



A Protocol for the Control of Bed Bugs

Objective: To develop a detailed, up-to-date, high quality protocol designed to control bed bug infestations in residential and commercial settings.

Background: Over the past 10 years, many treatment protocols involving a large number of insecticide products used individually or mixed together (cocktails) plus several different non-pesticidal strategies have been employed in treatment efforts. The results of many of these efforts have been reported in the literature. There are a number of facts that seem to be consistent:

- A bed bug infestation, unless caught early, is probably the hardest pest infestation a PMP will have to control. **Customer compliance is essential;** proper pre-treatment preparation of the facility may be the single most important step in an effective bed bug treatment strategy.
- 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 get control. It can take months for the customer and the PMP to determine if the infestation has actually been controlled.
- An effective bed bug control protocol must take all of these factors into account to maximize the protocol 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 to pay for necessary treatment to effect full control make the treatment tasks for the PMPs very difficult. Add to these issues the growing number of lawsuits against hotels, landlords, universities and housing authorities and the PMPs to do it right the first time – an almost impossible task – it is no wonder that many PMPs feel that they are between a rock and a hard place. The protocol below provides PMPs, housing managers and the lay public with the latest information available for best treatment practices as of December 2010.

Control Strategy: 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.

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 the 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. The *ActiveGuard* mattress liner is impregnated with permethrin and it kills bed bugs in a few days and continues to kill over time. An encasement (e.g., Protect-A-Bed®, MattressSafe™, etc.), which is not treated but starves bed bugs over a prolonged period of time may also be used even though there are no benefits against subsequent infestations attempting to reinfest the bed. Bed bugs can live 6 months to more than a year without a feeding. Other longer residual products are used on the inside of the box spring, and all other areas of the room or structure. A long lasting residual, which still might require several reapplications, is needed to protect the room for months from reinfestation just as the mattress is protected so that the bed bugs do not “outlast” the treatment.

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

Initial Inspection

Decision Point: Human or canine 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 and that 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. 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; live bugs, staining, eggs, caste 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, including treatment of infested adjacent rooms.

Decision Point: Inspectors with Technicians

When conducting initial inspections, PMPs should note the following considerations: 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. and lack of open communication with residents may open the landlord to successful lawsuits from unhappy tenants.

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 (which is 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) – immediately placing the bedding into black garbage bags and tied off at the top to prevent the spread of bed bugs to other areas of the structure. Most other clothing items and items that can tolerate a clothes dryer should be similarly treated. 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 or other items removed 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 15 minutes.

Infested electronics such as computers, televisions, radios, clocks, DVD players, and telephones may require treatment or should be bagged and discarded. The use of dry heat (PackTite™ Bed Bug Heat Unit) or the bagging of infested electronic equipment with a DDVP strip (Nuvan® Prostrips™) labeled for that use may work, but PMPs should note that damage to equipment using these methods, which are not yet labeled for that use, may lead to PMP liability for equipment damage.

Mattresses and box springs may be discarded if heavily infested or cleared of bed bugs, then covered with either an active mattress liner (*ActiveGuard™*) or an encasement (e.g., *Protect-A-Bed®*, *MattressSafe™*, etc.) and kept in service. Both devices can be installed by the tenant or PMP to protect the mattress and box spring, if cost is not an issue.

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 cotton 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 or, if possible.

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 or desiccant approach to sleeping surface

*Decision Point: Wetable 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 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 is

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)

accomplished through the use of one or more of a series of control agents. These control agents would include products such as: Steri-Fab®, Bedlam® Insecticide, Tempo® 1% Dust, steam, Cryonite®, CB-80 Extra™, diatomaceous earth, whisk broom and vacuuming. Bag and discard vacuum bags outside right away.

The inside of the box spring, the headboard, and bed framing should be treated with more residual products such as: Demand® CS, Suspend® SC, Tempo® SC Ultra, Onslaught™ Microencapsulated Insecticide, Transport® GHP Insecticide, Gentrol® IGR Concentrate, diatomaceous earth, Alpine® Dust, Tempo® 1% Dust, Drione® Insecticide, DeltaDust® Insecticide or Phantom® Termiticide-Insecticide. Mixtures of these products, such as: Suspend plus Gentrol, plus Phantom are acceptable as long as such mixtures are not prohibited within state and federal labels. Once the mattress and/or box spring is cleared, install the appropriate size active mattress liner or encasement. The occupants should install a mattress pad and/or sheet on top of the liner. If an active mattress liner is employed, it should be left in place and not washed.

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

Treatment of other infested or suspected infested areas should be treated with more residual control agents. Control agents would include: Demand® CS, Suspend® SC, Tempo® SC Ultra, Onslaught™ Microencapsulated Insecticide, Transport® GHP Insecticide, Gentrol® IGR Concentrate, diatomaceous earth, Alpine® Dust, Tempo® 1% Dust, Drione® Insecticide, DeltaDust® Insecticide or Phantom® Termiticide-Insecticide. Mixtures of these products, such as: Suspend plus Gentrol, plus Phantom are acceptable as long as not prohibited within 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, and more must be treated to prevent bed bugs from escaping the treatment. Pay close attention to wood and fabric surfaces that bed bugs prefer.

