

Minnesota Department of Health
Drinking Water Protection

Annual Report 2012



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Reports from previous years (through 1995) are also available:
<http://www.health.state.mn.us/divs/eh/water/com/dwar/index.html>



PROTECT
TREAT
MONITOR

ENSURING SAFE DRINKING WATER

Safe drinking water does not happen by accident.

Minnesota is fortunate to have an abundant supply of water in most parts of the state, and Minnesota consistently maintains one of the highest compliance rates in the nation for meeting requirements of the federal Safe Drinking Water Act.

Safe drinking water is a result of the ongoing efforts of drinking water professionals at different levels of government as well as many organizations, such as engineering firms, contractors, and associations such as Minnesota Rural Water Association and American Water Works Association in the non-profit and private sector.

However, every Minnesotan plays a role in ensuring safe drinking water. People help keep our water safe to drink by conserving and using water wisely, protecting drinking water sources, understanding what is needed to continue to produce safe water, and being willing to make the necessary investments to keep it that way.

Since 1995 the Minnesota Department of Health (MDH) has issued an annual report on the quality of drinking water in our state. The report has included a summary of sampling and monitoring results from the previous year as well as a section on emerging issues.

Over time, individual water systems have begun creating their own annual water quality reports (officially called Consumer Confidence Reports) and have distributed them to their residents. These reports also contain the results of monitoring from the previous year. The reports are often on a city's web page and can always be obtained upon request by any resident.

Since community water systems issue their own reports, MDH is changing the focus of its report starting in 2013. A summary of monitoring results, including trends from recent years, will continue in a more condensed fashion, and the report will highlight issues, stories, and other information related to activities to protect drinking water.



“In the end our society will be defined not only by what we create but by what we refuse to destroy.”

**John Sawhill
Former President
The Nature Conservancy**

Making and maintaining safe drinking water has always followed a multi-pronged approach:

PREVENTION

It is much easier and more cost-effective to keep potentially harmful contaminants out of drinking water sources than it is to remove them. Communities and the Minnesota Department of Health participate in Source Water Protection activities to keep rivers, lakes, and streams as well as underground aquifers (the source of most drinking water in the state) as clean as possible. These efforts include assessing the vulnerability to contamination of the aquifers being used and managing potential contaminant sources and land uses.

Education and training of people involved in the treatment and distribution of drinking water is another component of prevention.

MDH assesses the vulnerability of water supply systems to contamination, taking into account a number of factors. If the system uses groundwater, proper well construction can serve to decrease the risk of contamination. In some systems, natural geologic barriers may serve to protect the source water from contamination.

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 kinds of surface contaminants, including bacteria and parasites such as *Cryptosporidium*. Aquifers in many areas of Minnesota are free of microbial contamination; as a result, many groundwater systems do not routinely include disinfection as part of their normal water treatment procedures.

TREATMENT

Public water systems, often municipalities, are responsible for treating water to make sure it is safe to drink. Disinfection keeps the water free of microbiological organisms that can cause and spread disease, and filtration is often used to remove contaminants. Many municipalities also perform treatment to remove naturally occurring elements that are in the ground, such as iron and manganese, that can affect aesthetic qualities like color, taste, and odor, even if these contaminants don't have the potential to harm people's health.

MONITORING

Engineers and public health sanitarians from the Minnesota Department of Health regularly sample treated water distributed by water systems to ensure the water complies with the drinking water standards in the Safe Drinking Water Act. The process includes sampling for microbiological contaminants and nitrate, which can create immediate health hazards, and monitoring for chemical and radiological contaminants, which can increase the likelihood of adverse health effects if elevated levels are present and the water is consumed over a long period of time.

Monitoring requirements for individual public water supply systems depend partly on how vulnerable the system is to contamination.

Any time a drinking water standard is violated, the water system must take corrective actions that include notifying its residents. In addition to this notification, all community water systems will include this information in their annual water quality report (Consumer Confidence Report). This report contains information on the source of the system's water and a list of all regulated contaminants that were detected, even in trace amounts well below the legal standard, during the previous calendar year.



PROFILE OF MINNESOTA'S DRINKING WATER PROTECTION PROGRAM

The Minnesota State Board of Health (now the Minnesota Department of Health) was established in March of 1872 as a result of waterborne and foodborne diseases. Typhoid fever, a waterborne disease, was taking a large toll on lives at this time. Minnesota was the fourth state (after Massachusetts, Virginia, and California) to establish a board of health.

Regulations dealing with the safety of drinking water varied from state to state at this time. Some limited drinking water standards established by the federal government existed during this period, but it wasn't until December 1974, with the passage of the federal Safe Drinking Water Act, that a national program of regulations and standards that covered all public water systems in the United States was established. Minnesota already had strong regulations in place, which helped ease the transition to compliance when the Safe Drinking Water Act was passed.

The U.S. Environmental Protection Agency oversees the Safe Drinking Water Act, but most states, including Minnesota, have taken over the responsibility of administering and enforcing the provisions of the Act in their states.



