



MODEL RFP FOR COMPLEX-WIDE MANAGEMENT OF BED BUGS IN MULTIFAMILY HOUSING COMMUNITIES

This model RFP is based upon results of Academic research regarding tools and methods proven to be effective in the detection and treatment of bed bugs. The specifications for detection and treatment should be updated as new tools and techniques become available and have been proven effective through scientific methods.

The goal of this RFP is not to just outline effective methods to eliminate bed bugs but is also designed to limit the impact that bed bugs have at the community-level within housing complexes. The extent of proactive inspections will vary based upon the infestation rate within a housing community as well as the infestation rate associated with individual buildings within a housing community. At the adoption of this RFP, all buildings within the housing community will receive a proactive inspection to establish the level of bed bug activity that has not been reported. The extent of the proactive inspection will depend upon the known history of bed bug activity with each building. Buildings with a known history of less than 5% bed bug infestation rate over the previous 12 months can receive a brief visual inspection of all units that can be conducted by any trained personnel. Monitoring in buildings with a known infestation rate below 5% can be limited to only those units where evidence suggests bed bugs may exist. Buildings with a known infestation rate of 5% or greater require a more comprehensive proactive inspection.

The model RFP also recognizes that effective bed bug management requires a cooperative effort between property management, the pest management professional, and residents. However, in some cases residents are unable or unwilling to follow important recommendations necessary for the elimination of bed bugs from their apartment. When this occurs, property management must take an active role to support the bed bug management program. Without the support of property management, community-wide success is unlikely to be achieved.

Areas highlighted in red indicates opportunities where costs can be reduced by housing staff carrying out these activities. Any activities that will be carried out by housing staff should be specified with the pricing structure of the bid.

Specifications of Bed Bug Management Program

1. EDUCATION

Education about bed bugs including information on their biology, behavior, prevention, detection, and what to do (and what not to do) if bed bug activity is identified or suspected will be provided on an annual basis to all residents and key staff members, including anyone interacting with residents or conducting bed bug related activities. Education can be provided through

- a. Educational fact sheets or brochures
- b. Live or recorded presentations
- c. Educational Posters

2. INITIAL INSPECTION OF APARTMENTS AT ONSET OF BID CONTRACT (START OF YEAR ONE)

a. Inspection in buildings with a known infestation rate below 5%:

At the onset of the contract, all buildings with fewer than 5% of the apartments treated for bed bugs within the past 12 months will receive a proactive inspection of all units, for identification of well-established infestations that have not been reported. **The inspection can be conducted by in-house staff that has been properly trained in the detection of bed bug activity or by a contracted party.** Conditions that create obstacles to control such as cluttered conditions around sleeping and resting areas, hoarding, or mattresses in direct contact with the floor, should also be noted during this inspection.

Inspections will be conducted in the following manner:

- i. Inspections will be limited to a brief (1-2 minute) visual inspection of beds and upholstered furniture to identify bed bug infestations that are readily observed on accessible areas of beds and upholstered furniture. Inspection is limited to the corners of the mattress beneath fitted sheets and visibly accessible areas of the box spring and upholstered furniture and does not involve the removal of mattresses and box springs, or the turning over of upholstered furniture. During the inspection, residents that are home will be asked if they are aware of any bed bug activity or suspect bed bug activity.
- ii. Apartments will be monitored by placing interceptors at beds and upholstered furniture if 1) the apartment has been treated for bed bugs within the past 12 months, 2) has visible evidence of bed bug activity (i.e. fecal spotting, shed skins, hatched eggs, dead bugs) but no live bed bugs observed, or 3) the resident indicates bed bugs are present or suspects activity but no live bed bugs are observed during the brief visual inspection.

NOTE: An alternative to visual inspection is the use of canine scent detection. If canine scent detection is used as the inspection method, all positive alerts by dogs must be verified by confirming live bed bug activity through either visual inspection. If bed bug activity is not confirmed through visual inspection, interception devices should be installed at beds and upholstered furniture and inspected for bed bug activity 2 or 4 weeks after installation (depending upon the device used).

