California Environmental Protection Agency
Department of Pesticide Regulation

ENVIRONMENTAL JUSTICE PILOT PROJECT PESTICIDE AIR MONITORING IN PARLIER SECOND PROGRESS REPORT

December 2006

Summary

As part of the California Environmental Protection Agency's Environmental Justice Action Plan, the Department of Pesticide Regulation (DPR) is conducting a pilot project focusing on pesticide air concentrations in Parlier. Initially, DPR sought to answer three primary questions:

- Are residents of Parlier exposed to pesticides,
- If so, which pesticides and in what amounts, and
- Do measured levels exceed levels of concern to human health, particularly children.

The Local Advisory Group formed by DPR to advise the project added four additional goals:

- Tell the community about the project.
- Evaluate pesticide risk compared with other pollutants that are monitored.
- Reduce pesticide risk.
- Follow up on the findings. For example, DPR might provide education and technical support to farmers to encourage them to use alternatives that are less toxic or, if there are health concerns, DPR can put stricter controls on certain problematic uses.

This is the second in a series of progress reports describing the project status and includes preliminary monitoring results from January 1 to August 16, 2006. The first progress report presented data from January 1 to March 31, 2006. The results in this progress report are preliminary and subject to change after full analysis of quality control data. Data to ensure quality control is collected throughout the project, but will not be fully analyzed until air monitoring is finished in December 2006. Analysis of this data may result in modifications to information in this progress report.

DPR, with assistance from other agencies, is monitoring for pesticides as well as other pollutants. Most pesticide monitoring occurs three consecutive days each week at three elementary schools in

Parlier: Martinez (northwest part of town), Benavidez (central), and Chavez (southeast). Monitoring began in January 2006 and will continue through December 2006.

Enforceable state or federal health standards have not been established for most pesticides in air. For this pilot project, DPR, with assistance from OEHHA, developed health screening levels for each pesticide to help determine when it may be prudent to evaluate potential health effects of chemical exposure. By itself, a screening level does not indicate the presence or absence of a hazard, but detections above a screening level point to a need for further evaluation.

In the first seven and a half months of monitoring, the key findings were:

- Twenty-two pesticides or breakdown products were detected. (See Table 1 for more information.)
    - Of the 22, 17 are assumed to be present because of their use as pesticides. One, however, had no reported use in the Parlier area during the study period, (diclorvos, used both in agricultural and home-and-garden settings.)
    - The remaining five compounds detected have some pesticidal uses, but their presence is typically due to non-pesticidal sources (for example, vehicle emissions). Four of the five had no reported pesticidal use. The fifth, xylene, had reported use as a pesticide but most of the detections are believed to be non-pesticidal in origin.

- Two pesticides exceeded the acute health screening levels. Diazinon exceeded the acute screening level during one day of the 297 days monitored. The highest concentration detected for the pesticide diazinon and the diazinon oxygen analog (OA) together at a single site was 243 nanograms per cubic meter (ng/m^3). The acute screening level for diazinon and diazinon OA is 130 ng/m^3 for each chemical. In addition, acrolein exceeded the acute health screening levels for most of the days monitored. Acrolein concentrations measured were similar to those typically found in other areas of the state. The acrolein detections were likely due to non-pesticidal sources (for example, vehicle emissions).

- The pesticide with the highest concentration was formaldehyde, detected at 9,250 ng/m^3 [7.7 parts per billion, ppb] (below the acute screening level of 19,000 ng/m^3 [15.8 ppb]). The formaldehyde detections were likely due to non-pesticidal sources.

- The chemical with the highest concentration that likely resulted from pesticide use was the fumigant MITC, detected at 5,010 ng/m^3 [1.7 ppb] (acute screening level is 66,000 ng/m^3 [22 ppb]). MITC was also the pesticide most frequently (78 percent of 297 samples) detected by DPR. All were well below the screening level.

- As many as 11 pesticides were detected at an individual location and day (four additional pesticides were likely due to non-pesticidal sources), and 82 percent of the locations and days monitored had detectable concentrations of more than one pesticide.

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Introduction

***Environmental Justice Action Plan**: DPR's pilot project is one of several being conducted throughout the state. Different pilot projects focus on different geographic areas and/or environmental concerns. All pilot projects include common elements to address children's environmental heath, cumulative impacts, precautionary approaches, and public participation.*

As part of the California Environmental Protection Agency's Environmental Justice Action Plan, the Department of Pesticide Regulation (DPR) is conducting a pilot project focusing on pesticide air concentrations in Parlier. Parlier is a small agricultural community located in California's San Joaquin Valley, approximately 20 miles southeast of Fresno. Fruit orchards and grape vineyards are the predominant crops in the area.

