

Minnesota Drinking Water Annual Report for 2018

MAY 2019



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Executive Summary

Any discussion of Minnesota’s drinking water must start with the observation that our public water systems provide very safe water. In 2018, more than 99 percent of Minnesotans drinking water from a public water system received water that met all federal standards throughout the year. This achievement is the product of generations of hard work and smart investment.

However, some parts of the state struggle to have enough water to meet the demands of their communities. Contaminants such as nitrate, bacteria, and arsenic continue to pose problems. And there are always challenges on the horizon, such as addressing new threats to drinking water, including pharmaceuticals and harmful algal blooms. The Minnesota Department of Health (MDH), public water systems, and other partners are actively engaged to identify, prevent, and resolve challenges to drinking water.

Our annual drinking water report, which we have been publishing for nearly a quarter-century, explains the issues that have been and will remain at the forefront of our efforts, as well as the work we do to maintain safe drinking water.

This report addresses:

- How we protect source water - the first step in providing safe drinking water - with a success story about source water protection in southwest Minnesota;
- Our efforts to educate Minnesotans about drinking water through exhibits, institutes for teachers, and interaction with citizens at places such as the State Fair;
- Training we provide to make sure there are qualified and licensed operators at water treatment plants;
- How we assist individual water systems, with on-site consultation as well as proactive approaches, such as reviewing plans for water facilities;
- Results from tests of drinking water showing that water from a public water system is more thoroughly tested and closely regulated than water from any other source, including bottled water;
- How we anticipate and develop responses to threats to drinking water, including aging infrastructure and contaminants of emerging concern; and
- How we fund projects through grants and below-market-rate loans to allow water systems to maintain compliance with the federal Safe Drinking Water Act.

Nearly 80 percent of Minnesotans receive their drinking water from public water systems, while others use private wells. The Minnesota Department of Health (MDH) assists nearly 6,800 public water systems by providing or overseeing water monitoring and inspection services and helping systems prevent, find, and correct problems. MDH also helps systems plan for protection of the lakes, rivers, watersheds, and underground aquifers from which we get our drinking water. MDH has authority for these activities under the federal Safe Drinking Water Act and Minnesota statutes and rules.

Funding for these activities is provided by the U.S. Environmental Protection Agency (EPA), Minnesota’s Safe Drinking Water (service connection) Fee, and the Clean Water Fund, which was created by Minnesota’s 2008 Clean Water, Land and Legacy constitutional amendment.

A Letter from the Manager

Greetings,

I am honored to have become manager of one of the top drinking water programs in the United States, a prestigious group with a history going back to the 1970s, when Minnesota took over the administration and enforcement of the federal Safe Drinking Water Act from the Environmental Protection Agency. I started in this position in November 2018, having been at the Minnesota Pollution Control Agency (MPCA) for the prior two decades.

During my time at MPCA I was always in close contact with MDH, starting when I was a hydrologist in the state's Rochester district office, alongside staff in the MDH drinking water program. Protecting the environment and water sources, a key part of my career at MPCA, ties in with our mission of ensuring that drinking water is safe for everyone, everywhere in Minnesota.

Since 1995, we have been providing a yearly report, sharing information on how we ensure Minnesotans have a reliable and sustainable supply of water that is safe to drink. Much of this involves working with our partners, including the nearly 6,800 public water systems in the state, as well as anticipating and addressing ongoing challenges.

We have many success stories and highlights, some of which you will read about in this report. Our engineers and public-health sanitarians are in regular contact with a wide range of partners to assist in protecting drinking water, and will continue to actively communicate with the public in many ways.

Continue to enjoy and celebrate the great drinking water we have in Minnesota, and please keep in mind all that needs to be done to keep it this way. Together we can ensure that future generations have safe, reliable, affordable drinking water.

Sandeep Burman
Manager
Section of Drinking Water Protection
Minnesota Department of Health

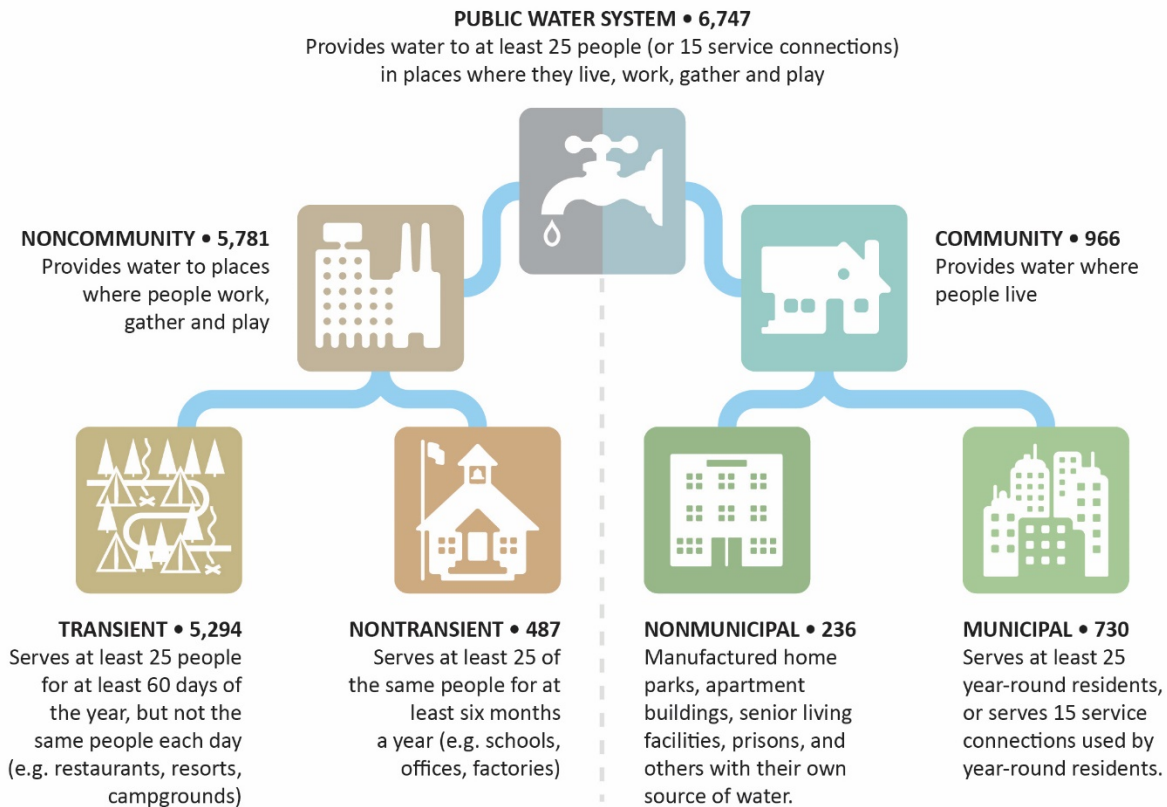
Program Overview

The Minnesota Department of Health (MDH) is responsible for enforcing the federal Safe Drinking Water Act and safeguarding the quality of drinking water in our state. This includes regulating 6,747¹ public water systems statewide, including community and noncommunity water systems, as shown in Figure 1.

In Minnesota, 966 community water systems provide drinking water to people in their homes. The community systems include 730 municipal systems serving towns or cities. The others serve such places as manufactured housing developments, nursing homes, and housing developments that are not connected to city water and that have their own water source. A water source can be a well, lake, or river.

Another 5,781 public water systems in the state serve water to people in places other than their homes. Known as noncommunity water systems, these include schools, factories, resorts, parks, churches and highway rest stops that have their own water source.

Figure 1. Public Water System Classifications



¹ The numbers in this section come from [Minnesota Drinking Water by the Numbers for FY2019](https://www.health.state.mn.us/communities/environment/water/docs/waternumbers.pdf) (<https://www.health.state.mn.us/communities/environment/water/docs/waternumbers.pdf>).

The specific contaminants tested for at public water systems depends on how often we expect that the same people will drink water from a system. All water systems are tested for contaminants that could cause people to be sick with a single drink. These “acute” contaminants include nitrate and bacteria. A highway rest stop, for example, serves different people every day who may only drink the water once, so that system is only tested for acute contaminants.

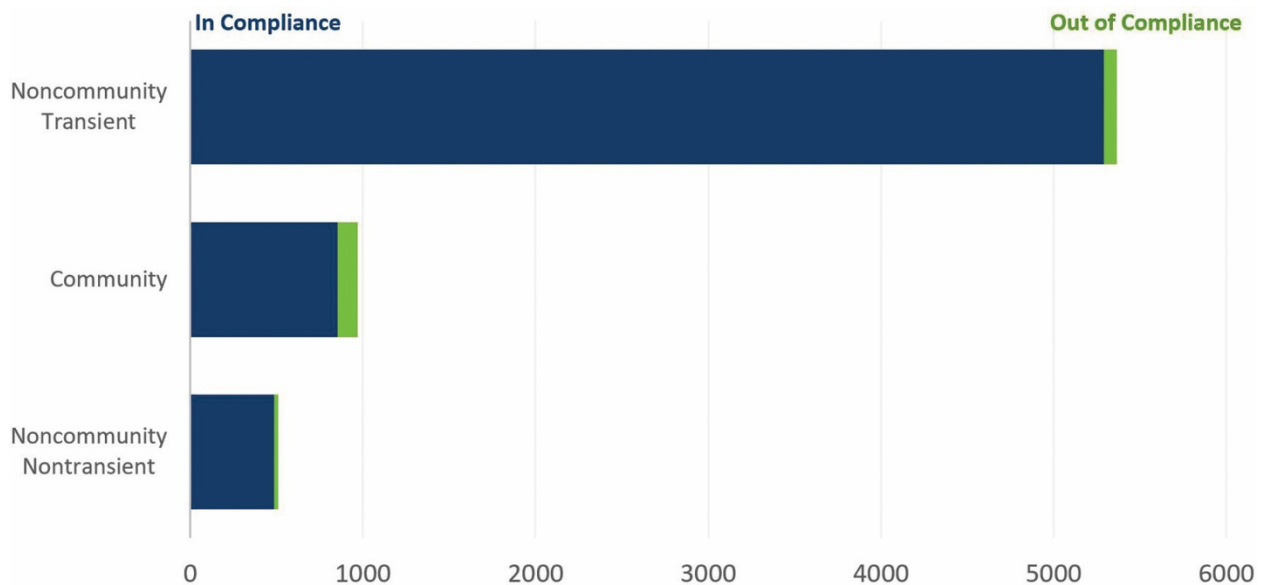
On the other hand, when people drink water in their homes, schools, or businesses, they have regular and repeated exposure to that water. These systems are tested for “chronic” contaminants that could cause health problems from drinking the same water over many years.

