SUMMARY OF RESULTS FROM THE CALIFORNIA PESTICIDE ILLNESS SURVEILLANCE PROGRAM
- 2007 -

HS-1876

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Department of Pesticide Regulation
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Executive Summary:

This report describes illnesses identified by the Pesticide Illness Surveillance Program (PISP) of the California Department of Pesticide Regulation (DPR) during 2007. With this release, DPR announces the availability of an Internet query program that allows people to supplement the information in this report by retrieving data to their own specifications. The California Pesticide Illness Query (CalPIQ) is available at http://apps.cdpr.ca.gov/calpiq, and can supply either individual case descriptions or data summaries.

DPR assigned 1,479 cases for investigation in 2007, which returns the program to a level typical of recent years after a dip in 2006 partially attributable to absence of reports from the California Poison Control System (CPCS) during most of the year. CPCS had previously offered this service through a federally supported pilot program that lapsed at the end of 2002. CPCS assistance resumed in October 2006, under a new contract funded by DPR. Of the 1,479 cases investigated in 2007, 538 were reported through CPCS. Scientists concluded that pesticide exposure had been at least a possible contributing factor to 982 (66%) of the 1,479 cases investigated. Agriculture was the source of pesticide exposure in 318 of the 982 cases.

DPR expanded pesticide safety outreach efforts in 2007. The DPR outreach program disseminated pesticide safety information at health and service oriented events attended by thousands of low-income Spanish speakers, and has publicized safety principles in interviews on Spanish-language radio and television. To help direct pesticide-related complaints to County Agricultural Commissioners more quickly, DPR continues to maintain a statewide toll free phone number (1-87-PestLine). DPR scientists also remain active in the Border 2012 project, helping to coordinate border-area focus groups and plan for international cooperation in illness surveillance.

A list of acronyms is provided as an appendix to this report.

Background on the Reporting System

The California pesticide safety program, which the Department of Pesticide Regulation (DPR) administers, is widely regarded as the most stringent in the nation. Mandatory reporting of pesticide[1] illnesses has been part of this comprehensive program since 1971. Reports are collected, evaluated, and analyzed by the Pesticide Illness Surveillance Program (PISP). PISP is the oldest and largest program of its kind in the nation, and provides data to regulators, advocates, industry, and individual citizens.

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

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

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

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

Sources of Illness Information

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

DPR strives to ensure that the PISP captures the majority of significant illness incidents and records them in its database. To identify pesticide cases that may go unreported by doctors, DPR has negotiated a memorandum of understanding with DIR and the CDPH, under which scientists review copies of the Doctor’s First Report of Occupational Illness and Injury (DFROII), documents that the California Labor Code requires workers' compensation claims payers to forward to DIR. Scientists select for investigation any DFROII that mentions a pesticide, or pesticides in general, as a possible cause of injury. Reports that mention unspecified chemicals

are also investigated if the setting is one in which pesticide use is likely. From 1983 through 1998, DFROII review identified the majority of the cases investigated.

From 1999 through 2002, the California Poison Control System (CPCS) facilitated pesticide illness reporting. Funds from U.S. EPA supported development of an enhanced system of poison control facilitation, which operated from mid-2001 through November 2002. Cooperation with CPCS identified hundreds of symptomatic exposures that otherwise would have escaped detection, but the 2002 state budget crisis prevented continuation of the contract after federal funding ended. Improved financial status allowed DPR to renew its contract with CPCS in 2006. Poison control facilitation of illness reporting resumed in October 2006. DPR also continues to cooperate with OEHHA in efforts to provide the public and the health care community with information on pesticide safety and public health surveillance.

The agricultural commissioners of the counties where exposures occurred investigate all identified incidents, whether or not they involve agriculture. They attempt to locate and interview all the people with knowledge of the pesticide exposure event, and also review relevant records. Their investigations identify how exposure occurred, characterize the subsequent illnesses, and determine whether pesticide users complied fully with safety requirements. DPR provides instructions, training and technical support for investigations. These instructions include directions for when and how to collect samples of foliage, clothing, or surface residues to document environmental exposures. As part of the technical support, DPR contracts with a California Department of Food and Agriculture laboratory to analyze the samples.

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

information the CACs have gathered. They then classify incidents according to the circumstances of pesticide exposure.

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

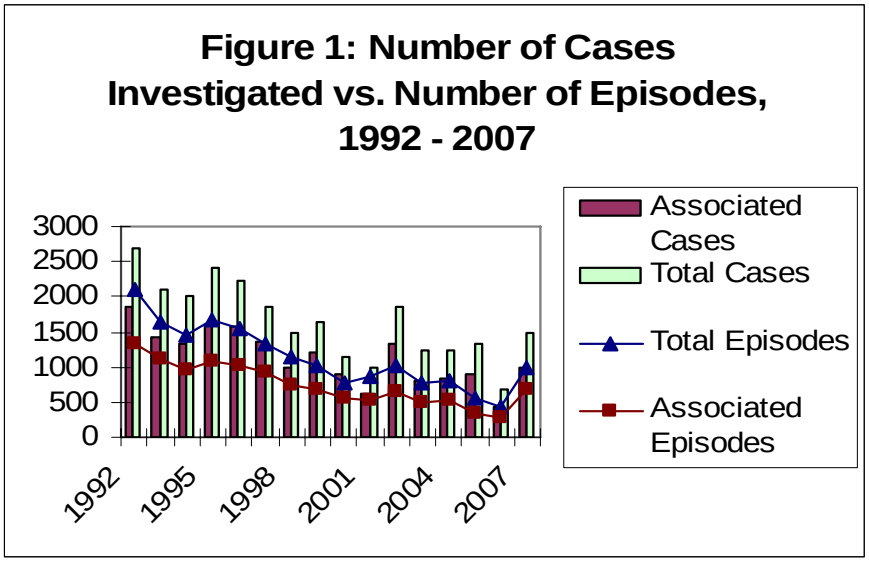
Purpose of Pesticide Illness Surveillance

DPR maintains its surveillance of human health effects of pesticide exposure in order to evaluate the circumstances of pesticide exposures that result in illness. DPR scientists regularly consult the PISP database to evaluate the effectiveness of the DPR pesticide safety regulatory programs and assess any need for changes. In high-risk situations, DPR may implement additional California restrictions on pesticide use. For example, taking illness data into consideration, DPR may adjust the restricted entry interval following pesticide application, specify buffer zones or other application conditions, or require pesticide handlers to use protective equipment that meets certain standards. In some instances, changes to pesticide labels provide the most appropriate mitigation measures. Since the U.S. EPA has exclusive authority to require label changes, DPR cooperates with U.S. EPA to develop appropriate instructions for users throughout the country. If an illness incident results from illegal practices, state and county enforcement staff take appropriate action to deter future incidents.

During 2007, WHS finalized a review of PISP data on illnesses attributed to exposure to agricultural pesticides that release methyl isothiocyanate (Akanda, 2007) and incorporated illness data into a finalized exposure assessment for methidathion (Beauvais, 2007). WHS also investigated a report of cholinesterase inhibition among employees of an agricultural pest control business (Fong, 2007), and identified several potential sources of exposure. The most heavily contaminated source proved to be the symptomatic employee's own leather boots, which may have acted as a reservoir for the organophosphate insecticide chlorpyrifos.

2007 Numeric Results – Totals

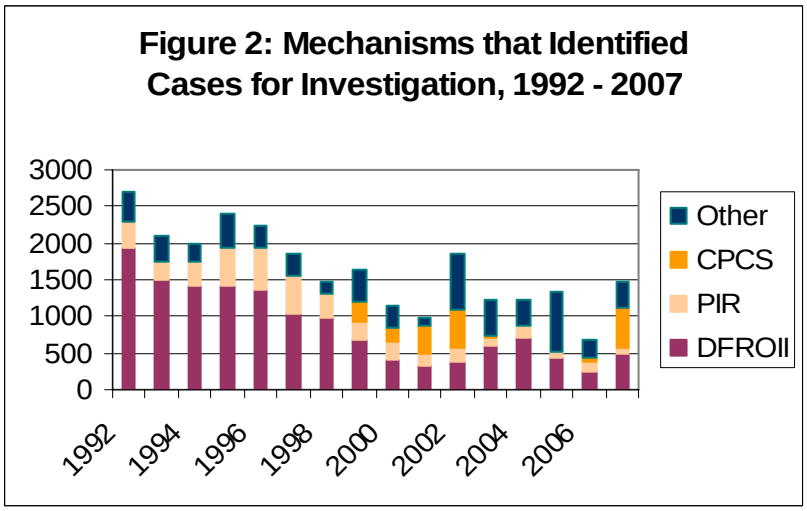
In 2007, DPR and CACs investigated 1479 cases (see Figure 1). This is more than double the 681 investigated in 2006, and a return to levels typical of recent years.



A case is the Pesticide Illness Surveillance Program representation of a person whose health problems may relate to pesticide exposure.
An episode is an event in which a single source appears to have exposed one or more people (cases) to pesticides.
Associated cases are those evaluated as definitely, probably, or possibly related to pesticide exposure. A definite relationship indicates that both physical and medical evidence document exposure and consequent health effects. A probable relationship indicates that limited or circumstantial evidence supports a relationship to pesticide exposure. A possible relationship indicates that evidence neither supports nor contradicts a relationship
Associated episodes are those in which at least one case was evaluated as associated.

Renewed participation by CPCS, which assisted in the transmission of 538 case reports, provided the majority of the increase in case identification. There were also several significant exposure episodes, described in later segments of this report.

Although the 2007 case count returned to pre-2006 levels, DPR will continue to pursue authorization for access to electronic workers' compensation data. Access to these data would significantly improve the reliability and consistency of information about occupational exposures. DPR also expanded outreach efforts to provide safety information to farm workers and other groups potentially isolated by poverty and/or lack of English fluency.

