



Department of Pesticide Regulation



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MEMORANDUM

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SUBJECT: SUMMARY OF RESULTS FOR FISCAL YEAR 2000/01 GROUND WATER
PROTECTION LIST MONITORING FOR ALACHLOR, METOLACHLOR,
AND TWO DEGRADATES OF EACH

BACKGROUND

In 1987, a group of 45 pesticide active ingredients (AIs) were put into regulation as the Ground Water Protection List (GWPL) (Title 3, California Code of Regulations Section 6800[b]) compounds which have the potential to pollute ground water through normal agricultural use. A monitoring protocol for GWPL AIs developed in 1988 required that compounds on the list be prioritized before monitoring was conducted [1]. From 1992 through 1999, a total of 20 of the highest priority AIs [2, 3, 4, 5, 6, 7, 8, 9] were monitored with between 25 and 40 wells sampled for each AI.

A revised protocol for GWPL monitoring was approved in 1997 [10] and is now used to select AIs for monitoring. Under the new protocol, compounds on the GWPL are not formally prioritized. Rather, AIs are selected for monitoring based on current information about their physico-chemical characteristics, cultural practices for crops on which they are applied, detections in ground water anywhere in the United States, and any other pertinent information. The GWPL was also amended in regulation on March 23, 2001, and now includes a total of 62 AIs. Each year, one or more AIs will be selected for monitoring with approval from the branch chief.

Alachlor and metolachlor, along with the ethanesulfonic acid (ESA) and oxanilic acid (OXA) degradates of each, were selected for monitoring during FY 2001/02. Well monitoring for alachlor and metolachlor parent compounds had been conducted in Merced County, California in 1987 but no residues of either AI were detected [11]. More recently, ground water monitoring conducted by the U.S. Geological Survey (USGS) in Iowa showed the presence of the ESA



and OXA degradates of alachlor and metolachlor along with the parent metolachlor [12]. Therefore, those degradates were included in the analyses for this study.

METHODS

Environmental Hazards Assessment Program sampled wells for alachlor and metolachlor and the ESA and OXA degradates of each during April-September, 2001. Areas to be surveyed for well sampling were selected based on pesticide use report information for 1994-1999. Counties were listed in descending order for use of each AI, and the nine counties with the greatest use of each AI were selected. Sections were chosen within each county where the greatest quantities of the pesticides had been applied. Those sections that had coarse soil types and shallow depth to ground water were targeted as primary locations for monitoring. Both alachlor and metolachlor were used in some of the sections. Sampling crews drove through pre-selected sections of land in each county with the goal of sampling one well per section. For each well sampled, two primary, four backup, and two field blank samples were collected.

An agreement was made with the USGS to serve as the primary laboratory, analyze one primary sample, and one backup sample from each well. The primary sample was analyzed using a LC/MS screen for alachlor ESA, alachlor OXA, metolachlor ESA, metolachlor OXA, and also for acetochlor ESA, acetochlor OXA, dimethenamid ESA, dimethenamid OXA, flufenacet ESA, and flufenacet OXA. This analytical method was later determined to be unequivocal for the OXA but not the ESA degradates [13]. Therefore, no second analysis was necessary for verification of detections of the OXA degradates; detections of ESA degradates required verification by a second laboratory.

A backup sample was subjected by the USGS to a gas chromatography/mass spectroscopy analytical screen that included acetochlor, alachlor, atrazine, deethylatrazine (DEA), deisopropylatrazine (ACET), cyanazine, cyanazine amide, dimethenamid, flufenacet, demethylfluometuron, 3-trifluometylaniline, 3-(trifluoromethyl) phenyl urea, metolachlor, metribuzin, molinate, norflurazon, dimethylnorflurazon, pendimethalin, prometryn, deoispropylprometryn, propanil, propazine, simazine, and trifluralin. The reporting limit was 0.05 parts per billion (ppb) for all analytes. This analytical method was later determined to be unequivocal for all 25 analytes [14].

A second primary sample was analyzed by the California Department of Food and Agriculture (CDFA) Laboratory using LC/MS/MS analysis for alachlor, metolachlor, and the OXA and ESA degradates for each parent compound. The reporting limit was 0.1 ppb for the samples collected in April; the reporting limit for subsequent samples was 0.05 ppb. The CDFA analytical method for alachlor, metolachlor, and their respective OXA and ESA degradates was documented to be unequivocal [15]. Therefore, no second analysis was necessary for verification.

