A Closer Look
When a school environment is unhealthy, students may be exposed to harmful pollutants and chemicals that may cause their health, attendance, and academic performance to suffer. This focus area is about creating a healthy physical environment at the school. "Environmental health" is a broad topic and covers many areas including cleaning and maintenance, mold and moisture, chemical and environmental contaminant hazards, ventilation, and pests and pesticides. Poor environmental health can impact student learning and staff performance.

In Wisconsin, it is required that all public schools have an Indoor Environmental Quality (IEQ) Plan. It is important to find out who your IEQ Coordinator is and engage that person and the building custodians for this focus area. The facility director is beneficial as well, as there may be district policies that have to be addressed. Engaging whoever makes purchasing decisions is helpful to examine current practices and policies regarding cleaning supplies.

This section is broken up into five specific areas providing ideas for action in each.

1. Cleaning and Maintenance
2. Mold and Moisture
3. Chemical and Environmental Contaminant Hazards
4. Ventilation
5. Pests and Pesticides

EDUCATIONAL OPPORTUNITIES
Here are some guiding questions and curricular ideas to consider with your students and staff:

- **Cleaning and Maintenance**: How do cleaning practices and products impact health? What routine cleaning practices ensure a healthy environment? What types of cleaning products are used? How do "green products" compare to more harsh chemicals? How does room use impact cleaning practices (i.e., are there areas difficult to clean due to obstructions?)

- **Mold and Moisture**: What impacts can mold and moisture have on health? What potential sources for mold or moisture problems exist in the school? How can mold and moisture issues be avoided?

- **Chemical and Environmental Contaminant Hazards**: What types of chemicals are in the school? How are chemicals for classes like chemistry stored and managed? How are students and staff notified if there is an indoor or outdoor air quality issue?

- **Ventilation**: How does air flow into, through, and out of the school? Identify these areas around the school. Do all rooms seem to have the same air flow or are there variances (in humidity, temperature, etc.)? How does classroom use (i.e., furniture arrangement, wall hangings, clutter) impact ventilation? What are the benefits of good ventilation systems in schools? What are some possible concerns?

- **Pests and Pesticides**: What are potential sources for pest problems in the school? How can potential problems be avoided? Research various ways to manage pests and analyze environmental impact of each management practice.

**Subtopic A: Cleaning and Maintenance**
School environments are healthier when they are kept clean and well maintained. Unsanitary conditions attract insects and vermin, and irritants and allergens found in dust and dirt can have a negative impact on student health and performance in schools. Indoor air pollutants and allergens related to poor cleaning practices contribute to increased respiratory and asthma symptoms among children and adults (National Research Council, 2006). According to the Center for Disease Control, asthma is one of the leading causes of school absenteeism, resulting in nearly 14 million missed school days annually nationwide (Akinbami, 2006). Regular and thorough cleaning and building maintenance can prevent pest problems, minimize irritants and allergens, and create healthier learning and working environments for children and staff.

Choosing the right cleaning products and practices is critical for maintaining a healthy school environment and protecting the health of children and staff. The chemicals found in some cleaning products can cause health problems, including eye, nose, and throat irritation and headaches, and in some cases can trigger asthma attacks. Using green cleaning products and practices can help to avoid these health effects, improve indoor air quality, and increase the lifespan of facilities.

Maintaining the school facility is just as important as routine cleaning to ensure a healthy environment for students and staff. A regular inspection program can identify problems before they impact the school environment and the occupants' health. School building maintenance protocols should address the entire building infrastructure: the foundation, exterior and interior walls, windows and doors, and roofing.
Subtopic B: Mold and Moisture
The key to mold control is moisture control. Keeping the school environment dry is essential for maintaining a healthy school building, as well as promoting an environment conducive to learning and working. The presence of moisture within building structures stimulates the growth of molds and other biological contaminants, and damp schools provide a nurturing environment for mites, roaches, and rodents, which are associated with asthma, allergies, and other respiratory diseases. Moisture and mold can also damage building infrastructure and result in costly renovations. Individual school districts have incurred costs from $200,000 to as much as $13 million for remediating mold and mildew damage (NIOSH, 2003 & 2010; Scheel, Rosing, Farone, 2001; EPA, 2003; Velez and Broward County Grand Jury, 2002). A few hundred dollars of annual preventive maintenance can avoid the need for costly mold remediation, as well as the potential legal liability posed by the presence of mold and mildew and its health risk for children and staff.

