

**California Environmental Protection Agency
Department of Pesticide Regulation**

COMPLIANCE ASSESSMENT REPORT

**Pesticide Handler and Field Worker Safety Survey,
June 1997 – March 2001**

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DPR COMPLIANCE ASSESSMENT REPORT
Agricultural Pesticide Handler and Field Worker Safety Survey
June 1997 – March 2001
Executive Summary

BACKGROUND

The Department of Pesticide Regulation (DPR) is responsible for the administration of the statewide pesticide use enforcement program and for supervision of local enforcement programs administered by the County Agricultural Commissioners (CACs). California's pesticide laws and regulations are designed to safeguard pesticide handlers, field workers, the public, and the environment while allowing the use of effective pest management products. Compliance with California's pesticide regulatory program is essential for achieving the protections intended by this program.

In 1994 and 1995, a new federal Worker Protection Standard (WPS) was implemented nationwide, among other things revising employer requirements to give agricultural pesticide handlers personal protective equipment and safety training. Federal regulations also required pesticide registrants to improve the safety requirements on their pesticide labels and to include a reference to the federal WPS.

Although the federal standard drew on California's worker safety program as its model, there were significant differences between the two. In 1995, U.S. EPA recognized California's unique agricultural practices and worker safety program and conditionally approved a request by DPR for equivalency of its worker safety program. Approval became final with California's 1997 adoption of conforming regulations.

California law makes DPR and the CACs jointly responsible for implementing the pesticide use enforcement program. DPR's responsibilities include providing the CACs with the guidance and training necessary to carry out a use enforcement program that is consistent throughout the state. CACs enforce pesticide laws and regulations through activities that include pesticide handler inspections, industry outreach and training, private applicator certification, restricted material permit evaluation, conducting scheduled and unannounced inspections, investigating complaints and worker illnesses, and penalizing violators through the administrative civil penalty program. Because of the risks inherent in the large-scale, commercial application of agricultural pesticides, DPR and CACs have focused on increasing compliance by professional license-holders with the pesticide regulatory requirements. DPR believes that this well-placed focus, especially enforcement actions taken by CACs over the years, resulted in pest control business (PCB) compliance that is significantly higher than grower compliance.

DPR is responsible for the overall statewide program while the CACs administer the local program in their county. Although authorized to inspect, investigate and penalize pesticide handlers, DPR concentrates staff resources on evaluating the effectiveness of county programs; providing guidance to the CACs to assure uniform implementation; assisting in county program planning; and presenting outreach to agricultural stakeholders. CACs utilize the policies, procedures, and training provided by DPR to assure statewide consistency in the administration of county pesticide use enforcement programs.

PURPOSE

The compliance assessment program is part of DPR's statewide effort to improve the quality of its Pesticide Enforcement Program. This assessment provides an evaluation of the effectiveness of the statewide enforcement program. Compliance may vary among specific industry sectors, employers or counties. DPR recognizes that the individual county assessments were a snapshot in time. However, by integrating the various county compliance assessments, DPR is able to construct a general overview that examines factors relative to improving the state/county pesticide program. Our goal is to improve pesticide safety among agricultural field workers and handlers, and protect public health and the environment from the adverse effects of improper pesticide use. The report includes assessment of compliance with rules and regulations government pesticide handlers, field workers, and closed systems used for mixing and loading hazardous liquid pesticides.

The purpose of the compliance assessment program is to:

- Develop compliance measurement standards that accurately reflect compliance by pesticide users with applicable provisions of the Food and Agricultural Code, California Code of Regulations.
- Use a predetermined set of criteria to collect data on pesticide user compliance through field observations by DPR staff.
- Develop compliance improvement strategies for implementation at the state and county levels.
- Aid county and state managers in making decisions on policy and regulatory changes, priority setting, and program planning.

SURVEY METHODS

Each assessment was conducted in one county by a two-person team over a 10- to 14-day period. In addition to conducting observations from 8 AM to 5 PM on Monday through Friday, assessments were conducted on weekends, evenings and early mornings. This approach reduced logistical problems and allowed DPR staff to survey an area intensively and efficiently. DPR staff identified possible observation sites through information obtained from CAC staff, restricted material permit and operator identification records, and DPR's Senior Pesticide Use Specialist assigned to the county. Survey observations were selected and conducted according to established written procedures and staff documented their findings using checklists specific to each survey type. Between June 1997 and April 2001, DPR staff conducted 811 observations covering all survey categories. Staff conducted 572 observations of agricultural pesticide handling activities and 239 observations of field workers performing hand labor in fields with a history of pesticide treatment. These observations covered a wide range of seasonal field activities in more than 60 crops, including fields, nurseries and greenhouses.

County Selection: DPR, in cooperation with the CACs, selected 20 counties for participation in this survey.). The counties were representative of the geographic and growing regions of the State. County selection was based on:

- 1) diversity of their agricultural industries.

- 2) location. DPR's enforcement field staff is divided among three geographic regions, and to make most efficient use of field staff, DPR divided the assessments between these regions each year.
- 3) type. DPR selected larger counties that had higher agricultural production, higher use of agricultural pesticides and higher numbers of handler and field worker activities to observe;
- 4) interest. Some CACs requested compliance assessment visits.

Work Activity Focus: This survey assessed compliance with worker safety requirements in four focused work activities:

- Pesticide handler compliance with worker safety regulations designed to prevent overexposure to pesticides.
- Field worker compliance with worker safety regulations designed to prevent overexposure to pesticide residues.
- Pesticide handler compliance with the DPR's closed system criteria. (DPR requires closed mixing and loading systems for handlers using certain, high-toxicity liquid pesticide formulations.)
- Methyl bromide field fumigation.

Interpretation of Survey Results: Compliance with worker safety requirements reduces the potential for injurious exposures to pesticides and pesticide residues. It is DPR's intention to achieve the highest rate of industry compliance possible. In recognition of this goal, DPR developed the following scale to assess the survey results, define areas needing improvement, and prioritize departmental initiatives:

- Desirable – 90 to 100 percent
- Acceptable - 80 to 89 percent
- Needs Improvement - Less than 80 percent

DPR staff developed checklists that identified the key observation criteria for each survey category and the "letter" codes used to document their results. The observation criteria focused on pesticide laws and regulations that had the greatest effect on worker safety. Staff used DPR's "Inspection Procedures Manual" to guide their data collection; however, in compliance assessment observations, they examined a narrower range of criteria than the routine inspections performed by the CACs. Staff used the standard inspection procedure checklists during compliance assessment observations to assure a thorough evaluation of all applicable criteria and accurate documentation of the results.

DPR staff coded violations of requirements for personal protective equipment (PPE) using "N" for "not in compliance" and "P" for "provided but not used." "N" indicated that the PPE was not available at the work site, it was worn but in poor condition, or it was available but not worn due to poor fit. "P" indicated that the PPE was available and in good condition but was not worn by the handler.

SUMMARY OF FINDINGS

General Findings:

- DPR's survey of agricultural pesticide handlers and field workers revealed compliance below the "Acceptable" level (80 to 89 percent) with regulatory requirements designed to mitigate exposure of agricultural workers to pesticides and pesticide residues.
- Growers in general had significantly lower compliance with the pesticide handler safety requirements than licensed pest control businesses.
- Pesticide handlers, especially growers, had low compliance that "Needs Improvement" level (less than 80 percent) with the provision and use of personal protective equipment, the use of closed pesticide handling systems, the requirement to post emergency medical care information, the provision of adequate decontamination facilities, and the posting of treated fields.
- The field worker safety survey showed no significant differences between grower and farm labor contractor compliance.
- This survey revealed operator compliance in the lower percentage of the "Needs Improvement" level (less than 80 percent) with the hazard communication posting requirements and with providing workers unimpeded access to accurate pesticide application information.

Agricultural Pesticide Handlers

- Growers showed significantly lower compliance than agricultural pest control businesses (PCBs) in most requirements observed. The differences were largest in the areas of emergency medical care posting, the availability of decontamination facilities, the use of personal protective equipment, and the safe use of closed systems. Growers had compliance below the "Needs Improvement" level (less than 80 percent) with the treated field-posting requirement. This requirement applied only to the operator of the property and not to the PCB making the application.
- Agricultural PCBs showed compliance below the "Needs Improvement" level (less than 80 percent) with some PPE requirements and the safe use of closed systems.
- The number of handler compliance observations in all survey criteria increased steadily from 0 percent to 100 percent, with the median at 82 percent. However, when PPE criteria were considered separately, handlers fell into two distinct groups: those with less than 40 percent compliance (repetitive violators) and those with 100 percent compliance. About 36 percent of the growers and 25 percent of the agricultural PCBs surveyed appear to be repetitive violators of the PPE requirements. For the purposes of this survey, a repetitive violator is a handler who is observed in compliance with less than 40 percent of the requirements applicable to their pesticide handling activities.
- Handler compliance with the PPE requirements was similar for those using enclosed cab application vehicles and those operating without this engineering control. While median compliance was high (92 percent and 100 percent, respectively), repetitive violators composed about one-third of each group.

Field Worker Safety

Grower and farm labor contractors (FLCs) showed similar compliance with all survey criteria except for the provision of decontamination facilities where grower compliance was much lower than FLC compliance. Compliance well below the “Needs Improvement” level (less than 80 percent) was found with application-specific and hazard communication information display requirements in both grower and FLC fieldworker operations.

Closed Systems

- Many systems, either in their construction or their use, do not meet the Department’s closed system criteria. Systems often lacked appropriate probe seals or adequate rinsing capability.
- Handlers were observed using systems unsafely due to modifications made to decrease loading time (removal of probe seals), and improper maintenance of elements such as external sight gauges (open tank cover to observe filling).
- In some instances, staff observed physical incompatibilities between closed systems available at the location and the pesticide containers delivered to the use site. In addition, some pesticide labels have mixing instructions that are incompatible with the proper use of a closed system (requires tank hatch to be opened during loading or mixing).

CONCLUSION – RESPONSE TO FINDINGS SUMMARY

DPR’s survey of agricultural pesticide handlers and field workers revealed compliance levels needing improvement with regulatory requirements designed to mitigate agricultural workers’ exposure to pesticides and pesticide residues. DPR will work with county agricultural commissioners and agricultural industry representatives to improve compliance with new and long-standing regulatory requirements designed to protect the health of agricultural workers, and in doing so, protecting public health and the environment.

DPR intends to allocate resources towards improving compliance with survey observation criteria shown to have less than 80 percent average compliance and among individual operators with less than 80 percent compliance with the observation criteria applicable to their handling activity. The strategies for compliance improvement follow.

Compliance Improvement Strategies

Short and long-term strategies will be used by DPR’s Enforcement Branch to address the compliance issues discussed above. DPR’s Enforcement Branch will implement the following strategies in conjunction with the CACs and with support from other DPR programs.

Enforcement and Compliance Actions

- DPR will continue to work with CACs to prioritize appropriate enforcement and compliance actions by using the Enforcement Guidelines (policy), and the fine guidelines (3CCR 6130),

utilizing the information provided through the Compliance Assessment Program. DPR will provide refresher training on DPR's "Enforcement Guidelines" policy to assure consistent statewide implementation. **(Ongoing)**

- Recent legislative and regulatory action has given DPR the authority to take enforcement actions against violations committed in multiple jurisdictions or associated with priority investigations (as defined in the current U.S. EPA Cooperative Agreement). DPR also has the authority to refer those violations to the county District Attorney. DPR will issue a policy letter that explains the procedures DPR will use to implement the Department's enforcement action authority. **(Short-term)**
- DPR will use its Enforcement Action Tracking database to compare the level of actions taken against growers and licensed PCBs. This assessment will be conducted to assure that all license or certificate holders and permittees receive equitable treatment of documented violations. **(Long-term)**
- DPR's Enforcement Branch will review the Enforcement Guidelines to determine the effectiveness of this policy and to propose improvements where needed. **(Short-term)**

Pesticide Use Monitoring and Records Inspections

- DPR will emphasize grower handler inspections relative to licensed PCB inspections in counties where grower compliance is significantly lower than PCB compliance. DPR will work with appropriate CACs to assure that this priority appears in their annual Negotiated Work Plans. **(Ongoing)**
- DPR will encourage CACs to increase the number of fieldworker inspections (target total for FY 2001/2002: 3000 inspections). This increase will address compliance below the "Needs Improvement" level with the Hazard Communication Information display requirements and provide CACs and DPR the opportunity to gain a better understanding of the barriers to compliance with the application-specific information display requirement. **(Ongoing)**

Oversight and Guidance

DPR provides supervision and guidance to the CACs to assure statewide consistency in the administration of pesticide use enforcement programs at the local level.

- DPR staff will continue to conduct overview inspections with CAC staff during pesticide use monitoring and records inspections to determine adherence to established procedures and to assess CAC staff's training needs. **(Ongoing)**
- DPR will use overview inspections to evaluate the accuracy of the compliance assessment in counties participating in the initial survey and as a general indicator of compliance in other counties.
- DPR will develop and/or update policies and procedures in response to identified program needs and provide follow-up training to CAC staff to assure proper implementation. The

Enforcement Branch intends to complete a review and revision of the pesticide use monitoring and field worker safety inspection procedures and forms by January 2002. **(Short-term).**

- Enforcement Branch field staff will provide inspection procedures training (using current procedures) to specific CAC staff on the basis of established need, including the addition of new staff or deficiencies noted during overview inspections or the annual Effectiveness Evaluation of the county. DPR will schedule large-scale (regional) training soon after completion of the inspection procedure review **(Ongoing)**
- DPR has committed to providing CACs with immediate access to current, updated Pesticide Laws and Regulation and Procedural Guidance Manual through DPR's external web site. Existing information is being reformatted to improve downloading and updating. **(Short term and mid-term, respectively)**

Evaluation of Statewide Pesticide Enforcement Program Evaluation

DPR uses information from a variety of sources to evaluate the effectiveness of the statewide pesticide use enforcement program and identify ways in which the program can be improved through state and local efforts.

- DPR's draft Strategic Plan aims to reduce human and environmental health risks by maximizing compliance with all regulatory requirements. To meet that goal, DPR intends to identify and address compliance problems identified through the annual analysis of compliance database. Starting fiscal year (FY) 2001/2002, DPR will begin a pilot program to evaluate the use of CAC inspection information in the development of a compliance database. This will allow DPR and the CACs to identify and prioritize compliance problems, develop strategies to address the priority issues, and evaluate the effectiveness of those strategies on program improvement. **(Long-term)**
- The Field Worker Safety compliance survey identified barriers to the display and use of application-specific information. DPR intends to continue working with the U.S. EPA to assure increased protection of agricultural field workers through the provision of, or unimpeded access to, appropriate pesticide-related information. **(Long-term)**
- The closed system compliance survey identified barriers to safe use of these systems, including lack of training, improper maintenance, and system incompatibilities with pesticide containers or pesticide labeling requirements. DPR will work with the American Society of Agricultural Engineers (ASAE), the U.S. EPA, the agricultural industry, and university personnel in an effort to develop national performance standards for closed systems that load and/or transfer liquid and/or dry pesticides. **(Long-term)**
- DPR will use CAC inspection reports to document the engineering incompatibilities encountered during routine pesticide handling inspections and investigations. DPR will work with appropriate national organizations to promote the use of standardized, bulk, and/or recyclable containers for pesticides that require the use of closed systems. **(Long-term)**

- Some pesticide labels require the handler to add pesticides and adjuvants in a certain order to avoid adverse chemical reactions or poor mixing. Sometimes the handler must add other pesticides, including adjuvants, after loading the pesticide that requires the use of the closed system. DPR will use CAC inspection reports to document pesticide-labeling incompatibilities encountered during routine pesticide handling inspections and investigations. **(Long-term)**

Outreach to Public and Industry Stakeholders

- DPR conducts outreach to industry groups that addresses all elements of the department's programs and priorities. As a result of information collected during the Compliance Assessment surveys, DPR will focus on improving agricultural employers' compliance with pesticide safety requirements through the use of videos, hotlines, brochures and presentations. **(Short-term)**

Sharing Compliance Assessment Information

- DPR intends to present compliance assessment findings to industry groups such as grower and commodity groups, labor and public training organizations, and to licensees through continuing education classes. **(Short-term)**

General Outreach Presentations

- DPR staff will continue to provide field worker safety and pesticide handler safety outreach and training to industry members, licensees, and CAC staff. **(Ongoing)**

DPR COMPLIANCE ASSESSMENT REPORT

Agricultural Pesticide Handler and Field Worker Safety Survey

June 1997 – March 2001

Introduction

Among other responsibilities, the Department of Pesticide Regulation (DPR) administers the statewide pesticide use enforcement program and supervises local enforcement programs administered by the County Agricultural Commissioners (CACs). California's pesticide laws and regulations are designed to protect pesticide handlers, field workers, the public, and the environment while allowing the safe use of effective pest control products. Compliance with California's pesticide regulatory restrictions is essential for achieving the protections intended by this program.

In 1997, the Department began a Compliance Assessment Program to perform onsite field evaluations of pesticide users to assess the degree of compliance with certain, predetermined requirements of the Food and Agricultural Code. Enforcement Branch staff conduct compliance assessments by observing specific aspects of pesticide use in field situations and documenting pesticide user compliance with requirements. DPR and the CACs use this information to identify program strengths and weaknesses, plan focused inspections, design outreach programs, make programmatic and policy changes, and modify annual work plans.

While compliance may vary among specific industry sectors, employers or counties, DPR uses compliance assessment data to evaluate the effectiveness of laws, regulations, and label requirements. CACs also use the data to identify statewide trends, target enforcement activities, and evaluate county pesticide use enforcement priorities.

DPR, in cooperation with the CACs, selected 20 counties for participation in this program based on the size and diversity of their agricultural industries and on their location within the state. Between June 1997 and March 2001, staff conducted 572 observations of agricultural pesticide handling activities and 239 observations of field workers performing hand labor in fields with a history of pesticide treatment. DPR staff spent approximately two weeks in each county, over one 14-day period or two 7-day periods. Appraisals were conducted according to established procedures and staff documented their findings using checklists specific to each observation category (Attachments 1-5). The results provide a general assessment of compliance trends among agricultural employers.

Assessment Categories:

Section I: Agricultural Pesticide Handler Safety Requirements:

- **General Requirements:** In 1994 and 1995, a new federal Worker Protection Standard (WPS) was implemented nationwide, among other things revising employer requirements to give agricultural pesticide handlers personal protective equipment and safety training. Although the federal standard drew on California's worker safety program as its model, there were significant differences between the two. In 1995, U.S. EPA recognized California's unique agricultural practices and worker safety program and conditionally approved a request

by DPR for equivalency of its worker safety program. Approval became final with California's 1997 adoption of conforming regulations.

The WPS also required pesticide registrants to improve the safety requirements on their pesticide labels and to include a reference the federal standard.

During their observations, DPR staff assessed handler compliance with safety regulations designed to mitigate worker exposure to pesticides. These requirements included the use or availability of personal protective equipment, closed systems, decontamination supplies, and emergency medical information. Staff also assessed general pesticide handling standards including proper pesticide container rinsing and control procedures, adequate supervision of uncertified handlers, treated field posting, and compliance with applicable pesticide label instructions.

- **Closed System Equipment Requirements:** DPR requires closed mixing and loading systems for handlers using certain, high-toxicity liquid pesticide formulations. This survey assessed handler compliance with the DPR's closed system criteria (3CCR section 6746 and Worker Health and Safety letter - WHS 98-01, "Application of Closed System Criteria"). The closed system criteria apply to employees who mix and load liquid pesticides, and liquid dilutions of dry pesticides, labeled with the signal word "Danger" or listed in 3CCR section 6790, "Minimal Exposure Pesticides". Federal and state regulations allow handlers to substitute a closed system for some or all personal protective equipment required by pesticide labeling or by regulation. Closed systems that do not meet DPR's safety criteria may increase handler risks when used with reduced personal protective equipment.
- **Methyl Bromide Field Fumigation Requirements:** This survey assessed handler compliance with permit conditions governing methyl bromide field fumigations. (Methyl bromide users must obtain a permit from the county agricultural commissioner. Permits are specific to the site where the application is to be made. Before approving a permit, the commissioner reviews the site to ensure that schools, homes, and other "sensitive" sites are protected. Commissioners may require specific use practices as a condition of use. Suggested "permit conditions" are developed by DPR.) In January 2001, new, more restrictive regulations governing methyl bromide field fumigations went into effect. DPR staff concluded these assessments before full implementation of the new regulations.

