CITY OF BENICIA

2022 ANNUAL WATER QUALITY REPORT

The City of Benicia (City) is proud to report that in calendar year 2022, your drinking water quality met or surpassed all Federal and State drinking water health standards. To ensure tap water is safe to drink, the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board (State Water Board) prescribe limits that regulate the amount of certain contaminants in water provided by public water systems. This drinking water quality report is provided to our water customers and contains information about the quality and sources of water treated from January 1, 2022, through December 31, 2022. This report and other information can be found on the City's website at www.ci.benicia.ca.us/publicworks

THE CITY OF BENICIA CALIFORNIA

Este informe contiene información es muy importante sobre su agua para beber. Favor de comunicarse City of Benicia 707-746-4336 para asistirlo en español.

If you have questions or comments regarding this report or have questions relating to your drinking water, please contact Marc Bautista, Water Quality Supervisor, at 707-746-4394

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FROM SOURCE TO TAP

The City owns and operates the Benicia Water Treatment Plant (WTP), transmission system, storage reservoirs and distribution system, which serve approximately 30,000 customers and numerous visitors to our City.
The Water Treatment Plant can produce up to 12 million gallons a day (MGD) of drinking water. Our water supply consists of three surface water sources: State Water Project water via the North Bay Aqueduct (NBA), Lake Berryessa transported through the Putah South Canal (PSC), and our local source, Sulphur Springs Creek diverted at Lake Herman. Each source provides clean and safe water for drinking, fire protection, irrigation, and industry. The City maintains the ability to treat and deliver from any of its sources based on season, operational needs, and contractual obligations.
Source Water Assessments evaluate the quality of the water used as a drinking water supply for local communities and examine the water's vulnerability to possible contamination from activities within the watershed.
A copy of each assessment is available at: State Water Resources Control Board, Division of Drinking Water, San Francisco District Office, 850 Marina Bay Parkway Bldg. P, Second Floor Richmond CA 94804-6403, (510) 620-3474.

Source	Last Assessment	Identified Vulnerabilities
State Water Project via the North Bay Aqueduct (NBA)	2022	Cattle and sheep grazing activities
Lake Berryessa transported through the Putah South Canal	2017	Illegal activities/unauthorized dumping and herbicide application
Sulphur Springs Creek/ Lake Herman	2023	Urban runoff, herbicides and pesticides application, cattle grazing operations, and historic mining operations

SOURCES OF DRINKING WATER AND CONTAMINANTS THAT MAY BE IN SOURCE WATER

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances deriving from the presence of animals, or from human activity. Contaminants that may be present in source water include:

- Microbial contaminants such as viruses and bacteria that may come from wastewater treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants such as salts and minerals that 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 that 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 that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- Radioactive contaminants that can be naturally occurring or be the result of oil and gas production, and mining activities.

SPECIAL INFORMATION

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 (800) 426-4791.
Some persons may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised people such as those with cancer undergoing chemotherapy, those 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 microbial contaminants are available from the EPA's Safe Drinking Water Hotline (800) 426-4791.

WATER TREATMENT PLANT UPDATE

In 2022, the City of Benicia replaced two chemical bulk storage tanks and added a spare tank for future use. Through this process, additional seismic restraints and new piping were installed.

In addition, the Electrical Surge Tank air system at the NBA pump station was upgraded. The electrical system was replaced and updated to add local SCADA alarms and controls at the Water Treatment Plant. The air compressor was replaced in 2021The prior system was approximately 33 years old, and it is expected that the new system should last several decades.

BENICIA WATER TREATMENT PLANT PROCESS

COAGULATION & FLOCCULATION	SEDIMENTATION	FILTRATION	DISINFECTION	DISTRIBUTION
Aluminum salts are added to help dirt and particles to bind together into floc.	The process of allowing suspended materials to settle by gravity.	Water flows through Granulated Active Carbon, sand and rock to remove any remaining particles.	Chlorine, a powerful disinfectant, is added to water to kill bacteria & viruses.	Transport water to homes and businesses through more than 150 miles of pipelines.

