SUMMARY OF RESULTS FROM THE CALIFORNIA PESTICIDE ILLNESS SURVEILLANCE PROGRAM - 2011 –

HS-1893

California Environmental Protection Agency
Department of Pesticide Regulation
Worker Health and Safety Branch
1001 I Street
Sacramento, California 95814

Executive Summary

This report provides a summary of illnesses identified by the Pesticide Illness Surveillance Program (PISP) of the California Department of Pesticide Regulation (DPR) in 2011. DPR identified 1,473 cases potentially involving health effects from pesticide exposure. This represents a 32% increase from the 1,114 cases investigated in 2010, and an 11% increase from the 1,329 cases investigated in 2009. The number of cases investigated remains within the range of cases in prior years (1992 – 2010).

DPR epidemiologists concluded that pesticide exposure had been at least a possible contributing factor to 1,067 (72%) of the 1,473 cases. Agricultural use of pesticides was the source of exposure in 239 (22%) of the 1,067 cases, while 76% (816 cases) were associated with non-agricultural situations. This is within the range of the proportion of associated non-agricultural cases seen from 1992 to 2010.

The increase in associated cases in 2011 is largely attributed to non-agricultural pesticide exposures, which increased 42%, from 572 to 816 cases. Agricultural cases increased 3% in 2011, up from 231 to 239 associated cases. Pesticide illnesses at schools, none of which involved children, dropped sharply from 44 cases in 2010 to 12 cases in 2011.

Background, Sources, and Purpose of Illness Surveillance

DPR administers the California pesticide safety program, widely regarded as the most stringent in the nation. Mandatory reporting of pesticide[1] illnesses has been part of the program since 1971. Illness reports are collected, evaluated, and analyzed by program staff. PISP is the oldest and largest program of its kind in the nation; its epidemiologists provide data to regulators, advocates, industry, and individual citizens.

Under Health and Safety Code section 105200, California physicians are required to report any suspected case of pesticide-related illness or injury by telephone to the local health officer within 24 hours of examining the patient. The law requires health officers to inform the county agricultural commissioner (CAC) and to complete a pesticide illness report (PIR), which is sent to the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Industrial Relations (DIR), and DPR. Unfortunately, this reporting pathway identifies only a minority of the cases investigated. DPR strives to ensure that PISP captures the majority of illness incidents. To identify unreported pesticide cases, DPR has a memorandum of understanding with the Occupational Health Branch of the California Department of Public

[1] "Pesticide" is used to describe many substances that control pests. Pests may be insects, fungi, weeds, rodents, nematodes, algae, viruses, or bacteria 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.

