MAINTENANCE GUIDEBOOK VII
TERMITE, INSECT AND RODENT CONTROL

CHAPTER ONE - INTRODUCTION

SECTION A WHY WAS THIS GUIDEBOOK PRODUCED?

The purpose of this Guidebook is to introduce public housing agencies and Indian housing authorities (jointly known as HAs) to current pest-management methods and principles that will make their task more rewarding and effective. In order to reduce risk from exposure to toxic pesticides, these methods are less dependent upon chemical pesticides. The old ways no longer work well since pests developed resistance to many pesticides. This Guidebook provides information on modern Integrated Pest Management (IPM) to control pests, a new approach which provides a higher level of control at lower costs to HAs.

SECTION B PEST MANAGEMENT—WHAT IS IT?

1. GENERAL

What is a pest? Living organisms fulfill their natural roles wherever they are, but only when they impact unfavorably on human life and activities are they considered pests. A "pest" then is any living organism that interferes with human objectives.

The goal of the IPM approach is to manage pests, reduce costs, and protect human health and environmental quality. IPM systems combine technical information on the pest and how it interacts with its environment with known and available pest-control methods. Because IPM applies an overall approach to pest-management decision-making, it takes advantage of *all* appropriate pest-management options including, but not limited to, pesticides. Thus IPM is:

- A system utilizing multiple methods,
- A decision-making process,
- A risk-reduction system,
- Information intensive,
- Cost-effective, and
- Site specific.

Unlike any single method or tactic of pest control, the IPM approach to pests employs a combination of tactics, including sanitation, monitoring, habitat modification, and the judicious use of pesticides, when necessary. IPM is equally suited to the pest-management needs of single and multi-unit housing

structures and surroundings, while it reduces the exposure of children and adults to potentially hazardous pesticides. Additionally, IPM provides low-cost and effective pest management in the long term. The repetitive, so called "preventive" pesticide treatments are eliminated, thus reducing costs and unnecessary exposure, and the likelihood that pests will develop a resistance to pesticides. The best available technical information about the pest and its interaction with its surroundings is employed with IPM, which relies on permanent modifications of the pest's habitat to achieve control. The system requires careful attention to sanitation, preventive building maintenance, and exclusion and mechanical means, as well as appropriate pesticidal methods of pest management.

A successful IPM system for urban sites has five major components. All of them should be addressed and implemented in some form for the system to be most effective. Deletion of portions of the system will lead to poor results. These components are:

1. Definition of Roles and Responsibilities:

   Define the roles and responsibilities of all involved in the pest-management system (for instance, resident and HA's staff or contractor pest manager). Ensure understanding and establish communication links between them.

2. Develop Pest-Management Objectives and Action Thresholds:

   Determine the management objectives for each specific area of the development, having identified those organisms that constitute pest problems. Set action thresholds—the point at which pest populations or environmental conditions indicate that some action must be taken.

3. Inspection and Monitoring:

   Inspect the development and monitor the pest population on a consistent basis to determine when the action threshold is reached, and to determine whether the actions taken have been sufficient.

4. Management Methods:

   Take action that reduces the number of pests the habitat can support, exclude the pest, or otherwise make the development's environment incompatible with the biological needs of the pest. Take appropriate pesticidal action, utilizing the least toxic, most effective and efficient application technique. The method employed should provide the longest contact time between pesticide and pest, when the pest is in its most vulnerable stage, and should offer the least possible hazard to people, property, and the environment.

5. Evaluation and Record-Keeping:

   Evaluate the results of habitat modification and pesticidal treatment actions by periodically monitoring the development's environment and pest populations. Evaluation compares the pest-management objectives (how many pests are too many) with the level achieved, and determines what more needs to be done. Keep written records of the development's pest-management objectives, monitoring procedures and data collected, actions taken, and the results obtained by the pest-management methods.

