State of Illinois
Illinois Department of Public Health

Illinois General Standards Manual for Structural Pest Control

2013

Illinois Department of PUBLIC HEALTH

ILLINOIS GENERAL STANDARDS MANUAL FOR STRUCTURAL PEST CONTROL

CONTENTS

This manual presents information that is subject to change. Like pest management techniques, laws and regulations can change over time, and so the text of this manual may become outdated. For this reason, and because the manual discusses only selected portions of the Structural Pest Control Act and Code, it is recommended that you review current versions of the act and code, which are available on the Structural Pest Control Program website of the Illinois Department of Public Health.

BECOMING A CERTIFIED TECHNICIAN


Illinois Department of PUBLIC HEALTH
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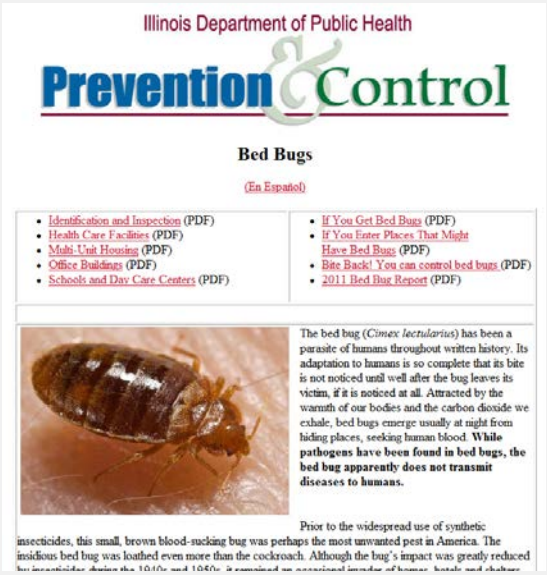
Those wishing to become certified structural pest control technicians, as well as those wanting to learn more about pest management, are invited to use this manual. The manual was designed to help prepare technicians for the General Standards Examination of the Illinois Structural Pest Control Program. Becoming a certified technician (CT) enables you to apply general-use pesticides without supervision. Certification also permits you to supervise uncertified technicians operating from your place of business. This basic certification also enables you to acquire full certification and apply restricted-use pesticides after passing one or more subcategory exams.

All applicants must have graduated from high school or have a GED. Those that wish to become *fully* certified are required to be minimally certified and have **one** of the following:

- At least six months of experience performing pest control of the kind for which certification is sought. For example: Doing termite control if the applicant seeks certification in Subcategory B.
- The equivalent of 16 semester hours of college-level coursework in entomology or a related field.
- Successful completion of a pest control course approved by the Illinois Department of Public Health, such as the "Advanced Level Urban and Industrial IPM" correspondence course offered by Purdue University.

This manual is the primary study material recommended for the General Standards Examination, a closed-book exam (you are not permitted to use this manual, notes or other reference materials during the exam). It also is recommended that applicants read the Department's pest-related **fact sheets**, as well as the **Illinois Structural Pest Control Act** (225 ILCS 235) and **Illinois Structural Pest Control Code** (77 IAC 830). All of the above, along with instructions on how to apply for the General Standards Exam, are found on the Department's Structural Pest Control Program website at **http://www.idph.state.il.us/envhealth/structuralpest.htm**.


Illinois Department of Public Health

Prevention & Control

Bed Bugs

(En Español)

- Identification and Inspection (PDF)
- Health Care Facilities (PDF)
- Multi-Unit Housing (PDF)
- Office Buildings (PDF)
- Schools and Day Care Centers (PDF)
- If You Get Bed Bugs (PDF)
- If You Enter Places That Might Have Bed Bugs (PDF)
- Bite Back! You can control bed bugs (PDF)
- 2011 Bed Bug Report (PDF)

The bed bug (*Cimex lectularius*) has been a parasite of humans throughout written history. Its adaptation to humans is so complete that its bite is not noticed until well after the bug leaves its victim, if it is noticed at all. Attracted by the warmth of our bodies and the carbon dioxide we exhale, bed bugs emerge usually at night from hiding places, seeking human blood. **While pathogens have been found in bed bugs, the bed bug apparently does not transmit diseases to humans.**

Prior to the widespread use of synthetic insecticides, this small, brown blood-sucking bug was perhaps the most unwanted pest in America. The insidious bed bug was loathed even more than the cockroach. Although the bug's impact was greatly reduced


Illinois Department of Public Health

Prevention & Control

Spiders

It can be said that no other "bug" generates as much fear as the spider. Fear of spiders ranks as one of our greatest phobias, along with fears of snakes, heights and public speaking.

Of course, most of the negative publicity spiders receive is undeserved. It's been suggested that because some spider bites may have resulted in negative consequences for our prehistoric ancestors, that fearing spiders is adaptive, as it helps us avoid debilitating consequences. Yet there are a couple of problems with this theory.

Jumping Spider

First, "arachnophobia" affects only a few of us – why not all of us? If spider bites can seriously harm or kill us, why don't we all have an innate fear of spiders? This leads to another problem with attempts to justify the fear of spiders: On the whole, spiders just aren't that dangerous. While virtually all spiders use their fangs to inject venom, the fangs of many of the more than 3,500 spider species in the United States are incapable of penetrating human skin. Fewer still are the number of species capable of producing bites with complications more severe than the average mosquito bite or bee sting. And spiders are rarely aggressive toward humans; they bite only in self defense.

These and other fact sheets can be found at: http://www.idph.state.il.us/envhealth/entpestfshts.htm .

This manual was prepared with the assistance of the Illinois Structural Pest Control Advisory Council. The advisory council provides guidance on concerns related to the Structural Pest Control Act and Code (known as the "act" and "code"). The council is made of 10 representatives of the pest management industry, food industry, health departments, colleges or universities, other agencies and the general public. Members meet at least twice annually to consider a variety of topics and provide recommendations to the Department's Structural Pest Control Program.

Illinois Department of PUBLIC HEALTH

The Illinois Department of Public Health is responsible for regulating structural pest control companies and technicians in Illinois. Questions on structural pest control licensing, registration and certification should be directed to the Department's website (above) or 217-782-5830.

Certification in structural pest control does not permit an individual to destroy or interfere with wildlife. The trapping, removing or killing of animals including bats, squirrels,

rabbits, raccoons, opossums, woodchucks, geese, woodpeckers and many other species is regulated by the Illinois Wildlife Code (520 ILCS 5) and usually requires an individual to obtain a Nuisance Animal Removal Permit, or the services of a Nuisance Wildlife Control Operator. To contact a District Wildlife Biologist of the Illinois Department of Natural Resources, and view other information on this topic, see *Living With Wildlife In Illinois* (http://web.extension.illinois.edu/wildlife/), a website of the Illinois Department of Natural Resources and University of Illinois Extension.

The Illinois Department of Agriculture (IDA) licenses and certifies pesticide applicators and dealers with regard to pest management in outdoor environments and the production of agricultural commodities. This includes pesticide application for mosquito control as well as applications to fields, right-of-way areas, turf, ornamental plants, and other outdoor areas. Questions should be directed to the IDA at 800-641-3934.

THE PEST MANAGEMENT PROFESSIONAL

Pest management technicians are professionals whose specialized training enables them to solve a variety of pest problems. Many customers are unaware of what it takes to be a pest management professional. It is up to you to demonstrate your training, knowledge, expertise and professionalism.

How do you demonstrate these qualities? By solving problems your customers cannot solve. By using *knowledge* that comes from study materials, like this manual; from on-the-job training with other professionals, from attending pest management courses and seminars, and from experience.

1 - PESTS

Consider the multicolored Asian lady beetle. This "lady bug" becomes a pest when it enters homes seeking shelter as temperatures cool in autumn. Yet during the summer, lady beetles and their young can be beneficial in the garden, colorful, and amusing to children – certainly not *pests*. So some organisms are considered pests only at certain times, such as when they're in a place we don't want them in. In fact, only a small percentage of organisms are pests. Still there are plenty of pests that are not only "out of place," but also destructive.

You will be asked to manage a variety of pests. Some will be familiar, others may not be. Here are some examples:

- INSECTS (termites, roaches, ants, flies, bed bugs, bees, wasps, fleas, and others)
- ARACHNIDS (spiders, mites, ticks, scorpions)
- MYRIAPODS (millipedes, centipedes)
- CRUSTACEANS (sowbugs, pillbugs)
- RODENTS (rats, mice)
- BIRDS (house sparrows, pigeons, starlings)
- FUNGI (wood-destroying fungi)

ARTHROPODS

The first four types listed above are **arthropods**. Arthropods are invertebrates (animals without vertebrae, or backbones). Besides being "spineless," arthropods have other characteristics, including a hard shell-like exoskeleton. An exoskeleton is a skeleton on the outside of the body. Whereas an *endo*skeleton grows from within the body, an arthropod's *exo*skeleton is external and rigid. When arthropods such as insects grow, they must shed their exoskeletons and replace them with new exoskeletons that are larger than the ones they shed. This happens through the process known as molting.

Other characteristics of arthropods include bodies composed of segments, and appendages (e.g., legs, antennae) that are jointed. In fact, the word "arthropod" means "jointed leg."

Most of the arthropod pests you encounter will be insects. About 80 percent of all animal species are arthropods, and insects are the most numerous animals on earth. There are more different kinds (species) of insects than any other type of animal on Earth. We know this from the study of insects (entomology) and those who study insects (entomologists). Some say there are about 1 million kinds of insects known, and many more species still undiscovered.

Insects have unique characteristics that distinguish them from other arthropods. Adult insects and most immature insects have six legs. Insects also have three body parts: the head, thorax and abdomen. Most adult insects have one or two pairs of wings.

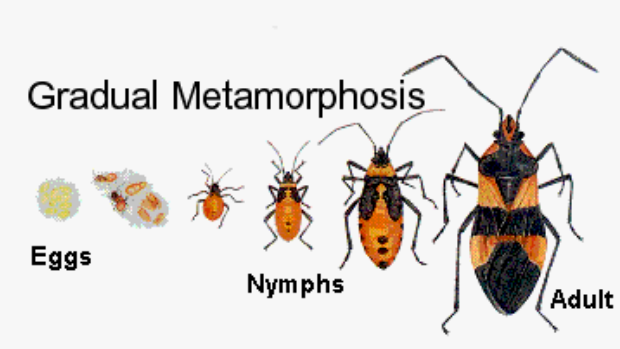
The table below shows the various groups to which most structural pests belong. It should be noted that all beetle species, for example, are not pests. Less than 1 percent of insect species are considered pests. Even so, no person can know and recognize every pest they encounter. However, as a PMP you should be able to determine which of the following groups a pest belongs to. Knowing this will help you identify the pest – your first stop on the road to successful pest management.

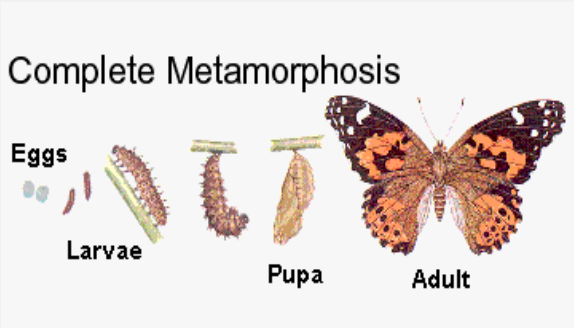
IMPORTANT ARTHROPOD GROUPS INCLUDING STRUCTURAL PESTS

PEST TYPE	TYPICAL CHARACTERISTICS (there are exceptions)
HEXAPODS	Insects: Three body regions, six legs or legless, two or four wings or wingless
Ants, bees, wasps	Four membranous wings, some females have stingers, some species are colonial[1]
Moths	Scaly wings and bodies, long tubular mouthparts
Flies	Two wings, piercing or sucking mouthparts
Fleas	Flattened sideways, hind legs for jumping, bloodsucking parasites
Beetles	Hard shell-like forewings, mouthparts for chewing
True bugs[2]	Forewings (when present) leathery and membranous, beak-like mouthparts
Psocids	Tiny (up to 6mm long), long antennae
Earwigs	Forceps-like cerci[3], flattened bodies
Termites	Wingless except "swarmers"[4] have 4 equal-sized membranous wings, colonial[1]
Cockroaches	Bodies flattened and oval-shaped, long antennae, cerci[3], egg capsules (oothecae)
Crickets	Jumping hind legs, long antennae, female with long egg-laying tube (ovipositor)
Silverfish, firebrats	Scaly, flattened bodies with "tail" consisting of 3 long bristles
Springtails	Lever-like "spring" beneath abdomen for jumping, tiny (up to 6mm long)
ARACHNIDS	Spiders, Mites and Ticks: six or eight legs, two body regions
Spiders	Eight legs, usually 6 or 8 eyes, fangs, spinnerets for producing webs
Mites, ticks	Six-legged larval stage precedes 8-legged nymph and adult stages
OTHER ARTHROPODS	
Sowbugs, pillbugs	14 legs, tail appendages like cerci[3], some roll into a ball when disturbed
Millipedes	30 or more legs with usually 4 per body segment, long and cylindrical body
Centipedes	15 or more legs with 2 per body segment, long and flattened body

1-social species with different forms (e.g., workers, soldiers, reproductives) that live together and cooperate, 2-the group includes bed bugs, box elder bugs, stink bugs, assassin bugs, 3-antennae-like sensory appendages on the end of the abdomen, 4-swarmers are also known as primary reproductives, males and females the colony produces seasonally to mate and found new colonies.

