



Analytical Results Interpretation

Bridger Analytical Lab is capable of testing for ALL analytes listed in this document at our lab in Bozeman, MT.

Useful Definitions	
MCL: Maximum Contaminant Level, as set by the EPA. A result above this number is considered unsafe for drinking.	ND: None detected; Analyte was not detected in the sample above the respective reporting limit
mg/L: milligrams per liter; parts per million	ug/L: micrograms per liter; parts per billion
uS/cm: microsiemens per centimeter; unit of measurement for electrical conductivity	NTU: Nephelometric Turbidity unit; unit used to measure light scattering particles in water

Bacteriological (Included with Package #3 and #4)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Total Coliform Bacteria – Should not be present in groundwater	N/A	Absent	Satisfactory	EPA suggests testing all wells at least annually
		Present	Unsafe for Consumption	Generally not a direct health threat, but suggests other harmful bacteria may be present
E. Coli Bacteria – Indication of fecal contamination	N/A	Absent	Satisfactory	EPA suggests testing all wells at least annually
		Present	Unsafe for Consumption	Direct health threat. Can cause gastrointestinal illness, skin, ear, respiratory, eye, neurologic, and wound infections

Basic Mineral Content (Included with Package #1-5)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Alkalinity – A measure of the water's capacity to resist a change of pH	N/A	ND to 100 mg/L	Corrosive	Can cause corrosion of pipes
		100 to 200 mg/L	Satisfactory	
		200 mg/L or higher	Scaling	Can cause scaling and may have a soda-like taste
Conductivity – Measure of how well the water conducts electricity. A broad measure of total dissolved minerals, similar to TDS	N/A	ND to 400 uS/cm	Satisfactory	Normal range for untreated well water in Montana
		400 to 1000 uS/cm	Moderate	
		1000 uS/cm or higher	Objectionable	May cause mineral build up on fixtures. Could be an indication of other analytes being over their respective MCL
Hardness – Consists of calcium and magnesium ions in the water. Can cause a buildup of white residue around fixtures, sinks, and inside hot water heaters	N/A	ND to 60 mg/L	Soft	Can be corrosive to pipes and plumbing, but generally not an issue
		60 to 120 mg/L	Moderate	Generally a satisfactory intermediate
		120 to 180 mg/L	Hard	High risk to cause scaling and residue buildup
		180 mg/L or higher	Very Hard	Will likely cause abundant scaling and deposit buildup on all fixtures. A water softening system is recommended
pH – Indicates how acidic or basic the water is. A pH of 7 is neutral	N/A	Less than 6.5	Objectionable	Considered acidic. May have a metallic taste and is a greater risk for corrosion of plumbing
		6.5 to 8.5	Satisfactory	Optimal range for drinking water
		Greater than 8.5	Objectionable	Considered basic. May have a slippery feel and soda-like taste