A second backup sample was analyzed by CDFA using a LC/MS/MS analytical screen for atrazine, bromacil, diuron, hexazinone, norflurazon, prometon, simazine, DEA, ACET, and didealkylated triazine (DACT). The reporting limit was 0.05 ppb for all analytes.

Use of alachlor and metolachlor was documented from pesticide use reports for 1994-1999. The total number of pounds of each chemical applied was determined for each section in which a well was sampled and also for the eight adjoining sections surrounding the monitored section. Land use characteristics were also determined for each section of land in which a well was sampled. The percentage of each land use type was determined for all but one county as based on 1993-1996 Department of Water Resources maps. Maps from 1989 were used for Yolo County. No land use data was available for sections monitored in Ventura County.

Expanded well monitoring was conducted in Stanislaus County during August 2001. During the initial well survey, three wells sampled there contained multiple degradate residues and the concentrations were generally higher than those found in other counties. Attempts were made to locate additional wells in sections surrounding those three contaminated wells. Samples were analyzed by the CDFA laboratory with a reporting limit of 0.05 ppb for all analytes. Again, the methods used were unequivocal so all detections were considered to be verified.

RESULTS

When sampling crews surveyed sections targeted for monitoring, they often could not locate a well in the targeted section and instead had to go to one of the eight adjoining sections to sample a well. A total of 74 wells were sampled in nine counties (Table 1, attached). Seventeen wells in four counties were targeted for alachlor and 57 wells in six counties for metolachlor. However, all primary samples were analyzed for both alachlor and metolachlor as a single analysis. Thus, each well was tested for both AIs.

None of the wells contained detectable residues of alachlor or metolachlor parent compounds. Several wells did contain residues of one or more of the degradates alachlor ESA, alachlor OXA, metolachlor ESA, or metolachlor OXA (Table 1). There were 25 detections of degradates made by the CDFA laboratory, and of those, 23 of the same detections were made by the USGS laboratory. Since the CDFA method is unequivocal, the 25 CDFA detections are verified. The USGS laboratory had an additional five detections of alachlor ESA and six detections of metolachlor ESA degradates which are considered to be unverified since the analytical method was not unequivocal for those degradates and no verification was made by the CDFA laboratory. Those detections were at or near the reporting limit of 0.05 ppb.

Verified detections of alachlor ESA were found in seven wells in four counties, alachlor OXA was detected in one well, metolachlor ESA was detected in ten wells in five counties, and

metolachlor OXA in seven wells in four counties. Seven wells contained two or more of the degradates. Three of those wells were in Stanislaus County, two were in Tulare County, and one well each in Sacramento County and San Joaquin County. Concentrations of alachlor ESA ranged from 0.051 to 1.131 ppb, the one alachlor OXA detection was 0.051 ppb, metolachlor ESA ranged from 0.196 to 4.02 ppb, metolachlor OXA ranged from 0.059 to 0.344 ppb.

Other herbicide residues were also detected. Atrazine was found in two wells, simazine in one, diuron in four wells, and norflurazon in one well. Also detected were degradates of atrazine and simazine: DEA (2-amino-4-chloro-6-isopropylamino-s-triazine or deethylatrazine), ACET (2-amino-4-chloro-6-ethylamino-s-triazine, also known as deisopropylatrazine or deethylsimazine) and DACT (2,4-diamino-6-chloro-s-triazine, also known as didelakylated triazine when it's not known if parent compound is atrazine or simazine). Residues of DEA were found in two wells, ACET in four, and DACT in six wells.

