Almond Board of California
Food Quality and Safety Program

A Commitment to Quality and Safety

The purpose of the Almond Board of California's Food Quality and Safety Program (FQSP) is to enhance the industry's commitment to produce almonds in a safe, responsible manner and to provide consumers around the world with the highest level of confidence in our product. Good Agricultural Practices (GAP's) provide guidelines to growers on how to minimize potential biological hazards during production and harvesting of almonds. Good Manufacturing Practices (GMP's) define procedures to be used by handlers to allow almonds to be processed, packed and sold under sanitary conditions. Sanitation Standard Operating Procedures (SSOP's) ensure a clean and sanitary environment in the facility. Together, these programs provide a framework for a Hazard Analysis and Critical Control Point (HACCP) program by proactively eliminating or minimizing potential sources of contamination.

The implementation of these practices at the farm and manufacturing level will help minimize microbiological hazards. At the farm level, GAP's focus on reducing, rather than eliminating the sources of potential contamination, as elimination of all potential risks is considered impractical. For huller/shellers and handlers, food safety and quality are a function of a carefully implemented Hazard Analysis and Critical Control Point (HACCP) program.

The FQSP should not be viewed as a static document, but rather part of an industry commitment to a dynamic process. As research is completed and analyzed, as new food safety concerns are highlighted, and as safer practices for the orchard and the factory are identified, our FQSP will be updated.

Food Quality and Safety is voluntary but vital

The Almond Board of California's Food Quality and Safety Program provides assistance in guiding that process, giving growers and handlers a list of recommended practices based on state and federal law as well as common sense. It also offers guidance to industry members on their

individual responsibilities to identify, mitigate, and avoid potential hazards in their operations.

While all industry members are expected to follow good agricultural or manufacturing practices, each operation is different and therefore the steps taken to develop and implement an individual food quality and safety program will be unique to that handler or grower.

Documentation: An important tool to tracking and solving problems

It is important for every handler to establish documentation and implement a traceback system that would allow tracing product back from the customer to the field. Should there ever be a question concerning California almonds, trace back would allow the industry to identify the source and take appropriate measures in a timely manner.

Certification: Closing the loop

To close the FQSP loop, a voluntary food safety audit and certification program clearly demonstrates that the almond industry takes seriously its responsibility to minimize exposure to all hazards and to provide the lowest risk product. This proactive step is yet another tool almond handlers can use to their competitive advantage during business negotiations. Using an independent third party to audit handler compliance provides a credible and verifiable record of the industry's commitment to its customers and authorities in domestic and international markets.

Almond Board of California
Food Quality and Safety Program
User's Guide

The FQSP is organized into five sections: (1), GAP's for almond growers and GMP's for almond handlers, hullers, and shellers; (2), Sanitation Standard Operating Procedures (SSOP's); (3), a discussion on Hazard Analysis and Critical Control Point (HACCP) practices; (4), resource information; and (5), copies of relevant government regulations and guidelines. Sample forms are included after many of the subject areas throughout the FQSP. It is suggested that individual sections and their sample forms be copied and distributed within an operation to the personnel responsible for those activities. GAP's and the relevant forms should be copied by handlers and provided to their growers. Government regulations and guidelines are cited throughout the GAP's and GMP's where appropriate for reference purposes.

The sample forms will help you when building your own GAP's and GMP's. These forms are presented as examples, and can be used as presented or modified for your use. If you already have forms that collect all necessary information you should continue to use them. In any case, legal and/or technical experts should review all data collection forms prior to their use to ensure their appropriateness and relevance.

Resource information, contact phone numbers and addresses and copies of cited State and Federal regulations and guidelines are provided for those interested in the "letter of the law" on aspects of GAP's and GMP's. State of California regulations are color-coded pale blue while Federal regulations are beige colored. Guidelines are green.

Ideas, suggestions, criticisms, or questions that will improve the Almond Board of California's Food Quality and Safety Program are welcome. Updates to the Program will be circulated as they become available.

To contact the Almond Board of California, please call 209-549-8262, fax us at 209-549-8267, visit us at our website at www.almondboard.com, or write us at: Food Quality and Safety Program, c/o Almond Board of California, 1150 9th Street Suite 1500, Modesto, CA 95354.

Almond Board of California
Good Agricultural Practices (GAP's)
For Almond Growers

Introduction: Why we need GAP's

Food safety and product quality are top priorities for the California almond industry. For instance, the Almond Board's Quality Control Committee constantly examines safety and quality issues and makes recommendations to maintain and improve California almond quality.

All food products are coming under increasing scrutiny by government agencies and consumer groups. With the fast growth of the California almond industry comes the increasing possibility of contamination, whether by the use of unsanitary harvesting tools, germs from workers' hands, improper fertilizer use or a variety of other obvious and not-so-obvious sources. Contamination control programs cannot start and stop at the huller/sheller or handler. Prevention steps must begin at the farm. As current technologies cannot eliminate all potential food safety hazards, GAP's are based on risk reduction, not risk elimination.

As an almond grower, you want your buyers to know they're getting the very best quality nuts – and that they're free of microorganisms or chemicals that could harm people. An undetected microorganism could lay all your hard work to waste.

It's the right thing

By maintaining and documenting Good Agricultural Practices, California almond growers can assure food processors, consumers and government regulators worldwide that our industry is diligent in its commitment to offer safe, high-quality almonds. Not only is it good, sound business…it's the right thing to do.

This guide is designed to help you examine and improve your own growing practices and ensure that they meet the generally accepted standards of Good Agricultural Practices. In several locations throughout these GAP's, recommended forms have been provided for your use. These forms are provided as samples only and haven't been approved for use by state or federal regulatory agencies. You may use them as is, modify them to suit

your needs or create new ones as necessary. In all cases, you should have these forms and documents reviewed by technical and/or legal experts before using them to ensure their adequacy in meeting requirements under state and/or federal regulations. In several of the following sections, when you see the word "food" used, it refers to almonds or almond products.

The basic principles of GAP's

1. Prevention of microbial contamination of almonds is favored over reliance on corrective actions once contamination has occurred. Once pathogens are on almonds, they are nearly impossible to remove without resorting to a lethal process, or "kill step".
2. To minimize microbial food safety hazards in almonds, growers should use GAP's in those areas over which they have control, such as sources of water, orchard management, fertilizer practices, etc. Some potential sources of contamination can be managed better than others. These should be the focus of your GAP's.
3. Anything that can come in contact with almonds has the potential of contaminating it. Almonds can be contaminated by simple contact with sources of infection.
4. Whenever water comes in contact with almonds, its source and quality dictate the potential for contamination. Irrigation water and water used to mix pesticides are two primary sources of contamination.
5. All pesticides should only be used in strict accordance with manufacturer recommendations, and state and federal ordinances.
6. Practices using manure and/or compost should be closely managed. Non-composted manure is a source of human pathogens.
7. Worker hygiene practices play a critical role in minimizing potential contamination. Employee hygiene includes the availability of clean toilet facilities, hand washing stations, and training and enforcement of good hygiene policies.
8. Accountability is important to a food safety program. The ability to traceback product from the consumer to the farm is critical. There is no assurance proper attention has been paid to risk prevention unless documentation of the operation is available.

Thank you for helping the California almond industry – and yourself – as we continue providing the world with the highest quality, best-tasting, and safest almonds possible.

Almond Board of California
GAP's for Growers
Traceback Procedures

Traceback is the ability to track food items, including almonds, back to their source (growers, huller/shellers, handlers, etc.). A system to identify the source of almonds alone cannot prevent the occurrence of a microbiological hazard that may lead to an initial outbreak of food borne disease. However, the ability to identify the source of a product through traceback serves as an important component of good agricultural and management practices intended to prevent the occurrence of food safety problems. Information gained from traceback investigation may also be useful in identifying and eliminating a hazardous practice.

Advantages of an effective traceback system

An effective traceback system can give investigators clues that may lead to a specific region, packing facility, or even orchard, rather than an entire commodity group. It also builds confidence among regulators and consumers that the industry is truly in control of all phases of production.

From a public health perspective, improving the speed and accuracy of tracing implicated food items back to their source helps limit the population at risk in an outbreak, the accompanying publicity, and reduces consumer anxiety. Rapid and effective traceback minimizes the unnecessary expenditure of valuable public health resources. Tracing implicated food items assists public health officials in determining potential causes of contamination, thereby providing data for growers, shippers, and others for identifying and minimizing future microbial hazards.