Total Mineral Content (Included with Package #2-5)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Calcium – Naturally occurring mineral that is essential to the human diet	N/A	Any value	Satisfactory	Major component of hard water, which leaves mineral deposits on faucets and other fixtures. See Hardness for more information. It is recommended to consume at least 1000 mg per day for health reasons.
Chloride – Naturally occurring in salts, found in its ionic form in water	250 mg/L	ND to 250 mg/L	Satisfactory	Most drinking water has at least a detectable amount of chloride.
		250 mg/L or higher	Objectionable	Higher concentrations can cause a salty taste.
Fluoride – Found in many types of rock, enters water through erosion. Common in Montana. Many municipal systems add a small amount through treatment plants	4 mg/L	ND to 0.7 mg/L	Satisfactory	Below ideal range for protection of tooth enamel
		0.7 to 1.5 mg/L	Satisfactory	Ideal range for protection of tooth enamel
		1.5 to 2.0 mg/L	Satisfactory	Above ideal range for protection of tooth enamel
		2.0 to 4.0 mg/L	Objectionable	Levels above 2 mg/L can cause mottling or permanent white stains on teeth.
		4.0 mg/L or higher	Unsafe for Consumption	Above 4 mg/L can cause dental or skeletal fluorosis
Lithium – Naturally occurring mineral generally found in low concentrations in MT	N/A	No current EPA guidelines exist for Lithium in drinking water. This metal has been used in pharmaceuticals to treat mental health disorders, but can cause adverse health effects such as impaired thyroid and kidney function.		
Magnesium - Naturally occurring mineral that is essential to the human diet	N/A	Any Value	Satisfactory	Significant component of hard water, which leaves mineral deposits on faucets and other fixtures. See Hardness for more information.
Nitrate + Nitrite – Inorganic forms of the nitrogen cycle. Can be an early warning that a well is being contaminated by a source of waste. It is suggested to test for N+N annually	10 mg/L	ND to 1 mg/L	Satisfactory	
		1 to 4 mg/L	Possible contamination	Potential pollution exists. Continue monitoring annually
		4 to 10 mg/L	Above normal natural levels	May indicate runoff from agricultural operations or septic system contamination
		10 mg/L or higher	Unsafe for Consumption	Can be fatal to infants under 1 year old. High levels of nitrate indicate risk for contamination from other analytes as well.
Phosphate - Inorganic form of the phosphorus cycle. Can be an early warning that a well is being contaminated by a source of waste. Often used in fertilizers	N/A	ND to 10 mg/L	Satisfactory	It is suggested to monitor for phosphate annually.
		10 mg/L or above	Objectionable	Not a direct health threat, but could indicate a contamination from surface water runoff
Potassium - Naturally occurring mineral that is essential to the human diet	N/A	Any value	Satisfactory	A healthy adult should consume 4700 mg of potassium per day through food

Total Mineral Content (continued, included in Package #2-5)				
Sodium – Common mineral found in Montana water. Also used in water softening systems	N/A	Any value	Satisfactory	Can have a salty taste over 250 mg/L. High background sodium can also prevent water softeners from working properly. Consult your medical doctor if on sodium dietary restrictions.
Sulfate – Abundant mineral found in most water in Montana	250 mg/L	ND to 250 mg/L	Satisfactory	Can have a laxative effect, and may impart a bitter, medicinal taste to the drinking water
		250 mg/L or higher	Objectionable	

Dissolved Trace Metals (Included in Package #3 and #4)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Arsenic – Occurs naturally in rock and soil. Very common in Montana	10 ug/L	ND to 10 ug/L	Satisfactory	Consider annual testing if arsenic is detected in any amount
		10 ug/L or higher	Unsafe for Consumption	Short Term: Vomiting, diarrhea, skin lesions Long Term: Cancer of the skin, lungs, urinary bladder, and kidney, as well as other skin changes
Copper – Commonly found in water as a result of corrosion of pipes	1300 ug/L	ND to 1300 ug/L	Satisfactory	Essential nutrient in small amounts
		1300 ug/L or higher	Unsafe for Consumption	May cause green staining in sinks or tubs. Can cause gastrointestinal distress and liver or kidney disease
Lead – Can be naturally occurring but generally comes from corrosion of lead or brass plumbing fixtures, or old solder pipe joints	15 ug/L	ND to 15 ug/L	Satisfactory	Consider annual testing if result is higher than 5 ug/L
		15 ug/L or higher	Unsafe for Consumption	Can cause physical or mental developmental disabilities, especially in children. Can also cause kidney problems and high blood pressure
Mercury - Naturally occurring heavy metal that is found within the Earth's Crust	2 ug/L	ND to 2 ug/L	Satisfactory	Consider annual testing if mercury is detected in any amount
		2 ug/L or higher	Unsafe for Consumption	Can cause kidney, digestive system, or brain damage. Also associated with skin rashes
Uranium (Natural) - Occurs in nature in the form of minerals. Leaches from soil and rocks	30 ug/L	ND to 30 ug/L	Satisfactory	Consider annual testing if Uranium is detected above 10 ug/L
		30 ug/L or higher	Unsafe for Consumption	Prolonged exposure via ingestion can lead to kidney toxicity and Uranium is a known carcinogen
Manganese – Naturally occurring metal that is essential to the human diet	300 ug/L	ND to 50 ug/L	Satisfactory	
		50-300 ug/L	Objectionable	Can cause a bitter, metallic taste and cause black or brown staining of fixtures
		300 ug/L or higher	Unsafe for Consumption	Preliminary EPA limit. Long term exposure to manganese at this level can cause harm to the nervous system.