Insects develop through a process known as **metamorphosis**. It enables insects to progress from an egg to the adult stage. Insects such as cockroaches and termites undergo **gradual metamorphosis**. They hatch from eggs as nymphs, and gradually become adults, growing and molting through several nymph stages known as instars. Once they become adults, insects no longer grow or molt.





Another type of metamorphosis, the kind seen in moths, flies, bees, fleas and beetles, is known as **complete metamorphosis**. An insect developing this way hatches from an egg as a larva. The larva grows and becomes a pupa. In time, the pupa transforms into an adult. This type of metamorphosis is illustrated by the life cycle of a butterfly or moth. Moths hatch from eggs as tiny larvae known as caterpillars. This larval stage feeds, grows and molts until it becomes a pupa. In the pupal stage the caterpillar encloses itself in a cocoon. Inside, the insect transforms to emerge as the adult we recognize as a moth.

Why is metamorphosis important to PMPs? First, even if knowledge of insect metamorphosis had nothing to do with controlling pests, simply knowing about such things enables you to answer questions you will inevitably get from customers – questions they expect you to know.

Insect metamorphosis is also important because knowing about it can help you control pests. Knowing the different stages of an insect helps you recognize it in all its forms. Imagine this scenario: Your customer complains of moths in the house and asks you to get rid of them. How will you do it? Will you spray the walls where the customer said they saw a moth resting?

Often moths that infest homes are those whose larvae feed on stored foods, such as nuts, beans, dry pet food and bird seed. To solve the customer's problem, you will inspect for moths, especially their larval stage (caterpillars) around stored foods. If you discover them, you can advise the customer to discard the infested food, or simply put it in the refrigerator or seal it in a tight-fitting container. Problem solved – and without pesticides. It may not always be this simple, but knowledge certainly can help solve pest problems.

Insects and other pests, like the moths in the example above, destroy property. And while it has been said that half of our crops would be lost without the pollination provided by bees and other beneficial insects, other insects might consume half of our crops, if not for pest management. Similarly, termites might destroy our structures by consuming wood, were it not for the protective measures employed by PMPs. But despite our efforts, insects and other arthropods continue to have both positive and negative impacts on humans. Some are even deadly.

In Illinois, people suffer from several diseases carried by arthropods. These include Lyme disease, spotted fever, ehrlichiosis and anaplasmosis – all from ticks – and West Nile disease and LaCrosse encephalitis from mosquitoes.

Vertebrate pests also can carry disease, and harm people in other ways too. The vertebrate pests most commonly associated with structures are rodents and birds.

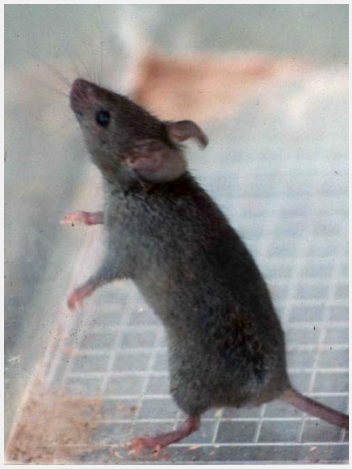
RODENTS

Not only does their presence make people uncomfortable, but living with rats and mice can be hazardous to your health. These are mammals of the rodent family that have adapted to living with humans. When conditions are favorable, rats and mice will live and reproduce inside human dwellings. Like cockroaches, they can consume and contaminate food and are capable of spreading bacteria that cause food poisoning. Rodents also can transmit the disease organisms (pathogens) that cause plague, typhus, leptospirosis, lymphocytic choriomeningitis and Hantavirus pulmonary syndrome.

The word **rodent** refers to gnawing. Rodents are constantly gnawing on things to sharpen their teeth. In doing so, they may damage property, such as furnishings, insulation and electrical wiring. It has been estimated that up to half of all fires attributed to "unknown causes" are actually caused by rats and mice. In addition, rat burrowing has caused buildings to collapse. Rodents also have been responsible for destroying valuable computer data, shutting down the Internet, causing power failures and human deaths.

In Illinois, the rat and mouse species that pest management professionals are most familiar with are the **house mouse** and **Norway rat**. They have the following characteristics in common:

- Gray, brown or black fur
- Poor, colorblind vision
- Very keen senses (except for vision)
- Omnivorous diet (consume both plant and animal matter)
- Most active at dusk and dawn
- Excellent dexterity (good at climbing and swimming)
- Typically live less than one year
- Easily transported by humans



HOUSE MOUSE

Mice are the most numerous mammals on earth, and the most important rodent pests. The house mouse (*Mus musculus*) weighs no more than one ounce and is usually less than 4 inches long, not including the tail. It has a relatively pointed snout, small eyes, small feet, large ears and a long tail.

House mice prefer to feed on grains, cereals and seeds. They are nibblers that often feed on and store different foods in different locations. They consume only about one-tenth of an ounce of food daily, but may leave up to 100 droppings per day. House mice obtain water from their food and do not need to drink.

Their nests are often located within 15 feet of their food source. Indoors, mouse nests are situated in walls, ceilings, appliances, furniture and similar out-of-the-way places. Under *optimal* conditions, a single female mouse can produce more than 50 baby mice in one year, giving birth to up to eight litters of four to seven young each. Male mice are territorial and aggressively protect their territories and females against rival males. When trapped with other mice, they may kill and even eat each other.

The **deer mouse** (*Peromyscus maniculatus*) is similar to the house mouse in size, but has proportionately larger ears and eyes. Deer mice also are distinctly two-toned, their bodies and tails being more brownish above and white below. Deer mice inhabit forests and fields. They are more likely to occur in farmhouses and rural outbuildings, and are not so common in urban dwellings. As deer mice (but not house mice) can transmit the Hantavirus to humans, precautions should be taken when working in structures inhabited by deer mice.

NORWAY RAT

The Norway rat originated in Europe and Russia. Humans unwittingly transported it to just about every corner of the world.

Compared to mice, Norway rats have relatively blunt snouts, small eyes and ears, large feet and short tails. They average 16 inches from nose to the tip of the tail. Their stout bodies weigh about three-quarters of a pound, rarely more than a pound. The average rat consumes about an ounce of food daily in one or two locations and leaves up to 50 droppings per day. Preferred foods include grain, nuts, meats and fish, though they also will kill and eat insects, birds and small mammals. Unlike mice, rats must drink water daily.

Rat nests are often located along rivers, streams and sewers, from which the rats typically range up to 150 feet in search of food and water. They usually nest in burrows, but can nest in voids in buildings and sewer systems. Burrows are 2 inches to 3 inches wide, extending just a few feet. In addition to the main entrance hole, there are usually one or two well-camouflaged “bolt holes” for making emergency escapes.

Rat reproduction is similar to that of the house mouse. An average female under *optimal* conditions can produce more than 50 offspring in a year, four to seven litters of eight to 12 young each.

Rat behavior tends to be more social than mouse behavior. Rats are highly adaptable to changing conditions, capable of seizing opportunities to establish themselves and to reproduce. Unlike mice that are curious about new objects placed in their domain, rats tend to be suspicious and more cautious.

BIRDS

The Migratory Bird Treaty and Endangered Species Acts prohibit the trapping, possession or killing of most birds, as well as their eggs and nests, without a permit (contact the Illinois Department of Natural Resources at 217-782-6384 for information). Only **house sparrows** (*Passer domesticus*), **European starlings** (*Sternus vulgaris*) and **pigeons** (*Columba livia*) are not protected by state or federal law. However, local ordinances may protect these birds. Be sure to check with local authorities before attempting control.

Both protected and unprotected species can be annoying and endanger humans. Nests in structures can be a fire hazard and a source of mite and insect parasites that can affect people. And, while the direct transmission of disease from birds to humans is uncommon, life-threatening diseases can be contracted from bird droppings.

HOUSE SPARROW

The house or English sparrow is the most common bird in cities. These are the familiar 6-inch long, brown and buff colored birds. Nests are a bulky arrangement of twigs on any available horizontal surface. Sparrows feed on grain, seeds, buds, fruit, insects and trash. The male is easily identified by its black “bib” and white cheeks.

PIGEON

Pigeons feed on garbage, insects, seeds and grain. While referred to as “rats with wings,” some people have a different opinion and feed pigeons as they would pets. Feeding can increase the number of pigeons and pigeon problems in an area.

Pigeons are fond of nesting on ledges and rooftops of multi-story buildings. They construct crude nests -- simple piles of sticks, often cluttered with feathers, droppings and debris. The species was bred from the European rock dove and has been domesticated for hundreds of years. Hence pigeons are well adapted to urban life.

EUROPEAN STARLING

The starling's aggressive nature and nesting habits have probably displaced more native songbirds than has the house sparrow or pigeon. All are species introduced from Europe. Starlings are so aggressive they sometimes die when fighting each other for nest sites. Preferred nesting sites include holes or cavities in trees and structures. About one in every three starling nests is "parasitized" by females that lay eggs in other female starlings' nests.

Starlings measure 8 inches to 9 inches from tip of beak to tip of tail. Their plumage is black with some iridescence, but can also be brownish or spotted. Males have yellow bills, females black bills. They feed on seeds and fruits, but also are fond of insects and trash. In large numbers they can consume and contaminate feed and food at livestock feedlots and food-processing facilities.

In fall and winter, starlings congregate in large flocks. While visual and auditory "scare tactics" are less likely to affect house sparrows and pigeons, this method can be effective when used to disperse starlings from their roosting areas.

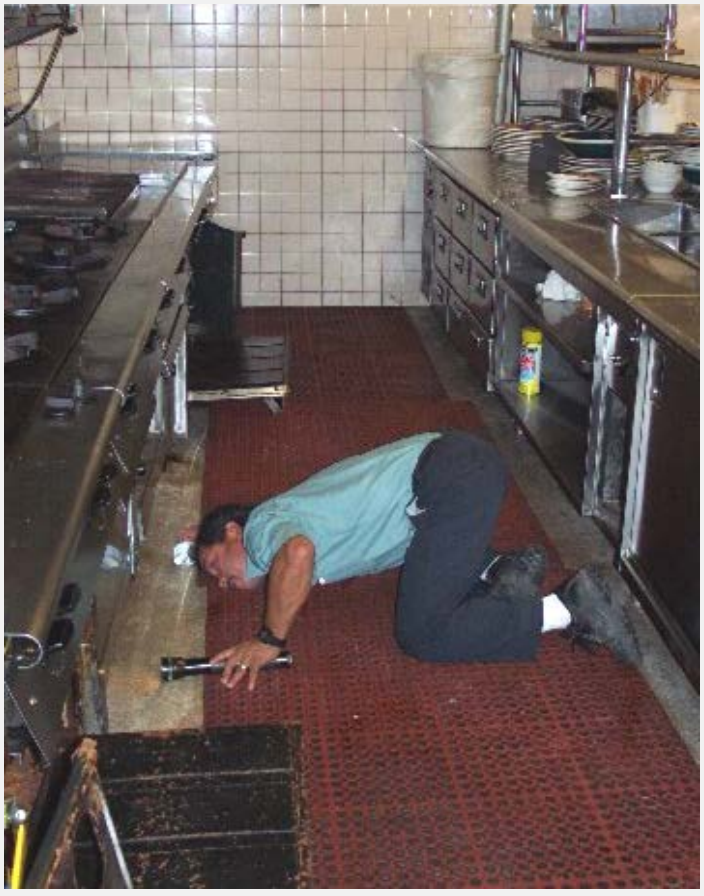
2 – IPM

So far you have learned the *why* of pest management. You know why the PMP's job is important. Now let's consider the *how* of pest management. How do PMPs use knowledge to solve the pest problems they encounter? For this, they need a plan.

