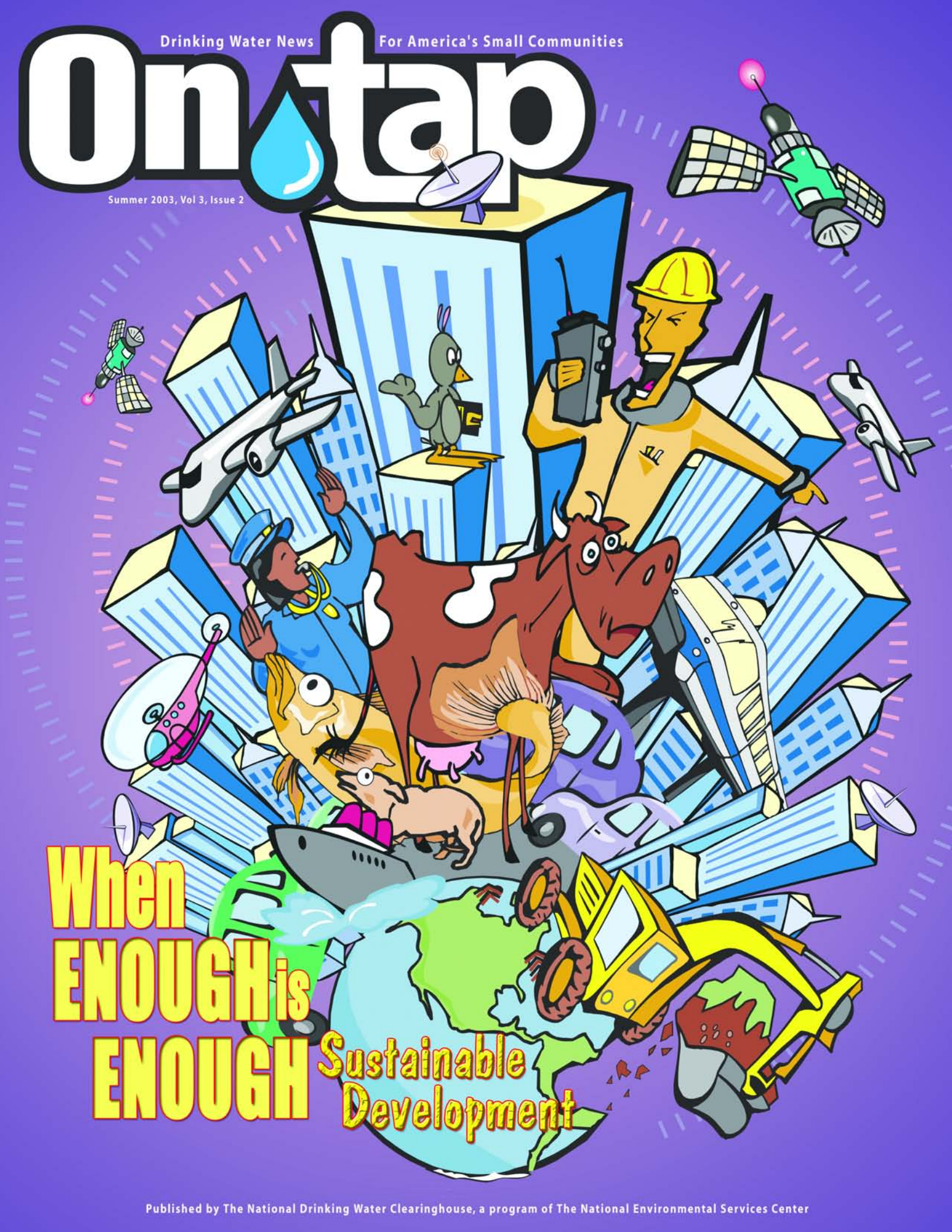
Drinking Water News For America's Small Communities

On tap

Summer 2003, Vol 3, Issue 2



When ENOUGH is ENOUGH

Sustainable Development

Published by The National Drinking Water Clearinghouse, a program of The National Environmental Services Center

Wisconson's Year of Water

Governor James Doyle proclaimed the year 2003 to be Wisconsin's "Year of Water." Events have been held around the state to, as Doyle says, "celebrate water as our most precious natural resource."

One of those events was a poetry reading, held in Madison, with water as the theme. The poems on this page and on the inside back cover are from that reading. More water poems may be found on the National Drinking Water Clearinghouse Web site at *www.ndwc.wvu.edu*.

Morning Rain

After summer's dry spell raindrops
tap on the windowpanes announcing
life is here,
here,
here.
The raindrops join, blend and become stronger—
Miracle we cannot echo. We don't understand
the blending of the raindrops coming together
from all over the world.

We don't understand their
commitment to become one, to grow
together—regardless of what weaknesses

or strengths each inherited from the clouds—
they join, become rivers and lakes—
follow their way to the oceans.
Eventually they will return
to the clouds.

I listen to the raindrops
as they echo each
other's urgency.

Nydia Rojas

Zahf al-Jafaf (Drought's Crawling Reptile Army)

Written during dry spell of August, 2001,
a month before 9/11

It rained
and rained
and rained
And suddenly stopped.
The earth echoed for awhile.
Then was silence.
The static hiss of drought
Rattled its snaky husk,
Dragged its desiccated belly
Toward our town,
Wrapped itself around our throats
And plunged its fangs
Deep into a refreshing well of blood.
One drop escaped.
It trickled to the earth,
Tickling the parched grass with its red
And silver tongue.
Faint laughter from the dusty graves
Of our forgotten ancestors arose,
And segued into echoes
Of faint
Distant
Thunder.

Kevin J. Barrett

First published in *The Book of Hope*, Birgitta Jonsdottir, Editor. Iceland: Beyond Borders, 2002.

On tap

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COVER STORY 14

When Enough is Enough

Sustainable Development

In a world facing water shortages and burgeoning populations, learning to live within our means isn't a luxury— it's a necessity.

Cover art by Julie Black.

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Tear Out Insert

Tech Brief • Pumps

From start to finish, pumps play an important role in all water distribution systems. They are used to transfer raw water to the treatment plant; they supply water to sections of a distribution system where it is not possible to supply it by gravity; they add appropriate chemical doses during treatment; and they transfer sludge from settling chambers for further treatment and disposal. Pumps will provide long-term efficient service if they are properly operated and maintained.

From the Editor's Desk

As you look through this edition of *On Tap*, you're sure to notice that something's different. With this issue, we've moved from two-color inside pages to full-color throughout the magazine. We hope you like the results.

The redesign is the result of much work from everyone on the National Drinking Water Clearinghouse (NDWC) publications staff. Particular kudos are due the National Environmental Services Center (of which the NDWC is part) design staff—Julie Black, John Fekete, and Chris Metzgar—who created our new appearance. We're not only proud of the way *On Tap* looks but in the fact that we found a printer who will do this at about the same price we paid previously.

Thanks to all of you who completed our reader survey and mailed it back. Ordinarily, we're a pretty humble bunch here but the results impressed us. So, permit me to do a little bragging:

- More than 99 percent of the respondents find *On Tap* useful in their work;
- More than 93 percent use the magazine to educate others;
- Articles about treatment process helped 77 percent; and
- Learning about a subject in *On Tap* helped 57 percent save money for their communities.

We strive to present timely and useful information, so these figures are very gratifying to us.

Of course, we know this doesn't mean *On Tap* is perfect. We're always interested in hearing your constructive criticism and learning how we can make the magazine more useful to you. Send me an e-mail at *mkemp@wvu.edu* or call toll-free at (800) 624-8301 ext. 5523.

Mark Kemp-Rye
On Tap Editor

Photo by Mark Kemp-Rye

Julie Black, Chris Metzgar, and John Fekete • The NESC Graphic Design Team

On Tap

Drinking Water News and Information for America's Small Communities
Summer 2003 . Volume 3 . Issue 2

Sponsored by the Rural Utilities Service

Hilda Gay Legg . administrator
Susan Loney . loan specialist

National Drinking Water Clearinghouse
The National Drinking Water Clearinghouse (NDWC) assists small communities by collecting, developing, and providing timely information relevant to drinking water issues. Established in 1991, the NDWC is funded by the U.S. Department of Agriculture's Rural Utilities Service and is located within the National Environmental Services Center at West Virginia University.

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Helping Small Systems...

It's what we do!

The National Drinking Water Clearinghouse (NDWC) is a nonprofit organization funded through the U.S. Department of Agriculture's Rural Utility Service. Our mission is to help small towns and rural areas have the best drinking water possible. We have information available to make it easier for you to achieve that goal.

We maintain a toll-free technical assistance hotline, produce *On Tap* magazine, and distribute many other free educational materials. We also sponsor conferences, workshops, and seminars.

The NDWC houses several databases, including a comprehensive small system treatment technologies database called RESULTS, which can be searched by request at no charge.

To learn more about the NDWC, you can order an information package or speak with a member of our staff by calling (800) 624-8301. Or, you can visit our Web site at: *www.ndwc.wvu.edu*.

Free Publications Address Wastewater Issues

Anyone who wants to keep up on alternative wastewater treatment options will be interested in the publications *Small Flows Quarterly*, a magazine devoted to wastewater, and *Pipeline*, a newsletter explaining small community and onsite wastewater treatment topics to the general public. Published quarterly by the National Small Flows Clearinghouse (NSFC), both publications are free.

Small Flows Quarterly has news, technical, and educational articles about wastewater issues, such as treatment technologies, regulations, and finance. Each issue also includes a peer-reviewed research paper dedicated solely to the topic of small wastewater systems.

Each *Pipeline* issue features a single wastewater theme or topic. The articles are presented in an easy-to-read, non-technical style, and readers are encouraged to reprint them in local newspapers or include them in newsletters, brochures, and handouts. A list of contacts and resources for local officials and community residents is included.

Both *Pipeline* and *Small Flows Quarterly* may be downloaded from NSFC's Web site at *www.nsfc.wvu.edu*. The site also contains information about new wastewater-related products, NSFC services, and a calendar of upcoming conferences and events.

To order either publication, call (800) 624-8301 or (304) 293-4191. To order by e-mail, send name, address, phone number, and the quantity you wish to order to nsfc_orders@mail.estd.wvu.edu.

Located within the National Environmental Services Center at West Virginia University, the NSFC is a nonprofit organization funded by the U.S. Environmental Protection Agency to provide free and low-cost information about small community and onsite wastewater treatment. For more information, call the NSFC at the phone numbers listed above and request a free information packet.

Risk Management Primer

The National Center for Small Communities (NCSC) offers a primer designed to introduce the concept of risk management to elected officials of small communities.

Titled *Limiting Small Town Liability*, the publication explains the goals and purposes of risk management and covers topics, such as understanding your risks, tools and techniques, risk assessment, and management issues.

The free primer is available in bulk orders only—65 copies per box. Those requesting bulk orders can also receive a trainer's guide, a PowerPoint™ presentation summarizing the primer, trainer's notes on running effective meetings, and the primer itself. The materials are also on a CD that is included with the order.

To preview or download the materials, go to www.smallcommunities.org/ncsc/ *and click on "New Resources." To order, please email your request to* ncsc@sso.org, *along with your mailing address and the number of boxes you would like. NCSC requests a street address (i.e., no P.O. Boxes).*

NETCSC Tracks Small System Regulations

The National Environmental Training Center for Small Communities (NETCSC) has compiled a list of water- and wastewater-related rules and policies that may affect small communities.

The list describes applicable regulations; the size of communities impacted; specific rules for different size communities; and current and future Safe Drinking Water Act and Clean Water Act regulatory dates. Included are contacts and sources and a glossary of acronyms and important terms.

Dedicated to providing environmental training and training-related information to small communities, NETCSC is a National Drinking Water Clearinghouse partner within the National Environmental Services Center at West Virginia University.

The NETCSC Regulations List is available online at www.netc.wvu.edu/netcsc_regs.html *or by calling (800) 624-8301 or by writing to NETCSC, P.O. Box 6064, Morgantown, WV, 26506-6064.*

USDA Announces Rural Projects

On Earth Day (April 22, 2003), U.S. Department of Agriculture (USDA) Secretary Ann Veneman announced 45 rural water and wastewater projects worth more than $105 million. The projects, in 29 states, will help rural communities address health and environmental issues and promote business development. The funding consists of loans totaling $37.2 million and $68.3 million in grants.

One recipient of these funds is Maine's Boothbay Region Water District. Comprised of the small coastal communities of Boothbay, Boothbay Harbor, Boothbay Center, and East Boothbay, the project will finance the consolidation of three water districts and the construction of a 500,000-gallon underground tank.

Funds include a $1 million grant and a $3.05 million loan and will rectify problems with inadequate water supply during the summer (tourist season) and low pressure. Staff from Maine Rural Development and Maine Rural Water worked with the communities to develop the new water district and to obtain necessary legislative approval.

According to USDA, "the primary recipients for this project are the residents and the very important tourist industry. This project will improve the quality of life for the residents of the area by providing safe drinking water and improving the overall quality and quantity of water for residential use and fire safety of its inhabitants."

To see a complete list of the 45 rural water and wastewater projects, go to www.rurdev.usda.gov/rd/newsroom/news.htm.

World Water Forum Meets in Japan

The third World Water Forum (WWF) was held in Kyoto, Japan, in March 2003. The 24,000 participants from 182 countries developed more than 100 new "commitments" dealing with global water issues.

Noting that by 2050, water shortages brought on by increased populations and global warming will affect between two and seven billion people around the world, the conference explored the geopolitical aspects of water and warned of conflicts over this resource.

"Water is an inalienable human right. Water is life," said Mikhail Gorbachev, former president of the Soviet Union and currently leader of Green Cross, a non-governmental organization dedicated to creating a sustainable future, in a March 20 *Reuters* article. "People are sometimes willing to do anything to get water. There could be grave consequences of this."

Rather than just focusing on the potential conflicts that could arise over water, the conference examined ways that these issues can be turned into positive forces for change. The "common basic requirement for water is an opportunity for cooperation and peace," said William J. Cosgrove, vice president of the World Water Council, one of the WWF's sponsors.

"Water-related conflicts can be prevented if humanity recognizes that water can be a learning ground for conflict resolution," said Amdras Szollosi-Nagy, deputy assistant director general with UNESCO, the United Nation's cultural division.

For more information, visit the WWF Web site at www.world.water-forum3.com.

Finland's Water Rated Best

According to a report by the United Nations Educational Scientific and Cultural Organization (UNESCO), Finland has the best water quality among 122 nations studied.

The rest of the top ten, in order, were Canada, New Zealand, the United Kingdom, Japan, Norway, the Russian Federation, the Republic of Korea, Sweden, and France. The U.S. ranked 12th in the UNESCO study.

The report was based on an in-depth look at every major dimension of water use and management, from the growth of cities to the threat of looming water wars between countries. The report ranked the countries according to the quality of their water, as well as their ability and commitment to improving their water. Some of the factors used in the analysis were the quantity and quality of freshwater (especially groundwater), the number of wastewater treatment facilities, and legal issues, such as the application of pollution regulations.

End of the water wars?

If a new U.S. Department of the Interior (DOI) initiative is successful, water wars in the West may one day be a thing of the past. A June 2003 meeting between DOI and western water officials—titled "Water 2025: Preventing Crisis and Conflict in the West"—sought to start a discussion about preventing chronic water supply problems facing communities in the years ahead.

According to a DOI news release about the conference, "explosive population growth in western urban areas, the emerging need for water for environmental and recreational uses, and the national importance of the domestic production of food and fiber from western farms and ranches is driving major conflicts between these competing uses of water. Water 2025 provides the basis for a public discussion in advance of water crises and sets forth a framework to focus on meeting water supply challenges in the future."

"Crisis management is not an effective solution," said DOI Secretary Gail Norton. "We need to work together now. Locally driven, practical solutions are needed. States, tribes, local governments, and affected communities should have a leading role in this effort."

Photo of the Grand Canyon by Harriet Emerson

The goal, DOI officials say, is to identify the watersheds facing the greatest potential risk in the next 25 years, evaluate the most effective ways of addressing water supply challenges, and recommend cooperative planning approaches and tools that have the most likelihood of success.

For more information about Water 2025, write to the U.S. Department of the Interior, 1849 C Street NW, Washington DC, 20240 or visit their Web site at www.doi.gov.

Water Quality and Property Values

A study by researchers at Bemidji State University found a direct correlation between water quality and property values around Minnesota lakes. The researchers examined 1,205 residential property sales between 1996 and 2001 in the upper Mississippi River watershed. Land values were compared to water quality data for 37 lakes in the region.

"We concluded that water clarity is very significantly related to the price per foot of lakeshore," said Charlie Parson, geography professor and the study's co-author, in a May 26, 2003 Minneapolis–St. Paul *Star Tribune* article. "We have enough lakes and enough parcels to establish that this is a real relationship."

"Lake Leech," the article cites as an example, "is clear to a depth of about 10 feet. The study said that if the water got clearer—so that you could see down another three feet—a lake property's value would rise by $423 for each foot of frontage. For a 40-foot lakefront lot, that amounts to nearly a $17,000 gain in value. If the lake's clarity is reduced by more than three feet, the study said, it would cut values by $594 per frontage foot."

For more information about the report, contact the Center for Research and Innovation, Bemidji State University, 1500 Birchmont Drive NE, Bemidji, MN 56601-2699 or call (218) 755-4900 or e-mail kross@bemidjistate.edu.

RUS Loans: Poverty Rate Unchanged; Others Down

The Rural Utilities Service (RUS) recently announced interest rates for water and wastewater loans. RUS interest rates are issued quarterly at three different levels: the poverty line rate, the intermediate rate, and the market rate. Each has specific qualification criteria.

The rates, which apply to all loans issued from July 1 through September 30, 2003, are:

poverty line: 4.5 percent (unchanged from the previous quarter);
intermediate: 4.375 percent (down 0.125 percent from the previous quarter); and
market: 4.25 percent (down 0.375 percent from the previous quarter).

For this quarter, all loans may be obligated and closed at the market rate.

RUS loans are administered through state Rural Development offices, which can provide specific information concerning RUS loan requirements and applications procedures.

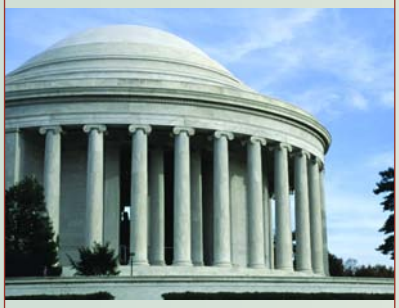
For the phone number of your state Rural Development office, contact the National Drinking Water Clearinghouse at (800) 624-8301 or (304) 293-4191. The list is also available on the RUS Web site at www.usda.gov/rus/water/states/usamap.htm.

Denotes an event where the National Drinking Water Clearinghouse will have a booth or that staff will attend. Look for us at these conferences!

Calendar of Events

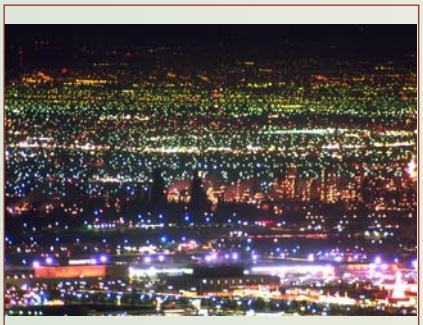
SEPTEMBER

National Association of Towns and Townships Annual Conference
September 3–5, 2003
Hyatt Regency Capitol Hill
Washington, DC
Contact: Robert Neidlinger
Phone: (202) 624-3550
Fax: (202) 624-3554
www.smallcommunities.org/ncsc



OCTOBER

Association of State Drinking Water Administrators Annual Conference and Exposition
October 6–9, 2003
Sheraton Hotel
Boston, MA
Contact: Tom Maves
Phone: (202) 293-7655
Fax: (202) 293-7656
www.asdwa.orgz



76th Water Environment Federation WEFTEC '03
October 11–15, 2003
Los Angeles Convention Center
Los Angeles, CA
Contact: Nanette Tucker
Phone: (800) 666-0206
or (703) 684-2452
Fax: (703) 684-2492
www.weftec.org

AMWA Annual Conference
October 12–15, 2003
The Catamaran
San Diego, CA
Phone: (202) 331-2820
Fax: (202) 785-1845
www.amwa.net

55th Annual National Rural Water Association Convention
Cox Convention Center
Oklahoma City, OK
October 19–22, 2003
Contact: Dawn Meyers
Phone: (580) 252-0629
Fax: (580) 255-4476
www.nrwa.org

DECEMBER

National Ground Water Association Annual Conference
December 9–12, 2003
Orlando Convention Center
Orlando, FL
Contact: Kathy Butcher
Phone: (800) 551-7379
Fax: (614) 898-7786
www.ngwa.org

International Water History Association 3rd Conference
December 11–14, 2003
Cairo, Egypt
Phone: +47 55 589315
Fax: +47 55 589892
www.iwha.net/events.htm

If you are sponsoring a water-related event and want to have it listed in this calendar, please send information to Lori Jennings, National Drinking Water Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064. You also may call Lori at (800) 624-8301 or (304) 293-4191 extension 5522 or e-mail her at *Lori.Jennings@mail.wvu.edu*

It's Free!

That's right, it costs absolutely nothing to get *On Tap*. Why not sign up and have the magazine delivered to your door four times a year? We make it as easy as we can for you to subscribe:

Call us toll free at **(800) 624-8301**, send an e-mail to *ndwc_orders@mail.nesc.wvu.edu*, or write to National Drinking Water Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown WV, 26506.

Don't forget to include your name and mailing address.

International City/County Management Association
www.icma.org

Running a water system (or a small town) can be complicated work. The International City/County Management Association (ICMA), an organization that promotes excellence in local government through professional management, has an extensive Web site to help city and county administrators.

On the site you'll find information about water resources management, water quality, drinking water, public works, smart growth, and the environment. ICMA's publications the *Municipal Year Book*, *Public Management* magazine, and a quarterly newsletter titled *Environmental Scan* are available on the site, as are numerous books, reports, and other publications.

National Watershed Coalition
www.watershedcoalition.org

The National Watershed Coalition (NWC) has launched a new Web site. The NWC is made up of national, regional, state, and local organizations, associations, and individuals, that advocate dealing with natural resource problems and issues using watersheds as the planning and implementation unit.

The site contains information about upcoming events, legislative alerts, watershed budget and program information, frequently asked questions, and the quarterly *Watershed News* newsletter.

Photo by Sue Haywood, iPlayOutside.com

On the Web

Want to learn more about drinking water?
www.ndwc.wvu.edu

Most people rely on community water systems without giving them a thought. They turn on the taps, get the water they need, and go on with their lives. But those who provide that clean, safe water know there's a whole lot more to the picture.

You can learn more about your water and everything that goes into providing it by visiting the National Drinking Water Clearinghouse (NDWC) Web site. We offer plenty of information and links that help explain the drinking water story.

Treatment technologies, management and financial strategies for operations, current and changing environmental regulations, conservation, and health topics are presented in simple, down-to-earth language. The NDWC Web site offers online services, such as access to *On Tap* magazine, hundreds of free and low-cost products, database searches, and technical assistance. We also provide an online discussion group for interactive conversations about small community drinking water issues.

