

Chapter 14

HEALTHY SCHOOL ENVIRONMENT

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Healthy School Environment

Maintaining a healthy school environment is critical to the success of students in our schools. A healthy school environment includes safeguarding the rights of students, faculty, and staff, and maintaining a safe work environment and a healthy atmosphere. Included are methods conducive to creating a setting and atmosphere that is physically, mentally, and psychologically supportive.

Indoor Air Quality

The indoor air quality of schools is a growing concern across the nation. During the last several decades, exposure to indoor air pollution has increased. Construction of tightly sealed buildings, reduced ventilation rates to save energy, synthetic materials in buildings and furnishings, and chemicals in consumer goods are some of the reasons that indoor pollution is increasing. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be two to five times and occasionally 100 times higher than outdoor levels of pollutants. This situation is of concern because the majority of people spend about 90% of their time indoors.¹

Some of the consequences of poor air quality in schools are²:

- Increased long- and short-term health problems for students and staff;
- Spread of airborne infectious diseases;
- Degraded student learning environment, which affects comfort and attendance;
- Reduced productivity of teachers and staff due to discomfort, sickness, or absenteeism;
- Deterioration of the school building and equipment;
- Strained relationship among school administrators, staff, and parents;
- Negative publicity for the school and its administrators; and
- Potential liability problems.

It is the position of the National Association of School Nurses that the school nurse is in a unique position to work with administration, maintenance personnel, and other health professionals in detecting, monitoring, and eliminating sources of indoor air contaminants. School nurses possess the knowledge and skills to be proactive in educating students, staff, and parents on indoor air quality issues.³

Indoor Air Quality Tools for Schools Action Kit

To provide school staff with guidance on how they can improve air quality in their school, the EPA developed the *Indoor Air Quality Tools For Schools Action Kit*. The kit may be used by administrators, teachers, school nurses, maintenance personnel, and anyone else whose daily decisions and activities affect the quality of air within the school. The kit includes easy-to-follow checklists that enable staff to make decisions regarding how to improve air quality in their schools. This kit is included in Exhibit 1 of this chapter, and is recommended by the National Safety Council, the American Lung Association, the National Education Association, and the National Parent Teacher Association (PTA). It is recommended that each school use the checklists in the kit to determine ways in which to improve the school's indoor air quality.

TDH Voluntary Indoor Air Quality Guidelines for Public Schools

In 1998 the Texas Department of Health (TDH) adopted "Voluntary Indoor Air Quality Guidelines for Public Schools" as required by Chapter 385, Health and Safety Code. This document is available online at <http://www.tdh.state.tx.us/beh/IAQ/iaqgdln.htm>. It recommends that each school appoint an indoor air quality coordinator whose responsibilities will include coordination of an indoor air quality team, preparation for emergency responses, dissemination of indoor air quality information, tracking of indoor air quality complaints and direction of responses, and communication of indoor air quality issues and status to interested parties. The indoor air quality coordinator and school administration should develop an indoor air quality program that is reviewed by the local school board. The management plan should be reviewed annually to ensure that it meets current safety standards and the needs of the school students and staff.

Below are recommendations from TDH's "Voluntary Indoor Air Quality Guidelines for Public Schools."

Preventive Maintenance Program. Personnel should be educated and trained in the prevention, recognition, and resolution of indoor air quality concerns. The Texas

Department of Health recommends that a written preventive maintenance program should be developed that includes the following:

Training: Education and training of the indoor air quality coordinator and support team, teachers, staff, and students.

Communication: A procedure for communicating with students, parents, faculty, and staff regarding indoor air quality issues.

Complaint Response: A written procedure for documenting and responding to indoor air quality complaints and problems

Record Keeping: An indoor air quality complaint collection, resolution, and records retention program.

Maintenance and Operation Plan: A written building and maintenance and operation plan to be updated annually that contains:

- A written description of the building systems and building functions and occupancy;
- Schematics and/or as-built drawings with equipment locations and performance criteria;
- Outside air requirements;
- Sequences of operation;
- Daily building and system operation schedules;
- Test and balance reports;
- Maintenance schedules;
- Building inspection checklists;
- Maintenance equipment checklists.

Implementation Schedule: A schedule to implement the management plan.

Annual Review: Annual indoor air quality inspection/review of facilities including a walk through by the indoor air quality coordinator or designee.

When developing a written preventive maintenance program, a school should consider the following:

Records: A written maintenance record program should be developed and implemented. The following lists are required to be maintained by each school district. Because maintenance accidents and chemical spills can occur at any time, during or after school hours, it is a good idea to keep a copy of each of these lists in an easily accessible location or in the location in which these chemicals are stored in order that appropriate steps can be taken should an accident or spill occur.

- **Material safety data sheets:** A public school employer shall maintain a legible copy of the current Material Safety Data Sheet for each hazardous chemical used in the workplace, including those in cleaning supplies, pesticides, and art supplies, in accordance with Section 502.006, Health and Safety Code.
- **Workplace chemical list:** The employer shall prepare a workplace chemical list if required to do so by Section 502.005, Health and Safety Code.
- **Facility chemical list:** The employer shall prepare a facility chemical list (also known as a Tier Two report) if required to do so by Section 506.006, Health and Safety Code.

Maintenance Requirements: Adherence to product manufacturers' maintenance requirements should be required as a minimum.

Supplies: Maintenance and operational supplies should be kept in order and properly labeled in a clean, dry room to prevent contamination of the air and infestation of insects and rodents.

Cleaning Procedures: Cleaning procedures and equipment should be selected to minimize airborne dust.

Scheduling: Schedule and conduct maintenance activities with high emissions (painting, roofing repair, pesticide applications) to minimize occupant exposure to indoor air contaminants.

Filters: A system filter change-out should be developed and implemented. A filter upgrade program should be implemented if the filters do not meet the latest recommended efficiency.

Coils and Condensate Drain Systems: A cleaning program of the coil and condensate drain systems of the HVAC systems should be developed and implemented.

HVAC Systems:

- **Outside Air:** The HVAC systems should be operated to provide acceptable outside air with quantities in conformance with the most current and accepted standard, up to the equipment capabilities. Placement of outside air intakes should take into consideration potential external sources of contamination.
- **Positive Pressure:** The HVAC systems should be operated to provide a positive building pressure to reduce the entry of contaminants and provide more effective temperature and humidity control.
- **Moisture Control:** The HVAC systems should be operated to prevent excessive moisture that could cause microbial growth or high humidity.
- **Ducts:**
 - **Inspection:** Periodic inspection of ducts for mold, dirt, and deterioration should be performed.
 - **Cleaning:** Cleaning of ducts internally lined with fibrous or soft material that can be damaged by mechanical cleaning devices is discouraged. Replacement of these types of contaminated line ducts is preferred.
 - **Replacement:** Ducts with internal surfaces that are easily cleaned, are not damaged by typical cleaning methods, do not harbor dust and microbials, and will not emit materials or gases that can harm occupants should be used when a duct is repaired or replaced.
 - **Cleaning methods:** The ducts should be cleaned using methods that will not expose occupants to potentially harmful substances.
- **Drain pans:** Condensate drain systems should be free of microbial growth and other debris.

- **Exhaust Air:** Exhaust air systems should be operating properly and vented to the outside.
- **Preconditioning:** The HVAC systems should be operated for sufficient time prior to building occupancy to remove contaminants and to condition the air.
- **Access:** If existing access to the HVAC systems does not allow proper inspection and maintenance, access ports should be installed.

Cleanliness: The air supply and return systems and mechanical rooms should be kept clean and properly maintained.

Sewer Traps: A sewer trap maintenance program should be developed and implemented to prevent sewer gas back drafts into buildings.

Storage: Air handling rooms should not be used for storage.

Animals and Plants: Live animals and plants should be maintained in a healthy and clean condition.

