

SAMPLING FOR PESTICIDE RESIDUES IN CALIFORNIA WELL WATER

2002 Update of the Well Inventory Database

**For Sampling Results Reported from
July 1, 2001 through June 30, 2002**

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

Pursuant to the
Pesticide Contamination Prevention Act



California Environmental Protection Agency
DEPARTMENT OF PESTICIDE REGULATION

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California Department of Pesticide Regulation

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by
DPR portion:
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Department of Pesticide Regulation
Environmental Monitoring Branch
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EH02-07

EXECUTIVE SUMMARY

The Pesticide Contamination Prevention Act

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

- The Department of Pesticide Regulation (DPR) to maintain a statewide database of wells sampled for active ingredients of pesticide products.
- Agencies 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 submit a report to the Legislature, CDHS, the Office of Environmental Health Hazard Assessment (OEHHA), 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) 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.

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.

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

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

What Happens When Detections are Reported to DPR

A detection in ground water of a pesticide registered for agricultural use will trigger a process defined by the PCPA that requires a comprehensive review of the detection. DPR will attempt to verify the detection by conducting a well sampling study. Detections may not be verified for one of several reasons, including:

- Follow-up sampling has not yet been completed by DPR.
- DPR sampled in response to the positive detection and found no residues of the compound under investigation.
- The well where the detection occurred may no longer be available for sampling (permission to sample was denied, or well has been abandoned).

If a detection is verified, DPR determines whether the contamination occurred because of legal agricultural use, and if so, formally reviews the pesticide to determine if continued use should be allowed.

Detections of pesticides not registered for agricultural use are reviewed under DPR's general regulatory authority.

Pesticide detections 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) are referred to SWRCB.

The Data in this Report

This is the seventeenth annual report.

Data were submitted to DPR from July 1, 2001, to June 30, 2002.

Data are the results of 31 investigations conducted by two agencies.

Data are from studies conducted from March 2000 through December of 2001.

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

CATEGORY	Total							TOTAL ^d
	1984-1996	1997	1998	1999	2000	2001	2002	1984-2002
Total wells sampled	20,037	2,508	1,898	2,389	3,165	3,027	3,713	21,556
No detections	15,812	2,071	1,668	2,093	2,841	2,757	3,233	16,897
Detections ^(a)	4,225	437	230	296	324	270	480	4,659
Verified detections ^(b)	794	96	3	39	84	16	142	992
Total counties sampled	58	48	41	49	50	49	54	58
No detections	14	24	21	29	26	23	32	8
Detections ^(a)	44	24	20	20	24	26	22	50
Verified detections ^(b)	31	7	3	10	5	5	11	33
Total pesticides and related compounds sampled	296	165	83	111	105	110	135	315
No detections	202	143	67	94	85	95	110	212
Detections ^(a)	94	22	16	17	20	15	25	103
Verified detections ^(b)	22	11	5	8	9	6	14	28
Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c)	14	9	9	9	12	9	15 ^(e)	20 ^(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, registered for agricultural use according to its labeled directions and in accordance with all laws and regulations (see Appendix D: legal agricultural use).

(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 15 compounds are ACET, alachlor ESA, alachlor OXA, atrazine, bromacil, DBCP, deethyl-atrazine (DEA), diaminochlorotriazine (DACT), diuron, ethylene dibromide (EDB), metolachlor ESA, metolachlor OXA, norflurazon, prometon, and simazine.

(f) The 20 compounds are ACET, DACT, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, 1,2-D, DBCP, deethyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, alachlor ESA, alachlor OXA, metolachlor ESA, metolachlor OXA and 2,3,5,6-trachloroterephthalic acid. Aldicarb (based on sulfone and sulfoxide detections), 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 before 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

113,071 records (chemical analyses) were added to the database for this report.

3,713 wells were sampled in 54 counties.

135 pesticide active ingredients and breakdown products were analyzed.

25 compounds were reported with detections.

Of the 3,713 wells sampled, 3,454 (93%) were public drinking water wells, 194 (5%) were private drinking water wells, 28 (0.8%) were nondrinking water wells, and 37 (1%) wells were either unused or the use was unknown.

Detections Referred to SWRCB

Detections of 11 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.

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

1,2-dibromo-3-chloropropane (DBCP): 297 wells.

1,2-dichloropropane (1,2-D): 7 wells.

ethylene dibromide (EDB): 19 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

DPR verified detections of 14 compounds: atrazine and its breakdown product DEA; bromacil, diuron, prometon, simazine, hexazinone, norflurazon, and the breakdown products ACET and DACT, which are common to both atrazine and simazine and the breakdown products (ESA and OXA) for alachlor; and the breakdown products (ESA and OXA) for metolachlor. The ESA and OXA compounds for alachlor and metolachlor have not been detected in California by DPR until this year. Verified detections were made in 149 wells in 12 counties (Table 2). Among the wells with verified detections, 138 were private drinking water wells and 11 were non-drinking wells. For the compounds with established water quality criteria, the concentrations of all verified detections were below their respective health advisory levels (HAL) and/or maximum contamination levels (MCL).

Table 2. Summary of wells with verified detections of pesticide residues, by county and chemical. Results are for data reported from July 1, 2001, through June 30, 2002.

County	atrazine	bromacil	diuron	prometon	simazine	hexazinone	norflurazon	alachlor ESA	alachlor OXA	metolachlor ESA	metolachlor OXA	ACET	DACT	DEA	Total Wells With Detections
Fresno	4	20	35	1	53	2 ^(a)	15					58	56	2	63
Kern		1	4		1							2	1 ^(a)		4
Madera	2 ^(a)	2 ^(a)	1		1							2	2 ^(a)	2 ^(a)	2
Merced		2	1		1		1 ^(a)					2	1		5
Monterey		1	1 ^(a)		1								1 ^(a)		3
Sacramento								1 ^(a)		1 ^(a)	1 ^(a)				1
San Joaquin			1							2 ^(a)	1 ^(a)	4	5		6
Solano	1		2 ^(a)				1 ^(a)	1 ^(a)		1 ^(a)		1	1	2	3
Stanislaus	1		1			1	10 ^(a)	1 ^(a)	13 ^(a)	6 ^(a)	2	2 ^(a)	1 ^(a)		20
Tulare	1	18	21		27		10			3 ^(a)	2 ^(a)	27	25	4	34
Yolo								1 ^(a)							1
Total Detections	9	44	67	1	84	3	27	13	1	20	10	99	93	11	149

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

Legal Agricultural Use Determinations and Recommendations for Pesticide Management Zones

After well sampling and land use surveys are completed, DPR determines 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) may be recommended where a pesticide previously reviewed under the PCPA has been detected in ground water and determined to be due to legal agricultural use. PMZs are one-square mile sections of land established by regulation to prevent further contamination of ground water. Currently, the use of the chemicals atrazine, bromacil, diuron, prometon, norflurazon, and simazine is prohibited or restricted in PMZs.

Legal agricultural use was determined to be the source of residues of atrazine, diuron, simazine, bromacil, norflurazon ACET, DACT, and DEA in wells in Fresno and Tulare counties. DPR recommended ten new sections in Fresno and one in Tulare as PMZs (Section III Table III-3).

Changes in the Ground Water Program

DPR is planning to change the ground water protection program to make the program more preventive. Based on information collected since the early 1980s, DPR will propose expanding the number of sensitive areas regulated to protect ground water. As part of the proposed regulations, mitigation measures tailored to fit the mechanism of movement to ground water will become mandatory.

Well Monitoring Network

In order to measure the success of these regulatory changes, a network of monitoring wells has been identified for both leaching and runoff soil conditions to measure changes in residue concentrations over time. The data reflect only the condition of ground water in the Fresno and Tulare counties area. Pesticides have been detected in other areas of California but DPR's fiscal resources do not support a comprehensive monitoring system.

Activities of the State and Regional Water Boards

SWRCB 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, OEHHA, and SWRCB annually by December 1.

This report presents data reported to DPR from July 1, 2001, through June 30, 2002. This is the seventeenth 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 four parts—Sections I, II, and III were written by DPR staff. Section IV 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, and 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.

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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
AI	active ingredient
AR	actively registered
BDPA	Birth Defect Prevention Act
CAC	County Agricultural Commissioner
Cal/EPA	California Environmental Protection Agency
3CCR	Title 3, California Code of Regulations
CDHS	California Department of Health Services
CUI	currently under investigation
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
DEA	deethyl-atrazine
DPR	Department of Pesticide Regulation
DWR	California Department of Water Resources
EDB	ethylene dibromide
EM	Environmental Monitoring (part of DPR)
ESA	oxo-ethanesulfonic acid
FAC	Food and Agricultural Code
GWPA	ground water protection areas
GWPL	Ground Water Protection List
HAL	health advisory level
LAU	legal agricultural use
MCL	maximum contaminant level
MDL	minimum detection limit
NR	not registered
OXA	oxoacetic acid
PCA	pest control adviser
PCPA	Pesticide Contamination Prevention Act of 1985 (AB 2021)

PDRP	pesticide detection response process
PHG	public health goal
PMZ	Pesticide Management Zone
ppb	parts per billion
PREC	Pesticide Registration and Evaluation Committee
Rfd	reference dose
RWQCB	Regional Water Quality Control Board
SB 950	Senate Bill 950: The Birth Defect Prevention Act
SNV	specific numerical value
SWRCB	State Water Resources Control Board

I. WELL INVENTORY DATABASE

INTRODUCTION

The PCPA requires the 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 pesticide contamination of ground water from sampling conducted by DPR and various State and local agencies, and is updated continually. The PCPA further mandates DPR to review findings of pesticide contamination, undertake necessary mitigation measures, and report annually to the Legislature, the California Department of Health Services (CDHS), the Office of Environmental Health Hazard Assessment (OEHHA), and the State Water Resources Control Board (SWRCB). This report summarizes sampling results from July 1, 2001, to June 30, 2002. It also includes results from the well inventory network of wells dating back to March 2000. It details actions taken by DPR and SWRCB and its nine regional boards to prevent pesticides from polluting ground water. It also summarizes factors contributing to the movement of pesticides to ground water resulting from legal agricultural use.