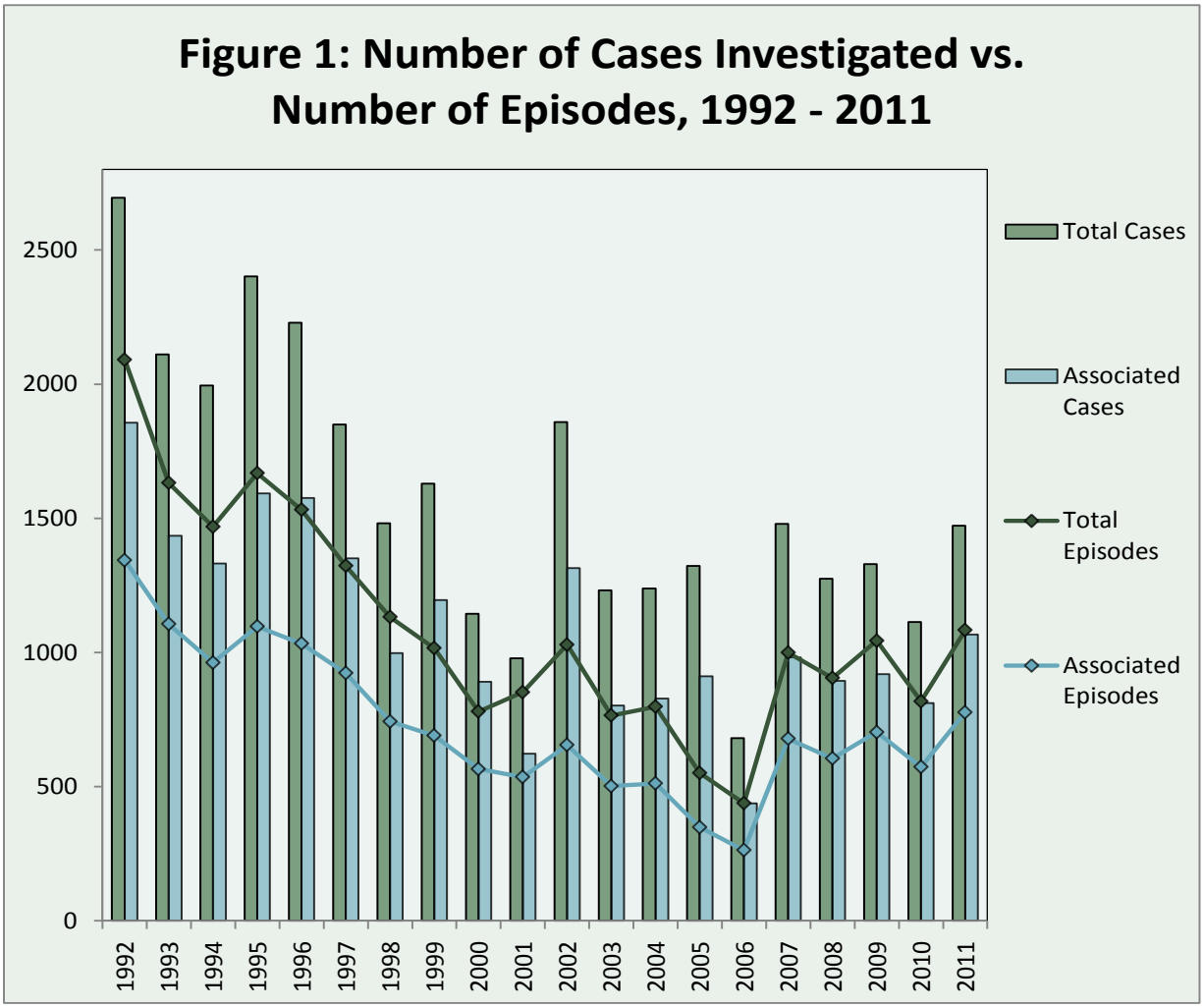
Health (CDPH-OHB), under which PISP epidemiologists review copies of the Doctor's First Report of Occupational Illness and Injury (DFROII), documents that workers' compensation claims payers are required to forward to DIR and are subsequently shared with CDPH. PISP epidemiologists select for investigation any DFROII that mentions a pesticide as a possible cause of injury, or mentions unspecified chemicals if the occupation or setting is one in which pesticide use is likely. Another significant source of pesticide illness reports is the California Poison Control System (CPCS), which began assisting with pesticide illness reporting in 1999. Budgetary troubles prevented complete CPCS participation from 2003-2006. When medical professionals contact CPCS and suspect that a pesticide caused an illness, CPCS submits a pesticide incident report to DPR which satisfies the physician's reporting requirement. Through our contract with CPCS, PISP continues to identify hundreds of symptomatic non-occupational exposures that otherwise would escape detection.

County agricultural commissioners investigate identified pesticide illnesses that occur in their jurisdictions, whether or not they involve agriculture. DPR provides instructions, training and technical support for investigators. The instructions include directions for when and how to collect samples to document unintended exposure or contamination of persons and/or the environment. As part of the technical support, DPR contracts with the California Department of Food and Agriculture Center of Analytical Chemistry to analyze the samples. When investigations are complete, CACs send reports to DPR describing their findings. These reports describe the circumstances that may have led to pesticide exposure and the consequences to the exposed individuals. DPR epidemiologists evaluate medical reports and all information the CACs gather in the investigative process. They abstract and encode basic descriptors of the event, then undertake a complex synthesis of all available evidence to assess the likelihood that pesticide exposure caused the illness. Standards for the determination are described in the PISP program brochure, "Preventing Pesticide Illness," which can be viewed or downloaded from DPR's web site at http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf.

DPR maintains its surveillance of human health effects of pesticide exposure in order to evaluate the circumstances of pesticide exposures that result in illness. DPR epidemiologists regularly consult the PISP database to evaluate the effectiveness of DPR's pesticide safety regulatory programs and assess need for changes. If illness reports indicate excessive risk, DPR may implement additional restrictions on pesticide use by providing CACs with California-specific recommendations for pesticide application permit conditions or by changing regulations. If an illness incident results from illegal practices, state and county enforcement staff take appropriate action to deter future incidents.

