

Drinking Water Quality: Public Water Systems and Private Wells

Background

Public Water Systems

A major use of New Jersey's water resources is for drinking water supply. About 1.2 billion gallons of potable water are used in New Jersey each day, with 88 percent of the state's population receiving its drinking water from public water systems, while the remainder is supplied by private wells. A public water system is defined as a water system that pipes water for human consumption that has at least 15 service connections or regularly serves at least 25 individuals 60 days or more a year. About half the state's population receives its drinking water from surface water, the rest from ground water.

Historically, New Jersey focused attention on total coliform bacteria and a limited number of inorganic, organic and radiological parameters in drinking water. In 1983, the New Jersey Legislature gave the NJDEP authority to require water systems to monitor for a list of 22 hazardous contaminants which were mainly volatile organic contaminants (VOCs), including solvents, degreasers, and components of gasoline. The Legislature also established the New Jersey Drinking Water Quality Institute to develop standards, or Maximum Contaminant Levels (MCLs), for these contaminants in drinking water. Today there are MCLs for 26 VOCs in New Jersey.

Over the last two decades, NJDEP has become concerned about naturally occurring radiological contaminants in drinking water systems. In 1996, New Jersey began analyzing radiological samples within 48 hours of collection and discovered a naturally occurring, short-lived radioisotope called radium-224. Radium-224 is most often found in the Kirkwood-Cohansey aquifer system of southern New Jersey. In 2004, New Jersey required that water systems analyze for gross alpha particle activity using this 48-hour rapid gross alpha test.

The USEPA and NJDEP continue to refine existing rules and develop new rules in an ongoing effort to protect human health and the environment, and to improve drinking- water quality. For example, the 2000 Federal Radionuclide Rule required community water systems to monitor for a variety of new radionuclides beginning in 2005 and 2006. Revisions in 2002 to the Surface Water Treatment Rules ensure increased protection against microbial contamination (viruses, *Giardia* and *Cryptosporidium*) that may be present in surface water systems. In January 2006, New Jersey's new arsenic drinking water standard of 5 micrograms per liter (or parts per billion, ppb) went into effect, which is the most stringent MCL for arsenic in the nation. In 2009, the USEPA-adopted Ground Water Rule went into effect to provide

an increased protection against microbial pathogens in public water systems with ground water sources. In 2012, risk-targeted monitoring for the Stage 2 Disinfection/Disinfectant Byproduct Rule began at New Jersey's largest water systems; compliance determinations with the current disinfection byproduct MCLs will protect public health by supplementing existing drinking water regulations. In 2016, New Jersey will implement the Federal Revised Total Coliform Rule, which represents a shift to treat total coliform as an indicator of a potential pathway of contamination in the distribution system and emphasizes a proactive approach to identifying and fixing problems to improve public health protection.

When results from community water systems are found to be greater than the drinking water standards, these systems are required to take the necessary steps, including public notification, to safeguard the public, and to either remove the contaminants from the water systems through treatment or use an alternate source of drinking water. Since 1999, community water systems in New Jersey have nearly a 100% compliance rate with the Consumer Confidence Report Rule, a rule that requires valuable water quality results and educational materials be provided to the consumer by July 1st every year.

Trends

Drinking water is a direct route of potential human exposure to microbiological and chemical contaminants. To protect public health, both the USEPA and the NJDEP have set standards for approximately 90 contaminants. Public water suppliers must monitor for these regulated contaminants based on the type of water system and the source of the drinking water. Since 1996, 92 percent or more of the community water systems in New Jersey have met the microbiological standards each year. A community water system is a type of public water system that supplies water to the same population year-round.

As can be seen on the graph of *Percent of Community Water Systems Meeting All Standards*, microbiological rule compliance decreased in 2010 and 2011. This decrease was most likely due to the implementation of the federal Ground Water Rule, which became effective in December 2009 for water systems using groundwater. This rule requires water systems to sample for *E. coli* bacteria in their wells when coliform bacteria are detected in routine monitoring. Microbiological compliance was also affected by the unprecedented flooding of water systems by Hurricane Irene and Tropical Storm Lee in August and September 2011. Compliance with the microbiological standards is generally good and when a problem occurs, the water systems provide public notification and fix it quickly. Microbiological rule compliance has since increased from 2011 to 2014.

Compliance with all chemical standards and radiological standards has improved since 1999 from 93 to 98 percent in community water systems (see *Percent of Community Water Systems Meeting All Standards Chart*). As new rules are implemented, compliance generally decreases slightly until the affected water systems are able to address their contamination and return to compliance. One of the last major rules that went into effect was the Arsenic Rule in 2006. Changes to monitoring requirements for disinfection byproducts as a result of the Stage 2 Disinfection/Disinfectant Byproduct Rule went into effect in 2012 and did not result in an increase in chemical standards violations.

