What You Don't Know Could Hurt You

Pesticides in California's Air

Environmental Working Group™

Acknowledgments

This report is the joint product of Bill Walker, Richard Wiles, Todd Hettenbach and Chris Campbell of EWG and Kert Davies, formerly of EWG and now of Ozone Action. It is released in partnership with Californians for Pesticide Reform, a statewide coalition of more than 100 public interest groups, including EWG, working to protect public health and the environment from pesticide proliferation.

Thanks to EWG's Molly Evans who designed and produced the publication. For their insight, suggestions and assistance, thanks also to David Chatfield, Ken Cook, Patty Clary, Joan Clayburgh, Jonathan Kaplan, Anne Katten, Ralph Lightstone, Pete Price, Zev Ross and Wil Sumner. Special thanks to Jeanne Merrill of Pesticide Watch and the Community Coalition Against Pesticide Drift, and all the groups who assisted with the Community Monitoring Project: Action Now, Californians for Alternatives to Toxics,Community & Children's Advocates Against Pesticide Poisoning, Committee to Save Pescadero, the community of Davenport, Environmental Center of San Luis Obispo, Environmental Defense Center, Farm Without Harm, Regional Environmental Alliance for Progress and Volunteers for a Healthy Valley.

What You Don't Know Could Hurt You is dedicated to Alexandra Walker Barish (b. 8/2/98) and Oona Mae Davies (b. 7/16/98).

This report was made possible by grants from the Richard and Rhoda Goldman Fund, the W. Alton Jones Foundation, the Arkay Foundation, Patagonia Inc, and The Gap Foundation. The opinions expressed in this report are those of the authors and do not necessarily reflect the views of the supporters listed above. Environmental Working Group is responsible for any errors of fact or interpretation contained in this report.

Environmental Working Group

Environmental Working Group is a nonprofit environmental research organization with offices in Washington, D.C. and San Francisco. EWG is a project of the Tides Center, a California Public Benefit Corporation based in San Francisco that provides administrative and program support services to nonprofit programs and projects.

Kenneth A. Cook, President
Richard Wiles, Vice President for Research
Edward Hopkins, Vice President for Programs
Bill Walker, California Director

To order a copy

Copies of this report may be ordered from the Washington office for $20 each (plus 6% sales tax, or $.60 for Washington, D.C. residents) and $3 for postage and handling. Payment must accompany all orders. Please make checks payable to:

Environmental Working Group
1718 Connecticut Avenue, N.W. Suite 600
Washington, D.C. 20009
(202) 667-6982 (phone)
(202) 232-2592 (fax)
info@ewg.org (e-mail)
www.ewg.org

EWG California
P.O. Box 29201, The Presidio
San Francisco, CA 94129
(415) 561-6698 (phone)
(415) 561-6696 (fax)
bwalker@ewg.org (e-mail)

www.ewg.org

This report and other EWG publications are available online at www.ewg.org.

Contents

Foreword

"Given the way the law is set up, you might as well designate all pesticides as toxic air contaminants. They all kill something and they are all toxic, or they wouldn't be put in the air."

— James Wells, Director
California Department of Pesticide Regulation
(Lifsher 1997)

The California Department of Pesticide Regulation (DPR) is in denial.

In the state that uses one-fourth of all pesticides applied in the United States, and where the amount of pesticide use per capita is double the national rate, DPR insists that the increasing volume of agricultural poisons used in California is irrelevant to questions of public health. DPR has done little field monitoring of real-world pesticide applications to assess Californians' actual exposure to airborne agricultural chemicals. Still, the agency claims that a rising tide of toxic pesticides is not of concern, because DPR's regulations limit public exposure to supposedly safe levels.

DPR further shows its disregard for public health by its record of repeatedly failing to officially list pesticides as toxic air contaminants, a designation which under state law triggers significantly increased mitigation and enforcement efforts. It's hard to say what's worse: DPR's recalcitrance or the willingness of the Wilson Administration to let them get away with it for the last eight years.

DPR maintains its mask of denial even though air monitoring by public interest groups, local communities and the agency itself has repeatedly found exposure and drift problems. DPR maintains its denial even when confronted with geographical data showing the proximity of schools or residential neighborhoods to areas of heavy pesticide use.

In August 1998, Californians for Pesticide Reform, a statewide coalition of more than 100 public interest organizations including Environmental Working Group, released a computer analysis estimating that 2.8 million Californians live within half a mile of heavy use of the most dangerous pesticides. (CPR 1998) Previously,

The state claims that a rising tide of toxic pesticides is not of concern, because regulations "limit" exposure to supposedly safe levels.

Californians have no practical way of knowing what pesticides they are exposed to on a day-to-day basis.

EWG had shown that more than 14 million pounds of toxic pesticides were sprayed within 1.5 miles of California schools in 1995 (EWG 1998), and that 73,000 California children attend school within 1.5 miles of heavy methyl bromide use. (EWG 1998b) DPR Director Wells dismissed the findings out of hand, declaring: "That's like saying that millions of Californians must be at risk because they live within half a mile of freeways where cars emit exhaust." (DPR 1998)

The undisputed fact is that many Californians who live close to freeways *are* at increased risk because of exposure to auto exhaust. The link between auto exhaust (which contains smog-forming chemicals also found in pesticides) and asthma, emphysema and lung cancer is well documented. Or DPR could look to the example of the California Air Resources Board, who recently decided that smog-spewing sport-utility vehicles must be regulated as strictly as other autos. (No exception, in other words, just because a crackdown on a growing source of air pollution might be politically unpopular.) If the head of the state's pesticide agency really believes that increased exposure to automobile exhaust is not a health risk, it's not surprising he thinks it's safe to spray highly toxic and volatile chemicals close to schools and homes.

DPR's position rests on the argument that statistical analyses are irrelevant because they measure proximity to potential exposure, not actual exposure. Now, for the first time, this report documents that many Californians are indeed routinely exposed to toxic pesticides in the air they breathe. In two years of testing up and down the state, EWG's Community Pesticide Drift Monitoring Project found toxic pesticides in the air in a significant majority of samples. What's more, we found that Californians have no practical way of knowing what pesticides they are being exposed to on a day-to-day basis. In the state that prides itself on having the nation's most comprehensive laws to protect the public's right to know about pesticide use, that is simply unacceptable.

It's time for DPR to stop denying the obvious problem of runaway pesticide use. It's time for the State of California and the new Davis Administration to acknowledge that pesticides are air pollution — posing as serious a health threat as auto exhaust and industrial smokestacks — and take the steps urgently needed to protect the public.

Kenneth A. Cook, President
Environmental Working Group

Executive Summary

Independent air monitoring in eight California counties by Environmental Working Group found that toxic pesticides routinely drift from farm fields into surrounding neighborhoods and schoolyards. Of 94 air samples collected for EWG's Community Monitoring Project from June 1996 to September 1998, 60 samples, or 64 percent, detected pesticides known to cause cancer, brain damage, birth defects, acute poisoning or other illnesses. Air monitoring was conducted at 22 different locations; at 19 sites, drifting pesticides were detected in the air. (Table 1.)

These findings — derived from almost twice as many air monitoring tests as state pesticide regulators have conducted this decade — corroborate the overwhelming statistical evidence that pesticide air pollution in agricultural regions of California is a real phenomenon, and a real problem. An EWG analysis of the latest available state data estimates that more than 100 million pounds of pesticide pollution drifts or evaporates each year from farm fields and vineyards into the air Californians breathe.

Sixty-four percent of EWG air samples found drifting toxic pesticides.

Table 1. Many toxic pesticides drift into California communities.

County	Number of Locations	Dates	Total Number of Air Samples	Percent Positive	Pesticides Detected
Contra Costa	1	8-9/96	2	0%	none
Monterey	5	8/96*, 8-9/97 & 5-7/98	35	66%	cyfluthrin, permethrin, carbaryl, methomyl, methyl bromide
San Mateo	1	5-6/97	3	33%	iprodione
Santa Barbara	1	8/96	1	100%	cyfluthrin
Santa Cruz	2	11/96, 8/97, 10/97 & 5-7/98	17	59%	permethrin, chlorpyrifos, methyl bromide
Sonoma	6	5-8/98	26	62%	sulfur, carbaryl, phosmet
Ventura	3	6/96*, 3-5/97 & 8/97	9	66%	chlorpyrifos, mycobutanil, methyl bromide
San Luis Obispo	1	10/97	1	100%	methyl bromide

**Included one 24-hour continuous methyl bromide sample.*

Source: Environmental Working Group

For communities near heavy pesticide use, the issue is not whether the amount of poison in the air is "safe," according to the DPR, but the right not to be poisoned at all.

According to 1995 data from the California Department of Pesticide Regulation (DPR), there were 303 reports of individuals exposed to pesticide drift in 1995 — almost one case of exposure in the state per day. (DPR 1997) (Table 2.) This figure should be considered conservative in light of reports from agricultural communities that some local officials are reluctant to report drift incidents and tend to dismiss residents' complaints.

In almost all documented cases of pesticide drift, DPR maintains that the levels of potential exposure did not pose a danger to public health. Indeed, levels of airborne pesticides detected by EWG monitoring were in most cases relatively small. But exposure to low levels of airborne pesticides should not be misconstrued as safe. Health-based safety standards for most pesticides in air have not been established. Those that do exist are not set to protect children and other sensitive populations but are based on supposedly safe levels of exposure for the average adult. Furthermore, they account only for exposure to individual pesticides, not to combinations of chemicals often drifting off of treated fields. For communities near heavy pesticide use, the issue is not whether the amount of poison in the air is "safe," according to the DPR, but the right not to be poisoned at all.

Pesticide air pollution affects millions of Californians: residents of communities near application sites, children and teachers at nearby schools, and farm workers and farm families who may breathe pesticide-laden air at work *and* home. Yet pesticide air pollution is poorly controlled due to a gaping loophole in state air pollution regulations. Unlike all other air pollutants, pesticides are not regulated by the California Air Resources

Table 2. Exposure incidents from pesticide drift reported in 1995.

County	Reported Drift Incidents
San Jose	61
Monterey	55
Kern	39
Fresno	27
Imperial	25
Tulare	22
Ventura	18
Santa Barbara	10
San Diego	7
Kings	6
Merced	4
Stanislaus	4
Yolo	4
Sacramento	3
Solano	3
Yuba	3
Butte	2
Humboldt	2
Madera	2
Orange	2
Sonoma	2
Tehama	1
Colusa	1
TOTAL	303

Source: California Dept. of Pesticide Regulation, 1995 Pesticide Use Reporting database.

