

NEW YORK CITY 2016 DRINKING WATER SUPPLY AND QUALITY REPORT



**Environmental
Protection**

Bill de Blasio
Mayor

Vincent Sapienza, P.E.
Acting Commissioner



For details on infrastructure projects highlighted in this year's report, click on the links (★) in the graphic above.



Vincent Sapienza, P.E.
Acting Commissioner

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Dear Friends:

During a year in which awareness of the need to protect drinking water supplies rose to new levels, I am proud that New York City continues to have some of the cleanest and best-tasting drinking water of any city in the world.

New York City consumes approximately 1 billion gallons of water each and every day. This year's report should provide peace of mind to our fellow New Yorkers, especially in light of problems identified in a few drinking water systems across the country over the last several years. New York City is fortunate to have a protected and well-regulated watershed that surrounds our reservoirs in the Hudson Valley and Catskill Mountains. We are also vigilant about properly treating the City's water to prevent the type of incidents that transpired elsewhere. Because we take these extensive and deliberate steps to protect our water supply and distribution system, we are confident that these types of incidents will not happen in New York City.

The City's water meets or exceeds all state and federal safety requirements. Every day of the year, scientists from the New York City Department of Environmental Protection (DEP) collect samples from our expansive reservoir system, the aqueducts that deliver the water to the city, and the roughly 1,000 street-side sampling stations spread across the five boroughs. Those water samples are then delivered to one of DEP's four state-of-the-art laboratories where nearly 630,000 analyses are performed on them each year. Data from these extensive scientific analyses can be found in the pages of this report and the conclusion of this work is simple: New York City has world-class drinking water.

To ensure that our amazing water system remains in a state of good repair, DEP continues to make substantial investments to maintain and improve its infrastructure. This includes the most complex repair in the history of the water supply system, the \$1 billion construction of a Delaware Aqueduct bypass tunnel under the Hudson River. That work is on schedule. Two deep shafts have already been completed on either side of the river, and tunneling has begun this year. You will find details about this and several other infrastructure projects in the pages that follow.

On behalf of the 6,000 employees at DEP, I am proud to present this report to the 8.5 million New Yorkers who rely on us to deliver safe, clean, high-quality drinking water every day.

Sincerely,

A handwritten signature in black ink, appearing to read 'Vincent Sapienza'.

Vincent Sapienza
Acting Commissioner



NEW YORK CITY'S WATER SUPPLY

The New York City Water Supply System provides approximately 1 billion gallons of safe drinking water daily to more than 8.5 million residents of New York City, and to the millions of tourists and commuters who visit the City throughout the year. The water supply system also provides about 110 million gallons a day to approximately one million people living in the counties of Westchester, Putnam, Orange, and Ulster. In all, the New York City Water Supply System provides nearly half the population of New York State with high-quality drinking water.

WHERE DOES NEW YORK CITY'S DRINKING WATER COME FROM?

New York City gets its drinking water from a surface supply system that comprises 19 reservoirs and three controlled lakes spread across a nearly 2,000-square-mile watershed. The watershed is roughly the size of the State of Delaware, extending 125 miles north and west of New York City. A map of the watershed and reservoirs can be found on the inside cover of this report. The New York City Water Supply System, Public Water System Identification Number (PWSID) NY7003493, consists of three individual water supplies: the Catskill/Delaware supply, located in Delaware, Greene, Schoharie, Sullivan, and Ulster counties; the Croton supply, New York City's original upstate supply, in Putnam, Westchester, and Dutchess counties; and a groundwater supply in southeastern Queens.

In 2016, New York City received a blend of drinking water from the Catskill/Delaware and Croton supplies. The Catskill/Delaware supply provided approximately 91 percent of the water, and approximately 9 percent was supplied by Croton. Water from the groundwater supply was not fed into distribution in 2016.

HOW DOES NEW YORK CITY TREAT ITS WATER SUPPLIES?

CATSKILL/DELAWARE SUPPLY

Due to the very high quality of our Catskill/Delaware supply, New York City is one of only five large cities in the country with a surface drinking water supply that does not require filtration as a form of treatment. Rather, the Catskill/Delaware supply operates under a Filtration Avoidance Determination (FAD), and the water from the supply is treated using two forms of disinfection to reduce microbial risk. First, water is disinfected with chlorine before arriving at the Catskill/Delaware Ultra-violet (UV) Disinfection Facility. Chlorine is a common disinfectant added to kill germs and stop bacteria from growing on pipes. The UV Disinfection Facility, located in the towns of Mount Pleasant and Greenburgh in Westchester County, is the largest of its kind in the world. It consists of 56 UV disinfection units that contain a total of 11,760 large UV light bulbs. The facility is designed to disinfect more than 2 billion gallons of water per day. At the facility, water is again disinfected as it flows under UV light. Exposure to UV light inactivates potentially harmful microorganisms, such as *Cryptosporidium* and



Ashokan Reservoir

Giardia. UV treatment does not change the water chemically, as nothing is added except energy. DEP also adds food grade phosphoric acid, sodium hydroxide, and fluoride to the water before sending it into distribution. Phosphoric acid creates a protective film on pipes that reduces the release of metals, such as lead, from service lines and household plumbing. Sodium hydroxide is added to raise the pH and reduce corrosivity, which also reduces the potential for lead to enter water from household plumbing.

DEP is one of the many water suppliers in the United States that treat drinking water with a controlled, low level of fluoride for the protection of its consumers' dental health. New York City's drinking water has been treated with low levels of fluoride since 1966. According to the United States Department of Health and Human Services, fluoride is effective in preventing cavities when present in drinking water at an optimal level of 0.7 mg/L. To improve dental protection, DEP continuously monitors fluoride levels. During 2016, DEP provided continuous fluoride treatment on the Catskill/Delaware supply, except for two brief outages. In total, only 4.8 percent of the water produced by Catskill/Delaware supply was not fluoridated.

CROTON SUPPLY

The Croton Water Filtration Plant, located underground in the Bronx, filters the Croton supply. It has the capacity to produce up to 290 million gallons of drinking water each day, helps to ensure an adequate supply of water for the

City in the event of drought, and increases the resiliency of New York City's supply against the potential effects of climate change. New York City constructed the Croton Water Filtration Plant under a federal consent decree, and the plant has been operational since May 7, 2015. On September 28, 2016, DEP completed the requirements of the consent decree and the decree has been terminated. In 2016, the Croton Water Filtration Plant was off-line for a period of eight weeks from August 25 to October 20; it was running for the rest of the year.

Once water arrives at the filtration plant it undergoes treatment to remove impurities. The treatment process includes coagulation, dissolved air floatation, filtration, and disinfection. During coagulation, chemicals are added to untreated water, causing any particulates to bunch together and become larger particles called floc. Most of the floc floats to the top and is skimmed off; any that remains is removed by filtration. The water is disinfected with chlorine and UV light to protect against potentially harmful microorganisms. The treatment process helps to reduce disinfection by-products, color levels, and the risk of microbiological contamination. In addition, as with the Catskill/Delaware supply, Croton water is also treated with food grade phosphoric acid, sodium hydroxide, and fluoride.

During 2016, DEP provided continuous fluoride treatment to the Croton supply except during one brief outage. In total, only 0.6 percent of the water produced by the Croton Water Filtration Plant was not fluoridated.



Water quality monitoring
in the watershed

DRINKING WATER QUALITY

REGULATION OF DRINKING WATER

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbial contaminants, inorganic contaminants, pesticides and herbicides, organic chemical contaminants, and radioactive contaminants.

In order to ensure that tap water is safe to drink, the New York State Department of Health (NYSDOH) and the United States Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in water provided by public water

systems. The NYSDOH and the federal Food and Drug Administration's (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. The presence of contaminants does not necessarily indicate that water poses a health risk. These regulations also establish the minimum amount of testing and monitoring that each system must undertake to ensure that the tap water is safe to drink.

DEP's water quality monitoring program – far more extensive than required by law – demonstrates that the quality of New York City's drinking water remains high and meets all state and federal drinking water standards. Additional information concerning drinking water can be found at: www.epa.gov/safewater/ or www.health.ny.gov.

DRINKING WATER SAMPLING AND MONITORING

DEP monitors the water in the distribution system, upstate reservoirs and feeder streams, and wells that are sources for New York City's drinking water supply. Certain water quality parameters are monitored continuously throughout the watershed and as the water enters the distribution system, and DEP regularly tests water quality at nearly 1,000 water quality sampling stations throughout New York City. DEP conducts analyses for a broad spectrum of microbiological, chemical, and physical measures of quality. In 2016, DEP performed over 407,500 analyses on more than 36,300 samples from the distribution system, meeting all state and federal monitoring requirements. Additionally, DEP performed over 231,700 analyses on approximately 15,200 samples from the upstate reservoir watersheds, and took close to 1.5 million robotic monitoring measurements to support FAD watershed protection programs and to optimize water quality. The results of the tests conducted in 2016 under DEP's distribution system monitoring program are summarized in the tables starting on page 15 of this report.