2. ROLES AND RESPONSIBILITIES

The concepts and methods of IPM were developed for agricultural settings. Later, its value in urban pest management was recognized as well. Key to the success of this system in a residential development is the interaction among the people involved in pest management—residents, pest managers (HA staff or contractors), and decision-makers (HA staff)—who share the information necessary to achieve the pest-management objectives. Their functions and responsibilities, identified below, should be included in the pest-management plan.

a. Residents' Roles and Responsibilities

Residents are concerned about the effectiveness and possible adverse effects of the pest-control methods used. They should receive information addressing these concerns as well as their roles in the development's pest-management system. When everyone's role in the system is agreed upon, and when communication is good, effective and inexpensive protection of the development and the residents can be achieved with reduced risk.

Sanitation and Elimination of Pest Harborage: The most important responsibility of the residents is sanitation. Extremely small amounts of crumbs, grease, or water can meet the food and water needs of most pests for many days or weeks. Much of the prevention and reduction of pest infestations depends on clean-up of food leftovers, paper clutter, and proper housekeeping. Kitchens, where food is prepared, and dining rooms, where food is consumed, are especially vulnerable to pest infestation, so special attention should be given to washing dishes and cooking utensils after every meal, and storing food in pest-proof containers. Food should not be left out overnight. All spaces should be thoroughly cleaned and vacuumed, and wet garbage and other trash removed from the premises often. Food should be stored in glass, plastic, or metal pest-proof containers and rotated (first in, first out).

Observation and Early Detection of Problems: Since residents spend a great deal of time in the home, they should be aware of signs indicating the presence of pests. Noting and reporting these signs to the HA will help in the detection and control of pests. Things to look for are live or dead insects, droppings, holes in paper or cardboard food containers, brown spots in corners of cabinets or rooms, "salt and pepper" droppings, fine sawdust piles, olive-pit shaped droppings, holes in cabinets or woodwork, gnawing, scrambling or scratching sounds in walls.

b. The HA's Pest-Management Role and Responsibilities

The HA's staff or pest-control contractor should evaluate the extent of the pest infestation and the development's environment and decide how to achieve the pest-management objectives. Then the pest manager designs a system that takes into account potential liability, applicator and resident safety, costs, effectiveness, time required, and resident concerns. The pest manager also performs the necessary pest-management actions or directs others to take action.

Response to Resident Pest Observations: Residents should have the means to report any signs of pest activity, and the HA should respond quickly to such observations.

Inspect and Monitor the Development: The pest manager should respond to resident observations by initiating a thorough inspection of the environmental conditions of the development to determine how they provide the biological needs (food, water, shelter) for pest populations, where pests are, and the size of the pest population.

Identify the Pest(s): The pest manager identifies the pest (to species, if possible) and determines the necessary sanitation and exclusion methods, and biological and physical control measures that can be used to achieve control.

Educate the Resident about IPM: The residents need to be informed about the importance of their roles in IPM for the successful management of pests.

Identify Preventive Measures: Residents should be advised of their responsibilities in pest management, such as vacuuming, sanitation, removal of clutter, handling of wet garbage, food-storage methods, and other cultural means to remove what pests need to survive in the home.

Make Recommendations: Some necessary actions to be taken, such as repairs of leaks and exclusion measures, may not be the responsibility of the pest manager. Such actions should be recommended by the pest manager for the HA's staff to accomplish.

Manage the Pests: The pest manager should take whatever means are needed to manage the development's environment and pest populations, including the use of pesticides, if necessary.

Provide Risk Communications: The pest manager should communicate any potential risks from pesticide use to the residents and the HA's staff. The system for the development should achieve the goals within the limitations posed by safety, time, money, and materials available. Pest managers monitor the development's environment and pest population to determine if actions

tions taken are successful, and keep accurate records of any pesticides used, the amounts and treatment dates for each development.

c. The HA Decision-maker's Role and Responsibility

HAs authorize the IPM program, control the money for pest management, and should be directly involved in its management. The HA should rely on the expertise of its certified staff in purchasing pesticides, especially when ordering restricted use pesticides, or request assistance from the local public health department or local cooperative extension service or hire a consulting entomologist or pest control specialist.

