



Breathe Easy

What every school can do to improve indoor air quality

BY PAMELA WHEATON SHORR

About 50 million kids go to school in the United States, and by the time they finish high school, they will have spent more than 13,000 hours inside school buildings. We like to think that time is spent safely and productively. Unfortunately, we're wrong.

The U.S. Department of Health and Human Services estimates that one in five schools in America has indoor air quality (IAQ) problems that can lead to

short- and long-term ear, eye, nose, and throat inflammation or worse. According to the Environmental Protection Agency, school officials across the country are seeing a rise in children's health problems, particularly asthma.

Today one out of every 13 school-age children has asthma, and the rate of diagnosis in young children has risen by 160 percent in the past 15 years. Asthma is now the most common chronic childhood illness in the United States, accounting for more than 14 million missed school days each year, according to the Centers for Disease Control and Prevention.

Does that mean kids are "catching" asthma from schools? In many cases, the unfortunate answer is yes.

Jean Cox-Ganser, research team leader for the Field Studies Branch of the Division of Respiratory Disease Studies at the National Institute for Occupational Health and Safety (NIOSH), has studied work-related asthma in schools and office buildings for the past five years. "Our strongest evidence is that the presence of dampness in a building exacerbates existing [respiratory] conditions and is responsible for new-onset asthma in otherwise healthy people," she says.

And schools may be causing an aston-

ishing 50 percent of asthma cases in kids, says Claire L. Barnett, executive director of Healthy Schools Network Inc. "Children breathe more air per pound than adults, and they have heightened vulnerabilities to environmental toxicants," Barnett says. "They are *not* just little adults."

Meanwhile, teachers and staff members working in schools are being affected by unhealthy school air, too. "We've seen an excess of respiratory symptoms, wheezing, diagnoses of asthma, and shortness of breath in [people] who work in schools," says Cox-Ganser. "Rhinitis and sinusitis are more prevalent than asthma in adults, but these can also lead to a lot of sick absenteeism in schools."

Kids missing school, the scramble for substitutes to cover missing staff members, and a lot of extra work for the school nurse—these are just one side of the indoor air quality problem in schools. There are also some pretty hefty financial tolls that schools must absorb.

Bill Moore, executive director of school support for Florida's Lee County Schools, says more than one IAQ lawsuit is pending against his district. And Steve Fields, director of buildings and grounds at Barrington (Ill.) Community Unit School District 220, says eradicating mold and other un-

healthy elements from the air in an aging building ended up costing the community \$700,000.

"It would have been a lot cheaper if we'd made the repairs electively," Fields says, "rather than in an emergency."

A COMPLEX CHEMICAL SOUP

The quality of the air kids breathe in school might not be a brand-new concern, but it's an increasingly pressing one.

"A number of factors have combined to make the latter half of the 20th century probably worse in indoor environmental problems than the first half of the 20th century," says Michele Guarneiri, director of the Environmental Protection Agency's Indoor Air Quality Tools for Schools Program.

"The average public school in the U.S. is 42 years old," she says. "Most were built as cheaply as possible and gradually starved for maintenance money. Inattention to maintenance over several decades exacerbated problems with leaky roofs, worn carpets, and malfunctioning ventilation systems."

It's partly a matter of design, according to Certified Industrial Hygienist Ken Wallingford, an indoor environmental quality research coordinator for NIOSH. Wallingford says the energy crisis of the mid-70s and 80s changed school architecture radically—and not for the better.

"The ventilation systems were redesigned to take in less fresh air so that schools didn't have to heat or cool it," he says. "Double insulating windows and doors meant to save energy often trapped water inside, causing mold." Ironically,

Other environmental health hazards

Just because you've addressed your indoor air quality problems doesn't mean you can breathe easy. Keeping schools safe for kids takes a certain amount of diligence. Here are some other environmental health hazards to keep in mind:

■ **Arsenic:** Pressure-treated wood used in school playgrounds and planters has been found to leach arsenic, a potentially deadly poison, into the surrounding soil.

■ **Asbestos:** Banned in 1970, asbestos was used as a building and insulation material in many buildings before that date. When asbestos-containing material begins to deteriorate, minute fibers can be released into the air. Fibers are then inhaled and absorbed into the body, causing lung disease.

