2016 Consumers' Annual Report on Water Quality

Regional Water Authority

Dear Consumer

Essential to a healthy, thriving and economically vibrant community is an abundant, reliable supply of high-quality water. For over 150 years, the Regional Water Authority (RWA) has played an integral role in meeting the ever-growing demands of our area. Today, the RWA provides high-quality drinking water to nearly 430,000 consumers, and our services support the region's health, quality of life and economic growth.

Planning for high-quality drinking water began over a century ago when Eli Whitney II conceived the region's water system—a marvel of engineering and civic initiative. An enduring part of our heritage today, Whitney's vision to improve life lives on in every aspect of the RWA. Everything we do goes back to our higher purpose, which is to make life better for people by delivering high-quality water for life.

This 2016 Consumers' Annual Report on Water Quality provides you with a summary of the region's water quality. In 2016, the RWA collected more than 10,000 water samples and conducted over 110,000 tests to ensure that high-quality water reaches residents and businesses in Greater New Haven. The 2016 test results presented in this report demonstrate that your drinking water meets or is better than the water quality standards established by the U.S. Environmental Protection Agency (EPA) and the Connecticut Department of Public Health (CTDPH).

In the pages that follow, you will also learn where your water comes from and about our multi-barrier approach to ensuring water quality. This approach focuses on watershed and aquifer management to protect the quality of our drinking water sources, treatment of the water prior to consumption, maintenance of the distribution system that delivers the water to the tap and monitoring the quality to ensure compliance.

Please take this opportunity to discover more about your drinking water and our commitment to provide you with the highest-quality water at the lowest possible price and to protect your drinking water sources for generations to come. You can find a digital version of our 2016 Consumers' Annual Report on Water Quality on our website, rwater.com. There, you can also learn about our recreation and education programs and our water-related products and services.

Our record of excellence, trust and innovation is a proud reflection of our more than 260 skilled employees who work hard every day to deliver high-quality water for life. We are proud to have such an important purpose. It is a privilege and a responsibility.

Sincerely,

Larry L. Bingaman
President & Chief Executive Officer

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A five-member Authority and a 21-member Representative Policy Board oversee our operations. The Authority meets on the third Thursday of each month at 12:30 p.m., and the Representative Policy Board normally meets on the third Thursday at 6:30 p.m. at our headquarters at 90 Sargent Drive in New Haven. Please call to confirm meeting time.

This report contains important information about your drinking water. Please translate it, or speak with someone who can and who understands it.

Este informe contiene información muy importante sobre su agua beber. Tradúzcalo ó hable con alguien que lo entienda bien.

Drinking Water Quality

Your high-quality tap water continues to meet or is better than all EPA drinking water standards. This report provides an annual snapshot of regulatory water testing programs that help safeguard our drinking water supply.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at 1.800.426.4791 or by visiting epa.gov/safewater.

