

Health & Safety

*Report*

Worker Health and Safety Branch

HS-1776

OVERVIEW OF THE CALIFORNIA PESTICIDE ILLNESS  
SURVEILLANCE PROGRAM

- 1996 -

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# Pesticide Illness Surveillance Program - 1996

The California Department of Pesticide Regulation (DPR) maintains a surveillance program to record human health effects of pesticide exposure. Section 105200 of the California Health and Safety Code requires physicians to report any patients whose condition they know or have reason to believe derived from exposure to pesticides. To supplement physician reporting, DPR staff review workers' compensation cases for evidence of pesticide involvement. County agricultural commissioners investigate all cases identified as potentially related to pesticide exposure.

Every pesticide active ingredient has a pharmacologic effect by which it controls its target pest. Pesticide products may have other potentially harmful properties in addition to the ones that work to control pests. Excessive exposure to pesticides may cause illness by various mechanisms. The Pesticide Illness Surveillance Program (PISP) collects information on adverse effects from pesticide products including the active ingredients, inert ingredients, impurities, or breakdown products. Whether pesticide products act as irritants or as allergens, through their smell or by causing fires or explosions, DPR's mission is to require users to avoid exposures that compromise health.

DPR maintains the PISP in order to evaluate the circumstances of pesticide exposures that result in illness. Staff regularly consult the data collected to evaluate the effectiveness of the DPR pesticide safety regulatory programs and assess the need for changes.

## Background on the Reporting System

The DPR worker safety program is widely regarded as the most stringent in the nation. It includes requirements for thorough data review of all pesticides<sup>1</sup> before registration for use in California, safety training of all pesticide handlers and field workers, and ongoing monitoring of people and the environment to detect potential for pesticide exposure. Mandatory reporting of pesticide illnesses has been part of this comprehensive program since 1971. In a report issued in December 1993, the

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<sup>1</sup> "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, 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.

U.S. General Accounting Office noted that "California had by far the most effective and well-established monitoring system in place" and that the U.S. Environmental Protection Agency (U.S. EPA) "relies heavily on the pesticide illness data collected by the California monitoring system... and has tried to encourage selected states to develop monitoring systems modeled after the California system."

Under a statute enacted in 1971 and amended in 1977, California physicians are required to report any suspected case of pesticide-related illness or injury by telephone to the local health department. The health department informs the county agricultural commissioner and also completes a pesticide illness report (PIR), copies of which are distributed to the State Office of Environmental Health Hazard Assessment, to the California Department of Industrial Relations (DIR), and to DPR.

DPR strives to ensure that the PISP captures the majority of illness incidents. For example, since doctors do not always file the required illness reports, DPR's Worker Health and Safety Branch (WH&S) also reviews reports of worker illness and injury submitted to DIR under workers' compensation reporting requirements. Staff select for investigation any report that mentions a pesticide, or pesticides in general, as a possible cause of injury. Reports that mention unspecified chemicals also are investigated if the setting is one in which pesticide use is likely. In typical years, this procedure identifies two-thirds to three-quarters of the incidents investigated.

The agricultural commissioner of the county where the incident occurred investigates every reported incident. DPR provides instructions, training, and technical support for conducting investigations. The commissioners prepare reports describing the circumstances in which pesticide exposure may have occurred and any other relevant aspects of the case. If investigations identify other affected people, they are identified in the investigation report and reflected in the PISP database.

Worker Health and Safety Branch staff evaluate commissioners' reports and classify incidents according to the circumstances of exposure to a pesticide. Staff undertake a complex task of determining the likelihood that a pesticide exposure caused the incident. A number of factors complicate illness incident analysis. First, the PISP evaluates adverse effects after the fact and often from secondary sources. Second, illness incidents can occur from exposure to pesticide product components other than the active ingredient and may be unrelated to predicted hazards of the active ingredient. For instance, a documented allergic reaction to a pesticide would be recorded as a definite adverse effect, although it bears no relation to the way the pesticide acts on pests.

The PISP database provides the means to identify trends in pesticide-related illnesses warranting additional California restrictions or label modifications through the U.S. EPA's Label Improvement Program. Since many illness incidents result from illegal practices, ensuring compliance can improve work place safety. The PISP data allow state and county enforcement staff to prioritize inspections to significant non compliance activities.

## **Efforts to Improve Reporting Compliance**

The illness surveillance program is not designed to capture every pesticide-related incident. Although some cases are missed, the PISP captures the major trends and safety problems. In order to maximize the utility of the database, DPR continually strives to improve reporting compliance and completeness. The PISP can miss pesticide-related illnesses due to a number of factors. People may not consult physicians after a pesticide illness episode, especially if exposed to pesticides outside of a workplace environment. Physicians may not recognize that their patients are suffering from pesticide exposure, or may be unaware of the reporting requirement. The likelihood is very good, however, that people treated for acute illnesses under workers' compensation will be reported to DIR, where review by WH&S will recognize pesticide-related cases.

