University Of California Berkeley

Berkeley Department of Facilities

2000 Carleton St, Berkeley, CA 94720

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IPM Integrated Pest Management Program Manual

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Purpose / Background:

Since its inception in 1973 The Department of Integrated Pest Management has used I.P.M practices to address rodent issues at U.C. Berkeley. As noted in our mission statement, "Our stated goal is to rely upon environmentally safe techniques, including sanitation, habitat and structural modification, education, biological controls…" as an alternative to pesticides. Integrated Pest Management (IPM) is a common sense approach to pest management that uses a variety of methods to control pests (rodents, insects, spiders, molds, fungus, select plants, etc). Chemicals may be part of an IPM program, however considerable effort is put towards preventing pest problems by controlling conditions in and around buildings which may attract and support pests. A successful IPM program requires collaborative efforts of everyone involved in the engineering, management and use of a building throughout the building's entire life cycle; beginning at the Concept for the building and progressing through stages of the building's Design, Construction, Commissioning, Use, and finally Renovation or Destruction. The purpose of this document is to describe UC Berkeley pest management practices and assign responsibility for management of pests.

IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. In practicing IPM, building managers aware of the potential for pest infestation follow a four-tiered approach. The four steps include:

Set Action Thresholds

Before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken.

Monitor and Identify Pests

Not all insects, weeds, and other living organisms require control. Many organisms are innocuous, and some are even beneficial. IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

Prevention

As a first line of pest control, IPM programs work to manage the landscape or indoor space to prevent pests from becoming a threat. In landscape design, this may mean selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

Control

Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, IPM programs then evaluate the proper control method both for effectiveness and risk. Effective, less *risky* pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as

trapping or weeding. If further monitoring, identifications and action thresholds indicate that less risky controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of non-specific pesticides is a last resort.

Goals and Intents

As defined by the Structural Pest Control Act (225 ILCS 235/3.24), IPM is a pest management system that includes the following elements whenever possible:

- Identifying pests and their natural enemies;
- Establishing an ongoing monitoring and record keeping system for regular sampling and assessment of pest and natural enemy populations;
- Determining the pest population levels that can be tolerated based on aesthetic, economic and health concerns, and setting action thresholds where pest populations or environmental conditions warrant remedial action;
- Preventing pest problems through improved sanitation, management of waste, addition of physical barriers, and the modification of habitats that attract or harbor pests;
- Relying to the greatest extent possible on nontoxic, biological, cultural or mechanical pest management methods, or on the use of natural control agents;
- Using chemical pesticides, when necessary, with preference for products that are the least harmful to human health and the environment; and
- Record keeping and reporting of pest populations, surveillance techniques and remedial actions taken.

Scope: IPM OPERATIONAL PROCEDURES AND IMPLEMENTATION STRATEGIES

This SOP pertains to the UC Berkeley Campus and it is applicable to all Departments, Labs and Centers.

Overview of UC Berkeley Pest Management Program

The overriding goal of our program is to rely upon environmentally safe techniques, including sanitation, habitat and structural modification, education, biological control, and least toxic pesticides to resolve pest problems. To achieve this, The Department of Integrated Pest Management employs a preventive, as opposed to a reactive, approach to pest management. Typical preventative measures would include education of clients in sanitation; providing advice to campus architects to “build out” pests such as pigeons and rodents; the use of low toxicity chemicals; and if possible the use of biological controls such as parasitic wasps for cockroach control. When implemented, the above measures not only resolve immediate pest issues, but also have the desired effect of long term pest control.

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Pest Management Practices

The UC Berkeley Pest Management Program integrates a wide range of non-chemical methods, including education, sanitation, pest exclusion, habitat and structural modification, biological control, and the limitation of pest resources such as food, water, and shelter. Pest populations are routinely monitored, and inspections are made on a regular basis in housing complexes, dining facilities, child care centers, sports facilities, libraries, museums, and other facilities as needed.