Board (ARB), but instead are under the purview of the Department of Pesticide Regulation — an agency whose stated policy is that it is not necessary to reduce or eliminate use of toxic pesticides, as long as the public's exposure is "limited." Responding to a 1997 analysis of state data by Californians for Pesticide Reform (CPR), a statewide coalition including EWG, that found a dramatic increase in pesticide use, a DPR spokeswoman said: "Increased spraying does not equate to increased risk if you control the exposure, and we control the exposure." (Arax 1997)

In fact there is no evidence that DPR adequately controls exposure. The agency rarely even attempts to measure exposure through air testing. It allows pesticides to be applied in close proximity to homes and schools, and even closer proximity to farm workers in adjacent fields. It virtually refuses to add pesticides to the list of chemicals regulated as air pollution. It is a central premise of this report that under the conditions that have prevailed during the Wilson Administration — the huge and rapidly increasing volume of pesticides used in California; growth patterns that are turning once-isolated agricultural communities into densely populated suburbs; and DPR's failure to monitor the air for pesticide drift or regulate pesticides as air pollution — it is virtually impossible to adequately control exposure.

DPR's head-in-the-sand attitude, symptomatic of the agency's longstanding accommodation of agricultural interests at the expense of public health, has allowed pesticide air pollution to effectively escape monitoring and needed controls. Pesticides enjoy this regulatory holiday even though an EWG analysis found that pesticide use is a larger source of one of the major forms of toxic air pollution in California (reactive organic gases such as benzene and other solvents) than petroleum refining and all other stationary industrial sources of these smog-forming gases.

Under a 1983 California law (AB 1807), chemicals designated as toxic air contaminants (TACs) by the state are subject to increased monitoring and mitigation efforts to protect public health. DPR, which has authority over whether or not pesticides are designated as TACs, has shown a cavalier disrespect for the entire listing process. State records show that while the ARB has placed 20 other air pollutants on the TAC list since 1983, DPR has taken similar action on just one pesticide — and then only after that pesticide had already been banned by the U.S. Environmental Protection Agency. Worse, the record also shows that while ARB requires extensive monitoring for TACs across the state, pesticide air pollution is virtually unmonitored by DPR.

Each year, the ARB analyzes more than 16,000 air samples for over 50 TACs, performing a total of more than 60,000 individual chemi-

DPR has listed only one pesticide as a Toxic Air Contaminant — after it was banned by the U.S. EPA.

DPR monitors for pesticides in air one time for every 84,000 applications.

cal analyses annually. (ARB 1996) DPR routinely analyzes the air for none. Since 1991, excluding a few special monitoring projects, DPR has monitored the air for pesticides just 50 times in 14 locations.[1] Out of more than 600 pesticides registered for use in California — approximately 150 of which have been identified by federal or state agencies as TAC candidates — DPR has tested the air for fewer than 30.

In many counties with heavy pesticide use, no air samples have ever been taken or analyzed for pesticides by the DPR. From 1991 to 1995, more than 4.2 million separate applications of pesticides were reported in California, making DPR's sampling record approximately one test for every 84,000 applications in the state. Even in counties with heavy pesticide use, DPR's record is not much better. In the top three counties for number of pesticide applications each year — Fresno, Tulare and Monterey — DPR sampled the air for pesticides just 21 times from 1991 through the present, an average of one test for approximately every 69,000 pesticide applications.

All of which leaves Californians to fend for themselves. In this light, perhaps the most disturbing finding of the Community Monitoring Project is the lack of a public right to know when and what pesticides will be applied to a given field, even when that field is located directly adjacent to homes, schools and businesses. In California — home of the nation's most comprehensive program for pesticide data collection and reporting — timely information about pesticide use in local communities is scarce and difficult to obtain due to an indifferent or openly hostile bureaucracy and a political tradition of accommodation of the agrichemical industry. These barriers inhibit citizens' rights to know about local pesticide use and the accompanying right to avoid exposure.

The bottom line: Even though pesticides are a significant source of toxic air pollution, Californians living near sprayed fields have no guaranteed or uniform access to find out what pesticides are being applied adjacent to their homes or the schools where they send their children. If you have time, persistence and know where to look, it is possible to learn which agricultural poisons were sprayed near your home, school or business *three years ago* — but a daunting task to find out what will be sprayed tomorrow or next week.

Recommendations

Pesticide air pollution is, in at least one respect, no different than industrial air pollution. It is a routine and inevitable consequence of pesticide use, not merely the accidental result of "agricultural chemicals" being blown off-site. Agriculture is in fact the largest industry in California, and as a significant contributor of toxic air emissions, should be regulated as such. On DPR's watch, however, pesticide air pollution has largely escaped moni-

toring and regulation, placing many Californians at risk of exposure to toxic chemicals known to have serious health effects.

In the face of DPR's persistent failure to effectively address increasing pesticide use, widespread evidence of pesticide drift and growing community concern over exposure of the public to pesticide air pollution, EWG and CPR urge the State of California to:

- Transfer authority for the regulation of pesticides in air from DPR to the California Air Resources Board. The ARB is a recognized world leader in public health protections from air pollution. Without question, ARB has greater expertise in air pollution monitoring, risk assessment and standard-setting than the Department of Pesticide Regulation. The agency responsible for regulating pesticides in air should be committed to recognizing, assessing and reducing risk, not to ignoring evidence of problems. Californians living in counties with heavy pesticide air pollution should not be denied the protections that ARB's regulations extend to other residents of the state.

- Direct the ARB to conduct routine monitoring of pesticide applications to determine the need for increased buffer zones and other measures needed to protect the public from pesticide active ingredients and reactive organic gases from pesticide formulations drifting off-site after applications.

- Mandate 72-hour written notice to all homes, schools and businesses within 1,000 feet of a field before the application of any pesticide known or suspected to cause cancer, brain or nerve damage, or reproductive disorders.

- Guarantee that agricultural workers will be given the same degree of protection from potential pesiticide exposure as people who live near application sites.

- Require growers, in their annual applications for use of restricted pesticides, to list less-toxic alternatives to the chemicals they plan to use.

- Provide all Californians with easy, localized access to information about recent and pending pesticide applications in their communities.

- Order DPR to adopt a policy of reducing and eliminating the use of the most dangerous pesticides, with an aggressive plan and an accelerated timetable for implementation. To facilitate this goal, the state must immediately and significantly increase funding for research into non-toxic alternatives to chemical pesticides.

Pesticide regulators must reduce exposure, not ignore problems.

Note

[1] DPR contracts with ARB for almost all of its air monitoring. When this report refers to "DPR tests," we mean routine tests for pesticides in air performed by ARB staff at DPR's request. Results of all general monitoring studies performed up to 1995 were published both by DPR and in professional journals. In addition, DPR's Environmental Monitoring Branch conducts occasional special studies in response to accidents, citizen complains and other urgent situations. Such a monitoring program is now underway in Lompoc, following years of residents' complaints about spraying and after state health studies found elevated rates of cancer in the community. Over the last two decades, DPR (and its predecessor agency) has conducted about two dozen of these special studies — an average of about one per year. Results from these studies have never been published in a comprehensive or standardized format, therefore we did not include them in our analysis.

Chapter 1

The Community Pesticide Monitoring Project

EWG air monitoring for drift of multiple pesticides in Southern, Central and Northern California shows that even as DPR fails to monitor, pesticides are drifting off-site after applications into residential neighborhoods, schoolyards and other public spaces. The California Food and Agricultural Code (Sec. 12972) states: "The use of any pesticide by any person shall be in such a manner as to prevent substantial drift to nontarget areas." However, the definition of "substantial" is ambiguous, is subject to varying interpretation by county agricultural commissioners, and has not been tested in court.

EWG began its Community Monitoring Project in 1996 to document pesticide drift in the so-called agricultural/urban interface — suburban communities where residential development is occurring in close proximity to large-scale farming. Although this phenomenon is found throughout California and is on the rise in the booming Central Valley, it is currently most pronounced in the coastal strip, as the outer suburbs of the Los Angeles Basin and the San Francisco Bay Area have expanded into areas where the intensity of pesticide use is the highest in the state, and among the highest in the nation.

The Monitoring Project focused on three coastal areas where citizens have organized to fight illegal pesticide drift: Ventura County in Southern California, Monterey and Santa Cruz counties on the Central Coast and Sonoma County in Northern California. In 1995, Santa Cruz County growers used 75.1 pounds of pesticides per harvested acre, most in the state. Ventura ranked fourth, with 51.8 pounds per acre; Sonoma fifth with 48.7 pounds per acre; and Monterey seventh at 39.6 pounds per acre. (In Fresno County, perennially the top-producing agricultural county in the United States, 1995 use per acre was 39.3 pounds.) (CPR 1997) Between 1991 and 1995, as the population of these four coastal counties increased by an estimated 3.9 percent, total reported pesticide use increased by 52 percent. (DOF 1998)

Between June 1996 and September 1998, EWG coordinated air monitoring at 15 individual locations across 7 counties to assess multiple pesticide drift.

Relative to population, the rate of pesticide use in coastal California is among the highest in the nation.

Drifting pesticides were detected in 19 of 22 communities tested.

Monitoring was conducted in Contra Costa, Monterey, Santa Barbara, Santa Cruz, Sonoma, San Mateo and Ventura counties. Six different locations in Sonoma County, four in Monterey, and one in each in the other counties were monitored. Samples were taken near the edge of treated fields, usually in residential neighborhoods, typically in front or back yards. During the same period, EWG monitored specifically for methyl bromide, an especially toxic and volatile fumigant gas, at seven other locations in Ventura, San Luis Obispo, Monterey and Santa Cruz counties, including two elementary schools.

A total of 55 air samples were collected for analysis of multiple pesticides, and 39 other samples were taken for analysis of methyl bromide. Of the 55 multiple pesticide samples, 29 samples, or 53 percent, tested positive for drifting pesticides. (Table 3.) Of the 39 methyl bromide samples, 31 samples, or 80 percent, detected methyl bromide. Measurable drift was detected at 13 of the 15 multiple pesticide sampling locations, and at all but one of the methyl bromide sampling locations. (See p. 10 for details of methyl bromide monitoring results.)

Multiple Pesticide Monitoring Results: Monterey-Santa Cruz

EWG monitored pesticide applications in five locations in Monterey and Santa Cruz counties. Of 18 samples taken, 10 detected drifting pesticides. Most frequently detected was permethrin, found at five locations in Monterey County and one in Santa Cruz County. The highest detection of permethrin was 4.3 parts per billion (ppb) in Monterey County; the average level of the six detections was 1.4 ppb. Other pesticides detected in the two counties included chlorpyrifos, carbaryl, methomyl and cyfluthrin. The highest level of any pesticide detected was cyfluthrin, at 4.5 ppb in Monterey County.

The Department of Pesticide Regulation has only tested for two pesticides in Monterey County since 1991: oxydemeton-methyl and permethrin. Neither of these pesticides are on the TAC list.

Sonoma County

Six locations in Sonoma County were monitored with PUF tubes — filter-lined glass tubes attached to air pumps. (See Methodology.) Of 26 samples taken, 15 detected drifting pesticides. Most frequently detected was sulfur, found at nine locations. Sulfur was detected at levels of up to 10.5 ppb with an average of 2.8 ppb. Other pesticides detected in Sonoma sampling were carbaryl (5 detections) and phosmet (1 detection). The average of the carbaryl detections was 0.25 ppb, with the highest detection 0.65 ppb. Phosmet was detected at 0.19 ppb.

