Version 2.2

April 24, 2009

These are steps to reduce household hazards. People are not born knowing that they must brush their teeth to prevent decay, they must learn it. So with household hazards, they must learn how to take care of themselves. Occupants know things about the building and themselves that can be learned nowhere else. Start with the people.

The second step is to keep the household in a certain condition:

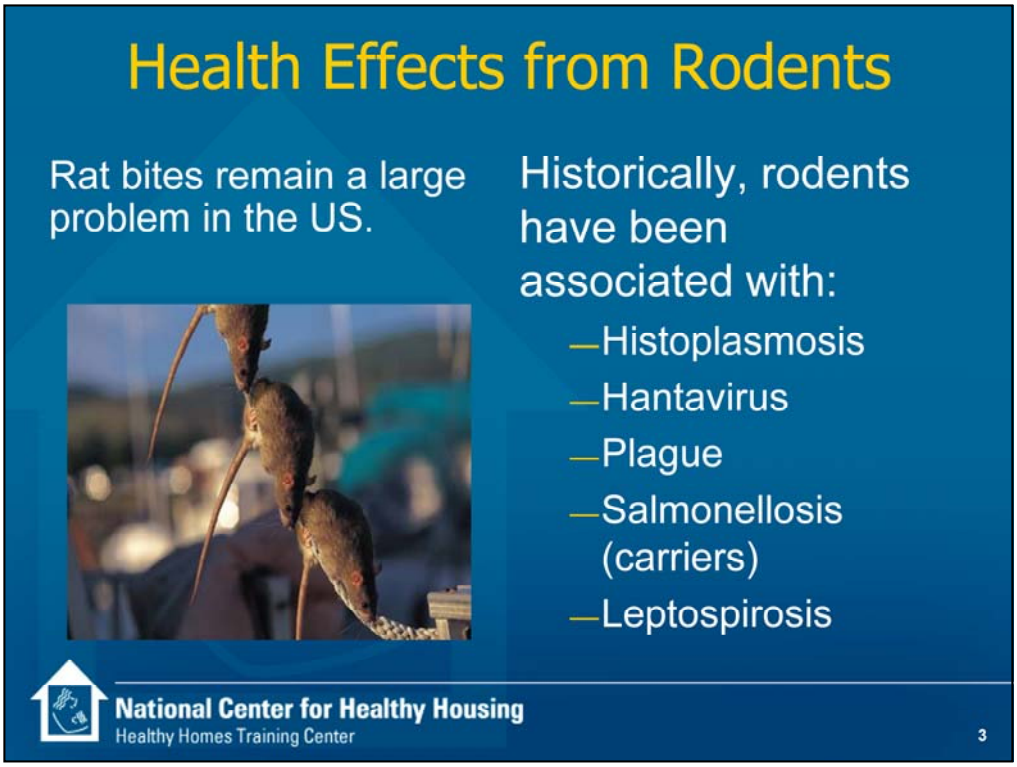
- limit moisture related problems,
- limit dust and allergens,
- limit pest borne disease,
- provide local exhaust ventilation and general dilution ventilation to control unavoidable air contaminants,
- provide a comfortable space by limiting hazards like slips, falls, electric shock, drowning and poisons.

Third, limit sources of contaminants like lead, asbestos, combustion fumes, VOCs (Volatile organic compounds) and radon.

Fourth, maintain the house so it continues to provide dry, clean, comfortable and safe conditions.

Why Pest Free?

- Between 1980 and 1994, the prevalence of asthma increased 75% overall.
- Some pests are associated with asthma or asthma symptoms:
  - Dust mites
  - Cockroaches
  - Mice dander



Rat bites remain a large problem in this country. In addition, rodents have been associated with a variety of diseases. [1]

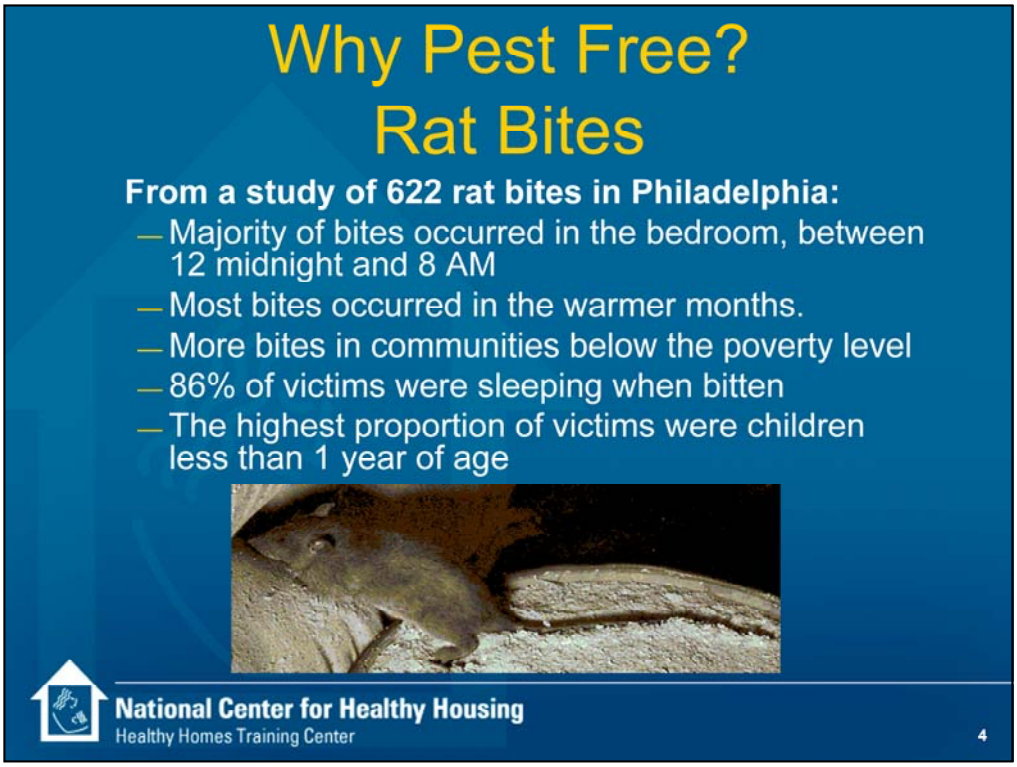
Histoplasmosis is a chronic respiratory infection that is caused by inhaling the spores of the fungus, Histoplasma capsulatum,which is found in bird, bat, and rodent droppings. A person infected usually complains of a fever, chills, a productive cough, or possible joint stiffness.

Hantavirus is a disease characterized by flu-like symptoms followed by respiratory failure. It is carried by rodents, especially deer mice, and is present in their urine and feces. Humans are thought to be infected when they are exposed to contaminated dust from the nests or droppings of mice.

The plague is a serious (sometimes fatal) infection caused by the bacterium *Yersinia pestis,* that can be accidentally transmitted to humans by the bite of an infected rat flea. Symptoms include chills, fever, vomiting, diarrhea, and painful swelling of lymph glands.

Rodents also carry salmonella. If this bacteria enters the body it can cause swelling in the lining of the small intestine, resulting in muscle cramping, diarrhea, fever, chills, etc.

Leptospirosis is an infectious disease caused by a particular type of bacteria called a spirochete. It can be transmitted by rats, skunks, raccoons, foxes, and other vermin. It can result in headaches, muscle aches, eye pain with bright lights, and neck stiffness.



Here are some interesting facts about rat bites discovered in Philadelphia. [1]

How Common are Pests?

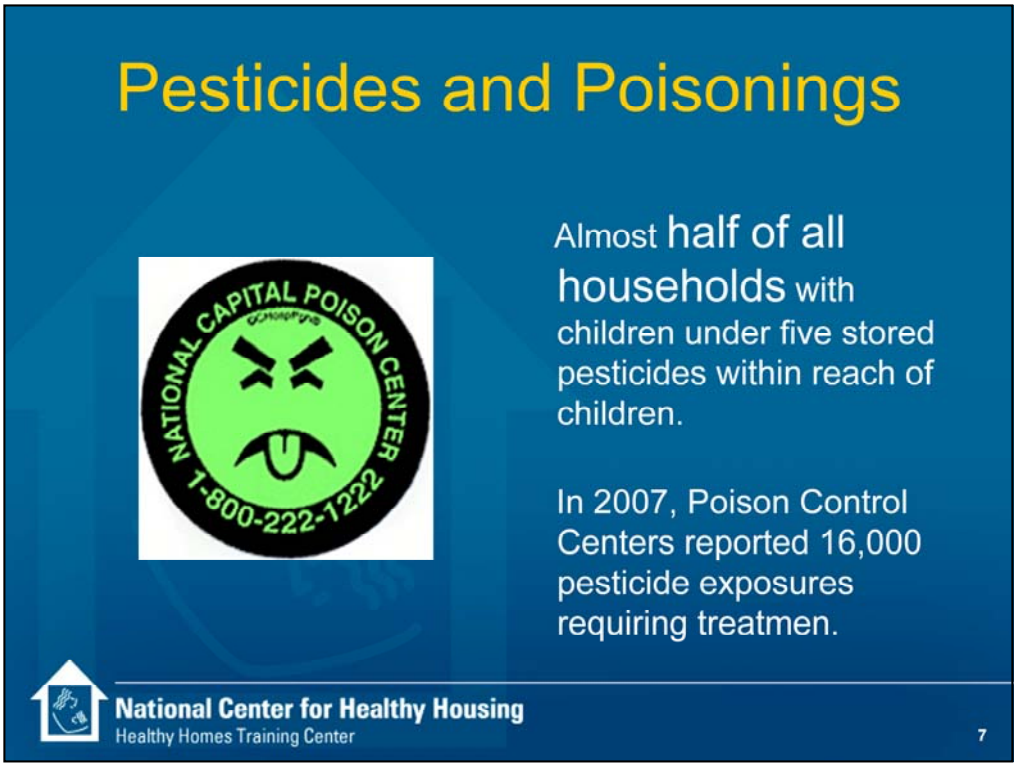
- Signs of rodents in last three months
  - Rats
    - 0.7%)homes overall
    - 1.0% for renters
    - 1.4% for residents below poverty level
  - Mice
    - 5.5% homes overall
    - 6.0% for renters
    - 9.0% for manufactured housing.
    - 8.1% for residents below poverty level.
- Cockroaches ,bed bugs and other pests not measured

From American Housing Survey – 2007

Pesticides are “toxic by design”. Therefore it makes sense to decrease their use in homes where children are present and may be exposed.

Acute effects include skin rash, headaches, dizziness, muscle pain and stomach cramps, nausea and vomiting, and breathing difficulties.

