MICHIGAN STATE UNIVERSITY

ISSUED JUNE 2020

WATER QUALITY REPORT

2019

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2019 WATER INFRASTRUCTURE UPDATES

Michigan State University completed construction in 2020 on a $21 million water treatment plant and water tower that will remove iron and other minerals from campus water to improve its taste and appearance.

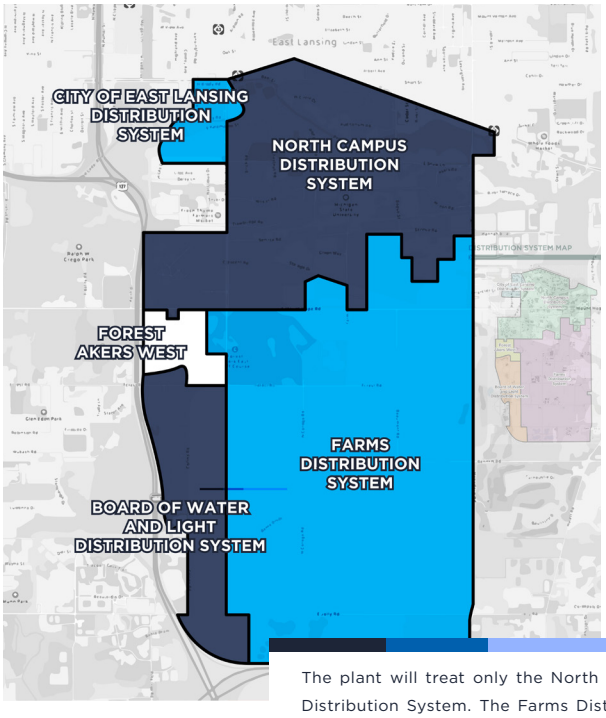
While MSU's water is clean, safe and regularly tested to ensure it meets state and federal water quality requirements, consumer concerns remain about its color and taste.

MSU's well water supply naturally contains high levels of hardness and minerals. The treatment plant is expected to go online in July 2020 after extensive water-quality testing, but noticeable aesthetic changes at consumer use points may be gradual as years of mineral and sediment build-up in water mains and within buildings are flushed out of the system and removed. Some buildings may see improvements more quickly than others.

As in any municipal water system, water discoloration events still may occur when pipes break or are flushed out for maintenance, but the discoloration will become less noticeable over time as accumulated minerals and sediment are removed from the system.

In addition to addressing consumer complaints about the water's taste and appearance, the upgraded water system will result in significant cost savings to the university by eliminating the need for powered water distribution pumps. Instead of electricity, the water tower uses gravity to create water pressure, ensuring firefighters have adequate water during a major power outage.

MSU continues to work to replace water lines in residence halls and other buildings throughout campus to address aging infrastructure. McDonel and Wonders Halls had domestic water service replacements in 2019, with Holden and Owen Graduate Halls scheduled for 2020.



The plant will treat only the North Campus Distribution System. The Farms Distribution System serves the southern agricultural area.

2019 WATER QUALITY REPORT

Our report includes details on where MSU water comes from, what's in it, and what we are doing to ensure its safety.

The report further compares campus water quality to federal Environmental Protection Agency (EPA) and Michigan Department of Environment, Great Lakes and Energy (EGLE) standards and regulations. MSU facilities operate 24 hours a day, seven days a week and are monitored by qualified, trained and licensed personnel.

MSU is pleased to report our drinking water meets or surpasses all federal and state regulatory requirements.

Our commitment to safe water

MSU is committed to providing our campus community with safe and reliable water.

To ensure that tap water is safe to drink, EPA regulations limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) establishes limits for contaminants in bottled water, which provide the same protection for public health.

The state and EPA require MSU to test our water on a regular basis to ensure its safety. MSU meets all monitoring and reporting requirements for both state and federal regulations.

In the wake of the water crisis experienced in Flint, it is understandable that the MSU community is concerned about its water quality. Infrastructure Planning and Facilities has a highly qualified staff of water utility professionals who understand the importance of the water quality for our community. We are dedicated to providing the highest quality drinking water, and continue to meet or exceed all state and federal regulatory requirements.

