SUMMARY OF RESULTS FROM THE CALIFORNIA PESTICIDE ILLNESS SURVEILLANCE PROGRAM
- 2013 -

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Executive Summary

This report provides a summary of illnesses identified by the Pesticide Illness Surveillance Program (PISP) of the California Department of Pesticide Regulation (DPR) in 2013. DPR identified 1,718 cases potentially involving health effects from pesticide exposure. DPR epidemiologists determined that 1,128 (66%) of the 1,718 identified cases were at least possibly associated with pesticide exposure, a 14% increase from 992 associated cases in 2012. Evidence indicated that pesticide exposure did not cause or contribute to ill health in 332 (19%) of the 1,718 cases evaluated. Insufficient information prevented evaluation of 258 cases (15%).

Despite the increase in the number of cases in 2013, the number of associated episodes, defined as an event in which a single source possibly, probably, or definitely exposed one or more people (cases) to pesticides, actually decreased 7%, from 790 in 2012 to 733 in 2013.

PISP identified 435 (39%) of the 1,128 cases as associated with agricultural use of pesticides. Non-agricultural pesticide use was associated with 685 cases (61%). Eight of the 1,128 pesticide-associated cases could not be characterized as agricultural or non-agricultural due to insufficient information.

In 2013, 228 of the 685 non-agricultural cases were occupational, defined as those that occurred while the affected people were at work. Over half of these cases (66%) involved antimicrobial products.

In 2013, 131 of the 685 non-agricultural pesticide related cases involved children (less than 18 years old). None of the cases involved children exposed to pesticides while at school.

PISP data reflects that 266 agricultural field workers were injured by pesticide exposure in 35 separate episodes in 2013. The largest number of field workers injured in a single episode was 48. In 2012, the largest number of field workers injured in a single episode was 42. The total number of field worker episodes increased by 35% from 26 episodes in 2012.

Background, Sources, and Purpose of Illness Surveillance

DPR administers the California pesticide-safety regulatory program, widely regarded as the most stringent in the nation[1]. Mandatory reporting of pesticide[2] illnesses has been part of the program

[1] United States General Accounting Office. (1993). Report to the Chairman, Committee on Agriculture, Nutrition, and Forestry, U.S. Senate. *Pesticides on Farms, Limited Capability Exists to Monitor Occupational Illnesses and Injuries*. Report Number PEMD-94-6.

[2] Pursuant to California Code of Regulations, Section 6000, "pesticide" is used to describe any substance which is intended to prevent, destroy, repel, or mitigate any pest. Pests may be insects, fungi, weeds, rodents, nematodes, algae, viruses, or bacteria that may infest or be detrimental to vegetation, man, animals, or households, or any agricultural or non-agricultural environment. 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, water modifiers, and wetting and dispersing agents.

since 1971. Illness reports are collected, evaluated, and analyzed by program staff. PISP is the oldest and largest program of its kind in the nation; its epidemiologists provide data to regulators, advocates, industry, and others.

Under the California Health and Safety Code Section 105200, physicians are required to report any suspected case of pesticide-related illness or injury to the local health officer within 24 hours of examining the patient. The law requires local health officers to inform the County Agricultural Commissioner (CAC) and to complete a pesticide illness report (PIR), which is sent to the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Industrial Relations (DIR), and DPR. In 2013, PISP began receiving PIRs from the California Reportable Disease Information Exchange (CalREDIE). Pesticide illness was added to this online medical provider portal in December 2012 to allow local health officers and healthcare providers to fulfill the reporting requirement. This endeavor was made possible through collaborative efforts between the California Department of Public Health (CDPH), OEHHA, and DPR, and is not currently available in all counties. CalREDIE is not anticipated to be a major source of reporting for some time.

DPR strives to ensure that PISP captures the majority of illness incidents. DPR epidemiologists review copies of the Doctor's First Report of Occupational Illness and Injury (DFROII) submitted to the California Department of Public Health Occupational Health Branch (CDPH-OHB) to identify occupational pesticide illness cases that may not have been reported to the local health officer. These are documents associated with workers' compensation claims that physicians are required to forward to DIR and are subsequently shared with CDPH-OHB. PISP epidemiologists select for investigation any DFROII that mentions a pesticide as a possible cause of injury, or involves a situation in which pesticide use is likely.

Another significant source of pesticide illness reports is the California Poison Control System (CPCS). When a medical professional contacts CPCS about an illness or injury that may be related to a pesticide, CPCS offers to submit a pesticide incident report to DPR on behalf of the medical provider. Through this contract with CPCS, PISP continues to identify hundreds of symptomatic exposures that may otherwise be unreported. CPCS began assisting with pesticide illness reporting in 1999, but budgetary constraints prevented complete CPCS participation from 2003-2006.

County Agricultural Commissioner (CAC) staff investigate suspected pesticide illnesses that occur in their jurisdictions, whether or not they involve agriculture. DPR provides training and technical support for investigators. CACs are trained on how, when, and what type of samples to collect to document unintended exposure or contamination of persons and/or the environment, when possible. DPR contracts with the California Department of Food and Agriculture Center of Analytical Chemistry to analyze these samples. When investigations are complete, CACs send their reports to DPR describing their findings. These reports describe the circumstances that may have led to pesticide exposure and the consequences to the exposed individuals. PISP epidemiologists evaluate medical reports and all information the CACs gather in the investigative process. They abstract and encode basic descriptors of the event, then undertake a complex synthesis of all available evidence to assess the likelihood that pesticide exposure caused the illness. Standards for the determination are described in the PISP program brochure, "Preventing

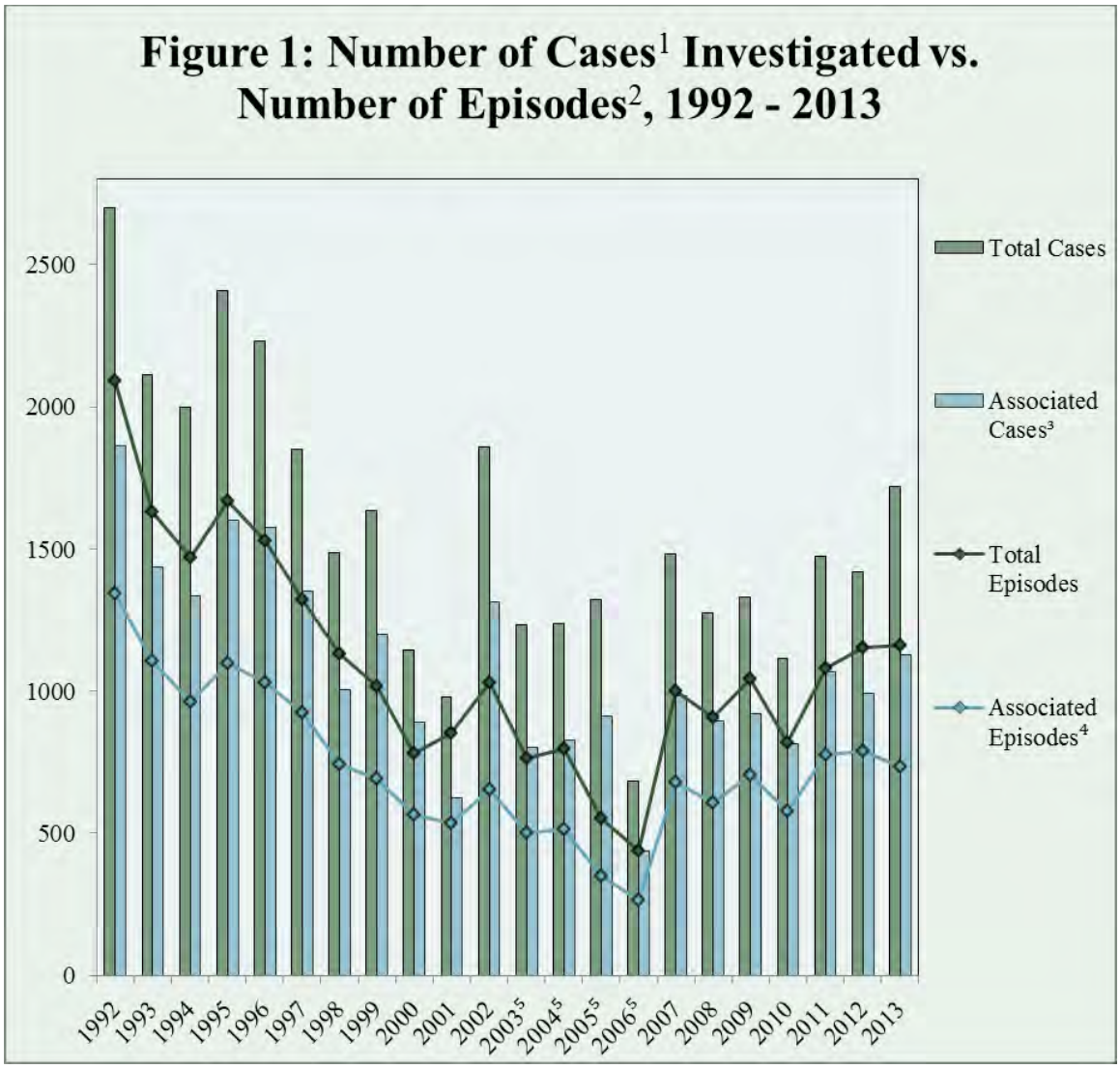
Pesticide Illness," which can be viewed or downloaded from DPR's web site at http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf.

PISP is a passive surveillance system, and depends primarily on medical providers to provide data. This means there are limitations in the quality, quantity, and timeliness of the data available, and consequently, analysis of the data is similarly limited. Measuring the population at risk is critically important in analysis, yet determining the size of the population at risk of a pesticide exposure is difficult. These difficulties inhibit more extensive utilization of the database.

DPR maintains its surveillance of human health effects of pesticide exposure in order to evaluate the circumstances of pesticide exposures that result in illness. DPR epidemiologists regularly consult the PISP database to evaluate the effectiveness of DPR's pesticide safety regulatory programs and assess need for changes. Trends in the illness data may result in implementation of additional restrictions on pesticide use through California-specific permit conditions administered by the CACs or by changing statewide regulations. If an illness episode results from illegal practices, state and county enforcement staff take appropriate action to educate pesticide users and promote appropriate pesticide use.

2013 Numeric Results

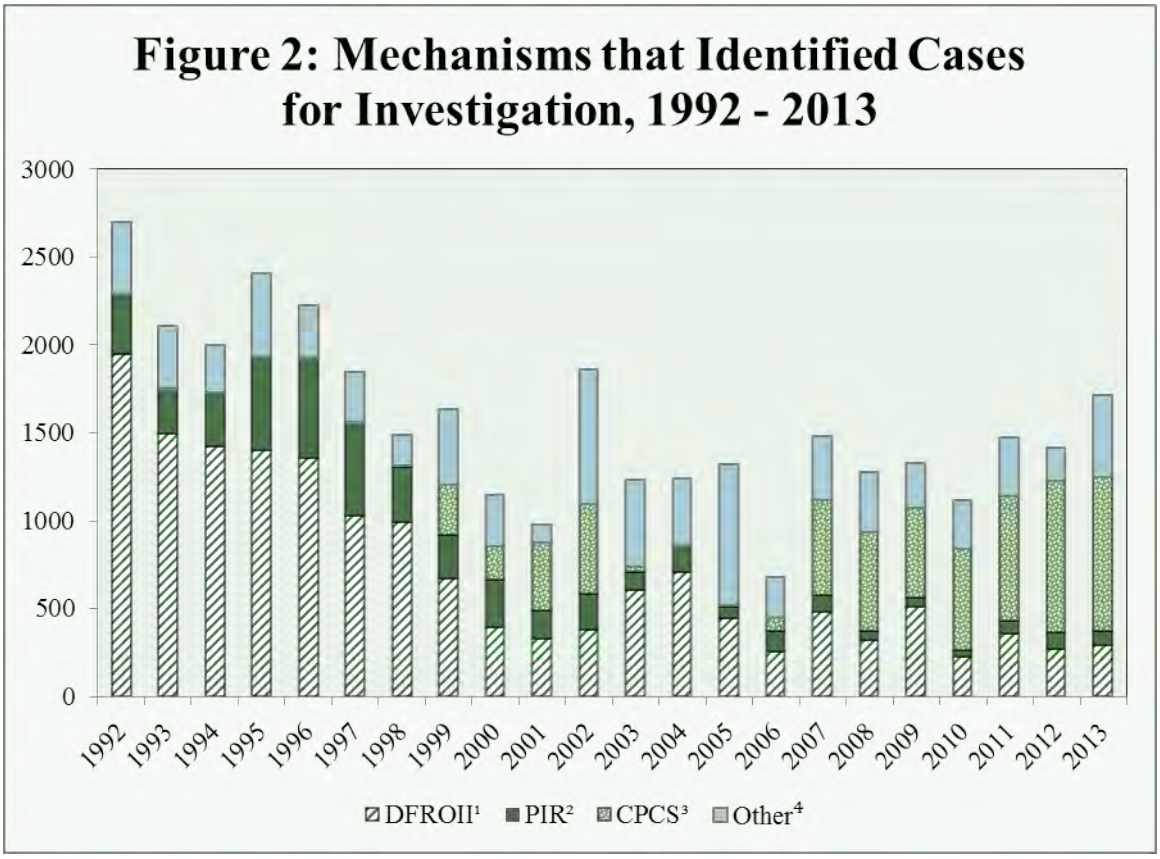
In 2013, PISP epidemiologists identified 1,718 cases potentially involved health effects from pesticide exposure. This represents a 21% increase from 1,418 cases identified in 2012, and a 17% increase from 1,473 cases identified in 2011. The total number of episodes, defined as an event in which a single source exposed one or more people (cases) to pesticides, increased less than 1% from 1,152 in 2012 to 1,160 in 2013 (Figure 1).