Section II: Agricultural Field Worker Safety Requirements Title 3 of the California Code of Regulations (3CCR) and the federal WPS:

In 1997, DPR amended California's worker safety regulations in response to changes in federal pesticide law. Federal law improved safety provisions for agricultural field workers and required pesticide registrants to identify restricted entry intervals, safety requirements for early entry work activities, posting and notification requirements, and references to the federal WPS on their pesticide labels. California's amended regulations mitigate workers' exposure to pesticide residues through the availability of decontamination supplies, emergency medical information, and information concerning the treatment history of the work site.

Compliance Rating Scale

Compliance with worker safety requirements reduces the potential for injurious exposures to pesticides and pesticide residues. It is DPR's intention to achieve the highest rate of industry compliance possible. In recognition of this goal, DPR developed the following scale to assess the survey results, target areas needing improvement, and prioritize departmental initiatives.

- 90 percent to 100 percent = Desirable
- 80 percent to 89 percent = Acceptable
- Less than 80 percent = Needs Improvement

General Program Information

Observations Categorized by Operator and Survey Category

DPR staff observed pesticide handlers and field workers under a broad range of agricultural use settings, including more than 200 pesticide products and 85 crops. Observations included growers, pest control businesses (PCBs) and farm labor contractors (FLCs).

Table 1. Number of Observations, Categorized by Operator and Survey Category

Types of Operators	Pesticide Handler Safety			Field Worker Safety	Total:
	General Handler Safety	Closed Systems Equipment	Methyl Bromide Field Fumigation		
Growers	394	7	7	164	558
PCBs	173	19	6		198
FLCs				80	80
Other	2				2
Total	569	26	13	244	852

Observations Categorized by Pesticide Handler and General Pesticide Handling Activities

DPR staff assessed compliance with general pesticide safety requirements for aerial, ground and hand applications, field soil fumigations, and mixing and loading operations.

Table 2. Number of Observations, Categorized by Pesticide Handler and General Pesticide Handling Activities

Handlers	Application				Mix / Load	App. / Mix / Load		Other	Total
	Aerial	Ground	Hand	Fumigation		Aerial	Ground		
Growers		256	17	6	109		5	1	394
PCBs	37	47	1	9	74	2	3		173
Other			1					1	2
Total	37	303	19	15	183	2	8	2	569

Agricultural Pesticide Handler Safety Assessment Results

Compliance with Pesticide Handler Safety Observation Criteria – All Handlers

Agricultural pesticide handler compliance for each observation criterion ranged from 31 percent, for the use of chemical-resistant aprons required by the pesticide label, to 98 percent, for securing pesticide containers at the use site and for compliance with the site, rate and method requirements on pesticide product labeling. The applicability of the observation criteria to the regulatory and label requirements of the pesticide product being used is reflected in the column labeled, “Total # of Observations.”

Table 3. Compliance with Pesticide Handler Safety Observation Criteria – All Handlers

Requirements:	Percent Compliance	95% Confidence Interval (CI) ¹		Total # of Observations
		Lower	Upper	
Emergency Medical Care Information:				
Emergency Medical Posting – Address	57%	53%	61%	538
Emergency Medical Posting – Name	60%	56%	64%	538
Emergency Medical Posting – Telephone No.	62%	57%	66%	538
Decontamination Facilities:				
Emergency Eyewash Available	62%	57%	67%	408
Decontamination Supplies	70%	66%	74%	543
Extra Coveralls	78%	74%	81%	485
Decontamination Site w/in ¼ mi. of Use Site	86%	83%	89%	542
Decontamination Site Present	87%	83%	89%	542
PPE Provided and Used:				
PPE Label – Apron	31%	19%	46%	48
PPE Regulation – General	56%	52%	61%	541
PPE Label – General	58%	54%	62%	563
PPE Regulation – Protective Eyewear	67%	63%	71%	503
PPE Label – Protective Eyewear	68%	56%	65%	480
PPE Label – Chemical-resistant Clothing	71%	54%	85%	38

¹ Confidence Interval.

As used in this report, the "percent compliance" value is an estimate based on the number of observations, and the associated confidence interval represents the likely range of estimated compliance. The confidence interval is a measure of the relative uncertainty of the compliance estimate and defines the range where the true value is most likely to occur. A 95 percent confidence interval signifies that there is a 95 percent chance that the true compliance percentage lies between the lower and upper values of the intervals. (That is, if the compliance assessment survey was repeated many times, the resulting compliance estimates would fall within the confidence interval 95 percent of the time. There is inherently more certainty in a compliance estimate with a narrow confidence interval; that is, when there is a narrow gap between the two endpoints. A very wide confidence interval-typically found in categories with a limited number of observations-may indicate that more data should be collected before anything very definite can be said.

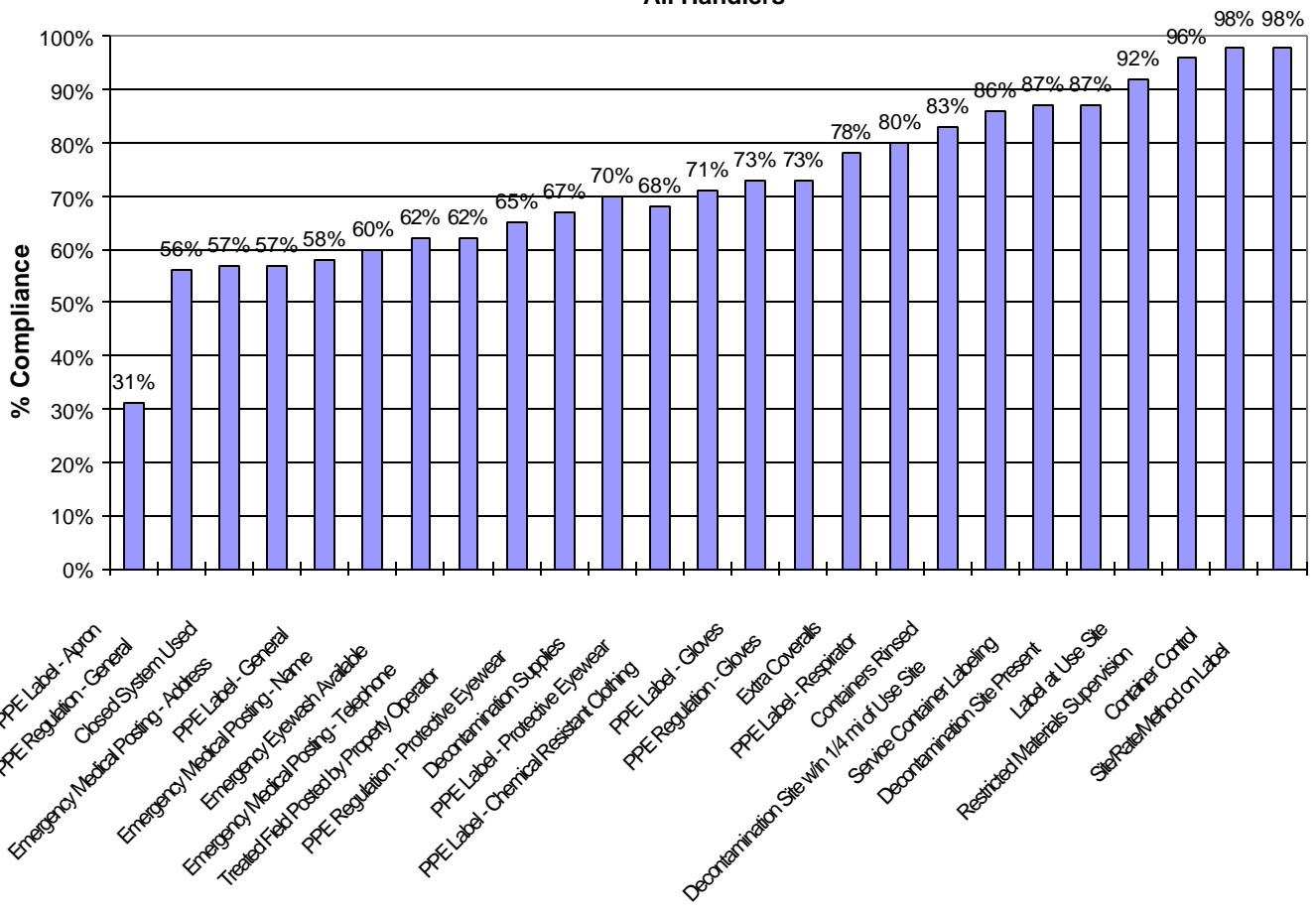
Reference: Biostatistical Analysis, 3rd edition, 1996. Jerrold H. Zar. Prentice-Hall. Upper Saddle River, NJ 07458

Chapter 23. More on Dichotomous Variables

Section 23.4 Confidence Limits for Population Proportions, p. 524.

PPE Label – Gloves	73%	69%	77%	514
PPE Regulation – Gloves	73%	69%	77%	506
PPE Label – Respirator	80%	73%	86%	148
General Application Standards:				
Closed System Used	57%	42%	70%	53
Treated Field Posted by Property Operator	65%	53%	76%	69
Containers Rinsed	83%	73%	90%	86
Service Container labeling	87%	66%	97%	23
Label at Use Site	92%	90%	94%	559
Restricted Materials Supervision	96%	92%	98%	176
Container Control	98%	96%	99%	522
Site/Rate/Method on Label	98%	96%	99%	550

Chart 1
Compliance with Agricultural Pesticide Handler Safety Observation Criteria:
All Handlers



Compliance with Pesticide Handler Safety Observation Criteria –Growers and PCBs

Grower compliance was lower than that of agricultural pest control businesses (PCBs) for each observation criterion assessed. The largest differences were in the availability of emergency medical information and decontamination facilities, and the use of closed systems and PPE. PCBs had acceptable compliance with the majority of observation criteria but their compliance with many of the PPE requirements and with the use of closed systems needs improvement. Growers need to improve compliance with emergency medical posting, decontamination, PPE, closed systems, container rinsing, and treated field-posting requirements.

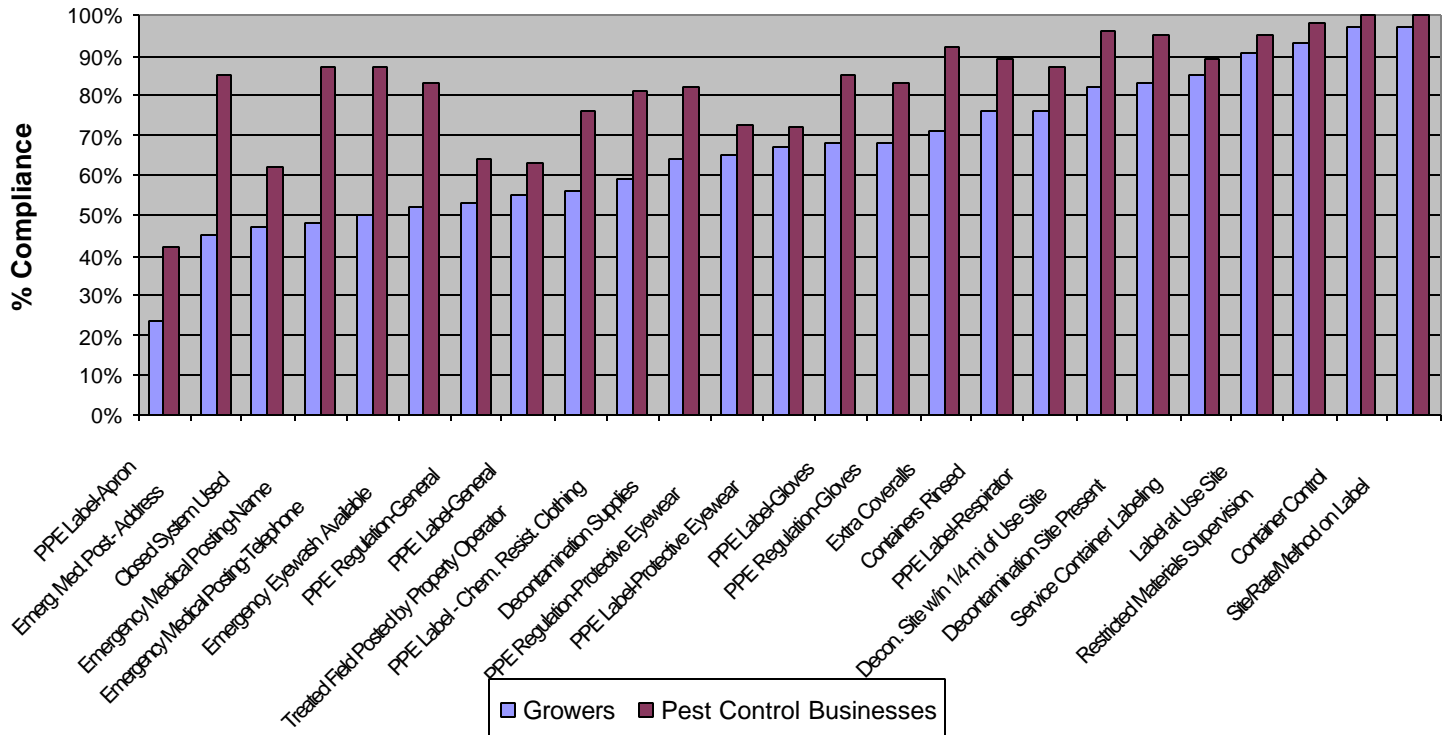
Table 4. Compliance with Pesticide Handler Safety Observation Criteria – Growers and PCBs

Requirements	Growers				PCBs			
	# Obs	% Comp	95% CI		# Obs	% Comp	95% CI	
			L	U			L	U
Emergency Medical Care Information:								
Emergency Medical Posting –Address	372	45%	40%	50%	164	85%	78%	90%
Emergency Medical Posting –Name	372	48%	43%	53%	164	87%	80%	91%
Emergency Medical Posting –Telephone No.	372	50%	45%	55%	164	87%	81%	92%
Decontamination Facilities:								
Emergency Eyewash Available	274	52%	46%	58%	133	83%	76%	89%
Decontamination Supplies	375	64%	59%	69%	166	83%	77%	88%
Extra Coveralls	330	71%	66%	76%	153	92%	87%	96%
Decontamination Site - ¼ mi. of Use Site	375	82%	77%	85%	165	96%	92%	99%
Decontamination Site Present	375	83%	79%	87%	165	95%	91%	98%
PPE Provided and Used:								
PPE Label – Apron	29	24%	10%	44%	19	42%	20%	67%
PPE Regulation – General	372	53%	47%	58%	168	64%	57%	72%
PPE Label – General	392	55%	50%	60%	170	63%	55%	70%
PPE Label – Chemical-resistant Clothing	17	59%	33%	82%	21	81%	58%	95%
PPE Regulation – Protective Eyewear	355	65%	60%	70%	147	73%	65%	80%
PPE Label – Protective Eyewear	297	67%	61%	72%	126	72%	64%	80%
PPE Label – Gloves	363	68%	63%	73%	150	85%	78%	90%
PPE Regulation – Gloves	355	68%	63%	73%	150	83%	76%	89%
PPE Label – Respirator	87	76%	65%	84%	61	87%	76%	94%
General Application Standards:								
Closed System Used	19	47%	24%	71%	34	62%	44%	78%
Treated Field Posted by Property Operator ²	36	56%	38%	72%	33	76%	58%	89%
Containers Rinsed	41	76%	60%	88%	45	89%	76%	96%
Service Container Labeling	13	85%	55%	98%	9	89%	52%	100%
Label at Use Site	392	91%	88%	94%	166	95%	90%	97%
Restricted Materials Supervision	74	93%	85%	98%	102	98%	93%	100%
Container Control	368	97%	95%	98%	153	100%	98%	100%
Site / Rate / Method on Label	377	97%	95%	99%	172	100%	98%	100%

² State and federal law holds property operators, not PCBs, solely responsible for compliance with this requirement.

Chart 2

Compliance with Agricultural Pesticide Handler Safety Observation Criteria: Comparison of Growers and Pest Control Businesses



Comparison of Pesticide Handler Compliance with PPE Observation Criteria Based on the Use of Enclosed Cab Application Vehicles³

Approximately 30 percent of the applications observed by DPR staff were conducted from within enclosed cab application vehicles while the remaining applications were conducted without this type of engineering control. The survey showed similar compliance with the general PPE requirements among the two types of applicators. Handlers who did not use an enclosed cab had much lower compliance with the requirement to wear chemical-resistant clothing than did their counterparts who were required to possess this article of PPE in the cab. Handlers who used enclosed cab vehicles had somewhat lower compliance with the respirator requirement than the other handlers did (Table 5, Chart 3).

Table 5. Comparison of Pesticide Handler Compliance with PPE Observation Criteria Based on the Use of Enclosed Cab Application Vehicles

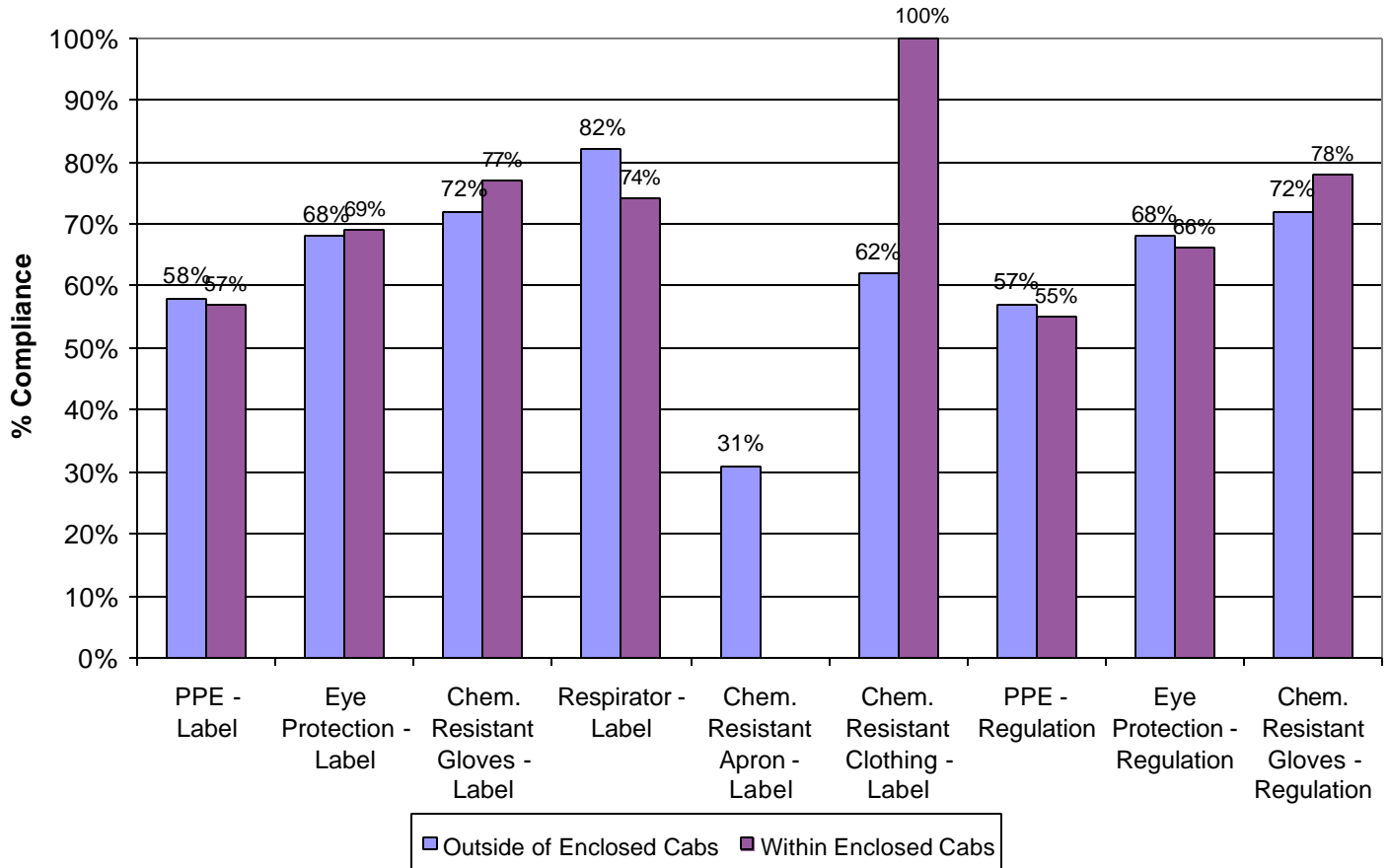
Requirements:	No Enclosed Cab Application Vehicles				Enclosed Cab Application Vehicles Used by Handlers			
	# Obs	% Comp	95% CI		# Obs	% Comp	95% CI	
			L	U			L	U
PPE Label – General	445	58%	53%	63%	118	57%	47%	66%
PPE Label – Protective eyewear	331	68%	63%	73%	93	69%	58%	78%
PPE Label – Chemical-resistant gloves	410	72%	68%	76%	104	77%	68%	85%
PPE Label – Respirator	117	82%	74%	89%	31	74%	55%	88%
PPE Label – Apron ⁴	47	32%	19%	47%	N/A	N/A	N/A	N/A
PPE Label – Chemical-resistant clothing	29	62%	42%	79%	9	100%	66%	100%
PPE Regulation – General	428	57%	52%	62%	113	55%	45%	64%
PPE Regulation – Protective eyewear	403	67%	63%	72%	100	66%	56%	75%
PPE Regulation – Chemical-resistant gloves	406	72%	67%	76%	100	78%	69%	86%

³ Pesticide handlers must wear the PPE specified on the pesticide label and in regulation unless they use an engineering control to mitigate their exposure to pesticides. When using an engineering control, handlers are exempt from wearing some or all of the required PPE provided they have it with them at the use site during their handling activities. Agricultural use pesticide product labeling provides handlers with detailed PPE requirements; however, they do not describe PPE exceptions and requirements related to the use of engineering controls. Instead, the product labeling refers handlers to specific sections in the Code of Federal Regulations. In California, pesticide handlers must refer to 3CCR section 6738, Personal Protective Equipment, to learn about the engineering control PPE exceptions.

