APPENDIX A

Project Objectives, Pesticides, and Community for Monitoring

Department of Pesticide Regulation

Environmental Justice Pilot Project
Project Objectives, Pesticides, and Community for Monitoring

June 2005

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Overview

As part of its Environmental Justice Action Plan, Cal/EPA is conducting six pilot projects that incorporate some of the themes in the Governor's Environmental Action Plan and focus on environmental risk factors that impact children's health. As part of this effort, the Department of Pesticide Regulation (DPR) will conduct an air monitoring project in the Fresno County community of Parlier. This document describes objectives and activities for the first phase, and provides background on how the community and pesticides were selected.

DPR's project, as well as the other Cal/EPA environmental justice pilot projects, will include additional elements to address definitions of and guidance for cumulative impacts, precautionary approaches, and public participation. These elements will be addressed as the project evolves. In addition, DPR's pilot project will include a strong public participation focus, with establishment of a local advisory group (LAG). The LAG will provide recommendations and input to the DPR staff involved in that pilot project. The LAG has

been selected to provide for a diversity of viewpoints and representation of community representatives, local agencies, the business community, and other local stakeholders

Project objectives:
The objectives define the scope of the project. These objectives may be refined after discussion with the LAG.:

- Are residents of the community exposed to pesticides in the air?
- Which pesticides are people exposed to and in what amounts?
- Do measured pesticide air levels exceed levels of concern to human health, particularly children?

Candidate pesticides to monitor:
DPR proposes to attempt to monitor for 21 to 27 pesticides. Candidate pesticides were selected based on the following criteria:

- Statewide use
- Volatility
- DPR risk assessment priority
- Valid monitoring method

Community selection:
DPR evaluated 83 communities, 81 of them in Merced, Madera, Fresno, Kings, and Tulare counties. In addition, one community each was evaluated in Kern and Stanislaus counties. These criteria were used to prioritize the communities:

- Community environmental justice factors
    - Child population (less than 18 years old)
    - Non-white population
    - Family income
    - Pesticide drift illnesses
- Availability of cumulative impact data
    - Pesticide well monitoring
    - Monitoring stations for criteria air pollutants
- Pesticide use
    - Regional use (within 5 miles of community) of four different categories of pesticides
    - Local use (within 1 mile of community) of four different categories of pesticides

DPR also considered other factors, including air sampling feasibility, weather patterns, and the potential for collaboration with other projects focused on environmental health.

Based on an extensive analysis of all these factors, DPR selected Parlier in Fresno County for monitoring.

Introduction

Cal/EPA's environmental justice strategy includes four overall goals:

1. Ensure meaningful public participation and promote community capacity-building to allow communities to effectively participate in environmental decision-making processes.
2. Integrate environmental justice into the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.
3. Improve research and data collection to promote and address environmental justice related to the health and environment of communities of color and low-income populations.
4. Ensure effective cross-media coordination and accountability in addressing environmental justice issues.

As part of its Environmental Justice Action Plan, Cal/EPA is developing and conducting six pilot projects that incorporate these goals and some of the themes in the Governor's Environmental Action Plan, emphasizing environmental risk factors that impact children's health. DPR was asked to develop a pilot project in the Central Valley, focusing on pesticides in a rural, farming community.

Because they are located closer to agricultural fields, California rural communities may have higher concentrations of pesticides in ambient air compared to urban communities. Air monitoring conducted by DPR and ARB currently provides limited data to estimate human exposure to both single and multiple pesticides over several months or years.

This pilot project will provide more systematic air monitoring for a community in the Central Valley and therefore will serve as a more robust foundation for exposure assessment. DPR conducted a similar project in Lompoc (Santa Barbara County) and the U.S. Environmental Protection Agency is completing one in McFarland (Kern County). DPR will use similar methods for this study. For example, air sampling devices are typically placed on the roofs of public buildings (like schools), and analyses are done for a number of targeted pesticides. The study will include as many as 27 pesticides. Monitoring will likely occur at two to four sites in Parlier, sampled four to twelve times per month, for 6 to 12 months. As the first step in the planning process, DPR established the following project objectives, criteria for selecting pesticides, and criteria for selecting the community for monitoring.

Project Objectives

The objectives define the scope of the project and are consistent with the overall environmental justice goals. The goal in developing the objectives was to make them simple, measurable, attainable, realistic, and timely. DPR selected the following objectives, but may refine them after discussion with the LAG.

- Are residents of the community exposed to pesticides in the air?
- Which pesticides are people exposed to and in what amounts?
- Do measured pesticide air levels exceed levels of concern to human health, particularly children?

Pesticide Candidates for Monitoring

DPR selected candidate pesticides for monitoring based on potential health risk, with higher-risk pesticides having higher priority for monitoring. DPR selected higher-risk pesticides based on the following criteria:

- Statewide use
- Volatility
- DPR risk assessment priority*
- Valid monitoring method

** NOTE: Risk assessments have been completed on several of the target pesticides. However, each pesticide is 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.*

Pesticide health risk is a function of exposure and toxicity. Use and volatility are surrogates for exposure. Risk assessment priority is a surrogate for toxicity. Priority was also given to pesticides that can be monitored as part of a suite of chemicals (that is, pesticides for which a laboratory method exists that allows detection of multiple pesticides in a single analysis).

Table 1 (below) shows the top 100 pesticides used on agricultural sites in the state during 2002 which are potential candidates for monitoring. (2002 data was the most recent available when this analysis was done.) The 19 pesticides with scores of 10 or higher are considered high-priority candidates for monitoring.

Two of the nineteen pesticides (paraquat and maneb) cannot be monitored because no method to analyze them in air has been developed. (DPR and ARB efforts in this regard have not been successful to date.)

Several pesticides can only be monitored as single compounds. DPR has resources to use no more than two analytical methods in this project. The first should be a modification of the method DPR used for its Lompoc project, as it is a “screening” method that allows a single test to detect multiple chemicals (in this case, as many as 24 different pesticides). The other method should be a single-chemical method for another high priority pesticide, such as methyl isothiocyanate (MITC, a breakdown product of metam-sodium), or chloropicrin.

Some high-priority pesticides, in particular methyl bromide and 1,3-dichloropropene, cannot be analyzed with instruments available to DPR. The State Air Resources Board (ARB) conducted the previous ambient air monitoring for these pesticides as part of DPR’s toxic air contaminant program. ARB has agreed to assist DPR in this project by monitoring for these pesticides.

The final selection of the pesticides for monitoring will be made in consultation with the LAG.

New monitoring methods will have to be developed for this project. While this pilot project will be in the San Joaquin Valley, in future years, air monitoring may be done in other areas of the state. Therefore, the laboratory is attempting to add several pesticides to the Lompoc method, including ones with that are little used in the San Joaquin Valley. If the laboratory

can develop a single procedure for a broad range of pesticides, DPR will be able to use a standard method in each new area monitored, achieving significant cost savings.

Community Candidates for Monitoring

DPR selected the community based on objective data, using criteria that can be quantified, validated, and verified. This provides a more transparent and fair selection process.

DPR evaluated 83 communities, 81 of them in Merced, Madera, Fresno, Kings, and Tulare counties. These five counties have high pesticide use (all are among the top 10 counties) and can be sampled by DPR's Fresno-based staff. In these five counties, DPR evaluated all communities included by name in the 2000 U.S. Census, except those communities in foothill areas. Several of these communities had been suggested by persons who commented on earlier drafts of this plan.

DPR also evaluated two communities suggested by commenters that are not in one of the five counties, Arvin (Kern County) and Grayson (Stanislaus County).

Commenters also made numerous suggestions for criteria to select the community. DPR developed its selection method based primarily on criteria suggested by one or more commenters. Each of the 83 communities were rated on the following categories and subcategories:

- Environmental justice factors
    - Population density of children (less than 18 years old)
    - Non-white population percentage
    - Median family income
    - Number of drift illnesses
- Availability of cumulative impact data
    - Monitoring density for pesticides in municipal wells
    - Monitoring stations for criteria air pollutants
- Pesticide use
    - Regional (within 5 miles of community) use density of organophosphates
    - Regional (within 5 miles of community) use density of fumigants
    - Regional (within 5 miles of community) use density of copper and sulfur
    - Regional (within 5 miles of community) use density of other pesticides
    - Local (within 1 mile of community) use density of organophosphates
    - Local (within 1 mile of community) use density of fumigants
    - Local (within 1 mile of community) use density of copper and sulfur
    - Local (within 1 mile of community) use density of other pesticides

Category Descriptions:

All subcategories were assigned a factor of 1 to 4 (a few subcategories were assigned rating factors from zero to 4). Four represented the highest priority for monitoring. For each subcategory, the 83 communities were divided into four groups. In most cases, the 20 communities with the highest values (or lowest values where appropriate) were rated four, the second 21 communities were rated three, and so forth. In most cases, the subcategory ratings are based on density per square mile rather than numerical totals. This minimizes the effect of the size of the community in the ratings. Without this adjustment, large

communities such as Fresno would show much greater child population and pesticide use in comparison to communities with small areas.

Child population density was determined from the 2000 Census and expressed as number of people less than 18 years old per square mile of the community. The 83 communities were divided into four groups and rated one to four, as described above.

Non-white population percentage was determined from the 2000 Census and expressed as the percentage of the community population. The 83 communities were divided into four groups and rated one to four, as described above.

Median family income was determined from the 2000 Census and expressed as the number of dollars per year. The 83 communities were divided approximately into four groups and rated one to four, as described above.

Drift illnesses were determined from DPR's Pesticide Illness Surveillance Program database for 1993 through 2002, and expressed as the number of non-occupational drift illnesses within the community. Only 11 of the 83 communities had illnesses documented in the database, so the normal groupings were not used. The four communities with 51 or more illnesses were rated four. No communities were rated three. The three communities with 13 to 16 illnesses were rated two. The four communities with two to seven illnesses were rated one. All other communities were rated zero. DPR considered expressing drift illnesses as a density or per capita basis, but this appeared to add an unnecessary level of complexity since only a few communities had illnesses and most were associated with small communities. DPR also considered using number of drift episodes, rather than number of illnesses as the criterion. However, very few communities had more than one episode, so this provided very little separation in ratings between communities.

Monitoring density for pesticides in municipal wells was determined from DPR's Well Inventory database for 1999 to 2004 and expressed as

$$\frac{\text{Number of municipal wells sampled x number of pesticides sampled}}{\text{Square miles of the community}}$$

Of the 83 communities, 28 had no municipal well monitoring data and were rated zero. The remaining communities were divided into groups with similar well monitoring densities. The 23 communities with the highest well monitoring density were rated four. The next 13 communities were rated three. The next seven were rated two. The next 12 were rated one.

Air monitoring stations were determined from ARB's and San Joaquin Valley Air Pollution Control District's (APCD) air monitoring network, and expressed as the number of criteria air pollutants monitored within the community. Of the 83 communities, 75 have no air monitoring stations. Three communities are monitored for five to six criteria air pollutants and were rated four. Two communities are monitored for three criteria air pollutants and were rated three. Three communities are monitored for one or two criteria air pollutants and were rated two. Those with no monitoring stations were rated zero.

All ***pesticide use*** was determined from DPR's 2002 pesticide use report database, and divided into eight subcategories. Use was compiled for two different area sizes and four types of pesticides. The two areas were regional and local use. ***Regional use density*** was expressed as pounds reported per square mile within five miles of the community boundary. ***Local use density*** was expressed as pounds reported per square mile within one mile of the community boundary.

Commenters were interested in specific types of pesticides. In addition, disparities in application rates (and therefore, in amount used per application) would give disproportionate weight to some pesticides if use were rated on total pounds of all pesticides. Therefore, pesticide use density was divided into four types:

- Organophosphates (14 pesticides in this subcategory);
- Fumigants (4 pesticides);
- Sulfur and copper (2 pesticides); and
- 13 other pesticides included in the Lompoc multi-pesticide method, or which DPR is attempting to add to the Lompoc method.

For each of the eight pesticide subcategories, the 83 communities were divided approximately into four groups, usually with the 20 communities with the highest pesticide use density rated four, the second 21 communities rated three, and so forth. A few communities had no use of some of the pesticide subcategories. These were rated zero.

How the community rating factors were weighted:
A rating for each of the three major categories (environmental justice, availability of cumulative impact data, and pesticide use) was determined by averaging the subcategory ratings. The three major category ratings were then added together for an overall community rating. This system gives equal weight to each of the three major categories.

Communities that are highly rated for monitoring:
Table 2 (below) shows the subcategory, category, and overall ratings for each community. The key to Table 2 gives a detailed description of the rating system. Appendix A contains charts showing a comparison of the 30 communities with the highest overall ratings for each of the 14 subcategories.

Based on this system, the following communities had the highest <u>overall ratings</u> (maximum rating of 12):

- Parlier (Fresno County), 10.0
- Arvin (Kern County), 8.4
- Visalia (Tulare County), 8.4
-

The following communities had the highest <u>environmental justice ratings</u> (maximum of 4):

- Earlimart (Tulare County), 4.0
- Arvin (Kern County), 3.5
-

The following communities had the highest <u>cumulative data availability ratings</u> (maximum of 4):

- Clovis (Fresno County), 3.5

- Parlier (Fresno County), 3.5
- Visalia (Tulare County), 3.5

The following communities had the highest pesticide use ratings (maximum of 4):
- Kingsburg (Fresno County), 3.9
- London (Tulare County), 3.8
- Huron (Fresno County), 3.6

Figure 1 shows the geographic locations of the highly rated communities listed above.

Air Sampling Considerations:
Several of these communities are currently monitored by ARB or the APCD for criteria air pollutants, or have been monitored previously for the toxic air contaminant program. In addition, DPR staff scouted most of the highly rated communities for monitoring sites. 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
- Can be routinely sampled in four hours by DPR Fresno staff (minimizing travel time and costs and thus maximizing resources that can be directed to sampling and analysis)

The monitored community should have at least two sites that meet the minimum and preferred criteria listed above. DPR's preliminary observations show that the following highly rated communities do not meet all of these criteria:
- Arvin – cannot be sampled within four hours
- London – possibly one location that meets the preferred siting criteria

However, no site was eliminated from consideration because it could not meet the preferred criteria.

Weather Considerations:
Certain weather conditions are known to produce higher air concentrations, all other factors being equal. These conditions include low wind speed or calm conditions and persistent wind direction. DPR evaluated weather data from the State Department of Water Resources – California Irrigation Management Information System (CIMIS), for 1995 through 2004. Ratings were not determined for each community due to the overwhelming amount of

meteorological data. However, the highly rated community candidates can be divided into a few geographic areas. The historical weather data for the following areas were compared:

- Arvin
- Huron
- Mendota
- Parlier
- Visalia

Figures 2 and 3 show the wind speed and wind direction for each of these communities. Figure 2 shows that low wind speeds (less than 4.5 miles/hour or 2 meters/second) occur with greater frequency in Arvin, Parlier, and Visalia. Figure 3 shows that persistent wind direction occurs with greater frequency in Huron and Mendota. Since none of the communities had high frequency of both low wind speeds and persistent wind direction, air concentrations in these five areas would likely be comparable, all other factors being equal. In other words, weather conditions do not favor one community over another for this project.

Other Considerations:

Of the highly rated communities, the following ones may be less desirable for monitoring because they may not meet one or more of the overall environmental justice goals of the pilot project:

- Clovis – relatively low percentage of non-whites in population; relatively high income levels; relatively large population and area
- Kingsburg – relatively low percentage of non-whites in population; relatively high income levels
- Visalia – relatively low percentage of non-whites in population; relatively high income levels; relatively large population and area

Collaboration with other projects:

A number of communities under consideration offered benefits associated with collaboration with organizations planning complementary or related studies:

- The University of California, Davis, Agricultural Health and Safety Center plans a study of occupational and environmental health hazards in a migrant farmworker population, focusing on Mendota.
- The University of California, San Francisco, Valley Air Pollution Health Effects Research Institute in Fresno plans a study to evaluate correlations between asthma in children and air toxics, including pesticides. This study will examine asthma prevalence and air concentrations at two urban and two rural schools. The schools have not been selected, but they will likely be located in Fresno County.
- The California Environmental Health Tracking Program (joint program of the Centers for Disease Control and Prevention, California Department of Health Services, and Cal/EPA's Office of Environmental Health Hazard Assessment) is conducting a pilot project in the San Joaquin Valley to demonstrate the feasibility of linking exposure (including pesticides) and health outcomes data. This project will also evaluate potential relationships between exposure and health outcomes.

In this regard, Parlier and Mendota are more desirable for monitoring to take advantage of these collaborative projects.

Conclusions and Recommendations

Pesticides:
DPR selected pesticides for monitoring based on high statewide use, high volatility, high toxicity, and availability of monitoring methods. DPR likely has the resources to conduct monitoring using two methods. A modification of DPR's method used for the Lompoc project will be one of the methods used to analyze samples, as it will likely be able to analyze for most if not all of the following 21 pesticides (indicated by "DPR-Lompoc" or "DPR-Lompoc add" in Table 1): ***azinphos-methyl, chlorpyrifos, cypermethrin, diazinon, dicofol, dimethoate, diuron, endosulfan, EPTC, malathion, metolachlor, molinate, naled, oxyfluorfen, permethrin, propanil, propargite, SSS-tributyltriphosphorotrithioate (DEF), simazine, thiobencarb, and trifluralin***.

The other method will be a single-chemical method for another high-priority pesticide, such as ***MITC or chloropicrin***. With ARB assistance, the project will analyze for these pesticides as volatile organic compounds: carbon disulfide; 1,3-dichloropropene; and methyl bromide. ARB will also analyze for the following pesticides as metals/elements: chlorine, copper, and sulfur.

The pesticides included in the monitoring may be revised after discussion with the LAG.

Community:
DPR selected the community based on objective data. DPR has developed criteria that can be quantified, validated, and verified, providing a more transparent selection process. In addition, the analytical approach and information gathered will be useful in selecting communities for any future air monitoring projects.

DPR selected Parlier (Fresno County) for monitoring based on community environmental justice factors (child population, non-white population, income, drift illnesses); availability of cumulative impact data (well data, criteria air pollutant data); pesticide use (within one mile and five miles of the community); air sampling considerations; weather patterns; and possible collaboration with complementary studies.

Parlier has the highest overall rating (10.0) by a substantial margin. The next highest communities were Arvin and Visalia (8.4), Orange Cove (8.1), London (8.0), Cutler (7.8), and Reedley and Farmersville (7.6). Note that Parlier is 1.6 points higher than the next highest community, and 0.1 or 0.2 points separate most of the other communities. Alternatively, the 1.6 points separating Parlier and the two communities that ranked second is more than the 1.5 points separating the ratings of the next 20 communities (i.e., those ranked second through twenty-second).

In addition, Parlier is a candidate for UCSF's asthma study. Parlier also offers the potential of a collaborative relationship with the University of California Kearney Agricultural Center. The mission of the Kearney Center (located just outside Parlier) is to provide state-of-the-science research and educational programs to promote sustainability of California's agriculture industry and to enhance the quality of the rural environment. The possibility of consultation with the world-class scientists at Kearney would be beneficial not only during

the air monitoring portion but, even more important, during any mitigation development phase of the project. From a monitoring standpoint, Parlier likely has several preferred monitoring sites. Parlier's only drawback is that no non-occupational drift episodes have been reported. Also, "other" pesticides have moderate rather than high use.

DPR considered two other highly rated communities for monitoring: Arvin and Mendota. Arvin had the second highest overall rating (8.4). Arvin would be the preferred community if availability of cumulative impact data was not a factor, or if fumigant use was an overriding consideration. However, collection of cumulative impact data is one of the goals of all the environmental justice pilot projects being conducted by Cal/EPA. Furthermore, if this project was to focus on high fumigant use, the logical choice would have been a coastal farming community, as fumigant use is highest in the Central and Southern coastal areas of the state. A significant drawback for Arvin is that it is not a candidate for any of the collaborative health studies. Also, Arvin may only have one or two preferred monitoring sites. Its distance from Fresno (more than 130 miles) would mean that additional travel and per diem expenses would be incurred, resulting in fewer resources for sampling (10 to 30 percent fewer samples would be collected). Arvin's monitoring station for criteria air pollutants is located approximately three miles outside of the community.

Mendota has a lower overall rating (6.5, 25th highest) than Parlier and Arvin, as well as other communities, and normally would not be a leading candidate for monitoring. Mendota has little cumulative impact data available. Mendota has moderate use of most pesticides; none of the pesticide groups have high use. Mendota's advantage over other communities was the opportunity for collaboration with the UCD health study.

Tables 3 through 6 and Appendix B (maps showing key features and pesticide use) provide detailed information used to develop the rankings for Parlier, Arvin, and Mendota. Table 5 shows that a variety of commodities (although in different combinations) are grown in the region surrounding the leading candidate communities. The Parlier area primarily has fruit and nut orchards, and grapes, with some vegetables and nurseries. The Arvin area has more varied crops, including grapes, vegetables, cotton, and orchards. The Mendota area has grapes, vegetables, and field crops. From 19 to 39 different crops within five miles of each community were treated with candidate pesticides. Table 6 shows reported pesticide use from 2001 through 2003 (2004 data is not yet available) and indicates recent use is consistent for most pesticides.

The other communities with high overall ratings (Visalia, London, Orange Cove, Cutler, Reedley) do not offer any advantages over Parlier, except some have higher use of "other" pesticides, but lower ratings in most other categories. Earlimart and Huron would be highly rated (along with Parlier and Arvin) if availability of cumulative impact data was not a criterion for community selection.

Table 1. Pesticide candidates for DPR's environmental justice pilot project. Each category is rated one to four, with four representing the higher priority for monitoring (see key following table). Total Rating represents the sum of the use rating, volatility rating, and risk assessment rating. Pesticides with a "DPR-Lompoc" or "DPR-Lompoc add" monitoring method will likely be included in the monitoring.

Pesticide	2002 Statewide Use Rank	2002 Statewide Use (lbs)	Volatility	DPR Risk Assessment Priority	Monitor Method	Use Rating	Volatility Rating	Risk Assess Rating	Total Rating	TAC	Prop 65
1,3-DICHLOROPROPENE	6	5,412,503	High	High	ARB-VOC	4	4	4	12	yes	yes
CHLOROPICRIN	8	4,339,662	High	High	DPR-single	4	4	4	12	no	no
METAM-SODIUM [MITC]	3	15,518,465	High	High	DPR-single	4	4	4	12	yes	yes/no
METHYL BROMIDE	4	6,594,515	High	High	ARB-VOC	4	4	4	12	yes	some
POTASS N-METHYLDITHIO CARBAMATE [MITC]	18	1,267,737	High	High	DPR-single	4	4	4	12	yes	no
CHLORPYRIFOS	16	1,446,547	Med	High	DPR-Lompoc	4	3	4	11	no	no
MOLINATE	22	881,605	Med	High	DPR-Lompoc add	4	3	4	11	no	no
PROPARGITE	21	977,039	Med	High	DPR-Lompoc add	4	3	4	11	no	yes
SULFURYL FLUORIDE	9	3,045,084	High	Med	ARB-single	4	4	3	11	no	no
2,4-D, DMA SALT	41	452,155	Med	High	DPR-single	3	3	4	10	yes	no
ACROLEIN	59	283,541	High	High	ARB-single	2	4	4	10	yes	no
CHLOROTHALONIL	32	630,275	Med	High	ARB-single	3	3	4	10	no	yes
DIAZINON	29	689,603	Med	High	DPR-Lompoc	3	3	4	10	no	no
DIURON	17	1,303,745	Med	Med	DPR-Lompoc	4	3	3	10	no	no
MALATHION	33	619,811	Med	High	DPR-Lompoc	3	3	4	10	no	no
MANEB	25	852,435	Low	High	Unsuccessful	4	2	4	10	no	yes
PARAQUAT DICHLORIDE	24	869,244	Low	High	Unsuccessful	4	2	4	10	no	no
PROPANIL	15	1,470,535	Low	High	DPR-Lompoc add	4	2	4	10	no	no
TRIFLURALIN	19	1,103,442	Med	Med	DPR-Lompoc	4	3	3	10	yes	no
ACEPHATE	61	258,955	Med	High	DPR-single	2	3	4	9	no	no
ALDICARB	65	244,786	Med	High	DPR-single	2	3	4	9	no	no
CAPTAN	47	394,104	Low	High	Unsuccessful	3	2	4	9	yes	yes
CARBARYL	62	256,030	Med	High	DPR-single	2	3	4	9	yes	no
DIMETHOATE	52	332,543	Med	High	DPR-Lompoc	2	3	4	9	no	no
IPRODIONE	64	251,521	Med	High		2	3	4	9	no	yes
MANCOZEB	46	396,344	Low	High	Unsuccessful	3	2	4	9	yes	yes
MCPA, DMA SALT	50	347,377	Med	Med	DPR-single	3	3	3	9	no	no
NALED	73	201,504	Med	High	DPR-Lompoc	2	3	4	9	no	yes/no
OXYFLUORFEN	44	425,817	Med	Med	DPR-Lompoc add	3	3	3	9	no	no
PERMETHRIN	48	385,403	Med	Med	DPR-Lompoc	3	3	3	9	no	no
PHOSMET	45	405,088	Med	Med	DPR-single	3	3	3	9	no	no

Table 1 continued

Pesticide	2002 Statewide Use Rank	2002 Statewide Use (lbs)	Volatility	DPR Risk Assessment Priority	Monitor Method	Use Rating	Volatility Rating	Risk Assess Rating	Total Rating	TAC	Prop 65
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	76	190,149	Med	High	DPR-Lompoc add	2	3	4	9	yes	no
SIMAZINE	31	634,888	Med	Med	DPR-Lompoc	3	3	3	9	no	no
ZIRAM	30	654,062	Low	High	Unsuccessful	3	2	4	9	no	no
AZINPHOS METHYL	88	153,200	Med	High	DPR-Lompoc add	1	3	4	8	no	no
BENSULIDE	74	196,249	Med	Med		2	3	3	8	no	no
CHLORINE	39	502,944	High		ARB-metal	3	4	1	8	no	no
CHLORTHAL-DIMETHYL	72	201,919	Med	Med	DPR-single	2	3	3	8	no	no
CYPERMETHRIN	55	302,983	Med	Med	DPR-Lompoc add	2	3	3	8	no	no
DICOFOL	79	182,464	Med	High	DPR-Lompoc	1	3	4	8	no	no
ENDOSULFAN	89	150,954	Med	High	DPR-Lompoc	1	3	4	8	no	no
ETHEPHON	38	538,553	Med	Low		3	3	2	8	no	no
GLYPHOSATE, IPA SALT	5	5,625,732	Low	Low		4	2	2	8	no	no
IMIDACLOPRID	70	224,730	Med	Med	DPR-single	2	3	3	8	no	no
METHOMYL	54	321,476	Med	Med	DPR-single	2	3	3	8	no	no
NITROGEN, LIQUIFIED	36	561,505	High			3	4	1	8	no	no
PENDIMETHALIN	42	447,032	Med	Low		3	3	2	8	no	no
PETROLEUM HYDROCARBONS	37	554,623	High			3	4	1	8	no	no
SODIUM HYPOCHLORITE	35	568,308	High			3	4	1	8	no	no
SODIUM TETRATHIO CARBONATE [CS2]	49	352,342	High		ARB-VOC	3	4	1	8	yes	yes
THIOBENCARB	27	844,565	Med	Low	DPR-Lompoc add	3	3	2	8	no	no
(S)-METOLACHLOR	57	299,992	Med	Low	DPR-Lompoc add	2	3	2	7	no	no
CALCIUM HYDROXIDE	13	1,861,117	Low			4	2	1	7	no	no
COPPER HYDROXIDE	11	2,592,460	Low		ARB-metal	4	2	1	7	no	no
COPPER SULFATE (BASIC)	23	876,722	Low		ARB-metal	4	2	1	7	no	no
COPPER SULFATE (PENTAHYDRATE)	10	2,916,477	Low		ARB-metal	4	2	1	7	no	no
CRYOLITE	20	1,101,802	Low			4	2	1	7	no	no
MINERAL OIL	7	5,044,900	Low			4	2	1	7	no	no
NORFLURAZON	78	188,032	Med	Med		1	3	3	7	no	no
ORYZALIN	81	179,886	Med	Med		1	3	3	7	no	no
PETROLEUM DISTILLATES	14	1,554,311	Low			4	2	1	7	no	no

Table 1 continued

Pesticide	2002 Statewide Use Rank	2002 Statewide Use (lbs)	Volatility	DPR Risk Assessment Priority	Monitor Method	Use Rating	Volatility Rating	Risk Assess Rating	Total Rating	TAC	Prop 65
PETROLEUM DISTILLATES, REFINED	60	276,457	High			2	4	1	7	no	no
PETROLEUM OIL, UNCLASSIFIED	2	17,673,122	Low			4	2	1	7	no	no
SODIUM CHLORATE	12	2,385,103	Low			4	2	1	7	no	no
SULFUR	1	53,614,583	Low		ARB-metal	4	2	1	7	no	no
SULFUR DIOXIDE	75	190,362	High		ARB-single	2	4	1	7	no	no
ALUMINUM PHOSPHIDE	84	165,230	High			1	4	1	6	yes	no
CARBON DIOXIDE	91	137,057	High			1	4	1	6	no	no
DISODIUM OCTABORATE TETRAHYDRATE	26	846,422	Low			3	2	1	6	no	no
EPTC	63	253,887	Med		DPR-Lompoc add	2	3	1	6	no	no
FOSETYL-AL	58	298,150	Low	Low	Unsuccessful	2	2	2	6	no	no
GLYPHOSATE-TRIMESIUM	90	147,402	Low	Med		1	2	3	6	no	no
HYDROGEN CYANAMIDE	77	188,376	High			1	4	1	6	no	no
LIME-SULFUR	28	761,536	Low			3	2	1	6	no	no
OLEIC ACID, METHYL ESTER	71	212,198	Med			2	3	1	6	no	no
PROMETRYN	82	176,882	Med	Low		1	3	2	6	no	no
UREA DIHYDROGEN SULFATE	34	589,897	Low			3	2	1	6	no	no
ALKYLARYL POLY(OXYETHYLENE) GLYCOL	40	501,085				3	1	1	5	no	no
ARSENIC PENTOXIDE	67	233,506	Low			2	2	1	5	yes	yes
CHROMIC ACID	53	326,645	Low			2	2	1	5	yes	no
COPPER OXIDE (OUS)	68	229,214	Low		ARB-metal	2	2	1	5	no	no
GLYPHOSATE	86	157,872	Low	Low		1	2	2	5	no	no
KAOLIN	43	438,548				3	1	1	5	no	no
MOLASSES	99	108,567	Low			1	3	1	5	no	no
PETROLEUM OIL, PARAFFIN BASED	51	343,916	Low			2	2	1	5	no	no

Key to Pesticide Candidate Ratings

Statewide Use (DPR Pesticide Use Report Database)

4 = 852,435 - 53,614,583 lbs during 2002 (top 25 pesticides)
3 = 347,377 - 846,422 lbs during 2002 (2nd 25 pesticides)
2 = 190,149 - 343,916 lbs during 2002 (3rd 25 pesticides)
1 = 108,518 - 188,376 lbs during 2002 (4th 25 pesticides)

Volatility (DPR Pesticide Chemistry Database)

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

DPR Risk Assessment Priority (SB950 – Birth Defect Prevention Act report)

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

Monitor Method

DPR-Single = DPR/CDFA has a validated method as a single analyte
DPR-Lompoc = Pesticide included in DPR's multi-chemical method for the Lompoc project
DPR-Lompoc add = CDFA attempting to add to the Lompoc method
ARB-VOC = Pesticide included in ARB's standard volatile organic compound method
ARB-Metal = Pesticide included in ARB's standard metal method
ARB-Single = ARB has a validated method as a single analyte
Unsuccessful = Previous attempts to develop a method were unsuccessful
Blanks indicate that neither DPR or ARB have attempted to monitor

TAC

yes = listed as a toxic air contaminant
no = not listed as a toxic air contaminant

Prop 65 - pesticides that cause cancer or reproductive effects

yes = listed under Proposition 65
no = not listed under Proposition 65
some = some uses listed under Proposition 65
yes/no = parent compound is listed, but the primary breakdown product is not, or vice versa

Table 2. Community candidates for DPR's environmental justice pilot project. Each category is rated one to four (with a few zeros), with four representing the higher priority for monitoring (see the following key for the values associated with each rating). Total Rating represents the sum of the average environmental justice community rating, average cumulative impact data rating, and average pesticide density rating.

Community	Child Population Rating	Non-white Population Rating	Income Rating	Drift Illness Rating	Avg EJ Community Rating	Well Monitoring Rating	Air Monitoring Rating	Avg Cumulative Impact Data Rating	Regional OP Rating	Regional Fumigant Rating	Regional Sulfur-Copper Rating	Regional Other Pesticide Rating	Local OP Rating	Local Fumigant Rating	Local Sulfur-Copper Rating	Local Other Pesticide Rating	Avg Pesticide Density Rating	Total Rating
Parlier	4	4	4	0	3.0	4	3	3.5	4	4	4	2	4	4	4	2	3.5	10.0
Visalia	3	1	1	4	2.3	3	4	3.5	3	3	2	3	3	3	2	2	2.6	8.4
Arvin	3	3	4	4	3.5	1	2	2.5	3	4	4	2	3	4	4	3	3.4	8.4
OrangeCove	4	4	4	0	3.0	4	0	2.0	4	3	2	4	4	1	3	4	3.1	8.1
London	3	2	4	0	2.3	4	0	2.0	4	4	3	3	4	4	4	4	3.8	8.0
Cutler	4	3	4	0	2.8	3	0	1.5	4	3	3	4	4	4	3	3	3.5	7.8
Reedley	4	2	1	2	2.3	4	0	2.0	4	4	3	3	4	4	3	2	3.4	7.6
Farmersville	4	3	3	0	2.5	4	0	2.0	4	3	2	4	4	4	2	2	3.1	7.6
Orosi	3	4	3	0	2.5	3	0	1.5	4	3	3	4	4	3	3	4	3.5	7.5
Sanger	4	2	2	0	2.0	4	0	2.0	4	3	4	3	4	3	4	3	3.5	7.5
Selma	4	3	2	0	2.3	4	0	2.0	4	4	4	2	3	3	4	2	3.3	7.5
Ivanhoe	3	3	3	0	2.3	4	0	2.0	4	2	2	4	4	3	2	4	3.1	7.4
Dinuba	4	2	2	1	2.3	3	0	1.5	4	4	3	4	4	4	3	2	3.5	7.3
Traver	1	2	4	0	1.8	4	0	2.0	4	3	3	4	4	4	3	3	3.5	7.3
Exeter	4	1	1	2	2.0	4	0	2.0	4	2	2	4	4	3	3	4	3.3	7.3
Calwa	3	4	3	0	2.5	4	0	2.0	2	4	4	1	2	4	4	1	2.8	7.3
Woodlake	3	3	4	0	2.5	4	0	2.0	3	2	1	4	3	3	2	4	2.8	7.3
Madera	3	2	3	2	2.5	2	3	2.5	2	2	4	2	1	1	4	2	2.3	7.3
Fresno	4	2	2	0	2.0	2	4	3.0	2	2	4	2	1	3	3	1	2.3	7.3
Kingsburg	3	1	1	0	1.3	4	0	2.0	4	4	4	3	4	4	4	4	3.9	7.1
Poplar	2	4	3	0	2.3	4	0	2.0	3	3	2	4	2	4	2	3	2.9	7.1
Lindsay	4	3	4	0	2.8	3	0	1.5	4	0	2	4	4	0	3	4	2.6	6.9
Huron	4	4	4	0	3.0	0	0	0.0	4	4	4	4	4	3	3	3	3.6	6.6
Strathmore	2	3	3	0	2.0	4	0	2.0	4	1	1	4	4	0	3	4	2.6	6.6
Earlimart	4	4	4	4	4.0	0	0	0.0	2	2	4	1	2	3	4	2	2.5	6.5
Mendota	4	4	4	0	3.0	2	0	1.0	3	3	3	3	3	0	2	3	2.5	6.5
Clovis	3	1	1	1	1.5	3	4	3.5	1	2	2	1	1	2	1	1	1.4	6.4
Del Rey	1	2	3	0	1.5	4	0	2.0	4	3	4	1	3	2	4	1	2.8	6.3
Fowler	2	3	1	0	1.5	4	0	2.0	3	4	4	1	2	3	4	1	2.8	6.3
Parksdale	2	4	3	0	2.3	4	0	2.0	1	2	4	2	1	0	4	2	2.0	6.3
Richgrove	4	4	4	0	3.0	0	0	0.0	4	1	4	4	4	0	4	4	3.1	6.1
Woodville	1	4	4	0	2.3	3	0	1.5	2	3	1	3	2	3	2	3	2.4	6.1
Merced	3	2	2	0	1.8	2	2	2.0	2	2	2	4	2	1	2	4	2.4	6.1
Easton	1	2	2	0	1.3	4	0	2.0	2	3	4	1	2	4	4	2	2.8	6.0
Parkwood	2	3	2	0	1.8	4	0	2.0	1	2	4	2	3	0	4	2	2.3	6.0
Bowles	1	3	1	0	1.3	4	0	2.0	2	3	4	1	2	3	4	2	2.6	5.9
Winton	3	3	3	0	2.3	3	0	1.5	1	4	2	1	1	4	2	1	2.0	5.8
Terra Bella	3	4	4	0	2.8	1	0	0.5	3	1	3	4	2	0	2	4	2.4	5.6

Community	Child Population Rating	Non-white Population Rating	Income Rating	Drift Illness Rating	Avg EJ Community Rating	Well Monitoring Rating	Air Monitoring Rating	Avg Cumulative Impact Data Rating	Regional OP Rating	Regional Fumigant Rating	Regional Sulfur-Copper Rating	Regional Other Pesticide Rating	Local OP Rating	Local Fumigant Rating	Local Sulfur-Copper Rating	Local Other Pesticide Rating	Avg Pesticide Density Rating	Total Rating
Planada	3	4	4	0	2.8	3	0	1.5	2	2	1	1	3	0	1	1	1.4	5.6
Ducor	2	4	3	0	2.3	2	0	1.0	3	1	4	4	1	0	1	4	2.3	5.5
Tulare	3	2	1	0	1.5	3	0	1.5	2	3	1	3	3	3	2	3	2.5	5.5
Firebaugh	2	3	2	0	1.8	3	0	1.5	1	2	2	3	3	0	3	4	2.3	5.5
Goshen	2	1	3	0	1.5	4	0	2.0	3	2	2	3	2	0	1	3	2.0	5.5
Livingston	3	3	2	0	2.0	2	0	1.0	1	4	3	1	1	4	3	1	2.3	5.3
Grayson	1	2	1	0	1.0	3	0	0.0	3	3	2	2	3	3	2	3	2.6	5.1
Cantua Cr	1	3	3	0	1.8	0	0	0.0	2	4	3	3	3	4	4	4	3.4	5.1
Kerman	4	3	2	0	2.3	0	0	0.0	2	4	4	2	2	3	4	2	2.9	5.1
Biola	2	4	3	0	2.3	0	0	0.0	1	3	4	3	1	3	4	3	2.8	5.0
Porterville	3	2	2	1	2.0	1	0	0.5	3	2	2	4	2	1	2	4	2.5	5.0
Raisin City	1	1	4	0	1.5	1	0	0.5	3	3	4	2	2	2	4	3	2.9	4.9
Avenal	1	3	3	4	2.8	0	0	0.0	1	4	2	1	1	4	2	1	2.0	4.8
San Joaquin	4	3	4	0	2.8	0	0	0.0	3	3	2	2	4	0	0	2	2.0	4.8
LemonCove	1	1	2	0	1.0	4	0	2.0	2	1	1	3	1	0	2	4	1.8	4.8
LemooreSta	2	1	3	0	1.5	0	0	0.0	4	4	2	3	3	3	3	3	3.1	4.6
Caruthers	2	2	1	0	1.3	1	0	0.5	3	3	4	3	3	0	4	2	2.8	4.5
Pixley	1	4	4	0	2.3	1	0	0.5	2	2	2	1	1	3	2	1	1.8	4.5
Corcoran	2	4	2	0	2.0	0	2	1.0	2	0	1	3	2	0	1	3	1.5	4.5
Delhi	2	2	1	0	1.3	1	0	0.5	2	4	3	1	2	4	3	2	2.6	4.4
Atwater	4	2	1	0	1.8	1	0	0.5	1	4	1	3	1	4	2	1	2.1	4.4
Madera Ac	2	1	1	0	1.0	3	0	1.5	2	2	4	2	1	0	3	1	1.9	4.4
Los Banos	3	1	1	0	1.3	3	0	1.5	1	2	1	3	1	0	2	3	1.6	4.4
Tranquillity	2	3	1	0	1.5	0	0	0.0	3	3	3	2	4	0	3	4	2.8	4.3
Laton	1	3	2	0	1.5	0	0	0.0	4	2	3	2	4	2	2	2	2.6	4.1
Lanare	1	4	3	0	2.0	0	0	0.0	3	2	3	3	2	0	1	3	2.1	4.1
Home Gard	3	3	4	0	2.5	0	0	0.0	3	1	1	3	1	0	1	3	1.6	4.1
KettlemanC	4	4	4	0	3.0	0	0	0.0	1	4	1	1	1	0	0	1	1.1	4.1
Tipton	2	4	3	0	2.3	2	0	1.0	1	0	1	2	1	0	1	1	0.9	4.1
S Dos Palos	1	2	4	0	1.8	0	0	0.0	1	1	2	4	3	0	3	4	2.3	4.0
Chowchilla	1	1	2	0	1.0	0	0	0.0	2	2	3	2	3	3	3	3	2.6	3.6
Le Grand	1	2	3	0	1.5	1	0	0.5	2	2	2	1	1	3	1	1	1.6	3.6
Dos Palos	3	1	2	0	1.5	0	0	0.0	1	1	3	4	2	0	2	3	2.0	3.5
Riverdale	1	2	3	0	1.5	0	0	0.0	3	1	3	2	2	0	2	3	2.0	3.5
Stratford	3	3	2	0	2.0	0	0	0.0	3	1	1	1	3	2	0	1	1.5	3.5
Hilmar	1	1	1	0	0.8	1	0	0.5	1	4	3	1	2	4	2	1	2.3	3.5
Hanford	3	1	1	1	1.5	0	0	0.0	3	1	1	3	3	0	1	3	1.9	3.4
Armona	2	1	2	0	1.3	0	0	0.0	3	1	1	2	3	2	1	1	1.8	3.0
Gustine	3	1	1	0	1.3	0	0	0.0	1	2	1	1	3	2	1	2	1.6	2.9
Lemoore	3	1	1	0	1.3	0	0	0.0	3	1	1	2	3	0	1	2	1.6	2.9
Alpaugh	1	2	4	0	1.8	0	0	0.0	1	0	1	3	2	0	0	2	1.1	2.9
Bonadelle	1	1	1	0	0.8	1	0	0.5	1	1	3	2	1	0	3	1	1.5	2.8
Coalinga	2	2	1	0	1.3	0	0	0.0	1	3	1	1	1	0	0	1	1.0	2.3
Friant	1	1	2	0	1.0	0	0	0.0	1	1	2	1	1	0	2	1	1.1	2.1

Key to Community Data

Environmental Justice Community Factors

Child Population Density (2000 Census)

4 = 1338 - 2969 children/mi2 (approx highest 20 communities)
3 = 788 - 1261 children/mi2 (approx 2nd 21 communities)
2 = 352 - 765 children/mi2 (approx 3rd 21 communities)
1 = 22 - 340 children/mi2 (approx lowest 21 communities)

Non-white Population Percentage (2000 Census)

4 = 65.5 - 91.1 percent (approx highest 20 communities)
3 = 52.8 - 65.0 percent (approx 2nd 21 communities)
2 = 42.1 - 52.4 percent (approx 3rd 21 communities)
1 = 6.9 - 41.5 percent (approx 21 lowest communities)

Median Family Income (2000 Census)

4 = 20,524 - 25,481 $/yr (approx lowest 20 communities)
3 = 26,166 - 32,470 $/yr (approx 2nd 21 communities)
2 = 32,852 - 37,033 $/yr (approx 3rd 21 communities)
1 = 37,979 - 86,653 $/yr (approx highest 21 communities)

Pesticide Illnesses (DPR Pesticide Illness Surveillance Program Database)

4 = 51 - 178 non-occupational drift illnesses during 1993 - 2002 (4 communities)
3 = no communities
2 = 13 - 16 non-occupational drift illnesses during 1993 - 2002 (3 communities)
1 = 2 - 7 non-occupational drift illnesses during 1993 - 2002 (4 communities)
0 = no non-occupational drift illnesses during 1993 - 2002 (72 communities)

Availability of Data for Cumulative Impact Evaluation

Municipal Well Monitoring Density (DPR Well Inventory Database)

4 = 28.3 - 1322 wells x pesticides sampled/mi2 during 1999 - 2004 (23 communities)
3 = 8.5 - 24.6 wells x pesticides sampled/mi2 during 1999 - 2004 (14 communities)
2 = 5.7 - 7.2 wells x pesticides sampled/mi2 during 1999 - 2004 (7 communities)
1 = 0.5 - 4.6 wells x pesticides sampled/mi2 during 1999 - 2004 (11 communities)
0 = 0 wells sampled during 1999 - 2004 (28 communities)

Air Monitoring Stations (ARB and APCD)

4 = monitored for 5 - 6 criteria pollutants (3 communities)
3 = monitored for 3 - 4 criteria pollutants (1 community)
2 = monitored for 1 - 2 criteria pollutants (4 communities)
0 = not monitored for criteria pollutants (75 communities)

Pesticide Use

Regional Organophosphate Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 14 OPs within 5 miles of the community during 2002

4 = 274 - 796 lbs/mi2 (approx highest 20 communities)
3 = 157 - 247 lbs/mi2 (approx 2nd 21 communities)
2 = 93 - 155 lbs/mi2 (approx 3rd 21 communities)
1 = 9 - 88 lbs/mi2 (approx lowest 21 communities)

Regional Fumigant Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 4 fumigants within 5 miles of the community during 2002

4 = 1,148 - 12,649 lbs/mi2 (approx highest 20 communities)
3 = 359 - 1073 lbs/mi2 (approx 2nd 21 communities)
2 = 74 - 342 lbs/mi2 (approx 3rd 21 communities)
1 = 2 - 70 lbs/mi2 (approx lowest 21 communities)
0 = no use

Regional Sulfur and Copper Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported within 5 miles of the community during 2002

4 = 7927 - 22701 lbs/mi2 (approx highest 20 communities)
3 = 3109 - 6464 lbs/mi2 (approx 2nd 21 communities)
2 = 1467 - 2874 lbs/mi2 (approx 3rd 21 communities)
1 = 5 - 1377 lbs/mi2 (approx lowest 21 communities)

Regional Other Pesticide Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 13 other pesticides within 5 miles of the community during 2002

4 = 354 - 566 lbs/mi2 (approx highest 20 communities)
3 = 241 - 331 lbs/mi2 (approx 2nd 21 communities)
2 = 156 - 234 lbs/mi2 (approx 3rd 21 communities)
1 = 3 - 147 lbs/mi2 (approx lowest 21 communities)

Local Organophosphate Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 14 OPs within 1 mile of the community during 2002

4 = 288 - 1264 lbs/mi2 (approx highest 20 communities)
3 = 143 - 249 lbs/mi2 (approx 2nd 21 communities)
2 = 86 - 130 lbs/mi2 (approx 3rd 21 communities)
1 = 1 - 82 lbs/mi2 (approx lowest 21 communities)

Local Fumigant Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 4 fumigants within 1 mile of the community during 2002

4 = 1,485 - 15,893 lbs/mi2 (approx highest 20 communities)
3 = 268 - 1,404 lbs/mi2 (approx 2nd 21 communities)
2 = 93 - 225 lbs/mi2 (approx 3rd 21 communities)
1 = 20 - 39 lbs/mi2 (approx lowest 21 communities)
0 = no use

Local Sulfur and Copper Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported within 1 mile of the community during 2002

4 = 6,388 - 16,424 lbs/mi2 (approx highest 20 communities)
3 = 187 - 987 lbs/mi2 (approx 2nd lowest 21 communities)
2 = 93 - 143 lbs/mi2 (approx 3rd 21 communities)
1 = 10 - 616 lbs/mi2 (approx lowest 21 communities)
0 = no use

Local Other Pesticide Use Density (DPR Pesticide Use Report Database)
Pounds/mi2 reported of 13 other pesticides within 1 mile of the community during 2002

4 = 387 - 1123 lbs/mi2 (approx highest 20 communities)
3 = 220 - 351 lbs/mi2 (approx 2nd 21 communities)
2 = 132 - 214 lbs/mi2 (approx 3rd 21 communities)
1 = 3 - 126 lbs/mi2 (approx lowest 21 communities)

Table 3. Environmental justice factors, availability of cumulative impact data, number of monitoring sites, and other factors for the leading community candidates. Each community is rated one to four (a few with zero) for each category, with four representing the higher priority for monitoring.

Community Characteristic	Arvin	Mendota	Parlier
Area (mi^2)	4.8	1.9	1.6
Population	12,994	7,891	11,088
Population density (people/mi^2)	2,707	4,153	6,930
Environmental justice factors			
Child population density (children/mi^2)	1,082	1,382	2,618
Child population rating	3	4	4
Non-white population percentage	55.7	75.1	65.5
Non-white population rating	3	4	4
Median family income ($/yr)	24,816	22,984	24,275
Income rating	4	4	4
Number of non-occupation drift illnesses	178	0	0
Drift illness rating	4	0	0
Average environmental justice rating	3.5	3.0	3.0
Availability of cumulative impact data			
Number of municipal wells sampled	3	1	37
Well density (#wells x #pesticides/mi^2)	4.0	6.4	202.6
Well monitoring rating	1	2	4
Number of criteria pollutants monitored	2 (ozone, NO_2)	0	3 (ozone, CO, NO_2)
Air monitoring rating	2	0	3
Average cumulative impact data rating	1.5	1.0	3.5
Monitoring sites			
Likely number of preferred sites[a]	1 or 2	2 or 3	4 or 5
Able to collect maximum number of samples	No	Yes	Yes
Other factors			
Other air monitoring	None	None	Dioxin
Community environmental health study	No	Yes	Maybe

[a] Preferred monitoring sites are schools or other "sensitive sites" on the edge of town that meet U.S. EPA ambient air siting criteria.

Table 4a. Regional (within five miles of the community) use density (pounds per square mile) of candidate pesticides for the leading candidate communities, 2002. Each community is rated one to four (a few with zero) for each category, with four representing the higher priority for monitoring.

Type of Pesticide	Pesticide	Arvin	Mendota	Parlier
Fumigant	1,3-DICHLOROPROPENE	1,624.6	242.9	1,590.6
	CHLOROPICRIN	334.5	0.0	29.2
	METAM-SODIUM	10,525.1	583.3	172.8
	METHYL BROMIDE	165.0	0.0	103.8
Fumigant Total		12,649.2	826.2	1,896.4
Fumigant Rating		4	3	4
Organophosphate	AZINPHOS-METHYL	8.3	0.0	5.8
	CHLORPYRIFOS	68.5	57.6	182.5
	DIAZINON	0.0	33.6	28.1
	DIMETHOATE	26.1	1.1	5.7
	MALATHION	2.3	5.9	7.4
	METHIDATHION	5.0	0.0	0.0
	METHYL PARATHION	0.0	0.0	1.5
	NALED	1.0	43.8	0.0
	OXYDEMETON-METHYL	0.0	5.4	0.0
	PARATHION	0.0	1.0	0.0
	PHORATE	21.1	5.1	0.0
	PHOSMET	10.3	0.0	267.6
	SSS-TRIBUTYLPHOSPHOROTRITHIOATE	1.8	43.4	0.0
Organophosphate Total		144.3	196.8	498.7
Organophosphate Rating		3	3	4
Other	(S)-METOLACHLOR	1.9	42.5	0.0
	CARBARYL	10.6	2.3	15.5
	CYPERMETHRIN	0.0	0.3	0.0
	DICOFOL	2.3	55.2	4.2
	DIURON	35.3	49.8	16.2
	EPTC	64.1	6.5	0.0
	OXYFLUORFEN	24.6	15.5	34.3
	PERMETHRIN	3.7	1.3	0.0
	SIMAZINE	45.8	7.6	94.2
	TRIFLURALIN	39.5	104.4	1.6
Other Total		227.9	285.4	166.2
Other Rating		2	3	2
Sulfur-Copper	COPPER	323.4	18.3	785.2
	SULFUR	5,081.4	4,138.1	7,607.0
Sulfur-Copper Total		5,404.8	4,156.4	8,392.2
Sulfur-Copper Rating		4	3	4
Regional Pesticide Rating		3.3	3.0	3.5
Average (Regional and Local) Pesticide Rating		3.4	2.5	3.5

NOTE: These communities had no use of the following candidate pesticides: disulfoton, molinate, propanil, and thiobencarb.

Table 4b. Local (within one mile of the community) use density (pounds per square mile) of candidate pesticides for the leading candidate communities, 2002. Each community is rated one to four (a few with zero) for each category, with four representing the higher priority for monitoring.

Type of Pesticide	Pesticide	Arvin	Mendota	Parlier
Fumigant	1,3-DICHLOROPROPENE	2,100.9	0.0	834.9
	CHLOROPICRIN	211.3	0.0	76.5
	METAM-SODIUM	13,326.1	0.0	508.0
	METHYL BROMIDE	255.2	0.0	217.7
Fumigant Total		15,893.4	0.0	1,637.2
Fumigant Rating		4	0	4
Organophosphate	AZINPHOS-METHYL	27.3	0.0	0.4
	CHLORPYRIFOS	95.9	30.2	236.9
	DIAZINON	0.0	0.0	21.9
	DIMETHOATE	41.3	6.2	0.6
	MALATHION	2.5	10.9	3.1
	METHIDATHION	22.6	0.0	0.0
	NALED	1.9	60.5	0.0
	OXYDEMETON-METHYL	0.1	0.0	0.0
	PARATHION	0.0	6.2	0.0
	PHORATE	31.9	2.3	0.0
	PHOSMET	24.3	0.0	482.9
	SSS-TRIBUTYLPHOSPHOROTRITHIOATE	1.1	64.3	0.0
Organophosphate Total		248.9	180.6	745.8
Organophosphate Rating		3	3	4
Other	(S)-METOLACHLOR	0.0	33.3	0.0
	CARBARYL	18.2	12.7	28.7
	CYPERMETHRIN	0.0	1.3	0.0
	DICOFOL	0.3	58.1	1.4
	DIURON	26.3	31.0	9.9
	EPTC	89.8	0.0	0.0
	OXYFLUORFEN	55.5	24.0	54.2
	PERMETHRIN	3.8	0.0	0.0
	SIMAZINE	63.5	0.0	92.0
	TRIFLURALIN	63.5	81.4	1.9
Other Total		321.0	241.8	188.0
Other Rating		3	3	2
Sulfur-Copper	COPPER	447.6	14.0	1,081.9
	SULFUR	8,213.9	985.1	6,840.0
Sulfur-Copper Total		8,661.5	999.1	7,921.9
Sulfur-Copper Rating		4	2	4
Local Pesticide Rating		3.5	2.0	3.5
Average (Regional and Local) Pesticide Rating		3.4	2.5	3.5

NOTE: These communities had no use of the following candidate pesticides: disulfoton, molinate, propanil, and thiobencarb.

