Minnesota Department of Health
Protecting, maintaining and improving the health of all Minnesotans

Annual Reports
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Minnesota Drinking Water: Protecting Public Health

Summary of Drinking Water Protection Activities in Minnesota for 2004

Issued May 2005

Introduction

Ensuring the safety of our drinking water is one of the most fundamental, and most critical, responsibilities of modern public health. In fact, safe drinking water has been a key ingredient in some of the greatest public health achievements of the last half-century, including the dramatic reductions in disease and improvements in longevity that we now tend to take for granted. Along with other basic public health measures like immunization, drinking water protection has played a crucial role in building a safer and healthier society.

We need to remain vigilant if we are to protect those past gains. The Minnesota Department of Health (MDH) is strongly committed to safeguarding the quality of our drinking water, and as part of that commitment, we routinely monitor all of our state's public water supply systems for a broad range of chemical, radiological, and biological contaminants.

MDH believes that educating the public about water quality issues is an important element of drinking water protection. Since 1995, we have been releasing annual summary reports, like this one, to help us achieve that goal. Like previous reports in the series, this year's report covers test results and actions taken during the preceding calendar year.

The main body of the report provides information about Minnesota's community water supply systems—that is, systems that provide people with drinking water in their places of residence.

The section on Emerging Issues contains information on the security of water systems, an update on drinking water standards that are being reviewed and revised, and a look at challenges some water systems are facing because of contaminated sources. In addition, the section contains a listing of key dates in the history of the drinking-water program in Minnesota.

We hope this information will provide the people of Minnesota with a clearer picture of what is being done to protect the quality of their drinking water, and what our monitoring efforts have revealed about the success of those efforts. We believe that the picture is a positive one, and we hope this report will build Minnesotans' confidence in both the safety and the quality of their drinking water.

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Executive Summary

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 the responsibility of regulating approximately 7,600 public water supply systems statewide. This figure includes 966 community systems, which provide drinking water to people in their places of residence. The community systems include 720 municipal systems, serving towns or cities.

The Major Elements of Drinking Water Protection
Minnesota's drinking water protection strategy includes three major elements:

- **Prevention** measures are used to protect the quality of drinking water at the source by controlling potential sources of pollution, regulating land use, reviewing plans and providing advice on construction of water treatment and distribution facilities, and inspecting these facilities on a regular basis.
- **Treatment** measures, including routine disinfection, are used to make the water palatable and safe to drink.
- **Monitoring** of water supplies for potentially harmful contaminants, on a routine basis, is the critical element of the state's enforcement responsibilities under the Safe Drinking Water Act.

The Monitoring Process
Minnesota's community water supply systems are monitored for the following types of contaminants:

- **Pesticides and Industrial Contaminants.** Each community water system may be tested regularly for more than 100 pesticides and industrial contaminants, including both synthetic organic chemicals (SOCs) and volatile organic chemicals (VOCs). The list of chemicals to be tested, and the testing schedule, may vary from one system to another. Testing requirements depend on factors such as whether a particular chemical is likely to be present in the local environment and how vulnerable the system is to contamination. If a system exceeds the applicable federal or state drinking water standard for a particular chemical, it must notify the people who use the water and take appropriate steps to correct the problem.

- **Bacterial Contamination.** Larger community water systems are tested monthly, and smaller systems are tested quarterly, for contamination by coliform bacteria. The coliform test is used as a general indicator of water quality in the system, in terms of potential microbial contamination.

  Standard procedures are followed whenever potential bacterial contamination is detected. Systems are disinfected, flushed, and retested to ensure that any contamination problems are eliminated. All of the residents served by the system are informed of the situation. In some cases, boil water notices are issued, advising residents to boil their water before using it for drinking or cooking.

- **Nitrate.** Each system must be tested annually for nitrate. Nitrate occurs naturally in the environment, but elevated nitrate levels in drinking water are usually associated with the use of fertilizer, or the breakdown of human and animal waste. It is a health concern primarily for infants under the age of six months. If the federal standard for nitrate is exceeded, an advisory is issued regarding consumption of the water by infants. The advisory remains in effect until steps can be taken to correct the problem.