A properly functioning enclosed cab application vehicle protects handlers from dermal exposure to pesticides. A small number of enclosed cabs also provide protection from inhalation exposure to non-fumigant pesticides because the manufacturers equipped these cabs with an appropriate air purification system. The level of PPE substitution is commensurate with the level of protection provided by the enclosed cab. Handlers are not required to wear specified articles of PPE but they are required to carry the PPE in the cab in a clean, chemical-resistant container.

⁴ “Applications Using Enclosed Cab Vehicles” does not include the “PPE Label – Chemical Resistant Clothing” criterion because this requirement usually applies only to mixing and loading operations.

Chart 3
Comparison of Agricultural Handler Compliance with PPE Observation
Criteria Based on the Use of Enclosed Cab Application Vehicles



Types of PPE Violations

DPR staff codified PPE violations using “N” for “not in compliance” and “P” for “provided but not used” (Attachments 2-5). “N” indicated that the PPE was not available at the work site, it was worn but in poor condition, or it was available but not worn due to poor fit or discomfort due to ambient conditions. “P” indicated that the PPE was available and in good condition but was not worn by the handler. Most PPE violations observed in this survey resulted from employers’ failure to provide employees with appropriate PPE or to assure its availability at the work site before the employees handled pesticides. PCB handlers were somewhat more likely to fail to use available PPE than grower handlers were (Table 6).

Table 6. Types of PPE Violations

Requirements:	Number of Violations by Type					
	All Handlers		PCBs		Growers	
	“N”	“P”	“N”	“P”	“N”	“P”
PPE Label – General	228	9	57	6	172	3
PPE Label – Protective Eyewear	110	24	25	10	85	14
PPE Label – Chemical-resistant Gloves	115	23	16	7	99	16
PPE Label – Respirator	22	7	2	6	20	1
PPE Label – Chemical-resistant Apron	30	3	9	2	21	1
PPE Label – Chemical-resistant Clothing	9	2	2	2	7	0
PPE Regulation – General	223	13	52	8	171	5
PPE Regulation – Protective Eyewear	136	29	29	11	107	18
PPE Regulation – Chemical-resistant Gloves	112	25	18	7	94	18
% of Total:	88%	12%	78%	22%	91%	9%

Pesticide Handler Compliance with the Closed System Equipment Observation Criteria

DPR staff conducted 26 observations of pesticide handlers using a closed system as required by the pesticide label or California’s regulatory requirements. Often, equipment failed to meet safety standards or was used improperly by handlers (Table 7, Chart 4). The Director’s Closed System Criteria describe safety requirements covering probe seals, container rinsing, external sight gauges and shut-off valves. Violations of these criteria reduce the protection provided by this type of engineering control, especially when handlers use it as a substitute for the PPE required by the label or in regulation.

Table 7. Handler Compliance with the Closed System Equipment Observation Criteria

Requirements:	Total Observations	Percent Compliance	95% CI	
			L	U
Meets Director’s Closed System Criteria in PSIS A-3	26	54%	33%	73%
Probe Seal	19	58%	33%	80%
Equipment Safe to Operate	26	65%	44%	83%
Equipment Used Properly	26	65%	44%	83%
Rinsing Capability	18	72%	47%	90%
External Sight Gauge	22	82%	60%	95%
Hose Shut-Off	16	94%	70%	100%
External Shut-Off Valve	21	100%	84%	100%

Pesticide Handler Compliance with the Methyl Bromide Field Fumigation Observation Criteria

Pesticide handlers showed high levels of compliance with methyl bromide product label requirements and the Restricted Material Permit Conditions. However, the small sample size and, as a result, the wide range between the upper and lower confidence intervals makes it difficult to identify this level of compliance as a statewide trend (Table 8, Chart 5).

Table 8. Pesticide Handler Compliance with the Methyl Bromide Field Fumigation Observation Criteria

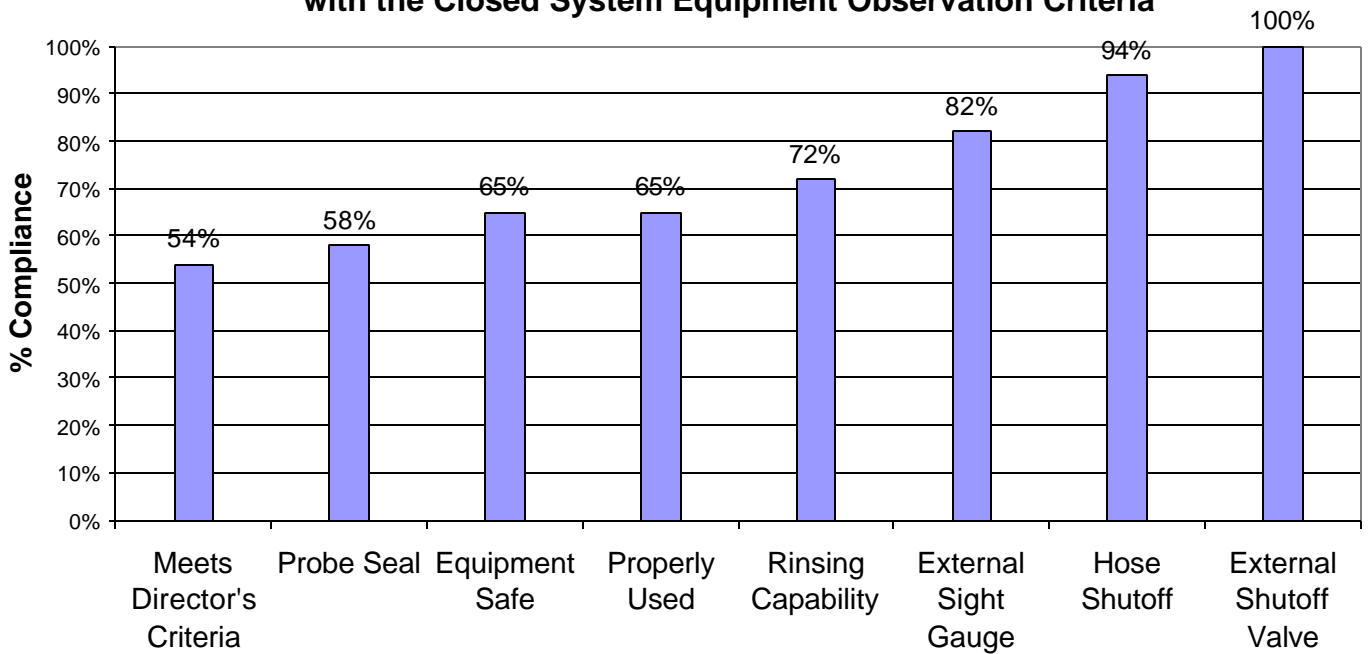
Requirements:	Total Observations	Percent Compliance	95% CI	
			L	U
Equipment – Fans	5	80%	28%	99%
Tarp Seal	13	92%	64%	100%
Equipment – Gas	13	100%	75%	100%
Application Depth	11	100%	72%	100%
Buffer Zone – Residential	13	100%	75%	100%
Buffer Zone – Workers	13	100%	75%	100%
Hours – Driver & Copilot	7	100%	59%	100%
Blade/Chisel Type	8	100%	63%	100%
Tarp Type	13	100%	75%	100%
Label On-Site	13	100%	75%	100%
Site/Rate	13	100%	75%	100%

Pesticide Handler Compliance with Applicable Observation Criteria

The preceding charts use the average compliance for each observation criterion to evaluate industry compliance and the need for targeted compliance improvement efforts. In the following charts, DPR uses average pesticide handler compliance with observation criteria applicable to their handling activities as another measure of program effectiveness. Requirements vary according to the pesticide used, the specific activity, and the handler; therefore, PCBs and growers must have a clear understanding of a large number of pesticide label and regulatory requirements to assure compliance under a wide range of pesticide handling situations.

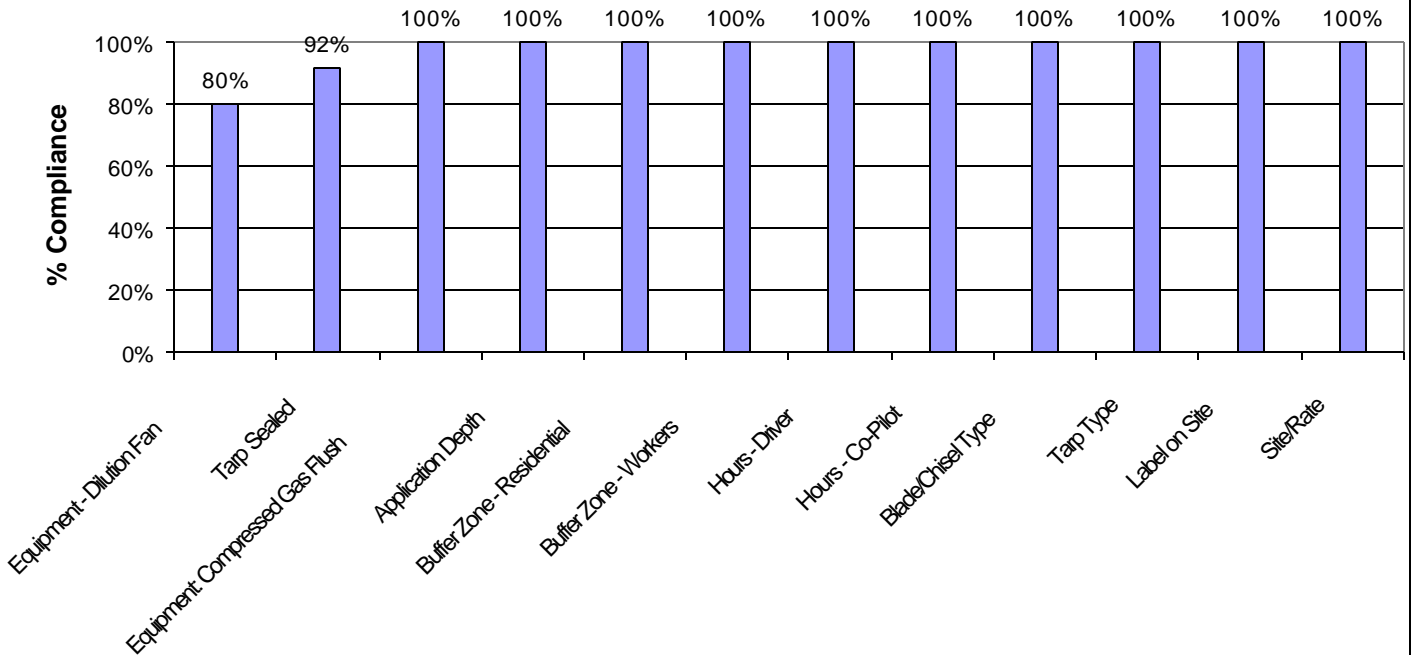
DPR based this analysis on the general pesticide handler safety criteria (Table 3). Neither the closed system equipment nor the methyl bromide field fumigation results were incorporated into this analysis due to the small sample sizes for those surveys. For this analysis, DPR consolidated the emergency medical care posting criteria, “Name”, “Address”, and “Telephone Number” into one criterion called “Emergency Medical Care Posting” to remove duplicate violations that would affect average compliance for this criterion. 3CCR section 6726, Emergency Medical Care, requires employers to plan for emergency medical care in advance and to post the name, address, and phone number of the medical facility at the work site or in a work vehicle. Employers are in violation of this requirement when the required information is incomplete, illegible, or inaccessible.

Chart 4
Agricultural Pesticide Handler Compliance
with the Closed System Equipment Observation Criteria



Closed Mixing / Loading System required by:
Pesticide Label: 8 observations
3CCR 6746, Closed Systems: 22 observations
3CCR 6793, Minimal Exposure Pesticide Safety Use Requirements: 2

Chart 5
Agricultural Pesticide Handler Compliance
with the Methyl Bromide Field Fumigation Observation Criteria



The following charts show the distribution of handler compliance within a group (all handlers, PCBs, or growers) and compare handler compliance between groups. Percent compliance was determined for each handler observation by dividing the number of observation criteria found in compliance with the total number of criteria applicable to that handling operation. Handlers were then grouped according to compliance level and a cumulative percent of total for each level was established. The “cumulative percent of total” is obtained by adding the number of observations at each compliance level to the preceding value(s) and dividing by the total number of observations. This provides a rolling, or “cumulative percent”, of the observations represented at each compliance level and allows average handler compliance to be compared between groups with different sample sizes. The median is the value where fifty percent of the observations, when arranged in order of magnitude, lie on each side. The 95 percent Confidence Interval for the Median is also provided.

Pesticide Handler Compliance per Observation: All Observation Criteria

Median compliance was 82 percent for all handlers. Growers had significantly lower compliance with the applicable observation criteria than PCBs did (Mood Median Test, P= 0.000). Median grower compliance was 77 percent while median PCB compliance was 93 percent (Table 9, Charts 6-8).

Table 9. Pesticide Handler Compliance per Observation: All Observation Criteria⁵

Compliance Level:	All Handlers		PCBs		Growers	
	Total Observations	Cumulative % of Tot. *	Total Observations	Cumulative % of Tot.	Total Observations	Cumulative % of Tot.
0% - 10%	2	0.4%	0	0.0%	1	0.3%
11% to 20%	20	3.9%	3	1.7%	17	4.6%
21% to 30%	12	6.0%	0	1.7%	12	7.6%
31% to 40%	43	13.5%	5	4.6%	38	17.3%
41% to 50%	37	20.0%	4	6.9%	33	25.6%
51% to 60%	46	28.1%	10	12.7%	36	34.8%
61% to 70%	48	36.6%	14	20.8%	34	43.4%
71% to 80%	65	48.0%	23	34.1%	42	54.1%
81% to 90%	65	59.4%	16	43.4%	49	66.5%
91% to 100%	231	100.0%	98	100.0%	132	100.0%
Total Obs:	569		173		394	
Median:		82%		93%		77%
95% CI for Median:		78% 87%		90% 95%		73% 81%

⁵ The “Other” category (Table 2) was not analyzed separately due to the small sample size.

Chart 6
Agricultural Pesticide Handler Compliance per Observation:
All Handlers, All Observation Criteria

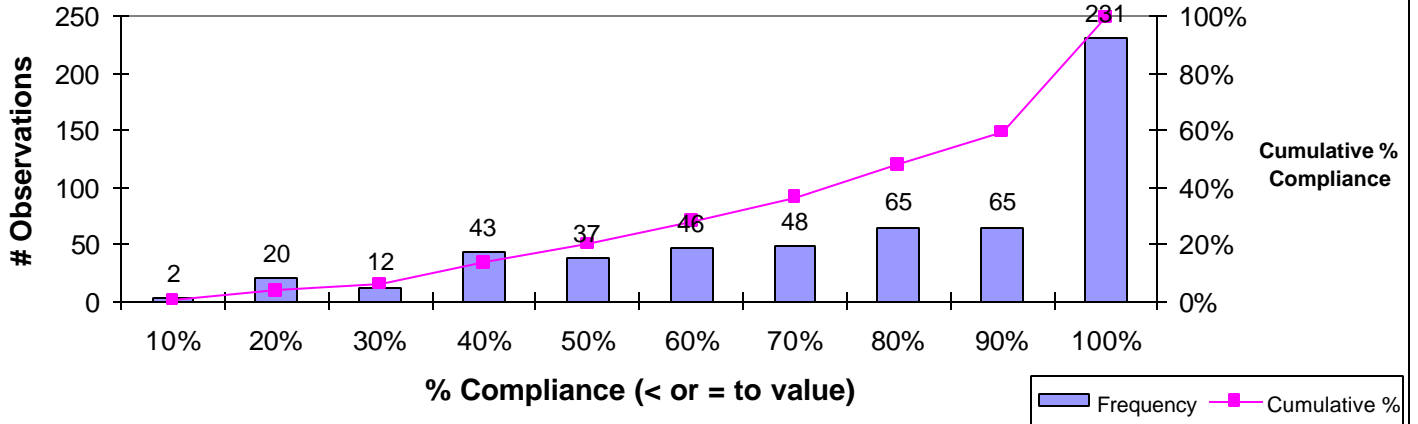


Chart 7
Agricultural Pesticide Handler Compliance per Observation:
Pest Control Businesses, All Observation Criteria

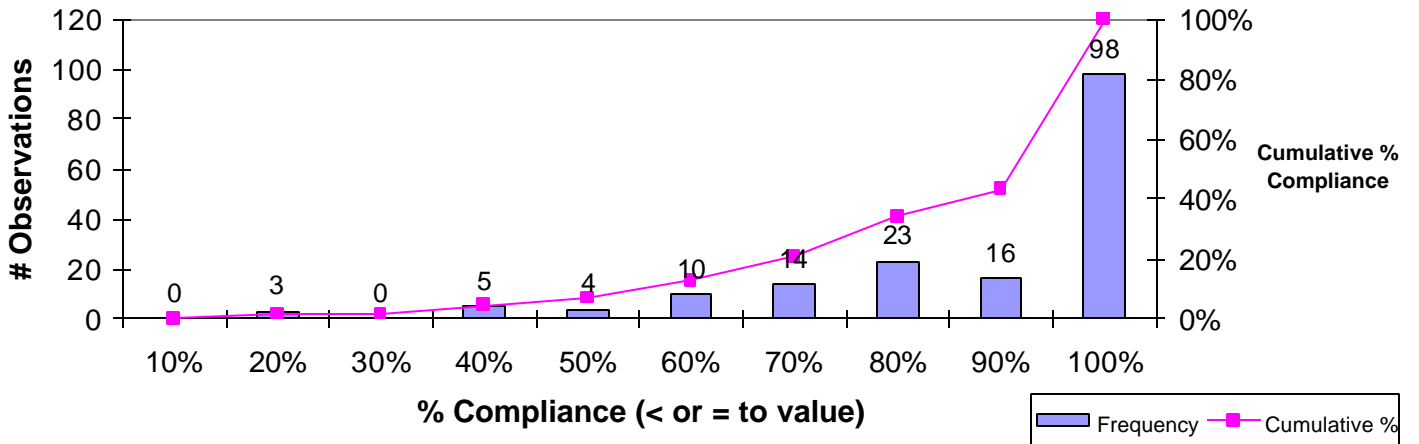
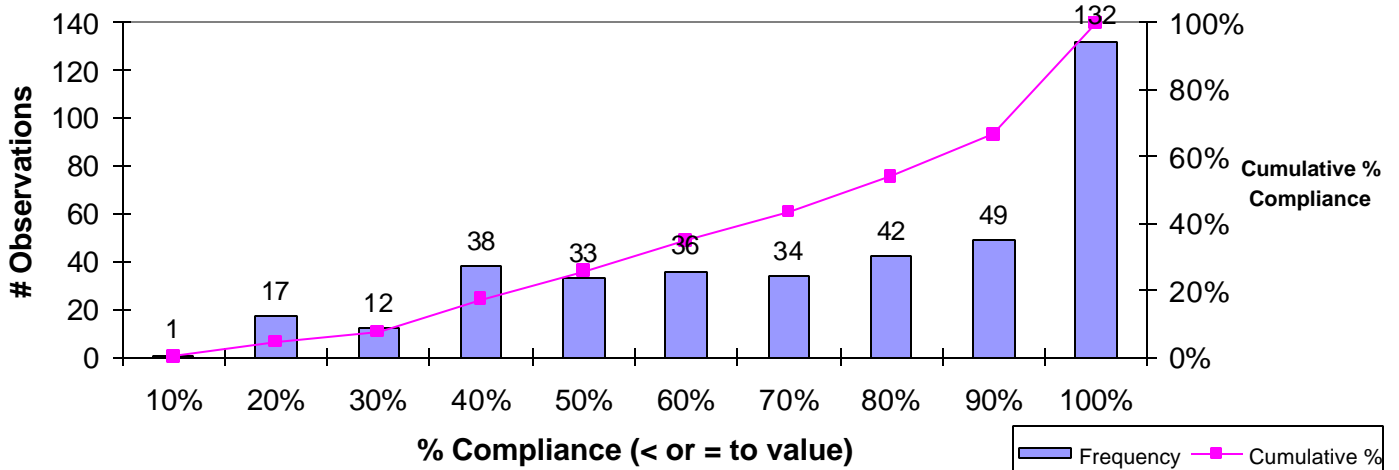


Chart 8
Agricultural Pesticide Handler Compliance Per Observation:
Growers, All Observation Criteria



Pesticide Handler Compliance per Observation: PPE Observation Criteria

This analysis assessed handler protection by determining the level of compliance with the specific PPE required for each handling situation.

