

2014

Water Quality Report



Drinking water information for
customers in the City of Roanoke,
Roanoke County & Franklin County



WESTERN VIRGINIA WATER AUTHORITY

About this Publication

2014 Water Quality Report

The Western Virginia Water Authority supplies our customers in the City of Roanoke, Roanoke County and Franklin County with an annual water quality report. This provides you with information about the source of your water, what it contains and how it compares to the standards set by regulatory agencies based on data collected during calendar year 2013.

The Water Division of the Western Virginia Water Authority vigilantly safeguards your water supplies and is proud to report that again in 2013, the Water Authority was in full compliance with all state and federal monitoring and reporting requirements.

General Information	2-3
Protecting Your Water Quality	4-7
Education Outreach & Conservation	8
Franklin County Water Systems	9-13
Roanoke Area Water Systems	14-19
Customer Service Information	20

Meet Our Executive Directors

The Western Virginia Water Authority has two Executive Directors that oversee the daily treatment and delivery of almost 20-million gallons of drinking water and the collection and treatment of 37-million gallons of wastewater a day. Michael McEvoy (L) is the Executive Director Wastewater Services and Gary Robertson, P.E. (R) is the Executive Director Water Operations.



Western Virginia Water Authority Board of Directors

The Western Virginia Water Authority is governed by a Board of Directors appointed by the member localities. Representatives from the City of Roanoke include Mr. John P. Bradshaw, Mr. Marc Fink and Mr. Harvey Brookins. The Roanoke County representatives include Mr. Grey Goldsmith, Mr. Fuzzy Minnick and Mr. Don Davis. Mrs. Shirley Holland represents Franklin County.

Board meetings are held on the third Thursday of each month with the exception of August and December. The Board meetings are open to the public.

Western Virginia Water Authority

2004-2014

On July 1, 2004, the Western Virginia Water Authority was formed from the former utility departments of the City of Roanoke and Roanoke County. In November 2009, Franklin County joined the Water Authority, offering a larger regional approach to meeting our communities' water and wastewater needs.

In the first ten years, the Authority has achieved the highest industry awards for both water and wastewater, implemented energy saving measures across all departments, focused on cleaning the sanitary sewer lines and rehabilitated 10% of the water distribution system.

We thank you for being our customer and look forward to continuing to provide you with an excellent product and superior service.

Saving Water • Saving Energy

In 2010, the Authority signed an energy saving contract with Honeywell Inc. to save water and reduce energy. The major components of the project have been completed including:

- 58,000 water meters replaced. The new Iperl meters transmit data wirelessly to the Authority's billing offices. This data allows the Authority to notify customers much faster about leaks - saving the customer money and lost water.
- 155 zone meters installed. These meters, located throughout the distribution system, are helping the Authority pin-point water leaks in our system.
- 17 pumps replaced. The new energy-efficient pumps reduce our electricity costs and help our environment.
- HVAC and lighting replaced in administration and treatment facilities.

National Recognition



2013 Platinum Award for Utility Excellence



2012 Platinum Award for Excellence in Management



Join our 10th Anniversary Celebration!

To celebrate our tenth anniversary, we are inviting our customers to learn more about what goes on behind the faucet. Come visit one of our drinking water treatment facilities - the tours are free and open to all ages. The tours do involve walking; however, the areas are accessible for all.

Spring Hollow Tour

Celebrate the 20th anniversary of the completion of the Spring Hollow Reservoir along with the 10th Anniversary of the Water Authority. We'll tour the treatment plant and lab and then drive over to the 3.2-billion gallon storage reservoir.

Date: Saturday, August 30, 2014

Time: 10am - noon

RSVP or Info: info@westernvawater.org

Carvins Cove Tour

See how we treat almost 10-million gallons of water a day at the Carvins Cove Water Treatment Facility. Visitors will follow a drop of water as it goes through aeration, flocculation, sedimentation and filtration steps. We'll end our visit by visiting the reservoir.

Date: Saturday, October 18, 2014

Time: 10am - noon

RSVP or Info: info@westernvawater.org

Crystal Spring Tour

Take a step back in history as we start our tour at the 1905 steam pump responsible for delivering spring water to the growing downtown Roanoke area. Then we will fast forward for a visit to the modern microfiltration facility and pumps that now filter and deliver the water.

Date: Saturday, March 21, 2015

Time: 10am - noon

RSVP or Info: info@westernvawater.org

Backflow Prevention & Cross-Connection Identification

Protect Your Drinking Water

A **plumbing cross-connection** is an actual or potential connection between the public water supply and any source of contamination or pollutant. Through this connection, contaminated substances could **backflow** into the public system and your drinking water supply without proper plumbing precautions.

Water travelling through the Authority's distribution system is pressurized. If the water system loses pressure, such as during a water main break, system maintenance or fire hydrant usage/testing, the flow of the water may be reversed. If a customer has made a cross-connection with hazardous substances or even non potable water, these substances can backflow into the public water system and create a risk to public health.

We all need to work together to protect our drinking water. The Western Virginia Water Authority *and* all our customers share the responsibility to help safeguard the public water supply. We are working closely with the Virginia Department of Health and our customers to identify potential backflow issues so your drinking water maintains the highest possible quality.

We're asking all our customers to help us identify potential locations where a backflow can occur on their property by completing a simple **Backflow Prevention Survey** on-line at www.westernvawater.org. Thank you for your cooperation.

Potential Cross-Connection Sources Where Backflow Can Occur Please check all that apply	Do you have this on your property?		
	Yes	No	Maybe
Outside Spigots			
outside spigots without a vacuum breaker			
Wells & Irrigation Systems not Protected by a Backflow Device (Connected to Public Water)			
private well, spring or cistern			
lawn irrigation/sprinkler system - supplied by a pond/lake			
lawn irrigation/sprinkler system - supplied by public water			
water storage tank			
Pools, Ponds & Hot Tubs not Protected by a Backflow Device (Connected to Public Water)			
hot tub			
swimming pool			
fish pond			
Internal Plumbing Not Protected by a Backflow Device (Connected to Public Water)			
fire protection sprinkler system			
solar heating system			
water softener			
water filtration system			
darkroom/photo development			
Anything Else? Are there any other items or treatment units connected to the water system on your property?			



What You Can Do To Protect Your Drinking Water

Help us **identify potential locations** in our service area where backflow can occur. Mail the attached short survey or complete it online.

If necessary, contact the Water Authority to **schedule a free assessment** with our staff to assist you in finding and removing any potential cross-connection sources.

Remove any cross-connections you find or install backflow prevention devices (available at hardware stores) where needed. A Water Authority representative is available to assist you with this process if needed.

If you have a backflow prevention device installed by a certified plumber, have it tested annually or after any repairs.

Questions about backflow prevention?
email us at backflow@westernvawater.org
call us at 853.5700

Drinking Water Regulations

Water Quality Information

In order to ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in 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.

All drinking water, including bottled drinking 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.

Cryptosporidium & Giardia

Cryptosporidium and *Giardia* are microscopic organisms that can cause fever, diarrhea and other gastrointestinal symptoms when ingested. The organisms come from animal and human wastes and are eliminated through water filtration and disinfection. Even though the presence of these organisms is not regulated by the state or federal government, the Water Authority has tested for *Cryptosporidium* and *Giardia* and has not detected either organism.

Some people may be more vulnerable to contaminants 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, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Lead & Copper

Copper is a nutritionally essential element, but at high levels, copper can cause gastrointestinal difficulties such as nausea and diarrhea. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily associated with materials and components in service lines and home plumbing.

The Western Virginia Water Authority 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 15 to 30 seconds or until it becomes cold or reaches a steady temperature 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 or at <http://www.epa.gov/safewater/lead>.

Water Discoloration

Changes in water pressure in water systems, such as when water mains break or fire hydrants are used or flushed, can occasionally cause drinking water to be discolored. The discoloration is caused by sediments in pipes mixing with clear water. The sediments occur naturally from the oxidation of iron in pipes. While discolored water is ordinarily safe to drink, it is best to flush any discolored water from pipes by turning on all cold-water faucets in your home or business. Avoid turning on hot-water faucets so the discolored water is not drawn into water heaters.