Alachlor and metolachlor use data and land use characteristics are presented by county in Tables 2-9 (attached). In each table, the total number of pounds of alachlor or metolachlor applied during the years 1994-1999 are presented for the section in which a well was sampled (in section) and also as a total for that section plus the eight adjoining sections (9-section). No applications of alachlor in the monitored area of Stanislaus County were reported after 1994. Therefore, alachlor use in Stanislaus County is reported for the years 1990-1994. For the 17 sections targeted for alachlor, use of alachlor was documented in eight of those sections and in sections adjacent to three others. For the seven sections where alachlor metabolites were detected in a well, alachlor use was documented in two of the sections and in sections adjacent to two others. In the 65 sections targeted for metolachlor, use of metolachlor was documented in 53 sections and in sections adjacent to 12 others. For sections where metolachlor degradates were detected in a well, metolachlor use was documented in nine of the ten sections and in sections adjacent to the tenth

For expanded monitoring conducted in Stanislaus County, a total of 14 additional wells were sampled in 13 sections (Table 10, attached). At the time these wells were sampled, a survey was made of the areas around the wells for possible point sources. Sampling crews observed a few holding ponds used to collect excess irrigation or rain water runoff from nearby fields. Also, at one location, water was seen flowing into a drain hole in the ground. The holding ponds and drain hole may be related to the elevated levels of herbicide residues found in the area.

Alachlor ESA was found in six wells, metolachlor ESA in ten, and metolachlor OXA in two wells. Levels of metolachlor ESA were high (20.2 and 10.03 ppb) in wells in sections 07S/08E-14 and 07S/09E-07. Backup samples for those wells were sent to the USGS laboratory for analysis and results show that similar levels of metolachlor ESA (24.0

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and 11.0 ppb) were detected (Table 10). Also, residues of diuron and hexazinone were found in one well each.

Alachlor and metolachlor use data and land use characteristics for Stanislaus County are presented in Table 7. Alachlor use was documented in one of the six sections where well contamination was found and in sections adjacent to three others. Use of metolachlor was documented in eight of the nine sections where metolachlor degradates were found in wells and in sections adjacent to the ninth.

Attachments

REFERENCES CITED

1. Weaver, D. November 30, 1988. Protocol for ranking the ground water protection list for contamination potential and for subsequent monitoring under commercial agricultural conditions.
2. Weaver, D. and J. Marade. July 15, 1992. Memorandum to K. Goh: Summary of results for FY 1991-92 ground water protection list monitoring.
3. Weaver, D. and J. Marade. August 23, 1993. Memorandum to J. S. Sanders: Summary of results for FY 1992-93 ground water protection list monitoring.
4. Weaver, D. and J. Marade. August 19, 1994. Memorandum to K. S. Goh: Summary of results for FY 1993-94 ground water protection list monitoring.
5. Weaver, D. and J. Marade. June 30, 1995. Memorandum to K. S. Goh: Summary of results for FY 1994-95 ground water protection list monitoring.
6. Weaver, D. and J. Marade. August 21, 1996. Memorandum to K. S. Goh: Summary of results for FY 1995-96 ground water protection list monitoring.
7. Weaver, D. and J. Marade. June 30, 1997. Memorandum to K. S. Goh: Summary of results for FY 1996-97 ground water protection list monitoring.
8. Weaver, D. and J. Marade. June 30, 1998. Memorandum to K. S. Goh: Summary of results for FY 1997-98 ground water protection list monitoring.
9. Weaver, D. and J. Marade. March 19, 1999. Memorandum to K. S. Goh: Summary of results for FY 1998-99 ground water protection list monitoring.
10. Weaver, D. J. April 8, 1997. Revised protocol for selecting Ground Water Protection List active ingredients to be monitored under certain agricultural conditions.
11. Troiano, John and J. Sitts. 1990. Survey for alachlor, atrazine, metolachlor and nitrate residues in well water in Merced County and their relation to soil and well characteristics. California Department of Pesticide Regulation, Environmental Hazards Assessment Program, EH 90-3. 83 pp.
12. Boyd, Robert A. 1999. Herbicides and herbicide degradates in shallow ground water and the Cedar River near a municipal well field, Cedar Rapids, Iowa. U.S. Geological

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Charleston South Carolina March 8-12, 1999.

13. Spurlock, Frank. April 22, 2002. Memorandum to Kean S. Goh: Determination if USGS's LC/MS method for chloroacetanilide herbicide degradates (Method 0-2134-00, analysis code LCAA) meets the "unequivocal detection" criteria.
14. Spurlock, Frank. April 22, 2002. Memorandum to Kean S. Goh: Determination if USGS's GC/MS method for selected herbicides and degradates (Method 0-2132-99, analysis code GCR) meets the "unequivocal detection" criteria.
15. Spurlock, Frank. August 30, 2001. Memorandum to Kean S. Goh: Determination if the California Department of Food and Agriculture's alachlor, metolachlor and selected metabolites LC/MS/MS method (EM 37.6, revision date 4/13/01) meets the "unequivocal detection" criteria.