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, CDHS, and Cal/EPA's SWRCB and OEHHA. The report contains specific information from the database, as well as actions taken by the Director of DPR and 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 database was enhanced and is now an archive of ground water sampling data for California which includes pesticide data from many different studies and is not limited to agricultural use.

In 1992, the first cumulative report (Maes, *et al.*, 1992) summarized the data by identifying the number of wells with detections resulting from the legal agricultural use of pesticides. Emphasis, at this time, was placed on those wells with confirmed, positive detections. In 1989, criteria were established for verifying detections of pesticide residues in ground water (Biermann, 1989). Reports following the 1992 cumulative report emphasize verified detections.

This is the seventeenth 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 direction in which DPR is moving to prevent pesticide movement to ground water. Section III describes the actions taken by DPR in response to pesticide detections in ground water. Section IV summarizes the actions taken by the SWRCB and its regional boards 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 ADDED TO THE WELL INVENTORY

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

- (1) Well water samples were entered into the database as zero 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 DPR 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. DPR 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 DPR's well inventory database by report year.

CATEGORY	Total							TOTAL ^d
	1984-1996	1997	1998	1999	2000	2001	2002	1984-2002
Total wells sampled	20,037	2,508	1,898	2,389	3,165	3,027	3,713	21,556
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Pesticides and related compounds detected in ground water as the result of legal, agricultural use ^(c)	14	9	9	9	12	9	15 ^(e)	20 ^(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, registered for agricultural use according to its labeled directions and in accordance with all laws and regulations (see *Appendix D: legal agricultural use*).

(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 15 compounds are ACET, alachlor ESA, alachlor OXA, atrazine, bromacil, DBCP, deethyl-atrazine (DEA), diaminochlorotriazine (DACT), diuron, ethylene dibromide (EDB), metolachlor ESA, metolachlor OXA, norflurazon, prometon, and simazine.

(f) The 20 compounds are ACET, DACT, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, 1,2-D, DBCP, deethyl-atrazine, diuron, EDB, norflurazon, prometon, simazine, alachlor ESA, alachlor OXA, metolachlor ESA, metolachlor OXA and 2,3,5,6-trachloroterephthalic acid. Aldicarb (based on sulfone and sulfoxide detections), 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 before 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, 2001, to June 30, 2002. The data are the results of 31 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 five well sampling surveys were added to the well inventory database from July 1, 2001, to June 30, 2002. The surveys were conducted from March 2000 to December of 2001. The data represent 3,713 wells in 54 counties that were sampled for 135 pesticide active ingredients and breakdown products. Table I-2 summarizes the data added to the database by sampling agency. Appendix B details each of the five studies.

Of the 3,713 wells sampled, 3,454 (93%) were public drinking water wells, 194 (5%) were private drinking water wells, 28 (0.8%) were non-drinking water wells, and 37 (1%) wells were either unused or the use was unknown.

Table I-2. Summary of records added to DPR’s well inventory database, by agency, for the reporting period July 1, 2001, through June 30, 2002.

Sampling Agency	Wells	Counties	Chemicals Analyzed	Samples with Detections	Wells with Detections	Records Added to Database
CDHS	3,484	54	119	1,583	331	106,135
DPR	230	14	34	1,096	149	6,936

RESULTS BY PESTICIDE AND COUNTY

Sampling Distribution

Sampling results for 135 pesticide active ingredients and breakdown products were reported. Among the 54 counties sampled, the frequency of sampling for each chemical varied widely. Table I-3 shows the chemicals sampled, number of counties and wells sampled, and number of wells with unverified and verified detections. Counties with and without detections of pesticides during the period from July 1, 2001, to June 30, 2002 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 1 (Mono) to 84 (Kern). The number of wells sampled in individual counties ranged from 1 (Calaveras, Mono, and Trinity) to 667 (Los Angeles). Appendix A details the number of chemicals sampled and the number of positive wells by chemical in each of the 26 counties with detections.

Table I-3. Pesticide active ingredients and breakdown products added to the well inventory database for the 2002 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, 2001, through June 30, 2002.

CHEMICAL	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
1,3-Dichloropropene (1,3-D Telone)	10	282		
1,1,2,2-Tetrachloroethane	53	3013		
1,2,4-Trichlorobenzene	53	3004		
1,2-D + 1,3-D + C-3 Compounds	53	2937	1	
1,2-Dichloropropane (Propylene Dichloride, 1,	53	3014	6	
2,3,7,8-Tcdd (Dioxin)	17	193		
2,4,5-T	13	145		
2,4,5-Tp (Silvex)	25	570		
2,4,6-Trichlorophenol	1	1		
2,4-D	25	582		
2,4-Dinitrophenol	1	1		
3-Hydroxycarbofuran	25	445		
4(2,4-Db), Dimethylamine Salt	2	13		
Acenaphthene	3	12		
ACET (Deethyl-Simazine Or Deisopropyl-Atrazin	14	223		99
Alachlor	31	919		
Alachlor ESA	9	88	5	13
Alachlor OXA	9	88		1
Aldicarb	25	450		
Aldicarb Sulfone	25	449		
Aldicarb Sulfoxide	25	449		
Aldrin	23	493		
Ametryne	1	1		
Aminocarb	2	33		
Atrazine	32	1170		9
Barban	2	33		
Benefin (Benfluralin)	1	1		
Bentazon, Sodium Salt	24	568		
Benzene (Benzol)	53	3022	4	
BHC (Other Than Gamma Isomer)	4	13		
Bromacil	31	1035		44
Butachlor	30	783	1	
Butylate	1	1		
Carbaryl	25	458		

CHEMICAL	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Carbofuran	25	456		
Chloramben	2	13		
Chlordane	24	529		
Chlorobenzilate	2	7		
Chloromethane (Methyl Chloride)	53	2954	7	
Chloroneb	2	7		
Chlorothalonil	22	482		
Chlorpropham	3	33		
Chlorpyrifos	1	6		
Chlorthal-Dimethyl (Dacthal / DCPA / Dimethyl	2	13		
Cyanazine	9	150		
Cycloate	1	2		
Dalapon	25	574		
DBCP	32	1541	297	
DDD	5	14		
DDE	8	194		
DDT	5	14		
DDVP (Dichlorvos)	1	1		
Deethyl-Atrazine	14	223		11
Demeton	1	1		
Diaminochlorotriazine (DACT)	14	223		93
Diazinon	30	790		
Dicamba	25	564		
Dichlorprop, Butoxyethanol Ester	2	13		
Dieldrin	23	612		
Dimethoate	30	779		
Dinoseb	25	570		
Diphenamid	1	1		
Diquat Dibromide	25	384		
Disulfoton	1	1		
Diuron	28	520		67
Endosulfan	4	13		
Endosulfan Sulfate	4	13		
Endothall	24	341		
Endrin	24	639		
Endrin Aldehyde	4	13		
EPTC	5	187		
Ethylene Dibromide	33	1414	19	
Fenamiphos	9	61		
Fenamiphos Sulfone	9	60		

CHEMICAL	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Fenamiphos Sulfoxide	9	60		
Fenuron	2	34		
Fenuron Trichloroacetate (TCA)	2	34		
Fluometuron	10	110		
Glyphosate, Isopropylamine Salt	22	386		
Heptachlor	24	518		
Heptachlor Epoxide	24	637		
Hexachlorobenzene	24	637		
Hexazinone	14	224		3
Lindane (Gamma-Bhc)	24	636		
Linuron	2	34		
Malathion	2	11		
Merphos	1	1		
Methiocarb	6	49		
Methomyl	25	446		
Methoxychlor	24	644		
Methyl Bromide (Bromomethane)	53	2953	5	
Methyl Parathion	1	5		
Metolachlor	31	875		
Metolachlor ESA	9	88	6	20
Metolachlor OXA	9	88		10
Metribuzin	31	937		
Mexacarbate	1	31		
Molinate	31	1091		
Monuron	2	34		
Monuron-TCA	2	34		
Naphthalene	49	2641	1	
Napropamide	1	1		
Neburon	2	34		
Norflurazon	14	223		27
Ortho-Dichlorobenzene	53	3019	2	
Oxamyl	25	455		
Paraquat Dichloride	1	4		
Parathion or Ethyl Parathion	2	11		
Pendimethalin	9	76		
Pentachloronitrobenzene (PCNB)	1	1		
Permethrin	2	7		
Picloram	25	570		
Prometon	14	224		1
Prometryn	31	938		

CHEMICAL	Number of Counties Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections
Propachlor	30	765		
Propanil	9	76		
Propazine	10	77		
Propham	2	33		
Propoxur	6	49		
Siduron	2	33		
Simazine	33	1173	1	84
Simetryn	1	1		
Tebuthiuron	1	1		
Terbutryn	1	1		
Tetrachlorvinphos (Stirofos)	1	1		
Thiobencarb	30	942		
Toxaphene	24	515		
Triadimefon	1	1		
Trichlorobenzenes	53	2938		
Trifluralin	12	84		
Vernolate	1	1		
Xylene	54	2910	6	

Table I-4. Counties with and without detections of pesticides or related compounds for data reported during the period July 1, 2001, through June 30, 2002.

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

* Counties with verified detections

Table I-5. Summary, by county, of total number of pesticides and wells sampled, wells with unverified, verified, and wells with no detections. Wells may have both unverified and verified detections. Results are for data reported from July 1, 2001 through June 30, 2002.

