Department of Pesticide Regulation
Pesticide Air Monitoring Network
Proposed Monitoring Plan

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Overview

The Department of Pesticide Regulation (DPR) is establishing a network to sample ambient air for multiple pesticides in several communities. Sampling will be done on a regular schedule over five or more years. DPR will use the data gathered to evaluate health risk and, as necessary, improve protective measures against pesticide exposure. The project is expected to begin in 2010. DPR is soliciting comments on its proposed monitoring plan, including objectives, pesticides, and communities included in the monitoring network. DPR will describe additional details, particularly on sampling, laboratory, and data analysis methods, in a subsequent monitoring protocol.

Proposed project objectives

The objectives define the scope of the project. DPR proposes the following scientific objectives:
1) Identify common pesticides in air and determine seasonal, annual, and multiple-year concentrations
2) Compare concentrations to subchronic and chronic health screening levels
3) Track trends in air concentrations over time
4) Estimate cumulative exposure to multiple pesticides with common modes of action
5) Attempt to correlate concentrations with use and weather patterns

Proposed sampling plan

DPR proposes to monitor one location in each community selected, collecting one or two 24-hour samples each week. This sampling plan is based on an evaluation of results from a one-year study in Parlier that included air monitoring at three locations, three days each week. The Parlier data indicated that monitoring a single location once a week will provide adequate data to estimate long-term concentrations. DPR will describe additional details, particularly on sampling, laboratory, and data analysis methods in a subsequent monitoring protocol.

Monitoring in the selected communities is contingent on finding suitable monitoring locations that meet U.S. Environmental Protection Agency (U.S. EPA) siting criteria, are secure from tampering, provide electricity, and grant permission.

Proposed pesticides for monitoring

DPR proposes to monitor for 25 to 34 pesticides and several breakdown products, selected based on the following criteria:
1) Use (indicator of exposure)
2) Volatility (indicator of exposure)

3) DPR risk assessment priority (indicator of toxicity)
4) Feasibility of including in multi-residue monitoring method

Almost all of the pesticides can be monitored by collecting and analyzing two samples, one for semi-volatile (nonfumigant) pesticides by modifying the Parlier study method, and one for volatile (mostly fumigant) pesticides using a volatile organic compound (VOC) method. Based on the four criteria above, DPR proposes to monitor for:

Pesticides included in the method used for Parlier project

1) Chlorothalonil (Bravo)
2) Chlorpyrifos (Lorsban) and oxygen analog breakdown product
3) Cypermethrin
4) Diazinon and oxygen analog breakdown product
5) Dicofol (Kelthane)
6) Dimethoate (Cygon) and oxygen analog breakdown product
7) Diuron (Karmex)
8) Endosulfan (Thiodan)
9) EPTC (Eptam)
10) Malathion and oxygen analog breakdown product
11) Naled as dichlorvos (DDVP) breakdown product
12) Norflurazon (Solicam)
13) Oryzalin (Surflan)
14) Oxyfluorfen (Goal)
15) Permethrin
16) Phosmet (Imidan)
17) Propargite (Omite)
18) S,S,S-tributyl phosphorotrithioate (DEF)
19) Simazine (Princep)
20) S-metolachlor (Dual)
21) Trifluralin (Treflan)

Pesticides included in the VOC method

22) 1,3-dichloropropene (Telone, Inline)
23) Acrolein (Magnacide)
24) Methyl bromide
25) Sodium tetrathiocarbonate (Enzone) as carbon disulfide breakdown product

DPR will attempt to modify the method used for the Parlier project to include the following pesticides, if they have high use within 5 miles of a community selected for monitoring:

26) Acephate (Orthene)
27) Bensulide (Prefar)
28) Iprodione (Rovral)
29) Methidathion (Supracide)
30) Oxydemeton-methyl (Metasystox-R)

If the monitoring network includes fewer communities, or if sampling frequency is decreased, DPR may take additional samples and analyze for one or more of the following pesticides:

31) Chloropicrin

32) Dazomet as methyl isothiocyanate (MITC) breakdown product (Basamid)
33) Metam-sodium as MITC (Vapam, Sectagon)
34) Potassium N-methyl dithiocarbamate (metam-potassium) as MITC (K-Pam)

Proposed communities

DPR likely has sufficient resources to monitor two to five communities in the state. The number of communities monitored depends on the number of samples collected each week, and if chloropicrin and/or MITC are included in the monitoring. DPR proposes to select communities based on the following criteria:

1) Use of the 34 proposed pesticides
    a. Use within the community (community zone)
    b. Use between the community boundary and 1 mile of the community (local zone)
    c. Use within 1 to 5 miles of the community (regional zone)
2) Demographic criteria
    a. Population density of people under age 18
    b. Population density of people older than 65
    c. Population density of people older than 5, with disabilities
    d. Population density of people employed in farming, fishing, or forestry
3) Other desirable community characteristics, such as an existing air monitoring station or complementary studies
4) Geographic distribution

DPR proposes to select communities with higher use of the 34 proposed pesticides within the zones listed above because they will likely have higher air concentrations. The demographic groups noted above represent subpopulations DPR considers in its risk assessments. DPR proposes to use community demographic characteristics and the other two factors listed above to help select a single community for monitoring when a group of communities within a geographic area have similar pesticide use.

Based on the criteria above, DPR proposes to select a total of two to five communities for the air monitoring network from those listed below:

- Linden or Ripon (San Joaquin Valley, San Joaquin County)
- Shafter or Wasco (San Joaquin Valley, Kern County)
- Greenfield, Salinas, or Castroville (North Central Coast, Monterey County)
- Camarillo or Oxnard (Ventura County)
- Huron or Mendota (San Joaquin Valley, Fresno County)
- Reedley or Parlier (San Joaquin Valley, Fresno County)

Introduction

Under California law, DPR is required to “eliminate from use” any pesticides that “endangers the agricultural or nonagricultural environment….” To perform this function, the law requires DPR to conduct “continuous evaluation” of currently registered pesticides. Several DPR programs evaluate use practices to detect possible problems and to determine if further regulatory action is necessary. For example, DPR conducts field studies to monitor exposure to workers, and to measure how pesticides move and break down in air, soil and water. DPR uses monitoring data (including the kind of data envisioned from the air network) to evaluate exposure and resulting risk to health (risk assessment), develop measures to reduce risk (risk management), and determine the effectiveness of use restrictions.

DPR, the Air Resources Board (ARB), university researchers, and others currently conduct short-term air monitoring studies of pesticides. For example, DPR and the ARB coordinate monitoring for pesticides under California’s Toxic Air Contaminant Act. In this program, two types of samples are collected. Air is monitored next to applications of specific pesticides for several days (application-site monitoring) to estimate acute exposures. Samples are also collected for several weeks in communities near high-use regions and during high-use periods (ambient monitoring) to estimate seasonal exposures. DPR extrapolates the short-term concentrations detected during several days or weeks of monitoring to estimate concentrations associated with annual and lifetime exposures. Additionally, both the application-site and ambient monitoring usually sample for single pesticides.

While similar to current ambient monitoring, the proposed air monitoring network will supplement the toxic air contaminant monitoring by providing data for long-term exposures over several years to multiple pesticides. The project is expected to begin in 2010. DPR conducted similar multiple-pesticide monitoring projects in Lompoc (Santa Barbara County) and Parlier (Fresno County). However, their duration was shorter (Lompoc 10 weeks; Parlier 12 months). DPR designed the Parlier project in part to evaluate methods and approaches that it might use for a future air monitoring network.

This plan is a revised version of a plan first proposed in April 2009. The revisions are based on comments received during public meetings with DPR’s Pesticide Registration and Evaluation Committee on April 17, May 15, July 16, and August 20, 2009; a public meeting with DPR’s Pest Management Advisory Committee on May 14, 2009; and meetings with agricultural commissioners of the affected counties. Comments that did not result in changes to the plan are noted in the appropriate sections below.

Project Objectives

The objectives define the scope of the project and are consistent with DPR’s overall goals discussed above. The intent in developing the objectives is to make them simple, measurable, realistic, and timely. DPR proposes the following scientific objectives:

1) Identify common pesticides in air and determine seasonal, annual, and multiple-year concentrations
2) Compare concentrations to subchronic and chronic health screening levels
3) Track trends in air concentrations over time

4) Estimate cumulative exposure to multiple pesticides with common modes of action
5) Attempt to correlate concentrations with use and weather patterns

In general, DPR uses monitoring data for risk assessment, risk management, and to determine the effectiveness of regulatory requirements. DPR will likely use the data from the air monitoring network for all three goals. The air network data will enable DPR to make more accurate estimates of long-term exposure and resulting risk, since it will no longer be necessary to extrapolate from short-term monitoring data. DPR currently assesses exposure and risk for individual pesticides. The air network data will provide the opportunity to assess cumulative exposure to multiple pesticides. DPR will assess cumulative exposure for pesticides that cause toxic effects by a common mode of action (e.g., cholinesterase inhibition).

Since risk assessments normally take several years to complete, DPR will initially evaluate detected air concentrations using "health screening levels" to place the results in a health-based context. Although not regulatory standards, these screening levels can be used in the process of evaluating the air monitoring results. A measured air concentration that is below the screening level for a given pesticide would not be considered to represent a significant health concern and would not generally undergo further evaluation, but also should not automatically be considered "safe" and could undergo further evaluation. By the same token, a measured level that is above the screening level would not necessarily indicate a significant health concern, but would indicate the need for a further and more refined evaluation. Significant exceedances of the screening levels could be of health concern and may result in mitigation measures.

Risk management is the evaluation and selection of mitigation options. Risk managers use risk assessment as an important tool to determine the acceptability of a level of exposure and then reduce exposures to that level. Unlike risk assessment, risk management is not based solely on scientific considerations, since it also involves social, economic, and legal considerations to make regulatory and policy decisions. DPR considers these factors in analyzing the possible regulatory responses to potential health hazards. The process is necessarily subjective in that it requires value judgments on the acceptability of risks and the reasonableness of control measures. If DPR considers the risk unacceptable from either individual or multiple pesticides, the air network data will provide information to develop mitigation measures. For pesticides with unacceptable risks, it is likely that DPR will use the air network data in conjunction with the other application-site and ambient monitoring data to develop mitigation measures such as application method restrictions and/or use limitations to reduce long-term exposures.

If and when DPR implements voluntary or regulatory restrictions, the air network will provide evidence of the effectiveness of the restrictions. For example, use limitations (township caps) for 1,3-dichloropropene and methyl bromide are based on achieving certain target concentrations. The air network will provide data to determine if the target concentrations are met. Similarly, the air monitoring network will provide data to determine trends over time within the monitored communities. If DPR can relate pesticide use levels to detected concentrations, the effect of application method changes or other restrictions on air concentrations can be estimated.

Several additional suggested objectives are beyond the proposed scope and DPR resources or capabilities. As described above, DPR will use screening levels and risk assessment to evaluate the detected air concentrations. DPR will also attempt to relate detected air concentrations with use and weather patterns for each community, but comparing communities is not an objective.

DPR assesses and mitigates risk of pesticides, not communities. Therefore, monitoring an urban community, or other type of control or background site, may be valuable but not essential for this project. This would require monitoring fewer high agricultural use communities due to resource constraints. Moreover, selecting an appropriate comparison community is problematic. As described in later sections, DPR proposes to select pesticides and communities for monitoring that have high reported use. Pesticide use reports mainly reflect agricultural applications; home use of pesticides is not reported. DPR cannot determine which pesticides have high use in which urban communities, making the selection of the pesticides and communities to monitor problematic. In addition, many home use pesticides would have lower priority for monitoring due to lower toxicity.

While the air monitoring network is a follow-up to an environmental justice pilot project in Parlier, it will not focus on environmental justice issues. This is a project to obtain scientific information and therefore does not address several environmental justice goals such as community capacity building, and monitoring may or may not occur in communities with environmental justice characteristics. However, DPR will include applicable environmental justice elements, such as considering certain demographic factors in selecting communities, coordination with other agencies, and public participation in the project development and planning phase.

DPR or other agencies and researchers may find the air network data useful for purposes other than the stated objectives. For example, DPR plans to collect a series of 24-hour samples to evaluate seasonal and long-term exposures. However, single 24-hour samples also indicate acute exposures. DPR normally uses the higher concentrations associated with application-site monitoring to evaluate acute exposures, rather than the lower concentrations associated with ambient monitoring. However, DPR may compare the 24-hour concentrations to acute screening levels. Another example is estimating cumulative impacts from pesticides or other pollutants with different modes of action. This type of evaluation is currently beyond DPR’s capabilities, but the Office of Environmental Health Hazard Assessment (OEHHA) is researching this issue. DPR is coordinating and consulting with OEHHA on the air monitoring network and methods to assess cumulative exposure, so a more comprehensive cumulative exposure evaluation may be feasible in the future. Also beyond DPR’s current capabilities is attempting to relate the detected concentrations with disease rates (epidemiology evaluation). Other researchers may attempt this, particularly if a health study is conducted in a community selected for monitoring.

Proposed Sampling Plan

DPR proposes to monitor one location in each community selected, collecting one or two 24-hour samples each week. In 2006, DPR conducted a year-long ambient air monitoring study in Parlier (http://www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm). This plan is based on an evaluation of results from a one-year study in Parlier that included air monitoring at three locations, three days each week. The Parlier data indicated that monitoring a single location once a week will provide adequate data to estimate long-term concentrations (Appendix 1). DPR analyzed the number of positive samples for the three most frequently detected pesticides: chlorpyrifos, diazinon, and methyl isothiocyanate (MITC). The air concentrations were not normally distributed, so standard statistical techniques could not be used. However, the Parlier data showed little difference between the three Parlier monitoring locations in the frequency of detection. Similarly, there was little difference in frequency of detections between odd and even weeks, and days of the week. Based on this analysis, it is likely that sampling at one location in each community, one or two days each week, will provide adequate data to characterize seasonal and long-term exposure. Collecting one sample per week will provide minimal data to estimate seasonal exposures; two samples per week will provide more robust data. However, DPR must balance the number of samples collected with the number of pesticides and communities monitored.

Monitoring sites must meet the following minimum criteria:

- The location of sample collection meets all U.S. EPA ambient air siting criteria
    - 2 to 15 meters above ground
    - At least 1 meter horizontal and vertical distance from supporting structure
    - Should be at least 20 meters from trees
    - Distance from obstacles should be at least twice the obstacle height
    - Unobstructed air flow for 270°
- Accessible to sampling personnel during time of sampling
- Accessible to electrical outlets
- Secure from equipment loss or tampering
- Permission of site operator/owner

Preferred monitoring sites also meet the following criteria:

- School, day care center, or other “sensitive site”
- Located on the edge of the community and/or adjacent to agricultural fields

DPR will describe additional details, particularly on sampling, laboratory, and data analysis methods, in a subsequent monitoring protocol.

Proposed Pesticides for Monitoring

DPR proposes to monitor for most of the same pesticides as the Parlier project in 2006, based primarily on potential health risk. Higher-risk pesticides will have higher priority for monitoring. Proposed pesticides were selected based on the following criteria:

1) Pounds of use by area/region (indicator of exposure)
2) Volatility (indicator of exposure)
3) DPR risk assessment priority (indicator of toxicity)
4) Feasibility of including in multi-residue monitoring method

** NOTE: Risk assessments have been completed on several of the target pesticides. However, each was at some point assigned a priority for risk assessment based on a number of factors, including health concern. The risk assessment priority ranking assigned to the pesticide was therefore incorporated as a factor in selecting pesticides to be targeted in this project.*

Several people suggested other criteria to select pesticides that DPR did not add, including octanol-water coefficient as an indicator of persistence, acreage treated, and method of application. DPR evaluated data for several dozen proposed pesticides and found no correlation between octanol-water coefficient and terrestrial field dissipation rate. Moreover, some pesticides that are persistent would be rated higher even though they are low risk, such as copper, sulfur, and oils. DPR believes that mass (pounds) of use is a better indicator of exposure than acreage treated. For example, exposure to fumigants is high in part due to the high mass applied and high application rates, but the acreage treated is relatively small compared to other pesticides. DPR believes that the limited information received on the method of application is not a good indicator of exposure. Most use reports only indicate air, ground, or other. Some ground application methods, such as air blast sprayers may cause as high or higher exposure than aerial applications.

DPR selected candidates for monitoring from the 100 pesticides with the most pounds reported from 2005 through 2007 in each of the five candidate areas: North Central Coast air basin, Sacramento Valley air basin, Salton Sea air basin, San Joaquin Valley air basin, and Ventura County. [NOTE: See the following section for the reasons these areas were selected.] DPR excluded inorganic pesticides (e.g., copper and sulfur), oils, and antimicrobial pesticides because of their low volatility, low risk assessment priority, and difficulty in monitoring. The remaining pesticides were each assigned ratings for use, volatility, and risk assessment priority. Pesticides were rated 0 to 4 in use for each of the five areas, with 0 for a pesticide not within the top 100 in use for the area and 4 representing high use in the area. Pesticides were each rated 1 to 4 in volatility (vapor pressure), with 1 representing unknown volatility and 4 representing high volatility. Pesticides were also rated 1 to 4 based on the risk assessment priority assigned by DPR and OEHHA scientists, with 1 representing no priority established and 4 representing high priority. An overall score was determined for each pesticide by adding individual rating. Therefore, each pesticide was assigned a total rating of 2 to 12 for each of the five geographic areas. Table 1 shows the 82 pesticides rated 6 or higher in any of the areas. [See the key following Table 1 for the exact rating criteria for each category.]

DPR proposes to collect and analyze at least two different air samples. The California Department of Food and Agriculture's (CDFA's) Center for Analytical Chemistry will develop and validate the pesticide residue method(s) and analyze the samples collected by DPR. CDFA developed a method to analyze for 29 pesticides and breakdown products in a single sample for the Parlier project and will modify this method for the air network. In Parlier, ARB analyzed additional pesticides that are volatile organic compounds (VOCs). However, DPR recently funded the purchase of instruments and materials that will enable the CDFA laboratory to analyze samples for VOCs, including the fumigants methyl bromide and 1,3-dichloropropene. DPR and CDFA should be able to include these compounds in the air network without ARB assistance.

Based on the ratings in Table 1 and the feasibility of including the compounds in the two monitoring methods, DPR proposes to include the following 25 pesticides in the monitoring network:

Pesticides included in the method used for Parlier project

1) Chlorothalonil (Bravo)
2) Chlorpyrifos (Lorsban) and oxygen analog breakdown product
3) Cypermethrin
4) Diazinon and oxygen analog breakdown product
5) Dicofol (Kelthane)
6) Dimethoate (Cygon) and oxygen analog breakdown product
7) Diuron (Karmex)

8) Endosulfan (Thiodan)
9) EPTC (Eptam)
10) Malathion and oxygen analog breakdown product
11) Naled as dichlorvos (DDVP) breakdown product
12) Norflurazon (Solicam)
13) Oryzalin (Surflan)
14) Oxyfluorfen (Goal)
15) Permethrin
16) Phosmet (Imidan)
17) Propargite (Omite)
18) S,S,S-tributyl phosphorotrithioate (DEF)
19) Simazine (Princep)
20) S-metolachlor (Dual)
21) Trifluralin (Treflan)

Pesticides included in the VOC method

22) 1,3-dichloropropene (Telone, Inline)
23) Acrolein (Magnacide)
24) Methyl bromide
25) Sodium tetrathiocarbonate (Enzone) as carbon disulfide breakdown product

DPR may also monitor for as many as 9 additional pesticides, 5 by adding them to the Parlier method and 4 that would require single-chemical analysis.

DPR will attempt modify the method used for the Parlier project to include the following pesticides, if they have high use within 5 miles of a community selected for monitoring:

26) Acephate (Orthene)
27) Bensulide (Prefar)
28) Iprodione (Rovral)
29) Methidathion (Supracide)
30) Oxydemeton-methyl (Metasystox-R)

The following pesticides likely can only be monitored by collecting additional single-chemical samples. DPR may include one or more of the following pesticides, if fewer communities are monitored and/or fewer samples are collected:

31) Chloropicrin
32) Dazomet as methyl isothiocyanate breakdown product (MITC, Basamid)
33) Metam-sodium as MITC (Vapam, Sectagon)
34) Potassium N-methyl dithiocarbamate (metam-potassium) as MITC (K-Pam)

DPR proposes to <u>not</u> monitor for the following pesticides that were included in the Parlier project:

Azinphos-methyl (registration [sale] ends in 2012)
Formaldehyde (difficult to include in CDFA's VOC method)
Molinate (registration [sale] ends in 2009)
Propanil (low use in selected areas)
Thiobencarb (low use in selected areas)

DPR proposes to not monitor the remaining pesticides shown in Table 1. This includes 21 pesticides rated 10 or higher in at least one candidate area. Eleven of the 21 pesticides cannot be included in either of the two monitoring methods. Ten of the 21 pesticides have relatively low use in the three selected areas for monitoring. The following pesticides specifically suggested by commenters are also not proposed for monitoring:

Aminopyralid (not highly rated due to low use, low volatility)
Chlorthal-dimethyl (cannot be included in proposed methods)
Clopyralid (not highly rated due to low use, low volatility)
Mancozeb (cannot be included in proposed methods)
Maneb (cannot be included in proposed methods)

DPR will reconsider the pesticides for monitoring after selecting communities and reassessing pesticide use in those areas.

Proposed Communities for Monitoring

DPR likely has sufficient resources to monitor two to five communities in the state. DPR proposes to select communities based on objective data, using criteria that can be quantified, validated, and verified. This provides a transparent and fair selection process. DPR is unable to fully evaluate all communities in all areas suggested for monitoring in a timely manner due to the large number of communities that would require compilation of pesticide use, demographic, and other data. DPR proposes to select the monitored communities from among one to three areas based on the following two-tiered process.

Tier 1 – Selection of Candidate Areas

DPR evaluated the pesticide use in five areas (Figure 1):

- North Central Coast air basin (all of Monterey, San Benito, and Santa Cruz counties)
- Sacramento Valley air basin (all of Butte, Colusa, Glenn, Sacramento, Sutter, Tehama, Yolo, Yuba counties)
- Salton Sea air basin (all of Imperial County, and Coachella Valley portion of Riverside County)
- San Joaquin Valley air basin (all of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare counties, and valley portion of Kern County)
- Ventura County ozone nonattainment area (all of Ventura County)

DPR selected these five areas for several reasons. 1) These areas were suggested by one or more commenters, including members of DPR’s Pesticide Registration and Evaluation Committee or Pest Management Advisory Committee. 2) These areas have high pesticide use. They include all of the top 10 counties and 17 of the top 20 counties for reported pesticide from 2005 through 2007. The 22 counties included in these five areas account for 86 percent of the reported statewide pesticide use from 2005 through 2007 [Table 2]. 3) All or parts of four areas do not meet one or more federal air quality standards [all except North Central Coast].

Neither of the remaining areas suggested (Napa, San Diego) are among the top 20 counties for reported pesticide use during 2005-2007.

DPR compiled and compared the use of the candidate pesticides for each of the five areas (Tables 3a and 3b). San Joaquin Valley is likely the top area for monitoring because it has more than twice the use density (pounds per square mile) of the original Parlier-method pesticides than the other areas. San Joaquin Valley also has the highest use density for 17 of the 30 pesticides included in the original Parlier and VOC methods. The remaining four areas have the highest use density for 3 or 4 of the 30 Parlier and VOC pesticides. Ventura has the highest use density for VOC method pesticides, including the fumigants methyl bromide and 1,3-dichloropropene, but has the lowest pesticide use density for semi-volatile (Parlier method) pesticides. North Central Coast has relatively high use density for fumigants as well as several semi-volatile pesticides. Most of the additional high-rated candidate pesticides (e.g., chloropicrin and MITC) also have highest use in North Central Coast, San Joaquin Valley or Ventura.

DPR evaluated two key weather parameters that influence air concentrations: consistency of wind direction and wind speed. Generally, consistent wind directions and lower wind speeds lead to higher downwind air concentrations from pesticide applications. DPR compiled and evaluated several years of weather data from 37 stations within the five areas. Ventura County had the lowest wind speeds and most consistent wind direction. The Salton Sea air basin had the highest wind speeds and least consistent wind directions. However, the differences between areas in terms of low wind speeds and consistency of wind direction was minor and yield inconclusive results for assessing likely impact on long-term air pesticide concentrations (Figures 2 and 3; Appendix 2).

DPR received a comment to consider including pesticide drift illnesses as a factor in selecting areas. However, reported drift illnesses are primarily due to acute exposure, while the objective of the air monitoring network is to measure seasonal and long-term exposure. Drift incidents are usually a result of misuse and does not appear to be good indicator for selecting areas to evaluate seasonal and longer-term exposures. DPR did not consider drift illnesses in selecting the areas, but North Central Coast and Ventura had the highest number of drift illnesses from 2005 through 2007 (Table 4).

Based on the use of the proposed pesticides, DPR proposes to select communities in the North Central Coast air basin, and/or San Joaquin Valley, and/or Ventura County for the air monitoring network.

Tier 2 – Candidate Communities Within the Selected Areas

DPR proposes to evaluate 226 communities in the following areas and select a total of 2 to 5 for monitoring:

- North Central Coast air basin (48 communities)
- San Joaquin Valley (161 communities)
- Ventura County (17 communities)

DPR proposes to evaluate and rate each of the communities using the following criteria:

1) Use of 34 proposed pesticides listed above
    b. Use within the community (community zone)
    c. Use between the community boundary and 1 mile of the community (local zone)
    d. Use within 1 to 5 miles of the community (regional zone)

2) Demographic criteria
    a. Population density of people under age 18
    b. Population density of people older than 65
    c. Population density of people older than 5, with disabilities
    d. Population density of people employed in farming, fishing, or forestry (indicator of farmworkers)

The distances for pesticide use zones are a subjective selection, although the pesticides most frequently detected in the Parlier project typically did correspond with applications within five miles. The demographic factors are based on subpopulations considered in DPR's risk assessments, such as children and farmworkers.

The pesticide ratings developed for this analysis are based on the average use reported to DPR from 2006 through 2008. Demographic ratings are based on 2000 U.S. Census data. New data from "The 2008 American Community Survey" - a nationwide survey designed to provide data on selected communities to show how they are changing – was evaluated for use in this selection procedure. However, it was deemed unsuitable because it only contains demographic data for approximately 10 percent of the communities within California.

Pesticide Use Data – Use information was obtained from DPR's pesticide use report database for 2006, 2007 and 2008. The total amount per year of each pesticide applied to each square-mile section was averaged over the three years. A geographic information system (GIS) analysis calculated the amount of each pesticide applied to one-mile-square geographic sections. These were classified under three types of zones: those all or partially within the community boundary (the "community zone," or CZ); between the community boundary and 1 mile of the community boundary (the "local zone," LZ); and within 1 to 5 miles of the community boundary (the "regional zone," RZ). The amount of pesticides applied within each of these three "zones" was divided by the square mileage of each zone, and then expressed as amount of pesticide active ingredient per square mile.

The pesticide use category has 102 subcategories (34 pesticides x 3 use zones). For each subcategory, the 48 North Central Coast communities, the 161 San Joaquin Valley communities, and the 17 Ventura County communities are combined (226 total communities) and ranked, with the community with the highest use density ranked 226 and the lowest community ranked 1. With such a large number of variables there is a wide range of data completeness. While there may have been reported use of a certain pesticide within a geographic area, there may be no use within the community, local or regional zones (Table 5).

DPR proposes to assign a rating of 1 to 4 for each subcategory (i.e., each pesticide and zone combination), with 4 representing the highest priority for monitoring. For each of the 102 pesticide use subcategories, the 226 communities are divided into four groups (quartiles). The top quartile (approximately 56 communities) with the highest values are rated four, the second highest quartile are rated three, and so forth. For each pesticide, the rankings and quartile rating for the three use zones (community, local, and regional zones) are averaged to determine an overall ranking and rating for each pesticide.

Demographic Factors – The range of population densities for each demographic factor is shown in Table 6. Similar to the pesticide use category, the demographic category has four subcategories. For each subcategory, the 226 communities are ranked, with the community with the highest value ranked 226 and the lowest community ranked 1. For each of the four demographic factors, the 226 communities are divided into four groups (quartiles). The top quartile (approximately 56 communities) with the highest values are rated 4, the second highest quartile are rated 3, and so forth. The quartile rating for the four demographic subcategories are averaged to determine an overall demographic rating.

Additional considerations for community selection

Some communities in proximity to each other have similar ratings, particularly for pesticide use due to similar cropping patterns. To evaluate a variety of pesticide exposures, DPR proposes to select communities that represent different pesticide use patterns. If two or more highly rated communities have similar cropping patterns and pesticide use, DPR proposes to select only one of the communities.

DPR proposes to select communities for monitoring primarily based on their pesticide use ratings. These are likely the communities with the highest exposure. Where two or more communities with high pesticide ratings are within a few miles of each other, DPR may select the community with the higher demographic rating for monitoring, depending on other factors (for example, suitable monitoring locations).

OEHHA or others may find the data from this project useful for a cumulative impacts evaluation or other research. Therefore, DPR may favor communities where complementary work is being conducted (e.g., monitoring station for criteria air pollutants or community health study). However, this is not an overriding factor in selecting communities for pesticide monitoring.

Proposed communities

Pesticide and demographic data for all 226 communities are shown in Appendix 3. Tables 7 to 9 summarize the highest rated communities for various groups of pesticides. Communities with the highest average ratings for all 34 proposed pesticides combined are summarized in Table 7. Communities with the highest average ratings for fumigants (Table 8) and organophosphates (Table 9) are shown because historical monitoring indicates that these pesticides can have high exposure and resulting risk. Table 10 summarizes the communities with the highest average demographic ratings. Table 11 lists the communities with other desirable characteristics such as a criteria air pollutant monitoring station or a community health study.

Based on the information in Tables 7 to 11, DPR proposes to select a total of two to five communities for the air monitoring network from those listed below (Figure 4):

- Linden or Ripon (San Joaquin Valley, San Joaquin County)
- Shafter or Wasco (San Joaquin Valley, Kern County)
- Greenfield, Salinas, or Castroville (North Central Coast, Monterey County)
- Camarillo or Oxnard (Ventura County)
- Huron or Mendota (San Joaquin Valley, Fresno County)
- Reedley or Parlier (San Joaquin Valley, Fresno County)

DPR proposes selecting from these 13 communities based primarily on pesticide use ratings, then deciding among closely ranked communities using demographic factors and other characteristics. The communities listed are the top two within each geographic group in overall pesticide use ratings (Table 7), with the following exceptions:

- In Monterey County, Salinas is preferred over Soledad due to the monitoring station for criteria air pollutants, a health study in Salinas, higher use ratings for organophosphate pesticides, and more desirable demographic characteristics.
- Castroville is included in the Monterey County group because use densities for several pesticides (chloropicrin, malathion, methidathion, methyl bromide) are several times higher than the other proposed communities (Figures 5 to 10).
- Patterson and Westley are not included because of their proximity to Linden and Ripon. Patterson and Westley are approximately 20 miles southwest of Ripon, likely too far to be included in that group but likely too close to consider monitoring as a separate location. Linden and Ripon are preferred over Patterson and Westley due to higher pesticide ratings.
- Huron and Mendota are preferred over Cantua Creek because of the air monitoring station in Huron, a health study in Mendota, and more desirable demographic characteristics. In addition, there are few if any suitable monitoring locations in Cantua Creek.

Several other communities with high use of certain pesticides were considered, but not included (Figure 11):

- Gonzales (Monterey County), Chualar (Monterey County), and East Orosi (Tulare County) had among the highest nonfumigant use densities due to a few pesticides but lower ratings for other pesticides.
- Similarly, Mettler (Kern County), Pajaro (Monterey County), and El Rio (Ventura County) had the highest fumigant use densities but lower ratings for the other pesticides.
- Several Merced County communities (Delhi and others) had the second highest fumigant ratings (Table 6). The use densities for most fumigants were comparable to the other proposed communities. The Merced County group was rated higher primarily due to relatively high use of sodium tetrathiocarbonate. Most other communities do not rate highly for this fumigant.

