UT Extension

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Suggested Guidelines for Managing Pests in Tennessee's Schools:

Adopting Integrated Pest Management

THE UNIVERSITY of TENNESSEE

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Adopting Integrated Pest Management

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West Virginia Department of Agriculture. 1995. Integrated Pest Management in Schools
and Other Public Institutions.

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Introduction

Why We Should Use Integrated Pest Management in Schools

We all agree it is necessary to protect our children and other school occupants from unnecessary exposure to pest control products, while also ensuring they are not subjected to the health risks associated with pests. Cockroaches can pose a severe health threat. German cockroaches are the most common pests in commercial kitchens and they, along with flies and other pests, may transmit food poisoning agents. Cockroaches and their remains are a leading cause of asthma. Mosquitoes, ticks, fleas, rodents and birds are involved in the transmission of such diseases as viral encephalitis, Rocky Mountain spotted fever, ehrlichiosis and others. We are all aware that most pests are a nuisance, regardless of their ability to transmit diseases.

What Exactly Is IPM?

Integrated Pest Management (IPM) is an environmentally friendly approach to pest management that relies on common-sense practices to manage pests. IPM emphasizes regular inspecting and monitoring of pests to detect them at low population levels, which is a better alternative than the scheduled spraying of pesticides. Information about the life cycle of the pest and its interactions with the environment are used to make a control decision. Thresholds have been developed for some pests. This means no control measures may be needed if the number of pests has not exceeded a given threshold. If control measures are necessary, the pest is managed with a combination of techniques that are economically feasible and that reduce risk to human health, property and the environment. This may include the reasonable use of pesticides.

Most pests need access to food, water, air and shelter. By removing the basic survival elements or by blocking access into a structure, pest populations can be lowered or prevented from establishing. Blocking access into the structure may be as easy as shutting doors when not in use; adding weather-stripping so doors close tightly; caulking and sealing openings in walls, especially around plumbing penetrations and wall/floor interfaces; installing or repairing screens; and pulling vegetation, shrubs and wood mulch at least 12-18 inches away from a structure to discourage occasional invaders as well as carpenter ants, termites and other pest species. Traps and vacuums are other less toxic approaches that can be used to manage pests. Pesticides may be necessary, but they should be used in a manner to minimize the risk of exposure to the occupants. The use of baits, dusts in wall voids and sprays applied in cracks and crevices should reduce exposure of pesticides to occupants. Using pesticides less frequently also decreases the chance of a pest becoming resistant. By using IPM, pesticide use can be reduced, and economical and effective pest suppression can be achieved.

IPM in Schools

IPM is currently implemented in schools around the country (in Arizona, California, Florida, Illinois, Maryland, Michigan, New Jersey, New York, Massachusetts, Ohio, Oregon, Pennsylvania, Texas and elsewhere) including those in Nashville and Memphis, TN (Appendix 1). IPM principles and methods have been adopted in Metro Nashville's School System and Juvenile Court Building.

In 1994, complaints about cockroach populations in Memphis City Schools escalated, and environmentalists with the local Sierra Club obtained a list of pesticides being used. The Sierra Club objected to several of the pesticides and to their application during the school day. With the help of others, including a local environmental group in Nashville, the media was contacted statewide. Comments came from parents, school board members, state representatives, principals, environmentalists and journalists. To their credit,

the Memphis City Schools listened to the community and adopted IPM.

Memphis has developed a good IPM program after listening to the somewhat forceful suggestions of local activists and citizens. However, if IPM can be adopted for schools in a more cooperative and proactive manner, we will have more flexibility to seek solutions that fit each situation.

Currently, IPM in schools is not mandated by the state of Tennessee. The Association of Structural Pest Control Regulatory Officials, a national organization, has suggested a School Integrated Pest Management Act of 1996 be adopted in every state. This act suggests schools adopt IPM on a voluntary basis. Although it has not been officially adopted by the Tennessee Department of Agriculture (TDA), it may be in the future. One law that is in effect is 62-21-124 of the TDA's Division of Regulatory Services' "Laws and Regulations Governing Pest Control Operators and Applicators of Restricted Use Pesticides."

62-21-124. Pesticides in buildings used for food preparation and service, or lodging.

(a) Whether or not engaged in the business of applying pesticides, a person may not apply a pesticide within any of the following buildings, except under the direct supervision of a person licensed to apply pesticides in accordance of this chapter:
(1) any building used for the preparation or serving of food;
(2) any building used for the temporary or permanent lodging of others;
(3) any building used primarily for educational purposes, except those buildings used primarily for religious instruction or for providing education to not more than seven (7) persons; or
(4) any commercial food processing facility.

This basically says no one may apply pesticides in a school if he or she is not under the direct supervision of a licensed operator. Therefore, school personnel should not use aerosol cans of flying insect spray or leave rat bait, etc. within the school boundaries. Other state and federal (and maybe local) laws pertain to the storage, transportation and application of pesticides.

A mishap in Texas relating to lice control caused legislation to be enacted to mandate IPM in Texas schools. An outbreak of head lice in a school caused local volunteers to take matters into their own hands. Volunteers sprayed toxaphene and lindane, pesticides used to control lice on cattle, throughout the school to control head lice. This caused students to have severe headaches, nausea, skin irritations, etc., which resulted in the school being closed for four weeks for decontamination. Let's avoid a mishap like this in Tennessee. Adopt IPM in your school system. It is the best method to control pests. Mishaps can occur with licensed operators also. It is important to find responsible, qualified contractors. The bidding process sometimes results in contracts being awarded to companies with lower performance standards. Price should not be the sole factor upon which a contract is awarded. Many schools and businesses address this problem by using a weighted factor rating system.

IPM in schools should not be a new concept to school officials. Some educators may have read about this in journals or in media releases. In 1995, each school system in Tennessee should have received the booklet entitled, "Pest Control in the School Environment: Adopting Integrated Pest Management," prepared by the United States Environmental Protection Agency. A letter from University of Tennessee Extension again introduced the concept of IPM to all public school systems in September 1996.

In 1996, seminars demonstrating IPM in schools to the pest control industry were conducted at five locations throughout the state. During these sessions, certificates were distributed to each person attending. Numerous articles pertaining to IPM in schools have appeared in the pest control trade journals. Representatives from industries that produce IPM products have provided many seminars to the pest control community. In addition, Metro Nashville schools have co-sponsored two 3-day training workshops in urban IPM for themselves, other government agencies and local pest control professionals. Therefore, the pest control industry should be fairly well aware and perhaps trained in IPM. When placing bids for pest control services, inquire if the company has participated in IPM training and ask to see its certificate of participation.

The School Superintendent Study Council Executive Committee of Tennessee discussed integrated pest management (IPM) in schools with a representative of the University of Tennessee Extension at a meeting in 1996. The concept was well received. School officials can easily integrate IPM into their existing pest management and maintenance plans. School management operations such as preventive maintenance, janitorial practices, landscaping, occupant education and staff training are all used in an IPM program. Using IPM can reduce health risks as well as exposure to pesticides and liability. In the long run, repair and maintenance activities may reduce overall costs of the pest control operations and the maintenance and operating budget.

University of Tennessee Extension and the TDA have prepared this document to assist school officials, pest control operators and others in examining and improving their pest management practices and adopting IPM in schools. Methods to reduce pesticide reliance in school buildings and landscapes and alternative methods for managing pests most commonly occurring in schools are discussed. Topics covered include developing an official IPM policy statement, designating pest management roles, setting pest management objectives, inspecting site(s) and monitoring pest populations, applying IPM strategies to control pests, evaluating results and developing bid invitations for pest control services in public schools.

Establishing IPM Programs for Schools

School officials can integrate IPM into their existing pest management and maintenance plans. The following steps are suggested to develop an IPM decision-making network:

1) Develop an official IPM policy statement. This useful first step in making transition from a traditional pesticide reliance program to an IPM program goes beyond stating a commitment to support and implement an IPM approach. It acts as a guide in defining the IPM program.

2) Designate pest management roles for occupants (custodians, teachers, students, kitchen staff, etc.), pest management personnel and key decision-makers; assure good communications among them; and educate or train people involved in their respective roles.

3) Set pest management objectives. Pest management objectives will differ for each site. Therefore, the type of pest management sought should be outlined.

4) Inspect site(s), identify and monitor pest populations for possible problems.

5) Set levels of pests (action thresholds) or environmental conditions where action must be taken to reduce pest populations.

6) Apply IPM intervention strategies to control pests. This may include redesigning and repairing structures, improving sanitation, using pest-resistant varieties or plants, initiating watering and mowing practices and judiciously using pesticides.

7) Evaluate results to determine if pest management objectives are achieved, and maintain written records of all aspects of the program.

STEP 1. Developing an Official School Policy Statement for Pest Management.

A policy statement should be written stating the school administration's intent to implement an integrated pest management program. It should briefly specify the expectations of the program, including the incorporation of existing services into an IPM program and the education and involvement of students, staff and pest manager. A model policy statement is provided in Appendix II. It is only an example; schools should modify it to reflect their site-specific needs.

STEP 2. Designating Pest Management Roles.

Good communications between all occupants (students and staff), parents, pest manager and decision-makers is needed for IPM to be successful in schools. All employees have an effect on their school's integrated pest management (IPM) program. Even staff with no formal responsibility for pest control can determine the degree of success of an IPM program; every employee has some influence on the school environment. The school environment then affects whether pests will become a serious problem. When the roles of each of these people are identified and agreed upon, and they are communicating clearly to each other, an effective pest management system that lends itself to less expensive protection of the site and people can be achieved with fewer risks. Here are some of the roles and responsibilities shared by school employees and occupants:

IPM Coordinator

The IPM Coordinator plays a major role in a school IPM program. Each school district should designate an IPM coordinator. This person is responsible for overseeing most of the day-to-day requirements of the district's program. The IPM Coordinator could be a school principal, a custodian, a science teacher or other faculty member, or an individual under contract to the school system. The IPM coordinator should attend training on IPM in the schools provided by University of Tennessee Extension, or other creditable trainers.

The duties of the IPM coordinator include:

- Maintain a priority list of needed structural and landscape improvements.
- Work with district administrators when contracting for pest control work to ensure that bid specifications comply with the district's IPM policy and the principles of IPM.
- Oversee district in-house pest management personnel. Educate employees who apply pesticides to use the appropriate personal protective equipment. If in-house pest management personnel are applying pesticides to the structure, the IPM coordinator should ensure they are licensed. Results of a survey conducted in the summer of 1997 indicate most (76 percent) of the pest control applications made indoors to schools are through licensed pest control applicators who have contracted services with the school system. If the IPM work is contracted, the IPM coordinator is not responsible for personal protective equipment, but should verify that the applicator is licensed or under the direct supervision of an operator licensed in Tennessee.
- Handle and maintain records relating to pest problems, IPM activities and pesticide-related complaints.
- Maintain files of pesticide application records, pesticide labels and Material Safety Data Sheets (MSDS).
- Educate school district administrators and other personnel about suggested IPM requirements (central area for logbook of pest control services, sanitation and pesticide storage).
- Understand pesticide labels and their components (Appendix III).

Overseer of Pest Control Services Logbook

In addition to the IPM Coordinator for the school system, each school should appoint someone to oversee the logbook that contains the pest control service records.

Custodial and Groundskeeper Staff

Custodians and grounds-keepers both have significant roles to play in an IPM program. Custodial staff are responsible for recognizing and correcting conditions that may lead to pest problems such as water leaks, potential pest entryways and substandard sanitation practices. Custodians are responsible for sealing cracks and crevices in walls and around pipes to reduce shelter for and dispersal of cockroaches. These personnel are most often exposed to the pests and should report location and pests sighted in the logbook and to the IPM coordinator.

Outdoors, many pest problems can be reduced through good horticultural practices. With proper landscape design and maintenance, many pesticide applications can be avoided. Because custodial and grounds-keeping personnel often are not trained to recognize conditions that may lead to pest problems, those staffs should participate in IPM training, perhaps organized by the IPM coordinator.