Help keep track of your almonds

Many growers, especially smaller operations, have little control over their crop after they enter the distribution and marketing chain. Despite the best efforts by food industry operators, food may never be completely free of microbial hazards. Therefore, it is critical that growers establish tracking systems from the earliest stages of growing and which follow the product from their orchards through to the point where the grower loses the "chain of control".

In summary

1. Maintain records of orchard practices prior to harvest.
2. Establish a lot numbering scheme as loads are harvested.
3. Be sure that each load leaving your farm can be traced to the orchard of origin and date of harvest.
4. Maintain records of lot numbers for all loads of almonds leaving your farm.

A minimum traceback procedure will enable you to know the name and/or location of the particular orchard, the date of harvest and a document trail from the orchard to the huller/sheller.

Reference (A copy of this document can be found under "Regulations and Guidelines")

FDA

- Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables Section IX, Traceback

Almond Board of California
GAP's for Growers
History of Your Orchard Site

Check the background of your ground

Because almond growers do not harvest their crops for a period of years after planting, the history of the orchard site is not quite as important as in annual crops. However, GAP's include knowing what the land was used for prior to almond planting, mainly because human pathogens are associated with fecal contamination. Of greatest concern would be prior land use that may have involved animal grazing, disposal sites for dairy or poultry operation waste, or distribution of municipal wastes (biosolids).

Be aware of activities on adjacent land that may affect your orchard

Types of activities to note would be animal operations, pesticide and herbicide applications, run-off from water sources or water applications, and other activities that could result in spreading of pollutants or contaminants. Consider vegetative buffers to mitigate run-off or to serve as windbreaks in the prevention of wind-borne contaminants. Diversion canals or berms may also be necessary to prevent contamination from water.

Reference (A copy of this document can be found under "Regulations and Guidelines")

FDA

- Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, Section II 1.1, Agricultural Water

Almond Board of California
GAP's for Growers
Soil Guidelines

Know your dirt

Document the soil type, production history, previous and adjacent land uses, soil testing and amendments to help identify potential microbiological risks. Include in your analysis:

- **Physical description of soil type –** Sandy loam, clay, sandy clay loam, etc. Know your soil type and its drainage capabilities.
- **Production history –** Years farmed in almonds. If less than three years, document previous crops and uses.
- **Previous land use –** Record previous land uses, paying particular attention to landfill site, livestock operation, etc.
- **Adjacent land use** – Document and characterize adjacent land uses, especially livestock or poultry operations.
- **Soil Amendments** – Document the use of organic amendments (compost, raw manure, etc.), including the source of the material (compost producer, feedlot, etc.), how much was used, when it was applied, how it was applied, and certification or test results for pathogen reduction. See the section on "Fertilizer Use" for more detail.
- **Soil Testing –** Soil testing for fecal coliform/E. coli may be necessary where previous land uses could have potential for microbiological risks, such as dairy operations, poultry farm or high use of animal manure.
    - Testing is also suggested following flooding, leakage or unusual run-off from adjacent land.
    - If you use organic amendments, testing them prior to application is highly suggested. If you are concerned about possible microbiological soil contamination, consult your local University of California Cooperative Extension office.

What to do

- Soil and harvest – As harvest nears, keep your soil as dry as possible to minimize the growth of harmful microorganisms. Set your sweeper to pick up as little dirt as possible.

Discourage animal and bird traffic in your orchard

Keep animals, including poultry and pets, out of the orchard, especially close to harvest time. Work to minimize wild animal and bird traffic in ponds and through fields.

In the Resources section you will find a list of some of the testing labs. A list of UC Cooperative Extension offices and phone numbers can be found in the Resources section as well.

Almond Board of California
GAP's for Growers
Pest Control

Little critters, big damage

All animals, including mammals, birds, reptiles, and insects, are potential sources of contamination because they harbor, or could be a vector for, a variety of pathogenic agents such as *Salmonella* or *E. coli*.

Establish a pest control system

- For all facilities, establish a pest control program to reduce the risk of contamination by rodents and other animals. The program should include regular and frequent monitoring of affected and treated areas to accurately assess the program's effectiveness.

Establish pest control procedures

- All procedures should be written and all agrochemicals must be registered for use in food handling establishments.
- Pest control procedures should include information about any bait stations you may have on your ranch or farm. Document the location of each indoor or outdoor bait station, glue board or insectocutors. Use a map, numbering each station and recording the type of trap described. Keep records of bait disappearance and catches for each bait station and trap.
- Describe insect control procedures.
- Describe bird control and animal control procedures. Include procedures to remove animals wandering into buildings and areas where harvesting and other equipment is stored.
- Maintain a pest control log that includes dates of inspection, inspection report, and steps taken to eliminate any problems. Establish frequent monitoring of affected and treated areas to determine the effectiveness of the treatment applied.

- Grounds in the immediate vicinity of all buildings and storage areas should be kept clean of waste, litter, and improperly stored garbage. Keep all grasses cut to discourage the breeding, harboring, and feeding of pests, such as rodents and reptiles.
- Remove any unnecessary articles, including old and inoperative farm equipment that is no longer used, to eliminate areas that harbor rodents and insects.
- Clean and sanitize daily to remove product or product remnants that attract pests in and around any buildings where product is handled or stored.
- Maintain adequate surface drainage to reduce breeding places for pests and that may contribute to food contamination by seepage.

Monitor and maintain facilities regularly

- Regularly inspect all buildings to check for evidence of pest populations or animal contamination. Minimize the availability of food and water to pests.
- Remove dead or trapped birds, insects, rodents, and other pests from traps promptly to ensure clean and sanitary facilities and to avoid attracting additional pests.
- Ensure that potential nesting or hiding places for pests have been eliminated.
- Clean surfaces soiled by birds or other wildlife.
- Collect garbage, trash and garden debris frequently. All garbage receptacles should have tight-fitting covers.
- Off-the-ground storage of pallets and other supplies will help reduce the area's appeal for rats and mice. It will also make detection easier.

Determine the presence of rodents

Look for these signs:

- Tracks on dusty surfaces – If no dust is present, you can use a tracking powder such as chalk or flour. You will see footprints and tail drag marks.
- Droppings along bases of walls, on ledges and shelves and other hiding places.
- Burrow openings and runways around foundations and under floors, rubbish piles, stored trays and equipment. Rat and mouse nests may also be found under such material and debris.

- Smears or darkened areas where rodents' dirty, oily hair repeatedly rubs as they pass over and under beams, along walls and through narrow openings.
- Gnawing around doors, windows, cracks, holes for wires and pipes and other openings.

Trapping alone may solve light infestation problems
Trapping will help you determine what kind of rodent you're dealing with. Ordinary wood-base snap traps are more effective when the trigger is enlarged with a square of cardboard, metal or screen that fit inside the wire deadfall. Place traps crossways to the direction of travel in runways and against walls. You can nail or wire traps to beams, pipes and posts to deal with climbing rats and mice.

Bait traps with attractive foods such as peanut butter, raisins, nutmeats or bacon rinds. Tie solid baits to the trigger of the trap.

Place traps at close intervals for mice. They may live entirely within a 15-foot radius if food and shelter are available.

Heavy infestations may require a lethal, one-dose application
Extremely heavy rodent infestations may require initial treatment with a single-feeding/exposure poison such as zinc phosphide, which is lethal with a single dose. **Use according to manufacturer's directions, and only where safety conditions for humans and animals permit.** Do not repeat treatment more than twice a year because poison-shy survivors will reject more frequent applications. If necessary, follow single-exposure treatment with an anticoagulant-baiting program.

A restricted material permit is required from the county agricultural commissioner to use or possess zinc phosphide and other single-dose poisons.

Anticoagulant baits require more time to kill pests
Rodents must feed on most anticoagulant baits several times for the bait to be effective. For this reason, the bait must be available for five or more days. For best results, provide fresh bait each day until feeding stops.

Anticoagulant baits are commonly available in meal, pellet, kernel or liquid form. Paraffin blocks impregnated with toxic grains are available for use in

areas where moisture might spoil other types of baits. Anticoagulants mixed with water and sugar are particularly useful when water is scarce or when rodents have access to other food sources and you want something that's more enticing to them.