In selecting the communities, DPR also proposes to consider which specific pesticides have high use near each community. As shown in Figures 5 to 10, some of the proposed geographic groups have high use for many of the same pesticides (e.g., Parlier and Shafter) while other geographic groups have high use for different pesticides (e.g., Parlier and Huron). DPR may favor communities that have high use for different pesticides. Table 12 lists the rankings of each pesticide for the 13 proposed communities. It shows that Huron had the highest use of 9 pesticides and Castroville the highest use of 8 pesticides. The remaining proposed communities had the highest use of 3 or fewer pesticides.

Options and Key Decisions

Given limited resources, DPR must balance three components in developing the air monitoring network: the number of samples collected from each community, the number of pesticides monitored, and the number of communities monitored. The tradeoffs associated with these components can be summarized by the following questions:

- Should DPR collect one or two 24-hour samples each week in each community? Two samples per week will provide more robust data to estimate seasonal exposure.

- Should DPR maximize the number of pesticides monitored by including chloropicrin and/or MITC, in addition to those already proposed? To do so would require reducing the number of samples collected and the number of communities monitored. If yes, DPR may only collect one sample per week in each community, in two or three communities.

- Should DPR maximize the number of communities monitored (4 or 5) and minimize the number of samples collected and number of pesticides monitored? If yes, DPR may only collect one sample per week in each community and cannot monitor chloropicrin and MITC.

There are other key issues to consider. First, the proposed rating system favors communities with relatively high use of many pesticides. Communities with extremely high use for a few pesticides are not as highly rated. It is uncertain if high use of many pesticides has greater overall risk than extremely high use of a few pesticides. DPR proposes this rating system because the project is designed to supplement the toxic air contaminant monitoring that already measures pesticide concentrations in areas of the highest use of individual pesticides.

Second, is the relative weighting of the various community factors. DPR proposes to select communities for monitoring based primarily on pesticide use. DPR proposes to use demographic ratings and other factors to assist in selecting a single community within a geographic group that has high pesticide use ratings. Different communities would be proposed if the demographic ratings or other factors were to be weighted more heavily.

Third, is selecting the appropriate combination of communities. DPR proposes to select a set of communities that represents a variety of pesticide use and cropping patterns. This may mean selecting a lower rated community over a higher rated community. In addition, DPR may favor Parlier over higher rated communities due to the previous year-long monitoring. Continuing monitoring in Parlier will leverage the previous monitoring data, particularly in determining time trends and relating concentrations to use and weather patterns. DPR will also consider resources when selecting the communities, particularly related to Oxnard or Camarillo. These two communities cannot be sampled within a single day by DPR monitoring staff located in Sacramento or Fresno. Travel expenditures, contract, or other additional resources would be needed to monitor Oxnard or Camarillo. The number of samples, number of pesticides, or number of communities may need to be reduced to include Oxnard or Camarillo.

Table 1. Pesticide candidates for the air monitoring network (top 100 pesticides reported in each of five areas for 2005-2007, excluding oils, inorganics, and antimicrobials). Each pesticide is rated 1 - 4 in each of three categories: volatility, risk assessment priority, and use. Higher rating indicates higher monitoring priority, with 12 as the highest total rating. Top 82 pesticides (rated 6 or higher) are shown in table. Total rating may differ by area due to differences in area use. Yellow highlight indicates pesticide included in Parlier or VOC monitoring method. Blue highlight indicates considering monitoring as a single pesticide method. Pink highlight indicates DPR will attempt to add pesticide to Parlier method, if high use area selected.

			Total Rating						
Pesticide	**Volatility Rating**	**Risk Assessment Rating**	**North Central Coast**	**Sacramento Valley**	**Salton Sea**	**San Joaquin Valley**	**Ventura**	**Max**	**Highest Use Area**
Chloropicrin	4	4	12	12	12	12	12	12	
Methyl bromide	4	4	12	12	12	12	12	12	Ventura
1,3-dichloropropene	4	4	12	12	12	12	12	12	Ventura
Metam-sodium (MITC)	4	4	12	12	12	12	12	12	
Metam-potassium (MITC)	4	4	12	12	8	12	12	12	
Sodium tetrathiocarbonate	4	4	11	8	12	12	11	12	San Joaquin Valley
Propylene oxide	4	4	8	12	8	10	8	12	
Sulfuryl fluoride	4	3	11	10	7	9	11	11	
Chlorpyrifos	3	4	11	11	11	11	11	11	San Joaquin Valley
Diazinon	3	4	11	9	10	9	9	11	North Central Coast
Chlorothalonil	3	4	10	10	10	10	11	11	Ventura
Propargite	3	4	7	11	7	11	7	11	San Joaquin Valley
Malathion	3	4	11	9	11	9	11	11	North Central Coast
Acrolein	4	4	8	9	8	11	8	11	San Joaquin Valley
Oxydemeton-methyl	3	4	11	7	7	7	7	11	
2,4-D, dimethylamine salt	3	4	7	11	10	10	7	11	
EPTC	3	4	7	7	11	8	7	11	Salton Sea
Paraquat dichloride	2	4	10	10	10	10	8	10	
Maneb	2	4	10	10	10	9	9	10	
Captan	2	4	10	9	6	8	10	10	
Propanil	2	4	6	10	6	6	6	10	Sacramento Valley
Trifluralin	3	3	6	9	10	10	6	10	Salton Sea
Phosmet	3	3	6	9	6	10	6	10	San Joaquin Valley
Ziram	2	4	6	10	6	10	6	10	
Diuron	3	3	8	9	8	10	8	10	San Joaquin Valley
Mancozeb	2	4	9	9	9	9	10	10	
Bensulide	3	3	10	6	10	6	9	10	
Dicloran	3	3	9	6	6	6	10	10	

			Total Rating						
Pesticide	**Volatility Rating**	**Risk Assessment Rating**	**North Central Coast**	**Sacramento Valley**	**Salton Sea**	**San Joaquin Valley**	**Ventura**	**Max**	**Highest Use Area**
Aldicarb	3	4	7	7	9	10	7	10	
Chlorthal-dimethyl	3	3	10	6	10	6	9	10	
Methomyl	3	3	10	7	10	8	8	10	
Thiram	3	3	8	6	7	6	10	10	
Dimethoate	3	4	10	9	10	10	7	10	San Joaquin Valley
Propyzamide	3	4	10	7	10	7	8	10	
Acephate	3	4	10	7	10	7	9	10	
Thiobencarb	3	3	6	10	6	6	6	10	Sacramento Valley
Iprodione	3	4	10	8	9	9	7	10	
Naled	3	4	10	8	7	9	7	10	San Joaquin Valley
Methidathion	3	4	10	8	7	8	7	10	
Molinate	3	4	7	10	7	7	7	10	Sacramento Valley
Aluminum phosphide	4	4	9	9	8	9	10	10	
Atrazine	3	4	7	7	10	7	7	10	
Dazomet (MITC))	4	4	8	8	10	8	10	10	
Linuron	3	4	7	7	10	7	8	10	
4-(2,4-DB), dimethylamine salt	3	4	7	8	10	7	7	10	
Pendimethalin	3	2	5	8	8	9	5	9	
Oryzalin	3	3	8	9	6	9	6	9	San Joaquin Valley
Oxyfluorfen	3	3	9	9	8	9	6	9	San Joaquin Valley
Simazine	3	3	8	8	6	9	8	9	San Joaquin Valley
Hydrogen cyanamide	4	1	5	5	9	7	5	9	
Oxamyl	3	2	7	5	5	7	9	9	
Cypermethrin	3	3	9	7	8	6	6	9	North Central Coast
Formaldehyde	4	3	7	8	7	9	7	9	San Joaquin Valley
Metaldehyde	4	2	8	6	6	6	9	9	
Permethrin	3	3	9	7	9	8	9	9	San Joaquin Valley
Dicofol	3	4	7	7	7	9	7	9	San Joaquin Valley
Carbaryl	3	4	9	9	7	9	9	9	
Cyprodinil	3	3	7	7	6	7	9	9	
Diquat dibromide	2	4	7	7	9	6	7	9	
Endosulfan	3	4	7	7	9	7	7	9	Salton Sea
2,4-DB acid	3	4	7	7	9	7	7	9	
Glyphosate, isopropylamine salt	2	2	8	8	8	8	8	8	
Fosetyl-al	2	2	8	4	6	4	6	8	
Ethephon	3	2	5	6	7	8	5	8	

			Total Rating						
Pesticide	**Volatility Rating**	**Risk Assessment Rating**	**North Central Coast**	**Sacramento Valley**	**Salton Sea**	**San Joaquin Valley**	**Ventura**	**Max**	**Highest Use Area**
Imidacloprid	2	3	8	5	8	5	8	8	
S-metolachlor	3	2	5	8	5	8	5	8	San Joaquin Valley
MCPA, dimethylamine salt	3	3	6	8	6	8	6	8	
Prometryn	3	2	7	5	5	6	8	8	
Isopropyl alcohol	4	1	8	5	6	7	5	8	
Spinosad	2	3	7	5	8	5	7	8	
S,S,S-tributyl phosphorotrithioate	3	4	7	7	7	8	7	8	San Joaquin Valley
Glyphosate, potassium salt	2	1	7	7	7	7	7	7	
Glyphosate	2	2	6	5	4	7	4	7	
Fenhexamid	2	2	6	4	4	4	7	7	
Methoxyfenozide	2	3	7	5	7	7	7	7	
Piperonyl butoxide	2	2	4	6	4	4	7	7	
Norflurazon	3	3	6	6	6	7	6	7	San Joaquin Valley
Borax	1	3	4	4	7	4	4	7	
Propamocarb hydrochloride	2	1	6	3	3	3	3	6	
Boscalid	2	1	6	4	4	5	6	6	
Glyphosate, monoammonium salt	2	2	4	4	4	4	6	6	
Oleic acid	2	1	3	3	6	3	3	6	

Key to Pesticide Candidate Ratings

Use (DPR Pesticide Use Report Database)

4 = approx top 25 pesticides of pounds reported in area, 2005-2007 average
3 = approx 2nd 25 pesticides of pounds reported in area, 2005-2007 average
2 = approx 3rd 25 pesticides of pounds reported in area, 2005-2007 averge
1 = approx 4th 25 pesticides of pounds reported in area, 2005-2007 average
0 = not among top 100 pesticides used in area, 2005-2007

Volatility (DPR Pesticide Chemistry Database)

4 = >10-2 mm Hg (high)
3 = 10-6 - 10-3 mm Hg (medium)
2 = <10-6 mm Hg (low)
1 = volatility unknown

DPR Risk Assessment Priority (SB950 report)

4 = high priority
3 = medium priority
2 = low priority
1 = no priority assigned

Table 2. Reported pesticide use by county, 2005-2007. Counties with an area identified are included in one of the five candidate areas for the air monitoring network.

County	Area	2005-2007 average (lbs)	Rank
Fresno	San Joaquin Valley	30,004,078	1
Kern	San Joaquin Valley	28,231,745	2
Tulare	San Joaquin Valley	16,615,982	3
San Joaquin	San Joaquin Valley	10,410,585	4
Madera	San Joaquin Valley	9,979,675	5
Monterey	North Central Coast	8,505,686	6
Merced	San Joaquin Valley	7,173,859	7
Ventura	Ventura	6,476,493	8
Kings	San Joaquin Valley	6,067,134	9
Stanislaus	San Joaquin Valley	5,817,403	10
Imperial	Salton Sea	5,342,814	11
Santa Barbara		4,301,460	12
Sacramento	Sacramento Valley	3,483,331	13
Butte	Sacramento Valley	3,226,091	14
Sutter	Sacramento Valley	3,092,629	15
Sonoma		2,866,769	16
Los Angeles		2,823,577	17
Riverside	Salton Sea	2,825,473	18
Yolo	Sacramento Valley	2,646,438	19
Glenn	Sacramento Valley	2,331,833	20
Colusa	Sacramento Valley	2,024,572	21
San Luis Obispo		2,136,360	22
Napa		1,831,760	23
Santa Cruz	North Central Coast	1,752,055	24
San Diego		1,719,357	25
Mendocino		1,418,136	26
Orange		1,298,107	27
Yuba	Sacramento Valley	1,331,087	28
Santa Clara		1,090,570	29
Siskiyou		1,035,967	30
Solano		873,015	31
Tehama	Sacramento Valley	923,949	32
Contra Costa		795,901	33
San Benito	North Central Coast	726,996	34
Lake		618,193	35
San Bernardino		493,742	36
Del Norte		334,895	37
Shasta		308,480	38
Placer		313,916	39
Alameda		299,196	40
San Mateo		277,220	41
Modoc		267,803	42

County	Area	2005-2007 average (lbs)	Rank
El Dorado		145,489	43
Amador		112,692	44
Lassen		93,209	45
Humboldt		62,151	46
Marin		54,570	47
Nevada		62,761	48
Calaveras		44,630	49
San Francisco		34,178	50
Tuolumne		28,723	51
Trinity		10,841	52
Plumas		12,100	53
Inyo		8,459	54
Mariposa		7,744	55
Sierra		5,786	56
Mono		2,681	57
Alpine		431	58
STATEWIDE TOTAL		184,780,778	
CANDIDATE COUNTIES TOTAL		158,989,908	

Table 3a. 2005-2007 area use summary of the 30 pesticides included in the original Parlier and VOC methods.

	North Central Coast	Sacramento Valley	Salton Sea	San Joaquin Valley	Ventura
2005-2007 use density of all VOC method pesticides (lbs/mi^2)	2,280.4	189.8	297.4	1,083.8	3,562.1
2005-2007 use density of all Parlier method pesticides (lbs/mi^2)	116.6	121.3	82.6	304.7	75.3
Number of Parlier and VOC pesticides with highest use	3	4	3	17	3

Table 3b. 2005-2007 area use summary of additional candidate pesticides. Underline indicates highest use area.

Candidate Pesticide (max total rating from Table 1)	**2005-2007 Pesticide Use Density (lbs/mi^2)**				
	North Central Coast	**Sacramento Valley**	**Salton Sea**	**San Joaquin Valley**	**Ventura**
Chloropicrin (12)	1,418.3	31.5	61.0	57.3	<u>2,192.8</u>
MITC-generating pesticides (12)	286.1	36.6	752.2	<u>1,253.0</u>	523.2
Oxydemeton-methyl (11)	<u>15.7</u>				
Bensulide (10)	17.3	<u>20.1</u>			
Acephate (10)	<u>10.2</u>		1.6		3.2
Iprodione (10)	7.6	0.5	0.9	<u>8.0</u>	
Methidathion (10)	<u>4.4</u>	0.6		2.8	

Table 4. Number of pesticide drift illnesses reported in the candidate areas, 2005-2007. Data from DPR's pesticide illness surveillance program.

Area	**2005-2007 Reported Illnesses (number/mi^2)**	**2005-2007 Reported Episodes (number/mi^2)**
North Central Coast	0.0835	0.00388
Sacramento Valley	0.0058	0.00139
Salton Sea	0.0036	0.00211
San Joaquin Valley	0.0147	0.00258
Ventura	0.0260	0.00489

Table 5. Number of communities within an area that had reported use of a pesticide within the community zone, local zone (1 mile), and regional zone (5 miles) zone.

	Geographic Area								
	Ventura 17 Communities			North Central Coast 48 Communities			San Joaquin Valley 161 Communities		
Pesticide	***CZ***	***LZ***	***RZ***	***CZ***	***LZ***	***RZ***	***CZ***	***LZ***	***RZ***
1,3-dichloropropene	8	12	12	7	11	16	75	101	130
Acephate	11	11	12	10	14	16	49	90	133
Acrolein	0	0	0	0	0	0	0	0	0
Bensulide	7	9	12	9	10	12	7	15	51
Chloropicrin	10	14	16	8	9	15	49	76	117
Chlorothalonil	13	14	17	8	12	16	81	105	136
Chlorpyrifos	13	16	16	11	15	16	134	144	148
Cypermethrin	7	9	15	6	10	13	13	31	74
Dazomet (MITC)	2	4	7	0	2	6	0	3	5
Diazinon	8	10	15	11	13	17	68	100	134
Dicofol	2	4	8	1	5	9	59	82	127
Dimethoate	7	9	12	9	11	14	97	120	142
Diuron	10	12	16	2	5	11	117	139	149
Endosulfan	4	6	7	2	3	7	27	54	96
EPTC	0	1	4	3	4	7	30	62	105
Iprodione	9	13	16	8	13	16	112	130	144
Malathion	9	11	14	7	10	15	89	120	142
Metam-sodium (MITC)	7	9	12	3	4	9	33	55	100
Methidathion	0	0	4	3	3	7	53	85	127
Methyl bromide	8	10	12	6	8	15	59	82	116
Naled	4	6	11	6	10	13	43	67	117
Norflurazon	4	6	11	0	1	2	74	108	139
Oryzalin	6	7	15	1	6	13	117	133	144
Oxydemeton-methyl	7	9	12	10	11	17	6	18	47
Oxyfluorfen	12	13	16	9	13	16	136	144	150
Permethrin	12	13	16	10	12	17	89	116	141
Phosmet	1	2	8	2	4	6	81	112	140
Potassium N-methyl dithiocarbamate (MITC)	2	3	6	5	9	14	32	48	82
Propargite	0	0	4	0	1	2	109	127	141
S,S,S-tributyl phosphorotrithioate	0	0	0	0	0	0	9	18	46
Simazine	11	14	16	3	5	7	107	120	137
S-metolachlor	4	7	12	6	6	8	65	88	130
Sodium tetrathiocarbonate	2	8	15	0	0	2	7	14	46
Trifluralin	6	8	12	3	6	11	100	126	144

Table 6. Range of population densities for the demographic factors.

Community Demographic Factors	Min	Max
Population density of people <18 yrs old (persons/mi^2):		
Ventura County	179	2290
North Central Coast	48	2842
San Joaquin Valley	4	3514
Population density of people > 65 yrs old (persons/mi^2):		
Ventura County	39	689
North Central Coast	20	1156
San Joaquin Valley	2	923
Population density of people > 5 yrs old with disabilities (persons/mi^2):		
Ventura County	63	1298
North Central Coast	27	1738
San Joaquin Valley	0	1906
Civilian population employed in farming (persons/mi^2):		
Ventura County	0	280
North Central Coast	0	1127
San Joaquin Valley	0	1641

Table 7. Communities with the highest average ratings for 2006-2008 use of all 34 candidate pesticides combined. Communities within a few miles of each other are grouped together. Communities highly rated for demographics (4.00 or 3.75 rating) are shown in italics. Communities that have other desirable characteristics, such as criteria air pollutant monitoring station are underlined.

Community(ies)	**Area (County)**	**Pesticide Rating**
Linden, Ripon, Salida, Escalon, Manteca, Del Rio, Riverdale Park, Lathrop, <u>Modesto</u>, <u>*Stockton*</u>, Hickman	San Joaquin Valley (San Joaquin, Stanislaus)	3.23-2.71
<u>Shafter</u>, Wasco, <u>Arvin</u>, Rosedale, Mettler	San Joaquin Valley (Kern)	3.01-2.77
Greenfield, Soledad, <u>*Salinas*</u>, *Gonzales*, <u>King City</u>, *Castroville*	North Central Coast (Monterey)	2.96-2.62
Patterson, Westley	San Joaquin Valley (Stanislaus)	2.93
Camarillo, *Oxnard*	Ventura (Ventura)	2.89-2.86
Cantua Creek, <u>*Huron*</u>, <u>*Mendota*</u>	San Joaquin Valley (Fresno)	2.85-2.71
Reedley, <u>*Parlier*</u>	San Joaquin Valley (Fresno)	2.77-2.62
Poplar	San Joaquin Valley (Tulare)	2.71

Table 8. Communities with the highest average ratings for 2006-2008 fumigant use (1,3-dichloropropene, chloropicrin, methyl bromide, MITC pesticides, and sodium tetrathiocarbonate). The ratings are similar if chloropicrin and/or MITC pesticides are excluded. Communities within a few miles of each other are grouped together. Communities highly rated for demographics (4.00 or 3.75 rating) are shown in italics. Communities that have other desirable characteristics, such as criteria air pollutant monitoring station are underlined.

Community(ies)	**Area (County)**	**Pesticide Rating**
Camarillo, *Oxnard*, <u>El Rio</u>, Ventura, <u>Thousand Oaks</u>, Santa Paula, Port Hueneme	Ventura (Ventura)	3.78-2.84
Delhi, Livingston, Hilmar, Winton, Turlock, Atwater	San Joaquin Valley (Merced)	3.64-2.84
Salida, Ripon, Manteca, Escalon, Del Rio, Riverdale Park, West Modesto	San Joaquin Valley (San Joaquin, Stanislaus)	3.23-2.84
<u>*Salinas*</u>, Prunedale, Elkhorn	North Central Coast (Monterey)	3.04-2.89
Delano, Wasco, <u>Shafter</u>	San Joaquin Valley (Kern)	3.04-2.87
Kingsburg	San Joaquin Valley (Fresno)	2.89
Patterson	San Joaquin Valley (Stanislaus)	2.84

Table 9. Communities with the highest average ratings for 2006-2008 organophosphate use. Communities within a few miles of each other are grouped together. Communities highly rated for demographics (4.00 or 3.75 rating) are shown in italics. Communities that have other desirable characteristics, such as criteria air pollutant monitoring station are underlined

Community(ies)	**Area (County)**	**Pesticide Rating**
Salinas, Boronda, *Castroville*, Prunedale, Moss Landing, *Watsonville*, San Juan Bautista, Chualar, and others	North Central Coast (Monterey, San Benito)	3.36-3.21
Mendota, Cantua Creek, Firebaugh	San Joaquin Valley (Fresno)	3.30-2.94
Linden, Ripon, Salida	San Joaquin Valley (San Joaquin, Stanislaus)	3.21-2.91
Shafter	San Joaquin Valley (Kern)	3.09
Oxnard, Camarillo	Ventura (Ventura)	3.03-2.97
Reedley	San Joaquin Valley (Fresno)	2.97

Table 10. Communities with the highest average ratings for all demographic factors combined. Demographic factors include density (number of persons per square mile) of people less than 18, people greater than 65, people with disabilities, and people employed in farming, fishing, and forestry.

Community(ies)	**Area**	**Demographic Rating**
Castroville, Freedom, Gonzales, Greenfield, Salinas, Watsonville	North Central Coast	4.00
August, Bret Harte, Dinuba, Kerman, Lindsay, Newman, Parlier, Reedley, Sanger, Selma, Shackelford, South Woodbridge	San Joaquin Valley	4.00
Oxnard, Santa Paula	Ventura	4.00
Hollister, Pajaro	North Central Coast	3.75
Atwater, Bystrom, Cutler, Exeter, Farmersville, Garden Acres, Huron, Kettleman City, Lodi, Madera, McFarland, Mendota, Orange Cove, Richgrove, Riverbank, Stockton, Turlock	San Joaquin Valley	3.75
Casa Conejo, Fillmore, Port Hueneme	Ventura	3.75

Table 11. Communities with other desirable characteristics. These include monitoring station for criteria air pollutants, ongoing health study, or previous monitoring.

Area	Community	Desirable Characteristic(s)
North Central Coast	Carmel Valley	Air monitoring station
North Central Coast	Davenport	Air monitoring station
North Central Coast	King City	Air monitoring station
North Central Coast	Hollister	Air monitoring station
North Central Coast	Salinas	Health study; air monitoring station
North Central Coast	Santa Cruz	Air monitoring station
North Central Coast	Scotts Valley	Air monitoring station
North Central Coast	Watsonville	Air monitoring station
San Joaquin Valley	Arvin	Air monitoring station
San Joaquin Valley	Bakersfield	Air monitoring station
San Joaquin Valley	Clovis	Air monitoring station
San Joaquin Valley	Corcoran	Air monitoring station
San Joaquin Valley	Edison	Air monitoring station
San Joaquin Valley	Fresno	Air monitoring station
San Joaquin Valley	Hanford	Air monitoring station
San Joaquin Valley	Huron	Air monitoring station
San Joaquin Valley	Lebec	Air monitoring station
San Joaquin Valley	Madera	Air monitoring station
San Joaquin Valley	Mendota	Health study
San Joaquin Valley	Merced	Air monitoring station
San Joaquin Valley	Modesto	Air monitoring station
San Joaquin Valley	Oildale	Air monitoring station
San Joaquin Valley	Parlier	Air monitoring station; 2006 pesticide monitoring
San Joaquin Valley	Shafter	Air monitoring station
San Joaquin Valley	Stockton	Air monitoring station
San Joaquin Valley	Tracy	Air monitoring station
San Joaquin Valley	Turlock	Air monitoring station
San Joaquin Valley	Visalia	Air monitoring station
Ventura	El Rio	Air monitoring station
Ventura	Ojai	Air monitoring station
Ventura	Simi Valley	Air monitoring station
Ventura	Thousand Oaks	Air monitoring station
Ventura	Ventura	Air monitoring station

Table 12. 2006-2008 pesticide use rankings for proposed communities. Highest possible rank is 226. Rank of 1 indicates no use.

Pesticide	Linden	Ripon	Shafter	Wasco	Greenfield	Salinas	Castroville	Camarillo	Oxnard	Huron	Mendota	Reedley	Parlier	Highest Ranked Community
1,3-Dichloropropene	137	200	186	190	83	188	150	203	215	29	30	210	202	Oxnard
Acephate	53	141	171	178	216	221	223	193	200	127	207	112	67	Castroville
Acrolein	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bensulide	104	138	1	1	222	215	219	206	205	52	59	178	116	Greenfield
Chloropicrin	167	182	92	125	109	216	220	210	218	60	1	116	142	Castroville
Chlorothalonil	179	199	171	129	163	134	182	207	209	224	120	179	149	Huron
Chlorpyrifos	176	167	216	205	194	126	132	141	134	195	162	179	205	Shafter
Cypermethrin	161	100	1	1	217	203	217	220	215	224	42	1	1	Huron
Dazomet	1	1	1	1	1	1	1	224	225	1	1	1	1	Oxnard
Diazinon	166	183	209	160	217	220	220	153	139	211	118	179	196	Salinas/Castroville
Dicofol	213	141	160	188	197	139	1	85	128	75	212	105	47	Linden
Dimethoate	162	126	163	156	212	198	200	107	125	224	172	139	80	Huron
Diuron	182	126	151	171	127	74	152	83	70	130	187	155	165	Mendota
Endosulfan	194	136	1	121	44	45	113	90	160	226	220	110	181	Huron
EPTC	40	121	217	146	200	170	1	95	1	1	143	1	1	Shafter
Iprodione	196	193	218	211	214	214	203	91	109	221	68	198	201	Huron
Malathion	189	167	93	101	193	218	221	196	201	86	160	154	186	Castroville
Metam sodium	185	36	217	208	117	194	49	214	216	218	205	173	59	Huron
Methidathion	205	214	218	183	1	188	226	34	36	56	181	212	112	Castroville
Methyl bromide	171	191	178	204	124	215	222	210	217	103	1	115	91	Castroville
Naled	208	168	168	49	199	215	220	187	189	224	211	67	23	Huron
Norflurazon	177	191	146	190	1	1	1	64	27	66	1	166	193	Parlier
Oryzalin	156	200	164	189	136	1	1	82	77	77	41	207	194	Reedley
Oxydemeton-methyl	188	48	1	119	219	221	221	195	197	64	139	1	1	Salinas/Castroville
Oxyfluorfen	209	204	214	211	179	91	218	72	86	183	176	187	185	Castroville
Permethrin	132	205	208	187	214	215	205	192	199	213	62	108	86	Salinas
Phosmet	190	141	226	216	1	1	1	23	104	32	79	215	221	Shafter
Potassium N-methyl dithiocarbamate	156	146	136	1	203	41	51	195	186	76	208	99	185	Mendota
Propargite	225	189	138	175	1	1	1	27	28	197	162	157	185	Linden
S,S,S-tributyltriphosphoro (DEF)	1	1	209	67	1	1	1	1	1	71	222	61	1	Mendota
Simazine	187	155	135	120	183	1	1	115	86	166	20	182	197	Parlier
S-metolachlor	205	162	177	176	208	121	31	135	136	226	207	23	25	Huron
Sodium tetrathiocarbonate	1	144	73	66	72	1	1	136	64	1	1	1	1	Ripon
Trifluralin	168	164	179	179	106	100	53	113	107	220	217	103	125	Huron

Figure 1. Candidate areas for the air monitoring network.

Figure 2. Distribution of wind speeds in the five candidate areas: San Joaquin Valley (SJV), Sacramento Valley (SV), North Central Coast (NCC), Salton Sea (SS), and Ventura (VENT).

