

# Wisconsin Public Water Systems 2016 Annual Drinking Water Report



Wisconsin Department of Natural Resources  
Bureau of Drinking Water and Groundwater  
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**Wisconsin Public Water Systems  
2016 Annual Drinking Water Report**

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## EXECUTIVE SUMMARY

The Wisconsin Department of Natural Resources (DNR) works to protect the quality and quantity of Wisconsin's water resources to ensure that safe drinking water is available to everyone who lives, works and plays in the state. DNR is responsible for implementing and enforcing the Safe Drinking Water Act to safeguard the quality of Wisconsin's drinking water.

Strong state and federal regulations combined with the collaborative efforts of many people—including DNR, the US Environmental Protection Agency (EPA), individual owners and operators of public water systems, county health officials, professional associations, other water quality organizations and water consumers—have allowed Wisconsin to successfully manage its drinking water resources.

The scope of Wisconsin's public water supply program is large: there are more than 11,400 public water systems here, the most of any state in the nation.

Wisconsin's *2016 Annual Drinking Water Report* summarizes compliance with the drinking water requirements during 2016 and highlights initiatives that help to provide a safe and adequate supply of drinking water in the state. DNR works in many ways to help provide safe drinking water:

- Monitoring for contaminants is a critical part of the strategy to ensure safe drinking water. All public water systems test their water for contaminants, and during 2016, more than 99 percent of them provided water that met EPA's Maximum Contaminant Level standards.
- The contaminants detected most often in drinking water in Wisconsin are bacteria, nitrate, arsenic and radionuclides. When contaminants exceed permissible levels, DNR works with water systems to correct problems and return to compliance as soon as possible.
- Federal requirements related to monitoring for bacterial contaminants changed during 2016. Wisconsin's public water systems made the transition to the "Revised Total Coliform Rule" in April. DNR adopted an innovative method for "finding" sources of bacterial contamination and "fixing" the problems that allow them entry into drinking water systems.
- DNR and its partners conducted more than 2,600 inspections of public water systems to ensure compliance with construction, operation and maintenance requirements.
- DNR's partners provided on-site assessments for transient non-community water systems, technical assistance for small public water systems and training for operators throughout 2016.
- DNR awarded almost \$24 million in financial assistance through the Safe Drinking Water Loan Program during 2016. The funding, both loans and grants, is helping 14 communities in Wisconsin to make needed infrastructure improvements to their drinking water systems.
- DNR created an innovative funding program to help communities replace both the public and private sections of lead service lines throughout the state. During 2016, DNR awarded \$14.5 million through this Private Lead Service Line Replacement Funding Program to 38 communities in the state for projects to "get the lead out."

Although future needs are challenging, Wisconsin's public water systems do well at providing safe drinking water in the state. Vigilant monitoring combined with effective approaches to the challenges we face are essential to ensuring safe drinking water in Wisconsin. DNR is committed to protecting the state's drinking water to ensure that it is safe today and for the future.

The Wisconsin Department of Natural Resources (DNR) works to protect the quality and quantity of the state's water resources to ensure that safe drinking water is available to everyone who lives, works and plays in the state.

With strong state and federal regulations and collaborative efforts between DNR, the US Environmental Protection Agency (EPA), public water systems, county health officials, professional associations, individual operators, other water quality organizations and water consumers, Wisconsin has been able to successfully manage its drinking water resources.

The federal Safe Drinking Water Act (SDWA) requires states to provide an annual report summarizing violations of the drinking water standards. This *2016 Annual Drinking Water Report* summarizes how Wisconsin's public water supply systems complied with the drinking water requirements

between January 1 and December 31, 2016. This annual report also highlights state and local initiatives that help to provide a safe and adequate supply of drinking water to the citizens and visitors of Wisconsin.



## **WISCONSIN'S DRINKING WATER PROGRAM: THE BASICS**

Requirements for public water systems come from the federal SDWA, which was originally passed in 1972 and has been amended several times since. In the SDWA, EPA sets national limits for contaminants in drinking water to ensure that the water is safe for human consumption. These limits, known as Maximum Contaminant Levels (MCLs), are health-based standards that are specific to each contaminant.

The SDWA also details how often public water systems must test their water for contaminants and report the results to the state, EPA and the public. Testing or "monitoring" requirements vary depending on a water system's size, the type of population served, and the vulnerability of the water source to

contamination. In general, water systems serving residential populations and larger populations have more stringent monitoring and reporting requirements.

Finally, the SDWA requires public water systems to notify their consumers when they have not met these requirements. Consumer notification must include a clear and understandable explanation of the violation that occurred, its potential adverse health effects, steps that the water system is taking to correct the problem and the availability of alternative water supplies during the violation.

States can obtain approval from EPA to administer their own public water supply programs. This authority, called “primacy,” means that EPA has determined that the state has adopted drinking water regulations that meet SDWA requirements and that it can enforce the requirements. In Wisconsin, the DNR is the primacy agency for the state’s drinking water program.

## WISCONSIN’S PUBLIC WATER SYSTEMS

Wisconsin has 11,408 public water systems, the largest number of any state. Public water systems provide water for human consumption to at least 15 service connections or regularly serve at least 25 people for 60 days or longer per year. Wisconsin has four types of public water systems:

- Community water systems serve water to people where they live. Wisconsin has 1,054 community water systems.
  - **Municipal community (MC) water systems** are owned by cities, villages, towns or sanitary districts. This group also includes congregate care or correctional facilities that are owned by counties or municipalities. Milwaukee Waterworks is the state’s largest municipal water system, serving almost 650,000 people. Wisconsin’s smallest municipal systems, by contrast, serve fewer than 100 people each.
  - **Other than municipal community (OC) water systems** serve residents of areas supplied by privately-owned wells. The state’s OC water systems include mobile home parks, apartment buildings, condominium complexes and long term care facilities.