If you notice evidence of a water main break or leaking fire hydrants, please call 853.5700.



The following are other resources for drinking water safety information:

Virginia Department of Health:

540.463.7136 (Roanoke area system)

434.836.8416 (Franklin County water systems)

Centers for Disease Control and Prevention:

1.800.311.3435,

404.639.3311 or

404.639.3312 (TTY)

Roanoke Environmental Health Department:

540.857.7663

EPA Safe Drinking Water Hotline

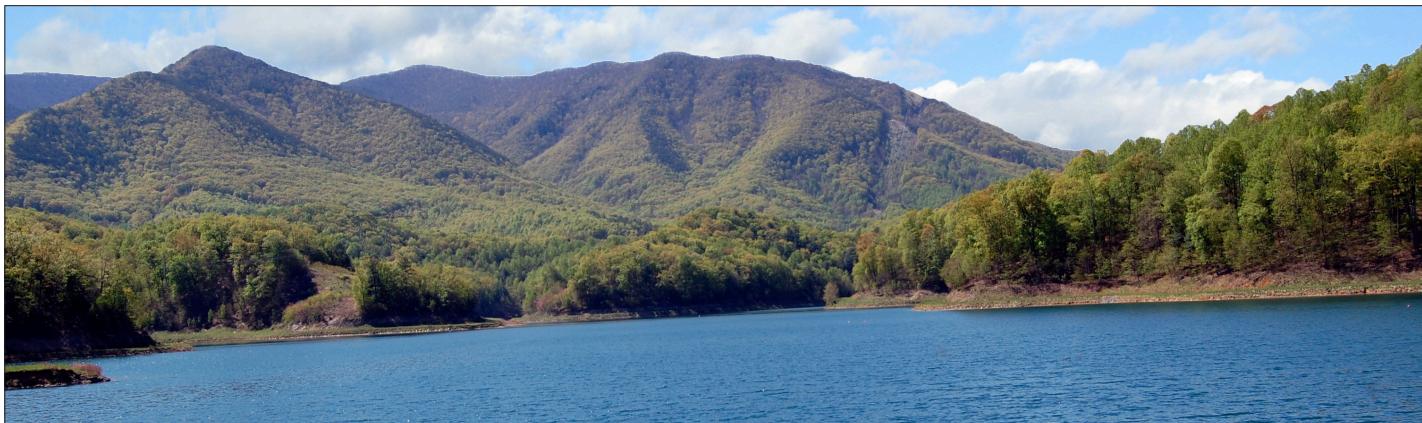
800.426.4791

Western Virginia Water Authority

853.5700

Drinking Water Regulations

Source Water Assessments



The Western Virginia Water Authority has worked with the Virginia Department of Health to determine how susceptible to contaminants each of our water sources may be. The assessment is a requirement of the Virginia Department of Health's (VDH) Source Water Assessment Program (SWAP) in accordance with the 1996 Amendments of the Safe Drinking Water Act.

As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up substances resulting from the presence of animals or from human activity. Water from surface sources is treated to make it drinkable while groundwater may or may not require any treatment.

Contaminants in source water may be naturally occurring substances, or may come from:

- 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 be naturally-occurring 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 be naturally-occurring or be the result of oil and gas production and mining activities

The Western Virginia Water Authority has completed a source water assessment of our water sources. The assessment determined that **Crystal Spring, Falling Creek and Carvins Cove** are susceptible to contamination based on land use activities and potential types of contaminants in these areas. This designation does not mean that the source water has been impacted or that it will be impacted. It does mean that if there is a release of pollutants in the assessment area, the source water could be impacted.

The VDH also completed a source water assessment of **Spring Hollow Reservoir's water source, the Roanoke River**. This assessment determined that the Roanoke River may be susceptible to contamination because it is surface water exposed to a wide array of contaminants at varying concentrations. Also, changing hydrologic, hydraulic and atmospheric conditions promote migration of contaminants from land use activities of concern into the Roanoke River.

The assessment also determined that the Water Authority's wells might be susceptible to contamination because they are located in areas that promote migration of contaminants from land use activities of concern. More specific information may be obtained by contacting the Western Virginia Water Authority's Water Division at 540.853.5700.





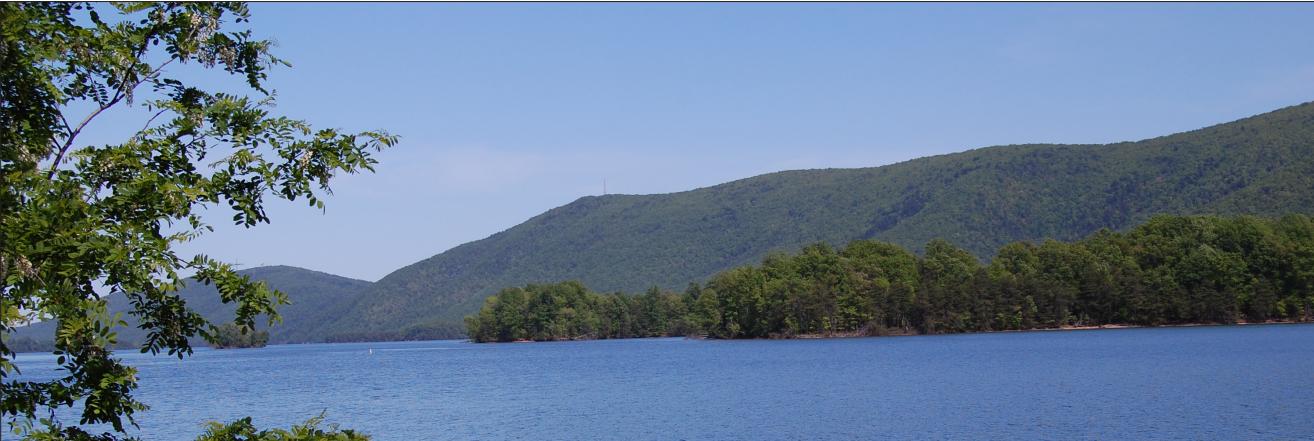
A source water assessment of the **Boxwood Green Water System** was conducted in 2003 by the Virginia Department of Health. Wells No. 3, No. 4 and No. 5 were determined to be of high susceptibility to contamination using the criteria developed by the state in its approved Source Water Assessment Program. The assessment report consists of maps showing the source water assessment area, an inventory of known land use activities of concern, and documentation of any known contamination within the last five years.

A source water assessment for **Contentment Island** is in the works. After the assessment is conducted, we will provide you with information about potential sources of contamination and ways to reduce or eliminate them.

A source water assessment of the **Water's Edge Water System** was conducted in 2002 by the Virginia Department of Health. Wells No. 3 and No. 4 were determined to be of high susceptibility to contamination using the criteria developed by the state in its approved Source Water Assessment Program. The assessment report consists of maps showing the source water assessment area, an inventory of known land use activities of concern and documentation of any known contamination within the last five years.

A source water assessment for **Royal Estates** is in the works. After the assessment is conducted, we will provide you with information about potential sources of contamination and ways to reduce or eliminate them.

A source water assessment of the **Weatherwood Water System** was conducted in 2002 by the Virginia Department of Health and the wells were determined to be of high susceptibility to contamination using the criteria developed by the state in its approved Source Water Assessment Program. The assessment report consists of maps showing the source water assessment area, an inventory of known land use activities of concern, and documentation of any known contamination within the last five years.



Learn about your water resources

Use Water Wisely

Using water wisely in times of drought is critical; however, it is always important to use our valuable natural resource wisely.