DPR initiated an effort in 1994 to improve physician familiarity and compliance with the reporting requirement. Besides identifying cases that might escape detection otherwise, direct physician reporting allows DPR to investigate cases promptly, while the people involved remain accessible, with accurate recollection of the event. About half of all direct physician reports arrive within two weeks of the occurrence, and nearly 90 percent within the month following exposure. About three-quarters of the cases identified through workers' compensation records are more than a month old by the time they are located.

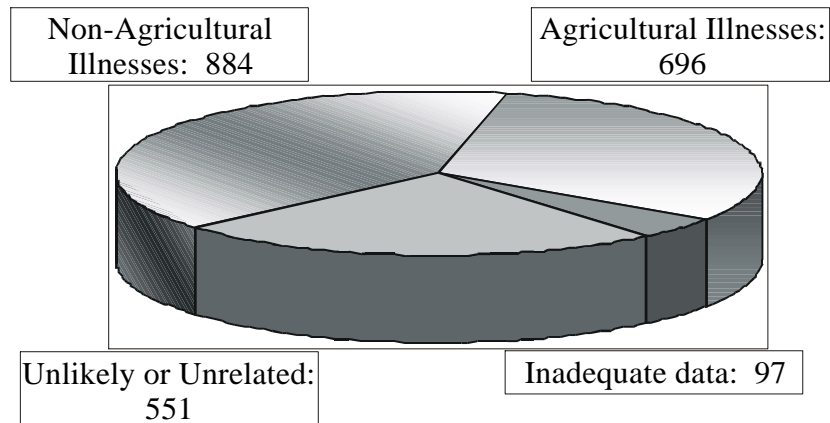
Late in 1994, DPR and DIR sent summaries of the requirements for reporting pesticide-related conditions to all physicians who held active California medical licenses. In 1995 and 1996, WH&S recorded the names of physicians from documents retrieved from workers' compensation records. If no corresponding report had been received through the local health officer, the system generated a letter to the physician explaining the reporting requirement and mentioning the case or cases located through workers' compensation. A total of 1,371 letters were sent to 996 different doctors by the end of 1996. OEHHA, which has statutory responsibility for medical training, conducted outreach sessions during this period. Orange, Riverside, and Stanislaus Counties were selected as primary locations for outreach because they had especially poor records of direct reporting coupled with substantial numbers of cases found through workers' compensation.

This effort increased physician reporting to more than 20 percent of cases from a low of 12 to 13 percent in 1992 and 1993. Because the effort was costly and labor-intensive, DPR sought a more efficient way to increase reporting. In 1996, DPR undertook a pilot project to increase physician reporting by contracting with the poison control center serving the San Joaquin Valley. For one year, that poison control center offered physicians the option of allowing the center to report cases on their behalf. Only a few dozen reports arrived by this route, but they arrived promptly, often within a day or two of the event.

### 1996 Numerical Results -- Totals

During 1996, DPR received reports of 2,229 people whose health may have been affected by pesticide exposure. After investigation, analysts found that pesticide exposure had been at least a possible contributing factor to 1,580 (71 percent) of the 2,229 cases. Of those 1,580 cases, 696 (44 percent) involved use of pesticides for agricultural purposes and 884 (56 percent) occurred in other settings. Evidence established a definite relationship to pesticide exposure for 331 of the 1,580 cases.

## Outcome of 1996 Illness Investigations



Another 757 were classified as probable, with 492 entered as possible. Tabular summaries presenting different aspects of the data are available through the DPR web site at <[www.cdpr.ca.gov](http://www.cdpr.ca.gov)>, or by contacting the Worker Health and Safety Branch.

The total number of cases referred for investigation declined by 172 (7 percent) relative to 1995. The drop occurred even though a single significant drift episode generated 243 case reports. Physician reporting remained comparable to the enhanced level observed during 1995. Apart from the large drift episode just mentioned (which generated 151 physician reports among its 243 cases), DPR received physician reports for 415 of 1,986 cases investigated (21 percent). This compares to 529 of 2,401 (22 percent) in 1995 and 310 of 1,995 (16 percent) in 1994. Occupational exposures (those that occurred while the affected people were at work and eligible for workers' compensation) accounted for 2,012 (90 percent) of the 2,229 cases identified. A substantial number of the episodes derive from actions already prohibited by pesticide safety regulations, which indicates that safety could be improved through increased efforts to get all users to comply with regulations.