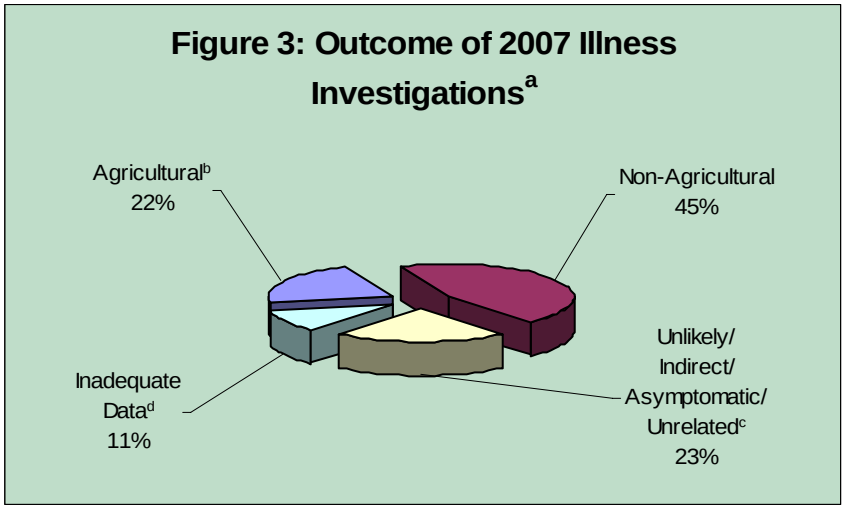


DFROII – Doctor's First Report of Occupational Illnesses and Injury (Workers' Compensation document).
PIR – Pesticide Illness Report (physician reporting in compliance with Health and Safety Code Section 105200).
CPCS – California Poison Control System (facilitated physician reporting).
Other – All other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

Figure 2 shows that PISP continues to receive a substantial number of reports outside of the standard PIR and DFROII-based pathways. Such episodes may come to the CACs' attention via emergency response contacts, news reports, or direct citizen complaints. Large drift episodes gave rise to exceptional numbers in this category in 2002 and 2005. In these episodes, relatively few people received medical care; so doctors could report only the minority of cases. When CACs investigated the episodes, they located many additional affected people and informed DPR of their findings.

DPR found that pesticide exposure had been at least a possible contributing factor to 982 (66%) of the 1479 cases investigated. PISP uses the term "pesticide-associated" to refer to cases evaluated as possibly, probably, or definitely related to pesticide exposure. Pesticide-associated cases included 318 (22% of the 1479 investigated) attributed to pesticides used for agricultural purposes (i.e., intended to contribute to production of an agricultural commodity, including livestock). The other 664 associated cases (45% of the 1479 investigated) occurred in non-agricultural circumstances such as structural, sanitation, or home garden use, in the manufacturing process, or during storage. In 337 (23%) of the 1479 cases assigned for

investigation, the weight of evidence was against a pesticide contribution to ill health, including the cases of 77 individuals (5%) who denied experiencing health effects. Lack of information prevented evaluation of 160 cases (11%) (Figure 3).



[a] Total cases investigated = 1479.
[b] *Agricultural* and *Nonagricultural* refer to the intended use of the pesticides definitely, probably, or possibly related to human health effects.
[c] *Unlikely/Indirect/Unrelated/Asymptomatic* refers to cases in which the weight of the evidence was against pesticide causation. This occurs when exposed people did not develop symptoms, or if symptoms were not caused or were unlikely to have been caused by pesticide exposure.
[d] *Inadequate* means that there was not enough data available or reported to determine if pesticides contributed to ill health.

Evidence established a definite relationship to pesticide exposure for 89 (9%) of the 982 pesticide-associated cases. Another 576 (59%) were classified as probable, with 317 (32%) entered as possible (Table 1). Tabular summaries presenting different aspects of the data are available through the DPR Web site at http://www.cdpr.ca.gov/docs/whs/2007pisp.htm, or by contacting the WHS Branch.

Table 1: Relationship Evaluation of 2007 Illness Investigations

Relationship	Agricultural[a]	Non-Agricultural	Relation to Agriculture Unknown or Not Applicable	Total
Definite[b]	10	79	0	89
Probable[c]	195	381	0	576
Possible[d]	113	204	0	317
Pesticide-Associated Subtotal	**318**	**664**	**0**	**982**
Unlikely[e]	23	75	5	103
Indirect[f]	0	3	0	3
Asymptomatic[g]	71	6	0	77
Unrelated[h]	0	0	154	154
Not Applicable[i]	12	132	16	160
Overall Total	**424**	**880**	**175**	**1479**

[a] Agricultural cases are those that implicate exposure to pesticides intended to contribute to the production of agricultural commodities.
[b] High degree of correlation between pattern of exposure and resulting symptomatology. Requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions.
[c] Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
[d] Some degree of correlation evident. Medical and physical evidence are inconclusive or unavailable.
[e] A correlation cannot be ruled out absolutely. Medical and/or physical evidence suggest a cause other than pesticide exposure.
[f] Pesticide exposure is not responsible for symptomatology, but pesticide regulations or product label contributed in some way, (e.g., heat stress while wearing chemical resistant clothing).
[g] Exposure occurred, but did not result in illness/injury.
[h] Definite evidence of cause other than pesticide exposure, including exposures to chemicals other than pesticides.
[i] Relationship cannot be established because the necessary information is either unavailable or not provided.

Internet users now have the additional option of using the new query program, CalPIQ, to develop reports to their own specifications. CalPIQ is available at http://apps.cdpr.ca.gov/calpiq and can retrieve any cases evaluated as definitely, probably, or possibly related to pesticides from 1992 through the most recent year completed. Users can specify which cases to retrieve based on county of occurrence, year of identification, whether or not agriculture was the source

of pesticide exposure, the identity of the implicated pesticide(s), the type of location where exposure occurred (e.g. farm, school), the site for which the pesticide application was intended (e.g. grapes, food handling equipment), the manner of exposure (e.g. drift, direct spray), and/or activity of the affected people (e.g. applicator, field worker). Users can direct CalPIQ to retrieve either descriptions of each individual case or the total number of cases that match the selected criteria (summary report). If the summary report option is selected, users may request subtotals by activity, county, type of exposure, type of location, and/or year of identification.

Occupational exposures (those that occurred while the affected people were at work) accounted for 640 (65%) of the 982 pesticide-associated cases from 2007. Occupational exposures typically predominate among the cases PISP collects, reflecting the importance of DFROIIs (workers' compensation documents) for identifying cases. Three pesticide-associated cases could not be identified as occupational or non-occupational.

Enforcement actions often are still under consideration when DPR receives the illness investigative reports, and identification of violations is difficult. Based on the information available at the time of evaluation, WHS scientists concluded that 407 (41%) of the 982 pesticide-associated cases might have been avoided if pesticide users had adhered strictly to safety procedures already required by regulations and pesticide labels. In 107 cases (11%), violations were identified but were judged not to have contributed to pesticide exposure, and scientists remained uncertain whether violations contributed to 57 cases (6%). In 411 (42%) of the pesticide-associated cases, health effects were attributed to pesticide exposure in spite of apparent compliance with all applicable label instructions and safety regulations. Exposure in spite of compliance was more common for pesticide handlers than for bystanders, for exposures to residue than for spray or drift exposures, and for non-agricultural exposure situations than for exposure to agricultural-use pesticides. Further evaluation of these cases is needed to determine if additional safety requirements are appropriate.

The fraction of cases with violations is comparable to the 45% identified in 2004 and 2006, although a 2005 drift episode affected 324 people and raised the percentage of cases with violations to 68%. In 2007, contributory violations were identified in 155 (49%) of the 318 cases

associated with agricultural uses of pesticides, and 252 (38%) of the 664 non-agricultural pesticide-associated cases.

Agricultural Field Worker Incidents

In 2007, 126 cases of field worker illness or injury were evaluated as definitely, probably or possibly related to pesticide exposure (Figure 4). Fifty-eight of them (46%) involved exposure to pesticide residue in 33 separate episodes, and 66 (52%) involved exposure in eight drift episodes. One field worker became ill after drinking potentially contaminated water. A greenhouse worker's exposure could not be characterized with confidence.

Twenty-five of the 58 residue exposures were evaluated as probably related to reported health effects. The other 33 field worker residue exposures were evaluated as possibly related.

WHS helped to investigate a Tulare County reentry violation episode (Hernandez and Kabir, 2007): Two harvesting crews (total of 33 workers) entered an orange grove about 90 minutes after the end of a chlorpyrifos application. The workers smelled a strong pesticide odor and noticed that the leaves were wet. One by one, they stopped working; and all left the orchard within an hour and a half. Interviews with 28 of the workers were documented. Of the 28, 12 denied experiencing any health effects from their exposure. The other 16 reported symptoms, primarily headaches and dizziness, which resolved within a day.

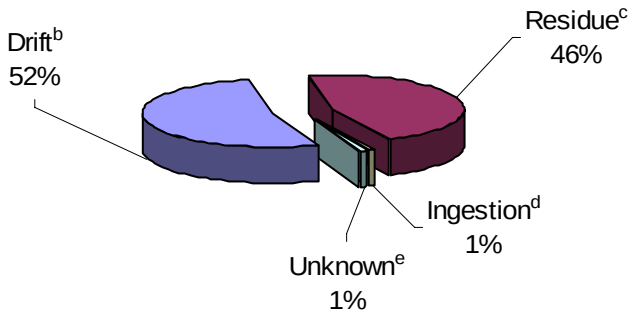
The day after the application, WHS scientists took leaf samples, which demonstrated chlorpyrifos deposition on the orange leaves in amounts consistent with application records. Samples from a neighboring pistachio orchard showed only about one percent of the chlorpyrifos level found on the orange leaves.

Investigators determined that the required signs had not been posted at the orange grove, and the grower had not informed workers of the application. One of the labor contractors had not trained his workers appropriately, did not provide adequate decontamination facilities, and did not take

sick workers for medical care. The Tulare County Agricultural Commissioner fined the grower $3,000 and the labor contractor $9,970 for these violations of regulations.

Of the other 42 field workers exposed to residue, 28, including three irrigators who violated reentry intervals, were exposed in incidents that involved no other people. The remaining 14 field workers were involved in four episodes that each exposed two to six field workers to pesticide residue No violations were identified in these four episodes.

Figure 4: Field Worker Exposure to Pesticides, 2007[a]



[a] Total field worker cases associated with pesticide exposure = 126.
[b] Drift refers to field worker cases associated with exposure to drift from a pesticide application.
[c] Residue refers to field worker cases associated with exposure to residue of previously applied pesticides.
[d] Ingestion refers to pesticides exposure through consumption either of pesticide products or of contaminated food or beverage.
[e] Unknown means scientists could not determine how exposure occurred.

Drift exposure probably caused or contributed to symptoms experienced by 51 field workers, and was a possible factor in 15 field worker cases. The largest field worker drift episode occurred in Tulare County on a Saturday, when an almond grower made an airblast application of chlorpyrifos to his trees while, across a narrow road, 70 workers pulled grape leaves and turned cane.