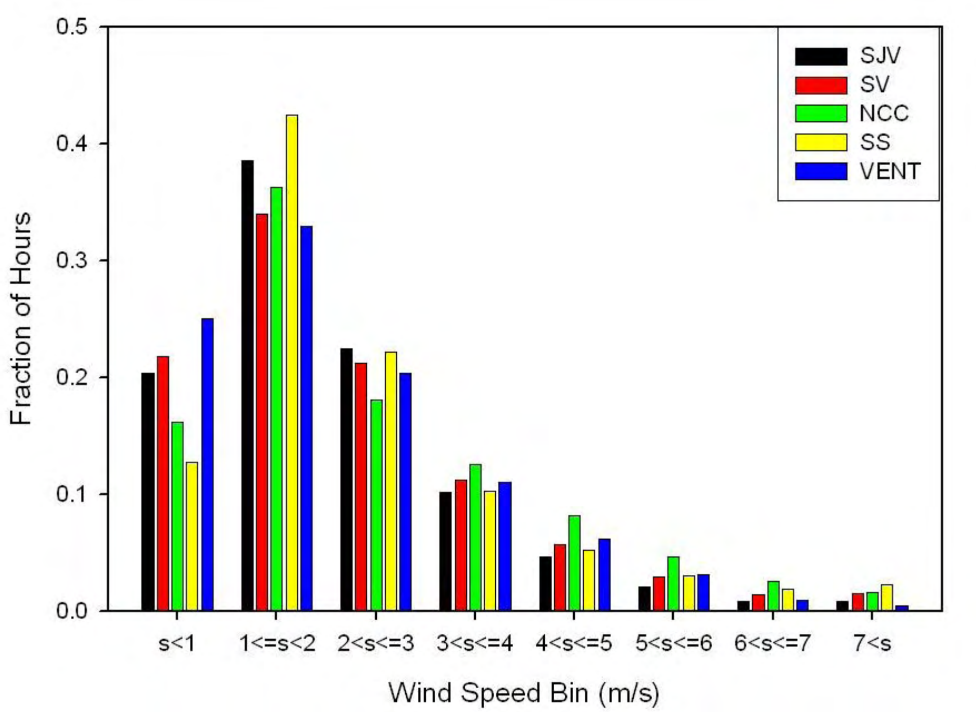


Figure 3. Consistency of wind direction in the five candidate areas: San Joaquin Valley (SJV), Sacramento Valley (SV), North Central Coast (NCC), Salton Sea (SS), and Ventura (VENT)

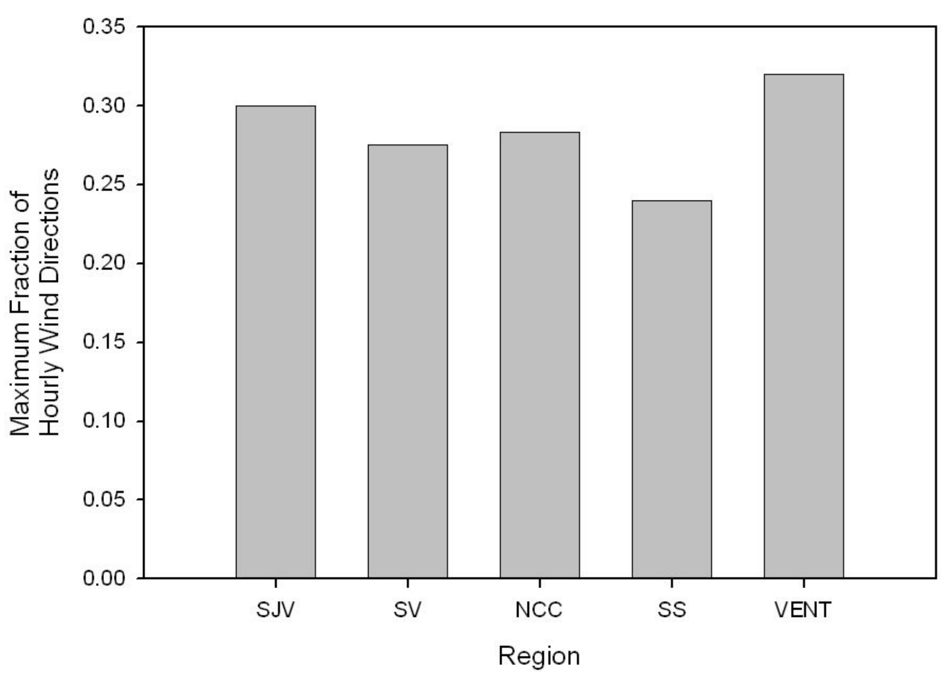
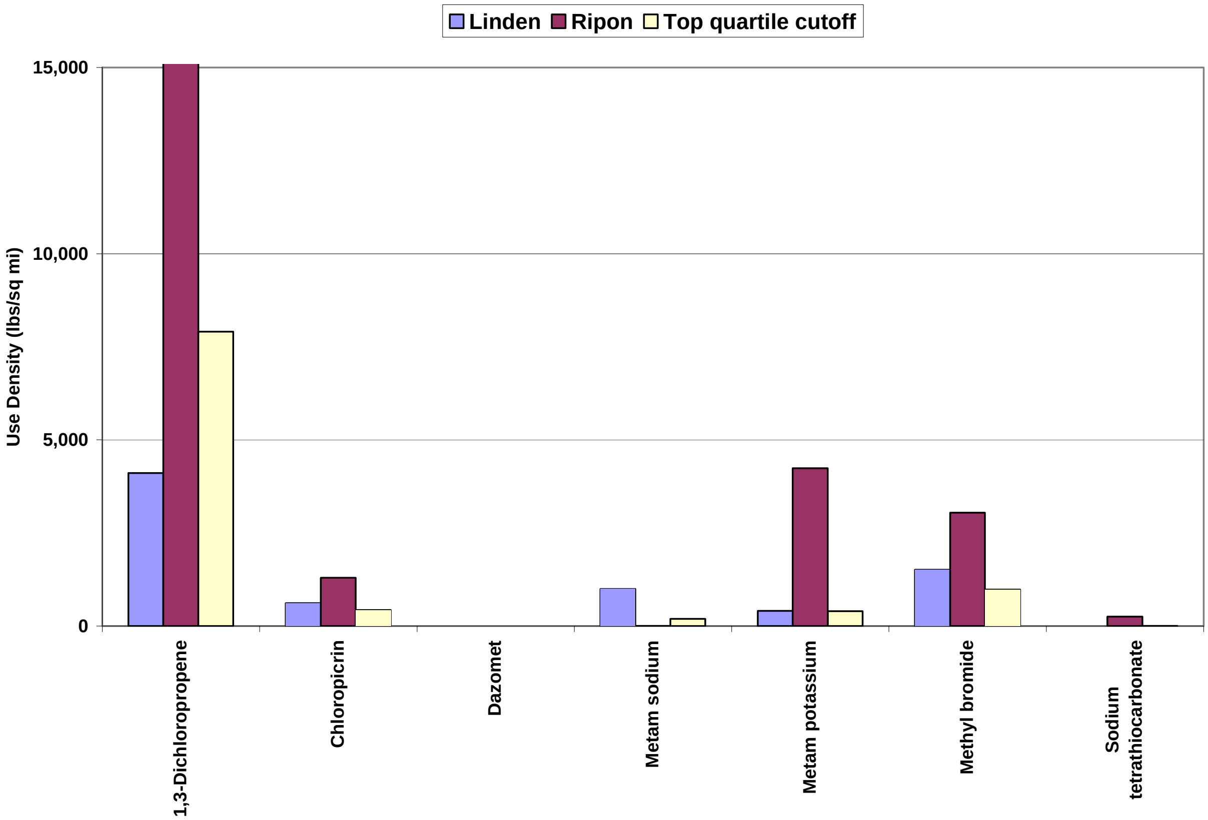


Figure 4. Candidate communities for the air monitoring network.

Figure 5. 2006-2008 average use of proposed pesticides for Linden and Ripon. Use exceeding the top quartile cutoff (yellow bars) is rated 4.



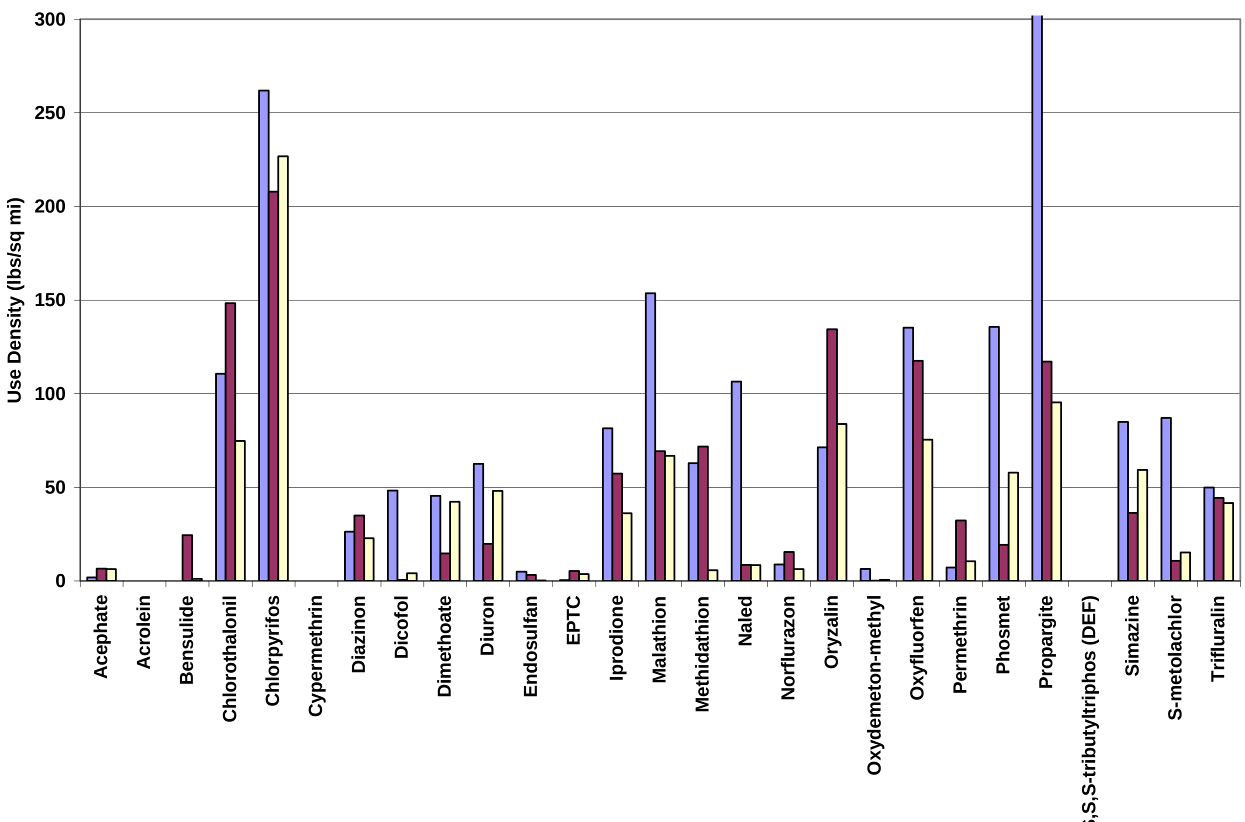


Figure 6. 2006-2008 average use of proposed pesticides for Castroville, Greenfield, and Salinas. Use exceeding the top quartile cutoff (yellow bars) is rated 4.

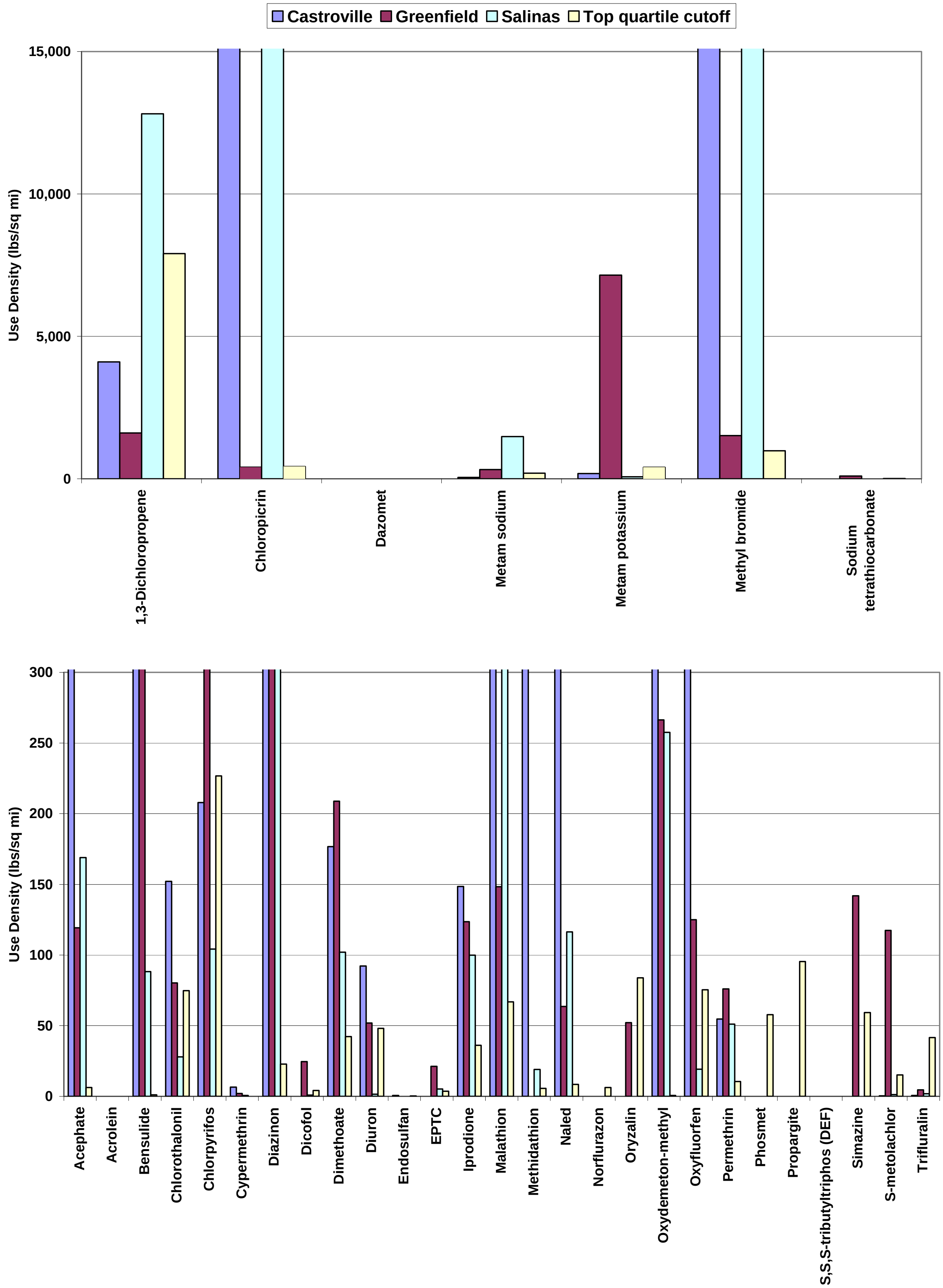
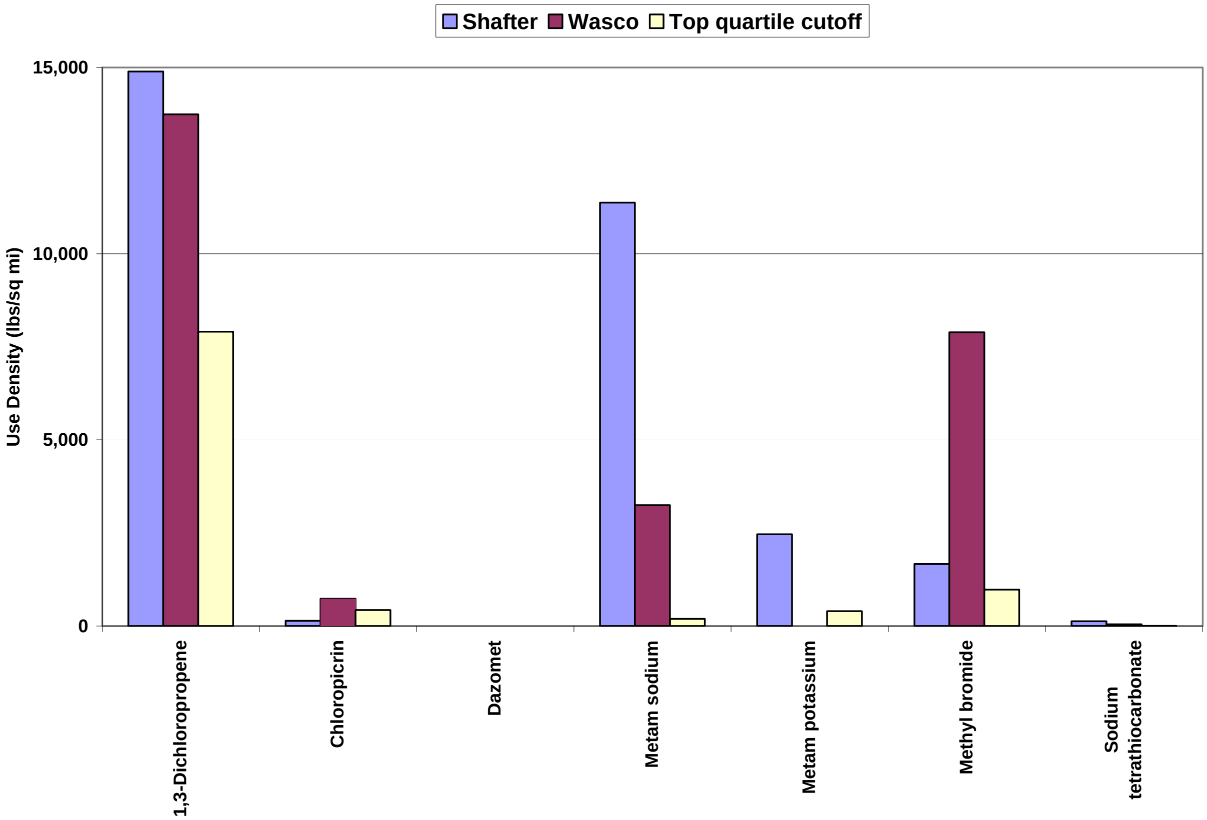


Figure 7. 2006-2008 average use of proposed pesticides for Shafter and Wasco. Use exceeding the top quartile cutoff (yellow bars) is rated 4.



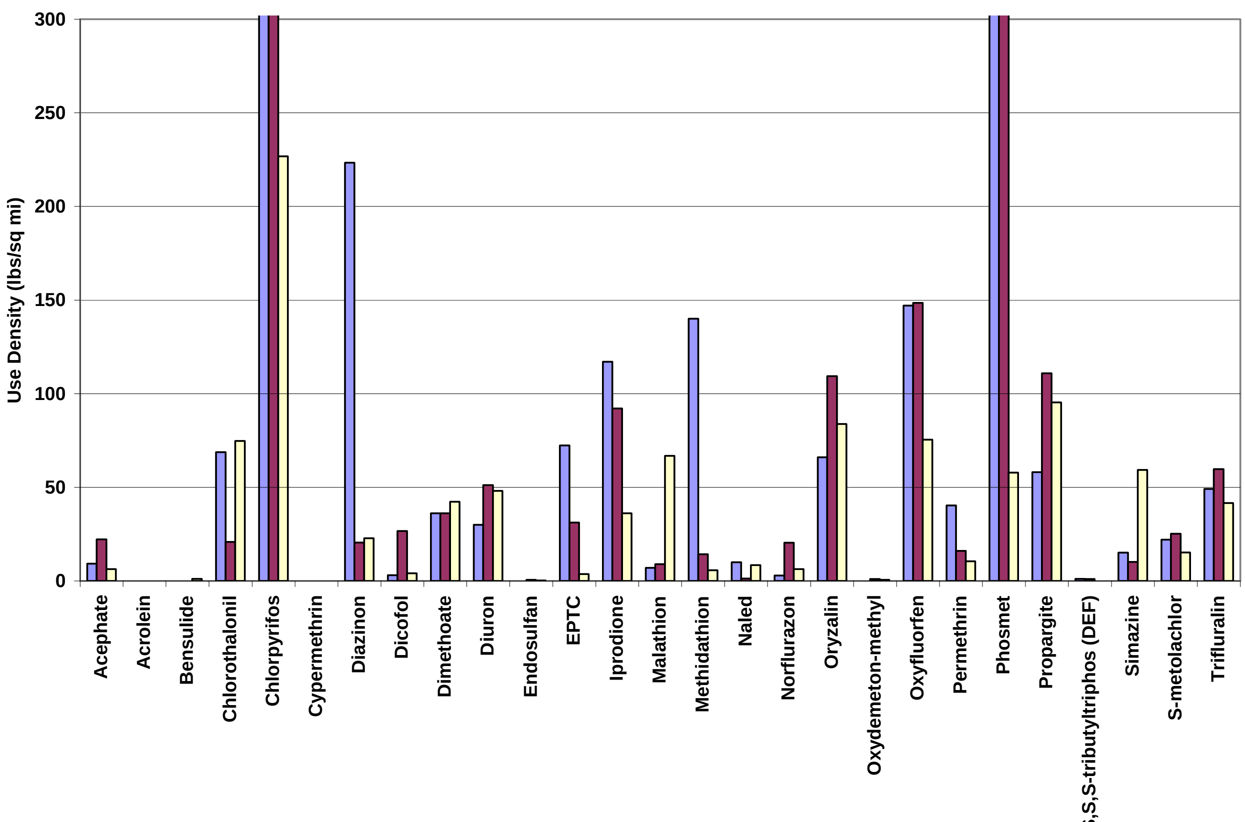
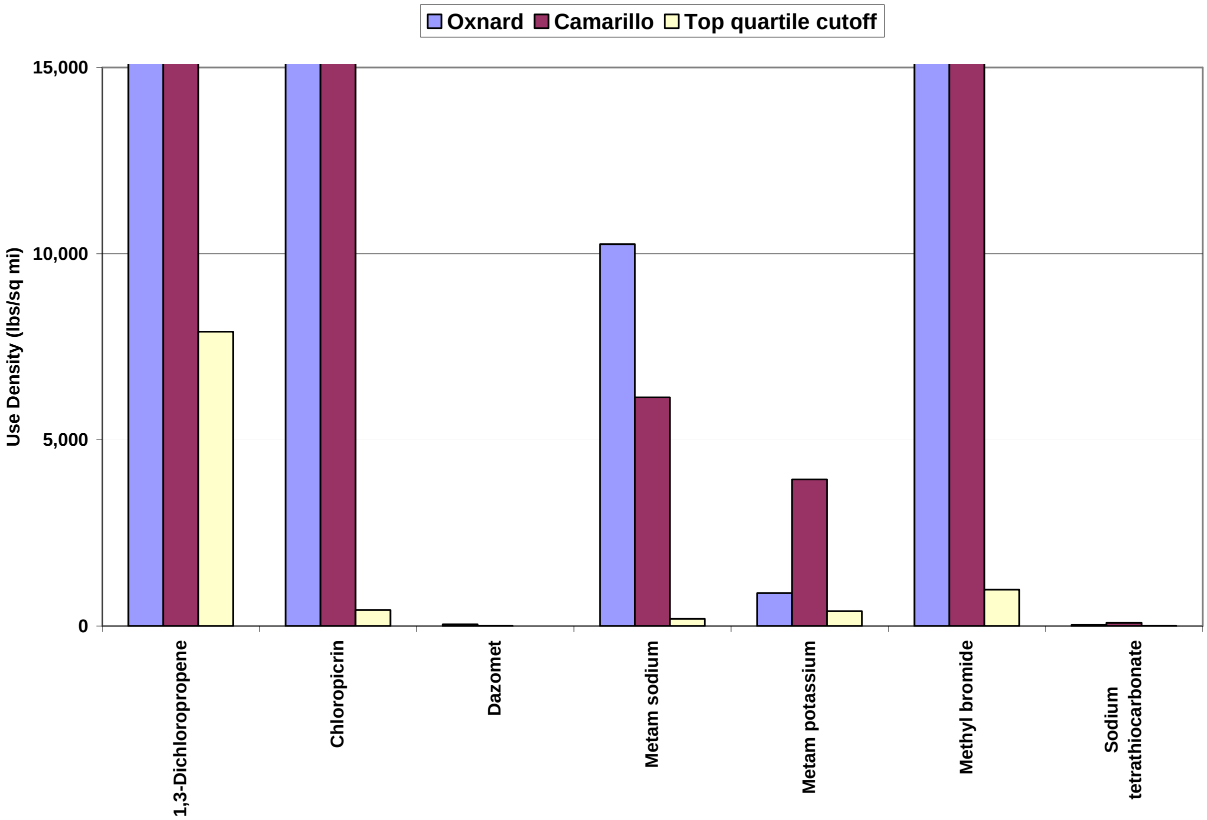


Figure 8. 2006-2008 average use of proposed pesticides for Camarillo and Oxnard. Use exceeding the top quartile cutoff (yellow bars) is rated 4.



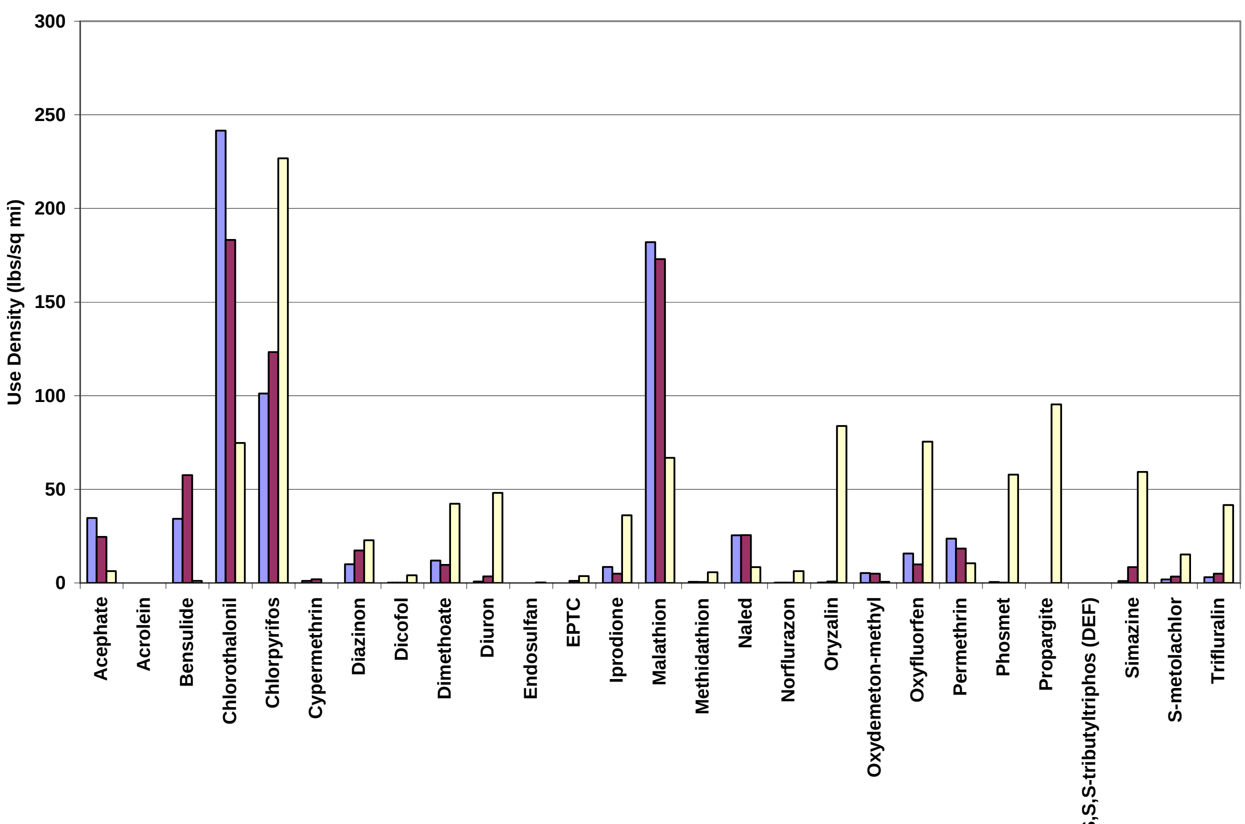
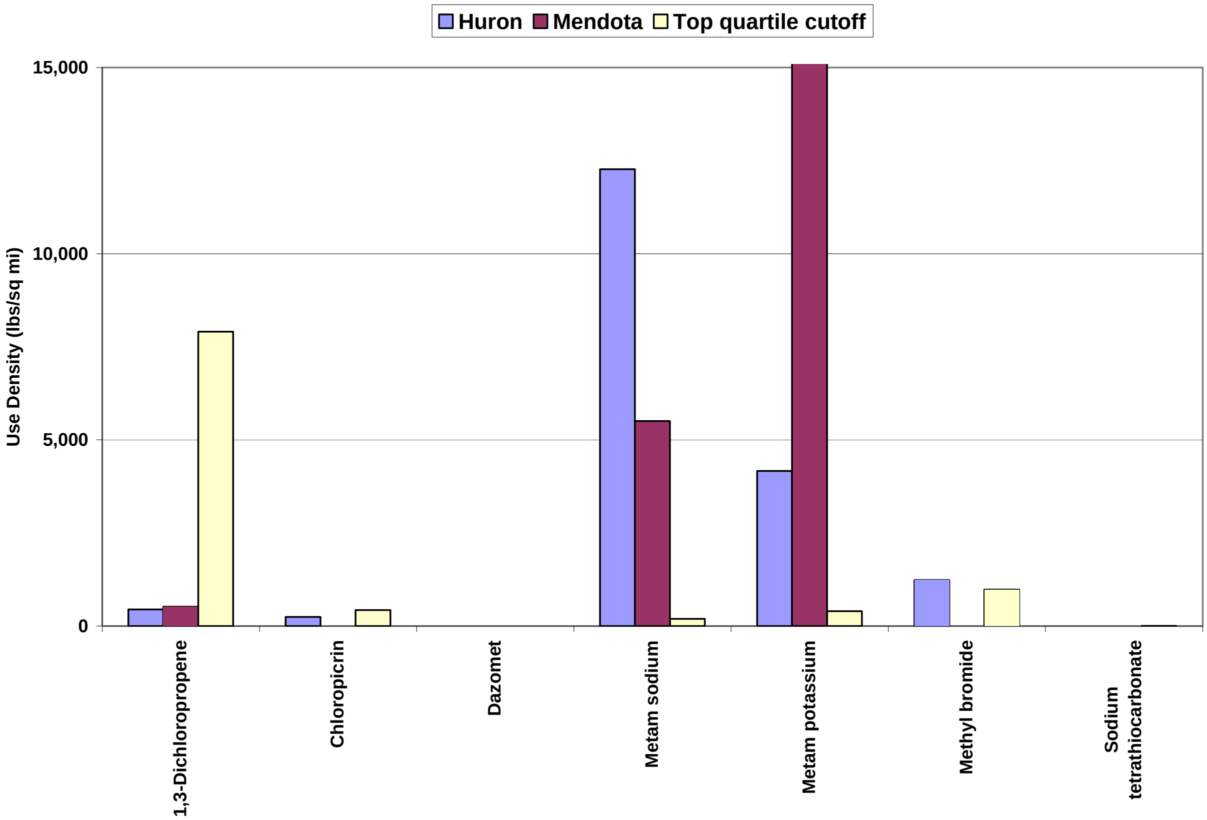


Figure 9. 2006-2008 average use of proposed pesticides for Huron and Mendota. Use exceeding the top quartile cutoff (yellow bars) is rated 4.



