



### What's INSIDE?

*How You Get Clean Water in Your Home*

*Understanding Water Quality*

*Hot Water Heater Maintenance*

*Golden's Drinking Water Source*

*Golden's Water Monitoring Results for 2004*

*If You Have Special Health Concerns*

*Glossary of Terms and Definitions*

*More Water Resources*

*Backflow and Cross Connections*

*Golden's Water Plant and Collaborations with CSM*

### ESPAÑOL

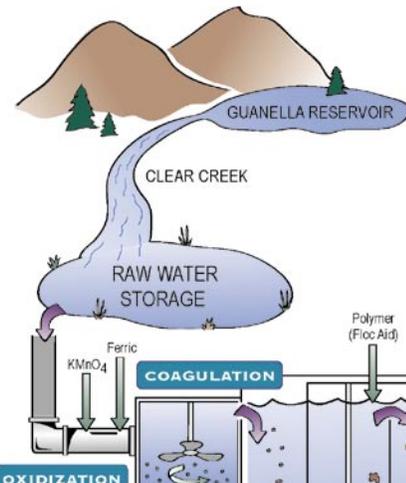
Este informe contiene información importante sobre su agua de beber. Si no puede leer, por favor busque la ayuda de alguien que lo puede traducir.

## Annual Water Quality Report

The City of Golden is pleased to provide you with your Annual Water Quality Report. This report summarizes information about the quality of the water provided to you in 2004. It contains important information about the water you drink, where it comes from and how it is treated. There were no violations in the levels of substances detected in Golden's drinking water during 2004. Informed Golden consumers are the best advocates for safe drinking water and we welcome your input and feedback. The Environmental Services Division can be reached by calling 303-384-8181 or emailing [esdiv@ci.golden.co.us](mailto:esdiv@ci.golden.co.us). Or, you can learn more online at [www.cityofgolden.net](http://www.cityofgolden.net).

### Golden's Drinking Water

The City of Golden's drinking water comes from the beautiful Rocky Mountains. The water flows into Clear Creek from melting snow or rainfall. The City receives the water directly from the Creek through a controllable gate where it flows into two holding ponds. This short-term storage promotes settling of solids before the water is pumped into the treatment basin.

