

**SUMMARY OF RESULTS FROM THE CALIFORNIA PESTICIDE
ILLNESS SURVEILLANCE PROGRAM
- 2015 -**

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EXECUTIVE SUMMARY

This report provides a summary of illnesses identified in 2015 by the Pesticide Illness Surveillance Program (PISP) of the California Department of Pesticide Regulation (DPR). DPR identified 1,757 cases potentially involving health effects from pesticide exposure. DPR epidemiologists determined that 1,187 (67.6%) of those identified cases were at least possibly associated with pesticide exposure, a 9.6% increase from the 1,083 associated cases in 2014. Evidence indicated that pesticide exposure did not cause or contribute to ill health in 248 (14.1%) of the 1,757 cases evaluated. Insufficient information prevented evaluation of 322 (18.3%) cases.

Despite an increase in the number of associated cases from 2014 to 2015, the number of associated episodes, defined as an incident in which one or more people are exposed to pesticides from a particular source, decreased 7.1%, from 836 in 2014 to 777 in 2015.

PISP identified 397 (33.4%) of the 1,187 cases as associated with the agricultural use of pesticides. This reflects a 45.4% increase from the previous year in which there were 273 cases. There were 787 (66.5%) cases associated with non-agricultural pesticide use, a decrease of 1.6% from 2014 (800). Three of the 1,187 pesticide-associated cases could not be characterized as agricultural or non-agricultural due to insufficient information.

In 2015, 207 (26.3%) of the 787 cases associated with non-agricultural use of pesticides were occupational, meaning the incident occurred while the affected individuals were at work. Of the 207 associated occupational, non-agricultural use cases, 157 (75.8%) involved antimicrobial products.

PISP data reflects that 206 agricultural field workers were injured by pesticide exposure in 24 separate episodes in 2015; the same total number of episodes as in 2014. The largest number of field workers injured in a single episode was 68, whereas in 2014, the largest number of field workers injured in a single episode was 40.

Children (less than 18 years old) accounted for 225 (19.0%) of the associated cases; 221 cases involved non-agricultural use pesticides and 4 cases involved agricultural use. Fifty-three (23.6%) of the 225 cases involved children exposed when pesticides drifted from a nearby fitness facility on to their school.

BACKGROUND, SOURCES, AND PURPOSE OF ILLNESS SURVEILLANCE

The California Department of Pesticide Regulation (DPR) administers the California pesticide¹-safety regulatory program. This program includes a thorough data review of all pesticides before registration in

¹ Pursuant to Title 3 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 are considered pesticides. In California, adjuvants are also subject to the regulations that control pesticides. Adjuvants are substances added to

California, often with specific data requirements not required by other states, as well as mandatory pesticide illness and pesticide use reporting requirements. In addition, DPR oversees a unique enforcement system involving the assistance of the California Agricultural Commissioners (CACs) operating in every county in the state. The CACs ensure compliance with all federal and state pesticide laws and regulations, and, in the case of restricted material pesticides, issue time and location specific permits that can place additional restrictions on use^{2, 3}.

In California, reporting of pesticide illnesses has been mandatory since 1971. Illness reports are collected, evaluated, and analyzed by program staff. DPR's Pesticide Illness Surveillance Program (PISP) is the oldest and largest program of its kind in the nation; its epidemiologists provide data to regulators, advocacy groups, industry, and other interested parties. Indeed, the U.S. General Accounting Office noted that California had "...the most comprehensive event monitoring and surveillance system, as well as the most comprehensive pesticide use management practices, of any state."⁴

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 (LHO) to inform the local CAC and to complete a pesticide illness report (PIR), and send it to the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Industrial Relations (DIR), and the DPR-PISP. LHOs and healthcare providers are also able to fulfill their reporting requirements via the California Reportable Disease Information Exchange (CalREDIE), a statewide web-based morbidity reporting system. PISP began receiving PIRs from CalREDIE in 2013. Though there has been a slight increase in the number of illness reports from CalREDIE since the program started, many were duplicates from other existing pesticide-illness reporting systems.

California Poison Control System (CPCS) began assisting in the reporting of possible pesticide-related illnesses and injuries in 1999, and this system continues to be a significant source of pesticide illness reports. When a medical professional consults with CPCS about an illness or injury that may be related to a pesticide, CPCS offers to submit a PIR on behalf of the medical provider. Through this contract with CPCS, PISP is able to identify hundreds of pesticide-related exposures, mostly non-occupational, that may otherwise be unreported.

DPR strives to ensure that the PISP database captures the majority of pesticide illness incidents. PISP 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 the DIR and are subsequently shared with the CDPH-OHB. The DFROIIs are the primary

enhance the efficacy of a pesticide, and include emulsifiers, spreaders, water modifiers, and wetting and dispersing agents.

² <http://phys.org/news/2015-01-california-unveils-strict-pesticide.html>

³ <http://phys.org/news/2016-10-california-tightening-popular-pesticide.html>

⁴ U.S. General Accounting Office (1993). Pesticides on farms: Limited capability exists to monitor occupational illnesses and injuries. Report Number PEMD-94-6. Washington, D.C.

source of PISP's occupational illness reports and predominantly involve non-agricultural and, to a lesser extent, agricultural use of pesticides. As described in the paragraph below, PISP epidemiologists send for investigation any DFROII that mentions a pesticide as a possible cause of injury, or involves a situation in which pesticide use is likely.

DPR is vested with primary authority through the U.S. Environmental Protection Agency (U.S. EPA) to enforce federal and state laws pertaining to the proper and safe use of pesticides. DPR's authority to enforce pesticide laws and regulations throughout the state is largely carried out in California's 58 counties by the CACs and their staffs (approximately 400 inspector/biologists). The CAC staff investigate suspected pesticide illnesses that occur in their jurisdictions, whether or not they pertain to agriculture. DPR provides training and technical support for CAC investigators. The 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, the CACs send their reports describing their findings to DPR. These reports describe the circumstances that may have led to pesticide exposure and the consequences to all those known to have been exposed. In their role as enforcement agents, the CACs also determine whether pesticide users complied with safety requirements. PISP epidemiologists evaluate medical reports and all information gathered by the CACs in the investigative process. They abstract key information related to the episode and enter those variables into the PISP database. Following analysis of all the available information and evidence, PISP epidemiologists assess the likelihood that the pesticide exposure caused or contributed to the illness. Standards for the determination of pesticide exposure are described in the PISP program brochure, "Preventing Pesticide Illness."⁵

PISP is a passive surveillance system that depends primarily on the reports submitted by medical providers to identify cases of pesticide-related illnesses and injuries. Thus, there may be limitations in the quality, quantity, and timeliness of the information received. Measuring the population at risk is critically important in analysis, yet determining the size of the population at risk of pesticide exposure is difficult. However, when combined with other reporting mechanisms, the information PISP receives can provide a more accurate representation of pesticide-related illnesses and injuries occurring throughout the state⁶.

The purpose of this report is to provide a descriptive summary of the number and types of exposures occurring in a given year, not to draw conclusions or make recommendations. DPR scientists may however, conduct subsequent investigations or studies of these cases for several reasons. For instance, DPR may consider these reports when conducting a risk evaluation or mitigation for a specific pesticide. Similarly, DPR scientists regularly look to the PISP database to evaluate the effectiveness of the Department's pesticide safety regulatory programs and to assess the need for changes. Trends in the illness data may be brought to the attention of DPR management for future action and can result in the implementation of additional restrictions on pesticide use through California-specific permit conditions administered by the CACs or by changing statewide regulations. (e.g., see the discussion on

⁵ The PISP program brochure, "Preventing Pesticide Illness" can be viewed or downloaded from DPR's web site at <http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf>.

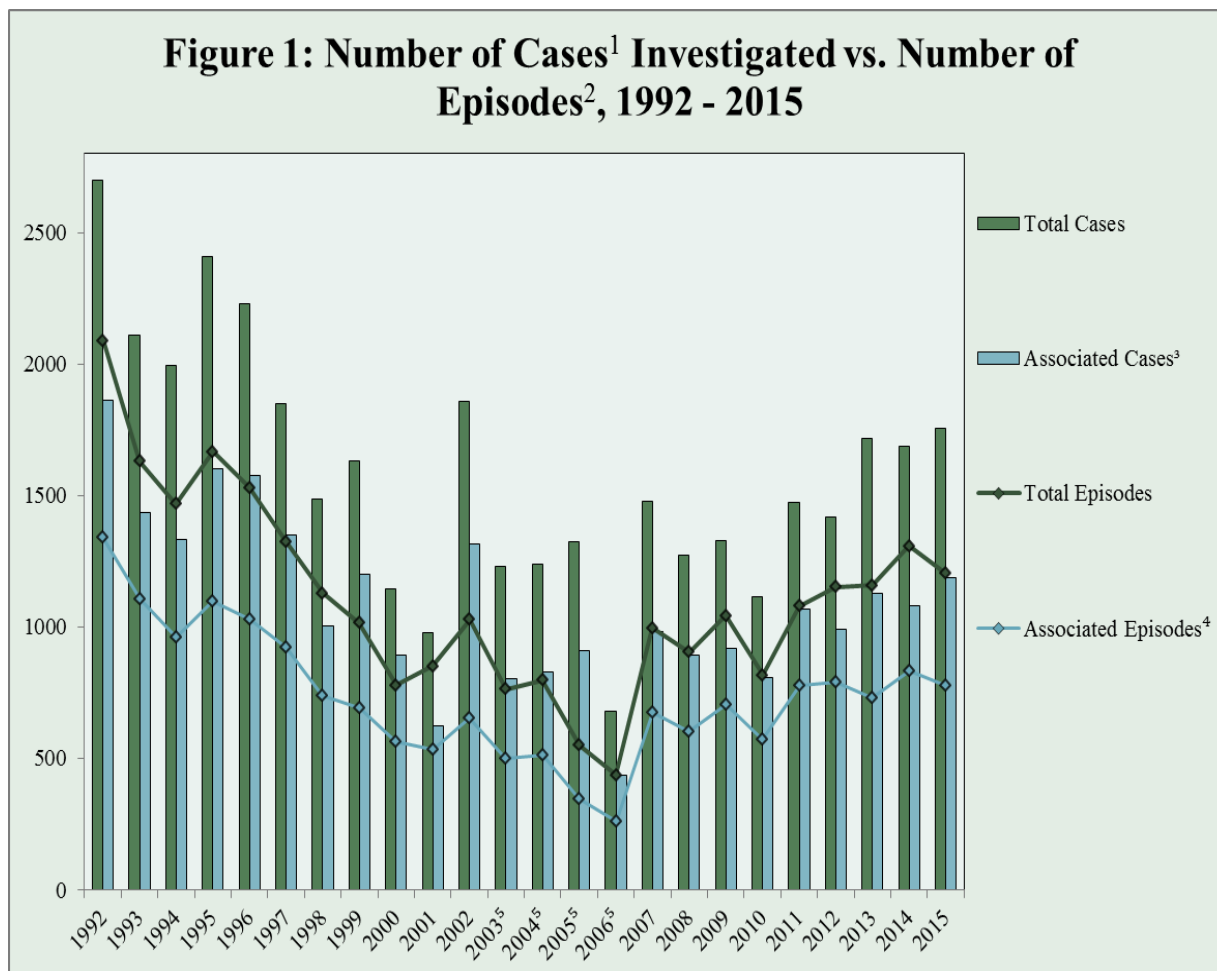
⁶ Mehler, L. N., M. B. Schenker, et al. (2006). "California surveillance for pesticide-related illness and injury: coverage, bias, and limitations." *J Agromedicine* 11(2): 67-79.

fenpyroximate on page 25). Finally, if an illness episode results from illegal practices, in addition to an enforcement action, state and county staff may take appropriate action to educate pesticide users and promote appropriate pesticide use.

In an effort to improve the quality of the investigation reports received, DPR provides training sessions on investigation procedures approximately every two years, or upon the request of the CACs, to train new CAC staff. Topics include authority and jurisdiction, types of investigations, developing an investigative plan, evidence collection and assembling the report. The last statewide training sessions were given in 2014, however, regional enforcement offices have provided investigative training to specific counties upon request.

