



Presented By
**Henrico County
Public Utilities**

ANNUAL
**WATER
QUALITY
REPORT**

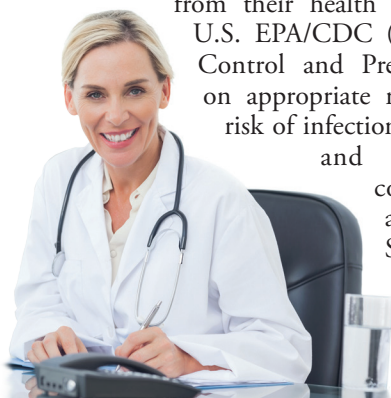
WATER TESTING PERFORMED IN 2016

We've Come a Long Way

Once again we are proud to present our annual water quality report covering the period between January 1 and December 31, 2016. In a matter of only a few decades, drinking water has become exponentially safer and more reliable than at any other point in human history. Our exceptional staff continues to work hard every day—at any hour—to deliver the highest quality drinking water without interruption. Although the challenges ahead are many, we feel that by relentlessly investing in customer outreach and education, new treatment technologies, system upgrades, and training, the payoff will be reliable, high-quality tap water delivered to you and your family or business.

Important Health Information

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 may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or at <http://water.epa.gov/drink/hotline>.



Cryptosporidium

Cryptosporidium is a microscopic parasite that can cause cryptosporidiosis, a type of gastrointestinal illness, in humans. Henrico County recently completed 24 months of monitoring of the untreated water in the James River for *cryptosporidium*, to determine if the level of treatment provided at the Henrico Water Treatment Plant is adequate for the concentration of *cryptosporidium* detected in the river. The average concentration detected in the river water was 0.033 oocysts per liter. If the average concentration detected in the river water had exceeded 0.075 oocysts per liter, additional treatment would be required at the Henrico Water Treatment Plant.

Substances That Could Be in Water

To ensure that tap water is safe to drink, the U.S. EPA prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

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, in some cases, radioactive material, and substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

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

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or may result from urban storm-water 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 storm-water runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and may also come from gas stations, urban storm-water runoff, and septic systems;

Radioactive Contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Community Participation

Regular Meetings of the Henrico Board of Supervisors are typically held on the second and fourth Tuesdays of every month in the Board Room, Administration Building, Government Center, 4301 East Parham Road. The Board meeting schedule and agenda can be found at <http://henrico.us/supervisors/>.

Each Board agenda has a public comment period.

Water Treatment Process

The treatment process consists of a series of steps.

First, raw (untreated) water is pumped from the river to the treatment plant. After it enters the plant, a coagulant is added and the water then goes to a rapid mixing basin, followed by a flocculation basin. These two steps cause particles to adhere to one another (called “floc”), making them heavy enough to settle to the bottom of the sedimentation basins, where the sediments are removed.

The water then undergoes intermediate ozonation, which is used for primary disinfection of settled water prior to filtration. Next, the water goes through deep-bed granular activated carbon (GAC) filters. The GAC filters are used for removing turbidity, taste, and odors, and any biodegradable organics and/or ozonation by-products remaining in the water following ozonation. Chloramines and fluoride are added to the filtered water; chloramines as a secondary disinfectant and fluoride to promote strong teeth. We also add a corrosion inhibitor to prevent the leaching of harmful metals from materials and components associated with service lines and home plumbing. Finally, the finished water is pumped into the distribution system, which delivers the water to your home or business.

Unidirectional Flushing

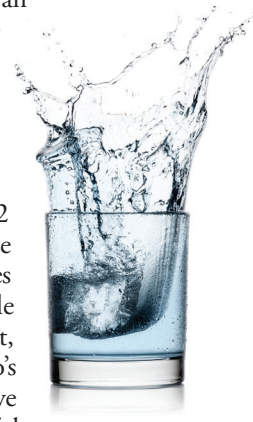
Unidirectional flushing (UDF) is using a high-velocity of released water to clean the interior of the drinking water pipes. This procedure is used to enhance the water quality by removing any collected sediment from the water pipes. Our contractor will begin working on Year 6 of the 10-year program in the summer of 2017. Year 6 flushing area is in the western part of the county, and we anticipate flushing 150 miles of water mains. Each resident affected by the flushing program will receive notification in the form of a letter two weeks in advance and a door hanger 48 hours ahead of the flushing. You will also see signs in your neighborhood advertising the flushing. A list of streets affected by the flushing will be maintained on our website. If you have any questions, please call our Community Liaison at (804) 501-7540.

