1. Atrazine Updates

Quick Resources

- Read the Atrazine Reregistration Eligibility Decision (RED)(PDF) (12 pp, 108k, about PDF)

Current as of July 2009

Atrazine is a herbicide for controlling weeds that compete with desirable plants such as food crops, pasture, and other types of agriculture, as well as golf course turf and residential lawns. One of the most widely used pesticides in the U.S., atrazine is also among the most intensively examined pesticides in the marketplace. Go to more information about atrazine.

EPA's Office of Pesticide Programs (OPP) has determined that atrazine is safe when used according to approved label directions and precautions. In making this finding, the Agency has ensured that children, women of child-bearing age, and other sensitive subpopulations are protected. The Agency's risk assessments for atrazine are based on effects on the most sensitive subpopulation, developing children, and include factors to ensure that any uncertainties are taken into account. If at any time atrazine data raise new risk concerns, EPA will modify its regulatory controls for atrazine as appropriate.

This page provides results to date from the programs, activities, and studies required by EPA's Atrazine Reregistration Eligibility Decision of 2003, including:

- Office of Pesticide Programs' Monitoring in Community Water Systems
- Ecological Watershed Monitoring Program
- Cancer
- Amphibians

EPA's 2006 triazine cumulative risk assessment considered the combined effects of atrazine and simazine, two closely related triazine herbicides. EPA concluded that cumulative exposures to these pesticides through food and drinking water are safe and meet the rigorous human health standards set forth in the Food Quality Protection Act (FQPA). In other words, the levels of atrazine and simazine that Americans are exposed to in their food and drinking water, combined, are below the level that would potentially cause health effects. EPA is currently revising its 2006 triazine cumulative risk assessment, taking into consideration additional monitoring data, as well as public comments the Agency received. The Agency expects to issue the revised cumulative assessment and a response to comments on the 2006 assessment in late 2009.

Pesticide Program's Monitoring in Community Water Systems

Status Update - July 2009

Currently, an intensive monitoring program to look for atrazine residues in drinking water from approximately 150 community water systems (CWS) is ongoing. These systems, located primarily in the Midwest, are among the most vulnerable to atrazine exposure. A summary of data submitted by the registrant from 2003 – 2007 is available. The complete raw data from the program are available in OPP's public docket EPA-HQ-OPP-2003-0367. Through its review of this data, the Agency has confirmed that none of the systems have exceeded OPP's level of concern, a 90-day average of 37.5 parts per billion (ppb) of atrazine and its degradates. Concentrations below this 90-day average are considered to be safe. The Agency has released 20 CWS from the program because these systems have had no exceedences of EPA's level of concern after five years of monitoring.

Background on CWS Monitoring Program

The January 2003 Atrazine Interim Reregistration Eligibility Decision (IRED) (323 pp, 1.87 MB) about PDF)and subsequent Memorandum of Agreement (MOA) (36 pp, 132 KB, about PDF) between EPA and the atrazine registrants initiated a monitoring program to focus on the most significant human health exposures associated with agricultural and residential uses -- exposures through drinking water. Through the CWS monitoring program, EPA is ensuring that exposures to atrazine in drinking water do not reach levels that pose a risk to public health. EPA's regulatory program for atrazine ensures drinking water concentrations are below a level that could potentially cause changes in hormone levels, which is the most sensitive health effect observed in an extensive battery of toxicity tests. The Agency's level of concern ensures protection of children and adults, including women of child-bearing age.

How CWS were Chosen - Of the approximately 50,000 CWS in the United States, 40,000 are served by ground water and 10,000 are served by surface water. Because atrazine levels in surface water tend to be higher than those in ground water, surface water is EPA's focus for this monitoring program. In 2003, the Agency identified 3,600 systems where atrazine was used and monitoring information was available. OPP used Safe Drinking Water Act (SDWA) data to screen CWS nationwide to see which systems might be more likely to have higher seasonal atrazine contamination. An initial group of CWS was identified for more intensive monitoring based upon the Agency's review of data submitted voluntarily by the registrant. Under conditions of the Atrazine RED and MOA, EPA required an intensive drinking water monitoring program in these CWS. This monitoring program began in 2003.

Information developed by EPA's Office of Water under the SDWA is continually reviewed to determine whether additional CWS should be monitored more intensively through OPP's required atrazine monitoring program. Since 2003, a number of CWS have been added to OPP's monitoring program based on SDWA monitoring data as detections approached or exceeded the Office of Water's Maximum Contaminant Level (MCL) for atrazine as an average of four quarterly samples.

