Debating How Much Weed Killer Is Safe in Your Water Glass The New York Times

By CHARLES DUHIGG
Published: August 22, 2009

For decades, farmers, lawn care workers and professional green thumbs have relied on the popular weed killer atrazine to protect their crops, golf courses and manicured lawns.

Mark Lyons for The New York Times

In Piqua, Ohio, the city manager, Frederick Enderle, left, said he was unaware of spikes in atrazine. Residents like Jeff Lange are angry about the risks.

Toxic Waters

Disputed Science

Articles in this series will examine the worsening pollution in American waters and regulators' response.

But atrazine often washes into water supplies and has become among the most common contaminants in American reservoirs and other sources of drinking water.

Now, new research suggests that atrazine may be dangerous at lower concentrations than previously thought. Recent studies suggest that, even at concentrations meeting current federal standards, the chemical may be associated with birth defects, low birth weights and menstrual problems.

Laboratory experiments suggest that when animals are exposed to brief doses of atrazine before birth, they may become more vulnerable to cancer later.

An investigation by The New York Times has found that in some towns, atrazine concentrations in drinking water have spiked, sometimes for longer than a month. But the reports produced by local water systems for residents often fail to reflect those higher concentrations.

Officials at the Environmental Protection Agency say Americans are not exposed to unsafe levels of atrazine. They say that current regulations are adequate to protect human health, and that the doses of atrazine coming through people's taps are safe — even when concentrations jump.

But some scientists and health advocates disagree. They argue that the recent studies offer enough concerns that the government should begin re-examining its regulations. They also say that local water systems — which have primary responsibility for the safety of drinking water — should be forced to monitor atrazine more frequently, in order to detect short-term increases and warn people when they occur.

The E.P.A. has not cautioned pregnant women about the potential risks of atrazine so that they can consider using inexpensive home filtration systems. And though the agency is aware of new research suggesting risks, it will not formally review those studies until next year at the earliest. Federal scientists who have worked on atrazine say the agency has largely shifted its focus to other compounds.

Interviews with local water officials indicate that many of them are unaware that atrazine concentrations have sometimes jumped sharply in their communities. But other officials are concerned. Forty-three water systems in six states — Illinois, Indiana, Iowa, Kansas, Mississippi and Ohio — recently sued atrazine's manufacturers to force them to pay for removing the chemical from drinking water.

Representatives of the E.P.A. and Syngenta, the company that manufactures most of the atrazine sold, say that current federal standards

are based on hundreds of studies showing Americans are safe. In a written statement, the E.P.A. said that it applied large safety buffers in regulating atrazine and continued to monitor emerging science.

“The exposure that the agency allows under its atrazine drinking water regulations is at least 300 to 1,000 times lower than the level where the agency saw health effects in the most sensitive animal species tested,” the statement said. New studies, while raising important issues, do not “suggest a revision to E.P.A.’s current regulatory approach, which has been built on the review and consideration of hundreds of studies, including animal toxicity and human epidemiological studies dealing with atrazine,” the agency said.

Syngenta said the lawsuits were baseless.

But the head of another government agency voiced apprehension. “I’m very concerned about the general population’s exposure to atrazine,” said Linda S. Birnbaum, director of the National Institute of Environmental Health Sciences, a division of the Department of Health and Human Services. “We don’t really know what these chemicals do to fetuses or prepubescent children.”

“At a minimum, pregnant women should have access to accurate information about what’s in their drinking water,” Dr. Birnbaum added.

Critiques of the E.P.A.

Atrazine is just one example of what critics say are regulatory weaknesses in the protections of America’s drinking water. Health and environmental advocates argue that the laws safeguarding drinking water and policing toxins are insufficient, and that the E.P.A. is often too slow in evaluating emerging risks, not cautious enough and too unwilling to warn the public when health concerns arise.

In January, a Government Accountability Office report said that the E.P.A.’s system for assessing toxic chemicals was broken, and that the

agency often failed to gather adequate information on whether chemicals posed health risks.

Forty percent of the nation's community water systems violated the Safe Drinking Water Act at least once last year, according to a Times analysis of E.P.A. data, and dozens of chemicals have been detected at unsafe levels in drinking water.

In interviews, some E.P.A. officials conceded that they were frustrated by the limitations they face in scrutinizing chemicals like atrazine. An estimated 33 million Americans have been exposed to atrazine through their taps, according to data from water systems nationwide.

"The public believes that the E.P.A. has carefully reviewed all the chemicals that are used and has the authority it needs to deal with risks, but that's often not the case," said Erik D. Olson, director of food and consumer product safety at the Pew Charitable Trusts, and a former lawyer at the E.P.A. and for the Senate Committee on the Environment and Public Works.

"The E.P.A. is working with weak laws, basic research at the agency is often seriously underfunded, and in some cases there's institutional inertia against change," he added. "That's contributed to a sense that the agency is often slow to react to new science showing risks."

