



### BEFORE THE AUDIT:

1. Note how and where your business uses water (i.e., Toilet flushing, dishwashing, showers, icemakers, chillers and cooling towers, irrigation, etc.)
2. Determine your flow rates on all fixtures and devices.
3. If you pay your own water bill, take inventory your water history and past plumbing maintenance, noting the average monthly cost and usage per person.
4. If you are a tenant of the building, discuss your goals with the owners/property managers. Be prepared to meet with the manager and building engineer to discuss factors affecting the property's water usage.
5. Review the Water Conservation portion of the checklist you have submitted and be prepared to show supporting documentation for all the measures "checked off" on your checklist.
6. Compile and review any maintenance reports from outside agencies that service any water-related process equipment (e.g., tunnel washers, icemakers, cooling towers).

### WHAT TO EXPECT:

GB staff will go over the "water conservation" portion of the checklist with you and walk through the property to verify items "checked off" on your checklist. This may require speaking with other building personnel. Your business will pass the audit, only if the minimum number of required measures is already in place. If not, SFGB staff will give you recommendations to help implement measures to meet GB criteria.

### GENERAL WATER CONSERVATION BEST PRACTICES

1. The key to water efficiency is to be able to control and predict your water use. Below are some tips that will help your business pass the GB water conservation portion of this certification.
  - Document maintenance and upgrades to fixtures and accessories.
  - Monitor your water usage! This should be documented by keeping a log of meter reads on at least a weekly basis so that any spikes in usage can be assessed and repairs can be made in a timely manner.
  - Utilize and install leak detection and water conserving tools (such as installing isolated meters, shut off valves to each separate appliance or fixture, rain shut off devices or ET controllers on irrigation systems).

- Quantify economic and environmental savings: determine flow rates, flush volumes, occupancy, frequency of usage on the premises, fixture counts, etc. and put a plan in place to reduce water usage for the better of your business and your environment.
  - If fixtures are already “low flow” and appear to comply with GB criteria, it is important to look at the maintenance of these fixtures. A GB representative can show you how to look for signs of water inefficiencies on the property and can offer educational materials and technical resources.
  - Inspect your property for leaks on a regular basis. Make repairs to leaks as soon as you notice them. Exercise any valves and fixtures that are rarely used to prevent future leaks.
2. Establish a relationship with your building management and neighboring occupants.
- Sponsor meetings that promote water conservation practices and offer incentives to tenants, staff, and maintenance crews in order to meet established goals.
  - Post signs in common areas that promote conservation of natural resources. This may include who to call if leaks are apparent.
3. Any irrigation systems should ideally be metered and regularly monitored to establish indoor vs. outdoor usage and to detect leaks that may occur in the system. SEE IRRIGATION SECTION TO FOLLOW FOR MORE SPECIFIC RECOMMENDATIONS.
- Run the system manually once a month and inspect the performance of all sprinklers and drip systems. Sprinkler heads often break and go unnoticed for months. Soupy, muddy areas are an indicator that there is an underground leak. Irrigation valves should be tested at least every five years, and completely turned off during the rainy season.
  - Adjust watering schedules to fit the needs of the plants. Generally, it is best to water deep and less frequent to promote deep root growth. Every day watering promotes shallow rooting, thereby making the plants drink more water.
  - Shrubs and plantings should be sustainable and climate appropriate.
  - If turf is planted, consider replacing with climate appropriate plants.
  - Pick out weeds early in the season and mulch twice a year to stifle weed growth. Grass and weeds are two of the biggest water-guzzlers!
  - If tropical plantings exist, they should be appropriately grouped with other plants with similar watering needs.
  - Annuals that are changed out each season should be watered on a separate schedule, as the roots tend to be shallow and need more frequent watering in lesser amounts.

## DIY Guide - RESOURCES TO HELP YOUR BUSINESS IMPLEMENT WATER CONSERVATION MEASURES:

Please use the resources below to help you meet minimum standards and pass your water conservation audit.

### 1. LEARN HOW TO READ YOUR WATER METER

There are several reasons why you'd want to be able to locate and read your water meter. First, you might be interested in just how much water you use in a day. By reading your meter at the beginning and the end of the day you can compare the two totals and determine how much water your business has used. The second reason is to check for leaks. If you turn off all the taps on the property, look at your meter and if it is still turning, this may indicate a leak. Here are some hints to help you find and read your water meter:

