



Minnesota Drinking Water Annual Report for 2021

MAY 2022

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5/2/2022

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Executive Summary

Each year since 1995, the Minnesota Department of Health (MDH) has provided citizens and the United States Environmental Protection Agency (EPA) with a report on the status of public drinking water in Minnesota. This report provides both an assessment of how well public water systems are doing at meeting the standards set in the federal Safe Drinking Water Act and insights about current challenges faced by public water suppliers.

As we issue this report, we are still dealing with the impacts of coronavirus disease 2019 (COVID-19). Our priority has been working with public water systems to keep them up and running as well as in compliance with the Safe Drinking Water Act while keeping our employees and others safe.

Even through the challenge of the pandemic, ongoing attention, investment, and response to new and ongoing challenges to our water resources is needed to maintain an adequate supply of safe water. Sustainable water resources are critical to personal and public health as well as our economy. Protecting water sources, treating water, and testing water after it is treated are part of the multi-barrier approach to assuring an adequate supply of water that is safe to drink.

The monitoring results summarized in this report demonstrate the success of Minnesota's efforts to protect its drinking water. More than 97% of community water systems, and more than 98% of the population served by community water systems, have drinking water meeting all federally established health-based standards.

Protecting and supplying safe water depends on many organizations and individuals. While the Minnesota Department of Health administers and enforces the provisions of the federal Safe Drinking Water Act on behalf of the EPA, we rely on our partners including the state's 6,677 public water systems, as well as others in areas ranging from government to industry to non-profit organizations who take an active role and contribute to this quest.

These partners include everyone, including individual Minnesotans. Everyone plays a part in ensuring safe water. As always, our aim with this report is to provide Minnesotans with a clearer picture of what is done to protect the quality of their drinking water and the success of the efforts to do so.

COVID-19 Impacts and Responses

Keeping safe water flowing has been a critical element of the public health response to the COVID-19 pandemic and has also been important as Minnesota's schools, businesses, and events restarted fuller operations in 2021. Although COVID-19 presented challenges for the duration of the year, MDH's drinking water program continued to adapt and work in collaboration with Minnesota's public water systems to ensure ongoing protection of drinking water statewide.

MDH used enhanced field safety practices for onsite inspections and sample collection (such as use of social distancing, face coverings, and sanitizers) to keep both water system operators and MDH staff as safe as possible. Just as importantly, MDH maintained a high level of communication with water systems, to share recent developments related to COVID-19, to better understand the challenges systems were facing, to safely arrange for site visits, and to provide technical assistance. MDH continued to advise water systems on specific issues related to COVID-19, such as the re-opening of buildings idled during the pandemic, kept an eye on

supply chain issues that could affect water system supplies and chemicals, and met with the EPA, professional organizations, and others to make sure everyone was as well informed as possible regarding COVID-19 impacts on the operation of water systems.

Throughout all of COVID-19's challenges this year, MDH staff were safely able to complete required inspections and sampling, water systems made sure safe water was available, and a continued high level of compliance with state and federal rules was maintained, as described further in this report. Additionally, MDH did not let COVID-19 prevent it from looking ahead to plan for and address upcoming issues and opportunities, including those related to lead, emerging contaminants, infrastructure improvements, health equity, source water protection, water reuse, and more. A number of these initiatives are also further described later in this report.

A Current Profile of Minnesota's Drinking Water Protection Program

The Minnesota Department of Health began as the Minnesota State Board of Health in 1872, largely as a result of waterborne and foodborne diseases. Typhoid fever, a waterborne disease, was taking a significant toll on lives at this time.

Advances in protecting water were rapid; the results were dramatic. By the early 1900s, treatment and disinfection of drinking water resulted in the virtual elimination of waterborne diseases such as cholera, typhoid, dysentery, and hepatitis A.

A century later the importance of safe and sufficient water remains as strong as ever, and the challenges toward achieving this goal emerge in new and different manners.

The passage of the federal Safe Drinking Water Act in 1974 established a national program of regulations and standards covering all public water systems in the United States.

Since 1974, the EPA has been responsible for regulating the nation's public water supply systems, under the federal Safe Drinking Water Act (SDWA). However, almost all states, including Minnesota, have assumed responsibility for enforcing the act within their own borders. Minnesota became one of the first states to achieve primacy, and to begin regulating public water supply systems at the state level, in 1976.