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 plug cover plates, treat the void with a dust and replace the plates. It may be necessary for the installation of Wall Injectors™ (small plastic plugs) in selected wall areas if treatment of a wall void with a dust must 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 inspection tool.

Reinspection

A reinspection of the room or structure should be completed within 2 weeks of the initial treatment where 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 individual conversant in the language of the resident to facilitate communication. Overcrowded dwellings can result in too much clutter, locked doors for personal property security, and lack of compliance because of immigration concerns.

Cocktails (typically mixed in B&G sprayers) are often used to treat non-sleeping areas, but 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 worked out how these items can be treated effectively and insure that their function is maintained afterwards. Platform beds and futons appear to suffer from severe infestations with bed bugs. 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. Encasements left with the customer to install are often installed inside out, not properly measured and fitted or slightly ripped upon installation. PMPs probably should manage encasement installation to ensure effectiveness.

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: _____

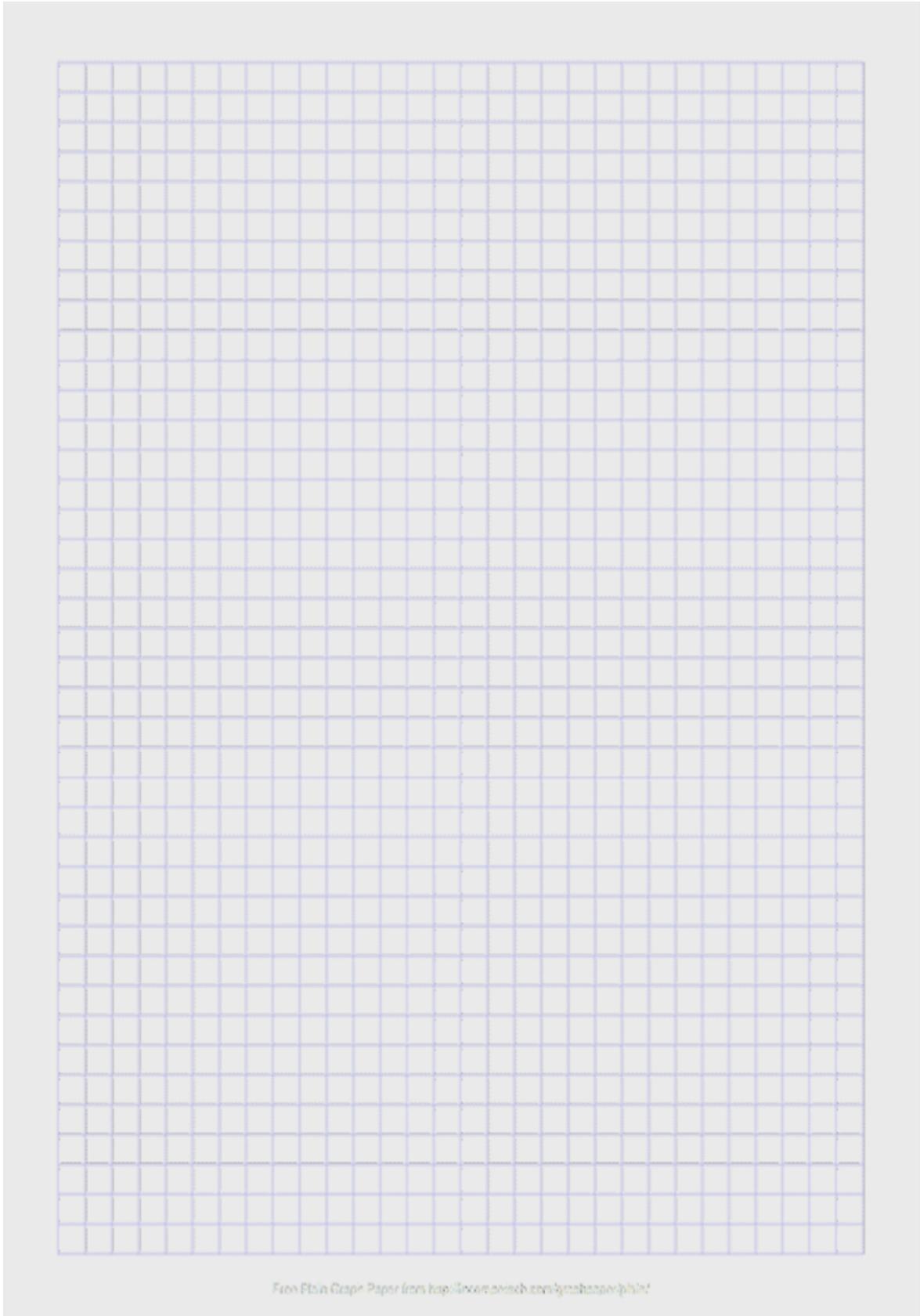
Encasement: _____ Active Mattress Liner: _____ Neither: _____

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.



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