



# Healthier Schools for Healthier Kids

Model K-12 School Environmental Health Program

## HIGHLIGHTS



Research shows that the healthier a school's physical condition is, the better its students perform academically. An unhealthy school environment can affect children's health, attendance, concentration, and performance, and lead to expensive, time-consuming cleanup.

To improve children's health and academic achievement, the U.S. Environmental Protection Agency (EPA) has developed a three-tier model program to help schools and school districts create healthier school environments. This brochure series highlights important tips and action steps from the model program.

In addition to improving student health and performance, a school environmental health program has the potential to:

- Decrease absentee rates of children and teachers.
- Improve student participation in the classroom.
- Promote teacher retention and job satisfaction.
- Reduce operating expenses through energy and water conservation.
- Improve facility maintenance.



These guidelines are voluntary and are not intended to replace, amend, or negate policies, statutes, regulations, activities, or guidance related to existing school environmental health programs. By following the recommendations in these guidelines, states can help promote safe and healthy school environments for children and school staff.

# The Five Components

The EPA model program features five components:



**Component 1**  
**Practice Effective Cleaning and Maintenance**



**Component 2**  
**Prevent Mold and Moisture**



**Component 3**  
**Reduce Chemical and Environmental  
Contaminant Hazards**



**Component 4**  
**Ensure Good Ventilation**



**Component 5**  
**Prevent Pests and Reduce Pesticide Exposure**

For details about how each component works, visit  
[www.epa.gov/schools](http://www.epa.gov/schools).



# Which Tier Is My School?

Because resources vary from school to school, the model program offers a choice of three tiers of action to carry out each component. A school may be Tier 1 for some components and Tier 2 or 3 for others.

- **Tier 1 actions** are fixes schools can make immediately, and are a good starting point for schools with little or no previous experience with environmental health programs. Many can be implemented for little or no cost.
- **Tier 2 actions** are an essential part of a comprehensive school environmental health program. They are best suited for schools that have completed most of the Tier 1 tasks and would like to build on their existing programs.
- **Tier 3 actions** are for schools looking for ways to enhance their current comprehensive school environmental health programs. They are for schools that have undertaken many of the steps in Tiers 1 and 2.

# Tips for All Schools

Effective school environmental health programs are built through collaboration among all members of the school community, including teachers, school administrators, facility managers, and students. The most successful programs use an ongoing process to develop, implement, and evaluate policies, procedures, and practices that strive for continuous improvement.

The following steps are essential for a school or school district preparing to implement a school environmental health program:

- Secure leadership support.
- Establish a district or school environmental health team.
- Identify priorities and goals.
- Develop an action plan.
- Provide faculty and staff training.
- Encourage student involvement.
- Promote program success.

To find out how to complete each of these steps, go to [www.epa.gov/schools](http://www.epa.gov/schools).



# More Ways to Promote Environmental Health in Schools



**New construction and renovation projects** are good opportunities for schools to improve the health of the school environment, address areas of concern identified under the five key components of the model program, improve classroom comfort, and become more energy and water efficient.

By adopting high-performance practices, schools and school districts can lower their operating costs up to 30%. Existing schools can save 25% of operating costs by implementing some basic efficiency measures, occupant education, and engagement programs.



**Enhancing classroom comfort** can significantly affect school building performance and occupant comfort. Proper design, maintenance, and operation of lighting systems, ventilation systems, thermal control systems, and acoustics all play a role in increasing comfort.



**Energy and water efficiency** can help schools reduce energy bills 5%–20% without significant capital investment.

For more information on the EPA Model K–12 School Environmental Health Program, visit [www.epa.gov/schools](http://www.epa.gov/schools).



# Tier 1

## Getting Started with a School Environmental Health Program

### Component 4 continued

#### Here's what you can do:

- Ensure the school has a functioning ventilation system.
- Establish and implement a regular schedule for inspecting and changing filters.
- Ensure condensate pans are clean, unobstructed, and draining properly.
- Implement a regular cleaning schedule for air supply diffusers, return registers, outside air intakes, and ducts.
- Ensure HVAC system settings fit the actual schedule of building use, including night and weekend use.

