



CITY OF BENICIA

2021 Annual Water Quality Report



The City of Benicia (City) is proud to report that in calendar year 2021, 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, 2021 through December 31, 2021. This report and other information can be found on the City's website at www.ci.benicia.ca.us/publicworks

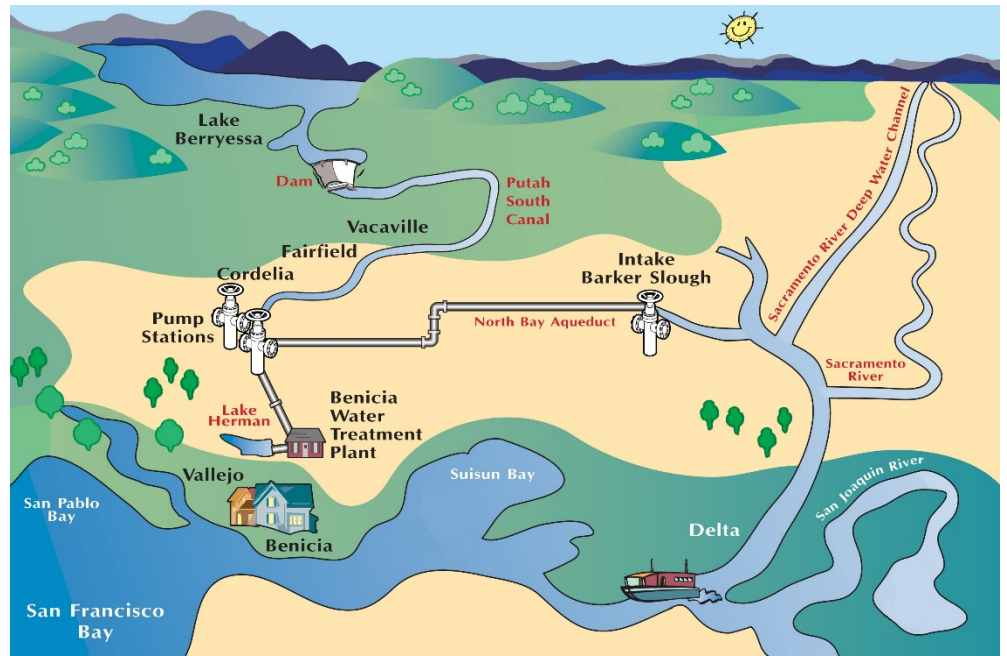
PUBLIC PARTICIPATION

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.

The City encourages customers to participate in City Council meetings, which take place every first and third Tuesday of the month. For more information, please visit the City's website:

<https://www.ci.benicia.ca.us/citycouncil>

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 707-746-4336.

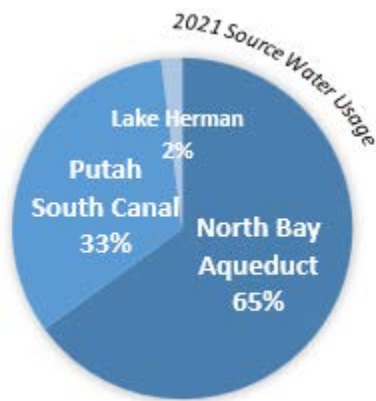


FROM SOURCE TO TAP

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 many 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)	2016	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	2002	Urban runoff, herbicides and pesticides application, cattle grazing operations, and historic mining operations

SOURCES OF DRINKING WATER AND CONTAMINANTS
THAT MAY BE PRESENT 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:



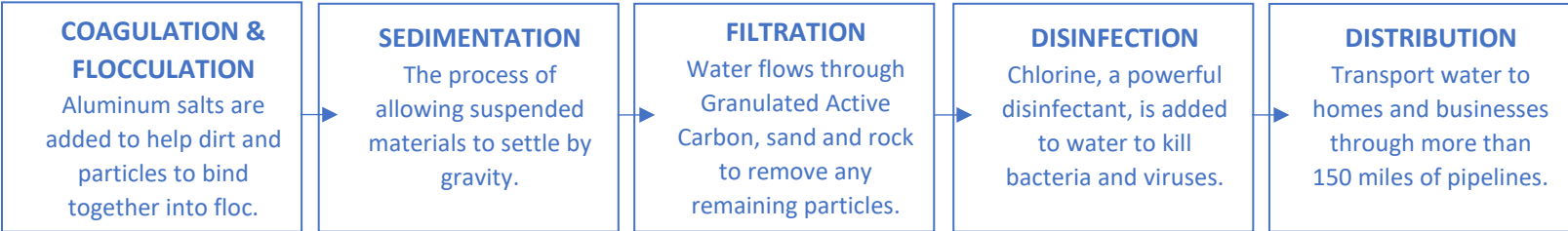
- Microbial contaminants such as viruses and bacteria that may come from wastewater treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants such as salts and minerals that can be naturally occurring or result from urban stormwater runoff, industrial 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

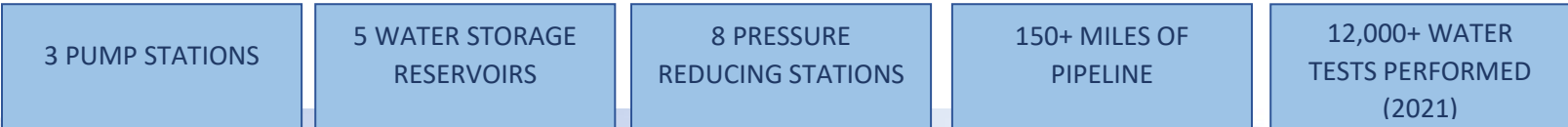
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling 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.