2015 NUMERIC RESULTS

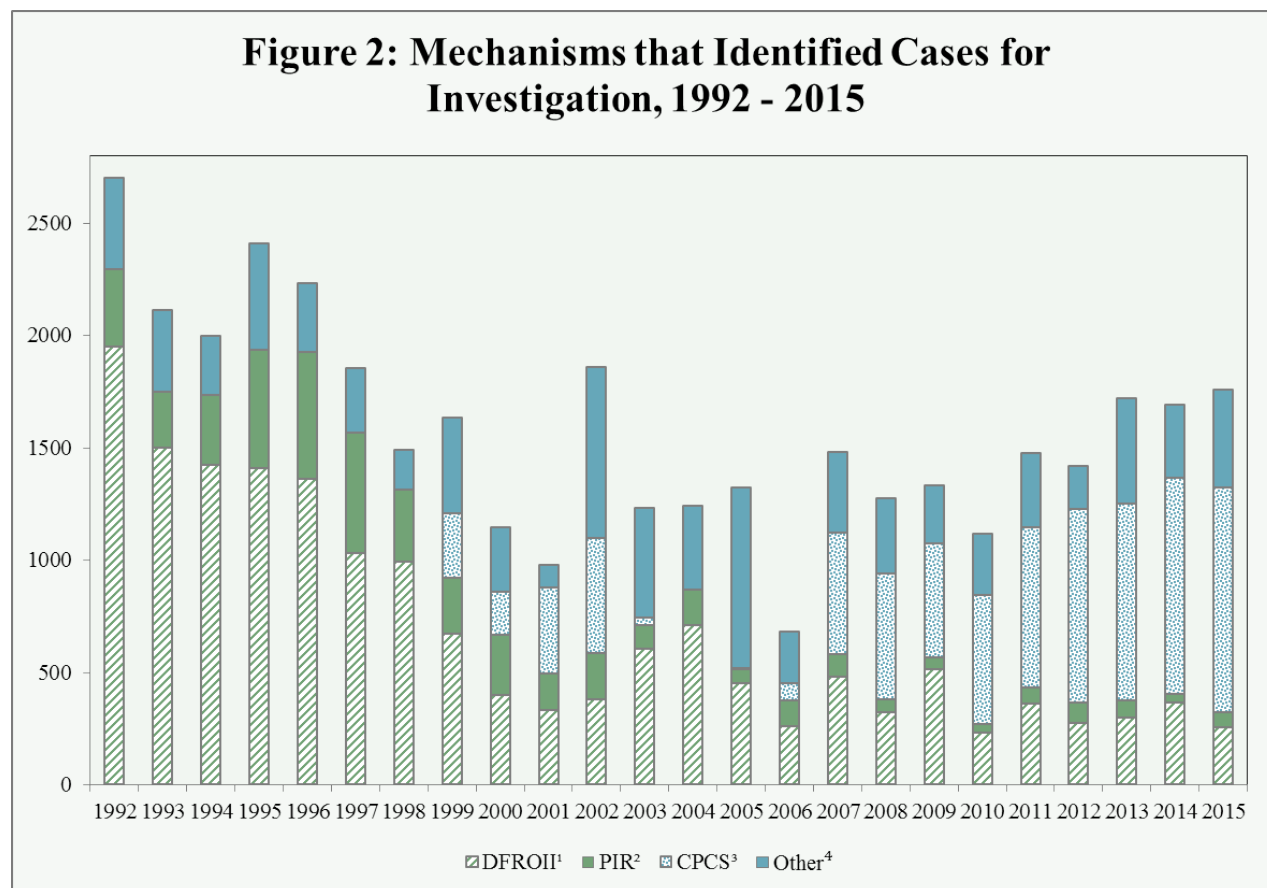
In 2015, PISP epidemiologists identified 1,757 cases that potentially involved health effects from pesticide exposure. This represents a 4.0% increase from 1,689 cases identified in 2014, and a 2.3% increase from 1,718 cases identified in 2013. However, the total number of episodes, defined as an event in which a particular source exposed one or more people (cases) to pesticides, decreased by 7.9% from 1,309 in 2014 to 1,205 in 2015 but increased by 3.9% from 2013 (1160) (Figure 1). Overall, the data suggest the number of cases and episodes have been relatively consistent since 2011.



-
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 particular 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 pesticide-related illness reports from 2003-2006.

Figure 2 demonstrates the variation in the number of case reports identified by the different reporting sources initiating investigations. The proportions of initiating documents received from the different sources in 2015 are similar to those of recent years.

The CPCS remained a major source of case identification in 2015 (998, 56.8%). Though the proportion of total cases received from CPCS remained unchanged from 2014, the number of cases reported increased by 3.7%. DFROII reports contributed 255 (14.5%) illness cases, a decrease from 2014 and 2013, 363 (21.5%) and 296 (17.2%), respectively. The 2015 data represents a decrease in both the number of cases reported and the proportion of total DFROII received, the lowest number of reports and proportion since 2011. Other reporting sources, such as county complaints, news media, as well as additional cases identified during the course of an investigation, accounted for 438 (24.9%) cases in 2015, an increase of 35.6% from 2014 (323, 19.1%). Direct physician reporting to local health officers, as required by HSC § 105200, accounted for 66 (3.7%) of all identified cases, an increase of 61.0% from 2014 (41) and a decrease of 15.4% from 2013 (78). Of those 66 cases, CalREDIE PIRs were cause for initiating 11 (<1%) of the investigations, an increase from 5 cases in 2014. CalREDIE PIRs provided additional case information on 86 cases in the PISP database that were initially reported through other sources, an increase of 24.6% from 2014 (69).

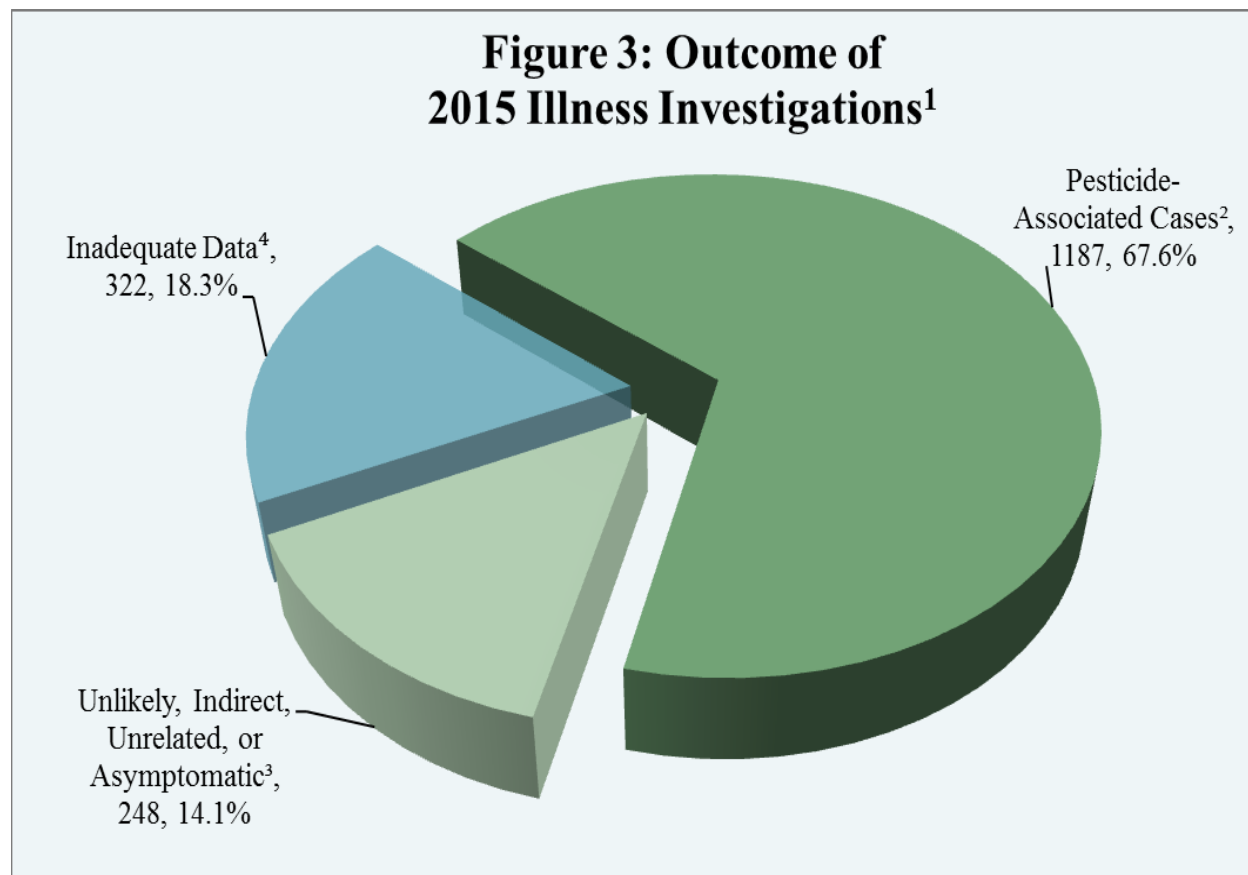


1. *DFROII* – Doctor’s First Report of Occupational Illnesses and Injury (Workers’ Compensation document).
2. *PIR* – Pesticide Illness Report (physicians reporting to local health officers in compliance with Health and Safety Code Section 105200).
3. *CPCS* – California Poison Control System (facilitated 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 1,187 (67.6%) of the 1,757 cases identified in 2015 were associated cases. This is an increase of 9.6% from 2014 where 1,083 cases were associated with pesticide exposure. Despite the increase in the number of cases in 2015, the number of associated episodes, actually decreased 7.1%, from 836 in 2014 to 777 in 2015 (Figure 1). Thus, the data suggests that although there were fewer pesticide-related incidents in 2015, more people were affected when incidents did occur.

Evidence indicated that pesticide exposure did not cause or contribute to ill health in 248 (14.1%) of the 1,757 cases evaluated. This grouping includes 75 asymptomatic cases, which constitute 4.3% of the total

cases identified in 2015. Insufficient information prevented evaluation of 322 cases (18.3%), an increase of 14.2% (282) from 2014 (Figure 3).

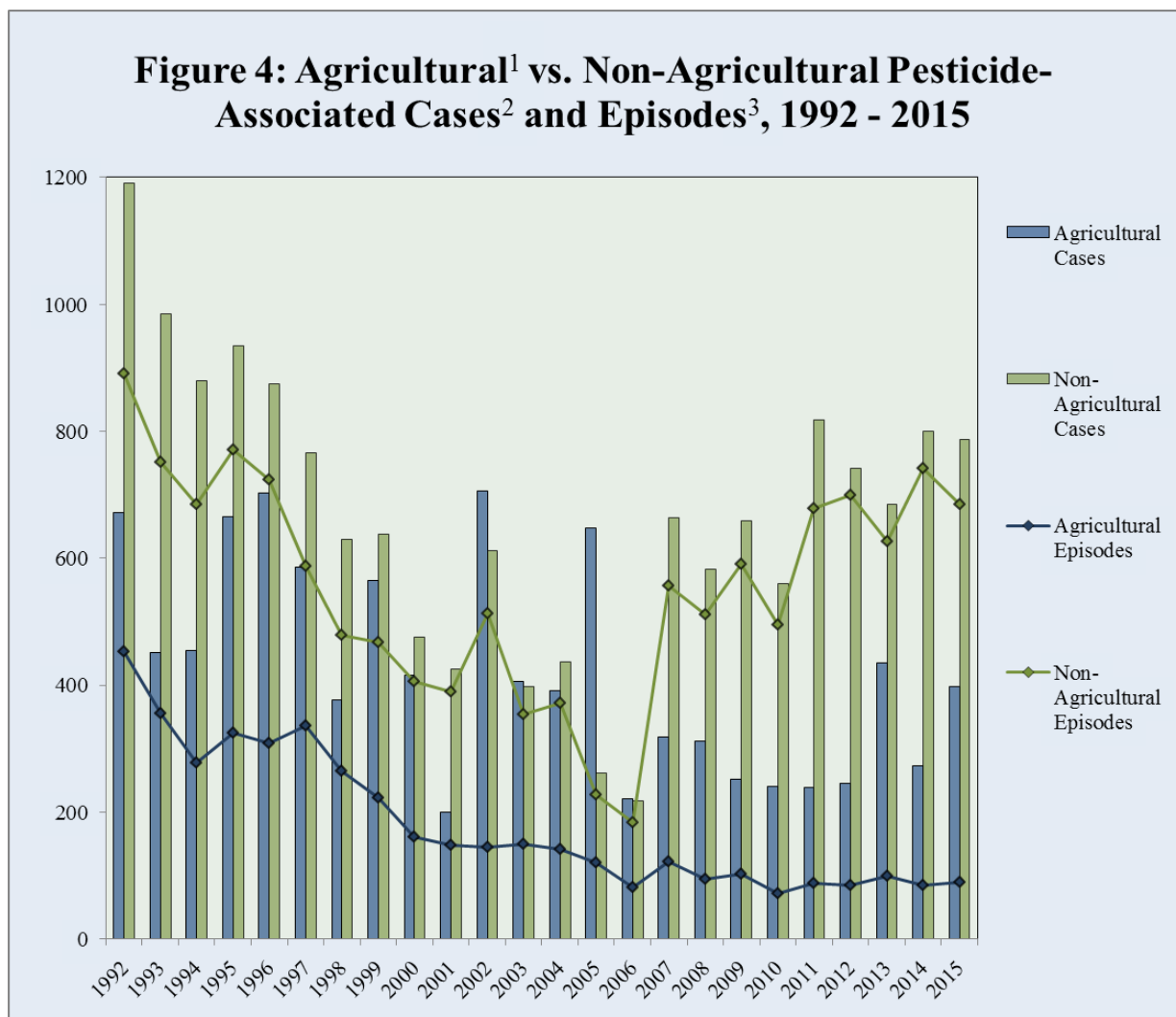


1. Total cases = 1,757
2. *Associated Cases* refers to cases involving pesticides classified as definitely, probably, or possibly related to human health effects.
3. *Unlikely/Indirect/Unrelated/Asymptomatic* refers to cases in which the weight of the evidence was against pesticide causation. Unlikely 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. Asymptomatic cases are those in which the exposed people did not develop symptoms.
4. *Inadequate* means that there was not enough information collected to determine if pesticides contributed to ill health.

Overall, the number of associated agricultural episodes has been relatively consistent since 2007 (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.” Of the 1,187 associated cases, 397 (33.5%) were attributed to pesticides used for agricultural purposes, an increase of 45.4% (273) from 2014 and a decrease of 8.7% (435) from 2013 (Figure 4). The total number

of associated agricultural episodes increased by a smaller percentage (4.7%) as compared to 2014, which indicates there were more multiple person episodes involving more people that occurred in 2015. Of the remaining 790 associated cases, 787 (66.5%) occurred under circumstances considered non-agricultural, a decrease of 1.6% from 2014 (800) and an increase of 14.9% from 2013 (685). The total number of associated non-agricultural episodes also shows a similar pattern as the number of cases, a decrease from 2014 (741) and an increase from 2013 (627). Use or intended use in non-production agriculture is designated as “non-agricultural.” Structural, sanitation, or home garden use, as well as pesticide manufacture, transport, storage, and disposal, are considered “non-agricultural.” The slight decrease in the proportion of non-agricultural cases, from 74.6% in 2014 to 66.5% in 2015, may in part be due to an increase in the number of agricultural cases and not necessarily a marked reduction in the number of non-agricultural cases. Indeed, after a substantial increase in 2011, the overall number of associated non-agricultural cases and episodes has remained relatively consistent.

The three remaining 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), 2013 (8), 2014 (10), and 2015 (3). These cases are not included in Figure 4.
3. Some 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), 2013 (7), 2014 (10), and 2015 (3). 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 certainty (relationship) and whether or not the cases involved the agricultural use of pesticides. Sufficient evidence was available to determine that of the 1,187 pesticide-associated cases, 192 (16.2%) were definitely related, 742 (62.5%) were probably related, and 253 (21.3%) were possibly related to a pesticide exposure (Table 1).