The definition of "public water system" in the Safe Drinking Water Act is broad. To be considered "public," a water supply system must have its own water source and provide water to 25 or more people, or have 15 or more service connections.

Minnesota currently has 6,677 public water systems. Of those systems, 965 are community systems, which provide water to people in their homes or places of residence. Most of these community systems use groundwater from underground sources, tapped by wells, as their source of water. However, 24 of these systems, including the municipal systems that serve the state's largest cities, use surface water drawn from lakes or rivers.

Of the state's 965 community water systems, 730 are municipal systems, serving towns or cities. The rest of the community systems provide water to people in various residential locations, including manufactured home parks, apartment buildings, housing subdivisions, and correctional facilities.

The rest of the state’s 5,712 public water systems are noncommunity systems. Some of these noncommunity systems provide water to an ever-changing “transient” population at places such as restaurants, resorts, and highway rest stops. Other noncommunity systems may provide water to relatively stable population groups in nonresidential locations such as schools, places of employment, and day-care facilities. These facilities are considered nontransient noncommunity public water systems.

The Major Elements of Drinking Water Protection

Three basic strategies are used to safeguard the quality of our drinking water: prevention, treatment, and monitoring.

Prevention

Preventing contamination of the source water used by public water supply systems – lakes, rivers, and water wells – is an important component of drinking water protection. This aspect of drinking water protection includes managing land use, regulating the construction of water treatment facilities, and controlling potential sources of pollution.

- Source Water Protection

Source Water Protection Plans identify the land area that supplies water, assess the vulnerability of that area to contamination, and identify actions to reduce the risk of threats. MDH requires source water protection planning for all community and noncommunity water systems that use groundwater. The Source Water Protection Program has long been engaged in planning for community water systems using groundwater.

MDH is expanding the surface water program to provide more support to systems that use surface water. Planning for systems that use surface water is voluntary. MDH and community water systems (CWSs) have completed several Source Water Assessments and Surface Water Intake Protection Plans. Progress is accelerating, as several communities are currently preparing these plans with MDH and outside contractors.

- Assessing Vulnerability to Contamination

Source water protection activities and monitoring requirements for individual public water systems depend partly on how vulnerable the system is to contamination. MDH does vulnerability assessments of water supply systems, taking into account a number of factors. For groundwater systems, these include well construction, geologic setting, water quality, and well use. High vulnerability conditions lead to more aggressive sampling, monitoring, inspection, and other actions than low vulnerability conditions require.

In general, groundwater systems tend to be less vulnerable to certain types of contamination than surface water systems. Water tends to be naturally filtered as it moves downward through the earth, making its way from the surface to the underground aquifers tapped by water wells. That process can remove certain surface contaminants, including bacteria and parasites such as *Cryptosporidium*. For that reason, many groundwater systems do not routinely include disinfection as part of their normal water treatment procedures.

Treatment

Most community water systems use some form of treatment so the water will be palatable and safe to drink. Many systems require routine disinfection to safeguard against potential problems with bacteriological contamination. Groundwater systems are less likely to require disinfection, because properly constructed wells located in a non-vulnerable aquifer are less susceptible to surface contamination. Surface water systems must provide more extensive treatment, including filtration and disinfection, as surface water supplies can be more susceptible to contamination.

MDH reviews plans for proposed treatment systems to help ensure that they function as intended. MDH staff also provide field and technical assistance – as well as training opportunities – to public water system operators which aids in the ongoing operation and maintenance of treatment and other water system components.

Monitoring

Monitoring is a critical element of compliance activities under the Safe Drinking Water Act (SDWA). Under provisions of the Act, public water systems are required to sample treated – or “finished” – water regularly and submit the samples to the MDH lab for analysis. The samples are tested for a broad range of potential contaminants. If unacceptable levels of contaminants are found, the water supply owner or operator is legally responsible for informing the people who use the water and for taking steps to eliminate potential health hazards.

Under the provisions of the SDWA, the individual public water system is responsible for taking water samples and submitting them to certified laboratories for analysis. To provide for comprehensive surveillance, lessen the burden on water supply operators, promote compliance, and help ensure consistent approaches, most of the required samples in Minnesota are collected by field staff from MDH. As a result, Minnesota’s public water systems have one of the best records in the nation regarding compliance with these sampling and testing requirements.

