A report from the Minnesota Department of Health

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Safe Drinking Water in Minnesota:

A Reliable Tradition

A summary of

Drinking Water Protection Activities

in Minnesota for 2006

Issued May 2007
Minnesota Department of Health
Division of Environmental Health

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This report is available on the World Wide Web at

http://www.health.state.mn.us/divs/eh/water/com/dwar/report06.html

Reports from previous years (through 1995) are also available at this site

Minnesota Department of Health

Drinking Water Protection Section Web Page:

http://www.health.state.mn.us/divs/eh/water/com/dwar/index.html

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 reduction in disease and increased 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, beginning on page 15, contains information on rules that are being revised and an update on some communities that are dealing with contaminated sources of water.

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.

Executive Summary

The Minnesota Department of Health 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 7,300 public water supply systems statewide. This figure includes 963 community systems, which provide drinking water to people in their places of residence. The community systems include 726 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.

  Total coliform bacteria are common in the environment (such as in soil) and the intestines of animals, and are generally not harmful. Fecal coliform and *Escherichia coli (E. coli)* bacteria are found in greater quantities than total coliform in animal fecal matter.

  If fecal coliform or *E. coli* is detected along with total coliform in drinking water, there is strong evidence that sewage is present; therefore, a greater potential for harmful organisms exists. In these cases, immediate corrective actions must be taken. The actions include a notice to residents to boil their water before using it for cooking and drinking. The water system will be disinfected, flushed, and retested to ensure that any contamination problems are eliminated.

If only total coliform is detected (without the presence of fecal coliform or *E. coli*), the source is most likely contamination from the environment, introduced during construction or while repairs to plumbing or a water main were underway. 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 will not be issued.

- **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 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. 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.

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.

The definition of "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 have its own water source and provide water to 25 or more people, or have 15 or more service connections.

Minnesota currently has 7,343 public water supply systems. Of those systems, 963 are community systems, which provide water to people in their homes or places of residence. Most of these community systems use groundwater from underground sources, tapped by wells, as their source of water. However, 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 963 community water systems, 726 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 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 the MDH lab 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*** on page 8). 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 pesticides and industrial contaminants. 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 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 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.

As noted in the Executive Summary, 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 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 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 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.

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. 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 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 such as *Cryptosporidium*. For that reason, many groundwater systems do not routinely include disinfection as part of their normal water treatment procedures.

Monitoring Test Results
for calendar year 2006

Pesticides and Industrial Contaminants
During 2006, MDH conducted 19,145 tests for pesticides and industrial contaminants in community water systems. One of the tests exceeded the drinking water standard for trichloroethene. The violation occurred in the city of Bayport (population 3,131, Washington County). The city has been issuing public notices about the situation to its residents as it builds a new water treatment plant that will remedy the problem.

Bacterial Contamination
Fourteen community systems, including nine municipal systems, tested positive for bacterial contamination in 2006. All of the affected systems serve fewer than 1,000 people.

The municipal systems that had confirmed total coliform bacteria contamination (without fecal coliform or *E. coli*) in 2006 were DeGraff (population 140, Swift County), Dumont (pop. 115, Traverse County), Gibbon (pop. 791, Sibley County), Marble (pop. 699, Itasca County), New Munich (pop. 354, Stearns County), and Watson (pop. 211, Chippewa 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 the residents served by the affected systems were informed of the situation.

Three municipal systems tested positive for both total coliform and fecal coliform/*E. coli* and, as a result, issued boil water notices to their residents. The systems were St. Cloud and St. Augusta (populations 67,046 and 1,400 respectively, Stearns County), and Holloway (pop. 112, Swift County).

Nitrate/Nitrite
Two community nonmunicipal systems exceeded the standard for nitrate in 2006.

Arsenic
Eighteen community systems, including 15 municipal systems, exceeded the standard for arsenic in 2006. The affected municipal systems are Albany (population 1,887, Stearns County), Blaine (pop. 49,962, Anoka and Ramsey Counties), Buffalo Lake (pop. 757, Renville County), Callaway (pop. 210, Becker County), Dalton (pop. 260, Otter Tail County), Darwin (pop. 290, Meeker County), Dilworth (pop. 3,104, Clay County), Dumont (pop. 112, Traverse County), Elizabeth (pop. 174, Otter Tail County), Lake Lillian (pop. 241, Kandiyohi County), McIntosh (pop. 616, Polk County), Mound (pop. 9,630, Hennepin County), New Auburn (pop. 498, Sibley County), Norcross (pop. 61, Grant County), and Warroad (1,746, Roseau County).