UNREGULATED CONTAMINANT MONITORING RULE (UCMR)

Under the 1996 amendments to the federal Safe Drinking Water Act and the Third Unregulated Contaminant Monitoring Rule (UCMR3), EPA is required once every five years to issue a new list of up to 30 unregulated contaminants that public water systems must monitor. The intent of the rule is to provide baseline occurrence data that EPA can combine with toxicological research to make decisions about potential future drinking water regulations. DEP completed the last quarter of this contaminant testing in 2016. The data from this sampling can be found in the tables of this report. For more information on the rule, and to see a list of the unregulated contaminants, go to water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3.

LEAD IN DRINKING WATER

HOW DOES LEAD GET INTO MY DRINKING WATER?

New York City water is virtually lead-free when it is delivered from New York City's upstate reservoir system, but water can absorb lead from solder, fixtures, and pipes found in the plumbing of some buildings or homes. DEP has an active corrosion control program aimed at reducing lead absorption from service lines and internal plumbing. Under the federal Lead and Copper Rule, mandated at-the-tap lead monitoring is conducted at select households throughout New York City. In 2016, based on the results of this monitoring, the 90th percentile did not exceed 15 µg/L, the established standard or Action Level for lead. The at-the-tap monitoring results are presented in the table on page 18 of this report.

WHAT ARE THE HEALTH EFFECTS OF LEAD?

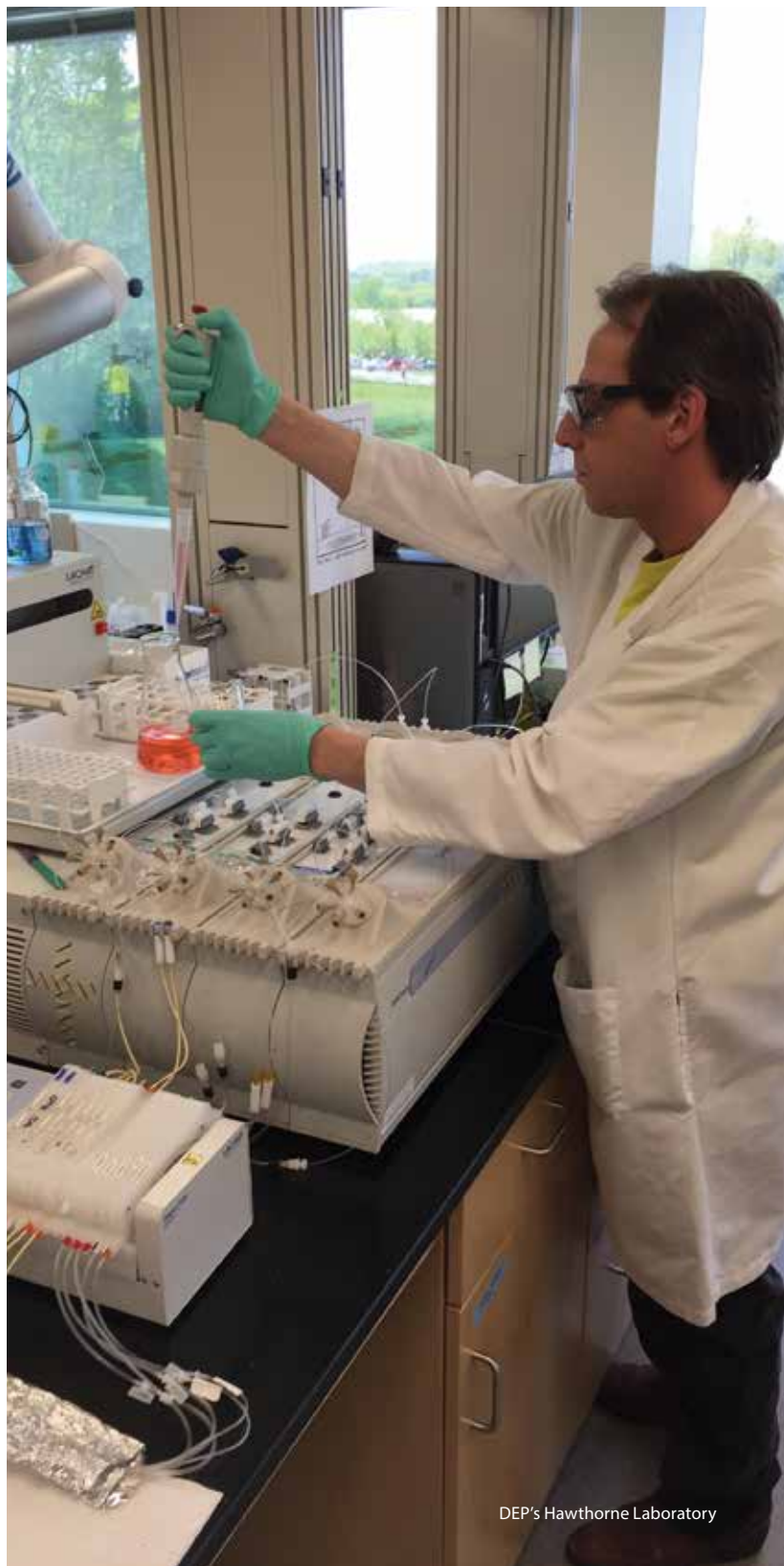
Lead is a metal that can harm children and adults when it is consumed. Lead is a known neurotoxin, and is particularly harmful to the developing brain and nervous system of children under 6 years old. Lead can harm a young child's growth, behavior, and ability to learn. Lead exposure during pregnancy may contribute to low birth weight and developmental delays in infants and miscarriages. There are many sources of lead in the environment, and it is important to reduce exposure to lead as much as possible. Water testing helps identify and correct possible sources of lead that contribute to exposure from drinking water.

If present at elevated levels, lead can cause serious health problems, especially for pregnant women, infants, and young children.

WHAT CAN I DO?

Lead in drinking water is colorless, odorless, and tasteless. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. DEP is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. DEP offers free testing to New York City residents. The Free Residential Testing Program is the largest of its kind in the nation: DEP has distributed over 113,000 sample collection kits since the start of the program in 1992, and saw an almost 400 percent increase in demand for testing in 2016 compared to the previous year. To request a free kit to test for lead in your drinking water, call New York City's 24-hour helpline at 311 or visit www.nyc.gov/apps/311 and search for Lead Test Kit.

Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at www.epa.gov/safewater/lead.



DEP's Hawthorne Laboratory



Robotic Water Quality Monitoring Buoy

ROBOTIC MONITORING

In 2012, a Robotic Water Quality Monitoring Network (RoboMon) became part of DEP's routine water quality monitoring program. The water quality data that are generated by this network are critical for providing near real-time measurements for effective operation of the water supply. In 2016, the network generated nearly 1.5 million water quality measurements to support water supply operations.

RoboMon consists of a variety of water quality instruments that are deployed in upstate streams and reservoirs. The stream monitoring stations are structures that house water quality instruments that receive data from sensors deployed in the streams. The reservoir monitoring stations are floating platforms, or buoys, with water quality instrumentation that receive data from sensors deployed in the reservoir. Data are uploaded each day to a database that can be viewed almost in real-time by water managers to then make informed decisions regarding the operation of the City's water supply.

DEP's RoboMon network originally consisted of four reservoir buoys, but has since expanded to include five stream stations and 13 reservoir buoys. DEP plans to expand this critical network in 2017 to further support water supply operations.

CRYPTOSPORIDIUM AND GIARDIA

In 1992, New York City started a comprehensive program to monitor its source waters and watersheds for the presence of *Cryptosporidium* and *Giardia*. In 2016, DEP collected weekly samples from three locations: the outflow of the Kensico Reservoir prior to chlorination and UV disinfection; the outflow of Hillview Reservoir prior to secondary disinfection with chlorine; and the outflow of the Jerome Park Reservoir prior to filtration. Samples were analyzed using EPA Method 1623.1. The *Cryptosporidium*

and *Giardia* data for Kensico, Hillview and Jerome Park Reservoir outflows are presented in the table on page 18 of this report.

The presence of low levels of *Cryptosporidium* and *Giardia* detected in the source water required no action on the part of DEP. DEP's *Cryptosporidium* and *Giardia* data from 1992 to the present can be viewed on the DEP website at www.nyc.gov/dep.

While there is no evidence that any cases of cryptosporidiosis or giardiasis have been attributed to the New York City water supply, federal and state law requires all water suppliers to notify their customers about the potential risks from *Cryptosporidium* and *Giardia*. Cryptosporidiosis and giardiasis are intestinal illnesses caused by microscopic pathogens, which can be waterborne. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Some people may be more vulnerable to disease causing microorganisms, or pathogens, in drinking water than the general population. Immunocompromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly individuals, and infants, can be particularly at risk from infections. These people should seek advice from their health care providers about their drinking water. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium*, *Giardia*, and other microbial contaminants are available from EPA's Safe Drinking Water Hotline at (800) 426-4791.

