

**SAMPLING FOR PESTICIDE RESIDUES
IN CALIFORNIA WELL WATER**

**1998 Update of the
Well Inventory Database**

**For Sampling Results Reported From
July 1, 1997 through June 30, 1998**

Thirteenth Annual Report to
the Legislature,
Department of Health Services,
Office of Environmental Health Hazard Assessment,
and the State Water Resources Control Board

Pursuant to the
Pesticide Contamination Prevention Act



California Environmental Protection Agency
DEPARTMENT OF PESTICIDE REGULATION

February 2000

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California Environmental Protection Agency
DEPARTMENT OF PESTICIDE REGULATION

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Governor

Winston H. Hickox
Secretary for Environmental Protection

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Director
Department of Pesticide Regulation

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Pursuant to the
Pesticide Contamination Prevention Act

by
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California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring and Pest Management Branch
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EH00-03

EXECUTIVE SUMMARY

The Pesticide Contamination Prevention Act

The Pesticide Contamination Prevention Act (PCPA) was enacted in 1985 to prevent further pesticide pollution of the state's ground water. The PCPA requires:

The Department of Pesticide Regulation (DPR) to maintain a statewide database of wells sampled for active ingredients of pesticide products;

Agencies (government and private) to report to DPR the results of any well sampling for the active ingredients of pesticides;

DPR to review findings of pesticide contamination and undertake necessary mitigation;

DPR, in consultation with the California Department of Health Services (CDHS) and the State Water Resources Control Board (SWRCB), to annually make this report to the Legislature, CDHS, the State Office of Environmental Health Hazard Assessment, and SWRCB.

The Well Inventory Database

The well inventory database was developed by DPR (then a division of the California Department of Food and Agriculture) in 1983 before the passage of the PCPA.

The purposes of the database were to centralize information on the occurrence of nonpoint source contamination of ground water by the agricultural use of pesticides and to facilitate graphical, numerical, and spatial analyses of the data.

To meet the requirements of the PCPA, sampling results from both point source and nonpoint source contamination are included in the database.

What Happens When Detections are Reported to DPR

When a pesticide is found in ground water, a well-defined process established by the PCPA is triggered. This process allows for comprehensive review of the detection.

DPR refers detections to SWRCB if the pesticide is: not currently registered for use; registered for other than agricultural, outdoor industrial, or outdoor institutional uses; or found in ground water and determined not to be due to legal agricultural use. (See Appendix D for definitions of terms used in this report.)

DPR attempts to verify the detection of pesticides that are currently registered for agricultural use by conducting a well sampling study. There are specific criteria for verification of a detection. If a detection is verified, a determination is made as to whether the contamination occurred because of legal agricultural use of the chemical. Detections may not be verified for one of several reasons, including:

Follow-up sampling has not yet been completed by DPR, or sampling was not conducted by DPR. The detection may have been referred to SWRCB; there may be no wells available for sampling; or permission to sample could not be obtained from the well owner.

Analyses of all other samples taken by DPR in response to the positive sample were negative for the compound under investigation.

General Information about Sampling Results in the Well Inventory Database

A summary of the data in the database by report year is given in Table 1.

The data can be used to:

Display the geographic distribution of well sampling.

Display the geographic distribution of pesticide residues in sampled wells.

Identify areas potentially sensitive to contamination by the legal agricultural use of pesticides.

There are limitations on interpreting the data, including:

The data indicate which pesticides are present in well water among those pesticides for which analyses were performed. They do not represent a complete survey of ground water quality throughout the State nor do they represent sampling for all pesticides.

Sampling by agencies other than DPR is not necessarily related to suspected agricultural sources of contamination.

The Data in this Report

This is the thirteenth annual report.

Data were submitted to DPR from July 1, 1997 to June 30, 1998.

Data are the results of 33 investigations conducted by three agencies.

Data are from studies that were conducted from 1993 through 1998.

Table 1. Summary of well sampling results included in the Department of Pesticide Regulation's (DPR) well inventory database, by report year.

| CATEGORY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | TOTAL^(d) |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------|----------------------------|
| Total wells sampled | 574 | 3074 | 752 | 2784 | 1557 | 4741 | 2324 | 2839 | 3322 | 3564 | 2508 | 1898 | 20512 |
| no detections | 317 | 2791 | 543 | 2550 | 1351 | 3985 | 1945 | 2414 | 2769 | 3128 | 2071 | 1668 | 16108 |
| detections ^(a) | 257 | 283 | 209 | 234 | 206 | 756 | 379 | 425 | 552 | 436 | 437 | 230 | 4404 |
| verified detections ^(b) | 29 | 4 | 140 | 93 | 133 | 67 | 80 | 37 | 213 | 6 | 96 | 3 | 858 |
| Total counties sampled | 20 | 41 | 33 | 53 | 30 | 52 | 46 | 50 | 47 | 48 | 48 | 41 | 58 |
| no detections | 6 | 24 | 11 | 27 | 11 | 24 | 25 | 30 | 19 | 20 | 24 | 21 | 10 |
| detections ^(a) | 14 | 17 | 22 | 26 | 19 | 28 | 21 | 20 | 28 | 28 | 24 | 20 | 48 |
| verified detections ^(b) | 3 | 3 | 16 | 8 | 14 | 9 | 17 | 10 | 17 | 5 | 7 | 3 | 32 |
| Total pesticides and related compounds | 79 | 167 | 96 | 191 | 186 | 125 | 112 | 114 | 166 | 121 | 165 | 83 | 308 |
| no detections | 64 | 142 | 81 | 164 | 166 | 85 | 83 | 95 | 139 | 99 | 143 | 67 | 212 |
| detections ^(a) | 15 | 25 | 15 | 27 | 20 | 40 | 29 | 19 | 27 | 22 | 22 | 16 | 96 |
| verified detections ^(b) | 6 | 5 | 9 | 6 | 9 | 5 | 10 | 6 | 9 | 3 | 11 | 5 | 24 |
| Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c) | 8 | 1 | 7 | 6 | 7 | 5 | 11 | 8 | 9 | 8 | 9 | 9 ^(e) | 16 ^(f) |

(a) Includes verified and unverified detections.

(b) Detections are designated as verified if residues are detected in one sample as a result of an analytical method approved by DPR and verified, within 30 days in a second discrete sample taken from the well, by a second analytical method or laboratory approved by DPR; or if an unequivocal detection is made.

(c) Legal, agricultural use is the application of a pesticide, according to its labeled directions and in accordance with all laws and regulations. Agricultural use is defined in Food and Agricultural Code section 11408.

(d) The total is not additive. A single well that had sampling data reported in the 1987, 1988, and 1990 reports is counted one time only.

(e) The 9 compounds are 1,2-D, atrazine, bromacil, DBCP, deethyl-atrazine, diuron, EDB, prometon, and simazine.

(f) The 16 compounds are 1,2-D, ACET, aldicarb, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, DBCP, deethyl-atrazine, deisopropyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, and 2,3,5,6-tetrachloroterephthalic acid. Aldicarb, atrazine, bentazon, bromacil, diuron, prometon, and simazine have been reviewed through the Pesticide Detection Response Process. DPR considers the remaining chemicals to have reached ground water as a result of legal, agricultural use.

Summary of Data in This Report

37,822 records (chemical analyses) were added to the database for this report.

1,898 wells were sampled in 48 counties.

83 pesticide active ingredients and breakdown products were analyzed.

16 compounds were reported with positive detections.

Detections Referred to SWRCB

Detections of seven chemicals, including three chemicals where historical agricultural applications are considered by DPR to be the source of residues in ground water, were reported to SWRCB.

The three chemicals and the number of wells with detections are:

1,2-dibromo-3-chloropropane (DBCP): 208 wells

1,2-dichloropropane (1,2-D): 6 wells, and

ethylene dibromide (EDB): 9 wells.

Chemical names

Deethyl-atrazine (2-amino-4-chloro-6-isopropylamino-s-triazine, DEA) is a degradate of atrazine. 2-amino-4-chloro-6-ethylamino-s-triazine (ACET) and 2,4-diamino-6-chloro-s-triazine (DACT) are breakdown products of either atrazine or simazine.

Summary of Verified Detections

Verified detections were made of five compounds: diuron, hexazinone, atrazine and its breakdown product DEA, and the breakdown product ACET, which is common to both atrazine and simazine. Verified detections were made in a total of three wells in Glenn, Merced, and Solano counties (Table 2). All three verified detections were made in private drinking water wells. The concentration of all verified detections was below established health action levels for these compounds.

Table 2. Summary of wells with verified detections of pesticide residues by county and chemical. Results are for data reported from July 1, 1997 through June 30, 1998.

| Chemical | Glenn | Merced | Solano | Total Wells |
|--------------|----------|------------------|------------------|-------------|
| atrazine | | | 1 | 1 |
| diuron | | 1 | | 1 |
| hexazinone | | 1 ^(a) | | 1 |
| ACET | | | 1 ^(a) | 1 |
| DEA | 1 | | 1 ^(a) | 2 |
| Total | 1 | 1 | 1 | 3 |

^(a) First time verified detection of this chemical in this county

Legal Agricultural Use Determinations

After well sampling and land use surveys are completed, a determination is made as to whether the detection of the pesticide residues in ground water could have been due to legal agricultural use. Specific criteria must be met for this determination to be made.

Legal agricultural use was determined to be the source of residues of atrazine, bromacil, diuron, prometon and simazine wells in Contra Costa, Fresno, and Tulare counties (Section II, Table II-3).

Pesticide Management Zone (PMZ)

A PMZ is a land area where a pesticide has been detected in ground water and where it has been determined that the contamination was due to legal agricultural use. PMZs are established in regulation to prevent further contamination of ground water. The use of certain chemicals is prohibited or restricted in these areas. PMZs have been established in various areas of the State for atrazine, bromacil, diuron, prometon, and simazine.

DPR recommended 26 sections as new PMZs (Section II, Table II-4).

Factors That Contribute to Ground Water Contamination

DPR environmental scientists continue their work to understand the factors that contribute to ground water contamination by pesticides used in agriculture. They conduct field studies on pesticide movement, investigate contaminated wells, compile extensive databases, and review the work of other scientists. The knowledge gained from these activities is used to develop pesticide use practices designed to prevent further ground water contamination. For the past several years, DPR scientists have been developing an approach that integrates climatic, soil, and geographic data in analyses of their combined influence on the movement of pesticides to ground water. This method may provide a basis for development of regional agricultural management practices to reduce ground water contamination by pesticides.

DPR continues a three-year program to prevent or eliminate additional herbicide residues from reaching ground water. In cooperation with the University of California Cooperative Extension, DPR works with growers, pest control advisors, the agricultural industry, and herbicide registrants to identify practical farm management alternatives that can reduce or prevent off-site movement of herbicides used in grape and citrus production.

The State and Regional Water Boards

SWRCB and nine regional water quality control boards are responsible for protecting the beneficial uses of water in California and for controlling all discharges of waste into waters of the state.

Actions taken by SWRCB to prevent pesticides from migrating to ground water are detailed in section III of this report.

PREFACE

This report fulfills the requirements contained in section 13152, subdivision (e) of the Food and Agricultural Code, directing DPR to report specified information on sampling for pesticide residues in California ground water to the Legislature, CDHS, the Office of Environmental Health Hazard Assessment, and SWRCB annually by December 1.

This report presents data reported to DPR from July 1, 1997 through June 30, 1998. This is the thirteenth annual report.

The Pesticide Contamination Prevention Act (PCPA) requires that the annual report give the location of wells for which sampling results were reported. Although well locations are specified by township, range, and section in the database, listing results in this manner in the report is not possible due to the large number of wells sampled. Instead, sampling locations are summarized by county.

The information in this report is presented in three parts: Sections I, and II were written by DPR staff. Section III was written by SWRCB staff.

ACKNOWLEDGMENTS

The authors wish to thank the reviewers whose unique perspectives helped ensure this report's accuracy and readability. In addition, we acknowledge the staff of cooperating federal, state, local, and private agencies for contributing their data, time, and efforts.

DISCLAIMER

The mention of commercial products, their source, or their use, in this report is not to be construed as either an actual or implied endorsement of such product.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|----------|--|
| AB 1803 | Assembly Bill No. 1803 (Connelly, 1983), Health and Safety Code, sections 4026.2 and 4026.3 |
| AB 2021 | Assembly Bill No. 2021 (Connelly, 1985), Food and Agricultural Code, sections 13141 through 13152. Also known as the Pesticide Contamination Prevention Act. |
| ACET | 2-amino-4-chloro-6-ethylamino-s-triazine |
| Cal/EPA | California Environmental Protection Agency |
| 3CCR | Title 3, California Code of Regulations |
| CDHS | California Department of Health Services |
| 1,2-D | 1,2-dichloropropane; propylene dichloride |
| 2,4-D | 2,4-dichlorophenoxyacetic acid |
| DACT | 2,4-diamino-6-chloro-s-triazine |
| DBCP | 1,2-dibromo-3-chloropropane |
| DPR | Department of Pesticide Regulation |
| DWR | California Department of Water Resources |
| EDB | ethylene dibromide |
| EHAP | Environmental Hazards Assessment Program (Part of DPR) |
| EMPM | Environmental Monitoring and Pest Management Branch (DPR) |
| FAC | Food and Agricultural Code |
| GWPL | Groundwater Protection List |
| HAL | health advisory level |
| MCL | maximum contaminant level |
| MDL | minimum detection limit |
| PCA | pest control advisor |
| PCPA | Pesticide Contamination Prevention Act of 1985 (AB 2021) |
| PDRP | Pesticide Detection Response Process |
| PMZ | pesticide management zone |
| ppb | parts per billion |
| PREC | Pesticide Registration and Evaluation Committee |
| RWQCB | Regional Water Quality Control Board |
| SB 950 | Senate Bill 950: The Birth Defect Prevention Act |
| SWRCB | State Water Resources Control Board |
| U.S. EPA | U. S. Environmental Protection Agency |

I. WELL INVENTORY DATABASE

INTRODUCTION

This report presents results from California water wells sampled for pesticide residues. The Department of Pesticide Regulation (DPR) compiled the sampling results from July 1, 1997 through June 30, 1998. The report discusses actions taken to prevent pesticides from entering ground water by DPR and the State Water Resources Control Board (SWRCB), including the nine Regional Boards. Factors contributing to the movement of pesticides to ground water as a result of legal agricultural use are also presented.

BACKGROUND

In 1979, the soil fumigant 1,2-dibromo-3-chloropropane (DBCP) was detected in ground water in Lathrop, California. These detections prompted widespread testing and many areas of DBCP contamination were found. Since then studies have been conducted throughout California to determine whether other pesticides have migrated to ground water.

On January 1, 1986, the Pesticide Contamination Prevention Act (PCPA) added sections 13141 through 13152 to Division 7 of the Food and Agricultural Code (FAC). The PCPA requires DPR to maintain a statewide database of wells sampled for pesticide active ingredients and to submit a report annually to the Legislature, the SWRCB, the California Department of Health Services (CDHS), and Cal/EPA's Office of Environmental Health Hazard Assessment. The report contains specific information from the database, as well as actions taken by the Director of DPR and the SWRCB to prevent pesticides from migrating to ground water.

In 1983, the Environmental Hazards Assessment Program (EHAP) of DPR developed the well inventory database to archive information on the occurrence of wells containing pesticide residues due to the agricultural use of pesticides. The well inventory is a unique archive of ground water sampling data for a single state. Although databases have been compiled in other states, only California centralizes monitoring results from various agencies.

The 1992 cumulative report (Maes, *et al.*, 1992) was the first to discuss the number of wells with detections resulting from the legal agricultural use of pesticides. Before 1992, well inventory reports emphasized the number of wells with confirmed, positive samples. In 1989, criteria were established for verifying detections of pesticide residues in ground water (Biermann, 1989). Reports after 1992 emphasize verified detections.

This is the thirteenth annual report. Section I summarizes the database by total wells sampled, verified detections, unverified detections, and the status of pesticides with verified detections. Section II describes the actions taken by DPR to prevent pesticides from entering ground water. Section III summarizes the actions taken by the SWRCB and the RWQCBs to prevent pesticides from migrating to ground water. Also included are a summary of the number of wells sampled by county and chemical (Appendix A), a summary of studies (Appendix B), the methods of data collection and format of records (Appendix C), and a glossary (Appendix D). A summary of data added to the database, by report year, is given in Table I-1.

CRITERIA FOR CLASSIFYING RECORDS IN THE WELL INVENTORY

Each record in the well inventory database represents a well water sample analyzed for a pesticide residue. Each record was classified as follows:

(1) Well water samples were designated as *negative* if pesticide residues were not detected at or above the minimum detection limit (MDL) of the method used for analysis.

(2) If pesticide residues were detected at or above the MDL, samples were classified into one of three categories:

(a) *unconfirmed*: Pesticide residues were detected in only one sample during a single monitoring survey. Confirmation of the initial detection by a second positive sample was not possible because either only a single sample was taken from the well or analyses of all other samples taken from the well during the survey were negative.

(b) *confirmed, unverified*: Pesticide residues were detected in two discrete samples taken from a well during a monitoring survey. A confirmed detection is unverified unless it meets the criteria of a verified detection.

(c) *verified*: Confirmed detections are verified if they meet the criteria specified in FAC section 13149(d) of the PCPA. Section 13149(d) requires that the detection of a pesticide in ground water results either from an analytical method approved by the department that provides unequivocal identification of a chemical, or from verification within 30 days by a second analytical method or a second analytical laboratory approved by DPR. Criteria have been set by DPR for determining whether the detection of a pesticide or its breakdown product(s) in ground water meets the standards of section 13149(d) (Biermann, 1989, 1996).

Table I-1. Summary of well sampling results included in the Department of Pesticide Regulation's (DPR) well inventory database, by report year, for data reported through June 30, 1998.

| CATEGORY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | TOTAL ^(d) |
|---|------|------|------|------|------|------|------|------|------|------|------|------------------|----------------------|
| Total wells sampled | 574 | 3074 | 752 | 2784 | 1557 | 4741 | 2324 | 2839 | 3322 | 3564 | 2508 | 1898 | 20512 |
| no detections | 317 | 2791 | 543 | 2550 | 1351 | 3985 | 1945 | 2414 | 2769 | 3128 | 2071 | 1668 | 16108 |
| detections ^(a) | 257 | 283 | 209 | 234 | 206 | 756 | 379 | 425 | 552 | 436 | 437 | 230 | 4404 |
| verified detections ^(b) | 29 | 4 | 140 | 93 | 133 | 67 | 80 | 37 | 213 | 6 | 96 | 3 | 858 |
| Total counties sampled | 20 | 41 | 33 | 53 | 30 | 52 | 46 | 50 | 47 | 48 | 48 | 41 | 58 |
| no detections | 6 | 24 | 11 | 27 | 11 | 24 | 25 | 30 | 19 | 20 | 24 | 21 | 10 |
| detections ^(a) | 14 | 17 | 22 | 26 | 19 | 28 | 21 | 20 | 28 | 28 | 24 | 20 | 48 |
| verified detections ^(b) | 3 | 3 | 16 | 8 | 14 | 9 | 17 | 10 | 17 | 5 | 7 | 3 | 32 |
| Total pesticides and related compounds | 79 | 167 | 96 | 191 | 186 | 125 | 112 | 114 | 166 | 121 | 165 | 83 | 308 |
| no detections | 64 | 142 | 81 | 164 | 166 | 85 | 83 | 95 | 139 | 99 | 143 | 67 | 212 |
| detections ^(a) | 15 | 25 | 15 | 27 | 20 | 40 | 29 | 19 | 27 | 22 | 22 | 16 | 96 |
| verified detections ^(b) | 6 | 5 | 9 | 6 | 9 | 5 | 10 | 6 | 9 | 3 | 11 | 5 | 24 |
| Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c) | 8 | 1 | 7 | 6 | 7 | 5 | 11 | 8 | 9 | 8 | 9 | 9 ^(e) | 16 ^(f) |

(a) Includes verified and unverified detections.

(b) Detections are designated as verified if residues are detected in one sample as a result of an analytical method approved by DPR and verified, within 30 days in a second discrete sample taken from the well, by a second analytical method or laboratory approved by DPR; or if an unequivocal detection is made.

(c) Legal, agricultural use is the application of a pesticide, according to its labeled directions and in accordance with all laws and regulations. Agricultural use is defined in Food and Agricultural Code section 11408.

(d) The total is not additive. A single well that had sampling data reported in the 1987, 1988, and 1990 reports is counted one time only.

(e) The 9 compounds are 1,2-D, atrazine, bromacil, DBCP, deethyl-atrazine, diuron, EDB, prometon, and simazine.

(f) The 16 compounds are 1,2-D, ACET, aldicarb, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, DBCP, deethyl-atrazine, deisopropyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, and 2,3,5,6-tetrachloroterephthalic acid. Aldicarb, atrazine, bentazon, bromacil, diuron, prometon, and simazine have been reviewed through the Pesticide Detection Response Process. DPR considers the remaining chemicals to have reached ground water as a result of legal, agricultural use.

INTERPRETING THE DATA

This report discusses data submitted to DPR from July 1, 1997 to June 30, 1998. The data are the results of 33 investigations, designed and conducted by three agencies for varying purposes.

The information contained in the well inventory database can be used to:

- Design studies for future sampling.
- Display the geographic distribution of well sampling.
- Display the geographic distribution of pesticide residues in sampled wells.
- Identify areas potentially sensitive to contamination by the legal, agricultural use of pesticides.

Interpretation of sampling results in the well inventory database is subject to the following limitations:

The data indicate which pesticides are present in well water among those pesticides for which analyses were performed. They do not represent a complete survey of ground water quality throughout the State nor do they represent sampling for all pesticides used.

Sampling by agencies other than DPR is not necessarily related to the suspected presence of residues in ground water due to the agricultural use of pesticides. It should not be assumed that results submitted by those agencies are an indication of which pesticides are more or less likely to reach ground water as a result of agricultural use.