Table 1. Detections of herbicides in wells sampled for alachlor or metolachlor during 2000-2001 Ground Water Protection List Monitoring. Only data for herbicides that were detected are presented. For each well, CDFA laboratory results are shown on the first line, USGS laboratory results on the second line.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Fresno	13S/11E-01	M	ND ^a	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND
			0.06	ND	ND	ND	0.07	ND	ND	ND	- ^b	-	ND
	13S/12E-22	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	13S/12E-34	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	13S/13E-05	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	14S/13E-24	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND			ND	ND	ND	ND	ND	ND	ND	-	-	ND	
14S/17E-24	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
15S/16E-03	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
16S/17E-14	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
17S/19E-36	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Kings	18S/22E-27	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	19S/23E-05	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	19S/23E-05	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	19S/23E-07	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	0.05	ND	ND	ND	ND	ND	ND	-	-
19S/23E-09	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
20S/19E-04	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
20S/22E-20	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
21S/19E-19	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
Sacramento	05N/05E-01	M	0.058	ND	0.716	0.144	ND	ND	ND	ND	ND	ND	
			ND	ND	0.76	0.16	ND	ND	ND	ND	-	-	ND

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Sacramento	05N/05E-03	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	05N/06E-02	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	0.06	ND	ND	ND	ND	ND	ND	-	-
	06N/05E-10	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	06N/05E-11	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	06N/05E-17	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND			ND	ND	ND	ND	ND	ND	ND	-	-	ND	
06N/05E-23	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
06N/05E-28	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
06N/05E-29	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
06N/05E-34	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
San Joaquin	01N/05E-23	M	ND	ND	0.196	0.059	ND	ND	ND	ND	ND	ND	ND
			ND	ND	0.34	0.14	ND	ND	ND	ND	-	-	ND
	01N/07E-26	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	03N/06E-33	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	04N/05E-35	M	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	04N/07E-04	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
04N/07E-05	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
04N/07E-08	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
01S/08E-14	M	ND	ND	0.689	ND	ND	ND	ND	0.06	0.22	ND	ND	
		ND	ND	0.94	ND	ND	ND	ND	ND	-	-	ND	
01S/09E-05	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
San Joaquin	02S/05E-03	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	02S/06E-31	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
Solano	05N/03E-27	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	06N/01E-08	A	ND	ND	1.05	ND	ND	ND	ND	0.05	0.41	0.08	0.10
			0.09	ND	1.09	ND	ND	ND	0.05	-	-	0.10	
	06N/01E-20	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			0.05	ND	0.07	ND	ND	ND	ND	ND	-	-	ND
	07N/01E-10	A	ND	ND	ND	ND	0.11	ND	0.07	ND	ND	0.21	ND
			ND	ND	ND	ND	0.08	ND	0.06	ND	-	-	ND
	07N/01E-22	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	07N/01E-22	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			0.05	ND	0.05	ND	ND	ND	ND	ND	-	-	ND
	07N/01E-25	A	0.29	ND	ND	ND	ND	ND	0.065	ND	ND	ND	ND
			0.30	ND	ND	ND	ND	ND	0.050	ND	-	-	ND

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Solano	07N/01E-25	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			0.05	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Stanislaus	02S/08E-25	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
	02S/08E-26	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	0.06	ND	ND	ND	ND	ND	ND	-	-
	03S/07E-36	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
	03S/07E-36	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
	05S/07E-24	M	1.31	0.051	0.75	0.344	ND	ND	ND	ND	ND	ND	ND
			1.38	0.05	0.76	0.44	ND	ND	ND	ND	ND	-	-
05S/08E-18	M	0.055	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		0.13	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
06S/08E-12	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	0.05	ND	ND	ND	ND	ND	ND	-	-	ND
06S/08E-23	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
06S/08E-35	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Stanislaus	06S/08E-36	M	0.208	ND	1.89	0.137	ND	ND	ND	ND	ND	ND	ND
			0.23	ND	1.96	0.20	ND	ND	ND	ND	-	-	ND
	06S/09E-09	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
	06S/09E-19	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND			ND	ND	ND	ND	ND	ND	ND	-	-	ND	
06S/09E-31	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	
07S/08E-12	M	0.051	ND	4.02	0.101	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	3.54	0.12	ND	ND	ND	ND	-	-	ND	
Tulare	17S/24E-23	M	ND	ND	1.15	0.118	ND	ND	ND	ND	ND	ND	ND
			ND	ND	1.57	0.10	ND	ND	ND	ND	-	-	ND
	17S/24E-24	M	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
17S/24E-35	M	ND	ND	1.10	0.068	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	1.50	0.10	ND	ND	ND	ND	-	-	ND	
18S/24E-03	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	

