One Community’s Fight Against Drought

TUCSON Stretches Its Water Resources

Also in this issue:
- How to Hire a Water System Operator
- Contents of a Comprehensive Water Conservation Plan
- Xeriscaping® Conserves Water
Liquid feeder pumps are used to inject various chemicals needed for effective water and wastewater treatment. Calibrating these pumps helps control and optimize feeding rates, which in turn provides better water quality at a lower cost.
At the close of 2007, the United Nations estimated that there were more than 6.6 billion people on Earth, an increase of six billion since 1900. Over the next 40 years, this number is expected to increase to 9.4 billion. Now math was never my best subject, but when I ponder these numbers and remember that we have the same amount of water we’ve always had, I realize that we’re facing a big, big problem.

Residents of the drier parts of our planet have had a taste of water shortage for years. Increasingly, though, regions like the American Southeast—where, historically, there’s been more than enough water—are beginning to understand the problem firsthand.

An important way to address water shortages, regardless of their cause, is through conservation. This On Tap has some great information about conserving water, from Web sites on pages 12 and 13 to the final column by Amy Vickers, you’ll find some useful ideas about using less.

In “One Community’s Fight Against Drought: Tucson Stretches Its Water Resources,” Caigan McKenzie looks at steps this Arizona city has taken to reduce water use. As with so many things in life, education is the linchpin in Tucson’s water conservation efforts.

Other articles in this issue provide specific ways to conserve water. “Xeriscaping™ Conserves Water,” for example, examines gardening and plant growing and the impact they have on water use while, on page 23, you’ll find specific
recommendations for implementing water conservation plans. Regardless of your current water situation, conservation is destined to be part of your future.

The future of the National Environmental Services Center (NESC) got a little brighter at the end of April. I’m pleased to announce that we’ve hired a new director: Dr. Gerald Iwan. Many of you already know Jerry from his career as chief of the Water Supplies Section of the Connecticut Department of Health and his service on numerous water-related projects at the national and international levels.

“I am delighted that the leadership and staff at West Virginia University have invited me to work with them on continuing and enhancing NESC’s long and highly regarded tradition of education and service to the water, waste, and wastewater sectors,” Iwan says. “The next few years are going to be exciting, considering population growth, public health, climate, economy, security, and social restructuring. The need for reliable infrastructure; safe, sustainable drinking water resources; and sound waste and wastewater management systems and practices will become even more apparent as we wrestle with these and other emerging issues.” Welcome to NESC, Dr. Iwan!

Regards,

Mark Kemp-Rye
Editor
Sponsoring an event?
If you are sponsoring a water-related event and want to have it listed in this calendar, please send information to Mark Kemp-Rye, National Environmental Services Center, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064. You also may call Mark at (800) 624-8301 or (304) 293-4191 ext. 5523 or e-mail him at mkemp@mail.wvu.edu.
USDA Rural Infrastructure Loans and Grants

The U.S. Department of Agriculture (USDA) has announced a new series of programs to help small towns and rural residents finance infrastructure improvement. “These loans, grants, and loan/grant combinations will help communities provide essential services and maintain the infrastructure necessary for businesses and residents to enjoy a high quality of life in rural areas,” says Under Secretary for Rural Development Thomas Dorr. This initiative offers help to small communities across a wide range of important infrastructure issues such as public television digital conversion, telemedicine, energy costs, and household water wells.

Of particular interest to those working with water and wastewater issues are the Revolving Fund Grant Program, which helps nonprofit groups with pre-development costs for water and wastewater projects, and the Household Water Well Grant Program, designed to help individual households pay for an upgrade to or replacement of their water well system.

Details are available at state Rural Development offices. For the phone number of your state Rural Development office, contact the National Environmental Services Center at (800) 624-8301 or (304) 293-4191. The list is also available on the Rural Development Web site at www.rurdev.usda.gov/recd_map.html. To learn more about USDA Rural Development, visit their Web site at www.rur-dev.usda.gov/rd/index.html.

Water Wars Become Border Wars

Desperate times call for desperate measures. The state of Georgia, in an effort to relieve the severe water shortage it has endured for the past year, is claiming that an old land survey done in 1818 shows that the state’s boundary crosses the Tennessee River, giving them access to much-needed water.

Two state senators introduced resolutions to essentially move the Georgia state line north, running it right through a bend in the river. Nearly all Georgia legislators signed on to the resolutions.

Tennessee officials reacted with a combination of humor and defiance to this proposal. Justin Wilson, former deputy governor and now a Nashville attorney, responded to the proposal with, “Us good Tennesseans will take our long rifles up to Lookout Mountain and fire when ready!”

Most Georgia officials agree that it is a federal issue, which just might work to their favor. The Tennessee Valley Authority, a federal agency, manages the river and so might let Georgia take its case directly to the U.S. Supreme Court.
A new U.S. Geological Survey circular gives resource professionals, public decision-makers, and citizens a better understanding of water budgets and the hydrologic cycle. Water budgets give an accounting of water as it moves through the earth’s atmosphere, over land and below the surface. A water budget assesses how a natural or human-made change affects the other aspects of the cycle. Uncertainties that exist in water budgets are explained to help the reader understand the complex nature of evaluating how much water is available for human and environmental needs. Several examples are included.


Albuquerque Adopts Water Efficiency Standards

The Albuquerque-Bernalillo County Water Utility Authority recently adopted water saving standards for new construction.

New homes are required to have rainwater collection systems, capturing water from at least 85 percent of the roof area. A water cistern with pump will be required for any building larger than 2,300 square feet. Rain barrels, cisterns, or catchment basins will be required for smaller buildings. High-efficiency toilets that use 1.2 gallons are required.

The new regulations also affect lawn areas. Turf is not allowed on slopes steeper than a 5:1 gradient and no areas smaller than 10 feet in any dimension may be sprinkler-irrigated.

To learn more about this project, visit the Albuquerque-Bernalillo County Water Utility Authority Web site at www.abcwua.org.

New USGS Report Explains Water Budgets

A new U.S. Geological Survey circular gives resource professionals, public decision-makers, and citizens a better understanding of water budgets and the hydrologic cycle.

Water budgets give an accounting of water as it moves through the earth’s atmosphere, over land and below the surface. A water budget assesses how a natural or human-made change affects the other aspects of the cycle. Uncertainties that exist in water budgets are explained to help the reader understand the complex nature of evaluating how much water is available for human and environmental needs. Several examples are included.

A new $490 million treatment plant and purification system that can turn 70 million gallons of treated sewage into drinking water every day is one solution to lingering drought in Orange County, California.

Although officials say the resulting water is as clean as distilled water, the finished product will be injected into the county’s giant underground aquifer to be cleansed further as it percolates through the earth. As their other sources of drinking water are becoming available, county officials are counting on this groundwater basin to supplement drinking water supplies for 2.3 million people who live in Orange County.

An added benefit to storing this water underground is that it helps to combat saltwater intrusion into their aquifer. The aquifer has been plagued for decades by saltwater flowing in as fresh water is pumped out.