Use bait boxes with anticoagulants
Bait boxes protect the bait from the weather and restrict accessibility mainly to rodents, thereby safeguarding people, pets and other animals. Bait boxes should be large enough to accommodate several rats or mice at a time and should contain a self-feeding hopper for holding the bait. All bait boxes should be clearly labeled "POISON" and should be locked or secured.

Preventive measures are important
Even after the reduction program has achieved control, keep some permanent anticoagulant stations year round to help with population control. Keep the bait fresh. The stations will gradually control survivors of the initial baiting program and also rodents that come in from other areas.

Remember: Document your rodent control program.

Reference (A copy of this document will be found under "Regulations and Guidelines")
FDA

- 21 CFR 110.35(c) (Pest control)

For specific pest control recommendations, consult a licensed structural pest control operator.

Almond Board of California
GAP's for Growers
Pesticide Use Guidelines

California has the nation's most stringent pesticide regulations
All pesticides must be registered with both the EPA and the California Department of Pesticide Regulation (CDPR). Maintain documentation of your farm's compliance with local state and federal pesticide regulations. These include:

Use permits and posting requirements

- A restricted material permit or operator identification number is required before you possess or use any pesticide.
- Comply with all federal, state and local field posting requirements.

Application and use records

- A notice of "Intent to Apply Restricted Material" is required.
- Pesticide use reports must be submitted monthly.
    - California is the only state that requires full reporting of all pesticide use. Since 1990, any grower, commercial pest control operator, ground and aerial applicator, structural operator or professional gardener must report pesticides applied, date, location and crop, and whether the application is structural. Reports are filed with the agricultural commissioner in the county where applications occur.
- Daily pesticide use completion reports are required for all restricted material applications.

Private Applicator Certification, PCO/PCA licensing and registration

- Identify individuals or companies responsible for pesticide permits and applications.
- Verify proper licensing and registration of pest control operators, businesses, advisors, etc.
- Completion of private applicator certification is required prior to any pesticide possession and/or use.

Documentation of training

- Provide written documentation of pesticide applicator and field worker safety training.

Applicator, mixer/loader and field worker safety requirements

- Document compliance with all federal, state and local laws and regulations relating to applicator, mix/loader and field worker safety.

Retention of pesticide use documentation for the period required by law

- Under California state law, many pesticide use documents must be kept for the three years.

Monitoring water quality

- Monitor the source and quality of water used for pesticide applications. Potable water from a municipality is the preferred water source for pesticide applications. Test water quality if water from sources other than a municipality is used.

Workers Training Documentation

Date:_____ Grower:_____
Topics Discussed:_____
Trainer(s): _____ Affiliation: _____
_____ _____

Attended by:

Attendees	Signature of Attendee

This form is only a sample and should be modified to meet the needs of your particular operation.

Employee Training Documentation

Employee: _____ Position: _____

Hire Date: _____

Date of Training	Topic of Discussion

This form is only a sample and should be modified to meet the needs of your particular operation.

Acknowledgement of Pesticide Safety Training

Employee's Last Name **First Name** **Middle Initial**

It is the responsibility of the employee to make sure he/she understands the items discussed herein regarding pesticide safety. Your signature indicates that you have read, understand, and agree to it. Applicators will be held personally responsible for violations of pesticide labeling. If there is something you do not understand, ask your trainer.

List the training methods and materials used to train employees in the safe handling of pesticides. One copy must be kept in the employer's files (study guides, slides, videotapes, etc.).

The Pesticide Safety Series is always available to employees and is posted at:

(List specific location[s] – to be filled out by employer)

Product Label	Date	Employee Signature

Trainer's Signature Employer's Signature

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Pesticide Safety Guide for Agricultural Workers

Pesticides, used to control crop diseases and pests, are applied in liquid and solid forms, and as gases. Specific instruction beyond the scope of this training, and personal protective equipment, are needed to mix, load, apply, or otherwise handle pesticides, or to enter treated areas during post-application "restricted entry intervals."

Restricted entry intervals range from 4 to 72 hours or more. No one, except a properly trained and equipped person can enter a treated area when entry is restricted. If you see warning signs posted around an orchard, do not enter the orchard until your supervisor removes the signs.

Field workers will be informed of pesticide applications taking place or when a restricted entry interval is in effect on an employer's establishment, orally and/or by official warning signs.

Pesticide Safety Information Series A-9 (Hazard Communication Information for Employees Working in Fields) must be available at the worksite. These documents provide information on employee's rights to receive information about pesticides and potential work hazards.

Pesticide applicators must assure no pesticide is applied so as to contact anyone directly, or through drift. Applicators can't apply any more than the recommended amount of pesticide to a crop and must follow all label directions.

Pesticides could injure field workers, including irrigators, if entry restrictions, worker hygiene, and other precautions aren't followed. Pesticide exposure can occur from spray drift, or contact with treated plants, soil or water.

Move away if pesticides drift into your work or housing area, and tell your supervisor. Stay out of areas you are instructed by signs or supervisors not to enter, including areas where pesticides are stored or handled. Do not go near pesticide applications in progress.

If you are working in an enclosed area and feel dizzy or have breathing problems, get to fresh air. If someone passes out in an enclosed area, get help from someone trained and equipped for rescue.

Plants, insects, or pesticide residues can cause skin, nose, throat, or eye irritations. Pesticide residues are small, usually unseen, amounts remaining on plants, soil, and equipment that could contact your skin and eyes.

Pesticide residues may affect some people more than others, and can cause allergic reactions. You can also be exposed to pesticides by inhaling them, or eating contaminated crops.

Wear long sleeves, pants, hat, socks and shoes or boots. Wash your hands before eating, drinking, smoking or using the toilet, and prior to going home.

Shower with soap and shampoo after work. Then put on clean clothes.

Wash almonds that you are allowed to pick in the orchard with clean water before you eat them. Don't use water in irrigation systems or drainage ditches for washing almonds or drinking as pesticides are sometimes applied to crops through irrigation.

Empty pesticide containers, even after rinsing, have residues on them. They're unsafe for any purpose. If you find one, tell your supervisor. Never take a pesticide container home.

Pesticide residues can get on work clothes. Wash work clothes separate from other clothes, preferably with hot water and laundry detergent, before you wear them again.

Symptoms of pesticide contact with skin include staining, reddening, blistering of the skin, or an itching or burning sensation. Other pesticide exposure symptoms include headaches, dizziness, upset stomach, flu-like symptoms or irritation of the eyes, nose, and throat.

Some of these symptoms are caused by other illnesses unrelated to pesticides, including heat stress. To reduce harmful effects of working in hot conditions, drink plenty of water supplied by your employer, and take needed breaks to cool down.

Severe heat stress, called heat stroke, can be fatal. Signs of heat stroke are fatigue, headache, chills, dizziness, loss of coordination, severe thirst, and altered behavior.

Try to get a heat stress victim into a cool area. Splash face, neck, hands, and forearms with water. Have the person, if conscious, drink water and stay quiet until help arrives.

If a pesticide spray ever gets on you, remove contaminated clothing. Wash contacted skin with soap and water promptly. If your eyes have been exposed, rinse immediately with clean water or an eye flush kit for at least 15 minutes.

Quickly tell your supervisor of all work injuries to you or others. It is the supervisor's responsibility to ensure that employees with any sign of heat stress or pesticide exposure receive medical help.

Do not drive yourself to the doctor. Employers will ensure that you get to a doctor or clinic, and will furnish all available information about any pesticide that may have made you ill.