County	Number of Pesticides Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections	Wells with no Detections
Alameda	56	22			22
Amador	11	3			3
Butte	24	64	1		63
Calaveras	11	1			1
Colusa	12	3			3
Contra Costa	59	9	1		8
Del Norte	11	3			3
El Dorado	12	21			21
Fresno	59	397	108	63	227
Glenn	11	5			5
Humboldt	11	6			6
Kern	84	178	23	4	151
Kings	27	18	2		16
Lake	46	11			11
Lassen	11	6			6
Los Angeles	67	667	9		658
Madera	34	22	3	2	17
Marin	11	4			4
Mariposa	12	11			11
Mendocino	71	14			14
Merced	59	45	15	5	25
Modoc	11	7			7
Mono	1	1			1
Monterey	56	49		3	46
Napa	29	3			3
Nevada	11	5			5
Orange	72	216			216
Placer	14	8			8
Plumas	11	5			5
Riverside	58	259	20		239
Sacramento	75	261	9	1	251
San Benito	57	4			4
San Bernardino	58	373	64		309
San Diego	57	48	1		47
San Joaquin	27	137	22	6	109
San Luis Obispo	58	65			65
San Mateo	57	17	1		16

County	Number of Pesticides Sampled	Number of Wells Sampled	Wells with Unverified Detections	Wells with Verified Detections	Wells with no Detections
Santa Barbara	56	30			30
Santa Clara	58	133			133
Santa Cruz	58	39			39
Shasta	11	20			20
Sierra	11	4			4
Siskiyou	11	10			10
Solano	11	23	5	3	16
Sonoma	80	48	1		47
Stanislaus	28	154	25	20	109
Sutter	11	16			16
Tehama	11	53			53
Trinity	11	1			1
Tulare	57	143	28	34	81
Tuolumne	12	2			2
Ventura	58	32	1		31
Yolo	26	21		1	20
Yuba	71	16	1		15

WELLS AND COUNTIES WITH VERIFIED DETECTIONS

Verified detections were made in 149 wells in 12 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.

Table I-6. Summary of verified detections of pesticide residues, by number of wells, county and chemical. Results are for data reported from July 1, 2001, through June 30, 2002.

County	atrazine	bromacil	diuron	prometon	simazine	hexazinone	norflurazon	alachlor ESA	alachlor OXA	metolachlor ESA	metolachlor OXA	ACET	DACT	DEA	Total Wells With Detections
Fresno	4	20	35	1	53	2 ^(a)	15					58	56	2	63
Kern		1	4		1							2	1 ^(a)		4
Madera	2 ^(a)	2 ^(a)	1		1							2	2 ^(a)	2 ^(a)	2
Merced		2	1		1		1 ^(a)					2	1		5
Monterey		1	1 ^(a)		1							1 ^(a)			3
Sacramento								1 ^(a)		1 ^(a)	1 ^(a)				1
San Joaquin			1							2 ^(a)	1 ^(a)	4	5		6
Solano	1		2 ^(a)				1 ^(a)	1 ^(a)		1 ^(a)		1	1	2	3
Stanislaus	1		1			1		10 ^(a)	1 ^(a)	13 ^(a)	6 ^(a)	2	2 ^(a)	1 ^(a)	20
Tulare	1	18	21		27		10			3 ^(a)	2 ^(a)	27	25	4	34
Yolo								1 ^(a)							1
Total Detections	9	44	67	1	84	3	27	13	1	20	10	99	93	11	149

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

STATUS OF PESTICIDES WITH VERIFIED DETECTIONS

The pesticide use information presented in the following tables was obtained from the 2001 pesticide use report (PUR). This is raw data. No outlier programs have been run to extract questionable data submissions or data entry errors. Three months of Kern County data are not yet included.

Alachlor

Alachlor, a preemergence herbicide, was not detected in wells that were sampled; however, residues of the alachlor degradates, ESA and OXA were verified in seven wells. These degradates are to be further reviewed.

The following sites represent the major uses of alachlor reported in 2001.

SITE	POUNDS APPLIED
Corn, Human Consumption	10,259
Beans (All Or Unspec)	9,957
Corn (Forage - Fodder)	3,337
Beans, Succulent (Other Than Lima)	2,623
Beans, Dried-Type	2,472
All Other	784
TOTAL	29,431

The range of concentrations of alachlor ESA and alachlor OXA was 0.05 to 1.38 ppb and 0.05 to 0.51 ppb, respectively. The CDHS and U.S. Environmental Protection Agency's (U.S. EPA) maximum contaminant level (MCL, see glossary) for alachlor is 2 ppb. The California Public Health Goal (PHG) is 4 ppb.

Atrazine

Atrazine, a selective herbicide, was reviewed through the Pesticide Detection Response Process (PDRP) in late 1986 through December 1989, including review by a subcommittee of the Pesticide Registration and Evaluation Committee (PREC), pursuant to FAC sections 13149 through 13151. DPR adopted regulations in January 1989 that prohibit the use of pesticides containing atrazine within an atrazine PMZ. A PMZ is a geographic surveying unit of approximately one square mile (a section) 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 2001.

SITE	POUNDS APPLIED
Forest Trees, Forest Lands	29,171
Bermudagrass (Forage - Fodder)	10,954
Corn (Forage - Fodder)	8,020
Sudangrass (Forage - Fodder)	8,012
Corn, Human Consumption	4,996
All Other	1,719
TOTAL	62,872

The range of concentrations of verified detections was 0.046 to 0.148 ppb. The CDHS and U.S. EPA maximum contaminant level (MCL, see glossary) for atrazine is 3 ppb.

Bromacil

Bromacil, an herbicide, was reviewed through the PDRP in 1989, 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 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 2001.

SITE	POUNDS APPLIED
Orange (All Or Unspec)	21,566
Rights Of Way	16,408
Lemon	7,113
Landscape Maintenance	4,274
Grapefruit	3,753
All Other	2,982
TOTAL	56,095

The range of concentrations of bromacil was 0.025 to 9.61 ppb. The U.S. EPA HAL is 90 ppb.

Diuron

Diuron, a selective herbicide, was reviewed through the PDRP in 1989, 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 pest control adviser (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 2001.

SITE	POUNDS APPLIED
Rights Of Way	523,868
Orange (All Or Unspec)	174,024
Alfalfa (Forage - Fodder)	167,479
Landscape Maintenance	55,052
Walnut	28,504
Grapes	27,798
Grapes, Wine	23,446
All Other	106,721
TOTAL	1,106,892

The range of concentrations of diuron was 0.023 to 1.03 ppb. No MCL has been established for diuron. The U.S. EPA HAL is 10 ppb and the integrated risk information system as a drinking water level (IRIS) Rfd is 14 ppb.

Hexazinone

Hexazinone is an herbicide. The following sites represent the major uses of hexazinone reported in 2001.

SITE	POUNDS APPLIED
Alfalfa (Forage - Fodder)	61,021
Forest Trees, Forest Lands	44,957
Rights Of Way	760
N-Outdr Container/Fld Grwn Plants	45
All Other	107
TOTAL	106,890

Verified residue concentrations of hexazinone ranged from 0.05 to 0.07 ppb. No MCL has been established for hexazinone. The IRIS Rfd as a drinking water level is 230 ppb.

Metolachlor

Metolachlor, a selective herbicide, was not detected in wells that were sampled; however, residues of metolachlor degradates ESA and OXA were verified in 20 wells. These degradates are to be further reviewed. The following table includes combined uses of metolachlor (no longer registered for use in California) and (S)-metolachlor, an isomer of metolachlor currently registered for use in California.

The following sites represent the major uses of metolachlor reported in 2001.

SITE	POUNDS APPLIED
Corn (Forage - Fodder)	47,850
Cotton, General	120,583
Safflower, General	2,826
Beans, Succulent (Other Than Lima)	10,834
N-Outdr Grwn Cut Flwrs Or Greens	1,374
All Other	73,762
TOTAL	257,229

The range of concentrations of metolachlor ESA and metolachlor OXA was 0.06 to 24 ppb and 0.05 to 2.65 ppb, respectively. No MCL has been established for metolachlor. The IRIS Rfd as a drinking water level is 110 ppb.

Norflurazon

Norflurazon, a selective herbicide, was reviewed through the PDRP, including review by a subcommittee of the PREC. DPR adopted regulations that prohibit agricultural, outdoor institutional, and outdoor industrial uses of pesticides containing norflurazon in areas that are specifically managed or designed to recharge ground water and inside canal and ditch banks, within PMZs. Norflurazon was also made a restricted material for which a permit is required for crop uses in norflurazon 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 norflurazon can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of norflurazon reported in 2001

SITE	POUNDS APPLIED
Almond	46,169
Alfalfa (Forage - Fodder)	46,013
Orange (All Or Unspec)	21,595
Grapes, Wine	20,594
Rights Of Way	18,146
All Other	57,623
TOTAL	210,141

The range of concentrations of norflurazon was 0.022 to 0.337 ppb. No MCL has been established for norflurazon. The IRIS Rfd as a drinking water level is 230 ppb.

Prometon

Prometon, a nonselective herbicide, was reviewed through the PDRP in 1989, including review by a subcommittee of the PREC. DPR adopted regulations that prohibit the use of pesticides containing prometon within a prometon PMZ. Prometon was also made a restricted material. Allowed uses of prometon outside prometon PMZs can only be applied by or under the supervision of a certified applicator.

The following sites represent the major uses of prometon reported in 2001

SITE	POUNDS APPLIED
Landscape Maintenance	1
Rights Of Way	1
TOTAL	2

The range of concentrations of prometon was 0.06 to 0.098 ppb. No MCL has been established for prometon. The U.S. EPA HAL is 100 ppb

Simazine

Simazine, a selective herbicide, was reviewed through the PDRP in 1989, 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 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 2001.

SITE	POUNDS APPLIED
Orange (All Or Unspec)	180,537
Grapes, Wine	115,095
Grapes	110,116
Peach	57,372
Almond	52,292
Walnut	35,823
All Others	82,909
TOTAL	634,144

Concentrations of verified detections ranged from 0.034 to 0.244 ppb. Both the CDHS and U. S. EPA's MCL for simazine is 4 ppb.

SUMMARY OF UNVERIFIED DETECTIONS

Samples with unverified detections are addressed in one of two ways. (1) Detections of the following are referred to 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. 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.