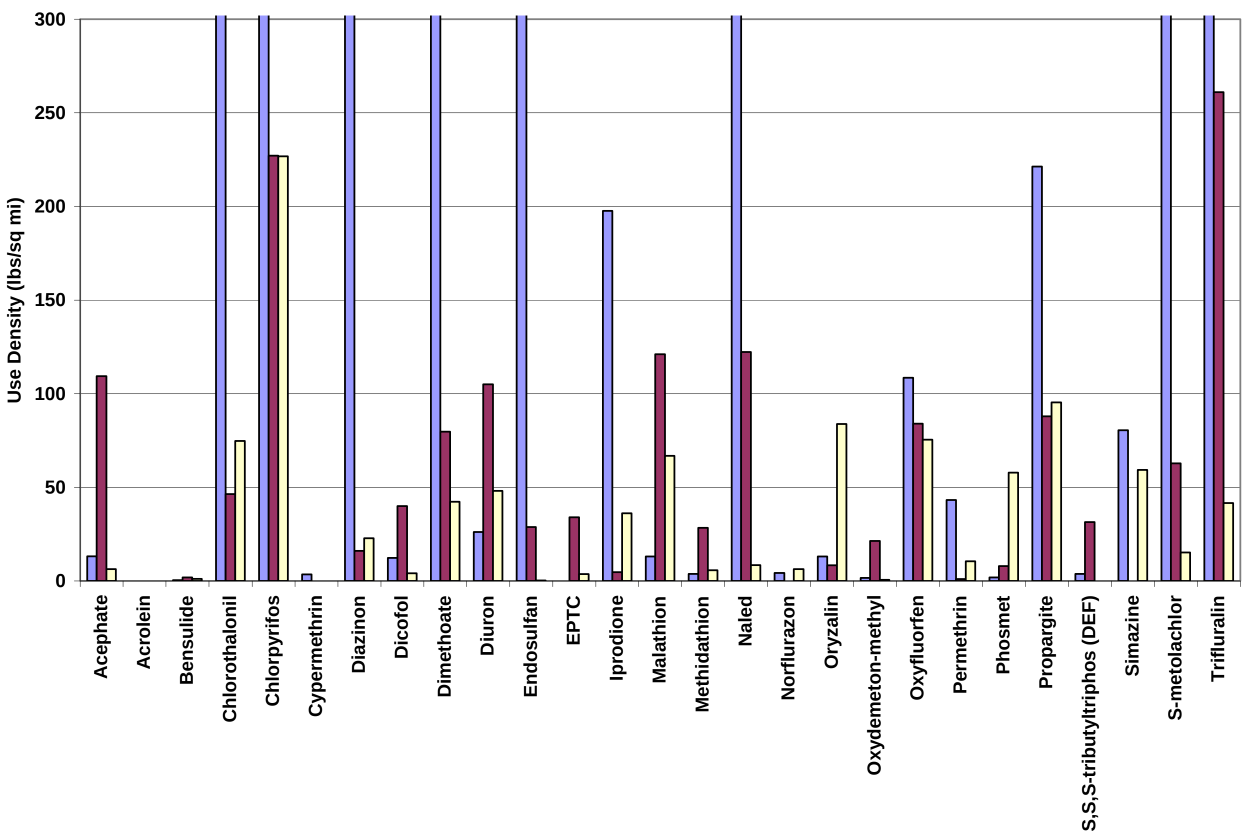
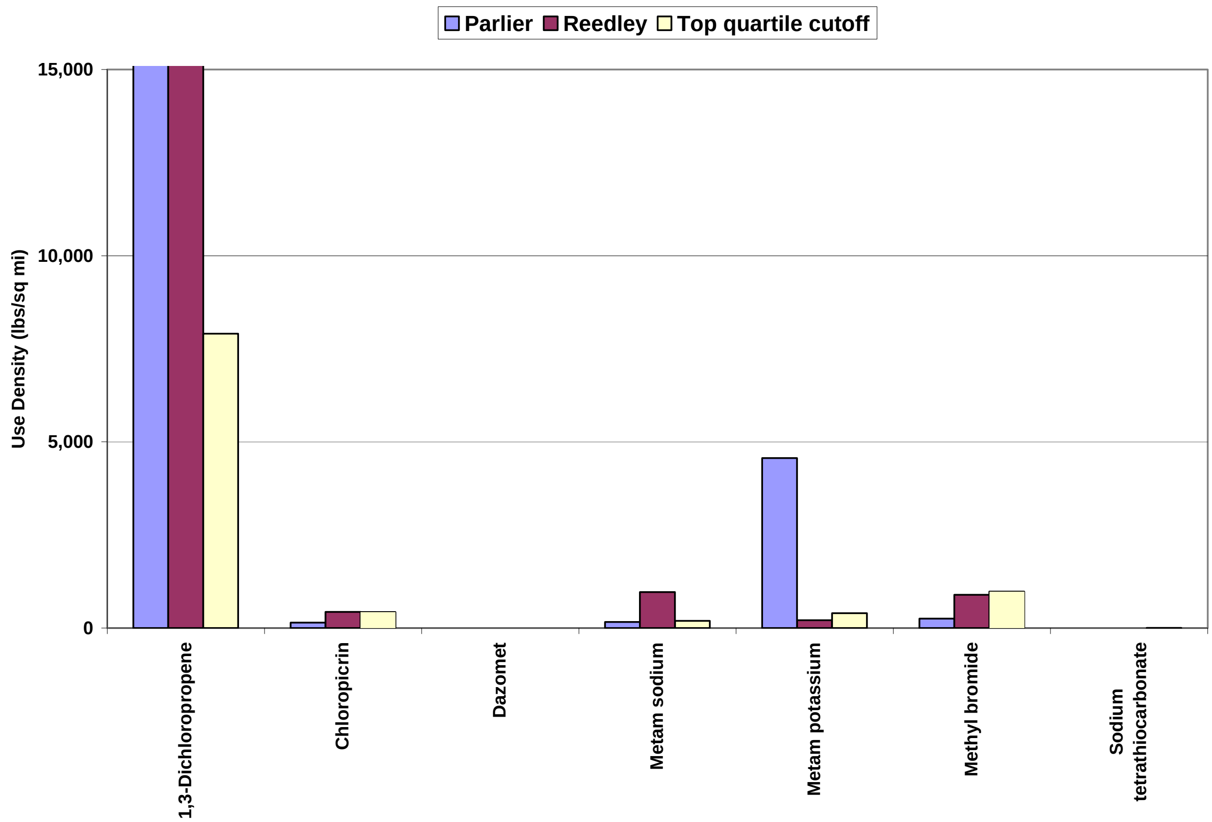


Figure 10. 2006-2008 average use of proposed pesticides for Reedley and Parlier. Use exceeding the top quartile cutoff (yellow bars) is rated 4.



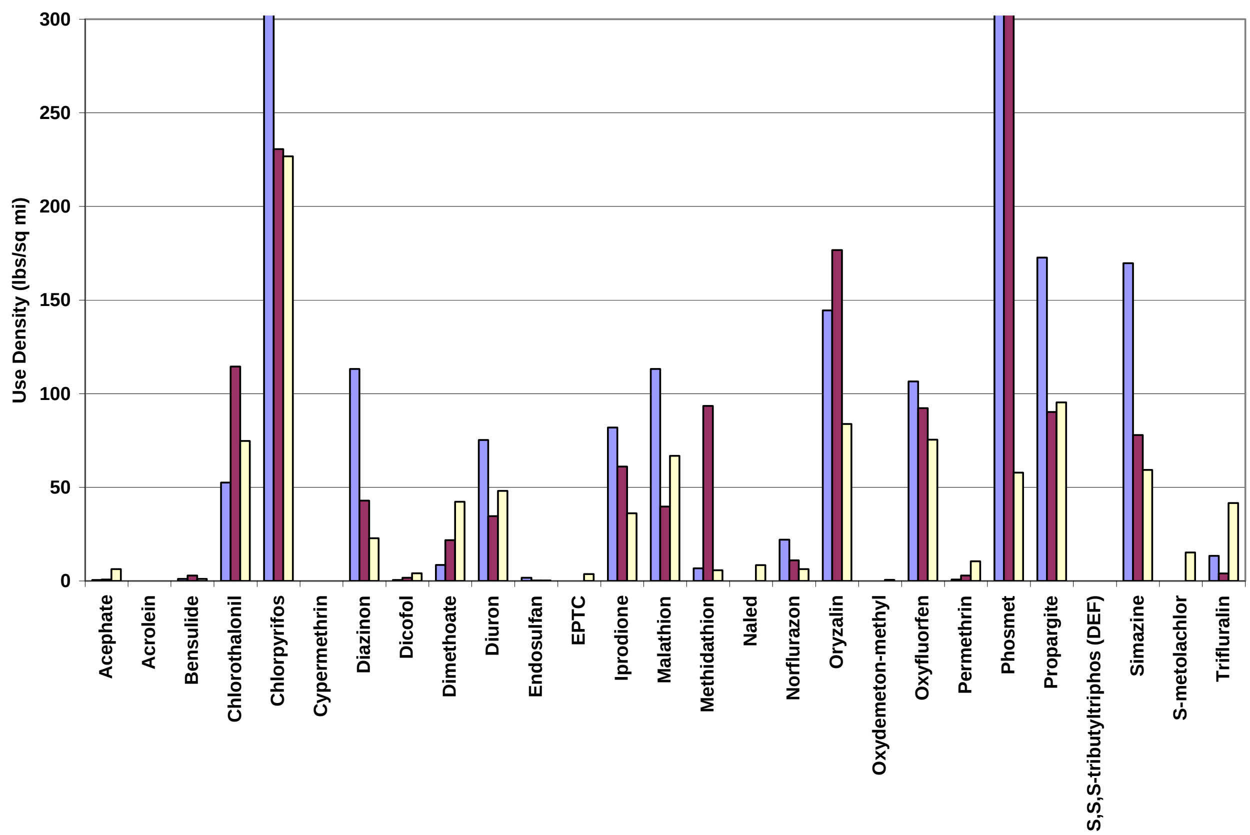
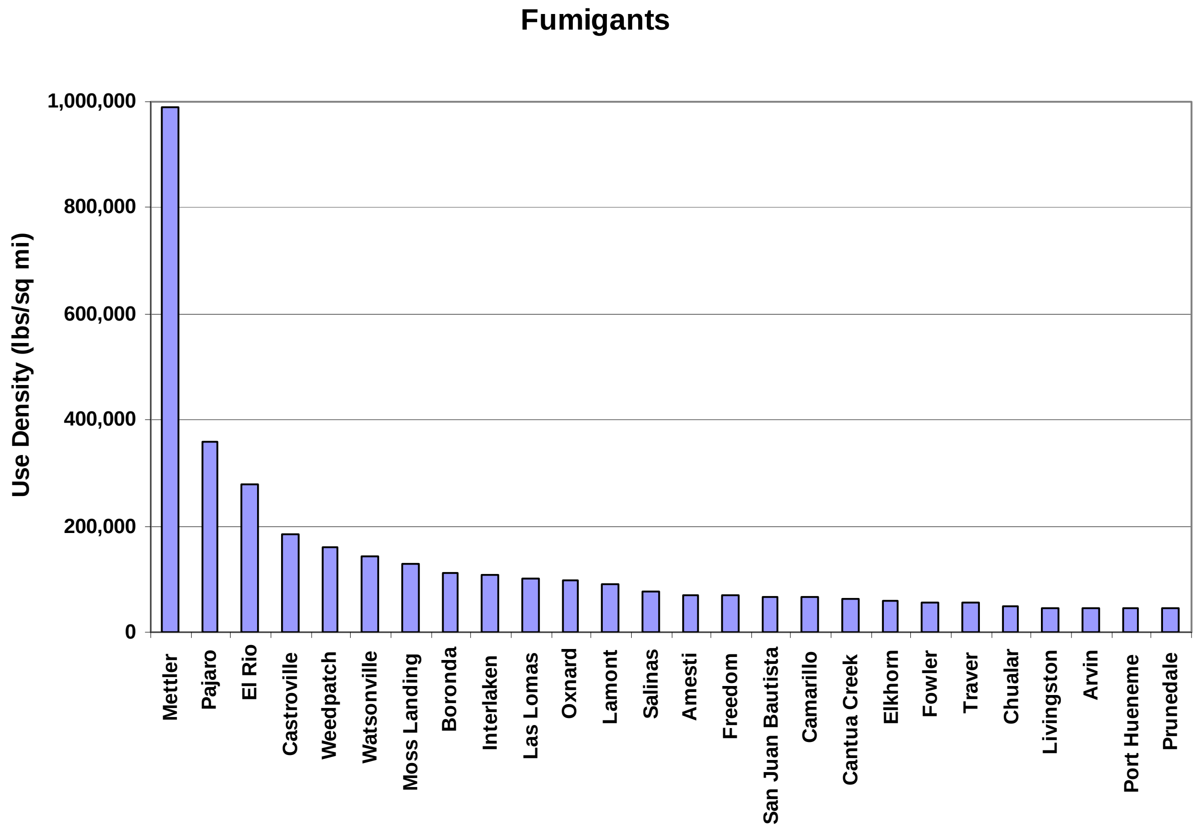
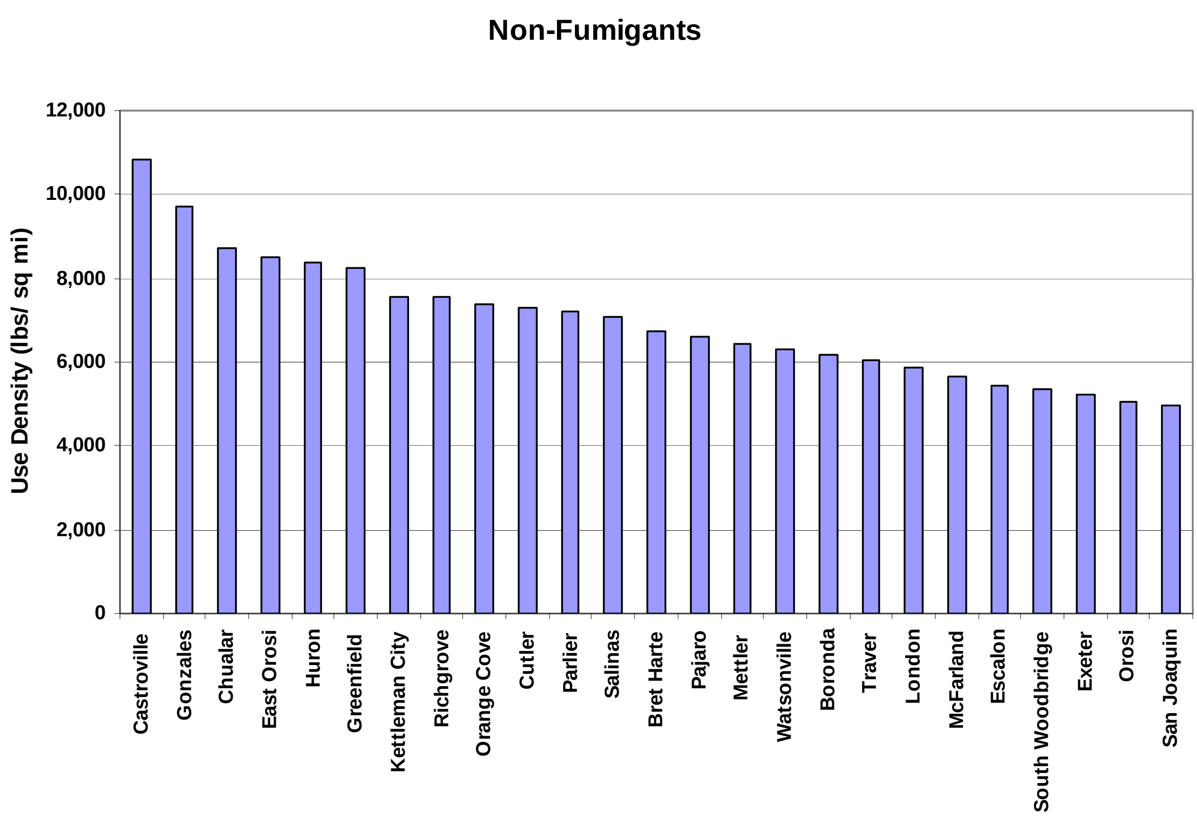


Figure 11. Top communities for 2006-2008 average use density of proposed pesticides.





Mary-Ann Warmerdam
Director

Department of Pesticide Regulation

MEMORANDUM

Arnold Schwarzenegger
Governor

TO: Pamela Wofford
Senior Environmental Scientist
Environmental Monitoring Branch

FROM: Jing Tao, Ph.D.
Environmental Scientist
Environmental Monitoring Branch
916-324-4201

Original signed by

DATE: November 9, 2009

SUBJECT: ANALYSIS OF SAMPLING INTENSITY FOR PROPOSED AIR MONITORING NETWORK BASED ON PESTICIDE MONITORING DATA FROM PARLIER, CALIFORNIA

INTRODUCTION

The Department of Pesticide Regulation (DPR) plans to set up an air monitoring network to regularly monitor multiple pesticides in several communities over the next five or more years. DPR will use the data gathered to evaluate and improve protective measures against pesticide exposure. The monitoring would consist of two to four sites in each community and each site would collect 24-hour samples on a recurring schedule. Several issues arise concerning the frequency of sampling which directly affects the number of samples and the personnel costs and hence, the number of different communities which can be sampled. These concerns include: (a) whether it is necessary to sample in more than one location within each proposed community; (b) whether it is necessary to sample on weekends or particular days of the week; and (c) if sampling can be conducted less than once-per-week. In order to design an efficient and effective monitoring protocol, we analyzed data from a recent DPR monitoring study in Parlier, California.

The Parlier study monitored 31 pesticides and pesticide breakdown products in 3 ambient locations from January 3 to December 26, 2006. Samples were collected for 24 hours three consecutive days a week at each of the three sites. The weekly starting day varied each week. With regard to the proposed air monitoring scheme, we asked the following questions of the Parlier monitoring data:

- Question 1: Were samples from the three Parlier locations different from each other?
- Question 2: Were samples on weekend days different from other days of the week?
- Question 3: Were samples on different days of the week different from each other?
- Question 4: Would sampling every week differ from sampling every other week?

The analysis described in this memorandum provides answers for these questions.

METHODS

Data description

The Parlier study used in this analysis monitored 31 pesticides and pesticide breakdown products based on their: (a) toxicity, (b) vapor pressure (volatility), (c) use, (d) availability of sampling and laboratory methods, and (e) ability to be included in a multiple analysis method. The results showed that 17 chemicals were not detected at a level above the method detection limit ([MDL], the smallest amount of the chemical that can be identified in a sample with the employed method). There nondetected concentrations were referred as "nd." Six chemicals were detected as "trace," which was a level between the MDL and the limit of quantitation ([LOQ], the smallest amount of a chemical that can be measured). Eight chemicals were detected at quantifiable levels. Three pesticides with the highest percentages of concentrations above the MDL were used in this analysis: methyl isothiocyanate (MITC) with 84 percent (%) detect concentrations, Chlorpyrifos with 64%, and Diazinon with 32%.

We adjusted the original dataset in two different ways. The first adjusted dataset contained all of the original concentration values but replaced "nd" with the average MDL and "trace" with the midpoint between MDL and LOQ. The second dataset consisted of only two values: 1 if the original value was quantifiable or "trace" concentrations and 0 if the original value was "nd." This second adjustment helps to determine the probability of detecting chemicals with different sampling frequency instead of the concentration distribution.

The normality was tested on the first dataset with procedure of CAPABILITY by SAS 9.1. This procedure consists of four methods: Kolmogorov-Smirnov, Cramer-von Mises, Anderson-Darling and Chi-Square. Small p-values suggest non-normal distributions.

Question 1: Difference between sampling stations

Air-sampling stations were set up at three elementary schools in Parlier: John C. Martinez (MAR, northwest part of town), S. Ben Benavidez (BEN, central), and Cesar E. Chavez (CHA, southeast). To answer this question, three analyses were conducted:

<u>Method 1: correlation coefficient</u>
The correlation coefficients were calculated on chemical concentrations for three pairs of sampling stations. High correlation would suggest the consistency of sampling in two stations. Otherwise, difference may exist between them.

<u>Method 2: nonparametric statistical method (Kruskal-Wallis Method)</u>
Reference: Hollander, M. & Wolfe, D.A., Nonparametric Statistical Methods, Second Edition (1999), Wiley.

Kruskal-Wallis method is a nonparametric multiple comparison procedure based on pairwise ranking. It was applied to compare the significant difference between three sampling sites for each of three pesticides using Minitab 15. The first dataset was used.

The hypothesis of the procedure:
$H_0 : \tau_1 = \tau_2 = \tau_3$, where τ is the effect of three sampling sites
$H_1 : \tau_1, \tau_2, \tau_3$ not all equal

Kruskal-Wallis Statistic

$$H = \left(\frac{12}{N(N+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} \right) - 3(N+1)$$

Where N is the total number of observations; n_j is the observation number in j sampling site;
$R_j = \sum_{i=1}^{n_j} r_{ij}$, let r_{ij} denote the rank of observation X_{ij} in the joint ranking.

Reject H_0 if $H \geq h_\alpha$, where h_α is chosen to make the type I error probability equal to $\alpha = 0.05$.

<u>Method 3: comparison of proportion of detects</u>
The second dataset were used in the method 3. The proportions of detect values (1) were calculated for each location and compared to answer if chemicals can be detected with the same probability in different location.

Question 2: Difference between weekend and other days of the week

The second dataset was analyzed to answer if different sampling frequency impacts the detection probability. For this question, the data were divided into two categories: weekend (1) and other days of week (0) and summarized in contingency tables (Table 1). The proportion of each cell was calculated and compared for their significant difference.

Statistical tests were also conducted. Since the counts of both weekend and weekday are large (>30), the proportions of positive values for weekend and weekday have approximately normal distribution. Therefore, the difference between them is normal and z value can be calculated as:

$$z = \frac{\hat{p}_0 - \hat{p}_1}{\sqrt{\hat{p}(1-\hat{p})(\frac{1}{n_0} + \frac{1}{n_1})}}$$. For example: in Chlorpyrifos

$\hat{p}_0 = \frac{277}{432} = 0.64$, $\hat{p}_1 = \frac{22}{36} = 0.61$, $\hat{p} = \frac{299}{468} = 0.64$, $n_0 = 432$, $n_1 = 36$

The statistic z is compared with the standard normal distribution table.

Table 1. Counts of detect (1) and nondetect (0) sampled on weekends (1) and other days (0).

Chlopyrifos	Weekend		
Count	0	1	Total
0	155	14	169
1	277	22	299
Total	432	36	468

Diazinon	Weekend		
Count	0	1	Total
0	296	23	319
1	136	13	149
Total	432	36	468

MITC	Weekend		
Count	0	1	Total
0	72	4	76
1	360	32	392
Total	432	36	468

Question 3: Difference between days of the week

For this question, the second dataset was grouped by each sampling start day within a week. Monday was 1, Tuesday 2, . . ., and Sunday 7 (Table 2). No sampling started on Saturday. The proportions of positive values were calculated and compared.

Statistical testing was conducted to address any significant difference of a day from others within a week. Let the observed estimate O_{ij} = count {sample value from jth day fall in ith category (detect or nondetect)}. Then the statistic: $\sum_i \sum_j \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$ has approximately χ^2_{df} distribution. Where E_{ij} is expected count and equal to $\frac{n_{i.} n_{.j}}{n_{..}}$, df = (I-1)(J-1) = 5.

Table 2. Counts of detect (1) and nondetect (0) sampled on each day of the week.

Chlorpyrifos	Day of the week						
Counts	1	2	3	4	5	7	Total
0	32	50	38	24	11	14	169
1	49	70	85	51	22	22	299
Total	81	120	123	75	33	36	468

Diazinon	Day of the week						
Counts	1	2	3	4	5	7	Total
0	52	86	84	52	22	23	319
1	29	34	39	23	11	13	149
Total	81	120	123	75	33	36	468

MITC	Day of the week						
Counts	1	2	3	4	5	7	Total
0	12	22	26	9	3	4	76
1	69	98	97	66	30	32	392
Total	81	120	123	75	33	36	468

Question 4: Difference between sampling every week and every other week

The second dataset was categorized as odd week and even week and the counts of detects and nondetects are listed in Table 3. The proportions of detect values were calculated and compared.

Table 3. Counts of detect (1) and nondetect (0) sampled in odd and even weeks.

Chlorpyrifos	Week		
Counts	even	odd	Total
0	84	85	169
1	150	149	299
Total	234	234	468

Diazinon	Week		
Counts	even	odd	Total
0	163	156	319
1	71	78	149
Total	234	234	468

MITC	Week		
Counts	even	odd	Total
0	38	38	76
1	196	196	392
Total	234	234	468

RESULTS AND DISCUSSION

Data distribution

The result of normality test is shown in Table 4. All the p-Values < 0.01, which indicated that the monitoring data were not normally distributed. In addition, 90% of Chlorpyrifos data, 91% of Diazinon, and 70% of MITC were assigned numbers (“nd” or “trace”) in this test and this feature probably contributed to the nonnormality. Therefore, the statistical methods based on numerical concentrations with assumption of normality can not be directly applied on the measured data in the Parlier study. Correlation coefficients, contingency tables and nonparametric methods were conducted in this work.

Table 4. Normality test on chemical concentrations of three pesticides.

Chlorpyrifos: Goodness-of-Fit Tests for Normal Distribution

Test	Statistic		DF	p-value	
Kolmogorov-Smirnov	D	0.353		Pr > D	<0.010
Cramer-von Mises	W-Sq	9.724		Pr > W-Sq	<0.005
Anderson-Darling	A-Sq	51.490		Pr > A-Sq	<0.005
Chi-Square	Chi-Sq	12035.821	10	Pr > Chi-Sq	<0.001

Diazinon: Goodness-of-Fit Tests for Normal Distribution

Test	Statistic		DF	p-value	
Kolmogorov-Smirnov	D	0.403		Pr > D	<0.010
Cramer-von Mises	W-Sq	23.582		Pr > W-Sq	<0.005
Anderson-Darling	A-Sq	113.975		Pr > A-Sq	<0.005
Chi-Square	Chi-Sq	1945.073	10	Pr > Chi-Sq	<0.001

MITC: Goodness-of-Fit Tests for Normal Distribution

Test	Statistic		DF	p-value	
Kolmogorov-Smirnov	D	0.441		Pr > D	<0.010
Cramer-von Mises	W-Sq	31.015		Pr > W-Sq	<0.005
Anderson-Darling	A-Sq	147.105		Pr > A-Sq	<0.005
Chi-Square	Chi-Sq	128.737	10	Pr > Chi-Sq	<0.001

Question 1: Difference between sampling stations

<u>Result 1: correlation coefficient</u>

The correlation coefficients were calculated for daily measurement, weekly average, and monthly average data (Table 5). The data from different sites were highly related with each other for pesticide Chlorpyrifos, and moderately for Diazinon. The weekly and monthly average concentrations showed increased correlation between three sites for these two pesticides. This indicated that different sampling sites followed the similar pattern on weekly, and monthly exposure, which may related with the chronicle pattern of pesticide use.

Table 5. Correlation between pesticide concentrations of three sampling stations: Benavidez (BEN), Chavez (CHA) and Martinez (MAR).

Daily data

Correlation Coefficient	Pesticide		
	Chlorpyrifos	*Diazinon*	*MITC*
BEN v.s. CHA	0.76	0.50	0.49
BEN v.s. MAR	0.80	0.63	0.75
CHA v.s. MAR	0.75	0.77	0.79

Weekly average

Correlation Coefficient	Pesticide		
	Chlorpyrifos	*Diazinon*	*MITC*
BEN v.s. CHA	0.82	0.52	0.47
BEN v.s. MAR	0.91	0.81	0.70
CHA v.s. MAR	0.83	0.79	0.88

Monthly average

Correlation Coefficient	Pesticide		
	Chlorpyrifos	*Diazinon*	*MITC*
BEN v.s. CHA	0.95	0.67	0.18
BEN v.s. MAR	0.96	0.87	0.51
CHA v.s. MAR	0.94	0.88	0.84

The coefficient between BEN and CHA was 0.49 in MITC daily data and dropped to 0.18 for MITC monthly average data. The decreasing coefficient was also found between BEN and MAR for MITC in daily versus monthly correlation. This result came from an extreme MITC concentration of 5012.4 mg/L sampled at BEN in May. This value was seven times that of the second highest concentration of MITC (723.6 mg/L at BEN in May) and nine times the third (548.48 mg/L at MAR in May). Consequently, the average concentration of May was 391.48 in BEN, much higher than 26.36 in CHA and 48.81 in MAR. Since other monthly averages tracked more closely to each other, large magnitude differences in one month caused the statistically weak correlation. Excluding May, the correlation coefficient was 0.89 between BEN and CHA, 0.97 BEN and Mar, and 0.89 CHA and MAR for monthly data. Therefore, aside from this single extreme concentration, three sampling sites showed reasonably high correlation to each other.

<u>Result 2: nonparametric method</u>
Nonparametric method does not require the traditional assumption that the underlying population of the data is normal. Median, instead of mean, is used as statistical estimate and to compare different treatment group/effect. Therefore, it is applicable in Parlier study since the data showed non-normal distribution.

The result of Kruskal-Wallis method is shown in Table 6. The large p-values indicated that no significant difference between sampling locations according to nonparametric method.

Table 6. Result of nonparametric Kruskal-Wallis test for comparison of three sampling stations.

Pesticides	Statistic	
	H	p-value
Chlorpyrifos	0.22	0.90
Diazinon	0.04	0.98
MITC	1.15	0.56

<u>Result 3: comparison of proportion of detects</u>
Table 7 lists the proportion of detect values of three pesticides. The result shows that three locations had the same probability to positively detect samples with close proportions of positive values.

Table 7. Proportions of detects in three sampling stations.

Sampling Stations	Proportion		
	Chlorpyrifos	*Diazinon*	*MITC*
Martinez	0.66	0.33	0.84
Benavidez	0.62	0.32	0.85
Chavez	0.64	0.31	0.82
Average	0.64	0.32	0.84

Question 2: Difference between weekend and other days of the week.

The proportions of positive values were close to each other for weekend and weekday (Table 8). The results of statistic z were also listed in the table. The absolute values of z were very small compared to 1.65 at $\alpha = 0.10$ and suggested no statistically significant difference.

Table 8. Statistical analysis on proportions of detect (1) and nondetect (0) sampled on weekends (1) and other days of the week (0).

Chlorpyrifos	Weekend		$\hat{p}$	z
Proportion	0	1		
0	0.36	0.39	0.36	-0.36
1	0.64	0.61	0.64	0.36
Total	1.00	1.00		

Diazinon	Weekend		$\hat{p}$	z
Proportion	0	1		
0	0.69	0.64	0.68	0.57
1	0.31	0.36	0.32	-0.57
Total	1.00	1.00		

MITC	Weekend		$\hat{p}$	z
Proportion	0	1		
0	0.17	0.11	0.16	0.87
1	0.83	0.89	0.84	-0.87
Total	1.00	1.00		

Question 3: Difference between days of the week

For three pesticides, proportions of positive values are listed and they are close over a week (Table 9). The statistical test estimates χ^2 are 4.24 for Chlorpyrifos, 1.65 for Diazinon, and 5.60 for MITC. These values are very small compared to 9.24 at $\alpha = 0.10$ and indicate no significant difference between each day within a week.

Table 9. Proportions of detects sampled on different days of the week.

Proportion	Pesticide		
Day of the week	*Chlorpyrifos*	*Diazinon*	*MITC*
Mon	0.60	0.36	0.85
Tue	0.58	0.28	0.82
Wed	0.69	0.32	0.79
Thr	0.68	0.31	0.88
Fri	0.67	0.33	0.91
Sun	0.61	0.36	0.89
Average	0.64	0.32	0.84

Question 4: Difference between sampling every week and every other week

Table 10 shows that the detect values appeared with the same proportion in the even weeks and odd weeks. Therefore, there was no difference between sampling in even and odd weeks, and also between sampling every week and every other week.

Table 10. Proportions of detects sampled in odd and even weeks.

Proportion	Pesticide		
Week	*Chlorpyrifos*	*Diazinon*	*MITC*
Odd	0.64	0.30	0.84
Even	0.64	0.33	0.84
Average	0.64	0.32	0.84

CONCLUSION

The monitoring data of three pesticides in the Parlier study were analyzed to suggest an appropriate sampling set-up for the air monitoring network. According to the statistical analysis result, different days of week had the same probability to obtain samples with detectable concentrations. Sampling every other week was enough to detect the same proportion of positive values with sampling every week. Although one of the nine possible pairwise correlations between three sites showed fair relationship, further analysis and nonparametric method showed that samples from three sites were not significantly different with each other. They were also consistent in the probability to sample positive values.

TO: Randy Segawa
Environmental Program Manager I
Environmental Monitoring Branch

FROM: Bruce Johnson, Ph.D.
Research Scientist III
Environmental Monitoring Branch
916-324-4106

Original signed by

DATE: July 29, 2009

SUBJECT: SUMMARY OF METEOROLOGICAL DATA FROM SELECTED REGIONS

In prioritizing possible communities for long term air monitoring for pesticides, selection priority will probably be given to those communities which might expect for various reasons to experience higher pesticide air concentrations. All other factors being equal, one component which determines air concentrations is meteorology. Generally, persistent wind directions and lower wind speeds lead to higher downwind air concentrations from pesticide applications. Stability conditions also play a role, though the role is more complex than wind persistence. In part, stability conditions are based on wind speed. As a contribution to the ongoing prioritization process, you requested that I provide estimates similar to those in the Department of Pesticide Regulation's Environmental Justice Project (2005, Figures 2 and 3) which describe wind speeds and wind directions for selected regions: specifically, San Joaquin Valley (SJV), North Central Coast (NCC), Salton Sea (SS), Sacramento Valley (SV) and Ventura County (VENT).

Methods

The California Irrigation Management Information System (CIMIS) Web site provides hourly meteorological data from some 210 stations located in agricultural areas of California. The CIMIS Web site provides station information, including latitude and longitude. Using geospatial analysis the latitude and longitude information was used to classify the stations into their respective air basins (Rosemary Neal, personal communication). I downloaded multiple years of data from 37 stations. Stations were located in selected California regions (Figure 1). Downloaded data included station number, date, hour, solar radiation (ly/day), net radiation (ly/day), air temperature (^{o}F), wind speed (MPH), wind direction (0-360^{o}), standard deviation of wind direction (0-360^{o}), precipitation (in).

The total years of downloaded hourly meteorological data was 351 (Table 1). This included 40 years from Mojave Desert, which was not included in the final summary. The selection of years and stations was not a complete set of what was available from CIMIS for each region. The initial downloads were restricted to active stations which had 10 years of data from 1999 to 2008. However, it was necessary in VENT to include smaller year ranges and inactive stations in order to acquire sufficient data. The downloaded data consisted of NCC 70 years, SJV 124 years, SS 40 years, SV 50 years and VENT 27 years. All downloaded data files started with January 1 and ended on December 31. The downloaded files begin with a three-digit station code used in Figure 1 and on the CIMIS Web site.

