PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT

FOR

PROPOSED 2011 AMENDMENTS TO RULES ON THE USE OF PESTICIDES CONTAINING ATRAZINE

Prepared by

Wisconsin Department of Agriculture,
Trade and Consumer Protection

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ABSTRACT

The original Atrazine Rule, ch. Ag 30, Wis. Adm. Code, was created in March 1991 to protect groundwater in Wisconsin. That rule restricted the use of atrazine on a statewide basis and established an atrazine management area (AMA) and atrazine prohibition areas (PAs) in which the use of atrazine was further restricted or prohibited. Amendments to the rule, including renumbering it to ch. ATCP 30, Wis. Adm. Code, have been promulgated in several years since 1991. Currently, 101 PAs totaling over 1.2 million acres are included in the rule.

Under the proposed rule change, all statewide provisions in the current rule remain in effect. This proposed rule change would add one new atrazine PA in Sauk County and join and expand two existing atrazine PAs in Columbia County where the Enforcement Standard (ES) for atrazine in drinking water supply wells have been attained or exceeded. The proposed rule would add approximately 8,640 acres of land where the use of atrazine would be prohibited. This action is based on groundwater samples for atrazine that the department has received in the last two years.

The Environmental Impact Statement (EIS) contains: a description and discussion of the proposed rule; background information on atrazine, including information on the use of atrazine and findings of atrazine residues in groundwater; a discussion of the environment and persons affected by the proposed rule; and the significant economic effects of the proposed action. The EIS also discusses and compares possible alternative actions.

This EIS finds that promulgation of the proposed rule would not create any new adverse environmental impacts from the use of alternative herbicides. Alternative herbicides, because of differences in mobility and persistence, generally have less potential to contaminate groundwater than atrazine. The Department of Agriculture, Trade and Consumer Protection ("DATCP" or "Department") will continue to monitor any impacts to groundwater from the use of alternative herbicides. The major effect the proposed rule is expected to have on the environment is a reduction in additional groundwater contamination by atrazine in the new and expanded PAs. This reduction in additional groundwater contamination will benefit both the natural and human environments.

Specific questions on the EIS or the proposed atrazine rule should be directed to the Division of Agricultural Resource Management, Wisconsin Department of Agriculture, Trade and Consumer Protection, P.O. Box 8911, Madison, Wisconsin, 53708-8911. Phone 608/224-4502.

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CHAPTER 1 - THE PROPOSED RULE

Background

The original Atrazine Rule, ch. Ag 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 PAs (PAs) in which the use of atrazine was further restricted or prohibited. Statewide, atrazine application rates were limited to 1.0 - 2.0 pounds/acre depending on surface soil texture and whether atrazine was used the previous year. The AMA established in the Lower Wisconsin River Valley limited atrazine application rates to 0.75 pounds/year.

Amendments to ch. Ag 30, Wis. Adm. Code, were promulgated in March 1992. These amendments established five additional AMAs and eight additional PAs in areas of the state where sample results received by the Department by April 1, 1991 showed more acute contamination. The maximum atrazine application rates in the AMAs were 0.75 pounds/acre for coarse soils and 1.0 pounds/acre for medium and fine soils.

Changes to ch. Ag 30, Wis. Adm. Code, were promulgated in 1993. These changes included renumbering ch Ag 30, Wis. Adm. Code, to ch. ATCP 30, Wis. Adm. Code, further limiting the use of atrazine statewide and creating 54 atrazine PAs areas where the ch. NR 140, Wis. Adm. Code, Enforcement Standard (ES) for atrazine in groundwater had been exceeded. Because the new statewide restrictions were similar to the restrictions in the existing AMAs, the existing AMAs were not included in the rule.

Specifically, the 1993 rule amendments established statewide maximum allowable atrazine application rates of 0.75 pounds/acre for coarse textured soils and 1.0 pounds/acre or 1.5 pounds/acre for medium/fine textured soils. The 1.5 pounds/acre rate is allowed on medium/fine textured soil if no atrazine has been applied the previous year. If a rescue treatment is needed on seed and sweet corn, an additional amount of atrazine can be used as long as the total annual amount of atrazine use does not exceed 1.5 pounds/acre on coarse textured soils and 2.0 pounds/acre on medium/fine textured soils.

Additional amendments to ch. ATCP 30, Wis. Adm. Code, have been promulgated each year since 1993, except in 2003, 2006-2008 and 2010. These amendments created 51 new PAs, expanded 26 existing PAs, and, as a result of PAs being joined together, reduced the total numbe of PAs by three. These actions were based on groundwater sample results for atrazine and metabolites that DATCP received during this period. The total number of acres in atrazine PAs by 2010 was over 1.2 million acres.

In 1998, ch. ATCP 30, Wis Adm. Code, was expanded to include provisions restricting the use of a number of pesticides in addition to atrazine. These additional provisions were previously located in

ch. ATCP 29, Wis Adm. Code. All pesticide use restrictions are now contained within ch. ATCP 30, Wis. Adm. Code, and it has been renamed "Pesticide Product Restrictions."

The Proposal

Proposed PAs

Currently, 101 PAs totaling over 1.2 million acres are included in ch. ATCP 30, Wis. Adm. Code. The proposed rule amendments would expand and join two current atrazine PAs in Columbia County, and create one new PA in Sauk County adjacent to the existing lower Wisconsin River Valley PA. These proposed additional atrazine PAs include approximately 8,640 acres. This proposed action is based on groundwater sample results for atrazine and its metabolites that DATCP has received in the last two years. Maps showing existing PAs and those proposed here are shown on Figure 1 and 2.

Within every PA, atrazine applications are prohibited. The rule also prohibits atrazine mixing or loading in existing and new PAs unless conducted over a spill containment surface which complies with s. ATCP 29.45, Wis. Adm. Code.

How the Proposed PAs are Selected and Delineated

At well sites that exceed the ES for atrazine, an investigation is conducted to determine the source of the atrazine contamination in groundwater. As part of the investigation, each well owner is interviewed about atrazine use and handling practices around the well site. If it appears that the groundwater contamination is mainly from use of atrazine in the area (nonpoint source), a PA is proposed. If the groundwater contamination is believed to be mainly from point sources, a PA is not proposed unless it appears that use of atrazine in the area is significantly contributing to the existing contamination. In the case of isolated wells exceeding the ES, single well PAs are proposed. If clusters of wells exceeding the ES are identified, multiple well PAs are proposed.

The various types of boundaries that can be used to delineate PAs include soil and geologic boundaries, groundwater or surface water divides, legal land descriptions, and public roads. For the proposed expanded PA, legal land descriptions are used for boundaries. In some cases the boundaries correspond to roads. Surface water features are used to modify PA boundaries where appropriate. The advantages of using legal land descriptions for the smaller single well PAs is that the recharge area for a well can be approximated more accurately than by using roads. The disadvantage of legal land descriptions is that they can split individual farm fields. A PA may be smaller if a river or other groundwater divide exists near the well site.