Table 5. Regional (within five miles) use density (pounds per square mile) of candidate pesticides by crop/site for the leading candidate communities, 2002

Crop/Site	Arvin	Mendota	Parlier
ALFALFA	16.61	130.48	0.44
ALMOND	17.82	3.67	21.85
APPLE	4.98	0.00	19.60
APRICOT	3.31	0.00	12.72
BEAN, DRIED	0.23	1.20	0.00
BEAN, SUCCULENT	5.23	0.00	0.29
BEET	1.39	0.00	0.00
BLUEBERRY	0.00	0.00	1.17
BROCCOLI	0.00	139.20	0.00
CABBAGE	0.01	0.00	0.00
CANTALOUPE	0.00	324.53	0.00
CARROT	5,362.48	0.00	0.00
CELERY	0.97	0.00	0.00
CHERRY	14.04	0.00	11.43
CHRISTMAS TREE	0.00	0.00	0.01
CITRUS	0.00	0.00	8.51
CORN (FORAGE - FODDER)	3.01	0.00	0.00
CORN, HUMAN CONSUMPTION	0.00	47.47	0.00
COTTON	387.87	201.59	0.00
EGGPLANT	0.00	0.00	10.37
FIG	0.00	0.00	0.00
GAI LON	0.02	0.00	0.00
GARLIC	0.13	2.23	0.00
GRAPE	2,879.21	156.71	11,338.63
GRAPE, WINE	2,350.39	1,055.32	542.14
GRAPEFRUIT	5.36	0.00	0.62
KIWI	0.00	0.00	0.11
LEMON	0.90	0.00	0.00
LETTUCE, HEAD	0.01	0.00	0.00
LETTUCE, LEAF	0.01	0.00	0.00
MELON	0.00	46.73	0.00
NECTARINE	91.26	0.00	1,302.70
N-OUTDR PLANTS IN CONTAINERS	15.16	0.00	36.55
OAT	0.00	0.00	0.01
ONION, DRY	266.60	0.24	61.12
ONION, GREEN	0.04	0.00	0.00
ORANGE	149.02	0.00	18.99
PARSLEY	18.85	0.00	0.00
PASTURELAND	0.00	0.00	0.00
PEACH	149.45	0.00	1,208.44
PEAR	0.00	0.00	6.96
PEPPER, FRUITING	126.07	0.00	0.00
Crop/Site	**Arvin**	**Mendota**	**Parlier**

PERSIMMON	0.00	0.00	0.31
PISTACHIO	6.44	5.01	7.15
PLUM	2.98	0.00	245.64
POMEGRANATE	0.00	280.34	0.00
POTATO	5,387.62	0.00	0.00
PRUNE	0.00	0.00	6.92
RESEARCH COMMODITY	0.00	0.00	0.00
RIGHTS OF WAY	0.00	0.00	0.03
SAFFLOWER	0.00	0.00	0.00
SOIL FUMIGATION/PREPLANT	0.00	0.00	999.59
SUGARBEET	0.00	44.01	0.00
TANGERINE	2.36	0.00	0.86
TOMATO	0.00	12.52	0.00
TOMATO, PROCESSING	239.46	1,871.23	0.00
TURF/SOD	0.00	0.00	0.53
UNCULTIVATED AG	0.19	0.59	0.35
WALNUT	45.37	0.00	11.22
WATER AREA	0.00	0.00	0.01
WATERMELON	259.81	0.00	0.00
WHEAT	63.22	1.95	0.00
Number of Crops/Sites	39	19	38

Table 6. Regional (within five miles of the community) pesticide use density (pounds/mi^2) for the leading candidate communities, 2001 – 2003.

Type of Pesticide	Year	Arvin	Mendota	Parlier
Fumigant	2001	4,803	704	1,897
	2002	12,649	826	1,896
	2003	11,166	2,205	2,016
Organophosphates	2001	122	275	494
	2002	144	197	499
	2003	143	235	408
Other	2001	179	253	185
	2002	228	285	166
	2003	202	222	135
Sulfur-Copper	2001	5,647	3,061	7,120
	2002	5,405	4,156	8,392
	2003	4,833	2,723	6,242

Figure 1. Locations of highly rated communities for DPR's environmental justice pilot project.

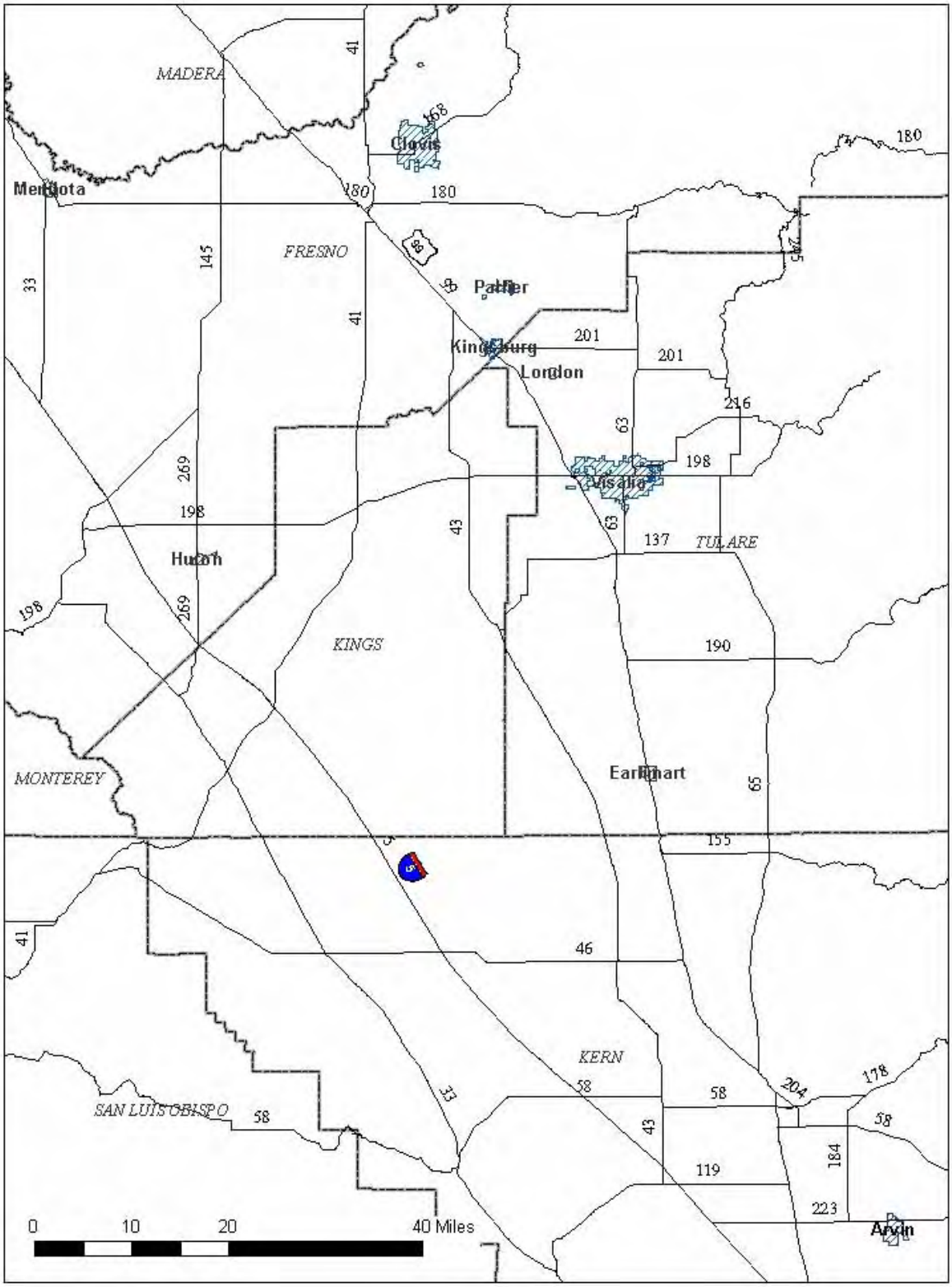


Figure 2. Wind speed at several high-rated communities, 1995 – 2004.

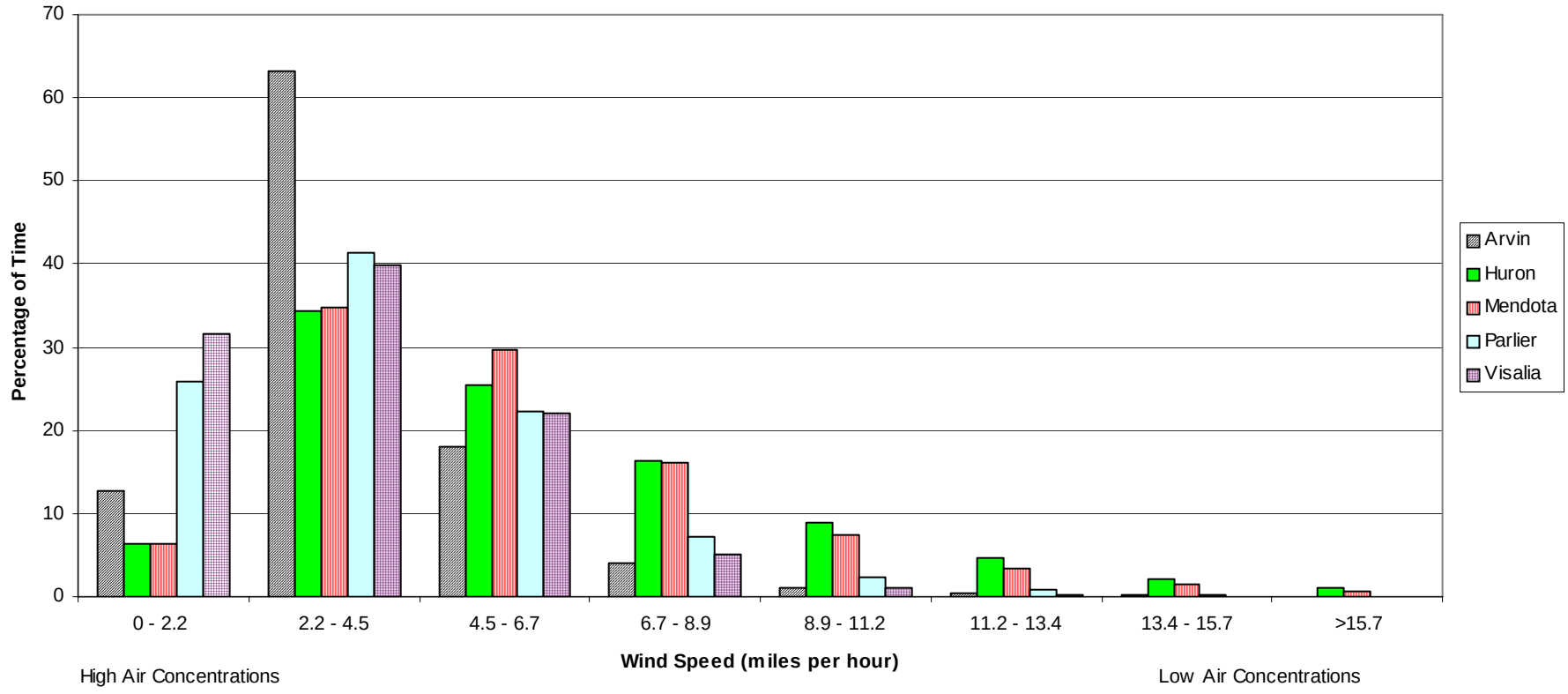


Figure 3. Wind direction at several high-rated communities, 1995 – 2004.

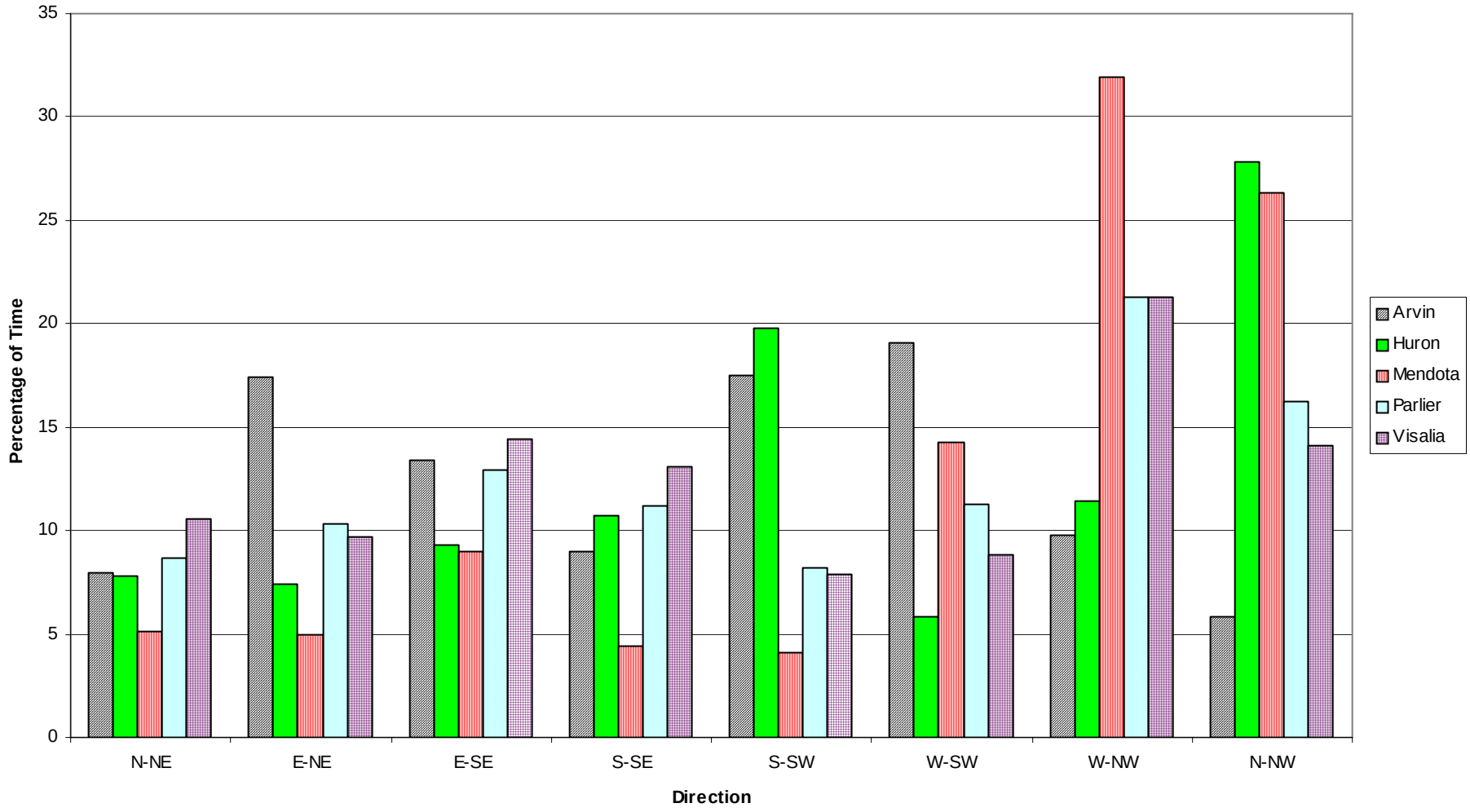
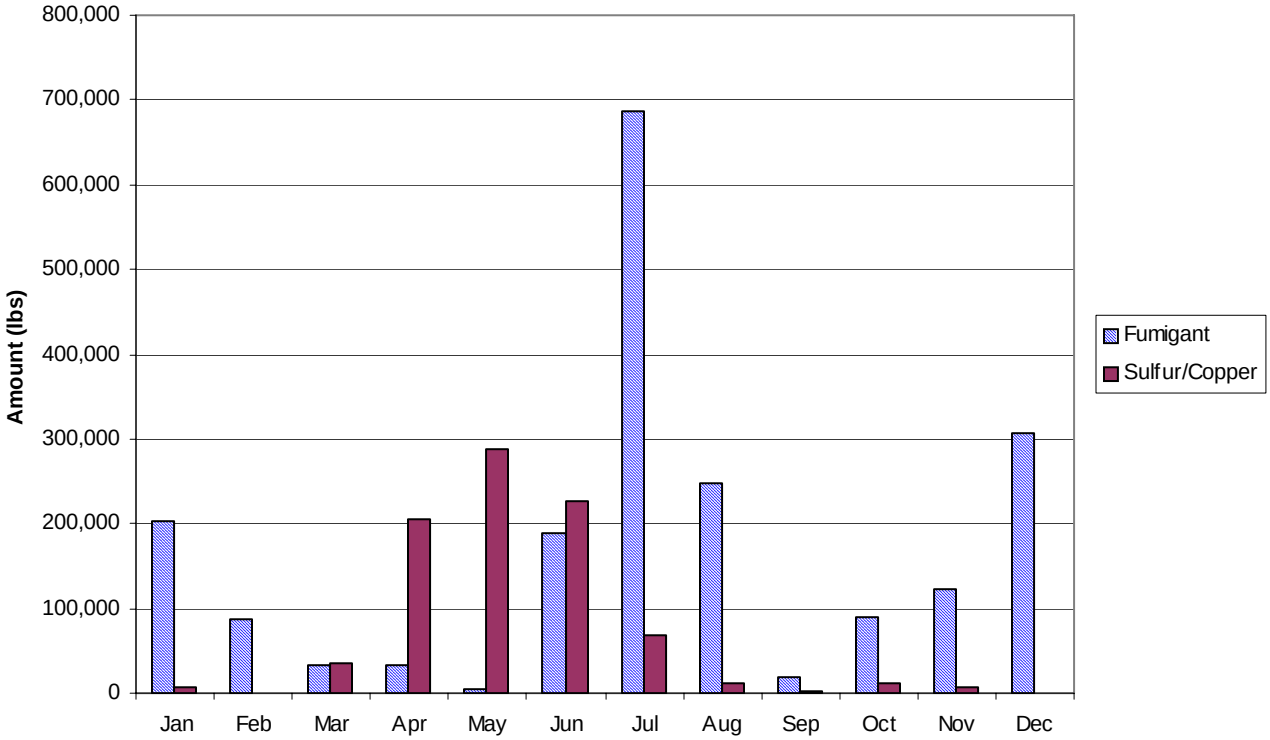


Figure 4. Regional (within five miles of community) use of pesticides for Arvin by month, 2002.



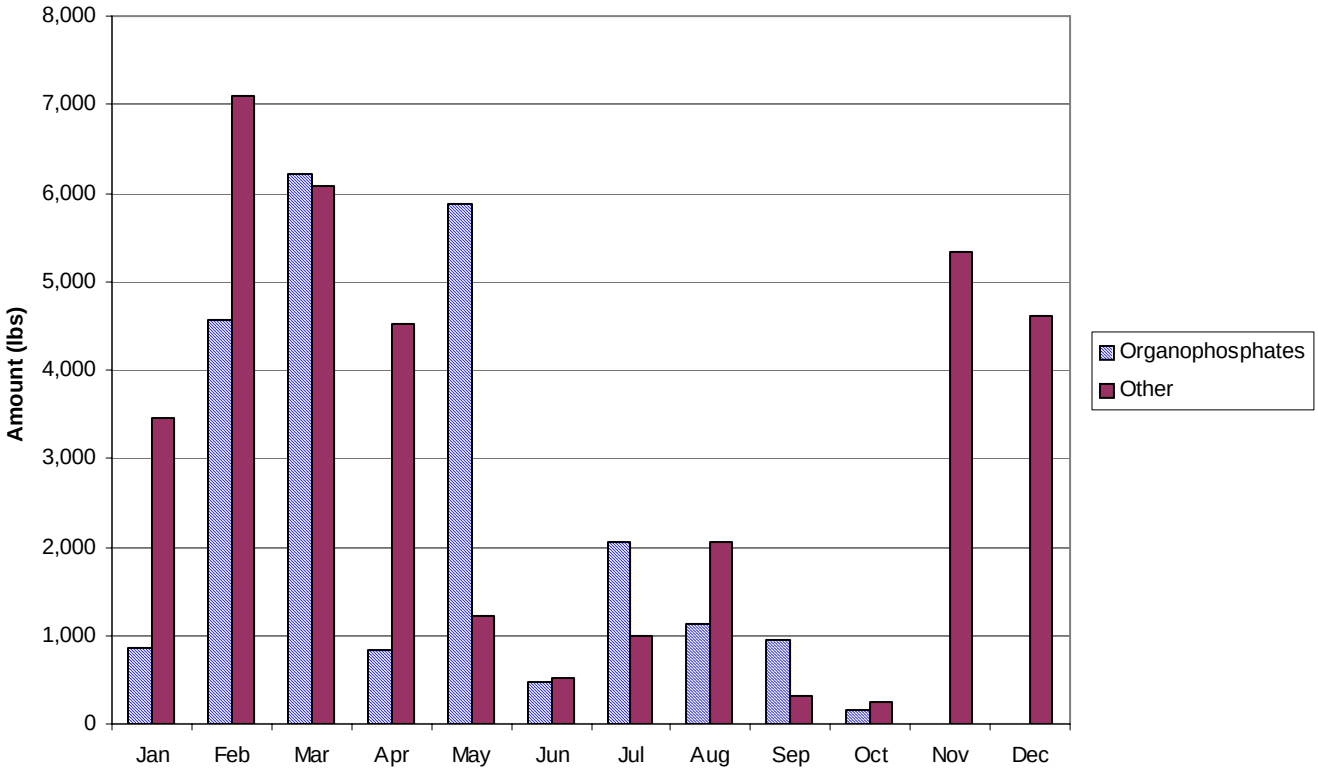
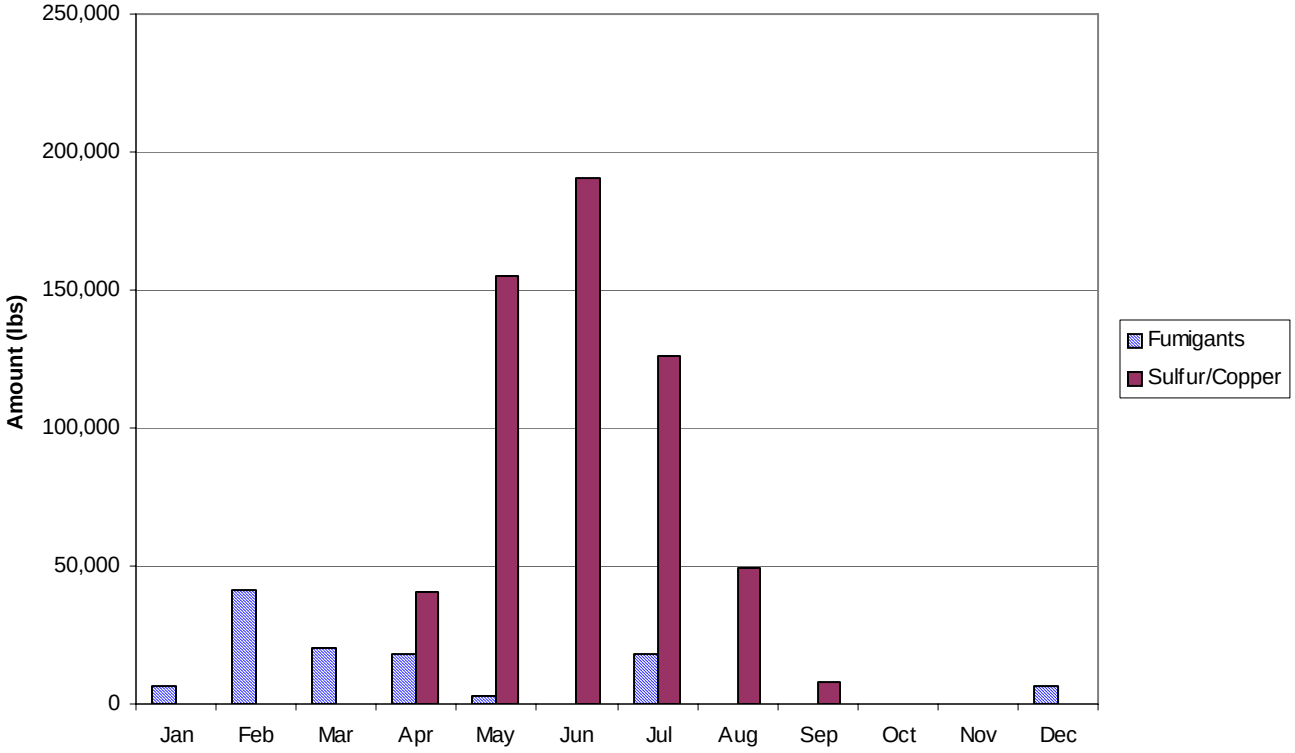


Figure 5. Regional (within five miles of community) use of pesticides for Mendota by month, 2002.



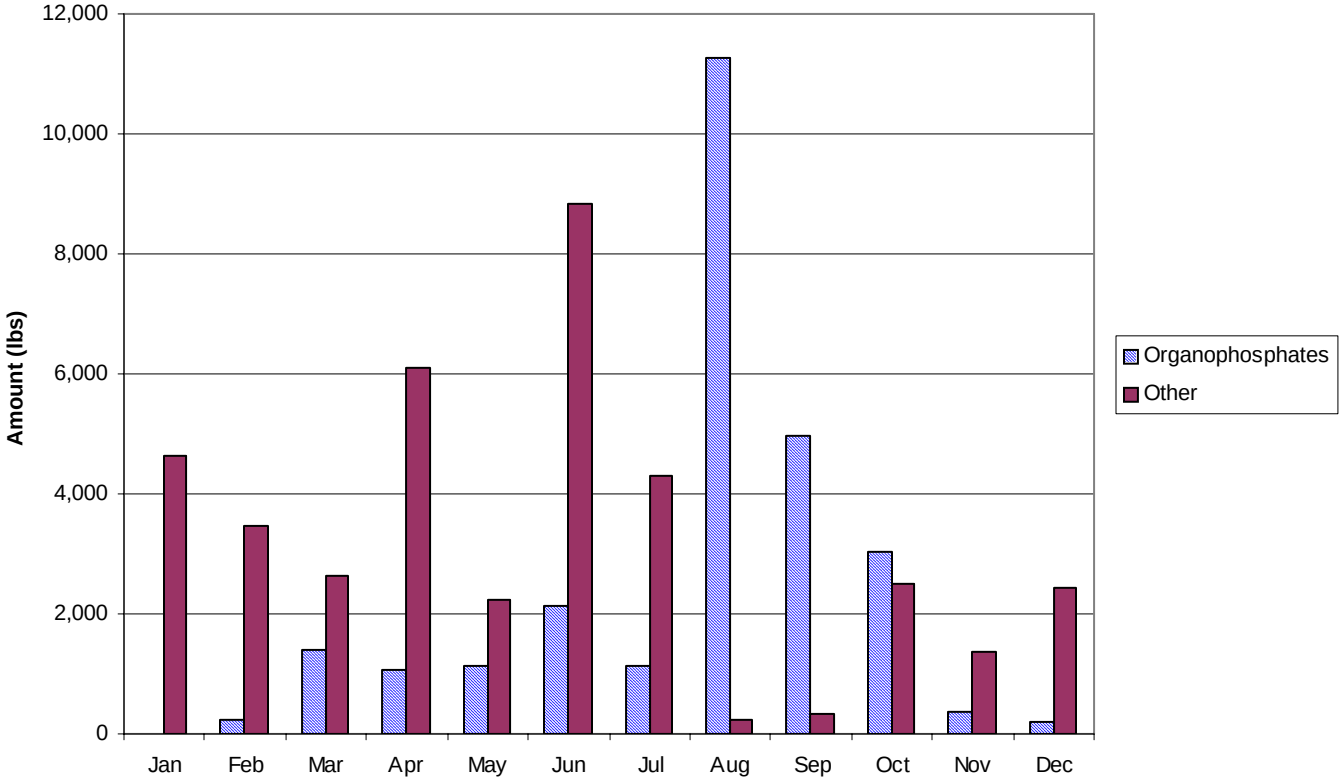
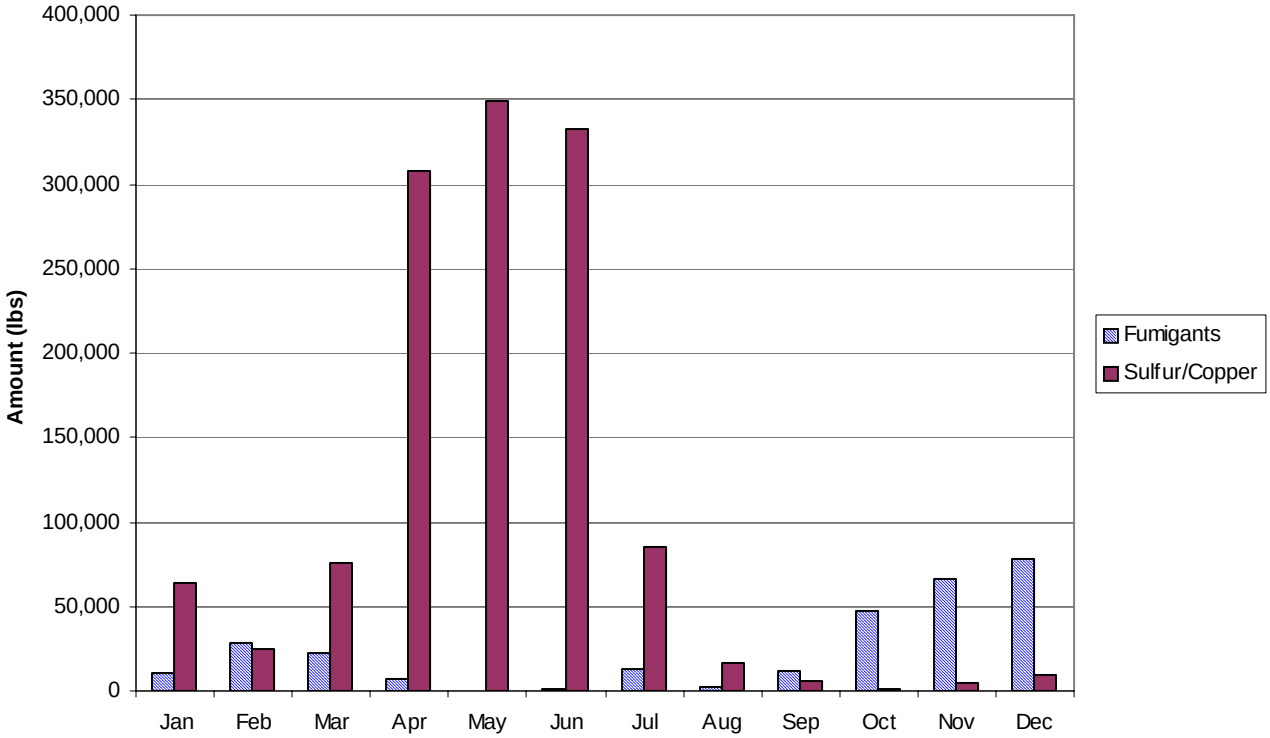
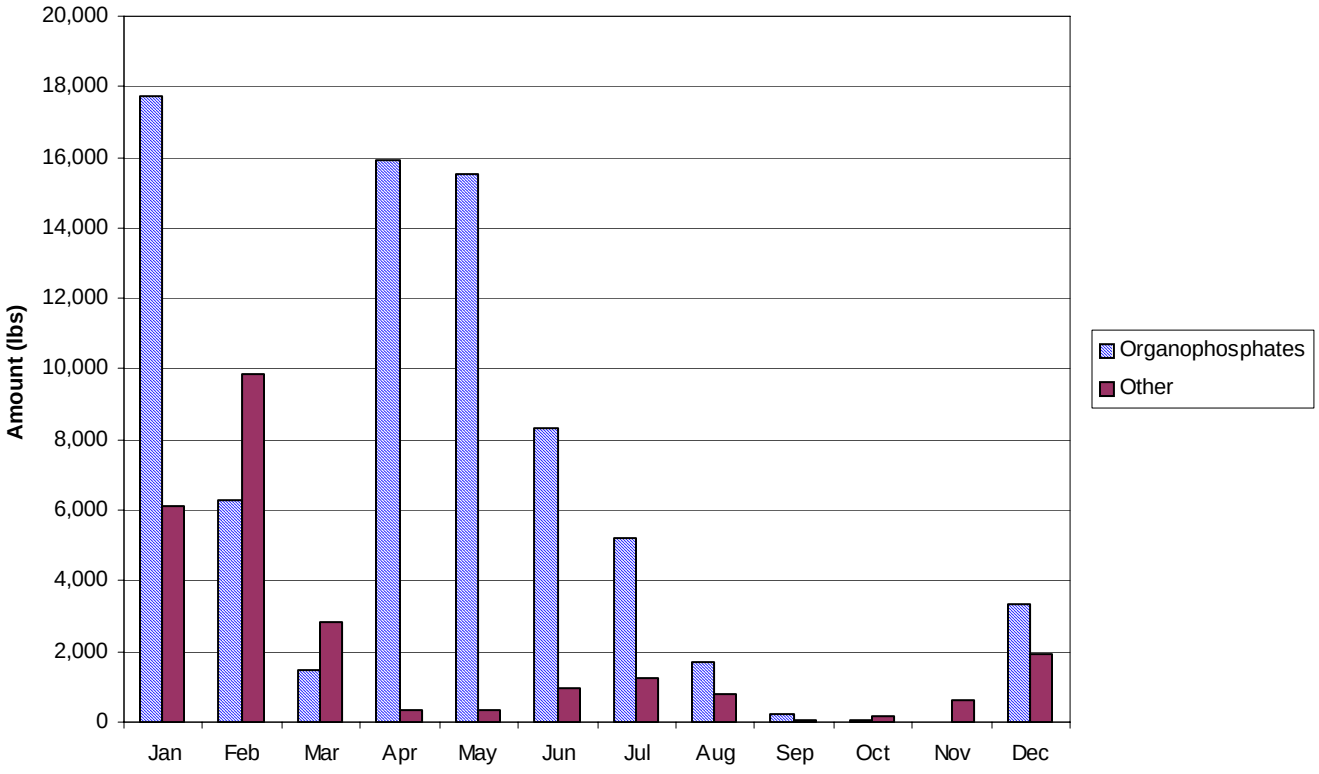


Figure 6. Regional (within five miles of community) use of pesticides for Parlier by month, 2002.





APPENDIX B

Environmental Justice Pilot Project Protocol for Pesticide Air Monitoring In Parlier

ENVIRONMENTAL JUSTICE PILOT PROJECT
PROTOCOL FOR PESTICIDE AIR MONITORING IN PARLIER

DECEMBER 30, 2005
REVISED
MARCH 1, 2006

PREPARED BY
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF PESTICIDE REGULATION

Randy Segawa, Pam Wofford and Clarice Ando

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1. INTRODUCTION

1.1 Background

As part of the California Environmental Protection Agency's (Cal/EPA's) Environmental Justice Action Plan, the Department of Pesticide Regulation (DPR) will lead a pilot project in the Central Valley focusing on pesticides in a rural, farming community. This protocol describes the monitoring to be conducted for ambient air concentrations of pesticides in the Fresno County community of Parlier.

California rural communities may have higher concentrations of pesticides in ambient air compared to urban communities, due to their proximity to agricultural fields. DPR evaluated 83 communities in Fresno, Kern, Kings, Madera, Merced, Stanislaus, and Tulare counties as candidates for this project. The communities were prioritized based on population data, availability of cumulative impact data, and pesticide use – both local and regional use. DPR also considered other factors, including air sampling feasibility, weather patterns, and the potential for collaboration with other projects focused on environmental health. Based on an analysis of all these factors, DPR selected Parlier in Fresno County (DPR, 2005).

This project will focus on monitoring ambient air concentrations of as many as 40 pesticides and pesticide breakdown products. The data gathered will help DPR evaluate ambient air exposure to pesticides in order to better understand and identify opportunities to reduce environmental health risk, particularly to children. This project will include additional elements to address definitions of and guidance for cumulative impacts, precautionary approaches, and public participation.

1.2 Site Description

Parlier is a small city (approximately 1.6 square miles in area) located in the San Joaquin Valley, approximately 20 miles southeast of Fresno (Figure 1). Parlier has an elevation of approximately 340 feet, with approximately 13 inches of precipitation annually. Temperatures during the summer typically range from 60 – 96 °F, and 35 – 50 °F during the winter. Winds are most frequently from the northwest at 5 – 8 miles per hour (Figure 2).

According to the 2000 U.S. Census the total population for Parlier is 11,088. Approximately 38 percent of the population is less than 18 years old, 97 percent are Hispanic, and the median family income is $24,275 per year.

Parlier is a rural community surrounded by agriculture. The major crops grown in the area are grapes and tree fruit. In 2003, approximately 249 chemicals were used for agricultural production within 5 miles of the Parlier region, with approximately 2,388,000 pounds used per year. Table 8 lists the pesticides that will be monitored in this study, which account for approximately 1.3 million pounds of that total use in the area. Insecticides and fungicides are the most heavily used pesticides in the Parlier area. See Section 3.1 for a detailed description of pesticide use in the Parlier area.

1.3 Project Goals and Objectives

1.3.1 Overall Goals

The overall goal for this pilot project is to evaluate ambient air exposure to pesticides to better understand and identify opportunities to reduce environmental health risk, particularly to children. The Parlier project is one of six environmental justice pilot projects being done by boards and departments that are part of the California Environmental Protection Agency (Cal/EPA). All include some common elements: assessment of cumulative impacts, application of precautionary approaches, and public participation.

For the purposes of this and the other pilot projects, the Interagency Work Group on Environmental Justice (which includes the Cal/EPA secretary and heads of its boards, departments, and offices) adopted the following working definitions:

> "Cumulative impacts means exposures, public health or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts will take into account sensitive populations and socio-economic factors, where applicable and to the extent data are available."
>
> "Precautionary approach means taking anticipatory action to protect public health or the environment if a reasonable threat of serious harm exists based upon the best available science or other relevant information, even if absolute and undisputed scientific evidence is not available to assess the exact nature and extent of risk."

A local advisory group (LAG) is key to ensuring meaningful public participation in this environmental justice project. The Parlier LAG includes representatives of the California Rural Legal Assistance Foundation; Californians for Pesticide Reform; Fresno County Agricultural Commissioner's office; Fresno Metro Ministry; Latino Issues Forum; LUPE (La Unión del Pueblo Entero); Parlier City government; Parlier HEAL Asthma Project; and the Parlier Unified School District. The LAG also includes a local Realtor; a Parlier businessman; local health care provider; a Parlier vintner; and three farmers, including an organic farmer. In addition, a Technical Advisory Group (TAG) was formed to provide guidance on the scientific elements of the pilot project. The TAG is composed of staff from federal, state, and county agencies, as well as technical specialists from the local communities.

1.3.2 Specific Project Objectives

DPR based the selection of the pesticides and community on the following objectives:

- Are residents of the community exposed to pesticides in the air?
- Which pesticides are people exposed to and in what amounts?

- Do measured pesticide air levels exceed levels of concern to human health, particularly children?

After discussion with the LAG, DPR added the following additional objectives:

- Inform the community of project, including public forums
- Reduce pesticide risk
- Conduct follow-up actions, such as education and/or regulatory actions
- Evaluate the pesticide risk relative to other pollutants monitored

1.3.4 Other Monitoring

The City of Parlier relies on ground water for its drinking water supply. The City of Parlier conducts routine monitoring of city municipal wells for pesticides and other potential water contaminants. In addition, during the study DPR will collect ground water samples from city wells and analyze them for pesticides not monitored by the City of Parlier and that may be groundwater contaminants.

DPR will check with other regulatory agencies to determine if Parlier has any unusual sources of pesticides or other environmental contaminants.

1.4. Previous Investigations

This pilot project will provide more systematic air monitoring for a community in the Central Valley and therefore will serve as a more robust foundation for exposure assessment. DPR conducted a similar project in Lompoc (Santa Barbara County) and the U.S. Environmental Protection Agency is completing one in McFarland (Kern County). DPR will use similar methods for this study.

1.4.1 Lompoc Air Monitoring

In 2000, DPR monitored ambient air concentrations of 22 pesticides and five breakdown products simultaneously during the peak use period for most of the pesticides in Lompoc (DPR, 2003). In addition, air concentrations of three fumigants were monitored following specific applications close to the city of Lompoc (DPR, 2003). Of the 31 pesticides or breakdown products monitored in the two-part study, DPR detected 27 of them in one or more of the 451 samples collected and analyzed. Four of the 31 chemicals were below any detectable concentrations, 11 detected at quantifiable concentrations (the smallest amount that can be measured), 16 were detected at trace amounts (detectable but not measurable). While many pesticides were detected, and some quite frequently, air concentrations were low compared to health screening levels.

1.4.2 McFarland

The U.S.EPA monitored ambient air concentrations at two schools in McFarland from July 2001 to May 2002 during different agricultural seasons. The extensive study monitored 145

chemicals and took more than 900 samples (U.S.EPA, 2004). The chemicals monitored included; pesticides used in the McFarland area, volatile organic compound (VOCs), dioxins, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticide breakdown products, and dust. Of the 145 chemicals monitored, 79 were detected of which 11 were detected above a screening level, but within EPA's protective health range. The chemicals detected above their screening levels were four metals; cadmium, chromium, manganese, and arsenic, and six VOCs; carbon tetrachloride, formaldehyde, methylene chloride, benzene, para-dichlorobenzene, and methyl chloride. Methyl bromide was the only pesticide found above its screening level. Although, the levels were within EPA's protective health range, the data was not sufficient to fully evaluate community exposure to methyl bromide applications.

1.4.3 Pesticide Toxic Air Contaminant Monitoring

The Air Resources Board, in consultation with DPR, conducts ambient monitoring for a variety of pesticides in accordance with the Toxics Air Contaminant (TAC) monitoring program. Monitoring for pesticides is conducted in counties with the highest use for a particular pesticide to be monitored and during the season of highest use. ARB's ambient air monitoring of pesticides is conducted near agricultural areas where use of the pesticides being monitored is expected. Public buildings such as schools are used as monitoring sites if such locations represent potential public exposure to the target pesticides. Information is available from ambient air sampling conducted under the TAC program for 13 of the pesticides included in the monitoring study in Parlier: 1,3-dichloropropene, chlorpyrifos, diazinon, endosulfan, EPTC, malathion, MITC, methyl bromide, molinate, permethrin, propargite, simazine, and S,S,S-tributyl phosphorotrithioate. Summaries of the TAC monitoring are given in Attachment I.

2. PROJECT PERSONNEL

DPR's standard project organization and responsibilities are described in SOP ADMN002.00 (Attachment II). This project is under the overall management of John Sanders, Branch Chief, DPR-Environmental Monitoring Branch. Other key personnel assigned to this project include:

Project Leader:	Randy Segawa Senior Environmental Research Scientist, DPR (916) 324-4137 rsegawa@cdpr.ca.gov
Field Sampling Coordinators:	Clarice Ando and Pam Wofford Associate Environmental Research Scientists, DPR
Senior Scientist:	Bruce Johnson Senior Environmental Research Scientist, DPR
Laboratory Liaison and Quality Assurance:	Carissa Ganapathy Associate Environmental Research Scientist, DPR

Pesticide Risk Evaluation:	Jay Schreider Primary State Toxicologist, DPR
Pest Management Analysis:	Pat Matteson Associate Environmental Research Scientist, DPR
Environmental Justice Coordinator:	Veda Federighi External Affairs Director, DPR
Chemical Analysis:	Department of Food and Agriculture, Center for Analytical Chemistry Air Resources Board, Monitoring and Laboratory Division

Air Resources Board personnel will conduct the monitoring for air toxics chemicals which includes volatile organic compounds and metals/elements. Personnel from the San Joaquin Valley Air Pollution Control District will conduct the monitoring of several criteria air pollutants and hydrocarbons as part of their Photochemical Assessment Monitoring Stations program.

In addition, to the personnel described above, other people have key roles for this specific project. DPR formed the LAG to assist with the project. The LAG advises DPR on overall project goals and priorities. The TAG will assist DPR in the planning of pesticide air monitoring and evaluation of results. DPR will also establish a multi-agency quality assurance team to perform audits of the monitoring.

3. SAMPLE COLLECTION DESIGN AND METHODS

The design for sample collection is a product of community and technical input from the TAG and LAG. This section describes the pesticides and other chemicals that will be monitored, types of samples to be collected, sample measurement details, monitoring locations and frequency, and other information pertinent to field collection and shipment of samples.

3.1 Pesticides and Other Chemicals Included in the Project

During the study, monitoring will be conducted for 20 pesticides and five pesticide breakdown products that were among the top 100 used within five miles of Parlier during 2003. Table 1 lists these pesticides and breakdown products and gives some key chemical and physical characteristics. The monitoring will include an additional 13 pesticides not among the top 100 used within five miles of Parlier because they are easily included at no extra cost with the methods and many have high use in other areas. DPR selected the pesticides for monitoring based on: (1) toxicity, (2) vapor pressure (volatility), (3) use, (4) availability of sampling and laboratory methods, and (5) ability to include a pesticide in a multi-residue method. DPR selected the pesticides for monitoring in two phases. Pesticides selected in the first phase were used as part of the criteria for selecting a community for monitoring. The pesticides selected in the first phase were based in part on statewide use. Once DPR selected Parlier for monitoring,

the second phase refined the pesticides selected for monitoring based on pesticide use in the Parlier area.

Following discussions with the LAG and TAG, DPR selected 24 pesticides and six pesticide breakdown products (Table 2) for monitoring in a single multi-residue method. DPR also selected metam-sodium for monitoring as a single chemical. Metam-sodium rapidly breaks down to methyl isothiocyanate (MITC), the primary pesticidal agent. DPR will monitor for MITC rather than metam-sodium. In addition, the Air Resources Board (ARB) will assist DPR by monitoring for toxic air pollutants, that includes 33 volatile organic compounds (VOCs) and 33 metals/elements (Table 3). As indicated in Table 3, ARB's VOC and metals/elements methods include several pesticides. The ARB and San Joaquin Valley Air Pollution Control District (SJVAPCD) also conduct monitoring near Parlier for 57 hydrocarbons and 12 aldehydes (Table 4) as part of the Photochemical Assessment Monitoring Stations program. A number of the VOCs and hydrocarbons included in the monitoring are likely inert ingredients in some of the pesticide products used in the Parlier area. ARB and SJVAPCD will also monitor for several criteria air pollutants in or near Parlier, including ozone and particulate matter (Table 5).

A number of important pesticides are not included in the monitoring due to resource limitations. DPR evaluated the top 100 pesticides used statewide as candidates for monitoring by rating these pesticides on toxicity, volatility and statewide use. Those pesticides with higher toxicity, higher volatility, and higher use were rated higher for monitoring. Table 6 shows the highly rated pesticides and which ones are included in the monitoring. While most of the pesticides with high use statewide also have high use in the Parlier area, a few pesticides have high use in Parlier, but not statewide. Table 7 shows the high-use pesticides in the Parlier area and which ones are included in the monitoring. Most of the high-use pesticides in the Parlier area not included in the monitoring are not highly rated for monitoring due to low toxicity and low volatility, with captan, chloropicrin, paraquat, and ziram being the exceptions.

Tables 8 and 9 show the amounts of pesticides reported and crops treated for the monitored pesticides. Figures 3 – 6 show the locations of high pesticide use in the Parlier area. Similar to other areas in the state, copper, sulfur, and the fumigants are the highest use pesticides, by far. In the Parlier area, grapes and fruit trees are the predominant crops treated with pesticides. Attachment III summarizes the products, crops, and target pests for the monitored pesticides.

3.2 Sampling Locations and Frequency

DPR considered several monitoring locations in Parlier, assessing each site based on the following criteria:

- Close proximity to high use areas for multiple pesticides monitored
- Close proximity to populated areas
- Sampling point meets all U.S. EPA ambient air siting criteria
    - 2 – 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 property owner

Air monitoring will occur at four locations in or near Parlier: Martinez Elementary School, Chavez Elementary School, Benavidez Elementary School, and Kearney Agricultural Center (Figure 7). DPR will conduct pesticide monitoring at Martinez School, Chavez School, and Benavidez School. ARB will conduct VOC, metal/element, and criteria air pollutant monitoring at Benavidez School. SJVAPCD will conduct hydrocarbon, aldehyde, and criteria air pollutant monitoring at the Kearney Agricultural Center.

DPR selected Martinez, Chavez, and Benavidez schools because they are in the northwest corner, southeast corner, and center of Parlier, respectively. DPR gave priority to placing monitoring locations at the edge of town and near agricultural areas, where the highest pesticide air concentrations are expected. While pesticides are applied in all areas surrounding Parlier, greater amounts of certain pesticides are applied west of Parlier, and other pesticides are applied in greater amounts east of Parlier (Figures 3 – 6). In addition, the predominant wind direction is from the northwest, so that Martinez Elementary School may have higher concentrations compared to the rest of Parlier, all other factors being equal. Benavidez Elementary School was selected because it is located near the center of Parlier and is likely the most representative single location in Parlier. VOCs, metals/elements, and particulate matter can only be monitored at a single location. Benavidez School will provide comprehensive data for both pesticides and other air pollutants at a single location. Kearney Agricultural Center was selected because SJVAPCD currently conducts its monitoring there on a routine basis.

DPR will collect 24-hour samples three consecutive days a week at each of the three schools for 52 weeks. The weekly starting day will vary through the week, but one of the DPR sample days each week will correspond with ARB’s scheduled 24-hour air toxics samples. One of DPR’s sampling days will also correspond with every other SJVAPCD sampling day.

As described in ARB (2005), ARB will operate an air monitoring station in Parlier for the one-year duration of DPR's pilot project and will collect samples typical of other monitoring sites for air toxics. Monitoring will be conducted at the Benavidez School as a site representative of general community exposure in central Parlier. ARB's standard toxics monitoring method for gaseous pollutants includes about 30 volatile organic compounds and includes two pesticides - methyl bromide and 1,3-dichloropropene (Telone). Air sampling filters are also routinely analyzed by ARB at air toxics monitoring sites for metals, some of which will give DPR information on metal-based pesticides such as sulfur and copper, used near Parlier. At ARB's air toxics monitoring sites throughout California, 24-hour samples are collected every 12 days. Data are used to establish annual average concentrations, which can be evaluated for trends from year to year. In some special projects, samples are collected every 6 days. In Parlier, ARB will collect 24-hour samples every 6 days, which will provide DPR with more data than would be typical of ARB's routine air toxics monitoring sites. Also, during the expected peak month of use of 1,3-dichloropropene and sulfur, ARB will collect 24-hour samples every 3 days. Figures 8-10 present historical daily application data for methyl bromide, 1,3-dichloropropene and sulfur, respectively. ARB will ship samples to ARB's lab in Sacramento,

analyze the samples, and include results of the monitoring on ARB's web site, making the results available to DPR and the public.

SJVAPCD routinely conducts monitoring for hydrocarbons and aldehydes at the Kearney Agricultural Center as part of the Photochemical Assessment Monitoring System (PAMS). SJVAPCD collects four sequential 3-hour samples (12 consecutive hours during the day) every three days between July and September. ARB's sampling days will correspond with SJVAPCD's sampling days.

Table 10 shows the frequency of all of the monitoring.

3.3 Sample Type

The most widely used procedure for atmospheric measurement of pesticides is to pass 2 to 100 liters of air per minute through a solid sorbent material onto which the pesticide is adsorbed (Keith, 1988). Sorbent media typically used to trap pesticides include XAD resins and carbon sorbents such as charcoal (Majewski and Capel, 1995; Keith, 1988; Baker *et al*., 1996). Sorbent tube samples will be collected according to procedures listed in DPR'S SOP EQAI001.00 (Attachment II). The multi-residue air monitoring will be conducted using Andersen air sampling pumps equipped with a sampling tube containing 30 mL of XAD-4 set at a flow rate of 15 L/min. MITC samples will be collected with SKC Inc. personal sample pumps equipped with 200/1800 mg coconut charcoal tubes (SKC Inc., #226-16-02) set at an air flow rate of 1.5 liters per minute (L/min). The use, operation, calibration and maintenance of SKC air sampling pumps are described in DPR's SOP EQAI001.00 (Attachment II).

Prior to monitoring, sample labels with the study number and sample identification numbers will be attached to the tubes. Preparation of sorbent tubes for use with air sampling pumps is described in DPR's SOP FSAI001.01 (Attachment II). Chain of custody forms, and sample analysis request forms will be supplied to field sampling personnel. Field personnel will collect field notes on sampler location and weather observations during the monitoring study.

Once samples are collected, each tube opening will be tightly capped and samples will be placed on dry ice and remain frozen until analysis. Sample handling and shipping will follow procedures defined in DPR's SOP QAQC004.01 (Attachment II). Samples will follow the tracking procedures outlined in DPR's SOP QAQC003.02 (Attachment II). Samples will be transported to the analytical laboratory once a week.

With ARB's assistance, DPR will obtain data for VOCs, including the fumigants 1,3-dichloropropene and methyl bromide. These samples will be 24 hours in duration and most VOCs will be collected in stainless steel Summa canisters. Carbonyl compounds will be collected on Sep-Pak silica cartridges (ARB 2005).

With ARB's assistance, DPR will obtain data for metals/elements, including the copper and sulfur-based pesticides. These samples will be 24 hours in duration and collected on Teflon® filters. Samples for chromium VI will be collected on cellulose fiber filters (ARB 2005).

3.4 Additional Sampling

In addition to the collection of air samples, DPR will collect ground water samples from the five municipal wells that supply drinking water for the city of Parlier. The samples will be collected once or twice during the 52-week monitoring study. The chemicals to be analyzed for are: atrazine, bromacil, diuron, hexazinone, metribuzin, norflurazon, prometon, simazine, and breakdown products desmethyl norflurazon, deethyl atrazine (DEA), deisopropyl atrazine (ACET), and diamino chlorotriazine (DACT). The samples will be analyzed by Department of Food and Agriculture, Center for Analytical Chemistry.

3.5 Field Tests

The flow rate for each sampler will be measured before and after each sampling period and recorded on the chain of custody. Flows will be measured with a DryCal ® primary flowmeter. All equipment will be checked and initially calibrated in the laboratory. Samples will be considered valid if the ending flow rate is within 20 percent of the starting flow rate.

3.6 Quality Control for Field Sampling

In addition to field samples collected during monitoring, trip blank samples, fortified field spikes and (co-located) duplicate samples will be collected.

A trip blank sample is used to provide information on contamination of samples. For the charcoal sample tubes, the ends will be broken open, capped and placed on dry ice with the field samples. The multi-residue XAD tubes will be left capped and also placed on dry ice to be stored and shipped with the field samples. A trip blank will be collected for each sample type during one of every three weeks of sampling. Blank samples containing detectable amounts of any of the pesticides will trigger a reassessment of the field and laboratory procedures.

A fortified field spike is a laboratory spike, which is sent to the field and placed on an air sampler with air flowing through the sorbent tube. Shipped on dry ice to the field, it is treated just like a field sample, including storage and shipping conditions. The fortified spike, in comparison with the respective field sample, gives us some information about any change in the ability to recover the analyte during air sampling. DPR will collect one fortified field spike for each sample type during one of every three weeks of sampling. Spike samples outside the control limits established from the validation data for each pesticide will trigger a reassessment of the field and laboratory procedures.

A duplicate sample is a sample that is co-located with a field sample. These samples serve to evaluate overall precision in sample measurement and analysis. DPR will collect one duplicate sample for each sample type during one of every three weeks of sampling. Duplicate samples that are greater than 50 percent different will trigger a reassessment of the field and laboratory procedures.

The quality assurance team will conduct a field audit of the sampler air flow rates.

3.7 Meteorological Monitoring

Meteorological stations will be located at SJVAPCD's monitoring station at the Kearney Agricultural Center and ARB's monitoring station at Benavidez School, as shown in Figure 7. The SJVAPCD station collects hourly data on wind speed, wind direction, air temperature, and relative humidity at a height of 10 meters. In addition, a sampling trailer supplied by ARB to collect air samples for analysis by the ARB laboratory will also be equipped with meteorological equipment to measure wind speed and direction, and temperature at a height of approximately 7 meters.

In addition, a California Irrigation Management Information Systems (CIMIS) station is located at the Kearney Agricultural Center. The CIMIS station provides hourly data for precipitation, solar radiation, vapor pressure, air temperature, relative humidity, dew point, wind speed, wind direction, and soil temperature.