Table 1: Relationship Evaluation of 2015 Illness Cases				
Relationship	Agricultural¹	Non-Agricultural²	Unknown or Not Applicable³	Total
Definite ⁴	65	126	1	192
Probable ⁵	289	453	0	742
Possible ⁶	43	208	2	253
Pesticide-Associated Subtotal	397	787	3	1,187
Unlikely ⁷	5	39	1	45
Indirect ⁸	0	0	0	0
Asymptomatic ⁹	72	3	0	75
Unrelated ¹⁰	0	0	128	128
Not Applicable ¹¹	60	250	12	322
Overall Total	534	1079	144	1,757

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 was not available to the evaluator.

In 2015, occupational exposures, defined as those that occurred while the affected people were at work, accounted for 573 (48.3%) of the 1,187 associated cases. Non-occupational exposures accounted for 609 (51.3%) of the associated cases. Five associated cases could not be characterized as occupational or non-occupational due to insufficient information (Table 1b).

Occupational Status	Agricultural¹	Non-Agricultural²	Unknown or Not Applicable³	Total
Non-Occupational ⁴	33	575	1	609
Occupational ⁵	364	207	2	573
Unknown or Not Applicable ³	0	5	0	5
Total	397	787	3	1,187

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 or occupational designation could not be characterized due to insufficient information.
4. The individual was not on the job at the time of the incident. This category includes individuals on the way to or from work (before the start or after the end of their workday).
5. 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.

When PISP receives and evaluates illness investigative reports, enforcement actions by CAC and DPR are often still under consideration, 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 780 associated cases stemming from 410 (52.9%) episodes contained evidence to indicate

a violation of safety requirements contributed to the exposure. Illness and/or injury may have been prevented if the people involved had adhered strictly to safety procedures required by regulations and/or pesticide labels. Of the 410 episodes with these contributory violations, 31 (7.6%) were attributed to pesticides intended for agricultural purposes. PISP epidemiologists identified 22 (2.8%) episodes of non-compliance with regulations that did not contribute to the pesticide exposure (e.g., paperwork violations). Due to insufficient information, violations, if any, could not be determined in 176 (22.7%) episodes. There were 167 (21.5%) episodes involving 209 individuals that had health effects attributed to pesticide exposure despite apparent compliance with all applicable label instructions and safety regulations. Of these 167 episodes with no noted violations, 38 (22.8%) were attributed to pesticides used for agricultural purposes, an increase of 52.0% from 2014 (25). Further evaluation of such cases is ongoing to determine if additional safety requirements are appropriate.

NON-AGRICULTURAL PESTICIDE ILLNESSES

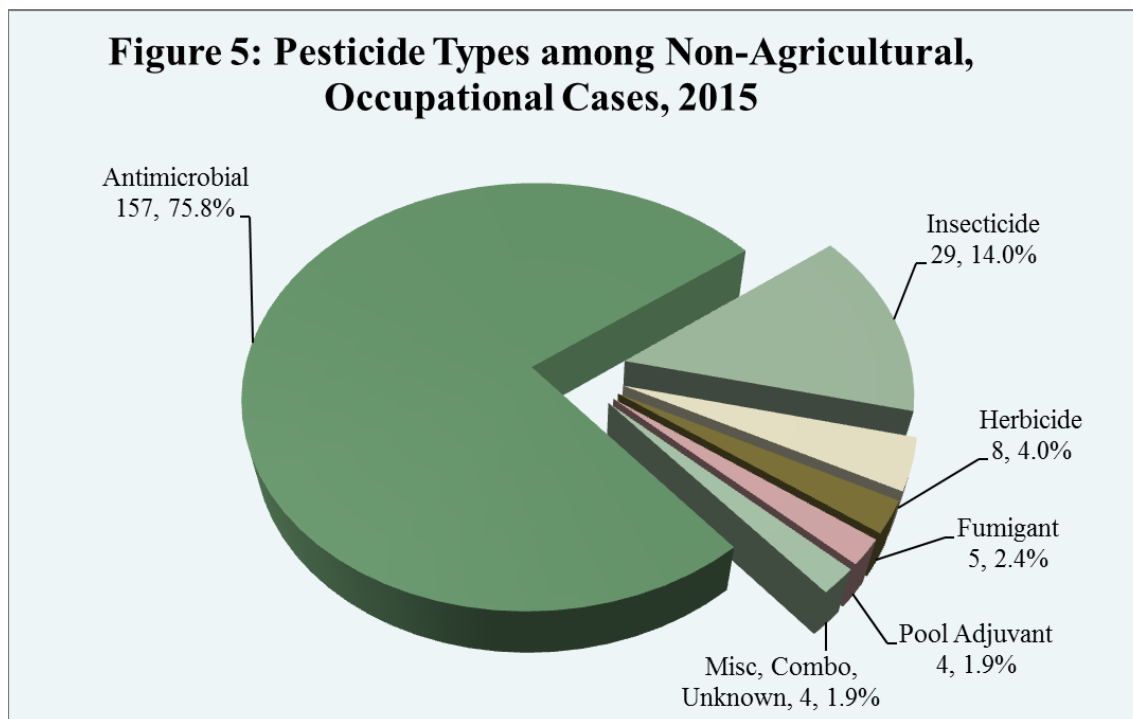
The number of associated non-agricultural pesticide use cases and episodes decreased in 2015 from 2014, by 1.6% and 7.6% respectively; indicating there were fewer incidents, but more people were affected. The total number of people involved was relatively similar compared to 2014 (800). Exposures from direct forms of contact contributed to 290 (36.9%) of the 787 non-agricultural cases. These affected individuals came in contact via a mechanism in which the pesticide was spilled or directly propelled by the application equipment. Exposures from drift followed in frequency, with 206 (26.2%) of the 787 cases. PISP defines drift as spray, mist, fumes, or odor carried from the target site by air during a pesticide application or the mixing/loading of pesticides. Drift as an exposure mechanism does not necessarily correspond to drift as a violation. Exposure from ingestion of pesticide accounted for 105 (13.3%) of the cases, a decrease of 26.1% from 2014 (142). Table 2 shows the number of non-agricultural cases according to exposure mechanisms.

Exposure Mechanism	Count
Drift ¹	206
Residue ²	74
Direct Contact ³	290
Ingestion ⁴	105
Other ⁵	37
Multiple Exposures ⁶	20
Unknown ⁷	55
Overall Total	787

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. This includes odor after the completion of an application.
3. *Direct Contact* is a combination of 2 different types of exposure: *Direct Spray/Squirt* indicates that application equipment propelled pesticide onto the person; and *Spill/Other Direct* refers to contact made where the material is not propelled by the application equipment.
4. *Ingestion* refers to intentional or unintentional oral ingestion and includes ingestion of residue.
5. *Other* indicates another known route of exposure that is not included in any other exposure category.
6. *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
7. *Unknown* indicates the route of exposure could not be identified.

Occupational Exposures

In 2015, 207 cases involving non-agricultural, occupational exposures were evaluated as associated with pesticide use, a 23.3% decrease from 270 in 2014. The majority of the workers were exposed while handling pesticides [Applicators (81, 39.1%) and Mixer/Loaders (29, 14.0%)]. Thirty-one (15%) workers were exposed to pesticides as bystanders, meaning they were not handling pesticide products and their normal work activity had minimal expectation for exposure to pesticides (e.g., office workers). Similar to 2014, three-fourths of the 207 occupational exposures involved antimicrobial disinfectants and sanitizers (157, 75.8%). Insecticides followed a distant second, accounting for 14% (29) of these cases. The Misc, Combo, Unknown category consists of pesticide types that account for less than 1% (rodenticide) of the occupational cases, multiple types of pesticides used in combination, and unknown pesticides (Figure 5). The most represented incident locations were service establishments (58, 28.0%), such as restaurants, hotels or fitness centers, followed by hospitals or other medical facilities (30, 14.4%), and schools (18, 8.7%).



*Representative Case Summaries of Employees Exposed to Non-agricultural Pesticides:***Case Summary - Occupational Antimicrobial Exposure**

A restaurant employee was splashed in the eye with sanitizing solution while washing dishes. He immediately rinsed his eyes but did not seek medical treatment until two to three days later when one of his co-workers noticed his right eye was very red and swollen, and brought it to the attention of their supervisor. The worker went to the hospital for treatment, and then to the occupational clinic four days later where he was diagnosed with subconjunctival hemorrhage and visual discomfort. Seven months later, he was still experiencing some eye pain and his vision in his right eye was not as sharp compared to his left eye.

Several contributory violations were identified during the investigation. The employee had not been trained on how to properly use the toxicity category I (signal word Danger) sanitizer, a violation of 3 CCR § 6724. He was also not provided with the label required eye protection or chemical resistant gloves, a violation of 3 CCR § 6738(b)(c). The employer provided only plastic gloves for cooking. The employer was also cited for storing the sanitizer in the same storage room as their food products, a violation of 16 CCR § 1983.

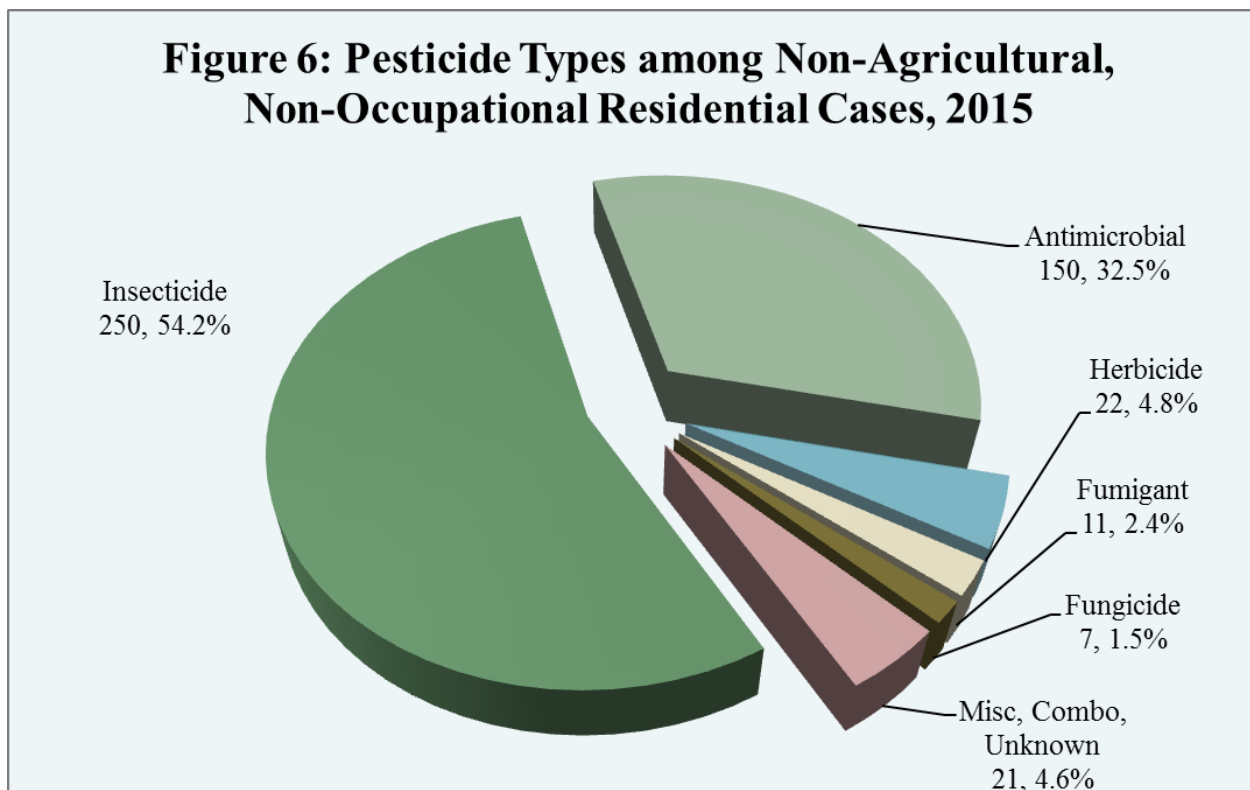
Case Summary - Occupational Insecticide Exposure

A licensed pest-control applicator was exposed to insecticide when he overfilled his backpack sprayer while preparing it at the start of his day. He was pressed for time and had a long list of places to service so he neglected to wipe down the sides of his backpack. The lid on the backpack sprayer was also not properly closed causing insecticide to spill onto his back every time he put on the backpack or when it was tilted. Further, not only did he not follow clean-up procedures when spills occurred, he also did not change his contaminated work clothes. He continued to work until his lower back began to feel itchy several hours later. However, he did not seek care until the end of his shift. He notified his employer the next day.

The applicator acknowledged he did not take due care while conducting pest control operations, which was a violation of 3 CCR § 6600(b).

Non-Occupational Exposures

In 2015, 575 cases involving non-occupational, non-agricultural exposures were evaluated as associated with pesticides, a 9.7% increase from 524 in 2014. Most of the individuals (281, 48.9%) were exposed while performing routine activities with minimal expectation for exposure to pesticides; followed by individuals who were exposed while handling pesticides (212, 36.9%). The majority of the incidents occurred in residential settings (461, 80.2%). The remaining associated cases occurred in non-residential locations such as service (41, 7.1%) or retail (4, 0.7%) establishments (e.g., public pools, fitness centers, restaurants). Contrary to occupational exposures, over half of the products involved in residential exposures were insecticides (250, 54.2%). Antimicrobial disinfectants and sanitizers (150, 32.5%) were the second most implicated product. The Misc, Combo, Unknown category consists of pesticide types accounting for less than 1% of the cases [pool adjuvants (e.g., muriatic acid) and rodenticides], multiple types of pesticides used in combination and unknown pesticides (Figure 6).



Ingestion of pesticide accounted for 92 (20.0%) of the 461 non-agricultural, non-occupational residential cases. Sixty five (70.7%) cases involved the accidental ingestion of pesticides, primarily due to improper storage (e.g., pesticide was stored in a water bottle or placed in areas easily accessible to children). Exposures via direct contact accounted for 131 (28.4%) of the non-agricultural, non-residential cases. Direct contact includes exposures to pesticides spilled or propelled by the application equipment. Drift exposures closely followed in frequency, with 111 (24.1%) cases. Pesticide handlers (Applicators and Mixer/Loaders) were mostly affected by drift, which suggests improper use of pesticides may have contributed to their exposure (Table 3).