If you are exposed to a pesticide, you may only experience short-term illness or irritation, but there's a chance chronic or delayed effects, such as reproductive harm, nervous system disorders, or cancer will appear years later. Employers must protect you from pesticide injury, but <u>your safety is also your responsibility.</u>

Written Training and Hazard Communication

1. **Employers shall provide annual training so that each employee who handles any pesticide understands, for each pesticide to be used, all of the following that is applicable to the particular handling task:**
    a. **The immediate and long term hazards involved including known or suspected acute, chronic, delayed effects, sensitization and reproductive effects as identified in Material Safety Data Sheets (MSDS), pesticide labeling and/or Pesticide Safety Information Series (PSIS) leaflets;**
    b. **The safety procedures, including routine decontamination, to be followed, engineering controls (such as enclosed cabs and closed system) to be used and the work clothing and personal protective equipment to be used;**
    c. **The procedures for handling non-routine tasks or emergency situations, the ways poisoning or injury from pesticides can occur, first aid including importance of immediate decontamination of skin and eyes when exposure occurs, the common symptoms of pesticide overexposure and where to obtain emergency medical treatment;**
    d. **The purposes and requirements of medical supervision, if category I or II organophosphate or carbamate pesticides with the signal words "DANGER" or "WARNING" are handled for the commercial or research production of an agricultural commodity;**
    e. **Applicable laws, regulations, MSDS, PS18 leaflets and pesticide product labeling requirements.**
    f. **The employee's rights, including the right:**
        1. **To personally receive information regarding pesticides to which they may be exposed;**
        2. **For the employee's physician or employee representative to receive information regarding pesticides to which the employee may be exposed; and**
        3. **Against discharge or other discrimination due to their exercise of these rights.**
    g. **The location of the written Hazard Communication Program (Pesticide Safety Information Series leaflet A-8), pesticide use records, Pesticide Safety Information Series leaflets, Material Safety Data Sheets, employee exposure and monitoring records and training records;**
    h. **Prevention, recognition and first aid treatment of heat related illness;**
    i. **Warnings about taking pesticides or containers home; Environmental concerns such as drift, runoff or wildlife hazards.**

2. **The employer must have a written training program for all pesticides that are handled by employees and maintain it at a central workplace location that is accessible to employees.**

The written program shall describe the materials and information that will be provided and used to train his or her employees. Examples of training materials are pesticide labels, slides, videotapes, and Material Safety Data Sheets.

3. **The employer, in a central location at the workplace, shall keep pesticide use records, Pesticide Safety Information Series, and MSDS's. This location is identified in Pesticide Safety Information Series A-8 that shall be provided to employees.**

4. **Employers shall provide, upon request of his employee, employee's representative, or employee's physician, access to any records or other documents required to be maintained. Access shall be granted within 48 hours.**

5. **The Pesticide Safety Information Series (PSIS) are informational handouts prepared by the California Department of Pesticide Regulation for use in the training of individuals who are required to handle pesticides in the course of their employment. The information contained in the PSIS and this training form is intended to supplement information found on pesticide labels. Employers shall post copies of the appropriate PSIS in a prominent location at the workplace. If PSIS's are not posted at the workplace, the employer shall provide copies of the Safety Series to each employee who handles pesticides.**

Label Review

6. **Pesticides include herbicides, insecticides, fungicides, fumigants, nematicides, rodenticides, avicides, algicides, disinfectants, etc.**

7. **Before using or handling a pesticide, the pesticide label shall be read and instructions followed carefully. The pesticide label must be present at the application site.**

8. **The pesticide label shall never be deviated from except when using:**

    a. **A decrease in dosage rate per unit treated;**
    b. **A decrease in the concentration of the mixture applied;**
    c. **Application at a frequency less than specified.**

9. **A pesticide bearing the signal words "DANGER" has a Category "I" rating and is of the highest toxicity, a pesticide bearing the signal word "WARNING" has a Category "II" rating and is of moderate toxicity and a pesticide bearing the signal word "CAUTION" has a Category "III" rating, and is of the lowest toxicity. Signal words do not indicate whether a chemical is restricted or not.**

10. **Be alerted by the signal words, "DANGER", "WARNING", and "CAUTION" on the pesticide label. Wear the appropriate safety clothing and equipment required as outlined on the pesticide label or Worker Safety Regulations.**

11. **Toxicity is the inherent capacity of a substance to produce injury or death.**

First Aid and Medical Supervision

12. **Know where the name, address and phone number of a physician, clinic, or hospital emergency room is posted at your worksite.**

13. **Symptoms of pesticide poisoning include: headache, nausea, vomiting, cramps, weakness, blurred vision, pinpoint pupils, tightness in the chest, labored breathing, nervousness, sweating, watering of eyes, drooling or frothing of the mouth and nose. Advanced pesticide poisoning signs include muscle paralysis, coma, extremely difficult breathing, and loss of bowel control.**

14. **Know that for pesticide emergency first aid, you must immediately:**
    a. **Get away from the source of the problem**
    b. **Remove contaminated clothing or shoes**
    c. **Wash contaminated area of body with soap and water**
    d. **Immediately wash eyes with water for 15 minutes if they are contaminated**
    e. **Obtain a label of the pesticide you have been working with and**
    f. **Arrange to be taken to a physician immediately. It is not safe to drive yourself.**

15. **If you work 6 days in any consecutive 30-day period handling organophosphate or carbamate pesticides for the purpose of producing an agricultural commodity with either signal word "DANGER" or "WARNING" on the label, your employer shall provide the services of a licensed physician. These services will consist of an initial red-blood cell and plasma cholinesterase determination followed by periodic check-ups thereafter, as recommended by the physician.**

16. **Severe heat stress, called heat stroke, can be fatal. Signs of heat stroke are: fatigue, headache, chills, dizziness, loss of coordination, thirst and altered behavior. To avoid heat stroke, do not work when it is too hot, drink plenty of water and take needed breaks to cool down. First aid for heat stroke is to get the person to a cooler area, splash face, neck and arms with water and give fluids if the person is conscious. Get medical attention immediately.**

17. **When mixing/loading pesticides, always wear eye protection. If the label does not specify which type of eye protection to wear, you may wear goggles, face shield, or safety glasses that offer side and brow protection. During the application process eye protection may not have to be worn if:**
    a. **The label does not specify that eye protection is required;**
    b. **The spray boom is mounted below the applicator and the nozzles pointed downward; and**
    c. **It is safe to apply the pesticide without wearing eye protection.**

18. **Rubber or neoprene gloves shall be worn while mixing/loading or applying pesticides, or handling contaminated equipment. Either new or clean gloves shall be provided each workday.**

19. **It is the responsibility of your employer to provide you with clean outer clothing when working daily with pesticides in Category I or II. You should wash and change from work clothes to street clothes before going home after mixing or applying pesticides.**

20. **It is the responsibility of your employer to provide at the mixing and loading site at least one change of clean work clothing if you are handling any pesticide in toxicity Category I or II.**

Respiratory Protection

21. **When recommended on the label, respirators must be worn while mixing or spraying pesticides or as necessary to prevent exposure.**

22. **The employer shall provide annual training in the use, sanitary care and limitations of any respiratory equipment that will be required for use.**

23. **Certain medical conditions may interfere with wearing a respirator and a statement regarding these limitations must be kept with your training records. If you have a medical condition that interferes with use of a respirator, an evaluation by a physician is required before you are allowed to do work that requires respirator use.**

Using Pesticides Safely

24. **You may not mix, load, or apply a pesticide in toxicity Category I for production of an agricultural commodity without periodic supervision, once every two hours during daylight, and every hour while working at night, whenever working with pesticides having the signal word "DANGER" on the label.**

25. **Category "I" liquid pesticides or diluted liquid mixes derived from dry pesticides in Toxicity Category "I" for the production of an agricultural commodity must be loaded through a closed system. This requirement does not apply to employees who handle a total of one gallon or less of pesticides in Toxicity Category "I" per 24-hour period exclusively in original containers of one gallon or less.**

26. **Do not eat, drink or smoke while handling pesticides or afterwards, until hands and face are thoroughly washed, using soap and clean towels. Cigarettes should be left in the trunk or lunch pail and not carried in pockets of clothes while mixing or spraying.**

27. **Know where soap, clean water, towels and clean clothing are readily available.**

28. **Pesticide exposure can occur by several different methods; inhalation-breathing dust or vapors, chemical spills into the eyes, chemical spills on to the skin or clothing, and swallowing chemicals.**

29. **Open pesticide bags with a sharp knife and stand sideways to the wind, allowing the wind to blow the material away from you.**

30. **When mixing pesticides, pour the concentrate from below eye level to reduce the hazard of a splash.**

31. **Mix pesticides in a well-ventilated and well-lit area.**

32. **Pesticides shall be weighed or measured accurately using devices that are calibrated to the smallest unit in which the pesticide is being weighed or measured, being careful not to exceed the required amount as it appears on the label for the crop being treated. Never use food or drink containers.**