3.8 Pesticide Use Data

Universal use reporting, required by the state of California, directs all growers to submit details of pesticide usage to the County Agricultural Commissioner. All pesticide use data will be collected for the agricultural area within five miles from Parlier. The township, range and sections that will be used to define the agricultural boundary of the study area are listed in Table 11 and mapped in Figure 11. Pesticide use reports contain the following information:

- Operator identification
- Date of application
- County of application
- Pesticide product applied
- Amount of pesticide product applied
- Area/amount treated
- Site/commodity treated
- Field identification
- Location – meridian/township/range/section

4. SAMPLE ANALYSIS DESIGN

4.1 Laboratory Analysis Methods

Chemical analysis will be performed by the California Department of Food and Agriculture Center for Analytical Chemistry (CDFA). For the XAD cartridges, the laboratory will follow method SOP EMON-SM-05-002 (Attachment II). Pesticides will be extracted from the sorbent using ethyl acetate and analyzed with a liquid chromatograph – mass spectrometer and gas chromatograph – mass selective detector. The method will likely be revised after analysis of initial field samples

CDFA will analyze MITC samples following SOP EM 41.9 (Attachment II). In this method, the MITC is extracted from the charcoal tubes using one percent carbon disulfide in ethyl

acetate and analyzed using a gas chromatograph with a nitrogen/phosphorous detector. The method will likely be revised after analysis of initial field samples

Well water samples will be analyzed by CDFA following SOP EM 62.9 (Attachment II). The method uses two conditioned waters cartridges to retain the analytes from the water sample. The chemicals are eluted with 5% ammonium hydroxide in methanol and analyzed using liquid chromatography – Atmospheric Pressure Chemical Ionization Mass spectrometry.

ARB will analyze the VOC and metal/element samples as described in ARB (2005).

4.2 Criteria Air Pollutant Monitoring

The ARB and SJVAPCD will monitor for the criteria air pollutants ozone, nitrogen dioxide, and particulate matter-2.5 microns. Ozone will be monitored continuously and recorded as hourly averages using ultraviolet photometry. Nitrogen dioxide will be monitored continuously and recorded as hourly averages using gas phase chemiluminescence. Particulate matter, less than 2.5 microns in diameter will be monitored continuously and recorded as hourly averages using a beta attenuation monitor.

4.3 Quality Assurance

The CDFA laboratory will follow DPR's standard laboratory quality control procedures, described in SOP QAQC 001.00 (Attachment II). Prior to the analysis of field samples, the laboratory will validate the method by analyzing a series of spikes (samples containing known amounts of pesticides) to document the precision and accuracy of the methods. Trapping efficiency tests will be performed to ensure breakthrough (pesticides not adsorbed to the sorbent tube) does not occur and to check for chemical transformation of the adsorbed pesticides. Storage stability tests will be performed to document the degradation of samples between the time of sample collection and the time of sample analysis. The laboratory will include quality control samples with each batch of field samples analyzed, including blank samples (samples containing no pesticides) to check for contamination, and spikes to check the precision and accuracy.

The other laboratories will follow standard, validated methods for analysis. All laboratories will include their standard quality assurance oversight.

Additionally, DPR will establish a quality assurance team to perform audits of the project procedures. ARB will lead the quality assurance team and it will submit a questionnaire to the laboratories participating in this study. Subsequent to mailing this questionnaire, the quality assurance team will visit the laboratories before or near the beginning of the study. The audit will result in a list of items that will assist the laboratories in their efforts to produce quality data. The quality assurance team will schedule another audit during sample analysis for each laboratory. A review of raw data and laboratory tracking procedures will be conducted on a minimum of five percent of all samples collected.

4.4 Method Detection Limit and Limit of Quantitation

The laboratory determined the method detection limit for each analyte by analyzing a standard at a concentration with a signal to noise ratio of 2.5 to 5. The spiked matrix is analyzed at least seven times, and the method detection limit is determined by calculating the 99% confidence interval of the mean. This procedure is described in detail in U.S. EPA (1990). The limit of quantitation is set a certain factor above the method detection limit. The level of interference found in the samples determines this factor: the more interference, the higher the factor. The method detection limits and limits of quantitation for each pesticide are given in Table 12.

5. DATA ANALYSIS

5.1 Calculation of Air Concentrations

Twenty-four-hour air concentrations will be calculated from the weight of analyte per sample (determined in the chemical analysis) divided by the volume of air drawn through an air sampler during the corresponding sampling period. Concentrations will be reported in nanograms per cubic meter (ng/m^3). Gaseous compounds will also be converted to parts per billion, volume per volume. Samples below the limit of detection will normally be treated as having one-half the detection limit, except in cases where a specific pesticide is not detected and not applied in the Parlier area, in which case DPR will likely assume that the concentration is zero. Samples with concentrations less than the limit of quantitation (reporting limit), but greater than limit of detection will be reported as having a "trace" concentration. For calculation purposes, DPR will normally assume that trace samples contain a concentration that is the average of the quantitation limit and the detection limit. Except, DPR's monitoring methods include some pesticides not used in the Parlier area, such as molinate that is only used on rice.

DPR will estimate the pesticide air exposure for acute, seasonal, and chronic scenarios. Acute exposure will be estimated for each monitoring location from the individual 24-hour samples by calculating the 95th percentile concentration for each pesticide. Seasonal exposure will be estimated for each monitoring location from the individual 24-hour samples by calculating the average concentration during the peak season of use for each pesticide. Chronic exposure will be estimated for each monitoring location from the individual 24-hour samples by calculating the average concentration of all samples (one year) for each pesticide. Figure 12 illustrates the relationship between the detection limit, quantitation limit, and screening levels, using chlorpyrifos as an example.

5.2 Health Evaluation Methods

DPR will compare these measured ambient air concentrations to human health screening levels to determine what, if any, action to take (Table 13, Attachment IV). No state or federal agency has established regulatory health standards for pesticides in ambient air (some agencies have developed occupational standards, or site-specific standards). Therefore, DPR in consultation with the TAG, has developed health screening levels for monitored pesticides 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 level that is below the screening level for a given pesticide would generally 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 would indicate the need to explore the imposition of mitigation measures.

To the extent possible, the screening levels are based on toxicology values taken from existing documents. The three primary sources are risk assessments, in the form of Risk Characterization Documents (RCDs) conducted by DPR, Reregistration Eligibility Documents (REDs) completed by USEPA, and Reference Exposure Levels (RELs) established by OEHHA and peer reviewed by the Toxic Air Contaminant (TAC) Scientific Review Panel. These documents specified the studies and toxicity values to be used for various exposure scenarios (e.g. acute inhalation, chronic exposure, etc.). When REDs or RCDs are not available or appropriate values are not available, the primary source was the DPR Toxicology Database. A description of how the screening levels were calculated and the data used to determine the levels for each monitored chemical are presented in Attachment IV.

The potential health risk of a chemical(s) in air is a function of both the inherent toxicity of the chemical(s) as well as the level of exposure to the chemical(s). The potential health risk to community residents from exposure to pesticides in the air can be evaluated by comparing the air concentration measured over a specified time (e.g. 24 hours, one month, one year) with the screening level derived for a similar time (acute, seasonal, chronic). The ratio of an exposure level for a chemical (measured air concentration of a pesticide) to a reference concentration or screening level for that pesticide is called the Hazard Quotient (HQ). In this case,

$$\frac{\text{Air concentration}}{\text{Screening level}} = \text{Hazard quotient}$$

A hazard quotient is the air concentration detected expressed as the percentage of the screening level. For example, if the air concentration were 25 percent of the screening level, then the hazard quotient would be 0.25. When the hazard quotient is greater than one, the air concentration would exceed the screening level and further analysis of the data would be required.

Overexposure to pesticides can cause a variety of adverse health effects. An overview of the potential health effects for pesticides included in the monitoring is given in Attachment IV. Pesticides may exhibit toxic effects independently, or they may interact in an additive, synergistic, or antagonistic manner. As a preliminary approach, DPR will estimate risk from multiple pesticides by adding all of the hazard quotients for the individual pesticides:

$$\begin{aligned}\text{Hazard Index} = \; & \text{Hazard Quotient of Pesticide 1} \\ & + \text{Hazard Quotient of Pesticide 2} \\ & + \text{Hazard Quotient of Pesticide 3} \ldots \text{(and so forth)}\end{aligned}$$

This approach assumes that toxicity and risk of all monitored pesticides are additive, although only a subset of the monitored pesticides (including organophosphate insecticides and oxygen analog breakdown products toxic to the nervous system) are known to act in an additive manner. U.S. EPA has developed more refined methods for analyzing cumulative impacts of pesticides, and these, the hazard quotient approach, and other avenues will be explored.

Should levels of pesticides be found above screening levels, it can trigger additional data collection and evaluation, in Parlier and elsewhere. The data helps DPR to evaluate the geographic scope, timing and use factors that contributed to the air concentrations. These and other data can establish parameters of problematic residues. The data are necessary to develop effective measures to minimize or eliminate unacceptable air exposures, and are required by law to support regulatory action.

5.3 Methods for Estimating Air Concentrations for Locations, Time Periods, and Pesticides Not Monitored

In some studies, computer modeling can be attempted to estimate ambient air concentrations from pesticide applications made during monitoring, provided meteorological measurements and application/sampling site information are available. Thus, modeling can be used to supplement measured air concentrations to determine potential concentrations at places and time periods other than the ones monitored, or in the event a large application, or one close to the city limits occurs. The strength of this approach is the flexibility afforded by modeling. It can provide air concentration estimates within city limits given application scenarios that occur outside of the monitoring period.

Using the data collected from the County Agricultural Commissioner's Office on pesticide use within the study area, an attempt will be made to use modeling to estimate air concentrations expected at locations other than sampling sites within the city area of Parlier. Modeling may be able to estimate concentration of the applied pesticides during times when samples were not collected. The U.S. EPA gaussian plume dispersion model, Industrial Source Complex Short Term model (U.S. EPA, 1995) may be used to estimate the modeled concentrations. As model inputs, DPR will use the following: 1) flux rates back-calculated from application site monitoring using the procedures described in Ross, et al. 1996, or measured flux rates from other studies; 2) weather data recorded during the monitoring period. Additional parameters and modifications to this proposed modeling scheme could be addressed in future TAG meetings.

5.4 Estimating Cumulative Impacts

Under Cal/EPA's Environmental Justice Action Plan, the Office of Environmental Health Hazard Assessment (OEHHA) has been designated to develop approaches to the evaluation of cumulative impacts for the regional /pilot projects, including DPR's Parlier project. As part of this process, OEHHA is examining the feasibility of using existing statewide data sources to characterize the potential for cumulative impacts from pollutant hazards from multiple sources and routes of exposure across different geographic areas (e.g., contaminants in drinking water or nearby stationary sources of air pollution). The Parlier pilot project is also evaluating the potential for adverse health effects based upon the pesticide and air toxics data that will be

accumulated during the 2006 monitoring. These data will be evaluated using a traditional hazard assessment approach, as described in Section 5 (Data Analysis).

6. RELATED PROJECTS

DPR hopes to coordinate with several others to provide additional information on potential health effects of pesticides and other pollutants in Parlier.

6.1 University of California, Davis (UCD)

Kent Pinkerton of UCD's Center for Health and the Environment is interested in collaborating on this project to examine the potential health effects of exposure to ambient airborne particles to the respiratory system in the Parlier area. In collaboration with engineers at UCD and the University of Southern California, the Center for Health and the Environment has acquired a special mobile system that allows them to concentrate in real- time, airborne particles to levels 20 to 40-fold above ambient concentrations. The system is designed to uniformly capture and concentrate particles from ultrafine (20 nanometer) to coarse (10 micron) size. These particles are concentrated without ever letting the particles deposit on a surface. In this manner small laboratory animals can be exposed to these concentrated particles in real time while the particles are passing through this system. In essence, with this system animals can be exposed to real world particles under conditions that might mimic a bad air pollution day. DPR will work with UCD to find a suitable location for this system in or near Parlier.

6.2 University of California, San Francisco (UCSF)

Tim Tyner of UCSF's Valley Air Pollution and Health Effects Research (VAPHER) Institute in Fresno proposes a study on the health impacts of cumulative pesticide exposures on children in Parlier. This case-crossover study will assess the acute effects of pesticide/pollutant exposures on the probability of a health event. VAPHER will collect children's health data in Parlier from the United Health Center clinic, four elementary schools, and asthma data from the Health Education and Access for Life program. VAPHER will attempt to evaluate the recorded health events with pesticide air concentrations to determine if there are any correlations.

7. RISK REDUCTION AND PRECAUTIONARY APPROACHES

7.1 Pest Management Analysis

DPR's Pest Management Analysis and Planning Program will conduct a study in the project area of cropping patterns, pest pressures, pest control practices, pesticide use, application methods, and alternative pest management techniques, with a focus on integrated pest management. DPR will coordinate its study with ongoing work already being done in the Parlier area: for example, the Almond Pest Management Alliance and Outreach Project; DPR's federally funded project to develop organophosphate alternatives for stone fruit; the Code of Sustainable Winegrowing Practices developed by the California Association of Winegrape Growers and the Wine Institute; and research and extension activities by the world-renowned

University of California Kearney Agricultural Center in Parlier, in particular those directed towards the development of ecologically-based pest management systems for insect pests in orchards and vineyards.

7.2 Evaluation of Results and Follow-up Actions

The monitoring results will be evaluated to determine the exposure and risk from individual as well as multiple pesticides. The data will be compared to historical monitoring results from other areas. DPR will also evaluate the results and pesticide use patterns at the time of monitoring to determine possible mitigation measures, as well as other potential areas and time periods for future monitoring. DPR is developing sampling and laboratory methods that provide flexibility so that they can be used in other areas with minimal additional work.

With assistance from ARB, DPR will also compare air concentrations of criteria pollutants, volatile organic compounds, and metals in Parlier with other areas of the state and determine if Parlier has elevated levels of these pollutants.

In situations where ambient air levels of pesticides lead to exposures of regulatory concern, DPR determines options to reduce ambient air concentrations. The options range from regulatory restrictions on the use of certain pesticides to seeking grant monies to promote alternative pest management strategies. While the focus of these efforts may be derived from the results of air monitoring, if other datasets evaluated by DPR (for example, groundwater pesticides data) demonstrate the need for further action, DPR addresses these also.

This project presents a number of opportunities for exploring the precautionary approach and supporting growers in the process. The type of actions DPR may take to change pesticide use practices can include:

- Collaborative efforts can be pursued with UC Cooperative Extension and the United States Department of Agriculture Natural Resources Conservation Service on education and financial support for growers on pest management alternatives. Evaluating and promoting the use of alternatives is a key element of precaution.

- DPR may seek grant monies to support public/private partnerships to develop and promote pest management alternatives.

- DPR's study of pest management practices in the Parlier area is intended in part to identify lower-risk alternatives. Outreach efforts will be explored to ensure that farmers are aware of the availability of and familiar with the use of these alternatives.

- A risk reduction approach could be focused on local and state enforcement efforts on eliminating illegal pesticide application practices that result in problematic levels of pesticides in air.

- Training pesticide applicators on best management practices (BMPs) can also be expanded. (BMPs are management and cultural activities and practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices or devices, or prohibitions of practices, to prevent or minimize harm to health and the environment. These practices are defined by research and field testing to be the most effective and practicable methods.)

- DPR can also work with the registrant and the U.S. Environmental Protection Agency to make improvements to the pesticide product label. Among other elements, the label includes instructions and restrictions on product use. (Under federal law, states are precluded from mandating changes in pesticide labels.)

These and other risk reduction measures can be used singly or in combination.

8. SCHEDULE

The following is the estimated schedule for completing this project. All dates are subject to change.

Activity	Start Date	End Date
Write protocol	August 1, 2005	December 16, 2005
Collect field samples	January 1, 2006	December 31, 2006
Conduct laboratory analysis	January 2006	February 2007
Conduct QA audits	January 2006	January 2006
Public Forum in Parlier	January 28, 2006	
Conduct data analysis	March 2006	August 2007
Issue first progress report	April 2006	
Conduct QA audits	April 2006	August 2006
Issue second progress report	October 2006	
Issue third progress report	April 2007	
Write final report	July 2007	October 2007
Conduct public forum	October 2007	

REFERENCES

ARB. 2005. Parlier Community Air Monitoring Project, Air Monitoring Plan for S. Ben Benavidez Elementary School. Air Resources Board, Monitoring and Laboratory Division.

Baker, L.W., D.L. Fitzell, J.N. Seiber, T.R. Parker, T. Shibamoto, M.W. Poore, K.E. Longley, R.P. Tomlin, R. Propper, and D.W. Duncan. 1996. Ambient air concentrations of pesticides in California. Environ. Sci. Technol. 30:1365-1368.

DPR. 1995. Pesticide Use Reporting: An Overview of California's Unique Full Reporting System. State of California. Department of Pesticide Regulation

DPR. 2003. Ambient Air Monitoring for Pesticides in Lompoc, California. Volumes 1 - 4. State of California. Department of Pesticide Regulation. March 2003. EH03-02.

DPR. 2005. Environmental Justice Pilot Project – Project Objectives, Pesticides, and Community for Monitoring. State of California. Department of Pesticide Regulation. June 2005.

Keith, L.H. 1988. Principles of Environmental Sampling. American Chemical Society. 458 pp.

Kollman, W.S. 1995. Pesticide air monitoring results. Report EH 95-10. State of California. Department of Pesticide Regulation.

Majewski, M.S. and P.D. Capel. 1995. Pesticides in the Atmosphere. Distribution, Trends, and Governing Factors. Ann Arbor Press, Inc. Chelsea, MI. 214 pp.

Ross, L.J., B. Johnson, K.D. Kim and J. Hsu. 1996. Prediction of methyl bromide flux from area sources using the ISCST model. J. Environ. Qual. 25(4):885-891.

U.S. EPA. 1990. Definition and Procedure for the Determination of the Method Detection Limit, Revision 1.11. Code of Federal Regulations, Title 40, Part 136, Appendix B.

U.S. EPA. 1995. User's Guide for the Industrial Source complex (ISC3) Dispersion Models. Volume 1. User Instructions. USEPA Office of Air Quality Planning and Standards; Emissions, Monitoring and Analysis Division, Research Triangle Park, North Carolina.

U.S. EPA. 2004. Results of Air Sampling. MacFarland Outdoor Air Investigation (Fact sheet 2 of 2). Dated October 2004. U.S. EPA, Region IX. San Francisco, CA

Table 1. Characteristics of pesticides and breakdown products included in the monitoring and among the top 100 used within 5 miles of Parlier during 2003.

Pesticide	Breakdown Product	Use	Molecular Weight (g/mole)	Water Solubility 9 – 25 C (ppm)	Vapor Pressure 20 – 25 C (mmHg)	Hydrolysis Half-Life 19 – 25 C pH 6 – 7.5 (days)	Soil Aerobic Half-Life (days)	Soil Photolysis Half-Life (days)
1,3-dichloropropene		Fumigant	111.0	2,250	29.4	NA	11.5	NA
Azinphos-methyl		Insecticide	317.3	28.0	1.60E-06			
Chlorothalonil		Fungicide	265.9	1.20	2.00E-06	>49.0	18.3 - 154	>74.0
Chlorpyrifos	Oxygen analog	Insecticide	350.6	1.39	2.21E-05	72.1	NA	10
Copper (sulfate)		Fungicide	249.7	230,500	nonvolatile	NA	NA	NA
Diazinon	Oxygen analog	Insecticide	304.3	60	8.98E-05	138	40	2.55
Dicofol		Insecticide	370.5	NA	3.90E-06	2.74	66.4	60.2
Dimethoate	Oxygen analog	Insecticide	229.2	39,800	1.85E-06	68	2	66.7
Diuron		Herbicide	233.1	36.4	6.90E-08	1240	372	
Endosulfan		Insecticide	407.0	0.325	1.30E-05	18.8	25.6	238
Malathion	Oxygen analog	Insecticide	330.3	125	2.30E-05	6	2	174
Metam-sodium (not monitored)[a]	Methyl isothiocyanate	Fumigant	73.1	8,610	16.0	20.4	0.5 - 50	1.1
Methyl bromide		Fumigant	94.95	1,380	1420	17	1.5 - 20	NA
Norflurazon		Insecticide	303.67	33.7	2.90E-08	~2,650	134	21.2
Oryzalin		Herbicide	346.4	2.5	1.00E-08	>28.0	63.3	3.95
Oxyfluorfen		Herbicide	361.7	0.116	NA	114	293-576	199
Phosmet		Insecticide	317.3	20.0	4.90E-07	0.37	7.20	
Propargite		Insecticide	350	0.5	3.89E-08			
Simazine		Insecticide	201.7	6	2.21E-08	28[b]	110	11.1
Sulfur		Fungicide	32.1	insoluble	3.95E-06	Not degraded	Not degraded	Not degraded
Trifluralin		Herbicide	335.3	0.3	1.04E-04	30	169	41
Xylene		Solvent	106.2	200	5.1			

NA – Not available
[a] Metam-sodium breaks down in a few minutes to the pesticidal agent methyl isothiocyanate (MITC).
[b] No reaction occurred during the study. The half-life is greater than the value listed which represents the length of the study.

Table 2. Pesticides and pesticide breakdown products included in DPR's multi-residue method. Pesticides in bold were among the top 100 used within five miles of Parlier during 2003. These pesticides will be monitored at Chavez School, Martinez School, and Benavidez School three days per week.

Pesticide (Active Ingredient)	Breakdown Product	Product Trade Names
Azinphos-methyl		**Guthion**
Chlorothalonil		**Bravo, Ridomil**
Chlorpyrifos	**Oxygen analog**	**Dursban, Lorsban**
Cypermethrin		Ammo, Demon, Raid
Diazinon	**Oxygen analog**	**AG-500, Diazol**
Dicofol		**Kelthane**
Dimethoate	**Oxygen analog**	**Cygon, De-Fend**
Diuron		**Direx, Karmex**
Endosulfan	**Endosulfan sulfate**	**Thiodan**
EPTC		Eptam
Malathion	**Oxygen analog**	
Metolachlor		Pennant, Bicep, Dual
Molinate		Ordram
Naled (not monitored)	Diclorvos, DDVP	Dibrom
Norflurazon		**Solicam, Predict**
Oryzalin		**Surflan**
Oxyfluorfen		**Goal, Galigan**
Permethrin		Pounce, Ambush
Phosmet		**Imidan**
Propanil		Duet, Stam, Wham
Propargite		**Omite, Comite**
SSS-tributyltriphosphorotrithioate (DEF)		DEF
Simazine		**Princep, Sim-Trol**
Thiobencarb		Bolero, Abolish
Trifluralin		**Treflan, Triap, Trilin**

DPR will also monitor methyl isothiocyanate (MITC) as a single chemical.

Metam-sodium (not monitored)	**Methyl isothiocyanate**	**Vapam, Busan, Sectagon**

Table 3. Chemicals included in ARB's volatile organic compound (VOC) and metals/elements methods. Chemicals in bold are pesticides that were among the top 100 used within five miles of Parlier during 2003. Chemicals in italics are pesticides not among the top 100 used within five miles of Parlier during 2003. Product names are given in parentheses. These chemicals will be monitored at Benavidez School one day per week.

VOCs	Metals/Elements
Acetaldehyde	Aluminum
Acetone	Antimony
Acetonitrile	*Arsenic (several products)*
Acrolein (Magnacide)	Barium
Acrylonitrile	Beryllium
Benzene	Bromine
1,3-Butadiene	Cadmium
Carbon Disulfide (Sodium Tetrathiocarbonate; Enzone)	Calcium
Carbon Tetrachloride	Chloride
Chlorobenzene	Chromium
Chloroform	Cobalt
meta-Dichlorobenzene	**Copper (several products)**
ortho-Dichlorobenzene	Hexavalent Chromium
para-Dichlorobenzene	Iron
cis-1,3-Dichloropropene (Telone, Inline)	Lead
trans-1,3-Dichloropropene (Telone, Inline)	Manganese
Ethyl Benzene	Mercury
Ethylene Dibromide	Molybdenum
Ethylene Dichloride	Nickel
Formaldehyde (Aldesan, Bactron)	Phosphorus
Methyl Bromide (Brom-O-Gas, Metabrom, Pic-Brom,)	Potassium
Methyl Chloroform	Rubidium
Methyl Ethyl Ketone	Selenium
Methyl tertiary-Butyl Ether	Silicon
Methylene Chloride	Strontium
Perchloroethylene	**Sulfur (several products)**
Styrene	Tin
Toluene	Titanium
Trichloroethylene	Uranium
meta/para-Xylene (several products)	Vanadium
meta-Xylene (several products)	Yttrium
ortho-Xylene (several products)	Zinc
para-Xylene (several products)	Zirconium

Table 4. Chemicals included in the SJVAPCD's Photochemical Assessment Monitoring Stations program. These chemicals will be monitored at the Kearney Agricultural Center approximately 0.5 miles southeast of Parlier once every three days during July – September.

Hydrocarbons		**Aldehydes**
ACETYLENE	n-PENTANE	Acetaldehyde
BENZENE	MCPENTANE	Acetone
n-BUTANE	cis-2-PENTENE	Acrolein
1-BUTENE	n-PROPBENZENE	Benzaldehyde
cis-2-BUTENE	PAMHC	Butyraldehyde
CYCLOHEXANE	1-PENTENE	Crotonaldehyde
CYCLOPENTANE	trans-2-PENTENE	Formaldehyde
n-DECANE	PROPANE	Hexaldehyde
m-DIETHYLBENZENE	PROPYLENE	MEK & Methacrolein
p-DIETHYLBENZENE	STYRENE	Propionaldehyde
2,2-DIMETHYLBUTANE	TNMOC as propane (ppbc)	Tolualdehyde
2,3-DIMETHYLBENZENE	TOLUENE	Valeraldehyde
2,3-DIMETHYLPENTANE	1,2,3-TRIMETHYLBENZENE	
2,4-DIMTHYLPENTANE	1,2,4-TRIMETHYLBENZENE	
n-DODECANE	1,3,5-TRIMETHYLBENZENE	
ETHANE	2,2,4-TRIMETHYLPENTANE	
ETHYLENE	2,3,4-TRIMETHYLPENTANE	
ETHYLBENZENE	n-UNDECANE	
m-ETHYLTOLUENE	m/p-XYLENES	
o-ETHYLTOLUENE	o-XYLENE	
p-ETHYLTOLUENE		
n-HEPTANE		
n-HEXANE		
1-HEXENE		
ISOBUTANE		
ISOPENTANE		
ISOPRENE		
ISOPROPBENZENE		
METHYLCYCLOHEXANE		
2-METHYLHEXANE		
2-METHYLPENTANE		
3-METHYLHEXANE		
3-METHYLPENTANE		
2-MHP		
3-MHP		
NONANE		
n-OCTANE		

Table 5. Criteria air pollutants monitored continuously by the ARB and SJVAPCD in or near Parlier.

ARB **Benavidez Elementary School**	**SJVAPCD** **Kearney Agricultural Center**
Particulate Matter-2.5 microns	Nitrogen Dioxide
	Ozone

Table 6. Highest rated pesticides for monitoring based on statewide use, volatility, and toxicity (risk assessment priority). Pesticides in bold are included in the monitoring.

Pesticide	Statewide Use Rating	Volatility Rating	Risk Assess Rating	Total Rating
1,3-DICHLOROPROPENE	**4**	**4**	**4**	**12**
CHLOROPICRIN	4	4	4	12
METAM-SODIUM [MITC]	**4**	**4**	**4**	**12**
METHYL BROMIDE	**4**	**4**	**4**	**12**
K N-METHYLDITHIOCARBAMATE [MITC]	**4**	**4**	**4**	**12**
CHLORPYRIFOS	**4**	**3**	**4**	**11**
MOLINATE	**4**	**3**	**4**	**11**
PROPARGITE	**4**	**3**	**4**	**11**
SODIUM TETRATHIOCARBONATE [CS_2]	**3**	**4**	**4**	**11**
SULFURYL FLUORIDE	4	4	3	11
2,4-D, DIMETHYLAMINE SALT	3	3	4	10
ACROLEIN	**2**	**4**	**4**	**10**
CHLOROTHALONIL	**3**	**3**	**4**	**10**
DIAZINON	**3**	**3**	**4**	**10**
DIURON	**4**	**3**	**3**	**10**
MALATHION	**3**	**3**	**4**	**10**
MANEB	4	2	4	10
PARAQUAT DICHLORIDE	4	2	4	10
PROPANIL	**4**	**2**	**4**	**10**
TRIFLURALIN	**4**	**3**	**3**	**10**
ACEPHATE	2	3	4	9
ALDICARB	2	3	4	9
CAPTAN	3	2	4	9
CARBARYL	2	3	4	9
DIMETHOATE	**2**	**3**	**4**	**9**
IPRODIONE	2	3	4	9
MANCOZEB	3	2	4	9
MCPA, DIMETHYLAMINE SALT	3	3	3	9
NALED	2	3	4	9
OXYFLUORFEN	**3**	**3**	**3**	**9**
PERMETHRIN	**3**	**3**	**3**	**9**
PHOSMET	**3**	**3**	**3**	**9**
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	**2**	**3**	**4**	**9**
SIMAZINE	**3**	**3**	**3**	**9**
ZIRAM	3	2	4	9
AZINPHOS METHYL	**1**	**3**	**4**	**8**
BENSULIDE	2	3	3	8
CHLORINE	3	4	1	8
CHLORTHAL-DIMETHYL	2	3	3	8
CYPERMETHRIN	**2**	**3**	**3**	**8**
DICOFOL	**1**	**3**	**4**	**8**
ENDOSULFAN	**1**	**3**	**4**	**8**
ETHEPHON	3	3	2	8
GLYPHOSATE, ISOPROPYLAMINE SALT	4	2	2	8
IMIDACLOPRID	2	3	3	8
METHOMYL	2	3	3	8
NITROGEN, LIQUIFIED	3	4	1	8
PENDIMETHALIN	3	3	2	8
PETROLEUM HYDROCARBONS	3	4	1	8
SODIUM HYPOCHLORITE	3	4	1	8
THIOBENCARB	**3**	**3**	**2**	**8**

Table 7. Top 25 pesticides used within five miles of Parlier during 2003. Pesticides in bold are included in the monitoring. All pesticides listed here would have a Parlier use rating of 4. Pesticides in **italics* would have a higher total rating based on their Parlier use instead of statewide use. The highest rated pesticides not included in the monitoring (based on Parlier use) are chloropicrin (total rating 12), ziram (10), paraquat (10), and captan (10).

Parlier Use Rank	Pesticide	Statewide (Parlier) Use Rating	Volatility Rating	Risk Assess Rating	Total Statewide (Parlier) Rating
1	**SULFUR**	**4**	**2**	**1**	**7**
2	PETROLEUM OIL, UNCLASSIFIED	4	2	1	7
3	MINERAL OIL	4	2	1	7
4	**1,3-DICHLOROPROPENE**	**4**	**4**	**4**	**12**
5	CRYOLITE	4	2	1	7
6	**COPPER HYDROXIDE**	**4**	**2**	**1**	**7**
7	**METHYL BROMIDE**	**4**	**4**	**4**	**12**
8	GLYPHOSATE, ISOPROPYLAMINE	4	2	2	8
9	****PHOSMET****	***3 (4)***	***3***	***3***	***9 (10)***
10	**ZIRAM**	*3 (4)*	*2*	*4*	*9 (10)*
11	**CHLORPYRIFOS**	**4**	**3**	**4**	**11**
12	****COPPER OXIDE (OUS)****	***2 (4)***	***2***	***1***	***5 (7)***
13	**METAM-SODIUM**	**4**	**4**	**4**	**12**
14	**SIMAZINE**	**4**	**2**	**1**	**7**
15	**PROPARGITE**	**4**	**2**	**4**	**10**
16	PARAQUAT DICHLORIDE	4	2	4	10
17	CHLOROPICRIN	4	4	4	12
18	PETROLEUM DISTILLATES	4	2	1	7
19	**IPRODIONE**	*2 (4)*	*3*	*4*	*9 (11)*
20	**PETROLEUM DISTILLATES, REFINED**	*2 (4)*	*4*	*1*	*7 (9)*
21	CALCIUM HYDROXIDE	4	2	1	7
22	**FORMETANATE HYDROCHLORIDE**	*0 (4)*	*1*	*2*	*3(7)*
23	****OXYFLUORFEN****	***3 (4)***	***3***	***3***	***9 (10)***
24	****COPPER****	***1(4)***	***2***	***1***	***4 (7)***
25	*CAPTAN*	*3 (4)*	*2*	*4*	*9 (10)*

Table 8. Use for 2003 and 2004 within five miles of Parlier for pesticides included in all the monitoring.

	2003			2004		
Pesticide	**Use (lbs)**	**No. of Applications**	**No. of Acres**	**Use (lbs)**	**No. of Applications**	**No. of Acres**
Fumigants						
1,3-Dichloropropene	248,547	97	1,257	224,603	97	1,025
Metam-sodium	15,468	5	98	26,670	3	84
Methyl bromide	36,742	20	150	23,753	13	83
Fumigant Total	300,756	122	1,505	275,026	113	1,192
Organophosphate						
Azinphos-methyl	504	32	318	337	14	227
Chlorpyrifos	25,132	1,266	12,909	26,620	1,275	13,253
Diazinon	2,334	162	1,539	30,921	200	2,266
Dimethoate	208	15	190	128	10	154
Malathion	621	12	98	1	2	3
Naled	0	0	0	0	0	0
Phosmet	32,118	1,376	13,552	36,965	1,624	15,283
SSS-Tributylphosphorotrithioate	0	0	0	0	0	0
Organophosphate Total	60,917	2,863	28,606	94,972	3,125	31,186
Carbamates						
EPTC	0	0	0	0	0	0
Molinate	0	0	0	0	0	0
Thiobencarb	0	0	0	0	0	0
Carbamate Total	0	0	0	0	0	0
Other						
Acrolein	0	0	0	0	0	0
Chlorothalonil	2,212	93	855	1,274	64	489
Cypermethrin	1	1	18	0	0	0
Dicofol	713	105	704	28	2	40
Diuron	2,477	140	3,255	2,165	121	3,103
Endosulfan	0	0	0	336	7	231
Metolachlor	0	0	0	0	0	0
Norflurazon	1,735	297	2,368	1,694	342	2,634
Oryzalin	2,615	272	2,269	5,253	412	3,956
Oxyfluorfen	3,973	1,576	17,580	5,087	1,786	19,902
Permethrin	10	5	61	64	16	364
Propanil	0	0	0	0	0	0
Propargite	9,212	397	5,217	6,481	224	3,557
Simazine	12,026	1,249	15,956	13,196	1,336	15,638
Sodium Tetrathiocarbonate (CS2)	0	0	0	0	0	0
Trifluralin	174	7	257	127	25	231
Xylene	299	13	179	194	9	144
Other Total	35,447	4,155	48,719	35,899	4,344	50,289
Metals						
Arsenic	0	0	0	0	0	0
Copper	99,558	1,871	27,238	90,333	1,964	23,989
Sulfur	849,451	4,952	114,344	933,120	5,745	122,762
Sulfur-Copper Total	949,009	6,823	141,549	1,023,453	7,7709	146,751

Table 9. Use for 2003 and 2004 within five miles of Parlier for pesticides included in the all monitoring, by crop/site

	2003			2004		
Crop/Site	**Use (lbs)**	**No. of Applications**	**No. of Acres**	**Use (lbs)**	**No. of Applications**	**No. of Acres**
Alfafa	43	3	78	453	6	240
Almond	8,615	52	1,713	4,880	72	1,269
Apple	369	27	198	811	60	376
Apricot	1,468	63	310	941	56	320
Bean, Succulent	0	0	0	6,356	3	26
Blueberry	0	0	0	318	5	114
Cherry	8,997	72	702	10,801	65	616
Christmas Tree	25	3	20	21	2	15
Citrus	1,554	25	280	22,399	22	263
Corn (Forage – fodder)	60	1	36	0	0	0
Cucumber	0	0	0	12,700	1	40
Eggplant	7,540	5	55	0	0	0
Grape	784,194	4,704	128,119	845,397	5,554	136,500
Grape, Wine	70,677	544	10,627	69,752	538	11,545
Grapefruit	28	3	12	1	1	4
Kiwi	29	4	52	28	9	22
Nectarine	139,314	3,658	35,858	175,546	3,886	36,373
N-outdr plants in containers	53	2	25	34	1	12
Onion, Dry	344	11	329	2,499	15	220
Orange	2,149	52	996	2,241	68	1,252
Peach	148,768	3,199	25,763	143,310	3,267	26,198
Pear	1,546	54	702	646	31	190
Pepper, Fruiting	2	1	3	0	0	0
Persimmon	5	11	69	17	8	39
Pistachio	2,669	10	300	843	10	252
Plum	38,373	1,3552	10,285	42,092	1,499	10,819
Pomegranate	>1	1	1	0	0	0
Prune	652	3	81	1,183	26	453
Research Commodity	5	4	6	1	3	6
Rights Of Way	0	0	0	11	4	10
Soil Fumigation/Preplant	114,983	20	635	46,395	15	587
Squash	>1	2	2	0	0	0
Squash, Summer	5864	4	50	4	2	12
Strawberry	201	1	1	191	1	1
Tangelo	0	0	0	9	1	3
Tangerine	592	18	259	679	31	529
Tomato	>1	2	1	1	1	1
Turf/Sod	0	0	0	35	2	33
Uncultivated Ag	759	1	5	912	2	6
Walnut	3,181	47	1,308	2,383	20	1,026
Watermelon	3,182	2	34	7,632	3	44

Table 10. Locations, frequency of monitoring, and number of samples collected in Parlier. Once monitoring is initiated, samples will be collected for 52 weeks (one year), except as noted. Figure 7 shows a map of the monitoring locations.

Chemicals Monitored	**Benavidez Elementary School**	**Chavez Elementary School**	**Martinez Elementary School**	**SJVAPCD – Kearney Ag Center**
DPR – Multiple Pesticides Total of 468 samples	3 days/wk 156 samples	3 days/wk 156 samples	3 days/wk 156 samples	---
DPR – MITC Total of 468 samples	3 days/wk 156 samples	3 days/wk 156 samples	3 days/wk 156 samples	---
ARB – VOC Total of 65 samples	1 day/6 days 65 samples*	---	---	---
ARB – Metals/Elements Total of 65 samples	1 day/6 days 65 samples*	---	---	---
SJVAPCD – Hydrocarbons Total of 120 samples	---	---	---	4 every 3 days** 120 samples
SJVAPCD – Aldehydes Total of 120 samples	---	---	---	4 every 3 days** 120 samples
ARB – Criteria Pollutants Particulate matter-2.5 microns	Continuous	---	---	---
SJVAPCD–Criteria Pollutants Nitrogen dioxide Ozone	 --- ---	 --- ---	 --- ---	 Continuous Continuous

*In addition, during the month of high use for 1,3-dichloropropene and sulfur sampling will be increased to 1day/3 days for an additional 5 samples.

**Four 3-hour samples collected on one day of every three days between July and September.

Table 11. Township, range and sections used to define the agricultural boundary for the Parlier air monitoring study. Figure 4 shows a map with the boundaries.

Meridian	Township	Range	Section	Township	Range	Section	Township	Range	Section
M	14S	22E	22	15S	22E	17	15S	23E	33
	14S	22E	23	15S	22E	18	15S	23E	34
	14S	22E	24	15S	22E	19	15S	23E	35
	14S	22E	25	15S	22E	20	15S	23E	36
	14S	22E	26	15S	22E	21	16S	21E	1
	14S	22E	27	15S	22E	22	16S	21E	2
	14S	22E	28	15S	22E	23	16S	21E	11
	14S	22E	29	15S	22E	24	16S	21E	12
	14S	22E	31	15S	22E	25	16S	21E	13
	14S	22E	32	15S	22E	26	16S	22E	1
	14S	22E	33	15S	22E	27	16S	22E	2
	14S	22E	34	15S	22E	28	16S	22E	3
	14S	22E	35	15S	22E	29	16S	22E	4
	14S	22E	36	15S	22E	30	16S	22E	5
	14S	23E	28	15S	22E	31	16S	22E	6
	14S	23E	29	15S	22E	32	16S	22E	7
	14S	23E	30	15S	22E	33	16S	22E	8
	14S	23E	31	15S	22E	34	16S	22E	9
	14S	23E	32	15S	22E	35	16S	22E	10
	14S	23E	33	15S	22E	36	16S	22E	11
	14S	23E	34	15S	23E	2	16S	22E	12
	14S	23E	35	15S	23E	3	16S	22E	13
	15S	21E	1	15S	23E	4	16S	22E	14
	15S	21E	11	15S	23E	5	16S	22E	15
	15S	21E	12	15S	23E	6	16S	22E	16
	15S	21E	13	15S	23E	7	16S	22E	17
	15S	21E	14	15S	23E	8	16S	22E	18
	15S	21E	23	15S	23E	9	16S	22E	19
	15S	21E	24	15S	23E	10	16S	22E	20
	15S	21E	25	15S	23E	11	16S	22E	21
	15S	21E	26	15S	23E	12	16S	22E	22
	15S	21E	27	15S	23E	13	16S	22E	23
	15S	21E	34	15S	23E	14	16S	22E	24
	15S	21E	35	15S	23E	15	16S	23E	2
	15S	21E	36	15S	23E	16	16S	23E	3
	15S	22E	1	15S	23E	17	16S	23E	4
	15S	22E	2	15S	23E	18	16S	23E	5
	15S	22E	3	15S	23E	19	16S	23E	6
	15S	22E	4	15S	23E	20	16S	23E	7
	15S	22E	5	15S	23E	21	16S	23E	8
	15S	22E	6	15S	23E	22	16S	23E	9
	15S	22E	7	15S	23E	23	16S	23E	10
	15S	22E	8	15S	23E	24	16S	23E	11
	15S	22E	9	15S	23E	25	16S	23E	15
	15S	22E	10	15S	23E	26	16S	23E	16
	15S	22E	11	15S	23E	27	16S	23E	17
	15S	22E	12	15S	23E	28	16S	23E	18
	15S	22E	13	15S	23E	29	16S	23E	19
	15S	22E	14	15S	23E	30	16S	23E	20
	15S	22E	15	15S	23E	31	16S	23E	21
	15S	22E	16	15S	23E	32			

Table 12. Detection limits and quantitation limits for the monitored pesticides. Detection and quantitation limits are approximate and will vary with the amount of air sampled and interferences present.

Pesticide	Method Detection Limit (ng/m^3)	Quantitation Limit (ng/m^3)
Acrolein	688	688
Arsenic	668	668
Azinphos-methyl	7.59	23.2
Carbon disulfide	311	311
Chlorothalonil	13.7	92.6
Chlorpyrifos	5.05	46.3
Chlorpyrifos oxygen analog	2.92	11.6
Copper	393	393
Cypermethrin	4.68	46.3
Diazinon	1.16	11.6
Diazinon oxygen analog	2.08	11.6
Dichlorvos	3.24	46.3
1,3-dichloropropene	454	454
Dicofol	2.13	46.3
Dimethoate	2.31	11.6
Dimethoate oxygen analog	1.94	11.6
Diuron	5.14	23.2
Endosulfan	3.24	46.3
Endosulfan sulfate	4.63	46.3
EPTC	1.67	11.6
Formaldehyde	123	123
Malathion	2.18	11.6
Malathion oxygen analog	1.30	11.6
Metam-sodium (MITC)	5.56	23.2
Methyl bromide	116	116
Metolachlor	2.73	11.6
Molinate	1.81	11.6
Norflurazon	3.75	11.6
Oryzalin	1.39	11.6
Oxyfluorfen	6.39	46.3
Permethrin	7.22	46.3
Phosmet	7.96	23.2
Propanil	2.31	11.6
Propargite	3.80	46.3
SSS-tributyltriphosphorotrithioate (DEF)	1.76	11.6
Simazine	1.20	11.6
Sulfur	1,600	1,600
Thiobencarb	5.60	11.6
Trifluralin	1.67	23.2
Xylene	850	850

Table 13. Health screening levels for pesticides included in the monitoring.

Chemical	Acute[a] Screening Level (ng/m^3)	Subchronic Screening Level (ng/m^3)	Chronic Screening Level (ng/m^3)
Acrolein	190	180	60
Arsenic	30	30	30
Azinphos-methyl	101,000	11,000	6,800
Carbon disulfide	1,550,000	800,000	800,000
Chlorothalonil	34,000	34,000	34,000
Chlorpyrifos	1,200	850	510
Copper	100,000	10,000	10,000
Cypermethrin	40,000	29,000	9,600
Diazinon	130	130	130
1,3-D	160,000	120,000	120,000
Dicofol	68,000	49,000	20,000
Dichlorvos	11,000	2,200	770
Dimethoate	34,000	17,000	850
Diuron	170,000	17,000	5,700
Endosulfan	4,000	2,900	2,900
EPTC	230,000	24,000	8,500
Formaldehyde	19,000	3,000	3,000
Malathion	40,000	29,000	29,000
MITC	66,000	3,000	300
Methyl Bromide	820,000	35,000	3,900
Metolachlor	85,000	15,000	16,000
Molinate	200,000	8,200	b
Naled	920	650	650
Norflurazon	170,000	26,000	26,000
Oryzalin	420,000	230,000	232,000
Oxyfluorfen	510,000	180,000	51,000
Permethrin	168,000	90,000	90,000
Phosmet	77,000	26,000	18,000
Propanil	51,000	51,000	51,000
Propargite	14,000	14,000	14,000
DEF	8,800	8,800	b
Simazine	110,000	31,000	31,000
Sulfur	c	c	c
Thiobencarb	425,000	34,000	17,000
Trifluralin	1,200,000	170,000	41,000
Xylenes	900,000	700,000	700,000

Footnotes

a. Normalized to 24 hour unless otherwise noted, subchronic and chronic also normalized to 7 days a week
b. These pesticides have seasonal use only, so there is no chronic exposure.
c. Insufficient data to derive screening levels.

FIGURES

Figure 1. Map showing Parlier approximately 20 miles southeast of Fresno.

Figure 2. Summary of wind direction and wind speed during 2004 at the SJVAPCD monitoring station, approximately 0.5 miles southeast of Parlier. The direction of the spokes indicates the direction the wind is coming from. The length of the spokes indicates the percentage of time in that direction. The width and color of the spokes indicates the wind speed.

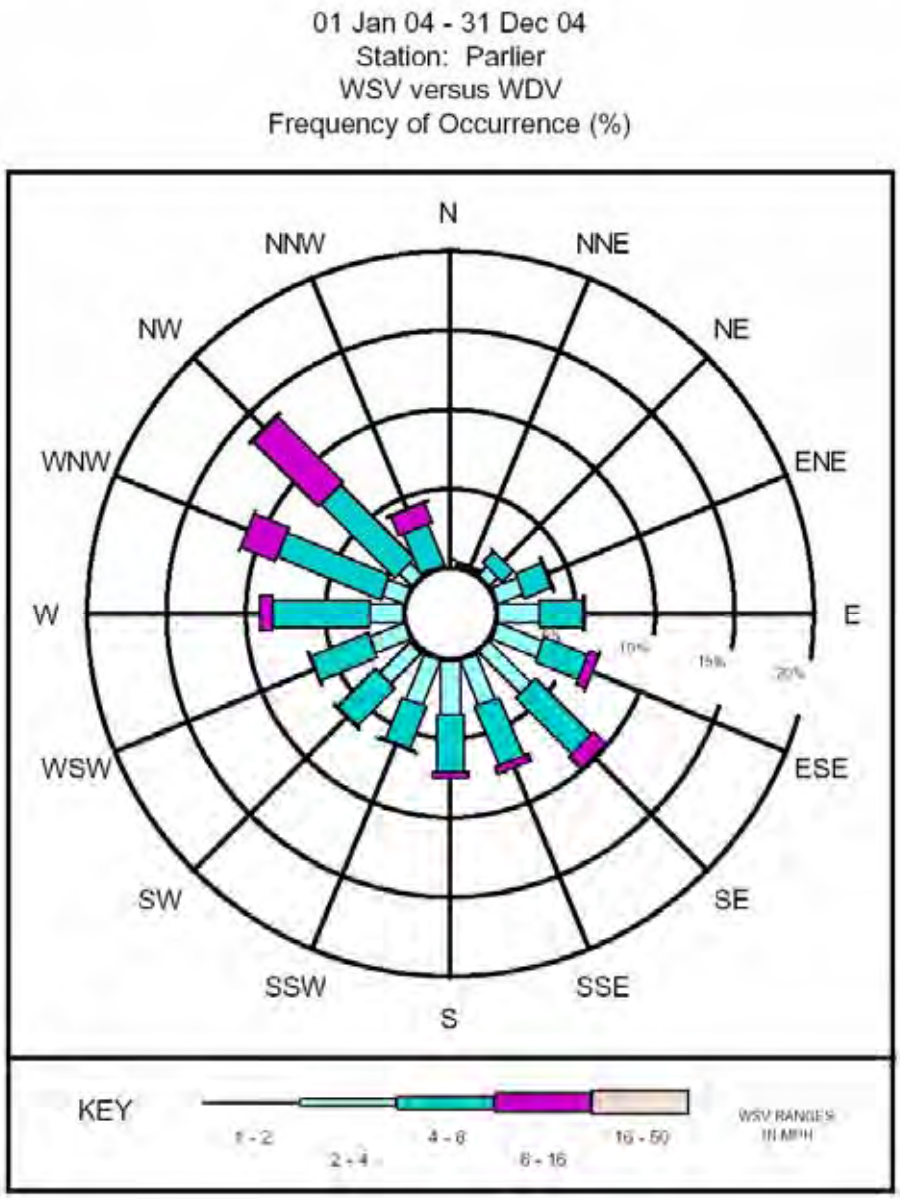


Figure 3. Amounts and locations of fumigant applications (chloropicrin, 1,3-dichloropropene, metam-sodium, and methyl bromide) within five miles of Parlier during 2004.

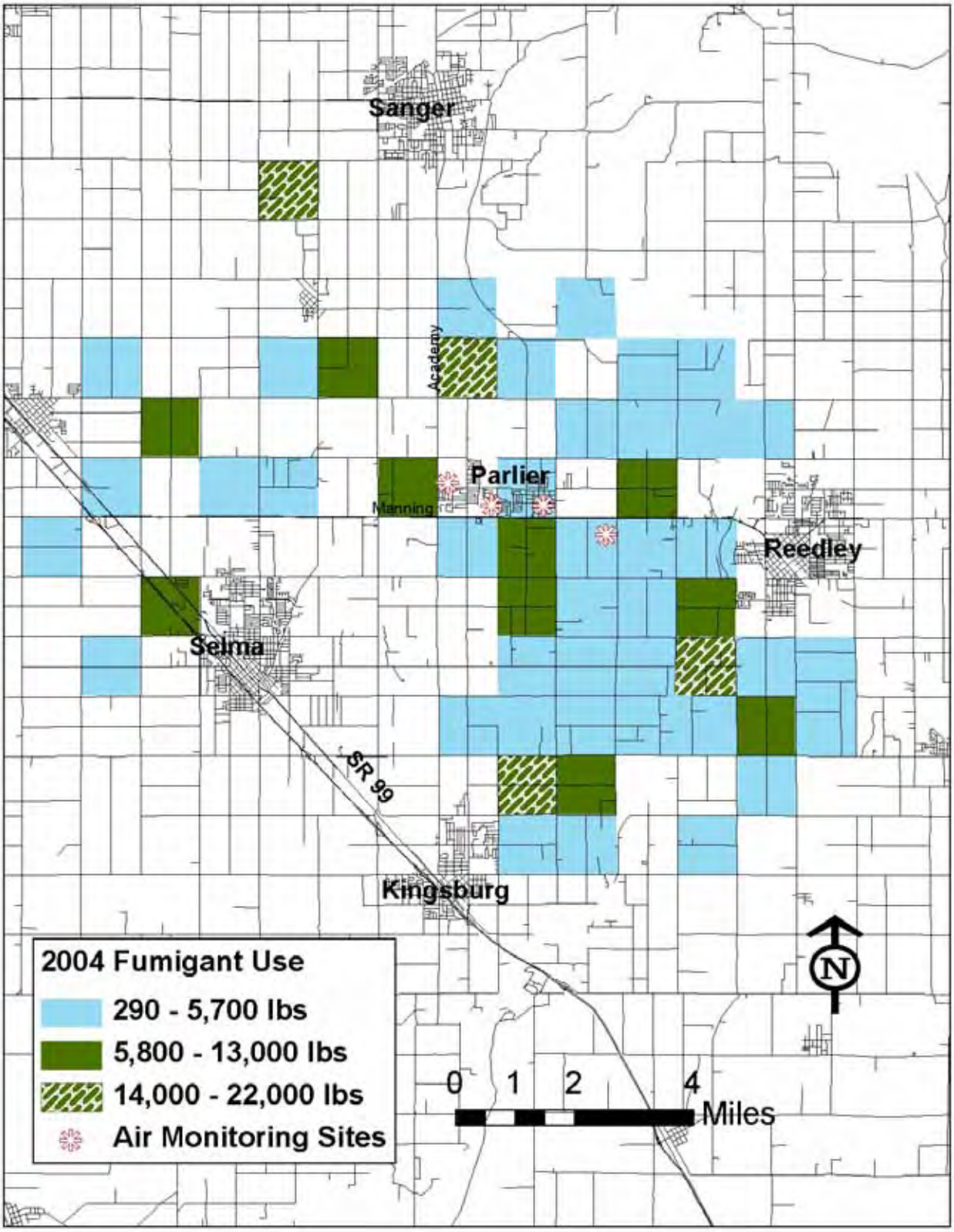


Figure 4. Amounts and locations of organophosphate applications within five miles of Parlier during 2004.

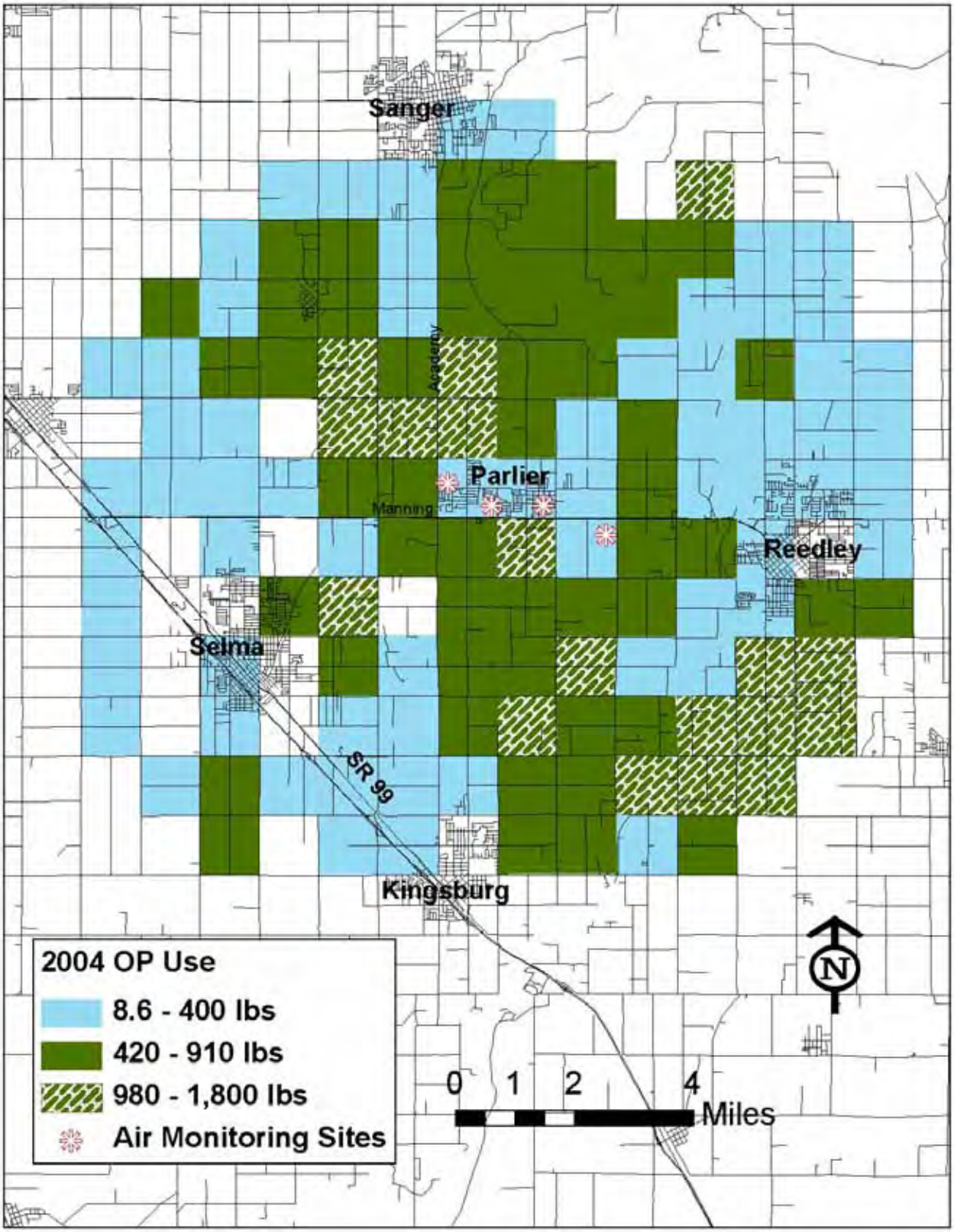


Figure 5. Amounts and locations of copper and sulfur applications within five miles of Parlier during 2004.