(2) Detections of compounds registered for agricultural, outdoor industrial, or outdoor institutional uses in California are investigated by DPR. Negative follow-up samples may result from delays (sometimes years) in reporting the initial detection to DPR.

The status of all positive samples (verified and unverified) added to the database for this report year is summarized in Table I-7. Of the 113,070 records added to the well inventory database, there were 1,594 (1.4%) unverified detections from 340 wells in 20 counties for a total of 14 pesticide active ingredients or breakdown products.

Of the 1,594 unverified samples, 1,576 (98.9%) were for eight chemicals not registered or not registered for agricultural use. The chemicals were benzene, butachlor, DBCP, 1,2-D, ethylene dibromide, ortho-dichlorobenzene, methyl chloride, naphthalene and xylene. These detections have been reported to SWRCB.

CDHS reported detections of simazine, and methyl bromide. DPR is investigating the simazine detection. No action was taken by DPR for the methyl bromide detections because CDHS resampled these wells and did not confirm the original detection. One of the methyl bromide detections was determined to be a laboratory error.

Table I-7. Status, as of June 30, 2002 of all reported detections of pesticide active ingredients and breakdown products in ground water that were added to DPR's well inventory database from July 1, 2001, through June 30, 2002

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
1,2-D + 1,3-D + C-3 Compounds	53 counties 2,937 wells	Butte, 1	1.2	CDHS & U.S. EPA MCL 5	Fumigant. Not registered (NR). Source of residues was determined by DPR to be due to historical nonpoint 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.
1,2-dichloropropane (1,2-D; propylene dichloride)	53 counties 3,014 wells	Fresno, 1 Kern, 1 Los Angeles, 1 San Diego, 1 San Mateo, 1	0.5 - 2.6	CDHS & U.S. EPA MCL 5	Fumigant. NR. Source of residues was determined by DPR to be due to historical nonpoint source, 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)	14 counties 223 wells	Fresno, 58 Kern, 2 Madera, 2 Merced, 2 Monterey, 1 San Joaquin, 4 Solano, 1 Stanislaus, 2 Tulare, 27	0.032-1.855		Breakdown product of atrazine or simazine, which are actively registered (AR) in California. Detections in Fresno and Tulare are part of the on-going well monitoring study (well network-study 182). All detections were determined to be due to LAU.

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
alachlor ESA	9 counties 88 wells	Fresno, 1 Sacramento, 1 Solano, 5 Stanislaus, 10 Yolo, 1	0.05-1.38	CDHS & US EPA MCL (for alachlor) 2	Breakdown product of alachlor a preemergence herbicide which is AR in California. Five detections are unconfirmed due to USGS lab method not unequivocal and 2 nd lab did not verify. Thirteen verified detections.
alachlor OXA	9 counties 88 wells	Stanislaus, 1	0.05	CDHS & US EPA MCL (for alachlor) 2	Breakdown product of alachlor, a preemergence herbicide which is AR in California. This is a verified detection.
atrazine	32 counties 1,170 wells	Fresno, 4 Madera, 2 Solano, 1 Stanislaus, 1 Tulare, 1	0.046-0.148	CDHS & U.S. EPA MCL 3	Herbicide. AR. All detections were determined to be due to LAU.
benzene	53 counties 3,022 wells	Kern, 1 Kings, 1 Solano, 1 Yuba, 1	0.68 – 21.7	CDHS MCL 1 U.S. EPA MCL 5	Benzene was an ingredient in some early grain fumigants. NR for agricultural use. Non-pesticidal uses of industrial chemicals may contribute to these findings. Referred to SWRCB.
bromacil	31 counties 1,035 wells	Fresno, 20 Kern, 1 Madera, 2 Merced, 2 Monterey, 1 Tulare, 18	0.025-9.61	U.S. EPA HAL 90	Herbicide. AR. All detections determined to be LAU.

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
butachlor	30 counties 783 wells	San Joaquin, 1	0.39	NAS HAL 70	Selective herbicide. NR in California. Referred to SWRCB.
chloromethane	53 counties 2,954lls	Fresno, 2 Los Angeles, 1 Sacramento, 2 Sonoma, 1 Tulare, 1	0.50-17	U.S. EPA SNARLs 3	Fumigant. NR. Non-pesticidal uses of industrial chemicals may contribute to these findings. Referred to SWRCB.
DBCP (1,2-dibromo-3-chloropropane)	32 counties 1,541 wells	Contra Costa, 1 Fresno, 103 Kern, 18 Los Angeles, 5 Madera, 3 Merced, 14 Riverside, 16 Sacramento, 3 San Bernardino, 64 San Joaquin, 22 Stanislaus, 21 Tulare, 27	0.01 – 3.7	CDHS & U.S. EPA MCL 0.2	Soil fumigant. NR. Use suspended in 1979. Source of residues considered by DPR to be from historical nonpoint source, legal agricultural use. Referred to SWRCB.
deethyl-atrazine	14 counties 223 wells	Fresno, 2 Madera, 2 Solano, 2 Stanislaus, 1 Tulare, 4	0.05 - 0.311		Breakdown product of atrazine, which is AR. All detections were determined to be due to LAU.

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
diaminochlorotriazine (DACT)	14 counties 223 wells	Fresno, 56 Kern, 1 Madera, 2 Merced, 1 San Joaquin, 5 Solano, 1 Stanislaus, 2 Tulare, 25	0.05 – 5.34		Breakdown product of atrazine or simazine, which are AR. All detections were determined to be due to LAU.
diuron	28 counties 520 wells	Fresno, 35 Kern, 4 Madera, 1 Merced, 1 Monterey, 1 San Joaquin, 1 Solano, 2 Stanislaus, 1 Tulare, 21	0.023 – 1.03	U.S. EPA IRIS Rfd 14	Herbicide. AR. All detections were determined to be due to LAU.
ethylene dibromide (EDB)	33 counties 1,414 wells	Fresno, 9 Kern, 6 Sacramento, 1 San Joaquin, 1 Tulare, 2	0.01 – 0.63	CDHS & U.S. EPA MCL 0.05	Fumigant, insecticide, nematicide. NR since 1/87. Source of residues considered by DPR to be from historical nonpoint source, legal agricultural use. Referred to SWRCB.
hexazinone	14 counties 224 wells	Fresno, 2 Stanislaus, 1	0.05-0.07	U.S. EPA IRIS Rfd 230	Contact and residual herbicide, which is AR. All detections are CUI by DPR.

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
methyl bromide	53 counties 2,953 wells	Fresno, 1 Merced, 1 Sacramento, 1 Ventura, 1	1.2-2.7	U.S. EPA IRIS Rfd 9.8	DPR determined that the detection in Fresno was lab error and all other detections were not confirmed; therefore no action will be taken on these detections.
metolachlor ESA	9 counties 88 wells	Kings, 1 Sacramento, 2 San Joaquin, 2 Solano, 3 Stanislaus, 15, Tulare, 3	0.05-24	U.S. EPA IRIS Rfd 110	Breakdown product of metolachlor a selective herbicide, which is AR. 20 detections of the metabolite were verified by DPR labs.
metolachlor OXA	9 counties 88 wells	Sacramento, 1 San Joaquin, 1 Stanislaus, 6 Tulare, 2	0.05-2.65	U.S. EPA IRIS Rfd 110	Breakdown product of metolachlor, a selective herbicide which is AR. Ten detections of the breakdown product were verified by DPR labs.
naphthalene	49 counties 2,641 wells	Los Angeles, 1	1.63	U.S. EPA IRIS Rfd 14	NR in California since 1991. No action taken. Referred to SWRCB.
norflurazon	14 counties 223 wells	Fresno, 15 Merced, 1 Solano, 1 Tulare, 10	0.022-0.337	U.S. EPA IRIS Rfd 280	Selective herbicide. AR. All detections were determined to be LAU.
ortho-dichlorobenzene	53 counties 3,019 wells	Riverside, 2	0.6-0.8	Not available	NR in California. Referred to SWRCB.
prometon	14 counties 224 wells	Fresno, 1	0.6-0.098	U.S. EPA IRIS Rfd 110	Non-selective herbicide. AR. Verified detections determined to be LAU.

Compound Detected	Number of Counties and Wells Sampled	Counties and Number of Wells with Detections	Range of Concentrations Detected (ppb)	Water Quality Criteria ^(a) (ppb)	Registration Status Type of Compound Comments
simazine	33 counties 1,173 wells	Fresno, 53 Kern, 1 Madera, 1 Merced, 1 Monterey, 1 Stanislaus, 1 Tulare, 27	0.034 – 1.3	U.S. EPA MCL 4.0	Herbicide. AR. All detections were determined to be due to LAU.
xylene	54 counties 2,910 wells	Fresno, 1 Los Angeles, 1 Riverside, 2 Sacramento, 1 Stanislaus, 1	0.5 –7.7	CDHS MCL 1750 U.S. EPA MCL 10000	Solvent. NR. There are no products currently registered for agricultural use in California that contain xylene as an active ingredient. Non-peticultural uses of industrial chemicals may contribute to these findings. Referred to SWRCB.

(a) Marshack, J.B. 2000. A Compilation of Water Quality Goals. Definitions of the various Water Quality Criteria are given below.

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

U.S. EPA MCL: MCL adopted by the U.S. Environmental Protection Agency (U.S. EPA) under the Safe Drinking Water Act. MCLs are enforceable by the CDHS on water suppliers. Values are expressed in ppb.

U.S. EPA IRIS Rfd: U.S. EPA Integrated Risk Information System (IRIS) Reference Dose (Rfd) as a drinking water level: published by U.S. EPA's Office of Water. See glossary for complete description. Values are expressed in ppb.

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

NR: Not registered

AR: Actively registered in California

CUI: Currently under investigation by DPR

LAU: Legal agricultural use

SECTION I SUMMARY

From July 1, 2001, through June 30, 2002, results were reported for 3,713 wells, located in 54 counties that were sampled for a total of 135 pesticide active ingredients or breakdown products. The data represent 31 ground water sampling studies conducted by two agencies from July 1, 2001, to June 30, 2002.