Water Conservation Tips

- **Fix leaks in faucets, toilet tanks and outside spigots.** To check to see if you have a toilet leak, put some food coloring in your toilet tank. The next morning, if the color shows up in the bowl without flushing, you have a leak. Toilet leaks can waste up to 200 gallons of water per day.
- **In the laundry or kitchen,** use full loads in your washing machine and dishwasher to maximize efficiency.
- **Don't overwater your lawn.** If you water your lawn, it only needs 1 to 1.5 inches of water every week or two. Water your garden or lawn before 10 AM or after 7 PM when temperatures are cooler to minimize evaporation.
- **While brushing your teeth,** turn off the water and save two gallons of water.
- **Taking shorter showers** saves water. Shorten your shower to five minutes.
- **Have a leak?** Fix it and let us know right away.

Education Outreach

In the classroom The Authority's outreach staff is pleased to offer free SOL correlated lessons to students in our service area. During the past school year, over 12,000 students participated in one of our outreach programs. These hands-on programs help your students understand topics such as the water cycle, watersheds and the amazing properties of water. Students in the upper grades learn about watershed protection, GIS mapping and future careers in the water and wastewater industry. Interested in bringing the Water Authority into your classroom? Email us at education@westernnvawater.org to schedule a visit.

Tours of our treatment plants Tours are offered for students in grades 3 and above as well as civic and community groups. You will be amazed to learn what goes on behind the faucet as we treat and deliver the highest quality drinking water to your home.

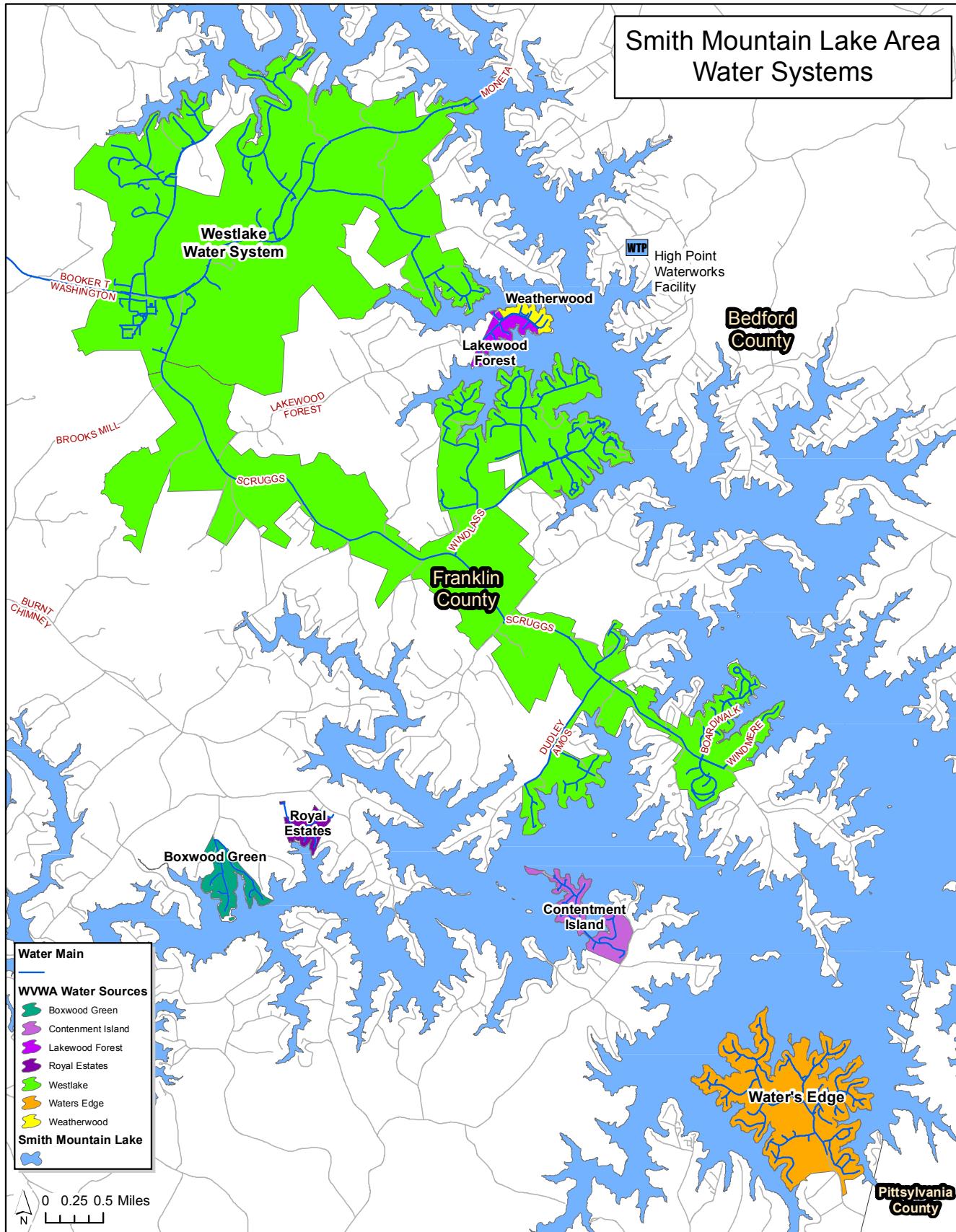
Guest Speakers Interested in having a speaker talk to your civic league or community group? We'd be happy to talk to your group about your water source, how we treat your water and improvements we are making to the water and wastewater infrastructure. Contact us at info@westernnvawater.org for scheduling and information.



The Water Authority is pleased to offer students in our service area free outreach programs in the classroom and at our drinking water reservoirs.

Franklin County Water Systems

What is the Source of Your Drinking Water?



Franklin County Water Systems



Smith Mountain Lake Water Treatment

The Authority has a successful working relationship with the Bedford Regional Water Authority (BRWA) to provide treated drinking water from the Highpoint Water Treatment Plant to the Westlake area.

How is it treated? This membrane filtration facility treats water from Smith Mountain Lake. The Authority's share of the plant's capacity is 400,000 gallons per day (GPD). The finished water in the distribution system is re-chlorinated at The Boardwalk and at the Waterfront Section 2-9 subdivisions for continuous chlorination.

Where does it serve? Water from this treatment plant serves customers in Bedford County and Franklin County. As the water flows through pipes under Hales

Ford Bridge, it enters the Authority's service area. Customers who live in the Westlake Commercial District, the Chestnut Creek, Waterfront, Boardwalk and Windmere Point communities and along Scruggs Road are served by the Westlake Area Public Water System. Contractors are currently extending this 12-inch water line along Route 122 to just past Wirtz Road.

In 2010, the Safe Drinking Water Act was amended to require water systems test for two classes of disinfection by-products. These are total trihalomethanes (TTHMs) and haloacetic acids (HAA5). Based on routine quarterly samples collected during 2013, the Westlake system exceeded the standard for primary maximum contaminant level (PMCL) for total trihalomethanes (TTHM). The standard for TTHM is 0.080 mg/L based on a four-quarter running average. The four-quarter running average concentration detected in: January – March 2013 was 0.083 mg/L; April – June 2013

0.095 mg/L; July - September 0.094 mg/L and October - December 0.080 mg/L.

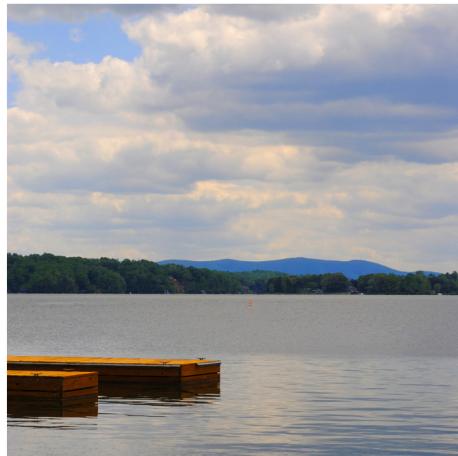
The Western Virginia Water Authority found elevated levels of lead in water samples collected in some homes on Windmere Trail as part of a routine sampling plan in the Westlake Area water distribution system. For the monitoring period January 1, 2011 thru December 31, 2013, the WVWA tested thirty-seven samples of drinking water from homes in the Westlake Area water distribution system for the presence of lead. Thirty-two of the samples were below the Action Level of 0.015 mg/L for the monitoring period; however, five of the samples, all taken from homes on Windmere Trail, exceeded the Action Level. Samples taken from the source water, distribution system and storage tank were well below the Action Level. Impacted homeowners on Windmere Trail were notified.