2011 Numeric Results – Totals

In 2011, 1,473 cases were identified potentially involving health effects from pesticide exposure. This represents a 32% increase from 1,114 cases investigated in 2010, and an 11% increase from 1,329 cases investigated in 2009 (Figure 1). Over time, the number of cases investigated remains within a typical range; the 2011 case total falls within two standard deviations of the average annual total of the previous four years of data since poison control renewed reporting assistance (2007-2010 mean = 1,299, SD = 151).



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 a high degree of correlation between the pattern of exposure and resulting symptomatology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions. A

probable relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable. A possible relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

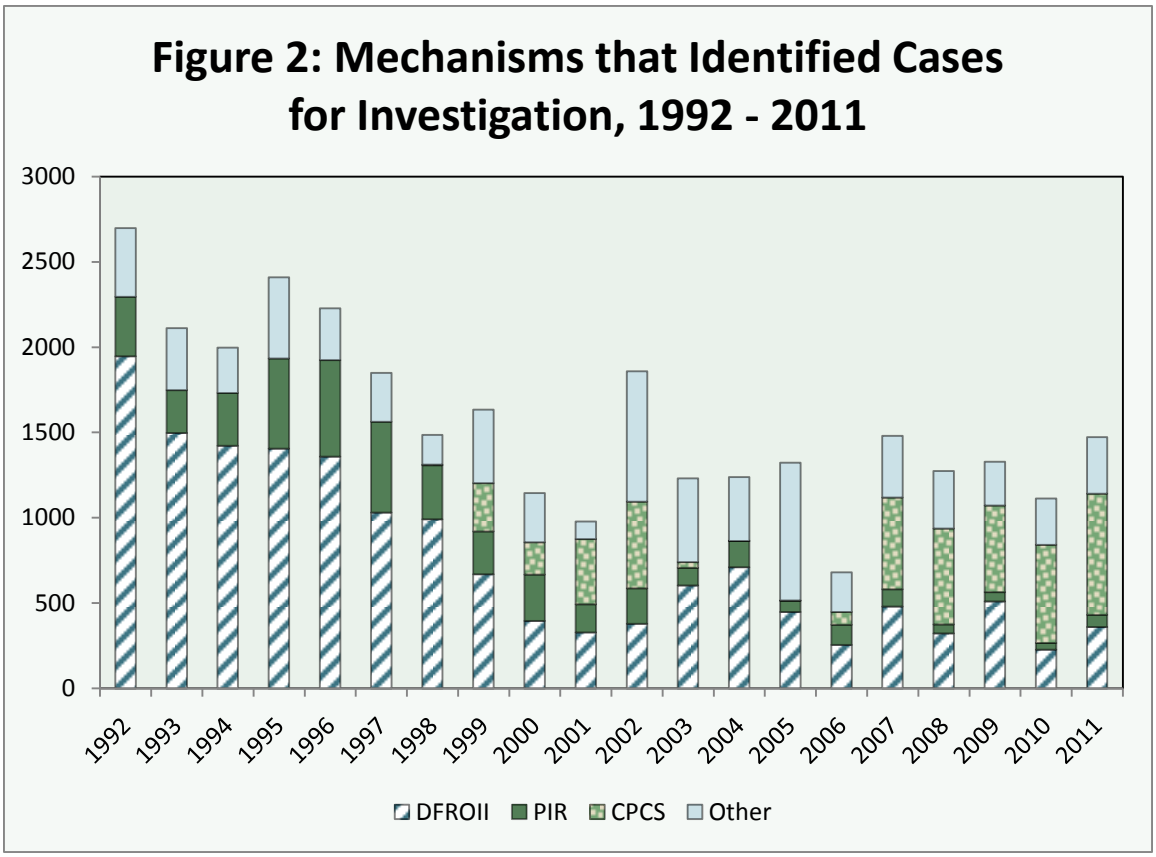
Associated episodes are those in which at least one case was evaluated as associated.

Figure 2 demonstrates the variation in numbers of cases identified by the different sources of initiating documents. The source document proportions for 2011 are similar to those of recent years.

The California Poison Control System (CPCS) remained a major source of case identification. CPCS reporting accounted for 48% of 2011 investigations. Of the 1,473 cases identified in 2011, investigated CPCS reports totaled 711, an increase from the 575 in 2010. Of the 711 CPCS reports investigated, 527 (74%) were evaluated as associated with pesticide exposure. Of these 527 cases, 477 (91%) were non-agricultural, 38 (9%) were related to pesticides intended for agricultural use, and in 12 (2%) cases the agricultural context remained unknown.