The pattern of handler compliance with PPE criteria is very different than the pattern seen in the preceding analysis (Table 9). PPE compliance follows a bimodal distribution, with the largest number of handlers at the highest and lowest levels of compliance, rather than the gradual increase seen when all applicable observation criteria are considered (Tables 9-10, Charts 6-11). Median handler compliance with applicable PPE criteria was 100 percent (Table 10). About half of the handlers surveyed wore all required PPE. However, in this analysis, the high median value masks the large number of handlers (>30 percent) with less than 40 percent compliance with PPE requirements. Grower compliance was significantly lower than PCB compliance with the PPE criteria, with median compliance at 75 percent and 100 percent respectively (Mood Median Test, P= 0.004). Although the median values suggest moderate to high compliance on the part of both groups, it should be noted that 36 percent grower handlers and 25 percent of PCB handlers complied with less than 40 percent of the PPE criteria.

Table 10. Pesticide Handler Compliance per Observation: PPE Observation Criteria ⁶

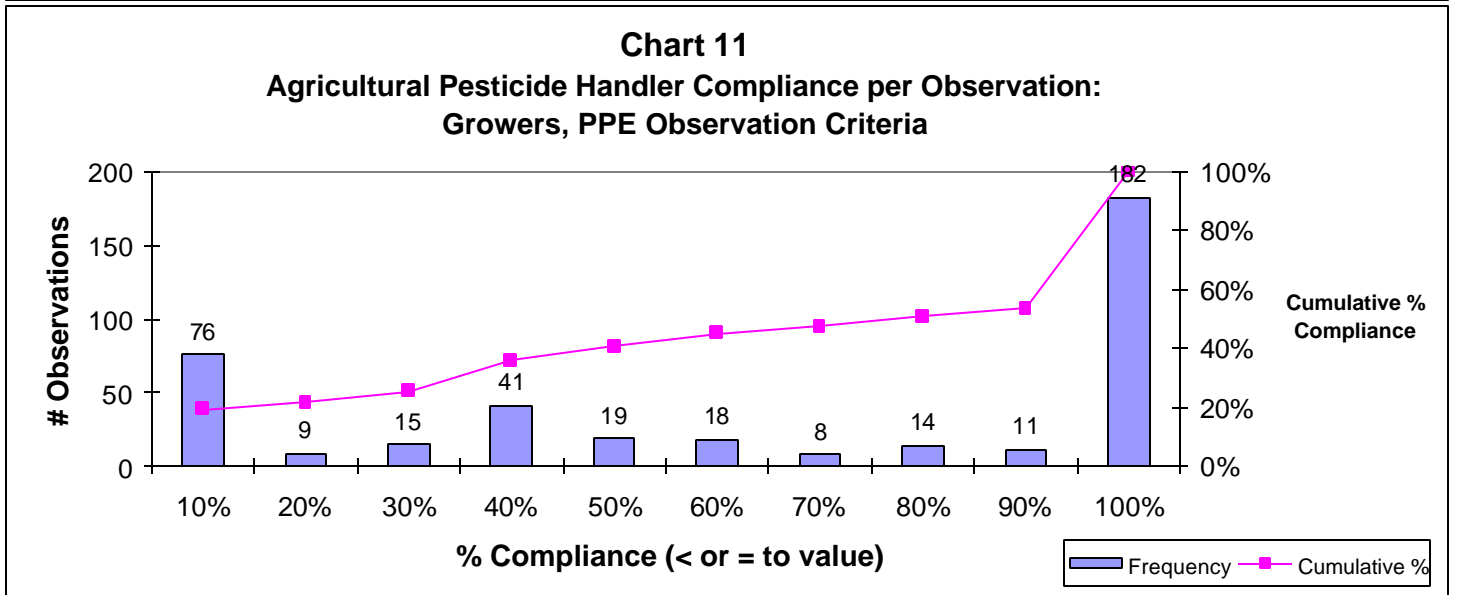
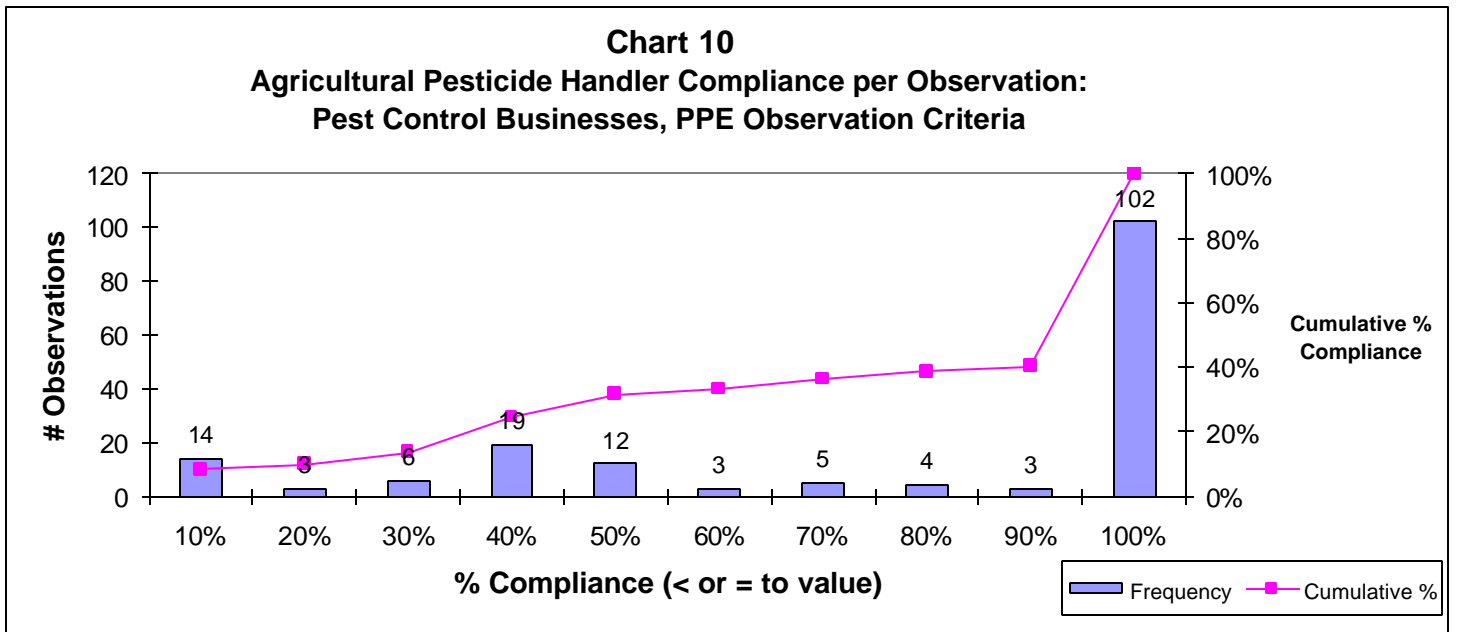
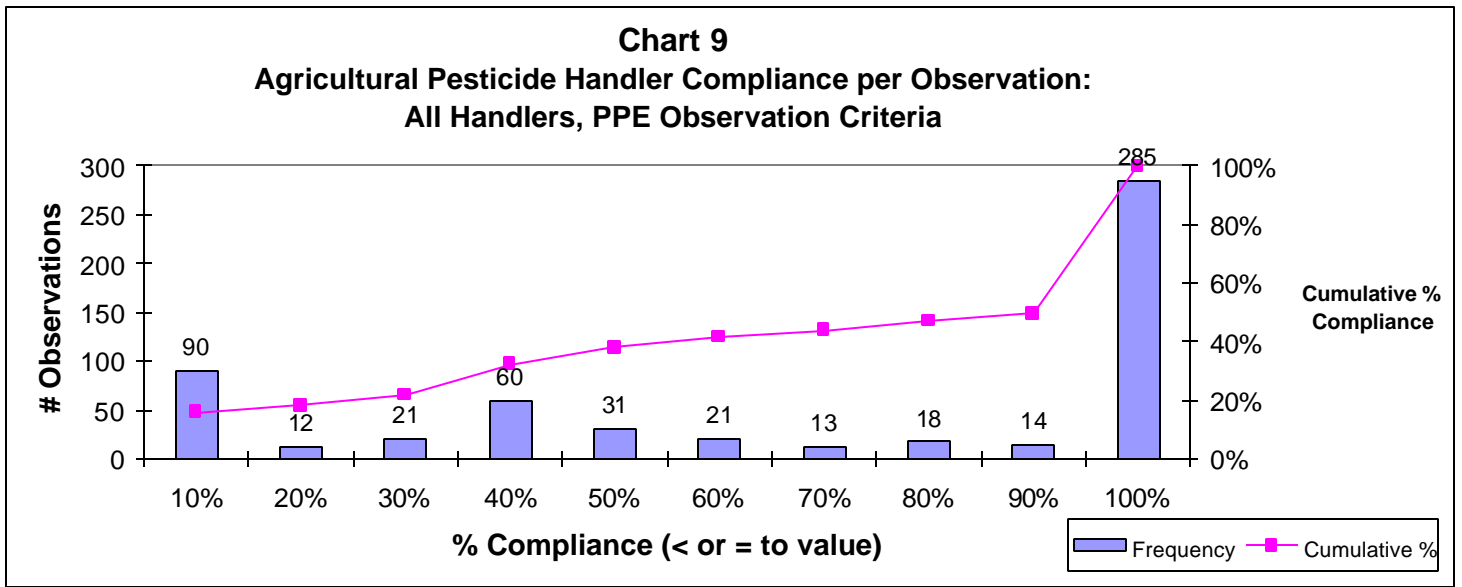
Compliance Level:	All Handlers		PCBs		Growers	
	Total Observations ⁷	Cumulative % of Tot.	Total Observations ⁸	Cumulative % of Tot.	Total Observations ⁹	Cumulative % of Tot.
0% - 10%	90	15.9%	14	8.2%	76	19.3%
11% to 20%	12	18.1%	3	9.9%	9	21.6%
21% to 30%	21	21.8%	6	13.5%	15	25.5%
31% to 40%	60	32.4%	19	24.6%	41	35.9%
41% to 50%	31	37.9%	12	31.6%	19	40.7%
51% to 60%	21	41.6%	3	33.3%	18	45.3%
61% to 70%	13	43.9%	5	36.3%	8	47.3%
71% to 80%	18	47.1%	4	38.6%	14	50.9%
81% to 90%	14	49.6%	3	40.4%	11	53.7%
91% to 100%	285	100.0%	102	100.0%	182	100.0%
Total Obs	565		171		393	
Median:		100%		100%		75%
95% CI for Median:		71% 100%		100% 100%		60% 100%

⁶ The “Other” category (Table 2) was not analyzed separately due to the small sample size.

⁷ 4 observations were excluded from analysis because they lacked applicable PPE criteria.

⁸ 2 observations were excluded from analysis because they lacked applicable PPE criteria.

⁹ 1 observation was excluded from analysis because it lacked applicable PPE criteria.



Pesticide Handler Compliance with PPE Observation Criteria per Observation Based on the Use of Enclosed Cab Application Vehicles

Compliance with the PPE observation criteria was slightly higher for handlers who did not use enclosed cab application vehicles (100 percent) than for those who used this type of engineering control (92 percent) but was not significantly different (Mood Median Test, P= 0.914) (Table 11, Charts 12-13). The pattern of compliance is similar to the pattern seen in the PPE analysis (Table 10) with the highest number of handlers at the highest and lowest levels of compliance.

Table 11. Pesticide Handler Compliance with PPE Observation Criteria per Observation Based on the Use of Enclosed Cab Application Vehicles

Compliance Level:	No Enclosed Cab Application Vehicles		Enclosed Cab Application Vehicles Used by Handlers	
	Total Observations ¹⁰	Cumulative % of Tot.	Total Observations ¹¹	Cumulative % of Tot.
0% - 10%	70	15.7%	20	17.0%
11% to 20%	11	18.1%	1	17.8%
21% to 30%	20	22.6%	1	18.6%
31% to 40%	47	33.1%	13	29.7%
41% to 50%	21	37.8%	10	38.1%
51% to 60%	16	41.4%	5	42.4%
61% to 70%	8	43.2%	5	46.6%
71% to 80%	15	46.5%	3	49.2%
81% to 90%	13	49.4%	1	50.0%
91% to 100%	226	100.0%	59	100.0%
Total Obs	447		118	
Median:		100%		92%
95% CI for Median		75% 100%		60% 100%

¹⁰ Deleted 2 observations – contained no applicable PPE observation criteria.

¹¹ Deleted 2 observations – contained no applicable PPE observation criteria.

Chart 12
Pesticide Handler Compliance per Observation:
NO Enclosed Cab Application Vehicles; PPE Observation Criteria

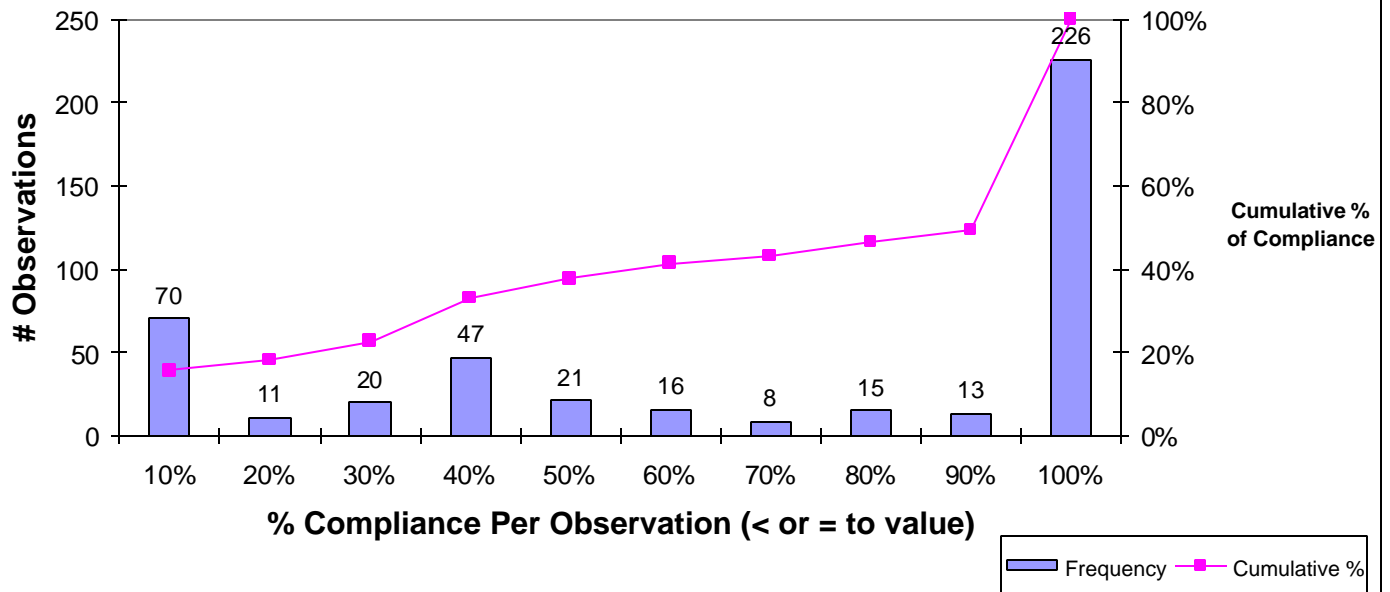
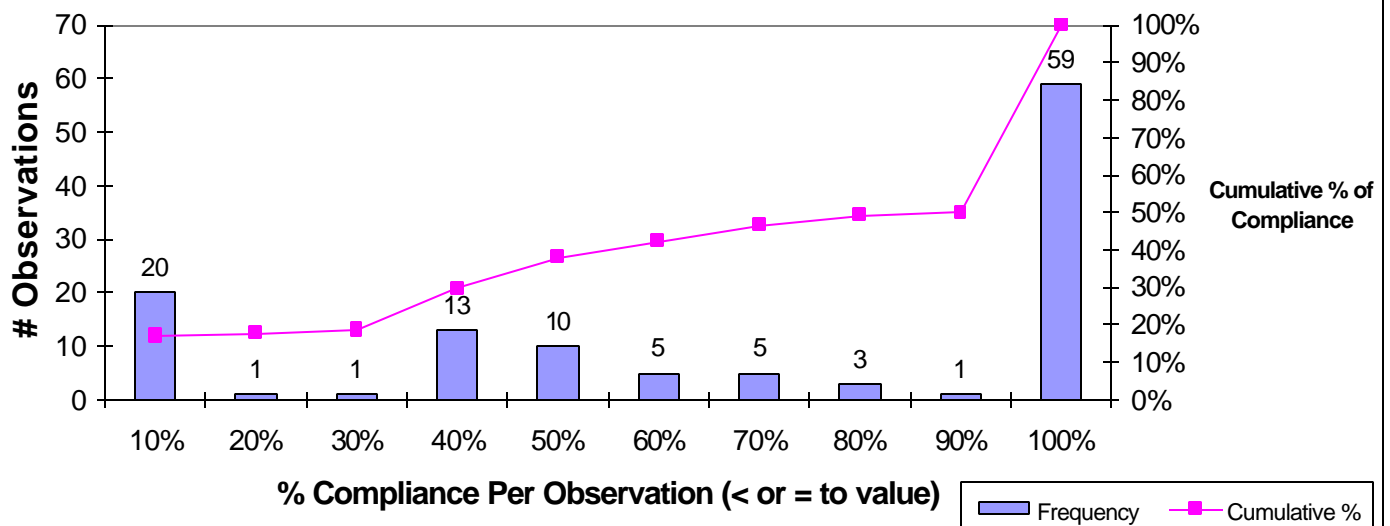


Chart 13
Pesticide Handler Compliance per Observation:
Enclosed Cab Application Vehicles USED, PPE Observation Criteria



Agricultural Pesticide Handler Safety Survey: Discussion

Assessment of Overall Handler Compliance

DPR determined each handler's compliance with the observation criteria applicable to their mixing, loading or application activities. Median agricultural pesticide handler compliance with all applicable criteria was 82 percent, or in the "acceptable" range (Table 9, Chart 6). PCB median compliance, at 93 percent, contributed significantly to the acceptable level of compliance for all handlers.

When only PPE criteria were considered, on the average the median handler compliance increased to 100 percent (Table 10, Chart 9). While median compliance indicates nearly perfect adherence to PPE requirements, handler compliance with PPE observation criteria followed two distinct statistical models or bimodal distribution with the largest numbers of handlers occurring at the highest (100 percent) and lowest levels of compliance (0 percent-40 percent). This distribution contrasts sharply with that seen for compliance with all applicable observation criteria where the number of handlers at each compliance level increased smoothly from the lowest to the highest compliance levels (Table 9, Chart 6). The high median handler compliance for each of these analyses masks the large number of handlers who violated all or most of the PPE observation criteria. Although improvement in PPE compliance would not significantly affect the overall handler compliance rate, it would assure increased protections for the employee pesticide handlers at the lowest compliance levels.

Assessment of Handler Compliance with Specific Observation Criteria

When the observation criteria were considered separately, agricultural pesticide handlers had less than 80 percent average compliance with 16 out of the 25 criteria observed (Table 3, Chart 1). Criteria having the lowest compliance rates included the availability of emergency medical information and decontamination supplies, availability and/or use of PPE, use of closed systems, and treated field posting. While handlers had acceptable compliance with the presence and distance of the decontamination facilities from the workers, those facilities often lacked supplies such as soap and single use towels. The confidence intervals, which are determined in part by the total number of observations, indicate the level of uncertainty associated with the estimated average or median compliance. DPR considered the range of estimated compliance in determining the acceptability of a compliance level associated with an observation criterion or group of pesticide handlers.