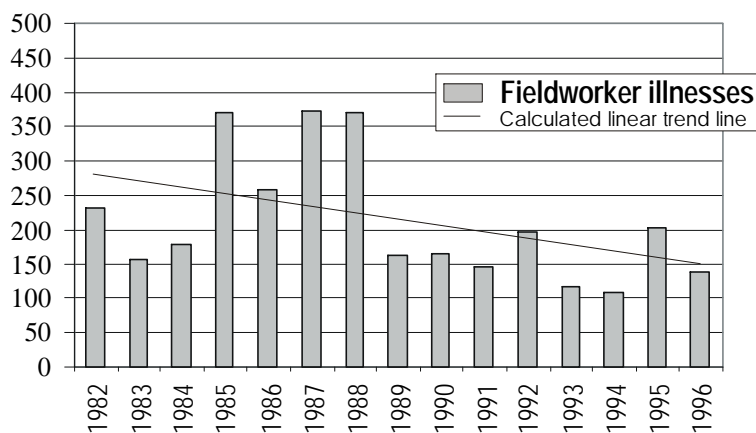
## **Agricultural Field Residue Incidents**

During 1996, exposure to field residue was implicated in 137 cases (20 percent) of the 696 agricultural-related incidents. Of the 137 cases, DPR classified 93 as possible and 44 as definite or probable cases. Illegal reentry during the restricted entry interval contributed to 41 (30 percent) of the 137 cases. Twenty-seven of those 41 occurred in a single episode: An applicator in Monterey County failed to verify the location of the intended application and treated a field scheduled for harvest. The harvesters began work 36 hours into a 72-hour restricted entry interval. The grower discovered the situation about two hours after harvest began, at which point a bus took the whole crew to a medical clinic. The grower and the labor contractor each were fined \$1,000 for their parts in the episode. The negligent applicator was fired and his supervisor suspended pending determination of his responsibility for the mistake.

The 1996 total of 137 field residue cases suggests a return to the improved baseline condition established by the regulatory changes of 1988 - 1989. From the earliest computerized records of 1982 through 1988, an average of 282 cases per year were definitely, probably or possibly related to field residue exposure. Regulatory changes lengthening restricted entry intervals for some pesticides took effect between the 1988 and 1989 growing seasons. Subsequently, the average number of cases related to field residue dropped to 149 per year for 1989 through 1994. In 1995, two large group episodes raised the number of cases identified among field workers to 230.

The improvement in number of field residue cases has continued long enough to provide evidence of a real change, as measured by statistical test. DPR will undertake more intensive review of field residue cases to try to identify the particular types of ill effects and exposure situations that have been mitigated and

## Worker Illnesses Caused by Exposure to Pesticide Residue in Agricultural Fields



those that remain to be addressed. Factors to consider include the months of highest risk, the counties and crops where cases occur, the formulations and ingredients of the pesticide products implicated, and the types of health effects experienced by field laborers. Comparing profiles before and since the reduction in case reports may also help to identify measures to reduce the toll further.

### Morbidity and Mortality

Among the 1,088 cases evaluated after investigation as definitely or probably related to pesticide exposure, 13 people were hospitalized and 145 lost time from work. Of 492 possible cases, two included hospitalization and 120 lost work time. Of five 1996 fatalities investigated, only one proved definitely related to pesticide exposure. That one involved voluntary ingestion of an organophosphate insecticide by a despondent stroke victim. Another fatality most probably resulted from pesticide ingestion, but DPR was unable to verify how medical staff identified the toxic substance involved. Lacking the hard evidence required for a definite relationship, this case was classified as probable.

Another case was classified as unlikely to be related to pesticides. Initial investigation of the death of a farm worker raised suspicion that the man might have eaten some of the gopher bait found in his truck. The coroner requested assistance from the agricultural commissioner, and DPR provided resources for analyzing samples. Autopsy findings did not support the supposition of pesticide involvement. Non-pesticide causes were identified for the other two deaths investigated.

## **Examples of the Importance of Compliance with Safety Procedures**

Severe intoxications typically result from careless and often illegal use of pesticides. The following episodes came to DPR's attention during 1996. In each case, people used pesticides irresponsibly, jeopardizing their own health and that of others.

