DENVER WATER

2011
Treated Water Quality Summary

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DENVER WATER

2011 TREATED WATER SUMMARY

Introduction

Denver Water provides its customers with high-quality drinking water. We want you to be aware of how that quality is maintained and learn more about the water treatment process. We take great care and effort into providing the Denver-metro area with water that meets the most stringent standards. This report was prepared to provide you with important information about Denver's water quality.

Table 1: Measurement Units Interpretation Table

Unit	Full Name	Equivalent to:
General Terms		
SU	Standard Units (a measurement of pH)	
µS	Micro Siemens (a measurement of Specific Conductance)	Micro mhos
°C	Degrees Celsius (a measurement of temperature)	25°C ≈ (= approx.) 77°F (Fahrenheit)
Chemical Terms		
mg/L	Milligrams per Liter	Parts per million (ppm)
µg/L	Micrograms per Liter	Parts per billion (ppb)
ng/L	Nanograms per Liter	Parts per trillion (ppt)
NTU	Nephalometric Turbidity Units (a measurement of clarity, fine particulate matter)	
pCi/L	PicoCuries per Liter (a measurement of radioactivity)	
AU	Absorbance units (a measurement of the absorbance at a specific wavelength)	
g/g	Grains per gallon a measure of water hardness, approximately = to 17.1 mg/L	
Microbiological Terms		
CFU/100 ml	Colony forming units per 100 milliliters (a bacterial unit)	
Count/ml	Count of organisms per milliliter of sample (a bacterial unit)	

Explanation of Terms

To better understand this report, please refer to Table 1, which gives brief explanations of terms and measurement units that are used in the document. Parameters such as temperature and turbidity is a measure of the discoloration or particulates in the water that interfere with the clarity of the water) are measurements of physical characteristics and are expressed in units specific to their analyses. Chemical results are generally expressed in terms of concentration, weight or amount per unit volume, for example, mg/L or µg/L. Microbiological results are generally expressed in terms of a count of organisms per volume of sample, for example, CFU/100 ml.

Report Data

This report includes graphs and tables summarizing data for samples collected throughout 2011 from the potable (drinking) water leaving Denver Water's treatment plants. This report also includes data from the source water to the treatment plants, and data from the distributed water. The data in this report are directly related to drinking water compliance criteria. Denver Water uses these analyses to ensure the safety and aesthetic quality of the water.

Some of the data is presented in graphs to highlight changes over time or dynamic ranges in the parameters. Results are expressed primarily as averages unless otherwise specified. On page 10 of this report, treated water results are displayed in tables that include the regulatory limit for the analysis where applicable. This year, trace levels of cyanide were detected in Marston Treatment Plant's treated water. It is a by-product of disinfection. Most of the time it was not present, but a few times it was detected at measurable levels. It is believed to be an artifact of the use of chloramines combining with natural organic matter. Only trace levels of cyanide were occasionally found, and it did not present a health or safety risk and were well below the MCL or level of concern.

Water quality is monitored both at the treatment plants and at more than 130 locations in the distribution system for various parameters each week. Total coliform bacteria are used as an indicator of water's potability. The percent of positive coliform samples each month is calculated and reported to the Colorado Department of Public Health and Environment (CDPHE), the primacy agency that enforces the Environmental Protection Agency regulations in Colorado. No more than five percent of the samples may be positive per month for total coliform. As evident from the table on page 3, Denver Water is well below the five percent level.

Where Does Denver Get Its Water?

Denver Water collects its water from two sources. The South Platte Collection System combines water from high mountain regions on the east slope of the Rocky Mountains, water diverted from Summit County and water from Dillon Reservoir on the west slope of the Continental Divide. The Moffat Collection System spans both sides of the Continental Divide, with the majority of it located in Grand County on the West Slope. Raw water from the Moffat Collection System is sent through the Moffat Tunnel to facilities northwest of Denver for storage and treatment. These sources provide high quality water, but their characteristics are quite different, and the source water mineral concentration varies seasonally with the amount of flow. In general, the water in the South Platte System has a higher mineral content than the water in the Moffat System.

How Is Water Treated To Make It Drinkable?

Denver Water has three treatment plants that process water for drinking, with a combined maximum treatment capacity of 715 million gallons per day. Two treatment plants, Foothills and Marston, process water from the South Platte Collection System. The third plant, Moffat, treats water from the Moffat Collection System. The treatment process begins with the addition of coagulants to raw water. These coagulants are commonly referred to as alum and polymer. Alum is aluminum sulfate, a chemical that attaches to dirt and other particles in the water. Through a process of slow mixing, the particles collide and stick together; as this process continues, the particles grow becoming large enough to see. The larger particles are called floc. Polymer enhances the process. These now larger and heavier particles settle to the bottom of the sedimentation basin. The clarified water at the top of the basin is then sent through filters-silica sand filters at Moffat Treatment Plant and sand and anthracite coal dual media filters at Marston and Foothills Treatment Plants. Filtration removes virtually all of the particles carried over from the sedimentation process. Each treatment plant produces extremely clear water, evidenced by low turbidities (a measure of clarity). Less than 0.10 turbidity units is a measure of clear, clean water. Potassium permanganate or powdered activated carbon may also be added to control excess manganese or odors, respectively.

Most of Denver Water's supply has naturally occurring fluoride. The Colorado Department of Public Health and Environment and the Centers for Disease Control and Prevention recommend optimal fluoridation. After filtration, the water may be supplemented to bring the total concentration of fluoride up to 0.70 mg/L. The health department and the Centers for Disease Control and

Watershed Collection System

Prevention have determined that 0.70 mg/L is the optimal level to prevent tooth decay. Caustic soda may also be used to control the pH (acidity/alkalinity) of the water. It is added to adjust the pH of the water to greater than 7.5 standard units. Finally, the water is thoroughly disinfected to maintain its high quality as it travels to homes and businesses.

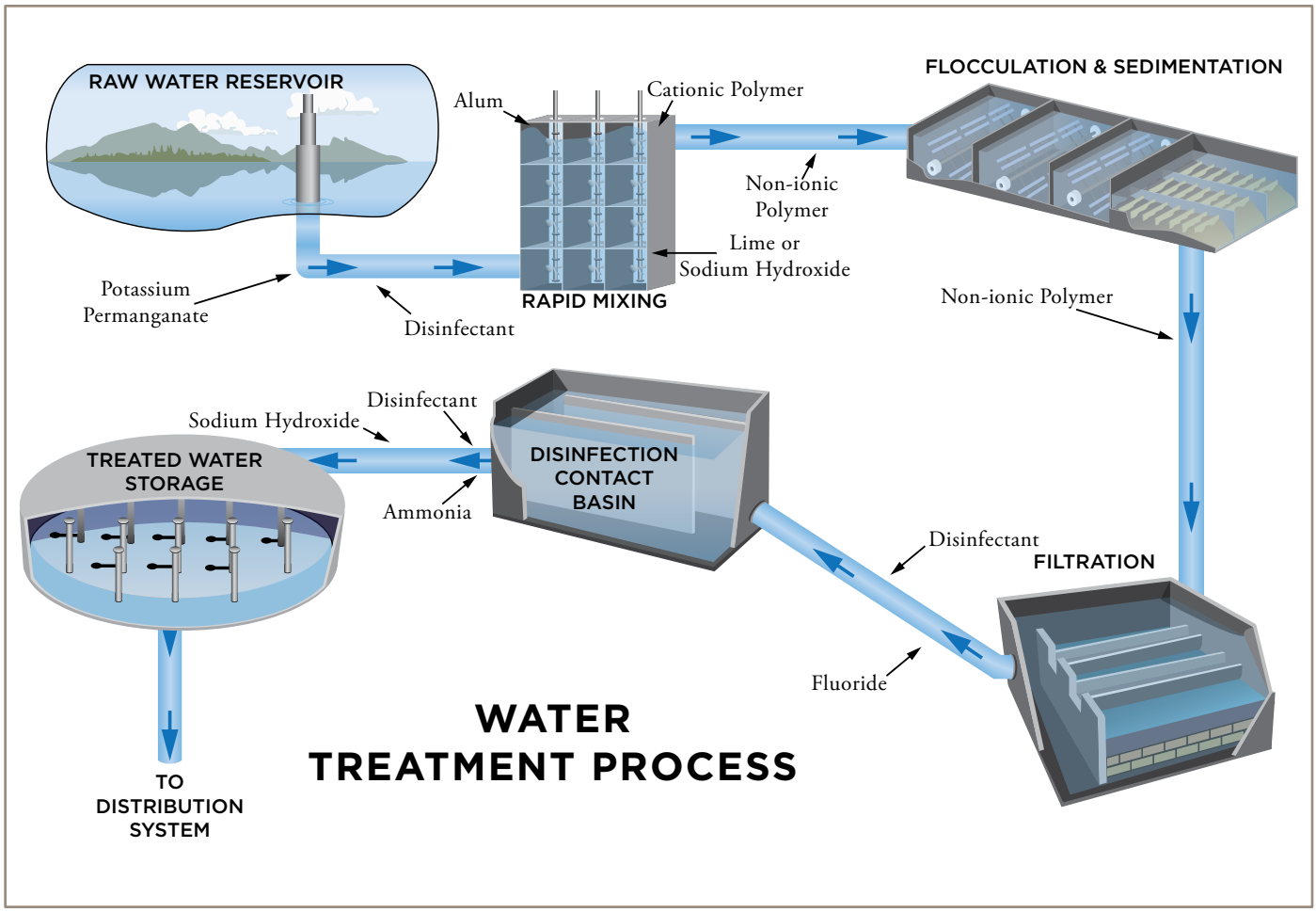
Table 2: Treatment Plant Treated Water and Distribution System Total Coliform Samples for 2011