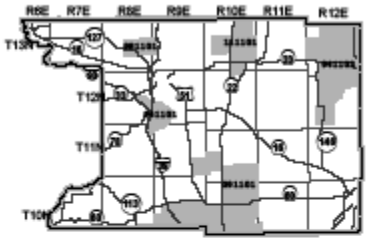
Advantages and Disadvantages of the Proposed Rule

Advantages

The advantage of the proposed rule is that it prohibits the use of atrazine in an area of the state where well sampling has found atrazine levels above the ES. This action should allow groundwater quality to gradually improve due to dilution, degradation and recharge of cleaner water to the aquifer.

Figure 1: Proposed Atrazine Prohibition Area PA 11-11-01

Columbia County
Towns of Marcellon and Wyocena



T 12-13N R10E **PA 11-11-01**

All uses of atrazine are prohibited on lands within the shaded regions. There are five prohibition areas in Columbia County. Refer to each map for specific locations.

***Note**: This PA expands and joins PAs 93-11-04 and 99-11-01*

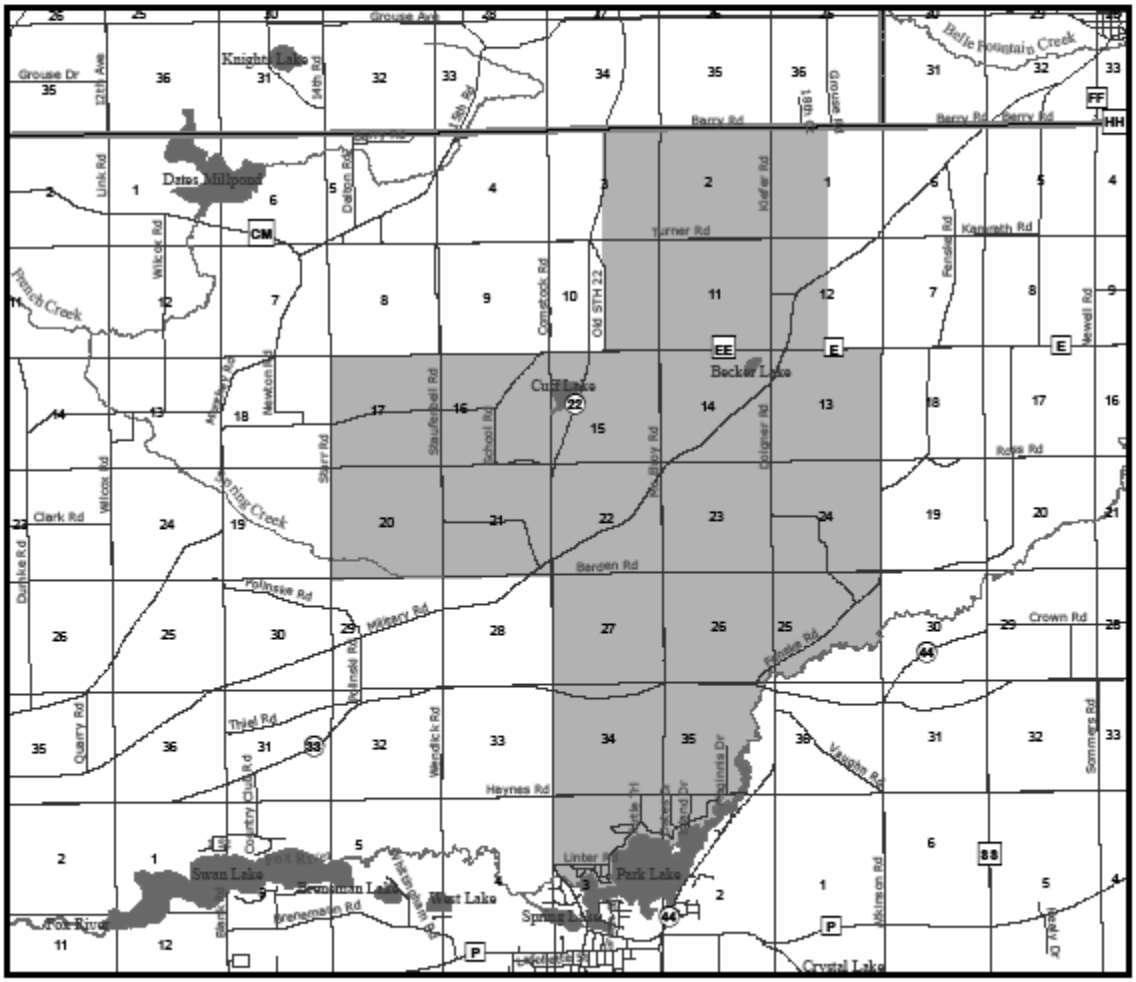


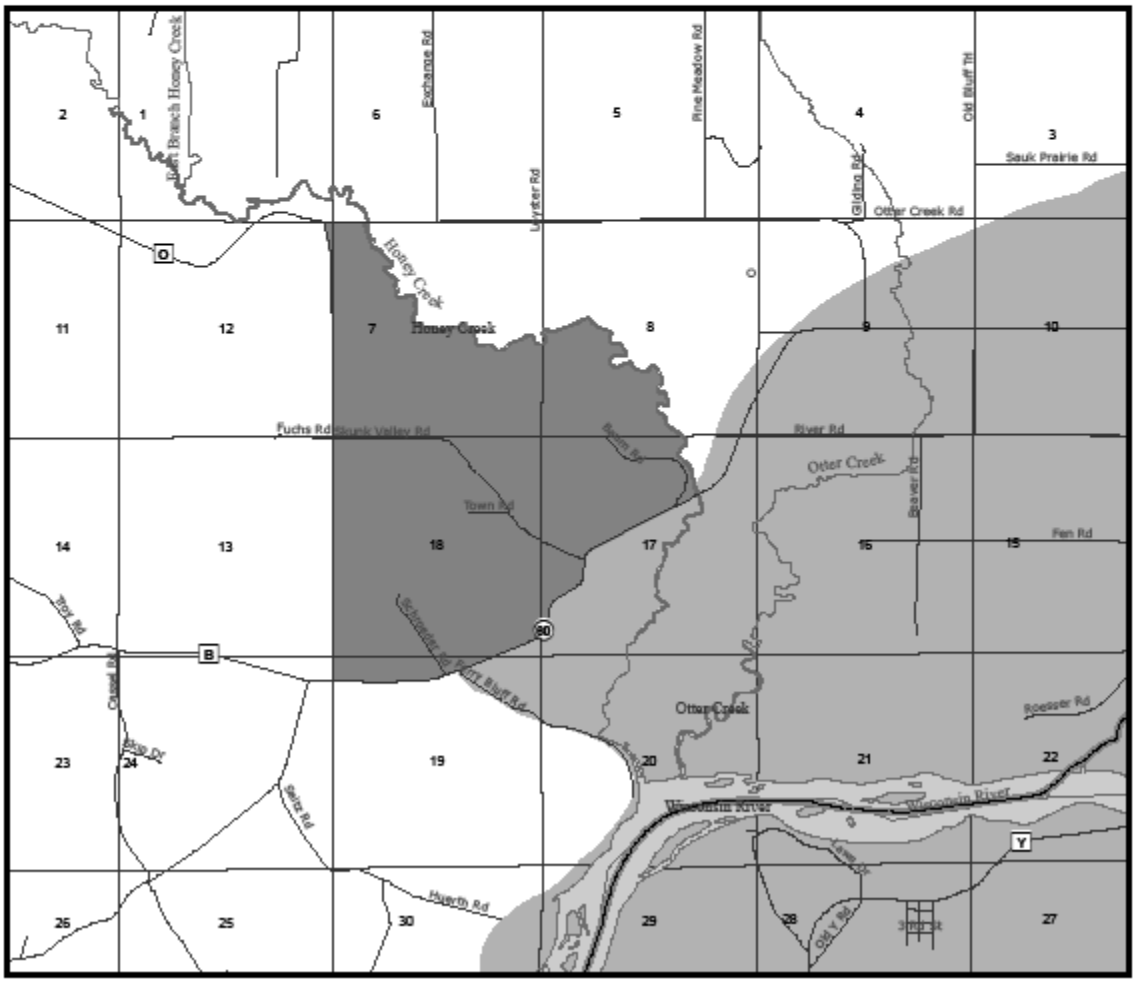
Figure 2: Proposed Atrazine Prohibition Area PA 11-57-01