A New Treatment Plant

For the first time in Virginia, two water utilities have agreed to jointly own and operate a water treatment facility. The Bedford Regional Water Authority (BRWA) and the Western Virginia Water Authority (WVWA) are working together to design and build a new water treatment facility at Smith Mountain Lake that will meet current and future customer needs through the year 2060.

The proposed 4-million gallon a day plant will replace the current Highpoint Water Treatment Plant that has 1-million gallon a day capacity. The new facility will have a joint management team with equal representation from each utility.



Boxwood Green Water System

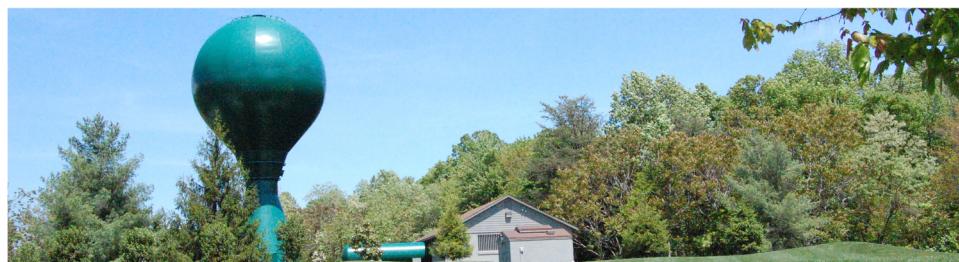
Groundwater wells (Wells No. 3, 4 and 5) provide water for the Boxwood Green community.

Greensand filters are used to remove iron, manganese and radium from the drinking water.

Contentment Island Water System

Groundwater wells (Wells 1, 2 and 3) supply drinking water for Contentment Island customers. Treatment of the water is provided by feeding chlorine for continuous disinfection of the water and soda ash for pH adjustment of the water.

According to results of the chemical analyses for metals based on a sample collected on May 4, 2011 the sodium in the treated water is 21.8 mg/L. This is above the EPA recommended optimal level of less than 20 mg/L for sodium in drinking water, which is established for those individuals on a "strict" sodium intake diet. This elevated level of sodium could be caused by the soda ash being added to the water for pH adjustment.



Water's Edge Water System

Customers who live in the Water's Edge community get their drinking water from four groundwater wells (Well No. 3, 4, 11 and 12) that are located throughout the Water's Edge subdivision. Wells 4 and 11 go to the treatment plant where three greensand filters are used to remove iron, manganese and radium from the drinking water. In 2012, the Authority added an orthophosphate feed system for corrosion control and a sodium hydroxide

feed system for pH adjustment both at the treatment plant and Well 12. Well 12 is also disinfected with chlorine. No treatment is added to Well No. 3.

According to results of the chemical analyses for Metals based on a sample collected on July 23, 2009 for entry point EP001 (Wells No. 4 and 11), the sodium in the treated water is 26.4 mg/L. This is above the EPA recommended optimal level of less than 20 mg/L for sodium in drinking water, which is established for those individuals on a "strict" sodium intake diet. This elevated level of sodium could be caused by the soda ash being added to the water for pH adjustment.

Royal Estates Water System

The Royal Estates Water System consists of two groundwater wells. A sodium hypochlorite and soda ash feed system is being installed to provide chlorine disinfection and pH control for the Royal Estates water system.

The Western Virginia Water Authority found elevated levels of copper in water samples collected in December 2013. The EPA sets the Action Level or 90th percentile value for copper in the drinking water at 1.3 mg/L. The 90th percentile copper concentration for the Royal Estates waterworks was 1.7 mg/L.

Water samples collected and analyzed during the month of October 2013 exceeded the standard or primary maximum contaminant level (PMCL) for total coliform bacteria. Of five samples collected during October 2013, five indicated the presence of total coliform bacteria.

Weatherwood Water System

The Weatherwood Water System is served by four (4) groundwater wells and related storage facilities. There are currently 33 active customers.

Since the Authority acquired the system, a sodium hypochlorite feed system has been installed to provide chlorine disinfection. The four drilled wells have chlorination and corrosion control treatment.

Franklin County Water Systems

Most Recent Data Presented as (Range) Average

Substance	Units	Ideal Goals (EPA's MCLG)	Highest Level Allowed (EPA's MCL)	Violation	Boxwood Green	Contentment Island	Royal Estates	Smith Mountain Lake Water System
Chlorine	ppm		4-MDRL	no	(0.12 - 2.0) 1.07	(0.0 - 1.64) 0.86	(0.32 - 2.0) 0.97	(0.14 - 1.21) 0.77
Fluoride	ppm	4	4	no	0.14	0.22	(ND - 0.05)	0.12
Total Nitrate & Nitrite (as N)	ppm	10	10	no	ND	0.25	(0.25 - 0.42)	0.62
Barium	ppm	2	2	no	0.02	0.03	(0.0116 - 0.0161)	0.03
Chromium	ppm	0.1	0.1	no	ND	ND	(0.0014 - 0.0029)	
TTHMs	ppb	0	80	yes - Westlake only	1.13	2		
HAA5s	ppb	0	60	no	ND	ND		
pH	pH units		6.5 - 8.5	no	7.5	6.8	(6.21 - 6.51)	(7.1 - 8.1) 7.0
Turbidity	NTU	TT	0.3	no	0.32	1.76	(ND - 7.12)	0.188
Total Coliforms	P/A	0	Presence of coliform bacteria in >5% of monthly samples	yes - Royal Estates only	0	0	6	1
Fecal Coliforms	P/A	0	A routine and a repeat sample are total coliform positive, and one is also fecal coliform or E. coli positive.	no	0	0	0	0
Most Recent Monitoring Period								
Gross Alpha	pCi/L	0	15	no		0.9	(-0.42 - 1.8)	0.1
Gross Beta	pCi/L	0	50	no		4.7	(-1.2 - 2.4)	
Radium 226/228	pCi/L	0	5	no	1.1	1.0	(-0.39 - 0.8)	0.8
Lead	ppb	0 ppb	AL = 15	yes - Westlake only	0 exceeded the AL 90th percentile 12 ppb	0 exceeded the AL 90th percentile 3.45 ppb	1 exceeded the AL 90th percentile 9.75 ppb	
Copper	ppm	1.3 ppm	AL = 1.3	yes - Royal Estates only	0 exceeded the AL 90th percentile 0.42 ppm	1 exceeded the AL 90th percentile 1.09 ppm	4 exceeded the AL 90th percentile Jan - June: 1.7 ppm July - Dec: 2.895 ppm	
Other Parameters								
Iron	ppm		0.3	n/a	0.099	0.032	(ND - 0.771)	
Manganese	ppm		0.05	n/a	0.004	0.041	(0.0008 - 0.007)	
Zinc	ppm	unregulated	5	n/a	0.042	0.37	(0.046 - 0.232)	
Alkalinity	ppm	unregulated		n/a	76	85	(22 - 34.6)	
Hardness	ppm	unregulated		n/a	44	46	(27.7 - 36)	(62 - 113) 77
Conductivity	µmhos/cm	unregulated		n/a	185	162	(66.17 - 72.2)	
Sodium	ppm	unregulated	20	n/a	20.4	21.8	(2.07 - 2.21)	
Corrosivity		unregulated	< -2.0 highly aggressive > 0.0 non aggressive	n/a	-0.91	-0.85	(-2.63 - -2.08)	

Action Level (AL): The concentration of a contaminant that triggers treatment or other requirement that a water system must follow.

HAA5s: Haloacetic acids.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG 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 Disinfection Level (MRDL): The highest level of a disinfection allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

mg/L: Milligrams per liter (for example, one minute in two years).

