Nitrogen and phosphorus are essential nutrients for plant growth. Farmers supplement these naturally occurring nutrients in their soils with both chemical and animal fertilizer to increase crop production. When these nutrient levels exceed plant needs, water carries the nitrogen (as nitrate) and phosphorus away, leading to water pollution.

Nitrate removal technologies include ion exchange and reverse osmosis systems.

### WHERE IOWANS GET THEIR DRINKING WATER

- **Private Wells** (230,000 people): 10%
- **Public Water Systems (PWS)** (2.8 million people): 90%

- 45% OF IOWANS get drinking water from public water systems that rely on surface water
- 55% OF IOWANS get drinking water from public water systems that rely on groundwater

### PWS NITRATE VIOLATIONS BY SYSTEM SIZE (1980-2017)

- 3% SYSTEMS SERVING >3,301 PEOPLE
- 31% SMALL SYSTEMS (501-3,300 people)
- 66% VERY SMALL SYSTEMS (25-500 people)

### LEGAL LIMIT FOR NITRATE IN PUBLIC WATER SYSTEMS

10 mg/L

### 1 IN 5 IOWANS CONSUMED DRINKING WATER FROM A PWS AFFECTED BY NITRATE BETWEEN 2012 AND 2016

- ~3x
- As much per person for nitrate treatment annually as residents of large systems (10,001 – 100,000 people)

### RESIDENTS SERVED BY VERY SMALL SYSTEMS PAY

*~3x* as much per person for nitrate treatment annually as residents of large systems (10,001 – 100,000 people)

### ANNUAL EXPENSE OF NITRATE REMOVAL TECHNOLOGIES

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<thead>
<tr>
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<th>Annual Expense Range</th>
<th>Per Person Expense Range</th>
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<tr>
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*Nitrate removal technologies include ion exchange and reverse osmosis systems.*

WHERE IOWANS GET THEIR DRINKING WATER

PWS NITRATE VIOLATIONS BY SYSTEM SIZE (1980-2017)

LEGAL LIMIT FOR NITRATE IN PUBLIC WATER SYSTEMS

1 IN 5 IOWANS CONSUMED DRINKING WATER FROM A PWS AFFECTED BY NITRATE BETWEEN 2012 AND 2016

RESIDENTS SERVED BY VERY SMALL SYSTEMS PAY

~3x AS MUCH PER PERSON FOR NITRATE TREATMENT ANNUALLY AS RESIDENTS OF LARGE SYSTEMS (10,001 – 100,000 PEOPLE)

ANNUAL EXPENSE OF NITRATE REMOVAL TECHNOLOGIES

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*Nitrate removal technologies include ion exchange and reverse osmosis systems.*
HEALTH EFFECTS OF NITRATE IN DRINKING WATER

Acute consumption of nitrate can lead to blue baby syndrome.¹ This fatal condition is caused when red blood cells become unable to bind with oxygen, an issue that impacts infants at a higher rate.

Long-term consumption of nitrate is associated with increased risks of bladder, ovarian, and thyroid cancers in women; as well as increased risks of birth defects with prenatal exposure.⁵

Harmful blue green algae blooms caused by excess nutrients release toxins that can pass through standard drinking water treatment practices.⁶ The toxins can affect the nervous system, liver, digestive system, and form tumor promoting compounds.⁷ Algae blooms also impair the taste and odor of drinking water.⁸

Disinfectants used to treat drinking water can react with the algae to form byproducts, such as trihalomethanes, that harm public health. The byproducts have been linked to rectal, bladder, and colon cancers; reproductive health risks; and liver, kidney, and central nervous system problems.⁹

SOURCES

⁴ Calculated from Iowa Department of Natural Resources public water system drinking water compliance data: includes Iowans served by PWS that treat for nitrate (by blending, ion exchange, or reverse osmosis) and Iowans served by a PWS that had a violation between 2012-2016.