

**BUREAU OF ENVIRONMENTAL HEALTH
Indoor Air Quality Program**

**Bed Bug Protocol for Public Buildings
and Other Non-Residential Settings**
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Introduction

The Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH) has received calls regarding bed bugs in office settings. As bed bugs continue to be a concern nationally, the MDPH/BEH anticipates being involved in infestations occurring in offices.

Unfortunately, the prevalence of bed bugs in the hotel industry and in multi-unit housing across the United States has become much more common. Bed bugs are becoming an increasing problem in many cities and towns. This may be because more people are traveling out of the country to places where bed bugs are a problem. Public health and housing officials have encountered bed bug infestation in both single and multi-family housing units. In the past few years, there have also been reports of bed bugs in the workplace in the United States. MDPH has provided recommendations for addressing infestation in office settings. Fortunately, the MDPH recommended methods to address these isolated incidents have been successful in eradicating the presence of bed bugs.

The purpose of this protocol is to provide a framework for prompt response to the emerging problem of bed bug infestation in state-owned or operated properties. Please note that state-owned properties are required by Executive Order No. 403 Massachusetts state agencies to use Integrated Pest management (IPM). IPM programs use information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM methods include **all of the following**: prevention of bed bug infestations, monitoring and identification of bed bugs, **and** the use of comprehensive, coordinated pesticide applications for the eradication of a confirmed bed bug infestation.

What are bed bugs?

Bed bugs are reddish-brown, flat, oval, wingless insects. If you look closely, you can see short, golden-colored hairs on an adult bed bug such as that shown in Figure 1. They give off a musty, sweetish odor. After they eat, they become swollen and dark red. Bed bugs are hardy and can live for up to 18 months without feeding.



Figure 1. Adult bed bug

Bed bug eggs are white and pear-shaped. When they first hatch, bed bugs are clear, and lighter in color. As they get older, they become browner.

Bed bugs feed on the blood of people and animals. Unlike mosquitoes, bed bugs do not transmit diseases to people. They typically live in bedding in homes, and usually bite at night when people are sleeping. They do not have wings and cannot fly, but can be transported by “hitchhiking” on personal belongings. Bed bugs are typically slow moving and prefer to stay

close to their meal source (e.g., in a mattress at a home); however, people can unknowingly carry them into an office building.

Monitoring and Prevention

All state facilities should have a pest management plan in place, including a contract with a pest management professional that can conduct monitoring for bed bugs and other pests. A permanent inspection and monitoring program for bed bugs and other pests may be necessary to prevent any bed bugs introduced by employees or visitors to office buildings from spreading.

Prevention and monitoring methods for pests, including bed bugs, typically include:

- Reducing clutter in offices/cubicles that can provide harborage for pests
- Using glueboard or other traps to monitor for pests
- Keeping records for all pest sightings (e.g., date, location)
- Identifying all pests by a pest management professional
- Inspecting areas where pests are sighted
- Physically removing pests through cleaning

In the experience of the MDPH, if bed bugs are confirmed in an office space, use of pesticides promptly and comprehensively is necessary for eliminating them. Several cycles of cleaning, inspecting, and pesticide application may be necessary to eliminate bed bugs. Maintaining a pest-free environment requires the commitment of both building management and occupants.

Responsibilities of building management and administrators

- Eliminate bed bug hiding spots (e.g., peeling paint, breaches/cracks in floors or walls)

- Encourage staff to report pests, including bed bugs, seen in the building
- Raise staff awareness about pests and bed bugs by educating staff on
 - Recognizing bed bugs, their signs, and their bites
 - Identifying bed bug and knowing their habits
 - Actions for reducing the risk of spreading bed bugs
- Maintain a log book of pests reported by staff, including:
 - Date of concern
 - Concern type (bites, bug sighting)
 - Room or unit number
 - Date of inspection
 - Inspection results and follow-up
- Respond to occupant concerns of bed bugs by conducting an inspection of the space
- Inform staff of any findings regarding biting insects (e.g., bed bugs, fleas)
- Follow Identification, Inspection, and Notification procedures outlined below

Responsibilities of staff

- Maintain an orderly office/work space
- Reduce clutter
- Report pests in the building
- Notify supervisor if bed bugs are suspected in home

Inspection, Identification, and Notification

Incident Reporting

If a bed bug is reported, the office manager/area director should interview staff to determine the location and time of bed bug sighting. The suspected bed bug should be collected following the instructions provided in the **Inspection – Specimen Collection** section of the protocol.