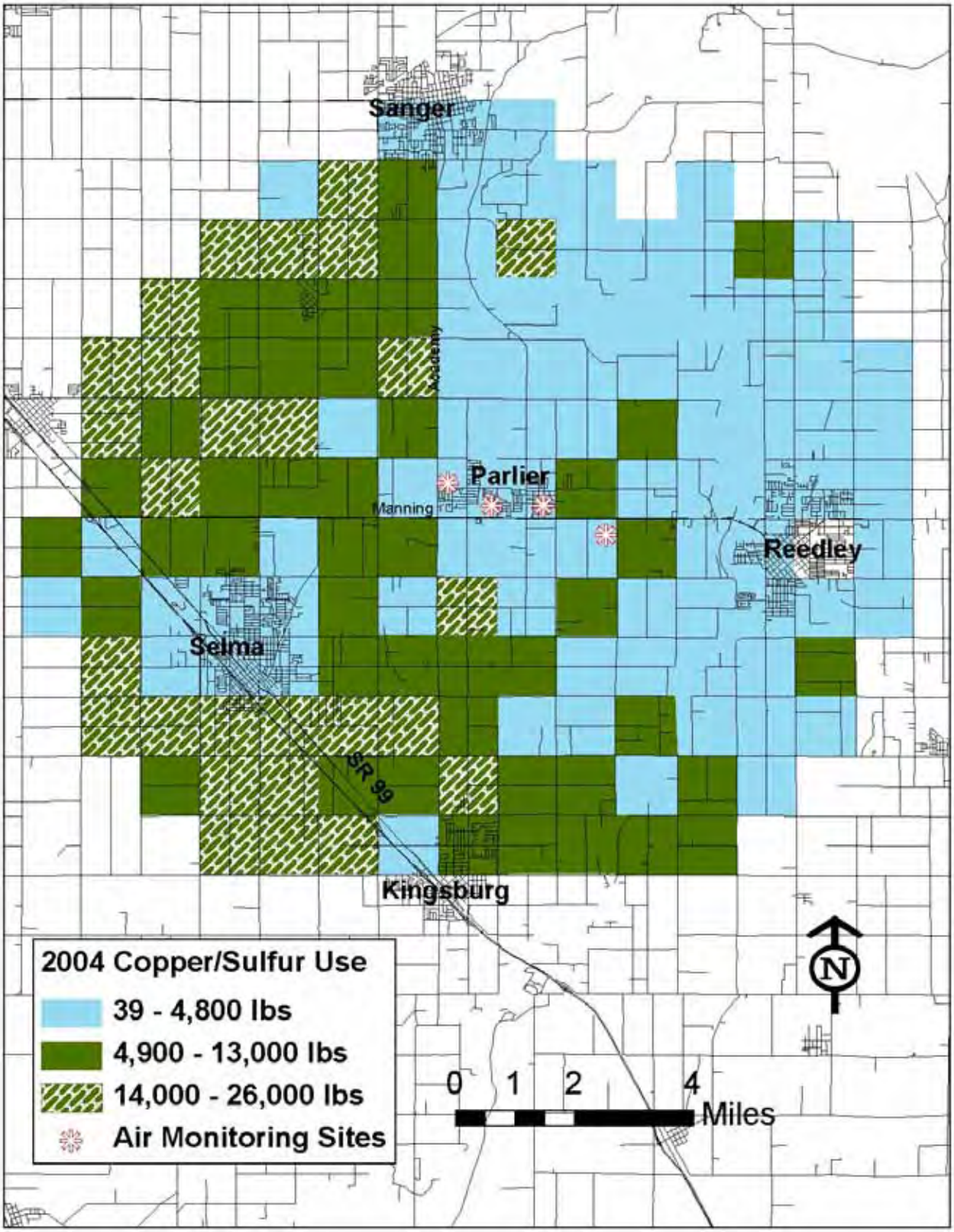


Figure 6. Amounts and locations of other pesticide applications within five miles of Parlier during 2004.

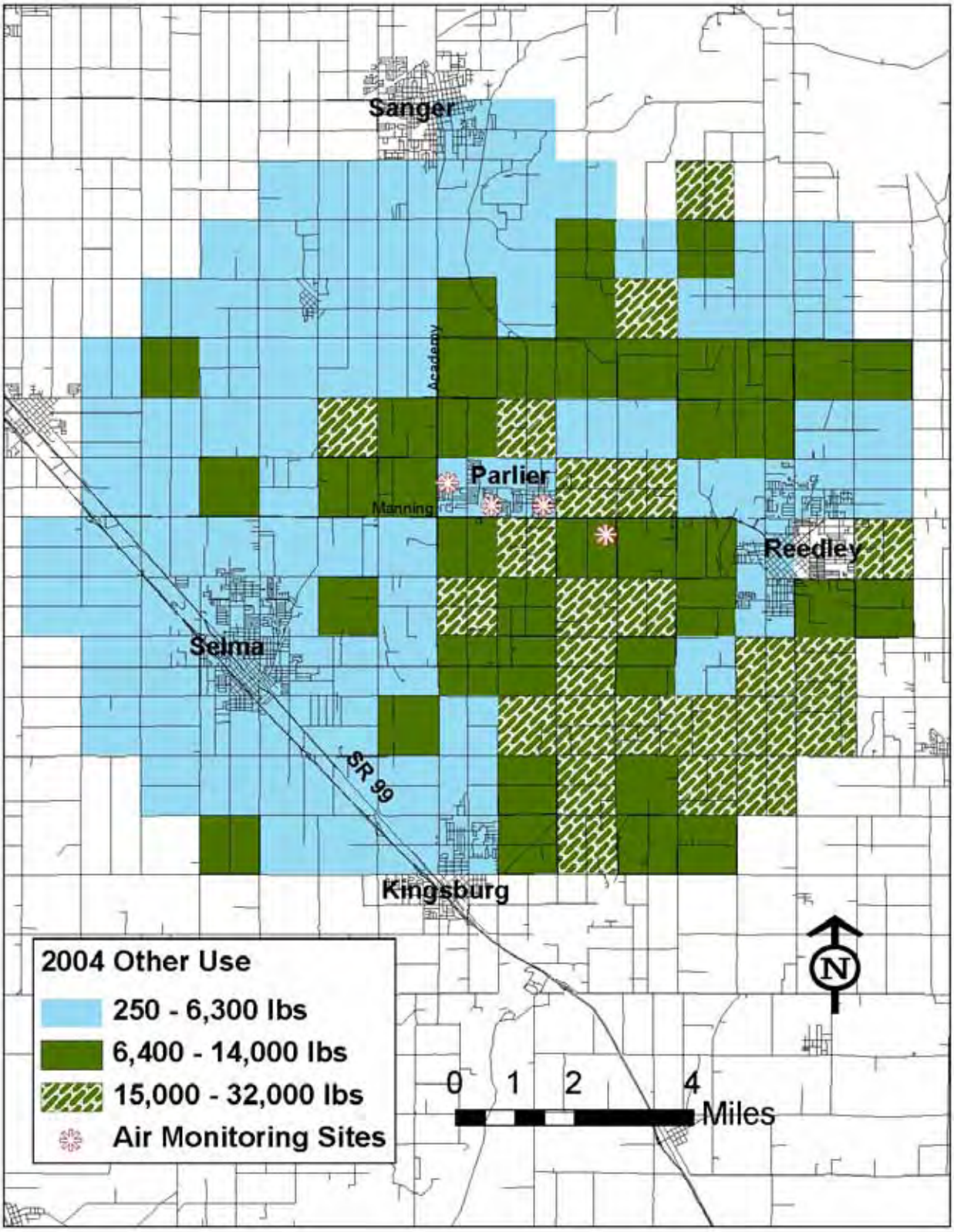


Figure 7. Locations of monitoring stations and population density in Parlier.

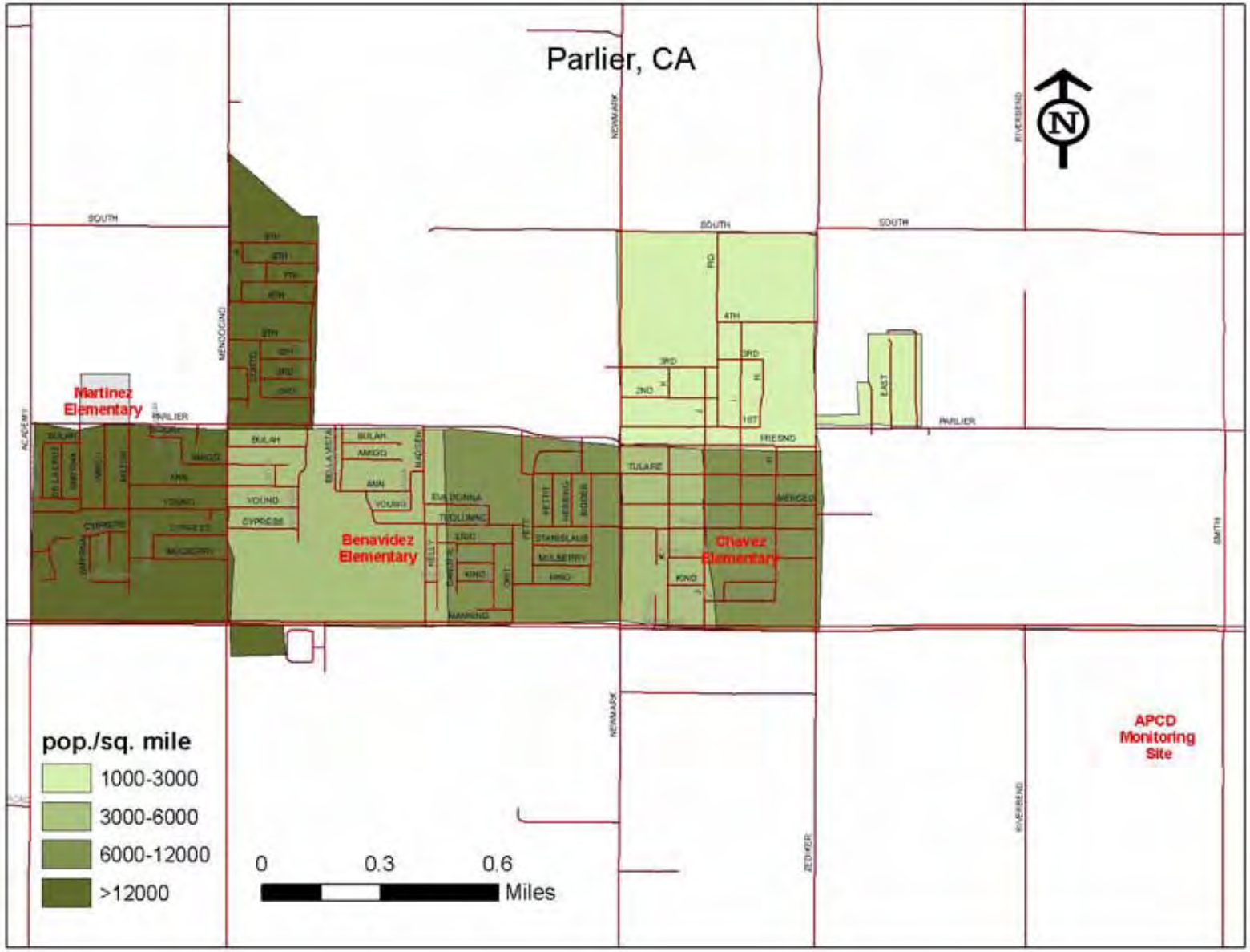


Figure 8. Total monthly 1,3-dichloropropene use (pounds active ingredient) for 2001 – 2004.

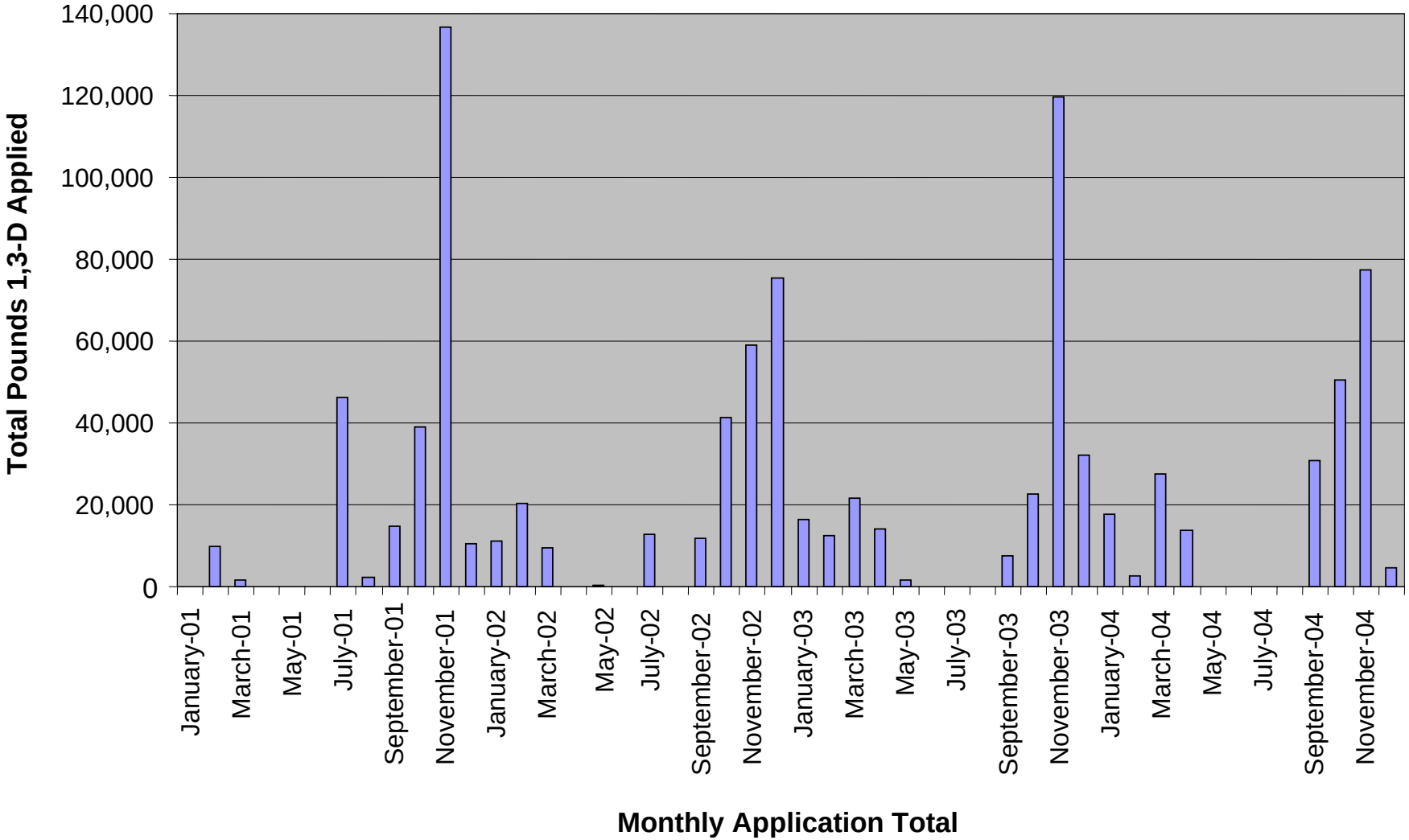


Figure 9. Total Sulfur monthly use (pounds active ingredient) for 2001 – 2004.

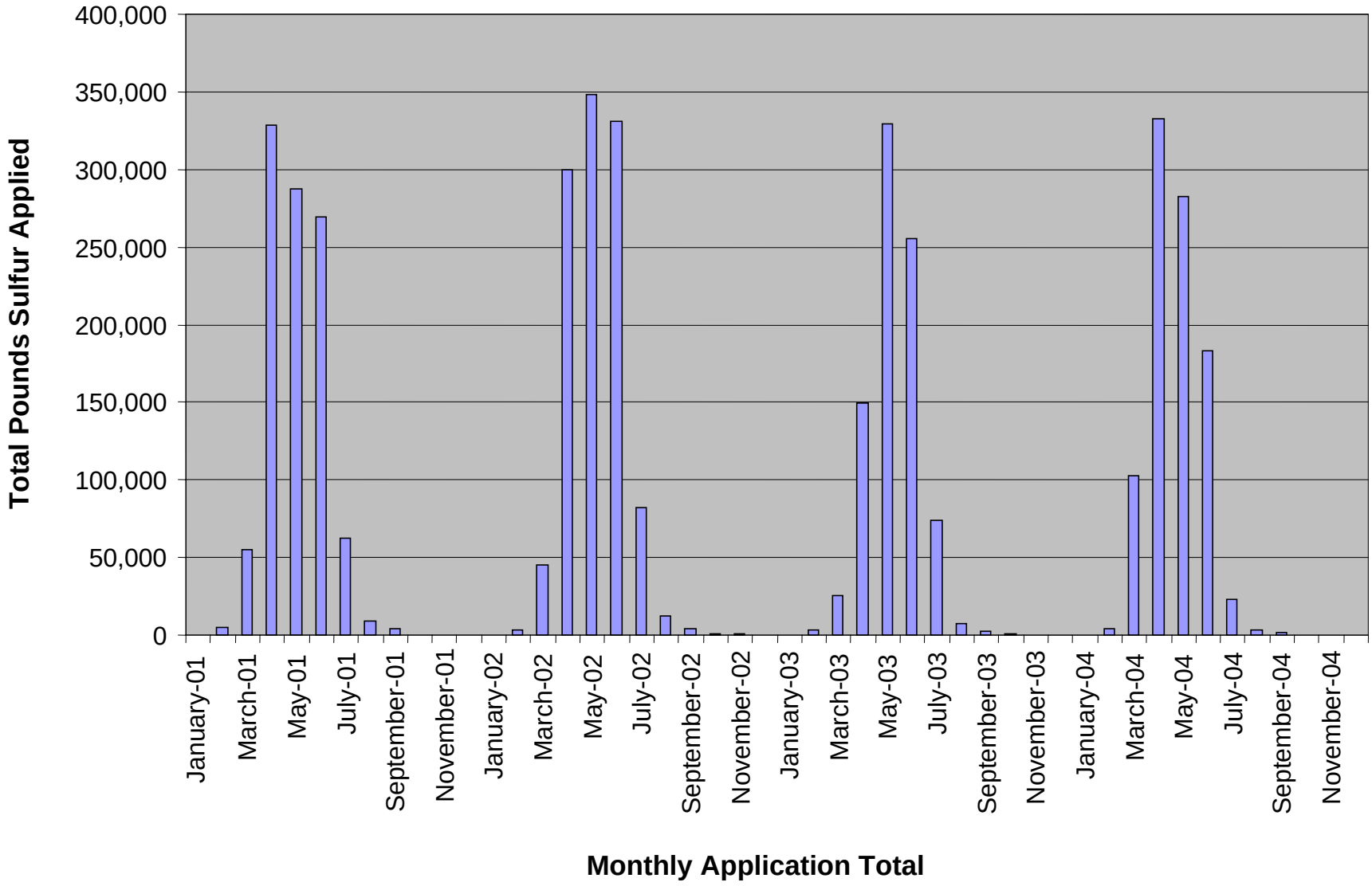


Figure 10. Total monthly methyl bromide use (pounds active ingredient) for 2001 – 2004.

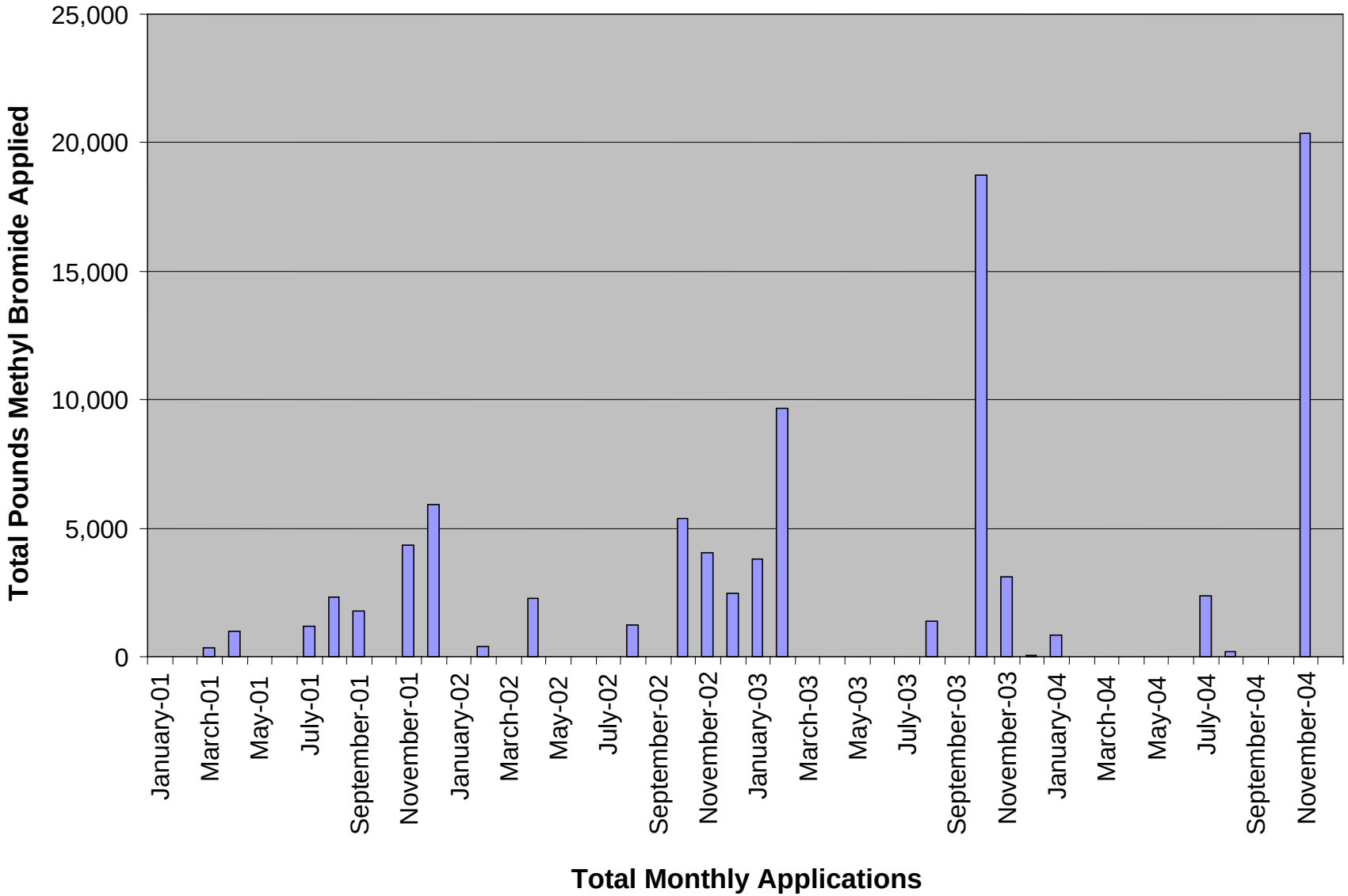


Figure 11. Township, range and sections used to define the agricultural boundary for the Parlier air monitoring study.

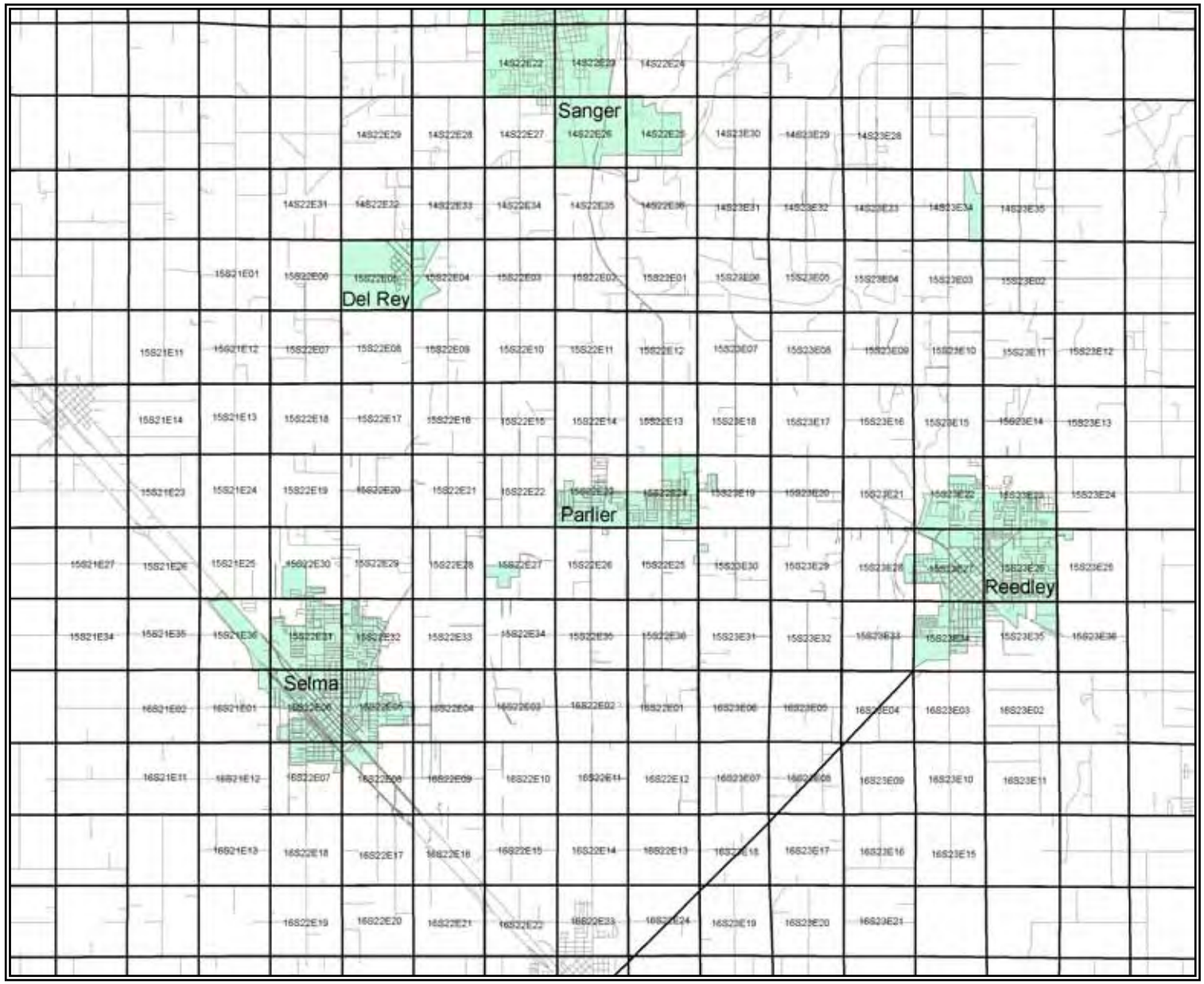
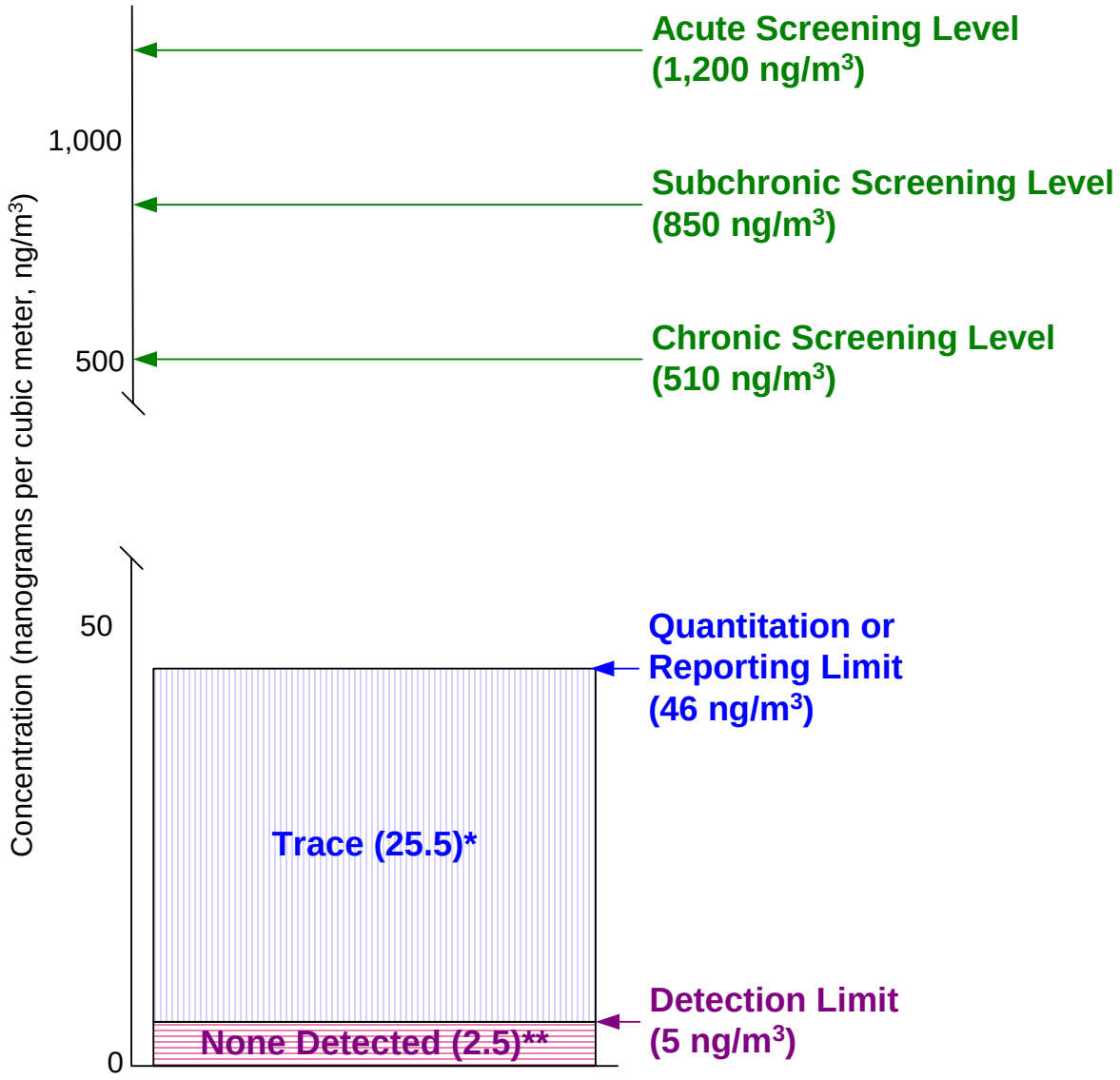


Figure 12. Relationship between detection limit, quantitation limit, and screening levels, using chlorpyrifos as an example.



* Detections between the quantitation and detection limits have "trace" levels and are assumed to have a concentration that is the average of the quantitation and detection limits.

** Samples that have no detectable amount are usually assumed to have a concentration of one-half the detection limit.

ATTACHMENTS

ATTACHMENT I – HISTORICAL MONITORING FOR THE TOXIC AIR CONTAMINANT PROGRAM

HISTORICAL MONITORING FOR THE TOXIC AIR CONTAMINANT PROGRAM

The Air Resources Board, in consultation with DPR, conducts ambient monitoring for a variety of pesticides in accordance with the Toxics Air Contaminant (TAC) monitoring program. Monitoring for pesticides is conducted in counties with the highest use for a particular pesticide to be monitored and during the season of highest use. Information is available from ambient air sampling conducted under the TAC program for 12 of the pesticides included in the monitoring study in Parlier: 1,3-dichloropropene, chlorpyrifos, diazinon, endosulfan, EPTC, malathion, MITC, methyl bromide, molinate, permethrin, propargite, simazine, and S,S,S-tributyl phosphorotrithioate. Summaries of the TAC monitoring are given in Attachment I.

The fumigants, 1,3-dichloropropene (1,3-D) and methyl bromide have been monitored over several studies. 1,3-D was measured over the course of eight days in Merced County in April 1990 (California Air Resources Board, 1991). The maximum concentration was 160 micrograms per cubic meter ($\mu g/m^3$) and the average was 24 $\mu g/m^3$. Following suspension of 1,3-D use in California, ARB monitored ambient air concentrations in Merced County in March through April 1995 during reintroduction of use of 1,3-D with mitigation measures m^3 (California Air Resources Board, 1995). The 24-hour concentrations ranged from no detectable amount (ND) to 7.4 $\mu g/m^3$. Similar monitoring conducted in Kern County during May to December, 1995 measured concentrations up to 27.0 $\mu g/m^3$ (California Air Resources Board, 1996). In July 1996, following permit condition revisions, 24-hour 1,3-D concentrations measured in Kern County ranged from 0.10 $\mu g/m^3$ to 13 $\mu g/m^3$ (California Air Resources Board, 1997). The highest 24-hour ambient air concentrations measured in Kern in 2000 and 2001 were 135 $\mu g/m^3$ and 96 $\mu g/m^3$, respectively (California Air Resources Board, 2000 and 2002b). In Monterey and Santa Cruz Counties the highest 24-hour concentrations measured were 4.34 $\mu g/m^3$ and 18.9 $\mu g/m^3$ in 2000 and 2001, respectively (California Air Resources Board, 2001a and 2002a).

Ambient air concentration of methyl bromide was also monitored in Kern, Monterey and Santa Cruz Counties in 2000 and 2001(California Air Resources Board, 2000, 2001a, 2002a and 2002b). The highest 24-hour concentrations measured in Kern in 2000 and 2001 were 55 $\mu g/m^3$ and 98.3 $\mu g/m^3$, respectively. In Monterey and Santa Cruz Counties the highest 24-hour concentrations measured were 119 $\mu g/m^3$ and 142 $\mu g/m^3$ in 2000 and 2001, respectively.

MITC was measured in Kern County in July 1993 using sorbent tubes (Baker et al., 1996). at four sites over the course of eight days. Four sites were measured over the course of eight days with 83 percent of the samples above the minimum quantitation level of 0.01 $\mu g/m^3$. The maximum 24-hour concentration was 18 $\mu g/m^3$, the average was 5.8 $\mu g/m^3$, and the mean urban background concentration was 2.1 $\mu g/m^3$. In June 2000, ARB monitored for MITC and MIC (another breakdown product of metam-sodium) in Kern County using sorbent tubes (ARB, 2003a) at five sites over the course of eight weeks. The 8-week average concentrations for MITC ranged from 0.12 $\mu g/m^3$ to 2.5 $\mu g/m^3$ at the five sites with 44 percent of the samples containing concentrations of MITC above the EQL of 0.42 $\mu g/m^3$. Of the 396 ambient air samples, none contained MIC concentrations above the EQL of 0.42 $\mu g/m^3$. The urban background site had a maximum 24-hour concentration of 1.7 $\mu g/m^3$ and 42 percent of the samples contained a concentration above the EQL of 0.42 $\mu g/m^3$. In the fall of 2000, ARB

monitored ambient air concentrations of MITC and MIC in Monterey and Santa Cruz Counties at five sites for eight weeks, four 24-hour samples per week. Of the 192 samples, only one sample (0.43 $\mu g/m^3$) had a concentration of MITC above the EQL of 0.42 $\mu g/m^3$, and two samples were below the EQL but above the MDL. None of the samples contained any detectable concentration of MIC. There were no measurable concentrations of MITC or MIC at the urban background sampling location.

Chlorpyrifos and its oxygen analog were measured in Tulare County during May and June 1996 (California Air Resources Board, 1998b). The maximum concentration was 0.815 $\mu g/m^3$ or 815 nanogram per cubic meter (ng/m^3), and the mean urban background concentration was 27 ng/m^3.

Diazinon was measured in Fresno County during January and February 1997 at four sites over a six-week period (California Air Resources Board, 1998a). The maximum concentration was 290 ng/m^3, and all urban background sample concentrations were below the level of quantitation.

Ambient air monitoring of endosulfan was conducted in Fresno County from July through August, 1996 (California Air Resources Board, 1998c). Chemical analysis was performed for two isomers of endosulfan (endosulfan I and endosulfan II) as well as endosulfan sulfate. The highest 24-hour values observed for the study were 140 ng/m^3 and 26 ng/m^3 for endosulfan I and II, respectively. Endosulfan sulfate was not found above the quantification limit of 6.6 ng/m^3.

EPTC was measured in Imperial County during October and November 1996 at four sites over the course of 24 days (California Air Resources Board, 1998d). The maximum EPTC concentration was 240 ng/m^3, and all of the urban background samples had concentrations below the limit of quantitation.

Malathion and its breakdown product malaoxon were measured in Imperial County during February and March 1998 (California Air Resources Board, 1999a). Four sites were measured over the course of 12 days. The maximum malathion concentration was 90 ng/m^3, and the mean urban background concentration was 5.7 ng/m^3.

Molinate was measured in Colusa County during peak use period in May, 1992 (Kollman, 1995). Ambient 24-hour concentrations ranged from 160 to 1170 ng/m^3.

Naled/dichlorvos (DDVP) were measured in Tulare County during May and June 1991 using XAD-2, and analyzed by gas chromatography (California Air Resources Board, 1993). Four sites were measured over the course of 16 days and 14 percent of the sample concentrations were above the minimum quantitation level of 40 ng/m^3. The maximum concentration was 65 ng/m^3, and the mean urban background concentration was 68 ng/m^3.

Permethrin was measured in Monterey County during August and September 1997 at four sites over the course of 24 days. (California Air Resources Board, 1998e). Five percent of the sample concentrations were above the limit of detection, but were below the limit of quantitation (15 ng/m^3 for a 24-hour sampling period).

Propargite was measured in Fresno and Kings Counties from June 24 to August 4, 1999 (California Air Resources Board, 2001b). The highest 24-hour propargite concentration was 1300 ng/m^3. Fourty percent of the samples were above the quantitation limit of 23 ng/m^3.

Simazine was measured in Fresno County during February through April 1998 at four sites over the course of 24 days (California Air Resources Board, 1999b). The maximum concentration was 18 ng/m^3; all background sample concentrations were below the estimated quantitation limit.

The cotton defoliant S,S,S-tributyl phosphorotrithioate (DEF) was monitored four days a week at four sites in Fresno County during September through early November in 1987 (ARB, 1988). Maximum detection was 330 ng/m^3, and 17 percent of the urban background samples contained concentrations above the MDL of 1.1 ng/m^3.

REFERENCES

California Air Resources Board. 1988. Pilot Analysis of DEF in Air. Memorandum to Jack Parnell, Department of Food and Agriculture from James D. Boyd, Air Resources Board. Dated December 30, 1988.

California Air Resources Board. 1991. Telone (1,3-dichloropropene) Monitoring in Merced County. Project No. C90-014. January 4, 1991. Sacramento, CA.

California Air Resources Board. 1993. Airborne concentrations of Naled and Dichlorvos in Central Tulare County from Sampling conducted in May and June 1991. Test Report No. A032-094. June 24, 1993. Sacramento, CA.

California Air Resources Board. 1994. Ambient air monitoring for MITC in Kern County during Summer 1993. Project No. C92-070. April 27, 1994. Sacramento, CA.

California Air Resources Board. 1995. Ambient Air Monitoring in Merced County for Telone (1,3-dichloropropene) During DowElanco's Commercial Reintroduction, March-April, 1995. Project No. C94-071-M. November 9, 1995. Sacramento, CA.

California Air Resources Board. 1996. Ambient Air Monitoring in Kern County for Telone (1,3-dichloropropene) During DowElanco's Commercial Reintroduction, May-December, 1995. Project No. C94-071-K. November 8, 1996. Sacramento, CA.

California Air Resources Board. 1997. Report for 1996 Ambient Monitoring of Telone in Kern County. Project No. C96-045. October 14, 1997. Sacramento, CA.

California Air Resources Board. 1998a. Ambient Air Monitoring of Diazinon in Fresno County During Winter, 1997. Project No. C96-036. April 6, 1998. Sacramento, CA.

California Air Resources Board. 1998b. Application and Ambient Air Monitoring of

Chlorpyrifos (and the oxon analogue) in Tulare County During Spring/Summer, 1996. Project No. C96-041. April 7, 1998. Sacramento, CA.

California Air Resources Board. 1998c. Air Monitoring of Endosulfan in Fresno County (Ambient) and in San Joaquin County (Application). Project No. C96-034. April 17, 1998. Sacramento, CA.

California Air Resources Board. 1998d. Air Monitoring of EPTC in Merced County (Application) and in Imperial County (Ambient). Project No. C96-035. June 10, 1998. Sacramento, CA.

California Air Resources Board. 1998e. Application (Butte County) and Ambient (Monterey County) Air Monitoring of Permethrin. Project No. 97-041. November 17, 1998. Sacramento, CA.

California Air Resources Board. 1999a. Application and ambient air monitoring of Malathion in Imperial County. Project No. C98-002. January 28, 1999. Sacramento, CA.

California Air Resources Board. 1999b. Application (Tulare County) and Ambient (Fresno County) Air Monitoring of Simazine. Project No. C97-071. November 22, 1999. Sacramento, CA.

California Air Resources Board. 2000. Ambient Air Monitoring for Methyl Bromide and 1,3-dichloropropene in Kern County – Summer 2000. Project No. C00-028. December 27, 2000. Sacramento, CA.

California Air Resources Board. 2001a. Ambient Air Monitoring for Methyl Bromide and 1,3-dichloropropene in Monterey/Santa Cruz Counties – Fall 2000. Project No. C00-028. January 31, 2001. Sacramento, CA.

California Air Resources Board. 2001b. Report for the Application and Ambient Air Monitoring for Propargite and Bifenthrin in Fresno and Kings Counties. Project Nos. C99-032, C99-032a, C99-033, and C99-033a. August 8, 2001. Sacramento, CA

California Air Resources Board. 2002a. Ambient Air Monitoring for Methyl Bromide and 1,3-dichloropropene in Monterey and Santa Cruz Counties – Fall 2001. Project No. P-01-004. March 29, 2002. Sacramento, CA.

California Air Resources Board. 2002b. Ambient Air Monitoring for Methyl Bromide and 1,3-dichloropropene in Kern County – Summer 2001. Project No. P01-004. June 20, 2002. Sacramento, CA.

California Air Resources Board. 2003a. Ambient Air Monitoring for Chloropicrin and Breakdown Products of Metam Sodium in Kern County – Summer 2001. Project No. P01-004. November 13, 2003. Sacramento, CA.

California Air Resources Board. 2003b. Ambient Air Monitoring for Chloropicrin and Breakdown Products of Metam Sodium in Monterey and Santa Cruz Counties – Fall 2001. Project No. P01-004. December 23, 2003. Sacramento, CA.

ATTACHMENT II – STANDARD OPERATING PROCEDURES

To reduce the consumption of paper, the Standard Operating Procedures (SOPs) are available on our Departmental website. If needed, a hardcopy can be requested from the authors.

STANDARD OPERATING PROCEDURES

1. Administrative Standard Operating Procedures

Personnel Organization and Responsibilities for Studies
http://www.cdpr.ca.gov/docs/empm/pubs/sops/admn002.htm

2. Equipment Standard Operating Procedures

Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps
http://www.cdpr.ca.gov/docs/empm/pubs/sops/eqai001.pdf

3. Field Sampling Standard Operating Procedures

Preparation of Air Sampling Tubes and Resin Jars
http://www.cdpr.ca.gov/docs/empm/pubs/sops/fsai0101.pdf

4. Quality Assurance and Quality Control Standard Operating Procedures

Transporting, Packaging and Shipping Samples from the Field to the Warehouse or Laboratory.
http://www.cdpr.ca.gov/docs/empm/pubs/sops/qaqc0401.pdf

Sample Tracking Procedures
http://www.cdpr.ca.gov/docs/empm/pubs/sops/QAQC003.02.pdf

Chemistry Laboratory Quality Control.
http://www.cdpr.ca.gov/docs/empm/pubs/sops/qaqc001.pdf

5. Department of Food and Agriculture, Center for Analytical Chemistry Standard Operating Procedures

Determination of MITC in Air By GC/NPD or GC/TSD

Determination of Selected Pesticides Collected on XAD-4 Resin by High Performance Liquid Chromatography Ion Trap Mass Spectrometry and Gas Chromatography Mass Spectrometry

Determination of Atrazine, Bromacil, Cyanazine, Diuron, Hexazinone, Metribuzin, Norflurazon, Prometon, Prometryn, Simazine, Deethyl Atrazine (DEA), Deisopropyl Atrazine (ACET), and Diamino Chlorotriazine (DACT) in Well Water and River Water By Liquid Chromatograph – Atmospheric Pressure Chemical Ionization Mass Spectrometry.

TABLES

ATTACHMENT III – PESTICIDE USE PATTERNS

Table 1: Pesticides included in DPR's Environmental Justice Pilot Project
Agricultural uses emphasize Parlier area pesticide use patterns. Nonagricultural uses listed are those allowed by California product labels. [Also please see the notes which follow these tables]

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
azinphos-methyl (Guthion, Gowan Azinphos, Azinphosmethyl-various brands)	Insecticide; organophosphate chemical *(see definition in notes at end of table)* for control of a broad spectrum of insects, mites, and other arthropod pests	Ground or aerial preplant or in-crop application to all nuts, vegetables, and fruits (including raisins), grains, forage/fodder crops, pulses, cotton, ornamentals; used in nurseries; trees/forestry	None
chlorine (several labels)	Antimicrobial; used to kill bacteria, fungi, other animal/plant pathogens, and algae	Preventive or postharvest disinfection of poultry, eggs, fish, meat, dairy, turf, and vegetable and fruit crops, including nectarines, peaches, and plums	Used in commercial, industrial, and residential settings including packing houses, water systems and water treatment, swimming pools, and other aquatic sites
chlorpyrifos (Dursban, Lorsban, Nufos, Lock-On, Chlorpyrifos-various brands)	Insecticide; an organophosphate chemical *(see notes at end)* effective against a broad spectrum of arthropod pests including flies, mosquitoes, cockroaches, ants, wasps, termites, ticks and lice	Many crops including grapes and wine grapes, raisins, nectarines, peaches, plums; all use on post-bloom apples or tomatoes prohibited; used for quarantine treatment, in nurseries and greenhouses, and with turf and ornamentals; animal husbandry premises, livestock and livestock ear tags	**Dursban formerly used widely in homes and gardens; these uses phased out as a result of an agreement between the U.S. EPA and the manufacturer. Some nonagricultural uses of chlorpyrifos by professional pest control operators and vector control districts are still allowed.**
copper hydroxide (Champ, Champion,	Antimicrobial; used to kill fungi, bacteria, and	Ground or aerial applications to a broad range of crops, such as all	In wood preservatives, coatings, and marine anti-foulant; applied to

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
Kocide, Nu-Cop, etc.)	algae	fruits (including raisins), nuts, and field crops, vegetables; ornamentals, turf/lawns, mulch; in greenhouses, nurseries, and gardens; trees/forestry/lumber	fabric surfaces; used in industrial, institutional, and commercial settings for buildings and structures, uncultivated areas (including pavement, rights-of-way), and recreational areas (such as tennis courts, golf courses)
copper oxide (ous) (Nordox, Chem Copp, etc.)	Fungicide; used to control fungi, including crop diseases	Ground or aerial application in a wide range of crops such as nuts, fruits (including grapes and wine grapes, nectarines, peaches, plums), vegetables, pulse, forage, beverage, and field crops; ornamentals, trees	Household use; application to buildings/structures (with arsenic and chromic acid), roofs; antifouling treatment/paint for the wooden parts, bottoms/hulls of boats
copper oxide (ic) (CCA Type-C, Wolman E, Wolmanac)	Fungicide and insecticide, including against termites; combined in some products with arsenic and chromic acid	None	Wood preservative
copper sulfate (basic) (Basicop, Cuprofix Disperss, etc.)	Antimicrobial and disinfectant; used against bacterial and fungus diseases and contamination	Ground or aerial applications in many crops including vegetables, fruits (such as grapes and wine grapes, raisins, nectarines, peaches, plums), all nut crops; trees and ornamentals; used in greenhouses	Food processing/handling facilities, households; septic/sewage systems
copper sulfate (pentahydrate) (Agritec, Bioguard, Roto Rooter Root Killer, etc.)	Antimicrobial, dessicant, and molluscicide; for controlling fungi, bacteria, algae, pond	Ground or aerial application in crops such as rice, all nut crops, fruits (including grapes and wine grapes, nectarines, peaches, plums), ornamentals; used in greenhouses,	Wood protection treatments; home/garden; used in commercial, industrial, domestic, and natural aquatic settings such as irrigation and drainage, drinking water, and

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
	weeds, snails, slugs, shrimp; root control in pipes	nurseries; animal husbandry premises; can be applied to cattle; trees/lumber	septic/sewage systems, swimming pools, coolers/condensers, toilet bowls, ponds, marshes and wetlands
cypermethrin (Ammo, Demon, Cynoff, Raid, Zep, etc.)	Insecticide; pyrethroid chemical *(see definition in notes at end of table)* used against a broad spectrum of insects and other arthropods including crop pests, ants, roaches, fleas, flies, lice, ticks, mosquitoes and termites	Ground or aerial preplant or in-crop applications to field, forage and oil crops, nuts, vegetables, cotton, ornamentals, lawns, greenhouses, beehives; farm/ag structures including animal husbandry premises; topical applications to horses for fly control; trees/forestry/lumber	Wood protection treatment; fencerows, hedgerows; home, garden, and structural pest control, including fogging; sewage/septic systems; commercial, industrial, and institutional facilities for food and nonfood storage, processing/handling, transport (all manner of vehicles), and marketing, such as hospitals, schools, restaurants; uncultivated land including rights-of-way, paved areas, refuse and solid waste sites, recreation areas
diazinon (AG-500, Diazol, Diazinon-various brands)	Insecticide and acaricide; an organophosphate chemical *(see notes at end)* that kills a broad spectrum of insects and other arthropod pests such as spiders, mites, and ticks	Ground or aerial application to a wide range of crops including grapes and wine grapes, raisins, nectarines, peaches, and plums; rangeland, pastures; nurseries, turf and lawns, ornamentals; almond hulls; farm and animal husbandry premises, farm animals (including cattle ear tags), beehives; forests	Products sold in 2004 and earlier were for domestic dwellings and other buildings and structures; refuse and solid waste sites; rights-of-way, recreational and uncultivated land; aquatic settings including irrigation and drainage systems. **Starting in 2005, all residential products are phased out and only products for outdoor agricultural use may be sold. Existing stocks labeled for**

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
			other purposes may be used indefinitely.
1,3-dichloropropene (Inline, Telone, Tri-Cal, Pic-Clor, etc.)	Soil fumigant; combined with chloropicrin in many products; used for nematode, disease, and insect control	Applications to soil before planting of many crops, such as fruits (including grapes and wine grapes, nectarines, peaches, plums), vegetables, nuts, cotton, ornamentals; used in nurseries, pasture; forestry	None
dicofol (Kelthane)	Acaricide; organochlorine chemical *(see definition in notes at end of tables)* used against mites	Ground or aerial application in selected crops such as cotton, vegetables, nuts, and fruits (including grapes, wine grapes), turf/lawns, ornamental trees; used in gardens, nurseries	Buildings and structures
dimethoate (Cygon, De-Fend, Digon, Prozap, Dimethoate-various brands)	Insecticide and acaricide; Organophosphate chemical *(see notes at end)* effective against a broad spectrum of insect and arthropod pests including flies, mosquitoes, cockroaches, ticks, lice	Ground or aerial application to many crops such as cotton, vegetables, fruits (including grapes, wine grapes, and raisins), ornamentals; nurseries, fallow areas, manure; livestock and poultry; farm/agricultural structures including animal husbandry premises; trees/forestry	Used in household, commercial, and institutional settings including storage and transport facilities, food processing/handling; uncultivated land, refuse and solid waste sites, recreational areas
diuron (Direx, Karmex, etc.)	Algaecide and defoliant; substituted urea chemical effective against algae including pool scum	Ground or aerial applications preplant or in-crop on forage and field crops, olives, ornamentals, cotton, grains, vegetables, and fruit including grapes, wine grapes, and	Used in commercial, industrial, and institutional settings such as airports and runways, buildings and structures, storage and processing areas, rights-of-way and

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
		peaches; applied as a defoliant for cotton, carrots, and onions; used on fallow land, pastures, farm and animal husbandry premises; lumber	other uncultivated land; in aquatic sites such as aquaria, ponds, lakes and reservoirs, drainage and irrigation systems; preservative for adhesives, paint, and coatings
endosulfan (Thiodan, Phaser, Thionex, Endosulfan-various brands)	Insecticide and acaricide; organochlorine chemical *(see notes at end)* used against a wide range of insect and mite pests	Ground or aerial use in many crops such as cotton, nuts, vegetables, forage crops, ornamentals, and fruits including grapes and wine grapes, nectarines, peaches, and plums; greenhouses, nurseries, gardens; trees/forestry	None
EPTC (Eptam, etc.)	Herbicide; for control of grasses and broadleaf weeds	Ground or aerial application in forage and field crops, nut crops, citrus, potatoes, tomatoes, corn; pine trees; no reported use in the Parlier area during the last five years	None
iprodione (Rovral, Chipco, etc.)	Fungicide; for controlling plant diseases	Ground or aerial applications against many diseases of fruits (including grapes and wine grapes, raisins, nectarines, peaches, plums), nuts, vegetables, cotton, cereals, field crops, oil crops, trees, turf; ornamentals; used in greenhouses and for landscape maintenance	Applied in commercial, institutional, and industrial settings, recreational areas (golf courses)
malathion (Malathion-various brands, Fyfanon, Mosquito B Gon, etc.),.	Insecticide and acaricide; organophosphate chemical *(see notes at end)* effective against a	Ground or aerial preplant or in-crop applications to many crops including grapes and wine grapes, raisins, nectarines, peaches, and plums; also seeds, ornamentals, turf and lawns,	Rights-of-way and other uncultivated land; home and garden; structural, institutional, industrial, and commercial use in rural and urban settings, such as