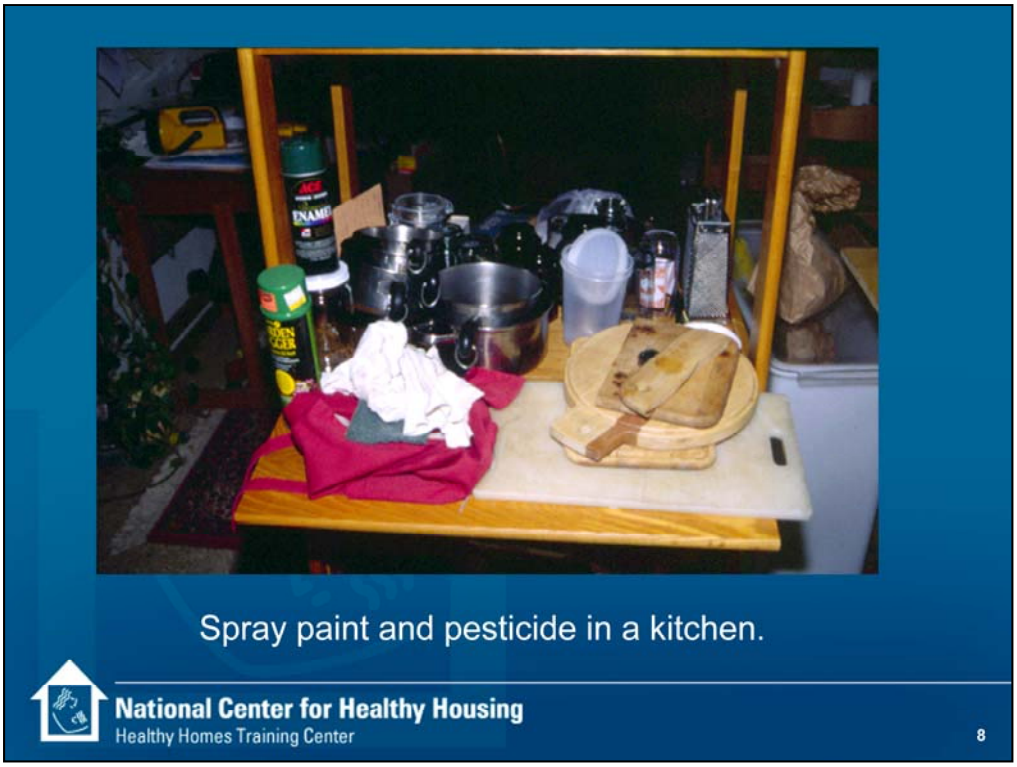
Chronic effect include cancer, reproductive effects, and effects on the central nervous system.



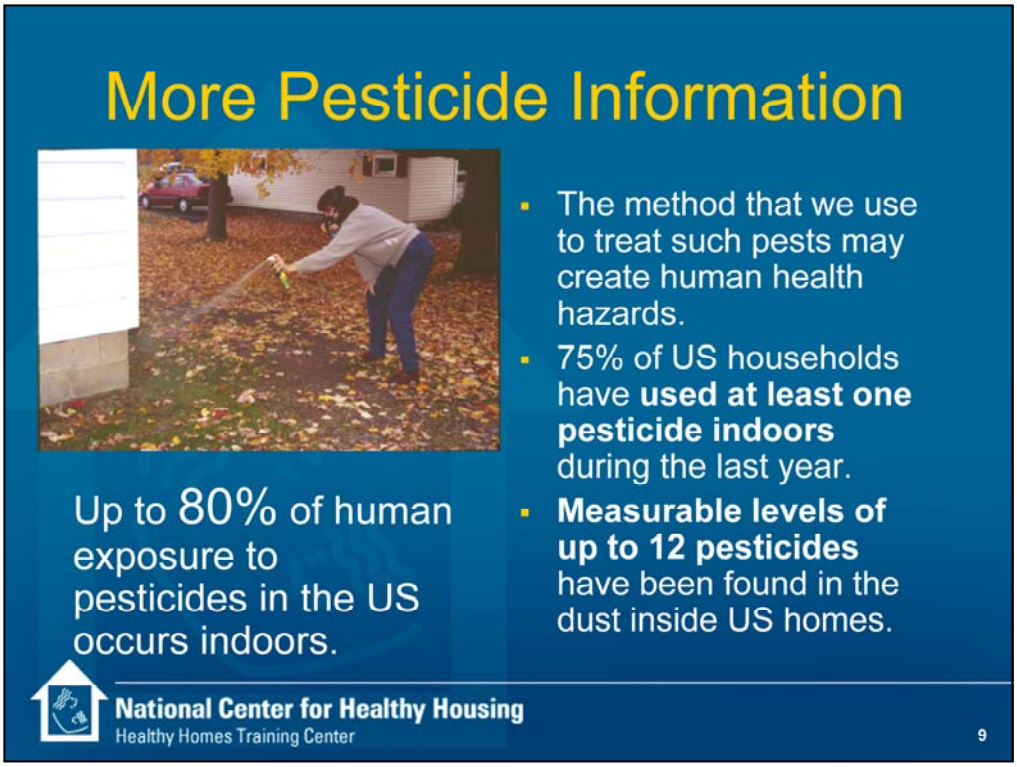
The American Association of Poison Control Centers reported 113,000 cases of pesticide poisonings. [2] Surprisingly, it is estimated that this figure represents only 1/4 to 1/3 of the total since most incidents were not reported to their registry.

2007 Annual Report of the American Association of Poison Control Centers' National Poison Data System: 25th Annual Report (17301), www.cdc.gov/mmwr/preview/mmwrhtml/mm5650a1.htm?s_cid=mm5650a1_e. There were 96,307 pesticide exposures – 44,644 involving children five years or younger. 15,965 exposures required treatment in a health-care facility.

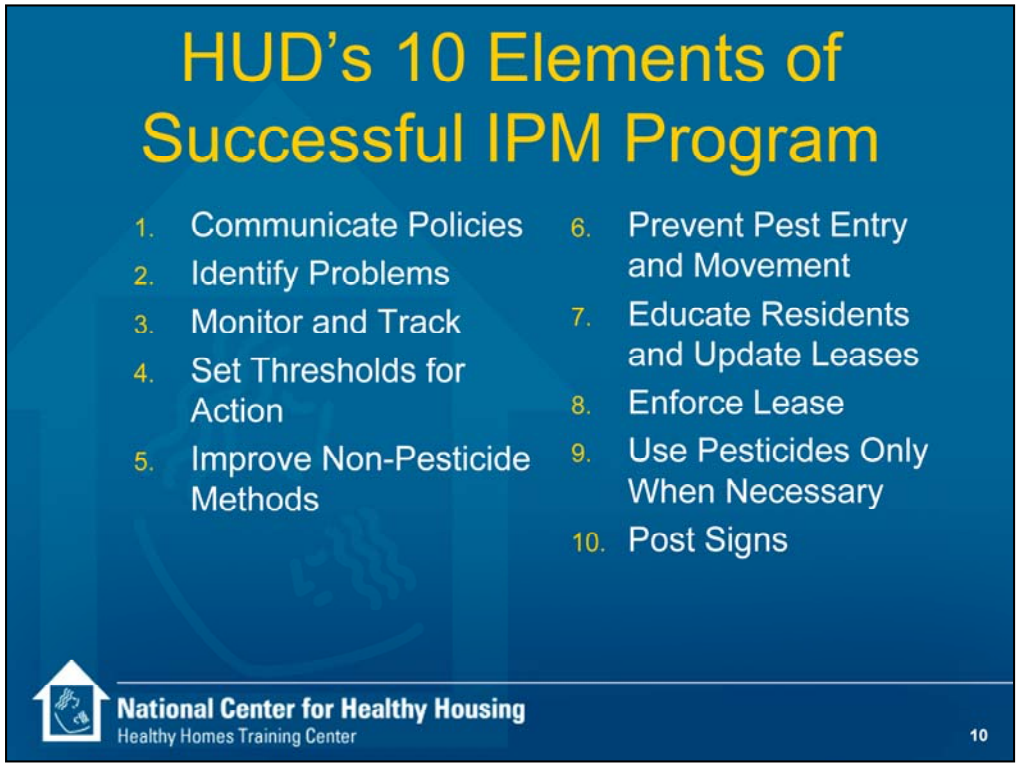
In 1971, Mr. Yuk was created by the Pittsburgh Poison Center at Children's Hospital of Pittsburgh. Since then, Mr. Yuk has been used to educate children and adults about poison prevention and to promote poison center awareness. In addition, Mr. Yuk has raised awareness that poison centers are available 24 hours-a-day, every day of the year to assist in the management of poisoning emergencies. [3]



Pesticide in a food preparation area.



If you think most people do not use pesticides, you are wrong. Here are some interesting statistics on pesticide use in the home. [4]



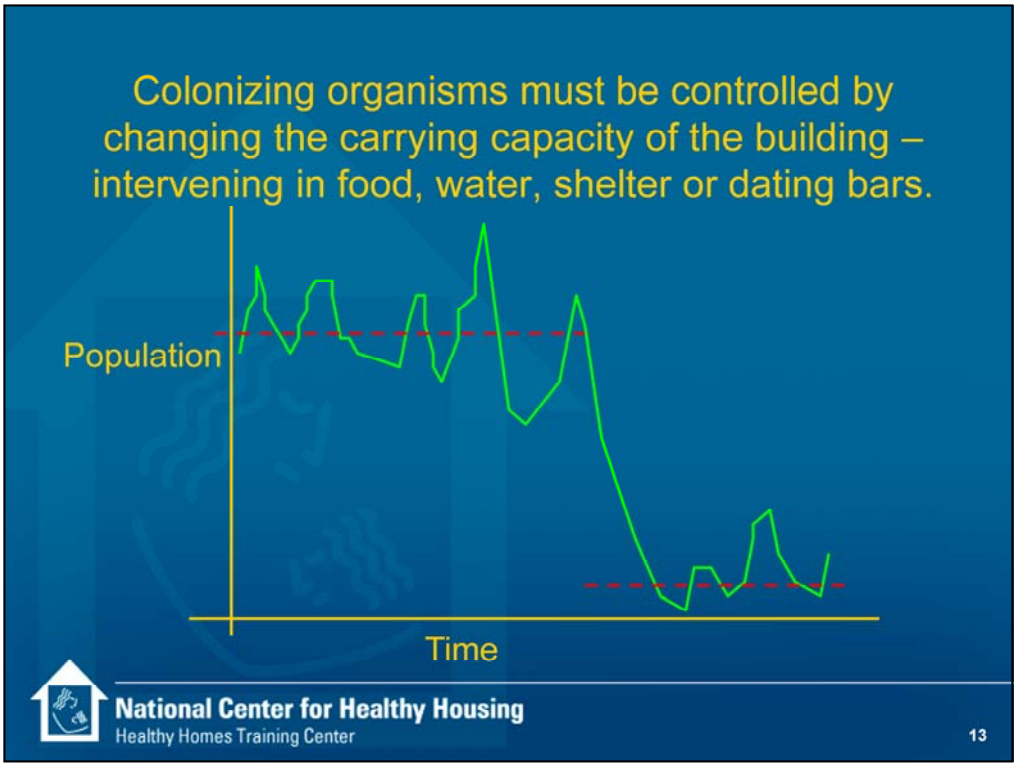
HUD's Guidance is on Page 34 of 48 in Reference Tab Codes Section

Integrated pest management can make dramatic reductions in both pesticide use and pest species. It can do an efficient job of getting rid of pests for the long-term, and reduce short-term and long-term environmental and health hazards associated with widespread pesticide use.

