# STANFORD UNIVERSITY UTILITIES DIVISION

# 2002 Annual Water Quality Report

**May 14, 2003**

**WHAT'S INSIDE:**



## Water is Top Quality

The Stanford Utilities Division is pleased to provide you with the 2002 Annual Water Quality Report. During 2002, the San Francisco Public Utilities Commission (SFPUC) and Stanford University monitored water quality for both source and treated water supplies, and in all cases the water quality was in compliance with California Department of Health Services (DoHS) and U.S. Environmental Protection Agency (U.S. EPA) drinking water requirements. We continue our commitment to provide our customers with safe, high quality drinking water. It is the policy of the Stanford Utilities Division to fully inform its consumers about the water quality standards and typical concentrations of constituents found in the water.

Stanford University
Utilities Division

## Change in Domestic Water Disinfection-November 2003

This November our drinking water supplier, the San Francisco Public Utilities Commission, will switch from chlorine to chloramine disinfection for drinking water. The main reason for the change is to ensure compliance with stricter federal and state water quality regulations.

Chloramine, similar to chlorine, disinfection has many benefits, including protecting customers from bacteria, viruses and most other microbes that can be found in water. Another benefit is an improvement in the taste and odor of the water. Chloramine is a chemical compound formed by the addition of a small amount of ammonia to the chlorine water mix. The disinfection properties of chloramine last longer than chlorine in the distribution system providing increased protection for the water while it is in the reservoirs and pipelines on its way to your tap.

The majority of Bay Area residents outside the SFPUC service area already receive chloraminated water for many years.

While switching to chloramine disinfection is intended to improve public health overall by lowering disinfection byproducts, some consumers will need to take precautions. At Stanford University the impact of the switch will be felt most by **aquarium owners** and research involving highly processed water.

Fish and some amphibians and reptiles pass water through their gills directly into the bloodstream. Like chlorine, chloraminated water can do harm if passed directly into the bloodstream of aquarium pets. Chloramine can be removed from water with water treatment products (drops or tablets) or specific carbon filters. These products are readily available at most pet supply stores.

Additional information is provided at the Stanford University – Water Department web site: www.stanford.edu/group/water or contact the Chloramine Information Line at 725-8030. We will be sending more information to our water customers over the next several months in water bills and direct mailings, please be on the look out!

# Source and Protection of Stanford's Potable Water

During 2002, the sole source of potable water for Stanford consumers was from the SFPUC. Their main source of water is snowmelt in the Hetch Hetchy watershed. The watershed is located within 459 square miles of the protected Yosemite National Park. The water from this watershed is stored in the Hetch Hetchy Reservoir and is delivered 150 miles to the Bay Area through a series of tunnels and pipelines, and is treated but not filtered due to its high quality. The surface water from Hetch Hetchy is the main water source for approximately 85 percent of SFPUC's water supply. The remainder comes from surface water runoff collected on watershed lands in the East Bay and on the Peninsula. The local surface water runoff is treated and filtered.

The SFPUC monitors the Hetch Hetchy watershed weather conditions, water turbidity levels, microbial contaminants, and aqueduct disinfectant levels. The SFPUC complies with monitoring and reporting requirements to protect our watersheds, and updates its watershed sanitary surveys for the Hetch Hetchy supply on an annual basis. The 2002 SFPUC Watershed Sanitary Survey describes the watersheds and water supply system, identifies potential sources of contamination in the watersheds, discusses the existing and recommended watershed management practices that protect water quality, and summarizes the water quality monitoring conducted.

The SFPUC completed a detailed drinking water source water assessment in 2000 for all SFPUC watersheds. The assessment showed that SFPUC watersheds have very low levels of contaminants, and those contaminants found are associated with wildlife and to a limited extent, human recreational activity.

# General Information about Sources of Water

The DoHS requires that annual drinking water reports include the information in this section.

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over land surfaces or through the ground, it dissolves naturally occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or human activity.

Explanations for expected contaminants that may be present in source water before treatment are:

**Microbial Contaminants**: such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural live stock operations, and wildlife.

**Inorganic Contaminants**: such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharge, oil and gas production, mining, or farming.

**Pesticides and Herbicides**: which may originate from a variety of sources such as agricultural, urban storm water runoff, and residential uses.

**Organic Chemical Contaminants**: including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.

**Radioactive Contaminants**: which can be naturally occurring or be the result of oil and gas production and mining activities.

"Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised 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 from infections. These people should seek advice from their health care providers about drinking water. U.S. EPA/Center for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the U.S. EPA Safe Drinking Water Hotline (800-426-4791)." [1]

"In order to ensure that tap water is safe to drink, U.S. EPA and the State DoHS prescribe regulations, which limit the amount of certain contaminants in water provided by public water systems. The State DoHS regulations also establish limits for contaminants in bottled water that provide the same protection for public health." [2]

"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. More information about contaminants and potential health effects can be obtained from the U.S.EPA Safe Drinking Water Hotline (800-426-4791). " [3]

## Results from SFPUC's and Stanford's 2002 Sampling

The enclosed data tables summarize the 2002 sampling results from laboratory analyses of parameters detected in SFPUC's supply and Stanford's distribution systems. An extensive water sample collection and testing protocol is used at the various water sources throughout the SFPUC transmission system and in the campus distribution system. Both the SFPUC and Stanford monitor for many additional parameters, which were not detected.

SFPUC's source water supply results are presented in Table 1. Stanford's water quality results for the campus distribution system are presented in Table 2. Tables 1 and 2 contain the name of each substance, the highest level allowed by regulation (MCL), the ideal goals for public health (PHG), the average and range, the typical sources of such contamination. Footnotes explaining the data and a key to units of measurement are included.

## SFPUC Addresses New Drinking Water Regulations

Since the 1996 Safe Drinking Water Act, the U. S. EPA has enacted a series of regulations to address potential microbial and chemical contaminants in drinking water. This year, the U. S. EPA will promulgate the "Long Term 2 Enhanced Surface Water Treatment Rule". This regulation will mandate an additional disinfectant for SFPUC's unfiltered Hetch Hetchy supply, and it may also require modification of disinfectants at the SFPUC's water treatment plants.

To comply with the new regulations, the SFPUC is examining advanced disinfectants, such as ozone, chlorine dioxide, or ultraviolet light. The SFPUC has experience with ozone at its Harry Tracy Water Treatment Plant and is researching the other disinfectants through industry organizations such as the American Water Works Association Research Foundation. Over the last several years, ultraviolet light disinfection has shown particular promise for minimizing the hazards of parasites in raw water. A number of U.S. utilities are researching or implementing ultraviolet light disinfection, which has been widely used by European utilities.

## Cryptosporidium and Giardia

*Cryptosporidium* and *Giardia* are parasitic microbes found in most surface water supplies and can pose a potential health threat. If ingested, both may produce symptoms of diarrhea, stomach cramps, upset stomach, and slight fever. Some people are more vulnerable to *Cryptosporidium* and *Giardia* than others, especially those with compromised immune systems. The SFPUC tests regularly for *Cryptosporidium* and *Giardia* in both source and treated water supplies. Both were occasionally found at very low levels in the City of San Francisco's treated water in 2002.

This year, the San Francisco Department of Public Health published a case-control study that found an increased risk of *Cryptosporidiosis* from drinking tap water among people with AIDS whose immune systems are compromised. A companion study found no increased risk of *Cryptosporidiosis* among people who were not immuno-compromised. For people with AIDS, strengthening their immune system is the first line of defense against *Cryptosporidiosis*. The SFPUC advises people with compromised immune systems to seek advice about drinking tap water from their health care providers.

## Lead and Copper

Stanford University completed three consecutive six-month monitoring periods for lead and copper in 1994 and follow-up monitoring in 1995, 1998 and 2001. Stanford does not exceed the lead and copper action levels established by the U.S. EPA and DoHS. Because Stanford met all compliance standards for lead and copper, the DoHS specifies a reduced sampling program to once every three years.

"Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water you can flush your tap for 30 seconds to 2 minutes before use, and always use cold water for cooking. You may also wish to have your water tested. Additional information is available from the Safe Drinking Water Hotline (800-426-4791)."[4]

Note: Paragraphs with footnotes: 1, 2, 3, 4, and 5 are from the DoHS and are required to be included in this annual report.