How Are We Doing?

In 2018, public water systems in Minnesota successfully implemented Safe Drinking Water Act standards, as shown in Figure 2. These standards include requirements for health, monitoring and reporting, public notification and education, and treatment techniques. MDH works with systems to keep them in compliance and assists systems that are out of compliance with Safe Drinking Water Act standards. MDH helps systems take corrective actions, which include informing residents of the issue and what is being done to correct it.

Figure 2. Public Water System Compliance by Type

Minnesota public water systems have high compliance with the Safe Drinking Water Act.

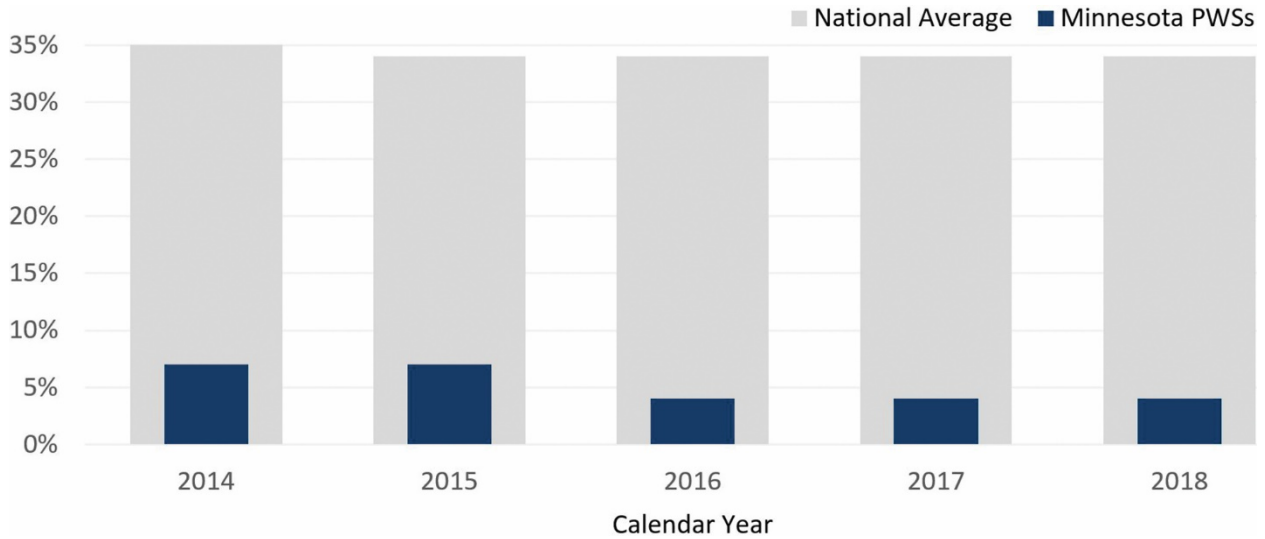


Source: EPA Enforcement and Compliance History Online (ECHO) Drinking Water Dashboard

Safe Drinking Water Act violations include health-based violations, monitoring and reporting violations, public notification and education violations, and treatment technique violations. In 2018, 4 percent of Minnesota public water systems had some type of Safe Drinking Water Act violation, far below the national average of 33 percent, as shown in Figure 3. In addition to being well below the national average, Figure 3 shows that Minnesota continues to reduce violations from year to year.

Figure 3. Public Water Systems with Any Violation

Fewer Minnesota public water systems have Safe Drinking Water Act violations than public water systems nationally.

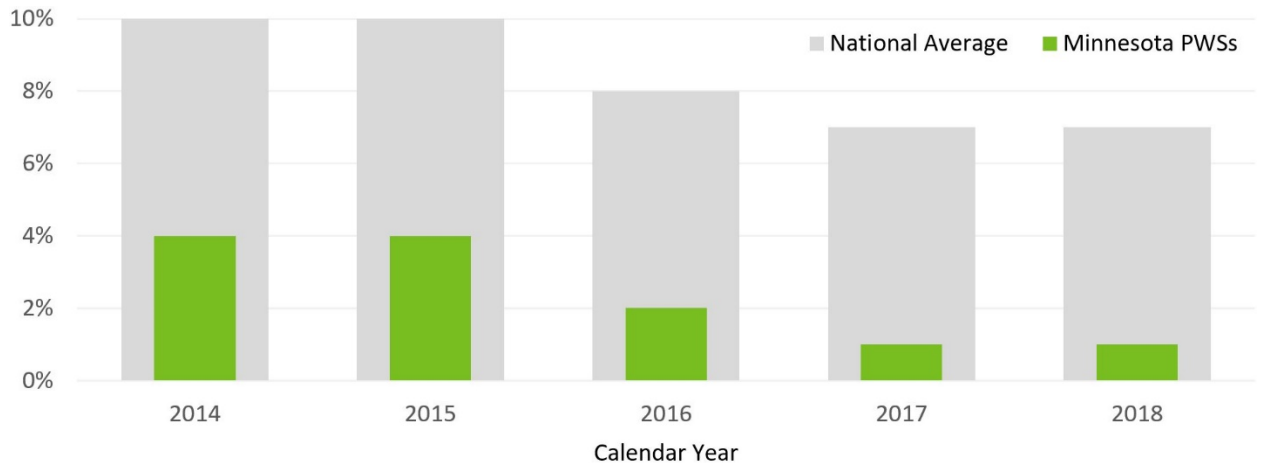


Source: EPA ECHO Drinking Water Dashboard

When testing shows that a contaminant in the water is over a federal limit, a health-based violation is issued to the public water system. Health-based violations can occur when source water quality changes or when the system has a failure in operation or treatment that can directly affect health. In 2018, 1 percent of Minnesota public water systems had a health-based Safe Drinking Water Act violation, below the national average of 7 percent, as shown in Figure 4.

Figure 4. Public Water Systems with Health-Based Violations

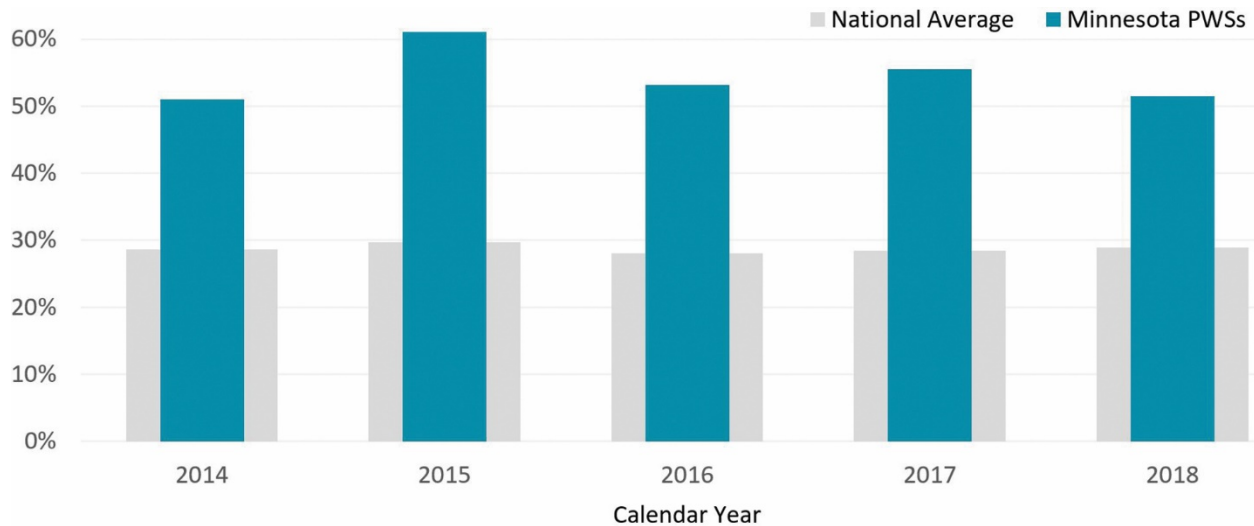
Fewer Minnesota public water systems have health-based Safe Drinking Water Act violations than public water systems nationally.



When a public water system has a Safe Drinking Water Act violation, MDH works with the system to help them resolve the issue and return to compliance. In 2018, of the 4 percent of systems that had a Safe Drinking Water Act violation (268 systems), 51.5 percent (138 systems) returned to compliance within the year. This is far above the national average of 28.9 percent, as shown in Figure 5. The other systems continue to work toward compliance while keeping their residents informed of the situation.

Figure 5. Public Water Systems Returned to Compliance

Minnesota surpasses the national average with the percentage of public water systems returning to compliance.



Source: EPA ECHO Drinking Water Dashboard

In summary, Minnesota has fewer overall violations, fewer health-based violations, and a faster return to compliance than national averages. Program excellence is supported by a range of efforts and resources.