Use EPA's *IAQ Tools for Schools* ([www.epa.gov/iaq/schools/actionkit.html](http://www.epa.gov/iaq/schools/actionkit.html)) program resources to identify, correct, and prevent indoor air quality problems.



### Component 5: Prevent Pests and Reduce Pesticide Exposure

Droppings or body parts from cockroaches, rodents, and other pests can trigger asthma and cause allergic reactions. Pests also can transmit infectious diseases. Pesticides contain chemicals that can be toxic to the environment and pose a risk to human health. Children can be especially vulnerable to pesticides because their internal organs are still developing and maturing. Integrated pest management practices can effectively control pests in schools while reducing pesticide use by 70%–90%.

#### Here's what you can do:

- Conduct an initial inspection of the school to identify potential pest problems.
- Replace weather stripping on doors as needed.
- Caulk and seal openings in walls.
- Install or repair screens.
- Keep vegetation, shrubs, and wood mulch at least one foot away from the school building.

### Component 5 continued

- Remove trash daily from the building.
- Clean all food crumbs or spilled liquids immediately.
- Vacuum carpeted areas frequently.
- Keep counters, sinks, tables, and floors clean and clear of clutter and moisture.
- Store food and waste in closed containers.
- Place screens on vents and floor drains.
- Fix dripping faucets and leaks.
- Remove grease accumulation from vents, ovens, and stoves.
- Keep areas as clean and dry as possible.

For more information on the EPA Model K-12 School Environmental Health Program, visit [www.epa.gov/schools](http://www.epa.gov/schools).



Tier 1 actions are appropriate for schools with little or no experience with environmental health programs. You can make many of the fixes for little or no cost. Here are the five components:



### Component 1: Practice Effective Cleaning and Maintenance

A school environment is healthier when it is kept clean and maintained well. Irritants and allergens found in dust and dirt can have a negative impact on health and performance, including increased respiratory and asthma symptoms among children and adults. According to the Centers for Disease Control and Prevention, asthma is one of the leading causes of school absenteeism, resulting in nearly 14 million missed school days annually nationwide.

Unsanitary conditions attract insects and vermin. Maintaining the school facility is just as important as routine cleaning to ensure a healthy environment. A regular inspection program can identify problems before they affect the school environment and the occupants' health.

#### Here's what you can do:

##### Cleaning

- Schedule routine cleaning when the building is unoccupied.
- Read and follow product labels.
- Maintain an up-to-date inventory of all cleaning products used.
- Clean and remove dust and paint chips.
- Use walk-off mats at building entrances.

## Component 1 continued

### Maintenance

- Check weather stripping of windows and doors and replace as needed.
- Inspect the foundation for cracks, decay, and water infiltration.
- Inspect ceilings and ductwork for deteriorating tiles and HVAC lining.
- Cut back overgrown vegetation near exterior walls.



## Component 2: Prevent Mold and Moisture

The key to mold control is moisture control. Moisture within building structures stimulates the growth of molds and other biological contaminants. Damp schools provide a nurturing environment for mites, roaches, and rodents, which are associated with asthma, allergies, and other respiratory diseases.

Moisture and mold also can 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. A few hundred dollars of annual preventive maintenance can eliminate the need for costly mold remediation.

### Here's what you can do:

- Conduct routine moisture inspections.
- Fix leaking plumbing and leaks in the building and roof as soon as possible.
- Vent moisture-generating appliances (such as dryers) to the outside.
- Ensure carpeting is not installed in areas with exposed plumbing.
- Maintain gutters, downspouts, scuppers, and storm drains.
- Visit [www.epa.gov/mold/mold\\_remediation.html](http://www.epa.gov/mold/mold_remediation.html) for mold cleanup guidance and procedures.



