



PRIVATE WELL TESTING & GROUNDWATER SUMMARY JUNE 2019

Groundwater is a valuable resource to Calumet County residents. Most residents, businesses, and municipalities rely on groundwater for drinking water and other uses. Sample results from private wells in Calumet County have shown that over 30% of wells have tested unsafe due to coliform bacteria and/or nitrate contamination. In some neighborhoods, over 50% of wells can test unsafe.

The Calumet County Land and Water Conservation Department (LWCD) has administered a private well testing program for over 15 years, educating private well owners on the importance of testing wells on a regular basis for contaminants. Well owners are recommended to sample their drinking water for coliform bacteria and nitrate every 12-15 months, more frequently if problems are found.

The following report provides information on the 2019 annual group testing program, as well as cumulative results of participating wells since 2005.

ANNUAL GROUP TESTING PROGRAM

In an effort to encourage private well owners to test their wells, the Calumet County LWCD offers an annual group testing program. The program targets two municipalities annually, rotating between 7 of the 8 municipalities in the county on a four year rotation. The Town of Chilton tests annually.

Benefits of the program include bottle pick up & drop off convenience, free shipping and an education night held approximately 5 weeks after the sampling day. The education night is an opportunity to learn how to interpret results and options to resolve problems with water quality, including plumbing, proper well maintenance and at-home practices to improve your drinking water.

In 2019, the LWCD targeted private well owners in the Towns of Brothertown, Chilton and Woodville through a group testing program. Additional residents on the County Groundwater mailing list were also included. Two hundred registered for the event. On March 25th of this

year, samples were collected from 190 wells by residents. All samples were analyzed for coliform bacteria and nitrate. Sixty-four samples were analyzed for a metals package, and 41 samples were analyzed for triazines – atrazine and other pesticides. Forty-seven wells were new to the county program, while the remaining wells had participated during the past 15 years. The results from the 2019 program are described in Figure (1). Nitrate results from treatment systems (such as a reverse osmosis or R.O. system) were not included in the data analysis.

Figure 1: 2019 Group Testing Program results. All samples drawn on March 25, 2019.

	Chilton # (percent)	Brothertown # (percent)	Woodville # (percent)	Other # (percent)	County # (percent)
Number of Wells	N = 95	N = 46	N = 30	N = 19	N = 190
Coliform Bacteria Positive	15 (15.8%)	3 (6.5%)	0 (0%)	7 (36.7%)	25 (13.2%)
E. coli	1 (1%)	0 (0%)	0 (0%)	2 (10.5%)	3 (1.6%)
Nitrate >10 mg/L	20 (21.1%)	6 (13.0%)	0 (0%)	1 (5.2%)	27 (14.2%)
Nitrate >2 mg/L	60 (63.2%)	16 (34.8%)	0 (0%)	12 (63.2%)	88 (46.3%)
Bacteria Present AND/OR Nitrate >10mg/L	31 (32.6%)	7 (15.2%)	0 (0%)	7 (36.7%)	45 (23.7%)

WHAT HAPPENS IF A WELL IS BACTERIA POSITIVE?

The test for total coliform bacteria is sensitive to many different coliform bacteria, including fecal coliforms. Most non-fecal coliforms are not a public health concern, but rather are an indicator that a well is susceptible to contamination from local sources or neighboring land use practices. With a few exceptions, private well owners are not required to take corrective action. A well owner is encouraged to do one or more of the following:

- Perform a retest to ensure the result was not a false-positive result due to sampling error.
- Chlorinate the well. Instructions are made available to well owners to disinfect the well and/or contact a professional to provide this service.
- Perform a well inspection.
 - Is there a vermin-proof cap? Is the conduit cracked?
 - Are there landscaping features or structures around the well that would invite wildlife to nest near the well?
 - Is the area around the well graded to keep standing water away?

- Does the well terminate at least 12" from grade?
- Are there any contamination sources close to the well, including downspouts?
- Is the well meeting state codes? Contact a well professional to inspect casing and well. Consider upgrading or replacing dug wells or pit wells.
- Is the private onsite waste treatment system (POWTS) functioning properly? Date of last inspection?
- Is there another unused or old well located on the property?

