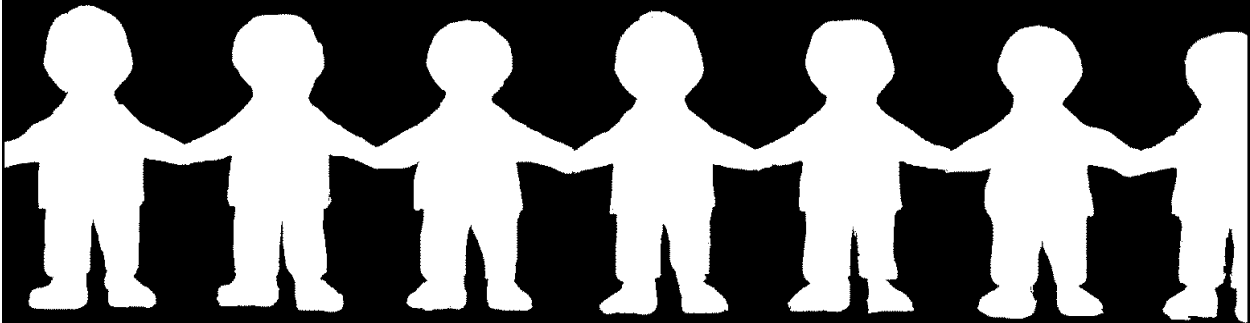


NC STATE UNIVERSITY

INTEGRATED PEST MANAGEMENT FOR NORTH CAROLINA SCHOOLS



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500 copies of this public document were printed at a cost of \$3,525.00 or \$7.05/copy.

Published by
North Carolina Cooperative Extension Service

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Acknowledgments:

Drawings used in this manual were contributed by students at Oak Grove Elementary School, Cary, North Carolina.

Funding for this manual was provided, in part, by the North Carolina Department of Agriculture and Consumer Services.

The pest management professionals serving on the North Carolina School IPM Committee contributed many helpful suggestions during the preparation of this manual.

Integrated Pest Management for North Carolina Schools

INTRODUCTION

In general, most people are repulsed by pests and have low tolerance for pests. Pests are a nuisance: they damage property, destroy and contaminate food, and can be involved in the transmission of diseases. Recent research has indicated that children are especially at risk to pests. For example, cockroaches and their remains are recognized as a source of allergens that can cause asthma in children. Because cockroaches are associated with unsanitary conditions, they can harbor micro-organisms that could potentially cause diseases. Mosquitoes, flies, ticks, fleas, rodents, and birds are involved in transmission of disease-causing viruses, bacteria, and fungi.

There is no doubt that pest control is necessary to safeguard the health of children and other occupants of school buildings and to prevent pests from damaging school property. However, conventional pest control by widespread application of pesticides can expose children to pesticide residues. Compared to adults, children are more at risk from pesticides because of their rapid growth, small body size, and habits. Younger children may spend considerable time on classroom floors; they touch various surfaces and objects; and they put their hands into their mouths without washing them. These behaviors increase their potential for inadvertent exposure to pesticides.

As parents have become aware of the potential hazards to children from the pesticides used in school pest control programs, they have pressured schools to use alternative approaches that are effective and safer around children. To reduce the impact of pests and pesticides on the health and well-being of school children and other school occupants, the federal government has recently adopted regulations that require all schools to adopt programs of Integrated Pest Management (IPM).

This manual provides general information on IPM principles and implementation for Pest Management Professionals (PMPs) and school personnel.



Torri Shelley

Part One:

WHAT IS INTEGRATED PEST MANAGEMENT?

Definition Integrated Pest Management (IPM) is a comprehensive approach that combines effective, economical, environmentally sound, and socially acceptable methods to prevent and solve pest problems. IPM emphasizes pest prevention and provides a decision-making process for determining IF pest suppression is needed, WHEN it is needed, WHERE it is needed, and WHAT control tactics are appropriate. The term “integrated” in IPM stands for the combination (integration) of multiple control tactics—biological, physical, cultural, and chemical—into a comprehensive plan.

Goal The overall goal of IPM in schools is to maintain a high quality environment for school occupants by reducing pest problems using safe, effective, and socially acceptable strategies. To do this, an IPM approach seeks to address the root cause of the pest problems at a particular site. The keys to IPM are:

- knowing the specific life-sustaining resources (food, water, and shelter) and conditions (temperature, humidity, light, air, etc.) needed by each pest (Figure 1).
- identifying the availability of those resources in the school environment and understanding the behavior of the pests in finding these resources.

IPM looks for the weak links in the pest’s **biology** and **behavior** (life cycle, food and habitat preferences and sources, how it feeds, mates, reproduces, and disperses). It then exploits these

weaknesses to manage the pest by altering or removing one or more of the basic necessities. For example, sanitation removes food and water, caulking eliminates cracks and crevices, and sealing off entry points into buildings denies pests access to potential harbor-age sites.

IPM programs never use pesticides on a predetermined schedule, but only when and where monitoring indicates that the pest population has reached a level that will cause economic or aesthetic damage, or medical injury (see Important Terms, page 6). If a pesticide treatment is needed, the material, the application method, and timing are chosen to be effective against pests and safe for humans. Chemicals are used in the least toxic form (active ingredient and/or formulation) that is effective against the pest. Placement or application techniques (e.g., crack and crevice treatments) are selected to minimize human exposure.

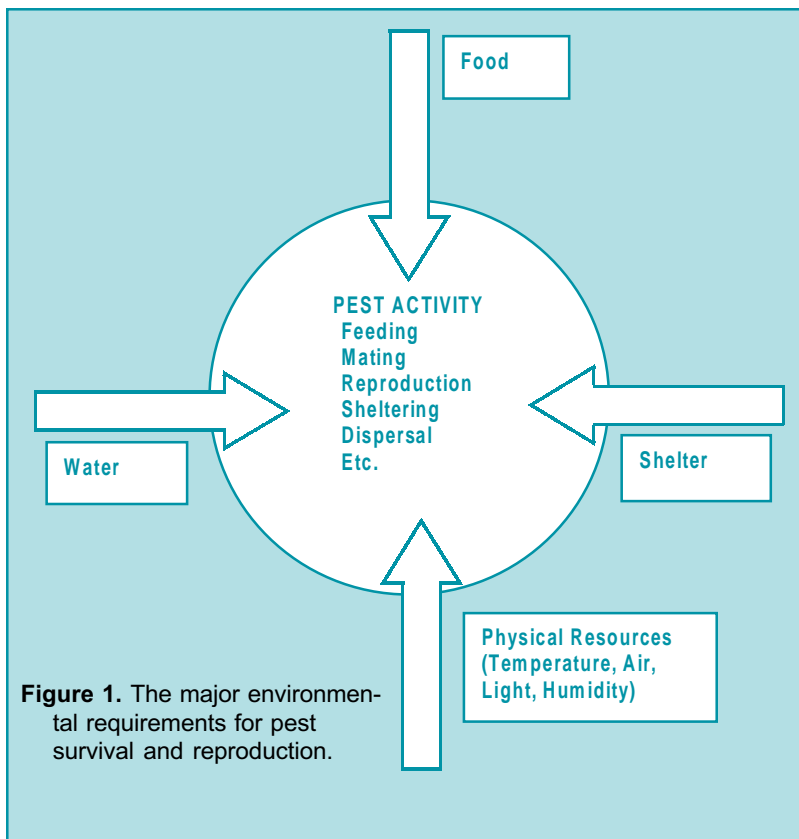


Figure 1. The major environmental requirements for pest survival and reproduction.

Educational strategies are used to enhance pest prevention and to build support for the IPM program.

School IPM relies on monitoring techniques to determine pest location and action levels, and it requires cooperation from students, staff, and administrators who know about the principles of IPM. Monitoring data are used to select appropriate tactics, determine the best implementation procedures, and evaluate effectiveness of pest management measures.

There are four basic IPM strategies:

- pest exclusion.
- pest population reduction.
- combination of pest exclusion and population reduction.
- no immediate remedial action; continue-monitoring strategy.

Pest exclusion and population reduction can be accomplished through a wide range of methods. Particular methods are often specific to the pest problem and location.

Methods

Four categories of control methods can be combined to develop a school IPM program:

Cultural control

The goal of cultural control is to remove or prevent pests from accessing suitable habitats and sources of food, water, and shelter. Cultural control requires modification of people's behaviors that make pest problems worse. For example, changes can be made in sanitation practices, cleaning schedules, recycling, garbage disposal, inspection procedures for incoming products, storage practices, and the reporting of pest sightings. It is critical to have a clear understanding of the pest problem and changes needed to alleviate the problem and a clear assignment of responsibility for implementing control measures. A written description of the problem and plan of action are often helpful.

Physical control

The goal of IPM is to make it impossible for pests to enter and establish a population in a structure. This means using site-specific physical means to exclude, repel, or deter pests. Prevention through exclusion begins with a thorough inspection to locate possible points of entry, potential harborage areas where pests live and hide, and sources of food and water. Other tactics for physical control of pests include altering the light, temperature, and/or humidity levels in parts of the structure to make them unfavorable for pest habitation.

Biological/microbial control

Biological and microbial control uses beneficial organisms such as pathogens to control pests. At present, effective microbial control agents for indoor pests are not available, but research is under way to improve the effectiveness of *Metarhizium anisopliae* for cockroach control and to discover new biological agents.

Chemical control

Currently, pesticides are the mainstay of pest control in school buildings. In IPM programs, however, use pesticides only as a last resort when other possible control strategies are not fully effective or practical. Always use the least toxic chemical formulations, and apply these products in accordance with their labels.



After implementation of an IPM program, this T-shirt might say: "SOME bugs are pests."

Important Terms

Action: Any measure taken to control a pest population, including biological, cultural, physical, and chemical measures.

Action level or threshold: The level of pest infestation at which corrective measures must be taken.

Aesthetic damage: Damage that affects appearance without affecting health. For example, annoyance or embarrassment from visibility of a pest—people just don't like to see cockroaches.

Aesthetic pest: A pest whose mere presence is objectionable.

Bait: A pesticide formulation that combines an edible or attractive substance with a pesticide.

Economic damage: Damage severe enough to cause an economic loss. In the school setting, this may include structural damage or loss of food due to rodent or insect contamination.

Harborage: Refuge or shelter; hiding places for pests (e.g. cracks and crevices for cockroaches).

Inspection: Careful examination of an area to assess pest presence, damage, and conditions that may contribute to pest problems.

Logbook: A record-keeping book placed in a specific location in a school where occupants record pest sightings, relevant observations, and requests for action. It also contains MSDS, service reports, and quality assurance reports

Medical injury: Illness or harm caused by pests or carried or vectored by pests. For example, rodents and flies can carry diseases; bees, wasps, and hornets can sting and cause allergic reactions, etc.

Monitoring: A series of regular and ongoing inspections to assess and record pest presence, population levels, damage, or conditions contributing to pest problems.

Materials Safety Data Sheet (MSDS): A form prepared by the manufacturer or distributor of any hazardous material that provides detailed technical and safety information on the use of and exposure to the chemical product.

Pathogen: An organism (e.g. bacteria or virus) that causes disease in another organism.

Pest management strategy: An overall plan for preventing, eliminating, or alleviating pest problems.

Pest management tactic: A specific pest control method utilized as part of a pest management strategy (caulking, sanitation, baiting, etc.).

Pheromones: Chemical substances produced by some organisms, including insects, for communication within the species.