PUBLIC WATER SYSTEMS

The Safe Drinking Water Act administered by the Minnesota Department of Health applies only to public water systems, those that serve water to the public. This includes municipal water systems as well as facilities, such as mobile home parks or factories, that have their own source of water and that serve it to the public. Whether the water system is privately owned or not, if it serves water to more than 25 people on a regular basis or has more than 15 service connections, it is considered a public water supply and subject to the regulations of the Safe Drinking Water Act.

Water from a public system will be more thoroughly tested and regulated than water from any other source, including bottled water.

Approximately 80 percent of Minnesotans get their primary source of water—that is, the water in their home—from a public water system. The other 20 percent have private wells, but even these people will be affected by public water supplies as they consume water at work or school or while traveling throughout the state. MDH regulates well construction. It's up to owners of private wells to do their own testing to ensure the safety of the water; that is not regulated by the state or federal government.

Minnesota has 6,969 public water supply systems as of April 2013. Of those systems, 961 are community systems, which provide water to people where they live. Most of these community systems use groundwater from underground sources, tapped by wells, as their source of water. However, 24 of these systems, including the municipal systems that serve the state's largest cities, use surface water drawn from lakes or rivers.

Of the state's 961 community water systems, 730 are municipal systems, serving towns or cities. The rest of the community systems provide water to people in a variety of residential locations, including manufactured home parks, apartment buildings, housing subdivisions, colleges, hospitals, and correctional facilities.

The other public water suppliers (approximately 6,000) are noncommunity systems. Some of these 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.

ROLE OF THE MINNESOTA DEPARTMENT OF HEALTH IN ENSURING SAFE WATER

The Minnesota Department of Health works with water suppliers and others to ensure compliance with SDWA standards, although enforcement through fines and administrative penalty orders can be used when necessary.

Role of the Minnesota Department of Health:

- Monitor drinking water quality and perform onsite inspections of a water system's facilities and operation. MDH may test each public water system for up to 118 different contaminants. A monitoring schedule is tailored for each system, based on its vulnerability to various types of contaminants.
- Establish construction standards and review and approve plans for construction of drinking water facilities. The review process ensures conformity with design standards that enable water systems to meet and remain in compliance with current and future SDWA regulations.
- Train and certify operators of water supply systems.
- Award loans to public water suppliers for infrastructure improvements.
- Work with public water suppliers to develop and implement plans that protect their water sources.
- Review and approve wellhead protection plans.
- Provide public information, education, and assistance.

According to the U.S. Environmental Protection Agency, it costs about 10 to 30 times more to clean up contaminated drinking water wells than it does to prevent the contamination.

PREVENTION

An active part of drinking water activities at the Minnesota Department of Health is Source Water Protection. Partners such as Minnesota Rural Water Association and public water suppliers are also part of this effort.

The goal of the Source Water Protection program is to prevent contamination of public water supply wells. According to the U.S. Environmental Protection Agency, it costs about 10 to 30 times more to clean up contaminated drinking water wells than it does to prevent the contamination. Therefore, source water protection makes sense from two perspectives: public health and economic.

Minnesota's Source Water Protection program has three primary parts:

- **Wellhead Protection**
- **Source Water Assessments**
- **Protection of Surface Water Intakes**

Wellhead Protection programs are designed to protect wells. For public water systems, states are required to have wellhead protection programs under the provisions of the 1986 amendments to the federal Safe Drinking Water Act. A capture zone for the well (called the wellhead protection area) is designated, and a plan is developed and implemented for managing potential contamination sources within the wellhead protection area. The Minnesota Department of Health assigns staff in the Source Water Protection Unit to assist public water suppliers with preparing and implementing wellhead protection plans. Minnesota Rural Water Association provides similar assistance to public water suppliers. MDH administers the state wellhead protection rule, Chapters 4720.5100 - 4720.5590, that sets standards for wellhead protection planning.

Since 1973, the following advances in wellhead/source water protection have occurred:

- Minnesota's wellhead protection program description was approved by the U.S. Environmental Protection Agency in 1996, and state wellhead protection regulations were adopted the following year.
- Wellhead protection has been integrated into Minnesota's environmental programs and regulations, such as environmental review, feedlot, on-site wastewater, leaking fuel tank, and stormwater regulations.
- As of early 2013 MDH has phased in 423 of the state's community water suppliers that use groundwater into the wellhead protection program. Of these, 286 are implementing their wellhead protection plans (69 are also amending their plans), and 136 are developing wellhead protection plans for the first time.
- An Inner Wellhead Management Zone, which is defined by a 200-foot radius, has been designated for all of the state's public water supply wells to address potential contamination sources that present an acute health risk from high levels of bacterial and chemical contamination.


Implementing management measures for potential contamination sources not only reduces the risk they may present to public drinking water, but in some cases, has reduced the contaminant levels in a public well.