Program Resources

The annual budget of MDH's drinking water program is approximately \$18.4 million. Funding comes from a variety of federal and state sources, as shown in Table 1. There are three primary sources of funding:

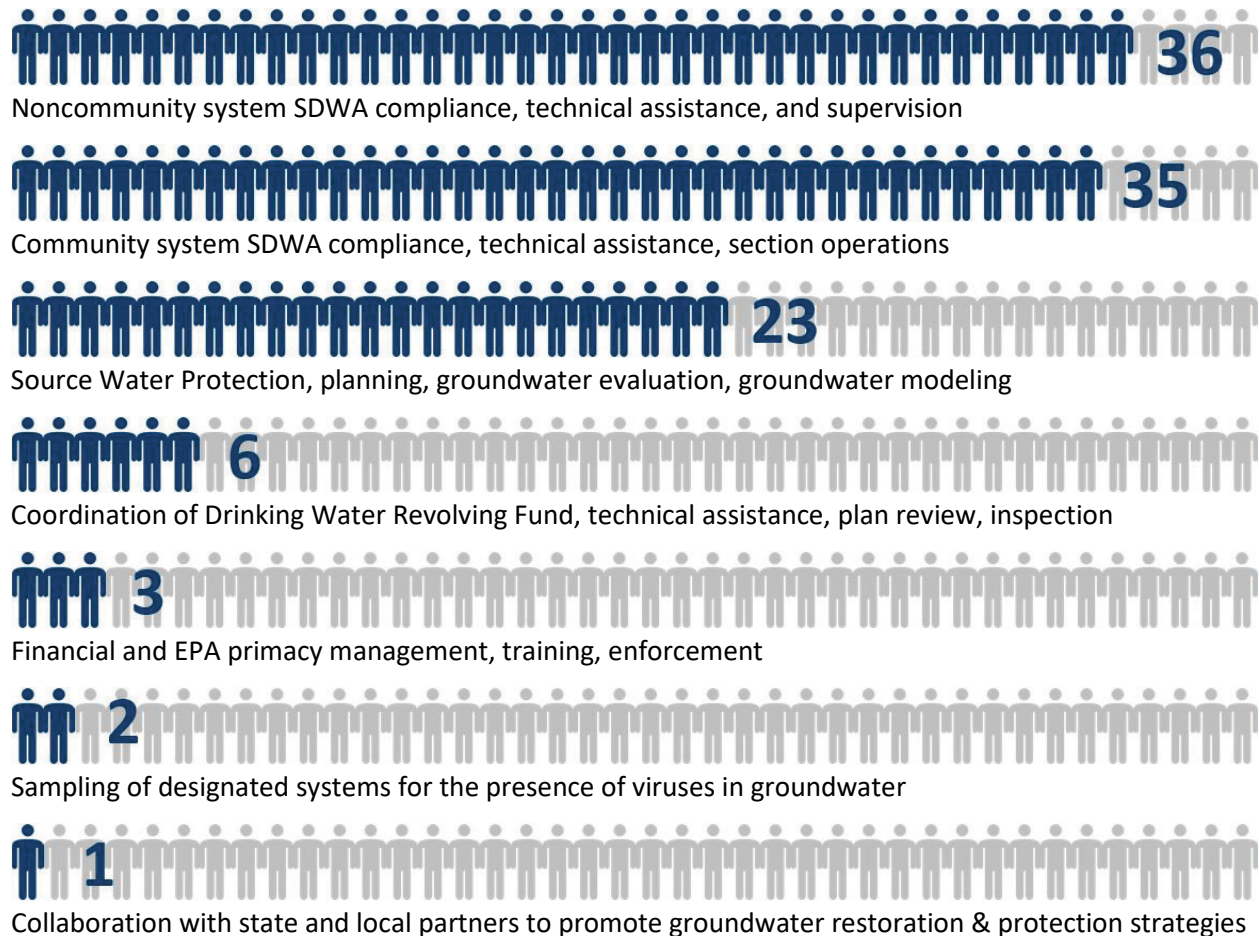
- Public Water Supply Service Connection Fee** (also known as the Safe Drinking Water Fee): In 1992, the Minnesota Legislature established the service connection fee, which directs each municipal water system to collect an annual fee (currently \$6.36) for each service connection. These funds are sent to MDH to cover the costs of testing the nearly 6,800 public water systems in the state, as well as to conduct inspections, develop protection plans, and provide technical assistance to these systems. This helps ensure that safe water is provided to people across Minnesota.
- EPA grants and set-asides:** EPA provides direct funding through the annual Public Water Supply Supervision grant and also allows states to use a portion of the funds provided for Drinking Water State Revolving Fund (DWRf) programs to administer the requirements of the Safe Drinking Water Act and provide for source water protection.
- Clean Water Fund:** On November 4, 2008, Minnesota voters approved the Clean Water, Land and Legacy Amendment (Minnesota Constitution, Article 11, Section 15) to the constitution to protect drinking water sources; to protect, enhance, and restore wetlands, prairies, forests, and fish, game, and wildlife habitat; to preserve arts and cultural heritage; to support parks and trails; and to protect, enhance, and restore lakes, rivers, streams, and groundwater. The amendment specifies that at least five percent of the Clean Water Fund be dedicated to drinking water protection. MDH's initiatives supported by the Clean Water Fund mostly focus on source water protection.

Table 1. Budget for Minnesota’s Drinking Water Program

Activity	Budget	Percent of total
Public Water System Service Connection Fee (Safe Drinking Water Fee)	\$8,480,000	46
EPA Public Water Supply Supervision Grant	\$2,477,000	13
EPA Drinking Water Revolving Fund (DWRF) Public Water Supply Supervision Set-aside	\$1,695,500	9
EPA DWRF Source Water Protection Set-aside	\$1,695,500	9
DWRF Support – Administrative	\$678,200	4
EPA DWRF Technical Assistance Set-aside	\$339,100	2
Clean Water Fund Source Water Protection Planning and Grants	\$2,907,000	16
Clean Water Fund Groundwater Restoration and Protection Strategies	\$125,000	1
Total	\$18,397,300	100

MDH deploys 106 staff to implement the Safe Drinking Water Act, assist in the development and implementation of source water protection plans, and manage compliance through extensive technical assistance and partnerships, as shown in Figure 6. Staffing levels reflect our commitment to proactively working with public water systems and other local partners to identify and fix issues before they become major public health threats.

Figure 6. MDH Drinking Water Staff by Activity



How MDH Provides Safe Drinking Water

The rest of this report is structured according to the bands of the water tower shown in Figure 7. The bands represent the ways in which we support the goal of providing safe drinking water to everyone, everywhere in Minnesota. Each report section corresponds with one band of the tower and contains more information about how we conduct each activity.

Figure 7.



Protect Source Water

In Minnesota, 923 community water systems use groundwater as a drinking water source. Systems with groundwater sources are required to prepare and implement wellhead protection plans, which outline management practices to prevent groundwater contamination. More than 600 systems have prepared wellhead protection plans or have plans in development. Of the three million people served by systems using groundwater, 88 percent are served by systems with wellhead protection plans.

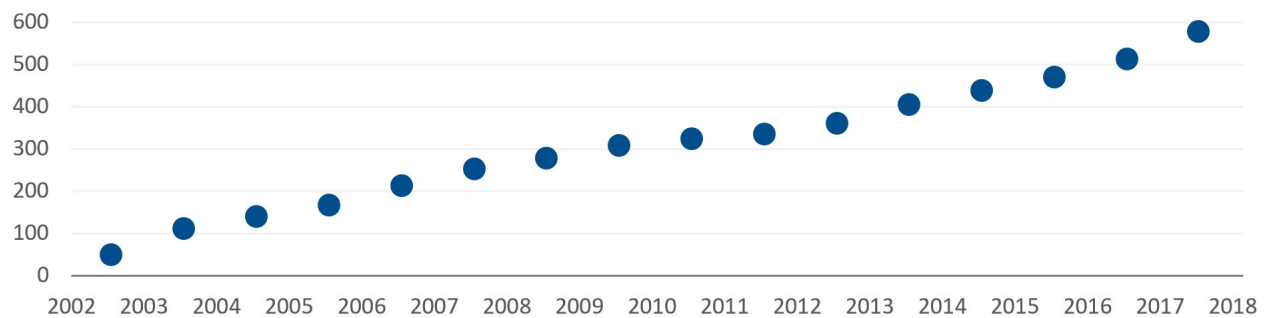


Twenty-three community water systems use surface water, such as rivers and lakes, as their drinking water source. These systems serve approximately 1.5 million people in 42 cities. The 2017 Minnesota Legislature approved use of Clean Water Fund dollars to help systems with surface water sources develop source water protection plans. Source water protection plans will identify strategies to prevent contamination of surface waters that supply drinking water. This voluntary program is being piloted in the city of Fairmont.

Source water protection plans focus on geographical areas that provide source water to the water supply. These areas are called Drinking Water Supply Management Areas. In Minnesota, approximately 1.2 million acres of land are in Drinking Water Supply Management Areas. Of these, roughly 9,000 acres are in permanent protection.

Currently, 610 public water systems have approved source water protection plans, as shown in Figure 8.

Figure 8. Public Water Systems with Approved Source Water Protection Plans



Note: Data represents plans approved at the end of each fiscal year.

Clean Water Fund Success Story: Rock County Rural Water District

Rock County Rural Water (RCRW) District serves just over 3,000 people in southwest Minnesota. Unlike much of the state, southwest Minnesota does not have abundant water. Many of the surface waters are impaired, and groundwater resources are scarce. This concern is heightened for RCRW because water quality monitoring has shown that nitrate contamination exists, which is a significant public health concern.



MDH staff helped RCRW develop a source water protection plan for protecting local sources of drinking water. RCRW built relationships with local landowners to educate them about options for managing their land to protect source water. RCRW then worked with farmers and provided financial incentives to implement nitrogen best-management practices on about 1,700 acres of land. MDH helped make these activities possible through Clean Water Fund-supported grants.

For effective implementation of its source water protection plan, along with the meaningful planning process used for the implementation, RCRW received the American Water Works Association (AWWA) 2018 Exemplary Source Water Protection Award for Small Source Water Systems at the AWWA Annual Conference & Exposition in Las Vegas.



Educate Minnesotans

The more people understand the importance of safe drinking water, the more they understand the role they play in protecting water resources and maintaining water that is safe to drink.

Raising awareness and educating citizens of all ages is a critical component of providing safe drinking water.





Drinking Water Institute for Educators

One way to educate young people about drinking water is through science teachers. Every year, MDH partners with the Minnesota Section of the AWWA and the Hamline University Center for Global Environmental Education to host a three-day professional development program called *Water Works: A Drinking Water Institute for Educators*. The goal of the program is to educate teachers about drinking water and allow them the flexibility to

adapt this new content into their existing water-related curricula.

This award-winning program has been held annually since 2001, serving nearly 400 teachers and reaching more than 150,000 Minnesota students.



We Are Water Minnesota

We Are Water MN is a partnership led by the Minnesota Humanities Center with the Minnesota Departments of Agriculture, Health, Natural Resources, Pollution Control Agency, and Historical Society.

