



*Many pesticides are toxic to human beings and practically all are capable of causing some type of damage or injury if improperly handled.*

— 1950 California Department of Agriculture annual report

## Protecting Workers and the Public

The mission of the Department of Pesticide Regulation (DPR) is to protect human health and the environment from risks posed by pesticides and to promote safer means of pest control. DPR programs are oriented to those goals through:

- Evaluating the safety of pesticides before registration, sale, and use.
- Monitoring places where pesticides are sold to remove unregistered products from the channels of trade.
- Training of professional pesticide handlers and others who may be exposed to pesticides in the workplace.
- Ensuring that only specially trained and certified workers handle the most toxic pesticides (restricted materials) and requiring site- and time-specific permits for use of these compounds.
- Monitoring of air, water, and fresh produce to find out if there are residues of concern.
- Monitoring of pesticide exposure in the workplace and other settings.
- Investigating and tracking pesticide illnesses and injuries.
- Local enforcement to ensure laws and regulations are being obeyed.
- Promoting adoption of pest management strategies that stress pest prevention and the use of nonchemical or least-toxic methods in farm fields, homes, parks, schools and child care centers.

Many of these topics are discussed in other chapters. This chapter focuses on health and safety programs managed by DPR's Worker Health and Safety (WHS) Branch.

### DPR'S PIONEERING WORKER SAFETY PROGRAM

Following the 1972 passage of Assembly Bill 246, which amended the Food and Agriculture Code, the state departments of Agriculture and Public Health established training requirements for pesticide handlers and set up a pesticide illness reporting and investigation system, then unique in the nation. California was also the first state to establish a policy on the use of closed systems for mixing and loading highly toxic liquid pesticides. Closed systems are a preferable engineering alternative to personal protective equipment.

### Worker protection standard

In 1992, the U.S. Environmental Protection Agency (U.S. EPA) issued a new federal Worker Protection Standard (WPS), which became final in 1995. This federal regulation was designed to reduce the risk of pesticide poisonings and injuries among pesticide handlers and other agricultural workers exposed to pesticides. Although the federal standard drew on California's worker safety program as a model, there were differences between the two. In 1997, after DPR made conforming changes in its regulations, U.S. EPA approved the department's request for equivalency of California's pesticide safety program.

In November 2015, the U.S. EPA published revisions to the 1992 version of the WPS. The new WPS requirements were implemented starting Jan. 2, 2017. DPR revised its worker protection regulations to conform to these changes and maintain its pesticide safety program equivalency.

In addition, DPR has several regulatory requirements stricter than those in the 2015 federal WPS. For example, the federal WPS applies only to pesticide use in production agriculture. DPR’s worker safety regulations apply to all employees who handle pesticides and all employees exposed to pesticide residues.

### Hazard communication

DPR requires employers to provide and maintain a mandated written hazard communication program for their employees and provide unimpeded access to pesticide use records and Safety Data Sheets (SDSs). In ongoing efforts to improve worker protection, DPR and technical experts met with public interest and farm labor groups; county agricultural commissioners (CACs); state and local public health officials; migrant health clinic directors; and agricultural production representatives to improve the notification and hazard communication regulations. Following up on the information gathered, DPR studied the effectiveness of warning signs posted around treated fields that tell workers and others when it is safe to reenter. DPR also studied how workers received verbal notification of when a field was scheduled to be treated, information about the hazards of working with pesticides, and about symptoms of illness.

The studies found problems with notification and hazard communication rules that led DPR to make changes in the regulations. In 2009, DPR put regulations into place to ensure employees get information about pesticides being used in the fields where they work, before and after an application. The changes were also designed to strengthen safeguards already in place to prevent employees from entering a treated field during a restricted-entry interval. The rules made several changes, including:

- Requiring pesticide applicators to notify the grower before and after a chemical is used, and re-notify if the scheduled application date changes.
- Requiring the grower to manage his or her property as if the application could occur any time within a 24-hour window.
- Requiring growers, and any hired contractor notified by the grower of a scheduled application, to ensure prior notification for any employees who walk within one-quarter mile of a field to be treated.
- Requiring growers to notify persons who they know will likely enter a field to be treated (other than their employees or contractors) before and after an application.
- Requiring growers and labor contractors to provide uncomplicated directions to where employees can find information about the pesticides used where they work, and to provide unimpeded access to these records (Application information is usually posted at a central location for a farming operation, not in the field where the application was made.)