Some local (on-site) contamination sources discovered through conversations or site inspections in Calumet County:

- Well surrounded by landscaping or false rock.
- Chickens housed in the well house.
- No vermin proof cap.

WHAT HAPPENS WHEN NITRATE EXCEEDANCE OCCURS?

Short-term exposure to high nitrate levels are a concern for pregnant women, women who are trying to become pregnant, infants under 6 months of age, and others with compromised immune systems. It is recommended that all well owners reduce or eliminate long-term consumption. Well owners are encouraged to make sure their well is properly maintained, following the same guidelines and questions for bacteria positive wells above. Nitrate in groundwater tends to persist overtime, but can be treated with a point of use system such as a reverse osmosis system or a distillation system. A homeowner is encouraged to make sure the device installed is certified by Wisconsin Dept. of Safety and Professional Services and test the device for efficiency if nitrate exceeds 15 mg/L.

Similar to total coliform bacteria, nitrate is used as an indicator to determine if the well is susceptible to contamination from local sources or neighboring land use practices.

GROUNDWATER EDUCATION NIGHT

On April 30th, 2019 participants were invited to a one hour educational meeting where they obtained the full lab report, including metals results, and instructions on how to interpret the lab information. Calumet County staff and UW-Extension staff are available throughout the evening to answer questions that well owners may have. This event is always well attended, with 79 people in attendance in 2019 (56 wells). This event was also open to the public.

COUNTY-WIDE PRIVATE WELL DATA 2005-2019

The Calumet County Land and Water Conservation Department (LWCD) has administered a private well testing program for over 15 years, educating private well owners on the importance of testing wells on a regular basis for contaminants. Well owners are recommended to sample their drinking water for coliform bacteria and nitrate every 12-15 months, more frequently if problems are found. Annual results can be found in Figure 2.

Beyond the annual group testing program, the department receives test results from additional sources including the following:

- Year-round voluntary private well testing.
- County Land Division Ordinance (Bacteria, Nitrate, Arsenic).
- County Health Department; Infant Wellness Program (Bacteria, Nitrate, Metals, and more).
- County LWCD funding for investigating spills or brown water events.
- Occasional research or DNR investigations.

Figure 2: Annual test results from private well samples in Calumet County. Cumulative Data (in yellow) represents the most recent sample from each participating well.

Private Well Test Results County-Wide 2005-2019										
6/1/2019	Coliform Bacteria					Nitrates			Bacteria Present and/or Nitrate > 10 mg/L (%)	
	# wells	Coliform Bacteria Positive	% Positive	E. coli Positive (%)	% E.coli	# wells	Nitrate > 10 mg/L	% Unsafe Wells (≥ 10 mg/L)	Unsafe (Bacteria present AND Nitrates)	%
2005	246	52	21%	10	4%	246	48	20%	86	35%
2006	248	56	23%	11	4%	248	75	30%	110	44%
2007	367	70	19%	7	2%	367	77	21%	130	35%
2008	305	79	26%	8	3%	305	90	30%	142	47%
2009	261	53	20%	6	2%	261	53	20%	93	36%
2010	250	61	24%	13	5%	250	55	22%	96	38%
2011	190	39	21%	4	2%	190	44	23%	69	36%
2012	197	30	15%	4	2%	197	38	19%	55	28%
2013	133	21	16%	1	1%	133	24	18%	42	32%
2014	188	41	22%	11	6%	188	33	18%	59	31%
2015	232	40	17%	5	2%	232	57	25%	84	36%
2016	199	54	27%	7	4%	199	43	22%	81	41%
2017	201	22	11%	2	1%	198	27	14%	45	22%
2018	245	52	21%	19	8%	214	27	13%	67	27%
2019	190	25	13%	3	2%	190	27	14%	45	24%
Cumulative Data*	1748	358	20.5%	56	3.2%	1638	263	16.1%	546	31%

* Wells in the Calumet County Test Program may be sampled multiple years or more than once in a year. These data represent the most recent sample from each participating well.

