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

MINNESOTA MDH DEPARTMENT OF HEALTH

Annual Reports
Choose Year:

Commitment to Quality

A Summary of Drinking Water Protection Activities in Minnesota for 1995

Issued May 1996

Foreword

Ensuring the safety of our drinking water is one of the most fundamental—and most critical responsibilities of modem 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 and biological contaminants.

Beginning last year, we added a new element to our drinking water protection efforts. Although the results of our monitoring activities have always been available to the public, we took the step of formally releasing—for the first time—summary information on our monitoring activities for the entire previous year.

MDH believes that educating the public about water quality issues is an important element of drinking water protection. For that reason, we now plan to release summary information on our monitoring activities on an annual basis. This report provides information on water testing results—and actions taken on the basis of that information—during calendar year 1995. We hope this information will provide the people of Minnesota with a clearer picture of what's being done to protect their drinking water, and what those monitoring efforts have revealed about drinking water quality in the state.

Go to > top.

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. That includes responsibility for regulating 8,946 public water supply systems statewide. That figure includes 960 community systems, which provide drinking water to people in their places of residence. Those community systems include 708 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, and 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 system may be tested regularly for up to 118 pesticides and industrial contaminants. The list of chemicals to be tested for—and the testing schedule—may vary from one system to another. Testing requirements depend on factors like 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 systems are tested monthly— and smaller systems are tested quarterly—for total coliform contamination. The total coliform test is used as a general indicator of water quality in the system, in terms of potential microbial contamination. Whenever bacterial contamination is detected, people served by the system are advised to boil the water before using it for drinking or cooking. The system must be disinfected, flushed, and found to be free of contamination before the "boil order" can be lifted.
- **Nitrate.** Each system is 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 nitrate problem.
- **Inorganic Chemicals and Radioactive Elements.** Each system is typically tested once every three years—or as often as once a year, in some cases—for a list of 13 additional inorganic chemicals and 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.
- **Lead and Copper.** Lead and copper are not typically present in the water when it leaves the treatment plant. Lead enters the water through contact with lead plumbing

components, usually in individual homes. Copper levels are used as an indicator of how corrosive the water is—which determines how easily it will absorb lead from plumbing. If more than 10 percent of the homes in a community exceed the federal "action level" for lead—based on the results of a community-wide survey—the local water supply system must do additional testing and take steps to reduce lead levels.

Go to > top.

A Current Profile of Minnesota's Drinking Water Protection Program

Since 1974, the U. S. Environmental Protection Agency 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 begin regulating public water supply systems at the state level—in 1977.

The definition of a "public water supply system," for purposes of the Safe Drinking Water Act, is a broad one. To be considered "public," a water supply system must provide water to people other than those who own or operate the system. It must also have more than 15 service connections, or provide water to more than 25 people.

Minnesota currently has 8,946 public water supply systems—more than all but six other states. Of those systems, 960 are community systems—that is, systems which provided 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.

Only 708 of the state's community systems 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, often at truck stops or other retail business sites. Other noncommunity systems may provide water to relatively stable population groups, but in non-residential locations—like schools, factories and other 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 like regulating land use, regulating the construction of water wells, 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— but not all—require routine disinfection, to address potential problems with bacterial contamination. Groundwater systems may be 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 enforcement activities under the Safe Drinking Water Act. 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. 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 taking steps to eliminate potential health hazards.

  Under the provisions of the SDWA, the individual water supply system is responsible for taking water samples and submitting them to MDH for testing. To lessen the burden on water supply operators, some of the required samples are collected by field staff from MDH. Minnesota's 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.

Go to > top.

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 up to 118 different pesticides and industrial contaminants. 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 U.S. Environmental Protection Agency (EPA) has developed legal standards known as maximum contaminant levels (or MCLs) for 60 of the 118 chemicals on the list. We have developed advisory standards known as health risk limits (or HRLs) for the other 58 chemicals on the list, and those are used in the same way as the MCLs in assessing test results.