All of our popular four-page *Tech Brief* fact sheets were recently added to the site and are available for download. These fact sheets provide concise, technical information about drinking water issues and treatment technologies relevant to small systems. Topics include:

- Corrosion Control
- Diatomaceous Earth Filtration for Drinking Water
- Disinfection
- Filtration
- Ion Exchange and Dimineralization
- Iron and Manganese Removal
- Leak Detection and Water Loss Control
- Lime Softening
- Membrane Filtration
- Organic Removal
- Ozone
- Package Plants
- Poster: Treatment Technologies for Small Drinking Water Systems
- Reservoirs, Towers, and Tanks
- Slow Sand Filtration
- System Control and Data Acquisition
- Ultraviolet Disinfection
- Valves
- Water Hammer
- Water Quality in Distribution Systems
- Water Treatment Plant Residuals Management

Whether you're an operator, engineer, homeowner, or student, *www.ndwc.wvu.edu* can help you find answers to your drinking water questions.

Teaching Kids About Water
www.projectwet.org

Project WET (Water Education for Teachers) is an international, interdisciplinary, water education program for educators of students age five to 18. Founded in 1984 as a pilot program to encourage water stewardship in North Dakota, the program has expanded to 48 U.S. states, the District of Columbia, and several other countries.

According to the Project WET Web site, the centerpiece of the program is the *Curriculum and Activity Guide*. "This collection of over 90, broad-based water resource activities was developed, field-tested, and reviewed by over 600 educators and resource managers working with 34,000 students nationwide," says the site.

"Project WET activities are designed to satisfy the goals of educational programs by complementing existing curricula rather than displacing or adding more concepts," the site says. "Project WET activities provide many opportunities to address curriculum objectives and educational standards. These interdisciplinary activities designed for students in grades K-12 are perfect for use in formal and non-formal education settings." However, educators interested in using the curriculum must first attend a training session conducted by one of 2,500 facilitators.

For more information about Project WET, write to 201 Culbertson Hall, Montana State University, P.O. Box 170575, Bozeman, MT 59717-0575 or send an e-mail to info@projectwet.org.

Environmental Health of Older Americans
www.epa.gov/aging

The U.S. Environmental Protection Agency has a new Web site devoted to the environmental health of older Americans.

"Due to the normal aging process, even older Americans in good health may have increased health risks from exposures to environmental pollutants," the site says. "As we age, our bodies are more susceptible to hazards from the environment, which may cause or worsen chronic or life-threatening conditions. In addition, older persons have accumulated a lifetime of environmental and occupational contaminants which are capable of remaining in the body—such as lead, mercury, and PCBs."

The site has a section about water, including information about pesticides, contaminants, and microorganisms in drinking water and how they impact public health.

The Web site is part of an EPA initiative known as the National Agenda for the Environment and the Aging. According to EPA, this agenda will "help identify research gaps and develop strategies that will help us better understand the environmental hazards affecting the health of older Americans."

EPA Offers Security Flyers
www.epa.gov

Recognizing that water security is a shared responsibility between water systems, government, law enforcement, and citizens, the U.S. Environmental Protection Agency (EPA) has developed flyers to educate and alert communities. The flyers are available on EPA's Office of Ground Water and Drinking Water Web site.

"Public utilities are often located in isolated areas," the site notes. "Drinking water sources and wastewater collection systems may cover large regions. Involved citizens increase the eyes and ears of any community."

The flyers are designed to be posted in public areas and to encourage citizens to be on the lookout for suspicious activities. They are available in different formats, depending on the format needed. Space is provided for the community to provide contact information.

For more information or to download the flyers, go to www.epa.gov/OGWDW/security/flyers/index.html.

www.ndwc.wvu.edu

Ask the Experts

Each issue, we ask members of the *On Tap* Editorial Advisory Board to answer a drinking water-related question. We then print as many responses as space permits. The opinions expressed are not necessarily those of the NDWC.

How does your utility handle water theft generally and, more specifically, how do you deal with unauthorized use of fire hydrants or contractors who bypass meters when building?

Backflow Is a Big Worry

Water theft is a concern for the Auburn water supply, especially the potential introduction of contaminants via backflow. We have very strict regulations in our municipal ordinance relating to the use of hydrants, and these regulations are made very clear to contractors working within the city's water district. Any request to use our hydrants requires that the water be metered and protected from backflow. To accomplish this, we have several meter/backflow setups that attach to the hydrants and are supplied by the city. Where we have hydrants that are somewhat obscured, we have locking caps that can be operated only by our fire department or water maintenance personnel. To accommodate those who require bulk water (such as lawn maintenance services, pool fillers, etc.), we have set up a station at our maintenance garage where they can come in to fill their tanks only under the supervision of one of our staff members. This station is metered and protected from backflow as well. We found out from experience that if we made it easier for those who wanted bulk water supplies, they were less likely to tap the hydrants themselves. It has worked out very well for us.

Frank J. DeOrio
Director of Municipal Utilities
City of Auburn, New York

We Can Only Do So Much

The bottom line is: we do as much as we can to thwart water theft from hydrants and enforce our watering restrictions, but it is not practical for us to pursue prosecution, which is the only way that we could seek compensation for the illegal usage.

Along with our city employees, who are always on the lookout for improper hydrant usage and restriction violations, we rely heavily on John Q. Public to inform us of possible illegal water usage—and they do a pretty darn good job, especially now that we are in a drought situation and the public is being held to restrictions. Realistically, though, we can only do so much. If, for example, a contractor is caught illegally filling his 5,000 gallon water truck at, say, $2.00 per 1000 gallons, that's only $10.00. Most of our city employees have hourly wages higher than that, so it is not economically feasible to pursue the matter any further.

We do note people and/or contractors who repeatedly violate restrictions or have been caught more than once stealing water, and we have, on occasion, taken the matter to the next step. The water shop has 30 meters for contractors to check and report their usage, but those are generally for the honest people.

Nelson Yarlott
Resident Operator
Bellvue Water Treatment Plant,
Greeley, Colorado

Fighting Theft Is a Full-Time Job

Peninsula Light Company (PLC) is a mutual cooperative. We adhere to the Washington Utility and Transportation Commission regulations for private, for-profit water systems regarding theft whenever possible but are not bound by them. We have one person in our company who processes theft and long-overdue bills for both our electric and water customers. This position is entirely self-supporting by these lost revenue sources primarily because of the number of electric customers we have.

According to PLC policy, any bypass of the meter or unauthorized connection is considered theft. Theft occurs on both our commercial and residential accounts

and can be discovered by meter readers, anonymous tips, monthly audit reports done by a revenue protection officer, as a result of repair work being performed, or by the customer calling to report unusual consumption patterns or bills. There is a $250.00 tamper fee, back billing, and possible denial of service for repeat offenders. A complete file history—including photographs—is compiled for each theft. The file is stored for seven years in case the theft makes it to a courtroom.

Water services are immediately disconnected and locked off upon discovery of theft. Customers are notified by mail. The customer of record is most often the one fined. If the customer of record fails to pay the fines, reconnection is denied. The landowner or PLC member may also be held responsible for the fines and back billing.

We have had situations where we have had to proceed with caution and work with the local police authority. One on-going theft was from a property directly adjacent to our well site and also next to a daycare. The residence was a suspected "meth" lab and, therefore, considered potentially dangerous by the local police authority. Originally, they were disconnected at the meter from the previous owner of the system for non-payment.

Our water technician found them hooking up directly to the pump house. We disconnected and moved the spigot inside the building and barricaded the building. Our water technicians had been threatened while working at this location and forewarned to call before we came out. It appears the meth lab then illegally tapped into the water line, and we knew customers on the system were at risk if a cross-connection existed. Needless to say, locating the illegal tap is not something the water technicians are eager to do, but it is something we must do for the protection of the other customers on the system.

Our largest theft of water actually occurs from hydrants on a couple of our water systems. Two of the larger systems we manage do not want anyone using their hydrants other than the local fire districts. At one of these systems, the county has been a repeat offender even though they have the ability to draw water after the meter on their own property and were repeatedly informed not to. They were even provided a large meter by PLC at our own expense so they could use the hydrant in front of their facility, but they chose to leave it in the closet for a year.

We have drafted a hydrant policy for the systems we own. It will involve informing the worst offenders (street cleaners, hydro seeding, contractors, and the county) that unapproved use of a hydrant is considered theft. This policy will also benefit the systems we manage. The draft policy requires the inspection of trucks for cross-connection protection and a meter to be used or other means for estimating total water used. There will be fees associated with this service. These particular users may choose to get their water from other water systems not owned or managed by PLC rather than pay for this service. This should reduce our unaccounted-for water use and hydrant maintenance cost.

We also need to determine how we can recover the repair cost of over-use of a particular hydrant from the local fire district for training purposes. We have fewer than 30 customers on this system, so our revenue does cover this type of on-going maintenance cost. This particular issue is currently being discussed with the local fire district directly. If the fire district does not pay for repairs, our options include adding a surcharge to the customers' bills or allowing the hydrant to remain non-functional.

Lisa Raysby
Water Department Manager
Pennisula [Washington]
Light Company

Editor's Note: The cover story for the Winter 2004 On Tap *explores stealing water—how it's done, how to spot it, and what to do about it—in greater detail.*

We're all ears!

Do you have a suggestion for improving this magazine or a great idea for an article we should explore? Do you have a question for our "Ask the Experts" column or a Web site that you find particular helpful? *On Tap* editors are always eager to learn from you. Here's how to get a hold of us:

Mark Kemp-Rye
e-mail: *mkemp@wvu.edu*
phone: (800) 624-8301 ext. 5523

Kathy Jesperson
e-mail: *kjespers@wvu.edu*
phone: (800) 624-8301 ext. 5533

Or write to us at:
National Drinking Water Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown WV 26506-6064

When ENOUGH is ENOUGH

Sustainable Development

By **Mark Kemp-Rye** • *On Tap* Editor

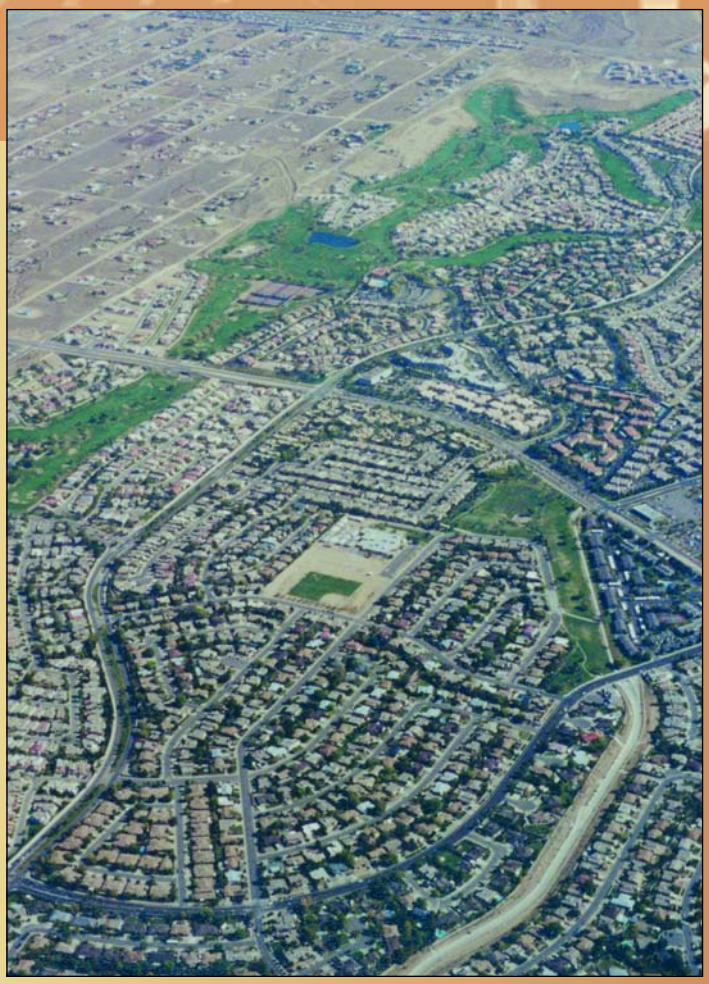


Photo by Harriet Emerson

Suburban development in Albuquerque, New Mexico—as seen in this photograph taken from an airplane window—highlights the contrast between the natural and human landscapes. The right (green) side of the photo shows houses, trees, and irrigated lawns. The left (brown) side is the native environment, which receives less than 10 inches of rain each year.

First settled by the ancestors of today's Pueblo Indians, Albuquerque, New Mexico, has, for most of its existence, been little more than a blip on the map. According to the *Lonely Planet World Guide*, it was "nothing more than a dusty trading center along the trail linking Mexico and the then capital, Santa Fe" during much of the 18th and 19th centuries.

Following the Second World War, though, the city began to grow, reaching 200,000 population in 1960 and 450,000 in 2000. By 2030, the U.S. Bureau of the Census projects that the Albuquerque metropolitan area will be home to more than a million people. It's the kind of growth that many rust belt cities eye with envy. However, there's one big problem: Albuquerque is running out of water.

For years, Albuquerque has relied on groundwater to supply the city's needs. But evidence shows that the groundwater is being rapidly depleted and could be exhausted within 35 years. The city is seeking permission to divert 94,000 acre-feet of surface water each year from the Rio Grande and return half of it as treated effluent downstream

The weekly paper *Alibi* describes the plan as "intended to save Albuquerque from running out of groundwater and then collapsing of her own weight into an empty hole that was once an aquifer." Whether or not this is hyperbole remains to be seen. What the plan *has* done is to galvanize farmers and environmentalists who are concerned by the diversion project.

Growing Concern About Groundwater Depletion

As dramatic as the Albuquerque situation is, it's not the only place where groundwater reserves are being depleted. It's happening all over the country, in places large and small, and especially in the water-scarce western states. (For more information about scarcity and water rights, see the article "Water Wars: Whose water is it and why do I need a permit to use it?" in the Fall 2001 *On Tap.*)

The Ogallala Aquifer, a vast underground reservoir stretching from northern Texas to South Dakota, is being used faster than it can be replenished. In states such as Kansas and Nebraska, irrigation is to blame; in Texas, it's a combination of farming, population growth, and denser soils. Exacerbated by recent drought, the depletion is "as pressing or more pressing" than it ever has been before, according to Rex Buchanan, associate director of the Kansas Geological Survey.

The situation has more than just water professionals concerned. "We have an economy that's based on receiving 36 inches of rain a year, when they get closer to 20," says Kansas Senator Stan Clark in a February 2003 *U.S. Water News Online* article. "Quite honestly, we need to move to an economy that doesn't require the Ogallala, and we must begin that separation soon."

Some states have begun such moves. Nebraska has implemented limits to groundwater use in certain areas to combat this depletion. "Average precipitation plus soil type plus demand equals the average rate of depletion," says Susan Seacrest, founder and president of the Groundwater Foundation. "Usually, these are five- to seven-year averages and have been implemented as 'suggested' withdrawal rates by conservation districts in water-short areas. In some places (like Nebraska) suggestions have become required withdrawal rates. It's been very difficult to achieve sustainability but the idea of 'no net loss' worked for wetland restoration and probably could work for groundwater depletion as well.

"The best analogy I've heard on depletion is the notion that a groundwater aquifer is like money in the bank," Seacrest says. "The idea is to use the interest productively and efficiently but to not deplete the principle. In other words, withdrawals need to equal the inputs."

Enough Is Enough

The solution to these and other water scarcity problems can be found by employing the principles of "sustainable development," maintain its proponents. First defined in a 1987 Bruntland Commission report titled *Our Common Future*, this concept refers to "development that meets the needs of the present without compromising the ability of further generations to meet their own needs."

Sustainable development is not really a new idea at all. There is an old African proverb that says: "The earth is not ours. It is a treasure we hold in trust for our children and their children." Similar sentiments are found in Native American cultures.

The idea of sustainability began gaining currency in the U.S. and elsewhere during the 1990s. Then-president Clinton created a council that explored the topic and the United

> The earth is not ours. It is a treasure we hold in trust for our children and their children.
>
> *African proverb*

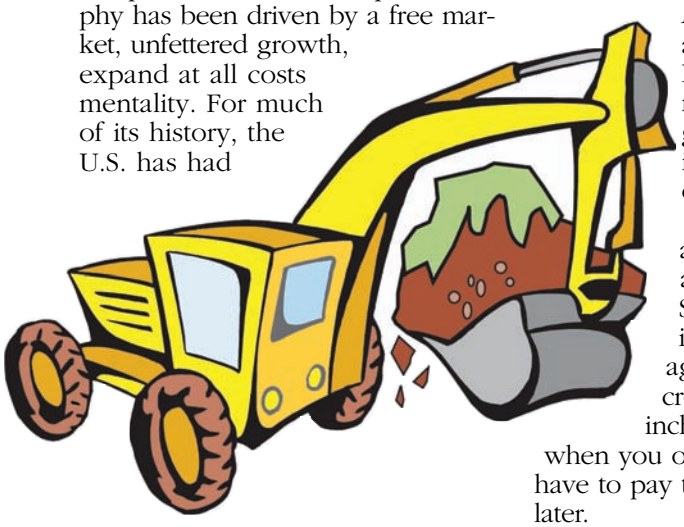
Nations convened at least three international conferences to discuss sustainable development, the most recent a World Summit held in Johannesburg, South Africa. But it's not just an idea for large organizations and governments. Increasingly, communities and local groups are creating development plans that foster sustainability.

"Sustainable development is a concept that is becoming increasingly important to all people and all communities as we become more and more aware of the limited capacity of the planet to meet the growing needs of a growing human population," says Jeff Erikson, director of operations for SustainAbility Inc., a Washington, D.C.–based consulting group. "Its current/future perspective attempts to ensure that our grandchildren will be left with the opportunity for a high quality of life, that we are thinking of them in all that we do today. It addresses the three components that are essential to present and future quality of life: environmental protection, social equity, and economic advancement."

Development based on sustainable principles brings into question several long-held premises in American economic thought. To this point, our economic philosophy has been driven by a free market, unfettered growth, expand at all costs mentality. For much of its history, the U.S. has had what seemed like unlimited resources and an abundance of room to expand. Only lately, it seems, have we awakened to the fact that there are limits to our resources and our space. (See the article "Smart Growth and Small Communities: Sprawl Comes to Rural America" in the Fall 2001 *On Tap.*)

"A growing number of communities are discovering that there's an alternative to economic 'development' strategies based on expansion," writes Michael Kinsley of the Rocky Mountain Institute in *The Economic Renewal Guide: A Collaborative Process for Sustainable Community Development.* "They're embracing sustainable development, a more balanced approach that weighs social and environmental considerations alongside conventional economic ones. Expanding towns need not give up prosperity as they slow their expansion. Communities with little prospect for expansion need not give up their dreams. There are plenty of development options that don't require expansion."

Some put this in simple terms of quality over quantity. They see quality of life and a responsibility to the future as being more important than continued expansion.



After all, the writer and environmentalist Edward Abbey once noted, "growth for growth's sake is the ideology of the cancer cell."

Sustainability is also about appropriate choices. As Senator Clark notes, it isn't wise to base an agricultural economy on crops that require 36 inches of rain a year when you only get 20. You will have to pay the piper sooner or later.

Water Is a Prime Factor

It is impossible to separate water resources and sustainable development. A community—its people and its industry—cannot exist without an adequate water supply. In fact, water availability will usually dictate what can and should happen in a particular location. This may seem self-evident to those who work with water on a day-to-day basis but it sometimes seems lost on many planners and developers.

"Water sustains life," Erikson says. "We need it every day, but we also need to ensure it is available to future generations. Communities that don't have an adequate supply of water to support domestic, industrial, and agricultural needs will not grow and prosper. Water needs to be available for today's needs, but communities also should think about how it will be available for the community's needs in 25 and 50 years."

By necessity, this concept demands a holistic, integrated approach to community planning and development. "Those concerned with water resources sustainability will need to go farther [than new legislation and increased regulations], urging support for community and regional processes that connect water infrastructure development to water quality, watershed management, natural resources management, and economic development," writes Stephen Gasteyer, director of community development programs for the Rural Community Assistance Program in the Winter 2003 issue of *Rural Matters.*

"Support for technical assistance that helps communities take a broader view (incorporating quality of life, including a healthy environment) can be combined with regional watershed initiatives that look at adaptive management processes that take into account community quality of life," he continues. "Water resources sustainability will involve ongoing innovation through participatory planning, education, technological, and management innovation, and monitoring. Federal and state

Community Sustainability: Ingredients for Long-Term Success

As part of an emerging and creative worldwide trend, decision makers in a varietyof communities are linking their local economy, their community, and the environment. Instead of deciding which will prevail—economy, community, or environment—they understand that each is a leg supporting the stool of community success. They're seeking ways to strengthen all three.

A review of many of these efforts reveals 10 ingredients of smart and sustainable governance.

1. Genuine collaboration among leaders of all community sectors and people from all walks of life ensures better solutions informed by more perspectives, plus broad support for results. Proceeding through every stage of policy and decision making, collaboration is most effective when it evolves into a diverse coalition committed to the community's vision and plan.

2. Develop and publicize a community goals or vision statement that sets forth economic, environmental, and community goals. This statement provides guidance to leaders who are often pulled in conflicting directions by a wide range of opinions on many local issues.

3. Develop and publish indicators of progress toward each of the goals in the vision statement. Economic, environmental, and community indicators may include such wide-ranging issues as industry trends, water quality, newborn birth weight, and housing affordability. Indicators can become the method by which the community determines its progress toward sustainability. They can be the factual basis for important community decisions.

4. Develop and adopt decision-making tools and methods that ensure integrated, whole-systems consideration of community, economy, and environment—whether the decision is being made by public, private, or nonprofit sectors. These tools make complex issues easier to understand, and they disclose the basis upon which decisions are made. They include intensive workshops, matrices, criteria, and indicators.

5. Take Action: In order to achieve the goals set forth in the vision statement, choose projects and programs that actively strengthen the local economy, nurture the community, and restore the environment. Collaboratively use the community's decision-making tools to select the projects.

6. Foster community entrepreneurship: To implement many community projects, employ the business skills and tools of such organizations as cooperatives, community development corporations, land trusts, community stock corporations, development authorities, special purpose districts, and micro-credit lending institutions.

7. Organize a business network to share information, ideas, and techniques for more sustainable and successful business, to educate the public, and to influence local government to eliminate barriers to sustainable business practices.

8. Establish a community sustainability plan, or better, integrate sustainability into your existing plans. A community, often supported by its local governments, can build on its vision by adopting specific objectives, action items, policies, guidelines, and regulations, all of which can take the form of a formal plan.

9. Employ continuous learning: Revisit major decisions and actions at predetermined dates following implementation. Central to the establishment of a learning community, this practice determines if actions achieve their intended objectives and considers new actions based on this feedback. It minimizes unintended consequences. A community that has already identified indicators of sustainability has a sound basis for determining the effects of decisions and for continuous internal feedback and improvement.

10. Foster leadership and civic capacity: Through training, events, and organizations, commit local resources to helping existing leaders understand new ideas and creative ways of making decisions. Also, nurture and train the next generation of leaders.

Long-term success requires building community capacity. Develop these ingredients in order to integrate sustainability into the fabric of community decision making and to achieve your community's full potential.

Source: Rocky Mountain Institute, reprinted by permission

government, intermediaries, local non-governmental organizations, and communities will all have a role to play in water resources sustainability." (See the article "Getting Citizens Involved: Public Participation Helps Communities and Residents" in the Spring 2002 *On Tap* for more information about increasing community involvement.)

Don't Forget Infrastructure

While an adequate water supply is vital to a community, so is the system that brings the water to homes and businesses. But, the simple fact is we're falling behind. The investments we've made—as significant as they've been on a national level—aren't adequate for an infrastructure more often than not described as "crumbling."