1. A *case* is the Pesticide Illness Surveillance Program representation of a person whose health problems may relate to pesticide exposure.
2. An *episode* is an event in which a single source appears to have exposed one or more people (cases) to pesticides.
3. *Associated cases* are those evaluated as definitely, probably, or possibly related to pesticide exposure. A definite relationship indicates a high degree of correlation between the pattern of exposure and resulting symptomatology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions. A probable relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable. A possible relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.
4. *Associated episodes* are those in which at least one case was evaluated as associated.
5. Budgetary constraints prevented complete California Poison Control System participation in providing case information from 2003-2006.

Figure 2 demonstrates the variation in number of cases identified by the different sources of investigation-initiating documents. The proportions of initiating documents received from the different sources in 2013 are similar to those of recent years.

The California Poison Control System remained a major source of case identification in 2013. Though there was an increase in the number of cases reported by CPCS from 2012 (from 862 to 873), there was a decrease in the proportion of total cases received via this route, from 61% to 51%. DFROII reports contributed 296 (17%) illness cases, an increase from 274 (19%) in 2012, which again represents an increase in number of cases reported but a decrease in the proportion. Other reporting sources, such as county complaints and media reports, as well as additional cases identified during the course of an investigation, led to 471 (27%) cases in 2013. In 2012, 13% of cases came from other reporting sources. Direct physician reporting to local health officers accounted for 78 (5%) of all identified cases. Of those 78 cases, CalREDIE PIRs initiated 21 (27%) of the investigations. CalREDIE PIRs provided additional case information on 53 cases in the PISP database that had been initiated by other sources. This new mechanism of case identification is discussed in greater detail in the Background, Sources, and Purpose of Illness Surveillance section of this report.

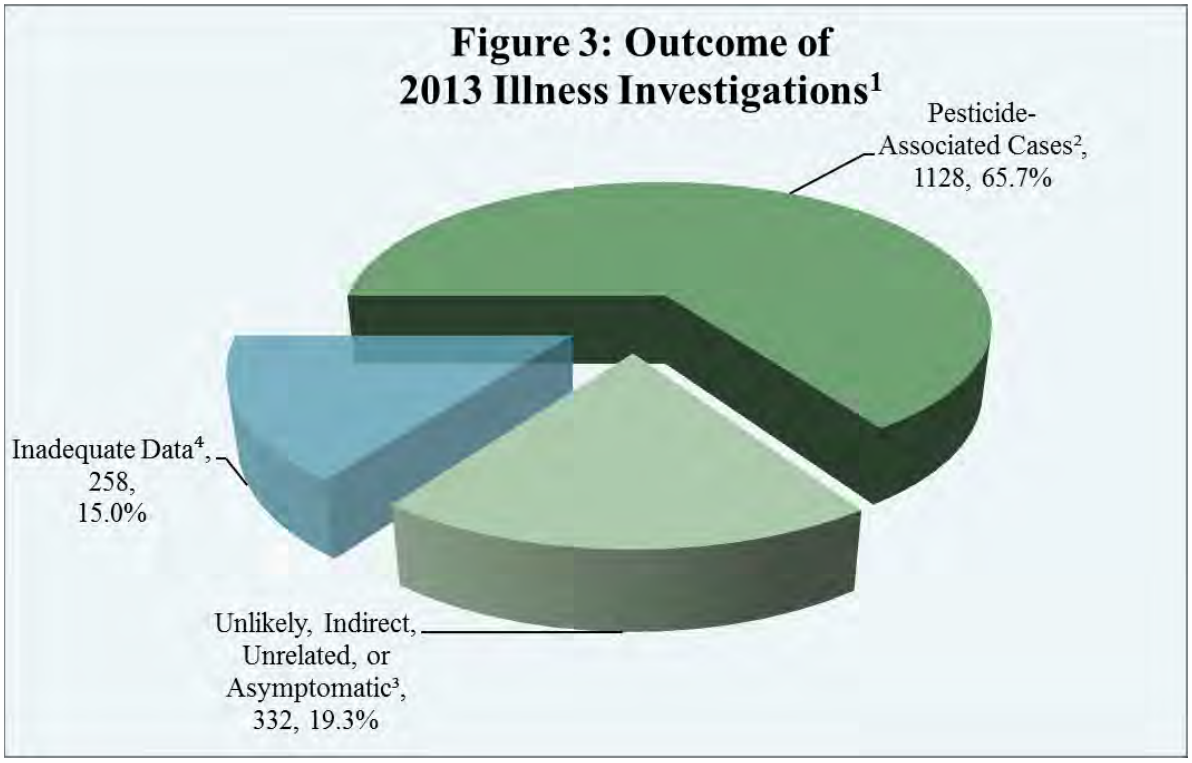


1. *DFROII* – Doctor's First Report of Occupational Illnesses and Injury (Workers' Compensation document).
2. *PIR* – Pesticide Illness Report (physician reporting to local health officers in compliance with Health and Safety Code Section 105200).

3. *CPCS* – California Poison Control System (facilitated physician reporting). CPCS began assisting with pesticide illness reporting in 1999. Budgetary constraints prevented complete CPCS participation from 2003-2006.
4. *Other* – All other methods of case identification, including citizen complaints, contacts by emergency responders, and news reports.

PISP defines the term "associated" as cases evaluated as definitely, probably, or possibly related to pesticide exposure. PISP epidemiologists determined that 1,128 (66%) of the 1,718 cases identified in 2013 were associated cases. In 2012, 992 cases were associated with pesticide exposure. This is an increase of 14% from 2012 to 2013. Despite the increase in the number of cases in 2013, the number of associated episodes, defined as an event in which a single source possibly, probably, or definitely exposed one or more people (cases) to pesticides, actually decreased 7%, from 790 in 2012 to 733 in 2013 (Figure 1).

Evidence indicated that pesticide exposure did not cause or contribute to ill health in 332 (19%) of the 1,718 cases evaluated. This grouping includes asymptomatic cases, which increased by 132% from 2012 to 2013. The 139 asymptomatic cases constitute 8% of the total cases identified in 2013. Insufficient information prevented evaluation of 258 cases (15%) (Figure 3).

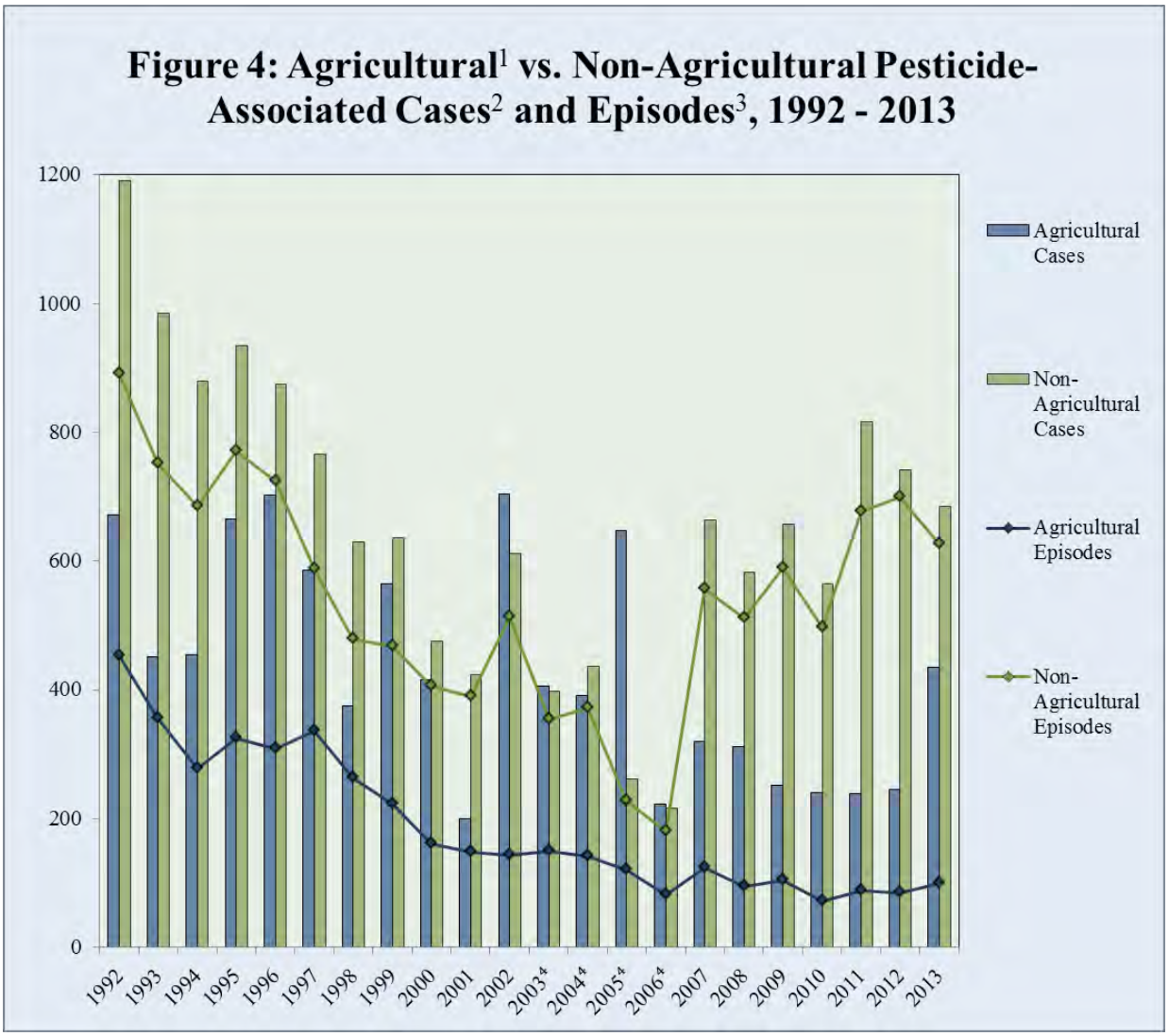


1. Total cases = 1,718
2. *Associated Cases* refers to cases involving pesticides classified as definitely, probably, or possibly related to human health effects.
3. *Unlikely/Indirect/Unrelated/Asymptomatic* refers to cases in which the weight of the evidence was against pesticide causation. Unlikely cases are those in which a correlation cannot be ruled out absolutely, but medical and/or physical evidence suggest a cause other than pesticide exposure. In indirect cases, pesticide exposure is not responsible, but pesticide

regulations or product label requirements contributed to the illness (e.g., heat stress while wearing chemical resistant clothing). In unrelated cases, there is conclusive evidence of a cause other than pesticide exposure. Asympomatic cases are those in which the exposed people did not develop symptoms.

4. *Inadequate* means that there was not enough data reported to determine if pesticides contributed to ill health.

