

**SUMMARY OF RESULTS FROM THE
CALIFORNIA PESTICIDE ILLNESS
SURVEILLANCE PROGRAM
- 2005 -**

HS-1869

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Pesticide Illness Surveillance Program – 2005

Executive Summary

The California Department of Pesticide Regulation's Pesticide Illness Surveillance Program (PISP) seeks to identify any health effect caused by pesticides. While DPR strives to collect as many individual reports on illnesses and injuries as possible, within resource constraints, our primary goals are to identify high-risk situations that warrant regulatory action; and to promote pro-active, health-protective measures, especially for those individuals who regularly face the highest pesticide exposure risks.

The 2005 PISP summary continued to capture a wide range of pesticide illnesses in California, with 1,323 cases investigated (compared to 1,238 investigations in 2004). Investigation confirmed pesticide exposure as a potential causal factor in 911 cases in 2005, compared to 828 cases in 2004.

Two significant points of interest emerge from the 2005 data. First, a full one-third of the investigations involved a single incident: A field fumigation in Monterey County allowed irritant vapors to escape into a suburban neighborhood. (See details on page 14.) The incident graphically demonstrated the potential impacts of pesticide drift, and underscored the need for strong restrictions to prevent situations that may lead to drift injuries.

The second point of interest involves a sharp decline in the number of non-occupational injury reports. Apart from the Monterey incident, only 70 non-occupational cases were investigated in 2005, nearly a ten-fold decline from some recent years.

An obvious explanation is related to DPR budget cuts four years ago. At that time, DPR was unable to take over a federally funded project with the California Poison Control System (CPCS), which monitors emergency calls for toxic exposure information. DPR annually received hundreds of CPCS-mediated pesticide illness reports until 2002, when federal funding for the

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project was exhausted. By late last year, the improved condition of DPR's budget allowed the Department to fund resumption of the project.

DPR also continues to work with the Office of Environmental Health Hazard Assessment (OEHHA) on a pilot project to improve physician reporting of pesticide cases. While state law requires such reporting, compliance has been spotty for years, despite extensive DPR efforts to inform the medical community of its responsibilities. With federal funding, DPR and OEHHA are working to integrate pesticide reporting into a statewide, internet-based system. The project now under development also involves cooperation with local health officials and agricultural commissioners in three pilot counties.

The number of suspected pesticide injuries to farm field workers in 2005 – 132 cases involving drift, 28 residue -- declined in comparison to 2004, with 180 and 68 cases, respectively.

This continues a long-term decline since the 1980s, when more than 350 workers were injured in some years. However, DPR continues to seek further improvements in field safety, such as worker notification rules.

Background on the Reporting System

The California pesticide safety program, which the Department of Pesticide Regulation (DPR) administers, is widely regarded as the most stringent in the nation. Mandatory reporting of pesticide¹ illnesses has been part of this comprehensive program since 1971. It is the oldest and largest program of its kind in the nation, and supplies data to regulators, advocates, industry, and individual citizens.

The U.S. Environmental Protection Agency (U.S. EPA) and the National Institute for Occupational Safety and Health (NIOSH) have encouraged other states to develop programs similar to California's. Through NIOSH's Sentinel Event Notification System for Occupational Risk (SENSOR), they now partially support programs in the states of Michigan, New York, and Washington. SENSOR also provides technical assistance to the states of Arizona, Florida, Louisiana, New Mexico, Oregon, and Texas. In addition, it supports pesticide-related work by the Occupational Health Branch of the California Department of Health Services, which coordinates with DPR's Worker Health & Safety (WHS) Branch. U.S. EPA continues to rely heavily on California data for evidence of pesticide adverse effects because of the large size and long historical perspective of the database.

DPR scientists participate in the national working group on pesticide illness surveillance that NIOSH convened to develop standards for information collection. DPR's 1998 expansion of the Pesticide Illness Surveillance Program (PISP) database incorporated several features from the NIOSH standards. These upgrades have been applied to all data collected from 1992 through the present. Data earlier than 1992 have not been revised to incorporate the 1998 database upgrades, and will be presented only when historical perspective is important.

¹ "Pesticide" is used to describe many substances that control pests. Pests may be insects, fungi, weeds, rodents, nematodes, algae, viruses, or bacteria -- almost any living organisms that cause damage or economic loss, or transmit or produce disease. Therefore, pesticides include herbicides, fungicides, insecticides, rodenticides, and disinfectants, as well as insect growth regulators. In California, adjuvants are also subject to the regulations that control pesticides. Adjuvants are substances added to enhance the efficacy of a pesticide, and include emulsifiers, spreaders, and wetting and dispersing agents.

Excessive exposure to pesticides may cause illness by various mechanisms, and the surveillance program attempts to monitor all of them. Every pesticide active ingredient has a pharmacologic effect by which it controls its target pests. Pesticide products may have other potentially harmful properties in addition to the qualities designed to control pests. PISP collects information on any adverse effects from any component of pesticide products, including the active ingredients, inert ingredients, impurities, and breakdown products. DPR has a mission to mitigate any pesticide exposure that compromises health. This applies to products that affect health by acting as irritants or as allergens, through their smells or by causing fires or explosions, as well to classical toxic effects.

Sources of Illness Information

Under a statute enacted in 1971 and amended in 1977 (now codified as Health and Safety Code section 105200), California physicians are required to report any suspected case of pesticide-related illness or injury (whether it occurred on a farm, in a home, or in any other situation) by telephone to the local health officer within 24 hours of examining the patient. Each California county has a health officer with broad responsibility for safeguarding public health, and a few cities have chosen to have their own health officers. These officials may investigate pesticide incidents to whatever extent they find useful. The law only requires them to inform the county agricultural commissioner (CAC), to complete a pesticide illness report (PIR), and to distribute copies of the PIR to the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Industrial Relations (DIR), and DPR.

DPR strives to ensure that the PISP captures the majority of significant illness incidents and records them in its database. To identify pesticide cases that may go unreported by doctors, DPR has negotiated a memorandum of understanding with DIR and the California Department of Health Services, under which scientists review Doctor's First Reports of Occupational Illness and Injury (DFROII), documents that California's Labor Code requires workers' compensation claims payers to forward to DIR). Scientists select for investigation any DFROII that mentions a pesticide, or pesticides in general, as a possible cause of injury. Reports that mention unspecified chemicals are also investigated if the setting is one in which pesticide use is likely. From 1983 through 1998, DFROII review identified the majority of the cases investigated.

From 1999 through 2002, the California Poison Control System (CPCS) facilitated pesticide illness reporting. Funds from U.S. EPA supported development of an enhanced system of poison control facilitation, which operated from mid-2001 through November 2002. As DPR received increasing numbers of case reports through CPCS, the fraction located by DFROII review fell first to one-third and finally to one-fifth of all investigations. Cooperation with CPCS identified hundreds of symptomatic exposures that otherwise would have escaped detection, but the State's fiscal crisis prevented continuation of the contract after federal funding ended. Since the contract with CPCS lapsed, DFROII review has become more prominent again, although the majority of 2005 cases were identified outside of the usual reporting channels. DPR contracted with CPCS to facilitate illness reporting in October 2006.

DPR cooperates with OEHHA in broader efforts to improve reporting timeliness and completeness. A federal grant to OEHHA, DPR, and the California Environmental Protection Agency supports a set of initiatives for this purpose. Ultimately, this grant will support integration of pesticide illness reporting into the system by which doctors file other required reports. The California Department of Health Services has undertaken a software development project, WebCMR, to support physician report submission via the Internet. This project has been delayed; but when it is complete, doctors will be able to enroll in a system that gives them access to a website that complies with the security requirements of the Health Insurance Portability and Accountability Act. This site will accept reports on all conditions that doctors must report, including pesticide illness cases. The site will also feature links to resources related to the condition being reported. DPR has collaborated with OEHHA to identify critical information to collect and the most useful resources to offer. While awaiting development of the statewide system, OEHHA and DPR are working with San Diego, Monterey, and Fresno counties to pilot test computer systems to coordinate reporting and investigation of pesticide-related incidents.

The agricultural commissioners of the counties where exposures occurred investigate all identified incidents, whether or not they involved agriculture. They attempt to locate and interview all the people with knowledge of the pesticide exposure event, and also review relevant records. Their investigations determine how exposure occurred, characterize the subsequent illnesses, and determine whether pesticide users complied fully with safety requirements. DPR

provides instructions, training, and technical support for conducting investigations. These instructions include directions for when and how to collect samples of foliage, clothing, or surface residues to document environmental exposures. As part of the technical support, DPR contracts with a specialized laboratory to analyze the samples. In 2005, DPR's PISP scientists and Enforcement Branch staff completed a joint effort to update and consolidate the investigation manual that all CACs use. Among other enhancements, the revised manual provides guidance in developing plans for conducting illness investigations and in writing clear and complete narratives to record investigation results. The manual also incorporates a protocol for investigating public exposure episodes involving large numbers of people, and documents DPR's policy on complaints or illnesses related to odor. The policy recognizes that odor detection inherently demonstrates exposure, and states that such reports must be investigated seriously.

The CACs prepare reports describing the circumstances in which pesticide exposure may have occurred and any other relevant aspects of the case. When appropriate, they request authorization from the affected people to include relevant portions of their medical records with the report. Medical record authorizations comply with the Health Insurance Portability and Accountability Act (HIPAA) and always include commitments to maintain confidentiality. When investigations identify affected people not previously reported by other mechanisms, those people are identified in the investigation report and recorded in the PISP database. DPR scientists evaluate the physicians' reports and all the information the CACs have gathered. They then classify incidents according to the circumstances of pesticide exposure.

DPR evaluators undertake a complex evaluation of medical records and investigation reports to determine the likelihood that a pesticide exposure caused the incident. Standards for the determination are described in the PISP program brochure, "Preventing Pesticide Illness," which can be viewed or downloaded from the DPR Web site at <http://www.cdpr.ca.gov/docs/dprdocs/pisp/brochure.pdf>.

Purpose of Pesticide Illness Surveillance

DPR maintains its surveillance of human health effects of pesticide exposure in order to evaluate the circumstances of pesticide exposures that result in illness. The PISP database provides the means to identify high-risk situations warranting DPR action, including implementing additional California restrictions on pesticide use. For example, taking illness data into consideration, 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.

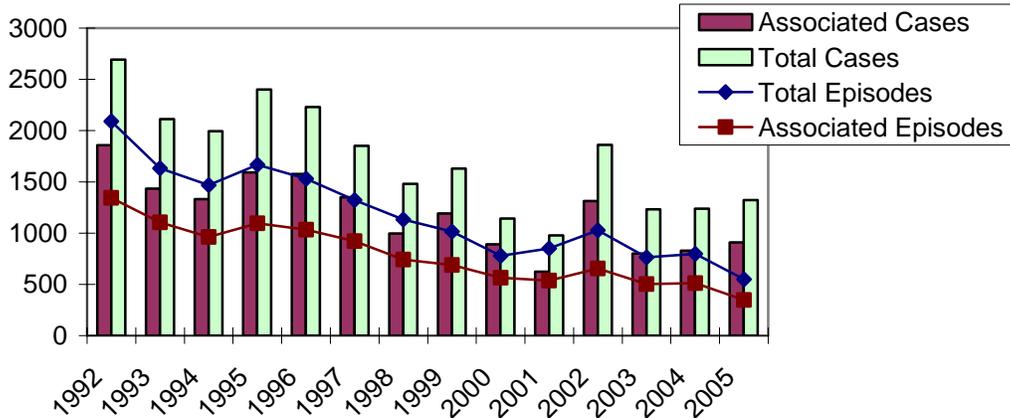
DPR scientists regularly consult the data collected to evaluate the effectiveness of DPR's pesticide safety regulatory programs and assess the need for changes. During 2005, PISP data were incorporated into exposure assessments and reviewed to inform mitigation proposals and discussions with pesticide registrants. PISP data provided the basis for a review of pyrethroid effects prepared by WHS scientists during 2005 and published by Reviews of Environmental Contamination and Toxicology in 2006 (Spencer and O'Malley, 2006).

