IPM in Schools

A Practical Guide for Pest Management Professionals

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This publication was developed by the National Pest Management Association's IPM in Schools Committee. Many thanks to the committee, under the chairmanship of Dr. Bobby Corrigan, for producing this excellent manual.

The National Pest Management Association's IPM in Schools Committee 2000-2001

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Purpose and Target Audience

As of the spring of 2002, many manuals have been written addressing the topic of Integrated Pest Management (IPM) in schools, and are now available from various state agencies, school districts, university extension agencies, state pest control associations and several private independent environmental organizations.

Thus, there is no shortage of information on the topic of school IPM. The purpose of this NPMA manual as was originally conceived by NPMA's technical committee is to provide pest management professionals whom are contracted by schools, school corporations, and other child care facilities with a practical, *on-the-job guide for conducting IPM services in a typical school. It is particularly targeted to the professional that services the school. Moreover, it is written in a format as to the sequence a typical school would be serviced by a pest management professional.*

This manual does not attempt to provide in-depth discussions of the meaning or philosophy of IPM, or provide in-depth reviews of any of the state or federal attempts at legislating school IPM. Information on pest biology and behavior is provided only to a cursory level to assist from an on-the-job approach for managing specific pests in a school environment.

Additional, detailed information on nearly all school IPM topics are now readily available from a good selection of easily accessible web sites. More detailed information on pest biology, behavior and management are available from popular industry text references (e.g., the NPMA Field Reference Guide, The Mallis Handbook of Pest Control, The Scientific Guide to Pest Control Operations, PCT's Field Guide Series, etc.). A list of these references and valuable web sites are provided in Section 5 of this manual.

Section 1. Practical Urban IPM Defined

What is IPM?

Of course, IPM refers to Integrated Pest Management. But to be able to provide IPM services we must first understand the concept of IPM as it is used in urban environments—especially "sensitive" environments such as schools, day care centers, health care facilities, food manufacturing plants and a host of others.

The concept of IPM is a very dynamic one and continues to evolve and change. The fact is that IPM may be perceived by different individuals meaning different things. Additionally, over the years, IPM has become a political hot button and thus a variety of public interest groups made an effort to direct the course of Integrated Pest Management to meet their particular "philosophy" and to address children's health concerns. Defining what IPM is and how it will be performed has been publicly debated over the past decade, especially as it relates to the management and elimination of pests in schools and day care centers.

Some definitions of IPM suggest that you must consider non-chemical measures before you apply any pesticides. Others look to limit the number and type of pesticides available for use, while still others indicate that pesticides should never be an option. With such great disparity in opinions, where do you begin?

It is important to try and simplify the subject so that we can clearly understand the goals and objectives of School IPM. A good place to start is by examining the definition that has been provided by the National Pest Management Association. Currently, IPM is defined within the "Urban IPM Handbook", as: A *process consisting of five basic steps. These include inspection, identification, the establishment of threshold levels, the employment of two or more*

control measures and the evaluation of the effectiveness. To be acceptable, the control measures must be both environmentally compatible and economically feasible.

It is important to understand what is meant by the definition above. First, IPM is a process. This process in many ways is similar to the process that is practiced in any pest control effort. In order to solve almost any pest problem, inspections, identification and corrective actions are necessary. The difference between IPM and other methods of pest management exist in the degree of emphasis that is placed on the various steps and the methods of action that are deemed "acceptable" for controlling an active pest problem. In addition, the IPM approach is based upon the following tenets:

1. Prevention rather than reaction to pest problems. In other words, IPM is thought of as " proactive, not reactive. "
2. Use of nonchemical control measures wherever possible, such as vacuums, sticky traps, and methods such as sanitation, pest proofing, etc.
3. Control of active pest infestations using methods designed to minimize any potential hazard associated with the use of a pesticide.
4. Prevention of active pest problems from reoccurring again in the future.

Prevention of pest problems is one of the cornerstones of the IPM process. From the onset of an IPM program the emphasis is placed on correcting conditions that are conducive to pest problems. This means, IPM is everyone's responsibility, including the school and its staff and students.

Conducive conditions are noted and a school is informed (and educated) via a pest professional's eyes. This is achieved through an intensive inspection process. Inspections are required throughout the IPM effort to identify conditions that, if not corrected, may result in a pest problem in the future.

Inspections are also required in order to fully understand why an existing pest has occurred and what actions are necessary to prevent the same pest from occurring in the future. Because inspections are so important in the overall process, they comprise a fair amount of the discussion in this manual.

Another cornerstone of the IPM process is the "chemical decision making process" that is required to take place in the event that a pesticide is applied. This may in fact be the most politically sensitive stage of the IPM approach. This is also the area where the greatest degree of variation exists amongst IPM specifications and bid language. The objective of an IPM program is to limit pesticide applications to times when:

1. Non-chemical methods are proven to be incapable of providing a "satisfactory" level of control within a "satisfactory" time frame. Clearly the term "satisfactory" is subjective and must be agreed upon by both the IPM contracting party and the pest control provider.
2. Non-chemical methods are determined to be economically prohibitive. The contracting party typically determines this.

In the event that one of the above situations occur a pesticide application will be considered. Selection of the pesticide to be applied requires careful deliberation and consideration, to insure that the toxicity, type of formulation and method of application are all taken into account. Each of these factors is an important component in managing hazard as it relates to the application of a pesticide. The objective of the "pesticide selection process" is to minimize the potential for hazard by selecting pesticides that are low in toxicity, and choosing formulations and methods of application that minimize exposure.

Perhaps the most important concept to recognize is the presence of pesticides around children in our schools. It is important to understand the objectives of the IPM approach in minimizing pesticide usage and exposure in the school environment. Integrated Pest Management has been a very dynamic concept over the years especially in recent years, as it relates to schools. The

Federal government is actively involved in the subject of School IPM. This has been manifested in revised labeling, re-registration of various pesticides, education, and other regulatory avenues. Proposed changes in legislation are continuously being recommended and this trend is likely to continue to escalate as we head into the future (see Section 2).

For these reasons it is important to clearly understand the basic concept s of IPM as well as the objectives of an IPM program. However, the fact remains that the pest management professional is not always in the driver's seat when dealing with school IPM. The rules and parameters of a specific IPM program may be dictated to the pest control professional by the school board or by government. When this occurs, it is up to the pest management professional to demonstrate creativity and innovation to manage or eliminate pests within the parameters set before them. It is important for the PMP to adjust programs to suit the needs of regulation, school policy, or whatever is driving the program.

Section 2. Background and Current Legislation

The concept and practice of IPM in schools was raised about 1990. Since then, many collaborative IPM in Schools meetings of national significance have occurred involving interdisciplinary efforts among universities, pest management professionals, State Boards of Health, consultants, the Environmental Protection Agency, the U.S. Department of Agriculture, State pesticide regulatory agencies, school board corporations, the National Pest Management Association, and various environmental groups.

As of January of 2002, approximately 40% of the states in the U.S. have some type of formal, structured School IPM program in place. It is likely all states will eventually have some type of school IPM program in place within the next few years, or that perhaps school IPM will be legislated for all states from a federal level as discussed below.

Of those states with formal programs, several now have state legislation mandating IPM in their schools (e.g., Texas, W. Virginia, Michigan, Maryland, Illinois, Louisiana, Massachusetts, Minnesota, et.al.). Other states have "voluntary" IPM programs involving state policies and/or guidelines in place with varying degrees of formality and interdisciplinary involvement.

Several states have developed comprehensive IPM in Schools programs complete with training booklets, manuals, videos, and public relation posters, (e.g., Illinois, Maryland, North Carolina, Pennsylvania, Texas, and others).

Outstanding IPM in schools web sites are available from several different sources (e.g., The University of Florida, Pennsylvania State University, Purdue University, etc.). These sites provide a wide range of both technical information for entomologists and pest professionals and also practical information for lay audiences (teachers, students, administrators, maintenance personnel, parents, and the general public). No doubt, other states in the future will also be producing state-specific web sites, or will provide hyper-links to existing sites.

For states and school corporations that have yet to address IPM in their schools, most of the existing programs offer excellent templates from which to structure and streamline a new program.

School IPM Legislation

Since 1991, most legislation that has been passed relative to IPM in schools has been at the state level. And as mentioned above, several states now have state legislation mandating school IPM programs.

On a national level, several attempts at legislation or partial legislation have been made since 1998, but as of spring of 2002, no federal legislation has successfully been completed to formally establish federal school IPM requirements for all states. This could change at any time however. Therefore, it is important to note the components of the nearly successful legislation, as it is likely this legislation or some modified version of it will eventually become law.

The most significant attempt at federal school IPM legislation occurred on June 19, 2001, when the U.S. Senate approved an amendment offered by U.S. Senator Robert Torricelli (D-NJ) regarding IPM programs as part of comprehensive education reform legislation.

The amendment was entitled the School Environment Protection Act (SEPA), and was supported by the National Pest Management Association and other industry groups as well as numerous environmental and public interest organizations [e.g., the Responsible Industry for a Sound Environment (RISE) organization, the National Coalition Against the Misuses of Pesticides/Beyond Pesticides and others].

Specifically, the SEPA amendment had two key components of importance:

1. State lead pesticide agencies would be required to develop a school pest management plan (subject to final approval by EPA) within a year of enactment of the amendment; and

2. School districts would be required to implement the state's pest management plan. (School districts would have 12 months from the time they receive the approved state school pest management plan to implement the plan)

As part of this legislation, school districts would be required to:

1) Employ or contract with a certified applicator or other person authorized by the state lead agency to oversee the district's pest management plan;
2) Post signs at least 24 hours before applications alerting students, staff and visitors of pesticide applications; and
3) Notify all parents and staff twice a year, at the beginning of and at the mid-point of the school year (and if applicable, at the beginning of the summer session) of the district's pest management plan and of the right to be notified prior to individual pesticide applications.