Microbial Management:

- **Water Intrusion:** Damaged building systems or components that cause water condensation or water leaks in the building should be promptly repaired.
- **Water Damage:** Remove or dry, preferably within 24 hours, porous materials, such as carpet and padding, ceiling tiles, sheet rock, and insulation that become water-damaged. Major water damage or flooding should be remediated by qualified personnel.
- **Cleaning/Replacement:** Promptly clean or replace materials contaminated with mold or other substances that may affect indoor air quality. Contaminated porous material should be replaced.
- **Management:** Microbial growth on surfaces or in water reservoirs is unacceptable and should be removed using procedures to avoid dissemination and worker/occupant exposure. Appropriate steps should be taken to prevent future growth in these locations without causing occupant exposure to potentially harmful chemicals.

- **Sewage Backups:** Building occupants should be removed from any area flooded by sewage. The cleanup should ensure rapid decontamination (to include water extraction, cleaning, and disinfection) and drying of all wet surfaces. Contaminated porous materials should be replaced, preferably with un-porous materials.

Wild Animals: Birds, bats, and other wild animals should not be allowed to roost in or otherwise enter occupied buildings, including attics or plenums in or near fresh air intakes. Areas contaminated with urine or feces should be decontaminated. Protection for building occupants and workers should be required during the process.

Cleaning Products:

- **Toxicity:** Use the least toxic product.
- **Directions:** Follow manufacturers' directions for cleaning products. The excessive use of cleaning materials can cause unacceptable indoor air quality.
- **Training:** Assure that all personnel using cleaning products with hazardous chemicals have been trained in the proper usage and handling of such products as required by the Texas Hazard Communication Act (Section 502.007, Health and Safety Code).
- **Labeling:** Follow the labeling requirements of Section 502.007, Health and Safety Code (see Appendix A).
- **Ventilation:** Adequate ventilation during and after use of cleaning products is necessary to minimize exposure to potentially harmful or irritating substances in the products.
- **Scheduling:** Schedule the use of cleaning products when the buildings are unoccupied to minimize exposure to students, staff, and other occupants.

Pesticide Use:

- Pest management for both building and lawn care should emphasize non-chemical management strategies whenever practical, and least toxic chemical controls when pesticides are needed.

- Pest management must be in accordance with the Structural Pest Control Act (Section 4J, Article 135b-6, Vernon's Texas Civil Statutes, and 22 Texas Administrative Code § 595.11).
- When contracting for pest control services, the use of businesses that conform to 22 Texas Administrative Code § 595.14, Reduced Impact Pest Control Services, is preferred.
- Dead pests should be promptly removed from the premises.

Emergencies: An emergency response plan, including staff training, should be developed for chemical spills, dangerous air contamination, and similar events.

How Everyone Can Improve Indoor Air Quality Every Day

All school personnel and students play a role in maintaining indoor air quality. TDH recommends the following guidelines as practices that all building occupants can do on a daily basis:

Cleanliness: Classrooms and teaching supplies should be kept clean and orderly to prevent conditions conducive to insect or rodent infestations and contamination of indoor air.

Product Usage: Products such as pesticides, air fresheners, scented products, and other materials that may be a health concern should not be used.

Classroom Activities: Use the least toxic instructional materials (markers, glue, art supplies, etc.) that will serve the intended purpose. When classroom activities generate air pollutants, steps should be taken to minimize impact, such as using local exhaust fans or opening windows.

Diffusers and Grilles: Supply air diffusers and return air grilles should be kept free and clear of any obstructions.

Spills: Spills should be cleaned up promptly and properly. Spills of hazardous chemicals must be disposed of in accordance with all applicable state and federal laws.

Pets: Classroom pets should be maintained in such a manner to prevent indoor air quality problems.

Food: Food should be stored in airtight containers and refrigerated if necessary.

Garbage: Waste containers should be stored properly, emptied regularly, and located away from air intakes or other sensitive areas.

Smoking: Smoking tobacco is prohibited in public schools under Section 48.01(a), Penal Code.

Portable Air Cleaning Devices: Portable air cleaning devices may be of limited help in cleaning a small area. They must be properly maintained to be beneficial.

Ozone-Generating Devices: Because ozone is a lung irritant, ozone-generating devices should not be used in occupied spaces.

Sensitive Individuals: Carefully consider and, to the extent possible, accommodate the needs of sensitive individuals by the following:

- Consulting: Teachers of students with allergies or chemical intolerances should consult, as necessary, students, parents, school health officials, and with written parental consent, their physicians.
- Locating: Locate sensitive individuals away from potential sources of symptom-triggering substances and activities.
- Discouraging: Discourage the use of scented personal care products or other scented products that may cause adverse reactions in sensitive individuals.

Medical Care: Any building occupant experiencing chronic or serious health problems is encouraged to seek appropriate medical care and work with medical professionals in management of the illness.

Reporting: Promptly report indoor air quality problems or complaints to the indoor air quality coordinator or designee.

For more information on indoor air quality and pollutants, the following national contacts are available to you:

National Safety Council's Air Quality Program Helpline

1025 Connecticut Avenue NW, Suite 1200

Washington, D.C. 20036

Automated Hotline: (800) SOS-RADON (available 24 hours a day, 7 days a week)

Helpline: (800) 55-RADON (available M-F 7:30am-4:00pm CST, message can be left at any time)

Fax: (202) 293-0032

Email: airqual@nsc.org

On the web: <http://www.nsc.org/ehc.htm>

National Lead Information Center

Optimus

8601 Georgia Avenue, Suite 503

Silver Spring, MD 20910

Automated Hotline: (800) LEAD-FYI (available 24 hours a day, 7 days a week)

Clearinghouse: (800) 424-LEAD (available M-F 7:30am-4:00pm CST, message can be left at any time)

Fax: (301) 585-7976

Email: lead@optimuscorp.com

National Center for Environmental Publications and Information (NCEPI)

P.O. Box 42419

Cincinnati, OH 45242

Phone: (800) 490-9198

Fax: (513) 489-8692 or 8695

On the web: <http://www.epa.gov/ncepihom/index.html>

Indoor Air Quality Information Clearinghouse (IAQ Info)

P.O. Box 37133

Washington, D.C. 20013-7133

Phone: (800) 438-4318 or (703) 356-4021 (available M-F 8:00am-4:00pm CST)

Fax: (202) 484-1510

Email: iaqinfo@aol.com

On the web: <http://www.epa.gov/iaq>

National Pesticide Telecommunication Network

NPTC OSU

333 Weniger Hall

Corvallis, OR 97331

Phone: (800) 858-PEST

Email: nptn@ace.orst.edu

On the web: <http://ace.orst.edu/info/nptn>

For Non-Toxic Arts and Crafts Materials

To order at no cost a list of products that have been certified non-toxic or the book *What You Need to Know About the Safety of Art and Craft Materials*, contact:

Art and Creative Materials Institute

100 Boylston St., Suite 1050

Boston, MA 02116

Phone: (617) 426-6400

Fax : (617) 426-6639

Email: acmi@guildassoc.com

On the web: <http://www.creative-industries.com/acmi>

Asbestos

Asbestos is a toxic substance and a known carcinogen that can cause several serious diseases in humans, including cancer and lung disease.⁴ Asbestos consists of small fibers that are invisible to the naked eye. If these fibers are released from asbestos-containing material they remain in the air for many hours, increasing the possibility of being inhaled. The U.S. Environmental Protection Agency estimates that asbestos-containing materials are in many of the nation's primary and secondary schools. It has been used in heat and electrical insulation, floor and ceiling tile, cement pipe, corrugated-paper pipe wrap, fireproofing, and other insulation.⁵

If left undisturbed asbestos-containing materials generally pose no health risk. If this material becomes damaged or deteriorated over time, however, the airborne particles can cause serious health problems. Symptoms usually do not develop for a long time, often

twenty years or more. **It is the policy of the EPA to leave asbestos-containing material intact and undisturbed in order to protect children and staff members.**

In 1986 the U.S. Congress passed the Asbestos Hazard Emergency Response Act (Public Law 99-519), or AHERA, to protect children and staff from asbestos hazards in schools. This act requires public school districts and private schools to inspect all school buildings for asbestos, develop plans to manage asbestos in schools, and carry out these rules in a timely fashion.⁶ Further, it requires schools to notify parents and staff about the presence of asbestos in schools and make available a copy of the report that identifies the location of asbestos-containing material in the school buildings.

