Water Treatment Plant

501 N. Lakeshore Dr. Ludington, MI 49431

Jamie Hockemeyer (231) 843-8830

2023 Drinking Water Quality Report

Drinking Water

Water is a necessity for every home and business. The City of Ludington is dedicated to providing safe and abundant drinking water to all residents and customers.

Every year, a Consumer Confidence Report (also known as the Annual Drinking Water Quality Report) for the City of Ludington's public water system is provided to federal and state regulatory agencies, the local health department, and all water customers. The City of Ludington is once again pleased to share that the drinking water meets all federal and state requirements. Details are included in this report.

If you have any questions about this report or your water quality, please contact Jamie Hockemeyer Water Treatment Plant Superintendent at (231) 843-8830. If you want to learn more about the operation of City government, please attend any of the regularly scheduled City Council meetings which are held at 6:00 pm on the second and fourth Monday of every month in the Council Chamber at City Hall 400 S. Harrison St. Ludington, MI 49431.

The City of Ludington routinely monitors for contaminants in drinking water according to federal and state laws, sampling directives, and monitoring schedules. The "Water Quality Results Table" found on pages 4 and 5 shows the results of monitoring during the period of January 1 - December 31, 2023 (unless noted). Additional information is provided on pages 6-15.

Drinking water, including bottled water, may be reasonably expected to contain at least small amounts of contaminants. The presence of contaminants does not necessarily indicate the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the United States Environmental Protection Agency (US EPA) Safe Drinking Water Hotline at 1-800-426-4791 or the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Environmental Assistance Center (EAC) at 1-800-662-9278.

Source Water

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Source water for the City of Ludington and customers supplied in the City of Scottville, Pere Marquette Charter Township, Amber Township, Victory Township, and West Shore Community College is drawn through two different intake structures in Lake Michigan and treated at the City of Ludington Water Treatment Plant located at 501 N. Lakeshore Drive Ludington, MI 49431.

EGLE performed an assessment of the city's source water in 2003 to determine the susceptibility or the relative potential of contamination. The susceptibility rating is on a six-tier scale from "very-low" to "very-high" based primarily on geologic sensitivity, water chemistry, and contamination sources. The susceptibility of the intakes to potential contamination is moderate. An effort has been made to protect our source water by creating, implementing, and updating a Surface Water Intake Protection Plan (SWIPP).

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Individuals with Special Health Needs

For those individuals with special health issues and concerns, the following information contains US EPA water use guidelines which may be applicable. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

Guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants can be obtained by calling the US EPA Safe Drinking Water Hotline at 1-800-426-4791, EGLE EAC at 1-800-662-9278, or the Centers for Disease Control and Prevention (CDC) at 1-800-232-4636.

Possible Contaminants Present in Source Water

Microbial contaminants such as viruses, protozoa, and bacteria may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife. Inorganic contaminants such as salts and metals, which can be naturally-occurring or result from urban storm water run-off, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming. Pesticides and herbicides may come from a variety of sources such as agriculture, urban storm water run-off, and residential uses. Organic chemical contaminants including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production can also come from gas stations, urban storm water run-off, and septic systems. Radioactive contaminants can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure tap water is safe to drink, the US EPA and EGLE prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. US Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Water Treatment and Distribution

The City of Ludington operates an 8.0 million gallon per day capacity conventional surface water treatment facility which is staffed by a team of 7 licensed operators and the Water Treatment Plant Superintendent (operator in charge). This facility operates 24 hours a day – 7 days a week and uses coagulation, flocculation, sedimentation, and filtration treatment processes to provide high quality aesthetically pleasing drinking water for the community. Approximately 1,093,853,000 gallons were produced in 2023.

The distribution system is comprised of a finished storage reservoir, a booster station, several high service pumps, elevated storage tanks, miles of watermain ranging from 4-inch to 20-inch in diameter, watermain valves, curb-stop valves, hydrants, service line connections, and meters. This system provides reliable and abundant water for consumption, hygiene, cleaning, and fire-fighting capabilities for the community. The distribution system is maintained by a combination of 8 licensed operators from the water plant and utility maintenance department.

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Glossary of Terms and Abbreviations

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Locational Running Annual Average (LRAA): The average of analytical results for samples obtained at a particular monitoring location during the previous four calendar quarters.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water per primary drinking water regulations. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Method Detection Limit (MDL): The minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from the method blank results.

Modified Reporting Limit (MRL): Final reporting limit that applies to the sample once all sample preparation factors and/or dilution factor have been applied.