A Source Water Assessment is a document—produced by MDH, provided to the public water system, and made available to the public—that summarizes a variety of information regarding the water sources used by a public water system. Specifically, the assessment includes:

- A description of the drinking water source(s) used by the water system and the area that contributes water to the source(s). This includes a map showing the location of the water source(s).
- A determination of the “susceptibility” of drinking water sources to contamination. Susceptibility describes how likely it is that a water source may become contaminated. For wells, susceptibility is based on well construction, underlying geologic materials, the type of aquifer that supplies the well(s), and previous water sampling results.
- Drinking water contaminants are of concern to anyone using the water source. For wells, this will be based on any detection of regulated contaminants during previous water sampling. Along with the text portion of the assessment, a map will be generated showing the Inner Wellhead Management Zone for the well(s) or a Drinking Water Supply Management Area, if one has been approved.

Protection of Surface Water Intakes is not required, but several of Minnesota's 24 community water supply systems that use surface water—St. Cloud, Minneapolis, and St. Paul—have developed and are implementing surface water intake protection.





Both quality and quantity are considered in protecting water sources throughout Minnesota, where challenges vary depending on the region. For example, the southwestern part of the state gets less precipitation and also has geologic features that make it less conducive to holding water in aquifers. Rising demand for agricultural, commercial/industrial, and residential uses can cause underground and surface supplies to be depleted if the water drawn from these sources exceeds the amount being replenished by rain and snowfall. A lack of water has impacts for many uses, from recreational use to issues affecting the potential for economic development in many communities. How land is used and treated by industry, agriculture, and citizens plays a role in protecting water resources. Both regulation and cooperation, often voluntary, are needed. MDH has water quality information for private wells as well as public systems, such as municipalities, and works with other organizations and state agencies with the goal of assuring a continued supply of water of sufficient quality to meet the various needs for it. Partnerships are essential in achieving the goals of having water quality and quantity needed to keep Minnesota vibrant in areas ranging from the environment, business development, and an overall standard of living. MDH works with, among others, the Minnesota Department of Natural Resources, American Water Works Association, Minnesota Pollution Control Agency, Minnesota Department of Agriculture, U. S. Geological Survey, and Minnesota Rural Water Association in its commitment to safe drinking water as well as water for other purposes.

Success Stories:

The Missing Well

Some gumshoe work by the Minnesota Department of Health, the Hastings Public Works Department, and the Dakota County Environmental Management Delegated Well Program finally cracked the case of the missing well in Hastings.

A municipal well had been taken out of service and buried in the 1930s without ever having been properly sealed. No construction records existed for the well, but available documents indicated that the well was 415 feet deep and constructed prior to 1911. Engineering reports from the State Board of Health revealed that the well was located in the bottom of a 14-foot square well pit that was 18-1/2 feet deep and within 25 feet of the Mississippi River in downtown Hastings. The well had once provided approximately 90,000 gallons of water per day to residents in addition to furnishing the railroad depot and filling two coaches of the Chicago, Milwaukee, and St. Paul Railway Company.

In early 2009, the county's delegated well program found fire insurance maps that showed a city pumphouse and well in Levee Park in downtown Hastings. There was no well sealing record on file indicating that the well had been properly sealed. Staff conducted a magnetometer survey in the park to search for the well and detected a large magnetic anomaly in the park near the Mississippi River. That May, MDH inspectors followed up with another magnetometer survey. The following year, the city removed a tree, excavated the site and found the well pit.

The top of the well casing was 17 feet below the surface, approximately at river level. It was anticipated that artesian conditions, where water would flow freely from the well, would be encountered once the pump and suction pipe were removed from the well. A well drilling firm removed the pump from the well, extended the well casing above the ground surface to stop any artesian flow, and temporarily capped the well. This firm eventually sealed the well with neat-cement grout.

Prior to the well sealing, the city was informed that this public water supply well might qualify for well sealing grant money through the MDH's Drinking Water Protection Section from the Minnesota Clean Water, Land, and Legacy Amendment Fund. The city of Hastings applied for, and was awarded, \$10,000 in grant money to help pay for the well sealing costs.

Legacy Funds Help Small Cities Seal Wells with High Arsenic Levels

Big Falls, in Koochiching County, has dealt with issues of naturally occurring levels of arsenic, especially since the maximum contaminant level for arsenic was lowered from 50 to 10 parts per billion in 2006. One of the city's wells had high levels of arsenic, and Big Falls struggled to meet the stricter standard. Finally, the city drilled a new well and took the well with high arsenic out of service. However, this old well was close to the new well and an existing well and needed to be sealed so that it wouldn't become a channel for contamination to get into the groundwater.

Big Falls is a small city and found the cost of sealing the well to be a hardship. Funds from the Minnesota Clean Water, Land, and Legacy Amendment covered the \$1,350 cost of sealing the well, while the city was responsible for obtaining estimates, contracting with a licensed well driller, and providing documentation to the Minnesota Department of Health.

Funds from the Minnesota Clean Water, Land, and Legacy Amendment helped Big Falls to protect its groundwater and to continue to provide its 264 residents with safe drinking water.