Total Iron (included in Package #3-5)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Iron (Total) – Abundant naturally occurring metal that is essential to the human diet	N/A	ND to 0.3 mg/L	Satisfactory	Can cause red-orange colored water, stain plumbing fixtures, and have an objectionable metallic taste
		0.3 mg/L or higher	Objectionable	

Dissolved Trace Metals (Included in Package #4)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Aluminum – 3 rd most common element in Earth’s crust. Also found in some water treatment systems	N/A	ND to 200 ug/L	Satisfactory	
		200 ug/L or higher	Objectionable	Can cause cloudy, colored water, but is still safe for consumption
Antimony - a metal found in natural deposits as ores containing other elements	6 ug/L	ND to 6 ug/L	Satisfactory	Consider annual testing if antimony is detected in any amount
		6 ug/L or higher	Unsafe for Consumption	Short Term: Nausea, vomiting, diarrhea Long Term: Antimony is a known carcinogen
Barium – Exists in nature in ores containing mixtures of elements. Also used in well drilling operations	2000 ug/L	ND to 2000 ug/L	Satisfactory	
		2000 ug/L or higher	Unsafe for Consumption	Can cause gastrointestinal issues and high blood pressure
Beryllium - Found in natural deposits as ores containing other elements	4 ug/L	ND to 4 ug/L	Satisfactory	Consider annual testing if beryllium is detected in any amount
		4 ug/L or higher	Unsafe for Consumption	Long term exposure can cause damage to bones and lungs or cancer
Boron – Abundant element naturally found in minerals in the Earth’s crust	N/A	ND to 2000 ug/L	Satisfactory	
		2000 ug/L or higher	Objectionable	Generally considered safe for most adults, but pregnant women should not consume as it can adversely affect the fetus
Cadmium – Can be found in natural deposits or from corrosion of galvanized pipes and other metal alloys	5 ug/L	ND to 5 ug/L	Satisfactory	Consider annual testing if cadmium is detected in any amount
		5 ug/L or higher	Unsafe for Consumption	Short Term: Vomiting, diarrhea, cramps, kidney issues Long Term: Kidney, liver, bone, and blood damage
Chromium - found in natural deposits as ores containing other elements, as well as a component of stainless steel and other metal alloys	100 ug/L	ND to 100 ug/L	Satisfactory	Consider annual testing if chromium is detected in any amount
		100 ug/L or higher	Unsafe for Consumption	Short Term: Skin irritation or ulceration Long Term: Damage to liver, kidney circulatory and nerve tissues; skin irritation
Cobalt – Natural metal found throughout the environment, including food. Also used in some alloys	N/A	There is no current EPA guideline for Cobalt in drinking water. It is essential in trace amounts for humans and other mammals as it is an integral component of the vitamin B12 complex. It is highly unlikely that a dangerous amount of exposure could occur from drinking water. Rarely found in Montana groundwater.		
Molybdenum – An essential nutrient in human diets. Found in small amounts in leafy vegetables, legumes, and seeds	N/A	ND to 40 ug/L	Satisfactory	
		40 ug/L or higher	Objectionable	In animal studies, high levels of molybdenum intake resulted in reproductive issues, although not enough data exists for human effects