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. For many years, the standard for arsenic was 50 parts per billion (ppb). A revision to the Arsenic Rule, which was finalized in January 2001, lowered the limit to 10 ppb. The new standard took effect in 2006.

Previous testing indicated that approximately 40 community water systems in Minnesota had arsenic levels that would exceed the revised standard. Working with MDH, these water systems studied alternatives, and more than 20 of these systems reduced their levels to under 10 ppb prior to the new standard taking effect. They did this by adding treatment processes, replacing existing wells, or connecting to other water supplies.

Those remaining systems in exceedance are working with MDH to come into compliance and are also communicating regularly with their residents about the situation.

Radioactive Elements

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

Gross Alpha Emitters

Nine community water systems—including seven municipal systems—were exceeding the standard for gross alpha emitters on the distribution system in 2006. The affected municipal systems are Andover (population 19,000, Anoka County), Brook Park (pop. 156, Pine County), East Bethel (pop. 63, Anoka County), Glenville (pop. 729, Freeborn County), Goodview (pop. 3,373, Winona County), LaCrescent (pop. 5,072, Houston County), and New Market (pop. 1,500, Scott 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 2006. The affected municipal systems are Andover (population 19,000, Anoka County), Anoka (pop. 18,172, Anoka County), Brook Park (pop. 156, Pine County), East Bethel (pop. 63, Anoka County), Goodview (pop. 3,373, Winona County), Harris (pop. 400, Chisago County), Isanti (pop. 4,500, Isanti County), LaCrescent (pop. 5,072, Houston County), Medford (pop. 1,107, Steele County), New Brighton, (pop. 22,100, Ramsey County), New Market (pop. 1,500, Scott County), and Norwood-Young America (pop. 3,162, Carver County). 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 to make infrastructure changes or is studying alternatives to meet the MCL.

Other Inorganic Chemicals

No community water systems exceeded the standards for other inorganic chemicals in 2006.

Lead and Copper

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. 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.

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. Fortunately, with corrosion-control treatment and treatment optimization, the number of systems exceeding the lead and/or copper action level in Minnesota has not increased.

In 2005 and 2006, our community water supplies exceeded the lead action level and 28 community water systems exceeded the copper action level. 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 80 percent of the systems achieved compliance after treatment installation and optimization. Of the 28 systems not meeting the copper action level, 10 have a 90th percentile copper value greater than 2.0 parts per million. 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.

Copper is an essential element for living organisms, including humans, and—in small amounts—necessary in our diet to ensure good health. However, too much copper can cause adverse health effects, including vomiting, diarrhea, stomach cramps, and nausea. It has also been associated with liver damage and kidney disease.

The human body has a natural mechanism for maintaining the proper level of copper in it. However, children under one year old have not yet developed this mechanism and, as a result, are more vulnerable to the toxic effects of copper. People with Wilson's disease also have a problem with maintaining the proper balance and need to exercise particular care in limiting exposure to copper.

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.

Emerging Issues

Work on PFC Contamination Continues

As noted in the annual report issued by MDH in 2006, sampling begun late in 2004 revealed the presence of perfluorochemicals (PFCs) in groundwater in Oakdale, a St. Paul suburb. Since that time, perfluorobutanoic acid has been found in several community water systems in other parts of the East Metro area of the Twin Cities.

PFCs have been used for many years to make products that resist heat, oil, grease, stains, and water. Common uses include nonstick cookware, stain-resistant carpets and fabrics, components of fire-fighting foam, and other industrial applications.

Minnesota is one of only a few states in the country where these chemicals were made and used. The 3M Company made PFCs at its Cottage Grove facility from the late 1940s until 2002. Wastes from the production process were placed in local disposal sites.

PFCs are stable chemicals that do not change or break down in the environment. As a result, they may build up in soil, sediments, and other places. Since the PFC family of chemicals is relatively new, there have been few studies to date regarding its health effects on human beings. The Minnesota Department of Health has been reviewing ongoing research on PFCs to determine health-based values to ensure that its guidelines reduce exposures and protect public health. Health-based values reflect levels of a chemical that MDH considers safe for human consumption over a lifetime.

In addition to its research on the health effects of PFCs, MDH has been working with the affected communities and their residents, as well as 3M Company, Minnesota Pollution Control Agency, and the U. S. Environmental Protection Agency, to find remedies for the situation. This work includes defining the extent of the contamination, making recommendations on interim precautions residents can take, and determining long-term solutions.