We Are Water MN is also the title of a traveling exhibit and community engagement initiative that explores the connections between the humanities and water. The initiative focuses on historical perspective, personal experiences, and relationships

related to water and scientific information. During 2018, the host communities included the University of Minnesota and Bemidji, preceded by stops at the Minnesota State Capitol and Moorhead, Minnesota. The outreach effort drew 2,900 exhibit visitors, 719 event attendees, 188 water stories, 120 water drops (commitments to action), and 241 opening ceremony attendees, with many valuable partnerships developed along the way.

Since 2016, when the initiative began, the exhibit has visited 10 communities, engaged 433 community organizations, reached 17,829 visitors, and strengthened five state agencies' community engagement.



Drinking Water Display at the State Fair Eco Experience

More than 200,000 people visited the Eco Experience building in 2018. MDH's drinking water exhibit is one of our key efforts to educate the public about drinking water.

Between April and August 2018, MDH Environmental Health staff and Dunwoody College faculty and students came together to develop new exhibit messages, create design concepts, and coordinate the creation of a new drinking water exhibit. This was the start of a new five-year

partnership with Dunwoody College of Technology. This partnership allows us to access graphic design and exhibit construction skills beyond our internal capacity, and allows college students to gain real-world experience and exposure to drinking water and public health communications.

The success in year one of this partnership will allow us to build on the relationship and continue to enhance the exhibit over the next four years.



Water Bar: An Exciting New Concept

"Welcome to Water Bar. Water is all we have." Minnesotans are hearing these words as they sample drinking water around the state at a multitude of venues, including at the State Fair Eco Experience. Water Bar is an opportunity to engage citizens about water issues and concerns.

The Great Minnesota Tap Water Taste Test

Public presentations and media interviews are another way of raising awareness about drinking water. Every year MDH works with the Minnesota Section of the American Water Works Association on the Great Minnesota Tap Water Taste Test. Water from more than 16 cities is brought in and sampled by audience members on the Sustainability Stage at the State Fair Eco Experience building. After the taste test, the water from the finalists is brought to the WCCO Radio booth and discussed for their live audience.





Train and Certify Operators

A major function of our drinking water program is to ensure that there are qualified and licensed operators at Minnesota’s public water systems. With the Minnesota Section of AWWA, MDH co-sponsors water operator training schools. MDH also partners with other organizations, such as Minnesota Rural Water Association, on training opportunities for operators. In 2018, MDH partnered with Minnesota AWWA on eight training schools – including several multi-day ones – and reached a total of 625 operators. MDH also administered tests for operator licensure for 449 operators. In addition, MDH has been part of an eight-week professional operator development course and an advanced treatment technology course.





More specialized training includes hands-on seminars for advanced treatment technologies and (shown to the left) a series of surface-water optimization courses. MDH has revived optimization concepts that have existed for decades, because there is increasing need for operator and regulatory staff training around practical treatment skills and plant performance assessment.

Optimization offers a cost-effective compliance approach by focusing on improving operations rather than making sometimes-unaffordable capital

improvements. As factors like workforce attrition, infrastructure degradation, and source water impairments continue to challenge surface water treatment systems, certified operators must improve troubleshooting and process improvement skills to avoid treatment failure.

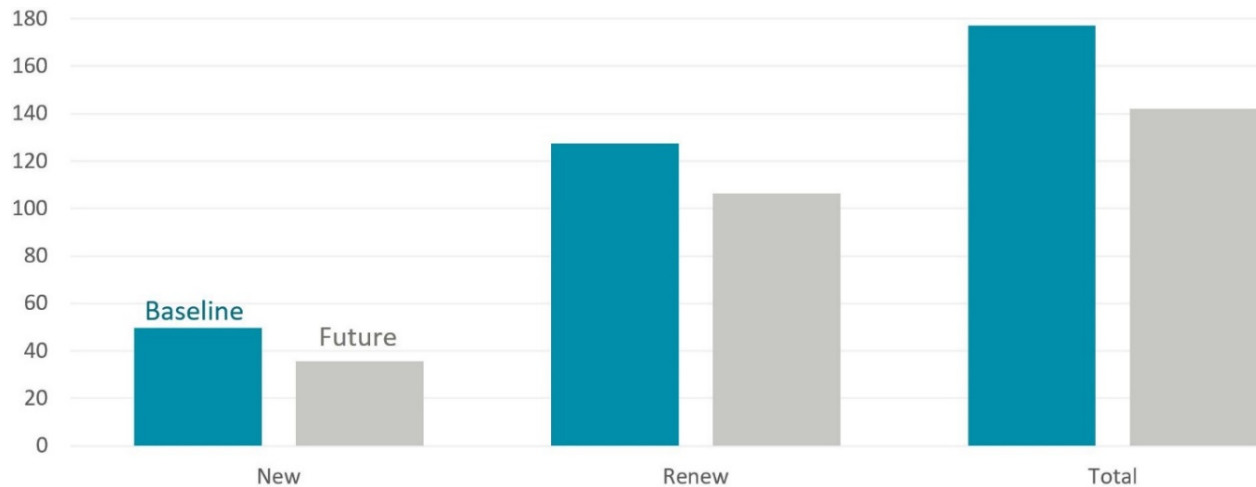
By partnering and collaborating with other organizations and regulatory agencies, MDH hopes to establish a multiple-barrier approach to public health protection by implementing process control programs where regulations do not exist. Our primary goal is to sustain and support the adoption of optimization concepts in a long-term, sustainable approach that enhances the capability of water system operators at utilities of all sizes.

Licensing Operators

New water operators are needed due to staff changes, retirements, and changes in water system classifications. Knowledgeable, certified water operators are pivotal in ensuring all Minnesotans have safe drinking water. In an effort to improve MDH procedures, we looked at the time spent processing water operator certificates, as shown in the baseline in Figure 9. The time could be reduced considerably by using technology to automate some manual steps, as shown in the future projections. This would also reduce opportunities for errors and staff time.

Figure 9. Total Hours Spent Yearly on New and Renewed Licenses

The commitment to having qualified and licensed water operators requires significant staff time. New technology initiatives will reduce this time in the future.



MDH strives to have a licensed water operator at all public water systems. When an operator leaves a system without a timely replacement, the system falls out of compliance. Improvements in the process over time have reduced the amount of time it takes to get a system back into compliance, as shown in Figure 10. Overall, improvement has been steady over the last 10 years (with the spike in October 2016 being the result of the departure of an operator who had been overseeing two systems).

Figure 10. Average Number of Days for Systems to Reach Compliance after Receiving a Violation





Assist Water Systems

MDH staff conduct site visits and provide technical assistance to public water systems across the state. We build relationships with drinking water operators that result in extensive knowledge, trust, and a willingness to take action before they may violate safe drinking water standards.

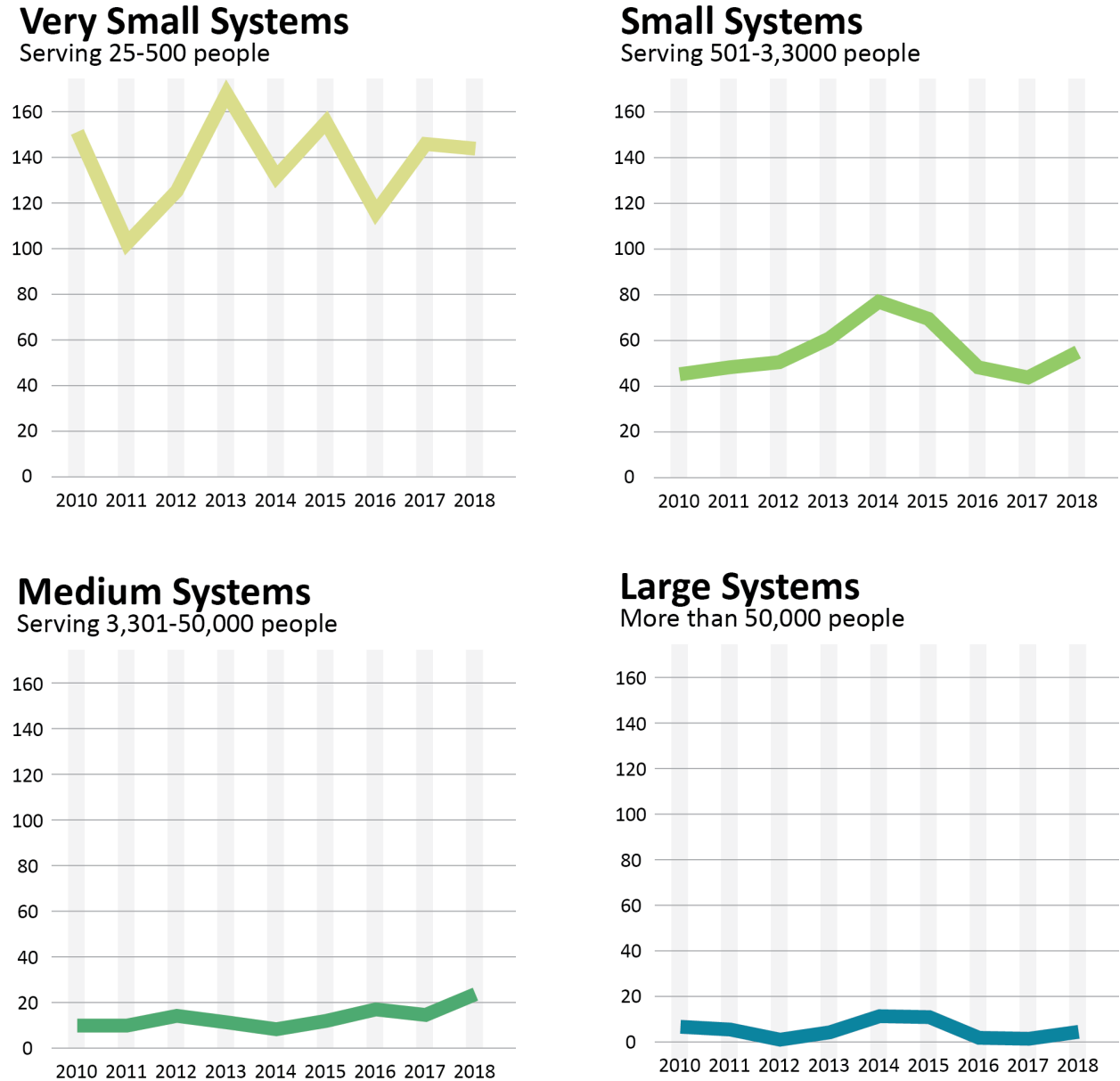
Our services are especially helpful to small, rural water systems, which have more difficulty meeting water standards. They have fewer resources for testing, investigations, and physical improvements because of their smaller customer bases.