Of the 135 compounds, 25 pesticide active ingredients or breakdown products were detected in 480 wells in 22 counties. Verified detections were made of 14 compounds in 142 wells in 11 counties.

Detections of the following chemicals were verified for the first time in the following counties: hexazinone and alachlor ESA in Fresno; DACT in Kern; atrazine, bromacil, DEA, DACT in Madera; norflurazon in Merced; diuron, and ACET in Monterey; alachlor ESA, metolachlor ESA and OXA in Sacramento; metolachlor ESA and OXA in San Joaquin; diuron, norflurazon alachlor ESA and metolachlor ESA in Solano; alachlor ESA and OXA, metolachlor ESA and OXA, DACT and DEA in Stanislaus; metolachlor ESA and OXA in Tulare; alachlor ESA in Yolo.

II. PROCESSES CONTRIBUTING TO THE PREVENTION OF 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 prevention of 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, 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 by movement of runoff water. Leaching is the process by which pesticide residues are dissolved in water and carried through the soil matrix as it recharges a ground water aquifer. Pesticide residues in runoff water move from sites of application to natural or man made conduits that facilitate movement to ground water. Natural conduits include structures like sinkholes, 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 nonpoint 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. Nonpoint source contamination occurs when pesticides reach ground water from a large area, typically because of movement of pesticides after an agricultural application.

SPECIAL STUDIES

Update on Proposed Regulation Changes

DPR plans to revise the ground water protection regulations to make them more preventive. The revised regulations would require adoption of new management practices both in areas where pesticides have been found in ground water and in areas that are vulnerable to pesticide movement to ground water. Currently, pesticides that are found in ground water as a result of legal agricultural use are regulated in vulnerable areas called PMZs. PMZs are identified based on detections of one or more pesticides in ground water. DPR is planning to change the criteria for identifying vulnerable areas and designate those areas as Ground Water Protection Areas (GWPA). GWPA will include all current and draft PMZs as well as additional areas that have soil and depth-to-ground water that are characteristic of areas where pesticides have been found

in ground water. These new criteria have been developed from a statistical analysis of over 15 years of well sampling data compiled by DPR. Geological characteristics of vulnerable areas were first identified through a statistical clustering analysis. The second step was to develop a classification method so that sections that did not contain well sampling data but that had similar geologic characteristics to vulnerable areas could be grouped into vulnerable clusters. This determination was based on a combination of soil data obtained from the U.S. Natural Resources Conservation Service (formerly the Soil Conservation Service) and data generated for estimated depth-to-groundwater. The current method used to group and profile sections of land based on soil data is explained in the EM Branch report EH 00-05 and the method to determine depth-to-groundwater estimates for sections of land in EM Branch report EH 00-02. The statistical methodology that was developed and the testing of the clustering analysis is referenced in the following EM Branch Reports and refereed scientific journal articles available at DPR's web site at <<http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps.htm>>:

Branch Reports:

- EH 92-09 Troiano, J., B. Johnson, S. Powell, And S. Schoenig. 1992. Profiling Areas Vulnerable to Ground Water Contamination by Pesticides in California. (PDF, 1.8 Mb)
- EH 00-02 Spurlock, F. 2001. Procedures for Developing a Depth-To-Ground Water Database. (PDF 1.4 Mb)
- EH 00-05 Troiano, J., F. Spurlock, And J. Marade. 1999. Update of the California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water: October 14, 1999. (PDF 1.8 Mb)
- EH 00-08 Marade, J. 2001. Draft List Of Ground Water Protection Areas. Identified by the CALVUL Model. (PDF, 61 Kb)
- EH 00-07 Marade, S.J. and J. Troiano. 2001. Sections of Land Requiring Special Assignment as Runoff or Leaching Ground Water Protection Areas. (PDF, 1.1 Mb)

Refereed Journal Articles:

- 1994 Troiano, J., B.R. Johnson, and S. Powell. 1994. Use of Cluster and Principal Component Analyses to Profile Areas in California Where Ground Water Has Been Contaminated by Pesticides. Environ. Monitor. Assess. 32: 269-288.
- 1997 Troiano, J., C. Nordmark, T. Barry, and B. Johnson. 1997. Profiling Areas of Ground Water Contamination by Pesticides in California: Phase II- Evaluation and Modification of a Statistical Model. Environ. Monitor. Assess. 45:301-318.
- 1998 Troiano, J., C. Nordmark, T. Barry, B. Johnson, and F. Spurlock. 1998. Pesticide Movement to Groundwater: Application of Arial Vulnerability Assessments and Well

Monitoring to Mitigation Measures. p.239-251. In Ballatine et al. (ed.) Triazine Herbicides Risk Assessment. ACS Symposium Series 683.

- 1999 Troiano, J., J. Marade, and F. Spurlock. 1999. Empirical Modeling of Spatial Vulnerability Applied to a Norflurazon Retrospective Well Study in California. J. Environ. Qual. 28:397-403. (PDF, 135 kb). Reprinted with the permission of the American Agronomy Society.

Monitoring Temporal Changes in Concentrations of Detected Herbicides and Their Degradates--Well Monitoring Network

DPR has established a well monitoring network consisting of approximately 70 rural, domestic wells located in Fresno and Tulare counties. The wells will be used to measure the temporal changes in concentrations of pesticides present in those wells. This network will be used to monitor the effectiveness of the new regulations DPR plans to adopt to prevent movement of pesticides to ground water. The wells are sampled twice a year, once in the spring and once in the fall, to monitor the concentration of pesticide residues. These wells were identified because they had been previously sampled and determined to contain residues of the pesticides that will be monitored, and because they are located in one of the two soil conditions identified in vulnerable areas, either coarse textured, sandy soil or hardpan. Water samples drawn from the wells are subject to a chemical analytical screen for seven parent active ingredients -- atrazine, simazine, bromacil, diuron, prometon, hexazinone, and norflurazon -- and 3 triazine breakdown products-DEA, ACET, and DACT.

Well sampling was initiated in the fall of 1999. A summary of the data can be found in Appendix B of this report. Since the new regulations have not yet been adopted, these data provide background concentrations for the well network. The active ingredients consistently detected are simazine and diuron in wells located in vulnerable areas with coarse-textured soils and simazine, diuron, and bromacil in vulnerable areas with soils that contain a hardpan. Simazine and diuron are used on grapes and deciduous and citrus trees, while bromacil is used only on citrus. This pattern reflects use conditions because grapes and deciduous tree crops predominate the coarse-textured soil condition whereas citrus is the predominate crop on the hardpan soil condition.

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

ENVIRONMENTAL MONITORING PROGRAM

The EM branch performs the lead role in implementing DPR's environmental protection programs. EM personnel design and conduct field studies of air, soil, surface water 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 investigated by DPR or referred to SWRCB. 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 PCAs who write ground water protection advisories for growers. Growers must submit these advisories to the county agricultural commissioner (CAC) before the CAC can issue permits that are required for crop uses of simazine, bromacil, diuron, and all allowed uses of norflurazon, in their respective 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 ground water protection advisory, 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 ground water protection advisory contains specific information for applying a regulated pesticide in a PMZ to reduce the potential for movement of the chemical into ground water.

DPR has conducted ground water protection training annually since 1989. Speakers review the extent of pesticide residues in ground water, potential sources of pesticide residues, contamination pathways, factors that influence pesticide movement to 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 pathway of pesticide movement to the ground water. These pathways are often soil related. DPR scientists have classified California vulnerable areas into two categories, leaching areas and runoff areas, based on the dominant pathways by which 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 among others, 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 or via movement to coarse soil areas. The training also reviews changes in ground water laws, regulations, and programs. For the period from July 1, 2000 to June 30, 2001, DPR conducted four training sessions in late February through early March to qualify PCAs to write ground water protection advisories.

CHEMIGATION TRAINING

The EM branch is sponsoring an effort to train CAC staff and enforcement personnel to recognize pesticide label-required chemigation safety devices that help to prevent ground water contamination. The one-day training sessions were held between October and December 2001 in six different locations throughout the state. Over 300 people from 39 counties attended the training sessions. DPR also provided 21 two-hour backflow prevention training sessions; over 600 growers and PCAs attended the targeted training sessions.

Chemigation Valve Displays

DPR provided most CAC offices with a six-inch “cut-away” chemigation valve display. The valves are mounted on a floor stand and the cut-away section allows growers to examine the spring-loaded rubber-coated check valve.

Chemigation Pamphlet – English and Spanish

A chemigation pamphlet was developed and published in English and Spanish for distribution at CAC offices. The pamphlet contains a brief description and example of an approved backflow prevention system and serves as a reminder to growers that they must comply with label language. Over 9,000 English and 3,000 Spanish pamphlets have been distributed to the CAC and other interested parties.

Task Force

DPR worked with the Center for Irrigation Technology in Fresno to form a task force to evaluate the need for further educational and regulatory action on chemigation applications. The task force is composed of irrigation specialists, representatives from the agricultural community, engineers with specialty in backflow prevention, representatives from the CAC, and other

pertinent individuals. The task force met on April 4 and May 21, 2002. Between the two meetings approximately 25 individuals with varied experience attended.

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), EM 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 analytical 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).

EM 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.

EM 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 and the detection is equal to or above 80 percent of the current MDL established by EM’s laboratory.
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. If a currently registered pesticide is found in ground water due to legal non-agricultural use, DPR would review the detection using its other regulatory authorities, including reevaluation.