Those parents desiring notification prior to individual pesticide applications would have the opportunity to have their names placed on a registry. Schools would then be responsible for contacting parents on the registry at least 24 hours prior to individual treatments.

<u>However, two exemptions are important to note:</u>

(1) Baits, pastes, gels, and anti-microbial pesticides (e.g., disinfectants, cleaning compounds, etc.) would have been exempt from the amendment's notification and posting requirements; and

2) Pesticide applications to control pests that pose an immediate danger to students and staff (e.g., Africanized honey bees, yellowjackets, red imported fire ants, brown recluse spiders, etc.), would be exempt from SEPA's pre-notification and posting requirements.

Additionally, under SEPA, the following would be prohibited:

1) Application of a pesticide to a room or area that is occupied by students, and

2) Broadcast applications (e.g., perimeter treatments of foundation walls), baseboard spraying, tenting or fogging within 24 hours of students occupying a room or area, unless the product label specifies a different re-entry interval.

The 2001 SEPA legislation would have permitted the continuation of existing state programs that meet or exceed SEPA's requirements, as determined by the EPA administrator.

The SEPA amendment was attached to the Better Education for Students and Teachers Act (BEST) and was sent to the joint House –Senate Conference Committee to reconcile the differences between the House and Senate versions of the education bill.

However, when SEPA went up for vote in congress on November 30, 2001, it was voted down in the Education Conference Committee and thus failed to pass into legislation. Consequently, as of the spring of 2002, no federal legislation mandating the practice of IPM in schools and other health care facilities exists. SEPA, or some amended form of SEPA, is likely to be re-introduced to congress in future sessions. But in the meantime, each state remains independent as to how they address School IPM.

Regardless of SEPA, and the future of SEPA, it should be kept in mind that 29 states have adopted pesticide laws that have one or more of the provisions of SEPA. Of those, 15 states require written notification, either by universal notice or a registry, and 13 states recommend or require schools to use IPM programs.

Pest management professionals should remain alert for changes in federal legislation, and check with NPMA or your local pest management association for your state's status or local and state mandates on school IPM.

Section 3. Implementing School IPM.

3.1. Performing IPM Inspections In Schools

Considering the basic premise of IPM, especially as it relates to schools, (i. e., pesticide applications are the least desirable aspect of a pest management program), the monthly inspection of a school premises for the presence of pests and noting those conditions that are conducive to attracting or harboring pests, ***is the most valuable service a contracted pest management professional can offer a school client.***

For the purposes of this manual, a typical on-the-job IPM inspection of a school is comprised of the following five steps:

(1) Checking with school staff for any areas experiencing recent pest activity.

(2) Checking the school's pest sighting log.

(3) Performing visual inspection of any pest sighting areas and those areas of the school most vulnerable to pest activity.

(4) Inspecting and servicing installed pest monitors and other equipment (e.g., mouse traps, fly traps, pheromone traps).

(5) Accurately identifying or collecting (for identification) pests turned in, or found on monitors.

In most cases, these steps are performed concurrent with the routine service visit to the school. But because the inspection is the most important aspect to any school lPM service, let's examine each of these steps in more detail.

3.1.1. Checking with the School Personnel

As is done with all pest management clients, you should always check with the school personnel regarding any pest sightings or "complaints" since the last visit.

Often the school staff members are the best source to guide a pest professional's inspection and possible corrective action or treatment. Office staff, teachers, custodians, cafeteria personnel, and sometimes even the students themselves can serve as "eyes" for discovering or encountering pests in between routine service visits. School custodians work on a daily and nightly basis cleaning the floors, mopping and looking behind objects. Whether they realize it or not, are acting as daily pest monitors.

However, it cannot be stressed enough how important it is for the school's staff to religiously utilize an established pest-sighting log and record all pest sightings. (see discussion below).

3.1.2. Installing, maintaining and checking the pest sighting log

A pest-sighting log is one of the most valuable components of a school IPM program. There are many variations of pest- sighting logs, but two things are most important: (1) the log must be used regularly; and (2), the log book should allow for ample space for recording of the date, the specific location and nature of the pest sighting, and the person making the entry. A couple of examples inserted into the log will assist in showing the staff the correct entry methods. There should also be a space for the pest management professional to initial the sighting entry, demonstrating that action was taken to follow-up on the school personnel's entry to the log. One example is provided in Appendix X.

The pest-sighting log should be established where it is easy and convenient for the entire staff to fins and use it. Usually, this is somewhere in the front office, or some other area where most of the school staff visits daily. Logbooks should not be kept in offices that are out of the way, or locked when a staff member is out of the office (e.g., custodial or coaching staff offices).

Once a log is first installed, it is important for the school staff to be constantly encouraged to use it for each pest sighting. In some cases, this takes time and repeated encouragement. Once a log becomes inactive, it serves no purpose, and pest management professionals no longer check the logbook. Then a sighting that was placed into the log may go unaddressed for months, until a minor problem escalates to a more serious one. For each pest verbally reported to you, ask the staff member, "did you record your sighting into the log?" Or, "I didn't see that noted in the log."

3.1.3. Performing efficient visual inspections

Of course, as you would do in any of your accounts, schools should be visually inspected using your flashlight and your experience in observing what may or may not be occurring in any of the areas reported as having pest activity. Additionally, the visual inspection should take you to those areas most vulnerable to pest activity (as discussed below). During your visual inspection, you should record all conditions conducive to pest issues (see discussion below), and inform the school where they need to participate in a true IPM program by action upon your recommendations.

3.1.3.1 Pest Vulnerable Areas

Not all rooms and areas of a school are equally vulnerable to pest activity or infestations. Some areas, because of either environmental conditions (e.g., classrooms along outside walls bordered by a field) or operational conditions (e.g., clutter in a closet of the science classroom), are much more vulnerable to infestations than others. Moreover, consider that many school pest control contracts are bidded low, and thus the servicing time for most schools is very limited. Therefore, it makes sense to spend inspection time, possible treatment times, and monitoring efforts in those areas most vulnerable to pests. Table 1 is an "ABC approach" to those areas of a school that are typically most vulnerable

(A list) to pest activity or invasion, moderately vulnerable (B list), and least vulnerable (C list).

Table 1. The Pest Vulnerable Areas (PVAs) of Schools [1]

"A" List

1) Visually inspect during each service visit
2) Install and maintain pest monitors
3) Check on Pest Sighting Logs and seek faculty feedback.
4) Apply low impact pesticides as needed (e.g., cockroach bait)
5) Check Trap Stations for mice.

- Kitchen
- Kitchen Store Room
- Exterior Dumpster and Trash Area
- Teachers lounges
- Pool and associated locker rooms
- Science classrooms with animals
- Home Ec classrooms
- Concessions stands
- Booster storage rooms with food
- Custodial Closets
- Food vending machines

"B" List

1. Maintain monitors and check periodically and / or
2. Check on pest sighting logs and staff sightings

- Boiler rooms and basements (providing no food is stored)
- Office areas (monitor for roaches and mice)
- Lavatories
- Classrooms (especially exterior-wall rooms).
- Shop areas, etc.

[1] A professional could categorize their own PVA list for a particular school's situation, environment, pest pressure, and staff's desires. This list is provided merely as a generic example.

"C List"

1. Check periodically and / or
2. Rely on pest sighting logs and any staff sightings

- Storage closets with no food items
- Attic areas with no storage
- Hall Lockers (school policy should be established regarding foods and maintaining, etc.)

Of course, at any given school, on any given day, pests can invade or be introduced into any area of the school, (even a "C" area). Therefore, you must also rely on the schools pest sighting log, the staff's verbal feedback, the findings on the pest trap monitors, and perhaps most importantly, *being alert and observant for spotting pests in virtually any area during the routine service visit.*

3.1.4. Inspecting and servicing installed pest monitors

Pro-active monitoring, using monitoring devices is one of the most critical and valuable components of a true IPM program. In fact, the use of simple sticky trap monitors (appropriately applied) is one of the most distinguishing aspects that separate IPM programs from standard pest "control" programs.

Pest monitoring simply helps you to determine the presence or absence of a pest, or gives you an estimate of the severity of a pest infestation. For example, is the infestation associated with the recent complaints minor, moderate or severe? Have new pests been introduced into the account via deliveries or within a student's book bag? Has the pest management program eliminated all the pests? Are potentially dangerous pests entering the school because a door or window is not pest-proofed properly?

For example, consider the "pay back" of a sticky monitor informing you of the new presence of any of the following: cockroaches, ants, brown recluse spiders, black widows, scorpions, rodents, filth flies, fruit and drain flies, just to mention a few.

In addition to all these benefits, pest monitors also provide five other valuable services to a pest professional:

1) Because trap monitors are working 24/7/365, monitors enable you to stay one step ahead of severe infestations;

2) Monitors can pinpoint areas needing possible treatments. This is valuable in saving time and materials (i.e., money) when cockroach or ant baits may need to be applied.

3) Some schools and/or staff personnel might require proof that a pest exists before they are willing to allow pesticidal treatments. Monitoring can provide this proof and justification for a specific treatment.

4) By comparing the monitoring trap data before and after an infestation clean up, the monitors can demonstrate the effectiveness of the program, or help to pinpoint where pests remain and still need attention.

5) By keeping records of monitor data, an IPM profile of the school can be maintained to demonstrate to any regulatory agency, school administrators, health inspectors and so forth the protection the school is receiving by having hired a professional pest management firm.

It would be hard to conceive of a school IPM program that does not utilize and actually depend upon trap monitors as a vital part of the program. Therefore, the following discussion provides five frequently asked questions by technicians implementing school IPM services.

