Important Information on the Water Quality Parameters Measured in Your Water

This document gives you important information about the water quality parameters tested in your water. The information will include:

- Where each parameter comes from.
- The potential problems parameters can cause to plumbing and the water's taste, smell, and look if the amount in the water is beyond what is considered acceptable.
- The potential health problems linked to parameters if the amount in the water swallowed/ingested is beyond the health-based screening levels.
- The drinking water standards and/or health-based screening levels that the Michigan Department of Health and Human Services (MDHHS) compared your results with.

Each table provides a list of the water quality parameters that were measured in your water. The tables are grouped by 1) metals, 2) disinfectants / disinfection byproducts, and bacteria, and 3) general water chemistry.

Important Facts

Finding a metal, chemical, or other measured water characteristic in your water isn't always a sign of a problem. Many chemicals including metals are normally in people's water all around Michigan and the United States. Some of them can be found naturally in the source water, whether it is from groundwater or surface water. Before the water gets to you, water treatment plants are required to complete water quality tests. This helps improve the quality of water delivered to homes. This water is called *finished water.* Here are some ways that chemical levels in your home's water may be different than the finished water leaving the plant.

- **Byproducts from disinfection.** Community public water supplies add chemicals to help improve the quality of water delivered to homes. These chemicals may also generate byproducts during the disinfection process.
- **Plumbing inside your home.** Some metals can come from the pipes, plumbing fixtures, and faucets that are installed your home. *Note:* if you have changed your pipes or water faucets since water samples were taken from your home, the measurements listed in the tables may not be the same as what is currently flowing from your home's faucets.
- **Plumbing outside of your home.** The pipe connecting your home to the water main in the street may have contaminants that get into your water supply.

Values Used to Compare Water Test Results

MDHHS compared your water test results with drinking water standards and/or health-based screening values established by federal or state agencies. These numbers are provided in the last two columns of tables.

- Drinking water standards are set to protect human health and based on technology available and the cost to test and treat.
- Health-based screening values have been set using the best available scientific research to be the most protective of human health.

After each number, a letter is provided to show which agency established (created) that value. At the end of the tables under "Value Description" you will find the letters, screening level name, and a description.

Please call the MDHHS Drinking Water Hotline at 844-934-1315 if you have any questions. MDHHS staff can discuss your test results and other information listed here.

Section 1: Metals

Certain conditions can cause metals from your home's plumbing to release into your drinking water. Some metals may also come from the source water. Too much metal in drinking water can be a health concern. Metals can be found dissolved in water and in small pieces called particulates. MDHHS tested water samples for the total amount of each metal, dissolved and particulates. MDHHS also tested water samples for dissolved lead, copper, iron, and manganese. These results were used to calculate the amount of metal particulate in the water.

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Aluminum	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can be found in beverage cans, foil, antacids, and other consumer products. • Can be mixed with other metals to form aluminum alloys. • Common metal in pipes and faucets. • Can be added to drinking water by water supplies as coagulant.	• Colored water. • Some studies found possible link between aluminum exposure and increased risk of bone or neurological problems. The link may be limited to some people with kidney disease.	0.05-0.20 (J)	0.3 (D)
Antimony	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can also come from industrial sources. • Found in municipal waste, flame retardants, glass, ceramics, explosives, and batteries.	• Stomach upset (if too much is consumed in a short time). • Linked to increased cholesterol levels. • Linked to decreased sugar levels in blood.	0.006 (F)	0.0028 (B: chronic for children)
Arsenic	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can get into water from natural deposits in the earth or from pollution.	• Skin damage. • Circulatory systems problems. • May increase a person's risk of developing skin, liver, bladder, and lung cancer.	0.01(F)	0 (G)

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Barium	• Can be found naturally in soil and rock; can be found naturally in groundwater.	• Stomach upset (if too much is consumed in a short time). • Changes in blood pressure or heart rhythm. • Numbness around the face, muscle weakness, or difficulty breathing.	2 (F)	0.7 (E: 1/10-day for children)
Beryllium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Other sources include mining operations, waste, processing plants, coal, and petroleum .	• May cause skin allergy upon contact for some people. • May cause harm to intestines.	0.004 (F)	0.004 (G)
Boron	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can be from industrial sources. • Used in flame retardants, cosmetics, cleaners, fuels, and leather tanning chemicals.	• Stomach upset (if too much is consumed in a short time). • Linked to problems with liver, kidney, stomach, brain/nerves. • Linked to problems with male fertility.	Value not established	1.4 (C: chronic for children)
Cadmium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Common metal in galvanized pipes.	• Linked to kidney damage.	0.005 (F)	0.0007 (C: chronic for children)