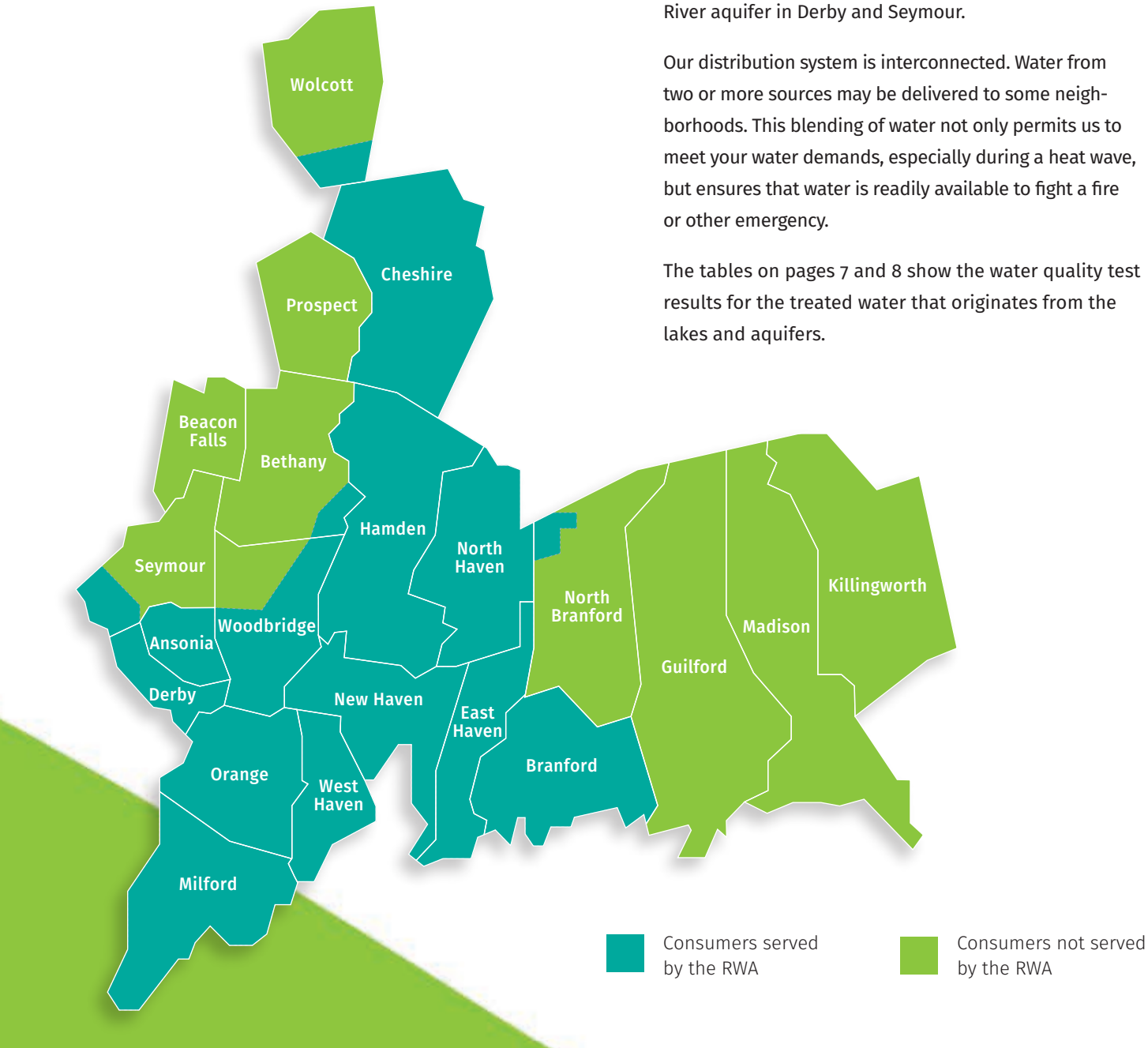
Drinking Water Sources

Your drinking water comes from 10 lakes and three aquifers. The lakes are filled by rivers. Aquifers are natural sand, gravel and bedrock areas below the surface of the ground that are saturated with water, typically from rainfall.

Over 80 percent of the tap water in our water district comes from four reservoir systems (North Branford, Saltonstall, West River and Whitney) located in Hamden, Woodbridge, East Haven, Bethany, Guilford, Madison, Killingworth, Branford and North Branford. The rest of it comes from wellfields that draw from the Quinnipiac and Mill River aquifers located in Cheshire and Hamden, as well as the Housatonic River aquifer in Derby and Seymour.

Our distribution system is interconnected. Water from two or more sources may be delivered to some neighborhoods. This blending of water not only permits us to meet your water demands, especially during a heat wave, but ensures that water is readily available to fight a fire or other emergency.

The tables on pages 7 and 8 show the water quality test results for the treated water that originates from the lakes and aquifers.



What We Do to Safeguard Your Drinking Water

1 Protect

Our source water protection program focuses on pollution prevention and watershed management. We protect over 27,000 acres of land in the region and manage it carefully. We monitor the quality of the water and all activity on the surrounding land, watching for potential contamination of the lakes and aquifers that are the sources of your tap water.