- **Inorganic Chemicals and Radioactive Elements.** Each system is typically tested once every nine years—although, in some cases, it could be as often as once a year—for 13 additional inorganic chemicals. Systems are normally tested every three years for a number of radioactive elements. Both inorganic chemicals and radioactive elements may be naturally present in the water. If the water exceeds health standards for either type of contaminant, people who use the water are informed, and steps are 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 disease. The most common method of disinfection is through the addition of chlorine to drinking water supplies. However, 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. By 2003, 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 (EPA), the water system must take action to correct the problem. The corrective actions include notifying all residents served by the water system.

- **Lead and Copper.** For the last several years, community water supply systems have participated in efforts to reduce lead and copper contamination in drinking water. Lead and copper are not typically present in the water when it leaves the treatment plant. Lead and copper differ from other contaminants in that they are rarely present in source waters. Rather, they enter the water through contact with plumbing components, usually in individual homes. If more than 10 percent of the homes in a community exceed the federal "action level" for lead or copper, based on the results of community-wide monitoring, the water system must do additional testing and take steps to reduce levels. Systems that exceed the action level for lead must also perform an ongoing program of public education.

Note: Any time a drinking water standard is violated, the affected water system must take corrective actions that include notifying its residents of the violation. In addition to this notification, all community water systems issue an annual **Water Quality Report** (sometimes referred to as a **Consumer Confidence Report)** that lists the source of the system's drinking water as well as a list of all regulated contaminants that were detected, even in trace amounts well below the legal standard, during the previous calendar year.

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A Current Profile of Minnesota's Drinking Water Protection Program

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

Minnesota currently has 7,637 public water supply systems, more than all but six other states. Of those systems, 966 are community systems, which provide water to people in their homes or places of residence. Most of these community systems use groundwater from underground sources, tapped by water wells, as their source of water. However, 23 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 966 community water systems, 720 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 remainder of the state's public water supply systems are noncommunity systems. Some of these noncommunity systems provide water to an ever-changing "transient" population at places such as restaurants, resorts, and highway rest stops. Other noncommunity systems may provide water to relatively stable population groups in nonresidential locations such as schools, places of employment, and day-care facilities.

The Major Elements of Drinking Water Protection

Three basic strategies are used to safeguard the quality of our drinking water:

- **Prevention.** Preventing contamination of the source water used by public water supply systems—lakes, rivers, and water wells—is an important component of drinking water protection. This aspect of drinking water protection includes measures such as regulating land use, regulating the construction of water treatment facilities, and controlling potential sources of pollution.
- **Treatment.** Most community water supply systems use some form of treatment, so the water will be palatable and safe to drink. Many systems require routine disinfection as a safeguard against potential problems with bacterial contamination. Groundwater systems are less likely to require disinfection, because contaminants tend to be filtered out of the water as it moves downward through the earth from the surface to the underground sources tapped by water wells.
- **Monitoring.** Monitoring is the critical element of compliance activities under the Safe Drinking Water Act (SDWA). Under provisions of the act, public water supply systems are required to sample treated—or

"finished"—water on a regular basis, and submit the samples to MDH for analysis. The samples are tested for a broad range of potential contaminants. If unacceptable levels of contaminants are found, the water supply owner or operator is legally responsible for informing the people who use the water and for taking steps to eliminate potential health hazards.

Under the provisions of the SDWA, the individual public water supply system is responsible for taking water samples and submitting them to certified laboratories for analysis. To lessen the burden on water supply operators, most of the required samples are collected by field staff from MDH. Minnesota's public water supply operators have one of the best records in the nation regarding compliance with these sampling and testing requirements.

Note: The monitoring requirements and test results described in this report apply primarily to community water supply systems.

Monitoring: What We Test For—and Why

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—depends 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 we test 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 (see ***Assessing Vulnerability to Contamination,*** below). 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 than 100 pesticide and industrial contaminants. Advisory standards have been developed for 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 immediately take steps to 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 that the system is adequately protected against contamination from other types of disease-causing organisms. However, if any detectable amount of coliform is 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. Standard procedures are followed whenever potential bacterial contamination is detected. Systems are disinfected, flushed, and retested to ensure that any contamination problems are eliminated. All of the residents served by the system are informed of the situation. In some cases, boil water notices are issued, advising residents to boil their water before using it for drinking or cooking.

Bacterial contamination problems are most commonly found in smaller water supply systems. Most of these smaller systems use groundwater, and many do not routinely disinfect the water as part of the treatment process.

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 run-off, 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 know 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, or drilling a new water well.

Older children and adults are generally not at risk from drinking nitrate-contaminated water. In fact, the average adult consumes about 20-25 milligrams 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 a 13 other inorganic chemicals in addition to nitrate. The testing is usually done once every nine years, but 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 through 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 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.