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Chromium, total	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Could be released from steel and pulp mills.	• Linked to skin allergies. • Note that a small amount is actually needed for our health.	0.1 (F)	0.0063 (C: chronic for children, Cr (VI))[1]
Copper	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can also come from pollution. • Common metal in water pipes and faucets.	• Stomach upset (if too much is consumed in a short time). • Liver or kidney damage (if too much is consumed over a long time). • People with Wilson's Disease should talk to their health care provider about their levels. • Metallic taste of water; blue-green staining. • Note that a small amount is needed for our health.	1.3 (A) 1.0 (J)	0.07 (C: acute/ intermediate for children) 1.3 (G)[2]

[1] The main forms of chromium in drinking water can be Cr(III) and Cr (VI). While we have measured the total amount of both forms, the health-based value is for Cr (VI) as it is much lower than a health-based value for Cr (III). Cr(III) is much less toxic than Cr (VI).

[2] The 0.07 mg/L EMEG was derived from the ATSDR's acute-/intermediate- duration oral Minimal Risk Level (MRL). According to the ATSDR's copper toxicological profile (https://www.atsdr.cdc.gov/toxprofiles/tp132.pdf), the MRLs are " intended to protect against exposure to excess copper in drinking water and assumes a normal copper dietary intake". The profile also used the 1.3 ppm as the "acceptable drinking water standard" in its Public Health Statement.

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Iron	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Common metal in pipes and faucets. • Can be added to drinking water by water supplies as coagulant.	• Rusty colored water and reddish or orange staining. • May see small flakes in water or build-up. • Metallic taste of water. • Stomach upset. • Note that a small amount is actually needed for our health.	0.30 (J)	2 (D)
Lead	• Can be found naturally in soil and rock. • Can be found in groundwater if contaminated with industrial or agricultural runoff. • Common metal in water pipes in homes built before 1986, pipe solder, and faucet fixtures. • Can get into drinking water when it is in contact with pipes, solder, or faucet fixtures that contain lead. • Can be found in paint, dirt, bullets, fishing sinkers, make-up and lotions, food, and many other items.	• Can harm brain and mental development in fetuses and children. • Can slow children's growth. • Linked to high blood pressure or kidney problems in adults.	0.015 (A)	0 (G)

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Manganese	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Used in steel production. • Commonly found in water from erosion of natural deposits.	• Black to brown colored water. • Black staining. • Bitter metallic taste of water. • Harm to the nervous system. • Note that a small amount is actually needed for our health.	0.05 (J)	0.3 (E: lifetime)
Molybdenum	• Can be found naturally in soil and rock; can be found naturally in groundwater.	• Possible kidney changes as suggested by animal studies. • Note that a small amount is actually needed for our health.	Value not established	0.035 (B: chronic for children)
Nickel	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Used in stainless steel and alloys. • Can also be found in electroplating, mining, and refining metals.	• Linked to skin allergies. • Stomach upset (if too much is consumed in a short time).	Value not established	0.1 (E: lifetime)
Selenium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can get into the water from sulfur and coal.	• Nausea, diarrhea, and vomiting (if too much is consumed in a short time). • Can affect the brain and nerves. • Causes brittle hair and nails. • Note that a small amount is actually needed for our health.	0.05 (F)	0.035 (B, C: chronic for children)

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Silver	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Used in alloys, solder, electronics and electrical equipment, and other products. • Could be released from ore mining and processing, product fabrication, electroplating.	• Skin discoloration . • Graying of the white part of the eye. • Linked to skin allergies.	0.1 (J)	0.035 (C: children – chronic for children)
Thallium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Used in electronics and alloys. • Could also be released from pharmaceutical manufacturing.	• Hair loss (if a lot is consumed in a short time). • Kidney, intestine, or liver problems (if a lot is consumed in a short time).	0.002 (F)	0.0002 (I)
Tin	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can get into water from mining activities, burning coal, and making tin compounds. • Also found in tin-lined cans, seafood, and household products containing organotin compounds.	• Stomach upset (if a lot is consumed in a short time). • Liver and kidney problems.	Value not established	2.1 (C: intermediate children)
Vanadium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can come from the burning of fuel oils. • Used in production of ceramics and steel.	• Stomach upset (if an increased amount is consumed in a short time). • Developmental effects seen in animal studies.	Value not established	0.0045 (D)