DEP's Waterborne Disease Risk Assessment Program conducts disease surveillance for cryptosporidiosis and giardiasis to track the disease incidence, and syndromic surveillance for gastrointestinal illness to identify potential citywide gastrointestinal outbreaks. All persons

diagnosed with cryptosporidiosis are interviewed concerning potential exposures, including tap water consumption. Disease and syndromic surveillance indicates that there were no outbreaks of cryptosporidiosis or giardiasis attributed to tap water consumption in New York City in 2016.

WATERSHED PROTECTION AND POLLUTION PREVENTION PROGRAMS

SOURCE WATER ASSESSMENT PROGRAM

Federal regulations require states to develop and implement source water assessment programs to identify the areas that supply public tap water, inventory contaminants and assess water system susceptibility to contamination, and inform the public of the results. The states are given a great deal of flexibility on how to implement source water assessment programs. These assessments are created using available information to help estimate the potential for source water contamination. Higher susceptibility ratings do not mean that source water contamination has occurred, or will occur, in the water supply; rather, they indicate the need for water suppliers to implement additional precautionary measures.

In 1993, New York City secured its first FAD for the Catskill/Delaware supply, and in 1997 the historic New York City Watershed Memorandum of Agreement was signed. Since that time, New York City has been implementing a series of programs to further reduce the susceptibility of its surface water supply to contamination from a variety of sources. These ongoing programs operate under the close scrutiny of both the NYSDOH and EPA. Because of these efforts, which are reported on in the *Watershed Water Quality Annual Report*, NYSDOH does not deem it necessary to perform a source water assessment on the New York City Water Supply. For information on the DEP *Watershed Water Quality Annual Report*, visit www.nyc.gov/html/dep/html/watershed_protection/fad_2016.shtml.

MAINTAINING NEW YORK CITY'S WORLD-RENOWNED WATER SUPPLY

10-Year Filtration Avoidance Determination

DEP funds and administers a number of watershed protection and pollution prevention programs to maintain the high quality of our drinking water. These strategies are designed to protect New York City's drinking water at its source by keeping pollution out of our upstate reservoirs and the streams, creeks, and rivers that feed them. DEP is currently implementing a 10-year FAD, issued by EPA in July 2007, and updated by NYSDOH in May 2014. The FAD outlines a number of watershed protection programs that are administered, or funded, by DEP to meet objective and subjective protection criteria, and to maintain the quality of water in our Catskill/Delaware System. Through these programs New York City has acquired

sensitive lands around our reservoirs and their headwaters, upgraded dozens of wastewater treatment and collection systems throughout the watershed, replaced more than 5,000 residential septic systems, restored about 40 miles of streambanks and floodplains, installed thousands of best management practices to improve the quality of runoff from local farms, and reviewed thousands of building projects to ensure their plans are compatible with protecting water quality. This work has been done through a number of invaluable partnerships with locally-based organizations that have administered many of the core watershed protection programs over the past 25 years. These include the Catskill Watershed Corporation, the Watershed Agricultural Council, county Soil and Water Conservation Districts, and other partners who bring a local voice and great skill to the implementation of the programs. In December 2016, DEP submitted a new 10-year plan for source water protection to NYSDOH. The City expects to renew its FAD in 2017. More information on DEP's watershed protection programs, can be found at www.nyc.gov/html/dep/html/watershed_protection/fad.shtml.



Waterfall near Schoharie Reservoir

Key programs and selected accomplishments include:

💧 **Land Acquisition** – New York City acquires real property interests from willing sellers to further protect and buffer its 19 reservoirs and three controlled lakes in the Catskill/Delaware and Croton watersheds. In 2016, New York City, including its land trust partners that receive funding from the City, signed 53 contracts with landowners to purchase more than 4,000 acres of sensitive watershed land. Since 1997, DEP has secured more than 144,000 acres of land and easements, adding to the roughly 42,000 acres surrounding the reservoirs that New York City owned in 1997. The property DEP owns is protected from development, which helps create natural buffers to avoid degradation of the water supply. Other entities such as land trusts, local towns, and the State of New York own and protect more than 240,000 acres of land in the New York City watershed.

💧 **Land Management** – With the acquisition of land over the past 20 years, New York City has become one of the largest landowners in the watershed region. DEP manages these properties to ensure that water quality is protected. DEP believes that protecting the watershed lands does not conflict with providing recreational access to members of the surrounding communities. Since 1997, DEP has increased the acreage of land and water open for recreation every year, and approximately 133,000 acres are now available for fishing, hiking, hunting, cross-country skiing, and other low-impact activities. Four of DEP's west-of-Hudson reservoirs are open for recreational boating, by permit, which includes rowboats, canoes, kayaks, and small sailboats. Electric trolling motors on rowboats are now allowed on the Cannonsville Reservoir. In 2016, DEP rolled out an interactive recreation mapping tool to help outdoor enthusiasts find accessible lands and waters more easily. These recreation areas can be found by visiting www.nyc.gov/dep/recmap.

💧 **Partnership Programs** – Many of New York City's watershed protection programs west of the Hudson River are administered by the Catskill Watershed Corporation, a nonprofit organization. Together, DEP and the Catskill Watershed Corporation have repaired or replaced more than 5,125 failing septic systems and authorized the construction of more than 70 storm-water control measures on properties in the watershed. New York City has also made available more than \$170 million for new community wastewater projects. When these projects are completed, they will be capable of treating nearly 1.6 million gallons of wastewater per day. Another DEP partnership program is the stream management program, which encourages the stewardship of streams and floodplains in the watershed west of the Hudson River. Additionally, the watershed agricultural program and watershed forestry program both represent long-term successful partnerships between DEP and the nonprofit Watershed Agricultural Council. The underlying goal of both programs is to support and maintain well-managed family farms and working forests as beneficial land uses for water quality protection and rural economic viability. Together, these partnerships work with watershed residents to identify and eliminate potential pollution sources.



Fishing at Pepacton Reservoir

WATER CONSERVATION

DEP operates the largest combined water supply and wastewater utility in the United States. Employees work hard to ensure that a reliable supply of high-quality water is delivered to about 9.5 million customers each day, and that about 1.1 billion gallons of wastewater from the five boroughs is collected and treated everyday. The operation of New York City's Water Supply System is immense, and DEP continues to implement improvements to deliver the best water possible to New Yorkers. The average single-family household in New York City uses approximately 80,000 gallons of water each year at a cost of \$3.89 per 100 cubic feet of water (748 gallons), or about \$416 a year. Since nearly all customers receive wastewater collection and treatment services in addition to water service, the combined annual water and sewer charge for the typical New York City household using 80,000 gallons per year is \$1,078, consisting of \$416 for water service and \$662 for wastewater services (based on the Fiscal Year 2017 rates).

Water storage in the City's upstate reservoirs dropped below historic average in 2016 as persistently dry weather gripped much of the Northeast. New York City, however, did not enter a water supply drought in 2016 thanks to the most significant drop in water demand since the 1970s, and the activation of the Croton Water Filtration Plant. However, DEP would like to remind all consumers that water is a precious resource. DEP asks that all New Yorkers do their part to conserve this important resource. All New Yorkers should adopt good water-conservation habits, and obey the City's year-round water use restrictions. These include a prohibition on watering sidewalks and lawns between November 1 and March 31, and from 11 a.m. to 7 p.m. from April 1 to October 31. Remember, it is illegal to open fire hydrants at any time without a permit. However, during the summer you can contact your local firehouse to have a DEP-approved spray cap installed on a hydrant.

WATER CONSUMPTION

For the last several years, DEP has been implementing the Water Demand Management Plan, which aims to reduce citywide water consumption by 2021. To meet this goal, DEP has developed a combination of programs to identify opportunities to conserve water.

DEP distributed a record-setting 11,111 rain barrels to New York City homeowners in 2016. The 60-gallon rain barrels are easy to install and connect directly to a property owner's downspout to capture and store the stormwater that falls on the roof. The water collected in the rain barrel can then be used to water lawns and gardens, or for other outdoor chores. Rain barrels can help reduce a homeowner's water bill as watering lawns and gardens can account for up to 40 percent of an average household's water use during the summer months.