DFR reports contributed 360 (24%) illness investigations, a slight rise despite an overall decrease in reports over time, likely attributable to a multitude of complex reasons. Of the 360 DFR reports investigated, 239 (66%) were evaluated as related to pesticide exposure, 34 (14%) of which were agricultural in nature.

Other reporting sources, such as county complaints, media reports, or multi-person episodes led to 331 (22%) investigations. Of these, 246 (74%) of these were found to be at least possibly related to exposure. Of these 246 associated cases, 132 (54%) were agricultural.
Direct physician reporting to Local Health Officers accounted for only 71 (5%) of all investigated cases, with 55 (77%) evaluated as associated with pesticide exposure, and 35 (64%) of the 55 were agriculturally related.



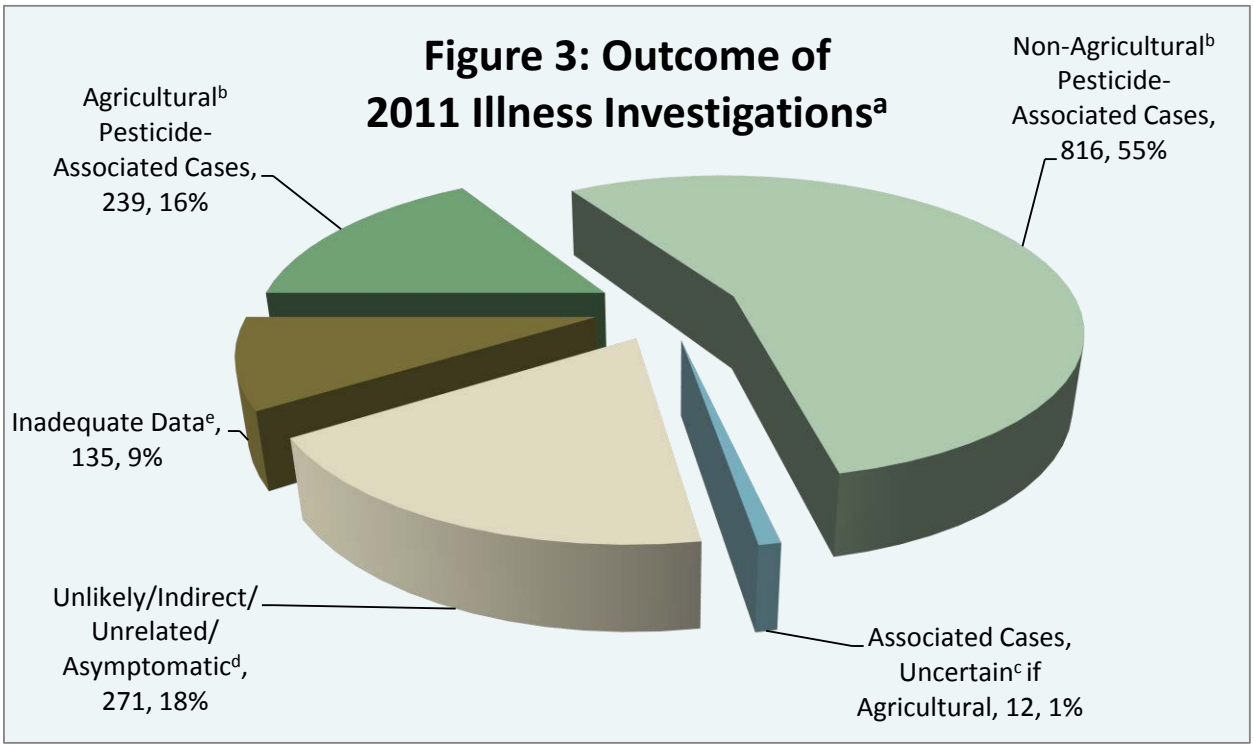
DFROII – Doctor's First Report of Occupational Illnesses and Injury (Workers' Compensation document).
PIR – Pesticide Illness Report (physician reporting to Local Health Officers in compliance with Health and Safety Code Section 105200).
CPCS – California Poison Control System (facilitated physician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

DPR epidemiologists found pesticide exposure to be at least a possible contributing factor to 1,067 (72%) of the 1,473 cases identified. The percent of associated cases were similar to that of 2010, with 73% of cases associated with pesticide exposure. PISP defines the term "associated" as cases evaluated as definitely, probably, or possibly related to pesticide exposure.

"Agricultural" is defined as involving pesticides intended to contribute to production of an agricultural commodity, including livestock. This corresponds to the regulatory definition of "production agriculture". Use or intended use in non-production agriculture is designated as "non-agricultural". Structural, sanitation, or home garden situations, as well as pesticide manufacture, transport, storage, and disposal are also considered "non-agricultural".