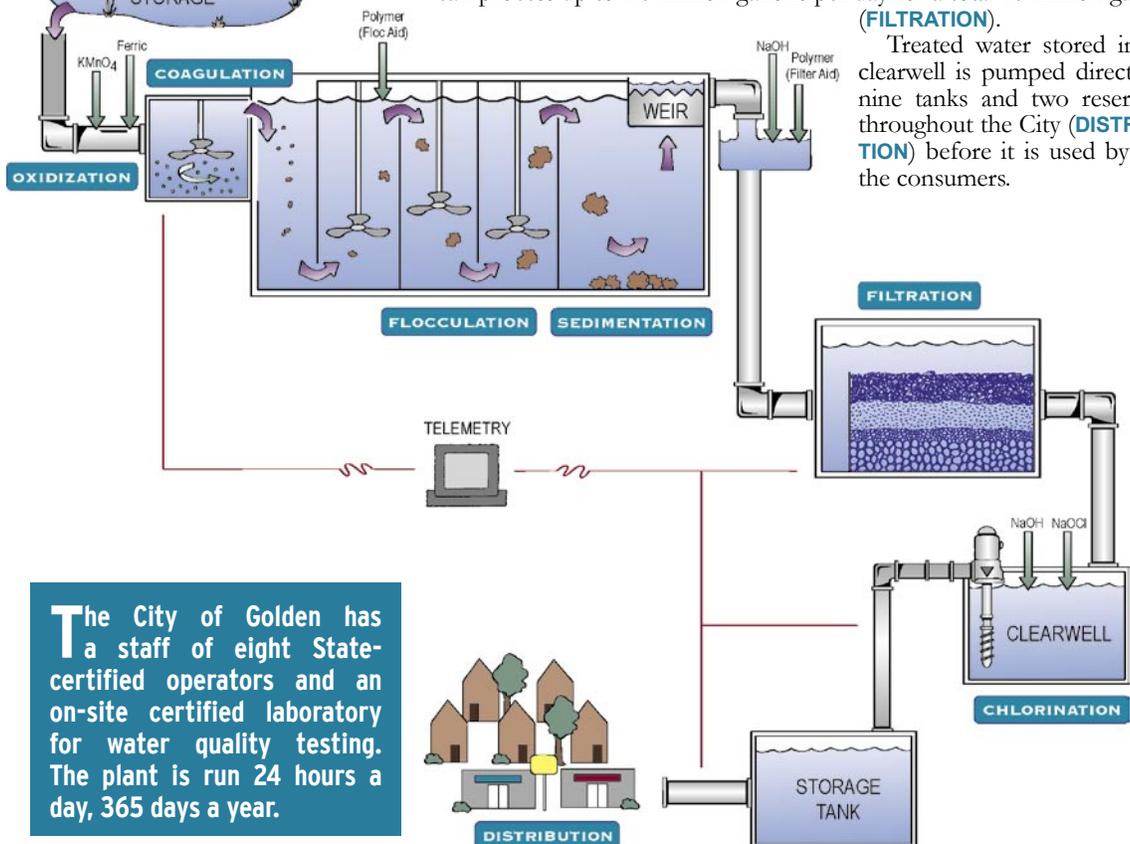


Treatment starts in the rapid mix where coagulants are added (**COAGULATION**). This causes dirt and other solids to clump together to form "floc" (**FLOCCULATION**).

As the particles get larger and heavier, they settle to the bottom of the basin (**SEDIMENTATION**) where they are continuously removed. This portion of the treatment process takes about two hours.

Then the clarified water flows to the filtration gallery where chlorine is added to destroy any harmful bacteria. Six large filter basins trap all remaining particles leaving the water clear and pathogen free. Each filter can process up to 2.5 million gallons per day for a total 15 million gallons (**FILTRATION**).

Treated water stored in the clearwell is pumped directly to nine tanks and two reservoirs throughout the City (**DISTRIBUTION**) before it is used by you, the consumers.



The City of Golden has a staff of eight State-certified operators and an on-site certified laboratory for water quality testing. The plant is run 24 hours a day, 365 days a year.

## Hot Water Heater Maintenance

It's a matter of chemistry and physics...when water that's not deionized or distilled is heated, many of the naturally occurring minerals precipitate out.

The portion that most people are used to seeing is called **calcium carbonate (CaCO<sub>3</sub>)**, which is usually seen as a crusty, whitish deposit.

Other minerals, such as iron (red or rusty) or manganese (dark brown or black), will also precipitate out or be deposited along with the calcium carbonate. This process takes place in all hot water heaters.

The deposits can cause many problems. Deposits cause a drop in the efficiency and contribute to an earlier failure of the hot water heater. The deposits can flake off causing particles to clog faucets, bubbler screens and valves, as well as stain light-colored laundry.

It's simple to minimize these negative effects. At the bottom of most hot water heaters is a valve that looks like a garden hose connector. Simply hook a hose onto the valve, route the hose to a drain and open the valve wide open for about 10 minutes.

If you perform this flush once per quarter, you will save money because your hot water heater will operate more efficiently.

## Understanding Water Quality

Did you know that the City of Golden monitors literally hundreds of parameters related to drinking water each year? On a routine basis, the City's Environmental Services lab staff monitors the levels of chlorine, metals, disinfection byproducts, bacteria and organic carbon within the drinking water system.

**CHLORINE** is used to destroy disease-producing microorganisms. The EPA requires the chlorine levels in drinking water to be no less than 0.2 mg/L and no greater than 4.0 mg/L.

**COLIFORM** is a type of bacteria used as an indicator for bacterial growth. The EPA requires there be no coliform bacteria present in drinking water.

**THMs/HAA5** are disinfection byproducts.

**TOTAL ORGANIC CARBON (TOC)** is any organic carbon-containing compound in the water.

**FLUORIDE** in drinking water is the same kind you receive at a dentist's office through a fluoride treatment. Water filters remove fluoride. Fluoride is not added to drinking water, as it is naturally present in the water. The EPA has set strict guidelines that fluoride levels should be no more than 4.0 mg/L.

Other common water tests conducted at homes and businesses include:

**pH** measures the acidity of a solution as an "index" of the amount of hydrogen ions present in a substance and affects many chemical and biological processes. Acidity increases due to mine draining, industrial waste and acid precipitation. pH is measured on a scale of 0 to 14, with a neutral pH at 7. A pH less than 7 is acidic, with more hydrogen ions; and a pH greater than 7 is basic and has more hydroxide ions. Most natural water has a pH value between 5.0 and 8.5. The EPA sets the drinking water standards of pH to between 6.5 and 8.5. All water with a pH of less than 5.0 or greater than 8.5 should be viewed as suspicious.

