PCT PEST CONTROL TECHNOLOGY

BED BUG SUPPLEMENT

# CONTROLLING BED BUGS IN TRANSIENT HOUSING FACILITIES

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Financial and organizational constraints often prohibit effective bed bug control at Section 8 housing, public housing and senior living facilities. Here are the results of a field demonstration that used a variety of methods and products to achieve control.

The control of bed bugs in transient housing facilities, Section 8 housing, public housing, supportive housing, and senior living facilities is challenging because of financial and organizational constraints. These facilities are faced with limited available funds to obtain bed bug elimination and there is the constant threat of reinfestation from new residents moving in (Gangloff-Kaufmann, 2010). In spite of this, it is critically important to identify control methodologies that can eliminate bed bugs in these facilities. Otherwise, these facilities will be relegated to the position of becoming bed bug repositories that will continue to act as a source for establishing infestations in other properties indefinitely.

Bed bug treatments at Washington Manor in Kingston, N.Y., included clearing mattresses of bed bugs and then installing either ActiveGuard mattress liners (shown here) or mattress encasements.

**FIELD DEMONSTRATION.** In 2010, PestMaster Services, Kingston, N.Y., approached Allergy Technologies to discuss a local philanthropic initiative. PestMaster wanted to establish a comprehensive bed bug elimination program for a nearby transitional housing facility. Queens Galley at Washington Manor, is a 501(c)3 not-for-profit organization that supports, creates and implements programs dedicated to the affordable nutritional education of children, families and seniors. In addition, Washington Manor provides housing for adults living at or below the poverty line. The facility was founded by Executive Director Diane Reeder.

PestMaster Services provided canine inspections and six service technicians for the job. Allergy Technologies provided the products used for the bed bug control demonstration. In addition, a local moving company, Allways Moving, provided a disposal container for clutter removal and an empty moving van for storage of the bagged belongings of the residents. Another pest management firm, Pest Shield Corporation, Suffern, N.Y., provided two service technicians to assist in the treatment. Rick Allen, a Residex technical sales representative, brought a number of products to the treatment site and assisted organizationally.

Washington Manor consists of a row of three Victorian, three-story homes connected together to provide 40 rooms containing 55 beds and a soup kitchen/common area for residents. The residents typically stay for about three months. Bed bug infestations have been a chronic problem for the facility over the years.

**THE PROTOCOL.** PestMaster Services has two experienced bed bug detection dogs, Sophie and Fern, and two experienced handlers, Adam Stafford and Paul Alley. The first inspection was performed in March 2010. This inspection indicated that as many as 18 of the rooms and one common area were or were suspected to be infested with bed bugs. A protocol was developed by PestMaster, Allergy Technologies and Jim Ballard that focused on clutter reduction, the bagging and removal of belongings, the installation of Wall Injectors (common name, "Insiders") for wall dusting, Tempo 1% dust for voids, Transport GHP for non-skin contact sur-

faces and Steri-Fab to clear skin contact surfaces of bed bugs (e.g., mattresses). The treatment was concluded with the installation of either an ActiveGuard mattress liner (active liner) or a high-quality encasement once each mattress was cleared of bed bugs to compare the two bedding treatment technologies. The facility also was scheduled for monthly inspections by Sophie and Stafford and any locations that Sophie signed as having bed bugs would be visually identified to verify the accuracy of the canine. Any bed bugs located would be spot treated using the same products applied in the original treatment.

Insecticides used as part of the Washington Manor protocol; PestMaster Services' Adam Stafford and bed bug detection dog Sophie.