The grape workers smelled the pesticide, and several of them reported feeling mist, although light wind blew from the vineyard towards the almond grove. The grape grower took 11 workers

for medical care, and eventually 28 of the crew members consulted doctors. In interviews, 26 grape workers reported experiencing symptoms that day or the next.

The agricultural commissioner took leaf samples on the day of exposure, and twelve exposed people donated clothing to test for pesticide. Lab tests detected chlorpyrifos in all the leaf samples and all but one of the clothing samples. WHS took samples for dislodgeable residue the following Monday, two days after the event (Hernandez 2007). No detectable amount of chlorpyrifos was found on those samples. The agricultural commissioner fined the almond grower $33,640 for proceeding with the application with workers nearby, for drifting pesticide onto the workers, and for shortcomings in his safety program for his own workers.

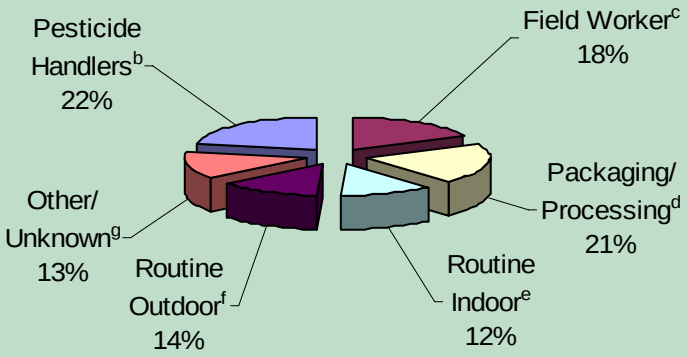
Large drift episodes also exposed field workers in Monterey and San Joaquin Counties. In Monterey, 19 of 34 strawberry harvesters reported symptoms upon smelling the odor from applications to adjacent fields. Eighteen of the reports were evaluated as probably related to the exposure; one was evaluated as unlikely to be related. In San Joaquin County, 14 of 18 tomato workers developed symptoms when an aerial application of propargite to corn drifted onto them. Samples demonstrated the propargite drift, and the agricultural commissioner proposed to fine the applicator $5,000. Four other drift episodes each affected one field worker, and one episode affected four.

Drift Exposure

The PISP defines drift exposure as exposure to pesticide "spray, mist, fumes, or odor carried from the target site by air." This definition differs from the definition used for enforcement of regulations in that the PISP definition includes the offsite movement of pesticides after they have been deposited at the target site, so long as the application remains in progress. Since fumigations remain in progress until ventilation is complete, this includes exposures to fumigants that escape confinement. It also includes exposures of pesticide users in which air movement carried the pesticide and caused exposure.

In 2007, DPR recorded a total of 370 individuals who reported symptoms evaluated as definitely, probably, or possibly related to exposure to drift (Figure 5) in 160 separate episodes, including the eight episodes that affected 66 field workers. Agricultural pesticide use was found responsible for 22% of the episodes and 49% of the affected people (35 episodes, 180 cases).

Figure 5: Illnesses Associated with Pesticide Drift, 2007[a]



[a] Total drift cases for 2007 = 370.
[b] Handlers include people mixing, loading and applying pesticides, repairing pesticide equipment and flagging for aerial application.
[c] Field Workers are people working in agricultural fields at the time of drift exposure.
[d] Packaging/Processing includes people involved in processing harvested crops.
[e] Routine Indoor includes people in offices and businesses, residential structures, etc. (occupational and non-occupational) who were not handling pesticides.
[f] Routine Outdoor includes people outdoors (occupational and non-occupational) with little expectation of contacting pesticides (e.g., gardeners not handling pesticides, residents).
[g] Other/Unknown – Any other type of activity or unknown activity.

Non-agricultural use accounted for 125 episodes in which 190 people experienced effects evaluated as definitely, probably, or possibly related to airborne pesticide exposure.

The largest drift episode affected 39 workers at a Yolo County tomato cannery. Plant material heavily coated a chlorine-sensing probe in the flume water, so the probe sensed a lack of chlorine. The automated system had increased the chlorine level to 15 times normal by the time the problem was identified. Chlorine drifted through the work area, causing respiratory and eye irritation, with additional symptoms reported in some cases. On that day, supervisors had neglected a protocol that required them to check and clean the sensor. This violated a regulatory requirement that employers inspect pesticide equipment every day before use, and correct any

safety defects. For this violation, the cannery paid a fine of $3,000. Cannery management responded to the lapse by augmenting the protocol to require the probe to be checked and cleaned every 4 hours, and chlorine measurements to be taken and recorded every hour. They also announced plans to install chlorine gas sensors above the flume water.

The next largest drift episode occurred in Monterey County, where vapor escaped from a field fumigated with a mixture of 41.5% chloropicrin and 57% methyl bromide. The application had gone smoothly and had been monitored by a CAC employee who noted no deficiencies. When nearby residents reported eye and respiratory irritation, CAC staff canvassed the affected neighborhood and identified 31 people probably or possibly affected, including two of the investigators. The investigation identified no cause for the problem beyond the fact of performing a fumigation near a residential area.

Overall, drift exposure was evaluated as definitely, probably, or possibly related to health effects reported by 66 field workers, 76 workers processing harvested produce, 46 people engaged in routine indoor activities when exposed, 51 people engaged in routine outdoor activities, 37 people involved in activities not adequately described by any of the defined categories, and 12 people whose activities were not known. Additionally, 82 pesticide handlers were definitely, probably, or possibly affected by airborne exposure to the pesticides they handled. Such exposures are recorded as drift. The affected handlers included five agricultural applicators and 77 non-agricultural pesticide handlers (12 mixer/loaders, 63 applicators, and two people who worked on contaminated equipment).

Light Brown Apple Moth

In an effort to eradicate the Light Brown Apple Moth (LBAM), the California Department of Food and Agriculture made aerial applications of moth mating disruption pheromones in Monterey and Santa Cruz Counties during September, October, and November 2007. Applications occurred on the Monterey Peninsula September 9 - 13 and October 24 - 26, 2007, in the north Santa Cruz area of Santa Cruz County on November 8 and 9, 2007, in the North Salinas/Boronda area of Monterey County on November 9 and 11, 2007, and in the

Prunedale/Royal Oaks area of Monterey County on November 9, 11, and 12, 2007. Hundreds of people registered complaints of health effects attributed to exposure to the pheromone, and medical care providers submitted illness reports for 46.

County agricultural commissioners investigated those 46 cases and submitted reports for evaluation by DPR scientists. In all investigation evaluations, PISP scientists must consider evidence of exposure, evidence of health effects, and any available toxicologic and epidemiologic information on the potential for the given exposure to elicit health effects of the sorts reported.

In cases attributed to the LBAM eradication effort, scientists considered that all people present in the treated areas during the applications incurred very small but real exposures. As in all case abstraction, symptomatology was transcribed verbatim. Respiratory effects were prominent, reported in 38 of the 46 cases. Three cases could not be evaluated because they reported symptoms that did not correspond to spray dates, and investigators could neither confirm nor correct the dates. One person reported pain that developed a month after a short visit to the spray area; this was evaluated as unrelated to exposure.

A collaborative review of toxicity studies on the LBAM pheromone products by scientist from DPR, OEHHA, and CDPH concluded that there is a very low likelihood of health problems from touching, breathing or ingesting any of the pheromone products (CDPH/DPR/OEHHA 2008). DPR scientists' attempt to develop epidemiologic evidence, described below, also failed to provide sufficient evidence to support attribution of symptoms to exposure in the other 42 cases.

Since toxicology results provided little support and no epidemiologic study was available, PISP scientists took the unusual step of attempting to develop epidemiologic evidence of an effect from spray exposure. A report published by the Centers for Disease Control and Prevention (CDC 2008) provided a model for using emergency room reports to identify an increase in health problems. CDC investigators analyzed data from San Diego County for the month of October 2007, when smoke from wildfires polluted the air October 21 – 26. Although some 300,000 people had evacuated, the CDC researchers demonstrated a marked increase, relative to the

period before the fires, in emergency room visits for respiratory conditions during the time the fires burned.

DPR scientists attempted a similar analysis for LBAM health problems: The Office of Statewide Health Planning and Development supplied counts of emergency room contacts at Monterey hospitals for the months of September, October, and November 2007 and for November consultations at Santa Cruz hospitals (OSHPD 2008). Cases were included if they were coded as asthma, other respiratory conditions, or any effect of pesticide exposure. To preserve the patients' anonymity, the data were aggregated into time periods of no less than a week. For each month, cases were reported for the period before spraying, the week spraying occurred, and the remainder of the month.

Scientists could not identify any increase in consultations during the spray periods. On the contrary, at each hospital in or near spray zones, respiratory complaints decreased slightly during the week that the area was sprayed. The few diagnoses of pesticide exposure related only to consultations that occurred before the spraying. So we have no epidemiologic basis for attributing ill health to spray exposure. This does not prove that no one suffered health effects from exposure to the LBAM spray. It remains possible that a few people have exceptional sensitivity to the product used.

Morbidity and Mortality

Among the 665 cases evaluated as definitely or probably related to pesticide exposure, 23 people were admitted to hospitals and 85 lost time from work. Of the 317 possible cases, six reported hospitalization and 40 lost work time. Thirteen of the hospitalized people apparently ingested pesticide intentionally, and one injected himself with pesticide. One child was hospitalized after drinking an insecticide from a bottle his father had collected for recycling. Among the other 14 hospitalizations, seven followed exposures to antimicrobial pesticides, five involved insecticides, and two involved fumigants. CPCS assisted in the transmission of reports on 26 of the 29 hospitalized cases.

DPR and CACs investigated four deaths in 2007. All four resulted from intentional pesticide ingestion, and all were reported via CPCS.

Significance of CPCS Participation

CPCS report facilitation greatly strengthens illness surveillance: CPCS transmits reports more rapidly than other intermediaries, and CPCS identifies qualitatively different exposures from those the program identifies by other means. Table 2 summarizes these characteristics.