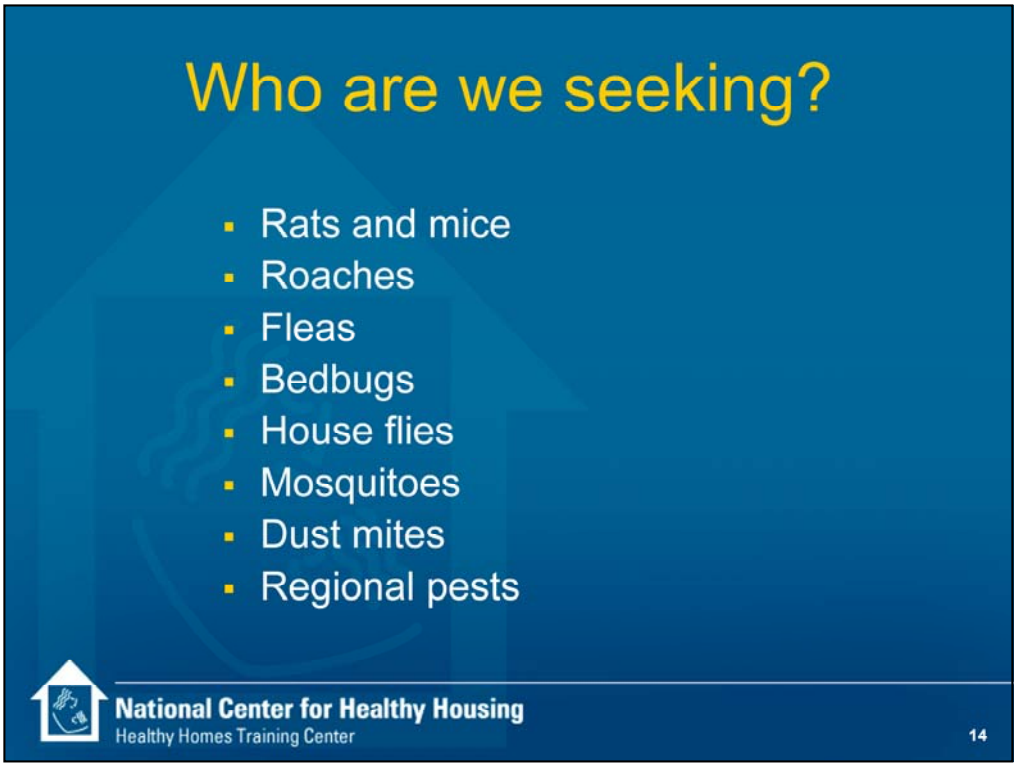
Creatures in houses are related to several health effects. Some of them, like dogs and cats, are invited, others are not. Dogs and cats, rodents, roaches and dust mites are all known to produce allergens.

Some animals, such as fleas, rodents, mosquitoes, and flies, carry diseases. Some sting (e.g. yellow jackets and bald-faced hornets). Some contaminate stored food (e.g.moths, rodents, mites, roaches, flies). And of course, termites can create extensive damage to the structure.

The most problematic animals are those that colonize. In this section we will focus on rats, bats, mice, roaches and dust mites that colonize.



Think of a building as having a carrying capacity for a given species. Carrying capacity is defined as enough food, shelter and water at the right temperatures to sustain some maximum number. Colonized for long enough the population will hover around the carrying capacity. If pesticides or trapping alone are used to decrease the population, the numbers will spring back to carrying capacity when the trapping or pesticide use stops. If, however, the entry points to the building, nest sites, food and water locations are sealed, the carrying capacity has been lowered. Removing pest food or storing human food (and food waste) in pest proof containers further lowers the carrying capacity. In a pest proofed building, pesticide use can be drastically reduced.



In this course, we have focused on the most common pest species.

Regional pests include:

- Brown recluse spider
- Fire ants
- Rabid animals

Look for signs that a building is colonized by pest species during an assessment. [5] All of them are looking for food, shelter, water and a date. Most of them are prey species, so they are uncomfortable when out in the open. The more you are able to think like the creature, the more you are able to identify signs that they are present.

The EPA Region 9 IPM for schools manual has fairly detailed information on many common species. [6]

"See the creature, be the creature"

A Cockroach's View

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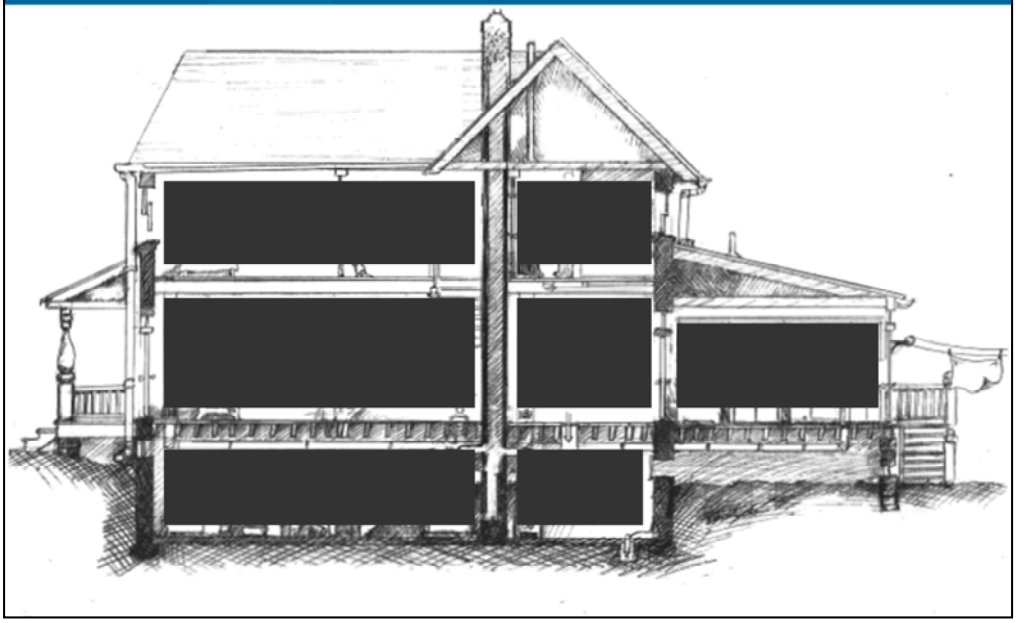
A Rat's View

A Person's View

A Cockroach's View



So . . . .

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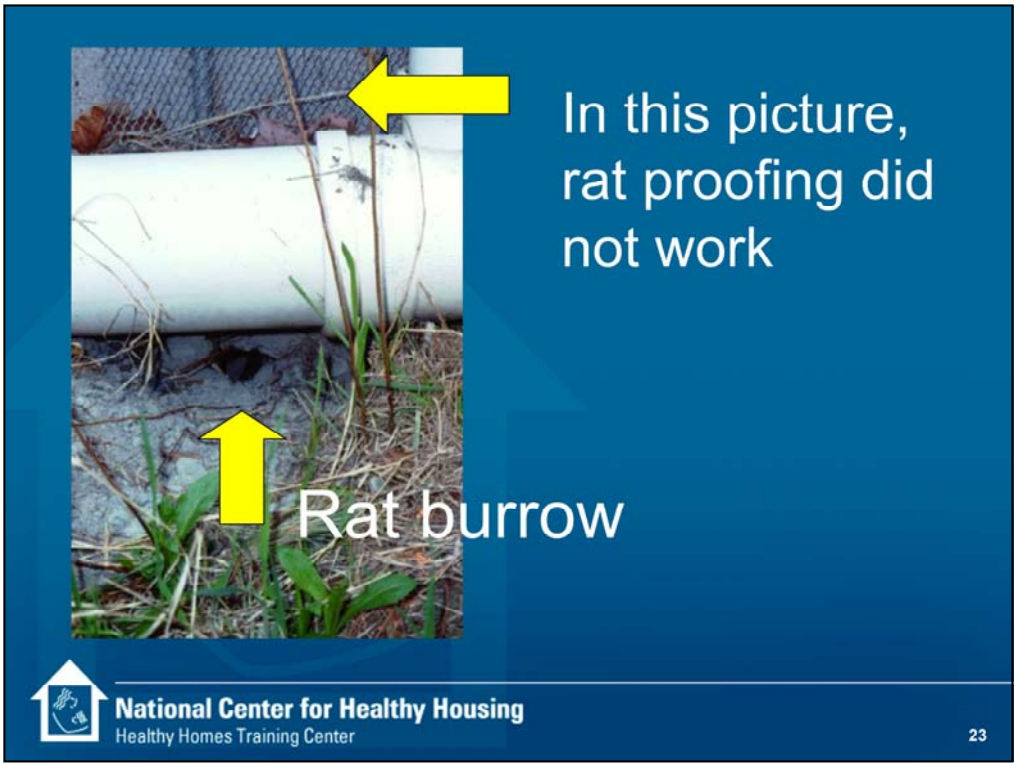
Look for signs of pests on the exterior of the house. The signs include:

- The animals or insect
- Droppings or urine
- Tracks
- Remains of meals
- Nests, gnaw marks
- Evidence of efforts at control (traps, baits, pesticides, stopped holes)