In some instances, changes to pesticide labels provide the most appropriate mitigation measures. DPR cooperates with U.S. EPA to develop appropriate instructions for users throughout the country. If an illness incident results from illegal practices, state and county enforcement staff take appropriate action to deter future incidents.

2005 Numeric Results – Totals

In 2005, DPR and CACs investigated 1,323 cases (see Figure 1), including 440 identified by the Monterey CAC following a release of chloropicrin from a field fumigation (described in the section on drift). This is consistent with the total of 1238 (DPR 2005) investigated in 2004. Apart from the Monterey episode, there were 70 instances of suspected non-occupational exposure identified for investigation, of which only 35 proved at least possibly related to pesticide exposure, while 20 could not be evaluated.

Figure 1: Number of Cases vs. Number of Episodes, 1992 - 2005



A case is the Pesticide Illness Surveillance Program representation of a person whose health problems may relate to pesticide exposure.

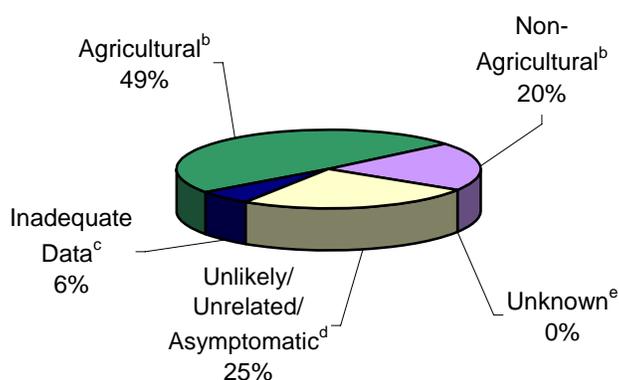
An episode is an event in which a single source appears to have exposed one or more people (cases) to pesticides.

Associated cases are those evaluated as definitely, probably, or possibly related to pesticide exposure. A definite relationship indicates that both physical and medical evidence document exposure and consequent health effects. A probable relationship indicates that limited or circumstantial evidence supports a relationship to pesticide exposure. A possible relationship indicates that evidence neither supports nor contradicts a relationship.

Associated episodes are those in which at least one case was evaluated as associated.

Of the 1,323 cases investigated, DPR found that pesticide exposure had been at least a possible contributing factor to 911 (69 percent). Evidence established an unlikely or unrelated relationship to pesticide exposure for 336 (25 percent) of the 1,323 cases assigned for investigation, including 114 individuals (9 percent) who denied experiencing health effects. Lack of information prevented evaluation of 76 (6 percent) (Figure 2).

Figure 2: Outcome of 2005 Illness Investigations^a



^a Total cases investigated = 1323.

^b *Agricultural* and *Nonagricultural* refer to the intended use of the pesticide.

^c *Inadequate* means that there was not enough data available or reported to determine if pesticides were involved in the case.

^d *Unlikely/Unrelated/Asymptomatic* refers to cases determined as unlikely related or unrelated to pesticide exposure or the exposed person did not develop symptoms.

^e *Unknown* refers to a single case possibly related to exposure to agricultural pesticides and/or to a non-agricultural pesticide.

Of the 911 cases recognized as definitely, probably, or possibly related to pesticide exposure, 647 (71 percent) involved use of pesticides for agricultural purposes (i.e., intended to contribute to production of an agricultural commodity, including livestock) and 263 (29 percent) involved pesticide exposure in other situations, such as structural, sanitation, or home garden use, in the manufacturing process, or during storage. One case could not be classified as agricultural or non-agricultural. That case concerned a vector control worker who developed eye irritation while applying a mosquito larvicide in a treated field. Although it is far from certain that any pesticide contributed to this case (the worker himself suspected a plant allergy), we cannot exclude the possibility of some contribution from (agricultural) field residue and/or the (non-agricultural) material that the affected worker applied.

Evidence established a definite relationship to pesticide exposure for 89 (10 percent) of the 911 definite, probable, and possible cases. Another 678 (74 percent) were classified as probable, with 144 (16 percent) entered as possible. Tabular summaries presenting different aspects of the data

are available through DPR's Web site at www.cdpr.ca.gov/docs/dprdocs/pisp/2005pisp.htm, or by contacting the WHS Branch.

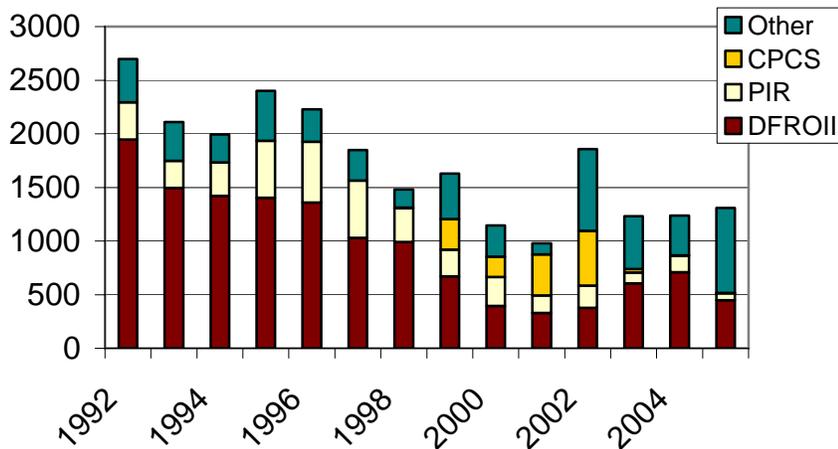
Enforcement actions often are still under consideration when DPR receives the illness investigative reports, and identification of violations is difficult. Based on the information available at the time of evaluation, WHS scientists concluded that factors already prohibited by pesticide labels and safety regulations contributed to 615 (68 percent) of the 911 cases evaluated as definitely, probably, or possibly related to pesticide exposure. This includes all 324 people who developed symptoms attributed to chloropicrin in the Monterey field fumigation episode (described in the section on drift) and another 175 people affected by apparent violations during or following other agricultural uses of pesticides. In the other 148 cases connected to agricultural pesticide use (23 percent), investigations did not identify violations that contributed to exposure. Further evaluation of these cases is needed to determine if additional safety requirements are needed. In circumstances other than agricultural use, evaluators determined that violations contributed to 116 (44 percent) of the 263 definite, probable or possible cases. No violations were identified in the case of the vector control worker potentially exposed to both agricultural and non-agricultural pesticides as he applied larvicide in a treated field.

Occupational exposures (those that occurred while the affected people were at work) accounted for 552 (61 percent) of the 911 pesticide-associated cases from 2005. One 2005 case could not be classified as occupational or non-occupational. It was not clear whether the affected person was waxing her own tractor when exposed to drift or working at an assigned task.

Occupational exposures typically predominate among the cases PISP collects, reflecting the importance of DFROIs (workers' compensation documents) for identifying cases. DPR has tried to develop supplementary methods for finding pesticide cases that doctors neglect to report, but DFROII review has been the only consistently productive mechanism. Figure 3 shows that historically, DFROII retrievals identified more cases than any other source, providing reasonably effective surveillance of occupational exposures.

Figure 3 also shows increasing case identification outside of the usual pathways (PIR and DFROII) in recent years. Since PIRs and DFROIIs come only from medical care providers, they cannot be filed unless the affected people consult doctors. In recent years, episodes in which pesticides escape into populated areas have become more prominent. Many people may incur low-level exposures in such events, but few may seek medical care. Such episodes come to the CACs’ attention via emergency response contacts, news reports, or direct citizen complaints. CACs also locate some additional cases in the course of investigating reported illnesses.

Figure 3: Mechanisms that Identified Cases for Investigation



DFROII – Doctor’s First Report of Occupational Illnesses and Injury (Workers’ Compensation document).
PIR – Pesticide Illness Report (physician reporting in compliance with Health and Safety Code 105200).
CPCS – California Poison Control System (facilitated physician reporting).
Other – All other methods of case identification. Including citizen complaints, contacts by emergency responders, and news reports.

Agricultural Field Worker Incidents

In 2005, 162 cases of field worker illness or injury were evaluated as definitely, probably or possibly related to pesticide exposure (Figure 4). Twenty-eight of them (17 percent) were exposed to pesticide residue, and 132 (81 percent) were exposed to drift. One field worker was sprayed in the face with diluted metam-sodium as he passed a chemigation sprinkler that had lost

its guard. Another worker in a treated field saw a cloud of sulfur dust from an application to an adjacent field, so could have been exposed to residue, drift, or both.

Drift exposure definitely affected one worker, probably caused or contributed to symptoms experienced by 113 workers, and was a possible factor in 18 field worker cases. In the largest of the episodes affecting field workers, a Kern County sprinkler application of metam-sodium gave off an odor that apparently affected at least 42 workers in nearby vineyards. The workers were not available for interview; but WHS scientists arranged to distribute questionnaires with their paychecks, and 42 of the workers returned responses. One worker went on to develop a very serious form of pneumonia. WHS's clinical consultant interviewed this worker's husband and reviewed her medical records.

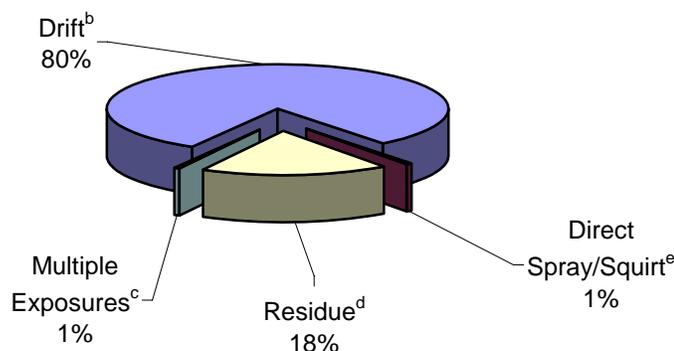
Another 27 vineyard workers in Kern County developed symptoms when they smelled the odor from an application of insecticides (cyfluthrin, spinosad, and oil) to an adjacent citrus orchard. WHS scientists participated in the investigation and collected samples of foliage and clothing (Spencer, 2006); chemical analysis detected pesticide residue only in a sample taken within the orchard being treated. The result failed to document exposure, but the vineyard workers still may have reacted to some attribute of the pesticides (most probably the odor). All 27 field workers, and the six emergency responders who developed transient symptoms while assisting them, were evaluated as having symptoms probably related to their exposure.

The other 63 field workers definitely, probably, or possibly affected by drift exposures included two groups of 13 workers and five groups ranging in size from two to 11 workers, as well as six incidents that affected just one person. Violations of pesticide safety regulations were identified in 10 drift episodes in which 93 field workers were definitely, probably or possibly affected.

Three of the 28 residue exposures were evaluated as probably related to reported health effects; the other 25 field worker residue exposures were evaluated as possibly related. Violation of a restricted entry interval was a factor in the eye irritation experienced by an irrigator who entered the field to repair equipment. Use above label rate contributed to the rash a field packer developed after washing radicchio in an insufficiently diluted antimicrobial solution. Non-

contributory violations were identified in four episodes involving a total of six workers. Except for one group of three workers and one group of two, field residue episodes affected one worker each.

Figure 4: Field Worker Exposure to Pesticides, 2005^a



^a Total field worker cases associated with pesticide exposure = 162.

^b Drift refers to field worker cases associated with exposure to drift from a pesticide application.

^c Multiple Exposures refers to contact with pesticides through two or more mechanism

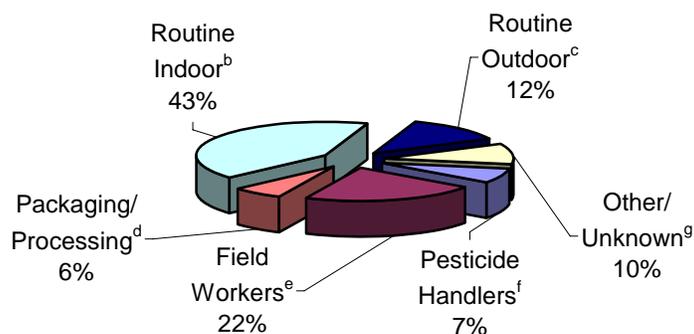
^d Residue refers to field worker cases associated with exposure to residue of previously applied pesticides.