2 Treat

Aquifer water is naturally filtered underground. Lake water is filtered at our filtration plants. We use chlorine to kill microbes that might cause illness, and we add phosphate to minimize corrosion of pipes and fluoride to prevent dental cavities as required by CTDPH regulations.

3 Distribute

The treated or finished water is delivered to you through a 1,700-mile-long network of pipes, pumping stations and storage tanks. We carefully maintain this extensive network to ensure that high-quality water is available whenever you turn on your tap.

4 Monitor

Our water testing is stringent. In 2016, we performed more than 110,000 tests on over 10,000 water samples taken from numerous locations throughout our water distribution system, within our water treatment plants and in the lakes and aquifers where the water is stored prior to treatment. These samples are brought back to our state- and nationally-certified laboratory for microbiological testing as well as organic and inorganic chemical testing. The laboratory uses analytical devices as simple as pH meters or as complex as gas chromatographs and mass spectrometers. The results of these tests are compared to more than 175 state and federal standards and are reported to the CTDPH on a monthly, quarterly and annual basis, ensuring that only the highest-quality drinking water is provided to you.

Source Water Assessment Information

A Source Water Assessment lists possible contaminants that might affect the quality of your water sources. The CTDPH Drinking Water Division completed an assessment of the RWA's sources of water. You can find the most recent assessment of the RWA's water on the CTDPH website: www.dir.ct.gov/dph/Water/SWAP/Community/CT0930011.pdf.

Additional Information

In order to ensure that tap water is safe to drink, the EPA and the CTDPH set regulations that limit the amount of certain contaminants in water provided by public water systems. For more information, visit the CTDPH website: ct.gov/dph.

Sources of drinking water (both tap and bottled) include rivers, lakes, streams, reservoirs, springs and wells. 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. Contaminants that may be present in source water due to these activities include the following:

Inorganic Compounds

Inorganic compounds, such as salt and metals, can be naturally occurring or result from urban storm-water runoff, industrial or domestic wastewater discharges or farming.

Pesticides and Herbicides

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

Organic Chemical Compounds

Organic chemical compounds, including synthetic and volatile organic chemicals that are by-products of industrial processes, can come from gas stations, urban stormwater runoff or septic systems. Some of these compounds, such as trihalomethanes and haloacetic acids, are disinfection by-products that result from the use of chlorine as a disinfectant in water treatment, which reacts with naturally occurring materials in water, such as leaves.

Radioactive Contaminants

Radioactive contaminants can be naturally occurring or may be the result of oil and gas production.

Radon

Radon is a radioactive gas that you cannot see, taste or smell. It is found throughout the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. The gas can accumulate to high levels in all types of homes. Radon can also get into indoor air when released from tap water during showers, washing dishes and other household activities. In most cases, however, radon entering the home through tap water is a small source of all the radon in indoor air. Radon is a carcinogen. Breathing air containing radon can lead to lung cancer. Drinking water containing radon may also cause increased risk of stomach cancer. If you are concerned about radon in your home, test the air. Testing is inexpensive and easy. If the level of radon in your air is 4 picocuries per liter (pCi/L) or higher, you need to take steps to reduce it. For additional information, call CTDPH at 860.509.7333 or EPA's Radon Hotline at 1.800.SOS.RADON.

Microbial Contaminants

Microbial contaminants, such as bacteria, viruses and cryptosporidium, may come from sewage treatment plants, septic systems, agricultural livestock operations, wildlife or natural sources.

At-Risk Populations

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised 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 from their health care providers about drinking water. The EPA and Centers for Disease Control offer guidelines on ways to lessen the risk from contaminants. They are available by calling EPA's Safe Drinking Water Hotline at 1.800.426.4791.

