The City of Hastings and Ravenna Township - Private Well Sampling in 2022

The purpose of community focused sampling is to provide all county residents using a private well for drinking water a chance to test their well water for common contaminants. This report contains a summary of the results from private wells located in Ravenna Township and the City of Hastings in Dakota County, Minnesota. Water samples were tested for the presence of geologically derived contaminants manganese and arsenic, as well as human-related contaminants lead, chloride, and nitrate.

Study Approach

The County offered water testing opportunities to 835 private well owners in Ravenna Township and 159 private well owners the City of Hastings*, of which 22% (228 of 994) participated. Residents were asked to collect a water sample from both an outside untreated spigot and an inside primary drinking water tap. All outside samples were tested for manganese, arsenic, nitrate, and chloride. If the outside sample result exceeded 3.0 mg/L for nitrate, 0.05 µg/L for arsenic, or 0.090 mg/L for manganese, then the sample collected from the inside tap was tested for that chemical. In addition, all inside tap samples were analyzed for lead.

Chemical	# of Well Samples	# of Detects	Drinking Water Guideline (DWG)	# of Samples above DWG	Mean (Average) Result	Maximum Result
Outside Arsenic µg/L	228	20	10 µg/L – No safe amount	1	0.12	13.4
Outside Chloride mg/L	228	185	250 mg/L	0	13.8	207
Outside Manganese (Infant < 1yr) mg/L	228	75	100 µg/L	2	12.07	285
Outside Manganese (All Others) µg/L	228	75	300 µg/L	0	12.07	285
Outside Nitrate µg/L	228	158	10 mg/L	102	7.92	22.48
Inside Arsenic µg/L	21	7	10 µg/L – No safe amount		0.3	1.46
Inside Lead µg/L	228	79	15 µg/L – No safe amount	1	0.7	18.5
Inside Manganese (Infant < 1yr) µg/L	4	2	100 µg/L	1	64.05	254
Inside Manganese (All Others) µg/L	4	2	300 µg/L	0	64.05	254
Inside Nitrate mg/L	144	144	10 mg/L	59	8.72	22.27

mg/L milligrams of chemical per liter of water equivalent to parts per million (ppm)
µg/L micrograms of chemical per liter of water equivalent to parts per billion (ppb)
< less than (result is below the level that the laboratory can report)
* Community Focused Sampling was conducted in the City of Hastings in 2020 but was included with Ravenna Township since the participation rate for the city was only 5%.

Arsenic

Arsenic occurs naturally in rocks and soil and dissolves into groundwater. Arsenic in drinking water is linked to increased risk of cancers of the bladder, lungs, liver, and other organs. High levels of arsenic in drinking water can also contribute to cardiovascular and respiratory disease, reduced intelligence in children, and skin problems, such as lesions, discoloration, and the development of corns. The drinking water guideline for arsenic is 10 µg/L, but the US Environmental Protection Agency goal for arsenic in drinking water is 0 µg/L since prolonged exposure to any level of arsenic can increase the risk of cancer.

Results and findings

- Arsenic was found in 8% (20 of 228 wells) of the outside samples and in 33% (7 of 21 wells) of the inside samples. None of the sampled wells exceeded the drinking water guideline of 10 µg/L.
- There was not a strong relationship between arsenic and manganese – meaning the presence of one does not indicate the presence of the other.
- There was not a strong relationship between arsenic and well depth – meaning that shallower wells are not more likely to be contaminated for arsenic than deeper wells.