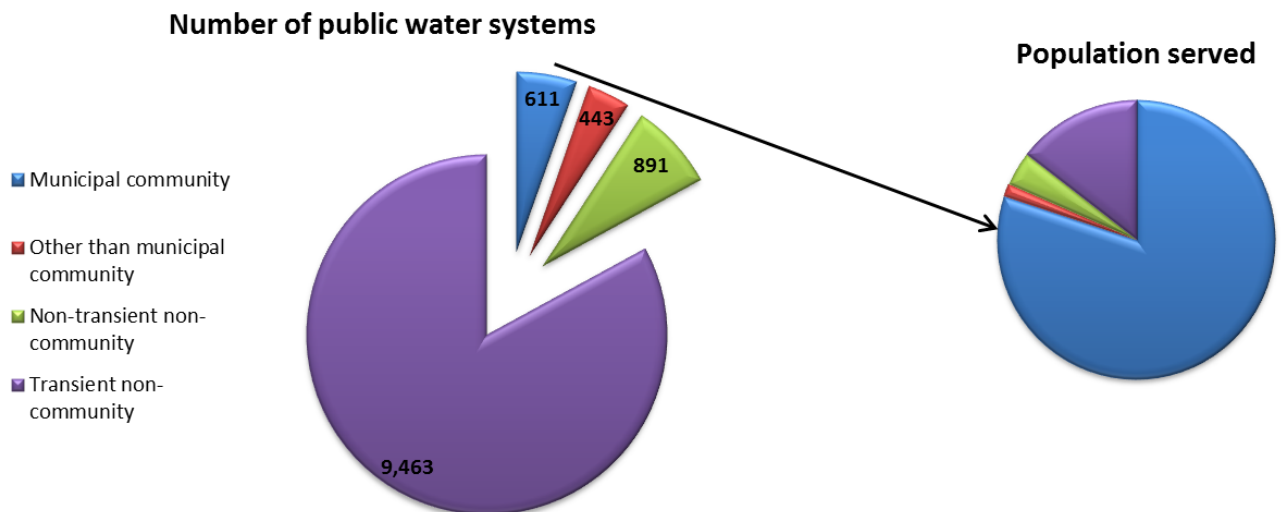


Figure 1. Wisconsin has more than 11,400 public water systems. Most are very small transient non-community systems, but the state’s municipal water systems serve the largest population.

- Non-community water systems serve water to people where they work, attend school or gather for food or entertainment. The wells supplying these systems are privately owned. Wisconsin has 10,354 non-community systems.
  - **Non-transient non-community (NN) water systems** regularly serve at least 25 of the same people for six months or more per year. They include schools, day care centers, office buildings, industrial facilities, dairies and other businesses.
  - **Transient non-community (TN) water systems** serve at least 25 people (though not necessarily the same people) for 60 days or longer per year. They include motels, campgrounds, parks, restaurants, taverns and churches.

The state’s smallest water systems make up the majority of the total number — Wisconsin has 9,463 transient non-community systems. In contrast, the state’s 611 municipal systems serve about 80 percent of the population (Figure 1).

The vast majority of Wisconsin’s public water systems rely on groundwater and obtain their water from wells. However, 56 systems use surface water from Wisconsin lakes to provide drinking water to their customers. These surface water systems serve some of the state’s largest communities including Milwaukee and Green Bay. So, while more than 99 percent of the state’s public water systems use groundwater sources, surface water systems serve about 37 percent of the state’s population.

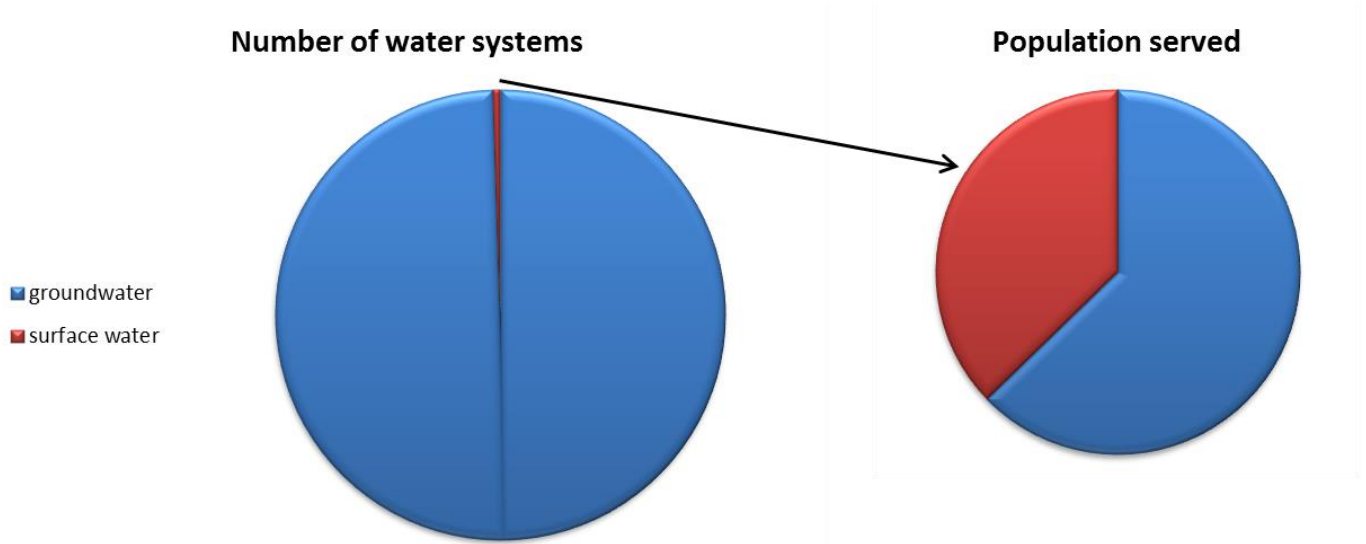


Figure 2. Most of Wisconsin’s public water systems use groundwater pumped from wells. The 56 systems that use surface water include the state’s largest public water systems.

## MONITORING AND TESTING FOR CONTAMINANTS IN DRINKING WATER



Monitoring is critically important to ensure safe drinking water and identify changes in water quality. All public water systems are required to monitor and test their water for contaminants. Monitoring involves collecting water samples, having them analyzed for potential contaminants and reporting the results to DNR and consumers. The frequency of monitoring and the number of contaminants measured depend on the type of water system and population served.

Contaminants can have either acute or chronic health effects. Acute contaminants pose an immediate risk to human health—people can become ill within hours or days of exposure. Chronic contaminants cause long-term health risks. Their maximum permissible levels are risk-based, typically set so that only one in 1,000,000 people would face an increased risk of

developing cancer by drinking two liters of water a day for 70 years.

All public water systems monitor for acute contaminants. The largest systems collect hundreds of water samples each month, while the smallest systems test once per year.

Public water systems monitor for chronic contaminants less frequently. The state's smallest systems, TNs, are not required to test for these contaminants.

### Types of regulated contaminants

Regulated contaminants fall into several groups based on their microbial or chemical characteristics:

- Acute contaminants
  - *Escherichia coli* (or *E. coli*) bacteria
  - Nitrate
  
- Chronic contaminants
  - Inorganic chemicals (IOCs)—this group includes arsenic, chromium, copper, lead and other chemicals
  - Synthetic organic chemicals (SOCs)—this group includes herbicides and pesticides
  - Volatile organic chemicals (VOCs)—this group includes benzene, toluene, xylene and other chemicals
  - Radionuclides—this group includes radioactive chemicals like radium and uranium



- Disinfectants and disinfection byproducts—this group includes chlorine and byproducts like haloacetic acid and trihalomethanes

Most of these chemical groups contain multiple contaminants. For example, the synthetic organic contaminants group contains 30 regulated chemicals (although there are many more synthetic organic substances in use in commerce). Municipal water systems, which have the most stringent monitoring requirements, test drinking water for more than 90 regulated contaminants to protect public health. (For a list of all the regulated contaminants and their health-based standards, or MCLs, see Appendix A.)