Pepacton Reservoir

- In 2016, DEP launched the On-Site Water Reuse Grant Program, a cost-sharing program aimed at providing commercial, mixed-use, and multi-family residential property owners with incentives to install water reuse systems. Grants ranging from \$250,000 to \$500,000 are being awarded to "building-scale" sites that contain 100,000 square feet or more of residential or commercial space, as well as "district-scale" properties that include the sharing of water between two or more parcels. The targeted water savings are 32,000 gallons per day and 94,000 gallons per day, respectively.
- Partnering with NYC Parks, activation buttons are being installed on the spray showers at 400 playgrounds around the city to save 1.5 million gallons of water a day. In addition, more than 40,000 bathroom fixtures in hundreds of public school buildings are also being updated. These retrofits will conserve approximately 4 million gallons of water each school day.
- To encourage water conservation on private properties, DEP began a voucher-based program to replace roughly 100,000 outdated residential toilets. The new toilets, which use 1.28 gallons per flush, replace older ones that used as much as 5 gallons per flush. DEP has also launched an automated Leak Notification Program that sends an alert to property owners if there is an unusual spike in water consumption. More than 72,000 customers have signed up for the program to quickly find and fix leaks on their property, saving more than \$60 million in water charges. To sign up, go to: www.nyc.gov/html/dep/html/water_and_sewer_bills/leak_notification.shtml



DELAWARE RIVER BASIN DROUGHT

A basin-wide drought watch for the Delaware River was declared on November 23, 2016. It was the first drought watch for the Delaware River since 2002. The watch was declared after combined storage in New York City's Cannonsville, Pepacton, and Neversink reservoirs dropped below a specified level. Persistently dry weather in the summer and fall last year had reduced runoff coming into the reservoirs to near record lows, causing reservoir storage to drop steadily.

Cannonsville, Pepacton, and Neversink reservoirs were constructed on the headwaters of the Delaware River. DEP regularly releases water from these reservoirs to meet flow targets in the river that were set by court rulings and interstate agreements.

In response to the drought watch, DEP took a number of steps to draw water from other parts of the system and improve the reservoirs' chance of refilling by the start of the next water year on June 1, 2017. For instance, DEP pulled as much as 235 million gallons per day from its Croton System to reduce its reliance on reservoirs in the Catskills, which had been affected most by the dry conditions. Croton water is generally distributed only to the lower elevation areas of the Bronx and Manhattan, but the dry conditions compelled DEP to pump Croton water into the higher service areas where it was blended with water from our Catskill/Delaware supply. This underscored the value of having access to Croton System, which was largely unavailable to DEP before the Croton Water Filtration Plant was activated in 2015.

A drought watch for New York City is different than the watch that was declared on the Delaware River. A drought watch in the City is declared when either of its two largest water sources – Catskill or Delaware – has less than a 50 percent chance of refilling by June 1. Modeling and forecasting showed that the Catskill System came close to this threshold when its probability of refilling dipped below 60 percent in October. However, a City drought watch was not declared which is a testament to the redundancy of our water supply, smart investments to maintain access to all our water sources, and informed operational decisions by DEP employees.

Meanwhile, hydrologic conditions improved during late fall and early winter. Our reservoirs have been steadily regaining storage, and the probability of refill in the Catskill and Delaware systems is well above 80 percent. The basin-wide drought watch on the Delaware River was terminated in January 2017.

OPERATIONS SUPPORT TOOL

The Operations Support Tool (OST) is an advanced computer model that can simulate future storage in the City's reservoir system by accounting for variables such as weather forecasts, current demand for water, operating rules, and many near real-time inputs from instruments in the field. Direct input of advanced National Weather Service forecasts, and a variety of data from other sources, has given DEP a better understanding of system risks to better drive operational decisions – including decisions made before storms or droughts. Originally, the OST was identified as a way for DEP to reduce overall impacts of Catskill System turbidity, but it has proven to be much more than just a turbidity control tool.

DEP is currently working with an expert panel from the National Academies of Science to find ways to improve and maximize use of OST. The expert panel consists of scientists from across North America with expertise in modeling, water quality, hydrology, water supply management, and climate change. The panel will meet five times in 2017 to examine the use of OST before issuing a report on its findings.

Dry conditions at
Cannonsville Reservoir



Steel liners for Delaware Aqueduct bypass

INFRASTRUCTURE PROJECTS

STATEN ISLAND SIPHON

In October 2016, a new \$250 million water tunnel connecting Brooklyn to Staten Island was activated to provide a critical back-up feed to Staten Island. The new, deeper tunnel – called a siphon – was constructed under the New York Harbor. It can deliver up to 150 million gallons of drinking water per day from Brooklyn to Staten Island. The new 72-inch siphon was excavated at a depth of 100 feet, replacing the two old water connections that ran from Brooklyn to Staten Island at a shallower depth.

In addition to building the tunnel, the project includes the installation of water control equipment and other related infrastructure improvements to connect the siphon to the existing water distribution networks in both boroughs. This work included 6,545 feet of new water mains in Staten Island and 1,710 feet of new water mains in Brooklyn.

WATER FOR THE FUTURE

DELAWARE BYPASS TUNNEL

DEP has implemented the Water for the Future program to upgrade and repair the two aqueducts that deliver water from the Catskills to the City. The primary focus of the program is to address two known leaks in the Delaware Aqueduct, which conveys about 50 percent of New York City's drinking water each day. The 85-mile

aqueduct is the longest continuous tunnel in the world. The central component of the repair involves building a 2.5-mile-long bypass tunnel to convey water around the largest leak, which is located in Newburgh, N.Y. This new tunnel will be constructed 600 feet below the Hudson River, and it will be connected to structurally sound portions of the existing tunnel to carry water around the leaking section. A much smaller area of leakage to the north, in Ulster County, will be repaired by grouting from inside the tunnel.

The Delaware Aqueduct will be shut down for approximately 6 months starting in October 2022 so that workers can connect the bypass tunnel to the existing aqueduct. Ahead of that planned shutdown, DEP has taken a number of steps to ensure the City has a sufficient and reliable supply of drinking water. Demand management plans have aimed to reduce the City's water demand by up to 5 percent. A rehabilitation project will begin within the Catskill Aqueduct starting in 2018 to clean the tunnel lining and restore some of its historic capacity. The Catskill Aqueduct generally conveys about 40 percent of New York City's drinking water on a typical day, but it will supply upwards of 60 percent while the Delaware Aqueduct is temporarily out of service. The City will also rely on additional water from the Croton System during that time now that its filtration plant in the Bronx has been completed.

The \$1.5 billion Water for the Future program comprises the largest, most complex repair in the history of New York City's water supply.

CATSKILL-DELAWARE INTERCONNECTION

In 2015, DEP placed the Catskill-Delaware Interconnection into service and continued using it in 2016. The roughly \$22 million interconnection was constructed in Ulster County at a location where the two aqueducts cross, with the deep-rock Delaware Aqueduct crossing under the Catskill Aqueduct at the surface. The project allows DEP to move as much as 365 million gallons per day from the Delaware Aqueduct into the Catskill Aqueduct. (Water cannot move the other way because the Delaware Aqueduct is a deep bedrock tunnel under pressure, and the Catskill is an open-channel tunnel built at the surface.)

The interconnection, which was utilized for several months in response to dry weather conditions in 2016, provides DEP with a new tool to access additional water from its Delaware System, and reduce turbidity in the water supply system after large storms. Turbidity after large rainfall or snow-melt events can be problematic in the Catskill System. The streams and creeks that feed its

reservoirs run through steep valleys comprised of loose silt and clay that were deposited by the glaciers that formed the region. These fine particles can be picked up by the fast-moving water and carried into the Ashokan and Schoharie reservoirs. The new interconnection gives DEP the flexibility to reduce its reliance on water from the Catskill System during episodes of high turbidity by moving additional Delaware System water through the Catskill Aqueduct. Because Delaware System water is not generally prone to high turbidity, the interconnection effectively reduces turbidity and reduces DEP's reliance on additional treatment chemicals.

Engineers envisioned a connection between the two aqueducts when they built the Delaware System in the 1940s. In fact, the east wall of the valve chamber at Delaware Aqueduct Shaft 4 was constructed with four arched openings – each temporarily closed by brick walls – that could one day allow pipes to be installed to move Delaware water into the Catskill Aqueduct. The new interconnection is one of several facilities that provide DEP with the flexibility to convey the best drinking water from different parts of its upstate reservoir system each day.



Catskill-Delaware
Interconnection Chamber

CITY WATER TUNNEL NO. 3

New York City has been constructing City Water Tunnel No. 3 in stages since the early 1970s. The project is one of the largest capital projects in the history of the City. When completed, City Water Tunnel No. 3 will improve New York City's water delivery system by creating redundancy that will allow DEP to take the other two large distribution tunnels out of service for periodic inspections or repairs. City Water Tunnels No. 1 and 2 were put into service in 1917 and 1936, respectively.

