AIR FORCE
QUALIFICATION TRAINING PACKAGE (AFQTP)

FOR

ENVIRONMENTAL CONTROLS

(3E4X3)

MODULE 15

INTEGRATED PEST MANAGEMENT

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MODULE 15

INTEGRATED PEST MANAGEMENT

Career Field Education and Training Plan (CFETP) references from 1 April 02 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES
FOR
ENVIRONMENTAL CONTROLS
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INTRODUCTION

Before starting this AFQTP, refer to and read the "AFQTP Trainer/Trainee Guide."

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks*.*

MANDATORY minimum upgrade requirements:

Core task:
AFQTP completion
Hands-on certification

Diamond task:
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location*.

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PRINCIPLES OF INTEGRATED PEST MANAGEMENT (IPM)

MODULE 15 AFQTP UNIT 1

PEST IDENTIFICATION KEYS (15.1.3.2.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PEST IDENTIFICATION KEYS

Task Training Guide

STS Reference Number/Title:	15.1.3.2.2. Identification keys (Pests).
Training References:	1. AFPMB Technical Information Memorandum (TIM) 29: *Integrated Pest Management In and Around Building*. 2. Military Pest Management Handbook, Chapter 2: *Entomology Basic to Pest Management.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 29. 2.2. Military Pest Management Handbook, Chapter 2.
Equipment/Tools Required:	1. Microscope. 2. Identification keys. 3. Insect specimens.
Learning Objective:	The trainee should learn to inspect insects under the microscope and identify them using a particular insect key.
Samples of Behavior:	1. The trainee will be able to set-up a microscope to observe insects. 2. The trainee will be able to identify insects by observing them under the microscope and using identification keys.
Notes:	
1. To successfully complete this element follow the steps outlined in this section. 2. Trainer should supply trainee with microscope, identification keys, and insect specimens.	

PEST IDENTIFICATION KEYS

1. Background: Integrated Pest Management (IPM) is defined as the "use of all appropriate techniques and management practices to bring about pest prevention and suppression in a cost-effective, environmentally sound manner." When one thinks of IPM, the first thing that comes to mind is knowing the adversary's biology. Knowing where the pest lives, how he lives, and in what setting he lives in best, are key steps in understanding the opponent's biology. In order to accomplish this, the adversary must be identified and a study must be done of the characteristics of this specific adversary. Only then can a procedure be determined to control or eliminate this pest in the most environmentally sound manner. Thus, in this section the topic of insect identification will be discussed. The procedures will be outlined for closely observing a particular insect using a microscope, and then identifying the insect by means of pictorial keys or picture books.

2. The following steps outline the procedure for observing and identifying insects using a microscope and pictorial keys.

Step 1: Insect to be identified should be kept in optimum condition so all body parts can be clearly viewed.

> **NOTE:**
> Freezing a live specimen will keep it in the best condition for identification. Pictorial guides such as "National Audubon Society Field Guide to North American Insects & Spiders" can be attained from local libraries or bookstores. Some pictorial insect keys can be found in the Military Pest Management Handbook. Others may be found at the Local County Extension Office, College Entomology Department, or the Center for Disease Control (CDC).

Step 2: Set up microscope with light and petri dish.

Step 3: Place insect under microscope and observe distinguishing characteristics.

Step 4: With the help of pictorial keys or picture guides identify the insect in question.

REVIEW QUESTIONS
FOR
PEST IDENTIFICATION KEYS

QUESTION	ANSWER
1. What is the first step in any IPM control strategy?	a. Kill the pest. b. Identify the pest. c. Freeze the pest. d. None of the above.
2. What must be done before an IPM control procedure can be outlined?	a. Know the person who called in the work order. b. Know the pest biology of the pest to control. c. Know the chemical to use to kill the pest. d. Know the building number the pest is in.
3. Where can one obtain pictorial insect keys?	a. Military Pest Management Handbook. b. Center for Disease Control. c. Local college Entomology Department. d. All of the above.
4. Freezing is a good way to keep a live specimen in optimum condition.	a. True. b. False.

PEST IDENTIFICATION KEYS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Keep specimen in good condition		
2. Set up microscope correctly with light		
3. Distinguish the characteristics of insect		
4. Identify insect correctly using keys		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL DISEASE VECTORS (15.2.1.3.)

CONTROL DISEASE VECTORS

Task Training Guide

STS Reference Number/Title:	15.2.1.3., Control Disease Vectors.
Training References:	1. AFPMB TIM 29, *Integrated Pest Management In and Around Building*. 2. AFPMB TIM 26, *Tick-Borne Diseases: Vector Surveillance and Control, 1998.* 3. Military Pest Management Handbook, Chapter 7: *Medically Important Arthropods.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 26 and 29. 2.2. Military Pest Management Handbook, Chapter 7.
Equipment/Tools Required:	N/A
Learning Objective:	The trainee should learn the IPM techniques for controlling disease vectors.
Samples of Behavior:	The trainee, given a control problem, will be able to solve the problem using correct IPM control measures.
Notes:	
1. To successfully complete this section, the trainee must follow the steps outline in this unit. 2. The trainer must design scenarios and perform on-the-job-training (OJT) to enhance the trainee's knowledge of disease vector IPM.	

CONTROL DISEASE VECTORS

1. Background: The definition of Integrated Pest Management is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, and environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides, IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda. In this unit, the use of IPM measures in a variety of situations will be examined, considering how different situations require different control measures.

2. The IPM process is comprised of six components, that if used correctly will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitat manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. Physical controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. Biological controls use nature against the pest by introducing natural predators to control the pests. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidal controls use genetic biology to control pests. Chemicals are used to prevent pests from reproducing. Thus, the chemical controls the pest through attrition. Examples of these autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM system, chemicals are used as a last resort. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control, IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for disease vector pests.

Step 1: The first step is to analyze the pest problem.

1.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

2.1. Most complaints are customer oriented.

2.2. It is important to understand the customer complaint and educate them on what they can do to help.

2.3. Also, it is important to educate the customer to what IPM techniques will be used and how long it will take them to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions to get the pest under control before implementing long-term IPM measures.

NOTE:
If mosquitoes are so numerous that no one can go outside, then initiate a fogging schedule to diminish their population. Other permanent IPM measures can then follow.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the selected controls.

5.1. Record keeping is also highly essential to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer.

6.1. It also ensures the problem is under control and the customer is satisfied.

6.2. Customer satisfaction is an essential part of the IPM process.

4. Mosquitoes. There are several disease vectors discussed in this section including mosquitoes, flies, fleas, ticks, lice, and mites. The most important disease vector is the mosquito that carries malaria, yellow fever, and dengue fever. However, on the home station, the mosquito is more important as a morale pest. In some parts of the country, the mosquito can render recreational areas unusable and make living in and around homes miserable. Thus, it is important to control these pests by the most economical and environmentally safe means possible.

NOTE:
When surveying for mosquitoes, the survey should consist of checking all ponds, low areas, streams, and any place where water stands for at least two weeks. Further, any areas where artificial containers are lying around such as dump areas should be checked for Aedes mosquitoes.

4.1. To control mosquitoes follow the steps outlined above. The following chart depicts the IPM control measures available for mosquitoes.

Pest	Cultural	Mechanica	Physical	Biological	Autocidal	Chemical
Mosquitoes	Water Management: drain ditches fill ponds & ditches. Vegetation Control: mowing to reduce resting sites.	Screening. Remove trash providing breeding site.		Predatory fish Fungi Bacteria Predatory Mosquito		Repellents (personal) Larvicides BTI Altosid Insect growth regulators. Adulticide Non-Residual (aerosols). Residuals (ULV). Barrier treatments.

5. Flies. Flies have been human companions and have annoyed and bitten us for years. Flies are important because not only do they annoy but they also carry typhoid fever, diarrhea, and dysentery. Flies are both indoors and outdoors pests, making it difficult to escape them. The most common of the many flies is the housefly. The housefly is the most dangerous of all insects closely related with humans.

5.1. To control flies use the steps outlined in the beginning of this section. IPM measures are listed in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Filth flies	Sanitation Breeding source reduction. Steam clean dumpster.	Screening Trapping Fly paper Attractant (muscular) UV light trap		Parasitic wasps		Insecticides Baits Non-Residual (aerosols). (ULV) Residuals
Biting Flies	Sanitation Breeding source reduction. Manure Grass clippings Seaweed Water Management Soil Management Schedule activities to reduce exposure	Screening Trapping Sticky trap Live trap UV light trap		Parasitic wasp		Repellent personal Insecticides Non-residual (aerosols). Residual Baits

NOTE:
If fruit flies are a problem, a solution of one part vinegar to five parts water works very well as an attractant.

6. Fleas. There are five types of common fleas, the oriental rat flea, the cat flea, the dog flea, human flea, and the northern rat flea. The most important medical flea is the oriental rat flea because they carry Bubonic Plaque and Murine Typhus. However, the most important flea at home station is the cat flea. This flea is found most common on pets and in turn, pets carry this pest into the homes. They are also a nuisance to pets and pet owners because of their ability to carry heartworm.

6.1. The steps for controlling fleas are found in the beginning of this section. The chart of IPM measures for fleas is listed below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Fleas	Sanitation Good housekeeping Management of domestic host animals Control of feral host animals	Vacuuming Remove carpets in public areas		Nematodes		Insecticides Non-residual aerosols Residuals Flea Collars Insect Growth Regulators

7. Ticks. Ticks are annoying blood-sucking pests that carry many diseases. There are two families of ticks: the hard tick and the soft tick. The most common is the hard tick. Ticks are medically important because, as previously stated, they carry relapsing fever, Rocky Mountain spotted fever, tick-borne typhus, and hemmorragic fever. However, ticks are most important to the home station because of parasitic characteristics to pets. Ticks attack the pets and they carry the pest into homes. This is important to humans because they carry Lyme disease.

7.1. The steps for controlling ticks are found in the front of this section. The chart below list the IPM controls for ticks.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Ticks	Weed, brush and leaf control Management of domestic host animals Control of feral host animals	Hand removal Vacuuming				Repellent personal Insecticide Residual Systemic for animals

8. Mites. There are over 200 species of mites found throughout the world. Most mites are parasitic to plants and animals. They are very small, being hardly visible to the naked eye. Mites are medically important because the carry mange and scabies. They are important to the home station because they are mostly a nuisance when they invade homes and buildings.

8.1. The steps for controlling mites are found in the front of this section. The chart below shows the IPM measures available for mites.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Mites	Weed, brush and leaf control Management of domestic host animals Control of feral hostanimals Rodents Birds	Hand removal Vacuuming				Repellents (personal) Insecticides Residual Systemic for animals

REVIEW QUESTIONS
FOR
CONTROL DISEASE VECTORS

QUESTION	ANSWER
1. What is the first step in initiating the IPM process?	a. Analyze and survey the problem. b. Understand the customer. c. Record keeping. d. Follow-up.
2. The second step in the IPM process is short-term control.	a. True. b. False.
3. What is the fourth step in the IPM process?	a. Understand the customer. b. Analyze the problem. c. Long-term controls. d. None of the above.
4. What is the sixth step in the IPM process?	a. Long-term control. b. Follow-up. c. Educate the customer. d. Short-term controls.
5. Which of the following is IPM control measures for mosquitoes?	a. Predatory fish. b. Screening. c. Bacteria. d. All of the above.
6. Which of the following flies is the most common?	a. Deer fly. b. House fly. c. Stable fly. d. Fruit fly.
7. The UV light trap is **not** an IPM control for flies.	a. True. b. False.
8. What disease makes the flea so important to pet owners?	a. Bubonic Plague. b. Heart Worm. c. Diarrhea. d. Dengue.
9. Which of the following is an IPM control measure for ticks?	a. Nematodes. b. Growth regulators. c. Weed control. d. Carpet removal.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the pest problem and initiate the correct control measure for disease vectors.

CONTROL DISEASE VECTORS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Analyze the pest problem correctly		
2. Inform the customer(s) of the problem and what corrective action was put in place		
3. Initiate short-term control		
4. Initiate long-term controls		
5. Document the control measure taken correctly		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL VENOMOUS ARTHROPODS (15.2.2.3.)