Table 3: Exposure and Activity of Non-Agricultural, Non-Occupational Cases in Residential Settings, 2015

Activity	Direct Contact ¹	Drift ²	Residue ³	Ingestion ⁴	Other ⁵ / Unknown ¹²	Total
Applicator ⁶	63	86	3	5	32	189
Mixer/Loader ⁷	5	10	0	0	2	17
Mechanical ⁸	0	1	0	0	0	1
Routine Activity ⁹	40	11	40	65	23	179
Transport/Storage/ Disposal ¹⁰	0	0	0	1	0	1

Table 3: Exposure and Activity of Non-Agricultural, Non-Occupational Cases in Residential Settings, 2015						
Activity	Direct Contact¹	Drift²	Residue³	Ingestion⁴	Other⁵/ Unknown¹²	Total
Other Activity ¹¹	16	3	11	18	9	57
Unknown ¹²	7	0	0	3	7	17
Total	131	111	54	92	73	461

1. *Direct Contact* is a combination of 2 different exposure types: *Direct Spray/Squirt* indicates that the application equipment propelled pesticide onto the person; and, *Spill/Other Direct* refer to contact made where the material is not propelled by application equipment.
2. *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.
3. *Residue* refers to cases associated with exposure to 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.
4. *Ingestion* refers to intentional or unintentional oral ingestion and includes ingestion of residue.
5. *Other* is a combination of 2 different exposure types: *Other* indicates another known route of exposure that is not included in any other exposure category; and *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
6. *Applicator* refers to individuals who apply pesticides by any method, including to their skin, or conducts activities considered ancillary to the application.
7. *Mixer/Loader* refers to individuals who mixes and/or loads pesticides.
8. *Mechanical* refers to individuals who maintain (e.g., cleans, repairs or conducts maintenance) pesticide contaminated equipment.
9. *Routine Activity* refers to individuals who conduct activities in either an indoor or outdoor environment with minimal expectation for exposures to pesticides.
10. *Transport/Storage/Disposal* refers to individuals who transport pesticides between packaging and preparation for use.
11. *Other Activity* refers to an individual performing an activity that is not adequately described by any specifically defined activity category.
12. *Unknown* refers to a case where the individual's activity or route of exposure is not known.

Representative Case Summary of a Resident Exposed to a Pesticide:

Case Summary – Non-Occupational Exposure to a Restricted Use Pesticide

A woman came across several canisters of methyl bromide stored on a shelf outside of a thrift store. She picked up a canister, shook it by her face, and noticed it was almost empty, so she picked up another one. The second canister felt full, so she purchased the one canister with the intentions of treating a bug infestation in her home. Later that night, her husband noticed she was having trouble breathing while she slept and woke her several times throughout the night. She sought care six days later for ongoing complaints of a rash and eye pain.

Methyl bromide is a restricted use pesticide, for use only by trained and certified applicators. The canisters were estimated to be 30 years old and weighed approximately one pound each. Staff from the

Department of Environmental Resources confiscated the bottle purchased by the resident as well as the remaining bottles at the thrift store. No other people were affected.

AGRICULTURAL PESTICIDE ILLNESSES

In 2015, the number of associated agricultural pesticide use cases increased by 45.4% (397) from 2014 (273). There was a much smaller increase (4.7%) in the number of associated agricultural episodes (87) from 2014 (85), indicating there were more people involved in the multi-person incidents. Exposures from pesticide drift contributed to 299 (75.3%) of the 397 agricultural cases, and mostly involved fungicides (144, 48.2%) and insecticides (101, 33.8%). Exposures from pesticide residue followed with 47 (11.8%) of the cases. Table 4 shows the number of agricultural cases according to the type of pesticide and exposure mechanisms.

Pesticide	Direct Contact¹	Drift²	Residue³	Other⁴/ Unknown⁵	Total
Antimicrobial	9	6	1	4	20
Fumigant	2	13	1	0	16
Fungicide	2	144	17	16	179
Herbicide	3	31	0	3	37
Insecticide	4	101	12	4	121
Rodenticide	0	1	0	1	2
Combo & Unknown	1	3	16	2	22
Total	21	299	47	30	397

1. *Direct Contact* is a combination of 2 different exposure types: *Direct Spray/Squirt* indicates that the application equipment propelled pesticide onto the person; and, *Spill/Other Direct* refers to contact made where the material is not propelled by application equipment.
2. *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.
3. *Residue* refers to cases associated with exposure to 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.
4. *Other* is a combination of 2 different exposure types: *Other* indicates another known route of exposure that is not included in any other exposure category; and *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
5. *Unknown* refers to a case where the individual's route of exposure is not known.

Case Summary - Bystander Drift Exposure

Workers at a solar farm construction site noted an odor and began to experience symptoms an hour after arriving at work. There were 300 construction workers on site that day, and 82 of them complained of symptoms. The grower usually notifies the solar farm company of planned pesticide applications and the crews do not work on those days. The solar farm company was informed of an application scheduled for the day after the incident.

On the day of the incident, the solar farm's construction site manager contacted the grower about pesticide spraying in nearby fields. The grower initially reported that an application was completed 4.6 miles away, but later confirmed that one of his fields, a pistachio farm, 0.6 miles southwest of the construction site, was treated with fenpropathrin that morning. The application used eight airblast sprayers and ended about two hours before the construction workers' symptoms began. No aerial applications to any nearby fields occurred on the day of incident, nor were there other farms within a one mile radius of the solar farm construction site that had applied fenpropathrin within the past 30 days. On the day of application to the pistachio farm, wind speed was stable at 0-0.2 mph in the early hours of that morning, with increasing temperatures, a condition conducive for horizontal off-site movement of pesticide particles.

The majority of the workers who reported symptoms were southwest of the construction site. Forty-nine workers reported an odor before experiencing symptoms. The workers described the odor as pungent, metallic, stinkbug-like, and sour-taste. Nine of the 82 affected workers had respiratory symptoms such as runny nose, throat irritation, sneezing, chest pain and breathing difficulty, while 3 had systemic symptoms such as headache, dry mouth, and lightheadedness. Seventy workers developed a variety of either eye, respiratory, skin and/or systemic symptoms such as watery/irritated eyes, itchiness, tingling nose, coughing, nausea, stomachache, diarrhea, vomiting, anxiety, and/or fatigue. Some workers felt or saw mist or dust that morning. Twenty-three symptomatic workers required treatment in medical facilities.

Gradient swab, foliage and workers' clothing samples were obtained and sent to a laboratory for analysis. The test results were positive for fenpropathrin. The grower was cited for violations which included failure to prevent substantial drift to non-target areas, and pesticide application during unsuitable climate conditions, and fined \$180,000 [FAC § 12972, FAC § 12973, 3 CCR § 6600(b)(d), 3 CCR § 6614(b)(1)].

Applicators and Mixer/Loaders

In 2015, 36 (9.1%) of the 397 associated cases involved applicators or mixer/loaders of agricultural pesticides. Of these 36 cases, drift contributed to 11 (30.6%) of the cases, followed closely by spills or other direct exposures at 10 (27.8%). The exposure mechanism remained unknown in 9 (25.0%) of the cases. Exposure via direct spray contributed to 4 (11.1%) of the 36 cases. Multiple and "Other" methods of exposure each contributed 1 case (2.8%). PISP data reflects that equipment failure contributed to 6 (16.7%) of the cases which led to pesticide exposure via direct contact. Ten (27.8%) of the handler (Applicator and Mixer/Loader) cases resulted in lost work days, of which one applicator was hospitalized for a 24-hour period or more.

*Representative Case Summaries of Handlers Exposed to a Pesticide:***Case Summary 1 - Pesticide Handler Exposures**

During a tarp application, a handler was exposed to 1,3-dichloropropene and chloropicrin when he was placing excess plastic tarp from the application under the toolbar of the tractor. The tractor driver began injecting the fumigant before the shanks were fully immersed in the ground causing pesticide to splash the worker, who was standing approximately 10 to 15 feet away from the shanks. Though he was wearing safety glasses and a half-face respirator, the liquid fumigant ran down his forehead and into his eyes. He immediately felt a burning sensation in his eyes and had difficulty breathing.

The Pest Control Advisor, who was supervising the application, asked the worker if he wanted to go to the hospital, but the worker declined. The worker removed all of his personal protective equipment, irrigated his eyes throughout the day, and completed his shift. While driving home, his eye symptoms persisted and went to the hospital for treatment. The next day he was evaluated by the company designated physician and he returned to work three days later.

The employer was fined \$1,560 for violating 3 CCR § 6726(c), which states that when there is reasonable grounds to suspect that an employee has a pesticide illness or when an exposure to a pesticide has occurred that might reasonably be expected to lead to an employee's illness, the employer shall ensure that the employee is taken to a physician immediately. Even though the worker declined to be taken for care, the employer was still responsible for ensuring he received medical care immediately.

Case Summary 2 – Pesticide Handler Exposures

Towards the end of a commodity fumigation, a valve seal failed, causing methyl bromide to leak out of the tank. After telling the forklift driver to leave the area, the applicator went to turn off the cylinders and valves. Neither of the employees was wearing the label required personal protective equipment, a violation of 3 CCR § 6738. Both men complained of a mild headache and dizziness after inhaling the fumigant. A CAC biologist, who was observing the fumigation, also became ill. Though the concentrations of methyl bromide at the time of the leak were unknown, approximately 10 pounds of the fumigant were estimated to have been released.

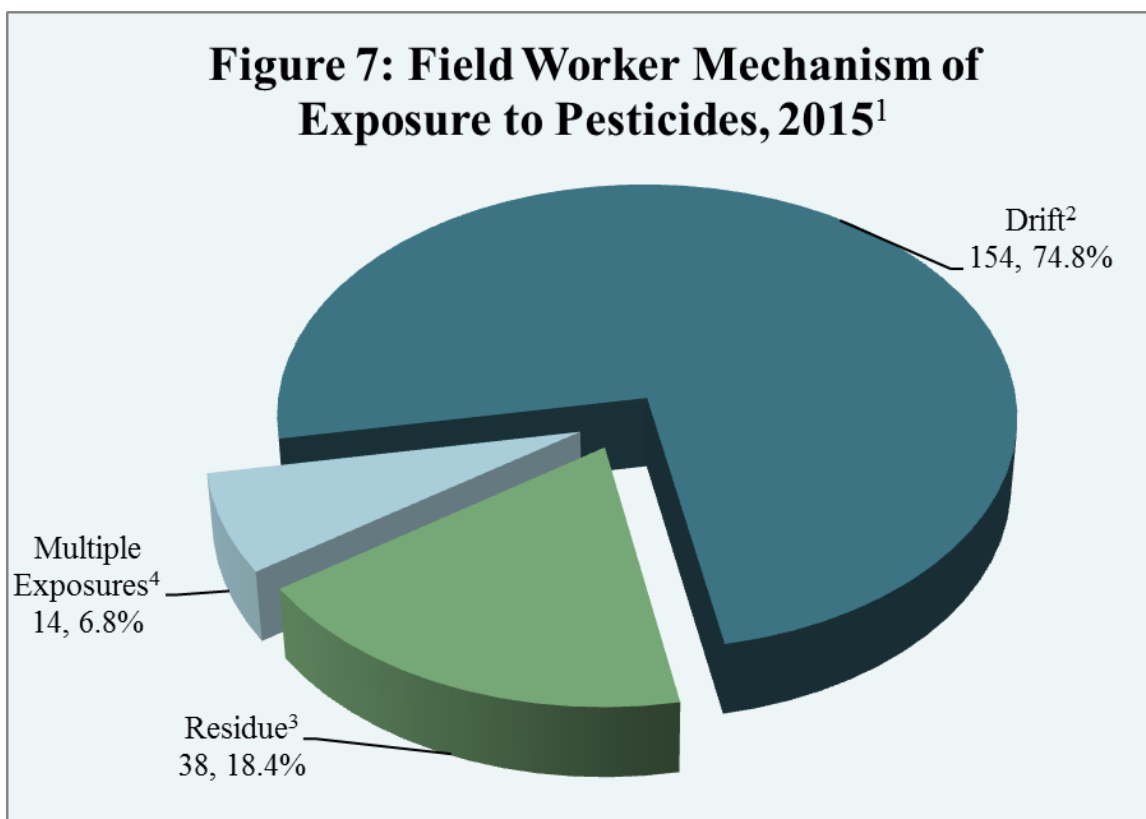
The company promptly replaced the valve and requested a consultation with DPR's Industrial Hygienist (IH). The CAC and IH found the control room for this chamber was within the 10 foot buffer zone; and the ventilation was internally circulating, with no clean air being introduced into the control room. Therefore, a Self-Contained Breathing Apparatus (SCBA) was required when conducting fumigation in this chamber since the facility did not have a continuous monitoring system. According to the company's standard operating procedure for methyl bromide application, employees were required to put on a SCBA unit when dispensing the fumigant. However, the applicators had not been fit tested for a respirator.

The employer was cited for not ensuring the applicators were wearing the required personal protective equipment (3 CCR § 6738) and respiratory protection when applying the fumigant (3 CCR § 6739), and for use of a pesticide in conflict with the registered label (FAC § 12973).

Field Workers

PISP data reflects that 206 field workers were injured by pesticide exposure in 24 separate episodes in 2015, which constitutes 51.9% of the 397 agricultural illness cases and 27.0% of the 89 agricultural episodes. Despite an increase from 2014, in which 149 field workers were injured in 24 separate episodes, the number of cases is comparable to that in 2013 (266). Larger episodes may not happen in every calendar year, but when they do, they can dramatically alter the overall number of cases from year to year.

In 2015, the largest number of field workers injured in a single episode was 68, an increase from 40 workers in a single episode in 2014. The total number of multi-person field worker episodes decreased 12.5% from 8 multi-person episodes in 2014 to 7 in 2015, and 56.3% from 16 episodes in 2013. Pesticide drift, as defined by PISP, was associated with 154 (74.8%) of the 206 field workers; pesticide residue contributed to 38 (18.4%) illnesses; and, 14 (6.8%) were exposed by drift and residue (multiple exposures) (Figure 7).