SUMMARY OF DATA

RESULTS BY REPORTING AGENCY

The results of five well sampling surveys were added to the well inventory database from July 1, 1997 through June 30, 1998. The surveys were conducted from 1993 through 1998. Additionally, 28 studies where sampling results were previously reported, or where well monitoring was not conducted are discussed in this report. The data represent a total of 1,898 wells in 41 counties that were sampled for 83 pesticide active ingredients and breakdown products. A summary of the data included in the database, by sampling agency, is shown in Table I-2. Some wells were sampled by more than one agency. A summary of each study is presented in Appendix B.

Of the 1,898 wells sampled, 1,851 (98%) were public drinking water wells, 38 (2%) were private drinking water wells, 7 were non-drinking water wells, and 2 wells were either unused or the use was unknown.

Table I-2. Summary of records added to the Department of Pesticide Regulation’s well inventory database, by agency, for the reporting period July 1, 1997 through June 30, 1998.

| Sampling agency | Wells | Counties | Chemicals analyzed | Samples with Detections | Wells with detections | Records added to database |
|------------------------|--------------|-----------------|---------------------------|--------------------------------|------------------------------|----------------------------------|
| CDHS | 1,858 | 41 | 78 | 1,013 | 225 | 37,260 |
| DPR | 45 | 9 | 16 | 6 | 3 | 552 |
| RWQCB-Lahontan | 2 | 1 | 1 | 10 | 2 | 10 |

RESULTS BY PESTICIDE AND COUNTY

Sampling Distribution

Sampling results for 83 pesticide active ingredients and breakdown products were reported. The chemicals, number of counties and wells sampled, and number of wells with unverified and verified detections is given in Table I-3. Variation in the sampling frequency is due to the differences in study design and programs of the agencies contributing data to the database.

Sampling results were reported for 41 of California’s 58 counties (Table I-4). Of the counties sampled, 20 had detections and 21 did not have detections. A summary, by county, of pesticides analyzed and number of wells sampled versus number of wells with unverified, verified, and negative detections is given in Table I-5. The number of pesticides analyzed in each county ranged from two (Modoc and Sutter) to 72 (Orange). The number of wells sampled in each county ranged from one (Butte, Napa, Plumas, San Benito) to 573 (Los Angeles). A summary of the number of wells sampled and the number of wells with positive detections, by county and chemical, is given in Appendix A.

Table I-3. Pesticide active ingredients and breakdown products added to the well inventory database for the 1998 report year, by total number of counties and wells sampled and number of wells with verified and unverified detections. Most wells were sampled for more than one compound. Results are for data reported from July 1, 1997 through June 30, 1998.

| CHEMICAL | Number of Counties Sampled | Number of Wells Sampled | Wells with Unverified Detections | Wells with Verified Detections |
|---|----------------------------|-------------------------|----------------------------------|--------------------------------|
| 1,3-DICHLOROPROPENE (1,3-D; TELONE) | 3 | 189 | | |
| 1,1,2,2-TETRACHLOROETHANE | 26 | 965 | | |
| 1,2,4-TRICHLOROBENZENE | 26 | 971 | | |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 25 | 933 | | |
| 1,2-DICHLOROPROPANE (1,2-D) | 26 | 967 | 6 | |
| 2,3,7,8-TCDD (DIOXIN) | 7 | 24 | | |
| 2,4,5-TP (SILVEX) | 24 | 316 | | |
| 2,4,6-TRICHLOROPHENOL | 2 | 12 | | |
| 2,4-D | 24 | 342 | | |
| 2,4-DINITROPHENOL | 2 | 12 | | |
| 3-HYDROXYCARBOFURAN | 19 | 270 | | |
| ACENAPTHENE | 3 | 17 | | |
| ACET (DEETHYL-SIMAZINE; DEISOPROPYL-ATRAZINE) | 9 | 45 | | 1 |
| ALACHLOR | 23 | 351 | | |
| ALDICARB | 20 | 274 | 2 | |
| ALDICARB SULFONE | 20 | 274 | | |
| ALDICARB SULFOXIDE | 20 | 270 | | |
| ALDRIN | 20 | 322 | | |
| ATRATON | 1 | 1 | | |
| ATRAZINE | 34 | 493 | | 1 |
| BENTAZON, SODIUM SALT | 22 | 294 | 1 | |
| BENZENE (BENZOL) | 28 | 969 | 4 | |
| BHC (OTHER THAN GAMMA ISOMER) | 2 | 9 | | |
| BROMACIL | 31 | 408 | | |
| BUTACHLOR | 28 | 334 | | |
| CARBARYL | 18 | 276 | | |
| CARBOFURAN | 23 | 300 | | |
| CHLORDANE | 20 | 349 | | |
| CHLOROMETHANE (METHYL CHLORIDE) | 25 | 940 | 1 | |
| CHLOROTHALONIL | 20 | 278 | | |
| CYANAZINE | 9 | 45 | | |
| DALAPON | 24 | 326 | | |
| DBCP | 26 | 1041 | 208 | |
| DDD | 1 | 8 | | |
| DDE | 1 | 8 | | |
| DDT | 1 | 8 | | |
| DEETHYL-ATRAZINE | 9 | 45 | | 2 |
| DIAZINON | 27 | 359 | | |

Table I-3 continued.

| CHEMICAL | Number of Counties Sampled | Number of Wells Sampled | Wells with Unverified Detections | Wells with Verified Detections |
|---------------------------------|----------------------------|-------------------------|----------------------------------|--------------------------------|
| DICAMBA | 22 | 281 | 1 | |
| DIELDRIN | 20 | 306 | 2 | |
| DIMETHOATE | 26 | 314 | | |
| DINOSEB | 24 | 302 | | |
| DIQUAT DIBROMIDE | 23 | 261 | | |
| DIURON | 24 | 201 | | 1 |
| ENDOSULFAN | 1 | 8 | | |
| ENDOSULFAN SULFATE | 1 | 8 | | |
| ENDOTHALL | 20 | 167 | | |
| ENDRIN | 20 | 333 | | |
| ENDRIN ALDEHYDE | 1 | 8 | | |
| ETHYLENE DIBROMIDE | 28 | 1045 | 9 | |
| GLYPHOSATE, ISOPROPYLAMINE SALT | 17 | 277 | | |
| HEPTACHLOR | 21 | 332 | | |
| HEPTACHLOR EPOXIDE | 21 | 335 | | |
| HEXACHLOROBENZENE | 20 | 312 | | |
| HEXAZINONE | 9 | 45 | | 1 |
| LINDANE (GAMMA-BHC) | 22 | 341 | | |
| MALATHION | 1 | 24 | | |
| METHIOCARB | 4 | 19 | | |
| METHOMYL | 19 | 270 | | |
| METHOXYCHLOR | 22 | 342 | | |
| METHYL BROMIDE | 25 | 939 | | |
| METHYL PARATHION | 1 | 24 | | |
| METOLACHLOR | 27 | 344 | | |
| METRIBUZIN | 32 | 392 | | |
| MOLINATE | 29 | 379 | | |
| NAPHTHALENE | 26 | 1077 | | |
| NORFLURAZON | 8 | 34 | | |
| ORTHO-DICHLOROBENZENE | 26 | 977 | | |
| OXAMYL | 22 | 296 | | |
| PARAQUAT DICHLORIDE | 5 | 22 | 1 | |
| PARATHION OR ETHYL PARATHION | 1 | 24 | | |
| PICLORAM | 24 | 337 | | |
| PROMETON | 11 | 47 | | |
| PROMETRYN | 30 | 399 | | |
| PROPACHLOR | 26 | 321 | | |
| PROPOXUR | 4 | 19 | | |
| SECBUMETON | 1 | 1 | | |
| SIMAZINE | 32 | 474 | | |
| TERBUTRYN | 1 | 1 | | |
| THIOBENCARB | 28 | 352 | | |
| TOXAPHENE | 21 | 323 | | |
| TRICHLOROBENZENES | 25 | 933 | | |
| XYLENE | 26 | 1032 | 2 | |
| TOTAL | 41 | 1898 | 227 | 3 |

Table I-4. Counties with and without detections of pesticides or related compounds for data reported during the period July 1, 1997 through June 30, 1998.

| <u>Counties</u> <u>without detections</u> | <u>Counties</u> <u>with detections</u> | <u>Counties</u> <u>Not Sampled</u> |
|--|---|---------------------------------------|
| Alameda | Fresno | Alpine |
| Amador | Glenn * | Colusa |
| Butte | Kern | Del Norte |
| Calaveras | Los Angeles | Imperial |
| Contra Costa | Madera | Inyo |
| El Dorado | Merced * | Kings |
| Humboldt | Riverside | Lassen |
| Lake | Sacramento | Marin |
| Mariposa | San Bernardino | Mono |
| Mendocino | San Joaquin | Nevada |
| Modoc | San Mateo | Placer |
| Monterey | Santa Cruz | San Francisco |
| Napa | Solano * | Shasta |
| Orange | Sonoma | Sierra |
| Plumas | Stanislaus | Siskiyou |
| San Benito | Sutter | Tehama |
| San Diego | Tulare | Trinity |
| San Luis Obispo | Ventura | |
| Santa Barbara | Yolo | |
| Santa Clara | Yuba | |
| Tuolumne | | |

* Counties with verified detections.

Table I-5. Summary, by county, of total number of pesticides and wells sampled, wells with unverified, verified, and negative detections. Wells may have both unverified and verified detections. Results are for data reported from July 1, 1997 through June 30, 1998.

| County | Pesticides Sampled | Wells Sampled | Wells with Unverified Detections | Wells with Verified Detections | Wells with No Detections |
|-----------------|--------------------|---------------|----------------------------------|--------------------------------|--------------------------|
| ALAMEDA | 8 | 5 | | | 5 |
| AMADOR | 29 | 2 | | | 2 |
| BUTTE | 9 | 1 | | | 1 |
| CALAVERAS | 3 | 2 | | | 2 |
| CONTRA COSTA | 57 | 6 | | | 6 |
| EL DORADO | 17 | 27 | | | 27 |
| FRESNO | 57 | 134 | 88 | | 46 |
| GLENN | 17 | 4 | | 1 | 3 |
| HUMBOLDT | 3 | 2 | | | 2 |
| KERN | 62 | 85 | 5 | | 80 |
| LAKE | 26 | 9 | | | 9 |
| LOS ANGELES | 64 | 573 | 11 | | 562 |
| MADERA | 14 | 12 | 1 | | 11 |
| MARIPOSA | 24 | 6 | | | 6 |
| MENDOCINO | 30 | 8 | | | 8 |
| MERCED | 62 | 18 | 2 | 1 | 15 |
| MODOC | 2 | 3 | | | 3 |
| MONTEREY | 40 | 10 | | | 10 |
| NAPA | 41 | 1 | | | 1 |
| ORANGE | 72 | 191 | | | 191 |
| PLUMAS | 12 | 1 | | | 1 |
| RIVERSIDE | 56 | 96 | 10 | | 86 |
| SACRAMENTO | 33 | 49 | 1 | | 48 |
| SAN BENITO | 13 | 1 | | | 1 |
| SAN BERNARDINO | 60 | 276 | 68 | | 208 |
| SAN DIEGO | 59 | 22 | | | 22 |
| SAN JOAQUIN | 40 | 34 | 2 | | 32 |
| SAN LUIS OBISPO | 55 | 26 | | | 26 |
| SAN MATEO | 43 | 8 | 2 | | 6 |
| SANTA BARBARA | 55 | 42 | | | 42 |
| SANTA CLARA | 57 | 28 | | | 28 |
| SANTA CRUZ | 18 | 16 | 1 | | 15 |
| SOLANO | 42 | 7 | | 1 | 6 |
| SONOMA | 42 | 39 | 1 | | 38 |
| STANISLAUS | 43 | 68 | 19 | | 49 |
| SUTTER | 2 | 4 | 1 | | 3 |
| TULARE | 13 | 27 | 8 | | 19 |
| TUOLUMNE | 11 | 3 | | | 3 |
| VENTURA | 58 | 22 | 1 | | 21 |
| YOLO | 62 | 20 | 3 | | 17 |
| YUBA | 24 | 10 | 3 | | 7 |
| TOTAL | 83 | 1898 | 227 | 3 | 1668 |

WELLS AND COUNTIES WITH VERIFIED DETECTIONS

Verified detections were made in a total of three wells in three counties. All three verified detections were made in private drinking water wells. A summary of wells with verified detections, by county and pesticide, is given in Table I-6. Also, the counties with a first-time verified detection of a pesticide are noted.

Table I-6. Summary of wells with verified detections of pesticide residues, by county and chemical. Results are for data reported from July 1, 1997 through June 30, 1998.

| Chemical | Glenn | Merced | Solano | Total Wells |
|--------------|----------|------------------|------------------|-------------|
| atrazine | | | 1 | 1 |
| diuron | | 1 | | 1 |
| hexazinone | | 1 ^(a) | | 1 |
| ACET | | | 1 ^(a) | 1 |
| DEA | 1 | | 1 ^(a) | 2 |
| Total | 1 | 1 | 1 | 3 |

(a) First time verified detection of this chemical in this county

STATUS OF PESTICIDES WITH VERIFIED DETECTIONS

Atrazine

For use reported in 1995, 69% of the total 36,201 pounds applied was accounted for in forage-fodder crops. Other sites of major use of this herbicide included forest lands, rights-of-way, and corn for human consumption (DPR, 1995). Atrazine was reviewed through the Pesticide Detection Response Process (PDRP), including review by a subcommittee of the Pesticide Registration and Evaluation Committee (PREC), pursuant to FAC sections 13149 through 13151. DPR adopted regulations that prohibit the use of pesticides containing atrazine within an atrazine Pesticide Management Zone (PMZ). A PMZ is a geographic surveying unit of approximately one square mile (a section) that is designated in regulation as sensitive to ground water pollution.

Detections of atrazine residues were verified in one well in Solano County out of 493 wells sampled in 34 counties. The concentration of the verified detection was 0.84 ppb. The CDHS and U. S. EPA maximum contaminant level (MCL, see glossary) for atrazine is 3 ppb.

Diuron

For use reported in 1995, 47% of the total 1,073,681 pounds used was accounted for in right-of-way uses and 23% in citrus. Diuron, an herbicide, was reviewed through the PDRP, including review by a subcommittee of the PREC. DPR adopted regulations that prohibit the agricultural, outdoor institutional, or outdoor industrial uses of diuron in non-crop areas and on rights-of-way within diuron PMZs. Diuron was also made a restricted material for which a permit is required for crop uses in diuron PMZs. The permit can only be issued if growers submit a ground water protection advisory written by a licensed PCA who has completed an approved ground water protection course within the previous two years.

Diuron residues were verified in one well in Merced County out of 201 wells sampled in 24 counties. The concentration of the verified detection was 0.12 ppb. No MCL has been established for diuron. The U. S. EPA IRIS RfD (see glossary) for diuron is 10 ppb.

Hexazinone

Hexazinone is an herbicide. For use reported in 1995, 53% of the total 102,101 pounds used was on alfalfa and 46% in forest lands. Hexazinone residues were verified in one well Merced County out of 45 wells sampled in nine counties. The concentration of the verified detection was 0.11 ppb. No MCL has been established for hexazinone. The U. S. EPA IRIS RfD for hexazinone is 230 ppb.

Triazine breakdown products: ACET, DEA.

Deethyl-atrazine (2-amino-4-chloro-6-isopropylamino-s-triazine, DEA) is a degradate of atrazine. 2-amino-4-chloro-6-ethylamino-s-triazine (ACET) is a breakdown product of either atrazine or simazine. Concentrations of verified detections ranged from 0.077 to 1.5 ppb for DEA and the concentration of the verified detection of ACET was 0.2 ppb. Both DEA and ACET were sampled in 45 wells in nine counties.

SUMMARY OF UNVERIFIED DETECTIONS

Samples with unverified detections are reviewed or investigated in one of two ways. Detections of the following are referred to the SWRCB: pesticides that are not currently registered for use, pesticides registered for other than agricultural, outdoor industrial, or outdoor institutional uses, and pesticides in ground water which are determined not to be the result of legal agricultural use. The SWRCB and nine RWQCBs are responsible for

protecting the beneficial uses of water in California and for controlling all discharges of waste into waters of the State. Compounds registered for agricultural use in California are investigated by DPR. The investigation of the initial detection may lead to other verified detections, or all subsequent samples may be negative for pesticide residues. Negative follow-up samples may result from delays (sometimes years) in reporting the initial detection to DPR.

A summary of the status of all positive samples (verified and unverified) added to the database for this report is given in Table I-7. Of the 37,822 records added to the well inventory for this report, there were 1,023 (2.7%) unverified detections from 227 wells in 18 counties for a total of 11 pesticide active ingredients or breakdown products.

Of the 1,023 unverified samples, 1,018 (99.5%) were for chemicals currently not registered or not registered for agricultural use. The chemicals were 1,2-dichloropropane, benzene, chloromethane, DBCP, dieldrin, ethylene dibromide, and xylene. These detections have been reported to the SWRCB.

Reported unverified detections of aldicarb, bentazon, dicamba, and paraquat dichloride, which are contained in pesticides registered for agricultural use, were investigated by DPR. The results of these investigations are described in Table I-7.

Table I-7. Status, as of June 30, 1998, of all reported detections of pesticide active ingredients and breakdown products in ground water that were added to the Department of Pesticide Regulation (DPR) well inventory database from July 1, 1997 through June 30, 1998.

| Compound Detected | Number of Counties and Wells Sampled | Counties and Number of Wells with Detections | Range of Concentrations Detected (ppb) | Water Quality Criteria ^(a) | Registration Status Type of Compound Comments |
|---|--------------------------------------|---|--|---------------------------------------|---|
| 1,2-dichloropropane (1,2-D; propylene dichloride) | 26 counties 967 wells | Fresno, 1 Los Angeles, 2 Riverside, 1 San Mateo, 2 | 0.5 - 7.1 | DHS & USEPA MCL 5 | Fumigant. Not registered (NR). Source of residues was determined by DPR to be due to historical non-point source, legal agricultural use. Regulations were adopted in 1985 that prohibit the use or sale of pesticides in California in which 1,2-D exceeds 0.5% of the total formulation. Referred to SWRCB. |
| ACET (2-amino-4-chloro-6-ethylamino-s-triazine) | 9 counties 45 wells | Solano, 1 | 0.2 | | Breakdown product of atrazine or simazine. Source of residue is currently under investigation by DPR. |
| aldicarb | 20 counties 274 wells | Yolo, 2 | 4.8 - 6.4 | | Insecticide. Active registration (AR). Non-detect in follow-up sampling conducted by DPR. Removed from Pesticide Detection Response Process (PDRP). |
| atrazine | 34 counties 493 wells | Solano, 1 | 0.84 | DHS & USEPA MCL 3 | Herbicide. AR. Source of residue is currently under investigation by DPR. |

(a) Marshack, J.B. A Compilation of Water Quality Goals. and personal communication. Definitions of the various Water Quality Criteria are given below.

DHS MCL: Maximum Contaminant Level (MCL) adopted by DHS under the Safe Drinking Water Act. MCLs are formally established in regulation and are enforceable by DHS on water suppliers. Values are expressed in ppb.

USEPA IRIS RfD: USEPA Integrated Risk Information System (IRIS) Reference Dose (RfD); published by USEPA's Office of Water. See glossary for complete description. Values are expressed in mg/kg/day.

USEPA MCL: MCL adopted by the U.S. Environmental Protection Agency (USEPA) under the Safe Drinking Water Act. MCLs are enforceable by the California Department of Health Services (DHS) on water suppliers. Values are expressed in ppb.

Table I-7 continued

| Compound Detected | Number of Counties and Wells Sampled | Counties and Number of Wells with Detections | Range of Concentrations Detected (ppb) | Water Quality Criteria ^(a) | Registration Status Type of Compound Comments |
|---------------------------------------|--------------------------------------|---|--|---------------------------------------|--|
| bentazon, sodium salt | 22 counties 294 wells | Yuba, 1 | 1.58 | | Herbicide. AR. Source of residues considered by DPR to be from historical non-point source, legal agricultural use. |
| benzene | 28 counties 969 wells | Kern, 1 Santa Cruz, 1 Sonoma, 1 Yuba, 1 | 0.2 - 4.3 | DHS MCL 1 USEPA MCL 5 | Benzene was an ingredient in some early grain fumigants. NR for agricultural use. Referred to SWRCB. |
| chloromethane | 25 counties 940 wells | Sacramento, 1 | 2.2 | USEPA IRIS RfD 2.8 | Fumigant. NR. Referred to SWRCB. |
| DBCP (1,2-dibromo-3-chloropropane) | 26 counties 1041 wells | Fresno, 88 Kern, 4 Los Angeles, 8 Madera, 1 Merced, 2 Riverside, 9 San Bernardino, 66 San Joaquin, 2 Stanislaus, 18 Sutter, 1 Tulare, 8 Ventura, 1 | 0.01 - 5.0 | DHS & USEPA MCL 0.2 | Soil fumigant. NR. Use suspended in 1979. Source of residues considered by DPR to be from historical non-point source, legal agricultural use. Referred to SWRCB. |
| deethyl-atrazine | 9 counties 45 wells | Glenn, 1 Solano, 1 | 0.077 - 1.5 | | Breakdown product of atrazine. No further action needed on detection in Glenn County because section was previously declared a PMZ for atrazine. Source of residue in Solano County is currently under investigation by DPR. |
| dicamba | 22 counties 281 wells | Santa Cruz, 1 | 0.13 | | Herbicide. AR. Follow-up monitoring conducted by DHS showed well to be non-detect for dicamba. |
| dieldrin | 20 counties 306 wells | San Bernardino, 2 | 0.062 - 0.15 | | Insecticide. NR. Referred to SWRCB. |
| diuron | 24 counties 201 wells | Merced, 1 | 0.12 | USEPA IRIS RfD 14 | Herbicide. AR. Source of residue is currently under investigation by DPR. |

Table I-7 continued

| Compound Detected | Number of Counties and Wells Sampled | Counties and Number of Wells with Detections | Range of Concentrations Detected (ppb) | Water Quality Criteria ^(a) | Registration Status Type of Compound Comments |
|--------------------------|--------------------------------------|--|--|---|---|
| ethylene dibromide (EDB) | 28 counties 1045 wells | Fresno, 5 Stanislaus, 1 Yolo, 3 | 0.02 - 0.46 | DHS & USEPA MCL 0.05 | Fumigant, insecticide, nematicide. NR since 1/87. Source of residues considered by DPR to be from historical non-point source, legal agricultural use. Referred to SWRCB. |
| hexazinone | 9 counties 45 wells | Merced, 1 | 0.11 | USEPA IRIS RfD 230 | Herbicide. AR. Source of residue is currently under investigation by DPR. |
| paraquat dichloride | 5 counties 22 wells | Yuba, 1 | 0.91 | | Herbicide, AR. Non-detect in follow-up sampling conducted by DPR. Removed from PDRP. |
| xylene | 26 counties 1032 wells | Los Angeles, 1 San Bernardino, 1 | 0.6 - 2.5 | DHS MCL 1750 USEPA MCL 10000 | Solvent. NR. There are no products currently registered for agricultural use in California that contain xylene as an active ingredient. Referred to SWRCB. |

SECTION I SUMMARY

From July 1, 1997 through June 30, 1998, results were reported for 1,898 wells, located in 41 counties, that were sampled for an overall total of 83 pesticide active ingredients or breakdown products. The data represent five groundwater sampling studies conducted by three agencies from 1993 through 1998.