CONTROL VENOMOUS ARTHROPODS

Task Training Guide

STS Reference Number/Title:	15.2.2.3., Control Venomous Arthropods.
Training References:	1. AFPMB TIM 29, *Integrated Pest Management In and Around Building*. 2. Military Pest Management Handbook, Chapter 7: *Medically Important Arthropods.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 29. 2.2. Military Pest Management Handbook, Chapter 7.
Equipment/Tools Required:	DD Form 1532-1, Pest Management Maintenance Record. WIMS-PM Module.
Learning Objective:	The trainee should learn the IPM steps to control venomous arthropods.
Samples of Behavior:	Trainee will be able to apply the IPM controls for venomous arthropods.
Notes:	
1. To successfully complete this section, the trainee must follow the steps outline in this unit. 2. The trainer must design scenarios and perform on-the-job-training (OJT) to enhance the trainee's knowledge of venomous arthropods IPM.	

CONTROL VENOMOUS ARTHROPODS

1. Background: The definition of IPM is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda. In this lesson the use of IPM measures in a variety of situations will be examined, contemplating how different situations require different control measures.

2. The IPM process is comprised of six components, that if used correctly will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitation manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. Physical controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. Biological controls use nature against the pest by introducing natural predators to control the pests. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidals controls use genetic biology to control pests. Chemicals are used to prevent pests from reproducing, thereby, controlling the pest through attrition. Examples of these Autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM system chemicals are used as a last resort. Only after all other means of control are exhausted, chemicals may be used. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control then IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for venomous arthropods pests.

Step 1: The first step is to analyze the pest problem.

1.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

2.1. Most complaints are customer oriented.

2.2. It is important to understand the customer complaint and educate them on what they can do to help.

2.3. Also it is important to educate the customer to what IPM techniques will be used and how long it will take them to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions to get the pest under control before implementing longer-term IPM measures.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the particular controls oriented.

5.1. Record keeping is also important to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer and ensure that the problem is under control and that the customer is satisfied.

6.1. Customer satisfaction is an essential part of the IPM process.

4. Bees. Bees are readily distinguished from wasps, with which they are commonly confused, by the presence of feathery (plumes) hairs. These are usually located on the thorax (Figure 1).

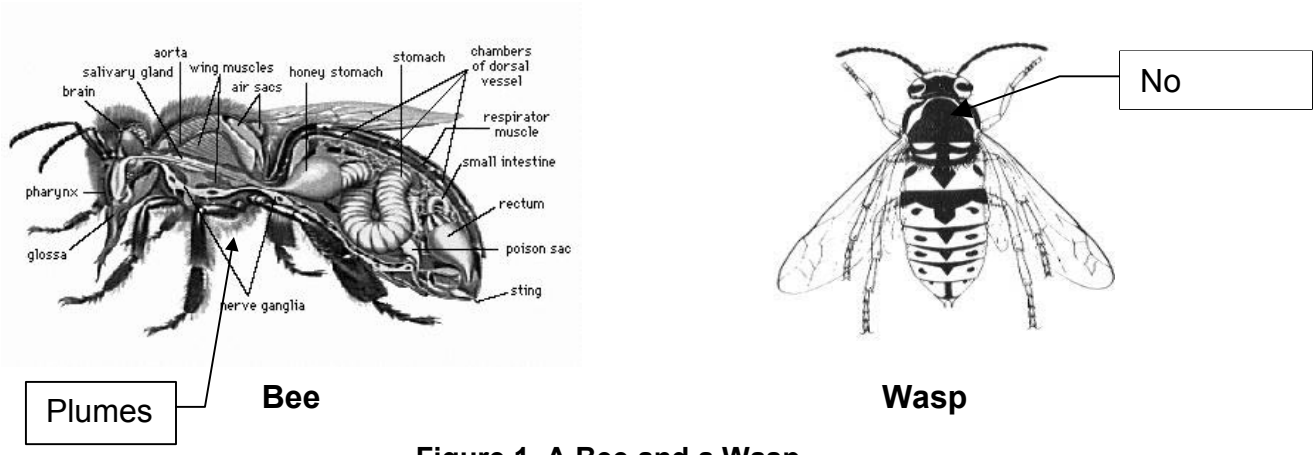


Figure 1, A Bee and a Wasp

Many bees live a solitary or sub-social existence. Bumblebees and honeybees are social bees, having a worker caste in their colonies. Bumblebees form temporary colonies with the fertilized young queen surviving the winter. Honeybees build permanent colonies that may survive indefinitely. Worker will readily sting an invader in defense of the colony. Periodically, a swarm of workers will split from the main colony to start a new one. The newest Honeybee arrival is the African or “killer bee.” The venom of the African bee is no more potent or venomous than the honeybee. It swarms much more frequently than the honeybee and attacks when the slightest motion occurs around the hive.

4.1. The steps for controlling **bees** are listed in the main text. The chart below list the IPM controls for bees.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Bees	Sanitation Food source removal Turf management Clover removal Diversion Grow nectar and pollen sources in infrequent sites.	Nest removal Swarm removal (Honeybees) Trapping Screening				Insecticides

5. Wasps and Hornets. More than 4000 species of wasps occur in North America. About 50 species are troublesome to people. The three main groups are hornets and yellow jackets, paper wasps and mud daubers. Wasps are distinguished from one another by their body structure and the nests they build. Hornets and yellow jackets (Figure 2) are stockier than paper wasps and mud daubers (Figure 3). They are black, with yellow or white markings.

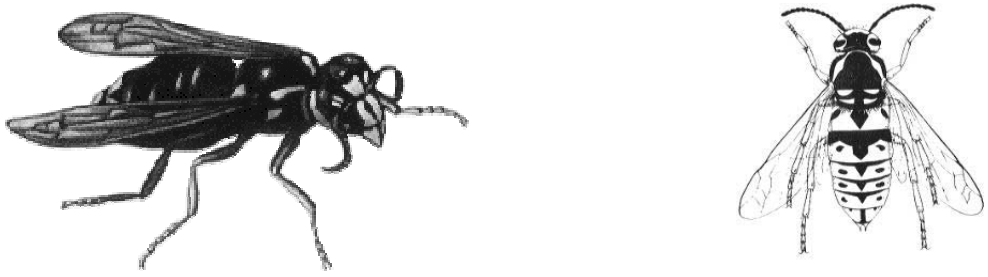


Figure 2, A Baldfaced Hornet and Yellow Jacket Wasp

Figure 3, A Mud Dauber and a Paper Wasp

The paper wasps are long, slender, wasps. They are black, brown or red with a few yellow makings. Mud daubers are also slender and are black and yellow, metallic blue, or shinny black. Hornet and yellow jacket nests are globular, paper structures concealing multi-cell combs. They are usually above ground but some species nest underground. Paper wasp nests are single-layered open-faced and umbrella-shaped. The size of the nest depends on the number of wasps living in them and enlarges them as the population increases. Mud dauber nests consist of several clay cells.

5.1. The steps for controlling **wasps and hornets** are listed in the main text. The chart below list the IPM controls for wasps and hornets.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Wasps and hornets	Sanitation Food source removal Turf management Clover removal Diversion Grow nectar and pollen sources in infrequent sites.	Nest removal Swarm removal (Honeybees) Trapping Screening				Insecticide

6. Ants. Ants are one of the most numerous types of animals on earth. Given their widespread distribution and characteristics, and appearance, they are easily recognized. Ants have two distinct morphological characteristics that make them easily identifiable. One of these is the separation of the abdomen into two distinct regions. It has a slender one or two-segmented, freely moving pedicel, and a larger, more compact terminal portion called the gaster. The other characteristic is the elbowed antennae, in which the first segment (scape) is greatly elongated in both the female and worker. In males, antennae often don't appear to be elbowed, since the scape isn't always noticeably lengthened. There are two ants that will be discussed, the Fire ant and the Harvester ant.

6.1. Fire ants. Are extremely pugnacious and are called fire ants because of their sharp, burning stings (Figure 4).

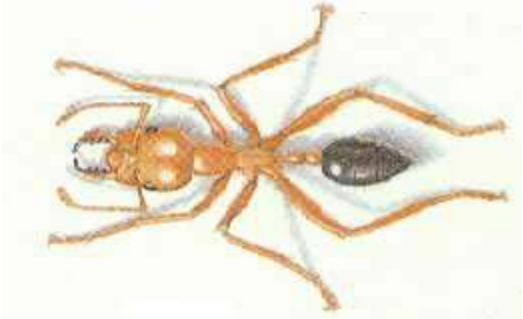


Figure 4, Fire Ant

Of special importance is the black imported fire ant introduced into the U.S. in the 1920s and has become extremely important in the southeastern U.S. This ant builds large hard-crusted earthen mounds. It stings by first sinking its powerful mandibles into the flesh for leverage and then driving its stinger into the victim.

6.2. Harvester ants are large red to dark brown ants (Figure 5). They nest only in the soil, but in lawns their nests may be near building foundation walls.

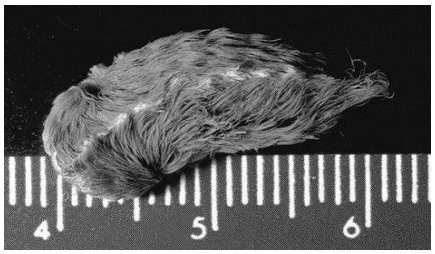
Figure 5, Harvester Ant

Most do not make mounds but clear large smooth areas from twelve to thirty feet in diameter. These ants are very active and aggressive in protecting their nests and will sting viciously. They are found in the warm dry areas of the southwestern US. These ants destroy vegetation, damage paved areas by extensive tunneling and readily attack people and animals. They have agricultural significance because of their low bare mounds.

6.3. The steps for controlling **ants** are listed in the main text. The chart below list the IPM controls for ants.

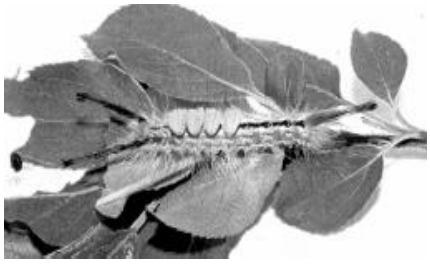
Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Ants	Sanitation Good house-keeping Vegetation Removal	Ant Proofing Sealing cracks Vacuuming Barrier water, petroleum jelly or stickum.	Soak houseplant pots to drown.			Insecticides Baits Residual liquids

7. Caterpillars and Moths. Caterpillars are larvae of moths and butterflies. In the U.S., there are ten families with species troublesome to people with many more irritating species found around the world. Caterpillars can have either urticatig (stinging) hairs or spines. One caterpillar, the meal snoutworm can be an intermediate host of the rat tapeworm which occasionally infects people. Caterpillars produce venom in glands at the base of hairs. Poison glands are sometimes outside the body surface, and these may occur singly or in clusters. When a victim contacts these spines, the venom may emerge through an opening at the tip of the spine or the spine may break off in the wound, thus releasing the venom. The more important venomous caterpillars and moths are the **Puss caterpillar, Flannel moth, White-marked tussock moth, Lo moth,** and the **Saddleback caterpillar** (Figure 6).



Puss Moth Caterpillar

Flannel Moth Caterpillar



White-Marked Tussock Moth Caterpillar

Lo Moth Caterpillar

Figure 6, Venomous Caterpillars

7.1. The steps for controlling **caterpillars and moths** are listed in the main text. The chart below list the IPM controls for caterpillars and moths.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Caterpillars and moths	Sanitation Good housekeeping	Removal of webs, if any. Hand Picking Vacuuming (adults & larvae) Screening Sealing cracks				Residual liquids

8. Spiders. Spiders are widespread in distribution, but most are found in temperate and tropical zones. Many spiders use their venom to paralyze their prey. Although spider venom is sufficient for this purpose against insects and some small animals, the venom of most spiders does not generally bother people. Very few spiders have mouthparts, which can penetrate human skin, and most of those that have venom can produce only local symptoms or an occasional allergic reaction. There are, however, dangerously venomous spiders in many parts of the world, and they are very abundant in some areas. The more common venomous spiders are the **Black widow** and the **Brown recluse**.

8.1. The Black Widow female body is usually bright shiny black, but in some specimens, the thorax and legs may be dark brown. On the underside of its abdomen, the female has an hourglass-shaped spot, which is usually bright red (Figure 7).