The next sections of this report provide detail on what is monitored at public water systems in Minnesota and the results of this statewide monitoring in 2021.

Monitoring: What We Test For – and Why

Minnesota’s public water systems are tested for different types of contaminants. The reasons for testing – and how often the testing is done – depend on contaminant type and other factors. The type of contaminant also determines what actions will be taken if unacceptable levels are found in the water.

The major types of contaminants we test for include:

Pesticides and Industrial Contaminants. Minnesota’s water supply systems are routinely tested for more than 100 pesticides and industrial contaminants, including synthetic organic compounds (SOCs) and volatile organic compounds (VOCs). Systems may be tested anywhere from four times a year to once every six years, depending on the specific chemical and the system’s vulnerability to contamination (see *Assessing Vulnerability to Contamination* on page 3). Some systems may not need to do any testing for a particular contaminant. A formal use

waiver is sometimes granted, specifically exempting a water supply system from testing for a particular contaminant, if that chemical or pesticide is not commonly used in the immediate area.

The EPA has developed legal standards known as maximum contaminant levels (MCLs) for 60 of the more common pesticides and industrial contaminants found in drinking water. In addition, advisory standards have been developed for the other pesticides and industrial contaminants, and those are used in the same way as the MCLs in assessing test results.

Any time a public water system exceeds the MCL for one of these contaminants, the water supply operator, with the assistance of MDH, must notify the people who use the water. Appropriate steps are then taken to reduce the contamination.

In some cases, the MCL or advisory standard is calculated to prevent immediate or short-term health effects. However, these standards are often designed to reduce the long-term risk of developing cancer or other chronic health conditions. They are calculated very conservatively. If the concern is long-term health effects, the standards are calculated to keep the risk of illness at levels most people would regard as negligible – even if they drink the water every day, over an entire 70-year lifetime.

Bacterial Contamination. Public water systems serving more than 1,000 people are tested one or more times per month for coliform bacteria. Smaller systems are tested four times a year or annually under certain conditions. The coliform test is used as a general indicator of water quality in the system, regarding potential microbial contamination. If the coliform test is negative, it is an indication that the system is adequately protected against contamination from other types of disease-causing organisms. However, if coliform bacteria are found in the water, it is assumed that the system may be compromised, and steps are taken to protect the people who use the water.

Total coliform bacteria (without the detection of *E. coli*) are generally not harmful. In these cases, the system will identify the source of the contamination, correct the problem, and thoroughly disinfect its system. The public will also be notified of the situation; however, unless unusual circumstances exist to cause particular concern about the safety of the water, a boil water notice would not be issued as it would be if *E. coli* were found.

Nitrate/Nitrite. All public water systems in Minnesota are tested at least once a year for nitrate. This chemical may occur naturally in the environment but that can also enter the water from fertilizer run-off, decaying plant and animal wastes, and sewage. Nitrate is a health concern primarily for infants under the age of six months. This is because the infant's digestive system can convert the nitrate to nitrite, which can interfere with the ability of the infant's blood to carry oxygen. The result is a serious illness known as methemoglobinemia, or "blue baby syndrome." Methemoglobinemia can be fatal if nitrate levels in the water are high enough and the illness isn't treated properly.

The MCL for nitrate in drinking water is 10 parts per million (ppm). If a public water system exceeds the standard, the people who use the water are notified and advised not to use the water for mixing infant formula or other uses that might result in the consumption of the water by infants under six months of age. The advisory is kept in place until steps can be taken to reduce nitrate levels in the water. Possible remedial measures include treating the water to remove the nitrate or drilling a new water well.

Older children and adults are generally not at risk from drinking nitrate-contaminated water. In fact, the average adult consumes about 20-25 milligrams of nitrate per day in food, primarily from vegetables. Because of changes that occur after six months of age, the digestive tract no longer converts nitrate into nitrite. However, some adults – including people with low stomach acidity and people with certain blood disorders – may still be at risk for nitrate-induced methemoglobinemia.