3.1.4.1. FAQs: Guideline for Using Pest Monitors in Schools

1. Is there a trap/monitor that is best for School IPM Programs?

Pest monitor traps are now available in many different models and styles. Some models are a better fit for some areas of a school than others (see Table 2). But overall, the traps need not be sophisticated. For most areas, a simple, inexpensive cardboard trap monitor is appropriate. However, various monitoring devices and "monitoring stations" are also available that offer both insect monitoring and mouse trapping capabilities [i.e., Mouse and Monitor Traps (MMTs)]. And consideration should be given when monitoring is required in areas that may be subject to staff disturbance, water, etc. For example, in a busy high school kitchen where floor monitors are needed for German cockroach monitoring, sturdy plastic monitoring stations are obviously better suited than an inexpensive cardboard sticky trap.

2. Where (inside the school) is it best to install pest monitor traps?

Monitors should be installed in all pest vulnerable areas (PVAs) of the school within or nearby attractive potential pest harborages (e.g., the kitchen; behind the refrigerator in the kitchen).

A good rule to keep in mind to maximize your feedback from a monitoring program is to use the real estate rule: "location, location, location". In other words, if a monitor is installed in an area where pests are not likely to travel anyway, the monitor will constantly read zero and be a waste of precious service time re-checking a trap that is not likely to ever have any pests. A list of suggested areas and number of traps per area is provided in Table 2.

Table 2. Examples of areas and locations to install pest monitor traps inside a school as part of an IPM program.

Room or Location	Placement recommendation	Suggested number of traps 1	Type of monitor trap 2	Comments
Kitchens				
1, Floor and wall cabinets 2. Behind major appliances	Install traps in corners in high and low shelves nearby sources of water or heat Install behind refrigerators, ice machine, other pest vulnerable appliances	4-6 2-4	Simple cardboard trap monitors Or protected trap monitors in high disturbance areas (MMTs)	Avoid placing traps where they will be subject to floor cleaning, or regular disturbance by kitchen /custodial staff.
Storage Room				
1. Floor 2. Ceiling	Install on floor in corners of room.	2-4	Protected monitors or MMTs	Monitor ceiling if school has a history of cockroaches or mice
Dining Halls				
	1. In out of sight areas where food may accumulate. 2. Behind vending machines	4+ 2	Simple cardboard trap monitors	
Teachers Lounges				
	1. Within sink cabinets. 2. Within food cabinets. 3. Behind vending machine or refrig.	1 1 1	Simple cardboard trap monitors	
Custodial Closets	On floor near slop sink; or on shelving	1-2	Simple cardboard trap monitors	
Classrooms				
	1. Any classroom that is storing pet foods snacks. Cluttered classrooms. Place traps with discretion.	1-2 per room	Simple cardboard trap monitors	Exterior wall classrooms more attention than interior area rooms.
Snack Stands Band Booster Closets	On shelves in corners, nearby food items.	2+	Simple cardboard trap monitors	

Lavatories	Not necessary unless activity dictates.			
Basements				
	1. Behind furnaces or slop sinks, areas where food or water may be stored. 2. Within or nearby accumulating clutter.	2-4	Simple cardboard trap monitors MMTs by exterior doors	

For schools with little or no pest activity, the lesser number of monitors can be installed. For schools with greater pest pressure from incoming pests, or to more closely monitor the progress on reducing an infestation of some sort, use more monitors. The numbers suggested above are not by any means the maximum number of traps that can be installed. Use professional discretion based up situation analysis.

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3. What is the correct number of monitor traps to install for a particular size school or building?

There is no exact science regarding the number of pest monitor traps that should be installed in any building. In fact, the number often varies significantly from one school to another—even among two schools of the same size and grade structure. However, there are some common sense guidelines. Two (2) traps is not enough to accurately monitor a typical elementary school kitchen, while 18 traps is likely to be too many.

A typical elementary school might contain a total of 15-20 traps, a middle school, 20-30 traps, while a 2000 student high school could easily contain upwards of 50 total traps.

Pest professionals should let experience and common sense guide them when deciding on the number of traps to be installed. Keep in mind however, the more traps installed the greater feedback on the pest activity in a room, or the school (provided the traps are installed into the areas of the schools most likely to have pest issues). Finally, clean and orderly areas generally require fewer monitors than cluttered and/or dirty areas.

Table 2 provides a simplified overview of a typical trap-monitor set up for a middle school.

4. ***Once installed, how often should pest monitors be checked and serviced?***

As a minimum, trap monitors are usually checked at each service visit. During the time of reducing any severe infestations, only those traps in the immediate area of infestation need to be checked as often as necessary to monitor progress. When traps become damaged, dirty, or full, they should be changed. Traps in good condition will remain effective for several months, and need not be changed. To obtain maximum effectiveness in trapping new pests, it is probably wise to change traps after three months regardless of condition of trap condition. In some school districts, the school custodians actually assist their pest management professionals in checking the traps from time to time and filling in trap monitor logs.

5. How much paper work is involved with maintaining pest monitors?

Not much. Still, to derive the maximum benefit of a monitoring program, all traps should be numbered and dated. Log sheets of trap captures should be maintained on the traps to demonstrate the program's effectiveness. A simple list and diagram of trap locations helps to avoid overlooking and forgetting traps, or leaving dirty old traps behind for a health inspector (or your competitor) to find at a later date.

3.1.5. Accurately identifying / collecting (for identification) pests turned in, or found on monitors.

Another very important aspect of the IPM inspection for schools (and all other clients) is to accurately identify any pest currently active at the school, or pests that have been registered in the pest sighting log (if a specimen has been retained for your analysis.)

In reality, for some pests, a positive identification (to species) is required, while for others a general identification (e.g., to group) will suffice.

Sometimes, the identification of a pest is the very first part of your service when arriving at a school. Other times, you may happen upon pests during your regular inspection, and either make a general or specific identification on the spot, or, you collect a sample of the pest for identification later.

For ants, flies, cockroaches, and rodents inside schools a specific identification is usually required. It is not enough to tell a school or any client for that matter (or record on your service ticket) that they have "ants", or "gnats" in the kitchen, or "roaches by the pool, or "bees" by the dumpster.

Hopefully, the reason for this is obvious. Not all ants can be controlled using the same techniques. Some species respond well to bait, others may respond only partially, or not at all. Some ants typically nest indoors, or within interior structural areas, while other species tend to nest along exterior areas, and only forage inside. Similarly, "gnats" around the kitchen may be fruit flies, drain flies, or phorid flies. Like ants, the key to managing small flies all depends upon which specific small fly it is. "Bees" by the dumpster are likely to be yellowjackets; a small rodent seen scurrying by the band booster booth could be a mouse or a small rat, and so forth.

In some cases, identification to species is not as critical as for the pests above, because the management strategy may be the same regardless of the exact arthropod. This is true with some occasional invaders. It may not be essential for example, to know <u>which</u> species of ground beetle; cricket or spider was found on two of the sticky traps in the basement. Nor, for example, which species of yellowjacket is foraging around the dumpster.

But for <u>infestations or recurring indoor activity</u> of ants, cockroaches, small flies, rodents, and other pests, the pest must be identified to species.

If there is any doubt as to the proper identification of the pest while at the school, a specimen should be brought back to the office for positive identification, or sent off to an entomologist.

Section 3.2 The Schools Role: Conditions List

As stressed earlier, IPM must involve both parties: the school (including the teachers, staff, as well as interested students and parents), and the contracted pest management professional. Let's examine each party's role in the IPM project.

The school itself plays the most important role in successful IPM programs. However, most school personnel may not realize the fact that if we keep our buildings tight, pests cannot gain easy entry. And, if pests cannot find easy access to food, harborage and water, they may not survive, and they cannot proliferate. For the sake of brevity, a simple list of the most important (and usually the most common) conditions most conducive to pest problems in and around schools are listed below.

I. School Exterior

Rodents

1. In general, openings larger than 6 mm (1/4 inch) will allow mice entry to a school. Thus:

    a. Sweeps, kick plates and doorsills should be maintained and regularly repaired to prevent rodent entry.

    b. Holes around all pipes and soffits must be sealed using durable appropriate sealants (foam sealants are not acceptable).

    c. Cracks in walls and foundations must be sealed

    d. All exterior doors must be kept closed at all times, and not kept open for added ventilation.

2. Garbage cans and exterior dumpsters should not be maintained too close to the school. Trash receptacles must be emptied frequently to prevent an overflow or spillage situation.

3. Shrubs and trees must be trimmed so they are not in contact to exterior walls or roof lines.

4. Drainage of all wet areas must be adequate to prevent standing water.

Crawling and Flying Insects

1. Exterior lighting must be non-attractant. Use yellow lights over entry areas.

2, All food waste must be picked up daily after lunch. If that is not possible, make sure the food items are in plastic (at least 4 mil) that is sealed so there is no leakage.

4) Move trash containers from just outside of entrance doors to the inside of an airlock.
5) Properly seal cracks and crevices around doors, windows and walls.
6) Drink and food spills must be cleaned immediately to prevent attracting ants and yellow jackets.
7) Marble chips, pea gravel, or river rock should be used instead of mulch around the foundation and plantings.
8) Avoid installing low cavernous plants or shrubs next to exterior walls.
9) Trim back trees or overhanging plants so ants do not have entry.
10) All refuse such as leaves or trash must be cleaned from downspouts and drains.
11) Keep unscreened windows closed at all times.
12) Look upward and check for any pipes, A/C, electric, etc. causing openings in walls, overhangs, soffit or roof.
13) All milk cartons MUST be in 4 mil garbage bags before thrown into outside dumpsters to avoid leakage.
14) Dumpsters should to be emptied daily after lunch and cleaned frequently.
15) All metal overhangs and roof edges must be tightly sealed to avoid nesting of wasps, hornets or other stinging insects.

16) All playground areas must be monitored for ground nesting hornets and bees.

17) Flowering bushes or plants that will attract bees (that may inadvertently sting students) should be avoided, especially near entryways to schools.

18) All exterior spider webs should be cleaned on a monthly basis.