^e Direct Spray/Squirt refers to contact made when the pesticide is propelled from handling equipment (e.g., direct spray).

Drift Exposure

The PISP defines drift exposure as exposure to pesticide “spray, mist, fumes, or odor carried from the target site by air.” This definition includes the offsite movement of pesticides after they have been deposited at the target site, so long as the application remains in progress. It also includes exposures of pesticide handlers in which air movement carried the pesticide and caused exposure. In 2005, DPR recorded a total of 615 individuals who reported symptoms evaluated as definitely, probably, or possibly related to exposure to drift (Figure 5) in 96 separate episodes. Agricultural pesticide use was found responsible for 45 percent of the episodes and 91 percent of the affected people (43 episodes, 558 cases), including one episode in which investigation identified 324 affected people. Non-agricultural exposure situations accounted for 53 episodes in which 57 people (including 33 pesticide handlers) experienced effects evaluated as definitely, probably, or possibly related to airborne pesticide exposure.

Figure 5: Illness Associated with Pesticide Drift, by Activity, 2005^a



^a Total drift cases for 2005 = 615.

^b Routine Indoor includes people in offices and businesses, residential structures, etc. (occupational and non-occupational) who were not handling pesticides.

^c Routine Outdoor includes people outdoors (occupational and non-occupational) with little expectation of contacting pesticides (e.g., gardeners not handling pesticides, residents)

^d Packaging/Processing includes people involved in processing harvested crops..

^e Field Workers are people working in agricultural fields at the time of drift exposure

^f Handlers include people mixing, loading and applying pesticides, repairing pesticide equipment and flagging for aerial application.

^g Other/Unknown – Any other type of activity or unknown activity.

DPR learned of nine 2005 events in which ten or more people reported health effects evaluated as definitely, probably, or possibly related to airborne exposure to agricultural pesticides. The largest episode occurred in Monterey County following an application of chloropicrin through a drip irrigation system to beds covered in plastic. The drip line was then flushed with water, and more water was applied to the field by sprinkler to supplement the barrier. Similar applications had been made nearer to homes on preceding days, and had caused no problems. That evening, local residents noticed an odor and developed symptoms, primarily eye irritation. Nearby weather stations recorded light winds (2 - 3 mph) blowing from the field toward the affected residential neighborhood. Investigators canvassed the neighborhood and sent explanatory letters to 1,163 addresses in the area. Four hundred forty potentially exposed individuals were identified. Of those, DPR scientists evaluated the symptoms reported by 324 people as at least possibly related to pesticide exposure, including 303 evaluated as probable.. Judging from odor

complaints and illnesses, detectable levels of chloropicrin moved two to three miles from the field.

After this episode, the application system was tested using dye to represent the fumigant. Dye was still visible in the irrigation water after the lines were flushed for the same length of time as was done after the application. This suggests that fumigant remained in the supposedly clean water applied to help confine the fumigant. The grower agreed to a civil settlement with the District Attorney and was ordered to pay approximately \$180,000: \$26,000 in penalties, \$65,000 in remedial costs associated with compliance, \$39,000 in reimbursement to agencies that responded to the release, and \$50,000 to support annual training for agricultural pesticide users in the county.

Apart from the Monterey chloropicrin episode, which affected residents otherwise unconnected to the application (and at least one fire fighter who responded to calls about the problem), drift exposure was evaluated as definitely, probably, or possibly related to health effects reported by 132 field workers, 39 workers processing harvested produce, 38 people engaged in routine indoor activities when exposed, 19 people engaged in routine outdoor activities, 17 people involved in activities not adequately described by any of the defined categories, and two whose activities were not known. Additionally, 44 pesticide handlers were definitely, probably, or possibly affected by airborne exposure to the pesticides they handled. Such exposures are recorded as drift. Of the 44 pesticide handlers exposed via drift, 11 worked in agriculture.

Morbidity and Mortality

Among the 767 cases evaluated as definitely or probably related to pesticide exposure, nine people were admitted to hospitals and 63 lost time from work. Of the 144 possible cases, none reported hospitalization and 30 lost work time.

DPR and CACs investigated eight deaths in 2005. Pesticides were strongly implicated in four of the deaths, and excluded as causes in three. One case could not be evaluated.

The deaths included those of three professional pesticide applicators, two of which clearly had non-pesticide causes: A structural pest control worker died of a massive heart attack as he began to loosen the tarp from a fumigated building, before any significant potential for exposure. Another applicator death occurred when an application vehicle fell and crushed the applicator as she unloaded it from a trailer onto unsecured planks. The victim had not handled any pesticides likely to impair judgment. The third involved an aerial applicator who died in a crash. Potential pesticide contribution could not be evaluated in this case, since (despite the CAC's repeated requests) the decedent's cholinesterase level was not tested.

No pesticide link was found in the death of a man who worked for an agricultural chemical company after having been treated for cancer. His family sued the employer and did not cooperate in the investigation. Since he worked at a facility that handled only fertilizers and no pesticides, we concluded that pesticides were not involved.

Of the four pesticide-related deaths, one was a suicide. The victim stated repeatedly that she had drunk Round-Up for the purpose of ending her life. No one else ever saw the bottle, however, and no test identified the toxicant. The clinical course was consistent with massive exposure to Round-Up (specifically, according to a poison control consultation, to a surfactant in the formulation), although some clinical features suggested another toxicant may have been present. The other three deaths were caused by fumigants:

Structural pest control workers returned to check a San Diego County apartment building about three hours after introducing fumigant. They were shocked to hear noises and see movement behind the tarpaulin. They lifted the tarp and helped a disheveled woman out. She was taken directly to a hospital, where she quickly lapsed into a coma and died within hours. In retrospect, workers remembered perplexing changes in her room during the time that they searched the building to verify that it was vacant. No fully consistent sequence of events could be determined, but the cause of death was unquestionably sulfuryl fluoride inhalation. WHS asked the county Environmental Health Department to collect air samples in the apartment building. The next day, six samples were taken in and around the apartment the victim had occupied. Laboratory analysis

detected a sufficient amount of chloropicrin in each to cause painful eye irritation within seconds of exposure (Schneider, 2005).

The other two fatalities involved a group of three young people who entered the United States from Mexico without documentation. They were told that a certain freight train would go to the city where the one of them had family. They climbed onto that train, and pried open the hatch of a car filled with rice. In the dark, they did not see the placards (in both English and Spanish) that warned of fumigation. They noticed no unusual odor, and kept the hatch nearly shut to avoid detection. After about half an hour, they began to vomit, but remained in the car. They left the train in Riverside County after traveling for two or three hours. At that time, the first to enter the car was barely conscious, and soon became unconscious. One companion carried her, while the other followed, gravely ill. They stopped a taxi and were taken to the family home. An ambulance took the youths to a hospital from there. One person was pronounced dead on arrival, and another died the next day. The last to enter the rail car, who presumably rode closest to the hatch, survived and was released after eight days of intensive treatment. Investigators measured 2.5 parts per million of phosphine in the air of the compartment they had occupied, approximately double the maximum concentration to which workers may be exposed for up to 15 minutes.

No children are known to have suffered life-threatening illness from pesticide exposure in California in 2005.

Examples of the Importance of Safe Pesticide Practices

Several 2005 cases illustrate aspects of respiratory sensitivity: An asthmatic food service worker was hospitalized for five days to regain control of her condition, which flared up after she smelled a strong bleach odor. In this incident, a co-worker used bleach to sanitize a food service line. That worker had no trouble handling the bleach, but her sensitive colleague needed hospital care.

A two-year-old spent time in the hospital following exposure to a pesticide used to promote hygiene. His mother was preparing to refill their swimming pool's chlorinator when she was

momentarily distracted. In that moment, the toddler put his mouth over the mouth of the jar of tablets, and inhaled the vapors that had collected. He began coughing; and by the time his mother got him to the hospital, he was visibly pale and breathing hard. He responded well to treatment in the emergency room, and developed no problems during two days of observation in the hospital. When interviewed, his mother reported complete recovery.

Among a group of field workers exposed to a nearby metam-sodium application, one apparently had an unsuspected type of vulnerability. This worker had not previously had respiratory problems, but she reported a strong odor, eye and throat irritation, and nausea and vomiting while working next to the treated field. Two days later, she went to a clinic with continuing respiratory complaints. She received treatment for pneumonia, but her condition deteriorated over the following week. She was admitted to the hospital, where specialists determined that her pneumonia was caused not by bacteria, but by the fungus *Coccidioides immitis*. This condition is known as “valley fever”, because the fungus is prevalent in the dust of the San Joaquin Valley. This fungal infection requires treatment with highly toxic medications. The worker was on a respirator for weeks, but ultimately recovered enough to leave the hospital. No hard evidence links this worker’s pesticide exposure to development of valley fever. It is essentially certain that the fungus was already present in the worker’s system when she was exposed to metam-sodium. The coincidence raises the concern, however, that the exposure may have suppressed her immune system just enough to allow the fungus to take hold.

These cases illustrate that even the most familiar products can be dangerous, and that even the most vigorous adults can be vulnerable. Using chemical products always requires caution and respect.

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**Summary of Illness/Injury Incidents
Reported in California as Potentially Related to Pesticide Exposure
Summarized Statewide and by County of Occurrence¹
2005**

