

CHAPTER 5

Healthful Environment

This chapter presents general guidelines for use in planning and implementing a *healthful school environment*, a component of a school health program. It focuses on the physical environment, including related codes, standards, and recommendations for addressing the physical climate of the school.

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Healthful Environment

Authorization

The following governmental agencies are associated with the school health environment:

Virginia Department of Education. Within the Virginia Department of Education, School Nutritional Services, requires compliance with its regulations governing the operation of food service programs.

Virginia Department of Health. The Virginia Board of Health has established standards for food service establishments, which are administered by the local health department. The operation of a food service facility in a school requires a permit from the local health department. Its issuance is dependent on the facility meeting the requirements of the rules and regulations governing restaurants. These minimum standards cover all aspects of food sanitation, sources of food, food protection, health and cleanliness of personnel, design and construction, installation and cleanliness of equipment and utensils, water supply, plumbing and sewage disposal, toilet and hand-washing facilities, vermin control, garbage and rubbish handling and disposal, lighting and ventilation, dressing rooms, and housekeeping. A minimum of one inspection by the local health department per year is required.

Overview

Definition. Although a universally accepted definition of the term “healthful school environment” has not been adopted, *Health Is Academic: A Guide to Coordinated School Health Programs* presents the following definition:¹²⁰

***Healthy School Environment:** The physical, emotional, and social climate of the school. Designed to provide a safe physical plant, as well as a healthy and supportive environment that fosters learning.*

A safe and healthful school environment includes a safe physical plant, safe equipment, a safe school area, appropriate physical learning conditions, and an environment that meets privacy needs. Through a safe and healthful school environment, students and staff are protected from injury, disease, or adverse conditions that are associated with known risk factors. A positive school environment is considered key to healthy relationships in the school.

¹²⁰ Marx, E., and Wooley, S.F. (Eds.). (1998). *Health Is Academic: A Guide to Coordinated Health Programs* (p. 4). New York, N.Y.: Teachers College Press.

The following section provides an outline to begin an assessment of the school environment. When assessing the school environment, local, state, and federal codes, and appropriate standards should be reviewed, along with any applicable Superintendent's Memorandum issued by the Superintendent of Public Instruction. This section includes codes, standards, references, resources, and some assessment tools that may help in gathering information about a school's environment. The section is not comprehensive; however, it provides the tools necessary to begin the process.

Note. When appropriate, topic-specific resources are listed at the end of each of the following subsections. For additional information about school health environment policies, procedures, and related student/staff training, please contact the school division's maintenance and operation unit or contact the following state agencies:

- ◆ Virginia Department of Education
Facilities
P.O. Box 2120
Richmond, VA 23218-2120
Telephone: (804) 225-2035

- ◆ Virginia Department of Education
School Safety Resource Center
P.O. Box 2120
Richmond, VA 23218-2120
Telephone: (804) 225-2928
Web site: <http://www.pen.k12.va.us/VDOE/Instruction/safety.html>

- ◆ Virginia Department of Health
Office of Environmental Health Services
P. O. Box 2448
Richmond, VA 23218-2448
Telephone: (804) 786-1750
Web site: <http://www.vdh.state.va.us/oehs/03htm>

Building and Environmental Standards

Authorization

In Virginia, the responsibility for establishing and enforcing minimal building and environmental standards for school buildings is shared by two state agencies: the Virginia Board of Housing and Community Development and Virginia Department of Education. These departments depend on local health, fire, and building inspection staff to approve school facilities as being in conformance with applicable state codes and regulations.

Virginia Board of Housing and Community Development. The Virginia Board of Housing and Community Development is responsible for the *Uniform Statewide Building Code* explained in the *Code of Virginia*.

Virginia Department of Education. The Virginia Department of Education is responsible for ensuring that the building meets functional standards.

Fire Marshal. The local or state fire marshal establishes regulations requiring local inspections with regard to fire hazards. Local building inspectors are responsible for the local inspections and for approving school buildings within their municipality.

Building Requirements. The school plant and accessory buildings should be maintained in good repair and in a clean sanitary condition. In the absence of more stringent applicable construction codes or related standards, the most current edition of the *Virginia Uniform Statewide Building Code: Volume I New Construction Codes* should be used as a guideline for the construction or alteration of school buildings. (Note: For information on maintenance standards, see Volume II of the statewide building code. It is important to note that although these guidelines are voluntary, they may be adopted by the local school division.)

Subsections

The following subsections highlight building and environmental standards that may be of particular interest to schools.

- ◆ Safety and Security
- ◆ Hazard Communication Standards
- ◆ School Food Service
- ◆ Indoor Air Quality
- ◆ Asbestos
- ◆ Radon
- ◆ Lead
- ◆ Underground Storage Tanks in Schools
- ◆ Pesticides
- ◆ Toxic Art Supplies

Safety and Security

Authorization

Code of Virginia, Section 22.1-278.1, School Safety Audits Required.

Excerpt: See Appendix A for *Code of Virginia, § 22.1-278.1.*

Overview

As crime rates rise, an increasing number of school divisions are incorporating environmental crime prevention features in the design of new buildings. In addition, school divisions are trying to redesign existing architecture to reflect the principles of environmental crime prevention.

Traditionally, security concerns have been given a low priority in the building process. Until the late 1960s, when the federal government took an interest in crime prevention in urban housing, few serious attempts were made to develop a workable philosophy for controlling crime through architectural planning and design. In the early 1970s, several studies financed through the Law Enforcement Assistance Administration and the Department of Housing and Urban Development demonstrated that architectural design could be used effectively to influence crime rates in housing developments. These studies showed that by combining security hardware, psychology, and site design, a physical environment could be developed that would, by its very nature, discourage crime.

Crime Prevention Through Environmental Design. Crime Prevention Through Environmental Design,¹²¹ or CPTED (pronounced “sep-ted”), is a relatively new concept. CPTED creates a defensive environment both from a physical and a psychological aspect. The goal of CPTED is the reduction of opportunities for crime to occur. This reduction is achieved by employing physical design features that discourage crime, while at the same time encouraging legitimate use of the environment. The features include defensible space, surveillance, lighting, and landscaping, which offer protection without resorting to the prison camp approach to security.

School Safety Audit. The principles from CPTED have been incorporated into the “School Safety Audit” developed by the Virginia Department of Education.

¹²¹ Gardner, Robert A. CEPTED. *Security Management Magazine*. April 1981.

Implications

Every school should conduct a school safety audit every three years. For information on the audit procedure and checklists to complete the audit, refer to the following.

- ◆ Virginia Department of Education, School Safety Resource Center. (1997). *School Safety Audit: Protocol, Procedures and Checklists*. Richmond, Va.: Author.

Listed below are the minimum ten components that should be assessed in the audit process:¹²²

1. Safety and security of buildings and grounds.
2. Development and reinforcement of policies.
3. Procedures for data collection.
4. Development of intervention and prevention plans.
5. Level of staff development
6. Opportunities for student involvement.
7. Level of parent and community involvement.
8. Role of law enforcement.
9. Development of crisis management plans.
10. Standards for safety and security personnel.

Resources

For more information, contact the Virginia Department of Education, School Safety Resource Center, at (804) 225-2020 or (800) 292-3820.

¹²²Virginia Department of Education, School Safety Resource Center. (1997). *School Safety Audit: Protocol, Procedures and Checklists*. Richmond, Va.: Author.

Hazard Communication

Authorization

Virginia Occupational Safety and Health (VOSH) Standards for Hazard Communication, 1910.1200. The VOSH Standards for Hazard Communication requires employers to maintain and implement a written hazard communications policy if hazardous chemicals are used or stored. This standard was adopted from the Federal OSHA Standard (29 CFR part 1910) as Virginia Law.

Overview

The purpose of the hazard communications standards is to ensure that the hazards of all chemicals produced or imported are evaluated and that information concerning their hazards is transmitted to employers and employees so they can recognize the hazards of chemicals used and stored and undertake appropriate protective measures. Such chemicals may include, but are not limited to, those used in science laboratories and vocational educational centers.

Recommendation

1. Employers must provide a written hazard communications policy in each work site that includes:
 - ◆ A list of all hazardous chemicals used or stored in the workplace.
 - ◆ A description of how the employer will implement the requirements of the standard, including procedures for assuring the proper labeling of chemical containers, procedures for procuring and maintaining material safety data sheets, and procedures for providing training and information to employees.
 - ◆ A statement of policy about how employees will be trained concerning hazards of nonroutine tasks and hazards of chemicals in unlabeled pipes.
 - ◆ A statement about how outside employers who might work in the school will be informed of the presence and availability of material safety data sheets (MSDS), any precautions that might be necessary to protect their employees, and the labeling requirements of the school hazard communications policy. (Note: The outside employer has the same obligation toward the school.)
2. Employers must assure that there is an MSDS available for each chemical stored or used in the school and that it is readily available on site for use by all employees.