II. School Interior

Rodents

1. All food storage areas must have stored products on industrial grade, stainless steel wire shelving to allow spilled foods to fall through to floor and facilitate removal.
2. Floors must be cleaned daily.
3. No foods should be left in classroom without being stored in closed metal tins.
4. NEVER use any grains for inside play area. (One school was using shelled corn in a sandbox in preschool/kindergarten class.)
5. All art supplies made from grain products (Flour Paste,etc.) must be stored in rodent proof containers.
6. All conduit must be plugged to keep mice from using it as a highway thru-out the building. (Also keeps mice from chewing on all wiring including computers).
7. All paper and dry storage areas must be cleaned and checked frequently for rodent or cockroach droppings or other pest evidence.
8. Continually decrease clutter in all storage areas including classrooms.

Insects

1. Keep all snacks, bulk style candies, cookies, sweets, etc., in sealed containers.
2. Monitor backpacks, book bags, etc. when cockroaches are recurring in a particular classroom.

3. Maintenance of the structure is vital to keep insects from being able to nest. Thus, seal all cracks and crevices around windows, doors, bathroom fixtures, moldings, water fountains, bulletin boards, etc.
4. All food areas including snack, coke machine, band booster, teacher lounges, as well as labs, home economics, cafeteria and kitchen must be cleaned daily or when used.
5. All grout and ceramic tiles must be maintained with no cracks orbroken pieces.
6. All mop molding must be glued tightly against the floor and wall with no gaps.
7. All trash receptacles must be emptied daily and removed from the building.
8. Use sealable plastic containers for small items that do not fit on shelving when removed from boxes.
9. Paper products should be stored in an area away from food items.
10. Inspect delivered equipment or "donated furniture" for possible insect infestations. It is not uncommon for used equipment and furniture (that may have sat idle in people's garages, attics, and basements) to harbor cockroaches, ants, fleas , mice or other pests. Items such as refrigerators, micro-waves, couches, overstuffed chairs, cabinets, chest freezers and similar items should always be thoroughly checked prior to allowing them entry to the school.
11. If a recycling program is in effect, inspect areas where recycled items (cans, bottles, paper) are stored.

Section 3.3 Contracted Professional IPM Services

Pest management professionals (PMPs) have much to offer schools via implementeing IPM programs. In fact, it is rare for any school district to not have to rely on a local pest management company to some degree. In the majority of cases around the United States, contracted pest management companies comprise the most significant portion of a typical school IPM program.

However, the days of pest technicians showing up at a school and following a custodian around and allowing themselves to be told "where to spray" are over. Spraying baseboards or basement corners are not only out of line with IPM, they are now perceived (rightly or wrongly) by many as being potentially hazardous to the occupants of the school. Moreover, from a scientific aspect, the routine spraying of pesticides along baseboards and in corners (regardless of the area) offers little or nothing in the way of controlling most structural pests. (There are exceptions however, when some baseboard **areas** may need treatments for certain ants, small flies or others).

In other words, schools do need the *skilled services and experience* of a quality (and qualified) pest management service, but they rarely need any *routine* pesticide applications.

The basic elements of a routine contracted IPM Service for an average school can be categorized as follows:

1. Monthly or semi-monthly visits and inspection of school premises
2. Installation and inspection of pest monitoring traps and/or stations in pest vulnerable areas and recording this information.
3. Installation of rodent monitoring traps and/or trap stations in pest vulnerable areas and recording this information.
4. Pest species identification of any pest affecting the school.

5. Recommendations for correcting and written documentation of any conducive conditions found during the service visit

6. The application (only when needed) as dictated by the results of the monitors or pest sighting logs, of ***low-impact*** pesticides and applications for ants, cockroaches, stinging or biting arthropods and certain occasional invaders.

7. Typical specialty services as add-ons to monthly service contracts:
   a. Stinging bees and wasp control
   b. Termite management
   c. Bat (and other wildlife) exclusion programs

Note that it may also be important and/or necessary to provide copies of labels and MSDS of pesticides that could be used in schools upon request.

(Refer to Appendix D for an example of a company letter/flyer illustrating the services that could be offered to a school).

Section 3.4 IPM Approaches For Commonly Encountered Pest Of Schools

A pest is defined as any living thing that is living in a place where it is unwanted. Some living things are pests by virtue of their potential to transmit disease or cause harm; others are "nuisance" pests, causing only disgust or alarm. In schools, some pests can be tolerated at low levels; others cannot be tolerated at all. For example, a few ground beetles or ladybugs wandering into a school would not be cause for alarm whereas cockroaches in a school kitchen, or a wasp nest near an entry, would be a serious concern. Part of the process of designing an Integrated Pest Management program for a school is that the PMP, school staff, and parents must cooperate in a decision-making process whose goal is to establish action thresholds for different categories of pests.

The types of pests found in the school environment include the following broad categories:

- Cockroaches
- Ants
- Flies
- Bees and Wasps
- Spiders
- Occasional Invaders
- Rats and Mice
- Head Lice
- Weeds

Each of these types of pests must be dealt with using an integrated approach, addressing and correcting the root causes of the pests' presence within

the school environment. Once these causes have been amended, and available non-chemical control methods have been implemented, the judicious use of insecticides can be considered.

Cockroaches

Once the most important pest of commercial and institutional settings, cockroaches have been reduced in status to a pest of secondary importance, largely as a result of recently developed bait insecticides. However, they are still considered a public-health threat because they can spread a variety of disease pathogens on their bodies, and because their presence can cause allergic reactions or trigger asthma symptoms in children and adults.

Schools provide many opportunities for cockroaches to find food, water , shelter and the appropriate temperature. Most schools have kitchens and food-serving areas; many classrooms are often outfitted with sinks; janitor closets offer abundant water; and hiding places abound not only in kitchens, but also in crowded classrooms, storerooms, and lockers. Food for cockroaches is provided throughout the building in the form of student lunches, classroom pet food, and spills and messes of all descriptions.

As is the case with any pest, cockroaches must be controlled in schools using the principles of Integrated Pest Management (IPM).

Monitor for the presence of cockroaches in susceptible areas. Use sticky traps placed in hidden locations near food, water or potential harborage. Suitable locations for sticky traps include behind refrigerators, in cabinets adjacent to sinks, in mop closets, and on floors of storerooms. Sticky traps work best when placed flat on a horizontal surface and against a wall or other vertical surface. Sticky traps placed out in the open – away from edges – are far less effective at catching cockroaches than those that are placed against an edge. Inspect sticky traps on each service visit to find out what pest activity, if any, has

taken place since the last visit. Remember the counsel of Dr. Austin Frishman: A flashlight inspection gives you a snapshot of current pest activity; a sticky trap provides a running "video" of everything that has gone on since your last inspection.

School personnel should inspect boxes and bags of foodstuffs for roaches or egg cases that might inadvertently be brought into the building. Cardboard boxes should be discarded, and their contents stored off the floor on racks. Consult with school personnel to make sure they know the importance of sanitation in cockroach control. All food, including pet food, must be stored in insect-proof containers. Garbage must be removed from the building each day and kept in closed containers; waste containers must be kept clean and free of spillage and residues. If the school practices can and bottle recycling, the containers used for collecting recyclables need to be kept clean, and emptied regularly.

In kitchens and other areas susceptible to cockroaches, identify cracks and crevices in which cockroaches might hide, and seal as many of them as possible with caulk or another appropriate sealant. Be careful, however, not to make cracks "people-proof" while still allowing roaches access to them. This happens when the top crack along the back of a countertop is sealed, but the void behind the counter is still accessible to roaches entering from the bottom.

Good candidates for caulking include pipe entries into walls; cracks between base tiles and the wall; bases of toilets and urinals in rest rooms; cracks around door and window frames; and the cracks behind cabinets mounted to walls.

When cockroaches are found either through monitoring, inspection, or by being reported by staff, it may be necessary to combine the non-chemical measures outlined above with the use of an insecticide.

For significant populations of cockroaches, consider the use of a vacuum cleaner first, to remove as many roaches as possible prior to applying

insecticides. This eliminates a large number of roaches so that less bait needs to be used, and also reduces the allergen load in the building by taking out actual cockroach bodies, feces, and caste "skins.".

Apply gel bait insecticides, in small placements, to the likely daytime hiding places of the cockroaches. In this way, human exposure to the insecticide bait is minimized, and the applications are placed exactly where the pests will find and eat them.

Where a suitable crack or crevice is not available into which to apply gel bait, containerized cockroach baits can be used.

Apply an insect growth regulator labeled for use in schools along with the baiting program; this will have a disruptive effect on the development of immature cockroaches (nymphs), and tends to encourage both nymphs and adult roaches to feed more actively on the bait you use.

Follow-up is crucial. Using sticky traps and flashlight inspections, evaluate the success of your efforts within a week or two of any initial treatment for cockroaches. Use sticky traps (zone monitors) to evaluate the success of your efforts, and to tell you when further "digging" is needed to completely eliminate a population of roaches.

Ants

Given the varied and opportunistic feeding habits of ants, and considering the tendency of school classrooms and student lockers to provide a veritable smorgasbord of assorted foodstuffs, it is no surprise to find ants doing very well in schools. Soil-nesting ants build their mound nests in close proximity to schools; some species might live underneath slab-on-grade structures or beneath the basement floor; other species can build their nests in walls and other hidden voids of the building itself.

For the purposes of providing IPM in schools, ants can be practically divided into three categories: carpenter ants, pharaoh ants, and other small ants. Carpenter ants are not normally associated with school buildings, but may occasionally be seen foraging inside schools. Pharaoh ants, when found, require specialized and well-planned control strategies. A variety of other small ants will be found inside schools; all can be controlled using the same basic principles.

It is important, as a first step in ant control in schools, to positively identify any ants that are reported, to ensure that the correct control program is implemented. The species most commonly found in schools include pavement ants; pharaoh ants; cornfield ants; Argentine ants; crazy ants; field ants; and a variety of other species. Of course each geographical area will have its own most troublesome species. Knowing exactly what kind of ants are involved will give the PMP important clues as to where the ants may be nesting; what foods they might seek (and what baits might be effective); and how to best control them.

