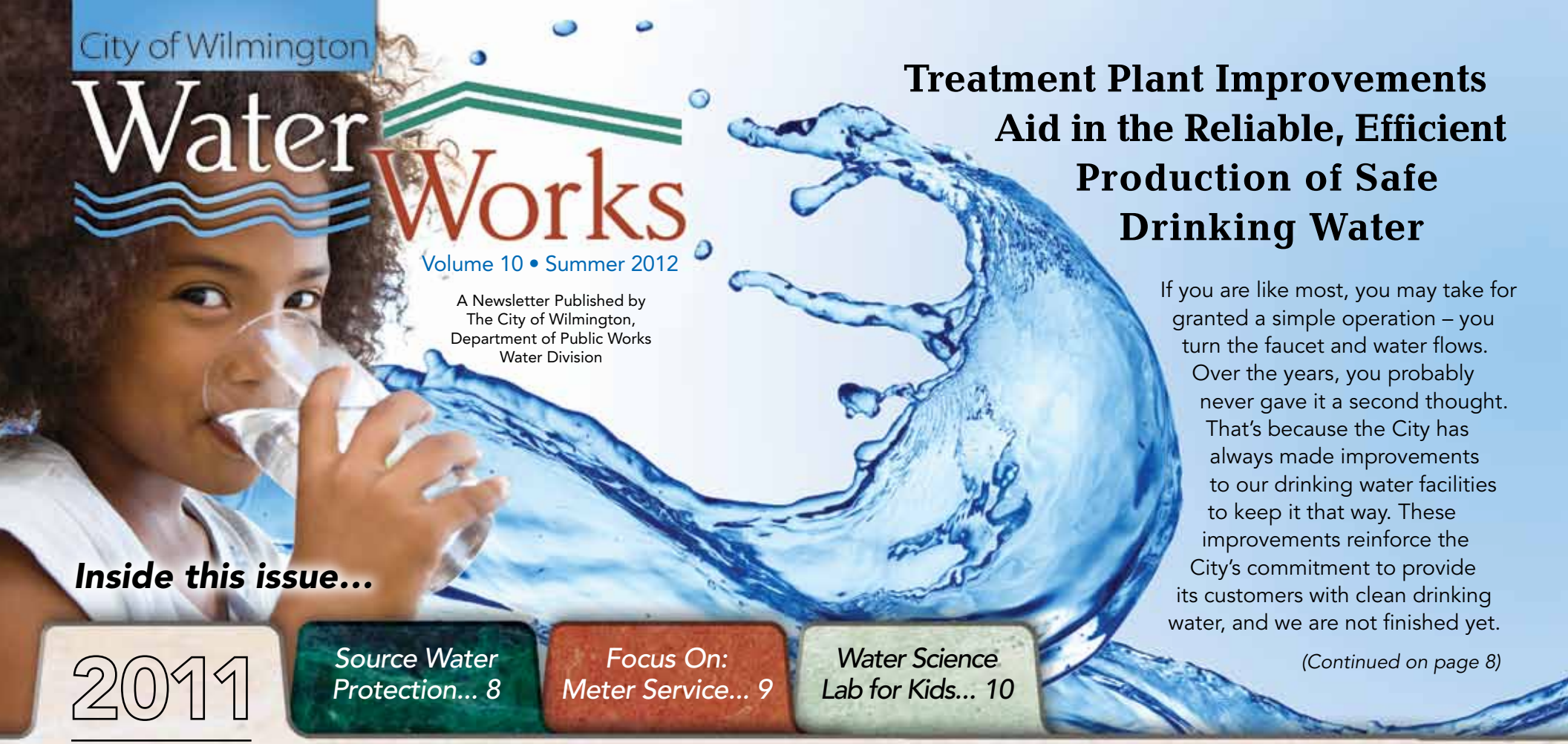
City of Wilmington
Water Works
Volume 10 • Summer 2012
A Newsletter Published by
The City of Wilmington,
Department of Public Works
Water Division



Treatment Plant Improvements Aid in the Reliable, Efficient Production of Safe Drinking Water

If you are like most, you may take for granted a simple operation – you turn the faucet and water flows. Over the years, you probably never gave it a second thought. That's because the City has always made improvements to our drinking water facilities to keep it that way. These improvements reinforce the City's commitment to provide its customers with clean drinking water, and we are not finished yet.