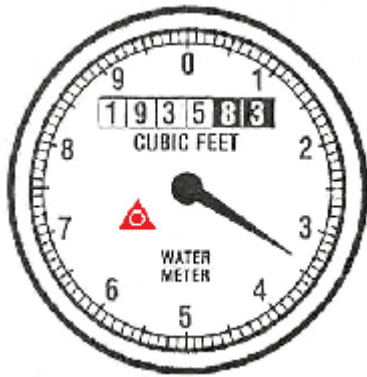


Figure 1

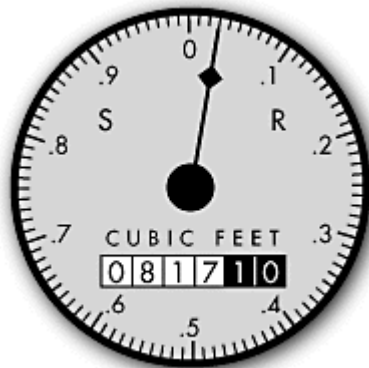


Figure 3

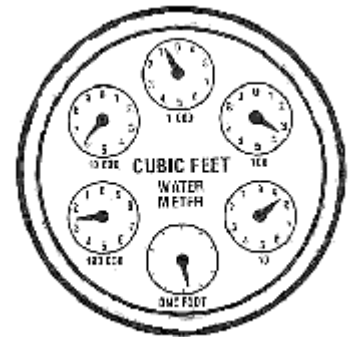


Figure 2

#### STEP 1: Locate Your Meter

Your water meter is generally located near the curb in front of your home or place of business in a direct line with the main outside faucet. It is housed in a concrete box usually marked "SFWD." Carefully remove the lid by using a tool such as a large screwdriver. Please, do not use your fingers. Insert the tool into one of the holes and pry the lid off. Visually examine the area around the meter to make sure there are no harmful insects or other animals. Some water meters in commercial properties are located in the basement under the sidewalk of the property.

#### STEP 2: Read Your Water Meter

All SFPUC customers have their water use measured by a meter. The water and wastewater charges are based on the amount of water that passes through the meter on a monthly or bimonthly basis.

The San Francisco Public Utilities Commission (SFPUC) uses two types of water meters: the straight-reading meter which resembles the mileage odometer in an automobile (figures 1 and 2), and the round-reading meter which has separate clock-like dials (see fig. 3). Both record water use in cubic feet. The SFPUC bills in units of 100 Cubic Feet; 1 UNIT EQUALS 748 GALLONS.

Charges for the amount of water consumed are based on the number of units of 100 cubic feet (748 gallons) you use during a billing period.

There are two basic types of water meters -- a straight reading meter, which resembles an odometer in a car (figures 1 and 2), and the round-reading meter, which has several separate dials (fig. 3). Some straight reading meters also have a leak detection dial, shown as the red triangle in figure 1. If all fixtures are off and the dial rotates continuously in one direction even slightly, this could mean there is a leak somewhere on the property.

### How to Read Your Meter:

In figure 2, the meter reads 81,710, which is the total number of cubic feet of water recorded since the meter was installed. Because our charge is based on units of 100 cubic feet, the meter reader rounds up or down to the nearest billing unit and discards the last two numbers (the ones with the black background). So, this reading would actually be 817.

So, if by the time we read your meter you had used 1,200 cubic feet of water, the new reading would be 82,910 (81,710 plus 1,200). Again, we'd drop the last two numbers and your official reading would be 829. Your bill would be figured by subtracting the old number (817) from the new number (829). You would then be billed for 12 units. To convert this to gallons, simply multiply 12 units by 748 gallons/unit and the total amount of gallons used during a billing period would be 8,976.

### Use your water meter to detect leaks, notice sudden spikes in usage, and monitor daily usage:

Once you know how to read your water meter, it's time to put that knowledge to work for you. Finding water leaks can save you water, which means you save money on your water and sewer bills. Also, you can figure out how much water various appliances are using.

1. Turn all water-using appliances off so that no water is being used anywhere in the house. Then check the position of the meter dial and wait. If after 15 minutes, the dials haven't moved, we can assume your meter is "holding" and all fixtures are holding tight.
2. If all your fixtures are off and you notice dials have moved, first start by checking toilets for leaks.
  - Put a few drops of food coloring or dye tablets (provided by your water utility) into the toilet tank and wait a few minutes. If there is blue in your toilet tank, you have a leak, probably at your flapper valve.
  - Check the water level in your toilet's tank. In a standard toilet, the water level should be one inch below the overflow tube. If the water is overflowing into the tube, try to set reset the water level according to manufacturer's specifications. If the valve fails to shut off, your fill valve should be replaced.
3. If all looks good, check all angle stops under your sinks and hose bib connections. If you have everything turned off and are sure the toilets and connections aren't leaking and yet the dials are still turning, you may have a hidden leak in an underground pipe or within the walls of your property.