1. Total pesticide-associated field worker cases = 206
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. This includes odor after the completion of an application.
4. *Multiple Exposures* indicates contact with pesticides occurred through two or more distinct mechanisms regardless of the number of pesticides involved.

*Representative Case Summaries of Field Worker Exposures:***Case Summary – Field Worker Drift Exposures**

Three crews working in separate peach orchards reported symptoms such as nausea, dizziness, headache, eye irritation, vomiting, and lip numbness after an aerial application of a fungicide to a nearby tomato field. Several workers reported an odor described as strong, foreign, chemicals, poison and sulfur-like. Workers who requested medical attention were taken to a nearby facility. The remaining workers were given the option for an on-site evaluation by medical personnel throughout the remainder of the work day.

CAC and DPR staff collected foliage samples from the three orchards where the crews were working, and confirmed off-site movement of a pesticide. The case has been referred to the District Attorney and is awaiting adjudication.

Case Summary – Field Worker Residue Exposures

Five crews, consisting of 68 field workers, began harvesting strawberries in five fields early in the morning. The workers noticed a faint odor 20 to 30 minutes later. As the odor intensified, the workers began to feel ill. Intending to reduce the intensity of the odor noted by the workers, the ranch manager moved them to the east end of the fields. However, the odor did not dissipate and the workers were dismissed for the day.

Two separate pesticide applications were made to the adjacent strawberry and lettuce fields, and were completed 4 and 7.5 hours prior to the arrival of the workers. The harvesting crew working between the two treated fields was most affected by the odor. Two safety officers were called on-site to inspect the odor. The safety officers noticed an odor from the north entrance of the ranch, a quarter mile to the south and one of the safety officers experienced nausea.

Thirty-eight field workers experienced symptoms such as headache, nausea, tight chest and throat, vomiting, dizziness, and eye irritation. One worker got a strong “whiff” of the odor as she was walking out of the field and fainted. She was taken to the emergency room by ambulance. Two other field workers were taken to an urgent care clinic for evaluations. Only these three workers were taken for care. All of the field workers returned to work the next day but one who was still experiencing symptoms and returned to the urgent care clinic. There were also two workers with persistent symptoms who were not taken for care.

Prior to the harvest, the field workers were notified about the strawberry treatment, and warning signs were posted around the treated lettuce fields. Both applications occurred when no one was present and were uneventful other than the unusually warm overnight temperatures, per applicators. Although the harvesting crews did not enter the treated fields, they did notice that the odor intensified as the temperature increased. At the beginning of the harvest, the temperature was at 73°F, overcast and calm, with wind at 5.8 mph and humidity at 52%. The temperature rose 1°F within an hour and there was very little air movement. Thus, the weather conditions for that morning indicate there could have been an inversion layer that created the volatilization of pesticide particles. No violations were cited by the CAC.

CHILD EXPOSURES

In 2015, there were 225 cases evaluated as definitely, probably, or possibly related to pesticide exposure involving children (less than 18 years old), an increase of 48.0% from 2014 (152). Eighty (35.6%) children had direct contact with the pesticide, 64 (29.8%) were exposed via drift, and 44 (19.6%) ingested the pesticide (Table 4). The two ingested pesticides most often implicated were antimicrobials and insecticides, 21 (47.8%) and 18 (40.9%), respectively. Thirty-three (75%) of those children who ingested pesticide were less than six years of age, a decrease of 29.9% from 2014 (47). Evidence suggests that in 28 (84.8%) of the 33 ingestions by children under six years of age, improper storage of the pesticide made it accessible to the child and contributed to the exposure. Five (2.2%) children were hospitalized due to their pesticide exposure, none of which resulted from self-harm attempts.

Four children were exposed to agricultural use pesticides, none of which were admitted to the hospital. Three (75%) of the four children came in contact with the pesticide via drift from two separate episodes. Two of the children were part of a multi-person episode when pesticides from a field fumigation of a nearby orchard moved off-site and entered the homes of three families. The third child, who was at home, became ill after smelling an odor while the adjacent cornfield was being treated with pesticides. The fourth child was a teenager working as a fieldworker, and entered a field while the restricted entry interval was in effect.

Fifty-three of the 225 children were exposed at school when pesticide drifted from a nearby service establishment.

Pesticide Type	Agricultural ¹		Non-Agricultural ²					Total
	Drift ³	Residue ⁴	Direct Contact ⁵	Drift ³	Residue ⁴	Ingestion ⁶	Other ⁷ / Unknown ⁸	
Algaecide	-	-	-	-	-	1	-	1
Antimicrobial	-	-	57	61	3	21	8	150
Fumigant	2	-	-	-	1	-	-	3
Fungicide	-	1	-	-	-	-	-	1
Herbicide	-	-	1	-	-	1	1	3
Insecticide	1	-	21	3	9	18	9	61
Rodenticide	-	-	-	-	-	3	-	3
Unknown ⁸	-	-	1	-	-	-	2	3
Total	3	1	80	64	13	44	20	225

1. *Agricultural* cases are those that implicate exposure to pesticides intended to contribute to the production of agricultural commodities.

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2. *Non-agricultural* cases include all those in which the pesticide was not intended to contribute to production of agricultural commodities.
 3. *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.
 4. *Residue* refers to cases associated with exposure to 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.
 5. *Direct Contact* is a combination of 2 different exposure types: *Direct Spray/Squirt* indicates that the application equipment propelled pesticide onto the person; and, *Spill/Other Direct* refers to contact made where the material is not propelled by application equipment.
 6. *Ingestion* refers to intentional or unintentional oral ingestion.
 7. *Other* is a combination of 2 different exposure types: *Other* indicates another known route of exposure that is not included in any other exposure category; and *Multiple Exposures* indicates that contact with pesticide occurred through two or more distinct mechanisms.
 8. *Unknown* refers to a case where the pesticide type or the individual's route of exposure is not known.

Representative Case Summary of Children Exposed to a Pesticide:

Case Summary – Swimming Pool Exposure

A chlorine-feeding pump malfunctioned causing a spill at an aquatic center, which resulted in chlorine gas drifting to a neighboring elementary school. Prior to the incident, a maintenance technician received a message that the chlorine level in one of the pools was too low, and went to investigate. He noticed a spill coming from the chlorine tank room. When he opened the doors, he saw that the chlorine had spilled over the containment area and into the driveway. After an inspection of the room, he noticed that one of the feeding pumps was leaking. He shut off the valve that feeds chlorine to the pump and left to attend to other duties.

A couple hours later, he returned and informed his supervisor of the situation and was instructed to use sodium thiosulfate to neutralize the spill. The technician spread the sodium thiosulfate in the area of the spill, both inside the tank room and on the driveway, and let the product sit for about 10 minutes. He returned and noticed that the reaction was producing bubbles and a noticeable gas. Upon seeing the gas cloud, he knew something was wrong. In an attempt to clean up the spill, he used a 5-gallon bucket to scoop up some of the material and poured it down a sewer drain. He began to cough and developed shortness of breath so he left the area. Once he felt better, he returned with a sump pump and pumped the liquid directly into a storm drain. In the meantime, the gas cloud continued to move offsite towards the elementary school.

The spill was estimated at 200 gallons of pool chlorine. The city fire department and both county and city HAZMAT Response Teams responded to the incident. Reportedly, 77 students and 4 teachers were affected; however, confidential morbidity reports were only provided for 49 students and two teachers. They reported symptoms such as coughing, sore throat, nausea and headache.

The aquatic center was cited for a failure to use equipment in good repair and safe to operate, failure to perform pest control in careful manner, and failure to exercise reasonable precautions to prevent a spill and avoid contamination of the environment [3 CCR § 6600(a), 6600(b) and 6600(e)]. Since the incident,

the facility has adopted several measures to prevent a reoccurrence of this type of incident. The equipment was replaced and a preventive maintenance program was implemented. The case has been referred to the District Attorney and is awaiting adjudication.

MORBIDITY AND MORTALITY

Of the 1,187 cases evaluated as associated with pesticide exposure, 26 people (2.2%) were hospitalized and 102 (8.6%) reported time lost from work or normal activity (e.g., going to school) (Table 6). Twelve (46.2%) of the 26 people hospitalized had ingested pesticide. Of those 12 people, 9 (75.0%) acknowledged self-harm attempts.

Relationship	Total Cases	Number Hospitalized⁴	Lost Work Time⁵
Definite/Probable ²	934	22	82
Possible ³	253	4	20
Total Cases	1187	26	102

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.

There were a total of two fatalities evaluated as definitely associated with pesticide exposure. The first fatality case involved a 67-year old male who was consolidating two containers of muriatic acid and was overcome by the fumes. As he tried to leave the unventilated garage, he was overcome by the vapors and lost consciousness. An emergency responder observed the garage door partially open and the man on the ground surrounded by muriatic acid. The man was a pool maintenance technician who worked out of his garage.

The second case involved a 34-year old male, with a history of mental illness, who was found deceased by emergency responders in a fumigated residence. On the day of the incident, he was observed by employees of the pest control company walking around the property and was seen reentering the home

prior to sealing of the tarp. An employee found him in the garage and escorted him out from under the tent. Later that evening, a neighbor noticed the light on in the tented house. The family had made arrangements for the man to stay with his sister during the fumigation, and contacted the police when he did not show up at her house and could not be found. The autopsy confirmed the cause of death was acute sulfur fluoride toxicity. The investigation found a number of the secondary locks placed on outside of entry doors to the house were not sufficient to secure against potential entry. The pest control company was cited for not securing structures and entrances against entry [16 CCR § 1970.3 and Division 3 California Business and Professions Code section 8516(b)].

PISP DATA ANALYSIS DRIVES FORMULATION CHANGE

Fenpyroximate Reformulation Update

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 new product, an emulsifiable concentrate with a Signal Word “Warning,” contained an inert ingredient belonging to the petroleum chemical family that had a solvent-like odor.

In 2013, the manufacturer’s regulatory affairs division reviewed an exposure summary on incidents involving a particular formulation containing fenpyroximate written by PISP staff (see 2014 Annual Report⁷ for summary of the incidents, page 22). This resulted in the reformulation of the product with inert ingredients of a considerably milder odor. The reformulated “low odor” product was registered on October 16, 2013 and introduced in the marketplace in 2014. In 2015, a third formulation of fenpyroximate was registered, and like its precursor, the newer product contained no aromatic or petroleum-based inert ingredients. To date, there have been no associated cases involving fenpyroximate since the reformulation in 2014.

PROGRAM MONITORING AND EVALUATION OF REGULATORY CHANGES

Rodenticide Regulatory Change Update

Rodenticides fall into three categories: first generation anticoagulant rodenticides (chlorophacinone, diphacinone, and warfarin), second generation anticoagulant rodenticides (brodifacoum, bromadiolone, difenacoum, and difethialone), and all other rodenticides that include acute toxicants (bromethalin, cholecalciferol, strychnine, and zinc phosphide) and gopher bombs. In July 2014, DPR designated all second generation anticoagulant rodenticides as restricted materials [3 CCR § 6400(e)]. This designation effectively banned the sale and use of these products by residential consumers (see 2014 Annual Report⁷ for complete summary of the rodenticide regulatory change, pages 22-23).

⁷ A copy of the 2014 Annual Report is available on DPR’s website at <http://www.cdpr.ca.gov/docs/whs/pisp/2014/2014sumdata.pdf>.

In 2015, PISP identified eight cases associated with exposures to non-agricultural use rodenticides, the same as in 2014. There were no second generation anticoagulant rodenticides associated with these cases. Two cases involved first generation anticoagulants, one of which was used in combination with an acute toxicant. The remaining six cases involved acute toxicants (2), other classes of rodenticides (2) and unknown rodenticides (2), used alone or in combination with other pesticides.

There were 139 alleged rodenticide exposures submitted by CPCS or LHO that did not meet the case criteria⁸ for investigation, a decrease of 4.1% from 2014 (145). Children under 6 years old accounted for 112 (80.6%) of these cases. The children were found playing with or near rodenticide pellets, and all were asymptomatic in relation to their exposure. Of these 112 cases, second generation anticoagulant rodenticides accounted for 28 (25.0%) exposures. There were 5 (4.5%) exposures with unknown long acting anticoagulant.

The added restrictions by the U.S. EPA and DPR over the past decade on rodenticides in general and the specific restrictions on second generation anticoagulant rodenticides are expected to continue to help reduce the number of rodenticide exposures in the coming years.

Fumigant Mitigation Measures

Fumigant pesticides are of particular concern because they are highly volatile gases and, when off-site movement of the gas occurs, it has the potential to affect a large number of people. In December 2010, the U.S. EPA instituted measures to mitigate exposure to workers and bystanders in two phases. Phase 1 addressed worker/handler protections, such as the use of additional personal protective equipment and stop-work triggers, reentry intervals extended from 48- hours to five days and limits on use. In December 2012, Phase 2 label changes added more protections for bystanders. These new mitigation measures added the requirement for notification of chloropicrin treated fields, established buffer zones, and placed restrictions on the distance that fumigations could occur relative to places where evacuation is difficult. Signs are required to be posted at usual entry points and along the likely routes of approach to buffer zones, alerting bystanders to stay out of a hazardous area.

In 2015, DPR placed more controls on chloropicrin in order to protect people working and living near fumigated fields⁹. These controls included extended buffer zones, notification and monitoring activities, acreage limits and a requirement to file a notice of intent prior to applying chloropicrin. There were 10 cases stemming from four episodes involving soil fumigants in 2015, a decrease from 2014 (40 cases; 7 episodes).

DPR's mitigation measures will continue to be evaluated along with illness surveillance data as information is acquired for years beyond 2015.

⁸ Criteria for case inclusion in the PISP database: 1) a pesticide is suspected to be involved, 2) evidence of signs or symptoms of illness, and 3) indication of medical consultation. Fatalities and large-scale episodes resulting with 5 or more people with symptoms regardless of medical consultation status are also included.