By 2004, 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. EPA, the water system must take action to correct the problem. The corrective actions include notifying all residents served by the water system.

Lead and Copper. Some public water supply systems in Minnesota are required to test their water, on a regular basis, for lead and copper. All public water systems in the state took part in an initial round of lead and copper testing that ended in 1994. 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 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.

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 are addressing the lead issue by treating their water, so it will be less likely to absorb lead from plumbing.

Assessing Vulnerability to Contamination
Monitoring requirements for individual public water supply systems depend partly on how vulnerable the system is to contamination. MDH does vulnerability assessments of water supply systems, taking into account a number of factors. If the system uses groundwater, the way in which the wells are constructed can serve to increase or 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.

Compared to surface water systems, groundwater systems tend to be less vulnerable to certain types of contamination. 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 tends to remove certain kinds of contaminants, including bacteria and parasites like Cryptosporidium. For that reason, many groundwater systems do not routinely include disinfection as part of their normal water treatment procedures.

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Monitoring Test Results for calendar year 2004

Pesticides and Industrial Contaminants
During 2004, MDH conducted 19,123 tests for pesticides and industrial contaminants in community water systems. No systems exceeded drinking water standards for these contaminants.

Bacterial Contamination
Eighteen community systems—including 10 municipal systems—tested positive for bacterial contamination in 2004. All but two of the affected systems serve fewer than 1,000 people.

The municipal systems that had confirmed coliform bacteria contamination in 2004 were Darfur (population 132, Watonwan County), Milan (pop. 329, Chippewa County), Cold Spring (pop. 2,975, Stearns County), Dumont (pop. 115, Traverse County), Pine River (pop. 943, Cass County), Kasota (pop. 680, LeSueur County), Wanamingo (pop. 1,007, Goodhue County), Delavan (pop. 215, Faribault County), La Porte (pop. 142, Hubbard County), and Ceylon (pop. 407, Martin County).

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.

Nitrate / Nitrite

Two community systems—including one municipal system—exceeded the nitrate standard in 2004. The affected municipal system is Cold Spring (pop. 2,975, Stearns County), which has discontinued using the well that had the elevated nitrate levels.

Radioactive Elements

Gross Alpha Emitters

Seven community water systems—including six municipal systems—were exceeding the standard for gross alpha emitters on the distribution system in 2004. The affected municipal systems are Anoka (population 18,145, Anoka County); Coon Rapids (pop. 62,137, Anoka County); Goodview (pop. 3,000, Winona County); Hamburg (pop. 538, Carver County); LaCrescent (pop. 4,923, Houston County); and Red Wing (pop. 15,770, Goodhue County). No restrictions were placed on water consumption, although residents were notified of the situation. Residents were told that this is not an emergency situation and were advised to consult with their doctors if they have any special concerns.

Radium 226 & 228

Thirteen community water systems—including 12 municipal systems—were exceeding the standard for radium 226 & 228 on the distribution system in 2004. The affected municipal systems are Anoka (population 18,145, Anoka County); Coon Rapids (pop. 62,137, Anoka County); Goodview (pop. 3,000, Winona County); Hamburg (pop. 538, Carver County); Isanti (pop. 3,600, Isanti County); LaCrescent (pop. 4,923, Houston County); Lucan (pop. 226, Redwood County); Medford (pop. 1,085, Steele County); Norwood (pop. 1,550, Carver County); Red Wing (pop. 15,770, Goodhue County); Spring Lake Park (pop. 6,777, Anoka County); and Wyoming (pop. 3,058, Chisago County). No restrictions were placed on water consumption although residents were notified of the situation. Residents were told that this is 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 to make infrastructure changes or is studying alternatives to meet the MCL.

It is anticipated that more systems may exceed the MCL once the revised radionuclides rule—which requires samples to be taken from each entry point to the distribution system rather than from a representative point on the distribution—takes effect in 2004.

Other Inorganic Chemicals

No community water systems exceeded the standards for inorganic chemicals in 2004.

Disinfection By-products

Two community water systems exceeded the standards for total trihalomethanes in 2004. The affected communities are Mora (population 3,300, Kanabec County) and Askov (pop. 372, Pine County).

Trihalomethanes are a by-product of the disinfection process. The addition of chlorine, which rids the water of microbiological organisms that could cause immediate illness, may combine with organic matter in the water and create by-products, such as trihalomethanes. This could increase the cancer risk for people drinking water with elevated levels of such by-products over a long period of time.

