

## UPDATE ON NEW GROUND WATER PROTECTION REGULATIONS

*Mark W. Pepple*  
*California Department of Pesticide Regulation*  
*P.O. Box 4015, Sacramento, California, 95812*  
[mpepple@cdpr.ca.gov](mailto:mpepple@cdpr.ca.gov)

The California Department of Pesticide Regulation's (DPRs) new ground water protection regulations went into effect on May 27, 2004. The regulations require users to modify the use of seven herbicides that have been found in California ground water due to legal agricultural use -- atrazine, simazine, bromacil, diuron, prometon, bentazon and norflurazon – when they are used in newly defined vulnerable areas called ground water protection areas (GWPA). The new use modifications and GWPA are based on an improved understanding of how pesticides move to ground water, how that movement can be minimized, and what constitutes a vulnerable area. For the first time, pesticide users will be required to take actions to prevent ground water contamination before it is reported.

Except in the case of bentazon, the previous ground water regulations only applied in the one-square mile sections of land where the herbicides were detected in ground water. Additional vulnerable areas were identified solely of the basis of additional sampling, which was slow and costly. After a decade of monitoring, enough detections of pesticides were available for DPR to determine whether there was a relationship between detections and soil characteristics, climate and depth to ground water in the contaminated areas. DPR's analysis indicated that most detections occurred in relatively low rainfall areas, in certain soil types, such as coarse and hardpan soils, and at a depth to ground water of 70 feet or less (1, 2, 3, 4). Sections of land with these characteristics were considered vulnerable to movement of certain pesticides to ground water. DPR then developed a procedure to screen all sections of land that hadn't been sampled for pesticides and for which Natural Resource Conservation Service soils data and depth to ground water data were available to determine if they should be identified as vulnerable areas (5). Sections with those characteristics along with sections with actual pesticide detections were then identified as GWPA.

The previous regulations banned all uses of two herbicides (atrazine, prometon), all noncrop uses of three herbicides (simazine, bromacil, and diuron), and use of norflurazon in recharge areas and inside canal and ditch banks – all within Pesticide Management Zones (PMZs), which were the areas where these herbicides were detected in ground water. These various mitigation measures were based on the best information available at the time and recommendations of a multi-agency committee that formally reviews pesticides found in ground water. However, since these herbicides have similar environmental fate characteristics – they are both mobile and persistent – and are often found in the same wells, DPR believes that they move to ground water by the same mechanisms. One of the problems with banning preemergent herbicides is that users simply switch to alternative preemergent herbicides. Since these alternative chemicals usually have the same mobility and persistence characteristics as the banned materials, they would also be expected to contaminate ground water.

As DPR identified sensitive soil conditions, they also conducted studies to determine how pesticides behave under these conditions. In two studies DPR found that rainfall was insufficient to significantly move simazine residues downward in soil in coarse soils under relatively low rainfall conditions in California (6, 7). In contrast, studies to observe movement of atrazine pre-emergent herbicide residues under various irrigation systems and water application rates showed that over irrigation appears to be the principal mechanism of movement in coarse soils (8). So movement of preemergent herbicides to ground water can be minimized by controlling the amount of irrigation water contacting treated areas in coarse soils.

In hardpan soils, DPR staff took deep soil samples in areas treated with pesticides found in ground water. In contrast to coarse soil areas, DPR found very little pesticide residue, indicating that leaching was probably not the primary pathway to ground water. In a cooperative study involving DPR, pesticide registrants, and the Tulare County Agricultural Commissioner staff, rain runoff entering drainage wells was sampled for preemergent herbicides detected in ground water in hardpan soil conditions. High levels were detected up to 2.5 months following application, indicating that runoff, not leaching, was the principal pathway of movement to ground water in hardpan areas (9).

The new regulations establish leaching GWPA's and runoff GWPA's, and require permits for all agricultural, outdoor industrial and outdoor institutional uses of the seven detected herbicides in GWPA's. In leaching GWPA's, one of the following three management practices must be designated on the permit:

- (1) No irrigation for six months following application,
- (2) Don't allow irrigation water to contact the area treated for six months following application, or
- (3) Irrigate efficiently for six months after application (apply no more than 133% of the net irrigation requirement, as defined).

In runoff GWPA's, one of the following seven management practices must be designated on the permit:

- (1) Apply the pesticide as a band treatment immediately adjacent to the crop row so that not more than 33 percent of the distance between rows is treated (for citrus, the band may extend out to the drip line of the tree),
- (2) Disturb the soil to be treated that is outside of the 33% band, or outside the dripline in citrus, by using a disc, harrow, rotary tiller, or other mechanical method within seven days before the pesticide is applied (not an option for bentazon),
- (3) Incorporate the pesticide on at least 90 percent of the area treated outside of the 33% band, or outside of the dripline in citrus, within 48 hours after the day the pesticide is applied. Incorporation may be by mechanical methods, such as by using a disc, harrow, or rotary tiller, or by sprinkler or low flow irrigation (1/4 – 1 inch of water applied at a rate that does not cause runoff), including chemigation if allowed by the label (not an option for bentazon),
- (4) Apply the pesticide between April 1 and July 31,
- (5) Retain all irrigation runoff and all precipitation on, and drainage through, the field for six months following the application. If a holding area is used, its percolation rate shall not exceed 0.2 inches per hour,
- (6) Channel runoff to a holding area off the application site, under the control of the property operator, that is designed to retain all irrigation runoff and all precipitation on, and drainage through, the treated field and all other areas draining into that holding area, for six months following the application. The percolation rate of the holding area shall not exceed 0.2 inches per hour; or
- (7) Manage the runoff so that it runs off onto an adjacent unenclosed fallow field at least 300 feet long that is not irrigated for six months after application, with full consideration of any plant back restrictions, for six months following application.

