ATRAZINE PROHIBITION AREAS: ATRAZINE REUSE STUDY

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Background

Groundwater monitoring initiatives in the 1980s and 1990s in Wisconsin discovered that the herbicide atrazine and its chlorinated metabolites are present in a variety of wells and aquifers around the state. The atrazine in groundwater was believed to have resulted from the legal use of atrazine (non-point source) and from improper handling, storage and disposal (point source). The distribution of atrazine detections in the state is still widespread. The most recent random statewide survey conducted by the department in 2001 estimated that about 12% of the groundwater in the state contains atrazine or its chlorinated metabolites. And about 1% of the groundwater is over 3.0 µg/L, the health based Enforcement Standard (ES) for atrazine.

Regulatory authority for protection of groundwater from pesticides, including atrazine, falls under ch. 160, Stats., and ch. ATCP 31, Wis. Adm. Code. Both the statute and code, describe the measures DATCP must take in response to document groundwater contamination by pesticides. For groundwater contamination above the ES, the department must prohibit the activity or practice that caused or may affect the contamination.

The original atrazine rule, ch. Ag 30, Wis. Adm. Code (now Ch. ATCP 30, Wis. Adm. Code), was created in March 1991 to protect Wisconsin's groundwater. This rule restricted the use of atrazine on a statewide basis and established one atrazine management area (AMA) and six prohibition areas (PAs) in which the use of atrazine was further restricted or prohibited.

Additional amendments to the atrazine rule were promulgated in March 1993. These amendments included further limiting the use of atrazine in the entire state and the replacement of AMAs with PAs. Over the years as additional testing uncovered more drinking wells contaminated by the legal use of atrazine, additional PAs were created. Currently there are 102 PAs in the state covering over 1.2 million acres.

In 1998, the department responded to grower and industry input and implemented a rule change that allows the department to consider repealing or modifying PAs in areas where the groundwater contamination from atrazine has improved. The department must find all of the following conditions met before it considers whether or not to repeal or reduce the size of a prohibition area:

- Tests on at least three consecutive groundwater samples, drawn from each well site in the prohibition area at which the atrazine concentration previously attained or exceeded the groundwater enforcement standard, show that the atrazine concentration at that well site has fallen to and remains at not more than 50% of the enforcement standard. The three consecutive samples must be collected at each well site at intervals of at least 6 months, with the first sample being collected at least 6 months after the effective date of the prohibition. A monitoring well approved by the department may be substituted for any well site which is no longer available for testing.

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- Tests (if any) conducted at other well sites in the prohibition area, during the same retesting period, reveal no other atrazine concentrations that exceed 50% of the enforcement standard.

- The department determines, based on credible scientific evidence, that renewed use of atrazine in the prohibition area is not likely to cause a renewed violation of the enforcement standard.

To evaluate the first condition, the department tests all available wells in atrazine PAs that have ever exceeded the ES as part of a yearly survey called the Exceedance Survey. To help answer the third condition, the department designed and implemented a seven year study of renewed atrazine use impacts in existing PAs (Atrazine Reuse Study). Evaluation of the second condition will not be conducted until the department determines that conditions one and three have been met.