The HA is responsible for determining whether the pest manager is performing at an acceptable level and whether the pest-management objectives are being met by performing the following:

Developing a Pest-Management Plan: The HA's staff should help develop the pest-management plan. The plan should include at least the five steps of a successful IPM system described in Section B-1 in this chapter. A good pest-management plan will ensure the success of implementing IPM in the development.

Providing Maintenance Procedures: Proper maintenance of residential buildings will eliminate opportunities for pest populations to develop. Routine maintenance includes leak repair, exclusion measures to keep pests out, and provision for timely garbage and trash removal.

Seeking Recommendations of a Professional Pest Manager: The pest manager should be a professional who knows the biology and behavior of pests and will make recommendations for structural changes, repairs, and innovative approaches that will economically achieve long-term control without the added risks of excessive pesticide use.

Understanding, cooperation, and commitment, from everyone is needed in order for IPM to succeed.

d. Educating and Training IPM Participants

An IPM program should include the education of residents and training for maintenance and other staff. Residents should understand the basic concepts of IPM and the importance of their cooperation. They should know whom to contact with questions or problems. Specific instructions should be provided on what to do and what not to do. Pesticide applications by residents should be discouraged.

The application of pesticides should only be done by the HA's designated certified and licensed pesticide applicator, in compliance with state laws. Training and certification in IPM of HA staff, especially the pest manager, is important to the success of an in-house IPM program. Universities and State Cooperative Extension Services have the expertise to meet most IPM training needs. There are also private organizations which can provide IPM training.

SECTION C PEST-MANAGEMENT OBJECTIVES AND ACTION THRESHOLDS

1. PEST-MANAGEMENT OBJECTIVES

A pest-management objective is like a road map for pest control. It tells us what we are trying to accomplish (where are we going) and when we have done enough. The pest-management objective should be as specific to the development's needs as possible, considering the residents, conditions, pest problems, and resources available.

Pest-management objectives will differ among developments. Some of the objectives might be preventing termite damage or cockroach populations. Pest managers should clearly identify specific objectives in pest-management plans, such as the following: Manage termites that may occur in the development to prevent or minimize damage to buildings, using appropriate monitoring, remedial, and preventive methods that also minimize injury or health risks to residents or HA staff, and preserve the integrity of the development buildings and structures.

a. Is Zero a Real Number?

In managing pests to a level where they do not have adverse impacts upon health and property, "zero" pest presence may not always be achievable. However, with the utilization of IPM principles and practices, very low levels (near zero) of pest presence can be achieved with reasonable expenditure of money, time, and material.

b. Realistic Pest-Tolerance Levels

Realistic tolerance for the presence of pests is relative to the risk posed by exposure to that pest. A rat in a bedroom is not tolerable, and requires immediate action. However, the presence of a fruit fly or termite does not pose a threat to life, and may not call for action immediately. Individual tolerance for some pests will be different from person to person, which should be considered in the development pest-management plans.

2. ACTION THRESHOLDS

An action threshold is a tolerance level determined by sensitivities of the residents, and should reflect the pest-management objective for the development. When pest populations exceed action thresholds, action should be taken. Precise recommendations or actions to achieve specific results are an essential part of an IPM program. Specific recommendations, including an explanation of the benefits, should be based on the evaluation of all available data obtained through monitoring. The presence of some pests does not, in itself, necessarily require pesticidal action.

SECTION D INSPECTION AND MONITORING

1. GENERAL

The identification of pests and the extent of infestation are vital in IPM to insure that the control methods will be effective. Eliminating the pest's desired habitat is another important step in IPM. Once the pests have been identified and the sources of their activity are pinpointed, habitat modifications—primarily, exclusion, repair, and sanitation efforts—may reduce the prevalence of pests greatly.

An IPM program consists of a cycle of monitoring, evaluating, and choosing the appropriate method of control. Monitoring includes inspection of areas for evidence of pests, entry points, availability of food, water, and harborage, and estimating pest-population levels. The information gained through monitoring is evaluated to determine whether the action threshold has been exceeded and what can be done in the way of prevention.