IDEAS FOR ACTION
Sprouting Up Actions
• Conduct an initial inspection of the school environment. Identify immediate actions that can be taken.
• Fix leaking plumbing and leaks in the school building and roof as soon as possible
• Watch for condensation and wet spots. Address sources of moisture problems promptly

Growing Stronger Actions:
• Ensure ventilation systems are circulating the indoor air properly
• Maintain indoor humidity levels between 30% and 60%

Reaching Higher Actions:
• Develop and record measures specific to the school that will demonstrate improvement in adopting effective moisture management techniques. Examples include: Reduction in the number of mold findings within the school facilities and recording moisture levels in susceptible locations
• Integrate information on mold into the student curricula across all grades
Subtopic C: Reduce Chemical and Environmental Contaminant Hazards

Schools need to provide a safe and healthy learning environment for children by preventing unhealthy exposure to chemicals and environmental contaminant hazards. Children spend a significant portion of their time in school and might be more vulnerable to chemical and environmental contaminant hazards than adults because their bodily systems are still developing. They eat more, drink more, and breathe more in proportion to their body size than adults; and their behaviors can significantly increase their exposures to chemicals and potentially harmful organisms.

Schools use chemicals in classrooms, science laboratories, art studios, vocational education shops, and facility maintenance. Many of these chemicals are toxic to humans, animals, and the environment and should be managed in a manner that protects students and school staff from accidents and risk of exposure. Exposure to some chemicals can cause serious health effects, including cancer; brain and nervous system disorders; organ damage (i.e., liver, kidneys, and lungs); irritation of the eyes, skin, nose, and throat; and asthma attacks. Below is a list of potential environmental health risks for students with a short description of the threats posed if chemicals are not properly handled, stored, or completely removed from the school.

Thoughtful chemical purchasing and management contributes to a healthy school environment, so consider the possible health, safety and environmental implications before buying a particular chemical. Proper chemical use and management (e.g., storage, labeling and disposal) is critical for reducing chemical exposures and costly accidents which ultimately affect student learning and attendance.

Polychlorinated biphenyls (PCBs)
PCBs are found in a variety of building products, including fluorescent light ballasts, which were installed in schools built before 1979. Congress banned the manufacturing and use of PCBs in 1976, and EPA phased out their use, with some exceptions, in 1979. Many of the fluorescent light ballasts that were installed before the ban, however, could contain PCBs and might still be used in schools. PCBs are highly toxic and high levels of exposure might cause cancer and neurodevelopmental effects in humans. Although intact PCB-containing light ballasts might not pose an immediate health threat, failing or leaking fluorescent light ballasts in schools could result in unsafe levels of PCBs in the air children breathe over the long-term.

Lead
Lead-based paint is an additional concern for schools, especially those built prior to 1978. Lead exposure affects the nervous system and can cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. Lead-based paint and lead contaminated dust are the main sources of lead exposure in U.S. children. Intact lead-based paint might not pose a hazard, but paint that flakes or becomes dust could result in unsafe levels of this dangerous chemical in the school environment.

Radon
Radon is a colorless, odorless, tasteless radioactive gas that occurs naturally in almost all soil and rock. Radon is found in outdoor air and can enter schools through cracks or other openings in the foundation. Exposure to radon is the second leading cause of lung cancer after smoking. (WHO, 2009) Although there is no evidence that children are at greater risk of lung cancer from radon exposure than adults, EPA recommends that schools test frequently occupied rooms at or below ground level for radon.

Asbestos
Students and school employees face significant health risks from lingering asbestos in schools and colleges across the U.S. One area of concern for parents and teachers is the prevalence of asbestos in U.S. school buildings. If a school was built before the 1980s, it’s likely that it contains some form of asbestos. About half of all schools in the U.S. were built from 1950 to 1969, when asbestos materials were highly prevalent in construction. When maintenance work disturbs these materials, or they start to deteriorate over time, asbestos dust can enter the air and be inhaled. Exposure to the dust puts teachers and students at increased risk for mesothelioma, lung cancer and other serious lung conditions.
Diesel Emissions
Bus and truck idling at schools can produce concentrated diesel exhaust emissions both inside and outside school buildings. Diesel exhaust contains fine particulate matter that, when inhaled, can cause lung damage and aggravate pre-existing respiratory conditions, such as asthma. (EPA, 2012b) Diesel particulate matter has also been identified as a likely cause of cancer. (EPA, 2012b) The soot and gases emitted by diesel engines are associated with acute eye, throat, and bronchial irritation; exacerbation of asthma and allergies; and potential interference with lung development in children. (EPA, 2012b) In addition to impacting human health, diesel exhaust also harms the environment by contributing to smog formation and acid rain.

