Department of Pesticide Regulation

M E M O R A N D U M

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SUBJECT: SELECTION OF PESTICIDE ACTIVE INGREDIENTS FOR FUTURE ANALYTICAL METHOD DEVELOPMENT AND GROUND WATER MONITORING

The Pesticide Contamination Prevention Act (1985) mandates that the Department of Pesticide Regulation (DPR) conduct ground water monitor for pesticide active ingredients on the Ground Water Protection List (GWPL). Pesticides on the GWPL either have been detected in the state's ground water and their use currently regulated or have been identified as potential ground water contaminants and subject to ground water monitoring. Currently, there are 101 pesticides on the GWPL identified as potential ground water contaminants.

Resource limitations have necessitated the prioritizing of pesticides on the GWPL for analytical method development and ground water monitoring. A process still under development has been adopted to prioritize these pesticides, ranking them according to their perceived threat to ground water. This prioritization scheme consists of coupling ranking data from various measures of each pesticide's use data, obtained from pesticide use reports, with computer modeling data simulating its potential movement to ground water. Various physical-chemical properties of each pesticide are used in the simulations along with typical weather data and soil conditions for a large cropping location in the San Joaquin Valley vulnerable to pesticide leaching. The simulations also are specific to each pesticide's application rate and use pattern. Pesticides with measures of high use and greater simulated potential for movement to ground water received higher overall rankings and, generally, higher priority for method development and monitoring.

Fourteen pesticides on the GWPL were demoted to the lowest rankings because of one or more factors mitigating their potential to impact ground water:

(1) Their registration has been cancelled.
(2) They are no longer manufactured.
(3) They have physical-chemical properties that would displace the effect of the use data on their rankings, such as extreme volatility, making their movement to ground water highly improbable.

Ground water monitoring has already been conducted for many pesticides on the GWPL. Pesticides for future method development and monitoring were selected from the 50 highest ranking pesticides on the GWPL with the criterion that monitoring by DPR had not previously been conducted on the pesticides or, if so, not since 1995. Seventeen pesticides met this criterion. These pesticides were then evaluated for factors limiting their potential to impact ground water that could not be quantitatively assessed by the above-mentioned ranking procedure:

(1) Site-specific pesticide applications. Generally, some sites have a reduced potential for pesticide leaching such as non-irrigated sites compared to irrigated sites.
(2) Targeted location of pesticide applications. Typically, the potential for residue leaching is reduced in non-soil applications compared to direct soil applications. Non-soil applications include those to above-ground plant structures.
(3) Declining annual pesticide use where recent state-wide applications have become negligible and are unlikely to return to previous levels.

Based on the occurrence or magnitude of these factors each pesticide was characterized as having a high, medium, or low potential for residue leaching. They were then categorized accordingly as having a high, medium, or low priority for monitoring. The pesticides within each category maintained their relative ranking from the quantitative assessment of the prioritization scheme, descending from those presenting the highest potential threat to ground water (Table 1).

Three rice pesticides are listed in Table 1. The computer modeling procedure used in the prioritization scheme, which was developed to simulate pesticide movement in a course, leaching vulnerable soil under a generic irrigation regime may not be appropriate for modeling residue movement under the unique culture of rice production. The soil surface is typically highly impervious to leaching in order to maintain flooded conditions. Additionally, water use in rice production is not entirely based on crop demand, being influenced also by its unique cultural practices. For these reasons, added uncertainty exists concerning the priority given for the monitoring of the rice pesticides.

Considering that the three rice pesticides are almost exclusively used on rice it is possible that they have significant overlapping use patterns. Added ground water monitoring efficiencies may be obtained by sampling for all three rice pesticides simultaneously. Other, largely rice-exclusive pesticides on the GWPL, such as propanil also could be considered in a general rice-pesticide monitoring study. The ranking of propanil in the prioritization scheme was too low to meet the requirements for inclusion in this current analysis. Because of the uncertainty in modeling rice pesticides, consideration for including propanil and any other rice pesticide on the GWPL in a rice-monitoring study would seem reasonable.

Table 1. Prioritization of pesticides for future analytical method development and ground water monitoring.