The Texas Asbestos Health Protection Act (Article 4477-3a, Vernon's Texas Civil Statutes) requires that the Texas Department of Health implement AHERA on the state level. "How to Manage Asbestos in School Buildings: The AHERA Designated Person's Self Study Guide" was published by the Texas Department of Health in 1996 to educate schools about inspections, procedures, and record keeping regarding asbestos. A copy of this guide is available online at <http://www.tdh.state.tx.us/beh/ih/DocPage.htm>.

Mold

Molds produce tiny spores to reproduce, and these spores waft through the indoor and outdoor air continually. When mold spores land on a damp spot indoors, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed. There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.⁷

Common Moisture Sources Found in Schools: Moisture problems in school buildings can be caused by a variety of conditions, including roof and plumbing leaks, condensation, and excess humidity. Some moisture problems in schools have been linked to changes in building construction practices during the past twenty to thirty years. These changes have resulted in more tightly sealed buildings that may not allow moisture to escape easily. Moisture problems in schools are also associated with delayed maintenance or insufficient maintenance, due to budget and other constraints. Temporary structures in

schools, such as trailers and portable classrooms, have frequently been associated with moisture and mold problems.

Suggestions for Reducing Mold Growth in Schools:

Reduce Indoor Humidity:

- Vent showers and other moisture-generating sources to the outside.
- Control humidity levels and dampness by using air conditioners and dehumidifiers.
- Provide adequate ventilation to maintain indoor humidity levels between 30-60%.
- Use exhaust fans whenever cooking, dishwashing, and cleaning in food service areas.

Inspect the Building for Signs of Mold, Moisture, Leaks, or Spills:

- Check for moldy odors.
- Look for water stains or discoloration on the ceiling, walls, floors, and windowsills.
- Look around and under sinks for standing water, water stains, or mold.
- Inspect bathrooms for standing water, water stains, or mold.
- Do not let water stand in air conditioning or refrigerator drip pans.

Respond Promptly When You See Signs of Moisture and/or Mold or When Leaks or Spills Occur:

- Clean and dry any damp or wet building materials and furnishings within 24-48 hours of occurrence to prevent mold growth.
- Fix the source of the water problem or leak to prevent mold growth.
- Clean mold off hard surfaces with water and detergent, and dry completely.
- Absorbent materials, such as ceiling tiles, that are moldy may need to be replaced.
- Check the mechanical room and roof for unsanitary conditions, leaks, or spills.

Prevent Moisture Condensation: Reduce the potential for condensation on cold surfaces (i.e., windows, piping, exterior walls, roof, or floors) by adding insulation.

Floor and Carpet Cleaning:

- Remove spots and stains immediately using the flooring manufacturer's recommended techniques.
- Use care to prevent excess moisture or cleaning residue accumulation and ensure that cleaned areas are dried quickly.
- In areas where there is a perpetual moisture problem, do not install carpeting (i.e., by drinking fountains, by classroom sinks, or on concrete floors with leaks or frequent condensation).⁸

Tobacco Use Prohibited

Section 38.006, Education Code, prohibits the use of tobacco on school property or at a school-related or school-sanctioned activity on or off school property. Additionally, students are prohibited from possessing tobacco products at a school-related or school-sanctioned event on or off school property.

Pest Control in Schools

The following information concerning pest control in Texas schools was published by the Texas Structural Pest Control Board and is available on their website at:

<http://www.spcb.state.tx.us/ipm/Adopt.htm>.

Concern about health and environmental risks associated with chemicals is increasing, particularly where children are involved. As the public becomes more aware of the health and environmental risks pesticides may pose, interest in finding effective alternative methods has increased. School administrators and other persons who have pest control decision-making responsibilities for school buildings and grounds should be aware of the options available to them. It is in everyone's best interest to reduce exposure to potentially harmful chemicals

The Texas Structural Pest Control Act (Article 135b-6, Vernon's Texas Civil Statutes) mandates that, by September 1, 1995, each school district should have adopted an integrated pest management control program.

Integrated pest management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interactions with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means and with the fewest possible hazards to people, property, and the environment.⁹

Integrated Pest Management

Each school district has established a pest management policy that serves as a guidance document for all personnel involved in pest management activities on school property. Each school district shall designate an IPM coordinator who is responsible for day-to-day pest management operations of the district as well as emergency pesticide application.

All pesticides to be used on school property must be classified as green, yellow, or red. "Green list" products include those pesticides that are approved for use at any time at the discretion of any licensed pesticide applicator. Green list pesticides are EPA categories III and IV pesticides, which are one of the following: inorganic pesticides (i.e., boric acid, silica gels, diatomaceous earth, disodium octabrate tetrahydrate), insect growth regulators, insect and rodent baits in tamper-resistant containers, or, for crack and crevice placement only, microbe or fungal-based insecticides, botanical insecticides (other than synthetic pyrethroids) containing not more than 5% synergists, and biological (living) control agents.

The use of "Yellow List" products requires written approval by a certified applicator (commercial or noncommercial) with a copy of written approval provided to the IPM Coordinator. Their use approval will be limited to no longer than three months or three applications, whichever occurs first. Yellow list products are all EPA Category III and IV pesticides that display a CAUTION signal word on the label and are not on the green list.

"Red List" pesticides are pesticides classified by the EPA as Category I and II (identified by a WARNING or DANGER signal word). Use of Red List products requires written

approval from both a certified applicator and IPM Coordinator and a copy of the approval sent to the Structural Pest Control Board no later than 14 days after the application. Red List approvals will be limited to three months or three applications, whichever occurs first. Any time products from the yellow list or red list are used, a copy of the written approval must be kept in the records of the IPM Coordinator for at least two years.

Developing an IPM Program for Your School

An efficient IPM program can be integrated with the school's existing pest management plan and other school management activities. School management activities such as preventive maintenance, janitorial practices, landscaping, occupant education, and staff training are all part of an IPM program.

Students and staff occupy the buildings and are concerned about the safety and effectiveness of pest control methods. The most important responsibility of students and staff is sanitation; they should report the presence of pests to school administration. School staff and students should receive information about integrated pest management and their roles in the school's pest management system.

Parents can raise the issue of reducing pesticides to the attention of school personnel, and they can assist in the transition to an IPM program. Parents need to learn about IPM practices and follow them at home so that pests are not carried to school in notebooks, lunch boxes, clothing, or the children's hair. Parents should be aware of the current pest management practices in their children's schools. The schools should welcome questions by parents and encourage them to seek information. Visible interest and concern on the parents' part is a valuable resource and stimulus for the implementation of a school IPM program. Parents may express their views to the school superintendent, school board, school district management, and the school's parent teacher association (PTA). Parents may participate on IPM advisory or oversight committees with school and government management.

Applying IPM Strategies to Control Pests. These include redesigning and repairing structures, improving sanitation, employing pest-resistant plant varieties, establishing watering and mowing practices, and applying pesticides judiciously. Pest prevention measures can be incorporated into existing structures. Preventive measures, including sanitation, structural repair, and physical and mechanical controls such as screens, traps,

weeders, air doors, etc., reduce the need for pesticide. Specific IPM strategies are provided below.