(Continued on page 8)

Inside this issue...

2011

Water Quality Report

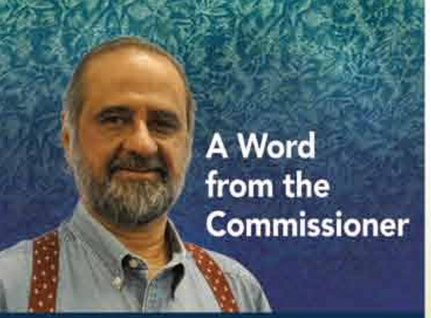
To ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in public water systems.

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 provides 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 – 800-426-4791.

(Continued on page 3)



A Word from the Commissioner

The City of Wilmington continues its commitment to providing you with clean and reliable drinking water and 2011 was an exciting year. In this report you will be reading about many exciting projects from new windows and security measures, to updated control valves on our filtering process at the Porter filtration plant. A major treatment technology upgrade to our Brandywine filtration plant is also well underway and we look forward to its completion next year. Bringing clean water to our customers is a priority, and improvements to our treatment facilities and distribution network are a vital component to this mission. I hope you enjoy this issue of WaterWorks and our 2011 Consumer Confidence Report.

Best Wishes,

Kash Srinivasan,
Commissioner,
Department of
Public Works

Source Water...

The City of Wilmington developed the Source Water Protection Plan (SWP Plan) in order to better protect its water supply for future generations, reduce long term operating costs and carbon footprint, avoid future treatment requirements, improve planning and response to future spills and water quality events, and leverage upstream investments to protect its water supply.

Recognizing the efforts and input of the many dedicated stakeholders in the Brandywine Creek Watershed who have been involved with this SWP Plan is very important. The SWP Plan integrates a significant amount of information from their previous studies and plans. Without the involvement of these stakeholders and the benefit of their previous efforts, this plan would not have been possible.

You can download and read the SWP Plan at ***http://www.wilmingtonde.gov/government/sourcewater***. If you have any questions please contact **Matthew Miller**, Water Quality Manager, at **302-573-5522**.

2010

Corrections/Revisions to Calendar Year 2010 Report

2011

The following language was inadvertently omitted:

"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, is 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 (800) 426-4791 or at **http://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: **http://www.wr.udel.edu/swaphome/index.html**"

(continued on page 4)

Annual Water Quality Report

City of Wilmington
800 French St.
Wilmington, DE 19801

PWSID# DE0000663

June 1, 2012

Report Covers
Calendar Year 2011

Water System Contact –
Matthew Miller,
Water Quality Manager
(302) 573-5522

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

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 by-products 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 by-product 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 (800) 426-4791, or at **http://www.epa.gov/safewater/lead**.

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2010
Other revisions/additions:

The full address found on the back page of the report should have been located on Page 5 of the publication (report title page). You will see this change in this year's report as well.

Several contacts were given throughout the report although the main contact for the water system is Matthew Miller, Water Quality Manager (302) 573-5522.

The following table represents a correction to the calendar year 2010 reported radioactive contaminants data.

Contaminant	Units	MCLG[1]	"MCL[3] or TT[4][5]"[6]	Average	Lowest Detected Level	Highest Level Detected	Violation	Source
Radioactive Contaminants - (2010 unless noted)								
Beta/photon emitters	mrem/yr	0	4	0.78	0.78	0.78	No	Decay of natural and man-made deposits.
Combined Radium	pCi/L	0	5	not avail.	0.16	1.36	No	Erosion of natural deposits.
Gross alpha excluding radon & uranium	pCi/L	0	15	not avail.	0	0.7	No	Erosion of natural deposits.

2011
Water Quality Report

The date of the calendar year 2010 report is June 1, 2011.