Reduced-risk pest control options: Non-chemical pest control options or pesticides with a low mammalian toxicity (EPA classification Category III and IV) or pesticide products with the signal word "CAUTION" on the label. Examples include baits, dusts, and other materials formulated for placement where there is minimal risk of human exposure and maximal impact on the pest.

Threshold: Same as action level.

Treatment: Application of some pest control tactic to reduce or eliminate a pest population.

Part Two:

ADOPTING AN IPM PROGRAM

The development of an IPM program generally occurs in two phases: the start-up or adoption phase and the operational or implementation phase.

The start-up phase can be divided into four steps:

1. Come to a consensus with key decision makers about the need for the IPM program and then adopt an IPM policy.
2. Agree on the roles and responsibilities of members of the school community and the pest management professional.
3. Engage the entire school community in establishing pest management objectives.
4. Set or adopt realistic, acceptable action levels that can promote achievement of the established pest management objectives and goals.

Step 1. UNDERSTANDING THE IMPORTANCE OF AN IPM POLICY

A clear IPM policy is absolutely necessary for successful transition from a conventional pesticide program to an Integrated Pest Management program. A policy statement clearly explains the intention of a school to implement an IPM program and provides specific goals, objectives, and expectations for the program and the education and involvement of staff and contractors.

The IPM policy should give highest priority to the protection of human health. It should specify that decisions on pest management actions consider the full range of control options and place priority on the use of non-chemical management strategies whenever practicable and the use of reduced-risk pesticides when chemical controls are needed. There are a number of advantages to having a written IPM policy:

- It improves the school district's decision-making process, resulting in more efficient, more effective, and safer resolution of pest problems.
- Administrators and other employees, as well as parents, become more informed about IPM and pest management by participating in formulating the policy statement.
- Pest management professionals get a better understanding of the school's goals and their role in the school IPM program.
- It provides procedural guidelines for the school to insure that federal, state, and school policies are followed each time a pesticide is used.
- It provides goals and expectations so that the performance, progress, and success of the program and personnel can be easily evaluated.
- It reduces conflict because goals, expectations, and guidelines are clearly stated.
- It allows participation of the whole community in developing the IPM program and provides the school with an effective way to respond to questions from the public.

Sample: INTEGRATED PEST MANAGEMENT POLICY STATEMENT

Structural pests can pose significant problems for people and property. The pesticides that are used in pest control are potentially risky. Integrated pest management is a proven approach that will effectively control pests and also minimize risk to school occupants. It is therefore the policy of the _____ school district to adopt IPM programs or incorporate IPM procedures into the maintenance program conducted by the school system for the control of structural pests.

Explanation of Terms

Pest: Any living organism (animals, plants or micro-organisms) that interferes with human activities at the school site.

Pest management objectives: Pests will be managed:

1. to reduce any potential human health hazard or to protect against a significant threat to public safety.
2. to prevent loss of or damage to school structures or property
3. to prevent pests from spreading into the community or to plant and animal populations beyond the site.
4. to enhance the quality of life for students and building occupants.

Integrated Pest Management (IPM): A comprehensive approach that combines effective, economical, environmentally sound, and socially acceptable methods to prevent and solve pest problems.

Integrated Pest Management Plan: An IPM plan identifies important pests, establishes pest thresholds or action levels, and outlines strategies that will be implemented to attain IPM program goals and objectives. The plan provides a reference for pest management professionals, school staff, and others to assure implementation and compliance with the school's IPM policy.

Pest Manager (pest management professional or school maintenance person licensed to control pests in schools): This person should be familiar with the principles and practices of IPM, be certified, and comply with the School District IPM policy and pest management plan.

Integrated Pest Management Procedures: An IPM decision based on information on the pest and situation shall consist of the following steps: inspection; pest identification; pest-population estimation to check against established action levels; selection of appropriate management tactics; monitoring and assessment of effectiveness of pest management strategy. Integrated pest management may include education, exclusion, sanitation, maintenance, physical and biological strategies or appropriate pesticide applications. If a pesticide must be used in order to meet pest management goals, then

reduced-risk formulations will be chosen and applied using methods that minimize inadvertent exposure. Although cost of control methods will be a factor, cost or staffing considerations alone will not be adequate justification for use of chemical control agents, and non-chemical pest management methods will be preferred. The application of pesticides is subject to the School District policies and procedures, U.S. Environmental Protection Agency (EPA) regulations, Federal regulations, and Occupational Safety and Health Administration regulations(OSHA).

School facilities planning and maintenance: The school district shall include pest management considerations in facilities planning and maintenance. Any landscaping, structural modifications, and sanitation changes recommended by the IPM contact person and the contracted pest management professional to reduce or prevent pest problems shall be addressed in a timely manner as budgets permit, for example, proper placement and types of lights to reduce pest entry into buildings, placement of dumpsters, pest-proof design for doors and ventilation systems, landscape designs that discourage indoor pests, etc.

Education: Staff, students, pest managers, parents, and the public will be informed about potential school pest problems, school IPM policies and procedures, and their respective roles in achieving the desired pest management objectives.

Record-keeping: Records of all pest management activities shall be maintained. These include, for example, inspection records, monitoring records, pest surveillance data sheets or other indicators of pest populations, and a record of structural repairs and modifications. If pesticides are used, records shall be maintained on site to meet the requirements of the state regulatory agency and School Board.

Notification: School staff, students, and parents may request notification when certain types of pesticide treatments are made. Notices will be posted in designated areas at school and sent home to parents who wish to be informed in advance of these applications.

Step 2. IDENTIFYING ROLES AND RESPONSIBILITIES

The success of any IPM program depends on the cooperation of all the people involved. In the school setting, this includes administrators, board members, teachers and other staff, students and parents, and, if pest management services are contracted, Pest Management Professionals (PMPs). Representatives from all of these segments of the school community must be involved in the IPM program from the beginning in order to foster “ownership” of the process and the program. When the respective roles of all the people involved are identified and agreed upon, and when these people communicate well with each other, policy goals can be met.

School administrators, teachers, staff, and students can help to achieve pest control objectives by:

- leaving chemical pest control to licensed applicators.
- not disturbing monitoring devices, for example, not moving sticky traps or other monitoring devices from their designated stations.
- making sure that screens, windows and doors or other openings are not left open unnecessarily.
- recording in the log books all pest sightings or conditions that may be conducive to pest infestation.



School users should not take pest control measures into their own hands.

School Personnel

Administrators and decision makers

Administrators and decision makers should understand the legal consequences of improper pesticide use, pesticide safety issues, and decision-making about pesticide products and their appropriate use for the school or district. This group may include not only superintendents and board members, but also purchasing agents or contracting officers.

The role of administrators is to:

- establish a clear IPM policy for their schools and implement it.
- select a qualified IPM contact person or coordinator.
- authorize the IPM program, commit the resources needed for pest management, and select a pest management professional who can meet the criteria of the IPM program as defined in the contract.
- determine whether IPM objectives are being met.

The IPM contact person or coordinator

The IPM contact person is at the center of the IPM implementation process and is critical to its success. The role of the contact person is to:

- oversee the daily operation of the program and evaluate progress in achieving pest management objectives.
- serve as the primary contact for inquiries and provide information requested by school personnel, parents, legal guardians, and the general public about the school pest management plan.
- keep both the school occupants and the decision-makers (management) informed about progress in the implementation of the IPM program.
- maintain information about the scheduling of any necessary pesticide applications in each school under the jurisdiction of the local educational agency.

- keep accurate records about the IPM program, including the amount and location of all pesticide treatments, dates of each treatment, level of effectiveness, IPM activities, pesticide-related complaints, needed structural and landscape improvements.
- work with administrators when formulating a contract for pest management services by contributing ideas about specific practices needed in their schools.
- Maintain and make available pesticide labels and materials safety data sheets (MSDS).

Occupants

Students and Teachers. The cooperation of students and teachers is essential to the success of any IPM program. Classrooms and lockers are key sites for pest problems in school buildings. Without cooperation of students and teachers it is unreasonable to expect the IPM program to be successful in controlling pests.

Students and teachers should:

- clean up food leftovers, store pet food and snacks properly in pest-proof containers (for example, plastic containers with tight-fitting lids), and maintain uncluttered and clean classrooms, cubbyholes, lockers, and other storage areas.
- follow IPM guidelines for reporting pest problems. For example, record pest problems in the pest-sighting log sheets.
- report conditions that are conducive to pest survival in the building (leaky faucets, damaged trash can lids, etc.).

Cafeteria Staff. Food handling and preparation areas are the most crucial areas for pest management because they provide all the life-sustaining resources and conditions (food, water, shelter, and warmth) that pests need. It is critically important for cafeteria staff to understand the importance of good sanitation, kitchen management, and proper food storage in successful pest management. Cafeteria staff should also participate in periodic IPM training.

A well-trained cafeteria staff can:

- locate and eliminate pest harborage areas.
- record pest problems in the logbook.
- record in the logbook conditions that may be conducive to pests.
- store food in pest-proof containers.
- reduce the availability of life-sustaining resources by cleaning the kitchen, equipment, and utensils thoroughly, removing garbage promptly, etc.

Maintenance Staff. Maintenance staff have significant roles in an IPM program. They are most likely to see pests in and around the building, but often do not recognize conditions that may lead to pest problems. With training, maintenance workers can become instrumental in the success of the IPM program since many pest problems are prevented or reduced through good cultural practices inside and outside the building. With proper maintenance and landscape design, many pesticide applications can be avoided.



The success of an IPM program depends on cooperation from ALL school users.

Maintenance staff members are responsible for:

- reporting the location of pest problems.
- recognizing and correcting conditions, such as water leaks, potential pest entry points into buildings, and substandard sanitation practices that may lead to pest problems.

Parents and Community. Parents should be made aware of the current pest management practices in their children’s schools. Active interest and concern on the part of the parents can motivate the schools to do their best to provide effective and safe pest control. Parents and the community can and should express their views to the IPM contact person, school administrators, PTA, and school board. Parents should have representation on school IPM advisory committees.

Pest Management Professionals

The pest manager should have technical training, knowledge, and experience in pest management. The PMP is an inspector, an identifier of pests, a communicator, a record-keeper, a decision-maker, and a guardian of the well being of students and staff. The pest manager should have a thorough understanding of the pest management contract (if services are contracted) and the school IPM policy and its implications.

The PMP takes a much more active and interactive role in IPM than a conventional pesticide applicator. In IPM, PMPs spend more time inspecting the school and communicating with school workers than applying pesticides. The pest manager recommends and applies the appropriate pest management methods based on knowledge of the site and information about specific pests and their biology.

The pest manager should:

- be certified and licensed to conduct pest control.
- inspect the school site to identify pests, conditions, behaviors, procedures, and practices of school occupants that encourage pest presence. This information should be reported to the school IPM contact person with recommendations for changes that can help the pest management effort.
- monitor the site to identify pests and determine the level of pest presence.
- provide written pest management recommendations to the IPM contact person and take pest control actions necessary to achieve pest management objectives. If pests have reached the action level and a pesticide application is deemed necessary, then the selected product and application method should minimize risk to school occupants.
- keep accurate records of any control actions taken. Monitor the site subsequently to determine if the actions taken are successful.
- examine the IPM log(s) for records of new pest sightings and requests for pest control, and to determine if the school administration has implemented the recommendations for structural modifications or behavior changes that are needed to discourage pests from entering or establishing.
- notify the IPM contact person of intent to use pesticides that are non-exempt (if notification is required before pesticide application).
- periodically provide written or oral reports showing progress in achieving IPM program objectives.