⁹ http://www.cdpr.ca.gov/docs/whs/pdf/control_measures_chloropicrin_summary.pdf

COLLABORATION WITH OTHER AGENCIES

Legislative Update – Assembly Bill 1963

In 2010, section 105206 was added to the California Health and Safety Code (HSC). This section requires laboratories to provide the reason a medical supervisor ordered cholinesterase (ChE) tests (pursuant to 3 CCR § 6728), and additional information on the patient, physician, employer and laboratory when submitting ChE test reports to DPR.

Since January 2011, PISP regularly receives reports on ChE test results from CDPH-approved laboratories. However, these reports have often not included the purpose of the test, as well as other information that would help determine whether or not the worker being tested is under the medical supervision program.

In 2014, to supplement the lack of information and to better evaluate the Medical Supervision Program, PISP surveyed physicians who ordered cholinesterase tests from 2011-2013. That same year, in collaboration with DPR's Enforcement Branch, PISP conducted a focused growers' headquarters survey and inspection on selected growers who reported the highest organophosphate and carbamate use from 2011-2013, based on the Pesticide Use Report. Both the survey and the focused inspections were conducted to determine the medical supervisors' and the growers' knowledge of and compliance with the requirements of the Medical Supervision Program. Results from these activities, and analysis of the ChE test results from 2011-2013 were included in the report on the Effectiveness of the Medical Supervision Program and the Usefulness of Laboratory-Based Reporting of Cholinesterase Testing for pesticide illness and surveillance. The report was a collaborative effort between DPR and OEHHA, in consultation with CDPH, and submitted to the state legislature on December 31, 2015¹⁰.

PISP staff continue to work closely with laboratory liaisons to improve reporting information specified under HSC § 105206.

FURTHER INFORMATION

Tabular summaries presenting different aspects of 2015 pesticide illness data are available online at <http://www.cdpr.ca.gov/docs/whs/pisp.htm> or 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.

¹⁰ A copy of the complete report is available on DPR's website at <http://www.cdpr.ca.gov/docs/legbills/reports/reg/cholinesterase/report.pdf>.

APPENDIX I: ACRONYMS

CAC	County Agricultural Commissioner
CalREDIE	California Reportable Disease Information Exchange
CCR	California Code of Regulations
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 Occurrence¹
2015**

Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
TOTALS								
Definite		192	112	57	3	20	65	126
Probable		742	163	392	66	121	289	453
Possible		253	36	58	52	107	43	208
Unlikely		45	7	1	3	34	5	39
Asymptomatic		75	3	67	5	0	72	3
Unrelated		128	-	-	-	-	-	-
Insufficient		72	-	-	-	-	-	-
Unavailable		250	-	-	-	-	-	-
OVERALL	1205	1757	321	575	129	282	474	829

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
ALAMEDA								
Definite		3	2	1	0	0	0	3
Probable		15	5	6	1	3	0	15
Possible		5	1	0	2	2	0	5
Unlikely		4	1	0	0	3	0	4
Unrelated		7	-	-	-	-	-	-
Unavailable		6	-	-	-	-	-	-
TOTAL	40	40	9	7	3	8	0	27
AMADOR								
Probable		1	0	1	0	0	0	1
TOTAL	1	1	0	1	0	0	0	1
BUTTE								

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Probable		10	1	8	0	1	7	3
Possible		6	2	3	0	1	1	5
Unlikely		1	0	0	0	1	0	1
TOTAL	11	17	3	11	0	3	8	9
CALAVERAS								
Definite		1	1	0	0	0	0	1
Probable		1	0	1	0	0	0	1
TOTAL	2	2	1	1	0	0	0	2
COLUSA								
Possible		4	2	0	1	1	4	0
Unrelated		2	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	7	7	2	0	1	1	4	0
CONTRA COSTA								
Definite		11	10	1	0	0	0	11
Probable		25	17	4	0	4	0	25
Possible		3	1	0	0	2	0	3
Unlikely		1	1	0	0	0	0	1
Asymptomatic		3	3	0	0	0	0	3
Unrelated		2	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		10	-	-	-	-	-	-
TOTAL	27	57	32	5	0	6	0	43
DEL NORTE								
Probable		2	1	0	0	1	0	2
Possible		1	0	0	0	1	0	1
Insufficient		1	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	5	5	1	0	0	2	0	3
FRESNO								
Definite		7	4	1	0	2	2	5

County⁵								
Relationship²	TOTAL EPISODES³	TOTAL CASES	Type of Exposure³				Intended Use⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Probable		103	3	91	3	6	95	8
Possible		7	0	3	2	2	5	2
Unlikely		3	0	0	0	3	0	3
Asymptomatic		42	0	42	0	0	42	0
Unrelated		6	-	-	-	-	-	-
Insufficient		3	-	-	-	-	-	-
Unavailable		16	-	-	-	-	-	-
TOTAL	50	187	7	137	5	13	144	18
GLENN								
Probable		1	1	0	0	0	0	1
TOTAL	1	1	1	0	0	0	0	1
HUMBOLT								
Probable		2	1	0	1	0	0	2
Possible		2	0	0	0	2	0	2
Unavailable		1	-	-	-	-	-	-
TOTAL	5	5	1	0	1	2	0	4
IMPERIAL								
Definite		2	1	1	0	0	0	2
Probable		14	3	3	5	3	8	6
Possible		9	0	5	2	2	7	2
Asymptomatic		20	0	20	0	0	20	0
Unrelated		5	-	-	-	-	-	-
Unavailable		3	-	-	-	-	-	-
TOTAL	22	53	4	29	7	5	35	10
KERN								
Definite		12	5	5	0	2	7	5
Probable		100	4	84	7	5	84	16
Possible		15	2	4	2	7	7	8
Unlikely		1	0	0	0	1	0	1
Unrelated		3	-	-	-	-	-	-
Unavailable		15	-	-	-	-	-	-

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
TOTAL	61	146	11	93	9	15	98	30
KINGS								
Probable		3	1	1	0	1	2	1
Unavailable		1	-	-	-	-	-	-
TOTAL	4	4	1	1	0	1	2	1
LAKE								
Definite		1	0	0	0	1	0	1
Unavailable		1	-	-	-	-	-	-
TOTAL	2	2	0	0	0	1	0	1
LASSEN								
Possible		1	0	1	0	0	0	1
TOTAL	1	1	0	1	0	0	0	1
LOS ANGELES								
Definite		16	11	3	1	1	0	15
Probable		92	31	20	12	29	0	92
Possible		58	11	7	13	27	0	58
Unlikely		6	0	0	1	5	0	5
Unrelated		20	-	-	-	-	-	-
Insufficient		18	-	-	-	-	-	-
Unavailable		61	-	-	-	-	-	-
TOTAL	258	271	53	30	27	62	0	170
MADERA								
Probable		1	1	0	0	0	0	1
Possible		1	0	0	0	1	1	0
Unrelated		1	-	-	-	-	-	-
Unavailable		3	-	-	-	-	-	-
TOTAL	6	6	1	0	0	1	1	1
MARIN								
Definite		1	0	1	0	0	0	1
Probable		5	1	1	0	3	2	3
Possible		1	0	1	0	0	0	1

County⁵								
Relationship²	TOTAL EPISODES³	TOTAL CASES	Type of Exposure³				Intended Use⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Insufficient		1	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	9	9	1	3	0	3	2	5
MARIPOSA								
Probable		1	0	1	0	0	0	1
TOTAL	1	1	0	1	0	0	0	1
MENDOCINO								
Probable		2	2	0	0	0	0	2
Possible		3	0	1	1	1	0	3
TOTAL	5	5	2	1	1	1	0	5
MERCED								
Definite		2	1	0	1	0	2	0
Probable		9	4	4	0	1	2	7
Possible		3	0	1	0	2	0	3
Unrelated		4	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-
TOTAL	19	19	5	5	1	3	4	10
MODOC								
Probable		1	0	0	0	1	0	1
Possible		1	0	0	0	1	0	1
TOTAL	2	2	0	0	0	2	0	2
MONO								
Probable		1	0	0	0	1	0	1
TOTAL	1	1	0	0	0	1	0	1
MONTEREY								
Definite		52	4	39	0	9	49	3
Probable		41	3	21	10	7	35	6
Possible		7	0	2	4	1	5	2
Unlikely		1	0	0	0	1	1	0
Asymptomatic		7	0	2	5	0	7	0
Unrelated		10	-	-	-	-	-	-

County⁵								
Relationship²	TOTAL EPISODES³	TOTAL CASES	Type of Exposure³				Intended Use⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Unavailable		10	-	-	-	-	-	-
TOTAL	38	128	7	64	19	18	97	11
NAPA								
Unrelated		1	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	3	3	0	0	0	0	0	0
NEVADA								
Possible		1	0	0	0	1	0	1
Unlikely		1	1	0	0	0	0	1
TOTAL	2	2	1	0	0	1	0	2
ORANGE								
Definite		3	3	0	0	0	0	3
Probable		19	5	9	2	3	0	19
Possible		13	2	2	4	5	0	13
Unlikely		1	0	0	0	1	0	1
Unrelated		4	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		11	-	-	-	-	-	-
TOTAL	53	53	10	11	6	9	0	36
PLACER								
Probable		4	1	0	0	3	0	4
Unlikely		1	0	0	0	1	0	1
Unrelated		1	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	8	8	1	0	0	4	0	5
RIVERSIDE								
Definite		7	7	0	0	0	0	7
Probable		48	11	29	1	7	27	21
Possible		15	2	7	1	5	1	14

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Unlikely		1	0	0	0	1	1	0
Asymptomatic		3	0	3	0	0	3	0
Unrelated		6	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		19	-	-	-	-	-	-
TOTAL	72	101	20	39	2	13	32	42
SACRAMENTO								
Definite		7	6	0	0	1	0	7
Probable		7	4	1	0	2	0	7
Possible		6	0	3	0	3	0	6
Unlikely		1	0	0	0	1	1	0
Unrelated		3	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		5	-	-	-	-	-	-
TOTAL	31	31	10	4	0	7	1	20
SAN BENITO								
Definite		1	1	0	0	0	1	0
Probable		1	1	0	0	0	0	1
Unrelated		1	-	-	-	-	-	-
TOTAL	3	3	2	0	0	0	1	1
SAN BERNARDINO								
Definite		4	3	1	0	0	0	4
Probable		29	5	16	0	8	1	28
Possible		14	1	1	2	10	0	14
Unlikely		2	0	0	0	2	0	2
Unrelated		6	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-
Unavailable		11	-	-	-	-	-	-
TOTAL	64	67	9	18	2	20	1	48
SAN DIEGO								
Definite		11	10	0	0	1	0	11

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Probable		77	12	57	2	6	0	77
Possible		12	0	2	4	6	0	12
Unlikely		3	1	0	0	2	0	3
Unrelated		11	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		9	-	-	-	-	-	-
TOTAL	74	125	23	59	6	15	0	103
SAN FRANCISCO								
Definite		1	1	0	0	0	0	1
Probable		6	2	0	3	1	0	6
Possible		5	2	0	2	1	0	5
Unlikely		1	0	0	0	1	0	1
Unavailable		6	-	-	-	-	-	-
TOTAL	19	19	5	0	5	3	0	13
SAN JOAQUIN								
Definite		7	7	0	0	0	2	5
Probable		14	5	3	1	5	2	12
Possible		3	0	0	1	2	2	1
Unlikely		2	1	0	1	0	1	1
Unrelated		7	-	-	-	-	-	-
Unavailable		18	-	-	-	-	-	-
TOTAL	43	51	13	3	3	7	7	19
SAN LUIS OBISPO								
Definite		1	0	0	0	1	0	1
Probable		1	1	0	0	0	0	1
Possible		2	0	0	2	0	0	2
TOTAL	4	4	1	0	2	1	0	4
SAN MATEO								
Definite		2	2	0	0	0	0	2
Probable		6	3	2	0	1	0	6
Possible		4	0	1	0	3	1	3

County⁵								
Relationship²	TOTAL EPISODES³	TOTAL CASES	Type of Exposure³				Intended Use⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Unrelated		1	-	-	-	-	-	-
Unavailable		3	-	-	-	-	-	-
TOTAL	16	16	5	3	0	4	1	11
SANTA BARBARA								
Definite		4	4	0	0	0	2	2
Probable		14	0	2	11	1	11	3
Possible		5	0	2	0	3	1	3
Unlikely		2	0	0	0	2	1	1
Unrelated		1	-	-	-	-	-	-
Insufficient		29	-	-	-	-	-	-
Unavailable		3	-	-	-	-	-	-
TOTAL	19	58	4	4	11	6	15	9
SANTA CLARA								
Definite		3	3	0	0	0	0	3
Probable		22	12	4	1	5	1	21
Possible		4	1	0	0	3	0	4
Unlikely		1	0	0	0	1	0	1
Unrelated		3	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-
Unavailable		11	-	-	-	-	-	-
TOTAL	43	45	16	4	1	9	1	29
SANTA CRUZ								
Definite		2	2	0	0	0	0	2
Probable		4	2	1	1	0	1	3
Possible		3	0	1	2	0	2	1
Unrelated		2	-	-	-	-	-	-
Unavailable		2	-	-	-	-	-	-
TOTAL	13	13	4	2	3	0	3	6
SHASTA								
Definite		18	15	2	0	1	0	18
Probable		5	4	0	0	1	0	5

County⁵								
Relationship²	TOTAL EPISODES³	TOTAL CASES	Type of Exposure³				Intended Use⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Possible		2	0	0	0	2	0	2
Unlikely		2	1	0	0	1	0	2
Unrelated		1	-	-	-	-	-	-
Unavailable		2	-	-	-	-	-	-
TOTAL	12	30	20	2	0	5	0	27
SISKIYOU								
Definite		1	1	0	0	0	0	1
Possible		1	0	1	0	0	0	1
TOTAL	2	2	1	1	0	0	0	2
SOLANO								
Definite		2	2	0	0	0	0	2
Probable		4	2	0	2	0	0	4
Possible		4	1	1	2	0	1	3
Unrelated		3	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	13	14	5	1	4	0	1	9
SONOMA								
Definite		2	1	1	0	0	0	2
Probable		4	0	2	1	1	0	4
Possible		3	0	1	1	1	0	3
Unlikely		2	0	1	0	1	0	2
Unrelated		2	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		1	-	-	-	-	-	-
TOTAL	16	16	1	5	2	3	0	11
STANISLAUS								
Definite		2	1	1	0	0	0	2
Probable		5	2	1	0	2	1	4
Possible		9	4	2	2	1	1	8
Unrelated		5	-	-	-	-	-	-
Insufficient		1	-	-	-	-	-	-