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 US, 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% removal. The City of Wilmington began monitoring for *Cryptosporidium* in source water for its two plants beginning in November of 2005. In 2008, average levels of *Cryptosporidium* were 4 and 2 per 100 L of raw water at Brandywine and Porter Filter plants, respectively. 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 (800-426-4791)**.

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]	Average	Lowest Detected Level	Highest Detected Level	Violation	Average	Lowest Detected Level	Highest Detected Level	Violation	Source
Microbiological Indicators (2011 unless noted)												
Turbidity - Percentile	% of samples below 0.3	Not Applicable	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			0.23	No			0.14	No	Soil runoff
Inorganic Chemicals (Metals and Nutrients)-(2011 unless noted)												
Barium (sampled 2010)	ppm	2	2	0.0338	0.0338	0.0338	No	0.0351	0.0351	0.0351	No	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Chromium (sampled 2010)	ppm	0.1	0.1	0.0029	0.0029	0.0029	No	0.0024	0.0024	0.0024	No	Discharge from steel and pulp mills; erosion of natural deposits
Fluoride	ppm	4	2/4[6]	0.77	0.38	1.7	No	0.79	0.08	1.3	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate	ppm	10	10	1.6	1.1	2.1	No	1.6	1.2	2.3	No	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Nitrite	ppm	1	1	0.002	ND	0.003	No	0.002	ND	0.003	No	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Disinfectants (2011 unless noted)												
Chlorine	ppm		At least 0.3 residual entering Distribution System		1.1		No		1.1		No	Water additive used to control microbes
Disinfection Byproduct Precursors (2011 unless noted)												
Total Organic Carbon	ppm			1.19	0.93	1.43	n/a	1.31	1.08	1.57	n/a	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	% Removal (Raw to Treated)		Must exceed 35% (25% in certain instances)	49%	38%	69%	No	46%	41%	56%	No	
Total Organic Carbon	Compliance Ratio (rolling annual avg)		Ratio of Actual to Required Removal - must be greater than or equal to 1		1.2[7]	1.4[8]	No		1.25[7]	1.4[8]	No	

Drinking water, including bottled water, may reasonably be expected to contain trace 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 the EPA's Safe Drinking Water Hotline (1-800-426-4791).

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 contaminant; 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.

2011 Water Quality Report

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

Contaminant	Units	MCLG[2]	"MCL[3] or TT[4][5]"	Average	Lowest Detected Level	Highest Detected Level	Violation	Source
Microbiological Indicators								
Total Coliform	% of samples positive each month	0%	5%	1.01	0	2.5	No	Bacteria that are naturally present in the environment. Used as an indicator of the presence of other potentially harmful bacteria.
Lead and Copper (based on 2008 sampling - testing is done every 3 years)								
Lead	ppb	0	90% of tap water samples samples must be less than the Action Level of 15.	3.0[9]	<2	7	No	Erosion of natural deposits; leaching from wood preservatives; corrosion of household plumbing systems
Copper	ppm	1.3	90% of tap water samples samples must be less than the Action Level of 1.3.	0.277[9]	<0.005	0.51	No	Erosion of natural deposits; corrosion of household plumbing systems
Disinfectants								
Chlorine	ppm	MRDLG = 4.0[11]	"MRDL = 4.0[10]"	1.08	0.84[12]	1.26[12]	No	Water additive used to control microbes
Disinfection Byproducts								
Total Trihalomethanes	ppb	Not Applicable	80: Based on Running Annual Average of Quarterly Samples	46.7 [8]	10.6	73.8	No	Byproduct of drinking water disinfection. Forms due to reaction of chlorine with total organic carbon. Health effects: Some people who drink water containing THMs 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	Not Applicable	60: Based on Running Annual Average of Quarterly Samples	29.8[8]	8.2	67.7	No	Byproduct of drinking water disinfection. Forms due to reaction of chlorine with total organic carbon.
Bromochloroacetic Acid	ppb	Not Applicable	None	3.4	<1.0	6.8	No	Byproduct of drinking water disinfection. Forms due to reaction of chlorine with total organic carbon.