The plan is **Integrated Pest Management** (IPM). It's a term well-known to the pest management professional, but to relatively few outside the industry. The Structural Pest Control Act (in Section 235/3.25) offers an official, and lengthy, definition of IPM. A basic definition is that IPM means *using the best methods to manage pests*. In each situation, determining the best methods to control a particular pest involves consideration of the methods available, their effectiveness and cost, as well as human safety and possible effects on the environment.

Take this example: A restaurant manager says "gnats" are bothering his customers. What will you do?

After getting information from the customer about the problem, the first step in your plan is to *inspect*. You want to find the pest and accurately *identify* it. If you do not find it, or evidence of it, you cannot be sure there is a pest problem. And if you cannot identify the pest, how will you determine the best methods of controlling it? Many pest problems cannot be solved unless the pest is identified along with the best means of controlling it.



In this example, you must determine what kind of pest is causing the problem. Are they really gnats? Or could they be fruit flies, drain flies, phorid flies, all the above or something else? You cannot rely on the restaurant manager to accurately identify pests for you. After all, *you* are the pest management professional, and you are being paid to manage the problem.

Eliminating a fly's food source is usually the best means of controlling it. Each of the flies above is attracted to somewhat different food sources. If you can identify the source, you have a better chance of eliminating it and the problem.

You conduct your inspection and identify the pest as *fruit flies*. The next step in your IPM plan is to determine if further action is needed. That is, has the problem reached its "action threshold?" An **action threshold** is the point at which further action should be taken to manage the pest. The thresholds are different for each type of pest, and should be predetermined as part of a facility's IPM plan. For example, day care

employees may be able to tolerate the occasional citing of an ant in a hallway without acting, but when one reports a dozen ants where children are napping, that may exceed the threshold listed in the facility's IPM plan and prompt the facility and the pest management technician to determine and to implement the best means of managing the ants.

In structural pest control, action thresholds are often exceeded with the sighting of a single pest. For example, a single German cockroach in a cafeteria will be sufficient cause to take action and implement cockroach control measures. In the example, the number of fruit flies flying around the restaurant exceeds the action threshold – because management does not want flies buzzing around customers or contaminating food – so the flies must be controlled.

From your training you know fruit flies are attracted to sweet or fermenting materials. You inspect further, looking for sources, such as rotting fruits and vegetables, spilled vinegar, liquor and soft drink residues. Then you find it – a trashcan containing empty juice and soft drink cans to be recycled. It has not been cleaned or emptied for some time. Fruit flies are swarming around it, attempting to lay their eggs on the sticky sweet residue at the bottom. You inform the manager of your findings, advising him to clean the trashcan and empty it more often – a safe, inexpensive, but effective way of managing the pest.

How did you do it? Using the principles of IPM, you inspected, identified, determined action was necessary, and employed the best method of control after considering the type of pest, the methods at your disposal, the safety of people (including yourself) and the environment, as well as the cost of available control methods.

You could have sprayed the adult fruit flies and killed them. The problem would "disappear" and your customer might be satisfied. But spraying the flies is not IPM because that is <u>not</u> the best method of control in this case. The adult flies might die, but their eggs would hatch and larvae (maggots) would still be feeding on the residue in the trash can. In a few days those larvae would develop into adults and the "gnats" would be back, prompting a "callback."

You may have noticed the problem above was solved without using pesticides. No spraying was necessary. Knowledge, and a little sanitation, solved the problem.

The next step in your IPM plan should be to *monitor* the infestation and to record and to evaluate your progress. In this case you might ensure the restaurant maintains a Sighting Log. This can simply be a sheet of paper upon which the employees record pest sightings, noting the type and location of the pests they observe, along with the date and time. A Sighting Log provides information a PMP can act on during services. Another means of monitoring is by using traps. Traps can show your progress in managing the problem, based on the number of pests caught over time. They also can provide valuable clues to the size, character and location of an infestation.

Steps in an Integrated Pest Management plan:

1) Identify the pest, often through inspection
2) Determine if further action should be taken, and if so…
    a. Determine and use the best means of control
    b. Monitor the infestation
    c. Record and evaluate the results
    d. Consider ways to prevent the pest's recurrence

Monitoring is critical in determining if your IPM plan is working. Is the pest being controlled, or are its numbers increasing? If the plan isn't working, you should re-evaluate. You may need to reconsider your choice of control methods and integrate different or additional means of control. Finally, you should consider what allowed the infestation to occur, and implement ways to prevent it from recurring.

IPM does not require the use of pesticides, nor does it require that you stop using pesticides. A common misconception is that IPM's goal is to use less pesticide, or to use "least toxic" pesticides, or none at all. IPM's goal is to manage pests by using the best methods in every situation. Sometimes one of those methods is the application of pesticide. In some situations, pesticides may be the *only* means by which the pest can be managed. Using less or no pesticide is certainly a desirable side effect of doing IPM, but pesticides remain a valuable tool in the IPM arsenal.

What types of control methods are there? The four basic types are:

- Biological
- Mechanical
- Environmental (Cultural)
- Chemical

Every control method used by pest management professionals falls into one of these groups. **Biological control** is probably the least commonly used in managing structural pests. It uses living organisms to achieve control. Those organisms include predators, parasites and pathogens. Predators are organisms that prey upon others, eating them. Parasites live off the blood or bodies of host organisms. Pathogens are disease-producing organisms, such as bacteria, viruses and fungi.

The multicolored Asian lady beetle is a predator that has been used for biological control. It was imported into the United States because it naturally feeds on insects that consume crops. Unfortunately the beetle adapted to its new home so well it too became a pest, e.g., by its tendency to seek shelter in homes.

Parasitic wasps have been used for control of cockroaches – an example of biological control using parasites. Similarly, certain fungi have been used to control termites and roaches – an example of biological control using pathogens. Bacterial and enzyme products applied to reduce sludge build-up in drains also can be considered biological control, because eliminating sludge controls pests, such as drain fly larvae that live in and feed on it.

Mechanical control deploys a physical mechanism to control pests. It includes removing and trapping them. Removal refers to the act of physically eliminating the pest. The device might be a vacuum cleaner, fly swatter, firearm or even your foot when you step on a cockroach. Traps used in pest management come in many forms, including snap traps, multiple-catch traps, sticky traps, glue traps and light traps. Pest management professionals often select trapping as one of the best methods for controlling rodents, especially mice.

Environmental control, also known as cultural control, involves modifying the pest's environment. Environmental control can be subdivided into groups that include sanitation, exclusion and other methods that use heat, cold, electricity or other environmental factors to manage pests.

Sanitation is cleaning. It is an important and frequently used method of managing pests. There are many examples, such as cleaning a restaurant kitchen to prevent food from accumulating and feeding cockroaches. Another is properly directing downspouts outside a structure to avoid excessive moisture next to the foundation – a condition that favors ant and termite infestation. Yet another example would be mowing weeds around a structure to discourage rodents from living there.

Establishing barriers to prevent pests from entering structures is an environmental control method known as **exclusion**. It includes applying netting, spikes and wires to exclude birds, as well as sealing with metal mesh, caulk, expandable foam, and other sealants around pipes and wires where pests enter structures. Other barriers prevent rodent entry, such as screening and weather stripping doors and windows, and attaching metal kick plates to the bottoms of doors. For fly control, fans or air curtain devices discourage entry through doorways. Like sanitation, exclusion is a common and very powerful type of environmental control.

A final control method, perhaps the most familiar, is **chemical control**. This method uses chemical substances, typically pesticides, to kill pests. It also utilizes non-lethal substances such as repellents and pheromones. Pheromones are chemical signals that insects produce for aggregating, mating and feeding purposes. Ants secrete pheromones to mark their trails, for example, allowing other ants to follow them to a food source.

IPM dictates that for every pest problem, the use of one or more control methods will provide the best control. Several methods are often used together, or *integrated* to achieve IPM's goal. For each pest situation, the pest management professional selects and integrates the best means of control.

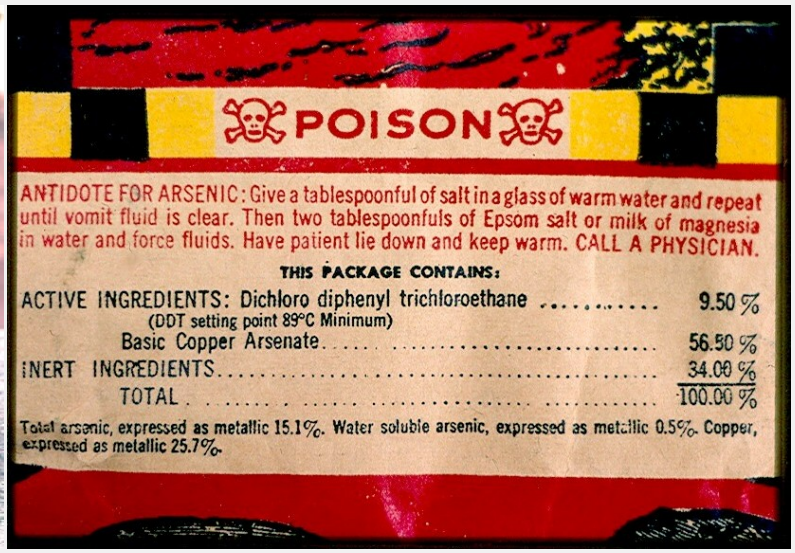
3 - PESTICIDES

Pesticides are substances intended to prevent, destroy, repel or mitigate a pest. They are classified in several ways. One way is by what the pesticide is designed to control. The ending, *-cide*, means *to kill*; thus a pest*icide* is meant to kill pests. As a PMP you may use a variety of pesticides including **insecticides** (for control of insects, but also insect relatives such as spiders), **termiticides** (for termites), **rodenticides** (for rats and mice), **avicides** (for birds), **acaricides** (for mites and ticks) and **fungicides** (for fungi).

Another way of classifying pesticides is by chemical structure and mode of action (how the pesticide actually affects the pest). The characteristics of pesticides vary considerably between each group or class. The first substance known to be employed as a pesticide was sulfur dust used in 2000 B.C. Soon substances derived from poisonous plants were being used. Arsenic was used to kill pests in China around 900 A.D. In the 1400s other heavy metals including mercury, copper and lead were frequently used against crop pests. Pesticides of this type are known as **inorganic** pesticides, because they are derived from non-biological materials. Boric acid is an inorganic pesticide used more recently.

Nicotine (as nicotine sulfate) is derived from the tobacco plant. It came into use as an insecticide in the late 1600s. In the late 1700s, soap (made from plant or animal oils) was used for its insecticidal properties. Other pesticides of botanical (plant) origin, such as pyrethrum from chrysanthemums, surfaced in the 1800s. Pesticides of this type, derived from plants, are classed as **botanical** pesticides.

While highly toxic metal compounds such as Paris Green (copper acetoarsenite) continued to be used as pesticides, warfarin, an early **anticoagulant** rodenticide was introduced, and dichlorodiphenyl-trichloroethane (DDT) came into use by the United States military in World War II. Perhaps the most recognized pesticide, DDT saved many servicemen from deadly parasitic diseases, including malaria. It was widely used in the 1950s and 1960s in both agricultural and structural pest control. It was highly effective, but found to accumulate in non-target organisms, posing a serious threat to wildlife. DDT use in the United States was cancelled in 1972 by the newly formed U. S. Environmental Protection Agency (USEPA). But at the time of this writing, DDT is still used in other parts of the world.