Officials admit that at $550 per acre-foot, the recycled water is slightly more expensive than supplies from other regions of the state, but they predict that, as these other sources become more scarce and more expensive, their new process will be competitive. An added bonus to the injection process is the huge reduction in treated sewage discharged off the coast.

Krista Clark, director for Regulatory Affairs for the Association of California Water Agencies, a nonprofit organization that represents 450 government authorities, says, “It will keep Orange County’s groundwater basin reliable and produce super quality drinking water in the future.”

To read more about this project, visit the Los Angeles Times Web site at www.latimes.com/news/local/la-me-reclaim2jan02,0,7789563.story

National Source Water Collaborative’s Call to Action

Your Water. Your Decision. is the title of a new four-page guide for local officials by the National Source Water Collaborative (SWC).

The Your Water. Your Decision. initiative helps local decision makers understand their role in source water protection and how to include drinking water protection into a community’s normal planning activities. The guide provides tools for specific situations, information about smart growth policies, and general resources for protecting our drinking water sources. Recommendations for appropriate development patterns, wise budget and pricing practices, and some general good stewardship techniques are included.

The SWC is comprised of federal, state and local organizations to further the goals of protecting sources of drinking water. The SWC hopes that by joining forces, they are able to more adequately protect America’s drinking water at the source.

Your Water. Your Decision. may be downloaded at www.protectdrinking-water.org.

Beijing Olympics Takes Water from Farmers

To provide a ‘lush sparkling city’ for Olympic athletes and visitors by August 2008, more than 309 kilometers of canals are hastily being dug to pump the 300 million cubic meters of water to Beijing.

According to a January 23, 2008, Reuters article, local farmers, already under a crush of drought and environmental strain, are watching in dismay, as they are forced to give up not only their water source but their fields that are in the way of these canals. Explosive industrial and urban growth have already exhausted rivers and aquifers in northern China and a decade-long drought has tripled the price of water in some areas.

While open complaints are few, villagers wonder about the long-term effects of choosing a rather short-term goal over the Olympic Games over their farms and fields.
Water Security Network Provides Information

The U.S. Environmental Protection Agency’s Information Sharing and Analysis Center for Water (WaterISAC) has announced a new service providing information about national security issues and warnings to American utilities. Subscribers will have access to “sensitive” and “for official use only” information and threat warnings.

The new service is being offered at two levels: Pro and Basic. The “Pro” service is intended for water and wastewater directors, managers, security, and IT personnel, where subscribers have special access privileges to an online secure portal providing time-sensitive information about threats to our water systems. The “Basic” service is free and provides important information from the federal government to increase awareness of security issues.

More information about this service may be found at www.WaterISAC.org. At the site, you can view a demonstration of the Pro service and the online secure portal.

Canadian Judge Mediates Texas/Mexico Water Dispute

More than 40 farmers, ranchers, and irrigation districts from Texas are taking their long-standing argument over the Rio Grande north to Canada to obtain a fair hearing.

This 2004 lawsuit, where farmers and ranchers are suing Mexico for $500 million, argues that they were shorted on water from the Rio Grande River from 1992 to 2002, in violation of a 1944 treaty. Last June, a tribunal operating under the North American Free Trade Agreement (NAFTA) decided it did not have jurisdiction. The case now goes to Canada because both sides agreed in arbitration that if an issue arose, they would go to a neutral location.

NAFTA is the only way farmers can seek redress because the 1944 treaty has no provisions for individuals to sue a country. The involved Texans feel that if they don’t force Mexico to pay a penalty now, it will be easier for them to shortchange their northern neighbors of precious water in the future.

EPA Releases Watersheds Needs Survey

The U.S. Environmental Protection Agency (EPA) has released the findings of its 2004 Clean Watersheds Needs Survey (CWNS). The results are from an extensive series of surveys of public wastewater systems, stormwater and sewer overflow facilities, nonpoint source pollution control projects, decentralized wastewater management, and estuary management projects. The survey aims to give the EPA and Congress an idea of what will be needed to make sure wastewater is returned clean to the environment.

The CWNS predicts that $202.5 billion is needed to control water pollution over the next 20 years. Overall needs grew by $16.1 billion in just the four years between the 200 and 2004 surveys.

The EPA says the top reasons for cost increases nationwide are population growth, stricter water quality standards, and aging infrastructure. “A significant portion of the nation’s infrastructure has reached, or soon will reach, the end of its projected usefulness,” the report states.

The entire report may be downloaded at www.epa.gov/cwns or it can be viewed chapter by chapter on the site. Also provided are links to the 1996 and 2000 reports.
New Partnership Advances Disaster Management

To increase coordination of all aspects of emergency management worldwide, the American Society of Civil Engineers (ASCE) and the International Association of Emergency Managers (IAEM) have signed a memorandum of cooperation. The new agreement will promote awareness of our nation’s crucial infrastructure, and encourages the involvement of the engineering community in supporting emergency managers.

While IAEM activities are dedicated to promoting the goals of saving lives and protecting property during emergencies, both organizations acknowledge the need for the engineering community to support the preparedness, response, recovery, and mitigation phases of emergency management. Both organizations recognize the need for additional funding and increased emphasis of coordination of all aspects of emergency management worldwide.

To learn more about ASCE’s Infrastructure Security Partnership, visit www.tisp.org/-tisp.cfm. To learn more about IAEM, go to www.iaem.com.

Relief From Drought-Induced Depression

Hypnotherapist Rick Collingwood was alarmed by signs of trauma, depression, and suicidal thoughts in farming communities across the New South Wales region of Australia in response to lingering drought conditions. In an effort to help, Collingwood began conducting group hypnosis sessions to “put an end to feelings of hopelessness and depression,” and distributed his self-hypnosis CDs to “give the farming families the tools they need to begin to turn their lives around.”

RDUS Loans: Poverty Rate Unchanged; Others Up

Interest rates for Rural Development Utilities Service (RDUS) water and wastewater loans have been announced. The market and intermediate rates are up slightly, while the poverty rate is unchanged.

RDUS interest rates are issued quarterly at three different levels: the poverty line rate, the intermediate rate, and the market rate. The rate applied to a particular project depends on community income and the type of project being funded.

To qualify for the poverty line rate, two criteria must be met. First, the loan must primarily be used for facilities required to meet health and sanitary standards. Second, the median household income of the area being served must be below 80 percent of the state’s non-metropolitan median income or fall below the federal poverty level. As of April 1, 2008, the federal poverty level was $21,200 for a family of four.

To qualify for the intermediate rate, the service area’s median household income cannot exceed 100 percent of the state’s non-metropolitan median income.

The market rate is applied to projects that don’t qualify for either the poverty or intermediate rates. The market rate is based on the average of the Bond Buyer index.

The rates, which apply to all loans issued from April 1 through June 30, 2008, are:

- **poverty line**: 4.5 percent (unchanged from the previous quarter);
- **intermediate**: 4.625 percent (up 0.25 from the previous quarter);
- **market**: 4.75 percent (up 0.375 from the previous quarter).