Month	Number of Samples	Number of Positives	% Positive
January	403	0	0.00%
February	423	0	0.00%
March	489	0	0.00%
April	449	0	0.00%
May	468	0	0.00%
June	458	0	0.00%
July	434	0	0.00%
August	505	0	0.00%
September	439	0	0.00%
October	437	0	0.00%
November	420	1	0.24%
December	391	1	0.26%
Totals	5,316	2	0.04%

Why Is The Water Treated This Way?

The treatment process is designed to remove dirt, particulate matter, naturally occurring organic matter, and microscopic organisms, such as bacteria, that are found in surface waters. Disinfection kills potentially harmful microorganisms, Table 2. Disinfection of drinking water has saved millions of lives over the past century by preventing waterborne diseases such as typhoid and cholera. See Graph 1 on the following page.

Denver Water uses a very effective long-lasting disinfectant, chloramine, this produces lower concentrations of disinfection by-products, such as total trihalomethanes and haloacetic acids, than would free chlorine. Disinfection by-products above their regulatory limits are potentially harmful; therefore minimization of them is very important. The Environmental Protection Agency establishes the water quality regulations for all water utilities in the United States. In Colorado, the Colorado Department of Public Health and Environment is the agency that oversees and enforces these regulations. These regulations are very strict and require that drinking water is made safe for consumption over a person's lifetime. At present, there are more than 89 contaminants and groups of contaminants that are regulated in drinking water. Some of these contaminants, such as lead, are clearly a threat, while others are merely suspected of being health risks but are still considered serious enough to regulate. The Environmental Protection Agency has set regulatory limits for these compounds. Regulatory limits are levels of safety that must



not be exceeded in order to maintain safe drinking water. Some contaminants are regulated based on the possibility of their occurrence in water. Regulatory limits or levels were determined based on the best available data from health effects studies. The majority of the EPA's drinking water regulations apply to the treated water entering the distribution system before it reaches the first customer. Denver Water is happy to report that we have never violated a regulatory limit for any contaminant to date.

How Well Is Denver Water Doing?

Table 3 illustrates the effectiveness of treatment for a few parameters of note.

Turbidity is a measurement of the clarity of the water; thus, a low turbidity indicates very clear water. Most microorganisms, including bacteria, are attached to particulate matter (fine dirt and debris). Particulate matter accounts for much of the turbidity in water. Therefore, turbidity is an extremely important parameter and has been regulated by the EPA for many years. The turbidity regulation requires that turbidities in the treated water be less than or equal to 0.30 NTU (turbidity units) in 95 percent of the samples each month. In 2011, 100 percent of the samples were below 0.30 NTU and even below 0.10 NTU. See Graph 2.

The total coliform test is a measure of all types of coliform bacteria in the water. Coliform bacteria are ubiquitous they are even found in soils and on plants. We test for coliform bacteria, which includes *E. coli* (found in the intestines of all mammals, including humans) to determine the cleanliness of the water. We test for total coliform in our plant's source and treated waters, as well as throughout our entire distribution system. On the rare occasion when a sample has tested positive for total coliform samples must be taken at locations upstream and locations downstream of the original test site and at the site itself. This re-sampling is mandated by the state health department to assure the safety of the water and also to satisfy Denver Water's internal operating procedures. When a total coliform analysis is performed, we also test for *E. coli (Escherichia coli)*. *E. coli* is a member of the fecal coliform group of bacteria, and has been given much media attention in the past. The occurrence of *E. coli* is a specific indicator of fecal contamination and the possible presence of other harmful bacteria.

Graph 1: Typhoid Statisitcs 1890 to 1940

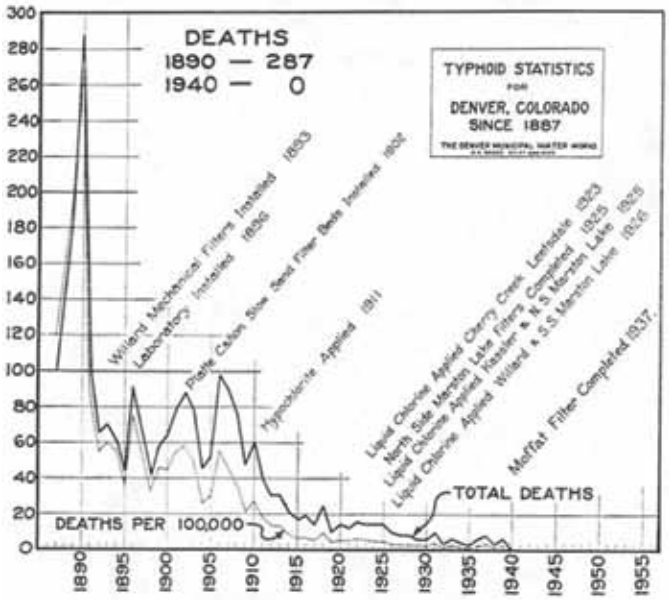


Table 3: Denver Water Average Values for 2011

PARAMETER	TREATMENT PLANT	RAW WATER RESULT	TREATED WATER RESULT	EPA REGULATORY LIMIT
Lead (ppb)	Marston	None detected	None detected	15 ppb (action level)
	Foothills			
	Moffat			
Arsenic (ppb)	Marston			10 ppb
	Foothills			
	Moffat			
Mercury (ppb)	Marston			2 ppb
	Foothills			
	Moffat			
Giardia (Cysts/L)	Marston	0.1		TT (Treatment Technique)
	Foothills	1.08		
	Moffat	None detected		
Cryptosporidium (Oocysts/L)	Marston	None detected		TT (Treatment Technique)
	Foothills	None detected		
	Moffat	None detected		
E. Coli (MPN/100 ml)	Marston	6		Ø
	Foothills	2		
	Moffat	None detected		

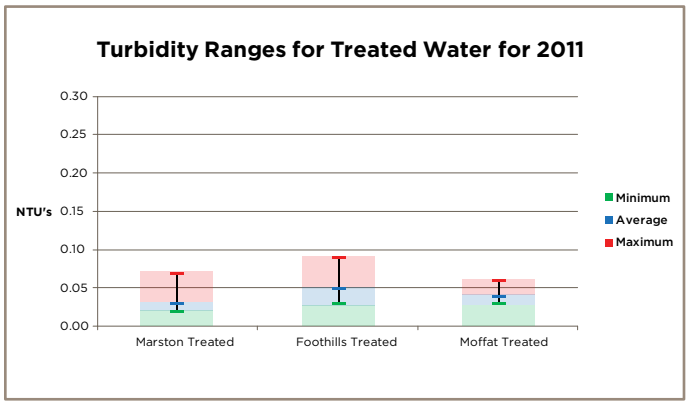
Are There More Serious Contaminants in the Water?