The PMP needs to make an accurate identification of the types of pests present in various locations. Drawing by Haley Schweizer.

Step 3. SETTING PEST MANAGEMENT OBJECTIVES

Pest management objectives must be set for different pests and sites before action levels are set. For buildings or other structures, the main objective might be to prevent termite damage. The main objective for kitchens or other food service areas might be to control cockroaches. Specific objectives should be outlined in the pest management plan.

For example, the objectives of an Integrated Pest Management program might be to:

- reduce any potential human health hazard or protect against a significant threat to public safety.
- prevent damage or loss to school resources, structures, or property.
- prevent pests from spreading in the school.
- prevent disruptions of the learning or work environment.
- enhance the quality of life for students, staff, and others.

Step 4. DECIDING WHEN TO TAKE ACTION

The mere presence of a pest should not always warrant initiation of control efforts since it is nearly impossible to totally eradicate pests. A more realistic goal for pest management is to keep pests at acceptable levels. This requires that action levels be determined to provide a clear basis for IPM decisions.

Pests in school kitchens and cafeterias are regulated under state and county health codes. There is little tolerance for cockroaches, ants, mice, flies, and other pests anywhere food is stored, prepared, or served. Action thresholds for these areas are typically low or zero. Safety and building standards rather than IPM considerations may determine when action is necessary to control termites and rodents. For areas other than kitchens and cafeterias, school districts should follow the guidelines recommended in this manual.

Setting action levels for pests in other school facilities is subjective and based on consensus of opinion. People's feelings about pests differ, and target levels may require compromise. In cases of aesthetics, for example, the question may be whether people are willing to tolerate some pests, evidence of pest activity, a change in appearance of a site, or the nuisance of the pest.

Questions

A number of factors influence the decision that a specific pest is causing serious problems. The following questions should be answered before deciding whether the action level is likely to be reached:

What is the potential for serious problems?

This depends on the type of pest, the size of the pest population causing intolerable aesthetic or economic damage or medical injury, and the location of the pest. For example, one German cockroach poses less of a concern than a termite, as the latter is a likely indicator of a larger infestation that can cause serious structural damage. A German cockroach seen in the serving line in the cafeteria is more serious than a cockroach in the gym.

What is the level of tolerance of the clientele?

How tolerant are school occupants to pests? Answering this question might require interviews with a sample of students, teachers, and staff. In addition, the IPM contact person can make inquiries in the school district to find out if there are records or reports of incidents of allergies to insects or complaints from parents about allergic reactions observed in their children that are attributable to insects, for example, wasps, bees, cockroaches, or other pests.

Minimize the number of panic decisions to institute immediate pest control action (usually spraying), when a single pest is sighted by informing the school community about the difference between an incidental pest and an infestation. Upon learning that the presence of one pest is not equivalent to an infestation and therefore should not trigger remedial action, many people revise their opinions and are willing to delay remedial action until monitoring has been done. The location of the infestation also makes a difference. For example, the action level for German cockroaches in a highly sensitive location such as the cafeteria will be lower than in a remote storage area for surplus furniture or equipment.

Action Level When an IPM program is first implemented for a particular pest or site, guidance on setting the action level may be available from state and county public health codes, data from pilot school IPM projects, existing school records, literature on the pest, discussions with those who have experience managing the pest elsewhere, and school staff recollections of the problem in prior years.

Determining action levels is a three-step process:

1. Reach consensus with school occupants on the number of pests that constitute an unacceptable level or how much aesthetic, medical, or economic damage can be tolerated.
2. Find out how large the pest population can grow before it causes economic damage or medical injury or reaches a level that is aesthetically unacceptable.
3. Establish an “action level.”

Action levels should be re-evaluated periodically for each pest and site. As people become more reluctant to have pesticides applied in schools, they become more tolerant of some level of pest presence where previously none was acceptable. This is particularly true if people have been educated as to what levels of pests in the school do or do not cause economic or medical damage.

Part Three: IMPLEMENTING A SCHOOL IPM PROGRAM

The operational phase is a continuous management process:

1. Implement IPM monitoring, including record-keeping and pest identification.
2. Select and carry out any necessary action steps.
3. Evaluate and fine-tune program.

Step 1. MONITORING, RECORD-KEEPING AND PEST IDENTIFICATION

Monitoring Inspection, monitoring, and pest identification are key components of IPM. See Part Four for several sample IPM inspection report forms.

Implementation of an IPM program should start with an initial inspection of the facilities to evaluate pest management needs of all premises. This means identifying problem areas and equipment, and determining whether structural features or management practices contribute to pest infestations.

Monitoring is a series of routine and ongoing inspections to look for pests and evidence of pest presence and conditions that may encourage infestation. Information from these inspections is always carefully and methodically recorded on appropriate data sheets, maps of the school grounds, and/or floor plans of buildings.

Monitoring combines communication with building occupants, visual inspection, and trapping to discover the presence of pests, entry points into buildings, and places where pests are finding food, water, and harborage or resting sites. Monitoring will also determine pest population levels to see whether action levels have been reached. In addition, monitoring provides quantitative information on how effective the actions taken have been or whether there is a need for further action if pest populations occur at unacceptable levels after remedial action has been taken.

PMPs use inspection and monitoring to become familiar with the workings of the school and to anticipate conditions that may trigger pest problems so that they can be prevented or eliminated before they become serious. The pest information collected by monitoring becomes the basis for informed and intelligent pest management decisions appropriate for a particular situation as outlined in the school system’s IPM program (see Fig. 2).

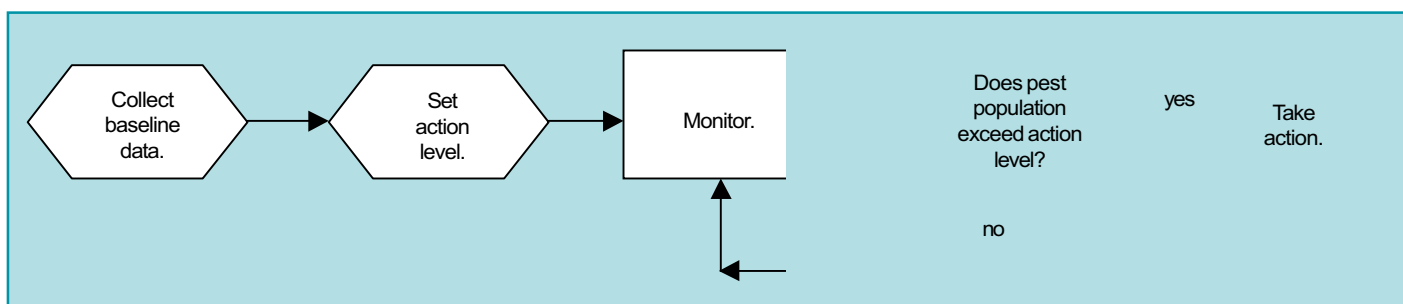


Figure 2. Continuous monitoring to catch pests early and identify conditions that favor pests is at the heart of IPM and determines whether and where action may be needed.

Why monitor?

Monitoring provides data on which to base decisions about whether action is necessary. Monitoring can help:

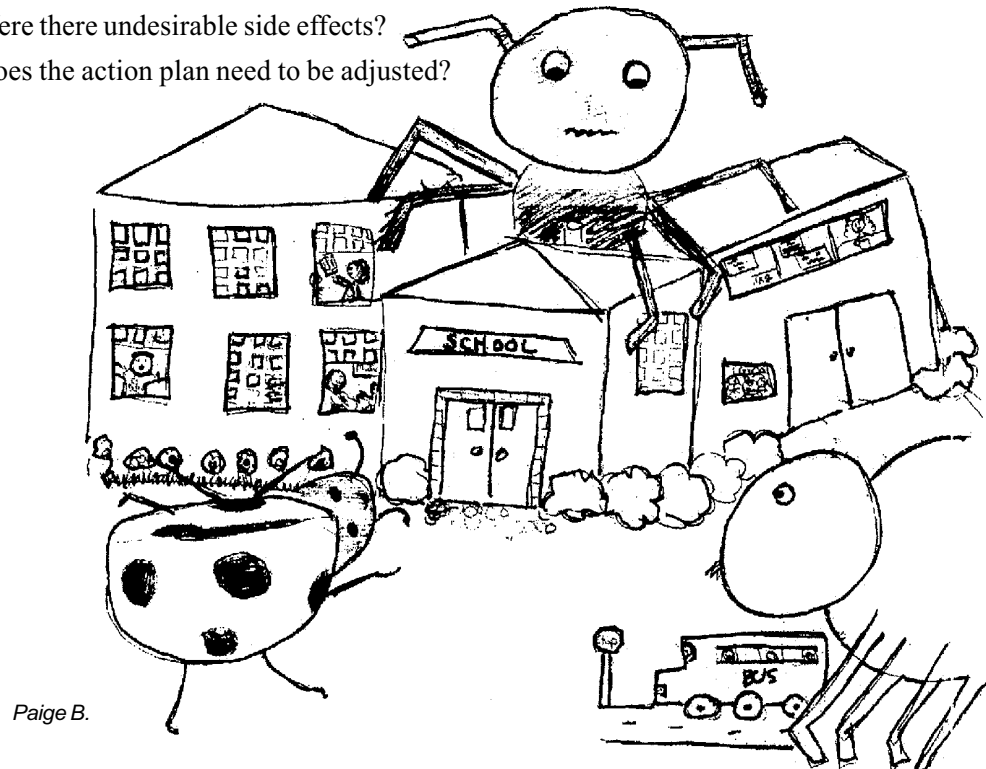
- show if the pest population is increasing or decreasing. Inspection of problem sites on different occasions will help determine whether a pest situation warrants action.
- detect pests early before they become a problem.
- provide information needed for discussions with clientele about progress in meeting pest management objectives. Without monitoring records, complaints or pest observations by occupants are the only source of information to direct pest control activities.

Monitoring helps to determine what kinds of actions are needed. It also indicates where action is needed and when it is needed. Monitoring will:

- show where pest-proofing, sanitation and/or other preventative measures are most needed.
- pinpoint pest infestations and “hotspots” and facilitate targeting of pesticide treatments.
- help to time and target treatments to the most vulnerable stage in the pest life cycle.
- facilitate the planning of treatments to avoid interference with school activities and, if necessary, provide sufficient time for notification.

Monitoring also measures the effectiveness of pest control actions and provides baseline data for evaluation and fine-tuning. The following questions can be answered from monitoring data:

- Did the action reduce the number of pests to acceptable levels?
- How long did the effect last?
- Is additional action needed?
- Were there undesirable side effects?
- Does the action plan need to be adjusted?



Paige B.

No one wants pests to succeed in taking over school buildings. Monitoring regularly to catch pest problems early and enlisting occupants as active participants in the Integrated Pest Management program will help everyone understand how their actions can make a difference.

What should be monitored?

Monitoring school buildings involves the regular observation and recording of:

- the condition of the building inside and out (structural deterioration, holes that allow pests to enter, conditions that provide pest harborage).
- the level of sanitation inside and out (waste disposal procedures, level of cleanliness inside and out, conditions that supply food to pests).
- pest damage and the number and location of pests or pest signs (rodent droppings, ants foraging, cockroaches caught in traps, etc.).
- human behaviors that affect pests (working conditions that make it impossible to close doors or screens, food storage and handling procedures that provide food for pests, etc.).
- management activities and their effects on the pest population (caulking, cleaning, setting out traps, treating pests, etc.).