Residents' reports and observation of the development will give the pest manager an idea of the size of the pest population. An astute observation will provide signs or actual sightings of the pests for identification. On the basis of such identification (to species, if possible), information can be obtained about the behavior and preferred habitat of the pest, and what methods will achieve control of the population.

All organisms have basic life needs for air, food, moisture, warmth, harborage, and environments that will meet these needs. Unfortunately, buildings are constructed and maintained in ways that provide pests with access and environments which encourage them to stay and multiply. Further, residents sometimes do not keep their kitchens and other spaces adequately clean, which can invite and support pest populations.

One of the primary goals of an effective pest-management program is to identify realistic and economically sound ways that eliminate those elements which pests need for survival. Deny

harborage, food, and water to pests that enter the units to eliminate and help catch those that otherwise survive. Neglecting any of these methods strengthens the pests' ability to survive and flourish.

a. Who Monitors for What Conditions

Resident Observations and Reporting: The resident is perhaps in the best position to observe pests that occur within the development. Observations of pests, or the damage they do, should be reported to the HA's staff to allow the pest manager to conduct an inspection and monitor the location and extent of the pest population, and determine the corrective actions to be taken.

Maintenance Observations and Reporting: While performing inspections or repairs, the HA's maintenance staff also have opportunities to observe the presence of pests or the results of their activities, which should be reported to allow the pest manager to conduct a thorough inspection and monitor the pest infestation.

The Pest Manager's Inspections and Observations: The HA's pest manager should schedule periodic inspections at each development to determine that sanitation standards are maintained and to detect any environmental conditions that may be conducive to the presence of pests. Inspection and monitoring in an IPM program is the most important function of the pest manager.

b. Conditions that Support Pests

Moisture: Water is a basic element of life. Elimination of leaks, condensation, and other moisture sources will reduce pest presence and pest damage.

Food: Although many pests can go without feeding for a long time (weeks or months in some cases), eliminating access to food will reduce their number. Thus, keeping food in pest-proof containers, good sanitation, and exclusion are important aspects of controlling pests.

Temperature: Most organisms have a relatively narrow range of temperatures within which they can function. Low and high temperatures can be lethal to insects, whereas temperatures between 65°F - 90°F enable insects to function well and reproduce rapidly. Observing temperature ranges can indicate potential pest growth rates.

Shelter: Small, concealed, and protected spaces, that insects and other pests can use, may provide shelter and harborage. Preventing access to these shelters by caulking or other exclusion methods will reduce available shelters. The HA's pest manager should notice conditions that

provide shelter to pests so action can be taken for their elimination.

Light: Many insects and other pests are active in the absence of light. Thus, the presence or absence of light can be a pest-management tool. Observation of light conditions and placement of light can give clues to pest presence or potential.

c. Monitoring Methods

The pest manager may use many monitoring tools to assess the level of pest infestation. Since some pests are elusive, monitoring tools may be in place for some time. These tools may capture the pest for counting (cockroach sticky traps) or merely note its presence (tracking powder). Some monitoring tools may attract pests from a long distance, so placement is very critical to avoid inviting more pests from outside the managed development. The monitoring methods provide data, over time, which are recorded and enable the pest manager to select the methods to achieve the desired level of control.

SECTION E PESTICIDE SAFETY AND EMERGENCY PROCEDURES

1. GENERAL

Pest controllers should understand pesticide toxicity as it relates to human exposure, know the appropriate safety equipment, procedures, and handling of pesticides, know the signs and symptoms of pesticide poisoning in humans, and be able to provide appropriate emergency procedures.

