

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

**1997 Update of the
Well Inventory Database**

**For Sampling Results Reported From
July 1, 1996 through June 30, 1997**

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

Pursuant to the
Pesticide Contamination Prevention Act

by
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EXECUTIVE SUMMARY

The Pesticide Contamination Prevention Act

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

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

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

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

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

The Well Inventory Database

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

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

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

What Happens When Detections are Reported to DPR

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

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

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

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

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

General Information about Sampling Results in the Well Inventory Database

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

The data can be used to:

Display the geographic distribution of well sampling.

Display the geographic distribution of pesticide residues in sampled wells.

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

There are limitations on interpreting the data, including:

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

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

The Data in this Report

This is the twelfth report and the fifth update to the 1992 cumulative report on the entire contents of the database.

Data were submitted to DPR from July 1, 1996 to June 30, 1997.

Data are the results of 28 studies conducted by 9 agencies.

Data are from studies that were conducted from 1989 to 1997.

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

| CATEGORY | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | TOTAL (d) |
|---|------|------|------|------|------|------|------|------|------|------|------|-------|--------------|
| Total wells sampled | 8987 | 574 | 3074 | 752 | 2784 | 1557 | 4741 | 2324 | 2839 | 3322 | 3564 | 2508 | 20,400 |
| no detections | 6583 | 317 | 2791 | 543 | 2550 | 1351 | 3985 | 1945 | 2414 | 2769 | 3128 | 2071 | 16,031 |
| detections (a) | 2404 | 257 | 283 | 209 | 234 | 206 | 756 | 379 | 425 | 552 | 436 | 437 | 4,369 |
| verified detections (b) | 44 | 29 | 4 | 140 | 93 | 133 | 67 | 80 | 37 | 213 | 6 | 96 | 855 |
| Total counties sampled | 53 | 20 | 41 | 33 | 53 | 30 | 52 | 46 | 50 | 47 | 48 | 48 | 58 |
| no detections | 30 | 6 | 24 | 11 | 27 | 11 | 24 | 25 | 30 | 19 | 20 | 24 | 10 |
| detections (a) | 23 | 14 | 17 | 22 | 26 | 19 | 28 | 21 | 20 | 28 | 28 | 24 | 48 |
| verified detections (b) | 5 | 3 | 3 | 16 | 8 | 14 | 9 | 17 | 10 | 17 | 5 | 7 | 32 |
| Total pesticides and related compounds | 160 | 79 | 167 | 96 | 191 | 186 | 125 | 112 | 114 | 166 | 121 | 165 | 308 |
| no detections | 144 | 64 | 142 | 81 | 164 | 166 | 85 | 83 | 95 | 139 | 99 | 143 | 212 |
| detections (a) | 16 | 15 | 25 | 15 | 27 | 20 | 40 | 29 | 19 | 27 | 22 | 22 | 96 |
| verified detections (b) | 8 | 6 | 5 | 9 | 6 | 9 | 5 | 10 | 6 | 9 | 3 | 11 | 24 |
| Pesticides and related compounds detected in ground water as the result of legal, agricultural use (c) | 9 | 8 | 1 | 7 | 6 | 7 | 5 | 11 | 8 | 9 | 8 | 9 (e) | 15 (f) |

(a) Includes verified and unverified detections.

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

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

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

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

(f) The 15 compounds are: 1,2-D, ACET, aldicarb, aldicarb sulfone, aldicarb sulfoxide, atrazine, bentazon, bromacil, DBCP, deethyl-atrazine, deisopropyl-atrazine, diuron, EDB, prometon, simazine, and 2,3,5,6-tetrachloroterephthalic acid. Aldicarb, atrazine, bentazon, bromacil, diuron, prometon, and simazine have been reviewed through the Pesticide Detection Response Process. DPR considers the remaining chemicals to have reached ground water as a result of legal, agricultural use.

* Beginning with this report, when the parent compound is unknown, 2-amino-4-chloro-6-ethylamino-s-triazine (ACET) and 2,4-diamino-6-chloro-s-triazine (DACT) will be used to name the degradates common to both atrazine and simazine. Previously, either deisopropyl-atrazine or deethyl-simazine were used.

Summary of Data in This Report

48,919 records (chemical analyses) were added to the database for this report.

2,508 wells were sampled in 48 counties.

165 pesticide active ingredients and breakdown products were analyzed.

22 compounds were reported with positive detections.

Detections Referred to SWRCB

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

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

1,2-dibromo-3-chloropropane (DBCP): 276 wells

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

ethylene dibromide (EDB): 18 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. Beginning with this report, when the parent compound is unknown, ACET and DACT will be used to name the degradates common to both atrazine and simazine. In previous reports, either deisopropyl-atrazine or deethyl-simazine were used in place of ACET.

Summary of Verified Detections

Verified detections were made of 11 compounds: bromacil, diuron, hexazinone, norflurazon, prometon, TPA, atrazine and its breakdown product DEA, simazine, and the breakdown products ACET, DACT, which are common to both atrazine and simazine.

Verified detections were made in 96 wells in seven counties (Table 2).

Counties with verified detections were: Butte, Fresno, Madera, Mendocino, San Joaquin, Stanislaus, and Tulare.

Verified detections were made in 86 private drinking water wells, 7 public wells, and 3 non-drinking wells.

The concentration of all verified detections was below established health action levels for these compounds.

Table 2. Summary of wells with verified detections of pesticide residues by county and chemical. Results are for data reported from July 1, 1996 through June 30, 1997.

| Chemical | Butte | Fresno | Madera | Mendocino | San | | | Total Wells |
|----------------|-------|--------|--------|-----------|---------|------------|--------|-------------|
| | | | | | Joaquin | Stanislaus | Tulare | |
| atrazine | 1 | 1 | | | 5 | | | 7 |
| bromacil | 1 | 16 | | | | | 11 | 28 |
| diuron | | 33 | 2 | | 2(a) | 1 | 12 | 50 |
| hexazinone | | | | | 2(a) | 1(a) | | 3 |
| norflurazon(b) | | 8(a) | | | | | 1(a) | 9 |
| prometon | | 1 | | | | | | 1 |
| simazine | | 47 | 3(a) | 2(a) | 1(a) | | 21 | 74 |
| TPA | | | 3(a) | | | | | 3 |
| ACET | | 21 | | | 3(a) | 1 | 12 | 37 |
| DACT(b) | | 22(a) | | | | | 5(a) | 27 |
| DEA | | 26 | | | 6(a) | | 8 | 40 |
| Total | 1 | 54 | 4 | 2 | 9 | 2 | 24 | 96 |

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

(b) These are the first verified detections of DACT and norflurazon in California

Legal Agricultural Use Determinations

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

Legal agricultural use was determined to be the source of residues in 45 wells in six counties (Section II, Table II-3). The pesticides and breakdown products are: atrazine, bromacil, diuron, prometon, simazine, ACET, DEA, and TPA

Pesticide Management Zone (PMZ)

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

DPR recommended 27 sections as new PMZs (Section II, Table II-4).

For the first time, two sections were recommended as PMZs for Madera County.

Factors That Contribute to Ground Water Contamination

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

DPR conducted a cooperative study with the U. S. Geological Survey to investigate the ages and concentrations of herbicides in ground water in areas of Fresno and Tulare counties.

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

The State and Regional Water Boards

SWRCB and nine regional water quality control boards are responsible for protecting the beneficial uses of water in California and for controlling all discharges of waste into waters of the state. Actions taken by SWRCB to prevent pesticides from migrating to ground water are detailed in section III of this report.