Figure 11 shows that although Minnesota’s community public water systems have high overall compliance with the Safe Drinking Water Act and do much better than the national average, challenges remain, especially with very small and small community water systems.

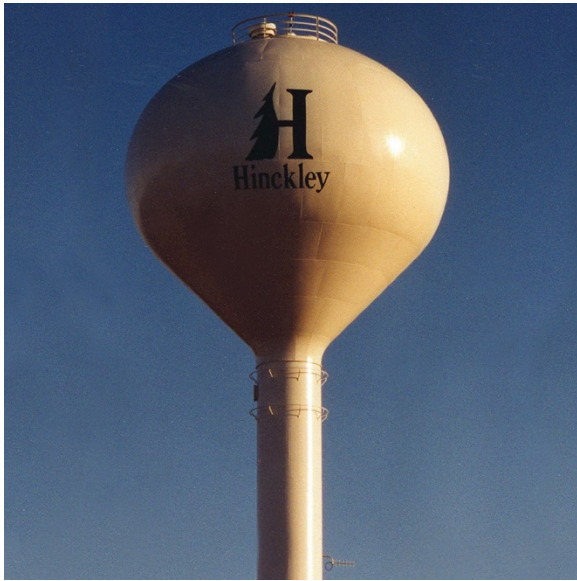
Figure 11. Number of Community Public Water Systems: All Violations

Very small systems are typically non-municipal systems, such as manufactured home parks. Small, medium, and large systems are mostly municipal systems.



Source: EPA Enforcement Targeting Tool (ETT)

MDH works with a variety of partners. The Minnesota Rural Water Association is a primary partner in working with smaller water systems on training and on-site assistance. Minnesota Rural Water Association’s mission is to provide the latest information, education, and technical assistance to protect our public waters and improve the quality of life in Minnesota.



MDH Helps Hinckley Hit the Mark for Radium

Hinckley, a city of 1,800, was having trouble meeting the Safe Drinking Water Act standard for radium. MDH staff helped Hinckley meet the standard and provide safe drinking water to residents and visitors.

Radium is a naturally occurring metal found in some of Minnesota’s rocks and soil, and it can affect groundwater. People have a higher risk of getting cancer if they drink water with radium above the drinking water standard every day for many years. The groundwater used as a source of drinking water for Hinckley has some of the highest radium levels in the state. The city has two drinking water

treatment plants that were removing most of the radium, but it was not enough.

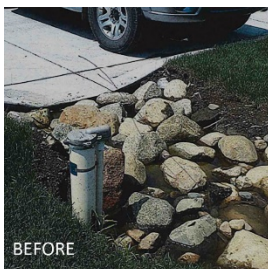
Through specialized engineering assistance and planning, MDH staff, city engineers, and the city’s contracted water and wastewater staff helped Hinckley adjust their treatment to better remove radium. After optimizing their treatment, Hinckley consistently has met the Safe Drinking Water Act Standard for radium.

Safeguarding Drinking Water Where People Learn, Work, and Play

In addition to working with community water systems, MDH helps make sure there is safe drinking water at nearly 6,000 schools, daycares, factories, resorts, restaurants, rest stops, and parks that have their own sources of water.

For example, MDH staff worked with a large, rural school in western Minnesota to help them address both water quality and quantity issues. The school was facing elevated copper levels—too much copper can be harmful—and a failing well. MDH took water samples, provided technical assistance, and connected with the Minnesota Department of Education to help the school better define the issues, select treatment, and access funding resources so that the school can provide a safe and reliable water supply to its staff and students.

In another recent case, while inspecting a new retail business in central Minnesota, MDH staff discovered that the business’s well had several major issues that left it open to contamination, including surface water runoff and vehicle damage, as shown in the left photo, below. MDH staff provided technical assistance to help the owner fix the issues. The protected well shown in the right photo, below, will provide safe drinking water to the business into the future.

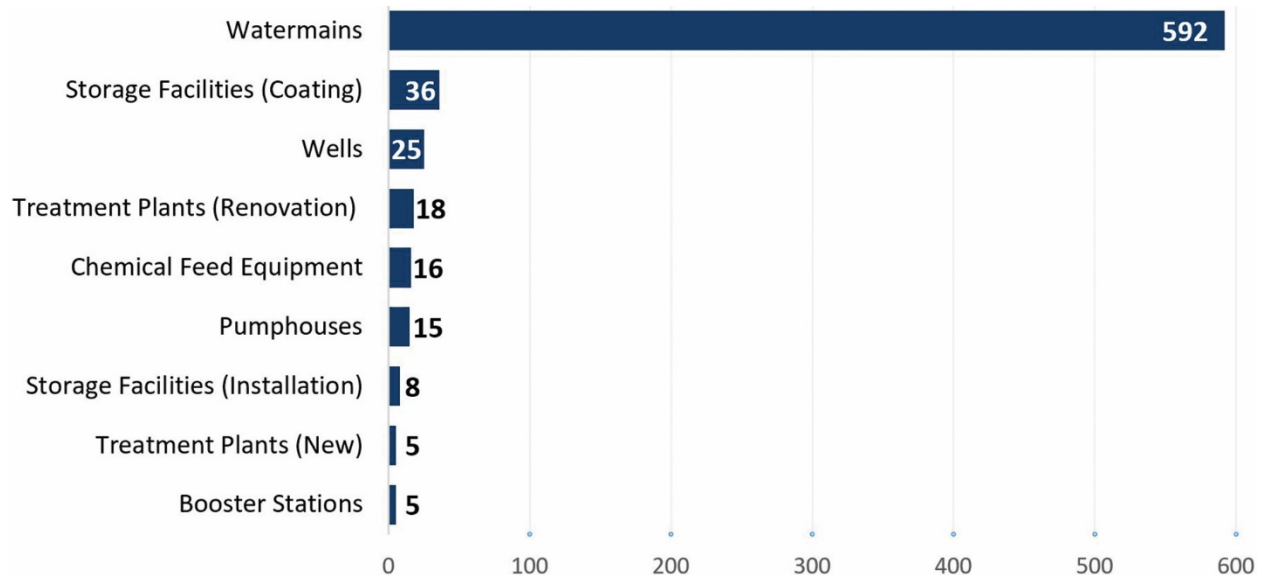


Plan Review

Ensuring proper construction for new and renovated drinking water infrastructure is another way of preventing problems before they happen. MDH reviews plans and specifications for drinking water infrastructure projects, such as treatment plants, water mains, wells, and water towers. Plan review protects public health, avoiding possible cross connections and improper treatment of water, and helping consulting engineers and the water systems they advise comply with construction standards and ultimately the Safe Drinking Water Act. MDH engineers can also save communities hundreds of thousands of dollars each year by having corrections made in the design phase rather than having to make costly modifications during the construction phase. Figure 12 shows the plans we reviewed in 2018 broken down by type.

Figure 12. 2018 Approved Community Water System Plans

Watermain approvals have risen from 360 in 2010 to 592 in 2018. The rise is due to the need to replace aging infrastructure and to new home construction.



Construction Inspections

Since 1998, construction inspections have been completed for all Drinking Water Revolving Fund (DWRF) projects, with the exception of watermains. During construction inspections, MDH engineers verify that construction standards have been met to protect public health and water operator safety. Based on the size of the project, both interim and final inspections are conducted. In 2018, we conducted 10 interim inspections and eight final inspections.



Test Water

MDH engineers and public health sanitarians oversee the testing of drinking water in the state, working closely with nearly 6,800 public water systems and more than 37,000 licensed water operators.

Testing the water is our quality-control check. Also, each visit to collect samples provides an opportunity to interact with water system staff, where questions can be addressed and issues discussed.

While important, testing is just one part of the process of producing safe drinking water. The other sections of this report discuss areas that are just as critical.



Public Water Systems with Health-Based Violations

MDH works with public water systems to test water. When a test shows that the level of a contaminant is over a federal limit, the public water system receives notice of a health-based violation. Health-based violations can occur when a public water system's source water quality changes or when the system has a failure in operation or treatment that can affect health. Table 2 shows the number of systems that had violations in Minnesota in 2018.

When a violation occurs, MDH works with the affected water system on corrective actions. The actions always include notifying the customers of the system.

2018 Monitoring Results

Table 2. 2018 Monitoring Results for Community and Noncommunity Water systems

Contaminants	Number of community systems monitored	Number of community systems with violations	Percent of community systems meeting the EPA standard	Number of non-community systems monitored ²	Number of non-community systems with violations	Percent of non-community systems meeting EPA standard
Pesticides and Industrial Contaminants	966	0	100%	485	1	99.8%
Bacteriological	966	2	99.8%	5,815	8	99.9%
Nitrate/Nitrite	966	1	99.9%	5,815	3	99.9%
Arsenic	966	5	99.5%	485	5	99.0%
Radionuclides	966	7	99.3%	N/A	Not regulated	N/A
Inorganic chemicals	966	0	100%	485	0	100%
Disinfection byproducts ³	727	0	100%	485	0	100%
Lead	966	3	99.7%	485	5	99.0%
Copper	966	21 ⁴	97.8%	485	2	99.6%
TOTAL		39			24	

Source: MNDWIS. Data accessed April 2019.

Systems with violations take steps to address the issue, which may include disinfecting their system, identifying and fixing the source of contamination, discontinuing the use of a well, notifying consumers, retesting, researching treatment options, installing new treatment, providing bottled water, connecting to a new water source, and conducting public education. The majority of systems that had a violation have since returned to compliance.

² Some contaminants are tested at all 5,815 noncommunity water systems; others are tested only at the 485 nontransient noncommunity water systems.

³ Disinfection byproducts are only monitored for at systems that disinfect their water.

⁴ Some aspects of Minnesota's groundwater quality may contribute to the corrosion of copper from plumbing materials.

Groundwater Virus Monitoring Study

In an ongoing evaluation requested by the 2013 Minnesota Legislature and shared with stakeholders by the MDH, scientists report finding evidence of viruses, bacteria, and protozoan parasites in water from some of the state's public water supply wells.

