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SUBJECT: STUDY GW07–SUMMARY OF RESULTS FOR FISCAL YEAR 2006/07 GROUND WATER PROTECTION LIST MONITORING FOR NAPROPAMIDE AND ORYZALIN

SUMMARY

Napropamide and oryzalin were chosen for monitoring from the active ingredients (AIs) on the Ground Water Protection List (GWPL). Seventy-four wells were sampled in nine counties during March through June 2007. No residues of napropamide or oryzalin were detected in any of the wells. Since additional laboratory funding was available, each sampled well was also analyzed for the presence of triazine herbicides and degradates, with several detections reported.

BACKGROUND

The Department of Pesticide Regulation's (DPR's) GWPL is a list of pesticides having the potential to pollute ground water. Pursuant to California Food and Agricultural Code (FAC) section 13143, companies seeking to register an agricultural use pesticide containing a new AI must send DPR certain chemical and environmental fate data. If these data exceed certain key values and the pesticide label specifies certain application methods, FAC section 13144 requires DPR to add the pesticide to GWPL. GWPL is contained in the Title 3,California Code of Regulations (3CCR) section 6800. FAC section 13148 requires DPR to monitor pesticides on GWPL to "more accurately determine the mobility and persistence of the pesticides" and "determine if these pesticides have migrated to groundwaters of the state." Since 1990, DPR has sampled approximately 1200 wells for 81 pesticides and pesticide breakdown products as part of GWPL monitoring (CDPR, 2007a). The herbicides napropamide and oryzalin were selected for monitoring during fiscal year 2006/07, based on procedures described in Troiano (1997). These herbicides were selected based on the availability of a combined laboratory analysis method and trends in reported use.

DPR may also sample for the presence of known ground water contaminants (3CCR section 6800[a]), hexazinone, and several important degradates of these parent AIs. Detections of these pesticides can be used to create new ground water protection areas (GWPAs), or as a comparison in investigations for the presence of new AIs in established GWPAs.

METHODS

DPR chose study sections based on soil vulnerability and pounds of AI applied as reported in the pesticide use reports (PURs). All selected sections were in the 80th percentile or higher for total pounds of target pesticide applied for reporting years 1992–2003; the ten counties with the highest use of each AI over this time period are presented in Table 1. Additionally, most sections were classified as GWPAs, having a depth to ground water of 70 feet or less, with soil types classified as vulnerable. The sampled sections were located in Butte, Colusa, Fresno, Merced, San Joaquin, Santa Clara, Stanislaus, Tulare, and Yolo counties (Table 2). Although high use of both napropamide and oryzalin was reported in Kern county, DPR did not sample the area due to a lack of available wells and excessive depth to ground water (greater than 100 feet).

Table 1. Counties with the highest use of napropamide and oryzalin for reporting years 1992–2003 (CDPR, 2007b).

Napropamide		Oryzalin	
County	**Pounds**	**County**	**Pounds**
Fresno	196,607	Kern	1,476,793
Yolo	184,271	Fresno	892,005
Kern	164,590	Madera	545,930
San Joaquin	156,408	Tulare	531,867
Merced	104,194	San Joaquin	473,888
Colusa	95,594	Stanislaus	362,775
Stanislaus	92,510	Merced	348,250
Monterey	68,320	Butte	210,815
Madera	59,132	Monterey	176,163
Solano	49,899	Orange	146,092

Table 2. Sections containing wells sampled during 2006–2007 GWPL monitoring. Pounds of napropamide or oryzalin applied in each section are given for reporting years 1992–2003 (CDPR, 2007b). Depth to ground water values are from Troiano et al. (2000).

County	Section	AI	Depth to ground water (ft)	Pounds applied
Butte	04M21N01E01*	Oryzalin	51	4072
	04M21N01E04		25	1879
	04M21N01E12		52	1985
	04M21N01E16		21	2489
	04M21N01E26		30	5681
	04M21N01E28		20	2162
Colusa	06M14N02W28	Napropamide	54	1545
	06M15N03W20		6	346
	06M15N03W28		13	1586
	06M15N03W29		13	1483
	06M15N03W33		30	388
	06M15N03W36		24	802
Fresno	10M14S23E26*	Oryzalin	54	1707
	10M14S23E32*		39	2436
	10M14S23E33*		36	7110
	10M15S23E06*		38	42
	10M15S23E07*		39	375
	10M15S23E13*		66	2840
	10M15S23E22*		57	3063
	10M15S23E24*		67	3177
	10M15S23E32*		39	803
Merced	24M05S11E33*	Oryzalin	41	2364
	24M06S10E25*		20	1787
	24M06S10E35*		14	1742
	24M06S11E04*		35	1683
	24M06S11E33*		39	911
	24M06S11E36*		51	164
	24M07S10E02*		13	1436
	24M07S10E03*		12	2092
San Joaquin	39M02S07E10*	Oryzalin	20	1779
	39M02S07E15*		15	2095
	39M02S07E16*		14	3925
	39M02S07E17*		9	2799
	39M02S07E21*		12	4128
	39M02S07E22*		12	4256
	39M02S07E23*		14	1980
Santa Clara	43M10S04E29*	Napropamide	48	1444
	43M10S04E33*		42	5853
	43M11S04E04*		29	2391
	43M11S04E10*		19	5557
	43M11S04E22*		10	1814

