CITY OF BOZEMAN
Water Treatment Plant

2014 Water Quality Report

January 1, 2014-December 31, 2014

www.bozeman.net

The City of Bozeman is Pleased to Present our 2014 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 2014.

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 Superintendent at 406-994-0501. This report is also available at the City of Bozeman website, www.bozeman.net/Residents/Water-Quality.

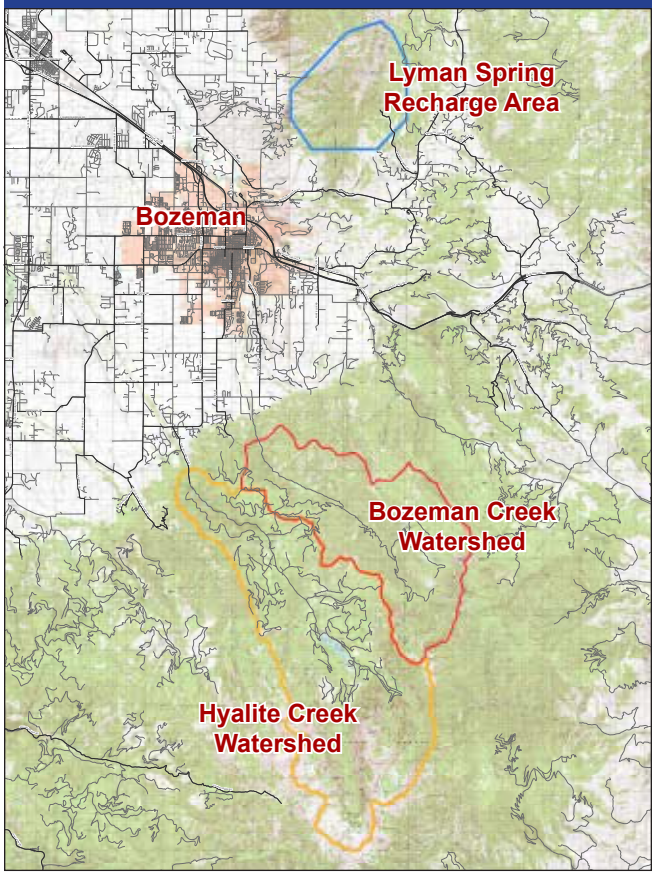
If you are a landlord or property manager, or know someone who is not billed directly, please share this report with your tenants and friends.

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 Monday 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 carried by pipeline to the water treatment plant.

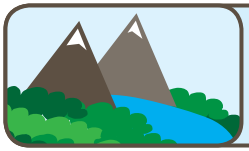
Sourdough Creek (Bozeman Creek)

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.

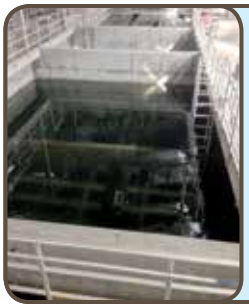
Sourdough Canyon Water Treatment Plant

In March 2014, a new 22 million gallon per day (MGD) microfiltration membrane filtration plant with robust pretreatment began treating water from Sourdough and Middle Creek. It replaced a 15 MGD direct filtration multimedia plant. The City is now better able to meet increased service demands and

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 6350 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.

Filtrate Conduit and Distribution System

comply with the Environmental Protection Agency and Montana Department of Environmental Quality regulations. (See Sourdough Creek Treatment Process).

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 mircon 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. (See Sourdough Creek Treatment Process).

Raw water can vary during the year. It is effected by spring runoff, rainstorms, accidental spills, and landslides. The new water treatment facility has capability to treat these varying conditions, thus can provide very high quality drinking water to Bozeman consistently.

Lyman Creek Treatment Process

Chlorine is added for disinfection.

Treated water is stored for use.

Fluoride is added for cavity prevention.

Distribution system

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.

2014 Test Results

Listed in the tables on the following pages are all the contaminants *detected* in Bozeman's drinking water after treatment during the 2014 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.

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.