While health officials do not see patterns of illness within the state population that would suggest a widespread threat from pathogen contamination of well water, the findings suggest a need for further examination of the issue. More information is needed to determine how and when pathogens enter the wells and whether there may be a health risk for people drinking the water.

The findings of the project, funded through the state's Clean Water Fund, demonstrate the value of that fund as well as the importance of continuing the strong and proactive partnership among state and local officials working to protect Minnesota drinking water.

Governor Tim Walz's budget plan directs additional resources from the Clean Water Fund to conduct research into emerging threats facing drinking water. The plan also includes a Safe Drinking Water Fee adjustment that amounts to a penny a day per connection. That fee adjustment will ensure continued state technical support for drinking water systems around the state as they work proactively to prevent contamination of their water.

The wells involved in the MDH evaluation project were from public water systems around the state. Department staff have been notifying system owners with the highest-risk wells, discussing results and next steps.

MDH has detected only five outbreaks of waterborne illness caused by microbial contamination of drinking water in the past 25 years. However, most illnesses do not occur as part of outbreaks, and it is unknown how many of these illnesses not associated with outbreaks may be due to drinking contaminated water. This project helps state and local officials better understand the threats facing Minnesota drinking water. It can also help health officials develop strategies to minimize risk.

The study found microbes in some systems on more than one occasion, but was not able to determine how they got into the wells. Microbes typically can get into wells when feces from leaky sewer lines, septic systems, or other sources get into the groundwater or directly into the well. If water contaminated in this way is not adequately treated, people drinking it may become sick.

Until additional work is done, MDH has no specific protective recommendations prompted by the findings so far. However, consumers with concerns about potential microbial contamination have several options, including using bottled water, boiling water used for food preparation and drinking, or installing a reverse osmosis water filter.

More generally, MDH recommends both public and private water systems continue to maintain their wells and conduct routine testing of their water supply, and to follow recommended procedures for operating and maintaining septic systems or other contaminant sources.



Address Threats

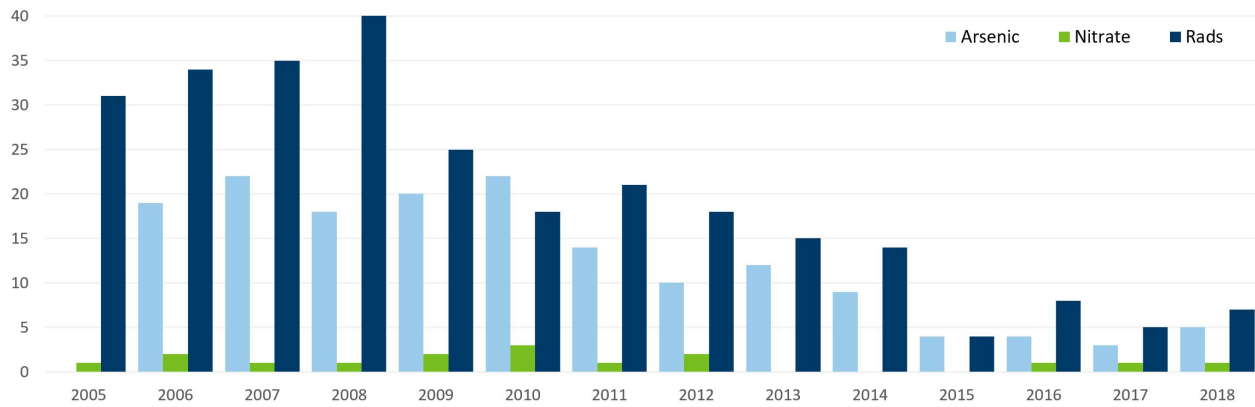
MDH works with community and noncommunity water systems to address threats posed by contaminants in drinking water. When a public water system has a violation, MDH staff work with the system to implement actions like consumer notification and education, treatment changes, and infrastructure changes (e.g. drilling a new well).

Figures 13 and 14 show some of the most common contaminants that cause health-based violations in community and noncommunity water systems.



Figure 13. Number of Community Systems with Arsenic, Nitrate, and Radionuclides Violations

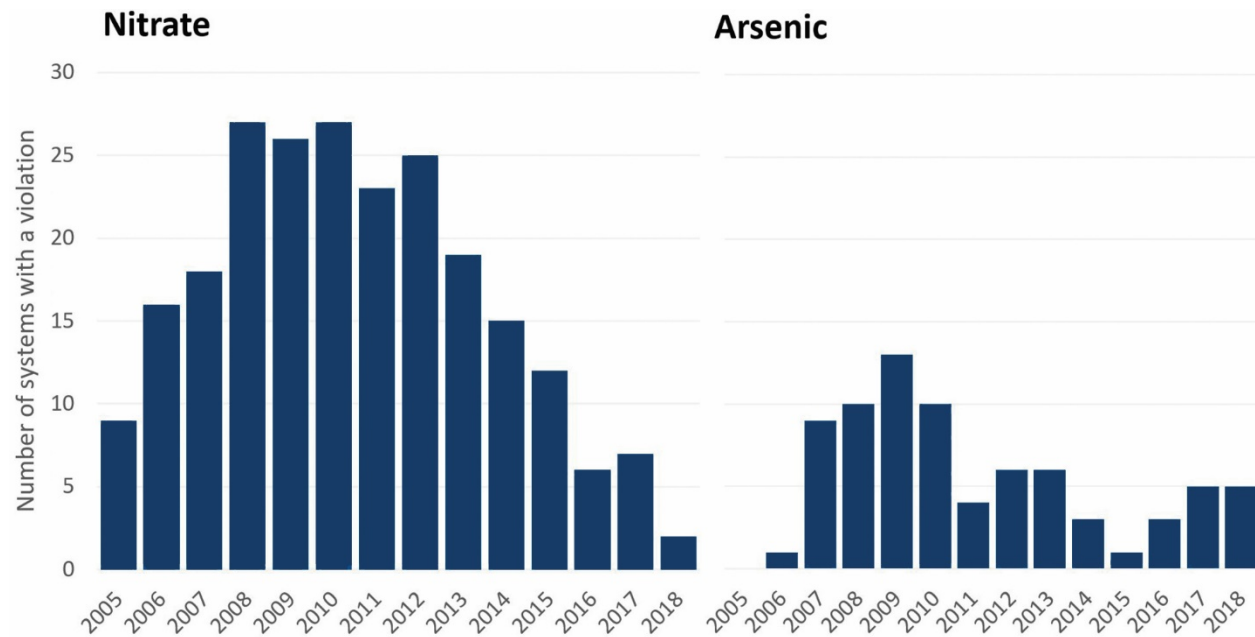
These three contaminants are among the common causes of health-based violations at community systems. The maximum allowable level of arsenic and radionuclides were lowered in 2008, which can explain the increase in violations seen for both of these contaminants that year.



Source: MNDWIS.

Figure 14. Number of Noncommunity Systems with Nitrate and Arsenic Violations

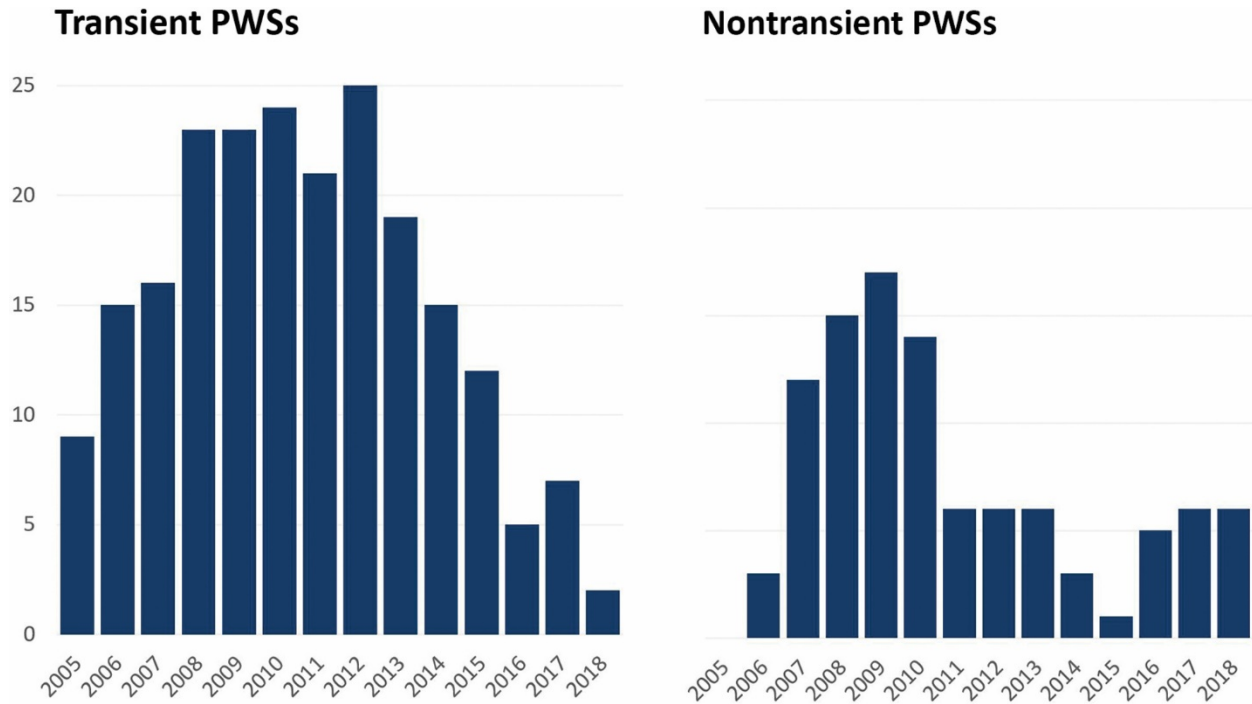
These two contaminants are among the most common causes of health-based violations at noncommunity systems. The maximum allowable level of arsenic was lowered in 2008, which can explain the increase in violations seen for arsenic that year.



Source: MNDWIS.

Figure 15 shows health-based violations at the different types of noncommunity systems (transient and nontransient). Violations at both types of systems have declined in recent years. In particular, transient violations have dropped since the creation of the source water protection grant program for transient systems.