It is important to note that before any management strategies are conducted the pest (both invertebrate and vertebrate) will be precisely identified. After identification, the appropriate control method will be made based upon previously determined "non-chemical" IPM protocols. If the need for the use of chemicals arises the chosen product will be "least toxic" in both its active and inert ingredients and will adhere to Tier III hazard criteria as established under the San Francisco Hazard Review Process. Moreover, when "least toxic" chemical treatments are employed they are applied within targeted locations, for targeted species.

Education

- We often provide information to our clients about pest biology and prevention. As a visual aid our department has designed handouts specifying preventative measures against rodents, ants, roaches, and museum pests. One of these handouts, "*Helpful Hints to Prevent Pests*" has proven to be quite popular and is often distributed to students, staff, and faculty members.
- We provide training to staff and building managers regarding pest identification and prevention. Typical training sessions involve the yellow jacket safety training for campus garners and bed bug management techniques for students and custodial staff.

Sanitation

- Sanitation is a major part of our pest management program. We determine when a pest situation can be helped through improved food storage techniques, better refuse management, rinsing recycling containers, cleaning drains, etc.
- Of particular importance to U.C. Berkeley's IPM program is installation of animal proof trash receptacles. Receptacles were redesigned to prevent rodents, raccoons, skunks, and other wildlife from accessing discarded food debris. The introduction of these containers cannot be overstated as there is a direct link between access to food sources and the ever present rodent population. As access to food diminishes so too will the size of the rodent population. And with this diminution there is the added benefit of a lessoning in the need for rodenticides.

Pest Exclusion

- To prevent rodents from entering buildings the technicians of U.C. Berkeley's IPM Program perform routine inspections to identify structural deficiencies. Typically, the primary route of access is the gaps below doors. Reducing the clearance under exterior doors, and to seal other openings.

- When larger vertebrates such as raccoons and skunks are discovered to have taken up residence underneath buildings the use of one-way doors has proven to be quite effective means of exclusion. This simple device has proven to be more preferable to trapping as it is not because it is more humane. Trapped animals can't be relocated, and would have to be euthanized or released on site if caught
- We recommend the use of screens to exclude flying insects and birds from building's Mosquito management is more important now than in the past due lo West Nile Virus, which is carried by mosquitoes, being in the area. Ideally, the campus should have screens placed on windows of all housing units to prevent mosquitoes from entering buildings.

Habitat and Structural Modification

We use habitat and structural modification for many pest problems, including adding netting under eaves to keep pigeons from roosting, removing ivy to prevent rodents, and placing concrete at the tops of pillars at a forty-five degree angle to prevent pigeon roosting. We review building plans and give advice on pest prevention design, such as sealing gaps under doors to exclude rodents. Campus animal care facilities are created in a way which "designs out" pests by sealing all cracks and using simple desig

Biological Control

The program has used biological control for the brown banded cockroach (Supella /ongipalpa) since 1977. For approximately 15 years, parasitic wasps (Comperia merceti) an egg parasitoid of these cockroaches was released in 14 research buildings. This practice, along with the use of cockroach bait starting in 1985, has eradicated these cockroaches from all but a few rooms. We are now using another wasp to help control the American cockroach, Periplaneta americana in a few locations.

Approval of Chemicals and Chemical Application

Chemicals may only be applied if mechanical or biological remedies prove insufficient. Following approval of the IPM Coordinator, only chemicals pre-approved for application for a specified select area may be used. Chemicals which are not pre-approved must be routed through the approval cycle prior to consideration for application. The approval cycle requires written acknowledgement of the Environmental Health and Safety/ Associate Directors / the Industrial Hygiene, BioSafety and Environmental Management disciplines.

Integrated methods that make use of monitoring and non-toxic preventative measures (e.g., site inspection and maintenance, cultural controls, pest inspection and population monitoring) will be used to proactively manage and minimize pest issues. In the event that monitoring activities reveal a need for the use of pest controls, appropriate control options will be evaluated, and the least-toxic option likely to be effective will be employed.

Least-toxic pesticides are defined by the City of San Francisco's Hazard Tier 3 criteria (least hazardous): http://www.up3project.org/documents/2007rpplbyaicomplete.pdf. Least-toxic pesticide status also

applies to any pesticide product, other than rodent bait, that is applied in a self-contained, enclosed bait station placed in an inaccessible location, or applied in a gel that is neither visible nor accessible.