Kitchen Staff

Food-handling and preparation areas are among the most crucial areas for pest management. It is imperative that kitchen staff understand the importance of good sanitation, kitchen management and proper food storage. For example, lids should be kept on garbage cans, spills cleaned as soon as possible and food stored in pest-proof containers. A well-trained kitchen staff can assist the district's IPM staff in locating and eliminating pest harborage areas. Kitchen staff should also be involved in periodic IPM training.

Administrators

Administrators and school boards set the tone for the IPM program. Their first responsibilities are selecting a qualified individual for the IPM coordinator's position and establishing a pest management policy. Administrators should have a general understanding of:

- suggestions pertaining to IPM in schools,
- the possible penalties for improper pesticide use by in-house pesticide applicators,
- pesticide safety issues and decision-making about which pesticide products are appropriate for district use.

Perhaps the most crucial role of administration is assigning priorities for building maintenance requests submitted by the IPM coordinator. Without administrative support for such requests, as well as requests to correct other reported problems (such as inadequate sanitation or improper management practices), IPM programs will be restricted in their effectiveness.

Teachers and Students

In addition to food handling areas, classrooms and lockers are key sites for pest problems in school buildings. The most important responsibility of the students and faculty is sanitation: cleaning up food leftovers, proper storage of pet food and snacks, and maintaining uncluttered and clean classrooms and locker areas. Also, teachers and students who can identify pests can be helpful to the IPM program. The more occupants who can participate, the greater the potential for success. Without the cooperation of teachers and students in the IPM program by reporting pests immediately and by keeping their classrooms clean, it is probably unreasonable to expect a totally pest-free environment or to control pests without any use of pesticides.

Parents and Community

Parents want their children to experience a pleasant learning environment without any undue risks from pesticides. For this reason, parents are usually among the first to express their concerns about perceived unsafe conditions in a school. Unsafe conditions can occur when pest problems are improperly managed, or when pesticides are overused or used improperly. Parents should be made aware of the current pest management practices in their children's schools. Visible interest and concern on the parents' part can stimulate the school to do its best to provide effective and safe pest control in school facilities. Parents and other community members can and should express their views to the IPM coordinator, school superintendent, school board, campus-based improvement committees, and parent-teacher associations and organizations. Parents can be representatives on IPM advisory committees with the schools.

STEP 3. Set Pest Management Objectives for Sites.

Before action thresholds can be set, pest management objectives must be set for different sites. For buildings or other structures, the main objective might be to control damage caused by termites. The main objective for kitchens or other food handling and preparation areas might be to control cockroaches. Specific objectives should be outlined in the pest management plan by administrators. Some examples of pest management objectives include:

1) pests should be managed to prevent interference with the learning or work environment,
2) the health of building occupants should be protected,
3) building occupants should be safe from injury on playing fields, or
4) the integrity of buildings or structures should be preserved.

STEP 4. Inspecting, Identifying and Monitoring.

IPM programs include identifying, monitoring, evaluating and choosing the appropriate method of control. Regular inspections and proper identification are key components to IPM programs. Perhaps this is where traditional pest control programs differ from IPM. Traditional programs rely on regularly scheduled pesticide sprays. IPM programs rely on regularly scheduled inspections and monitoring. If the pest and its source of activity aredetermined, often habitat modification (primarily exclusion, repair and sanitation) is all that is needed to reduce the pest population levels.

Monitoring consists of inspecting areas for pest evidence, entry points, food, water and harborage or resting sites, as well as determining pest population levels. If action thresholds are exceeded, the pest control measures must be performed.

Monitoring programs should be conducted in each school on an ongoing basis. Sticky traps are an essential component of an indoor IPM program. Sticky traps, which are designed to catch cockroaches and other insects as well as rodents, should be placed where two surfaces meet, such as along wall/floor junctions, vertical surfaces several inches above horizontal surfaces, behind or under appliances, in closets, cabinets and shelves, and other areas where insects have been seen. The following should be included in a monitoring program:

1) a floor plan of the site showing the number and location of each trap;
2) weekly inspection of each trap with the following information recorded on the suggested Pest Surveillance Sheet (Appendix IV):
   (a) date checked,
   (b) trap number and location,
   (c) trap condition (either acceptable or replace),
   (d) number and species of pest trapped,
   (e) other evidence of pests (cast skins, feces, rub marks, etc.) or damage, and
   (f) need for pest management;
3) replacing traps at least every two months or when the trap is full or no longer sticky, whichever comes first; and
4) removal and disposal of insects after identification and number confirmed, to remove a food source for other insects and rodents and to prevent counting specimens more than once.

STEP 5. Setting Action Thresholds.

Pest management action is initiated when pest numbers exceed set action thresholds. Action thresholds in schools are set by determining the number of pests that can be tolerated by the building's occupants. Action thresholds will reflect the pest management objectives for the site. Specific pest management strategies should be determined for varying levels of pests present. Table 1 lists different actions depending on the level of pests present.

STEP 6. Applying Other IPM Strategies.
Sanitation, structural repair and modification, exclusion devices (screens, air curtains, etc.) and traps are examples of preventive measures or devices that can be incorporated into existing structures and prevent pest populations from exceeding action thresholds. IPM strategies are provided for indoor and outdoor sites. Each school will experience different species of pests.

IPM Strategies for Indoor Sites

Usual pests include ants, cockroaches, flies, hornets, wasps, yellowjackets, mice, rats, spiders, termites, carpenter ants and other wood-destroying organisms. Indoor sites and control strategies follow.

Entryways - Doorways, overhead doors, windows, holes in exterior walls and openings around pipes, electrical fixtures and ducts.

1) Doors should be shut when not in use.
2) All doors should have weather stripping so doors close tightly.
3) Openings in walls should be caulked and sealed.
4) Screens should be installed or repaired.
5) Air curtains can be installed.
6) Vegetation, shrubs and wood mulch should be at least 12-18 inches away from structure to dis-

Table 1. Action Thresholds for Control of German Cockroaches in a Virginia Department of Corrections Facility (Robinson and Snell 1991)	
Average number trapped per zone[1]	**Action**
0	None caught for 3 months, convert monitoring to every 2 months and replace bait stations at 6 months.
1-2	Use bait stations on a routine basis; check for sanitation problems.
3-6	Apply pesticides in cracks and crevices in locations near traps with cockroaches; add or replace bait stations (don't spray near bait stations); check sanitation now and in 2 weeks.
7-15	Complete crack-and-crevice treatment, check sanitation and change monitoring of sticky traps to every 2 weeks.
15+	Close facility; conduct thorough inspection; crack-and- crevice treat and spot treat; replace and increase bait station; monitor every 2 weeks
[1]Each room or area monitored with 3 to 5 sticky traps for 24 hours on a monthly basis	

courage occasional invaders as well as carpenter ants, termites and other pest species.

Classrooms and Offices - Classrooms, laboratories, administration offices, auditoriums and hallways.

1) Food and beverages should be kept only in designated areas.
2) Keep indoor plants healthy. Remove small infestations manually or use insecticidal soaps where applicable. It may be necessary to move plants to an unoccupied room or outdoors for treatment.
3) Remove standing water, water-damaged or wet materials to keep areas as dry as possible. Some insects withstand starvation, but water is critical.
4) Animal food should be stored in tightly sealed containers and inspected regularly for pests. Animal cages should be cleaned regularly. Inspect animal cages for leaking water bottles.
5) Clean desks and lockers on a regular basis.
6) Vacuum carpeted areas as frequently as practical.
7) If students get head lice, check with the local health department and have parents contact a doctor. Educate children on how lice are spread and discourage sharing of hats or brushes.

Food Preparation and Serving Areas - Dining room, kitchen, lounges, lunchroom, snack areas, vending machines and food storage rooms.

1) Stored foods should be kept in pest-proof containers. Waste should also be stored in plastic, glass or metal containers with tight-fitting lids. Remove waste at the end of each day.
2) Vents, windows and storm drains should be screened to prevent cockroaches and other pests from using them as pathways.
3) Reduce availability of food and water to create inhospitable living conditions for pests. Remove crumbs and other food debris, fix dripping or leaky faucets and dry out wet spots.
4) Clean food preparation equipment after each use and remove grease accumulations from vents, ovens and stoves. Caulk or paint to seal cracks and crevices.
5) Rodents should be trapped with glue boards or mechanical traps. Traps should be placed in areas inaccessible to children. Glue boards or mechanical traps should be checked daily and dead or trapped rodents should be disposed of within 24 hours.

Rooms and Areas with Extensive Plumbing- Bathrooms, dishwasher rooms, greenhouses, locker rooms, rooms with sinks and swimming pools.

1) Repair leaks quickly and correct other plumbing problems to deny pests access to water.
2) Clean floor drains, strainers and grates. Pipe chases should be sealed.
3) Keep areas dry. Don't allow condensation to form. Areas that don't dry are conducive to molds which support insect life, as well as produce allergens. It may be necessary to increase ventilation.
4) Paper products or cardboard boxes should not be stored near moist areas, directly on the floor or against a wall.

Maintenance Areas - Boiler room, custodial resting areas, mechanical room and pipe chases.

1) Mops and buckets should be cleaned and hung to dry after each use.
2) Allow eating only in designated areas.
3) Trash cans should be cleaned regularly, plastic liners used and lids secured.
4) Areas should be kept as dry and clean as possible and void of clutter.

IPM Strategies for Outdoor Sites

Typical pests: Structure-invading pests such as rodents, ants and other insects, millipedes and other pests that enter structures from the outdoors. Turf pests such as broad-leaf and grassy weeds, insects such as grubs or sod webworms, diseases such as brown patch, and vertebrates (animals with backbones) such as moles. Ornamental plant diseases and insects such as thrips, aphids, Japanese beetles, bagworms and others.

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

1) Clean trash containers and gutters, and remove all waste such as food and paper debris on a regular basis.
2) Secure lids on trash containers.
3) Repair cracks in pavement and sidewalks.
4) Provide adequate drainage away from the structure and on the grounds.

Turf — Lawns, Athletic Fields and Playgrounds.

1) Maintain healthy turf by selecting a mixture of turf types best adapted for the area. Check with the University of Tennessee Extension for turf recommendations and management practices.
2) Mowing height should be set to allow competition with weeds; adjust cutting height of mower, depending on grass type; sharpen mower blades; and vary mowing patterns to help reduce soil compaction.
3) Water turf infrequently but sufficiently in the early morning to let turf dry out during the day; allow soil to dry slightly between waterings.
4) Allow good drainage and inspect turf regularly for evidence of pests.
5) Grass clippings can remain in turf to act as mulch or the clippings can be composted with other organic matter.
6) Use results of soil tests to determine the need for fertilizer and lime.
7) Fertilize at proper time of year. Excess fertilizer can cause additional problems, including weed and disease outbreaks.
8) Dethatch lawns in early fall or early spring. Thatch is the layer of organic matter (undecomposed roots, rhizomes, stolons, plant crowns, stems and organic debris) between the soil and the green foliage of the grass. Do not allow the thatch layer of your lawn to become too thick. This can lead to disease problems, and prevent water, fertilizer and pesticides from reaching the soil. Thatch also harbors insect pests such as sod webworms and cutworms.
9) Aerate to place soil on top of thatch so microbes can decompose the thatch.
10) Seed over existing turf in fall or spring.
11) You can obtain more information on turf from the numerous turf publications produced by University of Tennessee Extension or from EPA's brochure entitled, Healthy Lawn, Healthy Environment: Caring for Your Lawn in an Environmentally Friendly Way.

Ornamental Shrubs and Trees.

1) Apply fertilizer and nutrients to annuals and perennials during active growth. Trees and shrubs should be fertilized during the dormant season or early in growing season.
2) Use the correct fertilizer at the suitable time, water properly and reduce compaction.
3) Prune branches to improve plants and prevent pest access to structures.