- 💧 The 13-mile Stage 1 section of City Water Tunnel No. 3 went into service in August 1998. It runs from Hillview Reservoir in Yonkers, through the Bronx, into Manhattan, across Central Park, and into Astoria, Queens.
- 💧 Stage 2 of City Water Tunnel No. 3 consists of the Queens/Brooklyn leg and the Manhattan leg.
 - 💧 Tunneling on the 9-mile Manhattan leg of Stage 2 began in 2003 and was completed in 2008. Between 2008 and 2013, 10 new supply shafts were constructed to integrate the new tunnel section with the existing distribution system. The Manhattan leg was activated on October 16, 2013.
 - 💧 The Queens/Brooklyn leg is a 5-mile length of tunnel in Queens that connects to a 5.5-mile section in Brooklyn. Six of the eight shafts have been completed and Mayor de Blasio has allocated \$685 million to complete the remaining two. This funding will also help to ensure that the tunnel is activation-ready by the end of 2017, and able to provide water to Queens and Brooklyn in the event of an emergency.



Gilboa Dam

SCHOHARIE RESERVOIR GILBOA DAM

In 2014, DEP completed a \$138 million project to fully rehabilitate Gilboa Dam. The dam impounds the waters of Schoharie Reservoir and is the northernmost piece of infrastructure in the City's water supply system. Work on the 90-year-old dam included the addition of approximately 234 million pounds of concrete, molded and dyed to resemble the original bluestone face of the dam, along with more than 500 massive spillway slabs and upgrades to the abutment walls that support the dam. The project was finished two years ahead of schedule. The rehabilitation of Gilboa Dam was recognized in 2016 with a national award for engineering excellence from the American Council of Engineering Companies (ACEC). Since 1967, ACEC has given awards to projects that exemplify the year's most outstanding engineering accomplishments. Projects are judged by a panel of more than two dozen experts drawn from a cross section of industry. The ACEC award was the third such recognition for the Gilboa Dam project since it was completed. The project had previously been honored with top awards from the American Council of Engineering Companies of New York, and the Association of State Dam Safety Officials.

Work on the dam was part of a \$400 million program to build and improve infrastructure at Schoharie Reservoir. Workers are currently building release works that will allow DEP to release water from the reservoir into the Schoharie Creek below the dam. The \$142 million project – which is expected to be completed in the year 2020 – includes construction of an intake structure at the bottom of Schoharie Reservoir, more than 2,000 feet of subsurface tunnels, and a valve chamber along Schoharie Creek. The finished tunnel and valves will provide DEP with the ability to release water from the reservoir

to facilitate dam maintenance, respond to potential emergencies, and mitigate flood risk for downstream communities.

Schoharie Reservoir stores up to 19.6 billion gallons of water and it accounts for roughly 15 percent of the drinking water delivered to New York City each day.

ADMINISTRATIVE ORDERS

Hillview Reservoir is the final stop for drinking water from the Catskill/Delaware System before it enters the City's distribution system. On May 24, 2010, New York City and EPA entered into an Administrative Order on Consent that set forth a milestone schedule to install a cover over the Hillview Reservoir by mid-2028. The milestones of a previous Administrative Order on Consent from 2008, between New York City and NYSDOH, were incorporated into the 2010 Administrative Order on Consent. Additionally, in August of 2011, EPA released a report titled *Improving Our Regulations: Final Plan for Periodic Reviews of Existing Regulations*, in which EPA indicated that it would evaluate the reservoir cover requirement of the Long Term 2 Enhanced Surface Water Treatment (LT2) Rule. DEP was actively involved in EPA's review process. On January 11, 2017, EPA published in the Federal Register its determination not to alter the reservoir cover requirement of the LT2.

The Catskill/Delaware Ultraviolet Disinfection Facility, which began treating Catskill/Delaware water in October 2012, was constructed and is operating, formerly pursuant to an Administrative Order with EPA. DEP remained in compliance with the Administrative Order for its full duration. The Administrative Order was terminated on July 7, 2016.

THE NEW YORK CITY 2016 DRINKING WATER QUALITY TESTING RESULTS

HOW TO READ THE NEW YORK CITY DRINKING WATER QUALITY TESTING RESULTS

The following section of the Drinking Water Supply and Quality Report compares the quality of your tap water to federal and state standards for each parameter (if applicable). Table 1 reflects the compliance monitoring results for all regulated and non-regulated parameters, the number of samples collected, the range of values detected, the average of the values detected, and the possible sources of the parameters, unless otherwise footnoted. The monitoring frequency of each parameter varies and is parameter specific. Data presented are for the Catskill/Delaware and Croton systems, which were the only sources of water in 2016. Table 2 represents those parameters monitored for, but not detected in any sample. The monitoring results show that New York City's drinking water met all drinking water standards in 2016.

Most of our data are representative of 2016 testing; concentrations of parameters or contaminants do not change frequently. For previous years' results you can view our reports at: www.nyc.gov/dep.

DEFINITIONS

ACTION LEVEL (AL):

The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow. An exceedance occurs if more than 10 percent of the samples exceed the Action Level.

MAXIMUM CONTAMINANT LEVEL (MCL):

The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.

MAXIMUM CONTAMINANT LEVEL GOAL (MCLG):

The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MAXIMUM RESIDUAL DISINFECTANT LEVEL (MRDL):

The highest level of a disinfectant allowed in drinking water. The addition of a disinfectant is necessary for control of microbial contaminants.

MAXIMUM RESIDUAL DISINFECTANT LEVEL GOAL (MRDLG):

The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.

TREATMENT TECHNIQUE (TT):

A required process intended to reduce the level of a contaminant in drinking water.

90TH PERCENTILE VALUE:

The values reported for lead and copper represent the 90th percentile. A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below the value. The 90th percentile is equal to or greater than 90 percent of the lead and copper values detected at your water system.

UNITS & ABBREVIATIONS

CaCO₃ = calcium carbonate

CFU/mL = colony forming units per milliliter

/cm = per centimeter

°F = degrees Fahrenheit

µg/L = micrograms per liter (10⁻⁶ grams per liter)

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter (10⁻³ grams per liter)

MPN/100mL = most probable number per 100 milliliters

ND = lab analysis indicates parameter is not detected

NDL = no designated limit

NTU = nephelometric turbidity units

/50L = per 50 liters



TABLE 1: DETECTED PARAMETERS

THIS TABLE SUMMARIZES MONITORING RESULTS FOR ALL DETECTED PARAMETERS
IN 2016

CONVENTIONAL PHYSICAL AND CHEMICAL PARAMETERS

PARAMETER	NYSDOH MCL (Highest Level Allowed)	EPA MCLG (Ideal Goal)	# SAMPLES	RANGE	AVERAGE	MCL VIOLATION	SOURCES IN DRINKING WATER
Alkalinity (mg/L CaCO ₃)	-		304	13 - 74.1	23.5	No	Erosion of natural deposits
Aluminum (µg/L)	50 - 200 ⁽¹⁾		306	6 - 57	20	No	Erosion of natural deposits
Barium (mg/L)	2	2	306	0.01 - 0.04	0.02	No	Erosion of natural deposits
Calcium (mg/L)	-		304	5.5 - 30.4	9.2	No	Erosion of natural deposits
Chlorate (mg/L)	- ⁽²⁾		2	0.2	0.2	No	By-product of drinking water chlorination using sodium hypochlorite
Chloride (mg/L)	250		304	11 - 101	24	No	Naturally occurring; road salt
Chlorine Residual, Free (mg/L)	4 ⁽³⁾		15,816	0.0 - 2.2	0.6 ⁽³⁾	No	Water additive for disinfection
Chromium (µg/L)	100		307	ND - 31	ND	No	Erosion of natural deposits
Chromium VI (µg/L)	- ⁽²⁾		2	0.044 - 0.046	0.045	No	Erosion of natural deposits
Color - distribution system (color units - apparent)	-		14,105	3 - 45	6	No	Presence of iron, manganese, and organics in water
Color - entry points (color units - apparent)	15 ⁽⁴⁾		1,711	3 - 8	6	No	Presence of iron, manganese, and organics in water
Copper (mg/L)	1.3 ⁽⁵⁾	1.3	308	ND - 0.081	0.007	No	Corrosion of household plumbing systems; erosion of natural deposits
Corrosivity (Langelier index)	0 ^{(1) (6)}		303	-2.78 to -1.07	-2.13	No	
Fluoride (mg/L)	2.2 ⁽⁴⁾	4	2,076	ND - 0.9	0.7	No	Water additive which promotes strong teeth; erosion of natural deposits
Hardness (mg/L CaCO ₃)	-		304	19 - 119	33	No	Erosion of natural deposits
Hardness (grains/gallon[US]CaCO ₃) ⁽⁷⁾	-		304	1.1 - 7	1.8	No	Erosion of natural deposits
Iron (µg/L)	300 ^{(4) (8)}		305	ND - 154	30	No	Naturally occurring
Lead (µg/L)	15 ⁽⁵⁾	0	308	ND - 15	ND	No	Corrosion of household plumbing systems; erosion of natural deposits
Magnesium (mg/L)	-		304	1.1 - 11	2.5	No	Erosion of natural deposits

