Water Works

Volume 16 • Summer 2018

A newsletter published by the City of Wilmington Department of Public Works Water Division

Revitalizing Cool Spring Reservoir Plaza Park

Cool Spring Reservoir was originally built in 1875 and served the City as a finished water reservoir for over 130 years. In early 2006, the City of Wilmington began work on the reservoir at Cool Spring Park. The plan was to replace the open-air reservoir with a secure buried underground tank in order to protect drinking water supplies. Part of this project involved the creation of a new city park in an area previously inaccessible to neighbors. The park was opened to the public in late summer 2009 and was immediately embraced by the public as a new green space and has been used since by neighbors, neighboring schools and other organizations for special events.

(Continued on page 8)

City of Wilmington 2017

Water Quality Report

To ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in public water systems.

The Environmental Protection Agency (EPA) requires the City of Wilmington, and all other water suppliers in the US, to report yearly on specific details about testing for a number of contaminants in our water. Chemical and biological monitoring provide the data that helps suppliers, such as the City of Wilmington, make key water quality management decisions to ensure freshness and purity.

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. To ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulates bottled water, which must provide the same protection to the public's health.

More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (**1-800-426-4791**).

(Full report continues on page 3)

Jr. Water Works Kids Activity sheet... *page 10*

A Word from the Commissioner

The primary source of drinking water for the City of Wilmington is the Brandywine Creek. With 90% of the drainage area in another state (Pennsylvania), the City must depend on the actions of others to protect our drinking water supply. The City developed a Source Water Protection Plan (SWPP) in 2010. The SWPP has four main goals. The first was to better protect the water supply for future generations. Second, reduce long term operating costs while avoiding future treatment improvement costs through proactive watershed planning. Third, improve early warning and emergency communications. Fourth, leverage upstream investments to protect the water supply through agricultural mitigation and farmland preservation.

Each year, the City invests in preservation and conservation efforts in Pennsylvania to protect our water supply in Delaware. The money the city invests is leveraged with other partners in both States and the work being accomplished is extraordinary. The monies are used to create riparian buffers along the creek and its tributaries, fencing to keep livestock out of waters and to promote best management practices for manure management. All of these help keep pollutants, and excessive nutrients out of creek waters.

Mitigating agricultural impacts provides benefits to the water supply. It prevents and reduces pathogens such as Cryptosporidium, sediment, livestock pharmaceuticals, ammonia, nitrate, and phosphorus. A study by the American Water Works Association (AWWA) and the Trust for Public Lands of water supplies suggested that for every 4 percent increase in raw water turbidity, treatment costs increase 1 percent.

The City continues to be actively involved in pursuing its goals and objectives through partnerships and support. Investing in source water protection not only helps protect our drinking water supplies but it also makes the Brandywine Creek water more attractive for recreational uses.

Kelly Williams, Commissioner,
Department of Public Works

Information about Lead in the City of Wilmington's Drinking Water

The EPA Lead and Copper Rule, which is part of the Safe Drinking Water Act, went into effect in 1992. The purpose of the Rule is to protect public water system consumers from exposure to lead and copper in drinking water. The Rule requires water purveyors to collect water samples at customer's homes and analyze these samples for lead and copper. The Rule also requires that steps be taken to minimize lead and copper corrosion. The City has fully complied with the Rule requirements from 1992 up to the present time.

After collecting samples for a number of years and providing this information to the Delaware Office of Drinking Water (which is a division of Delaware Health and Social Services), the State reduced the required frequency of lead and copper monitoring to once every three years in 1999. This was because of the low levels of lead detected in the drinking water during previous sampling events.

The City last sampled for lead in 2017 and is scheduled to sample again during the summer of 2020. We would like to thank the homeowners who assisted the City in collecting the required lead and copper samples in 2017.

Please be aware that the City has a limited rebate program to assist customers with the replacement of their service lines. Additionally, free water tests for lead are, and have always been, available to customers upon request through the Water Quality Lab **(302)571-4158**.

For frequently asked questions, including questions regarding lead in drinking water, turn to page 9.

Contact Us

You can help us ensure the safety of our water supply by reporting any unusual or suspicious activity either on our waterways, near our reservoirs, water filtration plants, water towers or pumping stations.

To report an incident or general water quality concerns, call the City Call Center at (302) 576-3878.