County ⁵								
Relationship ²	TOTAL EPISODES ³	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Unavailable		4	-	-	-	-	-	-
TOTAL	26	26	7	4	2	3	2	14
SUTTER								
Probable		3	2	1	0	0	2	1
Unrelated		1	-	-	-	-	-	-
TOTAL	4	4	2	1	0	0	2	1
TEHAMA								
Probable		5	2	0	0	3	0	5
Possible		1	0	0	0	1	0	1
Unlikely		1	0	0	0	1	0	1
TOTAL	7	7	2	0	0	5	0	7
TRINITY								
Possible		1	0	0	0	1	0	1
TOTAL	1	1	0	0	0	1	0	1
TULARE								
Definite		3	2	0	0	1	0	3
Probable		19	4	11	2	2	5	14
Possible		9	2	3	0	4	2	6
Unlikely		5	0	0	0	5	0	5
Unrelated		4	-	-	-	-	-	-
Insufficient		2	-	-	-	-	-	-
Unavailable		2	-	-	-	-	-	-
TOTAL	37	44	8	14	2	12	7	28
TUOLUMNE								
Probable		2	1	1	0	0	0	2
Possible		1	0	1	0	0	0	1
TOTAL	3	3	1	2	0	0	0	3
VENTURA								
Definite		2	1	0	1	0	0	2
Probable		7	3	3	0	1	0	7
Possible		4	1	1	1	1	0	4

County ⁵								
Relationship ²	TOTAL EPISODES [‡]	TOTAL CASES	Type of Exposure ³				Intended Use ⁴	
			Direct Contact	Drift	Residue	Other/Unknown	Agricultural	Non-Agricultural
Unrelated		3	-	-	-	-	-	-
Unavailable		5	-	-	-	-	-	-
TOTAL	21	21	5	4	2	2	0	13
YOLO								
Definite		1	1	0	0	0	0	1
Probable		3	0	2	0	1	3	0
Possible		4	1	1	1	1	2	2
Unlikely		2	1	0	1	0	0	2
Unrelated		1	-	-	-	-	-	-
Unavailable		5	-	-	-	-	-	-
TOTAL	15	16	3	3	2	2	5	5
YUBA								
Probable		3	0	1	0	2	0	3
Unrelated		1	-	-	-	-	-	-
TOTAL	3	4	0	1	0	2	0	3

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.

[‡] An *episode* is an incident in which a one or more people (*cases*) experience pesticide exposure from a particular source.

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 California¹ with Documented² Pesticide Exposure
Summarized by the Type of Illness and the Type of Pesticides
2015**

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 Only	11	41	7	11	55	99	225
Systemic with Respiratory Effects	12	41	9	9	66	68	205
Systemic with Topical Effects	9	1	3	2	36	13	64
Systemic with Respiratory and Topical Effects	7	4	2	2	54	20	89
Respiratory							
Respiratory Only	14	110	0	3	37	41	206
Respiratory with Topical Effects	8	13	0	0	37	15	75
Topical							
Eye Only	78	31	0	0	77	53	240
Skin Only	34	6	1	0	5	17	63
Eye and Skin	5	2	0	1	6	5	19
Asymptomatic							
Asymptomatic	0	2	0	3	70	0	75
Unknown							
Unknown	0	0	0	0	0	1	1
TOTAL	178	251	22	31	443	332	1262

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 five cases in which the activity could not be determined as occupational or non-occupational.

**Hospitalization and Disability Associated¹ with Illnesses/Injuries
Definitely or Probably Related² to Pesticide Exposure in California,
Summarized by Occupational Status and Activity
2015**

Occupational³

Activity ⁶	Total Cases	Hospitalization ⁴			Disability ⁵		
		No. Cases	%	Unknown ⁷	No. Cases	%	Unknown ⁸
Applicator	82	0	0	0	16	19.5	17
Field Worker	188	0	0	0	7	3.7	2
Manufacturing/Formulation	1	0	0	0	0	0	0
Mechanical	7	0	0	0	0	0	3
Mixer/Loader	34	0	0	0	9	26.5	5
Other	33	0	0	0	7	21.2	7
Packaging/Processing	16	0	0	0	2	12.5	3
Routine Indoor	12	1	8.3	0	5	41.7	1
Routine Outdoor	79	0	0	0	11	13.9	33
Routine (Other or Unspecified)	18	0	0	0	0	0	5
Transport/Storage/Disposal	11	0	0	0	2	18.2	1
Unknown	10	0	0	0	1	10.0	7
Total Occupational	491	1	0.2	0	60	12.2	84

Non-Occupational³

Activity ⁶	Total Cases	Hospitalization ⁴			Disability ⁵		
		No. Cases	%	Unknown ⁷	No. Cases	%	Unknown ⁸
Applicator	142	5	3.5	2	7	4.9	59
Mechanical	1	0	0	0	0	0	1
Mixer/Loader	15	1	6.7	0	1	6.7	7
Other	44	7	15.9	2	8	18.2	21
Routine Indoor	106	4	3.8	0	4	3.8	29
Routine Outdoor	53	3	5.7	1	1	1.9	44
Routine (Other or Unspecified)	67	0	0	1	0	0	52
Unknown	12	1	8.3	1	1	8.3	10

Activity ⁶	Total Cases	Hospitalization ⁴			Disability ⁵		
		No. Cases	%	Unknown ⁷	No. Cases	%	Unknown ⁸
<i>Total Non-Occupational</i>	440	21	4.8	7	22	5.0	223
TOTAL CASES⁹	934	22	2.4	7	82	8.8	310

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/ Processing:	Handles (packs, processes, or retails) agricultural commodities from the packing house to the final market place. Field packing of agricultural commodities is classified as field worker.
Field Worker:	Works in an agricultural field performing tasks such as advising, scouting, harvesting, thinning, irrigating, driving tractor (except as part of an application), field packing, conducting cultural work in a greenhouse, etc. Researchers performing similar tasks in an agricultural field are also included.
Routine Indoor:	Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.
Routine Outdoor:	Conducts activities in an outdoor environment with minimal expectation for exposure to pesticides. This excludes field workers in agricultural fields. This includes gardeners who are not handling pesticides.
Routine (Other/Unspecified):	Conducts activities in an environment with minimal expectation for exposure to pesticides but is not adequately defined as indoor or outdoor. This includes individuals exposed to pesticides while inside a vehicle.
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 three cases in which the activity could not be determined as occupational or non-occupational. Of the three cases with unknown occupational status, none were hospitalized. The disability status of all three cases is unknown.

**Hospitalization and Disability Associated¹ with Illnesses/Injuries
Possibly Related² to Pesticide Exposure in California,
Summarized by Occupational Status and Activity
2015**

Occupational³

Activity ⁶	Total Cases	Hospitalization ⁴			Disability ⁵		
		No. Cases	%	Unknown ⁷	No. Cases	%	Unknown ⁸
Applicator	28	1	3.6	0	9	32.1	6
Field Worker	18	0	0	0	2	11.1	3
Mechanical	2	0	0	0	0	0	0
Mixer/Loader	4	0	0	0	0	0	2
Other	5	0	0	0	1	20.0	1
Packaging/Processing	3	0	0	0	1	33.3	1
Routine Indoor	12	0	0	0	2	16.7	5
Routine Outdoor	4	0	0	0	2	50.0	2
Transport/Storage/Disposal	2	0	0	0	0	0	1
Unknown	4	0	0	0	0	0	4
Total Occupational	82	1	1.2	0	17	20.7	25

Non-Occupational³

Activity ⁶	Total Cases	Hospitalization ⁴			Disability ⁵		
		No. Cases	%	Unknown ⁷	No. Cases	%	Unknown ⁸
Applicator	52	0	0	2	1	1.9	34
Mixer/Loader	2	0	0	0	0	0	1
Other	22	3	13.6	0	2	9.1	14
Routine Indoor	71	0	0	0	0	0	35
Routine Outdoor	12	0	0	0	0	0	8
Routine (Other or Unspecified)	1	0	0	0	0	0	1
Transport/Storage/Disposal	1	0	0	0	0	0	0
Unknown	8	0	0	0	0	0	7
Total Non-Occupational	169	3	1.8	2	3	1.8	100
TOTAL CASES⁹	253	4	1.6	2	20	7.9	127

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.
Routine (Other/Unspecified):	Conducts activities in an environment with minimal expectation for exposure to pesticides but is not adequately defined as indoor or outdoor. This includes individuals exposed to pesticides while inside a vehicle.
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 two cases in which the activity could not be determined as occupational or non-occupational. Of the two cases with unknown occupational status, none were hospitalized. The disability status of all two cases is unknown.

**Illnesses and Injuries Reported in California¹ Associated With² Pesticide Exposure
Summarized by the Type of Activity and Type of Exposure
2015**

Occupational³

Type of Activity ⁴	Type of Exposure ⁵								
	Drift	Residue	Direct Spray/ Squirt	Spill/ Other Direct	Ingestion	Multiple	Other	Unknown	Total
Applicator	32	0	21	39	0	2	3	13	110
Field Worker	154	38	0	0	0	14	0	0	206
Manufacturing/Formulation	0	0	0	1	0	0	0	0	1
Mechanical	1	0	1	5	0	0	1	1	9
Mixer/Loader	5	0	5	26	0	0	0	2	38
Other	6	8	3	12	3	1	3	2	38
Packaging/Processing	7	6	0	3	0	2	0	1	19
Routine (Other or Unspecified)	17	1	0	0	0	0	0	0	18
Routine Indoor	5	11	0	3	2	1	1	1	24
Routine Outdoor	81	0	2	0	0	0	0	0	83
Transport/Storage/Disposal	0	0	0	7	0	0	6	0	13
Unknown	2	0	1	6	0	0	0	5	14
Total Occupational Cases	310	64	33	102	5	20	14	25	573

Non-Occupational³

Type of Activity ⁴	Type of Exposure ⁵								
	Drift	Residue	Direct Spray/Squirt	Spill/Other Direct	Ingestion	Multiple	Other	Unknown	Total
Applicator	87	3	29	38	5	7	9	16	194
Mechanical	1	0	0	0	0	0	0	0	1
Mixer/Loader	10	0	3	2	0	0	2	0	17
Other	6	12	3	14	22	3	5	1	66
Routine (Other or Unspecified)	63	1	1	1	1	0	0	1	68
Routine Indoor	18	38	13	27	60	4	5	12	177
Routine Outdoor	11	3	1	36	7	3	2	2	65
Transport/Storage/Disposal	0	0	0	0	1	0	0	0	1
Unknown	0	0	3	4	4	0	2	7	20
Total Non-Occupational Cases	196	57	53	122	100	17	25	39	609
Total Cases⁶	507	121	86	225	105	37	39	67	1187

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.
Routine (Other/Unspecified)::	Conducts activities in an environment with minimal expectation for exposure to pesticides, but is not adequately described as being indoor or outdoor. This includes individuals who were inside a vehicle at time of exposure.
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 five cases in which the activity could not be determined as occupational or non-occupational.

**Illnesses and Injuries Reported by Physicians¹ Associated With² Pesticide Exposure
Summarized by Pesticide(s) and Type of Illness
2015**

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Organophosphates						
Acephate	1	1	0	0	1	1
Bensulide	26	0	0	0	26	0
Chlorpyrifos	1	0	0	0	1	0
DDVP	5	3	0	0	5	3
Malathion	3	3	1	0	4	3
N-Methyl Carbamates						
Carbaryl	1	0	0	0	1	0
Propoxur	0	1	0	0	0	1
Pyrethrins and Pyrethroids						
Beta-Cyfluthrin	2	1	3	0	5	1
Bifenthrin	3	4	1	1	4	5
Cyfluthrin	1	1	1	0	2	1
Cypermethrin	19	4	0	0	19	4
Deltamethrin	0	1	2	1	2	2
Esfenvalerate	3	0	2	0	5	0
Fenpropathrin	5	0	0	0	5	0
Gamma-Cyhalothrin	3	1	2	1	5	2
Lambda-Cyhalothrin	4	3	3	0	7	3
Permethrin	5	3	3	1	8	4
Pyrethrins	1	1	0	0	1	1
Other Pesticides						
Abamectin	0	1	0	0	0	1
Alkyl Amino Propane	0	0	1	0	1	0
Aluminum Phosphide	6	2	0	0	6	2
Ammonia	1	0	0	0	1	0
Bacillus Thuringiensis	1	0	0	0	1	0
Borax	0	1	0	0	0	1
Boric Acid	3	5	1	0	4	5

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Bromethalin	0	1	0	0	0	1
Bromine	0	1	0	0	0	1
Bromoxynil	0	0	1	0	1	0
Buprofezin	0	1	0	0	0	1
Calcium Hypochlorite	4	0	0	0	4	0
Carfentrazone-ethyl	1	0	0	0	1	0
Chlorine	2	0	0	1	2	1
Chlorophacinone	0	1	0	0	0	1
Chlorothalonil	1	0	0	0	1	0
Chromobacterium Subtsugae Strain PRAA4-1	0	0	1	0	1	0
Copper 8-quinolinolate	0	1	0	0	0	1
Copper Ammonium Complex	0	0	1	0	1	0
Copper Naphthenate	2	1	0	0	2	1
Cyanuric Acid	7	0	3	0	10	0
Deet	0	0	1	0	1	0
Dinotefuran	0	2	0	0	0	2
Diphacinone	0	1	0	0	0	1
Diquat	1	0	0	0	1	0
Dithiopyr	0	1	0	0	0	1
Ferric Sodium EDTA	1	0	0	0	1	0
Fipronil	0	3	0	1	0	4
Geraniol	0	0	0	1	0	1
Glycolic Acid	3	0	0	0	3	0
Glyphosate	3	2	5	0	8	2
Halogenated Hydantoins	0	0	1	0	1	0
Hydramethylnon	0	1	0	1	0	2
Hydrogen Chloride	6	2	5	0	11	2
Hydrogen Peroxide	1	0	5	1	6	1
Imidacloprid	0	1	0	0	0	1
Indoxacarb	1	1	0	0	1	1
Isothiazoline Disinfectants	0	1	0	0	0	1
Metam-sodium	0	0	1	0	1	0