Table 2: Characteristics of Report Sources, 2007[a]

	CPCS[b]	Other PIRs[c]	DFROIIs[d]
Median days in transit[e]	2	11	77
Average days in transit	3	23	97
Minimum days in transit	0	1	12
Maximum days in transit	29	206	1517
Non-occupational exposures	319	44	0
Exposures of children age < 10	93	1	1
Hospitalizations	34	1	2
Intentional exposures	36	1	0

[a] Includes all case reports investigated, whether or not evaluated as associated with pesticide exposure.
[b] Cases reported via the California Poison Control System (CPCS)
[c] Cases for which physicians submitted Pesticide Illness Reports independently of CPCS
[d] Cases identified through review of Doctor's First Reports of Occupational Illness or Injury
[e] Days in transit represents the number of days elapsed between exposure and arrival of a report at DPR.

This shows that DPR relies almost entirely on CPCS for information about exposures of children and non-occupational exposures, which account for the majority of hospitalizations and deaths from pesticide exposure. Additionally, prompt notification enables more informative investigations.

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OSHPD 2008. Summary of Emergency Department Encounters with Respiratory or Pesticide-Related Diagnoses from Hospitals in Monterey County, September, October, and November 2007 and from Hospitals in Santa Cruz County in November 2007.

Appendix I: Acronyms

CAC	County Agricultural Commissioner
CDC	Centers for Disease Control and Prevention
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
HIPAA	Health Insurance Portability and Accountability Act
LBAM	Light Brown Apple Moth
NIOSH	National Institute for Occupational Safety and Health
OEHHA	Office of Environmental Health Hazard Assessment
PIR	Pesticide Illness Report
PISP	Pesticide Illness Surveillance Program
SENSOR	Sentinel Event Notification System for Occupational Risk
U.S. EPA	United States Environmental Protection Agency
WHS	Worker Health & Safety Branch

Summary of Illness/Injury Incidents
Reported in California as Potentially Related to Pesticide Exposure
Summarized Statewide and by County of Occurrence[1]
2007

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
TOTALS							
Definite	89	60	15	0	14	10	79
Probable	576	146	263	74	93	195	381
Possible	317	25	92	83	117	113	204
Unlikely	103	2	12	70	19	23	80
Indirect	3	0	0	3	0	0	3
Asymptomatic	77	0	33	38	6	71	6
Unrelated	154	0	0	0	0	0	0
Insufficient	3	0	0	0	0	0	0
Unavailable	157	0	0	0	0	0	0
OVERALL	**1479**	**233**	**415**	**268**	**249**	**412**	**753**
COUNTY[5]							
ALAMEDA							
Definite	2	1	0	0	1	0	2
Probable	19	4	1	2	12	0	19
Possible	9	1	2	2	4	0	9
Unlikely	3	0	0	3	0	0	3
Unrelated	4	0	0	0	0	0	0
Unavailable	6	0	0	0	0	0	0
AMADOR							
Probable	1	1	0	0	0	0	1
Possible	1	0	0	0	1	0	1
BUTTE							
Probable	7	2	3	1	1	1	6
Possible	1	0	0	0	1	0	1
Insufficient	1	0	0	0	0	0	0
CALAVERAS							
Probable	1	1	0	0	0	0	1

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Possible	1	0	0	0	1	0	1
COLUSA							
Possible	1	0	0	0	1	1	0
CONTRA COSTA							
Definite	3	3	0	0	0	0	3
Probable	7	5	1	0	1	0	7
Possible	1	0	0	0	1	0	1
Unavailable	2	0	0	0	0	0	0
DEL NORTE							
Probable	3	2	0	1	0	1	2
Possible	1	0	1	0	0	0	1
Unrelated	1	0	0	0	0	0	0
Unavailable	2	0	0	0	0	0	0
EL DORADO							
Definite	3	1	2	0	0	0	3
Probable	1	0	0	0	1	0	1
Unavailable	1	0	0	0	0	0	0
FRESNO							
Definite	7	5	0	0	2	2	5
Probable	24	7	12	0	5	7	17
Possible	18	2	3	6	7	10	8
Unlikely	3	0	1	2	0	1	2
Asymptomatic	1	0	1	0	0	1	0
Unrelated	10	0	0	0	0	0	0
Unavailable	6	0	0	0	0	0	0
HUMBOLDT							
Probable	1	0	0	1	0	1	0
Possible	2	0	0	0	2	0	2
Unavailable	1	0	0	0	0	0	0
IMPERIAL							
Probable	13	4	7	0	2	8	5
Possible	9	0	5	1	3	6	3
Unlikely	1	0	0	0	1	0	1
Unrelated	1	0	0	0	0	0	0

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Unavailable	1	0	0	0	0	0	0
KERN							
Probable	50	3	24	23	0	32	18
Possible	11	4	0	6	1	9	2
Unlikely	8	1	0	7	0	7	1
Asymptomatic	24	0	0	24	0	24	0
Unrelated	1	0	0	0	0	0	0
Unavailable	3	0	0	0	0	0	0
KINGS							
Probable	4	3	0	0	1	1	3
Possible	2	0	0	1	1	2	0
Unlikely	1	0	0	0	1	1	0
Unavailable	1	0	0	0	0	0	0
LAKE							
Definite	1	0	0	0	1	0	1
Unavailable	1	0	0	0	0	0	0
LASSEN							
Possible	1	0	0	0	1	0	1
LOS ANGELES							
Definite	17	14	1	0	2	0	17
Probable	44	20	8	7	9	1	43
Possible	33	2	10	5	16	4	29
Unlikely	7	0	5	1	1	0	7
Asymptomatic	3	0	0	0	3	0	3
Unrelated	23	0	0	0	0	0	0
Insufficient	1	0	0	0	0	0	0
Unavailable	31	0	0	0	0	0	0
MADERA							
Definite	1	1	0	0	0	0	1
Probable	10	4	5	0	1	6	4
Possible	5	1	2	1	1	0	5
Unlikely	1	0	0	1	0	1	0
Unrelated	2	0	0	0	0	0	0
MARIN							

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Probable	4	2	1	0	1	0	4
Unrelated	1	0	0	0	0	0	0
Unavailable	1	0	0	0	0	0	0
MARIPOSA							
Definite	1	0	0	0	1	0	1
MENDOCINO							
Definite	2	1	1	0	0	0	2
Unrelated	2	0	0	0	0	0	0
Unavailable	2	0	0	0	0	0	0
MERCED							
Definite	4	3	1	0	0	2	2
Probable	8	3	3	0	2	1	7
Possible	6	1	1	0	4	1	5
Unrelated	5	0	0	0	0	0	0
Unavailable	4	0	0	0	0	0	0
MONO							
Possible	1	0	1	0	0	0	1
MONTEREY							
Definite	3	2	1	0	0	3	0
Probable	71	2	67	1	1	68	3
Possible	24	0	16	6	2	22	2
Unlikely	10	0	4	3	3	5	5
Asymptomatic	26	0	26	0	0	26	0
Unrelated	13	0	0	0	0	0	0
Insufficient	1	0	0	0	0	0	0
Unavailable	3	0	0	0	0	0	0
NAPA							
Definite	1	1	0	0	0	0	1
Probable	2	1	0	0	1	0	2
Possible	4	1	1	0	2	2	2
Unrelated	4	0	0	0	0	0	0
NEVADA							
Probable	2	1	1	0	0	0	2
ORANGE							

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Definite	3	3	0	0	0	0	3
Probable	20	8	8	0	4	2	18
Possible	15	2	3	0	10	0	15
Unlikely	3	0	0	3	0	0	3
Asymptomatic	1	0	0	0	1	0	1
Unrelated	7	0	0	0	0	0	0
Unavailable	6	0	0	0	0	0	0
PLACER							
Definite	1	1	0	0	0	0	1
Probable	5	3	1	0	1	0	5
Unrelated	1	0	0	0	0	0	0
Unavailable	4	0	0	0	0	0	0
RIVERSIDE							
Definite	3	2	0	0	1	0	3
Probable	18	8	5	0	5	2	16
Possible	7	1	1	1	4	1	6
Unlikely	1	0	0	1	0	0	1
Unrelated	5	0	0	0	0	0	0
Unavailable	13	0	0	0	0	0	0
SACRAMENTO							
Definite	5	4	1	0	0	0	5
Probable	12	4	5	2	1	0	12
Possible	21	1	2	15	3	1	20
Asymptomatic	1	0	0	0	1	0	1
Unrelated	12	0	0	0	0	0	0
Unavailable	11	0	0	0	0	0	0
SAN BENITO							
Probable	4	0	0	4	0	4	0
Possible	1	0	0	0	1	0	1
SAN BERNARDINO							
Definite	3	2	0	0	1	0	3
Probable	24	10	5	0	9	0	24
Possible	12	2	5	0	5	0	12
Unlikely	1	0	0	0	1	0	1

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Unrelated	4	0	0	0	0	0	0
Unavailable	5	0	0	0	0	0	0
SAN DIEGO							
Definite	8	4	4	0	0	0	8
Probable	38	10	11	13	4	7	31
Possible	26	0	5	11	10	3	23
Unlikely	2	0	0	0	2	0	2
Indirect	3	0	0	3	0	0	3
Unrelated	14	0	0	0	0	0	0
Unavailable	12	0	0	0	0	0	0
SAN FRANCISCO							
Definite	1	0	0	0	1	0	1
Probable	3	2	0	1	0	0	3
Possible	2	0	0	0	2	0	2
Unlikely	1	0	0	1	0	0	1
Unrelated	1	0	0	0	0	0	0
Unavailable	1	0	0	0	0	0	0
SAN JOAQUIN							
Probable	12	1	7	3	1	2	10
Possible	30	3	13	5	9	21	9
Unlikely	1	0	0	1	0	1	0
Asymptomatic	5	0	4	0	1	4	1
Unrelated	3	0	0	0	0	0	0
Unavailable	7	0	0	0	0	0	0
SAN LUIS OBISPO							
Probable	4	1	1	0	2	1	3
Possible	1	0	0	0	1	0	1
Unlikely	1	0	0	1	0	0	1
Unrelated	2	0	0	0	0	0	0
SAN MATEO							
Definite	2	2	0	0	0	0	2
Probable	7	3	1	2	1	0	7
Possible	1	0	0	0	1	1	0
Unlikely	1	0	0	0	1	0	1