Abandoned or unused wells can easily channel contamination from the land surface into aquifers that are used for drinking water. The city of Pelican Rapids, in Otter Tail County in central Minnesota, had a pair of wells located in areas where contamination was known to be present.

The Minnesota Department of Health identified these wells as potential threats to the city's drinking water supplies. After Pelican Rapids developed a wellhead protection plan that included the sealing of these two wells, MDH, using funds from the Minnesota Clean Water, Land, and Legacy Amendment, awarded the city \$8,940 to seal them.

By sealing the abandoned wells, the city is protecting its groundwater, helping it to continue providing its 2,374 residents with safe drinking water.

Plan Review Ensures Proper Construction

Ensuring proper construction for new and renovated drinking water infrastructure is another way of preventing problems before they happen. The Minnesota Department of Health reviews plans and specifications for drinking water projects. The totals for approved plans have risen steadily in the past few years, indicating growth following a recession. A total of 480 plans were approved in 2010, 432 in 2011, and 587 in 2012, broken down as follows:

- Booster Station - 4
- Chemical Feed - 15
- Plumbing - 5
- Pumphouse - 18
- Storage (Coating) - 16
- Storage (Installation) - 4
- Treatment - 21
- Treatment Plant (New) - 6
- Treatment Plant (Renovation) - 16
- Water Service Line - 36
- Watermain - 396
- Well - 50

Watermain approvals, a partial indicator of housing starts, increased from 360 in 2010 to 396 in 2012.



Clean Water Legacy Funding

In 2008 Minnesota voters approved the Clean Water, Land, and Legacy Amendment to the state constitution, increasing the sales tax by three-eighths of one percent and allocating the additional revenue to protect state waters, preserve arts and culture, and support state parks and trails. Approximately 33 percent of the tax proceeds are dedicated to a Clean Water Fund to protect, enhance, and restore water

quality in lakes, rivers, streams, and groundwater, with at least five percent of the fund targeted for protecting drinking water. Minnesota Department of Health activities focus on protecting public health by evaluating and communicating scientific information about the potential for health risks from exposures to possible contaminants in drinking water and by ensuring a safe and adequate supply of drinking water for all Minnesotans through source water protection.

MDH Clean Water Fund Activities

Activity	FY 10-11	FY 12-13	FY 14-15 (proposed)
Contaminants of Emerging Concern	\$1,335,000	\$2,040,000	\$2,340,000
Source Water Protection	\$2,415,000	\$2,830,000	\$3,230,000
Well Sealing	–	\$500,000	\$500,000
County Well Index	–	\$668,000	\$780,000
Private Well Protection*	–	–	\$650,000
Beach Monitoring*	–	–	\$210,000



* *New Initiatives*

(FY = Fiscal Year)

Source Water Protection Grants

The Source Water Protection grant program, made possible with funding from the Clean Water Fund, is a new grant program that offers financial support to public water suppliers. Three types of Source Water Protection grants cover all categories of public water suppliers:

Source Water Protection plan implementation grants apply to community or nontransient noncommunity water suppliers that have a current MDH-approved wellhead protection plan or MDH-endorsed intake protection plan. These grants help suppliers implement their source water protection plans.

Source Water Protection competitive grants apply to community or nontransient noncommunity water suppliers regardless of whether they have a wellhead protection plan in place to support management of a potential contamination source that presents a high risk to a source of drinking water.

Source Water Protection grants for noncommunity transient systems apply to transient noncommunity water suppliers to support wellhead protection measures that address a potential contamination source that presents a high risk to a source of drinking water.

The table below shows the number of grants awarded to date:

	FY 10 (closed)	FY 11 (closed)	FY 12 (in progress)	FY 13 (in progress)
Plan Implementation Grants	11 grants – \$92,449.14	66 grants – \$426,441.60	29 grants – \$186,081.85	20 grants – \$137,060.80
Competitive Grants	–	25 grants – \$183,146.15	17 grants – \$105,971.99	5 grants – \$46,279
Transient Grants	–	26 grants – \$102,097.15	32 grants – \$205,366.62	13 grants – \$73,762.17

(FY = Fiscal Year)

Contaminants of Emerging Concern

New contaminants are being found in Minnesota waters for a variety of reasons, including better analytical methods for finding substances at lower levels as well as the fact that additional substances are being looked for, new substances are being used, and old substances are being used in new ways. The Drinking Water Contaminants of Emerging Concern (CEC) program at the Minnesota Department of Health is investigating and communicating the health and exposure potential of these contaminants in drinking water.

Contaminants of emerging concern are substances that have been released to, found in, or have the potential to enter Minnesota waters (groundwater or surface water) and:

- do not have Minnesota human health-based guidance (how much of a substance is safe to drink);
- pose a real or perceived health threat; or
- have new or changing health or exposure information.