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

***Local Advisory Group (LAG) and Technical Advisory Group (TAG)**: The LAG includes representatives of community organizations, local businesses, a local health care provider, and growers. The TAG is composed of scientific staff from government agencies, university researchers, and technical specialists from the area. Both were formed by DPR for this project.*

With assistance from a Local Advisory Group and Technical Advisory Group, DPR established seven key objectives for the project:

- Are residents of Parlier exposed to pesticides.
- If so, which pesticides and in what amounts.
- Do measured levels exceed levels of concern to human health, particularly children.
- Tell the community about the project.
- Evaluate pesticide risk compared with other pollutants that are monitored.
- Reduce pesticide risk.
- Follow up on the findings. For example, DPR might provide education and technical support to farmers to encourage them to use alternatives that are less toxic or, if there are health concerns, DPR can put stricter controls on certain problematic uses.

This is the second in a series of progress reports describing the project status, focusing on interim monitoring results for the first three objectives. The first progress report was released in June, 2006. Another progress report will be released in Spring, 2007. The progress reports present the monitoring data and an initial health evaluation of acute exposures that may cause health effects. DPR expects to release a final report in late 2007. Using standard risk assessment methods, DPR will evaluate data for potential health risks from exposure to individual pesticides as well as to multiple pesticides (cumulative risk), exploring various approaches to evaluating the risk from multiple pesticides. To the extent possible, using standard methodology supplemented by guidance being developed by OEHHA, DPR will assess cumulative impacts from exposure to pesticides in other media and to other environmental contaminants.

Pesticides and Other Pollutants Monitored

Breakdown Products: *Over time, pesticides degrade to other chemicals, or breakdown products.* **Oxygen analogs** *(OAs) are breakdown products of* **organophosphate** *insecticides. Unlike most breakdown products, the oxygen analogs are usually more toxic than the parent organophosphate.*
Volatile organic compounds (VOCs)*: VOCs are hydrocarbons that evaporate into the air easily. Most VOCs contribute to the formation of ozone. The VOCs included in ARB's monitoring are also toxic chemicals.*

PM2.5*: Particulate matter pollution consists of very small liquid and solid particles floating in the air. PM2.5 consist of particulates less than 2.5 microns. Of greatest concern to public health are the particles small enough to be inhaled into the lung. PM2.5 is a major component of air pollution*

Air monitoring is being conducted for 40 pesticides (including five breakdown products). DPR selected the pesticides for monitoring based on toxicity, volatility, extent of use in the area, availability of sampling and laboratory methods, and ability to include in a multi-residue method. Twenty of the 40 pesticides being monitored were among the top 100 used within five miles of Parlier during 2003. The remaining pesticides were included in the multi-pesticide monitoring method because they could be added without extra cost and many have high use in other areas of the state, where the method may be used at a future date.

To collect data that can be used to address cumulative exposure, the Air Resources Board (ARB) is monitoring for particulate matter (2.5 micron size), volatile organic compounds, and metals/elements. The San Joaquin Valley Air Pollution Control District (SJVAPCD) is monitoring for other common air pollutants (ozone, nitrogen dioxide) on a routine basis, and for hydrocarbons during the summer. DPR is doing most of the pesticide monitoring, but ARB is monitoring for a few pesticides because they are included in their methods for volatile organic compounds and metals/elements. DPR is also doing limited monitoring for pesticides and other pollutants in Parlier drinking water.

Area Monitored

For this project, air monitoring is being done at three elementary schools in Parlier (Figure 1): Martinez (northwest part of town), Benavidez (central), and Chavez (southeast). In addition, SJVAPCD routinely monitors for other air pollutants at the University of California Kearney Agricultural Center, approximately one mile southeast of town.

Methods

Monitoring Plan – DPR, ARB, and SJVAPCD have different monitoring plans. DPR monitors 31 pesticides and breakdown products by collecting 24-hour samples, three consecutive days a week at each of the three schools, for 52 weeks during 2006. DPR also conducts limited pesticide monitoring in Parlier drinking water. The California Department of Food and Agriculture performs the laboratory analysis of DPR's samples.

ARB is monitoring for nine pesticides. They are among 33 volatile organic compounds (including six pesticides) and 33 metals/elements (including three pesticides) being collected and analyzed for as 24-hour samples every six days at Benavidez School. The sampling frequency increases to every three days during peak seasons for certain pesticides. ARB monitors particulate matter on a continuous basis at Benavidez.

SJVAPCD monitors ozone, and nitrogen dioxide on a continuous basis, and hydrocarbons seasonally at the Kearney Agricultural Center.