33. **Pesticide containers must be properly rinsed after use before being taken to a disposal site. Closed systems, when they are required, have the rinse process as part of the mixing and loading system with the rinse water going into the mix tank.**

34. **Do not spray when drift may contaminate non-target plants, persons, wildlife or surrounding areas.**

35. **Never transport pesticides in the passenger compartment of any vehicle or on a flatbed truck unless the pesticides on the flatbed truck have been tied down securely.**

36. **Never place a pesticide in a container of a type commonly used for food, drink or household uses.**

37. **Never store or place pesticides near food or feed. Insecticides and fungicides should be kept separate from herbicides to prevent contamination.**

38. **Pesticides must be kept in locked storage areas or be watched at all times. A pesticide shipment must be delivered to a responsible person or placed in a locked storage area.**

39. **Do not take pesticides or pesticide containers home. Pesticide containers cannot be used for any other purpose.**

Pesticide Accidents

40. **Accidents involving the use of pesticides must be reported immediately and accurately to the county agricultural commissioner, giving location and pesticide involved.**

41. **Handle all pesticide containers carefully, reporting all leaking containers and spills to your supervisor. Check for leaks, weak hoses, and worn gaskets on application equipment frequently.**

Minimal Exposure Pesticides

42. **There are special use handling requirements for pesticides designated "Minimal Exposure Pesticides." The requirements listed below do not allow a lower standard of protection when pesticide-labeling statements require a higher standard of protection. Read the pesticide label carefully!**
    a. **For employees who handle minimal exposure pesticides for any period of time, regardless of the toxicity category of the product used, the employer shall provide an area where employees may change clothes and wash themselves. Clean towels, soap, and adequate water shall be available to allow for thorough washing.**
    b. **The employer shall provide and maintain work clothing and require it to be worn by employees, regardless of the toxicity category of the minimal exposure pesticide.**
    c. **The employer shall provide a closed system and require its use by all employees who mix, load or transfer liquid formulations or load diluted liquid mixes derived from dry formulations of minimal exposure pesticides, regardless of the toxicity category of the product used. These requirements do not apply to employees who handle a total of one gallon or less of these pesticides per day exclusively in containers of one gallon or less.**

d. The employer shall provide and require employees to wear full body chemical resistant protective clothing, in addition to work clothing when handling minimal exposure pesticides. Employees working in the following situations are not required to wear chemical resistant full body protective clothing, but this clothing shall be present at the work site:

1) Employees using a closed system, or sealed water soluble packets, while mixing, loading or transferring these pesticides. These employees shall wear a chemical resistant apron, chemical resistant gloves and chemical resistant boots.

2) Applicators using equipment with vehicle mounted spray nozzles directed downward and located below the level of the employee.

e. The employer shall provide and require employees to wear respiratory protection when engaged in:

1) Hand application or ground application of minimal exposure pesticides (respirators do not need to be worn when applicators are using equipment with vehicle mounted spray nozzles directed downward and located below the level of the employee);

2) Mixing/loading dry formulations of minimal exposure pesticides, except mixer/loaders using sealed water-soluble packets.

f. Employers shall see that all protective clothing and equipment are cleaned inside and out or discarded at the end of each day's use.

Note: Consult with your local county agricultural commissioner regarding current information and requirements on pesticide safety training.

Authority cited: Title 3, Division 6 and 7, California Food and Agricultural Code.

Almond Board of California
GAP's for Growers
Fertilizer Practices

Proper procedures reduce risk of contamination

Using raw manure, (feces, urine, other excrement, and bedding produced by livestock that has not been composted), increases microbial risks and can contribute to food-borne illness. It should not be applied to almond orchards during harvest. The potential for fecal contamination is present when irrigation or other water splashes from the orchard floor onto the almonds.

Pathogens such as *E. coli* and *Salmonella* can remain in manure slurry and soil for up to three months or more, depending on temperature and soil conditions. Other pathogens may survive in soil for even longer.

Organic certification programs include strict requirements on the handling of raw manure and allow its use only on land not intended for crops consumed by humans. Both organic and conventional growers should follow GAP's to reduce microbial risk due to manure applications, using only composted product. (See www.ams.usda.gov/nop for manure and compost standards under the National Organic Program.)

First, consider the source and treatment of raw manure

Use of raw animal manure that has not been treated significantly increases the risk of microbiological contaminants.

- Use only treated, composted manure to help minimize the potential for microbiological contamination. (Treated means the final stages of the composting process that occurs after compost has undergone pathogen reduction, and after most of the readily metabolized material has been decomposed and stabilized.) Do not allow animals, including poultry or pets, to roam in the orchard, especially close to harvest time.

- Verify that proper treatment has taken place by asking the compost producer to provide documentation that shows a process to reduce pathogens has occurred. Ask the composter for:
    - The percentage and physical make-up of composted material
    - Documentation showing that:
        - Compost maintained temperatures between 131° F and 170° F for fifteen days or longer in a windrow composting system
        - Compost windrows were turned a minimum of five times during composting
        - Microbial test results showing *E. coli*<1,000 MPN/gram and *Salmonella* < 3 MPN/4 gram. (MPN = **M**ost **P**robable **N**umber).

  (Source: National Organic Program standards, 7 CFR Section 205.203). A Pathogen Reduction checklist follows for your use in collecting this data.

- High temperatures achieved by well-managed, aerobic compost can kill most harmful pathogens. Remember to optimize temperature, turning and time to produce high quality, stable compost.

- If raw manure has not been composted, age the manure to be applied to your field for at least six months prior to application.

Second, consider the storage of raw manure

- Store raw manure as far away as possible from areas where almonds are grown and handled.
- Where possible, erect physical barriers or wind barriers to prevent runoff and wind drift of raw manure.
- Store manure slurry for at least 60 days in the summer and 90 days in the winter before applying to fields.

Third, plan manure application timing and method of incorporation into the soil carefully

- Document the type of manure or compost used, the rates, and the dates and locations of the applications.

- Apply manure at the end of the season, preferably when soils are warm, non-saturated and/or cover-cropped. Non-composted, non-treated manure should never be applied less than 120 days prior to harvest. Mix manure into the soil immediately after application to minimize wind drift and water runoff.

- Do not apply manure after January 1. Do not apply poultry manure, dairy manure, or lagoon wastewater during the growing season.

- When planting new trees, spread the manure two weeks before planting.

- Do not side-dress crops with fresh or slurry manure. Do not use biosolids or municipal waste sludge at any time.

- Clean tractors used in manure handling thoroughly after their use.

- At minimum, harvesting equipment should be cleaned and sanitized between orchards.

Reference (A copy of this document can be found under "Resources and Guidelines")

FDA

- Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, Section III, Safe Fertilizer Practices.

Pathogen Reduction Checklist

Ask the compost producer for the following information:

1. Percentage and physical make-up of the composted material _____
_____

2. Date the compost process was started _____

3. Daily temperature readings of 131 degrees Fahrenheit or higher?_____

4. 15 Days or longer at 131 degrees Fahrenheit for windrow composting?__

5. Windrows turned a minimum of 5 turnings?_____

6. Microbiological testing conducted? (E. coli < 1,000 MPN/gram and Salmonella < MPN/4 grams; "MPN" means "Most Probable Number)

_____

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Soil Amendment Log

Ranch: _____

Date Applied	Total Quantity (Pounds or Tons)	Source of Material	Physical Make-up and Percentage	Pathogen Reduction Test
				Yes _____ No _____

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Compost Process Control Sheet

Pile #: _____Started on:_____

Materials _____ **Inoculated: _____**

_____ **Miscellaneous: _____**

_____ **_____**

Date	Temp. (F)	CO2 Level	Date Turned	Moisture	Remarks

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Almond Board of California
GAP's for Growers
Cleaning and Sanitation of Harvest Tools

Use tools approved for food contact

Harvest tools should be of stainless steel or other non-porous and cleanable material that is approved for food contact. Use and maintain tools that have been designed with safety in mind. For instance:

- Maintain cutting tools so they are free from damage such as ragged edges.
- Inspect tool condition periodically and replace damaged tools.
- Remove extraneous material such as tape, price labels, etc.