■ **Cleaning agents:** Detergents and bleaches are often poisonous and can cause serious burns, rashes, and even death if consumed. Cleaning products also contain volatile organic compounds. VOCs are also emitted by some graphic and arts materials, paints, and toners and other substances used in office equipment such as copiers. VOCs are usually released as a gas vapor in above-normal room temperatures. The fumes can cause nausea and eye, nose, and throat irritation.

■ **Formaldehyde:** In addition to being used as a preservative in biology classes, formaldehyde is used as

a stiffener and water repellent in carpets. Exposure to airborne formaldehyde may cause inflammation of the eyes and respiratory tract.

■ **Lead:** Materials containing lead were used extensively in older buildings, including in paint, walls, woodwork, and window castings. Lead may also accumulate in the water due to contamination of local water supplies and pipes, or it can be inhaled as fumes in industrial neighborhoods. Lead poisoning is associated with brain damage in children.

■ **Mercury:** Mercury is found in such devices as thermostats and thermometers. A deadly poison, it is also found in some chemicals and scientific laboratory equipment.

■ **Pesticides:** A host of dangerous products can be found in and around schools, including insecticides, herbicides, termiticides, rodenticides, and fungicides. They are applied as aerosols, "bombs," gels, dusts, and fumigants or as bait. Residues can persist for days, weeks, or even years after application. Immediate health effects associated with organophosphates and carbamates are headache, restlessness, dizziness, nausea, anxiety, muscle twitching, blurred vision, vomiting, weakness, and sweating. Synthetic pyrethroids cause burning, stinging, and itching.

■ **Soil:** Contaminated school sites can harbor many unseen toxins, from lead and arsenic to dioxins. A range of illnesses are related to these substances, depending on the contaminants involved.—P.W.S.



Fire department and hazmat personnel enter Cardozo High School in Washington, D.C., March 2, 2005, to investigate a mercury spill. The district closed the school for nearly three weeks and spent at least \$1 million in cleanup costs.

The mercury used in thermometers is a shiny, silver-white, odorless liquid. When heated, it becomes a colorless, odorless gas. Just a few drops can be hazardous.

The federal Environmental Protection Agency, which helped with the Cardozo cleanup, has responded to mercury spills in schools in six states in recent years.

quality can be a tricky technical feat. But, says Barnett, "board members are not prepared to deal with this issue. And very few school administrators ever have any facilities or environmental training."

Finding ways to deal with air quality problems may take a bit of a mind shift. But that's no reason not to try, and one place to start is the EPA's free Indoor Air Quality Tools for Schools Action Kit.

The kit includes checklists for school employees, a step-by-step guide for coordinating the checklists, an "IAQ Problem Solving Wheel," a fact sheet on indoor air pollution issues, and sample policies and memos for district use. EPA even produced a short video on operating and maintaining school ventilation systems, featuring the cast and crew of the popular television series *This Old House*.

"EPA provides schools with a free tool kit that can help them identify, resolve, and prevent indoor air quality problems in

Wallingford says, older buildings are often healthier than new ones, because they were built with windows that open and transoms over classroom doors to facilitate air circulation.

Windows can help, because the air inside a school is a complex chemical soup made up of dust from carpets, chalk, playground dirt, and old-fashioned kid germs and grime. It can also include lead and mercury, radon, glues, mold, solvents, dander

and disease from class pets, perfumes, off-gassing from computers, diesel fumes where buses are idling too near ventilation systems, and all the potentially hazardous materials found in art classes, science labs, and custodial areas.

WHAT'S A DISTRICT TO DO?

Given this chemical complexity, it's not surprising that maintaining good indoor air

schools at low or no cost,” says Guarneiri. But, she cautions, it isn’t a one-time fix. “Schools must be diligent and put in place a proactive indoor air quality maintenance program rather than work in crisis mode.”

That’s exactly what Lee County did. Bill Moore arrived shortly after the lawsuits were filed over air quality in district schools, but he says he believes in being proactive about potential problems in any case. Moore converted Lee County’s 76 schools to “positive pressure” ventilation, which fills buildings with excess air and helps keep the humid Florida air out of the buildings when doors are opened. He’s also combed buildings for water damage—potential sites for mold.