A detailed protocol for all of the monitoring is available at www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm.

Quality Control Methods – The monitoring includes extensive quality control measures to validate the methods before and check the methods' performance during the study. For the study period documented in this progress report, the method validation verified that the lowest possible detection limits and quantitation limits were achieved and ensured that the detection limits were lower than the health screening levels. The quality control measures include analyses of samples containing known amounts of pesticides (spikes) to determine accuracy, samples containing no pesticides (blanks) to detect inadvertent contamination, and duplicate samples to determine precision. A multi-agency group conducts audits to ensure appropriate procedures are followed.

Methods for Collecting Weather and Pesticide Use Data – Weather and pesticide use information are collected to help evaluate the monitoring data. Weather stations are located at the Benavidez and Kearney monitoring sites, and measure wind speed, wind direction, temperature, and humidity. DPR maintains a database of all reported agricultural pesticide applications in California, including date applied, amount applied, and application location.

Health Evaluation Methods – DPR, with the assistance of Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA), evaluates monitoring data for potential health risks from exposure to pesticides. The health risks are evaluated using screening levels established from toxicological data. Different exposure time periods have different screening levels. Acute (short-term) screening levels address exposures for one day. Subchronic (intermediate-term) screening levels address exposures for two weeks duration. Chronic (long-term) screening levels address exposures for one year.

***Method Detection Limit**: The method detection limit is the smallest amount of the chemical that can be identified in a sample with the method employed. If the sample contains no chemical, or may have a concentration less than the detection limit, the sample is designated as having **no detectable concentration (nd)**. When calculating average concentrations, DPR usually assumes that samples with no detectable amount have a concentration of one-half the detection limit.*

***Estimated Quantitation Limit**: The estimated quantitation limit is the smallest amount of the chemical that can be measured. Samples with concentrations less than the quantitation limit, but more than detection limit are designated as containing a **trace** amount, but the concentration cannot be measured reliably. When calculating average concentrations, DPR usually assumes that samples with a trace amount have a concentration of the midpoint between the detection and quantitation limits.*

***Screening Level**: Enforceable state or federal health standards have not been established for most pesticides in air. In these types of projects, DPR typically develops health screening levels for each pesticide to help determine when it may be prudent to evaluate potential health effects of chemical exposure. By* *itself, a screening level does not indicate the presence or absence of a hazard, but detections above a screening level point to a need for further evaluation.*

OEHHA is leading the effort to estimate the risk from the cumulative exposure to multiple pollutants. Evaluation of cumulative health risk will not be done until after the air monitoring is complete in December 2006 and data has been fully analyzed.

Preliminary Results and Discussion

This progress report describes preliminary monitoring results for the following periods:

- DPR: January 1 to August 16, 2006
- ARB: January 15 to June 28, 2006
- SJVAPCD: January 1 to April 30, 2006

***Number of samples**: For each day and location monitored, two or four individual samples are collected for one or more pesticides. DPR collects one sample for MITC and one sample for 30 other pesticides and breakdown products three consecutive days each week. ARB collects one VOC sample that includes six pesticides and one metals/element sample that includes three pesticides every six days.*

***Concentration and Units**: The concentration is the amount of a chemical in an amount of air. Concentrations in air can be expressed in units of volume or weight. For this study, concentrations are expressed as **nanograms per cubic meter (ng/m^3)**. This unit refers to the weight in nanograms of a pesticide contained in one cubic meter of air. A nanogram is one-billionth of a gram. One grain of salt weighs approximately 60,000 nanograms.*

*Providing concentrations in **parts per billion (ppb)** for this project is potentially misleading. The conversion from ng/m^3 to ppb is different for each chemical because it depends on the mass of*

The results for this progress report are preliminary and subject to change until DPR completes the analysis of all quality control data at the end of the project. DPR may consider three of its samples collected so far as invalid due to differences between the starting and ending sampler air flow rates. However, these samples are included in the results described here. In addition, because of equipment problems the analytical laboratory was unable to provide concentration data for chlorothalonil during the week of July 9 – 12, 2006. The detection limit and reporting limit have increased due to the problems. There was no use reported for chlorothalonil after April 15, 2006. DPR has also not yet conducted the normal quality control checks of the 2006 pesticide use reports; these data are also preliminary.