If you have questions about this report, call the Water Quality Laboratory at (302) 571-4158.

Weekends or after 5 P.M., (302) 571-4150.

2017 WATER QUALITY REPORT

How We Test Our Drinking Water

The Wilmington Water Division monitors for over 100 contaminants, including herbicides, pesticides, Cryptosporidia, Giardia and coliform bacteria. We collect samples from the Brandywine Creek, Hoopes Reservoir, Porter Reservoir, Cool Spring Reservoir, the filtration plants and at customers' taps in the distribution system.

Last year, over 30,000 water samples were drawn from the City's fresh water supply treatment plants and distribution system. Our laboratory performed over 70,000 water analyses on those samples. This data supports the conclusion that Wilmington's water system complies with all applicable EPA drinking water regulations.

During disinfection, certain byproducts form as a result of chemical reactions between chlorine and naturally occurring organic matter in water. These are carefully controlled to keep disinfection effective and byproduct levels low.

The state allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of our data, though representative, are more than one year old. If this is the case, the sample year will be noted in the report. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Wilmington 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. 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**.

The Division of Public Health, in conjunction with the Department of Natural Resources and Environmental Control (DNREC), has conducted source water assessments for nearly all community water systems in the state. Contact the City at **(302) 573-5522** regarding the availability of the assessment and how you may obtain a copy. The assessment may also be viewed at this website: **www.delawaresourcewater.org**.

City of Wilmington
800 French St.
Wilmington, DE 19801

PWSID# DE0000663

June 1, 2018

Report Covers
Calendar Year 2017

Water System Contact
Chris Oh
Assistant Water Division Director
(302) 573-5522

Water Source:
Surface Water (Brandywine Creek & Hoopes Reservoir)

Protecting the Public from Disease

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 activity.

Microbiological testing of water helps protect the public from waterborne diseases such as polio, diphtheria, typhoid and cholera. Chlorine is very effective at killing or disinfecting most of these organisms in drinking water. However, Cryptosporidium, a microbial pathogen found in surface waters throughout the U.S., is resistant to chlorine. Optimized water treatment, including filtration, provides an effective barrier against passage of Cryptosporidium into drinking water. One commonly used measure of this treatment effectiveness is turbidity removal. Turbidity is the cloudiness of the water that is caused by particles that are generally invisible to the naked eye. As shown in **Table 1** on **page 5**, the City continues to provide water that is well within State and Federal turbidity requirements.

The most commonly-used filtration methods, such as those used by Wilmington, cannot guarantee 100 percent removal. The City of Wilmington began monitoring for Cryptosporidium in source water for its two plants beginning in November of 2005. Based on research conducted on the removal of Cryptosporidium by common filtration methods, the level detected in the source water should have been removed by the filters at the City's treatment plant. Cryptosporidium has never been detected in the treated water supply.

Important Health Note for "At Risk" Populations

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, organ transplant recipients, people with HIV/AIDS or other immune system disorders, the elderly, and infants can be particularly vulnerable to infections. These people should seek advice from their health care providers. EPA/CDC guidelines on appropriate ways to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Regulating Contaminants

Contaminants that may be present in source water include: microbial contaminants, such as viruses and bacteria; inorganic contaminants, such as salts and metals, which can be naturally occurring; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants. In order to ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in drinking water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Table 1: Water Quality Results - Detected Primary[1] Parameters at ENTRY POINTS to Distribution System

