



National Pesticide Survey

Atrazine



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The U.S. Environmental Protection Agency (EPA) has completed its five-year National Survey of Pesticides in Drinking Water Wells (NPS), a study of the presence of 127 pesticides, pesticide degradates, and nitrate in community water system (CWS) wells and rural domestic drinking water wells. Atrazine was one of the pesticides detected in the Survey. This fact sheet provides a description of atrazine, its potential health effects, a summary of the concentrations of atrazine found by the NPS in wells, and guidance on both treating and preventing well contamination.

What is Atrazine?

Atrazine is the common name of an herbicide which is a member of the chemical family of triazines. Atrazine was registered for use in the late 1950s. It has been sold under the trade names of Atrazine, AAtrex, Atratol, Gesaprim, and Zeaphos. Atrazine is also a component of other herbicides such as Bicep, Bullet, Extrazine, Lariat, Marksman, Prozine, and Sutazine. Atrazine is used to control many annual broadleaf weeds and certain grasses in corn, sorghum, sugarcane, macadamias, and subtropical tree fruits such as guavas and pineapples. It is also used for general weed control on non-cropped industrial land, selective weed control in conifer restoration and Christmas tree plantations, and non-selective control of vegetation on fallow land.

How Does Atrazine Behave in Soil and Ground Water?

The behavior of a pesticide after it is released to the environment is dependent upon its movement in air, water, and soil as well as the rate at which it is transformed or broken down. Pesticides applied to crops or the soil surface may volatilize (vaporize) to the atmosphere, be carried off by surface runoff, be carried to ground water through leaching, or remain in the soil through adsorption (adherence) to soil particles and undergo little movement in air or water. Pesticides may be transformed by reaction with water, microorganisms, and exposure to sunlight. The likelihood that atrazine will migrate into ground water is influenced by its tendency to be transported (move) from soil to air and water and to be transformed by these various processes, as well as by the characteristics of the site, such as soil type, moisture, temperature, and depth to ground water. Atrazine has a high potential to be transported, and a low potential to be transformed.

How Does Atrazine Get into Ground Water?

Atrazine migration into ground water could result from the presence of atrazine in the soil due to agricultural and other applications of atrazine on cropped and non-cropped land. Atrazine could also reach ground water from direct entry into a well through accidental chemical spills or improper storage near a well.



Findings of the National Pesticide Survey

Based on the results of the NPS, EPA estimates that atrazine is present, at or above the analytical detection level of 0.12 $\mu\text{g/L}$ used in the Survey, in about 1,570 (1.7%) CWS wells and 70,800 (0.7%) rural domestic wells nationwide. Considering the precision of the Survey, EPA estimates that the number of CWS wells with detectable levels of atrazine could be as low as 420 or as high as 2,710, and the number of rural domestic wells could be as low as 13,300 or as high as 214,000. Atrazine is measured in micrograms per liter ($\mu\text{g/L}$) which is equivalent to parts per billion (ppb). The maximum concentration of atrazine detected was 0.92 $\mu\text{g/L}$ in CWS wells sampled by the Survey and 7.0 $\mu\text{g/L}$ in rural domestic wells sampled by the Survey. The median concentration of detectable atrazine was 0.26 $\mu\text{g/L}$ in CWS wells, and 0.29 $\mu\text{g/L}$ in rural domestic wells.

Atrazine was sometimes detected at concentrations above EPA's proposed Maximum Contaminant Level (MCL) and drinking water Lifetime Health Advisory Level (HAL) of 3 $\mu\text{g/L}$ in rural domestic wells. Other studies have also indicated atrazine concentrations above the HAL. EPA notified well owners and operators within 24 hours when detections were above the Health Advisory Level.

What Health Effects Might be Caused by Atrazine in Drinking Water?

Non-Cancer Effects: EPA has set a Lifetime Health Advisory Level for atrazine in drinking water at 3 $\mu\text{g/L}$. EPA believes that water containing atrazine at or below this level is acceptable for drinking every day over the course of one's lifetime, and does not pose health concerns. A Lifetime HAL represents the concentration of a contaminant in water that may be consumed over an average human lifetime without causing adverse health effects. Lifetime HALs are based on health effects that were found in animals given high doses of the pesticides in laboratory studies. This level includes a margin of safety. Consuming atrazine, however, at high levels well above the Lifetime Health Advisory Level over a long period of time has been shown to result in adverse health effects in animal studies, including tremors, changes in organ weights, and damage to the liver and heart.

Cancer Risk: EPA has not officially classified the carcinogenicity (cancer-causing) potential of atrazine. There is limited or uncertain information indicating that atrazine causes cancer in animals receiving high doses of the chemical over the course of their lifetimes. Because atrazine in drinking water may possibly increase the risk of cancer in humans, the Lifetime Health Advisory Level includes an additional margin of safety.

Standard: EPA sets enforceable standards for public water systems, called MCLs. These regulatory standards set achievable levels of drinking water quality to protect human health. The proposed MCL for atrazine is 3 $\mu\text{g/L}$ (proposed as of May 22, 1989).