Inorganic Chemicals. Community and nontransient noncommunity water systems in Minnesota are tested for 13 other inorganic chemicals in addition to nitrate. If past results don't indicate the presence of inorganic chemicals, testing is usually done once every nine years; otherwise it may be done as often as once a year. The list includes antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, sulfate, and thallium. In some cases, these chemicals may be naturally present in the groundwater. If a water supply system were to exceed the MCL for one of these chemicals, the people who use the water would be notified, and appropriate steps would be taken to reduce levels of these chemicals in the water.

Radioactive Elements. Community water systems in Minnesota are also usually tested once every three years – or as often as once a year or even quarterly in some cases – for a list of radioactive elements. These radioactive elements, or radiochemicals, are present in the water from natural sources. If a system were to exceed the federal MCL for one of these radioactive elements, the people who use the water would be notified and steps would be taken to correct the problem.

Disinfection By-products. Disinfection rids drinking water of microbiological organisms, such as bacteria, viruses, and protozoa, that can cause and spread diseases. The most common disinfection method is the addition of chlorine to drinking water supplies. Chlorine is effective against waterborne bacteria and viruses in the source water; it also provides residual protection to inhibit microbial growth after the treated water enters the distribution system. This means it continues working to keep the water safe as it travels from the treatment plant to the consumer's tap.

However, even though chlorine has been a literal lifesaver with regard to drinking water, it also has the potential to form by-products that are known to produce harmful health effects. For example, chlorine can combine with organic materials in the raw water to create contaminants called trihalomethanes (THMs) and haloacetic acids (HAAs). Repeated exposure to elevated levels of THMs over a long period could increase a person's risk of cancer.

The formation of disinfection by-products is a greater concern for water systems that contain organics or use surface water, such as rivers, lakes, and streams, as their source. Surface water sources are more likely to contain the organic materials that combine with chlorine to form THMs and HAAs.

All community and nontransient noncommunity water systems that add a disinfectant to the water must regularly test their treated water to determine if THMs and HAAs are present. If the THMs or HAAs exceed the limits set by the EPA, the water system must take action to correct the problem. The corrective actions include notifying all residents served by the water system.

Lead and Copper. All community and nontransient public water systems are tested for lead and copper. In community water systems, the water is tested in a number of homes within each system to determine if it exceeded the federal “action level” of 15 parts per billion (ppb) for lead or 1,300 ppb for copper. If a system exceeds the action level for lead or copper in more than 10 percent of the locations tested, it is required to take corrective action and do further testing. Testing requirements – the number of samples taken and the testing frequency – are based on population, historical results, and if any changes in the source of the water or treatment have occurred.

Lead in drinking water is not an environmental contamination problem in the conventional sense. Water is almost never contaminated with lead at the source or when it first enters the distribution system. However, water can absorb lead from plumbing components used in individual homes. Possible sources of lead contamination include lead pipe, lead plumbing solder, and brass fixtures. Lead exposure is a potentially serious health concern, especially for young children. However, the water must usually be in contact with lead plumbing components for an extended period, usually by standing in the system overnight, before it can absorb potentially hazardous levels of lead.

While most people are subject to lead exposure from a number of possible sources – and drinking water typically accounts for a relatively small proportion of a person’s total lead exposure – it is still a source of lead exposure to control and eliminate. Some Minnesota water supply systems address the issue by treating their water before it reaches a person’s home, making it less likely to absorb lead from plumbing. Removing lead sources, such as lead service lines, is also a meaningful way to reduce lead exposure.

Monitoring Test Results for Calendar Year 2021

This section provides a summary of results of monitoring performed in 2021. In the case of a violation, a water system takes corrective actions. These actions include public notification to inform affected residents of the situation and if there are any special precautions they should take. In all cases noted here, residents were advised directly by the water system at the time the violation occurred. All community water systems have also noted any violations in the annual water quality reports (also called Consumer Confidence Reports) they distribute to their residents.

