DEPARTMENT OF HEALTH
MINNESOTA DRINKING WATER PROTECTION

Minnesota Drinking Water Annual Report for 2022

STATUS OF PUBLIC DRINKING WATER SYSTEMS AND STRATEGIC INITIATIVES

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Executive Summary

Maintaining an adequate supply of safe drinking water requires attention, investment, and responses to new and ongoing challenges. 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.

Communication is also a critical component in this process. 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. In addition, community water systems also issue reports (called Consumer Confidence Reports) to their residents each year.

The monitoring results summarized in this report demonstrate the success of Minnesota's efforts to protect its drinking water. Nearly 98 percent of Minnesotans drinking water from a community public water system received water that met all federal health-based standards throughout the year.

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 6,649 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.

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. 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, climate resiliency, and more. A number of these initiatives are further described later in this report.

A Current Profile of Minnesota's Drinking Water Protection Program

MDH 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.

More than 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 6,649 public water systems. Of those systems, 964 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, 22 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 964 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 5,685 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 source 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 water regularly and submit the samples for analysis to the MDH lab or other MDH-accredited labs. 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 2022.

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 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 a similar 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 or eliminate 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 these contaminants 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 and must notify 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. Accelerating efforts to remove lead service lines is discussed later in this report.

Monitoring Results for Calendar Year 2022

This section provides a summary of results of monitoring performed in 2022. In the case of a violation, a water system must take 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 also communicate any violations in the annual water quality reports (also called Consumer Confidence Reports) they distribute to their residents by July 1 each year.

2022 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	964	0	0	100.0%	470	0	0	100.0%
Bacteriological	964	1	25	99.9%	5,685	11	1,197	99.8%
Nitrate/Nitrite	964	2	105	99.8%	5,685	11	1,920	99.9%
Arsenic	964	8	1,821	99.2%	470	2	55	99.6%
Radionuclides	964	11	33,769	98.9%	N/A	N/A	N/A	N/A
Other Inorganic Chemicals	964	0	0	100.0%	470	0	0	100.0%
Disinfection byproducts[3]	573	3	1,578	99.7%	47	1	200	97.9%
Lead	964	1	3,616	99.9%	470	1	100	99.8%
Copper	964	20	67,061	97.9%	470	10	1,955	97.9%

Pesticides and Industrial Contaminants

In 2022, MDH conducted 16,696 tests for pesticides and industrial contaminants in community water systems. No systems violated drinking water standards for these contaminants.

MDH conducted approximately 8,863 tests for pesticides and industrial contaminants in the 470 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 5,685 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 2022. All noncommunity water systems – transient and nontransient – are monitored for bacteriological contamination. There were 11 violations among the 5,685 noncommunity systems. All systems with violations worked with MDH staff to identify and make any corrections needed, disinfect their systems, and retest the water.

Nitrate/Nitrite

Two community systems exceeded the standard for nitrate in 2022. Eleven noncommunity systems (transient and nontransient) exceeded the standard for nitrate in 2022. 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 through steps such as installing treatment or using a new water source. No systems exceeded the standard for nitrite in 2022.

Seventy community systems participated in an ongoing nitrate source water monitoring program in 2022. Their source water is sampled prior to any treatment and before the water is distributed to customers. Of these 70 systems, 10 had raw, untreated water above the standard for nitrate. The information collected in the program is used to help systems reduce nitrate levels in their source water.

Arsenic

Eight community water systems and two noncommunity water systems exceeded the standard for arsenic by the end of 2022.

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, including evaluating treatment options and finding other water sources. 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 2022.

Radioactive Elements

Radiation occurs naturally in the ground, and some radioactive elements may work their way into drinking water. Eleven community water systems exceeded the standard for radium 226 & 228 and/or gross alpha emitters by the end of 2022.

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. In a number of cases, previously installed treatment is now reaching the end of its useful life and must be replaced to maintain reduction of radioactive elements.

Noncommunity water systems are not regulated for radioactive elements.

Disinfection By-products

Three community water system and one noncommunity water system exceeded the standard for disinfection by-products in 2022. The 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 2022, one community systems exceeded the lead action level, and 20 community systems exceeded the copper action level; one noncommunity system exceeded the lead action level, and 10 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 pursued in 2022, 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 contaminants that have been newly discovered in the environment or are generating increased interest because of new scientific information about its health or environmental effects. CECs can be naturally occurring or human made. MDH has many monitoring, policy, and communications projects to address CECs in drinking water. For a list of current projects, see the CEC Project Inventory (PDF).

Drinking Water Ambient Monitoring Program

MDH is creating a new program to advance scientific study of contaminants in drinking water sources. The Drinking Water Ambient Monitoring Program will proactively test for CECs and other priority contaminants in drinking water sources such as aquifers, lakes, and rivers. The program builds upon MDH's Unregulated Contaminant Monitoring Project, which tested for CECs in drinking water sources across the state.

