CAN ATRAZINE USE RETURN TO PROHIBITION AREAS?

Bruce D. Rheineck

Background

The Department of Agriculture, Trade & Consumer Protection (DATCP) has conducted several surveys of pesticides in groundwater and has consistently found atrazine to be the most commonly detected pesticide in groundwater. A survey of randomly selected Grade A dairy farm wells in 1989 detected atrazine in 12% of the wells tested. As of October 1999, over 23,000 private water wells have been tested using an immunoassay triazine screen. Thirty-seven percent of these samples have had triazine detected.

The Wisconsin Agricultural Statistics Service (WASS) has collected information on the use of agricultural pesticides in Wisconsin. According to WASS surveys, atrazine use peaked in the mid-1980’s at over 5.1 million pounds of active ingredient used per year. Atrazine was used at an average rate of 1.6 pounds of active ingredient/acre/year.

In response to the problem of groundwater contamination the Atrazine Rule was adopted in 1991. The rule limits how atrazine can be used in Wisconsin and prohibits it’s use in areas where atrazine contamination is found in groundwater above the enforcement standard (ES) of 3 ppb. Currently there are 101 prohibition areas in the state covering more than 1.2 million acres. In 1998 WASS reported atrazine was used at an average application rate of 0.87 pounds active ingredient/acre/year. A total of 1.8 million pounds of atrazine were applied in 1998 in Wisconsin.

To evaluate the effectiveness of the Atrazine Rule, DATCP conducted the Atrazine Rule Evaluation Survey between May 1994 and October 1996. The results of the study showed that the concentration of atrazine and its chlorinated metabolites in groundwater declined significantly. The average concentration in the wells declined from 0.96 ppb to 0.54 ppb. No significant change was documented, however, for the percentage of wells containing a detection of atrazine.

Atrazine Prohibition Area Repeal Process

Since atrazine use and levels in groundwater are declining, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) was asked to design a process to potentially remove prohibition areas where atrazine levels in wells have fallen below the ES. Prior to 1998, DATCP had procedures to create prohibition areas, but had not developed a specific process to remove these areas.

---

1 Senior Hydrogeologist, Wisconsin Department of Agriculture, Trade & Consumer Protection
In 1998, DATCP’s *Groundwater Protection Program* rule (ch. ATCP 31, Wis. Adm. Code) was modified to include a process to “repeal” (i.e., remove) pesticide prohibition areas. That same year, specific repeal requirements for atrazine prohibition areas were included in DATCP’s *Pesticide Product Restrictions* rule (ch. ATCP 30, Wis. Adm. Code). Repeal of an atrazine prohibition area requires that the following three conditions are met:

1) three consecutive water samples taken at least six months apart from wells that were above 3.0 parts per billion (ppb) must be at or below 1.5 ppb;
2) all other wells sampled in the prohibition area during the same time period must be at or below 1.5 ppb; and
3) research must show that renewed atrazine use will not cause atrazine levels in wells to rise above 3.0 ppb.

To meet the third repeal requirement, DATCP has designed a 5-year monitoring study to determine if renewed atrazine use in prohibition areas will contaminate groundwater, and under what conditions atrazine could be safely reintroduced in these areas. DATCP’s Atrazine Technical Advisory Committee helped design the study. Committee members include university researchers, state agency staff, farmers, agribusiness representatives, and an atrazine manufacturer.

Several groups have endorsed this project: Wisconsin Fertilizer & Chemical Association, Wisconsin Agribusiness Council, Novartis, Wisconsin Corn Growers Association, GroMark, Wisconsin Farm Bureau, and Wisconsin Federation of Cooperatives. They have asked their members to help find or be participants in this study. In addition, Novartis has funded the installation of the monitoring wells, laboratory analysis of samples, and incentives for project participants.

Study participants have a 10 - 40 acre field in atrazine prohibition areas where atrazine has not been used since 1993 and other site conditions have been met. Participants sign a project agreement and receive a permit from DATCP allowing them to use atrazine in the prohibition area for research purposes. They also receive $500 cash, a $100 coupon for seed corn, and a 3-year new or extended membership in the Wisconsin Corn Growers Association.

The study design consists of 17 sites, representing a range of soil textures, installed around Wisconsin. Fourteen of the sites were installed and have been sampled since spring 1998. Three other sites became active in spring 1999. A line of three monitoring wells is installed within each monitored field, and a fourth well is installed at the field edge to help determine groundwater flow direction under the site. Depth to groundwater underneath these fields is 30 feet or less. The monitoring wells are installed in unconsolidated materials (e.g., not drilled through bedrock).
Participants must plant corn the first year of the project and at least two other project years. Atrazine is applied on corn at or near the highest rate for the field, based on soil texture. Products containing cyanazine or simazine (other triazine herbicides) cannot be used on the monitored field during the study, but other pesticides and fertilizers are applied as needed. The grower chooses the tillage and pesticide application methods best suited for the operation. Participants report their pesticide application, tillage, precipitation/irrigation, and general crop information to DATCP annually. DATCP samples the wells four times a year. Samples are tested for atrazine, atrazine breakdown products, nitrate, and other common herbicides. All wells will be removed at the end of the project.

Atrazine Reuse Research Results to Date

The results of the 14 sites installed in 1998 are discussed here. For the three sites installed in 1999 we only have one pre-application of atrazine sample and one post atrazine application sample. For the 14 sites installed in 1998 we have six quarterly rounds of sample data. The first quarterly result is prior to renewed use of atrazine in the prohibition area, and the remaining five quarterly results are after renewed atrazine use.

Medium Texture Sites

- 6 of 8 sites have gone up (1st quarter to 6th quarter)
- 4 of 8 sites average is currently above ES
- 7 of 8 sites have had individual wells over the ES

Coarse Texture Sites

- 2 of 6 sites have gone up (1st quarter to 6th quarter)
- none of the sites average is currently over ES
- 1 site has had it’s average concentration over ES
- 2 sites have had individual wells over the ES

Figure 1 shows the average of each coarse-textured site’s three in-field monitoring well results by sampling quarter. Figure 2 shows the average of each medium-textured site’s three in-field monitoring well results by sampling quarter.
Figure 1. Average Total Atrazine Results at Coarse-Textured Sites, by Site and Sampling Quarter

Figure 2: Average Total Atrazine Results at Medium-Textured Sites, by Site and Sampling Quarter