TREATMENT

No matter how effective protection efforts are at keeping substances out of drinking water sources, some form of treatment may be needed. Some threats to drinking water come from animal and human activity, but naturally occurring elements in the ground can also make their way into water. Even the treatment itself can create by-products that may be harmful, and utilities have to manage this process. And sometimes water that leaves a treatment plant may be free of harmful contaminants, only to pick up substances, such as lead and copper, as the water passes through the distribution system and people's own residential plumbing.

The level of treatment needed is greater for surface water sources, which are open to the environment and more susceptible to contamination. Minnesota has 24 community water systems that use surface water. Minneapolis, St. Paul, and St. Cloud draw water from the Mississippi River. Duluth and several cities along the North Shore use Lake Superior for their source. Minnesota is unique in another type of surface source: unused mine pits for

CECs can include pharmaceuticals, pesticides, industrial effluents, personal care products that are washed down drains and processed by municipal wastewater treatment plants, and others.

MDH currently develops human health-based guidance for contaminants that have already been found in groundwater in Minnesota. Under the CEC program, MDH takes a proactive approach to the protection of drinking water by considering contaminants that have been found in groundwater, surface water, or soil or have not been found (or looked for) in Minnesota at all. Additionally, this program provides information on how people are exposed to these contaminants. These differences separate the work of this program from MDH's other guidance work and supplements existing work.

The CEC program supports the Clean Water Legacy Fund mission to protect drinking water sources and the MDH mission to protect, maintain, and improve the health of all Minnesotans.

some utilities in the Iron Range in the northeastern part of the state. These systems all perform filtration on the water, as do many systems that use groundwater.

Disinfection, usually with the addition of chlorine, rids the water of microbial contaminants. Sometimes chlorine can combine with organic matter in the water to form trihalomethanes, a by-product that can cause cancer. Management of the chlorine addition and other steps can reduce these by-products.

Municipal water treatment plants also have fluoride in the water for dental protection. In most cases, cities add fluoride to an optimal level although some communities have naturally occurring fluoride in the ground that dissolves into the water.

Water utilities may also adjust the chemical properties in their water to achieve different results, including making the water less corrosive and, as a result, less likely to absorb materials from the distribution system and household plumbing.

An example of the importance of water to local development has emerged in East Bethel, a bedroom community of 11,000 approximately 30 miles north of the Twin Cities, spanning both sides of Minnesota Hwy. 65.

A new water and stand-alone wastewater system was completed in 2012 on the west side of the city, designed to spur commercial development along the Hwy. 65 corridor. "The original thought was to promote industrial and commercial development," said city administrator Jack Davis, who added that this may also bring some high-density housing to the area. "With the availability of water, this changes the whole landscape."

Public works superintendent Nate Ayshford said the plant's dual pressure filters, which remove iron and manganese, have a rated capacity of just over 1,000 gallons a minute. "They can handle much more, but that is their approved capacity," said Ayshford.

Two new wells serve the plant, one that is 350 feet deep and draws from the Iron-ton-Galesville aquifer. The water from this well is low in iron, according to Craig Jochum of Hakanson Anderson Associates, Inc. of Anoka, Minnesota, the firm that designed the plant. The other, which is 250 feet deep in a gravel seam above the Iron-ton-Galesville aquifer, is a higher producer but also has higher levels of manganese. Jochum said that iron is added to the water before it reaches the filters to aid in the manganese removal. The utility also adds sulfur dioxide to control odors and chlorine. Fluoride is added to the water after it leaves the filters.

Davis said the entire project was financed with three bonds totaling \$18.8 million. "We're doing more commercially," he added. "Water is the key to development."



***"Water is
the key to
development."***

Bottle-filling stations are working their way into government facilities, schools, and other public places as people who care about water are promoting drinking from the tap with refillable bottles as an alternative to buying bottled water.

Bruce Wilson, the chief operator at the International Falls water treatment plant, installed such a station at the plant and is promoting its use in other municipal buildings. Wilson had been to the College of St. Benedict in St. Joseph and was impressed with the school's attitude toward water. The students saw water as a basic human right, not a commodity to be sold. In addition to not allowing sales of bottled water on campus, St. Benedict has a bottle-filling station in each building. These stations combine a normal drinking fountain with a ledge in back to allow for the filling of reusable water bottles.

When the drinking fountain at the water treatment plant needed replacement, Wilson replaced it with a bottle-filling station. Since then the fire department and municipal ice arena have installed these stations and other city facilities are considering it. "We want people to be aware we have an essentially free supply of water," said Wilson. "When you get right down to it, it's pretty convenient and pretty cheap."

"We've got a great source of water," said Wilson. "We might as well use it. No sense hauling it in on trucks."



"We want people to be aware we have an essentially free supply of water."

(Photo reprinted with permission of the *Journal of International Falls*.)

Training And Education

The people who perform the critical jobs of treating and distributing water to the public are required to meet strict regulations in their ability to do the work. Water operators in Minnesota must be licensed by the Minnesota Department of Health and attend ongoing training, provided by the Health Department in conjunction with other organizations, such as the Minnesota Section of American Water Works Association (AWWA) and the Minnesota Rural Water Association (MRWA).