DISTRIBUTION SYSTEM

3 PUMP STATIONS	5 WATER STORAGE RESERVOIRS	8 PRESSURE REDUCING	150+ MILES OF PIPELINE	12,000+ WATER TESTS PERFORMED

WATER QUALITY

HARDNESS is measured in milligrams per liter (mg/L). Calcium and magnesium are naturally occurring materials in our water and can cause water to be "hard". The City's water is generally "moderately hard" to "very hard", in the range of 72 to 186 mg/L. Water that is too "soft" (<30 mg/L) can be corrosive to plumbing pipes and water that is too "hard" (>300 mg/L) can cause scale to form on appliances and reduce laundry efficiency.

NITRATE in drinking water at levels above 10 mg/L (as nitrogen) is a health risk for infants less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider. Nitrate was once again not detected in any of the City's water sources or treated water in 2022.

TURBIDITY is a measure of the cloudiness of the water, and it is measured in Nephelometric Turbidity Units (NTU). Turbidity is an excellent indicator of the effectiveness of the filtration system for surface water treatment. The filtered water turbidity is analyzed continuously and sampled by City staff at a minimum of every four hours throughout the day at the Water Treatment Plant. In 2022, the City again successfully maintained its treated water turbidity under 0.1 NTU (0.03 NTU in 2022); the regulatory limit is less than 0.3 NTUs in 95% of the samples taken.

TOTAL ORGANIC CARBON (TOC) has no health effects. However, TOC provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the maximum contaminant levels (MCL) may lead to adverse health effects, including liver or kidney problems, nervous-system effects, and increased cancer risk. In 2022, the average TOC in Benicia drinking water was 1.6 mg/L with an average TOC removal of more than 50% compared to source water TOC.

CRYPTOSPORIDIUM AND GIARDIA are naturally occurring microbial contaminants found in surface water throughout the world. The City's water treatment plant provides a multi-barrier treatment process which includes filtration and disinfection with chlorine. Although filtration removes over 99.9% of these contaminates, even the most commonly used filtration methods cannot guarantee 100% removal. Cryptosporidium and Giardia must be ingested to cause disease and may be spread through means other than drinking water. Ingestion of Cryptosporidium can cause Cryptosporidiosis and Giardia can cause Giardiasis; both are gastrointestinal infections. Symptoms include nausea, diarrhea, and abdominal cramps.

2021 Lead and Copper Sampling Results

Contaminant	Action Level (AL)	Public Health Goal (PHG)	Benicia's Water 90th Percentile	Number of Sites Above the AL	Contaminant Source
Lead (ppb)	15	2	1.5	0	Corrosion of household plumbing systems
Copper (ppb)	1,300	300	100	0	

LEAD AND COPPER

In 2021, 38 homes were tested for lead and copper and no homes were detected above the regulatory action level or above the 90th percentile (see above table). In addition to setting action levels, USEPA also requires that 90th percentile value of the samples be below the regulatory action level (AL) of **15 ppb for lead and 1300 ppb for copper**. Every three years, the City is required to collect a representative sample of drinking water directly from City customer's indoor faucet. The next lead and copper test is scheduled for late Summer/Fall 2024. Due to continued low results, the City is only required to sample for lead and copper every three years.

The Lead and Copper Rule was introduced by USEPA in 1991 to limit the concentration of lead and copper allowed in drinking water at the customer's tap as well as to limit the corrosivity due to the water. The City proactively adjusts the pH of the water to form a calcium carbonate protective layer between the pipe material and the water supply to prevent lead and copper from leaching into the drinking water supply.

MINIMIZING EXPOSURE TO LEAD

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 material and components associated with water distribution service lines and home plumbing. The City of Benicia is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking.

The City has replaced all lead service lines; the remaining potential sources of lead are from older brass fixtures or solder joints in private structures. According to USEPA, homes built before 1986 are more likely to have lead pipes or fixtures and solder that contain lead. However, due to the City's effective corrosion control program, very little lead is leached from these plumbing materials. If a customer is concerned about risk of lead exposure from drinking water, we encourage you to have your water tested by a certified laboratory. Information on lead in drinking water, testing methods and steps you can take to minimize exposure are available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