In the event that cleaning products are used as a component of IPM, they shall also meet LEED-EBOM criteria for sustainable cleaning products.

In the event of an emergency, pesticides may be applied on the grounds without complying with the earlier stipulations for use of integrated and least-toxic methods. An emergency is defined as a mass infestation, threatening to occupant health, requiring application of a pesticide within 24 hours. In that event, all occupants are alerted immediately and given complete instructions on the safety of the building. If an occupant wishes to report an emergency regarding pests, he or she has a phone number that can be reached 24 hours a day, as per Section 4.6 below.

Reporting Pests

Facilities Costumer Services. This is the preferred method to report pests. Reports via this route receive expedited attention.
Email: E-mail: fs-newsr@berkeley.edu
Telephone: (510) 642-1032

RESPONSIBLE PARTIES

Name and Title	Responsibilities as Designated in IPM Action Plan
Facilities Manager –Facilities Buildings Manager/ Director/Coordinator	**Notification of pest problems to Facility Services/Pest Management. After consultation with Pest Management technician, Facilities Director or assigned subordinate will determine if proposed actions are in line with Option 1 of LEED v4 O+M EQ. After completion will review work performed by technician to ensure that pest problem has been resolved using agreed upon "non-chemical" means. If "non-chemical" means are insufficient in resolving problem, "least-toxic" measures will be discussed with parties within Facility Services Grounds and Pest Management Departments.**
Felix Deleon – Associate Director Facility Services Ground and Custodial	**Establish guidelines for U.C. Berkeley IPM Program. Guidelines will adhere strictly to "non-chemical" approach to resolve pest issues as primary means of controlling unwanted insects and animals that might invade building. Guidelines for the use of "least-toxic" chemical approach will also be delineated by Mr. Deleon.**
Theron Klos – Facility Services Grounds Operation Manager	**Coordinate personnel and purchase of non-toxic pest control items (snap traps, fly and flea light traps, non-regulated low-risk pesticides commonly referred to as "botanicals")**
Morris Lever - Facility Services Pest Management Supervisor	**Implementation of all IPM actions as established in Action Plan for LEED Buildings.**

QUALITY ASSURANCE AND CONTROL PROCESS

The party(s) responsible shall periodically evaluate the success of this plan. This evaluation will include producing and providing a report on an annual basis to senior management located at 2000 Carleton Street. Whenever possible, the annual report shall include an evaluation of the performance, safety, cost and environmental/public health benefits achieved as a result of its implementation.

Prior to the implementation of this plan, any non-U.C. Berkeley affiliated individuals, private business, or organizations (both private and public), who wish to provide pest management related services to Chou Hall shall submit a written document to the responsible parties listed in Section 2. Upon receipt of this document the responsible parties listed in Section 2 shall review the proposal to determine if the non-U.C. Berkeley entity's actions satisfies the criteria of the LEED action plan for Chou Hall. A key

component of this review process will require the Pest Management Supervisor to evaluate all practices and products prior to any contractual agreements.

Additionally, to ensure the quality of work performed at Chou Hall the responsible parties listed in Section 2 shall regularly communicate with any service provider, both affiliated with U.C. Berkeley and non-U.C. Berkeley affiliated. Regular site inspections will be conducted to evaluate work performed. And performance evaluations will be generated to ensure that all actives are in accordance with the agreed upon principles of the LEED action plan.

PERFORMANCE METRIC

The Building Management system, Maximo, and TMA for housing is used for collection of data. The Associate Director of Facilities collects and collates this data (i.e., number of calls, types of pests, etc.) and develops reports for management. The types of data collected and communicated are specified by management and / or by the IPM.

* Specification of the circumstances under which an emergency application of pesticides in a building or on surrounding grounds being maintained by building management can be conducted without complying with the earlier provisions.