Of the 1,067 pesticide-associated cases, 239 (22%) were attributed to pesticides used for agricultural purposes. Another 816 associated cases (76%) occurred under circumstances

considered non-agricultural. Twelve (1%) of the 1,067 pesticide-associated cases could not be characterized as agricultural or non-agricultural due to unclear circumstances presented in the investigations. Evidence indicated that pesticide exposure did not cause or contribute to ill health in 271 (18%) of the 1,473 cases assigned for investigation. Insufficient information prevented evaluation of 135 cases (9%) (Figure 3).



[a] Total cases investigated = 1,473

[b] *Agricultural* and *Nonagricultural* refer to the intended use of the pesticides definitely, probably, or possibly related to human health effects.

[c] *Associated Cases, Uncertain if Agricultural* refers to cases in which investigators could provide little or no information, such as when victims could not be located or refused interviews.

[d] *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.

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

Table 1 shows the numbers of cases evaluated at each level of relationship. Among the 1,067 pesticide-associated cases, evidence established a definite relationship to pesticide exposure for 181 (17%), a probable relationship for 637 (60%), and a possible relationship for 249 (23%) (Table 1).

Table 1: Relationship Evaluation of 2011 Illness Investigations

Relationship	Relation to Agriculture			Total
	Agricultural[a]	Non-Agricultural[b]	Unknown or Not Applicable[c]	
Definite[d]	27	153	1	181
Probable[e]	161	470	6	637
Possible[f]	51	193	5	249
Pesticide-Associated Subtotal	**239**	**816**	**12**	**1067**
Unlikely[g]	8	40	1	49
Indirect[h]	0	17	0	17
Asymptomatic[i]	62	15	0	77
Unrelated[j]	0	0	128	128
Not Applicable (inadequate data)[k]	9	107	19	135
Overall Total	**318**	**995**	**160**	**1,473**

[a] *Agricultural* cases are those that implicate exposure to pesticides intended to contribute to the production of agricultural commodities.
[b] *Non-agricultural* cases include all those in which the pesticide was not intended to contribute to production of agricultural commodities.
[c] Agricultural designation is not applicable to cases unrelated to pesticide exposure.
[d] A *definite* relationship indicates a high degree of correlation between the pattern of exposure and resulting symptomatology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions.
[e] A *probable* relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable.
[f] A *possible* relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.
[g] An *unlikely* relationship indicates that a correlation cannot be ruled out absolutely. Medical and/or physical evidence suggest a cause other than pesticide exposure.
[h] An *indirect* relationship indicates that pesticide exposure is not responsible for symptomatology, but pesticide regulations or product label requirements contributed in some way, (e.g., heat stress while wearing chemical resistant clothing).
[i] An *asymptomatic* relationship indicates that exposure occurred, but did not result in illness/injury.
[j] An *unrelated* relationship indicates definite evidence of causes other than pesticide exposure, including exposure to chemicals other than pesticides.
[k] A relationship of "*not applicable*" indicates that relationship cannot be established because the necessary information is not available to the evaluator.

Occupational exposures, defined as those that occurred while the affected people were at work, accounted for 563 (53%) of the 1,067 pesticide-associated cases from 2011. Non-occupational exposures accounted for 493 pesticide-associated cases (46% of the total). Eleven pesticide-associated cases could not be characterized as occupational or non-occupational; 7 of these 11 also could not be characterized as agricultural or non-agricultural.

Enforcement actions often are still under consideration when PISP receives and evaluates illness investigative reports, so linking cases to DPR Enforcement Branch violations is approximate. Based on the information available at the time of evaluation, PISP epidemiologists concluded that of the 1,067 pesticide-associated cases, 656 (61%) provided evidence that violation of safety requirements had contributed to exposure, and harm might have been avoided if all the people involved had adhered strictly to safety procedures already required by regulations and/or pesticide labels. Of the 656 cases with contributory violations, 163 (25%) were attributed to pesticides intended for agricultural purposes. Non-compliance with regulations that did not contribute to the pesticide exposure (e.g. paperwork violations) was identified in 56 (5%) cases. It was unknown whether violations contributed to 145 cases (14%) and 210 cases (20%) had health effects attributed to pesticide exposure in spite of apparent compliance with all applicable label instructions and safety regulations. Of these 210 cases, 50 (24%) were attributed to pesticides used for agricultural purposes. Further evaluation of these cases is needed to determine if additional safety requirements are appropriate.

