

In a 1999 UW-Extension Community Needs Assessment Survey, residents of Iowa County identified groundwater education as an important issue and need. Drinking water education programs were established on a township by township basis. In the past eight years 897 wells in Iowa County have been tested. Samples were taken from rural homeowners and the users had their drinking water samples tested at the Environmental Task Force Lab at UW-Stevens Point. This brochure describes some of the test results, and some of what's known about groundwater quality in Iowa County.

### **Nitrate**

Nitrate is a chemical commonly used as an agricultural and lawn fertilizer. Septic systems, animal wastes, and other decomposing materials also release it. Natural levels of nitrate in Wisconsin's groundwater are normally less than 2 milligrams per liter (mg/l) as nitrate nitrogen (NO<sub>3</sub>-N).

The recommended maximum level of nitrate in drinking water is 10 mg/l. Nitrate is especially hazardous to infants under six months old. Nitrate may cause methemoglobinemia, or "blue baby disease", which limits the baby's oxygen supply. High nitrate water may also increase the risk of certain birth defects or miscarriages. Some studies have shown associations of nitrate with cancer and other disorders.

Thirty-nine percent (313 wells tested) of the 897 well samples analyzed for nitrate in the past five years had levels less than 2 mg/l, or at the "natural" level of nitrate - a desirable condition.

Another 367 wells (47%) were in the 2-10 mg/l range. Elevated nitrate levels increase the chances that other contaminants from the land surface might be in the water. Wells with elevated nitrate levels need further evaluation of contaminant sources.

Fourteen percent or a total of 111 wells exceeded the drinking water standard of 10 mg/l. Water with nitrate at this level should not be consumed by pregnant women or infants under 6 months old.

### **Coliform Bacteria**

Coliform bacteria were found in 24% (206 wells) of the samples analyzed. This is higher than state average. These bacteria are present in large numbers in the soil and in the intestines of humans and other animals. They do not usually cause disease, but they indicate that human or animal wastes may be contaminating the water. Then, disease-causing organisms may also be present. Water with coliform bacteria is unsafe for human consumption.

Homeowners with coliform bacteria in their water should resample to be sure proper sampling procedures were followed. If the water is still unsafe, they should repair any sanitary defects found in the well, disinfect the well, and then resample.

### **Saturation Index (Corrosivity Index)**



Alkalinity, hardness, pH and conductivity measurements are used to calculate the corrosivity index. If the corrosivity index is negative (such as -0.5)

the water is more likely to corrode, or eat away, at metal plumbing. Besides damaging metal plumbing, corrosive water may release toxic copper or lead from pipes or solder joints. Symptoms of corrosive water include pinhole leaks in water pipes and green stains in sinks.

Corrosivity occurs naturally, especially in sandy areas or areas with granite bedrock, where there are few natural minerals for water to dissolve. However, high levels of human-introduced contaminants such as nitrate or chloride can make corrosivity worse.

Seventy-nine percent of the samples analyzed had corrosivity indexes in the ideal range of 0 to +1. Values in this range predict that a lime scale will form inside the pipes, protecting them from corrosion. Eight percent were slightly to moderately corrosive (0 to -2), and less than 2% (12 samples out of 897) were corrosive to severely corrosive (less than -2). Water with a negative corrosivity index should be run before drinking if it has not been used for any length of time, especially overnight. Using water treatment devices or a changing well depth might help those with more serious corrosion problems.

### **Total Hardness**

Calcium and magnesium minerals cause hardness in water. Water with 0-100 mg/l total hardness (as calcium carbonate) is considered soft, and water with less than 50 mg/l total hardness may be corrosive. Five percent of the wells analyzed had hardness of 50 mg/l or less. Iowa County water is naturally hard.

Homes with over 150 mg/l hardness in their water may benefit from a water softener to avoid scale build-up in pipes. Ninety percent of the samples analyzed had total hardness of 150 mg/l or greater. However, only 52% of the participants had water softeners, indicating that softeners are being used for hardness type problems or some other purpose.