Records

We keep records on a "Pest Management Report" form that is filled out for every pesticide application at UCB. The following information is recorded/ logged:

- ► Date of service
- ► Pest species found or reported
- ► Building, room number where pest occurred
- ► Contact person; phone number
- ► Time work started
- ► Hours/Minutes worked
- ► Type of service (planned inspection, response to request, planned treatment, other)
- ► Sanitation findings
- ► Structural repairs or sanitation advice
- ► Non-chemical controls implemented (to be added)
- ► Pesticides used (type and amount)
- ► EPA number of pesticide (to be added)

► Date, time and method of notification to occupants (to be added)

► Least toxic (YIN) (to be added)

► Name of technician

► Comments

When chemical controls other than "least-toxic" chemicals as defined by LEED EB: O&M are used in a building or on the surrounding grounds, all building occupants will be notified at least 72 hours in advance of the treatment. Pest Management will contact the building manager, and send them a notice with the product name, the active ingredient, the product label signal word, the time and location of the application, and contact information for persons seeking more information. The building manager will notify all of the occupants by email, and signs will be posted in hallways, if necessary in a second language. Signs will be posted on entrances to the area where the application is being made with the above information, including the time and date when the area can be reoccupied.

Emergency Pesticide Use

Emergency use of pesticides without prior notification will be necessary when there is an urgent need to make an application due to issues of health and safety or operational issues. Examples of this include:

- To control yellow jacket nests
- To control bees, wasps, stinging or biting insects inside a building.
- To control pests which must be treated immediately due to health concerns or operational concerns.

Universal notification as specified above will be given within 24 hours after application

IPM BUILDING LIFE CYCLE GUIDELINE

IN AS MUCH AS FEASIBLE, UCB WILL IMPLEMENT THE FOLLOWING IPM RECOMMENDATIONS AT EACH STAGE OF THE BUILDING LIFE CYCLE

CRITERIA FOR PEST MANAGEMENT AT THE CONCEPT AND DESIGN STAGES

Procedural/Design

- Submit preliminary design plans to the FS Office for review

- Design dumpster locations, water sources and floor drains for proper housekeeping practices.
- Exterior building envelop should be tight and flush with no gaps larger than 1/8" to prevent pest access (bees, ants, mice, rats, roaches, etc.).
- Food service counters, benches, cabinets, etc. should be flush with floors and walls to prevent nesting opportunities underneath and behind.
- Custodial closet and storage space floors should be finished and door sweeps required.
- Require overhead rolling doors to be flush and tight with no gaps larger than 1/8".
- Tree wells and raised beds with masonry features should be screened, grated or meshed to prevent harborage and nesting areas.
- Exterior ledges, particularly over entrances, to be eliminated, when eliminated, anti-bird/pigeon measures to be implemented (netting).
- Floor mounted heating and cooling vents should be screened to a less than 1/4" diameter opening
- Exterior landscaping features should be kept a minimum of 4' off the exterior of the building.
- Alternative dumpster locations and type need to be considered if the building site interferes with trash and recycling removal from surrounding buildings.
- Corridor shelving outside of labs for food and beverages.
- Cabinets designed for food storage must seal tightly

Preventative and Mechanical Measures

- Provide door sweeps on all exterior doors.
- Provide self-closures on all exterior doors
- Provide tightly sealed access panels to "dead spaces" (pipe chases, ceilings other than drop ceilings).
- Seal hatches or coverings for ejector pits.

- Require overhead doors to be motion detection capable to automatically close when no activity is present.
- Install bug lights in mechanical spaces that are likely to be wet.
- Exterior fencing around play areas or park like settings should have 24" metal extension below grade to prevent rodent burrowing.
- Means for pest control must be provided for spaces under raised floor
- Provide door sweeps on all interior mechanical space, food service, loading dock and "back of the house" doors.
- Trash/recycling rooms should have floor drains and a water source for proper housekeeping procedures.
- Waste containers (dumpsters/compactors), particularly animal bedding and food service compactors, should be water tight and sealed between the ram and container to prevent food sources from leaking.
- Exterior plantings should be native trees and shrubs that do not produce berries or nuts, have root systems conducive to burrowing, etc.
- Sidewalks and parking lots should slope and drain during inclement weather to prevent puddle formation.
- Exterior trash and recycling receptacles should be covered and rodent proof.