ND: Analyte was not detected or was below the method detection limit of the laboratory's instrumentation.

NTUs: Nephelometric Turbidity Units; a measure of turbidity.

pCi/L: Picocuries per liter is a measure of the radioactivity in water.

Franklin County Water Sources

About the Data

This table summarizes water-testing results from 2013 for both regulated and nonregulated substances. The Western Virginia Water Authority constantly monitors its water supplies for various contaminants to meet all regulatory requirements.

Most of the results in the table are from testing done in 2013. However, 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 results, though representative, are more than one year old. All regulated substances must be tested annually, except for lead and copper, which must be tested every three years, and radionuclides, which must be tested every six to nine years. The THMs/HAA5s were derived from running annual averages. Many other primary contaminants have been analyzed but were not present or were below the maximum contaminant level.

The Water Authority has tested for volatile organics (VOC's), and pesticides, all of which met with current state and federal standards for drinking water. Testing at Royal Estates detected Toluene with a level of 0.27 ppb and Methylene Chloride with a level of 0.44 ppb. Subsequent testing showed no detection of either contaminant. Toluene has a primary maximum contaminant level (PMCL) of 1000 ppb and Methylene Chloride has a primary maximum contaminant level (PMCL) of 5 ppb.

The U.S. Environmental Protection Agency sets MCLs at very stringent levels. In developing the standards EPA assumes that the average adult drinks 2 liters of water each day throughout a 70-year life span. EPA generally sets MCLs at levels that will result in no adverse health effects for some contaminants or a one-in-ten-thousand to one-in-one-million chance of having the described health effect for other contaminants.

Westlake Area Public Water	Water's Edge	Weatherwood	Source of Substance
	(0.14 - 2.2) 0.67	(0.0 - 2.20) 0.67	Required Disinfectant added during treatment process to eliminate bacteria
	(0.006 - 0.13)		Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from aluminum and fertilizer factories
	(ND - 0.45)	0.14	Run-off from fertilizer use; leaching from septic tanks, sewage; Erosion of natural deposits
	(0.0036 - 0.056)		discharge form drilling wastes; discharge from metal refineries; Erosion of natural deposits
	(ND - 0.0027)		
(80 - 95.5)	ND		By-product of drinking water chlorination
(22 - 25.1)	4.1		By-product of drinking water chlorination
	(5.65 - 7.86)		Acidity or basicity of water
	(0.044 - 4.17)		Soil run-off
	0	3	Naturally present in the environment
	0	1	Human and animal waste
	(<0.5 - 10.8)		Erosion of natural deposits
	(4.1 - 7.2)		Decay of natural and man-made deposits
	(<0.6 - 1.7)		Erosion of natural deposits
5 exceeded the AL 90th percentile 19 ppb	0 exceeded the AL 90th percentile 4.57 ppb	0 exceeded the AL 90th percentile 8 ppb	Natural\industrial deposits, plumbing solder, brass alloy in faucets
1 exceeded the AL 90th percentile 0.5 ppm	0 exceeded the AL 90th percentile 0.538 ppm	0 exceeded the AL 90th percentile 0.32 ppm	Natural\industrial deposits, plumbing, wood preservatives
	(ND - 0.021)		Naturally occurring in the environment
	(0.0004 - 0.023)		Naturally occurring in the environment
	(0.0061 - 0.093)		Naturally occurring in the environment
	(21.3 - 138)		Measurement of naturally occurring carbonates
	(12.5 - 121)		Measurement of naturally occurring hardness metals
	(46.9 - 322)		Physical property of water
	(3.49 - 36.5)		Naturally occurring in the environment
	(-3.15 - -1.91)		Physical property of water that occurs when water reacts with metal

ppm: One part per million (for example, one minute in two years).

ppb: One part per billion (for example, one minute in 2,000 years).

TTHMs: Total Trihalomethanes

Treatment Technique (T.T.): A required process intended to reduce the level of a contaminant in drinking water.

µg/L: Micrograms per liter (for example, one minute in 2,000 years).

µmhos/cm: Micromhos per centimeter; a measure of conductivity.

Water Hardness

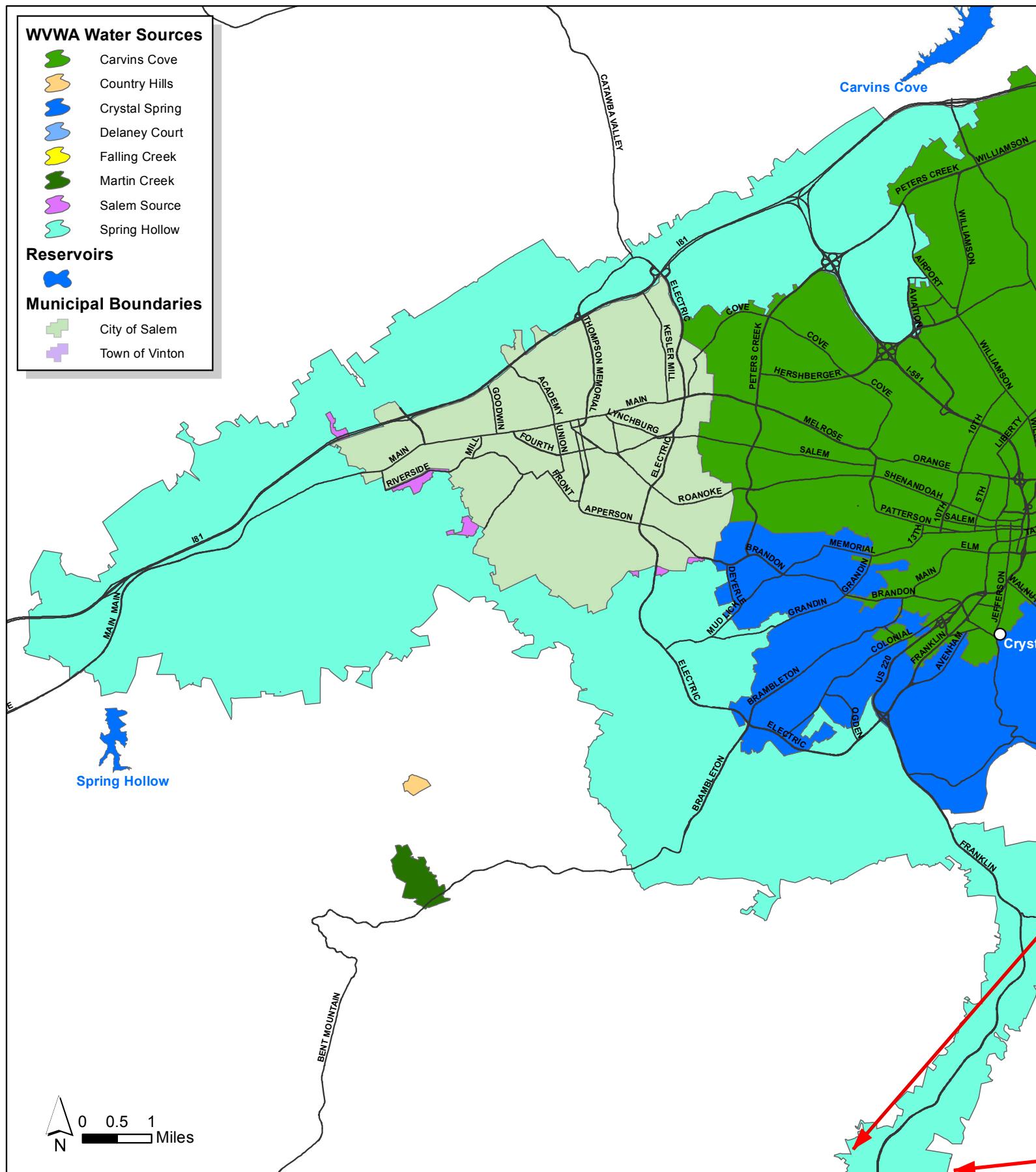
As water naturally flows over rocks and through the soil, it picks up minerals. The more calcium and magnesium present, the harder your water. While water hardness is not a safety issue, you may notice increased mineral build-up or soap residue with harder water.