				Brandywine Filter Plant			Porter Filter Plant			
Contaminant	**Units**	**MCLG[2]**	**MCL[3] or TT[4][5]**	**Range of Levels Detected**	**Highest Detected Level**	**Violation**	**Range of Levels Detected**	**Highest Detected Level**	**Violation**	**Likely Source of Contamination**
Microbiological Indicators - (2017 unless noted)										
Turbidity - Percentile	% of samples below 0.3	N/A	95% of monthly samples must be less than 0.3	100 -100	100	No	100 - 100	100	No	Soil runoff
Turbidity - Values	NTU		No sample must ever exceed 1.0	0.047 - 0.274	0.274	No	0.071 - 0.161	0.161	No	Soil runoff
Inorganic Chemicals (Metals and Nutrients) - (2017 unless noted)										
Barium	ppm	2	2	0.0348 - 0.0348	0.0348	No[14]	0.0414 - 0.0414	0.0414	No[15]	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Nickel	ppb	N/A	100	1.5 - 1.5	1.5	No[14]	2.0 - 2.0	2.0	No[15]	Discharge from industrial sources; Erosion of natural deposits
Chromium	ppb	100	100	1.0 - 1.0	1.0	No[14]	1.9 - 1.9	1.9	No[15]	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride	ppm	2	Delaware State MCL: 2 ppm[16]	0.52 - 0.97	0.97	No	0.38 - 0.85	0.85	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate	ppm	10	10	0.7 - 3.9	3.9	No	0.06 - 4.0	4.0	No	Runoff from fertilizer use; Leaching from septic tanks; Sewage; Erosion of natural deposits
Nitrite	ppm	1	1	0.002 - 0.009	0.009	No	0.002 - 0.020	0.020	No	Runoff from fertilizer use; Leaching from septic tanks; Sewage; Erosion of natural deposits
Disinfectants - (2017 unless noted)										
Chlorine	ppm	N/A	At least 0.3 residual entering Distribution System	0.82 - 3.5	3.5	No	1.22 - 3.0	3	No	Water additive used to control microbes
Disinfection Byproduct Precursors - (2017 unless noted)										
Total Organic Carbon	ppm	N/A		0.60 - 2.67	2.67	N/A	0.57 - 2.00	2.00	N/A	
Total Organic Carbon	% Removal (Raw to Treated)	N/A	Must exceed 35% (25% in certain instances)	23 - 70%	70%	No	34 - 60%	65%	No	Naturally present in the environment. Total organic carbon (TOC) has no health effects. However TOC provides a medium for the formation of disinfection byproducts
Total Organic Carbon	Compliance Ratio (rolling annual avg)	N/A	Ratio of Actual to Required Removal - must be greater than or equal to 1	1.08 - 1.24	1.24	No	1.28 - 1.48	1.48	No	
Synthetic Organic Chemicals (pesticides, defoliants, fuel additives) - (2016 unless noted)										
Dalapon	ug/L	200	200	0.79 - 0.79	0.79	No	-	-	-	Runoff from herbicide on rights of way
Atrazine	ug/L	3	3	-	-	-	0.031 - 0.031	0.031	No	Runoff from herbicide on rights of way
Di (2-ethylhexyl) phthalate	ug/L	0	6	0.27 - 0.27	0.27	No	0.28 - 0.28	0.28	No	Discharge from plastic production
Hexachlorocyclopentadiene	ug/L	50	50	-	-	-	0.077 - 0.077	0.077	No	Runoff from herbicide on rights of way
Simazine	ug/L	4	4	-	-	-	0.072 - 0.072	0.072	No	Runoff from herbicide on rights of way

Table 2: Water Quality Results - Detected Primary[1] Parameters in Distribution System

Contaminant	Units	MCLG[2]	MCL[3] or TT[4][5]	Range of Levels Detected	Highest Detected Level	Violation	Likely Source of Contamination
Disinfectants							
Chlorine	ppm	MRDLG = 4.0[9]	MRDL = 4.0[8]	0.0 - 2.1	2.1[10]	No	Water additive used to control microbes
Disinfection Byproducts							
Total Trihalomethanes	ppb	No goal for the total	80	13 - 85[7]	68[11]	No	Byproduct of drinking water disinfection. Forms due to reaction of chlorine with total organic carbon. **Health effects**: Some people who drink water containing TTHMs in excess of the MCL over many years could experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
Haloacetic Acids	ppb	No goal for the total	60	12 - 74[7]	50[11]	No	Byproduct of drinking water disinfection. Forms due to reaction of chlorine with total organic carbon.

Potential Contaminants

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, which can occur naturally or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff and septic systems.

Radioactive Contaminants, which can occur naturally or as a result of oil and gas production and mining activities.