BENICIA WATER TREATMENT PLANT PROCESS



DISTRIBUTION SYSTEM



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 2021.

TURBIDITY is a measure of the cloudiness of the water, and it is measured in Nephelometric Turbidity Units (NTU). Turbidity is a good 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 2021, the City was able to maintain its treated water turbidity under 0.1 NTU; 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 2021, 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 contaminants, 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.

Lake Herman Intake (photography by Ok Kyong)



JOIN THE BENICIA WATERSMART PROGRAM

The City of Benicia partnered with WaterSmart to offer customers FREE detailed information about your water use. It is part of our commitment to provide customers with the best tools to manage water use and your water bill. If you haven’t already signed up, get started today by logging onto the WaterSmart web portal at www.benicia.waterinsight.com.

Questions can be e-mailed to winsight@ci.benicia.ca.us

LEAD AND COPPER

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	

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.

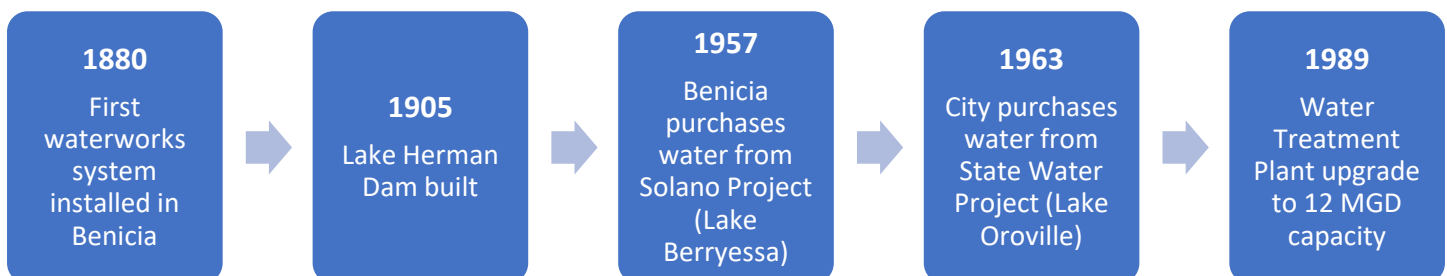
The Lead and Copper Rule was introduced by USEPA in 1991 to limit the concentration of lead and copper allowed in drinking water at the customer's tap as well as to limit the corrosivity due to the water. The City proactively adjusts the pH of the water to form a calcium carbonate protective layer between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



As of January 1, 2016, all brass plumbing fixtures must be lead-free. The City 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.



Parameters	Untreated Water						Treated Water				
	North Bay Aqueduct		Lake Berryessa		Lake Herman		Benicia's Treated Water				
PRIMARY DRINKING WATER STANDARDS <i>Contaminants that may affect your health</i>											
Inorganic	Range	Average	Range	Average	Range	Average	Range	Average	MCL	MCLG	Major Source in Drinking Water
Aluminum (ppm)	0.16 - 0.21	0.19	NA	0.14	NA	0.1	NA	ND	1	0.6	Erosion of natural deposits; residue from some surface water treatment process
Arsenic (ppb)	1.3 - 4	2.6	NA	2.3	NA	2.1	NA	ND	10	0.004	Erosion of natural deposits; runoff from orchards; glass and electronics production
Barium (ppm)	ND - 0.04	0.02	NA	ND	NA	0.07	NA	0.05	1	2	Erosion of natural deposits, industrial discharges
Copper (ppm)	ND - 0.004	0.002	NA	ND	NA	0.002	NA	0.002	1.3	0.3	Erosion of natural deposits, industrial discharges
Total Chromium (ppb)	1.4 - 2.9	2	NA	ND	NA	ND	NA	1.2	50	100	Erosion of natural deposits; Discharge from steel and pulp mills and chrome plating
Hexavalent Chromium (ppb)			NA	ND	NA	0.06	NA	0.1	10	0.02	Erosion of natural deposits, industrial discharges
Fluoride (ppm)	0.11 - 0.13	0.12	NA	ND	NA	0.22	0.35 - 1.11	0.78	2	1	Erosion of natural deposits; water additive to promote strong teeth
Nickel (ppb)	ND - 5.5	1.4	NA	ND	NA	ND	NA	ND	100	12	Erosion of natural deposits; discharge from metal factories
Lead (ppb)	ND - 0.52	0.2	NA	ND	NA	ND	NA	ND	15	0.2	Erosion of natural deposits; corrosion
Nitrate (ppm)	ND - 0.2	0.1	NA	ND	NA	ND	NA	0.4	10	10	Runoff and leaching from septic tanks and sewage, erosion
Nitrate + Nitrite (ppm)	ND - 0.2	0.1	NA	NA	NA	ND	NA	0.4	10	n/a	Runoff and leaching from septic tanks and sewage, erosion
Coliform Bacteria	Present in source water						NA	ND	5% positive	0	Naturally present in the environment
Disinfection Byproducts	Range	Average	Range	Average	Range	Average	Range	RAA	MCL	MCLG	Major Source in Drinking Water
Total Trihalomethanes (ppb)	NA	ND	NA	NA	NA	NA	34-72	60	80	NA	By-product of drinking water chlorination
Total Haloacetic Acids (ppb)	NA	NA	NA	NA	NA	NA	4.8-34	15	60	NA	By-product of drinking water chlorination