The following discussion refers to information provided in Table 3 and Chart 1 unless noted otherwise.

Desirable Compliance:

- **General Application Standards:** Handlers complied with the use site, rate, and method requirements on pesticide labels (98 percent); maintained control over their pesticides and pesticide containers such that they did not create a hazard to people or the environment (98 percent); and provided adequate supervision of uncertified handlers when they used restricted materials (96 percent).

- **Methyl Bromide Field Fumigation Requirements:** Handlers complied with methyl bromide field fumigation permit conditions and label requirements (>90 percent average) (Table 8, Chart 5).

Acceptable Compliance:

- **Decontamination Facilities:** Employers assured that the decontamination site was present at the mixing and loading site and within ¼ mile of other handlers (87 percent and 86 percent, respectively).
- **General Application Standards:** Handlers had the registered, WPS-approved pesticide label at the use site (92 percent); labeled service containers with the required information (87 percent)¹²; and rinsed their pesticide containers according to regulatory requirements (83 percent).

Compliance Needs Improvement:

- **Emergency Medical Care Information.** Agricultural employees often work in isolated areas and need immediate access to medical care information if they become ill or injured. Employers are required to plan for emergency medical care in advance and to post the medical facility's name, address, and telephone number at the work site where employees handle pesticides. Approximately 57 percent of all employees observed had access to complete emergency medical care information at the work site.

Eighty-nine (89) percent of the observed violations in this category were caused by employer's failure to post emergency medical care information or to assure employees' access to this information. In some of these cases, the posted information had become illegible due to prolonged exposure to sunlight. Emergency medical care information was incomplete in the remaining 11 percent of the violations; it lacked the medical facility's name, address, and/or phone number.

- **Decontamination Facilities:** Employers' failed to assure that employees had complete decontamination facilities at their work sites (70 percent). A complete decontamination facility includes water, soap, single use towels, and extra coveralls. Leading violations included:
 - lack of soap and single-use towels;
 - lack of extra, clean coveralls (78 percent);
 - inadequate amount of emergency eyewash (less than one pint per handler) or emergency eyewash was not immediately available to the handler (62 percent).
- **PPE Provided and Used:** The general PPE observation criteria included violations of both the listed PPE criteria and unlisted PPE requirements (such as chemical-resistant head and foot coverings). These criteria indicate of low average compliance with PPE requirements found on pesticide labels (58 percent) and in regulation (56 percent). Average compliance for specific PPE ranged from 31 percent for the use of chemical-resistant aprons during mixing and loading activities to 80 percent for the use of respiratory protection.

¹² A service container is any container other than the original pesticide container used to hold pesticides and pesticide dilutions.

With over 500 observations, the average compliance for the general PPE observation criteria, including chemical-resistant gloves and eye protection, provides a strong indication of expected industry compliance throughout the agricultural sector. However, the small number of observations for chemical-resistant aprons (48), chemical-resistant clothing (38), and respirators (148) makes it difficult to identify these results as statewide trends as indicated by the wide confidence intervals for these observation criteria. These PPE are not routinely required by pesticide label or by regulation; they are only required when the toxicity of the pesticide warrants additional protection and no better mitigation method exists.

Staff documented two types of PPE violations. In 88 percent of the observed PPE violations, the required PPE was not available at the work site or it was not usable due to poor condition. In the remaining 12 percent of the PPE violations, the PPE was available and functional but was not worn by the handlers (Table 6). DPR staff determined that, for the most part, employers failed to make the required PPE available to the employee at the use site. They observed only a few instances where the poor condition of the PPE prevented its use. In the cases where handlers failed to use available PPE, common barriers to compliance included the lack of adequate employer supervision; the loss of manual dexterity; or discomfort due to poor fit or high temperature.

- **General Application Standards: Warning signs posted around treated fields.** State and federal law places primary responsibility for the posting of a treated field on the property operator regardless of the person or business that made the pesticide application. PCBs often post warning signs for property operators as part of the service provided although they are not required to do so by law. Average compliance with this requirement, at 65 percent, includes fields posted by PCBs. When only growers (the property operators) are considered, their average compliance drops to 56 percent (Table 4, Chart 2). The leading causes of violations include property operators' failure to post the site prior to the application and failure to post warning signs at the proper locations around the treated site.
- **General Application Standards: Closed System Used.** Engineering controls, such as properly functioning closed systems, provide pesticide handlers a higher level of protection than that delivered by PPE alone. Forty-two percent of handlers, or 22 out of 52 observations, of handlers failed to use a closed system as required by regulation or pesticide labeling.

Of the 26 in-depth closed systems evaluations conducted by DPR staff, only 65 percent of them were used properly or were safe to operate (Table 7, Chart 4). Many pesticide handlers violated California's closed system safety requirements due to improper use and construction, inadequate handler training, and poor equipment maintenance. Violations also resulted from incompatibilities between the handler's closed system and the pesticide containers delivered to the use site or the pesticide label instructions that required breaking the system's integrity during mixing operations. The leading causes of closed system violations include:

- Handlers removed or left the tank covers open during mixing and/or loading activities. This violation was often due to carelessness or inadequate training.

- Occasionally, handlers opened the mix tank cover while mixing or loading to determine the amount of pesticide mixture in the tank because the equipment lacked a functional external sight gauge. These gauges become unreadable due to staining or clouding from age or viscous pesticides.
- Handlers removed pesticide container probe seals to facilitate loading large quantities of pesticide from numerous small containers. The container probe seal is attached to the probe and covers the mouth of the pesticide container to prevent splashing. This also violates the requirement for closed container rinsing procedures – without a probe seal, pesticide rinsate can splash out of the container mouth during rinsing procedures.
- Handlers broke the integrity of the closed system to add pesticides or adjuvants, per label instructions, after they had loaded the pesticides requiring the use of a closed system. These instructions appear on labels to assure the proper mixing of compounds which could become incompatible if introduced in the wrong order.
- Handlers were delivered pesticide containers that were physically incompatible with their closed systems. In these cases, handlers either attempted to modify their equipment or loaded the pesticides by hand.

Comparison of Agricultural PCB and Grower Handler Compliance

Grower compliance was significantly lower than PCB compliance with all applicable observation criteria as well as with applicable PPE criteria (Tables 9-10). Median PCB compliance was 93 percent for all applicable criteria and 100 percent for applicable PPE criteria, while median grower compliance was 77 percent and 75 percent, respectively.

The distribution of PCB and growers at each level of compliance is similar to the patterns seen for all handlers (Tables 9-10). The frequency of PCB handlers increases steadily as compliance increases (Chart 7). However, the number of grower handlers remains fairly constant between the 31 percent-40 percent and 71 percent-80 percent levels (Chart 8). While both groups show a bimodal pattern of PPE compliance (peaks at highest and lowest compliance levels), the pattern seen for growers is more conspicuous with 36 percent of grower handlers having less than 40 percent compliance with the PPE observation criteria (Charts 10-11). The high median PCB compliance makes a significant contribution to the overall pesticide handler compliance levels seen in this survey. Improvement in grower compliance, especially with PPE requirements, would increase the overall median pesticide handler compliance and provided increased protection for employee handlers.

Assessment of Grower Compliance with Specific Observation Criteria

Grower compliance was lower than PCB compliance for every criterion considered (Table 4, Chart 2). The differences ranged from an average of 45 percent lower for emergency medical care posting; 22 percent lower for decontamination facilities; 19 percent lower for the provision and use of PPE; and 11 percent lower for general application standards that include the use of closed systems and container rinsing. The leading causes for the observed violations were discussed in the previous section (pages 20-23). This discussion does not include specific observation criteria from the closed system equipment or the methyl bromide field fumigation survey results due to the very limited number of grower observations.

Acceptable to Desirable Compliance:

- **Decontamination Facilities:** Growers assured that employee handler decontamination facilities were present (83 percent) and appropriately located for the handling activity (82 percent).
- **General Application Standards:** Grower handlers complied with label instructions (97 percent); controlled pesticide containers to prevent the creation of a hazard (97 percent); supervised the use of restricted materials (93 percent); possessed the registered label at the use site (91 percent); and properly labeled their service containers (85 percent).

Compliance Needs Improvement:

- **Emergency Medical Care Information:** Growers had very low compliance with the requirement to post emergency medical care information at the employee handler's work site (45 percent average compliance).
- **Decontamination Facilities:** While most growers provided employee handlers with properly located decontamination facilities, they frequently failed to assure that the facilities had adequate supplies such as soap, water for washing, towels, and emergency eyewash (64 percent). They also failed to assure that employee handlers possessed extra, clean coveralls (71 percent) and had emergency eyewash immediately available to them (52 percent).
- **PPE provided and used:** Growers need to improve compliance with the requirement to provide PPE to their employees and assure its proper use. Grower compliance with general label and regulatory requirements was very low at 55 percent and 53 percent respectively. The general PPE category included all specified PPE observation criteria and unspecified PPE such as chemical-resistant footwear or head gear. For specific PPE identified in the survey, average grower compliance ranged from 24 percent for the use of chemical-resistant aprons to 76 percent for the use of respiratory protection. Most grower PPE violations were the result of the employer's failure to provide employees with functional PPE at the use site (91 percent). Failure to assure the proper use of available PPE by employees accounted for the remainder of the violations (9 percent) (Table 6).
- **General Application Standards:** Growers need to improve compliance with container rinsing (76 percent), treated field posting (56 percent) and closed system (47 percent) requirements.

Assessment of PCB Compliance with Specific Observation Criteria

PCBs had acceptable to desirable compliance in 17 out of 25 pesticide handler observation criteria. The provision and use of PPE and the use of closed systems represent the main areas where PCBs need to improve their compliance. The leading causes for the observed violations were discussed on pages 29-31. The following discussion does not include the closed system equipment or the methyl bromide field fumigation survey results due to the small number of PCBs observations collected in these surveys.

Acceptable to Desirable Compliance:

- **Emergency Medical Care Information:** PCB employers showed acceptable compliance with the requirement to post completed emergency medical care information at their employee handlers' work sites (~87 percent).
- **Decontamination Facilities:** PCBs provided their employee handlers with properly located decontamination sites (~96 percent) and extra, clean coveralls (92 percent). They had

somewhat lower compliance with the provision of decontamination supplies (83 percent) and emergency eyewash (83 percent). Emergency eyewash violations included inadequate amounts and lack of immediate access.

- **PPE Provided and Used:** Although PCBs had low compliance with general PPE requirements, they had acceptable compliance with specific PPE requirements such as the use of respiratory protection (87 percent), chemical-resistant gloves (~84 percent), protective eyewear (~73 percent) and chemical-resistant clothing. Most violations were the result of the failure of PCB employers to provide their employees with the appropriate PPE prior to handling pesticides (78 percent). The remaining violations were the result of PCB handlers' failure to wear the PPE available at the use site (22 percent) (Table 6).
- **General Application Standards:** PCB handlers complied with pesticide label requirements (100 percent); controlled their pesticide containers to avoid creating a hazard (100 percent); supervised the use of restricted materials by unsupervised applicators (98 percent); possessed the registered label at the use site (95 percent); labeled their service containers appropriately (89 percent); and properly rinsed their pesticide containers at the time of use (89 percent).

Compliance Needs Improvement:

- **PPE Provided and Used:** PCB handlers need to improve compliance with general label and regulatory PPE requirements (64 percent average), including the PPE identified in the handler survey and unspecified PPE such as chemical-resistant head and foot coverings. PCB handlers had very low compliance with the requirement to use a chemical-resistant apron during mixing and loading activities (42 percent).
- **General Application Standards:** PCB handlers need to increase their compliance with regulatory requirements covering the use of closed systems (62 percent).

Handler Compliance with the PPE Exceptions Applicable to the Use of Enclosed Cab Application Vehicles (Engineering Controls)

This analysis was conducted to determine if handler compliance with the engineering control PPE exceptions was adversely impacted by the lack of readily available regulatory information concerning these exceptions. Ninety-two (92) percent of the pesticide handlers had the WPS-approved pesticide label(s) at the use site, which contained detailed information about the PPE requirements specific to handling activities but did not explain the engineering control PPE exceptions. Therefore, if information access affects PPE compliance, then handlers who use enclosed cab application vehicles would be expected to have significantly lower compliance than the handlers who do not operate under the PPE exceptions do. Instead, the survey found no significant difference in compliance with PPE requirements between handlers who used an enclosed cab application vehicle and those who did not (Table 11, Charts 12 and 13). Although median compliance was very high, at 92 percent and 100 percent, handler compliance followed a bimodal distribution with close to 30 percent of the handlers from each group having less than 40 percent compliance with the applicable PPE criteria.

Although staff documented the types of PPE violations observed (Table 6), they did not determine how handlers obtained their understanding of the regulatory requirements applicable to their activity. While this survey did not establish a clear relationship between the level of compliance and the availability of regulatory information, patterns of compliance with the

respiratory protection criterion and handlers' failure to have the required PPE in the cab suggests a possible connection. Handlers using enclosed cab application vehicles had lower compliance with the respirator requirement than the handlers who did not use this engineering control, at 74 percent and 82 percent, respectively (Table 5, Chart 3). DPR staff reports suggest that handlers violated the respirator requirement because they incorrectly assumed that the enclosed cab's air conditioning system provided respiratory protection. Field information also suggests that handlers failed to carry the required PPE because they believed they were exempt from all PPE requirements when they used applied pesticides from within an enclosed cab. Information concerning engineering controls and the protections and limitations of the different enclosed cab types is only available through DPR or the American Society of Agricultural Engineers. Increased availability of regulatory and technical information may allow handlers to improve their understanding of their equipment and its limitations; the regulatory requirements associated with their activities; and how to better protect themselves from exposure to pesticides.

Correlation of the Incidence of Handler Illnesses and Compliance

Between 1997 and 1999, CACs investigated 39 agricultural PCB and 270 grower handler illnesses which Worker Health Safety classified as definitely, probably, and possibly related to pesticide exposure. Pesticide handler safety violations contributed to almost 30 percent of all PCB and grower illnesses investigated by the CACs (Attachment 6, Table 6-1).

Annually, CACs register about 3600 agricultural PCBs and monitor about 31,000 permittees (growers) (Attachment 6, Table 6-3, footnotes 21, 22, and 30). The county registration and restricted material permit program, while not exact, reflects the relative size of each group of pesticide handlers. California law requires growers and agricultural PCBs to report all pesticide applications made to agricultural crops. From 1997 through 1999, of agricultural PCBs' average annual applications totaled about 95.7 million pounds of pesticide active ingredients while growers' applications totaled 102.8 million pounds (Attachment 6: Table 6-2). According to this data, the average agricultural PCB handles about eight times more pesticide than the average grower does.

In comparing the average incidence of handler illness to the average pounds of pesticide active ingredient handled, growers suffered 6.2 times more handler illnesses than agricultural PCBs were and 6.3 times more illnesses with contributory pesticide handler safety violations (Attachment 6: Table 6-6). On a per capita basis, PCBs were somewhat more likely to be involved in illnesses, whether violations were noted or not.

According to information provided by the CACs in the Annual Pesticide Regulatory Activities Reports to DPR, property operators had 1.7 times more violations per pesticide use monitoring inspection than licensed pest control operators (Attachment 6: Table 6-7). DPR's Pesticide Handler Safety survey showed that growers had twice the number of violations per observation and 1.4 times more PPE violations per observation than agricultural PCBs (Attachment 6, Table 6-7).

According to the 1998 Pesticide Illness Surveillance Program report, regulatory violations contributed to over 30 percent of the pesticide-related illnesses and injuries investigated by the

CACs. While this indicates a strong relationship between pesticide handling violations and handler illnesses, the actual effect of compliance on the illness rate is unclear. For example, with the grower violation rate almost double that of agricultural PCBs, the proportion of grower illnesses with contributory violations is expected to be greater than the proportion associated with the PCBs, but turns out to be the same. Common handling activities, including pesticide toxicity category and application method, and compliance patterns may play different roles in the incidence of grower and agricultural PCB pesticide-related illnesses. Alternatively, contributory violations may occur more frequently than currently documented. Although the rate of illnesses with contributory violations is the same, growers have a much higher rate of handler illness on a “pounds-handled” basis. CACs often initiate illness investigations months after the pesticide handling activity occurred (due to the current illness and injury notification system). This delay creates difficulties in documenting all suspected contributory violations. While pesticide handler violations do not always result in acute handler illnesses or injuries, they increase the potential for the development of chronic health effects through unmitigated exposures. Improved compliance with worker safety requirements, especially for grower handlers, reduces the level of handler exposure and may result in reductions in the number of reported illnesses and injuries. Also, an efficient illness notification system would allow CACs to conduct timely and thorough investigations.

Correlation of Pesticide Use Enforcement Activities and Compliance

California law makes DPR and the CACs jointly responsible for implementing the pesticide use enforcement program. DPR’s responsibilities include providing the CACs with the guidance and training necessary to carry out a use enforcement program that is consistent throughout the state. CACs enforce pesticide laws and regulations through activities that include pesticide handler inspections, industry outreach and training, illness investigations, private applicator certification, restricted material permit evaluation, and the administrative civil penalty program. Historically, DPR and CACs have focused on increasing professional license-holders’ compliance with the pesticide regulatory requirements due to the risks inherent in the large-scale, commercial application of agricultural pesticides. DPR believes that this well-placed focus, especially actions taken by CACs over the years, resulted in PCB compliance that is significantly higher than grower compliance (Tables 8–9).

Annually, CACs conduct about 13,000 pesticide use monitoring inspections of private property operators and licensed pest control businesses (Attachment 6: Table 3). Grower and agricultural PCB handler inspections constitute a portion of this total; however, due to the current activity reporting system, the actual number is unknown. An estimate of the grower and agricultural PCB inspections (and violations) was based on the relative proportions of agricultural and non-agricultural handlers who received enforcement and compliance actions (Attachment 6, Table 5 and footnote 33). Given this uncertainty, the following comparisons may not accurately represent all local enforcement programs; however, DPR believes they may be used as program indicators.

In comparing the number of use inspections per pound of pesticide reported, CACs inspect growers three times more frequently than agricultural PCB (Attachment 6, Table 7). On a per

capita basis (permits and registrations), CACs inspect PCBs 2.6 times more frequently than permittees. Overall, property operators have 1.7 times more violations per use inspection than licensed PCBs do. During the Pesticide Handler Safety survey, DPR staff found that growers had double the violation rate of the agricultural PCBs they observed. When only PPE violations are considered, growers committed 1.4 violations for each agricultural PCB violation committed. Given the growers' high violation rate, the ratio of grower to agricultural PCB inspections "per pound" appears to be appropriate because it is weighted towards the growers (or property operators). However, when the "per business" inspection rate is considered against the violation rate, the inspection scheme is weighted toward licensed handlers who have half the violation rate of the unlicensed handlers. CACs should consider shifting their "per business" inspection rates to unlicensed handlers with a particular emphasis on growers.

CACs have the authority to take action against any person or business found in violation of California's pesticide laws and regulations. This action may take the form of a "compliance action," such as a letter of warning, an office interview, or a cease-and-desist order, or an "enforcement action," such as a monetary penalty, a business registration suspension, or a permit revocation. Between 1997 and 1999, CACs levied an average of about 330 enforcement actions against property operators and 304 actions against licensed PCBs per year (Attachment 6: Table 5). For the same time period, they issued an average of 558 and 487 compliance actions, respectively. When these actions are compared to documented use violations, licensed PCBs received almost twice as many enforcement and compliance actions per violation as did property operators (Attachment 6: Table 8). Due to the current reporting system, the actual number of violations attributable to growers and to agricultural PCBs is unknown but was estimated (Attachment 6: Table 8, footnote 37). Using this estimate, it appears that agricultural PCBs receive 2.2 times more enforcement actions and 1.7 times more compliance actions for a violation rate that is about half that of the growers.

DPR's "Enforcement Guidelines" (December 1994) allow CACs to consider the violator's familiarity with the pesticide regulatory requirements and adjust their actions accordingly. When comparing all property operators to all licensed PCBs, it is reasonable to see a higher rate of action for violations committed by licensed PCBs than for property operators. The term "property operator," as used here, includes people who are legitimately unfamiliar with pesticide requirements. However, since growers are regulated to almost the same degree as licensed agricultural PCBs, the rate of enforcement or compliance actions per violation should be similar for both growers and for licensed agricultural PCBs. Enforcement and compliance actions, coupled with the CAC's strong field presence, have increased PCB compliance and, in all likelihood, reduced the number of PCB handler illnesses. While unknown factors may contribute to the higher action rate against agricultural PCBs, the potential hazards posed by growers' violations and their familiarity with the pesticide regulatory system argue for raising the number of actions taken against growers to a level commensurate with seen for the agricultural PCBs.