### Training

DPR requires training each year of employees who handle pesticides (for example: mixers, loaders, applicators, and application equipment mechanics). Starting Jan. 2, 2017, DPR required annual training for fieldworkers which is a new requirement contained within the 2015 revision to the WPS. California regulations require that pesticide handler and fieldworker training incorporate the Pesticide Safety Information Series (PSIS) leaflets produced by the WHS Branch. PSIS leaflets are available for workers in both agricultural and nonagricultural settings. Subjects include hazard communication (worker rights), first aid, medical



Signs posted in fields alert workers and others about pesticide applications.



Maintenance gardener certification exam in 2016.

supervision, pesticide handler safety, pesticide storage and transport, protective equipment and engineering controls, minimal exposure pesticides, and respiratory protection. The leaflets are available on DPR's website in English, Spanish and Punjabi.

### Personal protective equipment (PPE)

In 2016, DPR revised the closed systems regulations to require a tiered mitigation scheme to establish specific closed mixing system and PPE requirements based on the Human Hazard and Precautionary Statements specified on the label. Pesticides with the following Precautionary Statements "Fatal if absorbed through skin," "May be fatal if absorbed through skin," "Corrosive, causes skin damage," or other comparable language are required to use one of two types of closed mixing systems. Closed systems place the responsibility on employers to protect workers, which is more effective than requiring employees to wear protective clothing. Where PPE is required, DPR has a more extensive set of requirements than U.S. EPA. In addition, DPR has adopted a full respiratory protection program equivalent to Cal/OSHA (and federal OSHA).

### Restricted entry intervals

DPR has established longer restricted-entry intervals (REIs) than U.S. EPA for 12 pesticide active ingredients. REIs reduce potential worker exposure to pesticide residues by specifying the period following the application of a pesticide during which unprotected workers should not enter a field.

### Soil fumigants

DPR has several rules related to soil fumigants. They are more restrictive than U.S. EPA's soil fumigant rules, implemented in 2010, and include pesticide-specific buffer zones around application sites and reduced application rates. In addition, pest control businesses conducting fumigations in California must have a supervisor with a special field fumigation license from DPR.

### Outreach

State law was amended in 2003 (Chapter 741, SB 1049) that required DPR to "create a program to conduct outreach and education activities for worker safety ... and proper pesticide handling and use ... (including) rights and procedures of workers and those potentially exposed to pesticides and how to file confidential complaints." In response, DPR assigned a bilingual specialist to coordinate outreach for Hispanic workers, their families and their communities. This specialist works with other WHS, Enforcement Branch, CAC, and U.S. EPA staff to promote pesticide safety with health and safety workgroups. The specialist also conducts outreach at safety and health fairs, and through radio and television public service announcements.

### Medical supervision

For more than 40 years, DPR has required employers to provide medical supervision for agricultural employees who regularly handle specific organophosphate and carbamate insecticides. Employers arrange with a physician to medically supervise workers who regularly handle these cholinesterase-inhibiting pesticides by monitoring their blood cholinesterase (ChE) levels. Cholinesterase is an enzyme that helps regulate nerve impulses. Overexposure to these compounds can inhibit ChE levels enough to induce serious illness and routine monitoring of ChE handlers allows physicians to detect excessive exposure before workers become clinically ill. Physicians compare the blood test results with baseline measurements taken before the worker was exposed to cholinesterase-inhibiting pesticides. If excessive exposure is detected, the employer must reexamine the workplace and pesticide handling procedures. If the employee becomes ill or cholinesterase falls

below specified levels, the employee must be removed from further exposure until new blood tests show it is safe to work with cholinesterase-inhibiting pesticides again. Only one other state (Washington) requires regular testing of organophosphate and carbamate pesticide handlers to prevent illness.