3. Employers must ensure that all containers of hazardous chemicals are properly labeled with a label that is in English, legible, and contains the appropriate information required by the standard.
 - ◆ Labels must indicate the identity of the chemical and the appropriate hazard warning. The identity of the chemical must be consistent with the identities provided on the list of hazardous chemicals and the MSDS.
 - ◆ For chemicals that pose a health hazard, the hazard warning must include the effect and target organ of the chemical (e.g., eye irritant or central nervous system depressant, or respiratory irritant, corrosive).
 - ◆ For chemicals that pose physical hazards, the hazard warning must indicate the nature of the hazards (e.g., flammable, explosive, corrosive).
 - ◆ Warnings may be by wording or by symbolic description. Symbolic or other means of providing this information on labels may be used if documented in written hazard communications program and if there is provision of adequate training and information so that employees can interpret them.
4. Employers must assure that employees are trained on the requirements of the hazard communication standard, provisions of the employer's written hazard communications policy, use and interpretation of MSDS, and the hazards of the chemicals to which they are or might be exposed.

Resources

For more information, contact the Virginia Department of Labor and Industry.

Web site: <http://www.dli.state.va.us/home.htm>

- ◆ Abington (540) 676-5465
- ◆ Fairfax (703) 359-1164
- ◆ Lynchburg (804) 385-0806
- ◆ Norfolk (757) 858-6700
- ◆ Richmond (804) 786-2377
- ◆ Roanoke (540) 562-3580
- ◆ Stuarts Draft (540) 337-3225

School Food Service

Authorization

Regulations. All food operations must be conducted in accordance with the requirements of the *Virginia Rules and Regulations Governing Restaurants*, which are promulgated by the Virginia Department of Health.

Health Department. The local health department provides oversight through periodic, unannounced inspections.

Overview

Food service operations in the schools of the Commonwealth must be carried out in a manner that will prevent the occurrence of food-borne illness, a major public health problem. The incidence of such illness can be reduced by using basic principles of food protection, suitable equipment, and sanitary food practices. Food may be prepared at the school or off-site and transported to the school.

Many foods are ideal media for the growth of microorganisms, including pathogenic bacteria. Contamination with pathogenic bacteria combined with mishandling or temperature abuse will result in infectious levels of bacteria or toxin production and subsequent foodborne illness outbreaks. Food sanitation is particularly important in a school food service program since the food is usually prepared to be served to a large number of students at one time, all of whom would be subject to illness if the food were not safe.

Guidelines for Food Service Personnel

Food Service Personnel. Food service personnel must be in good physical health and be free of symptoms of communicable diseases (see “List of Reportable Diseases” in Appendix A), open or infected cuts, burns, sores, or skin conditions that may contribute to the contamination of food. The food service manager should be able to recognize such conditions in the staff and exclude them from working in direct contact with food. (Note: A person with AIDS who does not have open or infected cuts, burns, or sores should not be excluded from working in a food service facility.)

Training. Training of food service personnel is not required but is offered by the local health department and local cooperative extension agencies.

Handwashing. Food service personnel must have clean hands at all times and should not wear rings. Hands must be washed with soap and hot running water after using the toilet,

coughing, sneezing, using a handkerchief, handling any object that may contaminate food, and between other operational functions and before returning to food preparation or handling functions.

Guidelines for Food Handling.

- ◆ Fingers should be kept out of the mouth and away from the hair, face, and nose.
- ◆ Workers must not eat or drink or use tobacco products in food areas.
- ◆ Plastic gloves are primarily suited for a continual food handling function. If used, workers must change them when switching from one operation to another. The use of gloves is not a substitute for proper hand washing.
- ◆ When food service workers change from a nonfood handling function to a food-handling function or from handling raw foods, they must still wash their hands before using gloves.
- ◆ Foodservice workers must also wear clean clothes and keep their hair secured with a hairnet, hat, or fastener.

Food Preparation and Storage

Ensuring Proper Food Temperature. Adequate equipment must be provided and maintained to ensure proper temperatures for food during storage, preparation, and service, as well as for the sanitation of dishware, tableware, and utensils. There must be a sufficient number of thermometers to monitor these temperatures constantly, and there must be test kits for monitoring the strength of the required sanitizing agents.

Food Transportation and Storage. If food is transported from one facility to another, adequate holding temperatures must be maintained at all times. Potentially hazardous foods must be either below 45°F or above 140° F at all times. The schools must have the facilities to maintain appropriate temperatures during storage, transportation, and service. It is important that the food and the food establishment be protected from contamination by insects and rodents, by the use of screens and other protective devices.

Indoor Air Quality

Authorization

Code of Virginia, Section 15.2-2801, Statewide Regulation of Smoking.

Excerpt: Statewide Regulation of Smoking prohibits smoking as follows:

...public school buses; the interior of any public elementary, intermediate, and secondary school; however, smoking may be allowed by a local school division in a designated area which is not a common area, including, but not limited to a classroom, library, hallway, restroom, cafeteria, gymnasium, or auditorium after regular school hours so long as all student activities in the building have been concluded...

See Appendix A for *Code of Virginia*, § 15.2-2801.

Overview

Most people are aware that outdoor air pollution can damage their health, but many do not know that indoor air pollution can also cause harm. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2 to 5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants are of particular concern because it is estimated that most people spend about 90 percent of their time indoors. Comparative risk studies performed by EPA and its Science Advisory Board have consistently ranked indoor air pollution among the top four environmental risks to the public

Consequences of Indoor Air Problems. Failure to prevent indoor air problems, or failure to act promptly, can have such consequences as:

- ◆ Increasing the chances for long-term and short-term health problems for students and staff.
- ◆ Impacting the student learning environment, comfort, and attendance.
- ◆ Reducing productivity of teachers and staff due to discomfort, sickness, or absenteeism.
- ◆ Faster deterioration and reduced efficiency of the school physical plant and equipment.

- ◆ Increasing the chance that schools will have to be closed or occupants temporarily moved.
- ◆ Straining relationships among school administration and parents and staff.
- ◆ Creating negative publicity that could damage a school's or administration's image and effectiveness.
- ◆ Creating potential liability problems.

Indoor air problems can be subtle and do not always produce easily recognized impacts on health, well-being, or the physical plant. Children are especially susceptible to air pollution. For this and the reasons noted above, air quality in schools is of particular concern. Proper maintenance of indoor air is more than a quality issue—it includes safety and good management of our investment in the students, staff, and facilities.

Factors Affecting Indoor Air Quality (IAQ)

Over the past 40 or 50 years, exposure to indoor air pollutants has increased due to a variety of factors, including the construction of more tightly sealed buildings, reduced ventilation rates to save energy, the use of synthetic building materials and furnishings, and the use of chemically-formulated personal care products, pesticides, and housekeeping supplies. In addition, such decisions as delaying maintenance to save money can lead to problems from sources and ventilation. There are three factors that should be considered with respect to indoor air quality:

1. Temperature and humidity.
2. Sources of indoor air pollutants.
3. Airflow patterns.

Temperature and Humidity. Dry, hot air in winter removes moisture from skin and mucous membranes. In summer, hot and humid air prevents a person's body from cooling off—the body tends to react by overheating. Although specific temperatures are not mandated by regulation in Virginia, it is recommended that heating and cooling systems be properly maintained and capable of providing room temperatures recommended by the local school division.

Sources of Indoor Air Pollutants. Indoor air contaminants can begin within the building or be drawn in from outdoors. If pollutant sources are not controlled, IAQ problems can occur, even if the HVAC system is working properly. Air pollutants consist of numerous particles, fibers, mists, molds, bacteria, and gases. In addition to the number of potential pollutants, indoor air pollutant levels can vary within the school building or even a single classroom. Pollutants can also vary with time, such as only once each week when floor stripping is done, or be continuous, such as when fungi are

growing in the HVAC system. Four major factors, which are described in the following table, affect the quality of air in schools: (1) microbial contamination, (2) contaminated indoor air, (3) indoor chemical sources, and (4) ventilation.

Four Major Factors That Affect Air Quality in Schools

Factor	Description
Microbial Contamination	<ul style="list-style-type: none"> <li data-bbox="537 443 1425 562">◆ Microbial contamination in buildings can become a serious indoor air quality problem. Microbial contaminants—such as fungi, bacteria, viruses, and dust mites—can result in allergic or infectious diseases, and some microbial contaminants or agents can produce toxic substances. <li data-bbox="537 575 1425 726">◆ Microbial agents proliferate in warm, moist environments, often found in humidification systems, water-damaged buildings, furnishings and carpets, contaminated central air handling systems, improperly cleaned and maintained ventilation systems, and moist or wet areas where organic matter (such as paper, books, or dirt) is present. <li data-bbox="537 739 1425 1010">◆ Some biological contaminants trigger allergic reactions, including hypersensitivity pneumonitis, allergic rhinitis, and some types of asthma. Some transmit infectious illnesses, such as influenza, measles, and chicken pox. And some biologicals, such as certain molds and mildews, release disease-causing toxins. Symptoms of health problems caused by biological pollutants include sneezing, watery eyes, coughing, shortness of breath, dizziness, lethargy, fever, and digestive problems. The number of children with asthma has increased, and these children are particularly vulnerable to biological contaminants in the school. <li data-bbox="537 1022 1425 1173">◆ Carpets that have had water damage are a potential source of airborne contaminants. Shortly after installation, carpets become “dirty” with dead skin cells, food debris, dust, and tracked-in dirt that provides a good growth medium for fungi, spores of which are present everywhere. Moisture is a necessary ingredient for this fungal growth. <li data-bbox="537 1186 1425 1398">◆ If a wet carpet cannot be cleaned and dried within 12 to 24 hours, fungal growth will occur, releasing spores that in an indoor environment can reach airborne levels high enough to cause sensitivity and allergic reaction. It is also believed that even after the carpet dries out, the dead shells of the spores and fungus can cause allergic reaction. The most common health problems are asthma and respiratory congestion, of which a significant number of adults and an even higher number of children are susceptible. <li data-bbox="537 1411 1425 1686">◆ Routine cleaning of carpets is essential and includes daily vacuuming with an appropriate vacuum and regular shampooing with a nontoxic shampoo. Removal of water damaged wall-to-wall carpet is recommended. In-place cleaning is rarely successful because carpets do not dry completely. Removable carpets and rugs may be successfully cleaned if dried within 12 to 24 hours. Commercial cleaners who pick up rugs for cleaning are recommended. For those areas where moisture can be a periodic problem, smooth flooring is recommended. If carpeting is necessary, it should be readily removable (e.g., carpet tiles, throw rugs).