Maintain tool cleanliness through daily cleaning and sanitizing

- Consider dipping or soaking tools in a sanitizer solution when they're not in use during harvest season, and after harvest for winter storage.
- Use a sanitizer such as chlorine (200 ppm total chlorine).
- Check, adjust and document the sanitizer concentration strength at least daily.

Clean harvest storage facilities prior to use

- Facilities used to store almonds should be cleaned and, if necessary, disinfected prior to harvest. Inspect buildings for evidence of rodents, birds and insects. Document your rodent and insect prevention and elimination programs.
- Discard damaged containers that are no longer cleanable to reduce the possibility of contamination.
- Clean containers or bins before using them to transport almonds.

Follow common-sense rules

- Don't use equipment that has hauled garbage, manure or other debris to haul almonds, or can come in contact with almond containers or pallets *unless* the equipment has been thoroughly cleaned and sanitized.
- Never take harvesting tools or gloves inside toilet facilities.
- Use of gloves is not a substitute for washing hands. Hands must be washed before putting on the gloves. Gloves should be cleaned and rinsed periodically during the harvest day. Replace heavily soiled and/or damaged gloves.

Some potential cleaning and sanitation methods:

- Using household detergent (one example is Simple Green) and a synthetic bristle brush, scrub the tool until clean, rinse with potable water and sanitize with a 200-ppm chlorine solution. One tablespoon of household bleach (5.25%) in one gallon of water is equivalent to 200-ppm chlorine. Sanitization should also be performed prior to start up and periodically during the day.

- Tools can also be cleaned in a properly running household dishwasher using standard dishwasher detergent. The dried tools should be stored in a clean place. The tools should be sanitized with a 200-ppm total chlorine solution just prior to start up and periodically during the day.

Note: These recommendations are to serve as examples of proper procedures. It is important that there is both cleaning (removal of dirt) followed by sanitization. Sanitizing alone is not sufficient to get the tool really clean. In addition is it important to be aware of the composition of the chemicals used to make sure that they do not result in contamination of the soil where run off might occur during the cleaning process.

Reference (A copy of these documents can be found under "Regulations and Guidelines")

California

- California Department of Industrial Relations Section 3457, Field Sanitation

FDA

- 21 CFR 110.35(a) (General Maintenance)
- 21 CFR 110.35(d)(1)-(5) (Sanitation)

Harvest Tool Cleaning Checklist

Ranch Location: _____Date: _____

Are tools being maintained so as to remain free of damage such as ragged edges?	Yes	No
Is there a regular repair/ inspection program to periodically fix or replace damaged tools?	Yes	No
Are the tools kept clean of extraneous materials such as tape?	Yes	No
Are stations available for the tools to be cleaned and dipped in sanitizing solution periodically during the day?	Yes	No
Is the sanitizer concentration verified and documented in a log?	Yes	No
Gloves are not to be used as a substitute for hand washing. Is there a hand-washing program in place? Is it being followed?	Yes	No
Are gloves maintained in a clean and sanitary manner?	Yes	No
Do workers know that gloves and harvesting tools are not to be taken into the toilet facility?	Yes	No
Are gloves cleaned and rinsed periodically during the harvest day?	Yes	No
Is there a program to replace heavily soiled or damaged gloves on a routine basis?	Yes	No

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Avoid locating facilities near sources of irrigation
Stay away from areas that are subject to water runoff, which has the potential to contaminate soil, water sources, almonds, animals and workers.

Keep facilities well supplied
Provide an adequate supply of toilet paper. Hand washing stations should be equipped with a basin, water, liquid soap, a waste container and sanitary hand drying devices such as single use disposable paper towels.

Keep facilities clean
Set up a regular cleaning schedule.

Document the steps you take to ensure compliance for quantity, sanitary condition and maintenance of field toilets
Have written procedures for and document the average number of field employees each week, number of field toilets in use, sanitation procedures, frequency of cleaning, individual or company responsible for maintenance and sanitation, and the procedure for checking and replenishing toilet paper.

Do not clean portable toilets in the orchard
Sewage transport trucks need direct access to toilet facilities to ensure proper collection and disposal of wastes through a municipal sewage system or a sub-surface septic tank system. When toilets must be cleaned or serviced near the field, use appropriate barriers or physical containment to prevent contamination in the event of an accidental leak or spill.

References (copies of these documents will be found under "Regulations and Guidelines")

FDA

- Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables Section V, Sanitary Facilities, and Section VI, Field Sanitation

California

- California Department of Industrial Relations Section 3457: Field Sanitation (includes specifications for field toilet facilities).

Field Sanitation Maintenance Log

Grower/Ranch Name: _____

Beginning Date: _____ through Year End Date: _____

Week Ending	# of Employees	# of Units	Checked By	Sanitation Frequency

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Field Sanitation/Hygiene Supplies

Grower/Ranch Name: _____

Beginning Date: _____ through End Date: _____

Date	Hand-wash Water	Soap	Paper Towels	Toilet Paper	Checked by
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
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	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	
	Check/refill	Check/refill	Check/refill	Check/refill	

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Field Sanitation and Worker Hygiene Checklist

Ranch Location:

_____

Field Sanitation	Yes	Description
Condition of Field Toilets		
A. Correct number of toilet facilities for male and female workers		
B. Close proximity to employees (1/4 mile or 5 minutes)		
C. Clean and sanitary facilities		
D. Documentation of maintenance and sanitation		
1. Average number of employees per week		
2. Number of field toilets in use		
3. Frequency of cleaning		
4. Procedure for maintenance and sanitation		
E. Provisions for regularly checking toilet paper		
Worker Hygiene		
A. Written training procedures		
1. Frequency and content of training		
B. Document information on hand washing		
1. Daily rinse and clean of wash water tanks		
2. Daily replenishment of water		
3. Source of hand washing water		
4. Sign indicating "For Hand Washing Purposes Only"		
C. Procedure for providing and replenishing daily		
1. Clean hand washing water		
2. Soap		
3. Single purpose towels		
Drinking Water Policy		
A. All drinking water potable		
B. Single use cups provided		
C. Drinking water changed daily		
D. Water containers rinsed and cleaned daily		
E. Document source of water		
Medical Leave and Illness		
A. Written medical leave and illness reporting policy		

This form is only a sample and should be modified by the appropriate experts and legal advisors to meet the needs of your particular operation.

Almond Board of California
GAP's for Growers
Safe Water Practices for Growers

Does your water need washing?

Water used in the production of almonds can be a source of pathogens and a vehicle for spreading microbiological contaminants. Therefore, maintaining a safe water supply is a top priority.

Irrigation water

- Identify and document your farm's primary and secondary sources of water, i.e., well water (capped or uncapped), open water (canal, reservoir, or collection pond) or municipal/district water systems. The form "Water Worksheet: Verification of Water Sources and Safety" provides a guide for you to follow.

- Identify and document your water delivery system, i.e., drip irrigation, flood, furrow or sprinklers.

- Identify the type of filtration system and where filters are located in the irrigation and water delivery system.

- Test water at the source as needed and keep results on file. Closed, underground or capped well systems should be tested annually at the beginning of the season. Uncapped wells, open canals, reservoirs and collection ponds should be tested quarterly through the season. If you use water from a municipality or water district, obtain copies of water quality reports from the municipality or water district for your files (monthly, quarterly or annually). You can use the "Water Testing Frequency and Documentation Guidelines" checklist for this purpose.

- Take samples of water after it has been filtered as well.

- If wells or water sources are found contaminated with fecal coliform/E. coli, take corrective measures such as disinfecting, filtration or chlorinating of the well or water source. Information follows on Bacterial Sampling, Disinfecting Procedures, and Chlorine Dosages.

Pesticide and foliar feed applications

Water used in mixing pesticide or foliar feed can be a source for microbiological contamination.

- Document the water source and test water coming from that source.
- Rinse and clean tanks after each use following all applicable federal and state pesticide laws and regulations regarding equipment and rinse water.

Water contamination risk from adjacent land

Adjacent farming operations or other land use activities may pose a potential risk for run-off or leaching of microbiological contaminants.

- Identify and document nearby landfill sites, sewage treatment facilities, septic tanks, leach fields, potential run-off or leaching from adjacent farming operations, such as dairy farms or compost producers.
- Take corrective actions and document your corrective steps taken, such as construction of physical barriers (ditches, berms or fencing), disinfecting wells and use of a catch pond.