Table 3: Detection of Unregulated Contaminants[12]

Chemical or Constituent	Units	Average	Range of Levels Detected	Likely Source of Contamination
Chromium 6+	ug/L	0.33	0.24 - 0.41	Naturally occurring from geological formations, aslo from manufacturing textile dyes, wood preservation, leather tanning & anti-corrosion coatings
Chromium, Total	ug/L	0.46	0.38 - 0.54	Discharge from steel & pulp mills & chrome plating; erosion of natural deposits. Allergic dermatitis may occur in sensitive individuals who use water containing chromium in excess of the MCL over many years.
Strontium	ug/L	135	130 - 140	Found in rocks & soil; Use of phosphate fertilizers
Vanadium	ug/L	0.4	0.4 - 0.4	Naturally occurring metal; Steel manufacture
Molybdenum	ug/L	2.9	1.5 - 4.2	Naturally occurring element in ores & present in plants, animals & bacteria; used as a chemical reagent in the form molybdenum trioxide
Chlorate	ug/L	382	270 - 500	Agricultural defoliant or desiccant; disinfection byproduct & used in the production of chlorine dioxide
1,4-dioxane	ug/L	0.1	0.1 - 0.1	A clear liquid used as a solvent in the manufacture of chemicals

Table 4: Radioactive Contaminants
(2016 unless noted)

Radioactive Contaminants	Units	MCLG	MCL	Highest Detected Level	Range of Levels Detected	Violation	Likely Source of Contamination
Beta/photon emitters	pCi/L	0	50[16]	3.5	3.5 - 3.5	No	Decay of natural and man-made deposits

Table 5: Secondary Parameters and Other Parameters of Interest Detected in Water as it Enters Distribution System

			Brandywine Filter Plant			Porter Filter Plant			
Contaminant	Units	SMCL[17]	Average	Lowest	Highest	Average	Lowest	Highest	Source
Conventional Physical and Chemical Parameters									
pH	units	6.5 - 8.5	7.3	6.7	7.7	7.4	6.6	8.1	Waters with pH = 7.0 are neutral
Alkalinity	ppm as $CaCO_3$	N/A	62	41	80	60	38	76	Measure of buffering capacity of water or ability to neutralize an acid
Hardness	ppm as $CaCO_3$	N/A	120	42	152	128	84	172	Naturally occurring; Measures Calcium and Magnesium
Conductivity		N/A	370	71	517	404	289	577	General measure of mineral content
Sodium	ppm	N/A	73.0	73.0	73.0	61.4	61.4	61.4	Naturally occuring; chemical additive to treat the water; Road salt application and run-off
Sulfate	ppm	250	16.2	16.2	16.2	18.7	18.7	18.7	Naturally occuring; can cause objectionable taste and odor in water
Chloride	ppm	250	67	43	115	78	51	126	Naturally occurring; Chemical Additive to treat the water; Road salt application and run-off
Metals									
Iron	ppb	300	–	–	–	20	20	60	Naturally occurring; Chemical Additive to treat the water; Corrosion of pipes; Can cause discoloration in water
Manganese	ppb	50	13	5	22	11	2	30.00	Naturally occurring; can cause discoloration and objectionable taste in water
Zinc	ppm	5	0.13	0.06	0.19	0.12	0.09	0.22	Naturally occurring; Chemical Additive to treat the water

Table 6: Lead and Copper
(based on 2017 sampling–testing is done every 3 years)

Contaminant	MCLG	Action Level (AL)[13]	90th Percentile	# Sites Over AL	Units	Violation	Likely Source of Contamination
Copper	1.3	1.3	0.247	0	ppm	No	Erosion of natural deposits; leaching from wood preservatives; Corrosion of household plumbing systems
Lead	0	15	5.60	3	ppb	No	Corrosion of household plumbing systems; Erosion of natural deposits

Key to Tables

[1] Primary parameters are contaminants that are regulated by a maximum contaminant level (MCL), because above this level consumption may adversely affect the health of a consumer.

[2] MCLG - Maximum Contaminant Level Goal is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow no margin of safety.

[3] MCL - Maximum Contaminant Level is 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.

[4] TT - Treatment Technique refers to the required process intended to reduce the level of a contaminant in drinking water. EPA's surface water treatment rules require systems to (1) disinfect their water and (2) filter their water such that the specific contaminant levels cited are met. Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. Total organic carbon is regulated by a Treatment Technique that requires systems operate with enhanced coagulation or enhanced softening to meet specified percent removals.

[5] Unless otherwise indicated value given is a MCL.

[6] State limit is to not exceed 2.0 mg/L.

[7] Cited range is the range of all individual results in 2017.