Not Applicable (NA): Information is either not applicable, not assessed, not provided, or there is no answer.

Nephelometric Turbidity Unit (NTU): Turbidity is a measure of the clarity of the water. We monitor turbidity because it is a good indicator of the effectiveness of our filtration system. Turbidity in excess of 5.0 NTU is just noticeable to the average person.

Non-Detect (ND): The contaminate is not present.

Parts per million (ppm) or Milligrams per liter (mg/L): A measure of the concentration of a contaminant in water. Equivalent to one penny in $10,000.

Parts per billion (ppb) or Micrograms per liter (µg/L): A measure of the concentration of a contaminant in water. Equivalent to one penny in $10,000,000.

Parts per trillion (ppt) or Nanogram per liter (ng/L): A measure of the concentration of a contaminant in water. Equivalent to one penny in $10,000,000,000.

Picocuries per liter (pCi/L): A measurement of radioactivity.

Reporting Level (RL): The minimum concentration that can be reported as a quantitated valve for a sample following laboratory analysis.

Running Annual Average (RAA): The average of analytical results for samples obtained during the calendar year.

Treatment Technique (TT): A treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

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Water Quality Results Table

Regulated Monitoring at the Treatment Plant

Contaminate	MCL, TT, or MRDL	MCLG or MRDLG	Highest Level Detected	Range	Year Sampled	Violation	Typical Source of Contaminate
Antimony (ppm)	0.006	0.006	ND	ND	2023	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic (ppm)	0.010	0	ND	ND	2023		Erosion of natural deposits; runoff from orchards, runoff from glass and electronics production wastes
Barium (ppm)	2	2	0.020	0.020	2023		Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium (ppm)	0.004	0.004	ND	ND	2023		Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries
Cadmium (ppm)	0.005	0.005	ND	ND	2023		Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints
Chromium (ppm)	0.1	0.1	ND	ND	2023		Discharge from steel and pulp mills; erosion of natural deposits
Cyanide (ppm)	0.2	0.2	ND	ND	2023		Discharge from steel/metal factories; discharge from plastic and fertilizer factories
Fluoride (ppm)	4	4	0.78	0.63 - 0.78	2023		Water additive which promotes strong teeth
Glyphosate (ppm)	0.7	0.7	ND	ND	2022		Runoff from herbicide use
Gross Alpha (pCi/L)	15	0	1.93	1.93	2018		Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Mercury (ppm)	0.002	0.002	ND	ND	2023		Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands
Nitrate (ppm)	10	10	0.37	0.37	2023		Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Nitrite (ppm)	1	1	ND	ND	2023		
PFAS (ppt)	Multiple	NA	See Page 7		2023		Fire suppression foam; household products
Radium 226 & 228 Combined (pCi/L)	5	0	0.74	0.74	2018		Erosion of natural deposits
Selenium (ppm)	0.05	0.05	ND	ND	2023		Discharge from petroleum refineries; erosion of natural deposits; discharge from mines
SOC (ppt)	Multiple		See Page 6		2021		Industrial discharge, agricultural chemicals
Thallium (ppm)	0.002	0.0005	ND	ND	2023		Leaching from ore-processing sites; discharge from electronics, glass, and drug factories
Total Organic Carbon (ppm) [1]	Met Alternative Compliance Criteria				2023		Naturally present in the environment
Total Xylenes (ppm)	10	10	ND	ND	2023		Leaks and spills from gasoline and petroleum storage tanks

Contaminate	MCL, TT, or MRDL	MCLG or MRDLG	Highest Level Detected	Percentage Meeting Limits	Year Sampled	Violation	Typical Source of Contaminate
Turbidity (ntu) [2]	TT	NA	0.05	100%	2023	No	Soil run-off, suspended matter in lake water

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Water Quality Results Table (continued)

Regulated Monitoring in the Distribution System

Contaminate	MCL, TT, or MRDL	MCLG or MRDLG	Level Detected	Range	Year Sampled	Violation	Typical Source of Contaminate
Free Chlorine Residual (ppm) [3]	4	4	1.15	0.93 - 1.38	2023	No	Used to disinfect drinking water
Haloacetic Acids (ppb) [4]	60	NA	32	15.3 - 55.6			Formed when chlorine is added to water with naturally occurring organic material
Total Trihalomethane (ppb) [4]	80	NA	45	24 - 56			
Contaminate	**Action Level**	**MCLG**	**90th Percentile**	**Range**	**Year Sampled**	**Violation**	**Typical Source of Contaminate**
Copper (ppm) [5]	1.3	1.3	0.0	ND - 0.1	2023	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb) [5]	15.0	0	1	ND - 2			Lead service lines, corrosion of household plumbing including fittings and fixture; Erosion of natural deposits