TOXICITY x EXPOSURE = RISK, so reduced risk involves both selecting pesticides with lower toxicity, and reducing exposure to pesticides. There are over 25,000 pesticides registered for use. In order to select the right product, we need to know how each affects not only the target pest but also the people exposed to it. The pesticide probably works on people the same way as on pests. To reduce the risk poison, we need to protect our skin, respiratory tract, eyes, and prevent the pesticide from getting into the mouth. Containerized baits or baits injected into cracks and crevices pose less risk than open baits, granular materials have less risk potential than dusts, and sprays are less risky than fogs or vapors, assuming that all have the same toxicity. Therefore, the formulation of a pesticide is important, as is the use of protective equipment, which should reduce the risk inherent in the toxicity of pesticides. Use protection that is appropriate to the material being used.

2. APPLYING AND STORING PESTICIDES

Of the wide variety of pesticides available, the pest manger should choose the least toxic, most effective, most efficiently applied, which provides the longest time in contact with the pest and is applied during the pest's most vulnerable stage. Due to their toxic nature, these materials should be used only by certified applicators, in a manner to ensure maximum efficiency, with minimal hazard. Pesticides should be applied only when a unit is unoccupied and properly ventilated.

The following general recommendations should help to minimize exposure to people and other non-target species when pesticides are applied:

- Choose the right pesticide formulation. (The label will indicate if the product is suited for the development and pest to be controlled.)
- Limit the use of sprays, foggers, or volatile formulations.
- Use baits or traps and crack-and-crevice application. (Look for crack-and-crevice label instructions.) The treatments should maximize the exposure of the target pest to the pesticide with the least pesticide exposure for residents.
- Apply only when residents are not present in areas where chemicals are applied.
- Insure appropriate ventilation during and after pesticide application and use proper protective clothing or equipment.
- Notify residents and staff of upcoming pesticide applications.
- Maintain a voluntary registry of residents who could be adversely affected by exposure to pesticides. Provide them with information on how to contact the HA's staff or contractor pest manager's office if emergencies result from pesticide exposures.
- Keep copies of pesticide labels and MSDS easily accessible.
- Store pesticides off the development, or in locked buildings not accessible to unauthorized persons. Ensure adequate ventilation of pesticide storage areas. Liquid pesticides should be stored differently from dry formulations. Herbicides should be stored separately to avoid potential damage to plants from the absorption of vapors onto other pesticides stored nearby, and for safety. Check state recommendations and requirements for pesticide storage.

If pesticides are stored in occupied buildings, take special care to ensure that air in the resident-occupied spaces is not contaminated. Place a notice outside the designated storage area. All pesticide containers should be tightly closed; however, even closed pesticide containers may volatilize toxic chemicals to the air. Therefore, pesticides should be stored in spaces physically separated and closed off from occupied spaces, where the air is exhausted directly to the outside). In addition, ensure that storage-space air cannot mix with the air in the central ventilation system. The pest manager is responsible for periodically checking stored pesticide containers for leaks or other hazards.

SECTION F PESTICIDE LAWS—FEDERAL AND STATE

1. CERTIFICATION

a. General

Pest management is complex. Control of pests cannot be attained simply by spraying baseboards. Applicators need to know about all phases of pest control in addition to the chemicals. The number of pesticides has increased and their effects on wildlife, human health, and the environment are vital considerations. Such knowledge should also be passed on to residents and other maintenance staff.

Requirements have been established to protect the general public, the environment, and those who apply pesticides. Anyone using restricted-use pesticides in any category must be certified or apply pesticides under the direct supervision of someone who is certified. **Direct supervision** means that the certified applicator is available to the person applying the pesticide and is aware of what is being done. Certified applicators should be aware of all current requirements. **Restricted-use** indicates that the environment, user, or others, could be harmed, even when the pesticide is used as directed. Certification is carried out by the states or tribes (except in Colorado and Nebraska, which have federal programs).

b. Certification Standards

Standards and testing for certification (and recertification) are part of EPA-approved state and tribal plans for commercial applicators. Recertification intervals vary from state to state. Training necessary to obtain certification is provided by different sources, such as university extension services, state regulatory agencies, national and state pest control associations, pesticide manufacturers, and other pest-control industry representatives.

c. Certification Records

Certified applicators should maintain records verifying attendance and participation in certification training programs. Subjects covered, time, location, instructor, and testing results should be noted. It is also good practice for applicators to keep a personal training record that records classroom training or testing, on-the-job training, workshops, performance testing, and use observations.