Of the 83 compounds, 16 pesticide active ingredients or breakdown products were reported detected in 230 wells in 20 counties. Verified detections were made of five compounds in three wells in three counties.

Detections of the following chemicals were verified for the first time in the following counties: hexazinone in Merced, and ACET and DEA in Solano.

II. ACTIONS TAKEN BY THE DEPARTMENT OF PESTICIDE REGULATION TO PREVENT PESTICIDES FROM ENTERING GROUND WATER AS A RESULT OF AGRICULTURAL USE

ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM

The Environmental Monitoring and Pest Management Branch's Environmental Hazards Assessment Program (EHAP) performs the lead role for implementing DPR's environmental protection programs. EHAP personnel design and conduct field studies of air, soil, and surface and ground water to determine the environmental fate of pesticides, and conduct monitoring surveys to determine the presence of pesticide residues in ground water. All sampling results reported to DPR with positive pesticide detections are reviewed and either referred to the SWRCB or further investigated by DPR. DPR uses results of these investigations to take actions to prevent pesticide contamination of ground water.

GROUND WATER PROTECTION TRAINING

Ground water protection training is part of a comprehensive program designed to protect ground water from contamination due to the legal agricultural use of pesticides. The training is required for licensed PCAs who write ground water protection advisories (GWPA) for growers. Growers must submit these GWPA to the county agricultural commissioner (CAC) before the CAC can issue permits that are required for crop uses of simazine, bromacil, and diuron in their respective Pesticide Management Zones (PMZs). A PMZ is an approximately one-square-mile area that has been determined to be sensitive to ground water pollution by pesticides. To be authorized to write a GWPA, a licensed PCA must have attended DPR-approved ground water protection training within the previous two years and submitted written proof of the training to the CAC. The GWPA contains specific information for applying a regulated pesticide in a PMZ to reduce the potential for movement of the chemical into ground water.

DPR has conducted ground water protection training annually since 1989. Speakers review the extent of pesticide residues in ground water, potential sources of pesticide residues, contamination pathways, factors that influence pesticide movement to ground water, and management practices that decrease such movement. Recommended management practices begin before the pesticide is applied with proper storage, mixing, loading, rinsing and disposal procedures, and wellhead protection. During and after application, management practices depend on the mechanism of pesticide movement to ground water. For leaching areas (coarse

soils), the training focuses on proper irrigation management which keeps excess irrigation water from leaching pesticides down to ground water through soil. For runoff areas (fine-textured and hardpan soils), the training recommends incorporation of soil-applied pesticides, which helps shield residues from surface water runoff that can subsequently carry residues to ground water via drainage (dry) wells or improperly sealed wells. The training also reviews changes in ground water laws, regulations, and programs.

THE PESTICIDE DETECTION RESPONSE PROCESS (conducted pursuant to sections 13149 through 13151 [FAC] of the PCPA)

Under the provisions of the Pesticide Detection Response Process (PDRP, see glossary), EHAP investigates all reports of detections of pesticides in ground water from its own sampling program and from sampling conducted by other public agencies or private entities.

A pesticide is considered to be “found” in ground water if it is detected using an unequivocal detection method, or if the original detection is subsequently verified. DPR has established precise criteria for analytical methods which provide for an unequivocal detection and for determining if a detection is verified (Biermann 1989, 1996).

EHAP determines if the detected pesticide could have resulted from the use of a currently registered pesticide and if the pesticide’s presence in ground water is due to agricultural use, i.e., the pesticide was properly applied according to the label directions of a pesticide registered for agricultural use and in accordance with federal and State laws and regulations.

In the past, unless the pesticide was detected in or immediately adjacent to its PMZ, DPR routinely conducted a “four-section survey” to help determine whether the detection was due to agricultural use. Sampling was conducted in the section of land of the original detection and in three adjacent sections of land. Often, these studies were located in areas that have been thoroughly investigated and would provide little additional useful information. In an effort to use resources in the most effective and efficient manner, DPR reviewed and modified its protocols for determining when field sampling is required (DPR, January 1996).

EHAP conducts a four-section survey under the following conditions.

1. For reported detections of new active ingredients, that is, pesticide active ingredients for which a Director’s finding has not been made pursuant to FAC section 13150.
2. For pesticide active ingredients for which a Director’s finding has been made pursuant for FAC section 13150 [6800(a) list chemicals] and:

- a. There has not been a previous detection of a pesticide in ground water in the section due to agricultural use, and,
- b. The sections included in the four-section study area do not include a section which is an adopted or recommended PMZ, and,
- c. The detection is not in an area identified by modeling as an area sensitive to ground water pollution, or,
- d. Conducting a well survey will provide new information that may be useful for vulnerability assessment.

In addition, DPR uses land use maps, pesticide use information, and surveys of potential “point” sources of pesticide residues to help make the agricultural use determination. Verified detections are determined to be due to legal agricultural use if all the following criteria are met (DPR, March 1996):

1. The residue detected (active ingredient, breakdown product, or any other specified ingredient) is from a pesticide that is registered for agricultural use in California.
2. The application of a pesticide in the vicinity of the detection was reasonably likely.
3. A point source was not a likely cause.
4. A non-agricultural use of the pesticide was not a likely source.
5. A non-pesticide source was not a likely cause.
6. The pesticide should be present in another adjacent section or verified within a second site within a ½ mile radius of original determination.

Verified detections of pesticide residues that are determined to be due to agricultural use and that have been previously formally reviewed by the Director are subject to the current applicable ground water regulations. Verified detections of pesticide residues that are determined to be due to agricultural use and that have not been previously formally reviewed by the Director are subject to special review specified in FAC section 13150. The purpose of the review is to determine whether continued registration, sale, and use of the compound will be allowed. A subcommittee of the PREC holds a hearing, evaluates information, and makes recommendations to the Director of DPR who then makes a determination regarding continued use of the compound in California.

The pesticide detection is removed from the PDRP and referred to the SWRCB if the pesticide is not currently registered for use; is registered for other than agricultural, outdoor industrial, or outdoor institutional use; or is detected in ground water not as a result of agricultural use.

ACTIONS TAKEN BY DPR ON PESTICIDE DETECTIONS

A total of 16 pesticide active ingredients and breakdown products were detected and reported from July 1, 1997 through June 30, 1998.

EHAP did not conduct investigations for seven of the 16 detected chemicals because they are not currently registered for agricultural use in California (1,2-D, benzene, chloromethane, DBCP, dieldrin, ethylene dibromide, and xylene). Those detections were referred to the SWRCB.

EHAP conducted monitoring studies or investigations for chemicals reported detected in ground water that are currently registered for agricultural use in California. These investigations are described below in three groups. First are chemicals that may have previously been reported and monitored for, but were removed from the PDRP and have not been reviewed by the PREC subcommittee. Second are chemicals that have previously been reviewed through the PDRP and by the PREC subcommittee and third, are chemicals for which investigations were completed without additional well monitoring. For each monitoring study, reported detections may not have been verified because (1) residues were not detected in follow-up sampling or (2) the original positive well could not be resampled. A description of each study is given in Appendix B.

Monitoring for pesticides not previously reviewed by the PREC subcommittee

A study was conducted in Yuba County in response to a reported detection of paraquat dichloride. No residues were detected and paraquat dichloride was removed from the PDRP.

Monitoring for pesticides previously reviewed through the PDRP and by the PREC subcommittee where additional well monitoring was conducted

A study was conducted in Yolo County in response to a reported detection of aldicarb. No residues were detected and aldicarb was removed from the PDRP.

Investigations for pesticides previously reviewed through the PDRP and by the PREC subcommittee where additional well monitoring was not conducted

EHAP completed 26 investigations for atrazine, ACET, bromacil, DACT, diruon, DES, DIPA, prometon, and simazine in Fresno and Tulare counties. These detections were made during a previous study, the results of which were presented in the 1995 update report. Based on a preponderance of evidence, legal agricultural use determinations were made and PMZs

were recommended. Two investigations in Contra Costa County were completed in response to reported detections of atrazine, bromacil, prometon, and simazine.

Norflurazon continues in the PDRP

DPR determined that residues of norflurazon detected in ground water were due to legal agricultural use. Norflurazon continues in the Pesticide Contamination Prevention Act detection response process. The registrant was notified of the norflurazon detections and requested a hearing of the subcommittee of the PREC. The subcommittee will review any information necessary to make a finding and/or recommendation pursuant to section 13150 of the Act.

AGRICULTURAL USE DETERMINATIONS AND RECOMMENDATIONS FOR PESTICIDE MANAGEMENT ZONES

As a result of investigations concluded between July 1, 1997 and June 30, 1998, pesticide residues in a total of 26 sections were determined, pursuant to Food and Agricultural Code section 13149, to be present in ground water as the result of non-point source, legal agricultural use. DPR recommended 26 sections as new PMZs (Table II-4) . Recommended PMZs must be adopted in regulation before they are subject to regulatory controls. These are the first sections recommended as PMZs for bromacil, simazine, and prometon in Contra Costa County. A more detailed description of the section number, and chemical is given in the study summary in Appendix B.

Table II-1. Number of sections recommended as Pesticide Management Zones by the Department of Pesticide Regulation from July 1, 1997 through June 30, 1998.

| County | Chemical(s) | Sections |
|--------------|--|-----------|
| Contra Costa | bromacil, prometon | 1 |
| | atrazine, prometon, simazine | 1 |
| Fresno | simazine | 8 |
| | diuron, simazine | 2 |
| | atrazine, simazine | 3 |
| | atrazine, bromacil, simazine | 1 |
| | atrazine, diuron, simazine | 1 |
| | atrazine, bromacil, diuron, simazine | 1 |
| Tulare | atrazine, simazine | 6 |
| | atrazine, diuron, simazine | 1 |
| | bromacil, diuron, simazine | 1 |
| Total | atrazine 14, bromacil 4, diuron 6, prometon 2, simazine 25 | 26 |

GROUNDWATER PROTECTION LIST MONITORING

The Groundwater Protection List (GWPL) is a list of pesticides having the potential to pollute ground water. It is required pursuant to FAC section 13145(d) and placed in 3CCR section 6800. The GWPL is divided into sublists (a) and (b). Sublist (a) is comprised of chemicals detected in the soil or ground water as a result of legal agricultural use. Sublist (b) is comprised of chemicals that meet the conditions specified in FAC section 13145(d).

These are pesticide active ingredients whose physicochemical properties exceed or are less than certain values (called specific numerical values or SNVs) and (1) are intended to be applied to or injected into the soil by ground-based application equipment or by chemigation or (2) the labels of which recommend that the application be followed, within 72 hours, by flood or furrow irrigation. DPR is required to conduct monitoring to determine whether these sublist (b) chemicals have migrated to ground water.

In 1992, DPR placed 45 pesticides on the GWPL. The chemicals were prioritized to determine in which order and to what extent the pesticides should be monitored. Factors used to prioritize the pesticides included whether a pesticide active ingredient was detected in ground water due to non-point sources in other states, listing in the top priority group for implementing the Birth Defect Prevention Act (SB950), physicochemical factors, and the amount of active ingredient sold per year.

DPR revised its protocol for selecting which ground water protection list active ingredients would be monitored. Previously, monitoring was conducted only for pesticide active ingredients in the first priority group. Under the new protocol the active ingredients on the GWPL are not grouped in fixed priority categories. Rather, all chemicals on the list will be reviewed for their potential to contaminate ground water. The following information will be used to evaluate whether or not any of the pesticides have a high potential to pollute ground water:

1. Occurrence of the pesticide in ground water due to non-point source contamination anywhere in the U.S.
2. Physicochemical properties of the pesticide.
3. Pounds of pesticide applied in California, especially in areas known or suspected to be vulnerable to ground water pollution.
4. Agricultural practices for crops treated with the pesticide.

As a result of the review, one or more pesticides on the list will be selected for monitoring each year.

The new protocol also details how areas will be selected for monitoring. Monitoring efforts will be focused in areas that are known or suspected to be vulnerable to ground water contamination, areas where the number of pounds of a pesticide applied is high, or areas where total pesticide use is low, but highly concentrated. Also, domestic wells, which are generally shallower than other types of wells, will be targeted for monitoring. Up to 40 wells will be monitored.

A total of 34 wells in 8 counties were sampled for hexazinone in October and November, 1997. Sampling results, by county and pesticide, are presented in Table II-2. A verified detection of hexazinone was made in one well in Merced County. Verified detections were also made of other pesticides or their breakdown products.

Table II-2. Summary of sampling for hexazinone, a pesticide active ingredient placed on the Ground Water Protection List (Title 3, California Code of Regulation, section 6800(b)). Sampling was conducted by the Department of Pesticide Regulation between July 1, 1997 and June 30, 1998. The number of wells sampled for hexazinone, by county, and the number of wells with verified detections are given.

| County | Wells Sampled | Wells with Verified Hexazinone Detections | Wells with Verified Detections of other Chemicals |
|-------------|---------------|---|---|
| Fresno | 3 | | |
| Glenn | 3 | | DEA verified in 1 well |
| Madera | 2 | | |
| Merced | 5 | 1 | diuron verified in 1 well (same well as hexazinone) |
| San Joaquin | 6 | | |
| Solano | 5 | | ACET, atrazine, and DEA verified in 1 well |
| Stanislaus | 5 | | |
| Yolo | 5 | | |
| Total | 34 | 1 | 3 |

SPECIAL STUDIES

A Voluntary Program of Modified Farm Management Practices to Prevent Herbicide Residues From Reaching Ground Water

Residues of the herbicides simazine, diuron, and bromacil are associated with citrus and grape production and have been detected in several hundred domestic wells in Fresno and Tulare counties. EHAP has been working with the University of California Cooperative Extension (UCCE), growers, PCAs, the agricultural industry, and herbicide registrants to identify practical farm management alternatives that can reduce or prevent off-site movement of herbicides used in grape and citrus production.

One hypothesis of this program is that preemergent herbicides can be maintained on-site through site-specific farm management strategies. These management strategies might include modified irrigation, weed control, or application methods. Recent EHAP studies also demonstrate that preventing residues from moving off-site can have a positive effect on herbicide efficacy.

Two core groups, one for grapes and one for citrus, consisting of growers, PCAs and farm advisors have been established by UCCE. These groups have identified potential management practices to minimize off-site movement of herbicides in grapes and citrus. EHAP has also sought the input of pesticide registrants, commodity groups, and other interested parties to find potential solutions to herbicide movement to ground water. Selected management practices have begun to be evaluated in field sites under actual growing conditions by UCCE and DPR. Evaluation criteria include herbicide movement, yield, tree or vine health, and root health. Workshops will be used to demonstrate successful management practices.

FACTORS CONTRIBUTING TO PESTICIDE MOVEMENT TO GROUND WATER AS A RESULT OF AGRICULTURAL USE

The PCPA requires DPR to include in the annual report an analysis of the factors that contribute to the movement of pesticides to ground water. Factors that determine the probability of an agricultural use pesticide reaching ground water include the chemical's physiochemical properties, pesticide formulation, site of application, soil type, climate, and irrigation practices. Many of these factors have been investigated by DPR.

Pesticides may reach ground water by leaching or direct streaming. Leaching is the process by which pesticide residues are dissolved or suspended in water and are carried through the soil matrix as it recharges a ground water aquifer. Direct streaming is the movement of a pesticide

to ground water through conduits. A natural conduit includes structures such as sink holes, macropores, insect and animal burrows, root channels, and deep cracks in clay soils. Man-made conduits include poorly constructed or damaged well seals or casings, agricultural drainage wells (dry wells), and improperly abandoned water, oil, or natural gas wells.

Ground water contamination may arise from point or non-point sources. Point source contamination occurs when the pesticide comes from a defined area such as from spills (improper handling, storage, disposal), or direct injection into ground water during mixing or chemigation. Non-point source contamination occurs when pesticides reach ground water from a large area, typically as a result of movement of pesticide after an agricultural application.

SECTION II SUMMARY

From July 1, 1997 through June 30, 1998, EHAP sampled 45 wells in nine counties. The samples were analyzed for a total of 16 pesticide active ingredients and breakdown products. Verified detections were made in three wells in three counties of five compounds: atrazine, diuron, hexazinone, deethyl-atrazine, and ACET.

DPR determined that residues of atrazine, deethyl-atrazine, bromacil, diuron, prometon, and simazine reached ground water as the result of legal, agricultural use. A total of 26 sections in three counties were recommended as PMZs.

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- Marshack, J.B. 1995. A compilation of water quality goals. California Regional Water Quality Control Board, Central Valley Region. Sacramento, California.

Appendix A

Number of wells sampled and positive detections, by county and chemical

This appendix is presented in two sections. The first contains summaries for counties without pesticide detections. The second contains summaries for counties with detections. In each section, the counties are given alphabetically. Sampling results are reported for the period July 1, 1997 through June 30, 1998. The counties without and with detections are as follows:

Counties without detections

Alameda
Amador
Butte
Calaveras
Contra Costa
El Dorado
Humboldt
Lake
Mariposa
Mendocino
Modoc
Monterey
Napa
Orange
Plumas
San Benito
San Diego
San Luis Obispo
Santa Barbara
Santa Clara
Tuolumne

Counties with detections

Fresno
Glenn
Kern
Los Angeles
Madera
Merced
Riverside
Sacramento
San Bernardino
San Joaquin
San Mateo
Santa Cruz
Solano
Sonoma
Stanislaus
Sutter
Tulare
Ventura
Yolo
Yuba

Appendix A part 1. Counties without detections. The chemicals and number of wells sampled for each chemical is given.

ALAMEDA: for each chemical, 5 wells were sampled.

| | | |
|----------|--------------------|---------------------|
| ALAMEDA | DBCP | LINDANE (GAMMA-BHC) |
| ALACHLOR | ETHYLENE DIBROMIDE | METHOXYCHLOR |
| ATRAZINE | HEXACHLOROBENZENE | SIMAZINE |

AMADOR

| | | | | | |
|---------------------------|---|----------------|---|-----------------------|---|
| 1,1,2,2-TETRACHLOROETHANE | 2 | BROMACIL | 1 | MOLINATE | 1 |
| 1,2,4-TRICHLOROBENZENE | 2 | BUTACHLOR | 1 | NAPHTHALENE | 2 |
| 1,2-D + 1,3-D + C-3 | 2 | CHLOROMETHANE | 2 | ORTHO-DICHLOROBENZENE | 2 |
| 1,2-DICHLOROPROPANE | 2 | DALAPON | 1 | PICLORAM | 2 |
| 2,4,5-TP (SILVEX) | 2 | DICAMBA | 2 | PROMETRYN | 1 |
| 2,4-D | 2 | DIMETHOATE | 1 | SIMAZINE | 1 |
| ALACHLOR | 1 | DINOSEB | 2 | THIOBENCARB | 1 |
| ATRAZINE | 1 | METHYL BROMIDE | 2 | TRICHLOROBENZENES | 2 |
| BENTAZON, SODIUM SALT | 2 | METOLACHLOR | 1 | XYLENE | 2 |
| BENZENE (BENZOL) | 2 | METRIBUZIN | 1 | | |

BUTTE for each chemical, 1 well was sampled.

| | | |
|-----------|-------------|------------|
| ATRAZINE | DIAZINON | MOLINATE |
| BROMACIL | METOLACHLOR | PROMETRYN |
| BUTACHLOR | METRIBUZIN | PROPACHLOR |

CALAVERAS for each chemical, 2 wells were sampled.

| | | |
|----------|--------|----------|
| ATRAZINE | DIURON | SIMAZINE |
|----------|--------|----------|

CONTRA COSTA

| | | | | | |
|---------------------------|---|--------------------|---|-----------------------|---|
| 1,1,2,2-TETRACHLOROETHANE | 4 | CARBOFURAN | 6 | HEXACHLOROBENZENE | 5 |
| 1,2,4-TRICHLOROBENZENE | 4 | CHLORDANE | 6 | LINDANE (GAMMA-BHC) | 5 |
| 1,2-D + 1,3-D + C-3 | 4 | CHLOROMETHANE | 4 | METHOMYL | 6 |
| 1,2-DICHLOROPROPANE | 4 | CHLOROTHALONIL | 5 | METHOXYCHLOR | 5 |
| 2,3,7,8-TCDD (DIOXIN) | 3 | DALAPON | 5 | METHYL BROMIDE | 4 |
| 2,4,5-TP (SILVEX) | 6 | DBCP | 6 | METOLACHLOR | 6 |
| 2,4-D | 6 | DIAZINON | 5 | METRIBUZIN | 6 |
| 3-HYDROXYCARBOFURAN | 6 | DICAMBA | 6 | MOLINATE | 5 |
| ALACHLOR | 5 | DIELDRIN | 6 | NAPHTHALENE | 4 |
| ALDICARB | 6 | DIMETHOATE | 5 | ORTHO-DICHLOROBENZENE | 4 |
| ALDICARB SULFONE | 6 | DINOSEB | 6 | OXAMYL | 6 |
| ALDICARB SULFOXIDE | 6 | DIQUAT DIBROMIDE | 6 | PICLORAM | 6 |
| ALDRIN | 6 | DIURON | 2 | PROMETRYN | 5 |
| ATRAZINE | 5 | ENDOTHALL | 5 | PROPACHLOR | 5 |
| BENTAZON, SODIUM SALT | 6 | ENDRIN | 5 | SIMAZINE | 5 |
| BENZENE (BENZOL) | 4 | ETHYLENE DIBROMIDE | 6 | THIOBENCARB | 5 |
| BROMACIL | 5 | GLYPHOSATE | 6 | TOXAPHENE | 6 |
| BUTACHLOR | 5 | HEPTACHLOR | 5 | TRICHLOROBENZENES | 4 |
| CARBARYL | 6 | HEPTACHLOR EPOXIDE | 5 | XYLENE | 4 |

EL DORADO

| | | | | | |
|---------------------------|----|-----------------------|----|-------------|----|
| 1,1,2,2-TETRACHLOROETHANE | 26 | BUTACHLOR | 1 | PROMETRYN | 1 |
| 1,2,4-TRICHLOROBENZENE | 26 | DIAZINON | 1 | PROPACHLOR | 1 |
| 1,2-DICHLOROPROPANE | 26 | DIMETHOATE | 1 | SIMAZINE | 1 |
| ATRAZINE | 1 | METRIBUZIN | 1 | THIOBENCARB | 1 |
| BENZENE (BENZOL) | 26 | MOLINATE | 1 | XYLENE | 26 |
| BROMACIL | 1 | ORTHO-DICHLOROBENZENE | 26 | | |

HUMBOLDT for each chemical, 1 well was sampled.

