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1-1-1997

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Recommended Citation

Wilson, Jim, "Developing a Groundwater Protection Plan for South Dakota's Future" (1997). *Extension Extra*. Paper 323.
http://openprairie.sdstate.edu/extension_extra/323

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Extension Extra

ExEx 8127
January 1997
Plant Science
Water Quality

COLLEGE OF AGRICULTURE & BIOLOGICAL SCIENCES / SOUTH DAKOTA STATE UNIVERSITY / USDA

Developing a Groundwater Protection Plan for South Dakota's Future

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Groundwater Quality Studies and Pesticide Contamination

What is the quality of South Dakota's groundwater? Several studies have been conducted to evaluate pesticide contamination of shallow aquifers in this state. In east central South Dakota from 1984-1990, 1,628 samples taken from 114 monitoring wells found 11% of the samples contained detectable levels of at least one pesticide. Another study during 1988-1994 detected pesticides in 16% of 1,190 samples from 45 wells.

In both studies, most pesticides were found at very low levels. Less than 0.1% exceeded the Environmental Protection Agency's (EPA) safety standards for drinking water. These standards are often referred to as MCL's (Maximum Contaminant Level) or HA's (Health advisories) and are measured in ppm (parts per million) or ppb (parts per billion).

Most detections were found during late spring and early summer which is when pesticides usually are applied and high monthly rainfall occurs. Even though these studies were conducted in areas where pesticide movement into groundwater is likely, the fact that pesticides were found at all indicates that we need to evaluate how they are getting there.

What do these studies mean to the residents of South Dakota? Agriculture in South Dakota relies heavily on groundwater and pesticides. Is a drastic change needed in how pesticides are managed? In many parts of the state, probably not, but there are areas in the state at high risk of pesticides contaminating the groundwater and connected surface waters.

The following conditions may affect the risk of pesticide movement into groundwater:

- Shallow depth of soil over the aquifer.
- Coarse or sandy soil.
- Use of pesticides that are soluble (dissolve easily in water), are persistent (don't break down easily) and, are easily leached (move through soil in soil water).
- High precipitation.
- Management factors such as irrigation, application rate, and cropping pattern.
- Contamination at well site during mixing and loading.

Pesticide and Groundwater State Management Plans

With so many factors affecting whether a pesticide will contaminate groundwater, **how do you protect high-risk aquifers without putting unneeded restrictions on those areas that are not at high risk?** EPA realizes that states must be given flexibility to protect their groundwater because of the tremendous diversity across the nation as well as within each state. If restrictions in pesticide use are needed to insure good groundwater quality, the restrictions should only be placed where there is a high probability of groundwater contamination.

EPA has determined that several pesticides, with a higher risk of leaching, will be canceled unless appropriate groundwater protection is put into place.

The South Dakota Department of Agriculture has been designated by EPA as the state lead agency to develop a generic Pesticide and Groundwater State Management Plan, with the assistance of several state agencies and

agricultural groups. The proposed plan will indicate which waters of the state will be protected, how these groundwaters will be protected, and who will be responsible for carrying out the plan.

The generic plan will be used as a framework for developing pesticide-specific management plans. The pesticide specific plans will contain information on how best to manage specific pesticides to reduce groundwater contamination. If the state decides not to develop a plan, EPA has the option of canceling the use of that specific product in the state.

The first five pesticides required to have pesticide-specific management plans are atrazine, alachlor (Lasso, etc.), cyanazine (Bladex, etc.), metolachlor (Dual, etc.) and simazine (Princep, etc.). These herbicides have chemical characteristics and use patterns which cause them to be among the most commonly found pesticides contaminating groundwater in the U.S. EPA also may require pesticide specific management plans for additional products in the future.

Protecting Critical Aquifers from Pesticide Contamination

Identifying where, when, and how pesticides enter groundwater is not always an easy task. While some level of protection from groundwater contamination should be given to all groundwater, aquifers should be prioritized based on their potential for contamination and their expected use. Many of the "high risk" aquifers in the state have been identified, particularly those in areas that are intensively farmed and provide drinking water to densely populated areas.

Preventing Pesticide Contamination of Groundwater

To effectively reduce groundwater contamination, the state intends to focus much of its efforts on prevention of pesticide contamination through information and education on proper use. A great deal of information must be gathered, interpreted, and provided to pesticide users. While there is much about pesticide movement in the soil

that is not understood, the best available information will be used to develop and implement the state's management plan, and it will be updated as new information becomes available. The plan proposes that if contamination increases, additional measures will be taken which may lead to the cancellation of the product in a specific area. Ideally, the plan will prevent or minimize contamination and allow the continued use of the particular pesticide.

Some of the current activities to prevent and reduce groundwater contamination by pesticides in South Dakota include:

- Monitoring wells are sampled across the state.
- Research evaluates the effect of reduced rates, banding and pesticide movement, etc.
- Best Management Practices, to protect groundwater but allow the producer flexibility in using the product, are being developed from research.
- Pesticide applicator training provides education on safe and proper use.
- The Integrated Pest Management program helps applicators use pesticides more effectively.
- The Pesticide Impact Assessment program surveys producers to determine pesticide use patterns in the state.

Protecting groundwater is in everybody's best interest. When using any pesticide, consider adopting the following practices to reduce the potential for contaminating ground or surface waters:

- Read the label for specific groundwater warnings or restrictions.
- Become familiar with any "high risk" aquifer areas that are being farmed.
- When feasible, use low-leaching-potential pesticides over "high risk" areas.
- Leave an unsprayed buffer strip when applying near surface water or wetlands.
- Know the location of abandoned and working wells and leave an unsprayed buffer.
- Don't mix pesticide or rinse containers or equipment near wells or water sources.
- Leave an air gap between the fill hose and tank or use a back flow prevention device.
- Consider using a portable water tank and mixing at different locations in the field.

If you have specific questions about handling pesticides, call or visit your local Extension agent or contact Jim Wilson, SDSU Extension pesticide education coordinator, by e-mail:
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150 copies printed by CES at a cost of 7 cents each. January 1997.