IPM Strategies for Indoor Sites. Typical pests include mice, rats, cockroaches, ants, flies, wasps, hornets, yellow jackets, spiders, microorganisms, termites, carpenter ants, and other wood destroying insects. Although beneficial as predators, wasps, hornets, yellow jackets, and spiders can be troublesome. Management strategies, by site, include:

Entryways (doorways, overhead doors, windows, holes in exterior walls, openings around pipes, electrical fixtures, or ducts):

- Keep doors shut when not in use.
- Place weather stripping on doors.
- Caulk and seal openings in walls.
- Install or repair screens.
- Install air curtains.
- Keep vegetation, shrubs, and wood mulch at least 1 foot away from structures.

Classrooms and Offices (classrooms, laboratories, administrative offices, auditoriums, gymnasiums, and hallways):

- Allow food and beverages only in designated areas.
- If indoor plants are present, keep them healthy. When small insect infestations appear, remove them manually.
- Keep areas as dry as possible by removing standing water and water-damaged or wet materials.
- In the science lab, store animal foods in tightly sealed containers and regularly clean cages. In all areas, remove dust and debris.
- Routinely clean lockers and desks.
- Frequently vacuum carpeted areas.
- If students get head lice, consult the school nurse or have their parents contact a physician. Discourage students from exchanging hats or caps at school, and be aware of students sharing athletic helmets (e.g, baseball helmets). See Chapter 8, “Communicable Diseases,” for additional information regarding the treatment of head lice.

Food Preparation and Serving Areas (dining room, main kitchen, teachers lounge, home economics kitchen, snack area, vending machines, and food storage rooms):

- Store food and waste in containers that are inaccessible to pests. Containers must have tight lids and be made of plastic, glass, or metal. Waste should be removed at the end of each day.
- Place screens on vents, windows, and floor drains to prevent cockroaches and other pests from using unscreened ducts or vents as pathways.
- Create inhospitable living conditions for pests by reducing availability of food and water—remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry out wet areas.
- Improve cleaning practices, including promptly cleaning food preparation equipment after use and removing grease accumulation from vents, ovens, and stoves.
- Use caulk or paint to seal cracks and crevices.
- Capture rodents by using mechanical or glue traps. (Note: Place traps in areas inaccessible to children. Mechanical traps, including glue boards, used in rodent control must be checked daily. Dispose of killed or trapped rodents within 24 hours.)

Rooms and Areas with Extensive Plumbing (bathrooms, rooms with sinks, locker rooms, dishwasher rooms, home economics classrooms, science laboratories, swimming pools, and greenhouses):

- Promptly repair leaks and correct other plumbing problems to deny pests access to water.
- Routinely clean floor drains, strainers, and grates. Seal pipe chases.
- Keep areas dry. Avoid conditions that allow formation of condensation. Areas that never dry out are conducive to molds and fungi. Increasing ventilation may be necessary.
- Store paper products or cardboard boxes away from moist areas and direct contact with the floor or the walls. This practice also allows for ease in inspection.

Maintenance Areas (boiler room, mechanical room, janitorial/housekeeping areas, and pipe chases):

- After use, promptly clean mops and mop buckets, dry mop buckets, and hang mop vertically on rack above floor drain.
- Allow eating only in designated eating areas.
- Clean trashcans regularly, use plastic liners in trashcans, and use secure lids.
- Keep areas as clean and as dry as possible, and remove debris.

IPM Strategies for Outdoor Sites. Typical pests include mice and rats. Turf pests include broad-leaf and grassy weeds, insects such as beetle grubs or sod webworms, diseases such as brown patch, and vertebrates such as moles. Ornamental plants pests include plant diseases and insects such as trips, aphids, Japanese beetles, and bagworms.

Playgrounds, Parking Lots, Athletic Fields, Loading Docks, and Refuse Dumpsters:

- Regularly clean trash containers and gutters and remove all waste, especially food, and paper debris.
- Secure lids on trash containers.
- Repair cracks in pavement and sidewalks.
- Provide adequate drainage away from the structure and on the grounds.

Turf (lawns, athletic fields, and playgrounds):

- Maintain healthy turf by selecting a mixture of turf types (certified seed, sod, or plugs) best adapted for the area. Check with local University or Cooperative Extension service for recommendations on turf types management practices or other information.
- Raise mowing height for turf to enhance its competition with weeds; adjust cutting height of mower, depending on the grass type; sharpen mower blades; and vary moving patterns to help reduce soil compaction.
- Water turf infrequently but sufficiently during early morning hours to let turf dry out before nightfall; let soil dry slightly between watering.

- Provide good drainage, and periodically inspect turf for evidence of pest or diseases.
- Allow grass clippings to remain in the turf (use mulching mower or mow often) or compost with other organic material.
- Have the soil tested to determine pH and fertilizer requirements.
- Use a dethatcher to remove thatch. Do this in the early fall or early spring when the lawns can recover and when overseeding operations are likely to be more successful.
- Time fertilizer application appropriately because excessive fertilizer may cause additional problems, including weed and disease outbreaks. Apply lime if necessary.
- Use aeration to place soil on top of thatch so that microbes from soil can decompose thatch.
- Seed over existing turf in the fall or early spring.
- Obtain more information on turf from the EPA's brochure entitled, "Healthy Lawn, Healthy Environment: Caring for Your Lawn in an Environmentally Friendly Way."

Ornamental Shrubs and Trees:

- Apply fertilizer and nutrients to annuals and perennials during active growth and to shrubs and trees during dormant season or early in the growth season.
- If using fertilizer, use the correct one at the suitable time, water properly, and reduce compaction.
- Prune branches to improve plant health and prevent access by pests to structures.
- Use the appropriate pest-resistant variety (check with your local Agricultural Extension Service), and properly prune for growth and structure.
- Correctly identify the pest in question. When in doubt, send several specimens to your local Cooperative Extension Service. Once the pest is identified, recommendations can be made.
- Use pheromone traps as a time saving technique for determining the presence and activity periods of certain pest species. Pheromones are

chemicals released by various organisms as means of communications with others of the same species, usually as an aid to mating.

- Select replacement plant material from among the many disease-resistant types being developed by plant breeders throughout the county.
- Check with your Local State Agricultural Extension Service or University for information on plant types appropriate for your site.
- Remove susceptible plants if a plant disease recurs and requires too many resources, such as time, energy, personnel, or money. Some ornamental plants, trees, and turf are so susceptible to plant diseases that the efforts to keep them healthy may be futile.

Applying Pesticides Judiciously. Many different kinds of pesticides are currently available for use against urban and structural pests. An appropriate application uses the least toxic and most effective and efficient technique and material. Due to their potentially toxic nature, these materials should be applied by qualified applicators in a manner to ensure maximum efficiency with minimal hazard. Pesticides should be applied only when occupants are not present in areas where they may be exposed to materials applied and only when students are not expected to be present for at least 12 hours.

All pesticides used in the U.S. must be registered with the EPA, and the registration number must be listed on the label. Read and follow the pesticide label directions, know how to apply and handle these chemicals, and try to minimize the exposure to children, adults, and other non-target species.

The following general recommendations should minimize exposure to people and other non-target species when the application of pesticides is being considered:

- Read and follow all label instructions.
- Choose a pesticide that is labeled for the specific site, intended for the pest you are trying to control, and targeted as specifically as possible, rather than for a broad spectrum.
- Use a spot-treatment method of application when pesticide treatments are required. Treat only the obviously infested plants in an area. This procedure helps conserve predators and parasites needed to reduce future pest populations and increases the time between pest outbreaks.

- Limit the use of sprays, foggers, or volatile formulations. Instead use bait and crack and crevice applications when possible. Look for crack and crevice label instructions on how to apply the pesticide. These treatments maximize the exposure of the pest to the pesticide exposure for the occupants.
- Place all rodenticides either in a location not accessible to children and non-target species or in tamper-resistant bait boxes. Outdoors, place bait inside the entrance of an active rodent burrow to prevent non-target species' access. Securely hook or fasten shut the lids of all bait boxes. Place bait in the protected feeding chamber of the box. Never place bait in the runway of the box.
- Apply only when occupants are not present or in areas where they will not be exposed to the material applied. Note any re-entry time limits listed on the label, and be aware that some residues can remain longer after application.
- Use proper protective clothing or equipment when applying pesticides.
- Properly ventilate areas after pesticide application.
- Notify students, staff, and interested parents of upcoming pesticide applications as noted in the school pest management policy. Pay particular attention to those individuals that may be at higher risk.
- Keep copies of current pesticide labels, consumer information sheets, and Material Safety Data Sheets (MSDS) easily accessible.