2021 Monitoring Results for Community Public Water Systems (CPWS) and Noncommunity Public Water Systems (NPWS)

Contaminants	Number of CPWS subject to monitoring	Number of CPWS with violations or ALE ¹ s	Population served by CPWS with violations or ALEs	Percent of CPWS meeting EPA standards	Number of NPWS monitored ²	Number of NPWS with violations or ALEs	Population served by NPWS with violations or ALEs	Percent of NPWS meeting EPA standards
Pesticides and Industrial Contaminants	965	0	0	100.0%	476	0	0	100.0%
Bacteriological	965	1	25	99.9%	5712	13	945	99.8%
Nitrate/Nitrite	965	4	23,417	99.6%	5712	5	635	99.9%
Arsenic	965	7	1,578	99.3%	476	2	75	99.6%
Radionuclides	965	14	35,369	98.5%	N/A	N/A	N/A	N/A
Other Inorganic Chemicals	965	0	0	100.0%	476	0	0	100.0%
Disinfection byproducts ³	573	2	868	99.7%	47	0	0	100.0%
Lead	965	3	2,786	99.7%	476	1	130	99.8%
Copper	965	29	87,784	97.0%	476	4	1495	99.2%

Pesticides and Industrial Contaminants

In 2021, MDH conducted 20,928 tests for pesticides and industrial contaminants in community water systems. No systems violated drinking water standards for these contaminants.

MDH conducted approximately 10,094 tests for pesticides and industrial contaminants in the 476 nontransient noncommunity water systems in the state. No systems violated drinking water standards for these contaminants.

¹ Action Level Exceedance (ALE)

² Some contaminants are tested at all 5,712 noncommunity water systems; others are tested only at the 476 nontransient noncommunity water systems.

³ Disinfection byproducts are only monitored at systems that disinfect their water or purchase disinfected water.

Bacteriological Contamination

One community water system exceeded the standard for bacteriological contamination in 2021. All noncommunity water systems – transient and nontransient – are monitored for bacteriological contamination. There were 13 violations among the 5,712 noncommunity systems. All systems with violations worked with MDH staff to disinfect their systems and retest the water.

Nitrate/Nitrite

Four community systems exceeded the standard for nitrate in 2021. Five noncommunity systems (transient and nontransient) exceeded the standard for nitrate in 2021. These systems notified the people who used the water, offering bottled water to those with infants, while working with MDH staff to remedy the problems.

Arsenic

Seven community water systems and two noncommunity water systems exceeded the standard for arsenic by the end of 2021.

Although residents were notified of the situation, no restrictions were placed on water consumption. Residents were told that this was not an emergency and were advised to consult with their doctors if they had any special concerns. Each of these systems has begun the process to meet the maximum contaminant level. Examples of actions systems may take include researching, starting, or completing approved infrastructure or operational changes.

Other Inorganic Chemicals

No community or noncommunity water systems exceeded the standard for other inorganic chemicals in 2021.

Radioactive Elements

Radiation occurs naturally in the ground, and some radioactive elements may work their way into drinking water. Fourteen community water systems exceeded the standard for radium 226 & 228 and/or gross alpha emitters by the end of 2021.

Although residents were notified of the situation, no restrictions were placed on water consumption. Residents were told that this was not an emergency situation and were advised to consult with their doctors if they have any special concerns. These systems have either started or completed infrastructure changes or are studying alternatives to meet the maximum contaminant level.

Noncommunity water systems are not regulated for radioactive elements.

Disinfection By-products

Two community water system and no noncommunity water systems exceeded the standard for disinfection by-products in 2021. The two affected systems are working to reduce the concentrations of disinfection by-products.

Lead and Copper

As a result of the Lead and Copper Rule, implemented by the EPA in 1991, community water systems began sampling for lead and copper in 1992. Monitoring for lead and copper is done in individual homes and on a case-by-case basis. Samples are taken under worst-case conditions, including taking them after the water has been idle in the pipes, which could result in higher levels. If more than 10 percent of the homes sampled in a community are above the action level (15 parts per billion for lead and 1,300 ppb for copper), the water system will be in exceedance and must take corrective actions and begin an ongoing public education program. The actions include corrosion control measures, such as adjusting water chemistry to make it less corrosive or less likely to absorb lead and/or copper from the plumbing. Replacement of lead service lines – which connect water mains to household plumbing – is another means of reducing levels.

In 2021, three community systems exceeded the lead action level, and 29 community systems exceeded the copper action level; one noncommunity system exceeded the lead action level, and four noncommunity systems exceeded the copper action level. These systems are exploring options for getting back into compliance and conducting a public education program. The Minnesota Department of Health continues to work with these systems and has been doing its own education campaign since the early 1990s with information about lead and copper and simple precautions, such as flushing faucets when the water hasn't been used for several hours, people can follow to reduce their exposure. All community water systems also issue an annual water quality report (known as a Consumer Confidence Report), which has the results of testing done in the previous calendar year.