Last year, the community was socked with four hurricanes. “Some things are an act of God, and you can’t plan for them,” Moore says, “but we reinforced gutters and roofs in order to keep out the blowing wind and rain that got up under the eaves.”

The district also created a six- to eight-person IAQ team whose only function is checking on air quality in the schools. And, the schools place “little black boxes”—measurement devices—in every single classroom twice a year to gather information about temperature and humidity changes. The data is fed into a computer, and anything that looks odd is thoroughly checked out.

AIRING STUDENT OPINION

An EPA survey conducted in 2002 found that 22 percent of schools are implementing an effective IAQ plan—either the EPA plan or something similar. “We are definitely seeing more and more schools taking on this important initiative,” Guarneiri says. “But our work is far from over. We want every district to be proactive about the quality of air in schools.”

East Valley School District in Spokane, Wash., has not only taken that message to heart, it has brought the message to students. The superintendent cobbled together money from a number of sources and asked a group of middle school kids in a talented and gifted program to start thinking about the air quality in their school.

“We had an HVAC [heating, ventilation,

and air conditioning] specialist on our maintenance department and a really visionary head of the custodial staff,” says Shelley Harding, the district’s director of student achievement. “The students did extensive research [on IAQ] and met with these two men and outside consultants.”

The students conducted experiments such as measuring levels of dirt particulates collected in a “backpack” vacuum versus a floor model (the backpack won). Eventually, the kids wrote a soup-to-nuts IAQ manual that was distributed to all the schools in the district.

The East Valley program was so effective, says Harding, that the district is using a \$45,000 grant from the Department of Health as a vehicle to expand and replicate it in two other middle schools. This time, students will be collecting data from school nurses on IAQ-related illnesses they’re seeing in schools. And, Harding says, the dis-

trict is waiting to hear about an EPA grant to establish a regional training center on IAQ for area teachers.

Guarneiri says a host of districts are addressing the indoor environment. The most successful programs, she says, designate an IAQ team; use EPA’s guidance; train and educate the school staff; and let students and parents know about the district’s IAQ programs and why the district has enacted a proactive program.

Ken Wallingford cuts directly to the chase. “I can’t emphasize enough that this is not rocket science,” he says. “You have to do the right thing, and keep your building maintained.”

Pamela Wheaton Shorr (pwshorr@comcast.net) has been writing about education for the past decade. She is the former head of editorial programming at Family Education Network and managing editor of *The Heller Reports*.

Inhale: 10 Steps to better indoor air

1. Put in place a comprehensive, districtwide indoor air quality maintenance program consistent with the U.S. Environmental Protection Agency’s Indoor Air Quality Tools for Schools program.

2. Conduct regular walkthrough inspections and measure the “Fundamental Four” (temperature, relative humidity, carbon monoxide, and carbon dioxide) in each building. Following the walkthrough, identify any indoor air quality problems in priority order.

3. Keep all air-supply diffusers, return registers, and outside air intakes in the heating, ventilation, and air-conditioning system clean and unobstructed. Regularly change filters and make sure condensate pans are properly draining.

4. Bring more outdoor air into the building using the ventilation system to flush polluted air out of the school. Maintain a minimum of 15 cubic feet of outdoor air per person.

5. Maintain indoor humidity levels between 30 percent and 60 percent to increase comfort and reduce problems with mold and bacteria.

6. Regularly clean and remove dust from hard surfaces with a damp cloth, and vacuum using high-efficiency filters.

7. Follow EPA and the New York City Department of Health guidelines for the assessment and remediation of mold. Water sources contribute to the growth of mold and bacteria.

8. Fix moisture problems, including those from roof, window, and plumbing leaks, promptly. Thoroughly dry wet areas within 24 to 48 hours to prevent mold growth.

9. Use integrated pest management methods in your schools instead of traditional pesticide-based methods.

10. Use low volatile organic compound paints, adhesives, and cleaning products that emit lower amounts of gases into the air.

See the resources on page 41 for more information.

Source: Indoor Air Quality Tools for Schools, U.S. Environmental Protection Agency