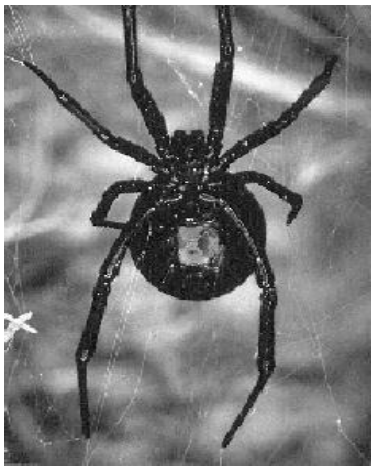


Figure 7, Underside of Black Widow Spider

Males have rows of red spots, diagonal yellowish stripes, or various straw colored markings on top of the abdomen. These spiders are commonly found under privy seats, in poles of lumber and trash, and in empty paint cans and buckets. They are common beneath houses in some areas, and may infest storerooms and garages. Black widows live in dark areas and generally avoid light. The female's bite can cause death, the death rate being about five percent in untreated cases.

8.2. The brown recluse has been responsible for a number of cases of necrotic spider poisoning in central and southwestern U.S. (Figure 8).

Figure 8, Brown Recluse Spider

It is common in Arkansas, Missouri, Louisiana, Oklahoma, Texas, and many parts of California. It is found in bathrooms, bedrooms, closets, cellars, basements, smokehouses etc. In the common areas, it is found in the folds of seldom-used clothing in closets or other storage areas. The brown recluse bite is localized. It produces considerable local necrosis or tissue damage that may produce an unsightly scar. The brown recluse has an identifiable fiddle-shaped marking on the top of the cephalothorax.

8.3. The steps for controlling **spiders** are listed in the main text. The chart below list the IPM controls for spiders.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Spiders	Sanitation Harborage removal (debris). Prey insect control	Removal of webs, if any. Vacuuming (adults & larvae). Screening Sealing cracks		Wasps		Freezing agent aerosols. Insecticides Non-residual aerosols. Residuals

9. Scorpions. Scorpions have six families with 650 species distributed throughout the tropics, subtropics, and warm temperate parts of the world. They invade dwellings to find food or shelter. Most scorpions only cause painful stings, but some species can cause death. Scorpions are nocturnal and seldom seen during the day unless they are disturbed. Medical importance of scorpions is determined by their habits and venom potency, not their size. The most medically important scorpions are in the genus *Centruroides* found in portions of the southwest U.S. and Mexico.

9.1. The genus *Tityus* is found in central and south America. The genus *Buthus* and *Androtonus* are found in southern Europe, the Middle East and North Africa. The genus *Perabuthus* is found in South Africa.

9.2. *Centruroides sculpturatus* is one of the most poisonous scorpions known to occur in the U.S., and is found mainly in southern Arizona. It is frequently found under loose bark of various trees, particularly eucalyptus and cottonwood, or under old logs and rocks. They are usually found in wet moist areas. Indoors, scorpions are found in areas where insects and water are plentiful. It is yellow in color with irregular black stripes down its entire back.

9.3. The steps for controlling **scorpions** are listed in the main text. The chart below list the IPM controls for scorpions.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Scorpions	Sanitation Harborage removal (debris)	Weather-stripping Screening Sealing cracks				Residuals Aerosols Dusts

10. Centipedes. Centipedes are found in tropical, subtropical and warm temperature parts of the world. They are all predacious, having well-developed poison glands used to kill their prey. Several species have shining, greenish or blackish bodies and orange or red legs and heads. Some are yellowish with dull red longitudinal bands, and still others are markedly phosphorescent. Centipedes are nocturnal. They hide by day under stones, rubbish, leaves, and logs and in other dark areas. They feed by night on earthworms, insects, etc. They bite only when molested or threatened. The secretion they inject is primarily a digestive enzyme, containing only a small portion of venom.

10.1. The steps for controlling **centipedes** are listed in the main text. The chart below list the IPM controls for centipedes.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Centipedes	Sanitation Harborager emoval	Weather-stripping Screening Sealing cracks				Contact insecticides Residual insecticides

REVIEW QUESTIONS
FOR
CONTROL VENOMOUS ARTHROPODS

QUESTION	ANSWER
1. The most distinguishing characteristic of bees than wasps is _____.	a. segmented bodies. b. four pairs of wings. c. large compound eye. d. feathery hairs.
2. The newest honeybee is the _____.	a. Bumble bee. b. Wood bee. c. Killer bee. d. Subterranean bee.
3. Hornets and yellow jackets are stockier than paper wasps and mud daubers.	a. True. b. False.
4. What do the three main groups of wasps and hornets include?	a. Hornets and yellow jackets. b. Paper wasps. c. Mud daubers. d. All of the above.
5. One of the most common animals on earth is the _____.	a. Moth. b. Ant. c. Spider. d. Caterpillar.
6. Fire ants received their name from _____.	a. their large heads. b. their red color. c. their sharp, burning sting. d. their large mandibles.
7. Harvester ants build large above ground mounds.	a. True. b. False.
8. Which of the following caterpillars acts as an intermediate host for the rat tapeworm?	a. Meal snoutworm. b. Fuzzy caterpillar. c. Saddleback caterpillar. d. Moth caterpillar.
9. The two common venomous spiders are the _____ and _____.	a. black widow and brown widow. b. brown recluse and black widow. c. brown widow and sac spider. d. crab spider and black recluse.
10. Which of the following scorpions is considered the most poisonous in the U.S.?	a. Tityus. b. Buthus. c. Centruroids sculpturatus. d. Perabuthus.
11. The secretion of a centipede is primarily a digestive enzyme.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the pest problem and initiate the correct control measure for venomous arthropods.

CONTROL VENOMOUS ARTHROPODS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Properly analyze the pest problem		
2. Inform the customer and was the customer satisfied with answers		
3. Conduct an efficient survey		
4. Actions control the pest		
5. Initiate long-term IPM controls		
6. Initiate monitoring and document it on the job order request		
7. Initiate records to record control actions		
8. Conduct/schedule a follow-up visit		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL STRUCTURAL PESTS (15.2.5.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CONTROL STRUCTURAL PESTS

Task Training Guide

STS Reference Number/Title:	15.2.5.3., Control Structural Pests.
Training References:	1. AFPMB TIM 29, *Integrated Pest Management In and Around Building.* 2. Military Pest Management Handbook, Chapter 9: *Wood Destroying Insects.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 29. 2.2. Military Pest Management Handbook, Chapter 9.
Equipment/Tools Required:	DD Form 1070, Termite and Wood Decay Inspection.
Learning Objective:	The trainee should learn the IPM techniques for controlling structural pests.
Samples of Behavior:	The trainee, given a control problem, will be able to solve the problem using correct IPM control measures.
Notes:	
1. To successfully complete this section, the trainee must follow the steps outline in this unit. 2. The trainer must design scenarios and perform on-the-job-training (OJT) to enhance the trainee's knowledge of structural pest IPM.	

CONTROL STRUCTURAL PESTS

1. Background: The definition of IPM is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda.

2. The IPM process is comprised of six components. If used correctly, they will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitation manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. These controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. This is the introduction of natural predators for control uses. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidal control uses genetic biology to control pests. Chemicals are used to prevent pests from reproducing, thereby, controlling the pest through attrition. Examples of these autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM system chemicals are used as a last resort. Only after all other means of control have been exhausted, are chemicals used. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control, IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for disease vectors pests.

Step 1:The first step is to analyze the pest problem.

3.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

4.1. Most complaints are customer oriented.

4.2. It is important to understand the customer complaint and educate them on what they can do to help.

4.3. Also, it is important to educate the customer as to what IPM techniques will be used and how long they will take to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions.

4.1. This gets the pest under control before implementing long-term IPM measures.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the specific controls performed.

5.1. Record keeping is highly important to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer, to ensure that the problem is under control, and that the customer is satisfied.

5.2. Customer satisfaction is an essential part of the IPM process.

4. Termites. From an economic standpoint, termites are the most destructive insects found on military installations. Termites will eat any cellulose (not to confused with cellulite) material including paper, cardboard, fiberboard, drywall, timbers, pallets, crates, furniture, and other wood products. They can mutilate a building so badly that it must be replaced. Termite control cost is second only to cockroach control on military bases.

4.1. There are three primary types of termites found in the United States. These are the native subterranean, the Formosan subterranean, and the dry-wood termites. The native subterranean termites are by far the most common termites found in the U.S.

4.1.1. Native Subterranean Termites. Native subterranean termites are found throughout the southern United States and southern California (Figure 1).

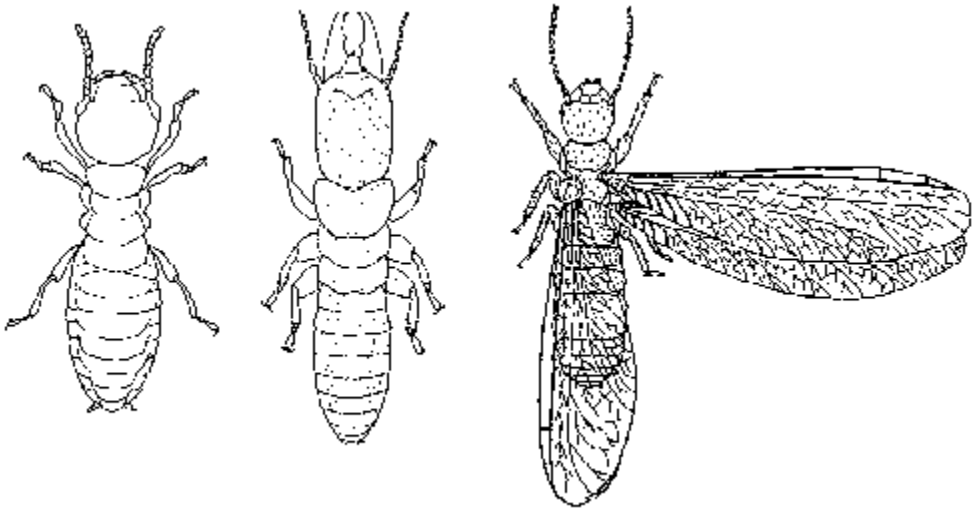


Figure 1, Native Subterranean Termites

These insects have particular moisture requirements that make them susceptible to control measures. Native subterranean termites must return to the soil at least every 24 hours for moisture. This makes them vulnerable to soil treatments performed at ground level. The swarmers are 3/8 to 1/2 inches long and are usually black to brown in color. The workers are a pale white and are sometimes called “white ants.” Mud tubes, excess dirt, and discarded wings are possible signs of infestation.

NOTE:
When surveying for subterranean termites start at the point of the structure most near the ground. This could be a basement, crawl space, or on slab construction, at the slab itself. Since subterranean termites come from the ground and must go back to the ground every 24 hours for moisture. thev will be found there first.

4.1.1.1. To control subterranean termites by chemical barrier follow the steps outlined below:

Step 1: The first step in termite control is to create a complete exterior chemical barrier to prevent the termites from entering the structure from the outside.

1.1. This barrier must be thorough otherwise; the termites will find the break and penetrate it.

1.2. This step can be accomplished either by trenching around the foundation or by rodding. (Rodding means injecting a rod into the ground every 12 inches and injecting termiticide around the foundation).

NOTE:
One must remember when treating for termites, that the intent of the treatment is not only to kill the termites, but also to protect the structure from the termites by placing this chemical barrier round it. Most subterranean termite nests are from 15 to 25 feet in the ground and extremely hard to find.

Step 2: The next step is to create a barrier on the inside of the structure. Of course, this prevents the termites from entering from the inside of the foundation.

2.1. This treatment must also be complete; otherwise, the termites will penetrate the barrier.

2.2. The method for creating this barrier treatment is contingent on construction type.

2.2.1. For instance, if the structure has a crawl space and the foundation walls are made of concrete, a trench would be dug along the foundation and the soil would be treated to create a chemical barrier.

2.2.2. This barrier would also be created around all pillars and plumbing pipes that protrude into the ground.

2.2.3. This alleviates any avenue for the termites to travel from the ground into the structure.

NOTE:
If the crawl space has a hollow-block foundation wall then each hollow of the block must be drilled and injected with termiticide. This will prevent the termites from entering through the hollow blocks unseen. If the foundation floor is covered with a concrete slab such as a basement, instead of trenching the foundation wall the concrete adjacent to the wall must be drilled with a roto-hammer every 12 inches and termiticide injected underneath the slab. Each building on base must be inspected at least every 2 to 4 years for termites. If the building is of wood construction, it must be inspected every year. The results of this inspection must be recorded on a DD Form 1070 as well as any wood infestation treatments to the building.

4.1.1.2. The following chart depicts the IPM control measures available for native subterranean termites.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Native Sub-terrain Termite	Design preventative Sanitation Pre-construction clearing of all wood Termite shields for survey	Repair and maintenance (corrective) Moisture control/water drainage Removal of wood scraps		Nematodes	Termite baits experimental	Wood preservative Insecticides Soil treatment with residuals.