**TURBIDITY** is the clarity of water. Clear water has a low turbidity, while murky water has a high turbidity. Sources include small particles suspended in water, such as algae, clay microorganisms, silt, organic chemicals, decaying vegetation or chemical wastes. **Nephelometric Turbidity Units (NTUs)** in drinking water that cause it to appear "cloudy" or "dirty" are often the result of a dirty hot water heater or pipes. Turbidity in drinking water can be no greater than 0.5 units.

**ALKALINITY** measures the ability of the water to neutralize (or buffer) acids and keep the pH from changing. Sources include rocks, soils, salts, plant activities and certain wastewater discharges. High water alkalinity causes higher algae and plant growth, while low alkalinity indicates that the water's ability to buffer acids is poor. If there are drastic changes in alkalinity, many chemical and biological processes will be affected. Acceptable levels in fresh water range from 20 to 200 mg/L. Levels below 10 mg/L indicate that water is susceptible to changes in pH.

**HARDNESS** is the concentration of calcium and magnesium in the water. In Colorado, most water hardness comes from calcium. Hardness can be easily seen in any white build-up in showers or on faucets, for example. Hardness levels from 0 to 60 mg/L are soft, from 60 to 120 mg/L are moderately hard, and 120 to 180 mg/L are hard, and 180 mg/L or more are very hard.

**If you would like your water tested**, or you have questions about a test done at your home, call the City of Golden's Environmental Services Laboratory at 303-384-8181. Golden's Water Treatment Plant and Laboratory are at 1445 10th St. For a tour of the Water Treatment Plant, please call 303-384-8187.

## Golden's Drinking Water Source

Golden's drinking water source is exclusively Clear Creek and its tributaries.

As it flows through the watershed, water may pick up substances from construction and highway maintenance, mining and remediation projects, land and rock slides, septic systems and pollutants transported by stormwater runoff. Contaminants that may be present in our raw water source include: bacteria and viruses, salts and metals, pesticides and herbicides from agricultural runoff, organics contaminants from petroleum spills and gas stations and radioactive contaminants that are naturally occurring or from mining activity.

In order to ensure that tap water is safe to drink, the EPA has set regulations that limit the amount of certain contaminants in water provided by public water systems.

## DETECTED REGULATED SUBSTANCES

|                                       | Parameter                   | Detected Level       | Range       | MCL      | MCLG      | Sample Date     | Violation? Y/N | Potential Sources                |
|---------------------------------------|-----------------------------|----------------------|-------------|----------|-----------|-----------------|----------------|----------------------------------|
| Regulated leaving the Treatment Plant | Barium, ppm                 | 0.032                | 0.023-0.032 | 15       | 0         | 15-Apr-04       | N              | Decay of Natural Deposits        |
|                                       | Beta emitters, pCi/L        | 0.6                  | n/a         | 50       | 0         | 16-Jul-04       | N              | Decay of Natural Deposits        |
|                                       | Fluoride, ppm               | 0.67                 | 0.4-1.04    | 4        | 4         | monthly         | N              | Erosion of Natural Deposits      |
|                                       | Nitrate, ppm                | 0.13                 | n/a         | 10       | 10        | 16-Aug-04       | N              | Fertilizer Run-off               |
|                                       | Turbidity, NTU              | 0.165*               | see note**  | TT       | None      | 28-Feb-04       | N              | Natural Run-off                  |
|                                       | Radium, pCi/L               | 0.1                  | n/a         | 5        | None      | 16-Aug-04       | N              | Decay of Natural Deposits        |
|                                       | Total Organic Carbon, ppm   | 0.84                 | 0.73-1.04   | TT       | None      | monthly - RAA   | N              | Naturally present in environment |
|                                       | Parameter                   | Detected Level - RAA | Range       | MCL      | MCLG      | Sample Date     | Violation? Y/N | Potential Sources                |
| Regulated in the Distribution System  | Total Trihalomethanes, ppb  | 32.6                 | 24.5-45.6   | 80       | n/a       | quarterly - RAA | N              | By-product of Chlorination       |
|                                       | Total Haloacetic Acids, ppb | 10.9                 | 7.6-17.1    | 60       | n/a       | quarterly - RAA | N              | By-product of Chlorination       |
|                                       | Chlorine, ppm               | 1                    | 0.9-1.09    | MRDL - 4 | MRDLG - 4 | quarterly - RAA | N              | Drinking water disinfectant      |

\* Highest single measurement for 2004. Monthly averages must be less than 0.5 ntu 95% of the time.