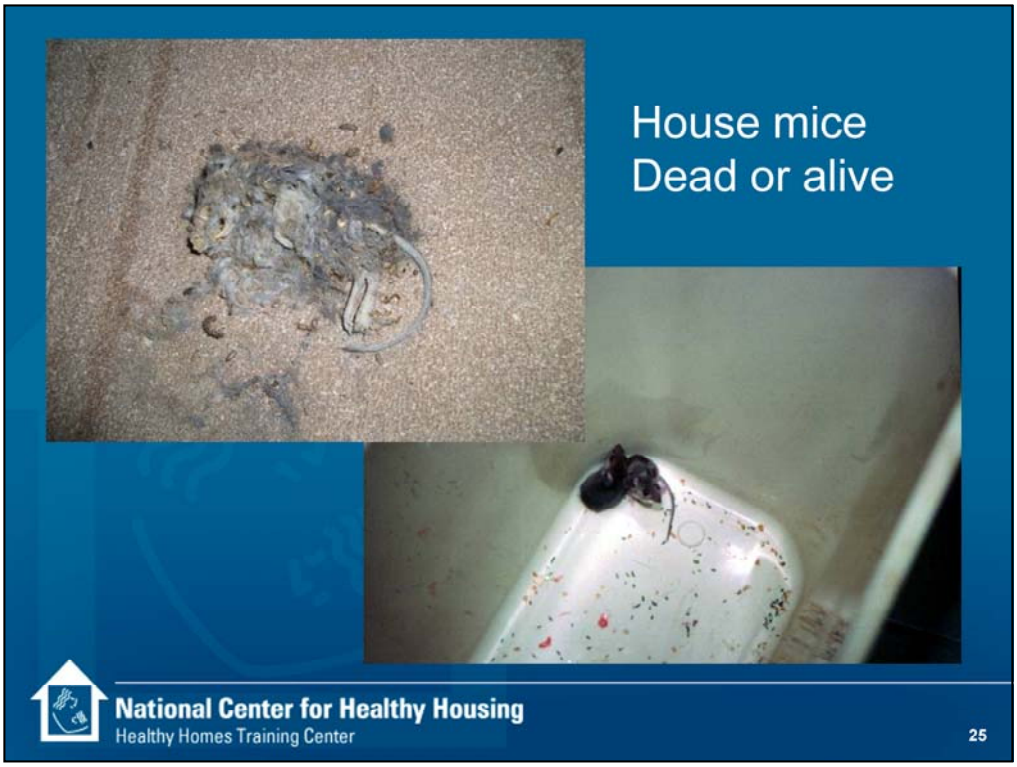
This starling has made a nest in the soffit where the siding has come loose.

Here is a raccoon entryway where the overhang and the roof come together.



Look for evidence of burrows or nests. Notice an ineffective effort to block the original entry point. Burrowing rodents may tunnel downward for several feet.

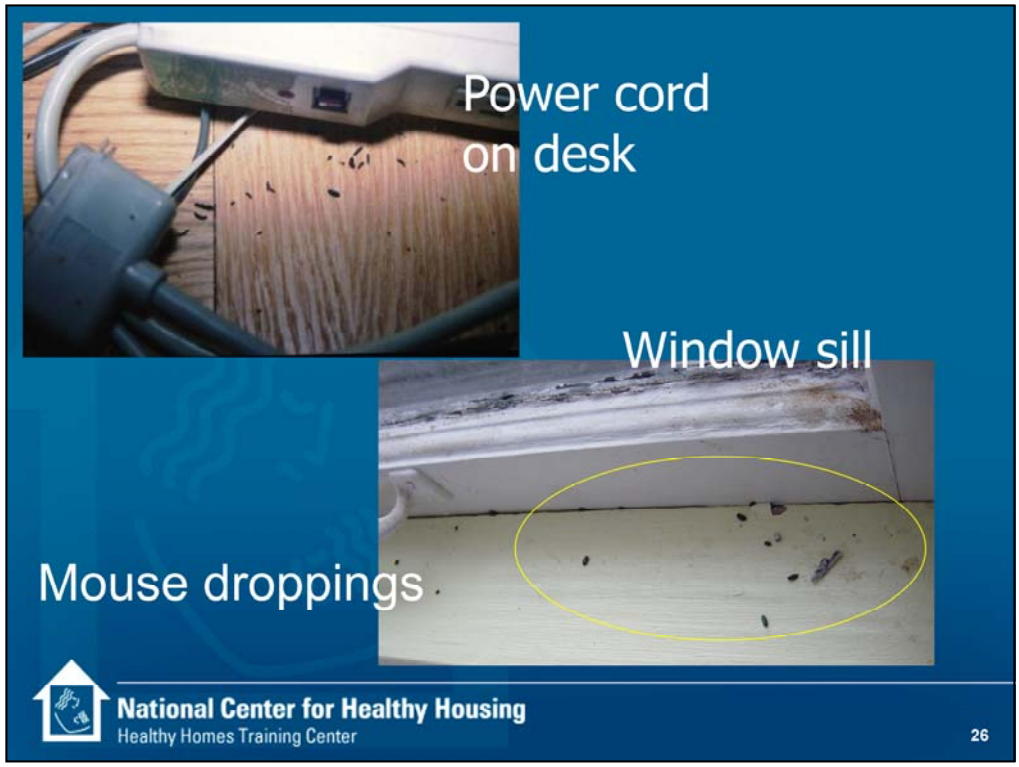
Look for standing water that may provide sites for mosquito larvae.



The top picture is the remains of a mouse. Both a dead and a live a mouse is an air quality issue.

Here is a picture of a couple of house mice who have trapped themselves in an empty waste basket by climbing in and being unable to climb out. A house mouse can squeeze through a hole ¼ inch by 3/8 of an inch. The skull is the limiting size because the bones don't calcify. They are ordinarily excellent climbers, however, the height, the rounded corners and the smoothness of the basket have defeated them. Generally, they don't travel more than a few dozen feet between home, food and water. They dribble urine wherever they go – leaving a trail of allergens. They also reproduce rapidly.

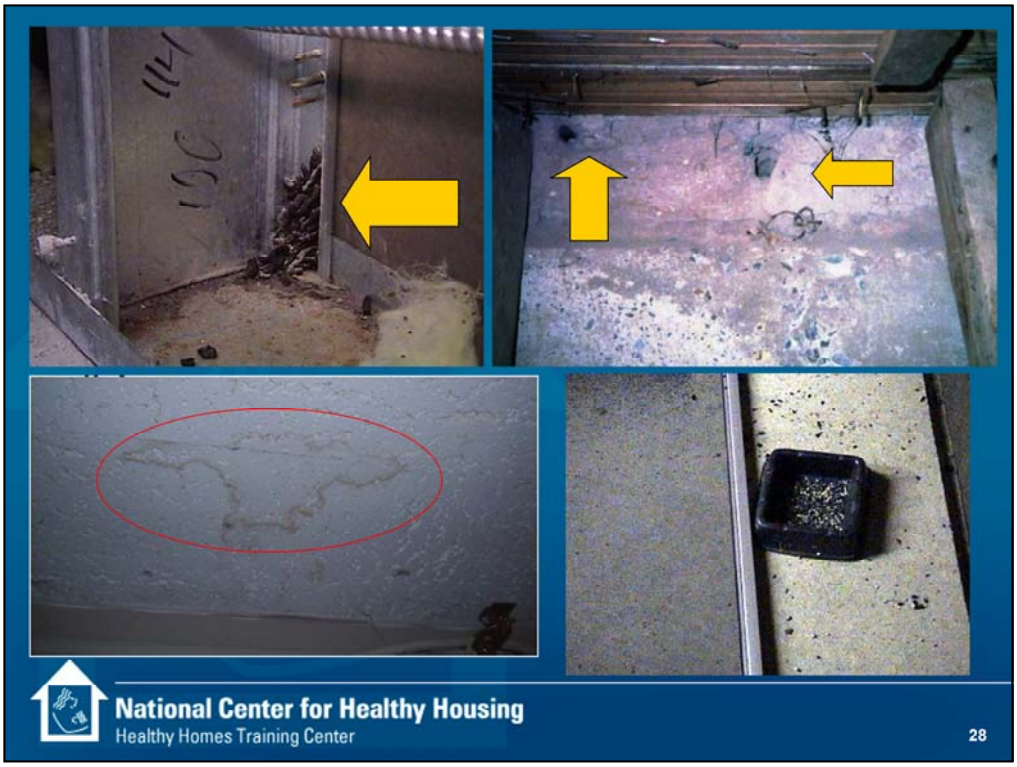
The bottom of the basket is covered with tiny mouse droppings.



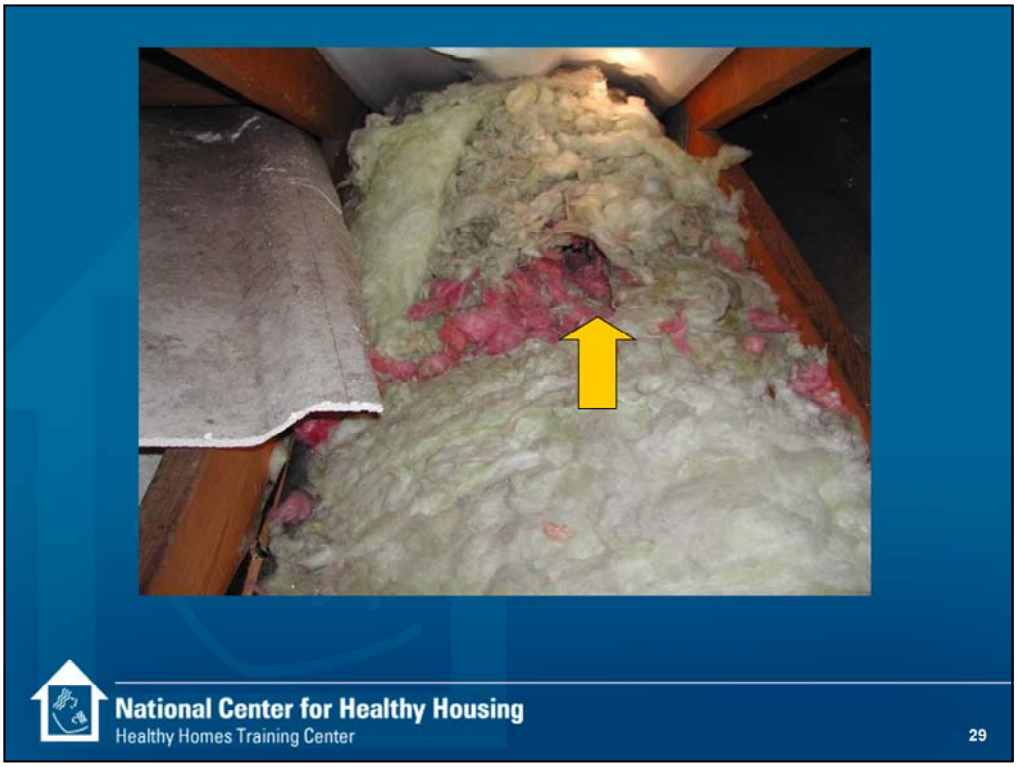
Look for mouse droppings in the hidden places where they may go. Mouse droppings are allergens.