The Agency Human Resources Director shall work with the office manager/area director and various agencies to provide information to staff in impacted areas regarding updates and pesticide application following confirmation of a bed bug. See “Additional Information/Who to Contact” below for more details.

Inspection

Once a suspected bed bug has been reported to the aforementioned groups, a thorough inspection should be conducted in an area where bed bugs are suspected. The inspection should be conducted immediately. The purpose of an inspection is to determine the level and extent of a potential infestation. The suspect area should be isolated immediately to the greatest extent possible, and access to the area should be limited to prevent unintended spread of the bed bug, since bed bugs can “hitchhike” from one location to another. The office area manager together with the property manager (leased space)/facility manager (state-owned facility) and the licensed pest control provider shall examine the area of concern.

Bed bugs hide in very small spaces. A professional pest manager should be prepared with tools to inspect cracks and dismantle furniture, and lift carpets. An inspection tool kit may include, but is not limited to:

- Strong flashlight
- Magnifying glass
- Thin blade, spatula, or probing tool
- Screwdrivers, wrenches, and other tools for disassembling furniture
- Plastic zip top bags and/or clear tape for collecting specimens
- Glueboard traps to be placed in suspect area(s)

In the experience of MDPH/BEH staff, common hiding sites are crevices of chairs. A thorough inspection of chairs includes examining spaces between the chair cushions, the underside of the chair, and chair wheels. Bed bugs may also be found around outlet covers, under raised floors, behind wall coving, inside room dividers and in cubicle walls or other cloth-bound furniture.

Any specimen observed during this inspection should be collected; the date and location of where the specimen is collected should be noted. If an infestation is observed in a chair or other movable piece of furniture, the item should be bagged and labeled as containing bed bugs. The item may be discarded once examined by a licensed pest control provider.

Specimen Collection

Any pests observed during the inspection should be collected for identification. A suspected bug or egg may be collected by using tape to lift the suspect body, folding the tape over so that stick sides can adhere and seal the specimen, and placing taped specimen in zip top bag. If a specimen is located within a crevice, a probing tool may be used to gently coax the bug out. **Keep specimen(s) as intact as possible.**

Bed Bug Detecting Dogs

Bed bug detecting dogs have been used in a number of instances as a way of locating bed bugs within an office both during the initial inspection and during follow-up assessments (about one month after pesticides have been applied). The handlers of detection dogs should be recognized by a certifying organization, such as the National Entomology Scent Detection Canine Association. It is important to note that while dogs may be useful as a tool in identifying suspected bed bugs, they are not always accurate. The services of a bed bug detecting dog should be combined with a trained pest control professional to reduce the problem of “false positives.” If a dog identifies an area or object of concern, the pest control technician should examine the location or material for positive identification.

Identification

Live bed bugs may exist in various sizes, (e.g., poppy seed to apple seed size) and color (e.g., clear/white to reddish brown). A preliminary determination of whether a bed bug is present can be made by comparing the specimen to Figure 2 (below). A licensed pest control provider can confirm whether the specimen is a bed bug. Other signs of bed bugs may include droppings, which form dark-colored stains on cloth/carpeting or bumps in hard surfaces, molted skin shed by the bed bug, or eggs. Eggs are very small, but will be found among droppings or within crevices where adults are hiding.

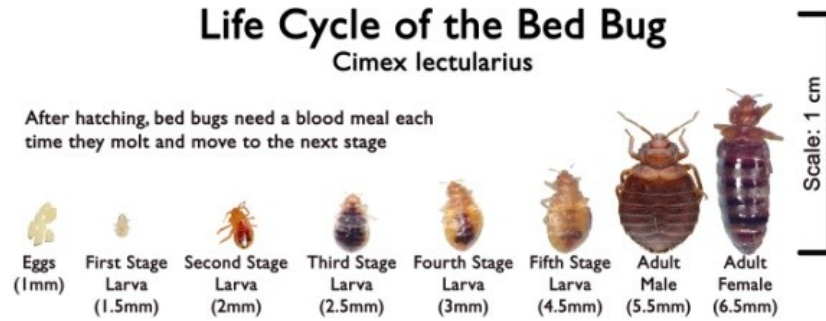


Figure 2. Life cycle of the bed bug

Those living in a home infested by bed bugs may also show signs of a rash. Bed linens may also show signs of blood spotting.

