



NITRATE IN DRINKING WATER: A Public Health Concern For All Iowans

Executive Summary



Elevated nitrate levels in Iowa's water have been a source of concern in recent decades since the state was identified as a top contributor of the nitrate and phosphorus pollution fueling the Dead Zone in the Gulf of Mexico. Recently, the challenges presented by high levels of nitrate in drinking water sources have received increased attention due to the Des Moines Water Works' suit against three drainage districts in northwest Iowa, an area identified as a hot spot for nitrate pollution in the state and the Nation.

Blue-baby syndrome, a serious and potentially fatal condition that can occur in infants who ingest water in formula containing high levels of nitrate, has long been acknowledged as a health threat. However, recent studies suggest that the health risks associated with nitrate in drinking water go beyond blue-baby syndrome. The Iowa Environmental Council report "Nitrate in Drinking Water: A Public Health Concern for All Iowans" provides an overview of research findings that suggest associations between elevated levels of nitrate in drinking water and human health problems, and calls for action to protect our state's drinking water sources and collective health.

Health Risks Posed by Nitrate in Drinking Water

The U.S. Environmental Protection Agency drinking water standard of 10 milligrams per liter (mg/L) of nitrate-nitrogen (nitrate-N) was established in 1962 to prevent methemoglobinemia, or blue-baby syndrome, a life-threatening condition that decreases the blood's ability to carry vital oxygen through the body. Blue-baby syndrome is rare – especially since establishment of the EPA health standard that regulates public water supplies. As such, some are calling upon the agency to consider raising the allowable nitrate level, claiming that the drinking water standard is unnecessarily stringent.

However, a number of studies suggest links between elevated nitrate concentrations in drinking water and other health issues, including birth defects, cancers, thyroid problems and a variety of other health concerns. Most of these associations have been found when

nitrate levels are higher than the drinking water standard, though some research suggests that nitrate concentrations even lower than the drinking water standard may be harmful.

When nitrate is consumed, it is reduced within the body to nitrite, which is considered unsafe at much lower levels than nitrate. Nitrite is further reduced in the body to N-nitroso compounds that are widely considered to cause cancer and contribute to a variety of health problems.

Iowans are particularly vulnerable to the potential health impacts from nitrate pollution because concentrations of nitrate in Iowa's streams and groundwater have been found to rank among the highest in the U.S., even higher than elsewhere in the Corn Belt and Northern Great Plains. This presents a significant challenge for public drinking water suppliers that are legally required to provide water with nitrate-N concentrations at or below 10 mg/L. In addition, many Iowans rely on private wells

that are unregulated and often untested. These Iowans are at a greater risk of ingesting elevated concentrations of nitrate or other regulated pollutants.

“Nitrate in Drinking Water: A Public Health Concern for All Iowans” summarizes peer-reviewed literature conducted by a wide variety of respected institutions in the United States and abroad, as well as reports from agencies and other information. Many of the studies referenced in the paper gathered detailed information on large “cohorts,” or study groups, followed over years or even decades. Such long-term research of human subjects is very challenging. Investigators must attempt to sort out many influences: Exposure to nitrate and nitrite comes from drinking water, and also from some foods, cigarette smoke and drugs that contain nitrogen-based compounds. Much of the research suggests that nitrate consumption in drinking water is most problematic when combined with regular exposure to these other sources of nitrate and nitrite and/or other suspect substances, such as some agricultural chemicals. We focus on adverse health outcomes that multiple studies have significantly associated with nitrate intake from drinking water.

- **BIRTH DEFECTS:** Studies conducted in Iowa, Texas, Canada and Australia found statistically significant links between elevated nitrate in drinking water and neural tube defects of the brain and spinal cord, including spina bifida, some oral cleft defects and limb deficiencies.
- **BLADDER CANCER:** Researchers who followed a large group of postmenopausal women in Iowa over many years found an increased risk for bladder cancer as nitrate concentration in water supplies increased. Other likely influences, including exposure to nitrate and nitrite through dietary and other sources, were also considered. Studies in Spain, Germany and Taiwan reported similar findings.
- **THYROID CANCER:** One of the most rapidly increasing cancers in the United States, thyroid cancer, has also been associated with extended exposure to high nitrate levels in drinking water in two large U.S. studies.

Taking Action

While more research is needed to better determine the risks of nitrate exposure, the Iowa Environmental Council asserts that the potential health concerns from nitrate in drinking water provide compelling reasons to act now to reduce pollution and improve water quality.

Drinking water treatment helps us manage the nitrate pollution, but it does not solve the problem. Heightened attention and additional resources are needed to prevent nitrate pollution at the source.

Solving Iowa’s nitrate problem will take time and require a statewide watershed approach that brings urban and rural citizens together to set goals and priorities. Iowa’s Nutrient Reduction Strategy (INRS) is a valuable “toolbox” that offers sound, science-based options to prevent and treat nitrate and phosphorus pollution. However, to adopt the large-scale, long-term conservation efforts called for in the INRS, a sustainable source of funding that is immediate, permanent and substantial, with clear timelines and accountability measures, is required.

The Iowa Environmental Council applauds all those who are taking responsibility to help clean up our water, including farmers, urban landowners, businesses, agency leaders and legislators, but additional participation and leadership is needed. We encourage all Iowans to join in this undertaking to benefit the health and well-being of our families, neighbors and those downstream.

To download the full report, visit the Iowa Environmental Council’s website, iaenvironment.org.