The large drift episode mentioned earlier occurred in Kern County when an aerial applicator proceeded with a scheduled application to a cotton field in spite of the obvious presence of about a thousand harvesters in the vineyard across the road. The pesticides applied have strong and objectionable odors. Although none of the harvesters reported feeling any mist, almost all smelled the pesticides. Analysis of grape leaves and of harvesters' clothing confirmed that some of the pesticides had drifted onto the vineyard. The fire department decontaminated the 22 most obviously affected harvesters on site. Over the next several weeks, at least 243 of the harvesters consulted physicians. Most of them reported non-specific symptoms such as headache, nausea, and eye irritation; a few denied experiencing symptoms but wished to be examined as a precaution. Because of the serious nature of the episode, the agricultural commissioner referred the case to DPR for enforcement action. DPR fined the application company \$60,000, suspended the company owner's license to operate for nine months, suspended the pilot's applicator license for six months, and required additional training and supervision for all the company's workers.

The Department of Pesticide Regulation has addressed the issue of drift through strict enforcement, policy development, electronic data management and outreach to pesticide applicators. DPR is working to improve incident/licensee identification, violation trends, statewide consistency in enforcement actions and evaluation of user compliance. In 1997, DPR issued a Pesticide Drift Enforcement Policy which defines drift and summarizes the regulatory standards. An additional step is the ongoing development of a compliance database. Upon completion in 2000, enforcement staff will be able to review compliance history as part of the process of issuing and renewing licenses. This database will enhance communication and add consistency to the overall enforcement decision-making



process. DPR participated in an industry-sponsored program on drift reduction that integrates training on proper equipment use and calibration along with pilot decision-making to decrease drift, risk-taking, and aerial accidents. In addition, drift control regulations under development will expand the drift regulations to all types of applications, not just restricted material applications.

In another noteworthy incident, a Los Angeles County woman attempted to treat herself for head lice by washing her hair with a home use insecticide intended for application to building surfaces. The next morning she was sick with nausea, vomiting, stomach cramps, blurred vision, and difficulty breathing. She spent more than one day in the hospital.

A Stanislaus County homeowner treated his yard with a home-use insecticide. He did not use any protective equipment and did not wash afterwards, although gusty wind had blown pesticide spray into his face. Several hours later, he developed symptoms including shortness of breath and vomiting. He was hospitalized for a day-and-a-half. Because the homeowner had already discarded the pesticide container, the investigator could not determine to what extent the homeowner had ignored available safety instructions.

A grower applied metam-sodium on a field adjacent to a water district canal. In the process, some of the pesticide entered a network of canals that supplied water to 20 households, which stored the water in cisterns for later use. The residents recognized and reported the problem because the water smelled bad. Besides noticing the odor and several dead crayfish, the investigator took samples that confirmed the presence of 3 parts per million of methyl isothiocyanate (the breakdown product of metam-sodium) in the household water supply. The irrigation district supplied the residents with clean water. The agricultural commissioner fined the grower \$2,500 for use in conflict with the label (in failing to take all precautions against environmental contamination), and also imposed a \$1,000 penalty on the dealer who delivered the pesticide and set up the equipment without insisting that the equipment be located to minimize risk.

## **Regulatory Responses to Illness Data Analysis**

Review of illness data showed that fumigating tree-planting sites with methyl bromide caused a number of incidents including severe burns to applicators. Among 16 cases definitely or probably attributed to methyl bromide exposure during 1994 and 1995, four involved tree hole fumigation, and two of the people involved each lost a week of work. In 1996, three of nine definite or probable methyl bromide cases derived from tree hole fumigation. One of the injured workers was disabled for two weeks. DPR has worked with a supplier of tree hole fumigant to develop improved application equipment. This effort has produced a modified application probe that appears to provide greater safety to applicators.

Field trials to document the improvement have been scheduled. If monitoring results confirm the expected advantage, DPR plans to impose new requirements for safer delivery systems and techniques in 1999.

Based on preliminary review of episodes involving pesticide applicators, use of backpack sprayers appears to be another area of potential concern. DPR will undertake more extensive analysis of use patterns and health complaints to determine whether the situation warrants regulatory intervention.

DPR also has begun a more general initiative, the Pesticide Workplace Evaluation Program. This program aims specifically to find ways to reduce the number of pesticide-related illnesses. DPR will train County Agricultural Commissioner enforcement staff in principles of industrial hygiene and occupational safety. This will equip them to take a broader view of safe pesticide use practices than they have had as enforcement agents. This initiative should provide new insights into the sources of illness and injury and new proposals for practical measures to control them.

Regulations requiring laboratories to report cholinesterase test results in standard units progressed towards implementation. To make use of cholinesterase tests, it is almost always necessary to compare results from the time of exposure to levels measured when the person had not been in contact with pesticides. At present, laboratories use such a variety of methods and procedures that tests done at one lab provide little guidance in determining whether another lab's test reflects a change from a person's normal status. The proposed regulations will not eliminate differences among laboratories, but should achieve reasonable comparability among their results. DPR expects standardized reporting to begin by January 1, 2000.