

**From Pest Treatment to Pest Prevention:  
A Case Study of Integrated Pest Management at  
The Metropolitan School District of Pike Township**

**Prepared by  
Joe D. Moore  
Improving Kids' Environment  
August 15, 2010**

**Improving Kids' Environment**  
**1111 E. 54<sup>th</sup> Street, Suite 212**  
**Indianapolis, IN 46220**  
**317-677-4760**  
[www.ikecoalition.org](http://www.ikecoalition.org)

## **Acknowledgements**

The author would like to acknowledge the following individuals and organizations who contributed toward the development of this case study:

- Indiana State Department of Health, Asthma Program
- Metropolitan School District of Pike Township, particularly Nancy Poore, Raul Rivas, Asaf Goldstein, and Debbi Carroll
- Marc Lame, Ph.D., Indiana University, School of Public and Environmental Affairs
- John Carter, Director of Planning at Monroe County Community School Corporation
- Jerry Jochim, Bloomington, Ind., IPM Consultant
- Teach for America Fellowship Program
- Julia Tipton Hogan, MPA, Indiana Perinatal Network and Indiana Pesticide Review Board
- Ruth Kerzee, MPH, Assistant Director, Schools/Children's Environmental Health at Safer Pest Control Project, Chicago, IL
- Beyond Pesticides, Washington, DC

## **About Improving Kids' Environment**

### **Mission Statement**

Improving Kids' Environment (IKE) is a non-profit advocacy organization that facilitates tangible and significant improvements to children's health through reductions in environmental threats.

### **Guiding Principles**

IKE works proactively and cooperatively with others to craft and offer reasonable solutions that are evidence-based, data-driven and legally sound. IKE works to ensure that all children – regardless of race, religion or socioeconomic status – reach their full potential. We do that by working with citizens, non-profit organizations, governments, businesses, and others to:

1. Reduce lead poisoning, reduce environmental triggers of children's asthma and reduce children's exposures to harmful substances;
2. Ensure that parents and others who work with children have access to information about these threats and the means to prevent them;
3. Support initiatives that strive to remove, reduce, and communicate these threats, including sensible solutions in legislation, ordinances, rules and policies; and
4. Promote practical means to remove or reduce recognized, serious threats that are not being addressed effectively

## Table of Contents

<b>Introduction</b> .....	1
<b>Pest Management in Indiana Schools</b> .....	2
<b>Pike Township Schools</b> .....	3
<b>Pike’s Former Pest Management</b> .....	3
<b>IPM Project Management</b> .....	5
<b>Pike’s Switch to Fewer Pests and Fewer Problems</b> .....	7
<b>Economic Analysis</b> .....	9
<b>Implementation Burden Analysis</b> .....	11
<b>Recommendations</b> .....	13
<b>Appendix A - Pesticide Health Risks</b> .....	16
<b>Appendix B – Pilot IPM Project Memorandum of Understanding</b> .....	18
<b>Appendix C - MSD of Pike Township Custodian Checklist</b> .....	19
<b>Appendix D - IPM Resources</b> .....	24
<b>Appendix E - Midwest Technical Resource Center’s Steps for School IPM Implementation</b> .....	25



## Introduction

It took just one year for the Metropolitan School District of Pike Township in Indianapolis (Pike) to halve the amount of pesticides it applied in two pilot schools. The following year, it applied practically no pesticides, employing only Dawn dish soap for the vast majority of its pest management. Despite the reduction in use of pest-killing chemicals, the school simultaneously reduced the number of pest complaints it received from teachers, students, and staff. Furthermore, during the first school year there was no increase in the school's pest management expenses,<sup>1</sup> and Pike reports saving between \$6,000 and \$10,000 the following year when it took the new pest management approach district-wide.<sup>2</sup>

One would guess that a shift to fewer chemicals and fewer pests for the same or less money would be an easy sell. Who would *not* choose less exposure to chemicals and pests? Exposure to both has been shown to have serious negative health effects (see Negative Health Effects of Pesticides in Appendix A). However, the tide has not turned wholly away from a pesticide-centric view of controlling pests. In 2004, the Indiana School Boards Association published a list showing that 255 school corporations had adopted a pest control policy emphasizing integrated pest management, an alternative to pesticide-centric pest control, and 15 others were in the process of adopting one. Two school districts (Zionsville and New Durham Township) had chosen not to adopt a policy.<sup>3</sup> Later research showed, however, that adoption of a policy did not equal implementation. Anecdotal evidence and a 2004 survey of actual pest control practices in Indiana schools suggest that Indiana still has room to grow in terms of adopting safer pest management practices. Pike Township school officials maintain that practicing real integrated pest management is the solution.

What is integrated pest management, or IPM? According to the IPM Institute of North America, Inc.:

*IPM is an approach to solving pest problems by applying our knowledge about pests to prevent them from damaging crops, harming animals, infesting buildings or otherwise interfering with our livelihood or enjoyment of life. IPM means responding to pest problems with the most effective, least-risk option.*

*Under IPM, actions are taken to control pests only when their numbers are likely to exceed acceptable levels. Any action taken is designed to target the troublesome pest, and limit the impact on other organisms and the environment.*

*Applying pesticides to crops, animals, buildings or landscapes on a routine basis, regardless of need, is not IPM. Applications of pesticides are always the last resort in an IPM program.*<sup>4</sup>

By eliminating potential food, water and living space for pests, and sealing up their entry routes into buildings, the need for pesticides is greatly reduced. Pesticides are used only when a confirmed pest problem is present (no preventative pesticide treatments). When pesticides are used, the least hazardous pesticide effective for control of a specific pest is applied using precise, targeted treatments in areas not contacted by or accessible to the children, faculty or staff.

---

<sup>1</sup> Rivas, R., personal communication, June 21, 2010.

<sup>2</sup> Callahan, R. (2010, July 25). Indiana set to approve pesticide rules for schools. *Louisville, Ky., Courier Journal*, online

<sup>3</sup> [http://www.ikecoalition.org/documents/ISBA\\_IPM\\_Policy\\_1-28-04.pdf](http://www.ikecoalition.org/documents/ISBA_IPM_Policy_1-28-04.pdf)

<sup>4</sup> <http://www.ipminstitute.org/faq.htm#WhatIsIntegratedPestManagement%28IPM%29?>

John Carter, currently the Director of Planning at Monroe County Community School Corporation and formerly its Director of School Facilities, describes the philosophy of traditional pesticide-based pest control as “out of sight, out of mind.” Under traditional pest control, the pest control vendor regularly treats facilities with residual pesticides, and then follows up any pest outbreaks with even more pesticides. “Out of sight, out of mind” was the way that schools “from Alabama to Indiana” thought about pests.<sup>5</sup> Fortunately, aided by “the relatively recent availability of effective low-risk” pest management technologies,<sup>6</sup> schools such as Pike Township and Monroe County have demonstrated they can effectively manage pests with IPM.

This case study, prepared by Improving Kids’ Environment with financial support from the Asthma Program at the Indiana State Department of Health and Teach for America, examines the implementation of a pilot IPM program at Pike Township schools in the 2008-09 school year and district-wide implementation in 2009-10. Pike Township can serve as a model for IPM implementation in Indiana, one that should encourage and empower other school districts to reduce their pesticide use and simultaneously reduce pest populations in the school environment.

### **Pest Management in Indiana Schools**

In 2001, with pressure from the General Assembly and the Indiana Pesticide Review Board, the Indiana School Board Association adopted a school pesticide policy and encouraged voluntary adoption at school districts throughout the state. Later reviews by the State Chemist’s office found that while many schools had adopted a policy to reduce the use of pesticides, just over half the schools that had adopted a pest management policy actually were following it.<sup>7</sup>

A 2004 study conducted by Purdue University’s Department of Entomology surveyed pest management policy adoption and implementation in Indiana schools. Written questionnaires were sent to all 294 public K-12 school corporations in Indiana, accompanied by a letter from the Indiana School Board Association. Responses were received from 184 schools on their pest management policies, and from 170 schools on day-to-day pest management implementation. Findings included:

- Over 95% of respondent schools had formally adopted a pest management policy, were in the process of adoption, or were considering adoption of a policy.
- Of those schools with a policy, 27% were required to practice IPM and 31% of the policies recommended a school district use IPM.
- Almost 60% of schools had adopted an IPM policy.
- Pesticides were applied as a routine preventative measure in more than 60% of schools.<sup>8</sup>

The survey documented that Indiana schools have adopted pest management policies at a high rate, but the pervasiveness of routine preventative pesticide applications demonstrates that IPM has not truly been adopted by those schools. With such a broad implementation gap, the Indiana Pesticide Review Board is again working to make school pest management practices safer.

---

<sup>5</sup> Carter, J. personal communication, August 4, 2010.