Table 2 (Addendum): Reported Radioactive Contaminants Data

Contaminant	Units	MCLG[2]	"MCL[3] or TT[4][5]"	Highest Detected Level	Range of Levels Detected	Violation	Source
Radioactive Contaminants - (2011 unless noted)							
Beta/photon emitters	mrem/yr	0	4	3.5	3.5 - 3.5	No	Decay of natural and man-made deposits.
Combined Radium	pCi/L	0	5	0.12	0.12 - 0.12	No	Erosion of natural deposits.
Gross alpha excluding radon & uranium	pCi/L	0	15	0.44	0.44 - 0.44	No	Erosion of natural deposits.

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, **(302) 576-3877**. If you have questions about this report, call the Water Quality Laboratory at **(302) 573-5522** or **(302) 571-4158**. Weekends or after 5 P.M. – **(302) 571-4150**.

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 by-products 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: Secondary[13] Parameters and Other Parameters of Interest Detected in Water as it Enters Distribution System

			Brandywine Filter Plant			Porter Filter Plant			
Contaminant	Units	SMCL[14]	Average	Lowest	Highest	Average	Lowest	Highest	Source
Conventional Physical and Chemical Parameters									
pH	pH units	6.5 - 8.5	7.1	6.1	7.8	7.3	6.6	7.8	Waters with pH = 7.0 are neutral
Alkalinity	ppm as $CaCO_3$	None	50	35	66	49	31	63	Measure of buffering capcity of water or ability to neutralize an acid
Hardness	ppm as $CaCO_3$	None	118	94	138	116	96	146	Naturally occurring; measures calcium and magnesium
Conductivity	mmhos/cm	None	408	301	1004	369	282	827	General measure of mineral content
Total Dissolved Solids (TDS)	ppm	500	186	186	186	186	186	186	Metals and salts naturally occurring in the soil; organic matter
Chloride	ppm	250	77	52	273	68	51	211	Naturally occurring; chemical additive to treat the water; road salt application and run-off
Metals									
Iron	ppm	0.3	0.02	ND	0.05	0.02	ND	0.05	Naturally occurring; chemical additive to treat the water; corrosion of pipes; can cause disoloration in water
Manganese	ppm	0.05	0.01	ND	0.017	0.013	ND	0.026	Naturally occurring; can cause discoloration and objectionable taste in water
Zinc	ppm	5	0.14	0.03	0.3	0.09	0.03	0.18	Naturally occurring; chemical additive to treat the water

Key to Tables

[1] Primary parameters are contaminants that are regulated by a maximum contaminant level (MCL), anything above this level of 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. EPAs surface water treatment rules require systems to (1) disinfect their water and (2) filter their water so 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. Federal MCL is 4.0 mg/L.

[7] Cited average is the lowest running annual average calculated from monthly samples in 2011.

[8] Cited average is highest running annual average calculated from quarterly samples in 2011.

[9] Value given is not an average, but the 90th percentile action level.

[10] 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.

[11] 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.

[12] Cited value is the lowest and/or highest average of a minimum of 120 routine samples per month.

[13] Secondary parameters are contaminants that are regulated by non-enforceable guidelines because the contaminants may cause non-health related cosmetic effects, such as taste, odor or color.

[14] SMCL: Secondary Maximum Contaminant Level is the level of a physical, chemcial or biological contaminant in drinking water above which the taste, odor, color or appearance (aesthetics) of the water may be adversely affected. This is a non-enforceable guideline which is not directly related to public health.

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

TREATMENT PLANT IMPROVEMENTS (CONTINUED...)