Sauk County
Town of Prairie du Sac

T 9-10N, R6-7E **PA 11-57-01**

All uses of atrazine are prohibited on lands within the shaded regions. There are six prohibition areas in Sauk County. Refer to each map for specific locations.

***Note**: This PA is adjacent to the existing Lower Wisconsin River Valley PA 93-57-04.



Disadvantages

The disadvantage of this approach is that farmers within the proposed expansion area would not have access to atrazine as a weed control option. However, alternatives to atrazine do exist although costs are typically higher.

CHAPTER 2 - BACKGROUND INFORMATION

Findings of Atrazine in Wisconsin Groundwater

Grade A Dairy Farm Well Water Quality Survey

Between August 1988 and February 1989, DATCP conducted a survey of water quality at Grade A dairy farm wells in Wisconsin. Well water samples were collected from 534 randomly-selected Grade A dairy farms in Wisconsin and analyzed for many commonly used pesticides and nitrate-nitrogen. Of the 534 wells sampled, 66 contained atrazine above the detection level of 0.15 parts per billion (ppb). Thirty-nine wells contained atrazine above the Preventive Action Limit (PAL) of 0.35 ppb and 3 wells were above the ES of 3.5 ppb. The average concentration for all wells containing atrazine was 1.0 ppb and the highest concentration found was 19.4 ppb.

From this study, a statistical estimate was made with 95% confidence that between 9% and 15% of Grade A wells in Wisconsin contain atrazine. In the South Central Agricultural Statistics District, which had the highest number of atrazine detects, it was estimated that 19% to 39% of Grade A wells contain atrazine. Dane County had by far the highest number of atrazine detects of any county.

Investigations at farms with contaminated wells did not conclusively identify the source of contamination. Further research has been supported by DATCP to help determine the source and extent of the atrazine contamination. This research has shown that the atrazine in Grade A wells can be the result of both use (non-point source) and improper handling, storage and disposal (point source).

DATCP Groundwater Monitoring Project for Pesticides

This study began in 1985 and utilizes monitoring wells to study pesticides in groundwater next to agricultural fields in highly susceptible areas. For this project, highly susceptible areas are defined as having sandy soil, shallow depth to groundwater, and irrigation. Groups of three monitoring wells have been installed at approximately fifty fields in the Central Sands, lower Wisconsin River valley, and other sandy soil areas of the state. The study was designed so that the findings in the monitoring wells reflect activities on the fields being monitored.

This study has helped determine which pesticides need the most attention for groundwater protection purposes. It has also helped to identify which areas of the state are most susceptible to pesticide leaching and to indicate that not all sandy soil areas have the same susceptibility to groundwater contamination. The major conclusions of the study to date are that atrazine and its metabolites are frequently detected in groundwater where it is used and that the lower Wisconsin River valley is an area particularly susceptible to groundwater contamination by pesticides.

DATCP Rural Well Sampling Program

In the first half of 1990, DATCP conducted a groundwater sampling program in which 2,187 rural well owners had their well water tested for certain agricultural chemicals. The results of the Rural Well Sampling Program indicated widespread atrazine contamination in groundwater in many areas of Wisconsin. Of the 2,187 wells sampled in phase 1 of the program, immunoassay screening showed detections of triazine in 351 (16%). Two hundred and twenty (10%) were above the PAL for atrazine. Official follow-up samples were taken at 435 qualifying wells. Of these, 215 had atrazine detects, 127 were above the PAL and 11 were above the ES. Ten follow-up samples known to contain atrazine were also analyzed for the atrazine metabolites deethyl atrazine and deisopropyl atrazine. All ten samples contained deethyl atrazine and six samples contained deisopropyl atrazine.

The highest frequencies of atrazine detections are in the south central, southwest, and west central regions of the state. As noted in the Grade A Dairy Well Survey, Dane County had by far the highest number of atrazine detections. Several other counties, such as Columbia, Grant, Sauk, Iowa, Lafayette, Rock, Walworth, and St. Croix also had a considerable number of relatively widely distributed detections. Most of the detections were at levels near or below the PAL of 0.35 ppb, but a few detects were at levels considerably above the 3.5 ppb ES. DATCP believes that the atrazine in these rural wells is due both to agricultural use (non-point source) and improper handling, storage and disposal (point source).

Atrazine Metabolite Testing in the Rural Well Survey

As part of the Rural Well Survey, the CIBA-GEIGY Corporation received split samples from the 236 wells that had a triazine finding at or above 0.35 ppb. These samples were analyzed by CIBA-GEIGY for atrazine, deethyl atrazine, deisopropyl atrazine and diamino atrazine. This represented the most rigorous analysis to date for atrazine residues in Wisconsin groundwater for two reasons. First, this was the first analysis of Wisconsin groundwater for diamino atrazine. Second, the 0.1 ppb level of detection for all four analytes was considerably lower than the levels of detection at any of Wisconsin's laboratories.

The results from these 236 wells showed atrazine present in 200 wells, deethyl present in 208 wells, deisopropyl present in 143 wells and diamino present in 195 wells. The average detect concentrations for these same four analytes were 1.1 ppb, 0.80 ppb, 0.45 ppb, and 1.0 ppb, respectively. The average total concentration (for total >0) was 3.0 ppb. These results indicate that 71 wells exceed the new ES for atrazine and its metabolites, which was changed to 3.0 ppb in 1992 (see page 11). Only 15 of these wells would have exceeded the old ES for atrazine alone. The newly-discovered presence of diamino atrazine played an important role in the increased number of wells exceeding the ES.

DATCP Exceedence Survey

DATCP conducted a study in 1995 to measure changes in pesticide concentrations in wells that had previously exceeded an enforcement standard (ES). The sampling of wells with an ES exceedence has continued yearly through 2009. Most of these wells are in Atrazine PAs. One-hundred-twenty-two (122) wells were resampled for this program in 1995. Sampling results for atrazine showed that 84% of the wells had decreased in concentration and 16% increased. Forty-three percent of the wells were still above the atrazine enforcement standard and 57% below.