Denver Water has tested for all of the EPA-regulated compounds for years, and in anticipation of upcoming regulations, has tested for newly identified contaminants as well. Contaminants that have been seen in news headlines include lead, arsenic, mercury, *Cryptosporidium*, *Giardia*, and *E. coli (Escherichia coli)* among others. Denver Water has tested for these for more than 20 years and has not detected them in the treated water. *Giardia, E. coli* and *Cryptosporidium* have occasionally been detected in the source water, but the effective treatment system in our treatment plants, as outlined on page 3, removes or inactivates these microorganisms.

Minerals In Nature That Are Found In Water

All natural waters contain minerals found in the earth's crust. These mineral salts result from the natural erosion of soils, rocks and/or the decay of plants and aquatic life. The amounts of these minerals in water also determine the characteristics of the water, such as its hardness. Minerals in water give water its flavor. Mineral-rich water often tastes chalky. Of the minerals shown below, only barium and aluminum are regulated in the treated water. Barium has a maximum contaminant level of 2,000 ppb, while Aluminum has a secondary maximum contaminant level, which is a non-enforceable drinking water regulation (does not impose a health risk)of 50- 200 ppb. Most minerals are not removed by conventional treatment. Calcium, magnesium, iron and manganese amounts may be reduced by water treatment, but not completely removed. Please note that these comparisons, though from the same treatment plants, are not always from samples collected on the same dates for the source and the treated waters, and therefore are general comparisons. Drinking water naturally contains several minerals that are in fact beneficial to humans and mammals. The minerals in Table 4, are beneficial at prescribed levels. However, at levels *above* the regulatory limits (where applicable), some of these minerals may cause detrimental effects over a lifetime. If there is no regulatory limit, or maximum contaminant level, listed in the table, then the amount of the mineral that might cause a potential health concern is much higher than would ever be found in water.

Graph 2:



Comparison of Fluoride Between Untreated and Treated Water

Fluoride compounds naturally occur in Denver Water's source water. When needed, Denver Water supplements the fluoride level to adhere to the recommendation of 0.70 mg/L set forth by the Center for Disease Control and Prevention for the prevention of tooth decay. Water from the Moffat

Table 4: Denver Water Average Values for 2011

PARAMETER	TREATMENT PLANT	RAW WATER RESULT	TREATED WATER RESULT	EPA REGULATORY LIMIT
Aluminum (ppb)	Marston	85	29	50 - 200 (SMCL)
	Foothills	147	34	50 - 200 (SMCL)
	Moffat	134	<20	50 - 200 (SMCL)
Barium (ppb)	Marston	40	39	2,000
	Foothills	37	35	2,000
	Moffat	19	19	2,000
Calcium (ppm)	Marston	31	31	None
	Foothills	27	27	
	Moffat	8	12	
Magnesium (ppm)	Marston	7.9	7.9	
	Foothills	7.7	7.6	
	Moffat	2.3	2.3	
Potassium (ppm)	Marston	2	1.9	
	Foothills	1.7	1.7	
	Moffat	0.8	0.8	
Sodium (ppm)	Marston	17	21	
	Foothills	17	21	
	Moffat	3	6	

Collection System has lower amounts of natural fluoride and must be fortified to meet the recommended standard (Graph 4). Natural fluoride levels from the South Platte Collection System generally meet or exceed the recommended level in the untreated water, but both the Foothills and Marston treatment plants can supplement when needed (Graph 5 & 6). Note: Fluoride is tested monthly for the source water and six times daily for treated water. Marston Treatment Plant was out of service during February, March and in November of 2011.

pH

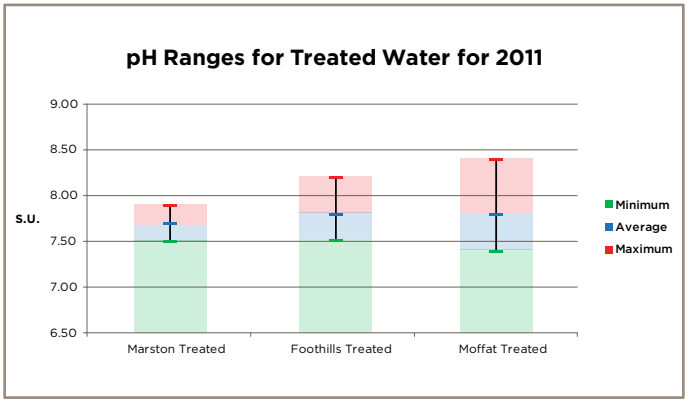
We measure the pH range of the water to ensure the water is not corrosive toward residential and distribution system plumbing. The pH of the water does not impact the safety of the water; it relates to the aggressiveness of it towards plumbing materials. Denver Water is required to maintain a pH greater than 7.5 SU to ensure that the water does not leach potentially harmful metals from plumbing, see Graph 3.

Hardness

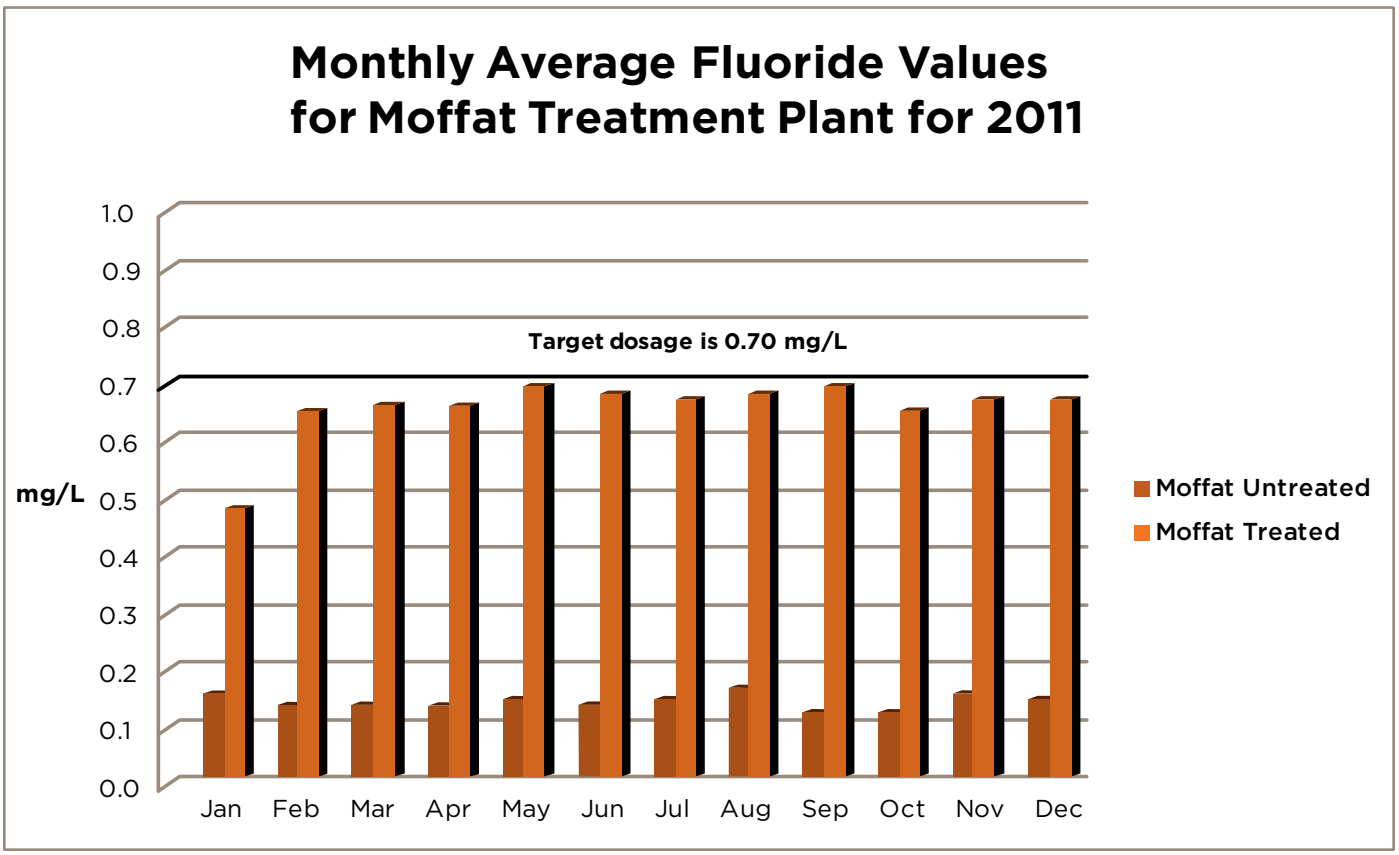
The hardness of the water is a result of calcium and magnesium salts dissolved in water. Other minerals like potassium and iron can also contribute to water hardness. In Denver's water, the iron levels are non detectable, but iron can come from old cast-iron water mains and the plumbing in buildings or homes. The units of measure for water hardness are in mg/L, but most customers' appliances state water hardness in grains per gallon, g/g. In the laboratory, we measure hardness in mg/L (ppm). Graph 7 on page 8, lists hardness in both mg/L and g/g.