Ozone, Particle Pollution, and Air Toxics
Ground level ozone and particle pollution are the two air pollutants that pose the greatest threat to human health in the United States. Ozone, the primary component of smog, can cause throat irritation, coughing, chest tightness, shortness of breath, and aggravated asthma symptoms. (EPA, 2012c) Particle pollution, or particulate matter, can embed deep within the lungs and cause serious health problems, especially for those with respiratory conditions. Even healthy individuals can experience temporary symptoms from exposure to particle pollution, including irritation of the eyes, nose, and throat; coughing; phlegm; chest tightness; and shortness of breath.

### IDEAS FOR ACTION

#### Sprouting Up Actions
- Do a yearly check for expired chemicals and properly dispose of them
- Prepare a chemical management plan. Have safety equipment and materials on hand in case of a chemical spill
- If the school was built before 1978, lead-based paint might be present on coated surfaces. If applicable, develop a list of rooms and areas that contain, or might contain, lead-based paint

#### Growing Stronger Actions:
- Ensure teachers and staff receive chemical management training as mandated under the Occupational Safety and Health Administration’s laboratory safety standard
- Conduct a chemical cleanout. Use the school’s chemical inventory to identify unused, unneeded, degraded, and unknown chemicals
- Switch to less hazardous alternative chemicals whenever possible

#### Reaching Higher Actions:
- Implement green curricula in the classroom. EPA’s Safe Chemical Management in Schools Workbook includes a section on putting together and starting a green curriculum in the classroom
- Participate in the School Flag Program to help the school and its surrounding community know the daily air quality conditions. Schools in the flag program raise a brightly colored flag each day that corresponds to the air quality forecast. Based on the color of the flag (green, yellow, orange, or red), teachers and coaches can modify outdoor activities when the air quality is unhealthy.
Hazardous air pollutants (HAPs), or air toxics, are pollutants that are known or suspected to cause cancer, respiratory effects, reproductive effects, and birth defects. The Clean Air Act lists 187 HAPs, 33 of which EPA has identified as posing the greatest threat to public health and the environment. Of those 33, 13 are mobile source air toxics, which are emitted from vehicles. Excessive idling by school buses, passenger vehicles, and delivery trucks may cause elevated levels of air toxics in and around the school.

**Subtopic D: Ensure Good Ventilation**

Indoor air pollution has been demonstrated to have an adverse impact on public health. Poor indoor air quality can cause short- and long-term health problems such as coughing, eye irritation, headaches, asthma episodes, allergic reactions, and in rare cases, life-threatening conditions such as respiratory distress. Improperly managed ventilation and filtration systems can contribute to airborne mold, infectious diseases, and carbon monoxide poisoning. Poor indoor air quality can also impact the comfort and health of children and staff, which can in turn affect concentration, attendance, and classroom performance.

Indoor air can be two to five times more polluted than outdoor air and large populations of children might be more susceptible to indoor pollutants than the general population. The high occupant densities of schools and classrooms makes it particularly important for building designers to incorporate ventilation systems that provide adequate outdoor air in compliance with the industry’s ventilation standard, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE, 2010), control moisture, and minimize energy costs.

Good indoor air quality can help ensure a healthier and higher performance learning environment for students and school staff, and proper maintenance of ventilation and filtration equipment plays a big role in the quality of the indoor air. Adequate ventilation with outdoor air is a key component for good indoor air quality in schools and classrooms, and can contribute to mitigating the effects of radon and vapor intrusion. Furthermore, well-maintained air filtration systems capture and remove airborne particles that can be asthma triggers, allergens, and infectious or toxic to humans.

**IDEAS FOR ACTION**

**Sprouting Up Actions**
- Establish and implement a regular cleaning schedule for air supply diffusers, return registers, and outside air intakes
- Use EPA’s IAQ Tools for Schools program resources to identify, correct, and prevent indoor air quality problems.

**Growing Stronger Actions**
- Ensure outdoor air ventilation meets or exceeds the industry’s ventilation standard (ASHRAE 62.1-2010 Ventilation for Acceptable Indoor Air Quality) or local code

**Reaching Higher Actions**
- Apply the ASHRAE 62.1-2010 IAQ Procedure. The IAQ Procedure is a performance-based design approach in which a building and its ventilation system are designed to maintain contaminant concentrations at specified levels.
Subtopic E: Prevent Pests and Reduce Pesticide Exposure

Droppings or body parts from cockroaches, rodents, and other pests can trigger asthma and can cause allergic reactions. Pests also can transmit infectious diseases. Pesticides contain chemicals that can be toxic to humans and the environment and pose a risk to human health, especially when people do not follow directions on product labels or if they use products irresponsibly (e.g., using pesticides when they are not needed, using pesticides for other than their intended use, or not following recommended application rates). Children can be especially vulnerable to pesticides because their internal organs are still developing and maturing.