4.1.2. Formosan Subterranean Termites. Formosan termites are the newest species to become established in the United States. The Formosan termites can be found in Hawaii, the Gulf Coast, California, and South Carolina. They are expected to spread to other areas as well. Formosans have many of the same characteristics as the native subterraneans but cause more damage because they are more aggressive. Formosans nest in the soil usually under stumps or at the base of poles. They tunnel up to wood just as the natives but are known to make nest in the walls of structures or in the food source itself. Formosan swarmers, usually reaching 5/8 inches, are larger than the native swarmers and are yellow and brown in color. Swarmers, unlike the native species, have hairy looking legs and swarm at night. Formosan soldiers have an oval-shaped head that with an opening on top that omits a sticky, whitish substance (Figure 2).

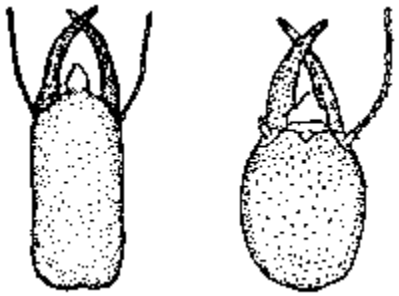


Figure 2, Formosan Soldier Termite Head Comparison

4.1.2.1. The steps for controlling the Formosan termite are the same as the native subterranean termite. See section above. The IPM measures for Formosan termites are listed in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Formosan Termites	Design preventative Sanitation Pre-construction clearing of all wood. Termite shields for survey.	Repair and maintenance corrective. Moisture control/water drainage. Removal of wood scraps.		Nematode	Termite baits experimental	Wood preservatives Insecticides Soil treatment with residual.

4.1.3. Dry-Wood Termites. Dry-wood termites are found in areas where the humidity is high such as Arizona, southern California, and along the Gulf Coast. The West Indian dry-wood is a problem in Puerto Rico, the U.S. Virgin Islands, Hawaii, and parts of Florida and Louisiana. The dry-wood termite, as the name suggests, lives in wood that is moderately to extremely dry and needs no contact with the ground. They invade furniture, fence posts, utility poles, firewood, and structures. The swarmers are 1/2 to 5/8 inches long, are light in color, and have cross vein and longitudinal veins on their wings. Fecal pellets and discarded wings are potential signs of infestation.

4.1.3.1. The steps for controlling dry-wood termites are found in the beginning of the section. The chart below lists the IPM control measures available for dry-wood termites.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Dry-wood termites	Design Selection of resistant lumber or materials	Repair Maintenance	Exposure to high or low temperatures			Wood preservaties Insecticide Residual Liquid Dusts Fumigation

5. Wood Infesting Beetles. There are two major types of wood infesting beetles that are common in the United States. Namely, these beetles are the powder-post and woodborer beetles. Both of these beetles attack untreated wood in homes, barns, and other wood structures. Damage by these beetles can range from unsightly holes in the wood to complete devastation of wood.

5.1. There are four major families of powder post beetles including the Lyctidae, (lyctus powder post beetle), the Bostrichidae, (large powder post beetle), the Anobiidae, (deathwatch beetle), and the Ptinidae, (spider beetle). The larva of these beetles does all the damage as they tunnel through the wood. The telltale signs of powder post beetle infestation are small round exit holes in the wood and fine powdery frass under the wood or beneath the holes.

5.2. There are three major woodborers that will be considered here. They are the Old house borer, Flat oak borer, and the Ivory marked borer, with the Old house borer being the most common. As with the powder post beetles the larva do all the damage. The telltale signs of infestation of the woodborers include elongated exit holes on the wood, usually almost twice as long as they are round, chewing sounds coming from the wood, and pale colored frass around the hole.

5.3. The steps for treating these wood-boring beetles are:

Step 1: Survey and identify the woodborers and the extent of damage that has occurred.

Step 2: Treat the infested wood with an insecticide that is labeled for woodborers.

2.1. Some of these insecticides are lindane, bora-care, timbor, pentachlorophenol, and chlorpyrifos.

NOTE:
One must be careful when selecting an insecticide for woodborers. (The label must be read completely). Lindane for instance, cannot be used in any living areas of homes. It can only be used in crawl spaces and attics if the attics are not being lived in. Fumigation can also be used for wood boring beetles. This control measure is highly effective to eradicate the infestation however, fumigation has no residual, and the beetles may return.

Step 3: Re-survey the infested area to ensure treatment was successful.

5.4. IPM measures for woodborers are listed in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Wood borers Powder post beetles	Design Selection of resistant lumber or materials	Repair Maintenance	Exposure to high or low temperatures experimental	Parasitic wasps		Wood preservatives Insecticides Residual Liquid Dusts Fumigation

6. Carpenter Ants. Carpenter ants tunnel into wood and excavate galleries to make a colony. They do not eat sound wood but tunnel into wood already damaged by mechanical action, fungi or other insects. They can build nests in living trees, logs, house timbers, poles, and most any other wood material. These ants are large about 1/2 inches long and usually black in color. The steps for controlling carpenter ants are found below.

6.1. ***To perform this task, follow these steps:***

Step 1: Survey and identify the carpenter ants.

Step 2: The next step is to find the carpenter ant nest.

2.1. Treat the nest with a residual insecticide liquid or dust.

NOTE:
If a nest is found inside the dwelling this is a secondary nest. The main nest will always be found outside. To completely control the carpenter ant the main nest must be found and eradicated.

Step 3: Follow up to ensure treatment was successful and customer is satisfied.

6.2. The IPM measures for carpenter ants are listed in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Carpenter ants	Harborage removal Selection of resistant lumber or materials	Repair Maintenance				Wood preservatives Insecticides - Residual Liquid Dusts Granules Fumigation

7. Carpenter Bees. Carpenter bees are large bees, reaching up to an inch long. They do not eat wood but bore tunnels into the wood to nest. Unlike ants and other bees, carpenter bees are not social bees. Each tunnel made will only contain one bee. Some signs of infestation include perfectly round holes in the wood about 1/2 inch in diameter and piles of sawdust under the hole. One carpenter bee does very little damage to the wood but numerous carpenter bees over a period of years can do considerable damage to infested wood.

7.1. The steps for controlling carpenter bees are located in the beginning of this section. The IPM controls for carpenter bees are listed in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Carpenter bees	Selection of resistant lumber or materials	Repair Maintenance Paint or stain wood				Wood preservatives Insecticides Residual Liquid Dusts

REVIEW QUESTIONS
FOR
CONTROL STRUCTURAL PESTS

QUESTION	ANSWER
1. Which of the following IPM processes include sanitation?	a. Physical. b. Mechanical. c. Cultural. d. Autocidal.
2. What is the first step in solving any pest control problem?	a. Understanding the customer. b. Analyzing the problem. c. Performing a short-term treatment. d. Performing a long -term treatment.
3. Which of the following is **not** a substance eaten by the termite?	a. Paper. b. Concrete. c. Fiber board. d. Cardboard.
4. Which of the following is **not** a sign of native subterranean termite infestation?	a. Discarded wings. b. Excess dirt. c. Sawdust. d. Mud tunnels.
5. Termite treatments are only intended to kill termites.	a. True. b. False.
6. Which termite is the newest termite in the U. S.?	a. Formosan subterranean termite. b. Dry-wood termite. c. Native subterranean termite. d. None of the above.
7. Which of the following is **not** a sign of powder post-beetle infestation?	a. Fine powdery frass. b. Chewing sounds. c. Small exit holes. d. None of the above.
8. The dry-wood termite **does not** need contact with the ground.	a. True. b. False.
9. Fumigation has the longest residual of all the treatments for wood-boring beetles.	a. True. b. False.
10. Carpenter ants eat wood.	a. True. b. False.
11. Which of the following is not a nesting area for carpenter ants?	a. Logs. b. Poles. c. House timbers. d. Old rugs.
12. Carpenter bees are social bees like ants and other bees.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the pest problem and initiate the correct control measure for structural pests.

CONTROL STRUCTURAL PESTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
Subterranean Termites		
1. Conduct survey for subterranean termites correctly		
2. Inform the customer and was the customer satisfied with answers		
3. Successfully create an outside barrier for termites		
4. Successfully create an inside barrier		
5. Conduct a post inspection		
6. Fill out inspection reports		
Dry-wood Termites		
1. Perform dry-wood termite inspections proficiently		
2. Inform customer of treatment needed		
3. Apply treatment for dry-wood termites		
4. Apply the correct IPM measures for dry-wood termites		
5. Perform post inspection for dry-wood termites		
6. Successfully perform/schedule a follow-up visit		
7. Fill out inspection reports		
Wood Infesting Beetles		
1. Survey for powder-post and woodborer beetles correctly		
2. Explain control procedures to the customer		
3. Perform chemical controls for wood boring beetles correctly		
4. Apply the correct IPM measures for woodborers		
5. Post inspections for woodborers proficiently		
6. Successfully perform/schedule a follow-up visit		
Carpenter Ants		
1. Survey for carpenter ants correctly		
2. Explain control procedures to customer		
3. Chemical controls for carpenter ants		
4. Apply the correct IPM measures for carpenter ants		
5. Perform post inspection for carpenter ants proficiently		
6. Successfully perform/schedule a follow-up visit		

CONTROL STRUCTURAL PESTS (Continued)

DID THE TRAINEE….?	YES	NO
Carpenter Bees		
1. Perform a carpenter bee survey proficiently		
2. Explain control procedures to the customer		
3. Perform chemical control procedures for carpenter bees		
4. Apply the correct IPM measures for carpenter bees		
5. Perform post inspection for carpenter bees proficiently		
6. Successfully perform/schedule a follow-up visit		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL HOUSEHOLD PESTS (15.2.8.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CONTROL HOUSEHOLD PESTS

Task Training Guide

STS Reference Number/Title:	15.2.8.3., Control Household Pests.
Training References:	1. AFPMB TIM 29, *Integrated Pest Management In and Around Building.* 2. Military Pest Management Handbook, Chapter 8: *Urban Arthropods (Home, Office, and Industrial Facilities).*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 29. 2.2. Military Pest Management Handbook, Chapter 8.
Equipment/Tools Required:	1. DD Form 1532-1, Pest Management Report. 2. WIMS-ES Module.
Learning Objective:	The trainee should learn the Integrated Pest Management (IPM) steps to control household pests.
Samples of Behavior:	Trainee will be able to apply the IPM controls for household pests.
Notes:	
1. To successfully complete this element follow the steps outlined in the lesson. 2. The trainer must design scenarios and perform on-the-job-training (OJT) to enhance the trainee's knowledge of household pest IPM.	

CONTROL HOUSEHOLD PESTS

1. Background: The definition of IPM is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda. In this lesson the use of IPM measures in a variety of situations will be examined, contemplating how different situations require different control measures.

2. The IPM process is comprised of six components, that if used correctly will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitation manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. Physical controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. Biological controls use nature against the pest by introducing natural predators to control the pests. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidal control uses genetic biology to control pests. Chemicals are used to prevent pests from reproducing, thereby, controlling the pest through attrition. Examples of these autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM, system chemicals are used as a last resort. Chemicals may be used only after all other means of control are exhausted. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control then IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for household pests.

Step 1: The first step is to analyze the pest problem.

1.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

2.1. Most complaints are customer oriented.

2.2. It is important to understand the customer complaint and educate them on what they can do to help.

2.3. Also it is important to educate the customer to what IPM techniques will be used and how long it will take them to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions to get the pest under control before implementing longer-term IPM measures.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the particular controls oriented.

5.1. Record keeping is also important to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer and ensure that the problem is under control and that the customer is satisfied.

6.1. Customer satisfaction is an essential part of the IPM process.

4. Cockroaches. Cockroaches are among the world's most common and widespread insects. These insects prefer a moist warm habit since most are tropical in origin. Some tropical cockroaches feed only on vegetation; however, those that live in structures, are usually scavengers having a wide choice of food. Cockroaches are especially fond of starchy materials, sweet substances and meat products. They will eat a great variety of materials such as cheese, bakery products, and so on. The most important species to the U.S. are the *American, German, Brown-banded,* and the *Oriental* cockroach.