4) Use pest-resistant varieties for new plantings and when replacing old ones (check with University of Tennessee Extension or use the publication by D. Smith-Fiola. 1995. Pest-Resistant Ornamental Plants. This is available from the Rutgers Cooperative Extension Service (908)349-1246.
5) Prune branches from just in front of the branch collar.
6) Prune infected or infested parts of plant. Sterilize pruning equipment when removing diseased parts.
7) Correctly identify the pest. If in doubt, send several specimens to your county Extension office.
8) Pheromone traps can be used to determine the presence and activity periods of pests. Pheromones are the chemicals released by organisms as a means of communicating with others of the same species, usually as a mating aid.
9) Use plants appropriate for the site.
10) Remove susceptible plants if a disease recurs and requires too many resources, such as time, energy, personnel or money. Some ornamental plants, trees and turf are so susceptible to disease that efforts to keep them healthy may be useless.

Applying Pesticides Judiciously

Many pesticides are registered for use against urban and structural pests. Prior to application, the toxicity of the product and the application technique should be considered to maximize effectiveness and reduce risk to the school occupants. Pesticides should not be applied in areas where occupants may be exposed to materials applied. The Environmental Protection Agency (EPA) registers pesticides for use within the United States, but that should not be interpreted to mean that a particular pesticide is safe under all conditions of use. The pesticide label must be read and followed. The pesticide label is a legal document that provides information on how to mix, apply, store and dispose of the product. Failure to heed label directions is a violation of federal law and is subject to penalties and fines. The label also provides a signal word to help identify the relative hazard associated with the product. The signal words are listing in order of increasing hazard, as follows:

CAUTION, WARNING, DANGER.

Minimizing Exposure from Pesticides

Pesticide exposure to people and other nontarget organisms should be minimized when the following general recommendations are considered:

1) All pesticides used in Tennessee are required to be registered by EPA and the Tennessee Department of Agriculture.
2) All label instructions must be read and followed.
3) A pesticide should be labeled for the specific site. Use a product that is intended for the target pest rather than a broad-spectrum pesticide.
4) The use of sprays, foggers and volatile formulations should be limited. Use baits or dusts in wall voids or cracks and crevices, or use sprays applied directly to cracks and crevices. Check the crack-and-crevice label instructions for application procedures. These treatments minimize exposure to the occupants and maximize exposure to the pest.
5) Rodents can be controlled with snap traps, multiple catch traps and glue boards. The use of rodenticides is highly discouraged. If the previous control measures prove inadequate and health risk is evident, rodenticides may be used. Rodenticides, regardless of packaging, should be placed either in locations not accessible to children and nontarget species or in tamper-resistant bait boxes. Securely lock or fasten shut the lids of all bait boxes. Bait should be placed in the baffle-protected feeding chamber of the box, and not the runway of the bait box.
6) Apply pesticides when occupants are not present or in areas where they will not be exposed to the material applied. If aerosols or sprays are applied, the room should be ventilated as indicated on the label or longer if stated by the IPM policy. Be aware that residues can persist

long after the application. Note any reentry intervals listed on the label. Reentry intervals can be extended by stating them in the IPM policy. The IPM in the school policy in place in Texas requires a 12-hour reentry interval on any pesticide applied. This means that pesticides must be applied at least 12 hours before occupants will be present.

7) Use proper protective clothing and equipment stated on the label when applying pesticides.
8) Notify occupants according to the IPM policy statements. Pay particular attention to individuals who may be at higher risk.
9) Copies of current pesticide labels, consumer information sheets and Material Data Safety Sheets (MSDS) should be accessible.

Pesticide Storage

Pesticides should preferably be stored off-site. If stored on-site, pesticides should be kept in buildings that are locked and inaccessible to all unauthorized personnel. Signs should be posted on the storage area with warnings to unauthorized persons to keep out and with "danger" and "peligro" in large type. Adequate ventilation is needed for the pesticide storage area. Do not store pesticides in places where flooding may occur or in open places where they might spill or leak into the environment. Store flammable liquids away from an ignition source. Check label requirements and state recommendations for pesticide storage.

If pesticides are stored in occupied buildings, extraordinary care must be taken to ensure air does not get contaminated. Again, notice should be placed outside the storage area. Store all pesticides in their original containers and secure lids tightly. Childproof caps should be properly locked. However, bear in mind that even closed pesticide containers may volatilize toxic chemicals into the air. Therefore, pesticides should only be stored in spaces that are physically separated and closed off from occupied spaces and where there is adequate ventilation (i.e., the air is exhausted directly to the outside). In addition, precautions are needed to ensure that the air in the storage area has no chance of mixing with the air in the central ventilation system.

The storage spaces should be checked periodically to determine if there are any leaks or other hazards. To reduce storage problems, buy only enough pesticides for one season. By mixing only the amount needed for the immediate application, pesticide waste can be reduced.

Equipment

Equipment used in an IPM program is effective if used by competent pesticide applicators. To use pesticides efficiently and economically, applicators should understand the uses of their equipment through thorough training. Presented here is just a sampling of the equipment available to the professional pesticide applicator. Other equipment is available, especially for crack-and-crevice treatments, and new equipment continues to be produced. This should not be considered an all-inclusive list.

Traps, Bait Boxes and Monitoring Devices

Rodent control traps include snap traps, boxes that use trap doors or spring- loaded multiple catch traps and small animal traps. Bait boxes or stations are containers that hold poisonous baits or glue boards. For safety reasons, they should be tamper-proof. Electric fly traps use an attracting light that lures flies to electrocution grids and/or glue boards. **Sticky traps are the cornerstone of urban IPM.** These small glue boards are used to catch mice, rats, cockroaches, other insects and organisms. Sticky traps are also used to monitor populations, especially cockroaches, and to determine the presence of other organisms.

Bait Stations and Bait Gels

Bait stations have a chamber that contains an attractant spiked with insecticide. Stations confine the insecticide to a small area and are tamper-resistant. Cockroaches feed on the bait and return to the harborage site, where they defecate and die. The toxicant is then picked up by other cockroaches through eating feces of the dying cockroach (coprophagy) and cannibalizing the dead or dying cockroach (necrophagy). The amount of insecticide needed to reduce a cockroach infestation is decreased, as are the chances of insecticide exposure to humans. Gels allow for placement of small

quantities of insecticide directly into cracks and crevices where cockroaches rest or forage. Baits for ants contain slow-acting poisons that allow the ants to bring the poisoned bait back to the nest and transfer the poisoned food to all members of the colony, thereby leading to colony elimination. Baits can be placed where sprays are not used, such as in electrical junction boxes and outlets. (Wires are often used by insects as guidelines to travel from one area to the next.) Bait stations and gels must be placed far from any pesticide sprays, above floor level so they will not be flushed with mop water, and located where the insects will find them.

Sprayers and Dusters

In the past, the one- or two-gallon, stainless steel compressed air sprayer was the piece of equipment used most often for pest control. Different spray patterns can be delivered, depending on the nozzle chosen. Spray pressure depends on the amount of pumping applied to the sprayer. Most nozzles are designed to deliver two flat-fan and two pin-stream patterns. In most cases, the pin stream is not fine enough to produce an ideal crack-and-crevice treatment unless the nozzle is fitted with a narrow-diameter plastic tube. The pest control applicator inserts the tubing into the edge of a crack and can then deliver an accurate stream of pesticide into the crack. This strategy provides the most effective spray pattern for cockroach control, with little or no exposure of building occupants to the insecticide.

Dusters apply a thin layer of a powdery mixture to a wall void or crack. Dusts accumulate on the insect's body. They may be either abrasive and gash the cuticle, causing the insect to desiccate, or they contain poisons that are absorbed through the cuticle. Or, these poisons are ingested during grooming and act as a stomach poison. Boric acid products are often used in dusters. The three types of dusters commonly used by pest management technicians are a bulb, bellows and plunger dusters.

Public Access to Pest Control Service Records

Occupants should have access to information describing pesticide treatments. If pest control services (monitoring and inspections as well as pesticide applications, etc.) are performed on the same day of each month, concerned individuals could inquire if, when, where and what pesticides were applied before entering the school the next day. All pest control services must be kept in a logbook in a central area. The IPM coordinator should be prepared and available to provide more specific information to concerned individuals. If needed, a voluntary register of individuals adversely affected by exposure to pesticides can be kept at the facility. Local poison control center and emergency personnel phone numbers should be kept accessible.

STEP 7. Evaluating Results and Record Keeping.

Accurate record keeping is essential to a successful IPM program. It allows the school to evaluate the results of practicing IPM to determine if pest management objectives have been met. Keeping accurate records leads to better decision making and more efficient procurement. Accurate records of inspecting, identifying and monitoring can record changes in the site environment (less available food, water or shelter), physical changes (exclusion and repairs), pest population changes (increased or reduced, older or younger pests) or changes in the amount of damage or loss. Each school should keep a complete and accurate logbook of pest control services. Pesticide use records also should be maintained to meet any requirements of the Tennessee Department of Agriculture and the school's administrators. The logbook should contain the following items:

1) A copy of the approved Integrated Pest Management Plan and service schedule for the property.
2) A copy of the current EPA-registered label and the current MSDS for each pesticide product used.
3) Pest surveillance data sheets that record in a systematic fashion the type and number of pests or other indicators of pest population levels found in the monitoring program for the site. Examples are date, trap (type, number and location) and numbers and species of insects trapped.
4) A diagram noting the location of pest activity, including the location of traps and bait stations in and around the site.

5) A diagram noting the date and location of areas treated.
6) Other pesticide use information required by TDA.

Evaluating the Costs

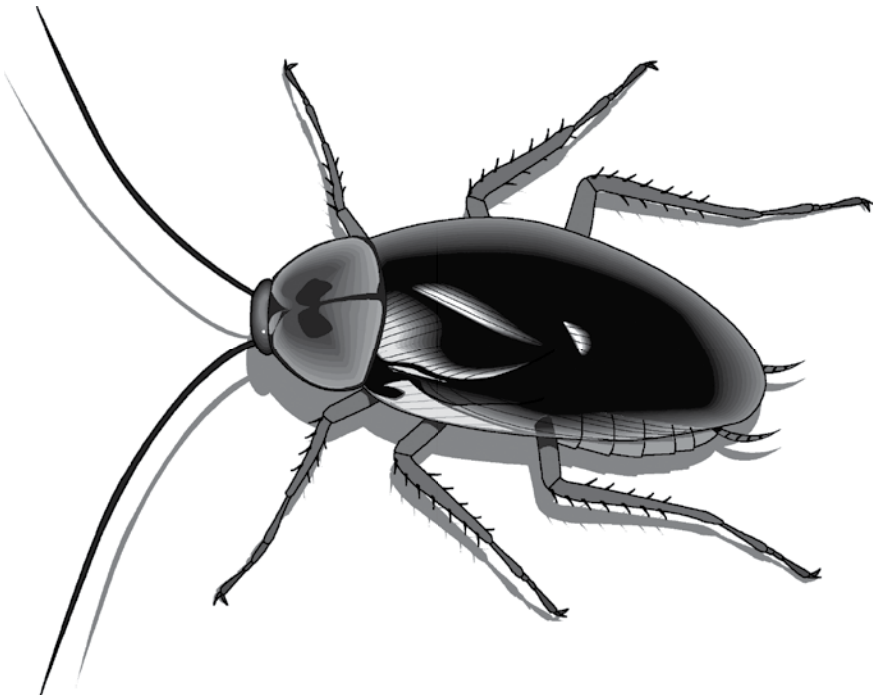
Long-term costs of IPM may be less than costs for a conventional pest control program that relies on the use of pesticides. However, long term labor costs may be higher for IPM programs than conventional pesticide treatments. Labor costs may be balanced by fewer service calls for the IPM coordinator and reduced expenditures for materials.

Current housekeeping, maintenance and pest management operations will determine whether an IPM program raises or lowers costs. Also factoring into the costs of implementing IPM are whether the pest management services are contracted, performed in-house or both. To fit the IPM program into the existing budgetary framework, facility administrators should consider the additional and redistributed expenditures. Insufficient resources will jeopardize the success of IPM.