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Unrelated	3	0	0	0	0	0	0
Unavailable	2	0	0	0	0	0	0
SANTA BARBARA							
Probable	4	2	0	0	2	2	2
Possible	4	0	2	0	2	3	1
Unlikely	7	0	0	6	1	5	2
Asymptomatic	2	0	0	2	0	2	0
Unrelated	2	0	0	0	0	0	0
Unavailable	5	0	0	0	0	0	0
SANTA CLARA							
Definite	2	2	0	0	0	0	2
Probable	11	6	0	0	5	0	11
Possible	9	1	0	6	2	0	9
Unrelated	6	0	0	0	0	0	0
Unavailable	3	0	0	0	0	0	0
SANTA CRUZ							
Definite	2	2	0	0	0	0	2
Probable	1	1	0	0	0	0	1
Unlikely	39	1	0	35	3	0	39
Unrelated	1	0	0	0	0	0	0
Unavailable	3	0	0	0	0	0	0
SHASTA							
Definite	1	1	0	0	0	0	1
Probable	3	2	0	0	1	0	3
Possible	3	0	0	2	1	0	3
Unavailable	2	0	0	0	0	0	0
SISKIYOU							
Probable	5	0	2	1	2	0	5
Possible	2	0	1	0	1	0	2
SOLANO							
Probable	11	2	3	0	6	0	11
Unrelated	2	0	0	0	0	0	0
Unavailable	3	0	0	0	0	0	0
SONOMA							

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
Probable	8	3	4	0	1	0	8
Possible	4	0	0	1	3	2	2
Unlikely	3	0	0	2	1	1	2
Unrelated	8	0	0	0	0	0	0
Unavailable	4	0	0	0	0	0	0
STANISLAUS							
Definite	2	2	0	0	0	0	2
Probable	22	4	14	0	4	3	19
Possible	11	3	2	2	4	5	6
Unlikely	2	0	1	1	0	0	2
Unrelated	8	0	0	0	0	0	0
Unavailable	2	0	0	0	0	0	0
SUTTER							
Probable	3	2	1	0	0	1	2
Possible	1	0	0	0	1	0	1
Unavailable	1	0	0	0	0	0	0
TULARE							
Definite	5	2	0	0	3	3	2
Probable	43	3	25	11	4	37	6
Possible	25	0	10	10	5	18	7
Unlikely	2	0	1	1	0	1	1
Asymptomatic	14	0	2	12	0	14	0
Unrelated	3	0	0	0	0	0	0
Unavailable	2	0	0	0	0	0	0
TUOLUMNE							
Probable	2	2	0	0	0	0	2
Unlikely	1	0	0	0	1	0	1
VENTURA							
Definite	1	0	0	0	1	0	1
Probable	9	2	5	1	1	6	3
Possible	2	0	1	0	1	1	1
Unlikely	1	0	0	0	1	0	1
Unrelated	4	0	0	0	0	0	0
Unavailable	1	0	0	0	0	0	0

Relationship[2]	TOTAL CASES	Type Of Exposure[3]				Intended Use[4]	
		Direct Contact	Drift	Residue	Other/ Unknown	Agricultural	Non-Agricultural
YOLO							
Definite	5	1	4	0	0	0	5
Probable	34	2	31	0	1	1	33
Possible	8	0	4	2	2	0	8
Unrelated	1	0	0	0	0	0	0
Unavailable	5	0	0	0	0	0	0
YUBA							
Probable	1	0	1	0	0	0	1
Possible	1	0	1	0	0	0	1
Unlikely	3	0	0	1	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.

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

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

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

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."

Unavailable : The available information is inadequate to make an informed judgement on the relationship between pesticide exposure and the reported symptomatology. For submitted investigations, the investigator made an adequate attempt to collect the necessary information, but was not able to do so (e.g., none of the parties concerned could be contacted). There usually needs to be more effort than to say the employee is not available for interview; other parties can often supply useful 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.

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 pyrolitic 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.

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.

Whom to Contact:

California Department of Pesticide Regulation
Worker Health and Safety Branch
Phone: (916) 445-4222.
Physical address: 1001 I St., Sacramento CA 95814-2828.
Mailing address: P.O. Box 4015, Sacramento, CA 95812-4015
Fax: (916) 445-4280
www.cdpr.ca.gov

About the Pesticide Illness Surveillance Program Data

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

Cases Reported in California[1] with Documented[2] Pesticide Exposure Summarized by the Type of Illness and the Type of Pesticides 2007

Type of Illness[3]	Antimicrobials[4]		Cholinesterase Inhibitors[4]		Other Pesticides[4]		Total
	Occupational[5]	Non-Occupational[5]	Occupational[5]	Non-Occupational[5]	Occupational[5]	Non-Occupational[5]	
Systemic							
Systemic with Respiratory and Topical Effects	44	2	13	8	43	19	**129**
Systemic with Respiratory Effects	30	14	13	11	37	40	**146**
Systemic with Topical Effects	16	1	13	3	20	11	**64**
Systemic Only	17	15	38	10	52	59	**191**
Respiratory							
Respiratory with Topical Effects	14	6	3	0	13	14	**51**
Respiratory Only	36	22	3	2	9	21	**93**
Topical							
Eye Only	113	9	1	4	26	48	**202**
Skin Only	35	0	6	1	30	16	**88**
Eye and Skin	9	0	0	1	6	2	**18**
Asymptomatic							
Asymptomatic	0	1	15	0	33	28	**77**
TOTAL	**314**	**70**	**105**	**40**	**269**	**258**	**1059**

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

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

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

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

Possible : 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, skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.

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

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

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

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

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

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

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

[5] **Occupational or Non-Occupational:** The relationship between the illness/injury and the individual's work. This summary includes three cases in which the activity could not be determined as occupational or non-occupational.

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

Whom to Contact:

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About the Pesticide Illness Surveillance Program Data

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

Illnesses and Injuries Reported in California[1] Associated With[2] Pesticide Exposure Summarized by the Type of Activity and Type of Exposure 2007

Occupational[3]

Type of Activity[4]	Type of Exposure[5]								
	Drift	**Residue**	**Direct Spray/ Squirt**	**Spill/ Other Direct**	**Ingestion**	**Multiple**	**Other**	**Unknown**	**Total**
Mixer/Loader	9	0	6	19	1	0	1	3	39
Applicator	29	1	22	72	0	6	6	35	171
Mechanical	1	0	3	6	0	0	3	0	13
Packaging/Processing	76	24	0	4	0	0	0	1	105
Field Worker	66	58	0	0	1	0	0	1	126
Routine Indoor	21	26	1	3	2	2	2	3	61
Routine Outdoor	20	4	1	1	0	0	1	0	27
Transport/Storage/Disposal	0	0	0	11	0	1	2	3	17
Emergency Response	0	2	0	0	0	0	1	0	3
Other	23	8	4	17	1	2	16	5	76
Unknown	0	0	0	1	0	0	0	1	2
Total Occupational Cases	***245***	***123***	***37***	***134***	***5***	***11***	***32***	***52***	***640***

Non-Occupational[3]

Type of Activity[4]	Type of Exposure[5]								
	Drift	**Residue**	**Direct Spray/ Squirt**	**Spill/ Other Direct**	**Ingestion**	**Multiple**	**Other**	**Unknown**	**Total**
Mixer/Loader	3	0	0	0	0	0	1	0	4
Applicator	39	0	14	16	2	2	4	11	88
Mechanical	1	0	1	1	0	0	0	0	3
Routine Indoor	25	27	7	5	25	4	5	2	100
Routine Outdoor	29	3	5	1	10	0	1	1	50
Transport/Storage/Disposal	0	0	0	1	0	0	0	0	1
Other	14	4	1	7	34	12	2	2	76
Unknown	12	0	0	0	2	1	1	1	17
Total Non-Occupational Cases	***123***	***34***	***28***	***31***	***73***	***19***	***14***	***17***	***339***
Total Occupational/ Non-Occupational	**370**	**157**	**66**	**165**	**78**	**30**	**46**	**69**	**982**

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

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

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

[3] **Occupational Status:** Occupational or Non-Occupational. This summary includes three cases in which the activity could not be determined as occupational or non-occupational.

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

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

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

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

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

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

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

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

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

Routine Indoor	:	Conducts activities in an indoor environment with minimal expectation for exposure to pesticides. This includes people in offices and businesses, residential structures, etc. who are not handling pesticides.
Routine Outdoor	:	Conducts activities in an outdoor environment with minimal expectation for exposure to pesticides. This excludes field workers in agricultural fields. This includes gardeners who are not handling pesticides.
Manufacturing and Formulation	:	Manufactures, processes or packages pesticides. This includes "mixing" if it is done in a plant for application elsewhere.
Transport/ Storage/ Disposal	:	Transports or stores pesticides between packaging and preparation for use. This includes shipping, warehousing and retailing as well as storage by the end-user prior to preparation for use. Disposal of unused pesticides is also included in this activity. This excludes driving a nurse rig to an application site.
Emergency Response	:	Emergency Response Personnel (Police, fire, ambulance and HAZMAT personnel) responding to a fire, spill, accident or any other pesticide incident in the line of duty.
Other	:	Activity is not adequately described by any other activity category. This includes but is not limited to: 1) being inside a vehicle; 2) dog groomers not handling pesticides; 3) individuals handling pesticide treated wood; 4) two or more activities with potential for pesticide exposure.
Unknown	:	Activity is not known

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

Drift	:	Spray, mist, fumes, or odor carried from the target site by air. Drift must be related to an application or mix/load activity.
Residue	:	The part of a pesticide that remains in the environment for a period of time following an application or drift. This includes odor after the completion of an application.
Direct Spray/Squirt	:	Material propelled by the application or mix/load equipment. Contact with the material can be by direct projection or ricochet. This includes exposure of mechanics working on application or mix/load equipment when the material is forced out by pressure.
Spill/Other Direct	:	Any of the following: 1) Contact made during an application or mixing/loading operation where the material is not propelled by the equipment; 2) Expected direct contact during use (e.g. washing dishes in a disinfectant solution); 3) Leaks, spills, etc.

not related to an application.

Ingestion	:	Intentional or unintentional oral ingestion.
Multiple	:	Contact with pesticides occurred through two or more mechanisms.
Other	:	Other known route of exposure not included in other exposure categories. This includes, but not limited to: 1) Residue from a spill and 2) Exposure to smoke or pyrolitic products from a fire where pesticides are burning.
Unknown	:	Route of exposure is not known.