[8] MRDL - Maximum Residual Disinfectant Level is the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

[9] MRDLG - Maximum Residual Disinfectant Level Goal is the level of drinking water disinfectant below which there is no known or expected health risk. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

[10] Cited value is the lowest and/or highest average of a minimum of 100 routine samples per month.

[11] Cited value is the highest Locational Running Annual Average (LRAA). MCL is based on the LRAA, which is compiled to include data from previous quarters.

[12] Unregulated contaminant monitoring helps EPA to determine where certain contaminants occur and whether the Agency should consider regulating those contaminants in the future.

[13] AL - Action Level: The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.

[14] Collected in 2014.

[15] Collected in 2015.

[16] The MCL for beta particles is 4 mrem/year. EPA considers 50 pCi/L to be the level of concern for beta particles.

ppm: milligrams per liter or parts per million - or one ounce in 7,350 gallons of water

ppb: micrograms per liter or parts per billion - or one ounce in 7,350,000 gallons of water

ND: not detected

Revitalizing Cool Spring Reservoir Plaza Park (Continued from cover)

The Cool Spring Park represents a major breakthrough in multi-purpose public spaces. A portion of the park houses a fully protected, underground water storage tank, while the park incorporates several water themed elements as a tribute to the original use of the land as a reservoir. One key water feature of the park is the freshwater pond and man-made wetlands surrounding it. The pond is not part of the water supply but rather pays tribute to the original water supply on the site.

In 2016 it was observed that non-native goldfish (Asian Carp) had been introduced into the pond located in the park and were multiplying at a rapid rate due to the lack of predators. This explosion in the population of the fish resulted in a large increase in nutrients and algae in the pond waters thus lowering water quality. At the same time, non-native invasive plant species were proliferating in areas adjacent to the pond thus crowding out other plants and cutting off views of the water from the adjacent walkways. While the pond and wetlands were under stress, the underground storage tank and the drinking water quality were never affected as they remain protected from surface activities.

The City realized that action was necessary to restore an ecological balance with the plant and fish populations. A team made up of Public Works personnel and consultants was established to evaluate the park conditions and come up with an action plan to restore an ecological balance. The plan developed included the removal of the goldfish, draining of the pond and removal of accumulated sediment, as well as the removal of most of the invasive plants. A variety of fish would be introduced into the pond waters to prevent any future proliferation of invasive fish in the waters. In order to perform this work, half of the park containing the pond had to be closed off to the public to protect the public from construction equipment. The work was also scheduled to occur during the winter months and early spring months when the park is least used by the public.

The rehabilitation work began in the winter of 2016 and was completed in the late spring of 2017. Since the completion of the work, the pond waters and plant species have been closely monitored to keep an eye on their condition. The pond now contains a diverse fish population which maintains a good ecological balance in the waters.

The new plant species have grown well and the plant buffer around the edge of the pond has been reestablished. This natural buffer provides a critical function in making the pond less attractive to Canada Geese thus keeping them away from the pond and nearby lawn areas of the park. Water quality in the pond continues to remain very good. Invasive plant species are now well controlled.

This necessary work has revitalized the park. The park and pond have now been restored back to the condition that existed when the park was first opened. The park continues to be a very popular neighborhood park and remains a popular attraction for special events.

Future improvement activities at the park include the addition of wildflowers in the meadow area and the replacement of some of the vegetation along the berm area with a ground cover to reduce soil erosion during heavy rain events.

Wilmington is proud of its variety, beauty and long history of its parks and public spaces. The Cool Spring Park is a unique addition to our park system and it is a breakthrough in Multi-purpose Public Space Design. This space was designed to be functional for our critical utility (the water tank) as well as serving the community as a space for recreation, exercise and expression. It combines several water features as a tribute to its past but has also become an educational tool for the future. It stands alone in the region with incorporation of a natural meadow, wetlands, uplands and water features. Cool Spring Park is a one-of-a-kind gem!

Water Quality Problem?

The City of Wilmington is committed to providing you with high quality drinking water. We also understand that concerns may arise at your tap and we strive to address these quickly and efficiently. If you experience issues such as: low water pressure, rusty/discolored water, or unusual taste and smell, please call our call center at **(302) 576-3878**. You will be asked a series of questions regarding your concern and then the appropriate Water Department personnel will be contacted to address your problem. If you would like your water to be sampled, one of our Water Quality Specialists will call you to schedule a time that is convenient for you.