Well owners with previous exceedences were interviewed in 1995 to determine what changes, if any, they had made to their water supplies in response to the exceedence. About 50% of the well owners continued to use their contaminated well and about 25% had installed new wells at an average cost of $6,300. The remaining well owners drink bottled water, haul water, or use water treatment.

By 2009 only six of the wells in the Exceedence Survey contained atrazine over the ES. Other pesticides that have also been detected include alachlor, metolachlor and acetochlor and their ethanesulfonic acid (ESA) and oxanilic acid (OA) metabolites. In addition, cyanazine, cyanazine amide, metribuzin, prometon and simazine were detected. Twenty-six wells have been abandoned.

Statewide Survey of Agricultural Chemicals in Wisconsin Groundwater

Between January 2007 and June 2007, 398 private drinking water wells were sampled as part of a statewide survey of agricultural chemicals in Wisconsin groundwater. The purpose of the survey was to obtain a current picture of agricultural chemicals in groundwater and to compare the levels in the 2007 survey with levels found in earlier surveys conducted in 1994, 1996 and 2001. Wells were selected using a stratified random sampling procedure and were used to represent Wisconsin groundwater accessible by private wells. Samples were analyzed for 32 compounds including herbicides, herbicide metabolites, one insecticide, and nitrate-nitrogen.

Based on statistical analysis of the sample results, it was estimated that the proportion of wells in Wisconsin that contained a detectable level of a pesticide or pesticide metabolite was 33.5%. Areas of the state with a higher intensity of agriculture generally had higher frequencies of detections of pesticides and nitrate-nitrogen. The two most commonly-detected pesticide compounds were the herbicide metabolites alachlor ESA and metolachlor ESA which each had a proportion estimate of 21.6 %.

The statewide estimate of the proportion of wells that contained atrazine total chlorinated residues (TCR) was 11.7%. The estimate of the proportion of wells that exceeded the 3.0 micrograms per liter (ug/l or approximately 3 ppb) enforcement standard for TCR was 0.4%. Estimates of the mean detect concentrations for pesticides were generally less than 1.0 ppb.

Time trend analysis was performed to determine whether the proportion estimates for atrazine, TCR, nitrate-nitrogen, alachlor ESA and metolachlor ESA in private wells had changed between the 2001 survey and the 2007 survey. The results of this analysis did not show any statistically significant changes for these compounds over this time period. Previous analysis showed that the proportion

of wells with a detection of parent atrazine had a statistically significant decline between 1994 and 2001.

Monitoring Reuse of Atrazine in PAs

In 1998, DATCP began monitoring the reuse of atrazine in areas of Wisconsin where its use had been prohibited since 1993 due to groundwater contamination. Requirements in ch. ATCP 31, Wis. Adm. Code, require DATCP to gather scientific data to show if renewed atrazine use in these areas will cause further groundwater contamination. DATCP tested groundwater quarterly under 17 monitored fields (10 to 40 acres in size) for five years. Growers planted corn and applied atrazine in the first year of the study and at least two other years. Products containing cyanazine or simazine cannot be used on monitored fields during the study, but other pesticides and fertilizers can be applied as needed. Growers choose the tillage and pesticide application methods best suited for their operations. Data from the 17 sites showed that atrazine concentrations have been over the enforcement standard (3.0 ppb) at 14 of 17 sites.

Atrazine Registration Information

"Atrazine" is the accepted common name for the compound 2-chloro-4-ethylamino-6-isopropylamino-s-triazine. This name is recognized by the American National Standards Institute.

Atrazine was initially registered in the United States in 1958 by CIBA-GEIGY for weed control in corn. Additional labels were subsequently approved for other agricultural crops by the U.S. Department of Agriculture (USDA) and since 1970 by the U.S. Environmental Protection Agency (EPA). Atrazine has been registered for control of broadleaf and grass weeds in corn, sorghum, rangeland, sugarcane, macadamia orchards, guava, pineapple, turf grass sod, conifer reforestation, Christmas tree plantations, grass in orchards, proso millet, ryegrass, wheat, grass seed fields and for nonselective vegetation control in chemical fallow and non-crop land. A large portion of atrazine use has been to control weeds on corn and sorghum in the 28 states where these crops are grown.

A number of herbicides have been registered for use in combination with atrazine. Some of these include alachlor, butylate, metolachlor, acetochlor, mesotrione, paraquat, propachlor, cyanazine, bentazon and simazine. Herbicide mixtures are often used in situations where atrazine alone is not completely effective due to the spectrum of weeds, soil conditions and other environmental factors.

Atrazine Use in Wisconsin

Atrazine Use on Crops

In Wisconsin, use of atrazine on crops has been primarily on corn including field corn, silage corn, sweet corn and seed corn. The United States Department of Agriculture, National Agricultural Statistics Service, Wisconsin Field Office (NASS) reported that in 2005, 3,800,000 acres of corn for

grain, and 88,400 acres of sweet corn were planted. Data on seed corn acreage are not routinely collected by NASS.

Atrazine controls many annual grass and broadleaf weeds in corn and can be applied preplant (surface applied or incorporated), preemergence, or post-emergence. The label application rates for preplant and preemergence uses of atrazine depend on soil texture and organic matter content. Prior to the 1990 label changes and the 1991 creation of ch. Ag 30, Wis. Adm. Code, the label application rates ranged from 2 pounds of active ingredient (a.i.)/acre on coarse textured soils to 4 pounds a.i./acre on fine textured soils with higher organic matter.

Atrazine is also applied with oil as a post-emergence treatment. This is a foliar spray and controls weeds by direct contact. The historical label rates for this application were 2 pounds a.i./acre if broadleaf and grass weeds were present or one pound a.i./acre if only broadleaf weeds were present.

Another important historical use of atrazine was for control of quackgrass, a perennial grass weed that can be a significant problem in corn production. Atrazine was applied for quackgrass control as either a split or single application. Prior to the 1991 Atrazine Rule and the 1990 label changes, the split applications consisted of 2 pounds of atrazine broadcast in the spring or fall followed by a second application in the spring before, during or after planting. For a single application, 3 to 4 pounds were applied in the fall or spring followed by a plowing 1 to 3 weeks later.

Wisconsin Pesticide Use Surveys

Several pesticide use surveys have been conducted in Wisconsin to provide information on atrazine use patterns.

1969: This early survey provides information on pesticide use in Wisconsin for the 1969 growing season. In 1969, 1,995,000 acres of corn were treated at least once with herbicides. Herbicide use on corn accounted for 82% of the total crop acreage treated with herbicides. Approximately 10 years after it first started to be used, atrazine was by far the most commonly used herbicide on corn. Atrazine alone and in combination with other herbicides was applied to 91% of the corn acreage receiving a preemergence herbicide treatment and 83% of the acreage treated postemergence. The average rate of atrazine application was 1.5 to 2.0 pounds a.i./acre.

