

**Exam Knowledge Expectations for  
Qualified Applicator Certificate, Qualified Applicator License, and  
Manned & Unmanned Pest Control Aircraft Pilot Certificates  
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)* and the *Laws and Regulations Study Guide (Third Edition, 2020)*. Knowing the information from all of the KEs should prepare you for taking the exam.

***The Safe and Effective Use of Pesticides (2016 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 non-target 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.
- H. Define heat stress and describe how people develop heat stress.

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## **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.
- K. Describe how pesticide records can contribute to pesticide safety.

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## **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.
- 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.

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- 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.

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**Laws and Regulations Study Guide (Third Edition, 2020).**

**Introduction**

- A. Identify the lead pesticide regulatory agencies responsible for creating and enforcing pesticide laws and regulations.
- B. Identify the purpose of California’s pesticide laws and regulations.
- C. Identify California’s state lead agency for creating the statewide pesticide regulatory program and what their responsibilities are.
- D. Identify the pesticide regulatory agencies that work cooperatively with the state lead agency to enforce pesticide laws and regulations.
- E. Know the responsibilities of the Department of Pesticide Regulations Licensing and Certification program.
- F. Identify the documents, which contain California’s pesticide laws and regulations.
- G. Identify the requirements to become certified as a commercial pesticide applicator within California.
- H. Identify the responsibilities of the County Agricultural Commissioner’s regarding pesticide use and the administration of private applicator certifications.
- I. Know the requirements to legally use a “restricted use pesticide.”
- J. Know what the Federal Insecticide, Rodenticide, and Fungicide Act is and its association to pesticide use, pesticide product registration, and the certification of pesticide applicators.

**Chapter 1 Pesticide Registration and Labeling**

- A. Identify the federal and state agencies responsible for registering pesticide products.
- B. Identify the requirements to register a pesticide product in California.
- C. Explain why some pesticides are labeled as “restricted use” or “restricted materials” and where a list of these products can be found.
- D. Know the restrictions associated with a pesticide product whose registration has suspended, lapsed, or been cancelled.
- E. Know the types of pesticide product registration exemptions that are available.
- F. Identify what a “research authorization” is and where one can be obtained.
- G. Identify pesticide labeling standards and who is required to meet these.
- H. Know when a pesticide label is required to be read by an applicator.
- I. Know how to read, interpret, and identify all sections of a pesticide label.
- J. Identify acceptable deviations from pesticide labeling directions.

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## **Chapter 2 Restricted Materials**

- A. Define federal “restricted use pesticide” and why some pesticides are designated as such.
- B. Define California “restricted material” and why some pesticides are designated as such.
- C. Identify who is responsible for issuing, reviewing, and complying with the requirements of a restricted material permit.
- D. Know the information required to be contained in a non-agricultural restricted material permit and who the permit may legally be issued to.
- E. Know the information required to be contained in an agricultural restricted material permit and who the permit may legally be issued to.
- F. Know the duration of a restricted material permit.
- G. Know when a restricted material permit may be refused, suspended, or revoked.
- H. Know what “feasible alternatives” and “mitigation measures” are and when they are required.
- I. Identify what a “Notice of Intent” is, when one is required, and the information one must contain.
- J. Know the purpose of pesticide safety information series (PSIS) leaflets.
- K. Define “exempt materials.”

## **Chapter 3 Certification & Licensing**

- A. For each DPR individual pesticide applicator license or certificate type, identify the following:
  - a. Requirements to obtain the license or certificate.
  - b. Activities allowed under the license or certificate.
  - c. Requirements to maintain the license or certificate.
  - d. Reasons for denying, revoking, or suspending the license or certificate.
- B. Identify the information required to be in a written recommendation made by an Agricultural Pest Control Adviser (PCA).
- C. For DPR’s Maintenance Gardener Pest Control Business License, Pest Control Dealer License, and Pesticide Broker License, identify the following:
  - a. Requirements to obtain the license.
  - b. Activities allowed under the license.
  - c. Requirements to maintain the license.
  - d. Reasons for denying, revoking, or suspending the license.
- D. Know the types of DPR licenses or certificates that have county registration requirements.