Strategic Initiatives

Even as MDH works to address current issues with our state's public water systems, it also has an eye on future challenges. Summarized here are some of the strategic initiatives taken in 2021, and which will continue in years to come, to best position Minnesota to continue to have a safe, abundant supply of drinking water

Contaminants of Emerging Concern

MDH ensures the safety of drinking water is by addressing risks from contaminants of emerging concern (CECs). CECs are often unregulated or are regulated at a level that may no longer be considered adequately protective of human health. CECs may be human-made or naturally occurring, such as bacteria, viruses, and protozoa. MDH has many monitoring, policy, and communications projects to address CECs in drinking water. These projects include the Water Reuse project and Statewide PFAS Monitoring Project, which have received funding from Clean Water Fund.

Cyanazine

MDH is working with the Minnesota Department of Agriculture (MDA) to sample community and noncommunity water systems for cyanazine and its degradates based on nearby agricultural activities. Cyanazine is a pesticide that was mainly used on corn crops until it was banned in 2002. Consuming water with elevated levels of total cyanazine (cyanazine plus its degradates) can present a health risk.

When MDA finds elevated levels of cyanazine in its Private Well Pesticide Sampling Project, MDH identifies nearby public wells that may also be affected. MDH coordinates with nearby public water systems to test for total cyanazine and identify any potential health risks for consumers.

PFAS

In 2021, MDH continued testing drinking water across Minnesota for per- and polyfluoroalkyl substances (PFAS) through the Statewide PFAS Monitoring Project. PFAS are a family of human-made chemicals that have been widely used for decades. PFAS are extremely stable and do not break down in the environment. The Statewide PFAS Monitoring Project aim is to evaluate whether Minnesotans are exposed to PFAS at levels above health-based guidance values in drinking water.

Preliminary findings from the project show that some PFAS are commonly found at low levels in Minnesota drinking water. PFAS are typically found at levels below health-based guidance values in drinking water. The project has rarely found elevated PFAS in drinking water outside of communities with contaminated sites.

EPA has announced that it will develop MCLs for two PFAS, perfluorooctanoic acid (PFOS) and perfluorooctanesulfonic acid (PFOA). EPA plans to release their proposed MCLs for PFOS and PFOA in the fall of 2022 and final MCLs in the fall of 2023. The announcement about upcoming MCLs reinforces the importance of testing drinking water to protect consumers from the health risks of PFAS exposure. Through the Statewide PFAS Monitoring Project, Minnesota's public water systems will be well-prepared for the new MCLs.

MDH has a goal to sample all community water systems (CWSs) for PFAS. Thanks to the support of CWSs participating in the Statewide PFAS Monitoring Project, MDH made significant progress toward this goal in 2021 and is projected to reach the goal in 2023. Funding for the Statewide PFAS Monitoring Project has come from the Minnesota Clean Water Fund.

Unregulated Contaminants

MDH has several monitoring projects to address unregulated contaminants in drinking water. In the past, projects to test for unregulated contaminants have generally been standalone efforts. MDH is in the process of creating a Drinking Water Ambient Monitoring program, which will serve as an umbrella for special monitoring projects, such as cyanazine and PFAS sampling.

Sampling under the Drinking Water Ambient Monitoring Program will help characterize water quality conditions in drinking water sources. It can also assess and evaluate risks in areas that are geologically vulnerable to or potentially impacted by sources of contamination. This program will help MDH and public water systems anticipate potential threats from unregulated contaminants and will inform future source water protection efforts.

Lead and Copper

The EPA released the final version of the Lead and Copper Rule Revisions (LCRR) in December, the first major update to the Lead and Copper Rule in nearly 30 years. The LCRR is designed to support near-term actions with the EPA also announcing a series of enhancements it envisions over the next few years. The focus of the Lead and Copper Rule Improvements (LCRI) include replacing all lead service lines and more equitably protecting public health by prioritizing communities historically underserved communities.

The LCRR requires public water systems to identify and make public the locations of lead service lines by developing lead service line (LSL) inventories by October 16, 2024 (and the current LCR will be in effect until then). It is also establishing a trigger level of 10 parts per billion (the lead action level is 15 ppb) that requires systems that already have corrosion control to re-optimize their treatment and for systems without corrosion control to conduct a corrosion control study to identify the best treatment approach. MDH, which has seen few exceedances of the lead action level in recent years, plans to reach out to systems approaching 10 ppb to help head off exceedances.