Records

The success of any IPM program depends heavily on a good record-keeping system and accurate records. The size of the school and number of buildings will help determine how many logbooks should be maintained. Logbooks can be established for each building or other facility as determined by the IPM contact person. Placing logbooks in central locations such as the main office, teacher's workroom or cafeteria should make them accessible to school occupants and limit the amount of time used by the pest manager to check them regularly. (See Part Four for a sample Pest-Sighting Log.)

Why keep records?

- Allow schools to determine if the IPM program objectives are being met.
- Lead to efficient decision-making and procurement of pest control supplies if pest control is done by maintenance personnel.
- Show changes in the site environment (availability of resources for the pest), physical changes (exclusion and repairs), pest population changes (population size and structure), or changes in the amount of damage or loss.
- Provide an ongoing record that may allow anticipation and planning for control of seasonal pests or tracking of recurring pest problems.
- Preserve important information when employees leave or retire and make it easy to pass this information from one employee to another.

What should be kept in the logbook?

- a copy of the approved IPM plan and service schedule (see pp. 39-44).
- contact information: name and phone number for IPM contact person, the contracted PMP, poison control center, etc.
- maps of the school grounds and floor plans of buildings showing sensitive areas (cafeteria, computer rooms, science laboratories, etc.), the location of pest activity, location of detection and monitoring devices and bait stations in/around the site.
- pest surveillance record sheets that show the type and number of pests or other indicators of pest population levels found in the pest monitoring program on the site.
- copy of current label and MSDS for each EPA-registered pesticide product used.
- pest management service reports showing dates and areas where action was taken and recommendations for structural repairs and modification.
- documentation of quality control assessments by the contractor.

The IPM records should be reviewed regularly by the pest manager and IPM contact person to identify pest trends and problem areas. It is a good idea to create graphs, bar charts or other visual representations of the information collected. This makes pest patterns emerge quickly, facilitating decision-making and updating of the client on progress in implementing the IPM plan.

Pest ID

Correct pest identification is crucial to IPM. Actions must be tailored to the pests actually present. For example, there is no point in putting out mouse traps to control rats.

Guidance in making correct identification can be obtained from several sources (see Resources on page 45). Once a pest has been correctly identified, information about its biology and behavior should be reviewed. Information about the life habits of a pest provides clues to look for during monitoring to find the weaknesses that can be exploited to best manage the pest.

If damage is the only evidence of pest activity, a different monitoring strategy should be tried. Based on knowledge of the pest's behavior, change visual inspection to match peak time for pest activity (consult with an entomologist at the pest control company and/or with Cooperative Extension staff or university researchers).

Tools for Inspection and Monitoring

Maps and Floor Plans

Maps and floor plans are necessary for monitoring in and around school buildings because they help the PMP to visualize the entire site and the relationships between areas. These should be available from the school or facilities manager. If plans are not available, make detailed drawings showing all pertinent areas—including areas at high risk to pests and sensitive areas.

Working copies of the floor plans should be used during each inspection, and the technician should have access to all areas whenever possible. Any evidence of pests and related information that may prove useful (sanitation problems, overflowing trash cans, torn screens, moisture problems, etc.) should be marked for later action.

Inspection Kit

- Flashlight or headlamp and extra batteries (or battery charger).
- Mirrors to inspect under objects, inside cabinets, drop ceilings, etc.
- Sticky traps, glue boards, etc.
- Plastic bags, vials, and forceps to collect samples of insects and other specimens.
- Hand lens or small portable microscope.
- UV light source for rodent inspections.
- Pad of paper and pencil to make notes and labels to place inside sample containers.
- Transparent tape to capture insects or mites too small to pick up with forceps. Index cards or paper for attaching the tape with captured insects.
- Screwdrivers, spatulas, putty knife, knife, and small hammer.
- Caulk and steel wool.
- Duct tape.
- Hand-held moisture meter to find areas of high wood moisture.
- Polaroid or digital camera or video camera to record problem areas.
- Soap/hand cleaner and clean rags/paper towels.

Step 2. CHOOSING IPM ACTION STRATEGIES

Criteria

Once the IPM decision-making process is in place and the decision is made to take action to suppress a pest, there are many choices of technique and strategy. When any action is under consideration, answering the four questions below will help determine its appropriateness for a particular situation.

Will the action prevent recurrence?

Taking action that prevents recurrence of the problem is at the heart of a successful IPM program. These actions often include changing the landscaping, repairing the structure, or altering a practice to prevent pest problems. The following are examples of preventive actions:

- Educate students and staff about how their behaviors may attract pests, encourage pest survival, or affect how well pest management measures work.
- Caulk cracks and crevices to reduce pest harborage and entry points.
- Improve sanitation in and around the building to reduce the amount of food available to pests.
- Clean gutters and direct the flow of water away from the building to prevent moisture damage.

Is it easy to carry out safely and effectively?

While the application of pesticides may seem to be comparatively simple, in practice it may not be the easiest tactic to carry out safely or effectively. When any pesticide is used, consider the potential hazards to humans, pets, fish and other aquatic animals, and the overall environment. Pesticide exposure can occur through the skin, through the mouth and eyes, and through the lungs by inhalation. The use of sprays, fogs, and volatile formulations should be considered a last resort since they can leave pesticide particles on surfaces touched by building occupants and in the air they breathe.

Is it cost-effective?

Consider whether any particular tactic carries a one-time cost, an annual cost, or a cost likely to recur several times during the year. Steps to prevent pest infestation may have higher initial or one-time costs, but lower long-term costs. Costs for established IPM programs are generally about the same as or less than costs of conventional calendar-based chemical programs.

If school personnel make pesticide applications, they must have appropriate training, licensing, and certification, and follow all label instructions for the product's use and post-application reentry times. Use of conventional pesticides often involves wearing protective clothing, a mask or respirator, gloves, goggles, and boots. In addition to labor and materials, costs associated with chemical pest control programs include construction or maintenance of an approved pesticide storage facility, disposal of empty pesticide containers and unused pesticides, liability insurance, environmental hazards, and public relations problems. Such liabilities and costs are often best left to pest management professionals.

Does it pose a hazard to humans, non-target organisms, or the environment?

Around children it is particularly important to take the health hazards of various strategies into consideration. Hazard information for any registered pesticides is provided on the product, on the MSDS available on request from the manufacturer, and from several other sources, including the Cooperative Extension Service, the National Pesticide Information Center, and non-profit organizations (see Part Six. Resources).

Education Education is a critical and cost-effective pest management strategy. It is important to teach people that the way they store food and dispose of wastes plays an important part in managing pests like cockroaches, ants, flies, yellowjackets, and rodents. Education helps occupants tell the difference between incidental occurrences of pests and pest infestations. This diminishes alarm or panic and subsequent demand for immediate remedial action when one individual pest or only a few pests are sighted and allows for monitoring to assess the need for remedial action. Education can also increase people’s willingness to tolerate harmless organisms in their environment and not insist on pesticide applications for such non-pest organisms. In addition, education can increase understanding of the benefits of a general ecosystem approach. Teaching children about IPM will have a long-term effect on the direction of pest management in this country as these students grow up to become consumers, educators, policy makers, and researchers.

Educate the school users about behaviors that help discourage pests

- Limit consumption of food and drinks to designated areas only.
- Keep indoor plants healthy. Do not over-water or over-fertilize.
- Store animal foods in tightly sealed plastic or metal containers, clean cages regularly, and attend to spills and leaks promptly.
- Clean classrooms, desks, cubbyholes, lockers and other storage areas regularly. Do not allow food to be stored in these areas.
- If students get head lice, consult the local health department. Ask parents to contact their physicians for advice on shampoos to use on their child. Discourage students from exchanging hats, caps, brushes, or combs, etc. Pesticide sprays in classes with affected children are not necessary.
- Use “FIFO” (“first in/first out”) policy for food storage. Keep all food items stored on shelves off the floor and away from walls.
- Store paper products and supplies in cardboard boxes on shelves away from moisture and prevent direct contact with floor or walls.
- Keep doors and unscreened windows closed when not in use.

Habitat Steps taken to reduce availability of food, water, shelter, and access routes can permanently eliminate some pest problems. If any one of these life-sustaining needs can be reduced or eliminated, the environment will support fewer pests.

Redesign or repair structure and landscaping

- Design changes can incorporate pest-resistant structural materials, fixtures, and furnishings.
- Elimination of drop ceilings, for example, takes away an entire pest habitat within the school.
- Replace carpets with easy-to-clean floor surfaces (e.g., vinyl tiles in high traffic areas).
- Barriers can be used to exclude pests from buildings or other areas. For example, door and window screens keep out flying and crawling insects. Weather-strip at entryways or install air curtains (“fly fans”) above doors that are opened frequently (e.g., loading dock doors).
- Caulking of cracks and crevices will eliminate cockroach harborage. This can be especially important where conduit or pipes penetrate walls. The hole drilled for

conduits or other utility lines is typically larger than the pipe, thus creating ready access for pest movement, especially cockroaches and mice. The importance of careful caulking cannot be overemphasized. Prevention is the least expensive but most overlooked pest management practice.

- Clearing away clutter and using movable, industrial, stainless steel wire shelving will also help reduce cockroach and rodent habitat and facilitate cleanup of spills and monitoring for problems.
- Attention to landscaping can reduce indoor and outdoor pest problems. For example, plants growing too close to walls may encourage indoor ant and rodent problems. As the ants look for food such as “honeydew” on the plants, they also use the branches as conduits to indoor sites. Removing dense vegetation near buildings will eliminate rodent harborage.
- Water leaks or drainage problems should be corrected, surfaces should be kept dry overnight, and any standing water should be eliminated to deny pests access to water.

Sanitation

Sanitation is probably the most important non-chemical pest control measure. Sanitation reduces or eliminates food and water for pests such as rodents, ants, cockroaches, flies, and yellowjackets and improves efficacy of pest control agents like baits. For effective pest management, good sanitation is needed in buildings (food service areas, science labs, animal cages, rest rooms, locker rooms, janitorial closets, floor drains, shower drains) and in outside areas around the foundations and adjacent to the buildings (flowerbeds, shrubbery, playgrounds, dumpsters, etc.).

Sanitation practices that discourage pests

- Keep areas free of debris and clutter.
- Vacuum carpeted areas thoroughly and frequently.
- Store food and waste in plastic or metal containers with tightly fitting lids. Use plastic liners in trashcans.
- Clean food preparation equipment and areas after use and remove grease from vents, ovens, and stoves.
- Clean and dry mop buckets after use and hang the mop vertically above floor drain to dry.
- Remove waste from buildings frequently.
- Keep areas around dumpsters clean.

Physical Control

Vacuum cleaners

The vacuum cleaner is one of the least used but most effective pest management tools. It can be used for removing food particles and other debris that pests feed on and also for directly removing pests. Some vacuums have special attachments for pest control and can pull cockroaches out of hiding places or collect spiders. Some can capture adult fleas, their eggs, and pupae. Specialty vacuums equipped with filters can remove tiny allergenic particles from buildings.

Trapping

Traps play an important role in pest control, and a wide variety of traps is available to the pest manager. Some traps, including cockroach traps and various pheromone traps, are used mainly for monitoring pest presence, although if the infestation is small, traps may sometimes be used to control the pests. Other traps include the familiar snap traps and glueboards for mice and rats, blacklight traps and flypaper for flies.