## Component 3: Reduce Chemical and Environmental Contaminant Hazards

Children may be more vulnerable to chemical and environmental contaminant hazards than adults because their body systems are still developing. They eat more, drink more, and breathe more than adults in proportion to their body size. Their behavior can significantly increase their exposure to chemicals and potentially harmful organisms.

Toxic chemicals can cause serious health effects, including cancer; brain and nervous system disorders; organ damage; irritation of the eyes, skin, nose, and throat; and asthma attacks. Mercury, PCBs, and lead are of particular concern to schools.

### Here's what you can do:

#### Chemicals and Chemical-Containing Products

- Conduct a chemical inventory of the school and ensure the school has up-to-date Safety Data Sheets for all chemicals and products.
- Where applicable, perform screenings and inspections of chemical-containing equipment (e.g., PCB fluorescent lighting ballasts, mercury-containing items) to ensure the equipment is properly managed.
- Develop a list of rooms or areas that contain, or might contain, lead-based paint.
- Ensure stored chemicals are clearly labeled, locked, and in undamaged containers.
- Review the school's mercury inventory list.
- Review the school's chemical hygiene plan, including chemical spill control policies and contact information for the local authorities responsible for managing chemical spills.
- Review the school's hazard communication plan.
- Encourage teachers to use school and art supplies that do not contain toxic chemicals or contaminants.

#### Radon

- Test frequently occupied rooms at or below ground level for radon.

#### Drinking Water

- Determine whether the school is a public water system. Most schools are part of a larger public water system, but smaller schools in rural areas can be their own public water system and must comply with all primary drinking water regulations.

## Component 3 continued

- Conduct and review a plumbing survey that identifies areas of high risk for lead sources.
- Maintain drinking water taps by routinely cleaning faucet aerators and disinfecting water fountains.
- Replace or take out of service any water fountains that are on EPA's list of known lead-containing models.
- Review or conduct lead testing for drinking water taps.

### Outdoor Air Pollution

- Minimize school bus idling by revising bus schedules.
- Identify the location of all school air handler intake vents to ensure they are not located near high vehicular traffic areas or chimneys. Relocate student drop-off and pick-up areas if needed.
- Keep classroom windows closed during periods of high traffic, such as before and after school and during rush hour, if the school is on a busy street or highway. Keep windows closed on days when smog or pollen counts are high.
- Implement an idling reduction campaign.
- Update the school's procedures for responding to Air Quality Index advisories.

### Secondhand Smoke

- Institute a smoke-free policy for the school campus.



## Component 4: Ensure Good Ventilation

Poor indoor air quality can affect the comfort and health of children and staff, which can in turn affect concentration, attendance, and classroom performance. Poor air quality also 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.

Component 4 continued on reverse

# Tier 2 Expanding Your School Environmental Health Program

Component 4 continued

Here's what you can do:

- Continue to perform HVAC system inspections.
- Establish an HVAC maintenance plan.
- Install high-efficiency filters, if not already in use.
- Take steps to ensure all rooms in the school building are ventilated.
- Ensure air intakes are located away from high vehicular traffic areas, plumbing and exhaust stacks, and chimneys for the school's heating system.
- Install carbon monoxide detectors near combustion sources (such as boilers, stoves, hot water heaters, and vocational education shops) to monitor carbon monoxide levels.
- 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.



## Component 5: Prevent Pests and Reduce Pesticide Exposure

Droppings or body parts from cockroaches, rodents, and other pests can trigger asthma and cause allergic reactions. Pests also can transmit infectious diseases. Pesticides contain chemicals that can be toxic to the environment and pose a risk to human health. Children can be especially vulnerable to pesticides because their internal organs are still developing and maturing. Integrated pest management practices can effectively control pests in schools while reducing pesticide use by 70%–90%.

Here's what you can do:

- Establish a school integrated pest management program ([www.epa.gov/pesticides/ipm/index.htm](http://www.epa.gov/pesticides/ipm/index.htm)).
- Once all integrated pest management strategies have been exhausted to control pests, use baits and traps before making a broad pesticide application.