Parameters	Untreated Water						Treated Water				
	North Bay Aqueduct		Lake Berryessa		Lake Herman		Benicia's Treated Water				
SECONDARY DRINKING WATER STANDARDS <i>Contaminants that my affect the odor, taste, or appearance of water</i>											
	Range	Average	Range	Average	Range	Average	Range	Average	MCL	MCLG	Major Source in Drinking Water
Aluminum (ppb)	160 - 210	185	NA	140	NA	100	NA	ND	200	NA	Erosion of natural deposits; residue from some surface water treatment process
Color (units)	50 - 228	135	NA	20	NA	15	NA	ND	15	NA	Naturally occurring organic materials
Iron (ppb)	240 - 1,460	788	NA	190	NA	170	NA	ND	300	NA	Leaching from natural deposits; industrial waste
Manganese (ppb)	22 - 84	44	NA	ND	NA	20	NA	ND	50	NA	Leaching from natural deposits
Odor (units)	NA	3	NA	4	NA	100	NA	2	3	NA	Naturally occurring organic materials
Silver (ppb)	NA	ND	NA	ND	NA	ND	NA	ND	100	NA	Industrial discharges
Turbidity (Units)	3.1 - 19.3	10.2	NA	4.7	NA	13	0.02 - 0.17	0.04	5	NA	Soil runoff
Total Dissolved Solids (ppm)	131 - 254	180	NA	220	NA	290	129 - 425	233	1,000	NA	Runoff/leaching of natural deposits
Conductivity (uS/cm)	236 - 277	267	NA	360	NA	500	194 - 639	392	1,600	NA	Substances that form ions when in water; sea water influence
Chloride (ppm)	14 - 26	22	NA	6.1	NA	31	NA	32	500	NA	Runoff/leaching of natural deposits; sea water influence
Sulfate (ppm)	11 - 24	16	NA	23	NA	46	NA	97	500	NA	Runoff/leaching of natural deposits; industrial waste
GENERAL WATER QUALITY PARAMETERS <i>Non-regulated parameters of general interest to consumers</i>											
Boron (ppb)	ND - 150	90	NA	180	NA	NA	NA	NA	1,000	NA	
Vanadium (ppb)	ND - 8.2	3.8	NA	3.5	NA	NA	NA	NA	50	NA	
Calcium (mg/l)	8 - 19	15	NA	20	NA	33	NA	16	NA	NA	
Chlorine (mg/l)	NA	NA	NA	NA	NA	NA	0.87 - 1.52	1.13	NA	NA	
Hardness (mg/l)	77 - 113	95	NA	178	NA	180	72 - 186	121	NA	NA	
Magnesium (mg/l)	10 - 14	12	NA	33	NA	24	NA	14	NA	NA	
Potasium (mg/l)	1.8 - 2.4	2.1	NA	1.5	NA	NA	NA	NA	NA	NA	
Sodium (mg/l)	18 - 28	22.3	NA	10	NA	39	NA	58	NA	NA	
pH	7.6 - 7.9	7.7	NA	8.7	NA	8	7.8 - 8.5	8.1	NA	NA	

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 health 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 ($\mu\text{g/L}$) 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

What's New at the Water Treatment Plant

In 2021, staff installed a new rotating pump system to complete the upgrade of the Utility Water System (UWS). The UWS provides water to maintain "process water" within the WTP such as chemical feeds used during the treatment process, water hoses within the WTP and restrooms at the WTP. The existing hydropneumatics tanks had been in continuous operation since 1968.

Staff also replaced Granulated Activated Carbon (GAC) filters in Filter #5 and #6 in 2021. Staff replace filter media of two filters every two years, with full renewal of all GAC filters every 6 years. Staff also topped off Filter #1 and #2 additional sand and GAC as Filters #1 and #2 were last replaced in 2017. Full replacement of all GAC filters is scheduled for completion in 2023.



Contact Information

Water Quality Supervisor
(707) 746-4336

Benicia WaterSmart Program
winsight@ci.benicia.ca.us

EPA's Safe Drinking Water Hotline
(800) 426-4791



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