RDUS loans are administered through state Rural Development offices, which can provide specific information concerning RDUS loan requirements and applications procedures. For the phone number of your state Rural Development office, contact the National Environmental Services Center at (800) 624-8301 or (304) 293-4191. The list is also available on the Rural Development Web site at www.rurdev.usda.gov/reccd_map.html.
Water Conservation Portal
www.waterconserve.info

Water Conserve, a non-commercial, water conservation portal and Internet search tool, provides access to reviewed water conservation news and information. The site has up-to-date news about conservation and links to hundreds of sites related to water conservation.

A Hundred Ways to Conserve Water
www.wateruseitwisely.com

“How much water can you save with a broom, toothbrush, tuna can, and shovel?” the Water Use It Wisely Web site asks on its homepage. The site lists more than 100 easy ways to conserve water, provides details on how to contact your local water authority, and includes printable files of water conservation materials.

The answers to the site’s initial question are:

- Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.
- Turn off the water while you brush your teeth and save four gallons a minute. That’s 200 gallons a week for a family of four.
- Place an empty tuna can on your lawn to catch and measure the water output of your sprinklers. For lawn watering advice, contact your local conservation office.
- Plant during the spring or fall when watering requirements are lower.

Liquid Assets: The Story of Our Water Infrastructure
www.liquidassets.psu.edu

Liquid Assets: The Story of Our Water Infrastructure is a 90-minute documentary about the nation’s drinking water, wastewater, and stormwater systems that will air on public television beginning in October 2008. The updated Web site, featuring a new design and clear navigation, has a three-minute preview of the documentary and provides additional information about the film and the filmmakers. The site also includes a public outreach initiative, which is described in the Web site’s “Get Involved” section. This summer, site visitors will be able download the Community Toolkit with materials to facilitate public discussions, including a public discussion guide, as well as customizable materials to advertise and facilitate public meetings.
Harvest Your Rainwater
www.harvesth2o.com

Ever watch the rain pour down and think “look at all that clean water and it’s free”? If so, you might be a candidate for harvesting rainwater, and you’ll want to check into this site. Here, you’ll find information ranging from a simple barrel to collect rainwater from your roof to the Florida House Learning Center, a demonstration home and yard featuring an environmentally friendly building and yard. The center showcases the use of native and drought-tolerant plants, xeriscaping, rainwater catchments, pervious walkways, and other ways to reduce runoff. The site provides suggestions about how to get started harvesting rain.

Natural Resources Conservation Service
www.nrcs.usda.gov

The Natural Resources Conservation Service (NRCS), formerly called the Soil Conservation Service, provides information about a variety of water-related topics. Their “Backyard Conservation Tip Sheet,” which may be found at www.nrcs.usda.gov/feature/backyard/watercon.html, provides suggestions for lawn care, watering, plant selection, and irrigation to help homeowners reduce their water usage.

SMART About Water
www.nesc.wvu.edu/smart

Funded by a $3 million grant from the U.S. Environmental Protection Agency, SMART About Water is being orchestrated by West Virginia University’s National Environmental Services Center (NESC) in partnership with the Rural Community Assistance Partnership (RCAP). The project will provide training and technical assistance about source water and wellhead protection to small and rural communities over the next 18 months and will focus on untreated wastewater from failing septic and sewer systems, the largest contributor to water quality degradation. The SMART About Water Web site has resources for source water and wellhead protection and more information about the SMART project.
When a small water system needs to hire an operator, what are the most important qualities they should consider in a candidate for the job?

Q:

Examine Candidates’ Experience

The most important considerations when hiring an operator of a small system are:

1. Similar job experience,
2. Formal education and certification, and
3. History in previous jobs.

The water system must first describe what it is they are looking for and quantify those desires in a job description that is accurate and applicable to the job to be performed. This way you can match up candidate skills with characteristics that are truly needed on the job—and you can recognize a good match for the job when they appear.

A seasoned operator with the valid experience and certification needed to perform the job may be hard to come by so there may be some trade-offs to consider. Look at the applicant’s educational background and track record in previous jobs. Does this person show a history of getting the job done while continuing to grow and learn to keep up with changes in the industry? Or does the employee move from job to job? A considerable investment is involved in keeping an operator trained. Consider or estimate the longevity of the employee by looking at his or her longevity in previous jobs. Some things can be changed but others tend to stay the same. Be honest about your expectations and keep looking until you find someone to meet those expectations.
A Job with Many Facets

Small water systems should evaluate several criteria before hiring an operator, specifically:

- What are the certification requirements the operator must have to comply with regulations?
- What experience and skills are necessary for the position, and which would be desirable?
- What is the going salary rate (and benefits) in the area for a system of similar complexity, level of certification, and experience?
- Does the budget sufficiently support the position and provide the necessary resources for the operator to maintain the system?
- What is the response time for emergencies, after hours, or holidays as it may impact how far outside the area an operator can live?

According to Kevin Odegard, water foreman at Peninsula Light Company in Peninsula, Washington, because small system operators tend to work alone, they have to be self-motivated. When focusing solely on the skills of an operator, remember these individuals may be the first in line in terms of communicating with regulators and customers. Therefore, they should have the ability to communicate professionally and effectively, and know who to ask for important information and resources. Key qualities should also include good record-keeping skills and ability to troubleshoot operational problems.

Understand all the Aspects

A water system needs to consider whether their system needs a full-time operator, or if they can make do with a part-time operator. A simple system, such as a well and chlorinator, may be able to use a contract operator that comes by periodically to check on the operation of the system and to take compliance samples. This kind of arrangement can keep operational costs down, but may require the assistance of the water users in helping to monitor, maintain, and provide occasional oversight of the system.

Depending on the complexity of the water system, a very small water system might consider the option of having one of the water users become certified and take over the operation of the system. This option assures the availability of the operator should problems occur. This does, however, depend on the cooperation of the users to provide assistance to the operator should operational problems occur.

Next, the water system needs to look at the reason for not having an operator. This, of course, would not apply to a new water system but for an existing system. The reason for the vacancy in the operator position needs to be determined. Was the pay too low? Was there a lack of benefits? Was the management providing the support needed to properly run a water system? Whatever the reason, the system needs to resolve these issues so that they can find, and keep, a new operator. Certification requirements are making the job market very attractive for operators. There are just not enough good operators out there for all the available jobs.

To provide adequate pay and benefits, as well as the financial support necessary to keep a system in good operating order, the system may have to take a hard look at their available financing. It may be necessary to adjust the rate structure to bring in additional revenue before the system is able to hire, and keep, an operator.

Finally, the system’s management needs to become aware of the level of certification required, including the job duties, the hours of operations, and the skills necessary to properly operate and maintain the system. The more that management knows about the actual operations of the system, the better it is able to understand the financial requirements necessary to keep the system properly operated and maintained, as well as in compliance.
Good Attitude, Reliable Actions

Anyone that has been in this business for a while will tell you that management usually expects the operator to:

- Be able to leap tall water storage tanks in a single bound.
- Run from pump house to pump house, faster than a speeding bullet.
- Have the strength to lift manhole covers all day long, even if they seem to weigh more than a locomotive.
- Possess x-ray vision that can see a leaking water main buried five feet underground.