DDT was replaced by other **chlorinated hydrocarbon** pesticides (e.g., chlordane and aldrin), as well as the organophosphate and carbamate pesticides that dominated the structural pest control market from the 1970s until they too were largely replaced by **pyrethroids**, synthetic compounds based on the pyrethrin compounds from chrysanthemums. These included the active ingredients resmethrin, deltamethrin, cyfluthrin, cypermethrin and several others. As a group, pyrethroids offered control with residual activity, as well as lower toxicity compared to **organophosphates**, such as chlropyrifos, diazinon and malathion, and **carbamates**, such as propoxur, carbaryl and bendiocarb.

In addition to classifying them by their target pest, chemical structure and mode of action, pesticides can be grouped by formulation. A pesticide's **formulation** is its particular mix of ingredients. An **active ingredient** (AI) is the substance that affects the pest. We say it is "active" against the pest. An **inert ingredient** is not active against the pest, but enhances the pesticide in some way. Ingredients found in formulations include solvents in which the AI is dissolved, carriers to which the AI adheres, synergists that combine with the AI to strengthen its effect on the pest, and others collectively known as adjuvants that enhance the pesticide's performance in various ways.

Pesticides come in different formulations to suit a variety of pests and situations. As mentioned above, there are one or more control methods that are best for each situation. If pesticides are one of those methods, more choices will have to be made. What type of pesticide is best to use? What active ingredient? What formulation?

DRY FORMULATIONS

Pesticide formulations can be wet or dry, liquid or solid. Dry formulations are sold as fine powders to coarse granules, or as pellets or blocks. **Granular** (G) formulations are produced by adsorbing an active ingredient onto coarse particles, such as sand, clay or ground corn cobs. Granules are typically sold in 20 pound to 50 pound bags and are dispersed by hand (using gloves) or by mechanical spreaders, such as those used in lawn care. Granules are intended for outdoor use and applied to lawns and around foundations. Note that structural pest control licensing and certification does not allow pesticide application to lawns for control of turf pests (contact the Illinois Department of Agriculture for licensing requirements).

Like other dry formulations, the safety hazard posed by granular pesticides is often low, but granules can be hazardous to non-target animals. Birds, for example, may mistakenly consume them. Granular formulations are not easily displaced by wind, though smaller fragments in their packaging may become airborne when the product is handled. They do not readily soak into skin as some liquids do, and do not require mixing, though water is added to some, enabling the AI to soak into the substrate. When properly applied, granular products can penetrate layers of leaves and mulch where pests live, perhaps better than other formulations.

Dust (D) formulations consist of active ingredients diluted with finely ground materials, such as talc, clay or chalk. They are ready-to-use powders applied by simple bellows-type hand dusters, bulb dusters, pump dusters or by specialized power dusters. When properly applied, dusts cover surfaces with a thin coat of fine powder. Dusts are especially useful for treating voids, such as those inside interior walls. In treating a hollow wall, it is easier to obtain uniform coverage using a dust rather than a liquid formulation that might simply drip down the back side of the wall. Dusts also are advantageous in that they do not conduct electricity as liquids do, and many are extremely long lasting, except when exposed to wind or moisture. In fact, dusts containing boric acid, silica gel or diatomaceous earth can remain active against pests indefinitely. Some dusts are desiccants. For example, those containing silica or diatomaceous earth are abrasive, causing microscopic cuts in an insect's exoskeleton, and death from dehydration.

One disadvantage is that dusts, being finely ground powders, are subject to drift. For this reason, dusts should never be applied to areas where vents, fans or winds can blow them. Similarly, they should not be

applied overhead, above false ceilings for example, where they might be dislodged and fall onto people, pets, food or other sensitive items. Eye protection should be worn and, to avoid inhalation, a dust mask or respirator should be worn, especially when filling dusters.

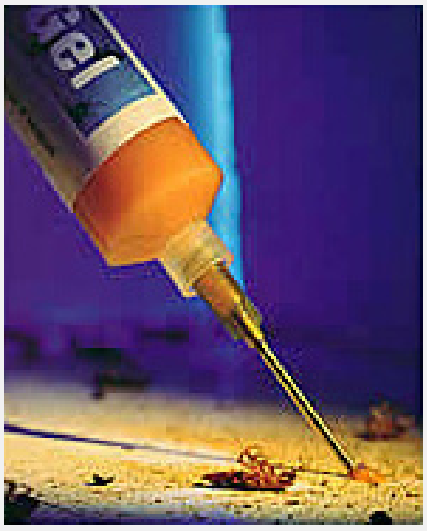
Similar to dusts are **wettable powder** (W or WP) formulations. The labels of some allow them to be applied dry, as a dust. But like emulsifiables and some microencapsulates, wettable powders are usually mixed with water to form a suspension that is applied by spraying. Like a dust, this dry formulation presents an inhalation and eye contact hazard during mixing, but generally poses less dermal hazard than solution or emulsifiable pesticides. Wettable powder dilutions also are less likely to soak into porous materials, such as concrete, brick and block, and they are less harmful to plants, making this formulation a good choice for treatments around the foundations of structures.

A wettable powder formulation consist of an active ingredient adsorbed to a finely ground carrier, clay for example, and often with a wetting or dispersing adjuvant added. They require frequent agitation to keep them evenly distributed in the spray tank, and may clog equipment more readily than some formulations. They also may leave a visible residue on treated surfaces.

Soluble powders (S or SP) are dry formulations that form solutions when mixed with water. Their properties are the same as those of a solution, except that as powders they pose a greater inhalation and eye contact hazard during mixing and loading.

Dry flowables (DF) are essentially wettable powders where the powder is aggregated into granules to which water is added to form a liquid. This formulation is sometimes known as water dispersible granules (WDG) or wettable granules (WG). These pesticides have the same characteristics as wettable powders, except dry flowables are somewhat easier and less hazardous to mix and load.

Baits can be wet *or* dry formulations. Their use has increased in recent years. Baits for cockroaches, termites, ants and rodents have had a huge impact on the management of pests and the pest control industry.



Baits are most often manufactured in dry form, ready-to-use (requiring no mixing). While some rodent bait has been produced in liquid form, most rodenticides occur as solid blocks or pellets. Ant baits come in many forms: liquid, gel, granular and solid. Ant and termite baits are often composed of a slow-acting active ingredient added to a food attractant. The slow-acting AI enables the distribution of bait in ant and termite colonies, and also reduces bait shyness – the avoidance of bait by pests, such as rats, after associating the bait with the unpleasant effects of bait consumption.

Baits have been considered a more environmentally friendly formulation fitting the concept of using less hazardous pesticides. Most baits are not easily inhaled or absorbed by skin. They may be subject to contamination if stored near other pesticides, and by absorbing smoke or odors. Some expertise is required to use baits effectively. Knowledge of pest behavior is critical in selecting the right bait and dispensing it in a manner acceptable to the target pest. Care must be taken to prevent non-target animals from consuming bait.

WET FORMULATIONS

One example of a liquid or wet formulation is a **solution** (S), produced when an active ingredient is dissolved in a solvent. Often the solvent is water. Solutions can be ready-to-use products or come in concentrated form requiring further dilution. After mixing, they do not require agitation.

Another wet formulation is the **emulsifiable concentrate** (E or EC). It consists of an active ingredient dissolved in oil, forming a concentrate. Since oil and water do not mix, the formulation includes a chemical known as an emulsifier that allows the applicator to mix water with the concentrate to obtain the proper dilution rate (the "use-dilution").

Emulsifiables can harm rubber, plastic, vinyl and foliage. They can clog equipment, and usually require some agitation. They are also readily absorbed by skin, as well as porous surfaces such as concrete block, brick, unfinished wood, mulch and soil – a disadvantage when doing exterior perimeter treatments of structures.

A **liquid flowable** (L or F) or **suspended concentrate** (SC) is basically a wettable powder premixed with water at the factory, requiring additional mixing with water before application. They form suspensions, not solutions, though their small particle size may not require agitation to remain in suspension. One advantage is that during mixing and loading they are less likely to be inhaled compared to dry formulations, such as wettable powders.

Another useful formulation is the **microencapsulate** (M or ME). As the name implies, microencapsulates are composed of minute capsules, each containing active ingredient. The capsules may be made of a plastic-like polymer or starchy material and are designed to release the AI slowly over time. This characteristic is advantageous for several reasons: The slow release helps ensure that sufficient amounts of AI will be available for pests to contact throughout the pesticide's residual life. Also the tiny "microcaps" tend to sit on top of porous surfaces where pests pick them up.

While microencapsulates require some agitation, they are more user-friendly than some formulations because the delayed release of active ingredient means the applicator is potentially exposed to less AI during application. Microencapsulates also can be formulated into dispersible granules or liquid flowables.

Some liquid formulations may be applied as **foam**. For example, termiticide is applied as foam to achieve better coverage in voids, such as those in porches that are incompletely filled with dirt. Foam is produced by equipment designed to convert the liquid to foam, with the addition of a foaming agent. Similarly, some aerosol products produce foam rather than liquid, such as those used to clean drains.

OTHER FORMULATIONS

Although they are not true formulations, **aerosols** are pesticides typically delivered as tiny particles from pressurized containers. Inside the containers are gas propellants that force the pesticide out when the trigger is actuated. Aerosols may contain solution, microencapsulate or even dust formulations.

Total-release aerosols are "foggers" in pressurized cans that, once triggered, release their contents as a space spray. They are ineffective when air currents cause them to drift away from the target area. They are often overused by consumers, and pose an inhalation hazard as well as an explosion hazard if the fog is exposed to an ignition source, such as a gas pilot light or burning cigarette.

Aerosols can be expensive, but are easy to use. It is much easier to use an aerosol in cramped conditions, than a heavy, bulky pump sprayer. But care must be taken when using aerosols. Safety glasses should be worn to protect against "blowback" that occurs when a shallow crack or hole is treated and spray shoots back toward

the applicator. Extreme heat or cold also can affect the performance of aerosols. Cans may freeze up, or explode when exposed to extreme heat.

Ultra Low Volume (ULV) formulations include products applied as a space spray, “mist” or “fog” using special equipment to dispense tiny particles that float in the air. Because they are highly concentrated, these products pose a contact hazard during mixing and loading. ULV formulations are generally used for control of flying insects, such as flies and mosquitoes (contact the Illinois Department of Agriculture for mosquito control licensing and certification requirements). They work well for treating large open spaces, but uniform coverage can be difficult to achieve. Drift can be a problem, along with the risk of inhaling the aerosolized material.

Fumigants are products with active ingredients in solid, liquid or gaseous form. When activated, they become poisonous gases. Fumigants can provide excellent coverage, as they are capable of penetrating materials such as wood. For this reason they are sometimes used to control wood-destroying pests, such as drywood termites and powderpost beetles.

Despite their capacity to completely eliminate pests within a piece of furniture, or an entire building, fumigants have several disadvantages. First they can be hazardous. Safety precautions must be taken especially since fumigants are generally colorless and odorless. Structural fumigation requires special equipment, is labor-intensive, costly and provides no residual protection.

In addition to grouping pesticides by their form or by the types of pests they are intended to control, they can be classified by their intended effect on pests. See the examples below. Remember that these too are considered pesticides.

Anticoagulant – prevents the clotting of blood when ingested, causing rats and mice to die from blood loss.
Attractant – any type of pheromone or food lure that attracts pests, often into traps.
Contact pesticide – controls only when directly applied to the pest. Usually degrades rapidly with little or no residual activity.
Desiccant – typically a dust formulation producing microscopic cuts in arthropod exoskeletons that result in dehydration.
Disinfectant – designed to kill germs on various surfaces. Note that products intended to destroy bacteria and viruses on or in humans are <u>not</u> considered to be pesticides.
Growth regulator – also known as insect growth regulator (IGR), disrupts pest development, injuring or killing the pest. Some prevent immature insects from developing into adults.
Pheromones – chemical scents released by insects to communicate for mating, aggregation or other purposes.
Repellent – helps prevent pests, such as mosquitoes, ticks and vertebrates, from attacking humans, other animals or property.
Residual pesticide – a longer-lasting product providing control for periods of days to years, typically applied to cracks, crevices and voids or as barriers to prevent pests from entering a structure.

4 - SAFETY

From nerve gas to table salt, all chemicals are potentially harmful. Whether they do harm or not depends on the circumstances. The term “hazard” is used rather than “safe” to describe a chemical’s potential to be harmful. To determine how hazardous a pesticide is, consider two things: toxicity and exposure.