Prior to 2003, only surface-water systems were monitored for these by-products. However, all community water systems are now checked. Askov has modified its treatment process and is back in compliance. Mora continues to investigate ways of lowering the level of trihalomethanes in its water. Both systems have informed their residents of the situation.

Lead and Copper

The Lead and Copper Rule (LCR) was brought back into the spotlight in 2004. Heightened by media attention on lead problems in Washington, D. C., regulatory agencies across the United States, including the Minnesota Department of Health (MDH), have gone through a year of reexamining the LCR and assessing its adequacy and effectiveness in protecting the public—particularly pregnant women, infants, and children—from lead contamination in our drinking water. An internal assessment of the Lead and Copper Program has induced MDH to make changes and updates in the areas of data and data-sharing policy; protocols on sample collection, handling, and site selection; operator training; and public-education materials. Although Minnesota communities have achieved great success in reducing the lead/copper levels in residential taps over the past decade, it is believed that the streamlining efforts will further our goal of public-health protection.

Minnesota's community water supplies started their lead/copper testing programs in 1992 and 1993. The testing was done by taking first-draw water samples from a number of consumers' taps in the system. If more than 10 percent of the samples exceeded the federal action level of 15 parts per billion (ppb) for lead or 1.3 parts per million (ppm) for copper, the entire system was considered to be "in exceedance." Communities that exceeded the action level(s) were required to do additional testing and take steps to reduce the absorption of lead/copper into the water from the water distribution system and/or household plumbing; in addition, the system was required to initiate a public-education program for lead within 60 days of the exceedance and continue the public-education program for as long as the system remained in exceedance.

Since 1992, more than 250 community water systems in Minnesota have exceeded the lead and/or copper action levels at one time or another. More than 150 of these systems have installed corrosion-control treatment to minimize the lead/copper levels in their consumers' taps, and the majority of them have been deemed by MDH to have optimized their corrosion-control treatment. An additional 50 systems were also deemed to have optimal corrosion control treatment without needing to install a chemical treatment. Corrosion-control treatments proved to be very effective in lowering the lead and/or copper levels in Minnesota's public water supplies. Among the various treatment approaches, the most widely adopted was the use of phosphate-based corrosion control inhibitors, which accounts for about 90 percent of the treatment installed for lead/copper corrosion control in Minnesota. By maintaining a consistent treatment and adequate level of corrosion inhibitor residuals in the water distribution system, both lead and copper levels can be effectively reduced. In fact, under such conditions, the majority of systems with lead exceedances achieved compliance within one year of treatment installation. For copper, it typically takes longer and requires higher inhibitor dosages. However, a reduction of 50 percent to 60 percent in tap copper levels can be achieved within six to nine months of treatment installation.

Two brand new community water supplies, McGregor and Lansing Township, exceeded the lead action level in 2004, bringing the total number of community water systems currently exceeding the lead action level to five. The other three, which have been phasing in and out of compliance, are New Hope, Eveleth, and Minnesota Correctional Facility at Moose Lake, due to their inability to maintain treatment consistency and/or optimal inhibitor feed rates. Overall, the lead levels in these three systems have also been significantly reduced through the implementation of corrosion-control treatment.

Due to unique characteristics of Minnesota's groundwater with its tendency to absorb copper, exacerbated by the iron-removal treatment process commonly used by groundwater systems, Minnesota experienced the highest rate of copper action level exceedances in the United States. About 200 systems have exceeded the copper action level since 1992. Although corrosion-control treatments are effective in lowering the lead and copper levels, the results for copper control are less impressive than those for lead. In general, corrosion-control treatment brought reduction in copper levels by 50 to 70 percent, and about 70 percent of the systems achieved compliance after treatment installation and optimization. Of the 31 systems not meeting the copper action level, only four remain with a 90th percentile copper value greater than 2.0 parts per million.

As noted, higher inhibitor usage is needed to reduce copper levels below the copper action level, and the majority of the water systems use phosphate-based corrosion inhibitors. Because of the concerns with potential environmental impacts from phosphorous and discharge limits set by the Minnesota Pollution Control Agency, some systems are unable to add phosphate at doses necessary to achieve levels needed to regain compliance for both lead and copper. With the need to balance public-health protection from copper and environmental protection from phosphorous, and recognizing that it is unlikely for copper to cause adverse health effects at levels below 2.0 parts per million, the Minnesota Department of Health does not envision copper levels in the remaining systems to be further reduced. However, the goal to lower the copper levels as much as is technically feasible will be continued.