In September 2002, U.S. Environmental Protection Agency (EPA) released the *Clean Water and Drinking Water Infrastructure Gap Analysis*, a report that examines the estimated funding needs of the nation's water systems. Assuming no growth in revenues, the total need for clean water—in both capital and operations and maintenance—exceeds $270 billion over 20 years. For drinking water, the gap approaches $265 billion for the same period, the report finds. Even with modest revenue increases, the gap is still in the billions of dollars.

Ensuring a working infrastructure both now and in the future was the subject of a January 2003 EPA meeting. "Today's challenges demand a multi-faceted approach to managing and sustaining our infrastructure assets," said

G. Tracy Mehan, III, assistant administrator of EPA's Office of Water at a forum titled "Closing the Gap: Innovative Responses for Sustainable Water Infrastructure." "Not only are we going to have to manage better in both the public and private sectors, we're going to have to use less water and, yes, pay an adequate price for our infrastructure in our role as ratepayers. There is, as the saying goes, no free lunch in our future."

Mehan sees four areas where sustainability can be improved:

Better Management—Better management practices like asset management, environmental management systems, consolidation, and public-private partnerships offer significant savings.

Smart Water Use—We need to create incentives to conserve and to protect our sources of drinking water.

Full Cost Pricing—Full cost pricing and rate restructuring can capture the actual costs of our water systems, raise revenues, and provide incentives to conserve.

The Watershed Approach—We need to use a watershed approach, looking more broadly at water resources in a coordinated way.

Unless we address this gap, we will saddle the next generation with an enormous burden. (For more information about watershed approaches to community development, see the articles "Grassroots Watershed Protection: County Group Works to Clean Up Waterways" in the Winter 2003 *On Tap* and "Helping Communities Help Themselves: The Canaan Valley Institute" in the Spring 2002 *On Tap*.)

Where do we go from here?

"The term 'sustainable development' would be doomed to the scrap heap of short-lived and overused buzzwords were it not rooted in a traditional value, stewardship—the careful, economical, long-term management of land, community, and resources," Kinsley writes. "It's a value that some towns have recently let fall by the wayside. But it's alive and well in many others, even if they don't notice it. People who care deeply about their community and who think conscientiously about the long-term implications of their actions are working for sustainability and stewardship, whether or not they use those words."

That's not to say sustainable development plans aren't without controversy or disagreement. The architects of Albuquerque's water diversion plan—mentioned at the beginning of this article—cite sustainability as a specific rationale for their plan. In fact, they call it a "transition to sustainability." Environmentalists argue that, while the plan may meet immediate human water needs, it doesn't factor in the larger ecosystem and the unique flora and fauna of the area (the endangered Rio Grande silvery minnow in particular). Farmers worry that their crops won't have an adequate supply of good water. Sometime in 2003, the New Mexico state engineer will resolve the issue.

When considering sustainable development, it helps to keep in mind that the process is as important as the outcome. "There's no standard way to achieve sustainable development," says Kinsley. "Every community's situation is unique. Perhaps more important is that there is no point at which a community arrives at sustainability—it's a goal, a moving target that requires a community to continually learn about itself, its external influences, and emerging opportunities."

The São Paulo, Brazil, metropolitan area is home to more than 16 million people. With the world population expected to reach 10 billion by the year 2035—much of it in developing cities such as São Paulo—planners and government officials are exploring the principles of sustainable development so that there will be enough water and other necessities for all.

More Information

For more information about sustainable development, contact the following organizations.

The Sustainable Communities Network
E-mail: *info@sustainable.org*
Web: *www.sustainable.org*

The Center for Water and Environmental Sustainability
210 Strand Agricultural Hall
Oregon State University
Corvallis, OR 97331-2208
Phone: (541) 737-4022
Email: *cwest@engr.orst.edu*
Web: *cwest.orst.edu*

The Canaan Valley Institute
P.O. Box 673
Davis WV 26260
Phone: (800) 922-3601
Email: *webmastert@cananvi.org*
Web: *www.canaanvi.org*

The Rocky Mountain Institute
1739 Snowmass Creek Road
Snowmass, CO 81654-9199
Phone: (970) 927-3851
E-mail: *outreach@rmi.org*
Web: *www.rmi.org*

World Resources Institute
10 G Street NE Suite 800
Washington DC 20002
Phone: (202) 729-7600
E-mail: *front@wri.org*
Web: *www.wri.org*

On Tap Editor **Mark Kemp-Rye** studied geography and regional planning at West Virginia University and the University of Toronto, Canada.

Overcoming Obstacles

Women Beg, Borrow, and Swap to Build Water System

If you want to learn a thing or two about overcoming adversity, talk to the women spearheading an effort to create a public water system for their 10-home community in the desert Southwest.

By **Jamie Knotts** • *On Tap* Assistant Editor
Photos provided by the Tangerine Water Group

In developing the Tangerine Water Group, a nonprofit organization, Susie Montgomery, Carol Millsap-Morley, and Christina Davis formed a bond that has overcome local zoning restrictions, a post 9/11 collapse of their businesses, lack of funds, and a convoluted maze of governmental agencies and funding agencies. Throughout the year-and-a-half-long process, the women learned to beg, borrow, and swap to get the items they need to build their water system. And along the way, they learned lessons that can help other "sparkplugs" who want to make a difference in their communities.

Facing Obstacles, Overcoming Them

The Tangerine Water Group is a collective of 10 people who have a few wells and live on a 40-acre land tract. Originally, one man owned the 40 acres in Pima County, Arizona, where he operated a greyhound kennel and racetrack. Zoning restrictions mandated tracts of land no less than 40 acres. Needing water for his dogs, the man drilled three wells. He later sold portions of his 40 acres to 10 others in what would come to be known as a "wildcat subdivision"—an illegal subdivision of the original land.

In time, the nearby town of Marana annexed the 10 properties, putting the landowners in a legal no man's land where they no longer fell under existing zoning laws because the owners each had fewer than the required 40 acres. At the same time, Carol Millsap-Morley—the nonprofit's secretary-treasurer—says that Marana officials kept coming to the landowners telling them they had to do certain things. "It angered all of the people here because it felt like they weren't really paying attention to us."

After 9/11, both Millsap-Morley, who owns a small kennel, and neighbor Christina Davis, who owns a trucking business and is the nonprofit's vice-president, lost all of their customers. "Business just went in the toilet, so we approached Marana for permission to turn one of Davis' old barns into an art studio, where people—especially women—could reflect on world events and express their frustrations in art," she says.

"We asked Marana for permission, and they laughed at us," Millsap-Morley says. "They said that we didn't have the proper zoning, the barn needed to be condemned; we didn't have the proper roads; and we didn't have adequate fire protection. So we kind of looked at each other, said 'then we'll fix all that,' and we'll have our art studio."

Residents of the subdivision also wanted to plan for the future to help both their own struggling businesses, as well as help others become established in the area.

"We believed that Marana wanted to supply us with water, and that meant that Marana was eventually going to take our wells. We had the wells in place, so in being part of their municipal water system we would have had to turn over our wells," says Millsap-Morley. "We wanted control over our water. That's essentially why we formed the nonprofit to

To say that Carol Millsap-Morley is passionate about her water system would be an understatement. She, along with Susie Montgomery and Christina Davis have worked tirelessly to bring a stable water supply to their homes in Arizona.

upgrade our well and distribution systems so we wouldn't have to be part of Marana's water system. Water is gold out here, so of course there's an issue with it."

The women eventually overcame the problem with an agreement by Marana to allow them to have their own system. "We asked Marana when they were to bring us water if we did decide to go with their municipal system and their first answer was two to three years and we couldn't wait that long," she says. "Our businesses were dying. In order to increase business now, we needed fire protection, roads, and the zoning now. We decided to tackle fire protection first."

Shortly after 9/11, and at the time they were told they needed fire protection to get the art studio off the ground, the area faced several devastating wild fires. "We found that we had no fire protection," Millsap-Morley recalls. "So, that was another real push to get everyone involved in the project. We had to have this. We didn't want to burn down. Right now we have fire protection with trucks hauling water, but they can't connect to our water system to provide a steady stream of water to put out a fire. And that scared us."

Editor's Note: While we were putting together this issue, a wildfire consumed thousands of acres in Pima County.

"Water is gold out here," says Carol Millsap-Morley of the Tangerine Water Group, a nonprofit organization she helped form near Marana in Arizona's Pima County. This photograph shows one of Tucson's growing suburbs, also located in Pima County.

Getting Help From Others

The women first set out to find funding sources to drill a well and get water flowing. "We had two small wells, but we needed a well that would afford us fire protection," she says. While there were other wells on the owners' properties, only two wells fed their small system's needs. "We had to bring up the water pressure, so we needed to go with 8-inch piping instead of the 2-inch that we currently had." Residents also needed fire hydrants to go along with the new well and distribution system.

"We got a bunch of people together to help us," Millsap-Morley says. "We joined ASUA [Arizona Small Utilities Association] and met Neil Wittle who was able to give us a ton of links and contacts to go to for help. WIFA [Water Infrastructure Financing Agency] was a huge help." WIFA is the Arizona state agency that provides construction loans for water and wastewater projects.

"We even got a local politician involved in the process," she says. "Once we really got into this. and we started using contacts and calling people, we found that people were really on our side."

As the women became more involved in the project, they found the U.S. Rural Development Administration's (RDA) Web site while looking for loans. The women landed a $100,000 RDA grant, but as a condition of receiving it, they had to secure an additional $85,000 in cash, equipment, and donations. The money would be used to drill the well and to get the water project underway.

Even the storage tank was donated to the Tangerine Water Group. While not yet in service, the tank—one of many donated items to the project—will soon serve the system's 10 customers.

Millsap-Morley, Davis, and Montgomery then started asking for donations from any source they could locate. "We will take parts and labor, donations, anything the public will help us with," Davis says. "If they don't have anything they can donate, they might donate ideas. You know, maybe they know of someone who could help us."

"We sat in a room—Christina and I—and we brainstormed," says Millsap-Morley. "We sat there on the phone, tenaciously called and boldly begged for supplies. That's where we used all of our contacts that people had supplied us with. We have talked to many people throughout the U.S."

Some of the donations they obtained included:

- $18,000 in technical assistance from WIFA,
- two 50,000-gallon water storage tanks valued at $250,000,
- a 5,000-gallon hydro-tank air compressor and other equipment from an American Indian tribe,

- $60,000 in volunteer hours, and
- $37,500 in equipment and person-hours from a local construction company.

"Every meeting we went to we handed out our cards and told them that if anybody had anything to donate or help us with we would take it," she says. "Even if it was just a suggestion, we took it and later made that contact. If I spent as much energy in my business as I spent on the Tangerine water project I'd be a little more wealthy. It was just something that we had to do to get the project off the ground, so we did it. Trying to get the grant money from RDA was time consuming. You have to be dedicated and be a visionary."

At this point, the treatment plant is still in the planning stages. "We had a preliminary well and system plan drawn up, but we won't know more about the actual system until we go to see it," says Millsap-Morley. "It was actually donated to us. It's about a $250,000 system that was donated by an Indian nation. That was a huge contribution. We even got the fencing donated to surround the well site due to the new laws for water systems."

The trio of women got their story out to others. They found that doing so helped them gain more support for the work they were doing. An electrician saw an article about their project and came forward to donate his time in return for room and board. "We haven't had the opportunity to use him yet, but we will as the project moves forward," Millsap-Morley says.

Tackling the Other Issues

Once the three women got the fire protection and water system project underway, they turned to the zoning issue that hampered building their art studio. Because they were in a wildcat subdivision and technically out of compliance with the 40-acre zoning law, the property owners had to get the zoning changed.

"They gave it the fancy name 'wildcat subdivision,' but it's essentially an illegal act. You know, this is the West," she says with a laugh. "It just means that the previous owner subdivided his property illegally, not according to the county's zoning rules. It created a real problem for Marana when they annexed us."

The women petitioned the town for a change to multiple-use zoning, which allows them to have commercial ventures on their land and also live on the property. "That is kind of an unusual phenomenon here in Pima County and Marana," she says. "We changed the zoning to allow one-acre splits. We weren't under the 40-acres rule anymore, but we were also not legally allowed to have

One-Stop Shopping Means Better Service for Arizona's Small Systems

The old adage says that two heads are better than one, especially when their goal is to complete a project better, faster, or under budget. Working together, organizations seeking to improve drinking water services in Arizona have gone a step farther by bringing together many minds for the benefit of small communities.

The Rural Water Infrastructure Committee (RWIC) of Arizona got its start in the early 1990s as a means of pooling the skills, knowledge, and financial resources of numerous organizations that work to improve water and wastewater services in small or rural communities. With the goal of working together as a team, members of the RWIC agreed to stop competing with one another and look for more opportunities to partner strategically.

Arizona's Rural Water Infrastructure Committee (RWIC) developed as an informal partnership, working to improve the wastewater and drinking water infrastructure in Arizona. The committee of federal, state, local, and private sector organizations meets regularly across the state to coordinate financial and technical assistance and offer advice to those coordinating water or wastewater projects.

For each proposal that goes before members of the RWIC, local project sponsors spend more than an hour discussing details. The sponsor first describes its situation and its proposed project. The committee then offers technical advice and recommends further sources of technical and financial support for the project. At the end of each meeting, the committee chair summarizes the discussion and recommends "next steps" with contact people and phone number for the project. From there, local project leaders must decide how to proceed.

The RWIC most often suggests that communities constructing wastewater treatment projects apply for funding from the Water Infrastructure Financing Authority of Arizona or the U.S. Department of Agriculture's Rural Utilities Service. To a lesser extent, other partners, including the Greater Arizona Development Authority, the Economic Development Administration, the North American Development Bank, the Department of Housing and Urban Development, and the Arizona Department of Emergency Management also support construction projects.

WRIC members, such as the Arizona Small Utilities Association and the Rural Community Assistance Corporation, also offer technical assistance to communities throughout the project development process. In addition, the RWIC identifies financial assistance programs that are most appropriate for each proposed project. It also offers advice about how to develop a funding package that coordinates multiple funding sources.

For more information about the RWIC, contact the Arizona Water Infrastructure Finance Authority by phone at (602) 230-9770 or visit their Web site at www.wifa.state.az.us. *For more information about Rural Utilities Service loans and grants, go to* www.usda.gov/rus/.

The Tangerine Water Group: (l-r) Carol Millsap-Morley, Susie Montgomery, and Christina Davis

one-acre lots. We overcame that. Now we can split our lots and have small portions legally. We can now live on our property and have a business here, too. Mixed usage is very unusual and is not wanted by many municipalities."

The town also had issues with the roads and wanted them upgraded. "We eventually got them upgraded because we're a non-profit," she says. "Once we lay our 8-inch pipe, Marana is going to donate the material to lay the roads for us."

Use the Resources Available

The three women worked closely together to secure the items they needed for their water system. Without the time spent phoning people for help, the project might not have gotten off the ground. They've learned a lot throughout the process, and they can offer others advice for tackling a similar project.

"Use the resources you can find to start talking to people because that's where they'll get the greatest amount of help," Millsap-Morley says. "Attend meetings to make contacts and network with others because that is truly what we did to get to where we are. We're only halfway there, but we've come a long way."

The women from Tangerine also sought help from the Rural Water Infrastructure Committee (RWIC) of Arizona by presenting their project to the committee. (See sidebar story on page 21 about the RWIC.)

"We were missing roughly $80,000 for the RDA grant, so we thought we'd walk away after the meeting with $80,000," Millsap-Morley laughs. "We thought they'd say 'Oh you guys are great, so here's the money.' But they gave us more contacts, which was helpful. We were a little disappointed, but we were very naïve in that we thought we would go before WRIC, and they were going to make this happen. What doesn't destroy you makes you stronger. If you have to work for it, it's so much mor meaningful to you.

"I wish there had been a pamphlet that someone could have given us that had all of the contacts, groups, and organizations that you're going to need to get to know," she says. "We didn't have that, so we kind of learned the hard way. If there was a hard way and easy way, we always had to go the hard way. For months we kept chasing funding that was elusive."

While the project is still in the works, these three women know that it will be completed soon. The final estimate has the water project costing approximately $500,000, including loans, grants, and the many donated items. Once the new 8-inch pipe goes in, they can work on upgrading their road. When that's done, they'll turn their attention to the thing that started them on their journey—that art studio.

To learn more about the Tangerine Water Group, contact Carol Millsap-Morley by phone at (520) 682-0646 or send an email to twgnpc@aol.com.

States with One-Stop Shopping Help for Water Projects

Arizona, *www.wifa.state.az.us*
Arkansas, *www.accessarkansas.org/aswcc/index.html*
California, *www.ibank.ca.gov*
Colorado, *www.dola.state.co.us/LGS/TA/utility.htm*
Illinois, *www.epa.state.il.us/water/financial-assistance/*
Louisiana, *www.deq.state.la.us/financial/srf/index.htm*
Missouri, *www.dnr.state.mo.us/env/financial.htm*
Montana, *www.dnrc.state.mt.us/cardd/resdevbureau/dwsrftsepl.htm*
Nebraska, *www.deq.state.ne.us/WasteWat.nsf/Pages/CA*
Nevada, *health2k.state.nv.us/bhps/phe/srf.htm*
New Mexico, *www.nmenv.state.nm.us/dwb/dwbtop.html*
New York, *www.nysefc.org/srf/SRFhome.htm*
Ohio, *www.epa.state.oh.us/ddagw/dwaf.html*
Oklahoma, *www.owrb.state.ok.us/financing/index.php*
Oregon, *www.econ.state.or.us/finance.htm*
Vermont, *www.anr.state.vt.us/dec/watersup/capacity.htm*
Washington, *www.doh.wa.gov/ehp/dw/our_main_pages/dwsrf.htm*
West Virginia, *www.wvinfrastructure.com*

This is Writer-Editor **Jamie Knotts**' last issue with the National Drinking Water Clearinghouse. He begins a new career this fall teaching special needs children in a public school.

In the Bluegrass State
Water System Consolidation Works

By **Kathy Jesperson** • *On Tap* Associate Editor

"Consolidation is both inevitable and desirable," said C. Meyrick Payne, senior partner, Management Practice Inc., a New York-based consulting firm. "There are too many small water systems, both investor-owned and municipal. Of the 58,000 water systems, only 2.5 percent serve more than 25,000 people; many small systems are, or will shortly become, non-viable."

Payne made those observations nearly a decade ago. Today, the community water systems (CWS) count comes in at about 54,000. What happened? The count could be a little off. Some systems may have folded. Many have consolidated.

Adding fuel to the already burning consolidation fire, Mo Ying W. Seto, senior vice president, Moody's Investment Service, says: "Within the next decade the water utility industry will likely be transformed into a few large water companies or systems on the national level."

While consolidation may not happen that fast, it seems the future of drinking water systems has been foretold. And current evidence indicates that Payne and Seto's predictions are not far from reality.

The situation in Kentucky mirrors what's going on around the U.S. "In 1978, Kentucky had more than 1,700 public water systems (PWS), and today there are approximately 650," says Gary Larimore, executive director, Kentucky Rural Water Association (KRWA).

Kentucky, like the other 49 states, had to abide by the 1996 reauthorized Safe Drinking Water Act (SDWA). The act made a lot of changes that affected small systems in particular. One major change was that it declared that states cannot provide assistance to any system that cannot prove its technical, financial, or managerial capacity to ensure compliance with SDWA over the long-term.

Further, the act tied the amount of funds a state could be eligible for directly to drinking water state revolving funds (DWSRF) and could penalize states for not complying with the capacity development standards.

Another problem is that many rural areas may no longer be considered rural. What was once farmland is now a bedroom community for a large city. As cities overflow, suburban areas grow quickly and rural areas become strip malls, fast food restaurants, and other urban wonders. And they all need water. To supply water to growing populations, communities have to find new, better raw water sources. One answer for states was system consolidation. (For more about sprawl and rural areas, see the Fall 2002 *On Tap.*)

What's a consolidated system?

A consolidated water system is any combination of CWS operated or managed as a single unit, whether they are physically connected or not. Examples of consolidated systems include acquisition of one system by another, or forming a water authority. Typically, they maintain uniform water rates for all customers of the consolidated system.

"The most successful consolidations occur because people volunteer to do it," says Larimore. "They know they don't have the water or infrastructure and need to do what's best for the community." (See more about voluntary regionalization in the Spring 2001 *On Tap.*) Larimore stresses that system consolidation can work, but requires all members to be willing participants.

"Regrettably, some folks still believe 'regionalism' means forced mergers," writes Ellen Miller of the Ellen Miller Group in the Spring 2001 *On Tap.* "They remember a few years back when some federal and state agencies touted mergers and consolidation as the best way to assure long-term viability.

"Occasionally bureaucratic zeal for achieving economies of scale ignored little details like miles between systems or what a board thought about being disbanded," she notes. "Rural America's economic and population downturns during the 1970s and 1980s both pushed and justified mergers and consolidation at almost any price. As this new century starts, things have changed drastically."

"Unfortunately local water boards may be seen as a training gound for a future role in partisan politics," says David Pask, an engineering scientist with the

National Small Flows Clearinghouse. "Having this in mind, I am not sure that all candidates are able to concentrate on the best interests of the present and future customers of the utility. Good management may be better served if potential politicians would step aside for visionary volunteers with leadership qualities and no axe to grind. These special persons may be able to develop programs and strategies for efficient management—including, sometimes, consolidation—without interfering with, and micro-controlling, day-to-day operations." (For more information about water boards, see the Winter 2003 *On Tap*.)

Consolidation Succeeds

Larimore says that one of the best examples of regionalization is the Logan-Todd Regional Water Commission in Kentucky. This venture consolidated the water treatment needs of 12-small, Kentucky systems into one regional commission, which included Russellville, Auburn, Lewisburg, Adairville, the East Logan Water District, the North Logan Water District, the South Logan Water Association in Logan County, Elkton, Guthrie, Trenton, the Todd County Water District in Todd County, and Oak Grove in Christian County. The combined population is about 45,000 people.

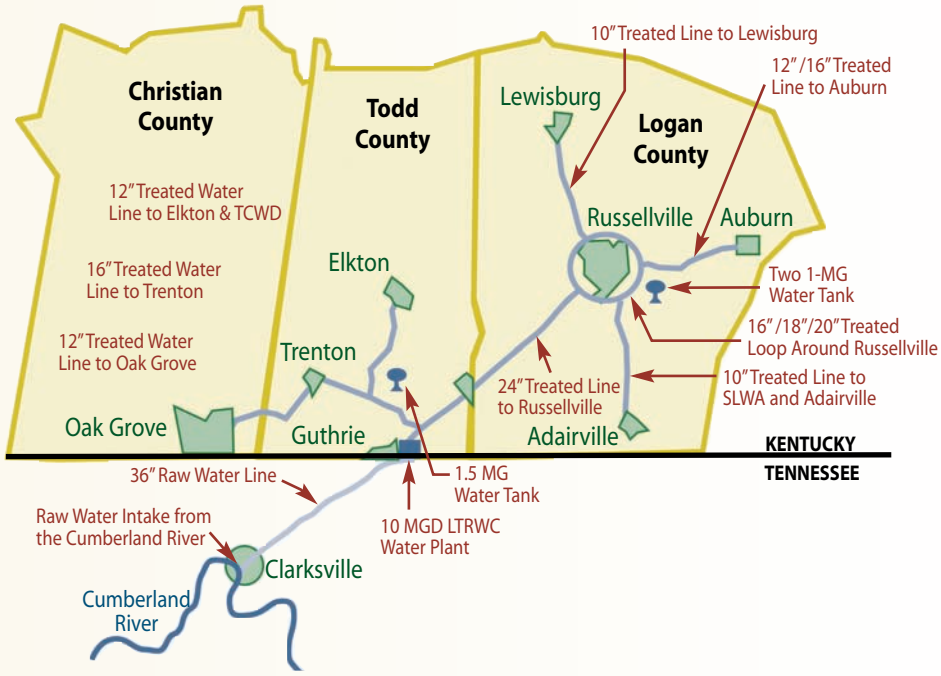
According to Clay Kelly, P.E., an engineer with Strand Associates and its subsidiary PEH Engineering, the regional concept of this water commission is working better than ever. "The first discussions and meetings that eventually led to the formation of the Logan-Todd Regional Water Commission were held in the early 1990s," Kelly explains. "The lack of capacity to serve new water customers hindered Logan County's economic development. To address this problem, the Logan County Chamber of Commerce formed a study group to determine what the best course of action would be to solve the problem.