County	Section	AI	Depth to ground water (ft)	Pounds applied
Santa Clara	43M11S04E33*		12	648
Stanislaus	50M03S08E32*	Napropamide	17	17
	50M03S08E33*		19	2294
	50M04S08E10*		20	337
	50M04S08E14*		19	1111
	50M04S08E23*		16	2892
	50M04S08E27*		13	850
Tulare	54M19S26E13*	Oryzalin	44	1580
	54M19S26E16*		39	2295
	54M19S26E17*		38	4178
	54M19S26E20*		41	415
	54M19S26E21*		39	2993
	54M19S26E23*		37	166
	54M19S26E24*		34	2065
	54M19S27E19*		37	1662
Yolo	57M10N01W20*	Napropamide	27	973

* Section is a GWPA

DPR selected domestic wells for sampling according to procedures in SOP FSWA006.00 (Marade, 1998), with the goal of sampling at least one well in each selected section. Samples were collected using the methods described in SOP FSWA001.00 (Marade, 1996). CDFA's Center for Analytical Chemistry analyzed one primary sample from each well for oryzalin/napropamide. A second sample was analyzed for the compounds in CDFA triazine screen: atrazine, bromacil, diuron, hexazinone, norflurazon, prometon, simazine, deethyl atrazine, deisopropyl atrazine, diamino chlorotriazine, and desmethylnorflurazon. Samples containing known amounts of oryzalin and napropamide and disguised as actual samples (blind spikes) were prepared and analyzed in accordance with SOP QAQC001.00 (Segawa, 1995). Samples containing deionized water (field blanks) were collected at the same time as the field samples and analyzed to confirm the validity of positive results. The reporting limit for all analytes was 0.05 parts per billion (ppb). The reporting limit is the smallest amount that can be reliably detected and is set by the testing laboratory for each compound.

RESULTS

A total of 74 wells were sampled in nine counties, with no reported detections of napropamide or oryzalin (Table 3). Compounds included in CDFA triazine screen were found in 32 wells located in Fresno, Merced, San Joaquin, Stanislaus, and Tulare counties. The analytical methods used by CDFA laboratory are unequivocal for all compounds included in the analytical screen; thus, no further verification of results is needed.

Table 3. Detections of pesticides in wells sampled for napropamide, oryzalin, and compounds in CDFA triazine screen during 2006–2007 GWPL monitoring. Data are presented only for compounds that were detected in at least one well. All detections are reported in ppb.

County	Section	Simazine	Diuron	Bromacil	Norflurazon	DSMN	ACET	DACT
Fresno	10M14S23E26	0.072	ND[a]	ND	ND	ND	0.109	0.109
	10M14S23E32	0.07	ND	ND	ND	ND	0.288	0.254
	10M14S23E33	ND	ND	ND	ND	0.241	ND	0.064
	10M15S23E22	ND	ND	ND	ND	0.093	0.083	0.172
	10M15S23E13	0.68	ND	ND	0.187	0.881	0.385	0.601
	10M15S23E32	0.084	ND	ND	ND	ND	0.218	0.365
	10M15S23E07	0.091	0.228	ND	ND	ND	0.154	0.155
Merced	24M06S10E35	0.106	ND	ND	0.267	0.123	0.152	0.073
	24M06S11E33	ND	ND	ND	ND	ND	0.05	0.089
	24M05S11E33	ND	ND	ND	ND	ND	0.052	0.531
	24M06S11E04	0.099	ND	ND	ND	0.484	0.236	0.527
San Joaquin	39M02S07E15	0.056	ND	ND	ND	0.065	0.551	0.714
	39M02S07E16	ND	ND	ND	ND	ND	ND	0.052
	39M02S07E21	ND	ND	ND	ND	ND	ND	0.05
	39M02S07E21	ND	ND	ND	ND	ND	ND	0.164
	39M02S07E10	0.107	ND	ND	0.052	0.112	0.158	0.149
	39M02S07E22	0.076	ND	ND	ND	0.079	0.262	0.659
Stanislaus	50M03S08E33	ND	ND	ND	ND	ND	0.078	0.311
	50M03S08E32	ND	ND	ND	ND	ND	ND	0.123
	50M04S08E14	ND	ND	ND	0.291	1.86	0.093	0.211
	50M04S08E14	ND	ND	ND	0.097	0.559	ND	0.134
	50M04S08E23	ND	ND	ND	ND	0.316	0.23	1.23
	50M04S08E23	ND	ND	ND	ND	ND	0.053	0.166
Tulare	54M19S26E24	0.102	0.655	0.924	2.48	1.44	1.79	1.68
	54M19S26E23	ND	ND	ND	0.112	0.084	0.078	0.088
	54M19S26E24	ND	ND	ND	ND	ND	0.064	0.068
	54M19S26E13	0.11	0.375	1.31	ND	ND	1.57	1.13
	54M19S26E21	0.148	ND	ND	ND	0.056	0.544	0.686
	54M19S26E21	ND	ND	ND	ND	ND	0.055	0.08
	54M19S26E15	0.089	0.177	ND	0.095	0.382	0.225	0.268
	54M19S26E17	0.09	0.166	ND	0.062	0.219	0.157	0.222
	54M19S26E20	ND	0.068	ND	ND	ND	ND	ND

[a] ND = none detected at the reporting limit of 0.05 ppb. The reporting limit is the smallest amount that can be reliably detected and is set by the testing laboratory for each compound.

DISCUSSION

None of the 74 sampled wells tested positive for either napropamide or oryzalin, despite being located in high-use sections with vulnerable soils. Similar results were obtained in a GWPL monitoring study conducted in 1998–1999, in which 64 wells were sampled for napropamide and oryzalin (Weaver and Marade, 1999). The combined results of the 1998–1999 and 2006–2007 monitoring studies indicate that the AI s napropamide and oryzalin have a low potential for contaminating California ground water due to legal agricultural use in vulnerable areas.

A total of 32 wells had positive detections of compounds in the triazine screen. All of these wells are located in GWPAs, where use of these pesticides has been modified to prevent further contamination.

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