

SAMPLING FOR PESTICIDE RESIDUES IN CALIFORNIA WELL WATER

2000 Update of the Well Inventory Database

**For Sampling Results Reported From
July 1, 1999 through June 30, 2000**

Fifteenth 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 DEPARTMENT OF PESTICIDE REGULATION
California Environmental Protection Agency

December 2000

EH00-15

California Department of Pesticide Regulation

Gray Davis, Governor

Winston H. Hickox, Secretary
California Environmental Protection Agency

Paul E. Helliher, Director
Department of Pesticide Regulation

SAMPLING FOR PESTICIDE RESIDUES IN CALIFORNIA WELL WATER

2000 Update of the Well Inventory Database

**For Sampling Results Reported From
July 1, 1999 to June 30, 2000**

Fifteenth 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

by

DPR portion:

F. Guo, D. Bartkowiak, D. Weaver, J. Troiano,
M. Pepple, F. Spurlock, and C. Nordmark

SWRCB Portion: Staff

California Department of Pesticide Regulation
Environmental Monitoring Branch
Environmental Hazards Assessment Program
1001 I Street, Sacramento, California 95814

EH 00-15

FLEX YOUR POWER! The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web site at <www.cdpr.ca.gov>.

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 pesticides products.

Agencies 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, DPR determines 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.

Sampling was not conducted by DPR.

The detection may have been referred to SWRCB.

There may be no wells available for sampling.

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. The data 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 fifteenth annual report.

Data were submitted to DPR from July 1, 1999, to June 30, 2000.

Data are the results of 13 investigations conducted by two agencies.

Data are from studies that were conducted from January through December of 1999.

Table 1. Summary of well sampling results in DPR's well inventory database, by report year.

CATEGORY	Total							TOTAL ^(d) 1984-2000
	1984-1994	1995	1996	1997	1998	1999	2000	
Total wells sampled	19,725	3,322	3,564	2,508	1,898	2,389	3,165	20,931
no detections	15,547	2,769	3,128	2,071	1,668	2,093	2,841	16,433
detections ^(a)	4,178	552	436	437	230	296	324	4,498
verified detections ^(b)	789	213	6	96	3	39	84	905
Total counties sampled	58	47	48	48	41	49	50	58
no detections	14	19	20	24	21	29	26	9
detections ^(a)	44	28	28	24	20	20	24	49
verified detections ^(b)	31	17	5	7	3	10	5	32
Total pesticides and related compounds	291	166	121	165	83	111	105	308
no detections	202	139	99	143	67	94	85	211
detections ^(a)	89	27	22	22	16	17	20	97
verified detections ^(b)	22	9	3	11	5	8	9	24
Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c)	15	9	8	9	9	9	12(e)	16(f)

(a) Includes both 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 includes data since the inception of the database in 1984, and is not additive. A single well that had sampling data reported in more than one year is counted one time only.

(e) The 12 compounds are atrazine, bromacil, deethyl-simazine or deisopropyl-atrazine (ACET), deethyl-atrazine, diaminochlorotriazine (DACT), dibromochloropropane (DBCP), 1,2-dichloropropane (1,2-D), diuron, ethylene dibromide (EDB), norflurazon, prometon, and simazine.

(f) The 16 compounds are ACET, aldicarb, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, 1,2-D, DBCP, deethyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, and 2,3,5,6-tetrachloroterephthalic acid. Aldicarb, atrazine, bentazon, bromacil, diuron, norflurazon, prometon, and simazine have been reviewed through the Pesticide Detection Response Process. The uses of 1,2-D, DBCP, and EDB were canceled prior to the passage of the PCPA; therefore, DPR did not review these chemicals but considers them to have reached ground water as a result of legal, agricultural use.

Summary of Data in This Report

103,714 records (chemical analyses) were added to the database for this report.

3,165 wells were sampled in 50 counties.

105 pesticide active ingredients and breakdown products were analyzed.

20 compounds were reported with detections.

Of the 3,165 wells sampled, 2,971 (94%) were public drinking water wells, 112 (3.5%) were private drinking water wells, 5 were non-drinking water wells, and 77 (2.4%) wells were either unused or the use was unknown.

Detections Referred to SWRCB

Detections of nine 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): 211 wells

1,2-dichloropropane (1,2-D): 3 wells.

ethylene dibromide (EDB): 12 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 nine compounds: bromacil, diuron, norflurazon, prometon, simazine, atrazine and its breakdown product DEA, and the breakdown products ACET and DACT, which are common to both atrazine and simazine. Verified detections were made in a total of 84 wells in 5 counties (Table 2). Among the wells with verified detections, 83 were private drinking water wells, and one was an irrigation well. 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, 1999 through June 30, 2000.

County	atrazine	bromacil	diuron	norflurazon	prometon	simazine	ACET	DACT	DEA	Total Wells ^(b)
Butte	1		1 ^(a)	2 ^(a)	1 ^(a)	1 ^(a)			1 ^(a)	4
Colusa						1	1			1
Fresno	2	13	27	9	1	45	49	45	4	50
San Joaquin	1	1		1 ^(a)		2	5	5 ^(a)	1	6
Tulare	2	17	18	4		20	21	19	2	23
Total Wells	6	31	46	16	2	69	76	69	8	84

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

(b) The total may not be additive due to detections of multiple residues in the same well.

Legal Agricultural Use Determinations and Recommendations for Pesticide Management Zones

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 making this determination.

A Pesticide Management Zone (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. Pesticide Management Zones are established by regulation to prevent further contamination of ground water. The use of certain chemicals is prohibited or restricted in PMZs. Pesticide Management Zones have been established in various areas for atrazine, bromacil, diuron, prometon, and simazine.

Legal agricultural use was determined to be the source of residues of atrazine, bromacil, diuron, simazine, prometon, ACET, DACT, and DEA in wells in Butte, Fresno, and San Joaquin counties. DPR recommended 11 sections in three counties as new PMZs (Section II, Table II-1).

Regulations on Norflurazon Use Are Being Proposed

A subcommittee of the Pesticide Registration Evaluation Committee held a hearing and has made findings and recommendations to the Director of DPR on continued use of norflurazon. After reviewing these findings and recommendations, the Director issued a final decision in April 1999. The Director concurred with the subcommittee that the use of norflurazon can be

modified so that levels of norflurazon residues will not be further elevated beyond present levels in contaminated ground waters. Regulations are being proposed to make norflurazon a restricted material, to add norflurazon use requirements, and to establish norflurazon PMZs.

Bentazon Monitoring

Well monitoring for bentazon has been conducted annually from 1993 to 1996. During those surveys only 7-12 wells were sampled because of the small quantities of bentazon applied in any one county or area within a county. In all, 21 different wells were sampled during the four surveys but no bentazon residues were detected. As a result of the low number of wells available for sampling in treated areas, bentazon monitoring was changed from an annual survey to a biennial survey as of September 1996.

The most recent survey was conducted in August 1998 and no bentazon or other herbicide residues were detected in eight wells sampled in three counties. The next survey for bentazon will be conducted during the fall/winter of 2000.

Changes in the Ground Water Program

The Department of Pesticide Regulation is changing the ground water protection program to make the program more preventive. Based on information collected since the early 1980s, DPR is expanding the number of sensitive areas and the number of pesticides regulated to protect ground water. Mitigation measures will be tailored to fit the mechanism of movement to ground water, will become mandatory, and will include measures to prevent wells themselves from serving as pathways for pesticide movement to ground water.

Factors That Contribute to Ground Water Contamination

Environmental scientists at DPR 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.

Activities of the State and Regional Water Boards

The State Water Resources Control Board and its 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 summarized 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, 1999, through June 30, 2000. This is the fifteenth annual report.

The 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 practical 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 and experiences helped ensure the accuracy and readability of this report. We gratefully acknowledge the staff of DPR, cooperating federal, state, local, and private agencies for contributing to the database.

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.

TABLE OF CONTENTS

Executive Summary	i
Preface	viii
Acknowledgments	viii
Disclaimer	viii
Table of Contents	ix
List of Tables	x
List of Acronyms and Abbreviations	xii

SECTION I. Well Inventory Database

Introduction	1
Background	1
Criteria for Classifying Records Added to the Well Inventory Database	2
Interpreting the Data	5
Summary of Data by Total Wells Sampled and Wells with Verified Detections	5
Results by Reporting Agency	5
Results by Pesticide and County	6
Wells and Counties with Verified Detections.....	12
Status of Pesticides with Verified Detections	13
Summary of Unverified Detections	17
Summary	22

SECTION II. Actions Taken by the Department of Pesticide Regulation to Prevent Pesticides from Entering Ground Water as a Result of Legal Agricultural Use

Environmental Hazards Assessment Program	23
Ground Water Protection Training	23
The Pesticide Detection Response Process (PDRP)	24
Actions Taken by DPR on Reported Detections	26
Monitoring for pesticides not previously reviewed by the PREC subcommittee	26
Monitoring for pesticides previously reviewed by the PREC.....	27
Norflurazon continues in the PDRP – Director’s Decision.....	27
Agricultural Use Determinations & Recommendations for Pesticide Management Zones.....	27
Ground water Protection List Monitoring	28
Bentazon Monitoring	29
Adjacent Section Monitoring	30
Special Studies.....	31
Age Dating of Herbicides in California’s Ground Water	31
Update of the California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water Study and the Proposed Ground Water Protection Areas	32
Monitoring Temporal Changes in Concentrations of Detected Herbicides and Their Degradates in Ground Water.....	33
Changes In The Ground Water Program.....	34
Factors Contributing to Pesticide Movement to Ground Water as a Result of Agricultural Use.....	34

Section II Summary 36
References..... 36

APPENDICES:

A. Summary of Number of Wells Sampled and Number of Positive Detections, by
County and Pesticide..... 38
 Part 1: Counties without any Detection 39
 Part 2: Counties with a Detection 50
B. Summary of Well Sampling Surveys Included in the 2000 Update Report 65
C. Methods Used for Data Collection 67
D. Glossary of Terms 68

**SECTION III. Actions Taken by the State Water Resources Control Board to
Prevent Pesticides from Entering Ground Water 75**

LIST OF TABLES

SECTION I:

Table I-1. Summary of well sampling results included in the well inventory database,
by report year, for data reported through June 30, 2000 4

Table I-2. Summary of records added to the Department of Pesticide Regulation’s well
inventory database, by reporting agency, from July 1, 1999 through
June 30, 2000. 6

Table I-3. Pesticide active ingredients and breakdown products with analytical results
added to the well inventory database for data reported from July 1, 1999 through
June 30, 2000, by total number of counties and wells sampled and number of wells
with verified and unverified detections..... 7

Table I-4. Counties with and without detections of pesticides or related compounds for
data reported from July 1, 1999 through June 30, 2000. 10

Table I-5. Summary, by county, of total pesticides sampled for, and total number of
wells sampled versus number of wells with unverified, verified, and negative
detections for data reported from July 1, 1999 through June 30, 2000..... 11

Table I-6. Summary of wells with verified detections by county and chemical. 12

Table I-7. Status, as of June 30, 2000, of all reported detections of pesticide active
ingredients and breakdown products in ground water that were added to the Dept. of
Pesticide Regulation well inventory database from July 1, 1999
through June 30, 2000. 19

SECTION II:

Table II-1. Number of sections recommended as Pesticide Management Zones by the Department of Pesticide Regulation from July 1, 1999 through June 30, 2000 28

SECTION III:

Table III-1. Actions taken by the Regional Water Quality Control Board, North Coast (Region 1), in FY 1998-99..... 77

Table III-2. Actions Taken by the Regional Water Quality Control Board, San Francisco Bay (Region 2), in FY 1996-97 78

Table III-3. Actions taken by the Regional Water Quality Control Board, Central Coast (Region 3), in FY 1998-99..... 79

Table III-4. Actions taken by the Regional Water Quality Control Board, Los Angeles (Region 4), in FY 1998-99..... 80

Table III-5. Actions Taken by the Regional Water Quality Control Board, Central Valley (Region 5, Sacramento), in FY 1996-97 81

Table III-6. Actions Taken by the Regional Water Quality Control Board, Central Valley (Region 5, Fresno), in FY 1996-97 83

Table III-7. Actions Taken by the Regional Water Quality Control Board, Lahontan (Region 6), in FY 1996-97..... 85

Table III-8. Actions Taken by the Regional Water Quality Control Board, Colorado River Basin (Region 7), in FY 1996-97..... 86

Table III-9. Actions Taken by the Regional Water Quality Control Board, Santa Ana (Region 8), in FY 1996-97..... 87

Table III-10. Actions Taken by the Regional Water Quality Control Board, San Diego (Region 10), in FY 1996-97..... 88

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 adviser
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

The Pesticide Contamination Prevention Act (PCPA) requires the Department of Pesticide Regulation (DPR) to maintain a statewide database of wells sampled for active ingredients of pesticide products. The database, referred to as Well Inventory Database, centralizes information on the occurrence of nonpoint source contamination of ground water by agricultural use of pesticides collected by various State and local agencies, and is updated annually. The PCPA further mandates DPR to review findings of pesticide contamination and undertake necessary mitigation measures, and report annually to the Legislature, Department of Health Services (DHS), the Office of Environmental Health Hazard Assessment, and the State Water Resources Control Board (SWRCB). This report summarizes sampling results from July 1, 1999 to June 30, 2000. It also details actions taken to prevent pesticides from polluting ground water by both DPR and the State Water Resources Control Board (SWRCB) and its nine Regional Boards. Factors contributing to the movement of pesticides to ground water resulting from legal agricultural use also are presented.

BACKGROUND

In 1979, the soil fumigant, 1,2-dibromo-3-chloropropane (DBCP), was detected in ground water wells in Lathrop, California. These detections prompted widespread subsequent 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 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 an annual report 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 California's 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 fifteenth 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. A summary of data added to the database, by report year, is given in Table I-1. 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).

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. The Department of Pesticide Regulation has set criteria to determine 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.

CATEGORY	Total							TOTAL ^(d) 1984-2000
	1984-1994	1995	1996	1997	1998	1999	2000	
Total wells sampled	19,725	3,322	3,564	2,508	1,898	2,389	3,165	20,931
no detections	15,547	2,769	3,128	2,071	1,668	2,093	2,841	16,433
detections ^(a)	4,178	552	436	437	230	296	324	4,498
verified detections ^(b)	789	213	6	96	3	39	84	905
Total counties sampled	58	47	48	48	41	49	50	58
no detections	14	19	20	24	21	29	26	9
detections ^(a)	44	28	28	24	20	20	24	49
verified detections ^(b)	31	17	5	7	3	10	5	32
Total pesticides and related compounds	291	166	121	165	83	111	105	308
no detections	202	139	99	143	67	94	85	211
detections ^(a)	89	27	22	22	16	17	20	97
verified detections ^(b)	22	9	3	11	5	8	9	24
Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c)	15	9	8	9	9	9	12(e)	16(f)

(a) Includes both 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 includes data since the inception of the database in 1984, and is not additive. A single well that had sampling data reported in more than one year is counted one time only.

(e) The 12 compounds are atrazine, bromacil, deethyl-simazine or deisopropyl-atrazine (ACET), deethyl-atrazine, diaminochlorotriazine (DACT), dibromochloropropane (DBCP), 1,2-dichloropropane (1,2-D), diuron, ethylene dibromide (EDB), norflurazon, prometon, and simazine.

(f) The 16 compounds are ACET, aldicarb, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, 1,2-D, DBCP, deethyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, and 2,3,5,6-tetrachloroterephthalic acid. Aldicarb, atrazine, bentazon, bromacil, diuron, norflurazon, prometon, and simazine have been reviewed through the Pesticide Detection Response Process. The uses of 1,2-D, DBCP, and EDB were canceled prior to the passage of the PCPA; therefore, DPR did not review these chemicals but considers them 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, 1999 to June 30, 2000. The data are the results of 13 investigations designed and conducted by two 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 nine well sampling surveys were added to the well inventory database from July 1, 1999 to June 30, 2000. The surveys were conducted from January to December of 1999. The data represent a total of 3,165 wells in 50 counties that were sampled for 105 pesticide active ingredients and breakdown products. Table I-2 summarizes the data added to the database by sampling agency. One well was sampled by both agencies. Appendix B summarizes each study.

Of the 3,165 wells sampled, 2,971 (94%) were public drinking water wells, 112 (3.5%) were private drinking water wells, 5 were non-drinking water wells, and 77 (2.4%) were wells of unknown use.