CWS Monitoring - Since 2003, raw and finished water at approximately 150 CWS has been monitored under the atrazine MOA to ensure that levels of atrazine and its chlorinated degradates do not reach the level of concern of 37.5 ppb. Because CWS enter and exit the program on an ongoing basis, the number of systems that have taken part in this program ranges from about 130

to 150 in any given year. These CWS have been monitored on a weekly basis during the peak atrazine use season and biweekly during the rest of the year.

Under the MOA, monitoring is conducted for at least five years. Two exceedances in raw water at a CWS in different years over a five-year period will result in prohibition of further atrazine use in the associated watershed. If a CWS does not have exceedances during five years of monitoring, it may be released from this monitoring program. To date, 20 systems have been released from the program, and no system has had two exceedances.

EPA will continue to review monitoring data under the SDWA. If any CWS in the future have detections approaching the MCL, then the intensive monitoring requirements and regulatory oversight of the Pesticide Program will be invoked.

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Ecological Watershed Monitoring Program

Status Update - July 2009

In mid-2009, EPA released additional atrazine ecological watershed monitoring program data from 2004-2008. These data include results from monitoring of Midwestern streams, as well as results from monitoring of water bodies associated with sugarcane crop production. The data are available in public docket EPA-HQ-OPP-2003-0367. The Agency's atrazine watershed monitoring program, conducted to ensure protection of aquatic ecosystems, is helping EPA and the states determine the extent to which additional monitoring and/or mitigation may be needed to protect aquatic resources.

Background on Ecological Watershed Monitoring Program

In its October 2003 Atrazine Interim Reregistration Eligibility Decision (IRED) (323 pp, 1.87 MB, about PDF), EPA required the registrants to conduct watershed monitoring to ensure protection of aquatic ecosystems. To gather the necessary data in corn and sorghum-producing areas, EPA required the registrants to implement an innovative, intensive ecological watershed monitoring program, as well as a risk mitigation process if atrazine water concentrations exceed the Agency's levels of concern.

Corn and Sorghum - The watershed monitoring program was designed to focus initially on flowing water bodies in the most vulnerable watersheds associated with corn and sorghum production. Monitoring occurred over a three-year period (2004 through 2006), and certain sites had additional monitoring conducted in 2007 and 2008. During the sampling timeframe, 40 watersheds were monitored, and each watershed had at least two years of monitoring data. The 40 watersheds are statistically representative of 1,172 watersheds identified as potentially vulnerable to atrazine exposure, out of 10,000 watersheds with some atrazine use in the U.S. The results of this survey will inform a decision on the extent to which additional water bodies may need to be surveyed. The study design and results will also aid the states in developing any atrazine monitoring they may wish to undertake. A list of the 40 watersheds (PDF) (2 pp, 125

KB, about PDF) included in this monitoring program is provided on the atrazine web page. Additionally, monitoring data from the 40 watersheds are available in public docket EPA-HQ-OPP-2003-0367.

For this monitoring program, the level of concern is approximately 10 to 20 parts per billion (ppb) for atrazine over a relatively prolonged period of time (approximately two weeks to three months). This level of concern is consistent with the Office of Water's draft aquatic life criteria.

The level of concern is based on atrazine testing in 33 studies of artificial pond and stream ecosystems. The results of these studies indicated that changes in aquatic plant communities were the most sensitive effects that are caused by atrazine. By focusing on protection of aquatic plant communities, EPA is protecting fish and invertebrates from effects that atrazine could have on habitat and food sources. The severity of atrazine effects on aquatic community structure is highly dependent on the frequency, magnitude and duration of exposure. The Agency has a refined method to evaluate any pattern of atrazine exposure to determine if the level of concern has been exceeded.

If any of the watersheds show levels of atrazine above the Agency's level of concern for two years, the registrants must initiate watershed-based management activities in concert with state or local watershed programs to reduce atrazine exposure. These remedies must be consistent with the EPA Office of Water's Total Maximum Daily Load (TMDL) program requirements but are enforceable under FIFRA through the 2003 Atrazine IRED and MOA.

As of mid-2009, two Missouri monitoring sites and one Nebraska site have exceeded the Agency's level of concern. The two Missouri sites are in the South Fabius River and Youngs Creek watersheds. The Nebraska site is in the Big Blue River (Upper Gage) watershed.