Four Major Factors That Affect Air Quality in Schools

Factor	Description
Contaminated Outdoor Air	<ul style="list-style-type: none"> ◆ At times the outside ambient air, particularly in urban areas, may be sufficiently contaminated to warrant treatment before it is delivered to occupied areas of the school building. As a result, air intake vents located close to or downwind from outdoor sources may cause building-related problems. Such outdoor sources of pollution as school bus and other loading areas, trash areas, oil fill areas, exhaust vents from rest rooms, street traffic, or parking lots are common.
Indoor Chemical Sources	<ul style="list-style-type: none"> ◆ Chemical sources in schools include building materials, furniture, carpets, paints, pesticides, cleaning agents, sewer gases, and combustion appliances. Such special activities as those occurring in science laboratories, photo labs, industrial/vocational shops, art and craft rooms, and duplicating devices can result in a buildup of harmful pollutants if they are not properly ventilated. ◆ If carpeting is used, it should be made of cotton or polypropylene. Nylon, orlon, wool, and silk produce toxic fumes when they become ignited. There is scientific controversy regarding the impact of carpets on indoor air quality, with the EPA concerned about emissions of volatile organic compounds (VOCs) from new carpets and related installation materials, such as carpet cushion and adhesives. Until the debate is resolved and a final determination is made by the appropriate authorities, schools purchasing and installing new carpeting should: <ol style="list-style-type: none"> 1. Talk to the carpet retailer/installer about the carpet industry's voluntary "green label." This label tells the consumer that the carpet type has been tested and passed voluntary emissions criteria. 2. Ask the retailer to unroll and air out the carpet in a well-ventilated area before installation. 3. Require low emitting adhesives if adhesives are needed. 4. Open doors and windows to increase the amount of fresh air into the building. 5. During and after installation, use window fans and room air-conditioners to exhaust fumes to the exterior. 6. Leave the building during and for several hours after carpet installation.
HVAC System	<ul style="list-style-type: none"> ◆ The heating, ventilation, and air-conditioning (HVAC) system includes all heating, cooling, and ventilating equipment serving a school. A properly designed and functioning HVAC system controls temperature and humidity to provide thermal comfort, distributes adequate amounts of outdoor air to meet ventilation needs of school occupants, and isolates and removes odors and pollutants through pressure control, filtration, and exhaust fans. ◆ Not all HVAC systems are designed to do all of these things. Some buildings rely only on natural ventilation. Others lack cooling, and many have little or no humidity control. ◆ Potential sources of pollutants from HVAC equipment include microbiological growth in drip pans, ductwork, coils, and humidifiers, improper venting of combustion products, and dust or debris in ductwork.

Pollutant Pathways and Driving Forces. Airflow patterns in buildings are caused by mechanical ventilation systems, human activity, and natural effects, such as wind. Air pressure differences created by these forces move airborne pollutants from areas of higher

pressure to areas of lower pressure through any available openings in building walls, ceilings, floors, doors, windows, and HVAC systems. An inflated balloon is an example of this driving force. As long as the opening to the balloon is kept shut, no air will flow, but when open, air will move from inside (area of higher pressure) to the outside (area of lower pressure). Even if the opening is small, air will move until the pressures inside and outside are equal.

Determining if There is an IAQ Problem

Diagnosing symptoms that relate to IAQ can be difficult. Acute (short-term) symptoms of IAQ problems typically are vague and similar to those from colds, allergies, fatigue, or influenza. There are clues, however, that can serve as indicators of potential indoor air problems:

- ◆ The symptoms are widespread within a class or within the school, potentially indicating a ventilation problem.
- ◆ The symptoms disappear when the students or staff leave the school building for the day.
- ◆ The onset is sudden after some change at school, such as painting or pesticide application.
- ◆ Persons with allergies, asthma, or chemical sensitivities have reactions indoors but not outdoors.
- ◆ A doctor has diagnosed a student or staff member as having an indoor air-related illness.

All of these symptoms, however, may also be caused by other factors and are not necessarily due to air quality problems. Such environmental stressors as improper lighting, noise, vibration, overcrowding, and psychosocial problems (such as job or home stress) can produce symptoms that are similar to those associated with poor air quality but require different solutions.

However, a lack of symptoms does not mean that the quality of the air within the school is acceptable. Symptoms from long-term health effects, such as lung cancer due to radon, often do not become evident for many years. For this reason, schools should establish a preventive indoor air program to minimize exposure of students and staff to indoor air pollutants.

Six Basic Control Strategies

There are six basic methods for lowering concentrations of indoor air pollutants. Specific applications of these methods are noted in the *Indoor Air Quality Tools for Schools*.¹²³

Source Management. Source management includes source removal, source substitution, and source encapsulation. Source management is the most effective control method when it can be practically applied. The best prevention method is never to bring unnecessary pollutants into the school building. Examples of source removal include not allowing buses to idle near outdoor air intakes, not placing garbage in rooms where HVAC system equipment is located, and banning smoking within the school. Source substitution includes such actions as selecting less toxic art material or interior paint than the products that are currently in use. Source encapsulation involves placing a barrier around the source so that it releases fewer pollutants into the indoor air.

Local Exhaust. Local exhaust is very effective in removing sources of pollutants before they can be dispersed into the indoor air, exhausting the contaminated air outside. Well-known examples include restrooms, kitchens, and science lab fume hoods. Other examples of pollutants that originate at specific points and that can be easily exhausted include science lab and housekeeping storage rooms, printing and duplicating rooms, and vocational/industrial areas, such as welding booths.

Ventilation. Mechanical or natural ventilation should be maintained to minimize health hazards, including excessive drafts, extreme temperature and humidity, and fluctuations in temperature. The American Society of Heating, Refrigeration and Air Conditioning Engineers' most recent edition of *Standard 62 Ventilation for Acceptable Indoor Air Quality* should be used as a guideline for proper indoor ventilation.

Some guidelines for proper ventilation are listed below.

- ◆ Ventilation system filters should be cleaned on a quarterly or 6 month schedule or replaced as needed to prevent excessive accumulation of dust or debris.
- ◆ Each room provided with an exhaust system should have fresh air supplied to the room equal to the amount discharged. Windows should not be used for the purpose of providing makeup air.
- ◆ Unvented combustion heaters, kitchen stoves, or hot plates should be prohibited for space heating purposes. Portable electric heaters with exposed elements should not be used in any student activity area. Hot plates, skillets, or similar cooking appliances should be used for food preparation only in kitchens, home economics rooms, or in rooms specifically designated and equipped for such use.

¹²³ U.S. Environmental Protection Agency. (1996). *Indoor Air Quality Tools for Schools*, Item number 055-000-00503-6. Washington, D.C.:U.S. Government Printing Office.

Exposure Control. Exposure control includes the principles of time of use and location of use. An example of time of use is to strip and wax the floor on Friday after school is dismissed, so that the floor products have a chance to release gases over the weekend, reducing the level of odors or contaminants in the air when the school is occupied. An example of location of use involves moving the contaminating source as far as possible from occupants or relocating susceptible occupants.

Air Cleaning. Air cleaning primarily involves the filtration of particles from the air as the air passes through the ventilation equipment. Gaseous contaminants can also be removed, but usually this type of system should be engineered on a case-by-case basis.

Education. Education of the school occupants is critical. If school staff are provided information about the sources and effects of contaminants under their control and about the proper operation of the ventilation system, they will better understand their indoor environment and can act to reduce their personal exposure.

Resources

For more detailed information, call (202) 512-1800 for “Indoor Air Quality Tools for Schools”, Item no. 055-000-00503-6.

Other information on IAQ is available by contacting the Regional EPA office or by calling (800) 438-4318.

Asbestos

Authorization

Asbestos Hazard Emergency Response Act. In 1986, the U.S. Congress passed the Asbestos Hazard Emergency Response Act (AHERA) to protect school children and school employees from exposure to asbestos in school buildings. The AHERA rule requires public school districts and private not-for-profit schools to inspect all school buildings for asbestos, to develop plans to manage asbestos in schools, and to carry out the rules in a timely fashion. Schools are required to inform parents and staff about the presence of asbestos in the school. A copy of the survey report must be available in each school identifying the location of asbestos containing materials in the school.

Asbestos Coordinator. In Virginia, the asbestos coordinator in each school division ensures that AHERA is properly carried out. The EPA sets standards for state accreditation of personnel involved in asbestos management or abatement in school buildings.