CIMIS data downloaded as 'CSV' is generally both fixed format and comma separated. CIMIS provides quality control characters which characterize the validity of the data in each field. When data is missing, the affected field is shortened and '—' (double dash) is inserted. In order to create strictly fixed format files, I wrote a FORTRAN program which located instances of missing values and expanded the affected fields out to the full field size (PADDER2.FOR, Appendix 1). An earlier attempt to obtain fixed formatting by using Excel to save these files as "PRN" files failed because: (1) the fixed formatting varied from one file to another and (2) Excel evidently analyzes the first few hundred lines to determine a formatting and this led to problems in the second half of the data where dates consisted of two digit months and two digit days and Excel had not left enough room. The advantage to fixed formatting is that the file can be more readily utilized by a variety of future programs.

After processing the files to produce fixed format, I wrote a FORTRAN program (AIRCONCIM3.FOR, Appendix 2) to process each file to summarize the following information: (1) count of wind speeds in 1 m/s increments up to 7 m/s with the final bin being 7+ m/s and (2) count of wind directions in 45^{o} sectors with 337.5 to 360 and 0 to 22.5 being the "North" bin (N), 22.5 to 67.5 being the "Northeast" bin (NE), and so on around the circle finishing with 292.5 to 337.5 being the "Northwest" bin (NW). This program did not utilize any data where the QC indicated anything other than valid data. In the CIMIS data sets valid data is indicated by an asterisk symbol. AIRCONCIM3.FOR output summary data for each file into a fixed format file for subsequent analysis.

The summary file revealed that Station #5 (Shafter, Kern County, and SJV) did not measure wind direction. Thus the SJV wind direction data is based on 114 years, while the wind speed data for SJV is based on 124 years.

The fraction of usable hours for each file for each of wind speed and wind direction parameters was determined. Based on usable hours, for each file the fraction of hourly wind speeds in each bin was determined. For each region the average bin fraction was determined over the files belonging in that region. For usable wind direction data, the maximum fraction of wind direction for each file was determined and the average of these maximum fractions was determined for each region. Averages were determined using each file as the unit. Differences in size of data files were ignored. The resulting file summaries were analyzed using both Excel pivot tables and BMDP (BMDP1D 1993).

Results

A large percentage of the speed data was usable. The fraction of usable speed hours averaged 98.6 percent (%). The lowest fraction was VENT with 97.7% usable speed hours. At the lowest speed category, VENT exhibited the highest fraction with 25% of the measured wind speeds at less than 1 m/s (Figure 2). The next highest was SV with 22%. In the next category from 1 to 2 m/s, SS Sea was highest at 43% with SJV second at 39%. It is difficult to quantify the impact of more low wind speed hours at 0 to 1 m/s and 1 to 2 m/s. In modeling terms, wind speeds can affect the concentration both as the denominator in the Gaussian plume equation and as a determinant of the stability category. As a denominator, lower wind speeds produce higher concentrations. With regard to stability class determinations, however, the effect of wind speeds varies between night and day. During daytime with strong solar insolation, lower wind speeds lead to more vertical atmospheric instability, which leads to lower downwind air concentrations (U.S. EPA 2000, Table 6-3 Key to the Pasquill Stability Categories). Conversely, at night, lower wind speed lead to more stable conditions with higher associated concentrations.

The fraction of usable direction hours exceeded 99% for all basins. The highest directional fraction occurred with VENT with 32% of the directions in the same 45^{o} sector (Figure 3). The next highest was SJV with 30%. The small magnitude of the difference suggests that wind direction persistence will not lead to great differences between the basins.

Conclusion

The differences between regions in terms of low wind speeds and persistence of wind direction based on a total of 311 years of hourly wind speed and direction data from the CIMIS air monitoring network yield inconclusive results for assessing likely impact on long term air pesticide concentrations.

Acknowledgment
Thanks to Rosemary Neal for help with assigning the CIMIS station to regions and for generating Figure 1.

References

Department of Pesticide Regulation. 2005. Environmental Justice Pilot Project Objectives, Pesticides, and Community. June 2005. <http://www.cdpr.ca.gov/docs/envjust/pilot_proj/ej_candidate_discussion_final.pdf>.

BMDP1D–Simple Data Description. Release 8. 1993. Statistical Solutions Ltd., 8 South Bank, Crosse's Green, Cork, Ireland.

U.S. EPA. 2000. Meteorological monitoring guidance for regulatory modeling applications. U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711 EPA-454/R-99-005 February 2000.

Table 1. Data inventory downloaded from CIMIS. Region acronyms are SJV=San Joaquin Valley, SV=Sacramento Valley, NCC=North Central Coast, SS=Salton Sea, MD= Mojave Desert (not analyzed), VENT=Ventura County

Filename	County	Station Number	Region	Start Year	End Year	Number of Years
002ciF19992003.csv	Fresno	002	SJV	1999	2003	5
002ciF20042008.csv	Fresno	002	SJV	2004	2008	5
005ciF19992003.csv	Kern	005	SJV	1999	2003	5
005ciF20042008.csv	Kern	005	SJV	2004	2008	5
006ciF19992003.csv	Yolo	006	SV	1999	2003	5
006ciF20042008.csv	Yolo	006	SV	2004	2008	5
007ciF19992003.csv	Fresno	007	SJV	1999	2003	5
007ciF20042008.csv	Fresno	007	SJV	2004	2008	5
008ciF19992003.csv	Tehama	008	SV	1999	2003	5
008ciF20042008.csv	Tehama	008	SV	2004	2008	5
012ciF19992003.csv	Butte	012	SV	1999	2003	5
012ciF20042008.csv	Butte	012	SV	2004	2008	5
019ciF19992003.csv	Monterey	019	NCC	1999	2003	5
019ciF20042008.csv	Monterey	019	NCC	2004	2008	5
032ciF19992003.csv	Colusa	032	SV	1999	2003	5
032ciF20042008.csv	Colusa	032	SV	2004	2008	5
039ciF19992003.csv	Fresno	039	SJV	1999	2003	5
039ciF20042008.csv	Fresno	039	SJV	2004	2008	5
041ciF19992003.csv	Imperial	041	SS	1999	2003	5
041ciF20042008.csv	Imperial	041	SS	2004	2008	5
054ciF19992003.csv	Kern	054	SJV	1999	2003	5
054ciF20042008.csv	Kern	054	SJV	2004	2008	5
068ciF19992003.csv	Imperial	068	SS	1999	2003	5
068ciF20042008.csv	Imperial	068	SS	2004	2008	5
070ciF19992003.csv	San Joaquin	070	SJV	1999	2003	5
070ciF20042008.csv	San Joaquin	070	SJV	2004	2008	5
071ciF19992003.csv	Stanislaus	071	SJV	1999	2003	5
071ciF20042008.csv	Stanislaus	071	SJV	2004	2008	5
080ciF19992003.csv	Fresno	080	SJV	1999	2003	5
080ciF20042008.csv	Fresno	080	SJV	2004	2008	5
087ciF19992003.csv	Imperial	087	SS	1999	2003	5
087ciF20042008.csv	Imperial	087	SS	2004	2008	5

Table 1. Continued

089ciF19992003.csv	Monterey	089	NCC	1999	2003	5
089ciF20042008.csv	Monterey	089	NCC	2004	2008	5
111ciF19992003.csv	Santa Cruz	111	NCC	1999	2003	5
111ciF20042008.csv	Santa Cruz	111	NCC	2004	2008	5
114ciF19992003.csv	Monterey	114	NCC	1999	2003	5
114ciF20042008.csv	Monterey	114	NCC	2004	2008	5
116ciF19992003.csv	Monterey	116	NCC	1999	2003	5
116ciF20042008.csv	Monterey	116	NCC	2004	2008	5
117ciF19992003.csv	San Bernardino	117	MD	1999	2003	5
117ciF20042008.csv	San Bernardino	117	MD	2004	2008	5
125ciF19992003.csv	Kern	125	SJV	1999	2003	5
125ciF20042008.csv	Kern	125	SJV	2004	2008	5
127ciF19992003.csv	Imperial	127	SS	1999	2003	5
127ciF20042008.csv	Imperial	127	SS	2004	2008	5
129ciF19992003.csv	Monterey	129	NCC	1999	2003	5
129ciF20042008.csv	Monterey	129	NCC	2004	2008	5
134ciF19992003.csv	San Bernardino	134	MD	1999	2003	5
134ciF20042008.csv	San Bernardino	134	MD	2004	2008	5
135ciF19992003.csv	Riverside	135	MD	1999	2003	5
135ciF20042008.csv	Riverside	135	MD	2004	2008	5
139ciF19992003.csv	Solano	139	SV	1999	2003	5
139ciF20042008.csv	Solano	139	SV	2004	2008	5
143ciF19992003.csv	San Benito	143	NCC	1999	2003	5
143ciF20042008.csv	San Benito	143	NCC	2004	2008	5
145ciF19992003.csv	Madera	145	SJV	1999	2003	5
145ciF20042008.csv	Madera	145	SJV	2004	2008	5
148ciF19992003.csv	Merced	148	SJV	1999	2003	5
148ciF20042008.csv	Merced	148	SJV	2004	2008	5
151ciF19992003.csv	Riverside	151	MD	1999	2003	5
151ciF20042008.csv	Riverside	151	MD	2004	2008	5
161ciF20002003.csv	Stanislaus	161	SJV	2000	2003	4
161ciF20042008.csv	Stanislaus	161	SJV	2004	2008	5
182ciF20042008.csv	Tulare	182	SJV	2004	2008	5
101ciF19962000.csv	Ventura	101	VENT	1996	2000	5
101ciF20012004.csv	Ventura	101	VENT	2001	2004	4
152ciF20012005.csv	Ventura	152	VENT	2001	2005	5
152ciF20062008.csv	Ventura	152	VENT	2006	2008	3
156ciF20022006.csv	Ventura	156	VENT	2002	2006	5
156ciF20072008.csv	Ventura	156	VENT	2007	2008	2
198ciF20062008.csv	Ventura	198	VENT	2006	2008	3

Figure 1. Geographic Locations of CIMIS Stations

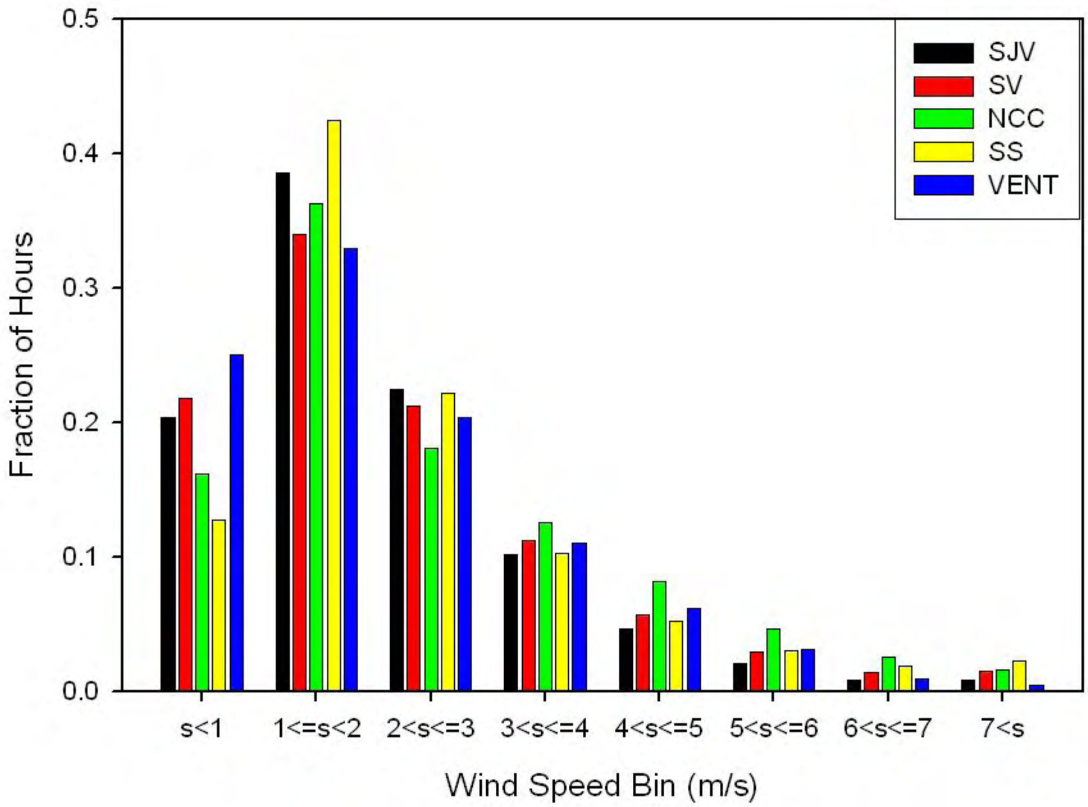


Figure 2. Distribution of wind speeds amongst selected regions.

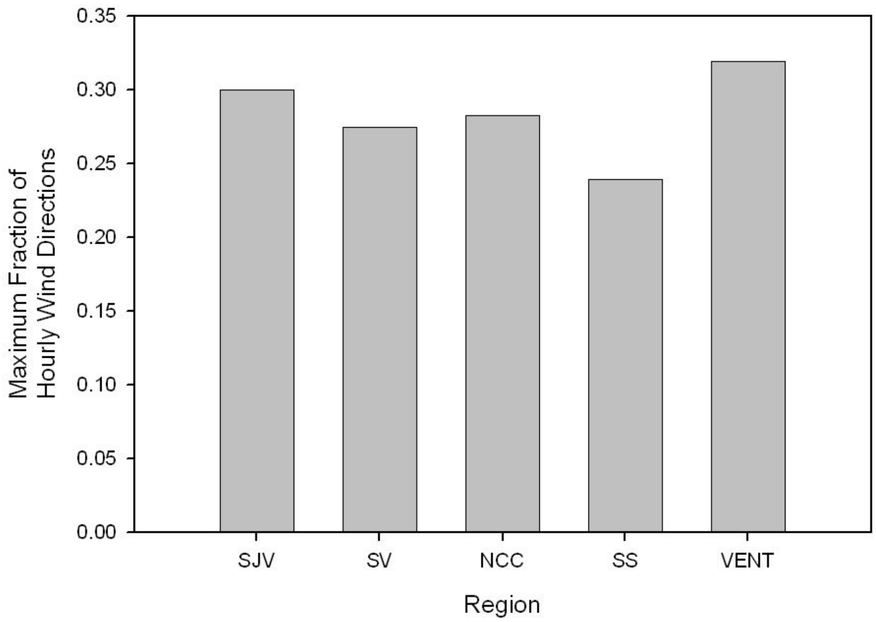


Figure 3. Average maximum fraction wind direction.

Appendix 1. Listing of PADDER2.FOR

```
C     Last change:  BJ    5 Jun 2009    3:48 pm
      PROGRAM PADDER2
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C090605LATER, VERSION 2 WILL USE A LIST OF FILES TO PROCESS
C THE FILENAMES ARE ..\NNNCIMY1Y1Y2Y2.CSV
C THE OUTPUT FILENAMES WILL BE NNNCIFY1Y1Y2Y2.CSV, WHERE THE M IS CHANGED TO F
C TO DENOTE THAT THE FILE HAS BEEN REFORMATTED AS A FIXED FORMAT FILE (IN OTHER WORDS
C THE PROBLEM WITH ANY "--"S HAS BEEN TAKEN CARE OF.
C
C 090605 I TESTED THIS PROGRAM USING TEST.IN WHICH CONTAINED SEVERAL
C LINES WITH MULTPLE INSTANCES OF -- AND IT RAN OK
C THIS PROGRAM OR PROBABLY EVENTUALLY SUBROUTINE IS TO
C TAKE THE CSV FILES FROM CIMIS AND LOOK FOR INSTANCES
C OF --.  THEN ON THOSE LINES WHERE -- OCCURS, TO PADD OUT
C THE FIELD SO THAT THE COMMAS WILL LINE UP AND THE FORMAT
C WILL BE FIXED.  UNFORTUNATELY THE NEW CIMIS FORMAT USES
C -- TO INDICATE MISSING VALUES AND THE FORMAT THEN CHANGES
C I NEED FIXED FORMAT, EVEN WITH THE COMMAS IN ORDER TO MORE
C EASILIY DO THE STUFF I NEED TO DO.
C
C THE KEY ELEMENTS TO THIS ARE THE SIZE OF EACH OF THE FIELDS
C WHEN THERE IS NO -- AND THE USE OF THE INTRINSIC INDEX FUNCTION
C WHICH LOOKS FOR THE FIRST INSTANCE OF A SUBSTRING WITHIN
C A STRING
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C HERE IS AN EXTRACT OF A DELICIOUS SITUATION WITH MORE THAN ONE INSTANCE OF --
C1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C0002,02/11/1999,0500,042,*,   -7,*,  -47,*,   32.6,*,    2.3,*,  105.7,*,   31.5,*,    0.00
C0002,02/11/1999,0600,042,*,   -4,*,  -46,*,   32.2,*,    3.0,*,  199.7,*,   58.9,*,    0.00
C0002,02/11/1999,0700,042,*,   -3,*,--,M,--,*,    4.3,*,  176.8,*,   34.0,*,    0.00
C0002,02/11/1999,0800,042,M,--,M,--,M,--,*,    4.5,*,  155.6,*,   58.7,*,    0.00
C0002,02/11/1999,0900,042,M,--,M,--,M,--,*,    5.7,*,  125.9,*,   60.0,*,    0.00
C0002,02/11/1999,1000,042,S,--,Q,--,S,--,*,    4.9,*,  114.0,*,   58.7,Q,    0.00
C 1:4 STATION NUMBER              41:41 COMMA             73:73 COMMA
C 5:5 COMMA                      42:42 AIRTEMP QC        74:80 STDEV WIND DIR
C 6:15  DATE                     43:43 COMMA             81:81 COMMA
C16:16 COMMA                     44:50 AIRTEMP           82:82 QC PRECIP
C17:20  HOUR                     51:51 COMMA             83:83 COMMA
C21:21  COMMA                    52:52 WIND SPEED QC     84:91 PRECIP
C22:24  JULIAN DAY               53:53 COMMA
C25:25  COMMA                    54:60 WINDSPEED
C26:26  SOLRAD QC CODE           61:61 COMMA
C27:27  COMMA                    62:62 WINDDIR QC CODE
C28:32  SOLRAD                   63:63 COMMA
C33:33 COMMA                     64:70 WINDDIR
C34:34 NETRAD QC CODE            71:71 COMMA
C35:35  COMMA                    72:72 STDEV WINDDIR QC
C36:40  NETRAD
C
C SIZE OF THE DATA FIELDS
C SOLRAD  5         WINDSPEED 7       PRECIP 8  (2 DECIMAL PLACES)
C NETRAD  5         WINDDIR   7
C AIRTEMP 7         STDEV     7
C
C START WITH GAME PLAN AS FOLLOWS:
C FOR EACH RECORD, CHECK POSITION OF COMMAS
```

```
C IF THERE IS A COMMA IN THE WRONG POSITION, THEN LOOK FOR --
C IF DON'T FIND --, THEN STOP ERROR
C IF FIND --, THEN PAD OUT THAT FIELD AND START PROCESS FROM RIGHT HAND SIDE OF THAT FIELD FOR
C REST OF STRING, AS CAN BE SEEN ABOVE, THERE WILL BE MULTIPLE INSTANCES OF -- IN SAME RECORD
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      IMPLICIT NONE
      CHARACTER*120 LINE
      CHARACTER*200 POSTLINE
      INTEGER L1,L2,P,NB,FLDLEN(7)
      INTEGER FLDNUM
      INTEGER GETFLD
      INTEGER ADDBL,N,KN
      INTEGER FLDSTART(7) !FIELD COMMA STARTING POSITIONS IN PROPERLY FORMATTED LINE
      DATA FLDSTART/27,35,43,53,63,73,83/
      INTEGER COUNT
      INTEGER LASTFIELD  !THIS KEEP TRACK OF THE LAST FIELD THAT GOT ADJUSTED
      DATA FLDLEN/5,5,7,7,7,7,8/  !FIELD LENGTHS
      CHARACTER*40 FIN,FOUT
      INTEGER BIGLEN

      OPEN(UNIT=10,STATUS='OLD',FILE='FILELIST.DAT') !CONTAINS LIST OF FILES TO PROCESS
888     CONTINUE  !START OF OPENING NEXT FILE TO PROCESS
       READ(10,890,END=99999)FIN
890      FORMAT(A40)
       BIGLEN=LEN_TRIM(FIN)
       !FORMAT SHOULD BE ..\NNNCIMY1Y1Y2Y2.CSV
       FOUT(1:BIGLEN-3)=FIN(4:BIGLEN)  !STRIP OFF PARENT DIRECTORY DESIGNATOR
       FOUT(6:6)='F'  !CHANGE M TO F
       OPEN(UNIT=1,STATUS='OLD',FILE=FIN)
       OPEN(UNIT=2,STATUS='UNKNOWN',FILE=FOUT)
      COUNT=0

1      CONTINUE
       LASTFIELD=0  !SET THIS TO ZERO WHEN STARTING NEW LINE
       READ(1,100,END=1000)LINE
100      FORMAT(A120)
       COUNT=COUNT+1
2       L1=LEN_TRIM(LINE)
       IF(LASTFIELD.EQ.0)THEN
C          P=INDEX(LINE,'--')
         N=1
       ELSE
C          P=INDEX(LINE(FLDSTART(LASTFIELD):L1),'--') !START SEARCH AFTER PREVIOUS INSTANCE OF -- BECAUSE THAT
ONE IS ALREADY TAKEN CARE OF
         N=FLDSTART(LASTFIELD+1)
       ENDIF
       KN=MAX(1,N)
       P=INDEX(LINE(KN:L1),'--')
       IF(P.GT.0)THEN  !WE HAVE A HIT, PROCESS THE LINE
         P=P+KN
         !FLDNUM=GETFLD(P) !FLDNUM IS NUMBER OF FIELD THAT CONTAINS --
         FLDNUM=GETFLD(P+1) !FLDNUM IS NUMBER OF FIELD THAT CONTAINS -- ,MUST ADD 1 BECAUSE START LOOKING
AT COMMA
         ADDBL=FLDLEN(FLDNUM)-2  !NUMBER OF BLANKS TO PREPAD TO FIELD
         CALL SUBPAD(LINE,L1,P-2,ADDBL,POSTLINE,L2) !INSERT THE BLANKS
C          WRITE(6,999)L1,P,KN,FLDNUM,FLDLEN(FLDNUM),LINE(1:91),
C     1                 ADDBL,POSTLINE,L2
C999       FORMAT(1X,5I10,/1X,A91/1X,I4,/1X,A91,/1X,I4)
         IF (L2.GT.120) THEN
          WRITE(6,120)L2
```

```
120       FORMAT(1X,I4,'L2 TOO LARGE > 120 ')
         STOP
        ENDIF

        L1=L2
        LINE(1:L2)=POSTLINE(1:L2)
        LASTFIELD=FLDNUM
        GOTO2  !CHECK FOR ANOTHER INSTANCE OF --
       ENDIF
       !LINE SHOULD NOW BE PROPERLY FORMATTED, CHECK THE LAST COMMA TO BE SURE
       IF(LINE(83:83).NE.',')THEN
        WRITE(6,200)LINE(1:90)
200      FORMAT(1X,A90)
        WRITE(6,201)
201      FORMAT(1X,'LAST COMMA IN WRONG POSITION')
        STOP
       ENDIF
       WRITE(2,300)LINE(1:91)
300     FORMAT(A91)
       GOTO1
1000   CONTINUE
      WRITE(6,1100)COUNT,FIN(1:21)
1100   FORMAT(1X,I5,' LINES PROCESSED IN FILE ',A21,'...')
      CLOSE(1)
      CLOSE(2)
      GOTO888
99999   CLOSE(10)
      STOP
      END PROGRAM
      INTEGER FUNCTION GETFLD(K)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C DETERMINES WHICH FIELD THE -- APPEARS, K IS THE
C FIRST POSITION IN LINE OF THE --
C
C 1:4 STATION NUMBER          41:41 COMMA          73:73 COMMA
C 5:5 COMMA                   42:42 AIRTEMP QC     74:80 STDEV WIND DIR
C 6:15  DATE                  43:43 COMMA          81:81 COMMA
C16:16 COMMA                  44:50 AIRTEMP        82:82 QC PRECIP
C17:20  HOUR                  51:51 COMMA          83:83 COMMA
C21:21  COMMA                 52:52 WIND SPEED QC  84:91 PRECIP
C22:24  JULIAN DAY            53:53 COMMA
C25:25  COMMA                 54:60 WINDSPEED
C26:26  SOLRAD QC CODE        61:61 COMMA
C27:27  COMMA                 62:62 WINDDIR QC CODE
C28:32  SOLRAD                63:63 COMMA
C33:33 COMMA                  64:70 WINDDIR
C34:34 NETRAD QC CODE         71:71 COMMA
C35:35  COMMA                 72:72 STDEV WINDDIR QC
C36:40  NETRAD
C
C SIZE OF THE DATA FIELDS
C SOLRAD  5      WINDSPEED 7      PRECIP 8  (2 DECIMAL PLACES)
C NETRAD  5      WINDDIR   7
C AIRTEMP 7      STDEV     7
C
      IMPLICIT NONE
      INTEGER FDEFS(2,7)
      DATA FDEFS/28,32,36,40,44,50,56,60,64,70,74,80,84,91/ !START AND END POINTS OF NUMERICAL FIELDS
      INTEGER K,I
      IF(K.LT.28)THEN
```

```
        WRITE(6,100)
100       FORMAT(1X,'ERROR GETFLD, "--" APPEARS BEFORE FIRST FIELD')
        STOP
       ELSEIF (K.GT.91)THEN
        WRITE(6,200)
200       FORMAT(1X,'ERROR GETFLD, "--" APPEARS AFTER LAST FIELD')
        STOP
       ENDIF
       DO I=1,7
        IF(K.GE.FDEFS(1,I).AND.K.LE.FDEFS(2,I))THEN
         GETFLD=I
        ENDIF
       END DO
       RETURN
       END
       SUBROUTINE SUBPAD(LINE,L1,P,NB,POSTLINE,L2)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C 090605 I TESTED THIS SUBROUTINE IN PROGRAM TSUBPAD.FOR
C THIS SUBROUTINE INSERTBS NB BLANKS INTO 'LINE' AT STARTING AT POSIITON P+1
C L1 IS THE INPUT LENGTH OF LINE (LEN_TRIM SENSE)
C
CTHIS SUBROUTINE IS DEPENDING HEAVILY ON THE ACCURACY OF L1, THE LENGTH OF LINE
CTHIS SUBROUTINE INSERTS NB BLANKS INTO
CLINE STARTING AT POSITION P+1 AND RETURNS
       !REMANUFACTURED LINE IN POSTLINE
       !LINE IS INPUT LINE
       !L1 IS LENGTH OF INPUT LINE
       !P IS POSITION TO INSERT (INSERTION STARTS AT P+1)
       !NB IS NUMBER OF BLANKS TO INSERT
       !POSTLINE IS RETURNED LINE
       !L2 IS LENGTH OF RETURNED LINE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
       IMPLICIT NONE
       CHARACTER*120 LINE
       CHARACTER*200 POSTLINE
       CHARACTER*200 DUMLINE !TEMPORARY STORAGE OF LINE
       INTEGER L1,P,NB,L2
       INTEGER I,J,K

       !INITIALIZE POSTLINE AND DUMLINE TO BLANKS
       DO I=1,200
        POSTLINE(I:I)=' '
       END DO
       DUMLINE(1:200)=POSTLINE(1:200)
       K=LEN_TRIM(LINE)
       IF(K.NE.L1)THEN
        WRITE(6,100)K,L1
100      FORMAT(1X,'ERROR IN SUBPAD: LINE LENGTH DISAGREEMENT',
     1           /1X,2I8)
        STOP
       ENDIF
       IF(NB+L1.GT.200)THEN
        WRITE(6,55)NB+L1
55      FORMAT(1X,'RESULTING LINE LENGTH TOOBIG: TSUBPAD',I5)
        STOP
       ENDIF
       POSTLINE(1:P)=LINE(1:P) !BEGIN BUILDING POSTLINE
       DUMLINE(1:L1-P)=LINE(P+1:L1)  !STORE PORTION OF LINE AFTER P, DUMLINE HAS L1-P CHARACTERS
       DO I=1,NB
        POSTLINE(P+I:P+I)=' '  !INSERT NB BLANKS INTO LINE
       END DO
```

```
POSTLINE(P+NB+1:L1+NB)=DUMLINE(1:L1-P)  !ADD BACK THE REST OF THE LINE
L2=L1+NB !RETURN THE SIZE OF POSTLINE
RETURN
END SUBROUTINE
```