Though the hazards posed by atrazine are far from clear, some scientists and health advocates argue that the chemical deserves special scrutiny because it is so widely used. The European Union, for instance, has banned atrazine as part of a precautionary policy that prohibits pesticides that easily contaminate groundwater. (European regulators did not evaluate the chemical's health risks.)

Atrazine, which is sold under various brand names including AAtrex, is most commonly used on corn in farming states. But it can also be found on lawns, gardens, parks and golf courses. Sometimes, the only way to avoid atrazine during summer months, when concentrations tend to rise as

cropland is sprayed, is by forgoing tap water and relying on bottled water or using a home filtration system.

E.P.A. officials note that anyone using atrazine must complete a short training course and is warned to wear long-sleeve shirts and pants, as well as chemical-resistant gloves and shoes, when spraying. The chemical cannot be applied near lakes, reservoirs or other bodies of water. And local water systems must produce an annual report detailing the highest concentrations of atrazine and other chemicals detected over the previous year.

Some high-ranking E.P.A. officials say there are concerns over atrazine, and that it, among other chemicals, is likely to be closely re-examined by the new E.P.A. administrator, Lisa P. Jackson.

“Atrazine is obviously very controversial and in widespread use, and it’s one of a number of substances that we’ll be taking a hard look at,” said Stephen A. Owens, who was recently confirmed as the E.P.A.’s assistant administrator for prevention, pesticides and toxic substances.

He went on: “I can’t say whether the outcome will be any different, but Administrator Jackson has made clear that we need to take a close look at decisions made in the previous administration, and be certain about the science behind those judgments.”

The New Science

Some of the current regulations governing atrazine in drinking water were established in the 1990s. Critics say that science has changed since then — but that the regulations have not.

Recent studies suggest that when adults and fetuses are exposed to even small doses of atrazine, like those allowed under law, they may suffer serious health effects. In particular, some scientists worry that atrazine may be safe during many periods of life but dangerous during brief windows of development, like when a fetus is growing and pregnant women are told to drink lots of water.

“There are short, critical times — like when a fetus’s brain is developing — when chemicals can have disastrous impacts, even in very small concentrations,” said Deborah A. Cory-Slechta, a professor at the University of Rochester in New York who has studied atrazine’s effects on the brain and serves on the E.P.A.’s science advisory board. “The way the E.P.A. tests chemicals can vastly underestimate risks.”

“There’s still a huge amount we don’t know about atrazine,” she added.

In recent years, five epidemiological studies published in peer-reviewed journals have found evidence suggesting that small amounts of atrazine in drinking water, including levels considered safe by federal standards, may be associated with birth defects — including skull and facial malformations and misshapen limbs — as well as low birth weights in newborns and premature births. Defects and premature births are leading causes of infant deaths.

Some of those studies suggest that as atrazine concentrations rise, the incidence of birth defects grows. One study — by researchers at Purdue University, published in the journal Environmental Health Perspectives — suggests that concentrations as small as 0.1 parts per billion may be associated with low birth weights.

The E.P.A. generally does not require water systems to notify residents unless the yearly average of atrazine in drinking water exceeds 3 parts per billion, and under a determination made earlier this decade, the agency considers one-day exposures of up to 297 parts per billion safe.

Another study suggests that concentrations of atrazine in drinking water below the E.P.A. thresholds may disrupt menstrual cycles.

Many of those studies examined large populations that are already exposed to atrazine and sought to exclude the effects of other contaminants and environmental or health factors. However, such epidemiological studies cannot prove that atrazine causes specific diseases. Definitive scientific proof would probably require unethical experiments, like exposing

pregnant women to the chemical in controlled settings. Some research found that other pesticides may have also contributed to health problems.

Agency and Industry Rebuttal

In written statements, the E.P.A. and Syngenta argued there were problems with all of the studies suggesting health risks from low doses of atrazine.

Agency officials pointed out that epidemiological findings cannot fully differentiate between multiple influences, and that they only highlight associations, and do not demonstrate a cause-and-effect relationship, and that the "E.P.A. has required and extensively reviewed laboratory studies on atrazine and developmental effects."

"Data from these studies," the E.P.A. said, "do not suggest that birth defects, small-for-gestational-age, or effects on limb development would occur as a result of exposure to levels of atrazine found in the environment." Officials added that the agency evaluates all studies as they appear and takes appropriate actions.

Syngenta said in a written statement that "the evidence is overwhelming that atrazine does not cause adverse health effects at levels to which people are normally exposed," and that "studies have shown that atrazine does not cause birth defects and does not cause reproductive effects."

But six researchers asked by The Times to review the epidemiological studies said the results were troubling. "These suggest real reasons for concern," said Melissa Perry, an associate professor at the Harvard School of Public Health. "The results need to be replicated, but they suggest there are real questions for policy makers about what constitutes safe levels of atrazine."