In 2012, MDH co-sponsored nine training workshops, ranging from one to three days and reaching more than 1,000 operators around the state, in a partnership with Minnesota AWWA. In addition, MDH presented and participated in training conducted by the Minnesota Rural Water Association, including MRWA's annual technical conference, which nearly 1,500 operators attended.

In 2012, 436 operators took certification exams with 89 percent of them passing on their first attempt. The department also issued 385 certificates and renewed 917 certificates.

Another area of education involves an annual workshop for Minnesota science teachers, *WaterWorks! A Drinking Water Institute for Educators*, which the Minnesota Department of Health, along with Minnesota AWWA, has conducted since 2001. Middle-school and high-school teachers learn about drinking water, along with ways to develop the subject into inquiry-based curriculum, at these Institutes. They also have the opportunity to write curriculum to take back to their classrooms. Teachers return for a follow-up session in the fall to present their action plans and have them subjected to a peer-review process. Those who complete the workshop receive college credits for their participation.

More than 250 teachers have attended the Drinking Water Institute since it began in 2001. The 2012 Drinking Water Institute was held at St. Cloud Technical & Community College. The 2013 Institute will be held in August in Rochester.

Water Operator Certification Exams

2010	Exams Given	Pass	Fail	% Pass Rate
Class A	21	10	11	48%
Class B	70	47	23	67%
Class C	89	79	10	89%
Class D	171	161	10	94%
Class E	110	110	0	100%
Total	461	407	47	88%

Certificates Renewed: 880
New Certifications Issued: 410

2011	Exams Given	Pass	Fail	% Pass Rate
Class A	26	11	15	42%
Class B	54	34	20	63%
Class C	126	115	11	89%
Class D	135	131	4	97%
Class E	104	104	0	100%
Total	445	395	50	89%

Certificates Renewed: 963
New Certifications Issued: 361

2012	Exams Given	Pass	Fail	% Pass Rate
Class A	26	11	15	42%
Class B	54	34	20	63%
Class C	127	115	11	91%
Class D	135	131	4	97%
Class E	94	94	0	100%
Total	436	385	51	89%

Certificates Renewed: 917
New Certifications Issued: 385

While Minnesota drinking water treatment and distribution systems are generally in good shape, an ongoing challenge is maintaining the infrastructure that makes safe water possible.

As treatment plants, wells, watermains, and other critical components of producing and delivering drinking water get older, investments are needed to keep them performing at optimum levels. Water utilities engage in a process called asset management to monitor and maintain their infrastructure in a manner to be able to continue the best possible service for their customers. Asset management involves ongoing review of facilities and planning for making sure they can be maintained or replaced when needed as well as identifying the means to pay for the necessary investments. Needs surveys project that more than \$6 billion will be required nationally over the next 20 years. Mechanisms such as Minnesota's Drinking Water Revolving Fund, which provides below-market-rate loans needed for water systems to achieve and maintain compliance with the federal Safe Drinking Water Act, are a great source of help for many utilities. However, other means of investment, such as adjusting water fees to customers to reflect the true value of water, are an important part of the process.



Treatment failures, watermain breaks, and other disruptions create public health risks and can also cause great inconvenience. Disasters can come from natural events, such as floods and tornadoes, and Minnesota has a response network that allows mutual-aid agreements among communities. The Minnesota Water/Wastewater Agency Response Network (MnWARN) facilitates prompt assistance, by providing personnel and equipment, to areas affected by a disastrous event.

Beyond natural disasters are security issues. Water utilities are aware of threats from vandalism and other malicious events. Emergency plans developed by water systems include responses and information sharing related to these types of events.

MONITORING

Minnesota's community water supplies are tested for a number of different types of contaminants. The reasons for testing—and how often the testing is done—depend on the type of contaminant 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 tested for include:

Pesticides and Industrial Contaminants. Minnesota's community water supply systems are routinely tested for more than 100 different 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 vulnerability of the system to contamination. Some systems may not need to do any testing for a particular contaminant. A formal use waiver is sometimes granted, specifically exempting a water supply system from testing for a particular contaminant, if that chemical or pesticide is not commonly used in the immediate area. The EPA has developed legal standards known as maximum contaminant levels (MCLs) for 60 of the more common pesticides and industrial contaminants found in drinking water. Advisory standards have been developed for the other pesticides and industrial contaminants, and those are used in the same way as the MCLs in assessing test results.

Any time a community water system exceeds the MCL for one of these contaminants, the water supply operator, with the assistance of MDH, must notify the people who use the water. Appropriate steps are then taken to reduce the contamination to acceptable levels. In some cases, the MCL or advisory standard is calculated to prevent immediate or short-term health effects. More often, however, these standards are 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. Community water supply 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. The coliform test is used as a general indicator of water quality in the

system, in terms of 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 fecal coliform or *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 would be if fecal coliform or *E. coli* were found.