Of the 40 pesticides or breakdown products for which results were available, 22 of them were detected in one or more of the 628 samples (297 samples for MITC, 297 samples for 30 other pesticides, 34 samples for VOCs) collected and analyzed (Table 1). Of the 22 detected pesticides, 17 are assumed to be present because of their use as pesticides. Two, however, had no reported use in the Parlier area during the study period (Table 2). The remaining five compounds detected have some pesticidal uses, but their presence is typically due to non-pesticidal sources (for example, vehicle emissions). Four of the five had no reported pesticidal use. The fifth, xylene, had reported use as a pesticide but most of the detections are believed to be non-pesticidal in origin.

Diazinon was the only pesticide monitored that exceeded the screening levels for the acute (one-day) periods. No pesticides exceeded the screening levels for the subchronic exposure (two-week) periods. Acrolein exceeded the screening level due to non-pesticidal use. (See the <u>*Other Pollutants and Weather Data*</u>

the chemical molecule (i.e. 1 ppb of chlorpyrifos is a different amount of mass than 1 ppb of diazinon). This makes the relative comparison of chemical concentrations in ppb difficult and potentially misleading.

Descriptions of pesticides with quantifiable concentrations

***1,3-dichloropropene** (Telone, Inline); soil fumigant; agricultural uses.*

***Acrolein** (Magnacide); aquatic herbicide; used in irrigation canals; non-pesticidal sources include engine exhaust, tobacco smoke, and chemical manufacturing.*

***Arsenic** (several products); inorganic compound; wood treatment; non-pesticidal sources include wood burning, and combustion sources.*

***Carbon disulfide** (Enzone); soil fumigant; agricultural uses; non-pesticidal sources include industrial processes and natural product.*

***Chlorpyrifos** (Dursban, Lorsban) organophosphate insecticide, oxygen analog analyzed; agricultural and residential uses.*

***Copper** (several products) Fungicide, agricultural and non-agricultural uses; natural product in soil.*

***Diazinon** (several products) organophosphate insecticide, oxygen analog analyzed; agricultural and residential uses.*

***Formaldehyde** (Aldesan, Bactron); disinfectant; used in poultry houses; non-pesticidal sources include pressed wood, tobacco smoke, combustion sources, textiles, and glues.*

***Methyl bromide** (Bromogas,*

section). Formaldehyde had the highest concentration (9,250 ng/m^3). However, non-pesticidal sources such as composite wood products, cigarette smoke, combustion products, and disinfectants may account for most of the formaldehyde detected. The chemical with the highest concentration that likely resulted from pesticide use was MITC (5,010 ng/m^3). This level is below the acute screening level. Table 2 shows that DPR detected MITC most frequently (78 percent of 297 samples).

1,3-dichloropropene, MITC, chlorpyrifos, copper, methyl bromide, diazinon, phosmet and sulfur were all detected at quantifiable concentrations (Table 1). Figures 2 and 3 show concentrations of these eight pesticides over time. Figure 2 shows the highest one-day concentrations (among the three monitoring locations). Figure 3 shows the highest two-week concentrations (among the three monitoring locations). Chlorpyrifos concentrations were more consistent over time, while the others were more variable.

Figure 4 shows the results by location. Air concentrations were approximately the same for Martinez (northwest), Benavidez (central), and Chavez (southeast), except for the single relatively high MITC sample detected at Benavidez.

As many as 11 of 40 pesticides and breakdown products monitored were detected at an individual location and day (five additional pesticides were likely detected due to non-pesticidal sources), and 82 percent of the locations and days monitored had detectable concentrations of more than one pesticide.

Pesticide Use – Table 2 shows the preliminary amount of use and number of pesticide applications reported for January 1 – July 31, 2006, within five miles of Parlier. A few of the pesticides monitored are used in residential areas; many of these applications are not required to be reported. The frequency of detections and magnitude of concentrations roughly corresponded to the use patterns for some pesticides, but not others. Based on the preliminary pesticide use data for 2006, all detected pesticides had reported use, except diclorvos (which also has home and garden use). Acrolein, arsenic, carbon disulfide, and formaldehyde were also detected and had no reported use, but these compounds have major non-pesticidal sources that likely account for their detection. In addition, carbon disulfide is a minor breakdown product of other pesticides, such as metam sodium. Most pesticides not detected had no use. Some pesticides had use, but no detections (oryzalin, oxyfluorfen, norflurazon, diuron). However, DPR has not determined the location and dates of these applications relative to the monitoring. In addition, these pesticides have low volatility. Table 3 shows monthly pesticide use for 2004 (the most recent year with finalized

MBR, Metabrom, Tri-Con); fumigant; agricultural uses include soil treatment and chamber fumigation of commodities.