Legislation in 2010 (Chapter 369, AB 1963) required that laboratories doing blood tests to determine worker exposure to cholinesterase-inhibiting pesticides report the results electronically to DPR. The department manages reporting, keeps a database of the information and shares it with the Office of Environmental Health Hazard Assessment (OEHHA) and the Department of Public Health (DPH).

### COORDINATION WITH COUNTY AGRICULTURAL COMMISSIONERS

DPR manages the state’s occupational pesticide safety enforcement program with field enforcement carried out by staff from each CAC office. Enforcement and Worker Health and Safety branches provide coordination, oversight, and technical and legal support to CACs.

Working under an interagency agreement with DPR, CACs perform certain pesticide enforcement activities. These range from investigations of pesticide-related illnesses to checking training and pesticide storage records of pest-control companies.

Each CAC also must work with DPR to negotiate an annual pesticide enforcement work plan that gives higher priority to such enforcement activities as worker protection inspections, illness investigations, applications of certain high-toxicity pesticides, and agricultural applications of pesticides near parks or schools. Lower priority is given to routine inspections of growers or businesses with no recent violations. *(For more information on enforcement and the role of CACs, see Chapter 2.)* When DPR and CACs collaborate on developing the annual enforcement work plans, they review pesticide illness statistics to see where extra emphasis may be needed in education or enforcement.

DPR provides technical support for CAC investigators. DPR scientists are subject-matter experts in their respective fields and are available to assist the CAC investigators. WHS and Enforcement Branch scientists have developed training modules covering basic to advanced investigation procedures, and provide these trainings to CAC every two or three years, or upon request. Topics include health effects of pesticides, evidence collection (including collection of foliage, clothing or surface residue samples to document environmental exposure), interview techniques, and writing investigative reports.

### INVESTIGATING PESTICIDE EPISODES

CACs, assisted by DPR, investigate pesticide-related episodes reported in their counties that result in harm to people or the environment. The primary objective of an investigation is to determine and document the circumstances of the episode, to identify continuing hazards or violations, and gather evidence to support regulatory changes or enforcement action.

Investigations are critical to evaluating pesticide use patterns, emerging risks and the effectiveness of the label directions, regulations, and regulatory policies and practices. Pesticide episodes investigated include:

- Human health effects while handling pesticides, pest control aircraft accidents, exposure to residues in treated areas (fields, offices, homes), and exposure from drift.
- Economic loss or damage to property, equipment or livestock (including bees) resulting from drift, accidents or residues that result in the inability to market a



**A farm labor contractor conducts worker safety training in Tulare County, 2015.**



**Cilantro tested for pesticide residue at the CDFA lab in Anaheim in 2015.**

crop or animal.

- Environmental effects including contamination or damage to the environment, such as fish or wildlife kills, domestic animal poisonings, lake, stream or ground water contamination, or phytotoxic effects because of persistent residues in the soil.
- Illegal residues on crops.

Pesticide episodes come to the attention of the department and CACs in various ways, including employee or public complaints, pesticide illness reports from local health officers, Poison Control Center and physician reports, and news media stories. Information may also come from government agencies, pest control operators, growers and public interest groups. State and county surveillance and compliance monitoring can also bring problems to light. DPR routinely forwards pesticide-related episode reports it receives to the appropriate CAC for investigation. DPR and CACs take joint responsibility for investigation of illegal pesticide residues on fresh produce. (*See Chapter 7 for information on DPR's residue monitoring program.*)

The commissioner's office in the county where the episode occurred is the lead investigative agency. CAC staff work in consultation with an environmental scientist in DPR's Pesticide Enforcement Branch, who can in turn draw on the expertise of other branches in the department. For example, scientists from the WHS and Human Health Assessment branches can provide support for illness episodes. Environmental Monitoring scientists may assist when incidents involve environmental effects and the Pesticide Registration Branch can provide experts in plant physiology and chemistry when pesticides adversely affect crops, fish and wildlife. In some incidents involving human illness or injury, WHS and Enforcement staff participates directly in the investigation. DPR also works with the California Department of Fish and Wildlife on wildlife investigations and with the U.S. EPA on episodes that cross jurisdictional boundaries between states, or between California and tribal lands or Mexico.