ATRAZINE

GLYPHOSATE

THIOBENCARB

LAKE

| | | | | | |
|-----------------------|---|--------------------|---|-------------|---|
| 2,4,5-TP (SILVEX) | 1 | DIAZINON | 4 | METRIBUZIN | 4 |
| 2,4-D | 2 | DICAMBA | 1 | MOLINATE | 4 |
| ATRAZINE | 5 | DIMETHOATE | 3 | OXAMYL | 3 |
| BENTAZON, SODIUM SALT | 1 | DINOSEB | 2 | PICLORAM | 3 |
| BROMACIL | 5 | DIQUAT DIBROMIDE | 3 | PROMETRYN | 5 |
| BUTACHLOR | 1 | DIURON | 2 | PROPACHLOR | 4 |
| CARBOFURAN | 5 | ENDOTHALL | 6 | SIMAZINE | 3 |
| CHLOROTHALONIL | 2 | ETHYLENE DIBROMIDE | 3 | THIOBENCARB | 1 |
| DALAPON | 3 | METOLACHLOR | 4 | | |

MARIPOSA

| | | | | | |
|---------------------------|---|----------------|---|-----------------------|---|
| 1,1,2,2-TETRACHLOROETHANE | 4 | BUTACHLOR | 2 | NAPHTHALENE | 4 |
| 1,2,4-TRICHLOROBENZENE | 4 | CHLOROMETHANE | 4 | ORTHO-DICHLOROBENZENE | 4 |
| 1,2-D + 1,3-D + C-3 | 4 | DIAZINON | 2 | PROMETRYN | 2 |
| 1,2-DICHLOROPROPANE | 4 | DIMETHOATE | 2 | PROPACHLOR | 2 |
| ALACHLOR | 2 | METHYL BROMIDE | 4 | SIMAZINE | 2 |
| ATRAZINE | 2 | METOLACHLOR | 2 | THIOBENCARB | 2 |
| BENZENE (BENZOL) | 4 | METRIBUZIN | 2 | TRICHLOROBENZENES | 4 |
| BROMACIL | 2 | MOLINATE | 2 | XYLENE | 4 |

MENDOCINO

| | | | | | |
|-----------------------|---|---------------------|---|-------------|---|
| 2,4,5-TP (SILVEX) | 3 | DIMETHOATE | 1 | METOLACHLOR | 1 |
| 2,4-D | 4 | DINOSEB | 2 | METRIBUZIN | 1 |
| ATRAZINE | 3 | DIQUAT DIBROMIDE | 2 | MOLINATE | 1 |
| BENTAZON, SODIUM SALT | 1 | DIURON | 2 | OXAMYL | 2 |
| BROMACIL | 1 | ENDOTHALL | 2 | PICLORAM | 2 |
| BUTACHLOR | 1 | ETHYLENE DIBROMIDE | 2 | PROMETRYN | 1 |
| CARBOFURAN | 1 | HEPTACHLOR | 1 | PROPACHLOR | 1 |
| DALAPON | 5 | HEPTACHLOR EPOXIDE | 1 | SIMAZINE | 3 |
| DIAZINON | 1 | LINDANE (GAMMA-BHC) | 1 | THIOBENCARB | 1 |
| DICAMBA | 1 | METHOXYCHLOR | 1 | TOXAPHENE | 1 |

MODOC for each chemical, 3 wells were sampled.

CARBOFURAN

METRIBUZIN

MONTEREY

| | | | | | |
|-----------------------|----|--------------------|----|---------------------|----|
| 2,4,5-TP (SILVEX) | 10 | CHLORDANE | 10 | LINDANE (GAMMA-BHC) | 10 |
| 2,4-D | 10 | DALAPON | 10 | METHOMYL | 10 |
| 3-HYDROXYCARBOFURAN | 10 | DBCP | 10 | METHOXYCHLOR | 10 |
| ALACHLOR | 10 | DICAMBA | 10 | METOLACHLOR | 10 |
| ALDICARB | 10 | DIELDRIN | 10 | METRIBUZIN | 10 |
| ALDICARB SULFONE | 10 | DINOSEB | 10 | MOLINATE | 6 |
| ALDICARB SULFOXIDE | 10 | DIQUAT DIBROMIDE | 10 | OXAMYL | 10 |
| ALDRIN | 10 | ENDOTHALL | 10 | PICLORAM | 10 |
| ATRAZINE | 10 | ENDRIN | 10 | PROPACHLOR | 10 |
| BENTAZON, SODIUM SALT | 9 | ETHYLENE DIBROMIDE | 10 | SIMAZINE | 10 |
| BROMACIL | 6 | GLYPHOSATE | 10 | THIOBENCARB | 6 |
| BUTACHLOR | 9 | HEPTACHLOR | 10 | TOXAPHENE | 10 |
| CARBARYL | 10 | HEPTACHLOR EPOXIDE | 10 | | |
| CARBOFURAN | 10 | HEXACHLOROBENZENE | 10 | | |

NAPA for each chemical, 1 well was sampled.

| | | |
|-----------------------|--------------------|---------------------|
| 2,4,5-TP (SILVEX) | CHLORDANE | LINDANE (GAMMA-BHC) |
| 2,4-D | CHLOROTHALONIL | METHOMYL |
| 3-HYDROXYCARBOFURAN | DALAPON | METHOXYCHLOR |
| ALACHLOR | DIAZINON | METOLACHLOR |
| ALDICARB | DICAMBA | METRIBUZIN |
| ALDICARB SULFONE | DIELDRIN | MOLINATE |
| ALDICARB SULFOXIDE | DIMETHOATE | OXAMYL |
| ALDRIN | DINOSEB | PICLORAM |
| ATRAZINE | DIQUAT DIBROMIDE | PROMETRYN |
| BENTAZON, SODIUM SALT | ENDOTHALL | PROPACHLOR |
| BROMACIL | ENDRIN | SIMAZINE |
| BUTACHLOR | HEPTACHLOR | THIOBENCARB |
| CARBARYL | HEPTACHLOR EPOXIDE | TOXAPHENE |
| CARBOFURAN | HEXACHLOROBENZENE | |

ORANGE

| | | | | | |
|---------------------------|-----|---------------------|-----|-----------------------|-----|
| 1,3-DICHLOROPROPENE () | 182 | CHLOROTHALONIL | 12 | METHIOCARB | 6 |
| 1,1,2,2-TETRACHLOROETHANE | 186 | DALAPON | 12 | METHOMYL | 10 |
| 1,2,4-TRICHLOROBENZENE | 186 | DBCP | 185 | METHOXYCHLOR | 12 |
| 1,2-D + 1,3-D + C-3 | 186 | DDD | 8 | METHYL BROMIDE | 186 |
| 1,2-DICHLOROPROPANE | 186 | DDE | 8 | METHYL PARATHION | 24 |
| 2,3,7,8-TCDD (DIOXIN) | 3 | DDT | 8 | METOLACHLOR | 29 |
| 2,4,5-TP (SILVEX) | 12 | DIAZINON | 32 | METRIBUZIN | 29 |
| 2,4-D | 12 | DICAMBA | 12 | MOLINATE | 32 |
| 3-HYDROXYCARBOFURAN | 10 | DIELDRIN | 12 | NAPHTHALENE | 186 |
| ACENAPHTHENE | 5 | DIMETHOATE | 32 | ORTHO-DICHLOROBENZENE | 186 |
| ALACHLOR | 30 | DINOSEB | 12 | OXAMYL | 10 |
| ALDICARB | 10 | DIQUAT DIBROMIDE | 13 | PARAQUAT DICHLORIDE | 9 |
| ALDICARB SULFONE | 10 | DIURON | 12 | PARATHION OR ETHYL | 24 |
| ALDICARB SULFOXIDE | 10 | ENDOSULFAN | 8 | PARATHION | |
| ALDRIN | 12 | ENDOSULFAN SULFATE | 8 | PICLORAM | 12 |
| ATRAZINE | 33 | ENDOTHALL | 10 | PROMETRYN | 32 |
| BENTAZON, SODIUM SALT | 12 | ENDRIN | 12 | PROPACHLOR | 31 |
| BENZENE (BENZOL) | 186 | ENDRIN ALDEHYDE | 8 | PROPOXUR | 6 |
| BHC (OTHER THAN GAMMA) | 8 | ETHYLENE DIBROMIDE | 185 | SIMAZINE | 33 |
| BROMACIL | 32 | GLYPHOSATE | 11 | THIOBENCARB | 32 |
| BUTACHLOR | 29 | HEPTACHLOR | 12 | TOXAPHENE | 12 |
| CARBARYL | 10 | HEPTACHLOR EPOXIDE | 12 | TRICHLOROBENZENES | 186 |
| CARBOFURAN | 10 | HEXACHLOROBENZENE | 12 | XYLENE | 186 |
| CHLORDANE | 12 | LINDANE (GAMMA-BHC) | 12 | | |
| CHLOROMETHANE | 186 | MALATHION | 24 | | |

RIVERSIDE for each chemical, 1 well was sampled.

| | | |
|-----------|-------------|-------------|
| ATRAZINE | DIMETHOATE | PROMETRYN |
| BROMACIL | METOLACHLOR | PROPACHLOR |
| BUTACHLOR | METRIBUZIN | SIMAZINE |
| DIAZINON | MOLINATE | THIOBENCARB |

SAN BENITO for each chemical, 1 well was sampled.

| | | |
|---------------------------|--------------------|----------------------|
| 1,1,2,2-TETRACHLOROETHANE | CHLOROMETHANE | ORTHO-DICHLOROENZENE |
| 1,2,4-TRICHLOROENZENE | DBCP | TRICHLOROENZENES |
| 1,2-D + 1,3-D + C-3 | ETHYLENE DIBROMIDE | XYLENE |
| 1,2-DICHLOROPROPANE | METHYL BROMIDE | |
| BENZENE (BENZOL) | NAPHTHALENE | |

SAN DIEGO

| | | | | | |
|---------------------------|----|---------------------|----|----------------------|----|
| 1,1,2,2-TETRACHLOROETHANE | 3 | CHLOROMETHANE | 3 | METHOMYL | 13 |
| 1,2,4-TRICHLOROENZENE | 3 | CHLOROTHALONIL | 12 | METHOXYCHLOR | 13 |
| 1,2-D + 1,3-D + C-3 | 3 | DALAPON | 5 | METHYL BROMIDE | 3 |
| 1,2-DICHLOROPROPANE | 3 | DBCP | 7 | METOLACHLOR | 13 |
| 2,4,5-TP (SILVEX) | 5 | DIAZINON | 13 | METRIBUZIN | 13 |
| 2,4-D | 5 | DICAMBA | 5 | MOLINATE | 13 |
| 3-HYDROXYCARBOFURAN | 13 | DIELDRIN | 13 | NAPHTHALENE | 3 |
| ALACHLOR | 12 | DIMETHOATE | 13 | ORTHO-DICHLOROENZENE | 3 |
| ALDICARB | 13 | DINOSEB | 5 | OXAMYL | 11 |
| ALDICARB SULFONE | 13 | DIQUAT DIBROMIDE | 11 | PICLORAM | 5 |
| ALDICARB SULFOXIDE | 13 | DIURON | 14 | PROMETON | 1 |
| ALDRIN | 13 | ENDOTHALL | 12 | PROMETRYN | 12 |
| ATRAZINE | 14 | ENDRIN | 13 | PROPACHLOR | 13 |
| BENTAZON, SODIUM SALT | 5 | ETHYLENE DIBROMIDE | 7 | PROPOXUR | 1 |
| BENZENE (BENZOL) | 3 | GLYPHOSATE | 14 | SIMAZINE | 13 |
| BROMACIL | 13 | HEPTACHLOR | 12 | THIOBENCARB | 11 |
| BUTACHLOR | 13 | HEPTACHLOR EPOXIDE | 13 | TOXAPHENE | 2 |
| CARBARYL | 13 | HEXACHLOROENZENE | 13 | TRICHLOROENZENES | 3 |
| CARBOFURAN | 13 | LINDANE (GAMMA-BHC) | 13 | XYLENE | 3 |
| CHLORDANE | 4 | METHIOCARB | 1 | | |

SAN LUIS OBISPO

| | | | | | |
|---------------------------|----|---------------------|----|-----------------------|----|
| 1,1,2,2-TETRACHLOROETHANE | 10 | CARBOFURAN | 3 | METHOMYL | 3 |
| 1,2,4-TRICHLOROBENZENE | 10 | CHLORDANE | 12 | METHOXYCHLOR | 12 |
| 1,2-D + 1,3-D + C-3 | 10 | CHLOROMETHANE | 10 | METHYL BROMIDE | 10 |
| 1,2-DICHLOROPROPANE | 10 | CHLOROTHALONIL | 9 | METOLACHLOR | 10 |
| 2,3,7,8-TCDD (DIOXIN) | 1 | DALAPON | 3 | METRIBUZIN | 10 |
| 2,4,5-TP (SILVEX) | 3 | DBCP | 14 | MOLINATE | 10 |
| 2,4-D | 4 | DIAZINON | 10 | NAPHTHALENE | 10 |
| 3-HYDROXYCARBOFURAN | 3 | DICAMBA | 3 | ORTHO-DICHLOROBENZENE | 10 |
| ALACHLOR | 10 | DIELDRIN | 12 | OXAMYL | 3 |
| ALDICARB | 3 | DIMETHOATE | 10 | PICLORAM | 11 |
| ALDICARB SULFONE | 3 | DINOSEB | 3 | PROMETRYN | 10 |
| ALDICARB SULFOXIDE | 3 | DIQUAT DIBROMIDE | 4 | PROPACHLOR | 7 |
| ALDRIN | 12 | DIURON | 2 | SIMAZINE | 15 |
| ATRAZINE | 15 | ENDRIN | 12 | THIOBENCARB | 10 |
| BENTAZON, SODIUM SALT | 3 | ETHYLENE DIBROMIDE | 14 | TOXAPHENE | 12 |
| BENZENE (BENZOL) | 10 | HEPTACHLOR | 12 | TRICHLOROBENZENES | 10 |
| BROMACIL | 10 | HEPTACHLOR EPOXIDE | 12 | XYLENE | 10 |
| BUTACHLOR | 10 | HEXACHLOROBENZENE | 7 | | |
| CARBARYL | 3 | LINDANE (GAMMA-BHC) | 12 | | |

SANTA BARBARA

| | | | | | |
|---------------------------|----|---------------------|----|-----------------------|----|
| 1,1,2,2-TETRACHLOROETHANE | 18 | CHLORDANE | 24 | METHOMYL | 41 |
| 1,2,4-TRICHLOROBENZENE | 18 | CHLOROMETHANE | 18 | METHOXYCHLOR | 24 |
| 1,2-D + 1,3-D + C-3 | 18 | CHLOROTHALONIL | 24 | METHYL BROMIDE | 18 |
| 1,2-DICHLOROPROPANE | 18 | DALAPON | 23 | METOLACHLOR | 29 |
| 2,4,5-TP (SILVEX) | 23 | DBCP | 28 | METRIBUZIN | 29 |
| 2,4-D | 23 | DIAZINON | 29 | MOLINATE | 29 |
| 3-HYDROXYCARBOFURAN | 41 | DICAMBA | 23 | NAPHTHALENE | 18 |
| ALACHLOR | 29 | DIELDRIN | 24 | ORTHO-DICHLOROBENZENE | 18 |
| ALDICARB | 41 | DIMETHOATE | 29 | OXAMYL | 41 |
| ALDICARB SULFONE | 41 | DINOSEB | 23 | PICLORAM | 23 |
| ALDICARB SULFOXIDE | 41 | DIQUAT DIBROMIDE | 20 | PROMETRYN | 29 |
| ALDRIN | 24 | DIURON | 10 | PROPACHLOR | 24 |
| ATRAZINE | 29 | ENDRIN | 24 | SIMAZINE | 29 |
| BENTAZON, SODIUM SALT | 23 | ETHYLENE DIBROMIDE | 28 | THIOBENCARB | 29 |
| BENZENE (BENZOL) | 18 | GLYPHOSATE | 1 | TOXAPHENE | 24 |
| BROMACIL | 29 | HEPTACHLOR | 24 | TRICHLOROBENZENES | 18 |
| BUTACHLOR | 29 | HEPTACHLOR EPOXIDE | 24 | XYLENE | 18 |
| CARBARYL | 41 | HEXACHLOROBENZENE | 24 | | |
| CARBOFURAN | 41 | LINDANE (GAMMA-BHC) | 24 | | |

SANTA CLARA

| | | | | | |
|---------------------------|----|--------------------|----|-----------------------|----|
| 1,1,2,2-TETRACHLOROETHANE | 16 | CARBOFURAN | 6 | HEXACHLOROBENZENE | 6 |
| 1,2,4-TRICHLOROBENZENE | 16 | CHLORDANE | 6 | LINDANE (GAMMA-BHC) | 6 |
| 1,2-D + 1,3-D + C-3 | 16 | CHLOROMETHANE | 16 | METHOMYL | 6 |
| 1,2-DICHLOROPROPANE | 16 | CHLOROTHALONIL | 13 | METHOXYCHLOR | 6 |
| 2,3,7,8-TCDD (DIOXIN) | 2 | DALAPON | 6 | METHYL BROMIDE | 16 |
| 2,4,5-TP (SILVEX) | 6 | DBCP | 6 | METOLACHLOR | 6 |
| 2,4-D | 6 | DIAZINON | 6 | METRIBUZIN | 6 |
| 3-HYDROXYCARBOFURAN | 6 | DICAMBA | 6 | MOLINATE | 6 |
| ALACHLOR | 6 | DIELDRIN | 6 | NAPHTHALENE | 27 |
| ALDICARB | 6 | DIMETHOATE | 6 | ORTHO-DICHLOROBENZENE | 16 |
| ALDICARB SULFONE | 6 | DINOSEB | 6 | OXAMYL | 6 |
| ALDICARB SULFOXIDE | 6 | DIQUAT DIBROMIDE | 6 | PICLORAM | 6 |
| ALDRIN | 6 | DIURON | 2 | PROMETRYN | 6 |
| ATRAZINE | 6 | ENDOTHALL | 6 | PROPACHLOR | 6 |
| BENTAZON, SODIUM SALT | 6 | ENDRIN | 6 | SIMAZINE | 6 |
| BENZENE (BENZOL) | 16 | ETHYLENE DIBROMIDE | 6 | THIOBENCARB | 6 |
| BROMACIL | 6 | GLYPHOSATE | 6 | TOXAPHENE | 6 |
| BUTACHLOR | 6 | HEPTACHLOR | 6 | TRICHLOROBENZENES | 16 |
| CARBARYL | 6 | HEPTACHLOR EPOXIDE | 6 | XYLENE | 16 |

TUOLUMNE

| | | | | | |
|---------------------------|---|------------------|---|-----------------------|---|
| 1,1,2,2-TETRACHLOROETHANE | 3 | BENZENE (BENZOL) | 3 | ORTHO-DICHLOROBENZENE | 3 |
| 1,2,4-TRICHLOROBENZENE | 3 | CHLOROMETHANE | 3 | TRICHLOROBENZENES | 3 |
| 1,2-D + 1,3-D + C-3 | 3 | METHYL BROMIDE | 3 | XYLENE | 3 |
| 1,2-DICHLOROPROPANE | 3 | NAPHTHALENE | 3 | | |

Appendix A part 2: Counties with positive detections. The chemical, number of wells sampled, and number of wells with positive detections is given.