Toxicity can be defined as a chemical substance’s capacity to harm living things. All chemicals are toxic to some degree. This includes pesticides, cleaning agents, aspirin, salt and the caffeine in coffee and soft drinks. The labels of most pesticides used by pest management professionals bear **signal words**. These indicate how toxic the pesticide is. "**CAUTION**" and "**WARNING**" indicate low and moderate toxicity, respectively. A few pesticides are labeled with the signal word, "**DANGER**," meaning they are highly toxic.

What exactly is high, moderate and low toxicity? The toxicity of a pesticide is often measured in terms of its “LD 50.” Pesticides are tested in the laboratory, usually by giving progressively larger doses to rats or mice until the dose is lethal to half the test population. A pesticide’s *acute oral* **LD 50** is the smallest amount that, when *ingested* by a group of test animals, is lethal to half the animals. The abbreviation, LD 50, means Lethal Dose to kill 50 percent. A *dermal* LD 50 refers to the amount of pesticide lethal to half the test animals when in contact with the animals’ skin. An LD 50 also can be calculated for the amount of pesticide lethal to half the test animals when *inhaled*, but in the case of inhalation, the term LC 50 is applied, meaning Lethal Concentration to kill 50 percent of the test animals, measured in milligrams per liter (mg/L).

An oral LD 50 is measured in milligrams per kilogram of body weight (mg/kg). Scientists determine how many milligrams of a pesticide it takes to kill rats weighing a certain number of kilograms. If half the lab rats die after each consumes 100 mg of a pesticide, and the average weight of the rats is 0.2 kg, then the pesticide’s LD 50 is 500 mg/kg, that is: 100 divided by 0.2. The pesticide in this example would be of moderate toxicity and thus have the signal word, WARNING, on its label.

If “Pesticide A” has an oral LD 50 of *100* mg/kg, and “Pesticide B” has an oral LD 50 of *1000* mg/kg, which pesticide is most toxic when ingested? The answer is Pesticide A. It takes less of Pesticide A to kill 50 percent of the test animals. The lower the LD 50, the more toxic the substance. Knowing that toxicity is dose-related, the toxicity of various substances can be compared.

A pesticide’s toxicity measurement tells how potentially harmful it may be, but this is only half of what is needed to gauge how hazardous a pesticide is. Note that a substance can be highly toxic, but not very hazardous.

How **hazardous** a substance is depends on its **toxicity** plus the **risk of exposure** to that substance. To determine exposure risk, scientists consider factors, such as the pesticide’s formulation, its rate of application, and the way the pesticide will be handled and applied.

There are three routes by which pesticides can enter the body: oral (by ingestion), dermal (by skin contact) and respiratory (by inhalation). The term *acute* refers to symptoms resulting from a single exposure. Symptoms of acute pesticide exposure include headache, dizziness, nausea, skin or eye irritation or redness. If any of these symptoms, or those listed on a pesticide’s label, appear when a pesticide is used, the affected person should stop using the pesticide and immediately seek medical help by contacting a physician, hospital emergency department or calling the Illinois Poison Center (800-222-1222).

Toxicity Categories and Signal Words

	High Toxicity (DANGER / Danger-Poison) Category I	Moderate Toxicity (WARNING) Category II	Low Toxicity (CAUTION) Category III	Very Low Toxicity (CAUTION or no signal word) Category IV
Acute Oral LD_{50}	**Up to and including 50 mg/kg (≤ 50 mg/kg)**	**Greater than 50 through 500 mg/kg (> 50 – 500 mg/kg)**	**Greater than 500 through 5,000 mg/kg (> 500 – 5,000 mg/kg)**	**Greater than 5,000 mg/kg (> 5,000 mg/kg)**
Inhalation LC_{50}	**Up to and including 0.05 mg/L (≤ 0.05 mg/L)**	**Greater than 0.05 through 0.5 mg/L (>0.05 – 0.5 mg/L)**	**Greater than 0.5 through 2.0 mg/L (> 0.5 – 2.0 mg/L)**	**Greater than 2.0 mg/L (> 2.0 mg/L)**
Dermal LD_{50}	**Up to and including 200 mg/kg (≤ 200 mg/kg)**	**Greater than 200 through 2,000 mg/kg (> 200 – 2,000 mg/kg)**	**Greater than 2,000 through 5,000 mg/kg (>2,000 – 5,000 mg/kg)**	**Greater than 5,000 mg/kg (> 5,000 mg/kg)**
Primary Eye Irritation	**Corrosive (irreversible destruction of ocular tissue) or corneal involvement or irritation for more than 21 days**	**Corneal involvement or other eye irritation clearing in 8 – 21 days**	**Corneal involvement or other eye irritation clearing in 7 days or less**	**Minimal effects clearing in less than 24 hours**
Primary Skin Irritation	**Corrosive (tissue destruction into the dermis and/or scarring)**	**Severe irritation at 72 hours (severe erythema or edema)**	**Moderate irritation at 72 hours (moderate erythema)**	**Mild or slight irritation at 72 hours (no irritation or erythema)**

National Pesticide Information Center (www.npic.orst.edu)

In contrast to acute exposure, is *chronic* exposure. Chronic exposure results in symptoms occurring after repeated exposure to a substance. The symptoms of chronic pesticide exposure include those listed for acute exposure, but are often more serious, affecting the body's organs or systems, including the nervous and reproductive systems. In addition, cancer can result from chronic pesticide exposure.

Using a pesticide properly helps reduce the exposure risk and therefore how hazardous the pesticide is to people, including the applicator. Following label directions is one way to reduce the hazard a pesticide poses to the applicator and to others.

Let's say you always read and follow pesticide label directions and that all the pesticides you use have the signal word "CAUTION" on their labels, meaning they are of low toxicity, or maybe they have no signal word and are considered to have very low toxicity. You might conclude these pesticides are not hazardous. Does that mean they are safe? No. When used carelessly or without the proper application and personal protective equipment, even the least toxic pesticides can be hazardous to your health and the health of others.

Remember all pesticides are toxic to some degree, even those classified as “minimum risk pesticides” that the USEPA does not require to be registered as pesticides.

A large portion of a pesticide label is devoted to safety precautions. Hazards associated with the pesticide are listed along with the personal protective equipment required for using the pesticide, as well as symptoms of exposure and first aid procedures. Reading the label is not done just to ensure the proper amount of pesticide is applied in the proper place. It is important to ensure the safety of the applicator and others, as well as the safety of non-target organisms and the environment.

It is important that the appropriate safety equipment is worn when working with pesticides. As a general rule, **EYE PROTECTION** in the form of safety glasses (with side shields), goggles (unvented) or a face shield, should be worn when:

- mixing from concentrates
- doing space or ULV treatments
- applying pesticides overhead or in confined areas
- using aerosols
- using power spraying equipment
- applying pesticides outdoors
- using power tools such as drills

Unlined **GLOVES** should be made of chemical-resistant material such as nitrile or butyl. An applicator's hands are the most likely part of the body to be contacted by pesticides, so this type of glove should be worn whenever there is a chance of spilling pesticide on hands, and especially when working with concentrates. Gloves – and hands – should be washed after using pesticides.

In addition, chemical-resistant boots or shoe covers should be worn when using power sprayers. Bump caps should be worn when working in attics and crawlspaces, hard hats should be worn in factories and at construction sites. Ear plugs may be necessary when drilling and when working in noisy places.

RESPIRATORS should be equipped with High Efficiency Particulate Air (HEPA) filters capable of filtering tiny particles, including the hantavirus, which can be present in the air in places contaminated by deer mice carrying the virus. Histoplasmosis, a fungal disease, can infect persons working around fungus-infected bird and bat droppings.

Use a respirator when:

- mixing concentrates
- applying pesticides in confined areas
- doing space or ULV treatments
- working in dusty places
- working around mold, asbestos, or rodent, bird or bat feces
- using a pesticide with a label requiring the user to wear a respirator

Just *having* a respirator is not enough protection. Remember to wear it, properly fitted, and to store it properly. To ensure proper fit, put the respirator on and place hands tightly over the filter(s) to block the air. Breathe deeply. The wearer should be unable to breathe if the respirator seals tightly against your face. If not,

air will rush in around the edges of the respirator. If it does not seal tightly, adjust the straps, or possibly get a different size or style of respirator. Test the respirator like this before every use. Store it and its filters in a tightly sealed container, such as a locking plastic bag. Filters should be replaced as recommended by the manufacturer, often after every eight hours of use, or if pesticide odors are detected while using them.

In addition to the personal protective equipment mentioned above, persons who work with pesticides should wear long-sleeve shirts, long pants, socks and shoes. Clothing should be in good condition and be made of tightly woven materials that are less absorbent. Do not wear leather or canvas. In some situations it is wise to wear suits made or coated with chemical-resistant materials, such as Tyvek^{R}, neoprene or polyethylene.

If clothing becomes contaminated with pesticide, handle it only while wearing chemical-resistant gloves. Items contaminated with pesticide concentrates are best removed and discarded. Articles contaminated with diluted pesticide should be kept separate from other clothing. It is best to pre-rinse the contaminated clothing outdoors using a water hose. Wash the garments as soon as possible in hot water and a strong detergent. Clothes should be dried by hanging them outdoors, when possible, rather than using a dryer. The washing machine should be run empty through one full-cycle before washing another load.

Here are some additional reminders when working with pesticides:

- Use personal protective equipment, especially when mixing from concentrates.
- Do not smoke or eat when using pesticides.
- If you spill pesticide on your skin, wash it off immediately with soap and water.
- If a pesticide contacts clothing, change the clothing and discard or launder it.
- Keep pesticides in their original, labeled containers. Never use food containers or mislabeled containers.
- Dispose of liquid pesticide containers properly by triple-rinsing and putting the rinsate back in your tank or dispose of it per label directions.
- Keep accurate application records for at least 2 years.
- Always carry, read and follow label directions.

To determine how hazardous a pesticide is, consider its toxicity and exposure risk. It is an applicator's duty to reduce the hazard posed by the pesticides used. Some ways in which pesticide hazard may be reduced include:

- Using less toxic pesticides
- Selecting formulations with lower risks of exposure
- Using pre-mixed (ready-to-use) pesticides
- Reading and following label directions
- Wearing personal protective equipment
- Using appropriate application equipment that is clean and working
- Applying less pesticide, less frequently, at lower rates*
- Cleaning clothes and PPE promptly after applying pesticides
- Keeping spill control equipment and emergency medical information ready
- Applying first aid care per label directions, if pesticide contacts a person
- Properly storing, transporting, and disposing of pesticides

* Pesticides may be applied at rates lower than those listed on their labels, unless the pesticide's labeling states otherwise.

Always consult the label for the proper means of disposing of a pesticide or pesticide residue. The Illinois Department of Agriculture may provide additional guidance on pesticide disposal.

The Illinois Structural Pest Control Code specifies requirements for storing pesticides and for service vehicles transporting pesticides. The code requires that at commercial and non-commercial pest control locations, **pesticide storage** must be:

- Orderly and in a dry, temperature-controlled place
- Inaccessible to unauthorized or untrained persons
- Posted with a pesticide warning sign and locked when unattended
- Ventilated to prevent build-up and discharge of pesticide vapors into living spaces
- Lighted to enable the reading of pesticide labels
- Equipped with an appropriate and operational fire extinguisher
- Equipped with, or having nearby, soap, water and towels
- Equipped with absorbent material to contain spilled pesticide
- Equipped with a file that contains labels for all pesticides stored
- Near (but away from) all safety equipment required by the labels of the stored pesticides
- Equipped with emergency medical information, e.g., poison control information phone number
- In closed, unbroken, original containers or temporarily in labeled service containers
- Off the floor (e.g., on pallets, racks, shelves or cabinets)
- In separate locations (within the same room) for structural pesticides vs. other types
- In separate locations (within the same room) for DANGER-labeled pesticides vs. others
- In separate locations (within the same room) from products marked “Stop Sale or Use”
- In separate locations (within the same room) for restricted-use (RUP) vs. general-use pesticides
- Posted where RUPs are kept – “RESTRICTED USE PESTICIDES – Authorized Use Only”
- Exclusive of fumigants, if the storage area is within or attached to a human dwelling
- In a separate room away from food, eating utensils, beverages, tobacco or household goods

The Illinois Structural Pest Control Code requires pesticide **service vehicles** to be equipped with:

- Locks, and locked when unattended or not inside a locked area, so all pesticides are inaccessible
- Restraining devices to prevent pesticide containers from becoming damaged in transit
- Absorbent material to contain spilled pesticide

- Personal protective equipment and clothing appropriate for the pesticides carried
- A first aid kit
- Emergency medical information, such as poison center telephone numbers
- The label of each pesticide transported in the vehicle
- A change of clothing, including shoes, stored to prevent contamination

All pesticides transported in vehicles must be secured to prevent damage to the containers, leaks and spills. Pesticides should not be stored in rooms, or in passenger areas of vehicles, with food, eating utensils, beverages, tobacco or household goods. For details see Sections 830.830-860 of the Illinois Structural Pest Control Code.