Any time a community water supply exceeds the HRL or MCL for one of these pesticides or industrial contaminants, the water supply operator must immediately take steps to notify the people who use the water—with the assistance of MDH. Appropriate steps are then taken to reduce the contamination to acceptable levels.

In some cases, the HRLs and MCLs are calculated to prevent immediate or short term health effects. More often, however, they 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 HRLs and MCLs 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 monthly for total coliform contamination. Smaller systems are tested four times a year. The total 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 assumed that the system has also been adequately protected against contamination with 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. Typically, they are advised to boil their tap water before using it for drinking or cooking—or switch to using bottled water for those purposes. The water supply system is responsible for notifying its customers about the advisory, with the assistance of MDH.

The boil order remains in effect until the system has been disinfected and flushed, and retested to make sure no contamination is present. That process typically takes about a week. After the advisory is lifted, the system is temporarily placed on an accelerated testing schedule for bacterial contamination.

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. Community water supply systems in Minnesota are tested once a year for nitrate—a chemical which may occur naturally in the environment, but 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 current standard (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. 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 pregnant women, 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 also tested for a list of 13 other inorganic chemicals, in addition to nitrate. The testing is usually done once every three years, but 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 federal 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 elements may sometimes be 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.

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 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 for lead or 1,300 parts per billion for copper. If a system exceeded the action level for lead or copper—in more than 10 percent of the locations tested—the system 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 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 in the system 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.

Copper testing is done primarily as a way to measure the corrosiveness of the water. The more corrosive the water, the more likely it is to absorb hazardous levels of lead from plumbing.

Assessing Vulnerability to Contamination

Monitoring requirements for individual 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 (see below). For that reason, many groundwater systems do not routinely include disinfection as part of their normal water treatment procedures.

Go to > top.

Monitoring Test Results for Calendar Year 1995

Pesticides and Industrial Contaminants

During 1995, MDH conducted 116,344 separate tests for pesticides and industrial contaminants in water samples submitted by the state's community water supply systems. Detectable levels of contaminants were found in 361 of these tests-or 0.31 percent of the total tests conducted.

Contaminant levels exceeding the federal MCL were found in two systems:

- Levels of 1,2-dichloroethane (DCA) exceeding the MCL were found in one of 15 wells used by the water supply system for a suburban community in the Twin City area. The average level of 1,2-DCA detected in the well was 6.2 parts per billion (ppb). The MCL is 5 ppb. Residents of the community were informed of the test results, and the well was taken out of service.
- Levels of trichloroethylene (TCE) exceeding the MCL were detected in the water supply system for a rental housing complex in northeastern Minnesota. A new well was constructed last year to serve this facility. Testing of the new well detected TCE at levels of 74 and 120 ppb. The MCL for TCE is 5 ppb. Residents of the complex were notified of the test results and advised not to use the water for drinking or cooking. The Minnesota Pollution Control Agency declared a drinking water emergency at the site, so that state Superfund money could be used to provide an alternative source of drinking water (bottled water) for residents of the complex. A new well has since been constructed in a location unaffected by the TCE contamination, and that well is now being used to provide water for the complex.

In both of these cases, the federal MCL was based on the risk of long-term health effects, assuming that people would be drinking the water on a daily basis over an entire 70-year lifetime. Although the MCL was exceeded in both of these cases, the duration of any human exposure was relatively brief. It is very unlikely that these brief exposures posed any significant health risk.

Bacterial Contamination

Positive bacterial tests were reported for 25 community water supply systems in Minnesota during 1995. Twelve of the affected systems were nonmunicipal systems, serving manufactured home parks or similar facilities. The other 13 systems were municipal systems serving smaller communities. The largest of these systems served a community of approximately 2,000 people. The other affected systems served communities of fewer than 1,000 people, and nine of the systems served fewer than 500 people.