"Unbeknownst to the Logan County group, Todd County was starting a similar study. Informal discussions between residents and officials of the two counties revealed that they both faced essentially the same issues, so they started looking into the possibility of working together.

"Legislation was already in place for the formation of multi-county water commissions," Kelly continues. "But there were problems with the statute that provided much of the legal mechanism for a successful joint water entity. It was very limiting as to who could serve as commissioners. The law said that an elected official, an employee of a water system, or a board member of a water district were ineligible to serve. In a rural area like Logan and Todd County, this essentially eliminated anyone who knew anything about water. We formed the commission under this law in 1996, but legislation did finally pass in 1998 that remedied the problems with the law."

Once formed, the commission had the authority to build, own, and operate water supply and treatment facilities. There are also provisions for new entities to join as the need arises. The commission can issue bonds and has the power of eminent domain, but it has no taxing authority. The commission can wholesale water only and cannot sell water directly to any end user.

Schematic of the Logan Todd Regional Water Commission (LTRWC) Service Area



Members Retain Autonomy

Within the Logan-Todd commission, there are 12 autonomous water entities, and one commissioner represents each member. Each entity maintains ownership and operating and maintenance responsibility for its distribution system. The commission does not take on any debt or ownership for the individual members, nor do the individual systems incur Logan-Todd's debt. Each system sets its own water rates.

The Logan-Todd Regional Water Commission concept has many advantages, it:

- provides economies of scale for efficient construction and operation;
- eliminates the duplication of services and provides for the efficient use of resources;
- ensures that each entity pays the same wholesale rate for water regardless of size or location;

- lowers overall water costs in the future when compared to other alternatives; and
- benefits of regional cooperation extend beyond areas besides water.

As with any plan, there are also disadvantages to consider.

- the commission relies on one large water source now instead of eight smaller sources as in the past;
- each system has its unique issues to address, including how to decommission unneeded treatment plants, and decide how to retire any remaining debt on those facilities; and
- higher water costs in the short term are almost certain, as are political squabbles.

The Logan-Todd project came into being primarily to address a shortage of raw water in the region. Water shortages in several of the communities caused homeowners and industries to face water use restrictions.

"Population growth, particularly in the rural areas also fueled demand for source water," says Kelly. "The big problem, however, was that there was no abundant source of water in the two-county area. Effective economic recruitment was out of the question with the limited water supply."

Raw Water Source Located

The engineers and community leaders set about to find a suitable water source. The Cumberland River at Clarksville, Tennessee, was eventually selected as the best alternative. Some reasons for this included the tremendous volume of water available, and the availability of the RJ Corman Railroad right-of-way as a direct corridor from the city of Guthrie to the river.

With the source decided, the preliminary layout of the treatment and distribution system followed. The treatment plant was placed in Guthrie to minimize pumping of untreated water, and to avoid having to "backtrack" with treated water. The distribution pipelines were laid out to directly connect to each of the 12 systems. Water is not required to pass through any member's system to get to another. This avoids issues of water loss, transmission costs, and capacity utilization between the retail systems.

Logan-Todd created a design committee consisting of three licensed water treatment plant operators from the member entities to advise the engineers during the planning and design phase.

Strand Associates and their subsidiary, PEH Engineers, led the treatment plant effort, and considered conventional treatment technologies as well as some newer alternatives. The entire system includes an intake on the Cumberland River in Clarksville, a 36" raw water pipeline from Clarksville to Guthrie, a 10 million gallon per day (mgd) water treatment plant at Guthrie, 85 miles of transmission main tying the plant to the member systems, three water storage tanks totaling 3.5 million gallons, and 17 metering stations.

Funds From Everywhere

The project has grown from the original proposal to build a system to serve only one county in the region, to the current project that serves all 12 entities. The total budget for the project is $77.5 million, although it now looks like the final cost will be closer to $75 million.

Rural Development (RD) provided most of the long-term financing. The agency committed to provide $48.2 million in loan funds to the project—the largest RD loan ever made in the U.S. Logan-Todd also received the largest state grant awarded from the tobacco settlement funds.

The funds to build the project came from practically every source available for a public infrastructure project, including:

- the community development block grant program;
- direct, line-item appropriations from the federal budget;
- drinking water state revolving fund loans; and
- private bond issues.

In 1998 and 2000, Governor Paul E. Patton provided state budget surplus grants, which were an important source of funding early in the project. A series of bond anticipation notes issued over the course of construction provided interim financing.

Continued on page 42 ➤

Associate Editor **Kathy Jesperson** enjoys writing articles about rural water systems. If you have an article idea for her, please e-mail her at *kjesperson@wvu.edu*.

Steal This Article

If you see an article in *On Tap* that you'd like to use in your publication, go ahead. We don't mind. In fact, we encourage people to use anything in this magazine they find useful. All we ask is that you let us know where and when you use it. Send a copy of the publication with the reprint to:

On Tap Editor
National Drinking Water Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown, WV 26506-6064

Finding a water leak is a lot like finding the proverbial needle in the haystack. There is, however, one distinct difference: A water leak is continuously trying to tell you where it is located. Water exiting a line may rumble, whistle, hiss, or in some cases, whisper; but it is continuously sending out an audible cry for help. Finding a water leak is knowing how and where to listen and what to listen for.

On the Trail of the Elusive Water Leak

Story and Photos by **Larry Rader** • NDWC Environmental Consultant

Many years ago, when I was working in my first water system, we knew there was a leak when we came to work in the morning and our only tank was almost empty. The treatment plant was very old and operated 24 hours a day just to furnish enough water for the community during the day and fill the single tank at night.

The panic usually began when we came to work in the morning and the tank was dropping like a stone. We would pile into the town truck (you had to push down hard on the steering wheel when turning a corner) and set off on a frantic search. We would check all the usual suspects, such as creek crossings and recently repaired leaks; all the time praying a wet spot would appear in the road in front of us. After an hour or so of this foolishness, the panic subsided, and we got down to the business of actually finding the leak. Although you may get a chuckle out of my experience, I'll bet there are people reading this who will think "Yep, that's how we do it."

Four Ways to Find a Leak

The hardest leaks to find, of course, are those that do not surface. Water will take the path of least resistance. It can follow the gravel bedding around the line for miles, find a broken sewer line to duck into, occur in the middle of a stream, or just disappear into a fracture in the earth. Before you can pinpoint this type of leak you must first localize it (i.e., narrow down the general site of the leak). Without the luxury of metering each line, there are four basic methods that have worked well for me.

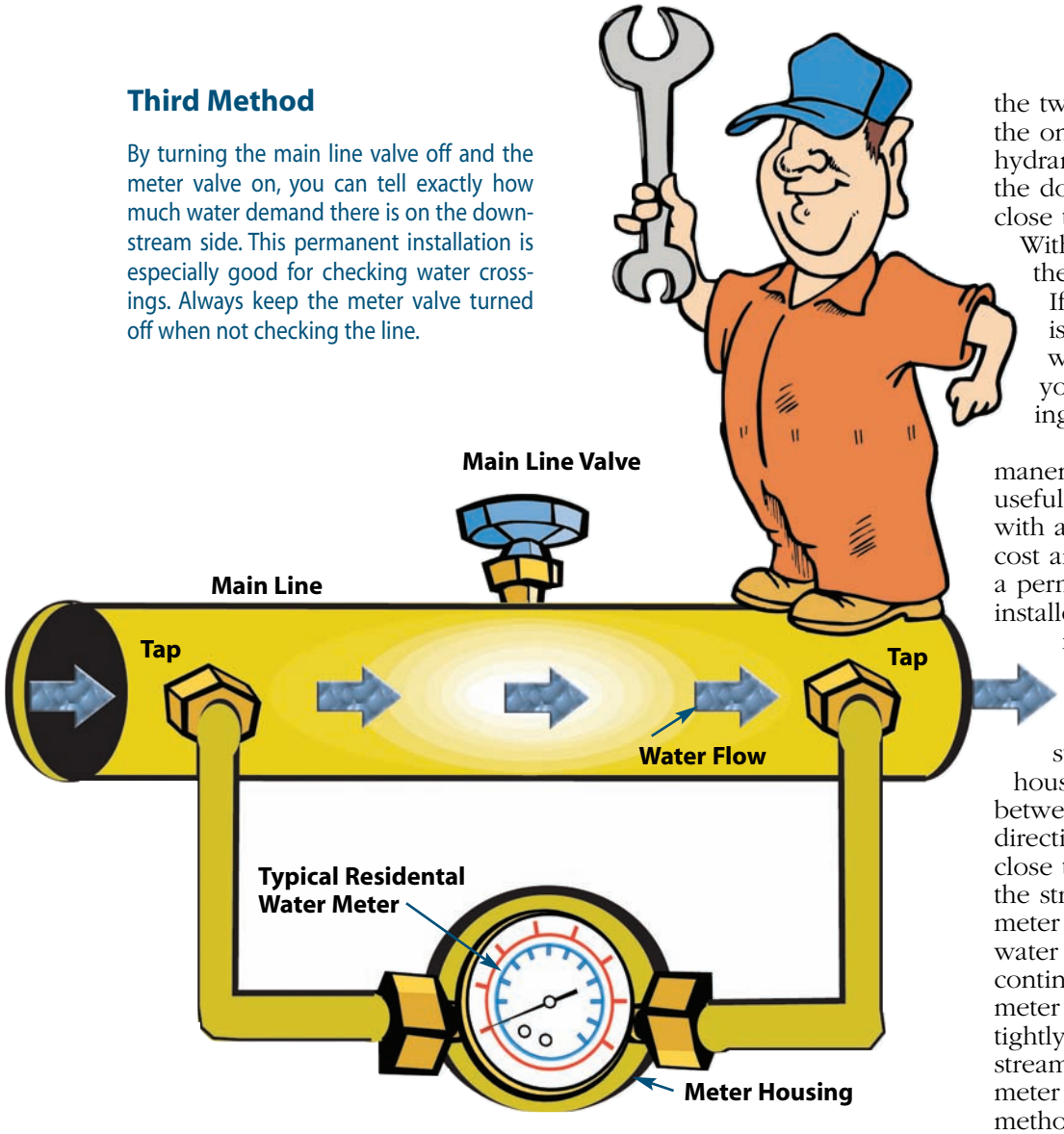
The first method, as with most leak detection measures, is most effective late at night when little water is being used. Although one person can do this, it goes more quickly, and it is much safer, when two people with some method of communication are working together. When using this particular method, always move in the direction of water flow. Pick a valve (#1) at the beginning of a particular stretch of line. Go in the direction of flow to the next valve (#2) and slowly turn the #2 valve off. Return to valve #1 and slowly turn it off. Wait ten minutes and barely crack valve #1.

Water under pressure, moving through a small space, makes a screeching or whistling sound. A metal valve wrench left on the valve will transmit that sound, and by placing your ear against the valve wrench you can hear water passing through the slightly open #1 valve. If there is no sound or if the sound quickly stops, the line is tight. However, if the noise continues, and valve #2 is tightly closed, water is leaving that stretch of line at some point between the two valves. Using this method two people can leap frog along a line fairly quickly.

The second method is very similar and is used when there is a fire hydrant connected to the suspect line. In the article I wrote about line flushing, I mentioned drilling and tapping a spare hydrant cap and installing a pressure gauge. (See "How To Flush Distribution Lines" in the Summer 2002 *On Tap*.) This cap

Third Method

By turning the main line valve off and the meter valve on, you can tell exactly how much water demand there is on the downstream side. This permanent installation is especially good for checking water crossings. Always keep the meter valve turned off when not checking the line.



If you are not careful, when you are looking for a leak, there will be wet spots everywhere you look. Wet spots along or in the roadway, unless they are running or the pavement is spongy underfoot, are most likely just wet spots.

and gauge combination also works well in localizing water leaks.

This procedure is also best accomplished late at night with two people and some means of communication. Remove one hydrant cap and gently flow the hydrant to flush away anything that could foul the pressure gage. Then install the cap and pressure combination. Securely tighten all hydrant caps and charge the hydrant. (Care must be taken when charging the hydrant. Several years ago I was doing this very test when a hydrant cap blew off as I was standing astraddle it. I still get cold chills thinking about how close it came to my … Well, let's just say I'd be singing in the Vienna Boy's Choir for the rest of my days.)

After charging the hydrant, read the line pressure. One person needs to remain with the hydrant while the other closes the two valves beginning with the one downstream from the hydrant, (#2 again). After closing the downstream valve, slowly close the upstream valve, (#1).

With both valves tightly closed, the line pressure should hold. If it drops off quickly, water is leaving the line somewhere. Always check with your engineer before charging a capped hydrant.

The third method is a permanent installation, which is very useful at stream crossings or lines with a history of problems. The cost and labor is minimal, and a permanent household meter installed at main line valves makes checking problem areas simple. A tap is made on the main line both upstream and down stream of the valve, and a household meter is installed between the two taps in the direction of flow. You can then close the valves on each side of the stream crossing, turn on the meter and see whether or not water continues to flow. If water continues to flow through the meter with both main line valves tightly closed, it is going into the stream. By installing a permanent meter setting, this particular method can be used to check any line. These first three methods require main line valves that work properly and shut off completely.

Last, but certainly not least, listening at control valves and hydrants can quickly help localize a leak. Older car mechanics know that holding a screwdriver against a valve cover and the other end tightly against your ear while the motor is running will amplify sound and allow them to check valve adjustment. The same principal can be used when looking for a hidden water leak. Water leaks make noise; you just need to listen.

If you have cast iron or ductile iron, the process becomes even easier. To demonstrate this, lay a piece of iron line and a piece of plastic line on the ground and strike each with a hammer. The iron line rings and the plastic, well, just thunks. Leaks in iron lines can be heard

at much greater distances because metal carries sound well. Plastic, on the other hand, is a very poor conductor of sound, and asbestos cement is somewhere between the two. Even when using correlators, the distance between the transmitters is greatly shortened when checking plastic lines.

Using Detection Devices

All of the leak location devices that I am aware of use some means of sound amplification. These devices run the gamut from geophones to correlators.

Geophones® have been around for years, and many people swear by them. They consist of two specially designed, heavy, brass plates connected to earpieces resembling a doctor's stethoscope. Geophones® are more convenient when the general location of the leak is known. (For more information about Geophones® see the *Tech Brief* "Leak Detection and Water Loss Control" in the Spring 2001 *On Tap.*)

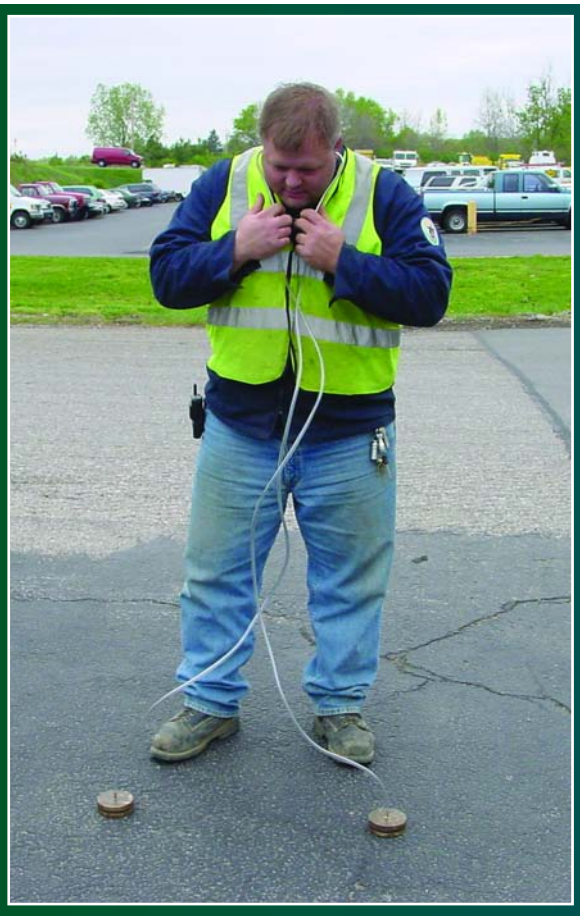
When you have a larger area to cover, one of the portable electronic leak locators is the next step up in both convenience and price. These devices use electronic sound amplification and allow the operator to move along at a fairly quick pace, making certain he/she is directly over the line, and setting the locator down every few steps to listen. These devices range from the very simple—a ground piece, headphones, and an on/off switch—to models that allow the operator to tune out back-

Even a large water department such as the one in Columbus, Ohio, rely on older technology to pinpoint leaks. The photo above shows a Sonoscope®—basically the earpiece from an old crank telephone with a spike on one end—being used to listen at a fire hydrant.

The photo on the right shows a Geophone® being used for the same purpose. Fire hydrants are not only a good place to begin localizing a leak, they are notorious for developing leaks around their seats.

Good Maps Are Important

I cannot stress strongly enough the need for accurate maps of your system. You can really feel foolish after spending the day looking for a leak on the left side of a road, only to discover the line is actually on the right! Most leak locators, from Geophones® to correlators, are only accurate when the exact location of the line is known.



Luther Bitzel (left) of the Columbus Ohio Distribution Group shows the correct way to use Geophones® when working above a water line.

When you get serious about leak detection, a leak correlator is state-of-the-art technology. You can check several miles of line each day with one meter precision.

ground noise and select from a wide range of frequencies. Do a little homework, then shop around.

The next step up is leak correlators. Like other devices, correlators are based on sound amplification with a twist. A pair of small portable amplification and transmitting devices, usually magnetic, are placed in contact with a valve, fire hydrant, exposed line etc., and spaced at varying distances, usually restricted by the composition of the line to be checked. The signal from each device is transmitted to the correlator. If the line size, location, distance between the two devices, and pipe material is known, the correlator screen can show, usually within one meter or so, where the leak is located.

Leak correlators can be expensive. But for large systems or a number of smaller systems working together, they provide not only emergency leak detection but also the ability to routinely survey their system. Although correlators are a great tool, they require a working knowledge of basic leak detection techniques to be completely effective.

The best water leak locator I ever worked with would find a leak with the correlator then jump out of his van with Geophones® to double check. There are a multitude of other listening devices, such as small units that magnetically attach to a valve, hydrant etc., and record sound levels over long periods. This information can then be downloaded using a specific computer program allowing you to visually see sound levels. But, no matter how many electric gadgets you purchase, you still need the basics.

Is that a wet spot?

If you are not careful, when you are looking for a leak, there will be wet spots everywhere you look. Wet spots along or in the roadway, unless they are running or the pavement is spongy underfoot, are most likely just wet spots. You should, however, always be on the lookout for vegetation that is suddenly greener and growing faster than the surrounding plants.

Looking for chlorine residual at the sight of a suspected leak can be misleading. I have questioned manufacturers of DPD chlorine reagents about interferences that could give a false color change. I have been told there are few things that can cause a pink color change other than chlorine itself. Be that as it may, I have dug some pretty large holes where there was neither a water leak nor a water line only because the grab sample turned pink when the reagent was added. Also, if the running water is actually a leak, the path from the leak to the surface may find a chlorine demand causing no residual to actually reach the surface.

In my opinion, fluoride residual is the best indicator, provided that your water is fluoridated. If the fluoride residual reaching the surface closely matches the residual in your system, there's a good probability that the water is coming from one of your lines. Many years ago one of the prevalent chlorine reagents was orthotolodine. Orthotolodine turns yellow in the presence of chlorine and did not appear to have any interference. It was discovered to be carcinogenic several years back and ordered out of treatment plants.

Locating hidden water leaks takes practice and even the best dig a lot of dry holes. Yes, the leak is continuously telling you where it is. However, the language is foreign and you must learn it.

Larry Rader has more than 25 years in the water industry. If you have a question for Rader, he can be reached by e-mail at *lrader@meer.net*.

Videoconferences Provide Solution to Training Challenges

For Small Water Systems in Rural Nevada

Crystel Montecinos, Administrative Assistant, Department of Environmental and Resource Sciences, University of Nevada, Reno.

Mark Walker, Associate Professor and State Extension Water Specialist, Department of Environmental and Resource Sciences, University of Nevada, Reno.

Adele Basham, Supervisor, Drinking Water State Revolving Loan Fund Program, Nevada State Bureau of Health Protection Services.

Cliff Lawson, Staff II Associate Engineer, Public Health Engineering, Nevada State Bureau of Health Protection Services

Philip Walsack, Rural Development Specialist, Rural Community Assistance Corporation,

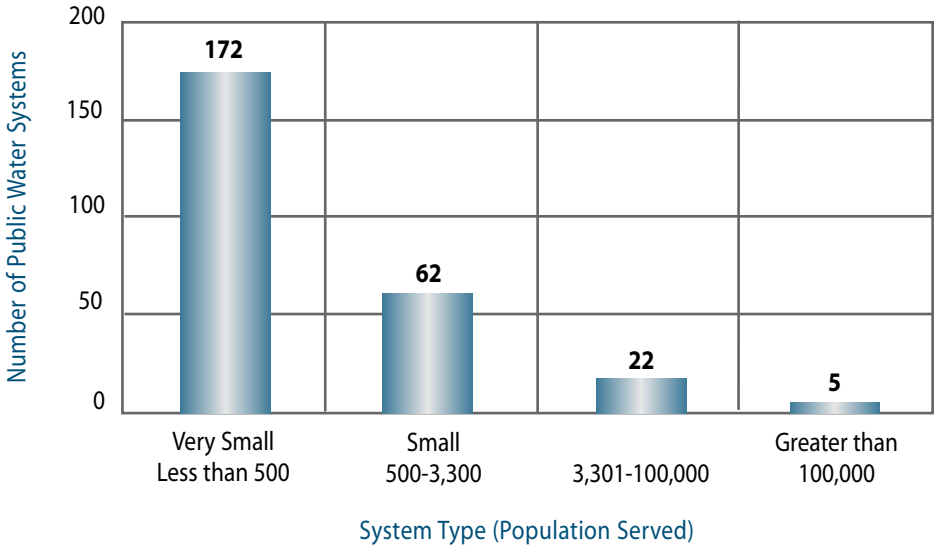
Debra Kaye, P.E., Water Treatment and Distribution Operations Manager, Truckee Meadows Water Authority

Robert Foerster, Circuit Rider, Nevada Rural Water Association

Larger than 116 nations in land area, Nevada—with a population of two million spread over more than 110,000 square miles—presents unique challenges to those providing water operator training.

Photo by Mark Walker

Figure 1: Size of Public Water Systems in Nevada



Nevada—twin oceans of sagebrush and sky. A person can drive for hours here without seeing so much as a jackrabbit. Small communities are relatively isolated in this state, which covers 110,540 square miles and has a population of approximately two million people. Drinking water system characteristics show this isolation: 79 percent of the population is served by 261 public water systems; and 88 percent of the population lives in three metropolitan areas: Las Vegas, Reno, and Carson City.

Of these metropolitan areas, 86 percent of the population served by public water supplies receives water from five major systems in Reno and Las Vegas. (See figure 1.) The remaining 14 percent are served by 256 public water systems.