Component 5 continued

Follow these guidelines before applying pesticides:

- When pest management services are necessary, the school should either contract with an integrated pest management certified professional or ensure that the facility management staff is licensed, trained, and able to implement integrated pest management practices as their state requires.
- Do not allow experimental, phased-out, or conditional-use pesticides and pesticide products to be used in school buildings and on school grounds. Do not allow teachers and school staff to bring pesticide products from home.
- Maintain records on pest management activities, including pesticide application dates, locations, and rates; copies of pesticide labels; Safety Data Sheets; and notifications issued.

For more information on the EPA Model K-12 School Environmental Health Program, visit [www.epa.gov/schools](http://www.epa.gov/schools).



Schools that have completed most of the actions listed under Tier 1 will be prepared to implement the key elements necessary for a more comprehensive school environmental health program.



## Component 1: Practice Effective Cleaning and Maintenance

A school environment is healthier when it is kept clean and maintained well. Irritants and allergens found in dust and dirt can have a negative impact on health and performance, including increased respiratory and asthma symptoms among children and adults. According to the Centers for Disease Control and Prevention, asthma is one of the leading causes of school absenteeism, resulting in nearly 14 million missed school days annually nationwide.

Unsanitary conditions attract insects and vermin. Maintaining the school facility is just as important as routine cleaning to ensure a healthy environment. A regular inspection program can identify problems before they affect the school environment and the occupants' health.

Here's what you can do:

- Establish a green cleaning and preventive maintenance plan for your school.
- Train facilities and custodial staff on cleaning practices and policies, as well as procedures for handling a chemical spill.
- Conduct an inventory of cleaning products. Identify and properly dispose of products that are outdated, unknown, or not needed.
- Maintain a standardized list of approved and disapproved cleaning products at the school district level.
- Annually assess and remove items that are stored in schools and are no longer needed.

Component 1 continued inside

### Component 1 continued

- Use EPA's *IAQ Tools for Schools Action Kit* checklists ([www.epa.gov/iaq/schools/actionkit.html](http://www.epa.gov/iaq/schools/actionkit.html)) to assist with routine school building inspections and maintenance.
- Schedule an annual inspection of school facilities by a building professional.
- Inspect roofs at least twice a year, including a pre-winter inspection in October or November.
- Maintain accurate records of roof and building inspections.

### Component 2: Prevent Mold and Moisture

The key to mold control is moisture control. Moisture within building structures stimulates the growth of molds and other biological contaminants. Damp schools provide a nurturing environment for mites, roaches, and rodents, which are associated with asthma, allergies, and other respiratory diseases.

Moisture and mold also can 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. A few hundred dollars of annual preventive maintenance can eliminate the need for costly mold remediation.

#### Here's what you can do:

- Establish a mold prevention and remediation plan.
- Ensure ventilation systems are circulating indoor air properly. See Component 4: Ensure Good Ventilation for more information.
- Maintain indoor humidity levels between 30% and 60%.
- Ensure indoor pool facilities are well ventilated to control humidity levels.
- Clean carpets with extraction cleaners to remove water and prevent mold growth.

### Component 2 continued

- Take steps to prevent water from ponding within 10 feet of the school building's foundation. For example, irrigation water spray lines should not be within three feet of the school building's foundation.
- Know what steps to take in the event of a flood. Visit [www.epa.gov/iaq/flood/index.html#Publicationsinformation](http://www.epa.gov/iaq/flood/index.html#Publicationsinformation) to learn how to clean up after a flood and prevent mold and moisture problems.



### Component 3: Reduce Chemical and Environmental Contaminant Hazards

Children eat more, drink more, and breathe more than adults in proportion to their body size. They may be more vulnerable to chemical and environmental contaminant hazards than adults because their body systems are still developing. In addition, their behavior can significantly increase their exposure to chemicals and potentially harmful organisms.