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
TOTALS							
Definite	89	78	7	0	4	21	68
Probable	678	55	549	36	38	533	145
Possible	144 ⁵	8	59	42	35	93	50
Unlikely	72	1	11	45	15	58	14
Asymptomatic	114	2	105	1	6	106	8
Unrelated	150						
Insufficient	10						
Unavailable	66						
OVERALL	1323⁵	144	731	124	98	811	285
COUNTY⁶							
ALAMEDA							
Probable	8	1	0	0	7	0	8
Possible	1	1	0	0	0	0	1
Unrelated	1						
Unavailable	4						
AMADOR							
Probable	1	0	1	0	0	0	1
Unavailable	1						
BUTTE							
Definite	2	2	0	0	0	0	2
Possible	2	0	1	0	1	2	0
Asymptomatic	1	0	1	0	0	1	0
Unrelated	24						
Unavailable	2						
CALAVERAS							
Possible	1	0	0	0	1	0	1
COLUSA							
Possible	1	0	0	0	1	1	0
Unrelated	2						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
CONTRA COSTA							
Definite	2	2	0	0	0	0	2
Probable	1	0	1	0	0	0	1
Possible	1	0	0	1	0	0	1
Unrelated	2						
DEL NORTE							
Possible	1	0	0	1	0	0	1
EL DORADO							
Possible	1	0	0	1	0	1	0
FRESNO							
Definite	4	3	1	0	0	3	1
Probable	17	2	12	0	3	12	5
Possible	10	0	1	6	3	8	2
Unlikely	2	0	0	2	0	2	0
Asymptomatic	2	0	2	0	0	2	0
Unrelated	12						
Insufficient	1						
GLENN							
Possible	1	0	1	0	0	0	1
Unrelated	1						
HUMBOLDT							
Definite	1	1	0	0	0	0	1
IMPERIAL							
Probable	2	1	1	0	0	1	1
KERN							
Definite	3	3	0	0	0	1	2
Probable	78	2	68	7	1	76	2
Possible	13 ⁵	2	3	5	3	10	2
Unlikely	3	0	0	1	2	2	1
Asymptomatic	7	2	5	0	0	7	0
Unrelated	2						
Unavailable	1						
KINGS							
Definite	1	0	1	0	0	1	0
Unrelated	1						
LAKE							
Possible	13	0	13	0	0	13	0
Unavailable	2						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
LASSEN							
Probable	1	0	1	0	0	0	1
Possible	2	0	2	0	0	0	2
Asymptomatic	2	0	2	0	0	0	2
Unrelated	1						
Insufficient	4						
Unavailable	1						
LOS ANGELES							
Definite	19	16	0	0	3	0	19
Probable	30	14	10	4	2	0	30
Possible	8	0	3	4	1	1	7
Unlikely	6	0	0	6	0	0	6
Asymptomatic	4	0	0	0	4	0	4
Unrelated	20						
Insufficient	1						
Unavailable	15						
MADERA							
Probable	2	0	1	0	1	2	0
Possible	2	0	1	0	1	2	0
Unlikely	1	0	0	0	1	1	0
Unrelated	1						
MARIN							
Probable	1	0	0	0	1	0	1
Possible	1	1	0	0	0	0	1
Unrelated	10						
MENDOCINO							
Definite	2	2	0	0	0	0	2
Probable	1	1	0	0	0	1	0
Unlikely	1	0	0	0	1	1	0
Unrelated	2						
MERCED							
Definite	4	3	1	0	0	4	0
Probable	23	0	9	13	1	8	15
Possible	2	0	0	2	0	2	0
Unlikely	2	0	0	0	2	2	0
Asymptomatic	2	0	1	1	0	1	1
Unrelated	8						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
MONTEREY							
Definite	2	1	1	0	0	2	0
Probable	316	0	309	4	3	309	7
Possible	26	1	22	1	2	24	2
Unlikely	10	0	10	0	0	10	0
Asymptomatic	92	0	92	0	0	92	0
Unrelated	3						
Unavailable	16						
NAPA							
Definite	2	2	0	0	0	1	1
Probable	1	0	1	0	0	0	1
Possible	3	0	0	0	3	3	0
Unlikely	2	0	0	1	1	1	1
Unavailable	1						
NEVADA							
Probable	1	0	0	0	1	0	1
Insufficient	1						
Unavailable	1						
ORANGE							
Definite	4	4	0	0	0	0	4
Probable	4	0	4	0	0	0	4
Possible	3	0	0	1	2	0	3
Unrelated	8						
Unavailable	2						
PLACER							
Definite	1	1	0	0	0	0	1
RIVERSIDE							
Definite	6	6	0	0	0	3	3
Probable	6	3	2	1	0	1	5
Possible	2	0	1	0	1	1	1
Unrelated	9						
Unavailable	4						
SACRAMENTO							
Definite	3	2	0	0	1	0	3
Probable	4	1	3	0	0	1	3
Possible	3	0	0	3	0	1	2
Unlikely	1	0	1	0	0	0	1
Unrelated	5						
Unavailable	2						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
SAN BERNARDINO							
Definite	4	4	0	0	0	0	4
Probable	10	4	2	2	2	0	10
Possible	4	0	2	0	2	0	4
Unrelated	4						
SAN DIEGO							
Definite	7	7	0	0	0	0	7
Probable	23	4	16	1	2	13	10
Possible	10	1	2	5	2	3	7
Unlikely	1	0	0	0	1	1	0
Unrelated	5						
Unavailable	2						
SAN FRANCISCO							
Definite	1	1	0	0	0	0	1
Probable	2	1	1	0	0	0	2
Possible	1	0	0	0	1	0	1
Unrelated	1						
Unavailable	2						
SAN JOAQUIN							
Definite	5	5	0	0	0	1	4
Probable	7	2	3	0	2	4	3
Possible	9	1	1	4	3	6	3
Unlikely	2	0	0	2	0	2	0
Asymptomatic	1	0	0	0	1	1	0
Unrelated	5						
Insufficient	1						
SAN LUIS OBISPO							
Unrelated	3						
SAN MATEO							
Definite	1	1	0	0	0	0	1
Probable	2	0	0	0	2	0	2
Unlikely	3	0	0	0	3	0	3
Unrelated	2						
Unavailable	1						
SANTA BARBARA							
Probable	9	2	7	0	0	8	1
Unlikely	1	0	0	0	1	1	0
Unavailable	4						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
SANTA CLARA							
Definite	4	3	1	0	0	1	3
Probable	7	1	2	1	3	0	7
Possible	1	0	0	0	1	0	1
Unrelated	1	0	0	0	0	0	0
Unavailable	1	0	0	0	0	0	0
SANTA CRUZ							
Definite	1	0	1	0	0	1	0
Probable	4	0	4	0	0	2	2
Possible	1	0	0	1	0	1	0
SHASTA							
Definite	1	1	0	0	0	0	1
Probable	1	0	0	0	1	0	1
SISKIYOU							
Definite	1	1	0	0	0	0	1
Probable	1	0	1	0	0	0	1
Unavailable	1						
SOLANO							
Probable	5	2	0	0	3	0	5
Possible	1	0	0	0	1	0	1
Asymptomatic	1	0	0	0	1	0	1
Insufficient	1						
SONOMA							
Probable	6	3	1	1	1	1	5
Possible	5	0	3	2	0	3	2
Unrelated	5						
STANISLAUS							
Definite	4	4	0	0	0	2	2
Probable	9	6	2	0	1	5	4
Possible	3	1	0	0	2	2	1
Unlikely	2	0	0	0	2	1	1
Unrelated	2						
SUTTER							
Definite	1	1	0	0	0	0	1
Probable	1	0	1	0	0	1	0
TEHAMA							
Definite	1	0	1	0	0	0	1
Possible	2	0	1	0	1	2	0
TRINITY							
Unrelated	1						

Relationship ²	TOTAL CASES	Type Of Exposure ³				Intended Use ⁴	
		Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
TULARE							
Probable	59	0	58	1	0	59	0
Possible	6	0	0	4	2	5	1
Unlikely	34	0	0	33	1	34	0
Unrelated	3						
Unavailable	2						
TUOLUMNE							
Probable	1	0	0	0	1	0	1
VENTURA							
Definite	1	1	0	0	0	1	0
Probable	32	4	28	0	0	29	3
Possible	3	0	2	1	0	2	1
Unlikely	1	1	0	0	0	0	1
Asymptomatic	2	0	2	0	0	2	0
Unrelated	5						
Insufficient	1						
YOLO							
Definite	1	1	0	0	0	0	1
Probable	2	1	0	1	0	0	2
Possible	1	0	0	0	1	0	1
Unrelated	1						
Unavailable	1						

- Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.
The term “potentially related to pesticide exposure” refers to all cases reported to the program, some of which were later determined to be unrelated to pesticide exposure.
- Relationship:** Degree of correlation between pesticide exposure and resulting symptomatology.

 - Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.
 - Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
 - Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.
 - Unlikely : A correlation cannot be ruled out absolutely. Medical and/or physical evidence suggest a cause other than pesticide exposure.

- Indirect : Pesticide exposure is not responsible, but pesticide regulations or product label requirements contributed in some way, (e.g. heat stress while wearing chemical resistant clothing).
- Asymptomatic : Exposure occurred, but did not result in illness/injury. Cholinesterase depression without symptoms falls in this category.
- Unrelated : Definite evidence of cause other than pesticide exposure including exposures to chemicals other than pesticides. Since there is no exposure to pesticides, there are no entries under “Type of Exposure” or “Intended Use.”
- Insufficient : The available information is inadequate to make an informed judgment on the relationship between pesticide exposure and the reported symptomatology. For submitted investigations, the investigator failed to make an adequate attempt to obtain the necessary information. Since a relationship to pesticide exposure cannot be determined, there are no entries under “Type of Exposure” or “Intended Use.”
- Unavailable : The available information is inadequate to make an informed judgement on the relationship between pesticide exposure and the reported symptomatology. For submitted investigations, the investigator made an adequate attempt to collect the necessary information, but was not able to do so (e.g., none of the parties concerned could be contacted). Since a relationship to pesticide exposure cannot be determined, there are no entries under “Type of Exposure” or “Intended Use.”

3. Type of Exposure: Characterization of how an individual came in contact with a pesticide.

- Direct Contact : An appreciable amount of pesticide contacted the individual’s body surface. This includes: 1) sprays or squirts from application equipment; 2) leaks or spills whether or not related to the application; and 3) deliberate immersion (as when cleaning implements in a basin with antimicrobials). This excludes drift exposures.
- Drift : Spray, mist, fumes, or odor carried from the target site by air. Drift must be related to an application or mix/load activity.
- Residue : The part of a pesticide that remains in the environment for a period of time following an application or drift. This includes odor after the completion of an application.
- Other/Unknown : Any of the following: 1) ingestion; 2) multiple routes of exposure; 3) residue from a spill; 4) exposure to smoke or pyrolytic products from a fire where pesticides are burning; 5) route of exposure is not known.

4. Intended Use: Agricultural/Non-Agricultural - Indicates whether the pesticide(s) were intended to contribute to the production of agricultural commodities. This summary includes one case in which pesticide exposure could not be established as either agricultural or non-agricultural.

- Agricultural : The pesticide(s) were intended to contribute to the production of agricultural commodities, including livestock. This includes: 1) agricultural research facilities, 2) handling of raw agricultural commodities in packing houses, 3) drift from agricultural applications into non-agricultural areas, and 4) transportation and storage of pesticides on farm lands. It excludes forestry operations, although they are classified as agricultural for regulatory purposes. It also excludes manufacture, transportation, and storage of pesticides prior to arrival at the site of agricultural production.

Non-Agricultural : The pesticide(s) were not intended to contribute to the production of agricultural commodities. This includes: 1) residential pesticide uses, 2) structural pest control, 3) rights-of-way, 4) parks, 5) landscaped urban areas, and 6) manufacture, transportation and storage of pesticides except on farm lands.

5. This total includes one case in which the intended use could not be established as either agricultural or non-agricultural.
6. **County:** Individual counties in California where the incident occurred. If a county is not listed, there were no reported illnesses for that county for the year.

Whom to Contact:

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Worker Health and Safety Branch
Phone: (916) 445-4222.
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About the Pesticide Illness Surveillance Program Data

Pesticide-related illnesses have been tracked within the state of California for more than 50 years. The California Environmental Protection Agency, Department of Pesticide Regulation (DPR) maintains a surveillance program which records human health effects of pesticide exposure. The Pesticide Illness Surveillance Program (PISP) documents information on adverse effects from pesticide products, whether elicited by the active ingredients, inert ingredients, impurities, or breakdown products. This program maintains a database, which is utilized for evaluating the circumstances of pesticide exposures resulting in illness. This database is consulted regularly by staff who evaluate(s) the effectiveness of the DPR pesticide safety programs and recommend changes when appropriate.

**Cases Reported in California¹ with Documented² Pesticide Exposure
Summarized by the Type of Illness and the Type of Pesticides
2005**

Type of Illness ³	Antimicrobials ⁴		Cholinesterase Inhibitors ⁴		Other Pesticides ⁴		Total
	Occupational ⁵	Non-Occupational ⁵	Occupational ⁵	Non-Occupational ⁵	Occupational ⁵	Non-Occupational ⁵	
Systemic							
Systemic with Respiratory and Topical Effects	10	0	9	2	77	30	129⁶
Systemic with Respiratory Effects	23	0	15	1	56	6	101
Systemic with Topical Effects	4	0	4	0	32	47	87
Systemic Only	11	1	26	1	19	11	69
Respiratory							
Respiratory with Topical Effects	10	0	6	0	14	82	112
Respiratory Only	12	2	2	2	17	15	50
Topical							
Eye Only	81	0	4	0	42	155	282
Skin Only	33	1	3	0	30	1	68
Eye and Skin	4	0	0	0	8	1	13
Asymptomatic							
Asymptomatic	1	0	2	0	12	99	114
TOTAL	189	4	71	6	307	447	1025⁶

¹ Source: California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Documented Pesticide Exposure:** Includes cases classified as definitely, probably, or possibly related to pesticide exposure as well as documented pesticide exposure that did not result in symptomatology.

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Type of Illness:** Categorization of the type of symptoms experienced.

Systemic : Any health effects not limited to the respiratory, skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.