Important Health Facts

Lead and Copper Testing

The EPA developed the Lead and Copper Rule (LCR) to protect public health by minimizing lead and copper levels in drinking water. The most common source of lead and copper in drinking water is corrosion of plumbing materials. Plumbing materials that can be made with lead and copper include pipes, solder, fixtures and faucets. The LCR established an action level of 15 parts per billion (ppb) for lead and 1.3 parts per million (ppm) for copper, based on the 90th percentile level of tap water samples. This means that no more than 10 percent of the samples can be above either action level. The Maximum Contaminant Level Goal (MCLG) for copper is 1.3 ppm; the MCLG for lead is zero. The test frequency for lead and copper is determined by state and federal regulatory agencies with sampling conducted at the consumer's tap.

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 RWA is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components that might be present in homes and businesses. 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 two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you should consider having your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from EPA's Safe Drinking Water Hotline at 1.800.426.4791 and epa.gov/safewater/lead.

The major sources of copper in drinking water are the corrosion of household plumbing systems and the erosion of natural deposits. Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor. To minimize exposure to copper, please follow the previous flushing instructions for lead.

Sodium

Sodium is an essential nutrient in your diet. It helps maintain the right balance of fluids in your body and transmit nerve impulses to your muscles. Sodium in drinking water normally presents no health risks, as about 99 percent of your daily salt intake is from food and only about one percent is from water. For comparison, whole milk has a sodium content of 530 milligrams per liter. However, elevated sodium in water may be considered a health concern for those on a restricted-salt diet. If you have been placed on such a diet, please inform your physician that our water can contain as much as 28 milligrams per liter of sodium.

Results of Cryptosporidium Monitoring

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal. Our monitoring in 2016 indicated that no organisms were detected in either the untreated source water or in the finished treated water ready for consumption.

RWA Drinking Water Analysis Data for 2016

The tables on this page and page 8 contain a summary of our water quality monitoring and testing completed during the 12-month period of 2016. Potential sources of contaminants are listed on page 10.

Regulated Contaminants Found in Lakes and Aquifers

Substance	MCL	MCLG	Range Detected	Average Level	Met Regulatory Standards
Barium	2 ppm	2 ppm	0.016 – 0.2904	0.067 ppm	Yes
Chloride	250 ppm	N/A	12 – 82	33 ppm	Yes
Fluoride	4 ppm	4 ppm	ND – 1.6	0.86 ppm	Yes
Microbial Pathogens[a]	TT = 100% of 4-log removal based on chlorine residual	N/A		100%	Yes
Nitrate (as nitrogen)	10 ppm	10 ppm	0.016 – 3.24	0.788 ppm	Yes
Total Haloacetic Acids (THAA)	60 ppb Average	N/A	ND – 73[b]	38 ppb	Yes
Total Trihalomethanes (TTHM)	80 ppb Average	N/A	2 – 123[b]	48 ppb	Yes
Turbidity (aquifers)	TT = 5 NTU	N/A	ND – 1.30	0.07 NTU	Yes

Substance	MCL	MCLG	Range Detected	Minimum Removal Ratio	Met Regulatory Standards
Total Organic Carbon (TOC)	TT = Removal Ratio ≥1[c]	N/A	1.00 – 2.21	1.33	Yes

Substance	MCL	MCLG	Highest Level Detected	Met Regulatory Standards
Total Coliform Bacteria	Presence of coliform bacteria not to exceed 5.00% of monthly samples	0%	0%	Yes
Turbidity (lakes)	TT = 95% of samples ≤ 0.3 NTU[d]	N/A	0.17 NTU	Yes

Substance	MRDL	MRDLG	Range Detected	Average Level	Met Regulatory Standards
Chlorine	4 ppm	4 ppm	0.7 – 2.4	1.6 ppm	Yes

Substance	MCL	MCLG	90th Percentile[e]	Met Regulatory Standards
Lead Analyzed 2014[f]	AL = 15 ppb[g]	0	2 ppb No. of sites above AL = 0	Yes
Copper Analyzed 2014[f]	AL = 1.3 ppm[g]	1.3	0.44 ppm No. of sites above AL = 0	Yes