### Detecting "Blind" Leaks:

figure 4



If you think you might have a blind leak, you can try to isolate the leak by use of your main house valve, or supply valve, which is usually located just inside the property structure in a straight line from the water meter. This is usually a round gate valve (see figure 4) that is designed to turn off and on very slowly to prevent a surge of pressure that may cause damage to your plumbing fixtures.

- Turn off the main house valve and empty all the water from the house by opening the faucets highest in elevation. If the water continues to flow from the faucet after about ten minutes, the your main supply valve must be repaired before continuing the blind leak test. If water stops flowing from the faucet, proceed. Otherwise you must make repairs to the main shut off valve before going to the next step.
- If your house valve is holding, and no water can run from your faucets inside the home, but the dials on the meter still continue to move, you may have a blind underground leak in your house pipe. If the meter stopped moving after shutting off the valve, the leak is likely inside the property.
- Under any of these circumstances, a representative from SFPUC can visit the property and assist with leak detection and give recommendations for reducing your water use.

#### Using your water meter to clock your irrigation use:

- Turn on the lawn sprinkler and watch the meter dial move for exactly one minute. One complete revolution of the sweep hand (on the straight-reading meter) or the one foot dial (round-reading meter) represents 7.5 gallons.
- Count the number of revolutions and multiply it by 7.48 to get the amount of gallons used per minute. Now estimate how long you usually leave the sprinkler running. The hundreds of gallons of water going into your lawn and garden each week may come as a surprise to you.
- This test can be used to assess a number of other household water fixtures, like your clothes washer, dishwasher, or faucet flow rates.

## 2. HOW TO CHOOSE THE RIGHT DEVICES AND FIXTURES:

The SFPUC provides various financial incentives and technical support that can assist you in choosing the best water-saving devices. Contact the [SFPUC Water Conservation Section](#) to see current rebate information and eligibility rules. Since the rise of Ultra Low Flow devices and increased awareness for the environment, a number of different manufacturers are developing state of the art equipment for both the commercial and residential sectors.

#### Low Flow Toilets:

**ULFT's:** In 1994 new water conserving toilets, called ultra-low-flush toilets (ULFT's) were required in all new construction. ULFT's use 1.6 gallons or less per flush and are much more water efficient than older toilets, which use up to 7 gallons per flush. Some of the early ULFT's performed poorly. Today however, nearly all ULFT's have excellent performance and a very high level of customer satisfaction. Each installed ULFT can save a typical family 70 gallons a day in water use.

**HET's:** High-Efficiency toilets (HET) are fairly new to the American market but have long been used overseas. The HET flushes at least 20% below the standard model. Many HET's are dual-flush toilets, which have two separate flush volume options, a half flush (.8 gallons) and a full flush (1.6 gallons).

SFPUC currently offers a \$125 rebate for replacing your pre-1994 water-guzzling toilet with an approved HET.

**HEU's:** High-Efficiency Urinals (HEUs) are defined as fixtures that function at 0.5-gpf or less. (The HEU category includes non-water urinals) Based on data from studies of actual usage, these urinals save 20,000 gallons of water per year with an estimated 20-year life. In addition to saving water and sewer cost, non-water urinals are an improvement over traditional urinals in both maintenance and hygiene. Go to [http://www.cuwcc.org/urinal\\_fixtures.lasso](http://www.cuwcc.org/urinal_fixtures.lasso) for more information about HEU's.

### Low Flow Toilets for Commercial Use:

A number of commercial ultra low flush toilets are available in a range of rough-in sizes and shapes. Both wall-mount and floor-mount 1.6 gallon per flush toilets are readily available. The efficiency of a flushometer and bowl combination toilet depends mainly upon two factors: choosing the right combination and regular maintenance of the flushometer valve.

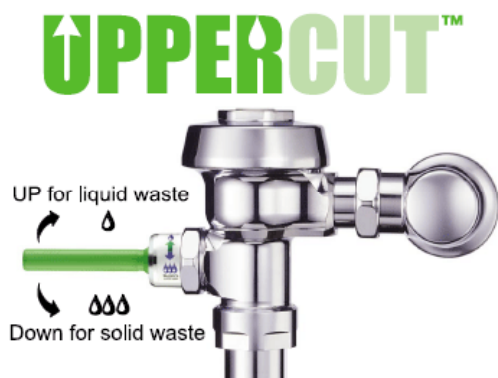
### Industrial Flushometer Valve HET's:

There are several flushometer HET's on the market, and some of them have passed performance standards set by the CUWCC (California Urban Water Conservation Council). Upload a current list of these industrial flushometer toilets at [http://www.cuwcc.org/toilet\\_fixtures.lasso#HETs](http://www.cuwcc.org/toilet_fixtures.lasso#HETs)