Potential Added Costs

Initiating an IPM program may require repair and maintenance to prevent pest entry and to eliminate sources of harborage, food and water. Examples of one-time expenses that may pay back with future budgetary savings include:

1) Improving waste management by moving trash or garbage containers away from buildings to reduce pest invasion. This cost is a one-time expense that could reduce pest problems and costs for pest control procedures.
2) Installing physical barriers such as air curtains over outside entrances to kitchens or light traps to reduce flying insect problems. There may be future maintenance costs associated with this equipment.
3) Quickly repairing leaky pipes and other structural problems reduces future maintenance problems and prevents pest problems. Caulking cracks and crevices in buildings and sealing pipe penetrations in walls may be an added cost, but is effective in reducing cockroach harborage space and reduces their ability to disperse throughout the building along the pipes.
4) Training staff in IPM may result in increased costs initially.
5) Re-landscaping the area next to buildings to discourage pests. In the long run, repair and maintenance activities may reduce overall costs of the pest control operations and the maintenance and operating budgets. Schools with an active maintenance and repair program may be better able to absorb these costs within their current budget.



How to Develop Bid Invitations for Pest Control Services in Public Schools

Integrated pest management can be successfully performed by school employees; however, currently most school districts in Tennessee contract with a pest control firm to provide pest control services. Some schools may wish to combine in-house and contracted services. Each approach has advantages and disadvantages; school officials should decide which is needed for their school district.

Advantages/Disadvantages of Using School Personnel for Pest Control Services (In-House Pest Control)

School personnel providing pest control services may find it easier to communicate and develop a rapport with others present in the school. Cooperation with all individuals occupying the school is needed for an IPM program to succeed. Pest control services can be combined with other maintenance jobs as long as the employee is a licensed pest control operator. Also, the in-house personnel are more likely to identify a pest problem before it becomes too obvious. Using in-house personnel will avoid the difficulty of developing a bid invitation, as well as eliminating the difficulty of choosing a reputable and reliable firm. Greater control of personnel and quality performance is provided through an in-house program.

The drawbacks to in-house pest control include the need to find a safe storage and disposal site for pesticides and equipment. The potential liability of the district in regard to pesticide use is probably higher in an in-house program. If a reentry interval is used that is greater than that listed on the label, such as 12 hours, overtime expenses could be incurred.

If schools are affiliated with the state of Tennessee, then payment for the licensing exam can be made with a journal voucher. Otherwise, licensing an employee to apply pesticides in a school will require an initial charge for the licensing exam.

Advantages/Disadvantages of Using Contracted Pest Control Services

Professional pest control personnel are usually more experienced with the techniques that safely and effectively control pests. School district personnel are not required to maintain contracted individuals' licenses, nor are they required to train the pest control technician. Potential liability could be reduced when using contracted services. The need for locating a special storage and disposal site for pesticides is eliminated. The district will avoid overtime pay for work performed after regular working hours.

Communication between contracted individuals and other school personnel, such as custodians, may not be as easily developed as in an in-house program. School district personnel must develop a bid invitation for contracted services, and a reputable and reliable firm must be chosen.

Importance of Bid Specifications

Thorough, stringent bid specifications help eliminate the problem of low bids by firms that are unable or unwilling to provide the quality of work your school district should expect. School officials can inquire with the local Better Business Bureau or the Tennessee Department of Agriculture Division of Regulatory Services (TDA DRS), to determine whether complaints are received regularly about a prospective company. School district personnel must verify with TDA DRS the licensing of operators and the certification of pest control technicians.

It is important not to choose a firm by the lowest bid. Use the Weighted Factor Rating System for Evaluating Pest Control Bids at the end of this document to choose the most qualified contractor. Some school districts may refer to this as a request for proposal (RFP) rather than a bid specification to allow an evaluation of the bid based on quality and services as well as price. Also, a contract awarded for more than a year may allow a firm to determine effective control methods for your site and develop a rapport with school staff. Contracts established

for several years may cause contractors to be more productive, knowing that they are not going to lose the job next year to a lower bidder.

IPM Bid Specifications Essential Items

Some suggested elements for IPM bid specifications are listed below:

– Prospective bidders should conduct a meticulous on-site inspection before submitting a bid. This allows potential bidders to view firsthand the facilities and pest problems, so bidders can make a realistic estimate of service needed and the time required for these services.

– Minimum service times can be defined by the school district in the bid. Bidders should understand that minimum service times are an expectation of the contract, and any failure of the contractor to meet these minimum service times should be grounds for cancellation of the contract by the school district.

– The use of least toxic materials necessary to provide satisfactory pest control, as identified by the district, should be understood and agreed to by the bidder.

– Appropriate monitoring tools and procedures should be used on a regular basis by the contractor to find pest infestations and assess the need for corrective treatment.

– School systems should receive from the bidder copies of labels and Material Safety Data Sheets (MSDS) for all products to be used on the school district property. The school system reserves the right to approve or disapprove any pesticide or device.

– The use of bait stations, crack-and-crevice or void treatments are preferred over the use of aerosol, broadcast, spot and baseboard treatments. The school system should not allow the use of aerosol or machine-generated fogs, mists or space sprays without written permission from the IPM coordinator.

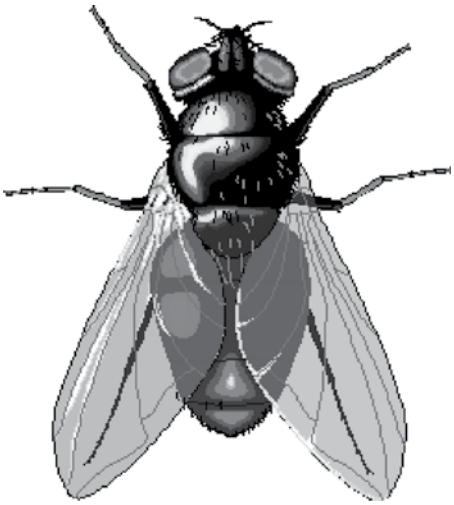
The above provisions and others are specified in the following set of model bid specifications. **THIS IS ONLY A SUGGESTED MODEL FOR SCHOOLS ATTEMPTING TO IMPLEMENT AN INDOOR IPM PROGRAM. THESE SPECIFICATIONS ARE NOT REQUIREMENTS.**

School systems may want to incorporate some elements of the model contract into existing bid specifications; others may adopt the requirements in total, with additions as suggested by the IPM coordinator, purchasing officer or other business personnel. Many standard clauses are omitted from the following contract to save space.

If there is a conflict between the model bid specifications and the school system's usual bid process, the school system should defer to its regular bidding process.

The following bid is excerpted and modified from the Texas Agricultural Extension Service Publication B-6015.

On November 23rd, 2004 the Tennessee school IPM advisory board met and discussed changes to the original bid invitations published in this manual in 1998. The suggested changes have been reviewed and incorporated into the following Model Contract Bid Specifications for Public Schools.



Model Contract Bid Specifications for Public Schools

Note: Italics indicate instructional language for the purchasing officer's attention or suggested specifications that the school system may wish to modify to suit its individual needs. The wording and content of these specifications are provided merely as a guide for school systems wishing to ensure that contractors adhere to IPM principles. Schools are not legally required to use all or any portion of these bid specifications. Populations of the following pests are excluded from this contract: termites, carpenter ants and other wood-destroying organisms; mosquitoes; birds, bats, snakes and all other vertebrates other than commensal rodents and pests that primarily feed on outdoor vegetation. A separate contract can be used for these pests.

Description of Services

Introduction. The purpose of this bid (*or request for proposal*) is to provide _____ (*school system name*) with a source to provide pest management services at the prices offered herein, for the term of the agreement and any renewal periods. It is the policy of the _____ (*school system name*) to use Integrated Pest Management (IPM) as the strategy for control of pests in and around school facilities. The following description details the school system's understanding of the scope and type of IPM services to be rendered.

Bidders should read the entire set of specifications carefully, as these will form the basis of the contractual agreement with the school system. Failure to comply with the specifications may provide grounds for termination of the contractual agreement. Bids should reflect not only the expected costs to the contractor providing basic pest control services, but also the costs of providing supplementary services such as reporting, emergency treatments, inservice training and quality control activities.

Bid Submittal Requirements

School systems may insert their standard contract clauses and requirements here. Contracts typically include clauses on: pricing, price escalation, contract extensions, cancellation, insurance requirements, workers' compensation, subcontracting, bid bonds, payment policy and conditions for acceptance of contracts, etc. The following clauses are relevant specifically to pest control contracts and are included to assist the school system in developing pest control specifications.

Site Visits. Bidder is encouraged to inspect all premises or a representative sample to be covered in the contract and render a bid detailing specific charges for each of the listed sites/facilities. Bidders may examine the facilities *on* _____ *(one date)* by calling _____, at ___-___-____. Bids will not be accepted from prospective contractors who have not conducted site visits *or attended a prebid conference* prior to submitting their bids. *(It is suggested that site visits be incorporated into the prebid conference.)*

Qualification of bidders.
1. Bids shall be considered only from bidders who, in the judgment of the school system, are regularly established in business, financially responsible, able to show evidence of satisfactory past performance and ready, willing and able to render prompt and satisfactory services.
2. Each contractor shall furnish, with his/her bid, documentation specifically stating: (1) that his/her bid company has been in business for at least___ *(5)* years. A copy of the Tennessee Department of Agriculture-issued license will be presented with the bid. Commercial pesticide applicator certification cards for

all technicians who will service the account will be furnished to the school system within 30 days of being awarded the contract.
3. Each contractor shall complete the References section of this bid and list customers who have contracts for service similar to that specified.
4. The school system may request other information sufficient to determine bidder's ability to meet the minimum standards listed above. Request for information contained in this section also may occur at any other time during the effective period of this contract or any extension/renewal thereof.

References. The references sections must be filled out completely. Failure to do so, or references giving unsatisfactory recommendations, may be reason to disqualify the bid. If the references given are not, in the opinion of the school system, applicable to a contract of this magnitude, the school system may contact other firms with whom the bidder has or is currently providing services as a means of validating compliance or providing noncompliance with the references requirement.

Please list three references who have used your pest control services on a regular basis within the past year (preferably educational institutions).

Company Name: (1)_____
Person to Contact_____
Company Address_____
City, State, Zip_____
Telephone_____

Company Name: (2)_____
Person to Contact_____
Company Address_____
City, State, Zip_____
Telephone_____

Company Name: (3)_____
Person to Contact_____
Company Address_____
City, State, Zip_____
Telephone_____

☐ **If checked, the school system incorporates the following section (14 written lines) on Board-Certified Entomologist or Associate Certified Entomologist into this bid specification *(request for proposal)*.**

Board-Certified Entomologist or Associate Certified Entomologist. Preference shall be given to bidders with a trained entomologist on staff, or access to one as a consultant. A Board-Certified Entomologist (BCE) is a person with formal training in entomology and an Associate Certified Entomologist (ACE) is one with more hands-on training and professional development. A BCE's and an ACE's expertise has been examined and certified by the Entomological Society of America. (For more information about BCEs or ACEs in your area, contact the Entomological Society of America at 10001 Derekwood Lane, Suite 100, Lanham, MD 20706-4876; tel. (301) 731-4535; http://www.entsoc.org)

Does your company have a Board-Certified Entomologist or Associate Certified Entomologist on staff?
____ Yes ____No

If you answered No, please provide the name and address of a BCE, ACE or other trained entomologist whom your company uses.
Name: _____ B.C.E.? ____ Yes ____No
Address_____
City, State, Zip_____
Telephone_____

Questions. If there are any questions regarding this bid or should a conflict of terminology on this bid arise, please contact_____, *Contractor of Purchasing*, at _____ *(phone)* or _____ _____, *IPM coordinator*, at _____ *(phone)* for clarification or issuance of an official addendum to resolve any conflicts. Specifications not listed in this bid or not included in official addenda are not applicable to this bid.

Scope of Work

Description of Services. The contractor shall provide a comprehensive Integrated Pest Management (IPM) plan for the buildings and other areas specified herein. This plan shall be in accordance with the school system's IPM policy. IPM is a process for achieving long-term, environmentally sound pest suppression through the use of a variety of technological and management practices. Control strategies in an IPM plan should extend beyond the application of pesticides to include structural and procedural modifications that reduce the food, water, harborage and access used by pests.