In 2011, we completed three major projects at the Porter Water Filtrations Plant:

1. **Improved Security**: As you arrive, you will notice a new security gate and camera. You will also see additional fencing around the facility that not only looks good, but adds another layer of security. Now that Porter is out of sight, golfers at the neighboring Rock Manor golf course will be able to focus more on their game than their drinking water being made right next door.
2. **Fresh Façade**: New windows were installed plant-wide. They not only enhance the physical appearance of the plant, but they significantly improve our ability to control the indoor climate at the plant so that energy is not wasted. The additional windows and doors included around the water filters provide a level of safety and security while complementing the exterior windows
3. **Automated Valves**: The most significant update may not be noticeable at first glance, unlike new windows and fencing, but it dramatically improves plant productivity. We replaced nearly 50 hand-operated hydraulic valves with new automated valves and integrated their operation with our existing computerized monitoring system. Valves can now be adjusted by clicking buttons on a computer screen. This improvement gives the treatment operators improved control and monitoring when operating the filtering system at the plant.

As you are reading this, we are embarking on two more projects to enhance our treatment facilities. Currently underway at Porter is the replacement of the filter media. Water flows through the media as it is filtered. Over several years of use and hundreds of washing cycles some media can be lost down the drain. When this project is complete, we will have fresh new media in each of our twelve filters. The final major project underway is the upgrade of our Brandywine Treatment Plant to a membrane treatment plant. This project is scheduled to be completed in Spring 2013. More information on both of these projects will be in next year's annual report, so stay tuned!

Source Water Protection Program–

Sustains Drinking Water for Generations

Implementing the City's Source Water Protection Program (SWPP) is a vital step in producing high-quality drinking water. In 2011, the City worked with its watershed partners on priority area projects, as identified by the SWPP, to protect our source of drinking water from possible contamination.

The Brandywine Commons parking lot (located along route 202) drains into a small stream that joins the Brandywine River prior to the City's water intake. Pollution and contaminants wash into the stream after storms and make water treatment more challenging. We sought to identify potential stormwater collection and draining improvements to this priority area. With the help of the Delaware Center for Horticulture (DCH), the City applied for and received a Surface Water Planning Grant from the State Department of Natural Resources and Environmental Control Division of Watershed Stewardship to help fund the study. The effort was also funded in part by the City, DCH, and Kimco Reality (property manager). As a result of the study, several best management practices (BMPs) were identified that would either significantly decrease the quantity of water and/or improve the quality of water running off the parking lot during wet weather. The City and the other project partners continue to explore funding opportunities to implement the study's recommendations in a phased approach.

In August 2010, the City completed a stream assessment of the West Branch of the Brandywine River in Honeybrook, PA. This assessment prioritized stream segments based on a variety of factors including the bacteria and nutrients level in the water. In 2011, we continued to work with the Brandywine Valley Association (BVA) to implement BMPs on the high priority sections. The BVA is working with the community landowners to install stream-bank fencing, which will prevent livestock from entering the stream and improve the riparian buffers along the creek. This work will provide protection for the nearly two miles of streams that mark the beginning of the Brandywine Creek.

Each year, the City actively seeks partnerships within the Brandywine Creek watershed to implement projects that will protect and sustain our source of drinking water for generations. This effort is a top priority for the City and we look forward to continuing our current partnerships and building new ones. If you have any questions or would like more information about the City's Source Water Protection Program, you can download the plan at **http://www.wilmingtonde.gov/government/sourcewater** or contact Matthew Miller, Water Quality Manager at **302-573-5522**.

Producing Your Drinking Water

Over the past few years we highlighted each stage of the journey to follow your drinking water from its source to the tap. In Part 1 of this 3-part series, we focused on water treatment and our two filter plants. In Part 2 we discussed the testing, transmission and distribution of your water. This year, Part 3 finishes the series with a focus on customer service and the vital role our metering section plays in providing water to our customers.

Part 3 of 3 Continued

FOCUS ON: METER SHOP

Water Treatment → *Testing* → *Transmission and Distribution* → ***Customer Service Meter Shop***

Now you know where water comes from, how it is treated and tested to meet regulatory requirements and how water travels to your home or business. The final step in the process is metering consumption and billing for water usage. There are approximately 37,500 accounts for Wilmington; of these accounts, 34,000 are residential. A meter measures the flow of water entering each home and business account. The meter information is used to generate a water bill. In 2006, all the water meters were replaced with radio-read meters. Now meter readers are used to record readings remotely instead of going to each home to record the readings individually.