Using U.S. Environmental Protection Agency (EPA) classifications of water systems by size, 234 of Nevada's public water systems (90 percent) are small or very small systems (very small water systems serve 25-500 people, small water systems serve 501-3,300). Among very small systems, 62 percent in Nevada serve fewer than 100 people. (See figure 2.)

This unique profile of small and very small systems spread across great distances creates a challenge when it comes to providing education and training for operator certification.

In a similar analysis of rural and remote water systems in Pennsylvania, Yuefeng Xie, associate professor of environmental engineering at Pennsylvania State University–Harrisburg, reported that "operators are unable to attend (classes) because of inconvenient training locations, inflexible schedules, or the technical level of the programs." For some water supply operators in Nevada, it may be as much as a six-hour drive to reach a community large enough to supply new pumps, valves, or chemicals. The same is true for education.

The Challenges of Distance and Limited Resources

The 1996 Safe Drinking Water Act Amendments require that operators of all community and non-transient, non-community water systems be certified. To be eligible for certification, operators must have at least six months of documented experience. Those wishing to maintain or renew certification must show proof of having attended educational programs, which are reported as contact hours. Contact hours are actual classroom or lecture hours spent in a state-approved program. To maintain certification Grade 1 and 2, operators must have a minimum of five contact hours per two-year renewal cycle. Operators with Grade 3 or 4 certification need 10 contact hours every two years.

Finding the resources for continuing education and certification to meet federal and state requirements can be costly and time-consuming. For most small systems, the expense of losing workdays plus travel costs can be a profound burden. In 1999, the Nevada State Health Division's Bureau of Health Protection Services conducted a survey of operator opinions and preferences about training. Respondents said that they decide to attend classes based on the content or subject matter, availability of continuing education credit, and distance of travel. According to Cliff Lawson, staff II associate engineer with the Nevada State Bureau of Health Protection Services, most respondents were willing to travel "more than 100 miles for training and prefer to finish training in a day or less."

Since 1999, a multi-agency and multidisciplinary partnership—including the University of Nevada, the Nevada State Health Division's Bureau of Health Protection Services, the Rural Community Assistance Corporation, Nevada Rural Water Association, and the California-Nevada Section of the American Water Works Association, with support and funding through the Nevada State Health Division's Drinking Water State Revolving Fund—has been working to meet the needs of Nevada's small and very small community water systems. Using videoconference technology, water operator classes are now being offered in rural communities across Nevada. The University and Community College System of Nevada maintains more than 85 video conferencing sites in 26 communities throughout the state, putting a videoconference facility within 70

miles of any public water system. (See figure 3.)

Most large systems have the resources to support ongoing education for staff. However, in small and very small systems, water system operation and maintenance may be just one of the many tasks that an owner/operator may be required to perform. Typically, small systems struggle to comply with changing federal regulations and continuing education requirements. The videoconferencing sessions are designed specifically to meet the needs of small system operators.

The videoconferencing classes consist of three hours of morning instruction to minimize time away from work. Participants earn three contact hours of continuing education. Classes, taught from the University of Nevada campus in Reno, are broadcast to up to as many as six sites at once. Participants at each site see and hear instructors and participants at all other sites. Instructors from partner groups share expertise and experience with small groups of participants from public water supply systems. This system of instructor-sharing ensures that a broad range of topics can be covered. Thus far, operators have been pleased that they are able to fulfill state education requirements without missing full or multiple work days.

> The benefit of videoconferencing over packaged courses—those taken through books or VHS tapes—is that classes are live and interactive.

Class topics have targeted specific federal requirements, such as consumer confidence report preparation, sampling techniques, options for meeting the new arsenic regulations, and basic treatment principles. Each class contains an hour-long section of mathematics related to the topic. For example, classes that cover coagulation and flocculation included calculations of daily feed rates and dilution equations. Classes for consumer confidence report preparation included review of techniques for computing averages and unit conversions.

In June 2001, operators attended three hours of water operator math, developed by Nevada's multi-agency Drinking Water and Wastewater Training Coalition. The math presentations reinforced the technical material and provided practical information related to plant operation. One operator commented that the most effective part of the class was "putting math into perspective when used in a work situation."

Benefits of Videoconferences

The benefit of videoconferencing over packaged courses—those taken through books or VHS tapes—is that classes are live and interactive. The statewide system of "smart classrooms" allows operators to hear, see, and communicate with the instructor and other classrooms simultaneously. Educational materials can be in any form, including lecture, computer graphics, transparencies, white board notes, and videotapes. Instructors can switch easily between media for dynamic and lively presentations. Also, operators who might never see their peers in person can exchange information and helpful suggestions with others in class-

Figure 2: Distribution of Public Water Supply Systems in Nevada by Population Served

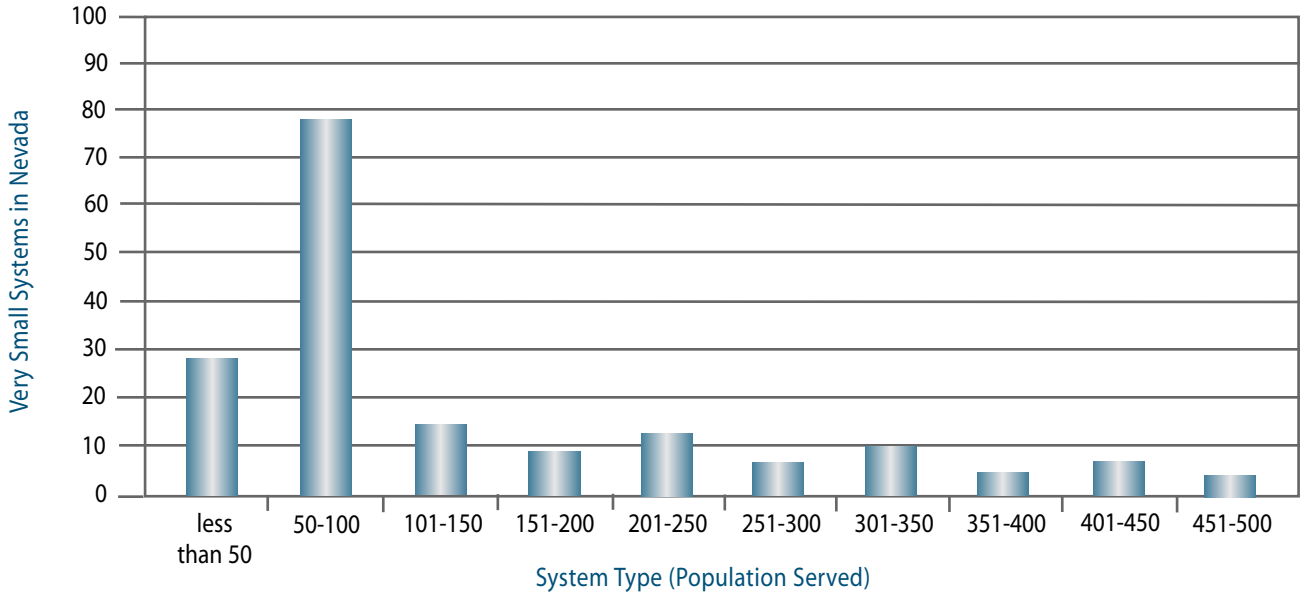


Photo by Mark Walker

Nevada—Twin oceans of sagebrush and sky. A huge land area and limited resources have fostered water training innovations in the Silver State.

rooms hundreds of miles away. When asked what was most effective about a session, a participant replied, "being able to talk to different towns and cities." Videoconferencing provides virtual face-to-face contact between small clusters of operators.

Participants can ask questions specific to their community's public water system. The remote videoconferencing sessions minimize travel and travel cost burdens on the parts of participants and organizers. Participants avoid the cost of traveling to distant seminars, and organizers and instructors are not required to travel to sessions that might be attended by very small audiences.

Because the sessions reach large but dispersed audiences throughout the state, training program coordinators have been able to invite speakers from federal, state, and local governmental agencies and private consultants. Representatives of 12 government agencies, including general improvement districts in Nevada, have conducted sessions.

Results Are Encouraging

To date, 20 classes have been held, reaching more than 500 operators from 153 different public water supplies and Indian reservations, with a large proportion coming from small to very small systems. At the end of each class, operators are asked to evaluate and comment on class content, effectiveness, and technical aspects. Responses to date have been very positive.

Participants rated different aspects of the class including the appropriateness of the material and the pace of the class. Ninety-two percent of participants felt that the material was appropriate. (See figure 4.) Individual sections of each class were rated separately in order to identify which topics best suited the audience. Overall, 77 percent of participants rated the classes good to very good. Ninety-nine percent of all participants would attend videoconferencing classes in the future in lieu of traveling to a seminar, and 95 percent would recommend them to colleagues and co-workers.

Support for Certification

Recently, operators participated in a special four-hour distance education session designed to help them prepare for the certification examinations. The class, held in cooperation with the Nevada State Health Division's Bureau of Health Protection Services and assisted by the

California-Nevada Section of the AWWA, was held a day before state certification examinations were administered. Water operators were able to attend the review and take exams at five locations in the state the following day. Examination proctors contracted and scheduled by the California-Nevada Section of the American Water Works Association were available in each community that hosted the videoconference.

The session included four instructors who presented information about treatment techniques; distribution basics; policy, safety, and management; and operator mathematics for treatment and distribution operators grades 1 and 2. They also provided confidence-building test-taking tips. Among those who attended, many felt that the review session had been a key factor in their success. An analysis of results showed that those operators who took the class prior to the exams had a passing success rate of 92 percent. This is notably higher than the average 84 percent success rate for the entire group that took the examination.

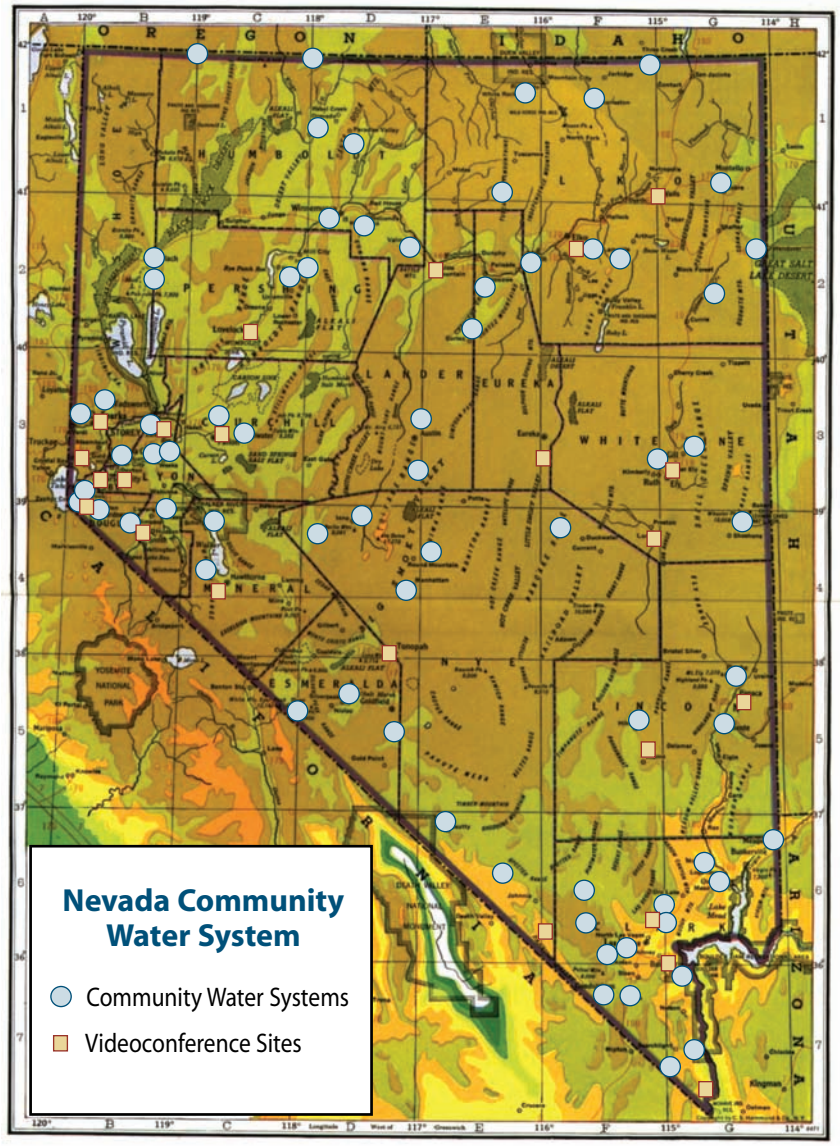


Figure 3: Distribution of Water Supply Systems and Videoconferencing Locations in Nevada.

The Future of Videoconferencing

Future classes will continue to focus on operators of small to very small systems and will also reach managers and board members. An upcoming session will cover board responsibilities, open meeting laws, and agendas. To address operator certification compliance, a class will also be held for the very smallest of systems including non-transient, non-community systems. These classes will address regulatory and policy issues, operator certification, and small system management. Requests for specific classes commonly include exam preparation, sampling requirements, and distribution topics, such as water mains, pump basics, and fire hydrant maintenance.

One exciting prospect for the future is using more instructors from remote locations. A recent session included an instructor who broadcast his portion of the program from EPA Region IX headquarters in San Francisco. These approaches will greatly expand the possibilities and variety of education opportunities for Nevada's rural water system operators.

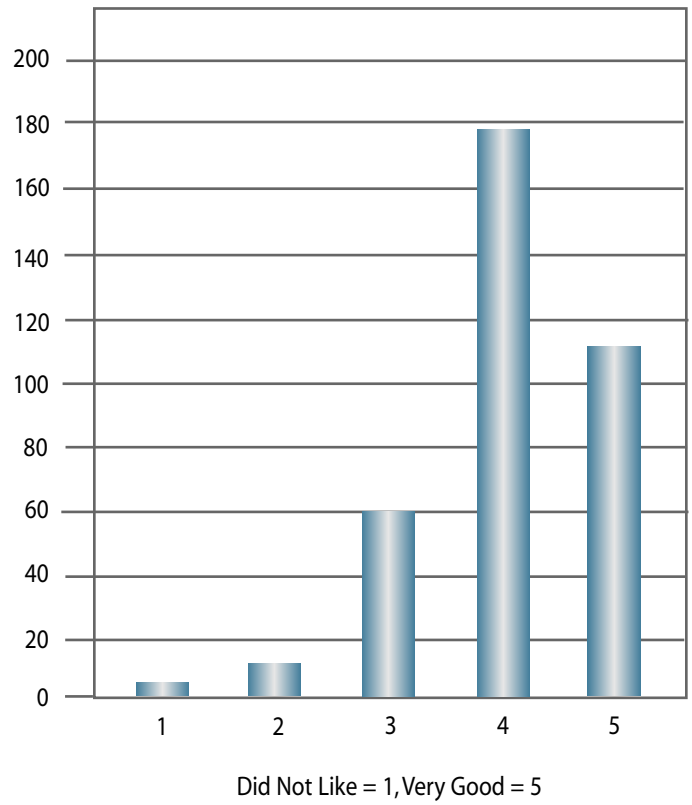
One exciting prospect for the future is using more instructors from remote locations.

The 1996 Amendments to the Safe Drinking Water Act require that all community water systems have a certified water operator available for each shift. Nevada's challenge is to support public water supplies in rural areas where training is less available and more costly to obtain than in metropolitan areas. Videoconferencing is proving to be an efficient way to reach small communities without the expense of lost work hours and extensive traveling. Using existing videoconference sites, a unique partnership between university, public agencies, and service groups now brings interactive training classes within about one hour's travel time of the remotest and smallest community systems in the state. Having operators from distant and rural small systems connected via videoconferencing has had the added benefit of enhancing communication among peers. In addition, success rates appear to be higher than average among those who attend preparatory classes prior to taking state operator certification exams. Ongoing evaluations of the classes have been very positive and are useful for designing programs to meet specific needs and requests of the smallest systems.

Having operators from distant and rural small systems connected via videoconferencing has had the added benefit of enhancing communication among peers.

The potential of videoconferencing in Nevada is just being realized. Access and availability to education is expanding for water system operators and for managers, board members, and community leaders as well. Creating a method of ongoing education that is affordable and accessible helps meet the basic objective of the SDWA of providing adequate, safe, and potable drinking water for all customers of public water systems in Nevada.

Figure 4: Summary of Participants' Reactions to Videoconferencing Training Sessions, 2000-02



Acknowledgements

The videoconferencing program is sponsored by the Nevada State Health Division's Bureau of Health Protection Services, using set-aside funding from the State Health Division's Safe Drinking Water Act's State Revolving Fund Program. Educational materials are supplied by the American Water Works Association, the Rural Community Assistance Corporation, the Nevada Rural Water Association and the Nevada Department of Environmental Protection. The Advisory Board of Certification for water system operators and operator certification and the California-Nevada Section of the American Water Works Association have been very supportive of the entire effort.

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With a new microfiltration plant (shown at left) and an important role in one of the largest regional water projects ever devised, the Lower Brule Indian Tribe (below) has become a showcase for small communities.

Microfiltration on the Missouri

Lower Brule Tribe Builds New Water Plant

Story by **Mark Kemp-Rye,** *On Tap* Editor
Photos by Rod Coker, Retired Tribal Utility Consultant, Indian Health Service

Did you know that each popcorn kernel contains a drop of water and that the corn won't "pop" without it? Did you know that although popcorn probably originated in Mexico, it was also grown in China, Sumatra, and India years before Columbus visited America? Did you know that 1,000-year-old popcorn found in Peruvian tombs was so well preserved that it would still pop?

While popcorn might not be something you ponder very often, it was a consideration for South Dakota's Lower Brule Sioux Tribe—one of the nation's leading producers—when it came time to design a new water system. When it's completed, Lower Brule's new system will have plenty of water for irrigating the popcorn fields, and it will have good, clean drinking water for 5,000 people from a state-of-the-art microfiltration plant.

The Old Days

Water hasn't always been readily available on the Lower Brule Reservation. Shirley Flute, long-time resident and advisor to the community leadership, recalls what it was like 40 to 50 years ago. "People got water from the river then," she says. "There was no treated water in those days, just river water that they had skimmed off what was floating on top and used that. If you wanted water delivered to your house it would cost $1 a barrel and $6 for a load of wood. Somebody within the community who had the means to deliver, would. Everyone knew how to conserve water because you had to make your supply last as long as you could."

Lower Brule is one one of the first Indian reservations in the U.S. to use microfiltration as a community water system treatment technology.

To illustrate how important conservation was, Flute tells a story of a visit her uncle made to her family back then. During the uncle's visit, one of Flute's children was hurt, and she and her husband had to take the child to the doctor. While they were away, the water barrel was delivered.

"When we got home, we found him mopping the floor because the barrel had a leak in it and he didn't want to waste the water," she says. "I don't know why he didn't just pour the water into the other barrel, which was empty."

For most of its history, Lower Brule was located right by the Missouri River where Flute and others got their water. Beginning in the 1950s, the U.S. Army Corps of Engineers began construction on the Big Bend and Fort Randall Dams. These projects meant that Lower Brule had to move to higher ground during the early 1960s. In 1963, the Corps starting flooding the area that created Lake Sharpe behind the Big Bend Dam.

With the move, Lower Brule got its first treated water—a small, package treatment plant with a conventional treatment process. By the 1970s, increased demand resulted in the original plant being replaced with two, six-foot-diameter pressure filters, each with a design capacity of 75 gallons per minute. Two additional filters were added in the 1980s during a renovation project.

Growth Means Change

By the mid-1990s, though, the pressure filtration system was struggling to meet U.S. Environmental Protection Agency (EPA) regulation limits during high turbidity events on the Missouri River. "Continued population growth of Lower Brule resulted in a need for additional capacity from the water treatment plant," says Rod Coker, retired tribal utility consultant, Indian Health Service. "It was at this point that the Tribal Council (the governing body for the reservation) made the decision that the existing water treatment plant would not meet the needs of the community. They felt that their best long-term option was to abandon the existing facility and to construct a new water treatment plant. The council also decided to obtain the services of their own engineering firm so as to no longer be solely dependent on the technical resources of the federal government (Indian Health Service)."

The tribe's engineering firm completed a microfiltration pilot study in October 1995. This was the first evaluation ever performed on the upper Missouri River for treatment by microfiltration. The study concluded that this treatment method would meet or exceed all current and foreseeable Safe Drinking Water Act regulations.

Funds for the project, however, proved difficult to find. Fortunately, the Tribal Council was able to become part of a large regional water project planned in South Dakota: the Mni Wiconi Rural Water Project.

That's One Big Water Project

According to Jim McCauley, director of the Lower Brule Rural Water System, the Mni Wiconi Rural Water Project is the largest rural water project ever undertaken by the Bureau of Reclamation. "When it's completed, this project will encompass four independent rural water systems, serve 55,000 people over 12,500 square miles, and deliver good, healthy drinking water to several counties in western and central South Dakota," he says.

"The Lower Brule Rural Water System will serve most of Lyman County off of its coreline system and will supply water to four communities and their distribution systems, which are located off the Lower Brule Sioux Reservation," he says. "The total population served by the Lower Brule Rural Water System will be about 5,000 people."

With the backing of the Mni Wiconi project and the support of several federal agencies, the Lower Brule Tribe was able to develop a coalition of funding support that would enable the construction of the microfiltration water treatment plant and link this

One Big Water Project

The Mni Wiconi regional water project was once billed "the largest engineering effort in the United States." Consider these statistics:

- The project, when completed, will cover approximately 12,500 square miles.
- It will serve more than 55,000 people.
- It will encompass four independent rural water districts.
- The project cost will top $300 million.

"The Mni Wiconi project is a critically important drinking water project for the western half of South Dakota," says Senator Tim Johnson, "[and will] bring a clean and dependable source of life's basic necessity—water—to much of western South Dakota."

system into the overall Mni Wiconi rural water system. The multi agency funding for this project was as follows:

Indian Health Service	$ 257,000
Housing and Urban Development	311,000
Environmental Protection Agency	562,000
Bureau of Reclamation	235,000
USDA Rural Development (Grant)	150,950
USDA Rural Development (Loan)	145,238
Lower Brule Tribe	145,000

"Working with all these federal agencies was a major coordination effort on the part of the Lower Brule Tribal Council," says Coker. "As a result, the tribe was able to construct (in 1999) one of the first microfiltration water treatment systems along the Missouri River. They are also one of the first Indian reservations in the U.S. to use microfiltration as a community water system treatment technology.

"Their operators have become extremely proficient in this treatment process," he continues. "Their water treatment plant is considered a model facility, and they routinely entertain visitors."

The people working in the plant are justifiably proud of their expertise. "Our treated water quality is consistently below 0.1 NTU [nephlometric turbidity units] no matter what kind of turbidity spikes we experience coming from the Missouri River," reports Steve Langdeau, Lower Brule's water treatment plant supervisor. "This is a welcome improvement to the water quality for local communities."

Water Key to Economic Development

The economy of Lower Brule Tribe is based mainly on agriculture and tourism. The tribe operates two farms totaling 6,000 acres, much of which is used for raising cattle and the aforementioned popcorn. Other activities include guided hunting, fishing on Lake Sharpe, and the Golden Buffalo Casino and Resort. Water will play an important role in current and future economic endeavors, say local leaders.

"In addition to improving the health of residents in the region, I strongly believe that the Mni Wiconi water delivery project will stabilize the rural economy," says South Dakota Senator Tim Johnson. "Water is a basic commodity and is essential if we are to ever foster new rural development. Water development and economic development are especially important in helping the residents of the Indian Reservations break the cycle of poverty. Several of the counties in this part of South Dakota are among the poorest in the nation. This project has and will continue to provide much needed jobs for this region."