Denver's water sources are considered soft to moderately hard. The South Platte source water from Antero Reservoir to Strontia Springs Reservoir in Waterton Canyon is moderately hard and varies between 70 - 130 mg/L or 4-7 g/g. While the water that feeds our Moffat Treatment Plant is all snow melt around the Winter Park area and is considered soft water, and varies seasonally between 30-60 mg/L or 2-4 g/g. Most customers calling about water hardness are inquiring for detergent usage amounts for dishwashers and clothes washers or adding water to their iron or other appliances. Our water tends to form a mineral scale on the inside of plumbing; this is purely aesthetic and does not impact the safety or health of the water. Many cities across the nation have much harder water than Denver's. Graph 7 shows the seasonal fluctuations in

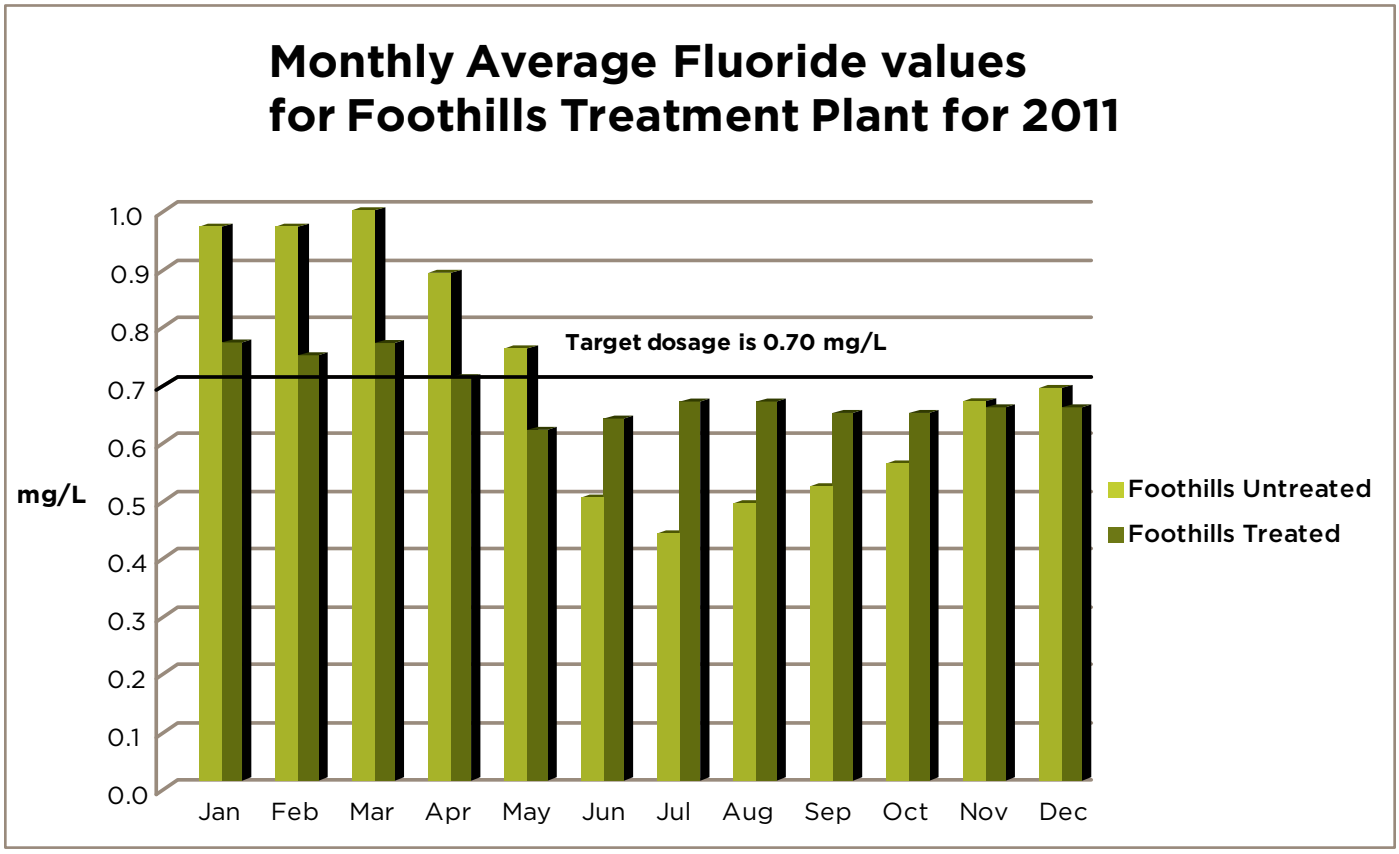
Graph 3:



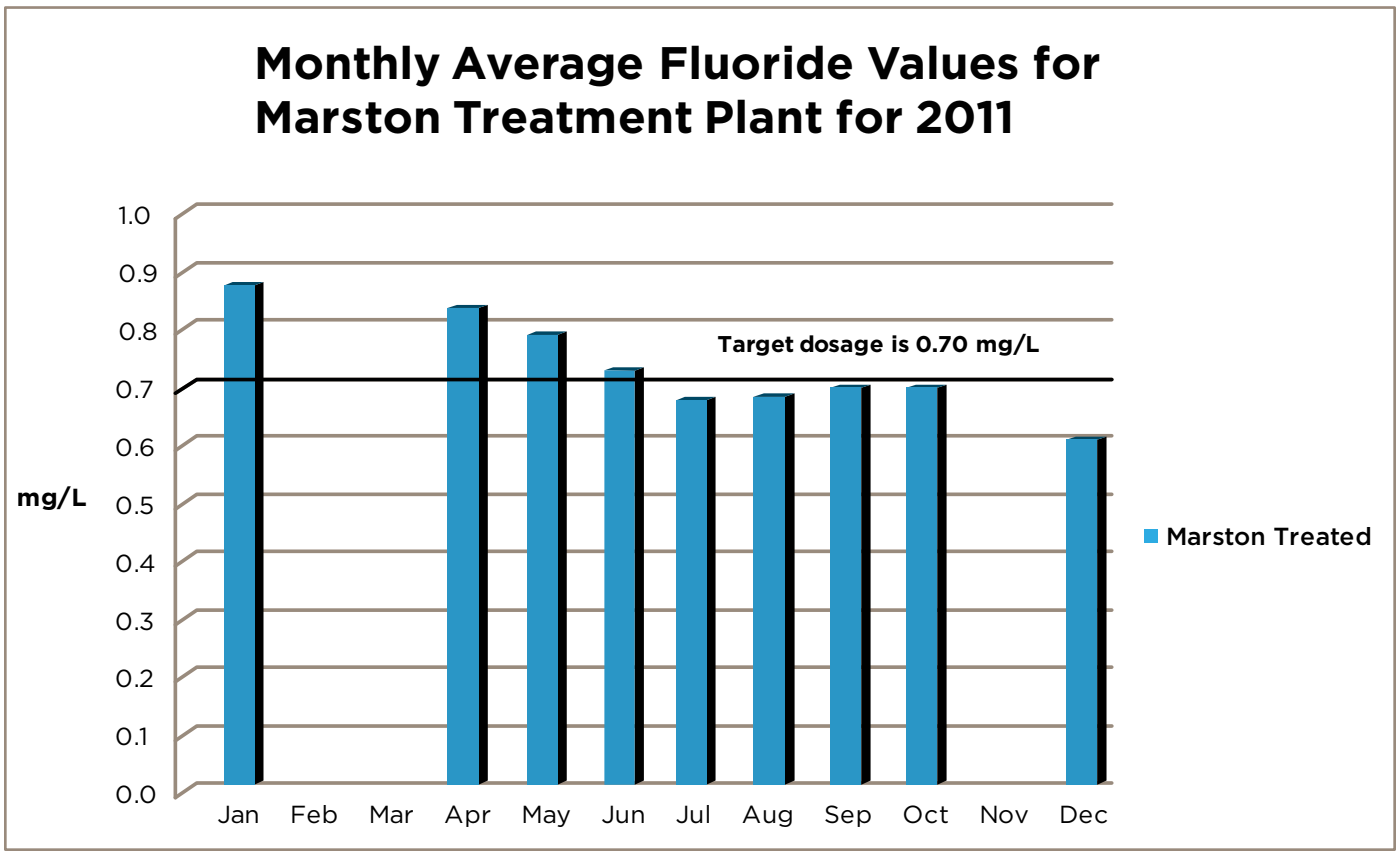
Graph 4:



Graph 5:



Graph 6:



hardness over the year. Gaps in data indicate times when the treatment plant was not in service (off-line).