Appendix 2. Listing of AIRCONCIM3.FOR

```
C    Last change:  BJ   25 Jun 2009   11:42 am
      PROGRAM AIRMONCIM3
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
c 090612 VERSION 3 WILL DETERMINE BIN FREQUENCIES FOR THE SPEED AS WAS DONE IN THE
C EARLIER ANALYSIS FOR THE EJ PROJECT TO SELECT PARLIER. LOOKS LIKE THE PREVIOUS WORK
C TOOK BINS OF 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7 AND 7 AND GREATER METERS/SECOND
C
C 090609 - HAD TO SOLVE PROBLEM WHERE SUM OF SECTORS IN ANGLES BINS LESS THAN TOTAL GOOD DIRECTION
C RECORDS.  IT TURNED OUT THAT MY LINKER SWITCHES DID not (THAT'S RIGHT, "NOT") INCLUDE ARRAY CHECKING
C SOMEHOW MY LINKER SWITCHES WERE ALL GONE. AND, WHEN THE DIRECTION WAS 337.5, GUESS WHAT, THE INDEX
C FOR THE COUNTING ARRAY BECAME 9 AND EVEN THOUGH THE ARRAY WAS SIZE 8, BECAUSE ARRAY BOUND
CHECKING
C WAS TURNED OFF, THERE WAS NO ERROR.  SO, I ADDED THE LINKER SWITCHES THAT I KNOW AND LOVE AND ALSO
C ADDED A LINE TO THE WIND DIRECTION PROCESSING TO CHECK FOR K=9 AND IF SO, MAKE IT 8 SO IT GETS
C ASSIGNED TO NW, WHICH WILL BE CONSISTENT WITH THESCHEME OF THE UPPER BOUND ANGLE BEINC INCLUDED
INTHE
C BINA ND THE LOWER BOUND ANGLE NOT.
C
C 090609 - LATER STILL VERSION 2.  I HAVE PROCESSED THE CIMIS FILES WITH PADDER2.FOR, IN ORDER TO FIX
C THE FORMAT BY PADDING OUT WHEN THERE ARE MISSING VALUES.  SO, I HAVE ABANDONED THE IDEA OF USING 'PRN'
FILES
C FOR REASONS DISCUSSED BELOW. AND WILL USE THE CSV FORMAT, THOUGH IT IS NOW ALSO A FIXED FORMAT AS
OUTLINED BELOW
C THE PROGRAM IS MODIFIED TO ACCOMMODATE THE FILE FORMATTING
C
C I TESTED THIS PROGRAMN AGAINST 2 SMALL FILES IN SUBDIRECTORY TESTAIR, BOTH FILES WERE ANALYZED
CORRECTLY
C I MANUALLY ANALYZED AND COMPARED AND LOOKS OK, SO READY TO ROLL
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C 090604-LATER-VERSION 2 WILL GET A LIST OF FILES AS INPUT, EACH FILE WILL BE OPENED
C PROCESSED AND THE RESULTS WILL BE ADDED TO A FIXED FILE DATABASE TYPE FILE, WHICH
C I CAN THEN POP INTO EXCEL FOR SUMMARIZATION
C
C THE DATABASE WILL CONTAIN
C STATION NUMBER, FILE NAME, TOTAL RECORDS (INCLUDING BAD ONES), # VALID WIND SPEED
C RECORDS, # VALID WIND SPEED RECORDS CALMS, #VALID WIND SPEED RECORDS NOT CALMS,
C # VALID WIND DIRECTION RECORDS, THEN 8 COUNTS OF WIND DIRECTIONS FROM NORTH (-22.5,22.5)
C NORTHEAST (22.5,67.5), EAST (67.5, 112.5), ETC.,
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C 090604 I TESTED AIRMONCIM1 ON TEST.TXT AND IT SEEMS TO BE
C READING THE WIND SPEEDS/DIRECTIONS CORRECTLY
C NEXT STEP, IN VERSION 2, WILL BE TO
C DETERMINE FRACTION OF CALMS, AND ASSIGN WIND DIRECTION
C TO ONE OF 8 SECTORS
C
C TO PROCESS THE MANY CIMIS FILES TO GET WIND SPEED
C AND PERSISTENCE INFORMATION FOR USE WITH THE
C AIR MONITORING NETWORK
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C THIS VERSION IS SIMPLY TO ASSURE THAT THE VALUES ARE BEING
C READ CORRECTLY, TO TEST READING
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC CURRENT CIMIS FILE FORMAT AND INCLUDES FIXING MISSING
VALUE RECORDS WITH PADDER2.FOR
C       1       2       3       4       5       6       7       8       9
```

```
C12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
c0002,01/01/1999,0100,001,*,   -1,*,  -59,*,   43.2,*,    6.8,*,   27.5,*,   14.3,*,    0.00
c0002,01/01/1999,0200,001,*,   -5,*,  -59,*,   42.0,*,    4.9,*,   22.8,*,   42.3,*,    0.00
c0002,01/01/1999,0300,001,*,    0,*,  -59,*,   41.8,*,    4.3,*,  232.8,*,   39.9,*,    0.00
c0002,01/01/1999,0400,001,*,   -1,*,  -59,*,   43.7,*,    5.8,*,  238.2,*,   33.7,*,    0.00
C
C WIND SPEED QA: 52       C  THESE DESIGNATIONS RELATED TO THE FOUR LINES LISTED JUST ABOVE THIS COMMENT
C WIND SPEED   : 54:60    C  AND HENCE ARE THE DESIGNATIONS THAT ARE NOW IMPLEMENTED IN THIS PROGRAM
C WIND DIR QA  : 62       C
C WIND DIR     : 64:70    C
C
C NOTE ON THE FOLLOWING FORMAT (LISTED BELOW 'PRN' FORMAT), WHICH I AM NO LONGER USING.
C    THE ORIGINAL IDEA OF USING THE PRN FORMAT WAS THAT IT SEEMED TO PROVIDE A FIXED FORMAT
C    FROM EXCEL THAT I COULD THEN TURN AROUND AND USE AS INPUT INTO THESE FORTRAN PROGRAMS
C    HOWEVER, 3 PROBLEMS CROPPED UP.
C
C    PROBLEM #1: THE FORMAT IS EVIDENTLY FIXED BY ANALYSIS OF THE FIRST 'N' RECORDS
C              WHERE 'N' IS UNKNOWN. CONSEQUENTLY, WHEN THE DATES, FOR EXAMPLE, REACHED OCTOBER
C              10, THEN THE YEAR GOT TRUNCATED BECAUSE GOOD OLD EXCEL ONLY LEFT ENOUGH SPACE
C              FOR 1+2+4, NOT 2+2+4.
C    PROBLEM #2: THE FORMAT WAS NOT FIXED BETWEEN FILES, WHEN EXCEL SAVES A FILE AS PRN
C              THE FIXING OF THE FORMAT IS DEPENDENT ON THAT FILE AND THUS IT CAN ARRIVE AT DIFFERENT
C              DECISIONS ABOUT HOW TO FORMAT DIFFERENT FILES
C    PROBLEM #3: CIMIS DATA CONTAINS '--' FOR MISSING VALUES AND THE REMAINDER OF THE RECORD IS
C              SHIFTED OVER TO THE LEFT BY THE NUMBER OF SPACES THAT OTHERWISE WOULD HAVE BEEN
C              IN THAT FIELD.  ALSO, THERE CAN BE MULTIPLE MISSING VALUES IN A RECORD.  TO DEAL
C              WITH THIS ISSUE, I WROTE THE PROGRAM CALLED PADDER2.FOR.  I RAN ALL OF THE NNNCIMY1Y1Y2Y2.CSV
C              FILES THROUGH PADDER2 AND CREATED THE CORRESPONDING SERIES OF NNNCIFY1Y1Y2Y2.CSV (NOTE CIM-
>CIF).
C              THE ABOVE FORMAT IS OUTPUT FROM THE PADDER2.FOR.  BASICALLY THIS FORMAT IS THE FORMAT
C              OF CONTEMPORARY CIMIS OUTPUT, EXCEPT THAT RECORDS CONTAINING MISSING VALUES HAVE HAD THE
C              FIELD WITH MISSING VALUES PADDED OUT WITH SPACES IN ORDER TO RESTORE THE FIXED FORMATTING.
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCC OLD PRN FORMAT THAT I NO LONGER USE, SAVED FOR HISTORICAL PURPOSES...
CCCCCCCCC
CCCC EXTRACT FROM STATION 2 CONTAINS SOME NUMBERS WITHOUT DECIMALS                              CC
C THIS FILE WAS CREATED BY USING EXCEL AND SAVING FILE AS "PRN" FILE                          CC
C NOTE THAT THE LEADING 0S IN STATION id ARE OMITTED FROM PRN FILE, BUT                        CC
C FORMATTING APPEARS TO BE FIXED FORMAT, WHICH IS GOOD!                                        CC
C2 8/7/2000 800220*  850* 470*   72.1* 6.8*327.1*14.3*   0                                     CC
C2 8/7/2000 900220* 1230* 723*   75.7* 6.8*322.3*21.9*   0                                     CC
C2 8/7/20001000220* 1551* 942*   79.9* 5.3* 15.2*30.7*   0                                     CC
C2 8/7/20001100220* 1749*1090*   83.4* 3.8* 71.6*40.9*   0                                     CC
C12345678901234567890123456789012345678901234567890123456789012345678                          CC
C                                                                                              CC
C WIND SPEED IS 38-41 (MAY OR MAY NOT HAVE DECIMAL)       C                                     CC
C WIND SPEED QC IS 37                               C AS DISCUSSED ABOVE THIS COLUMN DESIGNATION IS CC
C WIND DIRECTION IS 43-47, MAY OR MAY NOT HAVE DECIMAL     C UNRELIABLE FOR PRN FILES, SEE ABOVE FOR NEW
ANDC
C WIND DIRECTION QC IS 42                           C CORRECT DESIGNATION                      CC
C                                                                                              CC
C SO FIELDS APPEAR TO BE FORMATTED HOWEVER,                                                    CC
C FOR FUTURE WORK NOTE THE FOLLLOWING:                                                         CC
C WHEN THE DATE IS nn/nn/nnnn, THEN THE LAST DIGIT OF YEAR IS DROPPED!!                        CC
C ALSO LEADING ZEROS IN STATION NUMBER ARE DROPPED                                             CC
C BUT IT DOES APPEAR THAT THE FIELDS FOLLOWING THE DATE STAY STABLE                            CC
C (BASED ON VISUALLY SCANNING ABOUT 5 YEARS OF ONE SITE)                                       CC
C SO FOR THIS EXERCISE I WILL ONLY USE DATA WHICH HAS '*' AS                                   CC
C QUALITY CODE                                                                                 CC
```

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CCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCC

      IMPLICIT NONE
      INTEGER LK,L,I,K,COUNTS,COUNTD,COUNTL  !COUNT SPEED, COUNT WIND DIRECTION, LINES
      INTEGER COUNTF  !NUMBER OF FILES PROCESSED

C       INTEGER CALMS,NONCALMS

      INTEGER DIRS(8) !ARRAY OF COUNTS 1=NN, 2=NE, 3=WW PROCEED CLOCKWISE
      INTEGER SPEEDS(8) !ARRAY OF COUNTS FOR SPEED BINS 0-1,1-2,2-3, ETC UP TO 7 OR GREATER
      CHARACTER*80 FLD
      CHARACTER*1 QC
      CHARACTER*91 LINE
      CHARACTER*40 FIN  !NAME OF INPUT FILE TO PROCESS
      REAL WS,WDIR  !WIND SPEED, WIND DIRECTION, OBVIOUSLY
      REAL DIRTMP

      COUNTF=0
      OPEN(UNIT=2,STATUS='OLD',FILE='CIFFILES.IN') !CONTAINS LIST OF FILES TO PROCESS
      OPEN(UNIT=3,STATUS='UNKNOWN',FILE='WINDSD_DB3.OUT') !CONTAINS OUTPUT DATABASE WIND SPEED, DIR,
DATABASE


CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC NEXT FILE TO OPEN LOOP
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

5000    CONTINUE
        READ(2,5100,END=10000)FIN
5100     FORMAT(A18)
        OPEN(UNIT=1,STATUS='OLD',FILE=FIN)  !NOTE: FILENAMES ARE NNNCIFY1Y1Y2Y2.PRN WITH LEADING ZEROS ON
STATION NUMBER
                                   !THE INPUT FILES HAVE BEEN PROCESSED WITH PADDER2.FOR TO PAD OUT FIELDS WITH
                                   !MISSING VALUES '--', SO THAT THE FILES ARE NOW FIXED FORMAT
         COUNTF=COUNTF+1
         COUNTS=0
         COUNTD=0
         COUNTL=0
C          CALMS=0
C          NONCALMS=0
         DO I=1,8
          DIRS(I)=0  !RESET DIRECTION COUNTER
          SPEEDS(I)=0
         END DO

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC  READING RECORDS LOOP WITHIN EACH FILE
CCCCCCCCCCCCCCCCCCC

1         READ(1,100,END=1000)LINE
100        FORMAT(A91)
         COUNTL=COUNTL+1

C         WIND SPEED PROCESSING

         QC(1:1)=LINE(52:52)
         CALL BLUSH(FLD,10)
         WS=-1.
         IF(QC.EQ.'*')THEN !ONLY PROCESS IF THE QC CODE IS A '*'
           COUNTS=COUNTS+1
```

```
          CALL BLUSH(FLD,10)
          FLD(1:7)=LINE(54:60)  !THIS IS WIND SPEED IN MILES PER HOUR
          READ(FLD(1:7),110,ERR=55000)WS  !SHOULD NEVER GET ERROR ON READ, IF DO, THEN WANT TO KNOW ABOUT IT
110         FORMAT(F7.0)

          WS=WS/2.24  !CONVERT MPH TO METERS PER SECOND
          LK=1+INT(WS)
          LK=MIN(LK,8)
          SPEEDS(LK)=SPEEDS(LK)+1

        ENDIF

C         WIND DIRECTION PROCESSING

        QC(1:1)=LINE(62:62)
        CALL BLUSH(FLD,10)
        WDIR=-1.
        IF(QC(1:1).EQ.'*')THEN
          COUNTD=COUNTD+1
          CALL BLUSH(FLD,10)
          FLD(1:7)=LINE(64:70)
          READ(FLD(1:7),120,ERR=55000)WDIR   !SHOULD NEVER GET ERROR ON READ, IF DO, THEN WANT TO KNOW ABOUT
IT
120         FORMAT(F7.0)
          IF((WDIR.GT.337.5 .AND. WDIR.LE.360.).OR.
    1          (WDIR.GE.0.0 .AND. WDIR.LE.22.5))THEN
            DIRS(1)=DIRS(1)+1
          ELSE
             DIRTMP=WDIR+22.5
             K=1+INT(DIRTMP/45.)
             IF(K.EQ.9)THEN  !THIS NECESSARY FOR CASE WHEN WDIR=375.5, K GETS SET TO 9
              K=8
             ENDIF
             DIRS(K)=DIRS(K)+1
          ENDIF
       ENDIF
C         WRITE(6,200)LINE(1:59),WS,WDIR
C200     FORMAT(A59,1X,F8.1,1X,F8.1)      NNNCIMY1Y1Y2Y2.PRN
       GOTO1

C        END OF RECORD READ LOOP

1000     CONTINUE
C STATION NUMBER, FILE NAME, TOTAL RECORDS (INCLUDING BAD ONES), # VALID WIND SPEED
C RECORDS, 8 BINS FROM 0-1,1-2, 7+, # VALID WIND DIRECTION RECORDS,
C THEN 8 COUNTS OF WIND DIRECTIONS FROM NORTH (-22.5,22.5)
C NORTHEAST (22.5,67.5), EAST (67.5, 112.5), ETC.,
       WRITE(6,1100)FIN(1:18),FIN(1:3),COUNTL,COUNTS,(SPEEDS(L),L=1,8)
    1              ,COUNTD,(DIRS(I),I=1,8)
       WRITE(3,1100)FIN(1:18),FIN(1:3),COUNTL,COUNTS,(SPEEDS(L),L=1,8)
    1              ,COUNTD,(DIRS(I),I=1,8)
1100     FORMAT(1X,A18,1X,A3,1X,19I6)
       CLOSE(1)
       GOTO5000

