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Green County Well Water Monitoring Program's Year One Results

Groundwater is the principal water supply for Green County municipalities, industries, and rural residents. While municipal water supplies are regularly monitored and required to meet drinking water standards, private well owners must make decisions regarding when and what to test for and what to do if there is a problem. In an effort to understand changes to well water quality over time, effectively target management, and focus public health outreach efforts related to groundwater and private well owners, Green County undertook steps to initiate a 5-year project to monitor well water quality.

In July 2019, Green County began collaborating with the UW-Stevens Point and UW-Madison Division of Extension's Center for Watershed Science and Education to test a subset of Green County private wells as part of a long term monitoring network. The following county departments are assisting with the project: Extension Green County, Green County Health Department, Green County Land and Water Conservation Department, Green County Land Information Office, and Green County Land Use and Zoning Department.

Criteria were developed and used to select a network of wells that are representative of Green County's diverse soils, geology, land use, and well construction. A total of 770 landowners were contacted resulting in 388 households that agreed to participate. Sample collection kits were sent and 342 participants successfully submitted samples for Year 1 of the project. All water samples were analyzed for nitrate-nitrogen, chloride, pH, alkalinity, total hardness, and conductivity at the state-certified Water and Environmental Analysis Lab. The goal is for these same wells to be tested annually for the next four years.

Green County's groundwater can generally be characterized as slightly basic, hard water, with high alkalinity. These characteristics are often associated with scaling and treatment such as water softeners may be commonly used to counteract these effects. These aesthetic characteristics of the water are largely influenced by the geologic materials groundwater is stored and transported in; lower values of pH, alkalinity, and total hardness are sometimes found in wells near the Sugar River where wells may be shallower and access the sand/gravel aquifer versus bedrock.

Nitrate is a common health-related contaminant found in Green County's groundwater (average = 5.3 mg/L nitrate-nitrogen). Levels less than 10 mg/L are considered suitable for drinking.

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Fifteen percent of wells tested higher than the 10 mg/L drinking water standard. Infants and women who are or may become pregnant should not drink water higher than 10 mg/L nitrate-nitrogen; all other persons should avoid long-term consumption at these levels. Approximately 72% of wells tested had nitrate levels higher than 2 mg/L. Because 2 mg/L is considered the natural level, this indicates that groundwater is impacted by land use. Sources of nitrate include nitrogen fertilizers, animal waste or other bio-solids, and septic system drainfields.

Chloride provides additional insight into the effects of land use on water quality. Background levels of chloride in groundwater are typically less than 10 mg/L. Sources of chloride include potash fertilizers or certain bio-solids applied to agricultural fields, road salt, and septic system drainfields. Fifty-nine percent of wells measured chloride greater than 10 mg/L; the average chloride concentration in Green County was 19.1 mg/L. There are no health effects associated with chloride.

This study provides an important benchmark of well water quality in Green County. Additional work will be done in years 2-5 to investigate the main factors affecting well water quality. Year 1 results provide a foundation for future sampling efforts to investigate how or if groundwater is changing over time. More information about the results, including this year's report and recorded educational session, are available online at www.green.extension.wisc.edu.

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