Continued on next page

TABLE 1: DETECTED PARAMETERS (CONTINUED)

THIS TABLE SUMMARIZES MONITORING RESULTS FOR ALL DETECTED PARAMETERS IN 2016

CONVENTIONAL PHYSICAL AND CHEMICAL PARAMETERS (continued)

PARAMETER	NYSDOH MCL (Highest Level Allowed)	EPA MCLG (Ideal Goal)	# SAMPLES	RANGE	AVERAGE	MCL VIOLATION	SOURCES IN DRINKING WATER
Manganese (µg/L)	300 ^{(4) (8)}		308	ND - 81	15	No	Naturally occurring
Nickel (µg/L)	-		306	ND - 0.8	0.4	No	Erosion of natural deposits
Nitrate (mg/L nitrogen)	10	10	304	0.05 - 0.45	0.14	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Nitrite (mg/L nitrogen)	1	1	306	ND - 0.001	ND	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
pH (pH units)	6.8 - 8.2 ⁽⁹⁾		15,816	7.0 - 9.1	7.4	No	
Phosphate, Ortho- (mg/L)	1-4 ⁽⁹⁾		15,816	1.3 - 2.9	2.1	No	Water additive for corrosion control
Potassium (mg/L)	-		304	0.5 - 3	0.9	No	Erosion of natural deposits
Silica [silicon oxide] (mg/L)	-		304	1.4 - 5.8	2.6	No	Erosion of natural deposits
Sodium (mg/L)	NDL ^{(4) (10)}		304	9 - 54	16	No	Naturally occurring; road salt; water softeners; animal waste
Specific Conductance (µS/cm)	-		15,816	80 - 533	132	No	
Strontium (µg/L)	-		305	19 - 99	31	No	Erosion of natural deposits
Sulfate (mg/L)	250		304	3.8 - 24.9	6.5	No	Naturally occurring
Temperature (°F)	-		15,816	36 - 86	55	No	
Total Dissolved Solids (mg/L)	500 ⁽¹⁾		303	42 - 292	84	No	Metals and salts naturally occurring in the soil; organic matter
Total Organic Carbon (mg/L carbon)	-		304	1.3 - 2.4	1.6	No	Organic matter naturally present in the environment
Turbidity ⁽¹¹⁾ - distribution system (NTU)	5 ⁽¹²⁾		14,105	ND - 6.0	0.8 ⁽¹²⁾	No	Soil runoff
Turbidity ⁽¹¹⁾ - source water (NTU)	5 ⁽¹³⁾		-	-	4.3 ⁽¹³⁾	No	Soil runoff
Turbidity ⁽¹¹⁾ - filtered water (NTU)	TT ⁽¹⁴⁾		-	-	0.27 ⁽¹⁴⁾	No	Soil runoff
UV 254 Absorbency/cm	-		304	0.018 - 0.034	0.026	No	Organic matter naturally present in the environment
Zinc (mg/L)	5 ⁽⁴⁾		308	ND - 0.008	0.003	No	Naturally occurring

Continued on next page

TABLE 1: DETECTED PARAMETERS (CONTINUED)

THIS TABLE SUMMARIZES MONITORING RESULTS FOR ALL DETECTED PARAMETERS
IN 2016

ORGANIC PARAMETERS

PARAMETER	NYSDOH MCL (Highest Level Allowed)	EPA MCLG (Ideal Goal)	# SAMPLES	RANGE	AVERAGE	MCL VIOLATION	SOURCES IN DRINKING WATER
Bromochloroacetic Acid (µg/L)	50		304	ND - 4.5	1.6	No	By-product of drinking water chlorination
Caffeine (µg/L)	50		80	ND - 0.061 ⁽¹⁵⁾	ND	No	Wastewater plant effluent, leaching from septic tanks
Chloropicrin (µg/L)	50		24	ND - 0.65	0.39	No	By-product of drinking water chlorination
Chloral Hydrate (µg/L)	50		24	0.95 - 10.49	5.16	No	By-product of drinking water chlorination
Chlorothalonil (µg/L)	50		80	ND - 0.1 ⁽¹⁵⁾	ND	No	Fungicide used on crops and lawns
Dalapon (µg/L)	50		304	ND - 1.0 ⁽¹⁵⁾	ND	No	By-product of drinking water chlorination
Di(2-ethylhexyl)phthalate (µg/L)	6		80	ND - 0.69	ND	No	Probable source is sample contamination from plastic gloves or air particulates.
Haloacetic Acid 5 (HAA5) (µg/L)	60 ⁽¹⁶⁾		304	11 - 57	50 ⁽¹⁶⁾	No	By-product of drinking water chlorination
Haloacetonitriles (HANs) (µg/L)	50		24	0.92 - 3.75	2.62	No	By-product of drinking water chlorination
Halogenated Ketones (HKs) (µg/L)	50		24	1.07 - 3.42	2.47	No	By-product of drinking water chlorination
Methyl Acetate (µg/L)	50		305	ND - 0.58 ⁽¹⁵⁾	ND	No	Solvent in glues, paints, and nail polish removers
Methyl Tertiary Butyl Ether (MTBE) (µg/L)	10		305	ND - 1.1 ⁽¹⁵⁾	ND	No	Releases from gasoline storage tanks. Octane enhancer in unleaded gasoline. Atmospheric deposition.
Total Organic Halogen (µg/L)	-		245	96 - 318	153	No	By-product of drinking water chlorination
Total Trihalomethanes (TTHM) (µg/L)	80 ⁽¹⁶⁾		304	8.2 - 76	52 ⁽¹⁶⁾	No	By-product of drinking water chlorination

MICROBIAL PARAMETERS

PARAMETER	NYSDOH MCL (Highest Level Allowed)	EPA MCLG (Ideal Goal)	# SAMPLES	RANGE	# SAMPLES POSITIVE	AVERAGE	HIGHEST MONTH % POSITIVE	MCL VIOLATION	SOURCES IN DRINKING WATER
Total Coliform Bacteria (% of samples positive/month)	5% ⁽¹⁷⁾	0	9,756	-	27	-	2%	No	Naturally present in the environment
<i>E. coli</i> (MPN/100mL)	- ⁽¹⁷⁾	0	9,756	-	0	-	0%	No	Human and animal fecal waste
Heterotrophic Plate Count (CFU/mL)	TT	-	12,591	ND - 5,700	209	1	-	No	Naturally present in the environment

Continued on next page

TABLE 1: DETECTED PARAMETERS (CONTINUED)

THIS TABLE SUMMARIZES MONITORING RESULTS FOR ALL DETECTED PARAMETERS IN 2016

LEAD AND COPPER RULE SAMPLING AT RESIDENTIAL WATER TAPS: JANUARY TO DECEMBER 2016

PARAMETER	NYSDOH AL	EPA MCLG (Ideal Goal)	90% OF YOUR LEVELS WERE LESS THAN	RANGE	# SAMPLES EXCEEDING AL	EXCEEDANCE	SOURCES IN DRINKING WATER
Copper (mg/L)	90% of homes less than 1.3	1.3	0.185	0.003 - 2.037	1 out of 498	No	Corrosion of household plumbing systems
Lead (µg/L)	90% of homes less than 15	0	11	ND - 4,726 ⁽¹⁸⁾	34 out of 498	No	Corrosion of household plumbing systems

CRYPTOSPORIDIUM AND GIARDIA SAMPLING FROM SOURCE WATER OUTFLOWS 2016

PARAMETER	RESERVOIR OUTFLOW	# SAMPLES	# SAMPLES POSITIVE	RANGE	SOURCES IN DRINKING WATER
<i>Cryptosporidium</i> (oocysts/50L)	Kensico	52	4	0 - 2	Human and animal fecal waste
	Hillview	53 ⁽¹⁹⁾	4	0 - 2	
	Jerome Park	45	9	0 - 241 ⁽¹⁹⁾	
<i>Giardia</i> (cysts/50L)	Kensico	52	19	0 - 5	Human and animal fecal waste
	Hillview	53 ⁽¹⁹⁾	7	0 - 3	
	Jerome Park	45	22	0 - 11	

TASTE TEST WIN

In July 2016, the City's tap water was awarded the top prize in New York State's Regional Metro Tap Water Taste Test competition. The contest was held at the American Museum of Natural History in Manhattan and pitted New York City's tap water against drinking water suppliers from Westchester, Nassau, Suffolk, and Orange counties. Museum visitors sampled tap water from the five suppliers and ranked them by taste. New York City's tap water was judged to be the best tasting, followed by water from Elmsford in Westchester County.