Mechanical rodent traps and glue boards must be checked daily and captured rodents disposed of promptly. Traps should be in areas or boxes that are inaccessible to children.

Temperature, lights, and air curtains

Freezing can kill trapped insects such as clothes moths and the eggs and larvae of beetles and moths that destroy grain. For example, infested food packages can be placed in a freezer (not the self-defrosting kind) at 0 degrees F (-18 C) for 4 days to kill pantry pests before discarding them to avoid re-infestation of other stored food.

Replacing outdoor insect-attracting mercury vapor lamps and metal halide lights with high pressure sodium vapor lamps that are less attractive to outdoor pests can reduce invasion of buildings by the occasional pests attracted to the exterior lights.

Installing air curtains (“fly fans”) on external doors that are frequently used can prevent flying insects from entering buildings. These should be installed to come on automatically whenever the door is opened.

Pesticides

Although pesticides have a role to play in IPM programs for schools, they should only be used with caution and only in very specific situations. The risk of harm from exposure to pesticides is relatively higher for children than for adults exposed to the same levels. When chemical controls are needed, select the reduced-risk formulation that is effective against the pest.

The following guidelines are recommended for the judicious use of pesticides in school buildings:

- Pesticides should only be applied by state certified and licensed pesticide applicators.
- Pesticides should be applied as a last resort according to need, not on a routine or predetermined calendar schedule.
- The label is a legal document that must be read carefully before applying any pesticide
- Label directions must be followed for rates, concentrations, application methods, protective clothing, ventilation of treated areas, and any re-entry intervals.
- If there is a school policy concerning notification, be sure to follow the guidelines carefully. At a minimum, record all control measures during each visit. Current regulations of the North Carolina Department of Agriculture & Consumer services (NCDA & CS) require pest management professionals to maintain records of any pesticide applications. This provides a written record and can prevent possible misunderstandings. Pay particular attention to individuals who may be sensitive to pesticides. The IPM coordinator should have information from staff, parents, and guardians about members of the school community who may be sensitive to pests and pesticides.
- Keep copies of current pesticide labels, MSDS, and consumer information sheets easily accessible and available to anyone who may request the information.

Selecting pesticides

Reduced-risk pesticides have low or no acute or chronic toxicity to humans. They often affect a narrower range of species, and/or are formulated to be applied in a manner that limits or eliminates exposure of humans and other non-target organisms. Pesticides are classified according to their potential hazard to humans, animals, and the environment. Each pesticide is identified with one of the following signal words on the label: “DANGER,” “WARNING,” or “CAUTION”. Pesticide products with the signal word “DANGER” have the greatest potential hazard, while those with “CAUTION” have the least potential hazard. If pesticides are deemed

necessary to control pests effectively in schools, appropriate products with the signal word “CAUTION” should be selected. These might include insect and rodent baits in tamper-resistant containers or stations, cockroach baits that can be placed in cracks and crevices, insect growth regulators (IGRs), or inorganic pesticides like boric acid and silica gels. Whenever possible use an appropriate non-volatile bait (paste, gel, or containerized form) that utilizes very small amounts of active ingredient. Information on pesticide toxicity can be obtained from the pesticide label, from the MSDS on request from the manufacturer, or from several other sources, including the Cooperative Extension Service, the National Pesticide Information Network, and non-profit organizations (see Part Six. Resources).

The best materials affect only the target pest. IGRs are very specific for insects and minimize the hazard to humans.

Some pests such as cockroaches are known to develop resistance to certain pesticides when they are used intensively or exclusively. If pesticides are used for control, rotate among classes of pesticides (switch between pesticides with different modes of action).

In the future, regulations may restrict certain types of pesticide applications (space sprays, fogging, and baseboard applications), so it is prudent to focus on pest management using alternative methods.

Some Reduced-risk Pesticides and Application Methods

Reduced-risk pesticides have a low or no toxicity to mammals. Most least-toxic pesticide products have the signal word “CAUTION” on the label and are formulated and applied to limit or eliminate exposure to people and non-target animals. They include IGRs, desiccating dusts (e.g., silica aerogel, diatomaceous earth), boric acid, and non-volatile tamper-resistant or containerized baits (e.g. cockroach, ant, rodent bait stations).

Reduced-risk application methods apply insecticides to maximize pest exposure but minimize exposure to people and non-target organisms, for example, crack and crevice applications and spot treatments. Reduced-risk methods place pesticides in areas that are inaccessible to children and other building occupants or in tamper-resistant containers thus that reduce the possibility of exposure.

Before using any pesticide in a school, be ready to answer these questions:

Is it registered for the intended use?

Any pesticide used in North Carolina must be registered with the EPA and NCDA & CS and be labeled for the intended use (i.e., application to the intended site). For example, a pesticide cannot be applied in a food preparation or service area unless the label specifically permits its use there.

What are the hazards to humans?

What is the acute (immediate) and chronic (long-term) toxicity? Is this compound volatile, so that it could linger in the air and eventually be inhaled by the occupants? How long does the compound remain toxic in the environment? Is there an objectionable odor?

Decisions about which materials to use are pest specific. A quick-acting, short-lived, more acutely toxic material might be necessary in emergencies; a slow-acting, longer-lasting, less-toxic material might be preferable for a chronic pest problem.

Does the recommended application method minimize exposures to people and non-target animals?

Wherever possible, pesticides should not be applied on a broad scale in schools. Baseboard spray applications, for example, tend to increase the risk of exposure to building occupants. If baseboard or general space sprays are considered necessary, they should be done only when occupants are not present. Comply with any post-application re-entry time limits listed on the label and be aware that some residues can remain long after application.

To minimize human and non-target animal exposure, pesticides should be applied as selectively as possible. Treatments should be targeted only to the obviously infested areas or sites (“hotspots”) and pest harborages. Routine monitoring can help to locate and target the area(s) needing treatment.

This can be achieved several ways.

- Applying pesticides as a spot treatment in combination with improved sanitation, pest-proofing, and other non-chemical methods can minimize risks from pesticide exposure. (Note: EPA defines an individual spot treatment as 2 square feet or less.)
- Avoid (or limit) the use of surface and space sprays and volatile formulations. Use crack and crevice applications when possible. These treatments maximize exposure of the pest to the pesticide by targeting harborage sites, while minimizing pesticide exposure for the occupants.
- Use appropriate bait formulations to target harborages and hotspots. Baits should be placed in areas that are out of reach by children.
- Place rodenticides in locations not accessible to children and non-target species or in tamper-resistant bait boxes. Securely lock or fasten shut the lids of all bait boxes. Bait boxes can be glued in place with construction adhesive or attached to walls or floors with appropriate screws to insure that they cannot be moved. The same care should be applied to exterior baiting. Where possible, avoid baiting areas accessible to children. Follow the bait and box installation instructions. Use paraffinized bait blocks (instead of pelletized bait formulations) to reduce the likelihood that a rodent can remove the bait. Since rodents may die indoors and be found by children, it might be preferable to use traps and glue-boards indoors. However, traps and glueboards must be checked regularly, and dead rodents removed immediately.
- Remove or cover aquariums or cages with animals before any treatments. Product labels should be checked for specific instructions on treating rooms where aquariums are present.

Decisions

The basic IPM decision-making process is summarized by answering four key questions.*

1 — IS ACTION NECESSARY?

Remedial action is not always needed at the first sight of pests. The IPM program establishes action thresholds or levels for the number of pests that can be tolerated. When pests are sighted, monitoring should be instituted to determine whether the pest population occurs at or above the action level before appropriate action is taken.

2 — WHERE SHOULD ACTION TAKE PLACE?

If some action is deemed necessary, the IPM process recommends that the pest manager look at surrounding areas to determine the source of pest, possible entry points, and ways to eliminate the life-sustaining factors. If immediate action is needed, then pest control measures can be targeted at the sites where the greatest effect can be achieved – for example, in the preferred harborages of the pest.

3 — WHAT ACTION WILL BE MOST EFFECTIVE?

When choosing pest control measures for indoor sites, combine as many non-pesticidal tactics as possible. Pest life systems are complex, and any single tactic, such as the application of a pesticide, rarely solves a problem permanently. Every pest reduction, no matter how small, is a valuable addition to the program.

4 — WHEN SHOULD ACTION TAKE PLACE?

It is preferable to schedule pest control operations when the buildings are unoccupied to minimize exposure of occupants to pesticides (if needed) and interference with school activities and to comply with regulations.

View Each Pest Problem in a Larger Context

Every pest problem must be considered in the total setting of the school and grounds around it. Problems with different pests can occur at the same time or sequentially. In addition, pest problems are influenced by unrelated human activities, such as waste disposal and food handling inside the school, grounds management outside the school, weather conditions, and even the attitudes toward pests of the people who work and study within the district.

IPM takes a holistic or whole-system approach to solving a pest problem. To be successful, an IPM program must consider both the living (biotic) and non-living (abiotic) components of the system. For a school, the biotic components are the people (students, staff, parents, School Board members), laboratory animals, areas around the school, and pests. The abiotic components are school buildings, equipment, and furnishings. Information about any one of these components may be related to the design and implementation of a successful IPM program.

Integrated Pest Management is an ongoing or continuous process. Once an IPM tactic or strategy has been implemented, monitoring continues to determine if the implemented action resulted in the desired response or if an additional IPM action is required.

*Adapted from *IPM for Schools: A How-To Manual*, U.S. EPA. See Website Resources, Part Six.

Step 3. EVALUATING THE IPM PROGRAM

One of the most important components of IPM is evaluating how well the program is working and fine-tuning it when necessary. This means that every component of the IPM program will need objectives and criteria for measuring success. In the evaluation step, the IPM contact person determines whether all the necessary components were actually developed and if the components were well coordinated.

Evaluate every program component

- Was monitoring regular and record-keeping thorough?
- Were pest management objectives and action levels appropriate?
- Was the decision-making process appropriate?
- Were pest management actions taken? What was result?.
- Were school personnel successfully enlisted in the IPM program?
- Was the budgeted amount adequate? Too much? Too little?

Periodically (monthly, bi-monthly, or quarterly) use monitoring data to answer the questions below and make any necessary adjustments in methods for the next period.

- Was the pest population adequately suppressed in a timely manner?
- Was the planned procedure used? If not, what was different and why?
- Was there any damage from pests? If so what was the nature of any damage? What damage was tolerable?

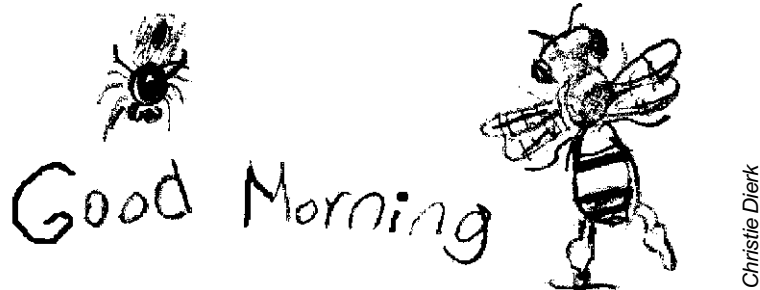
If an action was not effective

- Why was it not effective?
- Should action be repeated or should another kind of action be evaluated?

Fine Tuning

After two or three periods of fine tuning (modifying the habitat, redesigning or repairing parts of the school facility, or changing behavioral practices to discourage pests), many pest problems should diminish or even disappear. Once this point is reached, periodic monitoring rather than deployment of remedial pest control measures may be all that is needed. However, monitoring must continue at regularly prescribed intervals.