FAQs

Many customers have questions regarding the quality of their tap water. Below are some of the questions that are frequently asked. Please call the Call Center at (302) 576-3878 or the Water Quality Lab at (302) 571-4158 if you have further questions about your tap water.

What is considered a safe level of lead in drinking water?
There is **no safe level** of lead in drinking water. The Lead and Copper Rule requires that 90% of the samples collected have a concentration of lead of less than 15 parts per billion (ppb). The 15 parts per billion is considered an Action Level. Exceeding the Action Level does not result in a violation; rather, the water purveyor is then required to educate its customers (through public notices and public education programs) about lead, and provide suggestions for minimizing exposure to lead. The City's samples have never exceeded the Action Level and thus have always met the regulatory requirements. In other words, 90% of the samples collected have always had lead levels of less than 15 parts per billion.

How many samples are collected in the distribution system during each round of sampling?
Fifty samples are collected at homes throughout the distribution system. Each homeowner or resident is contacted ahead of time. The resident is given a sample bottle and instructions on how to collect the sample. The sample is usually collected from a kitchen faucet first thing in the morning before any water is used in the household. The sample collected must represent stagnant water which has remained in the pipe for at least 6 hours. Stagnant water is more likely to contain lead, because the water is in contact with lead-containing pipes/fixtures for a much longer period than when the water is flowing. The City collects the samples from the residents and sends them to a Certified Laboratory to have the samples tested. The City always shares the lead results with the customers whose water is sampled and also publishes the results in the City's annual Consumer Confidence Report.

What is the source of lead in drinking water?
The most common source of lead is old lead service lines. A less common source of lead is brass fixtures and fittings and lead soldered joints in the household plumbing. The City's drinking water leaving the water treatment plants is not a source of lead. The City's water mains are not a source of lead. Water mains are generally made from either ductile iron, cast or galvanized steel.

What actions can a customer take to minimize their exposure to lead in drinking water?
If you're concerned about lead in your drinking water, you can take several steps to limit possible exposure.

- Testing at the tap is the only way to measure the lead levels in your home. Contact the Water Quality Lab **(302) 571-5148** if you would like you water tested.
- Flush your tap water. Flushing the tap is particularly important when the faucet has gone unused for more than a few hours. It takes time for lead to dissolve into water, so the first water drawn from the tap in the morning or after a long period of non-use can contain higher levels of lead. Flushing clears standing water from your plumbing and home service line to ensure you are getting drinking water from the main, where lead is rarely present. Let the water run from the tap until it is noticeably colder (this may take up to two minutes or more) before using it for cooking or drinking.
- Remember, you must flush EACH drinking water faucet after long periods of non-use for this strategy to be effective. Use the flushed water for non-potable purposes such as watering plants or washing dishes.
- Use only cold water for cooking, drinking or making baby formula. Lead leaches more easily into hot water than cold water.

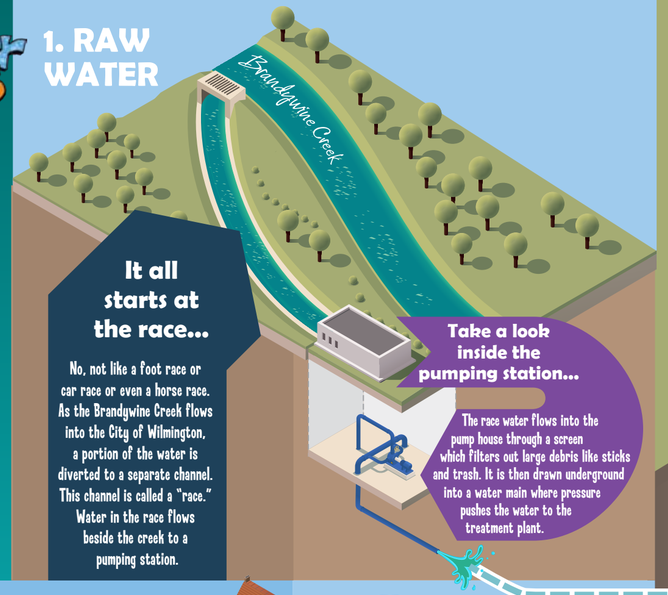
Jr. Water Works

The Water Treatment Process

This is the true story of how raw water from nature gets cleaned and purified and ends up at your tap...