FRESNO

| CHEMICAL | SAMPLED | POS. | CHEMICAL | SAMPLED | POS. |
|-------------------------------|---------|------|-----------------------|---------|------|
| 1,3-DICHLOROPROPENE (TELONE) | 1 | | DIQUAT DIBROMIDE | 1 | |
| 1,1,2,2-TETRACHLOROETHANE | 8 | | DIURON | 3 | |
| 1,2,4-TRICHLOROBENZENE | 8 | | ENDOTHALL | 1 | |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 8 | | ENDRIN | 4 | |
| 1,2-DICHLOROPROPANE | 8 | 1 | ETHYLENE DIBROMIDE | 119 | 5 |
| 2,4,5-TP (SILVEX) | 1 | | GLYPHOSATE | 1 | |
| 2,4-D | 1 | | HEPTACHLOR | 4 | |
| ACET | 3 | | HEPTACHLOR EPOXIDE | 4 | |
| ALACHLOR | 12 | | HEXACHLOROBENZENE | 4 | |
| ALDICARB | 1 | | HEXAZINONE | 3 | |
| ALDICARB SULFONE | 1 | | LINDANE (GAMMA-BHC) | 4 | |
| ALDICARB SULFOXIDE | 1 | | METHOXYCHLOR | 4 | |
| ALDRIN | 3 | | METHYL BROMIDE | 8 | |
| ATRAZINE | 16 | | METOLACHLOR | 12 | |
| BENZENE | 8 | | METRIBUZIN | 15 | |
| BROMACIL | 15 | | MOLINATE | 12 | |
| BUTACHLOR | 12 | | NAPHTHALENE | 8 | |
| CARBOFURAN | 1 | | NORFLURAZON | 3 | |
| CHLORDANE | 4 | | ORTHO-DICHLOROBENZENE | 8 | |
| CHLOROMETHANE | 8 | | OXAMYL | 1 | |
| CYANAZINE | 3 | | PICLORAM | 1 | |
| DALAPON | 1 | | PROMETON | 3 | |
| DBCP | 119 | 88 | PROMETRYN | 15 | |
| DEETHYL-ATRAZINE | 3 | | PROPACHLOR | 12 | |
| DIAZINON | 12 | | SIMAZINE | 15 | |
| DIELDRIN | 3 | | THIOBENCARB | 11 | |
| DIMETHOATE | 11 | | TOXAPHENE | 4 | |
| DINOSEB | 1 | | TRICHLOROBENZENES | 8 | |
| | | | XYLENE | 8 | |

GLENN

| CHEMICAL | SAMPLED | POS. | CHEMICAL | SAMPLED | POS. |
|------------------|---------|------|-------------|---------|------|
| ACET | 3 | | HEXAZINONE | 3 | |
| ATRAZINE | 4 | | METOLACHLOR | 1 | |
| BROMACIL | 4 | | METRIBUZIN | 4 | |
| BUTACHLOR | 1 | | MOLINATE | 1 | |
| CYANAZINE | 3 | | NORFLURAZON | 3 | |
| DEETHYL-ATRAZINE | 3 | 1 | PROMETON | 3 | |
| DIAZINON | 1 | | PROMETRYN | 4 | |
| DIURON | 3 | | PROPACHLOR | 1 | |
| | | | SIMAZINE | 3 | |

KERN

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 19 | DIQUAT DIBROMIDE | 24 |
| 1,2,4-TRICHLOROBENZENE | 19 | DIURON | 12 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 19 | ENDOTHALL | 26 |
| 1,2-DICHLOROPROPANE | 19 | ENDRIN | 24 |
| 2,4,5-TP (SILVEX) | 24 | ETHYLENE DIBROMIDE | 75 |
| 2,4-D | 24 | GLYPHOSATE | 26 |
| 3-HYDROXYCARBOFURAN | 12 | HEPTACHLOR | 24 |
| ALACHLOR | 26 | HEPTACHLOR EPOXIDE | 24 |
| ALDICARB | 12 | HEXACHLOROBENZENE | 25 |
| ALDICARB SULFONE | 12 | LINDANE (GAMMA-BHC) | 25 |
| ALDICARB SULFOXIDE | 12 | METHOMYL | 12 |
| ALDRIN | 24 | METHOXYCHLOR | 25 |
| ATRATON | 1 | METHYL BROMIDE | 19 |
| ATRAZINE | 30 | METOLACHLOR | 14 |
| BENTAZON, SODIUM SALT | 24 | METRIBUZIN | 14 |
| BENZENE | 20 | MOLINATE | 26 |
| BHC (OTHER THAN GAMMA) | 1 | NAPHTHALENE | 30 |
| BROMACIL | 14 | ORTHO-DICHLOROBENZENE | 19 |
| BUTACHLOR | 13 | OXAMYL | 24 |
| CARBARYL | 12 | PARAQUAT DICHLORIDE | 2 |
| CARBOFURAN | 24 | PICLORAM | 24 |
| CHLORDANE | 24 | PROMETON | 1 |
| CHLOROMETHANE | 19 | PROMETRYN | 14 |
| CHLOROTHALONIL | 12 | PROPACHLOR | 12 |
| DALAPON | 24 | SECBUMETON | 1 |
| DBCP | 75 | SIMAZINE | 30 |
| DIAZINON | 14 | TERBUTRYN | 1 |
| DICAMBA | 12 | THIOBENCARB | 26 |
| DIELDRIN | 12 | TOXAPHENE | 24 |
| DIMETHOATE | 13 | TRICHLOROBENZENES | 19 |
| DINOSEB | 24 | XYLENE | 19 |

LOS ANGELES

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,3-DICHLOROPROPENE (TELONE) | 6 | DIMETHOATE | 65 |
| 1,1,2,2-TETRACHLOROETHANE | 388 | DINOSEB | 64 |
| 1,2,4-TRICHLOROBENZENE | 392 | DIQUAT DIBROMIDE | 84 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 382 | DIURON | 28 |
| 1,2-DICHLOROPROPANE | 390 | 2 | 5 |
| 2,3,7,8-TCDD (DIOXIN) | 2 | ENDOTHALL | 72 |
| 2,4,5-TP (SILVEX) | 73 | ENDRIN | 79 |
| 2,4,6-TRICHLOROPHENOL | 10 | ETHYLENE DIBROMIDE | 95 |
| 2,4-D | 96 | GLYPHOSATE | 72 |
| 2,4-DINITROPHENOL | 10 | HEPTACHLOR | 72 |
| 3-HYDROXYCARBOFURAN | 41 | HEPTACHLOR EPOXIDE | 68 |
| ACENAPHTHENE | 10 | HEXACHLOROBENZENE | 72 |
| ALACHLOR | 71 | LINDANE (GAMMA-BHC) | 4 |
| ALDICARB | 41 | METHIOCARB | 41 |
| ALDICARB SULFONE | 41 | METHOMYL | 72 |
| ALDICARB SULFOXIDE | 37 | METHOXYCHLOR | 388 |
| ALDRIN | 72 | METHYL BROMIDE | 60 |
| ATRAZINE | 97 | METOLACHLOR | 63 |
| BENTAZON, SODIUM SALT | 73 | METRIBUZIN | 77 |
| BENZENE | 388 | MOLINATE | 455 |
| BROMACIL | 75 | NAPHTHALENE | 398 |
| BUTACHLOR | 63 | ORTHO-DICHLOROBENZENE | 43 |
| CARBARYL | 53 | OXAMYL | 2 |
| CARBOFURAN | 46 | PARAQUAT DICHLORIDE | 73 |
| CHLORDANE | 96 | PICLORAM | 73 |
| CHLOROMETHANE | 388 | PROMETRYN | 52 |
| CHLOROTHALONIL | 52 | PROPACHLOR | 4 |
| DALAPON | 73 | PROPOXUR | 99 |
| DBCP | 79 | 8 | 65 |
| DIAZINON | 76 | THIOBENCARB | 72 |
| DICAMBA | 71 | TOXAPHENE | 382 |
| DIELDRIN | 66 | TRICHLOROBENZENES | 454 |
| | | XYLENE | 1 |

MADERA

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|------------------|--------------|--------------------|--------------|
| ACET | 2 | ETHYLENE DIBROMIDE | 10 |
| ATRAZINE | 2 | HEXAZINONE | 2 |
| BROMACIL | 2 | METRIBUZIN | 2 |
| CYANAZINE | 2 | NORFLURAZON | 2 |
| DBCP | 10 | PROMETON | 2 |
| DEETHYL-ATRAZINE | 2 | PROMETRYN | 2 |
| DIURON | 2 | SIMAZINE | 2 |

MERCED

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 3 | DINOSEB | 9 |
| 1,2,4-TRICHLOROBENZENE | 3 | DIQUAT DIBROMIDE | 9 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 3 | DIURON | 9 1 |
| 1,2-DICHLOROPROPANE | 3 | ENDOTHALL | 9 |
| 2,4,5-TP (SILVEX) | 9 | ENDRIN | 9 |
| 2,4-D | 9 | ETHYLENE DIBROMIDE | 10 |
| 3-HYDROXYCARBOFURAN | 9 | GLYPHOSATE | 9 |
| ACET | 5 | HEPTACHLOR | 9 |
| ALACHLOR | 9 | HEPTACHLOR EPOXIDE | 9 |
| ALDICARB | 9 | HEXACHLOROBENZENE | 9 |
| ALDICARB SULFONE | 9 | HEXAZINONE | 5 1 |
| ALDICARB SULFOXIDE | 9 | LINDANE (GAMMA-BHC) | 9 |
| ALDRIN | 9 | METHOMYL | 9 |
| ATRAZINE | 14 | METHOXYCHLOR | 9 |
| BENTAZON, SODIUM SALT | 9 | METHYL BROMIDE | 3 |
| BENZENE | 3 | METOLACHLOR | 9 |
| BROMACIL | 14 | METRIBUZIN | 14 |
| BUTACHLOR | 9 | MOLINATE | 9 |
| CARBARYL | 9 | NAPHTHALENE | 3 |
| CARBOFURAN | 9 | NORFLURAZON | 5 |
| CHLORDANE | 9 | ORTHO-DICHLOROBENZENE | 3 |
| CHLOROMETHANE | 3 | OXAMYL | 9 |
| CHLOROTHALONIL | 9 | PICLORAM | 9 |
| CYANAZINE | 5 | PROMETON | 5 |
| DALAPON | 9 | PROMETRYN | 14 |
| DBCP | 11 2 | PROPACHLOR | 9 |
| DEETHYL-ATRAZINE | 5 | SIMAZINE | 14 |
| DIAZINON | 9 | THIOBENCARB | 9 |
| DICAMBA | 9 | TOXAPHENE | 9 |
| DIELDRIN | 9 | TRICHLOROBENZENES | 3 |
| DIMETHOATE | 9 | XYLENE | 3 |

RIVERSIDE

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 20 | DINOSEB | 26 |
| 1,2,4-TRICHLOROBENZENE | 20 | DIQUAT DIBROMIDE | 16 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 20 | DIURON | 17 |
| 1,2-DICHLOROPROPANE | 21 | ENDOTHALL | 18 |
| 2,4,5-TP (SILVEX) | 26 | ENDRIN | 30 |
| 2,4-D | 26 | ETHYLENE DIBROMIDE | 87 |
| 3-HYDROXYCARBOFURAN | 30 | GLYPHOSATE | 26 |
| ALACHLOR | 18 | HEPTACHLOR | 30 |
| ALDICARB | 30 | HEPTACHLOR EPOXIDE | 30 |
| ALDICARB SULFONE | 30 | HEXACHLOROBENZENE | 30 |
| ALDICARB SULFOXIDE | 30 | LINDANE (GAMMA-BHC) | 30 |
| ALDRIN | 30 | METHOMYL | 30 |
| ATRAZINE | 18 | METHOXYCHLOR | 30 |
| BENTAZON, SODIUM SALT | 26 | METHYL BROMIDE | 20 |
| BENZENE | 20 | METOLACHLOR | 18 |
| BROMACIL | 18 | METRIBUZIN | 18 |
| BUTACHLOR | 18 | MOLINATE | 18 |
| CARBARYL | 30 | NAPHTHALENE | 28 |
| CARBOFURAN | 30 | ORTHO-DICHLOROBENZENE | 20 |
| CHLORDANE | 30 | OXAMYL | 30 |
| CHLOROMETHANE | 20 | PICLORAM | 26 |
| CHLOROTHALONIL | 17 | PROMETRYN | 18 |
| DALAPON | 26 | PROPACHLOR | 30 |
| DBCP | 87 | SIMAZINE | 18 |
| DIAZINON | 18 | THIOBENCARB | 18 |
| DICAMBA | 26 | TOXAPHENE | 30 |
| DIELDRIN | 30 | TRICHLOROBENZENES | 20 |
| DIMETHOATE | 16 | XYLENE | 19 |

SACRAMENTO

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 33 | DINOSEB | 14 |
| 1,2,4-TRICHLOROBENZENE | 33 | DIQUAT DIBROMIDE | 1 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 33 | ENDOTHALL | 1 |
| 1,2-DICHLOROPROPANE | 33 | ENDRIN | 14 |
| 2,4,5-TP (SILVEX) | 14 | ETHYLENE DIBROMIDE | 14 |
| 2,4-D | 14 | HEPTACHLOR | 14 |
| ALDRIN | 14 | HEPTACHLOR EPOXIDE | 14 |
| BENTAZON, SODIUM SALT | 14 | HEXACHLOROBENZENE | 14 |
| BENZENE | 33 | LINDANE (GAMMA-BHC) | 14 |
| CHLORDANE | 14 | METHOXYCHLOR | 14 |
| CHLOROMETHANE | 34 | METHYL BROMIDE | 33 |
| CHLOROTHALONIL | 14 | NAPHTHALENE | 33 |
| DALAPON | 14 | ORTHO-DICHLOROBENZENE | 33 |
| DBCP | 14 | PICLORAM | 14 |
| DICAMBA | 14 | TOXAPHENE | 14 |
| DIELDRIN | 14 | TRICHLOROBENZENES | 33 |
| | | XYLENE | 33 |

SAN BERNARDINO

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 167 | DIELDRIN | 54 2 |
| 1,2,4-TRICHLOROBENZENE | 169 | DIMETHOATE | 49 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 167 | DINOSEB | 50 |
| 1,2-DICHLOROPROPANE | 167 | DIQUAT DIBROMIDE | 7 |
| 2,3,7,8-TCDD (DIOXIN) | 5 | DIURON | 40 |
| 2,4,5-TP (SILVEX) | 50 | ENDOTHALL | 5 |
| 2,4,6-TRICHLOROPHENOL | 2 | ENDRIN | 52 |
| 2,4-D | 50 | ETHYLENE DIBROMIDE | 217 |
| 2,4-DINITROPHENOL | 2 | GLYPHOSATE | 45 |
| 3-HYDROXYCARBOFURAN | 47 | HEPTACHLOR | 52 |
| ACENAPHTHENE | 2 | HEPTACHLOR EPOXIDE | 52 |
| ALACHLOR | 69 | HEXACHLOROBENZENE | 52 |
| ALDICARB | 47 | LINDANE (GAMMA-BHC) | 52 |
| ALDICARB SULFONE | 47 | METHOMYL | 47 |
| ALDICARB SULFOXIDE | 47 | METHOXYCHLOR | 52 |
| ALDRIN | 52 | METHYL BROMIDE | 167 |
| ATRAZINE | 69 | METOLACHLOR | 69 |
| BENTAZON, SODIUM SALT | 50 | METRIBUZIN | 69 |
| BENZENE | 167 | MOLINATE | 69 |
| BROMACIL | 69 | NAPHTHALENE | 177 |
| BUTACHLOR | 69 | ORTHO-DICHLOROBENZENE | 169 |
| CARBARYL | 47 | OXAMYL | 47 |
| CARBOFURAN | 47 | PICLORAM | 50 |
| CHLORDANE | 52 | PROMETRYN | 69 |
| CHLOROMETHANE | 167 | PROPACHLOR | 52 |
| CHLOROTHALONIL | 51 | SIMAZINE | 69 |
| DALAPON | 51 | THIOBENCARB | 69 |
| DBCP | 225 66 | TOXAPHENE | 52 |
| DIAZINON | 69 | TRICHLOROBENZENES | 167 |
| DICAMBA | 50 | XYLENE | 167 1 |

SAN JOAQUIN

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 1 | ENDRIN | 7 |
| 1,2,4-TRICHLOROBENZENE | 1 | ETHYLENE DIBROMIDE | 24 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 1 | HEPTACHLOR | 7 |
| 1,2-DICHLOROPROPANE | 1 | HEPTACHLOR EPOXIDE | 7 |
| ACET | 6 | HEXAZINONE | 6 |
| ALACHLOR | 7 | LINDANE (GAMMA-BHC) | 7 |
| ALDRIN | 7 | METHOXYCHLOR | 7 |
| ATRAZINE | 13 | METHYL BROMIDE | 1 |
| BENZENE | 1 | METRIBUZIN | 6 |
| BROMACIL | 13 | MOLINATE | 7 |
| CHLORDANE | 7 | NAPHTHALENE | 1 |
| CHLOROMETHANE | 1 | NORFLURAZON | 6 |
| CHLOROTHALONIL | 7 | ORTHO-DICHLOROBENZENE | 1 |
| CYANAZINE | 6 | PROMETON | 6 |
| DBCP | 27 2 | PROMETRYN | 13 |
| DEETHYL-ATRAZINE | 6 | SIMAZINE | 13 |
| DIAZINON | 7 | THIOBENCARB | 7 |
| DIELDRIN | 7 | TOXAPHENE | 7 |
| DIMETHOATE | 7 | TRICHLOROBENZENES | 1 |
| DIURON | 6 | XYLENE | 1 |

SAN MATEO

| CHEMICAL | SAMPLED | POS. | CHEMICAL | SAMPLED | POS. |
|-------------------------------|---------|------|-----------------------|---------|------|
| 1,1,2,2-TETRACHLOROETHANE | 4 | | DIAZINON | 4 | |
| 1,2,4-TRICHLOROBENZENE | 4 | | DICAMBA | 4 | |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 4 | | DIMETHOATE | 4 | |
| 1,2-DICHLOROPROPANE | 4 | 2 | DINOSEB | 4 | |
| 2,4,5-TP (SILVEX) | 4 | | DIQUAT DIBROMIDE | 4 | |
| 2,4-D | 4 | | ENDOTHALL | 4 | |
| 3-HYDROXYCARBOFURAN | 4 | | ETHYLENE DIBROMIDE | 4 | |
| ALDICARB | 4 | | GLYPHOSATE | 4 | |
| ALDICARB SULFONE | 4 | | METHOMYL | 4 | |
| ALDICARB SULFOXIDE | 4 | | METHYL BROMIDE | 4 | |
| ATRAZINE | 4 | | METOLACHLOR | 4 | |
| BENTAZON, SODIUM SALT | 4 | | METRIBUZIN | 4 | |
| BENZENE | 4 | | MOLINATE | 4 | |
| BROMACIL | 4 | | NAPHTHALENE | 8 | |
| BUTACHLOR | 4 | | ORTHO-DICHLOROBENZENE | 4 | |
| CARBARYL | 4 | | OXAMYL | 4 | |
| CARBOFURAN | 4 | | PICLORAM | 4 | |
| CHLOROMETHANE | 4 | | PROMETRYN | 4 | |
| CHLOROTHALONIL | 4 | | SIMAZINE | 4 | |
| DALAPON | 4 | | THIOBENCARB | 4 | |
| DBCP | 4 | | TRICHLOROBENZENES | 4 | |
| | | | XYLENE | 4 | |

SANTA CRUZ

| CHEMICAL | SAMPLED | POS. | CHEMICAL | SAMPLED | POS. |
|-------------------------------|---------|------|-----------------------|---------|------|
| 1,1,2,2-TETRACHLOROETHANE | 3 | | DALAPON | 1 | |
| 1,2,4-TRICHLOROBENZENE | 3 | | DICAMBA | 1 | 1 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 3 | | DINOSEB | 1 | |
| 1,2-DICHLOROPROPANE | 3 | | METHYL BROMIDE | 3 | |
| 2,4,5-TP (SILVEX) | 1 | | NAPHTHALENE | 16 | |
| 2,4-D | 1 | | ORTHO-DICHLOROBENZENE | 3 | |
| BENTAZON, SODIUM SALT | 1 | | PICLORAM | 1 | |
| BENZENE | 3 | 1 | TRICHLOROBENZENES | 3 | |
| CHLOROMETHANE | 3 | | XYLENE | 3 | |

SOLANO

| CHEMICAL | SAMPLED | POS. | CHEMICAL | SAMPLED | POS. |
|-------------------------------|---------|------|-----------------------|---------|------|
| 1,1,2,2-TETRACHLOROETHANE | 1 | | HEPTACHLOR | 1 | |
| 1,2,4-TRICHLOROBENZENE | 1 | | HEPTACHLOR EPOXIDE | 1 | |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 1 | | HEXACHLOROBENZENE | 1 | |
| 1,2-DICHLOROPROPANE | 1 | | HEXAZINONE | 5 | |
| ACET | 5 | 1 | LINDANE (GAMMA-BHC) | 1 | |
| ALACHLOR | 1 | | METHOXYCHLOR | 1 | |
| ALDRIN | 1 | | METHYL BROMIDE | 1 | |
| ATRAZINE | 6 | 1 | METOLACHLOR | 1 | |
| BENZENE | 2 | | METRIBUZIN | 6 | |
| BROMACIL | 6 | | MOLINATE | 1 | |
| BUTACHLOR | 1 | | NAPHTHALENE | 1 | |
| CHLORDANE | 1 | | NORFLURAZON | 5 | |
| CHLOROMETHANE | 1 | | ORTHO-DICHLOROBENZENE | 1 | |
| CHLOROTHALONIL | 1 | | PROMETON | 5 | |
| CYANAZINE | 5 | | PROMETRYN | 6 | |
| DEETHYL-ATRAZINE | 5 | 1 | PROPACHLOR | 1 | |
| DIAZINON | 1 | | SIMAZINE | 6 | |
| DIELDRIN | 1 | | THIOBENCARB | 1 | |
| DIMETHOATE | 1 | | TOXAPHENE | 1 | |
| DIURON | 5 | | TRICHLOROBENZENES | 1 | |
| ENDRIN | 1 | | XYLENE | 2 | |

SONOMA

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|---------------------|--------------|---------------------|--------------|
| 2,4,5-TP (SILVEX) | 18 | DIQUAT DIBROMIDE | 14 |
| 2,4-D | 18 | DIURON | 1 |
| 3-HYDROXYCARBOFURAN | 6 | ENDOTHALL | 28 |
| ALACHLOR | 1 | ENDRIN | 12 |
| ALDICARB | 6 | ETHYLENE DIBROMIDE | 25 |
| ALDICARB SULFONE | 6 | HEPTACHLOR | 11 |
| ALDICARB SULFOXIDE | 6 | HEPTACHLOR EPOXIDE | 13 |
| ALDRIN | 1 | HEXACHLOROBENZENE | 1 |
| ATRAZINE | 30 | LINDANE (GAMMA-BHC) | 13 |
| BENZENE | 1 | METHOMYL | 6 |
| BROMACIL | 10 | METHOXYCHLOR | 14 |
| BUTACHLOR | 2 | METOLACHLOR | 10 |
| CARBOFURAN | 10 | METRIBUZIN | 10 |
| CHLORDANE | 12 | MOLINATE | 10 |
| CHLOROTHALONIL | 14 | OXAMYL | 14 |
| DALAPON | 25 | PICLORAM | 30 |
| DBCP | 13 | PROMETRYN | 10 |
| DIAZINON | 10 | PROPACHLOR | 13 |
| DIELDRIN | 1 | SIMAZINE | 18 |
| DIMETHOATE | 2 | THIOBENCARB | 2 |
| DINOSEB | 13 | TOXAPHENE | 11 |