\*\* 100 % of all turbidity measurements were less than 0.5 NTU in 2004

Turbidity is a measure of the cloudiness of water. We monitor for turbidity because it is a good indicator of the effectiveness of our filtration system.

## DETECTED UNREGULATED SUBSTANCES

|                                       | Parameter                 | Average  | Range | MCL           | SMCL | Sample Date | Violation? Y/N | Potential Sources           |
|---------------------------------------|---------------------------|----------|-------|---------------|------|-------------|----------------|-----------------------------|
| Monitored leaving the Treatment Plant | Sodium, ppm               | 16.1     | n/a   | Not Regulated | None | 16-Aug-04   | n/a            | Erosion of Natural Deposits |
|                                       | Bromodichloromethane, ppb | 6.2      | n/a   | Not Regulated | None | 17-May-04   | n/a            | By-product of chlorination  |
|                                       | Chloroform, ppb           | 8.9      | n/a   | Not Regulated | None | 17-May-04   | n/a            | By-product of chlorination  |
|                                       | Chlorodibromomethane, ppb | 4.16     | n/a   | Not Regulated | None | 15-Nov-04   | n/a            | By-product of chlorination  |
|                                       | Radon, pCi/L***           | 4(+/-10) | n/a   | Not Regulated | None | 16-Jul-04   | n/a            | Erosion of Natural Deposits |

\*\*\*The test for radon has a high variability and therefore is reported as 4 pCi/L plus or minus 10 pCi/L. Because the test has a high margin for error, the result may be insignificant. Consumers should know that radon is a gas that you cannot see, taste or smell. Radon can be released into indoor air from showering, washing dishes or other household activities. However, in most cases, radon is not a problem in homes served by a public water supply. Radon is a known human carcinogen and if you have a concern about radon in your home, have the air tested. There are many low cost, easy to use radon test kits available to consumers. For additional information, call the State of Colorado Radon Program at 303-692-3040 or the EPA's Radon hotline at 1-800-SOS-RADON.

## OTHER SUBSTANCES DETECTED - Unregulated but of Public Interest

|                                      | Parameter      | Average | Range       | MCL | SMCL     | Sample Date | Violation? Y/N | Potential Sources           |
|--------------------------------------|----------------|---------|-------------|-----|----------|-------------|----------------|-----------------------------|
| Monitored in the Distribution System | Manganese, ppm | 0.029   | 0.007-0.18  | n/a | 0.05     | monthly     | n/a            | Erosion of Natural Deposits |
|                                      | Iron, ppm      | 0.073   | 0.006-0.66  | n/a | 0.3      | monthly     | n/a            | Erosion of Natural Deposits |
|                                      | Aluminum, ppm  | 0.02    | 0.009-0.03  | n/a | 0.05-0.2 | semi-annual | n/a            | Erosion of Natural Deposits |
|                                      | Zinc, ppm      | 0.061   | 0.036-0.087 | n/a | 5        | semi-annual | n/a            | Erosion of Natural Deposits |

## Glossary of Terms and Definitions

**MCL:** Maximum Contaminant Level

**MCLG:** Maximum Contaminant Level Goal, 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

**Treatment Technique (TT):** a required process intended to reduce the level of contaminant in drinking water instead of an MCL

**Running Annual Average (RAA):** an annual average based on weekly or quarterly monitoring

**Maximum Residual Disinfectant Level (MRDL):** the highest level of a disinfectant allowed in drinking water

**Secondary Maximum Contaminant Level (SMCL):** non-enforceable levels that primarily affect the aesthetic quality of drinking water

**ppm:** parts per million – corresponds to 1-inch in 16 miles

**ppb:** parts per billion – corresponds to 1-inch in 16,000 miles

**NTU:** Nephelometric Turbidity Unit, used to measure water clarity

**pCi/L:** picocuries per liter, used to measure radioactivity

**n/a:** not applicable

## More Water Resources

The City of Golden wants its water customers to be informed about the water utility. For more information about water quality, visit the following related Web sites:

**City of Golden:** [www.cityofgolden.net](http://www.cityofgolden.net)

**Colorado Water Protection Project:** [www.ourwater.org](http://www.ourwater.org)

**Drinking water standards:** [www.epa.gov/safewater/standards.html](http://www.epa.gov/safewater/standards.html)

**Backflow prevention:** [www.backflow.org](http://www.backflow.org) or [www.abpa.org](http://www.abpa.org)

## If You Have Special Health Concerns:

Because not all contaminants can be completely eliminated, 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 general population. Immuno-compromised individuals such as such as persons undergoing chemotherapy, persons who have undergone organ transplants, those with HIV/AIDS or other immune system disorders and some elderly and infants can be particularly at risk for infection. These people should seek advice about drinking water from their health care providers. For more information about contaminants and potential health effects, or to receive a copy of the EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbiological contaminants, contact the EPA Safe Drinking Water Hotline toll free at **1-800-426-4791**.