Exceedance Survey Results

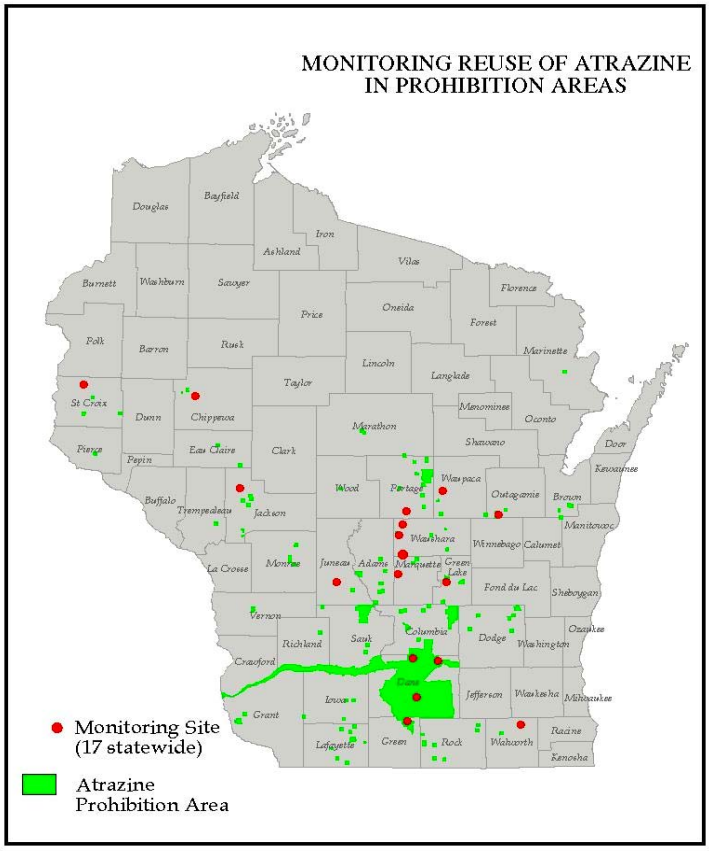
The Exceedance Survey began in 1995 and is a progam to sample water supply wells that have exceeded an ES for a pesticide. The survey started as a public service to well owners affected by pesticide contamination of their water and as a way to study the changes in pesticide concentrations over time. The survey includes both farm and non-farm wells supplying water for human consumption. Most of the wells in the survey are included due to an exceedance of the ES for atrazine.

Since the repeal process was established in ch. ATCP 30, Wis. Adm. Code, in 1998, the Exceedence Survey has also been used to determine if wells in PAs meet the first criteria for the repeal process. Currently we have data tracking 143 wells that have contained atrazine over the ES. Of these 143 wells, 94 show a downward trend, 17 are stable, and three show an increase. Ten of the 143 wells are still over the ES. An additional 29 wells do not have enough samples to determine their status. Applying the first condition of the repeal process to the results from these wells indicates that 21 PAs currently meet the first criteria.

It should be noted that the department is not currently able to track wells in all the atrazine PAs. Some well owners have chosen not to participate in this voluntary program, and twenty-five wells in PAs have been abandoned. In these PAs, gathering data on the first repeal criteria would require a substitute monitoring well be installed to mimic the original well.

Atrazine Reuse Study

The department's Atrazine Technical Advisory Committee provided extensive input on the design of the Atrazine Reuse Study. Syngenta, a manufacturer of atrazine, provided a portion of the funds and all of the laboratory analysis for the study. The department also confirmed the analysis by collecting split samples and analyzing the samples at the department's laboratory. The study recruited production growers with fields in older (1993 or 1994) PAs who were willing to grow corn, use atrazine and report pesticide use to the department. The selected fields were tested quarterly utilizing shallow monitoring wells for 5 to 7 years. The selected fields also needed to meet soil, topographic and geologic conditions to allow the study to be completed in a reasonable timeframe and cost. Seventeen growers with fields in PAs throughout the state (see figure 1) provided the study sites for the department.



The soil of the study fields were grouped into coarse and medium texture sites following the rule criteria in ch. ATCP 30, Wis. Adm. Code. The fields were screened to keep the slope under 5%. Study fields were selected such that the water table was in unconsolidated materials, avoiding areas where the water table was in bedrock. The unsaturated zone was of equal or greater permeability than the overlying soil. Depth to groundwater was less than 30 feet. The water table was not within the root zone of the crop being grown. The grower agreed to use atrazine on the monitored field (and was encouraged to use the highest legal use rate) at least three times during the study, depending on their crop rotation scenario. Products containing cyanazine or simazine were not allowed to be used during the study (since they form some of the same chlorinated residues as atrazine), although other pesticides and fertilizers were applied as needed. The grower selected the tillage and application method best suited for their operation.

Since the study fields were located in existing atrazine PAs, which by definition had at least one drinking water well over the ES at some time, the size of the area granted a research exemption to apply atrazine was limited to 10 to 40 acres. Three monitoring wells were installed in the middle of the atrazine treated area in the direction that the grower worked the field. Each well had a 5- or 10-foot screen with 3 to 4 feet of open interval below the water table. Wells were sampled following written sample collection procedures designed to minimize the possibility of cross contamination and following department chain-of-custody requirements to ensure adequate documentation of laboratory results.