Standard procedures were followed in all of these cases. Residents served by the affected systems were informed of the test results, and advised to boil their water before using it for drinking or cooking. All of the systems were disinfected, flushed, and retested to ensure that any contamination problems had been eliminated. The boil order was then lifted, and the systems were able to resume normal operations.

Most of the systems resumed normal operation in about a week. However, one of the aff6cted communities experienced the collapse of its only community water well two days after the state boil order was issued. For a time, the community was forced to use water from a nonmunicipal well in the area, which was not regarded as a reliable source of water. The Minnesota Department of Trade and Economic Development subsequently arranged for a grant of $25,000 and an interest-free loan of up to $15,000, to finance construction of a new well. The affected system serves a community of about 500 people in east central Minnesota.

Nitrate

Three Minnesota communities exceeded the MCL for nitrate during 1995. Two additional

communities have continuing nitrate problems that were originally detected in previous years.

All of the affected systems are municipal systems. People served by these systems have been informed of the test results, and advised not to allow consumption of the water by infants under six months of age. The affected communities are all relatively small, ranging in size from 200 to 2,600 people.

Inorganic Chemicals and Radioactive Elements
No community water supply systems in Minnesota exceeded the federal MCLs for radioactive elements or inorganic chemicals during 1995.

Go to > top.

New Developments and Emerging Issues

Wellhead Prevention—A New Prevention Strategy
Under state rules expected to take effect in July 1996, most public water supply systems in Minnesota will eventually be required to develop a formal wellhead protection plan, if they rely on groundwater as their water source. The purpose of such a plan is to protect the wells used by the system from potential sources of contamination. The new rules apply to both community systems and non-transient non-community systems.

The concept of wellhead protection is based on the fact that groundwater quality is affected by what happens on the surface. Underground aquifers-the groundwater sources tapped by wells-are generally fed by water that filters down through the ground within a specific geographic area.

The key to a successful wellhead protection plan is appropriate land use planning, designed to prevent contamination of the wells used by the water supply system. The planning process includes:

- assessing the vulnerability of the system's water wells to contamination;
- identifying potential sources of contamination that could affect the wells; and
- developing strategies for managing those potential contamination sources, in collaboration with local government and affected property owners.

Protecting the Infrastructure—The State Revolving Loan Fund
Infrastructure plays a key role in safeguarding the quality of our drinking water. Properly constructed water wells and intake systems, up-to-date treatment facilities and well-maintained distribution systems are critically important if we are to provide safe, high quality drinking water to the people of our state.

Making needed investments in infrastructure can be difficult for some water supply systems especially the smaller systems that serve many parts of greater Minnesota. For that reason, MDH has supported the establishment of a state revolving loan fund, which can be used by the states local water supply systems to finance necessary capital improvements.

Legislation now pending at the national level, as part of the proposed reauthorization of the Safe Drinking Water Act, would make federal funds available for this purpose. The Minnesota Legislature has already authorized up to $4 million in state matching fimds, to be split between the drinking water loan fund and a similar state wastewater revolving fund. Minnesota has taken this step so that we will be in a position to act quickly, and apply for the federal revolving loan

funds as soon as they become available. MDH believes that the revolving loan fund is a vitally important tool in the larger effort to protect the quality of our drinking water.

Cryptosporidium—An Emerging Health Issue

In April 1993, more than 400,000 people in the city of Milwaukee developed a severe form of gastrointestinal illness, after the city's public water supply system became contaminated with the protozoan *Cryptosporidium parvum.* It is believed that as many as 100 people may have died during the 1993 outbreak. Smaller outbreaks of cryptosporidiosis have been reported in a number of other U.S. cities.

A small outbreak of cryptosporidiosis, involving 27 people at a northern Minnesota resort, occurred during the summer of 1993. That outbreak was associated with consumption of inadequately treated lake water. No outbreaks have been reported in Minnesota since that time as a result of drinking contaminated water. Thirty-six cases of cryptosporidiosis were documented in Minnesota residents during 1995, but none were associated with drinking water.