<sup>6</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

<sup>7</sup> [http://www.ikecoalition.org/Pesticides\\_General/pesticides.htm](http://www.ikecoalition.org/Pesticides_General/pesticides.htm)

<sup>8</sup> Fournier, Al. (2004). Survey of Indiana Public Schools Pest Management Policies and Practices. Final EPA Project, Purdue University, Department of Entomology, Smith Hall, 901 West State Street, West Lafayette, IN 47909

In 2010, almost ten years after allowing school districts to voluntarily adopt safer pest management practices, the Indiana Pesticide Review Board has proposed a new school pesticide rule. The proposed rule is intended to minimize the potential for pesticide exposure to children at schools by ensuring the following:

- (1) Pesticides are used only by a certified applicator or an individual operating under the direct supervision of a certified applicator.
- (2) Pesticides are not used when children are present.
- (3) Pesticides are stored in locked storage areas.
- (4) Except for emergency situations, school corporations provide advance notice of pesticide applications to parents or guardians on a notification registry.
- (5) School corporations keep records of pesticide application.

The rule does not require that schools practice IPM, though it does pose additional requirements for the use of most pesticides. It also exempts gel or paste bait insecticides and enclosed manufactured insecticides, considered to create less exposure than sprayed pesticides. The rule was published in June 2010 and is awaiting formal adoption. One Indianapolis school district, however, has, in the past two years, put itself far ahead of the curve in both managing pests and reducing pesticide use.

### **Pike Township Schools**

The Metropolitan School District of Pike Township serves approximately 11,000 students on the northwest-side of Indianapolis. Pike Township uses 19 buildings, including 14 school buildings occupied by students (nine elementary schools, three middle schools, one high school, and one alternative education setting in a shopping center). The school's website claims that its facilities are "some of the most beautiful and technologically advanced in the Midwest." The oldest school building still in use dates from 1957, though it has been remodeled and added onto subsequently. A new school opened in August 2010.

Nancy Poore, a Pike Township school board member who describes herself as "aware of environmental issues," first learned of IPM in 2007 from a board member at Improving Kids' Environment, a non-profit education and advocacy organization that works to reduce environmental threats to children. Impressed by the safer, more environmentally friendly pest management, she suggested IPM to Raul Rivas, the recently hired director of facilities. Janet McCabe, then Improving Kids' Environment's executive director, facilitated communication among Superintendent Nathaniel Jones, environmentally active teachers and Dr. Marc Lame of Indiana University. Ultimately, the Metropolitan School District of Pike Township, Dr. Lame, and Improving Kids' Environment entered into an agreement to implement IPM at Pike with financial support from the U.S. Centers for Disease Control and Prevention.

### **Pike's Former Pest Management**

Before 2008, Pike, like most schools, was practicing "traditional" pest control. Pike had very little idea what its pest control vendor was doing. For instance, while the pest control vendor claims it employed localized pesticide treatments to address specific pest outbreaks, Pike's current IPM Coordinator, Asaf Goldstein, believes the vendor was applying routine preventative pesticide treatments throughout Pikes' school facilities. The pest control vendor in Indianapolis could not recall in an interview the exact pesticides the company used to address pest problems at Pike.<sup>9</sup> According to Mr. Goldstein, without a school or district-wide policy governing any aspect of pest management, the vendor had complete control over pesticide decisions at Pike Township schools.<sup>10</sup>

---

<sup>9</sup> Neal, M., personal communication, August 2, 2010.

<sup>10</sup> Goldstein, A. personal communication, August 2, 2010.

What is known is that seven out of 13 Pike schools had contracts with the pest control vendor to conduct routine preventative pesticide applications. The six schools without contracts received “a la carte” pest control, meaning that the pest control vendor treated pest outbreaks but did not schedule regular pesticide applications. In the seven schools with contracts, the vendor applied preventative pesticide treatments at least monthly. As for pesticide use, one year’s worth of the pest control vendor’s tickets shows that pesticides applied included: Termidor,<sup>11</sup> Maxforce,<sup>12</sup> Speckoz,<sup>13</sup> Talstar,<sup>14</sup> and Phantom,<sup>15</sup> in addition to a variety of baits and glueboards.<sup>16</sup> In the seven contracted schools, about five gallons of pesticide solution (pesticides are applied in heavily diluted form) had been applied. For the three sites that had warranted calls to the pest control vendor to address specific pest outbreaks that year, the vendor applied 9.5 gallons of pesticides.<sup>17</sup>



Figure 1. Pesticides deployed in school by pest control vendor in 2008.

Despite this array of pesticides, the pest control vendor claimed to be practicing IPM. In fact, in a year’s worth of the vendor’s visit receipts, 22 out of 85 visits were credited to IPM. Based on the duration and timing of visits and a review of the previous twelve months’ invoices, Mr. Carter, working in conjunction with the IPM implementation team, surmised that the vendor was lacking in pest diagnosis, education efforts, and attempts at non-chemical remediation – all integral components of IPM.

The process involved a principal or building manager calling Mr. Rivas’ secretary, who would then call the pest control vendor to treat the school’s problem. When called upon, the vendor’s technicians applied one pesticide or more to address problems. Because neither Pike nor the state had adopted a rule governing pesticide use, the pest control vendor had full decision authority over amount and type of pesticides applied. To further compound Pike Township’s pest control problems, faculty and staff independently purchased and applied over-the-counter pesticides on “numerous” occasions.<sup>18</sup> (Figure 2)

In February of 2008, as part of the assessment stage of the pilot IPM program, a team of IPM practitioners began conducting initial investigations at two schools that would pilot IPM in the fall. Dr. Lane, an entomology professor and IPM expert at Indiana University, composed an Initial Assessments report based

---

<sup>11</sup> Termidor is a termiticide whose active ingredient is fipronil, a broad-spectrum phenylpyrazole insecticide.

Fipronil is listed by U.S. EPA as a possible human carcinogen. <http://npic.orst.edu/factsheets/fiptech.pdf>

<sup>12</sup> Maxforce is a brand name for a variety of granular and gel-based baits used to control roaches, ants and flies.

Active ingredients in Maxforce products include fipronil, Imidacloprid and Hydramethylnon.

<http://www.domyownpestcontrol.com/maxforce-products-c-32.html>

<sup>13</sup> Speckoz is a brand name for a variety of pest control products, including aerosols, sprays and monitoring devices. These have a variety of active ingredients. <http://www.speckoz.com/>

<sup>14</sup> Talstar is brand name insecticide spray with Bifenthrin, a pyrethroid, as an active ingredient. It is highly toxic to fish and aquatic arthropods.

<http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480b03433>

<sup>15</sup> Phantom is a brand name for an insecticide spray labeled for indoor and outdoor use. Active ingredient is Chlorfenapyr, a pyrrole insecticide and miticide used in greenhouses and other structures to control mites, termites, spiders, and insects. [http://www.epa.gov/oppsrrd1/registration\\_review/chlorfenapyr/](http://www.epa.gov/oppsrrd1/registration_review/chlorfenapyr/)

<sup>16</sup> Carter, J., personal communication, August 4, 2010.

<sup>17</sup> Carter, J. (2008). *MSD Pike Township IPM Economic Analysis*.

<sup>18</sup> Lane, M. (2008). *Initial Assessment of the Metropolitan School District of Pike Township, IPM Program*.

on the team's observations. He discussed Pike's preparation for a switch to IPM, the deficiencies of Pike's pre-IPM pest control, and his recommendations for implementing IPM at Pike.

According to the report, Pike had an average system for gathering information and average evaluation and training programs. Pest management was not part of the faculty's or staff's training regimen. Average grades were given for waste management and sanitation, except in concession and kitchen areas serviced by the contracted food service company. "The sanitation in the kitchens was much below average following close inspection (under appliances, drains, etc.)," the initial assessment read. (See Figure 3)

Dr. Lame's assessment also stated: "As typical of most school districts, pests and pesticides are an 'out-of-sight, out-of-mind' contractual function. Pests appear to be controlled for the most part, but not managed nearly as well as possible – reactive rather than proactive – virtually no inspections resulting in recommendations to prevent pests are asked for or being provided."

Regarding pest management, Dr. Lame observed many of the same problems he had seen in earlier school pest management work. He wrote, "The [pest management] deficiencies that were alarming to the [school district] management are what we observe all the time." Though he rated the overall pest pressure on the district as low to moderate, through school inspections, Dr. Lame knew that many pests populated the school facilities. Observed pests included: pavement ants, deer mice, Canadian geese, wolf and cellar spiders, field crickets, moth flies, and fruit flies. Other pests' presence was deduced: crawling insects, such as beetles, mice, lice, wasps, and birds. To handle their pest problems, seven out of the thirteen Pike Township schools had contracts with the pest control vendor. (See Figure 4)

Fortunately, the people at Pike were eager to address their pest management problems. Mr. Rivas, Pike Township's Director of School Facilities, and his management staff displayed commitment to the pilot program. The school principals at the two pilot schools were "very motivated." The custodians were very cooperative. (Dr. Lame quotes one custodian as saying "I want what is best for my school.") Even the pest control vendor displayed motivation to comply with Pike's move to true IPM.<sup>19</sup>

### IPM Project Management

The IPM implementation team agreed to first establish a pilot IPM program at two Pike Township schools. After initial experience and success, the goal was to implement IPM district-wide. Throughout the winter of 2008, Dr. Lame's team held pre-program meetings, assessed and inspected schools, conducted training sessions, and produced reports on their progress,



Figure 2. School staff may purchase and use over-the-counter pesticides.