Each year, a few additional systems are expected to come onto the list of systems required to install corrosion control treatment due to treatment process changes, new water sources, or factors that bring a change in water characteristics. The Minnesota Department of Health continues to work with these systems to bring them into compliance through the effort of corrosion control treatment and optimization.

Each year between four and five new systems join the list of systems required to install corrosion-control treatment due to treatment process changes, new water sources, and other factors that brought changes in finished-water chemistry and/or characteristics, causing the system to exceed the lead or copper action level. The Minnesota Department of Health continues to work with these systems to bring them into compliance through the effort of corrosion-control treatment and treatment optimization.

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Emerging Issues
A Look Back with an Eye to the Future

December 2004 marked the 30th anniversary of the federal Safe Drinking Water Act (SDWA). Although drinking water standards had been adopted at the federal level as early as 1914, the standards applied only to water supplied to the public by interstate carriers and were limited to the bacteriological quality of water; they did not cover specific physical and chemical characteristics.

The passage of SDWA—signed into law by President Gerald Ford on December 16, 1974—marked the first national program to protect the quality of the nation's drinking water systems. It established a cooperative program among local, state, and federal agencies and required the establishment of primary drinking water regulations designed to ensure safe drinking water for the consumer. These regulations apply to all public water systems in the United States, covering both chemical and microbial contaminants.

The United States Environmental Protection Agency, or EPA, oversees the Safe Drinking Water Act, although most states, including Minnesota, have taken over the responsibility of administering and enforcing the provisions of the Act in their states. Minnesota established primacy in 1976 by adopting regulations in the state that were at least as stringent as the national standards and implementing a monitoring and inspection program.

Although SDWA has been around barely more than a quarter-century, the protection of drinking water in Minnesota goes back more than 130 years. 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 of lives at this time. Minnesota was the fourth state (after Massachusetts, Virginia, and California) to establish a board of health.

The same year the Board of Health was started (1872), Minneapolis Water Works was established for drinking water (it had begun for fire fighting five years earlier). It has grown to become the largest water utility in the Upper Midwest.

Chlorine was introduced as a disinfectant of water supplies in the United States in 1908, resulting in a dramatic decrease of waterborne disease outbreaks and individual cases of illness—number of deaths attributed to typhoid fever and cholera dropped to virtually zero in the U. S. by the mid-20th century.

Typhoid remained a problem in Minnesota until chlorination of community water supplies helped bring down the prevalence of the disease. Minneapolis introduced chlorination in 1910, Duluth in 1912, and St. Paul in 1920.

Here are some other key dates in the history of the Minnesota drinking water program:

1917

•State Board of Health adopted rules requiring submission and approval of plans for public water supplies.

1918

•State Board of Health adopted rules prohibiting cross connections between potable and non-potable water supplies.

1933

•The first state plumbing code, requiring licensed plumbers in cities with populations of greater than 5,000, was established.

1937

•State Board of Health adopted a water supply standard for the design for all types and sizes of water supplies.

Late 1930s

•The first operator training session was held in Minnesota. Sessions were held on a yearly basis until the 1950s. At that time voluntary certification for water and wastewater operators was instituted.

1970

•Mandatory fluoridation of municipal water supplies began in Minnesota for the purpose of enhancing dental protection

1971

•Certification of water operators became mandatory in Minnesota. We currently provide training for approximately 1,000 operators per year and have 2,588 certified operators.

1977

•Minnesota achieved primacy for the drinking water program, taking over the enforcement and administration of the Safe Drinking Water Act in the state. We were the 12th state nationally to achieve this and the first state in EPA's Region 5.

1985

•Minnesota plumbing code banned the use of lead-based solder as well as lead pipes and fittings.

1989

•Passage of state Groundwater Protection Act. Governor Rudy Perpich designated the Minnesota Department of Health as the lead agency for developing the program, which:

- •authorized the development of a state wellhead protection rule for public water supply systems;
- •expanded the well program to include district office inspection staff, which have reduced well construction violations tenfold (to a current level of only 3 percent of wells); and
- •required well disclosure at property transfer and the sealing of unused wells—140,000 wells have been sealed to date.