Recycled water usage

Recycled water, also known as tertiary treated water, has been used in California for agricultural, turf and landscape irrigation for more than 20 years without incident. “Recycled water” refers to domestic or municipal wastewater that has been treated and disinfected to meet the California Department of Health Services (CDHS) guidelines for irrigation of agricultural crops that are consumed without cooking.

The Environmental Protection Agency (EPA) has established a standard of less than 2.2 fecal coliform per 100 milliliters of water for recycled water used on non-processed fresh produce. Water containing that amount or less is considered free of pathogens for non-potable agricultural purposes.

Recycled water quality information is publicly available on a monthly basis and as an annual report from any local wastewater treatment facility/district providing recycled water.

Other considerations

- Obtain, review and maintain copies of monthly reports for your records if recycled water is used in your farming operations. Information and frequently asked questions on recycled water follow this section.
- Pay special attention to specific analysis information for *E. coli* as an indicator for fecal contamination.
- Take necessary steps to reduce or minimize direct recycled water contact with the edible portion of the crop. For instance, plug leaks in drip irrigation systems that could create puddles. Use an alternative water source (municipal or well water) for sprinkler irrigation during frost control.
- Document any actions you take, such as chlorination or filtration.

Provide safe, clean drinking water

All drinking water must be potable. Provide single use cups, rinse and clean water containers daily, change drinking water daily and document the source of water. A sample Drinking Water checklist follows this section.

References (copies of these documents will be found under "Regulations and Guidelines")

FDA

- See Section II, Water, in the "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables"

California

- California Department of industrial Relations Section 3457, Field Sanitation

Water Worksheet: Verification of Water Sources and Safety

Ranch Location: _____

Water	Irrigation Water Primary Source	Irrigation Water Secondary Source	Pesticide and Foliar Application Source	Hand Washing Water Source	Drinking Water Source
Source: Capped well __ Uncapped well __	Yes/no	Yes/no	Yes/no	Yes/no	Yes/no
Open source: canal, reservoir, pond, etc.	Yes/no	Yes/no	Yes/no	Yes/no	Yes/no
Source: Municipal District water	Yes/no	Yes/no	Yes/no	Yes/no	Yes/no
Irrigation water: drip	Yes/no	Yes/no	Yes/no		
Irrigation system: overhead	Yes/no	Yes/no	Yes/no		
Irrigation system: flood	Yes/no	Yes/no	Yes/no		
Describe filtration system location (attach diagram)					
List Applicable Dates for Each Category					
Capped Well Annual Test					
Uncapped well, canal, reservoir, pond, etc. quarterly test					
Municipal District quality Report					
Corrective action & date taken; chlorinate, disinfect, filter, etc.					
List potential risks from adjacent land (attach additional sheets as necessary)					

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Water Testing Frequency and Documentation Guidelines

Test ANNUALLY at the beginning of the season:

- Closed, underground or capped well systems

Test QUARTERLY throughout the season

- Uncapped wells
- Open canals
- Reservoirs
- Collection ponds/Recycled water

Maintain copies of water quality reports (monthly, quarterly or annually)

- Municipality or district water systems

Water test for possible microbial contaminants

- **Fecal Coliform/E. coli** (Irrigation water standards have no established maximum contaminant level for microbiological contaminants)

Possible mitigation measures for fecal coliform/E. coli detection level of "present" or "positive"

- Disinfect water source
- Add filtration system to water source
- Add chlorination system to water source

Note: Maximum Contaminant Level for Fecal Coliform/E. coli is 0.0% for Drinking Water Standards. (Title 22, California Code of Regulations, Section 644463.1)

Bacterial Sampling

Sampling Procedure:

For individual wells, technical advice regarding the collection of bacteriological samples may be obtained from the local health departments or from the laboratories that will examine the sample. If no technical assistance is available, the following procedure will suffice:

A sterile sample bottle, preferably one provided by the laboratory, must be used. It is extremely important that nothing except the water to be analyzed come in contact with the inside of the bottle or the cap; the water must not be allowed to flow over an object or over the hands and into the bottle while it is being filled. If the water is collected from a sample tap, turn on the tap and allow the water to flow for 2 or 3 minutes before collecting the sample. Do not rinse the sample bottle. The sample should be delivered to the laboratory as soon as possible and in no case more than 30 hours after its collection. During delivery, the sample should be kept as cool as possible (but not frozen).

Refer to Section 4026, California Health and Safety Code and Chapter 15, "Domestic Water Quality and Monitoring" of Title 22, California Code of Regulations.

Disinfecting Procedures

Disinfection of all contaminated wells is recommended to eliminate pathogenic organisms as well as organisms that can grow in wells and thereby cause clogging and affect the quality of water produced.

Disinfection involves seven steps:

1. A chlorine solution containing at least 50 mg/l (or parts per million) available chlorine is added to the well. Table I on the next page lists quantities of various chlorine compounds required to dose 100 feet (30 meters) of water-filled casing at 50 mg/l for diameters ranging from 2 to 24 inches (50 to 600 millimeters)[1].
2. The pump column or drop pipe shall be washed with the chlorine solution as it is lowered into the well.
3. After it has been placed into position, the pump shall be turned on and off several times (i.e., "surged") so as to thoroughly mix the disinfectant with the water in the well. Pump until the water discharged has the odor of chlorine[2]. Repeat this procedure several times at one-hour intervals.
4. The well shall be allowed to stand without pumping for 24 hours.
5. The water shall then be pumped to waste until the presence of chlorine is no longer detectable. The absence of chlorine is best determined by testing for available chlorine residual using a test kit designed for this purpose[3].
6. A bacteriological sample shall be taken and submitted to a laboratory for examination.
7. If the laboratory analysis shows the water is not free of bacterial contamination, the disinfection procedure should be repeated. Depending on the level of contamination, it may be necessary to use a higher concentration chlorine solution (several times that shown in Table 1). The water should then be retested. If repeated attempts to disinfect the well are unsuccessful, a detailed investigation to determine the cause of the contamination should be undertaken.

1. Where small, individual domestic wells to be treated are of unknown depth or volume, at least one pound (0.45 kilograms) of calcium hypochlorite (70 percent available chlorine) or two gallons (7.5 liters) of household bleach (sodium hypochlorite), such as Clorox or Purex, may be used in lieu of the chemicals shown in Table 1.

2. Disposal of the waste should be away from trees, shrubs or lawns and into storm sewers, drainage ditches, etc. Note that heavily chlorinated water should not be discharged into sewage disposal systems (septic tanks). Such strong disinfectants could neutralize the bacteria need to stabilize the sewage and also could damage the soil absorption system.

3. Testing for available chlorine residual is simple and inexpensive. Test kits can be obtained from chemical supply houses, swimming pool suppliers, etc.

Table I: Chlorine Dosages

Chlorine compound required to dose 100 feet (30 meters) of water-filled casing at 50 milligrams per liter[1]

Chlorine Compounds			
Diameter of Casing Inch (mm)	**70% Calcium Hypochlorite[2] (Dry Weight)[3]**	**25% Chloride of Lime (Dry Weight)[3]**	**5.25% Sodium Hypochlorite[4] (Liquid Measure)**
2 (50)	¼ oz. (7 g)	½ oz. (14 g)	2 oz. (59 ml)
4 (100)	1 oz. (28 g)	2 oz. (57 g)	9 oz. (266 ml)
6 (150)	2 oz. (57 g)	4 oz. (113 g)	20 oz. (0.6 l)
8 (200)	3 oz. (85 g)	7 oz. (0.2 kg)	2-1/8 pts. (1.0 l)
10 (250)	4 oz. (113 g)	11 oz. (0.3 kg)	3-1/2 pts. (1.7 l)
12 (300)	6 oz. (0.2 kg)	1 lb. (0.45 kg)	5 pts. (2.4 l)
16 (400)	10 oz. (0.3 kg)	2 lb. (0.9 kg)	1 gal. (3.8 l)
20 (510)	1 lb. (0.45 kg)	3 lb. (1.4 kg)	1-2/3 gal. (6.3 l)
24 (610)	1-1/2 lb. (0.7 kg)	4 lb. (1.8 kg)	2-1/3 gal. (8.8 l)

1 Some authorities recommend a minimum concentration of 100 mg/l. To obtain this concentration, double the amounts shown

2 HTH, Perchloron, Pittchlor, etc.

3 Where dry chlorine is used, it should be mixed with water to form a chlorine solution prior to placing it into the well. Note that dry chlorine should always be added to water, not vice versa. Further, the chemical should be added slowly. These precautions are necessary to lessen the possibility of a violent chemical reaction.