Of the 1,128 associated cases, 435 (39%) were attributed to pesticides used for agricultural purposes (Figure 4). "Agricultural" is defined as involving pesticides intended to contribute to production of an agricultural commodity, including livestock. This corresponds to the regulatory definition of "production agriculture." Use or intended use in non-production agriculture is designated as "non-agricultural." Structural, sanitation, or home garden situations, as well as pesticide manufacture, transport, storage, and disposal, are considered "non-agricultural." Of the 1,128 associated cases, 685 (61%) occurred under circumstances considered non-agricultural. Eight of the 1,128 pesticide-associated cases could not be characterized as agricultural or non-agricultural due to insufficient information. These uncharacterized cases constitute less than 1% of the associated cases.



1. *Agricultural* cases are those that implicate exposure to pesticides intended to contribute to the production of agricultural commodities. *Non-agricultural* cases include all those in which the pesticide was not intended to contribute to production of agricultural commodities.
2. Several pesticide-associated cases could not be characterized as agricultural or non-agricultural due to unclear circumstances. These cases occurred in 1995 (1), 2005 (1), 2009 (12), 2010 (9), 2011 (14), 2012 (6), and 2013 (8). These cases are not included in Figure 4.
3. Several pesticide-associated episodes could not be characterized as agricultural or non-agricultural due to unclear circumstances. These episodes occurred in 1995 (1), 2005 (1), 2009 (12), 2010 (9), 2011 (14), 2012 (6), and 2013 (7). These episodes are not included in Figure 4.
4. Budgetary constraints prevented complete California Poison Control System participation in providing case information from 2003-2006.

Table 1 shows the number of cases evaluated at each level of relationship. Sufficient evidence was available to determine that of the 1,128 pesticide-associated cases, 95 (8%) were definitely related, 650 (58%) were probably related, and 383 (34%) were possibly related to a pesticide exposure (Table 1).

Table 1: Relationship Evaluation of 2013 Illness Investigations

	Relation to Agriculture			
Relationship	Agricultural[1]	Non-Agricultural[2]	Unknown or Not Applicable[3]	**Total**
Definite[4]	11	84	0	95
Probable[5]	266	381	3	650
Possible[6]	158	220	5	383
Pesticide-Associated Subtotal	**435**	**685**	**8**	**1,128**
Unlikely[7]	6	47	0	53
Indirect[8]	0	11	0	11
Asymptomatic[9]	120	19	0	139
Unrelated[10]	0	0	129	129
Not Applicable[11]	20	233	5	258
Overall Total	**581**	**995**	**142**	**1,718**

1. *Agricultural* cases are those that implicate exposure to pesticides intended to contribute to the production of agricultural commodities.
2. *Non-agricultural* cases include all those in which the pesticide was not intended to contribute to production of agricultural commodities.
3. Agricultural designation is not applicable to cases unrelated to pesticide exposure.
4. A *definite* relationship indicates a high degree of correlation between the pattern of exposure and resulting symptomatology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions.

5. A *probable* relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
6. A *possible* relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.
7. An *unlikely* relationship indicates that a correlation cannot be ruled out absolutely. Medical and/or physical evidence suggest a cause other than pesticide exposure.
8. An *indirect* relationship indicates that pesticide exposure is not responsible for symptomatology, but pesticide regulations or product label requirements contributed in some way, (e.g., heat stress while wearing chemical resistant clothing).
9. An *asymptomatic* relationship indicates that exposure occurred, but did not result in illness/injury.
10. An *unrelated* relationship indicates definite evidence of causes other than pesticide exposure, including exposure to chemicals other than pesticides.
11. *Not applicable* indicates that relationship cannot be established because the necessary information is not available to the evaluator.

In 2013, occupational exposures, defined as those that occurred while the affected people were at work, accounted for 627 (56%) of the 1,128 associated cases. Non-occupational exposures accounted for 489 associated cases (43%). Twelve associated cases could not be characterized as occupational or non-occupational; 7 of these 12 cases also could not be characterized as agricultural or non-agricultural due to insufficient information.

Enforcement actions are often still under consideration when PISP receives and evaluates illness investigative reports, so violations noted by PISP may not correlate with DPR Enforcement Branch violations. Based on the information available at the time of evaluation, PISP epidemiologists concluded that of the 1,128 associated cases, there was evidence to indicate that 570 (58%) cases involved a violation of safety requirements that contributed to the exposure, and harm might have been avoided if all the people involved had adhered strictly to safety procedures already required by regulations and/or pesticide labels. Of the 570 cases with contributory violations, 215 (38%) were attributed to pesticides intended for agricultural purposes. Non-compliance with regulations that did not contribute to the pesticide exposure (e.g., paperwork violations) was identified in 138 (12%) cases. It could not be determined whether violations contributed to 171 cases (15%), and 249 cases (22%) had health effects attributed to pesticide exposure despite apparent compliance with all applicable label instructions and safety regulations. Of these 249 cases, 84 (34%) were attributed to pesticides used for agricultural purposes. Further evaluation of these cases is needed to determine if additional safety requirements are appropriate.

Non-Agricultural Pesticide Episodes

One hundred fifty-five (23%) of the 685 non-agricultural cases involved an exposure via spills or other direct forms of contact in which the pesticide was not propelled by application equipment. Drift exposure closely followed, with 152 (22%) of the cases. PISP defines drift as spray, mist, fumes, or odor carried from the target site by air during a pesticide application. Drift as an exposure mechanism does not necessarily correspond to drift as a violation. Definitions of drift may vary among agencies. Table 2 shows the number of non-agricultural cases and their exposure mechanisms.

Table 2: Mechanism of Exposure in Non-Agricultural Associated Cases, 2013	
Exposure Mechanism	**Count**
Drift[1]	152
Residue[2]	100
Direct Spray/Squirt[3]	56
Spill/Other Direct[4]	155
Ingestion[5]	116
Other[6]	49
Multiple Exposures[7]	17
Unknown[8]	40
Overall Total	**685**

1. *Drift* refers to cases associated with exposure to spray, mist, fumes, or odor carried from the target application site by air. Drift as an exposure mechanism does not necessarily correspond to drift as a violation.
2. *Residue* refers to cases associated with exposure to pesticide that remains in the environment for a period of time following an application or drift.
3. *Direct Spray/Squirt* indicates that application equipment propelled pesticide onto the person.
4. *Spill/Other Direct* refers to contact made where the material is not propelled by application equipment.
5. *Ingestion* refers to intentional or unintentional oral ingestion and includes ingestion of residue.
6. *Other* indicates another known route of exposure that is not included in any other exposure category.
7. *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
8. *Unknown* indicates the route of exposure could not be identified.

Child Exposures

In 2013, 131 of the 685 non-agricultural cases evaluated as definitely, probably, or possibly related to pesticide exposure involved children (less than 18 years old). This excludes 19 cases of unknown ages. Of the 131 associated cases, 57 (44%) had been exposed via ingestion of the pesticide. Forty-six (81%) of those children were less than six years of age. Products ingested by children under six years old included antimicrobial disinfectants and sanitizers (22, 48%), insecticides (16, 35%), rodenticides (5, 11%), herbicides (2, 4%) and fungicides (1, 2%). Evidence suggests that in 42 (91%) of the 46 ingestions, improper storage of the pesticide may have made it accessible to the child and contributed to the exposure. Four of the 131 cases involved hospitalization, and three resulted from self-harm attempts. None of the children were exposed at school.

Occupational Exposures

Two hundred twenty-eight cases of pesticide exposure involving occupational, non-agricultural exposures were evaluated as associated with pesticide exposure in 2013. The majority of the

workers (96, 42%) were exposed while applying the pesticide; 16 (7%) were exposed while mixing/loading. Products involved in these occupational exposures included antimicrobial disinfectants and sanitizers (150, 66%), insecticides (44, 19%), herbicides (14, 6%), rodenticides (10, 4%), and pool adjuvants (4, 2%), as well as unknown pesticide products (3), insect repellents (2), and algaecide (1), each 1% or less. The most represented incident locations were service establishments, such as restaurants or hotels (55, 24%), hospitals or other medical facilities (39, 17%), and schools (24, 11%). An illness episode involving employees of a service establishment exposed to an antimicrobial product is described below.

Case Summary - Occupational Antimicrobial Exposure

In San Francisco County, a restaurant employee was tasked with cleaning a soiled restroom. The employee was instructed to use only a bleach-and-water solution. Instead, the employee attempted to make a stronger cleaning solution by adding a lime descaler that he found in the chemical storage closet. The lime descaler was used by the evening cleaning crew to remove calcium and hard water buildup inside the dishwashing machine.

After pouring an unknown amount of lime descaler into a bucket that already contained a bleach and water solution, the employee began to roll the bucket towards the men's restroom. The resulting vapors from the mixture of chemicals caused him to cough profusely, and his eyes and throat began to sting. He left the bucket near an enclosed room and the vapors entered the workspace occupied by four other employees. All four of the employees began to experience the same symptoms.

Paramedics were called to the restaurant and the five affected employees were given oxygen prior to being taken for care. In the emergency room, medical staff noted that all of the employees were anxious and were complaining of a "burning sensation." One employee had shortness of breath. Although none of the employees lost any work days, they still had residual symptoms for more than two days. One employee who was working in the enclosed room remained under doctor's care a week after the exposure as a precautionary measure.

Since the incident, the restaurant has created an Injury and Illness Prevention Program and a Hazard Communication Plan. They also brought in a consultant to conduct training for both programs in English and Spanish languages. In addition, the restaurant has included DPR's flyer "Using Disinfectants, Sanitizers, Medical Sterilants, and Other Antimicrobials in the Workplace" in their Hazard Communication training.

Agricultural Pesticide Illnesses

Applicators and Mixer/Loaders

In 2013, 31 (7%) of the 435 associated cases involved applicators or mixer/loaders of agricultural pesticides. Of these 31 cases, 11 (35%) were exposed via drift. The exposure mechanism is unknown in 8 (26%) of the cases. Direct spray and spills or other direct contact each contributed to 4 (12%) of the cases. Residue and other exposures contributed to 1 (3%) and 3 (10%) of cases, respectively. PISP data reflects that equipment failure contributed to 7 (23%) of the cases. Eleven of the handler cases resulted in lost work days. None of the workers in these

cases were hospitalized for a 24 hour period or more. One of the cases in which an applicator lost work days is highlighted below.

Case Summary - Pesticide Handler Exposure

In Stanislaus County, a worker became ill when he mixed, loaded, and applied dimethoate to an alfalfa field. The dimethoate was applied using a front-ended ground boom sprayer attached to an open cab tractor. When interviewed, the worker stated that he could smell the dimethoate through his respirator, causing him to feel nauseous. After two hours of application, the worker mixed and loaded a new batch of dimethoate. The worker then applied the pesticide to the alfalfa field and shortly after developed a cough and strong chest pains.

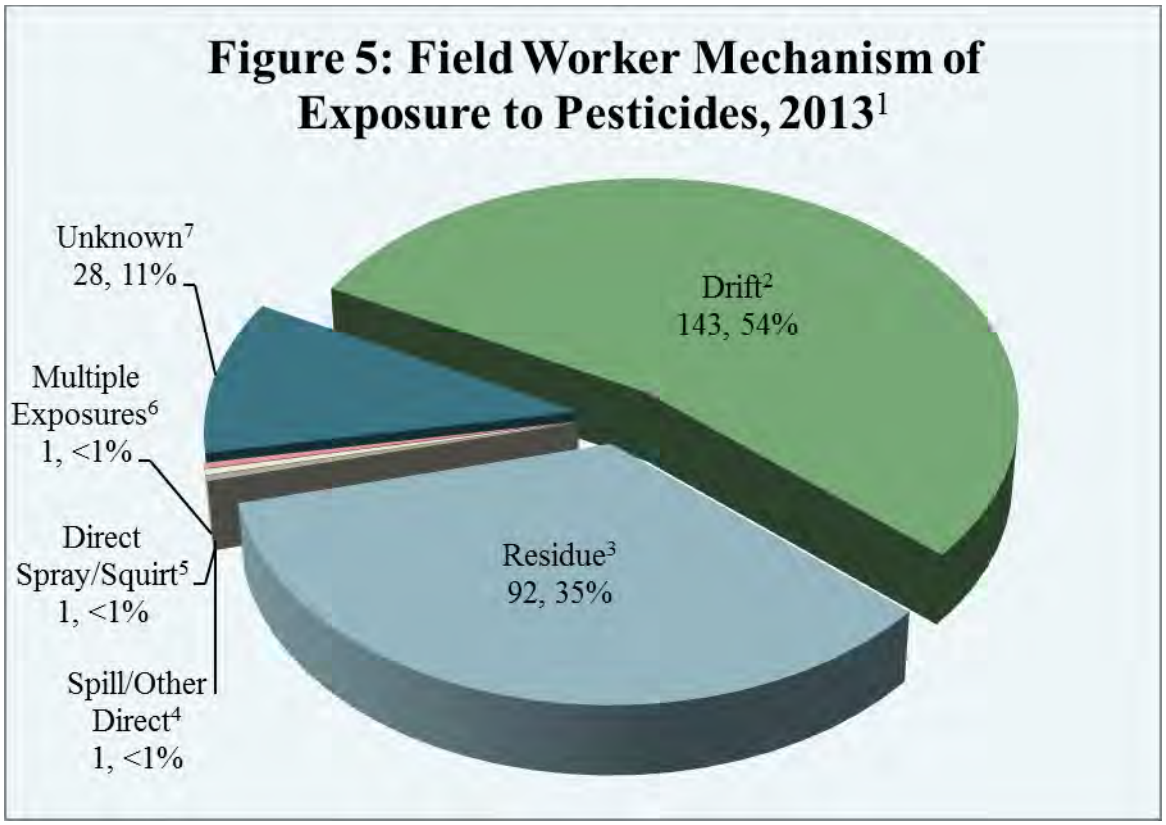
The worker notified his supervisor of his symptoms. The supervisor suggested that he go home and rest, but did not offer to take him to a medical facility. After going home, the worker had his wife take him to a local medical facility where he was admitted overnight. He lost two days of work.