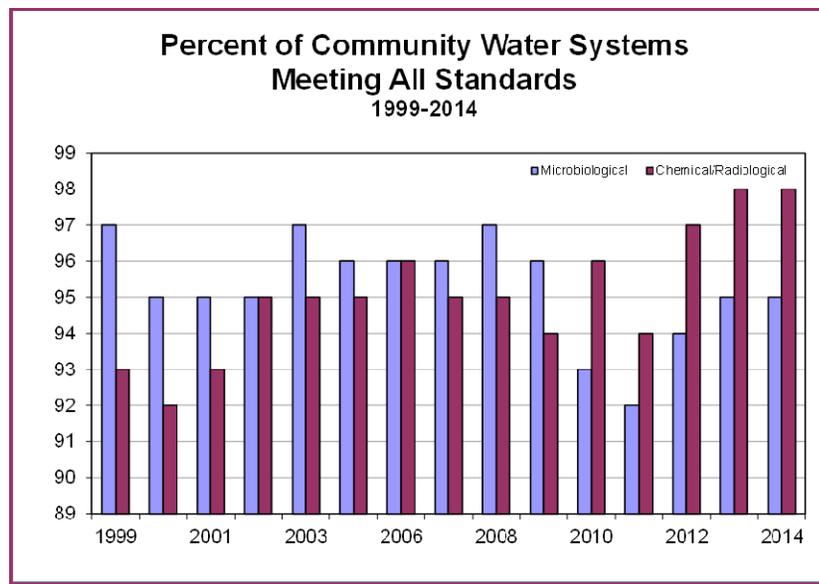


Figure 1: Percent of Community Water Systems Meeting All Standards

Private Wells

About 12% of the citizens of NJ use private wells as a source of drinking water. In response to a number of private wells found to be contaminated, the NJ legislature passed the NJ Private Well Testing Act (PWTa) in 2002. The PWTa is essentially a right-to-know law in that the buyer and/or seller are required to test the private well water and disclose the results as part of the real estate transfer. The detailed test results are confidential, although summaries of the data are available. The sample tested is the “raw” or untreated water, so that the buyer is aware of the quality of the well water prior to treatment. Where treatment exists, the water consumed may

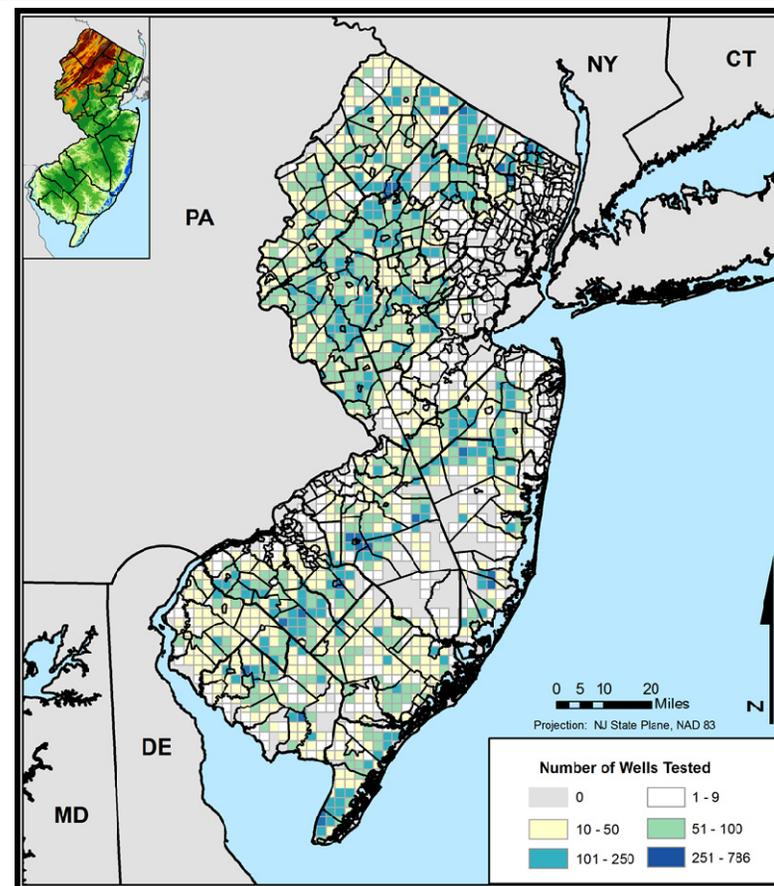


Figure 2: Number of Wells Tested as part of the PWTa through March of 2014.

differ from the raw water. The certified laboratory performing the analyses submits all sampling data to the NJDEP electronically; county health officials and municipal health officials have access to the test results. Summaries of the PWTa data are available, although the individual test results are confidential.

Under the PWTa, the water is tested for both primary and secondary contaminants. Primary drinking water contaminants have health-based standards or MCLs (maximum contaminant levels). The PWTa requires that all wells be tested for bacteria, nitrates, and 26 VOCs; in addition, testing for arsenic is required in 12 northern counties, testing for mercury is required in nine southern counties, and

gross alpha particle activity is required in nine southern counties and in Mercer, Middlesex, and Hunterdon Counties. Gross alpha activity is a surrogate for radium in southern NJ, and a surrogate for radium and/or uranium in northern NJ. All well water samples are also analyzed for three secondary parameters: pH, manganese and iron. Secondary standards are based on aesthetic considerations.