Hardness can be expressed as PPM - parts per million or GPG - grains per gallon.

PPM	GPG	Rating
0 - 75	0 - 4.3	Soft
76 - 150	4.4 - 8.7	Moderately Hard
151 - 300	8.8 - 17.5	Hard
over 300	17.6 +	Very Hard

Roanoke Area Water Systems

What is the Source of Your Drinking Water?



Community Well Systems in the Roanoke Area

Martin Creek System

Seven wells supply this groundwater source, which is disinfected with chlorine prior to distribution. Water is distributed throughout the community by two storage tanks and distribution piping consisting of 8-inch, 6-inch and 4-inch pipe. The total source/pump capacity is equal to 76,000 gallons per day. Current usage is approximately 18,200 gallons per day. This system supplies water to the Forest Edge and Carriage Hills areas.

Delaney Court System

One well supplies this groundwater source, which is disinfected with chlorine prior to distribution. Water is distributed throughout the community by a storage tank, a booster pump station and distribution piping consisting of 8-inch and 12-inch pipe. The total source/pump capacity is equal to 43,200 gallons per day. Current usage is approximately 6,000 gallons per day. This system supplies water to the Delaney Court subdivision.

Country Hills System

Groundwater obtained from one well is the source for this system. Chlorine is used to disinfect the water prior to distribution. Water is distributed throughout the community by a storage tank and distribution piping consisting of 6-inch, 4-inch and 2-inch pipe. The total source/pump capacity is equal to 43,200 gallons per day. Usage in 2013 was approximately 1,070 gallons per day.

Other Water Sources

Salem Source

The Water Authority contracts with the City of Salem to purchase water to supply Robin Hood Park and other areas around West Main Street and Riverside Drive in Roanoke County.

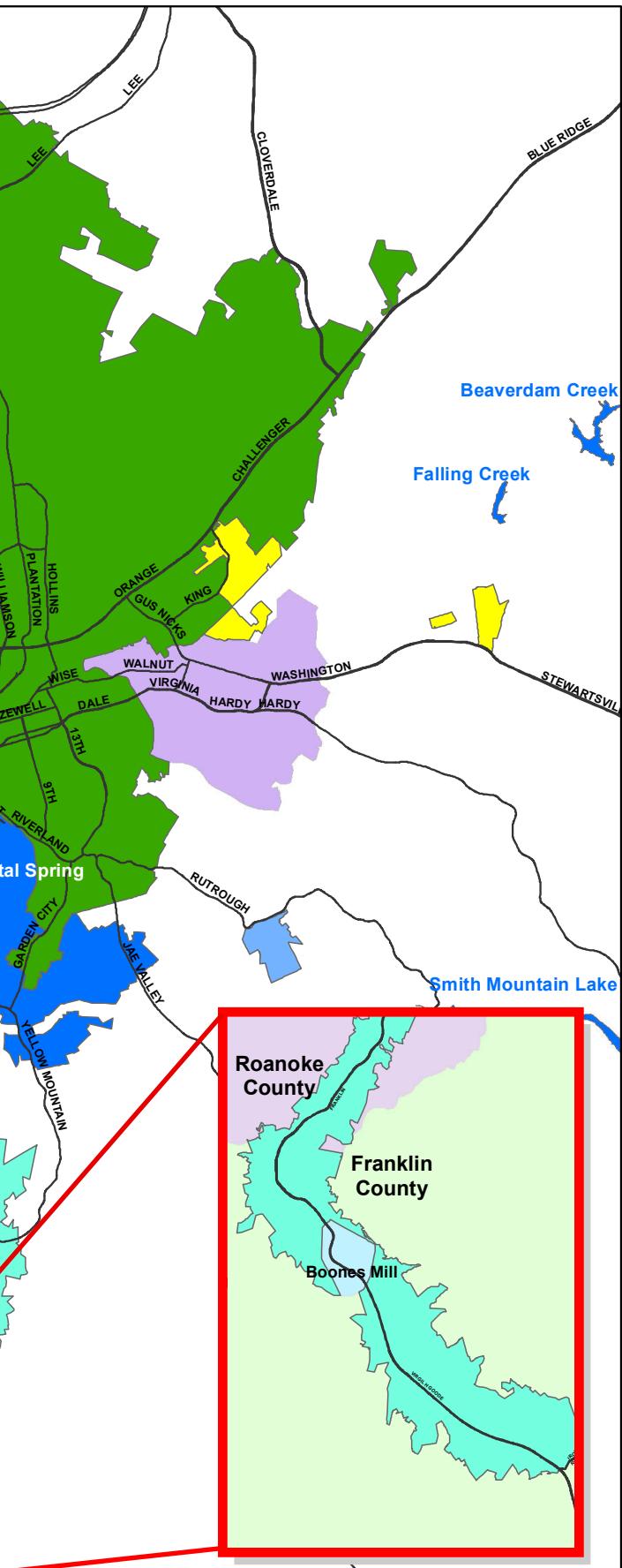
U.S. Route 220 - Franklin County

Customers who live along the U.S. Route 220 corridor in Franklin County receive water from the Spring Hollow Water Treatment Facility. In 2010, the 65,000 foot U.S. Route 220 water line was put into service, offering customers quality water service and fire protection.

Wells

The Authority maintains over 72 wells in the distribution area. While many of these wells are inactive, they offer an additional supply of water if needed.

see pages 16-17 for information on our primary sources of drinking water



Roanoke Area Water Systems



Carvins Cove Reservoir and Treatment Facility

Carvins Cove Reservoir is situated within Carvins Cove Natural Reserve, a 12,672-acre watershed near Hollins University in Botetourt County. The land in the reserve above the 1,200-foot contour is owned and managed by the City of Roanoke. The land below this elevation, and the reservoir, are owned and operated by the Western Virginia Water Authority. In addition to receiving water from the watershed, the reservoir is fed from two underground tunnels that carry overflow from Tinker and Catawba Creeks. This surface water source covers 630 acres and stores 6.5-billion gallons of water at full pond.

How is it treated? Carvins Cove Water Treatment Facility has the capacity to treat 28-million gallons of water from the reservoir every day. The water is first oxygenated and treated with chlorine dioxide to oxidize dissolved organic matter, iron and manganese. Water is aerated to remove unwanted dissolved gases and to oxidize dissolved metals, which reduces any unpleasant tastes and odors. Flash mixing of chemicals is the

next step, where ferric sulfate is added to coagulate suspended particles. Water then flows into settling basins where the particles clump together, become heavy and settle to the bottom of the basins.

The water is next filtered through gravel, sand and carbon and disinfected with chlorine. Fluoride is added to promote strong teeth, and orthophosphate is added to control corrosion in pipes.

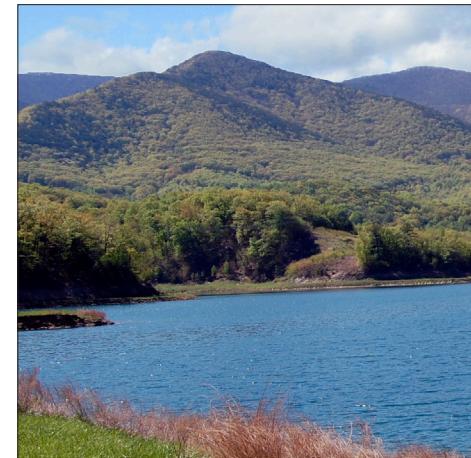
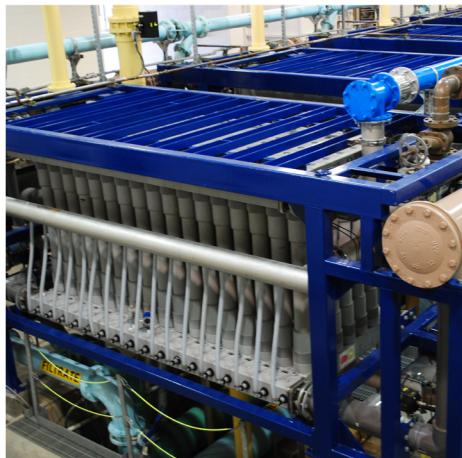
Where does it serve? A large part of the northeastern and northwestern parts of the city, and the majority of the southeastern part of the city, to Reserve Avenue, are served by Carvins Cove. Portions of northern and northeastern Roanoke County are also served by the Carvins Cove water source.