Figure 3. Food and trash found under kitchen equipment attracts pests.

<sup>19</sup> Lame, M. (2008). *Initial Assessment of the Metropolitan School District of Pike Township, IPM Program*.

including recommendations for Pike, and documents such as “Pest Presses” and pest sighting logs. To cover their pilot IPM program expenses, the team had allotted \$13,051. Mr. Carter, the Director of Planning at assessments (three times), inspections (eight times), and training sessions (eight times) all occurred during the pilot phase. Each item occurred just once during the district-wide phase. In total, for the second stage of IPM implementation, the team allotted \$10,527.

The pilot program terminated after the 2008-09 school year. Efforts to implement IPM district-wide had to be finished, according to the contract, by August 31, 2009. The grant also allotted \$9,000 for a state-wide IPM Conference that would feature local and national IPM practitioners and academics.<sup>20</sup>



Figure 4. Ants feeding on dropped food – a pest buffet.

Dr. Lame, one of the nation’s leading experts on and advocates for IPM in schools, provided much of the technical expertise for Pike’s IPM implementation and state-wide conference. As an entomologist with the University of Arizona, he helped commercial farms implement IPM. He has assisted with the implementation of IPM in 14 states and on four Indian reservations, and has served as an indirect consultant in 25 other states. Prior to his work at Pike Township, Dr. Lame worked with a graduate school class to implement an IPM program in the Monroe County Community School Corporation.

While interested from the beginning, the pivotal experience for Mr. Rivas was a tour through a Pike Township elementary school. Along the way, Dr. Lame was able to point out many breaches of pest management best practices – such as evidence of mice infestations and unsafe placement of pest baits. Mr. Rivas was struck by the simple solutions Dr. Lame offered to address various pest vulnerable areas, or common use areas or storage areas that provide food, water, and relatively undisturbed shelter for pests.<sup>21</sup>

Among the items pointed out in Dr. Lame’s initial assessment were dirty kitchen appliances, shelves, and drains; pest entryways to kitchen areas via doors, pipes and conduits; unsafe rodent bait stations (shown earlier in Figure 1); inadequate pest monitoring; gaps around exterior doors (Figure 5); and dumpsters too close to the school and needing to be cleaned. Consequently, with the support of Mr. Rivas and other Pike administrators, Dr. Lame began the pilot IPM program at Pike. Through a memorandum of understanding, Pike promised to provide open access – to its pest management records, schools, and personnel – and to prohibit its pest control contractor from treating any of the pilot schools without justification and/or communication with the team. The IPM implementation team agreed to provide education and training, pest monitoring materials, on-site inspection and pest management services, assistance in developing outreach materials and on-call pest management services. (See Memorandum of Understanding in Appendix B).



Figure 5. Gaps under doors invite pests into the school building.

<sup>20</sup> Contract between Improving Kids’ Environment and the Indiana State Department of Health. (Feb 2009).

<sup>21</sup> <http://www.extension.org/faq/37720>

## Pike's Switch to Fewer Pests and Fewer Problems

After the implementation team's initial assessments, the team provided recommendations broken in to four categories: immediate, short term, intermediate and long term action items.

The immediate action items identified in March 2008 were to be completed as soon as possible. These recommendations focused on the following aspects of pest management: addressing areas that were "very conducive to attracting pests" and unsafe rodent bait stations; designating an IPM Coordinator in the school district; monitoring for pests, then implementing strategic, pest-appropriate pest management accordingly; cleaning signs of infestations – feces, pest debris – to allow for accurate monitoring going forward; communication across vendor and school stakeholders; and educating school custodial staff and faculty.

The short term action items were to be completed by July. These recommendations primarily addressed maintenance and sanitation practices that increased pest pressures on the school. They included: sealing entry points into the school and into the kitchen; cleaning kitchen drains (Figure 6); repositioning external garbage dumpsters; training school pest management staff, including custodial staff and vendor technicians, in IPM; and shifting the responsibilities of the pest control vendor from pesticide application and investigation to diagnosing outbreaks and educating school pest management staff.

The intermediate action items recommended Pike hold an in-service training on IPM groundskeeping and take various small steps to reduce pest pressures – replace cardboard boxes with plastic containers, hang mops heads up to allow for quicker drying, and prune trees near buildings, etc. The long-term action items recommended Pike develop a pest management in-service for faculty and staff and take specific steps to improve maintenance in and around the schools.<sup>22</sup>



Figure 6. Unclean drains and sinks harbor cockroaches and other pests.

To hear Mr. Rivas and Mr. Goldstein tell the story of Pike's response to the implementation team's recommendations, Pike schools did much more than convert from an old school pest management approach to a safer, healthier one. They also opted to make their schools cleaner, better maintained, and safer – none is limited to pest management, though all are attributed to an IPM approach. All was done, they say, without spending any more money on pest management. In addition, each school's staff gained more autonomy over their budget.<sup>23</sup>

Why would an IPM school be a cleaner school? With IPM, Mr. Goldstein believes the Pike Township custodial staff has been given focus within their jobs. "Their lives are easier," he says. "They have clear expectations" – remove cardboard boxes that house cockroaches, reduce clutter, clean kitchen drains, and pay special attention to food storage. With those expectations comes a responsibility to avoid pest problems, which oftentimes is accomplished by simply enforcing a higher standard of cleanliness. Mr. Goldstein recalls staff walking around with their heads down. Now their heads are up, and they are using their deeper understanding of pest-vulnerable areas to reduce pests through improved school cleanliness.

<sup>22</sup> Lame, M. (2008). *Initial Assessment of the Metropolitan School District of Pike Township, IPM Program*.

<sup>23</sup> Rivas, R., personal communication, June 21, 2010.

To more clearly enumerate its focus on clean schools and pest prevention, Pike provided custodians with a checklist of things that the IPM Coordinator expects them to do (see IPM Custodian Checklist in Appendix C). Mr. Goldstein, checklist in hand, inspects kitchens on a regular basis. Mr. Rivas inspects custodians' work on his walk-throughs during the year and provides a grade for each custodian's work three times per year. The Pike IPM Coordinator compares their prior practice of unclear expectations to testing students on an unfamiliar subject. The expectation checklist and grading system have "worked like a charm," he says. But how has this oversight innovation affected the custodians on the ground?

Debbie Carroll, head custodian at Pike's Eagle Creek Elementary, has always taken great pride in providing students with the safest, cleanest learning environment. The only difference is that she is now equipped with a broader set of knowledge on which to base her custodial work. She knows that pesticides are potentially harmful, especially to the young kids who attend Eagle Creek. Though she doubted it at first, she knows that Dawn dish soap and water can work as well as pesticides in preventing pest outbreaks and addressing them when they occur. Because of the IPM training sessions she attended, she now looks under pest-vulnerable vending machines, and she is sure to clean under refrigerators on a regular basis, too. Basically, she knows that good pest management is based on clean facilities. Through her efforts, she has seen this principle effectively put into place at Eagle Creek Elementary.

School maintenance has received heightened attention with the implementation of IPM at Pike, too. Like cluttered, unclean areas, maintenance problems often go hand-in-hand with pest problems. Pests gain access when they find poor maintenance at entry points – broken piping, cracks under shut doors, poorly sealed windows, etc. Interior maintenance problems – insufficient or poorly sealed crevices, torn carpeting, leaky pipes, etc. – allow pest populations to build up and spread once they have gained entry. Unlike before, Pike prioritizes the correction of maintenance issues. Since initial IPM implementation, Pike has fixed malfunctioning HVAC units, replaced missing filters, addressed leaking faucets and moisture buildup in bathrooms, re-caulked around windows to improve seals, and reduced gaps under doors and around windows. In so doing Pike drastically reduced its pest susceptibility, concurrently improving the aesthetic appeal and reliability of its facilities and reducing school heating and cooling costs.<sup>24</sup>

Pike Township Schools has demonstrated that IPM can protect students and staff from chemical exposure while delivering better pest management results. With IPM, Mr. Rivas is certain he is furthering his mission as the school facilities director; he is creating a safer, cleaner learning environment for Pike's students.