Respiratory : Health effects involving any part of the respiratory tree.

Topical : Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

Asymptomatic : Exposure occurred, but did not result in illness/injury. Cholinesterase depression without symptoms falls in this category.

⁴ **Type of Pesticide:** Type of pesticide based on functional class.

Antimicrobials : Pesticides used to kill or inactivate microbiological organisms (bacteria, viruses, etc.).

Cholinesterase Inhibitors : Pesticides known to inhibit the function of the cholinesterase enzyme.

Other Pesticides : Any pesticide that is not an antimicrobial or cholinesterase-inhibiting pesticide.

⁵ **Occupational or Non-Occupational:** The relationship between the illness/injury and the individual's work activity at the time of exposure.

Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.

Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁶ This total includes one case in which the activity could not be determined as occupational or non-occupational.

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**Illnesses and Injuries Reported in California¹ Associated With² Pesticide Exposure
Summarized by the Type of Activity and Type of Exposure
2005**

Occupational³

Type of Activity ⁴	Type of Exposure ⁵								
	Drift	Residue	Direct Spray/ Squirt	Spill/ Other Direct	Ingestion	Multiple	Other	Unknown	Total
Mixer/Loader	8	0	6	25	0	0	2	2	43
Applicator	35	0	19	49	0	2	5	24	134
Mechanical	0	0	3	3	0	0	3	0	9
Packaging/Processing	39	4	1	6	0	0	0	0	50
Field Worker	132	28	1	0	0	1	0	0	162
Routine Indoor	28	26	0	1	1	1	6	1	64
Routine Outdoor	15	0	1	0	0	0	0	0	16
Manufacturing/Formulation	0	0	0	0	0	0	0	1	1
Transport/Storage/Disposal	0	0	1	4	0	0	4	0	9
Emergency Response	1	6	0	0	0	0	3	0	10
Other	14	11	2	10	0	4	6	2	49
Unknown	1	0	0	2	0	1	1	0	5
Total Occupational Cases	273	75	34	100	1	9	30	30	552

Non-Occupational³

Type of Activity ⁴	Type of Exposure ⁵								
	Drift	Residue	Direct Spray/Squirt	Spill/Other Direct	Ingestion	Multiple	Other	Unknown	Total
Mixer/Loader	1	0	0	0	0	0	0	0	1
Applicator	0	0	0	1	0	0	0	1	2
Routine Indoor	237	1	0	1	1	0	0	2	242
Routine Outdoor	58	2	1	0	0	0	1	0	62
Other	22	0	0	3	1	0	1	0	27
Unknown	23	0	0	1	0	0	0	0	24
Total Non-Occupational Cases	341	3	1	6	2	0	2	3	358
Total Occupational/ Non-Occupational	615⁶	78	35	106	3	9	32	33	911⁶

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Occupational Status:** Occupational or Non-Occupational. This summary includes one case in which the activity could not be determined as occupational or non-occupational

Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.

Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁴ **Type of Activity:** Activity of the injured individual at the time of exposure

Mixer/Loader : Mixes and/or loads pesticides. This includes: (1) removing a pesticide from its original container, (2) transferring the pesticide to a mixing or holding tank, (3) mixing pesticides prior to application, (4) driving a nurse rig, or (5) transferring the pesticide from a mix/holding tank or nurse rig to an application tank.

Applicator : Applies pesticides by any method or conducts activities considered ancillary to the application (e.g., cleans spray nozzles in the field).

Mechanical : Maintains (e.g. cleans, repairs or conducts maintenance) pesticide contaminated equipment used to mix, load or apply pesticides as well as the protective equipment used by individuals involved in such activities. This excludes the following: 1) maintenance performed by applicators on their equipment incidental to the application; 2) maintenance performed by mixer/loaders on their equipment incidental to mixing and loading; 3) decontamination by HAZMAT teams.

Packaging/Processing : Handles (packs, processes or retails agricultural commodities from the packing house to the final market place. Field packing of agricultural commodities is classified as FIELD WORKER.

Field Worker : Works in an agricultural field performing tasks such as advising, scouting, harvesting, thinning, irrigating, driving tractor (except as part of an application), field packing, conducting cultural work in a greenhouse, etc. Researchers performing similar tasks in an agricultural field are also included.

Routine Indoor : Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.

Routine Outdoor : Conducts activities in an outdoor environment with minimal expectation for exposure to pesticides. This excludes field workers in agricultural fields. This includes gardeners who are not handling pesticides.

Manufacturing and Formulation : Manufactures, processes or packages pesticides. This includes “mixing” if it is done in a plant for application elsewhere.

Transport/ Storage/ Disposal	: Transports or stores pesticides between packaging and preparation for use. This includes shipping, warehousing and retailing as well as storage by the end-user prior to preparation for use. Disposal of unused pesticides is also included in this activity. This excludes driving a nurse rig to an application site.
Emergency Response	: Emergency Response Personnel (police, fire, ambulance and HAZMAT personnel) responding to a fire, spill, accident or any other pesticide incident in the line of duty.
Other	: Activity is not adequately described by any other activity category. This includes but is not limited to: 1) being inside a vehicle; 2) dog groomers not handling pesticides; 3) individuals handling pesticide treated wood; 4) two or more activities with potential for pesticide exposure.
Unknown	: Activity is not known

⁵ **Type of Exposure:** Characterization of how an individual came in contact with a pesticide.

Drift	: Spray, mist, fumes, or odor carried from the target site by air. Drift must be related to an application or mix/load activity.
Residue	: The part of a pesticide that remains in the environment for a period of time following an application or drift. This includes odor after the completion of an application.
Direct Spray/Squirt	: Material propelled by the application or mix/load equipment. Contact with the material can be by direct projection or ricochet. This includes exposure of mechanics working on application or mix/load equipment when the material is forced out by pressure.
Spill/Other Direct	: Any of the following: 1) Contact made during an application or mixing/loading operation where the material is not propelled by the equipment; 2) Expected direct contact during use (e.g. washing dishes in a disinfectant solution); 3) Leaks, spills, etc. not related to an application.
Ingestion	: Intentional or unintentional oral ingestion.
Multiple	: Contact with pesticides occurred through two or more mechanisms.
Other	: Other known route of exposure not included in other exposure categories. This includes, but not limited to: 1) Residue from a spill and 2) Exposure to smoke or pyrolytic products from a fire where pesticides are burning.
Unknown	: Route of exposure is not known.

⁶ This summary includes one drift case in which the activity could not be determined as occupational or non-occupational.

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**Illnesses and Injuries Reported by California Physicians¹ Associated With²
Pesticide Exposure Summarized by Pesticide(s) and Type of Illness
2005**

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Organophosphates						
Chlorpyrifos	13	0	1	0	14	0
Malathion	1	1	0	0	1	1
N-Methyl Carbamates						
Aldicarb	1	1	0	0	1	1
Carbaryl	1	0	0	0	1	0
Methomyl	0	0	2	0	2	0
Propoxur	0	0	1	0	1	0
Pyrethrins and Pyrethroids						
Bifenthrin	1	0	0	0	1	0
Cyfluthrin	3	1	0	0	3	1
Cyhalothrin	1	1	1	1	2	2
Cypermethrin	1	1	1	0	2	1
Permethrin	1	1	0	0	1	1
Other Pesticides						
Abamectin	0	0	0	1	0	1
Acetamiprid	1	0	0	0	1	0
Aluminum Phosphide	4	1	0	1	4	2
Azoxystrobin	4	0	0	0	4	0
BT Israelensis Strain AM 65-52	0	0	1	0	1	0
Benomyl	0	0	0	1	0	1
Calcium Hydroxide	0	0	1	0	1	0
Calcium Hypochlorite	1	0	0	0	1	0
Captan	0	0	0	1	0	1
Chlorhexidine Diacetate	0	0	1	0	1	0
Chloropicrin	153	21	150	0	303	21
Citric Acid	1	0	1	0	2	0
Copper Naphthenate	2	0	0	0	2	0
Copper Sulfate	0	0	1	0	1	0
Cyanuric Acid	4	1	2	1	6	2
Dazomet	0	0	1	0	1	0
Fosetyl-al	0	0	1	0	1	0
Glutaraldehyde	13	1	4	0	17	1

PISP 2005: Summary of Cases by Pesticide and by Type of Illness- Page 1

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Glyphosate	1	2	5	4	6	6
Hydrogen Chloride	1	0	1	0	2	0
Hydrogen Cyanamide	1	0	0	0	1	0
Imidacloprid	0	1	0	0	0	1
Indoxacarb	6	0	0	0	6	0
Isothiazoline Disinfectants	0	0	0	1	0	1
K Salts Of Fatty Acids	0	0	1	0	1	0
Lime-sulfur	0	0	1	0	1	0
Metam-sodium	37	1	5	1	42	2
Methoxyfenozone	0	0	0	1	0	1
Methyl Bromide	2	0	0	1	2	1
Myclobutanil	0	0	1	1	1	1
Nonanoic Acid	0	0	1	0	1	0
Ozone	5	0	0	0	5	0
Paraquat	0	1	4	0	4	1
Pendimethalin	0	1	1	0	1	1
Petroleum Oil	0	0	1	0	1	0
Phthalaldehyde	0	0	2	0	2	0
Propargite	0	0	2	0	2	0
Quaternary Ammonia	7	0	27	5	34	5
Sabadilla	0	1	0	0	0	1
Sodium Hypochlorite	20	6	44	7	64	13
Sulfur	0	3	4	3	4	6
Sulfur Dioxide	36	0	1	0	37	0
Sulfuryl Fluoride	1	1	0	0	1	1
Trichloromelamine	0	0	1	0	1	0
Triethanolamine	0	0	1	0	1	0
Ziram	0	0	0	1	0	1
Combinations of Antimicrobials	7	3	15	4	22	7
Combinations of Fumigants	13	1	14	0	27	1
Combinations of Fungicides	1	4	0	4	1	8
Combinations of Herbicides	5	4	3	2	8	6
Combinations of Insecticides Including Cholinesterase Inhibitor(s)	12	4	1	1	13	5
Combinations of Insecticides Without Cholinesterase Inhibitor(s)	55	6	2	1	57	7
Miscellaneous Combinations	36	21	2	9	38	30
Unknown Antimicrobials	2	0	2	0	4	0

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Unknown Insecticides	2	1	0	0	2	1
Unknown Pesticides	0	1	0	0	0	1
TOTAL	456	92	311	52	767	144

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Type of Pesticide:** Pesticides listed on this table are grouped according to frequent inquiries received by DPR. Other pesticides are then listed in alphabetical order.

⁴ **Type of Illness:** Categorization of the type of symptoms experienced.

Systemic : Any health effects not limited to the skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.

Respiratory : Health effects involving any part of the respiratory tree.

Topical : Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

Whom to Contact:

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About the Pesticide Illness Surveillance Program Data

Pesticide-related illnesses have been tracked within the state of California for more than 50 years. The California Environmental Protection Agency, Department of Pesticide Regulation (DPR) maintains a surveillance program which records human health effects of pesticide exposure. The Pesticide Illness Surveillance Program (PISP) documents information on adverse effects from pesticide products, whether elicited by the active ingredients, inert ingredients, impurities, or breakdown products. This program maintains a database, which is utilized for evaluating the circumstances of pesticide exposures resulting in illness. This database is consulted regularly by staff who evaluate(s) the effectiveness of the DPR pesticide safety programs and recommend changes when appropriate.