Ambient drinking water monitoring will complement MDH's routine compliance monitoring to evaluate potential health risks from known or emerging contaminants of interest. Additionally, MDH will use the data from this program to better characterize potential sources, pathways, and timing for contamination to reach groundwater and surface water drinking water sources.

Information about CEC detections in drinking water sources will help inform priorities for future drinking water monitoring; development of health-based guidance; risk management; and management of aquifers at a watershed-scale for Drinking Water Supply Management Areas and private well users. The Drinking Water Ambient Monitoring Program is supported by the Minnesota Clean Water Fund, which was established by the 2008 Clean Water, Land and Legacy Amendment.

Per- and polyfluoroalkyl substances (PFAS)

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. In 2023, MDH will complete an initiative to sample all community water systems in Minnesota for PFAS. This sampling has taken place from 2021 to 2023 through the Statewide PFAS Monitoring Project. This project aimed to evaluate whether Minnesotans are exposed to PFAS at levels above health-based guidance values in drinking water. MDH has made sampling results publicly available on the Interactive PFAS Dashboard for Drinking Water, which was released in 2022. Funding for the Statewide PFAS Monitoring Project has come from EPA and the Minnesota Clean Water Fund.

EPA released draft MCLs for two PFAS in March 2023, perfluorooctanoic acid (PFOS) and perfluorooctanesulfonic acid (PFOA). EPA is also proposing an enforceable limit for four PFAS (PFBS, PFHxS, GenX and PFNA) that would be evaluated in combination with each other using an approach called a Hazard Index. A hazard index is calculated by comparing a measured drinking water value with a standard. EPA plans to release the final rules by the end of 2023 or early 2024.

Testing results from statewide sampling show that some PFAS are commonly found at low levels in Minnesota drinking water. Most systems have PFAS levels below the draft MCLs and

health-based guidance values in drinking water. In Minnesota, elevated PFAS levels in drinking water are rarely found outside of communities with contaminated sites.

PFAS: Cities in Action

Some cities have installed or are installing treatment for PFAS, including Bemidji and Woodbury.

Bemidji

The northern Minnesota city of Bemidji had historically used aqueous film-forming foam (AFFF), which contain PFAS, in firefighting training at its airport, adjacent to the city's water treatment facility and wells. In 2015 PFAS was detected in its wells. With stricter health-based guidance values being developed, the wells exceeded the values. The city examined response options and settled on a new plant using granular activated carbon (GAC) to remove PFAS. The facility (shown in the picture) was completed in March 2021. In addition to removing PFAS from the water, the new facility is keeping the plume from migrating to private wells to the east.

In the summer of 2022, the city began a second phase of construction to increase the capacity of the plant. The expansion is being funded with $10.2 million that Bemidji received from a state bonding bill passed in 2020. In addition to the bonding bill, the city received $12 million from a settlement with the 3M Corporation, which manufactured the PFAS contaminants. This money will be used for maintenance and operation for the next 50 years.

Woodbury

While Bemidji encountered PFAS through firefighting training, the east-metro suburb of Woodbury is in the heart of an area where the 3M Company manufactured and disposed of PFAS wastes.

The state of Minnesota and neighboring communities have coordinated efforts with 3M on water quality monitoring, disposal site remediation, and drinking water treatment solutions. In February of 2018 3M and the state reached an agreement for 3M to pay approximately $700 million towards drinking water treatment and potential PFAS mitigation efforts in the area.

To deal with the PFAS situation, Woodbury made short- and long-range plans for a water treatment facility. In 2020, a temporary plant was constructed in the central part of the city to treat the water using granular-activated carbon. The temporary facility will operate until a permanent plant, anticipated to be mostly financed by funds available from the 3M settlement, is constructed in the next five years.

Under different agreements and arrangements than the February 2018 settlement, other cities have received money from 3M. They include the east-metro suburb of Oakdale. 3M conducted a pilot study using GAC filters to remove PFAS and eventually built a facility to treat the water from two of Oakdale's wells.

Lead and Copper

The EPA published the final version of the Lead and Copper Rule Revisions (LCRR) in January 2021, 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. Since the publication of the EPA's Lead and Copper Rule Revisions in 2021, the Minnesota Department of Health has been working to prepare for the new rule requirements internally on a state implementation level as well as working with systems to incorporate new practices that will align with the requirements of the revisions once they are formally enforced on a federal level.

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 establishes a new trigger level of 10 parts per billion (the lead action level would remain at 15 ppb) that requires systems already having 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. EPA is also plans to release a successor the LCRR in 2023, termed the Lead and Copper Rule Improvements (LCRI). MDH will keep a close eye on the development and release of the LCRI and will work with Minnesota's water system to help them meet LCRI requirements.