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
	broad spectrum of indoor and outdoor pests including ants, fleas, cockroaches, mosquitoes, wasps, lice and ticks	nonliving plant material; used in quarantine facilities, nurseries, greenhouses, rangeland and pastures, on livestock, poultry, and pets, and in animal husbandry premises; trees and forestry, lumber	food/feed processing/handling, storage, and marketing facilities, restaurants, schools (indoor) and other buildings and structures; applied to refuse and solid waste sites, and to marshland and aquatic sites for mosquito abatement; added to wood preservatives, coatings, and paint
metam-sodium [MITC] (Metam, Busan, Nemasol, Sectagon 42, Vapam, etc.)	Fumigant; used to kill fungal and bacterial diseases, arthropod pests (insects, mites, shrimp), nematodes, and broadleaf and grassy weeds	Applied to soil before planting; all agricultural crops, ornamentals; forests/lumber	Wood protection treatment; all-purpose fumigant, including for wood structures; water applications such as sewage and waste water systems, aquatic areas
methyl bromide (Methyl Bromide-various brands, Brom-O-Gas, Terr-O-Gas, Metabrom, MBR, Pic-Brom, Tri-Com, etc.)	Soil, space and commodity fumigant; combined with chloropicrin in many products; for control of diseases, insects and other arthropod pests, nematodes, snails and slugs, rodents and other mammalian pests, broadleaf weeds and grasses	Applications to soil before planting of ornamental and agricultural crops and turf; used in nurseries and greenhouses, with nonliving plant material, for pre-shipment quarantine, and for disinfection of agricultural equipment, animal husbandry premises and beehives; forestry/lumber **Under an international treaty, the Federal government allows only certain "critical uses" for products manufactured or imported starting January 1, 2005.**	Used in recreational (golf courses), commercial, industrial, institutional, structural, and uncultivated settings; fumigation chambers, storage and transport facilities, food and nonfood processing and manufacturing, restaurants, public buildings, domestic dwellings; water disinfection

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
molinate (Ordram)	Herbicide; for control of watergrass	Ground or aerial application to rice; almost no reported use in the Parlier area	None
naled (Dibrom, Naled-various brands, Fly Killer D, Legion, Trumpet)	Insecticide and acaricide; organophosphate chemical *(see notes at end)* effective against a broad spectrum of arthropod pests including insects and mites	Ground or aerial applications in pastures, rangeland, and many crops including forage, fodder, and pulse crops, rice, cotton, vegetables, fruits, nuts, ornamentals, turf; animal husbandry premises; trees/forests	Used in a wide range of household, commercial, and institutional settings including food processing/handling facilities, restaurants; uncultivated areas such as refuse and solid waste sites, rights-of-way; municipal and other large-area mosquito control
oxyfluorfen (Goal, Galigan, FirePower, etc.)	Herbicide; diphenyl ether chemical for preemergence and/or postemergence control of certain annual broadleaf and grassy weeds	Ground or aerial application in many crops such as cotton, nuts, vegetables, fruits (including grapes, wine grapes, raisins, nectarines, peaches, plums); ornamentals, turf/lawns; farm/ag structures; trees/forestry	Fencerows, hedgerows; also used in household, structural, commercial, institutional, and industrial settings such as storage areas, airports and landing fields, rights-of-way, and other paved or uncultivated land
permethrin (Pounce, Ambush, etc.)	Insecticide; pyrethroid chemical *(see notes at end)* for control of a broad spectrum of insect and arthropod pests including crop pests and ants, cockroaches, mosquitoes, wasps, fleas, ticks, lice, mites, spiders and termites	Ground or aerial preplant or in-crop applications for all fruits and nuts, forage, oil, and field crops, cotton, vegetables, herbs, ornamentals, turf/lawns, greenhouses; also applied to pets, livestock, and animal husbandry premises; trees/forestry	Applied as an insect repellant; also home and garden, structural, area fogging, and aquatic uses

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
phosmet (Imidan)	Insecticide; organophosphate chemical *(see notes at end)* used against a broad spectrum of crop pests, as well as ticks, lice, and other veterinary pests	Ground or aerial application in fruits (including grapes and wine grapes, nectarines, peaches, plums), nut crops, forage crops, cotton, field crops, ornamentals; parasite control on cattle and pigs; forests	Used in household/domestic settings and for recreational areas, rights-of-way, uncultivated land
propanil (Duet, Stam, Wham, Super Wham)	Herbicide; anilide chemical for control of aquatic weeds, broadleaf weeds, and grasses	Postemergence ground/aerial applications in rice; no reported use in the Parlier area	None
propargite (Comite, Omite)	Acaricide; sulfite ester chemical used to control mites	Ground or aerial application to a broad range of crops such as cotton, vegetables, nuts, ornamentals, and fruits including nectarines, peaches, plums, grapes and wine grapes, raisins; forest trees; reported use of Comite is negligible in the Parlier area; reported use of Omite has been declining, to about 3,500 ac in 2004	None
(S)-metolachlor (Pennant, Bicep, or Dual Magnum; Medal)	Herbicide; chloroacetamide chemical for weed control	Ground or aerial application in selected crops including cotton, field and pulse crops, vegetables, fruits; tree nurseries, turf, ornamentals, landscape plantings; reported use rare in the Parlier area	Rights-of-way, recreational areas, airports and landing fields
S,S,S-tributyl phosphorotrithioate	Defoliant; organophosphate	Ground or aerial spray application to cotton; no reported use in Parlier	None

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
[tribufos] (Def, Folex)	chemical *(see notes at end)* used to remove leaves from the crop		
simazine (Princep, Sim-Trol, Simazine-various brands, Aquazine, etc.)	Herbicide and algaecide; Triazine chemical for control of most annual grasses and broadleaf weeds	Ground or aerial applications in forage and field crops, olives, carob, nuts, fruit (including grapes and wine grapes, nectarines, peaches, plums), vegetables, ornamentals and nurseries, turf/lawns and sod farm/ag structures and animal husbandry premises; trees/lumber/forestry	Fencerows and shelterbelt plantings; golf courses; uncultivated areas such as rights-of-way; also used in structural, industrial, and aquatic settings
sodium tetrathiocarbonate [CS2] (Enzone, ETK-1101)	Fumigant, or liquid applied to soil; used against fungi, nematodes, and insect pests	Preplant or postharvest use in fruit (including grapes and wine grapes, peaches, plums), nut crops, and roses; often applied through irrigation systems	None
sulfur (Thiosperse, Thiolux, Thioben, Yellow Jacket, Super Six, Kumulus, Microthiol, sulfur dust-various brands, copper-sulfur dust, etc.)	Acaricide, insecticide, antimicrobial, and soil amendment; used against insect and mite pests, fungal and bacterial plant diseases; also in smoke briquets or baits deployed for control of rodents and other mammal pests	Ground or aerial application on a wide range of crops such as vegetables, fruits (including grapes and wine grapes, raisins, nectarines, peaches, plums), cotton, grains, pulses, forage/fodder crops, all field and nut crops; ornamentals, turf, trees; used in lawns, gardens, greenhouses, pastures, rangelands; applied to dogs and horses against mange	Uncultivated land including rights-of-way; recreational areas (such as golf courses); in paint/wood preservatives
thiobencarb (Abolish, Bolero)	Herbicide; for control of aquatic weeds and grasses	Ground or aerial preplant or in-crop application to transplanted and direct-seeded rice fields; no reported	None

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
		use in the Parlier area	
trifluralin (Treflan, Triap, Trilin, etc.)	Herbicide and growth inhibitor; dinitroaniline chemical for controlling broadleaf and grass weeds	Ground or aerial preplant or in-crop use for many crops such as cotton, nuts, vegetables, and fruits including grapes and wine grapes, raisins, nectarines, peaches, plums; ornamentals, turf/lawns, nursery equipment, greenhouses; trees/forestry/lumber; reportedly applied to about 250-500 ac/yr in the Parlier area	Home and garden; structural, industrial, and uncultivated area applications including pavements, rights-of-way, sewage disposal sites, and recreational areas (golf courses)

Table 2: Additional pesticides that may be included in DPR's Environmental Justice Pilot Project

Agricultural uses emphasize Parlier area pesticide use patterns. Nonagricultural uses listed are those allowed by California product labels. [Also please see the notes which follow these tables]

COMMON NAME (COMMERICAL NAMES)	ACTION / TARGET PESTS	PARLIER AREA AGRICULTURAL USES	LABELED NONAGRICULTURAL USES
chloropicrin (Tri-Clor, Chlor-O-Pic, Metapicrin, Nutrapic)	Fumigant; combined in many products as a warning agent with odorless fumigants methyl bromide and 1,3 dichloropropene; controls bacteria, fungi, arthropods (insects, mites, ticks), nematodes, snails, slugs, and weeds	Preplant application in all agricultural crops, ornamentals, turf; also applied in greenhouses and nurseries, to nonliving plant material, and on uncultivated agricultural land; trees/forestry/lumber	All types of nonagricultural fumigation (buildings and structures, food and nonfood processing/handling, manufacturing, commercial and institutional storage, transport, and water systems)
chlorothalonil (Bravo, Busan, Daconil, Echo, etc.)	Fungicide and antimicrobial; used against fungi, bacteria, algae	Ground or aerial application to fruit (all orchards, grapes and wine grapes), beans and peas, peanuts, herbs, mushrooms, all vegetables and nuts; ornamentals, turf, grass grown for seed; used in greenhouses and nurseries; trees/forestry/lumber	Recreational areas (tennis courts, golf courses); industrial preservative (resin, adhesives, paints and coatings); wood protection treatment, including structures
2,4-D, dimethylamine salt (Banuel, Dri-Clean, Weedar, Weed Master, Weedaxe, Saber, etc.)	Herbicide, growth regulator in citrus; chlorinated phenoxy chemical for the control of broadleaf weeds, including aquatic weeds	Ground or aerial preplant or in-crop applications to fruits (including all orchards, grapes and wine grapes), forage/fodder crops, corn, sugarcane, all nuts and grains, ornamentals, turf/lawns, grasses grown for seed, pastures and	Fencerows, hedgerows, rights-of-way, uncultivated ag and non-ag land, wasteland; natural and artificial aquatic sites, swamps, marshes, irrigation and drainage systems; urban, commercial, institutional, and industrial uses including paved areas

		rangeland, hay silage; landscape maintenance, gardens/mulch; farm/ag structures; trees/forestry/lumber	(airports and landing fields), storage and recreational sites (tennis courts, golf courses); buildings and structures including homes

Notes

Preplant or in-crop application—At least one product containing that active ingredient is labeled for preplant application, and at least one product is labeled for in-crop application.

Ground or aerial application—At least one product containing that active ingredient is labeled for ground application, and at least one product is labeled for aerial application.

Crops—If at least one product containing that active ingredient is labeled for use on cotton or on Parlier's major crops—grapes, wine grapes, raisins, nectarines, peaches, plums—the table mentions the crop specifically, or by saying "all fruits," or "all orchards." **Crop categories:** If a category such as "field crops" is mentioned, it means that at least one product containing that active ingredient is labeled for use on at least one crop in the category. **Glossary:** "**pulse crops**" include peanuts and various types of peas and beans; "**field crops**" refers to certain crops grown on large areas, such as corn and sugar beets; "**forage/fodder crops**" such as alfalfa and clover are grown for animal food; "**oil crops**" like canola and safflower are grown primarily for extracting oils; "**beverage crops**" includes, for instance, coffee.

Chemicals—Organophosphates are a group of closely related pesticides that affect functioning of the nervous system. They are usually short-lived in the environment, but include some of the most toxic pesticides used in agriculture and can be hazardous to applicators and others who are over-exposed. **Pyrethroids** are a large class of synthetic insecticides produced to duplicate or improve on the natural insecticide produced by chrysanthemum flowers. In California, pyrethroids are often used on fruit and nut trees, field crops, rice, nurseries, and urban landscapes. Surface water runoff and pesticide drift during application can result in contamination and subsequent accumulation in sediment of adjacent waterways. **Organochlorines** (also known as chlorinated hydrocarbons) are a chemically related class of pesticides that contain a high percentage of chlorine. Most organochlorine insecticides were banned or severely restricted because of their carcinogenicity, tendency to persist in the environment and to bioaccumulate (accumulate in the body fat of humans and other animals), and toxicity to wildlife. The best-known organochlorine insecticide was DDT, which was banned more than 30 years ago.

Information sources

DPR. 2003. *Ambient Air Monitoring for Pesticides in Lompoc, California. Volume I: Executive Summary*. EH03-02, March. 18 pp.

DPR. 2005a. Pesticide label database.

DPR. 2005b. PUR database, Parlier EJ project area.

Federighi, V. DPR. Personal communication 7/12/05.

Herrera, L. DPR. Personal communication 7/12/05.

Kubiak, R. DPR. Personal communication 6/27/05.

Meister, R. T., Ed. 2005. *Meisterpro Crop Protection Handbook*. Willoughby, OH: Meister Media Worldwide.

Prichard, A. DPR. Personal communication 7/1/05.

ATTACHMENT IV – OVERVIEW OF POSSIBLE HEATH EFFECTS AND SCREENING LEVELS FOR MONITORED PESTICIDES

DESCRIPTION OF POSSIBLE HEALTH EFFECTS

The description of the major toxic effects that may be associated with overexposure to the pesticides that are included in the project are listed below with the screening levels. Some of these effects were identified in animal studies and some have been identified from human exposure incidents. This is only intended to be a brief overview of each pesticide and is not intended to be a detailed toxicity profile of each pesticide.

METHODS FOR DERIVING SCREENING LEVELS

The screening levels are based on identified critical toxicology values or exposure levels taken from existing documents that have already been subject to peer review and, in some cases, public comment. The three primary sources are risk assessments, in the form of Risk Characterization Documents (RCDs) conducted by DPR, Reregistration Eligibility Documents (REDs) completed by USEPA, and Reference Exposure Levels (RELs) established by OEHHA and peer reviewed by the Toxic Air Contaminant (TAC) Scientific Review Panel. In some cases, information from the USEPA Integrated Risk Information System (IRIS) is used for cancer potency values.

In 1996, Congress passed major pesticide food safety legislation. This legislation, titled the Food Quality Protection Act of 1996 (FQPA) made significant changes to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). Among other provisions, FQPA requires USEPA to review existing pesticide food tolerances and to include an additional tenfold "safety factor" to account for uncertainty in data relative to children, unless reliable data show that a different factor will be safe. This additional factor has become known as the "FQPA factor" or "FQPA safety factor." USEPA establishes the FQPA factor for a pesticide in the course of preparing the RED for that chemical. USEPA generally sets the factor at 1X, 3X, or 10X, depending on the completeness and reliability of the data available to assess pre or post-natal toxicity and depending on the potential for pre or post-natal effects of concern. The screening levels derived below do not incorporate the FQPA safety factor to avoid confusion in evaluating multiple pesticide/chemical exposure; however, the factors are presented and will be considered in evaluating the measured air levels of the individual pesticides.

Acute toxicity can be defined as the toxicity manifested within a relatively short time interval, generally not longer than one day. In this document, unless specifically noted, acute screening levels are for 24 hours. Subchronic toxicity can be defined as the toxicity manifested within a more extended interval, but not one that constitutes a significant portion of the lifespan of the species in question. In subchronic toxicity testing using mammalian test species, the period of exposure is generally 30 to 90 days. Chronic toxicity is manifested over a long-term period, generally for a significant portion of a lifetime.

One quantitative descriptor of the results of a toxicity study is the No Observed Adverse Effect Level (NOAEL). The NOAEL can be defined as the highest dose level of a chemical (in this case, a pesticide) that causes no observable adverse or toxic effect in the animal test species in the study. A related term, the Lowest Observed Adverse Effect

Level (LOAEL), can be defined as the lowest dose of a chemical that still causes an observable adverse or toxic effect. In some cases, a study will demonstrate adverse effects at all dose levels, and a NOAEL will not be readily apparent. In these situations, applying an uncertainty factor (generally 10-fold or less) to the LOAEL can generate an Estimated No Observed Adverse Effect Level.

Two other terms that need to be defined are Reference Dose (RfD) and Reference Concentration (RfC). The RfD is an estimate of the daily exposure of the human population to a chemical, usually by the oral route, that is likely to be without adverse effects. The RfC is an estimate of the daily air concentration of a chemical that is likely to be without adverse effects to the exposed human population. RfCs and RfDs are derived by applying the appropriate uncertainty factors to the appropriate NOAEL. In deriving a RfD or RfC from a NOAEL from an animal study, the standard practice is to apply a default uncertainty factor of 100 (to extrapolate from the results of an animal study to an estimated safe level for humans). This factor of 100 is derived from a factor of 10 to account for the uncertainty in extrapolating from animals to humans and an uncertainty factor of 10 to account for variability in the human population. The presence of additional data or information may support the use of alternate factors.

Children have the highest inhalation rate relative to body weight; therefore, they would inhale the highest amount of airborne material relative to their body weight. Since the screening levels are being used to evaluate ambient air levels, it is appropriate that health protective values are used, and the screening levels will be based on children less than one year of age. Unless otherwise stated, this document uses a default inhalation rate for a child less than one year of age of $4.5m^3$/day and a default body weight of 7.6 kg.

The respiratory rate is then calculated as:

$$(4.5m^3/day)/(7.6kg) = 0.59\ m^3/kg/day$$

The toxicology database for a pesticide contains a series of toxicity studies. The particular study and corresponding NOAEL that is selected as the basis for the risk calculations or screening level derivations can be described as the “critical” study or NOAEL. Inhalation NOAELs are generally derived from studies using laboratory animals, frequently the rat, and are usually expressed in terms of an air concentration. Since these animals have different respiratory rates from humans, which would result in different amounts of material being inhaled, it is DPR’s practice to convert an inhalation NOAEL from an animal study to a human equivalent level to account for the differences in respiratory rates. It should be noted that this adjustment does not factor in differences in toxicologic sensitivity. This potential differential sensitivity is taken into account in the application of uncertainty factors.

To convert an inhalation NOAEL to the human equivalent NOAEL, DPR uses the equation:

Animal NOAEL x (animal resp. rate/human resp. rate) = human equivalent NOAEL

For the rat, the DPR default respiratory rate is 0.96 m^3/kg/day, and the above equation

becomes:

Rat NOAEL x (0.96m^3/kg/day)/(0.59m^3/kg/day) = human equivalent NOAEL

Rat NOAEL x 1.6 = human equivalent NOAEL

OEHHA commented that it does not use the conversion from rat NOAEL to human equivalent NOAEL (rat NOAEL x 1.6 = human equivalent NOAEL). OEHHA states that this in effect says that once the material in inhaled, the absorption characteristics of the respiratory systems between the two species are equivalent and that humans are less sensitive (have higher NOAELs) than rats. OEHHA does not believe that either assumption is necessarily or universally true and suggests that the conversion is not used, at least for screening purposes. However, DPR continues to believe that it is scientifically appropriate to account for differences in breathing rates.

For logistical reasons, if the period of exposure in the animals study is for less than a full 24-hour period, the resulting NOAEL is usually normalized to a 24-hour period. In general, rat inhalation NOAELs are derived from studies of either 4 or 6 hours out of 24 hours. In cases where an inhalation NOAEL is derived from such a study, it is the accepted practice to normalize the NOAEL to 24 hours by multiplying the experimental NOAEL by either (4/24) or (6/24) to calculate an equivalent 24-hour NOAEL. Subchronic or chronic inhalation studies are often conducted for 5 days per week, and the results are normalized to a 7-day week by multiplying the NOAEL by (5/7) to calculate an equivalent NOAEL for exposure throughout the 7-day week.

Often, inhalation studies are not available for a particular chemical. In these cases, the results from oral studies are used. However, the oral NOAEL (or the RfD) must be converted to an inhalation NOAEL (or the RfC). This conversion calculates the air concentration that would result in the subject taking in the same amount of chemical as would be taken in orally. To convert an oral NOAEL or RfD to an inhalation NOAEL or RfC, DPR uses the equation:

RfC (or screening level) = RfD x body weight of subject/ inhalation rate

For the above child:

RfC or screening level (mg/m^3) = RfD (mg/kg/day) x (7.6kg)/(4.5 m^3/day)= 1.7 RfD

OVERVIEW OF POSSIBLE HEATH EFFECTS FROM PESTICIDES AND SCREENING LEVELS

Acrolein

Acrolein is a liquid with a pungent odor that readily dissolves in water and evaporates rapidly from water and soil. It is used as an herbicide in aquatic areas and irrigation systems. It is an acute respiratory and eye irritant and sufficiently high exposures can

result in death. More prolonged exposures in animal studies have resulted in nasal and respiratory damage.

DPR has prioritized acrolein for risk assessment initiation and USEPA has scheduled an RED on acrolein for release in 2006. Acrolein has extensive non-pesticidal (industrial) uses. OEHHA has set acute and chronic RELs for acrolein as part of the Air Toxic Hot Spots Program.

To address chronic exposure, OEHHA used a LOAEL of 400 ppb (920 ug/m^3) for upper respiratory tract lesions in a rat subchronic inhalation study in which rats were exposed 6 hours a day, 5 days a week. This was extrapolated to a continuous exposure of 71 ppb (160 ug/m^3). OEHHA addressed differences in breathing rates, applied an uncertainty factor of 3 to address using a LOAEL instead of a NOAEL, applied an uncertainty factor of 3 to address using a subchronic study to derive a chronic value, an uncertainty factor of 3 to address interspecies variability, and applied a factor of 10 to address intraspecies variability in order to derive a chronic REL of 0.03 ppb (0.06 ug/m^3). This chronic REL is used as the chronic screening level. Removing the uncertainty factor of 3 for using a subchronic study (to derive a chronic value) would result in a subchronic screening level of 0.09 ppb (0.18 ug/m^3).

OEHHA derived an acute 1-hour LOAEL of 5 ppb based on eye irritation in human volunteers. OEHHA extrapolated the 1-hour LOAEL from the 5-minute LOAEL of 60 ppb using the equation, C^n x T = K (a constant), where n=1. OEHHA then applied a factor of 6 to address the uncertainty of deriving a NOAEL from a LOAEL and an uncertainty factor of 10 to address the uncertainty of intraspecies variability. The resulting 1-hour REL is 0.09 ppb (0.19 ug/m^3). Using the above equation, one can calculate a 24-hour LOAEL of 0.2 ppb and a resulting 24-hour level of 0.0035 ppb (0.0079 ug/m^3). However, extrapolating, in effect, from 5 minutes to 24 hours introduces a great deal of uncertainty, especially for an irritative effect. This is supported by the observance that the 24-hour extrapolated acute value is less than the subchronic and chronic values. In this case, it is more appropriate to use the 1-hour value (0.19 ug/m^3) as the acute screening value, rather than the extrapolated 24-hour value. OEHHA is currently in the process of reevaluating the acute NOEL for acrolein.

The IRIS toxicology review for acrolein states that the data are not sufficient for a carcinogenicity classification.

Arsenic

OEHHA has set acute and chronic RELs for arsenic as part of the Air Toxic Hot Spots Program. Both the acute and chronic RELs were set based on the results of a developmental toxicity study in mice using arsenic trioxide. In the study, mice were exposed by inhalation to arsenic trioxide for four hours on gestation days 9 through 12. All values are expressed in terms of arsenic alone. The LOAEL was 0.19 mg/m^3 for developmental effects. OEHHA applied an uncertainty factor of 10 to address using a LOAEL instead of a NOAEL, an uncertainty factor of 10 to address interspecies uncertainty, and a factor of 10 to address intraspecies uncertainty in order to derive an acute 4-hour REL of 0.19 ug/m^3. This value is multiplied by 4/24 to derive a 24-hour hour acute screening level of 0.03 ug/m^3. OEHHA used the same study to derive a

chronic REL of 0.03 ug/m^3. This value will be used for the chronic and subchronic screening levels.

Arsenic is a known human carcinogen. As part of Air Toxic Hot Spots Program, OEHHA list carcinogenic potency of arsenic as 12 (mg/kg-day)$^{-1}$.

Azinphos-methyl

Azinphos–methyl, chloropyrifos, diazinon, dimethoate, malathion, naled, phosmet, and S,S,S-tributyl phosphorotrithioate (DEF) all belong to a class of insecticides known as organophosphates (OPs). These insecticides kill insects by direct contact or ingestion by disrupting their normal nervous system functions. They interfere with the acetylcholinesterase enzyme that is necessary for normal nerve transmission. Signs and symptoms associated with OP poisoning in humans include headache, nervousness, blurred vision, weakness, nausea, diarrhea, difficulty breathing, sweating, pin-point pupils, tearing, salivation muscle twitching, muscle weakness, and in severe poisonings convulsions, coma, and death. Severe, acute organophosphate poisoning may rarely be associated with chronic neurological effects. A blood test can document acute OP exposure.

In 2001, USEPA released an Interim Reregistration Eligibility Document (IRED) on azinphos-methyl. In this document, USEPA stated that the results of a 90-day rat inhalation study (6 hours per day, 5 days per week) should be used to assess inhalation of any time period. This study had a NOAEL of 1.2 mg/m^3 for the inhibition of plasma and red blood cell cholinesterase. This would be equivalent to a human NOAEL of 2 mg/m^3 for 6 hours and 0.5 mg/m^3 for 24 hours. Applying an uncertainty factor of 10 to address interspecies uncertainty and a factor of 10 to address intraspecies uncertainty would result in an acute screening level of 5 ug/m^3. Adjusting for exposure for 5/7 days results in subchronic and chronic screening levels of 3.5 ug/m^3. USEPA did not retain the FQPA safety factor.

DPR completed a revised RCD on azinphos-methyl in 2004. The RCD used an acute NOAEL of 0.75 mg/kg, established for inhibition of blood cholinesterase in a single dose oral study in adult human volunteers. This NOAEL was similar to the NOAELs in animal studies, suggesting that humans were not more sensitive than animals. The RCD used a daily respiration rate 0.74 m^3/kg/day, and an uncertainty factor of 10 for intraspecies variation to arrive at an acute RfC of 101 ug/m^3. The RCD used a subchronic NOAEL of 0.25 mg/kg/day, established for inhibition of blood cholinesterase in a 28-day oral study in adult male human volunteers. Again, this NOAEL was similar to subchronic NOAELs from animal studies. The RCD used a daily respiration rate of 0.74 m^3/kg/day, an uncertainty factor of 3 to address the fact that only males were used in the study, and an uncertainty factor of 10 for intraspecies variation to arrive at a subchronic RfC of 11 ug/m^3. The lowest NOAEL established in a chronic study was 0.15 mg/kg/day for clinical signs and red blood cell cholinesterase inhibition in an oral dog study. The RCD used this NOAEL, an uncertainty factor of 10 for intraspecies variation, and an uncertainty factor of 3 for interspecies variation to derive a chronic RfC of 6.8 ug/m^3. The uncertainty factor of 3 for interspecies variation was used, since the results of the subchronic human study suggested that humans were not more sensitive than animals.

Measured air levels of azinphos-methyl will be compared to the DPR derived screening levels. However, since the screening levels will be used to help decide if there is a need for further evaluation of measured air levels, rather than to take specific regulatory or mitigation action, USEPA derived levels will also be part of the consideration.

USEPA classifies azinphos-methyl as not likely to be carcinogenic to humans.

Carbon disulfide

Sodium tetrathiocarbonate is applied to the soil, but converts to **carbon disulfide**, sodium hydroxide, hydrogen sulfide, and sulfur in the soil. Hydrogen sulfide and carbon disulfide are released to the air and can move offsite. Carbon disulfide is the pesticidal active ingredient. Hydrogen sulfide has a strong odor and can cause irritation of the eye nose, throat, and exposed body surfaces; nausea; neurological effects; pulmonary edema; and death. A primary toxicological target of carbon disulfide is the nervous system. Toxicity in humans following acute inhalation exposure to very high concentrations of carbon disulfide usually includes symptoms similar to inebriation and a loss of tendon reflexes. Death may occur from respiratory depression. Other symptoms include disorientation, headache, nausea, dizziness, fatigue, heart disturbances, and hallucinations. Longer-term exposures of humans to lower concentrations have resulted in symptoms including polyneuritis, psychoses, gastric disturbances, headaches, impotence, tremors, sleep disturbances, and myopathy. Carbon disulfide also causes reproductive toxicity and has been listed under Proposition 65 as reproductive and developmental toxicant.

Carbon disulfide is also generated by the breakdown of metam sodium into MITC (methyl isothiocyanate). This screening level is set for carbon disulfide.

Carbon disulfide has extensive not-pesticidal uses and exposure sources. OEHHA has set acute and chronic RELs for carbon disulfide as part of the air Toxic Hotspots Program. OEHHA set an acute 6-hour REL of 6,200 ug/m^3 based on a rat inhalation developmental toxicity study. In this study, rats were exposed for 6 hours a day for gestation days 6-20. The NOAEL was 620 mg/m^3 for decreased fetal body weight. OEHHA applied an uncertainty factor of 10 to address interspecies variability and a factor of 10 to address intraspecies variability. The REL does not incorporate a factor to compensate for differences in breathing rates between rats and people. The 6-hour REL of 6,200 ug/m^3 can be multiplied by 6/24 to derive a 24-hour screening level of 1,550 ug/m^3.

OEHHA set a chronic REL of 800 ug/m3 based on a study that evaluated people occupationally exposed (8-hour work day) to carbon disulfide. This study established an average LOAEL of 7.6 ppm for decreased nerve conduction. OEHHA used a benchmark concentration (BMC) and compensated for 24-hour exposure to establish a human equivalent concentration of 2.54 ppm. An uncertainty factor of 10 to account for intraspecies variation was applied, resulting in a REL of 0.254 ppm. OEHHA rounded this to 0.3 ppm (800 ug/m^3). 800 ug/m^3 will be used as the subchronic and chronic screening levels.

Chlorothalonil

USEPA completed an RED on chlorothalonil in 1999. The RED addressed inhalation for

all time periods with a NOAEL of 2 mg/kg (kidney toxicity, forestomach ulcers) in a two-year oral rat study, assuming 100% absorption. Using this NOAEL and a combined uncertainty factor of 100 (a factor of 10 to address interspecies variability and a factor of 10 to address intraspecies variability) results in a screening level of 34 ug/m^3 for all time periods. USEPA assigned a FQPA safety factor of 1X. USEPA classified chlorothalonil as likely to be a human carcinogen by all routes of exposure (based on rat kidney tumors) and calculated a potency factor of 0.00766 $(mg/kg/day)^{-1}$. The RED uses both a potency factor and RfD approach for assessing carcinogenicity.

DPR completed a dietary RCD on chlorothalonil in 2004, which calculated a potency factor of 0.011 $(mg/kg/day)^{-1}$ for kidney tumors. This slightly higher potency factor will be used in this analysis. Since the RCD is limited to dietary exposure, inhalation was not included. Inhalation exposure will be evaluated in a comprehensive risk assessment (evaluates all routes of exposure and exposure scenarios) whose completion is pending completion of the non-dietary exposure analysis. The completion of this risk assessment could result in changes to the above screening levels.

Chlorpyrifos

Chloropyrifos belongs to the same class of organophosphates (OPs) insecticides as **azinphos–methyl**. The health effects are the same as described for azinphos-methyl.

USEPA completed an IRED on chlorpyrifos in 2001. The IRED addressed short-term and intermediate-term inhalation using the same subchronic rat inhalation study. Rats were exposed 6 hours per day, 5 days per week. The highest dose level was 297 ug/m^3, and no effects were seen at any dose level, making 297 ug/m^3 a health protective NOAEL. For an acute screening level, the 297 ug/m^3 is adjusted by 6/24 to give a 24 hour NOAEL of 74 ug/m^3 and a screening level of 1.2 ug/m^3 (employs uncertainty factors of 10 each for inter and intraspecies uncertainty and corrects for differences in breathing rates). For the subchronic screening level, the value is adjusted by 5/7 to compensate for the 5 day out of 7-day exposure, leading to a screening level of 0.85 ug/m^3. For chronic exposure, the IRED used a chronic oral dog study with a NOAEL 0.03 mg/kg for cholinesterase inhibition. This leads to an RfD of 0.0003 mg/kg and a screening level of 0.51 ug/m^3. USEPA retained the FQPA safety factor of 10X.

USEPA has assigned chlorpyrifos an “E” carcinogenicity classification, evidence of non-carcinogenicity.

Copper

OEHHA set an acute REL for copper based on the effects reported in an evaluation of occupationally exposed persons. The NOEL was set at 1 mg copper/m^3 for “metal fume fever.” Inhaled copper also causes upper respiratory irritation. OEHHA applied an uncertainty factor of 10 to account for intraspecies variation and established an acute REL of 100 ug/m^3. This value will be used as the acute screening level. The majority of the toxicity information on copper revolves around oral exposure, not inhalation exposure, but it appears that the toxicity profile differs considerably, depending on the route of exposure. In this situation, it would be inappropriate to use oral data as the basis for generating subchronic or chronic screening levels. Applying a default uncertainty factor of 10 to the acute screening level results in a level of 10 ug/m^3. This value will be

used as the subchronic and chronic screening levels.

USEPA has assigned copper a "D" carcinogenicity classification (insufficient data for classification).

Cypermethrin

Cypermethrin and permethrin belong to a class of insecticides called pyrethroids. Pyrethroids are synthetic forms of pyrethrins, which is an insecticide derived from an extract of chrysanthemum flowers. Pyrethroids act as contact poisons and affect the nervous system by interfering with the transmission of nerve impulses. Even though they are nerve poisons, they do not inhibit the cholinesterase enzyme, as do the organophosphates and carbamates. A large amount of pyrethroids on the skin can result in feelings of numbness, itching, burning, stinging, tingling, or warmth that could last for a few hours. Large amounts of these chemicals entering the body (through the skin, by inhalation, or orally) could result in dizziness, headache and nausea that might last several hours. Larger amounts could cause muscle twitching, reduced energy, loss of awareness, convulsions, and loss of conspicuousness. Allergic reactions have been seen in some individuals. Animal studies involving lifetime oral exposure to large amounts give some evidence of cancer.

USEPA is scheduled to complete an RED on Cypermethrin in 2006. In 2001, USEPA published a notice in the Federal Register establishing permanent tolerances for cypermethrin and zeta-cypermethrin. This notice contained a risk assessment of cypermethrin and stated that the NOAEL of 0.01 mg/L (10 mg/m^3) for body weight decrease in a 21-day subchronic inhalation study in rats should be used to assess inhalation exposure scenarios of all durations. The notice also stated that an additional uncertainty factor of 3X should be applied to the subchronic NOAEL to estimate a chronic inhalation NOAEL. In the study, exposure occurred 6 hours a day, 5 days a week. To estimate an acute 24-hour NOAEL, 10 mg/m^3 is adjusted by 6/24, resulting in a NOAEL of 2.5 mg/m^3. An adjustment of 5/7 results in a subchronic NOAEL of 1.8 mg/m^3 for exposure 7 days a week. The application of the previously mentioned uncertainty factor of 3X results in a chronic NOAEL of 0.6 mg/m^3. Applying a correction factor of 1.6 to the NOAELs results in human equivalent acute, subchronic, and chronic NOAELs of 4.0 mg/m^3, 2.9 mg/m^3, and 0.96 mg/m^3, respectively. Applying an uncertainty factor of 10 for interspecies variation and 10 for intraspecies variation results in acute, subchronic, and chronic screening levels of 40 ug/m^3, 29 ug/m^3, and 9.6 ug/m^3, respectively. USEPA assigned a FQPA safety factor of 1X.

USEPA has assigned cypermethrin a "C" carcinogenicity classification (possible human carcinogen) but did not derive a cancer potency value.

Diazinon

Diazinon belongs to the same class of organophosphates (OPs) insecticides as **azinphos–methyl**. The health effects are the same as described for azinphos-methyl.

The values for these screening levels were taken from a USEPA IRED released in 2004. In this document, USEPA determined that inhalation for all time periods should be evaluated using a 21-day rat inhalation study. The study used inhalation exposures of 6

hours per day, 7 days a week for 21 days. The LOAEL in this study is 0.1 ug/L (100 ug/m^3) for cholinesterase inhibition. USEPA used a factor of 3 to derive a NOAEL from a LOAEL. Therefore, the NOAEL would be 33 ug/m^3. Normalizing to a 24-hour exposure results in a NOAEL of 8.33 ug/m^3 and a human equivalent NOAEL of 13.3 ug/m^3. This results in an acute, subchronic, and chronic screening level of 0.13 ug/m^3. USEPA assigned a FQPA safety factor of 1X.

USEPA has classified diazinon as "not likely to be carcinogenic to humans."

1,3-dichloropropene (1,3-D)

1,3-dichloropropene (1,3-D, Telone) is a fumigant that can readily move from the soil to air and subsequently move offsite in the air. Workers breathing high concentrations of 1,3-D had irritated skin, eyes, nose and throat, coughing, nausea, headache, and fatigue. Short-term exposure of animals has also resulted in weight loss, nasal tissue damage, and death (with a sufficiently high dose). Some long-term studies resulted in carcinogenic effects, and 1,3-D has been classified as a probable human carcinogen.

DPR has set RfCs for 1,3-D to support its ongoing control measures. The acute RfC of 200 ug/m^3 was calculated from the acute inhalation NOAEL of 10 ppm (6 hours per day) in rats, based on body weight reduction that is indicative of systemic effects. This RfC was calculated using a breathing rate for children of 0.46 m^3/kg/day as opposed to the current default value of 0.59 m^3/kg/day. Using the value of 0.59 m^3/kg/day would result in a value of 160 ug/m^3. This latter value will be used as the acute screening level.

The subchronic RfC of 150 ug/m^3 was calculated from the subchronic inhalation NOAEL of 10 ppm (6 hours per day, 5 days per week) in rats, based on degeneration and necrosis in the nasal epitheliium. This RfC was calculated using a breathing rate for children of 0.46 m^3/kg/day as opposed to the current default value of 0.59 m^3/kg/day. Using the value of 0.59 m^3/kg/day would result in a value of 120 ug/m^3. This latter value will be used as the subchronic screening level.

The chronic RfC of 150 ug/m^3 was calculated from the chronic inhalation NOAEL of 5 ppm (6 hours per day, 5 days per week) in mice, based on hyperplasia and hypertrophy of the respiratory epithelium and hyperplasia of the urinary bladder mucosa. This RfC was calculated using a breathing rate for children of 0.46 m^3/kg/day as opposed to the current default value of 0.59 m^3/kg/day. Using the value of 0.59 m^3/kg/day would result in a value of 120 ug/m^3. This latter value will be used as the chronic screening level.

1,3-D is classified as a probable human carcinogen by USEPA and is listed as a carcinogen under Proposition 65. DPR has calculated a cancer potency of 0.055 $(mg/kg/day)^{-1}$, based on the occurrence of broncheoalveolar adenomas observed in male mice in a chronic inhalation study.

Dichlorvos (DDVP)

USEPA, which is scheduled to release an RED for dichlorvos, released a risk assessment for the RED in 2000. The risk assessment specifies the use of a NOAEL of 0.1 mg/kg from an oral rabbit developmental toxicity study (maternal mortality, decreased weight gain, and cholinergic signs) to evaluate short-term inhalation. This NOAEL would result

in an acute screening level of 1.7 ug/m^3. (USEPA used an uncertainty factor of 100 X, excluding the FQPA factor, for all exposure periods.) The risk assessment specifies the use of a NOAEL of 0.05 mg/kg from an oral dog chronic toxicity study (cholinesterase inhibition) to evaluate intermediate-term inhalation. This NOAEL would results in a subchronic screening level of 0.85 ug/m^3. The risk assessment specifies the use of a NOAEL of 50 ug/m3 (inhibition of brain cholinesterase) in a chronic rat inhalation study. Exposure took place 23 hours a day, 7 days a week. The amortized NOAEL is 48 ug/mg^3, and the resulting screening level would be 0.77 ug/m^3. USEPA assigned a FQPA factor of 3X and classified DDVP as having suggestive evidence of carcinogenicity.

DPR completed a RCD for DDVP in 1996, with two subsequent addenda. In the RCD, DPR evaluated acute inhalation exposure using the NOAEL of 1250 ug/m^3 (cholinergic signs) in a rabbit inhalation developmental toxicity study. Exposure took place 23 hours a day, 7 days a week. Amortizing the exposure to 24 hours results in a NOAEL of 1200 ug/m^3. Using this NOAEL, a rabbit breathing rate of 0.54 m^3/kg/day, and a 100 X uncertainty factor results in an acute screening level of 11 ug/m^3. The same study, but with the lower NOAEL 250 ug/m^3, was used to evaluate subchronic inhalation. This NOAEL would result in a subchronic screening level of 2.2 ug/m^3. The RCD used the same chronic inhalation study as was described for the USEPA risk assessment, resulting in the chronic screening level of 0.77 ug/m^3. DPR also developed a potency factor of 0.35 (mg/kg/day)$^{-1}$ based on leukemia in the rat. Since they were based on inhalation studies, the screening levels from the DPR RCD will be used.

Dicofol

Dicofol is an organochlorine insecticide related to DDT, and has moderate acute toxicity. Poisoning can affect the nervous system, liver, and kidneys. Signs associated with acute poisoning in humans include headache, fatigue, nausea, dizziness, weakness, skin irritation, and conjunctivitis, depending on the route of exposure. Very severe poisoning can result in convulsions, coma, or death. Repeated exposure studies in laboratory animals have resulted in toxicity to the nervous system, liver, adrenals, thyroid, and testes. The toxicology data for dicofol is suggestive of endocrine disruption.

USEPA completed a RED on dicofol in 1998. To evaluate short-term inhalation exposure, the RED uses a NOAEL of 4 mg/kg for increased abortions from an oral rabbit developmental toxicity study. This NOAEL results in an acute screening level of 68 ug/m^3. To evaluate intermediate-term inhalation exposure, the RED uses a NOAEL of 0.29 mg/kg for inhibition of ACTH release from a 90-day oral dog study. This NOAEL results in a subchronic screening level of 49 ug/m^3. To evaluate long-term inhalation, the RED uses a NOAEL of 0.12 mg/kg for ACTH release from a chronic oral dog study. This NOAEL results in a chronic screening level of 20 ug/m^3. USEPA assigned dicofol a carcinogen classification of C, possible human carcinogen, and recommended an RfD approach for assessing risk. USEPA assigned an FQPA factor of 3X.

Dimethoate

Dimethoate belongs to the same class of organophosphates (OPs) insecticides as **azinphos–methyl**. The health effects are the same as described for azinphos-methyl.

USEPA released a risk assessment on dimethoate in 1999 as part of the development of the RED. To evaluate short-term inhalation, the assessment uses a NOAEL of 2.0 mg/kg for neurotoxic effects (nerve damage) from an acute oral neurotoxicity study in rats. This NOAEL results in an acute screening level of 34 ug/m^3. To evaluate intermediate-term inhalation exposures, the assessment uses a LOAEL of 3.2 mg/kg for cholinesterase inhibition in a 90-day oral rat study. The LOAEL was reduced by a factor of 3X to arrive at an estimated NOAEL of 1.07 mg/kg. This NOAEL results in a subchronic screening level of 17 ug/m^3. To evaluate long-term inhalation, the RED uses a NOAEL of 0.05 mg/kg for cholinesterase inhibition in a chronic oral rat study. This NOAEL results in a chronic screening level of 0.85 ug/m^3. USEPA assigned dimethoate a carcinogenicity classification of C and recommended an RfD approach for risk assessment. USEPA assigned an FQPA factor of 1X.

Diuron

Diuron is an herbicide with low toxicity by the oral, dermal, or inhalation routes. It is not a skin or eye irritant. The primary sites of toxicity with repeated oral exposures are blood (hemolytic anemia), urinary bladder, and kidney. Diuron has also demonstrated carcinogenic effects in rats and mice, and has been identified as a likely human carcinogen.

USEPA completed an RED on diuron in 1993. To evaluate short-term inhalation, the RED uses a NOAEL of 10 mg/kg for maternal toxicity in a rabbit developmental toxicity study. Applying this NOAEL, an uncertainty factor of 10 to address interspecies uncertainty, and a factor of 10 to address intraspecies uncertainty results in an acute screening level of 170 ug/m^3. To evaluate intermediate-term inhalation, the assessment uses a NOAEL 1.0 mg/kg for altered hematological values in the first 6 months of a chronic oral rat study. Applying this NOAEL, an uncertainty factor of 10 to address interspecies uncertainty, and a factor of 10 to address intraspecies uncertainty results in a subchronic screening level of 17 ug/m^3. To evaluate long-term inhalation, the assessment uses a LOAEL 1.0 mg/kg for altered hematological values in the same chronic oral rat study. USEPA applied an uncertainty factor of 3 to estimate a NOAEL of 0.33 mg/kg. Applying this NOAEL, an uncertainty factor of 10 to address interspecies uncertainty, and a factor of 10 to address intraspecies uncertainty results in a chronic screening level of 5.7 ug/m^3. USEPA classified diuron as a likely human carcinogen (based on bladder and kidney tumors in rats and mammary tumors in mice) and derived a potency value of 0.0191 (mg/kg/day)$^{-1}$. USEPA assigned an FQPA factor of 1X.

Endosulfan

Endosulfan is an organochlorine insecticide and is highly acutely toxic by oral and inhalation routes. The primary site of its acute toxicity is the nervous system. Symptoms of acute poisoning include incoordination, imbalance, difficulty breathing, vomiting, diarrhea, convulsions, and loss of consciousness. Repeated dose animal studies have indicated toxicity to the kidney, liver, testes, blood, blood vessels, and immune system. There is also evidence that endosulfan causes endocrine disruption.

DPR is currently conducting a risk assessment on endosulfan. USEPA completed an RED on endosulfan in 2002. To evaluate short-term and intermediate-term inhalation, the RED recommends the use of a 21-day inhalation study in rats. In this study, rats were

exposed 6 hours a day, 5 days a week. The NOAEL for this study was 1.0 mg/m^3 for decreased body weight gain and hematological effects. Adjusting for the 6-hour exposure and the difference in human and rat breathing rates results in a human equivalent acute NOAEL of 0.4 mg/m^3 and an acute screening level of 4.0 ug/m^3. Adjusting for the 5 day a week exposure results in a subchronic screening level of 2.9 ug/m^3. The RED did not recommend a study or NOAEL to use to evaluate chronic inhalation. The RED established a chronic RfD of 0.006 mg/kg for decreased body weight gain and kidney injury from an oral rat chronic study. This would result in a chronic screening level of 10 ug/m^3. This value is higher than the subchronic screening level derived from an inhalation study. Therefore, the subchronic screening level will also be used to evaluate chronic exposure to endosulfan. USEPA assigned an FQPA factor of 10X. USEPA has classified endosulfan as not likely to be carcinogenic to humans.

EPTC

EPTC (eptam), molinate, and thiobencarb are thiocarbamate herbicides. They are similar to the carbamate insecticides, and likewise interfere with the acetylcholinesterase enzyme that is necessary for normal nerve transmission, though somewhat less consistently than the carbamate insecticides. Poisoning can also result in similar signs and symptoms. In addition, exposure of laboratory animals to EPTC has resulted in nerve and heart muscle degeneration. Exposure of laboratory animals to molinate has resulted in decreased fertility, nerve and muscle degeneration, and some indications of carcinogenic effects.

USEPA completed an RED on EPTC in 1998. DPR has completed a RCD on EPTC. To evaluate short-term exposures, the RED used a NOAEL of 58 mg/m^3 for myocardial degeneration (heart muscle damage) from a 90-day rat inhalation study with exposure 6 hours per day, 5 days per week. This NOAEL results in an acute screening level of 230 ug/m^3. To evaluate intermediate-term exposures, the RED used the same study. For exposures of less than 21 days, the RED used the above NOAEL, which results in a subchronic screening level of 170 ug/m^3. For intermediate-term exposures greater than 21 days, the RED used the same study, but a NOAEL of 8.3 mg/m^3 for clinical signs. This NOAEL results in a subchronic screening level of 24 ug/m^3. The RED did not select a value for evaluating long-term inhalation. The DPR RCD used an estimated NOAEL of 0.5 mg/kg/day for neuromuscular degeneration from a two-year oral rat study. This NOAEL converts to a chronic screening level of 8.5 ug/m^3. USEPA has classified EPTC as not likely to be carcinogenic to humans. USEPA assigned a FQPA factor of 10X.

Formaldehyde

OEHHA has set acute and chronic RELs for formaldehyde as part of Air Toxic Hot Spots Program. OEHHA used a 3-hour eye irritation study using human subjects (NOAEL of 0.5 ppm). OEHHA used a benchmark approach to derive a BC_{05} value of 0.44 ppm. OEHHA extrapolated a 1 hour NOAEL of 0.76 ppm using the equation, $C^n \times T = K$ (a constant), where n = 2. Using an uncertainty value of 10 for intraspecies uncertainty, OEHHA derived a 1-hour REL of 0.076 ppm. The above equation can be used to extrapolate a 24-hour NOAEL of 0.16 ppm (0.19 mg/m^3). Applying the uncertainty factor of 10 results in an acute (24-hour) screening level of 19 ug/m^3.

OEHHA used the results of a human occupational study to derive a chronic NOAEL. This study resulted in a chronic average NOAEL of 32 ug/m^3 for eye and respiratory irritation. Using an uncertainty value of 10 for interspecies uncertainty, OEHHA derived a chronic REL of 3 ug/m^3. This value will be used for both the chronic and subchronic screening levels for formaldehyde.

Formaldehyde is a probable human carcinogen. As part of Air Toxic Hot Spots Program, OEHHA lists the carcinogenic potency of formaldehyde as 2.1 x 10^{-2} (mg/kg-day)$^{-1}$.

Malathion

Malathion belongs to the same class of organophosphates (OPs) insecticides as **azinphos–methyl**. The health effects are the same as described for azinphos-methyl.

USEPA released a RED on malathion in 2000 and an updated risk assessment in 2005. To evaluate short-term and intermediate term inhalation exposures, the assessment used a LOAEL of 100 mg/m^3 for cholinesterase inhibition in a 90-day rat inhalation study in which rats were exposed 6 hours per day, 5 days per week. USEPA used a factor of 10 to derive an estimated NOAEL of 10 mg/m^3. Using the NOAEL, adjusting for the 6-hour per day exposure, and applying a total uncertainty factor of 100 X, results in an acute screening level of 40 ug/m^3. Using the NOAEL and adjusting for exposure 5 days per week results in a subchronic screening level of 29 ug/m^3.

In the RED, USEPA also indicated the use of the above NOAEL for evaluating long-term inhalation exposure. No recommendation was made for long-term inhalation exposure in the updated risk assessment. The updated assessment set a chronic RfD of 0.03 mg/kg (not including the FQPA factor) based on cholinesterase inhibition in a chronic oral rat study. If this RfD were used, the chronic screening level would be 51 ug/m^3. This is higher than the subchronic screening level generated from an inhalation study. Therefore, the lower subchronic screening level will be used as the chronic screening level. USEPA classified malathion as having suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential and indicated that a low-dose linear extrapolation model is not indicated. USEPA assigned an FQPA factor of 10X.

Metam Sodium/MITC

Metam-sodium, in the presence of water breaks down to **MITC** (a fumigant) and other compounds. MITC evaporates from the soil (after its application as metam sodium) and thus has the potential to move offsite in the air. MITC is a strong eye, respiratory, and skin irritant and can cause damage to these tissues. It can also exacerbate existing respiratory conditions, such as asthma.

While metam sodium is the active ingredient that is applied in agricultural settings, it converts to fumigant methyl isothiocyanate (MITC), which moves into the ambient air. Therefore, screening levels are set for MITC. DPR has completed a RCD on metam sodium and MITC. The RCD has undergone scientific peer review and has been accepted by the SRP. RELs were set in the RCD and reviewed by the SRP. DPR calculated an acute REL of 22 ppb (66 ug/m^3) based on eye irritation in a study of human volunteers. DPR calculated a subchronic REL of 1 ppb (3 ug/m^3) based on nasal epithelial atrophy in rat subchronic inhalation study. DPR calculated a chronic REL of

0.1 ppb (0.3 ug/m^3) based on the same subchronic rat study, but employing an uncertainty factor of 10X to address the uncertainty of using a subchronic value for chronic exposure. While metam sodium is classified by USEPA as a probable human carcinogen, USEPA has categorized MITC as having insufficient data for carcinogenicity classification. In the RCD, DPR concluded that the data were not sufficient to support a quantitative assessment of carcinogenicity. USEPA did not assign a FQPA factor to MITC. The above RELs will be used as the screening levels.

Methyl Bromide

Methyl bromide is a fumigant that can readily move from the application site to air and subsequently move offsite in the air. Methyl bromide can cause severe irritation to the eyes, skin, and mucus membranes. Neurotoxicity has been observed in humans and laboratory animals after exposure to methyl bromide. In animals, damage has been observed in a variety of tissues, depending on the level and length of exposure. These tissues include nasal tissues, brain, heart, testes, testes, adrenal glands, spleen, and kidney. Methyl bromide caused developmental effects in rats and rabbits. In humans exposed to high concentrations, neurological effects included ataxia, convulsions, and tremors. Sufficiently high exposures can result in death.

DPR completed an RCD for methyl bromide. RfCs were calculated in the RCD. DPR calculated an acute RfC of 210 ppb (820 ug/m^3) based on developmental effects (NOAEL of 40 ppm) in a rabbit developmental toxicity study. DPR calculated a subchronic RfC of 9 ppb (35 ug/m^3) based on neurotoxic effects in a subchronic dog inhalation study designed to evaluate neurotoxicity (NOAEL of 5 ppm). DPR calculated a chronic RfC of 1 ppb (3.9 ug/m^3) based on nasal epithelial hyperplasia and degeneration in a chronic rat inhalation study (LOAEL of 3 ppm, estimated NOAEL of 1 ppm).

OEHHA disagreed with DPR's use of 5 ppm as the critical subchronic NOAEL and felt that an estimated subchronic NOAEL of 0.5 ppm (from a different dog study) and a resulting subchronic RfC of 1 ppb should have been used. USEPA released a draft risk assessment for public comment in July 2005. The risk assessment used the same acute, subchronic, and chronic studies and corresponding NOAELs as DPR. USEPA may use somewhat different assumptions in arriving at an acute, subchronic, and chronic non-occupational RfCs in the final draft of the risk assessment. USEPA has classified methyl bromide as not likely to be carcinogenic to humans. USEPA assigned a FQPA factor of 1X.

Metolachlor

Metolachlor is a broad-spectrum herbicide with low acute toxicity. Longer-term studies indicated decreased weight gains and some liver toxicity. There was evidence of liver carcinogenicity in a long-term rat study, but not in a corresponding mouse study.

USEPA issued a Tolerance Reassessment Decision (TRED) on metolachlor and s-metolachlor in 2002. The TRED was based on a report of the USEPA Hazard Identification Assessment Review Committee (HIARC) released in 2001. In this report, USEPA specified the use of the NOAEL of 50 mg/kg (for clinical signs, decreased body weight gain, and decreased food consumption) in an oral rat developmental toxicity study

with s-metolachlor, for assessing short-term inhalation exposure. USEPA specified the use of the NOAEL of 8.8 mg/kg (for decreased body weight gain) in an oral dog subchronic toxicity study, for assessing intermediate-term inhalation exposure. USEPA specified the use of the NOAEL of 9.7 mg/kg (for decreased body weight gain) in an oral chronic dog study with metolachlor for assessing long-term inhalation exposure. In all cases, USEPA specified the use of a total uncertainty factor of 100X. This would result in acute, subchronic, and chronic screening levels of 85 ug/m^3, 15 ug/m^3, and 16 ug/m^3, respectively. Since the subchronic screening level is slightly lower than the chronic screening level, it will be used for both subchronic and chronic. USEPA has classified metolachlor as a C, possible human, carcinogen, but has specified a non-linear MOE approach. USEPA assigned a FQPA factor of 1X.

Molinate

Molinate is a thiocarbamate herbicide similar to **EPTC** (eptam). The health effects are the same as described for EPTC.

DPR completed a RCD on molinate in 1996. Although acute and subchronic rat inhalation studies were available, DPR concluded that they had questionable value in risk assessment, since the average absorbed doses (based on metabolic measurements) were grossly in excess of the theoretical values based on inhalation alone. As a result, the RCD evaluated ambient air using the NOAELs from oral studies. Acute inhalation was evaluated based on a NOAEL of 11.5 mg/kg/day for sperm abnormalities (after 5 days) in a rat study. Using this NOAEL, a combined uncertainty factor of 100, and the conversion factor of 1.7 results in a screening level of 200 ug/m^3. Seasonal (subchronic) inhalation was evaluated using the NOAEL of 0.48 mg/kg for sperm abnormalities from an oral 5-week rat study. Using this NOAEL, a combined uncertainty factor of 100, and the conversion factor of 1.7 results in a subchronic screening level of 8.2 ug/m^3.