### Other Water-Saving Flushometer Accessories:

Dual-flush handle retrofit for flushvalves

- \* Retrofits to most any existing valve
- \* Lifting Handle UP initiates reduced flush, eliminating liquid and paper waste
- \* Pushing Handle DOWN initiates full flush, eliminating solid waste and paper
- \* Reduces water volume by up to 30% when activated UPWARDS
- \* Antimicrobial coating on handle protects against germ transmission
- \* Distinctive green handle signifies water-conserving device



## Testing of Popular Flushometer Valve/Bowl Combinations:

While there has been considerable research into the performance and water savings related to residential toilet fixtures (typically gravity-fed), little work has been completed on flushometer valve fixtures for commercial applications. This flushometer testing program included flush volume and performance testing of seven popular commercial bowl models with seven different flushometer valves, for a total of 49 different bowl/valve combinations. Included within the study were measurements of the variations in flush volume that could be achieved with adjustments of the flush valves or the control stop. This study was sponsored by the City of Toronto, and the Regions of Durham and Waterloo in Ontario, Canada. For a PDF copy of the revised Final Report, download it from the website of Canadian Water and Waste Water Association: [http://www.cwwa.ca/pdf\\_files/FV%20Revised%20Final%20Report%20Aug.23.pdf](http://www.cwwa.ca/pdf_files/FV%20Revised%20Final%20Report%20Aug.23.pdf)

## Toilet and Urinal Upgrades:

- To download a current list of tested HET'S: [http://www.cuwcc.org/toilet\\_fixtures.lasso#HETs](http://www.cuwcc.org/toilet_fixtures.lasso#HETs)
- To compare the flush performance of over 175 types of US toilets, download the Maximum Performance (MaP) tested products: [www.cuwcc.org/MapTesting.lasso](http://www.cuwcc.org/MapTesting.lasso)
- For more information about HET's and HEU's, where you can buy them, and current rebates, contact the [SFPUC Water Conservation Section](#).

## Low flow faucet aerators and showerheads:

Installing Low-Flow shower heads and faucet aerators is the single most effective water conservation savings you can do for your home. Inexpensive and simple to install, low-flow shower heads and faucet aerators can reduce your home water consumption as much as 50%, and reduce your energy cost of heating the water also by as much as 50%. SFPUC gives free reduced flow faucet aerators and shower heads to all residential and commercial customers.

## How to tell if you need one:

**Faucet Aerators:** If an aerator is already installed on your faucet, it will have its rated flow imprinted on the side. If no aerator is visible, check to see if there are threads just inside the tip of the faucet. Most modern faucets are threaded to accept aerators. Some designer faucets have an internal built in "laminar" restrictor. To assess the flow rate of this type of faucet, use a "flow meter bag" which can be purchased at several online conservation websites. If there appears to be an aerator installed, but there is no flow rate stamped on the side, the aerator may not be a low flow type and should be replaced with a new one not to exceed 1.5 gallons per minute.

**There are two types of flow restrictors, laminar and aerated.**

**Standard aerators:** Aerators are devices that are designed to reduce the flow of the water coming out of the faucet while introducing air into the water flow. That is why they are called "aerators". Water has to pass through very small holes and spreads out to cover more surface.

**Laminar Flow Aerators:** These work differently than faucet aerators. Aerators add air to the water stream to make the flow feel stronger. Laminar flow controls, on the other hand, work by producing dozens of parallel streams of water.

**Tamper Proof Aerators for Commercial use:** If your aerators keep suddenly disappearing, tamper proof aerators are a great alternative.



LAMINAR  
FLOW



AERATED FLOW



1.5 lavatory faucet  
aerators



1.5 and 2.0 gpm  
kitchen faucet aerators



1.5 tamper proof swivel  
faucet aerators for  
commercial applications

## REDUCE FLOW RATES by use of a Flow Control Valve or Flow Regulators:

A flow valve is a device that reduces water-flow in faucets, showers and hose bibs by up to 85%. Earn valuable "build it Green" (lead) points for water and energy savings. If your faucets are vintage and are not threaded for aerators, installing these devices are the best option for reducing flow rates.

How much water does it take to brush your teeth, shave, shower, rinse dishes or wash your car? It takes 40%, 50% up to 80% less with custom flow control valves in place, suitable for hotels, fast food restaurants, gas stations, hospitals and homes.

The gallons per minute can be varied to fit the function (e.g. 1.5 gpm is recommended for bathroom use and 1.75 to 2.5 gpm for kitchen use due to volume related activities). Located under the sink, these tamper proof flow control valves go undetected by the faucet user. These solid brass flow control devices eliminate water waste and faucet vandalism.