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.

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.

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.

Statewide, efforts are underway to identify all lead service lines as required under the LCRR and to provide funding aid for service line replacement, as is discussed later in this report.

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.

In addition, MDH has a drinking water testing program to provide free sample kits and laboratory analysis to eligible schools and child care services. MDH also helps provide education, outreach, and technical assistance to these facilities. Starting in 2023, MDH also has added contractor services to help schools and child cares with sample collection.

Numerous other efforts to reduce lead in drinking water at schools and child cares are currently being considered at the state level. Legislative proposals in 2023 include a trigger level of 5 parts per billion for remediation, requirements for reporting results to parents, and an advisory group to evaluate the best way for schools to centrally report results to MDH for public display.

Infrastructure Needs

The federal Infrastructure Investment & Jobs Act (IIJA), also referred to as the Bipartisan Infrastructure Law, provides five years of infrastructure funding. This funding will be delivered through Minnesota's Drinking Water Revolving Fund (DWRF), which is jointly administered by MDH and the Public Facilities Authority.

Through the IIJA, the DWRF will receive supplemental base program funding. There will also be dedicated funding sources for inventory and replacement of lead service lines as well as management of emerging contaminants.

The chart below represents the associated funding amounts for the first of five years of funding.

Funding of Lead Service Line Replacement

The IIJA will provide federal dollars for LSL replacement in Minnesota. In order to receive funding for LSL replacements, water systems must apply to the DWRF. Currently, grant funds are available for 50 percent of the private line replacement costs. The state legislature is considering additional funding for LSL replacement but the legislative bills have not been finalized as of the publication of this report.

Resiliency/Climate Change

Recent climate change is resulting in warmer temperatures and changing precipitation. These changes are causing changes in air quality, weather patterns, water quality and quantity, and

ecosystems which, in turn, are leading to more air pollution, extreme heat, floods, drought, and ecosystem threats. 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 ones for public water systems. Climate resiliency means being able to anticipate, prepare for, and respond to issues related to climate change.

MDH established a climate workgroup to advance climate resiliency for Minnesota's drinking water. The group will work with public water systems with a focus on extreme weather and its impacts along with creating resiliency for Minnesota public water systems. Staff from MDH's Drinking Water Protection Section will be advocates in helping public water suppliers and resource partners identify the impacts extreme weather on drinking water.

MDH is also engaged in climate resiliency through the State Water Plan, including activities to assess social and health impacts of our changing waters. Along with other state and local partners, MDH will help enact the state Climate Action Framework to ensure the health, well-being, and resiliency of communities in the face of climate change.

MDH has a webpage about climate change and its impacts on water at https://editwww.web.health.state.mn.us/communities/environment/water/tenstates/boardcommtt.html.

Health Equity

Access to clean, affordable water is a human right. It is also a social determinant of health that, when unrealized, compounds environmental and economic disadvantages to weaken immunity and exacerbate health conditions. The Minnesota Department of Health (MDH), through its Drinking Water Protection (DWP) Section, works to promote safe and sufficient drinking water distribution for everyone everywhere in Minnesota. DWP's strategic visioning approach to health equity focuses on funding, water infrastructure, and promising practices.

Funding

The diversity in our state is expanding, and understanding Minnesota's history and demographic landscape is crucial to advancing equitable access to drinking water, especially for vulnerable communities. DWP has developed funding processes that help direct resources to communities with the greatest need. As a result, we have seen a number of small water systems serving low median household income populations that struggle with water quality violations receiving funding to improve their drinking water.

Source Water Protection Grants

One of the ways MDH provides support and assistance to small systems is through source water protection grants. These grants are awarded for activities that help protect and secure their drinking water supply. While the grant awards are modest, they can make a significant difference for systems. For example, Battle Lake Mobile Home Park is a geologically vulnerable system that started seeing elevated nitrate levels in one of their wells. They drilled a deeper well, but over time, the nitrate levels started increasing again. The system consulted with a well driller and MDH, who suggested that holes in the casing of the contaminanted well were allowing the nitrate-laden water to flow to the newer, deeper well. Battle Lake Mobile Home

Park was awarded a SWP Grant to seal the old well and saw a dramatic drop in their nitrate levels. Battle Lake was awarded a health equity point in the grant scoring for being under the county median household income (MHI) and would not have been able to seal the well without the SWP Grant funds. This grant award helped ensure that the system will have safe drinking water for years to come.

Looking at the 2022 source water protection (SWP) Grants, of the 147 grant awards, 112 grant recipients (76%) received the health equity point. St. Louis, Stearns, and Pipestone Counties had the highest number of grant awards with the health equity point.