ACTIONS TAKEN BY DPR ON PESTICIDE DETECTIONS

Detections of 25 pesticide active ingredients and breakdown products were reported during the period from July 1, 2001, to June 30, 2002. EM did not initiate investigations for 10 of the 25 detected chemicals (1,2-dichloropropane, 1,2-D + 1,3-D compounds, benzene, butachlor, chloromethane, DBCP, ethylene dibromide, naphthalene, ortho-dichlorobenzene, and xylene) because they are not currently registered for agricultural use in California. These detections were referred to SWRCB. There were three detections of methyl bromide reported by CDHS. An investigation was not initiated for the methyl bromide detection in Ventura County because it was determined that the detection was due to a laboratory error. For the other two methyl bromide detections, CDHS resampled the wells and did not confirm the original detection; therefore, EM did not investigate these detections. The 14 other detections resulted from studies conducted by DPR and are described in the following sections.

Norflurazon regulations adopted

DPR adopted regulations effective March 23, 2002 to add norflurazon to the list of pesticides found in ground water due to legal agricultural use (Title 3 section 6800(a) of the California Code of Regulations [3CCR]), establish norflurazon PMZs, and establish norflurazon use requirements. These use requirements prohibit use of norflurazon inside canal and ditch banks and in recharge areas within norflurazon PMZs. In addition, norflurazon is subject to all other regulations that apply to pesticides listed in 3CCR section 6800(a) and regulated in PMZs.

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 6800 (3CCR). 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 by ground-based application equipment into, the soil; or (2) for application to or injection into soil by chemigation; or (3) the pesticide label requires or recommends application to be followed, within 72 hours, by flood or furrow irrigation. In order to determine whether these pesticides have migrated to ground water, DPR is required to conduct monitoring for materials on the GWPL.

From 1992 to 1998, a monitoring protocol was used to determine in which order and to what extent the compounds should be monitored in California. First priority was given to pesticide active ingredients (AI's) that had been detected in ground water due to nonpoint sources in other states or which were 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 were sampled. Second priority pesticides were selected based on pounds of active ingredient sold per year and on a combination of physicochemical factors. Fifteen to twenty-five wells were to be sampled under this priority. Remaining compounds on the list were given third priority for monitoring, and 10 to 15 wells were to be sampled.

In 1992, 45 AI's were placed on the GWPL and prioritized. Monitoring was completed for 18 of those AI's between 1992 and 1998. A regulation package that became effective on May 13, 1999 added 15 new AI's to the GWPL.

The GWPL monitoring protocol was revised in April 1997 to improve the process for selecting chemicals for monitoring. Active ingredients on the GWPL are no longer ranked according to priority for monitoring. Instead, all active ingredients on the list are 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, agricultural production practices for crops treated with the pesticide, or any other pertinent information. Each year, one or more active ingredients on the GWPL are selected for monitoring.

DPR did not conduct GWPL monitoring in 1999 and 2000 due to lack of resources. GWPL monitoring was resumed during summer 2001. Wells were sampled for alachlor [including the metabolites alachlor ethanesulfonic acid (ESA) and alachlor oxanilic acid (OXA)] and for metolachlor [including the metabolites metolachlor ethanesulfonic acid (ESA) and metolachlor oxanilic acid (OXA)]. A total of 88 wells were sampled in nine counties, 14 of which were part of an expanded study in Stanislaus County where significant detection occurred. Sampling results, by county and pesticide, are presented in Table III-1. No alachlor or metolachlor parent compound residues were detected in any of the wells. Verified detections of alachlor ESA were made in seven wells in four counties, alachlor OXA was verified in one well, metolachlor ESA was verified in ten wells in five counties, and metolachlor OXA was verified in seven wells in four counties. Verified detections were also made of other pesticides or their breakdown products.

Some wells sampled in Stanislaus County contained multiple alachlor and metolachlor metabolite residues and at relatively greater concentrations than residues found in other areas. For that reason, additional monitoring was conducted in this county. Fourteen wells were sampled and alachlor ESA was found in six wells, metolachlor ESA in ten wells, and metolachlor OXA was detected in two wells. Again, the concentrations were generally greater than those detected in other counties. Those results are included in Table III-1. Eighty-eight total wells were sampled for the study.

Table III-1 GW01 sampling results by county and pesticide

County	Wells Sampled	Wells with Verified Alachlor ESA Detections	Wells with Verified Alachlor OXA Detections	Wells with Verified Metolachlor ESA Detections	Wells with Verified Metolachlor OXA Detections	Wells with Verified Detections of Other Chemicals
Fresno	9	0	0	0	0	3
Kings	8	0	0	0	0	0
Sacramento	10	1	0	1	1	0
San Joaquin	11	0	0	2	1	2
Solano	8	1	0	1	0	3
Stanislaus	28	10	1	13	6	2
Tulare	8	0	0	3	2	4
Ventura	2	0	0	0	0	0
Yolo	4	1	0	0	0	0
Total	88	13	1	20	10	14

Monitoring for fenamiphos, fenamiphos sulfoxide and fenamiphos sulfone was conducted during the fall of 2001. Staff from the EM Branch did some of the sampling and some was done as co-sampling in collaboration with staff from the U. S. Geological Survey. A total of 60 wells, including three monitoring wells, were sampled in nine counties. Sampling results, by county and pesticide, are presented in Table III-2.

None of the wells contained residues of fenamiphos, fenamiphos sulfoxide or fenamiphos sulfone. Verified detections of other pesticides or their breakdown products were made in 34 of the wells.

Table III-2 GW02 sampling results by county and pesticide

County	Wells Sampled	Wells with Verified Fenamiphos Detections	Wells with Verified Detections of Other Chemicals
Fresno	16	0	10
Kern	5	0	4
Madera	3	0	2
Merced	5	0	5
Monterey	8	0	3
San Joaquin	7	0	3
Sonoma	6	0	0
Stanislaus	5	0	3
Tulare	5	0	4
Total	60	0	34

AGRICULTURAL USE DETERMINATIONS AND RECOMMENDATIONS FOR PESTICIDE MANAGEMENT ZONES (PMZ)

As a result of investigations concluded between July 1, 2001, and June 30, 2002, and one continuous investigation, pesticide residues of five pesticides and their breakdown products in a total of 18 sections were determined to be present in ground water as the result of nonpoint source, legal agricultural use. DPR recommended 11 new sections as PMZs (Table III-3). DPR also recommended adding chemicals to 7 existing PMZs: in Fresno County, bromacil, norflurazon and simazine in section 14S/22E-03, diuron and norflurazon in section 15S/22E-03; in Tulare County, atrazine in section 16S/25E-19, diuron in section 19S/26E-21, and norflurazon in sections 17S/26E-30, 17S/26E-35 and 18S/27E-21. Recommended PMZs must be adopted in regulation before they are subject to regulatory controls. Appendix B gives a more detailed description of the section numbers and chemicals.

Table III-3. Number of sections recommended as PMZs by DPR from July 1, 2001, through June 30, 2002.

County	Chemical(s)	Sections
Fresno	atrazine, bromacil, diuron, norflurazon, simazine	10
Tulare	atrazine, simazine	1
Total Sections	atrazine 5, diuron 4, simazine 11, bromacil 1, norflurazon 2	11

SECTION III SUMMARY

From July 1, 2001, to June 30, 2002, EM sampled 230 wells in 11 counties. The samples were analyzed for 34 pesticide active ingredients and breakdown products. EM verified detections in 142 wells in 11 counties for 14 compounds—alachlor ESA and OXA, atrazine, bromacil, diuron, prometon, simazine, hexazinone, metolachlor ESA and OXA, norflurazon, DEA, DACT, and ACET.

The PREC subcommittee made findings and recommendations to the Director regarding the continued use of norflurazon. Regulations were adopted in March 2002 to make norflurazon a restricted material, add norflurazon use requirements, and establish norflurazon PMZs.

DPR recommended 11 new sections as PMZs and recommended adding chemicals to seven existing PMZs. Recommended PMZs must be adopted in regulation before they are subject to regulatory controls.

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Appendix A

Number of wells sampled and positive detections, if any, by county and pesticide for data reported to DPR between July 1, 2001, and June 30, 2002

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	Santa Barbara
Amador	Mendocino	Santa Clara
Calaveras	Modoc	Santa Cruz
Colusa	Mono	Shasta
Del Norte	Napa	Sierra
El Dorado	Nevada	Siskiyou
Glenn	Orange	Sutter
Humboldt	Placer	Tehama
Lake	Plumas	Trinity
Lassen	San Benito	Tuolumne
Marin	San Luis Obispo	

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

Butte	Monterey	Sonoma
Contra Costa	Riverside	Stanislaus
Fresno	Sacramento	Tulare
Kern	San Bernardino	Ventura
Kings	San Diego	Yolo
Los Angeles	San Joaquin	Yuba
Madera	San Mateo	
Merced	Solano	

Appendix B

Studies Included in the 2002 Update Report

This appendix summarizes the well sampling surveys that were added to the Well Inventory Database from July 1, 2001, to June 30, 2002. The study number assigned by DPR is shown to the left.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES (Sanitary Engineering Branch)

0023 Sampled 119 chemicals in 54 counties; January 2001 through December 2001; 3,484 wells sampled.

DEPARTMENT OF PESTICIDE REGULATION (EM)

STUDY	COUNTY STUDY TYPE	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (UNDERLINE INDICATES A VERIFIED DETECTION)
444	Fresno Kings Sacramento San Joaquin Solano Stanislaus Tulare Ventura Yolo <i>Ground Water Monitoring</i>	9 8 10 11 8 28 8 2 4	April-01 through September- 01	<u>Atrazine</u> , bromacil, <u>diuron</u> , prometon, simazine, alachlor, <u>hexazinone</u> , metolachlor, norflurazon, <u>DEA</u> , <u>ACET</u> , <u>DACT</u> , <u>alachlor ESA</u> , alachlor OXA, <u>metolachlor ESA</u> , <u>metolachlor OXA</u>
445	Fresno Kern Madera Merced Monterey San Joaquin Sonoma Stanislaus Tulare <i>Ground Water Monitoring</i>	15 5 3 5 8 7 6 5 6	September- 02 through November- 02	<u>Atrazine</u> , <u>simazine</u> , <u>diuron</u> , prometon, <u>bromacil</u> , hexazinone, <u>norflurazon</u> , <u>DEA</u> , <u>ACET</u> , <u>DACT</u> fenamiphos fenamiphos sulfone fenamiphos sulfoxide
447	Sonoma <i>Four-section Survey</i>	4	February-02	Atrazine, simazine, diuron, prometon, bromacil, hexazinone, norflurazon, DEA, ACET, DACT

STUDY	COUNTY STUDY TYPE	WELLS SAMPLED	SAMPLING DATES	CHEMICALS SAMPLED (<u>UNDERLINE INDICATES A VERIFIED DETECTION</u>)
448	Sacramento <i>Four-section Survey</i>	4	June-01	Atrazine, simazine, diuron, prometon, bromacil, hexazinone, norflurazon, DEA, ACET, DACT, aldicarb sulfoxide, aldicarb sulfone
440	Fresno Tulare <i>Well Inventory Network</i>	48 23	March-00 May-01	<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>

A four-section survey was not conducted for the following detections because either an investigation of the detections was determined by other means according to the memorandum “Identification of Pesticide Management Zones” or additional information indicated a four section survey was not necessary.