USEPA released a revised risk assessment on molinate in 2002, but stopped further work on an RED since USEPA and the registrant agreed to a phase-out of the use of molinate. In the risk assessment, USEPA selected the NOAEL of 120 mg/m^3 for neurotoxic effects in a 4-hour rat inhalation study as the basis of assessing short-term inhalation exposure. Adjusting for a full 24-hour exposure and the difference in rat and human breathing rates results in a human equivalent NOAEL of 32 mg/m^3. Applying the combined uncertainty factor of 100 results in a screening level of 320 ug/m^3. USEPA selected the NOAEL of 0.3 mg/m^3 for reproductive effects in a 4-week rat inhalation study as the basis of assessing intermediate-term inhalation exposure. Exposure took place 6 hours a day, 5 days a week, resulting in an adjusted NOAEL of 0.054 mg/m^3 and a human equivalent NOAEL of 0.086 mg/m^3. Applying the combined uncertainty factor of 100 results in a subchronic screening level of 0.86 ug/m^3.

Molinate is used on rice during a discrete time period each year. As a result, chronic exposure to molinate in the ambient air does not occur. Neither DPR nor USEPA evaluated chronic inhalation exposure. USEPA retained the FQPA safety factor of 10X. USEPA classified molinate as having suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenicity.

Naled

DPR completed a RCD on Naled in 1999 and an addendum in 2001. In the RCD, acute exposure, including inhalation, was evaluated using an estimated NOAEL of 2.5 mg/kg, based on neurotoxic effects in an oral rat Functional Observational Battery study. Subchronic exposure was evaluated using a NOAEL of 2.5 mg/kg (in terms of absorbed dose and amortized for daily exposure) for cholinesterase inhibition in a subchronic dermal rat study. Chronic exposure was evaluated using a NOAEL of 0.2 mg/kg for brain cholinesterase inhibition in a chronic rat study. This would result in acute, subchronic, and chronic screening levels of 43 ug/m^3, 43 ug/m^3, and 3.4 ug/m^3, respectively.

In 2002, USEPA released an RED on naled. In the RED, USEPA used a NOAEL of 0.23 mg/m^3 for cholinesterase inhibition from a 13-week rat inhalation study to evaluate inhalation exposure of any duration. In this study, exposure took place 6 hours per day, 5 days per week. Adjusting for the 6-hour exposure and breathing rate differences results in a human equivalent NOAEL of 92 ug/m^3. Applying an uncertainty factor of 100 results in an acute screening level of 0.92 ug/m^3. Adjusting for exposures 5 days per week results in subchronic and chronic screening levels of 0.65 ug/m^3. USEPA assigned a cancer classification of E, evidence of non-carcinogenicity and assigned a FQPA factor of 1X. Since the screening levels based on the RED are derived from an inhalation study, they will be used here.

Norflurazon

USEPA completed an RED in 1996 and a TRED in 2002. Neither document addressed inhalation exposure; therefore, the screening levels are set based on oral toxicity values. The TRED evaluated acute dietary exposure using the NOAEL of 10 mg/kg/day for increased skeletal variations in an oral rabbit developmental toxicity study. Using this NOAEL and a combined uncertainty factor of 100 results in an acute screening level of 170 ug/m^3. The TRED evaluated chronic dietary exposure using the NOAEL of 1.5 mg/kg/day for liver toxicity in a 6-month oral dog study. Using this NOAEL and a combined uncertainty factor of 100 results in chronic screening level of 26 ug/m^3. The TRED did not evaluate intermediate-term or subchronic exposure; therefore, the chronic screening level of 26 ug/m^3 will also be used as the subchronic screening level. USEPA has classified norflurazon as a C, possible human carcinogen based on liver tumors, but did not recommend a quantitative risk assessment. USEPA assigned an FQPA factor of 3X only for acute exposure of females 13-50 years of age, while assigning an FQPA factor of 1X for all other acute exposures and all chronic exposures.

OEHHA commented that a six-month dog study should not be considered chronic, but rather it is a subchronic exposure. An additional uncertainty factor should be applied to convert the subchronic NOAEL to estimate a chronic NOAEL. Applying an additional uncertainty factor of 10 would result in a chronic screening level of 2.6 ug/m^3. This will be considered when evaluating the monitoring results.

Oryzalin

USEPA completed an RED in 1994 and published a risk assessment in 2003, which will form the basis for a TRED. In the risk assessment, USEPA specified evaluating short-

term inhalation using the NOAEL of 25 mg/kg (maternal toxicity in an oral rabbit developmental toxicity study) and applying an uncertainty factor of 100X. This would result in an acute screening level of 420 ug/m^3. USEPA specified evaluating intermediate-term and long-term inhalation using the NOAEL of 13.82 mg/kg (decreased weight gain, hematological effects, and thyroid effects in a chronic rat feeding study) and applying an uncertainty factor of 100X. This would result in a subchronic and chronic screening level of 230 ug/m^3. USEPA classified oryzalin as likely to be carcinogenic to humans and assigned a slope factor of 0.00779 $(mg/kg/day)^{-1}$. USEPA assigned an FQPA factor of 1X.

Oxyfluorfen

Oxyfluorfen is an herbicide with low acute oral, dermal, and inhalation toxicity. In repeated dose studies in a variety of animals, oxyfluorfen inhibited heme production, resulting in a variety of anemias, and caused mild liver toxicity. Oxyfluorfen also caused liver tumors in mice, resulting in its classification as a possible human carcinogen.

USEPA completed an RED in 2002. In the RED, USEPA specified evaluating short-term inhalation using the NOAEL of 30 mg/kg (maternal toxicity in an oral rabbit developmental toxicity study) and applying an uncertainty factor of 100X. This would result in an acute screening level of 510 ug/m^3. USEPA specified evaluating intermediate-term inhalation using the LOAEL of 32 mg/kg (liver toxicity in a subchronic mouse feeding study), and applied an uncertainty factor of 3X to derive a NOAEL of 10.67 mg/kg. Applying an uncertainty factor of 100X results in a subchronic screening level of 180 ug/m^3. USEPA specified evaluating long-term inhalation using the NOAEL of 3.0 mg/kg (liver toxicity in chronic dog and mouse studies). Converting from oral to inhalation by multiplying by 1.7 and applying an uncertainty factor of 100X would result in a chronic screening level of 51 ug/m^3. USEPA classified oxyfluorfen as a possible human carcinogen based on liver tumors in mice and assigned a slope factor of 0.0732 $(mg/kg/day)^{-1}$. USEPA assigned an FQPA factor of 1X.

Permethrin

Cypermethrin and permethrin belong to a class of insecticides called pyrethroids. The health effects are the same as described for **Cypermethrin**.

USEPA completed an RED on permethrin in 2005. In the RED, USEPA specified using the NOAEL of 42 mg/m^3 (neurotoxicity in a 15 day rat inhalation study) to evaluate short-term, intermediate-term, and long term-inhalation exposure. USEPA applied an uncertainty factor of 100X. The study exposed animals 6 hours a day for an average of 3.75 days a week. Adjusting for exposure for 24 hours and differences in breathing rates results in a human equivalent acute NOAEL of 16.8 mg/m^3. Applying the uncertainty factor of 100X results in an acute screening level of 168 ug/m^3. Adjusting this value for exposure 3.75 days per week results in subchronic and chronic screening levels of 90 ug/m^3. USEPA classified permethrin as likely to be carcinogenic to humans based on lung tumors in mice and derived a slope factor of 0.00957 $(mg/kg/day)^{-1}$. USEPA assigned an FQPA factor of 1X.

Phosmet
USEPA completed an IRED for Phosmet in 2001. In the IRED and supporting risk assessment, USEPA specified evaluating short-term inhalation using the NOAEL of 4.5 mg/kg (cholinesterase inhibition an acute rat oral neurotoxicity study) and applying an uncertainty factor of 100X. This would result in an acute screening level of 77 ug/m^3. USEPA specified evaluating intermediate-term inhalation using the NOAEL of 1.5 mg/kg (cholinesterase inhibition in an oral subchronic rat neurotoxicity study) and applying an uncertainty factor of 100X. This would result in a subchronic screening level of 26 ug/m^3. USEPA specified evaluating long-term inhalation using the NOAEL of 1.1 mg/kg (cholinesterase inhibition in an oral rat chronic toxicity study) and applying an uncertainty factor of 100X. This would result in a chronic screening level of 18 ug/m^3. USEPA classified phosmet as having suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential. USEPA assigned an FQPA factor of 1X.

Propanil
Propanil is an herbicide used primarily on rice. It has a relatively low acute oral or inhalation toxicity, but can cause skin and eye irritation. Longer-term animal studies have indicated toxicity to the blood and blood forming organs, endocrine effects (including testicular toxicity), carcinogenic effects, and possible effects on the immune system.

USEPA completed an RED on propanil in 2002. In the RED, USEPA specified evaluating inhalation for all time periods using the LOAEL of 9 mg/kg for increased methemoglobin, increased spleen weight, and increased weights of seminal vesicles and prostates in males in a chronic oral rat study. USEPA applied an uncertainty factor of 3X to estimate a NOAEL of 3 mg/kg. USEPA applied an uncertainty factor of 100 to address intraspecies and interspecies variation, resulting in an acute, subchronic, and chronic screening level of 51 ug/m^3. USEPA classified propanil as having suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential. USEPA assigned a FQPA factor of 1X.

Propargite
Propargite is a miticide, is severely irritating to the skin and eyes, and is considered corrosive. These effects have been seen in workers exposed to propargite. Propargite has also been identified as a probable human carcinogen and a developmental toxin based on the results of animal toxicity studies.

USEPA completed an RED on propargite in 2001. In the RED, USEPA used a LOAEL of 310 mg/m^3 (mortality in a 4-hour rat inhalation study) to evaluate short-term, intermediate term, and long-term inhalation. The RED specified a total uncertainty factor of 1000X. This included a 10X factor due to the lack of a NOAEL, the severity of effects at the lowest dose tested, and the 4-hour exposure duration. Adjusting for differences in human and rat breathing rates and using this 1000X uncertainty factor would result in a screening level of 496 ug/m^3 for all timeframes. USEPA has classified propargite as a probable human carcinogen based on intestinal tumors in rats. The RED specified a cancer potency factor of 0.0033 $(mg/kg/day)^{-1}$. USEPA assigned an FQPA factor of 1X.

DPR completed an RCD on Propargite in 2004. In the RCD, DPR derived an acute RfC of 14 ug/m^3 based on maternal toxicity at 2 mg/kg in a rabbit developmental, an oral absorption rate of 40%, and an uncertainty factor of 100. DPR derived a chronic RfC of 26 ug/m^3 based decreased body weights and decreased food consumption at 3.8 mg/kg in a chronic rat study, an oral absorption rate of 40%, and an uncertainty factor of 100. The seeming incongruity of a chronic NOAEL higher than the acute NOAEL is probably the result of dose selection. Since the current process is intended to develop screening levels, a conservative approach would be to use the lower acute value to examine all time periods. For propargite, the screening level of 14 ug/m^3, derived from the acute RfC will be used for evaluating acute, subchronic, and chronic exposures. In the RCD, DPR calculated cancer potency values in a range of 0.0059 to 0.026 $(mg/kg/day)^{-1}$.

SSS-tributyltriphosphorotrithioate (DEF)

In 1999, DPR completed an RCD on DEF that was peer reviewed by the SRP. The RCD derived an acute and subchronic REL of 8.8 ug/m^3 based on cholinesterase inhibition and clinical signs in a 90-day rat inhalation study. Since DEF is not used year round, chronic inhalation exposure was not evaluated. DPR derived a carcinogenicity potency factor of 0.084 $(mg/kg/day)^{-1}$. In a 1999 IRED, USEPA specified the use of the same study to evaluate short-term and intermediate term exposure. The RED also did not evaluate long-term inhalation exposure. USEPA classified DEF as a likely high dose/not likely low dose carcinogen and recommended that a potency factor not be calculated. USEPA retained the FQPA factor of 10X.

Simazine

Simazine belongs to a class of herbicides called triazines and has low acute oral, dermal, and inhalation toxicity. Longer-term studies in animals have resulted in effects on a number of blood parameters (e.g., depressed red blood cell count), reduced body weights, and carcinogenic effects. Simazine has been classified as a possible human carcinogen.

USEPA is scheduled to release an IRED on simazine in 2006. In 2005, USEPA released a revised risk assessment that will form the basis for the IRED. In the assessment, USEPA recommended evaluating short-term inhalation exposure using a NOAEL of 6.25 mg/kg from a 28-day oral pubertal study in rats. This NOAEL results in an acute screening level of 110 ug/m^3. In the assessment, USEPA recommended evaluating intermediate-term and long-term inhalation exposure using a NOAEL of 1.8 mg/kg from an oral 6-month luteinizing hormone surge study in rats. This NOAEL results in a subchronic and chronic screening level of 31 ug/m^3. USEPA classifies simazine as a possible human carcinogen; however, a change in classification to not likely to be carcinogenic to humans is pending. USEPA assigned an FQPA factor of 3X.

Sulfur

Sulfur is found in a variety of fungicides and is also available as a powder. It has a low oral toxicity. However, it can cause skin, eye, and respiratory irritation. Inhalation exposure to large amounts of sulfur dust can cause inflammation of the nasal mucosa, bronchitis, cough, and expectoration.

There was insufficient information to derive screening levels for sulfur.

Thiobencarb
USEPA completed an RED in 1997. Since the acute inhalation toxicity was low, the RED did not assess inhalation risk. Short-term toxicity was addressed with a NOAEL of 25 mg/kg for decreased skeletal ossification in a rat oral developmental toxicity study. Intermediate-term toxicity was addressed with a NOAEL of 2 mg/kg for liver and kidney effects in an oral rat subchronic toxicity study and an oral rat multigeneration study. Long-term dietary toxicity was addressed with a NOAEL of 1 mg/kg for decreased body weight and changes in clinical chemistry in a two-year oral rat chronic toxicity study. In all three scenarios, USEPA used a total uncertainty factor of 100X. This would result in acute, subchronic, and chronic screening levels of 425 ug/m^3, 34 ug/m^3, and 17 ug/m^3, respectively. USEPA assigned a carcinogenicity classification of D, not classifiable as to carcinogenicity. USEPA did not retain the FQPA safety factor.

Trifluralin
Trifluralin is an herbicide and has a low acute oral toxicity. It is classified as a dermal sensitizer. Trifluralin has been classified as a possible human carcinogen, based on evidence in male and female rats.

USEPA completed an IRED on trifluralin in 2004. The IRED assessed short-term inhalation was assessed using a NOAEL of 300 mg/m^3 for methemoglobinemia and clinical signs in a 30-day rat inhalation study in which exposure took place 6 hours a day, 5 days a week. The amortized 24-hour NOAEL would be 75 mg/m^3. Adjusting for differences in rat and human breathing rates and applying a total uncertainty factor of 100X results in an acute screening level of 1,200 ug/m^3. Intermediate-term inhalation was assessed using a NOAEL of 10 mg/kg for kidney and urine chemistry effects in an oral rat urinalysis study. This would convert to a subchronic screening level of 170 ug/m^3. Long-term inhalation was assessed using a NOAEL of 2.4 mg/kg for decreased body weight, decreased red blood cells, and other hematological effects in an oral chronic dog study. This would convert to a chronic screening level of 41 ug/m^3. USEPA classified trifluralin as a C, possible human carcinogen and derived a cancer potency value of 0.0058 (mg/kg/day)$^{-1}$. USEPA assigned an FQPA factor of 1X.

Xylenes
OEHHA established acute and chronic RELs for xylenes. OEHHA set an acute 1-hour REL of 22 mg/m^3 based on a derived 1-hour NOAEL of 220 mg/m^3 for eye and respiratory irritation in human volunteers and an uncertainty factor of 10 X for human variation. The 1-hour NOAEL was extrapolated from a 30-minute NOAEL of 430 mg/m^3. Using this same relationship, a 24-hour NOAEL of 9.0 mg/m^3 can be calculated. Applying the 10X uncertainty factor results in 24-hour acute screening level of 900 ug/m^3. OEHHA set a chronic REL of 700 ug/m^3 based on a LOAEL for central nervous system effects and eye and respiratory irritation identified in a study of exposed factory workers (after adjusting for 24 hours per day, 7 days a week exposure). OEHHA used an uncertainty factor of 3X to derive a NOAEL from a LOAEL and an uncertainty factor of 10X to address human variation. The chronic REL derived by OEHHA will be used as the subchronic and chronic screening level. IRIS classifies xylenes as having inadequate evidence for an assessment of the carcinogenic potential of xylenes.

CHEMICAL	Acute[a]			Subchronic			Chronic			FQPA SAFETY FACTOR	Cancer Potency (Q_1^*) (mg/kg-day)$^{-1}$
	NOAEL (ug/m^3)[b,c]	UF	Screening Level (ug/m^3)	NOAEL (ug/m^3)[b,c]	UF	Screening Level (ug/m^3)	NOAEL (ug/m^3)[b,c]	UF	Screening Level (ug/m^3)		
Acrolein	10(man,1 hr)[d]	60	**0.19**	160 (rat)	9	**0.18**	160(rat)	27	**0.06**		
Arsenic	190(rat,4hr)[d]	1000	**0.03**	190(rat,4hr)[d]	1000	**0.03**	190(rat,4 hr)[d]	1000	**0.03**		12
Azinphos-methyl	0.75mg/kg(man)	10	**101**	0.25mg/kg(man)	30	**11**	0.15 mg/kg (dog)	30	**6.8**	1	
Carbon disulfide	6.2x10^5(rat,6hr)	100	**1,550**	2.4x10^4(man)	10	**800**	2.4x10^4(man)	10	**800**		
Chlorothalonil	2.0mg/kg(rat)	100	**34**	2.0mg/kg(rat)	100	**34**	2.0mg/kg(rat)	100	**34**	1	0.011
Chlorpyrifos	74 (rat)	100	**1.2**	53 (rat)	100	**0.85**	0.03mg/kg(dog)	100	**0.51**	10	
Copper	1000 (man)	10	**100**	1000(man)	100	**10**	1000(man)	100	**10**		
Cypermethrin	2500(rat)	100	**40**	1800(rat)	100	**29**	600(rat)	100	**9.6**	1	
Diazinon	8.33(rat)	100	**0.13**	8.33(rat)	100	**0.13**	8.33(rat)	100	**0.13**	1	
1,3-D	11000 (rat)	100	**160**	7400(rat)	100	**120**	3700(mouse)	100	**120**		0.055
Dicofol	4mg/kg(rabbit)	100	**68**	0.29mg/kg(dog)	100	**49**	0.12mg/kg(dog)	100	**20**	3	
Dichlorvos	1200(rabit)	100	**11**	240(rabbit)	100	**2.2**	48(rat)	100	**0.77**	3	0.35
Dimethoate	2.0 mg/kg (rat)	100	**34**	1.07mg/kg(rat)	100	**17**	0.05mg/kg(rat)	100	**0.85**	1	
Diuron	10mg/kg(rat)	100	**170**	1.0mg/kg(rat)	100	**17**	0.33mg/kg(rat)	100	**5.7**	1	0.0191
Endosulfan	400(rat)	100	**4**	290(rat)	100	**2.9**	290(rat)	100	**2.9**	10	
EPTC	14500(rat)	100	**230**	1500(rat)	100	**24**	0.5mg/kg(rat)	100	**8.5**	10	
Formaldehyde	190(man)	10	**19**	32(man)	10	**3**	32(man)	10	**3**		0.021
Malathion	2500(rat)	100	**40**	1800(rat)	100	**29**	1800(rat)	100	**29**	10	
MITC	660(man)	10	**66**	300(rat)	100	**3**	300(rat)	1000	**0.3**		
Methyl Bromide	40ppm(rabbit)	100	**820**	5 ppm (dog)	100	**35**	1 ppm (rat)	100	**3.9**	1	
Metolachlor	50mg/kg(rat)	100	**85**	8.8mg/kg(rat)	100	**15**	9.7mg/kg(rat)	100	**16**	1	
Molinate	11.5mg/kg(rat)	100	**200**	0.48mg/kg(rat)	100	**8.2**				10	
Naled	58 (rat)	100	**0.92**	41(rat)	100	**0.65**	41(rat)	100	**0.65**	1	
Norflurazon	10mg/kg(rabbit)	100	**170**	1.5mg/kg(dog)	100	**26**	1.5mg/kg(dog)	100	**26**	3[e]	
Oryzalin	25mg/kg(rabbit)	100	**420**	14mg/kg(rat)	100	**230**	14mg/kg(rat)	100	**232**	1	0.00779
Oxyfluorfen	30mg/kg(rabbit)	100	**510**	11mg/kg	100	**180**	3.0mg/kg(dog)	100	**51**	1	0.0732
Permethrin	10500(rat)	100	**168**	5600(rat)	100	**90**	5600(rat)	100	**90**	1	0.00957
Phosmet	4.5mg/kg(rat)	100	**77**	1.5mg/kg(rat)	100	**26**	1.1mg/kg(rat)	100	**18**	1	
Propanil	3mg/kg(rat)	100	**51**	3mg/kg(rat)	100	**51**	3mg/kg(rat)	100	**51**	1	
Propargite	2mg/kg(rat)	100	**14**	2mg/kg(rat)	100	**14**	2mg/kg(rat)	100	**14**	1	0.0059-0.026
DEF	600(rat)	100	**8.8**	600(rat)	100	**8.8**				10	0.084
Simazine	6.25mg/kg(rat)	100	**110**	1.8mg/kg(rat)	100	**31**	1.8mg/kg(rat)	3		3	
Sulfur	Insufficient data to derive screening levels										
Thiobencarb	25mg/kg(rat)	100	**425**	2mg/kg(rat)	100	**34**	1mg/kg(rat)	100	**17**	1	
Trifluralin	75000(rat)	100	**1200**	10mg/kg(rat)	100	**170**	2.4mg/kg(dog)	100	**41**	1	0.0058
Xylenes	9000(man)	10	**900**	22000(man)[d]	30	**700**	22000(man)[d]	30	**700**		

ATTACHMENT V – RESPONSES TO COMMENTS ON THE PROTOCOL

Responses are in bold font.

Page 3, Section 1.2: Pesticide use - On page 3, the last paragraph states that about 120,000 pounds of pesticides were used during 2003 within 5 miles of Parlier. Based on Table 8, the pesticide use for 2003 within 5 miles of Parlier should be about 1.3 million pounds.

The correction has been made.

Page 4, Section 1.3.1: LAG membership - On page 4, membership of the local advisory group is listed. While the county agricultural commissioner's office is listed, the county health department is not. Was the county health dept. invited to participate?

Yes.

Page 5, Section 1.4: Previous investigation - On page 5, previous investigations are listed. The DHS school and house dust study, conducted several years ago in Parlier, is not listed. I recall that DHS looked at pesticides that were found adsorbed to dust from different locations in Parlier. Martha Harnly was involved. You may want to reference that study also.

The other investigations listed in the protocol measured ambient chemical air concentrations. The DHS study measured pesticide exposure of children through ingestion. The study was directed toward homes in close proximity to agriculture and as a comparison between homes with residents that were farm workers and homes which did not have a resident that was a farm worker.

Page 5, Section 1.4.2: McFarland - This section notes "Methyl bromide was the only pesticide found above its screening level, but within EPA's protective risk range." It is also important to note that the Methyl bromide data which supports this statement was not sufficient to fully evaluate community exposure to Methyl bromide applications.

Comment was added.

Page 6, Section 1.4.3: TAC monitoring - On page 6, the text states that information is available from ARB TAC monitoring studies for 12 of the pesticides included in the Parlier monitoring. Thirteen pesticides are listed. These should agree.

Correction made.

Page 8, Section 3.2: Sampling Locations and Frequency - This section notes EPA ambient air siting criteria are important for sampling site selection. It is recommended that these criteria be adhered to for comparability purposes, but that the probe height be much lower than 15 meters so that the data are more representative of community exposures.

DPR agrees. The samples will be collected at approximately 4 to 6 meters above ground.

Page 9, Section 3.2: Monitoring locations - On page 9, the first sentence states that "air monitoring will occur . . ." I'd suggest that this be reworded as "air monitoring is proposed at . . ." since you are still taking comments on the proposal.

The sites have been agreed upon by the TAG and LAG and are expected not to change.

Page 9, Section 3.2: Monitoring frequency - On page 9, the text states that DPR will collect samples "three days per week." During the presentation on Aug. 18, you indicated that you were proposing to collect samples on three consecutive days per week. The word "consecutive" is not in the protocol. While I would recommend three random days per week, I understand your need to save personnel costs involved in collecting the samples. I'd restate this to note that the three consecutive days will be random (some weeks Monday-Thursday, other weeks Friday-Monday) and that one day will match ARB's scheduled sampling day.

The text has been changed to indicate the days will vary.

Page 9, Section 3.2: ARB monitoring - On page 9, please edit the description of ARB's monitoring, described as one day per week, to indicate that it will be one sample every 6 days, with one sample every 3 days during the high use months for 1,3-D and sulfur. You may want to make the same change in Table 10.

Change has been made.

Page 9, Section 3.2: Sample Locations and Frequency - This section notes that sampling will occur three days per week. The section should also note how this schedule compares to the Photochemical Assessment Monitoring Station (PAMS) schedule for the San Joaquin Valley Air Pollution Control District (SJV APCD) and to the schedule of the ambient air monitoring network. For comparability purposes it is recommended that the Parlier sampling schedule include the ambient sampling day in the network's "1 in 6" days.

The text has been changed to note that one day each week DPR's samples will correspond with ARB's "1 in 6" sampling schedule, and ARB's schedule corresponds with SJVAPCD's "1 in 3" schedule.

Page 10, Section 3.3: 8. ARB's assistance - On page 10, two consecutive paragraphs state that "with ARB's assistance, DPR will monitor . . ." ARB will be doing this monitoring, not DPR. Please revise these two paragraphs to indicate that with ARB's assistance, DPR will obtain data for . . . Also, the second of the two paragraphs mentions the pesticides copper and sulfur. Shouldn't this be sulfur and copper-based pesticides?

Change has been made.

Page 10, Section 3.3: Sample Type - This section should include additional information on: samples collected by SJV APCD: the type of sampling system used for collection into canisters (including information on certification of this system); and the type(s) of samples that will be collected for metals evaluation (Federal Reference Method (FRM) or non - FRM; cut points/sample volume (TSP, PM10, and/or PM2.5).

Unable to obtain a copy of SOP.

Page 10, Section 3.4: Field Tests; Section 3.5, Quality Control for Field Sampling - These sections should include or reference specific quality control criteria.

Text changed.

Page 10, Section 3.5: Quality Control for Field Sampling - This section should describe field controls to evaluate blank contamination and cartridge breakthrough.

Text changed.

Page 10, Section Section 3.5: QC for sampling - On page 10, the last paragraph discusses field spikes. I see no mention of trip spikes or trip blanks. I'd recommend having at least some of both (e.g., monthly).

Trip blanks have been added. The TAG agreed that if only one type of spiked sample could be collected, due to restricted budget, field spikes would be the best option.

Page 11, Section 3.6: Meteorological Monitoring - This section should include information about the tower height(s) used for meteorological monitoring.

Height specified.

Page 12, Section 4.1: Laboratory Analysis Methods - This section should include the SJV APCD methods.

Unable to obtain a copy of SOP.

Page 12, Section 4.2: APCD monitoring - The text on page 12 should be revised to delete mention of the APCD doing CO monitoring, since we learned that they don't.

Text deleted.

Page 12, Section 4.3: Quality Assurance - Section 8, Schedule: It is recommended that the first audit be scheduled when the lab is processing the first batch of field samples. Additionally, the audits should be added to the schedule in Section 8.

Text changed.

Page 12, Section 4.3: Quality Assurance - The first paragraph of this section notes items for which the laboratory will be responsible. There should be a clear statement that the laboratory will provide "internal QA oversight." While most laboratories automatically provide internal QA oversight, it was noted during the Lompoc QA audits that GLP/University laboratories may not automatically assign their QA staff to each project.

Text changed.

Page 12, Section 4.3: Quality Assurance - The second paragraph notes that there will be review and tracking of 5% of the data. There should be a discussion of how this 5% will be selected and if the review will be done entirely while onsite or if the laboratory will submit data to the QA team for review before or after the audits.

The QA team leader will determine this.

Page 13, Section 5.1: Calculation of Air Concentrations - Note that all data should not be reported in parts per billion by volume as these units are only applicable to gaseous pollutants.

Text changed.

Page 13, Section 5.1: Calculation of Air Concentrations - On page 13, the second paragraph of section 5.1 states that "acute exposure will be estimated for each monitoring from . . ." I assume that this should be "for each monitoring location from . . ."

Text changed.

Page 13, Section 5.1: Calculation of Air Concentrations - It is not appropriate to treat samples that are below the detection limit as having residue levels equivalent to half the limit of detection (LOD). The draft protocol does not indicate how samples that are below the limit of quantitation (LOQ) will be handed. The approach described in the protocol could report presence of residues for products that may not be used in the area at all, leading to erroneous assumptions about exposure. In a very limited case, where residues occur above the LOD but below the LOQ, it could be appropriate to assume half the LOD, so long as the assumptions and caveats are clearly explained.

Text changed.

Page 13, Section 5.1: Calculation of Air Concentrations - We are concerned about the ill-defined methodology for estimating acute exposures.

Did not understand comment. Protocol states: Acute exposure will be estimated for each monitoring location from the individual 24-hour samples by calculating the 95th percentile concentration for each pesticide.

Page 13, Section 5.2: Health Evaluation Methods - This section states that "No state or federal agency has established regulatory health standards for pesticides in air." This statement should be re-phased, as EPA and state waste programs have developed

standards for some pesticides in air on a site-specific basis. This section should also address the non-pesticide data that will be collected. Additionally, it would be helpful if "significant exceedance" was specifically defined for both the acute and chronic exposure scenarios.

Text changed.

Page 14, Section 5.2: Health Evaluation Methods - In particular, we question the fairness and accuracy of the development of the Hazard Index that "assumes that toxicity and risk of all monitored pesticides are additive, although only a subset of the monitored pesticides (including organophosphate insecticides and oxygen analog breakdown products toxic to the nervous system) are known to act in an additive manner." While we understand and support the desire to be cautious when measuring the pesticides in question, we are concerned that such an approach will not only be unscientific but also lead to unnecessary health concerns on the part of the general population. The conclusions that could be derived from such a method could be inaccurate and, in our view, lead to unintended consequences. We would hope that the measurement of the monitoring results is completed in the most objective manner possible and not by simply taking the cumulative approach, without proper justification, as described in your draft document.

This approach is consistent with the one DPR used for the Lompoc project. The additive approach is health-conservative and acts as screening tool. If the health index exceeds one using the additive approach, this will trigger DPR to conduct a more thorough analysis of the data. DPR will not take regulatory action based on the assumption of additive toxicity for all pesticides.

Page 15, Section 5.3: Modeling - On page 15, the text states that modeling may be used and that the ISC model will be used to "estimate the modeled concentrations." I would restate this to indicate that a U.S. EPA approved air dispersion model appropriate for the Parlier vicinity may be used to estimate air concentrations during times or at locations with no air monitoring data. You should be aware that U.S. EPA may propose to remove ISC3 from their list of approved models.

Text changed.

Page 15, Section 5.3: Modeling - The proposed protocol would use EPA's Gaussian Plume model to estimate pesticide distribution for places that are not monitored. (This model is currently used for tracking particulate matter in EPA's Source Apportionment Analysis, and was used for the dust propagation modeling around Manhattan Island following destruction of the World Trade Center Towers in 2001.) For this model to be meaningful for pesticide distribution, DPR must first validate the model using the data from the monitoring study.

DPR, EPA, registrants, and others have used ISCST to model agricultural pesticide applications, and have compared predicted concentrations with measured air concentrations. ISCST agrees with measured air concentrations in most situations.

Page 16, Section 7.1: Precautionary approach - On page 16, section 7 is listed as "Risk Reduction and Precautionary Approaches." I didn't find anything about the IWMB program for the precautionary approach, although they are participating in the TAG for that purpose. I'd suggest adding something here.

IWMB has not developed a plan yet.

Additional Comments:

In an e-mail dated October 17, 2005 to the Director of CDPR, five concerned members of the Local Advisory Group (LAG) requested that the monitoring for VOC and metal-associated pesticides conducted by ARB be expanded. The e-mail expressed concern that although the fumigants applied in the Parlier area seem to present the greatest potential for exposure risk to the community, the proposed VOC sampling by ARB would only occur 1-day in 6 as opposed to the 3 days a week schedule for DPR pesticide samples. It was felt the 1-day in 6 schedule would not provide accurate estimates of 1,3-D or methyl bromide exposures. Concern was also expressed that the data for 1,3-D and methyl bromide could not by used the UCSF Fresno in their study to assess the potential health impacts of pesticides and criteria pollutants in cooperation with CDPR's environmental monitoring.

The LAG members recommended that CDPR make a formal request to CARB for expanded VOC monitoring (3 days per week at one site). They provided two suggestions as possible means of accomplishing: 1) temporary re-assignment of VOC analysis away from the TAC monitoring locations where records indicate historically lower average cumulative VOC levels, or 2) CARB and/or CDPR formally request assistance from US EPA Region 9 to perform the laboratory analysis of the VOC samples. The latter option appears both logical and feasible, as recent inquires to EPA Region 9's Air Methods Laboratory suggest that they have the capacity to perform the 3 samples/week VOC analysis recommended for this project.

In addition, a request at a California Environmental Justice Advisory Committee (CEJAC) meeting, it was requested that we also consider additional monitoring for chloropicrin

Summary of the Director's response:

That DPR has allocated its entire air monitoring budget for two fiscal years to the project. ARB is assisting DPR with air monitoring during this pilot project by monitoring VOCs, metals, particulate matter, and weather conditions for the full year in Parlier. Neither agency is receiving additional funding for these projects, and must use existing resources to conduct them.

It was stated that with the current monitoring protocol, DPR will be able to estimate both average and high exposures for all VOCs, including methyl bromide and 1,3-dichloropropene. Concern was also expressed that the redirection of ARB resources would mean eliminating monitoring in areas of the State where there are also pesticide concerns. It was also pointed out that since the U.S. EPA use a different analytical method than ARB, all of the VOC sampling would need to be sent to the U.S. EPA laboratory for consistency.

In response to the request for additional chloropicrin in the Parlier it was noted that Chloropicrin use in Parlier appears to be declining. During 2004, there were only three applications of chloropicrin within five miles of Parlier. It was felt that that monitoring for a pesticide with such infrequent use near Parlier may not be a good use of limited resources. In addition, DPR is preparing a statewide health risk

assessment for chloropicrin based in part on monitoring studies done in California. Based on the results of the risk assessment, DPR may develop mitigation options to reduce public exposure to chloropicrin.

Summarized comments from members of the ARB Technical Committee on their review in e-mail dated 12/21/2005:

1. Would it be possible during the peak use period sampling for 1,3-dichloropropene and sulfur to do some consecutive days of sampling rather than once every third day? We had tried looking in the past at once of every sixth day sulfur concentrations with pesticide application data to see if we could discern any impacts and it was very difficult to do as it always seemed like the ambient sampling day never coincided with the nearby pesticide application. With some periods of every day sampling, you may be more likely to pick up any impacts that might occur, especially if they are short-term.

It was felt that spreading out the sampling so consecutive days of sampling could be collected would result in too much time passing in between sampling periods when short periods of higher concentrations could occur and would be missed.

2. I would suggest having a modeling protocol for the modeling project. This should also include some model performance evaluation using the model to predict known concentrations at a receptor to ensure that the model is adequate.

Section 5.3 describes DPR's plan to use computer modeling to attempt to estimate ambient air concentrations from pesticide applications made during monitoring to evaluate the model. If successful, modeling can be used to supplement measured air concentrations to determine potential concentrations at places and time periods other than the ones monitored.

In e-mail dated 12/22/2005: summarized

1. Make sure it follows EPA600/4-90-10 (Organochloride Pesticides in Air) and 600/8-90-041 (Pesticides in Air) quality control procedures and general protocols, as applicable.

The lab is performing more quality control than is required by EPA method 600/4-90-10.

2. The reporting limits seem pretty high (0.25-2.0 micrograms). Having a reporting limit significantly higher than the detection limit could result in underreporting (under quantifying the pesticide residues present) because you are reporting non-detect (under the reporting limit) for more samples than you need to.

The reporting limits are all below our health screening levels for all of the chemicals.

3. The procedure for cleaning the XAD-4 resin is not included in the protocol. The UC Davis Trace Analytical Laboratory developed a protocol for cleaning resin March 29, 2000 for their Lompoc Air Sample Study.

The CDFA Analytical lab's protocol for cleaning resin is basically identical to UC Davis's resin cleaning protocol.

4. Section 10.2-Instrument calibration - three levels for a linear curve is not uncommon. However, they list that they have standards at 5 levels-- I would want to make sure that if they go to a quadratic, instead of linear fit, they use more than three levels (use 4 or 5 of the standards). Obviously with a quadratic and only 3 points anything could be made to fit a formula.

The CDFA Analytical Lab uses 5 levels of standards (0.1, 0.5, 1.0, 2.0 and 5.0ng/μL) for all analytes. They use a linear fit for all of them. If an instrument problem causes a difficulty in obtaining a linear fit they always try to fix the problem and rerun them. Quadratic fit is the last option to salvage the data.

5. Section 11.3-- Endosulfan sulfate and propargite have similar retention and starting times, but can't be analyzed by LCMS confidently so there may be overlap between the peaks that won't be able to be confidently separated so the concentration of these may be questionable.

According to the Lab there is no separation and identification problems between these two chemicals. The endosulfan sulfate has a retention time = 20.04 (ions monitored: 272, 387, 229, 422) and the propargite has a retention time = 20.5-20.6 (double peaks, ions monitored: 135, 173, 350)

6. On page 20 the MDL for dichlorvos is questionable-- you have significant percent recovery difference between all the duplicates. For example one set % recovery varied from 0.5 to 136 another 50%-109%; another varied 67%-105%; and another varied 66% to 126. It begs the question of if there was an interference or contamination or if this method is not appropriate. Plus I can't quite understand the numbers, it looks like there could be excel sheet/mathematical errors. I.E. set 3 recovered 0.550 micrograms out of 0.5 micrograms but reported 0.5% recovery.

This method may be able to give only a qualitative analysis of dichlorvos rather than a quantitative amount. The percentage recovery of 0.5% for set 3 is a typing error. The true percentage recovery is 110%.

Comments on the Screening Levels:

1. FQPA factor: In the discussion of each chemical it would be useful to include the basis for the FQPA factor (or lack of one).

   FQPA factor- Time does not permit inclusion of a discussion of USEPA's basis for determining each FQPA factor in the protocol; however, that might be developed and included in the final report.

2. Consider expanding table to include endpoint for each exposure duration/NOAEL. May need to have three separate tables, one for each exposure duration.

   Expansion of table- I am not sure how the table will be incorporated into the protocol. As with the FQPA factor, time does not permit expansion of the table to include toxicity endpoints for the protocol; however, it may be appropriate for the final report. As you point out, the table would probably have to be broken up, but that could be done. In any case, the information is available in the write-ups on each chemical.

3. OEHHA does not use the conversion from rat NOAEL to human equivalent NOAEL (rat NOAEL x 1.6 = human equivalent NOAEL). This in effect says that once the material in inhaled, the absorption characteristics of the respiratory systems between the two species are equivalent and that humans are less sensitive (have higher NOAELs) than rats. We do not believe that either assumption is necessarily or universally true and suggests that the conversion is not used, at least for screening purposes.

   I have now included your comments on the conversion factor in the beginning of the document. However, we continue to think it appropriate to adjust for differences in breathing rates and resulting differences in amount of material inhaled.

4. Page1, last line of 4th paragraph: No *observed* Adverse Effect Level.
   Page 2, 3rd para: *from* humans, rather than "*than* humans"
   Page 2, last para: animal, not animal*s*
   Page 3, first para: normalize, not normaliz*ed*

   Corrected as suggested.

5. Acrolein: Suggest changing "normalized" to something like "extrapolated to continuous exposure." Change "uncertainty of intraspecies variability" to "intraspecies variability." Also change inter(and intra)species "uncertainty" to inter(and intra)species "variability." Also note that we are currently reevaluating our acute NOAEL for this compound.

   Changed as suggested.

6. Arsenic: OEHHA did not correct breathing rates; a HEC correction was not possible for arsenic.

   Corrected as suggested.

7. AZM: first para: "…sensitive *than* animals…" instead of "…sensitive *that* animals…" Same para, line 11: "… and, AN uncertainty factor…"

   Corrected as suggested.

8. Carbon disulfide: Carbon disulfide repeated twice in line three. Second para, *Hot Spots*, not *Hotspots*. Third para, fix m3, and "compensated" should be "time extrapolated."

   Corrected as suggested.

9. 1,3-dichloropropene: Insert space between 0.46 and m3 (two instances)

   Corrected as suggested.

10. Dicofol: "release of ACTH release"...???

    Corrected as suggested.

11. Dimethoate: dimethoate is misspelled in first sentence. LOAEL of 3.2 (no units given).

    Corrected as suggested.

12. Diuron: Second sentence": …NOAEL of 10 mg/kg..." Also, *chronic* (not subchronic) screening level of 5.7 mcg/cubic m.

    Corrected as suggested.

13. EPTC: *per* week, not peer week. Fix m3.

    Corrected as suggested.

14. Formaldehyde: "interspecies" should be "intraspecies". Last line: OEHHA lists the…

    Corrected as suggested.

15. Malathion: Drop comma in last line.

    Corrected as suggested.

16. Methyl Bromide: "DPR calculated a *subchronic* REL of…" Also, as you are

aware, we still have an issue with methyl bromide subchronic NOAEL (and REL) and suggest that the OEHHA value be adopted for screening purposes.

Methyl bromide. The paragraph has been changed to note OEHHA's position regarding the subchronic NOAEL. We have also included EPA's current conclusions (as released in their draft risk assessment) regarding the studies and NOAELs.

17. Molinate: Chronic exposure to molinate should be evaluated. OEHHA has PHG in which a chronic NOAEL was adopted and could be used for screening purposes.

    Since there is no chronic inhalation exposure to molinate in general and molinate is not expected to be used near Parlier, there is not a need to generate a chronic screening level at this time. However, it can be done, for the sake of completeness, in the final report.

18. Norflurazon: A six-month dog study should not be considered chronic, but rather it is a subchronic exposure. An additional uncertainty factor should be applied to convert the subchronic NOAEL to estimate a chronic NOAEL.

    We have included your comment on norflurazon.

19. Oxyfluorfen: …liver toxicity *in* a subchronic… Change the second to last sentence to: "Converting from oral to inhalation by multiplying by 1.7 and applying an uncertainty factor of 100X would result in a chronic screening …. "

    Changed as suggested.

20. Propanil: Second sentence: "…, *and* increased *weights of* seminal …" Last sentence: has to *as*.

    Changed as suggested.

21. Propargite: A mortality study is inappropriately used to derive an acute screening value; an extra UF of 10 should be applied for this endpoint or a less serious endpoint be identified. Also, fix m3.

    Propargite-USEPA did include an additional factor to account for the severity of the effect. In any case, we used a different study and NOAEL in our RCD and this resulted in a lower acute screening level than would have resulted from the use of the USEPA value.

22. Trifluralin: Third sentence: rats should be *rates*.

    Changed as suggested.

23. Xylenes: Second sentence: "NOAEL *of* 220…"

APPENDIX C

Department of Pesticide Regulation Standard Operating Procedures

Chemistry Laboratory Quality Control SOP: QAQC001.00
http://www.cdpr.ca.gov/docs/emon/pubs/sops/qaqc001.pdf

Conducting a Trapping Efficiency Study for Air Monitoring using Standard in Solvent SOP: FSAI003.00
http://www.cdpr.ca.gov/docs/emon/pubs/sops/fsai003.pdf

Sample Tracking Procedures SOP: QAQC003.02
http://www.cdpr.ca.gov/docs/emon/pubs/sops/QAQC003.02.pdf

Transporting, Packaging and Shipping Samples from the Field to the Warehouse or Laboratory SOP: QAQC004.01
http://www.cdpr.ca.gov/docs/emon/pubs/sops/qaqc0401.pdf

Instructions for Calibration and Use of an Andersen Series 110 Constant Flow Air Sampler SOP: EQAI002.00
http://www.cdpr.ca.gov/docs/emon/pubs/sops/eqai002.00.pdf

Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps SOP: EQAI001.00
http://www.cdpr.ca.gov/docs/emon/pubs/sops/eqai001.pdf

Obtaining and Preserving Well Water Samples SOP: FSWA 001.01
http://www.cdpr.ca.gov/docs/emon/pubs/sops/fswa00101.pdf

APPENDIX D

ARB's Air Monitoring Plan for S. Ben Benavidez Elementary School and Quality Assurance Report on the Parlier Community Air Monitoring Project and Audit results

Air Resources Board

Linda S. Adams
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Arnold Schwarzenegger
Governor

TO: Randy Segawa, Manager
Air and Groundwater Program
Environmental Monitoring Branch
Department of Pesticide Regulation

FROM: /s/ Jeff Wright, Manager
Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

DATE: April 25, 2008

SUBJECT: QUALITY ASSURANCE REPORT ON THE PARLIER COMMUNITY AIR MONITORING PROJECT: AIR MONITORING AT S. BEN BENAVIDEZ ELEMENTARY SCHOOL

Attached is the "Quality Assurance Report on the Parlier Community Air Monitoring Project." This report summarizes Air Resources Board's (ARB) role in the Department of Pesticides Regulation's (DPR) Parlier Community Monitoring Project. ARB's monitoring at the S. Ben Benavidez Elementary School is summarized along with the quality control and quality assessment aspect of this portion of the study. Monitoring data have been provided to DPR via the United States Environmental Protection Agency's Air Quality System.

If you or your staff have questions or need further information, please contact me at 322-7055 or via email at jwright@arb.ca.gov.

Attachment

cc: Pam Wofford, DPR (w/ Attachment)
William V. Loscutoff, MLD (w/o Attachment)
Jeff Cook, MLD (w/ Attachment)
Michael Poore, MLD (w/o Attachment)
Kenneth R. Stroud, MLD (w/o Attachment)
Lynn Baker, SSD (w/ Attachment)
Ahmed Mehadi, MLD (w/ Attachment)

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: http://www.arb.ca.gov.

California Environmental Protection Agency

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California Environmental Protection Agency

Air Resources Board

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Quality Assurance Report on the Parlier Community Air Monitoring Project

Prepared by
Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

April 2008

The following document has been reviewed and approved by the Air Resources Board (ARB) staff. Approval of this plan does not necessarily reflect the views and policies of the ARB, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Quality Assurance Report Approval

Title: Parlier Community Air Monitoring Project:
Air Monitoring Plan for S. Ben Benavidez Elementary School

Prepared By: Ahmed Mehadi, Air Pollution Specialist

Approval: The following quality assurance report is recommended for approval by staff of the Air Resources Board.

Signatures:

_____/s/_____4/25/08_
Jeff Cook, Chief Date
Quality Management Branch
Monitoring & Laboratory Division

_____/s/ _____4/25/08_
Jeff Wright, Manager Date
Operations Planning and Assessment Section
Quality Management Branch
Monitoring & Laboratory Division

EXECUTIVE SUMMARY

Quality Assurance Report on the Parlier Community Air Monitoring Project

This report summarizes the role of the Air Resources Board (ARB) in the Parlier Community Air Monitoring Project, a year-long monitoring effort conducted in 2006 and led by the Department of Pesticide Regulation (DPR). ARB's monitoring is summarized along the with the quality control (QC) and quality assessment (QA) aspect of the study. Monitoring data have been provided to DPR and will be evaluated and summarized in DPR's final report on the project.

In August 2005, ARB received a request from DPR to conduct ambient air sampling in the community of Parlier, located about 20 miles southeast of Fresno. The request originated as part of DPR's Cal/EPA Environmental Justice pilot project. The pilot project focused on ambient air sampling for one year for approximately 40 pesticides and their related breakdown products in Parlier.

Air monitoring occurred at four locations in or near Parlier: Martinez Elementary School, Chavez Elementary School, S. Ben Benavidez (Benavidez) Elementary School, and Kearney Agricultural Center. DPR conducted monitoring of 31 pesticides at each of the elementary schools. The San Joaquin Valley Air Pollution Control District monitored for ozone, nitrogen dioxide and hydrocarbons at their permanent Kearney Agricultural Center monitoring site. ARB established a temporary site at the Benavidez Elementary School and conducted monitoring for volatile organic compounds (VOCs), carbonyls, and metals/elements. Seven VOCs/carbonyls and three metals are considered pesticides in this report since they are known to have some pesticidal use. ARB also monitored for particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5) as well as wind speed, wind direction, and outside temperature.

ARB's sample collection and monitoring began on January 13, 2006, for PM2.5, on January 17 for VOCs, and on January 23, for metals. All monitoring ended on January 6, 2007. The sampling frequency was once every sixth day, but increased to once every third day during those periods of highest expected pesticide usage based on information provided to ARB by DPR. All samples collected by ARB were analyzed at ARB's Inorganic and Organic Laboratories in Sacramento. PM2.5 and meteorological monitoring were conducted continuously for the duration of the study.

In analyzing the data quality objectives, data capture was 90 percent or higher for all species measured. However, data completeness criterion was not met for January 2006, due the late start of the study during this month for all species measured. For carbonyls, data were incomplete for the months of June and July because of XonTech 924 malfunction and flow rate problems. In addition to the routine flow and other checks conducted in the field, the Quality Assurance Section (QAS) conducted an audit of the samplers and monitors. Their results indicated that all instruments were operated within specifications given in their respective standard operating procedures and/or manufacturer's manual.

ARB laboratories performed all the routine QC procedures (calibration, replicates, etc) to ensure that data generated are of the quality needed. In addition, QAS conducted a system audit of both ARB laboratories to provide an independent account of their QC status. Results of audits showed that the activities of both laboratories were within the acceptable criteria.

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3. Audit Reports

1.0 Introduction

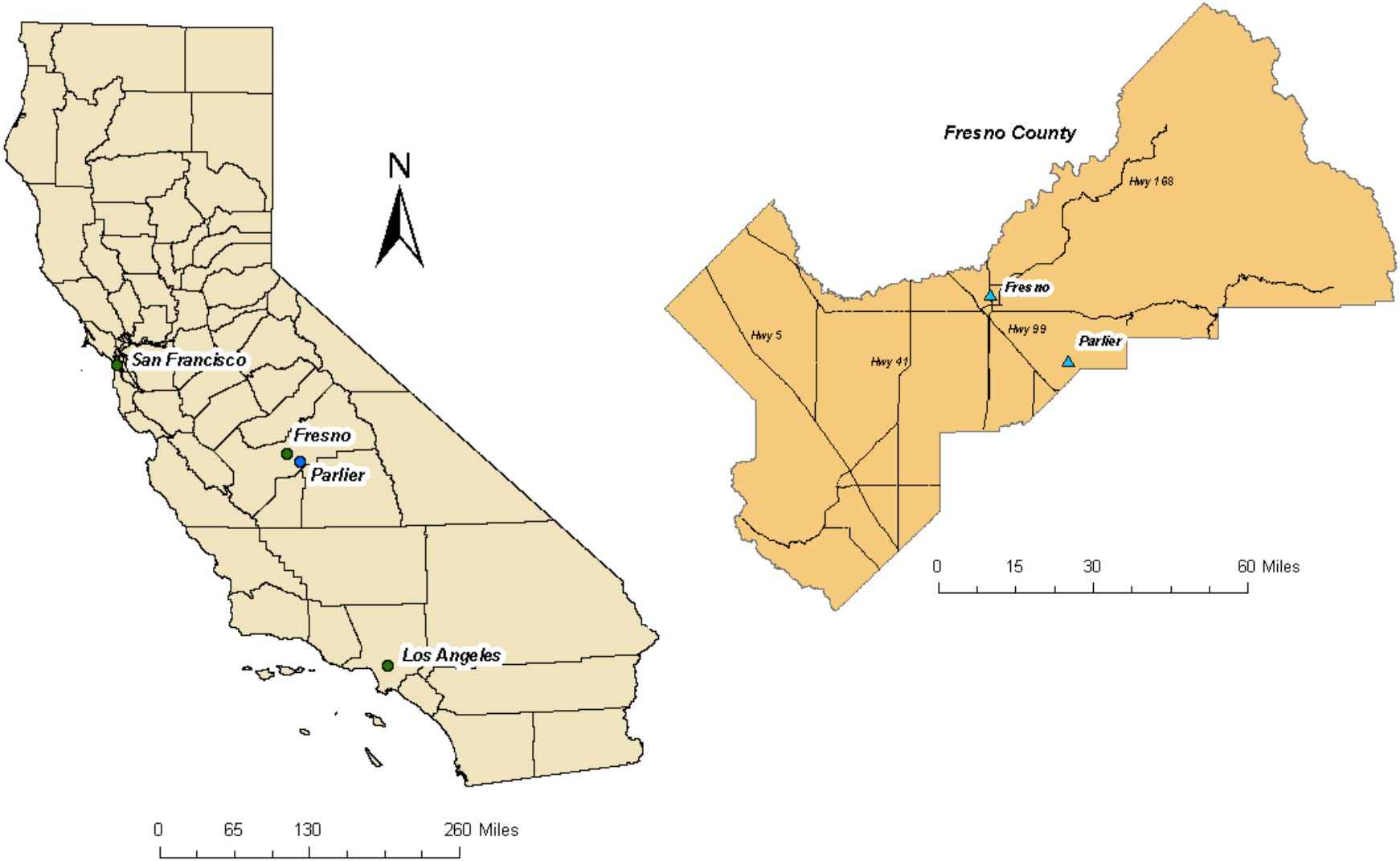
In August 2005, the Air Resources Board (ARB) received a request from the Department of Pesticide Regulation (DPR) to conduct ambient air sampling for nine pesticides in the community of Parlier, located about 20 miles southeast of Fresno (Figure 1). The request originated as part of DPR's Cal/EPA Environmental Justice (EJ) pilot project. The pilot project focused on ambient air sampling for one year for approximately 40 pesticides and their related breakdown products at three elementary schools in Parlier. DPR conducted monitoring of 31 pesticides at each of the elementary schools.

In response to DPR's request, ARB complimented DPR's sampling by establishing an air monitoring station at one of the elementary schools, S. Ben Benavidez (Benavidez) Elementary School, and sampled for nine pesticides and other air contaminants (Attachment 1). Specifically, ARB conducted ambient air sampling for 26 volatile organic compounds (VOCs), including seven pesticides, and 29 particle-bound elements, including three pesticides. Continuous monitoring for particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5) was conducted as well as wind speed, wind direction, and outside temperature.

ARB's sample collection and monitoring at the Benavidez Elementary School began on January 13, 2006, for PM2.5, on January 17 for VOCs, and on January 23 for metals and carbonyls. The monitoring for all parameters ended on January 6, 2007. The sampling frequency was once every sixth day, but increased to once every third day during those periods of highest expected pesticide usage based on information provided to ARB by DPR. All samples collected by ARB were analyzed at ARB's laboratories in Sacramento. PM2.5 and meteorological monitoring were conducted continuously for the duration of the study.

The data collected were expected to provide information on the extent to which air pollutants may adversely impact children at the school and residents of the surrounding Parlier community. The duration and frequency of ARB's sampling was intended to provide daily, seasonal, and annual air toxics and PM2.5 data. This report provides details on ARB's sampling schedule, laboratory analysis, and quality assurance aspects of the field and laboratories activities. The resulting ARB data from the Benavidez School site is stored at the U.S. Environmental Protection Agency's (U.S. EPA) Air Quality System (AQS) database. DPR will assess and present the results of all air monitoring in its final report.