1978: Another major pesticide use survey was conducted in Wisconsin in 1978 by NASS. In 1978, 3,750,000 acres of corn were planted and 3,589,000, or 96%, were treated with herbicides. Atrazine was used on 3,000,000 acres, or 80% of the corn acres planted, making it by far the most commonly used herbicide. The average rate of application was 1.5 pounds atrazine a.i./acre and a total of 4,410,000 pounds of atrazine a.i. were used. The South Central, Southwest, and West Central Crop Reporting Districts accounted for the highest number of acres treated with atrazine and the largest quantity of active ingredient applied. Quackgrass and foxtail were the most common target weeds for atrazine applications.

1985: In 1985, a major pesticide use survey was conducted by NASS to collect information needed for managing pesticides in groundwater. Atrazine was applied to 3,362,000 acres, or 77%, of the corn acreage. The average rate of application was 1.6 pounds of atrazine a.i./acre and the total quantity of atrazine used in the state was 5,165,000 pounds of atrazine a.i. The South Central, Southwest, and West Central Crop Reporting Districts were again the areas of highest atrazine use. Quackgrass, foxtail and velvetleaf were the most common target weeds for atrazine applications.

1990: In 1990, a pesticide use survey was conducted by NASS in a manner similar to the 1985 survey so that direct comparisons in pesticide use trends could be made. The number of acres planted to corn in 1990 was 3,700,000, down 14% from 1985. Atrazine was applied to 56% of the corn acres in 1990 compared to 77% in 1985. The average atrazine application in 1990 was 1.43 pounds of atrazine a.i./acre compared to 1.6 pounds in 1985. The overall effect was a 43% reduction in the quantity of atrazine used on corn in Wisconsin from 1985 to 1990.

1996: In 1996, a pesticide use survey was conducted by NASS in a manner similar to the 1985 and 1990 surveys so that direct comparisons in pesticide use trends could be made. The number of acres planted to corn in 1996 was 3,900,000, up from 3,700,000 acres in 1990. Atrazine was applied to 51% of the corn acres in 1996 compared to 56% in 1990. The average atrazine application in 1996 was 0.75 pounds of atrazine a.i./acre compared to 1.4 pounds in 1990. The overall effect was a 50% reduction in the quantity of atrazine used on corn in Wisconsin from 1990 to 1996.

2005: In 2005, a pesticide use survey was conducted by NASS in a manner similar to the 1985, 1990 and 1996 surveys so that direct comparisons in pesticide use trends could be made. The number of acres planted to corn in 2005 was 3,800,000. Atrazine was applied to 54% of the corn acres in 2005 compared to 51% in 1996. The average atrazine application in 2005 was 0.78 pounds of atrazine a.i./acre compared to 0.75 pounds in 1996. The overall effect was a 7% increase in the quantity of atrazine used on corn in Wisconsin from 1996 to 2005.

Summary of Trends in Atrazine Use

Information on pesticide use in Wisconsin indicates that the use of atrazine has declined since 1985, but has stabilized in recent years. The two components of pesticide use that are usually considered are the number of acres on which a compound is used and the rate of application, often expressed in pounds of a.i./acre/year. These two components together indicate the quantity of pesticide material used.

It is clear that the number of atrazine-treated acres in Wisconsin declined significantly between 1985 and 2005. The pesticide use surveys conducted by NASS indicate that the percentage of corn acres treated with atrazine decreased from 77% in 1985 to 54% in 2005. It is likely that this downward trend in atrazine use has resulted from an increased awareness of its environmental and carry-over problems, availability of alternative herbicide products, and the implementation of the atrazine rule.

The average atrazine application rate decreased from 1.6 pounds atrazine a.i. in 1985 to 0.78 pounds atrazine a.i. in 2005. Some of this reduction is likely due to the atrazine rule. Other opportunities for reducing application rates include using atrazine in combination with other herbicides, applying atrazine in a band over the corn rows, and using additional mechanical weed control practices. Many farmers have utilized these strategies to reduce their atrazine application rates. In some cases, however, the atrazine rate that farmers are using is already at a level where further reductions are not possible. In these cases, further reducing atrazine use would mean switching to non-atrazine weed control strategies.

Environmental Fate of Atrazine in Soil

The environmental fate, and in particular the leaching potential, of a pesticide applied to the soil is dependent on the characteristics of the environment and the chemical compound. For the chemical itself, the leaching potential is related to its mobility and persistence. Mobility refers to the water solubility and soil absorbance of the chemical and persistence is measured by the rate of degradation of the compound in the soil. For a pesticide to leach to groundwater as a result of field applications, it must have relatively high mobility and persistence in the soil.

Atrazine has environmental fate characteristics that indicate a high leaching potential and explain its widespread occurrence in groundwater. It is moderately mobile in the soil with a water solubility of 33 milligrams per liter (approximately 33 ppm) and a soil adsorption coefficient of 3.2. (The soil adsorption coefficient is the ratio of the amount of a pesticide adsorbed to soil to the amount dissolved in water). Persistence in soil is the factor that appears to give atrazine its high leaching potential. Literature values indicate a surface soil half-life of atrazine of 4 to 57 weeks depending on environmental conditions.

Toxicology of Atrazine

Acute Toxicity

Based on acute animal studies, atrazine is known to be slightly toxic when ingested and only mildly irritating to exposed skin or eyes. Rats exhibit muscular weakness, hypoactivity, ptosis, dyspnea and prostration after oral administration of large amounts of atrazine.

Toxicological Properties - Acute Toxicity to Mammals

Type of Animal Study	Technical Grade Atrazine
Acute Oral LD50 (rat)	1,869 mg/kg
Acute Dermal LD50 (rabbit)	>3,100 mg/kg
Eye Irritation (rabbit)	Nonirritating
Primary Skin Irritation	Mildly Irritating

Chronic Toxicity

The Wisconsin Department of Health Services[1] (DHS) selected a 1964, 2-year chronic feeding study in dogs with Atrazine 80W for chronic exposure risk assessment determinations. Based on this study, DHS determined a No Observable Effect Level (NOEL) of 0.35 mg/kg/day. In this study, dogs showed increased heart and liver weights at the 3.5 mg/kg/day dosage level. Effects on dogs at the 1,500 ppm feeding level included reduced food intake, decreased body weight and reduced hemoglobin and hematocrit values. Another feeding study with dogs showed electrocardiogram (EKG) alterations such as increased heart rate, decreased P-II values, atrial premature complexes, atrial fibrillations and moderate to severe cardiac lesions at the highest doses of atrazine fed (1,000 ppm).

Reproductive feeding studies (0 ppm to 500 ppm) on rats showed no effects on the reproductive parameters studied. At the highest feeding rate (500 ppm), both parental rats had statistically significant decreases in body weight and food consumption and male rats had statistically significant increases in relative testes weight. The reproductive NOEL and Lowest Effect Level (LEL) were 10 ppm and 50 ppm respectively (2.5 mg/kg/day and 25 mg/kg/day) and the parental NOEL and LEL were 50 ppm and 500 ppm.

Teratological feeding studies on rats showed reduced body weight gain in the first half of the gestation cycle. Similar feeding studies with rabbits showed decreases in body weight and food consumption. Developmental feeding studies on rabbits showed an increase in resorption of the fetus, decreased fetal weights of male and female pups and delayed ossification of fetal appendages.