Pike Township is not the only Indiana school to have successfully implemented IPM. During the 1994-95 school year, the Monroe County Community School Corporation (MCCSC) allowed students from one of Dr. Lame's graduate classes to audit their pest management. The audit included policy recommendations that catapulted MCCSC into a pilot IPM program beginning in January 1996. Six months into Dr. Lame's EPA-funded, three-school pilot IPM program, the success of the program was obvious to the district's Director of School Facilities, Mr. Carter, as it was to others at MCCSC. According to Mr. Jochim, MCCSC's IPM Coordinator, where roaches and pests had commonly been before, there were no pests. This despite the fact that the school had switched from routine pesticide spraying to "little to no spraying" and only gel baits. MCCSC's switch to IPM was a success. Unlike Pike, MCCSC had pest management baggage going into the switch.

A young boy at an MCCSC school had repeatedly fallen ill once a month. Eventually his mother called the school and inquired. Mr. Carter looked for a reason and found one in the pesticide application records. The dates of the student's sickness and subsequent absences correlated with the dates of pesticide application. The student's teacher was pest-phobic and had requested that her room be sprayed. The vendor had obeyed, and the boy was routinely ill within a few days of pesticide application.<sup>25</sup> Regardless, MCCSC likely would

---

<sup>24</sup> Goldstein, A., personal communication, August 2, 2010.

<sup>25</sup> Jochim, J., personal communication, July 1, 2010.

have switched to IPM when it did. The incident did make Mr. Carter more attentive to non-pesticide-based pest management.<sup>26</sup>

Pesticide mis-applications have caused problems at other schools. In March 2001, a maintenance worker at Broad Ripple High School accidentally switched the herbicide he intended to use with the organophosphate insecticide, Dursban, in order to kill some persistent weeds. The worker mixed Dursban with diesel fuel and proceeded to spray it on the grass while school was in session — right outside the open cafeteria windows. The school was evacuated when the diesel-pesticide mixture was sucked into the ventilation system. Five adults and one student were hospitalized, but they were not seriously hurt. It is unlikely that the worker had received specific training to use the pesticides.<sup>27</sup> Ironically, U.S. Environmental Protection Agency Administrator Carol Browner had announced in June 2000 that the agency would “eliminate the use of Dursban for all sensitive areas, such as schools, day cares, parks, hospitals, nursing homes and malls” by the end of 2000.<sup>28</sup>

Nationally, there have been pesticide exposure incidents from Connecticut to California. Students have been hospitalized with asthma attacks, dizziness, rashes, and vomiting that were believed to be linked to pesticide exposure. In severe cases, students have developed hypersensitivity to chemicals and even abnormal growths.<sup>29</sup> Nationwide the Poison Control Center documented 2,300 school pesticide exposures during only three school years (1993 to 1996).<sup>30</sup>

As there are horror stories of pesticide exposure, there are success stories of safer pest management at schools across the country; Pike’s and MCCSC’s successes are just two of hundreds. After its IPM implementation, MCCSC became IPM Star Certified, earning praise as the “most recognized school system in the nation for its IPM prowess.”<sup>31</sup> Eleven years later, another Indiana school district has fully implemented an IPM program. Indiana’s school districts are almost universally facing challenging financial times. Could more Indiana school districts implement IPM successfully? What are the costs and benefits? What is the additional burden on school staff?

## **Economic Analysis**

Clearly, adopting and then implementing a brand new pest management program does not come free, neither monetarily nor of labor. How does IPM compare to a traditional pest management system in regard to economics and burden of implementation?

After one full school year, Mr. Rivas reports that Pike is already saving money on pest management. From January 2007 to May 2009, Pike spent \$12,440 for contracted pest management services. The contract with the pest control vendor was canceled in May 2009, thereby eliminating approximately \$430 in monthly pest management and treatment costs.<sup>32</sup> As part of his work with the implementation team, Mr. Carter of MCCSC extrapolated the costs of Pike’s vendor to covering all 13 of the district’s schools (recall that Pike contracted the pest control vendor for only seven of its schools). He estimated that contracted pest control in all schools would have cost Pike approximately \$7,800.<sup>33</sup> On top of that expense, Pike was also paying its custodians to control pests.

---

<sup>26</sup> Carter, J., personal communication, August 4, 2010.

<sup>27</sup> [http://www.ikecoalition.org/Pesticides\\_Schools/pest\\_school\\_evacuated.htm](http://www.ikecoalition.org/Pesticides_Schools/pest_school_evacuated.htm)

<sup>28</sup> <http://www.epa.gov/history/topics/legal/03.htm>

<sup>29</sup> [http://www.beyondpesticides.org/schools/publications/school\\_pirs.htm](http://www.beyondpesticides.org/schools/publications/school_pirs.htm)

<sup>30</sup> <http://www.beyondpesticides.org/schools/sepa/index.htm>

<sup>31</sup> [http://www.ipminstitute.org/IPM\\_Star/ipmstar\\_profiles\\_monroe\\_county\\_in.htm](http://www.ipminstitute.org/IPM_Star/ipmstar_profiles_monroe_county_in.htm)

<sup>32</sup> Callahan, R. (2010, July 25). Indiana set to approve pesticide rules for schools. *Courier Journal*, online.

<sup>33</sup> Carter, J. (2008). *MSD Pike Township IPM Economic Analysis*.

On the recommendation of the IPM implementation team, Pike handed IPM Coordinator duties to Mr. Goldstein, who estimates that one-eighth of his work hours are consumed by IPM. Aside from Mr. Goldstein's time, Pike reports that it implemented IPM in its two pilot schools at no extra cost, not counting substantial consulting support through the IKE-CDC grant. In the 2009-10 school year, Pike claims to have only spent \$168 on Univar pesticides. Mr. Goldstein contests that, thus far, Pike has used only \$11 worth of the ant bait it purchased. Otherwise, it reports using only Dawn dish soap.

Under its IPM approach, Pike's custodians are empowered to fight pests through simple means and schools have incentive to ensure that staff members – custodians, teachers, etc. – are active in the fight. By recommending storing items in plastic bins instead of cardboard boxes and putting food items in pest-proof containers, staff members are reducing the chances that schools will have to request pesticide treatments by a contracted vendor. Hence, school faculty and staff have an incentive to improve cleanliness, thus practicing pest prevention. Money remaining in the facilities' budgets can be used for other maintenance concerns in the school district.<sup>34</sup>

MCCSC's financial pest management history runs parallel to that of Pike, though, due to time and thorough documentation, the MCCSC cost savings are better developed. In the early stages of its IPM implementation, MCCSC also hired an IPM Coordinator to oversee all 19 schools' pest management efforts and serve as the district's pest expert and certified pesticide applicator. Despite this added personnel cost, MCCSC reduced the \$34,000 it spent annually on pest control by 17.6 percent.<sup>35</sup>

Other schools nationwide are saving money through IPM, as well. In Maryland, Montgomery County Public Schools switched to IPM in 1985. Within four years, the county had saved \$1,800 per school and \$30,000 at the food service warehouse. Also in Maryland, the Anne Arundel School District reports reducing its pest management expenses from \$46,000 to \$14,000 after its first year of IPM implementation. On the opposite side of the country, in Santa Barbara, California, Vista de las Cruces School canceled its \$1,740 contract with a vendor to switch to IPM. The subsequent two years, Vista de las Cruces paid a total of \$270 for its pest management.<sup>36</sup>

Successful IPM implementation stories at these schools, clearly demonstrate that the economics of IPM can make sense. Looking specifically at Pike and MCCSC, though, the question remains as to whether IPM is feasible when a school district is faced with all of the costs from adoption to implementation. Neither Pike nor MCCSC would have been so quick to adopt IPM had they not received funding from CDC and EPA grants, respectively, admitted Mr. Rivas and Mr. Jochim. Dr. Lame estimates school IPM implementation, which typically lasts 18 months, to cost \$40,000.<sup>37</sup> To convert Pike to IPM work began with presentations to school administrators and school assessments in February of 2008 and ended with school assessments throughout the district by August 31, 2009. In Pike's case, total costs for the implementation team's services in implementation-related work amounted to \$23,578. Considering the costs, whether \$23,500 or \$40,000 or somewhere in between, school districts are unlikely to foot the bill for initial IPM implementation on their own.

Even if a school does have to foot its own initial bills Dr. Lame still advocates for IPM implementation – "IPM always pays off in the long-term." In a well-managed school, like Pike, he believes the first-year IPM cost will be minimally more or even equal to what a school pays for traditional pesticide-based pest control. Dr. Lame concedes that IPM, a program stressing communication, record-keeping, and being proactive, will cost more for schools not managed as well. That investment will serve to get the school on the road to

---

<sup>34</sup> Rivas, R., personal communication, July 7, 2010.

<sup>35</sup> Safer Pest Control Project. *Cost of IPM in Schools*. Chicago, IL: unknown author.

<sup>36</sup> Beyond Pesticides. (2002). *Schools Save Money with Integrated Pest Management*.