Pesticide handlers and applicators have an obligation to protect themselves and others from pesticide exposure, and to protect the environment. This can be done by following label directions, but knowing the potential environmental hazards associated with pesticide use also can help safeguard the environment in a way that goes beyond merely adhering to label directions.

Pesticides can contaminate the environment through several processes including:

- Adsorption
- Degradation
- Drift
- Leaching
- Runoff

Adsorption is the binding of pesticides to materials, such as soil. This binding helps prevent the pesticide from moving, unless the soil it is bound to moves, as when water washes soil away. The strength of this binding depends on the characteristics of the pesticide and the soil. Dryer soils and those containing more organic matter and/or clay are more adsorptive. This is why many termiticides are formulated to be highly adsorptive and their labels advise not to treat water-saturated soil because it is less adsorptive.

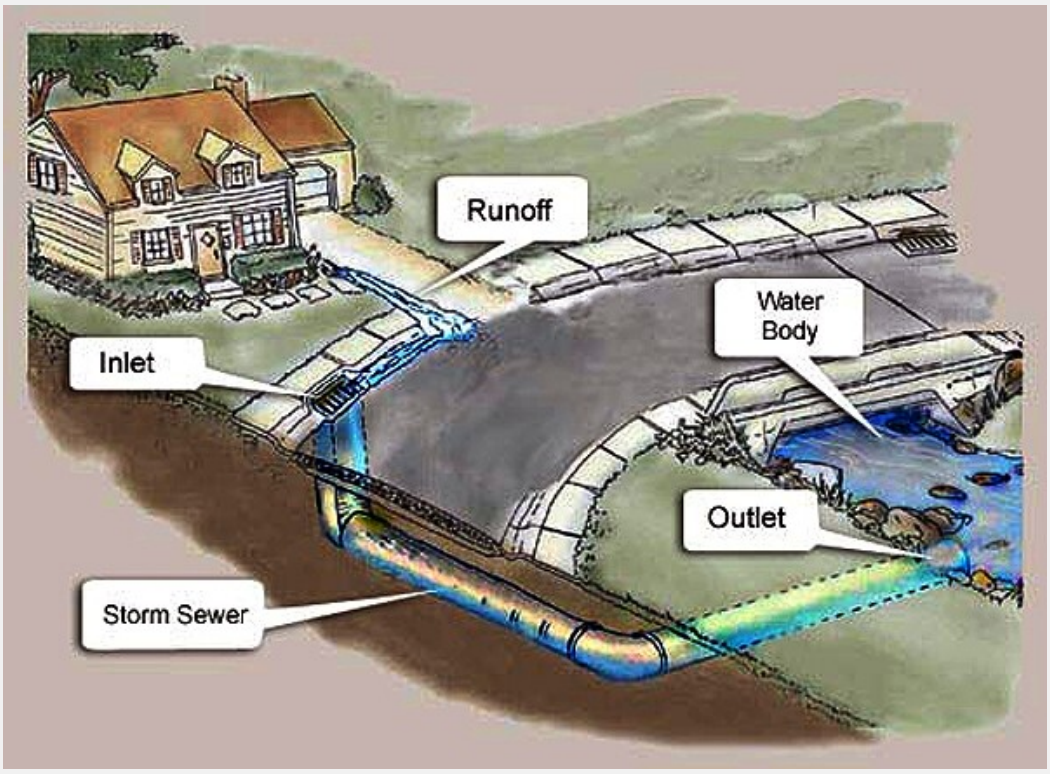
Degradation refers to the breakdown of pesticides. The process usually reduces a pesticide's toxicity by producing less toxic compounds, but some can break down into more toxic compounds. Degradation results from the action of soil microbes, the sun, water or oxygen. Microbial degradation occurs when microscopic organisms, such as bacteria, actually consume the pesticide. Photodegradation occurs when sunlight breaks down pesticide. The effectiveness of some pesticides lasts only minutes when exposed to daylight, because light causes a reaction that breaks the pesticide's molecules apart, producing less toxic substances. Chemical degradation occurs when a pesticide reacts with water or oxygen.

Drift is the movement of pesticide by wind. It is usually associated with pesticide spraying, but also can be a concern when using dusts, space sprays, fumigants and ULV pesticides. Drift generally occurs during outdoor applications, but it can occur indoors, during or after a pesticide application. The movement of a dust indoors can occur, for example, when fans or ventilation systems operate, or when windows or doors are left open allowing wind to enter the structure. Drift also can occur *after* an application, when a pesticide evaporates and is carried by air movement.

Three factors determine whether and how much drift will occur: the pesticide product, the application equipment and method, and environmental conditions. As indicated above, some pesticide formulations are more prone to drift. Dusts generally have greater drift potential than granular formulations, for example.

Pesticide sprays also are susceptible to drift. The proper selection and use of application equipment can reduce the likelihood and extent of drift. Selecting equipment, spray nozzles for example, that allow application of larger droplet sizes at lower pressures that drift less than smaller droplets at higher pressures, is important in reducing drift. Minimizing the distance from application equipment to the surface to be treated also helps minimize drift, because the pesticide has a shorter distance to travel and therefore less time for air currents to displace it.

Pesticide users also should be aware of environmental conditions during mixing, loading and application. Windy days increase the potential for drift, but hot days and low humidity also contribute by creating updrafts and increasing vaporization (the process turning liquid to a gas). A pesticide's tendency to vaporize is known as its vapor pressure. While vapor pressure is often not listed on a pesticide's label or material safety data sheet, the labels of pesticides with high vapor pressures (those that vaporize more readily) may contain warnings about the product's higher potential for drift.

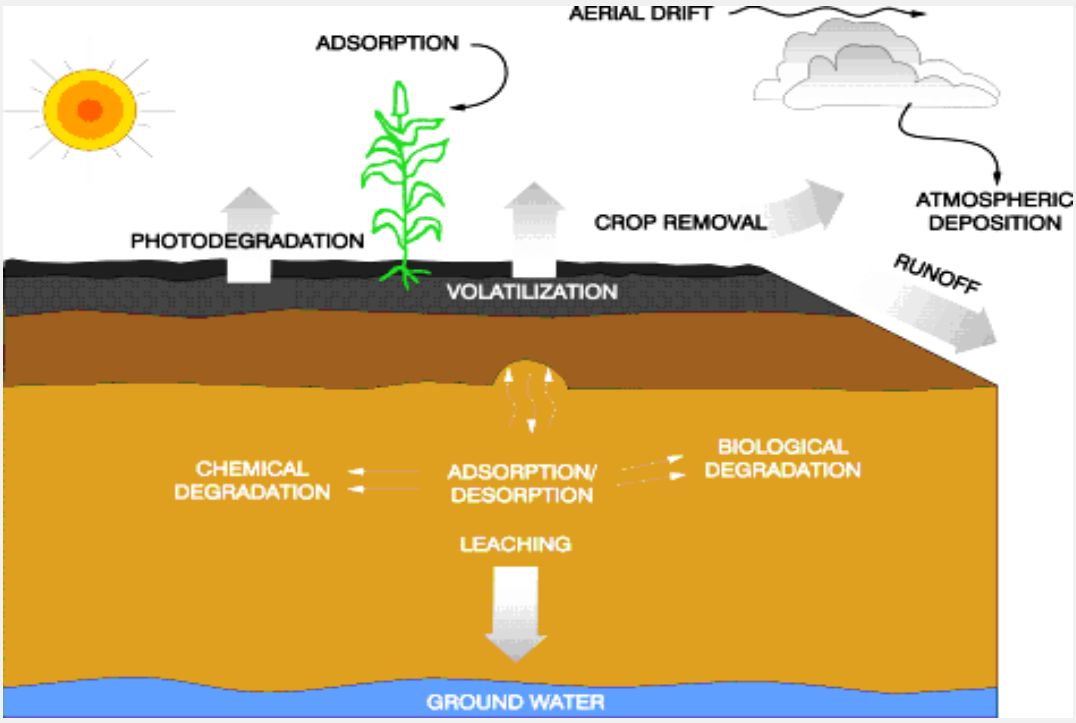


Runoff is a term used for the movement of liquid over the ground. This can happen when soil is flooded with water, e.g., resulting from heavy rainfall, and pesticide is carried along with the water. As mentioned above, soil also can be washed away, taking with it any pesticide that is bound to it. Runoff also might occur when a pesticide is applied to surfaces, such as concrete slabs, porches, patios and driveways.

Similar to runoff, **leaching** is the movement of pesticide *through* the soil. Adsorption affects leaching, in that more adsorptive pesticides and soils tend to reduce leaching, as does rapid degradation. Thus, the

forces that move pesticides are interrelated and can work in combination to determine a pesticide's fate in the environment.

It's easy to see how runoff, leaching and soil adsorption influence a pesticide's potential for contaminating surface water (ponds, lakes, streams, wetlands, drainage ditches) and ground water (aquifers, wells). The labels of many pesticides warn of using the products near potable (drinkable) water sources, such as wells and cisterns, and near bodies of water. In addition, anti-backflow or air-gap devices are prescribed to prevent pesticides from being siphoned into drinking water systems.



Unfortunately, accidents happen. If a pesticide is spilled or moves to a place where it was not intended to be, it should be confined as much as possible and clean up should commence according to label directions to prevent further contamination. Pest management professionals in Illinois should recognize a spill or other incident involving pesticides that results or *might* result in harm to humans, pets or non-target wildlife; or the contamination of food, water, a structure or the environment in a manner that threatens health, must be reported to the Illinois Department of Public Health within one business day. In addition, spills of hazardous substances, including some pesticides, may require the operator to notify the Illinois Emergency Management Agency (IEMA), the local emergency planning committee (LEPC) and the National Response Center. To learn if a spill should be reported to these and other agencies contact IEMA at 800-782-7860.

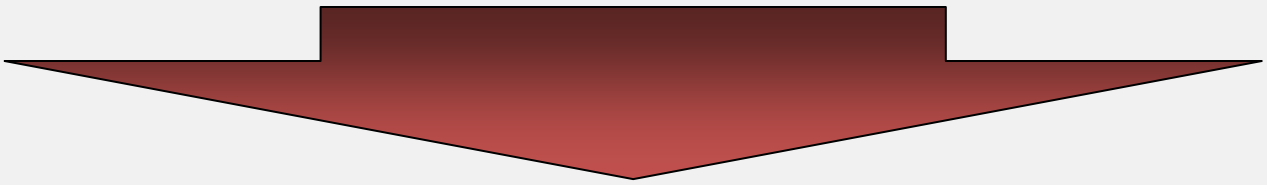
5 - LABELS

Have you ever picked up an aerosol can and sprayed for pests without first reading the label directions? If so you not only used the product without knowing how it should be used, but also failed to heed the misuse statement that appears on all pesticide labels: "*It is a violation of federal law to use this product in a manner inconsistent with labeling*."

The term **labeling** includes a pesticide's label and all related documents issued by the manufacturer. All are legal documents regulated by the U. S. Environmental Protection Agency to help ensure the pesticide's directions for use are clear and the information facilitates maximum benefit and minimum risk to humans and the environment. Most pesticide products are required to be registered with the USEPA and states in which they will be used. "Use" of a pesticide is generally defined as all aspects of a pesticide's handling, including its transportation, storage, mixing, loading, application and disposal.

The information on pesticide labels is grouped by content. This varies, of course, even for the same product. A pesticide may have two or more different labels in use. Labels can change over time. For example, older containers of "Pesticide AAA" may have one label, while newly manufactured Pesticide AAA containers bear a newly approved label with content somewhat different from the older label. Remember, even though there may be a new version of a pesticide's label in use, you are required to follow the directions listed on the label that came with the pesticide used. For this reason, do not rely on your memory of a pesticide label. Before each use, review the label that came with the product.