Lifetime feeding studies in rats are the basis for atrazine being classified by EPA as a class "C" or possible human carcinogen. The class "C" classification is assigned to a compound when there is limited animal evidence to indicate that a compound is a possible carcinogen. This classification can be based on studies which yield limited supportive animal evidence that a compound is carcinogenic. Such evidence can include (a) definitive malignant tumor response in a single species in a well-designed experiment (b) marginal tumor response in flawed studies (c) benign but not malignant tumors with an agent showing no response in a variety of short-term tests for mutagenicity, (d) marginal responses in a tissue known to have high and variable background rate. A compound classified as a Class A carcinogen is considered a known human carcinogen based on sufficient epidemiological evidence. Atrazine is currently being re-registered by EPA and a new health risk assessment is nearing completion. Based on new data and interpretations, EPA considers atrazine as NOT a likely human carcinogen.

EPA has established a lifetime Maximum Contaminant Level (MCL) of 3.0 ppb for drinking water. This level may change based on the new risk assessment completed as part of the re-registration effort. However, there is no formal effort underway at this time to change the MCL for atrazine.

[1] The Department of Health Services was previously called the Department of Health and Family Services. It is called the Department of Health Services throughout this EIS for consistency.

Wisconsin's Groundwater Standard for Atrazine

Pursuant to ch. 160, Stats., and based on a recommendation from DHS, the Department of Natural Resources (DNR) established groundwater standards for atrazine in 1988 in ch. NR 140, Wis. Adm. Code. The ES for atrazine was established at 3.5 ppb and the PAL was set at 0.35 ppb.

In 1991, DHS recommended to DNR that the atrazine ES standard be lowered to 3.0 ppb to be consistent with the lifetime MCL established by EPA. DHS also recommended that the groundwater standard for atrazine be modified to include the three chlorinated metabolites deethylatrazine, deisopropylatrazine, and diaminoatrazine. This recommendation was based on information from CIBA-GEIGY Corporation toxicologists indicating that these three chlorinated metabolites had toxicological properties similar to parent atrazine. In response to these recommendations, DNR adopted, in January 1992, an ES of 3.0 ppb and a PAL of 0.30 ppb for total chlorinated atrazine residues.

CHAPTER 3 - ENVIRONMENT AFFECTED BY AND POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The environment affected by the proposed expanded atrazine PAs includes portions of Sauk and Columbia counties. The total land area included in the proposed rule change is approximately 8,640 acres.

The proposed rule may lead to increased use of alternative herbicides that may also have environmental implications. Information gathered by DATCP has indicated that clopyralid (Curtail), flumetsulam (Hornet), dicamba (Banvel), acetochlor (Harness), and mesotrione (Callisto, Lumax) are among the most important alternative herbicides if atrazine use is reduced or eliminated. Simazine (Princep) is another triazine herbicide which may also be used where atrazine is not available. Many formulations of alternative herbicides are sprayed in liquid form, but the potential for drift and non-target exposures should not be significantly different than similar formulations of atrazine.

With the possible exception of simazine, alternative herbicides, due to differences in mobility and persistence, do not generally have as great a potential to contaminate groundwater as atrazine. Also, many other corn herbicides, with the exception of Lasso (alachlor), have less restrictive groundwater ESs than atrazine. Metabolites of alternative herbicides can also be of concern for groundwater and much remains to be learned about these compounds. Alachlor ESA and metolachlor ESA have been found extensively in groundwater and surface water in Wisconsin, but metolachlor ESA does not yet have a groundwater standard. (DNR is currently proposing to establish an enforcement standard for metolachlor ESA plus metolachlor OA at 1,300 ppb). DATCP will continue to monitor the potential for these alternative herbicide compounds to impact groundwater.

The desired long-term effect of the proposed rule on the environment is to decrease additional groundwater contamination by atrazine in the proposed expanded PAs. This reduction in additional groundwater contamination would benefit the natural and human environments.

CHAPTER 4 - SIGNIFICANT ECONOMIC EFFECTS OF THE PROPOSED ACTION ON ATRAZINE USERS

(DATCP Analysis of the Technical and Economic Feasibility of Reducing or Eliminating Atrazine Use)

Background

In 1990, DATCP conducted an extensive analysis of the technical and economic feasibility of reducing or eliminating atrazine use. This analysis consisted of per-acre cost comparisons for weed control strategies that utilized full or "conventional" atrazine rates, reduced atrazine rates, or no atrazine. The weed control strategies – including various combinations of atrazine, other herbicides, and mechanical weed control – were developed in consultation with the University of Wisconsin-Madison (UW) Agronomy Department. These strategies were realistic, but were hypothetical in the sense that they were designed in the office rather than portraying what a particular grower was actually using in the field. Cost comparisons for the various weed control strategies were made for representative cropping systems including continuous corn, corn in rotation with soybeans, and corn in rotation with alfalfa on coarse and medium/fine soil texture groups.

The results of this analysis indicated that the feasibility of reducing or eliminating atrazine use varied considerably across the many different weed control situations facing corn producers. In some situations, such as routine weed control in continuous corn or corn/soybean rotations, reducing or eliminating atrazine seemed reasonable. In other situations, such as in a rescue treatment for grass weeds that escaped the planned weed control program, atrazine played a more important role. This analysis is described in detail in Chapter 4 of the EIS dated January 1991 that accompanied the original Atrazine Rule, ch. Ag 30, Wis. Adm. Code.

To supplement the hypothetical analysis conducted in 1990, in 1991 DATCP reviewed all relevant Wisconsin field projects, both research and demonstration, that have compared the effectiveness and profitability of various levels of atrazine use. The information that was reviewed included relevant data from the Profits through Efficient Production Systems (PEPS) program, the UW Nutrient and Pest Management (NPM) Program, the DATCP Sustainable Agriculture Program, and relevant field trials conducted by the UW Agronomy Department.

The 1991 report also discusses weed control issues on sweet and seed corn in response to comments received during the 1990 public hearings. Sweet and seed corn both have unique weed control needs including a potentially greater need for atrazine.

Lastly, the report discusses changes in the herbicide/weed control picture that are influencing the feasibility of reducing or eliminating atrazine use. This review is described in detail in Chapter 4 of the EIS dated September 1991 that accompanied the 1992 amendments to ch. Ag 30, Wis. Adm. Code.

Conclusions

Chapter ATCP 31, Wis. Adm. Code, DATCP's Groundwater Protection Program rule, states that groundwater protection rules "shall be designed, to the extent technically and economically feasible, to minimize the level of the pesticide substance in groundwater and maintain compliance with the preventive action limit for the pesticide substance statewide." Based upon the 1990 Economic Evaluation and the 1991 update, it is possible to make some conclusions on the technical and economic feasibility of reducing or eliminating atrazine use. These conclusions can help determine what additional restrictions on atrazine use are appropriate. Throughout this discussion, it is useful to distinguish between individual uses of atrazine and the specific types of corn.

Technical Feasibility

Technical feasibility is generally considered to address the existence of suitable alternative weed control measures that can replace the individual uses of atrazine. These alternatives could potentially include alternative herbicides and mechanical weed control. Addressing the question of whether there are technically feasible alternatives to atrazine is independent of any economic or cost considerations. For instance, we can consider whether there are technically feasible alternatives to atrazine in specific situations, like routine weed control in continuous corn or for quackgrass control in first year corn after alfalfa sod, independent of cost. Furthermore, it is useful to consider whether the feasibility of reducing atrazine use varies between the various types of corn, such as field, sweet, and seed corn.