### **Chloride**

Chloride is similar to nitrate in two ways: it moves quite easily in groundwater, and it has many of the same sources. However, it is not toxic. Chloride in the county's groundwater is naturally less than 10 mg/l. A secondary drinking water standard of 250 mg/l has been set for chloride, because it causes a salty taste at this level. When chloride levels are high, sodium levels may also be high in water.

Half of the samples analyzed (397) contained less than 10 mg/l chloride. Twenty percent had more than 25 mg/l chloride, indicating some contamination by human activities.

## pH

pH is a measure of the acid level in water. The desirable range of pH in groundwater is 7.0-8.3. Ninety-seven percent of all samples from Iowa County fell within the desired pH levels. Only 3% of samples tested had a pH lower than 7.0. This could lead to a gradual deterioration of plumbing materials.

## Alkalinity

Naturally occurring carbonate minerals in water mainly cause alkalinity. Alkalinity protects water from rapid changes in pH. Low alkalinity water (less than 50 mg/l) may be corrosive. Only two percent of the samples tested had less than 50 mg/l alkalinity.

## Conductivity

Conductivity measures the total amount of dissolved minerals in a water sample, but does not tell what the minerals are. In natural groundwater in Iowa County, conductivity is typically twice the hardness value. If it is much greater than two times the hardness, human-made contaminants like chloride or nitrate are usually present. Iowa County typically has hard water from all the limestone ridges. Conductivity, for the most part, fell in the ideal ranges, two times the hardness.

## Atrazine

Atrazine is the most common herbicide (a weed killing pesticide) used in Wisconsin. It is also the one most commonly found in groundwater. Private wells within ¼ mile of a corn field should be tested for atrazine. About 38% of the wells tested in Iowa County had traceable amounts of atrazine. Forty percent of wells tested in Wisconsin have some amount of atrazine found.

## Conclusions about Groundwater Quality in Iowa County

1. Natural water is abundant in the county. But there are issues with water quality as many samples had high levels of nitrates and chlorides, showing that the water has been influenced by humans on the surface. Also, the high hardness levels make water softeners desirable for some people.
2. Atrazine is found in some wells. Throughout Wisconsin traceable amounts of atrazine are found in forty percent of all rural wells. Iowa County is right on that average. Safe drinking water standards for atrazine are 3 parts per billion.
3. Twenty-four percent of the samples had unsafe coliform bacteria levels.
4. Some Iowa County residents need to learn more about their wells. Only forty-five percent of the participants knew their well depth. Forty-eight percent did not know when their water had last been tested, or if it ever had been tested. Fourteen percent had tested their water within the last two years. Sixty-four percent had no idea if they had a well casing or not.

For more information on groundwater quality and drinking water quality in Iowa County, or on how you can have your well water tested, contact the Iowa County University Extension Office at 935-0391 or Iowa County Health Department at 935-2810.

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## Other Water Resources and Information for Iowa County

**Well Testing for Newborns:** If you have a newborn you are offered a free water test by the Iowa County Health Dept. This water analysis will test for bacteria, fluoride and nitrate. Call 935-2810.

**Further Testing:** The UW-Extension Office also has testing information available. There are three different tests that a rural homeowner can do:

- **Homeowners** test for nitrate, coliform bacteria, pH, alkalinity, hardness, conductivity, chloride and corrosivity
- **Metals** test looks at copper, lead, iron, manganese, zinc, potassium, calcium, magnesium
- **Triazine** test looks for triazine-type pesticides like atrazine.

**Fluoride tablets:** If you are interested in fluoride tablets for your children contact the Iowa County Health Department at 935-2810 for information on how to receive these tablets.

**Municipalities that have fluoride in their municipal water supply are:** Arena, Avoca, Barneveld, Dodgeville and Mineral Point.

**Well Abandonment:** Iowa County has a cost-share program to cap old unused wells. Call Tony Pillow at the Land Conservation Office at 935-2791 ext. 3 for more information.

**Water Testing for Refinancing:** This is to be done through the State Hygiene Lab, not the Iowa County Health Department. Call 1-800-442-4618 for test packet.

# Drinking Water Quality in Iowa County



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**Iowa County**

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