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Missouri Site Stewardship

- The atrazine registrant, Syngenta, has collected detailed soil, slope and cropping maps, rainfall measurements, crop rotation patterns, and other useful information about the Missouri sites.
- In 2005, Syngenta began discussions with stakeholders in Missouri to determine atrazine use patterns in these watersheds.
- Syngenta is now conducting watershed stewardship and outreach activities with these growers and other stakeholders in the Missouri watersheds, including a series of label education and best management practice (BMP) meetings. Through these meetings, growers are learning how to modify their atrazine use to protect local water quality.
- To evaluate the progress of this outreach effort, Syngenta will continue to monitor the two Missouri sites, as well as additional sites in these Missouri watersheds. This further monitoring will help EPA determine

whether additional mitigation steps are necessary, such as changes in use rates or, potentially, prohibition of atrazine use.

Nebraska Site Stewardship

- Since the Agency's determination that the Missouri sites exceeded the level of concern, EPA has revised its model for evaluating the effects of atrazine in Midwestern streams and determined in 2009 that the Nebraska site has also exceeded the level of concern.

- As a result of this determination, stewardship activities in the Nebraska watershed are being initiated and monitoring is continuing.

In a public peer review meeting on December 4-6, 2007, EPA consulted with the FIFRA Scientific Advisory Panel (SAP) on the approaches and methodologies of the atrazine ecological monitoring program, and the Agency's preliminary interpretations of monitoring results. As a body of independent scientific experts, the SAP provides advice and recommendations to the Agency on important scientific issues. The 2007 SAP recommendations can be found in docket EPA-HQ-OPP-2007-0934.

EPA revised its approach to the program based on recommendations from the 2007 SAP and presented its revised approach in another SAP meeting on May 12-15, 2009. The Agency is looking forward to receiving the 2009 SAP's final report and recommendations, which will be posted to the public docket (EPA-HQ-OPP-2009-0104) by late August 2009. Feedback from the SAP in this area will guide EPA's work to refine the level of concern and identify, within the 1,172 watersheds vulnerable to atrazine exposure, a set of watersheds that may require additional monitoring and/or mitigation.

Sugarcane - A pilot atrazine monitoring program in water bodies associated with sugarcane crop production was initiated in 2005. Monitoring began in Louisiana in March 2005 and Florida in December 2005; however, the monitoring effort in Louisiana was delayed in the latter half of 2005 because of Hurricane Katrina. In 2008 the Agency received results from the pilot monitoring program, which are available in public docket EPA-HQ-OPP-2003-0367. Advice from the 2009 SAP cited above will help the Agency interpret these data to determine whether additional monitoring and/or mitigation is needed.

Cancer

Status Update - July 2009

Based on available scientific studies, EPA has determined that atrazine is not likely to cause cancer in humans. This determination is the result of a transparent process that invited public participation, solicited development and submission of the best scientifically available data, and allowed preeminent independent scientists to ensure that the Agency was using the highest quality data in its regulatory decision-making process. EPA made this determination based on

results from the full spectrum of animal test data that the Agency requires, as well as numerous research studies on atrazine's mechanism of action.

In an abundance of caution, EPA is sponsoring epidemiological studies through the National Cancer Institute (NCI) to evaluate the potential for any association between atrazine exposure to people and cancer, even though rigorously conducted animal studies show that this result is unlikely.

Background

EPA has received several epidemiological cancer studies for atrazine and expects to receive and review other studies after they are completed. The Agency has received the following studies:

- a report from NCI analyzing previous epidemiological studies of atrazine and non-Hodgkin's lymphoma;
- an epidemiological study of all cancers among atrazine agricultural workers from NCI's Agricultural Health Study, entitled Cancer Incidence Among Pesticide Applicators Exposed to Atrazine in the Agricultural Health Study (PDF) (8 pp, 116 KB, about PDF); and
- a study conducted for Syngenta of the incidence of prostate cancer in workers at an atrazine manufacturing plant in St. Gabriel, Louisiana.

EPA expects to receive and review two additional epidemiological studies and analyses concerning atrazine and cancer from NCI's Agricultural Health Study in late 2009, including:

- an updated epidemiological study and analysis concerning the potential connection between multiple pesticides and prostate cancer; and
- a similar study on non-Hodgkin's lymphoma.