Carvins Cove Natural Reserve - come for a visit

Carvins Cove Natural Reserve, the second largest municipal park in the United States, offers outdoor recreation opportunities, including boating, fishing, hiking and nature viewing. Visitors can bring your own boat or rent kayaks, paddle boats and jon boats at the reservoir. See our website for more details.

Visitors to the Natural Reserve are charged \$2 per person for daily use or annual passes are available for \$20. Payment drop boxes are located at the Bennett Springs and Timberview parking lots, or passes can be purchased from the Security Office on Reservoir Road. For more information, call the Natural Reserve at 540-563-9170.



Crystal Spring Treatment Facility

Crystal Spring flows at the base of Mill Mountain in the southern part of the city. This groundwater source provides an average flow of 4-million gallons of water a day.

How is it treated? The water is filtered in the Crystal Spring Microfiltration Treatment Facility which filters out all particles larger than 0.2 micron. One micron is one thousandth of a millimeter. Filtered water is treated with chlorine and fluoride and pumped to water customers from the Crystal Spring Pumping Station.

Where does it serve? Crystal Spring serves portions of southwest Roanoke County and the southwestern part of the city. With the capacity to filter five-million gallons of water a day, Crystal Spring Treatment Facility is the largest microfiltration plant in western Virginia.

Falling Creek & Beaverdam Creek Reservoirs

Falling Creek Reservoir is a surface water source located in Bedford County east of Vinton. It covers 21 acres and stores 85-million gallons of water at full pond. It is fed by Beaverdam Creek Reservoir, which covers 69 acres and stores 435-million gallons of water at full pond.

How is it treated? The treatment process of this water source is similar to that of Spring Hollow Treatment Facility; treatment capacity is 1.5-million gallons a day.

Where does it serve? Falling Creek Water Treatment Facility serves King Street northeast to Route 460, along Route 24 to 13th Street and east on Route 24 to Stewartsville.

Spring Hollow Reservoir and Treatment Facility

The water source for this system comes from the Roanoke River and is pumped into the Spring Hollow Reservoir, a 3.2-billion gallon side-stream storage reservoir.

How is it treated? Water is withdrawn from the reservoir, oxygenated and treated with chlorine dioxide to oxidize dissolved organic matter, iron and manganese. Treatment at the Spring Hollow Treatment Facility includes clarification, filtration, chlorine disinfection and fluoridation. The Spring Hollow Water Treatment Facility currently has the capacity to treat 18-million gallons of water a day and can be expanded to 36-million gallons a day. Treated water is stored in a two-million gallon storage tank then pumped through the north and south transmission lines to the distribution system. The current usage averages 4.15-million gallons a day. During an emergency, standby wells may be used to supplement the source water.

Where does it serve? Spring Hollow supplies water to various neighborhoods in Roanoke County and Franklin County through the southern distribution lines and in the City of Roanoke and Roanoke County along I-81 through the northern distribution lines.



Crystal Spring Pump Station - come for a visit

You are invited to tour the historic **Crystal Spring Pump Station and the Snow Steam Pump**. Located across the parking lot from the Treatment Facility, the History Museum of Western Virginia opens the pump station for free guided tours each Saturday (12noon-4pm) and Sunday (1pm - 4pm) between May and September.

Roanoke Area Water Systems

Most Recent Data Presented as (Range) Average

Substance	Units	Ideal Goals (EPA's MCLG)	Highest Level Allowed (EPA's MCL)	Violation	Carvins Cove	Falling Creek	Crystal Spring	Spring Hollow	City of Salem
Chlorate	ppm		0.8	no	(ND - 0.09) 0.03	N/A	N/A	(ND - 0.04) 0.01	
Chlorine	ppm		4-MDRL	no	(1.1 - 1.4) 1.3	(1.2 - 1.4) 1.2	(1.0 - 1.2) 1.1	(1.1 - 1.3) 1.2	0.73 - 1.57
Chlorite	ppm		0.8	no	(ND - 0.2) 0.08	N/A	N/A	(ND - 0.06) 0.01	
Fluoride	ppm	4	4	no	(0.6 - 0.7) 0.7	(0.7 - 0.8) 0.7	(0.6 - 0.7) 0.7	(0.7 - 0.7) 0.7	0.59 - 0.78
Total Organic Carbon	ppm	TT	N/A	no	(1.68 - 2.02) 1.85	(1.13 - 1.9) 1.41	N/A	(0.98 - 1.29) 1.15	0.66 - 1.26
Total Nitrate & Nitrite (as N)	ppm	10	10	no	ND	ND	0.71	0.4	0.48
Barium	ppm	2	2	no	0.05	0.02	0.04	0.03	0.048
TTHMs	ppb	0	80	no	(22 - 75) LRAA range (9 - 86) site range				
HAA5s	ppb	0	60	no	(5 - 53) LRAA range (3 - 57) site range				
pH	pH units		6.5 - 8.5	no	(7.5 - 8.0) 7.8	(7.2 - 7.5) 7.4	(7.7 - 7.9) 7.8	(7.5 - 7.7) 7.6	(7.27 - 8.09)
Turbidity	NTU	TT	0.3	no	(0.09 - 0.15) 0.10	(0.1 - 0.28) 0.15	(0.01 - 0.094) 0.03	(0.07 - 0.13) 0.08	(0.02 - 0.05)
Total Coliforms	P/A	0	Presence of coliform bacteria in >5% of monthly samples	no	3	0	0	4	2
Fecal Coliforms	P/A	0	A routine and a repeat sample are total coliform positive, and one is also fecal coliform or E. coli positive.	no	1	0	0	0	0
Most Recent Monitoring Period									
Gross Alpha	pCi/L	0	15	no	-0.78	<0.5	1.1	<0.9	<1.1
Gross Beta	pCi/L	0	50	no	1.5	1.8	1.8	2.4	2.0
Radium 226/228	pCi/L	0	5	no	0.03/0.79	<0.6	0.8	<0.6	0.8
Lead	ppb	0 ppb	AL = 15	no	0 samples exceeded AL / 90th percentile 2.4 ppb				
Copper	ppm	1.3 ppm	AL = 1.3	no	0 samples exceeded AL / 90th percentile 0.622 ppm				
Other Parameters									
Iron	ppm		0.3	n/a	ND	0.03	ND	ND	ND
Manganese	ppm		0.05	n/a	0.0006	0.0088	ND	0.0007	0.01
Zinc	ppm	unregulated	5	n/a	ND	0.164	ND	ND	ND
Alkalinity	ppm	unregulated		n/a	(36 - 49) 44	(15 - 22) 17	121	(124 - 130) 126	105 - 182
Hardness	ppm	unregulated		n/a	(41 - 54) 47	(13 - 18) 15	(136 - 137) 137	(150 - 156) 154	131 - 225
Orthophosphate as P	ppm	unregulated		n/a	(0.2 - 0.3) 0.3	(0.2 - 0.3) 0.2	ND	ND	ND
Conductivity	µmhos/cm	unregulated		n/a	120	82	270	302.1	
Sodium	ppm	unregulated		n/a	6.88	11.7	3.76	5.72	7.24
Corrosivity		unregulated	< -2.0 highly aggressive > 0.0 non aggressive	n/a	-0.71	-1.98	-0.1	0	

Definitions

Action Level (AL): The concentration of a contaminant that triggers treatment or other requirement that a water system must follow.