1992

•The EPA's new Lead and Copper Rule caused Minnesota to change how it sampled for these contaminants. Any water system that had more than 10 percent of its homes indicated elevated levels of lead or copper had to perform a number of corrective actions. With lead, the actions included an ongoing campaign of public education. In addition to requiring the affected systems to perform this education, the Minnesota drinking water program conducted its own "Get the Lead Out!" campaign and spread the message through refrigerator magnets, articles in local publications, appearances on radio and television shows, and on grocery bags in Cub and Rainbow foods. The education campaign continues to this day.

1995

•MDH submitted the state wellhead protection program description to the EPA for approval. EPA approved the plan the following year.

•MDH began issuing an annual drinking water report card on the quality of drinking water in the state's public water supply systems.

1996

•Another major set of amendments to the Safe Drinking Water Act was passed. The amendments also addressed concerns about the existence of what was seen as an overly burdensome regulatory structure. Congress eliminated the 1986 requirement that EPA regulate an additional 25 contaminants every three years. Instead, EPA was allowed to establish a process for selecting contaminants to regulate based on scientific merit. In addition, the amendments also include provisions to allow for flexibility of regulations and monitoring for small water systems, and a requirement that EPA conduct cost-benefit analyses of new regulations and analyze the likely effect of the regulation on the viability of public water systems.

Another key element in the 1996 amendments was the requirement that states develop a program for preparing source water assessments for all public water supply systems (a broadening of the wellhead protection program to include surface sources as well).

The amendments also addressed concerns about funding needs for drinking water infrastructure and the need for the public to receive more information on their drinking water. The former was dealt with by the creation of Drinking Water State Revolving Fund, which was modeled after the Clean Water State Revolving Fund that was already in existence for wastewater; the latter concern was addressed by the Consumer Confidence Report:

•The Drinking Water Revolving Fund to allow states to issue below-market-rate loans to water systems to make capital improvements necessary to maintain compliance with the Safe Drinking Water Act. To date, Minnesota has issued $275 million in loans to 134 different water systems for more than 200 projects.

•The Consumer Confidence Report Rule requires that all community water systems in the country issue annual water quality reports to their customers. The reports must contain information about where the source of the system's water as well as a list of contaminants that were detected in the water, even in trace amounts, during the previous year. Minnesota has put together a system under which it has been able to issue the necessary information for the reports for all systems (approximately 960) that are required to do this. As a result the state has achieved a compliance rate of better than 99 percent each year.

1997

•Minnesota promulgated the state wellhead protection rule.

1999

•MDH submitted the state source water assessment program description to the EPA for approval in February 1999. EPA formally approved the program in April 2000. All assessments must be completed by May 2003.

2000

•Minnesota was ranked as having the Number 1 Drinking Water Protection Program nationally. The ranking was determined by the National Rural Water Association based on four years of EPA compliance data.

2001

•MDH, in conjunction with the Minnesota Section of American Water Works Association, began the first of a series of Drinking Water Institutes, designed for Minnesota teachers for the purpose of having them write curriculum for their classrooms on drinking water. The following year, this program received a national education award from American Water Works Association.

While the past is impressive and the future generally optimistic, the Minnesota Department of Health knows that the ability to continue having a safe and reliable supply of drinking water in the state requires ongoing dedication and vigilance from all parties involved.

Here are a few of the issues that continue to merit attention:

Water System Security

In 2002 the United States Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, which includes a section on Drinking Water Security and Safety in the form of an amendment to the federal Safe Drinking Water Act. The amendment requires all community water systems serving a population greater than 3,300 to "conduct a vulnerability assessment of its system to a terrorist attack or other intentional acts intended to substantially disrupt the ability of the system to provide a safe and reliable supply of drinking water."

All systems in Minnesota serving a population of 50,000 or more submitted their assessments to the U. S. Environmental Protection Agency (EPA) in 2003 and 2004. These systems then updated their emergency response plans to address the results from their vulnerability assessments.

The terrorist attacks of September 11, 2001 raised concerns about the threat of terrorism to other vital facilities around the country. No resource is more important than a safe and plentiful supply of drinking water.

Water systems and the people who operate them are aware of this and are guarding our drinking water from a variety of threats, including people with malicious intent. While water providers have been proceeding with a heightened sense of security and vigilance since September 11, this is not the beginning—but rather a continuation—of long-time efforts to keep their facilities and the water safe from vandalism, sabotage, and terrorism.