CRITERIA FOR PEST MANAGEMENT AT THE CONSTRUCTION / BUILD STAGE

- The Construction Project manager or selected contractor should be required to contract with a pest control provider of choice during the construction phase to better coordinate IPM efforts and address issues.
- Neighbors next to the construction area should be notified of the potential for increased pest activity due to the work activity nearby and they should be instructed on how and what they should do regarding pest activity.
- Access points in the perimeter of the project area to neighboring spaces should be sealed and or door sweeps installed
- Doors leading to and from the renovation area should be kept closed at all times, particularly exterior doors.

- Debris dumpsters, should be emptied as quickly as possible
- Staging areas should be required to be run clean at all times to prevent harborage and food sources.
- Exterior doors to the job site should be kept close at all times, particularly before or after deliveries to prevent access for pests (once they are in, it is difficult to get them out)
- construction dumpsters need to be emptied on a regular basis in the duster location site kept clean to prevent harborage and food sources
- The work site should remain "broom clean" and all waste generated removed daily, particularly food waste generated from coffee / lunch breaks, to prevent harborage and food sources.
- Staging areas should be required to be "broom clean" at all times to prevent harborage and food sources.
- Exterior doors to the job site should be kept closed at all times, particularly before/after deliveries, to prevent access for pests (once they are in, it is difficult to get them out).
- Pest control inspections of the job site should occur on a weekly basis, he written report generated, and corrective actions taken. Penalties should exist to ensure compliance.
- Construction dumpsters need to be emptied on a regular basis and the dumpster locations site kept clean to prevent harborage and food sources.
- Exterior and site trash receptacles should be required for use by construction personnel and catering trucks.

CRITERIA FOR PEST MANAGEMENT AT THE COMMISSIONING STAGE:

- Prior to the project being turned over to UC Berkeley, the project should be inspected and certified as being "pest free". If not, remedial action should take place in the project is not officially handed over until it is deemed to be pest free. Cost overruns as a result of delayed commissioning should be borne by the project management firm.

REGULATIONS / REFERENCES

- Regional IPM Centers
  - htmhttp://www.ipmcenters.org/index.cfm
- UC/ IPM Statewide Intergraded Pest Management Program
  - ipm.ucanr.edu/training/

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Pesticide Information

- Pesticide Environmental Stewardship, supported by the NSF Center for IPM and managed by Cornell University
- OPP Pesticide Ecotoxicity Database
- NASS Pesticide Use Data Online Database
- EPA Worker Protection Standard for Pesticides.

- Pesticide Data Program (PDP) from USDA AMS. PDP manages the collection, analysis, data entry, and reporting of pesticide residues on agricultural commodities, with an emphasis on those commodities highly consumed by infants and children.
- International MRL Database for US Specialty Crops from FAS Online
- The Database of Arthropods Resistant to Pesticides. From the Center for Integrated Plant Systems, Michigan State University
- IR-4 Minor Crops Information
- NASS Agricultural Chemical Usage Reports
- Pesticide Product Information System from EPA/OPP.
- Pesticide Active Ingredient Information from the Pesticide Management Education Program (PMEP) at Cornell University
- EPA Information Links
- EPA Pesticide Product Label System
- Insecticides (from the Insecticide Resistance Action Committee)

Basic Vegetation Pest Control Practices

BASIC VEGETATION PEST CONTROL PRACTICES	
Maintenance	▪ Keep the building grounds well-maintained at all times. ▪ Maintenance personnel shall apply mulch to plant beds, warding off weeds and other pests. ▪ <Include site-specific information>
Plantings	▪ Plant at the right time and in the right places. Seedlings must not be planted too early, nor located in unsuitable conditions. ▪ Avoid monocultures by mixing plant species in planters and gardens. ▪ <Include site-specific information>
Manual Controls	▪ Landscaping shall be hand weeded and chemical control shall be kept to a minimum. This measure prevents human and environmental exposure to hazardous chemicals. ▪ <Include site-specific information>
Chemical Controls	▪ When chemical use is necessary, replace hazardous substances with least-toxic chemicals as defined by the 2007 San Francisco Reduced-Risk Pesticide List
Inspection Schedule and Location	▪ The landscape contractor shall visit the site at regular intervals to monitor and apply pest controls operations. ▪ <Include site-specific information>