Asbestos Licensing and Lead Certification Board. Inspectors must be licensed by the Asbestos Licensing and Lead Certification Board within the Department of Professional and Occupational Regulation.

Overview

Description. Asbestos is a mineral found in certain types of rock formation. It takes the form of small fibers that are usually invisible to the naked eye. Because the fibers are so small and light, they can remain in the air for many hours if they are released from asbestos-containing material, increasing the danger of being inhaled.

Asbestos Containing Materials. EPA estimates there are asbestos-containing materials in many of the nation's approximately 107,000 primary and secondary schools. Asbestos has been used in thousands of products, particularly heat and electrical insulation. It has also been found in floor and ceiling tile, cement pipe, corrugated-paper pipe wrap, fireproofing, and other insulation.

Health Risk. Intact and undisturbed asbestos materials generally do not pose a health risk. However, asbestos fibers can cause serious health problems when, due to damage or deterioration over time (e.g., cracking, tearing, or crumbling), they release harmful fibers. If the fibers become airborne and are inhaled, they can cause cancer or lung disease. These diseases do not develop immediately after inhalation of asbestos fibers—it may be twenty years or more before symptoms become apparent. The more asbestos fibers a person inhales, the greater the risk is of developing an asbestos-related disease.

Resources

For more information, contact the Asbestos Coordinator in your local school division or the Director of Facilities at:

Virginia Department of Education
P.O. Box 2120
101 N. 14th Street
Richmond, VA 23218
Telephone: (804) 225-2035
Fax: (804) 225-2831.

Radon

Authorization

Code of Virginia, Section 22.1-138 B, Minimum Standards for Public School Buildings.

Excerpt: See Appendix A for *Code of Virginia*, §22.1-138 B.

Overview

Description. Radon is a naturally occurring gas that seeps into buildings from the surrounding soil. In some cases, well water may be a source of radon. A person cannot see, taste, or smell radon. In fact, the only way to discover if high levels of radon are present is through testing.

Risks Associated with Radon. Radon gas decays into radioactive particles that can be trapped in a person's lungs when a person breathes. As these particles break down, they release small bursts of energy. This can damage lung tissue and lead to lung cancer over the course of a person's lifetime. An individual's risk of getting lung cancer from radon depends mostly on three factors: (1) the level of radon, (2) the duration of exposure, and (3) their smoking habits.

EPA.¹²⁴ The U.S. Environmental Protection Agency (EPA) and other major national and international scientific organizations have concluded that radon is a human carcinogen and a serious environmental health problem. After smoking, it is the second leading cause of lung cancer in the United States, causing approximately 14,000 lung cancer deaths a year.

Early concern about indoor radon focused primarily on the hazard posed in the home. More recently, the EPA has conducted extensive research on the presence and measurement of radon in schools. Initial reports from some of those studies prompted the EPA in 1989 to recommend that schools nationwide be tested for the presence of radon. Based on more recent findings, EPA continues to advise U.S. schools to test for radon and to reduce levels to below 4 pCi/L.

¹²⁴ *Radon in Schools - Every School Should Take This Simple Test.* United States Environmental Protection Agency, Office of Air and Radiation (6604J). EPA Document #EPA-402-F-94-009.

Recommendation

School Testing for Radon. Testing for radon is simple and relatively inexpensive. The EPA has published guidance that is available free to schools throughout the country (see Resources below). The basic elements of testing are:

- ◆ Test all frequently used rooms on and below the ground level.
- ◆ Conduct tests in the cooler months of the year.

For more detailed information on school testing strategies, contact the Virginia Department of Health, Division of Radiological Health.

If a school does fail the radon test, the problem can be corrected. Proven techniques are available that will lower radon levels and lower risks of lung cancer from radon exposure. School is not the only place that students and teachers can be exposed to radon. Since children spend more time at home, high radon levels there can pose a much greater threat to their health.

Resources

For more information:

- ◆ Virginia Department of Health
Division of Health Hazards Control
Radiological Health Program
Telephone (804) 786-5932
- ◆ National Radon Information Line
1-800-SOS-RADON [1-800-767-7236]
- ◆ United States Environmental Protection Agency
Office of Air and Radiation
Radon-Specific Indoor Air Quality (IAQ) Publications
Web site: <http://www.epa.gov/iaq/radon/pubs/>
- ◆ *Radon in Schools* (Second Edition)
U.S. Environmental Protection Agency
Office of Air and Radiation (6604J)
EPA Document #EPA-402-F-94-009, October 1994
Note: To order, call Virginia Department of Health, Radiological Health Program, (804) 786-5932. Also, the publication is available online at:
<http://www.epa.gov/iaq/radon/pubs/schoolrn.html>

Lead

Authorization

No mandates for school inspections.

Overview

Risks. Lead in the school environment may pose a health threat to preschool-age children and renovation/remodeling workers. Once in the body, lead is very slow to leave the system. It can damage the brain and central nervous system of children, interfering permanently with their learning abilities and physical growth. Children under age 6 are at the most risk because their brain cells are still developing and even low levels of lead can interfere with normal brain development. Older children and adults can tolerate higher exposures to lead without harmful effects, but occupational exposures can exceed even these higher levels during renovation and remodeling of surfaces containing lead-based paint.

Sources of Lead. School officials should be concerned about the existence of lead in paint, dust, air, water, soil, and food. Some additional sources of lead are dust, such art activities as stained glass and pottery, and emissions from industrial processes.

Lead-Based Paint

Overview. Lead-based paint was banned for use in residences and child-care facilities in 1978. Since it was not banned for steel structures, some steel structural components in schools constructed after 1978 may contain lead-based paint if they were delivered to the school construction site pre-painted.

Recommendation.

- ◆ Primary concern should be to identify and remediate any lead-based paint exposure hazards from areas of the school occupied by children under age 6.
- ◆ Document all areas where lead-based paint exists so that future renovation and remodeling work can be planned with appropriate precautions to avoid scraping, burning, or open dry-sanding of lead-based paint. Only certified lead-based paint risk assessors and abatement contractors should be utilized for these activities.

Resources. For more information, contact the Virginia Department of Professional and Occupational Regulation at (804) 367-8595.

Soil

Overview. Lead occurs naturally in soil, which also collects lead from the air and other sources. Soil near roads and parking lots may be high in lead content due to a settling of particulates from the years of leaded gasoline exhaust emissions.

Recommendation.

- ◆ Steps should be taken to avoid direct exposure of children aged 6 or under to soil contaminated with lead.
- ◆ Bare soil areas of playgrounds use by preschoolers should be tested and covered if found to exceed the EPA recommended level of 400 parts per million. Appropriate coverings include mulch, sand, or a cultivated grass cover to reduce exposure to bare soil.

Playground Equipment

Overview. Testing by the U.S. Consumer Product Safety Commission and some state and local jurisdictions has shown that school, park, and community playgrounds across the country may have playground equipment that presents a potential lead-paint poisoning hazard for young children aged 6 and under. The equipment was painted with lead paint and, over time, the paint has deteriorated into chips and dust containing lead. Young children who put their hands on the equipment while playing and then put their hands in their mouths can ingest the lead paint chips and dust.

Recommendation. Please refer to the *Handbook for Public Playground Safety*,¹²⁵ page 31, item number 8.

Water

Overview. Lead is also a naturally occurring ingredient in surface and ground waters that supply drinking water to millions of Americans. Lead is no longer used in plumbing, however, it can still get into drinking water from old water pipes that contain lead.

Although drinking water is rarely the sole cause of lead poisoning, it can increase a person's total lead exposure. Lead dissolved in water cannot be seen, tasted, or smelled.

¹²⁵ CPSC's *Handbook for Public Playground Safety*. (1997). CPSC Document #325 U.S. Consumer Product Safety Commission, Washington, D.C. 20207

The only way to know if it is a problem is to test the water so that these toxins can be reduced or removed from the drinking water faucet

Recommendation. If lead is in the pipes:

- ◆ A tap that has not been used in the last 6 hours should be run for several minutes before consuming, and no one should use hot water for drinking because hot water draws lead out of pipes faster.
- ◆ If funds become available and water conservation is particularly needed in the community, the existing problem plumbing should be replaced with nonleaded pipes, fixtures, and solder.

Resources. The EPA passed tough lead rules that took effect January 1, 1993. The EPA training video *Lead in School Drinking Water* demonstrates how to carry out a successful sampling program. It can be obtained from the regional EPA office.

Lead Screening

Childhood lead poisoning is preventable and treatable. Data from the National Health and Nutrition Examination Survey (NHANES III, Phase 2, 1991-1994) show that 4.4 percent of children aged 1 to 5 had blood lead levels (BLL) of greater than or equal to 10 g /dl—the level that has been determined to affect learning and behavior problems in children. The prevalence was higher for those children living in homes built before 1946—non-Hispanic blacks (21.9%), Mexican Americans (13%), and white non-Hispanic (5.6%).

Centers for Disease Control and Prevention Guidelines. In November 1997, the Centers for Disease Control and Prevention (CDC) issued new guidelines on *Screening Young Children for Lead Poisoning*.¹²⁶ The American Academy of Pediatrics (AAP) issued congruent guidelines in June 1998.¹²⁷ The new guidelines recommend a target screening approach to increase screening and follow-up care of children who most need these services. Children in known high-risk geographic areas and children in known high-risk groups, such as the Medicaid population, are targeted for universal screening, while children from low-risk areas are evaluated on a case-by-case basis.