Control valves attach directly to faucets, hose bibs and shower arms, quickly and easily. They can reduce water-flow by up to 85% without a loss in consumer satisfaction.

These products range from 1/2 GPM to 10 GPM. You provide PSI and desired GPM outputs. Most flow control valves can work in either direction. They cost about \$20 a pair, pricing reduces with bulk purchasing.

## Low Flow Shower Heads:

If produced after 1994, your showerhead will usually have stamped flow rate or the flow rate can be found on the underside of the showerhead. If the flow rate is not apparent, place a 2qt. saucepan on the floor of the shower and position it in the middle of the shower stream. With shower on full, count how many seconds it takes to fill the pan. If it takes fewer than 12 seconds, you could use a low-flow showerhead. If you have a low-flow showerhead installed, it should read 2.5 gpm or less (1.5 gpm recommended for Green Business Certification).



Web Links to Online Sales of Water-Saving Devices and Fixtures:

[Energy Savers](#)  
[American Faucet Inc.](#)  
[Faucet.com](#)

[Niagara Conservation](#)  
[Creative Energy Technologies](#)  
[Omni](#)

[WaterMiser](#)  
[American Conservation Group](#)

### 3. CHOOSING WATER-EFFICIENT APPLIANCES AND PROCESS EQUIPMENT

#### Dishwashers:

- Run the dishwasher only when it's full; use the rinse-and-hold dishwasher feature until you're ready to run full load.
- Don't pre-rinse dishes before loading the dishwasher. Our tests show pre-rinsing doesn't improve cleaning, and by skipping this step, you'll save as much as 20 gallons per load, or 6,500 gallons per year.
- If you're buying a new dishwasher, consider a water-saver. The most water-efficient models we've tested use only about 4 gallons per wash—about a third of what the least efficient models used.

**Residential Dishwashers:** Visit [Green Ratings](http://www.greenerchoices.org/ratings.cfm?product=dishwasher) of various water efficient dishwashers:  
<http://www.greenerchoices.org/ratings.cfm?product=dishwasher>

**Commercial Dishwashers:** [Food Service Technology Center](http://www.fishnick.com) www.fishnick.com

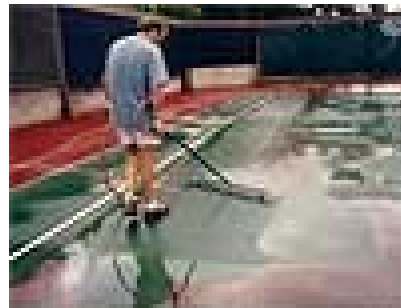
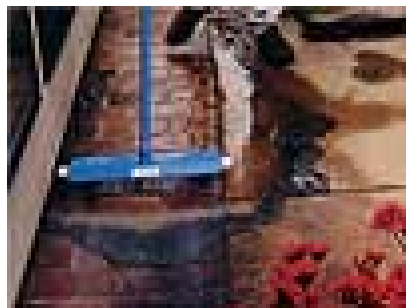
#### High Efficiency Clothes Washers:

High-Efficiency Clothes Washers (HECWs) utilize technological advances to deliver excellent wash performance while saving both water and energy. Resource efficient models use 35-50% less water and approximately 50% less energy. The water efficiency of clothes washers is rated using the term "water factor" to describe and compare its water use. Water factor is measured by the quantity of water (gallons) used to wash each cubic foot of laundry. A lower water factor represents greater water and energy efficiency.

Go to [www.sfwater.org](http://www.sfwater.org) for more information on high efficiency clothes washers and current rebates offered through SFPUC.

#### Water Brooms:

A Waterbroom uses a combination of air and water pressure to clean decking, patios, tennis courts, exterior walkways, entryways, etc., saving 60 percent of the water and 75 percent of the labor costs, while reducing urban runoff.



**Watermiser Waterbrooms:**  
<http://www.watermiser.com/>

## American Waterbroom:

<http://www.waterbroom.com/waterbroomInfo.html?initialScale=142&level=1&theSound=%5Bobject+object%5D&logoLevel=0>



## Pre-Rinse Spray Valves:

A low-flow pre-rinse spray valve is one of the easiest and most cost effective energy saving devices available to the foodservice operator.

In addition to minimizing water consumption, water heating energy and sewer charges are also reduced. Replacing a typical spray valve that flows up to three gallons of water per minute (gpm).

For more information about pre-rinse spray valves, go to <http://www.fishnick.com/saveenergy/sprayvalves/>

## Tankless Hot Water Heaters:



Throw away your water heater tank and shave ten to twenty percent off your water heating bill. That savings results from elimination of standby losses -- energy lost from warmed water sitting in a tank. And, since water heating accounts for about 14 percent of the average U.S. household energy budget, this can be a significant loss.