Cryptosporidium poses unusual challenges for water supply operators and the public health community, as they work to protect the public and prevent potential outbreaks. Testing the water for *Cryptosporidium* is not an effective measure, because current testing methods are not reliable. It also isn't clear whether some minimum level of contamination is necessary in order to make people sick. Conventional disinfection methods like chlorination cannot be relied on to inactivate the organism. Proper filtration methods can remove *Cryptosporidium* from the water, but care must be taken to ensure that the filtration system is operating at optimum levels, at all times.

Despite these uncertainties, important steps are being taken to protect Minnesotans against a potential outbreak of cryptosporidiosis.

Cryptosporidium is a concern primarily for systems that use surface water. Groundwater systems are generally believed to have some natural protection against this problem, since the filtering action that takes place as water moves from the surface to the groundwater would tend to remove the organism from the water. Minnesota's 23 surface water systems are currently taking the following steps to safeguard their customers:

- An effort is being made to protect surface water sources from potential contamination, through more effective watershed management activities.
- Surface water systems in Minnesota are striving to use the effective possible water treatment techniques, including the appropriate and effective use of properly maintained filtration systems.
- Surface water systems are also taking steps to ensure that their distribution systems are properly maintained, eliminating potential sources of contamination.

Public health is working to address the *Cryptosporidium* issue through stepped-up disease surveillance. The Milwaukee outbreak went undetected until it was already well underway, and many observers believe that delay may have contributed to the severity of the problem. Such a delay is unlikely in Minnesota. In January 1995, Minnesota became one of four sites named by the U.S. Centers for Disease Control and Prevention (CDC) to conduct surveillance for newly emerging infectious disease problems. As part of that effort, MDH is making a special effort to track foodbome and waterborne diseases, including cryptosporidiosis. It is unlikely that an outbreak in Minnesota would go undetected.

Since the Milwaukee outbreak, an effort has also been made to address the needs and concerns of people who may be at special risk of complications from a *Cryptosporidium* infection-including

people with HIV and others with compromised immune systems. People in these vulnerable groups are being encouraged to consult a physician regarding appropriate protective or preventive measures, and CDC has developed guidelines for health care providers who counsel these individuals.

Many of the scientific and policy issues surrounding *Cryptosporidium* remain unsettled. However, available evidence-including disease rates in the vulnerable population groups discussed above-suggests that this illness is not currently a widespread public health problem in Minnesota. Efforts to address the *Cryptosporidium* issue are ongoing. Continued vigilance is an appropriate and necessary part of our response to this disease problem.

Go to > top.

Conclusions

Monitoring results for calendar year 1995 suggest that Minnesota's community water supply systems remain—on the whole—clean and free of contamination. However, some systems have occasionally been found to contain unacceptable levels of pesticides and industrial contaminants, and a number of smaller community systems continue to experience problems with bacterial contamination.

These findings suggest a need for continued vigilance, as well as possible concerns about some aspects of the state's drinking water infrastructure. Continued support for the federal safe drinking water program is essential if we are to maintain the high quality of our state's drinking water, and the state revolving loan fund provides us with an invaluable tool for improving and maintaining infrastructure. Minnesota's new wellhead protection program represents a strategic approach to safeguarding water quality, based on primary protection of the source water used by our groundwater-based water supply systems. We must continue our efforts to address and resolve emerging water-related public health issues like Cryptosporidium.

It's all too easy to take the quality of our drinking water for granted. The citizens of Minnesota can generally drink the water provided by their local water utilities with great confidence. MDH is committed to maintaining that high level of quality—and safety—in our drinking water. Sustained effort will be needed—on the part of both water supply operators and the public health community—if we are to achieve that objective.

Go to > top.

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

Updated Thursday, 20-Mar-2008 13:37:57 CDT