Of the 17 sites in the study, one was excluded from the analysis, for not disclosing the presence of a septic drain field in the study field and for not following other study protocols. Of

the remaining 16 sites, seven were unable to meet the requirement of applying atrazine at least three times during the course of the study. The reasons for this ranged from forgetting to include atrazine in the application, to changes in the planned crop rotation. These seven sites with only one or two applications of atrazine are broken out separately in the analysis presented below. Results of the three wells at all of the sites are shown in graphs in the appendix.

The table below summarizes some of the results by study site. Two conditions are evaluated in this table. First, did any of the three in-field wells at a site ever exceed the ES for atrazine, if so how often? Second, at the sites where all of the three wells started under the ES, how many times, if any, did one or more wells later go above the ES once renewed use of atrazine began?

Results by Site

9 sites with at least 3 applications of atrazine:

Condition	Result
One well over ES at least once at the site	9 of 9
All wells start below at the site, with 1 or more wells later over ES	4 of 4

7 sites with one or 2 applications of atrazine:

Criteria	Result
One well over ES at least once at the site	3 of 7
All wells start below at the site, with 1 or more wells later over ES	1 of 5

Some wells at some sites started out above the ES even before renewed use of atrazine began. This was in spite of the fact that the study fields had not had atrazine applications for at least five years before renewed use of atrazine was allowed. This is likely due to a couple of factors; the long half-life of atrazine in water and soil, or the use of either cyanazine or simazine compounds in the years prior to the study. Eight of the 16 study sites had documented use of cyanazine or simazine in the 3 years before the study began.

Another way to summarize the results is by each individual well instead of grouped by site. These results are presented in the table below. Again two conditions are evaluated in this table. First, how many wells that start below the ES later exceed the ES for atrazine? Second, for wells that start over the ES, how many increase by at least three µg/L (the amount of the ES) once renewed use of atrazine began? Results here are also broken out by soil texture.

Results by Well

9 sites with at least 3 applications of atrazine – 27 total wells:

Criteria	Result
Wells that start below ES and later over ES	9 of 16
Wells that start above ES and later increase by at least 3 µg/l	9 of 11
Wells in medium texture soil that start below ES and later over ES	6 of 11
Wells in coarse texture soil that start below ES and later over ES	3 of 5

7 sites with one or 2 applications of atrazine – 21 total wells:

Criteria	Result
Wells that start below ES and later over ES	5 of 19
Wells that start above ES and later increase by at least 3 µg/l	1 of 2
Wells in medium texture soil that start below ES and later over ES	3 of 5
Wells in coarse texture soil that start below ES and later over ES	2 of 14

Advisory Committee Comments

On March 29, 2006, the Atrazine Technical Advisory Committee reviewed the results of the Atrazine Reuse Study. Staff presented a review of the design and implementation of the study, as well as a detailed presentation of the results. Departmental legal staff presented a review of the conditions contained in s. ATCP 30.375, Wis. Adm. Code, regarding repeal of PAs as well as a brief history of Wisconsin's groundwater law and the responses required when an ES or preventive action limit (PAL) is attained or exceeded in groundwater.

After discussing the study results, the advisory committee members were polled as to whether or not the third condition, that credible scientific evidence shows that renewed use of atrazine in PAs is not likely to cause a renewed violation of the ES, has been satisfied. Eight of the eleven members present felt the data do not support a confidence in repealing any PAs. Most suggested that the department remain open to new data and studies evaluating the impact of atrazine on the environment. One member was unequivocal and two members felt that the Atrazine Reuse Study and other scientific data do support the repeal of PAs. They suggested moving forward to repeal PAs in a measured manner. The measured approach they suggested was to find a subset of the 21 PAs that meet the first condition for repeal and allow the use of atrazine for five years, while sampling the water supply wells in the PA during that period.

Departmental Recommendation

Based upon a review of the Atrazine Reuse Study and input from the Atrazine Technical Advisory Committee, the department does not recommend moving forward with the repeal process for any existing prohibition areas at this time.