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Illnesses and Injuries Reported by California Physicians[1] Associated With[2] Pesticide Exposure Summarized by Pesticide(s) and Type of Illness 2007

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Organophosphates						
Bensulide	2	0	0	0	2	0
Chlorpyrifos	29	5	0	0	29	5
Diazinon	2	2	1	0	3	2
Dimethoate	0	0	1	0	1	0
Malathion	14	8	1	0	15	8
Phorate	0	1	0	0	0	1
N-Methyl Carbamates						
Carbaryl	2	1	0	0	2	1
Methomyl	1	0	0	0	1	0
Propoxur	0	1	1	0	1	1
Pyrethrins and Pyrethroids						
Allethrin	0	1	0	0	0	1
Bifenthrin	4	4	2	1	6	5
Cyfluthrin	2	1	0	0	2	1
Cyhalothrin	0	1	1	0	1	1
Cypermethrin	11	4	0	0	11	4
Deltamethrin	0	1	0	0	0	1
Esfenvalerate	0	1	1	0	1	1
Fluvalinate	0	0	0	1	0	1
Lambda-Cyhalothrin	4	2	3	1	7	3
Permethrin	3	2	0	3	3	5
Tetramethrin	1	0	0	0	1	0
Other Pesticides						
1,3-Dichloropropene	2	1	0	0	2	1
Acrolein	2	0	0	0	2	0
Aluminum Phosphide	1	0	0	0	1	0
Arsenic Trioxide	1	0	0	0	1	0
Beta-Cyfluthrin	1	0	1	0	2	0
Boric Acid	0	7	1	0	1	7
Brodifacoum	2	1	0	0	2	1
Calcium Hypochlorite	5	2	4	2	9	4
Chlorine	12	0	3	1	15	1
Chlorine Dioxide	1	0	0	0	1	0

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Chlorothalonil	0	1	0	0	0	1
Clove Oil	0	0	2	0	2	0
Copper Naphthenate	3	6	0	1	3	7
Copper Sulfate	2	0	0	0	2	0
Creosote	0	0	0	1	0	1
Cyanuric Acid	11	1	3	1	14	2
Deet	2	1	3	1	5	2
Dichlobenil	0	0	1	0	1	0
Dicloran	0	0	0	1	0	1
Dinotefuran	0	1	0	0	0	1
Diphacinone	0	2	0	0	0	2
Diquat	0	0	1	0	1	0
Disodium Octaborate Tetrahydrate	0	0	1	0	1	0
Eptc	1	0	0	0	1	0
Fipronil	0	2	1	0	1	2
Fludioxonil	1	0	0	0	1	0
Glutaraldehyde	15	5	4	1	19	6
Glyphosate	3	4	4	6	7	10
Halogenated Hydantoins	1	0	0	0	1	0
Hydrogen Chloride	4	0	2	0	6	0
Indole-3-butyric Acid	0	0	1	0	1	0
Iprodione	0	0	1	0	1	0
Isothiazoline Disinfectants	0	0	1	0	1	0
Lime-sulfur	1	0	1	0	2	0
Metaldehyde	2	2	2	0	4	2
Metam-potassium	0	0	1	2	1	2
Metam-sodium	9	0	8	0	17	0
Methyl Bromide	0	0	1	1	1	1
None	0	1	0	0	0	1
Oxyfluorfen	1	1	0	0	1	1
Ozone	0	1	0	0	0	1
Paraquat	0	1	0	0	0	1
Pendimethalin	0	0	0	1	0	1
Peroxyacetic Acid	0	0	1	0	1	0
Phenolic Disinfectants	0	0	1	2	1	2
Phosphine	21	2	1	0	22	2
Phosphoric Acid	0	0	1	0	1	0
Pine Oil	6	5	1	0	7	5
Propargite	2	13	2	0	4	13

Pesticide[3]	Systemic/ Respiratory[4]		Topical[4]		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Quaternary Ammonia	6	4	42	5	48	9
Silica Aerogel	1	0	0	0	1	0
Sodium Bisulfite	0	1	0	0	0	1
Sodium Chlorite	36	4	1	0	37	4
Sodium Hypochlorite	49	12	52	7	101	19
Spinosad	0	0	1	0	1	0
Strychnine	0	1	0	0	0	1
Sulfur	1	1	1	6	2	7
Sulfur Dioxide	0	0	0	1	0	1
Sulfuryl Fluoride	4	3	0	0	4	3
Thiram	1	0	0	0	1	0
Trichloromelamine	1	0	0	0	1	0
Zinc Phosphide	3	1	0	0	3	1
Combinations of Antimicrobials	16	5	21	7	37	12
Combinations of Fumigants	19	14	16	0	35	14
Combinations of Fungicides	1	2	0	2	1	4
Combinations of Herbicides	3	5	1	2	4	7
Combinations of Insecticides Including ChE Inhibitor(s)	13	8	0	2	13	10
Combinations of Insecticides Without ChE Inhibitor(s)	26	42	12	4	38	46
Miscellaneous Combinations	52	23	8	10	60	33
Unknown Antimicrobials	7	0	2	0	9	0
Unknown Insecticides	9	13	6	5	15	18
Unknown Pesticides	1	4	1	1	2	5
TOTAL	**436**	**238**	**229**	**79**	**665**	**317**

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

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

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

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

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

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Summary of Cases Reported by California[1] as Associated With[2] Pesticide Exposure Summarized by Occupational Status and by Location of the Incident 2007

Incident Setting[3]	Occupational Exposures[4]		Non-Occupational Exposures[4]		TOTAL	TOTAL
	Definite/ Probable[2]	Possible[2]	Definite/ Probable[2]	Possible[2]	Definite/ Probable[2]	Possible[2]
Farm	86	67	2	0	**88**	**67**
Nursery	18	7	0	0	**18**	**7**
Livestock Production Facility	1	0	0	0	**1**	**0**
Crop/Livestock Processing Facility	116	20	0	0	**116**	**20**
Animal Premise (Veterinary Hospital, Kennels, not Livestock)	9	1	0	0	**9**	**1**
Single Family Home	6	7	136	70	**142**	**77**
Multi-unit Housing	3	2	26	18	**29**	**20**
Labor Housing	0	0	0	0	**1**	**0**
Residential Institution	9	2	0	5	**9**	**7**
School	19	5	0	1	**19**	**6**
Prison	2	2	3	0	**5**	**2**
Hospital/Medical	51	9	1	0	**52**	**9**
Pesticide Manufacturing Facility	1	1	0	0	**1**	**1**
Industrial or Other Manufacturing Facility	18	3	0	0	**18**	**3**
Office/Business	11	15	0	0	**11**	**15**
Retail Establishment	15	9	0	1	**15**	**10**
Service Establishment	47	13	0	1	**47**	**14**
Wholesale Establishment	2	3	0	0	**2**	**3**
Road/Rail Or Utility Right Of Way	9	7	4	0	**13**	**7**
Park	1	0	4	0	**5**	**0**
Golf Course	1	1	0	0	**1**	**1**
Landscape, Lawn	1	0	2	2	**3**	**2**
Landscape, Other	1	3	10	2	**11**	**5**
Other (Telephone Poles, Fences, Etc)	21	6	1	1	**22**	**7**
Unknown	5	4	21	28	**27**	**33**

Incident Setting[3]	Occupational Exposures[4]		Non-Occupational Exposures[4]		TOTAL	TOTAL
	Definite/ Probable[2]	Possible[2]	Definite/ Probable[2]	Possible[2]	Definite/ Probable[2]	Possible[2]
TOTAL	**453**	**187**	**210**	**129**	**665**	**317**

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

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

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

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

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

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

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

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

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

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

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 the following locations: 1) road/rail or utility right-of-ways; 2) parks; and 3) golf courses.
Landscape, Other	: Landscaped ornamental shrub and tree areas. This excludes ornamental shrub and tree areas in the following locations: 1) road/rail or utility right-of-ways; 2) parks; and 3) golf courses.
Other	: Location of exposure occurred at a site not adequately described in any other incident setting category. This includes, but is not limited to, telephone poles, fences, water supply systems and wastewater treatment plants.
Unknown	: The location of the incident is unknown.

[4] **Occupational Status:** Occupational or Non-Occupational. This summary includes three cases in which the activity could not be determined as occupational or non-occupational.

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

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Summary of Cases Reported in California[1] as Associated With[2] Pesticide Exposure Summarized by Gender, Age Distribution, by Type of Pesticide and by Type of Use
2007

Agricultural Use Pesticide Exposure Incidents[3]

Age Group	Pesticides other than Antimicrobial Pesticides[4]			Antimicrobial Pesticides[4]			TOTAL
	Male	Female	Unknown	Male	Female	Unknown	
0 - 9	3	9	0	0	0	0	**12**
10 - 14	1	3	0	0	0	0	**4**
15 - 19	8	10	0	0	0	0	**18**
20 - 29	45	21	0	3	1	0	**70**
30 - 39	38	36	0	2	4	0	**80**
40 - 49	26	16	0	0	0	0	**42**
50 - 59	17	14	0	0	0	0	**31**
60 - 69	7	4	0	1	0	0	**12**
70 +	1	0	0	0	0	0	**1**
Unknown	22	19	7	0	0	0	**48**
TOTAL	**168**	**132**	**7**	**6**	**5**	**0**	**318**

Non-Agricultural Use Pesticide Exposure Incidents

Age Group	Pesticides other than Antimicrobial Pesticides			Antimicrobial Pesticides			TOTAL
	Male	Female	Unknown	Male	Female	Unknown	
0 - 9	26	18	0	8	12	0	**64**
10 - 14	5	3	0	2	1	0	**11**
15 - 19	4	7	0	8	12	0	**31**
20 - 29	23	9	0	29	31	0	**92**
30 - 39	20	14	0	25	46	0	**105**
40 - 49	29	28	0	42	61	0	**160**
50 - 59	29	23	0	30	43	0	**125**
60 - 69	7	11	0	7	9	0	**34**
70 +	9	12	0	0	1	0	**22**
Unknown	5	8	2	1	4	0	**20**
TOTAL	**157**	**133**	**2**	**152**	**220**	**0**	**664**

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

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

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

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

Possible : 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 suspected pesticide(s) is 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 (bacteria, viruses, etc.).