Centers for Disease Control and Prevention Recommendation. The objective of the 1997 CDC guidelines is to ensure screening of children who are high risk while reducing the number of children screened who are low risk. These new guidelines emphasize that

¹²⁶ Centers for Disease Control and Prevention (1997). *Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials*. Available: <http://www.cdc.gov/nceh/programs/lead/guide/1997/guide97.htm>.

¹²⁷ American Academy of Pediatrics. (1998). Screening for Elevated Blood Lead Levels. *Pediatrics*, 101(6).

decisions on populations to be screened should be made by local and state public health agencies. A cooperative effort between Virginia Department of Health, including local health departments, and local community representatives, pediatricians, and concerned citizen groups in making a complete assessment of the risk factors for the population in that area should result in a policy determination for lead testing in that geographic area. The focus is to be on primary prevention. The improved guidelines will focus increased attention and resources on children at highest risk, improve screening and follow-up care, and maximize the benefit of time, energy, and funds spent on screenings.

Screening. Screening is recommended for children aged 1 and 2, and aged 36 to 72 months who have not been screened previously if they meet at least one of the following criteria.

- ◆ Residence in areas with sufficient representative screening data to show that more than 12 percent of 1- and 2-year-olds have BLLs greater than or equal to 10 µg/dl.
- ◆ Residence in areas for which 27 percent or more of the housing was built before 1950.
- ◆ Membership in a group (e.g., Medicaid recipients) at risk for lead exposure.
- ◆ Parent/guardian answers “yes” or “don’t know” to any of the following questions:
 1. Does your child live in or regularly visit a house that was built before 1950 (include day care, baby-sitter, and relatives)?
 2. Does your child live in or regularly visit a house built before 1978 with recent or ongoing renovations or remodeling (within the last 6 months)?
 3. Does your child have a sibling or playmate who has or did have lead poisoning?

Resources

Other helpful sources of information include:

- ◆ National Lead Information Center (800) 424-LEAD.
- ◆ Lead-Safe Virginia Program (804) 225-4455. Virginia Department of Health, Division of Child and Adolescent Health, P.O. Box 2448, Richmond, VA, 23218. Web site: <http://www.vdh.state.va.us/fhs/child/lead/>.
- ◆ Centers for Disease Control and Prevention (1997). *Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials*. Available: <http://www.cdc.gov/nceh/programs/lead/guide/1997/guide97.htm>.
- ◆ American Academy of Pediatrics. (1998). Screening for Elevated Blood Lead Levels. *Pediatrics*, 101(6).
- ◆ Arvidson, C.R., and Colledge, P. (1996). Lead Screening in Children: The Role of the School Nurse. *Journal of School Nursing*, 12(3).

Underground Storage Tanks in Schools

Authorization

While there is no law specific to underground storage tanks in schools, users of this manual should contact the Virginia Department of Environmental Quality for related laws and regulations.

Overview

Underground storage tanks may become an environmental concern. Such tanks, many of which are made of steel, have rusted and are leaking their contents into the ground. Many school districts that operate school buses own underground storage tanks for gasoline. Therefore, any leak or spill can create a serious problem and become an environmental hazard.

Recommendation

The safety of these underground storage tanks is dependent on their age and condition. The Virginia Department of Environmental Quality (1-804-698-4000 or 1-800-592-5482) should be called if tanks become an environmental problem.

Pesticides

Authorization

U.S. Environmental Protection Agency (EPA). All pesticides legally sold in the United States must bear an EPA registration number on the front of the product label to show that they are registered. There are very few exceptions to this rule.

Virginia Department of Agriculture and Consumer Services. Only a certified pest-control operator who is licensed through the Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services is allowed to apply any pesticide, even those sold over the counter.

Overview

Pests may be managed or controlled by various means. Preventive measures include reducing or excluding hiding and nesting places and food available to pests. If pests increase, they may threaten the health of people or damage property. In this situation, pesticides are usually required. Pesticides are toxic tools used to control pests and are placed into the environment or a site with the purpose of controlling a specific pest.

Recommendation

Pest Control/Management. Pest control in schools should be done as part of an integrated pest management (IPM) program. This includes the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property, and the environment. A successful IPM program requires not only a skilled and knowledgeable pest control operator, but the cooperation of building managers and occupants. The EPA, as well as the state, encourages the IPM approach and is working with school officials and others to develop guidance for IPM in schools.

Note. For information on rabies, see “Selected Infectious Diseases” in Appendix C.

Storage and Use.

- ◆ Insecticides and rodenticides must be stored in locked storage areas that are accessible only to authorized personnel.
- ◆ All pesticides and rodenticides must be used in accordance with registered label directions.
- ◆ Instructions on the safe and proper use of these chemicals should be clearly posted.

Toxic Art Supplies

Authorization

Code of Virginia, Section 22.1-274.1 Criteria to Identify Toxic Art Materials; Labeling; Use in Certain Grades Prohibited.

Excerpt:

The State Department of Education, in cooperation with the State Department of Health, shall develop criteria to identify toxic art materials.

After these criteria have been developed, the Department of Education shall require school divisions to evaluate all art materials used in schools and identify those which are toxic. All materials used in the public schools which meet the criteria as toxic shall be so labeled and the use of such materials shall be prohibited in kindergarten through grade five.

See Appendix A for *Code of Virginia, §22.1-274.1.*

Regulation. Virginia Administrative Code, Title 8 – Education, Agency 20 - State Board of Education, Chapter 530 - Regulations Governing Criteria to Identify Toxic Art Materials; Labeling; Use in Elementary Grades Prohibited.

Excerpt: 8VAC20-530-10. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise:

“Art material” means any raw or processed material or manufactured product marketed or represented by the manufacturer or repackager, as suitable for use in demonstration or the creation of any work of visual or graphic art of any medium.

Visual or graphic art techniques employing art mediums may include, but should not be limited to, ceramics, drawing, enamels, glass, jewelry, leather, painting, photography, plastic sculpture, sculpture, stained glass, and textile goods.

Art materials shall include, but not be limited to acrylic paints, adhesives, chalks, charcoal, clays, crayons, drawing inks, drawing pencils, enamel colors, fabric dyes, felt tip markers, finger paints, fixatives, glazes, glues, lacquers, modeling materials, oils, oil paints, oil pastels, pastes, pastels, printing inks, screen printing inks,

shellacs, silver solder, solvents, spray paints, tempera paints, varnishes, and watercolors.

The term does not include economic poisons subject to the Federal Insecticide, Fungicide and Rodenticide Act (7 USC §136 et seq.), or drugs, devices, or cosmetic subject to the Federal Food, Drug, and Cosmetic Act (21 USC §301 et seq.).

Art Materials Labeling Act. In October 1988, the U.S. Congress passed § 1277. Labeling of Hazardous Materials Act (Use with Children Under Age 12 Prohibited) Public Law 100-695, 15 U.S.C. that requires warning labels on art materials with chronic long-term health hazards. The law mandates a voluntary standard, ASTM D-4236¹²⁸ as a mandatory labeling standard for art and craft materials.

Summary. The ASTM D-4236 standard requires labels for all art and craft materials determined to present a chronic health hazard. These products include solvents, spray paints, silk-screen inks, adhesives, and any other substance marked or represented as suitable for use in any phase of the creation of any work of visual or graphic art of any medium. The labels must provide:

1. A warning statement of the hazard.
2. Identification of the hazard.
3. Guidelines for safe use.

Under this standard, art material producers or repackers, including importers, must submit to the U.S. Consumer Product Safety Commission a written description of the criteria used to determine whether products can produce long-term health effects. While only hazardous art materials are required to have safety labeling, all art materials will have the statement “Conforms to ASTM D-4236,” “Conforms to ASTM Practice D-4236,” or “Conforms to health requirements of ASTM D-4236.” Products must be evaluated by a toxicologist at least every five years.

Note: Art educators are responsible for the art materials they order and the safe use thereof. Although there is no legislation prohibiting students older than age 12 from using toxic agents, there is the Hazard Communication Standard, VOSH 1910.1200, which addresses potentially hazardous materials in the workplace. (See previous section on Hazard Communication Standard.) All art educators in the field should have training in the usage, storage and disposal of each toxic agent they come in contact with while working.

¹²⁸ D4236-94 Standard Practice for Labeling Art Materials for Chronic Health Hazards. (1997). *American Society for Testing and Materials*, West Conshohocken, Pa.

Overview

According to the Environmental and Occupational Health Sciences Institute (1989),¹²⁹ children between the ages of 3 and 12 attending elementary school or participating in arts and crafts may be using harmful art supplies. These materials can include rubber cement, permanent felt tip markers, pottery glazes, enamels, spray fixatives, wheat wallpaper paste, and other possible hazardous materials.

Health Issues Related to Children Using Art Supplies

These toxic materials can be more harmful to children than adults. Since children are still growing and developing, their bodies can more readily absorb toxic materials that can cause more damage than in adults. Since children are smaller, an amount of a toxic material would be more concentrated than in an adult's body.

Children are also at higher risk because of their behavior. Children may not understand why it is important to be careful when using harmful materials. Also, some young children put things in their mouths and/or swallow them.