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, 1999 through June 30, 2000.

Sampling agency	Wells	Counties	Chemicals analyzed	Samples with Detections	Wells with detections	Records added to database
CDHS	3,056	50	99	1,562	240	102,285
DPR	110	6	14	323	84	1,429

RESULTS BY PESTICIDE AND COUNTY

Sampling Distribution

Sampling results for 105 pesticide active ingredients and breakdown products were reported. Table 3 shows the chemicals sampled, number of counties and wells sampled, and number of wells with unverified and verified detections. Among the 50 counties sampled, the frequency of sampling for each chemical varied widely (Table I-3). Counties with and without detections of pesticides during the period from July 1, 1999 to June 30, 2000 are listed in Table I-4.

Table I-5 summarizes by county the pesticides analyzed, number of wells sampled, and number of wells with unverified, verified, and negative detections. The number of pesticides analyzed in individual counties ranged from 6 (Alpine) to 77 (Los Angeles). The number of wells sampled in individual counties ranged from 1 (Alpine and Del Norte) to 718 (Los Angeles). Appendix A details the number of chemicals sampled and the number of positive wells by chemical in each of the 24 counties with detections.

Table I-3. Pesticide active ingredients and breakdown products added to the well inventory database for the 2000 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, 1999 through June 30, 2000.

Chemical	Number of counties sampled	Number of wells sampled	Wells with unverified detections	Wells with verified detections
1,3-DICHLOROPROPENE	2	183		
1,1,2,2-TETRACHLOROETHANE	49	2,517		
1,2,4-TRICHLOROBENZENE	49	2,524	1	
1,2-D + 1,3-D + C-3 COMPOUNDS	48	2,503		
1,2-DICHLOROPROPANE	49	2,518	3	
2,3,7,8-TCDD (DIOXIN)	17	232		
2,4,5-T	9	101		
2,4,5-TP (SILVEX)	28	608		
2,4,6-TRICHLOROPHENOL	2	39		
2,4-D	28	685		
2,4-DINITROPHENOL	2	2		
3-HYDROXYCARBOFURAN	27	550		
ACENAPTHENE	4	56		
ACET (DEETHYL-SIMAZINE OR DEISOPROPYL-ATRAZINE)	6	110		76
ALACHLOR	37	1,004		
ALDICARB	27	549		
ALDICARB SULFONE	27	549		
ALDICARB SULFOXIDE	27	549		
ALDRIN	29	556		
AMINOCARB	1	3		
ATRATON	1	1		
ATRAZINE	41	1,335		6
BARBAN	1	3		
BENEFIN (BENFLURALIN)	1	1		
BENTAZON, SODIUM SALT	28	607	7	
BENZENE (BENZOL)	49	2,527		
BHC (OTHER THAN GAMMA ISOMER)	3	22		
BROMACIL	40	1,075		31
BUTACHLOR	37	960		
CARBARYL	27	583		
CARBOFURAN	27	569		
CHLORDANE	30	651		
CHLOROMETHANE (METHYL CHLORIDE)	48	2,507	6	
CHLOROTHALONIL	30	564		
CHLORPROPHAM	1	3		
CYANAZINE	6	110		

Table I-3 Continued.

Chemical	Number of counties sampled	Number of wells sampled	Wells with unverified detections	Wells with verified detections
DALAPON	29	615		
DBCP	36	1,256	211	
DDD	4	26		
DDE	4	26		
DDT	4	26		
DEETHYL-ATRAZINE	6	110		8
DEMETON	4	50		
DIAMINOCHLOROTRIAZINE (DACT)	5	103		69
DIAZINON	36	991		
DICAMBA	28	601	1	
DIELDRIN	29	576		
DIMETHOATE	37	977		
DINOSEB	28	597		
DIQUAT DIBROMIDE	27	536		
DISULFOTON	4	50		
DIURON	31	593	1	46
ENDOSULFAN	3	25		
ENDOSULFAN SULFATE	4	26		
ENDOTHALL	26	348		
ENDRIN	30	599		
ENDRIN ALDEHYDE	3	24		
ETHYLENE DIBROMIDE	37	1,187	12	
FENURON	1	3		
FLUOMETURON	1	3		
GLYPHOSATE, ISOPROPYLAMINE SALT	25	455		
HEPTACHLOR	30	570		
HEPTACHLOR EPOXIDE	31	584		
HEXACHLOROBENZENE	30	637		
HEXAZINONE	6	110		
LINDANE (GAMMA-BHC)	30	599		
LINURON	1	3		
MALATHION	2	147		
METHIOCARB	3	23		
METHOMYL	27	553		
METHOXYCHLOR	30	621		
METHYL BROMIDE (BROMOMETHANE)	48	2,508		
METHYL PARATHION	1	146		
METOLACHLOR	37	968		
METRIBUZIN	39	1,030		
MEXACARBATE	1	3		
MOLINATE	38	989		
MONURON	1	3		
NAPHTHALENE	47	2,406	1	

Table I-3 Continued.

Chemical	Number of counties sampled	Number of wells sampled	Wells with unverified detections	Wells with verified detections
NEBURON	1	3		
NORFLURAZON	6	110		16
ORTHO-DICHLOROBENZENE	49	2,530		
OXAMYL	27	573		
PARAQUAT DICHLORIDE	5	40		
PARATHION OR ETHYL PARATHION	1	146		
PENDIMETHALIN	1	1		
PENTACHLORONITROBENZENE (PCNB)	1	1		
PICLORAM	28	610		
PROMETON	8	126		2
PROMETRYN	39	1,088		
PROPACHLOR	36	925	1	
PROPAZINE	1	14		
PROPHAM	1	3		
PROPOXUR	3	23		
SECBUMETON	1	1		
SIDURON	1	3		
SIMAZINE	42	1,353		69
TERBUTRYN	2	2		
THIOBENCARB	38	1,191	1	
TOXAPHENE	30	575		
TRIADIMEFON	1	1		
TRICHLOROBENZENES	48	2,505		
TRIFLURALIN	1	8		
VERNOLATE	1	1		
XYLENE	49	2,520	6	
Total	50	3,165	240	84

Table I-4. Counties with and without detections of pesticides or related compounds for data reported during the period July 1, 1999 through June 30, 2000.

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

* 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, 1999 through June 30, 2000.

County	Pesticides Sampled	Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections	Wells with No Detections
ALAMEDA	62	18			18
ALPINE	6	1			1
AMADOR	22	2			2
BUTTE	13	39		4	35
CALAVERAS	20	9			9
COLUSA	12	14		1	13
CONTRA COSTA	57	8	1		7
DEL NORTE	11	1			1
EL DORADO	11	28	1		27
FRESNO	59	340	79	50	211
GLENN	11	9			9
HUMBOLDT	56	2			2
INYO	13	7			7
KERN	68	160	14		146
KINGS	36	15	2		13
LAKE	43	10			10
LOS ANGELES	77	718	12		706
MADERA	28	10	1		9
MARIPOSA	13	8			8
MENDOCINO	44	13			13
MERCED	58	43	5		38
MONO	56	3	1		2
MONTEREY	57	31			31
NEVADA	57	8			8
ORANGE	71	203			203
PLACER	57	13			13
PLUMAS	11	6			6
RIVERSIDE	57	164	7		157
SACRAMENTO	74	123			123
SAN BENITO	57	9			9
SAN BERNARDINO	58	372	59		313
SAN DIEGO	57	35	1		34
SAN JOAQUIN	37	92	19	6	67
SAN LUIS OBISPO	55	48			48
SAN MATEO	58	22	1		21
SANTA BARBARA	56	51			51
SANTA CLARA	61	150			150
SANTA CRUZ	58	27	3		24
SHASTA	11	7			7

Table I-5 Continued

County	Pesticides Sampled	Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections	Wells with No Detections
SIERRA	11	2			2
SOLANO	57	18			18
SONOMA	57	70	2		68
STANISLAUS	36	90	14		76
SUTTER	16	4	1		3
TEHAMA	11	4			4
TULARE	45	70	12	23	35
TUOLUMNE	26	16	1		15
VENTURA	57	49	2		47
YOLO	40	14			14
YUBA	25	9	2		7
Total	105	3,165	240	84	2,841

WELLS AND COUNTIES WITH VERIFIED DETECTIONS

Verified detections were made in a total of 84 wells in five counties. Table I-6 summarizes the number of wells with verified detections, by county and pesticide, and notes the counties with a first-time verified detection of a pesticide. Most verified detections (greater than 98%) were in private drinking water wells. Only one well was an agricultural well.

Table I-6. Summary of wells with verified detections of pesticide residues, by county and chemical. Results are for data reported from July 1, 1999 through June 30, 2000.

County	atrazine	bromacil	diuron	norflurazon	prometon	simazine	ACET	DACT	DEA	Total Wells ^(b)
Butte	1		1 ^(a)	2 ^(a)	1 ^(a)	1 ^(a)			1 ^(a)	4
Colusa						1	1			1
Fresno	2	13	27	9	1	45	49	45	4	50
San Joaquin	1	1		1 ^(a)		2	5	5 ^(a)	1	6
Tulare	2	17	18	4		20	21	19	2	23
Total Wells	6	31	46	16	2	69	76	69	8	84

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

(b) The total may not be additive due to detections of multiple residues in the same well.

STATUS OF PESTICIDES WITH VERIFIED DETECTIONS

Atrazine

Atrazine, a selective herbicide, 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. Atrazine was also made a restricted material. Allowed uses of atrazine outside atrazine PMZs can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of atrazine reported in 1999 (DPR, 1999).

<u>SITE</u>	<u>POUNDS APPLIED</u>
FOREST TREES, FOREST LANDS (ALL OR UNSPEC)	27,880
SUDANGRASS (FORAGE - FODDER) (SORGHUM SUDANESE)	15,655
CORN (FORAGE - FODDER)	10,167
BERMUDAGRASS (FORAGE - FODDER)	7,359
CORN, HUMAN CONSUMPTION	5,904
ALL OTHER	2,459
TOTAL	69,425

Detections of atrazine were verified in six wells in four counties out of 1,335 wells sampled in 41 counties. The range of concentrations of verified detections was 0.05 to 0.195 ppb. The CDHS and U.S. EPA maximum contaminant level (MCL, see glossary) for atrazine is 3 ppb.

Bromacil

Bromacil, a selective 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 bromacil in non-crop areas and on rights-of-way within bromacil PMZs. Bromacil was also made a restricted material for which a permit is required for crop uses in bromacil PMZs. The permit can only be issued if growers submit a ground water protection advisory written by a licensed pest control adviser (PCA) who has completed an approved ground water protection course within the previous two years. Allowed uses of bromacil can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of bromacil reported in 1999 (DPR, 1999).

<u>SITE</u>	<u>POUNDS APPLIED</u>
ORANGE (ALL OR UNSPEC)	37,487
RIGHTS OF WAY	15,849
LEMON	8,793
GRAPEFRUIT	3,592
LANDSCAPE MAINTENANCE	3,083
ALL OTHER	5,708
TOTAL	74,513

Detections of bromacil residues were verified in 31 wells in three counties out of 1,075 wells sampled in 40 counties. The range of concentrations of verified detections was 0.052 to 4.166 ppb. No MCL has been established for bromacil. The U.S. EPA health advisory is 90 ppb.

Diuron

Diuron, a selective 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. Allowed uses of diuron can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of diuron reported in 1999 (DPR, 1999).

<u>SITE</u>	<u>POUNDS APPLIED</u>
RIGHTS OF WAY	497,273
ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	216,472
ORANGE (ALL OR UNSPEC)	204,880
LANDSCAPE MAINTENANCE	39,313
GRAPES	31,746
WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	28,964
ASPARAGUS (SPEARS, FERNS, ETC.)	23,597
GRAPES, WINE	20,743
LEMON	19,883
OLIVE (ALL OR UNSPEC)	18,664
COTTON, GENERAL	12,052
UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC)	10,471
ALL OTHER	36,527
TOTAL	1,160,586

Diuron residues were verified in 46 wells in three counties out of the 593 wells sampled in 31 counties. The range of concentrations of verified detections was 0.05 to 1.144 ppb. No MCL has been established for diuron. The U.S. EPA health advisory is 10 ppb.

Norflurazon

Norflurazon, a selective herbicide, was reviewed through the PDRP, including review by a subcommittee of the PREC. DPR is in the process of proposing regulations to prohibit agricultural, outdoor institutional, or outdoor industrial uses of norflurazon in areas designated to recharge ground water and inside canal and ditch banks. Norflurazon will be made a restricted material for which a permit is required for crop uses in norflurazon PMZs. The permit can only be issued if the permit applicant submits a ground water protection advisory written by a licensed PCA who has completed an approved ground water protection course within the previous two years. Allowed uses of norflurazon can only be applied by or under the supervision of a certified applicator.

Norflurazon is widely used in California. Reported use of norflurazon totaled 289,068 pounds in 1999. The following sites represent the major uses of norflurazon reported in 1999 (DPR, 1999).

SITE	POUNDS APPLIED
ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	106,354
ALMOND	48,617
GRAPES	25,701
ORANGE (ALL OR UNSPEC)	23,857
GRAPES, WINE	17,775
RIGHTS OF WAY	16,153
WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	7,188
PRUNE	7,150
ASPARAGUS (SPEARS, FERNS, ETC.)	6,645
PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	5,781
LEMON	5,332
PEACH	3,828
APPLE	3,159
NECTARINE	3,060
APRICOT	2,100
CHERRY	1,045
PEAR	1,036
GRAPEFRUIT	993
TANGERINE (MANDARIN, SATSUMA, MURCOTT, ETC.)	930
ALL OTHER	2,361
TOTAL	289,068

Norflurazon residues were verified in 16 wells in four counties out of the 110 wells sampled in six counties. The range of concentrations of verified detections was 0.059 to 0.46 ppb. No MCL or health advisory has been established for norflurazon.

Prometon

Prometon, a nonselective herbicide, was reviewed through the PDRP, including review by a subcommittee of the PREC. DPR adopted regulations that prohibit agricultural, outdoor institutional, or outdoor industrial uses of prometon within prometon PMZs. Prometon was also made a restricted material, which means that it can only be applied outside prometon PMZs by or under the supervision of a certified applicator.

The following sites represent the major uses of prometon reported in 1999 (DPR, 1999).

SITE	POUNDS APPLIED
LANDSCAPE MAINTENANCE	2.13
N-OUTDR GRWN CUT FLWRS OR GREENS	1.22
ALL OTHER	0.75
TOTAL	4.10

Prometon residues were verified in two wells in two counties out of the 126 wells sampled in 8 counties. The range of concentrations of verified detections was 0.05 to 0.074 ppb. No MCL has been established for prometon. The U.S. EPA health advisory for prometon is 100 ppb.

Simazine

Simazine, a selective herbicide, was reviewed through the PDRP, including review by a subcommittee of the PREC. DPR adopted regulations that prohibit the agricultural, outdoor industrial, or outdoor institutional use of pesticides containing simazine in non-crop areas or on rights-of-way within simazine PMZs. Simazine was also made a restricted material for which a permit is required for crop uses in simazine PMZs. The permit can only be issued if growers submit a ground water protection advisory written by a licensed pest control adviser (PCA) who has completed an approved ground water protection course within the previous two years. Allowed uses of simazine can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of simazine reported in 1999 (DPR, 1999).

SITE	POUNDS APPLIED
ORANGE (ALL OR UNSPEC)	214,560
GRAPES	145,620
GRAPES, WINE	120,329
ALMOND	55,851
WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	37,008
OLIVE (ALL OR UNSPEC)	24,326
LEMON	20,763
AVOCADO (ALL OR UNSPEC)	15,428
PEACH	11,044
RIGHTS OF WAY	9,816
NECTARINE	8,979
PEAR	8,149
GRAPEFRUIT	7,692
LANDSCAPE MAINTENANCE	5,092
APPLE	3,508
ALL OTHER	7,733
TOTAL	695,899

Simazine residues were verified in 69 wells in 5 counties out of the 1,353 wells sampled in 42 counties. Concentrations of verified detections ranged from 0.05 to 0.965 ppb. Both the CDHS and U. S. EPA MCL for simazine are 4 ppb.

Triazine breakdown products: ACET, DACT, and DEA.