Whom to Contact:

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About the Pesticide Illness Surveillance Program Data

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

Illnesses and Injuries of Application Workers Reported by California Physicians[1] Associated With[2] Pesticide Exposure Summarized by the Type of Equipment, Type of Activity and Occupational Status 2007

Occupational[3]

Type of Equipment[4]	Type of Activity[5]				
	Mixer/ Loader	Applicator	Flagger	Mechanic	Total
Fixed Wing Aircraft	1	0	0	0	**1**
Ground, Other or Unspecified	1	4	0	4	**9**
Ground Boom, Other or Unspecified	0	3	0	0	**3**
Ground, Boom Below/Behind	0	2	0	1	**3**
Airblast Sprayers	1	4	0	0	**5**
Power Dusters	0	2	0	0	**2**
Shank Injection without Tarps	0	1	0	0	**1**
Shank Injection with Tarps	0	1	0	0	**1**
Hand, Other or Unspecified	1	10	0	0	**11**
Pressurized Hose-line Sprayers	0	15	0	0	**15**
Hand Pump Sprayer	1	2	0	1	**4**
Back Pack Sprayer	1	6	0	0	**7**
Unpressurized Hand-held Spray Equipment	2	15	0	0	**17**
Aerosol Can	0	3	0	0	**3**
Foggers	0	1	0	0	**1**
Chamber	1	2	0	1	**4**
Automatic Equipment, Other or Unspecified	4	3	0	1	**8**
Automatic Equipment, Chlorinators	5	6	0	4	**15**
Sprinkler Irrigation Equipment	0	2	0	0	**2**
Manual Application Methods, Other or Unspecified	3	10	0	0	**13**
Immersion Equipment	6	18	0	0	**24**
Implements with Handles	3	8	0	0	**11**

Occupational[3]

Type of Equipment[4]	Type of Activity[5]				
	Mixer/ Loader	**Applicator**	**Flagger**	**Mechanic**	**Total**
Implements without Handles	1	19	0	0	**20**
Manual Placement	1	11	0	0	**12**
Not Applicable	0	0	0	1	**1**
Other	1	1	0	0	**2**
Unknown	6	22	0	0	**28**
Total Occupational Cases	**39**	**171**	**0**	**13**	**223**

Non-Occupational[3]

Type of Equipment[4]	Type of Activity[5]				
	Mixer/ Loader	**Applicator**	**Flagger**	**Mechanic**	**Total**
Hand, Other or Unspecified	0	11	0	0	**11**
Hand Pump Sprayer	0	9	0	1	**10**
Back Pack Sprayer	0	1	0	0	**1**
Unpressurized Hand-held Spray Equipment	0	11	0	0	**11**
Aerosol Can	0	16	0	0	**16**
Foggers	0	4	0	0	**4**
Automatic Equipment, Chlorinators	1	1	0	1	**3**
Manual Application Methods, Other or Unspecified	1	4	0	0	**5**
Implements with Handles	0	4	0	0	**4**
Manual Placement	1	17	0	1	**19**
Unknown	1	10	0	0	**11**
Total Non-Occupational Cases	**4**	**88**	**0**	**3**	**95**
Total Occupational and Non-Occupational Cases	**43**	**260**	**0**	**16**	**319**

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

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

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

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

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

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

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

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

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

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

[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 bottles (usually plastic) with built-in finger triggers.

Hand-Held Spray Equipment		
Aerosol Can	:	Disposable pressurized cans designed for intermittent use. The pesticide is propelled out of the can by an inert compressed gas propellant. This excludes foggers.
Foggers	:	Disposable pressurized cans designed for the total release of the contents in a single use. The pesticide is propelled out of the can by an inert compressed gas propellant.
Aerosol/Fog Generating Equipment	:	Refillable application equipment designed to disperse pesticide as a small airborne droplet, either in confined spaces or outdoor areas. These include truck-mounted equipment for outdoor use, hand-carried portable units and wall mounted electric units that are found in dairies, restaurants, etc.
Hand, Other Or Unspecified	:	Hand-held application equipment, other or unspecified. The equipment must propel the pesticide from a reservoir. This includes 1) hose-end sprayers, and 2) two or more types of hand-held application equipment. This excludes hand-held equipment already specified above.
Chamber	:	An enclosed, sealed chamber designed specifically for fumigating or sterilizing the contents of the chamber.
Tarp	:	Tarp placed over a commodity or structure and designed to restrict a fumigant to the application site.
Automatic Equipment, Chlorinators	:	Chlorination units that automatically inject chlorine into water for disinfection purposes. This includes chlorinators for swimming pools, packing houses and food processing plants.
Drip Irrigation Equipment	:	Chemigation through drip irrigation equipment.
Sprinkler Irrigation Equipment	:	Chemigation through sprinkler irrigation equipment.
Automatic Equipment, Other Or Unspecified	:	Equipment that automatically injects the pesticide to the target area. This includes equipment attached to milking machinery, dishwashers, etc. This excludes equipment already described above.
Immersion Equipment	:	Tanks, trays, sinks, etc. used for the dipping of animals, produce, bulbs, medical equipment, dishes, pots and pans, etc.
Implements With Handles	:	Mops, brushes, and other implements with handles.
Implements Without Handles	:	Cloths, towels, rags, sponges and other implements without handles.
Manual Placement	:	Manual placement of a pesticide directly to a target site. This includes bait stations, hand tossed pellets, and direct pouring of a pesticide onto a target surface from a container (such as pouring liquid chlorine directly into swimming pool water). This excludes the placement of fumigation pellet packs in chambers and under tarps.
Manual Application Methods, Other Or Unspecified	:	Manual application methods, other or unspecified. The pesticide is not propelled by any type of equipment. This includes two or more types of manual application methods. This excludes manual application method already described above.

Other	:	Any application methodology not described above. This includes two or more types of application equipment not elsewhere specified.
Unknown	:	The type of application equipment is not known.
Not Applicable	:	No application equipment is involved.

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About the Pesticide Illness Surveillance Program Data

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

Hospitalization and Disability Associated with Illnesses/Injuries *Definitely or Probably Related* to Pesticide Exposure in California[1,2], Summarized by Occupational Status and Activity 2007

Occupational[3]

Activity[4]	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[5]	No. Cases	%	Unknown[6]
Mixer/Loader	36	0	0	0	10	27.8	1
Applicator	121	1	0.8	0	15	12.4	2
Mechanical	12	0	0	0	4	33.3	0
Packaging/Processing	93	2	2.2	3	5	5.4	12
Field Worker	76	0	0	0	15	19.7	1
Routine Indoor	36	0	0	1	6	16.7	3
Routine Outdoor	15	0	0	0	2	13.3	0
Transport/Storage/Disposal	10	0	0	1	2	20	0
Other	53	0	0	1	8	15.1	3
Unknown	1	0	0	0	1	100	0
Total Occupational	**453**	**3**	**0.7**	**6**	**68**	**15**	**22**

Non- Occupational[3]

Activity[4]	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[5]	No. Cases	%	Unknown[6]
Mixer/Loader	4	1	25	0	1	25	1
Applicator	62	1	1.6	1	3	4.8	15
Mechanical	3	0	0	0	0	0	0
Routine Indoor	51	3	5.9	0	2	3.9	3
Routine Outdoor	37	0	0	0	2	5.4	2
Transport/Storage/Disposal	1	0	0	0	0	0	0
Other	47	15	31.9	1	9	19.1	10
Unknown	5	0	0	0	0	0	4
Total Non-Occupational	**210**	**20**	**9.5**	**2**	**17**	**8.1**	**35**
TOTAL CASES	**665**	**23**	**3.5**	**8**	**85**	**12.8**	**57**

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

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

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

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

[3] **Occupational Status:** Occupational or Non-Occupational. This summary includes two cases in which the activity could not be determined as occupational or non-occupational.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Hospitalization and Disability Associated with Illnesses/Injuries *Possibly Related* to Pesticide Exposure in California[1,2], Summarized by Occupational Status and Activity 2007

Occupational[3]

Activity[4]	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[5]	No. Cases	%	Unknown[6]
Mixer/Loader	3	0	0	0	0	0	0
Applicator	50	1	2	0	11	22	2
Mechanical	1	0	0	0	0	0	0
Packaging/Processing	12	0	0	0	1	8.3	1
Field Worker	50	0	0	0	12	24	1
Routine Indoor	25	0	0	1	5	20	4
Routine Outdoor	12	0	0	0	1	8.3	0
Transport/Storage/Disposal	7	0	0	0	0	0	0
Emergency Response	3	0	0	0	0	0	3
Other	23	0	0	0	7	30.4	2
Unknown	1	0	0	1	0	0	1
Total Occupational	**187**	**1**	**0.5**	**2**	**37**	**19.8**	**14**

Non- Occupational[3]

Activity	Total Cases	Hospitalization			Disability		
		No. Cases	%	Unknown[5]	No. Cases	%	Unknown[6]
Applicator	26	1	3.8	0	1	3.8	3
Routine Indoor	49	1	2	2	1	2	12
Routine Outdoor	13	0	0	0	0	0	0
Other	29	3	10.3	0	1	3.4	14
Unknown	12	0	0	0	0	0	8
Total Non-Occupational	**129**	**5**	**3.9**	**2**	**3**	**2.3**	**37**
Total Cases	**317**	**6**	**1.9**	**4**	**40**	**12.6**	**51**

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

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

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

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

Other	:	Activity is not adequately described by any other activity category. This includes but is not limited to: 1) being inside a vehicle; 2) dog groomers not handling pesticides; 3) individuals handling pesticide treated wood; 4) two or more activities with potential for pesticide exposure.
Unknown	:	Activity is not known

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

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

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Agricultural Drift Cases Reported in California[1] Associated With[2] Pesticide Exposure Summarized by Application Sites 2007

Application Site[3]	Number of Cases[4]	Number of Incidents[5]
BERRIES		
Strawberries	18	1
FIBER CROP		
Cotton	2	2
FORAGE CROP		
Alfalfa	5	1
GRAIN		
Corn	15	2
Rice	1	1
GRAPES		
Grapes	3	1
LEAFY/STEM VEGETABLE		
Lettuce	5	4
LIVESTOCK		
Dairy Animals	1	1
NON-CROP		
Soil	77	7
Uncultivated Agricultural Areas (Other or Unspecified)	1	1
Uncultivated Non-agricultural Areas	1	1
NUT TREES		
Almonds	33	5
OTHER FRUIT		
Avocados	1	1
ROOT CROP VEGETABLE		
Carrots	1	1
STONE FRUIT		
Nectarines	1	1
Plums	7	1
SUGAR CROP		
Sugarbeets	1	1
TREES		

Application Site[3]	Number of Cases[4]	Number of Incidents[5]
Ornamental and/or Shade Trees	6	2
TURF		
Ornamental Sod Farm (Turf)	1	1
TOTAL	**180**	**35**

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

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

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

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

Possible : 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] **Cases by Incidents:** Indicates the number of individuals exposed in one incident of agricultural drift.