CACs also provide low-cost or free outreach and training to the regulated community in an effort to raise compliance in a non-regulatory setting. On average, CACs conduct about 900 annual outreach and training sessions for growers and licensees, including PCBs, and attract about 27,000 attendees (Attachment 6: Table 3). While CACs provide almost twice the number of

grower-oriented outreach activities as licensee-oriented sessions, they attract only half the number of grower attendees per session. PCB attendance is consistently higher because they are often able to obtain the continuing education credits necessary to renew their commercial applicator licenses. Grower attendance may increase as more growers and their employees become certified private applicators and need continuing education credits to renew their certificates. On the other hand, these numbers suggest that “in-person” outreach may not be the most effective way to improve grower compliance with pesticide regulatory requirements. Given limited resources, DPR and the CACs should assess their current approach to grower outreach and, where needed, develop effective programs that relate the consequences of low compliance with adverse human health effects.

While the lack of grower compliance presents regulators with greatest urgency and serious challenges, agricultural PCBs also must address serious PPE violations, closed system deficiencies, and their failure to adequately supervise employees to assure they follow safe handling practices. As shown here, handler compliance increases when regulatory standards are enforced through inspections, punitive actions, and outreach. As compliance increases, the potential for adverse effects, such as handler illnesses and injuries, appears to decrease. All handlers should be held to the same regulatory standards, whether or not they hold a professional license. DPR and the CACs can and should work harder to improve compliance in targeted industry segments; however, given our limited resources, we cannot assure full adoption of safer, compliant pesticide handling practices without a very high level of commitment by the agricultural industry.

Agricultural Field Worker Safety Survey: Results

Compliance with Field Worker Safety Observation Criteria – All Operators

The observation criteria assessed by DPR staff closely resembles the field inspections conducted by CAC staff. In general, growers and licensed farm labor contractors (FLCs) have very poor compliance with state and federal requirements associated with information display and accessibility: 23 percent compliance with Application-Specific Information for Field Workers (3CCR section 6761.1) and 47 percent compliance with Hazard Communication for Field Workers (3CCR section 6761). Decontamination facilities were provided or adequate in only 78 percent of the observations (Table 12, Chart 14).

Table 12. Compliance with Field Worker Safety Observation Criteria – All Operators

Requirements:	Total Observations	Percent Compliance	95% CI	
			L	U
App. Specific Information Displayed	221	23%	18%	30%
PSIS A-9 Displayed	240	47%	41%	54%
Decontamination Facility	241	78%	72%	83%
Emergency Medical Care Knowledge	240	93%	89%	96%
Treated Field Posted	14	93%	66%	100%
Workers Trained	238	94%	90%	96%
Notification to Workers	221	95%	91%	97%
Restricted Entry Interval Compliance	239	98%	96%	100%
Possess EPA Card	80	N/A	N/A	N/A

Compliance with Field Worker Safety Observation Criteria: Comparison of Growers and FLCs

Growers and FLCs had similar compliance rates for all observation criteria except “Decontamination Facility” where FLC compliance was 88 percent and grower compliance was 73 percent (Table 13, Chart 15).

Table 13. Compliance with Field Worker Safety Observation Criteria: Growers and FLCs

Requirements	Growers				Farm Labor Contractors			
	#	%	95% CI		#	%	95% CI	
	Obs	Comp	L	U	Obs	Comp	L	U
App. Specific Information Displayed	155	24%	17%	31%	69	22%	13%	33%
PSIS A-9 Displayed	161	48%	41%	56%	79	46%	34%	57%
Decontamination Facility	163	73%	66%	80%	78	88%	79%	95%
Workers Trained	162	93%	87%	96%	76	96%	89%	99%
Treated Field Posted ¹³	14	93%	66%	100%	*	*	*	*
Emergency Medical Care Knowledge	161	94%	89%	97%	79	92%	84%	97%
Notification to Workers	152	94%	89%	97%	69	97%	90%	100%
Restricted Entry Interval Compliance	162	98%	94%	99%	77	100%	95%	100%

¹³ There were no Farm Labor Contractor observations for this criterion.

Chart 14
Compliance with Field Worker Safety Observation Criteria –
All Operators

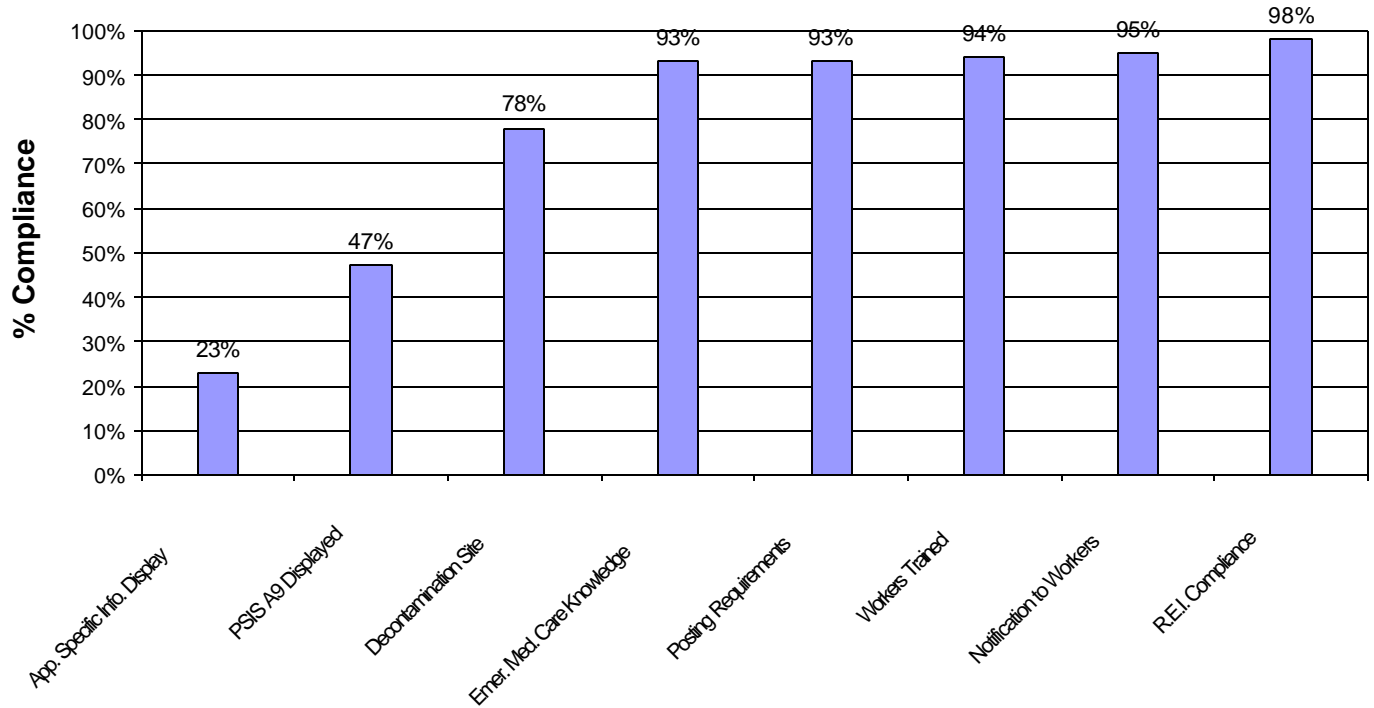
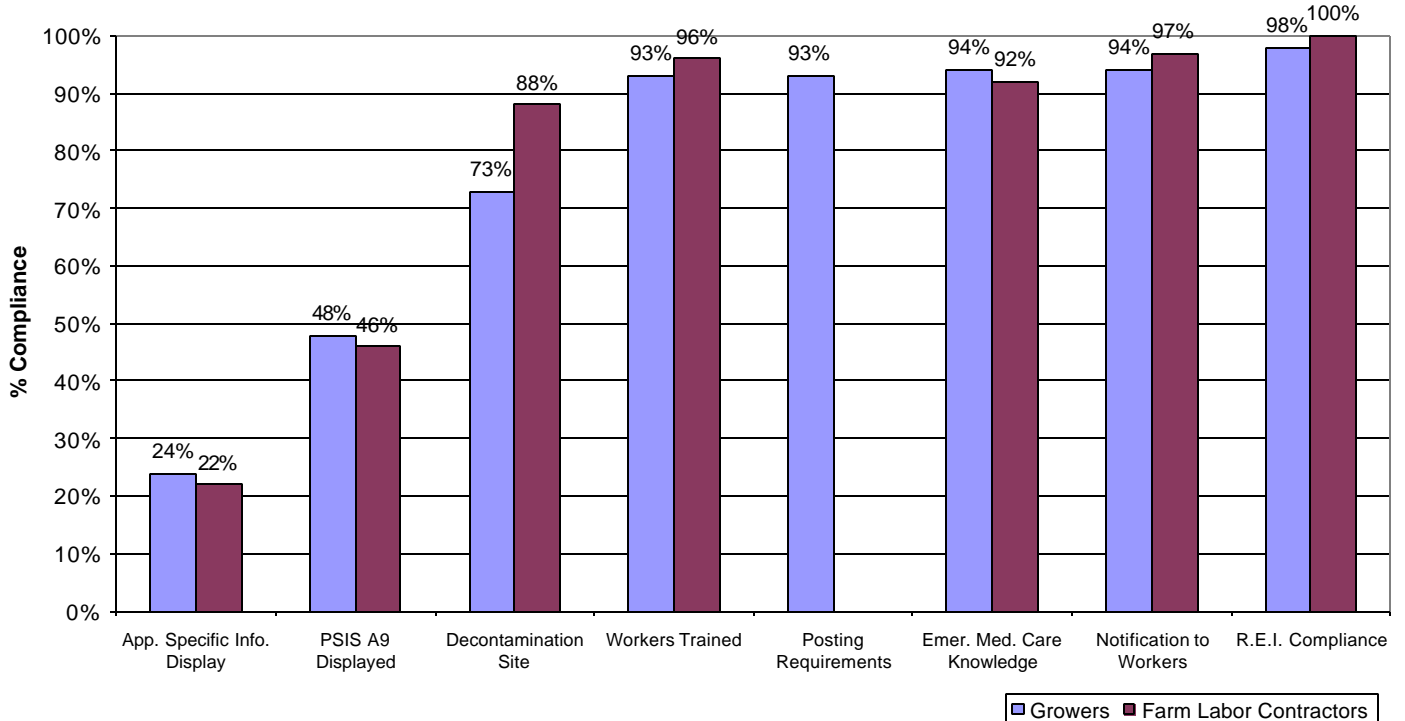


Chart 15
Compliance with Field Worker Safety Observation Criteria:
Comparison of Growers and FLCs



Field Worker Safety Operator Compliance per Observation: All Observation Criteria

DPR assessed each operator’s compliance with all applicable field worker safety observation criteria shown in Table 12. FLC and grower compliance was not significantly different (Mood Median Test, P= 0.714) (Table 14, Charts 16-18). Extremely low compliance with the two information display requirements caused reductions in the median compliance for all operators, as well as the FLCs and growers.

Table 14. Field Worker Safety Operator Compliance per Observation: All Observation Criteria

Compliance Levels:	FWS Operator Compliance with All Observation Requirements – Cumulative Percent of Total Per Compliance Level					
	All Operators ¹⁴		Farm Labor Contractors ¹⁵		Growers ¹⁶	
0% - 10%	1	0.4%	0	0.0%	1	0.6%
11% to 20%	2	1.2%	0	0.0%	2	1.8%
21% to 30%	3	2.5%	0	0.0%	3	3.7%
31% to 40%	2	3.3%	1	1.3%	1	4.3%
41% to 50%	12	8.3%	4	6.3%	8	9.2%
51% to 60%	31	21.1%	7	15.2%	24	23.9%
61% to 70%	10	25.2%	1	16.5%	9	29.5%
71% to 80%	62	50.8%	26	49.4%	36	51.5%
81% to 90%	81	84.3%	29	86.1%	52	83.4%
91% to 100%	38	100.0%	11	100.0%	27	100.0%
Total:	242		79		163	
Median:		71%		83%		71%
95% CI for Median		71% 86%		71% 86%		71% 86%

¹⁴ 2 observations were deleted from this analysis because they did not contain applicable criteria.

¹⁵ 1 observation was deleted from this category because the observation did not contain applicable criteria.

¹⁶ 1 observation was deleted from this category because the observation did not contain applicable criteria.

Chart 16

Field Worker Safety Operator Compliance per Observation:
All Operators, All Observation Criteria

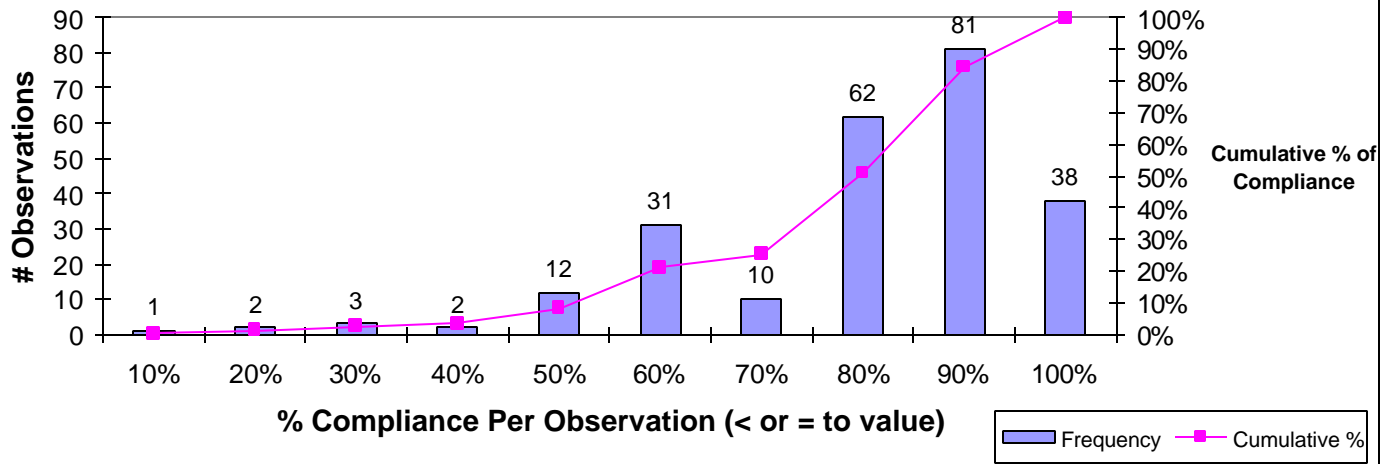


Chart 17

Field Worker Safety Operator Compliance per Observation:
Farm Labor Contractors, All Observation Criteria

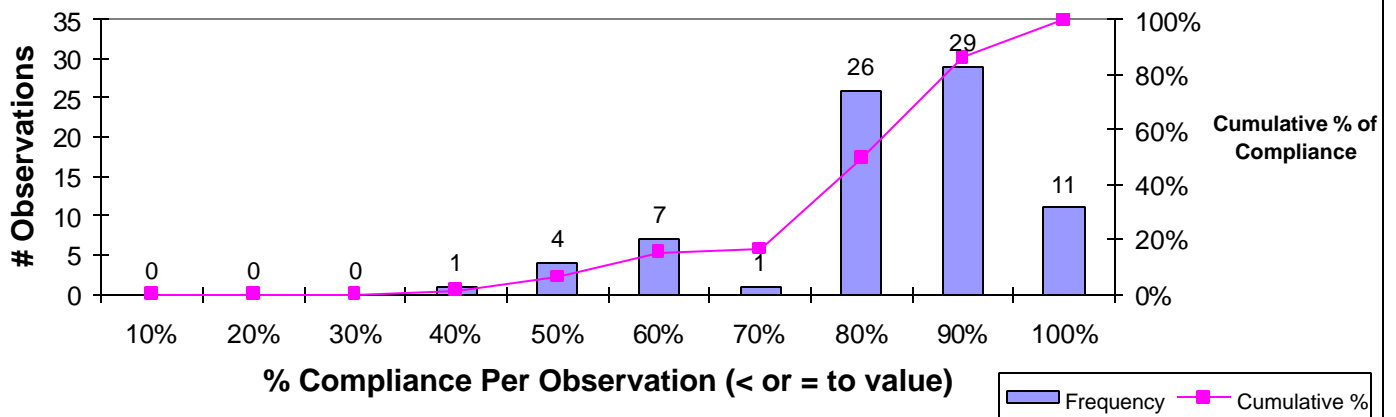
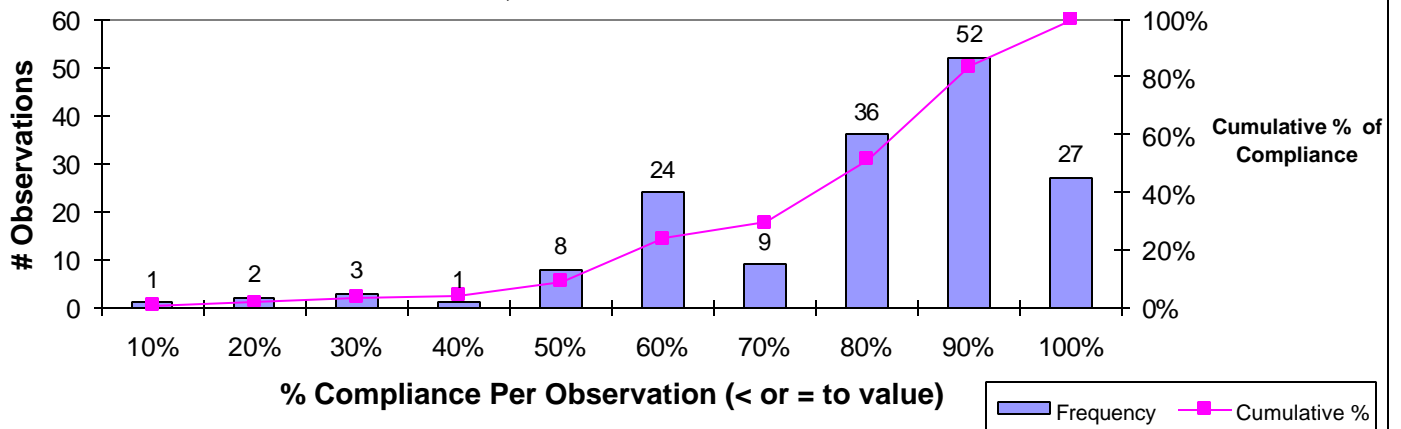


Chart 18

Field Worker Safety Operator Compliance per Observation:
Growers, All Observation Criteria



Agricultural Field Worker Safety Survey: Discussion

Assessment of Operator Compliance with the Field Worker Safety Requirements

DPR staff made 244 observations of workers conducting hand labor activities in fields with a history of pesticide application (Table 1). These observations covered a wide range of seasonal field activities in over 60 crops, including fields and greenhouses. DPR's Field Worker Safety survey is similar to the CACs' routine field worker safety inspection in the criteria and procedures used to determine compliance. In general, operators low overall compliance with field worker safety requirements stemmed from the persistent violation of state and federal information display requirements. Causes for these violations are discussed in the following section.

The compliance assessment team also evaluated the voluntary use of the U.S. Environmental Protection Agency (U.S. EPA) training cards by field workers and their employers. The use of these cards is voluntary. The assessment data shows that approximately 33 percent of the field-worker operations observed used the U.S. EPA training cards.

Comparison of Grower and FLC Compliance

Median grower and FLC compliance was not significantly different as determined by the Mood Median Test (P=714) (Table 13, Charts 14-16). Given the lack of statistical differences and the wide median confidence intervals associated with both groups, DPR feels that both growers and FLC need to improve their overall compliance with field worker safety requirements, especially with the information display requirements. Growers and FLCs had similar compliance for all observation criteria except the "decontamination facility" criteria where FLC exceeded grower compliance by 15 points (Table 12, Chart 13).

Assessment of Operator Compliance with Field Worker Safety Observation Criteria

Growers and FLC show similar compliance for all observation criteria except with the provision of adequate decontamination facilities in the case of the growers. Both groups need to improve compliance with information display requirements as discussed below.