Unregulated Monitoring

Contaminate	MCL, TT, or MRDL	MCLG or MRDLG	Avg. Level Detected	Range	Year Sampled	Violation	Typical Source of Contaminate
Calcium (ppm)	NA	NA	35	35	2023	No	Erosion of natural deposits
Chloride (ppm)			15.4	13 - 21			Erosion of natural deposits and run-off
Iron (ppm)			ND	ND			Erosion of natural deposits
Magnesium (ppm)			12	12			Erosion of natural deposits
Nickel (ppm)			ND	ND			Erosion of natural deposits, household plumbing
Sodium (ppm)			11	11			Erosion of natural deposits
Sulfate (ppm)			27.2	24 - 30			Erosion of natural deposits
US EPA UCMR			See Page 9				Fire suppression foam; household products; erosion of natural deposits; discharge from mines

Footnotes [#]:

1. Supply met the alternative compliance criteria for Total Organic Carbon (TOC) each month.

2. Turbidity is a measurement of water clarity. We monitor turbidity because it is a good indicator of our filtration process. The turbidity measurements must be less than or equal to 0.3 ntu in 95% of all samples taken each month and shall never exceed 1 ntu at any time. The percentage meeting limits shown for Turbidity is the lowest monthly percentage of samples meeting turbidity limits.

3. The level detected shown for Free Chlorine Residual is based on a running annual average calculated quarterly using monthly averages.

4. The level detected shown for Haloacetic Acids and Total Trihalomethanes is the highest locational running annual average calculated quarterly.

5. Collected from 20 homes that met the EGLE Tier 1 Site Criteria (single family residence with lead service line) and utilized the required 1st & 5th liter sampling method. There were no sample results above the Action Level. "90th Percentile" is used for compliance with the Lead and Copper Rule Action Level.

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Synthetic Organic Contaminants (SOC)- Herbicides, Pesticides, & Carbamates

Table summarizing results of this monitoring in 2021:

Synthetic Organic Contaminates (SOC)- Monitoring Results				
SOC Compound	**MCL**	**Reporting Level (RL)**	**Results (ppb)**	**Violation?**
2,4,5-T	NA	0.5	< RL (ND)	No
2,4,5-TP (Silvex)	50	0.1		
2,4-D	70	0.1		
3-Hydroxycarbofuran	NA	0.5		
Acifluorfen	NA	1.0		
Alachlor	2	0.1		
Aldicarb	NA	0.5		
Aldicarb sulfone	NA	0.7		
Aldicarb sulfoxide	NA	0.5		
Aroclor 1016 - 1260	NA	0.08 - 0.26		
Atrazine	3	0.1		
Baygon	NA	0.5		
Bentazon	NA	0.5		
Benzo(a)pyrene	0.2	0.02		
Carbaryl	NA	0.5		
Carbofuran	40	0.9		
Chlordane	2	0.1		
Dalapon	200	1.0		
DCPA Acid Metabolites	NA	0.5		
Di(2-ethylhexyl) adipate	400	0.6		
Di(2-ethylhexyl) phthalate	6	0.6		
Dicamba	NA	0.1		
Dinoseb	7	0.1		
Endrin	2	0.01		
Gamma-BHC (Lindane)	0.2	0.02		
Heptachlor	0.4	0.04		
Heptachlor epoxide	0.2	0.02		
Hexachlorobenzene	1	0.1		
Hexachlorocyclopentadiene	50	0.1		
Methiocarb	NA	1.0		
Methomyl	NA	0.5		
Methoxychlor	40	0.1		
Metolachlor	NA	0.1		
Oxamyl (Vydate)	200	1.0		
Pentachlorophenol	1	0.04		
Picloram	500	0.1		
Simazine	4	0.07		
Toxaphene	3	1.0		
Samples collected at the entrance point to the distribution system (EPTDS) at the Water Treatment Plant				

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PFAS (Regulatory Sampling)

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that include compounds such as PFOA, PFOS, and GenX. PFAS compounds have been manufactured and used in a variety of industries in the United States since the 1940s. Products that contain PFAS include: fire-fighting foams, stain repellents, waterproofing agents, nonstick cookware, food wrappers, fabric softeners, and many other products.