Legislative update – AB 1963

Assembly Bill 1963 (Nava, Chapter 369, Statutes of 2010), which modified Health and Safety Code (HSC) 105206, requires clinical laboratories to provide DPR the results of all cholinesterase blood tests performed for agricultural pesticide-related exposures related to certain activities. AB 1963 was established to evaluate the Medical Supervision Program (California Food and Agriculture Code, Section 12981) which requires agricultural employers to contract with physicians to monitor employees who regularly handle toxicity category I or II pesticides that inhibit cholinesterase. Physicians order baseline and periodic blood testing for these employees to measure the level of activity of cholinesterase enzyme. HSC Section 105206 requires clinical laboratories to provide numeric results along with the reason medical providers ordered the cholinesterase tests (pursuant to Section 6728 of Title 3 CCR). Information on the patient, physician, employer and laboratory should also be provided. PISP began receiving cholinesterase test results from six DPH-approved laboratories in the first quarter of 2011. Cholinesterase test results are reported monthly through DPR's Secure Access Website. PISP epidemiologists review each file submitted by the laboratories for consistency in reporting requirements. Laboratories are required to re-submit test result files if any discrepancies were noted in the data elements submitted. The information is shared electronically with the Office of Environmental Health Hazard Assessment (OEHHA) and the California Department of Public

Health (CDPH). PISP staff continue to investigate ways to integrate the data received from reporting laboratories into a database that can link cholinesterase test results to the individuals tested, so that changes may be identified over time. In 2015, DPR and OEHHA, in consultation with DPH, will produce a report on the effectiveness of the medical supervision program and the usefulness of laboratory-based reporting of cholinesterase testing for pesticide illness and surveillance.

Non-agricultural pesticide episodes

PISP defines drift as spray, mist, fumes, or odor carried from the target site by air. PISP illnesses classified as drift may include on-site or off-site movement of pesticide during or after an application. Definitions of drift may vary among agencies. Thirty-six non-agricultural drift episodes resulted in 232 illnesses in 2011. While most incidents affected only one person, two chlorine release episodes affected 58 people. Details of these exposures are highlighted below.

Chlorine release at a recreational water park

Eleven illnesses resulted from chlorine exposure at a Sacramento County recreational water park. On the day of the incident, despite a deactivated pump, a system bypass allowed a chlorine feeder to continue pumping chlorine into the water recirculation system causing chlorine to accumulate in the pool's piping. When a worker activated the pump, super-chlorinated water was released into a cyclical wave pool.

According to an employee, people began screaming and left the pool area when the water turned green from the influx of chlorine. A gas-like odor was described by multiple pool users and employees. News media initially reported at least 20 individuals (9 minors, 8 adults, and 3 water park employees) developed respiratory symptoms, but only 11 were reported to PISP by CPCS. The remainder could not be reached for interview. Four of the 11 injured people experienced coughing alone, while seven experienced two or more of the following symptoms: difficulty breathing, coughing, burning (of throats, eyes, or lungs), headache, nausea, painful or sore throat, and abdominal pain. Three water park employees who provided first aid and assisted in the transport of swimmers during the incident also complained of symptoms.

Investigators found that a cable was attached to a chemical feeder pump, allowing pool maintenance staff to manually control it. Likewise, a jumper cable was attached to the sensor unit allowing its function to be bypassed. In order for the chlorinating unit to work efficiently, the two vertical pumps should both be running at all times except on scheduled maintenance, with the sensor unit engaged and not bypassed or manually controlled. The water park company was cited by the California Occupational Safety and Hazard Administration (CalOSHA) for gross negligence of safety.

Chlorine release at a tomato cannery

Improper wiring of a chlorine pump in a Yolo County tomato canning plant triggered the release of a large amount of chlorine into a water flume used for transporting tomatoes. The exposure resulted in 47 cases of pesticide illness among plant employees. An investigation revealed that a contract technician serviced the flume system a week prior to the incident to repair an unspecified chlorine pump problem. The day before the incident, the flume was shut down for the first time since it was serviced in order to change the type of tomato on the processing line.

During the shutdown, the chlorine metering system continued to pump chlorine into the holding tank, allowing as much as 840 gallons of chlorine to enter the 1,700 gallon water tank during a 28 hour period. An inspection later revealed that a system to prevent addition of chlorine while the flume line is turned off had been bypassed. Interview statements among plant workers and the contract technician conflicted, so the party who bypassed the system remained unidentified.

