

2021 Water Quality Report

January 1, 2021 - December 31, 2021



BOZEMAN^{MT}
Water Treatment Plant

www.bozeman.net



The City of Bozeman is Pleased to Present our 2021 Water Quality Report (also called the Consumer Confidence Report)

We are proud to report that Bozeman's drinking water meets, or exceeds, all established federal and state water quality standards. The City of Bozeman Water Treatment Plant had zero violations in 2021.

The report informs you about the quality of drinking water and services delivered to residents each day. It contains a list of all *detected* contaminants found in Bozeman's drinking water and information on the water sources. If you have any questions regarding this brochure, please call the City of Bozeman Water Treatment Plant Assistant Superintendent at 406-994-0501. This report is also available at the City of Bozeman website, www.bozeman.net/waterquality.

If you are a landlord or property manager, or know someone who is not billed directly, please share this report with your tenants and friends.

The City of Bozeman encourages all citizens to become active in protecting our water sources and to participate

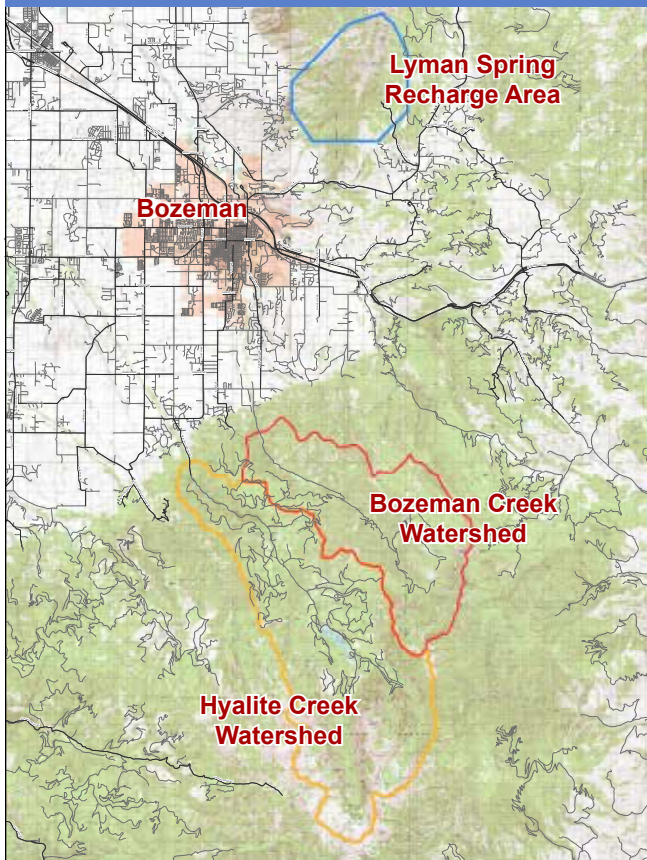
in the decisions affecting Bozeman's drinking water. The Bozeman City Commission meets Tuesday evenings at 6 p.m. at City Hall at 121 North Rouse Avenue.



Where Does Your Water Come From and How is it Treated?

The City of Bozeman drinking water is collected from two mountain ranges, and is treated in one of two water treatment plants. These facilities treat raw water supplied by Middle Creek, Middle Creek Reservoir (Hyalite Reservoir), Sourdough Creek, and Lyman Creek. All Middle Creek and Sourdough Creek water is treated at the water treatment plant located on Sourdough Canyon Road south of Bozeman. Lyman Creek water is treated at a plant northeast of town.

Bozeman Watershed



Middle Creek and Middle Creek Reservoir

Water from Middle Creek flows into Middle Creek Reservoir (Hyalite Reservoir) where it is stored. The water then flows down Hyalite Creek to the intake and is carried by pipeline to the water treatment plant.

Sourdough Creek (Bozeman Creek)

Creek water is drawn from the watershed in Sourdough Canyon. No storage reservoir exists here since the breaching of Mystic Lake Dam in 1985. From the intake on Sourdough Creek, the water is carried by pipeline to the water treatment plant where it is mixed with Middle Creek water.

Sourdough Canyon Water Treatment Plant

A 22 million gallon per day (MGD) microfiltration membrane plant with robust pretreatment treats water from Sourdough and Middle Creek. This plant allows the City to meet increased service demands and comply with Environmental Protection Agency and Montana Department of Environmental Quality regulations.