After evaluation, the school should receive a summary report that notes the current conditions, progress made against particular pests or conditions, remaining problems, and recommendations for additional changes.



Children in schools with good IPM education programs will know that honey bees and most spiders are beneficial insects.

Notes

Part Four:

Sample Forms

PEST-SIGHTING LOG	page 28
IPM INSPECTION REPORT	page 29
GENERAL FACILITY CHECKLIST	page 30
CAFETERIA INSPECTION CHECKLIST	page 35

PEST-SIGHTING LOG:

FACILITY: _____

IPM INSPECTION REPORT

To be filled in by school personnel.				To be filled in by pest manager.		
Date	Type of Pest	Sighted by	Location Bldg./Room	Date	Action Taken	Technician's Name

IPM INSPECTION REPORT

School	Room/Site	
PMP	Date/Time	Map Code

PESTS OBSERVED:

Cockroaches
 Rats
 Mice
 Stored product pests
 Flies
 Ants
 Other _____

SAN ITATION PROBLEMS:

STRUCTURAL DEFICIENCIES:

OTHER PROBLEMS:

RECOMMENDATIONS:

ACTIONS TAKEN:

NON-CHEMICAL:

PESTICIDES APPLIED:

GENERAL FACILITY CHECKLIST*

School name: _____ Date/Time of inspection: _____

PMP: _____

Food preparation and serving areas

	Satisfactory	Unsatisfactory	Comment
Condition of structure:			
Walls - free of holes, cracks, and crevices?			
Floors - in good repair, cleaned regularly?			
Drains - clean and operational?			
Vents - screened, clean, and free of debris?			
Pipes - sealed under sink?			
Ceilings – are tiles missing, stained, wet?			
Equipment:			
Stoves, hoods - clean and dry?			
Dishwasher - clean and dry?			
Microwaves, bread warmers, and toasters - Clean, dry?			
Countertops - clean and dry?			
Service lines (warmer legs/underneath) - clean and dry?			
Refrigerator/freezer areas clean and dry?			
Sink, drying board, and surrounding area - clean ?			
Tray drop off - clean?			
Shelves, cabinets, and drawers - clean, dry, and organized?			
Vending machines - clean, dry?			
Sanitation:			
Are wall/floor junctures clean, debris free?			
Tables and chairs - are leg ends sealed or plugged?			
Tables and chairs (top surfaces, legs, underneath) - clean?			
Is there debris on top of food packages, equipment, etc.?			
Utility areas:			
Utility closet - clean, dry, well organized?			
Mops and buckets - clean and dry?			

*Adapted from the General Facility Checklist published by the National Pest Management Association.

Food preparation and serving areas (continued)

	Satisfactory	Unsatisfactory	Comment
Trash:			
Recycling bins - clean?			
Are the bins emptied frequently?			
Trash cans - do lids fit tightly?			
Are they emptied frequently?			
Are they periodically rinsed out and dried before reuse?			
Pest activity and management:			
Any evidence of insect activity?			
Any evidence of rodent activity?			
Any evidence of bird activity (feathers, droppings, nesting)?			
Refrigerator - check gaskets, motor housings.			
Electrical receptacles.			
Bulletin boards, clocks, towel racks, soap dispensers.			
Ceiling panels - check for pest presence.			
Are cockroach monitoring traps present?			
Are cockroach bait stations present?			
Are blacklights/electrocutors in use?			
Is there an active fly-control program in evidence?			
Are there rodent traps or glue-boards present?			

Delivery and storage areas

	Satisfactory	Unsatisfactory	Comment
Are delivery-area doors closed when not in use?			
Procedures:			
Are materials dated as they arrive?			
Are supplies uncased in the receiving area?			
Is empty packaging taken to the trash disposal area promptly?			
Is there an inspection procedure for all incoming materials?			
Are contaminated or infested packages removed promptly?			
Are receivables put on sanitary shelves or mobile storage carts?			
Are chemicals and foods received in the same area?			

Delivery and storage areas (continued)

	Satisfactory	Unsatisfactory	Comment
Are all containers labeled and dated?			
Are materials/equipment stored on racks 12" above the ground?			
Are racks 6-12" from the walls to facilitate inspection?			
Are chemicals stored separately from food items, or below them?			
Are food and non-food items separated by an aisle?			
Is any product exposed to overhead contamination?			
Sanitation:			
Is there accumulated debris on top of items, food packages, etc.?			
Is there evidence of broken or exposed packages in stacks?			
Is there spillage?			
Is there evidence of employee smoking or eating in this area?			
Are any objectionable odors near food packages?			
Are floors/walls of refrigeration/freezer rooms clean?			
Are doors self-closing?			
Are shelves and ledges clean?			
Pest management practices:			
Are rodent control devices/glueboards present, installed properly along the walls? Are they clean, dated, and mapped?			

Interior areas: classrooms/hallways/offices

	Satisfactory	Unsatisfactory	Comment
Animal cages and surrounding areas - clean, dry?			
Aquariums - are surrounding areas clean and dry?			
Is animal/fish food stored in pest-proof container with tight lid?			
Floors - clean? Carpets - clean, good condition?			
Do bulletin boards/wall clocks show evidence of insect infestation?			
Are wall/floor junctures clean and debris free?			
Are openings screened?			
Are there signs of insect presence in, around, or under:			
a. Desks, drawers?			
b. Tables and chairs?			
c. TV/VCR other electrical equipment?			
Are storage closets/cubicles clean, organized and free of clutter?			
Are the locker and cubby hole areas clean and dry?			
Is there evidence of insect or rodent activity?			
Drop ceilings:			
Is there evidence of rodent activity in the area above the ceilings?			
Is there evidence of insect activity in the area above the ceiling?			

Restrooms and locker rooms

	Satisfactory	Unsatisfactory	Comment
Are bathrooms sanitary and clean?			
Are sinks and faucets in good repair?			
Are bathrooms well ventilated?			
Are sinks and sink areas clean and dry?			
Any evidence of insect activity behind mirrors?			
Are toilets and urinals clean?			
Are pipes entering the wall well sealed?			
Do paper towel and toilet paper dispensers fit against the walls?			
Are there signs of insect activity in tissue/paper towel dispensers?			
Are trash cans emptied regularly?			
Are locker rooms clean and free of all materials?			
Are tops of lockers free of all materials?			
Are doors to these areas self-closing?			
Are any food products or equipment stored in these areas?			

Exterior areas

	Satisfactory	Unsatisfactory	Comment
Are walls and foundation areas clear of weeds, grass, and brush?			
Is the fence line clear?			
Is there a 2-foot gravel strip next to buildings to prevent rodent burrowing?			
Are door seals intact?			
Do doors close tightly?			
Are there rodent barriers on all external doors?			
Are air curtains installed on loading doors? Do they appear effective?			
Are windows and screens in good condition?			
Are walls free from holes and cracks?			
Are plumbing and electrical service entrances sealed or screened?			
Are other exterior openings sealed or screened?			
Trash			
Are dumpsters placed on concrete slabs?			
Do dumpsters and trash cans have tight-fitting lids?			
Are dumpster drain plugs closed or screened?			
Are dumpsters and trash cans emptied regularly?			
Is there spillage or trash that may attract pests?			
Are dumpsters and trash cans cleaned regularly?			
Is discarded equipment or material placed next to the building?			
Pest activity and management			
Are there signs of birds roosting or nesting in any exterior areas?			
Are there signs of rodent harborage or burrows?			
Do exterior lights on or near the building attract night-flying insects?			
Are there potential out-building pest hazards?			

General sanitation throughout the facility

	Satisfactory	Unsatisfactory	Comment
Do employees seem to practice good sanitation?			
Is the overall appearance of the facility orderly?			

Comments:

Integrated Pest Management—Cafeteria Inspection Checklist

School name: _____ **Date/Time of inspection:** _____

PMP: _____

Condition	Satisfactory	Unsatisfactory	Comment
Food preparation/distribution area			
1. Counter and surface areas	_____	_____	_____
2. Food serving lines	_____	_____	_____
3. Spaces around appliances/equipment	_____	_____	_____
4. Other	_____	_____	_____
Other kitchen areas			
1. Dishwashing areas	_____	_____	_____
2. Garbage and trash areas	_____	_____	_____
3. Tray return area	_____	_____	_____
4. Storage area for pots/pans/plates	_____	_____	_____
5. Other	_____	_____	_____
Utility areas and bathrooms			
1. Sinks and toilets	_____	_____	_____
2. Custodians' closet/work area	_____	_____	_____
3. Other	_____	_____	_____
Lunchroom area			
1. Tables/chairs	_____	_____	_____
2. Office areas	_____	_____	_____
3. Vending machine area	_____	_____	_____
4. Other	_____	_____	_____
Building exterior			
1. Garbage storage area	_____	_____	_____
2. Garbage handling system	_____	_____	_____
3. Perimeter walls	_____	_____	_____
4. Perimeter windows/openings	_____	_____	_____
5. Roof areas	_____	_____	_____
6. Parking lot and/or drainage areas	_____	_____	_____
7. Weeds and surrounding landscape	_____	_____	_____
8. Rodent proofing	_____	_____	_____
9. Other	_____	_____	_____
Building interior			
1. Walls	_____	_____	_____
2. Floors	_____	_____	_____
3. Ceilings	_____	_____	_____
4. Floor drains	_____	_____	_____
5. Lighting	_____	_____	_____
6. Ventilation/air handling equipment	_____	_____	_____
7. Other	_____	_____	_____

IPM- Cafeteria inspection checklist (continued)

Condition	Satisfactory	Unsatisfactory	Comment
Food storage			
1. Dry food storage area	_____	_____	_____
2. Damaged/spoiled dry food	_____	_____	_____
3. Empty container storage	_____	_____	_____
4. Refrigerated areas	_____	_____	_____
5. Overall sanitation	_____	_____	_____
6. Other	_____	_____	_____

Recommendations to cafeteria employees to aid in pest prevention:

This report reviewed by _____

Title _____

Date: _____

Part Five:

HOW TO DEVELOP BID INVITATIONS

FOR INTEGRATED PEST MANAGEMENT SERVICES IN SCHOOLS

Integrated pest management can be successfully performed by school employees with the proper training. Most school districts in North Carolina, however, contract with pest control firms to provide pest management 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 Management Services

(In-House Pest Control)

School personnel providing pest management services may find it easier to communicate with 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 management services can be combined with other maintenance jobs as long as the employee has received the proper training. Also, the in-house personnel are more likely to identify a pest problem before it becomes widespread. Using in-house personnel will avoid the difficulty of developing a bid invitation and contract and choosing a reputable and reliable firm. Greater control of personnel and performance quality is likely through an in-house program if the supervisor is knowledgeable about pest management.

The decision to institute in-house pest control will require creation of a safe and secure site for storage of pesticides and equipment. The potential liability of the district in regard to pesticide use is probably higher with an in-house program than with a contractual arrangement with a commercial pest control firm. If a re-entry interval longer than that listed on the label is used, overtime expenses could be incurred. Licensing an employee to apply pesticides in a school will require a charge for the license and a time commitment to train for the license. In addition, all pesticide applicators will need to pass a certification exam. Expenses for appropriate personal protective equipment and on-going training will be incurred.