## Backflow and Cross Connections:

As used in the plumbing industry, the term cross-connection refers to a point in a plumbing system where the potable (drinkable) water system is connected to non-potable water. An example is the tank on the toilet.

The potable water is protected by a vacuum breaker installed in the tank where the water enters. This keeps the water in the tank from being siphoned backward into the plumbing system. Cross-connections could be a problem when non-potable water combines with a potable system. Examples of hazardous cross-connections are boilers where chemicals could be added, and irrigation systems that could be contaminated with chemicals or animal waste.

The City is implementing a Cross-Connection Control Program. This program will document the installation and maintenance of cross-connection control methods used by businesses throughout the City. The Cross-Connection Control Program is just one more way the City is working to continue to provide safe, high quality water to all of the people in the City of Golden.

# All About Stormwater

Picture the grime of City streets: oil and gas from cars and trucks, lawn chemicals and fertilizers, pet waste, and trash. Now picture those same streets after a rainstorm. The streets look cleaner, right? Sure, but the debris and contaminants haven't disappeared — they've been washed down the streets, into storm drains, through underground pipes and directly into Clear Creek (or one of its tributaries).

This type of pollution is known as urban runoff. The U.S. Environmental Protection Agency considers urban runoff to be the greatest threat to our nation's water quality. The good news is that there are a number of ways to help reduce urban runoff pollution:

- Fix automotive leaks as soon as they're discovered;
- Store antifreeze and gasoline in closed containers and dispose of them properly\*;
- Clean up after your pets;
- Keep lids secure on outside garbage cans;
- Use chemical alternatives for household cleaners and the lawn and garden;
- Wash your car on the lawn or take it to a car wash; and,
- Don't litter!

\* You can take household chemicals and yard waste to the Rooney Road Recycling Center for proper disposal. Schedule an appointment or get more information by calling 303-316-6262.

## Storm Sewer vs. Sanitary Sewer

There are two distinct sewer systems in the City of Golden. The **STORM SEWER** system is designed to drain water from the streets to prevent flooding. Any water that flows down gutters and into storm drains goes directly to Clear Creek without any treatment. Storm drain inlets do not remove pollutants. The **SANITARY SEWER** system transports wastewater from residential and commercial drains inside buildings to the wastewater treatment plant (located north of the Coors Brewing Co. complex). There, the wastewater is treated until it is clean enough to discharge back into Clear Creek.

## Golden's Water Plant and Collaborations with CSM

The Golden Water Plant continues to participate in the "Partnership for Safe Water." This voluntary program is managed by the American Water Works Association and encourages participants to go beyond the regulations in pursuit of aesthetically pleasing, high quality water. Participation in the program entails adherence to rigorous goals, including: professionalism of operations staff, consistent production of high quality water, well defined operational goals, and managerial support. You can learn more about the Partnership for Safe Water online at [www.awwa.org/Science/partnership/index.cfm?404=1](http://www.awwa.org/Science/partnership/index.cfm?404=1).

In November 2001, Golden's City Council unanimously approved formalization of a partnership between Colorado School of Mines and the Golden Water Plant. In May 2003, the results of this partnership led to the formal dedication of a "Pilot Plant Laboratory" by Golden Mayor Chuck Baroch, and



CSM V.P. Nigel Middleton.

In 2004, CSM students and Golden staff researched "Deep Bed Filtration" in the pilot lab. The study indicated that by implementing Deep Bed Filtration in Golden's Water Plant, significantly more water could be treated without increasing the number of filters. It would also

help optimize filtration efficiency during periods of high particulate loading in Clear Creek, such as spring runoff. In the future, the City will examine Deep Bed Filtration technology full scale.

You can learn more about the various programs online at [www.mines.edu/Academic/envsci/curriculum/ietl.htm](http://www.mines.edu/Academic/envsci/curriculum/ietl.htm).