Treatment and Control Procedures

Pre-treatment Procedures

Once a bed bug has been positively located and identified, treatment (e.g., pesticide application) will be necessary to rid the building of the pests. Control actions should be instituted in the immediate area, within 24 hours if possible. The office manager/area director, facility manager, and licensed pest control applicator should determine the scope (e.g., size of area, materials affected) requiring treatment. The treatment area may be the original isolation space or an expanded area as identified through the inspection. Once the size of location is determined, the space must be prepared for pesticide treatment. When possible, the following preparation procedures should be taken:

- **Clutter reduction:** Careful examination of materials placed on the ground and moving such items into storage boxes or large, heavy-duty (2-mil thick) contractor clean-up bags.

When possible, dispose of items. Only items that must be saved should be placed into boxes for fumigation.

- **Furniture:** File cabinets, desks, and other furnishings against a wall must be moved at least 4 inches away from the wall to allow the licensed pesticide applicator to apply the pesticide.
- **Personal items:** Personal items (e.g., clothing, shoes, backpacks/bags) should be placed in a plastic bag, sealed, and taken home. Personal affects can be placed in a dryer for at least 30 minutes at the HIGH heat setting.
- **Cleaning:** If possible, the area designated for treatment should be cleaned prior to pesticide application to allow a more thorough treatment of the space. Carpets should be vacuumed using a HEPA-filtered vacuum; a crevice tool may be attached to the vacuum to improve dust removal in cracks, which will allow for a more effective treatment of these cracks and crevices. Vacuuming may also serve to remove bed bugs and their wastes. After vacuuming, the bag and HEPA filter for the vacuum should be removed, placed in a plastic bag, and discarded to prevent spread to non-affected areas.

Chemical Treatment of Space

Only pesticides approved for use against bed bugs by the Commonwealth of Massachusetts may be legally applied. Further, the pesticide applicator conducting the treatment *must hold a current license* for pesticide application in the Commonwealth of Massachusetts. The most common room treatments include liquid and aerosol insecticides. Based on the experience of MDPH/BEH staff, the most common and effective chemical products used in treating office space includes:

- **Bedlam:** an aerosol insecticide sprayed directly onto live bed bugs found during inspection. Bedlam may also be applied directly to the underside of office chairs (e.g., chair cushions, chair wheels and casings) to inhibit further bed bug activity. The active ingredient in Bedlam is sumithrin, a man-made pesticide similar to the natural components of the chrysanthemum flower. Sumithrin can be found in many pesticide products, including those used for mosquito control, lice treatments, and on pets to control ticks and insects, such as fleas and ants.
- **Temprid SC:** a liquid insecticide used for treating moldings, baseboard covings, carpet edges, bases/footings of cubicle walls, and other cracks and crevices. The active ingredients in Temprid SC are imadacloprid and beta-cyfluthrin. Imidacloprid belongs to a group of pesticides that are synthetic derivatives of nicotine, a compound found in the leaves of many plants. It can be found in many products with widely varying uses, including topical use on pets (e.g., to control fleas). Beta-cyfluthrin is similar to sumithrin (in the same family of pesticides) and is used to control many insects, including ants, silverfish, cockroaches, fleas, and others.

These pesticides are designed for targeted application and will not be applied to any desk surface or personal belongings. By implementing the treatment preparation procedures, staff can facilitate a successful treatment and prevent any potential for unintended treatment of personal items that may be left on the floor.

As mentioned, treatment of an office requires not only preparation of the space but also coordination of staff to be away from the office. During application of these products, the treatment areas *must* be vacant. These pesticides, Temprid SC in particular, must be allowed to

dry for 4 hours following application. During the drying time, no access to the treated areas is permitted. It is important that staff are made aware of these restrictions, and building and agency management should ensure the necessary arrangements are made. To limit building occupant exposure and allow appropriate time for post-treatment procedures, it is recommended that the pesticides be applied on Fridays after hours or over the weekend.

Post-Treatment Procedures

Following treatment of an office space, arrangements should be made with the building manager to ensure that the treated spaces are cleaned properly. Cleaning should include the following:

- **Flat surfaces:** all flat surfaces (e.g., desks, tops of file cabinet, shelves) should be wet wiped using a non-odorous cleaning product. Cleaners containing ammonia or ammonium compounds are not recommended, since they have a strong scent and can result in respiratory irritation.
- **Floors:** carpets/floors should be vacuumed with a HEPA-filtered device. To avoid disturbing the applied pesticide, no vacuuming should be conducted within one foot of walls, desks, or cubicles.