Notes

(a) Treatment that reliably achieves at least 99.99 percent (4-log) treatment of viruses using inactivation

(b) Individual sample and individual location

(c) Ratio is a value derived from monthly TOC percent removal calculation

(d) 95 percent of samples within a given month

(e) Calculated value derived from the analysis performed on high-priority customers

(f) Test frequency as determined by state and federal regulatory agencies

(g) Action level is based on the calculated 90th percentile

Unregulated Contaminants Found in Lakes and Aquifers

Substance	MCL	Range Detected	Average Level	Met Regulatory Standards
Bromodichloromethane	N/A	1–25	8 ppb	N/A
Chloroform	N/A	1–93	40 ppb	N/A
Dibromochloromethane	N/A	ND–5	1 ppb	N/A
Dibromoacetic Acid	N/A	ND–1	BDL ppb	N/A
Dichloroacetic Acid	N/A	ND–29	14 ppb	N/A
Monochloroacetic Acid	N/A	ND–10	4 ppb	N/A
Trichloroacetic Acid	N/A	ND–37	20 ppb	N/A

Substance	Notification Level	Range Detected	Average Level	Met Regulatory Standards
Radon	N/A	12–1510	553 pCi/l	N/A
Sodium	28 ppm	10–33[h]	18 ppm	N/A

Note

(h) See sodium notice on page 6

Unregulated Contaminants for the Unregulated Contaminant Monitoring Rule List 3

During 2014, the RWA participated in the third phase of the Unregulated Contaminant Monitoring Rule (UCMR3). Unregulated contaminants are those that don't yet have a drinking water standard set by the EPA. Monitoring these contaminants assists the EPA in determining whether contaminants should have a standard. Detections are summarized in the table below; sources of these contaminants can be found on page 10. For general information on UCMR3, visit epa.gov/dwucmr or contact EPA's Safe Drinking Water Hotline at 1.800.426.4791.

Parameter	MCL	Range Detected	Average Level
1,4 Dioxane Analyzed 2014	N/A	ND–11	1.57 ppb
Chlorate Analyzed 2014	N/A	ND–1990	252 ppb
Chromium Analyzed 2014	N/A	ND–1.10	0.38 ppb
Hexavalent Chromium Analyzed 2014	N/A	ND–0.78	0.25 ppb
Strontium Analyzed 2014	N/A	20.5–123.0	70.1 ppb
Vanadium Analyzed 2014	N/A	ND–1.58	0.67 ppb

Technology, Definitions and Water Quality Measurement Units

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

BDL Below Detection Level
Calculated value resulting in below detection level.

MCL Maximum Contaminant Level
The highest level of a contaminant allowed in drinking water. Maximum Contaminant Levels are set as close to the Maximum Contaminant Level Goal 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 not a known or expected risk to health. Maximum Contaminant Level Goals allow for a margin of safety.

MRDL Maximum Residual Disinfectant Level
The level of disinfectant added for water treatment that may not be exceeded at the consumer's tap without adverse health effects.

MRDLG Maximum Residual Disinfectant Level Goal
A non-enforceable health goal. It does not reflect the benefits of adding the chemical for the control of waterborne microbial contaminants.

ug/L Micrograms per Liter
A unit of concentration for dissolved substances based on their weights.

N/A Not Applicable
Not applicable or required.

ND Not Detected
Not detected.

NTU Nephelometric Turbidity Units
A measure of clarity of water. Turbidity more than five NTU is just barely noticeable to the average person.

ppb Parts per Billion
A measure of the concentration of a substance roughly equivalent to half a teaspoon of water in one Olympic-size swimming pool.

ppm Parts per Million
A measure of the concentration of a substance roughly equivalent to one half of a dissolved tablet of aspirin in a full 50-gallon bathtub of water.

pCi/L Picocuries per Liter
A measure of radioactivity in water.

TT Treatment Technique
A required process intended to reduce the level of contaminants in drinking water.