Advantages/Disadvantages of Using Contracted Pest Management Services

Professional pest control personnel are usually more experienced with the techniques that safely and effectively control pests. Potential liability could be reduced when using contracted services. The need for a special storage 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 a school district should expect. School officials can ask the local Better Business Bureau or the Structural Pest Control Division of the North Carolina Department of Agriculture and Consumer Services whether complaints

have been received regularly about a prospective company. School district personnel must verify with the Structural Pest Control Division whether operators and pest control applicators have appropriate licenses and certifications. It is important that quality of service, not price, be the deciding factor in choosing a contractor. Also, a contract awarded for more than a year may allow a firm to determine effective control methods for a site and develop a rapport with school staff. Contracts established for several years may motivate contractors to be more productive, knowing that they are not going to lose the job next year to another bidder.

Steps Prior to Receiving Bids for IPM Services

- Prior to bid preparation, prospective bidders are expected to participate in the facilities tour scheduled for _____ so that they will be able to make a realistic estimate of the potential pest situation.
- Bidders should be given a copy of the school system's IPM policy and be willing to work with school personnel to improve pest control through non-chemical methods. If pesticides are needed for satisfactory control, Contractor must use reduced-risk materials. The school system reserves the right to approve or disapprove any pesticide or pest control device.

The following set of bid specifications **is only a suggested model for schools attempting to implement an 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 contact person and purchasing or business personnel. To save space, many standard clauses are omitted from the following model contract (modified from Texas Agricultural Extension Service Publication B-6015).

Integrated Pest Management Program Contract Specification Guide

1. GENERAL

Description of Program: This specification is part of a comprehensive Integrated Pest Management (IPM) program for the premises listed herein. IPM is a process for achieving long-term, environmentally sound pest suppression and prevention through the use of a wide variety of management practices. An IPM program includes:

- Proper identification of pests and an understanding of pest biology and behavior.
- Structural and procedural modifications to reduce food, water, harborage, and access to buildings by pests.
- A preference for non-pesticide methods such as trapping and monitoring devices.
- Use of reduced-risk pesticide compounds and formulations and selection of application methods that present a reduced potential hazard to humans and the environment.
- Coordination among all facilities management programs and school personnel relevant to the pest control effort.

Contractor Service Requirements: The Contractor shall furnish all supervision, labor, materials, and equipment (excluding insect light traps, air curtains, and other major expense items) necessary to accomplish the inspection, monitoring, trapping, pest management (including pesticide application if needed, but excluding sanitation and building maintenance), and pest removal components of the IPM program. The Contractor shall also provide detailed, site-specific recommendations for structural and procedural modifications to aid in pest prevention.

2. PESTS INCLUDED AND EXCLUDED

Populations of the following pests are included from this contract:

- A. Indoor populations of commensal rodents, insects, arachnids, and other arthropods. For the purposes of this contract, commensal rodents include Norway rat, roof rat, and house mouse. There may be an additional charge for the control of certain species because of increased material and/or labor expenses such as for Argentine, fire, odorous house and Pharaoh ants, millipedes, yellowjackets, flies, boxelder bugs, and mites.
- B. Outdoor populations of potentially indoor-infesting species that are within the property boundaries of the specified buildings within _____ yards of the building.
- C. Nests of stinging insects within the property boundaries of the specified buildings.
- D. Any of the excluded pest populations that are incidental invaders inside the specified buildings.
- E. Populations (even individual animals) of vertebrates (other than commensal rodents), including birds and bats. For vertebrate pests, contractor should recommend a qualified wildlife damage control agent.

Populations of the following pests are excluded from this contract:

- F. Termites and other wood-destroying organisms.
- G. Mosquitoes.
- H. Pests that feed on outdoor vegetation.

3. INITIAL BUILDING INSPECTIONS

The Contractor shall complete a thorough, initial inspection of each building or site at least _____ working days prior to the starting date of the contract. The purpose of the initial inspections is for the Contractor to identify problem areas and any equipment, structural features, and other conditions or management practices that are conducive to or contributing to pest infestations and to evaluate the pest control needs of all the locations. Access to building space shall be coordinated with the _____.

**Contact information for each facility (with address and telephone number) is attached to this contract.*

4. INTEGRATED PEST MANAGEMENT (IPM) PLAN

The Contractor shall submit to the _____ an Integrated Pest Management (IPM) Plan at least _____ working days prior to the starting date of the contract. Upon receipt of the IPM Plan, the _____ will render a decision regarding its acceptability within _____ working days. If aspects of the IPM Plan are incomplete or disapproved, the Contractor shall have _____ working days to submit revisions. The Contractor shall be on-site to perform the initial service visit for each building within the first _____ working days of the contract.

The IPM Plan shall consist of five parts as follows:

- A. *Proposed Methods for Pest Identification, Monitoring, and Detection:* The Contractor shall provide information on procedures to be used to identify pests, as well as describe methods and procedures to be used for identifying sites of pest harborage and access, for making objective assessments of pest population levels, and for determining the need to implement specific control measures throughout the term of the contract.
- B. *Description of any Structural or Operational Changes That Would Facilitate the Pest Control Effort:* The Contractor shall describe site-specific solutions for observed sources of pest food, water, harborage, access, or other conditions conducive to pest problems.
- C. *Proposed Materials and Equipment for Service:* The Contractor shall provide the following information:
 - 1) A list of all pesticide products to be used. This list shall include each product's brand name, common name of the active ingredient, and the "signal word" ("Caution," "Warning," or "Danger"), as defined under 40CFR 156.10(i).
 - 2) A list of the brand names of pesticide application equipment, rodent bait boxes, insect and rodent trapping devices, pest monitoring devices, pest detection equipment, and any other pest control devices or equipment that may be used.

- 3) The current label (and labeling) and Material Safety Data Sheet (MSDS) for each pesticide product on the list referenced.
- D. *Commercial Pesticide Applicator Documentation:* The Contractor shall provide the following documents:
 - 1) The phone number for the currently designated state poison control center.
 - 2) The names and phone numbers of at least two individuals who are designated as the primary and secondary 24-hour contacts for information concerning any aspects of the pest control service being provided.
 - 3) A photocopy of the valid North Carolina Commercial Pesticide Applicator License(s) under which all pest control is to be performed.
 - 4) A photocopy of the Contractor's valid Certificate of Insurance.
 - 5) A list of all Contractor employees who will be performing on-site service under this contract; this list shall include the employee's name and a statement of whether the employee is a licensee or certified applicator or registered technician as described in the regulations of the North Carolina Department of Agriculture and Consumer Services.
- E. The Contractor shall be responsible for carrying out work according to the approved IPM plan. The Contractor shall receive the concurrence of the _____ prior to implementing any subsequent changes to the approved IPM plan, including changes in on-site service personnel and any additional or replacement pesticides.

5. RECORD-KEEPING

The Contractor shall be responsible for maintaining a pest management logbook for each building or site specified in this contract. These logbooks shall be kept on site and be accessible to all site staff. The Contractor shall maintain or update the contents of these logbooks on each visit. Each logbook shall contain at least the following items:

- A. *Integrated Pest Management (IPM) plan:* A complete copy of the Contractor's approved IPM Plan.
- B. *Pest-Sighting Log:* A form that permits school occupants and personnel to record the location of any pest sightings. _____ will review and approve the design of this form prior to its distribution and use at the facilities.
- C. *Contractor's Service Report:* The Contractor shall document site-specific pest findings and subsequent control measures performed during the service visit. A separate form is not required if the Pest-Sighting Form is designed to incorporate this information.

6. MANNER AND TIME TO CONDUCT PEST MANAGEMENT ACTIVITIES

- A. *Time Frame of Service Visits:* The Contractor shall conduct routine pest management activities after school hours (except for non-serving areas of the cafeteria) to avoid class disruption. All Contractor employees shall adhere to all policies for notifying local personnel that the employee is on site and working in the building. When it is necessary to perform work outside the regularly scheduled time set forth in the IPM plan, the Contractor shall notify the _____ at least _____ day(s) in advance. The _____ shall approve such changes before any work is done.
- B. *Safety and Health:* The Contractor shall observe all applicable safety precautions throughout the performance of this contract. All work shall be in strict accordance with all applicable federal, state, and local safety and health requirements, as well as specific product label instructions. Where there is a conflict between applicable regulations, the most stringent will apply.
- C. *Compliance:* The Contractor 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. The Contractor's liability insurance must be maintained throughout the term of this contract.
- D. *Special Entrance:* Certain areas within some buildings may require special instructions for persons entering them. Any restrictions associated with these special areas will be explained by the _____. The Contractor shall adhere to these restrictions and incorporate them into the IPM plan.

- E. *Uniforms and Protective Clothing*: All Contractor personnel working in or around buildings specified in this contract shall wear distinctive uniform clothing. The Contractor shall determine the need for and provide any personal protective items required for the safe performance of work. Protective clothing, equipment, and devices shall, as a minimum, conform to U.S. Occupational Safety and Health Administration (OSHA) standards and to any specific label requirements for the products being used.
- F. *Vehicles*: Vehicles used by the Contractor shall be identified in accordance with state (North Carolina Department of Agriculture & Consumer Services (NCDA & CS) and North Carolina Department of Transportation (NCDOT)) and local regulations. While on-site, all service vehicles shall be secured to prevent unauthorized access to pesticides and equipment. Service vehicles shall be equipped with appropriate pesticide spill control equipment in accordance with NCDA&CS regulations.

7. SPECIAL REQUESTS AND EMERGENCIES:

On occasion, the _____ may request that the Contractor perform corrective, special, or emergency services that are beyond routine service requests. The Contractor shall respond to these exceptional circumstances and complete the necessary work within a time frame based on the physical circumstances and the pest's biology and approved by the _____, which will produce minimal disruption of the daily activities of the building.

8. CONTRACTOR PERSONNEL

Throughout the term of this contract, all Contractor personnel providing on-site pest control service must be currently registered technicians or certified applicators or licensee as described in the regulations of the NCDA&CS Structural Pest Control Division.

9. INSECT CONTROL

The priority for insect control will be the use of non-pesticide methods. The Contractor shall use non-pesticide methods of control wherever possible. For example:

- Portable vacuums rather than pesticide treatments shall be the standard method for initial cleanouts of cockroach infestations and the control of spiders and other miscellaneous pests.
- Trapping devices, such as blacklight traps, shall be the standard method for indoor fly control. The Contractor will make recommendations to the _____ regarding the purchase and installation of such traps.
- Point out and/or make recommendations for maintenance and sanitation deficiencies present that are conducive pest conditions.

Where pesticides are used, the Contractor shall use reduced-risk materials and methods of application.

- A. *Monitoring*: Monitoring devices (sticky traps, light traps, etc.) shall be used to guide decisions on appropriate pest control measures and subsequently to evaluate the effectiveness of these measures.
- B. *Insecticide Bait Formulations*: Non-volatile bait formulations are the first choice for cockroach and ant control. Baits shall be applied or placed in areas that cannot be accessed by children or other school occupants.
- C. *Application of pesticides to Cracks and Crevices*: As a general rule, the Contractor shall apply liquid/dry pesticide formulations as “crack and crevice” treatments only, defined in this contract as treatments in which the formulated pesticide is applied to hidden or protected areas that are used as harborage sites by pests.
- D. *Application of Insecticides to Exposed Surfaces*: Application of pesticides to exposed surfaces shall be restricted to exceptional circumstances where no alternative effective measures are practical. The Contractor shall obtain approval of the _____ prior to any application of pesticide to an exposed surface or to application of any space spray treatment. No surface application or space spray shall be made while the treatment site is occupied. The Contractor shall take all necessary precautions to ensure occupant and employee safety, and all necessary steps to ensure the containment of the pesticide to the site of application and the proper ventilation of the application site after pesticide applications.