**Summary of Cases Reported by California¹ as Associated With² Pesticide
Exposure Summarized by Occupational Status and by
Location of the Incident
2005**

Incident Setting ³	Occupational Exposures ⁴		Non-Occupational Exposures ⁴		TOTAL	TOTAL
	Definite/ Probable ²	Possible ²	Definite/ Probable ²	Possible ²	Definite/ Probable ²	Possible ²
Farm	142	59	0	0	142	59
Nursery	14	4	0	0	14	4
Livestock Production Facility	8	0	0	0	8	0
Crop/Livestock Processing Facility	65	7	0	0	65	7
Animal Premise (Veterinary Hospital, Kennels, not Livestock)	7	0	0	0	7	0
Single Family Home	4	2	307	26	311	28
Multi-unit Housing	5	6	5	1	10	7
Residential Institution	3	1	0	0	3	1
School	23	1	0	1	23	2
Prison	3	0	0	0	3	0
Hospital/Medical	39	7	0	0	39	7
Pesticide Manufacturing Facility	0	1	0	0	0	1
Industrial or Other Manufacturing Facility	26	2	0	0	26	2
Wood Treatment	0	1	0	0	0	1
Office/Business	27	6	0	0	27	6
Retail Establishment	4	3	3	0	7	3
Service Establishment	39	4	0	0	39	4
Wholesale Establishment	6	0	0	0	6	0
Road/Rail Or Utility Right Of Way	9	4	4	1	13	5
Park	3	0	0	0	3	0
Golf Course	0	1	0	0	0	1
Landscape, Other	1	0	0	2	1	2
Other (Telephone Poles, Fences, Etc)	8	3	4	0	12	3
Unknown	3	1	4	0	8⁵	1
TOTAL	439	113	327	31	767⁵	144

¹ Source: California Department of Pesticide Regulation, Pesticide Illness and Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Incident Setting:** Location where the incident occurred. The location may not coincide with the application site.

Farm : Areas where agricultural crops are grown. This excludes the following: 1) nurseries and greenhouses which are classified under NURSERY; 2) livestock and poultry farms; and 3) forestry operations.

Nursery : Facilities (including greenhouses) growing and selling plants, bulbs, seeds, etc. This includes the production of seedlings for transplanting into agricultural fields or forests.

Livestock Production Facility : Ranches, dairies, feedlots, egg production facilities, hatcheries and other establishments involved in keeping, grazing or feeding livestock or poultry for the sale of them or their products. This includes veterinary services provided for livestock.

Crop/Livestock Processing Facility : Facilities involved in packing, manufacturing or processing foods or beverages for human consumption and feed products for animals and fowl. This includes facilities that sort, grade and pack fresh fruits and vegetables.

Animal Premise (Veterinary Hospital, Kennels, Not Livestock) : Veterinary services, animal kennels, animal control facilities, dog grooming facilities and other services provided for companion animals. This excludes livestock.

Single Family Home : The house and other structures on property intended for use by a single family. This includes swimming pools, but excludes landscaped areas on the property.

Multi-Unit Housing : Apartments and multi-plexes and other buildings on property. This includes swimming pools, but excludes landscaped areas on the property.

Residential Institution : Dormitories, nursing homes, homeless shelters and similar facilities.

School : Establishments that provide academic or technical instruction. This includes daycare centers.

Prison : Establishments for the confinement and correction of offenders as ordered by courts of law. This includes California youth authority facilities.

Hospital / Medical : Establishments that provide medical, surgical and other health services to people. This includes offices and clinics of doctors and dentists, hospitals, medical and dental laboratories, kidney dialysis centers and other health related facilities.

Pesticide Manufacturing Facility	: Facilities engaged in manufacture and/or formulation of pesticides.
Industrial Or Other Manufacturing Facility	: Facilities involved in the mechanical or chemical transformations of materials or substances into new products. This excludes: 1) facilities engaged in manufacture or formulation of pesticides; and 2) facilities engaged in treatment of wood to protect against pest damage.
Wood Treatment	: Establishments involved in the treatment of wood with preservatives to protect against pest damage.
Office/Business	: Commercial establishments including public and private business offices. This excludes retail establishments and service establishments.
Retail Establishment	: Businesses engaged in selling merchandise for personal or household consumption and providing services related to the products. This excludes restaurants which are classified under service establishment.
Service Establishment	: Establishments engaged in providing services to individuals, businesses and government. This includes restaurants, laundries, etc. This excludes medical service establishments.
Wholesale Establishment	: Establishments involved in the distribution of merchandise to retail establishments or other wholesale establishments. This excludes "wholesalers" who sell directly to the public.
Road/Rail Or Utility Right Of Way	: Roads, rails or utilities and adjacent right-of-way areas. This includes aqueducts, manholes, landscaped median strips and vehicles moving along roadways.
Park	: An area of public land set aside for recreation. This includes public swimming pool facilities. This excludes private recreational facilities such as amusement parks, physical fitness facilities, etc. which are classified under SERVICE ESTABLISHMENT.
Golf Course	: Land used for playing or practicing golf, including putting greens and driving ranges. This excludes miniature golf courses.
Landscape, Lawn	: Landscaped lawns. This excludes lawn areas in the following locations: 1) road/rail or utility right-of-ways; 2) parks; and 3) golf courses.
Landscape, Other	: Landscaped ornamental shrub and tree areas. This excludes ornamental shrub and tree areas in the following locations: 1) road/rail or utility right-of-ways; 2) parks; and 3) golf courses.
Other (Telephone Poles, Fences, Etc.)	: Location of exposure occurred at a site not adequately described in any other incident setting category. This includes, but is not limited to, telephone poles, fences, water supply systems and wastewater treatment plants.
Unknown	: The location of the incident is unknown.

⁴ **Occupational Status:** Occupational or Non-Occupational. This summary includes one case in which the activity could not be determined as occupational or non-occupational.

Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.

Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁵ These totals include one case in which the activity could not be determined as occupational or non-occupational.

Whom to Contact:

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About the Pesticide Illness Surveillance Program Data

Pesticide-related illnesses have been tracked within the state of California for more than 50 years. The California Environmental Protection Agency, Department of Pesticide Regulation (DPR) maintains a surveillance program which records human health effects of pesticide exposure. The Pesticide Illness Surveillance Program (PISP) documents information on adverse effects from pesticide products, whether elicited by the active ingredients, inert ingredients, impurities, or breakdown products. This program maintains a database, which is utilized for evaluating the circumstances of pesticide exposures resulting in illness. This database is consulted regularly by staff who evaluate(s) the effectiveness of the DPR pesticide safety programs and recommend changes when appropriate.

**Summary of Cases Reported in California¹ as Associated With² Pesticide Exposure Summarized by Gender, Age Distribution, by Type of Pesticide and by Type of Use
2005**

Agricultural Use Pesticide Exposure Incidents³

Age Group	Pesticides other than Antimicrobial Pesticides ⁴			Antimicrobial Pesticides ⁴			TOTAL
	Male	Female	Unknown	Male	Female	Unknown	
0 - 9	25	20	0	0	0	0	45
10 - 14	16	19	0	0	0	0	35
15 - 19	30	20	0	0	0	0	50
20 - 29	73	59	0	3	2	0	137
30 - 39	61	59	2	2	2	0	126
40 - 49	50	62	1	1	2	0	116
50 - 59	24	27	0	0	1	0	52
60 - 69	5	4	0	1	0	0	10
70 +	3	2	0	0	0	0	5
Unknown	35	35	1	0	0	0	71
TOTAL	322	307	4	7	7	0	647

Non-Agricultural Use Pesticide Exposure Incidents

Age Group	Pesticides other than Antimicrobial Pesticides			Antimicrobial Pesticides			TOTAL
	Male	Female	Unknown	Male	Female	Unknown	
0 - 9	1	0	0	1	1	0	3
10 - 14	1	0	0	1	0	0	2
15 - 19	2	0	0	4	9	0	15
20 - 29	8	8	0	27	27	0	70
30 - 39	5	5	0	15	20	0	45
40 - 49	9	15	0	24	19	0	67
50 - 59	8	2	0	14	13	0	37
60 - 69	0	1	0	1	1	0	3
70 +	0	1	0	0	0	0	1
Unknown	9	10	0	1	0	0	20
TOTAL	43	42	0	88	90	0	263

¹ Source: California Department of Pesticide Regulation, Pesticide Illness and Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Intended Use:** Agricultural/Non-Agricultural - Indicates whether the suspected pesticide(s) is intended to contribute to the production of agricultural commodities. This summary omits one case in which pesticide exposure could not be established as either agricultural or non-agricultural.

Agricultural : The pesticide(s) were intended to contribute to the production of agricultural commodities, including livestock. This includes: 1) agricultural research facilities, 2) handling of raw agricultural commodities in packing houses, 3) drift from agricultural applications into non-agricultural areas, and 4) transportation and storage of pesticides on farm lands. It excludes forestry operations, although they are classified as agricultural for regulatory purposes. It also excludes manufacture, transportation, and storage of pesticides prior to arrival at the site of agricultural production.

Non-Agricultural : The pesticide(s) were not intended to contribute to the production of agricultural commodities. This includes: 1) residential pesticide uses, 2) structural pest control, 3) rights-of-way, 4) parks, 5) landscaped urban areas, and 6) manufacture, transportation and storage of pesticides except on farm lands.

⁴ **Antimicrobial** : Pesticides used to kill or inactivate microbiological organisms (bacteria, viruses, etc.).

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**Illnesses and Injuries of Application Workers Reported by California
Physicians¹ Associated With² Pesticide Exposure Summarized by the
Type of Equipment, Type of Activity and Occupational Status
2005**

Occupational³

Type of Equipment ⁴	Type of Activity ⁵				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Fixed Wing Aircraft	3	0	0	0	3
Airblast Sprayers	1	4	0	0	5
Ground, Boom Below/Behind	0	7	0	0	7
Ground Boom, Other or Unspecified	0	1	0	1	2
Power Dusters	0	1	0	0	1
Shank Injection with Tarps	0	3	0	0	3
Shank Injection without Tarps	0	1	0	0	1
Ground, Other or Unspecified	0	6	0	0	6
Back Pack Sprayer	1	5	0	1	7
Hand Pump Sprayer	1	4	0	0	5
Pressurized Hose-Line Sprayers	2	12	0	1	15
Unpressurized Hand-held Spray Equipment	2	17	0	0	19
Aerosol Can	0	4	0	0	4
Hand, Other or Unspecified	1	8	0	0	9
Chamber	2	1	0	0	3
Automatic Equipment, Chlorinators	4	1	0	5	10
Automatic Equipment, Other or Unspecified	4	2	0	1	7
Immersion Equipment	8	12	0	0	20
Implements with Handles	0	12	0	0	12
Implements without Handles	1	3	0	0	4
Manual Placement	0	4	0	0	4
Manual Application Methods, Other or Unspecified	6	14	0	0	20

Occupational³

Type of Equipment ⁴	Type of Activity ⁵				
	Mixer/Loader	Applicator	Flagger	Mechanic	Total
Other	1	0	0	0	1
Unknown	6	12	0	0	18
Total Occupational Cases	43	134	0	9	186

Non-Occupational³

Type of Equipment ⁴	Type of Activity ⁵				
	Mixer/Loader	Applicator	Flagger	Mechanic	Total
Unpressurized Hand-held Spray Equipment	0	1	0	0	1
Implements without Handles	0	1	0	0	1
Unknown	1	0	0	0	1
Total Non-Occupational Cases	1	2	0	0	3
Total Occupational and Non-Occupational Cases	44	136	0	9	189

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Occupational Status:** Occupational or Non-Occupational.

Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.

Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁴ **Type of Activity:** Activity of the injured individual at the time of exposure

Mixer/Loader : Mixes and/or loads pesticides. This includes: (1) removing a pesticide from its original container, (2) transferring the pesticide to a mixing or holding tank, (3) mixing pesticides prior to application, (4) driving a nurse rig, or (5) transferring the pesticide from a mix/holding tank or nurse rig to an application tank.

Applicator : Applies pesticides by any method or conducts activities considered ancillary to the application (e.g., cleans spray nozzles in the field).

Flagger : Flags for an aerial application, either fixed-winged or helicopter.

Mechanic : Maintains (e.g. cleans, repairs or conducts maintenance) pesticide contaminated equipment used to mix, load or apply pesticides as well as the protective equipment used by individuals involved in such activities. This excludes the following: 1) maintenance performed by applicators on their equipment incidental to the application; 2) maintenance performed by mixer/loaders on their equipment incidental to mixing and loading; 3) decontamination by HAZMAT teams.