When the flume was restarted, highly chlorinated water entered the work area, and several employees noticed an odor and a blue or green cloud. Ultimately, 47 employees were transported for medical care, and many more were evacuated from the building. A woman who had been standing near the flume fainted and was hospitalized for three days. She was unable to return to work for more than 30 days. Two other workers were admitted to the hospital overnight for observation, and several workers missed multiple work days as a result of the chlorine release. Many stated that the symptoms they experienced, which included burning eyes, coughing, head ache, nausea, vomiting, difficulty breathing, and dizziness, persisted for weeks.

Upon interview, several workers complained about the cannery's evacuation process, claiming no announcement was made over the loudspeaker. As a result, some workers were unaware the evacuation was underway, and continued to work as others left the premises. This may have contributed to the ill effects experienced.

The same facility experienced an event in 2007. A chlorine sensing probe became heavily coated with plant material and unable to properly detect the level of chlorine in the system, caused a chlorine release that was 15 times the normal level. Thirty-nine people complained of suffering ill effects from the exposure and two workers were hospitalized. In response to the 2007 incident, the facility was cited for failing to properly maintain equipment.

After the 2011 episode, the California Occupational Safety and Health Administration found that the cannery was in noncompliance with California laws requiring safe equipment in good repair and the use of engineering controls to prevent harmful exposures. OSHA fined the cannery over $60,000 for these violations.

Pesticide illness among fieldworkers

PISP data reflects that 137 fieldworkers were injured by pesticide exposure over 28 separate episodes. This total includes 31 fieldworker cases that occurred in 2010 but were not reported to DPR until 2011.

The largest number of fieldworkers injured in a single episode in 2011 was 14, compared with 33 in 2010. It is difficult to attribute the smaller scale of 2011 episodes to a specific cause. Depending on a number of factors, one episode has the potential to affect large numbers of workers. Larger episodes may not happen in every calendar year, but when they do, they can dramatically alter the overall number of cases from year to year.

Pesticide drift as defined by PISP was associated with 99 (72%) of the 137 fieldworker illnesses in 15 separate episodes. Among fieldworkers, pesticide residue contributed to 28 illnesses (20%) over five episodes. Of the remaining ten cases, the exposure remained uncertain in seven cases - one sustained multiple exposures, one was exposed by spill or other direct contact, and one was directly sprayed by application equipment.

Two fieldworker episodes, each affecting 14 people, are highlighted because they affected the largest number of agricultural workers in 2011. One episode resulted from agricultural drift; the other involved exposure to pesticide residue.

In Imperial County, 23 fieldworkers were drifted upon by insecticides during an application to a nearby alfalfa field. Three days after the incident, the CAC received an anonymous complaint from a worker advocacy group alleging that workers were exposed while harvesting lettuce. The CAC conducted a fieldworker safety inspection and interviewed workers. Many workers mentioned smelling a strong odor and seeing an airplane apply pesticides to a nearby alfalfa field. Use reports indicated a crop duster plane made an application to an adjacent field about a mile southeast of the fieldworkers. Of the 23 harvesters exposed, 14 reported symptoms and nine were asymptomatic. Symptoms reported included eye and nose irritation, headache, upset stomach, vomiting and difficulty breathing. The CAC collected gradient foliage samples and results indicated drift of malathion and permethrin onto the lettuce field. The CAC cited the Agricultural Pest Control Business (AgPCB) for failing to contain pesticides to the target area during application.

In Kings County, 15 fieldworkers were exposed to pesticide residue when they entered a field before the restricted entry interval (REI) had expired. The day before the application, an employee of the farm was unsuccessful in his attempt to notify the supervisor of the weeding crew. An aerial application of pesticides took place the next day as planned. One of the pesticides had an REI of 48 hours. The weeding crew arrived the day after the application to

continue where they had previously worked. Since the farm operators failed to post signs before the scheduled application and did not direct the AgPCB to put up signs, the crew of 15 fieldworkers entered the treated field less than 10 hours after the application was complete. Two-thirds into their first pass of a row, the workers' clothing became wet from moisture on the plants. Fourteen of the 15 workers complained of symptoms of nausea, headache, and dizziness. In addition, a few reported blurry vision, burning throat and skin irritation. Accounts differed on whether all fieldworkers showered after the exposure, and whether instructions were given for the workers to return to work, go home, or to headquarters to decontaminate further before transport for care. The farm operator was cited for failure to give notice of a scheduled application, failure to ensure that signs were posted around the treated fields and for allowing fieldworkers to enter a treated field before the REI expired. The farm labor contractor was cited for failure to immediately take an employee to a physician when there are reasonable grounds to suspect that an employee has pesticide illness. The AgPCB was cited for applying pesticide in conflict with label directions; the insecticide label requires posting of the application.