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

Whom to Contact:

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Agricultural Drift Cases[1] Reported by California Physicians as Associated With[2] Pesticide Exposure Summarized by the Activity of the Exposed Person and by the Type of Application Equipment Used
2007

Type of Application Equipment Used [3]	Type of Activity [4]				TOTAL
	Routine Indoor	Routine Outdoor	Field Worker	Other	
Fixed Wing Aircraft	0	5	0	3	**8**
Helicopter	0	1	16	2	**19**
Ground, Other or Unspecified	0	2	2	0	**4**
Ground Boom, Other or Unspecified	0	0	0	1	**1**
Ground, Boom Below/Behind	0	0	18	16	**34**
Airblast Sprayers	2	8	26	1	**37**
Shank Injection without Tarps	0	10	0	1	**11**
Shank Injection with Tarps	16	16	0	14	**46**
Hand, Other or Unspecified	3	0	0	2	**5**
Pressurized Hose-line Sprayers	0	0	4	1	**5**
Hand Pump Sprayer	0	0	0	1	**1**
Back Pack Sprayer	0	0	0	1	**1**
Drip Irrigation Equipment	0	0	0	1	**1**
Sprinkler Irrigation Equipment	0	0	0	7	**7**
TOTAL	**21**	**42**	**66**	**51**	**180**

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

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

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

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

Possible : 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.

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 equipment
Ground Boom, Other Or Unspecified	:	Ground application equipment with a spray boom. The following are excluded: 1) Ground Boom Below/Behind, 2) Over-The-Vine Boom, and 3) Electrostatic Sprayer.
Ground Boom Below/Behind	:	Ground application equipment with a spray boom located below or behind the equipment operator with the spray nozzles pointed downward.
Pressurized Hose-Line Sprayers	:	Hand-held spray equipment attached by a long hose to a power-pressurized tank. This excludes hose-end sprayers, which are classified under hand, other or unspecified.
Hand Pump Sprayer	:	Hand-held compressed air sprayer with small volume tanks (1 to 5 gallons). This excludes backpack sprayers.
Hand-Held Dusters	:	Hand-held application equipment for granules or dust. This includes belly grinders, bellows, squeeze bulbs, etc.
Back Pack Sprayer	:	Compressed air sprayer where the tank is worn on the back of the applicator.
Unpressurized Hand-Held Spray Equipment	:	Hand-held spray bottles (usually plastic) with built-in finger triggers.
Aerosol Can	:	Disposable pressurized cans designed for intermittent use. The pesticide is propelled out of the can by an inert compressed gas propellant. This excludes foggers.
Foggers	:	Disposable pressurized cans designed for the total release of the contents in a single use. The pesticide is propelled out of the can by an inert compressed gas propellant.

Aerosol/Fog Generating Equipment	: Refillable application equipment designed to disperse pesticide as a small airborne droplet, either in confined spaces or outdoor areas. These include truck-mounted equipment for outdoor use, hand-carried portable units and wall mounted electric units that are found in dairies, restaurants, etc.
Hand, Other Or Unspecified	: Hand-held application equipment, other or unspecified. The equipment must propel the pesticide from a reservoir. This includes 1) hose-end sprayers, and 2) two or more types of hand-held application equipment. This excludes hand-held equipment already specified above.
Chamber	: An enclosed, sealed chamber designed specifically for fumigating or sterilizing the contents of the chamber.
Tarp	: Tarp placed over a commodity or structure and designed to restrict a fumigant to the application site.
Automatic Equipment, Chlorinators	: Chlorination units that automatically inject chlorine into water for disinfection purposes. This includes chlorinators for swimming pools, packing houses and food processing plants.
Drip Irrigation Equipment	: Chemigation through drip irrigation equipment.
Sprinkler Irrigation Equipment	: Chemigation through sprinkler irrigation equipment.
Automatic Equipment, Other Or Unspecified	: Equipment that automatically injects the pesticide to the target area. This includes equipment attached to milking machinery, dishwashers, etc. This excludes equipment already described above.
Immersion Equipment	: Tanks, trays, sinks, etc. used for the dipping of animals, produce, bulbs, medical equipment, dishes, pots and pans, etc.
Implements With Handles	: Mops, brushes, and other implements with handles.
Implements Without Handles	: Cloths, towels, rags, sponges and other implements without handles.
Manual Placement	: Manual placement of a pesticide directly to a target site. This includes bait stations, hand tossed pellets, and direct pouring of a pesticide onto a target surface from a container (such as pouring liquid chlorine directly into swimming pool water). This excludes the placement of fumigation pellet packs in chambers and under tarps.
Manual Application Methods, Other Or Unspecified	: Manual application methods, other or unspecified. The pesticide is not propelled by any type of equipment. This includes two or more types of manual application methods. This excludes manual application method already described above.
Other	: Any application methodology not described above. This includes two or more types of application equipment not elsewhere specified.
Unknown	: The type of application equipment is not known.

[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.

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Illnesses and Injuries in California[1] Associated With Pesticide Residue in Agricultural Fields, 1982-2007

Year	Systemic/ Respiratory[2]		Topical[2]		TOTAL
	Definite/ Probable[3]	Possible[3]	Definite/ Probable[3]	Possible[3]	
1982	23	43	48	117	**231**
1983	19	29	41	96	**185**
1984	8	9	49	112	**178**
1985	25	24	156	164	**370**
1986	30	14	155	60	**259**
1987	58	83	52	180	**375**
1988	57	37	74	202	**370**
1989	17	22	30	93	**162**
1990	3	32	11	119	**165**
1991	16	38	7	87	**148**
1992	11	57	19	112	**199**
1993	10	38	2	67	**117**
1994	33	31	5	42	**111**
1995	20	48	74	89	**231**
1996	29	37	15	60	**141**
1997	83	44	20	62	**209**
1998	40	19	5	47	**111**
1999	23	17	0	42	**82**
2000	21	30	2	22	**75**
2001	7	22	0	17	**46**
2002	30	23	13	12	**78**
2003	4	17	4	33	**58**
2004	15	27	1	25	**68**
2005	1	9	2	16	**28**
2006	1	9	2	13	**25**
2007	24	15	1	18	**58**
Total	**608**	**774**	**788**	**1907**	**4080**

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

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

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

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

Definite	:	High degree of correlation between pattern of exposure and resulting symptomatology. Requires both medical evidence (such as measured cholinesterase inhibition, positive allergy tests, characteristic signs observed by medical professional) and physical evidence of exposure (environmental and/or biological samples, exposure history) to support the conclusions.
Probable	:	Relatively high degree of correlation exists between the pattern of exposure and the resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
Possible	:	Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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Incidents Involving *Field Workers* Reported in California[1] Associated With[2] Pesticide Residue Exposure Summarized by Crop and Type of Illness
2007

Crop	Systemic/ Respiratory[3]		Topical[3]		TOTAL
	Definite/ Probable	Possible	Definite/ Probable	Possible	
CITRUS					
Oranges	10	6	0	1	17
CUCURBITS					
Cantaloupes	0	0	0	1	1
FRUITING VEGETABLE					
Tomatoes	0	1	0	2	3
GRAIN					
Corn	0	0	0	1	1
GRAPES					
Grapes	0	4	1	7	12
LEAFY/STEM VEGETABLE					
Brussels Sprouts	1	0	0	0	1
Celery	0	2	0	0	2
Celery, Lettuce	4	0	0	0	4
Lettuce	0	1	0	1	2
MULTIPLE					
Ornamental Plants (Other or Unspecified), Uncultivated Agricultural Areas (Other or Unspecified)	0	0	0	1	1
ORNAMENTAL					
House Plants	0	0	0	1	1
Ornamental Bulb, Corm, Rhizome Plants	2	0	0	0	2
Ornamental Plants (Other or Unspecified)	7	0	0	0	7
OTHER VEGETABLE					
Onions (Dry)	0	0	0	1	1
SEED/POD VEGETABLE					
Peas	0	0	0	2	2

STONE FRUIT					
Peaches	0	1	0	0	1
TOTAL	**24**	**15**	**1**	**18**	**58**

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

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

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

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

Possible : 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 or skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.

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

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

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Pesticide-Associated Illnesses and Injuries Reported In California Schools[1, 2] by Exposure Category, Pesticide Type and Illness Symptoms 2007

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	3	1	3	0	0	0	**7**
Residue	1	0	1	0	0	0	**2**
Direct Spray/Squirt	0	0	1	3	0	1	**5**
Spill/Other Direct	1	0	0	6	0	0	**7**
Ingestion	0	0	0	1	0	0	**1**
Other	2	0	0	0	0	0	**2**
Unknown	0	0	0	0	0	1	**1**
TOTAL	**7**	**1**	**5**	**10**	**0**	**2**	**25**

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

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

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

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

Possible : Health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

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

Drift	: Spray, mist, fumes, or odor carried from the target site by air. Drift must be related to an application or mix/load activity.
Residue	: The part of a pesticide that remains in the environment for a period of time following an application or drift. This includes odor after the completion of an application.
Direct Spray/Squirt	: Material propelled by the application or mix/load equipment. Contact with the material can be by direct projection or ricochet. This includes exposure of mechanics working on application or mix/load equipment when the material is forced out by pressure.
Spill/Other Direct	: Any of the following: 1) Contact made during an application or mixing/loading operation where the material is not propelled by the equipment; 2) Expected direct contact during use (e.g. washing dishes in a disinfectant solution); 3) Leaks, spills, etc. not related to an application.
Ingestion	: Intentional or unintentional oral ingestion.
Multiple	: Contact with pesticides occurred through two or more mechanisms.
Other	: Other known route of exposure not included in other exposure categories. This includes, but not limited to: 1) Residue from a spill and 2) Exposure to smoke or pyrolitic 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, skin and/or eye. Cases involving multiple illness symptom types including systemic symptoms are included in the systemic category.
Respiratory	: Health effects involving any part of the respiratory tree.
Topical	: Health effects involving only the eyes and/or skin. This excludes outward physical signs (miosis and lacrimation) related to effects on internal bodily systems. These signs are classified under 'Systemic.'
Asymptomatic	: Exposure occurred, but did not result in illness/injury. Cholinesterase depression without symptoms falls in this category.

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

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

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