## Aesthetic standards

The SDWA also details aesthetic or “secondary” standards for additional contaminants. These substances may cause an unpleasant smell, taste, or appearance, or stain sinks or discolor clothes when they exceed certain levels. This group of chemicals includes iron, manganese and sulfate, among others. Public water systems may be required to take corrective actions if they exceed secondary standards for these contaminants. (Appendix A contains a list of the secondary standards.)

## COMPLIANCE WITH DRINKING WATER REQUIREMENTS



Compliance with drinking water requirements is measured in various ways. DNR and EPA track whether water samples are collected in a timely manner and tested for the correct contaminants, and whether contaminant concentrations exceed the permissible limits. They also track whether public water systems issue public notices or notifications in a timely manner, post or distribute them as required, and whether

they correct deficiencies by appropriate deadlines. Violations can occur when deadlines are not met, water samples are not collected, or public notices are not issued. They also occur when samples exceed permissible limits for contaminants.

Most of Wisconsin’s public water systems met all their regulatory requirements during 2016. This section of our report summarizes compliance rates and reviews the violations that did occur.

## Maximum Contaminant Level violations

The most serious violations at public water systems can occur when contaminants are detected in drinking water. A MCL violation occurs when a contaminant is detected at a higher concentration than is

permissible to protect public health (i.e., the MCL threshold). Although a MCL violation does not necessarily mean that any consumers experienced adverse health effects from drinking the water, it does require that the water system take action to notify consumers and correct the problem.

During 2016, more than 99 percent of Wisconsin's public water systems provided water that met all the MCL standards for regulated contaminants. Among the 76 systems that experienced contaminant MCL exceedances or assessment triggers, the problems encountered most often were bacteria, nitrate, arsenic and radionuclides. Table B-1 in Appendix B summarizes the MCL violations that occurred during 2016.

- **Microbial contaminants**

Microbes, especially coliform bacteria, are a common contaminant of drinking water supplies in Wisconsin (and other places). Total coliform bacteria are widely distributed in soil, plants and water; their presence in drinking water indicates that a pathway for contamination may exist. *Escherichia coli* (or *E. coli*) is a species of bacteria that, when present in drinking water, indicates contamination with human or animal wastes. *E. coli* is considered an acute contaminant because people can become ill after a single exposure to the viruses that may be present when *E. coli* is detected. Exposure can cause short-term health effects like diarrhea, nausea, cramps and headaches but may have more serious effects on vulnerable populations like infants, young children and people with immune system problems.

All public water systems in Wisconsin are required to monitor for the presence of coliform bacteria, and last year these requirements changed. From January-March 2016, public water system requirements were governed by the "Total Coliform Rule," and then on April 1, 2016 the requirements of the "Revised Total Coliform Rule" took effect.

Under the former rule, detection of total coliform bacteria in drinking water above a certain threshold constituted a MCL violation. During the first three months of 2016, 30 of Wisconsin's 11,408 public water systems (or 0.26 percent) incurred MCL violations for total coliform detections. The majority were transient non-community systems.

Under the new rule, the conditions that trigger a MCL violation have changed. The MCL for total coliform bacteria was replaced with an assessment requirement (see the feature on "finding and fixing"). The MCL for *E. coli* remains in effect in the new rule. From April-December 2016, 11 public water systems in Wisconsin (or about 0.1 percent) had MCL violations for *E. coli* detections. The number of MCL violations for bacterial contaminants in 2016 was lower than in previous years, since total coliform detections no longer constitute a violation.

## **Drinking Water News on Tap:** **Using the Revised Total Coliform Rule to Find and Fix**

Last year marked a change in the regulatory requirements for public water systems. On April 1, 2016, the Revised Total Coliform Rule (RTCR) took effect. It is the primary rule for ensuring that harmful bacteria and viruses are not present in public drinking water supplies. The RTCR embodies a new approach, by emphasizing “finding” the sources of microbial contamination and “fixing” the issues that allow the contaminants to enter drinking water systems.



Trained inspectors from DNR and counties throughout the state provide a valuable service to public water system owners and their customers by performing free inspections at facilities where bacteria have been detected. These inspections follow a “find and fix” approach to ensure that bacteria do not persist in the drinking water at these facilities. Since the RTCR took effect in April, more than 400 of these free inspections have been completed.

Often, inspectors discover simple corrections that will eliminate pathways for contamination and help water systems get back on track. Problems like cracked electrical conduits at a wellhead, or unnoticed cross connections to non-potable water sources, often can be corrected quickly and inexpensively. Shock-chlorinating wells with biofilms growing in them is another common corrective strategy.

When the solution is not so easily discovered, DNR has started using a new, innovative and powerful sampling procedure to identify bacterial contaminants that are difficult to find using standard analytical techniques. This “large volume sampling” technique involves collecting data from a much greater volume of water (100 liters, or about 26 gallons) and using ultrafiltration to concentrate bacteria. The analysis techniques can identify whether the source of bacterial contaminants comes from humans or animals, and can determine if the bacteria are present in a well or the underlying aquifer. Wisconsin is the first state to apply these techniques to investigations of drinking water contamination.

- ***Nitrate***

Nitrate is the most widespread inorganic chemical that occurs as a contaminant in drinking water here in Wisconsin. Because it is water-soluble and leaches readily through soil, nitrate can move easily into the groundwater. Sources of nitrate include agriculture and animal wastes, according to the Wisconsin Groundwater Coordinating Council. Nitrate is an acute contaminant because it can have serious health effects on infants younger than six months old, causing shortness of breath and blue baby syndrome. It has also been linked to some chronic diseases, and there is some evidence of an association between exposure to high nitrate levels in drinking water during the first weeks of pregnancy and certain birth defects. In adults, the health concerns include increased cancer risk.

All of Wisconsin’s 11,408 public water systems are required to monitor nitrate concentrations in drinking water. Among Wisconsin’s 1,945 community and non-transient non-community public water systems, 13 experienced violations for exceeding the nitrate MCL during 2016.

Federal and state regulations offer some leeway for very small water systems that incur nitrate MCL violations. This provision allows transient non-community systems to continue operating with water that has higher nitrate levels (above the MCL of 10 milligrams per liter [mg/L] but below 20 mg/L), so long as they meet certain conditions. They must notify the public about the nitrate contamination, ensure that the water will not be consumed by infants or women of childbearing age, and provide an alternate source of water.

<b>water system status</b>	<b>number of systems</b>
water systems on continuing operation before 2016	281
systems going on continuing operation during 2016	30
systems going off continuing operation during 2016	25
cumulative total number of systems	286

Wisconsin currently has almost 300 transient non-community water systems on “continuing operation” (Table 1). Some have remained in that status for more than 20 years. During 2016, another 30 TN systems with nitrate MCL exceedances were allowed to use the continuing operation option. During the same year, 25 TN systems went off continuing operation, but the overall number still increased, indicating that nitrate contamination in drinking water continues to be a challenge in Wisconsin.