WATER QUALITY IN KARST AREAS OF CALUMET COUNTY

There are areas in the county that are more susceptible to groundwater contamination. These areas are delineated on the Silurian Dolomite Aquifer Susceptibility Map (Right Map: red and blue areas). These areas are defined as moderately to highly susceptible to contamination due to proximity of bedrock to the surface, presence of karst features characteristic of the dolomite (limestone) aquifer, and/or thin soils.

Well testing data indicate that contamination percentages increase in karst areas of Calumet County; 38% of wells tested unsafe for bacteria and/or nitrate in 2019 (Figure (3)), compared to 24% county-wide.

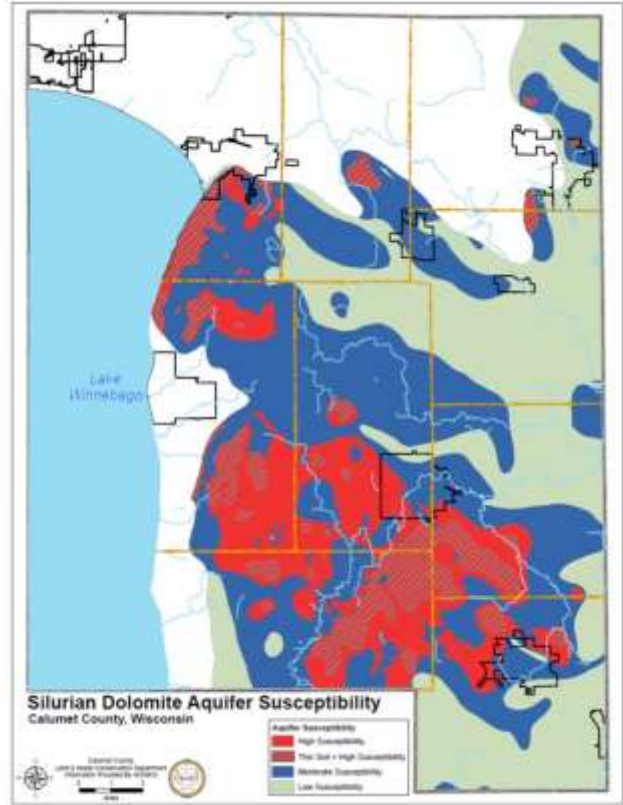


Figure (3): Annual test results from private well samples in Karst Areas of Calumet County. Cumulative Data (in yellow) represents the most recent sample from each participating well.

Private Well Test Results in Karst Areas 2005-2019										
6/1/2019	Coliform Bacteria					Nitrates			Bacteria Present and/or Nitrate ≥ 10 mg/L (%)	Bacteria Present and/or Nitrate ≥ 10 mg/L
	# wells	Coliform Bacteria Positive	% Positive	E. coli Positive	% E. coli	# wells	Nitrate ≥ 10 mg/L	% Unsafe Wells (≥ 10 mg/L)	Number	%
2005	194	40	21%	10	5%	173	48	28%	73	38%
2006	139	41	29%	9	6%	138	52	38%	75	54%
2007	219	54	25%	7	3%	217	80	37%	109	50%
2008	193	55	28%	8	4%	189	70	37%	100	52%
2009	140	31	22%	6	4%	137	50	36%	73	52%
2010	131	31	24%	13	10%	132	44	33%	58	44%
2011	123	31	25%	4	3%	121	42	35%	60	49%
2012	129	29	22%	4	3%	124	37	30%	53	41%
2013	83	16	19%	1	1%	82	21	26%	34	41%
2014	119	35	29%	11	9%	101	28	28%	49	41%
2015	153	26	17%	5	3%	143	54	38%	69	45%
2016	125	35	28%	7	6%	121	38	31%	59	47%
2017	120	19	16%	2	2%	118	27	23%	42	35%
2018	142	32	23%	18	13%	114	23	20%	50	35%
2019	131	30	23%	2	2%	116	27	23%	50	38%
Cummulative Data*	973	224	28%	45	6%	894	232	31%	389	39%

* Wells in the Calumet County Test Program may be sampled multiple years or more than once in a year. These data represent the most recent sample from each participating well.