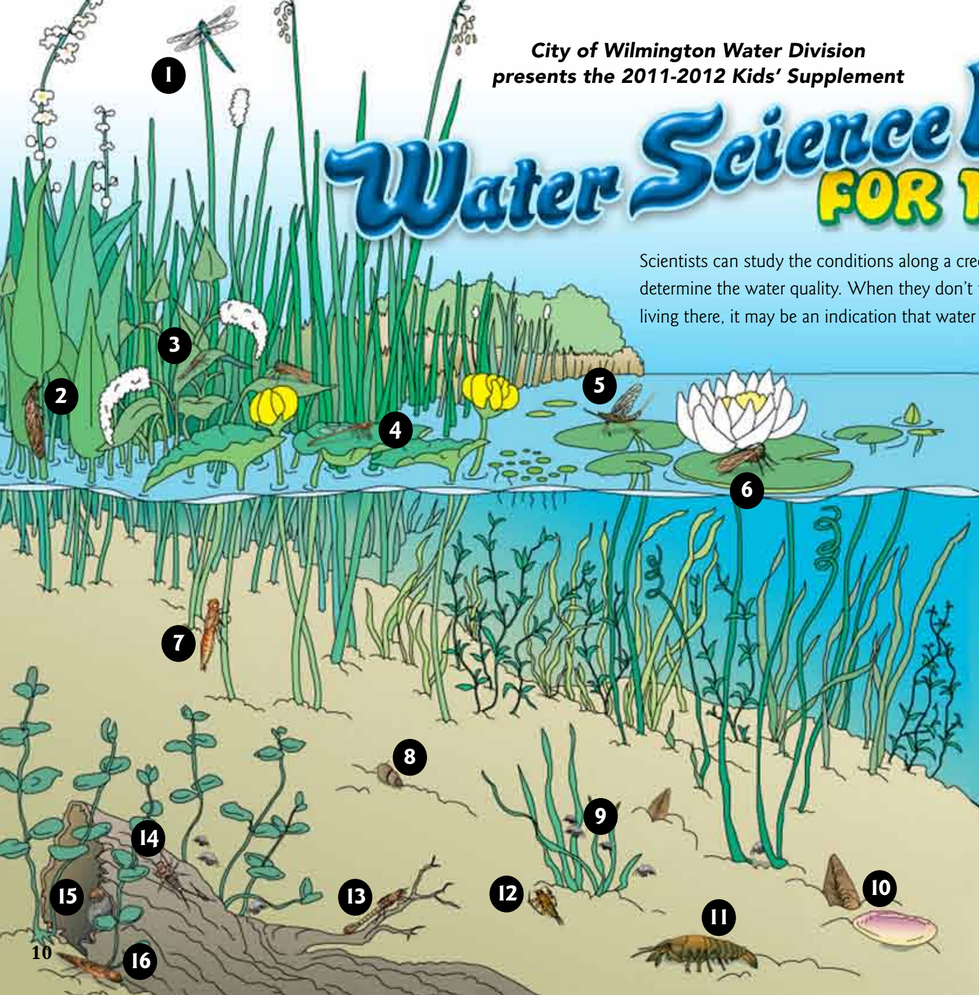
The City's meter department is responsible for maintaining water meters. Daily tasks include: acting on customer complaints, addressing leaky meters and identifying poor pressure problems. The meter shop replaces old meters and will test meters for accuracy at a customer's request. Meters are also installed on all new properties in the area for domestic use. Occasionally the meter department will assist the finance department with special meter reads for billing issues and assist in solving high billing concerns. The meter department works daily to ensure you continue to have clean water delivered to your tap.

Hopefully, you have enjoyed this ongoing series of articles providing the path and effort involved in pumping, treating, sampling and metering the water as it is delivered seamlessly to you – our customer. You can download the reports from prior years at **http://www.wilmingtonde.gov/government/waterreports**.