TABLE 2: NOT-DETECTED PARAMETERS

THE FOLLOWING PARAMETERS WERE MONITORED FOR, BUT NOT DETECTED IN ANY SAMPLE IN 2016

CONVENTIONAL PHYSICAL AND CHEMICAL PARAMETERS

Antimony, Arsenic, Asbestos, Beryllium, Bismuth-212, Bismuth-214, Cadmium, Cesium-134, Cesium-137, Cyanide, Gross Alpha, Gross Beta, Lead-212, Lead-214, Lithium, Mercury, Potassium-40, Radium-226, Radium-228, Selenium, Silver, Thallium, Thallium-208, Thorium-234, Uranium, Uranium-235

ORGANIC PARAMETERS

Principal Organic Contaminants:

Benzene, Bromobenzene, Bromochloromethane, Bromomethane, n-Butylbenzene, sec-Butylbenzene, tert-Butylbenzene, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloromethane, 2-Chlorotoluene, 4-Chlorotoluene, Dibromomethane, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Dichlorodifluoromethane, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene, 1,2-Dichloropropane, 1,3-Dichloropropane, 2,2-Dichloropropane, 1,1-Dichloropropene, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, Ethylbenzene, Hexachlorobutadiene, Isopropylbenzene, p-Isopropyltoluene, Methylene chloride, n-Propylbenzene, Styrene, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane, Tetrachloroethylene, Toluene, 1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, Trichloroethene, Trichlorofluoromethane, 1,2,3-Trichloropropane, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, m-Xylene, o-Xylene, p-Xylene

Specified Organic Contaminants:

Alachlor, Aldicarb (Temik), Aldicarb sulfone, Aldicarb sulfoxide, Aldrin, Atrazine, Benzo(a)pyrene, Butachlor, Carbaryl, Carbofuran (Furadan), Chlordane, 2,4-D, 1,2-Dibromo-3-chloropropane, Dicamba, Dieldrin, Di(2-ethylhexyl)adipate, Dinoseb, Diquat, Endothall, Endrin, Ethylene dibromide (EDB), Glyphosate, Heptachlor, Heptachlor epoxide, Hexachlorobenzene, Hexachlorocyclopentadiene, 3-Hydroxycarbofuran, Lindane, Methomyl, Methoxychlor, Metolachlor, Metribuzin, Oxamyl (Vydate), Pentachlorophenol, Picloram, Polychlorinated biphenyls (PCBs), Propachlor, Simazine, Toxaphene, 2,4,5-TP (Silvex), 2,3,7,8-TCDD (Dioxin), Vinyl chloride

Unspecified Organic Contaminants:

Acenaphthene, Acenaphthylene, Acetochlor, Acetone, Acifluorfen, Allyl chloride, Ametryn, tert-Amyl ethyl ether, tert-Amyl methyl ether, Anthracene, Bentazon, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[g,h,i]perylene, alpha-BHC, beta-BHC, delta-BHC, Bromacil, 2-Butanone (MEK), tert-Butyl alcohol, Butylate, Butylbenzylphthalate, tert-Butyl ethyl ether, Carbon disulfide, Carboxin, Chloramben, alpha-Chlordane, gama-Chlordane, Chlorobenzilate, 2-Chlorobiphenyl, 1-Chlorobutane, Chloroneb, Chlorpropham, Chlorpyrifos (Dursban), Chrysene, Cycloate, 2,4-DB, DCPA(Dacthal), DCPA (total mono & diacid degradate), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, DEF(Merphos), Diazinon, Dibenz[a,h]anthracene, Di-n-Butylphthalate, 3,5-Dichlorobenzoic acid, 2,3-Dichlorobiphenyl, Dichloroprop, Dichlorvos (DDVP), Diethyl ether, Diethylphthalate, Di-isopropyl ether, Dimethoate, Dimethylphthalate, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, Di-N-octylphthalate, Diphenamid, Disulfoton, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin aldehyde, EPTC, Ethoprop, Ethyl methacrylate, Etridiazole, Fenamiphos, Fenarimol, Fluoranthene, Fluorene, Fluridone, alpha-HCH, beta-HCH, delta-HCH, 2,2',3,3',4,4',6-Heptachlorobiphenyl, Heptachlor epoxide (isomer B), 2,2',4,4',5,6'-Hexachlorobiphenyl, Hexachloroethane, Hexazinone, Indeno[1,2,3-cd]pyrene, Isophorone, Malathion, Methiocarb, Methyl iodide, Methyl paraoxon, 4-Methyl-2-pentanone (MIBK), Mevinphos, MGK264-isomer a, MGK264-isomer b, Molinate, Naphthalene, Napropamide, 4-Nitrophenol, cis-Nonachlor, trans-Nonachlor, Norflurzon, 2,2',3,3',4,5',6,6'-Octachlorobiphenyl, Paraquat, Parathion, Pebulate, Pendimethalin, 2,2',3',4,6-Pentachlorobiphenyl, Pentachloroethane, Permethrin (cis- & trans-), Phenanthrene, Prometryn, Pronamide, Propazine, Propoxur (Baygon), Pyrene, 2,4,5-T, Simetryn, Stirofos, Tebuthiuron, Terbacil, Terbufos, Terbutylazine, Terbutryn, 2,2',4,4'-Tetrachlorobiphenyl, Tetrahydrofuran, Thiobencarb, Triademefon, 2,4,5-Trichlorobiphenyl, Trichlorotrifluoroethane (Freon 113), Tricyclazole, Trifluralin, Vernolate

Unregulated Contaminant Monitoring Rule (UCMR3) Parameters:

Androstenedione, Bromochloromethane, Bromomethane, 1,3-Butadiene, Chlorodifluoromethane, Chloromethane, Cobalt, 1,1-Dichloroethane, 1,4-Dioxane ⁽²⁰⁾, Equilin, Estradiol, Estriol, Estrone, Ethynylestradiol, Molybdenum, Perfluorobutanesulfonic acid (PFBS), Perfluoroheptanoic acid (PFHpA), Perfluorohexanesulfonic acid (PFHxS), Perfluorononanoic acid (PFNA), Perfluorooctanesulfonic acid (PFOS), Perfluorooctanoic acid (PFOA), Testosterone, 1,2,3-Trichloropropane, Vanadium

FOOTNOTES

- (1) EPA Secondary MCL: NYSDOH has not set an MCL for this parameter.
- (2) Chlorate and chromium (VI), also known as hexavalent chromium, were monitored for in March 2016, in addition to prior sampling in 2013 to 2015, under the requirements of the Unregulated Contaminant Monitoring Rule (UCMR). No MCL has been established for chlorate, and the NYSDOH chromium MCL is for chromium (total). Data presented are for 2016 only, prior years can be found in the applicable years' reports.
- (3) Value represents MRDL, which is the level of disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. The MRDL is enforceable in the same manner as an MCL and is the calculated running annual average. Data presented are the range of individual sampling results and the highest of the four quarterly running annual averages.
- (4) Determination of MCL violation: If a sample exceeds the MCL, a second sample must be collected from the same location within two weeks, or as soon as practical. If the average of the two results exceeds the MCL, then an MCL violation has occurred.
- (5) Action Level (not an MCL) measured at-the-tap. The data presented in this table were collected from sampling stations at the street curb. For at-the-tap monitoring, see the Lead and Copper Rule Sampling at Residential Water Taps table on page 18.
- (6) A Langelier Index of less than zero indicates corrosive tendencies.
- (7) Hardness of up to 3 grains per gallon is considered soft water; between 3 and 9 is moderately hard water.
- (8) If iron and manganese are present, the total concentration of both should not exceed 500 µg/L.
- (9) NYSDOH established Optimal Water Quality Parameters (OWQP) under the Lead and Copper Rule that include ranges for pH and orthophosphate which are presented here. The reported average value for pH is the median value. The pH was elevated in one sample collected at site 39550 (Carnegie Hill, 10128) on 7/18/16 with a pH of 9.1. This was attributed to a shut valve creating a stagnant condition which then was resolved. All other samples collected in 2016 reflected pH in the expected ranges.
- (10) Water containing more than 20 mg/L of sodium should not be used for drinking by people on severely restricted sodium diets. Water containing more than 270 mg/L of sodium should not be used for drinking by people on moderately restricted sodium diets.
- (11) Turbidity is a measure of cloudiness of the water. Turbidity is monitored because it is a good indicator of water quality, because high turbidity can hinder the effectiveness of disinfection, and because it is a good indicator of the effectiveness of our filtration system.
- (12) This MCL for turbidity is the monthly average rounded off to the nearest whole number. Data presented are the range of individual sampling results and the highest monthly average from distribution sites.
- (13) This MCL for turbidity is on individual readings taken every four hours at the unfiltered Catskill/Delaware source water entry point. Value presented is the highest individual sampling result.
- (14) This is a Treatment Technique performance standard for the Croton Water Filtration Plant. The value presented is the highest single combined filter effluent turbidity measurement which occurred on 10/21/2016. In addition, 100% of the measurements were < 0.3 NTU, surpassing the state regulations which require that turbidity at the combined filter effluent must always be < 1.0 NTU and that 95% of the measurements be < 0.3 NTU.
- (15) Only detected in one sample: caffeine was detected in only one sample collected from site 1SCL1 (Kingsbridge Heights, 10468) on 3/26/16; chlorothalonil was detected in only one sample collected from site 1SCL1 (Kingsbridge Heights, 10468) on 2/29/16; dalapon was detected in only one sample collected from site 37950 (East Village, 10009) on 11/1/16; methyl acetate was qualitatively detected in only one sample collected from site 36950 (Roosevelt Island, 10044) on 12/6/16; and MTBE was detected in only one sample collected from site 1SCH4 (Kingsbridge Heights, 10468) on 3/1/16. In all other samples the parameters were not detected.
- (16) The MCLs for HAA5 and TTHMs are calculated locational running annual averages. The data in the Range column are the minimum and maximum values of all sample sites monitored in the distribution system whether for compliance purposes or not. The values in the Average column are the highest locational running annual averages under the Stage 2 Disinfectant and Disinfection By-Products Rule.
- (17) If a sample and its repeat sample are both positive for coliform bacteria and one of the two samples is positive for *E. coli*, then an *E. coli* MCL violation has occurred. On April 1, 2016, requirements under the Revised Total Coliform Rule took effect, eliminating the previous 5 percent of samples positive per month MCL for total coliforms. Coliform data are presented for the entire year, even though the total coliform MCL was only applicable through March 31, 2016. The highest month percent positive of 2 percent occurred in July 2016.
- (18) The maximum value, 4,726 µg/L, was from one (1) sample that was not collected as directed, from a kitchen or bathroom tap, but rather from an unused bath tub. The value, therefore, was not representative of normal conditions. The next highest value was 150 µg/L.
- (19) Supplementary samples were collected to follow up on previous results. One was collected on May 4, 2016, from Hillview Reservoir due to a laboratory control issue, and a second from the Jerome Park Reservoir outflow was collected in response to the detection of 241 *Cryptosporidium* oocysts on December 19, 2016. The resample from the Jerome outflow, collected on December 21, 2016, was negative for *Cryptosporidium* oocysts, and had two *Giardia* cysts.
- (20) 1,4-dioxane was monitored for in March 2016, in addition to prior sampling in 2013 to 2015, under the requirements of the UCMR. It was detected in only one sample collected on 12/8/15 from site 1SCL1 (Van Cortlandt Village, 10463) at 0.082 µg/L far below the MCL of 50 µg/L.