Mice are creatures of habit. You can move furniture, disrupt patterns, and then you see more of them. Move and bait.

If there's a good food resource, keeping pests out becomes increasingly difficult. This is a picture of a rat getting into sacks of flour.



Top left shows rat droppings in a wall cavity. This causes an odor for years. Top right illustrates rat burrows in a clay wall in a basement. The bottom left picture is a stained ceiling tile below a mouse nest. Bottom right is an open, unsecured poison bait for rodents (note mouse droppings nearby). This picture illustrates that there is evidence that there is a pest problem.



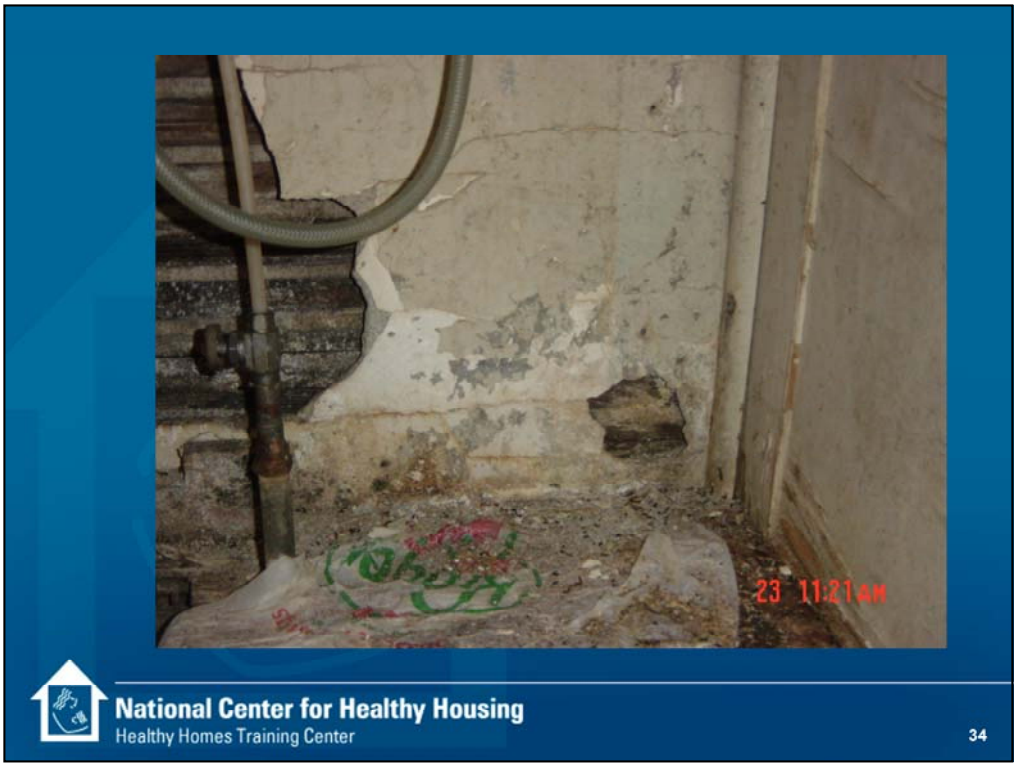
Here is a grey squirrel nest made from fiberglass insulation in an attic.

Here we have a living roach in the top picture. The lower pictures show a dead roach and roach droppings on a drawer bottom. Roaches like small cavities that they just fit in.

Top pictures show roach droppings in a bathroom and a kitchen cabinet. The bottom left shows shed exoskeletons in a light fixture. And the last picture is an American roach near an entry point into building, which is a floor drain.

Captured on Traps

Holes in the wall provide entry into the hidden passages of the wall, ceiling and floor cavities. These are likely harborage sites.



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Common tools for integrated pest management –

- Caulk gun, caulk: to seal openings and gaps
- Copper mesh: another way to seal around openings, particularly large ones unsuited for caulk. Called “Stuff It” hardware cloth, available from Allen’s Special Products Hatfield PA 800-848-6805. Steel wool can also be effective.
- Rubber gloves, N-95 respirator: IPM workers must keep themselves protected
- Sticky traps: used to investigate magnitude of pest problem
- Boric acid powder and a duster: to apply powder under and behind cabinets, appliances, etc.

A move to plastic bags makes food far more available to pest species than the rigid containers being replaced. The plastic container shown here is hard to climb, has an attached lid and seals well. Metal cans work well until they are battered and the lids lost or no longer fit.

A different kind of "no pest strip":

- Break up large areas of cover with wide stone/gravel walkways
- Keep all foliage at least 3ft (approx. 1m) from buildings
- Trim back any overhanging tree branches
- Many colonizing species are also prey species – they do not like open spaces

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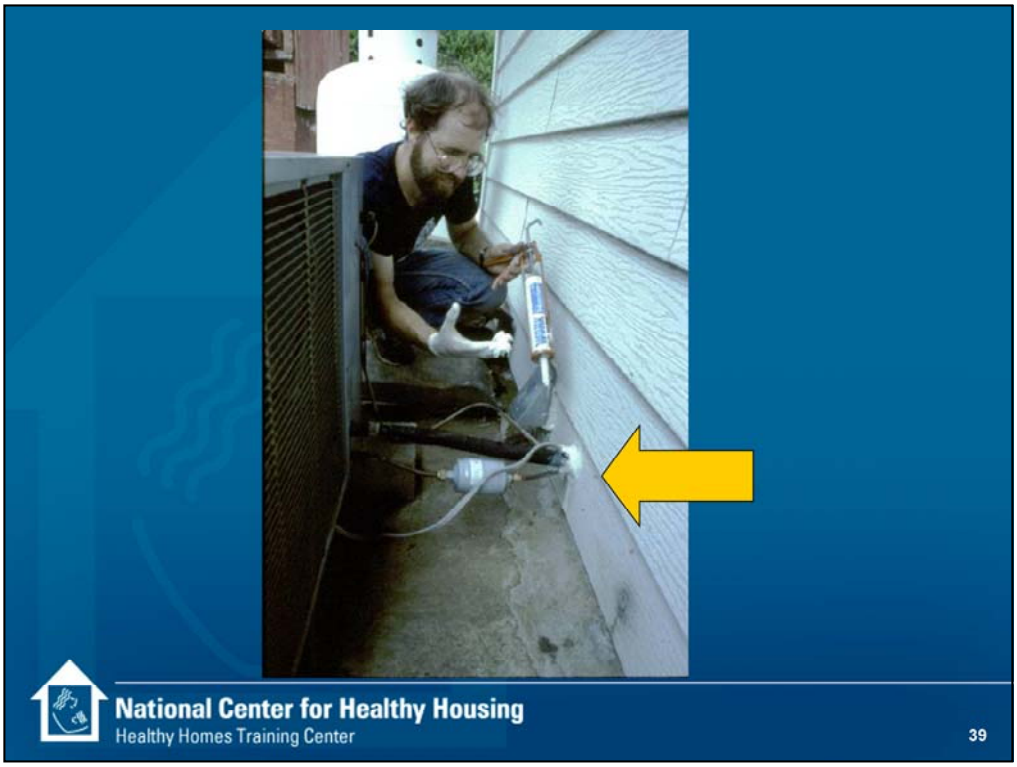
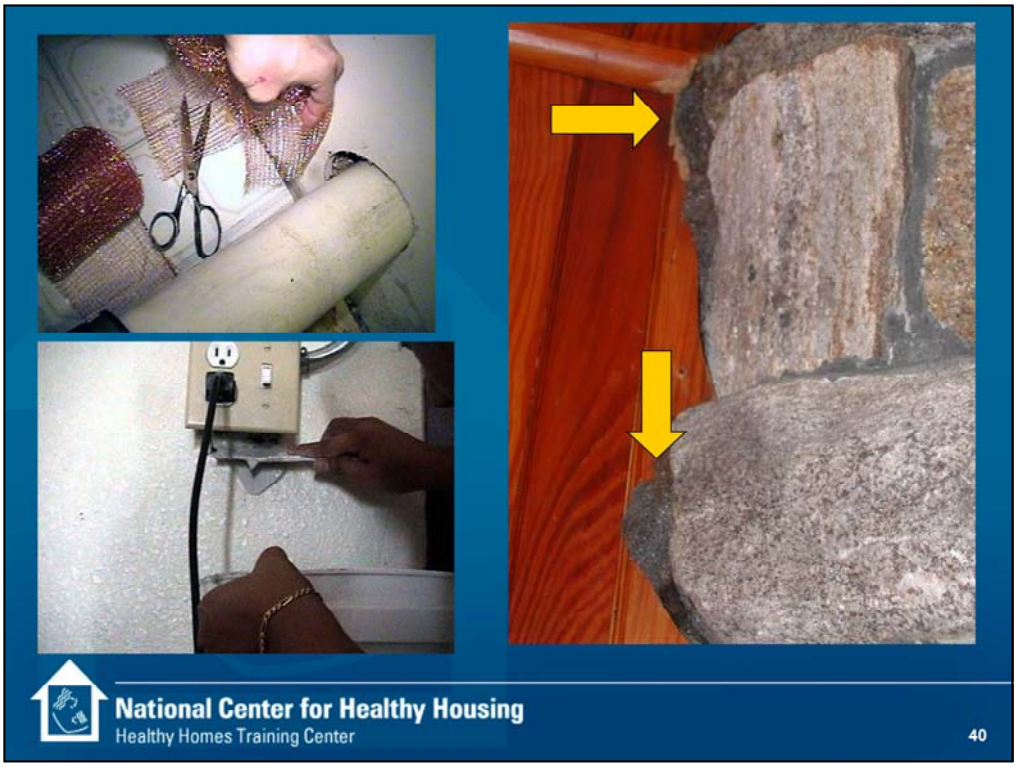
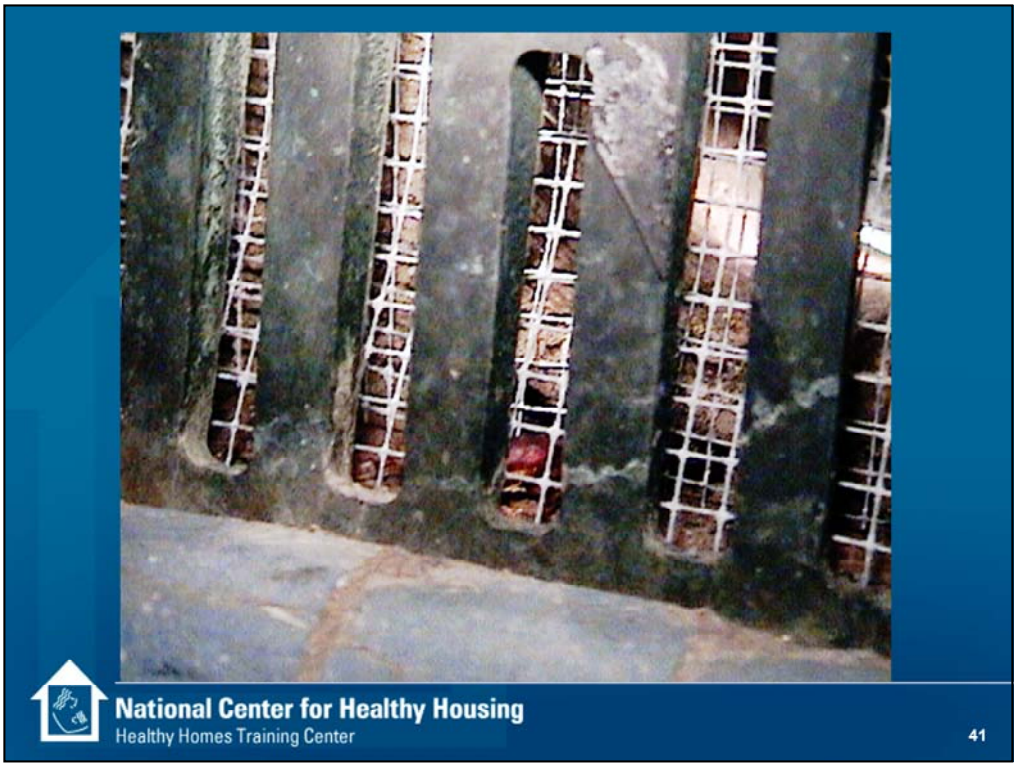
Landscaping the building so that it is unattractive to pest species can be a help.