FILE	COUNTY	CHEMICAL(S) IDENTIFIED	ACTION TAKEN
Z346	Fresno	Simazine DACT	No action required (see Z484)
Z347	Fresno	Simazine DACT	No action required (see Z484)
Z348	Fresno	Simazine DACT	PMZ recommended
Z422	Fresno	Simazine & ACET	PMZ recommended for simazine included is section 16S20E26
Z434	Tulare	Atrazine, simazine, ACET, diuron	recommend add atrazine to existing PMZ
Z436	Tulare	Diuron, simazine, ACET	recommend add diuron to existing PMZ
Z437	Tulare	Diuron, ACET	No action: already PMZ.
Z441	Stanislaus	Simazine	Already a PMZ
Z446	Merced	Methyl bromide	CDHS lab error
Z447	Sonoma	Methyl Bromide	CDHS lab error
Z450	Fresno	Diuron	PMZ for diuron
Z460	Tulare	DACT	Preponderance of evidence; recommend PMZ for simazine and atrazine
Z462	Fresno	Methyl Bromide	CDHS resample did not confirm detection

FILE	COUNTY	CHEMICAL(S) IDENTIFIED	ACTION TAKEN
Z463	Sacramento	Methyl Bromide	CDHS retest found no detection
Z464	Ventura	Methyl bromide	CDHS resample did not confirm detection
Z478	Fresno	Bromacil, Diuron, Norflurazon, Simazine, ACET, DACT	Preponderance of evidence recommend add simazine, norflurazon, and bromacil to existing PMZ
Z479	Fresno	Atrazine, simazine, norflurazon, bromacil, diuron, DACT, ACET	Preponderance of evidence; recommend PMZ for atrazine, simazine, norflurazon, bromacil and diuron
Z483	Fresno	Diuron, simazine	Preponderance of evidence and detection of norflurazon from another well in the section; recommend add norflurazon and diuron to existing PMZ
Z484	Fresno	Simazine, ACET, DACT	PMZ recommended for simazine. Included in recommendation, Z347(16S/19E-23) and Z346(16S/19E-14) as PMZs
Z485	Fresno	Simazine, ACET, DACT	PMZ recommended for simazine. Included in recommendation, Z486 (16S/20E-15) as PMZ
Z486	Fresno	Simazine, ACET, DACT	No action (see Z485)
Z487	Fresno	Simazine, ACET, DACT	No action (see Z422)
Z488	Tulare	Norflurazon, diuron, simazine, bromacil, DACT and ACET	Preponderance of evidence; recommend add norflurazon to existing PMZ
Z489	Tulare	Norflurazon, diuron, simazine, DACT and ACET	Preponderance of evidence; recommend add norflurazon to existing PMZ
Z490	Tulare	Diuron, simazine, DACT and ACET	No action: already PMZ
Z491	Tulare	Norflurazon, diuron, simazine, and ACET	Preponderance of evidence; recommend add norflurazon to existing PMZ

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, 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 CDHS 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 CDHS. Monitoring required by AB 1803 was completed in June 1989. Based on sampling results, CDHS may require a system to conduct periodic water analyses and to report to CDHS 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.

County Agricultural Commissioner – For each county in California, 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 CDHS pursuant to section 2426 of the Health and Safety Code (FAC 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 State 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.

established PMZ – A 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 PCA, who has successfully completed the Ground Water Protection Training Program given by DPR, that must be submitted by permit applicants before the CAC can issue a use permit for allowed uses of a regulated pesticide in a 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.

Ground Water 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 CDHS and by U.S. EPA under the Safe Drinking Water Act. MCLs are formally established in regulation and are enforceable by the CDHS 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.

nonpoint 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 CACs 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 CAC 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; and 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 a pesticide to submit specified information to the Director of DPR, provides for the establishment of the Ground Water 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, CDHS, 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 – Substance(s) which remains in or on a feed or food commodity, soil, air or water following use of a pesticide.

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 detection may be designated as confirmed or unconfirmed. Detections below the MDL are considered non-detects.

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 3CCR section 6802.

registered pesticide – A pesticide product approved by U.S. EPA and DPR for use in California.

registrant – A person or corporation that has registered a pesticide 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 3CCR section 6400 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 taking additional precautionary measures.

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 DPR to establish SNVs in regulation to help identify 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-member 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, 3CCR section 6484.1 states that agricultural, outdoor institutional, and outdoor industrial uses of pesticides containing atrazine are prohibited in its PMZs listed in 3CCR 6802(c).

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 FAC section 13149(d) 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 personnel. This number is known as the State well number.

**IV. PESTICIDE CONTAMINATION PREVENTION ACT
ANNUAL REPORT TO THE LEGISLATURE
STATE WATER RESOURCES CONTROL BOARD
November 2002**

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:

- Regularly attended meetings sponsored by the DPR, including the interagency Pesticide Registration and Evaluation Committee (PREC) and Pest Management Advisory Committee (PMAC).
- Participated in ongoing consultations with DPR staff, UC scientists, and pesticide manufacturers to design monitoring studies and BMPs.
- Participated in discussions with U.S. Geological Survey scientists on studies dealing with pesticides and water quality.
- 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.
- Reviewed and commented on DPR's proposed studies on pesticide and water quality pursuant to the Management Agency Agreement (MAA) with DPR.

Table IV-1. Actions taken by the Regional Water Quality Control Board, North Coast (Region 1), in FY 2001-2002.

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
Del Norte	Smith River Plains	Aldicarb, 1,2-D	One monitoring event accomplished.
	Smith River Plains 533 Fred Haight Drive	1,2,dichloropropane	One monitoring event accomplished.
Humboldt	U.S. Forest Service Nursery McKinleyville	Chlorothalonil	USFS monitoring and assessment to prevent discharges to surface water and ground water with RWQCB support.
	Sierra Pacific, Arcata	Pentachlorophenol, Tetrachlorophenol,	Ongoing contamination assessment and cleanup.
	Carlotta Lumber Company	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Beaver Lumber Company, Arcata	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and 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 to prevent discharges to surface water
	Schmidbauer, Arcata	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Schmidbauer, Eureka	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Simpson Plywood Mill (Old), Eureka	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Simpson Mill, Samoa	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
Siskiyou	Hi-Ridge Lumber Company	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Pine Mountain Lumber Company	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	Morgan Door/Roseburg	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
	J.H. Baxter	Pentachlorophenol, Tetrachlorophenol	Ongoing contamination assessment and cleanup.
Sonoma	Klein Foods	Fenamiphos	No further action.

Table IV-2. Actions taken by the Regional Water Quality Control Board, San Francisco Bay (Region 2), in FY 2001-2002

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 IV-3. Actions taken by the Regional Water Quality Control Board, Central Coast (Region 3), in FY 2001-2002

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
Monterey	Monterey SoilService, King City	EDB and DBCP	Monitored natural attenuation is used at the site for low-level residual concentrations of EDB and DBCP in groundwater.
Monterey	Castlerock Estates, Salinas	Toxaphene	Soil remediation completed. Monitored natural attenuation is used for low-level residual toxaphene concentrations in groundwater.
Santa Clara	Castle-Veg-Tech, Morgan Hill	Toxaphene, Endrin, Lindane, Endosulfan	Site is being actively remediated.
Santa Cruz	WFS-Greengro, Watsonville	1,2-DCP and Endosulfan	Site is being actively remediated. Endosulfan no longer detected in groundwater.
	WFS, Watsonville	DDT, DDD, Toxaphene	Monitored natural attenuation used for low-level residual concentrations of DDD and dieldren in groundwater. Removal of pesticide-contaminated soil was started in September 2002 and projected to be completed in October 2002.

Table IV-4. Actions taken by the Regional Water Quality Control Board, Los Angeles (Region 4), in FY2001-2002

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.

Table IV-4 (cont.) Los Angeles(Region 4)

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	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. Monitoring continues at site.
	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. Monitoring continues at site.
	City of Compton Landfill	Di(2-ethylhexyl) phthalate (DEHP), Di-n-Octyl-phthalate	Phthalates are thought to be from PVC well casing. Monitoring continues at site.
Ventura	Simi Valley landfill	Aldrin, Alpha-BHC, Gamma-BHC, 4,4- DDD, 4,4-DDT, Dioldren, Endosulfan III, Endrin, Heptachlor Dpoxide, Methoxychlor	These wells are located closed to the landfill. The operator will implement an evaluation monitoring program to determine the source, nature, and extent of a possible release.

Table IV-5. Actions taken by the Regional Water Quality Control Board, Central Valley (Region 5, Sacramento), in FY 2001-2002.