The contractor shall furnish all supervision, labor, materials and equipment necessary to accomplish the surveillance, trapping and pesticide application components of the IPM plan. The contractor shall also provide detailed, site-specific recommendations for structural and procedural modifications necessary to achieve pest prevention.

Pests Included and Excluded. The contractor shall adequately suppress the following pests:
– Indoor populations of commensal rodents (e.g., Norway and roof rats, house mice), cockroaches, ants (including, but not limited to, fire ants and Pharaoh ants*), flies, spiders and any other arthropod pests not specifically excluded from the contract. * School system may be charged for the additional cost of Pharaoh ant bait materials.
– Populations of the above pests that are located outside of the specified buildings, but within areas immediately adjacent to buildings.
– Winged termite swarmers emerging indoors.
– Severe brown recluse infestations or fire ants may require a separate contract.

Populations of the following pests are excluded from this contract:
– Termites, carpenter ants and other wood-destroying organisms.
– Mosquitoes.
– Birds, bats, snakes and all other vertebrates other than commensal rodents.
– Pests that primarily feed on outdoor vegetation and large outdoor populations of fire ants.

General Contractor Responsibilities

Initial Inspections of Facilities. The contractor shall conduct a thorough initial inspection of each building or site within ____ *(10)* days of the initiation of the contract. The purpose of the initial inspections is for the

contractor to evaluate the pest control needs of all premises and to identify problem areas and any equipment, structural features or management practices that are contributing to pest infestation. Access to building space shall be coordinated with the IPM coordinator. The IPM coordinator will inform the contractor of any restrictions or areas requiring special scheduling.

Pest Control Plan. Before rendering service, within ____ *(10)* days after the initial inspection, the contractor shall submit to the IPM coordinator a general Pest Control Plan with additional information listed for specific problems in each building. Within ____ *(5)* working days of receiving the Pest Control Plan, the IPM coordinator will decide if the plan is acceptable. If aspects of the Pest Control Plan are incomplete or disapproved, the contractor shall have ____ (2) working days to submit revisions. The contractor should be on site to initiate service within ____ *(5)* working days following notice of approval.

The Pest Control Plan shall consist of five parts as follows:
A. Proposed methods and equipment for service: The contractor shall provide a summary of proposed control methods including current labels and Material Safety Data Sheets (MSDS) of all pesticides to be used, brand names of pesticide application equipment, rodent bait boxes, insect and rodent trapping devices, pest monitoring devices, pest surveillance and detection equipment, and any other pest control devices or equipment that may be used to provide service. The summary can be made available either in print form or in electronic form. If made available in electronic form, software must be provided to allow printing of the electronic forms. If the electronic form contains pest control products that will not be used in the schools, then a printed list of those proposed to be used in the schools must be provided.

B. Proposed methods for monitoring and surveillance: The contractor shall describe methods and procedures to be used for identifying sites of pest harborage and access and for making objective assessment of pest population levels throughout the term of the contract. Monitoring devices should be placed in kitchen areas. In addition, the contractor will work with the IPM coordinator to establish population levels that constitute unacceptable levels of pest presence in school facilities.

C. Service schedule for each building site: The contractor shall provide complete service schedules that include planned frequency of contractor visits, and specified day(s) of the week for contractor visits.

D. Description of any structural or operational change that would facilitate the pest control effort: The contractor shall describe site-specific solutions for observed food sources of pest food, water, harborage and access.

E. Commercial applicator or technician license: The contractor shall provide a current list of names along with the photocopies of the commercial applicator license and the technicians' certification card for every contractor employee who will be performing on-site services under this contract.

Record Keeping. The contractor shall be responsible for maintaining a pest control logbook or file for each building or site specified in this contract. These records shall be kept on school property (normally in the principal's office or some other convenient site) and maintained on each visit by the contractor. Each logbook shall contain the following items:

A. Pest Control Plan: A copy of the contractor's approved Pest Control Plan for the facility, including labels and MSDS sheets for all pesticides used in the building, brand names for all pest control devices and equipment used in the building and the contractor's service schedule for the building.

B. Service and Complaint Logs: A logbook for recording service visit activities, including complaints from staff concerning pest sightings, pest sightings and response log, pesticide applications and other information

must be maintained and located in a central area of each school building *(principal's office)*. A floor plan of the site must also be recorded showing the number and location of monitoring traps and results of inspection of traps such as

(a) date checked,
(b) trap number and location,
(c) trap condition (either alright or replace),
(d) number and species of pests trapped,
(e) other evidence of pests (cast skins, feces, rub marks, etc.) or damage, and
(f) need for pest management.

All services must be recorded in the logbook before the start of school the next day or before the school is occupied, whichever comes first. Forms should show times in and out and should be signed by the contractor at each visit.

C. Service Report Forms: Customer copies of the contractor's Service Report Form, documenting all information on pesticide applications, pest sightings, sanitation/environmental status and building maintenance needs should be forwarded to the school system IPM coordinator at least once a month.

Public Access to Records of Pest Control Services. The contractor shall fulfill all obligations with regard to public access to pest control service records *as indicated in the school system's Official IPM Policy Statement*. At minimum, all records must be kept in the logbook as indicated above.

Times of Service. The contractor shall perform pesticide spray applications only during times when students are not expected to be present for normal academic activities for at least __ *(4 hours or as indicated in the school system's Official IPM Policy Statement or the minimum time stated on the pesticide label, whichever is greater)* after the application. In the event of an emergency treatment, the contractor shall work with the IPM coordinator to determine whether an emergency situation exists before applying any pesticides. In such cases, pesticides may be applied only to the local area of infestation if students are present or if less than ____ *(4 hours or as indicated in the school system's Official IPM Policy Statement, or the minimum time stated on the pesticide label, whichever is greater)* will elapse before students are expected to be present. In the event of such an emergency treatment, the contractor will maintain records of the reasons for such treatments.

Safety and Health. The contractor shall observe all safety precautions throughout the performance of this contract and shall assume full responsibility and liability for compliance with all applicable regulations pertaining to the health and safety of personnel during the execution of work and shall hold the school system harmless for any action on its part or that of its employees that results in illness, injury or death.

Uniforms and Protective Clothing. All contractor personnel working in or around buildings designated under this contract shall wear distinctive uniform clothing and carry their certification card. The contractor shall determine and provide additional personal protective equipment required for the safe performance of work. Protective clothing, equipment and devices shall, as a minimum, conform to Occupational Safety and Health Administration (OSHA) standards for the products being used.

Vehicles. Vehicles used by the contractor shall be identified in accordance with state and local regulations and shall be operated in a safe manner on school system property. Vehicles must meet Tennessee Department of Transportation requirements.

Licensing. Throughout the term of this contract, the contractor shall maintain a current license issued by the Tennessee Department of Agriculture Division of Regulatory Services. In addition, all contractor personnel providing on-site pest control services must be under the direct supervision of a person licensed to apply pesticides.

Complaints. Should at any time the school system become dissatisfied with pest control service, the successful contractor shall be notified in writing by the IPM coordinator regarding problems that occurred. The notice will detail the problem and site(s) that is experiencing the problems. The contractor will be required to contact the IPM coordinator to discuss possible solutions and the contractor will be given a date by which a response with the proposed solutions must be submitted.

Pest Control Responsibilities

Structural Modifications and Recommendations. The contractor shall be responsible for advising the IPM coordinator and appropriate support staff about any structural, sanitary or procedural modifications that would reduce pest food, water, harborage or access. The school system will not hold the contractor responsible for carrying out structural modifications as part of the pest control effort. However, minor applications of caulk and other sealing materials by the contractor to eliminate pest harborage may be approved by the school system on a case-by-case basis. The contractor shall obtain the approval of the IPM coordinator prior to any application of sealing material or other structural modification.

Training. The contractor will familiarize the appropriate school personnel, i.e., food-service staff, custodian and maintenance personnel, IPM coordinator and other appropriate individuals, with IPM during inservice trainings provided within __ months of accepting the contract.

Contractor entomology and/or IPM educational presentations made to the students will be encouraged. Contractors will be paid $ __ /hour of the presentation.

Use of Pesticides. The contractor shall be responsible for application of pesticides according to the label. All pesticides used by the contractor must be registered with the U.S. Environmental Protection Agency (EPA) and by the state of Tennessee. Transport, handling and use of all pesticides shall be in strict accordance with the manufacturer's label instructions and all applicable federal, state and local laws and regulations.

The contractor shall adhere to the following rules for pesticide selection and use:
A. Non-pesticide Products and Their Use: The contractor shall use non-pesticidal methods of control wherever possible. For example:

– Allergen-filtering portable vacuums rather than pesticide sprays shall be used for initial clean-outs of cockroach infestations, for swarming (winged) ants and termites and for control of spiders in webs wherever appropriate.
– Trapping devices rather than pesticidal sprays shall be used for indoor fly control wherever appropriate.

B. Application by Need: Pesticide application shall be according to need and not by schedule. As a general rule, application of pesticides in any inside or outside area shall not occur unless visual inspections or monitoring devices indicate the presence of pests in that specified area. Preventive pesticide treatment of areas where surveillance indicates a potential insect or rodent infestation is acceptable on a case-by-case basis, as approved by the IPM coordinator.

C. Pesticide Products and Their Use: When it is determined that a pesticide must be used to obtain adequate control, the contractor shall employ the least hazardous material, most precise application technique and minimum quantity of pesticide necessary to achieve control. When selecting pesticide products, **highest priority should be given to pesticides with a signal word of caution or category III and IV classification.**

Containerized and other types of crack-and-crevice-applied bait formulations, rather than sprays, shall be used for cockroach control and ant control wherever appropriate. As a general rule, liquid aerosol or dust formulations shall be applied only as crack-and-crevice treatments with application devices specifically designed or modified for this purpose. "Crack-and-crevice treatment" is defined in this contract as an application of small amounts of insecticides into cracks and crevices in which insects hide or through which they may enter a building.

Application of pesticide liquid, aerosol or dust to exposed surfaces and pesticide space sprays (including fogs, mists and ultra-low-volume applications), shall be restricted to unique situations where no alternative measures are practical.

The contractor shall obtain the approval of the IPM coordinator prior to any application of pesticide liquid, aerosol or dust to exposed surfaces or any space spray treatment. The contractor shall take all necessary precautions to ensure student and staff safety and all necessary steps to ensure the containment of the pesticide to the site of application.

D. Pesticide Storage/Disposal: The contractor shall not store or dispose of, any pesticide product on school system property.

E. Pesticide Sales and Distribution: The contractor shall not sell, share or make available any pesticide products to any non-licensed school system employee.

Rodent Control. As a general rule, rodent control inside occupied buildings shall be accomplished by trapping devices. All such devices shall be concealed out of the general view and in protected areas so as not to be affected by routine cleaning and other operations. Trapping devices shall be checked on a schedule approved by the IPM coordinator. Trapping shall not be performed during periods when maintenance will be delayed by holidays, weekends, etc. The contractor or IPM coordinator shall be responsible for disposing of all trapped rodents and all rodent carcasses in an appropriate and timely manner.

In circumstances when rodenticides are deemed essential for adequate rodent control inside occupied buildings, the contractor shall obtain the approval of the IPM coordinator prior to making any interior rodenticide treatment. All rodenticides, regardless of packaging, shall be placed in EPA-approved, tamper-resistant bait boxes to be inaccessible to children, pets, wildlife and domestic animals. In case of emergency where other rodenticide formulations or placements are deemed necessary, written permission from the IPM coordinator must be obtained before use.