Trends

In the period from September 2002 through March 2014, a total of 86,767 individual wells have been tested under the New Jersey Private Well Testing Act. Figure 2 (page 2) is a map showing the relative number of private wells that have been tested in each municipality. In some municipalities where public water is available, very few private wells have been tested, while in other municipalities, almost all of the water consumed comes from private wells.

The private well database provides us with information about the percent of private wells that meet the drinking water standards. Figure 3 is a summary of the percent of private wells that meet all drinking water MCLs since 2006, when the new arsenic MCL became effective. Since that date approximately 85% of the private wells in the state meet all New Jersey Drinking Water Standards.

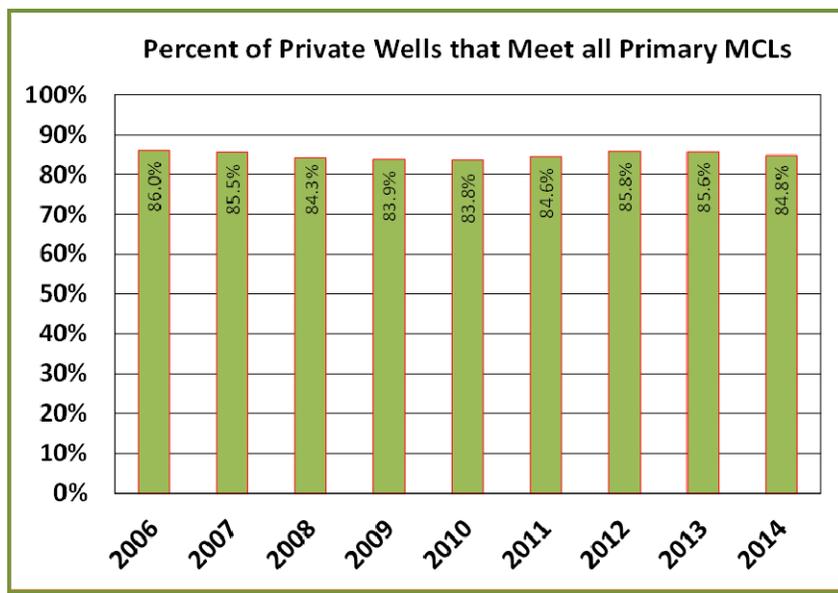


Figure 3: Percent of Private Wells that meet all Primary MCLs

An evaluation of the detection frequency for the monitored primary contaminants was performed. Since not all contaminants were analyzed in every sample, occurrence of arsenic was evaluated only in northern NJ, mercury in southern NJ, and gross alpha in southern and central NJ. As can be seen in Figure 4, the MCLs for naturally-occurring contaminants such as arsenic and gross alpha particle activity were exceeded most often in private wells. The MCLs for nitrate and bacteria (fecal coliform/*E. coli*) were the next most commonly exceeded; the likely origins are non-point sources. Finally, VOCs and mercury which originate from point sources are rarely found in private wells.

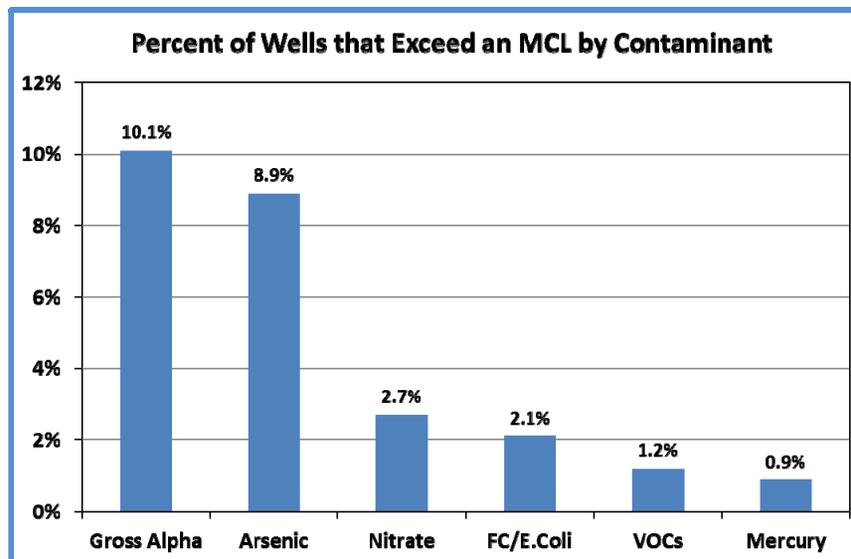


Figure 4: Percent of Wells that Exceed an MCL by Contaminant for the period between September 2002 and March 2014

More Information

For more information on private wells, visit the DEP's Web site www.state.nj.us/dep/dsr/dw/dw.htm or www.nj.gov/dep/pwta.

References

Much of the information on community systems in this report was provided by NJDEP's Division of Water Supply and Geoscience - Bureau of Safe Drinking Water and NJDEP's Office of Science.