Among the things water providers are doing to protect their systems and the water they serve to the public are making sure that all facilities are locked and secure; installing motion sensors and video cameras to monitor, detect, and record events; getting local law enforcement officials to become familiar with their facilities; establishing a procedure with local law enforcement for reporting and responding to threats; and setting up a system for detection, response, and notification issues with local public health officials.

Standard Review and Revisions

Over the next few years, Minnesota water supplies will have to comply with a change in standard for arsenic and radionuclides, as well as an anticipated rule for radon.

Arsenic

A revision to the Arsenic Rule was finalized in January 2001 with the federal standard of 50 ppb being lowered to 10 ppb. Approximately 40 community water supplies in Minnesota will be affected by the revised rule.

The reduction in the MCL has been anticipated for several years. Water supplies in Minnesota that have measurable levels of arsenic in their water have been studying alternatives and preparing for the possibility of having to add treatment processes or replace existing wells to comply with the new, more stringent standard.

Arsenic occurs naturally in the environment and, as a component of underground rock and soil, can work its way into groundwater, and is found in many areas of Minnesota.

Four community water systems in Minnesota—Climax, Stewart, Sabin, and Big Sauk Mobile Home Park—have been selected to participate in a U. S. EPA-funded Arsenic Treatment Demonstration Program. Innovative treatment technologies will be installed at the four systems to determine if they can effectively remove arsenic.

Also, in conjunction with the University of Minnesota, the Minnesota Department of Health has participated in an Arsenic in Minnesota Groundwater Study. The results of the study should help water systems determine the probability of encountering elevated arsenic levels before they drill a new well.

All public water systems must comply with the new standard by January 2006. Exposure to elevated levels of arsenic will not cause any immediate health effects, although long-term exposure could bring about an increased risk of bladder and skin cancer, as well as problems associated with the circulatory system and the nervous system.

Radionuclides
A revision to the Radionuclides Rule was finalized in December 2000 with a federal standard of 5 picoCuries per liter (pCi/L) for combined radium 226 and radium 228, 15 pCi/L for gross alpha emitters, and 20 pCi/L for uranium. The most significant revision affected the sampling point used for compliance. The former rule required samples to be taken from a representative point on the distribution system, while the revised rule requires samples to be taken from each entry point to the distribution system. It is anticipated that more supplies will be unable to meet the standard at these sampling points when the new rule takes effect in 2006.

Radionuclides are naturally occurring contaminants that are found in groundwater throughout central and southern Minnesota. Long-term exposure to elevated levels of these contaminants may result in an increased risk of cancer. Residents of community water systems can find out the radionuclide levels, if any, in their drinking water by reading the Water Quality Report (sometimes referred to as the Consumer Confidence Report) that is issued each year by their water utility.

Radon
The Radon Rule was proposed in November 1999 with a federal standard of 300 pCi/L and an alternative standard of 4,000 pCi/L. For those states that adopt a multi-media mitigation program—which compels citizens, homeowners, schools, and communities to reduce radon exposure from indoor air—a standard of 4,000 pCi/L would apply. For those states that do not adopt the multi-media mitigation program, the 300 pCi/L standard would apply.

In anticipation of this rule, MDH has surveyed water systems and determined that approximately one-third of the community water systems may exceed the standard of 300 pCi/L, while approximately one percent may exceed the standard of 4,000 pCi/L. Routine radon monitoring at community water systems began in 2001.

Radon occurs naturally in both indoor air and groundwater, as a decay product of uranium in the soil. Exposure to radon may occur from soil gases that enter the home or with the use of groundwater that releases radon into the air (showering, washing dishes, cooking, etc.) as well as ingestion of water containing radon. Exposure to radon in air is the second-leading cause of lung cancer in the United States.

Dealing with Contaminated Sources
Source water protection efforts are a vital part of providing safe drinking water. It's much easier to keep contamination out of surface and groundwater supplies than it is to remove it. However, sometimes water utilities must deal with contaminated sources. Often, it is because of waste-disposal techniques that were widely accepted at the time of the disposal, which have allowed the release of solvents and industrial chemicals into soil and groundwater.

Although the Minnesota Pollution Control Agency takes the lead in the clean-up of these sites, the Minnesota Department of Health's drinking water program works with affected communities to ensure the continuation of a safe supply of drinking water. Cities may install a treatment system to remove the contaminants, a method that can have the dual benefit of reducing the contamination plume in an aquifer while also making the water safe to drink.