McCauley agrees that safe drinking water is the key to Lower Brule's future. "The population increase at Lower Brule is a result of good, healthy drinking water dating back to the mid-1960s," he says. "With the distribution system now being built as part of the Mni Wiconi Rural Water Project, the people of Lower Brule will be able to receive good, healthy drinking water throughout the whole reservation. And with good drinking water, Lower Brule will continue to see the population increase due to healthy babies being born and people moving back to the Lower Brule Sioux Reservation to live on their own land."

For more information about the Lower Brule Sioux Tribe, read a community profile on the Internet at www.mnisose. org/profiles/lwbrule.htm. *To learn more about the Great Sioux Nation, go to* www.travelsd.com/history/sioux. *You may also write to the Lower Brule Sioux Tribe at P.O. Box 187, Lower Brule, SD 57584-0187 or call (605) 473-5561.*

Tribes Are Sovereign

Although the Lower Brule Sioux Tribe is found in South Dakota, it would be inaccurate to call it part of that state. Indian tribes are sovereign nations and are treated by the U.S. government as separate nations, responsible for self-government and with jurisdiction over their people and land. Treaties signed by the Tribes of the Great Sioux Nation and the U.S. between the 1820s and 1880s recognize this sovereignty and established boundaries still in effect today.

Acknowledgement

The author wishes to thank Rod Coker, retired tribal utility consultant, Indian Health Service, for his invaluable help on this article.

Filter Backwash Rule Set to Take Effect

By **Kathy Jersperson** • *On Tap* Associate Editor

Virtually every drinking water safety discussion since 1993 has included the cryptosporidiosis outbreak that struck Milwaukee, Wisconsin. It was the largest waterborne disease eruption ever to occur in the U.S., with an estimated 400,000 people affected. Fifty died.

The U.S. Environmental Protection Agency (EPA) considers microbiological contaminants a health concern. If finished water supplies contain microbiological contaminants, illnesses and disease outbreaks may result. Twelve waterborne cryptosporidiosis outbreaks have occurred at drinking water systems since 1984. Researchers linked three of these to contaminated drinking water from water utilities with questionable recycling practices.

In the backwash process, water is forced back through the filter media (e.g., gravel, sand) to clean the filter. This backwashed liquid contains particles dislodged from the filter that can contain microbes, metals, and coagulants, such as ferric chloride or alum.

The Filter Backwash Recycling Rule (FBRR) addresses a statutory requirement of the 1996 Safe Drinking Water Act (SDWA) Amendments to regulate filter backwash water recycling. The purpose of the FBRR is to require public water systems (PWSs) to review their recycling practices and, where appropriate, work with the state primacy agency to change recycling practices that may compromise public health by allowing microbes to slip through.

The primary benefits of this rule come from reduced risk of illness from microbial pathogens in drinking water. In particular, FBRR focuses on reducing the risk associated with pathogens, such as *Cryptosporidium*, that chlorine and other standard disinfectants don't kill.

The provisions of this rule will likely reduce exposure to disinfection-resistant pathogenic protozoa, such as *Giardia*, or other waterborne bacterial or viral pathogens. In addition to preventing illnesses, this rule is expected to have other benefits, such as avoiding non-health related costs associated with waterborne disease outbreaks.

The FBRR applies to all public water systems that:

- use surface water or groundwater under the direct influence of surface water (GWUDI);
- use direct or conventional filtration processes; and
- recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

The FBRR requires that recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes be returned to a system's conventional treatment process, including coagulation, flocculation, sedimentation (conventional filtration only), and filtration, are employed. Systems may apply to the state for approval to recycle at an alternate location.

EPA expects the final rule to apply to 4,650 systems serving nearly 35 million people and estimates that fewer than 400 systems will require capital improvements as a result of the requirements. The final rule was published June 8, 2001. Small systems must submit recycle notification to their state's primacy

Glossary of Filter Backwash Recycling

Recycle—The act of returning recycle streams to a plant's primary treatment process.

Recycle flow or stream—Any water, solid, or semi-solid, that a plant's treatment, operational, or residual processes generate and that is returned to the plant's primary treatment process.

Spent filter backwash water—A stream containing particles dislodged from filter media when water is forced back through a filter (backwashed) to clean the filter. Spent filter backwash water can contain particles, including coagulants, metals, and microbes, such as *Cryptosporidium*.

Thickener supernatant—A stream containing liquid from a sedimentation basin, clarifier, or other unit used to treat water, solids, or semisolids from the primary treatment processes. The "clear water" that exits the units after the particles have been allowed to settle out is thickener supernatant (or sludge thickener supernatant).

Liquids from dewatering processes—A stream containing liquids generated from a unit used to concentrate solids for disposal. Processes may consist of centrifuges, filter passages, belt presses, vacuum filters, monofills, or other sludge concentrating equipment. Such equipment may be used to dewater sludge from treatment units used in recycling processes or sludge from units found in the primary processes.

Source: U.S. Environmental Protection Agency

agency by December 2003 and have the approved process in place by June 2004.

Systems Must Provide Data

The FBRR also requires that systems notify the state in writing that they recycle. When notifying the state, systems must also provide the following information by December 8, 2003:

- A plant schematic showing the origin of all recycle flows, the hydraulic conveyance used to transport them, and the location where they are recycled back into the plant; and
- Typical recycle flow in gallons per minute (gpm), highest obser-ved plant flow experienced in the previous year (expressed in gpm), design flow for the treatment plant (in gpm), and the state-approved operating capacity for the plant if the state has determined one.

Finally, systems must collect and maintain the following information for the state to review, including:

- Copy of the recycle notification and information submitted to the state;
- List of all recycle flows and how often they are returned;
- Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in gpm;
- Typical filter run length and a written summary of how filter run length is determined (headloss, turbidity, time, etc.);
- The type of treatment the recycle flow receives; and
- Data about the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, treatment chemicals used, their average dose and frequency, and the frequency at which solids are removed where such units are used.

After evaluating the information, the state may require a system to modify its recycle location or recycle practices.

Systems must notify the state with the appropriate information no later than 30 months after the rule is promulgated. Systems must comply with the recycle return location requirements of the FBRR no later than 36 months after promulgation. If a system requires capital improvements to modify the location of its recycle return, it must complete all improvements within 60 months of promulgation.

The FBRR addresses filter backwash water and two additional recycle streams: sludge thickener supernatant and liquids from the dewatering processes. EPA believes that establishing such a regulation will reduce the opportunity for microbes, such as *Cryptosporidium,* to pass into finished drinking water.

This rule ensures that recycle practices do not jeopardize the 2-log (99 percent) *Cryptosporidium* removal requirement the Interim Enhanced Surface Water Treatment Rule established and proposed in the Long Term 1 Enhanced Surface Water Treatment Rule.

The rule requires that recycle be returned through the processes of a system's existing conventional or direct filtration process that the agency has recognized capable of achieving 2-log *Cryptosporidium* removal. This rule also ensures that systems and states will have the recycle-flow information necessary to evaluate whether site-specific recycle practices may adversely affect a system's ability to achieve 2-log *Cryptosporidium* removal.

Recycle flow surges may create conditions where plants exceed design capacity or state-approved operating capacity. Hydraulically overloaded situations can lower the performance of individual units within a treatment plant resulting in *Cryptosporidium* contamination.

EPA Calculates Cost

EPA estimates that the annualized cost of this final rule will be $5.8 million. The agency suggests that systems seek assistance from the drinking water state revolving loan fund. Other federal funds for infrastructure financing are available through the Housing and Urban Development's Community Development Block Grant Program, and the U.S. Department of Agriculture's Rural Utilities Service. EPA also provides program management funding to states that have primary enforcement responsibility for their drinking water programs through the PWSs grants program.

For more information about the FBRR, contact the Safe Drinking Water Hotline, at (800) 426-4791, or visit the EPA Safewater Web site at www.epa. gov/safewater/filterbackwash.html. *An EPA fact sheet titled "Technical Fact Sheet: Final Filter Backwash Recycling Rule is available at* www.epa.gov/safewater/mdpb/fbrr_factsheet.html.

The Filter Backwash Rule requires recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes to be treated to reduce the possibility of microbial contamination in finished water.

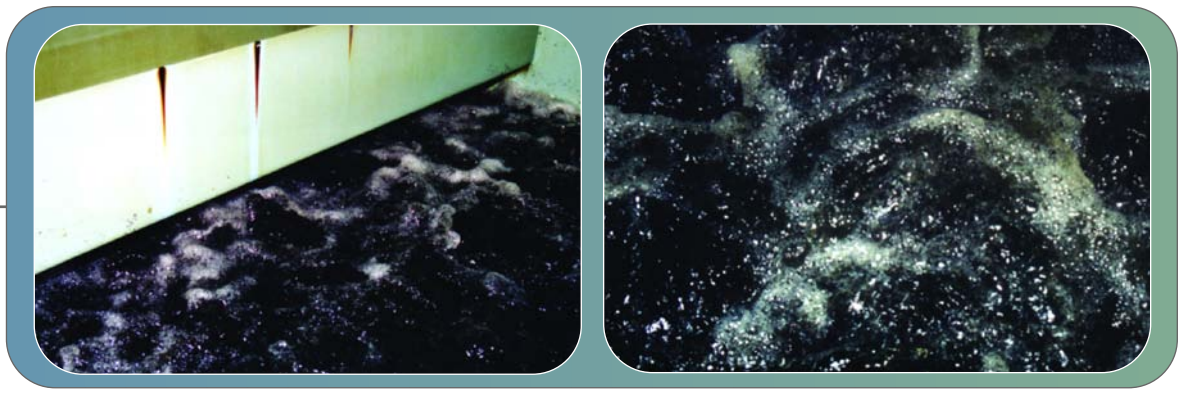


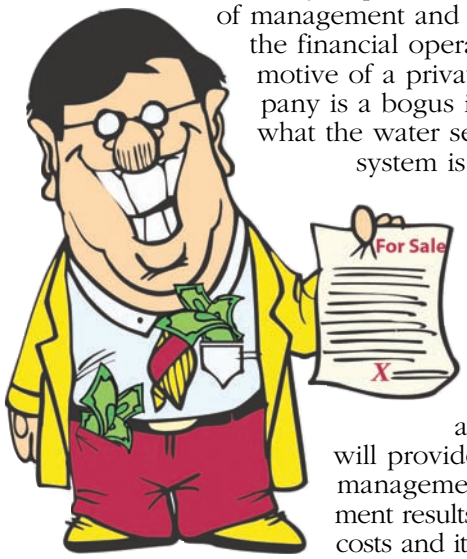
Photo from the National Drinking Water Clearinghouse archives

Letters to the Editor

Write to us! ***e-mail:*** *mkemp@wvu.edu* or *kjespers@wvu.edu* or **mail to:**
National Drinking Water Clearinghouse • West Virginia University
P.O. Box 6064 • Morgantown WV 26506-6064

Good Management Is Key

I read with interest the article on privatization of publicly owned water systems and have a slightly different viewpoint.



The key to privatization is the quality of management and the efficiency of the financial operation. The profit motive of a privately owned company is a bogus issue. The issue is what the water sells for when the system is operated in a prudent financial manner. The issue is not whether public or private ownership is good or bad. The issue is which management method will provide the best quality management. Bad management results in higher water costs and it does not matter whether the water system is publicly or privately held. A well-managed private system can make a profit and sell water (while making appropriate capital improvements) at a lower price than a poorly managed system that is publicly owned. Well-managed public water systems out compete poorly managed privately owned companies. Those of us in the industry see bad management in all sizes and types from the smallest privately owned companies to largest municipal systems.

There are some lessons to be learned by public owned water systems from privatization. The lesson is that capital is often cheaper than labor in the long run. Typically, a private company will automate a treatment plant and install a good supervisory control and data acquisition system, which may allow a reduction in treatment plant personnel from six to three. It may install a radio read meter system, which can read 5,000 meters a day and have the bills out the next day. Well-run publicly owned water systems know that spending money can save money and are making the same high payoff investments as privately run systems. Those in publicly run systems that are short sighted, or where their leaders are unwilling to make capital investments, or lack good management skills, will continue to be good candidates for privatization.

Ted Cady
Warwick, MA

Jamie Knotts responds to Ted Cady

Mr. Cady makes an interesting point about the nature of privatization from a management perspective. As noted in the article, privatization is a complicated, territorial issue muddied with emotion that requires considerable public scrutiny long *before* a system goes private.

Jamie Knotts
On Tap Assistant Editor

A Job Well Done

I would just like to thank you for doing such an excellent job with *On Tap*. In my opinion, *On Tap* is one of the best publications in the industry and we read it cover to cover. The articles are right on target, educational, and understandable, and the change from newsletter to magazine was most appropriate. This is a great resource for small water systems. Well done.

Debbie Gernes
General Manager, Travis County Water Control and Improvement District 17
Austin, Texas

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Continued from page 25 ►

The commission set the wholesale cost of water to each entity at $2.91 per 1,000 gallons. Since Logan-Todd is building all of the facilities necessary to deliver 10 mgd as the demand increases, the wholesale rate should decrease. In addition, as growth occurs in any one of the entities, it benefits all 12 in reduced water cost.

Construction of the project started in the summer of 2000 with the raw water pipeline. Since then, there have been 17 contracts, totaling more than $60 million, awarded to 15 separate contractors. At the peak of construction, 16 of the contracts were underway simultaneously.

The RJ Corman Railroad Company constructed the raw water pipeline in their rail right-of-way. This approach avoided easement problems and provided a direct route from the river to the plant site through some highly developed parts of Clarksville.

Individuals Come Together

"We pumped our first water from Clarksville in September 2002, and began filling basins, and conducting performance tests," says Kelly. "By early 2003, the plant was substantially complete and ready for service.

"In looking back over the project, there were a number of landmark events that led to its successful implementation," he explains. "First, and probably most important, was the realization that several water systems with common goals could work together. This sounds simple, but those of us in the water industry know what a leap of faith that sometimes requires.

"In 1998, Russellville had serious problems at their water plant," he adds. "The Logan-Todd project was already well on its way to fruition at that point, but obviously the crisis in Russellville added a sense of urgency. Completing the agreement with RJ Corman Railroad provided access to the Cumberland River, and a significant portion of the right-of-way needed for the transmission lines.

"The timing of the project corresponded to the advent of membrane technology in the municipal water industry, allowing us to be one of the first to employ what we believe is the technology of the future in water filtration," he concludes. "We were very fortunate to plan and build the project during a time of historically low interest rates, and state budget surpluses, which are now only fond memories. Having a 12-member commission provides a large customer base that benefits all members."

For more information about the Logan-Todd Regional Water Commission, e-mail Kelly at clay.kelly@Strand.com *or Larimore at* g.larimore@krwa.org.

NDWC and NETCSC Present Security Training

Small community water utilities face many of the same financial, technical, and managerial issues as larger cities. However, they encounter greater challenges in finding appropriate assistance. In the past two years, the threat of terrorism has made us more aware of the importance of security and emergency response planning.

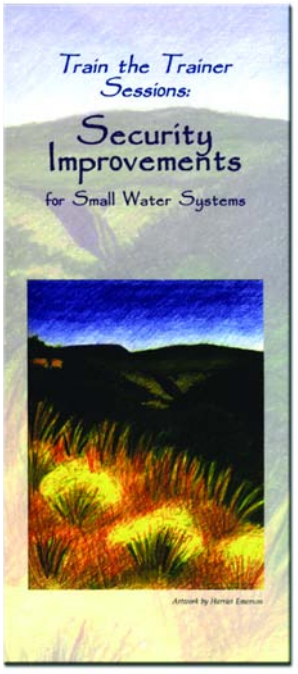
Last year's amendments to the Safe Drinking Water Act require that each drinking water system serving between 3,300 and 50,000 residents conduct a vunerability assessment (VA) by June 30, 2004, and complete an emergency response plan within six months of finishing their VA.

To help small water systems meet this challenge, the National Environmental Training Center for Small Communities (NETCSC) and the National Drinking Water Clearinghouse (NDWC) are partnering with national and local programs across the country to present a series of free train-the-trainer sessions: "Security Improvements for Small Water Systems."

Funded by the U.S. Environmental Protection Agency, these sessions will teach participants how to conduct vulnerability assessments, take steps to improve system security, and develop and update emergency response plans. Participants will also receive materials and training designed to help them educate others on these subjects. Class size for each location is limited.

Sessions will be presented in cooperation with St. Louis University School of Public Health-Center for Environmental Education and Training, National Tribal Environmental Council, National Environmental Health Association, California Department of Health Services, EPA Region VII, Florida Rural Water Association, New England Interstate Water Pollution Control Commission.

To register for small community training sessions, call Sandy Miller at (800) 624-8301, extension 5536, or e-mail smiller2@wvu.edu. *You may also download a registration form online at* www.netc.wvu.edu *and fax it to (304) 293-3161 Attn. Sandy Miller.*



Dates and Locations for Small Community Sessions

September 9–10	San Diego, California
September 17–18	Kansas City, Missouri
September 30–October 1	Anchorage, Alaska
October 15–16	Tallahassee, Florida
November 4–5	Manchester, New Hampshire

High School Students Solve Water Budget Woes

Rushford, Minnesota—like many rural towns across the country—has experienced trouble with excessive water loss and revenues that didn't meet expenses. Unlike many towns that have turned to an expensive consultant for answers, Rushford officials found a solution at their local high school.

Jeff Copley, Rushford's water and wastewater superintendent, provided the high school resource program with all the information they would need to devise a new water rate schedule. The class was divided into six groups. Each came up with a different solution.

While the class was working on the project, Copley informed the public about what the students were doing. After the project was completed and rates increased based on the students' recommendations, he heard not a single complaint from water customers.

"This was a great learning experience for these students," writes Jeff Dale, technical advisor with the Minnesota Rural Water Association (MRWA) in the Spring 2003 issue of their publication *Minnesota Rural Water Today*. "They are the next generation of councilpersons and mayors."

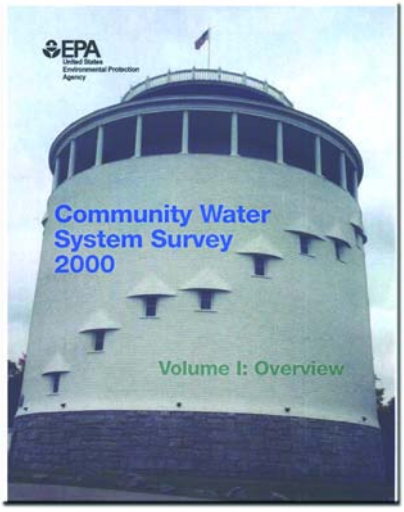
For more information about this project, call the MRWA at (218) 685-5197, write to 216 12th Avenue Southeast, Elbow Lake, MN, 56531 or visit their Web site at www.mrwa.com.

EPA Water System Survey Results

The results of the U.S. Environmental Protection Agency's (EPA) *Community Water System Survey 2000* have been published. The report found "an increase in the percentage of systems that treat their water and an overall improvement in water system financial performance." Other findings include:

- The percentage of systems operating at a loss declined for most size categories between 1995 and 2000.
- The percentage of systems providing treatment rose between 1976 and 2000.
- While the total number of community water systems increased between 1995 and 2000, the number of small systems declined. The number of systems serving populations of 100 or fewer declined by eight percent. The number of systems serving more than 3,300 people, on the other hand, increased by 20 percent.
- While systems continue to make substantial capital investments to fund water quality improvements (totaling more than $50 billion over the past five years), investment in treatment accounts for only 22 percent of systems' total capital investments. The largest share of investment went toward distribution and transmission (47 percent). Storage capacity accounted for an additional 12 percent of the total investment.

EPA conducted the *Community Water System Survey 2000* to "obtain data to support its development and evaluation of drinking water regulations." A total of more than 1,800 systems, ranging from very small to very large, were selected for inclusion in the survey. It is the fifth such endeavor, with others collected in 1976, 1982, 1986, and 1995.



Copies of the report are available online at www.epa.gov/OGWDW/cwssvr.html. *You may order a printed copy from EPA's Water Resource Center. Call them toll free at (800) 832-7828 or send an e-mail to* center.water-resource@epa.gov *or write to Water Resource Center (RC-4100), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue NW, Washington, D.C., 20460. Ask for document EPA 815-R-02-005A.*

Featured Products

To order, call the National Drinking Water Clearinghouse at **(800) 624-8301** or **(304) 293-4191**. You also may send an e-mail to *ndwc_orders@mail.nesc.wvu.edu*.

Community Involvement in Drinking Water Source Assessments

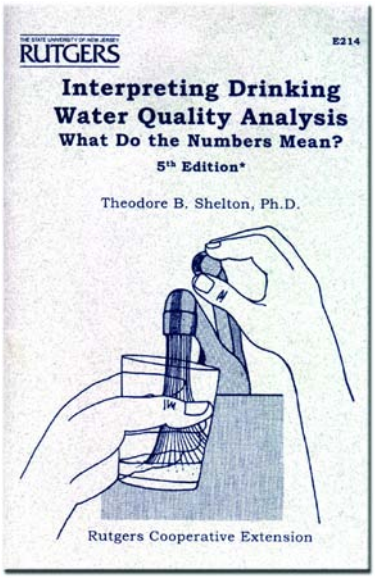
By working with their state's source water protection program, community groups can help identify potential threats to their drinking water. They can also help local officials develop and implement a plan of action to prevent water quality problems. This fact sheet explains the four steps of source water assessments and how communities can participate in the process. It also describes how communities can use assessment information to protect local water sources.
Item #DWFSGN53

Preventive Maintenance Tasks for Tribal Drinking Water Systems

Created like an old-fashioned recipe box, this handy toolkit helps document activities related to maintaining drinking water systems. A guide book outlines daily, weekly, and monthly tasks, and 3x5 cards hold the corresponding data. The kit allows changes and additions depending on a system's treatment method and water supply. Additional sources information and contacts are provided. Note: the kit does not take the place of a complete operation and maintenance manual.
Item #DWPKOM24

Interpreting Drinking Water Quality Analysis What Do the Numbers Mean?

Drinking water test results may be difficult to understand. This booklet clarifies test results by defining terms and standards used in the analysis of both public and nonpublic water supplies (home wells). Created primarily for homeowners (but suitable for health departments, environmental organizations, and other interested parties), the book also describes what tests are needed, where to have water tested, and how to treat the water when problems arise.
Item #DWBLPE112



NDWC Offers FREE Sanitary Survey Course Prep CD

Once again, the Montana Water Center (MWC) gives water system personnel a fun and informative training CD—the Sanitary Survey Fundamentals Prep Course—and the **National Drinking Water Clearinghouse** (NDWC) is a primary distributor.

Sanitary Sam, the CD's host, leads field staff through the procedures of inspecting and evaluating small water systems through interactive animation, games, narration, and video.

Course basics take about two hours to complete, preparing inspectors-to-be for the fast-paced sanitary survey workshops.

Call the NDWC at (800) 624-8301 and ask for item **#DWCDTR19**. Maximum orders of 20 CDs can be requested by those who provide the 2-day or 3.5-day sanitary survey workshops.