City of Wilmington Water Division presents the 2011-2012 Kids' Supplement

Water Science Lab FOR KIDS

Scientists can study the conditions along a creek, pond or other body of water to help determine the water quality. When they don't find many aquatic macroinvertebrates living there, it may be an indication that water pollution is occurring.



Dobsonfly Larva

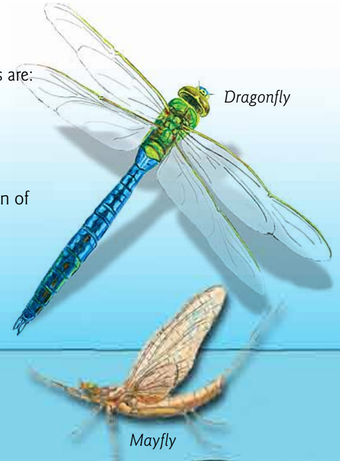
What's a macroinvertebrate?

Macroinvertebrates are small organisms without a backbone. Some common macroinvertebrates found in wetlands are: dragonfly nymph, worms, snails, beetles, leeches, mayflies, caddisflies, small crustaceans and other insects.

What can they tell us about our water quality?

Mussels

Macroinvertebrates are useful indicators of the health or condition of wetlands and other water bodies. They respond to many kinds of pollution, including chemical pollution and physical disturbance to the landscape.



Dragonfly

Mayfly

Can you find each of the macroinvertebrates listed below in the scene to the left?

Match the names to the numbers next to the correct image:

_____ Caddisfly
_____ Caddisfly Larva
_____ Crayfish (Crawdad)
_____ Damselfly
_____ Damselfly Nymph (Larva)
_____ Dobsonfly
_____ Dobsonfly Larva (Hellgrammite)
_____ Dragonfly

Stonefly Larva

_____ Dragonfly Nymph (Larva)
_____ Freshwater Mussel
_____ Gill-breathing Snail
_____ Mayfly
_____ Mayfly Nymph (Larva)
_____ Scud
_____ Stonefly
_____ Stonefly Larva

Scud

Check your answers here after you are finished!

Source: St. John River Water Management District
www.sjrwmd.com/education/water-science-for-kids.html

Answers (No peeking!):
6 Caddisfly, 15 Caddisfly Larva,
11 Crayfish (Crawdad), 4 Damselfly,
13 Damselfly Nymph (Larva),
2 Dobsonfly, 16 Dobsonfly Larva
(Hellgrammite), 1 Dragonfly,
7 Dragonfly Nymph (Larva),
10 Freshwater Mussel,
8 Gill-breathing Snail, 5 Mayfly,
12 Mayfly Nymph (Larva), 9 Scud,
3 Stonefly, 14 Stonefly Larva

Score (Number of correct answers):
1-3 - Squirt
4-6 - Splasher
7-9 - Big Splasher
10-12 - Wave Maker
13-15 - Tide Bringer
All 16 - Water Wizard

Freshwater Fractions

With water available right at the faucet, it's easy to forget that only a small fraction of Earth's water is usable freshwater. The following figures illustrate the importance of preserving and protecting our limited water resources.

If one tanker truck represented the amount of water on Earth, then it would hold 17,000 2-Liter bottles.

Only 2.5 percent of the total volume of water on Earth is freshwater. **(425 2-Liter bottles)**

Of these freshwater resources, 70 percent is in the form of ice and permanent snow cover in mountainous regions, the Antarctic and Arctic regions. **(297.5 2L Bottles)**

The other 30 percent of the world's freshwater is stored underground in the form of groundwater. This represents about 97 percent of all the freshwater that is potentially available for human use. **(127.5 2L Bottles)**

Freshwater lakes and rivers contain an estimated 0.3 percent of the world's freshwater. **(one 2L bottle)**

The total usable freshwater supply for ecosystems and humans is less than 1 percent of all freshwater resources. **(four 2L bottles)**

Source: United Nations Environment **Programme (UNEP) http://www.unwater.org/statistics_res.html**

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