Once the identity of the ants in question is known, IPM strategies targeted at that species can be brought to bear upon them.

As repeatedly stressed earlier, an inspection will reveal much about the infestation at hand, and will yield information about how to eliminate the ants. Through careful inspection, the professional will try to learn how the ants are getting into the building, what they are feeding upon, what conditions within the building are conducive to infestation, and possibly even where the nest or nests are located.

Non-chemical measures include exclusion and sanitation. Look for cracks in the foundation, under and around window and door frames, weep holes, and similar openings. Seal these as appropriate: caulk cracks, screen weep holes, repair broken mortar, etc.

Especially in slab construction, it might be possible to solve some ant problems simply by caulking the cracks through which ants enter the building. In particular, pavement ants, large yellow ants and ants of the genus *Hypoponera*

are subterranean in their nesting habits, and sealing cracks and expansion joints in concrete slabs often plays a large role in controlling them.

Look for branches and plantings in contact with the building, and trim these as necessary to ensure this route of entry is eliminated. Look also to find electrical, plumbing, communication and other utility lines that lead into the building, and make sure the openings through which these lines pass are tightly sealed.

Discuss with school personnel the importance of keeping surfaces clean, and of removing all food spillage immediately. As is the case with cockroaches, garbage must be taken out regularly in closed plastic bags; trash containers should be kept clean inside and outside so that ants cannot feed on minute residues in or on the cans. If recycling programs are in place, the recycling bins must be emptied regularly and kept scrupulously clean.

The role of insecticides in ant control begins after the non-chemical strategies outlined above have been implemented. Consider a barrier treatment with granular insecticide, bait or an appropriately labeled residual spray to limit the number of ants that must be dealt with on the inside.

If it is possible to find the ants' nest, a small amount of residual dust injected into the nest will often be all that is needed to eliminate it. Any dust or spray applications should be made at a time when students and as many staff as possible have gone home for the day, and great care must be taken to ensure any drift or over-spray is cleaned up.

If it is not possible to locate the nest, baits are the material of choice for controlling many ants. Apply ant baits next to the feeding trails you identified in the inspection phase; some experimentation might be needed to determine which bait the ant species in question will accept. Apply baits out of the reach of children.

Among the advantages of baits as an IPM tool for ant control are the fact that baits are low in human toxicity; they have low vapor pressure (low odor);

and they can be applied in small, precise amounts in areas where children and building staff are not exposed to them. Since baits work on the principle of being taken back to the ants' nest where they eventually kill off the entire colony, they are slow acting, and school personnel should be advised that control will not be achieved overnight.

Keep in mind that some ants will not accept baits, so the use of baiting programs against them is futile. Ants that cannot be controlled using baits include larger yellow ants, and ants belonging to the genus *Hypoponera*, among others. Pavement ants, cornfield ants, odorous house ants, small honey ants, Argentine ants and many others respond well to baiting programs.

In the case of pharaoh ants, baiting is the only effective method of control, unless a nest can be found and destroyed in its entirety. Attempting to control pharaoh ants by applying conventional sprays or dusts is likely to result in the colony "budding" into several separate colonies. Pharaoh ant control in a school building must involve a careful survey and inspection; baiting of those areas where the survey showed foraging activity; follow-up to make sure all ants are eliminated; and education of those people occupying the building to make sure they don't do anything contrary to the goals of the control program, e.g. self-applying over-the-counter insecticide sprays.

Flies

Unless conditions inside the building are horribly unsanitary, houseflies and other large filth flies will seldom be a problem inside a school building. If houseflies are a problem inside, it will usually be because of some contributing condition outside or nearby. In most cases, such improvements as moving a dumpster away from the building; installing screens on windows; repairing broken screens; or keeping doors properly closed, will take care of large-fly problems. Insect light traps (ILTs) might be of some value in receiving docks or other areas where doors must be left open for extended periods of time.

It is the small flies that can create real challenges for the PMP inside of school buildings. Small flies of particular concern in schools include fruit (Drosophila) flies; phorid flies; moth (drain) flies; small dung flies; and fungus gnats.

The first step in controlling small flies in schools is to identify which species of flies are present. Knowing this will give clues as to what breeding medium might be involved, and what sanitation measures will help eliminate the flies. The PMP is referred to the section on flies in the NPMA publication Field Guide to Structural Pests or to Field Guide for the Management of Structure-Infesting Flies (G.I.E. Publishers, Cleveland, OH)) for details on identification of the various small flies.

Once the flies in question have been identified, a careful inspection will reveal much about where they are breeding, and what conditions inside the building are conducive to their survival. Since all of the small flies rely for their survival on some type of decaying material, the inspection phase is all about finding the fermenting liquid (fruit flies), putrid material (phorid and small dung flies), or fungus-promoting condition (fungus gnats) that is fostering the infestation.

A cleaning deficiency is usually at the root of a small-fly problem. Food debris often gets pushed under coolers, commercial dishwashing machines, food preparation counters, steam tables, salad bars, and dirty dish conveyors, where it stays – wet, forgotten, and out of sight – until a fly population explodes. The purpose of inspection is to find these problems – preferably, before small flies are out of hand.

As with other pests of schools, controlling small flies is a matter of establishing a partnership between the PMP and the school's maintenance personnel, with the cooperation and support of administration and staff.

Among non-chemical methods of preventing and controlling small flies in schools, the following are essential:

- Keep drains clean and free flowing. This can be done via mechanical brushing; drain maintenance can be facilitated through the use of one of the many products on the market containing bacterial cultures.

- Remove trash daily, using tightly-tied garbage bags; make sure the trash containers are kept clean and dry beneath the liners, and are washed often enough that a sticky residue does not form in them.

- Do not leave produce out in non-refrigerated areas.

- If recycling programs are in place, make sure bottles and cans are rinsed out before being placed in bins; empty the bins daily and wash them at least once a week.

- Cleanse and rinse floor mops after each use, and hang them up to dry properly.

- Water potted plants only as often as needed to keep them from wilting; over watering plants can foster the development of fungus gnats.

Insecticide treatments will not usually be needed to control small flies. Sanitation is critical, and without it, no amount of insecticides can help. Where fast knockdown of flies is needed, a pyrethrin aerosol might be useful. Treating the resting areas of adult flies with a residual insecticide might also be of value, but only after sanitation measures have been practiced to their full extent.

Bees & Wasps

In the northern and Midwestern U.S., school buildings are often designed without air conditioning. On warm days at the beginning and end of the school year, unscreened windows are left open for ventilation. Bee and wasp populations are not high enough in the spring to create problems, but in the fall, the air is teeming with fertilized female paper wasps and yellow jackets, looking for a place to over-winter, and foraging for sweets. They easily find their way in through the open windows of school buildings, and panic is frequently the result.

Obviously, any nests that can be located on or near the building should be destroyed using a residual insecticide, or by knocking the nest into a large trash bag for destruction off-site.

For wasps that wander aimlessly through open windows, there is much value in a little education. Explain to school staff why those wasps are flying around (wasp nests are abandoned in late summer; fertilized females – next year's queens – are looking for food and, eventually, a place to spend the winter). Reassure them that the problem will only persist until the first hard frost, and ask them to keep windows closed, especially on the sunny side of the building. Any wasps that do get inside can be killed with a flyswatter or rolled-up magazine. Reassure the client that these do not represent a nesting population.

If wasps are a persistent problem, it may be worth the school district's money to install window screens – or to run the building's air-conditioning system.

Another IPM tactic that will reduce the number of bees and wasps that gather near a school building is to keep a tight lid on trash cans and dumpsters outside. Maintenance staff should put trash into these vessels only in tightly-tied, plastic trash bags. The dumpster or trash can itself, and the concrete pad or asphalt surface around it, should be kept clean and free of food residues that might attract wasps or bees.

Occasional Invaders

A variety of arthropod pests which normally complete all or part of their life cycle outdoors might invade a school building from time to time, driven inside by their search for food, water, suitable shelter, or simply by random wandering. These include spiders, clover mites, crickets, sowbugs, millipedes, ground beetles, boxelder bugs, lady beetles, leaf beetles, springtails, earwigs, etc.

Each geographical area will have its own list of occasional pests of importance.

As part of the school district's IPM program, those responsible for pest management within the district will have established action thresholds for all categories of pests, including occasional invaders. Unless they are found inside in great numbers, reasonable numbers of occasional invaders should not trigger pesticide applications by PMP.

This means that identification of the pest in question is the first step to be taken when an occasional invader is reported. Knowing whether it is something that can continuously infest the building, or a harmless outdoor species, will enable the professional to either take action against the pest, or to assure school personnel that there is nothing to worry about.

Pests of an occasional, non-infesting nature can be dealt with by simply removing the pest from the building; by swatting the pest or picking it up with a vacuum cleaner; or by incorporating it into the school district's science curriculum in some creative way.

Covered, non-toxic sticky traps can be placed near potential entry points of outdoor invaders in such a way that they trap pests as they enter.

The PMP should identify, on his or her normal inspection visit, potential entry points that can be slated for repair by maintenance personnel. Such items might include doors whose bottom sweeps do not fit tightly against the threshold; windows needing screens; doors that are propped open; or

infestations found in built-up grass thatch, mulch, wood bark, or similar landscape materials outside the building.

An example of the role played by landscape materials in supplying occasional outdoor invaders is shown by the tendency of springtails to be found in chipped landscape bark, which is often laid on top of unperforated poly sheeting. Without proper drainage, water is trapped in these chips, creating ideal conditions for springtails, millipedes, sowbugs, and other arthropod invaders. Providing good drainage – and/or replacing the wood chips with a crushed-rock border – would help to solve this type of problem.

Finally, the importance of lighting management in preventing outdoor arthropods from invading a school building should not be overlooked. Every PMP knows that mercury vapor light is far more attractive to night-flying insects than sodium vapor light. Light fixtures which, for security or safety reasons, need to be mounted directly on the building or near a door, should be of the sodium-vapor type. Mercury vapor lamps for parking lot and grounds lighting can be mounted on standards, 100 feet or more away from the building and shining onto it. In this way, insects will be attracted away from the school building, not towards it.