Deethyl-atrazine (2-amino-4-chloro-6-isopropylamino-s-triazine, DEA) is a degradate of atrazine. Both 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. A total of 110 wells in six counties were sampled for both ACET and DEA. Verified detections of ACET were made in 76 wells in four counties, and DEA detections were verified in eight wells in four counties. Concentrations of verified detections ranged from 0.05 to 2.01 ppb for ACET, and 0.05 to 0.58 ppb for DEA. Among the 103 wells in five counties sampled for DACT, detections of DACT were verified in 69 wells in three counties. Concentrations of verified detections ranged from 0.05 to 4.74 ppb for DACT. There are no drinking water quality criteria for ACET, DACT, or DEA.

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 that are found in ground water, but are determined

not to be the result of legal agricultural use. The SWRCB and its nine regional boards 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 an initial detection may lead to other verified detections. Negative follow-up samples may result from delays (sometimes years) in reporting the initial detection to DPR.

Table I-7 summarizes the status of all positive samples (verified and unverified) added to the database for this report. Of the 103,714 records added to the well inventory for this report, there were 1,562 (1.5%) unverified detections from 240 wells in 22 counties for a total of 12 pesticide active ingredients or breakdown products.

Of the 1,562 unverified samples, 1,559 (99.8%) were for nine chemicals currently not registered or not registered for agricultural use. The chemicals were 1,2,4-trichlorobenzene, 1,2-dichloropropane, benzene, chloromethane, DBCP, ethylene dibromide, naphthalene, propachlor, and xylene. These detections have been reported to the SWRCB.

Three reported unverified detections of dicamba, diuron, and thiobencarb, which are currently registered for agricultural use, were investigated by DPR. Table I-7 describes the results of these investigations.

Table I-7. Status, as of June 30, 2000 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, 1999 through June 30, 2000

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
1,2,4-trichlorobenzene	49 counties 2,524 wells	San Bernardino, 1	0.53	DHS & USEPA MCL 70	Not registered (NR). Non-agricultural uses of industrial chemicals may contribute to these findings. Referred to SWRCB.
1,2-dichloropropane (1,2-D; propylene dichloride)	49 counties 2,518 wells	Fresno, 1 San Joaquin, 1 San Mateo, 1	0.5 - 2.1	DHS & USEPA MCL 5	Fumigant. NR. Source of residues was determined by DPR to be due to historical non-point source, legal agricultural use (LAU). 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)	6 counties 110 wells	Colusa, 1 Fresno, 49 San Joaquin, 5 Tulare, 21	0.053 - 2.005		Breakdown product of atrazine or simazine. Detection in 1 well in Colusa was determined not due to LAU, and was removed from the PDRP; detections in 49 wells in Fresno, 5 wells in San Joaquin, and 21 wells in Tulare were determined to be due to LAU.
Atrazine	41 counties 1,335 wells	Butte, 1 Fresno, 2 San Joaquin, 1 Tulare, 2	0.05 - 0.195	DHS & USEPA MCL 3	Herbicide. AR. All detections were determined to be due to LAU.

(a) Marshack, J.B. 1998. A Compilation of Water Quality Goals. 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 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.

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 SNARLs: USEPA Drinking water health advisories or suggested no-adverse-response levels (SNARLs) for toxicity other than cancer risk.

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
benzene	49 counties 2,527 wells	Kern, 2 Kings, 2 Santa Cruz, 1 Yuba, 2	0.5 - 36.2	DHS MCL 1 USEPA MCL 5	Benzene was an ingredient in some early grain fumigants. NR for agricultural use. Non-agricultural uses of industrial chemicals may contribute to these findings. Referred to SWRCB.
Bromacil	40 counties 1,075 wells	Fresno, 13 San Joaquin, 1 Tulare, 17	0.052 - 4.166	USEPA SNARLs 90	Herbicide. AR. Detections in all wells were determined to be due to LAU.
chloromethane	48 counties 2,507 wells	Fresno, 2 Los Angeles, 2 San Bernardino, 1 Tuolumne, 1	0.5 - 37	USEPA SNARLs 3.0	Fumigant. NR. Non-agricultural uses of industrial chemicals may contribute to these findings. Referred to SWRCB.
DBCP (1,2-dibromo-3-chloropropane)	36 counties 1,256 wells	Fresno, 76 Kern, 8 Los Angeles, 9 Madera, 1 Merced, 5 Riverside, 6 San Bernardino, 57 San Joaquin, 19 Santa Cruz, 1 Stanislaus, 14 Sutter, 1 Tulare, 12 Ventura, 2	0.01 - 2.68	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	6 counties 110 wells	Butte, 1 Fresno, 4 San Joaquin, 1 Tulare, 2	0.05 - 0.567		Breakdown product of atrazine. All detections were determined to be due to LAU.

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
diaminochlorotriazine (DACT)	5 counties 103 wells	Fresno, 45 San Joaquin, 5 Tulare, 19	0.05 - 4.74		Breakdown product of atrazine or simazine. All detections were determined to be due to LAU.
Dicamba	28 counties 601 wells	Sonoma, 1	0.5	USEPA IRIS RfD 210	Herbicide, AR. Detection in 1 well in Sonoma is currently under investigation (CUI) by DPR.
diuron	31 counties 593 wells	Butte, 1 Fresno, 27 San Diego, 1 Tulare, 18	0.05 - 5.2	USEPA IRIS RfD 14	Herbicide. AR. Detection in 1 well in San Diego is CUI. All other detections were determined to be due to LAU.
ethylene dibromide (EDB)	37 counties 1,187 wells	Fresno, 6 Kern, 5 Riverside, 1	0.02 - 0.21	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.
naphthalene	47 counties 2,406 wells	Los Angeles, 1	5	USEPA SNARLs 20	Insecticidal fumigant. NR. Referred to SWRCB.
norflurazon	6 counties 110 wells	Butte, 2 Fresno, 9 San Joaquin, 1 Tulare, 4	0.059 - 0.46	USEPA IRIS RfD 280	Herbicide. AR All detections were determined due to LAU and continued in the PDRP.
prometon	8 counties 126 wells	Butte, 1 Fresno, 1	0.05 – 0.074	USEPA IRIS RfD & USEPA SNARLs 100	Herbicide, AR. All detections were determined to be due to LAU.
propachlor	36 counties 925 wells	Mono, 1	1.1	USEPA IRIS RfD 91 USEPA SNARLs 90	Herbicide. NR. Referred to SWRCB.
simazine	42 counties 1,353 wells	Butte, 1 Colusa, 1 Fresno, 45 San Joaquin, 2 Tulare, 20	0.05 – 0.965	USEPA MCL 4.0	Herbicide. AR. Detections were determined to be due to LAU.
thiobencarb	38 counties 1191 wells	Fresno, 1	7.2	DHS MCL 70	Herbicide. AR. Detection in 1 well of Fresno was determined not due to LAU and was removed from PDPR.
xylene	49 counties 2,520 wells	Contra Costa, 1 El Dorado, 1 Kern, 1 Mono, 1 Santa Cruz, 1 Sonoma, 1	0.6 - 5.8	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. Non-agricultural uses of industrial chemicals may contribute to these findings. Referred to SWRCB.

SECTION I SUMMARY

From July 1, 1999 through June 30, 2000, results were reported for 3,165 wells, located in 50 counties, that were sampled for a total of 105 pesticide active ingredients or breakdown products. The data represent 13 ground water sampling studies conducted by two agencies from July 1, 1999 to June 30, 2000.

Of the 105 compounds, 20 pesticide active ingredients or breakdown products were detected in 324 wells in 24 counties. Verified detections were made of nine compounds in 84 wells in five counties.

Detections of the following chemicals were verified for the first time in the following counties: diuron, norflurazon, simazine, and DEA in Butte County; and norflurazon and DACT in San Joaquin County.

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 action to prevent pesticide contamination of ground water.

GROUND WATER PROTECTION TRAINING

Ground water protection training is part of a comprehensive program designed to protect the ground water from contamination due to legal agricultural uses of pesticides. The training is required for licensed pest control advisers (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 approximate 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 the 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 the ground water, and management practices that limit 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 the ground water. These mechanisms are

often soil related. DPR scientists have classified California farm areas into two categories, leaching areas and runoff areas, based on the dominant mechanisms that pesticides move offsite. In leaching areas (coarse soils), the training focuses on proper irrigation management practices that keep excess irrigation water from leaching pesticides down to the ground water through the soil; in 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 through drainage (dry) wells or improperly sealed wells. The training also reviews changes in ground water laws, regulations, and programs. For the period from July 1, 1999 to June 30, 2000, DPR conducted five training sessions in July and August of 1999 and five training sessions in February and March of 2000 to qualify PCAs to write ground water protection advisories.

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 “found” in ground water if it is detected using an unequivocal detection method, or if the original detection is subsequently verified. DPR has established specific criteria for analytical methods that 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 legal agricultural use. Legal agricultural use means 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. These studies often were located in areas that have been thoroughly investigated and would provide little additional useful information. In an effort to use resources in an 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 to 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 survey 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 a well in another adjacent section or verified within a second site within a half-mile radius of the 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 (1) not currently registered for use, (2) registered for other than agricultural, outdoor industrial, or outdoor institutional use, and (3) detected in ground water not as a result of agricultural use.

ACTIONS TAKEN BY DPR ON PESTICIDE DETECTIONS

A total of 20 pesticide active ingredients and breakdown products were detected and reported during the period from July 1, 1999 to June 30, 2000. EHAP did not initiate investigations for 9 of the 20 detected chemicals because the chemicals are not currently registered for agricultural use in California. The chemicals include 1,2,4-trichlorobenzene, 1,2-dichloropropane, benzene, chloromethane, DBCP, ethylene dibromide, naphthalene, propachlor, and xylene. These detections were referred to the SWRCB.

EHAP conducted monitoring studies for chemicals reported detected in ground water that are currently registered for agricultural use in California. These investigations are described below in two 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. 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 re-sampled. A description of each study is given in Appendix B.

Monitoring for pesticides not previously reviewed by the PREC subcommittee

Dicamba was detected in a well in Sonoma County as a result of monitoring conducted in February of 1999 by the Office of Drinking Water of DHS. In response, EHAP conducted a four-section survey. A total of six wells including the original positive well were sampled. No pesticide residues were detected. DPR determined from the scientific evidence that the reported detection of dicamba in Sonoma County was not due to legal agricultural use. Dicamba was removed from the PDRP.

Thiobencarb was detected in a well in Fresno County as a result of monitoring conducted in April of 1999 by DHS. After examining the analytical data and information surrounding the well site, EHAP scientists determined that a four-section well survey was not warranted and no further action was taken on this reported detection.

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

Eleven studies were conducted in 6 counties for 13 chemicals that were reported detected. These chemicals included atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, ACET, and DACT. The studies are described in Appendix B. In some of the studies, the detections were verified and determined to be due to legal agricultural use, and Pesticide Management Zones were recommended (see below); in others, there was no evidence to support a legal agricultural use determination and the detections were removed from the PDRP.

Norflurazon continues in the PDRP - Director's Decision

Norflurazon was previously found in ground water and determined to be due to legal agricultural use. The registrant was subsequently notified and requested a hearing of the Pesticide Registration and Evaluation Committee (PREC) subcommittee, as prescribed by law. The PREC subcommittee held a hearing and made findings and recommendations to the DPR Director regarding the continued use of norflurazon. After reviewing these findings and recommendations, the director issued a final decision in April of 1999. The Director concurred with the PREC subcommittee that the use of norflurazon can be modified in such a way that there would be a high probability that no norflurazon residues other than those already present in ground water would migrate to ground water. DPR has proposed regulations to implement the Director's decision.

AGRICULTURAL USE DETERMINATIONS AND RECOMMENDATIONS FOR PESTICIDE MANAGEMENT ZONES

As a result of investigations concluded between July 1, 1999 and June 30, 2000, pesticide residues of five pesticides and their breakdown products in a total of 11 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 11 sections as new PMZs (Table II-1). Recommended PMZs must be adopted in regulation before they are subject to regulatory controls. Appendix B gives a more detailed description of the section number and chemical.

Table II-1. Number of sections recommended as Pesticide Management Zones by the Department of Pesticide Regulation from July 1, 1999 through June 30, 2000.

County	Chemical(s)	Sections
Butte	prometon	1
	atrazine, simazine	1
	diuron, simazine	1
Fresno	simazine	1
	diuron, simazine	1
San Joaquin	simazine	1
	atrazine, simazine	3
	diuron, simazine	1
	atrazine, bromacil, simazine	1
Total	atrazine 5, bromacil 1, diuron 3, simazine 10, prometon 1	11

GROUND WATER PROTECTION LIST MONITORING

The Ground Water Protection List (GWPL) is a list of pesticides having the potential to pollute ground water. It is established by FAC section 13145(d) and placed in section 3CCR 6800. The GWPL is divided into sub-lists (a) and (b). Sub-list (a) is comprised of chemicals detected in soil or ground water as a result of legal, agricultural use. Sub-list (b) includes chemicals that meet the conditions specified in FAC section 13145(d). These are pesticide active ingredients whose physicochemical properties exceed certain values (called specific numerical values or SNVs, [Johnson, 1991]) and that are labeled for use under any of the following conditions: (1) application to or injection into the soil; or (2) for application to or injection into soil by chemigation; or (3) application to be followed, within 72 hours, by flood or furrow irrigation. In order to determine whether these economic poisons have migrated to ground water, DPR is required to conduct monitoring for materials on the GWPL.

Before monitoring begins, chemicals on the GWPL are ranked for various factors used to determine in which order and to what extent the compounds should be monitored in California. First priority is given to pesticide active ingredients that have been detected in ground water due to non-point sources in other states or which are given a high priority for risk assessment on the list of pesticide active ingredients created for implementing the Birth Defect Prevention Act (SB950). For chemicals given first priority, between 25 and 40 wells are sampled. Second priority pesticides are selected based on pounds of active ingredient sold per year and on a combination of physicochemical factors; 15 to 25 wells are sampled for this group. Remaining compounds on the list are given third priority for monitoring, and 10 to 15 wells are sampled.

In 1992, 45 pesticide active ingredients (AIs) were placed on the GWPL and prioritized. Since that time, monitoring has been completed for 18 AIs. A regulation package that became effective on May 13, 1999 added 15 new AIs to the GWPL.

For future monitoring, active ingredients on the GWPL will no longer be ranked according to priority for monitoring. Instead, all active ingredients on the list will be evaluated for their potential to contaminate ground water based on the factors previously used to rank them along with any current information on recent detections, cultural practices or any other pertinent information. Each year, one or more active ingredients on the GWPL will be selected for monitoring. Alachlor and metolachlor are the next pesticides scheduled for monitoring. DPR is still developing analytical methods to detect breakdown products of these pesticides.

Monitoring during 1998-99 was conducted for napropamide and oryzalin. Neither pesticide was detected in 64 wells that were sampled. No GWPL monitoring was conducted during 1999-2000. It is expected that GWPL monitoring will be resumed during the coming year.

BENTAZON MONITORING

Historically, approximately 98% of all bentazon used in California was for post-emergence weed control in rice fields. In 1989, DPR confirmed detections of bentazon in 64 wells in 10 counties where rice was a major crop. As a result of those detections, DPR suspended the registration of bentazon until a full review could be conducted through the PDRP. The review resulted in DPR adopting regulations in January 1992 which added bentazon to section 6800(a) of the Ground Water Protection List (GWPL), and established use modifications that prohibited the use of bentazon (1) in Del Norte and Humboldt counties, (2) in the production of rice, (3) before April 1 or after July 31, and (4) in fields where irrigation applied through December of the application year would not be by sprinklers (Title 3 CCR 6486.6). In the PDRP findings, DPR's Director stated that the Department would continue to monitor for the presence of bentazon in ground water in areas where it was applied after the establishment of the use modifications.

Well monitoring for bentazon was conducted annually from 1993 to 1996. During those surveys only 7-12 wells were sampled because of the small quantities of bentazon applied in any one county or area within a county. In all, 21 different wells were sampled during the four surveys but no bentazon residues were detected. As a result of the low number of wells available for sampling in treated areas, bentazon monitoring was changed from an annual survey to a biennial survey as of September 1996.

The most recent survey was conducted in August 1998 and no bentazon or other herbicide residues were detected in eight wells sampled in three counties. The next survey for bentazon will be conducted during the fall/winter of 2000.