- E. *Space sprays*: Application of pesticides as space sprays must follow the same restrictions outlined for surface sprays. Space sprays must be timed to allow the specific treatment site to remain unoccupied for a minimum of 24 hours. The Contractor shall be responsible for ventilating the treatment site in accordance with instructions on the product label before school personnel reenter the site. The _____ will assist the Contractor in securing the treatment site to prevent tenant personnel from re-entering the area prior to ventilation or before any re-entry period specified on the product label, and to arrange for appropriate cleaning of exposed surfaces by _____ employees before the site is released for general use.

10. RODENT CONTROL

- A. *Indoor Trapping*: As a general rule, rodent control inside buildings shall be accomplished with trapping devices only. All such devices shall be placed if practical so as to conceal them from general view, reduce their accessibility to building occupants, and protect them from any adverse effects of routine cleaning and other operations.
- B. *Trapping devices* shall be checked on a schedule approved by the _____. The Contractor shall be responsible for disposing of all trapped rodents and all rodent carcasses in an appropriate manner.
- C. *Use of Rodenticides*: In exceptional circumstances, when rodenticides are deemed essential for adequate rodent control inside buildings, the Contractor shall obtain approval of the _____ prior to making any interior rodenticide application. Only block (paraffin-based or other types) rodenticides shall be used. Pellet/pack bait formulations and packaging shall not be used in/around school buildings. All bait shall be placed in tamper-resistant bait stations.
- D. *Use of Bait Stations*: All bait stations shall be maintained in accordance with Environmental Protection Agency (EPA) and NCDA&CS regulations, with an emphasis on the safety of non-target organisms. The Contractor shall adhere to the following five (5) points:
- 1) All bait stations shall be placed out of the general view, in locations where they will not be disturbed by routine operations.
 - 2) The lids of all bait stations shall be securely locked or fastened shut.
 - 3) All bait stations shall be securely attached or anchored to floor, ground, wall, or other immovable surface, so that the station cannot be picked up or moved by unauthorized personnel.
 - 4) Bait shall always be secured in the feeding chamber of the station and never placed in the runway or entryways of the station where it could be removed or dislodged.
 - 5) All bait stations shall be labeled with the name of the bait used, the contractor's business name and address, and dated by the Contractor's technician at the time of installation and each servicing.
- E. *The locations of all trapping devices and bait stations* will be recorded in the site's logbook. The Contractor shall record all changes/additions to this information before leaving the site. The Contractor will provide the _____ with a key and instructions for opening bait stations in the event of an emergency.

11. USE OF PESTICIDES

The Contractor shall be responsible for application of pesticides according to the label and all additional labeling. All pesticides used by the Contractor must be registered with the U.S. EPA or be EPA exempt and be registered with the NCDA&CS. 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 use:

- A. *Minimization of Risk*: Where pesticide use is necessary, the Contractor shall emphasize "reduced risk measures." The Contractor shall employ materials, quantities and application methods that minimize the risk or hazard of exposure to the applicator, building occupants, and the environment in general. The Contractor shall not give any pesticides to any site personnel for application to the site without written approval from _____.
- B. *Selection of pesticide products*: The order of selection of pesticides shall be:

- 1) Products with a “Caution” signal word.
- 2) Products with a “Warning” signal word.
- 3) Products with a “Danger” signal word.

Products with either “Warning” or “Danger” signal words shall be used only when there are no effective alternative products.

- C. *Approved Products*: The Contractor shall not apply any pesticide product that has not been included in the Integrated Pest Management Plan or has not been approved in writing by the _____. Any additions to the list of approved pesticides must be submitted to the _____ at least _____ working days prior to the proposed date of use. The _____ shall render a decision on the proposed addition within _____ working days. Prior to the use of any new approved pesticide products, the Contractor shall provide product labels and MSDS in the logbooks of each site where the products are to be used.
- D. *Application by Need*: Routine scheduled pesticide applications will not be employed. As a general rule, application of pesticides to any interior or exterior area shall be based on visual inspection or monitoring devices indicating the presence of pests in that specific area at or above the previously set “action level” after all non-chemical control strategies have been employed. Requests for preventive pesticide treatments in areas where surveillance indicates a potential insect or rodent infestation will occur will be evaluated by the _____ on a case-by-case basis. Written approval must be granted by the _____ prior to any preventive pesticide application.
- E. *Pesticide Storage*: The Contractor shall not store any pesticide product in the buildings specified in this contract.

12. VERTEBRATE PEST CONTROL (OTHER THAN COMMENSAL RODENTS)

- A. *General Vertebrate Pests*: The Contractor shall be responsible for the control of miscellaneous vertebrates, including snakes, raccoons, and skunks. Where state, county, or local regulations require the issuance of a wildlife depredation permit for the taking of such vertebrates, the Contractor shall arrange for such permits. Subsequent to the issuance of the depredation permit, the Contractor shall take or arrange with a state-licensed Wildlife Damage Control Agent (WDCA) to take such vertebrates in accordance with all state and local wildlife regulations. If the WDCA is not an employee of the contractor, then the Contractor shall inform the _____ in advance of the name of any WDCA to be used for such work. The cost of these services will be negotiated with the contractor separately from this contract.
- B. *Bat and Bird Populations*: Situations that require more extensive exclusion methods, such as repairs to exclude bats from established roosting sites within buildings, or the installation of mesh, pointed wire, or other devices to exclude birds from roosting, as well as the proper removal/cleanup of animal feces (“guano”), will be negotiated with the Contractor separately from this contract.

13. STRUCTURAL, SANITARY AND PROCEDURAL MODIFICATIONS AND RECOMMENDATIONS

Throughout the term of this contract, the Contractor shall be responsible for advising the _____ about any structural, sanitary, or procedural modifications that would reduce pest food, water, harborage, or access. The Contractor will not be held responsible for carrying out structural modifications as part of the pest control effort, unless such modifications are agreed upon by both parties. Minor applications of caulk and other sealing materials by the Contractor to eliminate pest harborage or access may be approved by the _____ on a case-by-case basis. The Contractor shall obtain the approval of the _____ prior to any application of sealing material or other structural modification.

14. PROGRAM EVALUATION

The _____ will regularly evaluate the progress of this contract for IPM services in terms of effectiveness and safety and will require such changes as are necessary. The Contractor and/or school officials shall take prompt action to correct all identified deficiencies.

15. QUALITY ASSURANCE PROGRAM

The Contractor shall establish a complete quality control program to assure that the requirements of the contract are provided as specified. Within _____ working days prior to the starting date of the contract, the Contractor shall submit a copy of this program to the Contracting Officer.

The program shall include at least the following items:

- A. *Inspection System:* The Contractor's quality assurance inspection system shall cover all the services stated in this contract. The purpose of the system is to detect and correct deficiencies in the quality of services before the level of performance becomes unacceptable and/or the _____ identifies the deficiencies.
- B. *Checklist:* A quality assurance checklist shall be used in evaluating contract performance during regularly scheduled and unscheduled inspections. The checklist shall include every building or site serviced by the Contractor as well as every task required to be performed.
- C. *File:* A record of all quality assurance inspections conducted by the Contractor and any corrective actions taken for each school shall be maintained throughout the term of the contract. Copies of these quality assurance records shall be kept in the IPM logbook maintained by the IPM coordinator at each school.
- D. *Inspector(s):* The Contractor shall state the name(s) of the individual(s) responsible for performing the quality control inspections.

16. CONTACT INFORMATION

For questions concerning specifications, or to preview facilities, contact _____ at _____ (Phone numbers). The _____ reserves the right to reject any or all bids and to waive informalities.

Part Six:

RESOURCES

IPM Information

Handbook For Pest Control. The behavior, life history, and control of household pests. A. Mallis. Mallis Handbook Technical and Training Co. 8th Edition. 1997.

Integrated Pest Management in Schools and Other Public Institutions. West Virginia Department of Agriculture. 1996.

Suggested Guidelines for Managing Pests in Tennessee's Schools: Adopting Integrated Pest Management. The University of Tennessee Agricultural Extension Service. 1995.

IPM Training Manual for Landscape Gardeners. The Bio-Integral Resource Center, Berkeley, CA. 1992.

Integrated Pest Management in Schools: IPM Training Manual. Maryland Department of Agriculture. 1995.

Wisconsin's Integrated Pest Management Manual. John C. Stier, Karen Delahaut, Phil Pellitteri, Brian Becker. University of Wisconsin. 2000.

IPM for Pennsylvania Schools: A how-to manual. Pennsylvania Department of Agriculture and Pennsylvania State University. 2001.

NPCA Field Guide to Structural Pests. Eric H. Smith and Richard C. Whitman. National Pest Control Association. 1995.

Useful Web Sites

Integrated Pest Management (IPM) for Schools: A How-to Manual. U.S. EPA. <http://www.epa.gov/region09/toxic/pest/schoolindex.html>

School IPM Website. University of Florida: <http://schoolipm.ifas.ufl.edu/>

The IPM Institute. <http://www.ipminstitute.org>

Pest Control Industry (Product Manufacturers and Pest Control companies): <http://www.pestweb.com>

National Pest Management Association (NPMA): <http://www.pestworld.org/professional.asp>

North Carolina Department of Agriculture and Consumer Services: <http://www.ncagr.com/str-pest/>

National Pesticide Information Center (NPIC): <http://npic.orst.edu>

National IPM Center (NCSU) Product labels and Materials Safety Data Sheets (MSDS): <http://ipmwww.ncsu.edu/cipm/labels.html>

North Carolina Cooperative Extension Service Pesticide Resources: <http://www.ces.ncsu.edu/resources/pesticides/>

Other Important Information Sources

Product manufacturers

- can provide information on hazards, efficacy, and safe use of pesticides.
- are required to provide the public with a sample label and MSDS on request.

Cooperative Extension personnel

- can provide information on the hazards and efficacy of pesticides.
- answer questions about the pesticides that are registered against specific pests.
- provide services for insect identification.

The National Pesticide Information Center (NPIC)

NPIC/Department of Agricultural Chemistry
Oregon State University
Corvallis, Oregon 97331-7301
(800) 858-7378

The National Pesticide Information Center (NPIC) operates a toll-free hotline staffed by toxicologists to provide the general public as well as the medical, veterinary, and other professional communities with the following:

- Information on recognizing and managing pesticide poisonings.
- Tips for correctly using pesticides, especially household and professionally applied pesticides.
- Referrals for laboratory analyses and investigation of pesticide incidents.
- Emergency treatment information.
- Pesticide clean-up and disposal procedures.

Agricultural Resources Center

PESTicide EDUcation Project
115 W. Main Street
Carrboro, NC 27510
(919) 967-1886

- Information and technical support on alternatives to pesticides for individuals and communities.

Pesticide Education Center

Dr. Marion Moses
P.O. Box 420870
San Francisco, CA 94142-0870
(415) 391-8511

- Well informed about the health hazards of pesticide exposure.
- Strong emphasis on women and children.

Bio-Integral Resource Center (BIRC)

P.O. Box 7414
Berkeley, CA 94707
(510) 524-2567

- Provides information and/publications on least-toxic methods for managing any pest.
- Publishes two journals: *The IPM Practitioner* and *Common Sense Pest Control Quarterly*.
- Publishes annual directory of least-toxic pest control products.
- Provides consultation and training in IPM.

Notes

Notes