Apartments where live bed bug activity is detected will be scheduled to be treated according the methods described below in #4 Treatment of apartments with confirmed bed bug activity).

b. Initial inspection in buildings with infestation rate of 5% or more:

Any buildings where 5% or more of the apartments have been treated for bed bugs over the past 12 months will receive a proactive inspection that includes a combination of detection methods (visual or canine scent detection* and installation of interception devices) to identify infestations of all levels, that have not been reported. **Visual inspection and monitoring with interception devices can be conducted by in-house staff that has been properly trained in the detection of bed bug activity or by a contracted party.** The inspection is intended to identify all level infestations, including low-level infestations that are often missed through visual inspection alone. Conditions that create obstacles to control such as cluttered conditions around sleeping and resting areas, hoarding, or mattresses in direct contact with the floor, should also be noted during this inspection.

Inspections will be conducted in the following manner:

- A brief visual inspection or canine scent detection inspection (verification of live activity is required for canine alerts, see * below) of all apartments as described in #1 above.
- Interceptors will be placed in all apartments where bed bugs have not been detected visually and inspected for bed bug activity 2 or 4 weeks after installation (depending upon the device used).

Apartments where live bed bug activity is detected will be scheduled to be treated according the methods described below in #4 Treatment of apartments with confirmed bed bug activity).

NOTE: If canine scent detection is being used as the inspection method, all positive alerts by dogs must be verified by confirming live bed bug activity through either visual inspection or monitoring if necessary. If monitoring is done, bed bug interception devices should be installed at beds and upholstered furniture and inspected 2-4 weeks later for bed bug activity.

3. ONGOING INSPECTIONS:

All apartments in buildings with an infestation rate of 5% or greater will be inspected annually as described in #2b above. In buildings with infestation rates below 5%, inspections can be limited to apartments in the following categories:

- a. Apartments that have been treated for bed bug activity within the past six months, along with apartments above, below, adjacent and across the hall from the treated unit, will be inspected 6-9 months after the date of the final bed bug treatment. Inspections will include at least 2 proven methods of detection (visual inspection, interceptor traps for 2 - 4 weeks, or canine scent detection*).
- b. Apartments with bed bug activity reported to property management or identified by a housing staff member, as potentially having bed bug activity.

NOTE: If canine scent detection is being used as the inspection method, all positive alerts by dogs must be verified by confirming live bed bug activity through either visual inspection or monitoring if necessary. If monitoring is done, bed bug interception devices should be installed at beds and upholstered furniture and inspected 2-4 weeks later for bed bug activity.

4. TREATMENT OF APARTMENTS WITH CONFIRMED BED BUG ACTIVITY

Preparation of apartments

Preparations should be required on an as-needed basis. Prior to the first treatment, apartments should be cleared of dirty laundry on the floor or any other obstacles complicating treatment of the beds and couches. If items such as dressers, nightstands, closets are found to have bed bug associated with them, then these areas need to be addressed by the resident prior to the next follow-up service. Preparations should be required on an as-needed basis, based upon the type and location of bed bug activity. The degree of infestation should be evaluated on the first treatment and additional preparation requests made for the next service based upon where bed bugs are noted or evidence of infestation is present. The following are examples of suggested preparations based upon evidence:

Treatment of apartments

The following is a list of activities that will be done in all apartments with confirmed bed bug activity. These activities are further described in the sections below the list.

- Elimination of visible bed bugs and eggs using vacuums and steam.
- Removal of dead bed bugs and caste skins with vacuum
- Treatment of entire apartment with an emphasis on rooms with beds and upholstered furniture.
- Encasement of mattresses and box springs (see below for discussion about encasement of box springs only)
- Installation of interception devices at beds and upholstered furniture
- Follow-up visits at approximately 14 day intervals until infestation is eliminated
- Implementation of an elimination protocol.

A multidisciplinary approach is necessary to eliminate most bed bug infestations due to their complex life cycle, behavior, and propensity for developing resistance to pesticides. The sections below elaborate upon the required methods for treatment of apartments with bed bug activity.

Methods to address bed bugs and their eggs

Bed bug eggs are difficult to see due to their small size, are adhered to the surface they are laid upon and research has noted that many pesticides may have little to no effect on them. Because of these factors, tools such as steamers, vacuums and others should be used as part of a bed bug treatment to address any eggs that are noted or treat areas where eggs are suspected but cannot be seen with the naked eye. Using pesticides alone is not a suitable approach to treating bed bug eggs.

Encasements

Bed encasements designed for use with bed bugs are recommended for the treatment of infested beds as well as the proactive protection of uninfested bedding. Encasements being used should completely enclose the mattress and box spring and the zipper and zipper end-stop (the area where the zipper stops when the encasement is closed) should be designed to keep bed bugs from escaping the encasement. Encasements should be installed on all mattresses and box springs within an infested home. Encasements should remain on the infested bedding for at least one year from the date of installation. Applying a dust pesticide to the inside of the box spring (if label directions permit) should be considered to address any bed bugs trapped inside. Lastly, all sharp edges on bed frames should be addressed by adhering felt or other padding so that the edges do not compromise (tear) the encasements.