How is Water Treated to Remove Contaminants?

Atrazine can be detected in drinking water by a laboratory using an EPA method such as #507. If atrazine is detected in well water and confirmed by retesting to be above 3 $\mu\text{g/L}$, State or County health officials should be consulted. They may advise periodic retesting to get an accurate overall picture of the water quality because changes in seasonal precipitation and changes in pesticide use can cause variations in the amount of chemicals found in water wells. They also may advise using an alternative drinking water supply (bottled water is an example of a temporary alternative), treating the water, or drilling a new or deeper well. If you receive your well water from a community water system, and have concerns about the quality of your water, contact your State public water supply agency. Public water suppliers are required to notify customers if the drinking water that they deliver contains a contaminant that exceeds its MCL.

You may also be able to treat your well water to remove pesticides and other contaminants. Treatment technologies that can remove atrazine from water include granular and powder activated carbon adsorption. Other technologies such as ion

exchange, reverse osmosis, ozone oxidation, and ultraviolet irradiation are in the experimental stages for this pesticide and are not necessarily appropriate or available in every situation. Certain treatment methods are more suitable for large community water systems than for individual domestic wells. State or County health officials should be able to provide advice on the best approach to follow.

**How Can
Water
Contamina-
tion be
Prevented?**

Several steps may be taken to prevent pesticides or nitrate from entering wells, such as eliminating direct entry through the well wall, drilling a new well, or modifying or reducing pesticide and fertilizer use.

Eliminate Direct Entry Through the Well Wall

If pesticides or nitrate are present in well water, they may be entering the ground water through the well itself rather than through the soil. If the well is old or poorly constructed or if there are visible cracks in the well casing, obtain expert advice on whether or not improvements can be made to the well. In addition, investigate simple methods of capping the well or sealing it at the surface to prevent entry. Do not conduct any mixing activities near the well if you use well water to mix pesticides because a spill could lead to direct contamination of the well.

Drill a New Well

If the soil surrounding the well is the source of contamination, drilling a new or deeper well may make sense if water can be drawn from a deeper, uncontaminated aquifer. Unfortunately, it often is difficult to know the quality of the ground water without drilling or extensive testing. Seek expert advice before you drill.

Learn More about Pesticide Use

If you use pesticides, whether for agricultural or home lawn and garden purposes, you should consider attending training courses given by your State or County agriculture department on how to reduce activities that can contaminate ground water. You may find that you can eliminate or lessen the frequency or quantity of your pesticide usage by choosing alternative methods of pest control.

**Why was the
National
Pesticide
Survey
Conducted?**

EPA conducted this Survey to determine the frequency and concentration of pesticides, pesticide degradates, and nitrate in drinking water wells nationwide and to examine the relationship between the presence of pesticides in drinking water wells and patterns of pesticide use and ground-water vulnerability. The Survey sampled 566 community water system wells and 783 rural domestic wells for 127 pesticides, pesticide degradates, and nitrate. The wells were selected as a representative statistical sample to provide nationwide estimates of the presence of pesticides and nitrate in drinking water wells, and are not meant to provide an assessment of pesticide contamination at the local, County, or State level.

**Where to Go
for More
Information**

This fact sheet is part of a series of NPS outreach materials, fact sheets and reports. The following additional fact sheets are available through EPA's Public Information Center (401 M Street SW, Washington, DC 20460, (202) 382-2080):

<i>Survey Design</i>	<i>Analytical Methods</i>	<i>Project Summary</i>
<i>Survey Analytes</i>	<i>Summary Results</i>	<i>Glossary</i>
<i>Quality Assurance/ Quality Control</i>	<i>Fact Sheet for each detected analyte</i>	<i>How EPA Will Use The NPS Results</i>

Additional information on the Survey and on pesticides in general can be obtained from the following sources:

U.S. EPA Safe Drinking Water Hotline 1-800-426-4791 (In Washington, DC (202) 382-5533) Monday-Friday, 8:30 am to 4:30 pm Eastern Time	Information on regulation of pesticides in drinking water
National Pesticide Telecommunications Network 1-800-858-7378 24 hours a day	Information on health effects and safe handling of pesticides
U.S. EPA Office of Pesticide Programs (OPP) Docket 401 M Street, SW Room NEG004 Washington, DC 20460 (202) 382-3587	Background documents for Survey (available for review)
National Technical Information Service (NTIS) 5285 Port Royal Road Springfield, VA 22161 (703) 487-4650	Copies of the <u>NPS Phase I Report</u> (available 1991) and <u>NPS Phase II Report</u> (when available)

If you are concerned about the presence of pesticides and nitrate in your private water well, contact your local or State health department. Other experts in your State environmental agency or agriculture and health departments may also be helpful to you. If you receive your drinking water from a community water system and have questions about your water quality, contact your local community water system owner/operator or the State water supply agency.

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