## TABLE 1. WATER OUALITY REPORT FOR SFPUC SOURCE WATER SUPPLY 2002[1][2]

| PARAMETER | Unit | MCL[3] | PHG[4] (MCLG[5]) | Range | Average | Major Sources in Drinking Water |
|---|---|---|---|---|---|---|
| **PRIMARY STANDARDS** | | | | | | |
| **MICROBIOLOGICAL CONTAMINANTS** | | | | | | |
| Turbidity Tesla Portal[6] | NTU | 5.0[7] | N | 0.20-0.66 | 0.33 | Soil run-off |
| Turbidity Sunol Valley Water Treatment Plant[6] | NTU | 0.3[8] | N | 0.06-0.18 | 0.08 | Soil run-off |
| **ORGANIC CHEMICALS (SFPUC Transmission System)** | | | | | | |
| Total Haloacetic Acids (HAAs)[9] | ppb | 60 | N | 18.1-33.6 | 24 | By-product of drinking water chlorination |
| Total Trihalomethanes (TTHMs)[9] | ppb | 80 | N | 47.9-50.1 | 48 | By-product of drinking water chlorination |
| Total Haloacetonitriles (HANs)[10] | ppb | N/A | N | 1-6 | 3 | By-product of drinking water chlorination |
| Total Haloketones (HKs)/Chloropicrin (CP)[10] | ppb | N/A | N | <0.5-7 | 2 | By-product of drinking water chlorination |
| Total Aldehydes [10] | ppb | N/A | N | 8-18 | 12 | By-product of drinking water chlorination |
| Total Organic Halides (TOX)[10] | ppb | N/A | N | 110-173 | 131 | By-product of drinking water chlorination |
| **INORGANIC CHEMICALS** | | | | | | |
| Arsenic[11] | ppb | 50 | N | <2-2 | <2 | Erosion of natural deposits, soil run-off |
| Chlorate [10] | ppb | N/A | N | 33-220 | 143 | By-product of drinking water chlorination |
| Fluoride - natural occurrence [11] | ppm | 2 | 1 | 0.1-0.2 | 0.2 | Erosion of natural deposits |

| PARAMETER | Unit | SMCL[3] | Range | Average |
|---|---|---|---|---|
| **SECONDARY STANDARDS - SOURCE WATER[11]** | | | | |
| Iron | ppb | 300 | <100-140 | <100 |
| Chloride | ppm | 500 | <3-7 | 5 |
| Specific Conductance | µS/cm | 1600 | 13-340 | 214 |
| Sulfate | ppm | 500 | 0.7-25 | 17 |
| Total Dissolved Solids (TDS) | ppm | 1000 | <5-190 | 114 |
| **SECONDARY STANDARDS - TREATED WATER[12]** | | | | |
| Color | unit | 15 | <6-24 | 10 |
| Odor Threshold | TON | 3 | <1 | <1 |
| **ADDITIONAL CONSTITUENTS - TREATED WATER[12][13]** | | | | |
| Alkalinity (as $CaCO_3$) | ppm | N/A | 13-120 | 66 |
| Boron | ppb | N/A | <100-180 | <100 |
| Calcium | ppm | N/A | 4-31 | 18 |
| Hardness (as $CaCO_3$) | ppm | N/A | 11-120 | 66 |
| Magnesium | ppm | N/A | <0.5-11 | 6 |
| pH | pH unit | N/A | 8.6-9.4 | 9.0 |
| Potassium | ppm | N/A | <0.5-1.0 | 0.5 |
| Silica | ppm | N/A | 5-6 | 5 |
| Sodium | ppm | N/A | 3-22 | 18 |

Notes:
(1) Water Quality Annual Report set-forth in 40 CFR Parts 141 and 142 National Primary Drinking Water Regulation and Cal. Code of Regulations, Title 22 Section 116470.
(2) All results met State and Federal drinking water regulations.
(3) Maximum Contaminant Level and Secondary Maximum Contaminant Level (SMCL) set by U.S. EPA / California Department of Health Services.
(4) Public Health Goal (PHG) adopted by the State Office of Environmental Health Hazard Assessment (OEHHA) of the California EPA.
(5) Maximum Contaminant Level Goal (MCLG) set by U.S. EPA.
(6) Turbidity is the water clarity indicator; it also indicates the quality of the water and the treatment system efficiency.
(7) The turbidity standard for unfiltered supplies is 5 NTU.
(8) Filtered water turbidity must be less than 0.3 NTU 95% of the time. This goal was met 100% of the time.
(9) Data obtained from 4-quarterly running annual average of Disinfectant/Disinfection Byproduct Rules (DBPs) monitoring for 8 locations in San Francisco Regional Water System.
(10) Based on Information Collection Rule data collected in 1998 at Alameda East Portal and SVWTP.
(11) Data obtained from Hetch Hetchy, Calaveras and San Antonio Reservoirs.
(12) Data obtained from Alameda East Portal and SVWTP.
(13) Note that, chromium, perchlorate, and MTBE were not detected in the source or treated water.
(14) Results are published as percent of positive samples per month.
(15) Compliance is based on 4-quarter running average from Disinfectant/Disinfection Byproducts Rule data in Stanford University's tap water.
(16) For fluoride that is added to the water supply the optimal level is temperature dependent based on annual averages of maximum daily air temperatures. Stanford's control range is 0.8 mg/L to 1.4 mg/L, the optimal level is 0.9 mg/L. The control range was not exceeded in 2002.
(17) Action Level (AL). The 90th percentile level for lead or copper must be less than the action level. All Stanford's sampling results were below the action levels. Results are based on 60 samples collected in 2001.