HAA5s: Haloacetic acids.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG

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 Disinfection Level (MRDL): The highest level of a disinfection allowed in drinking

water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

mg/L: Milligrams per liter (for example, one minute in two years).

ND: Analyte was not detected or was below the method detection limit of the laboratory's instrumentation.

NTUs: Nephelometric Turbidity Units; a measure of turbidity.

pCi/L: Picocuries per liter is a measure of the radioactivity in water.

ppm: One part per million (for example, one minute in two years).

ppb: One part per billion (for example, one minute in 2,000 years).

TTHMs: Total Trihalomethanes

Roanoke Area Water Quality Data

About the Data

This table summarizes water-testing results from 2013 for both regulated and nonregulated substances. The Western Virginia Water Authority constantly monitors its water supplies for various contaminants to meet all regulatory requirements. All regulated substances must be tested annually, except for lead and copper and SOCs, which must be tested every three years, and radiologicals, which must be tested every six to nine years. The THMs/HAA5s were derived from running annual averages. Many other primary contaminants have been analyzed but were not present or were below the maximum contaminant level.

The U.S. Environmental Protection Agency sets MCLs at very stringent levels. In developing the standards, EPA assumes that the average adult drinks 2 liters of water each day throughout a 70-year life span. EPA generally sets MCLs at levels that will result in no adverse health effects for some contaminants or a one-in-ten-thousand to one-in-one-million chance of having the described health effect for other contaminants.

The Water Authority has tested for volatile organics (VOC's), pesticides and synthetic organic compounds (SOCs), all of which met with current state and federal standards for drinking water. Total Xylene has a primary maximum contaminant level (PMCL) of 10,000 ppb. Total Xylene was detected in Country Hills with a level of 0.48 ppb and at Starkey 2 with a range of (ND - 4.58) ppb. Ethylbenzene has a PCML level of 700 ppb. Ethylbenzene was detected in Country Hills with a level of 0.24 ppb. The MTBE level at Martin Creek was 0.53 ppb. Subsequent testing at Starkey 2 and Martin Creek showed no detection of either contaminant.

If you have a question about one of our tests that is not reported in this chart, please contact us at 853.5700.

Wells in service 2013* - Arlington Hills, Crest Hill, Farmingdale, Garden City, Hidden Valley 2, LaBellevue 7, Longridge 2, Muse, North Lakes, Starkey 1A, Starkey 2, Starkey 3 and Wyndale.

PPM	GPG	Rating
0 - 75	0 - 4.3	Soft
76 - 150	4.4 - 8.7	Moderately Hard
151 - 300	8.8 - 17.5	Hard
over 300	17.6 +	Very Hard

Well Systems are Most Recent Data

Country Hills	Delaney Court	Martin Creek	Wells *	Source of Substance
N/A	N/A	N/A	N/A	By-product of drinking water chlorine dioxide
			(0.7 - 1.3) 0.9	Required Disinfectant added during treatment process to eliminate bacteria
N/A	N/A	N/A	N/A	By-product of drinking water chlorine dioxide
0.42	0.59	(0.27 - 2.92) 0.89	(0.08 - 0.86) 0.35	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from aluminum and fertilizer factories
N/A	N/A	N/A	N/A	
0.87	1.6	(ND - 0.32) 0.13	(0.02 - 1.23) 0.56	Run-off from fertilizer use; leaching from septic tanks, sewage; Erosion of natural deposits
0.002	0.001	0.01	(ND - 0.23) 0.06	Discharge form drilling wastes; discharge from metal refineries; Erosion of natural deposits
	3.3	6.8		By-product of drinking water chlorination
	ND	1.3		By-product of drinking water chlorination
7.11	7.13	(7.09 - 7.61) 7.33	(6.08 - 8.0) 7.5	Acidity or basicity of water
0.037	0.072	(0.04 - 0.108) 0.07	(0.05 - 6.42) 1.71	Soil run-off
0	0	0		Naturally present in the environment
0	0	0		Human and animal waste
0.3	0.2	(ND - 3.3) 1.45	(ND - 7.40) 1.96	Erosion of natural deposits
2.1	2	(0.9 - 3.3) 2.28	(ND - 6.3) 2.82	Decay of natural and man-made deposits
0.8	0.9	(ND - 1.8) 0.6/0.7	(ND - 1.2) 0.7/ 0.5	Erosion of natural deposits
0 samples exceeded AL - 90th percentile 5 ppb	0 samples exceeded AL 90th percentile 6.2 ppb			Natural\industrial deposits, plumbing solder, brass alloy in faucets
0 samples exceeded AL - 90th percentile 0.414 ppm	0 samples exceeded AL 90th percentile 0.141 ppm			Natural\industrial deposits, plumbing, wood preservatives
ND	0.0134	(ND - 0.032) 0.011	(ND - 1.57) 0.28	Naturally occurring in the environment
ND	0.0008	(0.001 - 0.028) 0.01	(ND - 0.05) 0.01	Naturally occurring in the environment
0.023	0.0078	(0.029 - 0.222) 0.088	(ND - 1.14) 0.18	Naturally occurring in the environment
74	102	(110 - 188) 171	(30-206) 129	Measurement of naturally occurring carbonates
114	96	(128 - 290) 213	(20 - 258) 155	Measurement of naturally occurring hardness metals
ND	ND	ND	(ND - 0.33) 0.33	Corrosion inhibitor added during treatment process
243	230	(284 - 521) 422	(88 - 1000) 376	Physical property of water
7.22	8.23	(12 - 38) 20.6	(2.3 - 12.6) 6.32	Naturally occurring in the environment
-0.82	-0.77	(-2.78 - -0.44)-0.39	(-2.51 - 0.99) 0.02	Physical property of water that occurs when water reacts with metal

Treatment Technique (T.T.): A required process intended to reduce the level of a contaminant in drinking water.

µg/L: Micrograms per liter (for example, one minute in 2,000 years).

µmhos/cm: Micromhos per centimeter; a measure of conductivity.

Water Hardness

As water naturally flows over rocks and through the soil, it picks up minerals. The more calcium and magnesium present, the harder your water. While water hardness is not a safety issue, you may notice increased mineral build-up or soap residue with harder water. Hardness can be expressed as PPM - parts per million or GPG - grains per gallon.

Doing Business with Us

Customer Service to Meet Your Needs



Winter Averaging

helping you conserve money and water

We're helping you save money on your sanitary sewer charges all year with winter averaging. During the winter months, we will calculate your sewer flow based on your average daily water consumption on your January, February and March statements. Starting in April, and for the rest of the year, you will be billed for your actual water usage, but your *maximum* sewer volume charge will be based on your calculated winter average.

If you use less water than your calculated winter daily average during any month, your sewer volume charge will be based on the lower water consumption for that billing period.

We'll recalculate your winter average each year to adjust to water use changes over time. Want to save even more? Try some of the water conservation tips in this publication.

Easy Payment Options

offering services to fit your schedule

The Authority's Customer Web Portal is available 24-hours a day to help you view and pay your bill, monitor your water consumption and much more. If you want to go paperless, simply sign up for the e-billing option on the Preferences tab at Customer Web.

To take advantage of these options, you will need to create a secure online account using your Water Authority account number - it's located in the top corner of your monthly statement. Once your account is created, you can pay your monthly bill by echeck from your checking or savings account (no charge) or credit/debit card (a \$2.95 fee).

Prefer to pay over the phone? Our automated phone system can process your payments for you. Simply use your phone's keypad to enter your account number, payment amount and date.

And you can sign up to automatically draft your bank account on the specific date you select - you never have to remember to pay your bill again!



CodeRED • get notified

keeping you informed

By simply registering your home or cell phone with the Water Authority, we'll keep you connected and up to date on water and sanitary sewer construction work happening in your neighborhood.

Simply log onto our website at www.westernvawater.org and click on the CodeRED link. It will just take a minute to sign-up for important notifications about your service.



WESTERN VIRGINIA
WATER AUTHORITY

853.5700
info@westernvawater.org
www.westernvawater.org