Figure 15. Number of Noncommunity Systems Health-Based Violations



Source: MNDWIS. Note: The arsenic and radionuclides limits were lowered in 2008.

Investment in Cleanup from PFAS

In February 2018, the Office of the Minnesota Attorney General settled its lawsuit against the 3M Company for \$850 million. The settlement was the result of 3M allegedly affecting drinking water in the east Twin Cities metropolitan area with its production and disposal of per- and polyfluoroalkyl substances (PFAS). After legal expenses are paid, approximately \$720 million will be invested in drinking water and natural-resource projects in the Twin Cities east metropolitan area.

Several community public water systems and many private wells in the area have had detections of PFAS above MDH health-based guidance values or have exceeded a Health Risk Index (a calculation that takes into account the health risks of exposure to multiple PFAS). Workgroups of industry, government, citizen, and business representatives are developing a plan for the region. The plan may include additional groundwater treatment, new wells, new surface water sources and treatment, interconnections, and/or a rural water system to serve private well owners.

MDH is also working with noncommunity public water systems in the area – including schools, churches, and businesses with their own wells – that have been or may be affected by PFAS.

MDH is providing technical assistance and guidance to community and noncommunity PWSs in helping to interpret PFAS monitoring results, evaluating protective and corrective actions, and plugging in to the broader conceptual plan for the east metropolitan area.



Communities Stand Ready

In late 2018, St. Anthony Village had a working-group meeting in lieu of its regular city council meeting. The mayor and council members were joined by other city officials as well as representatives from MDH, Hennepin and Ramsey counties, and WSB & Associates, the city’s engineering firm. The group walked through a scenario of a water contamination incident, with emphasis on public notification and communication.

Lead in Water

In Minnesota, if a water system goes to a different source of water, or makes certain changes to water treatment, MDH engineers will review the plans for treating the water and also examine corrosion-control methods that could be necessary to minimize the chance that the water absorbs materials such as lead and copper from service lines and premise plumbing. MDH engineers also review water quality reports. Based on these reports, engineers may issue recommendations to address any possibility that the water has the potential to absorb materials, which could include lead, from service lines and household plumbing.

In 2018 MDH issued *Reducing Lead in Drinking Water: A Technical Guidance and Model Plan for Minnesota’s Public Schools*. This plan reflects the commitment of public health, education, and legislative leaders, as well as those directly responsible for operating school drinking water systems, to reduce the chance that children are exposed to the health hazards of lead through school drinking water. It provides information on both required steps (testing, reporting) and flexible guidance that schools can consider to meet their individual needs. This manual builds on existing guidance that schools have used since 1989. It is designed to help schools develop and implement plans to test for lead in drinking water and communicate results to parents and the public – fulfilling the requirements of a new state law passed in 2017. Further, the manual describes steps schools may take to reduce lead in drinking water.

The 2017 Minnesota Legislature directed the Minnesota Department of Health (MDH) to “conduct an analysis to determine the scope of the lead problem in Minnesota’s water and the cost to eliminate lead exposure in drinking water.” MDH worked closely with the University of Minnesota in 2018 to generate *Lead in Minnesota Water: Assessment of Eliminating Lead in Minnesota Drinking Water*. This report estimates costs for removing the two most significant sources of lead (lead service lines and indoor plumbing) to be between \$1.52 billion and \$4.12 billion over 20 years. Estimated benefits associated with removing lead from water include improvements in population mental acuity and IQ (and resulting

increases in lifetime productivity, earnings and taxes paid). The projected range of benefits is \$4.24 billion to \$8.47 billion over 20 years, although there are a number of reasons to believe these benefits may be underestimated. Therefore, resources allocated to reducing lead in drinking water would be expected to yield a return on investment of at least twofold.

DWP Response to a Growing Threat: *Legionella* Bacteria

Legionella is a bacterium commonly found in natural and man-made aquatic environments. *Legionella* can be found at low concentrations in any public water system. *Legionella* only poses a health risk when growth occurs in warm, stagnant water, the water is aerosolized, and the small droplets are inhaled. *Legionella* generally does not pose a health risk if a person drinks the water. People who become infected may develop legionellosis, a type of pneumonia called Legionnaires' disease, or a flu-like illness called Pontiac fever. There has been an increase in Legionnaires' disease cases nationwide and in Minnesota, with 17 confirmed cases in 2004 and 115 cases in 2016.

When there are two or more confirmed cases in a facility or localized area, it is considered a *Legionella* outbreak. The MDH Drinking Water Protection (DWP) and Infectious Disease Epidemiology Prevention and Control (IDEPC) programs coordinate on a response and investigation. In 2018, DWP partnered with IDEPC on two public outbreak investigations. DWP's role is to work with community water systems for the affected area to help them gather and document water quality data, and to provide technical assistance to determine the outbreak source.

DWP staff are involved in an effort of the Association of Drinking Water Administrators to develop guidance for states on how to regulate facilities that install treatment for *Legionella*. MDH is developing a Minnesota-specific policy based on this guidance, anticipated to be in place by the end of 2019.

Risk Communication Toolkit

The new MDH [Drinking Water Risk Communication Toolkit](https://www.health.state.mn.us/communities/environment/water/toolkit/index.html) (<https://www.health.state.mn.us/communities/environment/water/toolkit/index.html>) is helping water professionals communicate about drinking water. The toolkit contains:

- Information about different types of communication, from teaching customers about everyday operations to communicating about contaminants in drinking water.
- Strategies, examples, and templates for communications planning, making your message, and telling your story.

Water professionals are using the toolkit to:

- Create simple-to-use, accurate, and clear messages about drinking water.
- Develop consistent messages to maintain and build confidence in tap water.
- Identify effective methods for communicating about contaminants in drinking water.
- Share examples of your communications successes with other public water systems.
- Request example messages on challenging or hot topics from MDH.



Fund Projects

Source Water Protection Grants

MDH has awarded 752 grants statewide under the Source Water Protection (SWP) grant program. Its purpose is to protect the drinking water source from contamination, with a focus on prevention.



The grant program started two years after the 2008 Minnesota voters passed the Clean Water, Land and Legacy Amendment to the state constitution. This Legacy Amendment includes protecting drinking water sources and funds these grants. The annual number of grants has grown from 11 to 103. The grants have led to some unique projects:

- The city of Edgerton will provide rent payments to landowners to allow the city to implement nitrogen Best Management Practices on fields. Grant funds will be used to purchase and customize seed rye to uptake residual nitrogen in the soil and prevent it from getting into groundwater. The city will also provide funds to supplement Conservation Reserve Program payments to farmers for incentives to not use nitrogen-based fertilizers on row crops.
- Birch Coulee County Park in the city of Morton will construct a new well on high ground outside of a flood plain.
- The city of Little Falls will use clarified effluent from a lime storage pond for irrigation instead of discharging it to the Mississippi River.
- Blade's Store, located in an unincorporated town in Douglas County, has drilled a new well.

SWP grants have funded a wide range of projects. The Transient and Competitive project activities are similar from year to year. The total number of activities under Plan Implementation grants vary each year.

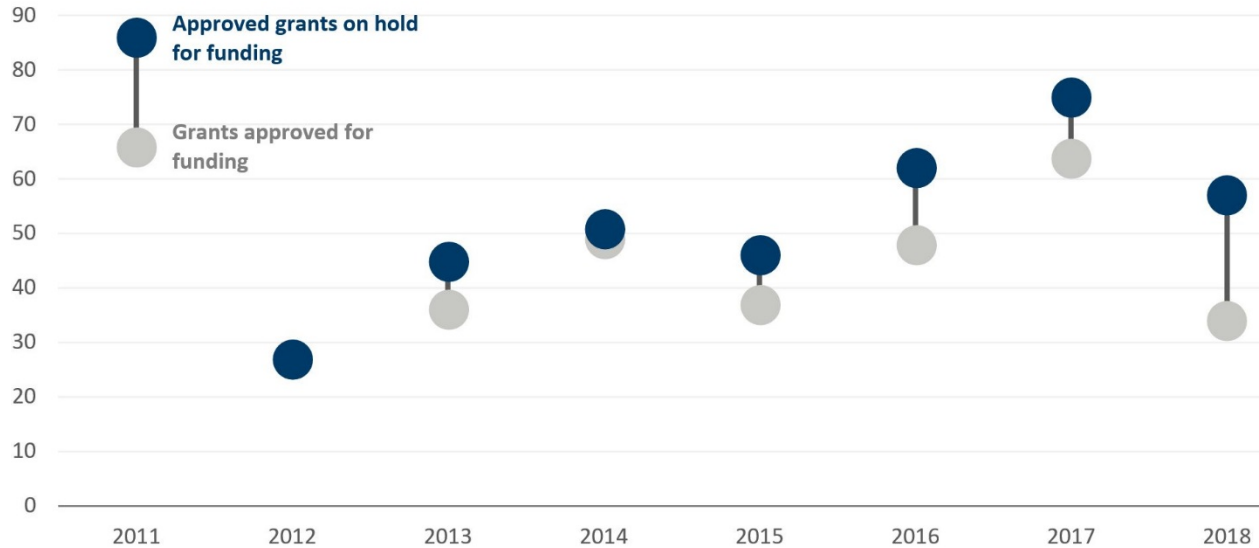
Well sealing is a popular project for all three grant categories. One example is an emergency well that was sealed in Sebeka in September 2017 with the assistance from MDH Well Management staff and a Plan Implementation SWP grant. Sebeka reported that this grant project “eliminated a contamination source within the Drinking Water Supply Management Area in accordance with wellhead protection.”



The Sebeka well sealing was one of 451 wells statewide made possible by the Source Water Protection grant program.

The demand for these grants is growing and exceeds the available funding, as shown in Figure 16. For the first time, there was insufficient funding for noncommunity water systems in 2018. Thirteen noncommunity systems were put on a funding wait list. Community water system demand has long outpaced available funding.

Figure 16. Demand for Source Water Protection Grants Exceeds Available Dollars



SWP grant applications are accepted each spring and fall. For more information, including a list of previous grant awards with project activities, visit [Source Water Protection Grants](https://www.health.state.mn.us/communities/environment/water/swp/grants.html) (<https://www.health.state.mn.us/communities/environment/water/swp/grants.html>).