Integrated pest management (IPM) is an effective and environmentally sensitive approach to pest management that uses current, comprehensive information on the life cycles of pests and their interactions with the environment, in combination with available pest control methods, to manage pests economically, and with the least possible risk to people, property, and the environment. IPM is a safer and sometimes less costly option for effective pest management in schools. IPM practices can effectively control pests in schools while reducing pesticide use by 70–90% (Green & Gouge, 2011). A school integrated pest management program uses common sense strategies to monitor and exclude pests while also reducing sources of food, water, and shelter for pests in school buildings and grounds. An IPM program should focus on prevention of pest problems first, and take advantage of all pest management strategies, including the judicious and careful use of pesticides, when necessary. The website, School IPM 2020: Reducing pest problems and pesticide hazards in our nation's schools (www.ipminstitute.org/school_ipm_2020/index.htm), is a good resource for schools and school districts to use in developing a school integrated pest management program.

IDEAS FOR ACTION

Sprouting Up Actions
• Review current pest management policies
• Conduct a general integrated pest management assessment at the school

Growing Stronger Actions
• Develop integrated pest management policies and procedures such as a fixed schedule for conducting monitoring routines year round
• Research and consider environmentally friendly options for controlling pests

Reaching Higher Actions
• Provide information to community members about IPM strategies

Follow these guidelines before applying pesticides: Use pesticides that present the least risk of exposure.
• Choose caulk and crevice pesticide applications, bait stations, or targeted spraying
• Carefully follow instructions on the label and use only the amount suggested
• Store all pesticides in a secure area of the building
• Do not use outdoor sprays and chemicals indoors
• Dispose of leftover pesticides and pesticide containers properly
• Do not transfer pesticides to other containers
• Do not spray during school hours, except in emergencies
LEARN MORE

Cooperative Educational Services Agency 10 (CESA 10) Environmental Project Consulting Services: CESA 10 in Wisconsin provides schools several types of facility management services including services related to environmental health and performance contracting. Explore their facility management services on their website for details. [www.cesa10.k12.wi.us](http://www.cesa10.k12.wi.us).

EPA Region 2’s Environmental Compliance and Best Management Practices: [Guidance Manual for K-12 Schools (2006)](http://www.ehs.columbia.edu/EPACD/k12-manual-epa.pdf) is a helpful tool to remind schools of their key environmental requirements. EPA regulates many chemicals found in buildings, such as asbestos, lead, PCBs and mercury. It is important to note that additional, and sometimes more stringent, state and local environmental regulations might also apply to schools.

Hazardous Chemicals in Schools ([website](http://www.hazwastehelp.org/educators/chemlist.aspx)) helps schools properly manage various chemicals. Type the chemical of interest and information will be generated on proper management.

OECD Substitution and Alternatives Assessment Tool Selector ([website](http://www.oecdsaatoolbox.org/Home/Tools)) The Tool Selector is designed to provide information on tools that can be used in conducting chemical substitutions or alternatives assessments. The filters below may be used to identify tools of greatest relevance to your substitution or alternatives assessment goals.

Schools Chemical Cleanout Campaign – Lessons Learned Report. U.S. EPA, Region III (January 30, 2009) The Schools Chemical Cleanout Campaign (SC3) is a program designed with the objective of raising national awareness of the potential dangers posed by mishandled chemicals in schools. The Environmental Protection Agency (EPA), Region III, developed a pilot project to help promote this campaign in Pennsylvania schools. Ten schools were selected to participate in this pilot project.

ENVIRONMENTAL HEALTH FEATURED SCHOOL

Houlton Elementary School, a recognized Sugar Maple School, made indoor air quality, chemical management, and integrated pest management a priority when implementing sustainability measures in their school. Houlton staff use EPA’s Indoor Air Quality Tool for Schools and meet the American Society of Heating, Refrigeration, and Air-conditioning Engineers ventilation standard. A number of actions contribute to indoor air quality improvement there: reducing exposure to asthma triggers, controlling humidity, using exhaust systems and moisture-resistant materials where needed, and inspecting combustion appliances for carbon monoxide releases. Houlton Elementary trains its custodial staff annually about its chemical management program and uses 75% certified green cleaning products. They follow an integrated pest management program, using a recognized pesticide applicator and following all notification, record-keeping, and other requirements for pesticide application (only done when school is not in session). In addition, they use marigolds and bat houses to help reduce garden pests and mosquitoes on the school grounds.