ADJACENT SECTION MONITORING

DPR samples wells located in land sections adjacent to PMZs to determine whether they are also vulnerable to pesticides reaching ground water. EHAP uses the results of this sampling, in conjunction with information gathered during land use surveys, to determine whether an adjacent section should also be declared a PMZ.

Adjacent section monitoring has been conducted annually from 1988 through 1995. However, in 1996 this monitoring was suspended because resources were reallocated to special studies designed to obtain information on mitigation of pesticide movement to ground water. No further adjacent section monitoring was conducted from 1996 through 1999.

Adjacent section monitoring was resumed in May 2000. EHAP sampled 29 wells in 16 previously unmonitored sections adjacent to PMZs in Butte, Colusa, Contra Costa and Mendocino Counties. Two wells were sampled in each of five sections in Butte County and in six sections in Contra Costa County. In Colusa County two wells were sampled in one section and one well was sampled in each of two sections. In Mendocino County one well was sampled in one section and two wells in another.

In Butte County, EHAP verified detections in 4 of 10 wells in 4 of 5 sections that were monitored. Atrazine, simazine, prometon, DEA and diuron were each found in one well; norflurazon was found in two wells. As a result of adjacent section monitoring, three new sections were recommended as PMZs. Analytical results for wells sampled in the remaining three counties were not ready for inclusion in this report. They will be included in the next well inventory report.

SPECIAL STUDIES

Age Dating of Herbicides in California's Ground Water

Preemergent herbicides and their degradates are the most commonly detected currently registered pesticides in ground waters of California (Bartkowiak et al., 1998, Maes et al., 1993, Spurlock et al., 2000). It is not clear whether current farming practices or historical applications contributed to such detections in California's ground waters. The answer to this question is of interest to scientists, growers, commodity groups, pesticide registrants, and the

general public. The detections of ACET and DACT are becoming more and more frequent throughout the State, particularly in Fresno and Tulare counties as the number of wells sampled in the two counties has increased in recent years. Both of these degradates may result from either atrazine or simazine applications. In both Fresno and Tulare counties, little atrazine has been used for approximately a decade. Age dating of ACET and DACT may help reveal the origin of these two breakdown products, and is useful to developing mitigation measures. However, existing monitoring data are inadequate to determine if the detections result from recent or historical application (i.e. within the last decade or 20-30 years ago).

Using chlorofluorocarbons (CFCs) as a tracer, EHAP in cooperation with the U.S. Geological Survey conducted a study to investigate the ages of three commonly detected herbicides, simazine, diuron, and bromacil, and two triazine degradates, ACET and DACT. CFCs are stable ubiquitous compounds that have been widely used, but there are no known natural sources of CFCs. Some of these CFCs have been used regularly and successfully as tracers for age dating in oceanic as well as in ground water studies (Spurlock, et al., 2000). The objectives of this study were to (1) estimate the time between herbicide application and subsequent detection in ground water using CFC tracers coupled with one-dimensional vadose zone transport modeling, and (2) evaluate the presence of triazine degradates in wells where simazine had been detected previously and to determine if herbicide concentrations in wells had changed with time. The study began in 1996 and was completed in 1999.

The study results (Spurlock et al., 2000) suggested that there was no detectable change in herbicide concentrations in the 30 domestic wells between 1994 and 1996. Estimated times between herbicide application and subsequent detections in well water ranged from 2 to 33 years, with more than half of the detections occurring due to applications within the last 7 to 9 years. The aggregate herbicide detections are due to relatively recent agricultural practices. The data also indicated that changes in ground water quality arising from management modifications of herbicides use or changes in other cultural practices will probably not be noticeable for at least a decade.

Update of the California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water Study and the Proposed Ground Water Protection Areas

The original California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water study developed an empirical model (CALVUL) relating certain soil characteristics with pesticide contamination of ground water (Troiano et al., 1994). Since that study was completed, the number of sections of land with pesticide detections has nearly doubled, and

the soil data tables originally obtained from the National Resource Conservation Service had been updated. Accordingly, EHAP scientists used that new data set to update CALVUL (Troiano et al., 1999).

The CALVUL study used cluster and principal component analysis to profile areas in California where ground water was contaminated by pesticides and their breakdown products. All of the sections used for this revision originated from DPR studies, which assured that sampled wells containing pesticide residues had met all criteria of a non-point source determination, especially with respect to visual inspection of well sites.

Variables that were important in discriminating clusters of soils were permeability, shrink-swell potential, presence of a hardpan soil layer, and presence of an annual water table. In this revision, soil texture was indicated by the combination of permeability and shrink-swell potential. Coarse soils were characterized by high permeability values and no shrink-swell potential, whereas clayey soils were characterized by very low permeability values and high shrink-swell potential. The addition of water table as a cluster variable provided greater separation primarily between clayey soils associated with and without pesticide contamination of ground water. Presence of a water table could be an important variable in the development of mitigation measures and requires further investigation.

DPR is planning to use the CALVUL model to help identify highly vulnerable areas, denoted as ground water protection areas by new regulation where mitigation measures will be implemented to prevent further movement to ground water. Ground water protection areas are identified as sections in coarse or hardpan soil clusters that have sectional estimates of depth to ground water (DGW) at 70 feet or less. Thus, the regulations will apply not only in areas where pesticides have been found in ground water, but also in areas where residues have not yet been detected in well water but where soil and DGW indicate a similar potential for contamination. In addition, the revised CALVUL model results will be used in investigations into processes of contamination in other vulnerable soil conditions. Detailed information on study methodology and results are found in a recent EHAP publication (Troiano et al., 1999).

Monitoring Temporal Changes in Concentrations of Detected Herbicides and Their Degradates in Ground Water

Changes that are proposed in the Ground Water Protection Program are more preventative than the current program because preventative measures will be implemented in areas where pesticide residues have not yet been detected in well water samples but that have been determined to be sensitive to the movement of residues to ground water. One measure of the success of the proposed program will be to observe temporal changes in pesticide concentrations in wells that are known to contain residues. These changes will be measured by conducting repeated sampling from a network of wells located in areas designated as ground water protection areas (GWPA's). EHAP has developed a protocol entitled 'Protocol for Monitoring the Concentration of Detected Pesticides in Wells Located in Highly Sensitive Areas'. The first wells were sampled in the fall of 1999, when the monitoring network of wells was identified (Garretson, 1999). Wells were chosen for sampling based on data obtained during previous EHAP well sampling investigations. The well samples were analyzed using a method that simultaneously measures the concentration of 13 different pesticide residues: atrazine, simazine, diuron, prometon, bromacil, norflurazon, which have been found in California ground water due to legal agricultural use and are listed in sections 6800(a) of the regulations; hexazinone which has been detected in ground water but not yet determined as a member of the 6800(a) list; prometryn, cyanazine, and metribuzin, which have not been detected in California but are potential ground water contaminants; and the triazine breakdown products DEA, ACET, and DACT, which have been found in ground water. All of the wells sampled for the monitoring network contained residues for one or more of the 6800(a) listed pesticides or their breakdown products. The wells will be sampled twice a year, in the spring and in the fall. The concentrations for these chemicals will be plotted over time, which will be used to determine a baseline prior to further regulation of their use. Based on data from an age-dating study and from monitoring of aldicarb residues in Humboldt and Del Norte Counties by the North Coast Regional Water Quality Control Board, a minimum of 5 years of monitoring may be needed before effects of changes in management practices are expressed as changes in pesticide concentrations at the wellhead.

CHANGES IN THE GROUND WATER PROGRAM

Presently, DPR identifies areas sensitive to ground water pollution and pesticides with a high potential to contaminate ground water based solely on well monitoring results. This process is very time consuming and expensive, and identifies sensitive areas and appropriate use restrictions only after contamination has occurred. Based on the large body of data collected since the early 1980's, DPR has developed a more efficient, comprehensive, and preventive method to identify these areas and to relate them to the mechanism of pesticide movement to ground water. In addition, DPR has developed mitigation measures to address various mechanisms of ground water contamination. DPR currently advises, but does not require, users of pesticides found in ground water to adopt these mitigation measures to protect ground water. And finally, there are no restrictions to prevent movement of pesticides residues in irrigation or rainfall runoff water into poorly sealed wells or drainage wells.

Based on this new information and methodology, DPR plans to change the regulations to make the ground water protection program more preventive. Sensitive areas will be identified based on soil types and depth to ground water that are characteristic of areas where contamination has occurred. Pesticides with a high potential to contaminate ground water will be identified based on factors such as detections anywhere in the United States and environmental fate characteristics, rather than only on detections in California ground water. DPR is now proposing to use the ground water protection areas derived from CALVUL as the basis for proposed regulations where mitigation measures will be implemented to prevent further movement to ground water. Users of pesticides will be required to adopt the mitigation measures that correspond to the mechanism of movement in all sensitive areas, even if contamination has not yet occurred. DPR also will require pesticide users to adopt wellhead protection measures so that wells themselves will not serve as a pathway for pesticide movement to ground water. DPR plans to sponsor a statewide chemigation training program as part of the overall wellhead protections initiative.

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, cathodic, 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, and disposal), or direct injection into the 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, 1999 to June 30, 2000, EHAP sampled 110 wells in 6 counties. The samples were analyzed for a total of 14 pesticide active ingredients and breakdown products. EHAP verified detections in 84 wells in 5 counties of 9 compounds. The compounds with verified detections included atrazine, bromacil, diuron, norflurazon, prometon, simazine, DEA, DACT, and ACET.

DPR determined that residues of atrazine, ACET, DACT, DEA, bromacil, diuron, prometon, and simazine reached ground water through legal agricultural use of these pesticides. A total of 11 sections in three counties were recommended as PMZs.

The PREC subcommittee held a hearing and made findings and recommendations to the director regarding the continued use of norflurazon. After reviewing these findings and recommendations, the director concurred with the PREC subcommittee that the use of norflurazon can be modified in such a way that there would be a high probability that no norflurazon residues other than those already present in ground water would migrate to ground water. Regulations will be adopted to make norflurazon a restricted material, add norflurazon use requirements, and establish norflurazon PMZs.

REFERENCES

- Biermann, H. 1989. Definition of a second analytical method for the purposes of AB 2021 (memorandum). California Department of Food and Agriculture, Environmental Hazards Assessment Program. Sacramento, California.
- Biermann, H. 1996. Definition of 'unequivocal detection methods' for the purposes of SB810 (memorandum). California Environmental Protection Agency, Department of Pesticide Regulation, Environmental Monitoring and Pest Management Branch, Environmental Hazards Assessment Program, Sacramento, California.
- Department of Pesticide Regulation. 1998. Summary of pesticide use report data. Sacramento, California.
- Department of Pesticide Regulation. January, 1996. Environmental Monitoring and Pest Management Branch. Revised protocol for selecting sampling areas and wells in a four-section survey to locate a second positive well site.
- Department of Pesticide Regulation. March, 1996. Environmental Monitoring and Pest Management Branch. Protocol to determine whether a pesticide may have been used in a section where it has been detected in ground water (establish legal agricultural use).
- Garretson, C. 1999. Protocol for monitoring the concentration of detected pesticides in wells located in highly sensitive areas.
- Maes, C., M. Pepple, J. Troiano, D. Weaver, W. Kimaru, and SWRCB staff. 1993. Sampling for pesticide residues in California well water: 1992 well inventory database, cumulative report 1986-1992. California Environmental Protection Agency, Department of Pesticide Regulation, Environmental Monitoring and Pest Management Branch, Environmental Hazards Assessment Program, Sacramento, California. EH 93-02.
- Marshack, J.B. 1998. A compilation of water quality goals. California Regional Water Quality Control Board, Central Valley Region. Sacramento, California.
- Spurlock, F., K. Burow, and N. Dubrovsky. 2000. Chlorofluorocarbon dating of herbicide-containing well waters in Fresno and Tulare counties, California. *J. Environ. Qual.* 29:474-483. Reprinted with the permission of the American Agronomy Society.
- Troiano, J., F. Spurlock, and J. Marade. 2000. Update of the California vulnerability soil analysis for movement of pesticides to ground water: EH 00-05.
- Troiano, J., Johnson, B.R., Powell, S. and S. Schoenig. 1994. Use of cluster and principal component analyses to profile areas in California where ground water has been contaminated by pesticides. *Environmental Monitoring and Assessment* 32:269-288.

Appendix A

Number of wells sampled and positive detections, by county and chemical for data reported to DPR between July 1, 1999 and June 30, 2000

This appendix is presented in two parts. The first part (part 1) summarizes information from the following counties where **pesticide residues were not detected**:

Alameda	Mariposa	San Luis Obispo
Alpine	Mendocino	Santa Barbara
Amador	Monterey	Santa Clara
Calaveras	Nevada	Shasta
Del Norte	Orange	Sierra
Glenn	Placer	Solano
Humboldt	Plumas	Tehama
Inyo	Sacramento	Yolo
Lake	San Benito	

The second part (part 2) summarizes information from the following counties where **pesticide residues were detected**:

Butte	Madera	Santa Cruz
Colusa	Merced	Sonoma
Contra Costa	Mono	Stanislaus
El Dorado	Riverside	Sutter
Fresno	San Bernardino	Tulare
Kern	San Diego	Tuolumne
Kings	San Joaquin	Ventura
Los Angeles	San Mateo	Yuba

Appendix A part 1. Counties without detections by chemical and number of wells sampled.

ALAMEDA

1,1,2,2-TETRACHLOROETHANE	17	DIMETHOATE	6
1,2,4-TRICHLOROBENZENE	17	DINOSEB	2
1,2-D + 1,3-D + C-3 COMPOUNDS	17	DIQUAT DIBROMIDE	2
1,2-DICHLOROPROPANE (1,2-D)	17	ENDOSULFAN	4
2,3,7,8-TCDD (DIOXIN)	2	ENDOSULFAN SULFATE	4
2,4,5-TP (SILVEX)	2	ENDOTHALL	2
2,4-D	2	ENDRIN	6
3-HYDROXYCARBOFURAN	2	ENDRIN ALDEHYDE	4
ALACHLOR	6	ETHYLENE DIBROMIDE	7
ALDICARB	2	GLYPHOSATE, ISOPROPYLAMINE SALT	2
ALDICARB SULFONE	2	HEPTACHLOR	6
ALDICARB SULFOXIDE	2	HEPTACHLOR EPOXIDE	6
ALDRIN	6	HEXACHLOROBENZENE	6
ATRAZINE	6	LINDANE (GAMMA-BHC)	6
BENTAZON, SODIUM SALT	2	METHOMYL	2
BENZENE	17	METHOXYCHLOR	6
BROMACIL	2	METHYL BROMIDE	17
BUTACHLOR	2	METOLACHLOR	6
CARBARYL	2	METRIBUZIN	2
CARBOFURAN	2	MOLINATE	6
CHLORDANE	2	NAPHTHALENE	17
CHLOROMETHANE	17	ORTHO-DICHLOROBENZENE	17
CHLOROTHALONIL	2	OXAMYL	2
DALAPON	2	PICLORAM	2
DBCP	7	PROMETRYN	6
DDD	4	PROPACHLOR	6
DDE	4	SIMAZINE	6
DDT	4	THIOBENCARB	6
DIAZINON	2	TOXAPHENE	2
DICAMBA	2	TRICHLOROBENZENES	17
DIELDRIN	6	XYLENE	17

ALPINE for each chemical, 1 well was sampled.

1,1,2,2-TETRACHLOROETHANE	BENZENE
1,2,4-TRICHLOROBENZENE	ORTHO-DICHLOROBENZENE
1,2-DICHLOROPROPANE (1,2-D)	XYLENE

AMADOR for each chemical, 1 well was sampled.

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

CALAVERAS for each chemical, 1 well was sampled.

1,1,2,2-TETRACHLOROETHANE	4	GLYPHOSATE, ISOPROPYLAMINE SALT	3
1,2,4-TRICHLOROBENZENE	4	METHYL BROMIDE	4
1,2-D + 1,3-D + C-3 COMPOUNDS	4	MOLINATE	1
1,2-DICHLOROPROPANE (1,2-D)	4	NAPHTHALENE	4
ALACHLOR	1	ORTHO-DICHLOROBENZENE	4
ATRAZINE	2	SIMAZINE	2
BENZENE	4	THIOBENCARB	2
BROMACIL	1	TRICHLOROBENZENES	4
CHLOROMETHANE	4	XYLENE	4
DALAPON	1		
ETHYLENE DIBROMIDE	1		

DEL NORTE for each chemical, 1 well was sampled.