⁵ **Type of Equipment Used:** Defines the type of application equipment regardless of who performed the application. If the type of equipment is not represented on the table, there were no cases involving that type of equipment for the year of the report.

Fixed Wing Aircraft : Fixed wing aircraft.

Helicopter : Helicopter.

Airblast Sprayers : Ground application equipment with a pump that delivers spray into an air stream created by a large fan at the back of the spray equipment.

Ground Boom Below/Behind : Ground application equipment with a spray boom located below or behind the equipment operator with the spray nozzles pointed downward.

Ground Boom, Other Or Unspecified : Ground application equipment with a spray boom. The following are excluded: 1) Ground Boom Below/Behind, 2) Over-The-Vine Boom, and 3) Electrostatic Sprayer.

Power Dusters : Ground application equipment used to apply dust formulated pesticides.

Shank Injection With Tarps : Ground application equipment that uses a shank or other piece of equipment to directly apply a pesticide into the soil. A tarp is placed over the soil to restrict the pesticide to the application site.

Shank Injection Without Tarps : Ground application equipment that uses a shank or other piece of equipment to directly apply a pesticide into the soil except when a tarp is placed over the soil, which is classified under shank injection with tarps. This also excludes surface applied pesticides that are subsequently incorporated into the soil by a cultivator.

Ground, Other Or Unspecified	: Ground application equipment, unknown or unspecified. This includes two or more types of ground application
Back Pack Sprayer	: Compressed air sprayer where the tank is worn on the back of the applicator.
Hand Pump Sprayer	: Hand-held compressed air sprayer with small volume tanks (1 to 5 gallons). This excludes backpack sprayers.
Pressurized Hose-Line Sprayers	: Hand-held spray equipment attached by a long hose to a power-pressurized tank. This excludes hose-end sprayers, which are classified under hand, other or unspecified.
Unpressurized Hand-Held Spray Equipment	: Hand-held spray bottles (usually plastic) with built-in finger triggers.
Aerosol Can	: Disposable pressurized cans designed for intermittent use. The pesticide is propelled out of the can by an inert compressed gas propellant. This excludes foggers.
Hand, Other Or Unspecified	: Hand-held application equipment, other or unspecified. The equipment must propel the pesticide from a reservoir. This includes 1) hose-end sprayers, and 2) two or more types of hand-held application equipment.
Chamber	: An enclosed, sealed chamber designed specifically for fumigating or sterilizing the contents of the chamber.
Automatic Equipment, Chlorinators	: Chlorination units that automatically inject chlorine into water for disinfection purposes. This includes chlorinators for swimming pools, packing houses and food processing plants.
Automatic Equipment, Other Or Unspecified	: Equipment that automatically injects the pesticide to the target area. This includes equipment attached to milking machinery, dishwashers, etc. This excludes equipment already described above.
Immersion Equipment	: Tanks, trays, sinks, etc. used for the dipping of animals, produce, bulbs, medical equipment, dishes, pots and pans, etc.
Implements With Handles	: Mops, brushes, and other implements with handles.
Implements Without Handles	: Cloths, towels, rags, sponges and other implements without handles.
Manual Placement	: Manual placement of a pesticide directly to a target site. This includes bait stations, hand tossed pellets, and direct pouring of a pesticide onto a target surface from a container (such as pouring liquid chlorine directly into swimming pool water). This excludes the placement of fumigation pellet packs in chambers and under tarps.
Manual Application Methods, Other Or Unspecified	: Manual application methods, other or unspecified. The pesticide is not propelled by any type of equipment. This includes two or more types of manual application methods. This excludes manual application method already described above.

- Other : Any application methodology not described above. This includes two or more types of application equipment not elsewhere specified.
- Unknown : The type of application equipment is not known.

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**Hospitalization and Disability Associated with Illnesses/Injuries *Definitely or Probably Related* to Pesticide Exposure in California^{1,2},
Summarized by Occupational Status and Activity
2005**

Occupational³

Activity ⁴	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown ⁵	No. Cases	%	Unknown ⁶
Mixer/Loader	38	0	0	0	6	15.8	0
Applicator	104	1	1	0	20	19.2	2
Mechanical	7	0	0	0	1	14.3	0
Packaging/Processing	46	0	0	0	2	4.3	0
Field Worker	118	1	0.8	1	18	15.3	10
Routine Indoor	53	0	0	0	3	5.7	2
Routine Outdoor	13	0	0	0	0	0	1
Transport/Storage/Disposal	8	0	0	0	2	25	0
Emergency Response	10	1	10	0	0	0	1
Other	38	2	5.3	0	7	18.4	6
Unknown	4	0	0	0	0	0	0
Total Occupational	439	5	1.1	1	59	13.4	22

Non- Occupational³

Activity ⁴	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown ⁵	No. Cases	%	Unknown ⁶
Mixer/Loader	1	0	0	0	0	0	1
Routine Indoor	224	0	0	1	1	0.4	2
Routine Outdoor	55	1	1.8	0	0	0	1
Other	26	3	11.5	0	3	11.5	1
Unknown	21	0	0	0	0	0	0
Total Non-Occupational	327	4	1.2	1	4	1.2	5
TOTAL CASES	767⁷	9	1.2	2	63	8.2	27

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Relationship:** Degree of correlation between pesticide exposure and resulting symptomatology.

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

³ **Occupational Status:** Occupational or Non-Occupational. This summary includes one case in which the activity could not be determined as occupational or non-occupational.

Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.

Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁴ **Type of Activity:** Activity of the individual at the time of exposure.

Mixer/Loader : Mixes and/or loads pesticides. This includes: (1) removing a pesticide from its original container, (2) transferring the pesticide to a mixing or holding tank, (3) mixing pesticides prior to application, (4) driving a nurse rig, or (5) transferring the pesticide from a mix/holding tank or nurse rig to an application tank.

Applicator : Applies pesticides by any method or conducts activities considered ancillary to the application (e.g., cleans spray nozzles in the field).

Flagger : Flags for an aerial application, either fixed-winged or helicopter.

Mechanical : Maintains (e.g. cleans, repairs or conducts maintenance) pesticide contaminated equipment used to mix, load or apply pesticides as well as the protective equipment used by individuals involved in such activities. This excludes the following: 1) maintenance performed by applicators on their equipment incidental to the application; 2) maintenance performed by mixer/loaders on their equipment incidental to mixing and loading; 3) decontamination by HAZMAT teams.

Packaging and Processing : Handles (packs, processes or retails agricultural commodities from the packing house to the final market place. Field packing of agricultural commodities is classified as FIELD WORKER.

Field Worker : Works in an agricultural field performing tasks such as advising, scouting, harvesting, thinning, irrigating, driving tractor (except as part of an application), field packing, conducting cultural work in a greenhouse, etc. Researchers performing similar tasks in an agricultural field are also included.

Routine Indoor : Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.

Manufacturing and Formulation : Manufactures, processes or packages pesticides. This includes "mixing" if it is done in a plant for application elsewhere.

Transport/Storage/Disposal : Transports or stores pesticides between packaging and preparation for use. This includes shipping, warehousing and retailing as well as storage by the end-user prior to preparation for use. Disposal of unused pesticides is also included in this activity. This excludes driving a nurse rig to an application site.

- Emergency Response : Emergency Response Personnel (Police, fire, ambulance and HAZMAT personnel) responding to a fire, spill, accident or any other pesticide incident in the line of duty.
- Other : Activity is not adequately described by any other activity category. This includes but is not limited to: 1) being inside a vehicle; 2) dog groomers not handling pesticides; 3) individuals handling pesticide treated wood; 4) two or more activities with potential for pesticide exposure.
- Unknown : Activity is not known

⁵ **Hospitalization Unknown:** Investigation did not specify whether hospitalization occurred or not.

⁶ **Disability Unknown:** Investigation did not specify whether disability occurred or not.

⁷ This total includes one probable case in which the activity could not be determined as occupational or non-occupational.

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**Hospitalization and Disability Associated with Illnesses/Injuries
Possibly Related to Pesticide Exposure in California^{1,2},
Summarized by Occupational Status and Activity
2005**

Occupational³

Activity ⁴	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown ⁵	No. Cases	%	Unknown ⁶
Mixer/Loader	5	0	0	0	1	20	0
Applicator	30	0	0	0	7	23.3	0
Mechanical	2	0	0	0	1	50	0
Packaging/Processing	4	0	0	0	2	50	0
Field Worker	44	0	0	0	16	36.4	1
Routine Indoor	11	0	0	0	1	9.1	1
Routine Outdoor	3	0	0	0	0	0	0
Manufacturing/Formulation	1	0	0	0	0	0	0
Transport/Storage/Disposal	1	0	0	0	0	0	0
Other	11	0	0	1	1	9.1	1
Unknown	1	0	0	0	0	0	0
Total Occupational	113	0	0	1	29	25.7	3

Non- Occupational³

Activity	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown ⁵	No. Cases	%	Unknown ⁶
Applicator	2	0	0	0	0	0	0
Routine Indoor	18	0	0	0	0	0	2
Routine Outdoor	7	0	0	0	1	14.3	1
Other	1	0	0	0	0	0	0
Unknown	3	0	0	0	0	0	0
Total Non-Occupational	31	0	0	0	1	3.2	3
Total Cases	144	0	0	1	30	20.8	6

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Relationship:** Degree of correlation between pesticide exposure and resulting symptomatology.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Occupational Status:** Occupational or Non-Occupational

- Occupational : Work related. The individual was on the job at the time of the incident. This includes both paid employees and volunteers working in similar capacity to paid employees.
- Non-Occupational : Not work related. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).

⁴ **Type of Activity:** Activity of the individual at the time of exposure.

- Mixer/Loader : Mixes and/or loads pesticides. This includes: (1) removing a pesticide from its original container, (2) transferring the pesticide to a mixing or holding tank, (3) mixing pesticides prior to application, (4) driving a nurse rig, or (5) transferring the pesticide from a mix/holding tank or nurse rig to an application tank.
- Applicator : Applies pesticides by any method or conducts activities considered ancillary to the application (e.g., cleans spray nozzles in the field).
- Flagger : Flags for an aerial application, either fixed-winged or helicopter.
- Mechanical : Maintains (e.g. cleans, repairs or conducts maintenance) pesticide contaminated equipment used to mix, load or apply pesticides as well as the protective equipment used by individuals involved in such activities. This excludes the following: 1) maintenance performed by applicators on their equipment incidental to the application; 2) maintenance performed by mixer/loaders on their equipment incidental to mixing and loading; 3) decontamination by HAZMAT teams.
- Packaging and Processing : Handles (packs, processes or retails agricultural commodities from the packing house to the final market place. Field packing of agricultural commodities is classified as FIELD WORKER.
- Field Worker : Works in an agricultural field performing tasks such as advising, scouting, harvesting, thinning, irrigating, driving tractor (except as part of an application), field packing, conducting cultural work in a greenhouse, etc. Researchers performing similar tasks in an agricultural field are also included.
- Routine Indoor : Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.
- Manufacturing and Formulation : Manufactures, processes or packages pesticides. This includes “mixing” if it is done in a plant for application elsewhere.
- Transport/Storage/Disposal : Transports or stores pesticides between packaging and preparation for use. This includes shipping, warehousing and retailing as well as storage by the end-user prior to preparation for use. Disposal of unused pesticides is also included in this activity. This excludes driving a nurse rig to an application site.
- Emergency Response : Emergency Response Personnel (Police, fire, ambulance and HAZMAT personnel) responding to a fire, spill, accident or any other pesticide incident in the line of duty.
- Other : Activity is not adequately described by any other activity category. This includes but is not limited to: 1) being inside a vehicle; 2) dog groomers not handling pesticides; 3) individuals handling pesticide treated wood; 4) two or more activities with potential for pesticide exposure.

Unknown : Activity is not known

⁵ **Hospitalization Unknown:** Investigation did not specify whether hospitalization occurred or not.

⁶ **Disability Unknown:** Investigation did not specify whether disability occurred or not.