Which Treatment Plant Serves My Area?

Denver Water's distribution system is completely integrated. This simply means that we can distribute water from any of our three potable treatment plants to anywhere in our system. Water is usually routed based on demand. Foothills Treatment plant is our largest gravity fed potable water plant. It is often in service and serves much of the system. However, we can blend the water from Foothills with Moffat or Marston or blend the water from any two potable treatment plants and send it anywhere in our system. This complete redundancy is rather unique compared to other distribution systems in the United States. When wondering which treatment plant serves you, it is best to assume that the water can come from any of the three treatment plants to your home or business at any given time, and if need be, to adjust your appliances or equipment accordingly.

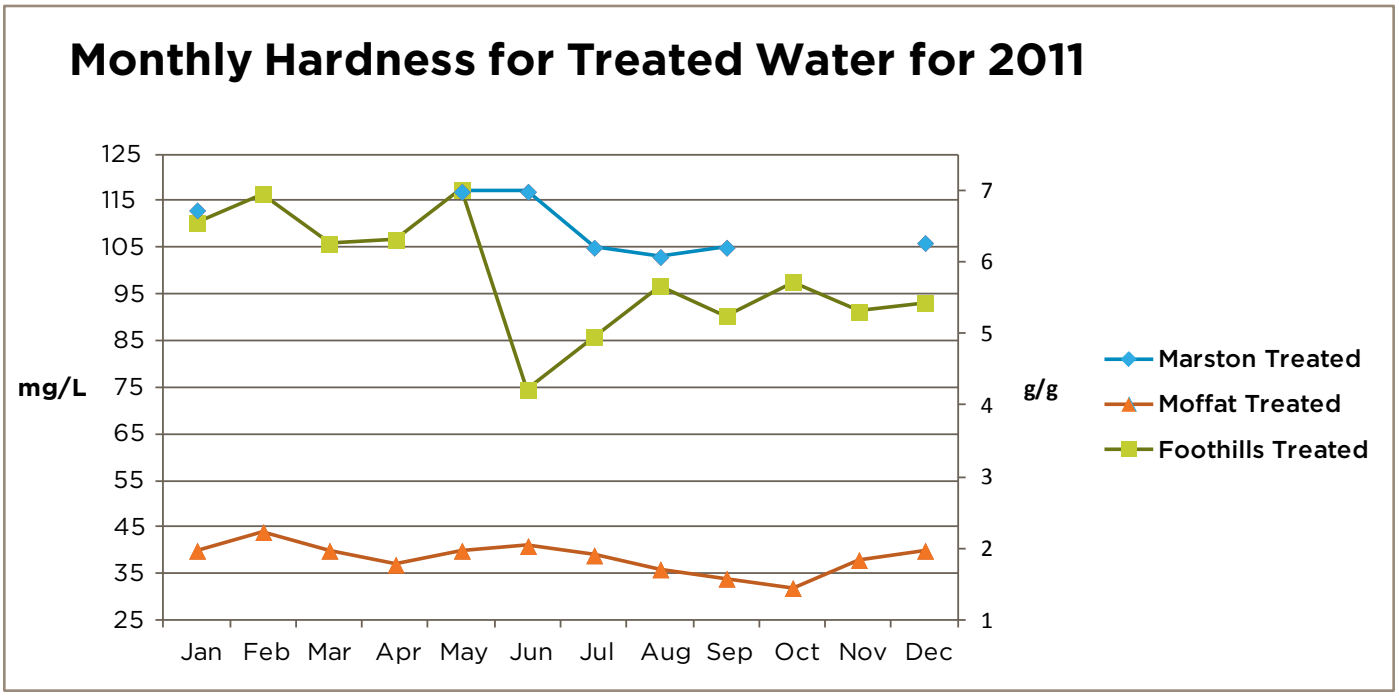
Looking Down the Road

Denver Water continues to replace and refurbish old water mains. For the past several years, we have worked on a cement mortar lining project. When old water mains are structurally sound on the outside, they are thoroughly cleaned, scoured and rehabilitated (relined) with cement mortar, which acts as a barrier protecting the water from being in contact with the old pipe. Each year older areas of Denver Water's system are identified and tested for viability for the CML project. More than 140 miles of pipe have been cleaned and relined since the program began in 1962. As part of ensuring high-quality drinking water, protection of the source water is vital. Recent media reports have highlighted the presence of pharmaceuticals in municipal water supplies. Denver Water pro actively participated in some of the earliest research projects looking for these compounds in a 2005 project with Colorado State University. The study was limited in scope and scale but did detect trace amounts of antibiotics at part per trillion (nanogram per liter) levels (one part per trillion is equivalent to one drop of water in twenty Olympic sized swimming pools). In 2011, as in previous years, we tested for these contaminants, and thus far we have not found them in Denver's water. We will continue to test for them annually. Scientists do not yet know what the presence of these substances in water means to human health. In fact, the testing technology is so new, most commercial laboratories are not yet equipped to analyze for these compounds. Consequently, the Environmental Protection Agency has no current regulations for these substances. Denver Water has and always will strive to deliver the highest quality water to our customers. If future research indicates that certain substances should be removed from water, we will work to find the best method of removal.

As discussed above, many new challenges await us in the drinking water industry. We can all help protect our water supplies simply by not dumping medications down the drains or toilets. Many pharmacies will dispose of unused drugs for you. Ask your pharmacist today if they have a disposal program. If not, remove medications from their original containers, mix them with used coffee grounds and dispose of them in the trash.

We drink the water we produce, and so we have a stake in making sure that the water is safe for all of us. We are environmental scientists and we care about the preservation of our watershed and the natural beauty that surrounds it. Though we have caretakers who live near our mountain reservoirs and monitor them, customers help with this effort and we appreciate it. We are committed to meeting your water needs by continuing to provide high quality drinking water and excellent service. If you have any concerns or questions, comments regarding water quality, call Denver Water at 303-893-2444.