The unique geology and soils of Calumet County present challenges in protecting groundwater. The upper layer of bedrock is a type of rock that is easily dissolved by water. Extensive networks of vertical and horizontal fractures (cracks) in the bedrock are continuously forming. These features, such as sinkholes, disappearing streams, and caves are called “karst” features.

Groundwater typically moves less than 1 foot per day, but in areas of thin soil and fractured bedrock, water and pollutants can move 100 feet or more per day. If a private well is connected to a fracture that has a direct conduit to the surface (karst feature), the well can be easily impacted by any land use near the karst feature.

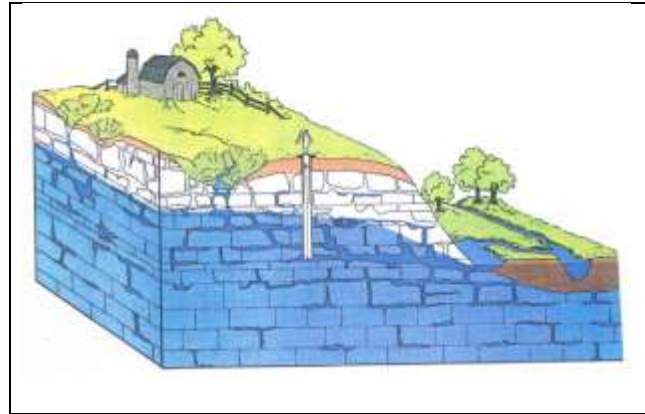


Diagram of a karst landscape showing how a private well intersects fractures that are connected to a karst feature at the surface, such as a sinkhole.

METALS AND PESTICIDES

Some metals cause problems that are considered aesthetic in nature, including sulfate, iron and sodium, while others are associated with health related risks, such as arsenic, lead and copper. Wells in the northern part of the county and along the L. Winnebago shoreline typically rely on the lower St. Peter Sandstone Aquifer, and are well known for having very hard water with a strong sulfur smell. Wells routinely test high for sulfate, sodium, hardness, and other inorganics in this aquifer, and some excessively exceed aesthetic limits. This can make it very challenging for a well owner to treat water enough to remove these aesthetic problems.

Arsenic is found in some county wells and levels occasionally exceed the safe drinking water standard of 10 parts per billion (ppb). However, most wells that do exceed safe drinking limits are rarely above 20 ppb, much lower than results in neighboring counties where wells test over 100 ppb (Outagamie, Winnebago). Well owners are encouraged to test for arsenic at least once. If found elevated, it is recommended to sample every 3-5 years to monitor for rising levels.

Arsenic levels may increase with declining water tables. A treatment system may be installed at the drinking water faucet to correct for high levels of arsenic.

Copper and lead are found in some homes in Calumet County. The presence of copper and lead is not related to geology or geographic distribution. The source of these two metals is primarily plumbing in the home. If levels exceed the safe drinking water standard, homeowners are

encouraged to run the water a few minutes prior to drinking to flush out water that was in contact with the plumbing for an extended period of time.

Forty-one wells performed the DACT screen which tests for triazines, a class of pesticides that include atrazine, simazine and cyanazine. Four wells detected levels of triazines, but no samples exceeded the safe drinking water standard set at 3.0 parts per billion.

ANNUAL TESTING RECOMMENDATIONS

Private well owners are responsible for maintaining and testing their local drinking water supply. It is important to understand the quality of a private drinking water supply by testing on an annual basis for bacteria and nitrates - at a minimum. The programs offered by Calumet County are voluntary and well owners are not required to take corrective action if a problem is discovered. Recommendations are provided based on well test results, location in the County, and general water quality in the area. On occasion, staff will conduct site visits upon request. Bottles are available year-round in the LWCD office, Room 227 of the Calumet County Courthouse.

CONTACT INFORMATION FOR FURTHER QUESTIONS

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