Toxic or poisonous materials can enter the body in three different ways:

1. Inhalation.
2. Ingestion (especially for young children who bite their nails or suck their thumbs).
3. Skin contact.

If toxic material does enter the child's body, it can result in an acute illness, chronic illness, cancer, allergic reaction, or death.

Recommendation

Safe Guidelines for Using Art Supplies. Safe guidelines for using art supplies are listed below.

1. Avoid certain materials from children's art supplies. The Center for Safety in the Arts suggests general rules of thumb about choosing art materials for children. The rules are listed below.
 - ◆ No dust or powders.
 - ◆ No chemical solvents or solvent-containing products.

¹²⁹ Environmental and Occupational Health Sciences Institute. (1989). *INFO Sheet: Children's Art Supplies, Report by the Center for Safety in the Arts.*

- ◆ No aerosol spray cans, air brushes, and so forth.
 - ◆ Nothing that stains the skin or clothing (or cannot be washed out of clothing).
 - ◆ No acids, alkalis, bleaches, or other corrosive chemicals.
 - ◆ No donated or found materials unless ingredients known.
 - ◆ No old materials—they may be more toxic and have inadequate labeling.
 - ◆ No lead, metals, or cadmium products—these can be found in paints, glazes, metal work, and stained glass.
2. Treat high-risk children with special care and attention. Children who are physically or mentally disabled are at greater than normal risk from toxic materials. High-risk children include those who have visual or hearing problems, physical disabilities, asthma, take medications, or are emotionally disturbed. These high-risk children need special attention of their use of possibly harmful art supplies.
 3. Make sure products are adequately labeled. Do not use any product that does not have a label or has a label that gives little or no information. In general, the more the label describes the product, the easier it will be to use safely. The label should state how the product is to be used. It should also state what to do in case of an accident. Even if the label says “nontoxic,” do not assume that it is completely safe. If containers are changed, be sure to label the new container.
 4. Purchase products in small containers. Smaller amounts of a product mean less exposure to the product. Also, larger amounts often are not readily used up. Leftover products need to be stored. Accidental poisonings often occur when stored products are left unattended. In the event of a poisoning, call the local poison control center.

Resources

For further information, contact the following:

- ◆ Cheryle C. Gardner
Principal Specialist of Fine Arts
Virginia Department of Education
P.O. Box 2120
Richmond, VA 23218-2120
Telephone: (804) 225-2881
E-mail: cgardner@pen.k12.va.us

Laboratory, Industrial, and Vocational Hazards

Overview

Provisions should be made for the protection of students engaging in industrial arts, physical sciences, vocational education, or in any activities where hazardous chemicals, hazardous devices, or hazardous equipment are used. These provisions should include:

- ◆ The development and posting of operating instructions.
- ◆ The development and posting of regulations.
- ◆ The development and posting of procedures.
- ◆ A comprehensive safety program addressing issues that range from dangerous exposure to hot water and broken glassware to toxic exposures and fire.

Subsections

The following subsections provide information on specific safety regulations and recommendations associated with educational courses involving industrial, vocational, or laboratory activities.

- ◆ Facilities
- ◆ Ventilation
- ◆ Equipment and Supplies
- ◆ Storage and Handling of Toxic or Hazardous Materials

Facilities

Authorization

Code of Virginia, Section 22.1-275, Protective Eye Devices.

Excerpt: See Appendix A for *Code of Virginia, §22.1-275.*

Recommendation

Safety rules specific to the activities conducted in each laboratory classroom (academic and vocational), including proper attire and the use of personal safety equipment, should be posted and enforced. A list of possible issues to consider is listed below.

- ◆ Adequate bench space with necessary utilities should be provided. Class size should be small enough to allow proper supervision.
- ◆ Protective eye devices must be worn by all students participating in, observing, or in close proximity to any experiment or activity that could result in eye injury. Eye-protection glasses, goggles, face shields, and similar eye-protection devices should be issued clean and properly sanitized and stored in a protected place.
- ◆ An easily accessible, fire blanket should be provided in each laboratory or other areas where an open flame is used.
- ◆ Where there is exposure to skin contamination with poisonous, infectious or irritating materials, a hand washing facility should be available.
- ◆ An easily accessible, operational eye-wash fountain should be provided in each laboratory or other areas where corrosives or irritating chemicals are used. The eye-wash fountain should be clean and must be tested annually. The use of portable eye-wash bottles as substitutes should not be permitted.
- ◆ An easily accessible, operational safety shower, capable of providing continuous flowing water, should be provided for each laboratory or other areas where corrosive or irritating chemicals are used. The safety shower can be centrally located to serve more than one area if doors are not locked and prompt access is available.
- ◆ Electrical equipment should be properly grounded and inspected regularly.
- ◆ Master gas valves and electrical shut-off switches should be provided in each laboratory or areas where power equipment is used. Electrical shut-off switches are not permitted to be located in fuse boxes.

Ventilation

Authorization

Threshold Limit Values and Biological Exposures Indices. All areas should be adequately ventilated so that exposures to hazardous or toxic materials are maintained at a safe level. In absence of more stringent guidelines, the most recent edition of the American Conference of Governmental Industrial Hygienists' publication *Threshold Limit Values and Biological Exposures Indices* should be used as a guide to determine safe levels.

Standards. Discharges from any exhaust hood should meet applicable *Virginia Air Pollution Standards*.

Recommendation

- ◆ Local exhaust ventilation should be provided so that contaminants are carried away from the students and not through the breathing zone.
- ◆ Sufficient fume hood capacity ventilation should be used for any activity producing hazardous toxic or noxious gases, mists, vapors, or dusts.
- ◆ Hoods should exhaust directly to the outside and should be located a minimum of 10 feet from any building air-intakes or building openings.
- ◆ Fume hoods should be kept free of storage and routinely inspected and maintained.
- ◆ A minimum face velocity of 100 feet/minute for general laboratory hoods should be provided.
- ◆ Air flow of fume hoods should be tested at least once a school year.

Equipment and Supplies

Authorization

No specific regulations.

Recommendation

- ◆ Instructional, athletic, recreational, or other equipment used in or out of the classroom should be maintained in a clean, safe condition.
- ◆ Toys and equipment should meet applicable state and local regulations.
- ◆ Gym equipment should be kept clean and in good repair. Body contact equipment surfaces should be routinely cleaned with a sanitizer approved by the local school division.
- ◆ Equipment used in physical therapy and special education should be cleaned after it is used.
- ◆ Facilities should be available for the proper storage of clean clothing and athletic, instructional, and recreational equipment and supplies to minimize health hazards and to facilitate cleaning.
- ◆ Cleaning materials, tools, and maintenance equipment should be provided and should be stored safely and secured in a locked area.
- ◆ Glassware should be properly constructed and designed for its intended use and should be handled and stored safely.
- ◆ Aspirators or suction bulbs should be used for drawing liquids into pipettes. The mouth should not be used directly on the pipettes.

Storage and Handling of Toxic or Hazardous Materials

Authorization

National Fire Protection Association Codes. National Fire Protection Association Codes should be used as guidelines for the proper storage, handling, and use of chemicals in the school. Where refrigerators are used to store flammable compounds, they must be explosion proof.

Note. National Fire Protection Association Codes are available from the National Fire Protection Association listed in this section under “Resources.”

Recommendation

- ◆ Toxic or hazardous materials should be stored in approved laboratory containers, separated by reactive group, and stored in a ventilated, locked, fire-resistant area or cabinet. (Note: The ventilation recommendations listed in the previous subsection, “Ventilation,” may not be called for where minimum quantities of such materials are stored for daily use.)
- ◆ Containers of chemicals, poisons, corrosive substances, and flammable liquids should be clearly labeled with the name of the material and the date the material entered the school. Exposure to noise or toxic liquids, dusts, gases, mists, vapors, or other hazards should be controlled to avoid health hazards.
- ◆ All chemicals, solvents, and hazardous substances should be inventoried by the school a minimum of once a year. The inventory should include the name of the compound, the amount, and the date it entered the school. Chemicals should be ordered in quantities only large enough for short-term needs.
- ◆ A current material safety data sheet should be provided for all poisonous, toxic, or hazardous substances and should be available for review upon request.
- ◆ A written plan for response to and cleanup of chemical spills should be provided by the school.
- ◆ A written plan that explains the proper storage, handling, and disposal procedures for all poisonous, toxic, or hazardous substances should be on file in each school and should be available for review upon request.
- ◆ A list of first aid procedures for accidental poisoning should be posted. The telephone number and location of the nearest poison control center should be posted near each telephone and written on the front cover of the flipbook, *First Aid Guide for School*

Emergencies, Virginia Department of Health (the flipbook should be kept in the school nurse's office or school health room). (Please refer to Appendix B for a copy of *First Aid Guide for School Emergencies*.) All incidents should be reported according to local policy.

- ◆ Pesticides and toxic or hazardous cleaning and maintenance chemicals and materials should be stored separately in a ventilated and locked cabinet or in an area accessible only to authorized personnel. The ventilation recommendation of this section may not be recommended in areas where minimum quantities of the above mentioned materials are stored for daily use. Flammable or combustible materials should be stored in accordance with the most recent edition of the *National Fire Protection Association 30 Flammable and Combustible Liquids Code* (available from the National Fire Protection Association listed below).
- ◆ The storage, preparation, and consumption of food and drink are prohibited in any area where there are poisonous, toxic, or hazardous substances.