Tankless water heaters provide hot water at a preset temperature when needed without storage, thereby reducing or eliminating standby losses. Tankless water heaters can be used for supplementary heat, such as a booster to a solar hot water system, or to meet all hot water needs.

Tankless water heaters have an electric, gas, or propane heating device that is activated by the flow of water. Once activated, the heater provides a constant supply of hot water. The maximum flow rate at a desired temperature will be determined by the capacity of the heater. Gas tankless water heaters typically have larger capacities than electric tankless water heaters.

Large units intended for whole house water heating are located centrally in the house while, in point-of-use applications, the water heater usually sits in a closet or under a sink.

Tankless water heaters are rated by the maximum flow rate at which a desired temperature rise is met. Special features may allow the user to set the delivery temperature. Efficiency is higher than an equivalent tank type water heater because standby losses are virtually eliminated. Electric tankless water heaters require a relatively high electric power draw because water must be heated quickly to the desired temperature. Residential gas models are available that can heat more than five gallons per minute by 60°F, generally more than enough for two showers to be run simultaneously. Whole house electric units typically have a capacity closer to three gallons per minute.

## Cooling Towers:

Cooling towers help regulate temperature by rejecting heat from air-conditioning systems or by cooling hot equipment. In doing so, they use significant amounts of water. The thermal efficiency, proper operation and longevity of the water cooling system all depend on the quality of water and its reuse potential.

In a cooling tower, water is lost through evaporation, bleed-off, and drift. To replace the lost water and maintain its cooling function, more make-up water must be added to the tower system. Sometimes water used for other equipment within a facility can be recycled and reused for cooling tower make-up with little or no pre-treatment, including the following:

- \* Water used in a once through cooling system
- \* Pretreated effluent from other processes, provided that any chemicals used are compatible with the cooling tower system.
- \* High-quality municipal wastewater effluent or recycled water (where available)

## Operation and Maintenance Options:

- \* Consider measuring the amount of water lost to evaporation. Some water utilities will provide a credit to the sewer charges for evaporative losses.

- \* Find out if conductivity is actually representative of your controlling parameter. Depending on your water supply, the equipment being cooled and the temperature differential across the tower, your parameter may be hardness, silica, total dissolved solids, algae or others. Once you determine the relationship between conductivity and your controlling parameter, set your blowdown valve to keep that parameter constant.

- \* Install conductivity and flow meters on make-up and bleed-off lines. Meters that display total water being used as well as current rate of flow are most useful. Check the ratio of conductivity of make-up water and the bleed off conductivity. Then check the ratio of bleed-off flow to make up flow. If both ratios are not about the same, check the tower for leaks or other unauthorized draw-off. Read conductivity and flow meters regularly to quickly identify problems. Keep a log of make-up, bleed-off consumption, dissolved solid concentration, evaporation, cooling load, and concentration ratio.

- \* Consider using acid treatment such as sulfuric or ascorbic acid, where appropriate. When added to recirculating water, acid can improve the efficiency of the water by controlling scale buildup created from mineral deposits. Acid treatment lowers the pH of the water, and is effective in converting a portion of the calcium bicarbonate, the primary cause of scale, into the more readily soluble forms. Make sure that workers are fully trained in the proper handling of acids. Also note that acid overdoses can severely damage a cooling system, so use a timer and add acid at points where the flow of water is well mixed and reasonably rapid. Also beware that lowering pH may mean you may have to add a corrosion inhibitor.

- \* Select your chemical treatment vendor with care. Tell vendors that water conservation is a high priority and ask them to estimate the quantities and costs of treatment chemicals, volumes of bleed-off water and the expected concentration ratio. Keep in mind that some vendors may be reluctant to improve water

efficiency because it means the facility will purchase fewer chemicals. In some cases, saving on chemicals can outweigh the savings on water costs. Vendors should be selected based on "cost to treat 1000 gallons makeup water" and highest "recommended system water cycle of concentration."

### Retrofit Options:

\* Install a sidestream filtration system that is composed of a rapid sand filter or high-efficiency cartridge filter to cleanse the water. These systems draw water from the sump, filter out sediment and return the filtered water to the tower, enabling the system to operate more efficiently with less water and chemicals. Sidestream filtration is particularly helpful if your system is subject to dusty atmospheric conditions. Sidestream filtration can turn a troublesome system into a more trouble-free system.

\* Install covers to block sunlight penetration. Reducing the amount of sunlight on tower surfaces can significantly reduce biological growth such as algae.