Even though most operators will work tirelessly, day after day, these expectations may be a little too optimistic. Here are some more realistic things to look for when hiring a new operator.

In addition to the standard knowledge, skills, and ability criteria that will be established and published with the job announcement, the attitude and actions of the candidate should be evaluated during the interview process.

Attitude

Does this individual display a willingness to learn? No matter what your knowledge basis is coming into this job, there is always more to learn. “Know it alls” are not appropriate and can often adversely impact the overall program.

Is this person a team player? Even if he or she will be the only operator for the system, there will always be others to interact with, such as the mayor, city council, utility board, regulatory agency staff, technical support providers, etc., and it is extremely important that the applicant have the willingness to work with others.

Is the candidate a “people person”? Most operators interact with the public and, therefore, are a key component to the water system’s public relations program. They are usually the first to make an impression on the people being served.

Actions

Small water systems typically have few employees. Therefore, the person you are thinking about hiring usually needs to be more of a generalist and less of a specialist.

- Equally skilled in treatment and distribution
- Electrical as well as mechanical
- Technical as well as managerial
- Operations as well as administration

Does this person understand the importance of preventive maintenance, standard operation procedures, operational guidelines, and emergency preparedness? Implementing these programs indicates a willingness to do more than keep “water in the pipes.” When you add it up, the attitude and actions of an applicant are just as important a consideration as their knowledge, skills, and abilities.

Check Out the New NESC Web site

A new year often prompts people to make changes. At the National Environmental Services Center, we greeted 2008 by launching a new and improved Web site.

In development for more than a year, the new site features better access to NESC information and new features to help our Web visitors get the water, wastewater, and environmental training information they need.

“We wanted to rearrange the information we’ve been amassing since the early 1990s in a way that would make sense to our customers,” says Julie Black, NESC web designer. “At the same time, we still wanted to retain the valuable services provided by our key programs, the National Drinking Water Clearinghouse, the National Small Flows Clearinghouse, and the National Environmental Training Center for Small Communities. We believe that the new site not only looks better but that users will be able to find what they need more easily.”

The new NESC site features access to our various publications, free and low-cost products, databases, and information about different water and wastewater topics.
To the Editor,

Reading the fall 2007 issue of On Tap, I was struck by the photo on page 9 of the outfall from a desalination plant in Kuwait. You give no explanation other than the caption “waste from a water desalination plant, Kuwait.” An uninformed reader would very likely come away with the impression that desalination plants spew forth a black waste stream.

I hope you know that this is not the case. I, and thousands of others, have viewed desalination plant outfalls worldwide (including in Kuwait) for more than 40 years. The discharge stream is indistinguishable to the eye from the intake stream. You may confirm this yourself by going to Google Earth and looking at images of any of the many thousands of desalination units operating around the world.

I bring this to your attention because I am concerned that some of your readers may jump to incorrect conclusions from the photo as published without explanation. For further information about desalination, I encourage On Tap readers to visit the International Desalination Association Web site at www.idadesal.org.

Sincerely,

Dr. Jim Birkett
West Neck Strategies
Nobleboro, Maine
Many people are aware of current drought conditions in the southeastern and western parts of the U.S., but what they may not know is that recent news reports indicate that the drought has spread also to the Mid-Atlantic region. In September 2007, the National Climate Data Center reported that 43 percent of the U.S. was in moderate to extreme drought. (Climatologists define extreme drought as one that happens once every 50 to 100 years.)

But while some states (Georgia, for instance) are declaring a state of emergency, Tucson, Arizona, has been able to protect its community from the devastation that can come with a drought. “Water conservation isn’t new to Tucson,” says Fernando Molina, water conservation program manager of Tucson Water. “Tucson made significant [water use] reductions in the mid- to late-’70s and has kept those numbers low. I’ve seen records showing that in the early to mid-’70s, the estimated per capita consumption was approaching 200 gallons per day (gpd) per person. By the end of the 80s, that number was reduced to 140 gpd per person.”

Molina points out that water demand fluctuates according to daily temperatures and rainfall amounts. “We have had a couple of cool, really wet years that have...
Groups Work Together to Conserve Water

Tucson Water has an active water conservation program that includes the community, businesses, and government. All three groups work together to reduce water consumption. Molina spent a year-and-a-half working with a task force of community representatives to develop recommendations for future conservation programs. The task force’s major concern is growth in the area. “This is a desert community, and the residents are concerned that we are saving water to support more growth and whether there is a sufficient supply of water to support continued growth,” he says.

Area businesses are working to become more visible in the community in their water conservation efforts, and Molina is working with them to help get the message out to residential customers that businesses support water conservation also. “In fact, we have begun to work with an advisory group of business representatives to develop incentive programs for

helped consumption go down. Right now we estimate that per capita usage is at about 160 gpd per person. Tucson Water is unique in that we also serve customers outside of our corporate boundary. So we serve slightly less than 80 percent of the region.”
them to do even more, partly because our drought-response plan requires that businesses take specific actions at specific points during a drought when they exceed a certain volume of water usage,” Molina says. “We have already had two meetings that were attended by 35 people representing various commercial and industrial groups in town.”

Politically, Tucson's mayor and council have supported water conservation efforts. In 1989, for instance, the county and city adopted plumbing codes requiring water-efficient fixtures in all new residential and commercial construction. Codes also included replacement of plumbing fixtures in existing homes and commercial buildings during renovation.

In 1991, the city and county rescinded the requirement to obtain a building permit to replace existing toilets so that people would be encouraged to replace conventional fixtures with water-efficient ones. Even if someone wanted to install conventional fixtures, they would have considerable trouble finding them anywhere in the state.

“Several years ago, Arizona passed state law prohibiting anything but water-efficient fixtures from being brought into the state,” Molina says.

In 2000, the mayor and council passed revisions to Tucson's water-waste ordinance. To enforce this ordinance, Tucson has hired several citation officers, known as “water cops,” who investigate all reports of water waste. You cannot, for example, operate a misting system in unoccupied, nonresidential areas or fail to repair a controllable leak such as a leaking valve or broken sprinkler head. The primary purpose of the ordinance is not to issue citations but to give customers the knowledge, skills, and tools to eliminate waste.

One important way residents can reduce their water use is in their gardens. By using native plants and appropriate landscaping techniques, the Tucson community has reduced water use. “If you compare Tucson with some of the cities in the Phoenix area, most visitors that have been

Tucson Water provides outreach programs for teachers, interactive activities for students, homeowner workshops, fact sheets, publications, a listing of water-related community events, training for system operations, information about water quality, and various water resources. There is even information on long-range planning, which looks 50 years into the future to determine what Tucson will be like, how much water it will need, where the water will come from, and the quality level of the water.

Hydrologists, engineers, resource planners, water treatment and water quality professionals, administrators, financial and management analysts, and many others are all involved in the long-range planning process. Tucson Water has scheduled town hall meetings both within and outside the City of Tucson so that homeowners can have their questions answered.
to both places notice that Tucson landscaping is a lot different from Phoenix’s because of our landscape design,” Molina says. Regulations require that drought-tolerant plants be used and limits the use of non-tolerant drought plants. “There is a strong ethic for supporting water conservation here because it is a desert community. I don’t think other cities, those in the Phoenix area for instance, have that same level of support politically or at the community level.”