Concerns have also been raised by researchers at the E.P.A. itself. Since 2003, for instance, research published by agency scientists in journals like Toxicology and Applied Pharmacology has shown that when rats are exposed to brief doses of atrazine as fetuses, some experience delayed

puberty and their mammary glands change in ways that could make them more vulnerable to cancer later in life.

“The morphological changes we see look similar to those caused by other compounds that make tissue more susceptible to carcinogens,” said Suzanne Fenton, an E.P.A. scientist who has written about atrazine. “This theory hasn’t been tested for atrazine. There’s still a lot that we don’t know.”

E.P.A. and Syngenta representatives said that experiments showing changes in rats used higher doses than found in drinking water and that those studies did not provide the scientific confidence required for regulation. Outside scientists, in interviews, said other research suggested that similar effects could be observed at lower doses.

Dr. Fenton says she is no longer working on atrazine. Other E.P.A. employees also said they had been encouraged to redirect their energies to other chemicals, because of insufficient resources and competing priorities.

E.P.A. officials said that other researchers were currently working on atrazine and that the agency intended to convene a panel by 2011 to evaluate epidemiological and other studies.

Below the Radar

The federal Safe Drinking Water Act was created, in part, with cities like Piqua, Ohio, in mind. A town of 20,500, it has its own water system, and thanks to federal right-to-know laws created to warn residents about chemicals in their drinking water, Piqua’s officials must test for atrazine and other substances and inform people of the highest concentrations detected.

But when spikes in atrazine occur in Piqua and elsewhere, residents often do not learn of them, a review of E.P.A. and state data shows.

Since local water systems test for atrazine as infrequently as once a year, the E.P.A. has required that the companies manufacturing the chemical,

primarily Syngenta, monitor the drinking water of a sample of towns — as many as 154 communities — as often as once a week. The companies submit that data to federal officials. The E.P.A. says those tests indicate that few towns have violated Safe Drinking Water limits for atrazine.

However, a Times review of Syngenta's data shows that some communities had large spikes of atrazine in their drinking water, sometimes for months at a time. But residents were not warned.

For instance, in April 2005, the drinking water in Piqua contained atrazine concentrations of 59.57 parts per billion. The residents of Piqua were also exposed to elevated concentrations of atrazine in 2004 and 2007. Data shows similar patterns in dozens of other cities, like Versailles, Ind., and Evansville, Ill.

But the people of Piqua never learned about those spikes from local water officials or the E.P.A. City officials test for atrazine only once a month in the spring, and the annual report sent to residents in 2005 said the highest level of atrazine detected was only 11.6 parts per billion — 80 percent lower than the peak measured by Syngenta. Residents were also not told when peaks had occurred or how long they lasted or whether there were multiple spikes.

Syngenta said the company regularly provided city officials with testing results. Piqua officials were largely unaware of or did not use those notifications.

"I didn't know that we got any information about atrazine besides our own testing," said Frederick E. Enderle, Piqua's city manager since 2005. "I'm not even sure what we would do with it."

Some residents are angry.

"This makes my blood boil," said Jeff Lange, a Piqua resident and environmental activist. "I have friends and family drinking this water. How are pregnant women or sick people supposed to know when to avoid it?"

Drinking water experts say atrazine spikes most likely occur in many other towns that are not monitored by Syngenta. In those areas, there is essentially no way for residents or officials to monitor how high levels go.

E.P.A. officials said that under the Safe Drinking Water Act, the data collected by third parties, like Syngenta, did not fall under right-to-know provisions and that Piqua was required only to notify residents based on the city's testing.

But residents, including Mr. Lange, said Syngenta's findings should have at least prompted the city to test more frequently, or led the E.P.A. to tell the city to change its testing schedule.

E.P.A. officials also said they do not believe that atrazine spikes like those in Piqua are dangerous. "A one-time reading of 59 parts per billion in finished water does not pose a risk to human health," the agency wrote.

However, studies like the one at Purdue suggest there are health risks at much smaller concentrations, and other studies suggest those risks rise as exposures grow.

Critics contend that atrazine is just one of the many chemicals the E.P.A. has not regulated with sufficient caution.

The Natural Resources Defense Council, an environmental advocacy group, is expected to release a report on Monday saying that weak E.P.A. regulation of atrazine poses risks to humans and the environment. Other organizations have made similar charges about a variety of chemicals, including fuel additives, dry cleaning and manufacturing solvents, and industrial waste dumped into water supplies.

"There's pretty broad consensus that the laws regarding toxic substances need to be modernized and overhauled, and that the E.P.A. needs more resources," said Mr. Olson of Pew, who added that the agency's new leadership had begun addressing many issues.

“But in the meantime, people are getting exposed to dangerous chemicals,” Mr. Olson said. “And the E.P.A. isn’t responding swiftly enough.”