Where Does My Water Come From?

During the past fiscal year (July 1, 2015, to June 30, 2016) Henrico County customers received an average of about 22 million gallons per day of water from the County’s water treatment facilities and about 12 million gallons per day from the City of Richmond’s water treatment facilities. The source water for both facilities is surface water drawn from the James River. The county’s water treatment facility began operations in April 2004 and can produce up to 80 million gallons per day to meet the county’s future drinking water needs. The facility has multiple sources of electric power and emergency generators to enhance our ability to provide drinking water during local power outages.

Source Water Assessment

The Safe Drinking Water Act mandated that the Virginia Department of Health (VDH) perform source water assessments for all public water sources. The assessment reports consist 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 from the date of the assessment. The VDH assessed our system in 2002 and determined that the source water for our system, the James River, was highly susceptible to contamination. As a result, both Richmond’s and Henrico’s water treatment facilities have systems that remove harmful contaminants from source water to ensure that high-quality drinking water is supplied to you. Information about the source water assessment is available from our Water Quality Engineer, Henrico County, Department of Public Utilities, at (804) 727-8700.



Lead in Home Plumbing

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. We are 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 or at www.epa.gov/lead.

Fact or Fiction

A person can live about a month without food, but only about a week without water. *(Fact: Dehydration symptoms generally become noticeable after only 2% of one's normal water volume has been lost.)*

A person should consume a half-gallon of water daily to live healthily. *(Fact: A person should drink at least 64 ounces, or 8 cups, of water each day.)*

Methods for the treatment and filtration of drinking water were developed only recently. *(Fiction: Ancient Egyptians treated water by siphoning water out of the top of huge jars after allowing the muddy water from the Nile River to settle. And, Hippocrates, known as the father of medicine, directed people in Greece to boil and strain water before drinking it.)*

There is the same amount of water on Earth now as there was when the Earth was formed. *(Fact: The water that comes from your faucet could contain molecules that dinosaurs drank!)*

A typical shower with a non-low-flow showerhead uses more water than a bath. *(Fiction: A typical shower uses less water than a bath.)*

About half the water treated by public water systems is used for drinking and cooking. *(Fiction: Actually, the amount used for cooking and drinking is less than 1% of the total water produced!)*

One gallon of gasoline poured into a lake can contaminate approximately 750,000 gallons of water. *(Fact)*



What type of container is best for storing water?

Consumer Reports has consistently advised that glass or BPA-free plastics such as polyethylene are the safest choices. To be on the safe side, do not use any container with markings on the recycle symbol showing "7 PC" (code for BPA). You could also consider using stainless steel or aluminum with BPA-free liners.

How much emergency water should I keep?

Typically, 1 gallon per person per day is recommended. For a family of four, that would be 12 gallons for 3 days. Humans can survive without food for 1 month, but can survive only 1 week without water.

How long can I store drinking water?

The disinfectant in drinking water will eventually dissipate, even in a closed container. If that container housed bacteria before it was filled with tap water, the bacteria may continue to grow once the disinfectant has dissipated. Some experts believe that water could be stored up to six months before needing to be replaced. Refrigeration will help slow the bacterial growth.

How many community water systems are there in the U.S.?

About 53,000 public water systems across the United States process 34 billion gallons of water per day for home and commercial use. Eighty-five percent of the population is served by these systems.

QUESTIONS?

If you have any questions about this report or your drinking water quality, please call our Water Quality Engineer, Henrico County, Department of Public Utilities, at (804) 727-8700. Also, you can view this report on our website at <http://henrico.us/public-data/water-quality-report-2016>.