Table 3. EWG discovered nine different pesticides in the air in agriculture communities.

County	Number of Locations	Dates	Total Number of Air Samples	Number of Pesticides Detected	Percent Positive	Maximum Individual Residue Detected
Contra Costa	1	8-9/96	2	0	0%	
Monterey	4	8/96 & 5-7/98	13	8	62%	cyfluthrin near lettuce field - 4.3 ppb
San Mateo	1	5-6/97	3	1	33%	iprodione near flower farm - 1 ppb
Santa Barbara	1	8/96	1	1	100%	cyfluthrin - 2.5 ppb
Santa Cruz	1	5-7/98	5	3	60%	permethrin near brussels sprouts field - 0.1 ppb
Sonoma	6	5-8/98	26	16	62%	sulfur near grape vineyard - 10.5 ppb
Ventura	1	3-5/97	5	2	40%	chlorpyrifos near strawberry field - 0.2 ppb

Source: Environmental Working Group

Seven paper-tray samples were also taken near Sonoma vineyards, and four tested positive for sulfur. Paper sampling trays were placed outdoors to passively collect pesticide fallout from nearby fields and vineyards. This test is useful for collecting data on potential exposure from pesticides that might accumulate on playground equipment, picnic tables and other outdoor surfaces. Use of sulfur in California vineyards was higher than normal in 1998, because of heavy rains triggered by El Nino.

DPR has never tested for any pesticides in the air in Sonoma County.

San Mateo County

One location in San Mateo County was monitored. Of three samples taken in May and June, 1997, one detected drifting pesticides. Iprodione, a fungicide, was found at 1 ppb near a crop of flowers.

DPR has never tested for any pesticides in the air in San Mateo County.

Ventura County

Monitoring was conducted at one location in Ventura County. Of five air samples taken, two detected pesticides. Chlorpyrifos was detected at a level of 0.22 ppb and myclobutanil was detected at 0.16 ppb.

DPR has only tested for two pesticides since 1991, chlorothalonil and siamazine, in the air in Ventura County. Neither of the pesticides are on the TAC list. In Ventura County, ARB tested for 61 different TACs more than 12,000 times between 1991 and 1995.

Santa Barbara County

The one sample that was taken in Santa Barbara County in August 1996 contained cyfluthrin, an insecticide, at 2.5 ppb..

DPR has never tested for any pesticide in the air in Santa Barbara County. ARB, on the other hand, tested the air in Santa Barbara County for 61 different TACS nearly 13,000 times between 1991 and 1995.

EWG's Air Monitoring for Methyl Bromide Drift

From June 1996 to August 1997, EWG conducted or facilitated air sampling for methyl bromide drift in Ventura, San Luis Obispo, Monterey and Santa Cruz counties. (Previously published detailed reports from these sampling projects are available on-line at www.ewg.org.)

Methyl bromide is a fumigant classified by the U.S. EPA as a Category I acute toxin — a designation reserved for the most toxic substances — and is known to cause birth defects and nerve damage. It is also a potent destroyer of the Earth's protective ozone layer. California is the world's largest user of methyl bromide, with 17.6 million pounds applied in 1995, mostly to Central Coast strawberry fields. Because the fumigant is injected into the soil as a volatile gas, methyl bromide routinely drifts off treated fields into adjacent neighborhoods and school grounds.

Methyl bromide was first targeted for phaseout by the California Birth Defects Prevention Act of 1984, but pesticide interests have successfully lobbied in Sacramento and Washington for repeated extensions of the deadline. Currently, under the Clean Air Act and an international treaty, the Montreal Protocol on Ozone Depleting Substances, methyl bromide will be banned in the United States in 2005.

Of 37 samples taken by EWG or local residents at seven locations — three suburban subdivisions, two elementary schools and two mobile home parks, all near strawberry fields — 28 detected methyl bromide in the air. In five of the locations, peak levels of methyl bromide detected exceeded DPR's safety guidelines of 210 parts per billion. (Table 4.) (DPR insists that the only valid measurements are 24-hour averages — scant reassurance to someone exposed to a toxic nerve gas for 6 or 12 hours.) In October 1997, at Salsipuedes Elementary School in Watsonville, the 24-hour average detection was 2,115 ppb — more than 10 times the guideline.

After widespread news coverage of EWG's findings and a series of permit challenges by local residents, DPR was forced to expand the

Table 4. Over sixty percent of the locations tested positive for methyl bromide.

County	Town	Dates	Number of Samples	Percent Positive	Testing Method	Mean Detection (ppb)	Maximum Detection (ppb)	Maximum 24 Hour Average (ppb)
Monterey	Castroville	8-9/97	9	66%	Carbon Filters			
Monterey	Castroville	8/96	continuous	NA	FTIR	204	665	102*
Monterey	Castroville	8-9/97	12	66%	SUMMA Canisters	202	490	370
San Luis Obispo	Oceano	10/97	1	100%	SUMMA Canisters	230	230	NA
Santa Cruz	Watsonville	8/97	2	0%	SUMMA Canisters	-	-	-
Santa Cruz	Watsonville	10/97	4	100%	SUMMA Canisters	1,350	3,700	2,115
Santa Cruz	Watsonville	11/96	4	100%	SUMMA Canisters	162	190	170
Santa Cruz	Watsonville	11/96	2	100%	Carbon Filters	6	6	6
Ventura	Camarillo	8/97	3	100%	SUMMA Canisters	64	68	68
Ventura	Ventura	6/96	continuous	NA	FTIR	294	1,900	147*

**12-hour average.*
Source: Environmental Working Group

minimum no-spray buffer zone between methyl bromide applications and adjacent homes or schools from 30 feet to 100 feet or more, depending on location. However, EWG monitoring has detected methyl bromide up to 1,300 feet from the application site, and a former state Air Resources Board expert has said that buffer zones should be at least half a mile throughout the state. (Sears 1997) In 1998, a bill to ban the use of methyl bromide within 1,000 feet of homes or schools was blocked in the California Assembly by farm-district legislators.

In October 1998, with no public notice other than an advisory to county agriculture commissioners, DPR said residential buffer zones for certain applications of methyl bromide to tracts of 10 acres or less could be reduced to 50 feet. DPR said it was also increasing the buffer zones for some methods of applying methyl bromide, but failed to note that the majority of applications in the counties of heaviest use are to tracts of 10 acres or less. At the same time, DPR set the minimum buffer zone between methyl bromide applications and workers in adjacent fields back to just 30 feet, arguing that because workers were exposed for 12 hours at a time whereas neighboring residents might be exposed round-the-clock, workers did not need as much protection from exposure.

DPR cited "new science" derived from "extensive" air monitoring as justification for the reduction. But as of the end of 1998, results had been made public for only two of the monitoring tests, both from San Luis Obispo County. One test found methyl bromide drifting beyond the 100-foot buffer zone, but in concentrations below the state guidelines. The other test found levels exceeding state guidelines drifting into a senior citizen's mobile home park, prompting county officials to extend the buffer zone for similar applications to 450 feet. (The trailer park was also where, in October 1997, air monitoring by EWG found 230 ppb of methyl bromide more than 350 feet from the field.) Questioned about DPR's basis for shrinking the buffer zones, county ag commissioners acknowledged that the agency had not provided them with its test results either. (Alvarez 1998)

Contra Costa County

Two samples were taken in Contra Costa County between August and September, 1996; however, neither of the samples tested positive for pesticides.

DPR has only tested for one pesticide in Contra Costa's ambient air: a single test for metam sodium in March 1994. The ARB, on the other hand, tested in Contra Costa for 61 toxic air contaminants over 15,400 times between 1991 and 1995.

About the pesticides

Each of the three major classes of insecticides in use were detected during the Monitoring Project. Organophosphates were detected in Ventura, Santa Cruz and Sonoma; carbamates were detected in both Monterey and Sonoma; and pyrethroids were detected in Monterey, Santa Cruz and Santa Barbara. In addition, three fungicides were detected: myclobutanil in Ventura County, iprodione in San Mateo County and sulfur in Sonoma County.

Organophosphates

Organophosphates (OPs) are a class of neurotoxic insect poisons for which the observable symptoms of exposure include nausea, vomiting, blurred vision, convulsions and irregular heartbeat. Exposure to OPs can produce long-

term damage to the nervous system, even in the absence of observable signs of toxicity. Animal studies, as well as evidence from human poisonings, show that fetuses, infants and children are often more susceptible to OP toxicity than adults. Because organophosphates are widely used on many different food crops, they are the first group of chemicals to be regulated under the Food Quality Protection Act, a landmark 1996 federal law that strengthened the protections for children from pesticides.

- Chlorpyrifos, an organophosphate detected in our sampling, is the most widely used insecticide in the U.S. and in California, where use exceeded 3.5 million pounds in 1995. In 1996, the ARB monitored for chlorpyrifos drift from orange groves in Tulare County, and detected the pesticide in 74 percent of the air samples taken near the groves. ARB also sampled the air in urban areas well away from the groves, and found the pesticide in 24 percent of samples.

- Phosmet is an organophosphate pesticide and a possible carcinogen. Phosmet is mostly used on fruit trees and vines and in some dog collars. More than 267,000 pounds were used in California in 1995.

Carbamates

Carbamates are another class of neurotoxic insecticides. Though they are more acutely toxic than organophophates, they can be flushed from the human body more quickly, making them less lethal. Known health effects of carbamate exposure include headache, dizziness and nausea at low level exposure and numbness, tingling burning sensations, seizures, coma and death at high exposures.

- Carbaryl is a widely used carbamate pesticide that is used on agricultural crops, forest land, and home gardens. Carbaryl is classified as a possible human carcinogen and suspected reproductive toxicant by the EPA and is a suspected endocrine toxicant. About 1.5 million pounds were used in California in 1995. Carbaryl drift has never been monitored by DPR or ARB.

Pyrethroids

Pyrethroids are synthetic formulations of chemicals originally derived from natural insecticides found in flowers that have the capability to kill insects by disrupting their nervous systems. While studies of their health effects are incomplete, the suspected effects include toxicity of the endocrine system.

- Permethrin is a pyrethroid insecticide that is classified as a possible carcinogen by the EPA and is a suspected endocrine toxicant. Approximately 420,000 pounds were used on a variety of fruit, vegetable, flower, and nut crops in California in 1995. Permethrin drift has been monitored by the state in Monterey and Butte counties, but as of late 1998 the results had not been made public.

- Cyfluthrin is a pyrethroid insecticide that is used on numerous types of fruits, vegetables, and nuts. Almost 44,000 pounds were used in California in 1995. Cyfluthrin drift has never been monitored by DPR or ARB.