Nitrate/Nitrite. Community water supply systems in Minnesota are tested once a year for nitrate, a chemical which may occur naturally in the environment but which can also enter the water from sources like fertilizer runoff, decaying plant and animal wastes, or sewage. Nitrate is a health concern primarily for infants under the age of six months. 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 water supply 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 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, blending the water with another source to lower the level of nitrate, or drilling a new 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 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 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, 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 method of disinfection is the addition of chlorine to drinking water supplies. Not only is chlorine 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. Chlorine can combine with organic materials in the raw water to create contaminants called trihalomethanes (THMs) and haloacetic acids (HAAs). Repeated exposure to elevated levels of THMs over a long period of time 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 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 U.S. Environmental Protection Agency, the water system must take action to correct the problem. The corrective actions include notifying all residents served by the water system.

Lead and Copper. All community and nontransient public water systems have been tested for lead and copper. In community water systems, the water was tested in a number of homes within each system to determine if they exceeded the federal "action level" of 15 parts per billion (ppb) for lead or 1,300 ppb for copper. If a system exceeded the action level for lead or copper in more than 10 percent of the locations tested, it was required to take corrective action and do further testing. Current testing requirements are based partly on the results of that initial round of testing and of the success of subsequent efforts to reduce the risk of lead contamination in systems that have previously exceeded the action level.

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 of time, usually by standing in the system overnight, before it can absorb potentially hazardous levels of lead. Consumers can usually protect themselves simply by turning on the faucet and letting the water run for 30 seconds, or until it runs cold, before using it for drinking or cooking. Those in homes with lead service connections should run the water an additional 30 seconds after it turns cold. 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 also one of the easiest sources 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, so it will be less likely to absorb lead from plumbing.



It is generally understood that occurrence trends among naturally occurring contaminants, such as arsenic and radium, are relatively stable. More work is being done to understand what trends may be occurring among contaminants caused by human and animal activity, and what can be done to minimize occurrence using source water protection.

Assessing Vulnerability to Contamination

Monitoring requirements for individual public water supply systems depend partly on how vulnerable the system is to contamination. MDH assesses the vulnerability of water supply systems, taking into account a number of factors. If the system uses groundwater, proper well construction can serve to decrease the risk of contamination. In some systems, natural geologic barriers may serve to protect the source water from contamination. Systems with a past history of contamination problems may be at higher risk.



MONITORING TEST RESULTS FOR 2012

This is a summary of results of monitoring performed in 2012. In the case of a violation, a water system takes corrective actions. These actions include public notification to inform affected residents of the situation and if there are any special precautions they should take. In all cases noted here, residents were advised directly by the water system at the time the violation occurred.

All community water systems have also noted any violations in the water quality reports they distribute to their residents. Information on a complete summary of monitoring results in 2012 is in the appendix.

Pesticides and Industrial Contaminants

During 2012, MDH conducted 22,807 tests for pesticides and industrial contaminants in community water systems. No systems violated drinking water standards for these contaminants.

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	0	0	1	0	0	1	1	0	0	0
- Municipal	0	0	1	0	0	1	1	0	0	0

Community systems include both municipal and nonmunicipal systems.

Bacteriological Contamination

Nine community systems, including 8 municipal systems, tested positive for bacteriological contamination in 2012.

Standard procedures were followed in all of these cases. Systems were disinfected, flushed, and retested to ensure that any contamination problems had been eliminated. All of the residents served by the affected systems were informed of the situation.

The number of systems that tested positive for bacteriological contamination is in line with numbers from previous years.

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	9	15	15	13	14	20	14	16	18	19
- Municipal	8	12	10	5	8	17	9	9	10	9

Nitrate/Nitrite

One nonmunicipal system exceeded the standard for nitrate in 2012.

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	1	1	3	0	0	0	2	1	2	2
- Municipal	0	1	1	0	0	0	0	0	1	1

Arsenic

Ten community water systems, including 8 municipal systems, exceeded the standard for arsenic by the end of 2012.

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

For many years the maximum contaminant level for arsenic in water was 50 parts per billion. In 2006 the maximum contaminant level was dropped to 10 ppb. Systems that were in compliance with the previous MCL but had levels that would not comply with the revised standard began making plans and considering options for reducing their levels of arsenic. Approximately 40 systems were in this category. By management of the water supply and/or adding treatment, many have come into compliance with the stricter MCL. The others are continuing to work on the situation and have been communicating with their residents.

Violations since 2006:

Year	2012	2011	2010	2009	2008	2007	2006
Community	10	10	15	10	13	11	18
- Municipal	8	8	10	6	9	11	15



Radioactive Elements

Radiation occurs naturally in the ground, and some radioactive elements may work their way into drinking water.

Radium 226 & 228

Nine community water systems, including 8 municipal systems, exceeded the standard for radium 226 & 228 by the end of 2012.

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

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	9	11	9	10	19	13	13	16	13	10
- Municipal	8	10	8	8	7	10	12	14	12	8

Other Inorganic Chemicals

No community water systems exceeded the standard for inorganic chemicals in 2011.