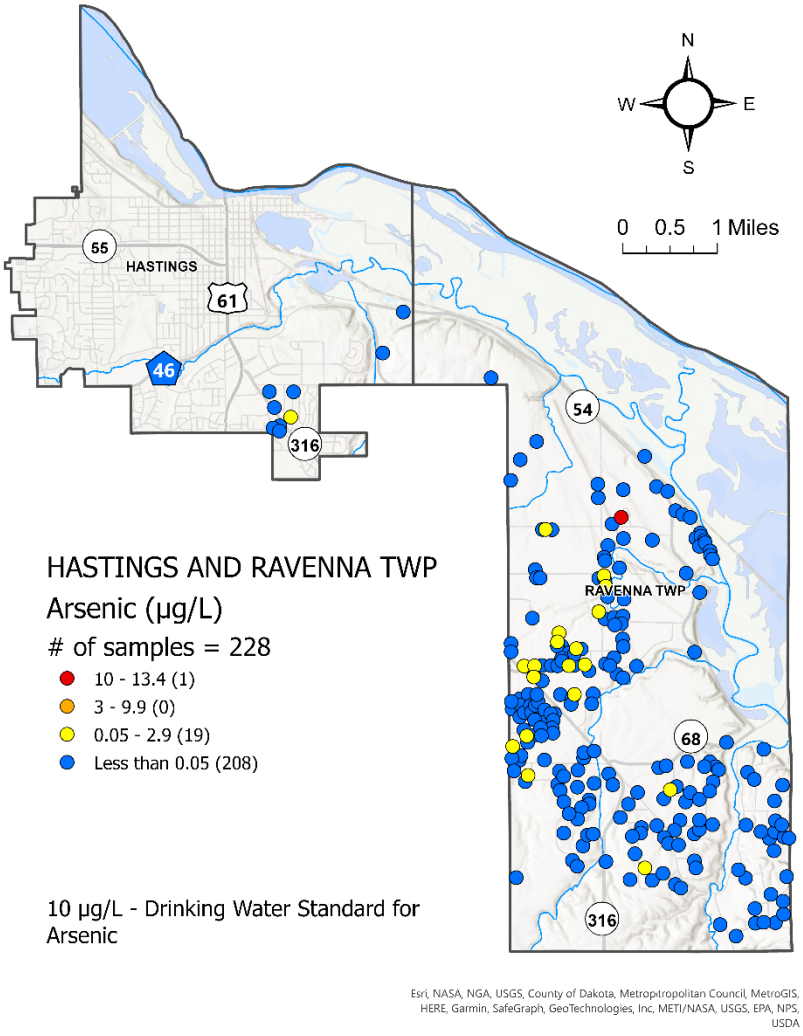

Figure 1. Arsenic results in untreated water from outside spigot

Manganese

Manganese occurs naturally in rocks and soil and dissolves into groundwater. Our bodies need a small amount of manganese to maintain health, and we get enough manganese from the foods we eat. However, research indicates that children and adults who drink water with high levels of manganese for a long time may develop problems with memory, attention, and motor skills. Infants are more vulnerable to the effects of manganese. For infants who drink well water or formula made with well water, manganese should not exceed 100 µg/L. For everyone else, the level of manganese should not exceed 300 µg/L. Non-health related problems (metallic taste and staining plumbing fixtures) may occur above 50 µg/L.

Results and findings

- Manganese was found in 32% (75 of 228 wells) of the outside samples and in 50% (2 of 4 wells) of the inside samples.
- Manganese in outside samples was detected in two wells above the drinking water guideline for infants under 1 year of age of 100 µg/L, while no wells were above the drinking water guideline for all others of 300 µg/L.
- Of the inside samples, only one well was above the drinking water standard for infants of 100 µg/L.
- There was not a strong relationship between manganese and arsenic – meaning the presence of one does not indicate the presence of the other.
- There was not a strong relationship between manganese and well depth – meaning that shallower wells are not more likely to be contaminated for manganese than deeper wells.