Toxic chemicals can cause serious health effects, including cancer; brain and nervous system disorders; organ damage; irritation of the eyes, skin, nose, and throat; and asthma attacks. Mercury, PCBs, and lead are of particular concern to schools.

#### Here's what you can do:

##### Chemicals and Chemical-Containing Products

- Form a chemical management team at the school.
- Conduct annual chemical inventories to ensure all unused, unneeded, and unknown chemicals are identified and disposed of properly.
- Develop a responsible chemical management program for the school or school district to ensure chemicals are stored, labeled, used, and disposed of properly. EPA's *Tool Kit for Safe Chemical Management in K-12 Schools* ([www.epa.gov/schools](http://www.epa.gov/schools)) has resources to help schools and school districts get started.
- Institute a chemical purchasing policy at the school.
- Ensure teachers and staff receive chemical management training as mandated under the Occupational Safety and Health Administration's Laboratory Safety Standard.
- Ensure students understand proper chemical management.
- Conduct a chemical cleanup.

### Component 3 continued

#### Radon

- Track radon test results, assessment data, and pending actions.
- Retest routinely if schools were mitigated to ensure radon mitigation systems are functioning properly.

#### Drinking Water

- Develop a plan for, and conduct routine maintenance of, the school's drinking water infrastructure.
- Test the school's drinking water for contaminants.
- If the school's drinking water lead concentrations exceed EPA's action level (20 ppb for municipal systems and 15 ppb for wells), take steps to develop a plan to reduce lead levels.

#### Outdoor Air Pollution

- Implement an anti-idling policy for school buses, passenger vehicles, and delivery trucks, and post signs stating all vehicles are prohibited from idling on school premises.

#### Secondhand Smoke

- Implement a smoking education program for students that covers the social and physiological consequences of tobacco use, information about social influences (e.g., peers, parents, and media), and training on how to manage peer pressure to smoke.



### Component 4: Ensure Good Ventilation

Poor indoor air quality can affect the comfort and health of children and staff, which can in turn affect concentration, attendance, and classroom performance. Poor air quality also 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.

# Tier 3 Building on Your School Environmental Health Program

Component 4 continued

ventilation are addressed in the design process. For additional information on air cleaning devices, see *Residential Air Cleaners: A Summary of Available Information* ([www.epa.gov/iaq/pubs/residair.html](http://www.epa.gov/iaq/pubs/residair.html)) and *Ozone Generators that Are Sold as Air Cleaners: An Assessment of Effectiveness and Health Consequences* ([www.epa.gov/iaq/pubs/ozonegen.html](http://www.epa.gov/iaq/pubs/ozonegen.html)).

- Develop and record measures specific to the school that will demonstrate improvement in HVAC system performance.
- Engage students in classroom activities and projects that focus on indoor air quality.
- Incorporate information and updates on indoor air quality into newsletters, school announcements, and other outreach material.