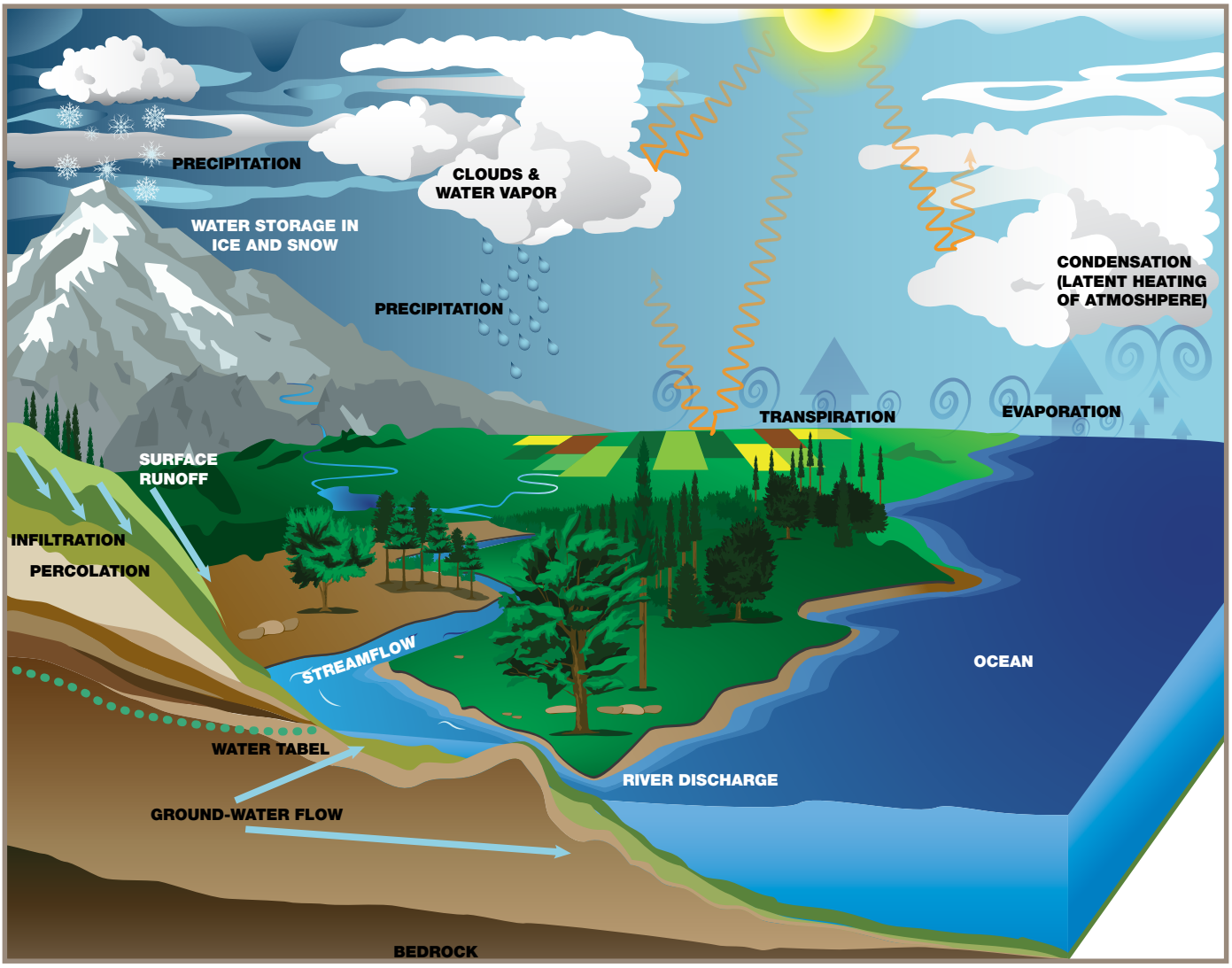
Graph 7:



The Hydrologic or Water Cycle

Planet Earth is not getting any new water. All of the water on Earth has always been here. Most of the water on our planet is saltwater and undrinkable. Much of the fresh water is solidified and unavailable in glaciers near the North and South poles. As the poles melt, the water goes into the sea and adds to the sea water. Approximately one percent of the water on Earth is drinkable. Nature recycles the water for us in what is termed the hydrologic or water cycle. In the water cycle, solar heat causes water from the oceans to evaporate into the atmosphere. Water from the leaves of plants through transpiration also goes into the atmosphere. This water vapor in the atmosphere is then condensed, forming clouds transported by winds that move over the Earth and rain, snow, hail etc. precipitate onto the land, filling streams, lakes and rivers. Some of the precipitated water percolates and infiltrates through the soils to replenish underground aquifers. Some of it is absorbed by root systems. The rest of this precipitation will run off of impermeable soils back into bodies of water and eventually back to the oceans from which it originated. All water eventually makes its way back to the oceans, where the cycle repeats itself. We are drinking water, though treated, that has been on planet Earth since its formation. Water is a very precious resource that must be protected.

The Hydrologic or Water Cycle



Regulatory Terminology

Pages 10 through 15 are tables of data for compounds found in the treated water. The tables contain the name of the compound, the maximum contaminant level (see below) where applicable, the average result, the range of detections for the year, and the number of times for which it was tested in 2011. Most of the compounds found are not regulated and do not pose a health or safety risk. Regulatory abbreviations are explained below.

AL: Action levels are enforceable triggers for compliance that force public notification and treatment optimization.

MCL: Maximum contaminant level, which are the U.S. Environmental Protection Agency's drinking water regulatory limits. Based on health and toxicology studies, results at or below these levels in drinking water are considered safe. These are usually numeric values; sometimes they are designated as DS or TT. (see below)

SMCL: Secondary maximum contaminant level, the U.S. Environmental Protection Agency's nonenforceable, but recommended guideline level of a contaminant or compound. When the fluoride secondary maximum contaminant level exceeds 2 mg/L, we must notify the public.

DS: Distribution system is how the total coliform regulation is decreed. Means that the total coliform regulation (less than 5 percent total coliform positive samples per month) applies to the water in the distribution system (service area) not just the treatment plant effluents.

TT: Treatment technique, refers to the water treatment process used in the plants, which must be optimized to control the levels of contaminants, such as the corrosion control process (maintaining a pH greater than 7.5 and alkalinity greater then 15) used to control lead and copper. To date, we have not detected lead in the raw, treated or distribution system water, and only small amounts of copper (less than a tenth of the regulatory limit 1.3 mg/L) have been found.

Compounds that were below reporting levels in Denver's water are listed on pages 16-17. We test for all of these compounds and contaminants at least annually. Contaminants that have been in the news recently, such as arsenic, lead, and TCE, are on the *not found* list.

Data Tables For Treated Water

Marston Treated Water

Analysis	MCL	Average	Range	No.
General (mg/L)				
Alkalinity, Total as $CaCO_3$		65	56 -76	410
Bicarbonate		78	73 - 84	7
Chlorine, Total		1.53	1.22 - 1.82	2,465
Hardness as $CaCO_3$		110	103 - 117	6
pH (SU)		7.7	7.5 - 7.9	2,461
Specific Conductance (µS)		329	280 - 360	29
Temperature (°C)		16	5 - 23	205
Total Dissolved Solids		189	175 - 204	7
Turbidity (NTU)	TT (Treatment Technique)	0.03	0.02 - 0.07	2,463
Metals (g/L)				
Aluminum		29	10 - 43	7
Barium	2,000	39	37 - 41	7
Boron		14	13 - 16	7
Calcium (mg/L)		31	29 - 33	7
Magnesium (mg/L)		7.9	7.2 - 8.5	7
Manganese		2	<2 - 7	7
Molybdenum		7	6 - 8	7
Nickel		<1	<1 - 2	7
Potassium (mg/L)		1.9	1.8 - 2.1	7
Sodium (mg/L)		21	19 - 23	7

Data Tables For Treated Water

Marston Treated Water

Analysis	MCL	Average	Range	No.
Ions (mg/L)				
Chloride		23.9	22.6 - 26.3	6
Cyanide, Total	0.2	<0.02	<0.02 - 0.02	2
Fluoride	4.0	0.71	0.51 - 1.02	586
Nitrate + Nitrite-Nitrogen	10	0.05	<0.04 - 0.08	6
Silicon		1.6	0.9 - 2.5	7
Sulfate		58	55 - 61	6
Radiological (pCi/L)				
Uranium (µg/L)	30	<0.5	<0.5 - <0.5	7
Disinfection By-Products (µg/L)				
1,1,1-Trichloropropanone		n/a	0.8	1
1,1-Dichloropropanone		br	br - 0.4	2
Bromochloroacetic acid		2.9	1.8 - 3.6	7
Bromodichloroacetic acid		<2.0	<2.0 - 2.4	6
Bromodichloromethane		8.7	7.1 - 9.7	7
Chloral hydrate		1.3	0.7 - 1.8	7
Chloroform		11.6	8.1 - 14.6	7
Chloropicrin		n/a	0.4	1
Cyanogen Chloride		8.4	1.9 - 15	2
Dibromochloromethane		3.6	3.1 - 3.9	7
Dichloroacetic acid		6.1	2.8 - 7.1	7
Dichloroacetonitrile		n/a	1.3	1
Haloacetic Acids (5)	60(DS)	12	5 - 15	7
Total Trihalomethanes	80(DS)	24	18 - 28	7
Trichloroacetic acid		4.2	2.2 - 5.0	7
Non-Specific Organics				
Total Organic Carbon (mg/L)		1.8	1.6 - 2.0	29
Total Organic Halogen (µg/L)		125	111 - 139	2