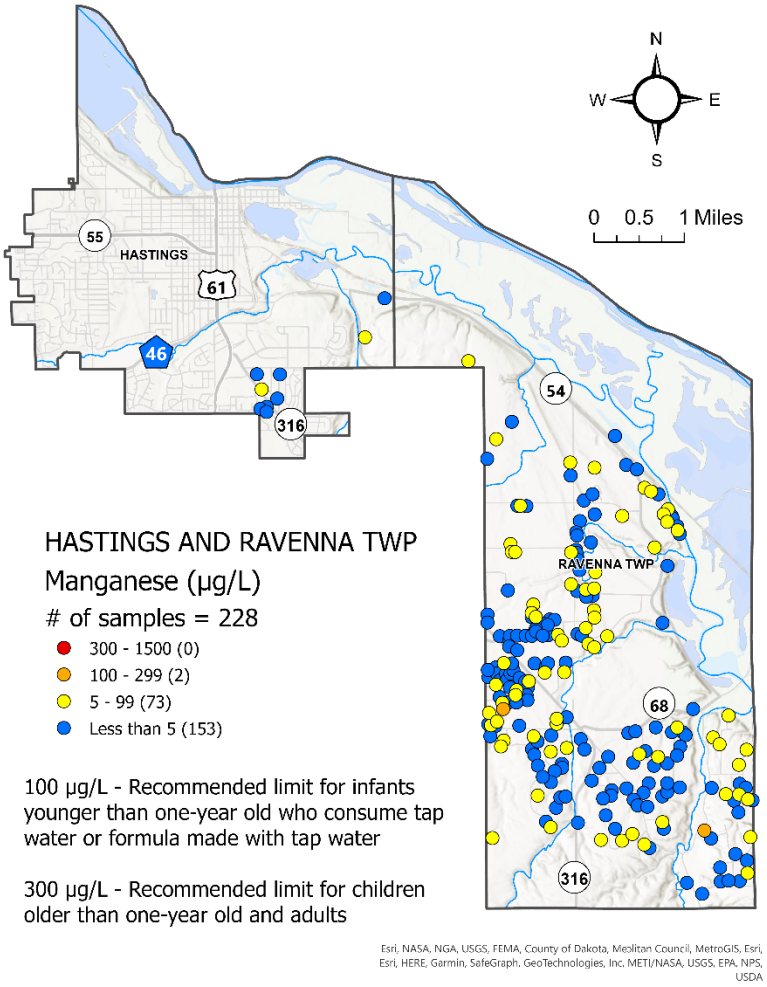

Figure 2. Manganese results in untreated water from outside spigot

Nitrate

Nitrate occurs naturally at very low levels. Nitrate in groundwater is usually associated with human activities including row crop agriculture, septic systems, and animal feedlots. In Dakota County, the major source is fertilizer used on agricultural crops, which leaches to the drinking water aquifers. A nitrate level above 10 mg/L in drinking water can be harmful to infants under six months old. Infants that consume water or formula mixed with water that is high in nitrate may develop “blue baby syndrome” (methemoglobinemia), a life-threatening condition. Adults may be susceptible to methemoglobinemia if they have certain health conditions. Always test for nitrate before giving well water to an infant. The presence of nitrate is a strong indication that herbicides or herbicide breakdown products are also present. Importantly, both nitrate and herbicides can be reduced using a water treatment device such as a reverse osmosis system (RO). Carbon filtration alone can reduce herbicide concentrations.

Results and findings

- Nitrate was detected in 69% (158 of 228) of the outside samples; 44% (102 of 228) exceeded the drinking water guideline of 10 mg/L.
- Nitrate exceeded the drinking water guideline in 40% (59 of 144 wells) in inside drinking water tap samples.
- There was a strong relationship between nitrate and chloride – meaning that when one is present, the other is more likely to be present. Both are applied to the ground by human activities and impact drinking water aquifers.
- There was moderately strong relationship between nitrate and well depth – meaning that shallower wells could be more likely to be contaminated with nitrate than deeper wells.