When you're done reading, try the word challenges on the far right.

1. RAW WATER



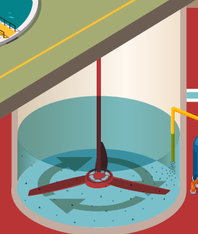
It all starts at the race...

No, not like a foot race or car race or even a horse race. As the Brandywine Creek flows into the City of Wilmington, a portion of the water is diverted to a separate channel. This channel is called a "race." Water in the race flows beside the creek to a pumping station.

Take a look inside the pumping station...

The race water flows into the pump house through a screen which filters out large debris like sticks and trash. It is then drawn underground into a water main where pressure pushes the water to the treatment plant.

2. COAGULATION

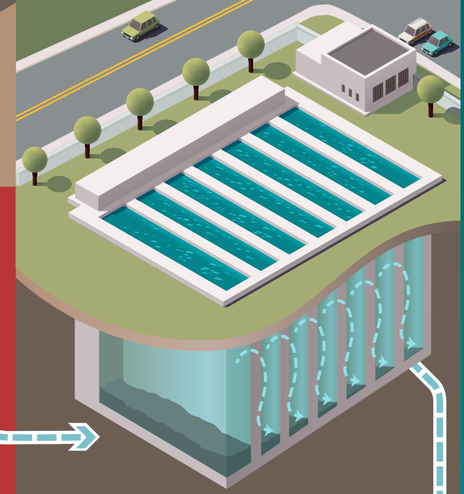


The coagulant is injected into the water where rotating blades mix it in. The circulating water helps impurities to clump together.

When the raw water arrives at the treatment plant, the first stop is the coagulation tanks...

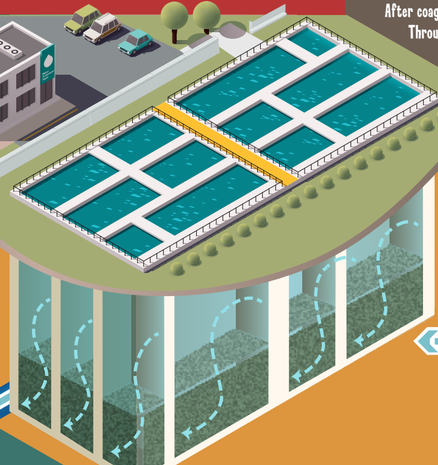
In these circular tanks a chemical called a coagulant is added to form sticky particles called "floc." You can think of the coagulant like little magnets that attract all the tiny particles and impurities floating in the water. These particles clump together forming larger, heavier bits that sink to the bottom.

3. SEDIMENTATION



After coagulation the water moves on to the sedimentation tanks. Through a process of gentle circulation, the water moves through a series of tanks. As it does so, the heavier materials in the water settle to the bottom. As more dirt settles out of the water, it becomes cleaner as it moves to each new tank.

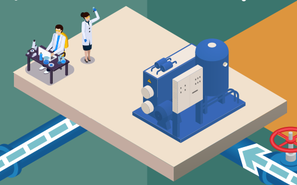
4. FILTRATION



The clear water from the sedimentation tanks now moves to the filtration system. Here the water is passed through a series of sand, charcoal or gravel layers to remove any tiny impurities that still remain.

5. CHLORINATION

In the final process of water purification, chlorine is added as a disinfectant. The water is now clear, clean and free of contaminants. It's ready to be pumped to water tower storage tanks and distributed to customers, like you.



And now the finished product arrives at your tap...

6. DRINKING WATER

We take for granted how easy it is to turn on our faucet and have access to clean drinking water. You may not have known all that is involved to make sure our water is safe to drink, but now you do!

Word Search

Find all the words relating to the water treatment process from the list below the puzzle. Words can go in any direction including backwards and diagonal.