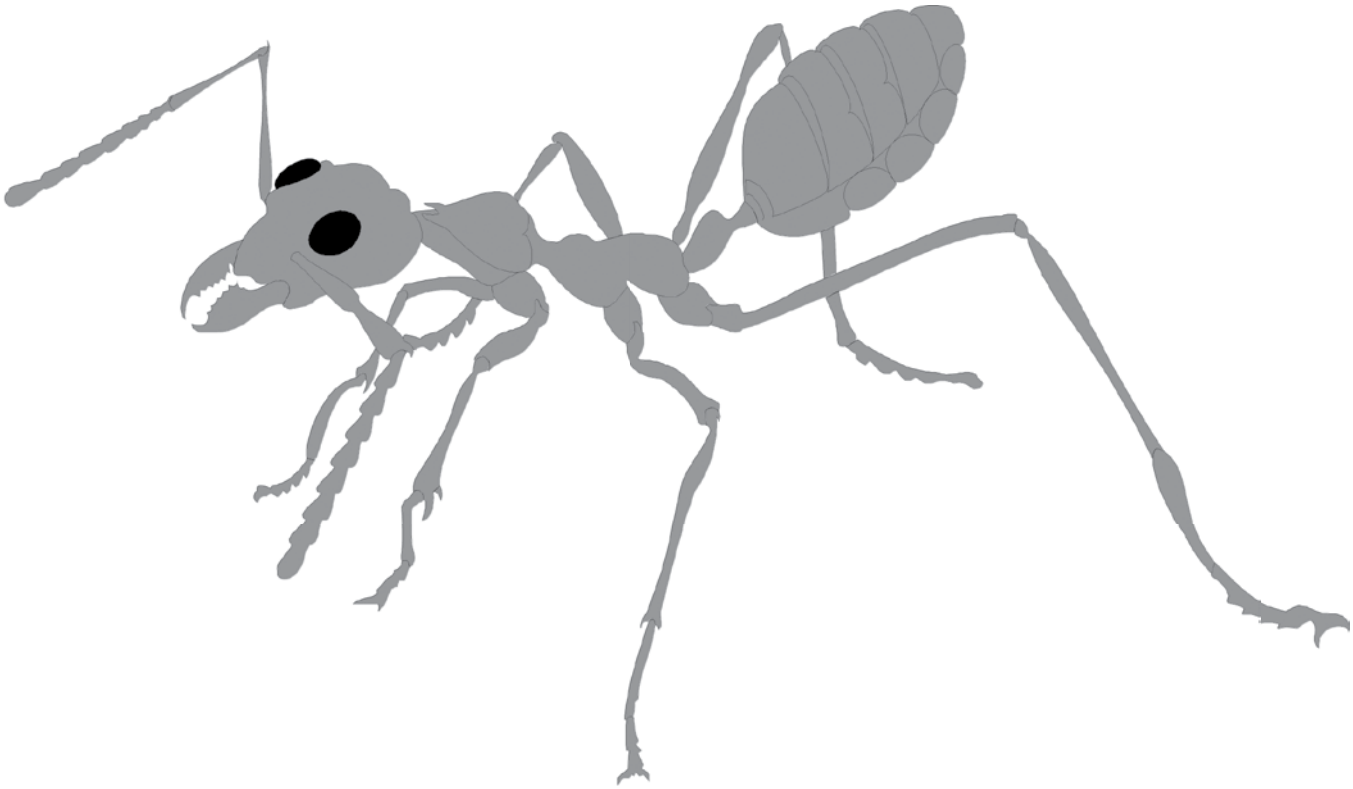
Frequency of bait box servicing shall depend upon the level of rodent infestation. All bait boxes shall be maintained in accordance with EPA regulations, with an emphasis on the safety of non-target organisms. The contractor shall adhere to the following rules:

– All bait boxes shall be placed out of the general view, in locations where they will not be disturbed by routine operations.
– The lids of all bait boxes shall be securely locked or fastened shut.
– All bait boxes shall be securely attached or anchored to the floor, ground, wall or other surface, so the box cannot be picked up or moved.
– Bait shall always be placed in the baffle-protected feeding chamber of the box and never in the runway of the box.
– All bait boxes shall be labeled with the contractor's business name and address and dated by the contractor's technician at the time of installation and at each servicing.

Program Evaluation. The school system will continually evaluate the progress of this contract in terms of effectiveness and safety and will require such changes as are necessary. The contractor shall take prompt action to correct all identified deficiencies.

Quality Control Program. The contractor shall establish a complete quality control program to assure the requirements of the contract are provided as specified. Within ____ *(5)* working days prior to the starting of the contract, the contractor shall submit a copy of his/her program to the school system.

Attachments should include list of schools/sites for which pest control services are to be performed, plus a copy of the school system's IPM policy.



Weighted Factor Rating System for Evaluating Pest Control Bids

The bidding process sometimes results in contracts being awarded to companies with lower performance standards. Price should not be the sole factor upon which a contract is awarded. Many schools and businesses address this problem by using a weighted factor rating system. Suggested weights and factors are listed if schools wish to use a weighted factor rating system. The factors and weights can be modified by each school system according to the school system's own priorities and preferences.

Below is a sample of a completed weighted factor rating form. In this example, supplier B has the highest rating and would be awarded the contract even though overall price was higher than that for supplier A.

Ratings within the various categories can be based on the contract officer's subjective assessment of a bidder's qualifications or might be based on a predetermined objective set of scoring criteria, such as giving a bidder a point for each desired component of a program that he/she demonstrates.

For example, companies A, B and C bid $5,000, $5,800 and $6,000, respectively, for a one-year contract. The $5,000 serves as a benchmark because it was the lowest bid. Therefore, company A receives the highest rating, in this case, of 35; company B bid was 16 percent higher and therefore this company is given a rating of 16 percent lower than the top rating ([35 - [35 x .16= 5.6]]= 29.4); and company C bid was 20 percent higher, hence a 20 percent lower rating (28).

Sample Weighted Factor Rating Form for Evaluating Pest Control Bids

FACTORS	**MAXIMUM RATING**	**SUPPLIER (Weights)**		
		A	**B**	**C**
Technical Factors				
IPM plan	25	22	25	22
Technician experience/ IPM training	15	12	15	12
Previous experience in educational institutions or other public facilities	15	13	15	5
Price Factors				
Price	35	35	29	28
Other Factors				
Managerial, financial capabilities	5	3	5	3
Quality control program	5	4	5	4
TOTAL SCORE	**100**	**89**	**94**	**74**

Price should not be the only factor when judging bids from competing pest control firms. This weighted factor rating form can be used to help evaluate each bidder on several criteria. The above factors and weights can be modified by each school system according to its individual priorities.

Appendix I.

STUDENTS OF IPM

THE MEMPHIS CITY SCHOOL DISTRICT SCORES AN A+ WITH ITS SUCCESSFUL IN-HOUSE IPM PROGRAM.

BY TROY BLEWETT

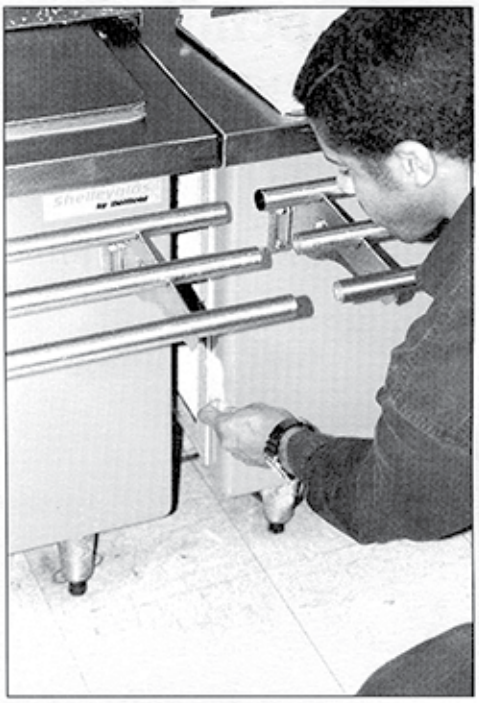
With 110,000 students, Memphis City Schools is the eighth largest public school system in the United States. Even so, pest control in the system's 165 schools is accomplished by just four full-time technicians, each serving about 40 schools on a twice-a-month basis.

Memphis City Schools is one of only five school systems nationwide that manages its own internal pest control program. It's an example of how an effective integrated pest management (IPM) program can help pest controllers do more with less.

"When I started in this position, there was virtually no control over the pest control problem in the schools' kitchens and cafeterias," says Bill Spitznas, pesticide/herbicide supervisor for the Memphis City Schools. "I had been in the business for 15 years before I came here, and I had never seen such severe infestations. Cockroaches were climbing the walls before you even applied flushing agent."

According to Spitznas and George Meeks, director of grounds for the school district, the severity and array of day-to-day problems overwhelmed traditional pest control service efforts and techniques. "Certain schools had such severe cockroach problems that even regular monthly service calls couldn't gain control of the infestation," Spitznas explains.

Additionally, PCOs were so busy battling the problems that they really couldn't take the time needed to communicate with the schools' personnel on their activities, Meeks notes. "There was little emphasis on the social and political environment in which they were applying their insecticides—these are schools, where children are present," he says. "At the same time, we needed clean, functional kitchens. We needed a way to balance those two aspects."



Memphis City Schools pest control inspector Edward Thompson places an IGR device in a strategic location in a school food handling area.

A NEW TACK. Hoping to combat these problems, Memphis City Schools brought its pest control service in-house. Despite this shift in strategy, the cockroaches persisted in great numbers in all of the schools.

The absence of an IPM service philosophy meant that control strategies still highlighted the use of residual insecticides. Only gradually did increased use of baits, exclusion and sanitation techniques, insect growth regulators (IGRs) and low-hazard formulations replace these earlier techniques, Spitznas notes.

Consequently, Memphis City Schools faced pressure from several different directions. It was the local media's turn first. Articles revealed and criticized the system's cockroach infestations, while at the same time sensationalizing the tools that the service technicians were using to fight the problem. "Out of a list of 150 products that we had used over the years, one article singled out two products with pretty intimidating names," Meeks says.

The fallout was pressure from parents, school board members, state representatives, school principals and environmental groups.

The local Greenpeace organization advanced their own idea of IPM to Memphis City Schools officials, Meeks recalls: "Basically, Greenpeace wanted us to use no chemicals at all."

Fortunately, reorganizing allowed seasoned professionals like Spitznas, and Joe Lane, the district's general foreman of grounds, to put Memphis City Schools on a more practical, effective course.

"We began to accelerate our progress toward integrated pest management in 1993," Meeks explains. "Joe Lane and Bill Spitznas spent more of their time investigating architectural causes of the problem and determining whether we could reduce spraying and start using IGRs, baits and traps. We didn't call it integrated pest management, though. There was a perception that this meant no chemical use. We called it 'least-toxic, most-effective' to continue to be very honest with our customers."

DEFINING 'CUSTOMER.' To the average PCO, "customers" may be homeowners or managers of commercial facilities. For the pest control professionals who work for Memphis City Schools, "customers" are school principals and food service personnel. The term reflects their dedication to ensuring that officials who are responsible for the health and well-being of hundreds of children are completely satisfied with their work.

"Everything we do is based on meeting our customers' expectations," Meeks says. "Our primary customers will always be the school principals. From a political and social standpoint, they drive the kinds of programs we will use."

When it comes to specifying particular products, though, Spitznas has the final say. And ever since 1993, he increasingly specifies insect growth regulators, in the form of Gentrol IGR or Gentrol Point Source, in addition to a variety of baits, dusts and traps.

"Because Tennessee has some very tight restrictions regarding how certain products are used, we try to use the least toxic products," Lane says. "Bill and I have attended numerous seminars and read a lot of labels, and low toxicity to people is a major reason for using Gentrol IGR, in addition to its effectiveness against cockroaches."

Beginning in 1993, tank-mixing Gentrol IGR with a synthetic pyrethroid resulted in the eradication of the severe cockroach infestations common in the school system's kitchens. With this victory, the tide turned from having to battle what seemed like a hopeless pest control problem to an under-control maintenance situation, Spitznas says.

SPECIAL DELIVERY. Recently, service technicians in the Memphis school system began using Gentrol Point Source, a device with a unique delivery system for Gentrol IGR.

"We've been trying to get away from spraying, and the Point Source seems to fit right into our IPM program," Spitznas says. "We've been using them in some of our serving areas, and especially food storage areas, because that's where pests that stow away in new produce will be."