Drinking Water Revolving Fund

The Drinking Water Revolving Fund provides below-market-rate loans to public water systems for capital improvements needed to achieve or maintain compliance with the federal Safe Drinking Water Act.

KEY STATISTICS

Since 1998, Minnesota has funded 580 projects totaling approximately \$1 billion. In fiscal year 2018:

- \$54 million funded 21 projects, with \$5.7 million in principal forgiveness.
- These 21 projects consisted of two new lime softening treatment plants, four treatment plant upgrades, one new treatment plant for iron and manganese removal after drilling new low nitrate wells, three storage projects, one new connection to a rural water system, and 10 water main replacement projects.

Bottle-Filling Stations

MDH awarded grants to the following communities and organizations to install drinking fountains with bottle-filling stations:

- Hmong American Partnership, St. Paul
- Arrowhead Economic Opportunity Agency, Virginia
- Mountain Lake Public School District ISD 173
- Partners in Quality Care, St. Paul
- Winona Public Library
- Perham Health
- Luverne Housing and Redevelopment Authority
- Brainerd Public Library
- White Bear Lake Area High School
- Parkview Center School, Roseville
- Benson School
- International Falls ISD 361
- Blue Earth School
- New London-Spicer School, New London
- Holy Cross Catholic School, Webster
- Goodridge ISD 561

The fountains provide an alternative to bottled water, retain fluoride from the water supply, and promote healthy behaviors by providing an alternative to sugar-sweetened beverages. Though none of the awardees had been found to have high levels of lead in their drinking water, the filling stations also protect people from exposure to lead in older water fountains.

Drinking Water Infrastructure Grant Funding Increase

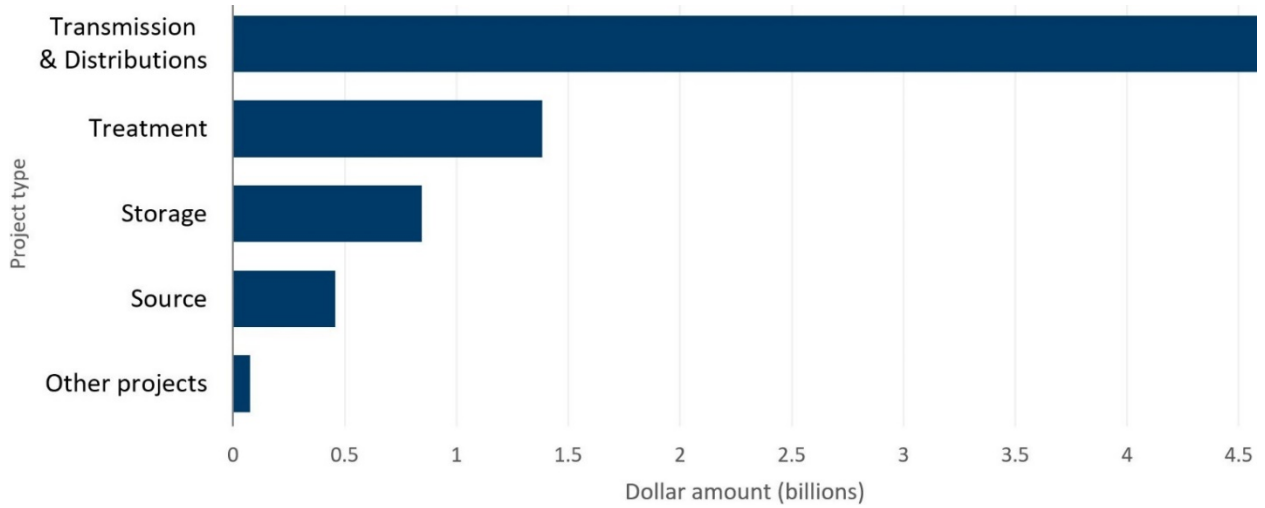
As a result of the changes in legislation to two key grant programs in Minnesota in 2017, the Water Infrastructure Fund (WIF) and Point Source Implementation Grant (PSIG), the grant funding for drinking water projects has increased over seven times the previous four year average to a total of \$29.7 million in 2018. WIF provides grant funding based on an affordability threshold allowing needed and costly drinking water infrastructure projects to be completed. PSIG is a grant program designed to help communities address limits placed on wastewater discharges and assist PWSs. Both of these programs, when linked to the Drinking Water Revolving Fund, have put many needed drinking water infrastructure projects in reach for communities across Minnesota.

Infrastructure Repair and Maintenance Funding

Maintaining and replacing critical infrastructure – water treatment plants, wells, and pipes – will continue to be a priority. EPA estimates that Minnesota must invest approximately \$7.4 billion over the next 20 years to upgrade community public water systems to comply with the Safe Drinking Water Act. The breakdown of our funding needs is shown in Figure 17.

Figure 17. Drinking Water Infrastructure Needs for Minnesota in the Next 20 Years

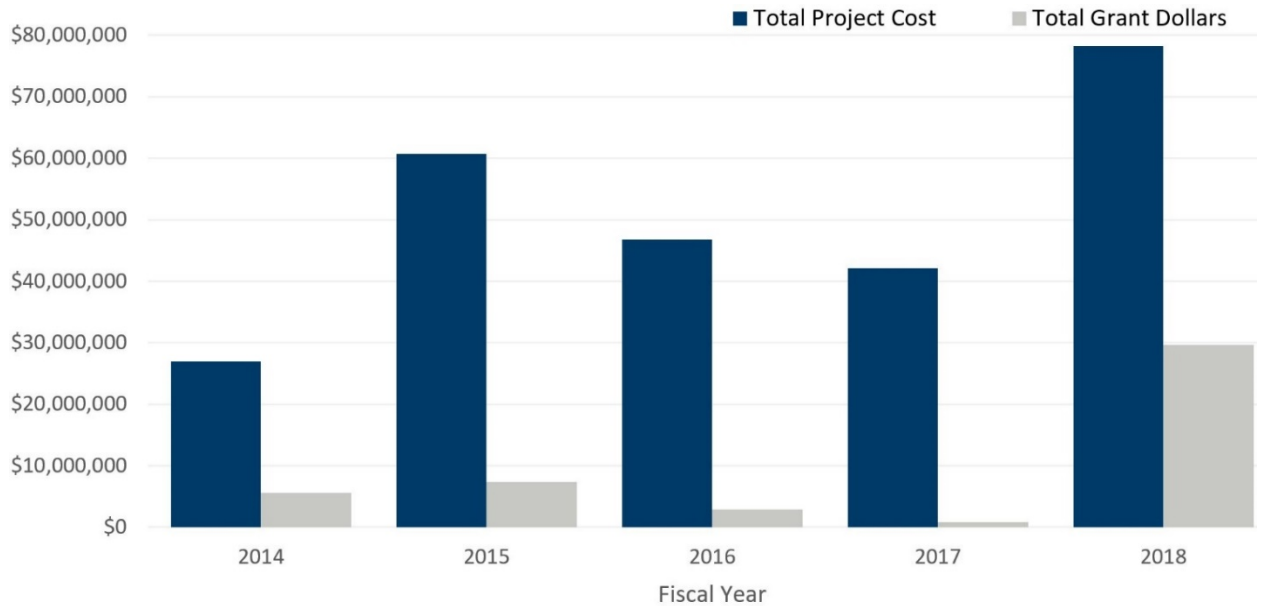
Our total need is \$7.4 billion.



Though available grant dollars increased in 2018, grant dollars still do not cover total project costs, so systems have to find other funding mechanisms for projects, such as loans. Figure 18 shows the difference between project costs and available grant dollars.

Figure 18. Grant Dollars and Total Costs for Drinking Water Infrastructure

Grant dollars are small in comparison to total project costs.



Conclusion

Minnesota's public water systems continue to provide drinking water that meets the federal drinking water standards of the Safe Drinking Water Act. When there are contamination events, the public is notified to help them avoid risks to their health. Preventing contamination remains a top priority for MDH and for public water systems.

Dealing with drinking water contaminants that are not regulated as part of the Safe Drinking Water Act is a challenge faced by more and more public water systems. Communicating about risk and financing solutions to contamination are part of that challenge.

The EPA infrastructure needs assessment process and demand for infrastructure loans demonstrate ongoing need for investment in drinking water treatment plants and distribution systems. These are critical infrastructure, as a safe drinking water supply is fundamental to healthy and prosperous citizens, communities, and businesses. Disparities in residents' costs for drinking water is an increasing concern, especially in some of Greater Minnesota's smaller towns, where rates for drinking water can be more than twice as high as in other communities.

Efforts to protect sources of drinking water continue to move forward, and associated implementation activities vary from managing known and potential sources of contamination to various forms of long-term land use protection, including easements. Most of this work has traditionally favored groundwater sources of drinking water, but new program resources are being directed to surface water sources of drinking water.

A report that lists all violations of the Safe Drinking Water Act in Minnesota for calendar year 2018 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.

Individual water systems produce an annual report, known as a Consumer Confidence Report, listing contaminants that were detected, even in trace amounts, during the previous calendar year. Please contact the individual water system if you would like a copy of this report, or visit [Search for Your Consumer Confidence Report](https://mnccr.web.health.state.mn.us/index.faces) (<https://mnccr.web.health.state.mn.us/index.faces>).

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 people in Minnesota. Some areas in Minnesota have aquifers so pristine that 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 systems 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
- Board of Water and Soil Resources
- Minnesota Pollution Control Agency
- Minnesota Department of Natural Resources
- Minnesota Department of Agriculture
- Metropolitan Council
- Environmental Quality Board
- Clean Water Council
- Public Facilities Authority
- Elkay
- H2O for Life
- U.S. and Minnesota Geological Survey
- Minnesota Ground Water Association
- Minnesota Water Well Association
- Suburban Utility Superintendents Association
- Water Resource Programs at Vermilion Community College, St. Cloud Technical and Community College and the University of Minnesota
- Association of State Drinking Water Administrators
- U.S. Environmental Protection Agency

Safe drinking water is everyone's job.

Notes on Data

Data from EPA and MDH may have slight discrepancies because of the following factors:

- There may be a lag in data transfer from MDH to EPA databases.
- Some data are reported based on the calendar year, with other data reported based on the state or federal fiscal year.
- Data may represent a point in time or a range of time.
- Dates when data is accessed may vary.
- Manual entry of data may not coincide with when data is accessed for reports.