CAC investigators try to locate and interview everyone with knowledge of the incident, collect samples appropriate and according to the investigative plan, and review relevant records. When appropriate, they ask for authorization from the affected people to get relevant portions of their medical records to include with the investigative reports.

Investigative samples can provide physical evidence to prove violations of pesticide laws, to assess the nature and degree of exposure, or to guide DPR development of mitigation strategies to prevent future episodes. Depending on the episode, investigative samples may include:

- Commodity samples to determine the presence and amount of pesticide residue.
- Foliage to determine the amount of residual pesticides on leaves.
- Material wiped from surfaces to detect contamination or drift onto cars, windows and similar surfaces.
- Air, water or soil.
- Clothing worn by affected workers.
- Dead bees, animals, birds or fish.
- Pesticide mixtures in application equipment.

DPR contracts with the California Department of Food and Agriculture Center for Analytical Chemistry to analyze samples.

When their investigations are complete, CACs send reports to DPR describing their findings. These reports describe the circumstances that may have led to incident and the effects on any exposed individuals. In their role as enforcement

agents, CACs also find out whether pesticide users complied with safety requirements. The CAC may file enforcement actions or ask local prosecutors to do so. DPR attorneys monitor and may help develop case files. DPR may prosecute administrative cases or serve on prosecution teams with county district attorneys or the California Attorney General's Office. (For information on the types of enforcement actions, see Chapter 2.) On request, DPR scientists will provide guidance to the CAC during an investigation or administrative civil penalty hearing.

DPR uses investigative reports to evaluate pesticide use patterns and trends, and to identify broader statewide or national issues. Complete, well-documented investigations establish the basis for taking appropriate enforcement actions and for determining whether an episode was pesticide-related and, if so, what the circumstances and effects were. Considering investigative and other data, DPR may adjust the restricted entry interval following pesticide application, specify buffer zones or other application conditions, or require pesticide handlers to use protective equipment that meets certain standards. Since many incidents result from illegal practices, investigations direct the attention of state and county enforcement staff to the reasons for noncompliance. Sometimes, no violation is found and changes to pesticide labels provide the most suitable mitigation measure. Since the U.S. EPA has exclusive authority to require label changes, DPR cooperates with U.S. EPA to revise instructions for pesticide users throughout the country or, alternatively, for a California-specific label. If an incident results from illegal practices, DPR or CAC staff can take enforcement action to deter future incidents.

### U.S. EPA PRIORITY EPISODES

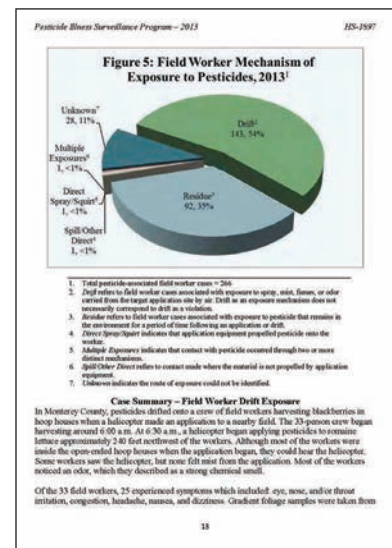
Certain episodes are considered “priority” investigations and trigger special handling under a cooperative agreement between DPR, CACs and U.S. EPA. The agreement sets criteria that define a priority episode and establishes reporting requirements and timeframes for the submission of investigation reports on these episodes. Criteria triggering priority investigation status include episodes involving death, serious illness or injury requiring in-patient hospitalization, or illness to five or more persons; aircraft accidents; significant environmental contamination; property loss; fish and wildlife kills; or episodes occurring at or near California's state, tribal or international borders.

Counties must report these episodes to DPR immediately. DPR in turn reports priority episodes to U.S. EPA, DPH, Department of Industrial Relations (DIR), the Office of Environmental Health Hazard Assessment (OEHHA) and other affected government agencies. Cooperating agencies with relevant expertise may become involved in a priority episode investigation.