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### **Chapter 4 Pest Control Work Requirements**

- A. Know the minimum age requirements for an employee conducting pesticide related activities.
- B. Know where to find information regarding the cleaning and use of pesticide application equipment.
- C. Know the notification requirements associated with conducting pesticide applications.
- D. Identify the information that must be included on, and the submission requirements for, pesticide use reports.
- E. Know what the Healthy Schools Act is and who is required to comply with it.
- F. Know the notification requirements and application restrictions for agricultural pesticide use around schools and child daycares.
- G. Know the pollinator protection requirements associated with conducting a pesticide application including notification requirements and bee protection areas.
- H. Know the requirements for proper storage, transportation, security, and disposal of pesticide products and their various containers.

### **Chapter 5 Pesticide Handler Safety**

- A. Know the pesticide related responsibilities of both the employee and the employer.
- B. Identify the types of information, documents, and resources required to be provided to the employee by the employer.
- C. Know the requirements to be trained as a pesticide handler.
- D. Identify symptoms of pesticide overexposure, illness, and injury.
- E. Know the requirements of emergency medical care for pesticide handlers.
- F. Know the requirements of handler decontamination facilities.
- G. Know when pesticide handlers must have medical supervision.
- H. Know personal protective equipment (PPE) requirements including who is responsible for supplying PPE, the types of PPE available, where you can find what type of PPE is required for an application, and specific exemptions from wearing PPE.
- I. Know the employee requirements that must be followed when working alone to conduct a pesticide application.
- J. Know the employers requirements to provide to employees adequate lighting, safe equipment, and equipment maintenance.
- K. Know the types of pesticide mixing systems and their use requirements.
- L. Define what a “Minimum Exposure Pesticide” is and the requirements of its use.

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### **Chapter 6 Fieldworker Safety**

- A. Know the hazard communication information that must be made available to employees by their employer.
- B. Know the requirements to be trained as a fieldworker.
- C. Identify who is qualified to train fieldworkers.
- D. Know the requirements of emergency medical care for fieldworkers.
- E. Know the requirements of fieldworker decontamination facilities.
- F. Define what a “restricted entry interval” is.
- G. Know how to calculate restricted entry interval adjustments.
- H. Know the restricted entry requirements for fieldworkers.
- I. Define what an “application exclusion zone” is.
- J. Know the requirements for employees conducting early entry activities.
- K. Know the notification and posting requirements required to conduct pesticide applications.

### **Chapter 7 Protecting the Environment**

- A. Define “pesticide residue” and the purpose of monitoring for these residues.
- B. Know what causes pesticide residues to form.
- C. Know who is responsible for monitoring for pesticide residues.
- D. Define “pesticide residue tolerance” and the purpose of establishing these tolerances.
- E. Know who is responsible for establishing residue tolerances and where these tolerances can be found.
- F. Know what happens to agricultural commodities that are found to have pesticide residue levels that exceed the legal limit.
- G. Define “parts per million.”
- H. Know what the Endangered Species Act is, the agencies responsible for enforcing the requirements of it, and how these agencies accomplish this goal.
- I. Know what “PRESCRIBE.”
- J. Identify the agency responsible for monitoring pesticide levels in groundwater.
- K. Define “Groundwater Protection Area” and the purpose of establishing areas as such.
- L. Identify the various types of groundwater protection areas.

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- M. Identify the ways in which DPR ensures surface water protection.
- N. Know what the following regulations are and what they entail:
  - a. Dormant Insecticide Contamination Prevention
  - b. Surface Water Protection in Outdoor Nonagricultural Settings
- O. Know the ways in which DPR works to protect air quality.

**QAL Examination ONLY – Pest Control Business License Requirements**

**Laws and Regulations Study Guide, Third Edition, (2020).**

- A. Know the requirements to obtain and maintain a Pest Control Business License.
- B. Know the activities allowed under a Pest Control Business License.
- C. Know Pest Control Business work requirements.
- D. Know the requirements associated with Pest Control Business work equipment.
- E. Know the record keeping requirements of a Pest Control Business.
- F. Know the type of information and reports required to be submitted to the County Agricultural Commissioner by a Pest Control Business.
- G. Know Pest Control Business requirements to comply with pesticide use reporting.