Acceptable to Desirable Compliance:

- Operators complied with the restricted entry interval requirements in regulation or pesticide product labeling (98 percent); notified workers of applications within ¼ mile of the worksite (95 percent); provided safety training to field workers (94 percent); assured that workers knew the procedures to follow to obtain emergency medical care and posted this information at the work site (93 percent); and posted treated fields with warning signs when required by regulation or pesticide product labeling (93 percent).

Compliance Needs Improvement:

- **Complete decontamination facilities.** Growers need to improve compliance with this requirement. Leading causes of violations included:
 - Failure to have wash water, soap, and/or single use towels at the work site.
 - Failure to have sufficient wash water at the work site.

- The decontamination facility was located more than ¼ mile from the field workers.
- Failure to provide a decontamination facility at the work site.
- **Hazard communication program.** Employers are required to complete and display the PSIS A-9 at the employees' work sites (47 percent - all operators).

Leading causes of violations included employers' failure to provide the PSIS A-9 leaflet at the work site. DPR provides PSIS A-9 leaflets, in English and Spanish, to CACs who in turn provide them to growers and field labor contractors free of charge. Employers also fail to complete the PSIS A-9 information requirements by recording the location (address) of the property operator's application-specific information in the space provided in the leaflet; or to properly display the PSIS A-9 at the work site. The PSIS A-9 leaflet provides a space for the property operator's application-specific information on the third page of the leaflet. Employers overlooked this element because it was at the back of the leaflet. Employers also fail to assure that the PSIS A-9 is posted in a location accessible to employees. In some cases, DPR staff were able to find the completed leaflet in a binder or loose in the field foremen's vehicles when the employees claimed no knowledge of its location. Employers may display the PSIS A-9 leaflet in a binder or in a vehicle; however, the workers must know where the leaflet is located in order to have unimpeded access to the information contained in the leaflet.

- 1) **Application-specific information display.** Employers (growers) are required to display this information at the work site or at a central location and make it accessible to all employees who work in fields with a history of treatment, including persons employed by a FLC (23 percent overall compliance). Staff observed some creative and exemplary systems employed by some growers; however, as can be seen by the data, few operators have been able to meet all of the requirements of this criterion. In most observations, staff found little interest among workers in accessing the application-specific information displayed by their employers.

Leading causes of violations included employers' failure to "display" the information in such a way that allowed employees unimpeded access to the information. In some cases, properly displayed application-specific information documents lacked required information or were not kept current. Employees must be able to readily see and read current, complete application-specific information during normal business hours, without having to make a specific request of any person. During most observations, the field foreman explained that if a worker asked for application records, the foreman would contact the grower and request the information. The grower would then provide the documents to the foreman who would, in turn, give them to the worker.

Responses to Survey Findings

State law places joint responsibility on DPR and the county agricultural commissioners to implement and maintain an effective pesticide use enforcement program. DPR is responsible for the overall statewide program while the CACs administer their local programs. Although authorized to inspect, investigate and penalize pesticide handlers, DPR concentrates staff resources on evaluating the effectiveness of local programs; providing guidance to the CACs to assure uniform implementation; assisting in local program planning; and presenting outreach to agricultural stakeholders. CACs utilize the policies, procedures, and training provided by DPR to assure statewide consistency in the administration of local pesticide use enforcement programs. Their daily enforcement activities include evaluating proposed applications of restricted use pesticides, certifying private applicators, conducting scheduled and surprise inspections, investigating complaints and worker illnesses, and penalizing violators.

DPR's survey of agricultural pesticide handlers and field workers revealed low compliance with regulatory requirements designed to mitigate agricultural workers' exposure to pesticides and pesticide residues. DPR will work with county agricultural commissioners and agricultural industry representatives to improve compliance with new and long-standing regulatory requirements designed to protect the health of agricultural workers. The survey results and strategies for compliance improvement are presented in the following sections.

Summary of Findings

DPR intends to allocate resources towards improving compliance with survey observation criteria shown to have less than 80 percent average compliance and among operators with less than 80 percent compliance with the observation criteria applicable to their handling activity.

Agricultural Pesticide Handlers:

- **Grower compliance.** Growers showed significantly lower compliance than agricultural pest control businesses (PCB) in most requirements observed. The differences were largest in the areas of emergency medical care posting, the availability of decontamination facilities, the use of personal protective equipment (PPE), and the safe use of closed systems. Growers had low compliance with the treated field-posting requirement. This requirement applied only to the operator of the property and not to the PCB making the application.
- **Agricultural PCB compliance.** Agricultural PCBs showed low compliance with some PPE requirements and the safe use of closed systems.
- **Chronic violators.** Handler compliance with all survey criteria rose steadily from 0 percent to 100 percent, with the median at 82 percent. However, when PPE criteria were considered separately, handlers fell into two distinct groups: those with less than 40 percent compliance (chronic violators) and those with 100 percent compliance. About 36 percent of the growers and 25 percent of the agricultural PCBs surveyed appear to be chronic violators of the PPE requirements. For the purposes of this survey, a chronic violator as a handler who is observed in compliance with less than 40 percent of the requirements applicable to their pesticide handling activities.

- **Engineering controls - PPE substitutions.** Handler compliance with the PPE requirements was similar for those using enclosed cab application vehicles and those operating without this engineering control. While median compliance was high (92 percent and 100 percent) respectively, chronic violators composed about one-third of each group. Anecdotal information suggests that handler confusion with the PPE exceptions and substitutions associated with the use of enclosed cabs (engineering controls) accounts for a large portion of these violations.

Field Worker Safety:

- Grower and farm labor contractors (FLC) showed similar compliance with all survey criteria except for the provision of decontamination facilities where grower compliance was much lower than FLC compliance. Very low compliance was found with application-specific and hazard communication information display requirements in both grower and FLC fieldworker operations.

Closed Systems:

- **Department’s closed system criteria.** Many systems, either in their construction or their use, do not meet the Department’s closed system criteria (WHS 98-01, “Application of Closed System Criteria”). Systems often lacked appropriate probe seals or adequate rinsing capability.
- **Unsafe use.** Handlers were observed using systems unsafely due to modifications made to decrease loading time (removal of probe seals) and improper maintenance of elements such as external sight gauges (open tank cover to observe filling).
- **System incompatibility with pesticide containers or label requirements.** In some instances, staff observed physical incompatibilities between handlers’ closed systems and the pesticide containers delivered to the use site. In addition, some pesticide labels have mixing instructions that are incompatible with the proper use of a closed system (requires tank hatch to be opened during loading or mixing). The violations usually resulted in unsafe conditions for the handler.

Compliance Improvement Strategies

This section outlines the short- and long-term strategies that DPR’s Pesticide Enforcement branch will use to address the compliance issues discussed above. DPR’s Enforcement Branch will implement these strategies in conjunction with the CACs and with support from other DPR programs.

Enforcement Activities

Enforcement and Compliance Actions. The Enforcement Guidelines (policy) and the fine guidelines (3CCR 6130) allow CACs to adjust the severity of the penalty to meet the seriousness of the violation.

- DPR will work with CACs to prioritize appropriate enforcement and compliance actions, with respect to information provided through Compliance Assessment and to provide refresher training on DPR’s “Enforcement Guidelines” policy to assure consistent statewide

implementation. This element is reviewed annually by DPR staff through the Effectiveness Evaluation process. **(Ongoing)**

-
- DPR will assess Enforcement Action Tracking data to compare the level of actions taken against growers and licensed PCBs. This assessment will be conducted to assure that all license or certificate holders and permittees receive equitable treatment for documented violations. **(Long-term)**
- With the recent adoption of FAC 12999.6, DPR now has the authority to take enforcement actions against violations committed in multiple jurisdictions or associated with priority investigations (as defined in the current Cooperative Agreement), or to refer those violations to the county District Attorney. DPR will issue a policy letter that explains the procedures DPR will use to implement the Director's enforcement action authority. **(Short-term)**
- DPR's Enforcement Branch will review the Enforcement Guidelines to determine the effectiveness of this policy and to propose improvements where needed. This policy was developed in 1995 to provide CACs with a framework for evaluating violations and assessing the level of action needed. **(Short Term)**

Pesticide Use Monitoring and Records Inspections. CACs have broad authority to inspect any premises where pesticides are handled stored or applied, including crops, equipment, employee facilities, the tank mixtures and any records maintained by the property operator or licensee pursuant to California's pesticide laws and regulations. DPR communicates statewide compliance issues through the Prioritization Plan, which is updated annually. CACs use this guidance document in the development of their Negotiated Work Plans that identify the strategies they intend to use to address local priority compliance issue.

- DPR's annual Prioritization Plan will emphasize increasing the number of grower handler use monitoring and headquarter records/safety inspections relative to the number of licensed PCB inspections in counties/regions where grower compliance is significantly lower than PCB compliance. DPR will work with appropriate CACs to assure that this priority appears in their annual Negotiated Work Plans. **(Ongoing)**
- DPR will encourage CACs to increase the number of fieldworker inspections (target total for FY 2001/2002: 3000 inspections). This increase will address low compliance below the "Needs Improvement" level with the Hazard Communication Information display requirements and provide CACs and DPR the opportunity to gain a better understanding of the barriers to compliance with the application-specific information display requirement. **(Ongoing)**

Oversight and Guidance

DPR provides oversight and guidance to the CACs to assure statewide consistency in the administration of pesticide use enforcement programs at the local level.

Overview Inspections. DPR staff “overview” CAC staff during pesticide use monitoring and records inspections to determine adherence to established procedures and to assess CAC staffs’ training needs. **(Ongoing)**

- DPR’s FY 2000/2001 Prioritization Plan focused DPR overview inspections on field worker safety, employee handler compliance with PPE requirements, pesticide drift investigations, and applications involving the use of closed systems. For FY 2001/2002, DPR will prioritize overviews in the following areas:
 - - field worker safety and information display requirements;
 - pesticide handling activities conducted by grower employees;
 - pesticide applications by growers or growers’ employees that require field posting; and
 - the safe use of closed systems.
- Overview inspections will be used as a follow-up assessment to the compliance assessment in counties participating in the initial survey and as a general indicator of compliance in the focused areas (regional industry compliance).

Procedure Review: DPR develops/updates policies and procedures in response to identified program needs and provides follow-up training to CAC staffs to assure proper implementation.

- **Pesticide Use Monitoring and Field Worker Safety Inspection Procedure Review.** The Pesticide Enforcement Branch intends to complete a review and revision of the pesticide use monitoring and field worker safety inspection procedures and forms by January 2002. **(Short-term).** This project will focus on:
 - incorporating U.S. EPA’s WPS monitoring requirements into DPR’s inspection procedures;
 - evaluating the effectiveness of the current Field Worker Safety Inspection with respect to information display requirements; and
 - assuring that amended inspection forms are compatible with the “Non-Compliance” database requirements (data entry).

Inspection Procedures Training. Pesticide Enforcement Branch field staff will provide inspection procedures training (using current procedures) to CACs on the basis of established need, including the addition of new staff or deficiencies noted during overview activities or the Effectiveness Evaluation. DPR will schedule large-scale (regional) training soon after completion of the inspection procedure review **(Ongoing).**

Procedural Manuals. DPR has committed to providing CACs with immediate access to current, updated pesticide use enforcement information through DPR’s external web site. Existing information is being reformatted to improve downloading and updating.

- **Pesticide Laws and Regulations.** This database is currently being developed and coordinated with several branches. **(Short-term)**

- **Pesticide Enforcement Manual.** DPR is developing a comprehensive resource document for state and local pesticide enforcement officials. It will include pesticide law, related regulations, and DPR's policies and procedures. **(Mid-term)**

Program Evaluation

DPR uses information from a variety of sources to evaluate the effectiveness of the statewide pesticide use enforcement program and identify ways in which the program can be improved through state and local efforts.

Compliance Database. DPR's draft Strategic Plan aims to reduce human and environmental health risks by maximizing compliance with all regulatory requirements. To meet that goal, DPR intends to identify and address compliance problems compiled through the annual analysis of compliance information. Starting FY 2001/2002, DPR will begin a pilot program to evaluate the use of CAC inspection information in the development of a compliance database. This will allow DPR and the CACs to identify and prioritize compliance problems, develop strategies to address the priority issues, and evaluate the effectiveness of those strategies on program improvement. DPR hopes to link this information to other departmental databases such as the Pesticide Use Report, the Pesticide Illness Surveillance Program, and the Enforcement Action Tracking Database. **(Long-term)**

Application-specific Information. The Field Worker Safety compliance survey identified barriers to the display and utilization of application-specific information. DPR intends to continue working with the U.S. EPA to assure increased protections of agricultural field workers through the provision, or unimpeded access, to appropriate pesticide-related information. **(Long-term)**

Closed Systems. The Closed System compliance survey identified barriers to safe use of these systems, including lack of training, improper maintenance, and system incompatibilities with pesticide containers or pesticide labeling requirements.

- **National Closed System Safety Standards.** DPR will work with the American Society of Agricultural Engineers (ASAE), the U.S. EPA, the agricultural industry, and university contacts in an effort to develop national safety standards for closed systems that load and/or transfer liquid and/or dry pesticides. California's closed system criteria covers only liquid pesticides and liquid pesticide mixtures. Also, Federal law prevents DPR from imposing container requirements on pesticide registrants. **(Long-term)**
- **Closed System/Pesticide Container Incompatibilities.** Due to the expense of this equipment, handlers usually own only one closed system. When pesticide dealers deliver pesticides in containers not compatible with their system, handlers mix and load the pesticide by hand or alter their system to allow use. DPR will use CAC inspection reports to document the engineering incompatibilities encountered during routine pesticide handling inspections and investigations. Using CAC-generated information, DPR will work with national organizations, such as SFIREG, to promote the use of standardized, bulk, and/or recyclable containers for pesticides that require the use of closed systems. **(Long-term)**

- **Incompatible Mixing Requirements.** Some pesticide labels require the handler to add pesticides and adjuvants in a certain order to avoid adverse chemical reactions or poor mixing. Sometimes the handler must add other pesticides, including adjuvants, after loading the pesticide that requires the use of the closed system. DPR will use CAC inspection reports to document pesticide-labeling incompatibilities encountered during routine pesticide handling inspections and investigations. DPR will provide this information to the U.S. EPA for consideration in their registration process. **(Long-term)**

Outreach to Public and Industry Stakeholders

DPR conducts outreach to industry groups that addresses all elements of the department's programs and priorities. As a result of information collected during the Compliance Assessment surveys, DPR will focus on improving agricultural employers' compliance with pesticide safety requirements through the use of videos, hotlines, brochures and presentations.

Compliance Assistance Information brochures. DPR is developing a series of brochures that will provide agricultural employers with reference tools that explain their roles and responsibilities as employers under the worker safety regulations. The brochures focus on the areas of low compliance identified through DPR's compliance assessment surveys. DPR will encourage CACs to provide this information to growers as part of the restricted material permitting procedure. The following brochures will be available over DPR's external website:

- Summary of Employer Responsibilities under the California Worker Safety Regulations (a general overview of requirements) **(Draft in Review)**
- Personal Protective Equipment (use, care, maintenance) **(Draft in Review)**
- Decontamination Facilities (supplies, emergency eyewash, extra coveralls) **(Short-term)**
- Emergency Medical Care (prior arrangement, transportation to medical care facility, posting) **(Short-term)**
- Closed System (requirements, use) **(Short-term)**
- Information At Central/Worksite Location (PSIS A-8 and PSIS A-9, Application Specific Information) **(Short-term)**

Compliance Assistance Videos. CACs, under contract with DPR, will produce field worker safety and pesticide handler safety videos to help agricultural employers understand their regulatory responsibilities. These videos will be released during FY 2001/2002.

'Self-Evaluation Checklist' for Agricultural Employers. DPR is investigating the usefulness of a checklist that could be used by agricultural employers to identify real and potential areas of their farming operations that are not in compliance with applicable California pesticide laws and regulations. **(Long-term)**

Sharing Compliance Assessment Information. DPR intends to present compliance assessment findings to industry groups such as grower and commodity groups, labor and public training organizations and to licensees through continuing education classes. **(Short-term)**

- DPR will post the Compliance Assessment report to the external website and issue a press release to alert stakeholders.
- DPR's Licensing and Certification Unit will determine feasibility of providing compliance assessment information to license holders.
- Out reach presentations will be posted to DPR's external web site. **(Ongoing)**

Pesticide Safety Information Series (PSIS). DPR's Worker Health and Safety Branch develops and maintains pesticide safety information. This information, which covers all aspects of California's pesticide regulatory program are offered in English and Spanish on DPR's external web site.

- Enforcement Branch staff will work with Worker Health and Safety Branch staff to review and update PSIS A-3, "Engineering Controls In Agricultural Settings (Closed Systems, Enclosed Cabs, Water Soluble Packaging)". This pamphlet describes two types of engineering control and the PPE exceptions and substitutions associated with the use of this equipment. The Pesticide Handler Safety compliance assessment indicated that handlers need clearer, more complete information about the PPE required when they use an engineering control. **(Short-term)**
- As a result of the Field Worker Safety compliance assessment, the Worker Health and Safety Branch recently revised PSIS A-9, "Hazard Communication Information for Employers with Employees Working in Agricultural Fields" to improve employer compliance with the hazard communication requirements and field workers' ability to register complaints with DPR. In the revised PSIS A-9, DPR placed the "write-in" block for the application-specific information on the first page and added DPR's Regional Office phone numbers as a contact for employees who are unable to access application-specific information. **(Completed)**

General Outreach Presentations. Annually, DPR staff provides outreach and training to industry members, licensees, and CAC staff.

- **Field Worker Safety.** DPR will focus outreach efforts on agricultural employers, including growers and FLCs. The presentations will address Field Worker Safety requirements, in particular: information-specific requirements that include example forms and strategies for displaying the required information; hazard communication leaflet content, completion and display; and the provision of complete decontamination facilities.
- **Pesticide Handler Safety.** DPR will focus outreach efforts on grower employers and address:
 - PPE requirements, emergency medical posting, decontamination, and treated field posting.
 - closed system equipment requirements, the proper use of equipment, and appropriate mixing and container rinsing procedures.

References in Text Attachment 1

Procedures

Observation Criteria and Documentation

DPR staff developed checklists that identified the key observation criteria for each survey category and the “letter” codes used to document their results (Attachments 2 - 5). During the first year of the compliance assessment observation program, staff amended the checklists to accommodate minor program changes. The observation criteria focused on pesticide laws and regulations that had the greatest effect on worker safety. Staff used DPR’s “Inspection Procedures Manual” to guide their data collection however, their compliance assessment observations examined a narrower range of criteria than the routine inspections performed by the county agricultural commissioners. Staff used these checklists during compliance assessment observations to assure a thorough evaluation of all applicable criteria and accurate documentation of the results. To maintain uniform assessment procedures and consistent results, staff met once a month to discuss on-going assessments and questions regarding compliance with various criteria in different field situations.

The following bullets provide information on data collection and DPR staff’s field experiences:

- ❖ The **Pesticide Handler Safety** observations include “PPE Regulation - General” and “PPE Label - General” criteria. These criteria cover all required PPE, including types not listed in Tables 4-7, such as chemical-resistant footwear, cloth coveralls, and long-sleeved shirts and long pants. DPR created “general” PPE criteria to determine overall compliance with all label and regulatory PPE, respectively.
- ❖ **Field Worker Safety** regulatory requirements apply when working in a treated field. 3CCR section 6000 defines a treated field as a field that has been treated with a pesticide or had a Restricted Entry Interval (REI) in effect within the last 30 days. Observation criteria focus on the federal WPS through DPR’s current worker safety regulations (Attachment 2).
- ❖ The **Field Worker Safety** checklist included criteria for evaluating compliance with 3CCR 6771, requirements for early entry field workers. This regulation allows field workers to enter treated fields before the REI expires if they are protected from exposure and adequately informed. Staff only observed “early entry” field workers twice. Although two observations provide insufficient data for analysis, both observations documented violations with all applicable requirements.
- ❖ **Field Worker Safety** observations often required an in-depth interview with the foreman, field workers, and the grower to determine compliance with the following criteria:
 - Compliance with 3CCR section 6764, Field Worker Training, was determined by the response of the field workers and foreman’s situational questions, such as “When were you last trained?”, “Who did the training?”, and “Where did it take place?”, and content

questions, such as “What do posting signs mean?” and “What are pesticide poisoning symptoms?”