### PESTICIDE ILLNESS SURVEILLANCE PROGRAM

Most pesticides are toxic to certain life forms by design. Pesticides also have the potential to cause adverse health effects on humans and other non-target species. Health effects may result from intentional misuse, unintentional exposures or use according to the product label. Pesticide handlers in the agricultural, retail food and service industries are most likely to face exposure to pesticides given the nature of their frequent contact with pesticides, including sanitizers. However, people can be exposed to pesticides in water, soil and air because of misuse or drift from sprayed areas, whether from agricultural fields or in office workplace settings. People may also face exposure from home-use pesticides or residues in food or drinking water.

Scientists from DPR's Pesticide Illness Surveillance Program (PISP) evaluate information gathered by CACs during their illness investigations to determine the likelihood the pesticide(s) caused the resulting symptoms. California has the



A page from 2013's PISP report. California has the nation's longest-standing and comprehensive program to investigate, track and evaluate pesticide illnesses.



*Adequate analytical technique is essential ... in securing accurate information on dosages, dilutions, and applications of the chemicals and in following the fate of chemicals in mixtures and as residues on treated plants. ...*

— 1945 California Department of Agriculture annual report

nation's longest-standing and comprehensive program to investigate, track and evaluate pesticide illnesses.

DPR collects information on adverse effects resulting from any component of a pesticide product, including the active ingredients, inert ingredients, impurities and breakdown products. Health effects evaluated include not only classic toxic effects but also illnesses that occur when products act as irritants or allergens, make people ill with their odor, or cause fires or explosions.

Illness episodes may be use-related or not use-related, and occupational or non-occupational. Use-related pesticide exposures result from pre-application (mixing/loading), application and post-application activities. Examples are mixing, loading and applying pesticides (including antimicrobials), operating equipment to move fumigated commodities, workers exposed to pesticide residue in fields and offices, exposure to pesticide drift, or cleaning spray equipment.

Occupational, use-related episodes affect people who were at work when they were exposed. They may be pesticide handlers, field workers, office workers, or others exposed to residue or drift from a pesticide application. Non-occupational, use-related illnesses are those that affect bystanders, for example, residents of homes affected by pesticide drift from nearby fields.

Non-use related exposures occurring at work fall under the jurisdiction of the Department of Industrial Relations (DIR). Non-use related exposures result from activities incidental to other tasks, such as: 1) pesticide manufacturing, formulating and packaging, 2) commercial transport and storage, 3) emergency response to fires and spills, or 4) exposure at disposal sites. Although non-use related exposures may be outside DPR/CAC jurisdiction, involvement by the commissioner or DPR may be requested because of their knowledge about pesticide toxicology, effects and hazards.

Records of pesticide-related illnesses and injuries among California workers have been maintained by various state agencies since the beginning of the 20th century, first by DIR and then DPH. In 1972, the Legislature gave the Department of Agriculture primary authority over the safety of pesticide use in the agricultural workplace. In 1988, the regulations were revised to cover other, nonagricultural workplaces where pesticides are used (except for exceptions under DIR jurisdiction). In 1991, with the creation of CalEPA, authority for regulating pesticide use was moved to DPR.

Since 1971 (Chapter 1415, Statutes of 1970), California law has required physicians to report all pesticide-related illnesses or injury to the local health authority, usually a county department of health. The law applies to all types of pesticides (for example, insecticides, herbicides and disinfectants) and to any location (such as farm, home or office). The health officer must send copies of the pesticide illness report to the county agricultural commissioner, OEHHA and DPR. Although DPR receives some illness reports from direct physician reporting, most come through the workers' compensation program or the California Poison Control System (CPCS).

In California, any employed person may visit a doctor and report that an illness or injury occurred on the job. DPR has a formal agreement (a Memorandum of Understanding) with DIR and DPH which allows WHS scientists to regularly review workers' compensation reports and select for investigation by the agricultural commissioners any report that mentions a pesticide or suggests a chemical likely used as a pesticide as a possible cause of injury. From 1983 through 1998, review of workers' compensation reports identified most cases investigated.