Resources

For more information, contact the National Fire Protection Association.

National Fire Protection Association

1 Batterymarch Park

P.O. Box 9101

Quincy, MA 02269-9101

Main telephone: (617) 770-3000.

Customer sales department telephone: (800) 344-3555 (On-line catalog available).

Web site: <http://www.nfpa.org>

Health and Safety Recommendations

Overview

This section presents information on possible environmental concerns or risk areas in the school environment. Material is presented on guidelines for assessing or reducing the environmental risks in the identified areas.

Subsections

The following subsections highlight areas identified as high risk areas or areas of concern:

- ◆ Playground Safety
- ◆ Toilets, Lavatories, Drinking Fountains, and Bathing Facilities
- ◆ Animals in School
- ◆ Lighting
- ◆ Swimming Pools/Therapy Pools
- ◆ School Maintenance and Sanitation
- ◆ Sewage Disposal
- ◆ Refuse Disposal
- ◆ Recycling

Playground Safety

Authorization

See local regulations.

Overview

The United States Consumer Product Safety Commission (1997)¹³⁰ reported that each year about 200,000 children are treated in U.S. hospital emergency rooms for playground equipment-related injuries. Approximately 148,000 of these injuries involve public playground equipment. About 15 children die each year as a result of playground equipment-related incidents. Most of the injuries are the result of falls. Most of these are primarily falls to the ground below the equipment, but falls from one piece of equipment to another are also reported. Most of the deaths are due to strangulation or falls.

Recommendation

Because of the injuries noted above, the Consumer Product Safety Commission made specific recommendations in their *Handbook for Public Playground Safety*.¹³¹ The following content is included in the handbook:

- ◆ Overview of playground injuries.
- ◆ Types of surfaces for playgrounds.
- ◆ Layout and design of playgrounds.
- ◆ Use zones for playground equipment.
- ◆ Installation and maintenance of equipment.
- ◆ General hazards.
- ◆ Guidelines for platforms, guardrails, and protective barriers.
- ◆ Guidelines for specific playground equipment, such as see saws and slides.

¹³⁰ CPSC's *Handbook for Public Playground Safety*. (1997). CPSC Document #325 U.S. Consumer Product Safety Commission, Washington, D.C. 20207

¹³¹ Ibid.

Resources

For more information, contact the following agencies.

- ◆ U.S. Consumer Product Safety Commission
 - Office of Information and Public Affairs
 - Washington, DC 20207
 - Telephone number (301) 504-0580
 - Web site: <http://www.cpsc.gov/>
- Consumer Product Safety Hotline (800) 638-2772 or (800) 638-8270 (TTY)

Note: CPSC's Internet Subscription List – Agency press releases (which include product recalls and other safety information, and the agency's public calendar) can be automatically sent by e-mail. Instructions for how to subscribe to this service are available at the following

Web site:

<http://www.cpsc.gov/about/subscribe.html>.

- ◆ U.S. Consumer Gateway
 - Web site: <http://www.consumer.gov/index.htm>

Note. The *CPSC's Handbook for Public Playground Safety* is available from either of the above agencies.

Toilets, Lavatories, Drinking Fountains, and Bathing Facilities

Authorization

No specific mandate. The *Virginia Uniform Statewide Building Code, Volume II Maintenance Code*, which is a voluntary maintenance code, can be used as a guide to develop local policies.

Recommendation

General.

- ◆ Toilet, lavatory, bathing facilities, and drinking fountains should be provided and should be accessible for use by individuals with disabilities.
- ◆ Functional water outlets should be available, where necessary, at designated refuse storage areas and at high-density student common use areas where heavy accumulations of refuse are generated, to minimize hazards and to maintain such areas in a clean, safe condition.
- ◆ Plans and specifications for the installation of sanitary facilities in schools that are being remodeled to increase the occupant load should be submitted for review and approval in accordance with Virginia Department of Health regulations prior to construction (see “Resources” at the end of this subsection).
- ◆ Floors, walls, and ceilings of all toilet, shower, and locker rooms should be smooth, easily cleanable, non-absorbent and should be maintained in good repair and in a clean, sanitary condition.

Drinking Water Fountains.

- ◆ The fountains must be at appropriate heights for the users and should be easily accessible to all school program activities.
- ◆ Drinking fountains should not be installed on sinks in bathrooms used for hand washing or arts and crafts or on sinks in toilet, science, or art areas.
- ◆ Drinking fountain spouts should be of angle jet construction, with water pressure maintained so that it extends at least 1 inch beyond the mouth guard.

Note: Use of common drinking cups or vessels should be prohibited.

Toilets and Lavatories.

- ◆ Toilets and washrooms must be available for use at all times and monitored if necessary. Rooms must be unlocked and fully accessible. Toilet rooms should be conveniently located at a travel distance of not more than 500 feet from any room to be served. All toilet rooms should be provided with adequate lavatory facilities.
- ◆ Sound public health practice dictates that soap (preferably liquid), paper towels, and toilet paper be provided. Soap and single service towels should be available for all lavatory facilities; however, mechanical warm air dryers may be used in place of towels.
- ◆ All toilet facilities must be ventilated directly to the outside, either by windows that open or by mechanical exhaust systems.
- ◆ Toilet bowls should be equipped with nonabsorbent, sanitary toilet seats. Toilet paper should be available at each toilet mounted in an appropriate dispenser.
- ◆ Hot and cold water or tempered water under operating pressures (20 PSI minimum) should be available for bathing and washing. Hot water delivered to showers and lavatories should not exceed 110°F. The temperature of hot water at other fixtures should not exceed 120°F, except where necessary for sanitizing purposes.

Showers.

- ◆ New facilities should have 12-square feet of floor area per showerhead. Centralized showerheads should be located at least 3 feet apart.
- ◆ Private showers should have one soap dispenser and one towel hook for each shower.
- ◆ Gang showers should have one soap dispenser for every two showerheads and one towel hook for each shower.
- ◆ Shower floors should have a nonskid surface.

Resources

For more information, contact the Virginia Department of Health, Division of Onsite Sewage and Water Services, or local health department's Office of Environmental Health Services.

Virginia Department of Health
Office of Environmental Health Services
Division of Onsite Sewage and Water Services
P.O. Box 2448
Richmond, VA 23218
Telephone: (804) 225-4030
Fax: (804) 225-4003
Web site: <http://www.vdh.state.va.us/onsite/ehmgrs.htm>

Animals in School

Authorization

No specific regulations

Recommendation

- ◆ Animals used for instructional purposes should be maintained in a sanitary condition and in a manner to prevent health hazards or nuisance conditions and to conform to local school policy.
- ◆ The practice of keeping animals in schools is discouraged because of potential allergies, bites, and spread of disease.
- ◆ Animals kept at school must be adequately immunized, fed, sheltered, and kept clean. They are prohibited from food storage, preparation, service, and dining areas.
- ◆ Do not permit turtles, parrots, raccoons, bats, or wildlife known to carry rabies or other diseases.
- ◆ Be sure that no child in a class is allergic to animals.
- ◆ Animal areas must be cleaned frequently.
- ◆ Wash hands after handling or cleaning. Children who assist with pet cleaning and maintenance must learn proper hand washing procedures.
- ◆ An exemption has been provided to allow guide dogs in dining areas when accompanying blind, deaf, or other disabled persons.
- ◆ Pest control/management should be a part of an integrated pest management program to maintain the facility free from vermin. (See previous section in this chapter on “Pesticides.”)

Note. For information on rabies, see “Selected Infectious Diseases” in Appendix C. For information on animal bites, see “*First Aid Guide for School Emergencies*” in Appendix B.

Lighting

Authorization

No specific regulations.

Overview

The provision of adequate interior and exterior school lighting is primarily the responsibility of illuminating engineers and architects. However, the administrator, classroom teachers, and the health staff must understand the basic principles of lighting in order to use available facilities properly and recommend change when needed. The administrator should not permit the standards to decline in the name of economics or energy savings.

Recommendation

While quantity of light is important, the quality of light is even more significant, as demonstrated in extensive research. In order to supply suitable light to all working surfaces for efficiency and comfort, the following items should be considered.

Control of Bright and Dark Areas. There should be control of both bright and dark areas to avoid glare. This is best accomplished by diffusion or light coming from many directions rather than a single source, whether artificial or natural. In addition, the reflective surfaces of desks, walls, woodwork, and so forth should be considered. The adverse effects of glare are cumulative. For a short time glare is annoying—with prolonged exposure, a person becomes progressively fatigued and may develop eyestrain and headaches.

Room Colors. Room colors greatly influence the effectiveness of a lighting system. Color and texture determine how much light is reflected. Room colors also contribute to a variety of psychological reactions and have been described as, for example, warm, cool, neutral, or depressing.

Lighting Recommendations. The electrical lighting system should be capable of the following light level intensities: 70-foot candle for classroom, libraries, offices, laboratories, and shops; 100-foot candles for drafting, typing, sewing rooms, and other rooms where close eye task activities are routinely conducted; 30-foot candles for reception rooms, rest rooms, gymnasiums, service rooms, swimming areas, and dining areas; 15-foot candles for auditoriums, locker rooms, and stairways; and 20-foot candles for corridors, hallways, storage, and utility areas. Light level intensities should be measured at the work surface or 30 inches from the floor.