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

GLENN for each chemical, 9 wells were sampled.

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

HUMBOLDT for each chemical, 1 well was sampled.

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

INYO

1,1,2,2-TETRACHLOROETHANE	4	METHYL BROMIDE	4
1,2,4-TRICHLOROBENZENE	4	ORTHO-DICHLOROBENZENE	4
1,2-D + 1,3-D + C-3 COMPOUNDS	4	SIMAZINE	3
1,2-DICHLOROPROPANE (1,2-D)	4	TRICHLOROBENZENES	4
BENZENE	4	XYLENE	4
CHLOROMETHANE	4		
DBCP	3		
ETHYLENE DIBROMIDE	3		

LAKE

1,1,2,2-TETRACHLOROETHANE	5	DIMETHOATE	2
1,2,4-TRICHLOROBENZENE	5	DINOSEB	5
1,2-D + 1,3-D + C-3 COMPOUNDS	5	DIQUAT DIBROMIDE	4
1,2-DICHLOROPROPANE (1,2-D)	5	DIURON	2
2,4,5-TP (SILVEX)	5	ENDOTHALL	4
2,4-D	5	ETHYLENE DIBROMIDE	3
3-HYDROXYCARBOFURAN	2	METHOMYL	2
ALDICARB	2	METHYL BROMIDE	5
ALDICARB SULFONE	2	METOLACHLOR	2
ALDICARB SULFOXIDE	2	METRIBUZIN	2
ATRAZINE	6	MOLINATE	2
BENTAZON, SODIUM SALT	5	NAPHTHALENE	5
BENZENE	5	ORTHO-DICHLOROBENZENE	5
BROMACIL	2	OXAMYL	4
BUTACHLOR	2	PICLORAM	5
CARBARYL	2	PROMETRYN	2
CARBOFURAN	5	PROPACHLOR	2
CHLOROMETHANE	5	SIMAZINE	6
CHLOROTHALONIL	2	THIOBENCARB	2
DALAPON	5	TRICHLOROBENZENES	5
DIAZINON	2	XYLENE	5
DICAMBA	5		

MARIPOSA for each chemical, 8 wells were sampled.

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

MENDOCINO

1,1,2,2-TETRACHLOROETHANE	7	DICAMBA	7
1,2,4-TRICHLOROBENZENE	7	DIMETHOATE	3
1,2-D + 1,3-D + C-3 COMPOUNDS	7	DINOSEB	7
1,2-DICHLOROPROPANE (1,2-D)	7	DIQUAT DIBROMIDE	6
2,4,5-TP (SILVEX)	7	ENDOTHALL	6
2,4-D	7	ETHYLENE DIBROMIDE	1
3-HYDROXYCARBOFURAN	4	HEPTACHLOR EPOXIDE	1
ALACHLOR	2	METHOMYL	4
ALDICARB	4	METHYL BROMIDE	7
ALDICARB SULFONE	4	METOLACHLOR	3
ALDICARB SULFOXIDE	4	METRIBUZIN	3
ATRAZINE	6	MOLINATE	3
BENTAZON, SODIUM SALT	7	NAPHTHALENE	7
BENZENE	7	ORTHO-DICHLOROBENZENE	7
BROMACIL	3	OXAMYL	6
BUTACHLOR	3	PICLORAM	7
CARBARYL	4	PROMETRYN	3
CARBOFURAN	6	PROPACHLOR	3
CHLOROMETHANE	7	SIMAZINE	6
DALAPON	7	THIOBENCARB	3
DBCP	1	TRICHLOROBENZENES	7
DIAZINON	3	XYLENE	7

MONTEREY

1,1,2,2-TETRACHLOROETHANE	24	DIQUAT DIBROMIDE	7
1,2,4-TRICHLOROBENZENE	24	DIURON	3
1,2-D + 1,3-D + C-3 COMPOUNDS	19	ENDOTHALL	7
1,2-DICHLOROPROPANE (1,2-D)	24	ENDRIN	10
2,4,5-T	5	ETHYLENE DIBROMIDE	7
2,4,5-TP (SILVEX)	10	GLYPHOSATE, ISOPROPYLAMINE SALT	7
2,4-D	10	HEPTACHLOR	10
3-HYDROXYCARBOFURAN	10	HEPTACHLOR EPOXIDE	10
ALACHLOR	10	HEXACHLOROBENZENE	10
ALDICARB	10	LINDANE (GAMMA-BHC)	10
ALDICARB SULFONE	10	METHOMYL	10
ALDICARB SULFOXIDE	10	METHOXYCHLOR	10
ALDRIN	10	METHYL BROMIDE	19
ATRAZINE	10	METOLACHLOR	10
BENTAZON, SODIUM SALT	10	METRIBUZIN	10
BENZENE	24	MOLINATE	10
BROMACIL	10	NAPHTHALENE	19
BUTACHLOR	10	ORTHO-DICHLOROBENZENE	24
CARBARYL	10	OXAMYL	10
CARBOFURAN	10	PICLORAM	10
CHLORDANE	10	PROMETRYN	10
CHLOROMETHANE	19	PROPACHLOR	10
CHLOROTHALONIL	10	SIMAZINE	10
DALAPON	10	THIOBENCARB	10
DBCP	7	TOXAPHENE	10
DIAZINON	10	TRICHLOROBENZENES	19
DICAMBA	10	XYLENE	24
DIELDRIN	10		
DIMETHOATE	10		
DINOSEB	10		

NEVADA

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

ORANGE

1,3-DICHLOROPROPENE (1,3-D TELONE)	181	CHLOROTHALONIL	8
1,1,2,2-TETRACHLOROETHANE	191	DALAPON	9
1,2,4-TRICHLOROBENZENE	191	DBCP	184
1,2-D + 1,3-D + C-3 COMPOUNDS	190	DDD	6
1,2-DICHLOROPROPANE (1,2-D)	191	DDE	6
2,4,5-TP (SILVEX)	9	DDT	6
2,4-D	9	DIAZINON	151
3-HYDROXYCARBOFURAN	7	DICAMBA	8
ACENAPHTHENE	6	DIELDRIN	11
ALACHLOR	153	DIMETHOATE	151
ALDICARB	7	DINOSEB	9
ALDICARB SULFONE	7	DIQUAT DIBROMIDE	8
ALDICARB SULFOXIDE	7	DIURON	5
ALDRIN	8	ENDOSULFAN	6
ATRAZINE	153	ENDOSULFAN SULFATE	6
BENTAZON, SODIUM SALT	9	<u>ORANGE</u> (continued)	
BENZENE	191	ENDOTHALL	8
BHC (OTHER THAN GAMMA ISOMER)	6	ENDRIN	12
BROMACIL	151	ENDRIN ALDEHYDE	6
BUTACHLOR	151	ETHYLENE DIBROMIDE	184
CARBARYL	7	GLYPHOSATE, ISOPROPYLAMINE SALT	8
CARBOFURAN	7	HEPTACHLOR	9
CHLORDANE	9	HEPTACHLOR EPOXIDE	12
CHLOROMETHANE	189	HEXACHLOROBENZENE	12

LINDANE (GAMMA-BHC)	12	PARAQUAT DICHLORIDE	6
MALATHION	146	PARATHION OR ETHYL PARATHION	146
METHIOCARB	5	PICLORAM	8
METHOMYL	7	PROMETRYN	151
METHOXYCHLOR	12	PROPACHLOR	152
METHYL BROMIDE	190	PROPOXUR	5
METHYL PARATHION	146	SIMAZINE	153
METOLACHLOR	151	THIOBENCARB	151
		TOXAPHENE	9
METRIBUZIN	151	TRICHLOROENZENES	190
MOLINATE	151	XYLENE	191
NAPHTHALENE	190		
ORTHO-DICHLOROENZENE	191		
OXAMYL	7		

PLACER

1,1,2,2-TETRACHLOROETHANE	10	DIQUAT DIBROMIDE	3
1,2,4-TRICHLOROENZENE	10	DIURON	3
1,2-D + 1,3-D + C-3 COMPOUNDS	10	ENDOTHALL	3
1,2-DICHLOROPROPANE (1,2-D)	10	ENDRIN	3
2,3,7,8-TCDD (DIOXIN)	2	ETHYLENE DIBROMIDE	3
2,4,5-TP (SILVEX)	3	GLYPHOSATE, ISOPROPYLAMINE SALT	3
2,4-D	3	HEPTACHLOR	3
3-HYDROXYCARBOFURAN	3	HEPTACHLOR EPOXIDE	3
ALACHLOR	3	HEXACHLOROENZENE	3
ALDICARB	3	LINDANE (GAMMA-BHC)	3
ALDICARB SULFONE	3	METHOMYL	3
ALDICARB SULFOXIDE	3	METHOXYCHLOR	3
ALDRIN	3	METHYL BROMIDE	10
ATRAZINE	3	METOLACHLOR	3
BENTAZON, SODIUM SALT	3	METRIBUZIN	3
BENZENE	10	MOLINATE	3
BROMACIL	3	NAPHTHALENE	10
BUTACHLOR	3	ORTHO-DICHLOROENZENE	10
CARBARYL	3	OXAMYL	3
CARBOFURAN	3	PICLORAM	3
CHLORDANE	3	PROMETRYN	3
CHLOROMETHANE	10	PROPACHLOR	3
CHLOROTHALONIL	3	SIMAZINE	3
DALAPON	3	THIOBENCARB	3
DBCP	3	TOXAPHENE	3
DIAZINON	3	TRICHLOROENZENES	10
DICAMBA	3	XYLENE	10
DIELDRIN	3		
DIMETHOATE	3		
DINOSEB	3		

PLUMAS for each chemical, 6 wells were sampled.

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

SACRAMENTO

1,1,2,2-TETRACHLOROETHANE	113	DIURON	19
1,2,4-TRICHLOROBENZENE	113	ENDOTHALL	8
1,2-D + 1,3-D + C-3 COMPOUNDS	113	ENDRIN	30
1,2-DICHLOROPROPANE (1,2-D)	113	ETHYLENE DIBROMIDE	10
2,3,7,8-TCDD (DIOXIN)	2	FENURON	3
2,4,5-T	6	FLUOMETURON	3
2,4,5-TP (SILVEX)	21	GLYPHOSATE, ISOPROPYLAMINE SALT	7
2,4,6-TRICHLOROPHENOL	1	HEPTACHLOR	29
2,4-D	21	HEPTACHLOR EPOXIDE	29
2,4-DINITROPHENOL	1	HEXACHLOROBENZENE	22
3-HYDROXYCARBOFURAN	19	LINDANE (GAMMA-BHC)	30
ACENAPHTHENE	1	LINURON	3
ALACHLOR	14	METHIOCARB	3
ALDICARB	19	METHOMYL	19
ALDICARB SULFONE	19	METHOXYCHLOR	29
ALDICARB SULFOXIDE	19	METHYL BROMIDE	113
ALDRIN	30	METOLACHLOR	16
AMINOCARB	3	METRIBUZIN	16
ATRAZINE	17	MEXACARBATE	3
BARBAN	3	MOLINATE	16
BENTAZON, SODIUM SALT	21	MONURON	3
BENZENE	113	NAPHTHALENE	113
BROMACIL	16	NEBURON	3
BUTACHLOR	16	ORTHO-DICHLOROBENZENE	113
CARBARYL	19	OXAMYL	19
CARBOFURAN	19	PICLORAM	21
CHLORDANE	30	PROMETRYN	16
CHLOROMETHANE	113	PROPACHLOR	27
CHLOROTHALONIL	30	PROPHAM	3
CHLORPROPHAM	3	PROPOXUR	3
DALAPON	21	SIDURON	3
DBCP	10	SIMAZINE	14
DIAZINON	16	THIOBENCARB	15
DICAMBA	21	TOXAPHENE	29
DIELDRIN	27	TRICHLOROBENZENES	113
DIMETHOATE	14	XYLENE	113
DINOSEB	22		
DIQUAT DIBROMIDE	8		

SAN BENITO

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

SAN LUIS OBISPO

1,1,2,2-TETRACHLOROETHANE	39	DALAPON	27
1,2,4-TRICHLOROBENZENE	39	DBCP	37
1,2-D + 1,3-D + C-3 COMPOUNDS	38	DIAZINON	34
1,2-DICHLOROPROPANE (1,2-D)	39	DICAMBA	28
2,4,5-TP (SILVEX)	27	DIELDRIN	28
2,4-D	28	DIMETHOATE	35
3-HYDROXYCARBOFURAN	29	DINOSEB	27
ALACHLOR	32	DIQUAT DIBROMIDE	27
ALDICARB	29	DIURON	24
ALDICARB SULFONE	29	ENDRIN	26
ALDICARB SULFOXIDE	29	ETHYLENE DIBROMIDE	37
ALDRIN	28	HEPTACHLOR	26
ATRAZINE	33	HEPTACHLOR EPOXIDE	26
BENTAZON, SODIUM SALT	27	HEXACHLOROBENZENE	26
BENZENE	39	LINDANE (GAMMA-BHC)	26
BROMACIL	33	METHOMYL	30
BUTACHLOR	34	METHOXYCHLOR	26
CARBARYL	30	METHYL BROMIDE	38
CARBOFURAN	28	<u>SAN LUIS OBISPO</u> (continued)	
CHLORDANE	27	METOLACHLOR	34
CHLOROMETHANE	38	METRIBUZIN	34
CHLOROTHALONIL	29	MOLINATE	33

NAPHTHALENE	39	SIMAZINE	33
ORTHO-DICHLOROBENZENE	39	THIOBENCARB	33
OXAMYL	28	TOXAPHENE	26
PARAQUAT DICHLORIDE	4	TRICHLOROBENZENES	39
PICLORAM	28	XYLENE	38
PROMETRYN	34		
PROPACHLOR	30		

SANTA BARBARA

1,1,2,2-TETRACHLOROETHANE	41	DIQUAT DIBROMIDE	28
1,2,4-TRICHLOROBENZENE	40	DIURON	29
1,2-D + 1,3-D + C-3 COMPOUNDS	41	ENDRIN	27
1,2-DICHLOROPROPANE (1,2-D)	42	ETHYLENE DIBROMIDE	37
2,4,5-TP (SILVEX)	29	GLYPHOSATE, ISOPROPYLAMINE SALT	2
2,4-D	29	HEPTACHLOR	27
3-HYDROXYCARBOFURAN	28	HEPTACHLOR EPOXIDE	27
ALACHLOR	39	HEXACHLOROBENZENE	28
ALDICARB	28	LINDANE (GAMMA-BHC)	27
ALDICARB SULFONE	28	METHOMYL	28
ALDICARB SULFOXIDE	28	METHOXYCHLOR	28
ALDRIN	27	METHYL BROMIDE	42
ATRAZINE	41	METOLACHLOR	41
BENTAZON, SODIUM SALT	29	METRIBUZIN	41
BENZENE	42	MOLINATE	41
BROMACIL	39	NAPHTHALENE	41
BUTACHLOR	41	ORTHO-DICHLOROBENZENE	42
CARBARYL	28	OXAMYL	28
CARBOFURAN	28	PARAQUAT DICHLORIDE	2
CHLORDANE	27	PICLORAM	29
CHLOROMETHANE	42	PROMETRYN	41
CHLOROTHALONIL	27	PROPACHLOR	30
DALAPON	29	SIMAZINE	41
DBCP	37	THIOBENCARB	41
DIAZINON	40	TOXAPHENE	27
DICAMBA	29	TRICHLOROBENZENES	41
DIELDRIN	27	XYLENE	42
DIMETHOATE	41		
DINOSEB	29		

SANTA CLARA

1,1,2,2-TETRACHLOROETHANE	126	ALDICARB	30
1,2,4-TRICHLOROBENZENE	138	ALDICARB SULFONE	30
1,2-D + 1,3-D + C-3 COMPOUNDS	126	ALDICARB SULFOXIDE	30
1,2-DICHLOROPROPANE (1,2-D)	126	ALDRIN	30
2,3,7,8-TCDD (DIOXIN)	8	ATRAZINE	30
2,4,5-T	18	<u>SANTA CLARA</u> (continued)	
2,4,5-TP (SILVEX)	30	BENTAZON, SODIUM SALT	30
2,4,6-TRICHLOROPHENOL	38	BENZENE	126
2,4-D	30	BROMACIL	30
2,4-DINITROPHENOL	1	BUTACHLOR	30
3-HYDROXYCARBOFURAN	30	CARBARYL	30
ACENAPHTHENE	38	CARBOFURAN	30
ALACHLOR	30	CHLORDANE	30

CHLOROMETHANE	126	LINDANE (GAMMA-BHC)	30
CHLOROTHALONIL	64	METHOMYL	30
DALAPON	30	METHOXYCHLOR	30
DBCP	64	METHYL BROMIDE	126
DIAZINON	30	METOLACHLOR	30
DICAMBA	30	METRIBUZIN	30
DIELDRIN	30	MOLINATE	30
DIMETHOATE	30	NAPHTHALENE	138
DINOSEB	30	ORTHO-DICHLOROBENZENE	138
DIQUAT DIBROMIDE	26	OXAMYL	30
DIURON	1	PICLORAM	30
ENDOTHALL	30	PROMETRYN	30
ENDRIN	30	PROPACHLOR	30
ETHYLENE DIBROMIDE	32	SIMAZINE	30
GLYPHOSATE, ISOPROPYLAMINE SALT	30	THIOBENCARB	30
HEPTACHLOR	30	TOXAPHENE	30
HEPTACHLOR EPOXIDE	30	TRICHLOROBENZENES	126
HEXACHLOROBENZENE	64	XYLENE	126

SHASTA

1,1,2,2-TETRACHLOROETHANE	7	NAPHTHALENE	1
1,2,4-TRICHLOROBENZENE	7	ORTHO-DICHLOROBENZENE	7
1,2-D + 1,3-D + C-3 COMPOUNDS	7	TRICHLOROBENZENES	7
1,2-DICHLOROPROPANE (1,2-D)	7	XYLENE	7
BENZENE	7		
CHLOROMETHANE	7		
METHYL BROMIDE	7		

SIERRA for each chemical, 2 wells were sampled.