4 Household bleaches such as Clorox, Purex, etc.

*** Refer to Section 4026, California Health and Safety Code and Chapter 15, "Domestic Water Quality and Monitoring" of Title 22, California Code of Regulations.**

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[1] Some authorities recommend a minimum concentration of 100 mg/l. To obtain this concentration, double the amounts shown.

[2] HTH, Perchloron, Pittchlor, etc.

[3] Where dry chlorine is used, it should be mixed with water to form a chlorine solution prior to placing it into the well. Note that dry chlorine should always be added to water, not vice versa. Further, the chemical should be added slowly. These precautions are necessary to lessen the possibility of a violent chemical reaction.

[4] Household bleaches such as Clorox, Purex, etc.

Drinking Water Checklist

Grower/Ranch Name: _____

Beginning Date: _____ through Year End Date: _____

Date	Drinking Water	Cups	Water Container	Checked by
	Check/Refill/Change	Check/Refill	Rinse/Clean	

This form is only a sample and should be modified by the appropriate technical experts and legal advisors to meet the needs of your particular operation.

Recycled Water Use Checklist

There is an increasing interest in the grower community to use recycled or tertiary treated water. This is due to the decreased cost and increased availability of recycled water* throughout the state's growing districts.

Tertiary treated water, also known or referred to as "recycled water," has been used for a variety of agricultural and urban uses in the United States for more than 50 years. If you are considering the use of recycled water, please be aware of the following points:

- Have direct communication and interaction with the wastewater treatment facility representatives. Become knowledgeable about the treatment process and the steps taken to ensure the quality and safety of the recycled water.
- Treatment facilities are required to conduct daily water tests for total coliform organisms and heavy metals. Weekly or monthly summaries of water tests should be kept in your files.
- You may want to consider an independent test of the recycled water for *E. coli* or *Salmonella* at the point of use (on the farm) to verify quality and safety.
- If you use a filtration system for your water supply, what microorganisms is your system capable of screening/filtering out of your water? Be aware and keep records of your system's capability.
- Minimize the direct contact of water to almonds. Drip irrigation or micro-jet sprinklers will minimize exposure. Consider using alternative water sources, when possible, for sprinkler irrigation.
- Document any corrective action taken, such as an on-farm chlorination or filtration system.

***Authority cited: Title 22 Water Recycling Criteria - California Code of Regulations.**

Q & A – Recycled Water Use

What is recycled water?
Recycled water is domestic/municipal wastewater that has been highly treated and disinfected so that it meets the California Department of Health guidelines for irrigation of crops that are consumed without cooking. As defined and used in Title 22 Water Recycling Criteria by the California Department of Health Services, recycled water means "disinfected tertiary recycled water."

Is reclaimed water synonymous with recycled water?
Yes and No. At one time reclaimed water was the general term most commonly used to describe disinfected and treated wastewater. Today, recycled water is the accepted terminology. Reclaimed water commonly refers to storm water or irrigation run-off, used processing wash water, etc. Recycled water is the end product of the disinfection and tertiary treatment of domestic/municipal sewage wastewater.

How is recycled water regulated?
Title 22 Water Recycling Criteria of the California Code of Regulations as administered by the California Department of Health Services regulates recycled water use.

What are the concerns over uses?
Recycled water may contain chemical elements that could cause plant damage, and pathogenic organisms including bacteria, parasites and enteric viruses that could lead to human health and safety concerns. Public/consumer perceptions and lack of knowledge of the tertiary treatment process of wastewater is a primary concern over the use of recycled water.

What are the other uses of recycled water?
The primary use of recycled water is in landscape irrigation (parks, golf courses, school playfields, etc.). Other uses included toilet flushing and industrial use, such as carpet dying. The Dublin San Ramon Services District is trying to use recycled water for groundwater recharge, but is facing major public opposition. The San Diego District has a quaternary (four-phase) disinfection and treatment facility capable of producing recycled water suitable for drinking purposes. The local media has coined the phrase "from toilet to tap" which has turned the public against this use.

What are the microbial food safety precautions taken for recycled water use on ready to eat food?

Title 22 only requires daily analyses for total coliform organisms in recycled water applied directly to the food crop. The maximum allowable is 2.2 per 100 milliliters, which is the National Primary Drinking Water Standard. Title 22 does not require specific analyses for parasites, viral or bacterial organisms such as *Giardia*, *Cryptosporidium*, *E. coli*, *Salmonella*, etc.

What is done if recycled water is found positive with *E. coli*?

If the problem is identified at the recycling facility, the disinfection treatment (usually chlorine) can be adjusted to eliminate the problem. If the problem is potentially at the farm site where there are several possible contamination sources such as raw water, distribution system (i.e. canal), or holding ponds, an on-farm water chlorination system is one option. The goal, whether it is recycled or raw water that is used, is to minimize water contact with the edible portion of the crop. Direct product contact by either recycled or raw water should be limited, when possible.

Almond Board of California
GAP's for Growers
Harvest and Delivery Sanitation

Ensure that your almonds are dry before being picked up
Moisture leads to the proliferation of microorganisms. Be sure that the almonds in windrows are dry before they're picked up. Also, be sure the orchard floor is dry, thereby discouraging the warm, moist environment favored by microorganisms for growth and proliferation.

Keep a clean pick-up machine

- Know how the pick-up machine has previously been used. Be sure it was not previously used in an orchard where fertilizer was applied after January 1.
- Make every effort to be sure the pick-up machine was cleaned and sanitized prior to picking up your almonds.
- Pick your almonds up as cleanly as possible, keeping excessive soil out of the pick-up machine. Soil is loaded with microorganisms you don't want to deliver to the huller/sheller.

Inspect all trailers and cargo containers before loading
Be sure they are:

- Clean of all visible debris, dirt, or other nutmeat.
- Free of odors.
- Clear of any excessive moisture.

Verify that the trailers and cargo containers have not previously been used to transport materials from animal operations such as dairy or poultry farms, and specifically that they have not been used to haul waste or manure. A form follows for your use when inspecting trailers and/or containers.

Have a policy in place for trailers or cargo containers that fail to meet your satisfactory loading guidelines, and tell your handler about your policy. Document any shipments not loaded because of an unsatisfactory condition of the trailer or cargo container.

Work with the huller/sheller

- Inspect the delivery area at the huller/sheller to insure the area is free of signs of rodents and birds. Especially check eaves of the delivery area roof for possible bird and rodent nesting areas.
- Ask your huller/sheller or handler about their company's traceback procedure. Understand the product flow within the huller/sheller's plant and have the company provide you with a copy of their traceback method.
- Ensure that your huller/sheller and your handler follow Almond industry recommended Good Manufacturing Practices (GMP's).

Reference (A copy of this document can be found under "Regulations and Guidelines")

FDA

- Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables Section VIII, Transportation

Carrier Inspection Form

CARRIER CONDITION:

Floor:	Tight _____	Cracks _____	With holes _____
Sides:	Smooth _____	Cracks _____	Broken _____
Roof:	Smooth _____	Cracks _____	Holes _____
Doors:	Excellent ____	Fair _____	Poor _____
Door seals:	Excellent ____	Fair _____	Poor _____

CARRIER CLEANLINESS

Floor:	Clean _____	Needs Sweeping _____	Filthy _____
Walls:	Clean _____	Dusty _____	Filthy _____
Roof:	Clean _____	Dusty _____	Filthy _____
Odors:	None _____	Off-odors _____	Putrid _____
Insects:	None _____	Evidence _____	Live _____
Rodents:	None _____	Evidence _____	Live _____
Chemicals:	None _____	Evidence _____	Powders _____
Other:	None _____	Evidence _____	Glass, etc. _____

COMMENTS:

_____

ACCEPT:_____ REJECT: _____REASON:_____

_____

INSPECTOR: _____DATE: _____