The employer was cited for multiple violations including failure to ensure the worker was immediately taken for medical attention when there was reasonable grounds to suspect that an employee had a pesticide-related illness, failure to ensure that the respirator was properly fitted via a fit test, and failure to ensure the employee wore the required personal protective equipment while mixing and loading. The worker also had not worn a chemical-resistant apron when he mixed a new batch of dimethoate. As a result, the grower was fined $700.

Field Workers

PISP data reflects that 266 field workers were injured by pesticide exposure in 35 separate episodes in 2013, which constitutes 61% of the 435 agricultural illness cases and 35% of the 99 agricultural episodes. This is an increase from 2012, in which 146 field workers were injured in 26 separate episodes.

In 2013, the largest number of field workers injured in a single episode was 48, an increase from 42 workers in 2012. The total number of multi-person field worker episodes increased 78% from 9 multi-person episodes in 2012 to 16 in 2013, and 14% from 14 episodes in 2011. Pesticide drift, as defined by PISP, was associated with 143 (54%) of the 266 field worker cases in 13 separate episodes. Among field workers, pesticide residue contributed to 92 illnesses (35%) in 15 episodes. There were 28 cases (11%) in two multi-person episodes and two single-person episodes in which the exposure mechanism could not be determined. In three additional single-person episodes, one person sustained multiple exposures, another was exposed by spill or other direct contact, and one was directly sprayed by application equipment (Figure 5). Two field worker episodes are summarized below.



1. Total pesticide-associated field worker cases = 266
2. *Drift* refers to field worker cases associated with exposure to spray, mist, fumes, or odor carried from the target application site by air. Drift as an exposure mechanism does not necessarily correspond to drift as a violation.
3. *Residue* refers to field worker cases associated with exposure to pesticide that remains in the environment for a period of time following an application or drift.
4. *Direct Spray/Squirt* indicates that application equipment propelled pesticide onto the worker.
5. *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
6. *Spill/Other Direct* refers to contact made where the material is not propelled by application equipment.
7. *Unknown* indicates the route of exposure could not be identified.

Case Summary – Field Worker Drift Exposure

In Monterey County, pesticides drifted onto a crew of field workers harvesting blackberries in hoop houses when a helicopter made an application to a nearby field. The 33-person crew began harvesting around 6:00 a.m. At 6:30 a.m., a helicopter began applying pesticides to romaine lettuce approximately 240 feet northwest of the workers. Although most of the workers were inside the open-ended hoop houses when the application began, they could hear the helicopter. Some workers saw the helicopter, but none felt mist from the application. Most of the workers noticed an odor, which they described as a strong chemical smell.

Of the 33 field workers, 25 experienced symptoms which included: eye, nose, and/or throat irritation, congestion, headache, nausea, and dizziness. Gradient foliage samples were taken from

inside the hoop house farthest from the treated field and moving into the treated field. Swab samples were taken from both inside and outside two hoop houses. Both swab and foliage samples tested positive for four of the pesticides applied to the lettuce field, none of which had been applied to the berries in the previous six months. As much as 0.146 ppm propamocarb hydrochloride was detected in a blackberry foliage sample taken from within a hoop house in a middle row. A swab taken from a plastic fence near the hoop house closest to the treated field had 0.419 µg propamocarb.

Several violations were uncovered during the investigation. The harvesters' employer failed to take all ill workers for medical care upon learning that they were experiencing symptoms that appeared to be pesticide-related. Only a few workers were taken for care that same day. Also, although the foreman for the harvesting crew said he waved his hat to make sure the helicopter was aware of the workers, the pilot stated he did not see them during his flyover visual survey. The helicopter pilot's acknowledgement that he was unaware of the workers' presence provided evidence that he failed to adequately evaluate the surrounding area before applying pesticides.

A notice of violation was issued to the applicator and the harvester's employer, along with an Agricultural Civil Penalty Action against the pilot/owner of the aerial application business for failing to protect persons, animals, and property.

Case Summary – Field Worker Residue Exposure

In Kern County, field workers arrived at a vineyard early in the morning and noted a gas-like odor as they exited their vehicles. Of the 206 field workers from 6 labor contractors, 202 noted a very strong odor. Most of them believed it was coming from an adjacent almond orchard to the north. An airblast sprayer application of fenpyroximate, penthiopyrad, and petroleum oil ended two hours prior to the arrival of the field workers. The wind was blowing towards the vineyard during the application. The vineyard manager had not been informed of the application to the almond orchard ahead of time.

Within an hour of arriving at the worksite, five of the six crews were moved to another section of the field due to the strong odor, and the sixth crew was sent home. By that time, 48 workers had already experienced symptoms such as headache, dizziness, nausea, vomiting, fatigue, shakiness, and upset stomach. Six of those who felt ill were taken to hospitals.

Gradient sampling of the vineyard confirmed the presence of fenpyroximate and penthiopyrad. The almond grower was fined $5,000 for pesticide use in conflict with the label, which specifically stated: "Do not allow this product to drift onto non target areas."

Morbidity and Mortality

Of the 1,128 cases evaluated as associated with pesticide exposure, 26 people (2%) were hospitalized and 118 (10%) reported time lost from work or normal activity (e.g., going to school) (Table 3). Sixteen (62%) of the 26 people hospitalized had ingested pesticide. Of the 16 patients hospitalized due to pesticide ingestion, 9 (56%) acknowledged self-harm attempts.

Table 3: Summary of Pesticide-Associated[1] Hospitalization and Disability, 2013			
Relationship	**Total Cases**	**Number Hospitalized[4]**	**Lost Work Time[5]**
Definite/Probable[2]	745	17	88
Possible[3]	383	9	30
Total Cases	**1128**	**26**	**118**

1. *Pesticide-associated* cases are those in which pesticide exposure was evaluated as definite, probable, or possible contributor to ill health.
2. A *definite* relationship indicates a high degree of correlation between the pattern of exposure and resulting symptomology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions. A *probable* relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomology. Either medical or physical evidence is inconclusive or unavailable.
3. A *possible* relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.
4. Number of associated cases who were admitted and were hospitalized at least one full day (24-hour period).
5. Number of associated cases who missed at least one full day of work or normal activity such as school.

A total of eight fatalities were evaluated as definitely, probably, or possibly associated with pesticide exposure. Six of the eight cases were related to deliberate self-harm, all of which involved mixing products registered as pesticides, such as fungicides and disinfectants, to produce a lethal gas, a method known as detergent suicide.

In the first of two unintentional fatalities, a woman obtained an herbicide in an iced tea bottle from an acquaintance. Her son thought the bottle contained tea and placed it in the refrigerator. Approximately one week later, the woman ingested liquid from the bottle. She became ill and ultimately succumbed to encephalopathy, renal failure, and respiratory failure. The bottle's contents were analyzed and found to contain 1.4% paraquat. The source of the paraquat could not be determined.

In the second case, a homeless man found a bag of what he thought were pills near a farm. He ingested two "pills" in an attempt to get high. He collapsed shortly after and was taken for care, where he died a few hours later. The "pills" were later identified as aluminum phosphide rodenticide, but the source could not be determined.

PISP Program Updates

Legislative Update – AB 1963

Assembly Bill 1963 (Nava, Chapter 369, Statutes of 2010), which modified California Health and Safety Code Section 105206, requires clinical laboratories to provide DPR the results of all cholinesterase tests performed on employees who regularly handle pesticides pursuant to Section

6728 of Title 3 of the California Code of Regulation. AB 1963 was established to evaluate the Medical Supervision Program (California Food and Agriculture Code, Section 12981), which requires agricultural employers to contract with physicians to monitor their employees who regularly handle cholinesterase-inhibiting, toxicity category I or II pesticides. Physicians order baseline and periodic blood testing for these employees to measure the level of cholinesterase enzyme activity.

Health and Safety Code Section 105206 requires clinical laboratories to provide the test results and the reason medical providers order cholinesterase tests (pursuant to Section 6728 of Title 3, California Code of Regulations) to DPR. Information on the patient, physician, employer and laboratory should also be provided.

PISP has regularly received cholinesterase test results from CDPH-approved laboratories since January 2011. In 2013, PISP scientists continued to work closely with each of the laboratory liaisons to find ways to obtain cholinesterase test results that are specific only to the medical supervision program.

In 2015, DPR and OEHHA, in consultation with CDPH, will submit a report to the state legislature on the effectiveness of the Medical Supervision Program and the usefulness of laboratory-based reporting of cholinesterase testing for pesticide illness and surveillance.

CPCS Best Practices Document

For many years, the California Poison Control System has been the largest source of PISP illness reports. In 2013, 873 (51%) of the 1,718 illness cases entered into the PISP database were initiated by a CPCS Pesticide Illness Report. In previous years, PISP would occasionally receive PIRs that lacked the necessary information for staff to determine if the report met criteria for case investigation.

In 2013, PISP and CPCS collaborated to develop and document “Best Practices” for data collection in an effort to improve the quality of information collected by CPCS. This provides specific documentation and triage guidelines for CPCS staff to collect information integral to the subsequent investigation by the CAC. In addition to ensuring that patient contact information and physician information are included in a report, the document includes guidance on determining the intended use of products that may be registered as pesticides but have both pesticidal and non-pesticidal uses. For example, though sodium hypochlorite products are often registered antimicrobials, they may also be used for laundry stain removal, a non-pesticidal use. Because these multi-purpose product cases constitute a large proportion of CPCS cases, knowing the intended use upon receipt of the PIR allows PISP epidemiologists to exclude non-pesticide related cases before they are sent out for investigation.

The best practices guidelines also recommends that CPCS staff refer callers to their County Agricultural Commissioner, particularly in cases of possible pesticide misuse which may have significant public health or public safety consequences, but may not meet PISP case criteria (for example, an agricultural worker felt ill and called CPCS, but did not seek care).

Secure Access Website Rollout

To facilitate the exchange of confidential information between PISP, DPR's Enforcement Branch, County Agricultural Commissioner offices, and other local and state agencies, DPR developed a Secure Access Website (SAW)—an online application that encrypts network communication from a user to DPR. After completing a successful test pilot in the fall of 2010 and making some minor modifications based on feedback from the participating test counties, SAW was rolled out to the remaining counties and outside agencies in 2013. By the end of the year, almost all of the 58 counties were submitting their investigations electronically to PISP. Using SAW, the majority of case investigations were received electronically in 2014.

SAW has also been utilized to assist reporting laboratories with mandatory cholinesterase reporting requirements as outlined in AB 1963, and to facilitate interagency communication of sensitive materials between PISP and CDPH.

Fenpyroximate Reformulation

An episode involving fenpyroximate is previously summarized in the section on Field Worker Residue Exposure. There were 6 previous episodes involving the pesticide fenpyroximate from 2001-2010. A total of 55 associated cases were attributed to these episodes. Two of the six episodes involved more than 20 workers, and an odor was noted in five of the episodes.

Of the 55 associated cases, 18 workers experienced systemic symptoms such as headache, nausea, vomiting, and dizziness. Eleven reported eye symptoms, four experienced respiratory issues, and two had skin symptoms. Twenty of these 55 workers had two or more of either eye, respiratory, or systemic symptoms.