Methyl isothiocyanate, MITC *(metam-sodium, metam-potassium, Vapam, Sectagon); fumigant; breakdown product of other pesticides such as metam-sodium; agricultural uses.*

Phosmet, *(Imidan); organophosphate insecticide; agricultural and residential uses.*

Sulfur (several products); *elemental compound; general use pesticide; non-pesticidal sources include combustion of petroleum products, and other products.*

Xylene *(several products); volatile organic compound and solvent; used as an active and inert ingredient in pesticide products; non-pesticidal sources include fuels, paints, cleaners, and other products.*

data), and indicates that use peaked in January – March for many of the pesticides detected, including chlorothalonil, chlorpyrifos, MITC (metam-sodium), simazine, and trifluralin. Use in the first seven months of 2004 and 2006 appeared comparable for most pesticides. Some of the other pesticides detected, such as phosmet and sulfur, peaked April – June in 2004, and reported use in 2006 appears to be similar except sulfur had about half of the use of 2004.

Figures 5 through 10 show the locations by sections of where the pesticides with quantifiable detections (chlorpyrifos, diazinon, phosmet, metam-sodium and potassium N-methylthiocarbamate [MITC producing products], 1,3-dichloropropene, and sulfur) were made. All methyl bromide applications were made to harvested commodities in chambers located approximately four4 miles southeast of the city of Parlier.

Pesticide Water Monitoring – Three municipal wells currently provide all of the drinking water for Parlier. DPR's samples from these wells contained no detectable concentrations of eight pesticides and four breakdown products found in ground water in other areas (atrazine, bromacil, diuron, hexazinone, metribuzin, norflurazon, prometon, simazine, desmethyl norflurazon, deethyl atrazine, deisopropyl atrazine, and diamino chlorotriazine).

Quality Control – DPR's quality control data for its pesticide air samples were within the normal range. None of the blank samples contained detectable concentrations, indicating inadvertent contamination did not occur. The analysis of spiked samples recovered between 70 and 120 percent, a common acceptable range. Duplicate sample results for the quantifiable MITC samples ranged from 4.7 to 8.2 relative percent difference. Duplicate sample results for the quantifiable multiple residue samples ranged from 4.8 to 29 relative percent difference. ARB's quality control data were not available.

In January, a sampler flow audit was conducted by ARB's Quality Assurance Section (QAS) to evaluate the monitoring equipment used by DPR and ARB. A subsequent follow up audit was performed in March. Both audits found that all samplers were operating within the QAS's ±10% control limit. In addition to the equipment, the three analytical laboratories that analyze samples for DPR and ARB were audited in March and September. The QAS team found that all three laboratories have good quality assurance practices and produce good quality data.

Other Pollutants and Weather Data – Table 4 shows the highest volatile organic compound (VOC) concentrations detected in

Parlier, as well as a comparison to concentrations detected at ARB's monitoring station in Fresno during January through June 2006. Twenty-two of the 23 VOCs monitored were detected in Parlier. Acetone had the highest concentration of 23,200 ng/m^3, which compares with levels measured in Fresno. Acrolein was the only VOC that exceeded the health screening level (highest concentration detected was 2,690 ng/m^3, screening level 190 ng/m^3). However, concentrations were similar to those detected in Fresno and other areas of the state, and the potential health effect is mild eye irritation. Acrolein is used as an aquatic herbicide in large irrigation canals. There are no such canals in the Parlier area, and there was no reported use of acrolein during January – July 2006 within five miles of Parlier. Major sources of acrolein include engine exhaust and tobacco smoke. Carbon disulfide and formaldehyde also have some pesticidal uses, but detected concentrations in Parlier are likely due to non-pesticidal sources. Carbon disulfide is a natural product and is used in industrial processes. Formaldehyde is found in pressed wood (e.g., plywood and particleboard), tobacco smoke and other combustion processes, textiles (e.g., clothing and drapes), and adhesives/glues.

Criteria air pollutants*: Common air pollutants for which health standard criteria have been established. Exceedance of the health standard criteria triggers regulatory actions to reduce concentrations. Criteria air pollutants monitored in Parlier include ozone, nitrogen dioxide, and particulate matter. Ozone and particulate matter frequently exceed the health standards in the San Joaquin Valley. ARB and SJVAPCD lead the development and implementation of regulatory measures to meet the health standards.*

Figure 11 shows concentrations of the criteria air pollutants ozone and nitrogen dioxide at the SJVAPCD Kearney Agricultural Center monitoring station during January through April 2006. These pollutants are monitored on a continuous basis. The highest 1-hour concentration for ozone was 179,000 ng/m^3 (91 ppb) and nitrogen dioxide was 96,000 ng/m^3 (51 ppb). Ozone exceeded the 8-hour average concentration air quality standard of 137,000 ng/m^3 (70 ppb) on April 28 and 29, 2006. Nitrogen dioxide did not exceed the 1-hour average concentration standard of 470,000 ng/m^3 (250 ppb). These concentrations were similar to previous years during this monitoring period, when peak 8-hour concentrations for ozone occurred in April and ranged from 133,500 – 153,000 ng/m^3 in 2004 and 2005. Peak concentrations of nitrogen dioxide occurred January and February and were 71,500 – 73,500 ng/m^3 in 2004 and 2005. Concentrations for both pollutants show the normal diurnal pattern of higher concentrations during the day and lower concentrations at night.