The DOs & DON'Ts of Water Conservation



BATHROOM

- ✓ Do take shorter showers and fill the tub halfway.
- ✗ Don't run water while washing your hands & brushing your teeth.

KITCHEN & LAUNDRY

- ✓ Do run the dishwasher & washing machine only when full.
- ✗ Don't let the water run while washing dishes. Kitchen faucets use 2 to 3 gallons a minute. Filling a basin only takes 10 gallons to wash and rinse.

EVERYWHERE

- ✓ Do install water-saving fixtures.
- ✗ Don't ignore water leaks. Turn taps off tightly.

OUTDOORS

- ✓ Do use a self-closing nozzle on your hose.
- ✗ Don't open fire hydrants.

REPORT LEAKS & WATER WASTE Call 311

In or out of a drought, every New Yorker can save hundreds of gallons of water each week by following these simple water-saving tips.

www.nyc.gov/dep

FREQUENTLY ASKED QUESTIONS

MY WATER IS A RUSTY BROWN COLOR. WHAT CAUSES THIS?

Brown or discolored water is commonly associated with plumbing corrosion problems inside buildings and from rusting hot water heaters. If you have an ongoing problem with brown water, it may be due to rusty pipes. It is recommended that you run your cold water for 2-3 minutes if it has not been used for an extended period of time. This will flush the line.

A sudden appearance of discoloration might result from a disturbance to nearby water mains, including breaks or repairs. This can also occur if there is construction near your building. Additionally, the use of fire hydrants for firefighting can temporarily cause brown water. Because the water mains are pressurized, a disturbance may stir up or resuspend sediments, thereby causing the water to be discolored. Discoloration is a temporary condition most often caused by particles of iron and manganese that have settled to the bottom of the water pipes buried under the roadways. Any sudden change in the flow of water within the pipes can cause them to vibrate, which, in turn, may loosen or resuspend the brownish/red/orange particles of iron into the water. This temporary problem is generally resolved or reduced when DEP flushes water from nearby hydrants.

SOMETIMES I THINK MY WATER HAS A TASTE OR ODOR?

You may, at times, find your water tastes or smells like chlorine. DEP is required to maintain a chlorine residual in the distribution system to prevent the growth of microorganisms. Chlorine is a very effective disinfectant, and is not considered hazardous or harmful in the amounts used to treat the water supply. New York City water meets all federal and state standards and is safe to drink. Chlorine odors may be more noticeable when the weather is warmer. The most effective way to eliminate or reduce the taste is by leaving a glass or pitcher of your tap water in the refrigerator overnight before drinking. You can also pour water from one container to another about 10 times to reduce the chlorine.

IS NEW YORK CITY'S WATER "HARD?"

DEP gets many questions about hardness from people who are installing dishwashers. Hardness is a measure of dissolved calcium and magnesium in drinking water. Water with less calcium or magnesium is considered "soft" which makes it easier to create a lather and suds. New York City's Catskill/Delaware water supply is "soft." Citywide average hardness is about 1.8 grain/gallon (CaCO_3). In areas of the City where Catskill/Delaware and Croton water supplies are blended, the hardness can reach 7 grain/gallon (CaCO_3), which is considered "moderately hard."

WHY DOES MY DRINKING WATER LOOK CLOUDY SOMETIMES?

Air becomes trapped in the water as it makes its long trip from the upstate reservoirs to the City. As a result, bubbles of air can sometimes cause water to appear cloudy or milky. This condition is not a public health concern. The cloudiness is temporary and clears quickly after water is drawn from the tap and the excess air is released.

WHERE TO GO FOR ADDITIONAL INFORMATION

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling EPA's Safe Drinking Water Hotline at (800) 426-4791.

For additional copies of this report, to report unusual water characteristics, or to request a free kit to test for lead in your drinking water, call 311 or from outside New York City call (212) New-York or visit 311 online at www.nyc.gov/apps/311. TTY services are available by calling (212) 504-4115.

For more information about *Cryptosporidium* and *Giardia*, contact the Bureau of Communicable Diseases of the New York City Department of Health and Mental Hygiene at (347) 396-2600 or call 311 or visit www.nyc.gov/apps/311.

To contact the New York City Department of Health and Mental Hygiene about other water supply health-related questions, call 311 or visit 311 online at www.nyc.gov/apps/311. To contact the New York State Department of Health, Bureau of Water Supply Protection, call (518) 402-7650 or visit www.health.ny.gov.

To report pollution, crime or terrorism activity occurring in the watershed, call (888) H2O-SHED (426-7433).

View the 2016 Drinking Water Supply and Quality Report at www.nyc.gov/dep/2016waterquality, or announcements of public hearings, and other information about the New York City Water Supply System at www.nyc.gov/dep.

This report contains important information about your drinking water. Translate it, or speak with someone who understands it.

Este reporte contiene información muy importante sobre el agua que usted toma. Haga que se la traduzcan o hable con alguien que la entienda.

Ce rapport contient des informations importantes sur votre eau potable. Traduisez-le ou parlez en avec quelqu'un qui le comprend bien.

Questo documento contiene informazioni importanti sulla vostra acqua potabile. Traducete il documento, or parlatene con qualcuno che lo può comprendere.

Rapò sa a gen enfòmasyon ki enpòtan anpil sou dlo w'ap bwè a. Fè tradwi-l pou ou, oswa pale ak yon moun ki konprann sa ki ekri ladan-l.

Ten raport zawiera bardzo istotną informację o twojej wodzie pitnej. Przetłumacz go albo porozmawiaj z kimś kto go rozumie.

В этом материале содержится важная информация относительно вашей питьевой воды. Переведите его или поговорите с кем-нибудь из тех, кто понимает его содержание.

這個報告中包含有關你的飲用水的重要信息。請將此報告翻譯成你的語言，或者詢問懂得這份報告的人。

이 보고서는 귀하의 식수에 관한 매우 중요한 정보를 포함하고 있습니다. 이 정보에 대해 이해하는 사람에게 그 정보를 번역하거나 통역해 받으십시오.

এই প্রতিবেদনে আপনার পানীয় জল সম্পর্কে গুরুত্বপূর্ণ তথ্য রয়েছে

يتضمن هذا التقرير معلومات هامة حول مياه الشرب الخاصة بك. ترجمه أو تحدث مع شخص يفهمه.

یہ رپورٹ آپ کے پینے کے پانی کے بارے میں اہم معلومات پر مشتمل ہے۔ اس کا ترجمہ کریں یا انسے بات کریں جو یہ رپورٹ سمجھتے ہیں۔