- **Arsenic**

Arsenic is a naturally occurring element that is found in some rock formations in Wisconsin, which is why it is one of the more common inorganic chemicals detected as a contaminant of drinking water supplies. It is classified as a chronic contaminant, meaning that health risks come from long-term exposure and include skin damage, circulatory system problems and possible increased cancer risk. All community and non-transient non-community water systems are required to monitor for the presence of arsenic. Of the 1,945 water systems in Wisconsin that monitor for arsenic, seven (much less than 1 percent) had MCL exceedances during 2016.

- **Radionuclides**

Radium and uranium are naturally occurring elements that occur in rock formations in Wisconsin and can be detected as contaminants of drinking water supplies. Health risks come from long-term exposure. For example, exposure over a lifetime could result in an elevated risk for cancer and kidney toxicity. Community water systems are required to monitor for radionuclides. Of the 1,054 community water systems in Wisconsin, 10 exceeded the MCL standards for radium and/or alpha emitters during 2016. Most of those violations occurred at one system, Waukesha Water Utility, which has a history of radionuclide detections in some of its wells. Waukesha Water Utility is working on a long-term solution to this issue.

DNR works with public water systems that have MCL exceedances to correct problems and return to compliance as soon as possible. Corrective actions can include steps like disinfection, reconstructing an existing well, drilling a new well to obtain an alternate water source or installing a treatment system. Microbial contaminants, nitrate, arsenic and radionuclides are all continuing priorities for DNR because of the common occurrence of these contaminants in Wisconsin.

## Monitoring and reporting violations

Public water systems are required to monitor to verify that contaminants in the water do not exceed the MCL thresholds. If water samples are not collected by appropriate deadlines, or are not analyzed using approved methods, monitoring and reporting (M/R) violations can occur. M/R violations also occur if water systems fail to notify consumers of lead and copper monitoring results from samples collected at their homes.

Monitoring and reporting violations occur much more frequently than MCL violations. During 2016, there were 722 M/R violations among the state’s 11,408 public water systems. The most common violations result from failure to collect required samples, collecting samples late, and failure to notify consumers of the results of lead and copper samples collected from their homes.

The overall number of violations last year is similar to 2015 and has decreased from 2012-2014 levels. This indicates that water systems in the state are doing better at meeting sample collection deadlines and collecting all required samples. DNR continues to work on ways to help water systems meet their monitoring and reporting requirements through providing information and technical assistance. Some of those activities are described later in this report. Table B-2 in Appendix B summarizes the M/R violations that occurred during 2016.



## Treatment technique violations

Some drinking water requirements utilize “treatment techniques” instead of MCLs to control unacceptable levels of certain contaminants in water. Treatment techniques are procedures or technological actions which public water systems must follow to ensure control of some contaminants. For example, treatment techniques have been established for viruses, some bacteria and lead.

Treatment technique (TT) violations can occur if water systems fail to use the required processes to reduce exposure to contaminants, fail to follow approved start-up procedures for seasonal operation or fail to correct significant deficiencies in water system construction or operation. TT violations signal the potential for health risks, since consumers cannot be certain whether their drinking water was adequately treated or protected to reduce exposure to contaminants.

Among Wisconsin’s 11,408 public water systems, 56 systems (0.5 percent) had a total of 76 treatment technique violations during 2016. Most of those violations resulted from failing to correct problems identified during inspections or assessments by established deadlines. Table B-3 in Appendix B summarizes the treatment technique violations that occurred during 2016.

## Notification and reporting violations

Table B-4 in Appendix B summarizes all the notification violations that occurred during 2016.

- **Public notice violations**

To protect public health, water systems are required to notify consumers whenever violations of the primary drinking water regulations occur, or if there is a situation that poses a risk to human health. Exceeding a contaminant MCL, failing to monitor drinking water and failing to properly treat the water are all violations that require public notification.

When public notices are issued, they must inform consumers about the nature of any violations, potential health effects, corrective actions that the water system is undertaking and any preventive measures that consumers should take. If a water system fails to notify consumers as required, public notice (PN) violations can occur.

Among all the violations summarized in this report, public notice violations were the most common type. These violations occurred at 1,663 of Wisconsin’s public water systems (about 15 percent of the total) during 2016. More than 80 percent of the public notice violations occurring last year were related to monitoring for bacterial contaminants and nitrate.

- **Consumer Confidence Report violations**

All community water systems (i.e., those serving residential customers) are required to prepare and deliver an annual water quality report each year. The Consumer Confidence Report (CCR, sometimes called a water quality report) provides information about the source of a system’s water, levels of any contaminants detected in the water, and a summary of violations incurred by the water system during the previous year. CCR violations occur whenever water systems fail to provide their customers with this annual report. Of Wisconsin’s 1,054 community water systems, only 45 (about 4 percent) incurred violations in 2016 for failing to distribute a CCR or issuing the report late.

- **Notification violations**

Identifying “significant deficiencies” at public water systems is an important step that DNR takes to protect public health. Significant deficiencies are defects in design, treatment, operation or maintenance of a public water system that cause contaminants to enter the system or cause health risks for consumers of the water. Water systems are required to correct significant deficiencies by established deadlines and notify DNR when the corrective actions have been completed. These requirements apply to all of Wisconsin’s public water systems, and failure to properly notify DNR can cause a violation to occur. During 2016, 12 water systems incurred violations for failing to provide these notifications.

## DNR WORKS TO ENSURE SAFE DRINKING WATER FOR WISCONSIN

DNR works in multiple ways to ensure that Wisconsin’s public water systems provide safe drinking water.

### Program funding & staffing

Wisconsin’s public water supply program receives funding from several sources, including the federal and state governments (Figure 3). Of the total \$9 million in funding during 2016, the majority was used to pay for DNR staff and contracts for help from outside organizations, county health departments and colleges. During 2016, Wisconsin’s drinking water program had 71 full-time staff working with the state’s public water systems, a slight decrease from the previous year.

**Drinking water program funding sources**

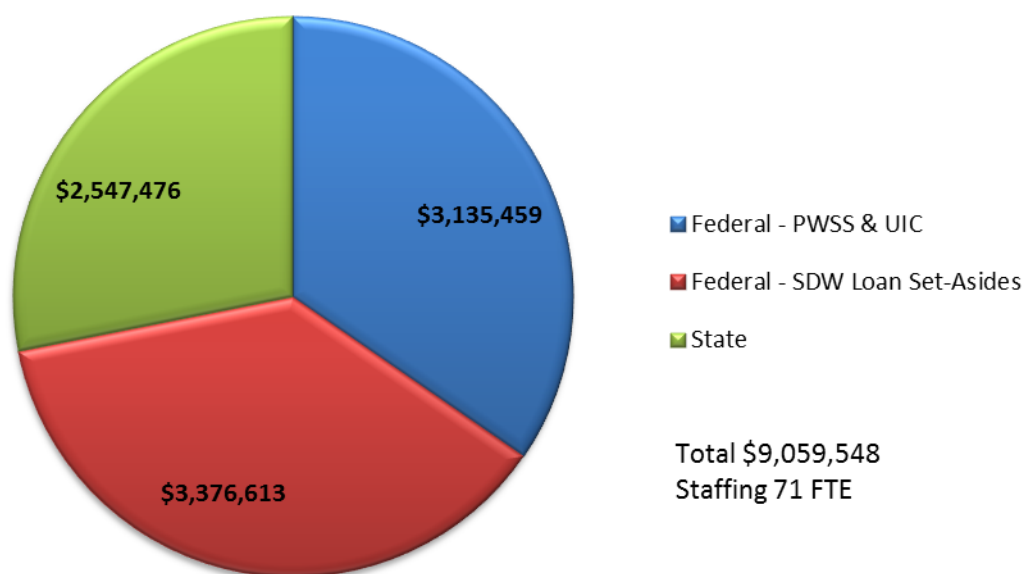


Figure 3. Funding from DNR’s public water supply program comes from both federal and state sources. During 2016, the program had 71 full-time staff.