Rats & Mice

Rats and mice have been living in close association with humans for many centuries, and they find ideal conditions for survival in schools. Food is available in classroom pet cages, birdseed supplies, desks, and lockers, not to mention the kitchen and food storeroom. Conditions in classrooms are often cluttered, providing ample harborage for rats and mice.

The potential of rats and mice to spread disease is well documented, so no one would dispute that the need to effectively control rodents is based on real health concerns.

On the other hand, the presence of children makes it especially imperative to be very cautious when controlling rodents in schools.

Anything that can be done in advance of actual infestation to prevent rats and mice from gaining access to buildings is, of course, of great value. Part of the PMP's service routine in schools should be to inspect the building, looking for holes, cracks and gaps rodents could use to gain entry. These can then be closed either by the PMP or by maintenance workers. Suitable materials for closing potential rodent entry points include sheet metal, concrete, copper wool, and such devices as replacement door sweeps.

While inspecting, the PMP should also look for signs of rodent infestation. Such signs include evidence of gnawing; droppings; urine stains; nest material; smears on surfaces from rodents' body oils; tracks in dust; and the rodents themselves.

The PMP can make recommendations to school staff on how to prevent rodent infestation. Some examples:

- If possible, institute a policy allowing food only in areas designated for eating. Especially do not allow food in lockers and desks – including faculty desks. This policy will involve educating students, staff, maintenance workers and parents, and bringing all affected individuals on board in a cooperative effort.
- Store food in tightly sealed containers.
- Doors leading to the outside should never be propped open for extended periods of time.
- All doors should be properly weather-stripped.
- The use of plantings around the immediate perimeter of a school building should be discouraged. If possible, replace plantings with a gravel strip at least a foot wide around the building.

- Keep materials in food storerooms and supply rooms up off the floor; maintain an inspection aisle around the perimeter of food storerooms, if possible. Also in shop areas, keep storage up off the floor.
- All staff should be alert for potential entry points, and they should notify maintenance when such problems are found.

Assuming the school has an IPM program in place, there should be an individual who acts as a contact person for pest sightings. This person should be notified whenever any staff member or maintenance person has seen rodents, or evidence of rodent activity. The PMP should be notified whenever rodent activity has been noticed by anyone.

Traps can be used to monitor for rodents, and also to catch rodents that have managed to get inside.

The use of rodenticide baits and tracking powders should be discouraged inside school buildings, except in rare circumstances and under controlled conditions, when rodenticide use is absolutely necessary to eliminate an existing population of rodents. In such situations, make sure rodenticides are applied in reliably inaccessible areas and in tamper-resistant bait stations, in such a way that you are certain that children have no way of getting to them, accidentally or otherwise.

Rely on traps for normal monitoring and control of rodents inside. Automatic, repeating mousetraps can be used in areas where mouse pressure dictates the need for such devices (as in a receiving dock area). When a mouse or rat is caught inside, supplemental traps can be added and kept in place until you are certain the infestation has been eliminated.

When inspecting as part of a normal pest management visit, don't forget to inspect outdoors for evidence of rodent activity, including rat burrows under concrete dumpster pads or under low vegetation.

Weeds

School districts may spend many thousands of dollars on lawns and athletic fields, and school administrators are understandably reluctant to allow weeds to compromise the appearance, safety, or service characteristics of these areas. On the other hand, the application of pesticides to outdoor areas often involves many hundreds of gallons of chemical mixture. Parents and the community at large are concerned about the effects of chemicals on children who come in contact with the lawns and playing fields. A balance must be found between maintaining the appearance of school grounds and good community stewardship on the one hand, and protecting the health of those who attend the school on the other hand.

Typically, IPM practices for weed control around schools involve dividing the school grounds into different types of zones. One type of zone might require a high level of weed control, e.g. the lawn in front of the school, the main football field and the baseball infield. Another zone, where some weeds could be tolerated, might include the baseball outfield and the back lawn; this would not need to be as well kept as the front lawn. The football practice fields, where a relatively high percent of weed-infested lawn could be tolerated, might represent a third zone. Under a responsible turfgrass IPM program, herbicide use would be allowed in those areas where utilitarian reasons and good community stewardship require a manicured appearance and weed-free conditions; less herbicide use would be needed for those areas in the second zone type, and little or no herbicide use would be prescribed for the areas in the third zone. This type of program can reduce, but usually will not eliminate, chemical use around schools. Of course, it is up to each individual school and community to

determine to what extent they will practice these principles, and what level of weeds they will accept.

Chemical herbicides are not the only tool at the turfgrass manager's disposal. Healthy, dense turf can be created through the use of such non-chemical strategies as soil aeration and selecting a higher setting on the mower blade. Healthy turf, in turn, naturally resists weed invasion, thereby reducing the need for chemical controls. Where turf must be kept short, supplemental irrigation can be used to keep the grass healthy enough to out-compete weeds.

Mechanical removal of weeds, such as hand removal, and the use of various rakes, diggers and other tools are practical for some areas, and is an option that should not be overlooked. Another simple mechanical tool for removal of isolated weeds emerging through sidewalk cracks or sprouting in an undesirable spot along a foundation is the use of a small hand-held blow torch. Slowly passing over the weed with the torch kills the weed. There is no need to hold the torch to the weed and "burn" the weed.

Head Lice

One of the most dreaded letters for a parent to receive is that there is an "outbreak" of head lice in their child's school. Since it is a medical problem, the role of the PMP is to recommend immediately that the school notify all parents and have their children examined by their family physician. As lice cannot live more than twenty-four hours off of a host, treatment of the school is not necessary.

3.4.1 Non-Chemical Pest management activities that can be accomplished by school personnel

In addition to abiding by the conducive conditions list in Section 3.2, the school itself can control some of the more common occasional invaders in and around schools via some simple janitorial efforts. Still, the contracted pest

management company could provide the school a valuable service by supplying fact sheets on the following, or directing the school to download this information off of any of the available IPM in schools web sites (see appendix).

For example:

1. Spider sightings and activity in classrooms and exterior areas can be kept to a minimum via weekly and monthly vacuuming programs by the custodial staff (brown recluse and black widow spiders excepted). Custodians must have the proper vacuums with extendable suction hoses to reach ceilings.
2. Pantry grain pests in classrooms and storage cabinets can be monitored via pheromone traps. Teachers can keep an eye on the trap.
3. Fruit flies and other small flies can be kept to a minimum by keeping all trash cans and drains clean on a scheduled basis, and attention to cleaning in all hard to reach areas beneath kitchen food prep equipment.

Section 3.5 Guidelines for Applying Pesticides in or Around Schools

Despite best efforts and effective IPM programs, pesticides are sometimes necessary to eliminate important pests, especially when they may pose a health threat to children. Whenever pesticides are to be applied, several considerations, both general and specific, are important.

General Considerations and Recommendations:

1. First and foremost: if there are no pests posing a threat, or no threat of a pest infestation present at the school, there should be no need to apply any pesticides. All non-chemical pest management approaches should be implemented prior to the use of any pesticide.
2. Never apply any pesticidal product in any manner inconsistent with its label. Always recheck label directions, and if in doubt, check with a supervisor.
3. Do not allow any school employee to dictate whether or not a pesticide should be applied, or which pesticide, or where a pesticide should be applied.
4. Do not apply any pesticide at any time while school is in session.
5. Be aware of any notification requirements in your state, and follow the requirements at all times.
6. Keep clear, concise records of any control measure, including pesticide application. Fill out the pesticide use log (Appendix B), and any applicable record keeping associated with your state.

Specific Considerations and Recommendations:

A. Insecticides

1. Use only those insecticides with low-toxicity ratings, or those approved for use within the school by any federal or state regulations, or local school policy.

2. Whenever possible, baits (cockroaches, ants) are the preferred insecticide formulation.

3. For persistent indoor fly infestations, sanitation is the key. However, for chronic infestations of drain, fruit or phorid flies, the use of bio-rationals (e.g., Gentrol™) may prove a good IPM choice to provide long term control of these flies.

4. Should liquid formulations be needed (and providing they are not prohibited by a state or local mandate):

a. Use only low-impact formulations such as micro-encapsulated materials, suspended concentrates, etc.

b. Always apply the insecticide directly into cracks and crevices

c. Use very low pressure on the sprayer (typically 10 PSI and less).

5. When considering the use of aerosols, be aware of the potential for the insecticide to drift inside buildings via air ducts, air currents, connecting chases, and so forth.

6. Never apply liquid exterior band treatments with a power sprayer because the pesticide might drift into the building, be taken in through air intakes, or drift onto nearby playgrounds or athletic fields.

B. Rodenticides

1. Traps are the preferred choice for most rodent control efforts. However, if baits must be used, bait blocks secured inside tamper-resistant bait stations is the recommended approach.

2. Never use pellet-style or packet style baits inside or around a school as these are prone to being carried off (translocated) by the rodents to areas where they might be encountered by students, or in areas they might contaminate foods or food surfaces.

3. All bait stations should be numbered and an informal map maintained of the station's locations.

4. Once control of the rodents has been achieved, remove all stations and maintain traps or trap stations in the areas of greatest rodent potential.

5. In general, rodenticide tracking powders should not be used inside schools, except under very controlled conditions, and where rodents are not responding to baits or traps. If tracking powders are used, they should be contained inside tracking stations and maintained as described for rodenticide bait stations above.

6. Do not install interior or exterior bait stations in any area where students might encounter them.

7. Rat burrows can be treated directly by inserting pellets directly into the burrow. Use a very long spoon or funnel pellets through a rubber hose for delivery deep into the burrow. Monitor the burrows weekly. Do not stuff bait packets, or bait blocks into the burrows, as these can be kicked back out of the burrow by rodents making them available to children and/or non-target animals.