The product can be placed during school hours, when children are in the building, he adds. "We can put Point Source devices out at 10 o'clock in the morning," Spitznas says. "If we only sprayed, we would have to wait until after school hours. As a result, we have gotten pretty good control over everything. Most of our activities now center on inspecting, using monitor traps, and exclusion."

Exclusion in a school system of rustic buildings constructed in the early 1900s is critical, according to Lane. "Some of the older schools had many pipe chases and voids that weren't completely closed, so we had service technicians caulk holes, make sure that screen doors and windows were intact, and inspect places where insects might seek harborage," he says.

TRAINING & EDUCATION. In-house training and continuing education of service technicians continues to play a major role in Memphis City Schools' success, Spitznas says. "We hire only technicians who are already certified in three areas — pest control and termite; lawn, turf and ornamental pest control; and right-of-way weed control," he notes. "We also have a mandatory continuing training program which I provide every month, and which is certified through the state of Tennessee."

These courses and additional training on pest control policies at Memphis City Schools are conducted at an official employee training center at Cypress Junior High School. One such policy requires technicians to complete a detailed form after every service call.

"This is something that we are ahead of the game on," Spitznas says. "This is not required yet by law, but I think in the future it will be mandatory in every state."

Another policy dictates how service technicians are to interact with and educate the school personnel on their route, Meeks says. "They must notify customers before they visit, and explain exactly why they are visiting," he explains. "The approach is much more refined than before."

COOPERATION CRITICAL. The pest control professionals who work for Memphis City Schools have worked hard to educate themselves, while at the same time educating their customers about their IPM program. "This is not a one-way thing, where we just come in and get rid of their roaches," Spitznas says. "They work with us, and we've had a very good response from the food service and custodial personnel and school administrators, in terms of maintaining good sanitation and exclusion."

Garbage disposal in cafeterias is a good example, Lane notes. "In the past, milk cartons were just out in a sack and thrown in a dumpster, which can attract flies and other pests. Now, they have stations where they rinse out milk cartons and other containers."

Although importation of cockroaches is a chronic threat, kitchen workers have been trained to store all incoming food in impermeable containers. "Anything they can do helps us," Lane says. "It's a joint venture to make our whole system pest free."

PEACEFUL PLATEAU. As a result of their efforts, the pest control personnel who work for Memphis City Schools have attained a high level of consistency in controlling cockroaches with an integrated pest management approach.

"We have reached a plateau of attaining consistent control of cockroaches with our IPM program," Spitznas says. "Another plateau we have reached is peace of mind as far as our customers are concerned. They understand what we're doing and why, and they see the results. Now, if they see one cockroach, it's a big thing. In the past, seeing over a thousand would have been unacceptable." **PCT**

Troy Blewett is a writer based in Milwaukee, Wisconsin.

HOW 'IPM' ARE YOU?

At Memphis City Schools, employing IPM practices means more than just using certain products — it means knowing that the product represents an IPM tool and finding ways to increase the use of these tools in the schools.

Bill Spitznas, pesticide/herbicide supervisor, tracks the "Percent IPM Service" of each of his technicians on a monthly basis. IPM service is generally defined as greater use of inspection, baiting, IGRs, and monitoring versus relying on insecticide spraying. The technician with the greatest Percent IPM Service, combined with other measures, is rewarded.

"We are using IPM techniques in 80% to 85% of our work," Spitznas says. "Using more Gentrol IGR, Gentrol Point Source, baits and traps has caused our Percent IPM Service to skyrocket from a low of using IPM techniques in about 30% to 35% of our work just two years ago."

Appendix II
Developing an IPM Policy Statement

The first step in developing your school's IPM program is to draft an IPM policy. It is important to distinguish between an IPM policy and an IPM plan. A policy is a generalized guide to help school personnel develop a more detailed plan for action. An IPM plan is the more specific instructions about how to implement the policy at various school facilities.

The IPM policy should state the intent of the school administration to implement an IPM plan; however, the policy need not include the plan. The policy should succinctly state the school system's goals and expectations of staff and contractors.

The policy should be based on generally accepted tenets of integrated pest management, including:

- strategies that rely on the best combinations of pest management tactics that are compatible with human health and environmental protection;
- proper identification of pest problems;
- monitoring programs to determine when pests are present or when pest problems are severe enough to justify corrective action;
- use of nonchemical management strategies whenever practical; and
- preferential use of least-toxic chemical controls when pesticides are needed.

To help your school system develop its own IPM policy statement, the following model is provided for you to adopt or modify as your school system determines.

Integrated Pest Management Policy Statement

_____ Independent School System

Approved _____

Structural and landscape pests can pose significant problems to people, property and the environment. Pesticides can also pose risks to people, property and the environment. It is therefore the policy of the _____ Independent School System to incorporate integrated pest management procedures into the maintenance program conducted by our school system for control of indoor and outdoor pest problems.

Definitions

Pests are populations of living organisms (animals, plants or microorganisms) that interfere with use of school facilities for human purposes. Strategies for managing pest populations will be influenced by the pest species and whether that species poses a threat to people, property or the environment.

Integrated pest management, or IPM, is a strategy that focuses on long term prevention or suppression of pest populations using a combination of tactics that minimize the impact of control activities on human health or other, non-target organisms.

An IPM plan is a set of procedures detailing how particular pest problems will be handled by School System IPM staff. The IPM plan for a particular facility will include descriptions of planned activities to reduce pest presence or maintain a pest-free environment. Details within such plans may include needed facilities or landscape improvements, pest-proofing modifications, approved nonchemical and chemical control activities, a pest monitoring plan, educational plans and criteria for evaluating the need for control or the success of control efforts.

Development of IPM Plans

The school system should appoint an IPM coordinator whose duties will include approving IPM plans for both indoor and outdoor school system facilities. IPM plans will be designed to accomplish the following objectives:

- Reduce any potential human health hazards or protect against a significant threat to the safety of students, staff or the public.
- Prevent loss or damage to school structures or property.

- Prevent pests from spreading into and adversely affecting the community or to plant and animal populations beyond the site.
- Enhance the quality of life for students, staff and the public.

Essential IPM Plan Components

The School System's pest management plans should include the following components:

- All activities designed to reduce pest populations will be based on an accurate determination of the pest's identity and on knowledge of the pest's biology and life cycle.
- Significant, recurring pest problems will be observed and recorded by IPM staff using monitoring methods so pest populations can be detected and control measures applied to the appropriate sites.
- Predetermined action thresholds for important pest problems will be determined by IPM staff, so results of inspections and monitoring programs can be used to help staff objectively determine when control actions are justified.
- The full range of control options, including physical controls, mechanical controls, biological controls and chemical controls (including the option of "no action"), will be considered when deciding on a pest management action.
- Educational activities will be conducted to gain cooperation and understanding among school system staff, students and the public.

Pesticide Use in School Facilities

The decision concerning whether or not to apply a pesticide will be based on a review of all other available options and a determination that these options are not acceptable or are not feasible. Cost or staffing considerations alone should not be adequate justification for use of chemical control agents. Efforts will be made to avoid the use of pesticides by adequate pest-proofing of facilities, good sanitation practices, selection of pest-resistant plant materials and good horticultural practices.

When it is determined that a pesticide must be used to meet important management goals, the least-hazardous material adequate for the job will be chosen.

Cooperation with IPM Coordinator

The school system will provide administrative support to the IPM coordinator for developing an IPM program that relies on minimal pesticide use. Such support will include efforts to address in a timely fashion, as budgets permit, any structural, horticultural and sanitation modifications recommended by the coordinator to reduce or prevent pest problems. Furthermore, the school system should assist the coordinator in developing and delivering materials and programs for staff, students and the public to educate them about the importance of sanitation and pest control.

Contractual Agreements with IPM Providers

All outside contractors providing pest control services will be required to follow the same IPM standards required for in-house staff. All contracted pest control activities will follow IPM plans based on the IPM components outlined above. The school system should take steps to ensure that selection of a contractor includes consideration of the contractor's ability to provide satisfactory IPM services in addition to price considerations.

Facilities Planning

The school system shall include pest management considerations in facilities planning. Such considerations include, but are not limited to, the planting of well-adapted and pest-tolerant plant varieties outdoors; landscape designs that require minimal fertilizer and pesticide inputs; proper placement and types of lighting to reduce pest entry into buildings; placement of dumpsters; storage of pesticide products; and pest-proof design of doors and ventilation systems.

Cooperation with Regulatory Agencies

All pesticide storage, transportation and application will be conducted in accordance with the requirements of the:

- Federal Insecticide, Fungicide and Rodenticide Act (7 United States Code 136 et seq.),
- Environmental Protection Agency regulations in 40 CFR,
- Occupational Safety and Health Administration regulations,

- *Laws And Regulations Governing Pest Control Operators And Applicators Of Restricted-use Pesticides,* Tennessee Department of Agriculture, Division of Regulatory Services, and
- school system policies and procedures, and local regulations.

Any person applying pesticides on school system property must have a pesticide applicator's license or be under the direct supervision of a person licensed to apply pesticides. Therefore, teachers or other occupants should not bring or use pesticides inside schools unless they are licensed and specifically granted permission by the officially designated IPM coordinator to do so.

The following is strongly suggested:

- Students, staff and parents should have access to a logbook that contains pesticide application records and other pest control services and information, including copies of labels and Material Safety Data Sheets (MSDS) used at each school.
- Pest control services including pesticide applications should be recorded in a logbook prior to the next occupation of the building (before school starts the next day).
- This logbook should be kept in a central area that is easily accessible in each school.
- An overseer of the logbook should be appointed in each school.
- A 12-hour waiting interval (or longer if indicated by the label) between pesticide application and student occupation of treated facilities should be adhered to.
- Pesticide applicators should be educated and trained in the principles and practices of IPM and the use of pesticides approved for use in the school system.
- All applicators must comply with this IPM policy and follow appropriate regulations and label precautions when using pesticides in or around school facilities.

Appendix III
Pesticide Labels and Labeling

Understanding a pesticide label is an important skill for an IPM coordinator. This section is provided to explain the various components of an EPA-registered pesticide label. Labels are legal documents that provide you with directions on how to mix, apply, store and dispose of the pesticide product. Failure to adhere to label directions is a violation of federal law and is subject to penalties and fines. It is your responsibility to read and understand the label. The label also provides information to help the IPM coordinator determine a classification for the product under the pesticide approval process. To help you better understand labels, each of the label components is explained below. The following was produced by Gene Burgess, Professor, Entomology and Plant Pathology as E&PP Info #300 (3/4/97).

Pesticide labels and labeling are among the most important documents that pesticide applicators see. Label refers to the information printed on the product container. Labeling refers to any information printed on, attached to or accompanying your purchase. The pesticide user is legally responsible to follow all label directions.

Under the "Directions for Use" section of the label is usually a statement that reads as follows: "It is a violation of Federal law to use this product in a manner inconsistent with its labeling." The user is personally liable if a pesticide application results in unwanted damage. Chemical companies are very careful to include disclaimers on their products' labels, which transfers all risks to the buyers of their products.

A LABEL -- Refers only to information printed on the product container. All labels, which are essentially the manufacturer's license to sell, provide the important facts about distribution, storage, sale, use, disposal and safety measures required for the pesticide.

LABELING -- Refers to any information printed on, attached to or accompanying your purchase. This may include such things as brochures, leaflets and information handed out by your dealer.

What Is a Pesticide?

A pesticide, as defined by FIFRA, is "...any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insect, rodent, nematode, fungus, weed or any other forms of life declared to be pests; and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant."

Pesticide Registration

Registration of pesticides is designed to protect people and the environment from abuse of pesticide use. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947 was primarily a labeling law and was originally administered by the U.S. Department of Agriculture. It has been amended several times to increase and expand the protection of users of pesticides, our food and the environment.

Amendments made in 1972 require that pesticides be classified for either general or restricted use. Further, people who apply restricted-use pesticides, either commercially or privately, are required to be certified by their respective states.