NDWC Products List

Item Number Breakdown

First two characters of item number: (Major Product Category)

DW	Drinking Water
FD	Finance Drinking Water

Second two characters of item number: (Document Type)

BK	Book, greater than 50 pages
BL	Booklet, less than 50 pages
BR	Brochure
CD	Compact Disk/ROM
FS	Fact Sheet
PK	Packet
PS	Poster
QU	Quarterly
SW	Software
VT	Video Tape

Third two characters of item number: (Content Type)

DM	Design Manual
FN	Finance
GN	General Information
MG	Management
NL	Newsletter
OM	Operation and Maintenance
PE	Public Education
PP	Public-Private Partnerships (P3)
RE	Research
RG	Regulations
TR	Training

Last two characters of item number:

Uniquely identifies product within major category

Products recently added to the list are highlighted.

All of the products listed are free!

Quantities are limited to one each per order.
If bulk copies are needed, please call for availability.

To order these free products, please use the product **order form on page 50** or call the National Drinking Water Clearinghouse at (800) 624-8301 or (304) 293-4191. You also may send an e-mail to *ndwc_orders@mail.nesc.wvu.edu*.

Design

DWBKDM16	Improved Protection of Water Resources from Long-Term and Cumulative Pollution
DWBKDM14	Manual for the Certification of Laboratories Analyzing Drinking Water; Criteria and Procedures Quality Assurance: Fourth Edition
DWBKDM06	Manual of Individual and Non-Public Water Supply Systems
DWBKDM05	Manual of Small Public Water Supply Systems
DWBKDM01	Manual of Water Well Construction Practices
DWBKDM12	Radionuclide Removal for Small Public Water Systems
DWBLDM02	Rainwater Cisterns: Design, Construciton, and Water Treatment
DWBKDM08	Regionalization Options for Small Water Systems

Finance

DWBLFN12	Action Guide for Source Water Funding: Small Town and Rural County Strategies for Protecting Critical Water Supplies
FDBKFN12	Alternative Financing Mechanisms for Environmental Programs
DWBKFN08	Alternative Funding Study: Water Quality Fees and Debt Financing Issues
FDVTFN18	Building Support for Increasing User Fees
DWBKFN30	Catalog of Federal Funding Sources for Watershed Protection
DWBKFN15	Catalog of Financial Support Sources for U.S. - Mexico Border Water Infrastucture
DWBKFN09	Drinking Water Infrastructure Needs Survey: First Report to Congress
DWBKFN33	Drinking Water Infrastructure Needs Survey: Second Report to Congress
FDBKFN34	The Drinking Water State Revolving Fund: Financing America's Drinking Water—A Report of Progress
DWBKFN31	Drinking Water State Revolving Fund Program Guidelines

DWBKFN14	Financial Accounting Guide for Small Water Utilities
DWBKFN05	Financing Models for Environmental Protection: Helping Communities Meet Their Environmental Goals
DWBLFN38	Guide to Using EPA's Automated Clearing House for the Drinking Water State Revolving Fund Program
DWBLFN07	Innovative Options for Financing Nongovernmental Public Water Supplies' Needs
DWFSFN35	Partners in Healthy Drinking Water Grants
DWSWFN01	PAWATER Users Manual: Financial Planning Model New, Small Community Water Systems (Version 2.2)
DWFSFN37	Protecting Drinking Water with the Clean Water State Revolving Fund
FDBLFN15	Road to Financing: Assessing and Improving Your Community's Creditworthiness
DWBKOM08	Small Water System Byproducts Treatment and Disposal Cost Document
DWBKDM19	Standardized Costs for Water Supply Distribution Systems: Complete EPA Report
FDBLFN14	State and Local Government Guide to Environmental Program Funding Alternatives
DWFSFN32	Using DWSRF Funds to Comply with the New Arsenic Rule
FDBLFN13	Utility Manager's Guide to Water and Wastewater Budgeting
FDBLFN03	Water and Wastewater Manager's Guide for Staying Financially Healthy

General Information

DWVTPE25	Careers in Water Quality
DWVTGN20	Clean Ground Water: Virginia's Endangered Inheritance
DWBKPE80	Clean Water Action Plan: Restoring and Protecting America's Waters
DWFSGN53	Community Involvement in Drinking Water Source Assessments
DWBKGN28	Designing a Water Conservation Program: An Annotated Bibliography of Source Materials
DWCDGN50	Drinking Water. Know What's In It For You.
DWPSGN49	Drinking Water. Pour Over the Facts.
DWBLGN24	Drinking Water Glossary: A Dictionary of Technical and Legal Terms Related to Drinking Water
DWFSGN47	Drinking Water Treatment
DWFSGN44	A Guide to Home Water Treatment
DWFSGN52	The History of Drinking Water Treatment
DWBKGN06	Improving the Viability of Existing Small Drinking Water Systems
DWFSGN46	Iron in Drinking Water
DWBRGN02	Lead Ban: Preventing the Use of Lead in Public Water Systems and Plumbing Used for Drinking Water
DWBLGN19	Lead in Drinking Water: An Annotated List of Publications
DWBKGN48	National Water Quality Inventory: 1998 Report to Congress—Ground Water and Drinking Water Chapters
DWBLGN43	Nutrient Management to Protect Water Quality
DWBKGN36	Outreach Resource Guide 2002
DWBLGN41	Providing Solutions for a Better Tomorrow: A Progress Report on U.S. EPA's Drinking Water Treatment Technology Demonstrations in Ecuador, Mexico and China
FDBKPP03	Public-Private Partnerships for Environmental Facilities: A Self-Help Guide for Local Governments
DWBRGN03	Public Water Systems: Providing Our Nation's Drinking Water
DWBLGN55	The Quality of Our Nation's Waters—A Summary of the National Water Quality Inventory: 1998 Report to Congress
DWFSGN51	Safe Drinking Water Information in Envirofacts
DWBKRE03	Summary Report: Small Community Water and Wastewater Treatment
DWBKGN20	Technical & Economic Capacity of States & Public Water Systems To Implement Drinking Water Regulations
DWBLRE02	USDA Rural Utilities Service Water 2000: A Plan for Action
DWBRGN45	Using Water Wisely in the Home
DWBLGN35	Water 2000 Information Package
DWFSGN54	Water Facts
DWBLGN17	Water Quality Self-Help Checklist

Management

DWBKMG22	Consolidated Water Rates: Issues and Practices in Single-Tariff Pricing
DWBKRG56	Disinfection Profiling and Benchmarking Guidance Manual
DWBKMG09	Drinking Water Handbook for Public Officials
DWBLMG20	Ensuring Safe Drinking Water for Tribes
DWBKMG14	Environmental Planning for Small Communities: A Guide for Local Decision Makers
DWBKRG54	Water Conservation Plan Guidelines
DWBLMG26	Handbook for Capacity Development: Developing Water System Capacity Under the Safe Drinking Water Act as Amended in 1996
DWBLMG12	Helping Small Systems Comply With The Safe Drinking Water Act: The Role of Restructuring
DWBKMG21	Information for States on Implementing the Capacity Development Provisions of the Safe Drinking Water Act Amendments of 1996
DWBLMG32	Institutional Solutions to Drinking Water Problems: Maine Case Studies
DWBLMG31	National Characteristics of Drinking Water Systems Serving Populations Under 10,000
DWBLPE83	NDWC Consumer Confidence Report
DWBKMG30	Optimizing Water Treatment Plant Performance with the Composite Correction Program
DWBLMG27	An Owner's/Operator's Handbook for Safe Drinking Water For Transient Noncommunity Public Drinking Water Systems
DWBKMG15	Practical Personnel Management for Small Systems
DWBKMG19	Preparing Your Drinking Water Consumer Confidence Report: Guidance for Water Suppliers
DWBLMG33	Protecting Sources of Drinking Water: Selected Case Studies in Watershed Management
DWBKMG36	Protocol for Conducting Environmental Compliance Audits for Public Water Systems Under the Safe Drinking Water Act
DWBLPE98	Risky Waste Disposal Practices Can Cost You Plenty: A Manager's Guide to Protecting Community Drinking Water
DWBLMG34	State FOIA Laws: A guide to Protecting Sensitive Water Security Information
DWPKMG29	Staying Ahead of the Curve: How well do you know your water system?
DWBLMG01	Self-Assessment for Small, Privately Owned Water Systems
DWPKTR01	Self-Evaluation Guide for Decision Makers of Small Community Water Systems
DWBLTR14	Small Systems Guide to Risk Management and Safety
DWBKMG25	State Programs to Ensure Demonstration of Technical, Managerial, and Financial Capacity of New Water Systems
DWBKMG28	State Strategies to Assist Public Water Systems in Acquiring and Maintaining Technical, Managerial, and Financial Capacity: A Comprehensive Summary of State Responses to Section 1420(c) of the Safe Drinking Water Act
DWBLPE75	Strategies for Effective Public Involvement: Drinking Water Source Assessment and Protection
DWBKMG05	Water Board Bible: The Handbook of Modern Water Utility Management

DWBLMG03 Water System Self-Assessment for Homeowners' Associations

DWBLMG02 Water System Self-Assessment for Mobile Home Parks

NDWC Publications

DWQUNL01 *OnTap*, Volume 1, Issue 1; Spring 2001

DWQUNL02 *OnTap*, Volume 1, Issue 2; Summer 2001

DWQUNL03 *OnTap*, Volume 1, Issue 3; Fall 2001

DWQUNL04 *OnTap*, Volume 1, Issue 4; Winter 2002

DWQUNL05 *OnTap*, Volume 2, Issue 1; Spring 2002

DWQUNL06 *OnTap*, Volume 2, Issue 2; Summer 2002

DWQUNL07 *OnTap*, Volume 2, Issue 3; Fall 2002

DWQUNL08 *OnTap*, Volume 2, Issue 4; Winter 2003

DWQUNL09 *OnTap*, Volume 3, Issue 1; Spring 2003

Operation and Maintenance

DWBKDM23 Alternative Disinfectants and Oxidants Guidance Manual

DWBKOM17 Arsenic Removal from Drinking Water by Coagulation/Filtration and Lime Softening Plants

DWBKOM12 Arsenic Removal from Drinking Water by Ion Exchange and Activated Alumina Plants

DWBKRE23 Arsenic Removal from Drinking Water by Iron Removal Plants

DWBKOM03 Control of Biofilm Growth in Drinking Water Distribution Systems

DWBKOM16 Controlling Disinfection By-Products and Microbial Contaminants in Drinking Water

DWBLRE01 Impact of Pipe Coatings on Drinking Water Quality

DWFSOM10 Interim Enhanced Surface Water Treatment Rule: A Quick Reference Guide

DWSWTR16 Leak Audit Software for Water Utilities to Quantify Distribution System Water Losses

DWBLOM22 An Operator's Handbook for Safe Drinking Water For Other Than Municipal and Nontransient Noncommunity Water Systems

DWBKOM09 Optimizing Water Treatment Plant Performance Using the Composite Correction Program: 1998 Edition

DWBLOM13 Oxidation of Arsenic (III) by Aeration and Storage

DWPKOM24 Preventive Maintenance Tasks for Tribal Drinking Water Systems

DWFSOM19 Safety Tips: Hazard Communications

DWBKRE11 Control of Lead and Copper in Drinking Water

DWBLOM05 Shock Chlorination of Wells and Springs

DWFSOM11 Stage 1 Disinfectants and Disinfection Byproducts Rule: A Quick Reference Guide

DWFSOM15 Tech Brief: Reservoirs, Towers, and Tanks–Drinking Water Storage Facilities

DWFSOM20 Tech Brief: System Control and Data Acquisition (SCADA)

DWFSOM21 Tech Brief: Valves

DWFSOM27 Tech Brief: Water Hammer

DWFSOM25 Tech Brief: Water Quality in Distribution Systems

DWBKOM26 Technologies and Costs for the Removal of Radon From Drinking Water: Public Comment Draft

DWBKOM18 Treatment of Arsenic Residuals from Drinking Water Removal Processes

DWCDOM23 Troubleshooting Guide for Small Ground Water Systems with Hypochlorination

DWBKTR15 Water Audit and Leak Detection Guidebook: Water Conservation Guidebook No. 5

Public Education

DWFSPE60 21 Water Conservation Measures for Everybody

DWBLPE134 The Adventures of Drinking Water: A Coloring Book for Grades K-2

DWBRPE124 Answers to your Questions about Groundwater

DWBLPE130 Answers to Your Questions on Well Abandonment

DWPKPE78 Bacteria and Water Wells

DWBLPE129 Better Homes & Groundwater

DWBRPE04 Bottled Water: Helpful Facts and Information

DWBRPE104 Children and Drinking Water Standards

DWBLPE32 Citizen Monitoring: Recommendations to Household Well Users

DWBLPE37 Citizen's Guide to Ground-Water Protection

DWBRPE103 Class V Injection Wells and Your Drinking Water

DWBKPE53 Cleaner Water Through Conservation

DWBLPE136 Consider the Source: A Pocket Guide to Protecting Your Drinking Water

DWBLPE117 Contaminants and Drinking-Water Sources in 2001: Recent Findings of the U.S. Geological Survey

DWFSPE30 Copper, Drinking Water, and You

DWVTPE69 Creator's Gift: Good Water

DWBLGN21 Cryptosporidium

DWBRPE28 De sus Ninos del Plomo en el Agua Potable (Protecting Your Kids from Lead in Drinking Water)

DWPKPE39 Drinking Water Activities for Teachers and Students

DWBLPE123 Drinking Water and Health: What you need to know!

DWBLPE05 Drinking Water from Household Wells

DWFSPE131 Drinking Water Monitoring, Compliance, and Enforcement

DWFSPE122 Drinking Water: Past, Present, and Future

DWFSPE118 Drinking Water Quality in Indian Country: Protecting Your Sources

DWFSPE120 Drinking Water Quality Reports—Your Right to Know

DWFSPE57 Emergency Disinfection of Water Supplies

DWBLPE96 Fact Sheet on Home Drinking Water Treatment

DWBLPE74 Fact Sheet: Water Conservation Measures

DWPKPE49 Give Water a Hand Action Guide

DWBKPE115 Ground Water and Surface Water: A Single Resource

DWFSPE36 Ground Water Protection: A Citizen's Checklist

DWVTPE23 Ground Water Video Adventure

DWBRGN26 Groundwater Contamination & Your Septic System

DWPSPE40 Groundwater Protection Begins at Home

DWBRPE03 Home Water Treatment Units: Filtering Fact from Fiction

DWFSPE127 Home Water Treatment Using Activated Carbon

DWFSPE46 Household Hazardous Waste: Where it Goes in Monongalia County

DWFSPE68 How to Protect Your Well

DWBLPE77 Improving Home Water Quality

DWBLPE112 Interpreting Drinking Water Quality Analysis: What Do the Numbers Mean?

DWBRPE91 Is Your Community's Drinking Water at Risk?

DWBLPE29 Is Your Drinking Water Safe?

DWBLPE113 It's YOUR Drinking Water: Get to know it and protect it!

DWPSPE10 Lead and Copper Rule Decision Diagram

DWBLPE06 Lead in School Drinking Water

DWBLPE16 Lead in Your Drinking Water: Actions You Can Take To Reduce Lead in Drinking Water

DWBRRE14 Lead Leaching from Submersible Well Pumps

DWFSPE126 Nitrate–A Drinking Water Concern

DWBLPE86 Pesticides in Drinking Water Wells

DWBKPE135 Plain Talk About Drinking Water: Questions and Answers About the Water You Drink

DWBKPE79 Private Drinking Water Supplies: Quality, Testing, and Options for Problem Waters

DWBLPE121 Protect Our Health From Source to Tap: National Drinking Water Program Highlights

DWBKPE66 Protect Your Ground Water: Educating for Action

DWFSRG57 Protecting Drinking Water Sources

DWBLPE133 Protecting Drinking Water Through Underground Injection Control

DWBLPE33 Protecting Local Ground Water Supplies Through Wellhead Protection

DWBLGN07	Protecting Our Drinking Water From Microbes
DWPSPE125	Safe Drinking Water Act: Protecting America's Public Health
DWPSPE132	Safe Drinking Water Act: Underground Injection Control (UIC) Program—Protecting Public Health and Drinking Water Resources
DWPKPE116	Safewater: Tap Into It!
DWBLOM06	Safeguarding Wells and Springs from Bacterial Contamination
DWBLPE02	Science Demonstration Projects in Drinking Water (Grades K–12)
DWBLFN13	Source Water 2000: Funding and Assistance Programs To Protect Small Town and Rural Drinking Water
DWBLPE89	Springs: Early Warning Systems for Our Groundwater
DWBLGN39	SPRINGS: Their Origin, Development, and Protection
DWBLPE38	Student Activity Sheets for Drinking Water Projects
DWBLRE17	Summary Results of EPA's National Survey of Pesticides in Drinking Water Wells
DWVTPE22	Surface Water Video
DWBKMG18	Tapping Your Own Resources
DWFSPE54	Update on Lead Leaching From Submersible Well Pumps and Private Drinking Water Systems
DWBRGN04	Volatile Organic Chemicals: Are VOCs in Your Drinking Water?
DWBLPE105	Water and Me
DWBLPE109	Water Around Us: The Hydrologic Cycle and Conservation
DWBLPE51	Water in Your Hands
DWBKPE92	Water on Tap: A Consumer's Guide to the Nation's Drinking Water
DWBLPE90	Water Protection at Home: What You Can Do To Prevent Water Pollution in Your Community
DWBLPE58	Water Testing
DWBLPE97	Water Testing Scams
DWBLPE119	Water Quality for Private Water Systems
DWBLPE94	Water Quality Improvements for Farmstead and Rural Home Water Systems
DWBLGN38	Well Abandonment
DWBRRE16	Wellhead Protection in Confined, Semi-Confined, Fractured, and Karst Aquifer Settings
DWBKMG06	Wellhead Protection: A Guide for Small Communities
DWFSPE128	You & Your Well
DWBRPE45	Your Home Could Contain Hazardous Waste: What You Need To Know

Regulations

DWBLRG64	25 Years of the Safe Drinking Water Act: History and Trends
DWBLRG76	25 Years of the Safe Drinking Water Act: Protecting Our Health from Source to Tap
DWFSRG69	Arsenic in Ground-Water Resources of the United States
DWBRRG70	Class II Injection Wells and Your Drinking Water
DWFSRG67	The Class V Rule
DWBLRG26	Consolidated Rule Summary for the Chemical Phases
DWBLRG52	Drinking Water Contaminant Candidate List
DWBLRG44	Drinking Water Regulations and Health Advisories
DWBKRG50	Drinking Water Standard Setting Question and Answer Primer
DWBKTR17	Enhanced Coagulation and Enhanced Percipitative Softening Guidance Manual
DWPKRG47	Safe Drinking Water Is in Our Hands
DWFSRG68	Filter Backwash Recycling Rule: A Quick Reference Guide
DWBLRG62	Final Drinking Water Public Notification Regulations
DWBKRG53	Guidance on Implementing the Capacity Development Provisions of the Safe Drinking Water Act Amendments of 1996
DWBKRG22	Lead and Copper Rule Guidance Manual
DWBKRG21	Lead In Drinking Water Regulation: Public Education Guidance
DWBKRG61	Microbial and Disinfection Byproduct Rules: Simultaneous Compliance Guidance Manual
DWBLRG12	Monitoring Guidance Document for the Lead & Copper Rule (Systems serving 3,301–10,000 people)
DWBLRG13	Monitoring Guidance Document for the Lead & Copper Rule (Systems serving 501–3,300 people)
DWBLRG14	Monitoring Guidance Document for the Lead & Copper Rule (Systems serving 101–500 people)
DWBLRG15	Monitoring Guidance Document for the Lead & Copper Rule (Systems serving less than 100 people)
DWPKRG38	National Primary Drinking Water Regulations (Drinking Water Contaminants): Inorganic Chemicals, Consumer Version
DWPKRG39	National Primary Drinking Water Regulations (Drinking Water Contaminants): Inorganic Chemicals, Technical Version
DWPKRG40	National Primary Drinking Water Regulations (Drinking Water Contaminants): Synthetic Organic Chemicals, Consumer Version
DWPKRG41	National Primary Drinking Water Regulations (Drinking Water Contaminants): Synthetic Organic Chemicals, Technical Version
DWPKRG42	National Primary Drinking Water Regulations (Drinking Water Contaminants): Volatile Organic Chemicals, Consumer Version
DWPKRG43	National Primary Drinking Water Regulations (Drinking Water Contaminants): Volatile Organic Chemicals, Technical Version
DWFSRG77	National Primary Drinking Water Standards
DWVTRG34	Nontransient Noncommunity Drinking Water: Requirements for Suppliers
DWFSRG60	Proposed Ground Water Rule: Questions and Answers
DWFSPE110	Public Notification Rule: A Quick Reference Guide
DWFSRG66	Radionuclides Rule: A Quick Reference Guide
DWPKRG17	Regulations Fact Sheet
DWBLRG58	Regulations on the Disposal of Arsenic Residuals from Drinking Water Treatment Plants
DWBKRG80	Research Plan for Arsenic in Drinking Water
DWPKRG25	Safe Drinking Water Act and 1996 Amendments
DWBLRG30	Safe Drinking Water: Health/Safety Requirements and Resulting Costs
DWPKRG65	A Small Systems Guide to the Total Coliform Rule
DWBLRG63	Small System Regulatory Requirements Under the Safe Drinking Water Act as Amended 1996
DWBKRG46	State Source Water Assessment and Protection Programs Guidance (Final Guidance)
DWFSRG18	Status of DBP Regulatory Negotiation
DWFSRG73	Technical Fact Sheet: Final Rule for Arsenic in Drinking Water
DWFSRG59	Technical Fact Sheet: Proposed Ground Water Rule
DWBLRG79	Unregulated Contaminant Monitoring Regulation Guidance for Operators of Public Water Systems Serving 10,000 or Fewer People
DWFSRG78	Using DWSRF Funds to Comply with the Radionuclides Rule
DWFSRG75	Using DWSRF Funds to Comply with the Stage 1 Disinfectants and Disinfection Byproducts Rule
DWBLRG04	Your Drinking Water: From Source to Tap, EPA Regulations and Guidance

Research

DWBLRE06	Benefits of Water and Wastewater Infrastructure
DWBKRE29	Drinking Water and Ground Water Data Within the 305(b) Program
DWBKRE26	Drinking Water Progress Review Workshop for the 1995-1998 Science to Achieve Results (STAR) Grants

DWBLRE20	Drinking Water Treatment for Small Communities: A Focus on EPAs Research
DWBLRE24	Estimating the Likelihood of MTBE Occurrence in Drinking Water Supplied by Ground-Water Sources in the Northeast and Mid-Atlantic Regions of the United States
DWBKRE27	A Field Study to Compare Performance of Stainless Steel Research Monitoring Wells with Existing On-Farm Drinking Water Wells in Measuring Pesticide and Nitrate Concentrations
DWBLMG17	Initial Summary of Current State Capacity Development Activities
DWBKRE21	Laboratory Study on the Oxidation of Arsenic III to Arsenic V
DWBKRE25	Methods for the Determination of Organic and Inorganic Compounds in Drinking Water: Volume 1
DWBLRE18	National Pesticide Survey: Update and Summary of Phase II Results
DWBLRE19	Occurrence and Distribution of Methyl tert-Butyl Ether and Other Volatile Organic Compounds in Drinking Water in the Northeast and Mid-Atlantic Region of the United States, 1993-98
DWBLRE30	Occurrence of Selected Radionuclides in Ground Water Used for Drinking Water in the United States: A Reconnaissance Survey, 1998
DWBLRE22	Occurrence and Status of Volatile Organic Compounds in Ground Water from Rural, Untreated, Self-Supplied Domestic Wells in the United States, 1986-99
DWBKRG49	Providing Safe Drinking Water in America: 1996 National Public Water Systems Compliance Report and Update on Implementation of the 1996 Safe Drinking Water Act Amendments
DWBLRE07	Radium Removal from Water by Manganese Dioxide Adsorption and Diatomaceous Earth Filtration
DWBKRE28	Safe Drinking Water Act, Section 1429 Ground Water Report to Congress
DWBLRE08	Strengthening the Safety of Our Drinking Water: Report on Progress & Challenges & Agenda for Action
DWBKRE15	Ultraviolet Light Disinfection Technology in Drinking Water Application—An Overview

Technologies

DWBKDM13	Corrosion in Potable Water Supplies
DWBKDM15	Corrosion Manual for Internal Corrosion of Water Distribution Systems
DWBLDM03	Cross-Connection Control Manual
DWBKGN09	Environmental Pollution Control Alternatives: Drinking Water Treatment for Small Communities
DWBKDM07	Nitrate Removal for Small Public Water Sytsems
DWFSGN29	RESULTS 3.0 Fact Sheet
DWBLRG48	Small System Compliance Technology List for the Surface Water Treatment Rule
DWPKPE71	Tech Brief Package
DWBLPE52	Tech Brief: Corrosion Control
DWFSPE108	Tech Brief: Diatomaceous Earth Filtration for Drinking Water
DWBLPE47	Tech Brief: Disinfection
DWBLPE50	Tech Brief: Filtration
DWBLPE56	Tech Brief: Ion Exchange and Demineralization
DWBLPE70	Tech Brief: Iron and Manganese Removal
DWFSPE102	Tech Brief: Leak Detection and Water Loss Control
DWBLPE67	Tech Brief: Lime Softening
DWBLPE81	Tech Brief: Membrane Filtration
DWBLPE59	Tech Brief: Organic Removal
DWBLPE84	Tech Brief: Ozone
DWBLPE63	Tech Brief: Package Plants
DWBLPE93	Tech Brife: Radionuclides
DWBLPE99	Tech Brief: Slow Sand FIltration
DWPSPE82	Tech Brief: Treatment Technologies for Small Drinking Water Systems
DWBLPE101	Tech Brief: Ultraviolet Disinfection
DWBLPE65	Tech Brief: Water Treatment Plant Residuals Management
DWBKDM04	Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities
DWBLGN11	USEPA Fact Sheets on POU/POE Units and Home Water Testing

Training Guides

DWBKTR12	Directory of Drinking Water Training Materials
DWBKPE95	How to Conduct an Inventory in Your Wellhead Protection Area
DWBLTR13	Methods for Assessing Small Water System Capability: A Review of Current Techniques and Approaches
DWBLOM04	Training Guide: Introduction to Water Loss and Leak Detection
DWBLTR05	Water Rates: Information for Decision Makers
DWCDTR18	Operator Basics Training Series: Ground Water Systems-National Version 2003

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To place an order, call the NDWC at (800) 624-8301 or (304) 293-4191, or **use the order form on page 50** and fax your request to (304) 293-3161. You also may send e-mail to *ndwc_orders@mail.nesc.wvu.edu*. Be prepared to give the item number and title of the product you wish to order.