Fenpyroximate is a pale, yellow liquid with a bitter or aromatic odor, and is a skin and eye irritant. It was first registered in California in 2002. An additional insecticide/miticide product containing fenpyroximate was registered in 2004, primarily for use on fruit and nut crops. This product is an emulsifiable concentrate with a Signal Word "*Warning.*" It contains an inert ingredient belonging to the petroleum chemical family and has a solvent odor. This product was implicated in all of the 55 associated cases.

An exposure summary written by DPR staff was reviewed by the manufacturer's regulatory affairs division, and beginning in 2014, the registrant began distribution of a low-odor formulation of the product.

Further Information

Tabular summaries presenting different aspects of 2013 pesticide illness data are available online at http://www.cdpr.ca.gov/docs/whs/pisp.htmor by contacting the WHS Branch at (916) 445-4222. Additionally, the public can retrieve reports of pesticide illness and generate reports according to their own specifications using the California Pesticide Illness Query program (CalPIQ). CalPIQ is available at http://apps.cdpr.ca.gov/calpiq and can retrieve cases evaluated

as definitely, probably, or possibly related to pesticides from 1992 through the most recent year published.

Appendix I: Acronyms

CAC	County Agricultural Commissioner
CalREDIE	California Reportable Disease Information Exchange
CDPH	California Department of Public Health
CPCS	California Poison Control System
DFROII	Doctor's First Reports of Occupational Illness and Injury
DIR	Department of Industrial Relations
DPR	California Department of Pesticide Regulation
OEHHA	Office of Environmental Health Hazard Assessment
OHB	Occupational Health Branch (of CDPH)
PIR	Pesticide Illness Report
PISP	Pesticide Illness Surveillance Program
U.S. EPA	United States Environmental Protection Agency
WHS	Worker Health and Safety Branch

Appendix II: Additional Data Tables

Summary of Illness/Injury Incidents Reported in California as Potentially Related to Pesticide Exposure Summarized Statewide and by County of Occurrence[1] 2013

Relationship[2]	TOTAL CASES	Type of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
TOTALS							
Definite	95	58	13	3	21	11	84
Probable	650	149	252	105	144	266	381
Possible	383	24	109	106	144	158	220
Unlikely	53	3	3	19	28	7	46
Indirect	11	0	0	11	0	0	11
Asymptomatic	139	8	29	13	89	120	19
Unrelated	129	-	-	-	-	-	-
Insufficient	22	-	-	-	-	-	-
Unavailable	236	-	-	-	-	-	-
OVERALL	**1718**	**242**	**406**	**257**	**426**	**562**	**761**

County[5]							
Relationship[2]	TOTAL CASES	Type of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
ALAMEDA							
Definite	2	1	1	0	0	0	2
Probable	11	4	0	3	4	0	11
Possible	6	1	1	3	1	0	6
Unlikely	2	0	0	2	0	0	2
Unrelated	5	-	-	-	-	-	-
Unavailable	4	-	-	-	-	-	-
TOTAL	**30**	**6**	**2**	**8**	**5**	**0**	**21**
AMADOR							
Unavailable	1	-	-	-	-	-	-
TOTAL	**1**	**-**	**-**	**-**	**-**	**-**	**-**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
BUTTE							
Probable	8	2	1	3	2	3	4
Possible	4	0	1	2	1	3	1
Asymptomatic	3	0	1	0	2	1	2
Insufficient	2	-	-	-	-	-	-
Unavailable	6	-	-	-	-	-	-
TOTAL	**23**	**2**	**3**	**5**	**5**	**7**	**7**
CALAVERAS							
Probable	1	1	0	0	0	0	1
TOTAL	**1**	**1**	**0**	**0**	**0**	**0**	**1**
COLUSA							
Probable	1	1	0	0	0	0	1
Possible	13	0	0	13	0	13	0
Insufficient	2	-	-	-	-	-	-
Unavailable	2	-	-	-	-	-	-
TOTAL	**18**	**1**	**0**	**13**	**0**	**13**	**1**
CONTRA COSTA							
Definite	4	4	0	0	0	0	4
Probable	7	1	2	2	2	0	7
Possible	2	0	2	0	0	1	1
Unlikely	3	1	0	0	2	0	3
Unrelated	1	-	-	-	-	-	-
Unavailable	2	-	-	-	-	-	-
TOTAL	**19**	**6**	**4**	**2**	**4**	**1**	**15**
DEL NORTE							
Probable	1	0	1	0	0	0	1
Unrelated	1	-	-	-	-	-	-
TOTAL	**2**	**0**	**1**	**0**	**0**	**0**	**1**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
EL DORADO							
Definite	2	2	0	0	0	0	2
Probable	6	3	3	0	0	0	6
Unrelated	1	-	-	-	-	-	-
Unavailable	1	-	-	-	-	-	-
TOTAL	**10**	**5**	**3**	**0**	**0**	**0**	**8**
FRESNO							
Definite	4	2	1	0	1	1	3
Probable	21	4	8	7	2	5	16
Possible	27	0	3	6	18	18	9
Asymptomatic	28	0	0	0	28	28	0
Unrelated	10	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	6	-	-	-	-	-	-
TOTAL	**97**	**6**	**12**	**13**	**49**	**52**	**28**
GLENN							
Definite	1	1	0	0	0	0	1
Possible	1	0	1	0	0	1	0
TOTAL	**2**	**1**	**1**	**0**	**0**	**1**	**1**
HUMBOLDT							
Definite	2	1	1	0	0	0	2
Possible	2	0	1	1	0	1	1
Insufficient	1	-	-	-	-	-	-
TOTAL	**5**	**1**	**2**	**1**	**0**	**1**	**3**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
IMPERIAL							
Definite	3	2	1	0	0	1	2
Probable	4	1	0	0	3	0	4
Possible	2	0	0	1	1	0	2
Unlikely	3	0	0	0	3	1	2
Unrelated	5	-	-	-	-	-	-
Unavailable	2	-	-	-	-	-	-
TOTAL	**19**	**3**	**1**	**1**	**7**	**2**	**10**
INYO							
Unrelated	1	-	-	-	-	-	-
TOTAL	**1**	**-**	**-**	**-**	**-**	**-**	**-**
KERN							
Definite	3	0	0	0	3	1	2
Probable	85	6	25	50	4	71	14
Possible	7	1	1	3	2	3	4
Unlikely	1	0	0	0	1	0	1
Unrelated	4	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	8	-	-	-	-	-	-
TOTAL	**109**	**7**	**26**	**53**	**10**	**75**	**21**
KINGS							
Definite	1	1	0	0	0	0	1
Probable	3	2	1	0	0	0	3
Possible	2	0	0	1	1	2	0
Asymptomatic	1	0	0	0	1	1	0
Unavailable	2	-	-	-	-	-	-
TOTAL	**9**	**3**	**1**	**1**	**2**	**3**	**4**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
LAKE							
Possible	1	0	0	0	1	0	1
Unavailable	2	-	-	-	-	-	-
TOTAL	**3**	**0**	**0**	**0**	**1**	**1**	**0**
LASSEN							
Definite	1	1	0	0	0	0	1
TOTAL	**1**	**1**	**0**	**0**	**1**	**1**	**1**
LOS ANGELES							
Definite	16	10	3	0	3	0	16
Probable	90	23	12	9	46	0	90
Possible	51	4	12	13	22	1	49
Unlikely	9	0	1	2	6	0	9
Asymptomatic	1	0	0	0	1	0	1
Unrelated	23	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	58	-	-	-	-	-	-
TOTAL	**249**	**37**	**28**	**24**	**78**	**1**	**165**
MADERA							
Definite	1	1	0	0	0	1	0
Probable	4	0	3	0	1	2	2
Possible	2	0	1	0	1	0	2
Unlikely	1	0	0	0	1	0	1
Unavailable	1	-	-	-	-	-	-
TOTAL	**9**	**1**	**4**	**0**	**3**	**3**	**5**
MARIN							
Probable	1	0	1	0	0	0	1
Unavailable	1	-	-	-	-	-	-
TOTAL	**2**	**0**	**1**	**0**	**0**	**0**	**1**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
MENDOCINO							
Definite	1	1	0	0	0	0	1
Probable	4	3	0	1	0	1	3
Possible	1	0	0	1	0	0	1
Unrelated	2	-	-	-	-	-	-
TOTAL	**8**	**4**	**0**	**2**	**0**	**1**	**5**
MERCED							
Probable	6	0	3	1	2	4	2
Possible	5	0	2	2	1	2	3
Unlikely	4	0	0	3	1	0	4
Asymptomatic	1	0	1	0	0	1	0
Unrelated	2	-	-	-	-	-	-
Insufficient	4	-	-	-	-	-	-
Unavailable	6	-	-	-	-	-	-
TOTAL	**28**	**0**	**6**	**6**	**4**	**7**	**9**
MONO							
Possible	1	1	0	0	0	0	1
TOTAL	**1**	**1**	**0**	**0**	**0**	**0**	**1**
MONTEREY							
Definite	4	3	0	0	1	1	3
Probable	87	4	80	0	3	82	5
Possible	11	1	4	3	3	10	1
Unlikely	1	0	0	0	1	0	1
Asymptomatic	14	0	14	0	0	14	0
Unrelated	1	-	-	-	-	-	-
Unavailable	7	-	-	-	-	-	-
TOTAL	**125**	**8**	**98**	**3**	**8**	**107**	**10**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
NAPA							
Definite	1	1	0	0	0	0	1
Probable	3	0	0	3	0	1	2
Possible	1	0	0	0	1	0	1
TOTAL	**5**	**1**	**0**	**3**	**1**	**1**	**4**
ORANGE							
Definite	2	1	1	0	0	0	2
Probable	23	10	5	1	7	0	23
Possible	11	1	4	2	4	1	10
Unlikely	6	1	0	0	5	0	6
Asymptomatic	1	0	0	0	1	0	1
Unrelated	6	-	-	-	-	-	-
Insufficient	2	-	-	-	-	-	-
Unavailable	13	-	-	-	-	-	-
TOTAL	**64**	**13**	**10**	**3**	**17**	**1**	**42**
PLACER							
Probable	1	1	0	0	0	0	1
Possible	2	0	1	0	1	0	2
Unrelated	1	-	-	-	-	-	-
TOTAL	**4**	**1**	**1**	**0**	**1**	**0**	**3**
PLUMAS							
Possible	1	0	0	0	1	0	1
Insufficient	1	-	-	-	-	-	-
TOTAL	**2**	**0**	**0**	**0**	**1**	**0**	**1**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
RIVERSIDE							
Definite	4	2	0	0	2	0	4
Probable	18	9	6	0	3	1	17
Possible	10	1	2	2	5	1	9
Unlikely	2	0	0	0	2	0	2
Indirect	1	0	0	1	0	0	1
Asymptomatic	1	1	0	0	0	0	1
Unrelated	11	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	11	-	-	-	-	-	-
TOTAL	**59**	**13**	**8**	**3**	**12**	**2**	**34**
SACRAMENTO							
Definite	2	0	1	0	1	0	2
Probable	20	7	6	2	5	0	20
Possible	11	1	2	3	5	0	10
Unlikely	4	1	0	2	1	0	4
Unrelated	4	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	4	-	-	-	-	-	-
TOTAL	**46**	**9**	**9**	**7**	**12**	**0**	**36**
SAN BENITO							
Probable	11	0	10	1	0	11	0
Possible	1	0	1	0	0	1	0
Asymptomatic	2	0	2	0	0	2	0
Unrelated	1	0	0	0	0	0	0
Unavailable	1	0	0	0	0	0	0
TOTAL	**16**	**0**	**13**	**1**	**0**	**14**	**0**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
SAN BERNARDINO							
Definite	3	2	0	0	1	0	3
Probable	20	9	5	1	5	0	20
Possible	16	2	2	3	9	0	16
Asymptomatic	2	2	0	0	0	0	2
Unrelated	6	-	-	-	-	-	-
Insufficient	1	-	-	-	-	-	-
Unavailable	23	-	-	-	-	-	-
TOTAL	**71**	**15**	**7**	**4**	**15**	**0**	**41**
SAN DIEGO							
Definite	6	1	0	1	4	0	6
Probable	32	14	8	2	8	0	32
Possible	15	1	4	5	5	1	14
Unlikely	1	0	0	1	0	0	1
Unrelated	12	-	-	-	-	-	-
Unavailable	14	-	-	-	-	-	-
TOTAL	**80**	**16**	**12**	**9**	**17**	**1**	**53**
SAN FRANCISCO							
Definite	1	1	0	0	0	0	1
Probable	8	2	5	0	1	0	8
Possible	4	0	0	1	3	0	4
Unlikely	2	0	1	0	1	0	2
Unrelated	1	-	-	-	-	-	-
Insufficient	4	-	-	-	-	-	-
Unavailable	4	-	-	-	-	-	-
TOTAL	**24**	**3**	**6**	**1**	**5**	**0**	**15**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
SAN JOAQUIN							
Definite	1	1	0	0	0	0	1
Probable	14	6	2	0	6	4	10
Possible	17	1	2	1	13	6	11
Unlikely	1	0	0	1	0	1	0
Asymptomatic	1	0	0	0	1	1	0
Unrelated	5	-	-	-	-	-	-
Unavailable	6	-	-	-	-	-	-
TOTAL	**45**	**8**	**4**	**2**	**20**	**12**	**22**
SAN LUIS OBISPO							
Definite	4	3	1	0	0	0	4
Probable	4	0	3	0	1	3	1
Possible	4	0	3	1	0	3	1
Asymptomatic	3	0	3	0	0	3	0
Unavailable	1	-	-	-	-	-	-
TOTAL	**16**	**3**	**10**	**1**	**1**	**9**	**6**
SAN MATEO							
Definite	3	2	1	0	0	0	3
Probable	11	7	3	1	0	0	11
Possible	2	0	2	0	0	0	2
Unlikely	1	0	0	1	0	1	0
Asymptomatic	2	1	0	1	0	0	2
Unavailable	2	-	-	-	-	-	-
TOTAL	**21**	**10**	**6**	**3**	**0**	**1**	**18**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
SANTA BARBARA							
Definite	1	1	0	0	0	1	0
Probable	23	0	19	1	3	20	3
Possible	38	1	12	10	15	27	11
Unlikely	1	0	0	0	1	0	1
Asymptomatic	56	2	5	0	49	54	2
Unrelated	1	-	-	-	-	-	-
Unavailable	4	-	-	-	-	-	-
TOTAL	**124**	**4**	**36**	**11**	**68**	**102**	**17**
SANTA CLARA							
Definite	5	2	0	2	1	0	5
Probable	14	7	5	0	2	0	14
Possible	14	1	8	3	2	0	14
Unlikely	2	0	0	1	1	0	2
Indirect	10	0	0	10	0	0	10
Asymptomatic	7	1	2	4	0	0	7
Unrelated	5	-	-	-	-	-	-
Unavailable	6	-	-	-	-	-	-
TOTAL	**63**	**11**	**15**	**20**	**6**	**0**	**52**
SANTA CRUZ							
Definite	2	1	0	0	1	0	2
Probable	8	0	7	0	1	2	6
Possible	11	0	0	8	3	9	2
Unlikely	1	0	0	1	0	1	0
Asymptomatic	4	0	0	4	0	4	0
Unrelated	1	-	-	-	-	-	-
Unavailable	2	-	-	-	-	-	-
TOTAL	**29**	**1**	**7**	**13**	**5**	**16**	**10**