- Staff also documented the number of field workers and employers who use the U.S. Environmental Protection Agency (U.S. EPA) training cards as proof of training. The use of these cards is voluntary. Field workers possessed U. S. EPA training cards in 78 out of 239 field worker safety observations (Table 11).
- DPR staff determined compliance with 3CCR 6618 (b), Notice of Applications, by asking the field foreman or workers about the system used to notify them of pesticide applications or restricted entry intervals within ¼ mile of their work site.
- 3CCR section 6761, Hazard Communication for Field Workers, requires the employer to display a completed copy of the Pesticide Safety Information Series (PSIS) A-9, “Hazard Communication Information for Employers with Employees Working in Agricultural Fields” at the work site. This leaflet describes an employee’s right to be told about the potential dangers present at the workplace, where to go for emergency medical care, and the location of the growers pesticide use records. A copy of this leaflet is available on DPR’s website at: <http://www.cdpr.ca.gov/docs/dprdocs/docsmenu.htm>

The work site may be the current field location of the workers or a central location where the workers start their workday. The accessibility and completeness of this document determined compliance. In some cases, DPR staff needed to determine where the workers started their workday to evaluate the accessibility of the document.

- Staff asked growers, field foremen, and field workers to estimate the level of workers’ interest in accessing the growers’ pesticide application information. 3CCR section 6761.1, Application-Specific Information for Fieldworkers”, requires property operators to provide field workers with unimpeded access to their pesticide application information. DPR’s informal survey indicated that very few workers review the application-specific information displayed by property operators. Instead, field workers tended to ask their field foremen about their work site’s (field) pesticide application history.
- ❖ **A closed mixing and loading system** transfers liquid pesticides from their original containers and liquid dilutions of liquid or dry pesticides from the mixing tank to the application equipment. Handlers use engineering controls, such as closed systems, personal protective equipment, or a combination of both methods to reduce their exposure to concentrated or diluted pesticides. The use of engineering controls is discussed in PSIS A-3, Engineering Controls in Agricultural Settings (Closed Systems, Enclosed Cabs, Water Soluble Packaging), available at: <http://www.cdpr.ca.gov/docs/dprdocs/docsmenu.htm>. In California, closed systems must meet DPR’s criteria to comply with regulatory requirements and be considered safe to operate. DPR’s Worker Health and Safety Branch identified these criteria in a letter issued to the CACs on January 12, 1998, titled “Application of Closed System Criteria” (WHS 98-01).

The following situations require handlers to use a closed system to mix and load pesticides:

- Employees handling Category 1 liquid pesticides per 3CCR Section 6746;

- Employees handling “minimal exposure” pesticides listed in 3CCR section 6790; and
- Pesticide product labels that require the use of a closed system.

❖ **Violations that threatened health and safety.** Occasionally, DPR staff observed violations of laws, regulations or restricted material permit conditions that threatened the safety of the pesticide handler(s), the field worker crew, the public or the environment. DPR staff notified the CAC and, in some cases, ordered the operator to cease the hazardous activity immediately.

Observation Site Selection

Between June 1997 and June 2000, DPR conducted 19 compliance assessments. Each assessment was conducted in one county by a two-person team over a 10 to 14 day period. Most assessments were conducted in two five to seven-day periods while a smaller number were conducted over one 10 to 14 day period. Assessments included weekends, evenings and early mornings. This approach reduced logistical problems and allowed DPR staff to survey an area intensively and efficiently. County selection was based on:

1. Location – DPR divided the assessments between the three DPR Regions each year.

Between June 1997 and August 2000, DPR staff conducted 811 observations covering all survey categories and all regions (Table 1-1).

Table 1-1. Observations by Survey Category and DPR Region

	Northern	Central	Southern	Total
Pesticide Handler Safety:				
General Handler Safety Requirements	189	218	128	535
Closed System Equipment	0	11	13	24
Methyl Bromide Field Fumigation	0	5	8	13
Field Worker Safety:	72	84	83	239
Total:	261	318	232	811

2. Type - DPR selected counties with a large agricultural base to fulfill the survey objectives.
3. Interest – Some CACs requested compliance assessment.

DPR staff identified possible observation sites through information obtained from the CACs staff and restricted material permit and operator identification records, and the Senior Pesticide Use Specialist (SPUS) assigned to the county. Staff also used the following guidelines to select observations that fairly represented the agricultural pesticide activities in the county:

1. Observe representative numbers of pesticide handler and field worker activities.
Select production agriculture sites based on the size of that industry within the county (i.e. row crops, orchards, greenhouse, nursery).
2. Observe representative numbers of growers and commercial operators, including pest control businesses (PCB), and farm labor contractors (FLC).
3. Avoid observing the same grower or commercial operator more than once during the assessment.
4. Attempt to observe each agricultural PCB registered to work in the county.
5. Prioritize the following pesticide handling activities:

- a) Category 1 (“Danger” or “Danger Poison”) pesticides.
 - b) Pesticides requiring the use of a closed mixing and loading system.
 - c) Use of California restricted materials.
 - d) Soil fumigation using methyl bromide.
6. Select field worker operations in crops that are representative of the county.
 7. Select sites with large field worker crews present.

Sharing Results with the Participating CAC

Staff provided the county compliance assessment report to the CAC at least one week before meeting with the CAC to discuss the results. During the meeting, DPR staff summarized the assessment results and the observation criteria checklists, answered questions, and discussed recommendations to improve compliance in the county.

While all county compliance assessment reports included recommendations for improvement, DPR staff took an active role in the implementation of the recommended program improvements in counties with low average compliance rates. DPR and the CACs used the Negotiated Work Plan and the Effectiveness Evaluation programs to plan, implement and evaluate activities designed to improve compliance and increase the safety associated with pesticide use in the county. Targeted program improvements included:

1. Increased quality and quantity of routine inspections performed by CAC staff.
2. Increased DPR assistance and oversight activities, such as:
 - a. Overview inspections where DPR staff train and evaluate CAC staff during “live” pesticide use inspections.
 - b. Training programs aligned with the CAC’s program needs.
3. Implementation of CAC outreach and education programs for the regulated community.
4. Increased enforcement follow-up activities and actions taken by the CAC.

The following “case studies” provide examples of follow-up activities by DPR and CACs:

Case 1: DPR asked the CAC to develop a written improvement plan for each observation criterion with low compliance after presenting the compliance assessment results to the CAC and Deputy CAC for the Pesticide Use Enforcement (PUE) program. The CAC developed a plan that specified the steps the CAC would take to improve each criterion. The CAC implemented this plan with the assistance of the SPUS assigned as a liaison to the county. Six months after the post assessment meeting, DPR staff audited the county’s pesticide records and found that the county had significantly improved their PUE program.

Case 2: In a similar situation, DPR’s Regional Office Staff and Agricultural Program Supervisors met with the CAC and Deputy CAC for the PUE program to develop a plan to improve the county’s pesticide enforcement program. The plan included increased inspections in the county’s Negotiated Work Plan, increased overview inspections with the Liaison SPUS assigned to the county, and outreach to growers and pest control businesses. The RO supervisor documented the improvement plan via letter to the

commissioner. A second meeting was held ten months later to track the county's progress in implementing the improvement plan.

Case 3: The county's Liaison SPUS, the CAC and the Deputy CAC for the PUE program reviewed the results of a recent compliance assessment and developed a Negotiated Work Plan that redirected county resources to improve the areas of low compliance. The SPUS assigned to evaluate this county audited the county's PUE program at six-month and one-year intervals following the assessment to document their progress in improving their program.

Attachment 2

COMPLIANCE CHECKLIST

WPS AG USE

Observation Number: App. _____ M/L _____
 County: _____ District: _____ Date: ____/____/____
 Company Type: _____
 Commodity/Site: _____ Location: _____

Pesticide(s): Rate Cat.
 1. _____ p/eye wp/cr gloves lss/lpants cvrlls. cr/cloth resp. apron cr shoes/ boots
 2. _____ p/eye wp/cr gloves lss/lpants cvrlls. cr/cloth resp. apron cr shoes/ boots
 3. _____ p/eye wp/cr gloves lss/lpants cvrlls. cr/cloth resp. apron cr shoes/ boots

Method: (Circle One) Ground Air Hand Other: _____

	Observations	App	M/L		Observations	App	M/L
1	Label on Site			15	Decontamination Facility - Supplies		
2	Site/Method/Rate			16	Emergency Eyewash		
3	WPS Approved Labeling			17	Extra Coveralls		
4	PPE Label Requirements - General			18	Medical Care Posting - Name		
5	PPE Label – Gloves			19	Medical Care Posting - Address		
6	PPE Label - Protective Eyewear			20	Medical Care Posting - Telephone		
7	PPE Label - Respirator			21	Containers under Control		
8	PPE Label - Full Body Chem resis. Clothing			22	Containers Properly Rinsed	X	
9	PPE Label – Apron			23	Service Container Labeling		x
10	PPE Regulation Requirements - General			24	Engineering Controls - Closed System	X	
11	PPE Regulation - Eyewear			25	Engineering Controls - Enclosed Cab		x
12	PPE Regulation - Gloves			26	Restricted Materials Supervision		
13	Decontamination Facility - Present			27	Heat Stress		
14	Decontamination Facility - Distance			28	Field Posting		x

Remarks:

C - in compliance N - not in compliance O - not observed X - not required
 P - provided but not used U - used but not required

Attachment 3

Observation Number: _____

COMPLIANCE CHECKLIST

FIELD WORKER SAFETY REQUIREMENTS

County: _____ District: _____ Date: ____/____/____

Company Name: _____ Company Type: _____

Commodity/Site: _____ Application Date: ____/____/____

Pesticide(s): _____ REI (Days): _____

REI Expired (Y/N): ____ Field ID: _____ Grower: _____

Crew Activity: _____ No. of Workers: _____

	Observations	Compl- iance		Observations	Compl- iance
1.	Field Workers Trained 6764		8.	REI Compliance 6772 & Label	
2.	Possess USEPA Training Cards		9.	Posting Requirements 6776	
3.	PSIS A-9 displayed 6761		10.	Early Entry - Informed of Label Req. 6771	
4.	Application Specific Info Displayed 6761.1		11.	E.E. PPE Provided/Used	
5.	Notification Given/Received 6618 (b)		12.	E.E. - 1 Pint Eyewash Water 6771(f)	
6.	Emergency Medical Care Knowledge 6766		13.	E.E. - Change Area 6771 (g)	
7.	Decontamination Facility - 1/4 mile 6768		14.	E.E.- Heat Related Illness Prev. 6771 (i)	

Remarks:

C- in compliance N - not in compliance O - not observed X - not required
 P - provided but not used U - used but not required

Attachment 4

Observation Number: _____

COMPLIANCE CHECKLIST

CLOSED SYSTEM REQUIREMENTS

County: _____ District: _____ Date: ____/____/____

Company Type: _____

Commodity/Site: _____ Location: _____

Pesticide(s): _____

	Observations	Compliance	Remarks
1.	Closed System Required by: Category I Liquid		
2.	Minimal Exposure		
3.	Label		
4.	Meets Criteria		
5.	Closed System Properly Used		
6.	External Sight Guages Protected		
7.	External Sight Gauges Equipped with Valve		
8.	Hoses Equipped with Shutoff Device		
9.	Provides Adequate Rinsing		
10.	Probe Sealed Around Container Opening		
11.	Equipment Safe to Operate		

Remarks:

C- in compliance N - not in compliance O - not observed X - not required
P - provided but not used U - used but not required

Attachment 5

Company Name: _____ Observation Number _____

COMPLIANCE CHECKLIST

METHYL BROMIDE SOIL FUMIGATION

County: _____ District: _____ Date: ____/____/____

Commodity/Site: _____ Company Type: _____

Pesticide: _____

Method No.: _____ Application Method _____

	Observations	Compliance	Remarks
1.	Label Onsite FAC 12973		Training by: Grower PCB
2.	Site/Rate/Method FAC 12973		Method:
3.	Buffer Zones - Resident FAC 12973		Feet
4.	Buffer Zones - Worker FAC 12973		Feet
5.	Equipment - Compressed Gas Flush FAC 12973		Type:
6.	Equipment - Dilution Fan FAC 12973		Inches in Diameter
7.	Equipment - Type of Blade/Chisel FAC 12973		Type:
8.	Tarp - Type Approved FAC 12973		Type:
9.	Tarp - Seal Properly FAC 12973		
10.	Application Depth FAC 12973		Inches
11.	Hours Worked - Tractor Driver/Shoveler		Hours
12.	Hours Worked - Co-pilot FAC 12973		Hours

13.	Other Permit Conditions FAC 12973		Location:
Remarks:			

C - in compliance N - not in compliance O - not observed X - not required
 P - provided but not used U - used but not required

Attachment 6

Table 6-1: Pesticide Handler Cases Received by the California Pesticide Illness Surveillance Program.

Year	Illness Category	Agricultural PCBs ¹⁷			Growers		
		Violations	No Violations	Total	Violations	No Violations	Total
1997	Definite / Probable	3	5	17	26	23	111
	Possible	0	9		12	50	
1998	Definite / Probable	4	7	13	19	24	89
	Possible	1	1		5	41	
1999	Definite / Probable	3	3	9	12	23	69
	Possible	0	3		4	30	
Total		12	27	39	78	192	270
Average		4	9	13	26	64	90

Table 6-2: Data from the Pesticide Use Report

Year	Pounds of Active Ingredients Reported	
	7-day PUR ¹⁸	Monthly Production PUR ¹⁹
1997	99,207,741	99,937,050
1998	99,744,832	107,690,127
1999	88,156,771	100,741,775
Average	95,703,115	102,789,651

Table 6-3: Pesticide Regulatory Activities Information²⁰

	Fiscal Year	Pesticide Use Monitoring Inspections ²¹		Agricultural Restricted Materials Permits ²²	PCB ²³ Registrations	Outreach and Training	
		Inspections	Violations			Sessions	Attendees
PCBs ²⁴	97/98	5,755	1,504		5,896	289	12,511
	98/99	5,581	1,337		6,069	343	13,469
	99/00	5,914	1,503		5,925	294	12,224
Average		5,750	1,448		5,963	309	12,735
Property Operators ²⁵	97/98	7,168	2,952	46,646		640	14,229
	98/99	7,679	3,263	45,231		626	14,316
	99/00	6,971	3,253	39,382		562	13,770
Average		7,273	3,156	43,753		609	14,105

¹⁷ Includes only licensed pest control businesses and private property operators using pesticides for the production of agricultural crops.

¹⁸ Use reports submitted by licensed agricultural pest control businesses when they apply pesticides for the production of agricultural crops.

¹⁹ Use reports submitted by growers when they apply pesticides for the production of agricultural crops.

²⁰ This information is submitted by CACs and used by DPR to allocate pesticide use enforcement program funds to counties.

²¹ Includes only non-fumigation application and mix/load inspections. Does not include Structural Pest Control use monitoring inspections.

²² Total includes amendments to the original permits. While the actual number of permittees is unknown, DPR estimates that they account for approximately 70 percent of the total number of permits (and permit amendments) reported by the CACs, or 30,627.

²³ Total includes all licensed PCBs required to register with the CACs. CACs register primarily agricultural PCB and maintenance gardener businesses. Of the 3500 PCBs licensed annually by DPR, approximately 60 percent are agricultural PCBs and 40 percent are maintenance gardeners (Pest Management and Licensing Branch, personal communication). DPR assumes that PCB registrations probably approximate the statewide licensing ratio and estimates that there are about 3577 agricultural PCBs

²⁴ Includes inspections of all persons observed operating as a pest control business except structural pest control operators. The reporting requirements do not separate agricultural pest control businesses from all other licensed businesses.

²⁵ Includes inspections of all property operators. Reporting requirements do not separate growers from all other property operators.

Table 6-4: DPR Compliance Assessment – Pesticide Handler Safety Survey

	Total # of Observations	Total # of Violations	Total # of PPE violations
Growers	394	2,028	852
PCBs	173	451	269

Table 6-5: Compliance and Enforcement Actions – July 1, 1997 – July 1, 2000

	Enforcement Actions²⁶			Compliance Actions		
	Production Agriculture	Other Settings	Annual Average	Production Agriculture	Other Settings	Annual Average
Property Operators²⁷	298	32	330	512	46	558
PCBs	121	183 ²⁸	304	157	330	487

Table 6-6. Illness Investigations - Comparisons²⁹

	Growers	Agricultural PCBs	Ratio³⁰
Pounds of Active Ingredient Reported / Restricted Materials Permit or PCB Registration ³¹	3,351	26,755	8.0 (PCB/Gro)
Number of Illness Investigations / 10,000,000 Pounds of Active Ingredient Reported	8.7	1.4	6.2 (Gro/PCB)
Number of Violative Investigations /10,000,000 Pounds of Active Ingredient Reported	2.5	0.4	6.3 (Gro/PCB)
Number of Illness Investigations / 1000 Restricted Materials Permits or PCB Registrations ³⁰	2.9	3.6	1.2 (PCB/Gro)
Number of Violative Investigations / 1000 Restricted Materials Permits or PCB Registrations ³⁰	0.9	1.1	1.2 (PCB/Gro)

²⁶ Data represents a 3-year average.

²⁷ See comments #5 and #6 in Table 3 for definitions.

²⁸ Most actions are attributable to unlicensed maintenance gardener businesses.

²⁹ Based on average values taken from Tables 1 – 3.

³⁰ For ease of discussion, all ratios use the larger value as the numerator and the smaller value as the denominator.

³¹ The number of growers and agricultural PCBs used for this comparison were based on the estimates provided in footnotes 21 and 22.

Table 6-7: Comparison Pesticide Regulatory Activities Data

	Property Operators (PO)	PCBs	Ratio
Use Violations / 10 Use Monitoring Inspections ³²	4.3	2.5	1.7 (PO/PCB)
Use Violations / 10 Pesticide Handler Survey Observations ³³	51.5	26.1	2.0 (PO/PCB)
PPE Violations / 10 Pesticide Handler Survey Observations ³²	21.6	15.6	1.4 (PO/PCB)
	Growers	Ag. PCBs	
Agricultural Use Monitoring Inspections/ 100,000 pounds AI reported ³⁴ (estimated)	6.4	2.1	3.0 (Gro/PCB)
Agricultural Use Monitoring Inspections / 10 Restricted Materials Permits or Ag PCB Registrations ³⁵ (estimated)	2.1	5.6	2.6 (PCB/Gro)
Outreach Sessions / 100 Restricted Materials Permits or PCB Registrations ³⁶	2.0	8.6	4.3 (PCB/Gro)
Attendees / Outreach Session	23.2	41.2	1.8 (PCB/Gro)

Table 6-8: Enforcement and Compliance Action Comparison

	Property Operators	PCBs	Ratio
Enforcement Actions / 10 Use Violations ³⁷	1.1	2.1	1.9 (PCB/PO)
Compliance Actions / 10 Use Violations ³⁶	1.8	3.4	1.9 (PCB/PO)
	Growers	Agricultural PCBs	
Enforcement Actions / 10 Use Violations ³⁸ (estimated)	1.1	2.4	2.2 (AgPCB/Gro)
Compliance Actions / 10 Use Violations ³⁷ (estimated)	1.8	3.1	1.7 (AgPCB/Gro)

³² Pesticide use monitoring inspections conducted by CACs includes all property operators and all persons operating as a pest control business (except structural pest control operators).

³³ Pesticide Handler Safety observations conducted by DPR staffs included only growers and agricultural PCBs.

³⁴ Pesticide Use Monitoring inspections include all types of property operators and PCBs while the PUR data in Table 2 includes only growers and agricultural PCBs. The number of grower and agricultural PCB inspections were estimated using information from Table 5, Compliance and Enforcement Actions. Overall, growers accounted for 90 percent of the total <average> compliance and enforcement actions taken against all property operators while agricultural PCBs accounted for 35 percent of the total actions taken against PCBs. For this comparison, these proportions are used to indicate the relative number of use monitoring inspections per category. Therefore, growers accounted for about 6546 and agricultural PCBs accounted for 2013 of the reported use monitoring inspections for their respective categories.

³⁵ This comparison used the estimates given in footnote 33 (use monitoring inspections), footnote 21 (permittees/growers) and footnote 22 (agricultural PCBs).

³⁶ Used permit and agricultural PCB estimates given in footnotes 21 and 22.

³⁷ From CAC Pesticide Use Monitoring Inspections, includes all property operators and licensed PCBs (Table 3). Uses the total annual average of enforcement and compliance actions taken against all property operators and licensed PCBs (except structural PCBs) (Table 5).

³⁸ This comparison based the number of violations committed by growers and agricultural PCBs on the estimated proportions of use monitoring inspections given in footnote 33. This estimate assumes that all handlers are equally likely to commit violations therefore, if growers accounted for 90 percent of the property operator use monitoring inspections, then they committed 90 percent of the reported violations (or 2840). If agricultural PCBs accounted for 35 percent of the PCB inspections, then they committed 507 of the reported violations.