Table 1. Continued.

County	Township/Range -Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion										
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon
Tulare	19S/23E-27	M	ND	ND	ND	ND	ND	0.09	ND	0.10	ND	ND	ND
			ND	ND	ND	ND	ND	0.10	ND	0.08	-	-	ND
	20S/25E-21	M	ND	ND	ND	ND	ND	ND	ND	ND	0.64	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
20S/26E-05	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
21S/27E-07	M	ND	ND	0.194	ND	ND	ND	ND	ND	ND	0.15	ND	ND
		ND	ND	0.28	ND	ND	ND	ND	ND	ND	-	-	ND
Ventura	01N/21W-21	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
	01N/22W-24	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Yolo	06N/03E-11	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
	09N/01E-17	A	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0.08			ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND
09N/01E-19	A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND

Table 1. Continued.

County	Township/Range-Section	Selected For Alachlor (A) or Metolachlor (M)	Concentration, parts per billion											
			Alachlor Esa	Alachlor Oxa	Metolachlor Esa	Metolachlor Oxa	Atrazine	Simazine	DEA	ACET	DACT	Diuron	Norflurazon	
Yolo	09N/02E-23	A	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND	ND -	ND -	ND ND

^a ND = none detected at the reporting limit of 0.05 parts per billion for all chemicals.

^b - = not tested for by that laboratory.

Table 10. Results of expanded well monitoring for herbicide residues in Stanislaus County in August 2001 as a follow-up to Ground Water Protection List Monitoring conducted there during June 2001. Only data for compounds that were detected are presented.

Township/Range- Section	Concentration, parts per billion				
	Alachlor Esa	Metolachlor Esa	Metolachlor Oxa	Diuron	Hexazinone
05S/07E-13 ^a	0.487	ND ^b	ND	ND	ND
05S/07E-24 ^a	1.27	0.157	ND	ND	ND
05S/08E-08 ^a	ND	ND	ND	ND	ND
05S/08E-18 ^a	0.688	ND	ND	ND	ND
05S/08E-19 ^a	ND	0.06	ND	ND	ND
06S/08E-25 ^a	ND	0.117	ND	ND	ND
06S/08E-26 ^a	0.05	ND	ND	ND	ND
06S/08E-36 ^a	0.621	1.98	0.129	ND	ND
07S/08E-02 ^a	ND	0.292	ND	ND	ND
07S/08E-14 ^c	0.479	20.20	2.65	ND	0.060
	0.640	24.000	2.380	ND	- ^d
07S/09E-06 ^a	ND	0.279	ND	0.07	ND
07S/09E-06 ^a	ND	0.117	ND	ND	ND
07S/09E-07 ^c	ND	10.03	ND	ND	ND
	ND	11.00	0.050	ND	-
07S/09E-18 ^a	ND	0.103	ND	ND	ND

^a Analytical results from the CDFA Laboratory.

^b ND = none detected at the reporting limit of 0.05 parts per billion for all analytes.

^c Analytical results on first line are from the CDFA laboratory; second line results are from the USGS laboratory. ND = none detected at the reporting limit of 0.05 parts per billion for all analytes.

^d - = not tested for by that laboratory.

Contact GWPP@cdpr.ca.gov for tables that have been removed and references not currently available on the web. Tables that have been removed are listed below.

Table 2. Fresno County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 3. Kings County-Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 4. Sacramento County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 5. San Joaquin County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 6. Solano County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 7. Stanislaus County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 8. Tulare County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.

Table 9. Yolo County -Use of alachlor and metolachlor and land use characteristics for sections of land in which one or more wells were sampled for 2000-2001 Ground Water Protection List monitoring.