In 1999, through a contract with DPR, the California Poison Control System began aiding in pesticide illness reporting by offering to report on behalf of physicians who call CPCS for consultation on pesticide-related illness and injuries. Cooperation with CPCS identified hundreds of symptomatic exposures—primarily

non-occupational—that otherwise would have escaped detection. The 2002 state budget crisis prevented continuation of the contract after federal funding ended. When DPR's financial footing improved, the department renewed its contract with CPCS in 2006. DPR also continues to work with OEHHA in its efforts to not only provide the healthcare community with information on pesticide safety but to also increase their awareness of pesticide illness reporting requirements.

Information gathered through investigation can be used to detect whether particular populations are at greater risk or whether there are activities associated with overexposure that can be adjusted to prevent illness. Evaluation by PISP scientists can reveal a pattern of problems associated with a particular pesticide active ingredient or a product formulation. Investigation can discover whether a pesticide made someone ill despite use according to the pesticide label, whether it was because of a violation of label instructions, or whether the label instructions were unclear, confusing or inaccurate. This information can be used to find out if the product was used inappropriately or whether changes are needed in label instructions, product design, or personal protective equipment to prevent more illnesses.

As part of DPR's program to continuously evaluate pesticides in use, scientists regularly consult the illness data to evaluate the effectiveness of DPR's pesticide safety programs and assess the need for changes. (*For more information on continuous evaluation, see Chapter 4.*) New regulatory initiatives may spring from analysis of the cumulative database or in direct response to illness episodes. For example, DPR traced a series of field worker illnesses in the 1980s to propargite exposure. In response, DPR extended the restricted entry interval beyond what was on the U.S. EPA-approved product label.

In 1988, a series of illnesses among vineyard workers prompted an in-depth field study by WHS scientists. They found that in late summer, residues of the insecticide methomyl dissipated slower than expected. This prompted DPR to adopt regulations extending the restricted-entry intervals from seven days to 21 days after July 1 each year.

In 2010, DPR received reports of two workers exposed intermittently to methyl bromide over several months as part of their job inspecting produce in a cold-storage facility. The imported produce had been fumigated earlier at the Port of Los Angeles, as required by U.S. law. After this incident, DPR conducted air monitoring at produce storage facilities and in transport trailers and determined that methyl bromide can off-gas for several days after fumigation and build up to potentially harmful levels in storage or transport. DPR worked with U.S. Department of Agriculture, U.S. EPA, the Los Angeles CAC, cold storage operators, fumigators, Chilean grape growers and import firms to develop new work practices to reduce post-fumigation exposure and prevent worker illness.

WHS has prepared annual summaries and analyses of reported pesticide illnesses since 1973. Annual summaries since 1996 are posted on DPR's website. In 2009, DPR launched a web-based search engine of the illness database. The California Pesticide Illness Query, or CalPIQ, includes illness and injury data since 1992. Users can seek data based on customized variables, including year and county where the incident occurred, whether the use was in agriculture or not, and specific pesticide by toxicity category, active ingredient or intended use.

WHS physicians and other staff are also available to consult with healthcare providers and local health authorities, often with active illness investigations. In addition, DPR staff is available to consult with the medical community about pesticide-related concerns.

## EXPOSURE MONITORING STUDIES

For more than four decades, DPR scientists have conducted studies designed to



**DPR contracts with the California Poison Control System and uses data to track reported pesticide incidents or poisonings.**





**DPR scientists study the movement of pesticides in the air during a drone demonstration in Arbuckle in 2016.**

increase knowledge of how workers and others are exposed to pesticides and, in doing so, improve protective measures.

The WHS exposure monitoring program designs and conducts studies to characterize human exposure to pesticides in the workplace and elsewhere; evaluate new application strategies (e.g. unmanned aerial vehicles); evaluate mitigation measures; and provide data for risk assessments (*see Chapter 5 for more information on exposure assessment*) and regulatory purposes. These studies monitor various activities such as mixing, loading and applying pesticides, worker reentry into treated fields, and fumigations (soil and structural). In each situation, the goal is to identify factors influencing the degree of exposure, as well as to measure exposure.