<sup>37</sup> Lame, M., personal communication, July 17, 2010.

successful IPM implementation and good management, he argues. One controversy around the true cost of IPM implementation informs the debate.

IPM requires schools to keep their facilities in good condition. It also requires one or more custodial or pest management staff member to seek out professional development opportunities. In many cases, schools, under budget pressure have cut back on both. Should reinstituting good school maintenance and paid professional development be considered part of the pest management budget? Dr. Lane thinks they should not, as they inflate the cost of pest management rather than being considered part of standard maintenance and management practices for schools.

He believes regular maintenance and professional development are integral school components, whether the school is practicing IPM or not. Instead of artificially inflating the economics of a switch to IPM, then, professional development and school maintenance should be part of the school's investment in itself.<sup>38</sup>

### Implementation Burden Analysis

Pike Township, Monroe County, and schools everywhere cannot just think of cost when deciding to adopt a new school policy. Especially given IPM's dependency on "more knowledge expertise than traditional pest control programs,"<sup>39</sup> the feasibility of implementation is just as important of a piece of the puzzle as the dollars and cents.

Successful IPM implementation depends upon custodial staff buy-in, education, and widespread communication among school and administrative staff, if not faculty as well.<sup>40</sup> The 2004 Purdue University survey of Indiana schools showed that the two biggest impediments to IPM adoption and implementation were time constraints (25%) and lack of adequate staff (14%).<sup>41</sup> Are these legitimate concerns? Does IPM require more time to implement and higher quality staff? Compared to traditional pest management is IPM more burdensome on school staff?

School administrative staff often include district-wide facility managers, pest management coordinator, or, at the least, individuals who work on facility maintenance and/or pest management oversight. In larger districts, these individuals likely are not doing day-to-day pest control, unless they are the schools' certified pesticide applicator. Instead, typically they oversee custodial, maintenance and grounds-keeping staff, and they collaborate on larger projects.

All four men who served as facility directors or IPM coordinators at MCCSC and Pike confidently state that staff workloads did not increase during the process. To the contrary, they perceived an increase in staff empowerment due to clearer expectations and heightened professionalism.

From the beginning, Mr. Rivas was struck by the simplicity of the IPM approach. However, he recognizes that the IPM program *could* be burdensome on his custodial staff. "[IPM] would be burdensome if we didn't train them," he said. By providing the professional development opportunities to his custodians, IPM did not

---

<sup>38</sup> Lane, M., personal communication, July 17, 2010.

<sup>39</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

<sup>40</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

<sup>41</sup> Unknown author. (2004). *Survey of Indiana Public Schools Pest Management Policies and Practices*. Final EPA Project, Purdue University.

add burden but alleviated it by providing Pike custodians with a cleaner working environment.<sup>42</sup> But what training was provided and how much time and energy did it take away from custodial staff members' work?

Through the pilot IPM program, Dr. Lame, often with Mr. Jochim and/or Mr. Carter, conducted monthly three-hour training sessions. Head custodians from all Pike schools attended and were then expected to communicate lessons learned to their subordinates. Head custodians at the two pilot schools went on hour-long monthly school inspections, again guided by Dr. Lame, Mr. Carter, and Mr. Jochim and accompanied by Mr. Goldstein and Mr. Rivas. School principals occasionally took part in the school inspections, too. Head custodians at the pilot IPM schools spent four to five hours, depending upon whether the school inspection was finished on time or not, on IPM per month, not including time for dissemination of information to their subordinate custodians.

After completion of the pilot IPM program, Pike adopted a less intensive training schedule. Semi-annual training sessions build upon the strong educational foundation that had been established the year prior. The monthly school inspections continued, allowing Mr. Goldstein the time to provide real-world guidance to head custodians. During district-wide IPM implementation, head custodians spent two to three hours on IPM, again, not including time for dissemination of information to their subordinate custodians.

In her role as a head custodian, Ms. Carroll is one of the head custodians Mr. Goldstein works with. Her elementary school was one of the two pilot IPM schools during the 2008-09 school year. She attended the IPM trainings, and her school's pest management was subjected to intense scrutiny during Pike's pilot test. She corroborates her bosses' sense of the ease of IPM implementation, though she is not willing to explicitly say that IPM has empowered her. Whereas in the past she would struggle to find an appropriate time to spray pesticides for a pest outbreak, she can now tackle problems immediately and without worry about exposing students to harmful chemicals. For example, on the last day of school in the summer of 2010, tens, if not hundreds, of ants covered food that had been dropped on the teacher's lounge floor. Instead of waiting for everyone to leave the room to apply a potentially harmful pesticide, Ms. Carroll swept up the ants and cleaned the floor with Dawn dish soap and water. Problems that caused her to waste time and effort before can now, with IPM, be handled promptly and efficiently.

Ms. Carroll's job is healthier, too. She appreciates the fact that she is no longer exposed to pesticides, which triggered asthma symptoms. And, through the training sessions, she also learned a lot. She learned that pesticides are potentially harmful, especially for kids, and that pesticide sprays are ineffective means of killing spiders – a method she recalls the pest control vendor using at her school. While she will not say IPM has changed her perception of her work, it is obvious that she takes pride in the pest management knowledge she has acquired.<sup>43</sup>

Back at MCCSC, Mr. Jochim reports that, much like the effect at Pike, Monroe County custodians' work lives got easier once the school district implemented IPM. The improved pest management reduced pest pressures on the school, reducing both the amount of time custodians spent addressing pests and the effort custodians put into avoiding them while completing routine tasks (a benefit Mr. Goldstein reported, too). IPM also gave MCCSC custodians more authority in dealing with teachers, who are known to not recognize custodians and facility personnel as authority figures.<sup>44</sup> Through their IPM training, custodians intimately knew the connection between cleanliness and pest-free areas. They could articulate problems, like using cardboard boxes for storage and allowing pests' access to food, to the teachers who tolerated or even encouraged pest-

---

<sup>42</sup> Rivas, R., personal communication, June 21, 2010.

<sup>43</sup> Carroll, D., personal communication, July 19, 2010.

<sup>44</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

vulnerable areas in their classrooms. Not only is this a sign of improved custodian professionalism, but it also demonstrates the capacity for IPM dissemination in a school where custodians have been trained in IPM.

## Recommendations

As demonstrated by the Pike and Monroe County examples and experiences in other states, schools can successfully reduce pest complaints and reduce pesticide use by adopting an IPM approach. But how best to push the school IPM movement forward?

Below, general recommendations are introduced for all advocates, including schools and state agencies such as the Indiana State Department of Health. Of further use to schools, Appendix E includes a twelve-step guide to implementing IPM in a school or daycare facility from the Midwest Technical Resource Center for IPM.

An organization wanting to advocate for IPM should align its current capacity and specialized skills to address one or more of the general or specific recommendations. Perhaps more importantly, relationships with schools' potential change agents – school board members, administrators, active parents, etc. – should be sought out and capitalized upon when established.

### *School Representatives*

- **Contract pest management services with a vendor that practices IPM.** Whether your school wants to go down a self-sustaining IPM path or not, in the short-term opt for an IPM-practicing vendor. Julia Tipton Hogan, the public representative on the Indiana Pesticide Review Board, believes this is the practical approach to get IPM in schools. Not only does contracting an IPM-practicing vendor make more sense for smaller school districts that might not be able to justify hiring their own IPM Coordinator, but this also allows for schools to start practicing IPM immediately.<sup>45</sup> As for vendors' ability to implement IPM, one instructive case involves Pike. There, the pest control vendor claimed to be practicing IPM. While there were problems with some of its IPM practices, it was using some insecticide baits – a practice Dr. Lame pointed out as a solid IPM approach in his Initial Assessments report.<sup>46</sup>
- **Use available resources.** A school likely cannot transform its traditional pest management program into IPM overnight. It can, however, likely implement small changes that, little by little, can make a big difference. After a few years worth of small changes, the school could be well down the IPM path. Resources to support your IPM efforts abound, too. Seek out IPM resources – available at Purdue University and the IPM Institute at Oregon State University – for immediate responses to safer pest management questions. Or go online for examples of pest-sighting logs and IPM implementation guides. Several other school IPM resources recommended by experienced IPM practitioners can be found in Appendix D.
- **Join your state's IPM Coalition.** Regardless of your school's current or future pest management intentions, enlist your school in your state's IPM Coalition. This group is made up of representatives from experienced IPM practitioners, including representatives from schools that have implemented, are implementing, or will implement IPM – who better to learn from and with? The model schools that have implemented IPM with the help of grant funding will be available to you through the Coalition. These schools can provide concrete examples of pest management done well, so that others following them can have a tangible goal in mind for their pest management improvements. Eventually, with support from your state's IPM Coalition, your school's pest

---

<sup>45</sup> Hogan, J.T., personal communication, July 15, 2010.