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

SOLANO

1,1,2,2-TETRACHLOROETHANE	17	BUTACHLOR	12
1,2,4-TRICHLOROBENZENE	17	CARBARYL	12
1,2-D + 1,3-D + C-3 COMPOUNDS	17	CARBOFURAN	12
1,2-DICHLOROPROPANE (1,2-D)	17	<u>SOLANO</u> (continued)	
2,3,7,8-TCDD (DIOXIN)	8	CHLORDANE	12
2,4,5-TP (SILVEX)	12	CHLOROMETHANE	17
2,4-D	12	CHLOROTHALONIL	12
3-HYDROXYCARBOFURAN	12	DALAPON	12
ALACHLOR	12	DBCP	12
ALDICARB	12	DIAZINON	12
ALDICARB SULFONE	12	DICAMBA	12
ALDICARB SULFOXIDE	12	DIELDRIN	12
ALDRIN	7	DIMETHOATE	12
ATRAZINE	12	DINOSEB	12
BENTAZON, SODIUM SALT	12	DIQUAT DIBROMIDE	12
BENZENE	18	DIURON	5
BROMACIL	12	ENDOTHALL	12

ENDRIN	12	NAPHTHALENE	17
ETHYLENE DIBROMIDE	12	ORTHO-DICHLOROBENZENE	17
GLYPHOSATE, ISOPROPYLAMINE SALT	12	OXAMYL	12
HEPTACHLOR	7	PICLORAM	12
HEPTACHLOR EPOXIDE	12	PROMETRYN	12
HEXACHLOROBENZENE	12	PROPACHLOR	12
LINDANE (GAMMA-BHC)	12	SIMAZINE	12
METHOMYL	12	THIOBENCARB	12
METHOXYCHLOR	12	TOXAPHENE	12
METHYL BROMIDE	17	TRICHLOROENZENES	17
METOLACHLOR	12	XYLENE	18
METRIBUZIN	12		
MOLINATE	12		

TEHAMA for each chemical, 6 wells were sampled.

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

YOLO

1,1,2,2-TETRACHLOROETHANE	9	ETHYLENE DIBROMIDE	11
1,2,4-TRICHLOROBENZENE	9	HEPTACHLOR	1
1,2-D + 1,3-D + C-3 COMPOUNDS	9	HEPTACHLOR EPOXIDE	1
1,2-DICHLOROPROPANE (1,2-D)	9	HEXACHLOROBENZENE	1
ALACHLOR	10	LINDANE (GAMMA-BHC)	1
ALDRIN	1	METHOXYCHLOR	1
ATRAZINE	10	METHYL BROMIDE	9
BENZENE	11	METOLACHLOR	10
BROMACIL	10	METRIBUZIN	10
BUTACHLOR	10	MOLINATE	10
CHLORDANE	1	NAPHTHALENE	9
CHLOROMETHANE	9	ORTHO-DICHLOROBENZENE	9
CHLOROTHALONIL	1	PROMETRYN	10
DBCP	11	PROPACHLOR	10
DIAZINON	10	SIMAZINE	10
DIELDRIN	1	THIOBENCARB	10
DIMETHOATE	10	TOXAPHENE	1
DIQUAT DIBROMIDE	1	TRICHLOROENZENES	9
DIURON	1	XYLENE	9
ENDOTHALL	1		
ENDRIN	1		

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

BUTTE

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>
1,1,2,2-TETRACHLOROETHANE	24		DIURON	10	1
1,2,4-TRICHLOROBENZENE	24		ETHYLENE DIBROMIDE	7	
1,2-D + 1,3-D + C-3 COMPOUNDS	24		HEXAZINONE	10	
1,2-DICHLOROPROPANE (1,2-D)	24		METHYL BROMIDE	24	
ACET	10		METRIBUZIN	10	
ATRAZINE	10	1	NAPHTHALENE	24	
BENZENE (BENZOL)	24		NORFLURAZON	10	2
BROMACIL	10		ORTHO-DICHLOROBENZENE	24	
CHLOROMETHANE	24		PROMETON	10	1
CYANAZINE	10		PROMETRYN	10	
DBCP	7		SIMAZINE	10	1
DEETHYL-ATRAZINE	10	1	TRICHLOROBENZENES	24	
DIAMINOCHLOROTRIAZINE (DACT)	10		XYLENE	24	

COLUSA

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>
1,1,2,2-TETRACHLOROETHANE	7		DIURON	7	
1,2,4-TRICHLOROBENZENE	7		HEXAZINONE	7	
1,2-D + 1,3-D + C-3 COMPOUNDS	7		METHYL BROMIDE	7	
1,2-DICHLOROPROPANE (1,2-D)	7		METRIBUZIN	7	
ACET	7		NAPHTHALENE	7	
ATRAZINE	7	1	NORFLURAZON	7	
BENZENE (BENZOL)	7		ORTHO-DICHLOROBENZENE	7	
BROMACIL	7		PROMETON	7	
CHLOROMETHANE	7		PROMETRYN	7	
CYANAZINE	7		SIMAZINE	7	1
DBCP	5		TRICHLOROBENZENES	7	
DEETHYL-ATRAZINE	7		XYLENE	7	

CHEMICAL SAMPLED POS

CONTRA COSTA

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>
1,1,2,2-TETRACHLOROETHANE	8		BENZENE (BENZOL)	8	
1,2,4-TRICHLOROBENZENE	8		BROMACIL	4	
1,2-D + 1,3-D + C-3 COMPOUNDS	8		BUTACHLOR	4	
1,2-DICHLOROPROPANE (1,2-D)	8		CARBARYL	4	
2,3,7,8-TCDD (DIOXIN)	1		CARBOFURAN	4	
2,4,5-TP (SILVEX)	4		CHLORDANE	4	
2,4-D	4		CHLOROMETHANE	8	
3-HYDROXYCARBOFURAN	4		CHLOROTHALONIL	4	
ALACHLOR	4		DALAPON	4	
ALDICARB	4		DBCP	4	
ALDICARB SULFONE	4		DIAZINON	4	
ALDICARB SULFOXIDE	4		DICAMBA	4	
ALDRIN	4		DIELDRIN	4	
ATRAZINE	4		DIMETHOATE	4	
BENTAZON, SODIUM SALT	4		DINOSEB	4	

CONTRA COSTA (continued)

CHEMICAL SAMPLED POS CHEMICAL SAMPLED POS

DIQUAT DIBROMIDE	4
DIURON	4
ENDOTHALL	4
ENDRIN	4
ETHYLENE DIBROMIDE	4
GLYPHOSATE, ISOPROPYLAMINE SALT	4
HEPTACHLOR	4
HEPTACHLOR EPOXIDE	4
HEXACHLOROENZENE	4
LINDANE (GAMMA-BHC)	4
METHOMYL	4
METHOXYCHLOR	4
METHYL BROMIDE	8
METOLACHLOR	4

SAMPLED POS

<u>CHEMICAL</u>	
METRIBUZIN	4
MOLINATE	4
NAPHTHALENE	8
ORTHO-DICHLOROENZENE	8
OXAMYL	4
PICLORAM	4
PROMETRYN	4
PROPACHLOR	4
SIMAZINE	4
THIOBENCARB	4
TOXAPHENE	4
TRICHLOROENZENES	8
XYLENE	8

1

EL DORADO

<u>CHEMICAL</u>	<u>SAMPLED POS</u>
1,1,2,2-TETRACHLOROETHANE	28
1,2,4-TRICHLOROENZENE	28
1,2-D + 1,3-D + C-3 COMPOUNDS	27
1,2-DICHLOROPROPANE (1,2-D)	28
BENZENE (BENZOL)	28
CHLOROMETHANE	27

<u>CHEMICAL</u>	<u>SAMPLED POS</u>
METHYL BROMIDE	27
NAPHTHALENE	2
ORTHO-DICHLOROENZENE	28
TRICHLOROENZENES	27
XYLENE	28

1

FRESNO

<u>CHEMICAL</u>	<u>SAMPLED POS</u>
1,1,2,2-TETRACHLOROETHANE	252
1,2,4-TRICHLOROENZENE	252
1,2-D + 1,3-D + C-3 COMPOUNDS	252
1,2-DICHLOROPROPANE (1,2-D)	252 1
2,4,5-T	36
2,4,5-TP (SILVEX)	36
2,4-D	36
3-HYDROXYCARBOFURAN	2
ACET	51 49
ALACHLOR	84
ALDICARB	2
ALDICARB SULFONE	2
ALDICARB SULFOXIDE	2
ALDRIN	10
ATRAZINE	135 2
BENTAZON, SODIUM SALT	36
BENZENE (BENZOL)	252
BROMACIL	129 13
BUTACHLOR	84
CARBARYL	2
CARBOFURAN	2
CHLORDANE	10
CHLOROMETHANE	252 2
<u>CHEMICAL</u>	<u>SAMPLED POS</u>
CHLOROTHALONIL	4
CYANAZINE	51
DALAPON	36
DBCP	104 76

DEETHYL-ATRAZINE	51	4
DEMETON	30	
DIAMINOCHLOROTRIAZINE (DACT)	51	45
DIAZINON	84	
DICAMBA	36	
DIELDRIN	10	
DIMETHOATE	84	
DINOSEB	36	
DIQUAT DIBROMIDE	2	
DISULFOTON	30	
DIURON	52	27
ENDOTHALL	2	
ENDRIN	10	
ETHYLENE DIBROMIDE	102	6
GLYPHOSATE, ISOPROPYLAMINE SALT	1	
HEPTACHLOR	10	
HEPTACHLOR EPOXIDE	10	
HEXACHLOROENZENE	10	
HEXAZINONE	51	

FRESNO (continued)

<u>CHEMICAL</u>	<u>SAMPLED POS</u>
LINDANE (GAMMA-BHC)	10
METHOMYL	2
METHOXYCHLOR	10
METHYL BROMIDE	252
METOLACHLOR	84
METRIBUZIN	135
MOLINATE	84
NAPHTHALENE	252

NORFLURAZON	51	9
ORTHO-DICHLOROBENZENE	252	
<u>CHEMICAL</u>	<u>SAMPLED POS</u>	
OXAMYL	2	
PICLORAM	36	
PROMETON	51	1
PROMETRYN	135	

PROPACHLOR	84	
SIMAZINE	135	45
THIOBENCARB	84	1
TOXAPHENE	10	
TRICHLOROBENZENES	252	
XYLENE	252	

KERN

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>
1,1,2,2-TETRACHLOROETHANE	99	
1,2,4-TRICHLOROBENZENE	95	
1,2-D + 1,3-D + C-3 COMPOUNDS	95	
1,2-DICHLOROPROPANE (1,2-D)	99	
2,3,7,8-TCDD (DIOXIN)	12	
2,4,5-TP (SILVEX)	12	
2,4-D	13	
3-HYDROXYCARBOFURAN	12	
ALACHLOR	47	
ALDICARB	13	
ALDICARB SULFONE	13	
ALDICARB SULFOXIDE	13	
ALDRIN	13	
ATRATON	1	
ATRAZINE	62	
BENEFIN (BENFLURALIN)	1	
BENTAZON, SODIUM SALT	12	
BENZENE (BENZOL)	102	2
BHC (OTHER THAN GAMMA ISOMER)	1	
BROMACIL	40	
BUTACHLOR	32	
CARBARYL	14	
CARBOFURAN	14	
CHLORDANE	13	
CHLOROMETHANE	99	
CHLOROTHALONIL	12	
DALAPON	12	
DBCP	87	8
DDD	1	
DDE	1	
DDT	1	
DIAZINON	36	
DICAMBA	12	
DIELDRIN	12	

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS</u>
DIMETHOATE	36	
DINOSEB	13	
DIQUAT DIBROMIDE	12	
DIURON	16	
ENDOTHALL	12	
ENDRIN	13	
ETHYLENE DIBROMIDE	87	5
GLYPHOSATE, ISOPROPYLAMINE SALT	12	
HEPTACHLOR	13	
HEPTACHLOR EPOXIDE	13	
HEXACHLOROBENZENE	34	
LINDANE (GAMMA-BHC)	13	
METHOMYL	14	
METHOXYCHLOR	34	
METHYL BROMIDE	99	
METOLACHLOR	36	
METRIBUZIN	36	
MOLINATE	35	
NAPHTHALENE	92	
ORTHO-DICHLOROBENZENE	99	
OXAMYL	14	
PENDIMETHALIN	1	
PENTACHLORONITROBENZENE (PCNB)	1	
PICLORAM	12	
PROMETON	1	
PROMETRYN	36	
PROPACHLOR	31	
SECBUMETON	1	
SIMAZINE	62	
TERBUTRYN	1	
THIOBENCARB	35	
TOXAPHENE	13	
TRICHLOROBENZENES	96	
XYLENE	102	1

KINGS

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	3
1,2,4-TRICHLOROBENZENE	3
1,2-D + 1,3-D + C-3 COMPOUNDS	3
1,2-DICHLOROPROPANE (1,2-D)	3
ALACHLOR	13

ATRAZINE	13	
BENZENE (BENZOL)	5	1
BROMACIL	13	
BUTACHLOR	13	
CHLORDANE	3	
CHLOROMETHANE	3	

CHLOROTHALONIL	3	METHYL BROMIDE	3
DBCP	13	METOLACHLOR	13
DIAZINON	13	METRIBUZIN	13
DIMETHOATE	13	MOLINATE	13
DIURON	13	NAPHTHALENE	3
ENDRIN	3	ORTHO-DICHLOROBENZENE	3
ETHYLENE DIBROMIDE	13	PROMETRYN	13
		PROPACHLOR	13
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	SIMAZINE	13
HEPTACHLOR	3	THIOBENCARB	13
HEPTACHLOR EPOXIDE	3	TOXAPHENE	3
HEXACHLOROBENZENE	3	TRICHLOROBENZENES	3
LINDANE (GAMMA-BHC)	3	XYLENE	3
METHOXYCHLOR	3		