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	US EPA drinking water values (mg/L)	Health-based level (mg/L)
Zinc	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Can come from mining wastes. • Common metal in water pipes and faucets.	• Metallic taste of water. • Stomach upset (if a lot is consumed in a short time). • Anemia, pancreas damage, and cholesterol change. • Note that a small amount is actually needed for our health.	5 (J)	2 (E: lifetime)

Section 2: Disinfectants, Disinfection Byproducts and Bacteria

Community public water supplies add chemicals like chlorine[3] to help improve the quality of water delivered to homes. These chemicals may also generate disinfection byproducts (DBPs)[4] during the disinfection process. Chlorine is an effective way to remove bacteria from the water. But swallowing water with too much chlorine or DBPs or inhale too much while showering over time can be a health concern. Your water may have also be tested for coliform bacteria if the chlorine level was low. MDHHS and the city of Flint will follow up with you if any bacteria is found in the result.

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	U.S. EPA drinking water standards (µg/L)
Chlorine (as Cl_2)	• Added to water as a disinfectant. • Free and total chlorine are tested in your water. Check the results on your "water test result for chlorine" document.	• Stomach upset (if a lot is consumed in a short time). • Eye and nose irritation.	4000 (H)

[3] Centers for Disease Control https://www.cdc.gov/healthywater/drinking/public/water_disinfection.html
[4] Centers for Disease Control https://www.cdc.gov/safewater/chlorination-byproducts.html

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:	U.S. EPA drinking water standards (µg/L)
Haloacetic Acids (HAA5)	• A group of disinfection byproducts. • The group includes bromoacetic acid (MBAA), chloroacetic acid (MCAA), dibromoacetic acid (DBAA), dichloroacetic acid (DCAA), trichloroacetic acid (TCAA).	• Linked to increased risk of cancer.	60 (F)
Total Trihalomethanes (TTHMs)	• A group of disinfection byproducts. • The group includes bromodichloromethane, bromoform chloroform, and dibromochloromethane.	• May increase a person's risk of developing cancer. • Linked to liver, kidney, or central nervous system problems.	80 (F)
Total Coliform and E. *coli*	• Coliform bacteria are found in soil, surface water, on plants, and in the intestines of warm-blooded animals and people. • One type of coliform bacteria called Escherichia *coli* (E. *coli*) is a sign that fecal waste is in the water.	• Most coliform bacteria are not harmful but some types of E. *coli* in drinking water can make you sick. A person that has been exposed to these bacteria may have an upset stomach, vomiting, fever, or diarrhea. • Children and the elderly are more at risk from these bacteria.	The MCL levels are based on the positive sample tests for total coliforms (monthly MCL), or for total coliforms and Escherichia coli (E. *coli*) or fecal coliforms (acute MCL). Refer to the for more details.

Section 3: General Chemistry

General chemistry is a group of water quality parameters that measure how corrosive the water is. Testing the water for these parameters will provide an understanding of how well the corrosion control works in households. Many of the parameters in this group are not chemicals and do not cause health problems directly by themselves.

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:
Calcium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Contributes to water hardness.	• Causes scale to form in pipes. • Note that a small amount is actually needed for our health.
Chloride	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Also, can come from industrial or home waste.	• Corrosion of pipes. • Salty taste of water. • Note that a small amount is actually needed for our health.
Specific Conductance	• The ability of water to conduct an electrical current. • Related to the amount of dissolved minerals.	• Some minerals in the water are expected and necessary, but when there are too many minerals, they may cause the problems listed in Sections 1, 2, and 3 above.
Hardness	• Comes from water contact with dissolved limestone or waste from mines. • Measures the amount of minerals in water; generally, calcium and magnesium levels.	• Causes scale to form in pipes. • Soap won't lather (suds or bubbles).