4.1. The steps for the controlling of **cockroaches** are listed in the main text. The chart below list the IPM controls for cockroaches.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Cockroaches	Design Preventive Design out harborage and allow access for chemical treatment Sanitation Good house-keeping Cockroach proof containers	Harborage elimination (corrective) Caulking Remove unused equipment Trapping limited control	Cold storage Moisture control	Parasitic wasp on American cockroach Parasitic wasp on brown-banded cockroach	Sterilization (expire-mental)	Repellent Insecticides Baits Residual liquids Non-Residual (ULV) Fumigants CO2 Hospital carts

5. Ants. Ants are one of the most numerous types of animals on earth. Their high degree of adaptability to different environments, foods, nesting sites and their great reproductive ability are other reasons why they are so abundant. Ants adversely affect people by infesting our homes and other buildings, feeding on our food or even structurally damaging our buildings. Ants can be especially annoying because of their bites and stings. The three main household ants are the **thief ant, pavement ant and the pharaoh ant.**

5.1. The steps for controlling **ants** are listed in the main text. The chart below list the IPM controls for ants.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Ants	Sanitation Good housekeeping Vegetation Removal	Ant Proofing Sealing cracks Vacuuming Barrier water, petroleum jelly or stickum	Soak house plant pots to drown			Insecticides Baits Residual liquids

6. Silverfish and firebrats. Silverfish and firebrats are among the most primitive of all insects, even predating cockroaches. The long, slender insects have a distinct body form, which is broad at the face and tapers gradually to the rear. They are wingless, have long antennae and several long, tail-like appendages at the abdominal end of the body. The common name for these insects is “bristletails.” These insects prefer paper and paper products containing paste or glue.

6.1. The steps for controlling Silverfish and firebrats are listed in the main text. The chart below list the IPM controls for Silverfish and firebrats.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Silverfish and firebrats	Sanitation Good housekeeping	Harborage removal Vacuuming Introduce more lighting	Temperature control Humidity control			Repellents Insecticide Baits Non-residual aerosols Residual liquids

7. Field crickets. The field cricket is best known for their high-pitched chirping sound. In some parts of the U.S., they are equally known for their invasion of buildings, including living areas. Under normal conditions, they can build up enormous populations. They feed on almost any organic substance and sometimes do considerable damage to fabrics. Field crickets migrate into buildings when there is a limited food source or in cool weather.

7.1. IPM controls for **field crickets** are listed in the main text. The chart below list the IPM controls for field crickets.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Field crickets	Sanitation Good housekeeping	Harborage removal Vacuuming Introduce more lighting	Temperature control Humidity control			Repellents Insecticide Baits Non-residual aerosols Residual liquids

8. Spiders. There are between 400 and 700 spider species found throughout the United States. These familiar predators live almost everywhere, on the ground, under rocks, among grasses, on plants, in tree branches, in underground caves, and even on water. All spiders are voracious predators. Most feed on insects, although a few large species prey on small vertebrate animals. Spiders are considered highly beneficial because they help keep the vast insect population in check. Few spiders bite people and the venom of most is harmless. The unnecessary removal of spiders in households should be avoided, if possible.

8.1. IPM controls for **spiders** are listed in the main text. The chart below lists the IPM controls for spiders.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Spiders	Sanitation Harborage removal (debris)	Vacuuming removal of webs, adults & eggs Spider proofing Screen Sealing cracks		Wasps		Freezing agent Insecticides Non-residual Residuals

REVIEW QUESTIONS
FOR
CONTROL HOUSEHOLD PESTS

QUESTION	ANSWER
1. The world's most common and widespread insect is the_____.	a. Ant. b. Spider. c. Cricket. d. Cockroach.
2. Cockroaches are especially fond of starchy foods.	a. True. b. False.
3. One of the most numerous types of animal on earth is the _____.	a. Cockroach. b. Cricket. c. Ant. d. Spider.
4. Ants can be annoying because of their _____.	a. large numbers. b. bites and stings. c. voracious appetites. d. none of the above.
5. The most primitive of all insects are the _____.	a. Silverfish and firebrats. b. Cockroaches. c. Ants. d. Spiders.
6. The common name for silverfish and firebrats is _____.	a. Bristletails. b. Forked tail devils. c. Whiptails. d. Ribbontails.
7. The field cricket is **not** known for their high-pitch chirping sound.	a. True. b. False.
8. Field crickets feed mainly on what type of food source?	a. Garbage. b. Organic substances. c. Starchy substances. d. Paper products.
9. Which of the following is a habitat of the spider?	a. Ground. b. Caves. c. Grasses. d. All of the above.
10. The unnecessary removal of spiders should be avoided.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the pest problem and initiate the correct control measure for household pests.

CONTROL HOUSEHOLD PESTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
Subterranean Termites		
1. Perform a cockroach survey correctly		
2. Perform a ant survey correctly		
3. Perform a field cricket survey correctly		
4. Perform a spider survey correctly		
5. Explain the pest control procedures to customer		
6. Perform short-term corrective actions		
7. Perform long-term preventative IPM controls		
8. Monitor and evaluate IPM controls		
9. Initiate a record		
10. Perform/schedule a follow-up visit		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL VERTEBRATE PESTS (15.2.9.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CONTROL VERTEBRATE PESTS

Task Training Guide

STS Reference Number/Title:	15.2.9.3., Control Vertebrate Pests.
Training References:	1. AFMPB TIM 29, *Integrated Pest Management In and Around Building*. 2. Military Pest Management Handbook, Chapter 10, Rodents, Birds, Bats, and Other Nonarthropod Pests.
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 29. 2.2. Military Pest Management Handbook, Chapter 10.
Equipment/Tools Required:	Live traps.
Learning Objective:	The trainee should learn the IPM techniques for controlling vertebrate pests.
Samples of Behavior:	The trainee, given a control problem, will be able to solve the problem using correct IPM control measures.
Notes:	
1. To successfully complete this section the trainee must follow the steps of the lesson. 2. The trainer will design scenarios or perform on-the-job-training (OJT) to enhance the trainee's knowledge of structural pest IPM.	

CONTROL VERTEBRATE PESTS

1. Background: The definition of Integrated Pest Management is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, and environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides, IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda. In this lesson, the use of IPM measures in a variety of situations will be examined, considering how different situations require different control measures.

2. The IPM process is comprised of six components, that if used correctly will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitat manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. Physical controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. Biological controls use nature against the pest by introducing natural predators to control the pests. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidal control uses genetic biology to control pests. Chemicals are used to prevent pests from reproducing. Thus, the chemical controls the pest through attrition. Examples of these autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM system, chemicals are used as a last resort. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control, other appropriate IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for disease vectors pests.

Step 1: The first step is to analyze the pest problem.

1.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

2.1. Most complaints are customer oriented.

2.2. It is important to understand the customer complaint and educate them on what they can do to help.

2.3. Also it is important to educate the customer to what IPM techniques will be used and how long it will take them to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions to get the pest under control before implementing long-term IPM measures.

> **NOTE:**
> If rats are a major problem in a structure, it may be necessary to use poison baits to eliminate the rats first. Once this is accomplished, other controls can be integrated such as elimination of entry points, etc.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the selected controls.

5.1. Record keeping is also highly essential to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer.

6.1. It also ensures the problem is under control and the customer is satisfied.

6.2. Customer satisfaction is an essential part of the IPM process.

4. Domestic Rodents. Domestic rodents are found throughout the world. They share our homes, eat and contaminate our food, and carry many diseases including plague, murine typhus, and rat-bite fever. There are three important domestic or commensal rodents, the Norway rat, the roof rat, and the house mouse. They are the most destructive rodents in North America. The chart on the next page shows the major differences between three domestic rodents.

Species	Norway Rat (Rattus norvegicus)	Roof Rat (Rattus rattus)	House Mouse (Mus musculus)
Weight	10 - 17 oz (280 - 480 gm)	4 - 12 oz (110 - 340 gm)	½ - ¾ oz (14 - 21 gm)
Total length (Nose to tip of tail)	12 ¾ - 18 in. (325 - 460 mm)	13 ¾ - 17 ¾ in. (350 - 450 mm)	6 - 7 ½ in. (150 - 190 mm)
Head and Body	Blunt muzzle; heavy thick body 7 - 10 in. (180 - 255 mm)	Pointed muzzle; slender body 6 ½ - 8 in (165 - 205 mm)	Small 2 ½ - 3 ½ in. (65 - 90 mm)
Tail	Shorter than head plus body, carried with much less movement, comparatively, than roof rat. Light-colored on under side at all ages. 6- 8 ½ in. (150 - 215 mm)	Longer than head plus body generally moving whip-like, uniform coloring top and bottom at all ages and for all subspecies. 7 ½ - 10 in. (190 - 255 mm)	Equal to or a little longer than body plus head. 3 - 4 in. (7.5 - 10 mm)
Ears	Small, close set, appear half buried in fur. Rarely over ¾ in (20 mm)	Large, prominent, stand well out from fur. Generally over ¾ in (20 mm)	Prominent, large for size of animal, ½ in. (15 mm) or less
Hind Foot	Usually over 1 ½ in. (40 mm) from heel to tip of longest toe.	Generally less than 1 ½ in. (40 mm) from heel to tip of longest toe.	Feet are shorter, darker, and broader than most wild mice. Generally less than ¾ in. (20 mm) from heel to tip of longest toe.

4.1. The steps for controlling domestic rodents are found in the beginning of this section. The IPM control measures are listed in the table below.

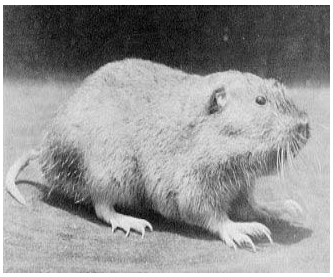
Pest	Cultural	Mechanica	Physical	Biological	Autocidal	Chemical
Domestic Rodents	Sanitation Food source removal Habitat manipulation	Harborage elimination Rodent proofing Barriers Trapping live Lethal Shooting Animal removal	Low Temperature exposure			Rodenticides Single dose baits Fumigation

5. Field Rodents. As the name implies the field rodents are usually found in open fields and trees. There are several field rodents such as: field mice, ground squirrels, tree squirrels, chipmunks, moles, pocket gophers, prairie dogs, woodchucks, and rabbits (Figure 1).

Chipmunk

Tree Squirrel

Ground Squirrel



Pocket Gopher

Prairie Dog

Rabbit

Figure 1, Field Rodents

Wood Chuck

Mole

Field Mouse

Figure 1, Field Rodents (Continued)

These rodents are normally native to a particular area and do not follow humans as much as the domestic rodents. However, on occasion these rodents will invade homes and other structures looking for food and shelter. Pest management personnel must manage these rodents when they invade structures or deplete base resources by excessive burrowing.

5.1. The steps for controlling these rodents are found in the beginning of this section. The IPM control measures are listed in the table below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Field Rodents	Sanitation Food source removal Habitat manipulation	Harborage elimination Rodent proofing Barriers Trapping live Lethal Shooting Animal removal	Low Temperature exposure		Birth control hormones	Rodenticides Single dose baits Fumigation

6. Wild Animals. Wild animals are found on all-military bases however; species will be different depending on the location of the base. Wild animals include skunks, raccoons, muskrats, feral cats, opossums, deer, and foxes. These animals become important to environmental personnel in two instances. First, when they invade human areas such as flightlines or structures. Second, when they are suspected of carrying rabies. Any animal that is acting strange should be treated with caution.

NOTE:
Live trapping the animal and relocating it back into a secluded area can handle most wild animal incidents.

6.1. The steps for controlling wild animals are included in the beginning of this section. The IPM control measures are outlined in the chart below.

Pest	Cultural	Mechanical	Physical	Biological	Autocidal	Chemical
Wild Animals	Sanitation Food source removal Habitat manipulation	Harborage elimination Pest proofing Barriers Trapping live Lethal shooting Animal removal	Low Temperature exposure			

REVIEW QUESTIONS
FOR
CONTROL VERTEBRATE PESTS

QUESTION	ANSWER
1. Which rodent has a blunt muzzle and a thick body?	a. Norway rat. b. Roof rat. c. House mouse. d. Field mouse.
2. Which rodent has a tail that is equal to or a little longer than the head and body?	a. Norway rat. b. Roof rat. c. House mouse. d. Field mouse.
3. The roof rat has small, close set ears that appear buried in the fur.	a. True. b. False.
4. Which rodent has a foot that is less than 1 1/2 inches from heel to longest toe?	a. Norway rat. b. Roof rat. c. House mouse. d. Field mouse.
5. Which of the following is not a field rodent?	a. Chipmunk. b. Mole. c. Opossum. d. Pocket gopher.
6. Feral cats are considered wild animals.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the pest problem and initiate the correct control measure for vertebrate pests.