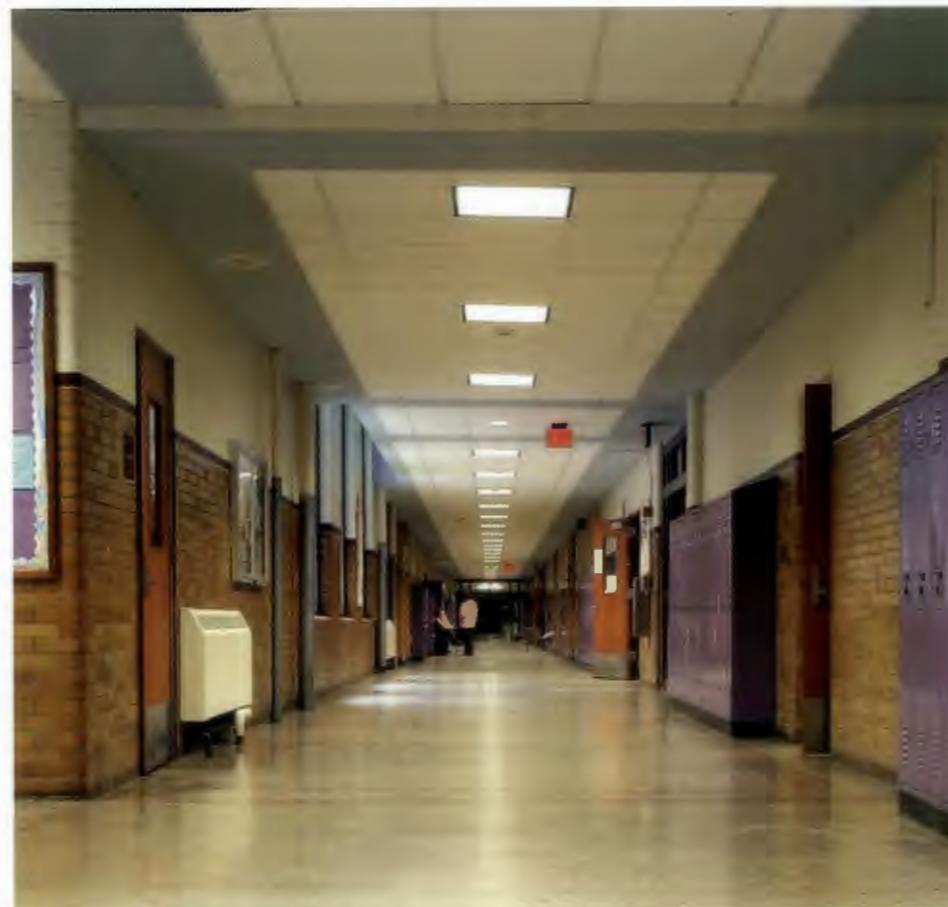
## Component 5: Prevent Pests and Reduce Pesticide Exposure

Droppings or body parts from cockroaches, rodents, and other pests can trigger asthma and cause allergic reactions. Pests also can transmit infectious diseases. Pesticides contain chemicals that can be toxic to the environment and pose a risk to human health. Children can be especially vulnerable to pesticides because their internal organs are still developing and maturing. Integrated pest management practices can effectively control pests in schools while reducing pesticide use by 70%–90%.

**Here's what you can do:**

- Expand the school's integrated pest management program to address outdoor areas including playgrounds, parking lots, athletic fields, loading docks, and trash dumpsters.
- Develop and record measures specific to the school that will demonstrate improvement in pest management practices.
- Incorporate awareness of integrated pest management principles into student curricula.
- Incorporate integrated pest management information and updates into newsletters, school announcements, and other outreach material.

For more information on the EPA Model K-12 School Environmental Health Program, visit [www.epa.gov/schools](http://www.epa.gov/schools).



Schools that have already taken steps to implement a comprehensive school environmental health program can build on their current initiatives with Tier 3 actions.



## Component 1: Practice Effective Cleaning and Maintenance

A school environment is healthier when it is kept clean and maintained well. Irritants and allergens found in dust and dirt can have a negative impact on health and performance, including increased respiratory and asthma symptoms among children and adults. According to the Centers for Disease Control and Prevention, asthma is one of the leading causes of school absenteeism, resulting in nearly 14 million missed school days annually nationwide.

Unsanitary conditions attract insects and vermin. Maintaining the school facility is just as important as routine cleaning to ensure a healthy environment. A regular inspection program can identify problems before they affect the school environment and the occupants' health.

**Here's what you can do:**

- Develop and record measures specific to the school that will demonstrate improvement in adopting healthier cleaning and maintenance practices. For example:
  - Number of green cleaning products piloted.
  - Number of training workshops held and number of participants.
  - Pounds of toxic chemicals avoided by switching to more environmentally friendly, less toxic cleaning products.
  - Number of nurse visits due to symptoms associated with exposure to cleaning products (such as eye, nose, and throat irritation; headaches; and asthma attacks).