2. CERTIFICATION CLASSIFICATIONS

a. Private

A certified private applicator uses, or supervises the use of, restricted-use pesticides only to produce agricultural commodities on property owned or rented by them or by an employer. Since HAs do not produce agricultural commodities, certified private applicators are not qualified to treat developments to control pests.

b. Commercial

A certified commercial applicator uses or supervises the use of any pesticide classified for restricted use, for any purpose, on any property other than those listed for private applicators. HA staff or other applicators hired to control pests on public housing property must be certified or under the supervision of a certified applicator.

3. FEDERAL COMMERCIAL CATEGORIES

Federal standards identify specific commercial pest-control categories. State certification standards must not be less stringent than these standards. Commercial applicators in some states may apply for certification in any or all of the categories, but they may practice only in categories for which they are certified. HA staff or hired pest controllers need to be certified in the appropriate commercial category to apply pesticides on public property.

4. FEDERAL PESTICIDE LAWS

The United States Congress established the Environmental Protection Agency (EPA) in 1970 and required that the agency regulate pesticides to make pesticide use safer for both people and the environment. The EPA sets standards through regulation for pesticide registration, handling, and use. Some practices which were only suggested for correct use in the past are now required by regulation. These regulations affect areas such as record-keeping, transportation, storage and disposal procedures, entry intervals, and filling and mixing methods.

a. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Through its Office of Pesticide Programs (OPP), EPA implements the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to fulfill its mandate. FIFRA was enacted in 1947, replacing the Federal Insecticide Act of 1910, and has been amended several times.

The most important amendment to FIFRA is called the Federal Environmental Pesticide Control Act (FEPCA) of 1972, which shifted the emphasis from pest-control regulations to the role of protecting public health and the environment.

FIFRA is the law which governs the registration of pesticide products. No pesticide may be marketed in the United States without EPA approval and its product registration number. Manufacturers must demonstrate that their pesticides will not have unreasonably adverse effects on human health.

In summary, FIFRA requires that:

- EPA register all pesticides as well their use, and approve the product label;
- Pesticides be categorized either for general use or restricted use; and
- Users of restricted-use pesticides be certified or apply such products under the direct supervision of certified applicators.

FIFRA also:

- Establishes tolerances for residues that may remain on raw agricultural products or in processed food;
- Provides penalties for "use inconsistent with the labeling" of a pesticide;
- Makes it illegal to store or dispose of pesticides or containers other than as directed by regulations, and provides penalties for illegal handling of containers;
- Provides civil penalties when the violation of a regulation is unintentional (fines can be as much as $5,000 for each offense by commercial applicators);
- Provides criminal penalties when the law is knowingly violated (commercial applicators may be fined up to $25,000 or one year in prison, or both);
- Permits states and tribes to establish more stringent, but not more permissive, standards.

Under FIFRA, the EPA has delegated substantial enforcement powers to the states.

b. State, Tribal, and Local Laws and Regulations

State, tribal, and local pesticide laws are written in compliance with federal law, and in response to specific pesticide-related problems. Such laws can be more stringent but cannot relax, overrule, or conflict with Federal law. In some states, laws further restrict the use of certain pesticides.

5. PROTECTION: THE APPLICATOR'S RESPONSIBILITY

a. Environmental Considerations

Protection of the environment from pesticides ultimately will fall to the pest manager. It should be ensured that the pesticides will not result in hazards to people in the dwelling units or on the grounds. Spills or leaks during mixing, loading, transporting, and disposing may wind up in ground or surface water or in the habitat of nontarget organisms, and should be prevented.

b. Pesticide Label

The pesticide label is the law. The key parts of the label are the signal word signifying the risks, precautionary information for protecting the applicator, others, and the environment, information on the pest, and where the pesticide can be used. Directions concerning the use of pesticides should always be read and followed.

END OF CHAPTER ONE