Exposure monitoring studies help WHS scientists evaluate the effectiveness of protective clothing and equipment (e.g. gloves and respirators), engineering controls (e.g. closed mixing systems for preparing pesticides for application, enclosed cabs), and work practices in mitigating exposures.

Many methods are used to obtain data. For example, clothing worn by agricultural workers performing routine tasks is collected and analyzed to determine residue levels and estimate the amount of dermal exposure. This information identifies factors affecting transfer of a pesticide from foliage to work clothing or skin. In addition, urine and blood samples may be collected and analyzed for biological indicators of exposure. Studies may compare the effect of various application methods on worker exposure (e.g., helicopter vs. unmanned aerial vehicles). Studies involving human subjects require formal protocols approved by an independent review board.

DPR scientists also collect data on the amount of pesticide residue deposited on plants following various application methods and rates. These data allow scientists to characterize residue decay rates that may differ under varying environmental conditions. This information may be critical in determining potential worker exposures and is used in developing mitigation measures.

Besides evaluating the effectiveness of mitigation measures, exposure monitoring studies may be used directly for regulatory purposes such as setting reentry intervals, determining needed protective gear, and developing safe handling practices.

DPR scientists review pesticide exposure protocols for studies conducted in California that involve human subjects. As part of the Human Subjects Protocol Review process, DPR scientists provide feedback on the protocol to the study's principal investigator and make recommendations to WHS managers whether or not to approve the protocol. Prior to making a recommendation for approval, DPR scientists ensure the protocol meets DPR's scientific and ethical standards. DPR scientists also travel to study sites to observe the study and ensure it is conducted according to the approved protocol.

### REDUCING PESTICIDE EXPOSURE

DPR scientists develop mitigation (exposure reduction) measures when health risk assessments and risk managers determine the need to reduce the risk of potential exposure. These exposures may occur at home or in the workplace from direct contact or through air, water or food. WHS and Environmental Monitoring scientists review available pesticide data to assess public health and worker impacts of pesticide use. WHS scientists may also conduct field studies to monitor pesticide exposure to workers performing routine tasks to find out if extra protective measures are needed.

DPR bases mitigation measures on scientific data, field implementation, enforceability and risk management guidance. (*See Chapter 5 for information on exposure assessment and Chapter 6 for information on risk management.*) DPR may put

mitigation measures into place as permit conditions—protective use practices a CAC may require before issuing a permit to use a restricted material. DPR may also put mitigation measures into statewide regulations or ask registrants to revise product labeling (U.S. EPA must approve label changes). If a product is not yet registered, DPR may place conditions on registration, such as restricting use to sites where there are no exposure concerns.

Once mitigation measures are in place, WHS and Environmental Monitoring scientists coordinate implementation with other DPR branches, registrants, agricultural organizations and other stakeholders. WHS and Enforcement Branch staff train CAC staff when new mitigation measures are introduced. WHS staff meets with growers and applicators to observe applications made using the mitigation measures, to discuss any problems the measures may cause, and to check that the measures are effective. WHS staff also develops outreach materials for farmworkers and pesticide applicators, and prepares health and safety recommendations for reevaluations managed by the Registration Branch.

### INDUSTRIAL HYGIENE

WHS industrial hygienists evaluate pesticide products and labeling and recommend control methods when needed to ensure protection for pesticide users and others who may be exposed. Their evaluation includes review of labels and hazard communication literature (such as Safety Data Sheets), application work-site evaluations and on-site monitoring. They provide recommendations on engineering and administrative controls, heat stress, personal protective equipment (PPE) and airborne monitoring methods. WHS industrial hygienists evaluate equipment and workplaces after accidents in agricultural settings to help discover how incidents occurred and collaborate with other organizations to develop preventive measures. Industrial hygienists also provide PPE training to pesticide handlers and government enforcement staff, and train emergency responders who deal with pesticide exposure events.



*Reports of injury or damage from agricultural chemicals in California are investigated, partly to determine if a violation was involved, but mainly to secure information that might suggest suitable precautions that would prevent similar accidents.*

— 1953 California Department of Agriculture annual report