Basic Animal Pest Control Practices

BASIC ANIMAL PEST CONTROL PRACTICES	
Site/Building Cleanliness	▪ Keep garbage containers clean, free of odors and covered at all times. Sanitation measures reduce habitat and food sources for pests. ▪ Keep areas around garbage containers free of spillage or garbage to prevent the collection of trash or debris on the ground around or underneath the containers. ▪ Keep grounds free of high weeds, trash, old equipment and debris, as these conditions create ideal harborage for rodents. ▪ <Include site-specific information>
Structural Integrity	▪ Maintain the building exterior in good repair with no holes or openings larger than ¼ inch including, but is not limited to, windows, doors, fans, vents, etc. Structural repairs prevent pests from entering the building. ▪ Address any deficiencies in the building exterior with corrective measures, i.e., cementing, screening, caulking, installing stripping on door bases, etc. ▪ Maintain door sweeps on all applicable doors to produce a good seal to the ground. ▪ <Include site-specific information>
Inspection Schedule and Location	▪ Visual inspections shall be performed at least 2 times per month, with treatment if necessary. After each visit, the pest contractor shall provide a printed service report that includes written observations, recommendations and details of IPM activities. ▪ <Include site-specific information>

Species-Specific Animal Control Strategies

SPECIES-SPECIFIC ANIMAL CONTROL STRATEGIES **<INCLUDE ALL SPECIES PRESENT ON BUILDING GROUNDS>**	
Ants	▪ In areas where ants are present, wipe the areas down with soapy water in order to prevent the formation of major scent trails. If there already is an established trail, wipe backwards from the food source to the entrance of the trail. ▪ Block all entry points to the building – ants will give up trying to find a way through after 1-2 days. Temporary blockades can be made using sticky substances such as petroleum jelly or chili powder, cinnamon, and boric acid. ▪ Always keep opened foodstuffs in sealed containers or store them in the refrigerator or freezer. Clean out kitchen cabinets, drawers and shelves to remove crumbs and stains. Keep sinks and worktops clean and dry. ▪ Baits are best put in the path of an ant trail and then removed after the ant activity stops, before they lure ants from another colony to the area. ▪ Prune branches close to the building and removed fences or anything that might create a bridge for the ants to cross. ▪ Low toxicity compounds to control ants include boric acid and diatomaceous earth (DE), a chalk-like powder consisting of the fossilized remains of diatoms, a type of hard-shelled algae. ▪ <Include site-specific ant controls>
Aphids	▪ Manage sap-sucking pest mites and whiteflies by releasing predatory mites, ladybugs and lacewings onto the grounds several times over a period of weeks. ▪ Consider using parasitic wasps to control scales on trees, shrubs and flowers ▪ If it is difficult to obtain supplies of beneficial insects for release into the garden, then it is possible to purchase a branded lure that simulates the scent of aphids and attracts ladybugs and lacewings to the area ▪ <Include site-specific aphid controls>

Bed Bugs	▪ If a bed bug infestation is detected, the most effective course of action is to enlist professional help to inspect the entire building for the presence of bed bugs and treat the affected areas. ▪ <Include site-specific bed bug controls>
Caterpillars	▪ Bacterial insecticides derived from natural ingredients are available to control caterpillars. ▪ <Include site-specific caterpillar controls>
Cockroaches	▪ Cockroaches contaminate food with their excrement and secrete and unpleasant odor that can permeate the indoor environment. ▪ There are five main species of cockroaches and effective control depends on identifying them correctly. ▪ Integrated pest management measures for controlling cockroaches include effective hygiene and exclusion practices, sticky traps lined with pheromones, boric acid, and insect growth regulators. ▪ All food handling areas should be cleaned frequently. ▪ Cockroach control is best done by a professional on a contract basis, through the application of least-toxic pesticides. ▪ Control is necessary on a regular basis because of the mobility, reproduction, longevity, and behavior of cockroaches. ▪ Ensure that you know what pesticides are being used by the professional contractor and do not assume they are using an environmentally appropriate chemical. ▪ <Include site-specific cockroach controls>
Dust Mites	▪ Fabrics, bedding and carpets attract and generate dust and dust mites. To keep dust mites at bay, keep building well-ventilated and dry. ▪ <Include site-specific dust mite controls>