### Inspections & assessments

Conducting inspections of public water systems is one of DNR’s core responsibilities. Inspecting water systems is a critically important tool, allowing DNR to measure compliance with requirements and helping to prevent future problems by allowing defects to be identified before health-based violations occur. Last year, the DNR and its contracted partners conducted 2,622 inspections of the water source, pumps and piping, treatment facilities and general operation and maintenance practices at public water systems throughout Wisconsin.

## Enforcement activity

Whenever water systems are not meeting the drinking water requirements, DNR works to resolve issues quickly to protect public health. The DNR follows a stepped enforcement process to ensure compliance with regulatory requirements.

Most situations are resolved quickly at the initial step in the process: first, the DNR sends a written Notice of Noncompliance (NON) to public water systems when problems are identified. Often, corrective action can be taken immediately to return the system to compliance.

If a system does not take action after initially receiving a NON, the enforcement process proceeds through additional steps. These include a Notice of Violation and in-person enforcement conference, which can result in written compliance agreements, administrative orders, and penalty orders. If the DNR is unable to resolve violations by working with a water system, a case may be referred to the Wisconsin Department of Justice for further enforcement.

When contaminants are detected in drinking water and MCLs are exceeded, the enforcement process is expedited to facilitate correcting any problems as quickly as possible. Water systems with MCL violations receive Notices of Violation to begin the process of evaluating corrective actions, with a goal of returning to compliance as quickly as possible.

Table 2 summarizes enforcement activity during 2016. DNR sent 1,810 NON letters but only 58 Notices of Violation last year, illustrating that most violations get resolved quickly after water systems are notified about problems. The number of NON letters sent in 2016 decreased substantially from recent years (during 2011-2015, DNR sent 2,171-2,690 NON letters per year), indicating there were fewer violations last year that required follow-up from DNR.

<b>Enforcement action</b>	<b>purpose</b>	<b>number</b>
Violation/reminder notice (NON)	inform public water system about failure to collect samples, report results, or distribute required information or notices	1,810
Notice of Violation (NOV)	notify water system owner about a violation and schedule a meeting with DNR staff to discuss corrective actions and timetable for returning to compliance	58
Compliance meeting	discuss enforcement process, possible corrective actions, and timeline for returning to compliance	29
Compliance Agreement	voluntary agreement between water system owner and DNR describing corrective actions and timeline for correcting violations	2
Administrative order	written order establishing corrective actions and timelines/deadlines for returning to compliance	18
Administrative order with penalty	written order establishing corrective actions and timelines/deadlines for returning to compliance and assessing fines for repeated violations	2
Case referred	case sent to Wisconsin Department of Justice for further enforcement	2
Consent decree/judgement	consent decree or judgement issued by Wisconsin Department of Justice	1



## Monitoring assistance

To assist public water systems with timely monitoring and reporting of drinking water quality throughout the year, the DNR prepares annual schedules for water system owners and operators. Information about monitoring requirements is sent twice per year. Advance notification (in August) allows system owners to budget for monitoring costs in the upcoming year. Final schedules are sent in January.

For all community and non-transient non-community public water systems in the state, DNR also evaluates the vulnerability of groundwater sources to possible contamination and uses the information to determine the proper frequency of monitoring required. DNR conducts these evaluations, called monitoring assessments, every three years. During the assessments, DNR evaluates proximity to potential contaminant sources, the local geology, well construction

criteria and previous water testing results. The assessments help to ensure continued safe drinking water sources for Wisconsin consumers and may reduce monitoring costs in excess of \$3 million annually for Wisconsin's public water systems.



## Protection of water sources

Wellhead protection is a preventive program designed to protect public water supply sources and reduce infrastructure costs, treatment costs and public health risk. The program represents a “first line of defense” approach to safe drinking water. It helps to prevent contaminants from entering public water supplies by managing the land use that contributes water to wells. Wisconsin's wellhead protection program incorporates both regulatory and voluntary components, and DNR encourages development and implementation of wellhead protection plans for all public water systems as a proactive step to protect wells from potential contamination. During 2016, ten new wellhead protection plans were reviewed and approved by DNR.

## Financial assistance

During 2016, DNR's community financial assistance program worked with the public drinking water program and awarded almost \$24 million to municipal water systems for projects that will help to provide safe water for consumers at affordable prices. The funding was comprised of \$19.7 million in low interest loans and \$4.2 million in principal forgiveness (i.e., grants). Depending on market interest rates, the savings to communities from a lower interest rate loan can equal 20 to 30 percent compared to a market rate loan. Since the Safe Drinking Water Loan Program began in 1998, 295 projects in Wisconsin have received more than \$579 million in loans and grants.

These are a few examples of how Wisconsin communities used Loan Program funds to provide safe drinking water in 2016:

- The city of Elkhorn received \$8,599,853 for construction of two wells, treatment to remove radium and transmission mains to address replacement of older infrastructure.
- The village of Black Earth received \$1,248,397 to replace water mains on Center Street.
- The city of Onalaska received \$3,080,371 for replacement of a wellhouse and an iron-manganese treatment plant.
- The city of Granton received \$456,031 for installing new well controls and SCADA (electronic control systems), rehabilitating the elevated storage tank and constructing a looping main and river crossing.
- The city of Rhinelander received \$2,638,893 to replace water mains on West Frederick and Courtney streets.

Appendix C has a list of all the communities that were awarded funding in 2016.