Data Tables For Treated Water

Foothills Treated Water

Analysis	MCL	Average	Range	No.
General (mg/L)				
Alkalinity, Total as $CaCO_3$		58	30 - 81	670
Bicarbonate		70	43 - 93	12
Chlorine, Total		1.59	1.10 - 1.98	4,025
Hardness as $CaCO_3$		101	72 - 120	10
pH (SU)		7.8	7.5 - 8.2	4,026
Specific Conductance (µS)		315	200 - 400	48
Temperature (°C)		12	2 - 20	673
Total Dissolved Solids		184	136 - 222	12
Turbidity (NTU)	TT (Treatment Technique)	0.05	0.03 - 0.09	4,010
Metals (µg/L)				
Aluminum		34	21 - 42	12
Barium	2,000	35	31 - 40	12
Boron		12	8 - 18	12
Calcium (mg/L)		27	21 - 37	12
Magnesium (mg/L)		7.6	4.8 - 10.1	12
Manganese		3	<2 - 8	12
Molybdenum		6	2 - 15	12
Nickel		<1	<1 - 2	12
Potassium (mg/L)		1.7	1.4 - 2.4	12
Sodium (mg/L)		21	15 - 29	12
Zinc		<5	<5 - 7	12
Ions (mg/L)				
Chloride		23.5	12.5 - 32.8	12
Cyanide, Total (regulated as free)	0.2	<0.02	<0.02 - <0.02	3
Fluoride	4.0	0.67	0.34 - 0.93	2,010
Nitrate + Nitrite-Nitrogen	10	0.10	<0.04 - 0.19	12
Silicon		2.9	2.5 - 3.5	12
Sulfate		54	47 - 78	12
Radiological (pCi/L)				
Uranium (µg/L)	30	<0.5	<0.5 - <0.5	12
Disinfection By-Products (µg/L)				
1,1,1-Trichloropropanone		0.5	0.5 - 0.5	2
1,1-Dichloropropanone		<0.5	<0.5 - <0.5	2
Bromochloroacetic acid		2.5	1.2 - 3.5	11
Bromodichloroacetic acid		1.7	<2.0 - 3.7	10
Bromodichloromethane		5.5	3.7 - 8.7	11
Chloral hydrate		1.1	<0.5 - 2.2	11
Chlorodibromoacetic acid		<2.0	<2.0 - 2.9	10

Data Tables For Treated Water

Foothills Treated Water

Analysis	MCL	Average	Range	No.
Disinfection By-Products (µg/L)				
Chloroform		11.1	6.0 - 16.4	11
Chloropicrin		<0.5	<0.5 - <0.5	2
Cyanogen Chloride		5.4	2.0 - 8.8	2
Dibromochloromethane		1.7	<1.0 - 3.0	11
Dichloroacetic acid		7.0	3.0 - 13.6	11
Dichloroacetonitrile		1.0	0.9 - 1.2	2
Haloacetic Acids (5)	60(DS)	16	6 - 25	11
Total Trihalomethanes	80(DS)	18	13 - 25	11
Trichloroacetic acid		5.9	2.9 - 9.4	11
Non-Specific Organics				
Total Organic Carbon (mg/L)		1.7	1.3 - 2.2	48
Total Organic Halogen (µg/L)		129	105 - 145	3

Data Tables For Treated Water

Moffat Treated Water

Analysis	MCL	Average	Range	No.
General (mg/L)				
Alkalinity, Total as $CaCO_3$		24	18 - 35	730
Bicarbonate		28	23 - 32	12
Chlorine, Total		1.45	1.08 - 1.98	4,375
Hardness as $CaCO_3$		38	32 - 44	10
pH (SU)		7.8	7.4 - 8.4	2,186
Specific Conductance (µS)		109	93 - 130	52
Temperature (°C)		11	4 - 20	732
Total Dissolved Solids		71	58 - 77	12
Turbidity (NTU)	TT (Treatment Technique)	0.04	0.03 - 0.06	4,372
Metals (µg/L)				
Aluminum		<20	<20 - 142	19
Barium	2,000	19	15 - 22	19
Boron		5	4 - 6	19
Calcium (mg/L)		12	9 - 15	19
Magnesium (mg/L)		2.3	1.7 - 2.9	19
Manganese		2	<2 - 14	19
Molybdenum		<1	<1 - 1	19
Nickel		<1	<1 - <1	19
Potassium (mg/L)		0.8	0.7 - 0.9	19
Sodium (mg/L)		6	4 - 8	19
Ions (mg/L)				
Chloride		5.0	4.1 - 6.8	12
Cyanide, Total	0.2	<0.02	<0.02 - 0.02	3
Fluoride	4.0	0.64	0.09 - 0.99	2,176
Nitrate + Nitrite-Nitrogen	10	0.04	<0.04 - 0.06	12
Silicon		3.0	2.8 - 3.6	19
Sulfate		20	17 - 23	12
Radiological (pCi/L)				
Uranium (µg/L)	30	<0.5	<0.5 - 1.9	19
Disinfection By-Products (µg/L)				
1,1,1-Trichloropropanone		0.6	0.5 - 0.6	2
1,1-Dichloropropanone		<0.5	<0.5 - <0.5	2
Bromochloroacetic acid		<1.0	<1.0 - 1.3	13
Bromochloroacetonitrile		<0.5	<0.5 - <0.5	2
Bromodichloroacetic acid		<2.0	<2.0 - <2.0	12
Bromodichloromethane		2.8	2.2 - 3.9	12
Chloral hydrate		1.0	<0.5 - 2.2	12
Chloroform		13.4	7.7 - 21.6	12

Data Tables For Treated Water

Moffat Treated Water

Analysis	MCL	Average	Range	No.
Disinfection By-Products (µg/L)				
Chloropicrin		<0.5	<0.5 - <0.5	2
Cyanogen Chloride		4.8	1.9 - 7.7	2
Dibromochloromethane		<1.0	<1.0 - <1.0	12
Dichloroacetic acid		7.4	<1.0 - 12.4	13
Dichloroacetonitrile		0.8	0.8 - 0.8	2
Haloacetic Acids (5)	60(DS)	16	8 - 22	12
Total Trihalomethanes	80(DS)	16	10 - 25	12
Trichloroacetic acid		6.4	1.5 - 9.3	13
Non-Specific Organics				
Total Organic Carbon (mg/L)		1.6	1.2 - 2.1	52
Total Organic Halogen (µg/L)		106	82 - 130	3

Contaminants Not Found In Denver's Drinking Water

The following analyses were performed, and each of these constituents was either below the reporting limit or the average result was less than the reporting limit. VOCs are Volatile Organic Chemicals (easily airborne), and SOCs are Synthetic Organic Chemicals, (typically man-made). The maximum contaminant level (MDL) is listed after the analysis in parentheses, if regulated in drinking water. The unit of measure is also listed if different than that listed for the subsection.