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The tables below show only those contaminants that were detected in the water. The state requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

| SUBSTANCE (UNIT OF MEASURE) | YEAR SAMPLED | MCL [MRDL] | MCLG [MRDLG] | Henrico County Public Utilities | | Richmond City Public Utilities | | VIOLATION | TYPICAL SOURCE |
|--|------------------------|---------------------------------------|-----------------|------------------------------------|-------------------|-----------------------------------|-------------------|-----------|---|
| | | | | AMOUNT DETECTED | RANGE LOW-HIGH | AMOUNT DETECTED | RANGE LOW-HIGH | | |
| Barium (ppm) | 2016 | 2 | 2 | 0.035 | NA | 0.028 | NA | No | Erosion of natural Deposits |
| Chloramines ¹ (ppm) | 2016 | [4] | [4] | 3.0 | 0.0–4.8 | 3.9 | 0.0–5.2 | No | Water additive used to control microbes |
| Combined Radium (pCi/L) | 2011/2012 ² | 5 | 0 | 2.3 | NA | <0.6 | NA | No | Erosion of natural deposits |
| Fluoride (ppm) | 2016 | 4 | 4 | 0.81 | NA | 0.7 | NA | No | Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories |
| Gross Beta (pCi/L) | 2011/2012 ² | 50 | 0 | 4 | NA | 2.3 | NA | No | Erosion of natural deposits |
| Haloacetic Acids [HAA] (ppb) | 2016 | 60 | NA | 25 | <1–48 | 21 | 12–28 | No | By-product of drinking water disinfection |
| Nitrate (ppm) | 2016 | 10 | 10 | 0.38 | NA | 0.15 | NA | No | Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits |
| TTHMs [Total Trihalomethanes] (ppb) | 2016 | 80 | NA | 32 | 0.6–48 | 31 | 14–46 | No | By-product of drinking water disinfection |
| Total Coliform Bacteria (% positive samples) ³ | 2015 | 5% of monthly samples are positive | 0 | 0.65% (1 sample) | NA | 2.5% (3 samples) | NA | No | Naturally present in the environment |
| Total Organic Carbon ⁴ (removal ratio) | 2016 | TT | NA | 1.7 | 1.0–3.0 | 1.5 | 1.2–2.5 | No | Naturally present in the environment |
| Turbidity ⁵ (NTU) | 2016 | TT | NA | 0.88 | NA | 0.213 | NA | No | Soil runoff |
| Turbidity (Lowest monthly percent of samples meeting limit) | 2016 | TT = 95% of samples meet the limit | NA | 99.93 | NA | 100 | NA | No | Soil runoff |

Tap Water Samples Collected for Lead and Copper Analyses from Sample Sites throughout the Community

| SUBSTANCE (UNIT OF MEASURE) | YEAR SAMPLED | AL | MCLG | AMOUNT DETECTED (90TH% TILE) ⁶ | SITES ABOVE AL/TOTAL SITES | VIOLATION | TYPICAL SOURCE |
|--------------------------------|-----------------|-----|------|--|-------------------------------|-----------|--|
| Copper (ppm) | 2015 | 1.3 | 1.3 | 0.139 | 0/50 | No | Corrosion of household plumbing systems; Erosion of natural deposits |
| Lead (ppb) | 2015 | 15 | 0 | 1 | 0/50 | No | Corrosion of household plumbing systems; Erosion of natural deposits |

¹Amount detected is the maximum of the rolling annual average. Range is the minimum and maximum of all 2016 samples used to calculate those averages.

²Henrico's year sampled was 2011 and Richmond's year sampled was 2012.

³We sample for coliforms each month, and the highest number of positive samples during any month for Henrico County occurred in both October & December. The highest amount for the City of Richmond occurred in May. For Henrico, the highest number of positive samples during any given month was 1, and the percentage of the total monthly samples this number represents is 0.65%. For the City of Richmond, the highest number of positive samples during any given month was 3 and the percentage of the total monthly samples this number represents is 2.5%.

⁴Amount detected is the lowest rolling annual average removal ratio. Range is the minimum and maximum of all samples used to calculate those averages. (A value of 1 or greater indicates that the water system complies with the TOC removal requirements.)

⁵Turbidity is a measure of the cloudiness of the water. It is monitored because it is a good indicator of the effectiveness of the filtration system.

⁶Ninetieth percentile of the latest round of sampling equals the value of lead or copper at the 90 percent level of ascending results.

Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): 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.

MCLG (Maximum Contaminant Level Goal): 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.

MRDL (Maximum Residual Disinfectant Level): 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.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pCi/L (picocuries per liter): A measure of radioactivity.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

removal ratio: A ratio between the percentage of a substance actually removed to the percentage of the substance required to be removed.

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