Field Corn. The feasibility analysis and discussions with the DATCP Atrazine Technical Committee have indicated that it is technically feasible to reduce or eliminate atrazine use on field corn. Particularly with new herbicide products entering the market and advancing technologies and expertise in mechanical weed control, it is technically possible to handle all weed control situations in field corn without the use of atrazine. In eliminating the use of atrazine, however, a higher level of management may be needed since weather and other factors make the timing of alternative weed control methods more critical.

Sweet and Seed Corn. The analysis indicated that on sweet corn and seed corn it is technically feasible to reduce atrazine use, but it may not be technically feasible to eliminate atrazine use. Sweet and seed corn have unique weed control needs and problems, including fewer registered alternative herbicides and higher potential for herbicide injury, that make atrazine a more integral component of the weed control strategy compared to field corn. There may be certain situations, such as when a rescue treatment is needed, where atrazine is the only technically feasible alternative. Although atrazine use is relatively more important on seed and sweet corn, it appears technically feasible to reduce application rates for routine use to 0.75 to 1.0 pound of atrazine a.i./acre.

Economic Feasibility

Economic feasibility goes beyond technical feasibility and considers the cost differences between atrazine and alternative weed control methods. It is possible, as in this analysis, to make per acre weed control cost comparisons for weed control strategies that use full atrazine, reduced atrazine, or no atrazine. It is also possible to use other economic parameters such as direct costs, production costs, or measures of profitability, such as gross margin analysis, to compare various weed control options. Furthermore, both micro and macroeconomic analysis can be conducted to determine the effects of modifying atrazine use on individual farms and the larger farm economy. Chapter 160, Stats., Groundwater Protection Standards, does not specify a method, so it is desirable to consider a range of economic indicators.

The guideline of economic feasibility in the ch. 160, Stats., and ch. ATCP 31, Wis. Adm. Code, is somewhat difficult to interpret and implement because no specific measure or yardstick of economic feasibility is specified. Whereas it is possible to make cost comparisons between weed control strategies utilizing various levels of atrazine, it is much more difficult to interpret these results and decide what level of additional cost is acceptable in order to protect groundwater. Cost-benefit analysis is a possibility, but is often fraught with bias and was not specifically envisioned in ch. 160, Stats. Short of some analytical or quantitative procedure for calculating acceptable or legitimate cost increases, DATCP is left with a process of negotiation, qualitative input from the public, and group consensus to determine how far it is feasible to further reduce atrazine use.

Field Corn. The 1990 and 1991 economic analyses indicated that it is economically feasible to reduce atrazine use on field corn. A one pound rate of atrazine has been used as a benchmark between higher and lower atrazine use rates in the analysis of the feasibility of reducing atrazine rates in the proposed AMAs. Data from the PEPs program, the NPM demonstrations, DATCP's Sustainable Agriculture Program, and the UW Agronomy field trials have consistently indicated that corn can be produced profitably using one pound or less of atrazine. This conclusion is corroborated by atrazine use patterns throughout Wisconsin. Most growers who continue to use atrazine use low application rates. At application rates of one pound or less, atrazine is used in premix products or to "spike" other herbicides in various tank mixes.

A determination of whether it is economically feasible to eliminate atrazine use on field corn depends largely on the extent of cost increase that is acceptable in order to further protect groundwater. Whereas DATCP's analysis has indicated that there is no significant cost disadvantage when reducing atrazine rates to one pound or less, it did indicate a potential cost increase when eliminating atrazine and switching to alternative herbicides. The extent of this cost increase depends largely on weed pressure and the extent to which mechanical weed control is practical. Some sources of data suggest a $5/acres - $10/acre cost increase if atrazine was eliminated in favor of alternative herbicides on field corn. Still other individuals have testified to DATCP that in a worst case scenario loss of atrazine could lead to a $20/acre-$30/acre cost increase. The decision making process must resolve the question of whether these cost increases are economically feasible to minimize groundwater contamination.

In July 2008, DATCP asked the UW Agronomy Department staff what the cost differential would be if atrazine was eliminated from a corn grower's pesticide regime. Agronomy staff estimated that the additional cost to a grower is likely to be approximately $10/acre more if atrazine cannot be used. This is consistent with the cost differential estimate made in 1991.

Sweet and Seed Corn. Discussions with the Atrazine Technical Committee and sweet corn producers indicated that it is economically feasible to reduce atrazine use on sweet corn and seed corn. The use of atrazine premix products, low levels of atrazine in tank mixes with other herbicides, and mechanical cultivation should allow routine atrazine application rates on sweet and seed corn to be reduced to 0.75 pounds atrazine a.i./acre to 1.5 pounds a.i./acre with a provision to allow additional atrazine use for rescue treatments.

In 1991, it was determined that it was probably not technically feasible to eliminate the use of atrazine on sweet and seed corn. Since this determination was made, discussion of the economic feasibility of eliminating atrazine use on sweet and seed corn was not considered relevant. However, alternative herbicides are now available so that sweet and seed corn can be produced without the use of atrazine. There are, however, additional costs associated with the use of these alternative products.

CHAPTER 5 - PERSONS DIRECTLY AFFECTED BY THE PROPOSED ACTION AND HOW THEY WILL BE AFFECTED

Atrazine Users - Field, Sweet, Seed and Silage Corn Growers

Atrazine users in the new and expanded PAs would be affected by the proposed rule. Growers in the PAs would not be able to apply atrazine or mix and load atrazine unless over a spill containment pad constructed in compliance with s. ATCP 29.45, Wis. Adm. Code. Portable pads are available at a cost of approximately $1,800. Construction costs for acceptable concrete pads are estimated to be between $1,500 and $3,000. A description of the economic effects of reducing or eliminating atrazine use on corn crops is provided in Chapter 4.

Effects on the Pesticide Industry

Dealers and Distributors of Atrazine

Dealers and distributors of atrazine who service the areas of the proposed new and expanded PA would be affected by a reduction in the sales of atrazine. It is likely, however, that an increase in the sales of alternative herbicides would compensate for the reduction in atrazine sales.

Commercial Applicators of Atrazine

Commercial application services will be required to know where all the atrazine PAs are located to avoid inadvertent applications. Since many growers who cannot or chose not to use atrazine will use alternative herbicides, there should not be a significant reduction in business for commercial applicators. Any impact of the proposed rule on commercial applicators will depend on how they respond to changing weed control practices. Applicators that provide comprehensive services such as weed management consulting and non-atrazine or non-herbicide weed control programs may see an increase in business.

Manufacturers of Atrazine

Approximately twenty-five companies are licensed in Wisconsin to sell approximately 94 products containing atrazine. By eliminating atrazine use in the new and expanded PA, the proposed rule is expected to result in a small decrease in sales of atrazine products in Wisconsin. The extent of the impact on sales is related to the number of corn acres where atrazine use will be eliminated. The impact of the reduction in atrazine sales in Wisconsin on the national atrazine market will be small unless this action serves as a precedent for other states.