An example of Tucson’s commitment to conservation is WaterSmart, a residential program that teaches homeowners the basics of landscape water conservation using xeriscape methods. WaterSmart won a “Best of Tucson” award in September 2007. Approximately 500 Tucson residents attend classes each year. (To learn more about xeriscaping, see the article on this topic beginning on page 28 of this On Tap.)

Using Lessons from the 1800s
A new residential water conservation program called the Zanjero Program offers customers a free, individualized water survey to help them find ways to lower their water use and water bills. This program reflects a time when water users in the Old Pueblo met annually to elect a water manager (Zanjero) to ensure that fields were irrigated in a way that conserved water and that water canals were properly constructed.
and maintained. The Zanjero could also control water use for the benefit of the whole community.

Tucson Water has six Zanjeros who have been trained in water-related issues and each visits up to three residences a day checking for leaks; measuring flow rates for dishwashers, water softeners, coolers and other such fixtures; and analyzing the efficiency of the irrigation system. Water-saving devices are installed where appropriate, and the resident is given the results of the analysis along with information to help reduce water bills.

**Drought News Reports are Reminders**

The people of Tucson are responding to news reports about droughts. Groundwater used to be Tucson’s only water source. Increased growth, however, has caused groundwater to be pumped faster than it could be replaced. So in May 2001, Tucson began to use blended water, a mix of recharged Colorado River water and groundwater from the Clearwater Facility in Avra Valley. This new water source enabled Tucson to discontinue pumping wells in the area where the water table had significantly dropped, giving the tables a chance to rise.

“Half of our water supply now is imported via the central Arizona project from the Colorado River to Tucson,” Molina says. Six western states compete with Arizona for water from the Colorado River. “The news coverage has focused on the drought on the Colorado and how it might impact us here,” Molina says. “People are being a little more cautious.” In addition, water professionals and scientists are concerned about the long-term water levels of the river because of the years of drought. The drought has made it necessary for Tucson Water officials to pay more attention to the Colorado River watershed, something that was not needed as a groundwater system.

“I am very lucky as the conservation manager for the City of Tucson to have all the water conservation support that I have,” Molina says. Over the past five years, the average monthly water use for a typical residence in the City of Tucson has decreased by almost 750 gallons. “The residents of the community are to be congratulated because they accept water conservation—it’s not a big controversy here,” he says.

**For More Information**

To learn more about Tucson’s water conservation program, visit Tucson Water’s Web site at [www.ci.tucson.az.us/water/](http://www.ci.tucson.az.us/water/). Several conservation-related Web sites are featured on pages 12 and 13 of this *On Tap.*

A member of NESC for more than eight years, Caigan McKenzie, has had her water and wastewater articles reprinted in numerous publications.
Specify Conservation Planning Goals
- List of conservation planning goals and their relationship to supply-side planning
- Description of community involvement in the goals-development process

Develop a Water System Profile
- Inventory of existing facilities, production characteristics, and water use
- Overview of conditions that might affect the water system and conservation planning

Prepare a Demand Forecast
- Forecast of anticipated water demand for future time periods
- Adjustments to demand based on known and measurable factors
- Discussion of uncertainties and “what if” (sensitivity) analysis

Describe Planned Facilities
- Improvements planned for the water system over a reasonable planning horizon
- Estimates of the total, annualized, and unit cost (per gallon) of planned supply-side improvements and additions
- Preliminary forecast of total installed water capacity over the planning period based on anticipated improvements and additions

Identify Water Conservation Measures
- Review of conservation measures that have been implemented or that are planned for implementation
- Discussion of legal or other barriers to implementing recommended measures
- Identification of measures for further analysis

Analyze Benefits and Costs
- Estimate of total implementation costs and anticipated water savings
- Cost effectiveness assessment for recommended conservation measures
- Comparison of implementation costs to avoid supply-side costs

Select Conservation Measures
- Selection criteria for choosing conservation measures
- Identification of selected measures
- Explanation for why recommended measures will not be implemented
- Strategy and timetable for implementing conservation measures

Integrate Resources and Modify Forecasts
- Modification of water demand and supply capacity forecasts to reflect anticipated effects of conservation
- Discussion of the effects of conservation on planned water purchases, improvements, and additions
- Discussion of the effects of planned conservation measures on water utility revenues

Present Implementation and Evaluation Strategy
- Approaches for implementing and evaluating the conservation plan
- Certification of the conservation plan by the system’s governing body

The U.S. Environmental Protection Agency (EPA) recommends that all water systems, including those serving 10,000 or fewer people, implement the following basic guidelines: universal metering, water accounting and loss control, costing and pricing, and information and education. The EPA guidelines on which this sidebar is based are available from the National Environmental Services Center. Call (800) 624-8301 and request the Water Conservation Plan Guidelines (product #DWBKMG47).

Operating a water or wastewater utility has never been easy. And with new technologies and increasing regulations, the job just keeps getting more difficult.

If you have questions about a particular technology or about other aspects of running your system, the National Environmental Services Center’s (NESC) technical staff may have the answers you need. Our engineers, certified operators, and support staff have decades of experience working with small water and wastewater systems.

Call us at (800) 624-8301 and select option 3 to speak with one of our technical assistance specialists. Even though many of our customers find our experience and information invaluable, we don't charge for the call or the advice. It’s free!

Give our FREE Technical Assistance line a call!
800 624 8301 x 3
or email info@mail.nesc.wvu.edu with your question

...all you have to do is A.S.K.
How to Hire a Water System Operator

Getting it Right the First Time Saves Headaches Down the Road

by Marilyn Noah, NESC Writer/Editor

Water treatment plant operators are responsible for operating and monitoring the equipment used to treat drinking water by disinfection, purification, and clarification. They work closely with engineers, scientists, and technicians to comply with water quality regulations at the state and federal levels. Most operators work for cities, towns, or water districts, while some work in national parks or private campgrounds.

“A water system operator is a trained professional with an enormous amount of responsibility,” says Zane Satterfield, an engineer with the National Environmental Services Center and a licensed water operator. “He or she is arguably the most important member of a utility’s staff. The operator is key to delivering safe water to customers. In many small systems, the operator is the one repairing leaks in the dead of winter or running the system in the middle of the night so the local fire department has the capacity to fight a fire. The operator does the dirty work others don’t want to do.”

So when it is time to hire a new operator, it is one of the board’s most important, and most difficult, responsibilities.

If you haven’t had to face this daunting task recently, be aware that it could happen to you soon. Water treatment workers are increasingly moving from job to job and system to system as they find better pay and better working conditions. Retirement is also having a large impact. The average age of water and wastewater treatment system employees is about 45 years and, as more reach retirement age, the field is experiencing loss of employees. A study funded by the American Water Works Research Foundation and the Water Environment Research Federation showed that 28 percent of water and wastewater employees will be eligible for retirement within the next 10 years.

