



A Protocol for the Control of Bed Bugs

Objective: To develop a current, detailed and interactive high quality treatment protocol to control bed bug infestations in residential and commercial settings.

Background: Bed bug treatment protocols developed over the past 10 years have used combinations of insecticide products (either individually or mixed together as 'cocktails') and non-pesticidal strategies. The results of these efforts have often been reported in the literature. There are a number of facts that seem to be consistent:

- The general strategy for the control of bed bug infestations should center upon the use of control measures on the mattress and box spring to reduce bed bugs numbers as soon as possible.
- A bed bug infestation, unless caught early, is probably the hardest pest infestation a PMP will have to control. Proper pre-treatment preparation of the facility may be the single most important step in an effective bed bug treatment strategy.
- **Customer compliance is essential.**
- Bed bug control programs are very costly in terms of anxiety, time, and expense on the part of customers, and in time and products used by PMPs.
- Many products are typically used in the control protocol; the value of each is not always clear.
- The bed bug life cycle can outlast most of the insecticides and control measures used in the treatment.
- It typically takes at least two treatments (1-2 weeks apart) or more to gauge progress. However, it can take months for the customer and the PMP to determine if the bed bug infestation has actually been controlled.

An effective bed bug control protocol must take all of these factors into account to maximize the protocol's effectiveness. Unfortunately, the combination of difficulty in treatment; length of time to determine effectiveness; the transient nature of the populations in some facilities; the varying levels of cooperation from both landlords and tenants; and, the inability or unwillingness of customers to pay for the necessary treatment to affect full control makes the treatment process for the PMP very difficult. Add to these issues the growing number of lawsuits against hotels, landlords,

universities and housing authorities and the repeated request of PMPs to ‘do it right the first time’ – an almost impossible task – it is no wonder that many PMPs feel that they are often in a ‘no-win’ situation. The protocol below provides PMPs, housing managers and the lay public with the latest information available for best treatment practices as of July 2012.

The Control Protocol: The elements of the control protocol include inspection, preparation for treatment, treatment, and reinspection/retreatment.

Initial Inspection

Decision Point: Canine or Human Inspection

Canine inspection through skilled trainers is a highly effective and sensitive means to detect bed bugs. This is especially true when large areas need to be inspected. However, drawbacks include cost issues as many firms have employed canine detecting dogs solely to increase revenue opportunities. This has resulted in a high degree of false positivity (positive canine alerts without true bed bug presence) leading to unnecessary treatments. Ideally, a canine positive alert should provide direction for the handler/PMP to verify the presence of a bed bug or remnant (egg or cast skin) through visual inspection. PMPs must be judicious in choosing an external firm for canine detection. Alternatively, if a PMP wishes to include canine detection as a tool, background homework in choosing the appropriate dog and training school must be given careful consideration.

An inspection should be performed to identify that bed bugs are indeed the problem. In some situations, a more detailed inspection may be necessary if the bed bug infestation is not immediately apparent. Record on the inspection form (located at the end of this document) what was found (e.g., live bugs, fecal droppings, staining, eggs, cast skins) and location. All rooms adjacent (sides, top and bottom) to the infested area should also be inspected to determine if additional treatment is needed. At the conclusion of the inspection, a treatment date and the preparation for the treatment form should be reviewed with the resident/owner/manager responsible for the property. Ideally, treatment should not be performed without preparation in advance by the landlord, residents and/or the pest management company. The same applies to the treatment of infested adjacent rooms.

A promising new technology, the Verifi™ Bed Bug Detector, an active monitor employing both carbon dioxide and chemical attractants, has just been introduced into the marketplace with the support of several university bed bug researchers. PMPs should follow the progress of this technology to determine how it performs under field conditions.

Decision Point: Inspectors with Technicians

When conducting initial inspections, PMPs should note the following consideration:

PMPs that send out inspectors followed by separate technicians must make sure that inspection results are well communicated to the technicians prior to treatment to ensure that infestation sites are not missed or that tenants have not moved infested items to other areas of the structure.