UCMR3: Unregulated Contaminant Monitoring Rule #3. Sampled at each WTP entry point (EP) to the system and in the distribution system Maximum Residence Time (MRT) for each source.

2014 Sourdough Test Results

SYSTEM	LOCATION	MIN	MAX	DETECTED LEVEL	UNITS	MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
Trihalomethanes (THMs)						80			By-product of drinking water chlorination
	DBP1	11.00	25.00	18.50	ppb				
	DBP2	2.00	6.10	4.18	ppb				
	DBP3	7.90	26.00	14.45	ppb				
	DBP4	19.00	49.00	31.25	ppb				
Haloacetic Acids (HAA5s)						60			By-product of drinking water chlorination
	DBP1	9.80	24.00	18.38	ppb				
	DBP2	0.72	4.70	2.43	ppb				
	DBP3	7.90	24.00	13.85	ppb				
	DBP4	12.00	32.00	24.00	ppb				
Lead*			Zero Sites exceeded A.L.	3.0 (90th percentile)	ppb		15	0	Erosion of natural deposits; corrosion of household plumbing systems
Copper*			Zero Sites exceeded A.L.	0.053 (90th percentile)	ppm		1.3	1.3	Erosion of natural deposits; corrosion of household plumbing systems
Total Coliform				1 positive sample		<1 sample/mo			Naturally present in the environment

SOURDOUGH									
Native Fluoride		0.07	0.34	0.19	ppm	4		4	Erosion of natural deposits
1st Service Fluoride		0.27	1.54	0.69	ppm	4		4	Erosion of natural deposits; water additive which promotes strong teeth
Turbidity **		0.011	0.055	0.013	NTU	TT= 1 NTU TT= 95% < 0.15 NTU			Natural result of soil runoff
EP Chlorate	Entry Point 502	26.8	49.7	38.2	ppb				Results from disinfection with sodium hypochlorite
EP Chromium-6	Entry Point 502	0.10	0.14	0.12	ppb	Total Cr = 100			Naturally occurring or from industrial activities
EP Strontium	Entry Point 502	66.0	78.1	73.2	ppb				Naturally occurring in the environment
EP Vanadium	Entry Point 502	0.36	0.73	0.53	ppb				Naturally occurring in the environment
MRT Chlorate	Max. Residence Time 502	25.6	50.5	38.0	ppb				Results from disinfection with sodium hypochlorite
MRT Chromium-6	Max. Residence Time 502	0.09	0.14	0.12	ppb	Total Cr = 100			Naturally occurring or from industrial activities
MRT Strontium	Max. Residence Time 502	65.0	78.6	71.9	ppb				Naturally occurring in the environment
MRT Vanadium	Max. Residence Time 502	0.35	0.78	0.53	ppb				Naturally occurring in the environment

ADDITIONAL WATER QUALITY INFORMATION						
Alkalinity		68.40	88.40	78.40	ppm	NA
Chloride		1.91	7.55	3.08	ppm	250
Free Chlorine		0.28	1.70	1.21	ppm	4 (MRDL)
Calcium Hardness		22.10	66.40	51.58	ppm	NA
Calcium		8.84	26.56	20.63	ppm	NA
Magnesium Hardness		13.00	57.10	28.46	ppm	NA
Magnesium		3.17	13.94	6.95	ppm	NA
Total Hardness		65.60	102.40	80.04	ppm	NA
Total Hardness (Grains)		3.83	5.98	4.68	Grains	NA
pH		7.71	8.88	8.27	SU	6.5-9.3
Sodium		4.16	6.40	5.29	ppm	20
Sulfate		1.00	10.00	4.36	ppm	500
Iron		0.000	0.040	0.017	ppm	0.3
Total Dissolved Solids		70.40	132.00	91.99	ppm	500
Turbidity		0.000	0.040	0.012	NTU	0.15
Dissolved Oxygen		5.30	13.70	9.91	ppm	NA
Aluminum		0.000	0.100	0.012	ppm	0.20
Manganese		0.000	0.400	0.087	ppm	0.05
UV254 (Organics)		90.60	98.10	95.66	%T	NA

*Lead has not been detected in Bozeman's source water. This sampling was done in July of 2012 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.