Sourdough Creek Treatment Process



Water from Bozeman Creek and Hyalite Creek are mixed together then enter the plant.



The treatment process starts with grit removal and addition of a flocculant. This combines with suspended particles to form "floc". It is mixed at progressively slower speeds.



The flocculated suspended particles and chemical settle out in the sedimentation basin. Inclined plate settlers speed up the settling process. The sludge that is formed is pumped to the solids handling processes.



The water is then pumped through strainers to remove particles and goes to the membranes.



The membranes have 6,350 fibers in each module and 124 modules in each rack. Each fiber has pores in them with a nominal pore size of 0.1 microns.

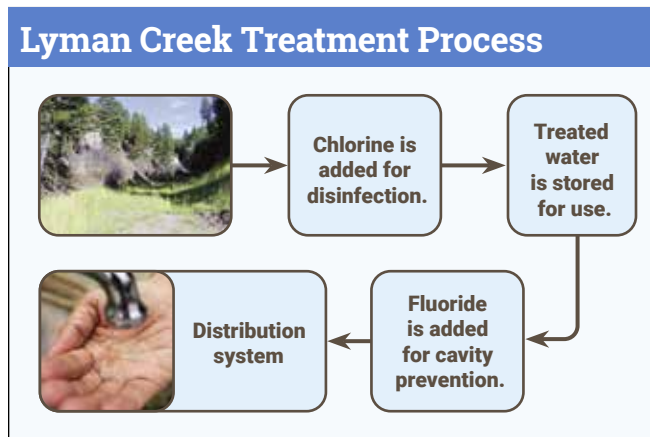
Chlorine is added for disinfection, sodium hydroxide is added for pH adjustment, and fluoride is added prior to going to the distribution system.



Distribution System

The membrane filtration plant consists of grit removal, flocculation and sedimentation to remove larger contaminants. The water then goes through 300 micron strainers to remove more contaminants. Membranes then filter the water through 0.1 micron pores of the membrane fibers. As final steps in the treatment process, sodium hypochlorite is added for disinfection, sodium hydroxide is added for pH adjustment and corrosion control, and fluoride is added for cavity prevention.

Raw water can vary during the year. It is affected by spring runoff, rainstorms, accidental spills, and landslides. The water treatment facility has the capacity to treat these varying conditions, thus provides a very high quality of drinking water to Bozeman consistently.



Lyman Creek

Located in the southern foothills of the Bridger Mountains, this source is a fully enclosed spring and is classified as a groundwater source. The quality of this water varies little throughout the year. The water is captured underground and flows to the treatment plant via a pipeline.

Lyman Creek Water Treatment Plant

The water is treated with sodium hypochlorite for disinfection, is stored in a 5 million gallon tank, and fluoride is added as it leaves the tank for cavity prevention. (See Lyman Creek Treatment Process).

Source Water Assessment

Bozeman's watersheds are devoid of significant potential sources of contamination. The exception is the transportation corridor along Hyalite Creek, which has a very high susceptibility to contamination by transportation of chemicals, including vehicle fluids, on Hyalite Road.

The City of Bozeman's Source Water Delineation and Assessment Report is available for viewing at the Bozeman Public Library.

The Sourdough (Bozeman) Creek and Middle (Hyalite) Creek watersheds are very highly recreated areas. Cross country skiers, ice climbers, mountain bikers, hikers, dog walkers, fishermen, and rock climbers all use the watersheds on an almost daily basis.

What Are Water Contaminates?

The sources of drinking water for tap water and bottled water include rivers, lakes, streams, ponds, reservoirs, springs, and groundwater. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material. Water can also pick up substances resulting from animal or human activity. Contaminants that may be present in water prior to treatment include:

- **Microbial contaminants** such as viruses and bacteria that can come from sewage treatment plants, septic systems, agricultural operations, wildlife, and domestic animals.
- **Inorganic contaminants** such as salts and metals, which can be naturally occurring or result from urban storm 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 storm water runoff, and residential uses.
- **Organic chemical contaminants** including synthetic and volatile organic compounds, which are by-products of industrial processes and petroleum production. These contaminants may also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive contaminants** that can be naturally occurring or be the result of oil and gas production and mining activities.