Pesticide Exposure affecting Bystanders

In Merced County, 11 bystanders were exposed when miticides applied to a nearby corn field drifted into a residential area. Two families living near the corn field, one to the east and another to the north of the field, complained of an odor and symptoms. They reported symptoms of burning eyes, difficulty breathing, headache, and blotchy skin, but none sought medical attention. Although both families were indoors at the time of application, one family, located 50 feet north of the field, said they could "taste" and smell an odor. They sealed doors with duct tape to keep the odor out. County investigators collected swab samples three days later from the homes and the corn field. Pesticides were detected only on the samples retrieved from within the field. Investigators concluded that label directions were apparently followed during the application, but cited the pest control operator for failing to submit a pesticide use report within seven days of application.

Pesticide Illness in Schools

Twelve illnesses evaluated as definitely, probably, or possibly associated with pesticide exposure occurred in schools. PISP defines schools as establishments that provide academic or technical instruction, including child day care centers. These 12 cases reflect a 73% decrease from 2010 data which included 44 school-related illness cases.

In 2011, no children were reported to have sustained pesticide illness at schools. All of the reported pesticide illnesses occurred in adults employed at schools, and all involved exposure to antimicrobial pesticides or pool adjuvants.

Morbidity and Mortality

Of the 1,067 cases evaluated as associated with pesticide exposure, 23 people (2%) were hospitalized and 94 (9%) reported time lost from work or normal activity (e.g. going to school) (Table 2). Fifteen (65%) of the 23 people that were hospitalized ingested pesticide. One of the ingestion cases was ultimately fatal. Of the 15 patients hospitalized due to ingesting pesticide, nine (60%) acknowledged suicide attempts.

Table 2: Summary of Pesticide-Associated[a] Hospitalization and Disability, 2011

Relationship	Total Cases	Number Hospitalized[d]	Lost Work Time[e]
Definite/Probable[b]	818	18	79
Possible[c]	249	5	15
Total Cases	**1067**	**23**	**94**

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

A total of five fatalities were evaluated as definitely, probably, or possibly associated with pesticide exposure. Three of the five incidents were related to deliberate self-harm. One suicide involved the ingestion of an herbicide and the other two cases involved mixing pesticides with household cleaners to produce a lethal gas, a method known as detergent suicide. The same readily available, non-restricted fungicide was implicated in both detergent suicides. The manufacturer did not renew the product registration for 2011; the product, however, was not recalled nor removed from store shelves.

Of the remaining fatalities, one person was suspected of unwittingly ingesting insecticide and the other was exposed to a fumigant. The first case involved a man suffering from dementia who ingested a small amount of an unidentified flea and tick shampoo. After being hospitalized for four days, he died. His death may have been due to pre-existing health conditions, but contributory effects of a pesticide cannot be ruled out. The second non-suicide fatality involved a

man who was discovered by a Structural Pest Control Operator (SPCO) crew when they returned to aerate a house after it was fumigated two days previously. The crew discovered that tarp clips had been removed and someone had entered through a window. They called emergency responders who found the man, who had entered the home illegally, deceased inside the home. Diagnostic analysis confirmed a lethal dose of sulfuryl fluoride in his blood. Statements from police and fire departments confirmed that the SPCO used secondary locks to secure the external doors of the house and garage.

Tabular summaries presenting different aspects of 2011 pesticide illness data are available online at http://www.cdpr.ca.gov/docs/whs/currpisp.htm or by contacting the WHS Branch at (916) 445-4222. Additionally, the public can retrieve reports of pesticide illness and generate reports according to their own specifications using the California Pesticide Illness Query program (CalPIQ). CalPIQ is available at http://apps.cdpr.ca.gov/calpiq and can retrieve cases evaluated as definitely, probably, or possibly related to pesticides from 1992 through the most recent year published.

Appendix I: Acronyms

CAC	County Agricultural Commissioner
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
NIOSH	National Institute for Occupational Safety and Health
OEHHA	Office of Environmental Health Hazard Assessment
PIR	Pesticide Illness Report
PISP	Pesticide Illness Surveillance Program
REI	Restricted Entry Interval
SENSOR	Sentinel Event Notification System for Occupational Risk
U.S. EPA	United States Environmental Protection Agency
WHS	Worker Health and Safety Branch