## TABLE 2. WATER QUALITY REPORT FOR STANFORD UNIVERSITY DISTRIBUTION SYSTEM 2002[1][2]

| PARAMETER | Unit | MCL[3] | PHG[4] (MCLG[5]) | Range | Average | Major Sources in Drinking Water |
|---|---|---|---|---|---|---|
| **MICROBIOLOGICAL CONTAMINANTS** | | | | | | |
| Total Coliform Bacteria[14] | % monthly positive sample | 5.0 | (0) | 0-0 | 0 | Naturally present in the environment |
| Turbidity[6] | NTU | 5[7] | N | 0.1-1 | 0.3 | Soil run-off |
| **ORGANIC CHEMICALS** | | | | | | |
| **Disinfection By Products[15]** | | | | | | |
| Total Trihalomethanes (TTHMs) | ppb | 80 | NS | 18.3-98.0 | 61.3 | By-product of drinking water chlorination |
| Total Haloacetic Acids (HAAs) | ppb | 60 | NS | 13.1-24.0 | 18.0 | By-product of drinking water chlorination |
| **INORGANIC CHEMICALS** | | | | | | |
| Fluoride[16] | ppm | NS | NS | 0.80-1.15 | 0.89 | Erosion of natural deposits; Water additive which promotes strong teeth |

| LEAD AND COPPER RULE STUDY | Unit | AL[17] | PHG[4] | Range | 90th Percentile | Major Sources in Drinking Water |
|---|---|---|---|---|---|---|
| Lead[17] | ppb | 15 | 2 | <2-3 | <2 | Corrosion of household plumbing systems; Erosion of natural deposits |
| Copper[17] | ppb | 1300 | 170 | <10-120 | 40 | Corrosion of household plumbing systems; Erosion of natural deposits |

**KEY**

| | | | |
|---|---|---|---|
| < | = less than | ppb | = parts per billion (ug/L) |
| ND | = Lower than Detection Limit, Not Detected | ppm | = parts per million (mg/L) |
| N/A | = Not Available | µS/cm | = micro Siemens per centimeter |
| N | = None | TON | = Threshold Odor Unit |
| NTU | = Nephelometric Turbidity Unit | | |
| SVWTP | = Sunol Valley Water Treatment Plant | | |

# Water Distribution Monitoring

The Stanford Utilities Division manages Stanford's water storage, distribution, system maintenance, and monitoring programs. Stanford fluoridates the water and collects daily samples to monitor fluoride concentrations. In 2002, 100 percent of fluoride sample results were within the optimum range between 0.8 and 1.4 mg/l. Stanford collects water samples routinely from various locations within the system. These samples are analyzed for coliform bacteria, chlorine residual, and general physical parameters. Additional samples are collected throughout the year. In compliance with DoHS requirements, a certified laboratory analyzes the samples and Stanford submits monthly monitoring reports to the DoHS.

The Stanford Utilities Division also maintains flushing, cross-connection, and backflow prevention programs.

In addition to Stanford's water monitoring program, SFPUC collects daily water samples from various locations within their system. The routine samples are analyzed for primary standards that apply to the protection of public health and secondary standards that refer to the aesthetic qualities such as taste and odor.

# Definitions

In this year's report, the following definitions were used for each parameter that was analyzed.

**Maximum Contaminant Level (MCL)**: The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically or technically feasible. Secondary MCLs are set for the odor, taste, and appearance of drinking water.

**Regulatory Action Level (AL)**: The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements, which a water system must follow.

**Primary Drinking Water Standard (PDWS):** MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

**Public Health Goal (PHG)**: The level of contaminant in drinking water below which there is no known or expected risk to health. The California Environmental Protection Agency sets PHGs.

**Maximum Contaminant Level Goal (MCLG)**: The level of a contaminant in drinking water below which there is no known or expected risk to health. The U.S. EPA sets MCLGs.