Storing Pesticides. Store pesticides off site or in buildings that are locked and inaccessible to all undesignated personnel. Be sure adequate ventilation is provided for the pesticide storage area. Store herbicides separately to avoid potential damage to plants from the absorption of vapors onto other pesticides stored nearby. Avoid storing pesticides in places where flooding is possible or in open places where they might spill or leak into the environment. Store flammable liquids away from an ignition source. Check for state recommendations and requirements for pesticide storage.

If pesticides are stored in occupied buildings, take special care to ensure that the air in the occupied spaces does not get contaminated. Place a notice outside the designated storage area. Store all pesticides in their original containers, and secure lids tightly. Make sure that childproof caps are properly fastened. Because even closed pesticide containers may release toxic chemicals into the air through volatilization, store pesticides only in spaces

that are physically separated and closed off from occupied spaces and where there is adequate exhaust ventilation (the air is vented directly to the outside). In addition, precautions are needed to ensure that the air in the storage space has no chance of mixing with the air in the central ventilation system.

The IPM Coordinator is responsible for periodically checking stored pesticide containers for leaks or other hazards. To preclude pesticide storage problems, buy only enough of the pesticide product to last through the season of use. Mix only the amount of pesticide needed for the immediate application.

Posting and Notification. State law requires schools to notify students and staff of impending pesticide applications. When good IPM practices are followed, concerns raised by notification and posting activities may be minimized. If notification and posting is a new practice at the school, the new policy should be explained so that it will not be misinterpreted to imply that more pesticides are being applied than previously.

Notification can be accomplished by posting notices around the school and sending notices home to those parents who wish to be informed in advance of pesticide applications. Schools must post notices in areas to be treated. The school IPM Coordinator should be prepared and be available to provide more specific information to concerned parents and others.

A voluntary registry of individuals who could be adversely affected by exposure to pesticides can be kept at the school health or administrative offices. Information on how to contact the local poison control center and emergency personnel should be kept readily accessible. The school may also wish to consider informing the adjacent community in advance of planned outdoor pesticide applications.

Compliance with the Structural Pest Control Act. The Texas Structural Pest Control Board (SPCB) is charged with the responsibility of ensuring that all school districts in the state comply with the requirements of the Structural Pest Control Act. Representatives of the SPCB may, at the discretion of the board or in response to a complaint, investigate to determine whether a school district is in compliance with the Act. The school district's pest management policy as well as any school district efforts to comply with the minimum standards, as outlined, shall be documented and kept on file by each district. To

determine compliance with the Act, school districts are required to make these files available to SPCB investigators upon request. For additional information write to:

Texas Structural Pest Control Board
1106 Clayton Lane. Suite 100LW
Austin, TX 78723
Telephone: (512) 451-7200
Fax: (512) 451-9400
E-Mail Address spcb@spcbtx.org.

Lighting at School

The adequacy of interior and exterior lighting on school grounds is primarily the responsibility of architects and illuminating engineers. However, it is important for the administration, staff, and faculty to be able to make recommendations for change when needed. The state of Texas recommends that “adequate lighting” be provided for school facilities. However, no further explanation is offered. The following lighting recommendations are from the Virginia School Health Guidelines:

The electrical lighting system should be capable of the following light intensities:

- 70-foot candles¹⁰ for classrooms, libraries, offices, laboratories, and shops;
- 100-foot candles for drafting, typing, and sewing rooms, and other rooms where close eye task activities are routinely conducted;
- 30-foot candles for reception rooms, gymnasiums, service rooms, swimming areas, and dining areas;
- 15-foot candles for auditoriums, locker rooms, and stairways;
- 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.¹¹

While quantity of light is important, the quality of light is even more important. In order to supply suitable light to all working surfaces for efficiency and comfort, the following should be considered:

- Control of both bright and dark areas to avoid glare: This is best accomplished by diffusion—light coming from many directions rather than a single source, whether artificial or natural, but also the reflective surfaces of desks, walls, woodwork, etc. The adverse effects of glare are cumulative: for a short time, they are annoying; with prolonged exposure, a person becomes progressively fatigued and may develop eyestrain and headaches.
- Influence of room colors on 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. Warm tones—peach or white with pink tones, for example—are considered best.
- Different light intensities for different tasks.

Illumination deteriorates rapidly when windows are not kept clean and ceiling surfaces are not well maintained. As light bulbs are used, they blacken and give off less light. Dirt and dust reduce reflection and transmission of lighting units. Flickering lights should be replaced before burnout because the strobe effect of a flickering light may cause a person who has a history of seizures to have an altered seizure threshold. Therefore, regular inspection is needed. 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?¹²

Promoting Healthy Computer Use

As students and staff spend more time using computers at school, it is important to be aware of steps that can be taken to avoid decreased productivity, comfort, and health. The Centers for Disease Control and Prevention (CDC) recommends the following:

Monitor Adjustment

The computer monitor should be placed so the top of the screen is at or just below eye level when seated in an upright position. The following suggestions can help prevent the development of eyestrain, neck pain, and shoulder fatigue while using a computer:

- Make sure the surface of the viewing screen is clean.
- Adjust brightness and contrast to optimum comfort.
- Position the monitor directly in front of the user to avoid excessive twisting of the neck.
- User must position the monitor at a comfortable viewing distance, approximately 18-30 inches from the user.
- Position monitors at right angles from windows to reduce glare. Close window blinds as needed to reduce glare from sunlight.
- Position monitors away from direct lighting that creates excessive glare or use a glare filter over the monitor to reduce glare.
- Adjust the monitor tilt so that ceiling lights do not reflect on your screen. If a document holder is used, it should be placed at approximately the same height as the monitor and at the same distance from the eyes to prevent frequent eye shifts between the monitor screen and reference materials.
- Get regular eye check-ups.
- Adjust as needed for larger screens. You may need to sit farther away and increase the font size to take full advantage of the larger screen.

Lighting

Lighting not suited to working with a computer is a major contributing factor in visual discomforts including eyestrain, burning or itching eyes, and blurred or double vision. The lighting in most school environments is too bright for optimal video display terminal (VDT) screen viewing. The illumination may be reduced by removing 2 bulbs in a 4-bulb fluorescent fixture, removing the bulbs in every other fixture, or turning off overhead lights altogether. Supplemental desk lighting is better than overhead lighting for reading or printed copy.

Use the following recommendations to reduce eyestrain and eye fatigue:

- Close drapes/blinds to reduce glare.

- Adjust lighting to avoid glare on screen (light source should come at a 90 degree angle, with low watt lights rather than high).
- Avoid intense or uneven lighting in your field of vision.
- Place monitor at 90 degree angle to windows where possible.
- Reduce overhead lighting where possible.
- Use indirect or shielded lighting where possible.
- Walls should not be painted with a reflective finish.
- Use a glare screen or monitor shield to reduce glare from overhead lighting.
- Replace flickering lights. Do not wait for flickering lights to burn out before replacement.

Additional information regarding the use of computers can be found on the CDC website at <http://www.cdc.gov/od/ohs/Ergonomics/compergo.htm#MONITOR>.

The American Federation of State, County, and Municipal Employees has released the following statement on radiation concerns regarding video display terminal (VDT) use:

Many people fear that they are exposed to harmful doses of radiation when they use a computer. The main concern regarding VDTs and radiation involves non-ionizing radiation emitted by VDTs. VDTs give off very low frequency (VLF) and extremely low frequency (ELF) radiation. Nonionizing radiation is not as strong as x-rays and other types of radiation that are known to cause cancer and other illnesses.