Weather data from the SJVAPCD monitoring stations showed the typical conditions for January through April. Figure 13 shows that winds were variable, with an average speed of four miles per hour, and no predominant direction.

Table 5 and Figure 12 present ARB's data for particulate matter and metals/elements, including the pesticides copper and sulfur monitored at Benavidez Elementary School. These pollutants are monitored on a 1 day in 6 day schedule (except for the period from

April 26th through May 17th when samples were collected every three days). The highest concentration measured for arsenic was 3 ng/m3, and copper and sulfur were 210 and 1800 ng/m^3, respectively. Fine particulate matter (PM2.5) is monitored on a continuous basis. The highest hourly concentration of particulate matter at 2.5 microns was 161,000 ng/m^3. PM2.5 exceeded the 24-hour state and federal air quality standard of 65,000 ng/m^3 on February 13, 2006.

Hexavalent chromium was detected during the first quarter of the study (Table 6). Concentrations measured were slightly lower than concentrations measured in Fresno during the same time period.

Table 1. Highest concentrations detected for each of the pesticides monitored, as of August 16, 2006. Results for the nine pesticides monitored by ARB are through June 28, 2006. See Figure 3 for distribution of daily concentrations for pesticides with quantifiable concentrations.

Pesticide	Quantitation Limit (ng/m^3)	Highest 1-Day Concentration (ng/m^3)	Acute Screening Level (ng/m^3)
1,3-dichloropropene	444	1,640	160,000
Acrolein[a]	670	2,690	190
Arsenic[a]	2.0	3*	30
Carbon disulfide[a]	310	3,050*	1,550,000
Chlorpyrifos	46.3	150	1,200
Chlorpyrifos oxygen analog	11.6	28*	1,200
Copper[b]	1.0	210*	100,000
Diazinon	11.6	172*	130
Diazinon oxygen analog	11.6	71*	130
Formaldehyde[a]	120	9,250*	19,000
Methyl bromide	116	950	820,000
MITC	23.2	5,010*	66,000
Phosmet	23.2	42*	77,000
Sulfur[b]	2.0	1,800*	Not determined
Xylene[b]	850	4,200	900,000
Chlorothalonil	92.6	Trace	34,000
Dichlorvos	46.3	Trace*	160,000
Malathion oxygen analog	11.6	Trace*	40,000
Permethrin	46.3	Trace*	168,000
Propargite	46.3	Trace*	14,000
Simazine	11.6	Trace	110,000
Trifluralin	23.2	Trace	1,200,000
Azinphos-methyl	23.2	Not detected	101,000
Cypermethrin	46.3	Not detected	40,000
Dicofol	46.3	Not detected	11,000
Dimethoate	11.6	Not detected	34,000
Dimethoate oxygen analog	11.6	Not detected	34,000
Diuron	23.2	Not detected	170,000
Endosulfan	46.3	Not detected	4,000
Endosulfan sulfate	46.3	Not detected	4,000
EPTC	11.6	Not detected	230,000
Malathion	11.6	Not detected	40,000
Metolachlor	11.6	Not detected	85,000
Molinate	11.6	Not detected	200,000
Norflurazon	11.6	Not detected	170,000
Oryzalin	11.6	Not detected	420,000
Oxyfluorfen	46.3	Not detected	510,000
Propanil	11.6	Not detected	51,000
SSS-tributylphos… (DEF)	11.6	Not detected	8,800
Thiobencarb	11.6	Not detected	425,000

*Concentration is higher than reported in first progress report or was not available.

[a] Detections of these compounds are likely due to non-pesticidal sources only.

[b] Detections of these compounds are likely due to both pesticidal and non-pesticidal sources.

Table 2. Percent of samples with detectable pesticide concentrations and preliminary reported use (within five miles of Parlier).