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	0	0	0	1	1	0	0	0	0	0
- Municipal	0	0	0	0	1	0	0	0	0	0

Disinfection By-products

No community water systems exceeded the standard for disinfection by-products in 2012.

Violations from the last 10 years:

Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Community	0	1	0	3	1	0	0	1	2	0
- Municipal	0	1	0	2	1	0	0	1	2	0

Lead and Copper

As a result of the Lead and Copper Rule, implemented by the U.S. EPA in 1991, community water services began sampling for lead and copper in 1992. These contaminants differ from others in that they are rarely present in source water. Rather, lead and copper may appear in water by dissolving from parts of the distribution system, often household plumbing. Monitoring for lead and copper is done in individual homes and on a case-by-case basis. Samples are taken after the water has been idle, resulting in elevated 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 materials from the plumbing.



Since the initiation of the lead and copper monitoring program in 1992, more than 250 community water systems in Minnesota have exceeded the lead and/or copper action levels. Most systems have returned to compliance after implementing corrective actions; however, approximately 5 to 10 systems end each year with a lead or copper exceedance.

In 2012, 3 community systems exceeded the lead action level, and 11 community 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 has worked with these systems and has been doing its own education campaign since the early 1990s with information about lead and copper and simple precautions people can follow to reduce their exposure.

Enforcement Tools

Minnesota Department of Health engineers and public health sanitarians evaluate compliance status and, when necessary, work with public water supply systems to develop actions and timelines to return to compliance. However, MDH will take enforcement actions when necessary by using a variety of methods to ensure compliance. The tools include a Notice of Violation, issued to a regulated party that has committed a violation of a statute or rule; a Compliance Agreement, a negotiated agreement between the party and MDH; a 10-Day Letter, requiring a response about potentially serious or repeated violations; and an Administrative Penalty Order, which is used to gain compliance. These methods can be used when a public water system violates a drinking water standard or when it violates reporting requirements.

In 2012, MDH entered into 16 compliance agreements and issued 15 10-day letters and 2 administrative penalty orders to community public water systems. (For comparison, in 2011, MDH entered into 17 compliance agreements and issued 9 10-day letters and 5 administrative penalty orders to community public water systems.)

Service Connection Fee

In 1992 the Minnesota Legislature established a service connection fee, which directs each municipal water system to collect an annual fee (now \$6.36) for each connection. These funds are sent to the Minnesota Department of Health to cover the costs of testing the nearly 7,000 public water systems in the state as well as to conduct inspections, develop protection plans, and provide technical assistance to these systems, which helps ensure that safe water is being provided to people in Minnesota.

A charge of \$1.59 will appear on a quarterly bill; the charge on a monthly bill will be 53 cents. It could also appear as one lump charge for the entire year on one of the bills.

SERVICE CHARGE	5.00
WATER CONSUMPTION - TIER 1	39.76
STATE TESTING FEE	1.59
SEWER	47.88
STORM DRAINAGE - RES	11.33
STREET LIGHTS	5.19
RECYCLING CREDIT	1.80CR

CONCLUSION

Monitoring test results for 2012 tend to reinforce the conclusions of previous years. Although we need to remain vigilant, Minnesotans can continue to have confidence in their drinking water.

MDH remains committed to protecting the high quality of our drinking water. The safety of our drinking water should never be taken for granted—but Minnesotans can be assured that their local water supply system is making every effort to ensure that their water is safe. And they can also be assured that the Minnesota Department of Health—and the broader public health community—are working to ensure that their confidence is well placed.



APPENDIX

The summary includes results for both community and noncommunity public water systems in Minnesota in 2012. Public water supply systems include all systems that serve 25 or more people on a regular basis, or that have 15 or more service connections. There are 6,969 such systems in Minnesota, including:

961 community systems, which provide water to consumers in their places of residence, including 730 municipal systems.

6,008 noncommunity systems, which provide drinking water in settings like factories, schools, restaurants, and highway rest stops.

A report that lists all violations of the Safe Drinking Water Act in Minnesota for calendar year 2012 is available from the Drinking Water Protection Section, Minnesota Department of Health, Box 64975, St. Paul, MN 55164-0975. This is also available at:

<http://www.health.state.mn.us/divs/eh/water/com/dwar/summary2012.pdf>

<http://www.health.state.mn.us/divs/eh/water/com/dwar/pwsid2012.pdf>

<http://www.health.state.mn.us/divs/eh/water/com/dwar/contaminant2012.pdf>

Individual water systems produce an annual 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.



Scan Here!

Use your smartphone to get the Drinking Water Annual Report at your fingertips.



Minnesota Department of Health
Drinking Water Protection

Mailing address:
P.O. Box 64975
St. Paul, MN 55164-0975

Phone: 651-201-4700

<http://www.health.state.mn.us/water>

We want to formally 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
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
U.S. and Minnesota Geological Survey
Minnesota Ground Water Association
Minnesota Water Well Association
Suburban Utility Superintendents Association
Hamline University Center for Global Environment Education
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.