Our commitment to safe water continued

There is no detectable lead in MSU drinking water when it enters the distribution system. Water supplied to MSU comes from a consistent source of groundwater, drawn from wells located deep within the Saginaw sandstone aquifer. If small amounts of lead are present in existing plumbing materials and water is allowed to set for several hours, lead may enter into drinking water since it is naturally corrosive.

To prevent this, MSU employs a comprehensive corrosion protection regimen, consisting of the use of phosphate additives. MSU has been testing for lead and other contaminants since 1992. Water results consistently show lead levels below the action level of 15 parts per billion (ppb).

Tap water versus bottled water

Instead of using and throwing away a plastic water bottle, please opt for a water bottle that can be refilled at one of about 160 on-campus water filtration and filter stations.

At MSU, plastic water bottles account for a large percentage of campus waste. It is estimated that only 25 percent of the nearly three million water bottles on campus make their way to MSU's Recycling Center each year.

The waste from plastic water bottles increases the university's landfill costs and contributes to our environmental footprint. For this reason, MSU encourages our campus customers to hydrate sustainably with a reusable water bottle at one of the university's many water refill stations. MSU has installed drinking water and water bottle refill stations that include additional filters across campus as a sustainable, aesthetic response to the campus community's concerns with MSU's drinking water.

The stations offer access to high-quality drinking water that is economically and environmentally responsible.

Annually, only 25% of nearly 3 million water bottles make their way to the MSU Recycling Center.

Sources of drinking water

The water source for Michigan State University's campus is groundwater drawn from the Saginaw aquifer. These underground water-bearing formations are continually replenished with water through the normal hydrologic cycle.

In Michigan and the Great Lakes Basin, we are fortunate to have an abundant supply of fresh water as compared with other areas of the world. The Great Lakes Basin contains 20 percent of the world's fresh water.

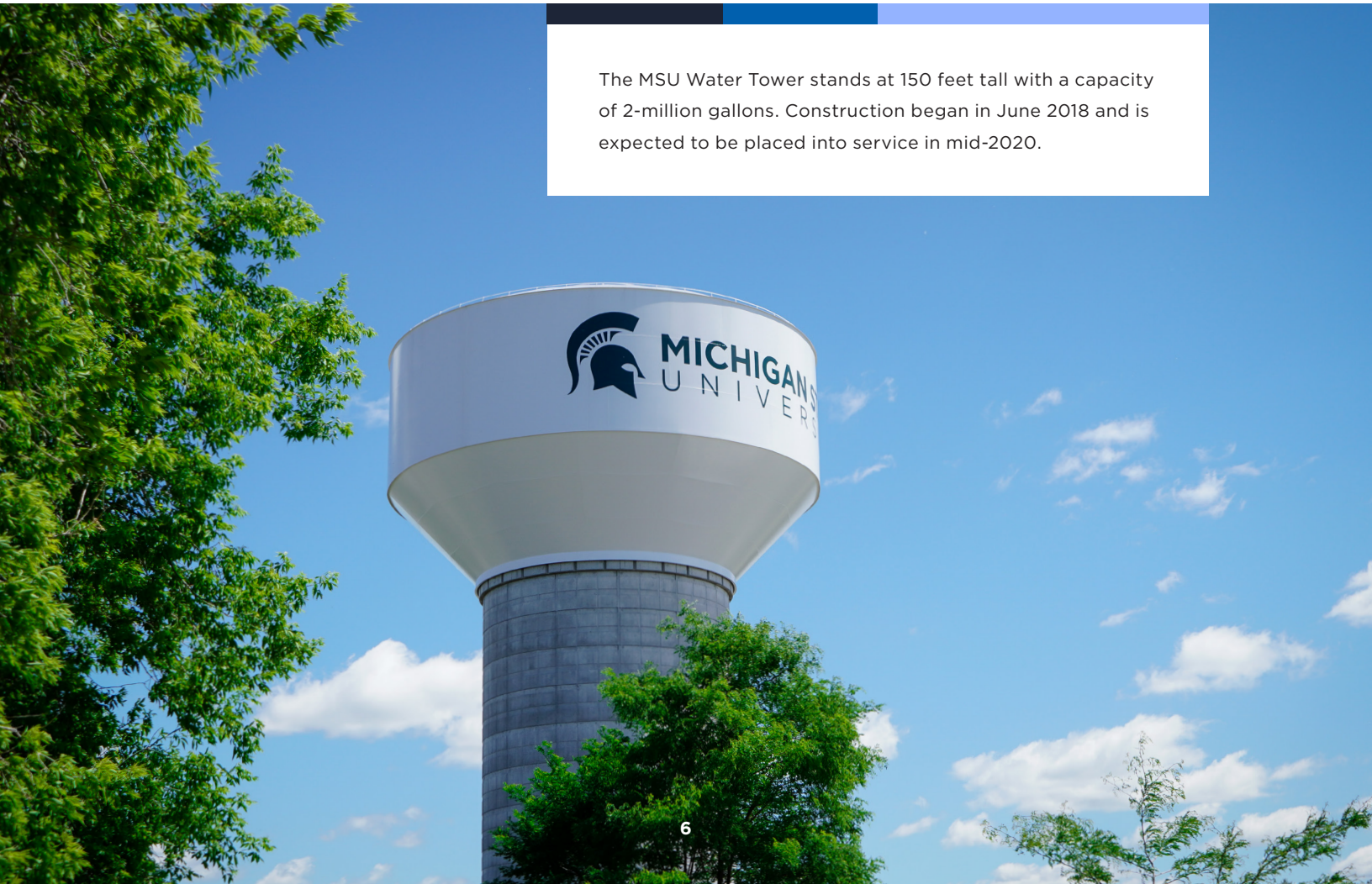
MSU's water system uses 15 groundwater wells, each with pumping capacities ranging from 400 to 850 gallons per minute. MSU closely monitors the source water and the treated drinking water to ensure a high level of quality and safety is maintained. Once treated, the water is pumped to campus through a network of water mains, consisting of about 74 miles of pipes that range from 6 to 16 inches in diameter.