C        END OF FILE READ LOOP

10000    CONTINUE
       WRITE(6,10010)COUNTF
10010    FORMAT(1X,'A TOTAL OF ',I3,' FILES PROCESSED')
       STOP
```

```
55000    CONTINUE  !THIS LINE REACHED IF THERE WAS A READ ERROR, THIS SHOULDN'T HAPPEN, SO NEED TO FIGURE IT
OUT
         WRITE(6,55100)LINE
         WRITE(3,55100)LINE
55100    FORMAT(A91)
         WRITE(6,55200)
55200    FORMAT(1X,'READ ERROR, NEEDS ATTENTION ')
         STOP
         END
         SUBROUTINE BLUSH(CCC,N)
         IMPLICIT NONE
         INTEGER I,N
         CHARACTER CCC*80
         DO I=1,N
           CCC(I:I)=' '
         END DO
         RETURN
         END SUBROUTINE
```

Appendix 3c. Population and pesticide densities for each community. Population densities are number per square mile. Pesticide densities are pounds per square mile. Pesticide densities are the 2006-8 average of community, local, and regional zones.

Community	Region	Child Population	People over 65	People with Disabilities	People Employed in Farming etc.	1,3-Dichloropropene	Acephate	Acrolein	Bensulide	Chloropicrin	Chlorothalonil	Chlorpyrifos	Cypermethrin	Dazomet	Diazinon	Dicofol	Dimethoate	Diuron	Endosulfan	EPTC	Iprodione	Malathion	Metam sodium	Methidathion	Methyl bromide	Naled	Norflurazon	Oryzalin	Oxydemeton-methyl	Oxyfluorfen	Permethrin	Phosmet	Potassium N-methyl dithiocarbamate	Propargite	S,S,S-tributyltriphos (DEF)	Simazine	S-metolachlor	Sodium tetrathiocarbonate	Trifluralin	Total fumigants	Total nonfumigants
Alpaugh	SJV	291	63	157	45	0	0.2	0.0	0.0	0	0.0	381.4	0.0	0.0	0	0.9	4.5	16.0	7.8	0.0	2.1	262.0	0	9.5	0	38.4	0.0	0.0	1.3	2.4	1.5	0.0	0	2.6	5.7	0.0	6.0	0	61.8	0	1,360
Amesti	NCC	245	113	168	18	2,263	18.7	0.0	15.0	29,097	41.7	87.7	0.1	0.0	100	0.1	4.5	0.0	0.0	0.0	10.4	469.1	0	0.0	38,247	35.4	0.0	0.4	9.0	5.9	2.2	61.3	352	0.0	0.0	1.0	0.0	0	0.0	69,959	1,408
Aptos	NCC	258	187	192	1	102	0.6	0.0	0.0	1,040	4.4	8.7	0.0	0.2	1	0.0	0.0	0.0	0.0	0.0	0.2	16.3	0	0.0	1,676	1.7	0.0	0.0	0.0	0.4	0.0	3.5	304	0.0	0.0	0.0	0.0	0	0.0	3,122	675
Aptos Hills	NCC	60	26	28	2	2,101	15.6	0.0	5.3	16,252	57.6	45.5	0.0	0.2	37	0.1	3.9	0.3	0.0	0.0	5.9	234.4	0	1.0	20,716	29.4	0.0	0.1	6.9	3.3	2.0	29.1	585	0.0	0.0	0.8	0.0	0	0.0	39,654	594
Armona	SJV	597	120	378	33	798	0.0	0.0	0.0	115	3.0	152.7	0.0	0.0	1	7.1	39.3	55.6	0.0	7.5	24.5	10.6	0	0.4	274	1.4	8.0	56.6	0.4	31.9	4.5	89.9	0	277.3	0.7	34.3	36.0	0	35.7	1,187	2,006
Aromas	NCC	178	45	117	11	2,084	30.0	0.0	18.4	12,690	4.8	6.9	0.5	0.0	100	0.0	13.1	0.0	0.1	0.0	4.1	166.3	231	0.0	15,347	41.5	0.0	0.0	28.8	1.8	9.4	1.0	52	0.0	0.0	0.0	0.0	0	0.0	30,404	778
Arvin	SJV	1,079	157	626	315	15,212	0.7	0.0	0.0	278	151.9	246.4	0.0	0.0	0	2.6	84.8	26.5	2.0	61.1	47.6	18.5	24,013	4.2	790	10.4	6.0	103.3	0.0	110.1	4.0	148.8	5,526	58.2	0.0	86.2	28.6	264	67.2	46,083	3,446
Atwater	SJV	1,491	389	807	105	12,568	17.5	0.0	0.0	304	8.8	61.9	0.0	0.0	5	1.1	11.7	3.8	0.0	1.8	12.7	4.4	114	6.0	416	0.0	0.9	36.6	0.0	29.3	3.2	0.7	4,998	30.1	1.3	3.0	6.7	18	3.2	18,418	3,041
Auberry	SJV	28	20	25	1	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0	0.0	0.0	0.0	0.0	0	0.0	0	74
August	SJV	2,013	552	1,564	190	1,073	0.0	0.0	0.0	36	11.2	26.2	0.0	0.0	6	4.3	4.8	13.4	1.5	0.8	10.2	17.3	43	2.8	104	3.0	0.6	10.5	0.1	14.0	0.5	5.3	0	78.3	0.0	7.0	9.0	0	13.4	1,257	4,560
Avenal	SJV	168	25	72	44	1,520	1.9	0.0	0.1	185	25.8	62.1	0.3	0.0	2	10.5	12.3	1.6	7.5	0.0	14.8	0.0	1,280	1.8	3	6.6	4.6	8.6	0.0	21.3	3.7	42.5	2,958	22.2	1.0	4.7	16.2	0	18.1	5,946	598
Bakersfield	SJV	705	190	389	26	2,462	3.3	0.0	0.0	53	23.1	49.0	0.1	0.0	3	3.0	14.6	32.8	0.6	6.2	11.2	2.6	6,185	2.6	30	1.0	0.6	10.9	0.0	9.8	1.2	29.4	2,292	4.9	0.0	8.8	10.1	42	28.8	11,064	1,567
Ben Lomond	NCC	725	141	479	11	55	0.1	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	55	1,356
Biola	SJV	589	157	196	106	38,121	1.1	0.0	0.0	4	0.6	22.0	0.0	0.1	4	0.2	0.6	128.6	0.2	0.0	10.4	1.3	0	0.0	8	0.7	77.7	438.8	0.0	131.7	0.1	21.9	0	343.8	0.0	576.7	0.4	0	33.8	38,133	2,843
Bonadelle Ranchos	SJV	182	48	183	3	2,570	0.5	0.0	0.1	9	0.4	41.0	0.0	0.0	1	3.3	19.3	37.5	0.0	0.0	11.4	2.3	0	9.3	18	0.0	0.4	103.7	0.0	51.3	40.2	12.0	0	6.4	0.0	40.7	0.2	0	2.8	2,597	801
Boronda	NCC	818	226	605	157	9,015	581.8	0.0	74.1	45,082	187.9	167.0	1.0	0.0	1,306	0.1	131.4	22.4	0.1	1.2	237.5	653.2	546	109.6	57,223	144.6	0.0	0.0	570.3	56.8	128.4	0.0	113	0.0	0.0	0.0	0.4	0	0.6	111,979	6,180
Boulder Creek	NCC	227	58	80	4	14	0.0	0.0	0.0	13	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0	0.0	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	44	369
Bowles	SJV	112	159	0	0	6,854	0.4	0.0	0.0	189	2.3	46.3	0.0	0.0	142	0.0	2.6	7.1	0.1	2.9	55.8	3.2	12	115.8	386	0.0	69.5	84.6	0.0	26.5	0.3	89.3	12	88.3	0.0	216.5	0.6	0	3.1	7,452	1,228
Bradley	NCC	369	114	123	114	304	0.0	0.0	0.0	0	22.9	0.0	0.0	0.0	0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	2.7	0.0	3.8	0.0	0.0	1,935	0.0	0.0	0.0	0.0	0	0.0	2,239	749
Bret Harte	SJV	3,514	568	1,906	203	3,663	1.4	0.0	5.2	2	167.9	129.0	0.0	0.0	16	0.0	3.9	3.8	0.0	3.3	13.6	12.6	220	15.7	29	0.1	4.5	37.1	0.0	47.5	3.8	34.1	1,166	40.2	0.0	8.0	9.2	99	6.0	5,179	6,753
Buttonwillow	SJV	69	15	49	13	14,570	14.5	0.0	0.0	380	31.1	134.2	0.0	0.0	0	0.0	6.2	30.5	1.8	70.9	19.2	69.9	2,491	0.0	0	0.0	2.5	19.9	3.9	21.9	6.2	123.7	1,942	19.3	10.4	0.0	22.7	0	71.9	19,385	827
Bystrom	SJV	1,254	355	806	76	2,471	1.0	0.0	4.2	22	41.6	34.0	0.0	0.0	8	0.0	2.8	1.9	0.0	1.9	11.5	6.7	28	3.0	96	0.5	2.1	24.0	0.0	16.7	1.8	14.3	899	22.8	0.0	5.2	3.0	80	4.5	3,596	2,703
Calwa	SJV	877	362	672	105	2,201	0.2	0.0	0.0	706	2.6	137.6	0.0	0.0	300	0.0	14.5	20.2	0.4	0.0	21.1	12.3	0	2.7	1,328	0.0	14.6	78.5	0.0	41.7	0.1	37.4	7	10.6	0.0	115.2	0.0	0	2.0	4,242	2,828
Camarillo	VENT	761	511	443	8	16,682	24.6	0.0	57.5	17,775	183.2	123.4	2.0	8.6	17	0.2	9.7	3.5	0.0	1.1	4.9	173.0	6,139	0.4	19,844	25.5	0.1	0.7	4.9	9.8	18.2	0.1	3,941	0.0	0.0	8.5	3.4	86	4.9	64,477	2,400
Cantua Creek	SJV	63	6	23	27	11,510	122.5	0.0	12.9	0	292.1	302.7	0.6	0.0	20	144.9	122.3	9.4	22.7	243.4	43.1	4.5	44,478	4.4	0	159.5	0.5	12.2	0.2	183.8	10.9	8.3	6,432	277.5	132.6	5.5	260.2	0	233.6	62,420	2,748
Capitola	NCC	1,095	842	960	13	293	0.1	0.0	0.0	17	0.9	2.3	0.0	1.9	1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0	0.0	21	0.0	0.0	0.0	1.3	0.0	0.0	0.0	253	0.0	0.0	0.0	0.0	0	0.0	585	2,916
Carmel Valley Village	NCC	51	39	36	1	0	0.5	0.0	0.0	76	0.0	0.2	0.0	0.0	1	0.0	0.1	0.0	0.0	0.0	0.0	0.5	0	0.0	102	0.2	0.0	0.2	0.7	0.2	0.1	0.0	0	0.0	0.0	0.0	0.0	0	0.0	178	131
Carmel-by-the-Sea	NCC	371	1,157	798	7	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	2,333
Caruthers	SJV	379	105	279	77	33,146	0.0	0.0	0.0	64	3.9	170.2	0.0	0.0	23	0.0	0.3	7.4	0.0	3.0	41.1	3.8	11	0.1	524	0.0	55.9	96.0	0.0	43.9	7.9	39.6	11	103.3	0.0	193.7	1.1	63	30.1	33,819	1,663
Casa Conejo	VENT	1,875	689	1,299	75	822	0.7	0.0	2.7	917	13.0	12.7	0.2	0.0	2	0.0	0.4	0.6	0.0	0.5	0.6	6.2	148	0.0	1,039	0.9	0.0	0.0	1.1	0.7	1.1	0.0	0	0.0	0.0	0.7	0.0	109	0.1	3,035	3,983
Castroville	NCC	2,468	370	1,738	363	4,104	398.0	0.0	424.7	73,944	152.1	207.9	6.5	0.0	675	0.0	176.6	92.2	0.6	0.0	148.5	981.4	47	1,404.8	106,219	370.6	0.0	0.0	459.7	320.2	54.7	0.0	180	0.0	0.0	0.0	0.3	0	0.6	184,494	10,814
Ceres	SJV	1,714	405	1,045	41	6,875	3.3	0.0	3.6	29	73.1	71.1	0.0	0.0	23	0.0	9.5	4.9	0.0	3.5	27.2	40.9	226	8.8	111	0.2	2.1	50.1	0.0	40.4	5.7	32.4	1,084	62.9	0.0	5.7	20.8	89	12.3	8,413	3,707
Chowchilla	SJV	349	146	206	29	10,207	0.2	0.0	0.0	69	72.0	182.5	0.1	0.0	3	0.0	3.6	32.5	0.0	0.0	66.8	12.1	0	1.4	147	0.0	15.6	347.1	0.0	103.7	33.1	40.1	35	59.8	0.0	79.4	3.5	0	64.2	10,459	1,851
Chualar	NCC	943	85	215	278	28,496	306.6	0.0	587.8	15,989	24.7	1,305.5	0.2	0.0	1,393	0.0	450.8	0.6	0.0	4.5	795.3	773.6	39	0.5	2,196	446.2	0.0	4.2	835.1	58.7	168.1	0.0	334	0.0	0.0	12.6	5.9	0	33.1	47,054	8,728
Clovis	SJV	1,227	374	693	23	406	1.2	0.0	1.0	58	8.1	23.5	0.0	0.0	2	0.0	1.8	9.5	0.0	0.0	7.8	4.7	5	0.0	138	0.1	0.8	47.3	0.0	12.6	1.6	3.4	140	0.2	0.0	20.4	5.4	0	0.7	746	2,470
Coalinga	SJV	650	166	325	71	64	35.2	0.0	0.7	0	8.0	19.1	0.1	0.0	6	1.6	5.4	2.0	5.0	0.0	4.8	0.0	235	1.9	0	2.9	1.8	12.1	0.0	31.6	12.0	5.0	341	17.4	0.2	4.0	4.5	0	16.1	640	1,408
Corcoran	SJV	551	121	297	62	0	16.9	0.0	0.0	0	10.5	187.6	1.1	0.0	1	50.4	36.9	111.5	34.2	1.3	9.5	55.8	0	3.1	0	55.9	1.7	10.9	0.0	44.7	26.3	24.1	60	82.6	4.5	0.9	8.3	0	149.1	60	1,960
Corralitos	NCC	69	39	48	2	1,293	7.9	0.0	4.9	8,866	10.7	47.8	0.0	0.0	30	0.1	2.7	0.0	0.0	0.0	3.7	96.2	0	0.0	11,128	15.3	0.0	0.5	4.1	3.6	1.3	60.4	310	0.0	0.0	0.8	0.0	0	0.0	21,597	447
Country Club	SJV	1,290	767	1,049	19	151	0.0	0.0	0.3	37	50.6	30.6	0.0	0.0	1	0.2	23.9	48.5	0.2	0.7	0.6	4.9	5	0.2	15	0.3	0.2	1.5	0.2	2.9	0.4	0.9	0	5.3	0.0	5.2	34.7	0	62.9	208	3,402
Cutler	SJV	2,210	291	1,369	789	3,973	1.3	0.0	0.0	229	10.4	386.9	0.0	0.0	216	3.1	238.3	112.7	0.3	30.7	14.6	446.5	0	8.3	26	0.2	1.9	157.9	0.0	95.2	0.2	448.4	0	317.5	0.0	112.4	1.7	0	21.8	4,228	7,285
Day Valley	NCC	48	21	28	0	238	0.9	0.0	0.9	1,580	3.4	9.3	0.0	0.1	4	0.0	0.3	0.0	0.0	0.0	0.6	24.6	0	0.0	1,938	2.4	0.0	0.1	0.1	1.0	0.0	6.9	71	0.0	0.0	0.1	0.0	0	0.0	3,828	152
Del Monte Forest	NCC	55	153	55	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	262
Del Rey	SJV	280	72	205	48	19,582	5.2	0.0	2.0	681	24.4	597.6	0.0	0.0	112	0.0	101.8	148.9	8.4	0.0	35.4	583.3	951	2.9	193	0.1	16.3	250.9	0.0	90.0	0.5	540.4	734	79.2	0.0	277.4	0.0	0	12.3	22,140	3,494
Del Rey Oaks	NCC	647	537	498	0	0	0.7	0.0	0.0	0	0.0	0.1	0.0	0.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	1,684
Del Rio	SJV	182	111	74	0	26,682	0.0	0.0	8.2	860	1,098.7	403.6	0.0	0.0	52	0.1	18.7	36.9	0.0	0.3	162.9	81.6	104	41.9	3,279	2.4	5.1	411.8	0.0	84.3	37.8	225.7	1,186	204.5	0.0	53.2	19.9	64	81.4	32,175	3,398
Delano	SJV	1,242	285	726	237	6,389	3.3	0.0	0.0	71	0.0	314.7	0.3	0.0	6	0.5	25.0	35.9	0.0	0.1	55.0	119.3	1,048	2.5	228	1.0	7.7	197.2	0.2	100.2	17.0	352.5	88	22.7	0.0	88.0	0.0	2,459	110.4	10,285	3,951
Delhi	SJV	639	102	281	68	20,707	4.1	0.0	0.0	7,407	110.3	102.9	0.0	0.0	12	3.9	27.4	1.6	0.0	9.9	49.3	12.8	65	0.8	11,446	0.0	1.1	96.7	0.0	86.2	5.1	14.2	3,612	56.9	0.0	2.9	14.5	577	5.4	43,813	1,707
Denair	SJV	505	165	352	53	5,240	1.4	0.0	0.0	301	180.7	139.2	0.0	0.0	12	0.2	41.6	1.8	0.0	25.0	55.2	18.5	0	2.0	965	0.9	3.4	119.6	0.0	87.5	13.6	14.7	890	205.2	0.0	16.1	42.6	0	79.9	7,397	2,136
Derby Acres	SJV	31	12	17	1	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	60
Dinuba	SJV	1,761	446	971	313	11,293	0.7	0.0	0.1	642	37.0	201.1	0.0	0.0	25	2.9	34.0	58.3	0.2	3.7	47.4	209.9	25	20.9	443	0.0	4.6	93.8	0.0	57.8	0.3	416.2	41	96.8	0.0	85.1	0.2	0	13.4	12,445	4,901
Dos Palos	SJV	1,075	320	567	99	0	1.7	0.0	0.0	0	23.2	163.5	0.2	0.0	2	29.2	68.6	70.8	6.5	84.5	0.2	192.8	0	0.0	0	82.6	0.0	0.0	1.8	37.0	1.3	0.0	0	52.5	32.8	0.0	30.8	0	412.8	0	3,356
Ducor	SJV	326	46	132	102	207	0.1	0.0	0.0	2	0.1	312.6	0.0	0.0	0	3.9	92.2	97.0	0.0	0.0	2.6	10.0	0	2.9	7	0.0	37.9	144.0	0.0	74.9	18.4	16.1	0	1.5	0.0	78.3	0.0	63	6.2	279	1,504
Dustin Acres	SJV	52	12	23	4	0	2.3	0.0	0.0	0	0.0	26.4	0.0	0.0	0	0.0	0.0	2.3	3.5	0.0	0.0	0.0	408	0.0	0	20.5	0.0	0.0	0.0	11.3	0.0	0.0	0	0.0	0.0	0.0	7.5	0	16.4	408	182
Earlimart	SJV	1,383	195	631	375	17,717	2.7	0.0	0.0	1	0.0	272.6	0.0	0.0	2	0.4	17.5	50.7	0.0	2.7	28.9	4.0	330	0.0	254	0.0	0.8	175.3	0.0	164.5	18.3	273.7	0	106.2	0.0	97.8	0.3	4,575	30.2	22,876	3,832
East Oakdale	SJV	120	61	51	3	2,889	85.5	0.0	0.0	3,850	103.0	200.6	0.0	0.0	39	7.3	3.7	13.9	0.0	2.3	20.3	137.3	70	9.4	10,263	4.1	12.9	125.7	0.7	44.3	3.5	50.0	0	63.7	0.0	63.4	0.5	0	4.5	17,072	1,232
East Orosi	SJV	666	109	476	89	1,120	0.9	0.0	0.0	67	5.2	757.6	0.0	0.0	11	1.5	1,276.7	554.8	0.3	3.6	4.6	3,821.0	0	5.8	4	0.3	1.5	40.5	0.0	26.4	0.2	46.5	0	15.3	0.0	594.3	1.5	0	5.2	1,192	8,515
East Porterville	SJV	827	155	513	184	1,092	0.0	0.0	0.0	3	0.4	160.4	0.0	0.0	0	14.1	50.1	57.0	0.1	0.1	0.6	15.8	0	5.8	41	5.0	11.7	14.7	0.0	6.6	0.9	8.3	0	2.1	0.0	94.3	0.1	0	1.1	1,136	2,129
Easton	SJV	197	87	126	9	7,508	1.4	0.0	1.0	1,356	6.3	73.5	0.0	0.0	36	0.0	2.5	15.4	0.1	2.6	10.7	17.3	0	10.5	3,014	0.0	30.2	91.5	0.0	28.6	0.3	58.8	0	67.4	0.0	87.1	1.2	0	9.5	11,877	970
El Rio	VENT	1,307	415	628	84	63,439	15.0	0.0	10.8	84,341	120.6	233.4	0.4	20.1	5	0.1	5.3	0.8	0.1	0.0	2.9	109.6	42,179	0.8	87,354	16.5	1.2	0.1	8.5	28.4	13.1	0.2	462	0.0	0.0	2.3	0.4	56	1.4	277,851	3,012
Elkhorn	NCC	84	30	66	3	4,962	53.0	0.0	26.4	22,421	136.9	13.5	0.1	0.0	73	0.0	15.9	2.3	0.1	0.0	15.0	307.5	65	64.3	29,865	85.9	0.0	0.0	46.5	17.8	6.0	0.0	646	0.0	0.0	0.0	0.9	0	0.2	57,957	1,048
Empire	SJV	780	268	604	45	9,432	0.4	0.0	1.2	130	190.3	144.7	0.0	0.0	17	0.0	4.6	7.9	0.0	1.5	29.3	3.4	3	6.8	632	0.9	8.7	94.2	0.0	57.8	10.9	186.0	1,252	94.8	0.0	23.6	19.4	6	1.2	11,454	2,602
Escalon	SJV	902	370	572	47	32,528	0.0	0.0	3.9	1,304	1,487.0	618.0	0.0	0.0	82	0.1	14.6	9.8	0.7	0.0	152.6	42.5	607	143.2	2,591	1.7	4.7	388.0	0.0	123.5	48.8	71.1	1,456	179.0	0.0	47.2	7.1	56	104.5	38,542	5,421
Exeter	SJV	1,387	457	870	106	2,552	3.6	0.0	0.0	117	123.0	425.8	0.0	0.0	37	5.9	267.0	301.0	1.8	1.6	9.9	85.0	3	72.9	946	0.1	3.2	130.2	0.0	87.7	6.0	465.4	0	48.7	0.0	322.5	1.4	20	10.2	3,638	5,230
Farmersville	SJV	1,787	295	1,040	285	14,270	1.8	0.0	0.0	463	26.0	330.1	0.0	0.0	32	4.6	33.7	85.4	2.9	2.1	20.8	25.5	0	11.0	2,613	0.0	7.7	62.7	0.0	82.7	6.1	225.1	0	135.3	0.0	144.0	1.6	0	6.1	17,346	4,653
Farmington	SJV	31	15	2	4	177	0.6	0.0	0.0	64	177.3	330.0	0.0	0.0	3	2.7	36.6	141.5	0.0	0.4	6.6	4.3	148	29.2	663	50.7	16.2	77.0	0.0	260.6	10.3	257.6	0	626.2	0.0	228.9	87.4	0	74.8	1,051	2,474
Fellows	SJV	65	38	52	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	155
Felton	NCC	301	109	127	0	66	0.1	0.0	0.0	0	0.2	0.1	0.0	0.2	0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	13	0.0	0.0	0.0	0.0	0	0.0	79	538
Fillmore	VENT	1,588	510	976	68	382	6.7	0.0	15.4	242	59.5	39.1	0.4	0.0	5	0.0	0.7	22.1	0.0	0.0	0.3	39.2	3,269	0.0	328	0.0	11.2	1.9	0.1	10.1	7.0	0.3	0	0.0	0.0	13.6	1.9	194	2.1	4,414	3,380

Appendix 3c. Population and pesticide densities for each community. Population densities are number per square mile. Pesticide densities are pounds per square mile. Pesticide densities are the 2006-8 average of community, local, and regional zones.

Community	Region	Child Population	People over 65	People with Disabilities	People Employed in Farming etc.	1,3-Dichloropropene	Acephate	Acrolein	Bensulide	Chloropicrin	Chlorothalonil	Chlorpyrifos	Cypermethrin	Dazomet	Diazinon	Dicofol	Dimethoate	Diuron	Endosulfan	EPTC	Iprodione	Malathion	Metam sodium	Methidathion	Methyl bromide	Naled	Norflurazon	Oryzalin	Oxydemeton-methyl	Oxyfluorfen	Permethrin	Phosmet	Potassium N-methyl dithiocarbamate	Propargite	S,S,S-tributyltriphos (DEF)	Simazine	S-metolachlor	Sodium tetrathiocarbonate	Trifluralin	Total fumigants	Total nonfumigants
Firebaugh	SJV	776	126	345	156	787	51.3	0.0	0.0	0	68.8	220.6	0.4	0.0	32	32.3	38.2	76.8	32.8	5.6	33.7	84.1	57	10.0	0	106.7	0.0	20.5	3.2	105.5	6.6	1.0	0	47.5	17.4	0.0	87.6	0	320.8	844	2,807
Ford City	SJV	728	283	593	34	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	1,638
Fowler	SJV	647	235	390	43	51,457	0.7	0.0	1.8	1,329	57.1	357.7	0.0	0.0	96	0.2	14.6	44.0	0.5	0.0	23.7	74.4	324	1.9	1,652	0.0	17.6	359.9	0.0	54.0	7.2	187.5	392	89.3	0.0	233.5	0.3	0	2.4	55,153	2,938
Frazier Park	SJV	141	47	162	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	350
Freedom	NCC	1,378	487	747	280	5,429	16.5	0.0	16.0	28,686	17.6	140.3	0.1	0.0	115	0.1	6.1	0.4	0.0	0.0	19.0	837.8	0	1.3	35,172	100.9	0.0	0.3	10.8	9.6	3.3	80.4	371	0.0	0.0	1.4	0.0	0	0.0	69,659	4,270
French Camp	SJV	325	81	248	42	7,071	0.0	0.0	0.1	1,329	83.8	49.1	0.0	0.0	33	24.8	53.2	40.1	0.4	5.2	9.7	56.7	407	4.9	1,331	2.6	0.5	16.9	2.6	34.0	5.2	1.7	63	46.3	0.0	4.3	87.3	0	90.1	10,200	1,347
Fresno	SJV	1,343	378	812	43	3,999	0.5	0.0	3.6	246	7.0	68.5	0.0	0.0	15	0.1	6.2	20.8	0.3	1.5	11.6	15.1	1	3.0	498	0.0	6.1	53.9	0.0	24.3	4.0	27.3	45	21.1	0.0	37.1	2.9	0	16.8	4,790	2,922
Friant	SJV	70	94	126	0	0	0.0	0.0	0.0	0	0.0	2.8	0.0	0.0	0	0.0	0.4	2.4	0.0	0.0	0.7	0.7	0	0.0	0	0.0	0.0	97.7	0.0	62.2	53.2	0.3	0	0.0	0.0	1.9	0.3	0	0.4	0	513
Garden Acres	SJV	1,296	314	938	111	3,594	0.0	0.0	0.0	41	21.4	64.9	0.0	0.0	9	11.8	10.6	117.5	1.2	0.5	30.7	36.0	180	12.4	175	9.0	2.1	48.8	0.2	39.3	1.6	58.3	83	175.9	0.0	20.3	23.0	0	17.7	4,072	3,372
Gonzales	NCC	2,009	305	1,016	469	5,333	279.6	0.0	668.3	4,611	108.2	599.2	6.5	0.1	1,658	0.0	247.5	33.7	0.0	3.6	270.9	891.8	10	0.0	4,190	162.8	0.2	62.2	613.5	71.5	123.7	0.0	202	0.0	0.0	30.1	0.8	4	72.6	14,350	9,704
Goshen	SJV	502	80	304	82	1,032	0.4	0.0	0.0	260	0.3	98.2	0.0	0.0	7	48.8	51.9	91.4	3.4	7.9	1.6	40.2	0	0.1	167	0.0	1.0	6.0	0.0	34.2	2.3	27.2	0	300.7	2.4	8.3	4.0	0	68.2	1,460	1,773
Grayson	SJV	144	25	85	10	4,471	4.2	0.0	3.8	1	189.8	127.7	1.5	0.0	10	72.3	194.5	27.3	0.0	3.4	50.8	4.8	1,242	1.0	7	22.9	9.2	47.2	1.1	49.1	10.4	8.0	943	138.3	0.4	27.1	191.3	296	87.7	6,960	1,547
Greenfield	NCC	2,842	371	1,086	1,128	1,606	119.2	0.0	426.7	404	80.2	395.9	2.0	0.0	387	24.6	208.8	51.9	0.0	21.1	123.5	148.4	320	0.0	1,513	63.6	0.0	52.1	266.4	125.0	75.9	0.0	7,150	0.0	0.0	141.8	117.4	97	4.6	11,089	8,263
Gustine	SJV	898	473	663	78	2,222	56.1	0.0	0.0	12	105.4	189.3	0.0	0.0	0	91.5	239.3	159.1	4.3	0.0	6.9	51.8	0	0.2	0	8.7	9.2	19.6	0.5	22.4	5.8	5.9	0	126.9	0.0	13.4	135.0	0	399.5	2,234	3,763
Hanford	SJV	1,007	329	570	47	2,692	0.2	0.0	0.0	48	3.3	104.7	0.0	0.0	2	6.7	56.0	35.3	0.0	15.0	17.7	21.0	0	1.0	229	0.4	10.1	34.6	1.1	28.6	6.1	63.8	0	227.1	10.8	22.6	28.2	0	29.0	2,969	2,677
Hickman	SJV	110	40	101	2	4,999	9.7	0.0	0.0	214	515.8	229.0	0.1	0.0	22	0.8	16.5	28.7	0.0	60.4	72.2	16.0	53	13.6	962	0.5	50.8	154.4	0.0	124.3	9.9	147.1	19	94.5	0.0	115.6	1.5	0	50.4	6,246	1,986
Hilmar-Irwin	SJV	355	162	254	32	21,584	19.6	0.0	0.0	1,910	138.4	132.0	0.0	0.0	4	0.1	111.3	11.8	0.3	57.0	41.4	8.8	354	3.7	2,570	0.0	0.4	48.3	0.0	45.3	25.8	2.2	12,801	100.0	0.0	4.5	144.9	16	12.2	39,234	1,714
Hollister	NCC	1,813	327	808	85	3,484	56.1	0.0	181.1	1,046	134.3	60.3	3.0	0.0	152	0.0	46.0	86.5	21.0	0.1	17.2	10.7	4,725	0.0	760	20.2	0.0	3.0	20.7	31.9	16.5	29.7	3,193	0.0	0.0	0.2	12.1	0	52.4	13,208	3,989
Home Garden	SJV	1,150	228	890	52	1,267	0.2	0.0	0.0	7	4.7	178.9	0.0	0.0	1	83.1	120.6	22.2	0.0	9.9	57.8	14.0	0	0.0	60	0.1	77.5	131.0	0.4	37.3	35.0	450.0	0	470.3	61.5	204.8	92.6	0	110.9	1,334	4,484
Hughson	SJV	1,190	342	681	66	35,111	3.0	0.0	0.0	155	340.0	509.5	0.0	0.0	51	0.0	5.3	7.7	0.0	27.1	92.2	4.3	6	7.0	775	12.5	17.1	281.9	0.0	236.9	4.8	258.2	500	395.8	0.0	43.0	4.8	6	3.0	36,553	4,584
Huron	SJV	1,840	198	830	603	449	13.1	0.0	0.3	247	786.6	407.4	3.5	0.0	373	12.2	552.2	26.2	364.0	0.0	197.6	13.1	12,269	3.7	1,240	457.9	4.2	13.0	1.6	108.5	43.2	1.8	4,171	221.3	3.7	80.4	756.1	0	442.6	18,375	8,359
Interlaken	NCC	231	55	126	53	6,926	56.2	0.0	58.9	45,201	20.1	59.9	0.1	0.0	202	0.1	23.7	0.7	0.0	0.0	17.3	347.3	0	0.0	55,086	63.7	0.0	0.6	35.3	4.4	11.1	25.6	282	0.0	0.0	0.3	0.0	0	0.0	107,495	1,392
Ivanhoe	SJV	843	128	456	196	20,785	5.9	0.0	0.0	10	5.0	907.5	0.0	0.0	4	79.3	316.0	262.8	2.1	1.4	0.7	221.2	4	145.0	122	0.3	17.3	54.4	0.0	46.3	0.2	48.3	0	48.0	0.0	322.0	1.0	0	10.3	20,921	4,123
Keene	SJV	8	5	5	1	0	0.0	0.0	0.0	0	0.0	0.9	0.0	0.0	0	0.0	0.1	6.0	0.0	0.0	0.9	0.2	0	0.0	0	0.0	0.0	2.2	0.0	1.3	0.0	0.0	0	0.0	0.0	7.0	0.0	0	0.0	0	37
Kennedy	SJV	1,026	196	523	81	1,562	0.0	0.0	0.0	90	21.7	37.9	0.0	0.0	3	2.6	17.5	28.8	0.2	1.4	9.7	15.1	94	3.7	73	2.2	1.9	6.4	0.2	18.4	1.1	4.3	72	48.0	0.0	3.1	46.5	0	39.3	1,892	2,139
Kerman	SJV	1,395	321	786	207	20,343	0.0	0.0	0.0	0	0.5	125.1	0.0	0.4	0	4.9	23.1	45.0	1.0	4.3	72.8	14.7	0	0.0	0	11.3	13.3	173.5	0.0	86.3	0.4	16.7	0	102.0	1.9	114.8	1.0	0	79.3	20,344	3,602
Kettleman City	SJV	3,154	371	487	1,641	27,330	0.0	0.0	0.0	0	17.3	652.9	0.2	0.0	1	0.0	4.6	5.4	1.0	0.0	198.5	0.0	583	0.0	0	5.8	476.8	3.1	0.0	449.1	1.7	50.1	2,366	0.2	6.3	0.2	9.3	0	38.2	30,279	7,575
Keyes	SJV	558	144	407	45	17,811	2.4	0.0	0.0	72	185.4	150.9	0.0	0.0	76	0.0	19.7	3.3	0.0	12.1	70.3	24.8	8	12.0	210	0.7	6.3	130.5	0.0	114.5	6.3	64.1	6,233	146.0	0.0	12.2	20.5	5	9.8	24,341	2,223
King City	NCC	1,065	185	520	360	1,109	100.8	0.0	707.2	205	24.2	179.9	1.9	0.0	287	2.3	72.6	0.3	0.4	1.3	87.9	137.1	3,208	0.0	41	32.4	14.5	73.7	264.6	92.7	119.0	0.0	332	0.2	0.0	50.6	17.9	0	4.4	4,895	4,402
Kingsburg	SJV	1,182	520	558	68	19,897	0.2	0.0	0.4	686	10.5	204.4	0.0	0.0	25	0.8	0.9	47.5	0.0	4.5	67.9	18.8	85	7.2	1,491	0.5	8.2	286.4	0.0	54.7	0.3	488.5	163	196.1	0.0	140.7	1.3	0	3.6	22,322	3,897
Lake of the Woods	SJV	66	33	87	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	185
Lamont	SJV	1,107	158	749	285	18,915	2.2	0.0	0.0	182	300.9	70.6	0.2	0.0	0	4.4	38.1	39.2	8.3	26.7	75.7	7.2	56,426	4.4	644	0.0	2.4	57.8	0.1	30.2	7.2	32.9	12,819	29.7	0.0	40.2	76.2	0	117.4	88,987	3,271
Lanare	SJV	92	26	68	29	880	15.7	0.0	0.0	0	6.5	277.3	0.4	0.0	8	70.8	78.7	96.7	2.5	1.8	10.9	12.3	443	3.2	0	108.9	1.5	37.8	0.0	190.2	28.6	36.5	744	56.4	3.6	14.5	19.3	0	243.3	2,067	1,541
Las Lomas	NCC	964	145	380	210	9,874	35.2	0.0	24.3	41,937	12.9	13.4	0.1	0.0	85	0.1	17.2	0.4	0.0	0.0	19.7	401.1	0	5.4	47,245	120.7	0.0	0.0	30.4	4.0	5.4	1.6	293	0.0	0.0	0.0	0.0	0	0.0	99,349	2,477
Lathrop	SJV	218	38	119	5	3,175	2.3	0.0	0.3	1,095	127.6	46.5	0.1	0.0	11	12.3	95.5	69.5	0.4	32.1	3.9	39.2	132	6.1	754	0.6	0.4	18.7	1.1	24.6	7.8	7.8	216	81.0	0.0	6.1	103.9	3	100.3	5,376	1,178
Laton	SJV	230	45	108	53	10,051	0.2	0.0	0.0	37	9.4	276.4	0.0	0.0	5	1.5	5.2	44.4	0.0	11.4	25.9	12.2	0	38.2	134	2.2	4.1	73.2	0.0	49.3	1.4	209.4	0	399.3	2.7	58.9	4.7	0	12.0	10,222	1,683
Le Grand	SJV	197	43	105	23	789	0.4	0.0	0.0	58	227.5	94.0	0.1	0.0	1	3.4	5.9	25.9	0.0	0.7	75.1	16.9	0	0.0	250	0.0	49.4	138.1	0.0	117.6	35.3	2.3	0	35.8	0.0	63.4	19.5	0	30.8	1,097	1,312
Lebec	SJV	26	11	16	0	0	0.0	0.0	0.3	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	147	0.0	0	0.0	0.0	0.4	0.0	0.6	0.1	0.0	0	0.0	0.0	0.0	0.0	85	0.0	232	54
Lemon Cove	SJV	93	55	106	10	382	4.8	0.0	0.0	1	0.2	411.5	0.0	0.0	0	28.7	187.1	534.6	4.1	0.0	0.0	66.3	4	76.5	2	11.6	46.3	93.2	0.0	79.1	0.0	19.4	0	0.9	0.0	678.5	3.1	0	0.2	389	2,510
Lemoore	SJV	808	148	348	39	138	0.1	0.0	0.0	1	10.2	153.4	0.0	0.0	0	2.8	37.2	44.8	0.3	5.1	2.5	4.9	165	0.3	2	48.1	3.9	13.1	0.3	19.0	1.9	6.7	0	100.8	12.7	3.2	41.6	0	211.9	306	2,068
Lemoore Station	SJV	482	2	62	3	0	5.3	0.0	0.1	0	72.6	246.3	1.4	0.0	2	37.1	135.5	39.0	3.0	0.0	6.5	43.5	2,047	0.0	0	139.3	4.0	128.9	0.0	120.8	38.4	21.0	2,567	99.8	15.8	0.0	170.0	0	256.0	4,614	2,136
Lincoln Village	SJV	1,667	923	1,070	0	135	0.0	0.0	0.0	6	19.8	20.3	0.0	0.0	1	0.6	6.7	22.7	0.2	0.0	1.7	6.5	15	1.1	156	0.8	0.4	3.5	0.0	5.3	0.1	2.0	0	11.7	0.0	8.1	11.2	0	35.1	312	3,820
Linden	SJV	45	17	21	1	4,109	1.7	0.0	0.0	614	110.7	261.9	0.1	0.0	26	48.3	45.3	62.6	5.0	0.4	81.5	153.6	999	62.9	1,514	106.5	8.7	71.3	6.4	135.2	7.2	135.7	413	609.7	0.0	84.9	87.1	0	49.8	7,649	2,247
Lindsay	SJV	1,620	388	883	461	165	0.9	0.0	0.0	1	2.8	332.1	0.0	0.0	0	5.8	180.2	241.7	0.7	1.9	3.6	96.2	0	112.5	8	0.8	5.7	105.1	0.0	26.0	0.6	28.9	0	32.5	0.0	252.7	1.0	21	7.6	195	4,790
Live Oak	NCC	1,207	601	837	17	260	0.1	0.0	0.0	0	0.0	1.3	0.0	1.4	1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0	0.0	18	0.0	0.0	0.0	1.1	0.1	0.0	0.0	124	0.0	0.0	0.0	0.0	0	0.0	404	2,665
Livingston	SJV	1,138	193	531	186	32,512	0.8	0.0	0.0	3,186	66.7	74.0	0.0	0.0	31	0.3	9.6	2.3	0.0	3.0	45.5	57.5	722	6.5	3,970	0.0	1.8	106.1	0.0	53.0	5.9	4.0	6,394	53.7	0.0	3.1	5.7	33	2.3	46,817	2,580
Lockeford	SJV	106	52	78	7	9,734	0.5	0.0	0.0	39	4.5	80.1	0.0	0.0	9	10.0	5.0	58.9	0.0	0.0	12.6	33.0	125	3.8	185	8.1	13.6	75.0	0.1	77.8	0.7	42.3	18	110.9	0.0	114.6	2.5	0	3.1	10,101	909
Lodi	SJV	1,304	660	955	83	1,786	0.3	0.0	0.0	46	24.4	50.3	0.0	0.1	11	0.9	15.9	66.9	0.1	12.6	14.2	6.4	744	3.3	102	1.5	3.6	43.7	0.0	46.5	0.5	17.5	413	78.1	0.0	50.9	38.9	0	164.4	3,092	3,653