The source of the radiation is the flyback transformer located in the rear of the monitor. Therefore, the radiation is strongest at the back of the machine rather than in front of the screen.

The research that has been conducted so far does not indicate that VDTs are a radiation hazard. VDT operators and others remain concerned, however, because these studies have not completely answered all the questions about potential risks. More research needs to be done about the possible risks of VDT radiation.

Although there is no conclusive evidence that VLF and ELF are harmful, a policy of "prudent avoidance" is still worth considering. The idea is to reduce exposure to radiation by moving people away from the source of the radiation. This means placing machines in such a way so that there is at least three to four feet between the back of the monitor and any employee.¹³

Protective Eyewear in Schools

The Texas Department of Health has developed guidelines for the selection and use of protective eyewear for students and teachers in public schools. Eye protection must be used when there is a reasonable probability of injury that can be prevented by eye protection, including where machines or operations present the hazard of flying particles, pieces, or substances.¹⁴ School districts shall furnish protective eyewear that is suitable for the work to be performed, and teachers and students are required to use this protective eyewear. Only protectors that bear the label of or meet the standards set forth in American Standards Association Bulletin Z2.1-1959 shall be used.

Protectors shall meet the following minimum requirements:

- Provide adequate protection against the particular hazards for which they are designed;
- Be reasonably comfortable when worn under the designated conditions;
- Fit snugly and shall not unduly interfere with the movements of the wearer;
- Be durable;
- Be capable of being disinfected; and
- Be easily cleaned.

Workers whose vision requires the use of prescription eyeglasses shall be provided with goggles of one of the following types:

- Goggles whose protective lenses provide optical correction.
- Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles, or

- Goggles that incorporate corrective lenses mounted behind the protective lenses.

Face shields are designed to provide protection to the face (i.e., the front part of the head including forehead, eyes, cheeks, nose, mouth, chin) and neck, where required, from flying particles and sprays of hazardous liquids and, in addition, to provide antiglare protection where required.

Typical uses for face shields include the following:

- Woodworking operations where chips and particles fly;
- Metal machining causing flying particles;
- Buffing, polishing, wire brushing, and grinding operations where flying particles or objects may strike the face;
- Spot welding; and
- Handling hot or corrosive materials.

Helmets and hand shields are designed to provide protection for the eyes, face, ears, and neck against intense radiant energy. Typical operations that require helmets or hand shields include various kinds of arc welding and heavy gas cutting.

Different types of goggles and spectacles should be used to protect the eyes from flying objects, fine dust particles, liquid splashes, fumes, glare, injurious radiation, and other dangerous circumstances. For information on the uses and regulations of the different types of goggles and spectacles, please refer to 25 Texas Administrative Code §295.145.

Maintenance of Protective Eyewear

It is crucial that protective eyewear is kept clean and is disinfected before use by another person. Daily cleaning of the eye protector with soap and hot water is recommended. Regular disinfection of eyewear is essential. The most effective method of disinfection is to disassemble the goggles or spectacles and thoroughly clean all parts with soap and hot water. Carefully rinse all traces of soap and replace defective parts with new ones. Swab thoroughly or completely immerse all parts for 10 minutes in a solution of germicidal deodorant fungicide. Remove parts from the solution and suspend in a clean place for air drying at room temperature or with heated air. Do not rinse after removing parts from solution because this will remove the germicidal residue, which retains its effectiveness

indefinitely. The dry parts or items should be placed in clean, dust-proof containers, such as a box, bag, or plastic envelope to protect them until reissue.

Animals in the Classroom

Animals kept in laboratories and classrooms present problems when their cages are not kept clean or when students or staff with allergies are present.

The National Association of School Nurses has adopted a position statement regarding animals in the classroom:

History:

Animals have been part of the learning experience of students for many years. Animals are effective teaching aids with positive benefits of bonding and caring. Service animals are used to assist some individuals with disabilities.

Description of Issue:

The human/animal bond is therapeutic and well established. The use of service animals is protected by law and may not be regulated by local education agencies. Animals are effective teaching aids and encourage caring skills and responsibility in students. There is, however, potential for adverse effects from animals:

- Allergic reactions
- Scratches and/or bites
- Asthmatic reactions
- Infections
- Infestations

Conclusion:

It is the position of the National Association of School Nurses that the practice of keeping animals in the classroom should be carefully monitored. Students with allergies and other special needs must be considered as individual school districts develop and implement policies

regarding animals in classrooms. Attention to potential for infection and allergic reaction is a necessary safeguard for the entire school community.¹⁵

School Building Requirements

To comply with state and federal law, the following standards apply to school facilities that are newly constructed or undergo major space renovation¹⁶ after September 1, 1998.¹⁷

For each type of instructional space, a district may satisfy minimum square foot requirements by using, as appropriate, either the standard for the minimum square feet per pupil or for square feet per room specified below. Room size requirements are based on rooms that will house 22 students at the elementary level and 25 students at the middle or high school level.

General Classrooms:

- Classrooms for pre-kindergarten to Grade 1 shall have a minimum of 36 square feet per pupil or 800 square feet per room.
- Classrooms at the elementary school level shall have a minimum of 30 square feet per pupil or 700 square feet per room.
- Classrooms at the secondary school level shall have a minimum of 28 square feet per pupil or 700 square feet per room.

Specialized Classrooms:

- Computer laboratories shall have a minimum of 41 square feet per pupil or 900 square feet per room at the elementary school level; and 36 square feet per pupil or 900 square feet per room at the secondary school level.
- Science lecture/lab rooms shall have a minimum of 41 square feet per pupil or 900 square feet per room at the elementary school level; 50 square feet per pupil or 1,000 square feet per room at the middle school level; and 50 square feet per pupil or 1,200 square feet per room at the high school level.

Major Support Areas:

- Primary gymnasiums or physical education space, if required by the district's educational program, shall have a minimum of 3,000 square feet at the elementary school level; 4,800 square feet at the middle school level; and 7,500 square feet at the high school level.
- Libraries shall have a minimum of 3 square feet times the planned student capacity of the school. The minimum size of any elementary school library shall be 1,400 square feet. The minimum size of any middle school library shall be 2,100 square feet. The minimum size of any high school library shall be 2,800 square feet.

A school district in an area that has adopted local building codes shall comply with those local codes, including fire, mechanical, electrical, and plumbing codes. A school district located in an area that has not adopted local building codes shall adopt and use the latest edition of either the Uniform Building Code or Standard (Southern) Building Code, related fire, mechanical, and plumbing codes, and the National Electric Code.

School districts shall comply with the provisions of the Americans with Disabilities Act of 1990 (Title I and Title II; see Appendix A) and other local, state, and federal requirements, as applicable. ADA requirements for access to facilities can be found on the web at <http://www.access-board.gov/adaag/html/adaag.htm#2.1>.

Fire Escapes

The standards for fire escapes in schools in Texas are contained in Appendix A of this manual. When inspecting fire escapes, be sure to test alternate means of exit from the building, such as windows, as well as all smoke detectors. An ideal time to test these alternate escape routes is during a fire drill. It is important that all staff members are knowledgeable about fire escape use, alternative escape routes, and any protocols the school may have in place in case of fire or other disaster, such as chemical spills, flooding, electrical outage, etc.

Safe Playgrounds

There has been a dramatic increase in playground-related injuries over the past two decades. According to the United States Consumer Product Safety Commission (CPSC) statistics, nearly 200,000 playground-related injuries requiring emergency room visits occur each year.¹⁸ The National Program for Playground Safety has published a Playground Inspection Guide, contained below, that can be instrumental in helping schools maintain safe playgrounds. This guide can also be found on the web at <http://www.uni.edu/playground/tips/general/inspect.html>.