<sup>46</sup> Lame, M. (2008). *Initial Assessment of the Metropolitan School District of Pike Township, IPM Program*.

management coordinator will become an IPM expert. Dr. Lane, who has initiated several coalitions throughout the country, believes that after three years of meeting four times a year, an IPM newcomer with good management skills should be able to implement IPM at her/his district.<sup>47</sup>

- **Bring IPM into the classroom.** Fournier, Gibb, and Oseto recommend “bringing IPM into the classroom,” as schools in Michigan, Minnesota, and Pennsylvania have done. Exposing teachers and students to IPM through meaningful classroom activities “has the potential to increase both student and teacher awareness of IPM principles and practices, and thereby increase their participation and cooperation in school IPM programs.” Classroom resources are available at <http://www.ipminstitute.org/supersleuth.htm> or <http://www.ipm.iastate.edu/ipm/schoolipm/lessonplans>
- **Implement IPM to fit your school’s needs and management structure.** IPM is not one size fits all. In IPM program implementation, Fournier, Gibb, and Oseto observed schools implementing IPM to meet their individual power structures and needs. The more schools identified with various aspects of IPM and perceived them to be consistent with their goals, the more likely schools were to implement each aspect of IPM. In one instructive example, an Indiana school left out some reporting components of IPM but still, by and large, implemented successful IPM. Before you attempt record-less IPM implementation, note that verbal communication was believed to make up for the loss of a thorough paper trail at the school.<sup>48</sup>
- **Appoint a pest management coordinator.** She/he will not practice pest management at first, but, after a few years worth of IPM Coalition participation, could be well on her/his way to full-scale IPM implementation. Your school will not as easily build on its pest management successes if there is not a point person in whom the many dots of IPM are being connected.
- **Properly manage IPM.** IPM requires effective management to achieve successful implementation, though each school can use its own specific management style. That being said, certain aspects of IPM do appear essential. School staff must buy in to IPM. IPM also requires thorough communication among all individuals implementing IPM at your school. And schools should ensure that custodial staff, or whoever else is implementing IPM strategies, is treated professionally. At schools discussed in Fournier, Gibb, and Oseto’s *Go to the Head of the Class*, pest-vulnerable areas were not addressed as quickly as possible due to teacher disrespect for custodial and facility operational staff. Custodians had to work through school principals to address teachers’ pest-conducive behaviors. Outside of the fundamental IPM components, do not be afraid to customize your IPM program to fit your particular school’s needs and management structure.
- **Invest staff in IPM.** According to Fournier, Gibb, and Oseto, staff buy-in was often “accompanied by a philosophical agreement with the goals or rationale” of the school’s IPM program. Repeatedly, the trio observed schools where teachers had not bought-in to IPM, complicating IPM efforts. In one school (out of four schools observed), teachers became so frustrated with what appeared to them to be ineffective pest management, they applied their own pesticides to address pest problems. None of the four schools worked to achieve teacher buy-in and, not coincidentally, teachers were unsupportive of IPM in all four schools. Perhaps even more important is investment of custodial staff. One school discussed in *Go to the Head of the Class* had its IPM efforts thwarted in part due to a lack of custodian investment.

---

<sup>47</sup> Lane, M., personal communication, July 19, 2010.

<sup>48</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

- **Don't mistake partial IPM with IPM.** IPM is not IPM if technical components are left out. If your school struggles with IPM, ensure that all essential facets of the program are being implemented before writing the problem off as a problem with IPM itself. In one school, Fournier, Gibb, and Oseto observed “ ‘missing’ aspects of IPM programs [contributing] to the persistence of pest problems and a lack of pest management satisfaction among staff” (Fournier, Gibb, Oseto).
- **Keep ball rolling after pilot IPM implementation.** Schools that benefit greatly from grant funding for their IPM implementation tend to struggle after change agents withdraw from the school. Good management of IPM and your IPM Coordinator should help keep up the school motivation for IPM upon completion of the pilot implementation.

### *State Government Recommendations*

- **Do away with bidding constraints that limit IPM implementation.** Having to opt for the lowest bidder can limit schools' ability to opt for an IPM-practicing vendor.<sup>49</sup>
- **Fund IPM.** Most of the states that mandate or encourage IPM provide no funding for IPM implementation. Neither do these states usually fund measures to enforce IPM implementation. Federal grants are helpful, but they are not enough (Fournier, Gibb, and Oseto); states and other local sources must help alleviate budgetary pressures on schools with a desire to implement IPM.
- **Provide uniform state IPM standards.** Fournier, Gibb, and Oseto give high praise to the creation of the EPA's national IPM Center. Any steps that could be taken to “facilitate consistent implementation, assist school administrators in identifying professional pest control services consistent with the goals of IPM, and facilitate program evaluation” would help tear down barriers to IPM implementation (Fournier, Gibb, and Oseto).
- **Demand IPM implementation not just policy adoption.** States are not off of the hook once they pass rules requiring progressive pest management. If not provided funding or fearing real enforcement, schools are unlikely to implement real IPM. In Illinois, while 97% of schools claimed to be practicing IPM, only 73% of schools were using non-chemical pest management methods and excluding routine pesticide applications. Similarly, 70% of schools in Massachusetts, required by law to practice IPM, were not in compliance with the state IPM law (Fournier, Gibb, and Oseto).
- **Publicize the state's IPM Coalition.** If your state already has an IPM Coalition, as Indiana does, then support it. State health and education officials should help the coalition gain publicity and acceptance as a resource for schools wanting to implement IPM but short on money to fund it. And, if your state does not have an IPM Coalition, help found one.

---

<sup>49</sup> Fournier, A., Gibb, T., and Oseto, C. (2010). *Go to the Head of the Class: A Researched-Based Approach to Understanding Adoption and Implementation of Integrated Pest Management in Schools*. West Lafayette, IN: IPM Technical Resource Center.

## Appendix A - Pesticide Health Risks

# IMPROVING KIDS' ENVIRONMENT



## PEST MANAGEMENT FOR SAFER, HEALTHIER SCHOOLS

### Pesticide Exposures Can Cause Problems in Schools

- From 1998-2002, 2,593 acute illnesses from pesticide exposures were reported in U.S. schools.<sup>1</sup>
- An Indianapolis high school was evacuated and six people sent to the hospital because of inappropriate pesticide use in 2000.<sup>2</sup>

### Children have higher health risks from pesticide exposure

- Children's bodies have 2 to 7 times higher levels of pesticides than adults living in the same space.<sup>3</sup>
- They are at higher risk because their bodies are still developing.
- Ill effects of acute exposure differ by chemical but can include nausea, vomiting, headaches, eye irritation and respiratory symptoms.<sup>4</sup>
- Some pesticides are neurotoxic,<sup>5,6</sup> and some have been linked to childhood cancers.<sup>7,8</sup>

### Schools may reduce absences by reducing pests and pesticides

- Many pesticides are respiratory irritants. Both pests (cockroaches) and pesticides have been associated with asthma symptoms in children.<sup>9</sup>
- Asthma is a leading cause of school absence in the U.S. – more than 12 million asthma-related absences per year.<sup>10</sup>
- In the average Indiana class of 25 children, 3 have asthma.<sup>11</sup>
- IPM reduces cockroaches, which are also an asthma trigger.

### For More Information

- Integrated pest management involves pest prevention and proactive pest management. By keeping pests out and removing sources of food, water and shelter, fewer pests are encountered and pesticides are used only as a last resort.
- Learn more about integrated pest management on our website: [www.ikecoalition.org](http://www.ikecoalition.org).
- Join the Indiana IPM Schools Coalition to learn from others how to reduce both pests and pesticides in your school.
- Contact IKE at 317-677-4760 or 1111 E. 54th Street, Ste. 212, Indianapolis, IN 46220.