Sealing the opening around the refrigerant lines for an air conditioner.

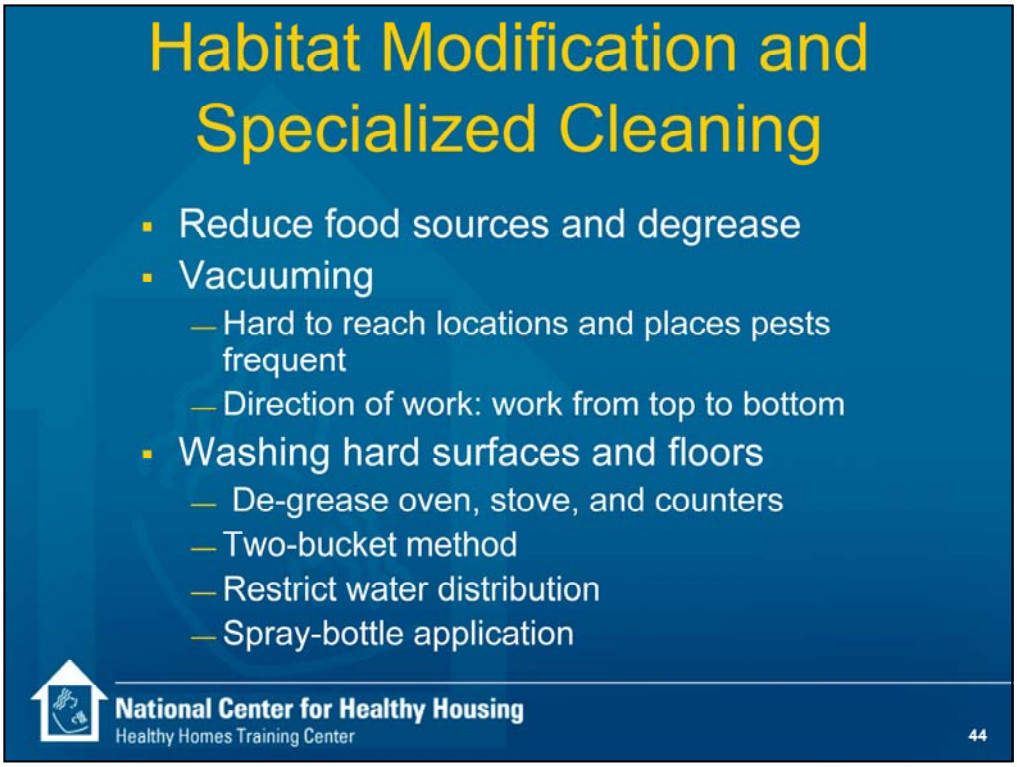


Copper mesh, plaster and steel wool are used to block mouse entryways. Steel wool eventually rusts. Copper mesh lasts longer and comes in rolls. Right picture is steel wool sealing up holes between stones.



Here an American roach peers through galvanized steel hardware cloth placed beneath a floor drain. This simple intervention rid a building of roaches.

In the upper right picture a bird mesh was used to prevent English sparrows from nesting in cavities in a porch area. The plastic owls work only temporarily. There is an osprey perched on the head of the plastic owl (upper left). Lower left picture shows a stainless steel wire to keep birds from perching on a ledge. Upper center picture shows a poorly placed wire with pigeon roosting behind it.



Vacuum: Use a HEPA vacuum or standard vacuum cleaner equipped with N-100 or P-100 air filters for all areas with evidence of vector/pest activity.

• Non-toxic way to remove rodent and cockroach fecal droppings, cockroach eggcases, cast skins, and bodies of insects, food particles, organic debris and other dust. Live insects that are removed will generally be killed by the vacuuming process.

• Remove vacuum bag at the end of the day, seal in a plastic bag, and discard (unless the bag can be burned).

• Vacuum locations: Window and door frames, wall moldings, picture frames and wall hangings, exposed conduits (e.g., pipes, wires, etc.), inside cabinets, drawers, and appliance voids (e.g., behind/under refrigerator and stove), furniture (including underside), baseboards, floors (use special carpet attachments and eliminate carpeting wherever possible).

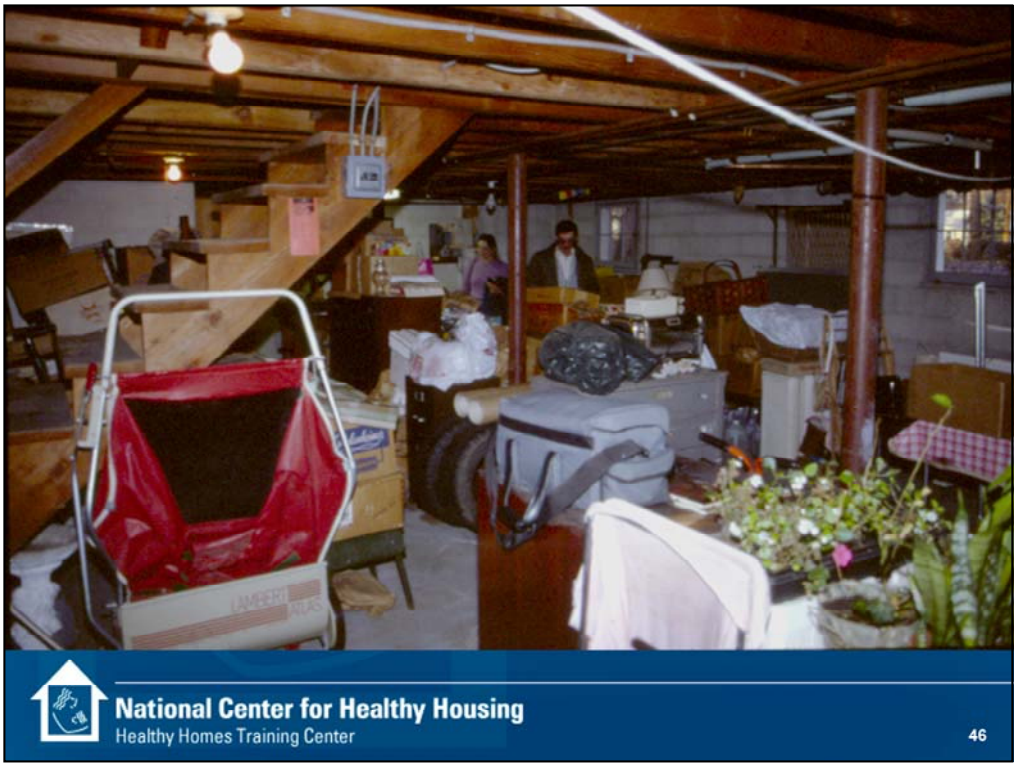
• Direction of work: Begin vacuuming or washing operations at highest locations working toward the lowest (ceiling toward floor) to collect all residual materials dislodged during the process.

Washing: Use the two-bucket method, one bucket with soapy water and one with clean rinse water. Change all water frequently.

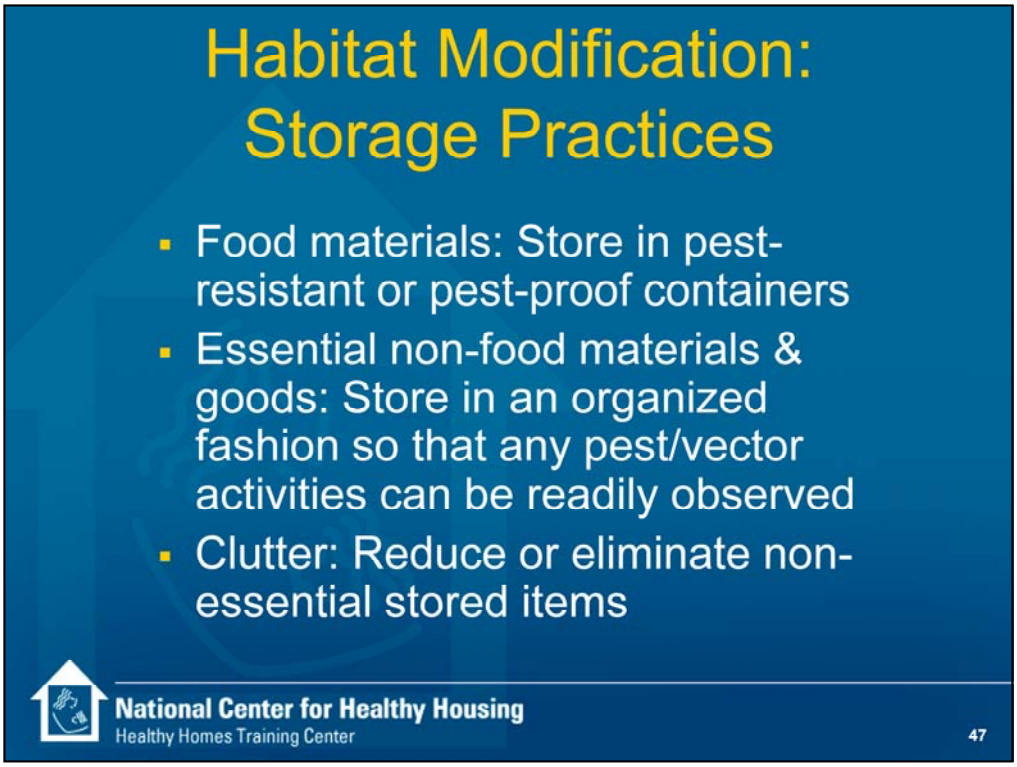
• Restrict amount of water being distributed to ensure fast drying and ensure no water left behind for pest/vector species. Never pour water directly onto the floor. Sponge mop generally restricts the amount of residual water better than a string mop. When done washing, rinse mops in hot water and hang to dry. Rinse buckets and turn over to dry.