STANISLAUS

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 25 | DIMETHOATE | 6 |
| 1,2,4-TRICHLOROBENZENE | 25 | DIQUAT DIBROMIDE | 3 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 25 | DIURON | 5 |
| 1,2-DICHLOROPROPANE | 24 | ENDOTHALL | 3 |
| 3-HYDROXYCARBOFURAN | 3 | ETHYLENE DIBROMIDE | 48 |
| ACET | 5 | HEXAZINONE | 5 |
| ALACHLOR | 1 | METHOMYL | 3 |
| ALDICARB | 3 | METHYL BROMIDE | 25 |
| ALDICARB SULFONE | 3 | METOLACHLOR | 6 |
| ALDICARB SULFOXIDE | 3 | METRIBUZIN | 10 |
| ATRAZINE | 13 | MOLINATE | 6 |
| BENZENE | 25 | NAPHTHALENE | 25 |
| BROMACIL | 11 | NORFLURAZON | 5 |
| BUTACHLOR | 6 | ORTHO-DICHLOROBENZENE | 25 |
| CARBARYL | 3 | OXAMYL | 3 |
| CARBOFURAN | 2 | PROMETON | 5 |
| CHLOROMETHANE | 25 | PROMETRYN | 11 |
| CYANAZINE | 5 | PROPACHLOR | 6 |
| DBCP | 49 | SIMAZINE | 11 |
| DEETHYL-ATRAZINE | 5 | THIOBENCARB | 6 |
| DIAZINON | 6 | TRICHLOROBENZENES | 25 |
| | | XYLENE | 25 |

SUTTER

| CHEMICAL | SAMPLED POS. |
|--------------------|--------------|
| DBCP | 4 |
| ETHYLENE DIBROMIDE | 4 |

TULARE

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 1 | DBCP | 25 8 |
| 1,2,4-TRICHLOROBENZENE | 1 | ETHYLENE DIBROMIDE | 25 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 1 | METHYL BROMIDE | 1 |
| 1,2-DICHLOROPROPANE | 1 | NAPHTHALENE | 1 |
| BENZENE | 1 | ORTHO-DICHLOROBENZENE | 1 |
| CHLOROMETHANE | 1 | TRICHLOROBENZENES | 1 |
| | | XYLENE | 2 |

VENTURA

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 17 | DINOSEB | 9 |
| 1,2,4-TRICHLOROBENZENE | 17 | DIQUAT DIBROMIDE | 9 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 17 | DIURON | 3 |
| 1,2-DICHLOROPROPANE | 17 | ENDOTHALL | 9 |
| 2,3,7,8-TCDD (DIOXIN) | 8 | ENDRIN | 14 |
| 2,4,5-TP (SILVEX) | 9 | ETHYLENE DIBROMIDE | 19 |
| 2,4-D | 9 | GLYPHOSATE | 9 |
| 3-HYDROXYCARBOFURAN | 9 | HEPTACHLOR | 14 |
| ALACHLOR | 14 | HEPTACHLOR EPOXIDE | 14 |
| ALDICARB | 9 | HEXACHLOROBENZENE | 14 |
| ALDICARB SULFONE | 9 | LINDANE (GAMMA-BHC) | 14 |
| ALDICARB SULFOXIDE | 9 | METHOMYL | 9 |
| ALDRIN | 14 | METHOXYCHLOR | 14 |
| ATRAZINE | 18 | METHYL BROMIDE | 17 |
| BENTAZON, SODIUM SALT | 9 | METOLACHLOR | 15 |
| BENZENE | 17 | METRIBUZIN | 15 |
| BROMACIL | 15 | MOLINATE | 15 |
| BUTACHLOR | 15 | NAPHTHALENE | 19 |
| CARBARYL | 9 | ORTHO-DICHLOROBENZENE | 17 |
| CARBOFURAN | 9 | OXAMYL | 9 |
| CHLORDANE | 14 | PARAQUAT DICHLORIDE | 1 |
| CHLOROMETHANE | 17 | PICLORAM | 9 |
| CHLOROTHALONIL | 14 | PROMETRYN | 15 |
| DALAPON | 9 | PROPACHLOR | 15 |
| DBCP | 19 1 | SIMAZINE | 18 |
| DIAZINON | 15 | THIOBENCARB | 15 |
| DICAMBA | 9 | TOXAPHENE | 14 |
| DIELDRIN | 14 | TRICHLOROBENZENES | 17 |
| DIMETHOATE | 15 | XYLENE | 17 |

YOLO

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-------------------------------|--------------|-----------------------|--------------|
| 1,1,2,2-TETRACHLOROETHANE | 2 | DINOSEB | 11 |
| 1,2,4-TRICHLOROBENZENE | 2 | DIQUAT DIBROMIDE | 6 |
| 1,2-D + 1,3-D + C-3 COMPOUNDS | 2 | DIURON | 14 |
| 1,2-DICHLOROPROPANE | 2 | ENDOTHALL | 6 |
| 2,4,5-TP (SILVEX) | 11 | ENDRIN | 11 |
| 2,4-D | 11 | ETHYLENE DIBROMIDE | 10 |
| 3-HYDROXYCARBOFURAN | 11 | GLYPHOSATE | 6 |
| ACET | 11 | HEPTACHLOR | 11 |
| ALACHLOR | 11 | HEPTACHLOR EPOXIDE | 11 |
| ALDICARB | 14 | HEXACHLOROBENZENE | 11 |
| ALDICARB SULFONE | 14 | HEXAZINONE | 11 |
| ALDICARB SULFOXIDE | 14 | LINDANE (GAMMA-BHC) | 11 |
| ALDRIN | 11 | METHOMYL | 11 |
| ATRAZINE | 19 | METHOXYCHLOR | 11 |
| BENTAZON, SODIUM SALT | 11 | METHYL BROMIDE | 2 |
| BENZENE | 2 | METOLACHLOR | 11 |
| BROMACIL | 19 | METRIBUZIN | 19 |
| BUTACHLOR | 11 | MOLINATE | 11 |
| CARBARYL | 11 | NAPHTHALENE | 7 |
| CARBOFURAN | 11 | NORFLURAZON | 5 |
| CHLORDANE | 11 | ORTHO-DICHLOROBENZENE | 2 |
| CHLOROMETHANE | 2 | OXAMYL | 11 |
| CHLOROTHALONIL | 5 | PICLORAM | 11 |
| CYANAZINE | 11 | PROMETON | 11 |
| DALAPON | 11 | PROMETRYN | 19 |
| DBCP | 10 | PROPACHLOR | 11 |
| DEETHYL-ATRAZINE | 11 | SIMAZINE | 19 |
| DIAZINON | 11 | THIOBENCARB | 11 |
| DICAMBA | 11 | TOXAPHENE | 11 |
| DIELDRIN | 11 | TRICHLOROBENZENES | 2 |
| DIMETHOATE | 11 | XYLENE | 2 |

YUBA

| CHEMICAL | SAMPLED POS. | CHEMICAL | SAMPLED POS. |
|-----------------------|--------------|---------------------|--------------|
| 2,4,5-TP (SILVEX) | 4 | DICAMBA | 4 |
| 2,4-D | 4 | DINOSEB | 4 |
| 3-HYDROXYCARBOFURAN | 8 | DIQUAT DIBROMIDE | 7 |
| ACET | 5 | DIURON | 5 |
| ALDICARB | 8 | ETHYLENE DIBROMIDE | 8 |
| ALDICARB SULFONE | 8 | GLYPHOSATE | 7 |
| ALDICARB SULFOXIDE | 8 | HEXAZINONE | 5 |
| ATRAZINE | 5 | METHIOCARB | 8 |
| BENTAZON, SODIUM SALT | 4 | METHOMYL | 8 |
| BENZENE | 1 | METRIBUZIN | 5 |
| BROMACIL | 5 | NAPHTHALENE | 7 |
| CARBARYL | 8 | OXAMYL | 8 |
| CARBOFURAN | 8 | PARAQUAT DICHLORIDE | 8 |
| CYANAZINE | 5 | PICLORAM | 4 |
| DALAPON | 4 | PROMETON | 5 |
| DBCP | 8 | PROMETRYN | 5 |
| DEETHYL-ATRAZINE | 5 | PROPOXUR | 8 |
| | | SIMAZINE | 5 |

Appendix B

Studies Included in the 1998 Update Report

The well sampling surveys that were added to the well inventory database during the period July 1, 1997 through June 30, 1998 are summarized. The study number assigned by DPR is shown to the left.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES (Sanitary Engineering Branch)

0023 Sampled a total of 78 chemicals in 32 counties; January 1997 - December 1998; 1,099 wells sampled.

REGIONAL WATER QUALITY CONTROL BOARD- LAHONTAN

RB42 Sampled for dieldrin in 2 wells in San Bernardino County.

DEPARTMENT OF PESTICIDE REGULATION (Environmental Hazards Assessment Program)

Analyses were performed for the listed chemicals.

Bold indicates the chemical(s) for which the study was initiated.

Underline indicates a verified detection of the chemical was made.

- 416 **Aldicarb**, aldicarb sulfoxide, aldicarb sulfone, atrazine, bromacil, cyanazine, diuron, hexazinone, metribuzin, prometon, prometryn, simazine; Yolo County; October 1997; 6 wells.
- 417 Ground Water Protection List Monitoring. Atrazine, bromacil, cyanazine, ACET, DEA, diuron, **hexazinone**, metribuzin, prometon, prometryn, simazine; Fresno, Glenn, Madera, Merced, San Joaquin, Solano, Stanislaus, Yolo counties; October to November 1997; 34 wells.
- 418 Atrazine, bromacil, cyanazine, diuron, hexazinone, metribuzin, **paraquat dichloride**, prometon, prometryn, simazine; Yuba County; April 1998; 5 wells.

A well sampling study was not conducted for the following detections because an investigation of the detections was conducted according to the “Revised protocol for selecting sampling areas and wells in a four-section survey to locate a second positive well site”.

| FILE | COUNTY SECTION; INITIATING CHEMICAL | ACTION |
|------|---|---|
| Z324 | Fresno 14S/22E-16; DIPA | PMZ atrazine, simazine. |
| Z327 | Fresno 14S/22E-35; simazine, DIPA | PMZ atrazine, simazine. |
| Z328 | Fresno 14S/23E-15; bromacil, diuron, simazine, DIPA | PMZ atrazine, bromacil, diuron, simazine. |
| Z329 | Fresno 14S/23E-26; simazine, DIPA | PMZ recommended under Z400. |
| Z332 | Fresno 14S/24E-27; simazine, DIPA | PMZ atrazine, diuron, simazine. |
| Z335 | Fresno 16S/21E-34; simazine, DIPA | PMZ simazine |
| Z349 | Fresno 16S/21E-04; simazine, DIPA | PMZ recommended under Z350. |
| Z350 | Fresno 16S/21E-05; simazine | PMZ simazine |
| Z351 | Fresno 16S/21E-07; simazine, DIPA | PMZ simazine |
| Z353 | Fresno 16S/21E-33; simazine, ACET | PMZ simazine |
| Z354 | Fresno 15S/21E-34; simazine | PMZ recommended under Z353. |
| Z356 | Fresno 16S/22E-01; diuron, simazine, DIPA | PMZ diuron, simazine |
| Z357 | Fresno 16S/22E-02; DIPA | PMZ atrazine, simazine |
| Z358 | Fresno 16S/22E-03; simazine, DIPA | PMZ simazine |
| Z360 | Fresno 16S/22E-33; bromacil | PMZ section 33: atrazine, bromacil, simazine. PMZ section 34 simazine, diuron |
| Z361 | Fresno 16S/22E-34; diuron, simazine | PMZ recommended under Z360 |
| Z363 | Fresno 17S/22E-05; simazine, DIPA | PMZ simazine |
| Z364 | Tulare 15S/25E-05; bromacil, diuron, simazine, DIPA | PMZ section 05: simazine, bromacil, diuron; section 08: atrazine, simazine, diuron |
| Z365 | Tulare 15S/25E-08; diuron, DIPA | PMZ declared under Z364 |
| Z366 | Tulare 16S/25E-31; DIPA | PMZ atrazine, simazine |
| Z370 | Tulare 17S/26E-13; DIPA | PMZ atrazine, simazine |
| Z371 | Tulare 17S/26E-14; DIPA | PMZ atrazine, simazine |
| Z372 | Tulare 17S/27E-29; simazine, DIPA | PMZ atrazine, simazine |
| Z373 | Tulare 19S/26E-25; simazine, DIPA | PMZ atrazine, simazine |
| Z374 | Tulare 19S/27E-29; simazine, DIPA | PMZ atrazine, simazine |
| Z375 | Tulare 20S/27S-29; atrazine, bromacil, simazine, DIPA, DEA | PMZ already declared for atrazine, bromacil, simazine. |
| Z388 | Contra Costa 02N/02W-14; bromacil, prometon | Z388 and Z389 combined present evidence to declare PMZ for bromacil, prometon in section 14 |
| Z389 | Contra Costa 02N/02W-24; atrazine, simazine, prometon | Z388 and Z389 combined present evidence to declare PMZ for atrazine, simazine, prometon in section 24 |

Appendix C

Methods Used for Data Collection

Data Collection

Section 13152, subdivision (c) of the PCPA requires all government agencies that sample wells for pesticides to submit their sampling data to DPR for inclusion in the well inventory database. DPR has notified agencies of this law and requested them to submit required information. DPR has also contacted private companies that conduct well sampling for pesticides to request sampling results.

Data were reviewed to determine if they met the criteria for inclusion in the database:

- Results were for the analyses of pesticides or pesticide breakdown products;
- Samples were taken from a well;
- Samples were obtained from an untreated and unfiltered system;
- Location of each well was identified by at least township/range/section according to the U.S. Geological Survey's Public Lands Survey Coordinate system;
- Data had not previously been entered into the database.

The PCPA also requires DPR, the SWRCB, and CDHS to jointly establish minimum requirements for well sampling that will help insure data integrity. The agencies agreed upon the following minimum reporting requirements, effective December 1, 1986: State well number, county, date of sample, chemical analyzed for, chemical concentration, minimum detectable limit, sampling agency, analyzing laboratory, street address of well location, well type, sample type (initial or confirmation).

Information included in the data base when it is available includes: method of analysis and analysis date, well depth and depths of top and bottom perforations of the well casing, depth of standing water in the well at time of sampling, year the well was drilled

Data Verification

Each laboratory analysis of a well water sample for the presence of a pesticide active ingredient or breakdown product comprises one record in the database. This record of sampling information can be supplemented with any available well location and construction information. Before being added to the permanent well inventory database, each record undergoes verification by programs developed by DPR staff.

Appendix D

Glossary of Terms

AB 1803 – (1983) A law that required the California Department of Health Services (DHS) to evaluate each public water system to determine its potential for contamination. The systems were required to conduct specified water analyses and to report those results to the DHS. Monitoring required by AB 1803 was completed in June 1989. Based on sampling results, the DHS may require a system to conduct periodic water analyses and to report to the DHS the results of the analyses.

AB 2021 – See *Pesticide Contamination Prevention Act*.

active ingredient – The chemical or chemicals in a pesticide formulation that are in themselves, or are transformed to chemicals that are capable of preventing, destroying, repelling or mitigating pests.

Agricultural commissioner – For each county in California, the person in charge of the County Department of Agriculture. Under the supervision of DPR, the commissioner enforces the laws and regulations pertaining to agricultural and structural pest control and all other pesticide uses.

agricultural use – (See also *legal agricultural use* and *legal agricultural use determination*.) The use of any pesticide or method or device for the control of any pests, or the use of any pesticide for the regulation of plant growth or defoliation of plants. It excludes the sale or use of pesticides in properly labeled packages or containers which are intended only for any of the following: home use, use in structural pest control, industrial or institutional use, the control of an animal pest under the written prescription of a veterinarian, local districts, or other public agencies which have entered into and operate under a cooperative agreement with the Department of Health Services pursuant to section 2426 of the Health and Safety Code. (Food and Agricultural Code, section 11408.)

analysis – The determination of the composition of a substance by analytical methods. For example, the separation and measurement of a pesticide or its degradation product from the sample matrix.

aquifer – A geologic formation that is water bearing and which transmits water in sufficient quantity to supply springs and pumping wells.

Birth Defect Prevention Act (BDPA) – (SB 950, 1984) A law requiring DPR to acquire certain toxicological data for registered pesticides in order to make a scientific determination that their uses will not cause significant adverse health effects. The BDPA prohibits the registration of any new pesticide active ingredient if required mandatory health effects studies are missing, incomplete, or invalid. Pesticide active ingredients already registered that are identified as having the potential to cause significant adverse health effects following a thorough review by DPR scientific staff will be canceled.

breakdown product – See *degradation product*.

Cal/EPA - California Environmental Protection Agency. Comprised of the Department of Pesticide Regulation, the Department of Toxic Substances Control, the Integrated Waste Management Board,

the Water Resources Control Board, the Air Resources Board, and the Office of Environmental Health Hazard Assessment.

CCR (3CCR) - California Code of Regulations. Title 3, California Code of Regulations (3CCR). California Code of Regulations contains enforceable regulations that provide the specific means for implementation of laws. Title 3 CCR contains regulations pertaining to food and agriculture, including sale and use of pesticides.

chemigation – The application of pesticides through irrigation water, using irrigation equipment.

confirmed detection – For purposes of the well inventory database, the detection of a compound in two discrete samples taken from the same well during the time period of a single monitoring survey.

database record – The results of each chemical analysis of a well water sample for a pesticide residue and other corresponding sampling information constitutes one record in the database.

degradation product – A substance resulting from the transformation of a pesticide active ingredient by physical or chemical processes (e.g., oxidation, reduction, hydrolysis, photolysis).

direct streaming – A pathway by which agricultural chemicals may reach ground water; the movement of pesticide residue in runoff surface water to subsurface soil and, ultimately, ground water, through dry wells, soil cracks, or other direct pathways.

discrete sample – Samples taken separately from a well; not one sample split into smaller samples.

dry well – A small-diameter hole or pit dug into the ground and filled with gravel or other material for the disposal of surface water by infiltration into soil.

economic poison – see pesticide.

established PMZ – A *pesticide management zone* (PMZ) listed in section 6802, Title 3 of the California Code of Regulations (3CCR).

FAC - Food and Agricultural Code. The laws pertaining to food and agriculture, including the registration, sale, and use of pesticides. Specific regulations for implementation of law are in the *California Code of Regulations*.

formulation – The way in which a pesticide product, containing the active ingredient, the carrier, and other additives, is prepared for use. Includes wettable powder, emulsifiable concentrate, etc.

fumigant – A chemical used in the form of a volatile liquid or a gas. Its vapors kill insects, nematodes, fungi, bacteria, seeds, roots, or entire plants; usually applied in an enclosure or in the soil.

ground water – Water beneath the surface that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the earth's surface via seeps or springs.

Ground water protection advisories (GWPA) – Written information given by a licensed pest control adviser, who has successfully completed the Ground Water Protection Training Program given by DPR, that must be submitted by permit applicants before the county agricultural commissioner can

issue a use permit for allowed uses of a regulated pesticide in a pesticide management zone (PMZ). The GWPA contains specific information for applying the regulated pesticide in a sensitive area (PMZ) in order to prevent or minimize the movement of pesticide residues to ground water.

Groundwater Protection List (GWPL) – A list of pesticides having the potential to pollute ground water. It is required by the PCPA and established in section 6800 (3CCR). The GWPL is divided into two sublists. Sublist (a) is comprised of chemicals that have been detected in ground water as a result of legal, agricultural use. Sublist (b) contains pesticide active ingredients whose physico-chemical properties exceed or are less than the *specific numerical values* and that are labeled for soil application under certain conditions. Chemicals placed on the GWPL are subject to certain restrictions and reporting requirements.

herbicide – A pesticide used to control unwanted vegetation.

historical agricultural use – The documented use of a chemical, no longer registered for such use, that has been applied over time in a specific area for the production of an agricultural commodity.

hydrolysis – The chemical alteration of a pesticide by water.

initial detection sample – For a single study and a particular well, the initial detection sample for a chemical is the positive sample with the earliest sampling date and/or time. Subsequent samples are coded in relation to the initial detection sample.

insecticide – A pesticide used to kill insects.

institutional use – Use within the confines of, or on property necessary for the operation of, buildings such as hospitals, factories, schools, libraries, auditoriums and office complexes.

law – State laws and statutes are the result of action by the California legislature.

leaching – A pathway by which agricultural chemicals may reach ground water; the process by which pesticides carried by water, either in the dissolved or suspended state, through the soil matrix as it recharges a ground water aquifer.

legal agricultural use – The application of a pesticide, according to label directions and in accordance with federal and state laws and regulations, for agricultural use as defined in Food and Agricultural Code, section 11408. (See *agricultural use*.)

legal agricultural use determination – A determination required by Food and Agricultural Code (FAC) section 13149 and based upon the following criteria: (1) the detection of a pesticide ingredient or its degradation product that has been verified according to DPR criteria; (2) a detection of the same pesticide ingredient or its degradation product in ground water, verified at a second site in either an adjacent section or within one-half mile radius of the original, verified detection; (3) the detected pesticide ingredient must be formulated in a product which has listed on its label one or more agricultural uses; (4) the application of the agricultural use product(s) in the vicinity of the reported detections should either be documented historically, confirmed by local interviews, or presumed by the identification of a target pest or commodity; (5) the Director may consider a preponderance of evidence as meeting these criteria.

maximum contaminant level (MCL) – MCLs are part of the drinking water quality standards adopted by DHS and by U.S. EPA under the Safe Drinking Water Act. MCLs are formally established in regulation and are enforceable by the DHS on water suppliers. Primary MCLs take into consideration both health-based criteria and technologic and economic factors relating to the ability to achieve and monitor these concentrations in drinking water supply systems.

metabolite – In the case of a pesticide, a compound derived from the action upon the pesticide by a living organism (bacteria, plant, insect, higher animal, etc.). The chemical transformation varies (oxidation, reduction, conjugation) and the metabolite may be more toxic or less toxic than the parent compound. The same derivative may, in some cases, develop through exposure of the pesticide in the environment. (See also *degradation product*.)

minimum detection limit (MDL) – The lowest concentration of analyte that a method of analysis can reliably quantify. The MDL is established in protocol for a study either as a result of a method validation study or by using accepted proven analytical methods (e.g., U.S. EPA methods).

model – Mathematical equations that represent certain processes. These equations can be implemented in a computer program in order to facilitate calculations and test model predictions against measured data.

monitoring study – See *survey*.

monitoring well – Any artificial excavation by any method for the purpose of monitoring fluctuations in ground water levels, quality of underground waters, or the concentration of contaminants in underground waters.

non-crop areas – These areas include rights-of-way, golf courses, and cemeteries. There may be agricultural use of pesticides in non-crop areas, e.g., for weed control around buildings on a farm.

non-point source – Contamination which cannot be traced to a small, definable location (compare with *point source*), e.g., applications of agricultural chemical to crops.

parts per billion (ppb) – A way to express the concentration of a chemical. One microgram of a chemical in one liter of water is equal to one ppb.

permit – Permits are issued by county agricultural commissioners for the use of chemicals that have been designated as restricted pesticides. Restricted pesticides, for various reasons, are potentially more hazardous than other pesticides.

pest – Any of the following that is, or is liable to become, dangerous or detrimental to the agricultural or nonagricultural environment of the State: any insect, predatory animal, rodent, nematode, or weed; any form of terrestrial, aquatic, or aerial plant or animal, virus, fungus, bacteria, or other microorganisms on or in living humans or other living animals; anything that the Director of the California Department of Food and Agriculture or Director of the Department of Pesticide Regulation declares, by regulation, to be a pest.

