. For example, the presence and proximity of schools to high-rises, power plants, factories, or freeways and busy roads can all affect CO<sub>2</sub> levels. You should measure the air outside the school first to determine your baseline measurement. A good benchmark is that inside CO<sub>2</sub> levels should be between 600-700 parts per million (ppm) higher than outside levels.

**Q13: What techniques are there for HVAC air purification (if the outside air is poor quality)?**

**A:** Particulate trapping filters placed downstream of incoming fresh outside air would be the first and perhaps only standard treatment of the air, other than heating or cooling. Activated carbon filtration can pull out many more contaminants but this is rarely seen in the real world because, to be effective, you need a big bed of carbon requiring bigger fans to pull air through it, and the carbon needs to be replaced regularly and it is quite expensive. So, more purification CAN be done, but it is often just not practical or cost prohibitive. No ozone, please.

**Q14: How effective are photos of problem areas in addition to the checklists?**

**A:** A picture is worth a thousand words. This is true for IAQ too.

**Q15: You mentioned you only need 4-5 cleaning products. What do you recommend using?**

**A:** Talk to your supplier to find out what green cleaning/environmentally friendly supplies they have, and try to reduce the overall number of cleaners you are using. Of course, you need more than one kind of cleaner – for example, to clean bathrooms and other areas, you will need an antibacterial product. But know that there are antibacterial green cleaners; you have options. The more benign the products you use, the better.

**Q16: How receptive have schools been to changing cleaning products?**

**A:** Reactions vary, but, by and large, the transition has been gracefully accomplished by the majority of schools offered the opportunity. My experience has been some initial resistance to change by a fraction of a given custodial staff. But with use and experience I believe all the nay sayers have been won over. With help from Steve Ashkin (Bloomington, IN), we started a green cleaning pilot program in 5 schools out of the 100 plus in my three county area. Before the pilot program was completed, virtually all of our schools had started the process of using up their old chemicals and switching over. I credit local suppliers with providing training and guidance that really sped up the process.

**Q17: Are there any air fresheners that are "green" or acceptable for classroom use?**

**A:** I am not personally aware of a specific product. These products essentially “mask” odors with an odor of their own, so instead of one exposure you’re getting two because you didn’t correct the initial odor problem.

**Q18: Can you recommend a product for cleaning and disinfecting keyboards?**

**A:** Not my area of expertise.

**Q19: We have dark walls above electrical- and water-heated baseboard heaters. Is this basically burnt dust sticking to the walls? If so, how do we avoid it?**

**A:** Yes, the airborne particles become charged from the heating elements and attach to the wall and other surfaces. From an IAQ perspective we would suggest reducing the airborne particles in the zone to not only reduce the “ghosting” on the wall but more importantly reduce the human exposure to the particles. The particles

may be originating from inside the building from combustion devices, candles, soiled carpets, etc. Or the particles may also be originating outside from diesel and automobile exhaust, tire wear, soot from industry, wood smoke, or other sources. A sample of the particles may be collected on a piece of adhesive tape and sent to a qualified lab for analysis in order to help you determine the predominant particle matter and the source. This can be important for determining exposure as well as targeting an effective and reliable solution.

**Q20: How often should a school's carpets be changed and/or cleaned?**

**A:** The best way to determine when to replace a carpet is to look at the manufacturer's specifications. There is no magic number; it truly depends on use. For example, if carpets are in high traffic areas, they will probably need to be cleaned and replaced more often than in low traffic areas. The key is to be sure you have budgeted money to clean and replace carpets in your school. Also, consider removing carpet in high traffic areas and only having it in classrooms...or using area rugs that can be taken outside and beaten or professionally cleaned when necessary.

**Q21: How can I find what resources are available in my state, such as who conducts these walkthroughs and provides IAQ advice and how is it funded?**

**A:** First check with your EPA region's indoor air coordinator to see if any such services are available in your state. Rich provides IAQ assistance through Region 10 EPA grants and frankly he volunteers as much time as he is paid for. That boy has trouble saying no. So, we are lucky in the PNW. My indoor air program at NW Clean Air Agency, currently unique in North America, will be eliminated in next year's budget so I too will be very limited in what I can sneak in on the side if local schools have issues and call me for help.

**Q22: How much does a walk-through inspection cost if professionals are hired?**

**A:** My guess would be about \$800/day per professional, plus expenses, but you might find someone locally that would work for less or volunteer and write off the donation of services. On the other hand, you may not need more talent than you can find "in house."

**Q23: What resources does the community have access to for making the same inspections in their home and workplace?**

**A:** Typically, there not many public resources out there. However, in the workplace it is possible that your state's department of labor and industries or equivalent provides consultation re safety and health including protection from moist environments. In the state of Washington, they will respond to complaints related to a specific pollutant source, like CO, but are much less likely to get involved with nebulous complaints of "sick building syndrome", etc. For assistance improving your home environment, start by looking at our DVD "Attack Asthma at Home: A Practical Approach to Asthma 'Trigger' Source Control and Prevention," posted on our Web site (<http://www.nwcleanair.org>) in the IAQ links and at the bottom of our front page. It has been called a good primer on general home IAQ in addition to being a good resource for asthma trigger control. You might also want to check with your local health department to see what services they provide.

**Q24: In addition to the IAQ Tools for Schools Program, what are other resources we can use to learn to improve our indoor air quality?**

**A:** The EPA has a wealth of excellent IAQ materials beyond the *IAQ Tools for Schools* Action Kit (<http://www.epa.gov/iaq/schools>). A couple of superb EPA resources are The Building Air Quality Manual (<http://www.epa.gov/iaq/pubs>) and the I-BEAM Program (<http://www.epa.gov/iaq/largebldgs/i-beam/index.html>). The EPA web site (<http://www.epa.gov>) has a publication on just about any major IAQ issue from Asbestos to Zonolite. Check with your state health department and land grant university extension services. American Lung Association, asthma organizations and trade groups also provide some excellent materials.