Pesticide ³	Systemic/ Respiratory ⁴		Topical ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Methyl Bromide	3	1	0	0	3	1
Mineral Oil	0	0	1	0	1	0
Neem Oil	0	1	0	0	0	1
Octanoic Acid	0	0	1	0	1	0
Ozone	0	1	0	0	0	1
Paraquat	0	1	2	0	2	1
Phenolic Disinfectants	0	0	2	0	2	0
Polixetonium Chloride	0	1	0	0	0	1
Propargite	0	1	0	0	0	1
Quaternary Ammonia	7	2	41	1	48	3
Sodium Chlorite	2	0	0	0	2	0
Sodium Hydroxide	0	0	2	0	2	0
Sodium Hypochlorite	110	16	54	11	164	27
Sulfur	40	0	28	0	68	0
Sulfuryl Fluoride	4	5	0	0	4	5
Zinc Phosphide	0	0	0	1	0	1
Ziram	0	0	0	1	0	1
Combinations of Antimicrobials	41	7	15	2	56	9
Combinations of Fumigants	7	1	2	0	9	1
Combinations of Fungicides	69	4	34	1	103	5
Combinations of Herbicides	10	6	3	3	13	9
Combinations of Insecticides Including ChE Inhibitor(s)	1	1	0	1	1	2
Combinations of Insecticides Without ChE Inhibitor(s)	117	39	16	3	133	42
Miscellaneous Combinations	66	24	10	2	76	26
Unknown Antimicrobials	17	2	9	3	26	5
Unknown Fumigants	1	1	0	0	1	1
Unknown Herbicides	1	0	2	0	3	0
Unknown Insecticides	31	32	9	7	40	39
Unknown Pesticides	3	5	2	0	5	5
TOTAL	657	208	277	45	934	253

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 California¹ Associated With² Pesticide Exposure
Summarized by Occupational Status and by Location of the Incident
2015**

Incident Setting ³	Occupational Exposures ⁴		Non-Occupational Exposures ⁴		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Farm	207	32	0	1	207	33
Nursery	2	1	0	1	2	2
Forest	0	1	0	0	0	1
Livestock Production Facility	1	1	0	0	1	1
Crop/Livestock Processing Facility	28	3	0	0	28	3
Animal Premise (Veterinary Hospital, Kennels, not Livestock)	3	0	1	0	4	0
Single Family Home	4	4	125	39	129	43
Multi-unit Housing	4	1	46	28	50	29
Residence (Other or Unspecified)	5	3	146	93	151	96
Residential Institution	5	1	2	0	7	1
School	27	2	68	0	95	2
Prison	5	1	2	0	7	1
Hospital/Medical	25	5	0	0	25	5
Pesticide Manufacturing Facility	2	0	0	0	2	0
Wood Treatment	1	0	0	0	1	0
Office/Business	5	5	0	0	5	5
Retail Establishment	9	1	2	2	11	3
Service Establishment	48	10	40	1	89	11
Wholesale Establishment	2	1	0	0	2	1
Road/Rail Or Utility Right Of Way	5	3	1	0	6	3
Park	2	0	0	0	2	0
Golf Course	3	0	0	0	3	0
Landscape, Other	1	0	0	0	1	0
Other	91	3	2	1	93	4
Unknown	6	4	5	3	13	9
TOTAL⁵	491	82	440	169	934	253

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.

Forest: Establishment engaged in the operation of timber tracts, tree farms, reforestation projects and other forest related activities.

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: Apartments and multi-plexes and other buildings on property. This includes swimming

Housing:	pools and landscaped areas on the property.
Residence (Other or Unspecified):	Human habitation of unknown type, or of a type not adequately described as single family home, multi-unit housing, labor housing, or residential institution.
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 five cases in which the activity could not be determined as occupational or non-occupational.

**Summary of Cases Reported in California¹ as Associated With² Pesticide Exposure
Summarized by Gender, Age Distribution, Type of Pesticide, and Type of Use
2015**

Agricultural Use Pesticide Exposure Incidents³

Age Group	Pesticides other than Antimicrobial Pesticides ⁴			Antimicrobial Pesticides ⁴			Total
	Male	Female	Unknown	Male	Female	Unknown	
< 6	0	0	1	0	0	0	1
7 – 12	0	0	0	0	0	0	0
13 – 17	1	2	0	0	0	0	3
18 – 24	46	3	0	5	0	0	54
25 – 34	73	14	0	3	2	0	92
35 – 44	42	12	0	3	1	0	58
45 – 54	30	13	0	0	4	0	47
55 – 64	15	8	0	0	1	0	24
> 65	2	4	0	0	1	0	7
Adult, Unknown Age	67	26	3	0	0	0	96
Unknown	3	12	0	0	0	0	15
Total	279	94	4	11	9	0	397

Non-Agricultural Use Pesticide Exposure Incidents³

Age Group	Pesticides other than Antimicrobial Pesticides ⁴			Antimicrobial Pesticides ⁴			Total
	Male	Female	Unknown	Male	Female	Unknown	
< 6	26	24	0	35	29	0	114
7 – 12	9	6	0	36	34	0	85
13 – 17	4	2	0	6	10	0	22
18 – 24	14	7	0	23	24	0	68
25 – 34	32	24	0	25	35	0	116
35 – 44	31	21	0	15	33	0	100
45 – 54	31	32	0	27	26	0	116
55 – 64	25	26	0	13	25	0	89
> 65	29	26	0	5	8	0	68
Adult, Unknown Age	1	1	0	1	0	0	3
Unknown	4	2	0	0	0	0	6
Total	206	171	0	186	224	0	787

Total Ag /Non-Ag Cases⁵	487	265	4	198	233	0	1187
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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 three additional three cases which could not be determined to be agricultural or non-agricultural use situations.

**Agricultural Drift Cases¹ Reported by California Physicians as Associated With²
Pesticide Exposure Summarized by the Activity of the Exposed Person and by the
Type of Application Equipment Used
2015**

Type of Application Equipment Used ³	Type of Activity ⁴				Total
	Routine Indoor	Routine Outdoor	Field Worker	Other	
Air, Other or Unspecified	0	0	1	0	1
Fixed Wing Aircraft	0	0	3	1	4
Helicopter	1	1	10	2	14
Ground, Other or Unspecified	1	0	2	2	5
Ground Boom, Other or Unspecified	0	1	0	0	1
Ground, Boom Below/Behind	0	0	0	1	1
Airblast Sprayers	1	79	0	7	87
Power Dusters	1	0	80	0	81
Shank Injection without Tarps	7	0	0	0	7
Hand, Other or Unspecified	0	0	0	1	1
Chamber	0	0	0	3	3
Sprinkler Irrigation Equipment	0	1	1	25	27
Immersion Equipment	0	0	0	6	6
Manual Placement	0	0	0	3	3
Other	0	0	57	0	57
Unknown	0	0	0	1	1
TOTAL	11	82	154	52	299

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 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.

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.

Fixed Wing Aircraft: Fixed wing aircraft.

Helicopter: Helicopter.

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.

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.

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.

Sprinkler Irrigation Equipment: Chemigation through sprinkler irrigation equipment.

Immersion: Tanks, trays, sinks, etc. used for the dipping of animals, produce, bulbs, medical

- Equipment: equipment, dishes, pots and pans, etc.
- 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.
- 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.

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

- 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.
- Other: Any activity, including handling pesticides, other than routine indoor, routine outdoor, or field work.

**Agricultural Drift Cases Reported in California¹ Associated With² Pesticide
Exposure Summarized by Application Sites
2015**

Application Site³	Number of Cases⁴	Number of Episodes⁵
BERRIES		
Strawberries	56	1
CITRUS		
Oranges	1	1
GRAIN		
Corn	2	2
GRAPES		
Grapes	28	5
IMPLEMENTS		
Inanimate Objects	5	1
LEAFY/STEM VEGETABLE		
Brussels Sprouts	2	2
Lettuce	34	2
Celery	1	1
Spinach	1	1
MULTIPLE		
Grapes, Tomatoes	60	1
Corn, Unknown	1	1
NON-CROP		
Uncultivated Agricultural Areas (Other or Unspecified)	7	1
Soil	1	1
Animal Burrows (Vertebrate and Insect Pests)	1	1
NUT TREES		
Almonds	1	1
Walnuts	5	4
Pistachios	86	3
ORNAMENTAL		
Ornamental Plants (Other or Unspecified)	1	1
Roses	1	1
OTHER VEGETABLE		
Vegetables (Other or Unspecified)	1	1
UNKNOWN		
Unknown	4	4
TOTAL	299	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 Cases: Indicates the number of individuals exposed in one incident of agricultural drift.

5. Number of Episodes: Indicates the number of episodes (events) where agricultural pesticide drift occurred based on the application site.

**Illnesses and Injuries of Applicators Reported by Physicians¹ Associated With²
Pesticide Exposure Summarized by Type of Equipment, Type of Activity, and
Occupational Status
2015**

Occupational³

Type of Equipment ⁵	Type of Activity ⁴				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Fixed Wing Aircraft	1	1	0	0	2
Helicopter	0	1	0	0	1
Ground, Other or Unspecified	2	2	0	1	5
Ground Boom, Other or Unspecified	1	1	0	0	2
Ground, Boom Below/Behind	0	3	0	0	3
Over-the-vine Boom	0	1	0	0	1
Airblast Sprayers	1	3	0	0	4
Shank Injection with Tarps	0	1	0	0	1
Hand, Other or Unspecified	3	5	0	0	8
Pressurized Hose-line Sprayers	0	7	0	0	7
Hand Pump Sprayer	0	3	0	0	3
Back Pack Sprayer	0	6	0	0	6
Unpressurized Hand-held Spray Equipment	2	9	0	0	11
Aerosol Can	0	2	0	0	2
Aerosol/fog Generating Equipment	0	0	0	1	1
Chamber	0	2	0	0	2
Automatic Equipment, Other or Unspecified	6	2	0	0	8
Automatic Equipment, Chlorinators	2	1	0	5	8
Drip Irrigation Equipment	0	2	0	0	2
Manual Application Methods, Other or Unspecified	6	5	0	0	11
Immersion Equipment	0	7	0	0	7
Implements with Handles	1	3	0	0	4
Implements without Handles	1	9	0	0	10
Manual Placement	2	10	0	0	12
Not Applicable	4	0	0	1	5

Other	1	2	0	0	3
Unknown	5	22	0	1	28
Total Occupational Cases	38	110	0	9	157

Non-Occupational³

Type of Equipment ⁵	Type of Activity ⁴				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Hand, Other or Unspecified	1	22	0	0	23
Hand Pump Sprayer	3	9	0	0	12
Back Pack Sprayer	0	1	0	0	1
Unpressurized Hand-held Spray Equipment	1	16	0	0	17
Aerosol Can	0	28	0	0	28
Foggers	0	31	0	0	31
Automatic Equipment, Chlorinators	0	0	0	1	1
Manual Application Methods, Other or Unspecified	1	12	0	0	13
Implements with Handles	1	6	0	0	7
Implements without Handles	0	2	0	0	2
Manual Placement	4	28	0	0	32
Not Applicable	1	0	0	0	1
Other	0	4	0	0	4
Unknown	5	35	0	0	40
Total Non-Occupational Cases	17	194	0	1	212
Total Cases⁶	55	308	0	10	373

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	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, Other Or Unspecified: 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 California¹ Field Workers Associated With Pesticide Residue and Drift, 1982-2015

Year	Residue ²					Drift ²				
	Systemic/ Respiratory ³		Topical ³		Total	Systemic/ Respiratory ³		Topical ³		Total
	Definite/ Probable ⁴	Possible ⁴	Definite/ Probable ⁴	Possible ⁴		Definite/ Probable ⁴	Possible ⁴	Definite/ Probable ⁴	Possible ⁴	
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	57	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	14	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
2014	1	5	0	1	7	114	17	1	2	134
2015	27	7	3	1	38	90	10	54	0	154
TOTAL	861	856	806	1926	4452	1565	469	284	38	2356

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 California¹ Associated With²
Pesticide Residue Exposure Summarized by Application Site and
Type of Illness 2015**

Application Site	Systemic/ Respiratory ³		Topical ³		Total
	Definite/ Probable	Possible	Definite/ Probable	Possible	
BERRIES					
Blackberries	0	1	0	0	1
Raspberries	0	2	0	0	2
Strawberries	1	0	0	0	1
CITRUS					
Lemons	5	0	0	0	5
GRAPES					
Grapes	9	2	2	0	13
MULTIPLE					
Grapes, Tomatoes	2	0	1	0	3
Lettuce, Strawberries	10	0	0	0	10
NUT TREES					
Almonds	0	0	0	1	1
OTHER VEGETABLE					
Onions (Dry)	0	1	0	0	1
UNKNOWN					
Unknown	0	1	0	0	1
TOTAL	27	7	3	1	38

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
2015**

Exposure ³	Systemic/Respiratory ⁴			Topical ⁴			Total
	Antimicrobials ⁵	Cholinesterase Inhibitors ⁵	Other Pesticides ⁵	Antimicrobials ⁵	Cholinesterase Inhibitors ⁵	Other Pesticides ⁵	
Drift	58	26	1	0	0	0	85
Residue	1	0	1	1	0	0	3
Direct Spray/Squirt	0	0	0	3	0	0	3
Spill/Other Direct	1	0	1	3	0	0	5
Unknown	0	0	0	1	0	0	1
TOTAL	60	26	3	8	0	0	97

1. Source: California Department of Pesticide Regulation, Pesticide Illness Surveillance Program. Fifty-three children were reported to have been exposed while at school in 2015.

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 into 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
Physical address: 1001 I St., Sacramento, CA 95814-2828
Mailing address: P.O. Box 4015, Sacramento, CA 95812-4015
Phone: (916) 445-4222
Fax: (916) 445-4280
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About the Pesticide Illness Surveillance Program Data

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