ActiveGuard® Mattress Liners
For Use Against Bed Bugs and Dust Mites

An Integrated Pest Management Protocol for the Control of Bed Bugs

Objective: To develop a detailed, up-to-date, high quality protocol designed to control bed bug infestations, including the use of pesticides, in residential and commercial settings. Decision points occur throughout the protocol; these were created to facilitate tailoring of specific programs as well as permitting the PMP (Pest Management Professional) to choose among options.

Background: Over the past 15 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, although 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 insecticidal treatments (1-2 weeks apart) or more to gain 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 protocol effectiveness. Unfortunately, the combination of difficulty in treatment; length of time to determine effectiveness; the transient nature of the residents in some facilities; the varying levels of cooperation from both landlords and tenants; and, the inability or unwillingness to pay for necessary treatment to affect full control make the treatment task for the PMPs very difficult. Add to these issues the growing number of lawsuits against hotels, landlords, universities, housing authorities and PMPs for failing to succeed in eradication on the 1st treatment – an almost impossible task. It is not surprising that many PMPs feel that bed bug remediation is a daunting task without a high likelihood of success. The protocol below was designed to provide PMPs, housing managers and the lay public with the latest information available for best treatment practices as of April 2015.

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: Active mattress liner (e.g., *Active*Guard®) vs. Encasements

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 active mattress liner, such as *Active*Guard®, which kills any missed bugs or bed bugs emerging from missed eggs and prevents the mattress from being re-infested. *Active*Guard® is impregnated with permethrin and it kills bed bugs 24/7 and continues to kill for up to two years. Recent published data indicates that 10 minutes of contact with *Active*Guard® significantly prevents egg deposition and feeding, which translates to decreased population growth and a reduction in biting. An encasement (e.g., Protect-A-Bed®, MattressSafe™), which is not treated but starves bed bugs over a prolonged period of time may also be used. Intact encasements prevent ingress/ egress of bed bugs in/out of the covered mattress or box spring and facilitates inspection for bed bugs on its surface. However, there are no benefits against subsequent or re-emerging infestations attempting to re-infest the bed. Bed bugs can live at least 6+ months 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 re-infestation 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 re-inspection/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 and target treatment. This is especially true when large areas need to be inspected, such as a movie theater or when the bed bug population is low. However, drawbacks include cost and many firms have employed canine detecting dogs solely to increase revenue opportunities. This has sometimes 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 independent firm for canine detection. Alternatively, if a PMP wishes to include canine detection as a tool in their own arsenal 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) findings, including: live bugs, staining, eggs, caste skins and location. All rooms adjacent (sides, top and bottom) to the infested target 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 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 that often inspectors are first sent out to assess the degree of an infestation and approximate cost for the customer. It is important that the technician(s) assigned are in direct communication with the inspector prior to treatment to ensure that infestation sites and other information specific to this case are well communicated as tenants may move 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 from others in the dwelling. Failure to deal with adjacent neighbors typically results in re-infestation via common walls, hallways, etc. Lack of open communication with residents may result in the landlord being subject to successful lawsuits from unhappy tenants.

Preparation for Treatment

The following guidelines should be used for preparing for a bed bug treatment. (Note: 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: Chemical vs. thermal vs. fumigation (e.g. Vikane® gas fumigant) choices of bed bug abatement will impact preparation process

One of the keys to successful treatment of bed bug 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 large garbage bags, which are securely tied off at the top to prevent the spread of bed bugs to other areas in the structure. This includes most clothing items and other articles that can tolerate either laundering or a clothes dryer. All other items to be removed from the infested room should also be securely bagged following inspection.

Infested items such as clothing, bedding, footwear, small rugs, backpacks, toys, stuffed animals should be also placed in a clothes dryer and subjected to the highest heat setting for at least 30 minutes. 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).

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 other similar heat boxes) or the bagging of infested electronic equipment with a DDVP strip (Nuvan® Prostrips™) or using the Cirkil® Rag in a Bag™ Protocol labeled for that use should work, but PMPs should note that damage to equipment using these methods, may subject the PMP equipment damage liability.

Mattresses and box springs may be discarded if heavily infested or cleared of bed bugs, then covered with either an active mattress liner (*Active*Guard®) or an encasement (e.g., Protect-A-Bed®, MattressSafe™) 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 these 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 and discard the fabric dust cover on the underside of the box spring to expose the internal springs and wood-framing for thorough treatment.

All furniture, windows, window sills, window treatments, and window frames should be completely wiped down with a cloth and an all-purpose cleaner, if possible. Launder fabrics at the hottest possible setting, 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 Surfaces

Decision Point: Physical, chemical or desiccant approach to sleeping surface

Decision Point: Wettable powders (e.g. Transport® GHP Insecticide) and silica-based dusts) such as CimeXa™ insecticide dust or Drione® Dust have demonstrated high efficacy in bed bug treatment due to enhanced bio-availability

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

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 accomplished through the use of one or more of a series of control agents/techniques including: Temprid™ SC Insecticide, Transport GHP Insecticide, Transport® Mikron™ Insecticide, Steri-Fab®, Bedlam® Insecticide, Bedlam Plus®, Phantom® Pressurized Insecticide, steam, Cryonite®, CB-80 Extra™, silica dusts, whisk-broom and vacuuming. Strict adherence to label instruction must be maintained for chemical treatment of the sleeping surface, and often limited to spot application(s). Securely bag and discard vacuum bags outside immediately after completion.

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 Surfaces

Decision Point: Wettable powders (e.g. Transport® GHP Insecticide) and broadcast pyrethroid-based and/or silica-based dusts such as CimeXa insecticide dust or Drione dust, Tempo® 1% Dust, Alpine® Dust) and Phantom® Termiticide-Insecticide have demonstrated high efficacy in bed bug abatement.

The inside of the box spring, the headboard, bed framing and voids should be treated with longer residual products such as: Temprid™ SC Insecticide, Tandem® Insecticide, Transport® GHP Insecticide, Transport Micron Insecticide, silica based dusts, Alpine® Dust, Tempo® 1% Dust, or Phantom® Termiticide-Insecticide.

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, insides of 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. Pit-fall type traps, such as Climbup™ Insect Interceptors, Blackout™ Bedbug Detectors, or SenSci Volcanos™ or other similar traps, may be used within the room or under the bed legs as a monitoring/inspection tool.

Platform beds and futons appear to suffer from severe infestations with bed bugs. These items need to be completely disassembled and treated thoroughly, preferably in the room they reside to guard against migration of bed bugs while transporting the

infested item.

Re-inspection

A re-inspection of the room or structure should be completed within 2 weeks of the initial treatment where additional control measures may be needed. This elapsed period of time allows for any missed eggs to hatch and emerge. 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 often prevent effective preparation and implementation of the treatment protocol. PMPs should attempt to have individual conversant in the resident's native language 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. Hoarders are of particular concern as space can often not be achieved for effective treatment; special care must be given and sufficient time allotted in these instances.

Active mattress liners or 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 locked, not properly measured and fitted or 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.

Since the use of a fumigant or heat treatment has no residual effect on bed bugs, these treatments should be supported with residual insecticides such as those listed previously in this protocol. For each treatment method, the installation of active mattress liners or encasements should not be overlooked.

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

Inspection Form
Bed Bug Control Program

Residence ID:_____ **Date:** _____

Address: _____

Visual Inspection Count:_____ **Inspector:** _____

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

Encasement: _____ ***Active*Guard 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 pit-fall traps or other monitoring tools placed under the bed and/or furniture legs or elsewhere, if used.