Fungicides

Fungicides are pesticides that are applied to structures and to crops before and after harvest to prevent or halt the growth of molds and fungi. Many fungicides have been found to be potent carcinogens and some, like hexachlorobenze and pentachlorophenol, are being phased out because of their toxic effects and persistence in the environment.

- Sulfur is one of the most heavily used fungicides in California, with nearly 70 million pounds applied in 1995 alone. As a naturally occurring mineral, it is approved for use in certified organic farming, and used sparingly is a less-toxic alternative to pyrethroids. Unfortunately, because of its widespread use and the volume of material used — typically, hundreds of pounds per acre — sulfur is the chemical most commonly implicated in farmworker pesticide health complaints, primarily respiratory or eye irritation. Sulfur drift has never been monitored by the ARB or DPR.

- Iprodione is a fungicide that is used on both pre-harvest and post-harvest fruits, vegetables, and flowers. More than 588,000 pounds of iprodione were used in California in 1995. It is classified as a known carcinogen by the State of California.

- Myclobutanil is a fungicide used on grapes and other crops. More than 100,000 pounds of myclobutanil were applied in California in 1995. The chemical has been shown to be associated with birth defects and testicular atrophy in laboratory animals.

Pesticides Are Pollution, Too

Pesticides are the only form of airborne contaminants not regulated by state air pollution experts.

When pesticides are applied to crops, some portion of the poison (for which the agrichemical industry's euphemism is "active ingredient") inevitably becomes airborne. Whether the pesticide is applied as a gas, liquid, spray or dust, blowing wind or drifting fog disperses the vapors, droplets or particles, and because of California's highly localized microclimates, the amount of drift varies greatly for a given day in a given location. In 1995, the United States Geological Survey released a report that documented drift of every major class of pesticides and the subsequent deposition of these chemicals in rain and fog. (Majewski 1995) Most of the air and fog samples collected in California tested positive for a number of pesticides, including highly toxic organophosphates like chlorpyrifos and methyl parathion.

In addition, for hours and even days after application, pesticide formulations evaporate from the soil and vegetation, emitting more chemicals into the air and possibly leading to continued exposure for farmworkers and nearby residents. These evaporating chemicals can include the active ingredients, chemical products of the breakdown of those ingredients and chemical additives — so-called "inert ingredients" — in the pesticide formula. Collectively, these evaporating chemicals are known either as volatile organic chemicals (VOCs), or as they are officially classified in California, reactive organic gases (ROGs). A more accurate term for this combination of drifting pesticides and post-application emissions of active ingredients and ROGs would be *pesticide air pollution.*

The fact that airborne pesticides and pesticide ROGs are air pollution may seem self-evident, but apparently not to the State of California, and in particular, not to the Department of Pesticide Regulation. Under a 1983 state law, AB 1807, if a chemical emitted into the air is officially determined to be a toxic air contaminant (TAC), it is subject to increased monitoring, mitigation and enforcement efforts designed to protect public health. All air pollution from factories, automobiles and all other non-agricultural sources is regulated under health-based standards by the ARB, which has set some of the toughest and most protective air

DPR has no statewide air monitoring program to quantify the extent or risks of pesticide air pollution.

pollution regulations in the nation, and by late 1998, had placed 20 contaminants on the TAC list — most recently, particulate matter in diesel exhaust.

Pesticides in the air, however, are overseen by DPR. Compared to ARB, DPR has responded lethargically to the law's mandate to protect public health: In its history as an agency, DPR has moved to list only one pesticide as a TAC, and only after the pesticide was banned by the U.S. Environmental Protection Agency. (At an October 1998 meeting of the state's Scientific Review Panel on Toxic Air Contaminants, DPR said it would submit TAC evaluations to the Panel for an additional 11 chemicals, including methyl bromide, by the end of 1999.)

But even when DPR does get around to placing a pesticide on the TAC list, it may not mean much. Under AB 1807, U.S. EPA listing of a substance as a hazardous air pollutant (HAP) under the Clean Air Act Amendments of 1990 triggers an automatic listing as a TAC in California. But DPR maintains that the federal listing mandates no additional monitoring or regulatory action (DPR 1997b). From 1991 through 1995, there were more than 45,000 applications in California of pesticides listed as HAPs by the U.S. EPA. DPR tested the air in California for these pesticides just 7 times from 1991 through 1997. ARB, on the other hand, monitored for HAPs across California over 178,000 times between 1991 and 1995. During that same period, ARB analyzed more than 80,000 air samples for TACs. (Table 5.)

DPR has undertaken no comprehensive, long-term or statewide air monitoring program to quantify the extent or risks of pesticide air pollution. Out of more than 600 pesticide active ingredients currently registered for use in California — approximately 150 of which have been identified by federal or state agencies as candidates for the TAC list — the state has tested the air for fewer than 30. And even this testing can not be characterized as routine monitoring. Instead it is typically designed to monitor the drift from one application, or for one pesticide over a few days. Most of the studies have been conducted in the Central Valley, where the agricultural industry's influence is dominant, largely ignoring the growing public health concerns over heavy pesticide use in coastal counties — the so-called suburban-ag interface. Judging from the department's 1997 methyl bromide monitoring in Castroville, where extraordinary precautions were taken to reduce the possibility of drift, it is also questionable whether DPR's special tests adequately reproduce real-world applications.

Even in the counties of heaviest pesticide use, DPR monitors only a minute fraction of applications. In the top three

Table 5. From 1991 through 1995, DPR tested the air once for every 65,000 applications of pesticides listed as Hazardous Air Pollutants*.

Year	Number of Applications (1991-1995)	Pounds (1991-1995)	DPR Testing for Hazardous Air Pollutants (1991-Present)	ARB Testing for Hazardous Air Pollutants (1991-1995)
1991	76,348	24,366,363	0	35,722
1992	82,674	24,530,058	1	34,782
1993	88,934	21,033,858	3	39,080
1994	100,010	23,590,287	0	34,508
1995	109,948	28,504,673	3	34,398

**Toxics (including pesticides) designated by the U.S. EPA as Hazardous Air Pollutants are automatically listed as Toxic Air Contaminants (TACs) under California law.*

Source: Kollman 1996, DPR 1996, DPR 1997, Kelley 1996, Baker 1996, Baker 1998 & ARB 1996.

counties for number of pesticide applications each year — Fresno, Tulare, and Monterey — DPR sampled the air for pesticides just 22 times from 1991 through the present, an average of one test for approximately every 66,000 applications. Between 5 million and 25 million pounds of pesticide active ingredients are applied in these three counties each year; during the peak of the spraying season, as many as 1,250 separate applications per day are recorded in Fresno County. (Table 6.)

Furthermore, in 11 counties with over 10,000 pesticide applications each year, DPR has not tested the air for pesticides since 1991. (Table 7.) Between 1991 and 1995, there were more than 1.1 million applications of hundreds of different pesticides in these counties; DPR monitored not one. It is not unusual for more than 100 different pesticides to be applied on the same day in just one of these 11 counties during peak spray season, contaminating the air with a mix of poisons that poses an unknown risk to residents. By contrast, in these same 11 counties, ARB monitored the air nearly 40,000 times for toxic air contaminants from 1991 to 1995.

Estimates of pesticide drift

An active ingredient is the part of a pesticide product that kills the target pest. It is the poison in the can of Raid, as opposed to all the other so-called inert ingredients in the formulated product. If you know the physical characteristics of the pesticide, the method of application, the crop density and height, and weather factors

Table 6. Even in the counties with the heaviest pesticide use, DPR monitors the air less than once for every 84,000 pesticide applications.

County	Number of Applications (1991-1995)	Pounds of Active Ingredient (1991-1995)	Number of Tests Commissioned by DPR (1991-Present)	Pesticide Applications per DPR Test
Fresno	601,060	124,163,515	13	46,235
Monterey	429,601	28,441,882	3	143,200
Tulare	415,573	48,367,349	6	69,262
Kern	262,307	65,821,723	10	26,231
San Joaquin	175,706	45,721,984	1	175,706
Santa Barbara	169,115	11,574,481	0	NA
Merced	159,532	26,137,842	1	159,532
San Diego	147,513	4,027,692	0	NA
Riverside	147,100	14,787,067	0	NA
Imperial	146,486	26,355,312	7	20,927
State Total	**4,204,798**	**619,627,380**	**50**	**84,096**

Source: DPR 1997, Baker 1996, Baker 1998 & Kollman 1996.

including temperature, humidity and wind, you can estimate, on a case-by-case basis, how much of a given pesticide active ingredient might drift from the application site. Applying that formula to the entire state is difficult, but a number of recent studies provide a basis for an estimate.

The best estimates of drift of pesticide active ingredients have been done by the U.S. Environmental Protection Agency (EPA) and Environment Canada, that nation's federal environmental agency. A 1995 EPA computer modeling project found that for just 11 of the most commonly used pesticides, nationwide over 35 million pounds of active ingredients drift or volitalize off-site each year. A more recent Canadian study estimated total North American drift of active ingredients from 10 commonly used pesticides at nearly 28 million pounds a year. (Scholtz 1997)

The EPA study determined that an average of 20 to 45 percent of the active ingredients of a given pesticide could drift from the field, depending on the volatility of the compound and other factors. (Benjey 1995) The study's author now believes average drift rates are probably lower, on the order of 5 to 20 percent of the pesticide applied. (Benjey 1998)

According to DPR studies, a number of pesticides used in California, including some of the most toxic, have much higher drift potential of 80 to 100 percent. Finally, in estimating the potential for drift and post-application emissions in California, keep in mind the fact that one-

Table 7. DPR does no monitoring at all in many counties where pesticide exposure potential is high.

County	Number of Applications (1991-1995)	Pounds of Active Ingredient (1991-1995)	Number of Tests Commissioned by DPR (1991-Present)
San Diego	147,513	4,027,692	0
Riverside	147,100	14,787,067	0
Stanislaus	145,669	19,321,048	0
Madera	128,176	37,507,347	0
San Luis Obispo	105,739	6,103,858	0
Sonoma	72,958	12,596,473	0
Santa Cruz	67,140	5,583,000	0
Yolo	64,290	12,011,217	0
Sutter	57,273	11,000,634	0
Napa	52,777	11,661,550	0

Source: DPR 1997, Baker 1996, Baker 1998 & Kollman 1996.

fourth of all pesticides used in the U.S. are applied in California, and that the rate of pesticide use per capita in California — eight pounds per person per year — is more double the national rate. (CPR 1998)

Even applying the lowest drift potential rate of 5 percent, the totals are substantial: Of the 212 million pounds of pesticide active ingredients applied in California in 1995, at least 11 million pounds drifted from the field. Applying a drift potential rate of 20 percent, the estimate rises to 44 million pounds.