PRIMARY DRINKING WATER STANDARDS *Contaminants that may affect your health*					
Parameters/ Constituents (unit of measurement)	**Range**	**AVG**	**MCL**	**MCLG**	**Major Source in Drinking Water**
Inorganics					
Aluminum (ppm)	NA	0.02	1	0.6	Erosion of natural deposits; residue from some surface water treatment process
Arsenic (ppb)	NA	ND	10	0.004	Erosion of natural deposits; runoff from orchards; glass and electronics production
Barium (ppm)	NA	0.03	1	2	Erosion of natural deposits, industrial discharges
Copper (ppm)	NA	3.4	1.3	0.3	Erosion of natural deposits, industrial discharges
Total Chromium (ppb)	NA	ND	50	100	Erosion of natural deposits; Discharge from steel and pulp mills and chrome plating
Hexavalent Chromium (ppb)	NA	0.88	10	0.02	Erosion of natural deposits, industrial discharges
Fluoride (ppm)	0.35 - 1.11	0.8	2	1	Erosion of natural deposits; water additive to promote strong teeth
Nickel (ppb)	NA	ND	100	12	Erosion of natural deposits; discharge from metal factories
Lead (ppb)	NA	ND	15	0.2	Erosion of natural deposits; corrosion
Nitrate (ppm)	NA	ND	10	10	Runoff and leaching from septic tanks and sewage, erosion
Nitrate + Nitrite (ppm)	NA	NA	10	NA	Runoff and leaching from septic tanks and sewage, erosion
Microbial					
Coliform Bacteria	NA	ND	5% +	0	Naturally present in the environment
Disinfection Byproducts					
Total Trihalomethanes (ppb)	42-73	60	80	NA	By-product of drinking water chlorination
Total Haloacetic Acids (ppb)	10-20	20	60	NA	By-product of drinking water chlorination

SECONDARY DRINKING WATER STANDARDS *Contaminants that may affect the odor, taste, or appearance of water*					
Parameters/ Constituents (unit of measurement)	**Range**	**AVG**	**MCL**	**MCLG**	**Major Source in Drinking Water**
Aluminum (ppb)	NA	21	200	NA	Erosion of natural deposits; residue from some surface water treatment process
Color (units)	NA	ND	15	NA	Naturally occurring organic materials
Iron (ppb)	NA	ND	300	NA	Leaching from natural deposits; industrial waste
Manganese (ppb)	NA	ND	50	NA	Leaching from natural deposits
Odor (units)	NA	2	3	NA	Naturally occurring organic materials
Silver (ppb)	NA	ND	100	NA	Industrial discharges
Turbidity (Units)	0.02 - 0.90	0.03	5	NA	Soil runoff
Total Dissolved Solids (ppm)	129 - 425	190	1,000	NA	Runoff/leaching of natural deposits
Conductivity (uS/cm)	194 - 639	330	1,600	NA	Substances that form ions when in water; sea water influence
Chloride (ppm)	NA	14	500	NA	Runoff/leaching of natural deposits; sea water influence
Sulfate (ppm)	NA	36	500	NA	Runoff/leaching of natural deposits; industrial waste
GENERAL WATER QUALITY PARAMETERS ***Non-regulated parameters of general interest to consumers***					
Boron (ppb)	NA	NA	1,000	NA	
Vanadium (ppb)	NA	NA	50	NA	
Calcium (mg/l)	NA	14	NA	NA	
Chlorine (mg/l)	0.9 - 1.4	1.2	NA	NA	
Hardness (mg/l)	42 - 200	135	NA	NA	
Magnesium (mg/l)	NA	18	NA	NA	
Potasium (mg/l)	NA	1.6	NA	NA	
Sodium (mg/l)	NA	25	NA	NA	
pH	7.3-8.7	8.1	NA	NA	
Alkalinity (mg/l)		100			

KEY WATER QUALITY TERMS

Some terms, abbreviation and symbols are unique to the water industry and might not be familiar to all customers. Terms used in the table are explained below:

AL Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that the water treatment plant must follow.
MCL Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Set by USEPA as close to the MCLGs as economically and technologically feasible.
MCLG Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. Set by USEPA.
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 drinking water 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 or not available
ND Not Detected at testing limit
NS Not Sampled
PDWS Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect heath along with their monitoring and reporting requirements, water treatment requirements.
Public Health Goal (PHG) The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.
RAA Running Annual Average
MG Million Gallons
MGD Million Gallons per Day

UNITS

ppb Parts per billion or micrograms per liter (µg/L) Equivalent to one second in 32 years
ppm Parts per million or milligrams per liter (mg/L) Equivalent to one second in 11.5 days
TON Threshold Odor Number, a measure of odor in water
NTU Nephelometric Turbidity Units, a measure of the relative clarity of water