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***Agricultural Drift* Cases Reported in California¹ Associated With² Pesticide
Exposure Summarized by Application Site
2005**

Application Site³	Number of Cases⁴	Number of Incidents⁵
BERRIES		
Blackberries	1	1
CITRUS		
Oranges	39	2
FIBER CROP		
Cotton	1	1
FORAGE CROP		
Alfalfa	6	2
FRUITING VEGETABLE		
Tomatoes	2	2
GRAIN		
Corn	3	2
GRAPES		
Grapes	56	9
LEAFY/STEM VEGETABLE		
Broccoli	6	1
Lettuce	1	1
LIVESTOCK		
Eggs (Poultry)	1	1
MULTIPLE		
Soil, Spinach	1	1
NON-CROP		
Soil	396	8
NUT TREES		
Almonds	15	4
ORNAMENTAL		
Ornamental Plants (Other or Unspecified)	1	1
POME FRUIT		
Apples	1	1
ROOT CROP VEGETABLE		
Root Crops (Other or Unspecified)	11	1

Application Site ³	Number of Cases ⁴	Number of Incidents ⁵
STONE FRUIT		
Peaches	2	2
Prunes	2	2
TREES		
Ornamental and/or Shade Trees	13	1
TOTAL	558	43

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness and Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Application Sites:** Site of the pesticide application. For crops, this includes applications at the growing site and to the commodity while being packed for sale. For incidents involving drift, the intended application site is listed.

⁴ **Number of Cases:** Indicates the number of individuals exposed in one incident or episode of agricultural drift.

⁵ **Number of Incidents:** Indicates the number of episodes where agricultural pesticide drift occurred based on the application site.

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**Agricultural Drift Cases¹ Reported by California Physicians as Associated
With² Pesticide Exposure Summarized by the Activity of the Exposed Person
and by the Type of Application Equipment Used
2005**

Type of Application Equipment Used ³	Type of Activity ⁴				TOTAL
	Routine Indoor	Routine Outdoor	Field Worker	Other	
Fixed Wing Aircraft	0	1	11	2	14
Helicopter	0	0	1	1	2
Airblast Sprayers	10	4	9	4	27
Over-the-Vine Boom	0	0	13	0	13
Power Dusters	1	0	0	1	2
Ground, Boom Below/Behind	0	6	11	1	18
Ground Boom, Other or Unspecified	0	0	4	1	5
Ground, Other or Unspecified	0	0	28	3	31
Shank Injection with Tarps	0	4	0	3	7
Pressurized Hose-Line Sprayers	0	0	13	0	13
Hand, Other or Unspecified	0	0	0	2	2
Chamber	0	0	0	36	36
Tarp	0	2	0	0	2
Automatic Equipment, Other or Unspecified	0	0	0	1	1
Drip Irrigation Equipment	246	55	0	42	343
Sprinkler Irrigation Equipment	0	0	42	0	42
TOTAL	257	72	132	97	558

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Type of Equipment Used:** Defines the type of application equipment regardless of who performed the application. If the type of equipment is not represented on the table, there were no cases involving that type of equipment for the year of the report.

Fixed Wing Aircraft : Fixed wing aircraft.

Helicopter : Helicopter.

Airblast Sprayers	: Ground application equipment with a pump that delivers spray into an air stream created by a large fan at the back of the spray equipment.
Over-The-Vine Boom	: Ground operated equipment with the arms of the spray boom extending over the tops of grapevines.
Power Dusters	: Ground application equipment used to apply dust formulated pesticides.
Ground Boom Below/Behind	: Ground application equipment with a spray boom located below or behind the equipment operator with the spray nozzles pointed downward.
Ground Boom, Other Or Unspecified	: Ground application equipment with a spray boom. The following are excluded: 1) Ground Boom Below/Behind, 2) Over-The-Vine Boom, and 3) Electrostatic Sprayer.
Shank Injection With Tarps	: Ground application equipment that uses a shank or other piece of equipment to directly apply a pesticide into the soil. A tarp is placed over the soil to restrict the pesticide to the application site.
Pressurized Hose-Line Sprayers	: Hand-held spray equipment attached by a long hose to a power-pressurized tank. This excludes hose-end sprayers, which are classified under hand, other or unspecified.
Hand, Other Or Unspecified	: Hand-held application equipment, other or unspecified. The equipment must propel the pesticide from a reservoir. This includes 1) hose-end sprayers, and 2) two or more types of hand-held application equipment. This excludes hand-held equipment already specified above.
Chamber	: An enclosed, sealed chamber designed specifically for fumigating or sterilizing the contents of the chamber.
Tarp	: Tarp placed over a commodity or structure and designed to restrict a fumigant to the application site.
Automatic Equipment, Other Or Unspecified	: Equipment that automatically injects the pesticide to the target area. This includes equipment attached to milking machinery, dishwashers, etc. This excludes equipment already described above.
Drip Irrigation Equipment	: Chemigation through drip irrigation equipment.
Sprinkler Irrigation Equipment	: Chemigation through sprinkler irrigation equipment.

⁴**Type of Activity:** Activity of the individual at the time of exposure.

Routine Indoor	Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.
Routine Outdoor	Conducts activities in an outdoor environment with minimal expectation for exposure to pesticides. This excludes field workers in agricultural fields. This includes gardeners who are not handling pesticides.

Field Worker	Works in an agricultural field performing tasks such as advising, scouting, harvesting, thinning, irrigating, driving tractor (except as part of an application), field packing, conducting cultural work in a greenhouse, etc. Researchers performing similar tasks in an agricultural field are also included.
Other	Any activity, including handling pesticides, other than routine indoor, routine outdoor, or field work.

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Illnesses and Injuries in California¹ Associated With Pesticide Residue in Agricultural Fields, 1982-2005

Year	Systemic/ Respiratory ²		Topical ²		TOTAL
	Definite/ Probable ³	Possible ³	Definite/ Probable ³	Possible ³	
1982	23	43	48	117	231
1983	19	29	41	96	185
1984	8	9	49	112	178
1985	25	24	156	164	370
1986	30	14	155	60	259
1987	58	83	52	180	375
1988	57	37	74	202	370
1989	17	22	30	93	162
1990	3	32	11	119	165
1991	16	38	7	87	148
1992	11	57	19	112	199
1993	10	38	2	67	117
1994	33	31	5	42	111
1995	20	48	74	89	231
1996	29	37	15	60	141
1997	83	44	20	62	209
1998	40	19	5	47	111
1999	23	17	0	42	82
2000	21	30	2	22	75
2001	7	22	0	17	46
2002	30	23	13	12	78
2003	4	17	4	33	58
2004	15	27	1	25	68
2005	1	9	2	16	28
Total	583	750	785	1876	3997

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness and Surveillance Program.

² **Type of Illness:** Categorization of the type of symptoms experienced.

Systemic : Any health effects not limited to the respiratory or skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.

Respiratory : Health effects involving any part of the respiratory tree.

Topical : Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

³ **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure.

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

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**Incidents Involving *Field Workers* Reported in California¹ Associated
With² Pesticide Residue Exposure Summarized by Crop and
Type of Illness
2005**

Crop	Systemic/ Respiratory ³		Topical ³		TOTAL
	Definite/ Probable	Possible	Definite/ Probable	Possible	
BERRIES					
Strawberries	0	0	0	1	1
CITRUS					
Citrus (Other or Unspecified)	0	1	0	0	1
GRAPES					
Grapes	0	7	1	8	16
STONE FRUIT					
Peaches	0	0	0	1	1
NUT TREES					
Almonds	0	0	0	1	1
ORNAMENTAL					
Ornamental Plants (Other or Unspecified)	0	0	0	2	2
LEAFY/STEM VEGETABLE					
Broccoli	0	0	1	0	1
Lettuce	0	1	0	0	1
ROOT CROP VEGETABLE					
Root Crops (Other or Unspecified)	0	0	0	1	1
SEED/POD VEGETABLE					
Beans (Other or Unspecified)	1	0	0	0	1
OTHER VEGETABLE					
Onions (Dry)	0	0	0	1	1
WATER					
Industrial Processing Water	0	0	0	1	1
TOTAL	1	9	2	16	28

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness and Surveillance Program.

² **Associated With:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

- Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.
- Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
- Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Type of Illness:** Categorization of the type of symptoms experienced.

- Systemic : Any health effects not limited to the respiratory or skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.
- Respiratory : Health effects involving any part of the respiratory tree.
- Topical : Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

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**Pesticide-Associated Illnesses and Injuries Reported in California Schools^{1,2}
by Exposure Category, Pesticide Type and Illness Symptoms
2005**

Exposure ³	Systemic/Respiratory ⁴			Topical ⁴			TOTAL
	Antimicrobials ⁵	Cholinesterase Inhibitors ⁵	Other Pesticides ⁵	Antimicrobials ⁵	Cholinesterase Inhibitors ⁵	Other Pesticides ⁵	
Drift	2	0	1	0	0	0	3
Residue	0	12	2	0	1	0	15
Direct Spray/Squirt	0	0	0	1	0	1	2
Spill/Other Direct	0	0	0	4	0	0	4
Other	0	1	0	0	0	0	1
TOTAL	2	13	3	5	1	1	25

¹ **Source:** California Department of Pesticide Regulation, Pesticide Illness Surveillance Program.

² **Pesticide-Associated:** Includes cases classified as definitely, probably or possibly related to pesticide exposure

Definite : High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.

Probable : Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.

Possible : Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.

³ **Type of Exposure:** Characterization of how an individual came in contact with a pesticide. Exposure categories not listed on the table indicate there were no illnesses that occurred under that category.

Drift : Spray, mist, fumes, or odor carried from the target site by air. Drift must be related to an application or mix/load activity.

- Residue : The part of a pesticide that remains in the environment for a period of time following an application or drift. This includes odor after the completion of an application.
- Direct Spray/Squirt : Material propelled by the application or mix/load equipment. Contact with the material can be by direct projection or ricochet. This includes exposure of mechanics working on application or mix/load equipment when the material is forced out by pressure.
- Spill/Other Direct : Any of the following: 1) Contact made during an application or mixing/loading operation where the material is not propelled by the equipment; 2) Expected direct contact during use (e.g. washing dishes in a disinfectant solution); 3) Leaks, spills, etc. not related to an application.
- Other : Other known route of exposure not included in other exposure categories. This includes, but not limited to: 1) Residue from a spill and 2) Exposure to smoke or pyrolytic products from a fire where pesticides are burning.

⁴**Type of Illness:** Categorization of the type of symptoms experienced.

- Systemic : Any health effects not limited to the respiratory, skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.
- Respiratory : Health effects involving any part of the respiratory tree.
- Topical : Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

⁵**Type of Pesticide:** Type of pesticide based on functional class.

- Antimicrobials : Pesticides used to kill or inactivate microbiological organisms (bacteria, viruses, etc.).
- Cholinesterase Inhibitors : Pesticides known to inhibit the function of the cholinesterase enzyme.
- Other Pesticides : Any pesticide that is not an antimicrobial or cholinesterase-inhibiting pesticide.

Whom to Contact:

California Department of Pesticide Regulation
Worker Health and Safety Branch

Phone: (916) 445-4222.

Physical address: 1001 I St., Sacramento CA 95814-2828.

Mailing address: P.O. Box 4015, Sacramento, CA 95812-4015

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About the Pesticide Illness Surveillance Program Data

Pesticide-related illnesses have been tracked within the state of California for more than 50 years. The California Environmental Protection Agency, Department of Pesticide Regulation (DPR) maintains a surveillance program which records human health effects of pesticide exposure. The Pesticide Illness Surveillance Program (PISP) documents information on adverse effects from pesticide products, whether elicited by the active ingredients, inert ingredients, impurities, or breakdown products. This program maintains a database, which is utilized for evaluating the circumstances of pesticide exposures resulting in illness. This database is consulted regularly by staff who evaluate(s) the effectiveness of the DPR pesticide safety programs and recommend changes when appropriate.