LOS ANGELES

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	DIURON	104	
1,3-DICHLOROPROPENE (1,3-D TELONE)	2	ENDOSULFAN	15	
1,1,2,2-TETRACHLOROETHANE	613	ENDOSULFAN SULFATE	15	
1,2,4-TRICHLOROBENZENE	613	ENDOTHALL	6	
1,2-D + 1,3-D + C-3 COMPOUNDS	613	ENDRIN	51	
1,2-DICHLOROPROPANE (1,2-D)	613	ENDRIN ALDEHYDE	14	
2,3,7,8-TCDD (DIOXIN)	5	ETHYLENE DIBROMIDE	73	
2,4,5-T	16	GLYPHOSATE, ISOPROPYLAMINE SALT	118	
2,4,5-TP (SILVEX)	46	HEPTACHLOR	48	
2,4-D	116	HEPTACHLOR EPOXIDE	51	
3-HYDROXYCARBOFURAN	52	HEXACHLOROBENZENE	42	
ACENAPHTHENE	11	LINDANE (GAMMA-BHC)	51	
ALACHLOR	56	MALATHION	1	
ALDICARB	52	METHIOCARB	15	
ALDICARB SULFONE	52	METHOMYL	52	
ALDICARB SULFOXIDE	52	METHOXYCHLOR	50	
ALDRIN	33	<u>LOS ANGELES</u> (continued)		
ATRAZINE	219	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	
BENTAZON, SODIUM SALT	46	METHYL BROMIDE	613	
BENZENE (BENZOL)	613	METOLACHLOR	42	
BHC (OTHER THAN GAMMA ISOMER)	15	METRIBUZIN	42	
BROMACIL	65	MOLINATE	62	
BUTACHLOR	42	NAPHTHALENE	546	1
CARBARYL	82	ORTHO-DICHLOROBENZENE	613	
CARBOFURAN	55	OXAMYL	51	
CHLORDANE	122	PARAQUAT DICHLORIDE	15	
CHLOROMETHANE	613	PICLORAM	45	
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	PROMETON	15	
DALAPON	45	PROMETRYN	50	
DBCP	80	PROPACHLOR	38	
DDD	15			
DDE	15	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	
DDT	15	PROPAGINE	14	
DIAZINON	80	PROPOXUR	15	
DICAMBA	35	SIMAZINE	217	
DIELDRIN	36	TERBUTRYN	1	
DIMETHOATE	50	THIOBENCARB	261	
DINOSEB	45	TOXAPHENE	50	
DIQUAT DIBROMIDE	119			

TRIADIMEFON	1	XYLENE	613
TRICHLOROENZENES	613		
TRIFLURALIN	8		
VERNOLATE	1		

MADERA

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	10	DISULFOTON	1
1,2,4-TRICHLOROENZENE	10	ETHYLENE DIBROMIDE	2
1,2-D + 1,3-D + C-3 COMPOUNDS	10	METHYL BROMIDE	10
1,2-DICHLOROPROPANE (1,2-D)	10	METOLACHLOR	2
ALACHLOR	2	METRIBUZIN	2
ATRAZINE	2	MOLINATE	2
BENZENE (BENZOL)	10	NAPHTHALENE	10
BROMACIL	2	ORTHO-DICHLOROENZENE	10
BUTACHLOR	2	PROMETRYN	2
CHLOROMETHANE	10	PROPACHLOR	2
DBCP	2 1	SIMAZINE	2
DEMETON	1	THIOBENCARB	2
DIAZINON	2	TRICHLOROENZENES	10
DIMETHOATE	2	XYLENE	10

MERCED

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	36	DIELDRIN	10
1,2,4-TRICHLOROENZENE	36	DIMETHOATE	19
1,2-D + 1,3-D + C-3 COMPOUNDS	36	MERCED(continued)	
1,2-DICHLOROPROPANE (1,2-D)	36	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
2,4,5-T	10	DINOSEB	10
2,4,5-TP (SILVEX)	10	DIQUAT DIBROMIDE	10
2,4-D	10	DISULFOTON	4
3-HYDROXYCARBOFURAN	10	ENDOTHALL	10
ALACHLOR	19	ENDRIN	10
ALDICARB	10	ETHYLENE DIBROMIDE	18
ALDICARB SULFONE	10	GLYPHOSATE, ISOPROPYLAMINE SALT	10
ALDICARB SULFOXIDE	10	HEPTACHLOR	10
ALDRIN	10	HEPTACHLOR EPOXIDE	10
ATRAZINE	19	HEXACHLOROENZENE	10
BENTAZON, SODIUM SALT	10	LINDANE (GAMMA-BHC)	10
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	METHOMYL	10
BENZENE (BENZOL)	36	METHOXYCHLOR	10
BROMACIL	19	METHYL BROMIDE	36
BUTACHLOR	19	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
CARBARYL	10	METOLACHLOR	19
CARBOFURAN	10	METRIBUZIN	19
CHLORDANE	10	MOLINATE	19
CHLOROMETHANE	36	NAPHTHALENE	36
CHLOROTHALONIL	10	ORTHO-DICHLOROENZENE	36
DALAPON	10	OXAMYL	10
DBCP	24 5	PICLORAM	10
DEMETON	4	PROMETRYN	19
DIAZINON	19	PROPACHLOR	14
DICAMBA	10	SIMAZINE	19

THIOBENCARB	19	XYLENE	36
TOXAPHENE	10		
TRICHLOROBENZENES	36		

MONO

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

RIVERSIDE

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	148	DINOSEB	50
1,2,4-TRICHLOROBENZENE	148	DIQUAT DIBROMIDE	25
1,2-D + 1,3-D + C-3 COMPOUNDS	148	DIURON	47
1,2-DICHLOROPROPANE (1,2-D)	148	ENDOTHALL	28
2,3,7,8-TCDD (DIOXIN)	17	ENDRIN	50
2,4,5-TP (SILVEX)	50	ETHYLENE DIBROMIDE	90 1
2,4-D	50	GLYPHOSATE, ISOPROPYLAMINE SALT	41
3-HYDROXYCARBOFURAN	59	HEPTACHLOR	50
ALACHLOR	61	HEPTACHLOR EPOXIDE	50
ALDICARB	59	HEXACHLOROBENZENE	50
ALDICARB SULFONE	59	LINDANE (GAMMA-BHC)	50
ALDICARB SULFOXIDE	59	METHOMYL	59
ALDRIN	50	METHOXYCHLOR	50
ATRAZINE	61	METHYL BROMIDE	148
BENTAZON, SODIUM SALT	50	METOLACHLOR	61
BENZENE (BENZOL)	148	METRIBUZIN	61
BROMACIL	61	MOLINATE	61
BUTACHLOR	61	NAPHTHALENE	148
CARBARYL	59	ORTHO-DICHLOROBENZENE	148
CARBOFURAN	59	OXAMYL	59
CHLORDANE	50	PICLORAM	50
CHLOROMETHANE	148	PROMETRYN	61
CHLOROTHALONIL	50	PROPACHLOR	50
DALAPON	50	SIMAZINE	61
DBCP	91 6	THIOBENCARB	61
DIAZINON	61	TOXAPHENE	50
DICAMBA	50	TRICHLOROBENZENES	148
DIELDRIN	50	XYLENE	148
DIMETHOATE	61		

SAN BERNARDINO

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	312	CHLORDANE	178
1,2,4-TRICHLOROBENZENE	312 1	CHLOROMETHANE	312 1
1,2-D + 1,3-D + C-3 COMPOUNDS	312	CHLOROTHALONIL	176
1,2-DICHLOROPROPANE (1,2-D)	312	DALAPON	188
2,3,7,8-TCDD (DIOXIN)	140	DBCP	245 57
2,4,5-TP (SILVEX)	188	DIAZINON	187
2,4-D	190	DICAMBA	189
3-HYDROXYCARBOFURAN	188	DIELDRIN	191
ALACHLOR	187	DIMETHOATE	188
ALDICARB	188	DINOSEB	178
ALDICARB SULFONE	188	DIQUAT DIBROMIDE	138
ALDICARB SULFOXIDE	188	DIURON	148
ALDRIN	177	ENDOSULFAN SULFATE	1
ATRAZINE	189	ENDOTHALL	129
BENTAZON, SODIUM SALT	188	ENDRIN	190
BENZENE (BENZOL)	312	ETHYLENE DIBROMIDE	210
BROMACIL	187	<u>SAN BERNARDINO</u> (continued)	
BUTACHLOR	188	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	GLYPHOSATE, ISOPROPYLAMINE SALT	143
CARBARYL	188	HEPTACHLOR	176
CARBOFURAN	188	HEPTACHLOR EPOXIDE	176
		HEXACHLOROBENZENE	190

LINDANE (GAMMA-BHC)	190	OXAMYL	187
METHOMYL	188	PICLORAM	188
METHOXYCHLOR	190	PROMETRYN	188
METHYL BROMIDE	312	PROPACHLOR	191
METOLACHLOR	188	SIMAZINE	206
METRIBUZIN	188	THIOBENCARB	188
MOLINATE	186	TOXAPHENE	176
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	TRICHLOROBENZENES	312
NAPHTHALENE	312	XYLENE	312
ORTHO-DICHLOROBENZENE	312		

SAN DIEGO

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	32	DINOSEB	9
1,2,4-TRICHLOROBENZENE	32	DIQUAT DIBROMIDE	12
1,2-D + 1,3-D + C-3 COMPOUNDS	32	DIURON	9 1
1,2-DICHLOROPROPANE (1,2-D)	32	ENDOTHALL	9
2,3,7,8-TCDD (DIOXIN)	9	ENDRIN	10
2,4,5-TP (SILVEX)	9	ETHYLENE DIBROMIDE	10
2,4-D	9	GLYPHOSATE, ISOPROPYLAMINE SALT	10
3-HYDROXYCARBOFURAN	10	HEPTACHLOR	9
ALACHLOR	9	HEPTACHLOR EPOXIDE	9
ALDICARB	10	HEXACHLOROBENZENE	10
ALDICARB SULFONE	10	LINDANE (GAMMA-BHC)	10
ALDICARB SULFOXIDE	10	METHOMYL	10
ALDRIN	10	METHOXYCHLOR	10
ATRAZINE	9	METHYL BROMIDE	32
BENTAZON, SODIUM SALT	9	METOLACHLOR	9
BENZENE (BENZOL)	32	METRIBUZIN	9
BROMACIL	9	MOLINATE	9
BUTACHLOR	9	NAPHTHALENE	27
CARBARYL	10	ORTHO-DICHLOROBENZENE	32
CARBOFURAN	10	OXAMYL	10
CHLORDANE	9	PICLORAM	9
CHLOROMETHANE	32	PROMETRYN	9
CHLOROTHALONIL	9	PROPACHLOR	10
DALAPON	9	SIMAZINE	9
DBCP	10	THIOBENCARB	9
DIAZINON	9	TOXAPHENE	10
DICAMBA	9	TRICHLOROBENZENES	32
DIELDRIN	9	XYLENE	32
DIMETHOATE	9		

SAN JOAQUIN

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	36	ETHYLENE DIBROMIDE	61
1,2,4-TRICHLOROBENZENE	36	HEPTACHLOR	11
1,2-D + 1,3-D + C-3 COMPOUNDS	36	HEPTACHLOR EPOXIDE	11
1,2-DICHLOROPROPANE (1,2-D)	36 1	HEXACHLOROBENZENE	11
ACET	12 5	HEXAZINONE	12
ALACHLOR	31	LINDANE (GAMMA-BHC)	11
ALDRIN	11	METHOXYCHLOR	11
ATRAZINE	41 1	METHYL BROMIDE	36
BENZENE (BENZOL)	36	METOLACHLOR	17
BROMACIL	30 1	METRIBUZIN	29
BUTACHLOR	17	MOLINATE	19
CHLORDANE	11	NAPHTHALENE	35
CHLOROMETHANE	36	NORFLURAZON	12 1
CHLOROTHALONIL	7	ORTHO-DICHLOROBENZENE	36
CYANAZINE	12	PROMETON	12
DBCP	66 19	PROMETRYN	29
DEETHYL-ATRAZINE	12 1	PROPACHLOR	15
DIAMINOCHLOROTRIAZINE (DACT)	12 5	SIMAZINE	43 2
DIAZINON	17	THIOBENCARB	20
DIELDRIN	11	TOXAPHENE	11
DIMETHOATE	15	TRICHLOROBENZENES	36
DIURON	12	XYLENE	36
ENDRIN	11		

SAN MATEO

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	16	DALAPON	11
1,2,4-TRICHLOROBENZENE	16	DBCP	8
1,2-D + 1,3-D + C-3 COMPOUNDS	16	DIAZINON	5
1,2-DICHLOROPROPANE (1,2-D)	16 1	DICAMBA	11
2,3,7,8-TCDD (DIOXIN)	6	DIELDRIN	11
2,4,5-T	3	DIMETHOATE	11
2,4,5-TP (SILVEX)	11	DINOSEB	11
2,4-D	11	DIQUAT DIBROMIDE	9
3-HYDROXYCARBOFURAN	9	DIURON	9
ALACHLOR	11	ENDOTHALL	6
ALDICARB	9	ENDRIN	11
ALDICARB SULFONE	9	ETHYLENE DIBROMIDE	8
ALDICARB SULFOXIDE	9	GLYPHOSATE, ISOPROPYLAMINE SALT	6
ALDRIN	11	HEPTACHLOR	11
ATRAZINE	11	HEPTACHLOR EPOXIDE	11
BENTAZON, SODIUM SALT	11	HEXACHLOROBENZENE	11
BENZENE (BENZOL)	16	LINDANE (GAMMA-BHC)	11
BROMACIL	11	METHOMYL	9
BUTACHLOR	11	METHOXYCHLOR	11
CARBARYL	9	METHYL BROMIDE	16
CARBOFURAN	9	<u>SAN MATEO</u> (continued)	
CHLORDANE	11	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	METOLACHLOR	11
CHLOROMETHANE	16	METRIBUZIN	11
CHLOROTHALONIL	9	MOLINATE	11
		NAPHTHALENE	22

ORTHO-DICHLOROBENZENE	16	PROPACHLOR	5
OXAMYL	9	SIMAZINE	11
PICLORAM	11	THIOBENCARB	11
		TOXAPHENE	11
		TRICHLOROBENZENES	16
<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>	
PROMETRYN	11	XYLENE	16

SANTA CRUZ

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>
1,1,2,2-TETRACHLOROETHANE	22		DIMETHOATE	16	
1,2,4-TRICHLOROBENZENE	22		DINOSEB	16	
1,2-D + 1,3-D + C-3 COMPOUNDS	22		DIQUAT DIBROMIDE	14	
1,2-DICHLOROPROPANE (1,2-D)	22		DIURON	2	
2,3,7,8-TCDD (DIOXIN)	7		ENDOTHALL	16	
2,4,5-T	6		ENDRIN	16	
2,4,5-TP (SILVEX)	16		ETHYLENE DIBROMIDE	18	
2,4-D	16		GLYPHOSATE, ISOPROPYLAMINE SALT	14	
3-HYDROXYCARBOFURAN	14		HEPTACHLOR	14	
ALACHLOR	16		HEPTACHLOR EPOXIDE	16	
ALDICARB	14		HEXACHLOROBENZENE	16	
ALDICARB SULFONE	14		LINDANE (GAMMA-BHC)	16	
ALDICARB SULFOXIDE	14		METHOMYL	14	
ALDRIN	14		METHOXYCHLOR	16	
ATRAZINE	16		METHYL BROMIDE	22	
BENTAZON, SODIUM SALT	16		METOLACHLOR	16	
BENZENE (BENZOL)	22	1	METRIBUZIN	16	
BROMACIL	16		MOLINATE	16	
BUTACHLOR	16		NAPHTHALENE	22	
CARBARYL	14		ORTHO-DICHLOROBENZENE	22	
CARBOFURAN	14		OXAMYL	14	
CHLORDANE	16		PICLORAM	16	
CHLOROMETHANE	22		PROMETRYN	16	
CHLOROTHALONIL	16		PROPACHLOR	16	
DALAPON	16		SIMAZINE	16	
DBCP	18	1	THIOBENCARB	16	
DIAZINON	13		TOXAPHENE	16	
DICAMBA	16		TRICHLOROBENZENES	22	
DIELDRIN	16		XYLENE	22	1