**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 0.055 NTU. Bozeman's average daily turbidity was 0.013 NTU.

2014 Lyman Creek Test Results

	LOCATION	MIN	MAX	DETECTED LEVEL	UNITS	MCL	AL	MCLG	TYPICAL CONTAMINANT SOURCE
LYMAN CREEK									
Nitrate + Nitrite	Entry Point 504			0.15	ppm	Nitrate -10 ppm Nitrite - 1 ppm		10 ppm 1ppm	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Fluoride	Entry Point 504	0.16	1.24	0.81	ppm	4 ppm		4 ppm	Erosion of natural deposits; water additive which promotes strong teeth
Radium*** (Combined 226/228)	Entry Point 504			0.8 (+/-0.4)	pCi/L	5 pCi/L		0 pCi/L	Erosion of natural deposits
Gross Alpha***	Entry Point 504			2.0 (+/-1.4)	pCi/L	15 pCi/L		0 pCi/L	Erosion of natural deposits
Haloacetic Acids (HAA5s)						60			By-product of drinking water chlorination
UCMR3									
EP Chlorate	Entry Point 504			103.7	ppb				Results from disinfection with sodium hypochlorite
EP Chromium-6	Entry Point 504			0.088	ppb	Total Cr = 100 ppb			Naturally occuring or from industrial activities
EP Molybdemum	Entry Point 504			1.01	ppb				Naturally occuring in the environment
EP Strontium	Entry Point 504			94.7	ppb				Naturally occuring in the environment
EP Vanadium	Entry Point 504			0.369	ppb				Naturally occuring in the environment
MRT Chlorate	Max. Residence Time 504			103.1	ppb				Results from disinfection with sodium hypochlorite
MRT Chromium-6	Max. Residence Time 504			0.093	ppb	Total Cr = 100 ppb			Naturally occuring or from industrial activities
MRT Molybdemum	Max. Residence Time 504			1.04	ppb				Naturally occuring in the environment
MRT Strontium	Max. Residence Time 504			95.3	ppb				Naturally occuring in the environment
MRT Vanadium	Max. Residence Time 504			0.382	ppb				Naturally occuring in the environment
MRT Vanadium	Max. Residence Time 502	0.35	0.78	0.53	ppb				Naturally occurring in the environment
ADDITIONAL WATER QUALITY INFORMATION									
Alkalinity		120.00	153.00	136.06	ppm	NA			
Chloride		1.26	5.42	3.09	ppm	250			
Free Chlorine		0.98	1.20	1.07	ppm	4 (MRDL)		4 ppm	
Calcium Hardness		67.20	107.20	97.09	ppm	NA			
Calcium		26.88	42.88	38.83	ppm	NA			
Magnesium Hardness		48.80	91.20	67.00	ppm	NA			
Magnesium		11.92	22.27	16.36	ppm	NA			
Total Hardness		156.00	170.00	164.09	ppm	NA			
Total Hardness (Grains)		9.11	9.93	9.58	Grains	NA			
pH		7.69	8.27	7.86	SU	6.5-9.3			
Sodium		1.05	11.70	3.03	ppm	20			
Sulfate		14.00	31.00	21.71	ppm	500			
Iron		0.01	0.17	0.05	ppm	0.3			
Total Dissolved Solids		139.90	166.80	160.80	ppm	500			
Turbidity (in NTU)		0.03	0.27	0.06	NTU	<1.0			
Dissolved Oxygen		2.00	10.10	7.63	ppm	NA			
Aluminum		0.000	0.011	0.004	ppm	0.20			
Manganese		0.000	0.100	0.047	ppm	0.05			
UV254 (Organics)		99.100	102.400	100.471	%T	NA			

***last collected in 2010 per EPA regulations

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

Eric Campbell, Superintendent
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www.bozeman.net