Decision Point: Treatment of Adjacent Rooms/Apartments

In addition to cost concerns about treating adjacent rooms, some multifamily management firms mistakenly want to keep the presence of bed bugs confidential to others in the dwelling. Failure to deal with adjacent neighbors typically results in re-infestation via common walls, hallways, etc. The lack of open communication with residents may result in the landlord facing successful lawsuits from tenants who subsequently become infested.

Preparation for Treatment

The following guidelines should be used for preparing for a bed bug treatment. *Note that preparations for the treatment of a hotel room may not be the same as the treatment of a residential bedroom.*

Decision Point: PMP vs. Tenant Preparation; Degree of Preparation and Cost Implications

Decision Point: Thermal or Fumigation (e.g. Vikane® gas fumigant) Choices of Bed Bug Abatement will Impact Preparation Process

One of the keys to successful treatment of bedbug infestations is the preparation done PRIOR to treatment of the room(s). Whether treatment is done by the tenant (significantly cheaper in the short run, but less likely to be properly completed and more likely to disturb the bed bugs and promote movement to other areas) or by the PMP (expensive, more effective when treatment can be done as preparation is taking place and may be denied by tenants who don't want PMPs "rooting through my personal stuff"), the following guidelines should be used for preparing for a bed bug treatment.

The tenant or PMP should start by stripping the bed(s) and immediately placing the bedding into black garbage bags, securely tying off the top to prevent the spread of bed bugs to other areas of the structure. Clothing and items that can tolerate a clothes dryer should be similarly bagged and tagged for washing/drying. All other items to be removed from the infested room should also be securely bagged following inspection.

Items used in the infested rooms, such as vacuum cleaners, laundry and other household items relocated to another part of the structure must be identified, inspected, and thoroughly treated (insecticide or laundered). Items that can be laundered should go through a normal washing machine cycle set at the hottest water setting. Infested items such as footwear, small rugs, backpacks, toys, stuffed animals

should be placed in a clothes dryer and subjected to the highest heat setting for at least 30 minutes, which is sufficient to kill adult bed bugs, instars and their eggs.

Infested electronics such as computers, televisions, radios, clocks, DVD players, and telephones may require treatment or should be bagged and discarded. The use of portable heat chambers such as PackTite™ Bed Bug Heat Unit or ThermalStrike to heat infested electronics is not particularly recommended by these manufacturers. The bagging of infested electronic equipment with (Nuvan® Prostrips™) is labeled for that use through supplemental use directions and should work. PMPs should note that damage to equipment using any of these methods, may lead to PMP liability for equipment damage.

Mattresses and box springs may be discarded if heavily infested. Another option is to clear the mattresses and box springs of bed bugs through treatment and cover with either an active mattress liner (*ActiveGuard™* Mattress Liner) or an encasement (e.g., Protect-A-Bed®, *MattressSafe™*) and keep in service. Both devices can be installed by the tenant or PMP to protect the mattress and box spring. Remember to engage any locking mechanism used by some encasement brands.

If the mattress or box spring is discarded, wrap the items in plastic to seal in any bed bugs and eggs and place in a dumpster. Firmly attach a note to the items indicating that they are infested with bed bugs.¹

Furniture and all other items must be pulled away from the walls. Remove electrical switch plates and outlet covers for inspection and for dust insecticide application.

Dismantle bed frames and stand mattresses and box springs on end if not discarded. Remove the fabric dust cover on the underside of the box spring to expose the internal springs.

All furniture, windows, window sills, window treatments, and window frames should be completely wiped down with a cloth and an all-purpose cleaner.

All occupants must remain out of the treated area for approximately four hours after treatment is completed or until all treated surfaces are dry.