PLAYGROUND INSPECTION GUIDE:

10 Steps to Safer Playgrounds for Children

1. Make sure adult supervision is present at the playground.

- It is estimated that more than 40 percent of playground injuries may be related in some way to inadequate supervision. Children should always be observed when playing on playground equipment. Adults need to watch for potential hazards, observe children playing, intercede in and facilitate play when necessary, and be available in case an injury occurs.

2. Guide children to play on age-appropriate equipment.

- Children are developmentally different. Therefore, equipment designed for children ages 5 to 12 is too big for children ages 2 to 5. Different playing areas for each of the age groups should be available and children should only play on their age-appropriate equipment.

3. Survey the play area and make sure it is free of apparent hazards.

- When visiting a play area, first visually survey the area and check to see that there are no apparent immediate hazards. Hazards range from broken glass or metal pieces lying around to playground design that creates congestion among the play equipment where children could collide or fall on each other. If the area is near a street or parking lot, make sure there is

fencing to prevent the children from running in front of cars. Be sure that metal equipment is in shaded areas or has a protective surface to prevent burns.

4. Check the playground surface for cushioned surfacing beneath equipment and its fall areas.

- Falls to surfaces are responsible for more than 70 percent of the injuries sustained on playgrounds. Improper surfacing is the leading cause of many of those injuries. Hard surfaces such as asphalt, blacktop, concrete, grass, packed dirt, or rocks should not be used. A fall to those surfaces could be life threatening. Acceptable surfaces include hardwood fiber/mulch, pea gravel, and sand. Other options include synthetic surfaces such as rubber tiles, mats, or poured surfaces. Surfaces should be maintained to a depth proportionate to the height of equipment. A good guideline would be to use 12 inches of loose fill, such as mulch, pea gravel, or sand, for equipment up to eight feet in height. Manufacturers of synthetic surfaces should make recommendations of the depth of their products depending on equipment height. Loose-fill surfaces may need to be pushed back underneath equipment for adequate cushioning if the material has been moved or pushed to the edge of the play area. Cushioned surfacing should be provided under all equipment and its fall zones. Therefore, cushioned surfacing should be extended a minimum of six feet in all directions from the perimeter of the equipment.

5. Examine equipment such as ladders, platforms, and steps.

- Climbers and monkey bars are popular equipment that promote strength and coordination skills. However, they also have the highest incidence of injury on public playgrounds and need to be closely supervised. Check to see that steps on climbers are in good condition and that handrails have appropriate grip sizes for children. If the climber has a platform, it should be surrounded with a guardrail or protective barrier. The choice of protection depends on the age level of children using the equipment and the height of the platform. For platforms for younger children, the

guardrails and protective barriers should be at least 29" high; for school-aged children, the barriers should be at least 38" high.

6. Survey types and quality of swings.

- Swings are also favorite equipment that need close observation. They are the pieces of moving equipment that are most likely to cause injuries. For preventive measures, the following changes are suggested: remove animal swings; remove metal or wooden seats and replace with soft seats; make sure swings are on a separate framework rather than attached to other equipment. Only two swings should be placed in each bay (or framework) that supports the swings. Swings should be positioned at least 24" apart at the base of the seats and 30" from any supports. Swings should have a fall zone that is twice the height of the pivot or swing hanger in front and in back of the swing seats. For example, if the hanger pivot height is 10 feet, the fall zone must be 20 feet in front and 20 feet in back of the swing seat. The fall zone also should extend six feet to each side of the support structure.

7. Check out the slides.

- Slides should be well-anchored and have firm handrails for gripping and steps with good traction. Steps should have drainage holes to make them less slippery. There should be no spaces between the slide platform and the slide bed where strings from clothing could catch and cause strangulation. Make sure metal slides are shaded or covered to prevent burns in the hot sun.

8. Review the seesaw area.

- Make sure the handles of the seesaw are secure and of a size and design that children can grip easily. Check to see if there is a soft bumper under the bottom of the seat to cushion the hit to the surface and that all pivot points are covered to prevent pinched fingers.

9. Inspect the action of merry-go-rounds.

- Merry-go-rounds should be firmly anchored into the ground and have handles for children to grasp easily. The surface under the bed of the merry-go-round should be positioned so that children cannot slide underneath. The gearbox should be covered so fingers cannot get caught. Finally, a governor should be attached to control the ultimate speed of the unit.

10. Be a good neighbor.

- Be sure to leave the area in good condition. Have the children help you redistribute any loose surfacing that may have been pushed aside by play back under swings and the bottom of slides. Close any gates that may be open.

To report a product hazard or a product-related injury, write to the U.S. Consumer Product Safety Commission, Washington, DC 20207 or call the toll-free hotline at 800-638-2772.

What You Can Do

Playground guidelines are only as useful as their level of implementation. Making a playground safer for children largely involves adequate supervision of children on playground equipment. Therefore, teachers and playground monitors should have a centralized, shaded (if possible) area on the playground in which to stand so that students may easily find assistance if they need it. Additionally, a kit containing a first aid kit, CPR mask, gloves, accident report forms, and a means of communicating with the school nurse's office or the administrative office of the school, if the playground is located a fair distance away, should be placed in an accessible area on the playground should an accident occur.

Surfacing on Playgrounds

Approximately 106,000 of all public playground injuries and several deaths each year are related to falls to surfaces. However, shock-absorbing surfaces can help disperse the momentum of a falling body or head, thus, reducing the risk of life threatening injuries.

The National Program for Playground Safety, the U.S. Consumer Product Commission (CPSC), and other organizations highly recommend the use of various loose-fill materials such as pea gravel and wood fiber as well as synthetic surfaces that tend to be shock absorbing. Surfaces such as asphalt, cement, dirt, grass, and rocks should not be used unless they are being utilized as the base for other appropriate shock absorbing surfaces.

CPSC has established recommendations for appropriate surfacing based on their own testing. One of CPSC's main points states that the more shock absorbing a surface can be made, the more likely it is to reduce injuries. However, it should be recognized that all injuries due to falls can not be prevented no matter what playground surfacing material is used.

There are no perfect playground surfaces. Playground safety experts highly recommend the use of various loose-fill or synthetic surface materials. The selection of cushioned surfacing varies from playground to playground. Purchasers need to ask the following questions. Does it meet American Society for Testing & Materials (ASTM) standards and CPSC guidelines? Does it have a proven track record in similar climates? Is it readily available? What are initial and maintenance costs? Will it meet the playground's needs as far as durability, drainage and accessibility?

Acceptable loose-fill materials include hardwood fiber chips or mulch, pea gravel, sand, and shredded rubber. Recommended synthetic surfaces include rubber tiles, rubber mats, or synthetic poured surfaces.

Loose-fill surfaces should be maintained to a depth proportionate to the height of the equipment. However, a 12-inch depth is a good guideline for equipment up to 8 feet in height.

Manufacturers should provide testing results to indicate appropriate depth of synthetic materials. Be sure to check CPSC guidelines and ASTM standard F1292-95 to make sure the manufacturers testing information is in compliance with recommendations.

Where should cushioned surfacing be placed?

Cushioned surfaces should be placed in all playground fall zones. Fall zones are defined as the area under and around playground equipment where children may fall. The total surfacing space is dependent on the type of equipment at the playground. In general, the

surface should extend a minimum of six feet in all directions from the edge of stationary playground equipment. Because of the momentum of children playing on slides or swings, different calculations for those fall zones need to be made.

The fall zone for slides higher than four feet can be determined by adding four feet to the height of the slide. For example, a six-foot slide should have 10 feet of surfacing extending beyond the exit of the slide. The maximum amount of surfacing for the end of any slide is 14 feet. Fall zones for swings are twice the height of the pivot or swing hanger in front and in back of the swing seats. For example, if the hanger pivot height is 10 feet, the fall zone must be 20 feet in front and 20 feet in back of the stationary swing seat. Surfacing should also extend six feet to each side of the support structures.