In apartments with low level infestations (below 20 bed bugs during initial inspection), the Housing provider reserves the right to encase box springs only.

Monitoring

Monitors, such as interception devices and any others proven effective through research, should be installed on all bed bug treatments during the first service and remain in the infested unit until the bed bug infestation is eliminated. Monitors as part of a bed bug treatment capture bed bugs between services thus reducing the number of bugs within the home as well as reducing the number of bites received by the people within the home. In addition to reducing the number of bed bugs they also provide information on where bed bugs may be hiding thus expediting elimination of the infestation (if bed bugs are found in the monitor under the head, right leg of the bed, it suggests bed bugs are hiding somewhere in the direction of that leg).

Monitors should be installed under all bed and couches in all infestations and in bad infestations (over 100 bed bugs) they should be also placed throughout the home along baseboards and in corners of rooms.

Treatment of apartment with pesticides

Pesticides play an important role in bed bug management however, wide-spread resistance to pesticides exists in bed bugs making it necessary to choose pesticides that are known to be effective based upon the most current scientific research. Liquid residual and aerosol generated pesticides (excluding foggers/total release aerosols) should be limited to those that research has found to be effective for bed bug control. Liquid residuals should be rotated from treatment to treatment with a minimum of two products being rotated from treatment to treatment. Also, a dust pesticide should be used to treat all cracks and crevices according to label directions and products found to be effective for the treatment of bed bugs should be chosen.

Methods for dealing with infested personal items with bed bug activity

If bed bugs are suspected in personal items/clutter or evidence is noted on these items they should be treated according to the requirements of these items.

- i. Any item that can be placed in a hot dry cycle should be placed in a dryer and heated accordingly (a full-cycle is typically recommended).
- ii. Any items that can withstand temperatures in excess of 120 degrees but not to exceed 160 degrees can be treated using commodity heaters such as ThermalStrike Ranger or other equivalent heating device. In areas and during certain times of the year where the sun creates temperatures that can exceed 120 degrees, items can be placed in black garbage bags and left in the sun for an extended period of time. Items should be placed in bags and elevated off of the ground. Lastly, a temperature probe should be inserted within the bag to guarantee that the temperature within the bag achieved 120 degrees for a minimum of a few hours.
- iii. Items that can tolerate freezing temperatures can be bagged and placed in a freezer for a minimum of one week.
- iv. Nuvan Pro-strips or other equivalent pesticide “strip” can be used to treat items contained within a plastic bag. Pesticide label directions should be followed when using pro-strips and items should be left inside the bag for a minimum of two weeks to assure proper treatment.

Follow-up visits

All bed bug infestations should receive a minimum of one follow-up treatment. All follow-up treatments should be spaced approximately 14 days apart. Follow-up treatments should consist of a thorough inspection of the apartment along with inspection of all monitors. Treatments should be applied according to the evidence noted within the apartment.

Elimination Protocol

Follow-up visits can be terminated once bed bugs are no longer observed through visual inspection or in interception devices. Interceptors will be left in place once the follow-up program has been terminated. A final inspection will be conducted six weeks after termination of the follow-up program. This inspection will include a visual inspection of beds and upholstered furniture as well as checking interceptor devices for bed bug activity. If no bed bugs are observed treatment of the apartment can be concluded.

Neighboring Apartments

All apartments sharing a common wall, ceiling or floor should be inspected for the presence of bed bugs at the start of treatment in the known infestation. In high-rise buildings directly across from a known infestation should also be inspected. It is recommended that the neighboring apartments are inspected again at the conclusion of treatment of the known infestation, especially if the known infestation was a high level infestation at the start (over 100 bugs). Inspections will include at least 2 proven methods of detection (visual inspection, interceptor traps for 2 or 4 weeks, or canine scent detection*).

NOTE: If canine scent detection is being used as the inspection method, all positive alerts by dogs must be verified by confirming live bed bug activity through either visual inspection or monitoring if necessary. If monitoring is done, bed bug interception devices should be installed at beds and upholstered furniture and inspected 2-4 weeks later for bed bug activity.