Reactive Organic Gases

But offsite drift of toxic pesticide active ingredients is only the tip of the iceberg. It does not include reactive organic gases that evaporate in huge quantities after the pesticide is applied. Reactive organic gases are volatile organic chemicals that readily evaporate into air from other substances. When you smell gasoline, you are smelling airborne ROGs. The chemical classification ROGs includes hundreds of chemical compounds, including solvents like benzene, toluene, naphtha and zylene. Some pesticides, such as chlorpyrifos and methyl bromide, are so volatile they are considered ROGs on their own.

Often these ROG solvents are added to pesticide formulations to dissolve the active ingredient and keep it in solution for even distribution on the crop. Sometimes solvents are added to help the pesticide penetrate the insect or plant targeted. In such cases these added chemicals are

Between 11 million and 44 million pounds of pesticides drift off California farm fields each year, along with millions of pounds of toxic chemical gases that evaporate into the air after the pesticides are applied.

Table 8. Pesticide Reactive Organic Gases (ROG) Emissions in California, 1995.

Rank	County	Agricultural		Structural (pounds)	Total Pesticide Reactive Organic Gases (ROG) Emissions (pounds)
		Methyl Bromide (pounds)	Non-Methyl Bromide (pounds)		
1	Kern	1,672,200	14,289,400	26,400	15,988,000
2	Fresno	372,800	12,742,200	162,000	13,277,000
3	Imperial	273,800	8,064,800	13,200	8,351,800
4	Kings	58,400	6,637,600	27,000	6,723,000
5	Monterey	4,154,200	2,319,400	32,200	6,505,800
6	Tulare	752,800	5,550,000	61,400	6,364,200
7	San Joaquin	1,108,400	2,695,600	56,600	3,860,600
8	Merced	785,800	2,053,000	271,400	3,110,200
9	Santa Barbara	794,200	1,993,200	53,000	2,840,400
10	Ventura	1,334,600	1,377,800	58,200	2,770,600
11	Riverside	667,800	1,627,200	306,200	2,601,200
12	Stanislaus	783,200	1,678,400	56,600	2,518,200
13	Yolo	24,000	2,321,200	15,200	2,360,400
14	Madera	33,400	1,704,000	19,400	1,756,800
15	Santa Cruz	1,170,400	400,800	8,800	1,580,000
16	Sutter	329,000	1,203,200	4,600	1,536,800
17	Los Angeles	54,000	366,400	960,000	1,380,400
18	Colusa	17,200	1,360,000	2,200	1,379,400
19	Orange	513,000	474,000	300,600	1,287,600
20	Butte	216,800	1,055,800	11,200	1,283,800
21	San Diego	472,000	374,800	294,000	1,140,800
22	Sonoma	471,200	525,600	25,600	1,022,400
23	Glenn	26,200	922,800	3,000	952,000
24	San Luis Obispo	225,200	669,400	12,800	907,400
25	Sacramento	25,800	741,400	99,800	867,000
26	Solano	78,400	720,600	25,400	824,400
27	Yuba	170,400	484,600	200	655,200
28	Napa	318,600	327,800	6,000	652,400
29	Santa Clara	78,200	300,800	161,000	540,000
30	San Benito	192,000	170,400	4,200	366,600
31	San Bernardino	38,000	219,200	100,400	357,600
32	Mendocino	49,000	276,800	2,200	328,000
33	Tehama	84,000	214,400	1,600	300,000
34	Contra Costa	3,400	226,200	70,200	299,800
35	Shasta	240,600	45,000	6,200	291,800
36	Alameda	80,200	127,800	62,400	270,400
37	Del Norte	40,800	219,800	200	260,800
38	Siskiyou	70,200	167,600	400	238,200
39	Placer	21,400	148,000	62,800	232,200
40	San Mateo	24,400	133,800	35,600	193,800
41	Lake	-	140,600	37,600	178,200
42	Lassen	112,000	9,000	200	121,200
43	Modoc	-	71,200	-	71,200
44	Calaveras	-	66,000	3,200	69,200
45	Amador	31,400	19,600	1,200	52,200
46	Humboldt	19,400	26,400	5,800	51,600
47	Marin	-	13,000	20,400	33,400
48	Mono	-	30,600	-	30,600
49	El Dorado	-	15,800	12,600	28,400
50	San Francisco	-	5,400	22,800	28,200
51	Nevada	-	15,000	5,600	20,600
52	Tuolumne	-	12,200	4,400	16,600
53	Mariposa	-	7,000	1,800	8,800
54	Plumas	-	2,200	4,800	7,000
55	Sierra	-	2,600	-	2,600
56	Inyo	-	600	1,400	2,000
57	Trinity	-	200	-	200
58	Alpine	-	-	-	-
	Statewide Total	17,988,800	77,368,200	3,542,000	98,899,000

Source: Environmental Working Group. Compiled from California Air Resources Board data.

called “inert ingredients,” but they are hardly biologically inert: Many ROGs are potent poisons that can cause cancer, birth defects, nervous system disruption, kidney disease and heart damage, as well as the flu-like symptoms associated with acute poisoning.

Because they contribute to the formation of smog, emissions of ROGs are regulated under the U.S. Clean Air Act. To comply with the law, DPR has established a ROG emissions potential factor (EF) for every pesticide registered for use in California. This rating gives the percentage of the chemical that either is or potentially will become airborne ROGs after the pesticide is applied. The EF varies greatly according to the exact formulation of the pesticide, even for products with the same active ingredient. For example, according to DPR, chlorpyrifos used for termite treatment has an emissions potential of around 25 percent while some formulations used on crops have EFs of near 100 percent. For many fumigant gases, such as methyl bromide, Telone and Vapam, DPR estimates the emissions potential at 97 or 100 percent. Of 246 currently registered pesticide products evaluated by DPR, almost one in 4 had emissions potential of at least 50 percent. (DPR 1998b)

Using methodology established by ARB and DPR’s 1995 pesticide use figures, EWG estimated that some 98.9 million pounds of ROGs are emitted as as result of pesticide applications in California each year. (Table 8.) This figure was calculated as the product of the number of pounds applied of each pesticide and DPR’s estimate of that pesticide’s emissions potential. Since some pesticides are themselves ROGs, there is some overlap between this figure and the estimate of 11 million to 44 million pounds of drift. However, it is a safe and conservative estimate to say that approximately 100 million pounds of pesticide active ingredients and ROGs drift or volitalize into the air each year as a result of pesticide use in California. This estimate is nearly four times the total statewide ROG emissions from petroleum refining (25.5 million pounds annually) and more than double the emissions from all other stationary industrial sources besides petroleum refining (46 million pounds).

Many agricultural regions of California are out of compliance with federal Clean Air Act standards — that is, levels of smog exceed the U.S. EPA’s health standards. According to ARB estimates, agricultural chemicals are significant contributors to some of these regions’ “non-attainment” status. (Baker 1998) (ARB’s ROG estimates for these non-attainment regions do not separate pesticides and fertilizers.)

In the San Joaquin Valley (Fresno, Kern, Kings, Madera, Merced, San Joaquin and Stanislaus counties), pesticides

Pesticides emit four times as much of one kind of air pollution than all the oil and gas refineries in California.

In the San Joaquin Valley and other areas, pesticides are a significant source of smog-forming chemicals.

and fertilizers emit an estimated 34 million pounds of ROGs a year, more than 13 percent of the region's total. In Ventura County, estimated pesticide and fertilizer ROGs are about 2.1 million pounds a year, or 5.6 percent of the total. In the Southeast Desert area (Riverside-San Bernardino), about 1.2 million pounds of ROGs were emitted from pesticides and fertilizers, or 3.4 percent of the total. In each of those areas, the main ROG culprit is methyl bromide, which has a potential emissions rate of as much as 100 percent, depending on the brand used.

The other agricultural area where ROG emissions exceed standards of the Clean Air Act is the Sacramento region, where pesticide and fertilizer ROGs total 2.7 million pounds annually, 3 percent of the total. In the Sacramento area, the biggest source of pesticide ROGs is chlorpyrifos, a neurotoxic organophosphate insecticide.

Regulations to control ROG emissions must be part of each state's implementation plan (SIP) of the Clean Air Act. In 1994, because California had failed to complete its SIP, the EPA proposed a plan that, according to DPR, would have required up to a 45 percent reduction in pesticidal ROGs and banned the use of some pesticides high in ROGs. DPR said the federal plan "would have had severe economic impacts," and proposed "more reasonable alternatives," accepted by EPA in 1996. The state plan now calls for a 20 percent reduction by 2005. (DPR 1998b)

However, the plan's baseline was developed not by air testing or computer modeling of emissions, but by surveying growers who estimated the emissions rate of pesticides they used. Further, the plan allows for reductions to be achieved *not* primarily through reducing pesticide use, but by changing the chemical formulation of the pesticide or using a DPR-developed protocol for recalculating the emissions factors that the agency says will "virtually always" yield a lower EF. This may or may not result in a real reduction in ROGs, but is consistent with DPR's insistence that the increasing volume of pesticide use is not a problem.

All in a Day's Spray

On a given day, Californians in a single county may be exposed to hundreds of applications of dozens of different toxic pesticides.

Even in counties with heavy pesticide use and high potential for human exposure, DPR virtually never monitors the air for pesticides. To estimate the potential for human exposure to pesticides and toxic ROGs from pesticide formulations, EWG calculated pesticide applications per day for each county, using the most recent data available from the California pesticide use reporting (PUR) system. PUR data were also combined with product-specific emissions factors (EFs) from DPR, to produce estimates of pesticide ROG air pollution by county. These analyses show that on many days during peak pesticide application months, Californians in counties where pesticide use is heavy are exposed to tens of thousands of pounds of toxic ROGs from pesticide use daily, as well as an array of pesticide active ingredients that pose serious health concerns.

Potential for human exposure to pesticides and toxic compounds in pesticide formulations can be estimated by spray events, or "spray-days" per county. A spray-day represents one field treated one time with one or more pesticides. Spray-days are an imperfect but useful indicator of the potential for human exposure to pesticides and the toxic compounds in pesticide formulations. Other measurements, such as pounds applied per day, reflect only the application rates of the pesticide active ingredients applied; spray-days show the frequency and geographic range of applications and the potential for public exposure to all the air toxins in the pesticide formulation. EWG's estimates of spray-days are conservative measures of potential exposure, since spraying one field with three chemicals at the same time counts as only one spray-day.

Why is the number of applications important? If measured in pounds, one spray-day consisting of one application of 10,000 pounds of methyl bromide in Monterey County would look the same as 10 applications of 1,000 pounds each in adjacent Santa Cruz County. Clearly, with 10 sites the potential for some level of drift is greater. Counting pounds instead of applications masks this wider potential for exposure; neither does it account for potential exposure to the toxic inert ingredients in pesti-

In many counties, pesticides are sprayed hundreds of times a day in peak growing season.

cides which are not reported in the PUR system.