Pest Control Adviser (PCA) – A person licensed by DPR and registered with the county agricultural commissioner who makes pest control recommendations. All agricultural use recommendations must

be in writing and contain certain information. A PCA must complete continuing education requirements before his/her license may be renewed.

pesticide – In California, any of the following: any spray adjuvant, any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment. Includes fungicides, herbicides, insecticides, nematocides, rodenticides, desiccants, defoliant, plant growth regulators.

Pesticide Contamination Prevention Act (PCPA) – (AB 2021) A law, effective January 1, 1986, which added sections 13141 through 13152 to Division 7 of the FAC. The PCPA requires each registrant of an economic poison to submit specified information to the Director of DPR, provides for the establishment of the Groundwater Protection List, requires the Director to perform soil and water monitoring, provides for a specific response to the detection of pesticides in soil and ground water, and requires the Director to maintain a specified well sampling database and to report certain information annually to the Legislature, the DHS, and the State Water Resources Control Board.

Pesticide Detection Response Process (PDRP) – A process, established in sections 13149 through 13151 (FAC) by the PCPA, in which the detection of a pesticide residue in soil (at specific depths) or ground water, is investigated, evaluated, and, when necessary, mitigated. As part of the process, a determination must be made that the detection probably resulted from a legal agricultural use application of the pesticide. As a result of this process, the use of a pesticide in California may be modified or canceled.

pesticide management zone (PMZ) – A geographic surveying unit of approximately one square mile (a section) that is designated in regulation as sensitive to ground water pollution. The use of a pesticide inside its PMZ is subject to certain ground water protection restrictions and requirements.

pesticide residue – The amount of a pesticide active ingredient remaining in a soil or ground water sample at the time of analysis.

physicochemical properties – The types of behavior that a substance exhibits in chemical reactions are called its chemical properties; other characteristics that are typical of a substance are called its physical properties. Taken together, the chemical and physical properties of a substance are called its physicochemical properties.

point source – A source of contamination, such as a spill or at a waste site, that is initially deposited and concentrated in a small, well-defined area. The contamination can be traced to its point of origin by locating a specifically shaped pattern in the ground water called a plume.

positive detection – A well water sample in which the presence of a pesticide chemical is detected at or above the minimum detection limit of the analytical method used for analysis of the compound under investigation. A positive analysis may be designated as confirmed or unconfirmed.

range – A single series or row of townships, each six miles square, extending parallel to, and numbered east and west from, a survey base meridian line. (See *well numbering system*.)

recommended PMZ – A section of land (one square mile) identified by DPR as sensitive to ground water pollution by specific pesticides, not yet adopted into regulation in section 6802 (3CCR).

registered pesticide – A pesticide product approved by the USEPA and DPR for use in California.

registrant – A person or corporation that has registered an economic poison for use in California and has obtained a certificate of registration from the Department.

regulation – These are adopted by state agencies to implement or clarify statutes enacted by the California Legislature. They can also be adopted in response to federal legislation, court decisions, changing technologies, and concerns for the health and well-being of the residents of California.

related compounds – See *degradation product* and *metabolite*.

restricted material – Compounds designated as “restricted materials” in section 6400 (3CCR) that, for various reasons, are potentially more hazardous to people, animals, or the environment than other pesticides. As a result, the use of these materials is regulated more closely and use is permitted only by trained personnel when additional precautionary measures are taken.

right-of-way – The strip of land over which facilities such as highways, or railroads are built.

section – A land unit of 640 acres (one square mile) equal to 1/36 of a township. (See *well numbering system*.)

soil adsorption coefficient (Koc) – A measure of the tendency of compounds such as pesticide active ingredients to adhere to the surfaces of soil particles.

specific numerical values (SNVs) – Certain numeric threshold values set for the following physical and chemical properties of pesticide active ingredients: water solubility, soil adsorption coefficient, hydrolysis, aerobic and anaerobic soil metabolism, and field dissipation. The PCPA associates these properties with the longevity and mobility of a chemical in the soil and requires the establishment of SNVs in regulation as a means of identifying pesticides with the potential to pollute ground water.

State Well Number – See *well numbering system*.

survey – In the context of this report, well monitoring conducted by an agency or private firm for a specified length of time in a designated area. A survey typically involves well water sampling and chemical analysis.

township – A public land surveying unit which is a square parcel of land, six miles on each side. The location of a township is established as being so many six-mile units east or west of a north-south line running through an initial point (called the “principal meridian”) and so many six-mile units north or south of an east-west line running through another point (called the “baseline”); see also, *well numbering system*).

triazines – A class of chemical compounds derived from any of three isomeric compounds, each having three carbon and three nitrogen atoms in a six-membered ring. Triazines are strong inhibitors of photosynthesis. Atrazine, prometon, and simazine are triazines.

unconfirmed detection – For a particular well, the detection of a pesticide in a single sample during the time period of an individual monitoring study. Confirmation of the initial detection by a second positive sample was not possible because either (1) only a single sample was taken from the well or (2) analyses of all other samples taken from the well during the study were negative.

U.S. EPA IRIS RfD – An oral reference dose that is an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is believed likely to be without an appreciable risk of certain deleterious effects during a lifetime. Expressed in mg/kg/day.

use requirement – Restrictions established in regulation for the use of certain pesticides. For example, section 6484.1 (3CCR) states that agricultural, outdoor institutional, and outdoor industrial uses of pesticides containing atrazine are prohibited in the pesticide management zones listed in 6802(c) (3CCR).

vapor pressure – A physical property that indicates the rate of evaporation of a compound. The higher the vapor pressure, the more volatile the compound.

verified detection (DPR study) – The unequivocal detection of a pesticide or a pesticide breakdown product, or the detection of a chemical in two discrete samples taken from a single well during a 30-day time period, and analyzed either by the same laboratory using different analytical methods or by two laboratories using the same method. The analytical methods used must be approved by DPR. Verification of the presence of a compound in ground water by this criteria fulfills section 13149(d) (FAC) of the PCPA and may be used for regulatory purposes.

water solubility – The property of a substance to dissolve in water.

water well - any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground.

well head – The immediate area surrounding the top of a well.

well numbering system – The California well numbering system is based on a grid system commonly referred to as the Public Lands Survey. Under this system, all tracts of lands are tied to an initial point and identified as being in a township. A *township* is a square parcel of land six miles on each side. Its location is established as being so many six-mile units east or west of a north-south line running through the initial point (called the “principal meridian”) and so many six-mile units north or south of an east-west line running through the point (called the “baseline”). The meridian lines parallel to, and east or west of, the principal meridian are called *range* lines. Every township is further divided into 36 parts called sections. A *section* is a square parcel of land one mile on a side, each containing 640 acres. Each section of land is divided into sixteen 40-acre tracts. Once the township, range, section, and tract are known, each well is assigned a unique sequence number (in chronological order) by Department of Water Resources (DWR) personnel. This number is known as the State well number.

**III. PESTICIDE CONTAMINATION PREVENTION ACT
ANNUAL REPORT TO THE LEGISLATURE
STATE WATER RESOURCES CONTROL BOARD
OCTOBER 1998**

Actions taken by the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) to prevent economic poisons from migrating to ground waters of the State are as follows:

A. SWRCB

SWRCB staff participated in the following activities:

- Reviewed DPR's findings on agricultural use determination for norflurazon residues in ground water pursuant to AB 2021 (Pesticide Contamination Prevention Act).
- Involved in ongoing consultations with pesticide manufacturers to design monitoring studies and BMPs.
- Regularly attended meetings sponsored by the DPR, including the interagency Pesticide Advisory Committee (PAC), Pesticide Registration and Evaluation Committee (PREC), Pest Management Advisory Committee (PMAC), and the Rice Pesticide Workgroup.
- Participated in discussions with U.S. Geological Survey scientists on studies dealing with pesticides and water quality.
- Participated in the California Department of Health Services' Interagency Workgroup to develop Source Water Assessment Program (SWAP) mandated by the 1996 amendments of the Federal Safe Drinking Water Act.
- Participated in outreach with Yolo County growers regarding alternatives to pesticide use through best management practices (BMPs).
- Reviewed, on an ongoing basis, DPR Notices of "Materials Entering Evaluation" and advised DPR on potential water quality impacts of pesticide registration and use decisions.
- Developed a draft policy to implement the California Toxics Rule, which includes pesticide water quality criteria.
- Compiled the statewide list of water quality limited segments and Total Maximum Daily Loads (TMDLs) pursuant to Section 303(d) of the Federal Clean Water Act.

- Reviewed and commented on DPR's proposed studies on pesticide and water quality pursuant to the Management Agency Agreement (MAA) with DPR.
- Developed a policy for the guidance on the Regional Toxic Hot Spot Cleanup Plans for the Bay Protection and Toxic Cleanup Program.
- Made several presentations on toxicity testing and its ecological relevance at various professional organizations' annual meetings and conferences.
- Contracted with University of California Cooperative Extension to:
 - Develop alternative agricultural and irrigation practices to prevent or reduce off-site movement of pesticides;
 - Educate growers and others regarding the pesticide-caused problems and outreach the alternative practices to the agricultural community; and
 - Design and initiate monitoring projects to assess the success of the alternative practices.
- Contracted with University of California, Davis' Aquatic Toxicity Laboratory for water quality monitoring (including toxicity testing, toxicity identification evaluations, and chemical analysis) to identify the spatial and temporal extent of the toxicity, as well as the chemical causes and sources of toxicity for the following five projects:
 - Central Valley Codling Moth Pesticide Runoff Project,
 - Sacramento River Watershed Project,
 - Yolo County Resource Conservation District Project,
 - Revlon Slough Project in Ventura County, and
 - Salton Sea Project in Imperial County.
- Contracted with University of California, Santa Cruz, to study toxicity of Salinas River water samples to aquatic organisms.

B. RWQCB

Information on actions to prevent economic poisons from migrating to the ground waters of the State by each of the nine RWQCBs is listed in Tables 1 through 10.

Table III-1. Actions taken by the Regional Water Quality Control Board, North Coast (Region 1), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-----------|--|--|--|
| Del Norte | Smith River Plains | Aldicarb, 1,2-D | Ongoing monitoring program. |
| Humboldt | U.S. Forest Service Nursery McKinleyville | Dithiocarbamate | USFS monitoring with RWQCB support. |
| | Blue Lake Forest Products | Pentachlorophenol, Tetrachlorophenol, Copper 8-Quinolinate | State Superfund Site with ongoing assessment. |
| | Carlotta Lumber Company | Pentachlorophenol, Tetrachlorophenol | Ongoing contamination assessment and cleanup. |
| | Beaver Lumber Company, Arcata | Pentachlorophenol, Tetrachlorophenol | Contamination cleanup. |
| | Sun Valley Bulb Farms | Chlorothalonil, Dithiocarbamate, Oxamyl | Ongoing monitoring and assessment to prevent discharges to surface water and ground water under RWQCB direction. |
| | Pacific Lumber Co. Carlotta | Pentachlorophenol Tetrachlorophenol | Ongoing contamination assessment |
| Mendocino | Marcel Peterson | Chlordane | Remediation underway; new well. |
| Siskiyou | Mount Heron | Strychnine | Source removal. |
| | Hi-Ridge Lumber Company | Pentachlorophenol, Tetrachlorophenol | Ongoing contamination assessment and cleanup. |
| | Pine Mountain Lumber Company | Pentachlorophenol, Tetrachlorophenol | Ongoing contamination assessment and cleanup. |
| Trinity | Stone Forest Industries, Burnt Ranch | Pentachlorophenol, Tetrachlorophenol | Ongoing contamination assessment. |

Table III-2. Actions Taken by the Regional Water Quality Control Board, San Francisco Bay (Region 2),
In FY 1996-97.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|--------------|---|--|---|
| Alameda | Parker & Amchem | 2,4-D | No monitoring for 2,4-D is required after many years of non-detect levels of 2,4-D. |
| | Jones-Hamilton | Pentachlorophenol | RWQCB Order No. 89-110 specified time schedule for investigation/cleanup. Ground water cleanup underway. No sampling of ground water for pesticides. |
| | Port of Oakland (Embarcadero Cove) | Chlordane, Pentachlorophenol, DDT, Endosulfan, 2,3,7,8-TCDD, DDD | Department of Toxic Substances Control (DTSC) has lead and has approved a Remedial Action Plan including continuous ground water monitoring. |
| | Lincoln Properties (Orsetti Site) | DDE, 2,4-D | DDE and 2,4-D were non-detect in monitoring wells and are no longer monitored. |
| | Peerless Southern Pacific Railroad | Pentachlorophenol | City of Berkeley Health Department has lead. Additional soil and ground water investigations required. |
| | FMC, Newark | EDB | RWQCB Order No. 89-055 specified time schedule for investigation and cleanup. Ground water cleanup underway. |
| | 3830 Old Santa Rita Road, Pleasanton | Dicamba, Dichloroprop, 2,4-D, 2,4,5-T | Pesticide found in grab water samples. One monitoring well installed on-site. Alameda County Department of Environmental Health lead on this site. Site closed October 1990. |
| Contra Costa | Chevron | Endrin, Lindane, Dieldrin, DDT, Arsenic | Submitted closure plan for Class I impoundment. A cut-off wall with a ground water extraction trench around the impoundment has been constructed. |
| | Levin Metals | Aldrin, 4,4'-DDD, 4,4'-DDE, o,p,-DDT, Dieldrin, BHC | U.S. Environmental Protection Agency (U.S. EPA) lead on-site cleanup. Awaiting report of completion for remedial dredging project. |
| | FMC, Richmond | DDT, DDD, DDE, Dieldrin, Chlordane, Tedion, Endosulfan, Ethion, Carbophenothion, Heptachlor | California Department of Health Services (DHS) lead on-site cleanup. Cleanup completed. Monitor to assure remaining pollutants do not migrate. |
| Marin | Former Sonoma Mosquito Abatement District, San Rafael | DDD, DDE, DDT, Dieldrin | DTSC is lead agency. Some soil removal has already taken place (approximately 3000 yd ³ in 1992). Old monitoring wells destroyed. Seven new wells were installed in 1996. DTSC has mailed out draft deed restriction and draft O&M Agreement for site. |

Table III-3. Actions Taken By the Regional Water Quality Control Board, Central Coast (Region 3), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-------------|------------------------------------|---|------------------------------------|
| Monterey | Monterey SoilService, King City | EDB, 1,2-D, DDT, DBCP, Toxaphene | Site is being actively remediated. |
| | WFS-Salinas | Dinoseb | Remediation completed. |
| | Castlerock Estates | Toxaphene, beta-BHC, delta- BHC, 4,4'-DDE, 4,4'-DDT, 4,4-DDE, 4,4-DDT, 4,4-DDD | Site is being actively remediated. |
| Santa Clara | Castle-Veg-Tech, Morgan Hill | Toxaphene, Endrin, Lindane, Endosulfan | Site is being actively remediated. |
| Santa Cruz | WFS-Greengro, Watsonville | 1,2-DCP, Endosulfan | Site is being actively remediated. |
| | WFS, Watsonville | DDT, DDD, Toxaphene | Site is being actively remediated. |

Table III-4. Actions Taken by the Regional Water Quality Control Board, Los Angeles (Region 4), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-------------|---|--|--|
| Los Angeles | Dominquez Park Landfill, Redondo Beach | Bis (2-ethylhexyl) phthalate | Phthalates are thought to be from PVC well casing. |
| | Bixby Village Sanitary Landfill (City Dump Salvage No. 1), Long Beach | Aldrin, Beta-BHC, Alpha-BHC, Bis (2-ethylhexyl) phthalate, Delta-BHC, 4,4'-DDE, 4,4'-DDT, 1,4-Dichlorobenzene, Dieldrin, 2,4-Dinitrophenol, Endosulfan I, Endrin, Endrin aldehyde, Lindane, Heptachlor | Additional analyses did not detect any pesticides. |
| | Market Place Sanitary Landfill (City Dump Salvage No. 2), Long Beach | Alpha-BHC, Bis (2-ethylhexyl) phthalate, Delta-BHC, 4,4'-DDE, 4,4'-DDT, Endosulfan I, Lindane, Heptachlor | Additional analyses did not detect any pesticides. |
| | Studebaker-Loynes Sanitary Landfill (City Dump Salvage No. 3), Long Beach | Alpha-BHC, Bis (2-ethylhexyl) phthalate, 4,4'-DDD, 4,4'-DDE, Di-n-octyl-phthalate, Endosulfan I, Endosulfan II, Endrin, Lindane, Heptachlor | Additional analyses did not detect any pesticides. |
| | Peter Pitchess Honor Rancho Landfill, Castaic Junction | Bis (2-ethylhexyl) phthalate | Phthalates are thought to be from PVC well casing. Monitoring continues at site. |
| | Royal Boulevard Land Reclamation Site, Torrance | Lindane, 1,3-Dichloropropene | Site is closed and capped. |
| | Port Disposal Landfill, Wilmington | Bis (2-ethylhexyl) phthalate, Di-n-Octyl-phthalate | Phthalates are thought to be from PVC well casing. |
| | Port Disposal Banning Pit and Macco Pit, Wilmington | Bis (2-ethylhexyl) phthalate, Napthalene, Di-n-Butyl phthalate, 2-Methyl-naphthalene | Phthalates are thought to be from PVC well casing. |
| | City of Compton Landfill | Di(2-ethylhexyl) phthalate (DEHP), Di-n-Octyl-phthalate | Phthalates are thought to be from PVC well casing. Monitoring continues. |

Table III-5. Actions Taken By The Regional Water Quality Control Board, Central Valley (Region 5, Sacramento), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|------------|---|--|---|
| Colusa | Moore Aviation | Atrazine, 2,4,5-TP, 2,4-D, 2,4-Dichlorophenol, 4-Nitrophenol | Ground water remediation ongoing. Soils bioremediation complete for most constituents. |
| Glenn | Barber Cashew Supply Corporation, Willows | Nitrate, ammonia, 1,2-DCE, PCE, TCE, toluene, carbon tetrachloride, chloroform, chlorobenzene | Cleanup and Abatement Order (CAO) issued. Need to define the ground water plume. |
| Merced | Merced Municipal Airport | 1,2 Dichlorobenzene, 1,2 Dichloroethane, 1,2 Dichloroethane (cis), 1,2 Dichloroethane (trans), 1,3 Dichloropropane (cis), Alachlor, Benzene, Captan, Carbophenothion (trithion), Chloroform, DDT (total), Dicofol (Kethane), Dieldrin, Endosulfan I, II, Endosulfan sulfate, Endrin, Endrin aldehyde, Endrin ketone, Ethylbenzene, Heptachlor epoxide, Methoxychlor, Tetrachloroethylene (PCE), Toluene, Toxaphene, TPH-diesel, TPH-gasoline, Trichloroethylene (TCE), Vinyl chloride, Xylenes | Health Assessment completed. Feasibility study submitted. |
| | J.R. Simplot, Winton | 1,2-DCP, Dieldrin, Benefin, 1,2,3-TCP, DBCM, DBCP, Endrin, Alachlor | Ground water remediation underway. |
| | BAC, Inc. | Chromium, Arsenic, Copper | RWQCB Lead Agency. Ground water extraction and treatment system in pilot study phase. Plume spreading due to ground water flow direction change. Implementing well reinjection, infiltration gallery, and National Pollutant Discharge Elimination System (NPDES) discharges. |
| | Western Farm Service, Merced | 1,2-DCP, DBCP, dinoseb, dalapon, nitrate, ammonia | Off-site assessment underway. MRP issued for quarterly groundwater monitoring. |
| Sacramento | Sacramento Army Depot | Diazinon, Dursban | Assessment report requested. Federal Superfund work in progress. Cleanup of pesticides completed. |
| | Natomas Field | Alachlor, Dicofol, DDE, DDT, Toxaphene, Gamma-BHC, Dieldrin, Endrin | Monitoring wells have been installed and sampled. |
| | Franklin Field Airport | Toxaphene | Requested feasibility study for soil cleanup and additional ground water sampling. |
| | McClellan Air Force Base | Aldrin, Alpha-BHC, Beta-BHC, Delta-BHC, Gamma-BHC, (Lindane), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin, Alpha Endosulfan, Endosulfan Sulfate, Heptachlor, Heptachlor Epoxide, 2,4-D, 2,4,5-T, 2,4,5-TP | Ground water cleanup underway. For the last 4-5 years, no pesticides found in ground water. |
| | Bureau of Land Management, Fitzgerald Ranch | Toxaphene | Buried empty pesticide containers found on land purchased by Bureau of Land Management (BLM). Soil containing toxaphene excavated and stockpiled onsite. BLM has proposed a pilot study for bioremediation of the stockpiled soils. No pesticides detected in three monitoring wells. |