Pesticide	Numbers of Samples Collected	Percent of Samples with Detection[a]	Reported Use Jan-July 2006 (pounds a.i.)	Number of Reported Applications Jan – July 2006
Carbon disulfide[b]	33	100	0	0
Copper[c]	31	100	78,443	1,669
Formaldehyde[b]	30	100	0	0
Sulfur[c]	31	100	351,606	3,604
MITC	297	78	26,401	11
Acrolein[b]	33	76	0	0
Chlorpyrifos	297	75	21,091	911
Diazinon	297	49	1,398	104
Methyl bromide	33	45	791*	57
Arsenic[b]	31	42	0	0
Trifluralin	297	31	79	16
Chlorpyrifos oxygen analog	297	30	---	---
Diazinon oxygen analog	297	29	---	---
Phosmet	297	28	15,378	579
Chlorothalonil	288	27	5,066	141
Xylene[c]	33	24	10	2
Propargite	297	18	1,147	61
Simazine	297	9	10,770	952
Malathion oxygen analog	297	3	---	---
1,3-dichloropropene	33	3	46,542	13
Dichlorvos	297	2	0	0
Permethrin	297	1	183	38
Dicofol	297	0	110	110
Diuron	297	0	1,822	108
Norflurazon	297	0	1,230	201
Oryzalin	297	0	11,547	632
Oxyfluorfen	297	0	6,058	1,727
Azinphos-methyl	297	0	0	0
Cypermethrin	297	0	0	0
Dimethoate	297	0	0	0
Dimethoate oxygen analog	297	0	---	---
Endosulfan	297	0	0	0
Endosulfan sulfate	297	0	---	---
EPTC	297	0	0	0
Malathion	297	0	0	0
Metolachlor	297	0	0	0
Molinate	297	0	0	0
Propanil	297	0	0	0
SSS-tributylphos… (DEF)	297	0	0	0
Thiobencarb	297	0	0	0

[a] Includes quantified detections and trace detections.

[b] Detections of these compounds are likely due to non-pesticidal sources only.

[c] Detections of these compounds are likely due pesticidal and non-pesticidal sources.

*All applications were chamber fumigations

Table 3. Reported use of pesticides included in the monitoring and applied within five miles of Parlier, by month for 2004. Highest month for each pesticide is shown in bold. Pesticides not shown had no reported use within five miles of Parlier during 2004, including acrolein, carbon disulfide, and formaldehye.

Pesticide	Amount Reported for 2004 (pounds)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1,3-DICHLOROPROPENE	17,797	2,655	27,433	13,709	0	0	0	0	30,709	50,473	**77,370**	4,457	224,603
AZINPHOS-METHYL	0	0	0	44	**249**	26	18	0	0	0	0	0	337
CHLOROTHALONIL	61	96	**1,100**	16	0	0	0	0	0	0	0	0	1,274
CHLORPYRIFOS	**12,782**	3,602	2,991	51	366	311	1,206	75	3,076	420	60	1,681	26,620
COPPER	**45,509**	15,563	8,477	5,158	379	1,336	894	1,666	284	1,993	3,385	5,688	90,333
DIAZINON	420	138	86	67	583	**985**	492	29	90	0	0	202	3,092
DICOFOL	0	0	0	0	0	0	**28**	0	0	0	0	0	28
DIMETHOATE	0	0	0	**96**	24	0	8	0	0	0	0	0	128
DIURON	33	378	**1,398**	130	0	0	0	0	0	61	163	0	2,165
ENDOSULFAN	0	0	0	0	0	0	1	**330**	6	0	0	0	336
MALATHION	0	0	**1**	0	0	0	0	0	0	0	0	0	1
METAM-SODIUM	**20,320**	6,350	0	0	0	0	0	0	0	0	0	0	26,670
METHYL BROMIDE	848	0	0	0	0	0	2,345	191	0	0	**20,368**	0	23,753
NORFLURAZON	614	**648**	293	0	0	0	0	0	0	0	0	139	1,694
ORYZALIN	1,025	**2,614**	644	17	0	19	0	2	0	187	278	468	5,253
OXYFLUORFEN	1,171	**2,771**	224	47	0	2	0	24	31	275	279	264	5,087
PERMETHRIN	34	0	0	0	**17**	3	6	1	0	2	0	0	64
PHOSMET	126	56	5	**17,528**	12,982	4,625	1,485	146	13	0	0	0	36,965
PROPARGITE	0	0	22	62	856	**2,835**	2,610	97	0	0	0	0	6,481
SIMAZINE	2,707	**6,116**	3,213	748	7	0	0	0	27	16	152	210	13,196
SULFUR	0	3,909	102,333	**332,500**	282,907	183,377	23,206	3,251	1,494	144	0	0	933,120
TRIFLURALIN	**55**	23	35	0	0	3	11	0	0	0	0	0	127
XYLENE[a]	11	0	0	0	0	0	16	0	0	0	0	**166**	193
Total	103,515	44,920	148,254	370,173	298,370	193,522	32,327	5,810	35,728	53,572	102,055	13,274	1,401,520

[a] Use shown for xylene is as an active, not inert, ingredient.