Per the new EGLE PFAS rule that took effect in August 2020 under the Michigan Safe Drinking Water Act (MSDWA), enforceable primary drinking water standard maximum contaminate levels (MCL) for 7 individual PFAS compounds were promulgated and the City of Ludington was required to start monitoring for PFAS quarterly in 2021.

Table summarizing results of this monitoring in 2023:

Per- and Polyfluoroalkyl Substances (PFAS)							
Contaminate	**MCL**	**MCLG**	**Level Detected**	**Range**	**Year Sampled**	**Violation**	**Typical Source of Contaminate**
Hexafluoropropylene oxide dimer acid (**HFPO-DA**) (ppt)	370	NA	ND	ND	2023	No	Discharge and waste from industrial facilities utilizing the Gen X chemical process
Perfluorobutane sulfonic acid (**PFBS**) (ppt)	420	NA	ND	ND			Discharge and waste from industrial facilities; stain-resistant treatments
Perfluorohexane sulfonic acid (**PFHxS**) (ppt)	51	NA	ND	ND			Firefighting foam; discharge and waste from industrial facilities
Perfluorohexanoic acid (**PFHxA**) (ppt)	400,000	NA	0.50	ND - 2.0			Firefighting foam; discharge and waste from industrial facilities
Perfluorononanoic acid (**PFNA**) (ppt)	6	NA	ND	ND			Discharge and waste from industrial facilities; breakdown of precursor compounds
Perfluorooctane sulfonic acid (**PFOS**) (ppt)	16	NA	2.33	ND - 2.90			Firefighting foam; discharge from electroplating facilities; discharge and waste from industrial facilities
Perfluorooctanoic acid (**PFOA**) (ppt)	8	NA	1.08	ND - 2.20			Discharge and waste from industrial facilities; stain-resistant treatments

Samples collected at the entrance point to the distribution system (EPTDS) at the Water Treatment Plant.

The level detected shown for individual PFAS compounds is the highest quarterly running annual average.

In addition to the seven regulated PFAS compounds shown above, the following unregulated compounds were sampled for and found non-detect (ND): PFHpA, ADONA, 9Cl-PF3ONS, PFDA, NMeFOSAA, NEtFOSAA, PFUnA, 11Cl-PF3OUdS, PFDoA, PFTrDA, and PFTA.

No Maximum Contaminate Level (MCL) Violations

As shown in the Water Quality Results Tables and supporting pages, there were no MCL violations and the City of Ludington's drinking water continues to meet all Federal and State requirements. More information about contaminants and potential health effects can be obtained by calling the US EPA Safe Drinking Water Hotline at 1-800-426-4791 or EGLE EAC at 1-800-662-9278.

MCLs are set at very stringent levels. To understand the possible health effects described for many regulated contaminates, a person would have to drink two (2) liters of water every day, which is approximately eight (8) - 8-ounce glasses of water, at the MCL level for a lifetime to have a one-in-a-million chance of having the described health effect.

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PFAS (Non-Regulatory Investigative Sampling)

In 2023, EGLE and the Michigan PFAS Action Response Team (MPART) continued their proactive efforts to investigate PFAS contamination in Michigan by continuing the voluntary, state funded, monitoring program of public water system source water. This investigative monitoring program was separate from the regulatory sampling required by the new EGLE PFAS rule. The City of Ludington elected to participate again in this voluntary monitoring program.

Table summarizing results of this monitoring in 2023:

State of Michigan EGLE & MPART Surface Water Intake PFAS Sampling (Lake Michigan)						
PFAS Compound	**3/30/2023**	**4/13/2023**	**5/9/2023**	**6/22/2023**	**8/24/2023**	**11/22/2023**
11C1-PF3OUdS	ND	ND	ND	ND	ND	ND
3:3FTCA	ND	ND	ND	ND	ND	ND
4:2FTS	ND	ND	ND	ND	ND	ND
5:3FTCA	ND	ND	ND	ND	ND	ND
6:2FTS	ND	ND	ND	ND	ND	ND
7:3FTCA	ND	ND	ND	ND	ND	ND
8:2FTS	ND	ND	ND	ND	ND	ND
9C1-PF3ONS	ND	ND	ND	ND	ND	ND
ADONA	ND	ND	ND	ND	ND	ND
HFPO-DA	ND	ND	ND	ND	ND	ND
NEtFOSAA	ND	ND	ND	ND	ND	ND
NMeFOSAA	ND	ND	ND	ND	ND	ND
PFBA	ND	ND	ND	ND	1.2*	ND
PFBS	ND	ND	ND	ND	ND	ND
PFBSA	ND	ND	ND	ND	0.4*	0.5*
PFDA	ND	ND	ND	ND	ND	ND
PFDoDA	ND	ND	ND	ND	ND	ND
PFDS	ND	ND	ND	ND	ND	ND
PFECHS	ND	ND	ND	ND	0.8*	0.9*
PFHpA	ND	ND	ND	ND	0.8*	ND
PFHpS	ND	ND	ND	ND	ND	ND
PFHxA	ND	ND	ND	ND	1.3*	ND
PFHxS	ND	ND	ND	ND	ND	ND
PFHxSA	ND	ND	ND	ND	ND	ND
PFNA	ND	ND	ND	ND	ND	ND
PFNS	ND	ND	ND	ND	ND	ND
PFOA	2.1	2.3	ND	ND	2.0*	ND
PFOS	2.3	ND	ND	ND	1.9*	1.6*
PFOSA	ND	ND	ND	ND	ND	ND
PFPeA	ND	ND	ND	ND	1.3*	ND
PFPeS	ND	ND	ND	ND	ND	0.4*
PFTeDA	ND	ND	ND	ND	ND	ND
PFTrDA	ND	ND	ND	ND	ND	ND
PFUnDA	ND	ND	ND	ND	ND	ND