### References

- <sup>1</sup>Alarcon, W.A., et al. 2005. Acute Illnesses associated with pesticide exposure at schools. *JAMA* 294, 455-465.
- <sup>2</sup>Improving Kids' Environment. 2000. Indy high school evacuated due to pesticides. [www.ikecoalition.org/pesticides\\_school/pest\\_school\\_evacuated](http://www.ikecoalition.org/pesticides_school/pest_school_evacuated)
- <sup>3</sup>U.S. Environmental Protection Agency. 2006. Feasibility of estimating pesticide exposure and dose in children using biological measurements.
- <sup>4</sup>National Institute for Occupational Safety and Health. (2007). Reducing pesticide exposure at schools. Retrieved April 25, 2010, from <http://www.cdc.gov/niosh/docs/2007-150/default.html>
- <sup>5</sup>Lizardi, P. S., et al. 2008. The effects of organophosphate pesticide exposure on Hispanic children's cognitive and behavioral functioning. *Journal of Pediatric Psychology*, 33(1), 91-101.
- <sup>6</sup>Shafer, T.J., et al. 2004. Developmental neurotoxicity of pyrethroid insecticides: Critical review and future research needs. *Env Health Perspectives* 113, 123-136.
- <sup>7</sup>Wigle, D. T., et al. 2009. A systematic review and meta-analysis of childhood leukemia and parental occupational pesticide exposure. *Environmental Health Perspectives*, 117, 1505-1513.
- <sup>8</sup>Efird, J. T., et al. 2003. Farm-related exposures and childhood brain tumours in seven countries: results from the SEARCH International Brain Tumour Study. *Paediatric and Perinatal Epidemiology*, 17(2), 201-211.
- <sup>9</sup>Salameh, P. R., et al. (2003). Respiratory symptoms in children and exposure to pesticides. *European Respiratory Journal*, 22(3), 507-512.
- <sup>10</sup>Centers for Disease Control and Prevention. (2007, August). Featured data & statistics: Statistics on asthma-related absences. [www.cdc.gov/datastatistics/archive/asthma-absences.html](http://www.cdc.gov/datastatistics/archive/asthma-absences.html)
- <sup>11</sup>Indiana State Department of Health (March 2008). *The Burden of Asthma in Indiana: Second Edition*

## **Appendix B – Pilot IPM Project Memorandum of Understanding**

### **MEMORANDUM OF UNDERSTANDING**

For the Implementation of a Pilot IPM Program into the Metropolitan School District of Pike Township

#### **PRINCIPALS**

School District - Raul Rivas, Director of School Facilities, Metropolitan School District of Pike Township

IPM Implementation Team

Dr. Marc Lame-Indiana University, School of Public and Environmental Affairs

Janet McCabe, Improving Kids Environment

**This program is dependent on the coordinated approach of different entities to assure successful implementation. While this document is not meant to be legally binding, it is, as a matter of ethical communication, requested that each participant agree to the following objectives and designated activities:**

#### **OBJECTIVES**

**To provide education through training, demonstrate technological and program planning innovations, develop and disseminate outreach materials, conduct audits of pesticide use, cost and exposure outlining tangible progress for the mitigation of risk to the school community, and is designed to be transferable to other school communities.**

#### **THE IPM IMPLEMENTATION TEAM WILL PROVIDE:**

- Education and training with regard to school staff, state change agents and pest management personnel (consisting of one training session at program initiation)
- Pilot program materials for purposes of pest monitoring (excluding capital goods, and termite control)
- Conduct on site inspection/treatment for purposes of program audit and pest management (consists of at least six visits per pilot school)
- Considerate scheduling for personnel training and inspection visits
- Aid in the development of outreach materials for local (newsletters) and statewide (newsletters/fact sheets) use
- Press Releases and regional presentations (IF agreed to by all parties)
- Communicate at least monthly
- “on call” status for pest complaints or emergencies

#### **THE SCHOOL DISTRICT WILL PROVIDE:**

- Access to previous records related to pest management and pesticide use
- Access to two schools for inspection and pest management
- Access to personnel in those schools (mostly staff vs. teachers) for training and determination of pest problems
- Assurance that current vendors be prohibited from treating any of the pilot schools without justification and/or communication with our team (though we welcome their participation in our training)
- Allow the distribution of IPM materials (newsletters) to teachers, admin and staff
- Agree to visitation by school administrators from other states

### **Signatures To the Memorandum of Understanding**

Raul Rivas, Director of School Facilities, Metropolitan School District of Pike Township

Dr. Marc Lame- School IPM Program Implementation Team Leader

Janet McCabe, Program Grant Administrator, Improving Kids Environment

**Appendix C - MSD of Pike Township Custodian Checklist**



IPM Facilities Inspection Form

Report No.

Type of Service Visit <input checked="" type="checkbox"/> Routine Service/Inspection <input type="checkbox"/> Follow-up for previous problem <input type="checkbox"/> Response to complaint Contact Person: _____	School	Date
	Service Address	Time In:
	Problem area(s) previously reported (if any)	Time Out:

Exterior

\*Note: For instructions on completing this form, go to pages 3 and 4.

	Needs			Location	Description/Comments
	OK	Work	N/A		
<b>Garbage Areas</b>					
1. Dumpsters seal properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
2. Dumpsters located adequate distance from doors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
3. Dumpsters on pest-proof pavement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
4. Area around dumpsters free from spillage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
5. Outdoor trash receptacles sealed between use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
<b>Building Features</b>					
6. Doors seal tightly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
7. Windows seal tightly/necessary screens in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
8. Plumbing and electric penetrations seal tightly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
9. Walls/roof line free of cracks/openings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
10. Ventilation intakes screened, unobstructed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
11. Adequate water drainage around foundation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
12. Exterior free of mildew/mold	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
13. Moisture meter readings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
14. Roof condition/drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
15. Gutters cleared of debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
16. Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
<b>Exterior Landscape Plants</b>					
17. Adequate visibility between plantings and building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
18. Building free from direct contact with trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
19. Building free from direct contact with shrubs/vines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
20. Property free from tree hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
21. Aesthetic appearance/safety features	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
<b>Pest Evidence</b>					
22. Rodents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
23. Nuisance birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
24. Other vertebrates (feral cats, raccoons, bats, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
25. Termites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
26. Fire ants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
27. Other ants/crawling insects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
28. Weeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
29. Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____



## IPM Program Assessment

### Needs

	Needs			Location	Description/Comments
	OK	Work	N/A		
48. Administrative Procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Pest sighting log in use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Parental notification on file	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Notice of pest control service posted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Designated contact person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Service reports maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
49. IPM services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sticky traps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
serviced/replaced monthly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
out of sight/reach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Light traps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
positioned properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
serviced monthly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Bait stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
out of sight/reach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
serviced monthly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
replaced when damaged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Required recordkeeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Safety procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Date of Inspection:

Follow-up Service Required?

Approximate Date of Next Inspection:

Signature/Title of School Contact Person

Signature/Title of Inspector

### Inspection Form Instructions

IPM facilities inspections provide the school district facilities manager or IPM program coordinator with an overall report on the state of a school campus or facility with special attention to pest control. Emphasis of the report is on building features that are critical to the overall success of pest management. Chemical pest control is no substitute for pest prevention and pest proofing. Properly maintained and sealed buildings will eliminate the need for pesticides in most cases.

In addition to an inspection checklist, this form provides space for listing the most important maintenance and sanitation needs for successful pest management. This list is a subjective summary of maintenance needs that can be used by school district maintenance supervisors to set priorities for facility repairs and upgrades.

This inspection form is intended for annual or semi-annual campus inspections. More frequent IPM services should use the IPM Service Report Form, SWTRC-1.

### Exterior Garbage Areas

- Item 1. Dumpsters that fail to seal completely can provide a food source for rodents, birds, flies, and other pests.
- Item 2. Dumpsters located too close to doors result in greater likelihood of fly infestations indoors. A minimum space of 50 ft. between dumpsters or garbage and doors is recommended.
- Item 3. Dumpsters situated on soil or damaged pavement encourage rodent burrowing and may result in large rodent populations. Dumpsters should always be situated on concrete or well-maintained asphalt pads.
- Item 4. All garbage receptacles should be cleaned periodically and the surrounding area kept free of trash and spills. Overflowing trash receptacles suggest need for more receptacle capacity or more frequent pickup.
- Item 5. Garbage cans should be fitted with attached lids to discourage wasps, bees, and other pests. Self-closing lids are the usually preferable.

### Exterior Building Features

- Item 6. If light is visible under doors, weatherstripping should be installed to prevent entry of rodents and crawling insects and spiders.
- Item 7. Screens should be present, tightly fitted, and in good repair, on all exterior windows that are open. Check condition of caulk and seals around all window frames.
- Item 8. Points at which plumbing and electrical or cable services enter the building should be tightly sealed to prevent pest entry.
- Item 9. In addition to checking for flaws in building seals at ground level, the inspector should check electrical service entry points and flashing on roofs and upper walls of buildings. Ladders or roof entry may be required for a complete inspection. Binoculars may also aid rapid inspections.
- Item 10. Ventilation intakes should be adequately screened and free from obstruction. Window screen may be needed to keep smaller flying insects from gaining entry. Outdoor lighting should be directed away from air intakes to minimize attraction of night-flying insects to vents.
- Item 11. Ground should always slope away from building foundations. Note low areas or standing water next to foundations. High moisture areas may be more prone to termites and promote mold and mildew.
- Item 12. Black stains on brick or concrete walls may indicate poor roof or foundation drainage.
- Item 13. Electronic moisture meters are useful tools for detecting leaks and higher than normal moisture in walls, roofs, etc.
- Item 14. Roofs should be in good condition and drain properly. Winter is a good time to check for ice dams and indoor leaks.
- Item 15. Clogged gutters increase the chance of wood rot and water damage to exterior walls. Make sure gutters are clear and drain freely.
- Item 16. Note any other conditions that may be conducive to pests, such as wood in direct contact with soil, soil or mulch that extends above the top of the foundation, need for insect-proof lighting, etc.