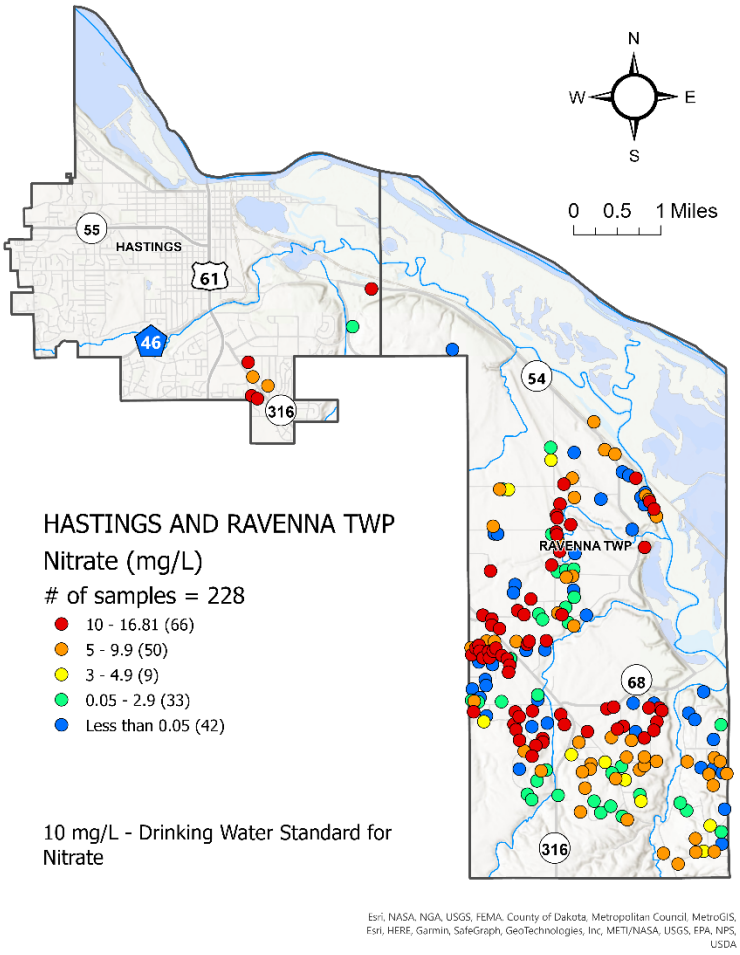

Figure 3. Nitrate results in untreated water from outside spigot

Chloride

Chloride occurs naturally in the rocks and soil across Dakota County at very low levels. High levels of chloride in groundwater indicate contamination from the application of road salt, potash fertilizer, water softener brine discharge into septic systems, or deicing salt applied to sidewalks and parking lots. Elevated chloride can potentially leach metals, like lead, from plumbing into the drinking water. There is no health-based guideline for chloride, but the USEPA recommends levels no higher than 250 mg/L to avoid undesirable tastes (saltiness). Chloride detected in well water indicates that the well is vulnerable to surface contamination.

Results and findings

- Chloride was found in 81% (185 of 228 wells) of the outside samples, the highest result was 207 mg/L.
- There was a strong relationship between chloride and nitrate – meaning that when one is present, the other is more likely to be present. Both are applied to the ground by human activities and impact drinking water aquifers.
- There was moderately strong relationship between chloride and well depth – meaning that shallower wells could be more likely to be contaminated with chloride than deeper wells.