S	N	M	M	F	L	U	M	C	C	R	C	P	N	M
V	O	F	F	L	F	F	Q	L	M	H	X	O	D	J
L	I	F	C	O	A	G	U	L	A	T	I	O	N	R
X	T	U	I	W	R	U	P	R	M	T	G	I	M	E
R	A	C	X	L	K	E	C	U	A	L	N	M	Q	W
Z	T	L	B	T	T	O	T	N	M	A	W	P	E	O
R	N	R	G	X	A	R	I	L	E	P	F	U	Z	T
Q	E	Y	Q	L	N	R	A	L	I	F	V	R	E	Z
S	M	Z	Y	A	O	T	C	T	L	F	O	I	D	X
S	I	Z	M	L	K	B	W	O	I	C	U	T	F	M
K	D	V	H	T	G	B	C	C	H	O	T	I	M	I
I	E	C	E	R	U	S	S	E	R	P	N	E	U	H
M	S	L	V	D	J	W	P	V	I	B	C	S	R	J
R	M	Z	F	W	T	Z	D	Q	E	V	L	N	I	Y
O	T	R	A	C	E	C	R	L	D	E	A	X	S	R

CHARCOAL
CHLORINATION
CLEAN
COAGULATION
FILTER
FILTRATION
FLOC
FLOW
IMPURITIES
PRESSURE
PUMP
RACE
SEDIMENTATION
TOWER

Word Scramble

Unscramble the words below and write them in the spaces to the right. Once you've unscrambled all five, unscramble the secret word made from the light green letters to find out what all the other words have in common.

AKTN _ _ _ _

YPFURI _ _ _ _ _ _

NWFOILG _ _ _ _ _ _ _

RICONHEL _ _ _ _ _ _ _ _

MTERANTTE _ _ _ _ _ _ _ _ _

_ _ _ _ _

Check your answers on the back page.

FAQs (continued)

What actions has the City taken to minimize the exposure of water customers to lead in their drinking water?

The City adds a corrosion inhibitor to the drinking water. The corrosion inhibitor the City uses is Zinc Orthophosphate and this is added before the water leaves the treatment plant. This corrosion inhibitor coats the inside of water mains as well as service lines and plumbing fixtures with a protective layer to minimize the likelihood of lead leaching into the drinking water from potential lead sources such as lead service lines and some brass fixtures and fittings. Zinc orthophosphate addition is considered to be one of the most reliable forms of lead corrosion control.

Do we know where all the lead service lines are located?

No. Lead service lines were common during the late 1800's and up through the mid 1900's. It was a popular material because of some of its properties (such as its ductility). Older homes are more likely to have lead service lines, however, tracking who has lead service lines and which lead service lines were replaced over the years is extremely difficult. Tracking other sources of lead such as the use of lead solder which was allowed up until 1986 and brass fixtures containing lead which were allowed up until two years, is even more difficult.

Jr. Water Works Answers:

Word Search

S	N	M	M	F	L	U	M	C	C	R	C	P	N	M
V	O	F	F	L	F	F	Q	L	M	H	X	O	D	J
L	I	F	C	O	A	G	U	L	A	T	I	O	N	R
X	T	U	I	W	R	U	P	R	M	T	G	I	M	E
R	A	C	X	L	K	E	C	U	A	L	N	M	Q	W
Z	T	L	B	T	T	O	T	N	M	A	W	P	E	O
R	N	R	G	X	A	R	I	L	E	P	F	U	Z	T
Q	E	Y	Q	L	N	R	A	L	I	F	V	R	E	Z
S	M	Z	Y	A	O	T	C	T	L	F	O	I	D	X
S	I	Z	M	L	K	B	W	O	I	C	U	T	F	M
K	D	V	H	T	G	B	C	C	H	O	T	I	M	I
I	E	C	E	R	U	S	S	E	R	P	N	E	U	H
M	S	L	V	D	J	W	P	V	I	B	C	S	R	J
R	M	Z	F	W	T	Z	D	Q	E	V	L	N	I	Y
O	T	R	A	C	E	C	R	L	D	E	A	X	S	R

Word Scramble

TANK
PURIFY
FLOWING
CHLORINE
TREATMENT
WATER

Kelly Williams, Commissioner
Department of Public Works
Louis L. Redding City/County Bldg.
800 French Street, Wilmington, DE 19801-3537

Velda Jones Potter, City Treasurer

www.wilmingtonde.gov

An electronic version of this document is available at **www.ccrwilmingtonde.com**.

Una versión en español de este documento está disponible por correo, previa solicitud.

Michael S. Purzycki, Mayor

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