Bozeman Municipal Watershed Project

The Bozeman Municipal Watershed Project is a cooperative effort between the Custer Gallatin National Forest and the City of Bozeman to maintain a high-quality, predictable water supply for Bozeman residents.

What is a watershed?

A watershed describes an area of land that contains a network of streams and rivers that all drain into a single body of water. In the Northern Gallatin Range that includes the mountains, valleys, and streams of Bozeman Creek and Hyalite Creek. 80% of Bozeman's drinking water comes from this watershed.

How are we protecting our watershed?

We are using prescribed burning, thinning, and timber harvest to reduce wildland fuels which will reduce the risk of severe and extensive wildfire in the lower portions of Hyalite and Bozeman creeks. This work will also help to decrease the amount of debris that could clog our waterways and limit the amount of sediment and ash from entering our water treatment plant. While this project and work will not eliminate fire starts in our watershed, the project will reduce fire severity near the municipal water intakes and treatment areas and protect our water quality for Bozeman's growing population.

Both the City of Bozeman and the Custer Gallatin National Forest will be in clear and constant communication with the public before and during fuel reduction activities. Any temporary trail or road closures will be posted well in advance and the work will be performed as expeditiously as possible. www.bznwatershed.com



Definitions

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment, or other requirements, which a water system must follow. Ninety percent of samples must be at, or below, this level. Lead and copper are measured at the 90th percentile.

Maximum Contaminant Level (MCL): The highest level of a contaminant allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG): The level of 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 disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants (4.0 mg/l).

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contamination (4.0 mg/l).

Nephelometric Turbidity Units (NTU): Level of turbidity in filtered water.

ppm: parts per million

ppb: parts per billion

pCi/L: Picocuries per liter (a measure of radioactivity).

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

Running Annual Average (RRA): Average of the results for the most recent four quarters.

Locational Running Annual Average (LRAA): Average of the results for a location for the most recent four quarters.

UCMR4: Unregulated Contaminant Monitoring Rule #4. Sampled at each WTP entry point to the system and in the distribution system Disinfection Byproduct (DBP) sample sites.

2021 Test Results

Listed in the tables on the following pages are all the contaminants *detected* in Bozeman's drinking water after treatment during the 2021 calendar year. The Environmental Protection Agency (EPA) and the State of Montana Department of Environmental Quality (DEQ) require monitoring of over 80 contaminants. There is also additional information frequently requested in the Additional Water Quality Information Tables.

2021 System Test Results

CONTAMINANT	LOCATION	MIN	MAX	DETECTED LEVEL	UNITS
Trihalomethanes (THMs)					
	DBP1	11.00	28.00	23.00	ppb
	DBP4	13.00	42.00	28.50	ppb
Haloacetic Acids (HAA5s)					
	DBP1	7.40	23.00	17.35	ppb
	DBP4	8.10	24.00	17.53	ppb
Total Coliform	Distribution System		720	0 positive samples	

LEAD AND COPPER*					
Lead*	Distribution System		Zero Sites exceeded A.L.	2.0 (90th percentile)	ppb
Copper*	Distribution System		Zero Sites exceeded A.L.	0.047 (90th percentile)	ppm

WATER QUALITY PARAMETERS					
Alkalinity	North Side (Lyman)	105.6	168.0	140.6	ppm
Chloride	North Side (Lyman)	0.480	2.410	0.979	ppm
Calcium Hardness	North Side (Lyman)	95.0	161.0	110.0	ppm
Total Hardness	North Side (Lyman)	148.0	219.0	167.7	ppm
Total Dissolved Solids	North Side (Lyman)	133.0	162.4	152.1	ppm
pH	North Side (Lyman)	7.61	8.15	7.90	SU
Sulfate	North Side (Lyman)	6.0	16.0	11.5	ppm
Temperature	North Side (Lyman)	9.2	18.4	13.3	Celsius
Alkalinity	South Side (Sourdough)	46.8	110.4	85.5	ppm
Chloride	South Side (Sourdough)	0.538	4.730	1.402	ppm
Calcium Hardness	South Side (Sourdough)	33.6	84.0	60.7	ppm
Total Hardness	South Side (Sourdough)	56.0	119.0	86.9	ppm
Total Dissolved Solids	South Side (Sourdough)	59.2	141.5	91.4	ppm
pH	South Side (Sourdough)	8.15	8.72	8.44	SU
Sulfate	South Side (Sourdough)	0.0	6.0	2.8	ppm
Temperature	South Side (Sourdough)	3.0	17.5	9.3	Celsius

MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
80			By-product of drinking water chlorination
60			By-product of drinking water chlorination
<5% of samples/mo		0	Naturally present in the environment

MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
	15	0	Erosion of natural deposits; corrosion of household plumbing systems
	1.3	0	Erosion of natural deposits; corrosion of household plumbing systems

NA
250
NA
500
6.5-9.3
500
NA
250
NA
NA
500
6.5-9.3
500

*Lead has not been detected in Bozeman's source water. This sampling was done in October of 2021 in accordance with EPA regulations. Lead and Copper are regulated over the entire distribution system (not by source), so these results were not repeated for the Lyman source. 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 City of Bozeman 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. 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 (1-800-426-4791) or at www.epa.gov/safewater/lead.

2021 Sourdough Test Results

	LOCATION	MIN	MAX	DETECTED LEVEL	UNITS
SOURDOUGH					
Native Fluoride	Plant Influent	0.00	0.26	0.12	ppm
Barium	Entry Point 502			19.00	ppb
1st Service Fluoride	Distribution System	0.04	0.76	0.53	ppm
Turbidity*	Plant Effluent	0.013	0.047	0.019	NTU
Radium** (Combined 226/228)	Entry Point 502			0.6 (+/-1.0)	pCi/L
Gross Alpha**	Entry Point 502			2.0 (+/-1.7)	pCi/L
Uranium**	Entry Point 502			0.0004	mg/L
UCMR4					
HAA5***	DBP1	13.5	20.7	17.1	ppb
HAA6Br***	DBP1	0.86	1.21	1.04	ppb
HAA9 ***	DBP1	14.36	21.91	18.14	ppb
HAA5 ***	DBP4	15.1	23.0	19.05	ppb
HAA6Br ***	DBP4	0.91	1.09	1.00	ppb
HAA9 ***	DBP4	16.01	24.09	20.05	ppb
Manganese ***	Entry Point 502	<0.40	0.64	0.32	ppb

ADDITIONAL WATER QUALITY INFORMATION					
Alkalinity	Plant Effluent	52.40	105.60	84.20	ppm
Chloride	Plant Effluent	0.53	3.22	1.42	ppm
Free Chlorine	Plant Effluent	0.59	1.08	0.81	ppm
Calcium Hardness	Plant Effluent	37.60	78.00	58.99	ppm
Calcium	Plant Effluent	15.04	31.20	23.60	ppm
Magnesium Hardness	Plant Effluent	16.80	40.80	27.36	ppm
Magnesium	Plant Effluent	4.10	9.96	6.68	ppm
Total Hardness	Plant Effluent	54.40	105.60	86.35	ppm
Total Hardness (Grains)	Plant Effluent	3.18	6.17	5.04	Grains
pH	Plant Effluent	8.25	8.77	8.48	SU
Sodium	Plant Effluent	3.30	7.10	5.61	ppm
Sulfate	Plant Effluent	0.00	7.00	2.67	ppm
Iron	Plant Effluent	0.000	0.020	0.011	ppm
Total Dissolved Solids	Plant Effluent	59.70	123.00	89.45	ppm
Dissolved Oxygen	Plant Effluent	8.30	12.60	10.90	ppm
Aluminum	Plant Effluent	0.000	0.030	0.003	ppm
Phosphorus	Plant Effluent	0.030	0.280	0.113	ppm
UV254 (Organics)	Plant Effluent	85.00	100.00	95.24	%T

**last collected in 2018 per EPA regulations

***last collected 2020 per EPA regulations

MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
4		4	Erosion of natural deposits
2000 ppb		2000 ppb	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
4		4	Erosion of natural deposits; water additive which promotes strong teeth
TT= 1 NTU TT= 95% < 0.15 NTU			Natural result of soil runoff
5 pCi/L		0 pCi/L	Erosion of natural deposits
15 pCi/L		0 pCi/L	Erosion of natural deposits
0.03 mg/L		0 pCi/L	Erosion of natural deposits
60			By-product of drinking water chlorination
			By-product of drinking water chlorination
			By-product of drinking water chlorination
60			By-product of drinking water chlorination
			By-product of drinking water chlorination
			By-product of drinking water chlorination
50			Erosion of natural deposits