1855 Place, Jack Breslin Student Events Center, Brody Neighborhood, University Village and the Kellogg Hotel & Conference Center are supplied by the East Lansing-Meridian Water and Sewer Authority. For more information, refer to East Lansing-Meridian Water and Sewer Authority water quality report online:

https://www.cityofeastlansing.com/600/Annual-Water-Quality-Report

Facilities along the southwest border of campus at Forest and Collins roads, including the Henry Center for Executive Development, are supplied by the Lansing Board of Water and Light. For more information, refer to the Lansing Board of Water and Light water quality report online:

https://www.lbwl.com/WaterQualityReport/



The MSU Water Tower stands at 150 feet tall with a capacity of 2-million gallons. Construction began in June 2018 and is expected to be placed into service in mid-2020.

ENSURING WATER QUALITY AND SAFETY

MSU's water treatment process consists of the addition of small quantities of chlorine, fluoride, phosphate and sodium hydroxide.

These treatment techniques are used to promote public health and to improve the aesthetic quality of the water in the MSU distribution system and campus buildings.

Chlorination is a chemical process used to control disease-causing microorganisms by killing or inactivating them, and is the most important step in drinking water treatment. Chlorination is the most common method of disinfection in North America. Significant strides in public health are directly linked to the adoption of drinking water chlorination. Before U.S. communities routinely began treating drinking water with chlorine, thousands of residents died annually from cholera, typhoid fever, dysentery and hepatitis A. Drinking water chlorination and filtration have helped eliminate these diseases in the United States. The filtration of drinking water plus the use of chlorine is likely the most significant public health advancement in human history.

Fluoride is one of the most plentiful elements on Earth, occurring naturally in both ground water and surface waters in Michigan. All ground water

sources contain some fluoride. Community water fluoridation is the process of adjusting the amount of fluoride found in water to achieve optimal prevention of tooth decay. When optimal levels of fluoride are present in drinking water, it has been shown to promote oral health by preventing tooth decay. Water systems are considered naturally fluoridated when the natural level of fluoride is greater than 0.7 milligrams per liter (mg/L). Fluoride in MSU's groundwater is .14-.42 mg/L prior to fluoride addition. Fluoride is added to achieve the optimal range recommended by EPA and EGLE.