Drinking Water Revolving Fund

DWP also targets assistance to disadvantaged public water systems through the Drinking Water Revolving Fund (DWRF), DWP provides funding consisting of a combination of principal-forgiveness grants and below-market-rate loans to communities which otherwise lack the resources to complete a needed project.

One of the success stories is the funding infrastructure improvements received by the city of Askov to address ongoing Maximum Contaminant Levels (MCL) violations for disinfection by-products. Askov, with a population of 364, was the highest-ranked project on the state's DWSRF Intended Use Plan that meets the grant criteria of being underserved and small or disadvantaged. With its median household income (MHI), the city met Minnesota's affordability threshold for disadvantaged communities. The affordability criteria take the drinking water system's annual expenses and compare that total to the city's current MHI of $37,500. The system is considered disadvantaged if the yearly expenses exceed 1.2% of MHI. In 2020, the city of Askov was awarded $1,395,467 for the construction of two wells and the rehabilitation of the drinking water treatment facility.

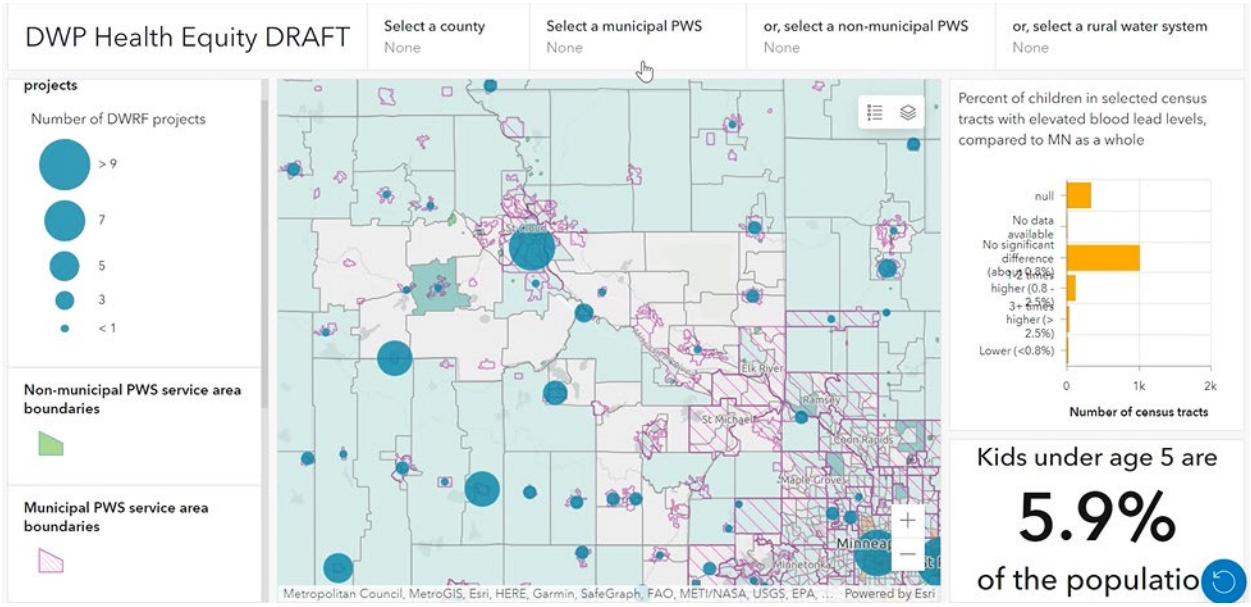
Promising Practices

The DWP Health Equity Workgroup

Created in September 2022 to explore pathways to a more equitable water future, the DWP Health equity workgroup is engaged to help advance health equity by identifying challenges and barriers within the drinking water sector and working towards sustainable solutions. The health equity workgroup is engaged in implementing a range of activities such as reviewing the definition of a disadvantaged community, developing a Lead Service Line Replacement Planning tool, developing a GIS application with public system service area boundaries (described below), enhanced community engagement, and more.

Using GIS Applications

Utilizing the power of geospatial technology, the in-development health equity geographic information system (GIS) tool will help DWP to visualize public water system service area boundaries and socioeconomic/environmental areas of concern. This provides a means of understanding spatial patterns and relationships to assist MDH in identifying areas of need within the state.



Example visual from draft GIS application for health equity analysis

MDH will continue to help communities with the greatest need access funds by improving technical assistance, increasing the amount of fully subsidized service, and prioritizing projects in high-poverty and historically underinvested communities. Advancing water equity is not a one-year project but a generational commitment that will require sustained leadership and partnership with all communities.

For More Information

Detailed Violation Report Available: This annual report provides an overview of monitoring results and health-related water quality violations in Minnesota in 2022.

In addition, a report listing all violations of the Safe Drinking Water Act in Minnesota for calendar year 2022 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) 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
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

CLEAN WATER LAND & LEGACY AMENDMENT