• For washing some surfaces, use spray-bottle application of the soap solution, then rinse with sprayed-on clean water and wipe with a dry absorbent cloth (e.g., cloth diapers). Frequently change wiping cloths. Mechanically wash soiled cloths in hot, soapy water.

A super “spring cleaning” helps to find and remove creatures, food resources and allergen.



Clutter provides harborage and safe passage between food, water and a nest. Most of the species that colonize homes don't wander more than 30 feet to find food or water.



For food storage, use plastic containers with tight closing lids, metal tins, or glass jars with screw-on caps. Appropriate items should be stored in the refrigerator or freezer.

For non-food materials, long-term storage should occur on racks or shelving. Commercially metal products are available, but other materials including wood can be utilized. The bottom shelf should be 18 inches from the floor. Free-standing shelving should be placed at least 18 inches from any wall or other shelving units.

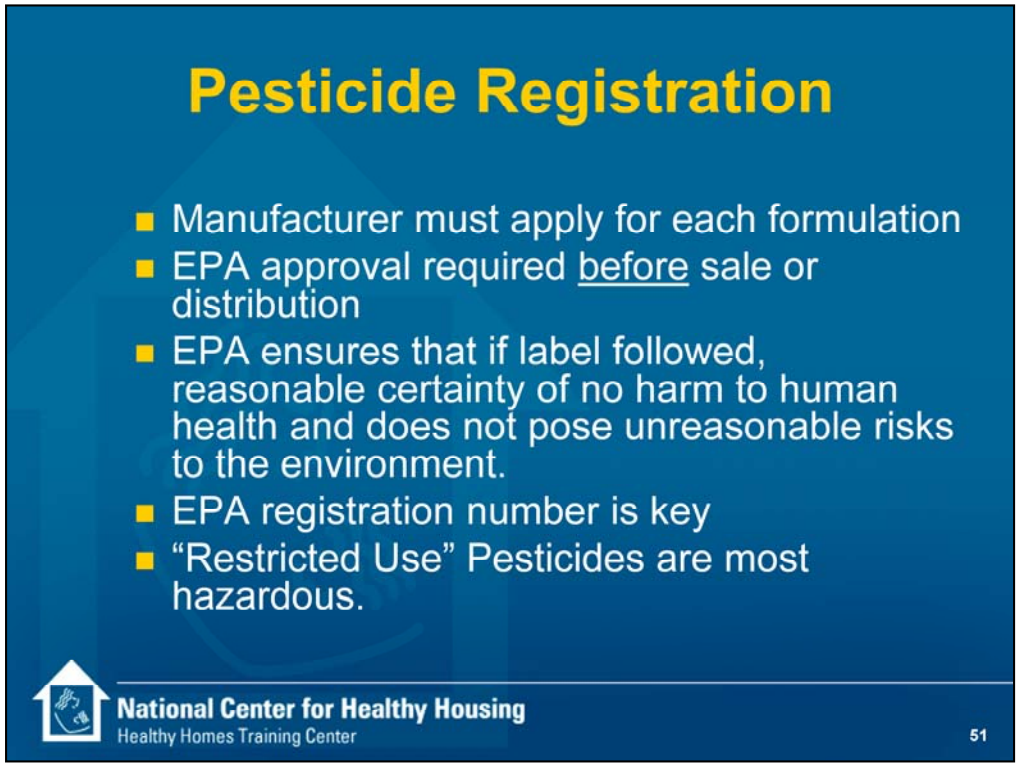
Clutter - Whatever can be eliminated should be recycled, donated to charity, sold, or discarded as rubbish.

Tight sealing plastic or glass food storage comes in a wide range of styles and prices. Simple zip-lock bags are effective for most insects.

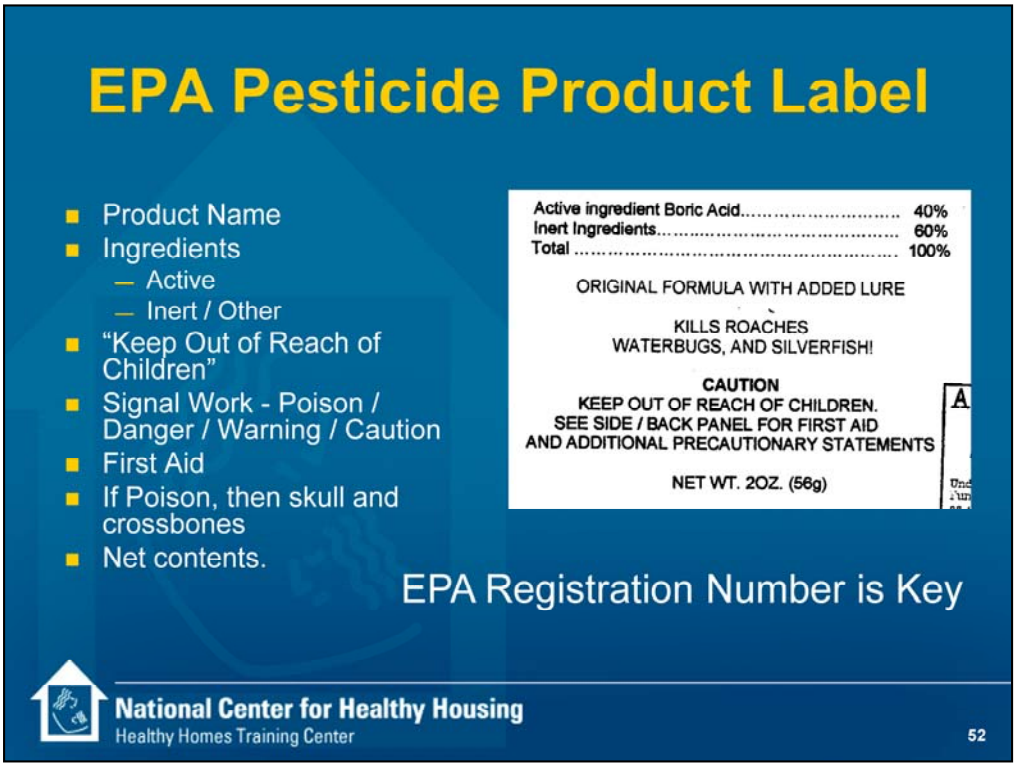
This photo shows misapplication of a pesticide. The pesticide is in the brown bait trap attached to the wall behind the valve. It was placed in this location because there is a hole through the wall where the water line and drain line come out. The cavities could have been lightly dusted with a low toxicity product like boric acid and then sealed with mesh and caulk or grout. Thus the pesticide would have been out of reach of pets and children and harborage sites would have been reduced.

Federal Pesticide Law

- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) administered by Environmental Protection Agency
- Pesticide – Broad term includes anything that kills or repels:
  - Insects
  - Plants
  - Rodents
  - Fungus
  - Mold
  - Microbes



See http://www.epa.gov/pesticides/about/aboutus.htm for more information.



EPA approves the language and layout for the label on every pesticide. Copies of all labels are available on-line at www.epa.gov/pesticides/pestlabels/. For labeling requirements, see www.epa.gov/oppfead1/labeling/lrm/.

EPA requires that the front panel include the information identified above. Back panel typically includes:

- EPA Registration Number - identifies the manufacturer/formulator and the product.
- Company Name and Address
- Precautionary Statements
    - Hazards to Humans and Domestic Animals
    - First Aid
    - Environmental Hazards
    - Physical or Chemical Hazards
- Directions for Use
- Storage and Disposal
- Warranty Statement (voluntary)
- Worker Protection Labeling

The product name was excluded to avoid appearing to endorse a particular product.

Are these labels?

When conducting your assessment, you should also look for illegal pesticides in the home. Illegal pesticides are often much more toxic than registered pesticides (those that EPA has approved).

Illegal naphthalene moth repellent products – Mothballs pose a hazard to young children. Mothballs can be easily mistaken for candy, or simply tempt young children to touch and play with them. Recent studies have linked naphthalene to illnesses, including nasal cancer. Widespread sale and distribution of these products make illegal mothballs a particular concern.

Illegal Insecticide Chalk is also known as "Miraculous Chalk" or "Chinese Chalk." You may have seen the chalk in a neighborhood store or sold on the street for about $1 a box. It is mostly imported illegally from China and often bears a label in both English and Chinese. Sometimes the manufacturer claims that the chalk is "harmless to human beings and animals" and "safe to use." These claims are untrue and dangerous.

"Tres Pasitos" is imported illegally from Mexico and other Latin American countries. Its name means "three little steps" in English, because after eating it, this is all mice can muster before dying. The active ingredient (or the chemical that actually kills the pest) in "Tres Pasitos" is a chemical called aldicarb. EPA considers aldicarb to be a very toxic chemical - and one that should never be used in your home. Children are especially vulnerable to poisoning by aldicarb when it is sprinkled around the home to control roaches, mice and rats. Exposure to high amounts of aldicarb can cause weakness, blurred vision, headache, nausea, tearing, sweating, and tremors in people. Very high doses can kill people, because it can paralyze the respiratory system. What "Tres Pasitos" does to pests, it can also do to you.

Recommend disposal of pesticides and use of integrated pest management as a “safer” alternative.