Treatment

The Sleeping Areas

Decision Point: Chemical, Desiccant or Thermal Approaches to Sleeping Surface

Decision Point: Wettable Powders (e.g. Transport® GHP Insecticide) and Broadcast

¹ As of December 3, 2010, NYC, enacted 1-04.1 of Chapter 1 of Title 16 of the Rules of the City of New York (see http://www.nyc.gov/html/dsny/downloads/pdf/rules/proprules/Notice_Bedbug.pdf)

Pyrethroid-based and/or Diatomaceous-based Powders (e.g., Tempo® 1% Dust, Alpine® Dust) Have Demonstrated High Efficacy in Bed Bug Treatment Due to Enhanced Bio-availability

Treatment begins with the clearing of bed bugs and eggs from the mattress and box spring (and any other location/furniture where people or pets sleep). Clearance of sleeping surfaces is accomplished through the use of one or more of a series of control agents labeled for this use. Pay specific attention to the labeled directions for use of each product as they frequently change, especially as applied to sleeping contact surfaces. These control agents would include products such as: Steri-Fab®, Bedlam® Insecticide, Bedlam Plus® Tempo® 1% Dust, steam, Cryonite®, CB-80 Extra™, diatomaceous earth, whisk broom and vacuuming. Securely bag and discard vacuum bags outside immediately.

The inside of the box spring, the headboard, and bed framing should be treated with more residual products such as: Demand® CS, Suspend® SC, Zenprox™ EC, Tempo® SC Ultra, Onslaught™ Microencapsulated Insecticide, Transport® GHP Insecticide, Transport® Mikron™ Insecticide, Temprid™ SC Insecticide, diatomaceous earth, Alpine® Dust, Tempo® 1% Dust, Drione® Insecticide, DeltaDust® Insecticide or Phantom® Termiticide-Insecticide. Mixtures of these products, such as Suspend plus Phantom are acceptable as long as such mixtures are not prohibited by state and federal labels. Once the mattress and/or box spring is cleared, install the appropriate size active mattress liner or encasement.

Decision Point: ActiveGuard™ vs. Encasements vs. Both

The mattress and box spring, cleared of as many bed bugs and eggs that can be found, may then be protected by:

- Installation of a long-lasting ActiveGuard™ Mattress Liner which kills any missed bugs or bed bugs emerging from missed eggs and prevents the mattress from being reinfested. ActiveGuard is impregnated with permethrin and kills bed bugs within a few days of contact and continuously for up to two years. There are no label restrictions for use. If the occupant chooses to use an active liner, they should install a mattress pad and/or sheet on top. Once in place, the active mattress liner should be treated as the new mattress and/or box spring surface and not washed.
- Installation of an encasement (e.g., Protect-A-Bed, MattressSafe). This device is a passive barrier that prevents ingress and egress of bed bugs across the encased surface, protecting against the capital expense of mattress and/or box spring replacement. As bed bugs can live at least 6 months without a feeding, encasements starve bed bugs over a prolonged period of time. In addition, they will improve the visibility of bed bugs missed during the initial treatment that reside on its surface. However, encasements do not provide any benefit to the resident or guest against recurrent infestations or newly introduced bed bugs attempting to infest the bed. In addition, special vigilance needs to be afforded when monitoring encasements, especially those installed on box

springs. Encasements demonstrate a propensity for tearing and ripping when subjected to sharp objects, rendering these coverings useless.

Non Sleeping Areas

***Decision Point:** Wettable Powders (e.g. Transport GHP Insecticide) and Broadcast Pyrethroid-based and/or Diatomaceous-based Powders (e.g., Tempo 1% Dust, Alpine Dust) Have Demonstrated High Efficacy in Bed Bug Abatement*

Other infested or suspected infested areas should be treated with more residual control agents. Control agents include Demand CS, Suspend SC, Zenprox EC, Tempo SC Ultra, Onslaught Microencapsulated Insecticide, Transport GHP Insecticide, Transport Mikron Insecticide, Temprid SC Insecticide, diatomaceous earth, Alpine Dust, Tempo 1% Dust, Drione Insecticide, DeltaDust Insecticide and Phantom Termiticide-Insecticide. Mixtures of these products, such as Suspend plus Phantom, are acceptable as long as not prohibited by state and federal labels.