Figure 1. Parlier, California



2.0 Monitoring Site

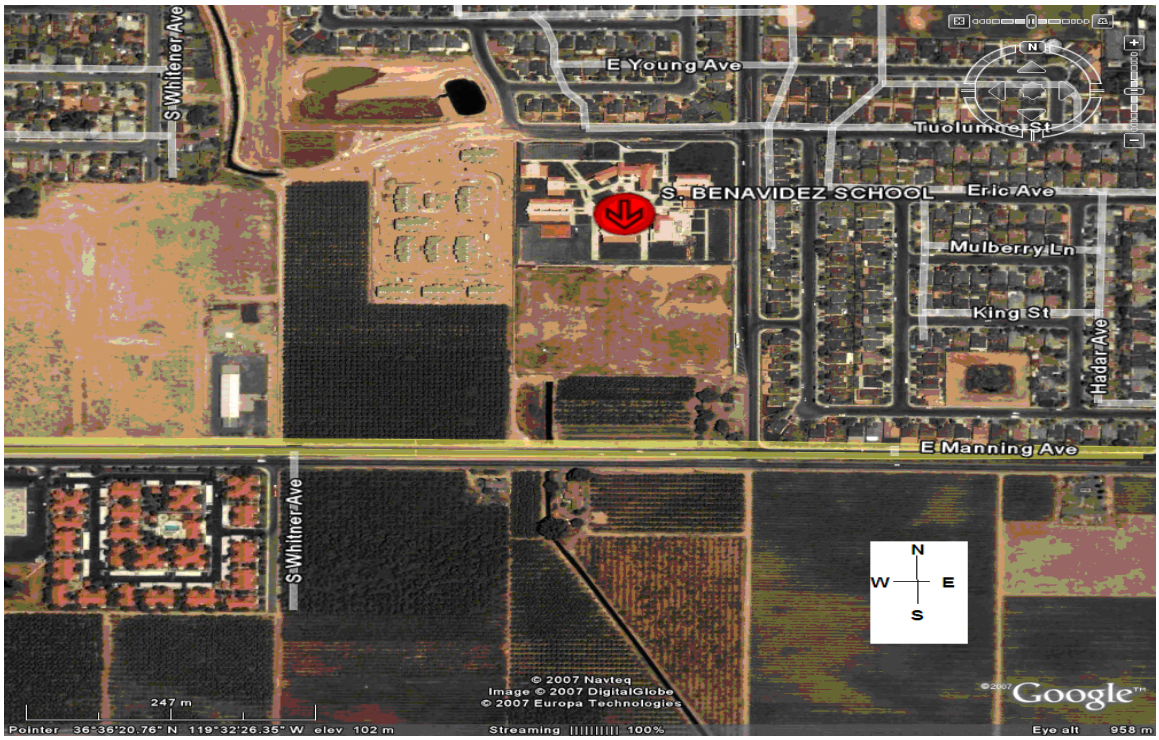
Site Name:	S. Ben Benavidez Elementary School
Address:	13900 Tuolumne Street, Parlier, CA 93648
Latitude/Longitude:	36° 36’ 26” / 119° 32’ 23”
AQS (AIRS) Site Code:	06-019-3002

Incorporated in 1921, the city of Parlier is located in the heart of the fertile San Joaquin Valley. The topography of the area is flat and is home to approximately 12,000 people. Parlier is situated in central California 210 miles north of Los Angeles, 199 miles southeast of San Francisco, and 21 miles southeast of Fresno.

About 40 percent of the residents are school-age children. Eight schools comprise the Parlier Unified School District, including four elementary schools, one junior high school, one high school, a charter school, and a continuation school.

The ARB’s monitoring station was placed on the southeast corner of the Benavidez Elementary School campus in central Parlier (Figure 2). The school is bordered to the north, east, and west by residences. Directly south of the school is an athletic field, beyond which are fruit orchards.

Figure 2. Location of Monitoring Station on Benavidez Elementary Campus



Benavidez School Sampling site

Southeast View from the Sampling Site

South View from the Sampling Site

The School and Its Surrounding

Sources of air pollution near Benavidez Elementary School include motor vehicles from East Manning Avenue, emissions from homeowner activities, including VOC-containing household products, and agricultural operations, including pesticide applications. East Manning Avenue is a major east-west road through Parlier, located approximately 300 meters due south of the school with traffic estimated at 25,000 vehicles per day.

For this study, ARB placed samplers and monitoring probes in accordance with the neighborhood spatial scale siting criteria, i.e., with respect to height above the ground, distance from trees, buildings, and walls, unobstructed airflow, and the like.[1] These criteria are listed in 40 CFR Part 58, Appendix E, and Volume II, Section 2.0.4, of ARB's Quality Assurance Manual.

[1] Neighborhood spatial scale refers to a particular spatial scale of representativeness. A spatial scale of representativeness is used to define a distance over which pollutant concentrations are expected to be essentially uniform. For neighborhood scale, monitoring data is considered representative of the air encompassing an area between 0.5 and 4 kilometers around the station.

3.0 Monitoring Frequency, Sampling Parameter, and Procedures

Full-scale monitoring was conducted during the period of January 23, 2006, to January 6, 2007. Summary of the monitoring schedule is as follows.

- ARB monitoring at Benavidez Elementary included all four seasons.
- The sampling frequency for pollutants monitored by ARB and collected on filters, cartridges, or in canisters was once every six days except for those periods (April 17 to May 11 and October 26 to November 22, 2006) of expected highest usage of Telone, methyl bromide, and sulfur in the immediate area of Parlier. During those highest-use periods, based on information provided to ARB by DPR, the sampling frequency was increased to once every three days.
- The one-in-six day and one-in-three day sampling schedules at the ARB site was overlapped with ARB's routine one-in-twelve day toxics monitoring schedule to the greatest extent possible to provide the maximum amount of comparable data with other toxics monitoring sites in the State. ARB's 2006 sampling schedule at the Benavidez Elementary School is included (Attachment 2). The interval for ARB filter, cartridge, and canister sampling was 24 hours. PM2.5 and meteorological data were collected continuously and recorded as hourly averages.

A summary of pollutants, measurement frequencies, expected number of samples or hours of monitoring, analytical methods, and field SOPs are given in Table 1.

Table 1. Summary of Pollutants, Measurement Frequency, Number of Samples, Field SOPs, and Analytical Methods

Pollutant/ Measurement[1]	Frequency (days)	Total Number of Samples or Days of Monitoring[3]	Field SOP Reference	Analysis Method[4]
VOCs	1 in 6 / 1 in 3[2]	71 samples	Vol. II, Appendix Q	GC/MS
Carbonyls	1 in 6 / 1 in 3[2]	72 samples	Vol. II, Appendix R	HPLC
Chromium VI[5]	1 in 6 / 1 in 3[2]	71 samples	Vol. II, Appendix R	Ion Chromatography
Metals/Elements	1 in 6 / 1 in 3[2]	71 samples	Vol. II, Appendix R	X-Ray Fluorescence
PM2.5	Continuous	358 days	BAM-1020 SOP400	Beta Attenuation
Meteorological Parameters	Continuous WS, WD, OT[6]	358 days	Vol. II Appendices T, U, V, AA, AL	(Cup/vane, sensors)

[1] Specific VOCs, carbonyls, and metals/elements are listed in Table 3.
[2] Frequency of sample collection will increase on months of high usage as pesticides.
[3] Number of samples or monitoring days is based on one year of station operation. Actual numbers may be less following QA/QC review of samples and/or collected data.
[4] Laboratory SOPs for each analytical method are listed in Table 3.
[5] Certain number of these samples were composited into quarterly sample for analysis
[6] Wind speed, wind direction, outside (ambient) temperature.

3.1 Pollutants Collected by 24-Hour Samplers

Twenty-four-hour integrated samples of VOCs, carbonyl compounds, and total suspended particulate-bound metals/elements including chromium VI were collected every sixth day. The six-day sampling schedule at the Benavidez School

overlapped with the one-in-twelve day sampling schedule at ARB's routine air toxics sampling sites around the State. The purpose of collecting coincident samples was to enable a comparison between the data collected for this project and data collected at routine air toxics monitoring sites. The closest routine air toxics monitoring site is located in Fresno (Fresno 1st Street).

For those periods of highest Telone, methyl bromide, and sulfur pesticide use in proximity to Parlier (April 17 to May 11 and October 26 to November 22), the sampling frequency for VOCs, carbonyls, and metals/elements was doubled from one sample every six days to one sample every three days (Attachment 2). The increased sampling frequency provided additional temporal resolution of potential pesticide concentrations from ARB samplers during those periods of highest pesticide use and was intended to capture peak concentrations.

The 24-hour samples collected from the ARB's Benavidez School site consisted of the following:

- VOCs, collected in 6-liter Summa canisters, and reported in parts per billion by volume (ppbv).
- Selected carbonyl compounds, collected on Sep-Pak silica cartridges, and reported in ppbv.
- Selected metals and elements, collected on 37-mm Teflon filters, and reported as the sum of all oxidation states in nanograms per cubic meter of sampled air (ng/m3).
- Chromium VI, collected on 37-mm cellulose fiber filters and composited over each quarter of sampling, and reported in ng/m3.

3.2 Continuous Measurements

PM2.5 was measured continuously using a Beta Attenuation Monitor (BAM 1020). PM2.5 data was averaged as hourly and 24-hour values and reported in ug/m^3. Meteorological data were also be collected on a continuous basis, averaged hourly, and consisted of the following measurements:

- Wind speed in knots;
- Wind direction (direction wind is blowing from) in degrees; and,
- Outside temperature in degrees Celsius.

3.3 Media/Sample Transfer

ARB's Northern Laboratory Branch prepared all sample media (filters, canisters, and cartridges) following standard procedures detailed in laboratory SOPs.
After each sampling period, samples were returned to the laboratory for analysis. When a scheduled sampling date was missed, field data sheets, filled out with scheduled run date and site name, were sent to the laboratory with the reason why the sample was missed. Make-up samples were collected at the earliest possible opportunity.

3.4 Sampling and Monitoring Procedures

No deviation from standard sampling and monitoring procedures occurred. All sampling and monitoring were conducted according to established procedures with regard to flow checks, calibrations, and instrument maintenance (Table 1).

A complete description of field sampling procedures, including procedures for instrument set-up, calibration, and operation is contained in Volume II of ARB's Quality Assurance Manual and is available at the following web address: http://www.arb.ca.gov/airwebmanual/vol2.php

3.5 Corrective Actions

When necessary, corrective actions were taken to ensure that the type and quality of data expected from the data quality objectives (DQOs) were achieved. In cases where a 24-hour sample was invalidated, or if a scheduled sample was missed, a make-up sample was usually taken. The make-up dates were within the same month as the scheduled date to obtain sufficient representative data (i.e., four or more samples) per calendar month for the one-in-six day sampling schedule.

Upon receipt of the samples in Sacramento, laboratory staff inspected samples and immediately notified the field operator when a sample was invalidated. Table 2 summarizes the flow rate/canister pressure criteria for establishing valid 24-hour samples.

4.0 Laboratory Analyses

All filter samples received from the field were logged into MLD's Laboratory Information Management System (LIMS) for tracking and reporting purposes. Filters were inspected for contamination, tears, holes, etc. Filters were not analyzed if the respective sampling did not meet validation criteria specified in Table 2 below. These criteria can be found in Volume II, Appendix R, Section R.1.2.9, of MLD's Quality Assurance Manual.

Table 2. Criteria for Determining Valid 24-hour Samples

Pollutant	Sampler/Media	Flow Rate or Canister Pressure	Run Time	Start/Stop Time
VOCs	XonTech 910A 6-Liter Summa Canister	10.0-16.0 (PSIG)	24 ± 1 Hour	00:00-24:00 (± 1 hour)
Metals/Elements	XonTech 924 37-mm Teflon Filter	1. 9-14 (SLPM) 2. PD[1] ≤ 10%	24 ± 1 Hour	00:00-24:00 (± 1 hour)
Chromium VI	XonTech 924 37-mm Cellulose Filter	1. 9-14 (SLPM) 2. PD[1] ≤ 10%	24 ± 1 Hour	00:00-24:00 (± 1 hour)
Carbonyls	XonTech 924 Sep-Pak Cartridge	1. 0.63-0.77 (SLPM) 2. PD[1] ≤ 10%	24 ± 1 Hour	00:00-24:00 (± 1 hour)

[1]Percent difference (PD) between start and stop flow rate, start and average flow rate, and stop and average flow rate.

Twenty-four-hour samples were analyzed following ARB's Northern Laboratory Branch's SOPs. Specific laboratory SOPs and reporting limits are listed in Table 3. All samples were analyzed individually except chromium VI. A composite sample consisting of seven valid chromium VI filters for each quarter was analyzed to obtain a quarterly average concentration of chromium VI. The remaining filters collected during the quarter were archived.

Following laboratory analyses, the data were entered into LIMS. LIMS calculates the concentration of each analyte in the sampled air using the analytical results and sampling information (run time, flow rate, etc.). The final ambient concentration data were then submitted to EPA's Air Quality System (AIRS code 06-019-3002). If the ambient concentration fell below the reporting limit, the result was reported to AQS as less than the reporting limit (e.g., < 0.1 ppb). AQS automatically reports those values less than the reporting limit as one-half of the reporting limit, i.e., if the result is < 0.1 ppb, AQS will display 0.05 ppb for that analyte. Monitoring results were provided to DPR and will be evaluated and summarized in DPR's final report on the project.

Table 3. Analytes, Reporting Limits, and Laboratory SOPs

Analyte[1]	Reporting Limit		Lab SOP	Analyte[1]	Reporting Limit		Lab SOP
VOCs				*METALS/ELEMENTS*			
1,1,1-Trichloroethane	0.01	ppbv	MLD058	Aluminum	3	ng/m3	MLD034
1,3-Butadiene	0.04	ppbv	MLD058	Antimony	5	ng/m3	MLD034
Benzene	0.05	ppbv	MLD058	**Arsenic**	**1**	**ng/m3**	MLD034
Bromomethane	0.03	ppbv	MLD058	Barium	4	ng/m3	MLD034
Carbon tetrachloride	0.02	ppbv	MLD058	Bromine	1	ng/m3	MLD034
Chloroform	0.02	ppbv	MLD058	Calcium	2	ng/m3	MLD034
***cis*-1,3-Dichloropropene**	**0.1**	ppbv	MLD058	Chlorine	1	ng/m3	MLD034
Dichloromethane	0.1	ppbv	MLD058	Chromium	1	ng/m3	MLD034
Ethylbenzene	0.2	ppbv	MLD058	Cobalt	1	ng/m3	MLD034
m/p-Xylene	0.2	ppbv	MLD058	**Copper**	**1**	**ng/m3**	MLD034
o-Dichlorobenzene	0.3	ppbv	MLD058	Iron	1	ng/m3	MLD034
***o*-Xylene**	0.1	ppbv	MLD058	Lead	1	ng/m3	MLD034
p-Dichlorobenzene	0.3	ppbv	MLD058	Manganese	1	ng/m3	MLD034
Perchloroethylene	0.01	ppbv	MLD058	Mercury	1	ng/m3	MLD034
Styrene	0.1	ppbv	MLD058	Molybdenum	2	ng/m3	MLD034
Toluene	0.2	ppbv	MLD058	Nickel	1	ng/m3	MLD034
***trans*-1,3-Dichloropropene**	0.1	ppbv	MLD058	Phosphorus	1	ng/m3	MLD034
Trichloroethylene	0.02	ppbv	MLD058	Potassium	2	ng/m3	MLD034
Carbon disulfide[2]	0.1	ppbv	MLD058	Rubidium	1	ng/m3	MLD034
Acrolein	0.3	ppbv	MLD066	Selenium	1	ng/m3	MLD034
Acetone	0.3	ppbv	MLD066	Silicon	2	ng/m3	MLD034
Acetonitrile	0.3	ppbv	MLD066	Strontium	1	ng/m3	MLD034
Acrylonitrile	0.3	ppbv	MLD066	**Sulfur**	**1**	**ng/m3**	MLD034
CARBONYLS				Tin	4	ng/m3	MLD034
Acetaldehyde	0.1	ppbv	MLD022	Titanium	1	ng/m3	MLD034
Formaldehyde	0.1	ppbv	MLD022	Vanadium	1	ng/m3	MLD034
Methyl ethyl ketone	0.1	ppbv	MLD022	Yttrium	1	ng/m3	MLD034
				Zinc	1	ng/m3	MLD034
				Chromium VI[3]	0.06	ng/m3	MLD039

[1]Bolded elements and compounds are pesticides or are ingredients in pesticides; they may have other sources as well
[2]The Northern Laboratory Branch dropped the analysis of carbon disulfide from its VOC program as of July 1, 2006.
[3]Quarterly average concentration from composite samples are reported

The following sections summarize and reference the laboratory methodologies used to analyze air sample filters (for metals, including chromium VI), cartridges (for carbonyls) and canisters (for volatile organic compounds).

Metals

The analytical method for metals analysis was ARB's "Standard Operating Procedure for the Chemical Elements by X-Ray Fluorescence Using Thermo Quanx EC x-ray instrument" (MLD SOP 034). The suspended particles collected on filters are placed under a vacuum in the x-ray spectrometer and irradiated with an x-ray of various energies generating fluorescent x-rays which are characteristics of each element in the sample. The x-ray scattered from the sample are individually detected and analyzed.

Hexavalent Chromium

Exposed filters were extracted with deionized water and analyzed by ion chromatography method (MLD SOP 039). The analytical concentration was converted to air concentration using the extract volume and the total volume of air sampled. Because of the low concentration of chromium VI in ambient air, samples collected on 37-mm cellulose fiber filters were composited (seven filters) over each calendar quarter of sampling and analyzed.

Carbonyls

The carbonyl compounds are collected on a solid adsorbent (Sep-Pak Cartridge) and analyzed by High Performance Liquid Chromatography (HPLC) (MLD SOP 022). Ambient air is drawn through chromatographic grade Sep-Pak silica cartridge. The cartridges are coated with acidified 2,4-dinitrophenylhydrazine (DNPH). During sampling, formaldehyde, acetaldehyde, and methyl ethyl ketone react with the DNPH to form derivatives which are called hydrazone derivatives. The DNPH derivatives are eluted from the sampling cartridges and are quantified using reverse-phase HPLC technique.

Volatile Organic Compounds (VOCs)

Ambient air is collected in a SUMMA™ polished stainless steel canister using a Xontech 910A sampler. An ambient air sample is introduced into the Gas Chromatographic (GC) system from a pressurized canister through stainless steel or Teflon tubing. The sample mixture is separated into individual components using temperature programmed GC system. Identification of a component in a sample is based upon both the retention time and mass spectral matching (MLD SOP 058 and MLD SOP 066).

All analytical methods, including the derivation on Limits of Detection (LOD) used for the measured pollutants, are detailed in the laboratory SOPs for inorganic and organic analyses. Laboratory SOPs are available online at: http://www.arb.ca.gov/aaqm/sop/summary/summary.htm.

5.0 Data Quality Objectives

Data quality objectives (DQOs) were identified prior to the study to ensure the data from this study are of sufficient quantity and quality to meet the quality objectives and users needs. DQOs for the Parlier Community Monitoring Project focused on collecting data necessary to adequately characterize the ambient concentrations of monitored air pollutants in the Parlier area. DQOs for this project were based on the following specific indicators: accuracy, precision, representativeness, completeness, and comparability.

The DQOs required the use of best laboratory and air monitoring practices and rigid quality goals. Strict adherence to those goals will enable the data to be used for other purposes as well, including modeling and inventory evaluation.

The following is a description of key field and laboratory activities used throughout the project to generate the quantity and quality of data needed by the client.

5.1 Accuracy and Precision

Accuracy is defined as the extent of agreement between an observed value and an accepted reference standard or true value from a third party. In situations involving a sampler and subsequent laboratory analysis, accuracy is assessed through a third-party audit of the sampler and the analytical laboratory.

Field Samplers
The accuracy of the samplers used at the Benavidez School was assessed through flow rate audits (Attachment 3). The flow audits indicate the accuracy of the samplers in collecting a known volume of air, which is a critical factor in calculating the concentration.

Results of field flow checks using a certified or calibrated transfer standard are shown in Table 4. All samplers and monitors performed within the acceptable range. The flow rate of air through three separate channels of the XonTech 924 sampler, used for collecting metals/elements, chromium V, and carbonyl samples was within $\pm$ 10 percent of the true value on each channel. For PM2.5, the audit control limit for the BAM 1020 flow rate was within the $\pm$ 4 percent criteria of the true flow.

The XonTech 910A 6-Liter Summa Canisters (used in the analysis of VOCs) are not routinely audited since any variation in the indicated flow rate from the true flow rate will not have any affect the subsequent analyte concentrations determined by the lab.

Table 4. Field Flow Checks (Accuracy)

Accuracy (Percent Difference[1] in Flow)	Goal	Maximum PD[1] Observed
Metals	PD ≤ 10%	PD ≤ 0.7%
Chromium VI	PD ≤ 10%	PD ≤ 0.6%
Carbonyls	PD ≤ 10%	PD ≤ 8.0%
PM2.5 BAM	PD ≤ 4%	PD ≤ 0.3%

[1]Percent difference (PD) between start and stop flow rate, start and average flow rate, and stop and average flow rate. Maximum values used for the table.

Laboratory Analysis

Analytical accuracy and precision were evaluated through the use of routine laboratory blanks, spikes, and duplicate samples. Detailed information on laboratory accuracy and precision, including spikes and duplicate sample control limits (see Section 6.0 below for details), are described in MLD's Laboratory QC Manual, method SOPs, and quarterly QC reports generated by each laboratory.

In addition to laboratory QC, laboratory performance audits of the Inorganic and Organic Laboratories were performed once during the Parlier project, to independently assess the quality of data produced by these laboratories. A performance audit is an on-site test aimed at challenging laboratory's ability to generate data of acceptable quality. Both laboratories were found to have good quality control activities and produced good quality data (Attachment 3).

Meteorological Instruments

The accuracy of meteorological sensor readings, consisting of ambient air temperature, wind speed, and wind direction was assessed by an audit with certified sensors using Photochemical Assessment Monitoring Station (PAMS) criteria.[1] The three sensors were found to perform well within the acceptable criteria.

Details on performance audit procedures, including calculations used in determining percent differences between observed flow and true flow are found in Volume V of the ARB's QA Manual:
http://www.arb.ca.gov/aaqm/qmosqual/qamanual/vol5/vol5.htm

Precision

In the State and Local Air Monitoring Station (SLAMS) network, including the State air toxics network, precision for manual sampling methods is evaluated using collocated samplers. No collocated samplers were placed at the Benavidez station. However, the operation and maintenance of manual samplers at Benavidez match those throughout the air toxics network and precision measurements made at

[1] Wind speed: ±0.2 m/sec + 5% of observed speed at speeds between 0.5 m/sec to 50 m/sec. Starting threshold ≤ 0.5 m/sec. Wind direction: ±5 degrees. Starting threshold ≤ 0.5 m/sec. Ambient temperature: ±0.5 degrees C.

routine toxic sites are expected to reflect the precision of samplers at the Benavidez site.

A quantification comparison of collocated measurements is generally done only when values are above their respective limit of quantification (LOQ), defined here as five times the LOD
. A preliminary comparison of available toxic collocated measurements in the State network during 2006 was done for VOCs at Bakersfield. (Collocated metals data were not available and all collocated chromium (VI) data were below the LOQ.) Most of the collocated VOCs were below the LOQ. For those nine VOCs that were above the LOQ, the average percent difference for each VOC during 2006 was below 15 percent except for carbon disulfide (39 percent). The relatively high percent difference for carbon disulfide may be at least partially attributed to the relatively low concentrations measured (i.e. close to its LOQ of 0.5 ppbv).

5.2 Representativeness

Representativeness refers to how accurately the sampling design at the Benavidez School represents the ambient concentrations of pollutants in the Parlier community. Although samplers and analyzers are capable of collecting only a relatively small volume of air at any given time, the volume of air sampled can represent concentrations prevailing over a much larger area if the geography, meteorology, and distribution of sources are homogeneous and if samplers are sited in a manner representative of the study area. These conditions are generally met in the area surrounding the Benavidez School in Parlier.

Spatial representativeness
Samplers and analyzers for the Benavidez site met the neighborhood scale siting criteria. Air quality measurements made using neighborhood spatial scale siting criteria represent the uniform air pollutant concentration in an area of 0.5 to 4.0 kilometers (1/3 to 2½ miles) surrounding the sampler inlets. Detailed information on the neighborhood spatial scale siting criteria can be found in 40 CFR, Part 58, Appendix D, and in ARB's Quality Assurance Manual, Volume II, Section 2.0.4.

Samplers and monitors were positioned on tripods with the sampler inlet approximately two meters above ground level. All samplers were within the two to seven meters range above the ground as required for particulate matter samplers. Air mixing within that range is considered thorough enough to ensure that sampled air is representative of the exposure experienced by receptors.

Temporal representativeness
Since sample concentrations vary over time, samples must be collected on a schedule that addresses temporal variations as well as providing information on long-term concentrations. To address weekly, monthly, and seasonal variations, as well as obtain annual average concentration information, sampling for VOCs, carbonyls, and metals/elements were conducted for 24 hours every six days, with an increase in frequency (1 in 3 days) for VOCs and metals/elements during

selected periods to capture peak concentrations. Monitoring for PM2.5 was continuous with the data recorded as hourly average concentrations.

5.3 Completeness

Completeness is an element of representativeness and ensures that data are representative during all time periods. Data for the Benavidez site is considered complete if there are representative, valid data during the required hours of the day (for continuous sampling), days of the month, and months out of the quarter. The completeness objective for ARB's sampling was to obtain sufficient data to achieve four (4) representative calendar quarters for PM2.5 and toxic air pollutants.

The completeness objectives used for criteria pollutants are found in ARB's QA Manual, Volume I, Section 1.0.1. While not strictly applicable to air toxics sampling, these criteria were considered goals for ARB's Parlier Community Monitoring Project.

A minimum of 75 percent of the intended number of samples was required to satisfy the data completeness objective. January 2006 fell short of meeting the data completeness goal of 75 percent for all parameters due to the late start of the study. All other months of 2006 met the completeness objective except carbonyl data for June and July. For carbonyls, data were incomplete for the months of June and July because of sampler flow rate problems and other instrument malfunctions (Table 5). For VOCs and carbonyls, the completeness for December were greater than 100 percent because of three more samples were collected as make-up samples while only one sample in each case was invalidated (Attachment 2).

Table 5. Data Completeness on a Monthly and Quarterly Basis

	VOCs				Carbonyls				Metals			
Sampling Month	Number of Valid Samples	Number of Expected Samples	Percent Completeness	Completeness	Number of Valid Samples	Number of Expected Samples	Percent Completeness	Completeness	Number of Valid Samples	Number of Expected Samples	Percent Composition	Completeness
January	3	5	60	N	2	5	40	N	2	5	40	N
February	5	5	100	Y	5	5	100	Y	4	5	80	Y
March	5	5	100	Y	5	5	100	Y	5	5	100	Y
First Quarter				N				N				N
April	7	7	100	Y	7	7	100	Y	7	7	100	Y
May	8	8	100	Y	8	8	100	Y	8	8	100	Y
June	5	5	100	Y	3	5	60	N	5	5	100	Y
Second Quarter				Y				N				Y
July	5	5	100	Y	3	5	60	N	5	5	100	Y
August	5	5	100	Y	5	5	100	Y	4	5	80	Y
September	5	5	100	Y	5	5	100	Y	5	5	100	Y
Third Quarter				Y				N				Y
October	5	6	83	Y	6	6	100	Y	6	6	100	Y
November	9	9	100	Y	8	8	100	Y	7	8	88	Y
December	8	6	133	Y	7	6	117	Y	5	6	83	Y
Fourth Quarter				Y				Y				Y

5.4 Comparability

Comparability reflects the confidence with which one data set may be compared to another. Data are comparable if they are collected using the same sampling protocols and analyzed with the same analytical methods. Data comparability is an important objective that should be met in order to compare data collected at one site with data collected from nearby routine network monitoring sites. The use of standard sampling and laboratory analytical procedures for toxics sampling throughout the statewide network is the principle means of ensuring data comparability. Other factors including data completeness, representativeness, and precision and accuracy contribute to overall comparability of these data to other like sites.

All samples were assessed qualitatively to determine if data collected during each event were comparable with one another. All events were deemed comparable in that they employed the same sampling procedures, analytical techniques, and reporting units.

6.0 Quality Control

Field and laboratory quality control (QC) procedures are critical to ensuring that data collected are consistent, relevant, and defensible. The ARB's standard field and laboratory QC procedures were used for this project and are contained in field and laboratory SOPs.

6.1 Field Quality Control Data Sheets and Calibration Reports

Field QC includes equipment certifications, calibrations, and instrument specific maintenance checks. All monitoring and sampling equipment were calibrated as specified in field SOPs and as recommended by the instrument manufacturer. Detailed certification procedures used by the ARB's Standards Laboratory to certify standards used for instrument and sampler calibration are available upon request. Instrument calibrations and maintenance checks were conducted according to the schedule prescribed in the field SOPs. (Field Maintenance Sheets will be made available upon request.)

Field Sampling

Field QC procedures are those activities performed on a routine basis in the field to ensure that samples are representative, accurate, and precise. During the period of this project, the following field QC procedures were performed.

<u>Sampler Calibrations and Flow Checks</u>

Calibrations and flow checks were conducted on air samplers using flow meters either certified or calibrated against a primary standard. Certification of a field flow standard involves a multi-point comparison in the laboratory against a primary flow standard traceable to the National Institute of Standards and Technology (NIST),

followed by least square regression analysis. Calibrations are similar to certifications except that a single comparison is made, rather than a multi-point, and the acceptable coefficient of determination is less strict. Details on flow standard certification and calibration procedures are available from the ARB's Quality Assurance Section. All meteorological equipment was calibrated prior to field deployment using NIST-traceable standards.

6.2 Analytical Laboratories Quality Control Activities

All samples were analyzed following current laboratory SOPs. Details on laboratory QC procedures, laboratory instrument calibration procedures, LODs, and precision estimates are included in the laboratory SOPs, the laboratory QC manual, and quarterly QC reports generated by ILS and OLS.

Metals Analysis

The analytical method for metals analysis was x-ray fluorescence using Thermo Quanx EC x-ray instrument (MLD SOP 034). The daily blanks, limit of detections, and other QC related activities are provided (ILS QC Reports, 2006).

Calibration

Instrument calibration is required annually, after instrument repair, or if a control standard result falls outside control limits. The most recent calibration was performed April 4, 2006 to April 6, 2006. For most elements, two standards and a blank were used. The calibration factor was obtained from the ratio of net x-ray counts to surface density (ug/m2) of the analyte in the standard.

Filter Blanks

Samples of every new batch of filters were analyzed for contaminants. If the contaminant levels are considerably greater than any elemental LODs (except for zinc and copper, which are unavoidable), then the filters are returned to the manufacturer for replacement. Besides zinc and copper, traces of the elements of lead, tin, and iron were found in the blank, but these levels were below the respective LOD.

Limit of Detection (LOD)

The LOD is obtained assuming variations (noise) in x-ray count rates due to random processes. The LOD is proportional to three times the standard deviation in the counts from the blank filter. All elements LODs were verified and no changes were reported (Table 3).

Replicates

One every ten field samples is re-analyzed to determine the maximum percent difference in the measurement method. This is to determine analytical precision. Relative percent difference (RPD) for sulfur was 4.1 percent and for iron was 8.3

percent. The RPDs for sulfur and iron are said to represent the RPDs for the other elements.

Hexavalent Chromium Analysis

Analysis of hexavalent chromium by ion chromatography (MLD SOP 039) follows laboratory QC procedures such as the use of calibrations, filter blanks, water blanks, spiked filters, and replicate analyses (ILS QC Reports, 2006).

Calibration

Four known standards were used to establish the linear regression calibration curve before samples were analyzed. The results of the analysis of the calibration curve must have a correlation coefficient of 0.950 or greater or else the standards are re-analyzed. If a sample was analyzed under an 'out-of –control' condition, the ion chromatographer was recalibrated and samples were re-analyzed. The calibration curve is run at the start of the analyses of field samples as well as after every 10 samples in the analysis run.

Filter Blanks

Filter blanks are unexposed filters that are extracted and analyzed along with each batch of field samples to monitor any contamination that may have been exposed to. All filter blanks for this project were free of contamination (results below the LOD).

Water Blanks

Water blanks are samples of the nanopure water used to extract the sample set. They were analyzed with each set of extracted filters to test for contamination. All water blanks analyzed for this project were free of contamination (results below the LOD).

Limit of Detection

The LOD for this method was verified in February 2006, and reported no change. LOD is verified on annual basis (Table 3).

Replicate Analysis

Analytical precision is the agreement between replicate measurements of the same sample extract. Replicates were done at a rate of one per ten field samples. Relative percent difference between results was calculated and all were within 19 percent of one another, which meets the less than 30 percent method criteria.

Spikes

Clean, unexposed, treated filters were spiked with a working standard. The composite spike is made from two spiked filters and a blank filter. The composite spike samples were extracted and analyzed. The recoveries for both the filters were within the target value of 80 to 120 percent.

Carbonyls
This section summarizes the quality control results for method MLD022 (Aldehydes and Ketones Analysis) during the period of 2006. Results from daily blanks, control samples, duplicate samples, and other quality control related activities are presented (OLS QC Reports, 2006).

Calibration
The HPLC was calibrated using three concentration levels of the target compounds before each analytical run.

Blanks
One solvent blank was analyzed for contamination with each analytical run. Blank silica-DNPH cartridges were checked for contamination as each new lot arrived in the laboratory. The blank cartilage must not contain any analytes with concentrations greater than two times the LOD. All the blanks were below the LODs.

Spikes
One spiked sample was analyzed with each analytical run. Spikes were made after the samples were desorbed from the sampling cartridges. The recoveries for all four spikes were between 93 to 103 percent. The acceptable recovery range for spikes is 70 to 130 percent

Limits of Detection
A multipoint analysis was performed on March 29, 2006. The resulting maximum linear ranges are unchanged from the previously established ranges for all three target analytes.

Replicates
Replicates analyses were performed on 10 percent of the samples analyzed each day. The maximum allowable RPD for a duplicate is either three times the method relative standard deviation (RSD) as determined from the control limit calculations, or 15 percent, whichever is greater. The maximum allowable RPDs for formaldehyde, acetaldehyde, and MEK are 15.0%, 15.0%, and 37.6%, respectively. All duplicate results were below the maximum allowable RPD.

Volatile Organic Compounds (VOCs)
The analytical method for VOCs analysis was the Gas Chromatographic technique for the analysis of aromatic and halogenated hydrocarbons (MLD058). The results for daily blanks, controls, duplicates, and other quality control related activities are provided (OLS QC Reports, 2006).

Calibration
NIST certified gases were used as the calibration standard for all the target compounds except CS_2. No NIST certified cylinders were available that contained CS_2, so a cylinder blended by Scott Marrin was used to calibrate CS_2.

Blanks
To ensure that the analytical system did not introduce bias, a liquid nitrogen headspace gas was analyzed within each sequence as a daily blank. All analyte concentrations obtained were less than twice their respective LODs.

Limits of Detection
A multi-analyses result showed that all calculated LODs were lower than the LODs listed in Table 3 except for carbon tetrachloride. However, the laboratory is experiencing problems with their carbon tetrachloride standard. For this reason, no values are being reported at this time.

Duplicates
To assess analytical precision, duplicate analyses were performed on at least 10 percent of the samples analyzed each day. The maximum allowable percent difference is 3 times the Assigned RSD achieved in the control limits table. This is also known as the duplicate criteria limit. All duplicate pairs analyzed had RPD values less than the duplicate criteria limits.

7.0 Quality Assessment

The Quality Assurance Section (QAS) of ARB performed quality assessments through laboratory and site performance audits. During the Parlier Community Monitoring Project, those portions of the laboratories conducting analyses for carbonyls and metals/elements were audited. The audit results provide an assessment of the accuracy of the methods used by the laboratory.

Similarly a site performance audit was conducted for this project consisting of flow audits for the XonTech 924 and PM2.5 BAM. An audit of all meteorological sensors was also conducted. The audit results provide an assessment of the accuracy of sampler flow rate and the output of analyzers and meteorological sensors.

Below are summaries of ARB's QAS audit of field samplers and monitors and a complete system audit of laboratories (Attachment 3).

Field Instruments
All QAS audited toxics samplers and the BAM PM2.5 located at the Benavidez School and were found to operate within the acceptable parameters.

Inorganic Laboratory Section
All activities within the laboratory were found to be within the acceptable criteria.

Organic Laboratory Section
The laboratory is experiencing problems with their carbon tetrachloride standard. For this reason, no values are being reported at this time. All other activities within the laboratory were found to be within acceptable criteria.

8.0 Data Management

8.1 Twenty-four-Hour Sample Data Review and Validation Procedure

Appropriate ARB procedures for data review and validation were used for 24-hour samples collected by ARB at the Benavidez station.

Three (3) levels of data review and validation, summarized below, were applied to 24-hour samples.

Level 1 (A) (inspection of post-sampling filter, canister, or cartridge)
Field operator(s) from MLD inspected the sample after collection, but prior to forwarding the sample with the field data sheet to the laboratory. After the sample was received in the laboratory, NLB staff inspected the sample and reviewed the field data sheet to ensure the field QC criteria listed in Table 2 were met.

Level 1 (B) (laboratory data review)
Laboratory staff reviewed all raw data prior to uploading to LIMS. This review includes checking instrument calibrations, control standards, blanks, spikes, duplicate analyses, and chromatographs. Criteria used for each method may be found in laboratory SOPs.

Level 2
After all samples collected for each month (or quarter) were analyzed and data were uploaded to LIMS, a LIMS report was generated. The NLB staff reviewed the report for completeness and accuracy.

Level 3
The NLB Branch Chief, and/or ILS and OLS Section managers, reviewed and approved the LIMS report. All final data were visually checked for consistency and reasonableness. Unusually high or unexpectedly low results were verified.

ARB personnel submitted the 24-hour sample data to AQS after appropriate review levels were complete.

8.2 Continuous Monitoring Data Review and Validation

Continuous monitoring data (PM2.5 and meteorological) were verified and reviewed through the evaluation of the data from the instrument and station data loggers and the equipment maintenance records. The high values, low values, and anomalies were verified.

ARB personnel submitted continuous monitoring data to AQS after appropriate review levels were completed.

9.0 Conclusion

In August 2005, ARB received a request from DPR to conduct ambient air sampling in the community of Parlier. The request originated as part of DPR's Cal/EPA Environmental Justice pilot project. The pilot project focused on ambient air sampling for one year of approximately 40 pesticides and their related breakdown products at each of three elementary schools in Parlier. At one of the three schools, Benavidez Elementary School, ARB established an air monitoring station and sampled for nine pesticides and other air contaminants. Specifically, ARB conducted ambient air sampling for 26 VOCs and carbonyls, including seven pesticides, and 29 particle-bound metals and elements including three pesticides. Continuous sampling of PM2.5 and meteorological parameters was also performed.

DQOs for this project were based on accuracy, precision, representativeness, completeness, and comparability. The DQOs were identified prior to the start of the monitoring to ensure that the data obtained were of sufficient quantity and quality to meet the end users' needs. Most of the DQOs were achieved during the monitoring at the Benavidez Elementary School.

All of these DQOs were met except for the completeness element. Although 90 percent of the total number of intended samples were collected, and valid, for each of the compounds, the completeness criteria goal, as mentioned in the monitoring protocol, was not met for all the compounds during the period of January 2006. The goal of this study was to meet the completeness criteria that are spelled out in State and federal regulations for criteria pollutants. These criteria do not routinely apply to air toxics monitoring. Due to the fact that the monitoring began in mid-January 2006, that month cannot be deemed "complete" based on completeness criteria. June and July of 2006 also had an insufficient number of valid samples for carbonyls to be deemed complete. These incomplete months led to incomplete calendar quarters for those respective months and parameters. All other completeness criteria were met.

Some caution is warranted when interpreting monthly and corresponding seasonal values during those periods (January 2006 for all parameters and June/July 2006 for carbonyls) when measured parameters did not meet the strict completeness criteria as specified in the monitoring protocol. However, it should be noted that in addition to the high overall percentage of data collected, the strict completeness criteria was met during two intensive sampling periods (1-in-3 day sampling for 24-hour samples) which occurred during periods of expected highest Telone and sulfur pesticide use in the area. These periods were chosen to represent potential peak concentrations. As a result, annual average calculations for these compounds would still be appropriate despite the strict completeness criteria that were not met for January 2006.

10.0 References

1. Bortnick, S. M., and S. Stetzer *Sampling Frequency Guidance for Ambient Air Toxics Monitoring*; Journal of the Air & Waste Management Association. 2002, 52: 867-875.
2. California Department of Finance Demographic Data. (http://www.dof.ca.gov/DOF.asp)
3. ARB's Quality Assurance Manual. (http://www.arb.ca.gov/aaqm/qmosqual/qamanual/qamanual.htm).
4. Field Standard Operating Procedures (http://www.arb.ca.gov/aqdas/vol2.php).
5. Laboratory Standard Operating Procedures (http://www.arb.ca.gov/aaqm/sop/summary/summary.htm).
6. 40CFR, Part 58, Appendices A-F.
7. Inorganic Laboratory Section Quality Control Reports, 2006.
8. Organic Laboratory Section Quality Control Reports, 2006.

Attachments

Attachment 1: Parlier Community Air Monitoring Project Air Monitoring Plan for S. Ben Benavidez Elementary School (without attachments)

Attachment 2: 2006 Monitoring Schedule

Attachment 3: Quality Assurance Section Audit Reports

Attachment 1

Parlier Community Air Monitoring Project:
Air Monitoring Plan for S. Ben Benavidez Elementary School (w/o attachments)

California Environmental Protection Agency

Air Resources Board

PARLIER COMMUNITY AIR MONITORING PROJECT

AIR MONITORING PLAN FOR S. BEN BENAVIDEZ ELEMENTARY SCHOOL

Prepared by
Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

November 21, 2005

The following document has been reviewed and approved by the Air Resources Board (ARB) staff. Approval of this plan does not necessarily reflect the views and policies of the ARB, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

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IV. Sampler and Monitor Probe Siting Requirements
V. 2006 Sampling Schedule
VI. Site Initiation/Termination Forms
VII. 24-Hour Sample Field Data Forms
VIII. MLD Contact List

Monitoring Plan Identification and Approval

Title: Parlier Community Air Monitoring Project:
Air Monitoring Plan for S. Ben Benavidez Elementary School

Approval: The following monitoring plan is recommended for approval by staff of the Air Resources Board.

Signatures:

12.1.05

Jeffrey P. Cook, Chief — Date
Quality Management Branch
Monitoring & Laboratory Division

1-9-06

Kenneth R. Stroud, Chief — Date
Air Quality Surveillance Branch
Monitoring & Laboratory Division

12/2/05

Michael W. Poore, Chief — Date
Northern Laboratory Branch
Monitoring & Laboratory Division

1.0 Project Background and Scope

In August 2005, the Air Resources Board (ARB) received a request to conduct ambient air sampling for two to three specific pesticides in the community of Parlier, located about 20 miles southeast of Fresno (Figure 1). The request originated with the Department of Pesticide Regulation (DPR) as part of their Cal/EPA Environmental Justice (EJ) pilot project. The pilot project for DPR focuses on ambient air sampling for approximately 24 pesticides and their related breakdown products at each of three elementary schools in Parlier. At one of the three schools, the ARB will partner with DPR by establishing an air monitoring station and sampling for two pesticides and other air contaminants (Attachment I).

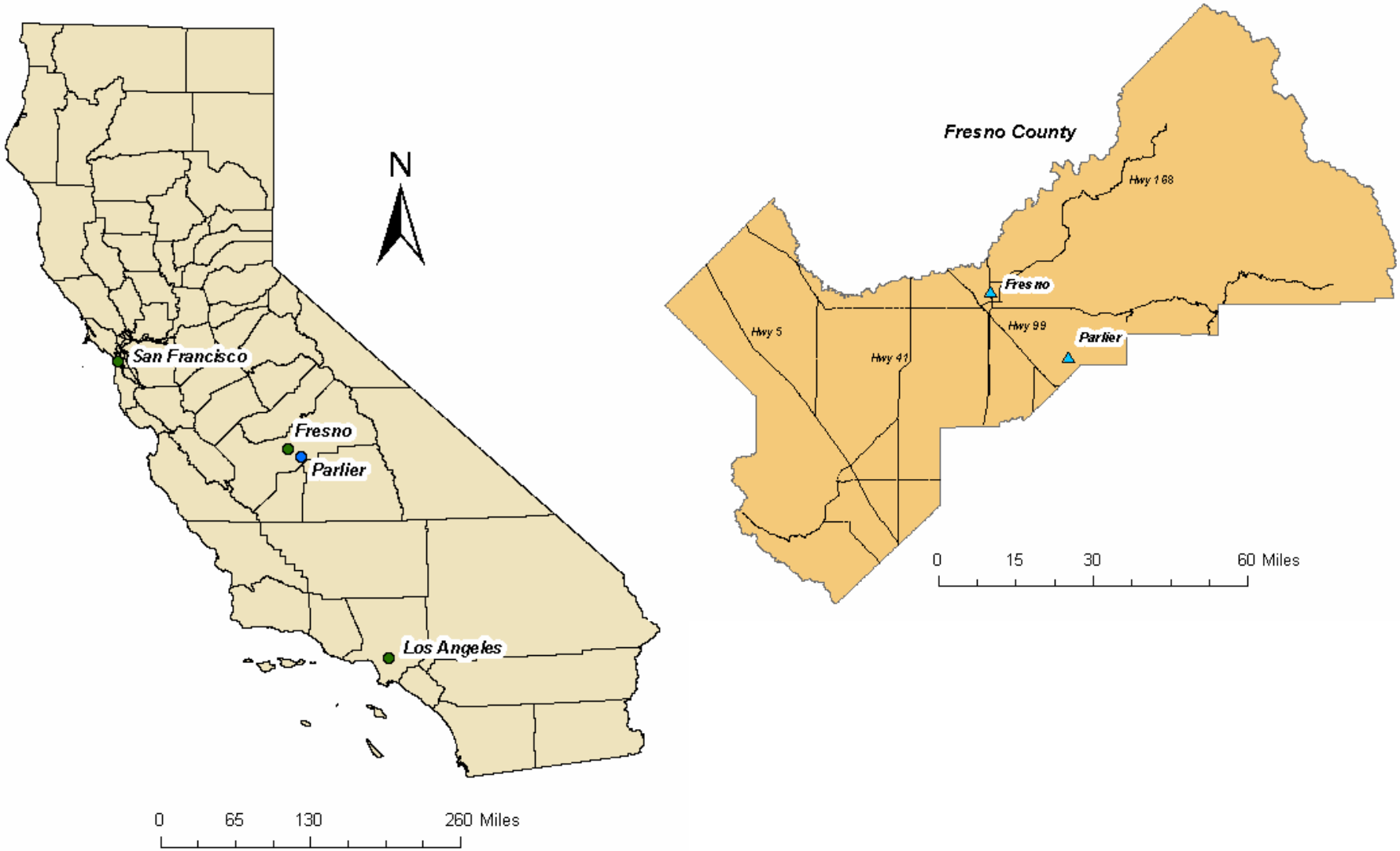
The ARB station will conduct ambient air sampling for 23 volatile organic compounds (VOCs), including two pesticides used near Parlier—Telone (1,3-dichloropropene) and Methyl Bromide—three carbonyl compounds and 30 particle-bound metals and elements, including hexavalent chromium. Continuous monitoring for particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5) will be conducted as will measurements of meteorological parameters, consisting of wind speed, wind direction, and outside temperature.[1] The ARB monitoring station will serve as one of the three school locations in Parlier for pesticide monitoring by DPR.

The purpose of this monitoring plan is to describe the objective of ARB's monitoring at the S. Ben Benavidez Elementary School in Parlier and to provide details on ARB's sampling schedule, laboratory analysis, and data management. ARB's monitoring objective at Benavidez Elementary is to measure the ambient concentration of selected pesticides (Telone, Methyl Bromide, and sulfur) and to complement DPR's pesticide sampling by measuring ambient concentrations of toxic air contaminants and PM2.5. The data collected will provide information on the extent to which air pollutants may adversely impact children at the school and residents of the surrounding Parlier community. The duration and frequency of ARB's sampling is intended to provide daily and seasonal air toxics and PM2.5 data.

Data from the school sites in Parlier can be compared with air quality data from a nearby air monitoring station operated by the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) at the Kearny Agricultural Station, located just outside Parlier. The station operated by the SJVUAPCD is part of a routine network of over 260 air monitoring sites operated by the ARB and local air districts. Currently, the SJVUAPCD's Parlier station continuously monitors for the criteria pollutants nitrogen dioxide (NO2) and ozone (O3). The ambient

[1] For purposes of this plan, monitoring refers to the use of direct-read, continuously operated instruments. Sampling refers to the collection of ambient air in a canister, or through a filter or cartridge, over a given time period and involves off-site laboratory analysis.

Figure 1
Parlier, California



concentration of non-methane hydrocarbons (NMHC) is also measured at the District's Parlier station as are data on wind speed and direction, outside temperature, barometric pressure, relative humidity, and solar radiation.

Sample collection and monitoring at ARB's station is expected to begin in January 2006 and will be conducted for one year. All samples collected by ARB will be analyzed at ARB's laboratory in Sacramento. The sampling frequency will be once every sixth day, but will be increased to once every third day during those months of highest expected pesticide usage based on information provided to ARB by DPR. PM2.5 monitoring will be conducted continuously for the duration of the study.

2.0 Site Description

The City of Parlier is located in central Fresno County and has an estimated population of approximately 12,000, of which about 40 percent are school-age children. Eight schools comprise the Parlier Unified School District, including four elementary schools, one junior high school, one high school, a charter school, and a continuation school.

The ARB's monitoring station will be placed on the southeast corner of the S. Ben Benavidez Elementary School campus in central Parlier (Figure 2). The school is bordered to the north, east, and west by residences. Directly south of the school is an athletic field, beyond which are fruit orchards.

Figure 2: Proposed Location of Station on Benavidez Elementary Campus

S. Ben Benavidez campus showing approximate proposed location of ARB air monitoring station (**X**)

Parlier is located in the San Joaquin Valley and the topography of the area is flat. Average yearly prevailing winds are northwesterly. However, the seasonal wind pattern differs between winter/early spring and summer/fall. During the winter/early spring, predominant winds are southeasterly, while during the summer/fall, predominant winds are northwesterly (Attachment III).

Sources of air pollution near Benavidez Elementary include motor vehicles from East Manning Avenue, emissions from homeowner activities, including VOC-containing household products, and agricultural operations, including pesticide applications. East Manning Avenue is a major east-west road through Parlier, located approximately 300 meters due south of the school with traffic estimated at 25,000 vehicles per day.

For this study, the ARB will site samplers and monitoring probes in accordance with the neighborhood spatial scale siting criteria, i.e., with respect to height above the ground, distance from trees, builders, and walls, unobstructed airflow, and the like.[2] These criteria are listed in 40CFR Part 58, Appendix E, and Volume II, Section 2.0.4, of ARB's Quality Assurance Manual and are included in Attachment IV of this plan.

3.0 Monitoring Schedule

Following placement of the monitoring station at the school, analyzers, samplers, and sensors will be calibrated using NIST-traceable transfer standards. The ARB's Quality Assurance Section (QAS) will conduct at least one on-site performance audit during the yearlong monitoring study. Schedule details for the ARB's monitoring station are outlined below:

- ARB monitoring at Benavidez Elementary will include all four seasons.
- The sampling frequency for pollutants monitored by ARB and collected on filters, cartridges, or in canisters will be once every six days except for those months of expected highest usage of Telone, Methyl Bromide, and sulfur in the immediate area of Parlier. During those highest use months, based on information provided to ARB by DPR, the sampling frequency will be increased to once every three days.
- The one-in-six day and one-in-three day sampling schedules at the ARB site will be overlapped with ARB's routine toxics monitoring schedule for sites to the greatest extent possible to provide the maximum amount of comparable data with other toxics monitoring sites in the state. The ARB's sampling schedule for year 2006 at the Benavidez School is included in Attachment V.

[2] Neighborhood spatial scale refers to a particular spatial scale of representativeness. A spatial scale of representativeness is used to define a distance over which pollutant concentrations are expected to be essentially uniform. For neighborhood scale, monitoring data is considered representative of the air encompassing an area between 0.5 and 4 kilometers around the station.

- The interval for ARB filter, cartridge, and canister sampling will be 24 hours. PM2.5 and meteorological data will be collected continuously.
- Data from each quarter of ARB monitoring will be available in USEPA's Air Quality System (AQS) database no later than 90 days after the end of the calendar quarter (e.g., data collected during the first quarter of 2006 will be available on AQS no later than the end of June 2006).

The overall monitoring schedule, which includes station setup and removal, sample/continuous data collection, performance audits, data review, and reporting schedules, is shown in Table 1. This project schedule is generated based on data quality objectives (DQOs) and site preparation requirements. The schedule will be reviewed quarterly, or as necessary, by MLD/OPAS staff. As the project progresses, the schedule may be modified in order to meet DQOs or in response to changes in the number of parameters measured, operational status of available equipment, changes to the monitoring site, etc. An updated schedule, and addendum to this monitoring plan, if necessary, will be forwarded to SSD and DPR.

4.0 Project Management

Communication with the school, residents, and other interested parties regarding the overall project will be through DPR with personnel from the ARB's Stationary Source Division (SSD) acting as the primary liaison between ARB and DPR.

With respect to the collaborative ARB/DPR monitoring planned for the Benavidez Elementary School, DPR will act as lead on the overall Parlier environmental justice air monitoring project and provide information on the status of the project to community members and others via several existing local working groups.

Data analysis, using ARB data collected at the Benavidez site and provided to DPR through the national Air Quality System (AQS) database, will be coordinated by DPR with input from SSD through the Office of Environmental Health Hazard Assessment (OEHHA).

It is anticipated that any change in the air monitoring plan at the Benavidez School that impacts ARB, including scope of monitoring, duration, months of increased 24-hour sampling frequency, will be communicated by DPR to SSD and/or MLD personnel as soon as possible.

Within the ARB, SSD personnel will be the primary contact for this project and will coordinate activities within ARB and between ARB and DPR.

Table 1: Parlier Community Monitoring – Tentative Schedule

Tasks	Frequency	Sep 2005	Oct 2005	Nov 2005	Dec 2005	Jan 2006	Feb 2006	Mar 2006	Apr 2006	May 2006	Jun 2006	Jul 2006	Aug 2006	Sep 2006	Oct 2006	Nov 2006	Dec 2006	Jan 2007
Field Activities[1]																		
Site Preparation	--	X	X	X														
Station Setup	--			X	X													
Calibrations	Biannual					X							X					
Station Removal	--																	X
Sample / Data Collection[2]																		
VOCs (Xontech 910A)	1 in 6 or 1 in 3[3]					X	X	X	X	X	X	X	X	X	X	X	X	
Carbonyls (Xontech 924)	1 in 6					X	X	X	X	X	X	X	X	X	X	X	X	
Metals/Elements (Xontech 924)	1 in 6 or 1 in 3[4]					X	X	X	X	X	X	X	X	X	X	X	X	
Chromium IV (Xontech 924)	1 in 6[5]					X	X	X	X	X	X	X	X	X	X	X	X	
PM2.5 (Met One BAM 1020)	Continuous					X	X	X	X	X	X	X	X	X	X	X	X	
WS, WD, OT (Met One)	Continuous					X	X	X	X	X	X	X	X	X	X	X	X	
Sampler Performance Audit	Annual							X										
Data Uploading to AQS	Quarterly											X[6]			X			X
Document / Report Preparation																		
Monitoring Protocol	--		X															
Site Initiation Forms	--					X												
Site Termination Forms	--																	X
Audit Report	Annual							X										

[1] Site development is contingent upon contractual agreement between the ARB and the Parlier Unified School District.
[2] Sampler or instrument is shown in parentheses.
[3] 1 in 6 is one sample collected every sixth day. 1 in 3 is one sample collected every third day. During the single month of expected highest Telone usage, VOC samples will be collected on a 1 in 3 schedule. For all other months, a 1 in 6 schedule will be used. DPR staff will inform ARB of expected highest use month for Telone.
[4] During the single month of expected highest sulfur usage, metals/elements samples will be collected on a 1 in 3 schedule. For all other months, a 1 in 6 schedule will be used. DPR staff will inform ARB of expected highest use month for sulfur.
[5] Chromium IV samples collected on a 1 in 6 schedule will be composited quarterly for analysis. Quarterly values will be reported.
[6] 1st quarter 2006 data will be uploaded to AQS by July 2006; 2nd quarter by October 2006; 3rd quarter by January 2007; and 4th quarter by April 2007. Data may be submitted earlier.