Phosphate and sodium hydroxide are added to promote corrosion protection of the infrastructure and building plumbing from the naturally corrosive water. They are added in relatively small amounts to provide a protective layer on pipe interiors, reducing corrosion. This prolongs the life of the pipes and reduces the amount of mineral and iron deposits in the water. These additives are monitored and approved by the EPA.

Water safety and quality continued

MSU performs multiple water quality tests throughout the year to ensure water quality. These are all promulgated and required by the EPA and EGLE. Additional testing is also performed to further ensure health and safety.

In addition to the water treatment and testing listed above, MSU flushes the distribution systems regularly. This helps remove naturally occurring iron sediment that is associated with the ground water that settles in the main lines, lessening the duration and impact associated with the occasional appearance of "red water" on campus.

Conditions that cause red water include increased water flow through mains or changes in water flow direction, resulting in stirred up sediment in the water distribution system. Although the red water is safe and does not pose a health risk, it can stain laundry or impact research activities. The flushing process minimizes red water occurrences to the community as much as possible.

SOURCE WATER ASSESSMENT

The 1996 amendments to the federal Safe Drinking Water Act required states to assess the susceptibility of all public water supplies to potential sources of contamination. The susceptibility rating is determined using a scale ranging from "very low" to "very high" based primarily on geologic sensitivity, water chemistry and locations of contaminant sources. MSU's Source Water Assessment was completed in 2003. The susceptibility of the campus water supply was deemed to be "moderately high."

Potential sources of contamination include: above-ground storage tanks, liquid manure spreading, chemical and waste storage areas, biowaste holding tanks, wet labs, equipment storage areas, farming operations, chemical storage, pesticide storage, equipment washing pads, paint storage, mixing and cleaning operations, a biotechnology facility, and a number of sites that generate, use and dispose of hazardous waste and other chemicals.

To protect our groundwater from these potential sources of contamination, MSU developed a Wellhead Protection Program (WHPP) in 2000. The program is updated regularly, with the latest revision approved by EGLE in 2014.

The goal of MSU's WHPP is to manage the land area that surrounds our water supply wells to minimize the potential for contamination.

Information about the WHPP can be found online: www.michigan.gov/whp

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TYPES OF CONTAMINANTS IN GROUND-WATER SUPPLY

Microbial Contaminants	Such as viruses and bacteria, which 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 runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
Radioactive Contaminants	Which are naturally occuring.
Organic Chemical	Including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems.
Pesticides / Herbicides	Such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

To reduce the potential of these contaminants reaching MSU water supply, a source water assessment was conducted and the Wellhead Protection Program was implemented.

These are in the source water assessment section of this report.

HEALTH AND SAFETY INFORMATION

Pure water is often called a universal solvent because it will dissolve almost anything. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material. It can also pick up substances resulting from the presence of animals or from human activity. Some of these substances have been deemed by the EPA to be contaminants that must be monitored and strictly controlled.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) are standards and criteria established using science and evidence-based approaches to keep the concentrations low at established safety levels based on toxicology studies, laboratory and engineering studies, and monitoring.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised people such as those with cancer undergoing chemotherapy,

people who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, and the elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

The EPA and the Centers for Disease Control and Prevention guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline.

The MSU campus drinking water is safe and meets all federal and state safety standards. However, the water may have a different taste and feel compared to the water you are used to if you come from a location with a different water supply.

For example, you may experience dry skin, or notice that the water feels “hard,” which is due to naturally occurring minerals in the water. Individuals usually acclimate to changes in a water supply fairly quick, however, if you have concerns, you should contact your health-care provider for further guidance. More information about contaminants and potential health effects can be obtained by calling the EPA Safe Drinking Water Hotline at 800-426-4791.

PROTECTING YOURSELF FROM LEAD

There are general safety recommendations you can follow to reduce the risk of contracting lead through drinking water.

Considering that many of our customers travel to other locations in the world, below are general safety recommendations provided by the EPA and EGLE that can be implemented to reduce the risk of contracting lead through any water system.

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 building plumbing. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap between 30 seconds to two minutes before using water for drinking or cooking.

Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. Please see the following pages for the action levels.

Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the EPA Safe Drinking Water Hotline at:800-426-4791 or at http://www.epa.gov/safewater/lead

NORTH CAMPUS DISTRIBUTION SYSTEM

JAN 1 - DEC 31, 2019

This table shows test results for substances that were found in MSU's drinking water. Results are not shown for substances that were tested for but not detected at or above the Maximum Contaminant Level (MCL).

CONSTITUENT/UNITS OF MEASUREMENTS	MCL	MCLG	AMOUNT IN MSU WATER	YEAR[1]	LIKELY SOURCES
BIOLOGICAL CONSTITUENTS					
Total Coliform (% Positive Samples)	N/A	N/A	Number Detected: 0 Violation: None	2019	Naturally present in the environment
INORGANIC					
Copper (ppb)[3]	AL = 1300	1300	500 Range: ND-560 Two samples exceeded the Action Level[4]	2017	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)[3]	AL = 15	0	9.0 Range: ND-30 Two samples exceeded the Action Level[4,5]	2017	Corrosion of household plumbing systems; Erosion of natural deposits
Number of Lead Services[7]	N/A	N/A	0 Lead Service Leads		N/A
Fluoride (Tap) (ppm)	4	4	0.59	2019	Naturally occurring and hydrofluorosilicic acid. Numbers shown averaged over 2019. Current recommended level at 0.7 per EPA and EGLE recommended dosage goal
Barium (ppm)	2	2	0.14	2015	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
DISINFECTANTS					
Chlorine (ppm)[6]	4	4	Highest RAA: 0.31 Range: 0.2-0.7	2019	Water additive used to control microbes
DISINFECTANTS BY-PRODUCTS					
State 2 Total Trihalomethanes (THMS) (ppb)	80	N/A	LRAA: 14.90 Range: 11.10-21.70	2019	By-product of disinfection
Stage 2 Total Haloacetic Acid (HAA5) (ppb)	60	N/A	LRAA: 8.95 Range: 5.0-13.0	2019	By-product of disinfection
RADIONUCLIDES					
Gross Alpha (pCi/L)	15	0	14.2	2016	Erosion of natural deposits
Radium (pCi/L)	5	0	3.7	2016	Erosion of natural deposits
UNREGULATED SUBSTANCE					
Sodium (ppm)	N/A	N/A	14	2019	Erosion of natural deposits and runoff

[1]Water quality regulations allow the monitoring of some substances less often than once a year because their concentrations are not expected to vary significantly from year to year.

[2]Unregulated substances are those for which the EPA has not established drinking water standards. The purpose of monitoring these substances is to assist the EPA in determining the occurrence of unregulated substances in drinking water and whether future regulation is warranted.

[3]MSU is currently on a three-year cycle for lead and copper testing. These results are from 2017.

[4]90 percent of samples were at or below this level.

[5]Sample Fixtures were isolated and changed after receipt of sample results above action level.

[6]Chlorine does not have an associated MCL or MCLG. It is limited by a MRLG which is defined on page 13. The levels shown are the MRLG limit.

MORE WATER QUALITY PARAMETERS OF INTEREST

NORTH CAMPUS

PARAMETER	UNITS	YOUR WATER RESULTS	
		AVG. LEVEL DETECTED	RANGE
Chloride	ppm	37	24-28
Hardness (calcium carbonate)	ppm	591	288-592
Iron	ppm	0.7	0.3-1.4
Nitrate as N	ppm	ND	ND
Nitrite as N	ppm	ND	ND
Sodium	ppm	14	6-34
Sulfate	ppm	90	16-180

[1]May differ at tap due to residence time

UNREGULATED CONTAMINANT MONITORING RULE 4 (UCMR4)[2]

CONTAMINANT	AVG.	RANGE	MRL*
Bromochloroacetic Acid (ppb)	1.58	1.40-1.70	.30
Bromodichloroacetic Acid (ppb)	1.43	1.30-1.50	.50
Chlorodibromoacetic Acid (ppb)	.33	.31-.35	.30
Dichloroacetic Acid (ppb)	4.00	3.60-4.30	.20
Trichloroacetic Acid (ppb)	4.30	3.80-4.60	.50

[2]Unregulated substances are those for which the EPA has not established drinking water standards. The purpose of monitoring these substances is to assist the EPA in determining the occurrence of unregulated substances in drinking water and whether future regulation is warranted.
*Minimum Reporting Limit

FARMS DISTRIBUTION SYSTEM

JAN 1 - DEC 31, 2019

This table shows test results for substances that were found in MSU's drinking water. Results are not shown for substances that were tested for but not detected at or above the Maximum Contaminant Level (MCL).