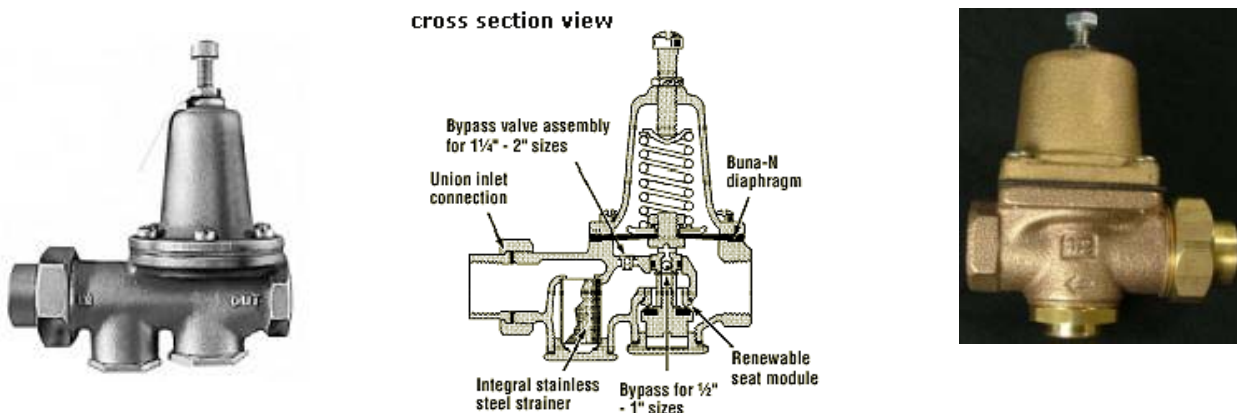
\* Consider alternative chemical-free water treatment options such as ozonation or ionization, to reduce water and chemical usage. Be careful to consider life cycle cost impact of such systems.

\* Install automated chemical feed systems on large cooling tower systems (over 100 ton). The automated feed system should control blowdown/bleed-off by conductivity and then add chemicals based on makeup water flow. These systems minimize water and chemical use while optimizing control against scale, corrosion and biological growth.

## 4. WHAT YOU NEED TO KNOW ABOUT WATER PRESSURE:

Water Pressure that is too high wastes water and causes stress to your pipes and fixtures. Water should enter the property at 45 to 60 pounds of pressure per square inch (psi). You can check your water pressure with a pressure gauge that attaches to your outdoor/indoor faucet threaded for a  $\frac{3}{4}$  inch hose bib, available at most hardware stores for around \$10.

Water pressure over 60psi can cause a strain on your plumbing fixtures or pipes and can even cause bursts in the water line. Pressure in excess of 80 psi may void warranties in some appliances and fixtures. If your water pressure exceeds 70 psi, install a pressure regulating valve (see images below). Depending on the size and type of regulator, they cost anywhere from \$40 and up, and can prevent future maintenance costs and leaks.



## 5. WATER-EFFICIENT LANDSCAPING:

Xeriscaping refers to the conservation of water through creative landscaping.

Originally developed for drought-afflicted areas, the principles of xeriscape today have an ever broadening appeal. With water now considered an expensive and limited resource, all landscaping projects, residential or commercial, can benefit from this alternative.

Xeriscapes do not have a single look - almost any landscaping style can be achieved. The principles can be applied to all or part of a yard, in any geographic region of North America.

### Benefits of Xeriscaping:

- It Saves Water. For most of North America, over 50% of residential water used is applied to landscape and lawns. Xeriscape can reduce landscape water use by 50 - 75%.
- Less Maintenance. Aside from occasional pruning and weeding, maintenance is minimal. Watering requirements are low, and can be met with simple irrigation systems.
- No Fertilizers or Pesticides. Using plants native to your area will eliminate the need for chemical supplements. Sufficient nutrients are provided by healthy organic soil.
- Improves Property Value. A good Xeriscape can raise property values which more than offset the cost of installation. Protect your landscaping investment by drought-proofing it.
- Pollution Free. Fossil fuel consumption from gas mowers is minimized or eliminated with minimal turf areas. Small turf areas can be maintained with a reel mower.
- Provides Wildlife Habitat. Use of native plants, shrubs and trees offer a familiar and varied habitat for local wildlife.