Understand the Job

Finding the right person to hire will be much easier if you first analyze the job you want to fill. Consider that any new employee(s) should provide the skills you may need in the future, not just match the job demands you see today.

The job duties of operators vary depending on the type and size of plant. Some general operator responsibilities include:

- Ensuring that water sold to customers meets federal, state, and local regulations through water sampling and reporting results to the board.
- Ensuring an uninterrupted supply of safe water by activities such as proper operation of pumps, water mains and reservoirs.
- Timely maintenance and repair of pumps, motors, control valves, and any and all electrical and mechanical equipment.
- Prepare monthly reports for the local utility board.
- Perform all duties that ensure safety of the operators and the public.

Before you advertise for your new position, be sure to conduct a skills inventory, write a new job description, and determine experience requirements. One easy way to conduct a skills inventory is by interviewing employees who have held the position in the past. If you’re lucky enough to have a top performer already in the job, learn from him or her.

According to the California Occupational Guide Drinking Water And Wastewater Treatment Plant and Distribution System Operators, water treatment plant operators should have mechanical aptitude. They must be able to read and comprehend charts, reports, and graphs. Operators need to be able to

www.nesc.wvu.edu 25
understand verbal and written instructions and follow those instructions to the detail. Physically, applicants should have color vision and good eyesight. They also need to be able to stand, walk, and lift heavy loads throughout the workday. Some intrinsic skills to look for in an applicant are an eagerness to learn, initiative, and the ability to work well with others.

Today's treatment workers must take courses, pass tests, and spend time learning treatment methods on the job so they may obtain proper certification as an operator. Hiring someone off the street to be an operator just won't work in today's world of federally mandated certification requirements.

Know the Certification Requirements

The U.S. Environmental Protection Agency mandates that every state have an agency responsible for the certification of water operators. Depending on the state, it may be the department of health, a state university, or a state department of environmental quality. An operator certification program ensures that the operator has the knowledge and understanding of drinking water standards needed to provide safe, potable water for your customers. A well-trained operator knows how to maintain the system, how to use chemicals properly, and how to take care of other things that will save your community money in the long run. As the November 2006 Community Water Bulletin explains, different sizes and types of systems require different levels of operator expertise and recommends that you contact the accrediting agency in your state to determine what types of operator certification regulations apply to your system. If you are considering hiring an uncertified person, you must arrange for the new employee to become certified. In such a case, you will need to determine who does the certification testing, what level is required for a system like yours, where do operators get training and how much the training costs.

Finding Quality Candidates

Recruiting for quality applicants will depend on your budget. A good starting place might be to look in-house for competent people. You might be surprised that some other city worker might be very interested in moving up to this position. In-house hiring eliminates a lot of the unknowns associated with an outside applicant.

For those recruiting on a limited budget you can use job listings at the unemployment office, newspaper ads, and even a sign in the window. Or, you can take advantage of a great new online job listing service that is being offered to small utilities. You can post your position with regional and national organizations that offer free or very reasonable advertising space on their Internet site. (Some of these organizations and their Web addresses may be found at the end of this article.)

After sorting through the applications, a few good ones should come to the top of the stack. Now it's time to get down to the business of the interviews. But before you set up any appointments, it is advisable to check references and do background checks to verify everything the applicant is claiming.
A simple background screening will make sure that what you are seeing is what you are getting. A screening company can review a candidate's social security numbers, address histories, criminal records, education and employment histories, any professional licenses and certification and any other areas relative to his or her employment.

Members of the National Rural Water Association can use the Rural Water Background Screening Program, which involves going to the NRWA Web site, clicking on background check (www.nrwa.org/backgroundcheck.htm). You simply create an account and then begin ordering your background checks.

Ask the Right Questions

The job interview is an important tool in the employee selection process. The U.S. Department of Commerce defines a successful interview as one where the employer asks the right questions, listens to the answers, and gets candidates to talk honestly about their abilities and attitudes.

Background and work history references provide good personal and factual information, but the job interview remains key to assessing the candidate's fit with your utility. The job interview remains the tool you can use to get to know your candidate on a more personal basis.

But don't count on your conversational skills to choose between candidates. At a basic level, your standardized hiring process should include criteria-based screening of an adequate number of candidates, a background check, standardized assessments, and structured interviews. Many assessment and interview tools are available, all of which will provide much more reliable results than the traditional interview. The more important the position, the more rigorous the hiring process should be.

Be careful not to ask questions that violate the applicant's rights. For example, you cannot ask about a candidate's age, health, marital status, pregnancy status, height, weight, or religion. There are many other personal topics that you must not bring up in an interview. If possible, have your interview questions reviewed by an attorney for possible discriminatory questions and statements.

You Find the Perfect Employee

Congratulations! You worked hard to find the perfect candidate. But remember that job turnover in the industry is very high. One of the biggest problems small water systems have is keeping good operators. They often move on to a better-paying job as soon as they get some experience under their belt.

To retain good employees, Satterfield suggests that systems create a work environment where workers feel secure and are respected for their abilities, pay them a competitive salary, and encourage them to be the best that they can be by getting all the training that they can. "The old adage 'good help is hard to find' has never been more true than today," he says. "Once you have that new employee on board, it will certainly pay in the long run to keep them there."

For More Information

Organizations that offer free or low-cost advertising of your position include:

- National League of Cities (www.nlc.org)
- American Water Works Association (www.awwa.org)
- National Rural Water Association (www.nrwa.org)
- Water Jobs Now (www.waterjobsnow.com)
- Water Environment Federation (www.wef.org)
- Water Jobs (www.waterjobs.com)

To find your state drinking water regulatory agency, go to the U.S. Environmental Protection Agency's Web site at www.epa.gov/safewater/dwinfo/index.html.


Advice and tips about how to conduct a great interview may be found at:

- The Free Management Library (www.managementhelp.org/staffing/screening/interfacing/intrvwng.htm)
- HR Lowdown (www.brlowdown.com/2007/how-to-interview-a-job-candidate/)
- U.S. Department of Commerce (www.mbda.gov/?section_id=5&bucket_id=128&content_id=2495&well=entire_page)


Marilyn Noah is a staff writer for the National Environmental Services Center.
It's probably no surprise that a big jump in household water use occurs in summer because folks are outdoors gardening and watering their lawns. Traditional commercial landscapes also consume plenty of water. These lush floral displays and broad expanses of turf dress up a neighborhood, but many popular landscape plants are real water guzzlers.

A relatively new concept in landscaping has cropped up that was created to conserve water. "Xeriscaping," a term coined (and trademarked) in Denver, Colorado, uses planting and design features that are more suitable to a particular region, whether in the arid West or the more variable climate of the Northeast.

Water treatment facilities, large and small, are being called upon to encourage consumers to consider using xeriscaping principles to decrease the huge volume of water devoted to landscape irrigation. Education through example is one simple way a small facility can achieve water savings—and make the treatment plant more attractive in the process.

Creating a Sustainable Landscape

Some people mistakenly think that xeriscaping means "zero-scaping" with nothing but a few cacti and rocks featured in a design. That's not the case. Xeriscaping includes a much broader range of choices, and using xeriscaping principles can reduce outdoor water use by one-third.