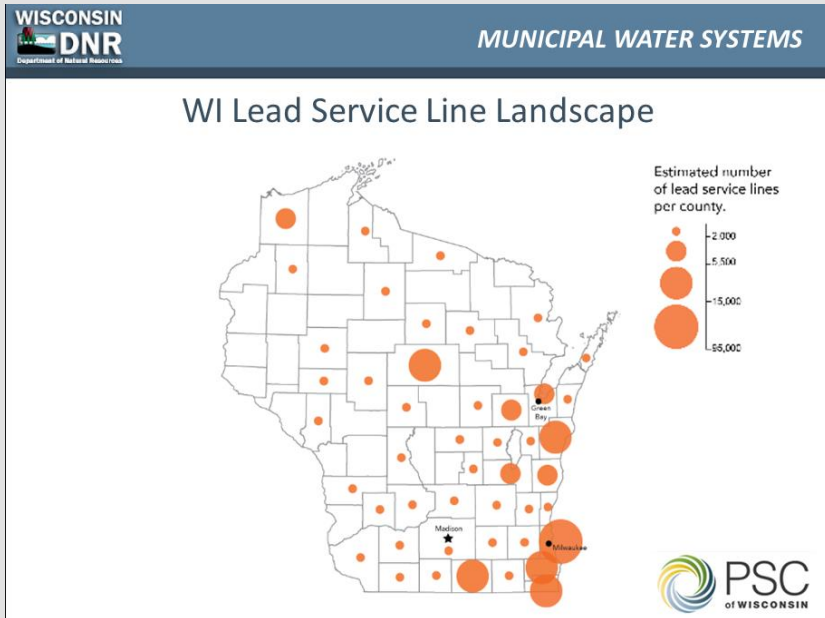
During 2016, DNR also created a new funding program to help communities make improvements to help provide safe drinking water. See the feature on Wisconsin's Private Lead Service Line Replacement program.

## Partnerships

In Wisconsin, providing safe drinking water is a cooperative effort between public water systems, professional associations, individual operators, DNR, local agencies, EPA, water consumers and many others. The DNR contracts with numerous organizations to help provide technical assistance, training and compliance support to the state's water system owners and operators. These contract programs include:

- County health departments perform inspections, assessments and water sampling at thousands of restaurants, parks, churches, and other transient non-community systems around the state. During 2016, these locally-based sanitarians performed more than 4,500 on-site inspections at transient non-community water systems throughout the state.
- Wisconsin Rural Water Association (WRWA) helps small public water systems by providing regular reminders of monitoring requirements and upcoming sampling deadlines along with specialized, on-site technical assistance to troubleshoot problems. During 2016, WRWA delivered 5,715 monitoring reminders and performed 538 site visits at other than municipal community and non-transient non-community water systems around the state.
- Moraine Park Technical College and Wisconsin Rural Water Association provide training that helps new water system operators prepare for exams and existing operators obtain required continuing education.

## Drinking Water News on Tap: Wisconsin’s Private Lead Service Line Replacement Funding Program



Wisconsin has more than 170,000 lead service lines statewide. These are the pipes that connect water mains to individual homes and other buildings. Lead service lines usually have a public portion, owned by the municipality, and a private portion, owned by the homeowner.

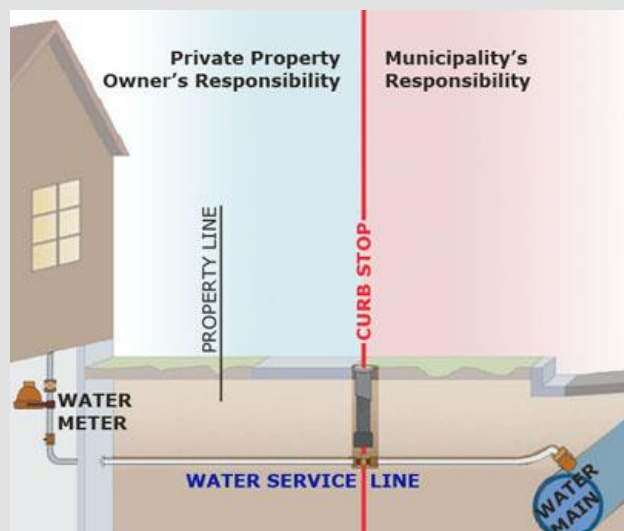
Options for replacing the private side of a water service are limited in Wisconsin, since municipalities cannot use ratepayer funds to assist private landowners. Some municipalities have ordinances requiring homeowners to replace private lead services—and pay the cost—when the publicly-owned pipes are replaced. In other communities, the choice is left to the

homeowner, and for some, the cost can be prohibitive.

Research on lead in drinking water has raised concerns regarding the potential for increased levels of lead in drinking water when partial lead service line replacement occurs. DNR and EPA advise replacing lead service lines in their entirety because partial replacement can increase lead levels in water.

During 2016, DNR created an innovative, first-of-its-kind program to replace the public *and* private parts of lead service lines. The Private Lead Service Line Replacement Funding Program reflects DNR’s commitment to safe drinking water and addresses financial barriers to full lead service line replacement. DNR received approval from EPA to make \$14.5 million available to disadvantaged communities for funding full lead service line replacement projects.

The program has been funded for two years. In 2016, 38 municipalities applied to participate in this program, and DNR awarded \$14.5 million for lead service line replacement projects in those communities (Appendix D contains a list of the funding recipients). The city of Milwaukee is receiving the largest award, \$2.6 million. For next year, 41 communities have expressed interest in applying for funding. The program is an important start to solving the problem of getting the lead out of drinking water.



## CHALLENGES AHEAD

Wisconsin's water supply infrastructure, like the rest of the nation's, is aging, and citizens and communities face steep costs to maintain and upgrade the pumps, pipes, and treatment facilities needed to bring safe water to our homes every day.

Every four years, EPA conducts its Drinking Water Infrastructure Needs Survey and Assessment (the most recent information comes from the 2011 survey). Nationally, an estimated \$384 billion are needed to meet the nation's drinking water infrastructure needs between 2011 and 2031. The price tag for Wisconsin was estimated to be over \$7.1 billion. Here's how that bill breaks down:

- Over 60 percent of Wisconsin's price tag (\$4.4 billion) is for distribution and transmission needs.
- Meeting treatment needs will require an estimated \$1.4 billion.
- For Wisconsin's largest community water systems, those serving populations greater than 100,000, infrastructure needs are estimated at more than \$1.7 billion.
- The needs of community water systems serving 3,300 to 100,000 are estimated at nearly \$3.4 billion.
- Infrastructure costs for small community water systems, serving less than 3,300, are estimated at over \$1.5 billion.
- Not-for-profit, non-community water system needs are estimated at \$550 million.

Although future needs are challenging, Wisconsin's public water systems do well at providing safe drinking water in the state. Many partners, including water system owners and operators, water industry professionals, training and technical assistance providers, and other agencies all participate in the effort and work hard every day. DNR is committed to protecting the state's drinking water and works hard to ensure that it is safe today and for the future.

## OBTAINING COPIES OF WISCONSIN'S 2016 ANNUAL DRINKING WATER REPORT

As required by the federal Safe Drinking Water Act, DNR makes the 2016 Annual Drinking Water Report available to the public. To obtain copies of this report, contact the Bureau of Drinking Water and Groundwater DG/5, Wisconsin Department of Natural Resources, PO Box 7921, Madison WI 53707, 608-266-1054. The report is also available on DNR's web site, [dnr.wi.gov](http://dnr.wi.gov), search "drinking water."



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## APPENDIX A. Maximum permissible levels of contaminants in drinking water

The tables below show the Maximum Contaminant Levels (MCLs) for the various groups of regulated drinking water contaminants.