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
Colusa	Moore Aviation	Atrazine,	Ground water remediation ongoing. Soils bioremediation complete for most constituents.
Colusa	Barber Cashew Supply Corporation, Maxwell	DDT, nitrate	Bioremediation of soil unsuccessful. Disposal under consideration. Phytoremediation for remediation of groundwater nitrates underway.
Glenn	Barber Cashew Supply Corporation, Willows	Nitrate, ammonia, 1,2-DCE, PCE, TCE, toluene, carbon tetrachloride, chloroform, chlorobenzene	Cleanup and Abatement Order (CAO) issued. Administrative Civil Liability Issued.
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.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	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	Downgradient extent being defined.
Sacramento	Sacramento Army Depot	Diazinon, Dursban	Assessment report requested. Federal Superfund work in progress. Cleanup of pesticides completed.
	Natomas Air Park	Dicofol, DDE, DDT, Endosulfan, Toxaphene, Dieldrin Endrin	Monitoring wells have been installed and sampled. Investigation underway.
	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, disulfoton, TPH-diesel.	Investigation continuing. Regional Board is lead agency.
San Joaquin	Occidental Chemical	EDB, DBCP, Sulfolane	Site remediation occurring pursuant to stipulation and judgement approving settlement (1981).
	John Taylor Fertilizers, Stockton	Dinosed, I,2,3-TCP, bromicil	Investigation underway, monitoring wells installed

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	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. Auqifer test completed.
	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. Soil remediation with thermal destruction and phytoremediation in progress.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	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. Pilot project using hydrogen release compound for insitu remediation underway.
Solano	Wickes Forest Industries	Chromium (Cr ³⁺ and Cr ⁶⁺), Arsenic, Copper	Ground water cleanup ongoing.
	John Taylor Fertilizer, Dixon	Dinoseb, dichlorprop, 2,4-D dicamba, DDT, chlordane, diuron, bromocil, tebuthiuron	Investigation underway, monitoring wells installed.
	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 remediation and 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	Groundwater remediation plan approved
	Valley Wood	Copper, Chromium, Arsenic	Out-of-court settlement. Federal Superfund site. Interim cleanup in progress.

Table IV-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	Soil excavation completed, pilot study underway using hydrogen release compound for insitu groundwater remediation.
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.
	DowElanco, Davis	1,2,DCP	Air sparging successful to reduce concentrations in groundwater, hydrogen release compound injected to remove last traces. Monitoring underway.
	U.C. Davis	Chlorpyrifos, Dicamba, Atrazine, Aldrin, Simazine, Dieldrin, Endrin, DDT	New CAO and MRP issued.
	J.R. Simplot, Courtland	EDB, 2,4-DB, Dicofol, Dicamba, 2,4,5-TP, Carbophenthion, DDT, Dieldrin, Dinoseb, Picloram	Health risk assessment completed. Phytoremediation underway for soil & groundwater remediation.
Yuba	Beale Air Force Base	Lindane	Ground water investigation underway. Investigation complete no further action required.

Table IV-6. Actions taken by the Regional Water Quality Control Board, Central Valley (Region 5, Fresno), in FY 2001-2002.

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, Helm Facility	Dieldrin	Monitoring of ground water continues.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	FMC Corporation, Fresno Facility	Aldrin, Dieldrin, DDT, DDD, DDE, Heptachlor, Lindane, Toxaphene, Ethyl Parathion, Malathion, Ethion, Endosulfan, Dimethoate, Furadan, Dinitrocresol, Dinoseb (DNBP)	Discharge area capped and undergoing remediation using SVE. Off-site groundwater extraction system construction on schedule. Enhanced reductive dechlorination groundwater pilot test completed.
Fresno	Britz, Inc., Five Points	Toxaphene, DDT, DNBP	State Superfund site. Remedial investigation and health assessment report submitted. Ground water remediation feasibility study submitted. Additional contamination assessment completed. Deed restriction in place.
	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.
	Spain Air	Ethion, DEF, Parathion, Trithion, Dinoseb, Paraquat, DDE, DDT, Endosulfan II	Assessment needed.
	PureGro, Oxalis	1,2-Dichloropropane, nitrate	On-site and off-site plume definition of eastern rinsewater pond groundwater plume complete. Soil and groundwater plume definition at recently discovered former western rinsewater pond contamination site complete. Workplan for soil remediation at western pond to be sub. Dec 2001.
	Western Farm Service, Delano Facility	DDT, Toxaphene, Dinoseb, Dicamba	Assessment on-going, impacted soils are in process of being capped.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	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 groundwater degradation. Additional groundwater monitoring wells proposed to determine extent of degradation. Title 27 cap also proposed.
	USDA, Shafter	Dichlobenil, EPTC, Prometryne, DDT, DDE, DDD, Dieldrin, Toxaphene, Silvex, PCP, Chlorpropham, Ametryn, Atrazine	Developing a closure plan. Soil remediation and dry well abandonment were requested in 1996 but have not been completed.
	Brown and Bryant, Inc., Shafter	EDB, DBCP, 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., Madera Facility	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.

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

Kern	Brown & Bryant, Inc., Arvin	1,2-D, 1,3-D, DBCP, Dinoseb, EDB, carbaryl	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.

Table IV-7. Actions taken by the Regional Water Quality Control Board, Lahontan (Region 6), in FY 2001-2002

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
El Dorado	Tahoe Paradise Golf Course	PCNB	Last tested on 5/23/97 and was non-detect at a detection limit of 0.02 mcg/l.
	Lake Valley State Recreation Area Golf Course	2,4 D, Dicamba, MCPP	All were tested, last on 11/5/97, and all were non-detect at detection limits of 1.6, 0.32, and 150 mcg/l respectively.
	Tahoe Keys Lagoon and Marina	Endothall, Floridone, Triclopyr	The Tahoe Keys Property Owners Association (TKPOA) intends to use these aquatic pesticides for the control of Eurasian watermilfoil in the lagoon and marina. As application is currently proposed, staff will recommend at the January 2002 regular Lahontan Regional Board meeting that the TKPOA request be denied.
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. A TMDL is under development for copper in this reservoir, scheduled for completion in 2002.
Placer	Resort at Squaw Creek	Triclopyr	One time test application of triclopyr currently is underway. Monitoring will assess effectiveness of product and any potential impact on ground water.

Table IV-7.(cont) Lahontan (Region 6)

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
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. Additional site assessment, including the installation of two new wells, confirmed dieldrin in ground water. Sampling continues. The Air Force is requesting additional funds. Board staff have not concurred with parcel transfer of sites with dieldrin.

Table IV-8. Actions taken by the Regional Water Quality Control Board, Colorado River Basin (Region 7), in FY 2001-2002

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 (site closed in 2001)
	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.

Table IV-8. Colorado River Basin (Region 7)

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	Coachella Valley Mosquito Abatement District	DDT	Under investigation. Pesticide contamination insignificant, UST Cleanup only. (site closed in 2001)
	Crop Production Services, Blythe (Formerly Pure Gro MW-24)	1,2-Dichloropropane	Undergoing cleanup.

Table IV-9. Actions taken by the Regional Water Quality Control Board, Santa Ana (Region 8), in FY 2001-2002.

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
Orange	Great Lakes Chemical Corporation (formerly Great Western Savings), Irvine	1,2-D, EDB, 1,2-DCE	On-site full-scale multi-phase vacuum extraction system is continuing. GLCC now discharges to County Sanitation District of Orange County under Special Purpose Discharge Permit as of 12/2001. GLCC was issued a CAO by RWQCB on 4/17/97 for off-site remediation of impacted groundwater. GLCC is operating an on-and off-site groundwater extraction and treatment system since February 2000
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.
	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 groundwater 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 groundwater from three wells to the reverse osmosis unit. Possible sale of this water to Cities of Norco and Jurupa in near future.
	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.
	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.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	City of Riverside, Twin Spring, mun.	DBCP	Well is out of service. Mitigation measures are being considered.
	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.
	City of Riverside (Russell "B", mun.)	Simazine, DBCP	Water is being blended with other supply wells in the area. Mitigation measures are being considered for summer of 2002
	City of Riverside (Garner "B", mun.)	DBCP	Water is being blended with other supply wells in the area. Mitigation measures are being considered for summer of 2002
	City of Riverside (Russell "C", mun)	DBCP	Water is being blended with other supply wells in the area. Mitigation measures are being considered for winter of 2002
	City of Riverside (1st Street)	DBCP	Well is not being used due to high concentrations of DBCP. No mitigation measures in effect.
	City of Riverside (Electric Street, mun.)	DBCP	Well water is being blended with water from other supply wells. Mitigation measures are being considered for winter of 2002
	City of Riverside (Palmyrita, mun.)	DBCP	Well is not being used due to high concentrations of DBCP. Mitigation measures are being considered. for winter of 2002
	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.
	City of Riverside (3 wells, emergency, Downtown Riverside)	DBCP	No mitigation measures in effect. These three wells are also contaminated with industrial organic solvents.
	Riverside County Hall Of Records, (pr)	DBCP	No mitigation measures in effect. Volatile organic chemicals such as TCE and PCE have also been found. Well is used for emergency purposes only.
	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 for winter of 2002
	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.
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.

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

COUNTY	SITE	PESTICIDE	PREVENTION ACTION
	Gage System Wells (16 wells, mun.)	DBCP	The City of Riverside and the Gage Canal Company operate the Gage System, which consists of fifteen 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. Two GAC treatment systems (total of six wells) have been in operation since February 2000 for removal of VOCs and DBCP. Additional GAC system have been designed for treatment of groundwater (total of three wells). These units are located at the leading edge of an existing TCE plume.
	Bunker Hill Basin: Crafton/Redlands area (36 wells)	DBCP	The City of Redlands started construction of a 8.5-MGD 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. Lockheed Martin has provided \$3.7 million for the cleanup of groundwater supplies that the City has been conducting since 1985.
	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.
	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).
	Monte Vista CWD (3 wells, mun.)	DBCP	All three wells are on standby status. Water is being purchased from MWD.
	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.
	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. Four new deep wells have been on line this year.

Table IV-10. Actions taken by the Regional Water Quality Control Board, San Diego (Region 9), in FY 2001-2002

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)