

**Exam Knowledge Expectations for  
Qualified Applicator Certificate & Qualified Applicator License  
R - Laws, Regulations, and Basic Principles of Safe  
and Effective Pesticide Use (Core Exam)**

Use these knowledge expectations (KEs) to help study the suggested material,  
*The Safe and Effective Use of Pesticides* (2016 Edition).

Knowing the information from all of the KEs should prepare you for taking the exam.

The core exam will also include information from the *Laws and Regulations Study Guide* (2011 Edition).

### **Chapter 1 Pest Management**

- A. Define Integrated Pest Management (IPM).
- B. Differentiate among key pests, occasional pests, and secondary pests.
- C. Define prevention, suppression, and eradication of pests.
- D. Describe the methods used to achieve prevention, suppression, and eradication of pests.
- E. Define economic injury/treatment thresholds and describe what happens when these are reached.
- F. Describe monitoring and explain why it is important.
- G. Identify the five major components common to all IPM programs.
- H. Describe IPM methods.
- I. Explain the importance of site-specific variables; pest, host, and natural enemy populations; and pest life stage in pest management planning.
- J. Explain the importance of evaluating pest management results.

### **Chapter 2 Pest Identification**

- A. Explain why understanding pest biology is important when managing pests.
- B. Explain why identifying pests correctly is important.
- C. List the main groups of common pests.
- D. Explain how pests are organized and identified using scientific names.
- E. List and describe the types of resources and references available for identifying pests, symptoms of infestation, and damage caused by pests.
- F. Distinguish between damage caused by pathogens and abiotic factors.
- G. List examples of common pests in California from each main group, and describe the damage they cause.

### **Chapter 3 Pesticides**

- A. Define a pesticide.
- B. Explain the concepts of hazard, exposure, and toxicity and how they relate to one another.
- C. List pesticide toxicity categories and signal words, and explain what each category means in terms of a pesticide's effects on humans and animals.
- D. List groups of pesticides according to pest target and describe the functions of each group.
- E. List major chemical families and describe the particular hazards associated with each one.
- F. Define mode of action and provide examples of the different modes.
- G. Explain how contact and systemic pesticides control pests differently.

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- H. Explain how various modes of action influence pesticide selection.
- I. Define a pesticide formulation.
- J. List the various formulations available and the advantages and disadvantages of each.
- K. Identify factors that should be considered when selecting pesticides.
- L. Explain the role of adjuvants in pesticide applications.

### **Chapter 4 Environmental Hazards**

- A. Explain the potential environmental hazards associated with pesticides.
- B. Describe pesticide chemical and physical characteristics and how these characteristics indicate the potential for pesticides to move offsite.
- C. List the types of offsite movement of pesticides.
- D. Describe factors that influence offsite movement of pesticides.
- E. Distinguish between point-sources and non-point-sources of environmental contamination by pesticides.
- F. Define pesticide residue, identify conditions that affect the buildup of residue, and explain how to avoid creating hazardous residues.
- G. List features of a given site, including soil type and geology, which influence the potential for a pesticide to reach surface or groundwater.
- H. Describe ways that pesticides can impact nontarget organisms.

### **Chapter 5 Human Hazards**

- A. Describe the ways people get exposed to pesticides and the routes of entry.
- B. Describe how offsite movement of pesticides endangers human health.
- C. Name conditions at the application site that may change and influence the hazards associated with pesticide application.
- D. List the tasks most often associated with accidental pesticide exposure and explain why these tasks are hazardous.
- E. Explain how each of the following can contribute to human hazards associated with pesticide use:
  - a. incorrect dosage
  - b. incorrect application timing
  - c. incorrect pesticide product application
- F. Explain the human hazards associated with pesticides.
- G. Describe the potential effects of acute and chronic pesticide exposure on people.

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H. Define heat stress and describe how people develop heat stress.

### **Chapter 6 Personal Protective Equipment (PPE)**

- A. Explain how PPE and engineering controls can protect a person from hazards associated with pesticides.
- B. Describe safety training provided to field workers and pesticide handlers.
- C. Describe the employer's responsibility to provide PPE for mixing, loading, applying, and storing pesticides to employees.
- D. List various PPE and engineering controls that pesticide handlers use to protect themselves from pesticide exposure.
- E. Explain how to select the most effective PPE for the job.
- F. Describe how to wear, clean, maintain and store reusable PPE, and how to dispose of worn or single-use person protective equipment.
- G. Describe how to prevent or mitigate heat stress.
- H. Explain the importance of selecting, fit testing, and wearing respiratory devices.
- I. Identify the limits of PPE to protect pesticide handlers.
- J. List the different kinds of engineering controls and explain when these are used.

### **Chapter 7 Safe Use**

- A. Explain why and in which situations it is important to communicate with neighbors and others in the area before making a pesticide application.
- B. Describe ways in which applicators ensure the public's safety before, during, and after pesticide applications.
- C. Describe how to restrict access to areas where pesticides are in use or have been used.
- D. List procedures and safety precautions for transporting pesticides in a vehicle.
- E. List the components of a proper storage area.
- F. Describe techniques for mixing and loading pesticides safely, including the equipment, location and procedures used in the process.
- G. Describe the proper weather conditions for the safe application of pesticides.
- H. Describe how to identify potentially sensitive areas that could be adversely affected by pesticide application, mixing and loading, storage, disposal, and equipment washing.
- I. Explain how to properly process all types of pesticide containers for disposal.
- J. Describe the procedures to follow for safe, effective cleanup after handling pesticides, including cleaning application equipment, as well as personal decontamination.