### The 7 Principles of Xeriscaping:

1. **Planning and Design** - The fundamental element of Xeriscape design is water conservation. Landscape designers constantly look for ways to reduce the amount of applied water and to maximize the use of natural precipitation. Before setting pencil to paper, familiarize yourself with the 7 Principles of Xeriscaping and take a tour of your local nurseries to see what drought-resistant plantings are available locally. Using graph paper, draw an aerial view of your property and begin your plan with the following considerations:

- orient the plot by marking down north, south, east and west. Include any limiting features such as trees, fences, walkways or structures. Note areas of sun and shade, which will help you establish zones of differing water needs. You'll want to group plants with similar watering needs for most efficient water use.
- study the natural contours and drainage patterns of the land. These contours can be easily developed into terraces, which add visual interest and help reduce soil loss and erosion due to rain or irrigation. Terraces can be as little as 3" and still offer visual appeal; terraces over 12" will require considerable support, such as rock walls or timbers reinforced with steel stakes.
- consider the planned use of each area within the plot. Areas for seating, walkways, visual barriers, dining or play should be defined and incorporated into your plan.
- areas to be left as turf should be designed to be easily mowed. Curved swaths are usually better than straight runs with sharp turns. Narrow swaths can be difficult to water with conventional sprinklers.

- larger plantings, such as shrubs and trees, can be positioned to provide natural heating and cooling opportunities for adjacent buildings.

2. **Soil Improvement** - The ideal soil in a water-conserving landscape does two things simultaneously: it drains quickly and stores water at the same time. This is achieved by increasing the amount of organic material in your soil and keeping it well aerated. Compost is the ideal organic additive, unless your xeriscape contains many succulents and cacti. These species prefer lean soil. It may be worthwhile to have your soil tested at a garden center or by using a home test kit. Most Western soils tend to be alkaline (high pH) and low in phosphorous. Adding bonemeal and rock phosphate will help.

3. **Create Limited Turf Areas** - Reduce the size of turf areas as much as possible, while retaining some turf for open space, functionality and visual appeal. When planting new turf, or reseeding existing lawns, ask at your garden center for water-saving species adapted to your area.

4. **Use Appropriate Plants** - For best results, select plants that are native to your region.

- use drought-resistant plants. In general, these plants have leaves which are small, thick, glossy, silver-grey or fuzzy - all characteristics which help them save water.
- select plants for their ultimate size. This reduces pruning maintenance.
- for hot, dry areas with south and west exposure, use plants which need only a minimum of water. Along north and east-facing slopes and walls, choose plants that like more moisture. Most importantly, don't mix plants with high- and low-watering needs in the same planting area.
- trees help to reduce evaporation by blocking wind and shading the soil.

5. **Mulch** - Cover the soil's surface around plants with a mulch, such as leaves, coarse compost, pine needles, wood chips, bark or gravel. Mulch helps retain soil moisture and temperature, prevent erosion and block out competing weeds. Organic mulch will slowly incorporate with the soil, and will need more applied, "top-dressed", from time to time. To be effective, mulch needs to be several inches thick. There should be no areas of bare soil.

6. **Irrigate** - Water conservation is the goal, so avoid over-watering. Soaker hoses and drip-irrigation systems offer the easiest and most efficient watering for xeriscapes because they deliver water directly to the base of the plant. This reduces moisture loss from evaporation. They also deliver the water at a slow rate, which encourages root absorption and reduces pooling and erosion. In general, it's best to water deeply and less frequently.

7. **Maintain your landscape** - Low-maintenance is one of the benefits of xeriscape. Keeping the weeds from growing up through the mulch may require some attention. Thickening the layer of mulch will help. Turf areas should not be cut too short - taller grass is a natural mulch which shades the roots and helps retain moisture. Avoid overfertilizing.

## ADDITIONAL RESOURCE LIST:

California Urban Water Conservation Council: <http://www.cuwcc.com>  
San Francisco Environment: <http://www.sfenvironment.org/>  
Water-Budgets and Irrigation Scheduling: [www.wateright.org](http://www.wateright.org)  
Water-Wise Landscaping: [www.stopwaste.org](http://www.stopwaste.org)  
General Water-Saving Tips: [www.H2ouse.org](http://www.H2ouse.org)  
American Water Works Association: <http://www.awwa.org/waterwiser/>  
NAHP: [http://www.nahbrc.org/greenguidelines/userguide\\_water\\_innovative.html](http://www.nahbrc.org/greenguidelines/userguide_water_innovative.html)  
Energy Star Home Appliance Product Info: [www.energystar.gov](http://www.energystar.gov)  
Energy Efficiency and Renewable Energy Network: [www.eere.energy.gov](http://www.eere.energy.gov)  
Plumbing Care and Repair Handbook: [www.theplumber.com](http://www.theplumber.com)  
Flapper Replacement information: [www.toiletflapper.org](http://www.toiletflapper.org)  
Thomasnet, The Industrial Newsroom: <http://news.thomasnet.com/>  
San Francisco Bay Area Friendly Landscaping: [www.stopwaste.org](http://www.stopwaste.org)  
Regional Water Conservation Outreach: [www.WaterSavingHero.com](http://www.WaterSavingHero.com)