"Xeriscape is an attractive, sustainable landscape that conserves water," Diane Radeke of the Colorado Springs Utilities Water Resources Xeriscape Demonstration Garden says. "In urban areas, 50 to 70 percent of all water used [in arid states] is for the irrigation of landscapes. If this usage can be reduced, it will help conserve an important resource and save money both in maintenance and water costs."

Colorado Springs, Colorado, only receives about 16 inches of precipitation annually, but people attempt to grow garden ornamentals there that require at least an inch of water per week to flourish. In other words, garden designs in the arid West and Southwest are better suited to desert marigold and globemallow than they are to delphinium and foxglove, traditional garden plants in moister climates.
What exactly is xeriscaping?

Seven principles define the basic ideals behind this landscaping practice:

- Planning and design,
- Soil analysis,
- Proper plant selection,
- Practical turf areas,
- Efficient irrigation,
- Use of mulches, and
- Appropriate maintenance.

The first step in any landscaping project is the creation of a workable and attractive design. Designing a Xeriscape is no different. Areas for traffic, recreation, reflection, and gardening pleasure are incorporated. Considerations, such as amount of sunlight, views, and time devoted to maintenance need to be included in the plans.

“All gardens should begin on paper,” Radeke says. “It is so much easier to erase a plant than to move it after it is planted in the wrong place. Also, plants perform better when they are grouped by their water needs. Planting a low water requiring plant next to a high demand plant results in over-watering one and under-watering the other.”

Besides water needs, the soil’s nutrient availability must be determined. Adding organic material to the soil is usually necessary, and compost or well-rotted manures also contribute much to a soil’s texture and general good health. Keep in mind, though, that many plants native to some areas of the West and Southwest are better suited to less fertile soil. Soil amendment applications (lime, fertilizer, etc.) need to be adjusted according to the results of a soil test, available through a state’s cooperative extension service.

Reduce Turf Areas

Changing turf areas may be one of the more difficult decisions in retrofitting to Xeriscape. People frequently believe turf requires less maintenance, but that’s not necessarily true. To keep a lawn green in the heat of summer is a lot of work, and takes a lot of water. Reducing the area of high water-requiring turf to a more reasonable size is necessary.

Many turf grasses will naturally whither and brown in the heat of a dry summer, going dormant until fall and winter rains rejuvenate them. This is a natural process, and watering only weakens their systems and causes problems. Grasses, such as Kentucky bluegrass, just do not do well in an arid climate like Phoenix, Arizona, or Albuquerque, New Mexico. With an average rainfall of
less than nine inches of rain per year, does it make sense to plant grass that requires 40 or more inches of water to remain green and healthy? A compromise can be achieved by reducing areas of turf grass to play yards and walkways around larger mulched beds of flowers, shrubs, and water-saving groundcovers.

“Water-wise” Plants Have an Advantage
Water-wise plants start out with an advantage. They are adapted to lower natural rainfall, so they require much less applied water than do non-natives and more demanding ornamentals. Cities encouraging xeriscaping usually have plant lists available for residents to refer to. Colorado Springs has lists of trees, shrubs, flowers, groundcovers, and grasses that are tailored for specific microclimates within the city’s borders. The list includes a plant’s water requirements, height and width, and other information.

“Plant lists were developed for each of the eight communities that include local and other western natives and non-native plants that would be compatible in that community,” Radeke says. “For commercial sites, the designer is required to use a specific percentage [60 percent] of these identified plants in their design, grouping plants by their water needs.

This concept of grouping plants, called “zoning,” places drier-growing plants separately from those with higher water requirements. So, when water does need to be applied, the right amount can be added to the appropriate zone.

Water Early To Lessen Evaporation
The best time to irrigate is early in the morning to reduce the evaporation versus absorption rate. Deep, infrequent waterings encourage roots to penetrate deeper into the soil, reaching down for moisture. Frequent, shallow watering causes root growth closer to the soil surface, making roots more vulnerable to drying out.

Turf is best irrigated with a sprinkler system, while trees, shrubs, and garden beds are best watered by low-volume drip hoses, which emit water at ground level where less evaporation can take place. The type of irrigation system chosen should be well thought out and designed to work for the particular landscape features it will service.

To reduce the frequency of irrigating, mulches should be applied to garden beds. Mulch is a barrier (bark chips, shredded compost, or other organic material) over the garden’s surface. In addition to reducing direct
evaporation from the soil, mulches also help cool plant roots. Keeping a deep layer of mulch on landscaped beds provides organic material that can be incorporated into the bed after it decomposes.

The last of the seven xeriscaping principles is a basic tenet of all good gardening—diligent maintenance. Mowing, pruning, weeding, pest control, and fertilizing keep any landscape strong and healthy. Maintenance of irrigation systems is imperative to their functioning properly.

**Towns Provide Incentives and Education**

Cities and towns across the South and West have adopted various incentives and ordinances to encourage xeriscaping to help protect their diminishing groundwater supplies. For instance, Albuquerque has a Xeriscape retrofit incentive program that provides assistance for replacing high water-use landscaping with a more water-efficient plan. Eligible applicants can receive a water bill credit of $0.15 for every square foot of qualifying landscape up to 1,667 square feet ($250), with a minimum of 500 square feet needed to participate.

In El Paso, Texas, the Texas Agricultural Extension Service conducts public workshops, and the Master Gardeners have prepared programs on water saving landscaping. “Sunscapers” is a nine-session course taught at the Centennial Museum at the University of Texas at El Paso that includes “water-smart landscaping within the larger context of conserving natural resources and living in the desert.”

In Amarillo, Texas, an existing recycling center adjacent to a solid waste transfer area had been “a bit of an eyesore,” Duane Strawn, a landscape architect with the parks department, remembers. Three city departments cooperated to build and maintain a xeriscaping demonstration garden. Now, this public garden of drought-tolerant plants surrounds the recycling operation.

The concepts of xeriscaping have become more the norm than the exception in dry regions of the U.S. In other parts of the country, such as Florida and the Northeast, utilities have had to devise strategies for conserving groundwater in the face of growing populations and pollution.

Radeke said that in 1990, when the Xeriscape Demonstration Garden was started, most people had never heard of xeriscaping. “In the early years we tracked the number of people who visited the garden,” she said. “It was a good week when we had 20 people visit us. Now our open houses bring hundreds of people, and we often have more than 20 people visit on a weekday. Local schools, community organizations, and other groups frequently arrange tours of the garden and the adjacent water operations building.”

In Corpus Christi, Texas, a partnership between city departments and local nonprofit organizations called the Xeriscape Coalition, is teaching residents water-saving habits through an interactive outreach program. Their Xeriscape Learning Center and Design Garden is a three-quarter-acre public garden at the Corpus Christi Museum of Science and History that, in addition to the garden itself, features two exhibits housed in separate gazebos. The Water Story Gazebo introduces visitors to the hydrologic cycle, water treatment, and conservation. The story of the city's water storage and delivery from the Nueces River Basin and a history and future look at water in South Texas are included in the displays. The Children’s Gazebo has a number of activities intended to make learning about water fun for kids.