Up to 1,200 Sprays a Day

In counties of heaviest pesticide use, hundreds of separate applications of 100 or more different chemicals can take place on a single day during periods of heavy spraying. (Table 9.) In 1995, Fresno, Monterey, and Tulare counties averaged more than 390 applications per day for at least one month, and Fresno County averaged more than 680 sprays per day for the month of May. For each month from March to August, Fresno County had an average of more than 400 applications per day. Nine other counties averaged more than 100 sprays per day during those months. To put it another way, calculated as annual spray-days, Fresno recorded more than 143,000 opportunities for potential drift or exposure in 1995; Monterey had almost 95,000 and Tulare more than 90,000. (Figure 1.)

The most sprays on any single day between 1991 and 1995 were recorded in Fresno County on May 17, 1995, when there were 1,278 separate applications of pesticides. In 12 counties, the peak spray-day had at least 250 separate applications, and in 26 counties the peak day had over 100 applications.

The highest number of different pesticides applied on any given day between 1991 and 1995 was also in Fresno County, with 159 different chemicals applied on June 30, 1995. In 12 counties, there was at least one day on which more than 100 pesticides were applied. In 14 counties, for the six months between March and August, more than 50 pesticides were applied every day.

In most coastal counties, the summer growing months are the time of greatest pesticide use.

In Monterey and Santa Cruz counties, an average of over 419 pesticide applications per day take place from May through September. On Aug. 5, 1995, there were 603 separate applications in Monterey County, using 133 different pesticides totaling 62,637 pounds. On June 30, 1995, there were 102 applications in Santa Cruz County, using 90 different pesticides totaling 5,586 pounds. In 1995, Monterey had almost 95,000 spray-days; Santa Cruz had about 13,000.

In Santa Barbara County, an average of 120 pesticide applications per day take place from May through September, and on May 31, 1995, there were 205 separate applications using 111 different pesticides totaling 16,741. pounds. More than 36,000 spray-days were recorded in Santa Barbara County in 1995.

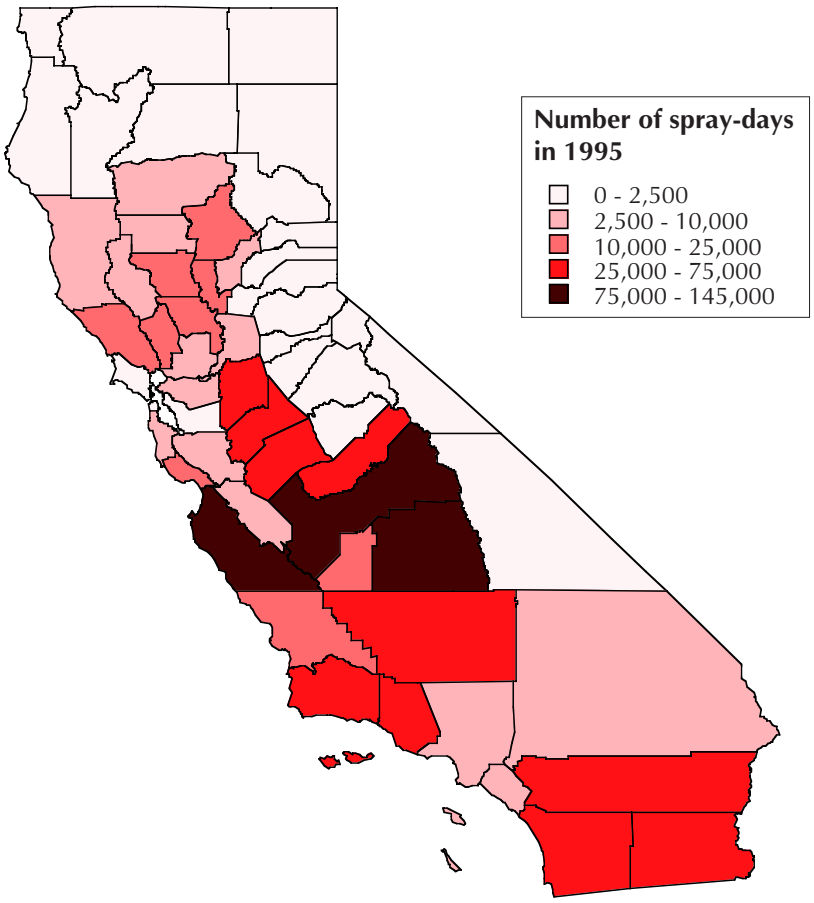
In Sonoma County, the summer months see an average of over 60 applications a day. On May 17, 1995, there were 263 separate applications in Sonoma using 53 different pesticides to-

Table 9. Pesticides can be applied up to 1.200 different times in one county in a given day.

County	Day with the Most Pesticide Applications (1991-1995)	Number of Applications	Pounds of Pesticide Active Ingredient	Number of Pesticides
Fresno	May 17, 1995	1,278	440,410	125
Tulare	May 10, 1995	852	124,315	133
Monterey	August 5, 1995	603	62,637	133
Kern	June 17, 1995	536	130,123	113
San Joaquin	May 17, 1995	402	177,222	108
Merced	March 7, 1995	314	55,878	105
Imperial	February 25, 1995	297	101,761	62
Madera	May 8, 1995	295	155,105	64
Stanislaus	March 17, 1995	295	39,900	92
Sonoma	May 17, 1995	263	95,582	53
Napa	May 17, 1995	239	82,053	33
Riverside	March 20, 1995	217	28,485	81
Kings	August 5, 1995	208	43,514	83
Santa Barbara	May 31, 1995	205	16,741	111
Glenn	May 19, 1995	202	84,829	45
Sutter	June 8, 1995	201	72,618	47
Yolo	February 15, 1995	194	24,475	62
Colusa	May 19, 1995	191	90,510	26
Solano	February 15, 1995	176	12,410	45
Butte	June 8, 1995	175	73,607	56
Ventura	March 15, 1995	163	7,057	90
San Diego	July 15, 1995	148	6,507	96
San Luis Obispo	June 20, 1995	136	19,274	84
Sacramento	March 30, 1995	127	16,548	51
Santa Cruz	June 30, 1995	102	5,586	90
Mendocino	May 18, 1995	101	37,756	31
Lake	April 4, 1995	70	1,797	28
San Benito	May 23, 1995	68	2,874	65
Santa Clara	June 20, 1995	62	2,409	51
Tehama	March 17, 1995	61	12,575	24

Source: California Dept. of Pesticide Regulation, 1991-95 Pesticide Use Reporting database.

Figure 1. Annual number of spray-days* in California.



**A spray-day equals one field treated once on a given day with at least one pesticide. A field treated with multiple pesticides in one spraying session counts as a single spray-day.*

Source: Environmental Working Group. Compiled from California Department of Pesticide Regulation, Pesticide Use Reports, 1995.

taling 95,582 pounds. In 1995, Sonoma County recorded more than 18,000 spray-days.

Pesticide use in Ventura County remains fairly steady throughout the entire year except for January, when there were an average of 68 sprays each day from 1991 to 1995. The peak day in that period was March 15, 1995, with 163 separate applications using 90 different pesticides totaling 7,057 pounds. Total spray-days in 1995 totaled more than 25,000.

Chapter 4

What You Don't Know Could Hurt You

Based on the response to EWG's call for local communities to participate in the Community Pesticide Air Monitoring Project, public concern about pesticide drift is widespread in California. Citizen volunteers attempted to sample air quality in five additional counties (Imperial, San Diego, Orange, Solano and Yolo). In some cases they were unable to find suitable sites, given the limitations of the equipment. (See Methodology.) But in most cases, the chief obstacle was the inability to learn the time and place of pesticide applications with enough notice to set up and activate the equipment.

In some communities citizens secured agreements with farmers or local authorities to notify them when pesticides were being applied, but this usually was achieved only after residents organized, filed complaints and held public protests to voice their concerns. Although state law requires annual reporting of every commercial application of pesticides, there is no law requiring prior notification to neighboring residents, schools or businesses before the use of even the most toxic and volatile pesticides.

To get information on what pesticides are being used on a field behind your house or near your child's school, the first source of information is the farmer. However, growers are not obligated to provide this information and, understandably, are often reluctant to provide it to citizens who may use it to organize opposition to spraying.

State law does not require notice to neighboring residents, schools, or businesses before the use of even the most toxic and volatile pesticides.

The County Agriculture Commissioner

This means most citizens must go to the County Agriculture Commissioner, the keeper of pesticide reporting records for each county. The willingness of Commissioners to assist citizens concerned about pesticide drift varies from county to county. Some view their jobs primarily as advocates for agriculture, denying that pesticides pose any risk, while others take seriously their responsibility to protect public health.

An activist in Davis described the Yolo County Agriculture Commissioner as "absolutely

Some local pesticide officials take citizen concerns seriously; others defend the status quo.

wonderful," providing a detailed map of crops grown in the proposed sampling area, but the Commissioner's office in neighboring Solano County was "unwilling to push (farmers) for information or relay it to me." (McCarthy 1997)

In 1997, when hundreds of parents at Amesti Elementary School in Santa Cruz County kept their children home from school because of a pending methyl bromide application, the County Ag Commissioner dismissed their fears as irrational, even before DPR conducted any monitoring to assess drift. But after an EWG air sampling project in nearby San Luis Obispo County detected methyl bromide drifting into a mobile home park for senior citizens, the Agriculture Commissioner took the information seriously, formally requesting that DPR monitor a series of methyl bromide applications in the county. DPR monitored two application in the county in the summer of 1998, and after again finding excess levels at the trailer park, county officials ordered a 450-foot buffer zone around methyl bromide applications using certain methods. (Sneed 1998)

These varying county-to-county attitudes mean access to local information about pesticide applications depends largely on where you live, rather than being uniformly and equitably provided to all Californians.

There are several records pesticide users must file with the Agricultural Commissioner:

- Before the planting and spraying season, farmers must file a Restricted Materials Permit, indicating what restricted use pesticides the farmer plans to use that year. Restricted use pesticides are those that are so dangerous that U.S. law allows their use only by trained and licensed applicators. The Restricted Materials Permit typically is a laundry list of all pesticides the farmer might use that year, because all anticipated uses must be approved by the Ag Commissioner before the application season. The permit, filed months before the crops are even planted, provides no information on where, when or in what volume pesticides will be sprayed.

- When the farmer wants to use a pesticide listed on the permit, he or she must file a Notice of Intent with the Ag Commissioner within 72 hours prior to the application. This Notice includes a map of the field where the application will take place, the acreage to be treated, the product and the amount to be used. But as a practical source of information to concerned citizens, it is of little use. The application may take place at any time within the 72-hour window and may be postponed or

canceled without notice, so citizens can't be sure when they will face exposure. Also, hundreds of applications may be pending in a county each day during the peak season, so unless a citizen has persuaded a friendly commissioner or clerk to provide a tip, finding out if a Notice of Intent has been filed for a particular field requires reviewing a mountain of forms each day.

- After application, farmers must report their actual pesticide use monthly. These reports are compiled by the Ag Commissioner and sent to DPR for inclusion in the state's Pesticide Use Reporting database, published annually. However, there is a delay of two or more years in availability of this data; the 1996 PUR is not expected to be released before the end of 1998.