So far, the results of the completed Agricultural Health Studies have shown no relationship between atrazine and prostate cancer or non-Hodgkin's lymphoma.

Based on recommendations from a 2000 FIFRA Scientific Advisory Panel (SAP) and substantiated in a 2003 SAP, the Agency determined that atrazine is "not likely to be carcinogenic to humans." EPA considered all available animal and human epidemiological data available. Although atrazine has been linked to mammary gland tumors in rats, this mode of action does not lead to breast cancer in humans. As indicated in the 2003 Atrazine RED, however, EPA plans to convene an SAP meeting concerning atrazine and its possible association with carcinogenic effects after receiving and reviewing the two additional NCI studies. At this future SAP, the Agency will present its assessment of all available data about the potential carcinogenicity of atrazine - both epidemiology studies and laboratory animal studies.

EPA will continue to review all new data submissions. If at any time results from any new studies raise significant questions, the Agency will convene another SAP meeting before all of the anticipated NCI Agricultural Health Study results concerning atrazine become available.

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Amphibians

Status Update - July 2009

EPA has concluded that atrazine does not adversely affect amphibian gonadal development based on a review of laboratory and field studies, including studies submitted by the registrant and studies published in the scientific literature. At this time, EPA believes that no additional testing is warranted to address this issue.

Background

In June 2003, after evaluating the available literature on the potential effects of atrazine on amphibian gonadal development, EPA concluded that there was sufficient information to formulate a hypothesis that atrazine exposure can affect amphibian gonadal development; however, there was insufficient information to refute or confirm that hypothesis, mainly because of the limitations of the study designs and uncertainties in the data. The Agency's 2003 White Paper (PDF) (8 pp, 62 KB, about PDF) carefully evaluated the data from 17 laboratory and field studies, discussed remaining uncertainties in evaluating the potential effects of atrazine on amphibian development, and outlined future studies that could address these uncertainties. The FIFRA Scientific Advisory Panel (SAP) reviewed EPA's White Paper and concluded that the Agency's review was thorough, the conclusions were valid, and the approaches and criteria for new studies were appropriate. The SAP also agreed that additional studies were warranted and that a tiered testing approach was appropriate.

In response to a November 2004 Data Call-In (DCI) Notice from EPA, Syngenta, the principal atrazine registrant, developed a testing protocol for determining the effects of atrazine on amphibian gonadal development, and conducted two studies consistent with the first tier of testing described in the 2003 White Paper and the SAP review. In June 2007, Syngenta submitted to EPA its final report regarding the potential effects of atrazine on gonadal development of amphibians.

To ensure the quality and transparency of its assessment of atrazine's potential to affect amphibian gonadal development, EPA solicited advice from the SAP at a second public peer review meeting on October 9 - 11, 2007. During this meeting, EPA presented its assessment of 19 laboratory and field studies, including the registrant-submitted studies and additional studies available in the public literature since the 2003 SAP. Of the 19 studies, only the two DCI studies submitted by the registrant incorporated all of the design elements recommended by the Agency and the 2003 SAP to address uncertainties identified in the 2003 White Paper. The 2007 SAP agreed with the Agency that, although both DCI studies contained some limitations, the overall design and conduct of the studies reflected a high degree of quality control that allowed them to

be used to evaluate whether or not atrazine exposure affects amphibian gonadal development. The 2007 SAP also agreed with the Agency that other laboratory and field studies reviewed by the Agency did not fully account for experimental and environmental conditions that could influence relevant endpoints. The 2007 SAP's final report and recommendations are available in public docket EPA-HQ-OPP-2007-0498.

Based on the Agency's thorough examination of the 19 studies and the 2007 SAP's subsequent concurrence with the Agency's assessment of those studies, EPA finds that atrazine does not adversely affect amphibian gonadal development. If new papers in the scientific literature regarding the potential effects of atrazine on amphibians become available, the Agency will review the information as part of its ongoing atrazine program.

Although EPA is not currently requiring additional testing of atrazine on amphibians, the Agency is examining other atrazine issues. As discussed earlier on this Web page, EPA also is awaiting the results of studies examining the potential for any association between atrazine exposure to people and cancer, and has received and is analyzing additional monitoring data from community water systems and data from an ecological watershed monitoring program. If at any time atrazine data raise new risk concerns, EPA will modify its regulation of atrazine as appropriate.

http://www.epa.gov/pesticides/reregistration/atrazine/atrazine_update.htm