Table A-1. Microbial contaminants	
contaminant	MCL
<i>Escherichia coli</i> bacteria	<p>MCL exceedance can occur in several ways:</p> <ul style="list-style-type: none"> <li>• <i>E. coli</i>-positive repeat sample following a total coliform-positive routine sample.</li> <li>• Total coliform-positive repeat sample following an <i>E. coli</i>-positive routine sample.</li> <li>• Failure to collect all required repeat samples following an <i>E. coli</i>-positive routine sample.</li> <li>• Failure to test for <i>E. coli</i> after a total coliform-positive repeat sample.</li> </ul>

Table A-2. Inorganic contaminants					
contaminant	MCL (mg/L)	contaminant	MCL (mg/L)	contaminant	MCL (mg/L)
Antimony	0.006	Chromium	0.1	Nickel	0.1
Arsenic	0.01	Copper	Action Level * = 1.3	Nitrate	10
Asbestos (fiber length >10 microns)	7 million fibers/L	Cyanide	0.2	Nitrite	1
Barium	2	Fluoride	4	Total Nitrate & Nitrite	10
Beryllium	0.004	Lead	Action Level * = 0.015	Selenium	0.05
Cadmium	0.005	Mercury	0.002	Thallium	0.002

\* Exceeding an action level is not a violation; it requires water systems to take additional steps and employ techniques to control corrosiveness of water.

Table A-3. Radionuclides			
contaminant	MCL (picocuries per liter)	contaminant	MCL (micrograms per liter)
Gross alpha particle activity	15	Uranium	30
Radium-226 and Radium-228	5		

**Table A-4. Disinfectants and disinfection byproducts**

DISINFECTION BYPRODUCTS		RESIDUAL DISINFECTANTS	
contaminant	MCL (mg/L)	disinfectant	MRDL * (mg/L)
Bromate	0.01	Chloramines (as Cl <sub>2</sub> )	4
Chlorite	1	Chlorine (as Cl <sub>2</sub> )	4
Haloacetic Acids	0.06	Chlorine dioxide (as ClO <sub>2</sub> )	0.8
Total Trihalomethanes	0.08	* MRDL = maximum residual disinfectant level	

**Table A-5. Organic contaminants**

SYNTHETIC ORGANIC CONTAMINANTS					
contaminant	MCL (mg/L)	contaminant	MCL (mg/L)	contaminant	MCL (mg/L)
2,4-D	0.07	Dibromochloropropane	0.0002	Hexachlorobenzene	0.001
2,4,5-TP	0.05	Dinoseb	0.007	Hexachlorocyclopentadiene	0.05
Alachlor	0.002	Dioxin	3 x 10 <sup>-8</sup>	Lindane	0.0002
Atrazine	0.003	Diquat	0.02	Methoxychlor	0.04
Benzo(a)pyrene	0.0002	Endothall	0.1	Oxamy	0.2
Carbofuran	0.04	Endrin	0.002	PCBs	0.0005
Chlordane	0.002	Ethylene Dibromide	0.00005	Pentachlorophenol	0.001
Dalapon	0.2	Glyphosate	0.7	Picloram	0.001
Di(2-ethylhexyl)adipate	0.4	Heptachlor	0.0004	Simazine	0.004
Di(2-ethylhexyl)phthalate	0.006	Heptachlor epoxide	0.0002	Toxaphene	0.003
VOLATILE ORGANIC CONTAMINANTS					
contaminant	MCL (mg/L)	contaminant	MCL (mg/L)	contaminant	MCL (mg/L)
Benzene	0.005	1,2-Dichloroethylene,trans	0.1	Toluene	1
Carbon Tetrachloride	0.005	Dichloromethane	0.005	1,2,4 Trichlorobenzene	0.07
o-Dichlorobenzene	0.6	1,2-Dichloropropane	0.005	1,1,1-Trichloroethane	0.2
p-Dichlorobenzene	0.075	Ethylbenzene	0.7	1,1,2 Trichloroethane	0.005
1,2-Dichloroethane	0.005	Chlorobenzene	0.1	Trichloroethylene	0.005
1,1-Dichloroethylene	0.007	Styrene	0.1	Vinyl Chloride	0.0002
1,2-Dichloroethylene,cis	0.07	Tetrachloroethylene	0.005	Xylenes (Total)	10

**Table A-6. Secondary drinking water standards**

Water containing inorganic chemicals in quantities above these limits is not hazardous to health but may be objectionable.

<b>parameter</b>	<b>standard (mg/L)</b>	<b>parameter</b>	<b>standard (mg/L)</b>
Aluminum	0.05 to 0.2	Iron	0.3
Chloride	250	Manganese	0.05
Color	15 units	Odor	3 (threshold number)
Copper	1	Silver	0.1
Corrosivity	Noncorrosive	Sulfate	250
Fluoride	2	Total Dissolved Solids (TDS)	500
Foaming agents	0.5	Zinc	5
Hydrogen Sulfide	Not detectable		



## APPENDIX B. Summary of violations of drinking water requirements during 2016

The following tables summarize violations during 2016 at Wisconsin’s public water systems. The tables contain reports of violations of MCL thresholds, monitoring and reporting requirements, treatment technique requirements, and notification requirements.

<b>Table B-1. Maximum Contaminant Level violations during 2016</b>						
contaminant	number of violations	number of water systems with violations				
		total systems *	MC	OC	NN	TN
<b>MICROBIAL CONTAMINANTS</b>	<b>48</b>	<b>41</b>	<b>2</b>	<b>6</b>	<b>3</b>	<b>30</b>
Total coliform (Jan-Mar, old rule)	33		2	6	3	19
<i>E. coli</i> (Jan-Mar, old rule)	3					3
<i>E. coli</i> (Apr-Dec, new rule)	12			1	2	8
<b>INORGANIC CONTAMINANTS</b>	<b>26</b>	<b>20</b>		<b>3</b>	<b>9</b>	<b>8</b>
arsenic	13			1	6	n/a
nitrate	13			2	3	8 †
<b>RADIONUCLIDES</b>	<b>209</b>	<b>10</b>	<b>9</b>	<b>1</b>		
gross alpha particle activity	88		3	1	n/a	n/a
radium 228	39		1		n/a	n/a
radium 226+228	82		9	1	n/a	n/a
<b>DISINFECTION BYPRODUCTS</b>	<b>9</b>	<b>3</b>	<b>3</b>			
haloacetic acids	2		2			
total trihalomethanes	7		3			
<b>SYNTHETIC ORGANIC CONTAMINANTS</b>	<b>1</b>	<b>1</b>			<b>1</b>	
di(2-ethylhexyl)phthalate	1				1	n/a
<b>VOLATILE ORGANIC CONTAMINANTS</b>	<b>1</b>	<b>1</b>			<b>1</b>	
dichloromethane	1				1	n/a
<b>Overall totals</b>	<b>294</b>	<b>76</b>	<b>14</b>	<b>10</b>	<b>14</b>	<b>38</b>
*Some water systems may have multiple violations within a contaminant group.						
† An additional 286 TN systems are on continuing operation with nitrate levels above the MCL of 10 mg/L.						