Stationary Source Division

Air Quality Measures Branch

Lynn Baker, Staff Air Pollution Specialist
Substance Evaluation Section
(916) 324-6997

Substance Evaluation Section (SES) responsibilities for the project will include:

- Coordinate and participate with DPR and ARB/MLD on all major project activities that impact ARB;
- Review and provide comments on sampling protocols and other key project documents that impact ARB, as they become available.

Operational issues associated with installation, operation, and removal of the station at Benavidez Elementary will be addressed directly with school site and district personnel by MLD staff.

MLD personnel will set up the air monitoring station, perform all instrument calibrations, and conduct all laboratory analyses of ARB canister, cartridge, and filter samples as described in this plan. MLD will also address quality control (QC) and quality assessment (QA) activities associated with sampling and laboratory analysis for this project.

Monitoring and Laboratory Division

Quality Management Branch

Jeff Cook, Chief
Quality Management Branch
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Webster Tasat, Manager
Operations Planning and Assessment Section
(916) 322-7055

Michael Miguel, Manager
Quality Assurance Section
(916) 324-6191

Operations Planning and Assessment Section (OPAS) responsibilities for the project include the following:

- Assist in site selection and site development;

- Develop data quality objectives and write monitoring plan;
- Track ARB 24-hour samples (via field data sheets) for sampling date, flow rate, and sampling duration;
- Review quarterly laboratory QC/performance reports from Organics Laboratory Section (OLS), Inorganics Laboratory Section (ILS), and Quality Assurance Section (QAS);
- Review project schedule and progress on a monthly basis and incorporate any changes into a monitoring plan addendum/updated schedule;
- Forward monitoring plan revisions to all appropriate parties;
- Report to upper ARB management on ARB monitoring status;
- Coordinate all MLD meetings to review and/or report on the status of the project;
- Provide tours of the station to students, teachers, and/or other interested parties, if requested;
- Write final project summary report.

QAS will have the following responsibilities with respect to the project:

- Conduct standard performance audits of all ARB station samplers, analyzers, and meteorological sensors (see Section 5, Table 2) within 60 to 90 days after start-up and initial calibration;
- Conduct flow audits of DPR samplers at the Benavidez, Chavez, and Martinez schools in Parlier;
- Provide preliminary audit report detailing the results of the complete audit to Air Monitoring – Central Section (AMCS) after the audit or within approximately 10 working days after the audit;
- Provide system audit of DPR's contract laboratory conducting analyses of air samples collected by DPR;
- Forward a copy of any Air Quality Data Action (AQDA) that may be issued to AMCS and data processing sections within ARB.

Air Quality Surveillance Branch

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Air Quality Surveillance Branch
(916) 445-3745

Gary Zimmerman, Manager
Air Monitoring – Central Section
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The AMCS of the Air Quality Surveillance Branch (AQSB) will develop the site with the required electrical power and security, deploy and operate the ARB's monitoring station, and close the station at the conclusion of ARB's monitoring. AMCS responsibilities will consist of the following:

- Assist in site selection;
- Conduct site development;
- Install and remove mobile air monitoring station;
- Ensure that major siting criteria are met as closely as possible per 40CFR, Part 58 and Volume II, Section 2.0.4, of ARB's Quality Assurance Manual;
- Complete site initiation and termination forms (Attachment VI);
- Calibrate and operate all samplers and analyzers according to existing MLD Standard Operating Procedures (SOP);
- Complete and review sampler calibration documentation;
- Forward 24-hour samples from ARB samplers to MLD's Northern Laboratory Branch in Sacramento for analysis;
- Review all analyzer data (i.e., BAM and met) using standard AQSB data QC review procedures;
- Investigate and resolve any ARB AQDA notices that may be issued, in conjunction with QAS;
- Review suspect ARB data in the event of an AQDA and apply corrections, if applicable (i.e., data rescue);
- Provide maintenance for samplers and analyzers and station support equipment (e.g., lighting system, A/C, etc.);
- Provide replacement samplers or analyzers for the ARB station, if necessary.

Northern Laboratory Branch

Michael Poore, Chief
Northern Laboratory Branch
(916) 322-6043

Kathy Gill, Manager
Organics Laboratory Section
(916) 445-9483

Cliff Popejoy, Manager
Inorganics Laboratory Section
(916) 322-6202

The Organics and Inorganics Sections of Northern Laboratory Branch (NLB) will analyze 24-hour samples and will be responsible for laboratory activities associated with the analysis of samples collected from ARB samplers at Benavidez Elementary. Specific laboratory activities consist of the following:

- Prepare and supply canisters, cartridges, and filter media to ARB station for air toxics monitoring with associated field data forms (Attachment VII) and return envelopes;

- Analyze 24-hour toxics samples and upload analytical data to MLD's Laboratory Information Management System (LIMS) using standard reporting units;
- Validate 24-hour samples using routine QC review procedures and enter field sampling information in LIMS;
- Inform MLD's field operations personnel (Attachment VIII, *MLD Contact List)* if a sample is invalidated by the laboratory;
- Post laboratory results to AQS within 90 days of the end of each calendar quarter;
- Provide laboratory QC information, i.e., quarterly QC reports, to MLD upper management.

5.0 Monitoring and Sampling Parameters

A summary of pollutants, measurement frequencies, expected number of samples or hours of monitoring, analytical methods, and field SOPs are contained in Table 2.

Table 2: Summary of Pollutants, Measurement Frequency, Expected Number of Samples, Field SOPs, and Analytical Methods

Pollutant/ Measurement[1]	Frequency[2]	Total Expected Number of Samples or Days of Monitoring[3]	Field SOP Reference	Analysis Method[4]
VOCs	1 in 6 / 1 in 3	65 samples	Vol. II, Appendix Q	GC/MS
Carbonyls	1 in 6 days	60 samples	Vol. II, Appendix R	HPLC
Chromium VI	1 in 6 days	60 samples	Vol. II, Appendix R	Ion Chromatography
Metals/Elements	1 in 6 / 1 in 3	65 samples	Vol. II, Appendix R	X-Ray Fluorescence
PM2.5	Continuous	365 days	BAM-1020 SOP400	Beta Attenuation
Meteorological Parameters	Continuous WS, WD, OT[5]	365 days	Vol. II Appendices T, U, V, AA, AL	(Cup/vane, sensors)

[1] Specific VOCs, carbonyls, and metals/elements are listed in Table 5.
[2] Frequency of sample collection will increase for Telone and sulfur on months of high usage as pesticides.
[3] Number of samples or monitoring days is based on one year of station operation. Actual numbers may be less following QA/QC review of samples and/or collected data.
[4] Laboratory SOPs for each analytical method are listed in Table 5.
[5] Wind speed, wind direction, outside (ambient) temperature.

A complete description of field sampling procedures, including procedures for instrument set-up, calibration, and operation is contained in Volume II of ARB's Quality Assurance Manual and is available at the following web address: http://www.arb.ca.gov/aqdas/amwm.php.

All analytical methods, including the derivation on Limits of Detection (LOD) used for the measured pollutants, are detailed laboratory SOPs for inorganic and organic analyses. Laboratory SOPs are available online at: http://www.arb.ca.gov/aaqm/sop/summary/summary.htm.

5.1 Pollutants Collected by 24-Hour Samplers

Twenty-four hour integrated samples of VOCs, carbonyl compounds, and total suspended particulate-bound metals/elements and chromium VI will be collected every sixth day. The six-day sampling schedule at the Benavidez School will overlap with the one-in-twelve day sampling schedule at the ARB's approximately 21 routine air toxics sampling sites around the State. The purpose of collecting coincident samples is to enable a comparison between the data collected for this project and data collected at routine air toxics monitoring sites.

For those months of highest Telone and sulfur pesticide use in proximity to Parlier, the sampling frequency for VOCs and metals/elements will be doubled from one sample every six days to one sample every three days. The increased sampling frequency will provide additional temporal resolution for pesticide concentrations from ARB samplers during those months of highest pesticide use and is intended to capture peak concentrations.

The ARB's sampling schedule for 2006 at the Benavidez School is included in Attachment V. A list of the VOCs, carbonyls, and chromium VI is provided in Table 5 along with reporting limits. Briefly, the 24-hour samples collected from the ARB's Benavidez School site will consist of the following:

- VOCs, collected in 6-liter Summa canisters, and reported in parts per billion by volume (ppbv).
- Selected carbonyl compounds, collected on Sep-Pak silica cartridges, and reported in ppbv.
- Selected metals and elements, collected on 37mm Teflon filters, and reported as the sum of all oxidation states in nanograms per cubic meter of sampled air (ng/m3).
- Chromium VI, collected on 37mm cellulose fiber filters and composited over each quarter of sampling, and reported in ng/m3.

5.2 Continuous Measurements

PM2.5 will be measured continuously using a Beta Attenuation Monitor (BAM 1020). PM2.5 data is averaged as hourly and 24-hour values and reported in ug/m3. Meteorological data will also be collected on a continuous basis, averaged hourly, and will consist of the following measurements:

- Wind speed in knots;
- Wind direction (direction wind is blowing from) in degrees; and,
- Outside temperature in degrees Celsius.

6.0 Field Activities

6.1 Site Reference Information & Documentation

Site Name: *Benavidez Elementary School*
Address: *13900 Tuolumne Street, Parlier, CA 93648*
Latitude/Longitude: *TBD*
AQS (AIRS) Site Code: *TBD*

All field activities at the Benavidez station, including sample collections, sampler calibrations, QC and maintenance, and site audits will be documented using ARB's standard field forms. Table 3 summarizes the forms that document site activities. Examples of these forms are contained in Attachment VI.

Table 3: Field Activity Documentation

Activity	Required Documentation
Station Installation	Site Initiation Information
Instrument Calibrations	Calibration Sheets
QC/Maintenance	Field Check Sheets
24-hour Sample Collection	Field Data Forms
Site Audit	Audit Forms
Site Close Down	Site Termination Forms
Start-up info, daily O&M, cals, unusual activity near site	Station Log

6.2 Media/Sample Transfer

Staff of the ARB's Northern Laboratory Branch will prepare all sample media (filters, canisters, and cartridges) following standard procedures detailed in laboratory SOPs.

The Inorganics Laboratory Section (ILS) staff will prepare Teflon filters for metals/elements sample collection and cellulose filters for chromium VI sample collection. The Organics Laboratory Section (OLS) staff will clean and prepare canisters for VOC collection and cartridges for carbonyl sampling. Sample collection media, along with the associated field data sheets and pre-addressed return envelopes, will be mailed to the station at least quarterly.

After each sampling period, samples will be returned to the laboratory for analyses. If a scheduled sampling date is missed, a field data sheet, filled out with scheduled run date and site name, will be sent to the laboratory with the reason why the sample was missed. A make-up sample will be collected at the earliest possible opportunity.

6.3 Sampling and Monitoring Procedures

All sampling and monitoring will be conducted according to established procedures regarding flow checks, calibrations, and instrument maintenance (see Table 2). Any deviations from current field SOPs used for the project must be clearly documented.

Access to the station will occur on a weekly basis with more frequent visits during increased sampling periods or for maintenance. Station instruments and samplers are automatic and are designed to operate with minimal oversight. For specific dates of site visits to the Benavidez station by ARB staff, contact the station operator or supervisory staff (Attachment VIII).

6.4 Corrective Actions

When necessary, corrective actions will be taken to ensure that the type and quality of data expected from the data quality objectives (DQOs) are achieved. In cases where a 24-hour sample is invalidated, or if a scheduled sample is missed, a make-up sample should be collected on the earliest possible date. The make-up date should be within the same month as the scheduled date to obtain sufficient representative data (i.e., four or more samples) per calendar month for the 1 in 6 day sampling schedule.

Upon receipt of the samples in Sacramento, laboratory staff will inspect samples and will immediately notify field operator if a sample has been invalidated. Table 4 summarizes the criteria for establishing valid 24-hour samples.

Table 4: Criteria for Determining Valid 24-hour Samples

Pollutant	Sampler/Media	Flow Rate or Canister Pressure	Run Time	Start/Stop Time
VOCs	XonTech 910A 6-Liter Summa Canister	10.0-16.0 (PSIG)	24 $\pm$ 1 Hour	00:00-24:00 ($\pm$ 1 hour)
Metals/Elements	XonTech 924 37-mm Teflon Filter	1. 9-14 (SLPM) 2. PD[1] $\leq$ 10%	24 $\pm$ 1 Hour	00:00-24:00 ($\pm$ 1 hour)
Chromium VI	XonTech 924 37-mm Cellulose Filter	1. 9-14 (SLPM) 2. PD[1] $\leq$ 10%	24 $\pm$ 1 Hour	00:00-24:00 ($\pm$ 1 hour)
Carbonyls	XonTech 924 Sep-Pak Cartridge	1. 0.63-0.77 (SLPM) 2. PD[1] $\leq$ 10%	24 $\pm$ 1 Hour	00:00-24:00 ($\pm$ 1 hour)

[1]Percent difference (PD) between start and stop flow rate, start and average flow rate, and stop and average flow rate.

7.0 Laboratory Analysis

Twenty-four hour samples will be analyzed following NLB's laboratory SOPs. Specific laboratory SOPs and reporting limits are listed in Table 5.

Upon receipt in the laboratory, sampling information, such as site name, sampling date, start/stop time, flow rates or canister pressures, will be logged into MLD's LIMS. Samples are then analyzed. All samples will be analyzed individually except chromium VI. A composite sample, consisting of seven (7) valid chromium VI filters for each quarter, will be analyzed to obtain a quarterly average concentration of chromium VI. The remaining filters collected during the quarter will be archived.

Following laboratory analyses, the data are entered into LIMS. LIMS calculates the concentration of each analyte in the sampled air using the analytical results and sampling information (run time and flow rate, etc.). The final ambient concentration data are then submitted to AQS. If the ambient concentration is below the reporting limit, the result will be reported to AQS as less than the reporting limit (e.g., < 0.1 ppb). AQS will automatically report those values less than the reporting limit as one-half of the reporting limit, i.e., if the result is < 0.1 ppb, AQS will display 0.05 ppb for that analyte.

8.0 Data Quality Objectives

The primary purpose of DQOs in ambient air sampling work is to produce air quality data that is of sufficient quantity and quality to meet the needs of the end user. DQOs for the Parlier Community Monitoring project focus on collecting data necessary to adequately characterize the ambient concentrations of monitored air pollutants in the Parlier area. DQOs for this project are based on the following specific indicators: accuracy, precision, representativeness, completeness, and comparability.

8.1 Accuracy and Precision

Accuracy is a measure of how close an individual measurement is to the actual or true value. In situations involving a sampler and subsequent laboratory analysis, accuracy is assessed through an audit of the sampler and the analytical laboratory.

Field Samplers
The accuracy of the samplers used at the Benavidez School will be assessed through flow rate audits. The flow audit will indicate the accuracy of the sampler in collecting a known volume of air, which is a critical factor in calculating concentration.

Table 5: Analytes, Reporting Limits, and Laboratory SOPs

Analyte	Reporting Limit		Lab SOP	Analyte	Reporting Limit		Lab SOP
VOCs				***Metals/Elements***			
1,1,1-Trichloroethane	0.01	ppbv	MLD058	Aluminum	4.0	ng/m3	MLD034
1,3-Butadiene	0.04	ppbv	MLD058	Antimony	6.0	ng/m3	MLD034
Benzene	0.05	ppbv	MLD058	Arsenic	2.0	ng/m3	MLD034
Bromomethane[1]	0.03	ppbv	MLD058	Barium	19	ng/m3	MLD034
Carbon tetrachloride	0.02	ppbv	MLD058	Bromine	1.0	ng/m3	MLD034
Chloroform	0.02	ppbv	MLD058	Calcium	4.0	ng/m3	MLD034
cis-1,3-Dichloropropene[2]	0.1	ppbv	MLD058	Chlorine	10	ng/m3	MLD034
Dichloromethane	0.1	ppbv	MLD058	Chromium	2.0	ng/m3	MLD034
Ethylbenzene	0.2	ppbv	MLD058	Cobalt	15	ng/m3	MLD034
m/p-Xylene	0.2	ppbv	MLD058	Copper	1.0	ng/m3	MLD034
o-Dichlorobenzene	0.3	ppbv	MLD058	Iron	1.0	ng/m3	MLD034
o-Xylene	0.1	ppbv	MLD058	Lead	3.0	ng/m3	MLD034
p-Dichlorobenzene	0.3	ppbv	MLD058	Manganese	1.0	ng/m3	MLD034
Perchloroethylene	0.01	ppbv	MLD058	Mercury	3.0	ng/m3	MLD034
Styrene	0.1	ppbv	MLD058	Molybdenum	2.0	ng/m3	MLD034
Toluene	0.2	ppbv	MLD058	Nickel	1.0	ng/m3	MLD034
trans-1,3-Dichloropropene[2]	0.1	ppbv	MLD058	Phosphorus	2.0	ng/m3	MLD034
Trichloroethylene	0.02	ppbv	MLD058	Potassium	5.0	ng/m3	MLD034
Carbon disulfide	0.1	ppbv	MLD058	Rubidium	1.0	ng/m3	MLD034
Acrolein	0.3	ppbv	MLD066	Selenium	2.0	ng/m3	MLD034
Acetone	0.3	ppbv	MLD066	Silicon	2.0	ng/m3	MLD034
Acetonitrile	0.3	ppbv	MLD066	Strontium	1.0	ng/m3	MLD034
Acrylonitrile	0.3	ppbv	MLD066	Sulfur	2.0	ng/m3	MLD034
Carbonyls				Tin	5.0	ng/m3	MLD034
Acetaldehyde	0.1	ppbv	MLD022	Titanium	3.0	ng/m3	MLD034
Formaldehyde	0.1	ppbv	MLD022	Uranium	3.0	ng/m3	MLD034
Methyl ethyl ketone	0.1	ppbv	MLD022	Vanadium	2.0	ng/m3	MLD034
				Yttrium	2.0	ng/m3	MLD034
				Zinc	1.0	ng/m3	MLD034
				Zirconium	2.0	ng/m3	MLD034
				Chromium VI[3]	0.06	ng/m3	MLD039

[1]Methyl Bromide
[2]Telone
[3]Quarterly average concentration from approximately composite samples will be reported.

The flow rate of air through the XonTech 924 sampler, used for collecting metals/elements and chromium VI filters, and cartridges for carbonyl samples, shall be within ± 10 percent of the true value. For PM2.5, a criteria pollutant, the audit control limit for the BAM 1020 flow is ± 4 percent of the true flow. True flow is determined with a flow measurement device certified against a primary standard from MLD's Standards Laboratory.

In the State and Local Air Monitoring Station (SLAMS) network, including the State air toxics network, precision for manual sampling methods is evaluated using collocated samplers. Currently, there are no plans to collocate samplers at the Benavidez station. However, the operation and maintenance of manual samplers at Benavidez will match those throughout the air toxics network and precision measurements made at routine toxic sites are expected to reflect the precision of samplers at the Benavidez site.

Laboratory Analysis
Analytical accuracy and precision will be evaluated through the use of routine laboratory blanks, spikes, and duplicate samples. Detailed information on laboratory accuracy and precision, including spikes and duplicate sample control limits, are described in MLD's Laboratory QC Manual, method SOPs, and quarterly QC reports generated by each laboratory. These QC reports are independently reviewed to ensure that the data produced meet quality standards. In addition to laboratory QC, a laboratory performance audit of the inorganics and organics laboratories, which will occur once during the project, will be used to independently assess the quality of the data produced by these laboratories.

Meteorological Instruments
The accuracy of meteorological sensor readings, consisting of ambient air temperature, wind speed, and wind direction will be assessed by an audit with certified sensors using Photochemical Assessment Monitoring Station (PAMS) criteria.[3]

Details on performance audit procedures, including calculations used in determining percent differences between observed flow and true flow is found in Volume V of the ARB's QA Manual:
http://www.arb.ca.gov/aaqm/qmosqual/qamanual/vol5/vol5.htm

[3] Wind speed: ±0.2 m/sec + 5% of observed speed at speeds between 0.5 m/sec to 50 m/sec. Starting threshold ≤ 0.5 m/sec. Wind direction: ±5 degrees. Starting threshold ≤ 0.5 m/sec. Ambient temperature: ±0.5 degrees C.

8.2 Representativeness

Representativeness refers to how accurately the sampling design at the Benavidez School represents the ambient concentrations of pollutants in the Parlier community. Although samplers and analyzers are capable of collecting only a relatively small volume of air at any given time, the volume of air sampled can represent concentrations prevailing over a much larger area if the geography, meteorology, and distribution of sources are homogeneous and if samplers are sited in a manner representative of the study area. These conditions are generally met in the area surrounding the Benavidez School in Parlier.

Spatial representativeness
Samplers and analyzers for the Benavidez site will meet the neighborhood scale siting criteria. Air quality measurements made using neighborhood spatial scale siting criteria represent the uniform air pollutant concentration in an area of 0.5 to 4.0 kilometers (1/3 to 2½ miles) surrounding the sampler inlets. Detailed information on the neighborhood spatial scale siting criteria can be found in 40 CFR, Part 58, Appendix D, and in ARB's Quality Assurance Manual, Volume II, Section 2.0.4.

Temporal representativeness
Since sample concentrations vary over time, samples must be collected on a schedule that addresses temporal variations as well as providing information on long-term concentrations. To address weekly, monthly, and seasonal variations, as well as obtain annual average concentration information, sampling for VOCs, carbonyls, metals/elements, and chromium VI will be conducted for 24 hours every six days, with an increase in frequency for VOCs and metals/elements during selected months to capture peak concentrations. Monitoring for PM2.5 conducted continuously with the data output as hourly average concentrations.

8.3 Completeness

Completeness is an element of representativeness and ensures that data are not over-represented of one time period or another. Data for the Benavidez site will be complete if there are representative valid data during required hours of the day and during the required calendar months. The completeness objective for ARB's sampling will be to obtain sufficient data to achieve four (4) representative calendar quarters for PM2.5 and toxic air pollutants.

The completeness objectives used for criteria pollutants are found in ARB's QA Manual, Volume I, Section 1.0.1. While not strictly applicable to air toxics sampling, these criteria will be considered goals for ARB's Parlier Community Monitoring Project.

8.4 Comparability

Comparability reflects the confidence with which one data set may be compared to another. Data comparability is an important objective that should be met in order to analyze data collected at one site with data collected from nearby routine network monitoring sites. The use of standard sampling and laboratory analytical procedures for toxics sampling throughout the statewide network is the principle means of ensuring data comparability (see Section 9.0).

For purposes of quantifying data comparability, a minimum of one (1) toxic sample collected each month at the ARB's Benavidez site will be collected coincidentally with the Fresno 1st Street site, which operates on a 1 in 12 sampling schedule for sites north of the Tehachapis.

9.0 Quality Assurance

Field and laboratory quality control (QC) procedures are critical to ensuring that data collected are consistent, relevant, and defensible. The ARB's standard field and laboratory QC procedures will be used for this project and are contained in field and laboratory SOPs.

9.1 Field Quality Control

Field QC includes equipment certifications, calibrations, and instrument specific maintenance checks. All monitoring and sampling equipment must be calibrated as detailed in field SOPs and as recommended by the instrument manufacturer. Detailed certification procedures used by the ARB's Standards Laboratory to certify standards used for instrument and sampler calibration are available upon request. Instrument calibrations and maintenance checks will be conducted according to the schedule prescribed in the field SOPs.

9.2 Analytical Quality Control

All samples will be analyzed with reference to laboratory SOPs. Details on laboratory QC procedures, laboratory instrument calibration procedures, LODs, and precision estimates are included in the laboratory SOP, the laboratory QC manual, and quarterly QC reports generated by ILS and OLS and reviewed by a third, independent section within MLD.

9.3 Quality Assessment

Quality assessment is accomplished through laboratory and site performance audits. Laboratory performance audits will be conducted annually following the routine laboratory audit procedure and schedule.

Currently, the QAS conducts laboratory performance audits for PM10 mass, ion analyses, and VOCs. It is anticipated that during the Parlier Community Monitoring Project those portions of the laboratory conducting analyses for carbonyls and metals/elements will be audited. The audit results will be evaluated by the QAS and will provide an assessment of the accuracy of the methods used by the laboratory.

A site performance audit will be conducted for this project and will consist of flow audits for the XonTech 924 and PM2.5 BAM. Audits of all meteorological sensors will also be conducted. The audit results will provide an assessment of the accuracy of sampler flow rate and the output of analyzers and meteorological sensors.

10.0 Data Management

The data management process for ARB's data collected for this project are the same as for the standing network and includes:

- Continuous analyzer data transfer (electronic acquisition of data from station, data review, submittal to AQS);
- Twenty-four hour sample data transfer (from field data collection, through sample analysis and LIMS, to data submittal to AQS);
- Data review and validation using standard data review procedures; and,
- Data storage on AQS.

Continuous analyzer data (PM2.5) and 24-hour, integrated air toxics data (VOCs, metals/elements, and carbonyls) will be collected, transferred, validated, and uploaded to AQS by ARB.

The ARB will establish an AQS account based on information from site initiation reports and Sections 6.1 and 7.0 of this monitoring plan. The format of the AQS account will follow that of routine ARB air toxic sites.

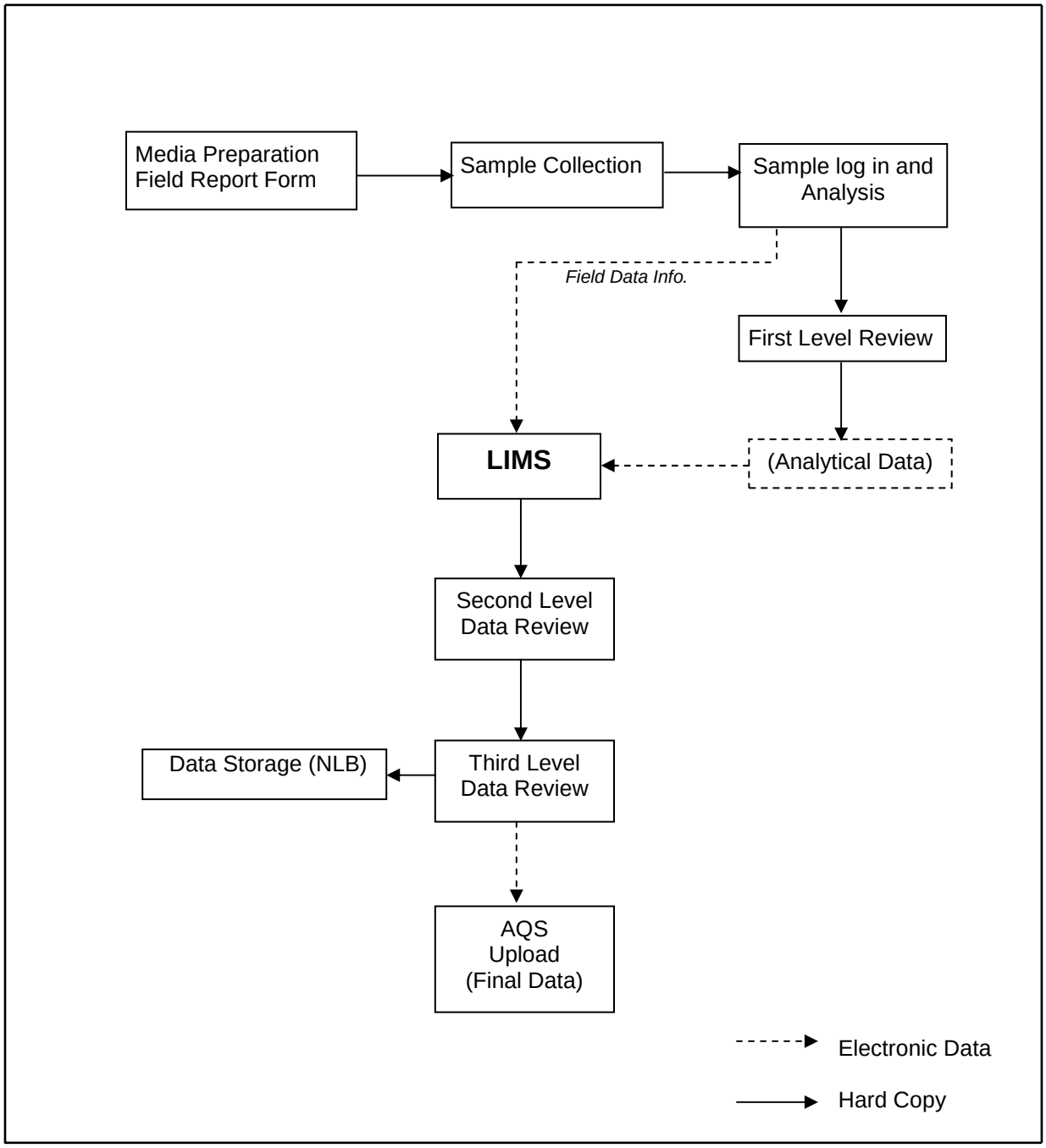
10.1 Twenty-four Hour Sample Data Review and Validation Procedure

Appropriate ARB procedures for data review and validation will be used for 24-hour samples collected by ARB at the Benavidez station.

Three (3) levels of data review and validation, summarized below, will be applied to 24-hour samples. Figure 3 illustrates the data transfer and storage procedure for 24-hour samples.

Level 1 (A) (inspection of post-sampling filter, canister, or cartridge)
Field operator(s) from MLD will inspect the sample after collection, but prior to forwarding the sample with the field data sheet to the laboratory. Any holes, tears, or contamination on the filters, or low

Figure 3: 24-Hour Sample Data Flow



pressure (<10 psig) in the toxics canister should be appropriately noted on the field data sheet as necessary. After the sample is received in the laboratory, NLB staff will inspect the sample and review the field data sheet to ensure the field QC criteria listed in Table 4 are met.

Level 1 (B) (laboratory data review)
Laboratory staff will review all raw data prior to uploading to LIMS. This review includes checking instrument calibrations, control standards, blanks, spikes, duplicate analyses, and chromatographs. Criteria used for each method may be found in laboratory SOPs.

Level 2
After all samples collected for each month (or quarter) are analyzed and data are uploaded to LIMS, a LIMS report is generated. The NLB staff will review the report for completeness and accuracy.

Level 3
The NLB Branch Chief, and/or ILS and OLS Section managers, will review and approve the LIMS report. All final data are visually checked for consistency and reasonableness. Unusually high or unexpectedly low results will be verified.

ARB personnel will submit the 24-hour sample data to AQS after appropriate review levels are complete.

10.2 Continuous Monitoring Data Review and Validation

Continuous monitoring data (PM2.5 and meteorological) will be verified and reviewed through the evaluation of the data from the instrument and station data loggers and the equipment maintenance records. The high values, low values, and anomalies will be verified.

All data assessment from the PM2.5 BAM unit and meteorological sensors will be conducted per standard data review procedures and professional technical judgment based on experience in the performance aspects of the BAM 1020 monitor and met sensors. ARB personnel will submit continuous monitoring data to AQS after appropriate review levels are complete.

10.3 Data Tracking and Storage

MLD staff will track the collection of 24-hour and continuous data from the Benavidez site, review, and storage into AQS and any intermediate databases.

The results of all monitoring and sampling will be uploaded to USEPA's AQS no later than 90 days from end of the quarter in which the data were collected. AQS will be the final repository for all data collected by ARB for the Parlier Community Monitoring Project.

11.0 Reporting

At the completion of ARB's monitoring, MLD, in consultation with SSD, will provide a brief summary report of ARB's monitoring to DPR. The summary report will include a brief review and explanation of ARB's role, the sampling design, results, and the means of data validation and will also include information on field and laboratory quality control for ARB's data collection.

12.0 References

1. Bortnick, S. M., and S. Stetzer *Sampling Frequency Guidance for Ambient Air Toxics Monitoring*; Journal of the Air & Waste Management Association. 2002, 52: 867-875.

2. California Department of Finance Demographic Data (http://www.dof.ca.gov/DOF.asp)

3. ARB's Quality Assurance Manual (http://www.arb.ca.gov/aaqm/qmosqual/qamanual/qamanual.htm)

4 Field Standard Operating Procedures (http://www.arb.ca.gov/aqdas/vol2.php)

5. Laboratory Standard Operating Procedures (http://www.arb.ca.gov/aaqm/sop/summary/summary.htm)

6. 40CFR, Part 58, Appendices A-F

Attachment 2
2006 Sampling Schedule

2006 Sampling Schedule for Metals

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	**23**	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	**4**
5	6	7	8	9	**10**	11
12	13	14	15	**16**	17	18
19	20	21	**22**	23	24	25
26	27	**28**[AJ]				

March

S	M	T	W	T	F	S
			1	2	3	4
5	**6**	7	8	9	10	11
12	13	14	15	16	17	**18**
19	20	21	22	23	**24**	25
26	27	28	29	**30**	31	

April

S	M	T	W	T	F	S
						1
2	3	4	**5**	6	7	8
9	10	**11**	12	13	14	15
16	**17**	18	19	20	21	22
23	24	25	26	27	28	**29**
30						

May

S	M	T	W	T	F	S
	1	2	3	4	**5**	6
7	8	9	10	**11**	12	13
14	15	16	**17**	18	19	**20**
21	22	**23**	24	25	26	27
28	**29**	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	**10**
11	12	13	14	15	**16**	17
18	19	20	21	**22**	23	24
25	26	27	**28**	29	30	

July

S	M	T	W	T	F	S
						1
2	3	**4**	5	6	7	8
9	**10**	11	12	13	14	15
16	17	18	19	20	21	**22**
23	24	25	26	27	**28**	29
30	31					

August

S	M	T	W	T	F	S
		1	2	**3**	4	5
6	7	8	**9**	10	11	12
13	14	**15**	16	17	18	19
20	**21**[AI]	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	**2**
3	4	5	6	7	**8**	9
10	11	12	13	**14**	15	16
17	18	19	**20**	21	22	23
24	25	**26**	27	28	29	30

October

S	M	T	W	T	F	S
1	**2**	3	4	5	6	7
8	9	10	11	12	13	**14**
15	16	17	18	19	**20**	21
22	23	24	25	**26**	27	28
29	30	31				

November

S	M	T	W	T	F	S
			1	2	3	4
5	6	**7**	8	9	10	11
12	**13**[AJ]	14	15	16	17	18
19[AJ]	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
					1[AN]	2
3	4	5	6	**7**[AH]	8	9
10	11	12	**13**[AQ]	14	15	16
17	18	**19**	20	21	22	23
24	**25**	26	27	28	29	30
31						

Bold = 1-in-6 scheduled dates
AH = Flow rate out of limit
AN = Machine Malfunction

Red... = 1-in-3 scheduled dates
AI = Insufficient data
AQ = Collection error

Green...= makeup sample
AJ = Filter damage

2006 Sampling Schedule for Carbonyls

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	**23**	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	**4**
5	6	7	8	9	**10**	11
12	13	14	15	**16**	17	18
19	20	21	**22**	23	24	25
26	27	**28**				

March

S	M	T	W	T	F	S
			1	2	3	4
5	**6**	7	8	9	10	11
12	13	14	15	16	17	**18**
19	20	21	22	23	**24**	25
26	27	28	29	**30**	31	

April

S	M	T	W	T	F	S
						1
2	3	4	**5**	6	7	8
9	10	**11**	12	13	14	15
16	**17**	18	19	20	21	22
23	24	25	26	27	28	**29**
30						

May

S	M	T	W	T	F	S
	1	2	3	4	**5**	6
7	8	9	10	**11**	12	13
14	15	16	**17**	18	19	**20**
21	22	**23**	24	25	26	27
28	**29**	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4[AN]	5	6	7	8	9	**10**
11	12	13	14	15	**16**	17
18	19	20	21	**22**	23	24
25	26	27	**28**[AH]	29	30	

July

S	M	T	W	T	F	S
						1
2	3	**4**[AH]	5	6	7	8
9	**10**	11	12	13	14	15
16	17	18	19	20	21	**22**
23	24	25	26	27	**28** AH	29
30	31					

August

S	M	T	W	T	F	S
		1	2	**3**	4	5
6	7	8	**9**	10	11	12
13	14	**15**	16	17	18	19
20	**21**	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	**2**
3	4	5	6	7	**8**	9
10	11	12	13	**14**	15	16
17	18	19	**20**	21	22	23
24	25	**26**	27	28	29	30

October

S	M	T	W	T	F	S
1	**2**	3	4	5	6	7
8	9	10	11	12	13	**14**
15	16	17	18	19	**20**	21
22	23	24	25	**26**	27	28
29	30	31				

November

S	M	T	W	T	F	S
			1	2	3	4
5	6	**7**	8	9	10	11
12	**13**	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
					1[AN]	2
3	4	5	6	**7**	8	9
10	11	12	**13**	14	15	16
17	18	**19**	20	21	22	23
24	**25**	26	27	28	29	30
31[AN]						

Bold = 1-in-6 scheduled dates
AH = Flow rate out of limit

Red... = 1-in-3 scheduled dates
AN= Machine Malfunction

Green...= makeup samples

2006 Sampling Schedule for VOCs

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	**17**	18	19	20	21
22	**23**	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	**4**
5	6	7	8	9	**10**	11
12	13	14	15	**16**	17	18
19	20	21	**22**	23	24	25
26	27	**28**				

March

S	M	T	W	T	F	S
			1	2	3	4
5	**6**	7	8	9	10	11
12	13	14	15	16	17	**18**
19	20	21	22	23	**24**	25
26	27	28	29	**30**	31	

April

S	M	T	W	T	F	S
						1
2	3	4	**5**	6	7	8
9	10	**11**	12	13	14	15
16	**17**	18	19	20	21	22
23	24	25	26	27	28	**29**
30						

May

S	M	T	W	T	F	S
	1	2	3	4	**5**	6
7	8	9	10	**11**	12	13
14	15	16	**17**	18	19	**20**
21	22	**23**	24	25	26	27
28	**29**	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	**10**
11	12	13	14	15	**16**	17
18	19	20	21	**22**	23	24
25	26	27	**28**	29	30	

July

S	M	T	W	T	F	S
						1
2	3	**4**	5	6	7	8
9	**10**	11	12	13	14	15
16	17	18	19	20	21	**22**
23	24	25	26	27	**28**	29
30	31					

August

S	M	T	W	T	F	S
		1	2	**3**	4	5
6	7	8	**9**	10	11	12
13	14	**15**	16	17	18	19
20	**21**	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	**2**
3	4	5	6	7	**8**	9
10	11	12	13	**14**	15	16
17	18	19	**20**	21	22	23
24	25	**26**	27	28	29	30

October

S	M	T	W	T	F	S
1	**2**	3	4	5	6	7
8	9	10	11	12	13	**14**
15	16	17	18	19	**20**	21
22	23	24	25	**26**	27	28
29	**30**[AF]	31				

November

S	M	T	W	T	F	S
			1	2	3	4
5	6	**7**	8	9	10	11
12	**13**	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
					1[AG]	2
3	4	5	6	**7**	8	9
10	11	12	**13**	14	15	16
17	18	**19**	20	21	22	23
24	**25**	26	27	28	29	30
31						

Bold = 1-in-6 scheduled dates
AF= Scheduled but not collected

Red… = 1-in-3 scheduled dates
AG = Sample time out of limit

Green… = makeup samples

Attachment 3

Field and Laboratory Audits

Air Resources Board

Robert F. Sawyer, Ph.D., Chair
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Alan C. Lloyd, Ph.D.
Agency Secretary

Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Webster Tasat, Manager
Operations Planning and Assessment

THROUGH: Michael Miguel, Manager
Quality Assurance section

FROM: Don Fitzell
Air Pollution Specialist

DATE: January 30, 2006

SUBJECT: PESTICIDE SAMPLER FLOW AUDITS

Attached are the results for the pesticide sampler flow audits conducted on January 26, 2006, at three schools (Benavidez, Martinez and Chavez) in Parlier. The sampling is part of a study being conducted by the Department of Pesticide Regulation. A mass flow meter (MFM) was attached in series with each pesticide sampler through the sampling cartridge to simulate actual operating conditions. The Quality Assurance Section's (QAS) MFM readings were corrected to actual flow and compared to the sampler's actual flow.

It was noted that the MFM used to set up the higher flow (15 liters per minute (LPM)) samplers had not been certified since June 21, 2004. In addition, the 15 LPM samplers were less than 1 meter apart.

All pesticide samplers were operating within the QAS's ±10% control limit. The QAS also audited the BAM PM2.5 and toxics samplers located at the Benavidez School. The results of those audits are also attached. If you have any questions, please contact me at 322-3892.

Attachments

cc: Randy Segawa
Department of Pesticide Regulation

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: http://www.arb.ca.gov.

California Environmental Protection Agency

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Attachment

Sampler ID	MFM Audit Reading	Standard Flow (sccm)	Actual Flow (ccm)	Sampler MFM Display	Sampler Standard Flow (sccm)	Sampler Actual Flow (ccm)	% Difference
628.0	48.9	1.52	1.49	N/A	1.54	1.51	1.3
317.0	50.3	1.57	1.54	N/A	1.55	1.52	-1.3
587.0	51.7	1.61	1.58	N/A	1.59	1.56	-1.3
349.0	52.3	1.63	1.60	N/A	1.63	1.60	0.0
303.0	51.1	1.59	1.56	N/A	1.60	1.57	0.6
301.0	50.2	1.56	1.53	N/A	1.57	1.54	0.7

CDPR MFM used for setting flows last calibrated 6/29/05.

Audit Calculations

Standard Flow = (MFM Audit Reading x MFM Slope) + MFM Intercept

Actual Flow = Standard Flow x (Ambient Temperature in Kelvin / 298.15 K) x (760 mmHg / Ambient Pressure in mmHg)

% Difference = ((Sampler Flow - Actual Flow) / Actual Flow) x 100

Audit MFM Slope: 0.0306

Audit MFM Intercept: 0.0282

Ambient Temperature = 291.55 K (18.4^{o}C)

Ambient Pressure = 756 mmHg

Audit Date: 1-26-06

Attachment

Sampler ID	MFM Audit Reading	Standard Flow (sccm)	Actual Flow (ccm)	Sampler MFM Display	Sampler Standard Flow (sccm)	Sampler Actual Flow (ccm)	% Difference
A5	51.5	16.1	15.8	N/A	16.4	16.1	1.9
A10	52.7	16.5	16.2	N/A	17.0	16.7	3.1
A15	53.6	16.7	16.5	N/A	17.5	17.2	4.2
A9	52.6	16.4	16.1	N/A	17.1	16.8	4.3
A13	55.8	17.4	17.1	N/A	17.0	16.7	-2.3
A14	52.9	16.5	16.2	N/A	16.6	16.3	0.6

CDPR MFM used for setting flows last calibrated 6/21/04.

Samplers are less than 1 meter apart.

Audit Calculations

Standard Flow = (MFM Audit Reading x MFM Slope) + MFM Intercept

Actual Flow = Standard Flow x (Ambient Temperature in Kelvin / 298.15 K) x (760 mmHg / Ambient Pressure in mmHg)

% Difference = ((Sampler Flow - Actual Flow) / Actual Flow) x 100

Audit MFM Slope: 0.3056

Audit MFM Intercept: 0.3491

Ambient Temperature = 291.55 K (18.4^{o}C)

Ambient Pressure = 756 mmHg

Audit Date: 1-26-06

Air Resources Board

Alan C. Lloyd, Ph.D.
Agency Secretary

Robert F. Sawyer, Ph.D., Chair
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Sacramento, California 95812 • www.arb.ca.gov

Arnold Schwarzenegger
Governor

TO: Randy Segawa
Agricultural Program Supervisor
Environmental Monitoring Branch
Department of Pesticide Regulation

FROM: CP Charles Pearson, Acting Manager,
Quality Assurance Section
Monitoring and Laboratory Division

DATE: March 29, 2006

SUBJECT: SYSTEM AUDITS OF THE CDFA AND ARB LABORATORIES - PARLIER PESTICIDE MONITORING

This report summarizes the system audit findings for the California Department of Food and Agriculture's (CDFA) Center for Analytical Chemistry, the Air Resources Board's (ARB) Organic Laboratory Section (OLS), and ARB's Inorganic Laboratory Section (ILS).

The Quality Assurance (QA) team evaluated the CDFA laboratory which analyzes for thirty different pesticides using gas chromatography-mass spectroscopy (GC-MS) and High Pressure Liquid Chromatography-Mass Spectroscopy (HPLC-MS). The ARB's ILS analyzes for twenty-nine different elements using Energy-Dispersive X-ray Fluorescent (XFR) spectroscopy and ion chromatography. The ARB's OLS analyzes for twenty-six aromatic and halogenated compounds using GC-MS and HPLC.

All laboratories were following accepted and agreed-upon procedures for analysis and quality assurance, including: sample handling, instrument calibration, method validation, and documentation. Overall, all three laboratories have good QA practices and produce good quality data. The QA team had the following comments and recommendations for the CDFA laboratory, ILS, and OLS:

CDFA

1. The CDFA laboratory does not have an independent review process for these data. Normally, the data are reviewed by another CDFA analytical chemist and the supervising chemist. It is recommended that an independent review be conducted by the QA officer.

2. The standard curve for several pesticides is skewed because of inclusion of a high concentration standard. This high level standard is included to bracket the high level field spike. It is recommended that field spikes be prepared at a level comparable to the ambient levels detected. Re-calculation of previous samples may be necessary.

3. Multi-point calibrations are performed before and after each set of samples. The average for each point is then used to calculate the standard curve. If the correlation coefficient is not high enough data points from one or the other multi-point is dropped. There does not appear to be standard criteria for omitting a data point. The criteria for omitting a data point should be formalized or the standard curve used as is, even if the correlation coefficient isn't as high as desired.

4. Standard Operating Procedures (SOP) for analyses have been modified since the start of the study. It is recommended that all SOPs be finalized. An SOP for the cleaning procedure of the XAD resin used should also be prepared.

5. Currently the CDFA lab receives the XAD resin in a plastic bag with no documentation or identification. It is recommended that the DPR provide some identification (e.g. lot number) in case a problem arises with the sample resin.

6. There is currently no documentation of the sample tubes that leave the laboratory for use in the field. It is recommended that a logbook be used to document the XAD sample tubes that are given to DPR for use in the field.

7. A portion of the sample extracts are saved in a freezer in case re-analysis is required. It is recommended that the meniscus be marked on the vial so any loss of volume can be detected.

8. One pesticide, phosmet, was initially reported only qualitatively due to its instability. Further studies by the laboratory established a higher limit of detection. It is recommended that the results for phosmet now be reported quantitatively using the higher detection limit.

Inorganic Laboratory Section

1. At the time of the audit, only one set of samples had been analyzed. There was no field blank with the samples. It is recommended that a field blank accompany each set of samples.

Organic Laboratory Section

1. At the time of the audit, a complete data package was not available. The QA audit team will review it, when available. It was found that the OLS does a single control point calibration for each set of data. This concerns the QA audit team. Further discussions with the OLS revealed this is the laboratory's SOP. A yearly standard curve is followed by 20 injections of a standard to establish an average value for the standard and its standard deviation (s.d.). A control chart is developed with warnings set at $\pm$2s.d. and out of control limits set at $\pm$3s.d. If the control standard for a particular analyte falls outside the limits, that run for the analyte is invalidated and investigated. Annual external audits as well as round robin comparisons have resulted in good accuracy for the laboratory; however, the QA team feels that if levels are detected that are of concern, further study should be done to confirm those levels before any action is taken.

2. The DPR's health screening levels (0.06 ug/m^3 to 0.19 ug/m^3) for acrolein are below OLS's detection limit (0.3 ppb).

cc: See next page

cc: Elaine Wong
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Air Resources Board

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Dan Skopec
Acting Secretary

Arnold Schwarzenegger
Governor

TO: Jeff Wright, Manager
Operations Planning and Assessment Section

THROUGH: Merrin Bueto, Manager
Quality Assurance Section

FROM: Don Fitzell
Air Pollution Specialist

DATE: April 14, 2006

SUBJECT: PESTICIDE SAMPLER FLOW RE-AUDITS

Attached are the results for the pesticide sampler flow audits conducted on March 30, 2006, at three schools (Benivedas, Martinez and Chavez) in Parlier. The sampling is part of a study being conducted by the Department of Pesticide Regulation (DPR). A mass flow meter (MFM) was attached in series with each pesticide sampler through the sampling cartridge to simulate actual operating conditions. The Quality Assurance Section's (QAS) MFM readings were corrected to actual flow and compared to the sampler's actual flow.

During the audit conducted on January 26, 2006, it was noted that that the higher flow MFM used by DPR had not been certified in over a year. The DPR had both MFMs re-certified on February 27, 2006. It was also recommended during that audit, that the higher flow (15 lpm) samplers should be 1 meter apart. Those samplers are still less than 1 meter apart.

All pesticide samplers were operating within the QAS's ±10% control limit. If you have any questions, please contact me at 322-3892.

Attachment

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: http://www.arb.ca.gov.

California Environmental Protection Agency

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cc: Randy Segawa
Agricultural Program Supervisor
Environmental Monitoring Branch
Department of Pesticide Regulation
P.O. Box 4015
Sacramento, CA 85812

Attachment

Sampler ID	MFM Audit Reading	Standard Flow (lpm)	Actual Flow (lpm)	Sampler MFM Display	Sampler Standard Flow (lpm)	Sampler Actual Flow (lpm)	% Difference
278	50.3	1.57	1.56	N/A	1.52	1.51	-3.2
203	51.0	1.59	1.58	N/A	1.60	1.59	0.6
317	49.5	1.54	1.53	N/A	1.56	1.55	1.3
650	50.5	1.57	1.56	N/A	1.63	1.62	3.8
349	48.8	1.52	1.51	N/A	1.54	1.53	1.3
301	51.2	1.59	1.58	N/A	1.59	1.58	0.0
85	48.3	1.5	1.50	N/A	1.52	1.51	0.7

CDPR MFM used for setting flows calibrated 2/27/06.

Audit Calculations

Standard Flow = (MFM Audit Reading x MFM Slope) + MFM Intercept

Actual Flow = Standard Flow x (Ambient Temperature in Kelvin / 298.15 K) x (760 mmHg / Ambient Pressure in mmHg)

% Difference = ((Sampler Flow - Actual Flow) / Actual Flow) x 100

Audit MFM Slope: 0.0306

Audit MFM Intercept: 0.0282

Ambient Temperature = 297.15 K (24.0^{o}C)

Ambient Pressure = 762 mmHg

Audit Date: 3-30-06

Attachment

Sampler ID	MFM Audit Reading	Standard Flow (lpm)	Actual Flow (lpm)	Sampler MFM Display	Sampler Standard Flow (lpm)	Sampler Actual Flow (lpm)	% Difference
A5	47.3	14.8	14.7	N/A	15.2	15.1	2.7
A7	46.3	14.5	14.4	N/A	14.6	14.5	0.7
A9	48.2	15.1	15.0	N/A	15.0	14.9	-0.5
A11	47.6	14.9	14.8	N/A	15.0	14.9	0.7
A2	47.4	14.8	14.7	N/A	14.8	14.7	-0.2
A14	46.5	14.6	14.5	N/A	14.8	14.7	1.7
A4	42.9	13.5	13.4	N/A	14.0	13.9	4.0

: CDPR MFM used for setting flows calibrated 2/27/06.

Samplers are still less than 1 meter apart.

Audit Calculations

Standard Flow = (MFM Audit Reading x MFM Slope) + MFM Intercept

Actual Flow = Standard Flow x (Ambient Temperature in Kelvin / 298.15 K) x (760 mmHg / Ambient Pressure in mmHg)

% Difference = ((Sampler Flow - Actual Flow) / Actual Flow) x 100

Audit MFM Slope: 0.3056

Audit MFM Intercept: 0.3491

Ambient Temperature = 297.15 K (24.0^{o}C)

Ambient Pressure = 762 mmHg

Audit Date: 3-30-06

Air Resources Board

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Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

TO: Randy Segawa
rsegawa@cdpr.ca.gov

FROM: Merrin Bueto, Manager /s/
Quality Assurance Section
Monitoring and Laboratory Division

DATE: September 20, 2006

SUBJECT: FOLLOW-UP AUDITS OF THE CDFA AND ARB LABORATORIES - PARLIER PESTICIDE MONITORING

This report summarize follow-up audit findings for the California Department of Food and Agriculture's (CDFA) Center for Analytical Chemistry, the Air Resources Board's (ARB) Organic Laboratory Section (OLS), and ARB's Inorganic Laboratory Section (ILS). The Quality Assurance (QA) team conducted follow-up audits to review data generated in the Parlier study. A complete system audit of these laboratories was conducted at the beginning of the monitoring; however, insufficient data was generated at that time to review the required five percent of the data generated. Overall, all three laboratories have good QA practices and produce good quality data. The QA team had the following comments and recommendations for the CDFA, ILS, and OLS laboratories:

CDFA

1. The QA team recommended that the CDFA QA Officer conduct an independent review of the data. This has not been done; however, there have been several recent changes in personnel, including the QA Officer.

2. The QA team recommended that field spikes be prepared at a level comparable to the ambient levels detected. DPR has only done this with the MITC spike. Field spikes above the ambient levels detected are of minimal QA value.

3. The QA team recommended that standard curve data points not be omitted to improve the correlation of coefficient. This recommendation has been implemented.

4. The QA team recommended that the Standard Operating Procedures (SOP) used should be finalized. This recommendation has been implemented.

5. The QA team recommended that the XAD resin received from DPR be identified by a batch or lot number. This recommendation has been implemented.

6. The QA team recommended that sample tubes provided for DPR to use in the field be documented. This recommendation has been implemented.

7. The QA team recommended that the meniscus on the vials of saved extract be marked. This recommendation has been implemented.

8. The QA team recommended that the data for phosmet be quantitatively, rather than qualitatively, reported. The laboratory is now doing this with a majority of the data (approximately 90%), where feasible.

9. The CDFA laboratory experienced instrument difficulties in June, following attempts to analyze samples extracted from filters. This resulted in higher detection limits or poor correlation of standard curves for three pesticides analyzed by GC/MS: chlorothalonil, endosulfan sulfate, and cypermethrin. DPR was notified and both DPR and the laboratory have taken steps to correct this problem; however, the GC/MS instrument performance has not yet fully recovered.

<u>ARB Inorganic Laboratory Section</u>

1. No comments or recommendations.

<u>ARB Organic Laboratory Section</u>

2. The laboratory is experiencing problems with their carbon tetrachloride standard. For this reason, no values are being reported at this time. In October the standard will be sent back for re-assay. If the concentration can be verified, the results will be calculated at that time and any impact on data quality will be evaluated by the laboratory.

cc: Steve Siegel

Mathew Platte

Kathy Orr

Kathy Gill

Cliff Popejoy

Don Fitzell

Lynn Baker