“Engineered rights of way” are areas within a GWPA that are constructed in a way that results in increased runoff and collection of storm water, such as railroad ballasts and berms, public roadsides, and highway median strips or similar areas, but not canal or ditch banks or utility lines. Use of the detected herbicides is prohibited on engineered rights-of-way in leaching or runoff GWPA's unless one of the following management practices is designated on the permit:

- (1) Comply with any of the runoff GWPA management practices
- (2) Manage any runoff from the treated right-of-way so that it passes through a noncrop fully vegetated area adjacent, and equal in area, to the treated area,

(3) Comply with any permit issued pursuant to the storm water provisions of the federal Clean Water Act pertaining to the treated area.

In lieu of the management practices specified for runoff and leaching GWPAs, or for engineered rights of way within GWPAs, pesticide users may submit a request to the Director and the Director may approve the following:

- (1) An alternative management practice based on scientific data demonstrating its effectiveness in reducing movement of pesticides to ground water; or
- (2). Interim use for up to three years, provided the requestor provides evidence that the available management practices are not feasible for a specific crop or site, and that there are no feasible alternatives for the specific crop or site submits a protocol that is subsequently approved by the Director for testing an alternative management practice, and collects the data on a timely basis.

On a statewide basis, the use of these seven herbicides is prohibited below the high water line in artificial recharge basins and inside unlined canal and ditch banks. This prohibition does not apply if water does not contact the treated area for six months after application, or in the case of canals and ditches, the percolation rate is not more than 0.2 inches per hour.

The new regulations also address wellhead protection, which applies to all pesticides mixed, loaded, rinsed, and stored around any type of well, including municipal, domestic, irrigation, drainage, abandoned, and monitoring wells. There are two options:

- (1) Wells should be sited so that runoff water from irrigation or rainfall does not move from the perimeter of the wellhead toward the wellhead and contact or collect around any part of the wellhead including the concrete pad or foundation. Alternately, wells should be protected by a berm constructed of any material sufficient to prevent movement of surface runoff water from the perimeter of the wellhead to the wellhead. Application of preemergent pesticides is prohibited between the berm and the wellhead; or
- (2) If the well cannot be protected, the following activities are prohibited within 100 feet of a well:
  - mixing, loading, and storage of pesticides.
  - rinsing of spray equipment or pesticide containers.
  - maintenance of spray equipment that could result in spillage of pesticide residues on the soil.
  - application of preemergent herbicides.

#### References

- (1) Troiano, J., B. Johnson, S. Powell, and S. Schoenig. 1992. Profiling Areas Vulnerable to Ground Water Contamination by Pesticides in California. [EH 92-0 9](#). Environmental Monitoring Branch, Department of Pesticide Regulation, California EPA, Sacramento, CA. Available at <http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh9209.pdf> (verified 13 Dec. 2004).
- (2) 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.
- (3) 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.
- (4) Troiano, J., C. Nordmark, T. Barry, B. Johnson, and F. Spurlock. 1998. Pesticide Movement to Groundwater: Application of Areal Vulnerability Assessments and Well Monitoring to Mitigation Measures. p.239-251. In Ballatine et al. (ed.) *Triazine Herbicides Risk Assessment*. ACS Symposium Series 683.
- (5) Troiano, J., F. Spurlock, and J. Marade. 2000. Update of the California Vulnerability Soil Analysis for Movement of Pesticides to Ground Water: October 14, 1999. [EH 00-05](#). Available at <http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh0005.pdf> (verified 13 Dec. 2004).

(6) Troiano, J. and C. Garretson. 1988. Soil Distribution of Simazine, Diazinon and Bromide in Sandy Soil after Exposure to 1985-86 Winter Rain in Fresno County. [EH 88-02](http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh8802.pdf). Available at <http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh8802.pdf> (verified 13 Dec. 2004).

(7) Neal, R., R. Teso, T. Younglove, and D.L. Sheeks III. 1991. Seasonal Rainfall Effects on Pesticide Leaching in Riverside, California. [EH 91-07](http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh9107.pdf). Available at <http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh9107.pdf> (verified 13 Dec. 2004).

(8) Troiano, J., C. Garretson, C. Krauter, J. Brownell, and J. Hutson. 1993. [Influence of Amount and Method of Irrigation Water Application on Leaching of Atrazine](http://www.cdpr.ca.gov/docs/empm/pubs/ehapref/atrzne.pdf). J. Environ. Qual. 22: 290-298. Reprinted with the permission of the American Agronomy Society. Available at <http://www.cdpr.ca.gov/docs/empm/pubs/ehapref/atrzne.pdf> (verified 13 Dec. 2004).

(9) Braun, A.L. and L.S. Hawkins. 1991. **DisplayText cannot span more than one line!** PM 91-1. Available at <http://www.cdpr.ca.gov/docs/pmap/pubs/pm9101.pdf> (verified 13 Dec. 2004).