Table 4. Highest volatile organic compound (VOC) concentrations detected at Benavidez, January through June 2006. VOCs that were likely detected due to pesticide use in the Parlier area are shown in bold. VOCs that have some pesticidal use, but not in the Parlier area are shown in italics. Concentrations detected at ARB's monitoring station in Fresno are shown for comparison.

Volatile Organic Compound	Quantitation Limit (ng/m^3)	Highest 1-Day Concentration in Parlier (ng/m^3)	Highest 1-Day Concentration in Fresno (ng/m^3)	Acute Screening Level (ng/m^3)[a]
1,3-Butadiene	87	370	450	Not available
1,3-Dichloropropene	**440**	**1,640**	**444***	**160,000**
Acetaldehyde	180	5,290*	4,050*	Not available
Acetone	700	23,200*	19,280*	Not available
Acetonitrile	490	7,880	6,240*	Not available
Acrolein	*670*	*2,690*	*1,820**	*190*
Acrylonitrile	640	1,910*	1,870*	Not available
Benzene	160	1,780	2,380	13,000,000
Carbon disulfide	*310*	*3,050**	*2,070*	*1,550,000*
Carbon tetrachloride[1]	120	860	920	19,000,000
Chloroform	96	143*	239*	1,500,000
Dichlorobenzene	1,760	Not detected	Not detected	Not available
Ethyl benzene	850	425*	425*	Not available
Formaldehyde	*120*	*9,250**	*6,010**	*19,000*
Methyl bromide	**116**	**950**	**190**	**820,000**
Methyl chloroform	50	110	110	Not available
Methyl ethyl ketone	290	580	870	130,000,000
Methylene chloride	340	1,390*	750	140,000,000
Perchloroethylene	66	200	200	200,000,000
Styrene	420	208*	208*	210,000,000
Toluene	740	4,800	5,160	370,000,000
Trichloroethylene	110	53*	53*	Not available
Xylene[b]	**850**	**4,200**	**4,250**	**900,000**

*Concentration is higher than reported in first progress report.

[a] Reference exposure levels determined by OEHHA are the acute screening levels used for VOCs.

[b] Non-pesticidal sources may contribute to the detection of xylene.

[1] Use was reported in the January - February data but not in the most recent data set for January – June 2006.

Table 5. Highest metal concentrations detected at Benavidez, January through June 2006. Metals that were likely detected due to pesticide use in the Parlier area are shown in bold. Metals that have some pesticidal use, but not in the Parlier area are shown in italics.

	Quantitation Limit (ng/m^3)	Highest Concentration in Parlier (ng/m^3)	Acute Screening Level (ng/m^3)
Aluminum	3*	3000	TBD[1]
Antimony	5*	16	TBD
Arsenic	*1**	*3*	*190*
Barium	4*	56	TBD
Bromine	1	11	TBD
Calcium	2*	1900	TBD
Chlorine	1*	650	210,000
Chromium	1*	5	TBD
Cobalt	1*	0.5	TBD
Copper	**1**	**210**	**100,000**
Iron	1	3200	TBD
Lead	1*	9	TBD
Manganese	1	89	TBD
Mercury	1*	0.5	1,800
Molybdenum	2	52	TBD
Nickel	1	2	6,000
Phosphorus	1*	770	TBD
Potassium	2*	1700	TBD
Rubidium	1	10	TBD
Selenium	1*	2	TBD
Silicon	2	8400	TBD
Strontium	1	28	TBD
Sulfur	**1***	**1800**	**TBD**
Tin	4*	7	TBD
Titanium	1*	320	TBD
Vanadium	1*	5	TBD
Yttrium	1*	2	TBD
Zinc	1	68	TBD

*The quantitation limit has changed over the study duration. All have decreased.
[1] To Be Determined.

Table 6. Average quarterly hexavalent chromium concentrations measured at ARB monitoring station in Parlier. Concentrations detected at ARB's monitoring station in Fresno are shown for comparison. Concentrations are for a composite sample averaged over 3-month period.

Date	Hexavalent Chromium (ng/m^3)	
	Parlier	Fresno
1/1/06 – 3/30/06	0.06	0.08
4/1/2006 – 6/30/06	<MDL	0.06

*Minimum detection limit (MDL) = 0.06