NA
250
4 (MRDL)
NA
NA
NA
NA
NA
6.5-9.3
20
500
0.3
500
NA
0.20
NA

*Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. The City of Bozeman's filtered water must be less than, or equal to 0.15 NTU in at least 95% of monthly measurements, and it can never exceed 1 NTU. The single highest measurement was 0.047 NTU. Bozeman's average daily turbidity was 0.019 NTU.

2021 Lyman Creek Test Results

	LOCATION	MIN	MAX	DETECTED LEVEL	UNITS
LYMAN CREEK					
Native Fluoride	Plant Influent	0.09	0.26	0.16	ppm
Nitrate + Nitrite	Entry Point 504			0.184	ppm
Fluoride	Entry Point 504	0.04	0.86	0.53	ppm
Barium	Entry Point 504			25.8	ppb
Selenium	Entry Point 504			0.74	ppb
Radium*** (Combined 226/228)	Entry Point 504			0.7 (+/-1.1)	pCi/L
Gross Alpha***	Entry Point 504			3.1 (+/-2.5)	pCi/L
Uranium***	Entry Point 504			0.0007	mg/L

ADDITIONAL WATER QUALITY INFORMATION					
Alkalinity	Plant Effluent	130.00	148.00	138.35	ppm
Chloride	Plant Effluent	0.35	1.63	0.77	ppm
Free Chlorine	Plant Effluent	0.42	0.60	0.53	ppm
Calcium Hardness	Plant Effluent	99.00	121.00	106.83	ppm
Calcium	Plant Effluent	39.60	48.40	42.73	ppm
Magnesium Hardness	Plant Effluent	50.00	73.00	60.05	ppm
Magnesium	Plant Effluent	12.21	17.83	14.66	ppm
Total Hardness	Plant Effluent	152.00	191.00	166.88	ppm
Total Hardness (Grains)	Plant Effluent	8.88	11.16	9.75	Grains
pH	Plant Effluent	7.61	8.19	7.89	SU
Sodium	Plant Effluent	0.72	2.56	1.64	ppm
Sulfate	Plant Effluent	8.00	15.00	10.67	ppm
Iron	Plant Effluent	0.00	0.07	0.02	ppm
Total Dissolved Solids	Plant Effluent	131.00	151.40	146.57	ppm
Turbidity (in NTU)	Plant Effluent	0.02	0.17	0.04	NTU
Dissolved Oxygen	Plant Effluent	3.00	9.30	7.60	ppm
Aluminum	Plant Effluent	0.000	0.005	0.001	ppm
Phosphorus	Plant Effluent	0.020	0.100	0.054	ppm
UV254 (Organics)	Plant Effluent	94.200	100.000	98.533	%T

***last collected in 2018 per EPA regulations

MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
4 ppm		4 ppm	Erosion of natural deposits
Nitrate -10 ppm Nitrite - 1 ppm		10 ppm 1ppm	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
4 ppm		4 ppm	Erosion of natural deposits; water additive which promotes strong teeth
2000 ppb		2000 ppb	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
50 ppb		50 ppb	Discharge from petroleum refineries; discharge from mines; erosion of natural deposits
5 pCi/L		0 pCi/L	Erosion of natural deposits
15 pCi/L		0 pCi/L	Erosion of natural deposits
0.03 mg/L		0 pCi/L	Erosion of natural deposits

NA			
250			
4 (MRDL)		4 ppm	
NA			
NA			
NA			
NA			
NA			
6.5-9.3			
20			
500			
0.3			
500			
<1.0			
NA			
0.20			
NA			



Water and Your Health

All 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. Some people may be more vulnerable to contaminants in drinking water than the public in general. 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 of infections from contaminants. These people should seek advice about drinking water from their health care providers.

More information about contaminants and potential health effects, or to receive a copy of the EPA and the US Center for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and microbiological contaminants, can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 800-426-4791.

For More Information

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