**Maximum Residual Disinfectant Level Goal (MRDLG):** The level of disinfectant added for water treatment below which there is no known or expected risk of health. The U.S. EPA sets MRDLGs.

**Maximum Residual Disinfectant Level (MRDL)**: The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

**Variances and Exemptions**: State or U.S. EPA permission to exceed an MCL or not comply with a treatment technique under certain conditions.

**Treatment Techniques**: A required process intended to reduce the level of a contaminant in drinking water.

**Waiver**: State permission to decrease the monitoring frequency for a particular contaminant.

# Water Conservation Tips for the Lawn and Garden

Water your lawn only when it needs it. To check, step on the grass. If it springs back up after you move, it does not need water. If it stays flat, then its time to water.

Deep-soak your lawn. Make sure you water long enough for the moisture to soak down all the way to the root zone. A light watering evaporates quickly and tends to encourage shallow root systems. Check out the lawn water guide developed by the Alameda County Water District at http://www.acwd.org/waterconserv-landscape.html.

Set your irrigation system to run in the early morning or late evening, when the water is less likely to be lost due to evaporation or wind.

Get rid of weeds, which compete with your ornamental plants for water.

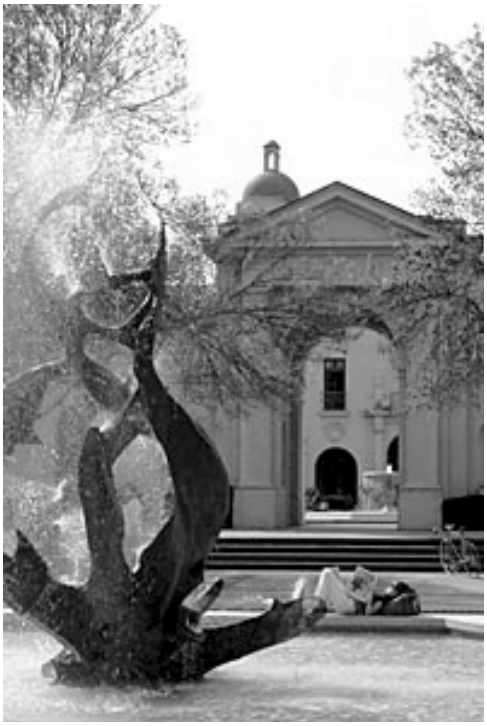
Don't water the gutter, sidewalks and driveways. Position sprinklers so water lands on the lawn or garden, not paved areas.

Plant drought-resistant trees and plants. There are many beautiful trees and plants that thrive with less water. For a listing of drought-resistant trees and plants that do well in the Bay area go to, http://www.ccwater.com/conserve/c-wwplant.asp, the Contra Costa Water District's Web Site.

Put down a layer of mulch around trees and plants. Mulch will slow evaporation of moisture and discourage weed growth. For an extensive landscape Water Wise guide visit the Santa Clara Valley Water District at http://www.heynoah.com/Water/Water_conservation/.

Check your landscaping often for leaks in pipes, hoses, faucets, sprinklers and couplings. Small leaks can add up to large water loss.

For more water conservation tips, please visit our water conservation web site at www.facilities.stanford.edu/conservation.



L.A. Cicero

## Water-wise Garden

You are invited to attend the opening of the Water-wise Garden on Friday afternoon, June 6th. See how low-water-use plants and irrigation systems can create lovely landscapes compatible with typical trees found in Stanford's faculty/staff neighborhood. The garden is located in Ryan Park just off Raimundo Way between Wing Place and Cottrell Way.

* Garden dedication ceremony
* Plant & irrigation experts to answer your questions
* Refreshments and give-aways
* Children welcome

**ADDITIONAL INFORMATION**

**Stanford Water Group Internet Homepage**:
http/www.stanford.edu/group/water

**SFPUC's Internet Homepage:**
http://sfwater.org

**U.S. EPA Drinking Water Internet Homepage**
http://www.epa.gov/safewater/
or Safe Drinking Water Hotline at-800-426-4791

If you have questions or need additional information about this report or Stanford's water quality, please contact;
Marty Laporte at 650/725-7864 or
E-mail: martyl@bonair.stanford.edu

**Este informe contiene información muy importante sobre agua potable. Por favor tomese el tiempo de entenderlo y traducirlo ó hable con alguien que lo entienda bien.**

Stanford University
Facilities Operations-Utilities Division
327 Bonair Siding
Stanford, CA 94305-7272