Potential Sources of Contaminants

1,4 Dioxane Used as a solvent or solvent stabilizer in the manufacture and processing of paper, cotton, textile products, automotive coolant, cosmetics and shampoos.

Barium Discharge of drilling waste; discharge from metal refineries; erosion of natural deposits.

Bromodichloromethane By-product of drinking water chlorination.

Chlorate By-product of the drinking water disinfection process; a number of compounds can react to release chlorate ion in water, including some in herbicides, fireworks and other explosives.

Chloride Naturally present in the environment.

Chlorine Water additive used to control microbes.

Chloroform By-product of drinking water chlorination.

Chromium Naturally occurring element; can come from industrial activities that use chromate-containing pigments, spray paints, coatings, chrome plating baths and metal (such as stainless steel) cutting or welding.

Copper Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives.

Dibromoacetic Acid By-product of drinking water chlorination.

Dibromochloromethane By-product of drinking water chlorination.

Dichloroacetic Acid By-product of drinking water chlorination.

Fluoride Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories.

Hexavalent Chromium Naturally occurring element, used in making steel and other alloys; chromium-3 or -6 forms are used for chrome plating, dyes and pigments, leather tanning and wood preservation.

Lead Corrosion of household plumbing systems; erosion of natural deposits.

Microbial Pathogens Naturally present in the environment.

Monochloroacetic Acid By-product of drinking water chlorination.

Nitrate (as nitrogen) Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits.

Radon Naturally present in the environment.

Sodium Naturally present in the environment; sources such as road salt storage and application, industrial wastes, sewage and fertilizers are usually the cause of elevated levels in drinking water supplies.

Strontium Naturally occurring element; other sources include air contamination from milling processes, coal burning and phosphate fertilizers.

Total Coliform Bacteria Naturally present in the environment.

Total Haloacetic Acids (THAA) By-product of drinking water chlorination.

Total Organic Carbon (TOC) Naturally present in the environment.

Total Trihalomethanes (TTHM) By-product of drinking water chlorination.

Trichloroacetic Acid By-product of drinking water chlorination.

Turbidity (aquifers) Soil runoff.

Turbidity (lakes) Soil runoff.

Vanadium Naturally occurring metal found in many different minerals and in fossil fuel deposits. The primary industrial use of vanadium is in the strengthening of steel.

Wise Water Use

Water is a precious resource. It is important to always use it wisely. To ensure we have sufficient water to meet the needs of all our consumers and put less stress on local water sources and the environment, we encourage consumers to use water wisely—whether we are in a drought situation or not. Here are some simple things you can do:

Check for any dripping faucets or running toilets. A leaky faucet that drips at the rate of one drip per second can waste more than 3,000 gallons of water per year. The average leaky toilet can waste about 200 gallons of water per day. That's over 6,000 gallons of water a month.

Shower to save water. A bath typically uses up to 70 gallons of water, whereas a five-minute shower will use only 10-25 gallons depending on the efficiency of your showerhead.

Turn off the faucet while brushing your teeth and save as much as four gallons of water. If you brush your teeth in the morning and at night, that adds up to saving 200 gallons of water a month. The same is true when you wash your hands or shave.

Scrape your dirty dishes into the trash, and then put them into the dishwasher. The average dishwasher uses six gallons of water per cycle; more efficient dishwashers use four gallons per cycle.

Wash only full loads of clothes. Older top-loading machines use 40 gallons of water to wash a full load. Today's newer standard models use 27 gallons, and more efficient Energy Star washers use 14 gallons per wash.

Avoid evaporation. Water your lawn in the early morning or later in the evening; if you have a swimming pool, cover it and cut water loss through evaporation by 90 percent.

Don't use a hose to spray away debris. Clean your sidewalk or driveway with a broom instead and save up to 80 gallons of water.

Apply mulch around flowers, shrubs, vegetables and trees. This will help to reduce evaporation, promote plant growth and control weeds.

EPA WaterSense PARTNER

For more tips on how to use water wisely, visit rwater.com or epa.gov/WaterSense.

Regional Water Authority
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