Lead Service Line Replacement

MDH estimates that there are more than 100,000 lead service lines in the state. Typically, a city owns the portion of pipe that extends from the water main to the edge of private property. The property owner is responsible for the costs of the service line from that point into the home.

Cities such as St. Paul have replaced their portion of lead service lines while giving property owners the chance to replace their portions simultaneously. Having the entire service line – from the water main into the home – replaced all at once resulted in lower costs for the private section of the line; however, only a small percentage of homeowners took advantage of the opportunity. More recently, in early 2022 the St. Paul Regional Board of Water Commissioners is developing a plan to replace all lead service lines over the next 10 years.

Research conducted by MDH and the University of Minnesota found that removing lead from service lines and other pipes will result in long-term monetary benefits derived from enhanced mental acuity and IQ in children as a result of reduced exposure to lead. The researchers estimated that increased productivity from improved mental acuity and IQ could yield a return of \$2.60 for every \$1 invested.

Funding of Lead Service Line Replacement

With the recent passing of the Infrastructure Investment and Jobs Act, a large influx of federal dollars will be coming to Minnesota for lead service line replacement. All LSL replacement funding will be channeled through the Drinking Water Revolving Fund (DWRf). Currently, grant funds are available to replace the privately-owned portion of an LSL. State legislative changes are being proposed to allow the grant funds to be used for LSL replacements regardless of ownership. As of now, the federal dollars would be limited to a 49 percent grant and 51 percent below-market-rate loan through DWRf.

Lead Testing in School and Child Care Settings

In 2017, state legislation was passed to require school districts and charter schools to test for lead in drinking water. MDH and the Minnesota Department of Education created a model plan that schools can use for testing for lead in their buildings. There are no requirements for child-care providers to test for lead in drinking water.

MDH has a lead in drinking water testing program to provide free sample kits and laboratory analysis to eligible schools and child care services. MDH will also help provide education and outreach to these facilities.

Resiliency/Climate Change

Climate change and extreme weather events can create challenges for public water systems. Heavy precipitation and flooding events can cause damage to infrastructure and increase the risk of drinking water contamination. Drought can also stress the water supply. These weather events can create new problems and worsen existing problems for public water systems. Climate resiliency means being able to anticipate, prepare for and respond to issues related to climate change.

One way that MDH is addressing climate change is through assessing and monitoring the safety and resiliency of surface water drinking water sources. Intense rainfall events can cause short-term changes in surface water quality parameters such as flow, nitrate levels, and total suspended solids. These fluctuations can create challenges for public water system operations. Through source water protection planning, MDH and communities identify potential threats to the source, forecast potential impacts from climate change, outline monitoring needs, and plan activities to evaluate and mitigate risks.

Water Reuse

Water reuse will be an increasingly important strategy to manage Minnesota's water resources as demands on our water supplies continue to grow due to population increases, urbanization, climate change, increased irrigation, and industry growth. Stormwater runoff from land surfaces and rainwater from roofs can be collected in ponds or cisterns, treated, and reused. Using this collected stormwater water for irrigation or washing vehicles has potential benefits. However, stormwater has been found to often contain bacteria, viruses, or protozoan pathogens that can make people sick.

MDH evaluated the safety of selected Minnesota stormwater reuse systems and released a White Paper outlining the public health perspective and implications of water reuse. The paper, [Reuse of Stormwater and Rainwater in Minnesota \(PDF\)](https://www.health.state.mn.us/communities/environment/water/docs/cwf/wpwaterreuse.pdf) (<https://www.health.state.mn.us/communities/environment/water/docs/cwf/wpwaterreuse.pdf>) outlines interim recommendations for those currently implementing the reuse of stormwater to consider.

Health Equity

The Minnesota Department of Health, through its Drinking Water Protection (DWP) program, works to promote safe and sufficient drinking water distribution for everyone, everywhere in Minnesota. As a result, Minnesota is among the top three states nationally in overall SDWA compliance rate. In addition, MDH supported water systems with the Drinking Water State Revolving Fund (DWSRF) and the Source Water Protection (SWP) Grants. The funding process is done with health equity indicators to assist public-owned water systems with infrastructure and improvement projects to help protect public health. DWP also provides technical assistance to support health equity and maintain compliance, particularly for small, noncommunity, and nonmunicipal systems.