In 2004, the likely source of trichloroethylene (TCE) that contaminated groundwater in Baytown Township in Washington County was discovered. TCE was commonly used as a degreasing agent as well as a dry-cleaning solvent. Most homes in this area use private wells (and those with TCE higher than the health-based value recommended by MDH have installed granular activated carbon filters), although levels of TCE were detected in two of the municipal wells for the city of Bayport. One of the wells has levels approaching the maximum contaminant level, and the city is now working with the Pollution Control Agency and MDH regarding treatment options.

Another situation developed late in 2004 as sampling begun in December revealed the presence of perfluorochemicals in groundwater in Oakdale, a St. Paul suburb. Perfluorochemicals have been used for many years by the 3M corporation and other companies in products that resist heat, oil, grease, stains and water. Two of these compounds, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), were recently found in groundwater beneath two former waste disposal sites in the area.

Low levels of PFOS and PFOA, below health-based values, were found in five city wells. Although exposure to compounds at concentrations below their HBVs is not considered to pose a long-term health risk, the city wells will now be tested for PFOS and PFOA on a regular basis. The city will continue to work with MDH to monitor the situation and provide regular updates to customers. Oakdale is also exploring treatment options that can reduce the levels of PFOS and PFOA in its system.

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Conclusion

Monitoring test results for 2004 tend to reinforce the conclusions of previous years. The quality of Minnesota's drinking water is very high. Even as our monitoring activities have expanded, we have rarely found any detectable contamination. Contaminant levels that exceed applicable health standards have been even more rare. 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.

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Appendix

Summary of Safe Drinking Water Monitoring Results for Minnesota
Includes Results for Both Community and Noncommunity Public Water Supply Systems in Minnesota for 2004

The following is a summary of drinking water monitoring test results for all public water supply systems in Minnesota for calendar year 2004. 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 approximately 7,600 such systems in Minnesota, including:

- 966 community systems, which provide water to consumers in their places of residence, including 720 municipal systems.
- 6,671 noncommunity systems, which provide drinking water in settings like factories, schools, restaurants, and highway rest stops.

Minnesota issued the following violations in calendar year 2004; in some cases, the violations were issued to water systems that were already in exceedance of the particular standard:

- 1 noncommunity systems with a violation of the maximum contaminant level (MCL) for nitrate.
- 2 community systems with a violation of the MCL for nitrate.
- 16 community systems with a violation of the MCL for total coliform.
- 178 noncommunity systems with a violation of the MCL for total coliform.
- 13 community systems with a violation of the MCL for combined radium.
- 7 community systems with a violation of the MCL for gross alpha emitters.
- 1 community systems with a treatment technique violation for the Surface Water Treatment Rule.
- 9 noncommunity systems with a treatment technique violation for the Surface Water Treatment Rule.
- 15 community systems with a violation of the Consumer Confidence Rule.
- 1 community system with a treatment technique violation for the Lead and Copper Rule.

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The following three reports are electronic copies which list all violations of the Safe Drinking Water Act in Minnesota for calendar year 2003.	
PDF (36kb/8 pages)	This file provides a summary of all Maximum Contaminant Level (MCL) and Monitoring/Reporting (M/R) violations in Minnesota for calendar year 2003. It does not provide any system specific information. Click PDF icon.
PDF (127kb/50 pages)	This large file lists, on a system by system basis, all MCL and Treatment Techniques (TT) violations in Minnesota for calendar year 2003. Systems are listed in numerical order by their Public Water Supply Identification (PWSID) number. Click PDF icon.
PDF (131kb/52 pages)	This large file lists, on a contaminant by contaminant basis, all MCL and TT violations in Minnesota for calendar year 2003. Click PDF icon.

If you want a print version of these reports, contact Dennis Maki via e-mail at dennis.e.maki@health.state.mn.us, by phone at 651-201-4665, or at Drinking Water Protection Section, Minnesota Department of Health, Box 64975, St. Paul, MN 55164-0975.

Note: Although a public water supply may be out of compliance with more than one contaminant or violation type, when calculating totals, it is counted no more than once within the population being totaled; as a result, the sum of number of public water systems in violation over the various violation types or contaminants may not add up to the total.

For a report on your community's drinking water, contact your individual water system or city government or go to the web site for the U. S. Environmental Protection Agency.

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For questions about this page, contact the Drinking Water Protecton Program: drinkingwater@health.state.mn.us or 651-201-4700. For specific Drinking Water questions, please use the contacts listed on our Contact Us page.

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