5. NEW RESIDENT INSPECTION PROGRAM

For residents moving into the community, Property Management will provide educational information about bed bugs and their control and educate the new resident about the apartment communities' bed bug management policies and procedures at the time of the signing of the lease. In addition to educating new residents, the following actions will be taken.

- a. Furniture including beds, bedframes, head boards, footboards, and upholstered furniture will be visually inspected for bed bugs at the time of move-in by a Housing staff member trained to in the detection of bed bugs.
- b. If evidence of bed bug activity is observed the following actions will be taken:
 - Live bugs found on furniture during inspection should be removed or destroyed by a trained Housing staff member using a vacuum or steamer.
 - Mattresses and box springs with visual evidence of bed bugs will be encased in bed bug encasement prior to be introduced into the new resident's apartment.
 - The apartment will be scheduled for treatment.

Although not required it is highly recommended for properties with high infestation rates, to schedule the new residents' apartment for inspection approximately two weeks after the move in date. The inspection should include at least 2 proven methods of detection (visual inspection, interceptor traps for 2 - 4 weeks or canine scent detection).

6. RESIDENT MOVE-OUT PROGRAM

Upon notice that residents are discontinuing their lease and moving out, the apartment should be inspected for bed bug activity. The inspection will involve moving the beds and upholstered furniture so that the bottom of the furniture can be inspected. In addition to a thorough visual inspection, interceptor traps can be installed for 2 - 4 weeks or canine scent detection can replace the need for a visual inspection.

If live bed bug activity is observed at any time during the inspection or monitoring process, treatment should begin immediately. Apartments should also be treated if evidence of bed bugs is observed in an apartment not previously known to have bed bug activity. This process drastically reduces the chance that residents move-out and leave bed bugs behind in the vacant unit. It also provides pest professionals the opportunity to treat the infested unit while people are still present in the home (vacant homes infested with bed bugs are extremely difficult to effectively treat).

7. COMMON AREAS

Common areas within buildings should be inspected every 3 months for bed bug activity. Monitors should also be installed under all upholstered furniture and checked monthly for the presence of bed bugs. If bed bug activity is noted it will be treated according to the area noted and the sensitivity of the clients using that area. Treatment actions to consider are pesticide application, steam and vacuums, amongst others.

References

- Bennett, G.W., Gondhalekar, A.D., Wang, C., Buczkowski, G., and Gibb, T.J. (2015) Using research and education to implement practical bed bug control programs in multifamily housing. *Pest Management Science*, 72 (1), 8-14.
- Cooper, R., Wang, C., and Singh, N. (2015a) Evaluation of a model community-wide bed bug management program in affordable housing. *Pest Management Science*, 72 (1), 45-56.
- Cooper, R., Wang, C., and Singh, N. (2015b) Mark-release-recapture reveals extensive movement of bed bugs (*Cimex lectularius* L.) within and between apartments. *PLoS ONE*, 10 (9), e013642. doi: 10.1371/journal.pone.0136462.
- Cooper, R., Wang, C., and Singh, N. (2015c) Effects of various interventions, including mass trapping with passive pitfall traps, on low-level bed bug populations in apartments. *Journal of Economic Entomology*, 109 (2), 762-769.
- Miller, D.M. (2010) Bed Bug Action Plan for Apartments, <http://www.vdacs.virginia.gov/pesticides/pdf/files/bb-apt1.pdf> (accessed 15 April 2016)
- National Pest Management Association (2011) Best Management Practices for Bed Bugs, http://www.pestworld.org/media/3242/bed_bug_bmps_for_consumers_final.pdf (accessed on 15 April 2016).
- Stedfast, M.L. and Miller, D.M. (2014) Development and evaluation of a proactive bed bug (Hemiptera: Cimicidae) suppression program for low-income multi-unit housing facilities. *Journal of Integrated Pest Management*, 5 (3), E1-E7.
- Wang, C., Singh, N., and Cooper, R. (2014b) What causes bed bug control failure? The resident factor. *Pest Control Technology*, 42 (8), 86-95.
- Wang, C., Singh, N., Zha, C., and Cooper, R. (2016) Bed bugs: Prevalence in low-income communities, resident's reactions, and implementation of a low-cost inspection protocol. *Journal of Medical Entomology*, 53 (3), 639-646.
- Wong, M., Vaidyanathan, N., and Vaidyanathan, R. (2013) Strategies for housing authorities and other lower-income housing providers to control bed bugs. *Journal of Housing and Community Development*, 70 (3), 20-28.