Determination of Appropriate Lighting. Illumination deteriorates rapidly unless windows are kept clean and wall and ceiling surfaces are well maintained. As light bulbs are used, they blacken and give off less light. Dirt and dust reduce the reflecting and transmitting qualities of lighting units. To help determine whether a classroom is appropriately lighted, the following questions should be answered.

- ◆ Is the room free from sharp shadows?
- ◆ Is it possible to exclude sunlight by adjustment of shades or blinds?
- ◆ Are walls, desktops, and chalkboards free from bright reflections?
- ◆ Are all lamps shielded so that bright light does not shine in the eyes?

Swimming Pools/Therapy Pools

Authorization

No specific regulations.

Recommendation

Swimming pools should be constructed, operated, and maintained in accordance with:

- ◆ Local regulations.
- ◆ Manufacturer's maintenance recommendations.

Resources

For more information, contact the local health department's Office of Environmental Health Services or Virginia Department of Health, Division of Onsite Sewage and Water Services.

Virginia Department of Health
Office of Environmental Health Services
Division of Onsite Sewage and Water Systems
P.O. Box 2448
Richmond, VA 23218
Telephone: (804) 225-4030
Fax: (804) 225-4003
Web site: <http://www.vdh.state.va.us/onsite/ehmgrs.htm>

School Maintenance and Sanitation

Authorization

No specific regulations.

Overview

Cleanliness is an extremely important aspect of a healthful school environment. Proper sanitation consists of maintaining the building free of those conditions that could lead to the transmission of disease. Each area of the school has its own particular cleaning and disinfectant needs.

Recommendation

- ◆ Each school should develop a written policy and plan for the cleaning and sanitizing of each area and assign the responsibility for carrying out the plan to a specific person in the school.
- ◆ The least expensive and highly effective sanitizing agent is chlorine bleach. Deodorizers should not be used—they only mask the problem. Chlorine bleach used to sanitize food contact surfaces, equipment, and utensils must be EPA approved for food service sanitation. The container of approved chlorine will have specific labeling for food establishment use and an EPA registration number.
- ◆ There must be adequate housekeeping and maintenance equipment and cleaning supplies, and equipment should be appropriate for the task it is intended to do. For instance, a vacuum cleaner should have adequate capacity and be powerful enough to clean rugs. Vacuum cleaners must also have proper filters to eliminate the dust and other small particles from being expelled from the equipment. The equipment must be kept clean, in good working condition, and be stored safely. All cleaning supplies and toxic materials must be kept in containers that are properly labeled with their contents. In food areas, cleaners, sanitizers and toxic materials must be stored away from food items.

Sewage Disposal

Authorization

Regulations. In all new schools and schools modifying existing sewage disposal systems or expanding their usage beyond the design capacity of the sewage disposal system, plans should be submitted to the Virginia Department of Health for review and approval in accordance with provisions of the most current edition of the *Sewage Handling and Disposal Regulations* or *Sewage Collection and Treatment Regulations*—whichever is more appropriate (available from the Virginia Department of Health, Division of Onsite Sewage and Water Services listed below) .

Recommendation

Facilities. Facilities approved by the Virginia Department of Health should be provided and maintained for the treatment and sanitary disposal of sewage. Where a public sewer system is available, all plumbing fixtures and all building sewer lines should be connected thereto. If a public sewer system is not available, a sewage disposal system meeting the requirements of the Virginia Department of Health should be provided and all plumbing fixtures and building sewer lines should be connected thereto.

Interruption of Service. Where a total interruption of sewer service occurs over an extended period of time, the school should be closed unless dismissal of the pupils would be detrimental to their physical well-being, or unless accessible approved alternatives for the sanitary disposal of sewage are available.

Resources

For more information, contact the Virginia Department of Health, Division of Onsite Sewage and Water Services or local health department's Office of Environmental Health Services.

Virginia Department of Health
Office of Environmental Health Services
Division of Onsite Sewage and Water Systems
P.O. Box 2448
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Web site: <http://www.vdh.state.va.us/onsite/ehmgrs.htm>

Refuse Disposal

Authorization

No specific regulations.

Overview

The storage, collection, transportation, and disposal of refuse should be conducted to control odors, insects, rodents, communicable disease, accidents, or other nuisance conditions.

Recommendation

Containers. Durable, nonabsorbent, cleanable refuse containers should be provided, kept in a clean condition, and placed in readily accessible locations.

Universal Precautions. Use universal precautions when (see “Universal Precautions” in Appendix C):

- ◆ Cleaning up blood and body fluids.
- ◆ Disposing of bio-hazard wastes, such as refuse from the health clinics or from cleaning of blood and body fluids.
- ◆ Disposing of all sharp-edged instruments, such as blades from exacto knives, blades from saws, or needles from hypodermic syringes.

Exterior Refuse Storage. Exterior refuse storage areas should be kept in a clean, sanitary condition. Refuse receptacles for exterior storage of garbage or putrescible wastes should be provided with covers. Exterior refuse containers should be stored on a smooth surface on nonabsorbent material, such as concrete or asphalt. Exterior putrescible waste storage areas should be located a minimum of 25 feet from food services areas and classrooms.

Frequency of Removal. Refuse should be removed from the buildings and removed from the premises as often as necessary but not less than twice weekly when putrescible wastes are stored.

Recycling

Authorization

No specific regulations.

Overview

The average American throws away more than 1,300 pounds of trash a year. In recent years, a garbage crisis has caught the attention of the nation and the world. As this country is faced with ever-increasing amounts of garbage and no place to put it, more and more people are recognizing the need for action. Recycling is one important remedy to the garbage problems much of the nation is facing today.

Recommendation

Schools can take a leadership role in recycling. School recycling programs can help students learn to respect the environment, become aware of their impact on it, and develop positive attitudes and behaviors. United States, EPA, and the Office of Solid Waste have developed a comprehensive educational program, "Recycle Today," to promote recycling programs and waste awareness in schools.

Resources

For more information, refer to the following pamphlet:

Title:	Recycle Today!
Date:	April 1990
Document Number:	EPA 530-SW-90-025
Source:	EPA Office of Solid Waste and Emergency Response
Order Information:	EPA NCEPI, 1-800-490-9198 or order on line at http://www.epa.gov/ncepihom/orderpub.html
Description:	This pamphlet describes four publications that address recycling. Teachers can order those items, which include a curriculum for building solid waste awareness, a how-to handbook for teachers, a poster, and a comic book for grades 4 through 7. Ordering information is included.
Audience:	Elementary School to High School

Informational

Overview

This section provides information on areas of concern within the school environment. These areas are not necessarily high-risk areas but rather areas in which school personnel have historically had a lot of questions.

Subsections

The following subsections include environmental areas in which school personnel have frequently asked for information.

- ◆ Electromagnetic Fields
- ◆ Hazards From Video Display Terminals
- ◆ Photocopiers, Mimeograph, Equipment, and Other Machines
- ◆ X-Ray Machines

Electromagnetic Fields

Authorization

Virginia Department of Health. The Virginia Department of Health monitors research on electromagnetic fields and provides a report to the legislature each year.

Note: At the time of publication, there is no definitive research to support any health problems associated with electromagnetic fields.

Recommendation

For ongoing information, consult the annual legislative report on electromagnetic fields by the Virginia Department of Health, Division of Radiological Health.

Virginia Department of Health
Radiological Health Program
P. O. Box 2448
Richmond, VA 23218
Telephone: (804) 786-5932
Web site: <http://www.vdh.state.va.us/rad/index.htm>

Hazards From Video Display Terminals

Authorization

No specific regulations

Note: Evidence to date indicates that exposure to video display terminals (VDTs) may pose minor health problems. VDTs are not a source of dangerous radiation. Although there is some evidence that VDTs may increase physical and emotional stress, studies suggest that measures can be taken to reduce these stresses, such as relaxing, decreasing the work load, and relieving boredom in the workplace. Thus far, no information has been found that definitively rules out an effect of VDTs on reproduction.

Photocopiers, Mimeograph, Equipment, and Other Machines

Authorization

No specific regulations.

Recommendation

- ◆ The most important health consideration with photocopiers is location. Locating photocopiers in large, well-ventilated areas will reduce possible health concerns. This is especially important if workers have to share space with the photocopier or other machines.
- ◆ It is recommended that the glass-plate cover be closed while copying.
- ◆ Special attention should be given to the refilling and disposal techniques for toner in dry machines. The warnings on the additives for photocopy, mimeograph, and duplication machines should be read and followed.

X-Ray Machines

Authorization

Regulations. See *Virginia Rules and Regulations Pertaining to Radiation Control*, as amended (available from the Virginia Department of Health, Radiological Health Program listed below).

Recommendation

Use of x-ray machines and other electronic devices producing ionizing or non-ionizing radiation and radioactive materials and equipment should conform to the most recent edition of the *Virginia Rules and Regulations Pertaining to Radiation Control*, as amended and promulgated by Virginia Board of Health.

Resources

For more information, contact the Virginia Department of Health, Radiological Health Program:

Virginia Department of Health
Radiological Health Program
P. O. Box 2448
Richmond, VA 23218
Telephone: (804) 786-5932
Web site: <http://www.vdh.state.va.us/rad/index.htm>