County[5]							
		Type of Exposure[3]				**Intended Use[4]**	
Relationship[2]	**TOTAL CASES**	**Direct Contact**	**Drift**	**Residue**	**Other/ Unknown**	**Agricultural**	**Non-Agricultural**
SHASTA							
Definite	1	0	1	0	0	0	1
Probable	4	0	1	2	1	0	4
Possible	1	0	0	0	1	0	1
Unavailable	1	-	-	-	-	-	-
TOTAL	**7**	**0**	**2**	**2**	**2**	**0**	**6**
SISKIYOU							
Probable	1	0	0	0	1	0	1
TOTAL	**1**	**0**	**0**	**0**	**1**	**0**	**1**
SOLANO							
Definite	1	1	0	0	0	0	1
Probable	2	0	0	0	2	0	2
Possible	7	3	2	1	1	0	7
Unavailable	6	-	-	-	-	-	-
TOTAL	**16**	**4**	**2**	**1**	**3**	**0**	**10**
SONOMA							
Definite	1	1	0	0	0	0	1
Probable	2	1	1	0	0	0	2
Possible	4	0	1	0	3	1	3
Unrelated	4	-	-	-	-	-	-
Unavailable	4	-	-	-	-	-	-
TOTAL	**15**	**2**	**2**	**0**	**3**	**1**	**6**
STANISLAUS							
Definite	4	3	1	0	0	2	2
Probable	23	3	19	0	1	19	4
Possible	5	0	1	0	4	1	2
Unlikely	5	0	1	3	1	1	4
Unrelated	4	-	-	-	-	-	-
Unavailable	3	-	-	-	-	-	-
TOTAL	**44**	**6**	**22**	**3**	**6**	**23**	**12**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	TOTAL CASES	Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
SUTTER							
Probable	1	0	0	0	1	0	1
Possible	9	0	0	8	1	8	1
Unlikely	1	0	0	1	0	1	0
Asymptomatic	4	0	0	4	0	4	0
Unavailable	2	-	-	-	-	-	-
TOTAL	**17**	**0**	**0**	**13**	**2**	**13**	**2**
TEHAMA							
Probable	1	1	0	0	0	0	1
Possible	2	0	0	0	2	2	0
TOTAL	**3**	**1**	**0**	**0**	**2**	**2**	**1**
TRINITY							
Probable	1	1	0	0	0	0	1
TOTAL	**1**	**1**	**0**	**0**	**0**	**0**	**1**
TULARE							
Definite	4	2	0	0	2	2	2
Probable	43	6	0	15	22	33	8
Possible	19	0	5	4	10	13	6
Unlikely	2	0	0	1	1	1	1
Asymptomatic	6	0	0	0	6	6	0
Unrelated	7	-	-	-	-	-	-
Unavailable	12	-	-	-	-	-	-
TOTAL	**93**	**8**	**5**	**20**	**41**	**55**	**17**
TUOLUMNE							
Probable	1	0	0	0	1	0	1
Unrelated	1	-	-	-	-	-	-
Unavailable	1	-	-	-	-	-	-
TOTAL	**3**	**0**	**0**	**0**	**1**	**0**	**1**

County[5]							
		Type of Exposure[3]				Intended Use[4]	
Relationship[2]	TOTAL CASES	Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
VENTURA							
Definite	2	1	0	0	1	0	2
Probable	9	3	4	0	2	2	7
Possible	34	3	28	2	1	26	7
Asymptomatic	1	0	1	0	0	1	0
Unrelated	2	-	-	-	-	-	-
Unavailable	2	-	-	-	-	-	-
TOTAL	**50**	**7**	**33**	**2**	**4**	**29**	**16**
YOLO							
Definite	2	2	0	0	0	1	1
Probable	5	3	2	0	0	1	4
Possible	2	0	0	2	0	2	0
Asymptomatic	1	1	0	0	0	0	1
Unrelated	1	-	-	-	-	-	-
Unavailable	3	-	-	-	-	-	-
TOTAL	**14**	**6**	**2**	**2**	**0**	**4**	**6**
YUBA							
Probable	7	4	1	0	2	1	6
Possible	4	1	0	1	2	1	3
Unavailable	2	-	-	-	-	-	-
TOTAL	**13**	**5**	**1**	**1**	**4**	**2**	**9**

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.

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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."

3. Type of Exposure: Characterization of how an individual came in contact with a pesticide. Type of exposure is not inputted in cases classified as Unrelated, Insufficient, or Unavailable.

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. Intended use is not inputted in cases classified as Unrelated, Insufficient, or Unavailable.

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. 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.

Cases Reported in California[1] with Documented[2] Pesticide Exposure
Summarized by the Type of Illness and the Type of Pesticides
2013

Type of Illness[3]	Antimicrobials[4]		Cholinesterase Inhibitors[4]		Other Pesticides[4]		Total[6]
	Occupational[5]	Non-Occupational[5]	Occupational	Non-Occupational	Occupational	Non-Occupational	
Systemic							
Systemic with Respiratory and Topical Effects	7	3	5	0	53	18	86
Systemic with Respiratory Effects	27	20	16	4	74	40	182
Systemic Only	21	45	37	10	86	119	322
Systemic with Topical Effects	7	0	2	2	37	10	58
Respiratory							
Respiratory Only	18	39	1	6	32	40	137
Respiratory with Topical Effects	10	6	2	1	29	15	64
Topical							
Skin Only	30	5	0	1	18	13	69
Eye Only	71	19	1	1	30	60	185
Eye and Skin	5	0	0	0	8	12	25
Asymptomatic							
Asymptomatic	8	1	13	1	101	15	139
Unknown							
Unknown	0	0	0	0	1	1	2
TOTAL	**204**	**138**	**77**	**26**	**468**	**342**	**1267**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

Systemic: Any health effects not limited to the respiratory tree, skin, and/or eyes. 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 (e.g., miosis, 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.

Unknown: Illness apparently occurred, but the specific nature of the illness could not be determined.

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

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

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.

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 (e.g., before the start of the workday, after the end of the workday).

6. Totals include 12 cases in which the activity could not be determined as occupational or non-occupational.

Hospitalization and Disability Associated[1] with Illnesses/Injuries *Definitely or Probably Related*[2] to Pesticide Exposure in California, Summarized by Occupational Status and Activity 2013

Occupational[3]

Activity[6]	Total Cases	Hospitalization[4]			Disability[5]		
		No. Cases	%	Unknown[7]	No. Cases	%	Unknown[8]
Mixer/Loader	19	0	0	0	1	5.3	2
Applicator	93	0	0	1	22	23.7	14
Mechanical	14	1	7.1	1	5	35.7	1
Packaging/Processing	19	0	0	0	3	15.8	1
Field Worker	191	0	0	0	8	4.2	18
Routine Indoor	40	2	5.0	0	22	55.0	2
Routine Outdoor	3	0	0	0	0	0	0
Manufacturing/Formulation	1	0	0	0	1	100.0	0
Transport/Storage/Disposal	6	0	0	0	1	16.7	0
Emergency Response	9	0	0	0	1	11.1	5
Other	47	0	0	0	4	8.5	4
Unknown	6	0	0	0	0	0	4
Total Occupational	**448**	**3**	**0.7**	**2**	**68**	**15.2**	**51**

Non-Occupational[3]

Activity[6]	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[7]	No. Cases	%	Unknown[8]
Mixer/Loader	8	0	0	0	1	12.5	0
Applicator	120	3	2.5	2	5	4.2	46
Routine Indoor	97	6	6.2	1	9	9.3	26
Routine Outdoor	20	0	0	1	1	5.0	4
Transport/Storage/Disposal	38	5	13.2	2	4	10.5	20
Other	10	0	0	0	0	0	8
Unknown	8	0	0	0	1	12.5	0
Total Non-Occupational	**293**	**14**	**4.8**	**6**	**20**	**6.8**	**104**
TOTAL CASES[9]	**745**	**17**	**2.3**	**8**	**88**	**11.8**	**159**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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 or Non-Occupational: The relationship between the illness/injury and the individual's work.

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 (e.g., before the start of the workday, after the end of the workday).

4. Hospitalization: Count of number of cases in which an individual was hospitalized at least one full day (24-hour period).

5. Disability: Count of number of cases in which an individual missed at least one full day (24-hour period) of work or other normal activity, such as school.

6. 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.

Mechanical: Maintains (e.g., cleans, repairs, 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/ Handles (packs, processes, or retails) agricultural commodities from the packing house

Processing:	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) individuals 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.

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

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

9. Totals include four cases in which the activity could not be determined as occupational or non-occupational. Of the four cases with unknown occupational status, none were hospitalized. The disability status of all four cases is unknown.