Below is a portion of a generalized pesticide label. You should become familiar with the various parts of labels and know what information each part offers. Take a look at the label below.



RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES CONVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

PERMATRIP

TERMITICIDE SOLUTION (S)

ACTIVE INGREDIENTS:
BNE (betel nut juice)..…….……....10%
INERT INGREDIENTS……..…90%
1 GALLON OF PERMATRIP CONTAINS 1 LBS OF BNE

EPA Reg. No. 0000-111
EPA Est. No. 0000-MP-1
Lefehlo, Incorporated
DeSoto, MO, USA

KEEP OUT OF REACH OF CHILDREN

WARNING

FIRST AID

IF SWALLOWED	Call a Poison Control Center or physician immediately for advice.
ON SKIN OR CLOTHES	Remove contaminated clothes, rinse skin with water for 20 minutes.
IF INHALED	If person is not breathing, call 911 and give artificial respiration.
IF IN EYES	Flush eyes with water for 20 minutes.

NOTE: Have the product label with you when contacting a Poison Control Center or physician.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION: Harmful if swallowed, absorbed or inhaled. Causes eye irritation.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
All pesticide handlers (mixers, loaders and applicators) must wear a long-sleeved shirt and long pants, socks, shoes and chemical-resistant gloves. In addition: all pesticide handlers must wear a respiratory protection device when working in a non-ventilated space; all pesticide handlers must wear protective eyewear when working in a non-ventilated space or when applying termiticide by rodding or sub-slab injection.

USER SAFETY RECOMMENDATIONS
After using termiticide, wash hands thoroughly before eating, drinking, chewing, smoking or using the toilet. Wash clothing with detergent and hot water before reusing. Remove PPE after handling, and wash before reusing.

ENVIRONMENTAL HAZARDS
This pesticide is toxic to birds, fish and aquatic invertebrates. Do not apply to water. Avoid runoff. Do not contaminate water with cleaning rinsate. Do not use PERMATRIP around edible plants, including fruit or nut trees.

MISUSE STATEMENT
It is a violation of federal law to use this product in a manner inconsistent with its labeling. Read the entire label before using this product.

DIRECTIONS FOR USE

STORAGE AND DISPOSAL
Do not contaminate water, food or feed when storing or disposing of this pesticide. Store in original container only, and out or reach of children and animals.

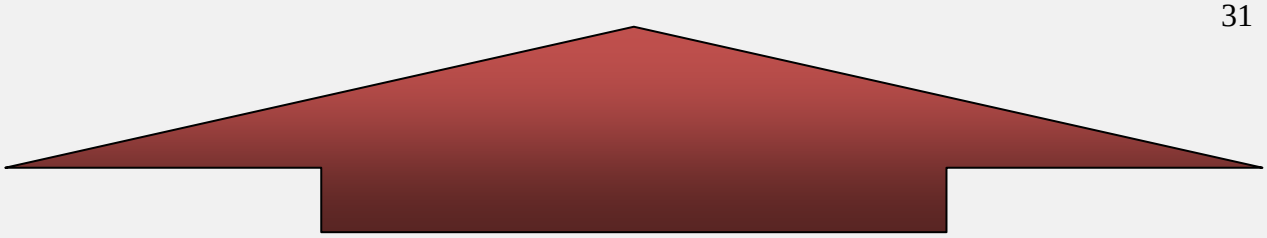
Improper disposal of pesticide is a violation of federal law. In case of leaks or minor spills, soak up termiticide with sand, soil or other absorbent material and dispose of contaminated material below grade in soil that is to be treated, or in a landfill. Triple-rinse containers for disposal, and offer for recycling or puncture containers and dispose of in a landfill or by burning (check state and local regulations).

MIXING INSTRUCTIONS
Mix the termiticide use dilution in the following manner:

1. Fill tank one-fourth to one-third full.
2. Start pump to begin bypass agitation and place end of treating tool in tank to allow circulation through hose.
3. Add appropriate amount of PERMATRIP.
4. Add remaining amount of water.
5. Let pump run and allow recirculation through the hose for two to three minutes.

To prepare a 0.6% water emulsion, ready for use, dilute 1 gallon of PERMATRIP with 99 gallons of water. To prepare a 1.2% water emulsion, ready for use, dilute 1 gallon of PERMATRIP with 49.5 gallons of water. For termite control operations requiring smaller volumes use 1.3 fluid ounces of PERMATRIP per gallon of water to achieve a 0.6% concentration.

RE-ENTRY
Keep people and pets out of treated interior parts of structures for two hours after treatment.



The parts of the pesticide label above are explained below in the order in which they appear on the label.

- Use classification
  - Tells if the product is a restricted-use pesticide.
- Content information
  - Shows the pesticide's brand name, weight or volume, ingredients and formulation.
- Registration information
  - Lists USEPA registration and establishment numbers, manufacturer name and address.
- Signal word (CAUTION, WARNING or DANGER)
  - Tells if the pesticide is of low, moderate or high toxicity.
- Statement of practical treatment (first aid)
  - Tells what to do if you are exposed to the pesticide.
- Hazards to humans and domestic animals
  - Tells how the pesticide can be harmful, and how to avoid being harmed.
- Personal protective equipment (PPE) instructions
  - Tells what PPE should be worn and when.
- Hazards to the environment
  - Tells of possible harm to bees, fish and ground water, and how to avoid.
- Misuse statement
  - Warns that not following label directions is a violation of federal law.
- Use directions and restrictions
  - Tells how to mix and apply, and where and when the pesticide can be applied .
- Storage and disposal instructions
  - Tells how to properly store and dispose of the pesticide and its container.
- Mixing instructions
  - Gives dilution rates and tell how to prepare the pesticide for use.
- Re-entry statement
  - Gives conditions under which it is permitted to re-enter the treated area.

The organization of information on pesticide labels is consistent from one product to the next, so if you know where to find what you're looking for on one label, you will know where to look for it on the next label you read. The more labels you read, the more knowledgeable you will be, and the more capable you will be as a pest management professional to protect the health of people, property and the environment.

Additional information about a pesticide can be found on its Material Safety Data Sheet (MSDS). An MSDS contains information on a pesticide's properties, the hazards it poses, how to avoid those hazards and what to do if they are not avoided.

6 - REGULATIONS

Pesticides are substances used to manage pests. They can be hazardous to humans, other organisms and the environment, and for this reason their use is regulated. The principal document regulating pesticides and their use is **FIFRA**: the **Federal Insecticide, Fungicide and Rodenticide Act**. Some major provisions of FIFRA are:

- The U. S. Environmental Protection Agency administers FIFRA, working with the designated agency(s) of each state to regulate pesticides, pesticide application, pesticide business and applicator licensing and certification.
- State university extension agencies are to assist in providing training for pesticide applicators.
- Pesticides are registered with the USEPA (and in Illinois also must be registered by the Illinois Department of Agriculture).
- The pesticide label is the law. A product's label is a legal document requiring the user to read and follow label directions.
- Pesticides are classified as general-use or restricted-use. Restricted-use pesticides may be applied only by, or under the direct supervision of, fully certified technicians.

General-use pesticides may be purchased and used by technicians and the general public. A pesticide is classified as restricted-use when it may have adverse effects on humans or the environment *even when used according to label directions*. Persons who purchase or use restricted-use pesticides must be certified in the appropriate pest management subcategory, or directly supervised by a fellow employee certified in the appropriate subcategory). The labels of restricted-use products bear the term "RESTRICTED USE PESTICIDE" in large, capital letters near the top of the label.

In addition to FIFRA, structural pest control technicians in Illinois must abide by the **Structural Pest Control Act** (225 ILCS 235) and **Structural Pest Control Code** (77 IAC 830).

The act defines structural pest control: "*Structural pest control means and includes the use of any device or the application of any substance to prevent, repel, mitigate, curb, control, or eradicate any structural pest in, on, under, or around a structure, or within a part of, or materials used in building, a structure; the use of any pesticide, including insecticides, fungicides and other wood treatment products, attractants, repellents, rodenticides, fumigants, or mechanical devices for preventing, controlling, eradicating, identifying, mitigating, diminishing, or curbing insects, vermin, rats, mice, or other pests in, on, under, or around a structure, or within a part of, or materials used in building, a structure; vault fumigation and fumigation of box cars, trucks, ships, airplanes, docks, warehouses, and common carriers or soliciting to perform any of the foregoing functions*."

The act exists to protect people and the environment from the adverse effects of pesticides by regulating those who use pesticides, and by promoting the use of IPM. It regulates the licensing of commercial pest control businesses, registration of noncommercial business locations, and the certification of individuals who perform structural pest control.

The code defines various administrative procedures, including how persons apply for commercial structural pest control licenses, noncommercial registrations, examinations and certification. The code also requires the certificates of technicians employed at a business location to be prominently displayed at

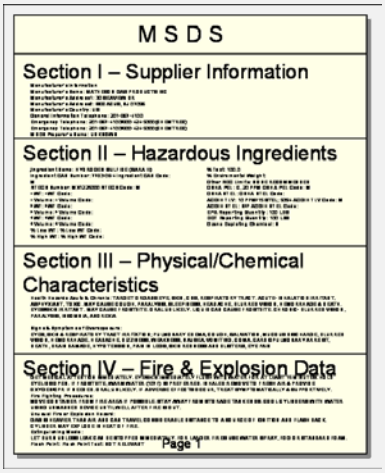
the location along with the business license. The code defines how pest management seminars are approved by the Illinois Department of Public Health to fulfill IPM requirements and to offer continuing education credits for renewal of certifications, specifying under what conditions credits will be granted to certified technicians. The code also imposes requirements for service recordkeeping, pesticide storage and handling. It also lists and classifies violations of the act and code, and defines the penalties to be imposed on violators.

To be certified under the act and code to use and supervise the use of **restricted-use pesticides** in Illinois, you must pass both the General Standards Examination and the subcategory exam appropriate for the type of restricted-use pesticide application you intend to perform. Structural pest control subcategories in Illinois include: A) **Insects, Rodents and Other Pests;** B) **Termites and Other Wood-destroying Organisms**; C) **Bird Control**; D) **Fumigation**; E) **Food Processing, Manufacturing and Storage**; F) **Institutional and Multi-unit Residential Housing**; G) **Public Health Pest Control**; and H) **Wood Products Pest Control**. A complete listing and description of subcategories can be found at the end of this chapter and in Section 830.410 of the Structural Pest Control Code.

The Illinois Department of Public Health licenses commercial structural pest control business locations and registers noncommercial locations. Commercial locations and technicians are hired by customers. Non-commercial locations may perform pest control (without compensation) on their own property or property directly associated with their operation. An example would be a maintenance person employed by an apartment complex applying pesticides to control structural pests in the apartments. Employees of noncommercial operations are required to be certified only if they will apply restricted-use pesticides.

Commercial business locations doing structural pest control must have at least one certified employee to provide supervision for uncertified technicians at that location. Additionally, if a commercial location will use restricted-use pesticides, it must employ at least one technician who is fully certified in each subcategory corresponding to the type of pest control performed using restricted-use pesticides. For example, a pest control business applying a restricted-use rodenticide for rodent control, and a restricted-use avicide for pigeon control, must employ at least one person certified in subcategory A (Insects, Rodents and Other Pests) and another certified in subcategory C (Bird Control) – or a technician certified in both subcategories. Note also that a certified technician may be employed by more than one company at the same time, but he/she can only supervise technicians at one business location.

If a certified technician has a change of home address or employment location, he/she must notify the Illinois Department of Public Health *in writing* within 15 days of the change. The written notice should include the effective date of the change and both the old and new home/employer addresses.



There are other laws governing structural pest management and the use of pesticides. The Illinois Pesticide Act (415 ILCS 60) specifies pesticide label and registration requirements, requiring pesticides for use in Illinois to be registered with the Illinois Department of Agriculture (in addition to being registered with the USEPA). Businesses that sell restricted-use pesticides also are required to register with the Illinois Department of Agriculture. This includes licensed structural pest control businesses that intend to sell restricted-use pesticides.