Even though current initiatives are closing the water inequity gap, it is essential to recognize ongoing water equity challenges.

In Minnesota, some small water systems serving low median household income populations struggle with water quality violations. These small systems face numerous challenges pursuing water infrastructure funding, such as limited administrative capacities and limited ability to provide matching funds. Inability to invest in water supply systems, improve coverage, and provide access to safe water results from this limited access to funding and the amount of funding they can receive. They also struggle to replace retiring water operators and expand their workforce.

Improving the health of populations includes strengthening the current initiatives and implementing new opportunities to provide equitable water access. DWP will seek to promote and implement some possible initiatives in collaboration with its partners, including:

- **Restructuring of funding requirements** to provide flexibility for small systems servicing marginalized populations.
- **Consumption at the tap:** Prioritizing lead service line replacement in low-income areas.
- **Communication:** Revising public notices to reflect health equity and empower people to act and provide translations.
- **Scholarships,** training, and educational opportunities are available to promote a diverse workforce in the water sector.

For More Information

Detailed Violation Report Available: This annual report has provided an overview of monitoring results and health-related water quality violations in Minnesota in 2021. In addition, a report that lists all violations of the Safe Drinking Water Act in Minnesota for calendar year 2021 is available from the Drinking Water Protection Section, Minnesota Department of Health, Box 64975, St. Paul, MN 55164-0975, 651-201-4700, health.drinkingwater@state.mn.us. The detailed report includes information about violations of National Primary Drinking Water Regulations including the following:

- Maximum contaminant level (MCL) violations
- Maximum residual disinfectant level (MRDL) violations
- Treatment technique requirement (TT) violations
- Significant monitoring and reporting requirements (M/R) violations
- Significant monitoring requirement (M) violations
- Significant reporting requirement (R) violations
- Variances and exemption violations
- Recordkeeping violations
- Significant public notification requirement violations
- Significant consumer confidence report (CCR) notification requirement violations

Consumer Confidence Reports: Individual community water systems produce an annual report listing contaminants that were detected, even in trace amounts, during the previous calendar year. This is called a Consumer Confidence Report. Please contact the individual water system or visit [Consumer Confidence Reports](https://www.health.state.mn.us/communities/environment/water/com/ccr.html) (<https://www.health.state.mn.us/communities/environment/water/com/ccr.html>) if you would like a copy of this report.

Partners

We acknowledge the many citizens, professionals, organizations, and agencies that work to protect and restore our water resources and provide safe drinking water to Minnesota citizens. Some areas in Minnesota have aquifers so pristine that at this time they require no treatment to provide safe drinking water. However, our ground and surface waters can be contaminated both by natural processes and by our human activities, and demand for water keeps increasing across Minnesota. It is because of the work of these people as individuals and as members of businesses, organizations, and government agencies that anywhere in Minnesota, citizens can feel confident that the drinking water provided by public water supplies meets all federal drinking water standards.

Our thanks to:

Minnesota Rural Water Association
 Water Bar
 American Water Works Association and its Minnesota Section
 Local government staff including counties, townships, and municipalities
 Nonmunicipal public water system staff and operators
 Landowners
 Business and industry owners
 Food, beverage, and lodging facilities owners and staff
 Manufactured housing development operators
 Schools and churches
 Treatment and correctional facilities
 Minnesota Board of Water and Soil Resources
 Minnesota Pollution Control Agency
 Minnesota Department of Natural Resources
 Minnesota Department of Agriculture
 Metropolitan Council
 Environmental Quality Board
 Minnesota Clean Water Council
 Public Facilities Authority
 H2O for Life
 U. S. and Minnesota Geological Survey
 Minnesota Ground Water Association
 Minnesota Water Well Association
 Minnesota Clean Water Land and Legacy Amendment
 Suburban Utility Superintendents Association
 Water Resource Programs at Vermilion Community College, St. Cloud Technical
 and Community College, the University of Minnesota, and St. Paul College
 Association of State Drinking Water Administrators
 U. S. Environmental Protection Agency
 ...and many more!

Safe Drinking Water Is Everyone's Job