Section 3.6 OTJ Summary For Servicing Schools Using IPM

1. Always check with the school contact as to pest problems or issues and if that person is not available, the secondary contact (always ensure there is a contact at the school at all times.).

2. Maintain and use the pest-sighting log at each visit. Keep the log in the main office to ensure school staff members see you depending on the log. Do not allow the log to become inactive.

3. Your inspection is the most important professional service to the school--not applying any type of "preventative" bait, spray, dust, etc.

4. If there is no current pest activity at the school, no pesticides need be applied..

5. Never, ever allow a custodian, teacher, coach, or anyone to tell you "where to spray"(or bait, or dust, or put out a little mouse bait, etc.)

6. Never place pellet-style or packet-style mouse bait as a "preventative mouse control program". Never give mouse bait to a school employee to put out at a later date. If rodent bait is needed to reduce troublesome infestations, use only block formulations secured inside tamper-resistant stations, mapped out to facilitate removal of the bait at a later date.

7. For preventative mouse control programs install multiple catch mouse traps, containing insect sticky monitors or install snap traps inside protected trap stations.

8. Always install trap monitors in the school's pest vulnerable areas, and check, service, and replace the monitors on a scheduled basis.

9. During the inspection always carry a clipboard or notepad to record and report to the school those conditions that are conducive towards attracting, permitting entry, or allowing pests to proliferate around or inside the school. Report such information in a professional, diplomatic manner to achieve a cooperative effort.

10. If your state has a formal, mandated IPM in Schools program (laws or guidelines), ensure you are familiar with the policies, in addition to all pesticide label directions, and existing state laws while performing IPM in the school.

APPENDIX A

Pest Sighting Log

Jones Avenue High School: Integrated Pest Management Program

IPM: Its Everyone's Responsibility !

Month _____ School _____

Head Custodian _____ School IPM Contact_____

1. Please make a record of all pest sightings below. Please be very specific as to where in the building and room the pest was seen.
2. Each sighting will be used by our IPM professional to track and follow up on corrective action.

Day, Date and Approx. Time	**Type of Pest**	**Room and specific location**	**Person reporting pest.**	**Checked By PMP And date**
Tue. 2/17/02; 9 AM	Black beetle.	Room 101; around sink	Jim Smith, Teacher,	R. Brady 2/25/02
Mon. 3/ 22/02 3PM	Cockroach	Teachers Lounge Near refrigerator	Mrs. Jones, Prin.	R. Brady 3/27/02

APPENDIX B

Pesticide Application Log

Triple Z Pest Management
Anywhere, Anystate

Jones County Schools: Integrated Pest Management Program 2002

Month _____ School _____

Principal_____ Head Custodian _____

Record any pesticide and appropriate comments on the form below.

Date	Type of Insecticide Application	Specific Location	Comments/ Initials
June 3, 2002	Installed 3 cockroach bait stations.	In desk drawers of kitchen supply rm.	saw nearby activity of cockroaches. / **SJ**
June 21, 2002	Applied insect growth regulator for small flies	In kitchen tiles underneath vegetable prep table.	saw nearby activity of fruit flies. / **SJ**

APPENDIX C

INTEGRATED PEST MANAGEMENT (IPM) SURVEY

School: **Jones Avenue High School, Anytown, Anystate** Date:_____

Address
Principal
Head Custodian Kitchen Supervisor:
OVERALL IPM RATING OF SCHOOL: (Excellent, Good, Fair, Poor)
Pest Sighted (Species confirmed Y or N)
1. German cockroaches (Y) 2. Mice (Y) _____
3. Yellow jackets (Y) 4. Pavement ants (Y)
Others:_____

Environmental Conditions and IPM Techniques	**Yes**	**No**	**Comments**
1. Exterior inspection conducted ?	X		N. side under construction
2. Structure pest proof ? List /Report.		X	
3. Exterior conditions conducive to pest problem (debris, trash, vegetation, etc.) (List Report)	X		
4. Interior Inspection Conducted?	X		
5. Monitoring program in place?	X		
6. Non-chemical control Program in place?	X	X	Some additions needed.
7. Non -chemical Techniques			
1. Pest Proofing		X	
2. Good Sanitation Practices	X		Some improvements
3. Good Organizational Prac.		X	required. Stockroom of
4. Trapping		X	kitchen
5. Vacuuming		X	
6. Cultural controls (e.g., keeping weeds and vegetation low and maintained.)	X		
7. Mechanical Repellents		X	
8. Exclusion Devices (e.g., Door pest strips)		X	Kitchen doors need brushes
8. Chemical Control Program ?	X		
a. Low-impact pesticides employed ?	X		Non-residuals flushing/
b. Any liquid residuals used?		X	Bait applications only.
Types of Pesticides Used			Location
1. Gentrol IGR for small flies	X		Kitchens
2. Hydramethylnon @ 2.15% cockroach bait	X		Kitchens, storeroom
3.			
4.			

Additional Comments:

APPENDIX D

Checklist of School Integrated Pest Management Services We Provide

Our company utilizes an Integrated Pest Management (IPM)approach, which includes the following services:

1. Inspection of the school and grounds to determine whether pests, or conditions conducive to their presence, exist;

2. Provide recommendations to appropriate school staff personnel for maintenance and sanitation to help eliminate pests and the conditions conducive to pest infestation (sources of pest food, water, and/or harborage);

3. Pest-proofing (excluding pests from structures) utilizing caulk, screening, mortar or other suitable materials;

4. Monitoring using traps and/or other detection devices on an ongoing basis to determine if pests are present;

5. Non-chemical, direct control measures such as trapping to actively eliminate pests;

6. Application of EPA-registered, low-impact pesticide materials when the above measures are not sufficient, or when there is reason to believe that public health may be in immediate danger due to pest infestation. Pesticides are not necessarily applied on every, nor on every, visit.

Pest Management
Company_____

Licensed Pest Management
Professional_____

Date_____

APPENDIX E

A Sample List of Contemporary Low-Impact Pesticides

The following pesticides are those that are commonly used by pest management professionals in IPM programs.

In general, baits are the preferred pesticides for crawling insects in an IPM program.
Examples include:
Boric Acid: Rockwell InTice Sweet Ant Gel, Waterbury Drax (liquid, gel and paste forms), Nisus Niban (granules), Whitmire Advance (liquid), Senoret Terro (liquid and single-use stations), Rockwell InTice Granular Bait.
Hydramethylnon: Clorox MaxForce (gel, granules, single-use stations), Waterbury Siege (gel), Wellmark Eclipse (granules)
Fipronil: Clorox MaxForce (gel and single use stations), Clorox MaxForce Ant Gel
Abamectin: Whitmire Avert (gel, single use stations), Whitmire Advance (granules)
Imidicloprid: Bayer Pre-Empt (gel)
Sulfluramid: Whitmire Advance Dual-Choice (single-use stations)

Note: Some of the baits listed above are labeled for ants, some for roaches, and some for both (and other species as well). Make sure you use the correct bait for the target species.

Baits should be placed in completely inaccessible areas or in heavy duty, refillable tamper-resistant bait stations. Examples include: B&G Perimeter Patrol, Rockwell D-Sect, Rockwell PFT, Waterbury Drax, Clorox MaxForce. Single-use, prebaited 'puck style' stations (noted above in bait section) may also be used, though are not recommended around very young children as they may put them in their mouths. Single-use stations are not labeled for refilling.

For long term control in wall voids and other completely inaccessible areas, boric acid powders may be used. Examples include: Nisus Nibor, Waterbury Borid, Whitmire Perma-Dust.

IGRs such as Gentrol, Nylar, and Gentrol Point Source may be used against labeled species including roaches, stored product insects, and fruit flies (in the case of Gentrol).

EcoSmart EcoPCO Dust (residual) and EcoPCO ACU Contact Spray (non-residual) with hexa-hydroxyl may be used against a broad spectrum of crawling and flying insects.

Pyrethrins in non-residual formulations may be used against a broad spectrum of crawling and flying insects when children aren't present. Examples for flushing and contact: Waterbury CB-38 Extra and CB-123 Extra. Total release products include Whitmire Pro-Control and Waterbury Total Release.

For bees and wasps, knock-down sprays such as EcoSmart EcoPCO Jet (hexa-hydroxyl) or Woodstream Wasp Spray (mint oil) may be used. For continuous control in season, use hanging cup-style traps (Rockwell Hanging PFT, Woodstream Victor trap). Nests may also be treated with boric acid powders (noted above).

For stored product insects, pheromone traps in high-risk areas (where grain products including popcorn are stored) should be used. Examples include: Rockwell InVite, Trece, Whitmire PT.

For general non-chemical control of flying insects, UV light traps are recommended for high pressure areas such as kitchens or areas frequently open to the outside. Examples include Whitmire Vector, PestWest Mantis, B&G light traps, Gilbert light traps.

Rodents:
As a first measure use repeating traps, or snap traps/ gluetraps. Snap traps and glue traps should not be used in any areas where they can be encountered by young children. If necessary, use block baits in tamper-resistant bait stations for control.
Examples include:
Bromadiolone: Bell Contrac Blox, Lipha Maki Mini Blocks
Brodifacoum: Bell Final Blox, Syngenta Talon Weather Blox
Chlorophacinone (not recommended for mice): Lipha Rozol Blocks
Diphacinone (not recommended for mice): Bell Ditrac Blox
Bromethalin: Bell Fastrac Blox (note that Bromethalin is not an anticoagulant and does not have an antidote)

Tamper-resistant bait stations include: Bell Protecta range, Eaton Gold Key range or metal stations, Lipha Aegis range. Gluetraps include Atlantic Paste Catchmaster, Bell Trapper, Eaton Stik-Em.

The trade names used above are the property of the companies noted. This list is intended to be representative, and is neither all inclusive nor meant to be an endorsement of specifics products.

Appendix F

Important references and web sites pertaining to school IPM

Bennett, G.W., J. M. Owens and R.M. Corrigan. 1998. Truman's Scientific Guide to Pest Control Operations. Purdue University/Advanstar Communications, West Lafayette, IN. 494pp.