Pesticide rank	Pesticide type	Main sites/crops of application	Estimated proportion of soil applications	Annual state-wide use (lbs)	Average annual rate of change in use 1994 – 2007
		High priority monitoring			
1 Isoxaben	Herbicide	Rights of Way (55%), Landscape Maintenance (28%), N-Outdr Container/Fld Grwn Plants (9.8%), Structural Pest Control (1.1%), Almond (1.1%)	95%	26,761 (2006) 22,818 (2007)	9% increase
2 Linuron	Herbicide	Carrots, General (81%), Asparagus (Spears, Ferns, etc.) (13%), Celery, General (4.9%), Rights of Way (1.0%)	Probably >50% [z]	59,164 (2006) 58,592 (2007)	3% decrease
3 Propyzamide	Herbicide	Lettuce head (60%) Lettuce leaf (33%) Artichoke (2%) Landscape Maintenance (1%)	75%	121,711 (2006) 114,860 (2007)	No change
4 Thiobencarb	Herbicide	Rice (99.9%)	100%	310,352 (2006) 289,046 (2007)	No change
5 Mefenoxam	Fungicide	Carrots, General (28%), Spinach (12%), Onion (Dry, Spanish, White, Yellow, Red, etc.) (8.7%), Tomatoes, For Processing/Canning (7.6%), Strawberry (All or Unspec) (5.1%)	90%	72,958 (2006) 57,444 (2007)	8% increase
		Medium priority monitoring			
6 Ethofumesate	Herbicide	Sugarbeet (60%) Landscape maintenance (30%) Ornamental Turf (3.5%) Structual Pest Control (1%)	60% [z]	17,127 (2006) 18,495 (2007)	No change [y]

7 Flutolanil	Fungicide	Landscape Maintenance (97%), Structural Pest Control (1.2%), Ornamental Turf (All or Unspec) (0.4%)	75%	11,372 (2006) 10,843 (2007)	14% increase
8 Thiamethoxam	Insecticide	Cotton (64%) Commodity Fumigation (11%) Tomatoes (8%) Cataloupe (4%) Peppers (2%)	8%	13,964 (2006) 9,428 (2007)	No change
9 Ethoprop [x]	Insecticide, nematicide	Potato (71%) Sweet Potato (10%) Cabbage (6%) Beans Dried Type (4%) Beans Succulent (3%)	70%	24,485 (2006) 24,241 (2007)	6% increase
10 Pyrazon	Herbicide	Sugarbeet (95%) Beets (1%) Wheat (1%) Soil app. Preplant-outdoor seedbeds (1%)	99%	4,196 (2006) 2,712 (2007)	No change [y]
		Low priority monitoring			
11 Vinclozolin [w]	Fungicide	Lettuce head (52%) Strawberry (18%) Lettuce leaf (8%) N-Out Grwn Cut Flwrs or Greens (4%) Peach (4%)	<5%	402 (2006) 390 (2007)	14% decrease
12 2,4-D	Herbicide	Wheat (26%) Almond (10%) ROW (7%) Barley (7%) Landscape Mantenance (5%)	<1%	439,049 (2006) 397,154 (2007)	No change
13 Methomyl	Insecticide	Lettuce, Head (All or Unspec) (16%), Alfalfa (Forage - Fodder) (Alfalfa Hay) (15%), Corn, Human Consumption (6.2%), Grapes (5.8%), Tomatoes, For Processing/Canning (5.8%)	<1%	318,089 (2006) 307,154 (2007)	9% decrease
14 Metalaxyl	Fungicide	Cotton, General (15%), Carrots, General (11%), Onion (Dry, Spanish, White, Yellow, Red, etc.) (9.3%), Tomatoes, For Processing/Canning (8.1%), Tomato (7.1%)	~50%	1,654 (2006) 492 (2008) [v]	27% decrease

15	Dichlobenil [u]	Herbicide	Landscape maintenance (67%) ROW (17%) Regulatory Pest Control (>1%) Structural pest control (>1%) Field Grown Plants (>1%)	2%	61,545 (2006) 80,334 (2007)	27% increase
16	Bispyribac-sodium	Herbicide	Rice (99.8%) Landscape maintenance (<1%) Almonds (<1%)	<1%	1,685 (2006) 1,972 (2007)	No change
17	Bensulfuron methyl	Herbicide	Rice (99%) Structual Pest Control (<1%)	99%	724 (2006) 856 (2007)	23% decrease

[z] Application to weeds can be pre- or post-emergence. Post-emergence applications are made to weeds in the seedling stage allowing for potential overspray onto the soil to be substantial.

[y] Use in 2008, 2009, and 2010 has dropped dramatically coinciding with reduced sugarbeet production in California.

[x] Could be considered for high priority monitoring. Ethoprop has a reduced threat to ground water compared to high priority monitoring pesticides because of a moderately high vapor pressure (volatility) and a short field dissipation half-life.

[w] Ronilan DF and Ronilan EG Fungicide were the main products containing the active ingredient vinclozolin. These products became inactive in 2003 and 2005, respectively. Use of vinclozolin has since become negligible.

[v] Use reporting for metalaxyl in 2007 is inconsistent with reported use in prior and subsequent years. It is probable that reported use in 2007 is in error and has been omitted from this report. Only 1 of 37 metalaxyl products has a current active registration. Use of this single product has become negligible.

[u] Dichlobenil use has been heavily misreported in the PUR. Ninety percent of its use is from products exclusively specifying treatment of root growth in drains. Eight percent of its use is from products specifying applications to soil under asphalt and paved areas. Two percent of its use is from products specifying applications to landscaped areas and agricultural crops.