** Reported value from laboratory is less than the reporting limit (RL) and greater than the method detection limit (MDL)- Result is estimated.*

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US EPA Unregulated Contaminant Monitoring Rule (UCMR)

The US EPA Unregulated Contaminant Monitoring Rule (UCMR) samples public water systems nationwide to collect data for contaminants which are suspected to be present in drinking water and do not currently have health-based standards set under the Safe Drinking Water Act (SDWA). Every 5 years, US EPA issues a new list of no more than 30 unregulated contaminates to be monitored by public water systems and analyzed by certified contracted laboratories.

US EPA follows the National Sample Assessment Monitoring Design and randomly selects which public water systems will be participating and which of the 30 unregulated contaminates they will sample for. The City of Ludington was required to sample in 2023 under UCMR 5 and the unregulated contaminates included 29 per- and polyfluoroalkyl substances (PFAS) and Lithium. Participation in UCMR 5 was fully funded and covered in the federal government budget. More information can be found at www.epa.gov

Table summarizing results of this monitoring in 2023:

US EPA Unregulated Contaminant Monitoring Rule (UCMR 5)		
Analyte	**Dates Sampled**	**Results (ppt)**
Lithium	2/13/2023 5/8/2023 8/15/2023 11/13/2023	< MRL (ND)
29 per- and polyfluoroalkyl substances (PFAS):		
11Cl-PF3OUdS		
4:2 FTS		
6:2 FTS		
8:2 FTS		
9Cl-PF3ONS		
ADONA		
HFPO-DA		
NFDHA		
PFBA		
PFBS		
PFDA		
PFDoA		
PFEESA		
PFHpA		
PFHpS		
PFHxA		
PFHxS		
PFMBA		
PFMPA		
PFNA		
PFOA		
PFOS		
PFPeA		
PFPeS		
PFUnA		
NEtFOSAA		
NMeFOSAA		
PFTA		
PFTrDA		
Samples collected at the entrance point to the distribution system (EPTDS) at the Water Treatment Plant		

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Lead

Information about lead: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Ludington is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you have a lead service line it is recommended that you run your water for at least 5 minutes to flush water from both your home plumbing and the lead service line. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead

Lead in drinking water is rarely the sole cause of lead poisoning, but it can add to a person's total lead exposure. All potential sources of lead in the household should be identified and removed, replaced, or reduced.

Information on lead in drinking water, paint, soil, testing methods, and steps to take to minimize exposure are available by calling US EPA Safe Drinking Water Hotline at 1-800-426-4791, EGLE EAC at 1-800-662-9278, or District Health Department #10 at 231-845-7381.

Lead and copper sampling in drinking water takes place every 3 years per regulatory requirements of the US EPA and EGLE Lead and Copper Rule (LCR). Regulatory sampling for the City of Ludington was last completed in 2023 and will take place again in 2026. Voluntary exploratory sampling takes place annually. Residents selected for this sampling will be contacted by the City of Ludington Water Treatment Plant Superintendent.

Lead Service Lines & Distribution System Material Inventory

The City of Ludington is currently working with residents and contractors to identify and replace lead service lines per requirements of the EGLE Revised Lead and Copper Rule.

At this point in time:

- 3,800 total service lines in the distribution system (within City Limits).
- 1,131 of those have been identified as meeting the lead service line criteria.
- 1,761 are considered unknown service lines (need to identify material).