**TREATMENT.** Prior to the treatment, 80 cubic yards of clutter were removed from the facility. Much of the residents' belongings were then bagged and stored in the moving truck. On April 17, 2010, the treatment was performed. An inspection of the rooms at this time revealed that three rooms and one common area still had bed bugs. This finding suggests that many bed bugs were discarded with the clutter and that some were probably bagged up with belongings to be returned to a room at a later date. All rooms and common areas were treated by teams of PMPs. After the mattresses were cleared of bed bugs, the mattresses in the rooms received either ActiveGuard mattress liners (which are impregnated with permethrin) or a mattress encasement which contains no insecticide and starves entrapped bed bugs to death over months. About an equal number of liners vs. encasements were installed. All the mattresses in each particular room were fitted with either all active liners or all encasements.

**RESULTS.** Fifty-four man hours were required to treat 40 rooms and two common areas. A total of 3.5 gallons of Steri-Fab, three pounds of Tempo 1% dust and 8 gallons of Transport GHP Insecticide were applied, and 30 ActiveGuard mattress liners and 25 encasements were installed.

The de-cluttering process simplified treatment and likely resulted in the bulk elimination of some bed bugs. A few rooms were spot treated after the first and second inspection (May and June, 2010) probably as a result of bed bugs residing in the bags of belongings that were stored in the moving truck during treatment and subsequently re-introduced after the initial treatment. Live bed bugs were found in each of the rooms that canine inspection indicated to be active rooms. Once the bed bug population was under control, it is presumed that new activity was the result of new residents coming into the facility (see Sept. 24, 2010, and Jan. 27, 2011 above). A total of 32 new residents moved into Washington Manor between April 2010 and March of 2011.

**DISCUSSION.** Visual inspection is unreliable and time consuming in terms of bed bug detection. It was clear throughout this demonstration that the use of canine detection on a monthly basis was critical to the success of this protocol. Bed bugs were located, rooms were spot treated and activity was eliminated as soon as it was discovered. All of the products used in the protocol appeared to work well in quickly bringing under control the infestation in general. Very small amounts of the same products were used in spot treatment.

Clutter reduction (Anon., 2010b) was also important to the success of the demonstration because it reduced the number of hiding places for bed bugs plus some bed bugs were likely discarded in the process. One weakness in the preparation was the bagging of the belongings for storage in the moving van during treatment. It was not possible to heat treat those belongings so any bed bugs placed into the bags were later released back into the rooms once returned. These newly released bed bugs probably were the cause for the few rooms that needed spot treatment one and two months after treatment. Fortunately the insecticides used were effective in getting control of the bed bug infestation in a short amount of time.

The ActiveGuard mattress liner is an odorless, patented, polyester fabric impregnated with 1.64% permethrin. The polyester fabric is not subject to damage but if ripped or torn, the efficacy of the product is not affected. The fabric is similar in design and concept to some of the bed nets used in other countries for mosquito control except that ActiveGuard is installed directly on the mattress or box spring. The permethrin in ActiveGuard has been found to kill 100% of bed bug studied within 72 hours and is effective for 18 months at which point it is replaced (Ballard, 2008). Earlier in this demonstration when bed bugs were introduced into the rooms when belongings were unbagged after treatment, bed bugs were found in the rooms but not on the mattress. In instances where a new resident brought in bed bugs, dead and dying bed bugs were found on the mattresses outfitted with ActiveGuard.

Encasements contain no active ingredients thus kill encased bed bugs through starvation over time. Encasements must be selected after the mattress or box spring has been carefully measured to ensure proper fit. The encasement is installed on the bed and the bug lock activated. Over time, encasements, because of their white color, make spotting new bed bugs easier. In this demonstration, one encasement was ripped, which would have allowed entrapped bed bugs to es-

cape if the mattress had not been cleared of bed bugs in advance. The ripped encasement was replaced but encasements on mattresses occasionally had live bed bugs on them until spot treatment provided control.

The contribution of mattress liners and encasements to the protocol were both important but differed in their mode of action. They both protected the mattress and box spring from becoming infested by bed bugs and allowed the salvage of infested bedding. ActiveGuard had the added advantage of removing isolated bed bugs from the surface of the mattress by killing them directly, thus minimizing the potential for re-establishment of an infestation. Because of its killing action, ActiveGuard may have value when used as a sole preventive control measure where a bed (e.g., in a hotel) may be attacked by a small number of bed bugs.