London	SJV	1,082	113	884	601	15,210	0.1	0.0	0.0	2,410	298.7	264.3	0.0	0.0	7	5.5	10.2	38.9	0.8	5.8	53.6	251.5	0	207.4	713	0.6	80.9	311.8	0.0	118.9	0.8	1,328.5	0	103.3	0.0	103.9	1.6	0	12.8	18,333	5,886
Los Banos	SJV	1,114	293	589	62	448	1.2	0.0	0.0	0	48.6	38.7	0.0	0.0	0	19.9	2.4	67.5	0.0	1.9	1.5	96.3	42	0.5	0	17.1	0.0	1.4	9.5	26.5	7.2	0.3	126	38.3	6.3	0.2	55.2	0	248.9	615	2,747
Lost Hills	SJV	135	7	92	63	828	0.0	0.0	0.0	0	6.0	358.9	0.0	0.0	0	0.0	0.0	2.5	0.0	0.0	43.7	1.3	2,746	0.0	0	0.0	9.0	364.4	0.0	129.3	18.6	357.8	0	9.0	0.5	2.2	0.0	0	6.9	3,574	1,607
Madera	SJV	1,245	310	717	160	3,562	1.5	0.0	0.0	116	8.2	53.9	0.0	0.0	17	5.4	6.2	11.0	0.1	0.0	26.5	1.6	116	2.0	200	0.1	6.5	129.5	0.0	84.2	12.4	34.9	0	49.5	0.0	73.0	0.3	308	13.7	4,303	2,971
Madera Acres	SJV	353	66	184	16	907	0.3	0.0	0.0	50	12.2	65.3	0.0	0.0	27	0.1	1.5	8.9	0.0	0.0	12.5	23.7	0	3.5	79	0.1	2.7	105.9	0.0	99.4	54.9	35.3	0	11.1	0.0	38.2	0.0	54	0.9	1,090	1,121
Manteca	SJV	978	288	588	19	2,521	4.4	0.0	1.4	2,145	92.6	53.7	0.0	0.0	18	10.8	34.1	14.5	3.4	37.8	19.1	16.3	481	73.0	4,674	1.3	1.6	46.2	0.2	33.6	17.4	4.2	465	59.7	0.0	5.3	53.7	75	51.1	10,360	2,527
Maricopa	SJV	220	83	214	12	0	0.0	0.0	0.0	0	0.9	6.2	0.0	0.0	0	0.0	0.0	5.5	0.0	0.0	1.8	20.6	0	0.0	0	0.0	3.6	24.9	0.0	9.0	0.2	0.0	0	13.1	0.0	0.3	0.0	0	0.4	0	617
Marina	NCC	558	206	381	36	955	54.6	0.0	30.3	13,242	15.9	34.1	0.2	0.0	126	0.0	19.7	4.7	0.1	0.8	24.9	99.4	178	115.7	17,587	22.0	0.0	0.0	85.0	27.5	11.3	0.0	18	0.0	0.0	0.0	0.1	0	0.6	31,980	1,854
McFarland	SJV	1,640	226	846	371	4,067	0.2	0.0	0.0	465	5.8	578.2	0.4	0.0	22	1.6	11.8	36.4	0.3	0.0	109.3	11.6	1,069	10.0	1,791	0.9	5.7	155.9	0.4	175.9	25.2	1,157.5	102	82.7	0.0	90.8	0.0	436	88.8	7,931	5,654
McKittrick	SJV	20	4	9	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	33
Meiners Oaks	VENT	821	281	599	18	0	0.0	0.0	0.0	0	0.2	26.0	0.0	0.0	0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	3.9	0.0	37	0.0	37	1,759
Mendota	SJV	1,430	221	1,022	545	523	109.4	0.0	1.8	0	46.4	227.2	0.0	0.0	16	40.0	79.7	105.0	28.7	34.0	4.6	121.1	5,508	28.2	0	122.2	0.0	8.4	21.4	83.9	1.0	8.0	22,677	87.9	31.4	0.0	62.8	0	261.1	28,709	4,748
Merced	SJV	1,116	303	640	49	131	0.6	0.0	1.0	29	27.0	37.3	0.0	0.0	10	11.1	14.2	18.4	0.0	2.6	4.9	21.5	123	9.0	131	0.5	4.6	32.7	0.1	33.1	6.9	2.3	277	25.9	2.7	4.5	20.6	0	49.3	690	2,450
Mettler	SJV	244	37	295	0	280,879	34.6	0.0	5.6	940	1,411.7	1,138.6	0.0	0.0	2	0.4	25.1	40.0	129.9	396.3	242.9	598.9	315,207	2.3	152	0.2	7.5	339.6	0.0	491.7	42.3	15.6	392,741	48.6	0.0	129.9	128.9	0	602.2	989,919	6,411
Mira Monte	VENT	428	255	282	7	0	0.0	0.0	0.0	2	6.2	27.3	0.0	0.0	0	0.0	0.0	20.5	0.0	0.0	0.8	0.5	0	0.0	0	0.0	0.0	0.0	0.0	1.2	0.9	0.0	0	0.0	0.0	6.3	0.0	22	0.0	24	1,035
Modesto	SJV	1,579	583	1,067	27	6,799	0.6	0.0	34.4	73	90.5	90.2	0.1	0.0	19	0.0	8.2	6.4	0.0	2.8	21.7	29.9	168	12.2	245	2.3	14.7	52.9	0.0	34.6	5.2	29.6	5,666	62.4	0.0	16.1	9.2	83	14.1	13,034	3,812
Monterey	NCC	420	376	378	16	0	2.2	0.0	0.0	0	0.0	0.2	0.0	0.0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.1	0.2	0.1	0.3	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	1,198
Moorpark	VENT	557	74	197	9	423	2.1	0.0	6.4	578	26.4	69.8	1.0	0.0	2	1.7	0.2	9.4	0.0	0.2	2.2	18.2	412	0.0	1,043	0.0	0.9	4.4	0.6	1.8	2.0	0.2	0	0.0	0.0	5.4	0.6	23	2.5	2,479	994
Morada	SJV	296	221	192	16	4,148	0.1	0.0	0.0	378	28.9	152.6	0.0	0.0	24	24.8	11.1	103.5	1.0	0.0	57.9	83.5	32	53.7	1,007	41.2	8.9	68.8	0.0	56.4	1.7	32.8	22	324.8	0.0	62.3	19.4	0	28.4	5,588	1,911
Moss Landing	NCC	107	55	108	33	9,117	276.0	0.0	96.9	53,742	50.4	60.6	0.2	0.0	512	0.0	85.3	17.9	0.1	0.0	51.9	263.6	60	155.3	65,438	70.4	0.0	0.0	342.7	111.0	24.7	0.0	78	0.0	0.0	0.0	0.4	0	12.3	128,436	2,435

Appendix 3c. Population and pesticide densities for each community. Population densities are number per square mile. Pesticide densities are pounds per square mile. Pesticide densities are the 2006-8 average of community, local, and regional zones.

Community	Region	Child Population	People over 65	People with Disabilities	People Employed in Farming etc.	1,3-Dichloropropene	Acephate	Acrolein	Bensulide	Chloropicrin	Chlorothalonil	Chlorpyrifos	Cypermethrin	Dazomet	Diazinon	Dicofol	Dimethoate	Diuron	Endosulfan	EPTC	Iprodione
Newman	SJV	1,825	454	846	173	371	8.3	0.0	0.5	5	193.7	90.1	0.0	0.0	1	14.6	119.8	162.9	0.0	0.0	9.6
North Woodbridge	SJV	118	67	65	0	4,772	0.1	0.0	0.0	175	3.0	88.1	0.0	1.2	9	0.2	4.2	75.7	0.5	0.9	16.6
Oak Park	VENT	2,291	486	701	0	0	0.0	0.0	0.0	0	0.5	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Oak View	VENT	604	179	393	5	0	0.0	0.0	0.0	0	1.2	5.9	0.0	0.0	0	0.0	0.0	4.4	0.0	0.0	0.2
Oakdale	SJV	885	391	684	28	11,163	5.5	0.0	0.0	439	103.6	234.2	0.0	0.0	16	0.9	8.5	13.5	0.0	0.4	22.2
Oakhurst	SJV	95	129	130	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Oildale	SJV	1,280	521	1,104	13	355	1.2	0.0	0.0	1	6.1	17.8	0.0	0.0	0	0.0	2.9	2.3	0.0	3.4	2.8
Ojai	VENT	441	316	303	4	0	0.0	0.0	0.0	0	0.1	30.6	0.0	0.0	0	0.0	0.0	19.7	0.0	0.0	0.0
Opal Cliffs	NCC	596	326	559	8	371	0.0	0.0	0.0	1	1.1	2.7	0.0	0.3	1	0.0	0.0	0.0	0.0	0.0	0.0
Orange Cove	SJV	2,032	250	935	621	4,374	3.9	0.0	0.0	411	14.4	751.2	0.0	0.0	4	5.6	270.6	858.2	0.0	0.0	12.5
Orosi	SJV	1,069	241	694	320	6,078	1.2	0.0	0.0	699	14.5	407.1	0.0	0.0	129	1.4	257.6	183.4	0.7	75.1	26.9
Oxnard	VENT	1,479	378	876	188	24,182	34.7	0.0	34.2	30,137	241.5	101.2	1.0	45.5	10	0.1	12.0	0.8	0.0	0.0	8.5
Pacific Grove	NCC	690	757	650	12	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Pajaro	NCC	1,430	151	734	487	5,956	473.5	0.0	228.4	155,000	88.3	120.9	1.0	0.0	1,162	0.1	156.4	0.3	0.0	0.0	73.7
Parksdale	SJV	600	90	307	93	980	2.5	0.0	0.0	75	7.7	38.4	0.0	0.0	8	0.7	1.6	20.5	0.0	0.0	11.4
Parkwood	SJV	735	131	355	151	2,186	14.6	0.0	0.0	573	30.2	132.9	0.0	0.0	32	7.1	0.2	78.8	0.0	0.0	20.9
Parlier	SJV	2,604	335	1,136	565	16,416	0.5	0.0	1.0	146	52.5	467.4	0.0	0.0	113	0.5	8.6	75.3	1.7	0.0	81.9
Patterson	SJV	1,470	292	635	130	12,344	53.5	0.0	1.8	133	235.0	64.4	0.5	0.0	9	56.8	162.5	39.2	0.0	1.9	49.0
Pine Mountain Club	SJV	22	14	20	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Piru	VENT	180	39	63	6	698	7.3	0.0	5.8	412	6.3	47.8	0.1	0.0	5	0.0	0.3	24.6	0.0	0.0	3.6
Pixley	SJV	332	61	111	92	517	0.0	0.0	0.0	0	0.0	210.9	0.0	0.0	4	18.3	24.3	118.8	0.2	62.6	32.9
Planada	SJV	796	140	342	155	27	0.0	0.0	0.1	59	164.2	167.3	0.0	0.0	29	26.7	23.0	12.3	0.0	5.9	27.2
Poplar-Cotton Center	SJV	474	89	198	109	4,908	1.3	0.0	0.0	484	1.3	586.6	0.0	0.0	8	70.4	31.5	93.6	2.3	23.9	19.2
Port Hueneme	VENT	1,293	501	886	55	12,013	22.4	0.0	9.3	14,064	113.7	38.8	0.3	15.5	4	0.0	4.9	0.1	0.0	0.0	5.5
Porterville	SJV	964	266	530	107	3,862	0.5	0.0	0.0	74	3.6	174.9	0.0	0.0	2	6.7	72.7	218.5	0.6	1.8	5.5
Prunedale	NCC	93	36	62	6	7,022	43.2	0.0	47.0	16,766	43.1	21.3	0.2	0.0	102	0.0	25.4	2.6	0.6	0.2	16.8
Raisin City	SJV	69	29	13	6	28,315	0.0	0.0	0.0	24	2.3	269.1	0.0	0.0	8	0.0	0.7	19.9	0.0	4.5	110.0
Reedley	SJV	1,488	523	955	268	21,519	0.7	0.0	2.9	435	114.6	230.7	0.0	0.0	43	1.7	21.7	34.5	0.2	0.0	61.0
Richgrove	SJV	2,524	254	1,036	716	4,860	1.8	0.0	0.0	8	0.1	778.1	0.0	0.0	11	2.9	26.9	385.1	0.0	1.4	21.2
Ridgemark	NCC	211	210	138	4	398	3.4	0.0	23.2	139	7.1	19.2	0.1	0.0	22	0.0	2.9	1.3	1.3	0.0	5.9
Rio del Mar	NCC	382	325	249	3	584	4.8	0.0	0.6	4,061	44.7	17.1	0.0	0.2	7	0.1	0.8	0.0	0.0	0.0	1.3
Ripon	SJV	777	246	352	16	22,793	6.4	0.0	24.4	1,299	148.4	207.8	0.0	0.0	35	0.5	14.7	19.7	3.3	5.4	57.3
Riverbank	SJV	1,682	359	833	85	4,001	0.0	0.0	4.3	590	128.4	125.2	0.2	0.0	11	0.6	5.9	5.7	0.0	0.0	36.4
Riverdale	SJV	215	64	109	35	8,989	8.8	0.0	0.0	0	4.0	158.7	0.1	0.0	6	22.9	50.0	54.9	0.4	4.7	14.8
Riverdale Park	SJV	270	60	144	4	15,008	0.4	0.0	5.0	1	113.4	257.4	0.1	0.0	75	0.0	9.6	14.8	0.0	5.8	50.3
Rosedale	SJV	74	13	32	1	6,021	10.7	0.0	0.0	15	112.6	199.5	0.0	0.0	48	4.3	26.0	9.8	0.0	42.9	99.1
Salida	SJV	860	121	323	24	11,983	0.3	0.0	119.8	553	202.5	237.2	0.0	0.0	20	0.2	8.7	15.0	0.8	1.9	41.3
Salinas	NCC	2,546	562	1,539	430	12,815	168.9	0.0	88.3	29,513	27.9	104.2	0.6	0.0	426	0.8	102.0	1.5	0.0	5.1	99.9
San Ardo	NCC	394	105	169	136	8,991	71.5	0.0	170.6	1,773	101.1	34.2	0.1	0.0	57	3.5	19.5	18.2	0.0	2.3	30.4
San Joaquin	SJV	1,361	132	536	367	0	35.2	0.0	0.0	0	19.6	322.4	0.1	0.0	1	4.5	141.8	100.2	197.4	3.4	5.7
San Juan Bautista	NCC	610	238	361	34	654	287.8	0.0	736.0	914	267.1	194.3	2.4	0.0	685	0.0	243.9	0.2	53.6	6.1	73.9
San Lucas	NCC	483	78	217	123	2,448	33.6	0.0	241.9	71	5.4	36.9	0.3	0.0	203	10.8	35.5	0.2	0.5	2.2	4.7
Sanger	SJV	1,360	402	780	196	5,720	1.6	0.0	0.5	156	31.6	193.3	0.0	0.0	54	0.4	26.9	44.3	0.4	0.0	22.8
Santa Cruz	NCC	606	299	501	16	3,134	0.3	0.0	0.0	0	9.0	17.7	0.0	0.2	9	0.0	7.3	0.0	0.0	0.0	0.0
Santa Paula	VENT	1,952	662	1,251	280	1,907	2.0	0.0	3.4	1,351	25.1	106.6	0.2	6.7	4	0.0	0.9	4.0	0.0	0.0	0.7
Scotts Valley	NCC	639	342	272	6	162	1.8	0.0	0.0	0	0.2	0.9	0.0	0.1	0	0.0	0.1	0.0	0.0	0.0	0.0
Seaside	NCC	1,069	300	579	34	53	16.4	0.0	5.1	1,854	3.4	7.4	0.0	0.0	37	0.0	4.6	0.2	0.0	0.0	7.2
Selma	SJV	1,479	462	822	196	8,452	0.6	0.0	10.0	158	21.1	166.1	0.0	0.0	22	0.1	4.0	17.7	0.2	0.0	14.2
Shackelford	SJV	2,266	421	1,673	140	2,150	1.4	0.0	4.7	1	48.8	39.3	0.0	0.0	10	0.0	2.9	2.5	0.0	3.0	13.4
Shafter	SJV	260	57	131	33	14,893	9.1	0.0	0.0	143	68.8	498.6	0.0	0.0	223	3.1	36.1	30.0	0.0	72.4	117.1
Shaver Lake	SJV	4	4	7	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Simi Valley	VENT	803	216	417	2	130	0.2	0.0	1.2	87	3.7	3.7	0.1	0.0	0	0.1	0.1	0.6	0.0	0.0	0.1
Soledad	NCC	984	159	403	396	1,541	55.8	0.0	270.9	1,700	54.6	191.4	1.3	0.2	293	0.6	109.9	2.2	0.0	11.2	76.4
Soquel	NCC	1,158	477	750	19	259	0.1	0.0	0.0	15	0.8	1.8	0.0	1.6	1	0.0	0.0	0.0	0.0	0.0	0.2
South Dos Palos	SJV	385	63	277	41	0	5.5	0.0	0.0	0	21.2	204.3	1.5	0.0	4	7.4	66.3	38.5	1.4	37.6	0.0
South Taft	SJV	620	166	355	16	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.3
South Woodbridge	SJV	2,499	541	1,291	174	1,150	0.1	0.0	0.0	295	3.4	171.9	0.0	2.3	4	0.2	3.1	75.6	0.0	1.1	15.5
Spreckels	NCC	1,055	397	673	112	2,398	145.1	0.0	67.9	16,370	12.3	134.1	0.2	0.0	331	0.2	85.7	0.4	0.0	0.9	82.8
Springville	SJV	57	62	69	2	0	0.0	0.0	0.0	0	0.0	8.6	0.0	0.0	0	0.2	6.0	5.2	0.0	0.0	0.0
Squaw Valley	SJV	11	8	12	0	525	0.8	0.0	0.0	2	3.0	51.3	0.0	0.0	1	5.0	42.9	74.6	0.0	0.0	1.1
Stockton	SJV	1,413	446	887	65	1,623	0.0	0.0	0.1	258	56.3	56.1	0.0	0.0	4	3.6	33.7	57.6	0.1	3.9	6.7
Stratford	SJV	742	96	457	152	0	2.1	0.0	0.0	0	267.4	351.5	0.0	0.0	0	0.9	261.2	32.7	114.1	1.2	1.6
Strathmore	SJV	702	126	298	118	864	0.7	0.0	0.0	4	3.3	551.7	0.0	0.0	2	12.1	200.2	372.0	0.6	1.1	5.1
Taft	SJV	108	54	89	3	0	0.4	0.0	0.0	0	0.5	8.3	0.0	0.0	0	0.0	0.0	3.8	0.0	0.0	4.9
Taft Heights	SJV	1,947	722	942	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Taft Mosswood	SJV	954	264	542	35	510	0.0	0.0	0.0	82	19.7	16.9	0.0	0.0	1	1.6	16.1	24.3	0.3	2.0	1.3
Terra Bella	SJV	761	109	474	249	1,899	0.1	0.0	0.0	16	0.3	257.6	0.0	0.0	0	48.3	99.9	271.1	0.0	0.2	2.6
Thousand Oaks	VENT	552	236	301	2	917	3.6	0.0	4.2	1,379	35.1	19.8	0.3	0.0	3	0.1	1.6	1.9	0.0	0.2	1.3

Community	Malathion	Metam sodium	Methidathion	Methyl bromide	Naled	Norflurazon	Oryzalin	Oxydemeton-methyl	Oxyfluorfen	Permethrin	Phosmet	Potassium N-methyl dithiocarbamate	Propargite	S,S,S-tributyltriphos (DEF)	Simazine	S-metolachlor	Sodium tetrathiocarbonate	Trifluralin	Total fumigants	Total nonfumigants
Newman	3.0	0	1.3	273	9.7	1.7	14.5	2.0	47.3	18.8	2.9	306	23.8	0.0	5.1	139.4	0	186.1	956	4,355
North Woodbridge	43.5	915	1.4	54	5.3	15.3	74.4	0.0	148.5	1.0	42.3	3,377	150.4	0.0	143.7	4.5	0	14.3	9,294	1,093
Oak Park	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	3,478
Oak View	0.6	0	0.0	0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0	0.0	0.0	1.8	0.0	4	0.0	4	1,195
Oakdale	78.4	550	2.9	1,200	4.7	8.9	129.7	0.1	37.1	2.2	171.6	0	138.8	0.0	40.3	0.7	0	6.1	13,352	3,015
Oakhurst	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	354
Oildale	0.7	145	1.7	2	0.0	0.3	8.7	0.0	3.8	0.6	16.1	126	0.0	0.0	1.7	0.2	174	1.5	802	2,989
Ojai	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	17.2	0.0	4	0.0	4	1,131
Opal Cliffs	0.0	0	0.0	26	0.0	0.0	0.0	1.6	0.0	0.0	0.0	343	0.0	0.0	0.0	0.0	0	0.0	741	1,495
Orange Cove	373.8	0	22.4	16	0.0	38.9	111.7	0.0	47.5	0.2	77.7	0	7.2	0.0	940.9	0.0	0	12.9	4,802	7,392
Orosi	613.4	0	15.3	149	0.2	6.1	128.6	0.0	75.0	1.1	382.9	0	168.8	0.0	188.1	1.5	0	51.7	6,926	5,054
Oxnard	181.9	10,257	0.6	33,522	25.4	0.1	0.3	5.3	15.7	23.6	0.4	886	0.0	0.0	0.9	1.8	32	3.0	99,061	3,624
Pacific Grove	0.0	0	0.0	0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	2,109
Pajaro	680.3	0	1.3	196,490	276.6	0.0	0.0	422.6	23.1	82.3	2.9	263	0.0	0.0	0.1	0.0	0	0.0	357,709	6,595
Parksdale	1.1	0	1.6	180	0.0	4.5	94.9	0.0	83.4	14.1	17.6	0	21.7	0.0	135.7	0.0	0	8.5	1,236	1,564
Parkwood	0.3	0	1.2	1,376	0.0	5.8	150.8	0.0	136.0	10.8	162.7	0	48.6	0.0	208.0	0.0	22	3.3	4,156	2,416
Parlier	113.2	163	6.8	253	0.0	22.0	144.6	0.0	106.6	0.7	1,012.3	4,566	172.7	0.0	169.7	0.0	0	13.4	21,543	7,205
Patterson	8.7	1,257	3.2	1,127	50.6	13.0	20.7	0.8	22.7	14.9	58.1	3,188	51.1	0.4	8.4	127.1	0	79.5	18,049	3,660
Pine Mountain Club	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	55
Piru	81.8	82	0.0	307	0.0	39.4	2.3	0.3	36.6	2.2	0.0	0	0.0	0.0	9.3	0.6	5	1.9	1,504	564
Pixley	44.1	0	0.0	2	0.0	0.9	79.7	0.0	57.5	10.8	122.0	0	113.5	0.1	23.4	19.0	1,017	48.8	1,536	1,588
Planada	21.0	0	1.0	257	0.0	38.7	43.8	0.0	128.4	13.7	3.5	0	148.5	0.5	41.2	11.8	0	38.9	343	2,380
Poplar-Cotton Center	57.8	2	27.5	2,930	0.3	11.4	257.1	0.0	248.0	8.6	693.6	0	590.7	0.1	93.4	31.4	9	38.6	8,331	3,767
Port Hueneme	70.3	5,347	0.0	14,183	9.0	0.0	0.1	2.1	6.3	10.9	0.1	169	0.0	0.0	0.0	0.4	3	1.7	45,793	3,034
Porterville	31.1	1	40.4	800	0.6	54.8	27.7	0.0	30.4	2.7	56.0	0	29.8	0.0	226.3	1.4	0	7.2	4,737	2,862
Prunedale	269.9	774	63.5	19,803	71.9	0.0	0.0	56.9	21.2	8.4	0.8	587	0.0	0.0	0.0	1.1	0	0.2	44,952	993
Raisin City	6.0	0	0.1	28	0.0	34.8	251.7	0.0	160.6	2.2	87.2	0	145.6	0.0	313.8	2.2	0	108.1	28,367	1,644
Reedley	39.7	968	93.5	891	0.0	11.0	176.7	0.0	92.2	2.9	392.2	209	90.2	0.0	78.0	0.0	0	3.9	24,022	4,724
Richgrove	51.9	64	4.1	295	1.4	37.7	754.5	0.0	111.4	5.2	348.9	345	11.9	0.0	461.1	0.0	16,688	7.7	22,259	7,554
Ridgemark	41.9	1,230	0.0	245	3.1	0.0	4.5	1.1	9.1	1.6	2.0	559	0.0	0.0	0.7	0.4	36	0.7	2,608	713
Rio del Mar	39.0	0	0.0	5,625	6.0	0.0	0.0	1.7	0.5	0.3	3.5	3,577	0.0	0.0	0.1	0.0	0	0.0	13,848	1,086
Ripon	69.3	4	71.8	3,047	8.5	15.4	134.4	0.1	117.5	32.2	19.3	4,236	117.1	0.0	36.2	10.8	251	44.3	31,630	2,592
Riverbank	28.4	84	4.2	944	6.0	2.5	154.9	0.0	68.7	4.4	22.5	716	147.4	0.0	22.7	0.8	0	7.0	6,335	3,746
Riverdale	55.1	164	7.6	0	16.9	3.4	72.2	0.0	34.6	9.7	56.6	0	240.3	2.1	27.7	69.9	6	190.0	9,159	1,535
Riverdale Park	51.0	1,049	17.1	1,075	4.6	13.5	96.4	0.0	72.1	8.3	103.1	2,934	161.2	0.0	34.2	10.1	802	7.9	20,870	1,589
Rosedale	9.8	28,151	31.7	55	2.9	1.6	28.2	0.0	65.9	13.5	400.6	8,520	13.5	0.5	3.3	39.8	113	50.7	42,875	1,335
Salida	54.7	159	42.5	1,550	20.1	62.0	105.7	0.1	95.7	17.5	68.8	14,973	119.8	0.0	60.0	8.9	382	28.2	29,600	2,660
Salinas	497.1	1,479	19.0	32,590	116.3	0.0	0.0	257.7	19.2	51.1	0.0	71	0.0	0.0	0.0	1.2	0	1.8	76,467	7,065
San Ardo	0.0	0	0.0	129	3.2	0.0	3.0	64.8	20.2	462.3	0.0	3,818	19.8	0.0	13.1	23.4	0	0.3	14,712	1,922
San Joaquin	0.1	687	514.5	0	322.6	1.2	8.9	0.1	218.5	1.5	0.0	1,680	103.4	16.4	4.4	328.3	0	213.7	2,366	4,961
San Juan Bautista	165.2	40,228	4.0	1,032	98.5	0.0	0.1	257.9	104.7	142.7	4.2	23,296	0.0	0.0	0.0	3.0	0	2.0	66,125	4,575
San Lucas	2.8	422	0.0	60	0.6	2.4	30.0	19.5	22.9	34.4	0.0	1,364	0.3	0.0	47.6	55.4	0	2.5	4,365	1,693
Sanger	47.4	91	17.8	486	0.3	9.1	117.1	0.0	51.0	0.4	190.4	164	36.4	0.0	76.4	0.0	0	9.8	6,616	3,671
Santa Cruz	0.1	0	0.0	15	0.1	0.0	0.0	16.1	0.3	0.0	0.0	1,349	0.0	0.0	0.0	0.0	0	0.0	4,498	1,481
Santa Paula	15.4	488	0.0	2,060	1.1	59.3	7.8	6.8	1.5	3.8	0.3	0	0.0	0.0	32.0	0.2	90	0.2	5,903	4,420
Scotts Valley	0.0	0	0.0	0	0.0	0.0	0.0	0.8	0.3	0.0	0.0	81	0.0	0.0	0.0	0.0	0	0.0	243	1,263
Seaside	18.0	33	5.2	2,473	3.5	0.0	0.1	19.8	2.1	2.6	0.0	0	0.0	0.0	0.0	0.0	0	0.2	4,413	2,115
Selma	38.0	1,470	0.5	341	0.0	8.5	184.9	0.0	31.2	0.3	244.2	2,094	55.8	0.0	161.1	1.8	0	4.0	12,515	3,945
Shackelford	11.0	97	3.4	25	0.4	1.9	21.8	0.0	17.1	2.8	11.5	973	25.6	0.0	4.2	4.6	90	5.4	3,335	4,736
Shafter	7.0	11,374	140.1	1,666	10.0	2.9	66.0	0.0	147.1	40.4	1,478.3	2,465	58.0	1.1	15.1	22.0	128	49.1	30,669	3,577
Shaver Lake	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	14
Simi Valley	2.6	22	0.0	197	0.0	0.1	0.2	0.2	0.5	0.5	0.0	0	0.0	0.0	0.2	0.2	0	0.4	436	1,454
Soledad	114.4	0	0.0	2,389	18.9	0.1	34.0	160.1	59.3	53.1	0.0	1,997	0.0	0.0	27.0	10.6	68	9.1	7,694	3,497
Soquel	0.1	0	0.0	18	0.0	0.0	0.0	1.1	0.0	0.0	0.0	224	0.0	0.0	0.0	0.0	0	0.0	518	2,409
South Dos Palos	161.6	0	0.3	0	150.5	0.0	0.0	5.9	43.5	2.3	0.0	0	83.5	20.0	0.0	50.2	0	297.2	0	1,968
South Taft	0.0	0	0.0	0	0.0	0.4	3.4	0.0	1.2	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	1,161
South Woodbridge	76.6	78	2.4	82	0.6	2.6	70.1	0.0	79.9	6.1	37.2	390	146.5	0.0	149.5	4.9	0	13.2	1,997	5,369
Spreckels	261.2	30	0.8	22,149	37.6	0.0	0.0	224.2	15.6	41.0	0.0	0	0.0	0.0	0.0	0.0	0	2.2	40,947	3,681
Springville	0.5	0	0.1	0	0.0	0.0	3.4	0.0	0.9	0.0	0.2	0	0.0	0.0	5.6	0.0	0	0.0	0	220
Squaw Valley	42.3	0	2.0	0	0.0	2.6	5.9	0.0	2.9	0.1	11.2	0	0.5	0.0	78.2	0.0	0	0.5	527	357
Stockton	18.3	414	10.1	168	4.3	2.3	14.1	0.3	20.9	2.3	10.5	254	58.5	0.0	17.1	47.6	0	85.9	2,717	3,327
Stratford	1.2	304	0.1	0	93.3	6.8	0.5	0.0	80.7	0.0	0.7	167	150.5	12.2	0.0	92.0	0	530.9	471	3,449
Strathmore	150.5	0	71.3	55	1.4	4.2	174.8	0.0	34.1	0.7	78.3	0	31.1	0.0	494.2	0.9	23	3.8	946	3,439
Taft	12.2	162	0.0	0	2.5	6.6	70.4	0.0	28.0	0.3	0.0	0	18.2	0.0	0.2	1.5	0	2.6	162	415
Taft Heights	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	3,611
Taft Mosswood	8.7	92	1.8	68	0.9	0.4	3.6	0.2	6.2	1.0	3.2	79	15.9	0.0	4.6	20.9	0	56.6	830	2,002
Terra Bella	53.2	2	41.8	63	0.0	29.9	86.3	0.0	29.4	24.3	16.9	0	3.6	0.0	334.1	0.0	33	4.5	2,013	2,897
Thousand Oaks	15.4	256	0.4	2,068	2.1	0.0	0.4	0.9	1.2	3.6	0.0	137	0.0	0.0	1.0	0.7	36	0.9	4,794	1,188

Appendix 3c. Population and pesticide densities for each community. Population densities are number per square mile. Pesticide densities are pounds per square mile. Pesticide densities are the 2006-8 average of community, local, and regional zones.

Community	Region	Child Population	People over 65	People with Disabilities	People Employed in Farming etc.	1,3-Dichloropropene	Acephate	Acrolein	Bensulide	Chloropicrin	Chlorothalonil	Chlorpyrifos	Cypermethrin	Dazomet	Diazinon	Dicofol	Dimethoate	Diuron	Endosulfan	EPTC	Iprodione
Three Rivers	SJV	10	11	11	0	0	0.0	0.0	0.0	0	0.0	2.5	0.0	0.0	0	0.0	0.5	1.4	0.0	0.0	0.0
Tipton	SJV	684	121	359	202	98	0.5	0.0	0.0	0	0.0	322.4	0.0	0.0	1	120.8	106.9	263.4	0.1	122.9	4.1
Tracy	SJV	933	173	411	10	1,293	12.8	0.0	0.1	61	79.1	39.0	0.4	0.0	0	27.9	62.6	63.5	0.0	17.7	0.6
Tranquillity	SJV	435	121	263	94	0	124.3	0.0	0.0	0	143.5	580.1	0.0	0.0	1	8.5	26.9	48.3	71.4	0.8	4.7
Traver	SJV	333	72	215	80	53,578	0.1	0.0	0.0	1,009	9.7	1,179.7	0.0	0.0	72	3.4	109.5	43.5	0.7	76.9	186.3
Tulare	SJV	912	247	504	56	1,029	3.8	0.0	0.0	55	0.2	161.5	0.0	0.0	0	26.6	34.5	61.2	1.7	18.6	2.8
Tupman	SJV	161	23	90	0	0	0.7	0.0	0.0	0	4.7	8.6	0.0	0.0	0	0.3	1.2	2.3	0.6	3.7	2.3
Turlock	SJV	1,252	496	778	59	11,259	1.1	0.0	0.0	357	133.7	96.9	0.0	0.0	16	0.1	32.7	4.9	0.0	13.2	29.6
Twin Lakes	NCC	780	633	667	10	378	0.0	0.0	0.0	1	0.0	2.0	0.0	0.3	1	0.0	0.0	0.0	0.0	0.0	0.0
Valley Acres	SJV	38	13	21	0	0	1.1	0.0	0.0	0	0.0	7.2	0.0	0.0	0	0.0	0.0	1.1	0.5	0.0	0.0
Ventura	VENT	774	396	514	13	8,399	12.1	0.0	8.9	9,985	118.4	98.5	0.2	1.5	3	0.0	11.0	1.4	0.0	0.0	0.6
Visalia	SJV	1,001	349	541	42	7,486	0.6	0.0	0.0	146	2.4	128.7	0.0	0.0	6	22.4	32.0	51.7	9.2	4.3	3.3
Wasco	SJV	767	151	390	122	13,744	22.2	0.0	0.0	735	20.9	342.1	0.0	0.0	21	26.7	36.1	51.2	0.6	31.2	92.1
Waterford	SJV	1,559	304	823	130	4,670	8.2	0.0	0.0	913	335.5	271.4	0.1	0.0	14	0.8	6.7	17.7	0.0	26.3	35.0
Watsonville	NCC	2,337	591	1,297	457	4,035	102.4	0.0	70.3	61,481	39.5	90.3	0.5	0.0	277	0.2	43.2	0.3	0.0	0.0	16.4
Weedpatch	SJV	372	44	282	112	28,408	15.7	0.0	0.0	237	402.8	91.2	0.3	0.0	0	1.1	16.5	32.0	10.6	125.2	87.4
West Modesto	SJV	1,152	316	765	17	15,415	0.3	0.0	4.3	1	96.1	208.1	0.1	0.0	58	0.0	10.3	12.1	0.0	11.1	38.2
Westley	SJV	164	16	54	55	3,637	29.8	0.0	0.0	0	425.7	90.4	0.3	0.0	17	206.8	397.6	33.0	0.0	5.8	65.7
Winton	SJV	1,202	185	710	164	25,108	0.5	0.0	0.0	1,865	11.4	57.6	0.0	0.0	16	0.1	3.4	1.7	0.0	2.8	20.4
Woodlake	SJV	1,022	203	555	233	3,749	20.7	0.0	0.0	8	2.9	366.9	0.0	0.0	0	30.8	221.2	252.8	11.8	0.0	1.1
Woodville	SJV	154	26	60	56	5,779	3.7	0.0	0.0	51	0.8	232.8	0.0	0.0	39	37.2	26.0	99.8	2.4	45.8	20.4
Yosemite Lakes	SJV	50	34	44	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM		3,514	1,157	1,906	1,641	280,879	581.8	0.0	736.0	155,000	1,487.0	1,305.5	6.5	45.5	1,658	206.8	1,276.7	858.2	364.0	396.3	795.3

Community	Malathion	Metam sodium	Methidathion	Methyl bromide	Naled	Norflurazon	Oryzalin	Oxydemeton-methyl	Oxyfluorfen	Permethrin	Phosmet	Potassium N-methyl dithiocarbamate	Propargite	S,S,S-tributyltriphos (DEF)	Simazine	S-metolachlor	Sodium tetrathiocarbonate	Trifluralin	Total fumigants	Total nonfumigants
Three Rivers	0.1	0	0.0	0	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0	0.5	0.0	1.1	0.0	0	0.0	0	39
Tipton	106.2	0	0.0	0	0.0	4.3	58.7	0.0	24.5	9.8	121.0	0	615.5	0.0	7.7	22.4	0	112.8	98	3,392
Tracy	12.2	0	0.7	0	0.3	0.4	8.7	0.5	16.4	5.7	0.3	725	35.0	0.0	2.0	95.2	0	106.6	2,079	2,115
Tranquillity	0.2	91	91.6	0	322.4	0.7	1.9	0.9	160.0	0.2	4.8	1,973	22.3	99.9	1.0	408.4	0	193.8	2,065	3,230
Traver	84.8	0	8.5	262	0.6	2.7	241.2	0.0	214.4	0.8	2,203.1	0	285.4	1.7	552.9	1.4	0	76.1	54,848	6,056
Tulare	27.6	0	3.0	1,218	0.0	5.9	29.0	0.0	27.5	13.9	77.3	0	193.8	0.1	23.8	12.9	0	52.8	2,302	2,498
Tupman	1.2	1,031	0.0	0	0.0	2.8	2.8	0.0	4.9	1.6	1.6	0	2.0	0.6	0.0	2.0	0	3.3	1,031	321
Turlock	13.0	0	2.4	582	0.2	7.6	49.8	0.0	41.5	4.8	15.2	7,604	90.4	0.0	7.3	41.8	14	29.4	19,816	3,216
Twin Lakes	0.0	0	0.0	27	0.0	0.0	0.0	1.6	0.0	0.0	0.0	180	0.0	0.0	0.0	0.0	0	0.0	586	2,094
Valley Acres	0.0	357	0.0	0	4.7	0.0	0.0	0.0	4.1	0.0	0.0	0	0.0	0.0	0.0	3.4	0	3.8	357	98
Ventura	71.8	2,061	0.0	13,163	10.2	1.8	0.3	7.6	8.6	17.1	0.3	76	0.0	0.0	5.8	0.1	31	0.7	33,716	2,075
Visalia	26.2	0	16.6	1,915	0.0	3.4	25.2	0.0	35.5	2.3	97.1	0	163.3	0.4	52.8	9.6	0	23.3	9,547	2,649
Wasco	8.9	3,249	14.2	7,892	1.2	20.4	109.4	1.0	148.4	16.1	405.8	0	110.9	0.9	10.1	25.2	46	59.8	25,668	3,007
Waterford	16.8	565	4.6	2,402	0.5	34.9	133.0	0.0	103.0	6.0	84.8	18	114.9	0.0	84.3	1.4	0	44.0	8,568	4,159
Watsonville	689.6	0	1.0	77,941	159.7	0.0	0.2	76.8	7.4	18.4	31.1	979	0.0	0.0	0.3	0.0	0	0.0	144,436	6,306
Weedpatch	23.3	81,668	2.2	282	3.0	1.1	66.4	0.1	34.0	10.2	19.4	48,086	50.7	0.0	30.4	130.7	0	132.8	158,681	2,097
West Modesto	40.2	1,194	5.2	833	3.6	13.5	52.2	0.0	58.1	8.4	67.5	2,353	142.6	0.0	19.7	7.8	540	6.4	20,336	3,115
Westley	20.2	918	0.4	0	20.4	16.8	156.0	1.2	142.1	26.7	16.7	855	155.9	0.5	15.5	158.7	251	48.8	5,661	2,340
Winton	2.6	60	1.3	1,128	0.2	4.4	46.3	0.0	43.6	2.3	4.3	3,041	47.5	0.0	8.2	2.3	0	3.3	31,202	2,541
Woodlake	39.5	23	141.2	366	1.9	4.6	62.4	0.0	45.1	0.0	16.5	0	3.4	0.0	303.2	10.1	0	1.0	4,147	3,551
Woodville	73.2	0	3.5	4,048	0.2	24.3	40.9	0.0	55.4	7.5	233.9	0	238.1	0.1	52.5	15.6	0	55.4	9,878	1,605
Yosemite Lakes	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	129
MAXIMUM	3,821.0	315,207	1,404.8	196,490	457.9	476.8	754.5	835.1	491.7	462.3	2,203.1	392,741	626.2	132.6	940.9	756.1	16,688	602.2	989,919	10,814