CONTROL VERTEBRATE PESTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
Domestic Rodents		
1. Perform domestic rodent surveys proficiently		
2. Inform the customer on control procedures for domestic rodents		
3. Implement short-term IPM measures		
4. Implement long-term IPM measures		
5. Monitor and keep records of control procedures		
6. Conduct/schedule a follow-up visit with the customer		
Wild Animals		
1. Analyze a wild animal problem		
2. Inform the customer on control procedures for wild animals		
3. Implement short-term control procedures		
4. Implement long-term IPM measures		
5. Document the building record correctly		
6. Conduct/schedule a follow-up visit with customer		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES

MODULE 15 AFQTP UNIT 2

CONTROL WEEDS (15.2.11.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CONTROL WEEDS

Task Training Guide

STS Reference Number/Title:	15.2.11.3., Control Weeds.
Training References:	AFPMB TIM 29, *Integrated Pest Management In and Around Building.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review AFPMB TIM 29.**
Equipment/Tools Required:	N/A
Learning Objective:	The trainee should learn the Integrated Pest Management (IPM) techniques for controlling weeds
Samples of Behavior:	The trainee, given a control problem, will be able to solve the problem using correct IPM control measures.
Notes:	
1. To successfully complete this section, the trainee must follow the steps of the lesson. 2. The trainer will design scenarios or perform on-the-job-training (OJT) to enhance the trainee's knowledge of weed control IPM.	

CONTROL WEEDS

1. Background: The definition of Integrated Pest Management is "the use of all appropriate technology and management practices to bring about pest prevention and suppression in a cost-effective, and environmentally sound manner." In today's Air Force with the Measure of Merit guidelines and all the emphasis on reduction of pesticides, IPM should be a daily routine. It should be the standard operating procedure instead of a separate agenda. In this lesson, the use of IPM measures in a variety of situations will be examined, considering how different situations require different control measures.

2. The IPM process is comprised of six components, that if used correctly will solve the pest problems, not only temporarily but long-term. The six components are as follows:

2.1. Cultural Controls. This is probably the most important of all the IPM measures because this step includes sanitation. Sanitation is the most important part of any pest problem as it takes away the food vital for survival. Cultural control also includes harborage control and habitat manipulation.

2.2. Mechanical Controls. This step includes such things as physically removing spider webs, screening to keep flies out of buildings, mechanical traps such as mousetraps, and tearing down bird's nests.

2.3. Physical Controls. Physical controls are designed to change the physical surroundings of the pest. An example would be to put clothes in cold storage to kill moths.

2.4. Biological Controls. Biological controls use nature against the pest by introducing natural predators to control the pests. An example of a biological control would be to introduce mosquito larva eating fish into a breeding habitat to control mosquitoes.

2.5. Autocidal Controls. Autocidal controls use genetic biology to control pests. Chemicals are used to prevent pests from reproducing. Thus, the chemical controls the pest through attrition. Examples of these autocidal chemicals include Gentrol for roaches and Torus for fleas.

2.6. Chemical Controls. In the IPM system, chemicals are used as a last resort. Chemicals are also used as a knockdown for extremely bad infestations. Once the infestation is under control, IPM measures are used to alleviate and prevent the problem from returning.

3. The following steps will outline the procedures for creating IPM control measures for weed pests.

Step 1: The first step is to analyze the pest problem.

1.1. Identify the pest in question and through survey, decide the source of the infestation.

Step 2: The next step is understanding and educating the customer.

2.1. Most complaints are customer oriented.

2.2. It is important to understand the customer complaint and educate them on what they can do to help.

2.3. Also it is important to educate the customer to what IPM techniques will be used and how long it will take them to work.

Step 3: Once the survey is complete, it is sometimes necessary to initiate short-term corrective actions to get the pest under control before implementing long-term IPM measures.

NOTE:
If weeds are at a heavy stage of growth, it may be necessary to apply herbicides initially. Other longer lasting IPM measures can follow.

Step 4: Once the pest is under control, implement long-term preventative IPM controls.

Step 5: Continue to monitor and evaluate the progress of the selected controls.

5.1. Record keeping is also highly essential to document IPM successes.

Step 6: A follow-up visit is important to communicate with the customer.

6.1. It also ensures the problem is under control and the customer is satisfied.

6.2. Customer satisfaction is an essential part of the IPM process.

4. Weeds. There are many types of weed growth that may need controlling such as: broadleaf in turf grasses, grasses in ornamental areas, tree and brush eradication, and total weed kill (soil sterilization). Some installations spray primarily soil sterilants while others may spray more selective broadleaf depending on the location. It is essential to maintain proper weed control to keep up base appearance, security, and safety. Tree & brush control is normally done by mechanical means, however there may certain situations for chemical control of young invasive, non-native species. Remember that chemical control is supposed to compliment mechanical controls. Never spray chemicals just to reduce man-hours for mowing and weed eating.

NOTE:
When surveying for weeds, the survey should consist of checking all visible areas where unwanted vegetation should be removed. Storage yards, fence lines, streets/parking areas, ditch banks; ponds and the flightline are prime candidate areas that may need control.

4.1. To control weeds follow the steps outlined above. The following chart depicts the IPM control measures available for weed control.

Pest	Cultural	Mechanica	Physical	Biological	Autocidal	Chemical
Weeds	Water Management: Maintain water amount optimum to turfgrass type Plant disease resistant grasses Mow at proper level	Burning Cultivating Mowing Mulching Dredging	Install physical barriers to prevent sunlight	Weed eating fish Grazing animals Insects		Selective & Non-Selective herbicides

REVIEW QUESTIONS
FOR
CONTROL WEEDS

QUESTION	ANSWER
1. What is the first step in initiating the IPM process?	a. Analyze and survey the problem. b. Understand the customer. c. Record keeping. d. Follow-up.
2. The second step in the IPM process is short-term control.	a. True. b. False.
3. What is the fourth step in the IPM process?	a. Understand the customer. b. Analyze the problem. c. Long-term controls. d. None of the above.
4. What is the sixth step in the IPM process?	a. Long-term control. b. Follow-up. c. Educate the customer. d. Short-term controls.
5. Which of the following is an IPM control measure for aquatic weeds?	a. Predatory fish. b. Screening. c. Bacteria. d. All of the above.
6. Which of the following is not a mechanical control?	a. Cultivating. b. Mowing. c. Burning. d. Grazing Animals.
7. It is okay to spray for weeds to reduce the amount of man-hours used for mowing.	a. True. b. False.
8. Which of the following is justification for weed control?	a. To keep people busy. b. Use up excess chemicals. c. Impress your boss. d. Maintain base appearance.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must analyze the problem and initiate the correct control measure for weeds.

CONTROL WEEDS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Perform a weed survey correctly		
2. Keep customer informed on all matters relating to the weed problem		
3. Initiate short-term control		
4. Initiate long-term controls		
5. Document the procedure used in the building record		
6. Perform/schedule a follow a follow-up visit		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

PESTICIDE MANAGEMENT

MODULE 15 AFQTP UNIT 3

INVENTORY PESTICIDES (15.3.1.)

INVENTORY PESTICIDES

Task Training Guide

STS Reference Number/Title:	15.3.1., Inventory Pesticides.
Training References:	1. AFI 32-1053, *Pest Management Program.* 2. AFI 32-7064, *Integrated Natural Resources Management.* 3. Military Pest Management Handbook, Chapter 6: *Safety*.
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFI 32-1053 and 32-7064. 2.2. Military Pest Management Handbook, Chapter 6.
Equipment/Tools Required:	Inventory Records.
Learning Objective:	The trainee should learn the basic steps required to keep and maintain inventory records.
Samples of Behavior:	Trainee will be able to establish and maintain inventory records.
Notes:	
1. To successfully complete this element follow the steps outlined in this procedure. 2. Trainer should design scenarios to enhance the trainee's knowledge of establishing inventory records.	

INVENTORY PESTICIDES

1. Background: As an environmental controls technician it is imperative and mandated to maintain complete records of the pesticides used. The Major Command, the State Environmental Protection Agency (EPA), and the Federal EPA mandate it. These records are usually kept on the IWIMS computer system. If the IWIMS is not available, these records are kept on the DD Form 1532-1. The Pest Management Maintenance Record and the DD Form 1532 The Pest Management Report. This lesson will outline the procedures for accomplishing this task.

2. The following steps describe the process for the inventory of pesticides.

Step 1: The first step in the inventory process is to setup a baseline.

1.1. This can be done on IWIMS or on an inventory sheet.

Step 2: As chemicals are used and amounts are recorded on the DD Form 1532-1 subtract these amounts from the inventory sheet.

2.1. If the IWIMS system is being used it will perform this automatically.

Step 3: New supplies are annotated on your inventory sheet or on the IWIMS system.

Step 4: Quarterly, a report must be compiled and sent to the Major Command, the fire department, and the Bio-Engineers of the chemicals on hand.

REVIEW QUESTIONS
FOR
INVENTORY PESTICIDES

QUESTION	ANSWER
1. Which of the following agencies mandate inventories of pesticides?	a. The State EPA. b. The Federal EPA. c. The Major Command. d. All of the above.
2. If the IWIMS system is not available, where are the pesticide records kept?	a. DD Form 1532-1. b. DD Form 1532. c. DD Form 1348-1. d. DD Form 2005.
3. What is the first step in the inventory process?	a. Setup a baseline. b. Inventory incoming stock. c. Inventory outgoing stock. d. Compile reports.
4. How often must a report be sent to the Major Command?	a. Monthly. b. Weekly. c. Quarterly. d. Semi-annually.

INVENTORY PESTICIDES

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Set up a baseline inventory correctly		
2. Subtract chemicals that were used from the inventory		
3. Add new chemicals to the inventory		
4. Compile quarterly reports		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

PESTICIDE MANAGEMENT

MODULE 15 AFQTP UNIT 3

STORE PESTICIDES (15.3.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

STORE PESTICIDES

Task Training Guide

STS Reference Number/Title:	15.3.2., Store Pesticides.
Training References:	1. AFPMB TIM 17, *Military Handbook 1028/8A, Military Handbook: Design of Pest Management Facilities.* 2. 40 CFR 165.9 & 165.10, *Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers*. 3. AFI 32-1053, Pest Management Program.
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 17. 2.2. 40 CFR 165.9 & 165.10. 2.3. AFI 32-1053.
Equipment/Tools Required:	1. Inventory Sheets. 2. IWIMS-ES Module.
Learning Objective:	The trainee should learn the procedures for proper pesticide storage requirements.
Samples of Behavior:	Trainee should apply the procedures for proper pesticide storage requirements.
Notes:	
To successfully complete this element follow the steps outlined in the lesson.	

STORE PESTICIDES

1. Background: Storage facilities must meet the requirements set forth by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA). These requirements are to protect individuals and the environment from adverse effects from pesticides. Department of Defense (DoD) installations instituted programs and policies that fulfill the guidelines for pesticide storage.

2. The requirements for pesticide storage are listed in the steps below.

Step 1: The size and components of the pesticide storage area is based upon the criteria described in the Technical Information Memorandum.

Step 2: The facility should have adequate space for personnel and equipment needed to sustain pest management operations.

Step 3: Contact the command entomologist or Engineering Field Division (US Army) (EFD) applied biologist for additional information on pesticide storage requirements.

Step 4: Facilities should be dry and well ventilated.

Step 5: Facility must maintain constant humidity and temperature.

5.1. Ideal temperature is between 40 degrees and 100 degrees Fahrenheit.

Step 6: Facility is capable of protecting pesticides from freezing and direct sunlight.

Step 7: Facility has sufficient lighting, fire fighting equipment and exhaust systems to maintain operations.

Step 8: Facility must have sufficient locks and a security fence.

Step 9: Post signs on facility to alert personnel of contents and unauthorized entries.

Step 10: Inform base fire department of facility location and contents.

Step 11: Storage shelves should be made of non-absorbent material.

11.1. Spill containment shelving is preferred.

Step 12: Keep isle space clear for easy access and inspections.

Step 13: Storage areas must have fire and smoke detectors.

Step 14: Separate storage areas are needed for herbicides and insecticides.

Step 15: Work areas, changing rooms, and pesticide storage areas must be segregated.

Step 16: Exhaust fans must vent away from public areas.

Step 17: Storage facility must have an emergency shower.