Filters containing activated carbon have been shown to be effective at removing PFCs. An activated-carbon water treatment plant, financed by 3M and designed to remove PFCs at two municipal wells in Oakdale, was completed in 2006.

Standard Review and Revisions

Minnesota water supplies are complying with updated rules for disinfection byproducts and surface water treatment.

Disinfection Byproducts and Surface Water Treatment

The U. S. Environmental Protection Agency (EPA) administrator signed notices for final versions of the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 ESWTR) on December 15, 2005. The Stage 2 DBPR and LT2 ESWTR are the second phase of rules required by Congress through 1996 amendments to the Safe Drinking Water Act. These rules strengthen protection against microbial contaminants, especially Cryptosporidium, and at the same time, reduce potential health risks of disinfection byproducts (DBPs).

Stage 2 DBPR built upon the existing Stage 1 DBPR to reduce potential cancer and reproductive and developmental health risks from DBPs in drinking water. It affects community and nontransient noncommunity water systems that produce and/or deliver water that is treated with a chemical disinfectant. Compliance monitoring requirements were tightened for two groups of DBPs: trihalomethanes and haloacetic acids. The rule targets higher-risk systems through prompting of distribution system evaluations, conversion from system-wide to locational compliance determination, and system performance within prescribed operational evaluation levels.

The LT2 ESWTR was developed with the intent to reduce illness linked to Cryptosporidium and other pathogenic microorganisms in drinking water. This regulation applies to all public water systems that use surface water or ground water under the direct influence of surface water. It also requires maintainance of microbial protection when systems take steps to decrease the formation of DBPs. The LT2 ESWTR and Stage 2 DBPR were promulgated simultaneously due to concerns about risk tradeoffs between pathogens and DBPs.

The dual rules will result in a larger scope and more uniform limits of DBP concentrations while focusing on a risk-based improvement in microbial protections. The process began in late 2006 when two large surface water PWSs proceeded with LT2 source water monitoring. The first of four stages of Stage 2 DBPR Initial Distribution System Evaluations (IDSEs) will begin during summer of 2007 with distribution system DBP monitoring public water systems serving populations between 50,000 and 99,999. The four parallel schedules of LT2 ESWTR source monitoring and Stage 2 DBPR IDSEs will occur consecutively through early 2010. IDSE results will be used to determine Stage 2 DBPR compliance monitoring locations, while source water data will be the basis for microbial removal and inactivation requirements.

Conclusion

Monitoring test results for 2006 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

Summary of Safe Drinking Water Monitoring Results for Minnesota

Includes Results for Both Community and Non-Community Public Water Supply Systems in Minnesota for 2006

The following is a summary of drinking water monitoring test results for all public water supply systems in Minnesota for calendar year 2006. 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 7,343 such systems in Minnesota, including:

- *963 community systems, which provide water to consumers in their places of residence, including 726 municipal systems.*

- *6,380 noncommunity systems, which provide drinking water in settings like factories, schools, restaurants, and highway rest stops.*

Minnesota issued the following violations in calendar year 2006; in some cases, the violations were issued to water systems that were already in exceedance of the particular standard:

- 1 noncommunity system with a violation of the maximum contaminant level (MCL) for benzene.
- 1 community system with a violation of the MCL for trichloroethene.
- 3 community system with a violation of the MCL for nitrate.
- 14 noncommunity systems with a violation of the MCL for nitrate.
- 13 community systems with a violation of the MCL for total coliform.
- 278 noncommunity systems with a violation of the MCL for total coliform.
- 14 community systems with a violation of the MCL for combined radium.
- 10 community systems with a violation of the MCL for gross alpha emitters.
- 1 community system with a violation of the MCL for total trihalomethanes.
- 1 community system with a violation of the MCL for haloacetic acids.
- 19 community systems with a violation of the MCL for arsenic.
- 7 noncommunity systems with a treatment technique violation for the Surface Water Treatment Rule.
- 18 community systems with a violation of the Consumer Confidence Rule.

A report that lists all violations of the Safe Drinking Water Act in Minnesota for calendar year 2006 is available from the Drinking Water Protection Section, Minnesota Department of Health, Box 64975, St. Paul, MN 55164-0975. This is also available on the world wide web through a link in the Appendix at http://www.health.state.mn.us/divs/eh/water/cinfo/dwar/report06.html or at:

http://www.health.state.mn.us/divs/eh/water/cinfo/dwar/summary2006.pdf
http://www.health.state.mn.us/divs/eh/water/cinfo/dwar/pwsid2006.pdf
http://www.health.state.mn.us/divs/eh/water/cinfo/dwar/contaminant2006.pdf

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

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.

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