Contracting Guidelines for integrated pest management services in Maryland Public Schools. 1995. MDA 286-295. Maryland Dept. of Agriculture, 50 Harry S. Truman Parkway, Annapolis, MD 21401. 410-841-5710. 75 pp.

Davidson, J. A. and M. J. Raupp. 1997. Landscape IPM guidelines for integrated pest management of insects and mite pests on landscape trees and shrubs. Bulletin 350. University of Maryland Cooperative Extension Service. (301) 405-3913. 106 pp.

Directory of least toxic pest control products. 1999. The IPM practitioner 20. (11/12). Bio-Integral Resource Center (BIRC). Nov/Dec. 1998. 52pp.

Integrated management o;f structural pests in schools. 1994. Illinois Dept. of Public Health. PDF file available at: http:/ www.Idph.state.il.us./envhealth/pdf/imsps.pdf

Integrated pest management in schools: IPM training manual for grounds maintenance. 1998. Bulletin #358. University of Maryland Cooperative Extension Service. 301-405-3913. 157pp.

Integrated pest management kit for building managers: how to implemente an IPM program for your buildings. No date. Massachusetts Dept. of Food and Agriculture, Pesticide Bureau. . 617 727-3018. PDF file available at: http:/ www.massdfa.org/IPM_kit_for_bldg_mgrs.pdf

IPM workbook for New York state schools. 1998. Pub. No. 605. Sponsored by the New York State Dept. of Environmental Conservation and Cornell Cooperative Extension. 9 Sections. PDF file available at: http:/www. Nysaes.cornell.edu: 80/ipmnet/ny/urban/workbook_final.pdf

Leslie, A.R. and R. L. Metcalf. eds. 1994. Handbook of integrated pest management for turf and ornamentals. U.S. Environmental Protection Agency, Washington, D.C.

Mallis, A. 1997. Handbook of Pest Control. 8th Ed. S. Hedges. (Ed). Mallis Handbook and Technical Training Company. Cleveland. OH. 1455pp.

Montana model school integrated pest and pesticide management program, the. 1994. Montana Dept. of Agriculture.

Olkowski, W., S. Daar, and H. Olkowski. 1991. Common-sense pest control: least toxic solutions for your home, garden, pets and community. Taunton Press. Newtown, CT. 715 pp.

Pennsylvania Integrated Pest Management Program. 2001. IPM for Pennsylvania Schools. A how-to manual. Available from the Publications Distribution Center, The Pennsylvania State University, 112 Ag Administration Bldg.University Park, PA. 16802. Tel: 814-865-6713. Also check web at: http://www.cas.psu.edu

Pest control in the school environment: adopting integrated pest management. 1993. EPA 735-F-93-012.U.S. Environmental Protection Agency. Public Information Center (3404), 401 M Street SW, Washington, DC 20460. (703) 305-6457. 44pp.

Pest management recommendations for commercial production and maintenance of tress and shrubs. 1997. Cornell Cooperative Extension (607) 255-2080. Email: dist_cent@cce.cornell.edu

Purdue University. 2001. IPM Resource Manual for Schools and Childcare Facilities. IPM Technical Resource Center. Department of Entomology. West Lafayette, IN.

Riley, B. 1994. Getting pesticides out of our schools. Northwest Coalition of Alternatives to Pesticides. P.O Box 1393. Eugene, OR 97440. 541-344-5044. 30 pp.

Simmons, S.E. , T.E. Tidwell, and T. A.Barry. 1996. Overview of pest management policies, program and practices in selected California public school districts. PM96-01 State of Ca. EPA-DPR. Pest Management Analysis and Planning Program. 68 pp.

Smith, E.H. and R.C. Whitman. 1992. NPCA Field Guide to structural pests. National Pest Management Association. Dunn Loring, VA.

Stier, J.C. K. Delahaut, P. Pellitteri, and B. Becker. 1999. Wisconsin's school integrated pest management manual: school pilot program draft. Available on the web at: http://ipcm.wisc.edu/programs/school/default.htm

Summary of structural pest control programs and implementation of IPM in Maryland public school systems. 1997. Maryland Dept. of Agriculture, 50 Harry S. Truman Parkway, Annapolis, MD 21401. 410-841-5710. 75 pp

Urban integrated pest management: a guide for commercial applicators. 1992. Prepared for U.S. EPA by DUAL and Associates, Inc. 703-527-3500.

Urban IPM Handbook. 1998. National Pest Control Association, Dunn Loring, VA 22720. 156 pages.

VIDEOS

IPM In Schools: 1998. National Pest Control Association. Dunn Loring, VA. Time: 18 minutes.

Integrated Pest Management (IPM) for Schools Series: 1997. Texas Agricultural Extension Service. The Texas A&M University System: Five Volumes.

Pest control in the school environment: adopting IPM. 1994. Featuring Dr. Austin M. Frishman, and Jeffrey B. Tucker, BCE. Video Development, Inc. PO Box 701067, Houston, TX. 77270. (713) 681-9004. Time: 90 min.

WEB SITES:

EPA. IPM for Schools: A How-to Manual, includes complete EPA Manual, downloadable as PDF files. http://www.epa.gov/region09/toxic/pest/school/index.html

The IPM Institute of North America, Inc. Web site with extensive school IPM information as well as IPM Standards, pest control links, etc. http://www.ipminstitute.org/

Northwest Coalition for Alternatives to Pesticides (NCAP). 1994. Includes examples of a model school IPM policy. http://www.efn.org/~ncap/modipmpol.html

Pennsylvania IPM. Web site with much IPM information and links, including the model Integrated Pest Management Policy for Schools, Developed by the Pennsylvania IPM Program and the Pennsylvania School Boards Association. http://paipm.cas.psu.edu

Purdue University. 2001. IPM Resource Manual for Schools and Childcare Facilities. IPM Technical Resource Center. Department of Entomology. West Lafayette, IN. http://www.entm.purdue.edu/entomology/outreach/schoolipm/

University of Florida. One of the most extensive school IPM web sites with many outstanding helpful links. http://schoolipm.ifas.ufl.edu/

Urban Entomology. Walter Ebeling 1975. Most of the text from this classic text book on urban entomology is on this web site:
http://entmuseum9.ucr.edu/ENT133/ebeling/ebeling.html

Web sites for Writing an IPM Policy

EPA's guideline to developing an IPM policy statement:
http://www.epa.gov/region09/toxic/pest/school/append-c.pdf

Example of a policy statement from Florida

http://gnv2.ifas.ufl.edu/%7Eschoolipm/admn_fr1.htm

University of Wisconsin's Guide to writing an IPM Policy
http://ipcm.wisc.edu/programs/school/section_6/school.htm

Entomology and IPM Related Fact Sheets

Many entomology and pest management fact sheets are available on the web from various universities. Check with your local land-grant university or search the web for fact sheets for pests pertinent to a specific area. Three sites are provided here to serve as examples, but there are easily several dozen websites that provide quick references for basic entomology and pest management topics.

The Pennsylvania State University Entomology Department Insect Pest Fact Sheets. http:// www.ento.psu.edu/extension/fact_sheets.htm

The Ohio State University Entomology Extension Fact Sheets.
http:// www.ag.ohio-state.edu/~online.ag.ohio-state.edu/hyg-fact/2000/2107.html

University of Minnesota. Entomology Fact Sheets: http:// www.extension.umn.edu

Entomology and IPM Websites that would be of interest to teachers :

By providing teachers and school staff members with web sites pertaining to the fascinating study of insects and environmentally friendly approaches to controlling pests, (i.e., IPM) you demonstrate to the school that you--as the servicing professional-- are well informed regarding the principles and concepts of IPM in schools.
The following sites can be printed on your company's letterhead, and given to teachers or staff members whom may express an interest in your IPM program, or simply ask you about good web sites for teaching students about "bugs".

Great Web Resources for Teachers!

Insects and Integrated Pest Management Curriculum

☺ Katerpillars (& Mystery Bugs)
http://www.uky.edu/Agriculture/Entomology/ythfacts/entyouth.htm
A University of Kentucky Entomology Department site that's fun for younger kids and educational. Includes sections such as "mystery bug," "bug food," "insect stories," and links to teaching resources, including lesson plans for field and classroom experiments, an entomology newsletter for teachers, a detailed project from 4H on how to collect insects, and a teacher's guide to using insects in the classroom ("a teacher's guide to six-legged science").

☺ Best of the Bugs
http://www.ifas.ufl.edu/~entweb/UF-BOB/
This University of Florida site lists the top 5% of websites dedicated to insects, mites, and nematodes, as judged by a committee of professional entomologists and nematologists. Don't worry, these aren't stuffy research sites. Most of them have a very broad appeal and include topics such as insects in art, history and mythology. Don't miss the link to "Insecta Inspecta," an award-winning page designed by 7th graders.

☺ Using Live Insects in Elementary Classrooms
http://insected.arizona.edu/uli.htm
From University of Arizona Center for Insect Education/Outreach, this site includes 20 lesson plans for k–2 that utilize insects to teach all kinds of concepts to young learners: health and hygiene, human sexuality, self esteem, decision making, function of body parts, etc. Really neat resource! Includes activity sheets and fact sheets on the various insects used. The same group at U of Arizona is currently developing a teaching resource for high school students that focuses on insects and plants in crop systems and is also cross-curricular.

☺ School IPM Education Resources
http://www.cas.psu.edu/docs/CASDEPT/IPM/schools/schoolEduc.htm
This site is part of the University of Pennsylvania IPM in Schools Program. Pennsylvania may be the only state so far that has included IPM in the state academic standards. This website hosts the most comprehensive list I know of teaching resources related to IPM. Many of these cover the agricultural aspects of IPM, not just the application to schools. The list includes publications, videos, software, activities, classes for teachers, a teachers "help desk" and more. This page is a great starting point to explore the growing resources for teaching IPM.