In 2023, 49 lead service lines were replaced with copper at a cost of $487,090.

$500,000 has been budgeted for lead service line replacement in 2024.

The City of Ludington continues to review available federal and state grants for service line replacement and material identification. This work will continue until all lead service lines are replaced in our water system.

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Microbiological

Water treatment plant operators routinely sample for bacteria (total coliform and E. coli) in drinking water and perform analysis in our certified laboratory utilizing several approved methods detailed in Standard Methods for the Examination of Water and Wastewater.

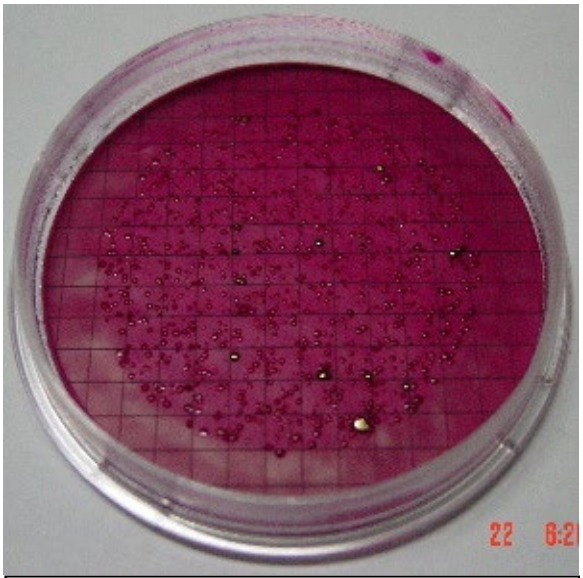
Samples are collected during the water treatment process and from multiple locations in the distribution system to provide a robust monitoring program to meet federal and state regulatory compliance.

Table summarizing total number of samples collected and analyzed in 2023:

Microbiological Testing	
Sample Location	**Number of Samples Collected and Analyzed**
Raw (Source water from Lake Michigan intakes prior to treatment process)	729
Filtered (After filtering step during treatment process)	531
Plant Tap (Entrance point to the distribution system after treatment process)	1,094
Distribution Sample Site (From six individual locations spread out over the distribution system to provide a representative sample pool)	208

No total coliform or E. coli bacteria were found during analysis of filtered, plant tap, or distribution system sampling in 2023.

The City of Ludington met compliance with the EGLE Revised Total Coliform Rule in 2023 and no assessments (level 1 or level 2) were required.



Example: Total Coliform and E. coli colonies on a membrane filter test using m-Endo

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EGLE and MDHHS Cyanotoxin Monitoring

In 2023, EGLE and the Michigan Department of Health and Human Services (MDHHS) continued the voluntarily, state funded, public water system cyanotoxin monitoring program during the harmful algal bloom season. This monitoring program included analysis of source and treated water to determine public water system vulnerability during the timeframe in which harmful algal blooms (HAB) may occur (July – October). The City of Ludington elected to participate again in the monitoring program. Samples collected were analyzed by the MDHHS laboratory.

Table summarizing results of this monitoring program in 2023:

State of Michigan EGLE & MDHHS Cyanotoxin Monitoring Program				
Collection Date	**Contaminate**	**Reporting Level (RL)**	**Sample ID**	**Results**
7/6/2023	Total Microcystin & Nodularin	Multiple 4.0 ng/L & 8.0 ng/L (ppt)	Source & Treated Water	ND
7/17/2023				
7/31/2023				
8/14/2023				
8/28/2023				
9/11/2023				
9/25/2023				
10/10/2023				
10/23/2023				
11/6/2023				
11/20/2023				
12/4/2023				

For more information on HABs, call the US EPA Safe Drinking Water Hotline at 1-800-426-4791 or EGLE EAC at 1-800-662-9278. Additional information can be found at https://www.epa.gov/cyanohabs

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Fluoride

Fluoridation is performed at the water treatment plant for dental health purposes. The CDC has the following advice for parents of infants; "The proper amount of fluoride from infancy through old age helps prevent and control tooth decay. Recent evidence suggests that mixing powdered or liquid infant formula concentrate with fluoridated water on a regular basis may increase the chance of a child developing the faint white markings of very mild or mild enamel fluorosis. Parents should follow the advice of the formula manufacturer and their child's doctor for the type of water appropriate for the formula they are using. Parents and caregivers of infants fed primarily with formula from concentrate who are concerned about the effect that mixing their infant's formula with fluoridated water may have in developing enamel fluorosis can lessen this exposure by mixing formula with low fluoride water most or all of the time." For more information- https://www.cdc.gov/fluoridation/faqs/infant-formula.html

In 2015, the US Department of Health and Human Services (DHHS) determined 0.7 ppm (mg/L) of fluoride in water to be the optimal level. The City of Ludington has been awarded the CDC's Annual Water Fluoridation Quality Award due to consistently meeting this optimal level. The MDHHS Oral Health Program has also congratulated us for achieving this annual award.