Component 1 continued inside

### Component 1 continued

- Consider purchasing building materials that can be easily cleaned and maintained with the same cleaning products used throughout the school building.
- Incorporate information and updates on healthier cleaning into newsletters, school announcements, and other outreach material.

### Component 2: Prevent Mold and Moisture

The key to mold control is moisture control. Moisture within building structures stimulates the growth of molds and other biological contaminants. Damp schools provide a nurturing environment for mites, roaches, and rodents, which are associated with asthma, allergies, and other respiratory diseases.

Moisture and mold also can 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. A few hundred dollars of annual preventive maintenance can eliminate the need for costly mold remediation.

#### Here's what you can do:

- 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.
  - Reduction in the number of cleaning or remediation events due to mold growth.
- Purchase furniture and carpeting made from mold-resistant materials when replacing worn or damaged items.
- Install vents to the outside for all areas in the school building that use large volumes of water (such as kitchens, bathrooms, locker rooms, and pool facilities).
- Integrate information on mold into student curricula.
- Incorporate information and updates on mold and moisture management into newsletters, school announcements, and other outreach material.



### Component 3: Reduce Chemical and Environmental Contaminant Hazards

Children may be more vulnerable to chemical and environmental contaminant hazards than adults because their body systems are still developing. They eat more, drink more, and breathe more than adults in proportion to their body size. Their behavior can significantly increase their exposure to chemicals and potentially harmful organisms.

Toxic chemicals can cause serious health effects, including cancer; brain and nervous system disorders; organ damage; irritation of the eyes, skin, nose, and throat; and asthma attacks. Mercury, PCBs, and lead are of particular concern to schools.

#### Here's what you can do:

##### Chemicals and Chemical-Containing Products

- Implement green curricula in the classroom. For guidelines, use EPA's workbook *Building Successful Programs to Address Chemical Risks in Schools* ([www.epa.gov/schools](http://www.epa.gov/schools)).

##### Radon

- Schedule retesting following all major renovations, and consider how HVAC modifications or upgrades might affect radon intrusion.

##### Drinking Water

- Develop and record measures specific to the school that will demonstrate improvement in drinking water quality.
- Involve students in drinking water testing. A teacher or facility manager should ensure testing is completed according to established procedures to obtain meaningful results. This activity can be integrated into science and mathematics courses, as well as special projects.

##### Outdoor Air Pollution

- Have students observe vehicle idling behavior before and after implementing an anti-idling policy.
- Have students calculate exhaust emissions generated before and after an anti-idling policy is implemented, using widely available web-based calculators.
- If funding allows, retrofit your current school bus fleet with improved emission control technologies, or replace older school buses with

Component 3 continued on next panel

### Component 3 continued

newer, more fuel-efficient, and less-polluting buses. Visit EPA's National Clean Diesel Campaign at [www.epa.gov/diesel](http://www.epa.gov/diesel) for more information.

- Participate in the School Flag Program ([www.airnow.gov/index.cfm?action=school\\_flag\\_program.index](http://www.airnow.gov/index.cfm?action=school_flag_program.index)) to help the school and surrounding community know 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 air quality is unhealthy.



### Component 4: Ensure Good Ventilation

Poor indoor air quality can affect the comfort and health of children and staff, which can in turn affect concentration, attendance, and classroom performance. Poor air quality also 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.

#### Here's what you can do:

- Apply new air ventilation, cleaning, and filtration technologies, as resources allow. Consider MERV 13 air filters and gas filtration media.
- Apply the ASHRAE 62.1-2010 IAQ Procedure ([www.ashrae.org/standards-research--technology/standards--guidelines](http://www.ashrae.org/standards-research--technology/standards--guidelines)). This is a performance-based approach in which a building and its ventilation system are designed to maintain contaminant concentrations at specific levels.
- Air cleaning devices, other than particle filtration in the HVAC system, generally are not required if controlling and managing sources of pollution and providing adequate

Component 4 continued on reverse