Persons in Affected Areas Who Use Groundwater as a Source of Drinking Water

Groundwater is the source of drinking water for approximately 70% of Wisconsin residents. Residents whose private wells have been sampled and found to contain atrazine and metabolite concentrations above the 3.0 ppb ES have been advised by letter to find an alternative source of water for drinking and cooking purposes. These people have been exposed to a health risk for an undetermined period of time. They also incur inconvenience and costs associated with purchasing either bottled water or transporting water from a clean source. In some instances new wells must be installed at a cost ranging from $1,000 to more than $15,000. Some of these new wells have been partially funded by the Wisconsin Private Well Compensation Program. Property values can also decline in areas with groundwater contamination. Some homeowners with atrazine in their well above the ES have had to subtract the cost of replacing the well from the selling price of their home.

The proposed new and expanded PAs is expected to reduce negative impacts on the quality of groundwater in Wisconsin. Since atrazine contamination is more severe in the PA, greater benefits are expected for residents of these areas. Eliminating atrazine use in the proposed new and expanded PA should reduce additional atrazine inputs to wells previously contaminated and decrease the potential for new wells to become contaminated. As a result, health concerns and psychological stress associated with contaminated drinking water should be reduced by the rule. Also, the costs, inconvenience and effort associated with using bottled or other alternative sources of water should be reduced as the levels of atrazine in groundwater decline. Reductions in property values due to groundwater contamination by atrazine should diminish.

Effects on Costs to Consumers

The proposed action is not expected to have a measurable effect on consumer food costs, specifically on corn-derived products. It is unlikely that corn production will decline as a result of decreased atrazine use. Corn prices, which are affected by several market forces including declining federal support programs and other factors such as weather, are not expected to change as a result of the proposed action.

State Agencies

DATCP would administer and enforce the proposed rule. Initially, a significant outreach effort will be needed to inform the regulated community of the new and expanded PAs. An increase in compliance and enforcement activities by DATCP will also be needed.

Groundwater monitoring will need to continue to allow evaluation of the rule over time. Overall, a significant expenditure of staff, money and analytical services will be required.

DNR has authority to sample wells and is likely to continue these efforts. DHS is expected to continue its cooperation with DNR and DATCP by offering information on possible health effects of atrazine and issuing health advisories regarding the use of water from contaminated wells.

CHAPTER 6 - ALTERNATIVES TO THE PROPOSED ACTION

No Action Beyond the Existing Rule

Under this option, no new or expanded PA would be created. The existing ch. ATCP 30, Wis. Adm. Code, would continue to apply to all areas of the state.

Advantages

An advantage of this option is that no additional rulemaking or compliance actions would be required for DATCP. Also, from a weed control perspective, growers in the proposed expanded PA could continue using atrazine at the existing statewide levels.

Disadvantages

The main disadvantage of this option is that it would not provide adequate groundwater protection in the areas where exceedences of the atrazine ES have been found. A lack of response would not meet DATCP mandates under the ch. 160, Stats.

Statewide Prohibition

Under this option atrazine use would be completely eliminated. No atrazine could be used for any crop in any part of the state. A prohibition on atrazine use could be imposed for the 2011 growing season or phased-in over 2 to 3 years. This is obviously the most restrictive action DATCP could take in response to atrazine contamination in groundwater.

Advantages

The biggest advantage of this option is that it would provide the highest degree of groundwater and public health protection from contamination by atrazine. No additional atrazine would be introduced into the environment to further contribute to the existing problem. The aquifers of the state could then begin to cleanse through degradation, dispersion and discharge into surface water. This option would be relatively easy to administer and enforce compared to a system of use restrictions and PAs.

Disadvantages

A statewide prohibition may eliminate atrazine use at low rates in areas where unacceptable contamination would not occur. This could lead to undue economic hardship on certain corn growers.

DATCP has estimated the economic impact of eliminating the use of atrazine in Wisconsin. The overall analysis was based on separate analyses for continuous corn, corn in rotation with alfalfa, and corn in rotation with other crops. The results indicated that the total economic cost of prohibiting atrazine use in Wisconsin would be between $1.6 and $10.9 million. This wide range reflects the considerable cost differences between possible alternative weed control strategies. In situations where increased mechanical weed control is feasible, for instance, the analysis indicated that the economic impact could be greatly reduced.

SUMMARY AND CONCLUSIONS

Groundwater monitoring initiatives in Wisconsin have 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 is believed to have resulted from both use (non-point source) and improper handling, storage and disposal (point source). The distribution of atrazine detections in the state is widespread. Most areas where testing has occurred have shown detections and certain areas have more acute contamination problems.

Regulatory authority for protection of groundwater from pesticides including atrazine falls under ch. 160, Stats., and ch. ATCP 31, Wis. Adm. Code. Both ch. 160, Stats., and ch. ATCP 31, Wis. Adm. Code, describe the measures DATCP must take in response to documented groundwater contamination by pesticides. For groundwater contamination above the Enforcement Standard (ES), DATCP must prohibit the activity or practice that caused or may affect the contamination. For levels of contamination below the ES, the appropriate regulatory response is more complex. Chapter ATCP 31, Wis. Adm. Code, states that any substance-specific groundwater protection rule "shall be designed, to the extent technically and economically feasible, to minimize the level of pesticide substance in groundwater and maintain compliance with the preventive action limit for the pesticide substance statewide."

The original Atrazine Rule, ch. Ag 30, Wis. Adm. Code, was created in March 1991 to protect groundwater in Wisconsin. That rule restricted the use of atrazine on a statewide basis and established an AMA and atrazine PAs in which the use of atrazine was further restricted or prohibited. Amendments to the rule, including renumbering it to ch. ATCP 30, Wis. Adm. Code, have been promulgated many times since 1991. Currently, 101 PAs totaling over 1.2 million acres are included in the rule.

Under the proposed rule change, all statewide provisions in the current rule remain in effect. The proposed rule changes create one additional PA and expand and join two existing PA based on groundwater sample results above the ES for atrazine and metabolites that DATCP received in the last two years.

This EIS finds that promulgation of the proposed rule would not create any new adverse environmental impacts from the use of alternative herbicides. Alternative herbicides, due to differences in mobility and persistence, generally have less potential to contaminate groundwater as compared to atrazine. The major effect the proposed expansion of the PAs on the environment is a reduction in additional groundwater contamination by atrazine in the PAs. This reduction in additional groundwater contamination will benefit the natural and human environments. DATCP will continue to monitor any groundwater impacts from alternative herbicides.

Several alternative regulatory strategies have been considered by DATCP staff. These include taking no action and prohibiting atrazine use statewide. Eliminating atrazine use statewide may provide greater protection of groundwater than the proposed rule, but may also lead to greater economic hardship for farmers who desire to continue using atrazine.

Atrazine use on some sites under this rule may lead to groundwater contamination that exceeds the PAL.

Dated:_____

WISCONSIN DEPARTMENT OF AGRICULTURE,
TRADE AND CONSUMER PROTECTION

By _____
Kathy F. Pielsticker, Acting Administrator
Agricultural Resource Management Division