The Occupational Safety and Health Administration (OSHA) utilizes the Occupational Safety and Health Act to ensure worker safety. This includes the Worker Right-To-Know Law requiring that employees receive training on the potential hazards they may encounter in

working with pesticides. A Material Safety Data Sheet for each pesticide a worker may be using on the job must be available for the worker's review.

The Environmental Protection Act (415 ILCS 5/14) generally prohibits structural pesticides from being stored within 400 feet of community water supplies and within 200 feet of non-community wells used for drinking water.

The Illinois Administrative Code (77 IAC 830.870, 29 IAC 430 and 29 IAC 620) requires certain pesticide incidents, including spills, be reported to the Illinois Emergency Management Agency (IEMA), to the Local Emergency Planning Committee (LEPC), and/or to the Illinois Department of Public Health – depending on the type of incident and pesticide involved.

SPECIAL SITUATIONS

PUBLIC SCHOOLS and LICENSED DAY CARE CENTERS

The Structural Pest Control Act recognizes schools and day care centers are special with regard to pesticide application, because children are especially vulnerable to pesticide exposure. Section 235/10.2 of the act requires all public schools and licensed day care centers to complete and file an IPM form with the Illinois Department of Public Health every five years. The form can be completed and submitted from the Integrated Pest Management website at: **http://www.idph.state.il.us/envhealth/ipm/index.htm**.

On the IPM form, each public school and licensed day care center must provide contact information and state whether the facility is implementing the principles of IPM. Those electing to implement IPM must designate a staff member as an **IPM coordinator** and formulate a written **IPM plan** to use in the management of pests. Guidelines on writing an IPM plan are posted on the IPM website. A facility's IPM coordinator might be an administrator or maintenance worker, but one who is responsible for ensuring that pest management is performed in accordance with IPM principles. The employee will coordinate the pest management efforts of maintenance and pest control technicians, act as a liaison between the administration, staff and pest control contractors, and ensure that persons are notified prior to pesticide applications, as required in Section 235/10.3 of the act (see below).

Public schools and licensed day care centers can elect not to implement IPM in managing pests; but only on the basis that doing IPM is not economically feasible. Facilities "opting out" of IPM are not required to have a written IPM plan, but must send at least one employee to complete six hours of approved IPM training every five years. Seminar dates are posted on the IPM website (above).

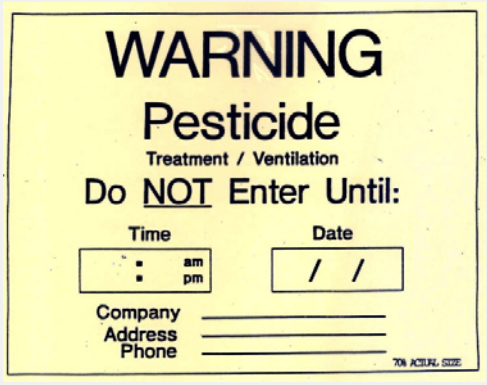
Section 235/10.3 of the Structural Pest Control Act has additional IPM regulations for public schools and licensed day care centers. It requires them to maintain a *registry* of parents, guardians and facility employees who wish to be notified prior to pesticide applications at the school or day care center. Persons expressing the desire to be notified are listed in the registry and must be notified prior to each non-bait pesticide application on the premises (indoors or outdoors). Facilities that do not maintain a registry of persons who wish to be notified, must notify *all* parents and guardians of their students and all staff. Many facilities solicit input from parents/guardians and staff by including a notice along with information provided to parents/guardians and staff at the beginning of each school year, asking them to sign and return the notice, or otherwise contact the facility, if they wish to be placed on the registry for notification. Notification must be at least two business days prior to the pesticide application, and must be made by phone or in writing (not by e-mail or by posting on a bulletin board).

The only exceptions to notification occur when the pesticide to be applied is a bait formulation (e.g., ant, cockroach or rodent bait) or when pesticide application is deemed an emergency, that is, when pests pose an imminent threat to the health or property of persons at the facility. When such emergency applications are made, notification must be made as soon as possible after the application. An example of an emergency application might be after a yellowjacket or honey bee nest is discovered at the facility and its location puts these pests in close proximity to people.

Note that the Illinois Child Care Act (225 ILCS 10) contains additional requirements for pesticide applications in child care facilities. Specifically the act mandates that, in licensed day care centers, the notification of persons prior to pesticide applications must not be more than 30 days prior to the expected application. It also states that pesticides must not be applied while children are present, that toys and other objects typically handled by children must be removed from a room before pesticide application, and that children must remain out of a pesticide-treated room for two hours or longer if the pesticide's label requires a longer period of time.

Finally, outdoor pesticide applications at public schools and licensed day care centers are subject to the same kinds of restrictions as stated in the Lawn Care Products Application and Notice Act. Again, pesticide and fertilizer applications to lawns, ornamental plants, playing fields and parking lots, are regulated by the Illinois Department of Agriculture, to which questions on applying pesticides in those outdoor areas can be directed.

PATIENT ROOMS in HEALTH CARE FACILITES



Requirements for pesticide application in patient areas of health care facilities are similar to those in day care centers insofar as patients must not be present in rooms during the application of non-bait pesticides. A unique requirement is for all entrances to patient areas to be posted after treatment, using prescribed signs warning persons to keep out of the room for a minimum of two hours – or longer if the pesticide's label says so. Applicators also must ensure that patient rooms are ventilated per label directions after being treated. In addition, the technician must provide, to the person responsible for patient care in the treated area, a copy of the warning sign, labels and material safety data sheets of the pesticide(s) applied and the pesticide manufacturer(s) recommendations for re-entry times and procedures if these are not stated on the labels. See Section 830.800 (g) of the Structural Pest Control Code for details and an example of the required sign.

CERTIFICATION – WHAT NEXT?

Being a certified structural pest management technician comes with certain responsibilities. One of those may be to train and to supervise technicians. Uncertified technicians require on-the-job training with a certified technician. Before doing a specific type of job without a certified technician present, an uncertified worker must be supervised on-site by the CT while performing the same type of pesticide application at two jobsites. An example would be where bait is to be used to control cockroaches in restaurants. The CT must advise and observe the uncertified technician apply bait in at least two different restaurants. Only then is the uncertified technician permitted to make bait applications in a restaurant without a certified technician present.

This does not mean that after receiving on-the-job training the uncertified technician will be operating without supervision. Whenever an uncertified technician performs pest control without the CT present, the CT must ensure the uncertified technician is able to:

- Review the label of each pesticide used.
- Immediately contact (by radio or telephone) the CT at all times during the pesticide application.
- If the need arises, have the CT at the job site within one hour of contacting the CT.

Even minimally certified technicians require supervision when they apply a restricted-use pesticide. The technician must be supervised in the same manner by a CT certified in the subcategory corresponding to the pesticide application being made.

Minimally certified technicians are those that have passed the General Standards Examination and whose application for certification has been approved by the Illinois Department of Public Health. To become fully certified, a technician must qualify to take and pass an additional examination in one or more of the following subcategories:

A) INSECTS, RODENTS AND OTHER PESTS includes the use or supervision of the use of restricted-use pesticides excluding fumigants, for the prevention and control of insects, mites, ticks and related pests, as well as rats and mice.
B) TERMITES AND OTHER WOOD-DESTROYING ORGANISMS includes the use or supervision of the use of restricted-use pesticides excluding fumigants, in, on or under a structure, for the prevention or control of wood-destroying organisms including termites, powderpost beetles, carpenters ants and carpenter bees.
C) BIRDS includes the use or supervision of the use of restricted-use pesticides for the prevention and control of pest birds (English house sparrow, pigeon and starling) in, on or around structures.
D) FUMIGATION includes the use or supervision of the use of restricted-use fumigants for control of pests in commercial and non-commercial pest control locations including, but not limited to, rail cars, trucks, ships, airplanes, docks and warehouses, involving general, spot, tarpaulin chamber, vehicle or in-transit fumigation.
E) FOOD PROCESSING, MANUFACTURING AND STORAGE includes the use or supervision of the use of restricted-use pesticides excluding fumigants, for the prevention and control of insect and rodent pests associated with the manufacturing, processing, packaging or holding of food products for ultimate consumption by man or animals where such products are not served or offered for sale directly to the ultimate consumer.
F) INSTITUTIONAL AND MULTI-UNIT RESIDENTIAL HOUSING includes the use or supervision of the use of restricted-use pesticides excluding fumigants, for the prevention and control of insect (excluding wood-destroying pests) and rodent pests in, on or around nursing homes, hospitals, public housing facilities, state institutions and similar structures.
G) PUBLIC HEALTH PEST CONTROL includes state, federal or other governmental employees using or supervising the use of restricted-use pesticides in public health programs for the prevention and control of pests (except mosquitoes) having medical and public health importance.
H) WOOD PRODUCTS PEST CONTROL includes the use of restricted-use pesticides to control or prevent wood degradation by wood-destroying organisms including insects, fungi or bacteria causing molding, staining and rot. Limited to individuals working in noncommercial wood treatment plants or commercial businesses that treat existing structures or structural components.

To qualify to take any of these subcategory exams to become fully certified, an individual must:

- Pass the General Standards Examination
- Submit a complete application and fee
- Arrange to take the exam at an approved location
- Have <u>one</u> of the following:
    - At least six months of experience doing pest control of the type listed in the subcategories.
    - The equivalent of at least 16 semester hours of college credit in a related field of study.
    - Successfully completed a pest control course approved by the Illinois Department of Public Health.

Also among the responsibilities of some certified technicians is reviewing the service records completed by uncertified technicians. A **service record** includes information about a pesticide service. Service records must be kept on file at the commercial business location for at least two years. Service records of general-use pesticide applications should be kept separate from records of restricted-use pesticide applications. <u>Non-commercial</u> business locations also are required to keep service records of their restricted-use pesticide applications for at least two years.

Service records are required to contain the following information:

- Name and address of customer or application site
- Name of technician applying the pesticide
- Date and time of application
- Target pest or purpose of application
- Brand or common name of pesticide applied
- USEPA registration number of pesticide applied
- Percentage of active ingredient applied
- Estimate of amount of pesticide applied

The supervising CT must review the service records of jobs performed by uncertified technicians, to ensure that label directions were followed and appropriate methods used. This review must be verified by the certified technician signing each paper record with his/her name and certification number. If only *electronic* service records are kept, the certified technician's review may be verified by other means.

Another responsibility of certification is to continue to learn about pest management. Certified technicians should continue to familiarize themselves with the regulations, especially the Illinois Structural Pest Control Act and code, as these can change. Not only are CTs encouraged to continue learning, but to renew their certifications they must attend seminars on pest management topics.

Certification remains active for three years, expiring on December 31. It can be renewed by completing and submitting a renewal application to the Illinois Department of Public Health with the required fee *by December 1* of the year the certification is to expire. The CT is required to have completed at least nine classroom hours of training by the end of the three-year period. Seminars approved for classroom hour credit are listed on the Illinois Department of Public Health's Structural Pest Control Program website. If a CT fails to renew certification within one year of its expiration, the individual must successfully re-examine and pay additional fees to continue his/her certified status.

Certification as a pest management professional is more than obtaining an official piece of paper with your name on it. It shows you are interested in your profession and learning to be a more capable technician. Certification demonstrates you are taking responsibility for your actions and the actions of any uncertified technicians you may train and supervise. It is not an ending but the beginning of the ongoing process of education and experience that makes a pest management professional.

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PHOTO AND ILLUSTRATION CREDITS: Michigan State University (Asian lady beetles), North Carolina State University (gradual and complete metamorphosis), Delaware Department of Health & Social Services (tick poster), Phil Nixon (house mouse, mouse trap, fly screening), University of Minnesota (deer mouse), Tom Murray (Norway rat, birds), Curt Colwell (restaurant inspection, DDT and label), SafeClean Service Brisbane (cockroach bait), Illinois Poison Center (poison emergency sticker), Delaware Department of Transportation (runoff), Alberta Agriculture and Rural Development (pesticide fates)

This document is available on the Illinois Department of Public Health website at: http://www.idph.state.il.us/envhealth/structuralpest.htm. For more information, contact the Illinois Department of Public Health, Division of Environmental Health, 525 W. Jefferson St., Springfield, IL 62761, 217-782-5830, TTY (hearing impaired use only) 800-547-0466.

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