## Inspection Form Instructions (continued)

### Exterior Landscape Plants

- Item 17.* The inspector should be able to see all sections of building foundations to inspect for termites, rodents, and other pests.
- Item 18-19.* To minimize entry of crawling insects such as ants, building should not contact trees or shrubs.
- Item 20.* Make note of diseased or damaged trees or limbs that might pose hazards to passersby or to the building itself. Do trees or shrubs obstruct doorways, especially infrequently used fire exits?
- Item 21.* To maintain an attractive facility appearance, check that all plants are pruned properly and weeds controlled. Look for areas of overgrown plants and reduced visibility posing a security hazard to pedestrians. suggest need for more receptacle capacity or more frequent pickup.

### Exterior Pest Evidence

- Item 22.* Look for burrows, evidence of gnawing on doors and other entry points, fecal pellets, rub marks around cracks and entries, reports of rodent sightings.
- Item 23-24.* Note roosting sites and evidence of excessive droppings from starlings, grackles, pigeons, and other nuisance birds. Look for droppings and other signs of feral dogs and cats, raccoons, opossums, etc. Check attic areas for evidence of bat roosting.
- Item 25.* Look for termite tubes along outside foundation walls. A screwdriver or other sharp probe should be used to test wood that is in contact with soil or otherwise suspect.
- Item 26.* In areas where fire ants are found, look for mounds with no obvious single point of entry. Fire ants respond vigorously to mound disturbance and have a painful sting.
- Item 27-29.* Look for ant trails around windows, electrical or plumbing lines, and building edges. Turn over bricks, stone, mulch, etc. when inspecting for other crawling pests.

### General Interior IPM Sanitation

For all indoor areas, make sure that pheromone and sticky traps are clean and replaced as necessary. Check bait stations and note service dates on the station cover. Minimum inspection equipment should consist of a flashlight and this form.

- Item 30.* Make note of sanitation or pest management deficiencies. Be specific about locations, so a manager can find and recognize problem areas. Examples of possible problems might include need for caulking or other pest proofing, exposed food, improper food storage practices, spilled food, and grease or organic debris buildup, especially in drains. Recycling bins for cans and other containers containing sweets or food for roaches and ants should sit away from potential pest harborage areas, sinks, etc. Report such conditions even if there is no sign of pest activity. Report signs of pest activity separately under pest evidence. Check that garbage and trash receptacles are clean and have intact liners.
- Item 31.* All food in storage areas should be off the floor and easily inspected. Remove and discard cardboard boxes and other unnecessary packaging to minimize hiding places for pests. Rotate food regularly, and place new cans and boxes at the backs of shelves.
- Item 32.* Inspect utility rooms for general cleanliness and pest proofing. Mops and other cleaning supplies should be stored clean and off the floor. Drains should be clean and screened to exclude roaches and other pests.
- Item 33.* Check condition of caulking and sealing.
- Item 34-37.* Areas with food should be cleaned and swept daily. Pet food and other food should be sealed in pest-proof containers. Windows, screens, and doors should fit tightly. Make note of cluttered and inaccessible areas. Trash cans should have liners.

### Interior Pest Evidence

- Item 38.* Look for fecal droppings, urine stains (UVB blacklight inspection only), rub marks, gnawing, damaged food containers, tracks, etc. Make sure bait stations are maintained and service dates documented.
- Item 39.* Termite activity may occur at any time of year, but is most likely to be noted in the spring when most swarming occurs. Distinguish termites from ants by their lack of pinched waist. Look for unusual wavy appearance on painted wood or gypsum sheetrock. Unusual mud crusts on walls or wood may indicate termite activity and usually occurs just prior to swarming. Report precise location of any termite activity.
- Item 40-41.* Note trails of fire ants or other ants. Accurate species identification may be essential for selecting the best bait or other control method.
- Item 42.* Look for fecal specks around cracks and other harborage entrances. Species identification is important and will determine bait selection and areas in which to focus control efforts.
- Item 43.* Species identification can assist in determining source of infestation. Field crickets are usually attracted to lighted buildings at night. Make note of possible entry points around lights or lighted entrances. House and camel crickets may breed indoors.
- Item 44.* Spiders are usually harmless and are best disposed of by mopping or vacuuming. Confirms spiders are non-venomous. Use sticky traps to survey spider populations.

### Recommendations for Action

The IPM technician can make recommendations for actions to be taken by the school district to improve pest control. These actions normally include only those building improvements that are beyond the scope of the pest management contractor or in-house pest management staff. Repairs or improvements that will be made at a later date by the technician, such as caulking or sealing, should be noted as such.

Priorities are assigned by the pest management technician and may not be identical to those assigned by facility managers.

### IPM Program Assessment

- Item 48.* Each school office should have a manual or computerized pest problem log that can be easily accessed by the pest control technician. Other paperwork (as required by each state or school district) should also be on file. Staff should be aware of the designated pest control contact person at each facility. Copies of all service reports should be maintained in an accessible file.
- Item 49.* Report the overall service condition of sticky and light traps, bait stations, and records maintained by the pest control technician. Poorly maintained equipment is a sign of inadequate service. Check that safety procedures are maintained and followed.

If serious problems are identified, set an approximate date for a follow-up

## **Appendix D - IPM Resources**

The resources below have been recommended by experienced IPM practitioners.

The Environmental Protection Agency's IPM in Schools Website

<http://www.epa.gov/pesticides/ipm/>

The IPM Institute of North America

[http://www.ipminstitute.org/school\\_biblio.htm](http://www.ipminstitute.org/school_biblio.htm)

National School IPM Information Source

<http://schoolipm.ifas.ufl.edu/>

Pennsylvania State University's IPM Extension

<http://extension.psu.edu/ipm>

Purdue IPM Extension

<http://extension.entm.purdue.edu/schoolipm/>

## Appendix E - Midwest Technical Resource Center's Steps for School IPM Implementation

Purdue University's Midwest Technical Resource Center for IPM recommends the following steps to implement an IPM program in a school or daycare facility:<sup>50</sup>

- 1. Adopt an IPM policy.** Adopt a policy and/or guidelines that state how pests will be managed in your facilities and on grounds. An important consideration in policy development is establishing a procedure for notification of pesticide use. Parent/staff notification will be required under new pesticide rules pending approval by the Indiana Pesticide Review Board.
- 2. Designate an IPM Coordinator for each building.** This person will act as a liaison between the building occupants and the pest management professional. Staff members should report any pest sightings to this person so that they can be communicated to the pest management professional. Any recommendations made by the pest control technician (for cleaning or repairs, etc.) should be relayed by the IPM Coordinator to the administration.
- 3. Inspect all buildings and grounds.** Inspections should be performed by a pest management professional or another person who is knowledgeable about pest biology and habits. The inspector will note situations that are conducive to pest populations and recommend repairs, sealing of pest entry points, clutter reduction, improved sanitation, and monitoring procedures.
- 4. Perform repairs as needed** to prevent pest access to buildings or to hiding spaces in walls and equipment. Also, repair any leaks and eliminate standing water wherever possible.
- 5. Review sanitation practices and reduce clutter.** Sanitation includes areas such as kitchen cleaning and maintenance, waste disposal procedures, and elimination of clutter. Clutter is an important harborage for many pests, including rodents, spiders, and cockroaches. Elimination of cardboard and conversion to "box-less storage" is recommended, particularly in food areas. Sanitation is pest control!
- 6. Set up a monitoring program for pests.** Monitoring means regular careful inspection of facilities to determine if pests are present. Monitoring programs focus on pest-vulnerable areas such as kitchens, teacher's lounges, and custodial closets, and use tools such as pest sighting logs and insect "sticky traps." Staff should report any pest sightings to the IPM Coordinator.
- 7. Identify potential pest species found and determine a control strategy (if one is needed).** Control strategies may include improved sanitation, repairs, and targeted pesticide treatments, among others.
- 8. Only apply pesticides when a known pest is present.** Preventive treatments are generally not an effective way to manage pest populations, and are not a routine part of an IPM program.
- 9. If a pesticide is needed, select the least hazardous pesticide.** Among the products and application methods available, select the least hazardous option that will effectively control the pest problem. Target treatments to the areas where pests hide. Never apply a pesticide when children are present!
- 10. Keep records of pest activity and control measures** (chemical and other control techniques).
- 11. Evaluate the program on a regular basis.**
- 12. Become a "Certified IPM" school or childcare center.** Once your facility is following all of the above practices, you will be qualified for recognition in as an IPM school or childcare facility. Contact Tim Gibb ([gibb@purdue.edu](mailto:gibb@purdue.edu)) for more information.

---

<sup>50</sup> <http://extension.entm.purdue.edu/schoolipm/1pmp/pmpcomp.htm>