Hospitalization and Disability Associated[1] with Illnesses/Injuries *Possibly Related*[2] to Pesticide Exposure in California, Summarized by Occupational Status and Activity 2013

Occupational[3]

Activity[6]	Total Cases	Hospitalization[4]			Disability[5]		
		No. Cases	%	Unknown[7]	No. Cases	%	Unknown[8]
Mixer/Loader	5	0	0	0	1	20.0	1
Applicator	27	0	0	0	7	25.9	7
Mechanical	1	0	0	0	0	0	0
Packaging/Processing	13	0	0	0	1	7.7	1
Field Worker	75	1	1.3	0	5	6.7	10
Routine Indoor	18	0	0	0	3	16.7	2
Routine Outdoor	5	0	0	0	0	0	1
Transport/Storage/Disposal	2	0	0	0	0	0	0
Emergency Response	7	0	0	0	0	0	0
Other	19	0	0	0	5	26.3	3
Unknown	7	0	0	0	0	0	6
Total Occupational	**179**	**1**	**0.6**	**0**	**22**	**12.3**	**31**

Non-Occupational[3]

Activity[6]	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[7]	No. Cases	%	Unknown[8]
Mixer/Loader	2	0	0	0	0	0	0
Applicator	46	1	2.2	2	1	2.2	27
Routine Indoor	97	2	2.1	3	3	3.1	41
Routine Outdoor	11	0	0	0	0	0	3
Transport/Storage/Disposal	1	0	0	0	0	0	0
Other	23	5	21.7	2	4	17.4	13
Unknown	16	0	0	0	0	0	10
Total Non-Occupational	**196**	**8**	**4.1**	**7**	**8**	**4.1**	**94**
TOTAL CASES[9]	**383**	**9**	**2.3**	**7**	**30**	**7.8**	**132**

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 or Non-Occupational: The relationship between the illness/injury and the individual's work.

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 (e.g., before the start of the workday, after the end of the workday).

4. Hospitalization: Count of number of cases in which an individual was hospitalized at least one full day (24-hour period).

5. Disability: Count of number of cases in which an individual missed at least one full day (24-hour period) of work or other normal activity, such as school.

6. 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.
Mechanical:	Maintains (e.g., cleans, repairs, 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, 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) individuals 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.

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

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

9. Totals include eight cases in which the activity could not be determined as occupational or non-occupational. Of the eight cases with unknown occupational status, none were hospitalized. The disability status of all eight cases is unknown.

Illnesses and Injuries Reported in California[1] Associated With[2] Pesticide Exposure Summarized by the Type of Activity and Type of Exposure
2013

Occupational[3]

Type of Activity[4]	Type of Exposure[5]								
	Drift	Residue	Direct Spray/ Squirt	Spill/ Other Direct	Ingestion	Multiple	Other	Unknown	Total
Mixer/Loader	9	0	1	12	0	0	2	0	24
Applicator	23	1	12	62	1	2	3	16	120
Mechanical	1	2	3	6	0	0	2	1	15
Packaging/Processing	3	16	0	3	0	9	1	0	32
Field Worker	143	92	1	1	1	0	0	28	266
Routine Indoor	36	12	0	2	3	1	4	0	58
Routine Outdoor	2	3	1	0	0	1	1	0	8
Manufacturing/Formulation	0	0	0	0	0	0	0	1	1
Transport/Storage/Disposal	0	0	0	7	0	0	1	0	8
Emergency Response	3	0	0	3	0	0	10	0	16
Other	16	8	2	2	2	23	9	4	66
Unknown	0	0	2	6	0	1	0	4	13
Total Occupational Cases	**236**	**134**	**22**	**104**	**7**	**37**	**33**	**54**	**627**

Non-Occupational[3]

Type of Activity[4]	Type of Exposure[5]								
	Drift	**Residue**	**Direct Spray/ Squirt**	**Spill/ Other Direct**	**Ingestion**	**Multiple**	**Other**	**Unknown**	**Total**
Mixer/Loader	3	0	0	6	1	0	0	0	10
Applicator	65	18	21	36	8	5	4	9	166
Routine Indoor	49	52	11	7	63	3	4	5	194
Routine Outdoor	11	3	6	1	7	1	1	1	31
Transport/Storage/Disposal	0	0	0	0	0	0	1	0	1
Other	4	6	0	7	29	1	13	1	61
Unknown	4	1	3	3	2	1	2	10	26
Total Non-Occupational Cases	**136**	**80**	**41**	**60**	**110**	**11**	**25**	**26**	**489**
Total Occupational/ Non-Occupational Cases[6]	**374**	**214**	**65**	**166**	**117**	**51**	**59**	**82**	**1128**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

3. Occupational or Non-Occupational: The relationship between the illness/injury and the individual's work.

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 (e.g., before the start of the workday, after the end of the 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.
Mechanical:	Maintains (e.g., cleans, repairs, 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, 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) individuals 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. Exposure categories not listed on the table indicate that no illnesses 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.
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 is 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. Totals include 12 cases in which the activity could not be determined as occupational or non-occupational.

Illnesses and Injuries Reported by Physicians[1] Associated With[2] Pesticide Exposure Summarized by Pesticide(s) and Type of Illness
2013

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Organophosphates						
Acephate	1	0	0	0	1	0
Bensulide	1	0	0	0	1	0
Chlorpyrifos	2	2	0	0	2	2
Coumaphos	2	0	0	0	2	0
DDVP	3	2	0	0	3	2
Dimethoate	1	0	0	0	1	0
Malathion	4	2	0	0	4	2
N-Methyl Carbamates						
Carbaryl	0	2	0	0	0	2
Propoxur	0	1	0	0	0	1
Pyrethrins and Pyrethroids						
Beta-Cyfluthrin	1	4	1	1	2	5
Bifenthrin	0	1	2	0	2	1
Cyfluthrin	1	9	0	1	1	10
Cyhalothrin	1	0	0	0	1	0
Cypermethrin	14	3	1	0	15	3
Deltamethrin	3	1	1	1	4	2
Esfenvalerate	22	1	2	0	24	1
Gamma-Cyhalothrin	3	0	2	0	5	0
Lambda-Cyhalothrin	4	2	6	1	10	3
Permethrin	1	4	1	1	2	5
Phenothrin	0	1	0	0	0	1
Pyrethrins	0	2	0	0	0	2
Pyrethrum	0	0	0	1	0	1
Other Pesticides						
Adjuvant	1	0	0	0	1	0
Aluminum Phosphide	9	2	0	0	9	2
Boric Acid	3	8	1	0	4	8

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Brodifacoum	1	2	0	0	1	2
Bromethalin	1	0	0	0	1	0
Calcium Hypochlorite	1	0	1	0	2	0
Caprylic Acid	0	0	1	0	1	0
Chlorine	3	1	0	0	3	1
Chlorine Dioxide	1	0	0	0	1	0
Chloropicrin	13	7	4	19	17	26
Chlorothalonil	0	1	0	0	0	1
Combinations of Antimicrobials	38	6	13	2	51	8
Combinations of Fumigants	52	0	10	1	62	1
Combinations of Fungicides	1	6	2	0	3	6
Combinations of Herbicides	5	12	8	2	13	14
Combinations of Insecticides Including ChE Inhibitor(s)	26	13	0	2	26	15
Combinations of Insecticides Without ChE Inhibitor(s)	53	34	25	5	78	39
Copper Ammonium Complex	0	0	1	0	1	0
Copper Ethanolamine Complex	0	0	2	0	2	0
Copper Naphthenate	2	0	0	0	2	0
Copper Sulfate	1	0	0	0	1	0
Cyanuric Acid	4	0	1	1	5	1
Diatomaceous Earth	1	0	0	1	1	1
Fenpyroximate	1	0	0	0	1	0
Fipronil	0	12	0	0	0	12
Geraniol	0	0	2	0	2	0
Glutaraldehyde	0	1	1	0	1	1
Glycolic Acid	1	0	0	0	1	0
Glyphosate	1	5	3	1	4	6
Hexythiazox	1	0	0	0	1	0
Hydrogen Chloride	8	0	4	1	12	1
Hydrogen Peroxide	1	0	5	1	6	1
Indoxacarb	0	1	0	0	0	1
Iprodione	0	1	0	0	0	1

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Isothiazoline Disinfectants	0	0	2	0	2	0
Lactic Acid	0	0	1	0	1	0
Lime-sulfur	0	0	1	0	1	0
Metam-potassium	0	1	0	0	0	1
Metam-sodium	0	1	0	0	0	1
Miscellaneous Combinations	126	86	8	10	134	96
Myclobutanil	1	0	0	0	1	0
Neem Oil	0	0	1	0	1	0
Oil of Lemongrass	1	0	0	0	1	0
Paraquat	1	0	1	0	2	0
PCNB	0	1	0	0	0	1
Phenolic Disinfectants	0	0	2	0	2	0
Phosphine	3	0	0	1	3	1
Pine Oil	1	0	0	0	1	0
Prodiamine	1	0	0	0	1	0
Pyriproxyfen	1	1	0	0	1	1
Quaternary Ammonia	2	0	26	2	28	2
Sodium Hypochlorite	68	10	53	6	121	16
Spinosad	0	0	0	1	0	1
Spirotetramat	1	0	0	0	1	0
Strychnine	0	2	0	0	0	2
Sulfentrazone	0	0	1	0	1	0
Sulfur	0	1	1	1	1	2
Sulfuryl Fluoride	0	11	1	0	1	11
Tebuthiuron	0	1	0	0	0	1
Unknown Antimicrobials	12	2	4	2	16	4
Unknown Herbicides	0	1	0	2	0	3
Unknown Insecticides	22	37	4	3	26	40
Unknown Pesticides	0	6	1	0	1	6
Zinc Naphthenate	0	0	1	0	1	0
Zinc Phosphide	3	3	0	0	3	3
TOTAL	536	313	209	70	745	383

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

3. Type of Pesticide: Type of pesticide based on functional class.

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

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.

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

Systemic: Any health effects not limited to the respiratory tree, skin, and/or eyes. 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 (e.g., miosis, 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.

Summary of Cases Reported in California[1] Associated With[2] Pesticide Exposure Summarized by Occupational Status and by Location of the Incident 2013

Incident Setting[3]	Occupational Exposures[4]		Non-Occupational Exposures[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Farm	206	92	0	1	206	93
Nursery	3	4	0	0	3	4
Forest	1	0	0	0	1	0
Livestock Production Facility	3	0	0	0	4	0
Crop/Livestock Processing Facility	62	23	0	0	62	23
Animal Premise (Veterinary Hospital, Kennels, not Livestock)	7	1	0	0	7	1
Single Family Home	11	3	121	63	132	66
Multi-Unit Housing	4	1	39	38	43	39
Residence (Other or Unspecified)	1	0	103	83	104	84
Residential Institution	7	1	1	0	8	1
School	19	5	0	0	19	5
Prison	2	2	0	0	2	2
Hospital/Medical	32	8	0	0	32	8
Pesticide Manufacturing Facility	2	0	0	0	2	0
Industrial or Other Manufacturing Facility	4	2	0	0	4	2
Office/Business	10	3	0	0	10	3
Retail Establishment	9	2	0	1	9	3
Service Establishment	39	16	12	1	51	17
Wholesale Establishment	0	1	0	0	0	1
Road/Rail Or Utility Right Of Way	5	3	9	2	14	5
Park	5	1	1	1	6	2
Golf Course	2	0	0	1	2	1
Landscape, Other	2	1	2	2	4	3
Other	6	0	0	0	6	0
Unknown	6	10	5	3	14	20
TOTAL[5]	448	179	293	196	745	383

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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:	Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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.
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 and landscaped areas on the property.
Multi-Unit Housing:	Apartments and multi-plexes and other buildings on property. This includes swimming pools and landscaped areas on the property.
Labor Housing:	Lodging facility or residence provided for the labor force.

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 any other incident setting.
Landscape, Other:	Landscaped ornamental shrub, tree, and other areas. This excludes landscaped areas in any other incident setting.
Other:	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 or Non-Occupational: The relationship between the illness/injury and the individual's work.

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 (e.g., before the start of the workday, after the end of the workday).