Data Requirements for Registration

As specified in amended FIFRA, all pesticides must be registered. This includes all pesticides used in and around the home, swimming pools, businesses, public buildings and in agriculture. Before any registration is issued, however, the manufacturer (applicant) must submit data to the Pesticide Registration Division of the Environmental Protection Agency (EPA) showing that the product when used as directed:

- is effective against the pest(s) listed on the label,
- will not injure humans, animals or crops or damage the environment,
- will not result in illegal residues on feed and food.

Parts of the Label

(1) BRAND or TRADE NAME -- Appears on the label. It is the name by which the product is advertised. Different manufacturers may use different brand names for the same pesticide active ingredient.

Common name -- The same chemical may appear on the shelf under several brand names, but the common name, or chemical name, may be the same.

Chemical name -- These names may be complicated, so common names may be used. Chemical names identify the chemical components and structure of the pesticide. An example is carbaryl for 1-naphthyl N- methylcarbamate.

Ingredient statement -- Two kinds of ingredients form pesticides: active ingredients and inert ingredients.

(2) ACTIVE INGREDIENTS -- Listed by either chemical name or common name. Must be stated as a percentage by weight or pounds per gallon of concentrate.

(3) INERT INGREDIENTS -- Need not be listed, but percent of their content must be. Inert ingredients are currently placed into four categories by the EPA. They include:

- Inerts of toxicological concern,
- Potentially toxic inerts (high priority),
- Inerts of unknown toxicity,
- Inerts of minimal concern.

Types of Formulations -- Pesticides come in different forms: liquids, wettable powders, dusts, etc. Each form is handled differently, and the label identifies the formulation. An example is 4E, which means it is an emulsifiable concentrate (E) with 4 pounds of active ingredient per gallon. Emulsifiable concentrates can also be represented by EC. Other common types of formulations include:

F, L, or FL	-	Flowables
ULV	-	Ultra Low Volume
D	-	Dusts
B	-	Baits
G	-	Granulars
P or PS	-	Pellets
W or WP	-	Wettable Powders
S or SP	-	Soluble Powders
DF	-	Dry Flowables
WDG	-	Water Dispersable Granules
WDL	-	Water Dispersable Liquids

Other less common formulations include:

AF	-	Aqueous Flowables
AS	-	Aqueous Suspensions
ES	-	Emulsifiable Solutions
MTF	-	Multiple Temperatures Formulation
OL	-	Oil-soluble Liquids
SL	-	Slurrys
ME	-	Microencapsulation. Liquid or dry pesticide particles may be surrounded by a plastic coating to produce a microencapsulated formulation.

Precautionary Statement

(4) HAZARDS TO HUMANS AND DOMESTIC ANIMALS -- These statements warn you of possible poisoning to humans and animals. Special precautions, including necessary protective equipment, appear here. If the product carries serious risk, proper poison treatment is listed.

Acute effects statements contain statements that indicate which route of entry (mouth, skin, eyes, lungs) you must particularly protect and what specific action you need to take to avoid acute effects from exposure. These precautionary statements tell you what parts of your body will need the most protection.

Delayed effects statements will tell you whether the product has been shown to cause problems such as tumors or reproductive problems in laboratory animals.

Allergic effects statement -- If tests or other data indicate that the pesticide product has the potential to cause allergic effects, such as skin irritation or asthma, the product labeling must state that fact. Sometimes the labeling refers to allergic effects as "sensitization."

Personal protective equipment statements -- Immediately following the statements about acute, delayed and allergic effects, the labeling usually lists personal protective equipment requirements. These statements tell you the minimum personal protective equipment that you must wear when using the pesticide.

Personal Protective Equipment Includes:

- Coveralls over long-sleeved shirt and long-legged pants
- Chemical-resistant gloves such as butyl or nitrile
- Chemical-resistant footwear plus socks
- Eye protection
- Respirator with an organic vapor-removing cartridge and a prefilter approved for pesticides--MSHA/NIOSH approval prefix (23C) or canister approved for pesticides--MSHA/NIOSH approval number (14G)
- Overhead applications: add chemical-resistant wide-brimmed hat or hood
- Mixers/loaders and cleaners of equipment: add chemical-resistant apron

(5) ENVIRONMENTAL HAZARDS -- Warnings here may include general statements about birds, fish and wildlife or include statements concerning toxicity to honey bees, surface and groundwater contamination and endangered species. Label information on groundwater contamination warns against applying pesticides in situations which may lead to contamination of groundwater.

(6) PHYSICAL AND CHEMICAL HAZARDS -- Warnings appear here about potential fire, explosion or chemical hazards. These statements are not located in the same place in all pesticide labeling. Some are in a box headed "Physical or Chemical Hazards," others list them beneath the signal word and some are under headings such as "Note" or "Important."

(7) DIRECTIONS FOR USE -- Explanation of correct use of the product. Also tells you what pests the product is registered to control, where the product can be used, when it should be used, how much to use and in what form to use it. This section also says whether the product is for general or restricted use.

Misuse statement -- You are warned here that if you fail to follow label directions exactly, you are violating federal law.

Directions for use by reference -- Some directions for use that pesticide users must obey are contained in documents that are only referred to on the product labeling. Such instructions include EPA or other government agency regulations or requirements concerning the safe use of the pesticide product.

(8) REENTRY STATEMENT -- Some products require that a person without protective clothing not enter the treated area until a certain time has passed. Consult local authorities for special rules that may apply.

(9) CATEGORY OF APPLICATOR -- If required for this product, this section will limit use to certain categories of commercial applicators.

(10) STORAGE AND DISPOSAL DIRECTIONS -- Pesticide labels will have some basic guidelines for pesticide storage, usually recommending that they be stored in a cool, dry, well-ventilated area away from feed and foodstuffs. Different types of pesticides should be stored separately: herbicides separately from insecticides, as an example. The pesticide storage area should be well marked with warning signs and be locked to prevent unauthorized entry. Pesticide labeling also contains some general information about how to dispose of excess pesticide and the pesticide container in ways that are acceptable under federal regulations. State and local laws vary, however, so the labeling usually does not give exact disposal instructions. Storage and disposal statements usually appear in a special section of the labeling titled "Storage and Disposal." Improper disposal of excess pesticide, spray mixture, rinsate or the

container is a violation of federal law. If these wastes cannot be disposed of according to label directions, contact the Tennessee Environment and Conservation (615) 532-0109, or the National Pesticide Telecommunication Network (800) 858-7378 (24-hour), for guidance.

NOTE: Burning pesticide containers is illegal in Kentucky.

(11) STATEMENT OF USE CLASSIFICATION -- The label must show whether the pesticide is for general or restricted use. Use is based on the hazard of poisoning, the way the pesticide is used and its effect on the environment. When a pesticide is classified as restricted, the label will state "Restricted Use Pesticide" in a box at the top of the front panel. Below this heading may be a statement describing the reason for the restricted-use classification.

General use -- According to FIFRA, a general use pesticide is one that, when applied according to its directions, will not generally cause unreasonable adverse effects on the environment.

Restricted use -- Restricted use pesticides have a statement at the top of the label's front panel saying "Restricted use pesticide for retail sale to and application only by certified applicators or persons under their direct supervision." According to FIFRA, a restricted use pesticide is one that, when applied according to its directions, may generally cause unreasonable adverse effects on the environment, including injury to the applicator.

(12) SIGNAL WORDS -- Signal words, standard by law in the industry, tell you how severely toxic a pesticide is. The signal word is immediately below the statement, "Keep out of reach of children," which also must appear on the label. The signal word reflects the hazard of any active ingredients, carriers, solvents or inert ingredients. The signal word indicates the risk of acute effects from the four routes of exposure to a pesticide products (oral, dermal, inhalation and eye) and is based on the one that is greatest. The 3 signal words used on pesticide labels are: DANGER, WARNING and CAUTION. Pesticides with the signal word DANGER are most toxic or hazardous and their use is normally restricted. They will usually have the word "Poison" and skull and crossbones on the label.

Less toxic pesticides may be given the signal word WARNING if there is a specific hazard, such as severe skin or eye injury, or a particular danger to the environment. For these, the word "Poison" or the skull and crossbones are not on the label. Pesticides with the signal word CAUTION are least toxic to people and are generally less hazardous. Every product label must have "Keep Out of the Reach of Children" and carry one of the signal words:

(13) SYMBOL -- The skull-and-crossbones symbol attracts attention to highly toxic materials. The symbol is accompanied by the signal word DANGER and the word POISON.

Signal Word	Toxicity	Approximate Amount Needed to Kill the Average Person
DANGER	Highly Toxic	A taste to a teaspoonful of a pesticide in this category could possibly cause death if taken orally.
WARNING	Moderately Toxic	A teaspoonful to a tablespoonful would probably kill an adult.
CAUTION	Slightly Toxic	An ounce to more than a pint would probably be required to cause death in an adult.

(14) STATEMENT OF PRACTICAL TREATMENT -- Emergency first aid is spelled out in this section. In addition, you are told what exposure requires medical attention, such as swallowing or inhaling the product or getting it in your eyes or on your skin. In the case of a possible poisoning, it is important to take the pesticide label to the attending physician.

(15) NAME AND ADDRESS OF MANUFACTURER -- The law requires the manufacturer to identify itself by name and address.

(16) REGISTRATION AND ESTABLISHMENT NUMBERS -- The registration number shows that the product is properly registered with the Federal Government (Environmental Protection Agency). The establishment number identifies the factory and appears on the container but may not be on the label.

(17) NET CONTENTS -- The net contents tells you the amount in the container. This can be expressed as pounds or ounces for dry formulations and as gallons, quarts, pints or fluid ounces for liquids.

Appendix IV.
Pest Surveillance Data Sheets

Date	Trap location	Trap condition	Pest	Number	Damage or other evidence	Pest management required	Remarks

Appendix V.
Pesticide Application Records

According to **0080-6-16-.05 RECORDS** of TDA's *Laws and Regulations Governing Pest Control Operators and Applicators of Restricted Use Pesticides*, all commercial applicators and commercial pest control operators are required to keep records, which include pesticide used; target pest; site (crop, plant, house, business or building a pesticide is applied on or to and location thereof); dosage rate; the landowner, producer or other person employing such applicator; date used and amount of pesticide applied. These must be retained for two years and made available to the Commissioner of Agriculture or his/her designee on demand. The following table can be used to record pesticides used in schools and should provide information in excess of that needed to comply with the above rule.

School: _____

IPM Coordinator: _____

Logbook overseer: _____

Address: _____

_____

_____

Pest Control Company: _____

Licensed Operator and Charter #: _____

Address: _____

_____

_____

Date	Time	Site (area and room number, other)	Target pest	Pesticide trade name	Dosage rate (per gal, per sq. or lin. ft., etc.)	Percentage of mixed use dilution	Total amount pesticide used	Common or chemical name	EPA registration	Total area treated	Name of certified applicator

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Linda Allinger, member of TEC (Tennessee Environmental Council)

Charles Hadden, former Section Leader, Entomology and Plant Pathology, University of Tennessee Extension

Frank Hale, Professor, Entomology and Plant Pathology, University of Tennessee Extension

Jim Jones, former Executive Director of Local Finance and Auxiliary Services, Department of Education, Nashville

Nancy McFadden, member of BURNT (Bring Urban Recycling to Nashville Today)

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Wanda Russell, Senior Publications Editor, Marketing and Communications, University of Tennessee Institute of Agriculture

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Forms and other information on school IPM can be found at the UT Web sites at

http://utyeah.utk.edu and **http://eppserver.ag.utk.edu/sch_ipm.htm:**

Logbook Sections - Download modifiable Microsoft Word versions of each section
- Example Childcare Policies
- Example Bid Specs
- Example Inspection Form
- Example Pest Sighting Log
- Example Pesticide Application Record Form
- Example Time Log

School personnel will be asked annually to take a survey that will rate their facility as using no, low, medium and high levels of IPM. Those using low, medium or high IPM levels will be listed on the above Web sites.

National IPM "star" certification can be obtained through National IPM Institute at
http://www.ipminstitute.org/school.htm

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author(s), the University of Tennessee Institute of Agriculture and University of Tennessee Extension assume no liability resulting from the use of these recommendations.

Visit the UT Extension Web site at
http://www.utextension.utk.edu/

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