CONSTITUENT/UNITS OF MEASUREMENTS	MCL	MCLG	AMOUNT IN MSU WATER	YEAR[1]	LIKELY SOURCES
BIOLOGICAL CONSTITUENTS					
Total Coliform (% Positive Samples)	N/A	N/A	Number Detected: 0 Violation: None	2019	
INORGANIC					
Copper (ppb)[3]	AL = 1300	1300	200 Range: ND-230 No samples exceeded the Action Level[4]	2017	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)[3]	AL = 15	0	0 Range: ND-1 No samples exceeded the Action Level[4,5]	2017	Corrosion of household plumbing systems; Erosion of natural deposits
Number of Lead Services	N/A	N/A	0 Lead Service Leads		N/A
Fluoride (Natural) (ppm)	4	4	0.23 Range: 0.14-0.42	2019	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Nickel (ppm)	0.1	0.1	0.01 Range: 0.09-0.19	2017	Erosion of natural deposits
Barium (ppm)	2	2	0.19 Range: 0.09-0.19	2017	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Arsenic (ppb)	10	10	6 Range: 2.0-6.0	2017	Erosion of Natural deposits; discharge from wood treatment; discharge from glass production.[5]
Isopropylbenzene (ppm)	none	none	0.0007 Range: 0-0.0007	2018	Runoff from petroleum products, paint, and ruse preventatives
RADIONUCLIDES					
Radium (pCi/L)	5	0	6.4 Range: 0-6.4	2017	Erosion of natural deposits[6]
Gross Alpha (pCi/L)	15	0	19.4	2017	Erosion of natural deposits[7]
UNREGULATED SUBSTANCE[2]					
Sodium (ppm)	N/A	N/A	34	2017	Erosion of natural deposits

[1]Water quality regulations allow us to monitor some substances less often than once a year because their concentrations are not expected to vary significantly from year to year.

[2]UCMR3 parameters may be sourced in Farms Distribution System.

[3]MSU is currently on a three-year cycle for lead and copper testing. These results are from 2017.

[4]90 percent of samples were at or below this level.

[5]While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

[6]Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.

[7]Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

APPENDIX I

COMMON ABBREVIATIONS

AL (Action Level) – The concentration of a contaminant which, if exceeded, requires a water system to initiate a treatment process or other action.

ALG (Action Level Goal) – The level of a contaminant in drinking water below which there is no known or expected risk to health. ALGs allow for a margin of safety.

AVG (Average) – Regulatory compliance with some MCLs are based on running annual average of monthly samples.

LRAA (Location Running Annual Average) – The average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

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

MCLG (Maximum Contaminant Level Goal) – 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.

MRDL (Maximum Residual Disinfectant Level) - 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.

MRDLG (Maximum Residual Disinfectant Level Goals) - The level of 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.

APPENDIX I

ND (None Detected) - Below analytical method detection limit.

NTU (Nephelometric Turbidity Units) - Unit of measurement for water clarity.

pCi/L (picocuries per liter or nanograms per liter ng/L) - A measure of radioactivity.

ppb (parts per billion or micrograms per liter mcg/L) - One ounce in 7,350,000,000 gallons of water.

ppm (parts per million or milligrams per liter mg/L) - One ounce in 7,350 gallons of water

ppt (parts per trillion or nanograms per liter ng/L) - One ounce in 7,350,000,000 gallons of water.

RAA (Running Annual Average) - A continuous averaging of four quarters of sampling.

SDWA (Safe Drinking Water Act) - A set of federally mandated regulations that ensures the quality and safety of water provided by public water systems.

TT (Treatment Technique) - A required process intended to reduce the level of contaminants in drinking water.

> - An abbreviation meaning "more than."

< - An abbreviation meaning "less than."

For more information about your water or the contents of this report, contact the MSU Water Operations Manager:

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Water Quality Report
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