General	**Disinfection By-Products (µg/L)**	**VOC's (Volatile Organic Compounds) (µg/L or ng/L)**	**Pesticides (Insecticides and Herbicides)- Semi-Volatile Compounds (µg/L or ng/L)**
Alkalinity, Phenolphthalein as CaCO3	n-Nitrosodiethylamine		
Chlorine, Free	n-Nitrosodimethylamine (NDMA)	Chloromethane	
Asbestos (7 MFL)	n-Nitrosodi-n-butylamine	cis-1,2-Dichloroethene (70)	1,4-Dioxane
Metals (µg/L)	n-Nitrosodi-n-propylamine	cis-1,3-Dichloropropene	2,4-Dinitrotoluene
Antimony (6)	n-Nitrosomethylethylamine	Cyclohexanone	2,4,5-T
Arsenic (10)	n-Nirtosopyrollidine	Dibromomethane	2,4,5-Trichlorobiphenyl
Beryllium (4)	Tribromoacetic Acid	Dichlorodifluoromethane	2,4-D (70)
Cadmium (5)	**VOC's (Volatile Organic Compounds) (µg/L or ng/L)**	Dichloromethane (5)	2,4-DB
Chromium (100)		Diethyl ether	2,6-Dinitrotoluene
Cobalt	1,1,1,2-Tetrachloroethane	Ethyl acrylate	3,5-Dichlorobenzoic acid
Copper (TT1)	1,1,1-Trichloroethane (200)	Ethyl methacrylate	3-Hydroxycarbofuran
Iron	1,1,2,2-Tetrachloroethane	Ethyl tert-butyl ether	4-Nonaphenol
Lead (TT1)	1,1,2-Trichloroethane (5)	Ethylene dibromide	4,4'-DDD
Lithium	1,1-Dichloroethane	Hexachloroethane	4,4'-DDE
Mercury, Total (2)	1,1-Dichloroethene (7)	m-Dichlorobenzene	4,4'-DDT
Selenium (50)	1,1-Dichloropropene	Methyl tert-butyl ether	a-BHC
Silver	1-Chlorobutane	Naphthalene	a-Chlordane
Thallium (2)	1,2,3-Trichlorobenzene	n-Butyl acrylate	Acenaphthene
Titanium	1,2,3-Trichloropropane	n-Butyl Benzene	Acenaphthylene
Vanadium	1,2,3-Trimethylbenzene	Nitrobenzene	Acetochlor
Zinc	1,2,4-Trichlorobenzene (70)	n-Propyl Benzene	Acifluourfen
Ions (mg/L)	1,2,4-Trimethylbenzene	o-Chlorotoluene	Alachlor (2)
Bromide	1,2-Dibromo-3-chloropropane (0.2)	o-Dichlorobenzene (600)	Aldicarb
Carbonate	1,2-Dichloroethane (5)	p-Chlorotoluene	Aldicarb sulfoxide
Hydroxide	1,2-Dichloropropane (5)	p-Dichlorobenzene (78.5)	Aldicarb sulfone
Nitrite-Nitrogen (1)	1,3-Dichloropropane	p-Isopropyl Toluene	Aldrin
Ortho Phosphorus, Dissolved	1,3-Dichloropropene	Pentachloroethane	Anthracene
Radiological (pCi/L)	1,3,5-Trimethylbenzene	sec-Butyl Benzene	Atrazine (3)
Alpha (15)	2,2-Dichloropropane	Styrene (100)	Baygon
Beta (4mRem)	2-Butanone	TAME	Bendiocarb
Radium 226/228(5)	2-Hexanone	tert-Butyl Alcohol	Bensulide
Uranium	2-Nitropropane	tert-Butyl Benzene	Bentazon
Microbiological	4-Methyl-2-Pentanone	Tetrachloroethene (5)	Benzo(a)anthracene
Cryptosporidium	Acetone	Tetrahydrofuran	Benzo(a)pyrene (0.2)
E. coli	Acrylonitrile	Toluene (1000)	Benzo(b)fluoranthene
Giardia (TT1)	Allyl Chloride	trans-1,2-Dichloroethene (100)	Benzo(g,h,i)perylene
Plankton	Benzene (5)	trans-1,3-Dichloropropene	Benzo(k)fluoranthene
Total Coliform (DS)	Bromobenzene	trans-1,4-Dichloro-2-butene	Bis(2-ethylhexyl)adipate (400)
Disinfection By-Products (µg/L)	Bromoethane	1,3-Butadiene	Bis(2-ethylhexyl)phthalate
Bromochloromethane	Bromomethane	Trichloroethylene (5)	β-BHC
Bromoform	Carbon disulfide	Trichlorofluoromethane	Bisphenol A
Carbon Tetrachloride	Chloroacetonitrile	Trichlorotrifluoromethane	Bromacil
Dibromoacetic acid	Chlorobenzene (100) C	Vinyl acetate	Butachlor
Dibromoacetonitrile	Chlorodifluoromethane (CFC 22)	Vinyl Chloride (2)	Butyl benzyl phthalate
Monochloroacetic Acid	Chloroethane	Xylenes (10000)	Butyl paraben

Contaminants Not Found In Denver's Drinking Water

Pesticides (Insecticides and Herbicides)- Semi-Volatile Compounds (µg/L or ng/L)	Hexachlorobutadiene	Propoxur	**Micro-Constituents* (µg/L or ng/L)** Components of Pharmaceuticals and Personal Care Products (PPCP's)
	Hexachlorocyclopentadiene	Siduron, Total	
	Indeno(1,2,3-cd)pyrene	Silvex (50)	
Carbaryl	Imidacloprid	Simazine (4)	Estrone
Carbofuran	Iopromide	TCEP	Fluoxetine (Prozac)
Chlorneb	Isophorone	TCPP	Freon113
Chlorobenzilate	Isoproturon	TDCPP	Gemfibrozil
Chloridazon	Lindane	Terbuthylazine	Ibuprofen
Chloroprene	Malathion	Terbacil	Iohexol
Chlorothalonil	Meprobamate	Terbuthiuron	Isobutyl paraben
Chlorotoluron	Metalaxyl	Thidiazuron	Ketoprofen
Chrysene	Metazachlor	Thiobencarb	Ketorolac
Clofibric acid	Methacrylonitrile	trans-Nonachlor	Lidocaine
Clomazone	Methiocarb	Triademefon	Lincomycin
Cyanazine	Methylacrylate	Triadimenol	Lopressor
Dalapon (200)	Methylmethacrylate	Trifluralin	Meclofenamic acid
DCPA acid metabolites	Methyl paraben	**Micro-Constituents* (µg/L or ng/L)** Components of Pharmaceuticals and Personal Care Products (PPCP's)	Naproxen
δ-BHC	Methyl parathion		Nifedipine
Diazinon	Metribuzin		Norethisterone
Dibenzo(a,h)anthracene	Metsulfuron methyl	1,7-Dimethylxanthine	Oxolinic acid
Dicamba	Molinate	2-Methylisoborneol (MIB)	Pentoxifyline
Dichlorprop	Monuron	17alpha-Ethynyl estradiol	Phenazone
Dichlorvos	n-Nitrosopiperidine	4-tert-Octylphenol	Primidone
Diethyl phthalate	Neburon	Acesulfame-K	Progesterone
Dieldrin	Oryzalin	Acetaminophen	Propyl paraben
Diflubenzuron	Oxadiazon	Albuterol	Quinoline
Dimethoate	Oxamyl (200)	Amoxicillin	Sucralose
Dimethyl phthalate	o-Xylene	Andorostenedione	Sulfachloropyridazine
Di-n-butyl phthalate	Paclobutrazol	Atenolol	Sulfadiazine
Di-n-octyl phthalate	Parathion	Azithromycin	Sulfadimethoxine
Dinoseb	Pendimethalin	Azoxystrobin	Sulfamerazine
Diuron	Pentachlorophenol (1)	Bendroflumethiazide	Sulfamethazine
Dursban	PFBS	Bezafibrate	Sulfamethizole
Endosulfan – A	PFDA	Butylbital	Sulfamethoxazole
Endosulfan – B	PFDoA	Caffeine	Sulfasalazine
Endosulfan sulfate	PFHpA	Carbadox	Sulfathiazole
Endrin (2)	PFHxA	Carbamazepine	tert-Amyl Methyl ether
Endrin Aldehyde	PFHxS	Carisoprodol	Theobromine
Epichlorohydrin	PFNA	Chloramphenicol	Theophylline
EPTC	PFOA	Cimetidine	trans-Testosterone
Ethyl paraben	PFOS	Cotinine	Triclosan
Fenuron	PFPeA	DEA	Trimethoprim
Fluometuron	PFUnA	Dehydronifedipine	Warfarin
Fluoranthene	Phenanthrene	DIA	*Man-made or natural, not regulated because methods are only recently available to detect these at the low levels typically seen in the environment and the health effects are unknown and being studied.
Fluorene	Pyrene	Diazepam	
gamma-Chlordane	Permethrin Isomers	Diclofenac	
Halofenozide	Picloram	Diethylstilbestrol (DES)	
Halosulfuron methyl	Propanil	Dilantin	
Heptachlor (0.4)	Propachlor	Erythromycin	
Heptachlor Epoxide (0.2)	Propargite	Estradiol	

Need More Information?

Here is a list of informational brochures that are available from Denver Water's Water Quality Section. Just call 303-628-5996 to have one mailed to you.

Waterborne Parasites: Giardia and Cryptosporidium
Safe Drinking Water After a Disaster or in an Emergency
Understanding Scientific Data and Terminology
Water Hardness
Water Quality Warning about Cross Connections
Fluoride
What to do If You Have Dirty Tap Water
Taste and Odor in Drinking Water
Handy Tips and Tool - Save Water Save Money
Keeping Denver's Water Safe

Report prepared by: Maria Rose-Data & Analytical Support, Nicole Peschel-Graphics, Format & Design

DENVER WATER
Water Quality Laboratory
6100 W Quincy Avenue
Denver CO, 80235
Phone: 303-628-5996
Fax: 303-795-2495