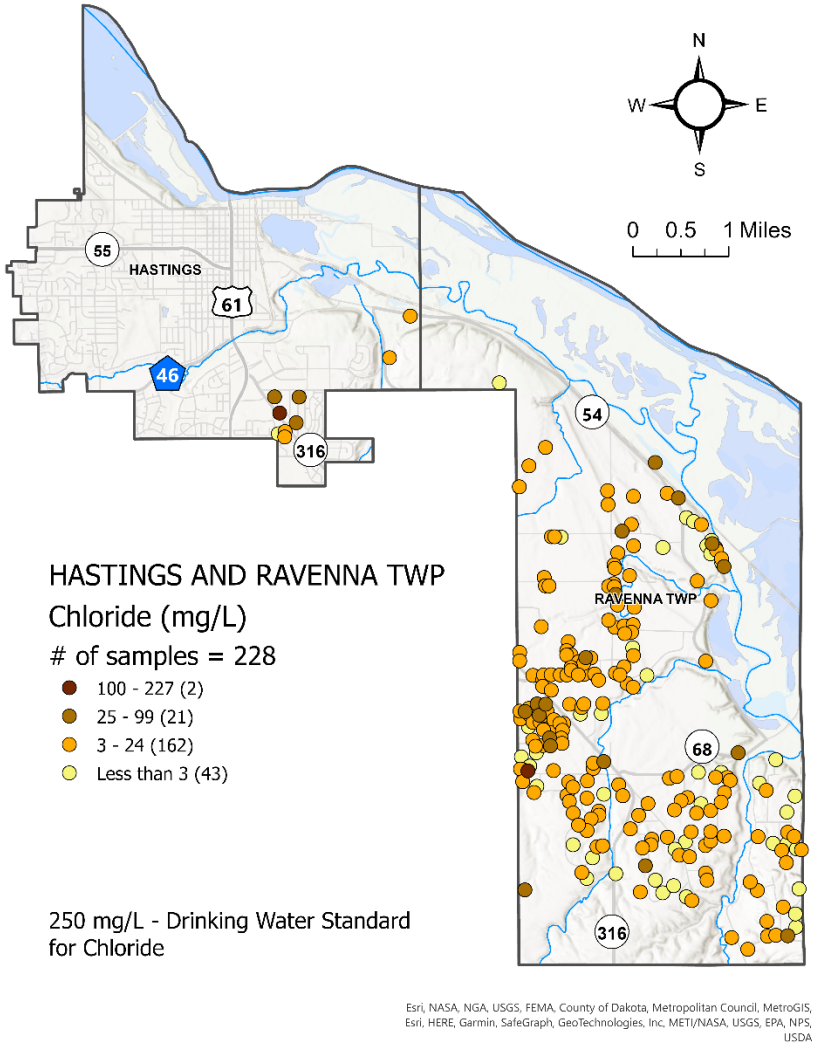

Figure 4. Chloride results in untreated water from outside spigot

Lead

Lead rarely occurs naturally in groundwater. Lead can leach into drinking water from lead pipes; lead solder on copper pipes; and brass faucets, fittings, and valves (including those advertised as lead-free). Brass fixtures, including fixtures that don't look like brass, such as chrome plate brass products, can contribute lead to drinking water. The USEPA federal drinking water guideline for lead is 15 µg/L, however, there is no safe level of lead. Lead exposure usually has no obvious health symptoms and can go unrecognized. Health concerns include impaired physical and mental development, hearing problems, and damage to the brain, kidneys, red blood cells, and nervous system. Pregnant women, infants, and children under six years of age are at the highest risk. The federal "Reduction in Lead in Drinking Water Act" (2014) reduced the amount of lead allowed in water systems and plumbing products by changing the definition of "lead free" from 8% lead content to not more than 0.25% lead in drinking water plumbing components.

Results and findings

- All samples collected from the inside primary drinking water tap were tested for lead. Lead was detected in 34% (79 of 228) of the samples. One sample exceeded 15 µg/L, the drinking water guideline for lead; however, no amount of lead is safe to drink. When purchasing a water treatment device look for one that is certified to reduce lead.

If drinking water has elevated levels of chemicals, do the following:

- ✓ Prepare infant formula with bottled water.
- ✓ **Do not boil** drinking water. Boiling water may concentrate contaminants, but it is effective at killing bacteria.
- ✓ **Identify** and, if possible, **remove** sources of contamination near the well. Fertilizers, animal wastes and sewage systems should be located far from the well and managed to avoid contamination. The top of the well should be at least 12 inches above the surrounding dirt or landscaping.
- ✓ **Install** a NSF, UL, or WQA certified water treatment system and **maintain** it annually. No single treatment process can remove all substances in water. If there are several substances you want removed from your water, you may need to combine treatment processes. The MN Dept. of Health website has information on water treatment at http://www.health.state.mn.us search water treatment.
- ✓ **Continue sampling**. Test your drinking water after you install treatment because there is often no other way to know if a treatment system is working properly. To test for common chemicals of concern, you can have a water test kit mailed to you by requesting one online at www.co.dakota.mn.us search well testing.
- ✓ A **Coliform Bacteria** test is recommended annually for private wells. Coliform bacteria was not tested as part of this study. Consider testing; see directions on how to get a test kit, below.

We can help

- Dakota County may have a copy of your original well record on file if the well was drilled after 1975. The well record can tell you the aquifer your well is tapping and assist a well contractor who may do future work on your well. To request your well record, go to: www.co.dakota.mn.us, Search Well Information
- If you choose to install a new well and will no longer be using your existing well, the old well will need to be sealed by a MN licensed well contractor. Dakota County may have grant funds available (usually 50% of the cost to seal the well). The application is located at: www.co.dakota.mn.us, Search Well Sealing Grant.

Further testing

Request a sample kit online from Dakota County at www.co.dakota.mn.us, Search: *Water Test*. Available tests include Coliform Bacteria, Nitrate, Arsenic, Manganese, Lead, and Fluoride.

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