Flies	▪ Flies reproduce more readily in waste and manure, which is where control should begin. In warm weather conditions, the reproduction cycle – from egg, to larva, to pupa, to adult winged fly – requires approximately one week. ▪ Collection of waste and residues should be carried out at least twice a week. ▪ Keep refuse areas clean to avoid providing flies with breeding grounds ▪ Ensure dustbin lids fit tightly and the interiors of bins are cleaned regularly to keep surfaces free of food material. ▪ Use fine mesh window and door screens as a barrier against entry by any flying insect. ▪ Ultra-violet (UV) fly killing equipment is very effective so long as it is situated correctly. ▪ UV equipment disguised as uplighters in dining and lobby areas are discreet
Mosquitoes	▪ The best control method for mosquitoes is to eradicate their habitat. ▪ Because they like moisture and lay their eggs in standing water, it is important not to leave flower pots, buckets, plastic sheeting or other open containers outside collecting water. Ensure that any rainwater collectors are fitted with lids. ▪ Clear debris from gutters and drains to ensure there is no standing water after rain and drain unused pools or fountains so that the water cannot become stagnant. ▪ Drain or fill depressions, mud flats, and other areas that might hold water. ▪ Repair leaking taps and air-conditioning units so that puddles cannot form and ensure that septic tanks and sewage systems are properly maintained and in good working order. ▪ Avoid over-irrigating lawns and gardens, and keep weeds and grass (where the insects rest) well-clipped. ▪ If you have a pond or lake on the building grounds, fill it with mosquito-eating fish such as top-feeding minnows or goldfish – they will eat the mosquito larvae before they mature into adults.

	▪ Some buildings have successfully reduced the number of mosquitoes and other insects by attracting bats to their property. A simply-built bat house will usually accommodate up to 100 bats. ▪ To prevent mosquitoes from coming indoors, fit fine-mesh screens to porches, doors and windows. ▪ If these measures are insufficient, area repellents such as citronella candles, coils or sprays will repel mosquitoes from porches, patios and other unscreened outdoor areas, although they only work well when the air is still. ▪ <Include site-specific mosquito controls>
Fabric/Clothing Moths	▪ Moth larvae feed on a wide variety of natural and synthetic materials. They can be found in kitchens, food storage areas, clothing, carpets, blankets and upholstery. ▪ Fabrics should be washed and then put in bags and placed in a freezer. When taken out to thaw, shake the fabrics vigorously to remove dead larvae. ▪ Clean the areas where fabrics have been stored with vinegar and water. ▪ Store fabrics in cedar chests or closets. Place cedar chips or blocks or lavender sachets in drawers. ▪ For acute moth problems, re-usable traps can be baited with a controlled-release pheromone system to lure moths into the trap and disrupt their mating cycle. ▪ Mothballs not only have an unpleasant odor, but they are also poisonous; avoid them if possible. Insect foggers are not recommended as they can pose a health threat and are not always effective. ▪ <Include site-specific fabric/clothing moth control>

Pantry Moths	▪ Clean affected areas by vacuuming all surfaces, walls, shelves, cabinets and floors. Scrub hard surfaces rigorously with hot water and detergent, especially in corners and around the edges of removable shelves. Clean all surfaces that come into contact with food. ▪ Rinse the affected areas with white vinegar, either in a spray or by wiping with a cloth. ▪ Throw away all grain-based food items as well as nuts, raisins, flour and tea, even if it is in sealed containers. ▪ Remaining food items and containers should be thoroughly cleaned with a detergent and water solution and wiped down with a vinegar rinse before being put back. Use air-tight containers made of hard plastic, glass or metal and not plastic bags. ▪ Kill any moths with a fly swatter or moth traps. ▪ After a severe infestation, freezing any new grain products and storing grain products in refrigerators or freezers can prevent reinfestation. ▪ Peppermint gum, bay leaves, peppercorns and cloves may also help deter pantry moths. ▪ <Include site-specific pantry moth controls>