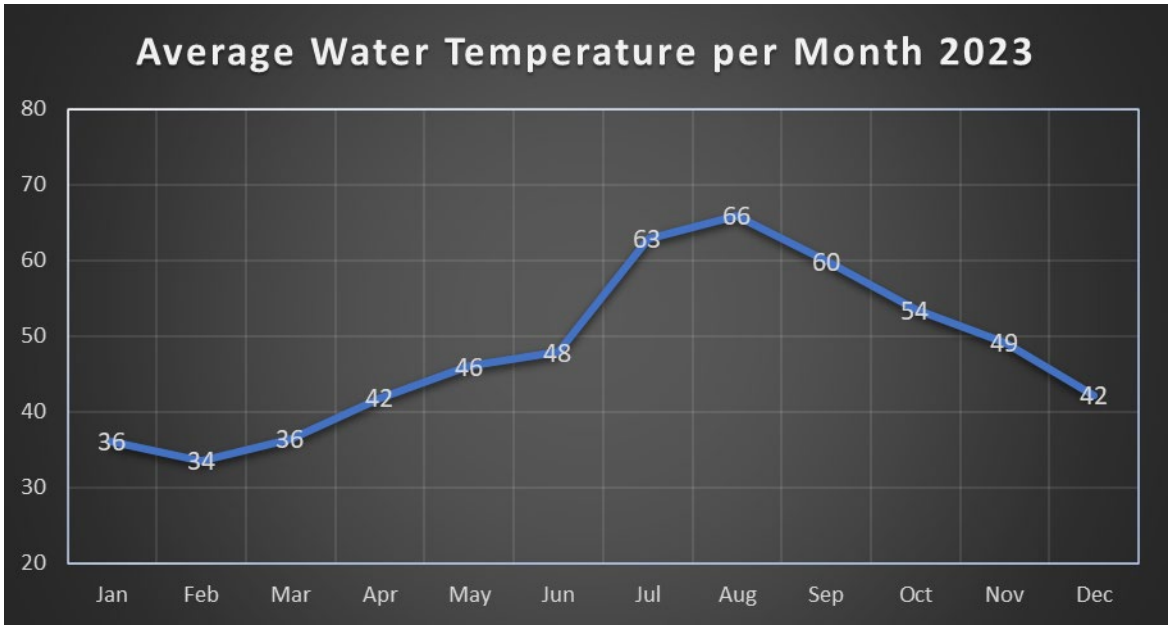
General Water Quality Parameters for 2023

Average Finished Water Total Hardness= 140 mg/L (as $CaCO_3$) or 8.2 grains per gallon

Average Finished Water Total Alkalinity= 111 mg/L (as $CaCO_3$)

Average Finished Water pH= 7.9

Average Monthly Source Water Temperature (°F) at the Intakes in Lake Michigan:



Taste and Odor

Aesthetic issues (taste, odor, discoloration) can sometimes be observed in drinking water. If you experience an abnormal situation and would like help determining the source of the issue or to have the water in your home tested, please contact Jamie Hockemeyer Water Treatment Plant Superintendent at (231) 843-8830.

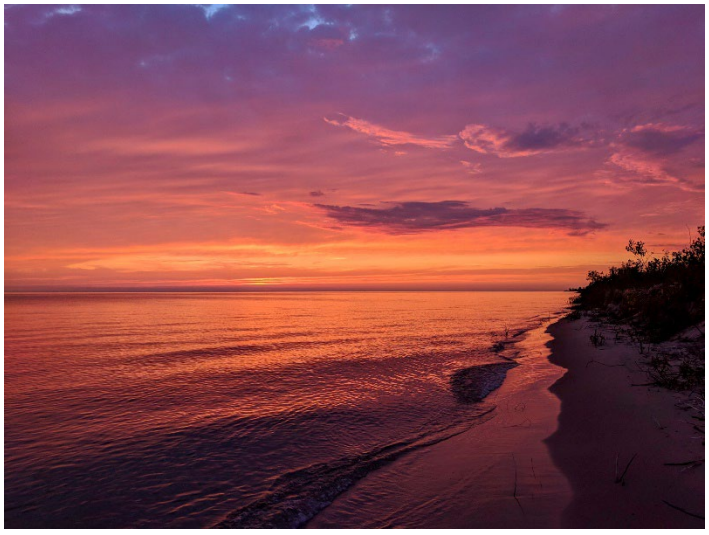
As the temperature of Lake Michigan increases above 65 degrees Fahrenheit during the mid to late summer months and decreases below 35 degrees Fahrenheit in late winter to early spring, you may experience sudden but short duration changes in the taste and odor of your drinking water. Water Treatment Plant operators use several treatment techniques to remove/reduce the chances of taste and odor issues. If you experience this situation, a common method to eliminate the issue is to flush water from all of your faucets (hot and cold) for 3-5 minutes.