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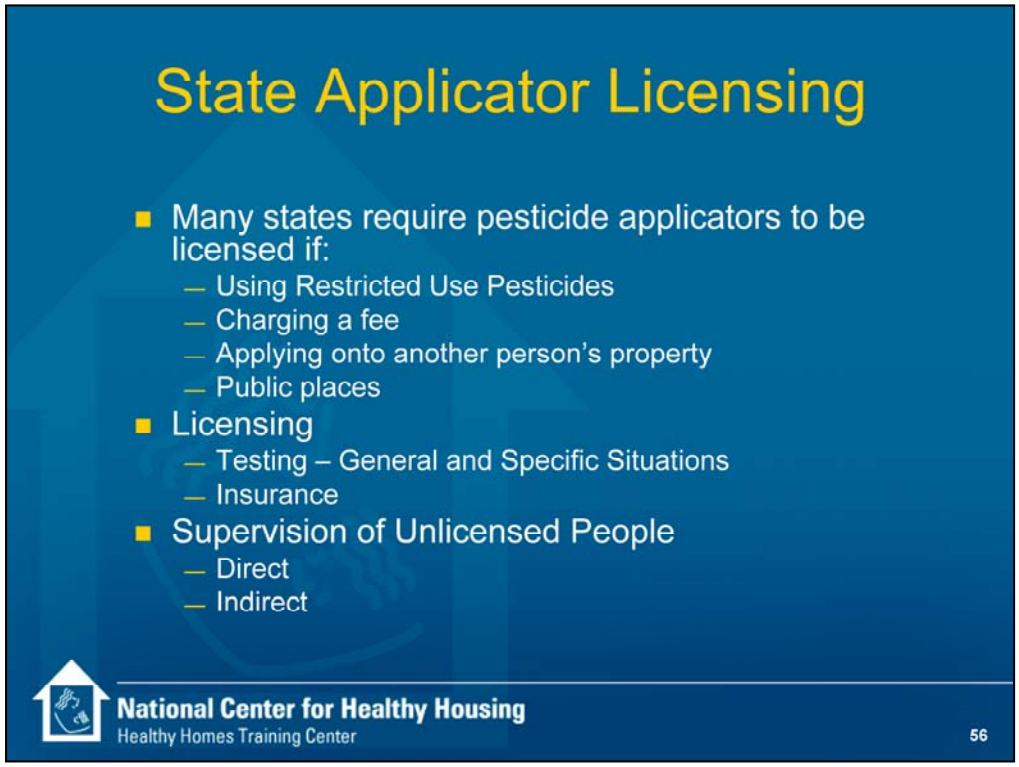


See http://www.epa.gov/pesticides/enforcement/enforcement.htm for more information.

Code Requirements Related to Pests

- **EXTERMINATION.** The control and elimination of insects, rats or other pests
  - by eliminating their harborage places;
  - by removing or making inaccessible materials that serve as their food;
  - by poison spraying, fumigating, trapping or by any other approved pest elimination methods.
- **INFESTATION.** The presence, within or contiguous to, a structure or premises of insects, rats, vermin or other pests.
- **308.1 Infestation.**
  - All structures shall be kept free from insect and rodent infestation.
  - All structures in which insects or rodents are found shall be promptly exterminated by approved processes that will not be injurious to human health.
  - After extermination, proper precautions shall be taken to prevent reinfestation.

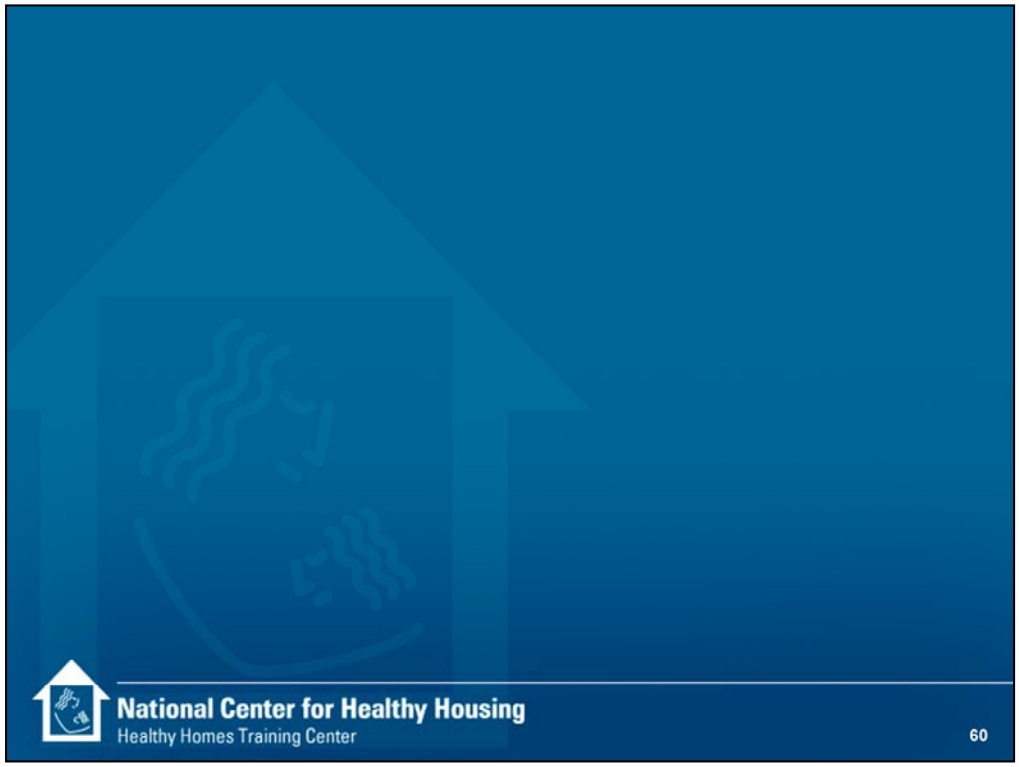
Code Requirements Related to Pests

- **302.5 Rodent harborage.**
  - All structures and exterior property shall be kept free from rodent harborage and infestation.
  - Where rodents are found, they shall be promptly exterminated by approved processes which will not be injurious to human health.
  - After extermination, proper precautions shall be taken to eliminate rodent harborage and prevent reinfestation.

- **304.14 Insect screens.**
  - During the period from [DATE] to [DATE], every door, window and other outside opening required for ventilation of habitable rooms, food preparation areas, food service areas or any areas where products to be included or utilized in food for human consumption are processed, manufactured, packaged or stored, shall be supplied with approved tightly fitting screens of not less than 16 mesh per inch (16 mesh per 25 mm) and every swinging door shall have a self-closing device in good working condition.

Code Requirements Related to Pests

- **308.2 Owner.** The owner of any structure shall be responsible for extermination within the structure prior to renting or leasing the structure.
- **308.3 Single occupant.** The occupant of a one-family dwelling or of a single-tenant nonresidential structure shall be responsible for extermination on the premises.
- **308.4 Multiple occupancy.** The owner of a structure containing two or more dwelling units, a multiple occupancy, a rooming house or a nonresidential structure shall be responsible for extermination in the public or shared areas of the structure and exterior property. If infestation is caused by failure of an occupant to prevent such infestation in the area occupied, the occupant shall be responsible for extermination.
- **308.5 Occupant.** The occupant of any structure shall be responsible for the continued rodent and pest-free condition of the structure.
  - **Exception:** Where the infestations are caused by defects in the structure, the owner shall be responsible for extermination.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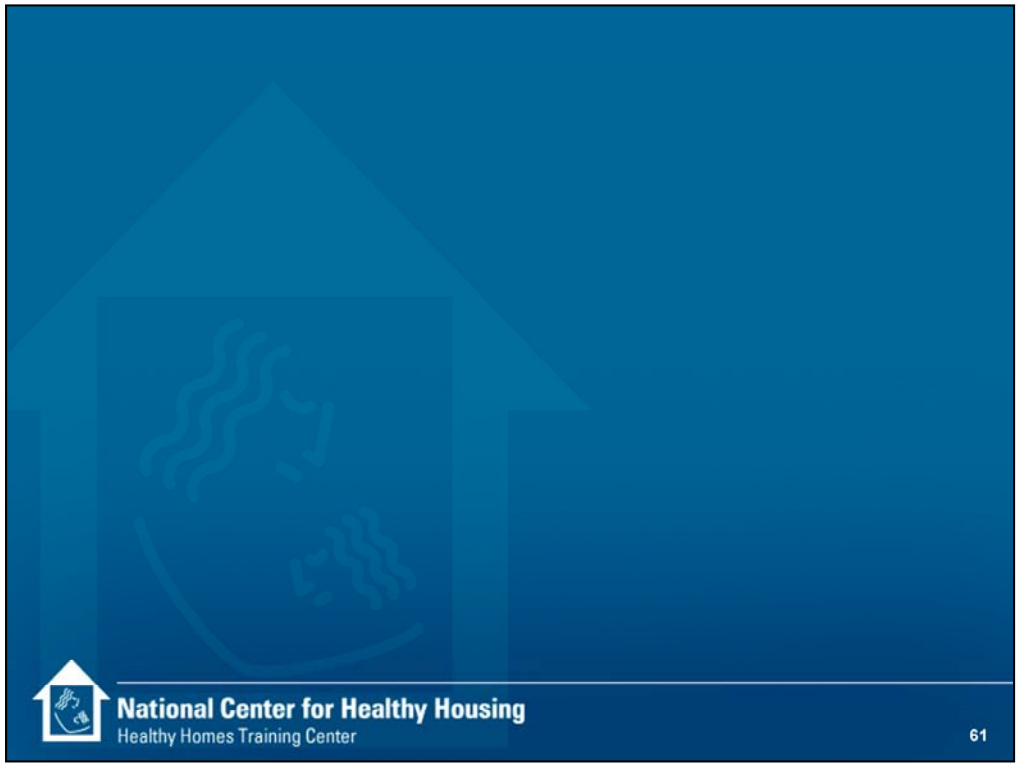
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Go to www.csrees.usda.gov/Extension/ to find your local cooperative extension system office.

Key Messages

- Pests can create allergens and be vectors of disease.
- Control of pests through pesticides can lead to poisonings and other neurological problems.
- Some pesticides found in homes have been banned.
- Make house less hospitable for pests. Prevent entry, control food, water, and places for shelter.
- Integrated Pest Management is the recommended strategy.

Learning Objectives

- Name three illnesses or injuries associated with pest infestation.
- Identify three clues of pest infestation.
- Identify the three strategies associated with an IPM approach.
- Name two illegal pesticides that may be used in the home.

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