SONOMA

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	48	DIMETHOATE	19
1,2,4-TRICHLOROBENZENE	48	DINOSEB	36
1,2-D + 1,3-D + C-3 COMPOUNDS	48	DIQUAT DIBROMIDE	33
1,2-DICHLOROPROPANE (1,2-D)	48	DIURON	18
2,3,7,8-TCDD (DIOXIN)	6	ENDOTHALL	33
2,4,5-TP (SILVEX)	36	ENDRIN	22
2,4-D	39	ETHYLENE DIBROMIDE	26
3-HYDROXYCARBOFURAN	15	GLYPHOSATE, ISOPROPYLAMINE SALT	6
ACET	6	HEPTACHLOR	22
ALACHLOR	25	HEPTACHLOR EPOXIDE	22
ALDICARB	13	HEXACHLOROBENZENE	19
ALDICARB SULFONE	13	HEXAZINONE	6
ALDICARB SULFOXIDE	13	LINDANE (GAMMA-BHC)	22
ALDRIN	22	METHOMYL	15
ATRAZINE	41	METHOXYCHLOR	22
BENTAZON, SODIUM SALT	35	METHYL BROMIDE	48
BENZENE (BENZOL)	48	METOLACHLOR	16
BROMACIL	25	METRIBUZIN	21
BUTACHLOR	16	MOLINATE	16
CARBARYL	15	NAPHTHALENE	48
CARBOFURAN	25	NORFLURAZON	6
CHLORDANE	22	ORTHO-DICHLOROBENZENE	48
CHLOROMETHANE	48	OXAMYL	35
CHLOROTHALONIL	17	PICLORAM	39
CYANAZINE	6	PROMETON	6
DALAPON	40	PROMETRYN	24
DBCP	2	PROPACHLOR	15
DEETHYL-ATRAZINE	6	SIMAZINE	42
DIAMINOCHLOROTRIAZINE (DACT)	6	THIOBENCARB	16
DIAZINON	16	TOXAPHENE	21
DICAMBA	41 1	TRICHLOROBENZENES	48
DIELDRIN	20	XYLENE	48 1

STANISLAUS

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	65	ENDRIN	3
1,2,4-TRICHLOROBENZENE	65	ETHYLENE DIBROMIDE	27
1,2-D + 1,3-D + C-3 COMPOUNDS	65	HEPTACHLOR	3
1,2-DICHLOROPROPANE (1,2-D)	65	HEPTACHLOR EPOXIDE	3
ALACHLOR	50	HEXACHLOROBENZENE	3
ALDRIN	3	LINDANE (GAMMA-BHC)	3
ATRAZINE	47	METHOXYCHLOR	3
BENZENE (BENZOL)	65	METHYL BROMIDE	65
BROMACIL	47	METOLACHLOR	47
BUTACHLOR	47	METRIBUZIN	4
CHLORDANE	3	MOLINATE	47
CHLOROMETHANE	65	NAPHTHALENE	65
DBCP	32 14	<u>STANISLAUS</u> (continued)	
DIAZINON	47	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	ORTHO-DICHLOROBENZENE	65
DIELDRIN	3	PROMETRYN	47
DIMETHOATE	47	PROPACHLOR	47
		SIMAZINE	47

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>
THIOBENCARB	47	
TOXAPHENE	3	
TRICHLOROBENZENES	65	
XYLENE	65	

SUTTER

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>
1,1,2,2-TETRACHLOROETHANE	3		DIURON	1	
1,2,4-TRICHLOROBENZENE	3		ETHYLENE DIBROMIDE	1	
1,2-D + 1,3-D + C-3 COMPOUNDS	3		METHYL BROMIDE	3	
1,2-DICHLOROPROPANE (1,2-D)	3		NAPHTHALENE	3	
ATRAZINE	1		ORTHO-DICHLOROBENZENE	3	
BENZENE (BENZOL)	3		SIMAZINE	1	
CHLOROMETHANE	3		TRICHLOROBENZENES	3	
DBCP	1	1	XYLENE	3	

TULARE

<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED</u>	<u>POS.</u>
1,1,2,2-TETRACHLOROETHANE	27		DINOSEB	4	
1,2,4-TRICHLOROBENZENE	27		DIURON	30	18
1,2-D + 1,3-D + C-3 COMPOUNDS	27		ENDRIN	9	
1,2-DICHLOROPROPANE (1,2-D)	27		ETHYLENE DIBROMIDE	39	
2,4,5-TP (SILVEX)	6		HEPTACHLOR	9	
2,4-D	6		HEPTACHLOR EPOXIDE	9	
ACET	24	21	HEXACHLOROBENZENE	11	
ALACHLOR	23		HEXAZINONE	24	
ALDRIN	9		LINDANE (GAMMA-BHC)	9	
ATRAZINE	51	2	METHOXYCHLOR	11	
BENTAZON, SODIUM SALT	6		METHYL BROMIDE	27	
BENZENE (BENZOL)	27		METOLACHLOR	26	
BROMACIL	39	17	METRIBUZIN	50	
BUTACHLOR	25		MOLINATE	27	
CHLORDANE	9		NAPHTHALENE	26	
CHLOROMETHANE	27		NORFLURAZON	24	4
CHLOROTHALONIL	1		ORTHO-DICHLOROBENZENE	27	
CYANAZINE	24		PICLORAM	6	
DALAPON	4		PROMETON	24	
DBCP	39	12	PROMETRYN	50	
DEETHYL-ATRAZINE	24	2	PROPACHLOR	17	
DIAMINOCHLOROTRIAZINE (DACT)	24	19	SIMAZINE	51	20
DIAZINON	27		THIOBENCARB	27	
DICAMBA	4		TOXAPHENE	9	
DIELDRIN	9		TRICHLOROBENZENES	27	
DIMETHOATE	27		XYLENE	27	

TUOLUMNE

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	16	DISULFOTON	15
1,2,4-TRICHLOROBENZENE	16	METHYL BROMIDE	16
1,2-D + 1,3-D + C-3 COMPOUNDS	16	METOLACHLOR	15
1,2-DICHLOROPROPANE (1,2-D)	16	METRIBUZIN	15
ALACHLOR	15	MOLINATE	15
ATRAZINE	15	NAPHTHALENE	16
BENZENE (BENZOL)	16	ORTHO-DICHLOROBENZENE	16
BROMACIL	15	PROMETRYN	15
BUTACHLOR	15	PROPACHLOR	15
CHLOROMETHANE	16 1	SIMAZINE	15
DEMETON	15	THIOBENCARB	15
DIAZINON	15	TRICHLOROBENZENES	16
DIMETHOATE	15	XYLENE	16

VENTURA

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
1,1,2,2-TETRACHLOROETHANE	46	DIQUAT DIBROMIDE	21
1,2,4-TRICHLOROBENZENE	46	DIURON	11
1,2-D + 1,3-D + C-3 COMPOUNDS	45	ENDOTHALL	4
1,2-DICHLOROPROPANE (1,2-D)	46	ENDRIN	21
2,4,5-TP (SILVEX)	21	ETHYLENE DIBROMIDE	35
2,4-D	21	GLYPHOSATE, ISOPROPYLAMINE SALT	8
3-HYDROXYCARBOFURAN	21	HEPTACHLOR	21
ALACHLOR	21	HEPTACHLOR EPOXIDE	21
ALDICARB	21	HEXACHLOROBENZENE	21
ALDICARB SULFONE	21	LINDANE (GAMMA-BHC)	21
ALDICARB SULFOXIDE	21	METHOMYL	21
ALDRIN	21	METHOXYCHLOR	21
ATRAZINE	32	METHYL BROMIDE	45
BENTAZON, SODIUM SALT	21	METOLACHLOR	23
BENZENE (BENZOL)	46	METRIBUZIN	23
BROMACIL	13	MOLINATE	24
BUTACHLOR	24	NAPHTHALENE	41
CARBARYL	21	ORTHO-DICHLOROBENZENE	46
CARBOFURAN	21	OXAMYL	21
CHLORDANE	21	PARAQUAT DICHLORIDE	13
CHLOROMETHANE	45	PICLORAM	21
CHLOROTHALONIL	15	PROMETRYN	23
DALAPON	26	PROPACHLOR	23
DBCP	34 2	SIMAZINE	32
DIAZINON	23	THIOBENCARB	24
DICAMBA	21	TOXAPHENE	21
DIELDRIN	21	TRICHLOROBENZENES	45
DIMETHOATE	23	XYLENE	45
DINOSEB	21		
<u>CHEMICAL</u>	<u>SAMPLED POS.</u>		

YUBA

<u>CHEMICAL</u>	<u>SAMPLED POS.</u>	<u>CHEMICAL</u>	<u>SAMPLED POS.</u>
		1,1,2,2-TETRACHLOROETHANE	7

1,2,4-TRICHLOROBENZENE	7		METHYL BROMIDE	7
1,2-D + 1,3-D + C-3 COMPOUNDS	7		METOLACHLOR	4
1,2-DICHLOROPROPANE (1,2-D)	7		METRIBUZIN	4
ALACHLOR	1		MOLINATE	4
ATRAZINE	4		NAPHTHALENE	7
BENZENE (BENZOL)	8	2	ORTHO-DICHLOROBENZENE	7
BROMACIL	4		PROMETRYN	4
BUTACHLOR	4		PROPACHLOR	4
CHLOROMETHANE	7		SIMAZINE	4
DIAZINON	4		THIOBENCARB	4
DIMETHOATE	4		TRICHLOROBENZENES	7
DIURON	1		XYLENE	7
<u>CHEMICAL</u>		<u>SAMPLED POS.</u>		

Appendix B

Studies Included in the 2000 Update Report

This appendix summarizes the well sampling surveys that were added to the well inventory database during the period July 1, 1999 to June 30, 2000. The study number assigned by DPR is shown to the left.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES (Sanitary Engineering Branch)
 0023 Sampled a total of 99 chemicals in 50 counties; January 1999 through December 1999; 3,056 wells sampled.

DEPARTMENT OF PESTICIDE REGULATION (Environmental Hazards Assessment Program)

STUDY	INITIATED FOR CHEMICAL COUNTY SECTION	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
434	simazine Colusa 15N/02W-31	3	21/22-Jul-99	atrazine, bromacil, <u>simazine</u> , diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, <u>ACET</u> , DACT
435	DEA, ACET Colusa 15N/03W-28	4	21/22-Jul-99	atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, ACET, DACT; all nd.
MEMO ONLY	diuron, ACET Fresno 15S/23E-33	0		N/A
MEMO ONLY	diuron, simazine Fresno 15S/22E-04	0		N/A
MEMO ONLY	diuron, simazine Fresno 15S/22E-15	0		N/A
MEMO ONLY	atrazine Merced 09S/12E-36	0		N/A
436	ACET San Joaquin 02S/07E-09	4	08-Nov-99	atrazine, bromacil, <u>simazine</u> , diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, <u>ACET</u> , DACT;
437	ACET San Joaquin 02S/07E-23	4	09-Nov-99	<u>atrazine</u> , bromacil, <u>simazine</u> , diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, <u>DEA</u> , ACET, DACT;
438	diuron, simazine, ACET San Joaquin 02S/08E-13	4	09-Nov-99	atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, <u>norflurazon</u> , DEA, ACET, DACT

DEPARTMENT OF PESTICIDE REGULATION (Environmental Hazards Assessment Program)
(Continued)

STUDY	INITIATED FOR CHEMICAL COUNTY SECTION	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
439	dicamba Sonoma 06N/19W-12	6 (yes)	17-Nov-99	atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, ACET, dicamba; all nd.
MEMO ONLY	thiobencarb Fresno 13S/20E-36	0		N/A
440	atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, ACET, DACT Multiple sections in Fresno and Tulare	75	03-Aug-99 08-Sep-99	<u>atrazine</u> , <u>bromacil</u> , <u>simazine</u> , <u>diuron</u> , <u>prometon</u> , prometryn, hexazinone, cyanazine, metribuzin, <u>norflurazon</u> , <u>DEA</u> , <u>ACET</u> , <u>DACT</u>
441	atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, metribuzin, norflurazon, DEA, ACET, DACT Multiple sections in Butte County	10	15-May-99 16-May-99	<u>atrazine</u> , <u>bromacil</u> , <u>simazine</u> , <u>diuron</u> , <u>prometon</u> , prometryn, hexazinone, cyanazine, metribuzin, <u>norflurazon</u> , <u>DEA</u> , <u>ACET</u> , <u>DACT</u>

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, and sample type (initial or confirmation).

Information included in the database 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, and 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, for example weed control around buildings on any of the areas described above.

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.

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
DECEMBER 2000**

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 Department of Pesticide Regulations' (DPR's) proposed regulation for norflurazon Pesticide Management Zones (PMZs) pursuant to AB 2021 (Pesticide Contamination Prevention Act).
- Involved in ongoing consultations with DPR staff, University of California scientists, and pesticide manufacturers to design monitoring studies and Best Management Practices (BMPs).
- Regularly attended meetings sponsored by the DPR, including the interagency Pesticide Registration and Evaluation Committee (PREC), Pest Management Advisory Committee (PMAC), and the now defunct Pesticide Advisory Committee (PAC) now merged with PREC.
- 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 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.
- Adopted a policy to implement the California Toxics Rule, which includes water quality criteria for pesticides and toxicity.
- Compiled the 2000 California Water Quality Assessment report as mandated by the federal Clean Water Act Section 305(b).
- Reviewed and commented on DPR's proposed studies on pesticide and water quality pursuant to the Management Agency Agreement (MAA) with DPR.
- Managed contracts with University of California Cooperative Extension to:
 - Examine the toxicity of irrigation runoff from alfalfa; and

- Educate growers and others regarding the pesticide-caused problems and outreach the alternative practices to the agricultural community.
- Managed contract 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 four projects:
 - Central Valley in-season application and runoff of insecticides from orchards,
 - Sacramento River Watershed Project,
 - Revolon Slough Project in Ventura County, and
 - Los Angeles River Project.
- Contracted with University of California, Santa Cruz, to study ambient water and sediment toxicity of Salinas River and perform benthic macroinvertebrate bioassessments.
- Contracted with Aqua Science, Davis, to determine contribution of chlorpyrifos and diazinon to toxicity and bioavailability in ambient waters of the state.

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 1998-99.

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-Quinolinolate	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 1998-99.

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 1998-99.

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 1998-99.

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	Soil cleanup underway. Ground water remediation continues.
	BAC, Inc.	Hexavalent Chromium, Arsenic, Copper	RWQCB Lead Agency. Ground water extraction and treatment system in pilot study phase. Plume spreading due to lack of hydraulic containment by system. Implementing well reinjection, infiltration gallery. No discharges re: NPDES permit.
	Western Farm Service, Merced	1,2-DCP, DBCP, dinoseb, dalapon, nitrate, ammonia	Off-site assessment continues.
Sacramento	Sacramento Army Depot	Diazinon, Dursban	Assessment report requested. Federal Superfund work in progress. Cleanup of pesticides completed.
	Natomas Field	Dicofol, DDE, DDT, Endosulfan, Toxaphene, 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.
	Western Farm Service, Walnut Grove	Nitrate, ammonia, aldrin, beta-BHC, gamma-BHC, DDD, DDE, dieldrin, heptachlor epoxide, endosulfan, disultoton, TPH-diesel.	Investigation continuing. Regional Board is lead agency.

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 Computer and telecommunications Station, San Diego Detachment	DDD, DDE	Assessment ongoing. Soil removal actions have occurred and more are planned. Groundwater assessment underway.
	Triple "E" Produce	Chloroform	Triple "E" is not a pesticide site. The chloroform is a by-product of chlorine disinfection.
	Western Farm Service, Stockton (former Pure Gro/Brea)	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/ Simplot/ 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, Propham, Diuron, Propoxur, 1,1,2,2-TCA, atraton, 2,4-DB, bromocil, chloromethane, tebuthiuron, simazine, methiocarb, MCP, 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	Remedial options for groundwater under consideration. 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	Chlorodane, 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.
	Western Farm Service, Modesto	DBCP, EDB, nitrate, ammonia	Soil and groundwater investigation underway. 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, Molinate, 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.
	John Taylor Fertilizers, Yuba City	1,2-DCP, 1,2,3-TCP, 1,2-DCB, chlorobenzene, DBCP	Groundwater and soil investigation initiated.
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, Carbophention, DDT, Dieldrin, Dinoseb, Picloram	Health risk assessment completed. Soil Remediation Plan submitted.
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 1998-99.

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
Fresno	Blue Hills Disposal Site County of Fresno	Dicamba, 2,4-D, Silvex	Corrective action underway.
	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)	Finished capping of discharge area. Implementing off-site RAP.
	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.
	PureGro, Oxalis	1,2-Dichloropropane, nitrate	Requested off-site plume definition.

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 Farm 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 1998-99.

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, MCP	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 III-8. Actions Taken By the Regional Water Quality Control Board, Colorado River Basin (Region 7), in FY 1998-99.

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.

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. Work plan for off-site investigation was submitted on March 11, 1999.
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 (Palmyrita, 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 1998-99.

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)