17.1. This shower should have a deluge shower and eyewash.

17.2. There should be one in the mixing room and one in each pesticide storage area.

Step 18: Exterior walls are constructed from either pre-engineered concrete or masonry blocks.

Step 19: A four-inch curb, surrounding facility, is mandatory to contain spilled material.

19.1. This prevents contamination from spreading and facilitate easy clean up.

Step 20: Security windows or bars should be installed if no security fence is installed.

Step 21: Suitable fire control devices, such as fire extinguishers, must be in facility.

21.1. The proper size and number is provided by the base fire department.

Step 22: Water sprinklers are not to be installed in pesticide storage areas.

22.1. This prevents unnecessary runoff in case of fire.

Step 23: All facility designs must adhere to all DoD, EPA and OSHA regulations.

23.1. The command entomologist or EFD applied biologist will provide additional guidance when requested.

23.2. It is your responsibility to ensure the design of new facilities meets these requirements.

REVIEW QUESTIONS
FOR
STORE PESTICIDES

QUESTION	ANSWER
1. Pesticide storage requirements are based on what document?	a. TIM 24. b. TIM 15. c. TIM 16. d. Military Handbook 1028/8A.
2. Besides the command entomologist who else gives advise on storing pesticides?	a. Bio-environmental. b. Engineering Field Division. c. Environmental. d. Engineering and design.
3. The ideal temperature for storing pesticides is between _____ and _____.	a. 30° and 70° F. b. 50° and 90° F. c. 40° and 100° F. d. 35° and 85° F.
4. All pesticide storage facilities require water sprinklers.	a. True. b. False.
5. A four-inch concrete curb is required in pesticide storage areas.	a. True. b. False.
6. Who provides the technical support for the size and type of extinguishers?	a. Base safety. b. Tech services. c. Public health. d. Fire department.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to come up with a hypothetical situation where the trainee must review the construction plans for a new storage facility and see if the facility meet the requirements outline in this document.

STORE PESTICIDES

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Research Military Handbook 1028/8A for facility requirement		
2. Review construction plans for accuracy		
3. Describe what to do if additional information was needed		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

PESTICIDE MANAGEMENT

MODULE 15 AFQTP UNIT 3

CLEAN UP PESTICIDE SPILLS (15.3.5.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CLEAN UP PESTICIDE SPILLS

Task Training Guide

STS Reference Number/Title:	15.3.5., Clean up pesticide spills.
Training References:	1. AFPMB TIM 15, *Pesticide Spill Prevention and Management.* 2. Military Pest Management Handbook, Chapter 6: *Safety*.
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review the following references:** 2.1. AFPMB TIM 15. 2.2. Military Pest Management Handbook, Chapter 6.
Equipment/Tools Required:	1. Pest Management Spill Plan. 2. Spill Kit. 3. Personal Protective Equipment (PPE).
Learning Objective:	The trainee should learn the procedures for cleaning up pesticide spills.
Samples of Behavior:	Trainee will be able to apply the procedures for cleaning up pesticide spills.
Notes:	
1. To successfully complete this element follow the steps outlined in the lesson. 2. Trainer needs to setup mock spill scenarios.	

CLEAN UP PESTICIDE SPILLS

1. Background: The first step in the event of a pesticide spill is to follow the spill contingency plan. This plan is included in the installation's Hazardous Waste Management Plan, Spill Contingency Plan and Hazardous Substance Spill Prevention Plan. These plans list the key personnel and agencies to contact, emergency telephone numbers and action to take if a spill occurs. Spills require reporting to the EPA and the Coast Guard when certain pesticides and reportable quantities are involved.

2. The pesticide spill clean-up procedures are listed below.

Step 1: When a spill occurs initiate the installations spill plan procedures.

Step 2: Determine if there is human exposure or contamination.

Step 3: If human exposure has occurred, don personal protective equipment and remove the individual(s).

Step 4: Eliminate all ignition sources to prevent fires or explosions.

Step 5: Initiate first aid procedures, if necessary, and call for medical assistance.

Step 6: Contain spilled material to prevent the spread of contamination.

> **NOTE:**
> Use vermiculite, pelletized cellulose or peat moss. **DO NOT USE SAND** as an absorbent. Spill kits should be purchased and located near pesticide storage areas. Use rags or soil as a last resort.

Step 7: Secure spill area to prevent unauthorized entries.

7.1. This is accomplished by using plastic caution tape, rope or traffic cones.

Step 8: Notify the base security police; fire department and emergency spill response team.

Step 9: Identify the spilled pesticide.

9.1. This includes trade name, chemical name of active ingredient(s), type of formulation, percent active ingredient(s), and the manufacturer's or formulator's name and address.

Step 10: Use a dry absorbent to contain a liquid spill and use a plastic tarp for dry spills to prevent drifting.

Step 11: After authorities have been notified, initiate any other required actions listed in the pesticide spill plan or on the pesticide label or Material Safety Data Sheets (MSDS).

Step 12: Await further instructions from the Environmental Flight.

REVIEW QUESTIONS
FOR
CLEAN UP PESTICIDE SPILLS

QUESTION	ANSWER
1. The first step in a pesticide spill is to _____.	a. call base fire department. b. call command post. c. report spill to EPA. d. follow the spill contingency plan.
2. No personal protective equipment is needed to remove a victim from a spill scene.	a. True. b. False.
3. Which of the following is **not** used to clean up a pesticide spill?	a. All purpose absorbent pads. b. Pelletized cellulose. c. Sand. d. Peat moss.
4. Which of the following is part of pesticide identification?	a. Trade symbol. b. Active ingredient percentage. c. Distributor's name. d. Skull and cross bones.
5. A dry absorbent is used to contain a liquid spill.	a. True. b. False.
6. Besides the pesticide spill plan, what other material gives instructions on spill clean up?	a. Material Safety Data Sheets. b. Pesticide labels. c. Both a and b. d. Base Evacuation Plan.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to come up with a hypothetical situation where the trainee must response to a pesticide spill and see if the trainee follows the steps in this AFQTP and/or your installation spill plan.

CLEAN UP PESTICIDE SPILLS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Locate the spill contingency plan		
2. Follow procedures listed in the plan		
3. Select proper PPE for rescue of accident victim		
4. Perform containment procedures		
5. Select correct absorbent for spilled material		
6. Secure area		
7. Identify spilled pesticide		
8. Apply absorbent to spill pesticide		
9. Notify proper authorities		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

PESTICIDE MANAGEMENT

MODULE 15 AFQTP UNIT 3

CALCULATE PESTICIDE REQUIREMENTS (15.3.6.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CALCULATE PESTICIDE REQUIREMENTS

Task Training Guide

STS Reference Number/Title:	15.3.6., Calculate Pesticide Requirements.
Training References:	AFPMB TIM 24, *Contingency Pest Management Pocket Guide.*
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review AFPMB TIM 24.**
Equipment/Tools Required:	1. Pesticide label. 2. AFPMB TIM 24. 3. Calculation sheets.
Learning Objective:	The trainee should learn the procedures for assessing pesticide requirements from year to year.
Samples of Behavior:	The trainee, given a pest control problem, will be able to calculate the amount of chemical needed to do the job.
Notes:	
1. To successfully complete this section the trainee must follow the steps of the lesson. 2. The trainer will design scenarios or perform on-the-job-training (OJT) to enhance the trainee's knowledge of calculating pesticide requirements.	

CALCULATE PESTICIDE REQUIREMENTS

1. Background: As an environmental controls technician it is imperative to use the correct amount of pesticides when doing a job. Too little pesticide will not give the control that is needed. Too much pesticide may runoff into a stream or drainage ditch and pollute the environment. There must be a way to calculate the exact amount of pesticides needed for each job. This section will explore the avenues for calculating pesticides to fit the control problem.

2. The following steps will outline the correct procedures for calculating pesticides.

Step 1: The first step in this process is to "read the label" and find the rate of application.

1.1. The amount of product for a given area is found under "application rates" on the label.

Step 2: The next step is to calculate the size of the area to be treated.

2.1. This area can be figured by using triangles, circles, rectangles or squares.

2.2. For large areas the Engineers in the CE Resources section can help.

NOTE:
Let's say on this particular label the application rate is 20 lb. of active ingredient per acre. When figuring up the area to be sprayed (these areas are not going to be perfect rectangles or squares). Therefore, it is helpful to break the area down into triangles, squares, or circles. If the area to be sprayed is 400 by 600 feet, then to find the area, multiply 400 x 600 = 240,000 square feet. This is the area to be treated.

Step 3: The area calculations units and the label area units must match.

3.1. For instance, if the area is calculated in square feet and the label area is in acres, then the units must match.

3.2. Therefore, the next step is to change the square feet of area into acres of area.

NOTE:
In this instance, 240,000 square feet would be divided by 43,560 square feet/acre and this would equal 5.5 acres.

Step 4: The last step in this process would be to multiply the amount of chemical in the application rate by the amount of area that is to be sprayed.

NOTE:
For this particular problem 20 lb./acre, the application rate, would be multiplied by 5.5 acres, the amount of area to be sprayed. Thus, the total number of pounds of active ingredient needed would be 110 lbs.

3. Rate, Area, Convert, Multiply (RACM) Method.

3.1. ***Follow these steps to determine the amount of chemical to use in the control area.***

Step 1: R-Rate, found in directions of use on the label. (Example 2-4 lbs per 1000 sq. feet.)

Step 2: A-Area, the measured area that needs controlled. (Example 20, 000 sq, feet.)

Step 3: C-Convert, amount of your area which needs to be controlled (20,000 sq. feet) divided by the unit of measured in step 1 (1000 sq. feet) should give you 20 units.

Step 4: Multiply 20 units from step 3 into your lbs per 1000 sq. feet in step 1 which will be 20 X 2 lbs = 40 lbs needed for your to complete the job, also known as the total product. (Note always go with the lower rate possible first on the label.)

3.2. This method can be used for all formulations making sure that when the conversions are made that the units are of the same, example sq. ft into sq. ft **NOT** acres to sq. feet or sq. yards into sq. feet will not work unless you convert to like units first.

REVIEW QUESTIONS
FOR
CALCULATE PESTICIDE REQUIREMENTS

QUESTION	ANSWER
1. Where is the “rate of application” found when calculating pesticide amounts?	a. On the pesticide label. b. On the calculation sheet. c. On the MSDS. d. In the CE Engineers office.
2. Which of the following is not a unit to figure an area by?	a. Triangles. b. Circles. c. Rectangles. d. Prisms.
3. The area calculation units and the application rate units do not have to match.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must calculate pesticide requirements for a given area.

CALCULATE PESTICIDE REQUIREMENTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Find the application rate		
2. Successfully calculate the spray area		
3. Correctly match area units		
4. Successfully calculate the amount of pesticides needed		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

PESTICIDE MANAGEMENT

MODULE 15 AFQTP UNIT 3

PREPARE FINISHED PESTICIDE PRODUCTS (15.3.7.)

PREPARE FINISHED PESTICIDE PRODUCTS

Task Training Guide

STS Reference Number/Title:	15.3.7., Prepare finished pesticide products.
Training References:	Military Pest Management Handbook, Chapter 3: *Pesticides*.
Prerequisites:	1. **Possess as a minimum a 3E433 AFSC.** 2. **Review Military Pest Management Handbook, Chapter 3.**
Equipment/Tools Required:	1. Pesticide Labels. 2. Personal Protective Equipment (PPE). 3. Glass measuring cups. 4. Pesticide dispersal equipment.
Learning Objective:	The trainee should learn the procedures for the preparation of pesticides.
Samples of Behavior:	Trainee should be able to apply the procedures for preparing pesticides for application.
Notes:	
1. To successfully complete this element follow the steps outlined in the lesson--no exceptions. 2. Trainer should give on-the-job training to trainee for pesticide preparation. 3. Trainer should teach the trainee how to Read The Friendly Label (RTFL).	

PREPARE FINISHED PESTICIDE PRODUCTS

1. Background: Pesticide product labeling is the main method of communication between a pesticide manufacturer and pesticide users. The information printed on or attached to the pesticide container is the label. Labeling includes the label itself, plus all other information received from the manufacturer about their product. Besides the label, the pesticide may have a brochure, leaflets, and other information that accompanies the pesticide. The Environmental Protection Agency (EPA) label requirements have made it much easier to quickly and accurately dilute and apply pesticides. Most pesticides purchased come in a commercially pure form and must be diluted before application. Pesticide labeling gives you instructions on how to use the product safely and correctly. **Pesticide users are required by law to comply with all the instructions and directions for use listed on the label.**

2. The pesticide preparation procedures are listed below.

Step 1: Identify pest problem.