Home gardening ideas are presented at the Xeriscape Learning Center and Design Garden, as well as displays comparing various mulches and demonstrations of composting techniques and soil preparation. One-page flyers explain the seven principles of xeriscaping, plus a more detailed “Xeriscape-to-Go” idea packet helps residents get started with their own water-saving gardening plans.

Inspiring people to work together to decrease water consumption can be challenging, especially in a small community with a tight budget. These common sense ideas using xeriscaping principles show a manageable way to achieve substantial water savings, while still providing the little bit of paradise we seek in a garden.

For more information about xeriscaping check these Web sites based in different parts of the U.S.:

- **Groton, Connecticut:**
  - www.grotonutilities.com/water_welcome.asp#xeriscape

- **Denver, Colorado:**
  - www.water.denver.co.gov

- **Colorado Springs Utilities:**
  - www.csu.org/environment/xeriscape/index.html

- **Albuquerque, New Mexico:**
  - www.abcwua.org/waterconservation/xeric.html

From the mid-1990s through 2005, Michelle Moore was a writer/editor with the National Environmental Services Center. She is currently working on several projects including a regular column about gardening in the Pittsburgh Post-Gazette.
### DESIGN

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**OPERATION AND MAINTENANCE**

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**Tech Brief**

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- DWFSPE276 Iron and Manganese Removal: $2.55
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- DWVTRG34 Nontransient Noncommunity Drinking Water: Requirements for Suppliers: $20.00
- DWFSRG73 Technical Fact Sheet: Final Rule for Arsenic in Drinking Water: $0.90
- DWFSRG77 National Primary Drinking Water Standards: $0.90
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- DWFSRG106 Lang Term 1 Enhanced Surface Water Treatment Rule: A Quick Reference Guide: $0.30
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### RESEARCH:

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- DWBKRE15 Ultraviolet Light Disinfection Technology in Drinking Water Application: An Overview: $38.85
- DWBKRE29 Drinking Water and Ground Water Data Within the 305(b) Program: $16.95
- DWBLRE31 Assessing Ground-Water Vulnerability to Contamination: Providing Scientifically Defensible Information for Decision Makers: $0.50
- DWBKRE33 Delivering Timely Water Quality Information to Your Community: The Jefferson Parish-Louisiana Project: $0.00

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- DWCDTR24 Contamination Explorer: Technical Assistance for Small Water Systems: $10.00
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- DWCDTR26 EPA’s Interactive Sampling Guide for Drinking Water Systems Operators: $0.00

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QUOTES

A lake carries you into recesses of feeling otherwise impenetrable.
—William Wordsworth (1770–1850)

Rivers are roads which move and which carry us whither we desire to go.
—Blaise Pascal (1623–1662)

Water links us to our neighbor in a way more profound and complex than any other.
—John Thorson (dates unknown)

Once, during Prohibition, I was forced to live for days on nothing but food and water.
—W.C. Fields (1880–1946)

WATER TRIVIA

Practically everyone knows that water moves around the earth in a water cycle. This water cycle has five parts, which are:

a) oxygen, nitrogen, hydrogen, phosphorous, and carbon dioxide
b) precipitation, infiltration, perspiration, transpiration, and photosynthesis
c) rain, snow, ice, saltwater, and freshwater
d) evaporation, condensation, precipitation, infiltration, and surface run-off

According to the U.S. Geological Survey, the water cycle consists of evaporating water, condensation, precipitation, infiltration, and surface run-off.

Hmmmm

If all the world's water were fit into a gallon jug, the fresh water available for us to use would equal only about one tablespoon.

Source: www.lenntech.com

www.nesc.wvu.edu 37
Lawn Binge

By Amy Vickers, President
Amy Vickers and Associates

BY VOLUME, America’s biggest drinking problem isn’t alcohol: It’s lawn watering.

Home lawn and landscape irrigation consumes an average of more than 8 billion gallons of water daily, equivalent to 14 billion six-packs of beer. One-third of all residential water use in the United States is devoted to irrigation, estimates the US Environmental Protection Agency. Many cities and some states in the Southeast and Southwest, the country’s fastest growing regions and those with the tightest water supplies, report that 50 percent of their residential water use is outdoors, primarily for lawns.

Massachusetts is following this trend with summertime water demands swelling to 50 percent or more, reports the Boston-based Metropolitan Area Planning Council, despite receiving more than 40 inches of precipitation annually—more than plenty for a healthy lawn. Fast-growing suburban subdivisions in other New England states that hear the giant hissing sound of automatic irrigation sprinklers—rain or shine—ever more loudly are also grappling with or may soon be headlong on the same trajectory.

The extent to which our culture’s irrigation-fueled lawn watering binge is acting like a wrecking ball in our rivers, streams, and lakes is a specific challenge to the security of our water supplies, even in “water rich” New England. Nearly 70 percent of the river drainage basins in the Bay State are classified as “flow stressed,” according to the Department of Conservation and Recreation, meaning they suffer from low flows and other problems.

Suburban communities are characterized increasingly by wide swatches of turf and automatic spray irrigation systems, many of which can pump thousands of gallons of water per hour. River basins in these areas have also witnessed the installation of more than 6,500 new unmetered residential irrigation wells between 2000 and 2005. Is a key suspect in this depleting of rivers not obvious?

Today, Massachusetts’ once abundant freshwater supplies are straining from excessive if not abusive use. Two statewide water conservation actions are needed now to begin to reverse this trend. First, we need to limit the number of watering days allowed per week. Many healthy and attractive lawns and landscapes in New England do fine on rainfall alone once they are established. Native, drought-adaptive, and noninvasive plants and grasses are particularly suited to loving neglect when it comes to watering.

The town of Franklin has had a once-a-week-only irrigation rule in effect since 2001, and green—not brown—lawns are the norm there. Franklin’s irrigation schedule has dramatically reduced water waste, and the town’s average residential water demand now meets the state’s residential water conservation goal of 65 gallons per capita per day.

Further, Franklin’s Kingsbury Pond, once depleted from 26 to 10 acres, is now at its highest level in 30 years. Franklin’s current total water demand is about what it was in 2001, despite an increase of 5,000 new residents.

Second, lawn and landscape watering rules must apply equally no matter the water source—public supplies or private wells. Exempting property owners with private wells from necessary restrictions on nonessential lawn watering acts as an incentive for more homeowners to drill private irrigation wells, a dynamic that only worsens ground and surface water depletion. At least two Massachusetts towns, Middleton and Bourne, have wisely passed local ordinances that require watering restrictions to also apply to private wells, effectively putting a cap on the high water withdrawals associated with wells.

If Massachusetts and other New England states act soon, we need not be fated to the long-term water shortages and chronic droughts now predicted for much of the nation. By reigning in our collective lawn water drinking binge through sensible rules and fixing the loophole that allows uncontrolled irrigation by residential private well owners, we can triumphantly restore our now declining water legacy.

This article originally appeared in the June 10, 2007, issue of the Boston Globe.
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