The *NDWC's Products Catalog* provides descriptions of many products. The guide may be downloaded via the NDWC's Web site at *www.ndwc.wvu.edu*.

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What is NESC?

The National Environmental Services Center (NESC)—pronounced "nessie"—specializes in providing technical assistance and information about drinking water, wastewater, and environmental training to communities with fewer than 10,000 residents. You may be familiar with our individual programs, each well established as a national leader in its areas of expertise.

Located in Morgantown, West Virginia, NESC is based at one of the nation's major doctoral-granting research institutions, West Virginia University.

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National Small Flows Clearinghouse (NSFC), a national information and assistance program, helps small communities identify appropriate wastewater technologies. NSFC offers more than 400 free or low-cost products, including posters and brochures; *Small Flows Quarterly* magazine with nearly 45,000 subscribers; and *Pipeline,* a newsletter for the public with approximately 20,000 subscribers. NSFC maintains five databases with bibliographic, manufacturers and consultants, state regulations, health department, and facilities information. NSFC annually hosts a conference for state regulators. Visit their Web site at *www.nsfc.wvu.edu.*

National Drinking Water Clearinghouse (NDWC) services include a toll-free technical assistance hotline; *On Tap*, a quarterly magazine that combines the NDWC's former newsletters *On Tap* and *Water Sense* into a single publication with approximately 23,000 subscribers; more than 300 free products; a literature database, and RESULTS [Registry of Equipment Suppliers of Treatment Technologies for Small Systems] database. The Web address is *www.ndwc.wvu.edu.*

National Environmental Training Center for Small Communities (NETCSC) services include *E-Train*, a quarterly newsletter with approximately 7,000 subscribers; five databases, providing information about environmental training activities; and many free and low-cost products, including the *Environmental Training Resources Catalog*. NETCSC helped develop 30 training curricula and hosts an annual, national environmental training institute. Find them at *www.netc.wvu.edu.*

National Onsite Demonstration Program, (NODP) encourages the use of alternative, decentralized wastewater treatment technologies in small and rural communities. NODP helps communities fund, install, monitor, and manage model wastewater treatment systems as cost-effective alternatives to centralized sewage systems. Visit their Web site at *www.nodp.wvu.edu.*

Fun Time Puzzle Solutions

CROSSWORD

S	C	A	R			P	V	C			D	I	C	E
N	U	D	E		W	O	O	L		S	U	D	A	N
O	B	I	S		I	O	T	A		U	S	E	R	S
W	A	T	E	R	S	H	E	D		S	T	A	R	
			L	O	E	S	S		R	I	B			
W	A	L	L	A	S			T	H	E	O	R	E	M
A	L	I		S	T	U	D	I	O		W	I	N	O
T	I	G	H	T		S	O	L		O	L	D	E	N
E	C	H	O		W	E	S	L	E	Y		G	M	T
R	E	T	R	E	A	D			R	E	D	E	Y	E
			M	R	S		M	U	R	R	E			
	S	T	O	A		D	I	S	A	S	T	E	R	S
R	A	I	N	S		E	M	I	T		A	L	A	N
U	L	N	A	E		L	E	N	A		C	L	I	O
S	E	A	L			L	O	G			H	A	N	G

WORD SEARCH

+	+	+	+	+	+	+	+	+	+	+	+	+	+	M
E	C	N	E	R	E	F	N	O	C	O	E	D	I	V
N	T	+	O	+	+	+	P	+	+	L	+	C	T	R
O	+	A	+	I	+	+	+	U	B	+	R	+	R	U
I	+	+	N	+	T	R	+	A	M	O	+	B	E	L
T	+	+	+	G	E	A	N	+	F	P	A	+	A	E
U	E	+	+	T	E	I	D	I	+	C	+	+	T	M
B	+	K	A	+	A	R	L	I	K	+	+	+	M	E
I	+	W	A	T	+	T	I	W	L	+	+	+	E	T
R	+	+	S	T	R	+	A	N	+	O	+	+	N	S
T	+	U	+	A	N	S	+	+	E	+	S	+	T	Y
S	S	+	T	+	H	I	L	E	A	K	+	N	+	S
I	+	I	+	+	+	+	+	+	+	+	+	+	O	+
D	O	D	E	V	E	L	O	P	M	E	N	T	+	C
N	R	E	T	L	I	F	+	+	+	+	+	+	+	+

HMMM. . .

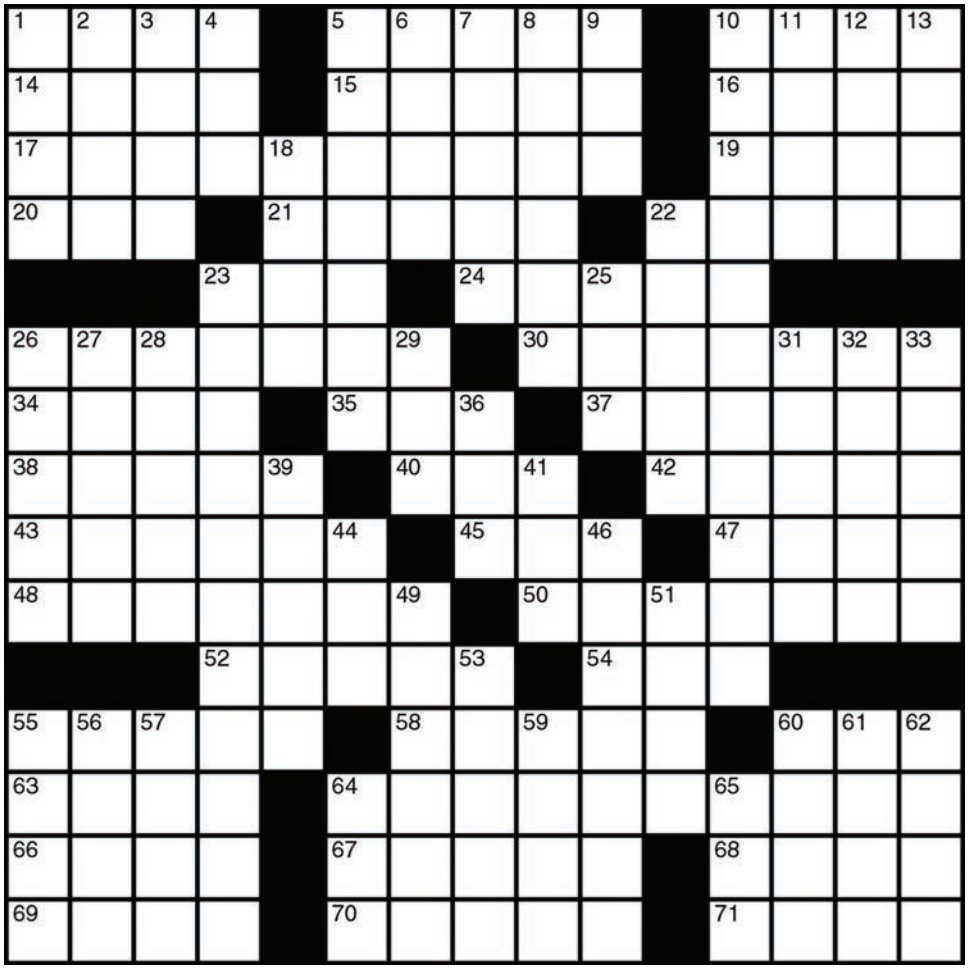
An anthropologist once asked a Hopi why so many of his people's songs were about rain. The Hopi replied that it was because water is so scarce. Is that why so many of your songs are about love?

Gregory McNamee in *Gila: The Life and Death of an American River*

Crossword

ACROSS

1. Bobbin
5. Necessity for life on Earth
10. Window part
14. Man or Wight
15. Actress Rene
16. Do ____ others
17. Absorb
19. Scottish island
20. Robert E. ___
21. Giant wrestler
22. Anesthetic
23. Excavate
24. Brown tinged with red
26. Connived
30. Token amount
34. Ukrainian capital
35. Pirate's liquor
37. Junior professor's goal
38. Runs an engine
40. Not solid or liquid
42. Overzealous
43. Laid-back
45. Europian blackbird
47. Nota ____
48. Error seeker (publications)
50. Fashionable London or New York neighborhood
52. Terror
54. Day before a big day
55. Formal dances
58. Burst of light
60. TV network
63. Desire
64. Pertaining to nourishment
66. Paradise
67. Reproductive structure
68. Smooth clothes
69. Gone
70. Sandwich cookies
71. *On Tap* publisher (abbr.)



Solution on page 51

Crossword by Mark Kemp-Rye.

DOWN

1. Iranian money
2. Actual being
3. Ultimatum word
4. Hawaian necklace
5. Old washing machine
6. ____ Lang Syne
7. Russian monarchs
8. Admiration
9. Fish eggs
10. *On Tap* cover story (with 23 down)
11. Egyptian symbol
12. Eyelid affliction
13. One doing gardening
18. Wound
22. Type of duck
23. (See 10 down)
25. Cooking vessel
26. Go too light on
27. Apple drink
28. Greeting
29. Excavated
31. Dices
32. What the kidneys send to the bladder
33. Tragic Greek heroine
36. Demented
39. Couches
41. Pouch
44. Old English letter that became "W"
46. On the other hand
49. One who pillages
51. Tied
53. Typical weather in a specific location
55. Expression of relief
56. Traveled on the bus
57. Not closed
59. Bullets (slang)
60. Queen or King
61. Above the eyes
62. *N____ ('90s boy band)
64. In the past
65. Rin ___ Tin

Word Search

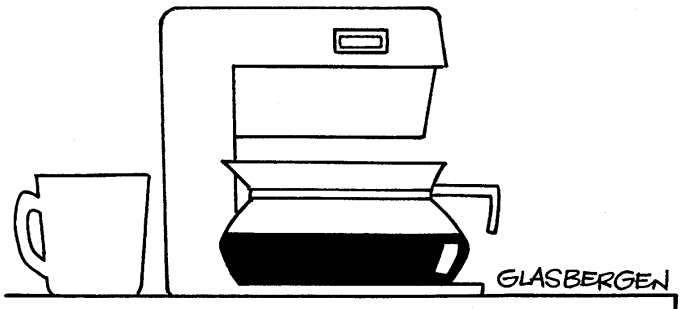
V X J K P D F C W G F I R O M
E C N E R E F N O C O E D I V
N T L O R V X P G Y L J C T R
O M A G I A H N U B T R T R U
I O O N I T R H A M O G B E L
T S P R G E A N Y F P A K A E
U E H K T E I D I P C H Q T M
B R K A G A R L I K H X K M E
I N W A T F T I W L B W M E T
R C H S T R X A N U O F I N S
T W U R A N S L I E U S G T Y
S S W T V H I L E A K L N G S
I E I E Y M U R T K C P H O Z
D O D E V E L O P M E N T C C
N R E T L I F V J T X I G E Z

Solution on page 51

Word Search by Mark Kemp-Rye.

Find the following words in the puzzle above.

BACKWASH
CONSOLIDATION
DEVELOPMENT
DISTRIBUTION
FILTER
INTAKE
LEAK
MICROFILTRATION
PUMP
RULE
SUSTAINABLE
SYSTEM
TANGERINE
TREATMENT
VIDEOCONFERENCE
WATER



Because of his ongoing ability to increase office productivity, the "Employee Of The Month" award again goes to Mr. Coffee.

QUOTES

Water, everywhere over the earth, flows to join together. A single natural law controls it. Each human is a member of a community and should work within it.

The I Ching

Conservation is a test. If we pass, we might get to keep the planet.

Marjory Stoneman Douglas (1890-1998)

WATER FACT

The wettest place in the U.S. is Mt. Waialeale, Hawaii, where it rains approximately 460 inches each year. Cherrapunji, India, where an average of 500 inches of rain falls during the six-month monsoon season, is considered the wettest place on Earth.

Sources: Scholastic Books and *www.extremescience.com*.

WATER TRIVIA

Which household appliance uses the most energy?

a) clothes washer
b) dishwasher
c) refrigerator
d) clothes dryer
e) water heater

According to "Drops and Watts: A Practical Guide for Conserving Water and Energy," water heaters are the biggest energy user in a typical home, followed by refrigerators, freezers, air conditioners, washers, dryers, dishwashers, portable heaters, and lights.

Sources: Legacy, Inc. and Partners in Environmental Education.

The Public Good

By **David Morris**
Vice President, Institute for Local Self-Reliance

At the birth of the American Republic, the word "private" had a sinister connotation. Derived from the Latin *privare*, meaning to reduce or tear apart, it described behavior that was independent of and often contrary to the public interest.

Today, "private" has become a positive, even a boosterish word. The term "private sector" has become synonymous with efficiency and innovation. It is the word "public" that now carries a shady undertone. The "public sector" has become a pejorative phrase, synonymous with bloat and unresponsiveness, even corruption. The phrase "public good" is viewed increasingly as an oxymoron.

It is remarkable that this linguistic and attitudinal love affair with the private has taken place during an era in which the costs to society of private malfeasance have far eclipsed the costs of public bumbling. Corruption in the private savings and loan, energy, and dot com sectors alone may have cost society as much as a trillion dollars.

Given the remarkably destructive recent record of the private sector, we may want to revisit our newfound antagonism to the public sector. When we do so we will discover that the public sector often delivers services at least as efficiently as the private sector. When privatization does lower costs, too often it does so simply by lowering wages and benefits, not by improving efficiency.

Consider electricity, the nation's third largest industrial sector. Nonprofit utilities, whether cooperatively or municipally owned, provide better service to their customer-owners than their absentee-owned, profit-oriented competitors. And they do so at lower prices.

The Defense Department is pushing to privatize approximately 1,600 utility systems located on military installations worldwide. That ideology, not economics, is driving this effort is clear from the process involved in privatizing the utilities at Robins Air Force base in Georgia.

In 2000, Robins took a detailed look at privatizing its electricity, sewage, and water systems and decided not to proceed. With a new administration in Washington, the effort is back on track. The man in charge of the effort, Colonel Lin Torchia, concedes, "We're not unhappy at all with the way our people are doing their jobs. This system is in very good shape. The base has made significant investment over the years. This is the best utility system I've seen in 25 years."

Privatization involves losing control. The churning of an increasingly globalized economy can make it difficult for communities to even know who owns their basic infrastructure. In 1992, New Orleans signed a contract with a company called Professional Services Group (PSG) to run its wastewater treatment plant. USFilter purchased that company. In 1999, USFilter was acquired by Vivendi, the parent company of PSG and its holding company Aqua Alliance.

Earlier this year, after a disastrous experience with privatization, Atlanta retook control of its water system even though many in the city thought that doing so could raise the price of water. Offering an interesting perspective on the public versus private debate, one Atlantan told the *New York Times*, "Is it possible to have private water work right? I'm sure it is. But if you have a political problem in your city, you can vote in a new administration. If you have a private company with a long-term contract, and they're the source of your problems, then it gets a lot more difficult."

One of the reasons it is so easy to condemn the public sector is that it's so, well, public. Government makes decisions in front of everyone. Even a cub reporter can easily uncover peccadilloes. The private sector, on the other hand, acts in secret. It is frightfully difficult to discover chicanery at privately owned Cargill; it is relatively straightforward to discover irregularities at the Minneapolis City Council.

In part we beat up on the public sector because we can. We can "throw da [public] bums out." We can even, if we choose (and we seem so to be choosing) shutter the public sector. But we can't throw the private bums out. Nor can we go to the polls and close down a private corporation, no matter what its level of venality.

The debate about the relative merits of the public and private sector is a healthy one. But a viable debate needs two sides. Where are those political leaders who will stand up and speak forcefully in favor of the public?

David Morris is co-founder and vice president of the Institute for Local Self Reliance, a non-profit research and educational organization providing technical assistance and information about environmentally sound economic development strategies. Learn more about their work at *www.newrules.org*.

Rainwater

Wherever water and wind reside
Waves die on shore then resurrect
In stronger forms to meet the same demise
The lake, a liquid mirror, growing restless
Gathers things once forgotten
And casts them upon itself
These thoughts roll over me on the shore
Of a waveless lake while one raincloud
Floats in the wrong direction

Distracted by memories that
shimmer and resemble
Trees, buildings and the crane that watched me
I try to remember that the secret is in
The dip between ripples, and the placid bands
That separate concentric, expanding
rings of wonder
Then one drop, and then another

I feel the water touch my lips
Slide down my throat
Revive my lungs
Unwrinkle leathered skin
After days of spitless swallowing
Like monsoons after deathly dry seasons
Water brings to life cells of earth and tissue
Planetary plasma from the universal donor

Breathing things and things appearing
not to breathe
Burst forth in wet ebullience
We are but minute suspensions
In this cosmic flask of water

Ken Haynes

Lake Monona in Moonlight

The lake celebrates
Its full moon by dressing up:
Black velvet, sequins.

Heather Dubrow

Photo by Julie Black

Safe Water

for ***You*** *and Your* ***Family***

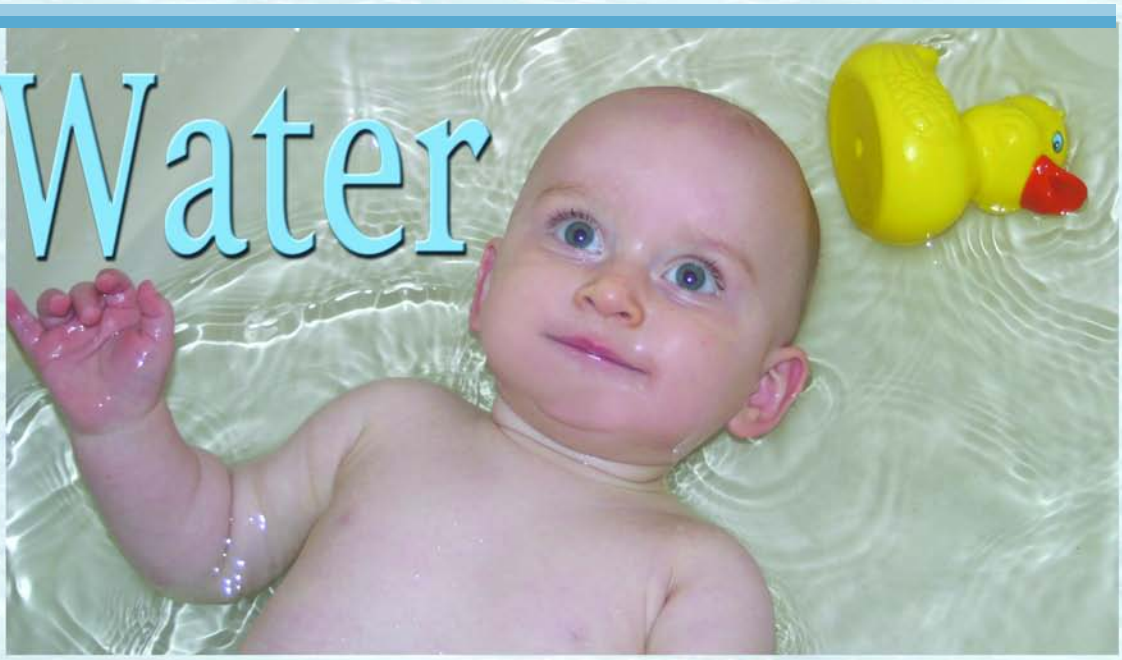


Photo of Kirk Black by Julie Black

Folks here at the National Drinking Water Clearinghouse (NDWC) want to make sure people in small towns and rural areas have the best drinking water possible, and we have information to help your community achieve that goal.

If you have questions about drinking water issues, look to us for answers. We provide a variety of free services, including a toll-free technical assistance hotline, more than 300 educational products, and *On Tap* magazine, available at your request. The NDWC also sponsors conferences, workshops, and seminars to bring our services to you in person.

Our staff is made up of engineering scientists, researchers, technical writers, and editors who locate and distribute information on subjects such as:

- water treatment technologies,
- source water conservation issues,
- operation and management strategies,
- regulation updates, and
- funding sources for community water treatment infrastructure.

The NDWC Website located at *www.ndwc.wvu.edu* is packed with information and links to other organizations that focus on drinking water. Online databases are accessible to the public also. An organizational database with over 300 drinking-water related groups is listed, and a general water information database offers nearly 2,000 water-related article topics.

Our RESULTS 3.0 database [Registry of Equipment Suppliers of Treatment Technologies for Small Systems] can be accessed by calling us and asking for technical assistance to help you locate water treatment technologies and systems that use them.

The technical assistance hotline can be reached Monday through Friday from 8 a.m.–5 p.m. Eastern Time.

Contact the NDWC today for a free information packet, to subscribe to *On Tap*, or to order any of our educational products.

We're eager to hear from you!

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Morgantown, WV 26506
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