Table III-5 (cont.) Central Valley (Region 5, Sacramento)

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-------------|---|---|--|
| San Joaquin | Occidental Chemical | EDB, DBCP, Sulfolane | Site remediation occurring pursuant to stipulation and judgement approving settlement (1981). |
| | Defense Depot, Tracy | Dieldrin, Simazine | A Record of Decision (ROD) was finalized in February 1998; it includes soil cleanup levels for simazine and dieldrin, and a ground water cleanup level for dieldrin. Remedial design phase was initiated in July 1998. |
| | Sharpe Army Depot, Stockton | Bromacil | Assessment ongoing. |
| | Marley Cooling | Arsenic, Copper, Chromium | Ground water cleanup underway. |
| | U.S. Navy Communication Station | DDD, DDE | Assessment ongoing. Soil removal actions have occurred and more are planned. Ground water assessment underway. |
| | Triple "E" Produce | Chloroform | Bioremediation began September 1993. A downgradient ground water extraction system began operation in the spring of 1996. The effectiveness of this extraction system is currently being evaluated. |
| | Pure Gro/Brea Agricultural Service, Stockton | 1,2-DCP, Chloroform, PCE, Bromoform, 1,1-DCA, Dibromochloromethane, bromochloromethane, bromodichloromethane | Soil and ground water investigation ongoing. Off-site plume definition continuing. Two soil areas capped. MRP issued for semi-annual ground water monitoring and long-term cap maintenance. |
| | Former Oxychem/ Simplex/ PureGro | DBCP, 1,2-DCP, 1,1-DCE, 1,2-DCA, Chlorobenzene, 1,1,2-TCA, Mevinphos, Fensulfothion, Dinoseb, Dicamba, 2,4,5-T, Atrazine, Monuron, Carbaryl, Carbofuran, Protham, Diuron, Propoxur, 1,1,2,2-TCA, atraton, 2,4-DB, bromocil, chloromethane, tebuthiuron, simazine, methiocarb, MCPP, fenuron, chloroform, chloroxuron, dichloroprop, EDB, oxamyl | Health risk assessment completed. Target cleanup level calculations underway. Off-site plume definition report submitted. |
| | Cal Farm Supply | b-BHC, Dieldrin, Prometon, Simazine, Atrazine, 2,4,5-TP, Dinoseb | Soils cleaned up. Ground water investigation continues. |
| | Western Farm Service, Vernalis | DBCP, EDB, diuron, methiocarb, diazinon, aldrin, nitrate, ammonia, 1,2-DCP | Extent of the off-site ground water plume is being defined. MRP issued for quarterly ground water monitoring. |
| Solano | Wickes Forest Industries | Chromium (Cr ³⁺ and Cr ⁶⁺), Arsenic, Copper | Ground water cleanup ongoing. |
| | Rio Vista Army Reserve Center | Chlordane, 4,4-DDE, 4,4-DDT, dieldrin | Site investigation is underway to determine threat to water quality. |
| Stanislaus | Chemurgic Agricultural Chemicals | BHC, DDT | 1993 CAO rescinded. Waste Discharge Requirements adopted in June 1997 for a ground water extraction and treatment system. Excavation of areas with elevated BHC in soil completed by December 1995. Ground water monitoring ongoing. |
| | Geer Road Landfill | 1,1-DCA, 1,1,1-TCA, TCE, Chloridazon, Freons | Ground water cleanup underway. |
| | PureGro, Modesto | DBCP, EDB, nitrate, ammonia | Requested off-site plume definition. Issued MRP for quarterly ground water monitoring. |
| | Rhone-Poulenc (formerly Union Carbide) Test Plots | Aldicarb | Monitoring has ended and wells were abandoned under the oversight of Stanislaus County Department of Environmental Resources. Site was closed in the spring of 1995. |
| | Shell Agricultural Research Facility | Cyanazine, Atrazine, Chloroform, Planavin, 1,1-DCE, DBCP, Nitrate | Requested feasibility study for groundwater cleanup. |
| | Valley Wood | Copper, Chromium, Arsenic | Out-of-court settlement. Federal Superfund site. Interim cleanup in progress. |

Table III-5 (cont.) Central Valley (Region 5, Sacramento)

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|--------|------------------------------------|---|---|
| Sutter | Bowles Flying Service | 2,4-D, Thiobencarb, Diuron, Metalaxyl, Mollinate, Simazine | Cease and Desist Order issued under the TPCA program. On DTSC's list as needing a Preliminary Endangerment Assessment. Monitoring wells installed. |
| | PureGro, Robbins | alachlor, aldrin, dicofol, monuron, 1,2-DCA, 1,2-DCP, diphenamid | MRP issued for quarterly ground water monitoring. Additional ground water characterization requested. |
| Yolo | Frontier Fertilizer Company, Davis | EDB, DCP, DBCP, Carbon tetrachloride | DTSC installed interim ground water treatment system. U.S. EPA expanded the system and is conducting an investigation to determine extent of plume. |
| | U.C. Davis | Chlorpyrifos, Dicamba, Atrazine, Aldrin, Simazine, Dieldrin, Endrin, DDT | New CAO and MRP issued. |
| | J.R. Simplot, Courtland | EDB, 2,4-DB, Dicofol, Dicamba, 2,4,5-TP, Carbophenthion, DDT, Dieldrin, Dinoseb, Picloram | Health risk assessment inadequate and must be resubmitted. Ground water remediation underway. |
| | Western Farm Service, Walnut Grove | Nitrate, ammonia, aldrin, beta-BHC, delta-BHC, gamma-BHC, DDD, DDE, dieldrin, heptachlor epoxide, endosulfan, disulfoton, TPH-diesel. | Investigation continuing. Sacramento County has lead. |
| Yuba | Beale Air Force Base | Lindane | Ground water investigation underway. |

Table III-6. Actions Taken By The Regional Water Quality Control Board, Central Valley (Region 5, Fresno), in FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|--------|--|--|---|
| Fresno | Blue Hills Disposal Site County of Fresno | Dicamba, 2,4-D, Silvex | Site characterization nearly complete. Corrective action plan will be developed. |
| | Thompson Hayward Agriculture & Nutrition | Alpha-BHC, Beta-BHC, Gamma-BHC, Dieldrin, DBCP, Diphenamid, Heptachlor, Heptachlor Epoxide | State Superfund site. Contamination assessment ongoing. |
| | Occidental Chemical/ J.R. Simplot | Dieldrin | Monitoring of ground water continues. |
| | FMC Corporation | Aldrin, Dieldrin, DDT, DDD, DDE, Heptachlor, Lindane, Toxaphene, Ethyl Parathion, Malathion, Ethion, Endosulfan, Dimethoate, Furadan, Dinitroresol, Dinoseb (DNBP) | State Superfund site. Remedial investigation/feasibility study in progress. Interim ground water removal process began December 1994. Final soil RAP approved June 1997. |
| | Britz, Inc., Five Points | Toxaphene, DDT, DNBP | State Superfund site. Remedial investigation and health assessment report submitted. Soil and ground water remediation feasibility study also submitted. Additional contamination assessment ongoing. |
| | Fresno County Wells | DBCP, EDB, 1,2-D | Pesticides detected in 146 wells (AB 1803 sampling). San Joaquin Valley DBCP Advisory Committee is overseeing studies on remedial alternatives for DBCP problems. |
| | Coalinga Airport | DDT, Chlorpyrifos, DEF, Ethion, Disyston | Contamination assessment needed. |
| | Union Carbide Test Plot | Aldicarb | Additional contamination assessment needed. |
| | Spain Air | Ethion, DEF, Parathion, Trithion, Dinoseb, Paraquat, DDE, DDT, Endosulfan II | Assessment needed. |

Table III-6 (cont.) Central Valley (Region 5, Fresno)

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|----------|---|---|---|
| Kern | Brown & Bryant, Inc., Arvin | 1,2-D, 1,3-D, DBCP, Dinoseb, EDB | Federal Superfund site. U.S. EPA has prepared Remedial Information Feasibility Study Report. |
| | Puregro Company, Bakersfield | DBCP | State Superfund site. Further assessment conducted. The waste discharge requirements for closure of a former dry well were issued March 1994 and amended March 1996. |
| | Guimarra Vineyard | DBCP | Contamination assessment and pond closure plan needed. |
| | Dick Garriott Crop Dusting, Bakersfield | Chlordane, DDE, DDT, PCNB, Endosulfan I & II, Methoxychlor, Carbofuran, Carbaryl, Bufencarb, DEF, Tedion, Diazinon, Chlorpyrifos, Ethyl Parathion, Diuron, Dinoseb, Dicamba | CAO issued in 1993. TPCA site. Hydrogeological Assessment Report completed in 1993. Work in progress to determine extent of ground water degradation. Impoundment is covered. |
| | USDA, Shafter | Dichlobenil, EPTC, Prometryne, DDT, DDE, DDD, Dieldrin, Toxaphene, Silvex, PCP, Chlorpropham, Ametryn, Atrazine | Developing a closure plan. |
| | Brown and Bryant, Inc., Shafter | Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Heptachlor, Toxaphene | State Superfund site. Contamination assessment ongoing. |
| | Kern County Wells | DBCP, 1,2-D, EDB | Pesticides detected in 57 wells (AB 1803 sampling). No assessment underway. |
| Madera | Chowchilla Municipal Airport | Dieldrin, Alpha-BHC, Endosulfan, PCNB, DDT, DDE, Lindane | Contamination assessment needed. |
| | Madera County Wells | DBCP, 1,2-D, EDB | DBCP detected in two wells (AB 1803 sampling). No assessment underway. |
| | Western Fam Service, Inc. | Dinoseb, DBCP, Dieldrin | Assessment ongoing. Impoundment closed. Impacted soils have been capped. |
| | Madera Municipal Airport | DDT, DDE, Toxaphene, Dicofol, Endrin | Soil and ground water investigation underway. Impacted soils have been capped. |
| Kings | Lemoore N.A.S. | Unspecified | Investigation ongoing. |
| | Blair Field | 2,4-D, Dicofol, Diazinon, Propargite | Assessment needed. |
| | Blair Aviation | Trifluralin, Mevinphos, Phorate | Contamination assessment needed. |
| | Lakeland Dusters | DDT, Toxaphene | Contaminated soils excavated and stockpiled on site. Remediation underway. |
| Tulare | Mefford Field, City of Tulare | p,p'-DDT, p,p'-DDE, 2,4,5-TCP, Dicamba, DNBP, Diuron | Contamination assessment and mitigation reports needed. |
| | Tulare Airport | 2,4-D, DNBP | Assessment needed. |
| | Kaweah Crop Dusters | DDT, 2,4-D, 2,4,5-T, Methoxychlor | DHS Remedial Action Order issued January 1984. Cleanup ongoing. |
| | Tulare County Wells | 1,2-D | Detected in wells through AB 1803 sampling. No assessment underway. |
| Tuolumne | Tuolumne County Wells | Methylene Chloride | Detected in one well (AB 1803 sampling). |

Table III-7. Actions Taken By The Regional Water Quality Control Board, Lahontan (Region 6), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|----------------|---|----------------------|--|
| El Dorado | Tahoe Paradise Golf Course | PCNB | Last tested on 5/23/97 and was non-detect at a detection limit of 0.02 mcg/l. |
| | Lake Valley State Recreation Area Golf Course | 2,4 D, Dicamba, MCPP | All were tested, last on 11/5/97, and all were non-detect at detection limits of 1.6, 0.32, and 150 mcg/l respectively. |
| Inyo | Haiwee Reservoir | Copper sulfate | In response to fish kills that may be related to the algaecide application, potential for ground and surface water contamination will be evaluated through a chronic toxicity study as required by a Cleanup and Abatement Order. Most recent fish kill occurred in June 1998. |
| Placer | Resort at Squaw Creek | Triclopyr | Although no herbicide application is currently approved, the Resort is conducting a study to assess the mobility of triclopyr. The study involves soil samples, surface water runoff samples and ground water from shallow monitoring wells. As triclopyr was detected in some soil and runoff samples, future evaluation is needed before application of triclopyr will be allowed at the Resort. |
| San Bernardino | George Air Force Base | Dieldrin | Of the three wells sampled at the base, two wells tested positive for dieldrin (0.10 mcg/l, 0.62 mcg/l). The Air Force was asked to conduct a PA/SI to include surface soil sampling to evaluate potential sources and reasons for the continued low levels found in the ground water. |

Table IV-8. Actions Taken By the Regional Water Quality Control Board, Colorado River Basin (Region 7), In FY 1996-97.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-----------|--|--|--|
| Imperial | Central Brave Agricultural Service | 4,4'-DDE, Endosulfan | Recalcitrant Discharger. Referred to Attorney General for nonpayment of fees. |
| | City of Brawley | 4,4'-DDE, Dieldrin | Contaminated soil excavated and transported to Class I facility. Site closed. |
| | Visco Flying Service | 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, Endosulfan I & II | Impoundment remediated, capped, and closed in place. |
| | J.R. Simplot Company, Sandin Siding Facility | Dieldrin, 4,4'-DDT, Endrin | CAO issued. Site in remediation. Risk base corrective action in-progress |
| | Stoker Company | Endosulfan I & II, Dinoseb, 2,4-DB | Land treatment facility undergoing closure. |
| | Ross Flying Service | 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin | Closure of surface impoundment. |
| Riverside | West Coast Flying | Endosulfan I & II, Disulfoton | Recalcitrant discharger. Referred to Attorney General for nonpayment of fees. |
| | Woten Aviation Services | Disyston, DEF, Ethyl Parathion, Methyl Parathion | CAO issued. U.S. EPA has lead in cleanup. |
| | Foster Gardner, Inc., Coachella Facility | 1,2-Dichloroethane, 1,2-D, Ethylene Dibromide | CAO issued October 1991 by RWQCB. Imminent and Substantial Endangerment Order issued by DTSC on August 21, 1992. Cleanup on-going. |
| | Farmers Aerial Service, Inc. | 4,4'-DDE, Endosulfan I | Closure of disposal area. |
| | Coachella Valley Mosquito Abatement District | DDT | Under investigation. Pesticide contamination insignificant, UST Cleanup only. |
| | Crop Production Services, Blythe (Formerly Pure Gro MW-24) | 1,2-Dichloropropane | Undergoing cleanup. |

Table III-9. Actions Taken By The Regional Water Quality Control Board, Santa Ana (Region 8), In FY 1997-98.

There are currently 103 confirmed detections of pesticides in the Santa Ana Region. Only one of these has been attributed to a point source discharge. Ground water extraction and treatment at this site is being performed under an order issued by the RWQCB. With the exception of this, all detections on this list are from domestic and agricultural production wells. One hundred and one of these wells contain dibromochloropropane (DBCP), four contain simazine, and one contains 1,2-dichloropropene (three wells contain both DBCP and simazine).

The presence of DBCP in the Region's ground water has resulted in both an actual and threatened impact on the beneficial use of water as a drinking water supply since 80 of the 101 wells containing DBCP are drinking water wells.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|----------------|---|---------------------|--|
| Orange | Great Lakes Chemical Corporation (formerly Great Western Savings), Irvine | 1,2-D, EDB, 1,2-DCE | A new NPDES permit was issued July 7, 1995. Ground water extraction and treatment continuing. GLCC was issued a CAO by RWQCB on 4/17/97 for off-site remediation of impacted ground water. |
| Riverside | Sunnymead Mutual Water Company (North and South Well) | DBCP | Both wells were sold to Eastern Municipal Water District in February 1991. Customers are being served by the new District from other supply sources. North Well has been completely rehabilitated. South Well will be used for emergency purposes only. |
| Riverside | Arlington Basin | DBCP | Construction of a 7 MGD reverse osmosis plant with partial flow through a GAC unit for treatment of TDS, NO ₃ and DBCP was completed in September 1990. About 1.0 MGD of ground water is treated and 0.5 MGD is bypassed. Treated water is mixed with the bypassed water and discharged to the Arlington Channel for ground water recharge purposes by the Orange County Water District. Salt brine (0.2 MGD) is discharged to the Santa Ana Regional Interceptor which discharges to the ocean via the Orange County Sanitation District. A second parallel transmission line has been completed to bring extracted ground water from three wells to the reverse osmosis unit. Possible sale of this water to Cities of Norco and Jurupa in near future. |
| Riverside | City of Corona (Well 8, mun.) | Simazine | Well has been completely rehabilitated. Simazine was not detected in the sampling after rehabilitation work. No further action being taken. Trace of TCE has been detected in recent sampling. No further action being taken. |
| Riverside | Home Gardens County Water District (Wells 2 & 3, mun.) | DBCP, Simazine | Water purveyor has closed these wells and is now purchasing water from the City of Riverside. |
| Riverside | City of Riverside, Twin Spring, mun. | DBCP | Well is out of service. Mitigation measures are being considered. |
| San Bernardino | Victoria Farms MWC (Well 01 & 03, mun.) | DBCP | Water purveyor has closed these wells and is now purchasing water from the City of San Bernardino. |
| Riverside | City of Corona (Well 17, mun.) | Simazine, DBCP | Well is being used. Trace of DBCP was detected in March 1991 sampling. Trace of TCE has been detected in recent sampling. |
| Riverside | City of Riverside (Russell "B") | Simazine, DBCP | Water is being blended with other supply wells in the area. Mitigation measures are being considered. |
| Riverside | City of Riverside (1st Street) | DBCP | Well is not being used due to high concentrations of DBCP. No mitigation measures in effect. |
| Riverside | City of Riverside (Electric Street, mun.) | DBCP | Well water is being blended with water from other supply wells; blended water is sampled on a bi-weekly basis. |
| Riverside | City of Riverside (Palmyra, mun.) | DBCP | Well is not being used due to high concentrations of DBCP. Mitigation measures are being considered. |
| Riverside | City of Riverside (3 wells, mun.) | DBCP | Water from Hunt Wells No. 6, 10, and 11 is being blended with other wells in the area. |
| Riverside | City of Riverside (3 wells, emergency, Downtown Riverside) | DBCP | No mitigation measures in effect. These three wells are also contaminated with industrial organic solvents. |

Table III-9 (cont.) Santa Ana (Region 8).

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|----------------|---|-----------|--|
| Riverside | Riverside County Hall Record, (pr) | DBCP | No mitigation measures in effect. Volatile organic chemicals such as Trichloroethylene and Perchloroethylene have also been found. Well is used for emergency purposes only. |
| Riverside | Loma Linda University, Arlington, (Wells 1 & 2, mun.) | DBCP | The University water supply system is tied into the City of Riverside domestic water supply distribution system. These two wells are used for irrigation purposes at the school. |
| Riverside | City of Riverside (Moor-Griffith, mun.) | DBCP | Well is out of service. Mitigation measures are being considered. |
| Riverside | Lake Hemet MWD (Wells A and B, mun.) | DBCP | Well A is being used for irrigation purposes by the District. Well B is being used by a local farmer for irrigation purposes. |
| Riverside | Buschlen, Dwight (mun.) | DBCP | Well was abandoned about ten years ago. A second well on the property with traces of DBCP is being used for irrigation only. |
| San Bernardino | Gage System Wells (12 wells, mun.) | DBCP | The City of Riverside and the Gage Canal Company operate the Gage System which consists of 15 wells located along the Santa Ana River. These wells are being blended for domestic use. Trace amounts of radon have been detected in some of these wells. The City installed three deep wells in the area to increase blending capacity. Mitigation measures are being considered. |
| San Bernardino | Bunker Hill Basin: Crafton/Redlands area (36 wells) | DBCP | The City of Redlands started construction of a 6,000 gpm granular activated carbon (GAC) treatment system in September 1991. This GAC system treats ground water from two wells. Treated water is being put into the local water supply distribution system. Funding for this system is from the SWRCB (\$2.8 million) and bond money through the State Expenditure Plan (\$1.9 million) which is managed by DTSC. The system has been off line since July 1997 due to presence of perchlorate above provisional Action Level in both production wells.. |
| San Bernardino | South San Bernardino Company Water District (4 wells, mun.) | DBCP | All four wells are out of service. The City of San Bernardino Water Department purchased the water district in July 1991. The City now supplies all the customers in the area. |
| San Bernardino | Cucamonga CWD (4 wells, mun.) | DBCP | Well No. 13 has not been used since 1991. The other three wells are standby wells and are used on a limited basis. Water is being purchased from Metropolitan Water District (MWD). |
| San Bernardino | Monte Vista CWD (3 wells, mun.) | DBCP | All three wells are on standby status. Water is being purchased from MWD. |
| San Bernardino | City of Upland (14 wells) | DBCP | Seven wells are out of operation. Three wells are currently on standby. Four wells are being used and are being blended with other supply wells. |
| San Bernardino | City of Loma Linda (6 wells, mun.) | DBCP | Two wells have been abandoned. One well is out of operation due to high nitrates. The City also purchases treated water from the City of San Bernardino. A new well will be on line next year. |

Table III-10. Actions Taken By The Regional Water Quality Control Board, San Diego (Region 9), In FY 1997-98.

| COUNTY | SITE | PESTICIDE | PREVENTION ACTION |
|-----------|---|------------------------------|---|
| San Diego | City of Oceanside Water Utility District (Well No. 12-11S/ 4W-18L1 S) | 1,2-DCP (1,2-Dicloropropane) | This backup drinking water well is located in the San Luis Rey River Valley. Up to 2.3 ppm has been detected in this well. The City of Oceanside is continuing monitoring of this well and reports to the State's DHS. |
| | Truly Nolen Exterminating, Inc. | Aldrin, Dieldrin, Chlordane | This is an on-site abandoned well which allegedly received pesticide wastes several years ago. Contaminated soil has been removed. Trace levels still exist in ground water. No further monitoring required. (RWQCB lead) |