The actual cost of the treatment (insecticides plus mattress liners, encasements and canine time) was approximately $5,000, which is too costly for these facilities. The cost of the monthly canine inspection plus the spot treatment products and replacement mattress liners or encasements was minimal and well within the ability of this facility to afford, especially since the cost is spread over months. The price for the entire demonstration, if proposed by a pest management professional to the management of this facility, would more likely be in the $20,000 to $25,000 range, which is prohibitive for these types of facilities. The actual cost of performing bed bug control needs to be further reduced. Using canine inspection to determine where to treat every month would reduce the cost of control as only actual bed bug infestations would be treated. In-house processes, such as the heat treatment (e.g., through the use of a clothes dryer) of all incoming donated clothing, periodic clutter reduction programs and inspection of mattresses for either mattress liners or encasements would help reduce the incidence of bed bugs coming into the facility. Perhaps through the efforts of legislation such as the Bed Bug Management, Prevention and Research Act (Anon, 2011) funds can be made available in the form of grants to help these facilities deal with the cost of the initial bed bug treatment.

**CONCLUSION.** This field demonstration, with supporting inspections and a few spot treatments, was successful in maintaining a bed bug-free environment.

The status of the beds need to be checked, perhaps every six months, to determine that whatever product was installed to protect the mattress (ActiveGuard or an encasement) was still in place and undamaged. Given the limited number of occurrences of bed bugs being found on mattresses in this study, a more robust study comparing ActiveGuard and encasements is warranted to achieve a greater understanding of the value of these products to a bed bug control program.

The normal business contract price from a pest management firm to achieve bed bug control at this facility would probably be too expensive for the initial treatment plus all of the monthly inspections and occasional spot treatments. If the initial treatment costs can be managed by an outside agency such as EPA or state or local jurisdictions, the monthly canine inspection and spot treatment costs to maintain the control should be manageable for this type of facility. **PCT**

Jim Ballard, Ph.D., BCE, is the owner of Ballard Pest Management Consulting. Ballard has been paid to conduct field research for numerous companies, including Allergy Technologies. Ballard has not received, nor is he contracted to receive, any equity interest or any sales allocation for Allergy Technologies or from any of the companies with which he has worked or is currently working. Paul Alley is the owner of Alleymor Inc. dba Pestmaster Services. Diane Reeder is the executive director of Queens Galley soup kitchen and Washington Manor housing. Joseph Latino is director of technical services for Allergy Technologies.

For a list of references, visit www.pctonline.com and click "online extras."



## CHRONOLOGY OF INSPECTION RESULTS

The chronology of inspection results from the demonstration is presented at right. Washington Manor was treated on April 17, 2010. Monthly canine inspections, which required about 1½ hours each month, were conducted and any positive signs from the canine was followed up with visual confirmation of actual live bed bugs and where they were in the room prior to spot treatment.

| DATE | INSPECTION | RESULTS |
|---|---|---|
| May 14, 2010 | 5 rooms active | 3 EN and 2 AG, spot treated |
| June 14 | 3 rooms active | 2 EN and 1 AG, spot treated |
| July 16 | all clear | |
| August 27 | all clear | |
| September 24 | 1 room active | AG, new resident, some dead bed bugs on mattress, spot treated |
| October 29 | all clear | |
| November 19 | all clear | status of all beds checked, replaced 1 ripped EN, 2 missing EN and 1 missing AG |
| December 17 | all clear | |
| January 27, 2011 | 1 room active | AG, new resident, resident installed EN over AG, spot treated |
| February 25 | all clear | |
| March 18 | all clear | status of all beds checked, 1 EN and 2 AG missing, all replaced, study terminated |

EN = encasement AG = ActiveGuard

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