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K. Describe how pesticide records can contribute to pesticide safety.

### **Chapter 8 Application Equipment**

- A. List the types of application equipment and describe the advantages and limitations of each type.
- B. List the types of application equipment used to apply liquids, and describe the situations in which each should be used.
- C. List components of liquid application equipment, explain how they work together, and identify which components work best with which pesticide formulations.
- D. Describe how to recognize wear in various components.
- E. Describe the various nozzles available, including design, size, angles, and output.
- F. List the important factors to consider when selecting nozzles for a given application.
- G. List types of chemigation systems, and describe the situations in which they can be used.
- H. List the types of application equipment used to apply dusts, and describe the situations in which each should be used.
- I. List the types of application equipment used to apply granules, and describe the situations in which each should be used.
- J. List types of bait application equipment and explain how they work.
- K. Name the parts of application equipment that can be switched out or adjusted to accommodate changing conditions and formulations (such as nozzles or psi).
- L. Describe how to maintain different kinds of equipment (liquid, dust, and granule).
- M. Describe safe and effective practices for cleaning application equipment.
- N. Describe how to properly store application equipment.

### **Chapter 9 Calibrating**

- A. Define calibration and explain why accurate calibration is essential to safe, effective pest control.
- B. List the tools needed for calibration activities.
- C. List the variables that must be measured to calibrate a sprayer.
- D. Describe how to calibrate liquid sprayers, and be able to calculate speed, gallons/minute (for low and high pressure sprayers), and nozzle output using formulas.
- E. Describe how to determine the correct amount of pesticide needed for a particular application.
- F. Describe methods used to determine how much pesticide to put into the hopper or tank for a specific application rate over the total area of the application site.
- G. Describe the best way to change the output of various pesticide application equipment and the consequences of each change.

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- H. Describe how to calibrate dry applicators.
- I. Describe what you need to know before you can dilute a pesticide correctly.
- J. Be able to calculate the active ingredient concentration of pesticides using formulas.
- K. Calculate the area of various shapes (circle, square, rectangle, triangle, and irregular shapes).
- L. Explain how system controllers can impact the calibration of equipment and calculations necessary to apply pesticides effectively.
- M. Explain the importance of properly calibrating sensors that are part of a system controller.

### **Chapter 10 Effective Use**

- A. Describe the goals of pesticide applications and how to achieve them.
- B. Explain how pest identification, scouting, monitoring, and economic threshold data influence pesticide use decisions.
- C. Provide examples of common pest monitoring methods used before applying pesticides.
- D. List the factors to consider when selecting and using a pesticide so that the application is maximally effective and hazards associated with its use are reduced.
- E. Describe how to select the most appropriate pesticide for a particular application.
- F. Describe the factors that control a pesticide's selectivity.
- G. Describe how to evaluate spray coverage and adjust application variables to change coverage as needed.
- H. Explain how a GPS unit can impact the effectiveness of pesticide applications.
- I. Explain how to determine whether two or more pesticides will be compatible for tank mixing.
- J. Describe mixing procedures for
  - a. a single pesticide
  - b. two or more pesticides
- K. Explain why pesticide resistance is a problem.
- L. List the factors that contribute to pesticide resistance.
- M. Describe the different types of drift, including factors that can affect the occurrence of each type of drift.
- N. Describe ways to prevent other types of offsite movement of pesticides.
- O. Describe procedures, additives, formulation types, and conditions that help keep pesticides on target.
- P. Describe how to implement a follow-up monitoring program to assess the effectiveness of a pesticide application.

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### **Chapter 11 Label**

- A. Identify the information found in the different parts of the label and associated labeling information.
- B. Explain the legal requirement to read, understand, and follow directions on a pesticide label.
- C. Describe how an employer can assure that labels and Safety Data Sheets (SDS) are readily available.
- D. Describe the type of safety information provided by pesticide labeling and SDS for the pesticide used.

### **Chapter 12 Emergencies**

- A. Define first aid.
- B. Explain the procedures to follow in getting emergency medical treatment for exposure episodes.
- C. Describe how to set up and execute an emergency response plan.
- D. Describe pesticide poisoning/over-exposure symptoms.
- E. Distinguish between symptoms of pesticide over-exposure and symptoms of common illnesses and heat stress.
- F. Describe how to identify heat stress and give first aid.
- G. Describe where to find information about first aid for a person involved in a pesticide incident and explain what to do if
  - a. you get pesticides on your clothing or skin
  - b. you get pesticides in your eyes
  - c. you inhale pesticides
  - d. you swallow pesticides
- H. List the contents of a well-equipped decontamination facility, including components specific to different formulations.
- I. List the contents of a pesticide spill kit, including components specific to different formulations.
- J. Describe what to do when faced with a pesticide leak or spill.
- K. Describe what to do when faced with a pesticide fire.
- L. Describe what to do when a pesticide product has been stolen.
- M. Describe how to respond to the misapplication of pesticides.
- N. Explain why any incident should be reviewed.