Step 2: Select appropriate pesticide and dispersal equipment to be used.

Step 3: Read the label of the pesticide selected for applicable dilution or mixture rates.

Step 4: Don suitable PPE per label instructions.

Step 5: All chemicals must be mixed in the appropriate area.

> **NOTE:**
> The proper areas to mix chemicals are mixing rooms with proper ventilation and in outside berm areas.

Step 6: The pesticide mixture is now ready for application.

REVIEW QUESTIONS
FOR
PREPARE FINISHED PESTICIDE PRODUCTS

QUESTION	ANSWER
1. The main method of communication between the pesticide manufacturer and user is _____.	a. Material Safety Data Sheets. b. Brochures. c. Leaflets. d. Labels.
2. Most pesticides are purchased in what type of form?	a. Emulsions. b. Pre-mixed. c. Pure. d. Powdered.
3. Pesticide users are **not** required by law to follow label instructions.	a. True. b. False.
4. PPE is required while mixing pesticides.	a. True. b. False.

NOTE TO TRAINER:
In order for the trainee to accomplish this task, you need to use a job/work order, if available, or come up with a hypothetical situation where the trainee must prepare pesticide products for an application.

PREPARE FINISHED PESTICIDE PRODUCTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

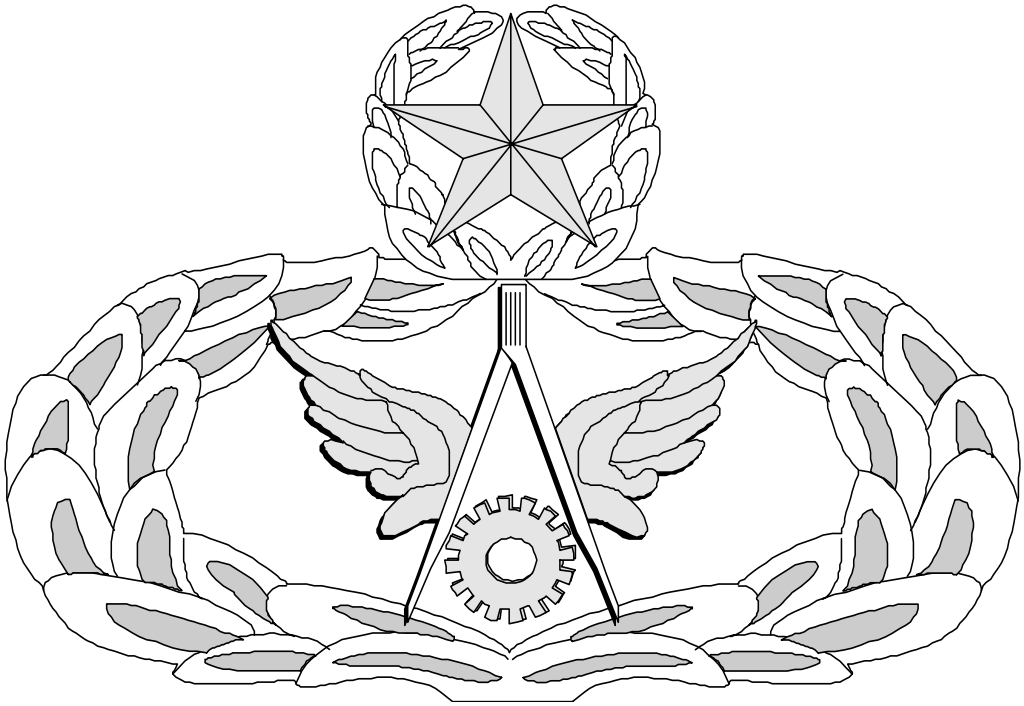
DID THE TRAINEE….?	YES	NO
1. Identify the pest		
2. Select the appropriate pesticide and dispersal equipment		
3. Follow the label instructions		
4. Don PPE before mixing pesticides		
5. Mix pesticides properly		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR

ENVIRONMENTAL CONTROLS

(3E4X3)

MODULE 15

INTEGRATED PEST MANAGEMENT

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

IDENTIFICATION KEYS
(3E4X3-15.1.3.2.2.)

QUESTION	ANSWER
1. What is the first step in any IPM control strategy?	b. Identify the pest.
2. What must be done before an IPM control procedure can be outlined?	b. Know the pest biology of the pest to control.
3. Where can one obtain pictorial insect keys?	d. All of the above.
4. Freezing is a good way to keep a live specimen in optimum condition.	a. True.

CONTROL DISEASE VECTORS
(3E4X3-15.2.1.3.)

QUESTION	ANSWER
1. What is the first step in initiating the IPM process?	a. Analyze and survey the problem.
2. The second step in the IPM process is short-term control.	a. True.
3. What is the fourth step in the IPM process?	c. Long-term controls.
4. What is the sixth step in the IPM process?	b. Follow-up.
5. Which of the following is IPM control measures for mosquitoes?	d. All of the above.
6. Which of the following flies is the most common?	b. House fly.
7. The UV light trap is **not** an IPM control for flies.	b. False.
8. What disease makes the flea so important to pet owners?	b. Heart Worm.
9. Which of the following is an IPM control measure for ticks?	c. Weed control.

CONTROL VENOMOUS ARTHROPODS
(3E4X3-15.2.2.3.)

QUESTION	ANSWER
1. The most distinguishing characteristic of bees than wasps is _____.	d. feathery hairs.
2. The newest honeybee is the _____.	c. Killer bee.
3. Hornets and yellow jackets are stockier than paper wasps and mud daubers.	a. True.
4. What do the three main groups of wasps and hornets include?	d. All of the above.
5. One of the most common animals on earth is the _____.	b. Ant.
6. Fire ants received their name from _____.	c. their sharp, burning sting.
7. Harvester ants build large above ground mounds.	b. False.
8. Which of the following caterpillars acts an intermediate host for the rat tapeworm?	a. Meal snoutworm.
9. The two common venomous spiders are the _____ and _____.	b. brown recluse and black widow.
10. Which of the following scorpions is considered the most poisonous?	c. Centruroids sculpturatus.
11. The secretion of a centipede is primarily a digestive enzyme.	a. True.

CONTROL STRUCTURAL PESTS
(3E4X3-15.2.5.3.)

QUESTION	ANSWER
1. Which of the following IPM processes include sanitation?	c. Cultural.
2. What is the first step in solving any pest control problem?	b. Analyzing the problem.
3. Which of the following is **not** a substance eaten by the termite?	b. Concrete.
4. Which of the following is **not** a sign of native subterranean termite infestation?	c. Sawdust.
5. Termite treatments are only intended to kill termites.	b. False.
6. Which termite is the newest termite in the U. S.?	a. Formosan subterranean termite.
7. Which of the following is **not** a sign of powder post-beetle infestation?	b. Chewing sounds.
8. The drywood termite **does not** contact with the ground.	a. True.
9. Fumigation has the longest residual of all the treatments for wood-boring beetles.	b. False.
10. Carpenter ants eat wood.	b. False
11. Which of the following is not a nesting area for carpenter ants?	d. Old rugs
12. Carpenter bees are social bees like ants and other bees.	b. False

CONTROL HOUSEHOLD PESTS
(3E4X3-15.2.8.3.)

QUESTION	ANSWER
1. The world's most common and widespread insect is the _____.	d. Cockroach.
2. Cockroaches are especially fond of starchy foods.	a. True.
3. One of the most numerous types of animal on earth is the _____.	c. Ant.
4. Ants can be annoying because of their _____.	b. bites and stings.
5. The most primitive of all insects is the _____.	a. silverfish and firebrats.
6. The common name for silverfish and firebrats is _____.	a. Bristletails.
7. The field cricket is **not** known for their high-pitch chirping sound.	b. False.
8. Field crickets feed mainly on what type of food source?	b. Organic substances.
9. Which of the following is a habitat of the spider?	d. All of the above.
10. The unnecessary removal of spiders should be avoided.	a. True.

CONTROL VERTEBRATE PESTS
(3E4X3-15.2.9.3.)

QUESTION	ANSWER
1. Which rodent has a blunt muzzle and a thick body?	a. Norway rat.
2. Which rodent has a tail that is equal to or a little longer than the head and body?	c. House mouse.
2. The Roof rat has small, close set; ears that appear buried in the fur.	b. False.
3. Which rodent has a foot that is less than 1 1/2 inches from heel to longest toe?	b. Roof rat.
4. Which of the following is not a field rodent?	c. Opossum.
5. Feral cats are considered wild animals.	a. True.

CONTROL WEEDS
(3E4X3-15.2.11.3.)

QUESTION	ANSWER
1. What is the first step in initiating the IPM process?	a. Analyze and survey the problem.
2. The second step in the IPM process is short-term control.	b. False.
3. What is the fourth step in the IPM process?	c. Long-term controls.
4. What is the sixth step in the IPM process?	c. Educate the customer.
5. Which of the following is an IPM control measures for aquatic weeds?	a. Predatory fish.
6. Which of the following is not a mechanical control?	d. Grazing Animals.
7. It is okay to spray for weeds to reduce man-hours used for mowing.	b. False.
8. Which of the following is justification for weed control?	d. Maintain base appearance.

INVENTORY PESTICIDES
(3E4X3-15.3.1.)

QUESTION	ANSWER
1. Which of the following agencies mandate inventories of pesticides?	d. All of the above.
2. If the WIMS system is not available where are the pesticide records kept?	a. DD Form 1532-1.
3. What is the first step in the inventory process?	a. Setup a baseline.
4. How often must a report be sent to the Major Command?	c. Quarterly.

STORE PESTICIDES
(3E4X3-15-3-2.)

QUESTION	ANSWER
1. Pesticide storage requirements are based on what document?	d. Military Handbook 1028/8A.
2. Besides the command entomologist who else gives advise on storing pesticides?	b. Engineering Field Division.
3. The ideal temperature for storing pesticides is between _____ and _____.	c. 40° and 100° F.
4. All pesticide storage facilities require water sprinklers.	b. False.
5. A four-inch concrete curb is required in pesticide storage areas.	d. True.
6. Who provides the technical support for the size and type of extinguishers?	d. Fire department.

CLEAN UP PESTICIDE SPILLS
(3E4X3-15-3.5.)

Question	Answer
1. The first step in a pesticide spill is to _____.	d. follow the spill contingency plan.
2. No personal protective equipment is needed to remove a victim from a spill scene.	b. False.
3. Which of the following is **not** used to clean up a pesticide spill?	c. Sand.
4. Which of the following is part of pesticide identification?	b. Active ingredient percentage.
5. A dry absorbent is used to contain a liquid spill.	a. True.
6. Besides the pesticide spill plan, what other material gives instructions on spill clean up?	c. Both a and b.

CALCULATE PESTICIDE REQUIREMENTS
(3E4X3-15.3.6.)

QUESTION	ANSWER
1. Where is the "rate of application" found when calculating pesticide amounts?	a. On the pesticide label.
2. Which of the following is not a unit to figure an area by?	d. Prisms.
3. The area calculation units and the application rate units do not have to match.	b. False.

PREPARE FINISHED PESTICIDE PRODUCTS
(3E4X3-15.3.7.)

Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers

Question	Answer
1. The main method of communication between the pesticide manufacturer and user is _____.	d. Labels.
2. Most pesticides are purchased in what type of form?	c. Pure.
3. Pesticide users are **not** required by law to follow label instructions.	b. False.
4. PPE is required while mixing pesticides.	a. True.

MEMORANDUM FOR HQ AFCESA/CEOF
139 Barnes Drive Suite 1
Tyndall AFB, FL 32403-5319

FROM:

SUBJECT: Qualification Training Package Improvement

1. Identify module.

   Module # and title_____

2. Identify improvement/correction section(s):

   _____ STS Task Reference
   _____ Training Reference
   _____ Evaluation Instructions
   _____ Performance Resources
   _____ Steps in Task Performance
   _____ Performance Checklist
   _____ Feedback
   _____ Format
   _____ Other

3. Recommended changes--use a continuation sheet if necessary.

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

4. You may choose to call in your recommendations to DSN 523-6380 or FAX DSN/Commercial 523-6488 or (850) 283-6488 or email ceof.helpdesk@tyndall.af.mil.

5. Thank you for your time and interest.

YOUR NAME, RANK, USAF
Title/Position