Dissolved Trace Metals (continued, included in Package #4)				
Analyte	MCL	Result Range	Result	Warnings/Comments
Nickel – Can be naturally occurring but generally comes from corrosion of pipes and fittings	N/A	ND to 100 ug/L	Satisfactory	Consider annual testing if nickel is detected in any amount
		100 ug/L or higher	Objectionable	Can cause skin irritation and dermatitis at high levels
Selenium – Enters water through natural deposits, or can be found in discharge from mines	50 ug/L	ND to 50 ug/L	Satisfactory	Consider annual testing if selenium is detected in any amount
		50 ug/L or higher	Unsafe for Consumption	Prolonged exposure can cause fingernail or hair loss, numbness in extremities, or circulation problems.
Strontium – Occurs naturally in some minerals, including calcium carbonate	N/A	ND to 4000 ug/L	Satisfactory	
		4000 ug/L or higher	Objectionable	Exposure to high levels during infancy and childhood can affect bone growth and cause dental changes.
Thallium - Metal found in natural deposits as ores containing other elements. Used in specialized electronic research equipment	2 ug/L	ND to 2 ug/L	Satisfactory	Consider annual testing if thallium is detected in any amount
		2 ug/L or higher	Unsafe for Consumption	Short Term: Gastrointestinal irritation; nerve damage Long Term: Changes in blood chemistry; damage to liver, kidney, intestinal, and testicular tissues; hair loss
Titanium – Present in many rocks; Generally found in water in its oxidized form	N/A	No current EPA guidelines exist for Titanium, and generally considered non-toxic; Titanium does not play a significant role in any body functions, and the body can tolerate relatively high doses as it does not bioaccumulate.		
Vanadium - Naturally occurs in many different minerals and in fossil fuel deposits. Used in the strengthening of steel	N/A	ND to 21 ug/L	Satisfactory	
		21 ug/L or higher	Objectionable	Being studied as a possible carcinogen, although no direct evidence as of 2022.
Zinc – Naturally occurring metal that is essential to the human diet	N/A	ND to 5000 ug/L	Satisfactory	
		5000 ug/L or higher	Objectionable	Can cause a metallic taste

Other Inorganic Analytes				
Analyte	MCL	Result Range	Result	Warnings/Comments
Bromate - Formed when ozone, or other oxidizing agents that are used to disinfect drinking water, reacts with naturally occurring bromide found in the source water	10 ug/L	ND to 10 ug/L	Satisfactory	
		10 ug/L or higher	Unsafe for Consumption	Can cause gastrointestinal symptoms such as nausea, vomiting, diarrhea and abdominal pain.
Bromide - Commonly found in nature along with sodium chloride and shale, but also in sources associated with fossil fuels (notably coal)	N/A	ND to 6000 ug/L	Satisfactory	Result above this value is very uncommon
		6000 ug/L or higher	Objectionable	Can cause nausea and vomiting, abdominal pain, coma, and paralysis but only when consumed in large amounts in a short time period
Chlorate - Highly oxidized form of chlorine, can result from water disinfection	N/A	ND to 1000 ug/L	Satisfactory	
		1000 ug/L or higher	Objectionable	Consumption by infants and young children in high concentrations can cause problems to the nervous system and anemia
Chlorite – Oxidized form of chlorine; similar to chlorate (above)	1000 ug/L	ND to 1000 ug/L	Satisfactory	
		1000 ug/L or higher	Unsafe for Consumption	Consumption by infants and young children in high concentrations can cause problems to the nervous system and anemia
Total Dissolved Solids (TDS) – Sum of the mass of all dissolved materials in water	N/A	ND to 500 mg/L	Satisfactory	Normal; could still have low concentration of dangerous contaminants
		500 mg/L or higher	Objectionable	Could cause water to be colored, taste poor, stain, or cause digestive issues. Can also leave a residue behind after drying
Turbidity - The measure of relative optical clarity of water	N/A	ND to 2 NTU	Satisfactory	
		2 NTU or higher	Objectionable	Excessive turbidity, or cloudiness, is aesthetically unappealing, and may also represent a health concern. Can promote growth of pathogens

Technical Sources and References:

<https://www.epa.gov/safewater/privatewells>

<https://www.wqa.org/learn-about-water>

<https://www.freedrinkingwater.com/water-contamination/>

<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>

<https://www.usgs.gov/news/strontium-us-groundwater-used-drinking-water-source>

https://www.epa.gov/sites/default/files/2014-09/documents/summary_document_from_the_ha_for_boron.pdf