This year the PUR was for the first time made available on CD-ROM, which in theory will improve citizens' access. Unfortunately, the database is complex and unwieldy, requiring computers and technical expertise — well beyond the resources of average citizens — to decipher local data and make use of it. In the process of compiling the data, the exact location of pesticide applications becomes obscured, and in the final database, use locations can be determined only within a 1-square-mile section. No individual fields can be identified, so the field behind your child's school is indistinguishable from those a mile away.

The state's pesticide reporting system is difficult for average citizens to use, and DPR doesn't make it any easier.

Challenging the Permit

Although state law allows citizens to challenge the conditions of a Restricted Use Permit, the deck is stacked against them. First the challenge goes to the Agricultural Commissioner, who can fairly be said to have a vested interest in upholding his previous decision to allow the use of restricted pesticides. Citizens may then appeal to the Director of DPR. Under normal circumstances, appeals of permit challenges are handled by the DPR in Sacramento without public input other than a review of the written record. But in the summer of 1997, in response to heated community opposition to methyl bromide applications in Ventura, Monterey and Santa Cruz counties, DPR was forced to hold public meetings to hear the appeals, which drew large and emotional crowds from both sides of the issue.

At the meetings, DPR officials stated they had come only to take comments and refused to answer most questions. They discouraged and restricted the presentation of factual evidence by opponents of the applications. They also failed, despite a specific request from Spanish-speak-

ing residents in Santa Cruz County, to provide full translation of the proceedings. (EWG 1997)

Although DPR Director Wells ruled in all three cases that the applications could go forward, he did impose additional restrictions on the amount of methyl bromide to be used, the application schedule, and the buffer zone between the fields and neighboring homes and schools. DPR then announced that future last-minute challenges would be to no avail: Unless challenges are filed well in advance of the Notice of Intent, the pesticide application will go forward. This forces citizens to file all potential challenges at the beginning of the season, long before the grower actually prepares to use a particular restricted pesticide. Once you find out a pesticide will be sprayed, it's too late to stop it.

Chapter 5

Methodology

The air sampling methods used in the Community Monitoring Project were the same protocols employed by DPR and ARB in their monitoring efforts. Monitoring experts within DPR and ARB and from California academic institutions were consulted during the development of EWG's monitoring protocols.

Equipment

Most of the air samples for multiple pesticides were taken using SKC programmable pumps fitted with polyurethane fiber (PUF) tubes. This setup, commonly used in occupational exposure studies of workplace pollutants, involves drawing air through the tube, which is lined with an absorbent filter. The pumps were programmed to draw one liter of air per minute for eight continuous hours.

Pesticides or other pollutants in the air were collected by the filters, which were then analyzed by an independent laboratory in Oakland. Pesticides were extracted from the filters using protocols of the National Institute of Occupational Safety and Health and the California Department of Food and Agriculture. By measuring the amount of pesticide collected in the filter against the amount of air drawn through the tube, the lab calculated the average concentration of that pesticide in the air during the monitoring period.

Sites

Volunteer samplers were instructed to watch the testing locations and take samples on days when pesticides were being used nearby. Sampling stations were placed on private property near the application sites. If possible, the testing location was to be located downwind from the pesticide application, with the pump tube mounted on a tripod four to five feet above ground. The approximate distance to the field, weather conditions, the crop planted, and the time, duration and method of application were recorded.

Limitations

Though PUF tubes are state-of-the-art methodology, only 30 or so pesticides have ever been successfully sampled with PUF tubes. PUF tubes have been verified as reliable for use on the pesticides by "spike tests" — deliberately spiking the filters with a known quantity of the chemi-

DPR was slow to adapt modern air sampling technology.

cal, then testing to confirm it. Many pesticides or fungicides cannot be detected by PUF tubes. Therefore, it is possible that our air samples contained more pesticides than the results indicate.

Lack of exact information about the specific pesticides used during a sampling period made laboratory analysis more difficult. Knowing the crop being sprayed provided some clues to lab technicians who are familiar with pesticide use practices across the state. EWG's lab employed specialists trained in pesticide identification, using techniques of analytical chemistry more advanced than the capabilities of most academic labs.

Methyl Bromide Monitoring Methodology

Methyl bromide tests cited in this report were conducted with three different technologies: carbon filters, silicon-lined canisters and an infrared electronic monitor.

During the initial stages of our work on methyl bromide in California we utilized carbon filter technology — at the time the industry standard. DPR and ARB were using this method, which involves drawing air through a glass tube lined with activated charcoal and analyzing the filters in a lab, and comparing the results to regulations for methyl bromide use near houses and other occupied structures. During EWG's tests, we discovered that carbon filters were no longer considered state-of-the-art. Due to interference by atmospheric moisture and degradation of the sample by heat and light on the way from the field to the lab, carbon filters routinely fail to detect 30 to 50 percent of the methyl bromide known to be in the air. Internal DPR memos indicate that the agency's scientists were aware of this limitation, yet the Department continued to use this outmoded technology.

Air monitoring experts recommended that instead of carbon filters we use SUMMA brand canisters, which the ARB had recently adopted. The stainless-steel canisters are fitted a vacuum pump that draws air into a silicon-lined chamber. After collecting the sample, the canister and the silicon lining are analyzed in the laboratory for a much more accurate reading of methyl bromide in air. In side-by-side sampling, EWG found that SUMMA canisters consistently detected higher levels of methyl bromide than carbon samples. In the summer of 1998, DPR finally began conducting its own tests to compare carbon filters and SUMMA canisters, and reportedly used canisters to monitor for methyl bromide in San Luis Obispo County. (Land 1998)

The FTIR infrared monitor, made available to EWG for our first two monitoring projects in Ventura and Monterey counties, uses a laser beam to identify chemical vapors in the air. Each chemical has a unique light-in-

terference "fingerprint" that can be detected by the laser. Unlike charcoal filters or SUMMA canisters, FTIR monitoring allows instantaneous real-time readings of methyl bromide in the air, at intervals as frequent as one minute. In 1996, U.S. EPA approved the FTIR methodology for monitoring of atmospheric gases in ambient air. Unfortunately, the FTIR technology is expensive and the instrument requires trained technicians to operate it, making it impractical for use by the public.

DPR Meets the Scientists

The state's Scientific Review Panel on Toxic Air Contaminants (SRP) is a panel of nine academics and physicians, including toxicologists, epidemiologists and other public health experts, appointed to advise DPR and the Air Resources Board on the implementation of AB 1807, the Toxic Air Contaminants Law. The SRP has been sharply critical of DPR's approach to science, saying the agency relies too much on information supplied by the pesticide industry, uses outdated methodology, takes far too long to take action against dangerous chemicals and seems less than adequately concerned with protecting public health. Most significantly, SRP members have stated that DPR's entire regulatory scheme, which says that increased volume of pesticide use doesn't matter if exposure is controlled, is fundamentally unsound.

For example, here are excerpts from a March 19, 1997 meeting at which the SRP reviewed DPR's draft evaluation of the cotton defoliant DEF as a toxic air contaminant. The excerpts are followed by a letter from California public interest groups to the SRP, offering a detailed technical critique of DPR's failure to adequate regulate pesticide air pollution.

Dr. John R. Froines, director, UCLA Center for Occupational and Environmental Health: "I have serious problems with this entire document. There is a fundamental problem we have to talk about. Everything in this document, every assessment of risk, is tied to an estimation of exposure. In the [AB] 1807 process we're supposed to evaluate toxicology separately — risk assessment is separate from risk management. If your exposure estimate is wrong, or the circumstances change, your assessment of risk can change radically. Toxicology must be evaluated on its own. This is a very peculiar way of doing things. I know of no other purportedly scientific agency that does things this way. All the way through, what we have is the dismissal of potential adverse effects. It's as if you want to dismiss everything. It's inappropriate. It's unconscionable. There are some really fundamental, not trivial, problems with this approach."

Dr. Stanton A. Glantz, professor of medicine, UC San Francisco: "The compound [DEF] is or isn't toxic. Answer that question first. Then the second question is how much of it people are exposed to. You keep saying it isn't toxic, based on your assumption of exposure."

DPR Deputy Director Jean-Marie Peltier: "Our regulations are promulgated on the basis of exposure."

Glantz: "If that's what [DPR's regulation] says, that's at odds with the law."

Froines: "This is what bothers me. You say [the proposed standard] meets your regulations. Or you say it conforms to a [safe level] from a previous study. But this process is not about meeting the minimum requirements. It's about protecting public health."

Dr. James Pitts, professor of chemistry, UC-Irvine, then-chair of SRP: "I just counted [DPR's] citations in this document. Of less than 100 references, 40 are from industry reports that aren't peer-reviewed — that come from people who have an interest in the numbers. You are not going to find good science in confidential industry reports. You don't mix paid data with science without stipulating the conflict of interest. . . . Let's stop playing these numbers games and tell the public what exposures they really ought to be worried about. It's frightening to think you can take a six-month-old baby into a home that's been fumigated with methyl bromide and the State of California offers you no protection. You have to take into account what will really protect public health. If you look at the risk of methyl bromide based on the exposure to the entire population, it may be low. But you also need to consider, what's the impact on a six-year-old whose home is next to a field sprayed with methyl bromide?"

(SRP 1997)

Letter to Scientific Review Panel From Public Interest Groups

October 12, 1998

Scientific Review Panel on Toxic Air Contaminants
c/o California Air Resources Board
2020 L Street
P.O. Box 2815
Sacramento, CA 95812

Dear Members of the Scientific Review Panel:

On October 14 you will be discussing the agenda for an upcoming educational workshop for new Scientific Review Panel members entitled "Pesticides in Air." We strongly support the idea that the Department of Pesticide Regulation should conduct this workshop, and request that the Scientific Review Panel include in its agenda the following additional items.

1. Statutory Authority

It is important to include a section in the workshop on DPR's responsibilities under the Toxic Air Contaminant (TAC) law.

In public comments responding to a recently released CALPIRG and Californians for Pesticide Reform (CPR) report, DPR acknowledged its failure to implement the TAC law but justified its actions with comments like "We have other laws," "We have simply chosen a faster way to do things," and "If the toxic air contaminant law disappeared tomorrow, it would not affect our ability to place controls on pesticides."

These comments imply that DPR believes it is not required to implement the TAC law. Government agencies, however, are not permitted to pick and choose the laws they implement. The TAC law was designed to address the specific hazards of pesticides in air and includes important air monitoring and public, peer-review components. On what basis does DPR justify ignoring this law and failing to produce required documents?