**Table B-2. Monitoring and reporting violations during 2016**

contaminant	number of violations	number of water systems with violations				
		total systems *	MC	OC	NN	TN
<b>MICROBIAL CONTAMINANTS</b>	<b>338</b>	<b>292</b>	<b>7</b>	<b>44</b>	<b>42</b>	<b>199</b>
Groundwater Rule	58		1	6	3	43
Total Coliform Rule	41		2	12	4	20
Revised Total Coliform Rule	239		1	32	35	147
<b>INORGANIC CONTAMINANTS</b>	<b>321</b>	<b>259</b>	<b>62</b>	<b>72</b>	<b>59</b>	<b>66</b>
arsenic	5			1	4	n/a
lead and copper	229		60	69	52	3
nitrate	84		2	4	6	63
inorganics panel	3 (30 individual contaminants)			1	2	n/a
<b>RADIONUCLIDES</b>	<b>6</b> (23 individual contaminants)	<b>4</b>	<b>2</b>	<b>2</b>		
<b>DISINFECTANTS &amp; DISINFECTION BYPRODUCTS</b>	<b>40</b>	<b>25</b>	<b>21</b>	<b>2</b>	<b>2</b>	
residual disinfectants	12		7	2	2	
disinfection byproducts	28		14			
<b>SYNTHETIC ORGANIC CONTAMINANTS</b>	<b>1</b> (25 individual contaminants)	<b>1</b>			<b>1</b>	
<b>VOLATILE ORGANIC CONTAMINANTS</b>	<b>16</b> (356 individual contaminants)	<b>11</b>	<b>1</b>	<b>4</b>	<b>6</b>	
<b>Overall totals</b>	<b>722</b>	<b>592</b>	<b>93</b>	<b>124</b>	<b>110</b>	<b>265</b>

\*Some water systems may have multiple violations within a contaminant group.

**Table B-3. Treatment technique violations during 2016**

contaminant	number of violations	number of water systems with violations				
		total systems *	MC	OC	NN	TN
<b>MICROBIAL CONTAMINANTS</b>	<b>57</b>	<b>43</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>30</b>
Groundwater Rule	30		6	4	1	9
Revised Total Coliform Rule	27		1	1		21
<b>INORGANIC CONTAMINANTS</b>	<b>12</b>	<b>6</b>	<b>3</b>	<b>3</b>		
Lead and Copper Rule	12		3	3		
<b>DISINFECTANTS &amp; DISINFECTION BYPRODUCTS</b>	<b>7</b>	<b>7</b>	<b>6</b>	<b>1</b>		
<b>Overall totals</b>	<b>76</b>	<b>56</b>	<b>16</b>	<b>9</b>	<b>1</b>	<b>30</b>

\*Some water systems may have multiple violations within a contaminant group.

**Table B-5. Notification violations during 2016**

requirement	number of violations	number of water systems with violations				
		total systems *	MC	OC	NN	TN
Consumer Confidence Report	45	45	6	39	n/a	n/a
Groundwater Rule	15	12	2	1		9
Public Notification	3,481	1,663	97	79	166	1,321
<b>Overall totals</b>	<b>3,541</b>	<b>1,720</b>	<b>102</b>	<b>108</b>	<b>166</b>	<b>1,327</b>

\*Some water systems may have multiple violations within a group.

**APPENDIX C. Communities receiving Safe Drinking Water Loan Program funding for drinking water projects during 2016**

<b>Water system</b>	<b>funding amount</b>	<b>project description</b>
Black Earth Waterworks	\$1,248,397	Replace mains on Center Street
Cottage Grove Waterworks	\$1,122,400	Install water mains on west side, improve pressure zones
Curtiss Waterworks	\$1,089,453	Construct new wells (No. 11- 14), treatment and raw water transmission main
Elkhorn Waterworks	\$8,599,853	Water supply and treatment at wells 9 & 10, construct transmission mains
Granton Waterworks	\$456,031	Install well control equipment/SCADA, rehab elevated tank and construct looping main and crossing
Manitowoc Waterworks	\$403,496	Extend water main along Viebahn Street
Mayville Waterworks	\$387,828	Replace cast iron mains with PVC in South Clark Street area
New Richmond Waterworks	\$399,457	Rehab and paint storage tank
Onalaska Waterworks	\$3,080,371	Replace well 9 wellhouse/ iron and manganese treatment
Park Falls Waterworks	\$1,453,244	Replace Fifth Street area water mains/valves /hydrants
Princeton Waterworks	\$563,624	Replace water main on South Farmer Street
Rhineland Water & Wastewater	\$2,638,893	Replace undersized water main along West Frederick and Courtney streets
Rice Lake Waterworks	\$933,332	Construct well 6, chemical feed equipment and backup power
Tomah Waterworks	\$1,083,895	Construct well 14
<b>Total</b>	<b>\$23,960,274</b>	

**APPENDIX D. Water systems and communities awarded funds through the Private Lead Service Line Replacement Funding Program during 2016**

<b>Water system or community</b>	<b>amount</b>
Antigo Waterworks	\$320,000
Ashland Water Utility	\$300,000
Bayfield Waterworks	\$30,000
Clintonville Utilities	\$350,000
Columbus Water & Light Department	\$300,000
Cudahy Waterworks	\$300,000
Eagle River Waterworks	\$300,000
Eau Claire Waterworks	\$500,000
Elkhart Lake Waterworks	\$94,000
Florence Utility Commission	\$325,000
Fond du Lac Waterworks	\$300,000
Green Bay Waterworks	\$500,000
Janesville Water Utility	\$500,000
Jefferson Waterworks	\$300,000
Lake Mills Waterworks	\$300,000
Manitowoc Waterworks	\$300,000
Marshfield Utilities	\$300,000
Menasha Elec & Water Util	\$300,000
Milwaukee Waterworks	\$2,600,000
Monroe Waterworks	\$300,000
Mosinee Waterworks	\$300,000
Oshkosh Waterworks	\$500,000
Park Falls Waterworks	\$300,000
Platteville Waterworks	\$310,000
Princeton Waterworks	\$320,000
Racine Waterworks	\$500,000
Randolph Water Dept	\$320,000
Rhineland Water & Wastewater	\$300,000
Saint Francis (through Milwaukee Waterworks)	\$300,000
Sheboygan Water Utilities	\$335,000
Stratford Waterworks	\$320,000
Sturgeon Bay Waterworks	\$300,000
Two Rivers Waterworks	\$247,500
Waterloo Waterworks	\$333,000
Wausau Waterworks	\$300,000
West Allis Waterworks	\$500,000
West Milwaukee (through Milwaukee Waterworks)	\$130,000
Wisconsin Rapids Water Works & Lighting Commission	\$300,000
<b>Total</b>	<b>\$14,434,500</b>