What are acceptable surfaces for playground access?

New surface materials are being developed daily to help meet accessibility needs for disabled persons. Currently, the most generally accepted surfaces for wheelchair accessibility are uniform wood chips, and synthetic products such as rubber mats or tiles and poured-in-place surfaces. Playground planners should note that the whole play area may not need accessible surfacing. However, an accessible path should be provided to the equipment and accessibility should be made so that play opportunities are given to all children.

Accessible paths should be 60 inches wide, slip resistant and have a slope not greater than 1:12. Transfer stations on playground equipment and parking areas for wheelchairs are good ideas to improve accessibility.

How to Determine How Much Loose-Fill Surfacing Is Needed

This information is based on CPSC critical height testing. The National Program for Playground Safety recommends that in general 12 inches of uncompressed loose-fill material be used for equipment up to eight feet in height.

Nine inches of compressed [material listed] will adequately provide safety for equipment with critical heights up to:

- Wood mulch /10 feet.
- Double shredded bark/7 feet.
- Uniform wood chips/6 feet.

- Fine sand/5 feet.
- Coarse sand/4 feet.
- Fine (pea) gravel/6 feet.
- Medium gravel/5 feet.

In other words, if you have equipment that has an eight-foot high slide, wood mulch would be the only loose fill material considered safe at a depth of nine inches compressed. Although testing has been done on both compressed and uncompressed materials, please remember that all loose materials compact, especially in high-usage areas and in cold and wet weather. Thus, when installing loose-fill materials allow for compression.¹⁹

Resources for School Facility Construction and Renovation

The Texas Association of School Administrators (TASA) recommends the following organizations' websites as resources.²⁰

TASA's Facility Planning Services

On the web: <http://www.tasanet.org/depserv/facilities/facilitiesi.html>

- These services are designed to assist school districts in addressing requirements related to space, demographic population shifts, state and federal building codes, educational programming, and long-range planning. The facilities studies provide districts with factual, objective data that can be used to justify a bond issue.

Building Officials and Code Administrators International, Inc.

On the web: <http://www.bocai.org/>

- A nonprofit membership association comprised of more than 16,000 professionals who are directly or indirectly engaged in the construction and regulatory process. BOCA is dedicated to preserving the public health, safety and welfare in the built environment through the effective, efficient use and enforcement of Model Codes.

The Clinton Administration's FY2001 School Modernization Proposal

On the web: <http://www.ed.gov/inits/construction/>

- The Council of Educational Facility Planners, International (CEFPI). Site includes publications, consultant directory, industry research, job board, etc.

ENERGY STAR

On the web: <http://yosemite1.epa.gov/estar/business.nsf/webmenus/K-12>

- A free tool and program available to assist schools in implementing affordable energy-efficient improvements. ENERGY STAR, a company that provides a suite of offerings that meets energy management needs, has made available a free K-12 press kit that gives insight on how schools across the nation are implementing affordable energy-efficient improvements. The press kit includes profiles of energy-efficient schools, tips for creating an energy-efficient school, information on financing energy upgrades in schools, and other online resources. In addition, ENERGY STAR provides tools to forecast your gains, learn about strategies to improve energy performance, and estimate financial returns.

Instructional Facilities Allotment (IFA)

On the web: <http://www.tea.state.tx.us/school.finance/facilities/index.html#idesc>

- The IFA program was enacted by House Bill 1 of the 75th Legislature. The program provides assistance to school districts in purchasing agreements. Bond or lease-purchase proceeds must be used for the construction or renovation of an instructional facility.

International Conference of Building Officials

On the web: <http://www.icbo.org/>

- ICBO is dedicated to public safety in the built environment worldwide through development and promotion of uniform codes and standards, enhancement of professionalism in code administration and facilitation of acceptance of innovative building products and systems.

National Clearinghouse for Educational Facilities

On the web: <http://www.edfacilities.org/index.html>

- Resources for planning, designing, building, and maintaining K-12 schools. (NCEF is part of the U.S. Department of Education's Educational Resources Information Center.)

New Instructional Facilities Allotment (NIFA)

On the web: <http://www.tea.state.tx.us/school.finance/facilities/index.html#ndesc>

- The NIFA was enacted by Senate Bill 4 of the 76th Legislature. A facility eligible for the NIFA is a newly constructed instructional site (campus), not occupied prior to the 1999-2000 school year, and used for teaching the curriculum required by Chapter 28, Education Code.

Qualified Zone Academy Bonds (QZABs)

On the web: <http://www.ed.gov/inits/construction/qzab.html>

- QZABs are a new type of bond that school districts can use to save money on school renovation projects. QZABs provide tax credits to pay interest on bonds for a variety of educational expenses (including building renovation) related to public school-business partnerships in Empowerment Zones and low income areas.

Reinvigorating Our Schools

On the web: <http://www.e-architect.com/resources/schools/home2.asp>

- A guide to help you think and talk about renewing your schools through innovative planning and design and high-quality construction.

School Facility Standards

On the web: <http://www.tea.state.tx.us/rules/tac/ch061cc.html#61.1033>

- Texas Administrative Code, Title 19, Part II, Chapter 61. School Districts, Subchapter CC. Commissioner's Rules Concerning School Facilities.

Southern Building Code Congress International

On the web: <http://www.sbcci.org/>

- Provides technical, educational, and administrative support to governmental departments and agencies engaged in building codes

administration and enforcement. SBCCI also provides similar support to others in the building design and construction industry.

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- ⁷ U.S. Environmental Protection Agency. (June 2001). Mold Resources: Mold and Indoor Air Regulations [On-line]. Available: <http://www.epa.gov/iaq/pubs/moldresources.html#>
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- ⁹ Texas Structural Pest Control Board. (July 2001). Pest Control in the School Environment: Adopting Integrated Pest Management. [On-line]. Available: <http://www.spcb.state.tx.us/ipm/Adopt.htm>
- ¹⁰ A "foot candle" is a standard unit, established as a reference and used when measuring the quantity of light. One Foot Candle equals the total intensity of light that falls upon a one square foot surface that is placed 1 foot away from a point source of light.
- ¹¹ Virginia School Health Guidelines. (1999). In T. P. Keen, & N. Ford (Eds.) Healthful Environment: Lighting (pp. 422-23). Richmond, Virginia: Virginia Department of Health.
- ¹² Massachusetts Comprehensive School Health Manual. (1995). In I. F. Goodman, & A. H. Sheetz (Eds.) Safe and Healthful Environment: Indoor air quality (section. 4-18, 4-19). Boston, Massachusetts: Massachusetts Department of Health.
- ¹³ American Federation of State, County, and Municipal Employees. (July 2001). Health Problems of VDT Work [On-line]. Available: http://www.afscme.org/health/keys_02.htm
- ¹⁴ 25 Texas Administrative Code §295.144
- ¹⁵ National Association of School Nurses. (July 2001). Animals in the Classroom [On-line]. Available: <http://www.nasn.org/positions/animals.htm>
- ¹⁶ "Major space renovation" means at least 50% of the gross area of the facility's instructional space is within the limits of the work. Other renovations associated with repair or replacement of architectural interior or exterior finishes; fixtures; equipment; and electrical, plumbing, and mechanical systems are

subject to local building codes, but not to the square foot requirements set forth by the Texas Education Agency.

¹⁷ 19 Texas Administrative Code §61.1033.

¹⁸ National Program for Playground Safety. (July 2001). Playground Safety Tips [On-line]. Available: <http://www.uni.edu/playground/tips.html>

¹⁹ National Program for Playground Safety. (July 2001). Fall Surfacing Guidelines for Playgrounds [On-line]. Available: http://www.uni.edu/playground/tips/SAFE/fallsurf_guidelines.html

²⁰ Texas Association of School Administrators. (July 2001). Facility Resources [On-line]. Available: http://www.tasanet.org/resources/resources_facilities.html