The PMP performing the application should inspect the inside framework of furniture as well as the back of pictures on the wall, luggage, and the attachment points for window treatments. Any infestation in these areas should be noted on the treatment report. Treatment of the carpet tack strip, inside closets, closet shelf edges, peeling wallpaper, etc. must be considered to prevent bed bugs from escaping the treatment. Pay close attention to wood and fabric surfaces where bed bugs prefer to harbor.

Attention to detail in treatment is critical for the control of this pest. Every conceivable potential harborage point, down to the space above recessed screws, should at least be inspected and treated as needed. The PMP must also remove switch and outlet cover plates, treat the void with a dust and replace the plates. It may be necessary to install Wall Injectors™ (small plastic plugs) in selected wall areas if treatment of a wall void with a dust is to be completed. Sticky traps or Climbup™ Insect Interceptors may be used within the room or under the bed legs as a treatment element and/or monitoring tool.

Reinspection

The reinspection of the room or structure should be completed within 10-14 days of the initial treatment. Additional control measures may be needed. Residents should be questioned concerning bed bug activity. Bed bugs are difficult to eliminate; therefore a second and potentially further inspection(s) and additional treatment(s) may be necessary.

Special Notes:

Often a structure cannot be completely treated because of social issues. Language barriers prevent effective preparation and implementation of the treatment protocol.

PMPs should attempt to have an individual conversant in the resident's language to facilitate communication. Overcrowded dwellings can result in too much clutter. Locked doors for the security of personal property can prevent needed access. A lack of compliance because of immigration concerns can also become a stumbling block.

Cocktails (typically mixed in B&G sprayers) are often used to treat non-sleeping areas. The value of some of the individual components and the cocktails themselves have yet to be proven to be effective.

Infested electronics can be a big issue. No field-tested solution has successfully shown how these items can be treated effectively and insure that their function is maintained afterwards. Platform beds and futons appear to be particularly susceptible to severe bed bug infestations. These items need to be completely disassembled and treated thoroughly.

Active mattress liners and encasements should be installed on every mattress and/or box spring cleared of bed bugs to prevent re-infestation. While only four sizes of active mattress liners (i.e. *ActiveGuard*) accommodate almost every bed size and installation is error-free, measurement and fitting of encasements is tedious and often inaccurately performed. Encasements left with an uneducated customer to install are often situated inside out and are prone to ripping upon installation. Once ripped, an encasement is deemed useless and needs to be replaced; attempts to repair with tape have not been proven to be effective in preventing ingress or egress of bed bugs. PMPs should manage encasement measurement and installation to ensure effectiveness and maintenance of the integrity of the liner during this process.

Full Structure/Large Item Treatments

In some cases, the size and value of the structure or contents may require treatment of the entire structure or item (e.g., a small apartment building or car). The use of Vikane® gas fumigant in a fumigation chamber or the fumigation of an infested structure are options that have been successfully used. Likewise, heat treating objects in a box truck or through portable heating units placed within a structure have been used effectively. The PMP should be aware of the labeled use of these treatments and the potential liabilities if used off-label.

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(excerpts taken with permission from James B. Ballard, PhD, BCE, Ballard Pest Management Consulting, LLC.)

Inspection Form for a Bed Bug Control Program

Residence ID: _____ Date: _____

Address: _____

Visual Inspection Count: _____ Inspector: _____

Original or Spot Treatment: _____ Time Spent in Residence: _____

Encasement: _____ Active Mattress Liner: _____ Neither: _____

ID Product Applied, Quantity, Where:

Adjacent Apartments Inspection or Treatment Details:

Comments: _____

Use the graph paper to diagram the residence. Number the beds and identify bed size and where bed bugs or evidence of bed bugs were found. Note the number of the bed for all bed details. Also number the Climbups™, sticky traps or other monitoring tools placed under the bed/furniture legs or elsewhere, if used.