Chemical Treatment of Items

As mentioned, during the pre-treatment processes, items that may require chemical treatment should be gathered and placed into file boxes or heavy-duty (2-mil thick) contractor bags. Boxes should then be carefully placed into contractor bags. All bags should be placed in a second bag, in case the primary bag is punctured. These bags should be moved to a storage area that does not share ventilation with occupants. If a storage area cannot be secured, consideration should be

given to renting a storage container that can be placed outside, away from passersby. Once items have been located to an appropriate storage space, the licensed pest control provider can begin to treat the materials using chemical fumigant strips.

The fumigant strips MDPH/BEH staff are most familiar with are the Nuvan Prostrips. The active ingredient in the Nuvan Prostrip is dichlorvos. Dichlorvos is used to protect stored products from insects. This product is designed to treat adult and nymph bed bugs, as well as bed bug eggs within the confines of the sealed bag. Once the strip is opened, the gases released from the pesticide product diffuse through the materials to inactivate bed bugs. While some studies have documented neurologic effects from dichlorvos, such effects involved very high exposure levels. It is important to follow the procedures outlined above (e.g., placing materials in two heavy-duty contractor bags, placing bags in a secure storage area) to prevent staff from potential exposure.

The licensed pest control provider will place fumigant strips into each bag and take appropriate steps to tie and seal the bag openings once the strips are in place. A building manager shall provide the means to secure the storage area or be available to secure the storage area after the licensed pest control provider has completed bag fumigation.

Fumigated materials must remain in place for a minimum of 7 days. It is recommended that bags containing fumigated materials be allowed to sit for two weeks. Following treatment, the licensed pest control provider must open each bag, and the bags must be allowed to ventilate for 2 hours. During the ventilation process, the licensed pest control provider will examine these bags for evidence and condition of bed bugs.

Follow-up Procedures

Immediately following the treatment, staff should remain vigilant and report any further sightings of bed bugs. The steps outlined above in **Monitoring and Prevention** should serve as guidance for all occupants of an office space. Two weeks following the initial chemical treatment, a licensed pest control provider should thoroughly inspect the treated area to identify any further bed bug activity. If live bed bugs are observed, the licensed pest control provider may recommend second chemical treatment of the office space. Whether at the two- or four-week mark following the initial treatment, it is recommended that a second pesticide application be made to ensure thorough treatment and elimination of bed bugs.

The services of bed bug detecting dogs may be employed one month following application. The dog can serve as an additional means for identifying further bed bug activity. Work with the pest control company providing pest management services regarding these follow-up inspections and activities. Building managers and area directors should continue to report bed bug-related activities (e.g., inspections, treatments) to their Agency Director and Agency Human Resources Representative, as well as DCAMM and MDPH/BEH.

Sources of Bed Bugs

It is important to remember that both employees and visitors may live in bed bug-infested homes. **Monitoring and Prevention** procedures outlined above should be conducted regularly. Staff should always remain vigilant and report all pest sightings to managers. Permanent monitoring practices can help curb potential infestation.

If a staff member is suspected to be the source of bed bugs, the Agency Human Resources Representative should work closely with the staff member's direct supervisor and area director to prevent introduction of bed bugs into the office environment. In previous bed bug infestations at state offices, it has been recommended that the staff member identified as the source of bed bugs remain at home until that individual can demonstrate the bed bug problem at the home has been addressed. Evidence of a successful home treatment may include a letter of inspection from a licensed pest control provider indicating that bed bugs were not observed.

Additional Information/Who to Contact

A FAQ regarding bed bugs and treatment has been developed for staff and is attached for your reference.

For **leased properties**, the office manager /area director should contact the following groups following a report of a bed bug:

- Building Property Manager, who should contact a licensed pest control service
- The Office of Leasing and State Office Planning at the Division of Capital Asset Management and Maintenance: (617) 727-4050
- Agency Human Resources Director
- Agency Director/Commissioner

For **state-owned properties**, the office manager/area director should contact:

- Building's Facilities Manager, who should contact the licensed pest control services for the building

- Agency Human Resources Director
- Agency Director/Commissioner
- The Office of Facilities Management and Maintenance at the Division of Capital Asset Management and Maintenance: (617) 727-4050

For additional information, you may contact the Bureau of Environmental Health at the Department of Public Health at (617) 624-5757