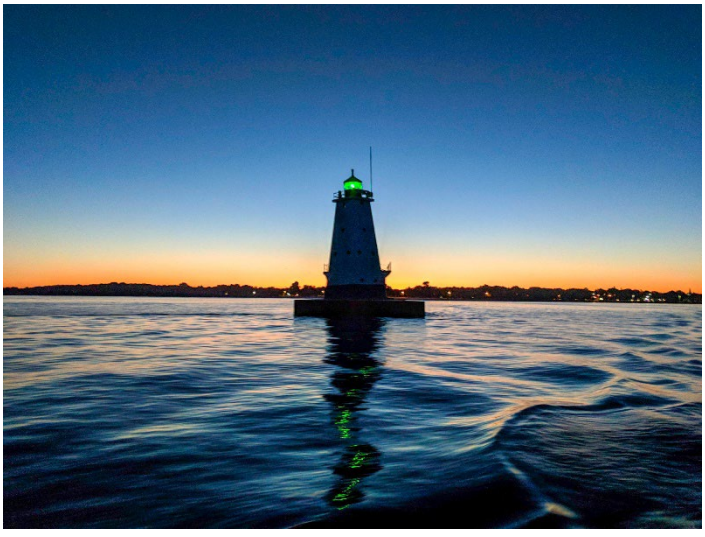
The Cross Connection Control Program

The Cross Connection Control Program is designed to protect the city's water supply from any unwanted flow from residential, commercial, or industrial customers. A cross-connection is a link or potential link between potable (safe) water and any source containing water or other substances that are not safe for human consumption. Utility Maintenance staff under DPW oversee inspection and testing of devices used to prevent cross connections throughout the community with the help of a qualified contractor as required by federal and state requirements.

Continuation of Water Service

In the event of a power outage, inclement weather, or natural disaster, the Ludington Water Treatment Plant and water distribution system is equipped to continue operation. This operation is due to the emergency standby generators at the plant, design of the system which utilizes several elevated storage tanks, updated standard operating procedures, and experienced operators.





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History of the Ludington Water Treatment Plant

The City of Ludington has been providing water from Lake Michigan to the public for over 120 years!

Before 1970, water was pumped from Lake Michigan through a crib intake to the city and surrounding communities.

In 1970, a new conventional surface water treatment plant with clarifiers and filters, buried intake, low lift pump station, wash-water recovery tank, sludge lagoons, high service pump station, and storage reservoir were built. This marked a dramatic improvement in water quality and capacity.

In 1998, the water treatment plant was upgraded to include new treatment chemical storage and feed equipment, an emergency backup generator, and variable frequency drives in the low lift pump station. This marked improvement in operational capability, safety, and reliability.

During 2006-2007, improvements were made to the high service pumps and discharge piping to the distribution system. This marked improvement in pumping capacity and redundancy.

During 2016-2019, the water treatment plant was upgraded again. Flocculation basins and inclined plate settlers replaced the existing clarifiers. Two additional filters, a larger emergency backup generator, new high service pumps with variable frequency drives, new chemical storage, and updated feed equipment were all installed. This investment provided improvement in treatment of source water and increased the treatment capacity of the water plant as required by EGLE to meet our water demand by the City and surrounding communities.

During 2020-2023, a focus on preventative maintenance involved overhauling of existing pumps and replacement of aging valve actuators. In addition, new water quality monitoring equipment for the laboratory and continuous process control for treatment stages which utilizes optical laser technology was installed. This technology allows for greater data accuracy and faster testing results which provides operators more information and better oversight. Water plant operators spent a considerable amount of time improving operational efficiencies in regards to electrical and treatment chemical use while maintenance staff worked on updating multiple standard operating procedures for emergency situations through testing and verification.