2. Pesticide Air Monitoring

The workshop should include a discussion of pesticide air monitoring, a critical component of the TAC process. Because the law directs DPR to give priority to the evaluation and regulation of pesticides based on health risk and exposure, air monitoring data can be a determining factor both in the decision to list a pesticide as a TAC and

in any ensuing mitigation. Thus, adequate monitoring of target pesticides is essential to protecting public health under the TAC program. In particular, the following subjects should be addressed:

- *Scope*. Considering the widespread use of pesticides, the scope of current pesticide air monitoring under the TAC program fails to provide sufficient monitoring data. CALPIRG's recent report, Poisoning the Air, found that TAC air monitoring had not been done in 42 out of California's 58 counties. While we support DPR's efforts to target monitoring in high use counties, monitoring in just one county per pesticide ignores regional variations, including differences in landscape, climate and population. We do not believe that monitoring in just one geographic location can accurately "document the level of airborne emissions," as required by TAC law. In addition, only limited numbers of pesticides have been monitored under the TAC law. Only 26 air monitoring reports have been completed in the 15 years of the program (air monitoring has been completed for 35 pesticides but the reports have not been completed for 9), far below the 72-78 that DPR projected completing by 1998. Therefore, more than 100 pesticides listed by the Department as "Candidate Toxic Air Contaminants" have not been monitored.

- *Correlating Air Monitoring with Use.* Presumably, actual pesticide use in the monitored region would be a critical factor in assessing the potential for pesticides to drift in and around California communities. For most pesticides, however, DPR makes no effort to correlate detection levels with actual pesticide use. Low or non-detect levels may simply be the result of little or no local use as opposed to low concentrations or mobility. As a result, important regulatory decisions affecting the health of local communities are currently made based on ambiguous data.

- *Notification of Agricultural Commissioners and the Potential for Altered Use Practices.* Anecdotal evidence from air monitoring in Lompoc suggests that growers with advance notice of air monitoring may alter use practices in order to reduce pesticide detections. While this evidence is strictly anecdotal, we believe advance notice of air monitoring statewide could result in altered practices and inaccurate monitoring results.

- *Monitoring Technology.* We are concerned that air monitoring technologies, particularly those used to monitor methyl bromide, may be outdated and inaccurate. According to studies by the Environmental Working Group (see *Something's in the Air*, 1997) the monitoring equipment used by DPR in some studies employs outdated charcoal-tube technology that routinely fails to

capture and retain significant amounts of methyl bromide in the ambient air. The workshop on pesticides in air should include a discussion of monitoring technologies and their strengths and weaknesses.

- *Publicizing Air Monitoring Results.* Local communities should be notified of the results of air monitoring in their areas. Currently no effort is made to provide communities with air monitoring results. Citizens who request information are sent documents that are typically long, complicated and difficult to interpret. Efforts should be made to summarize results and make them accessible to the public.

3. Hazardous Air Pollutants

DPR's "Pesticides in the Air" workshop should include the creation of an action plan for DPR's regulation of Hazardous Air Pollutants under the TAC law as well as its plans for producing health effects documents for these pesticides.

In a letter to Assemblyman Fred Keeley, DPR argues that "there is no requirement to mitigate HAPTACs" under the TAC law. In other words, DPR believes that the law only requires it to list Hazardous Air Pollutants as Toxic Air Contaminants and that their responsibility under the TAC law ends there. As a result, some of the most dangerous air pollutants have been effectively isolated from the TAC process precluding the production of health effects documents and avoiding public accountability.

We do not believe this is what the authors had intended when they specifically required that DPR list HAPs as TACs. We believe that health effects documents are needed in order to assess a particular pesticide's threat to human health and the environment.

4. Simultaneous Exposure to Multiple Pesticides

DPR should initiate a discussion with the Scientific Review Panel on the potential impact to public health of simultaneous exposure to multiple pesticides. Current TAC evaluation is done on a chemical by chemical basis; however, real-world exposure to airborne pesticides is more complex. For example, a recent study by Dr. Seiber [Dr. James N. Seiber, director of the Center for Environmental Science and Engineering, University of Nevada-Reno) found the three pesticides ethyl parathion, diazinon and chlorpyrifos 25 to 50 miles from the likely sites of application. The level of each individual pesticide was below the state's safety standard; however, cumulative exposure may be a more important consideration. The workshop should include a discus-

sion of how DPR is protecting the public from multiple exposures to pesticides with the same mechanism of toxicity (e.g. organophosphates and carbamates).

5. Pesticide Prioritization

Although DPR has produced a list of "Candidate Toxic Air Contaminants" ranked 1-134, this list apparently has not been used to prioritize the evaluation of potential TAC pesticides. According to a draft DPR memorandum, "Procedures to Address the Status of Toxic Air Contaminant Candidates," DPR has nearly completed the TAC process for pesticides ranked 4 and 38 and has initiated the process for pesticides ranked 3, 14, 23, 28. Clearly DPR is not using its own priority list. And if it is not using its own priority list, how are the pesticides being chosen? Why is DPR not using this list?

6. Structural Fumigation and Other Urban/Suburban Sources of Airborne Pesticides

Agricultural sources of airborne pesticides appear to be the sole focus of DPR's limited TAC program. Although agriculture does account for most of reported pesticide use statewide, non-agricultural uses of pesticides, both through fumigations and landscape work by licensed applicators, as well as unreported use by homeowners, may be a significant source of exposure to airborne pesticides for the general public. DPR studies outside of the TAC program have shown, for example, that structural fumigations with methyl bromide can result in unsafe exposures 50 to 100 feet from fumigated homes. Pesticides used outdoors may also accumulate indoors. The authors of *The Effects of Pesticides on Human Health* (Princeton Scientific Press,1990), for example, cited three studies and concluded that "at any given time, the air inside of the average dwelling in the U.S. contains several kinds of pesticides at levels that are typically 10-100 times higher than those found in the immediately surrounding outdoor air."

What are DPR's responsibilities under the TAC program to monitor and regulate airborne pesticides in the urban environment? Does DPR have any responsibility under the TAC program to monitor and regulate pesticides found indoors? Should DPR be monitoring for Candidate TACs inside buildings near fields as well as outside?

7. Strategies for Prevention

As the population of California expands, particularly in agricultural counties, airborne pesticides will become an increasingly controversial issue. Quoted in the *Los Angeles Times*, for example, DPR Assistant Director Paul Gosselin explained that rural-urban clashes "are going

to come up more and more." DPR should anticipate these clashes and take proactive steps now to encourage alternatives to pesticide use. In particular, DPR should create incentives to phase out the use of pesticides identified as carcinogens, reproductive toxins and acute nervous system toxins.

We hope you agree that the issues above are crucial to the understanding of pesticides in air, particularly as they relate to the Toxic Air Contaminant Program, and we hope that you will include them in the agenda for the workshop.

Sincerely,

Zev Ross
California Public Interest Research Group

Bill Walker
Environmental Working Group

Jeanne Merrill
Pesticide Watch Education Fund

Susan Kegley
Pesticide Action Network

References

Alvarez, Fred, 1998. "Groups Protest New Guidelines on Fumigant." *Los Angeles Times* (Ventura edition), Dec. 8, 1998.

ARB 1997. *California Ambient Air Quality Data: 1980-1996.* California Air Resources Board. TSD-97-007-CD, December 1997.

Arax, Mark, 1997. "Pesticide Use Is on Rise in State, Study Finds." *Los Angeles Times,* September 18, 1997.

Baker, Lyton T, et al, 1996. "Ambient Air Concentrations of Pesticides in California." Environmental Science & Technology. 30(4), pp. 1365-1368.

Baker, Lynton T, 1998. Personal Communication to EWG. November, 1998.

Benjey, W.G., 1993. "Agricultural Pesticide Emissions Associated with Common Crops in the United States." 86th Annual Meeting of the Air and Waste Management Association, Denver, CO, June 14-18, 1993, No. 93-WP-96.01, published by the Air and Waste Management Association, Pittsburgh, PA, 1994 (EPA Report No. 600/A-93/065)

CPR 1997. *Rising Toxic Tide: Pesticide Use in California 1991-1995.* Californians for Pesticide Reform, 1997.

CPR 1998. *Poisoning the Air: Airborne Pesticides in California.* Californians for Pesticide Reform, 1998.

DOF 1998. "County Population Estimates and Components of Change, 1996-1997, with Historical Estimates, 1990-1996," Demographic Research Unit, California Department of Finance, www.dof.ca.gov/html/Demograp/e-2text.html

DPR 1997. California Pesticide Use Reporting Database for 1995. California Department of Pesticide Regulation, 1997.

DPR 1998. "Statement on Pesticides In Air Report." California Department of Pesticide Regulation Press Release, August 19, 1998.

DPR 1998b. "Reducing Volatile Organic Compound Emissions form Agricultural and Commercial Structural Use of Pesticides." California Department of Pesticide Regulation. February 3, 1998.

EWG 1997. An EWG representative attended the DPR permit challenge hearings held in Watsonville and Ventura.

EWG 1998. *@Risk: Pesticide Use Near California Schools*. Environmental Working Group website, http://www.ewg.org/@risk, 1998.

EWG 1998b. *Methyl Bromide Use Near California Schools 1995*. Environmental Working Group, 1998.

Kelley, Kevin and Nu-may R Reed, 1996. "Pesticides for Evaluation as Candidate Toxic Air Contaminants." California Department of Pesticide Regulation Staff Report, October 1996.

Kollman, Wynette S. "Summary of Assembly Bill 1807/3219: Pesticide Air Monitoring Results Conducted by the California Air Resources Board 1986-1995." California Department of Pesticide Regulation, 1996

Land, Geoff, 1998. Personal Communication to EWG. July 1998.

Lifsher, Marc, 1997. "Pesticide Control Agency Is Stalling, Critics Say." *The Wall Street Journal* (California edition), March 5, 1997.

Majewski, Michael S. and Capel, Paul D., 1995. *Pesticides in the Atmosphere: Distribution, Trends, and Governing Factors*. United States Geological Survey, 1995.

McCarthy, Samantha, 1997. Personal Communication to EWG. September 1997.

Scholtz, Trevor M., et. al., 1997. "Pesticide Emissions Modelling: Development of a North American Pesticide Emissions Inventory." Final Report of the Canadian Global Emissions Interpretation Centre; prepared by Ortech Corporation, May 1997.

Sneed, David, 1998. "Pesticide Risk Prompts New County Regulation," *San Luis Obispo County Telegram-Tribune*, November 14, 1998.

SRP 1997. Transcript of Meeting of Scientific Review Panel on Toxic Air Contaminants, March 19, 1997, at http://www.arb.ca.gov/srp/srp.htm.

CPR
Californians For Pesticide Reform

49 Powell Street, Suite 530
San Francisco, CA 94102
Tel. (415) 981-3939
or (888)-CPR-4880
Fax (415) 981-2727
pests@igc.org
www.igc.org/cpr

Environmental Working Group™

Washington, D.C. Office
1718 Connecticut Ave., N.W. Suite 600
Washington, DC 20009
202-667-6982
info@ewg.org • www.ewg.org

California Office
P.O. Box 29201 • The Presidio
San Francisco, CA 94129
415-561-6698
info@ewg.org • www.ewg.org