5. Totals include 12 cases in which the activity could not be determined as occupational or non-occupational.

Summary of Cases Reported in California[1] as Associated With[2] Pesticide Exposure Summarized by Gender, Age Distribution, Type of Pesticide, and Type of Use 2013

Agricultural Use Pesticide Exposure Incidents[3]

Age Group	Pesticides other than Antimicrobial Pesticides[4]			Antimicrobial Pesticides[4]			Total
	Male	Female	Unknown	Male	Female	Unknown	
Unknown	54	30	1	0	9	0	**94**
0 - 9	0	1	0	0	0	0	**1**
10 - 14	2	0	0	0	0	0	**2**
15 - 19	6	4	0	0	0	0	**10**
20 - 29	57	40	0	2	6	0	**105**
30 - 39	59	29	0	2	10	0	**100**
40 - 49	30	33	0	1	10	0	**74**
50 - 59	22	18	0	2	3	0	**45**
60 - 69	3	1	0	0	0	0	**4**
70 +	0	0	0	0	0	0	**0**
Total	**233**	**156**	**1**	**7**	**38**	**0**	**435**

Non-Agricultural Use Pesticide Exposure Incidents[3]

Age Group	Pesticides other than Antimicrobial Pesticides[4]			Antimicrobial Pesticides[4]			Total
	Male	Female	Unknown	Male	Female	Unknown	
Unknown	5	12	0	2	0	0	**19**
0 - 9	29	33	0	32	13	0	**107**
10 - 14	3	5	0	0	1	0	**9**
15 - 19	10	5	0	6	15	0	**36**
20 - 29	32	18	0	29	40	0	**119**
30 - 39	37	28	0	21	32	0	**118**
40 - 49	35	27	0	27	14	0	**103**
50 - 59	36	24	0	18	19	0	**97**
60 - 69	17	12	0	9	5	0	**43**
70 +	17	11	0	1	5	0	**34**
Total	**221**	**175**	**0**	**145**	**144**	**0**	**685**
Total Ag /Non-Ag Cases[5]	**461**	**332**	**1**	**152**	**182**	**0**	**1128**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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:	Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

3. Intended Use: Agricultural/Non-Agricultural - Indicates whether the pesticide(s) were intended to contribute to the production of agricultural commodities.

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 (e.g., bacteria, viruses).

5. Totals include an additional eight cases which could not be determined to be agricultural or non-agricultural use situations.

Agricultural Drift Cases Reported in California[1] Associated With[2] Pesticide Exposure Summarized by Application Sites 2013

Application Site[3]	Number of Cases[4]	Number of Episodes[5]
BERRIES		
Small Fruits (Other or Unspecified)	1	1
Raspberries	2	1
Strawberries	5	2
FIXTURES		
Agricultural & Farm Equipment (Other or Unspecified)	1	1
FORAGE CROP		
Alfalfa	4	3
FRUITING VEGETABLE		
Fruiting Vegetables (Other or Unspecified)	1	1
Peppers	1	1
GRAIN		
Corn	2	2
GRAPES		
Grapes	5	1
LEAFY/STEM VEGETABLE		
Lettuce	37	4
Celery	1	1
Broccoli	11	1
NON-CROP		
Soil	101	4
NUT TREES		
Almonds	4	3
ORNAMENTAL		
Ornamental Plants (Other or Unspecified)	1	1
OTHER FRUIT		
Avocados	1	1
OTHER VEGETABLE		
Onions (Dry)	1	1
PREMISES		
Food Processing/Handling Plant/Area (Other or Unspecified)	21	1
ROOT CROP VEGETABLE		
Carrots	1	1
SEED/POD VEGETABLE		
Beans (Other or Unspecified)	16	1

Application Site[3]	Number of Cases[4]	Number of Episodes[5]
STONE FRUIT		
Cherries	1	1
UNKNOWN		
Unknown	1	1
WATER		
Industrial Processing Water	3	2
TOTAL	222	36

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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 Episodes: Indicates the number of individuals exposed in one incident of agricultural drift.

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

Illnesses and Injuries of Applicators Reported by Physicians[1] Associated With[2] Pesticide Exposure Summarized by Type of Equipment, Type of Activity, and Occupational Status
2013

Occupational[3]

Type of Equipment[4]	Type of Activity[5]				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Ground, Other or Unspecified	3	4	0	1	8
Ground Boom, Other or Unspecified	1	2	0	0	3
Ground, Boom Below/Behind	0	2	0	0	2
Over-the-Vine Boom	0	1	0	0	1
Airblast Sprayers	0	2	0	3	5
Power Dusters	0	1	0	0	1
Shank Injection with Tarps	1	0	0	0	1
Hand, Other or Unspecified	1	10	0	0	11
Pressurized Hose-Line Sprayers	1	4	0	0	5
Hand Pump Sprayer	0	5	0	0	5
Back Pack Sprayer	0	5	0	0	5
Unpressurized Hand-Held Spray Equipment	0	11	0	0	11
Aerosol Can	0	2	0	0	2
Chamber	0	1	0	0	1
Tarp	0	1	0	0	1
Automatic Equipment, Other or Unspecified	6	3	0	3	12
Automatic Equipment, Chlorinators	3	1	0	5	9
Drip Irrigation Equipment	1	0	0	0	1
Manual Application Methods, Other or Unspecified	2	7	0	0	9
Immersion Equipment	1	12	0	0	13
Implements With Handles	1	2	0	0	3
Implements Without Handles	0	21	0	0	21
Manual Placement	0	10	0	0	10
Not Applicable	0	0	0	1	1
Other	0	1	0	2	3
Unknown	3	12	0	0	15
Total Occupational Cases	**24**	**120**	**0**	**15**	**159**

Non-Occupational[3]

Type of Equipment[4]	Type of Activity[5]				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Hand, Other or Unspecified	2	13	0	0	15
Pressurized Hose-line Sprayers	0	1	0	0	1
Hand Pump Sprayer	2	7	0	0	9
Back Pack Sprayer	0	1	0	1	2
Unpressurized Hand-held Spray Equipment	3	19	0	0	22
Aerosol Can	1	30	0	0	31
Foggers	0	28	0	0	28
Manual Application Methods, Other or Unspecified	0	23	0	0	23
Implements With Handles	0	2	0	0	2
Implements Without Handles	0	1	0	0	1
Manual Placement	3	37	0	0	40
Other	0	3	0	0	3
Unknown	5	14	0	0	19
Total Non-Occupational Cases	**10**	**166**	**0**	**0**	**176**
Total Occupational/ Non-Occupational Cases[6]	**34**	**290**	**0**	**15**	**339**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

3. Occupational or Non-Occupational: The relationship between the illness/injury and the individual's work.

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 (e.g., before the start of the workday, after the end of the 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.
Mechanical:	Maintains (e.g., cleans, repairs, 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.
Air, Other Or Unspecified:	Aerial application equipment, other or unspecified. This includes two or more types of aerial application equipment and excludes fixed wing aircraft and helicopters.
Over-The-Vine Boom:	Ground operated equipment with the arms of the spray boom extending over the tops of grapevines.
Electrostatic Sprayer:	Ground operated equipment designed to impart an electrical charge to the pesticide particles. The electrostatic designation for ground application equipment overrides any other type of equipment it is used with.
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.

Power Dusters:	Ground application equipment used to apply dust formulated pesticides.
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.
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.
Ground, Other Or Unspecified:	Ground application equipment, unknown or unspecified. This includes two or more types of ground application.
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.
Ground Boom Below/Behind:	Ground application equipment with a spray boom located below or behind the equipment operator with the spray nozzles pointed downward.
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 Pump Sprayer:	Hand-held compressed air sprayer with small volume tanks (1 to 5 gallons). This excludes backpack sprayers.
Hand-Held Dusters:	Hand-held application equipment for granules or dust. This includes belly grinders, bellows, squeeze bulbs, etc.
Back Pack Sprayer:	Compressed air sprayer where the tank is worn on the back of the applicator.
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.
Foggers:	Disposable pressurized cans designed for the total release of the contents in a single use. The pesticide is propelled out of the can by an inert compressed gas propellant.
Aerosol/Fog Generating Equipment:	Refillable application equipment designed to disperse pesticide as a small airborne droplet, either in confined spaces or outdoor areas. These include truck-mounted equipment for outdoor use, hand-carried portable units and wall mounted electric units that are found in dairies, restaurants, etc.

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, Chlorinators:	Chlorination units that automatically inject chlorine into water for disinfection purposes. This includes chlorinators for swimming pools, packing houses, and food processing plants.
Drip Irrigation Equipment:	Chemigation through drip irrigation equipment.
Sprinkler Irrigation Equipment:	Chemigation through sprinkler irrigation equipment.
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.

Not Applicable: No application equipment is involved.

6. Totals include four cases in which the activity could not be determined as occupational or non-occupational.

Illnesses and Injuries in California[1] Field Workers Associated With Pesticide Residue and Drift, 1982-2013

Year	Residue[2]					Drift[2]				
	Systemic/ Respiratory[3]		Topical[3]			Systemic/ Respiratory[3]		Topical[3]		
	Definite/ Probable[4]	Possible[4]	Definite/ Probable[4]	Possible[4]	Total	Definite/ Probable[4]	Possible[4]	Definite/ Probable[4]	Possible[4]	Total
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	67	19	3	1	90
1993	10	38	2	67	117	7	21	3	4	35
1994	33	31	5	42	111	8	18	9	1	36
1995	20	48	74	89	231	64	24	6	8	102
1996	29	37	15	60	141	224	35	4	3	266
1997	83	44	20	62	209	68	14	9	1	92
1998	40	19	5	47	111	29	21	2	1	53
1999	21	17	0	42	80	10	30	0	3	43
2000	21	31	2	22	76	42	33	1	1	77
2001	7	22	0	17	46	4	5	1	1	11
2002	30	23	13	12	78	53	16	91	0	160
2003	4	17	4	33	58	10	8	1	0	19
2004	15	27	1	25	68	104	72	1	3	180
2005	1	9	2	16	28	108	17	6	2	133
2006	1	9	2	13	25	56	6	2	0	64
2007	24	15	1	18	58	51	15	0	0	66
2008	48	16	2	7	73	78	28	12	1	119

Year	Residue[2]					Drift[2]				
	Systemic/ Respiratory[3]		Topical[3]			Systemic/ Respiratory[3]		Topical[3]		
	Definite/ Probable[4]	Possible[4]	Definite/ Probable[4]	Possible[4]	Total	Definite/ Probable[4]	Possible[4]	Definite/ Probable[4]	Possible[4]	Total
2009	80	9	7	4	100	20	7	12	0	39
2010	8	8	1	2	19	94	16	3	2	115
2011	26	1	1	0	28	78	15	5	1	99
2012	4	9	2	2	17	71	7	47	1	126
2013	61	27	2	2	92	115	15	11	2	143
TOTAL	**833**	**845**	**803**	**1924**	**4408**	1361	442	229	36	2068

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

2. Type of Exposure: Characterization of how an individual came in contact with a pesticide. Data on drift exposure prior to 1992 has not been validated and is excluded from this report.

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.

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

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

Systemic: Any health effects not limited to the respiratory tree, skin, and/or eyes. 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 (e.g., miosis, lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

4. 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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

Incidents Involving Field Workers Reported in California[1] Associated With[2] Pesticide Residue Exposure Summarized by Application Site and Type of Illness 2013

Application Site	Systemic/ Repiratory[3]		Topical[3]		Total
	Definite/ Probable	Possible	Definite/ Probable	Possible	
BERRIES					
Strawberries	0	1	0	0	1
CITRUS					
Oranges	12	0	1	1	14
FIXTURES					
Agricultural & Farm Equipment (Other or Unspecified)	0	1	0	0	1
GRAPES					
Grapes	0	1	1	1	3
LEAFY/STEM VEGETABLE					
Lettuce	1	9	0	0	10
Spinach	0	1	0	0	1
MULTIPLE					
Soil, Tomatoes	0	13	0	0	13
NUT TREES					
Almonds	47	1	0	0	48
PREMISES					
Surfaces (Other or Unspecified)	1	0	0	0	1
TOTAL	**61**	**27**	**2**	**2**	**92**

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

Systemic: Any health effects not limited to the respiratory tree, skin, and/or eyes. 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 (e.g., miosis, lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'

Pesticide-Associated Illnesses and Injuries Reported In California Schools[1,2] by Exposure Category, Pesticide Type, and Illness Symptoms 2013

Exposure[5]	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	3	1	0	0	**6**
Residue	0	0	2	0	0	0	**2**
Direct Spray/Squirt	0	0	0	0	0	1	**1**
Spill/Other Direct	0	0	0	9	0	0	**9**
Ingestion	1	0	0	0	0	0	**1**
Other	0	0	1	1	0	0	**2**
Multiple Exposures	0	0	1	0	0	0	**1**
Unknown	0	0	0	1	0	1	**2**
TOTAL	**3**	**0**	**7**	**12**	**0**	**2**	**24**

1. Source: California Department of Pesticide Regulation, Pesticide Illness Surveillance Program. No children were reported to have been exposed while at school in 2013.

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 (e.g., measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (e.g., 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: Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

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 is 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.

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

Systemic: Any health effects not limited to the respiratory tree, skin, and/or eyes. 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 (e.g., miosis, 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 (e.g., bacteria, viruses).
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.
Fax: (916) 445-4280.
www.cdpr.ca.gov

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 the effectiveness of the DPR pesticide safety programs and recommend changes when appropriate.