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:
Magnesium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Contributes to water hardness.	• Causes scale to form in pipes. • May cause laxative effect if above 400 mg/L in drinking water[5]. • Note that a small amount is actually needed for our health.
Orthophosphate	• Commonly added to drinking water by water treatment plants to control corrosion.	• Flint drinking water supply system recommends levels of orthophosphate in drinking water supply to range between 3.1 to 3.7 mg/L. Any fluctuation beyond the provided ranges will be addressed by the Flint Drinking Water Department.
pH	• Measurement of the acidity or alkalinity of the water on a scale of 0-14, with 7 being neutral. • Helps govern corrosion and deposition of metals in pipes.	• Chlorine can't disinfect as well when levels are high. • Can cause corrosion in pipes when low. • Causes scale to form in pipes when high.
Sodium	• Can be found naturally in soil and rock; can be found naturally in groundwater. • Also is in products such as road salt and water treatment chemicals, like water softener salts.	• Salty taste of water. • Potential health concern for individuals on low-sodium diets (linked to high blood pressure and increased risk of heart disease). • Note that a small amount is actually needed for our health.

[5] https://www.michigan.gov/documents/deq/deq-rrd-chem-MagnesiumDatasheet_527861_7.pdf

Water quality parameters	What is it and where does it come from?	Potential problems if there is too much in drinking water:
Sulfate	• Enters the water from mineral deposits and saltwater intrusion, or from industrial or domestic waste.	• May cause laxative effect if above 500 mg/L in drinking water[6]. • Salty taste of water. • Causes scale to form in pipes.
Total Alkalinity	• Measure of the ability to neutralize acids.	• Can cause corrosion in pipes when low. • Can cause scaling in pipes when high. • Metallic taste of water when low. • Bitter taste of water when high.
Total Dissolved Solids (TDS)	• Measures the total amount of dissolved minerals in the water. • Enters the water from natural sources, like rock and soil, but also from human sources, such as landfill run-off and sewage.	• Some minerals in the water are expected and necessary, but when there are too many minerals, they may cause the problems listed in Sections 1, 2, and 3 above. • Colored water. • Salty taste of water. • Causes scale to form in pipes.
Turbidity	• Measures how clear the water is. • Caused by bits of clay, silt, microscopic organisms, and tiny bits of organic and inorganic matter.	• Water looks cloudy or dirty. • May mean there are biological contaminants (like *E.coli*) or bits of rust, dirt, sand, or sediment in the water.

[6] https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_sulfate_healtheffects.pdf

Value Descriptions

A. **Action Level (AL):** The Level of a contaminant that requires action when too high. The concentration of lead or copper which, if exceeded in over 10% of homes tested, triggers treatment and other actions.

B. **Agency for Toxic Substances and Disease (ATSDR) Reference Dose Media Evaluation Guide (RMEG):** The highest amount of a chemical a child can be exposed to in drinking water for more than one year and no harm would be expected. Learn more at https://www.atsdr.cdc.gov/hac/phamanual/appf.html.

C. **ATSDR Registry Environmental Media Evaluation Guide (EMEG):** The highest amount of a chemical a child can be exposed to in drinking water for more than one year and no harm would be expected (health effects other than cancer). Learn more at https://www.atsdr.cdc.gov/hac/phamanual/appf.html.

D. **Department of Environment, Great Lakes, and Energy (EGLE) 201 Cleanup Criteria:** The cleanup criteria are the risk-based screening levels developed by EGLE (formerly Michigan Department of Environmental Quality) for corrective actions. When the Part 201 Criterion for a chemical is an aesthetic level below a health-based value, the health-based value is also provided as a footnote in the document.

E. **U.S. EPA Health Advisory (HA):** The level of a contaminant in drinking water below which no harm is expected during short-term or a lifetime of exposure.

F. **U.S. EPA Maximum Contaminant Level (MCL):** The level of a contaminant not allowed to go over (exceed) in drinking water. This level is set as close to the MCLG (defined below) as feasible and taking cost into consideration.

G. **U.S. EPA Maximum Contaminant Level Goal (MCLG):** The level of a contaminant in water at which no known or expected health problems would occur.

H. **U.S. EPA 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.

I. **U.S. EPA Regional Screening Level (RSL):** The amount of a chemical in drinking water that is not expected to harm a child's health (health effects other than cancer). This is considered protective for adults too. Learn more at https://www.epa.gov/risk/regional-screening-levels-rsls.

J. **U.S. EPA Secondary Maximum Contaminant Level (sMCL**): The level of a contaminant that is recommended but not required to follow. Usually, this value is about the look, taste, and smell of water.

Units of Measurement

- mg/L = milligrams per liter
- µg/L = micrograms per liter
- µmhos/cm = microhos per centimeter
- NTU = Nephelometric Turbidity Units
- SU= Standard Unit