Drinking Water News For America's Small Communities

On tap

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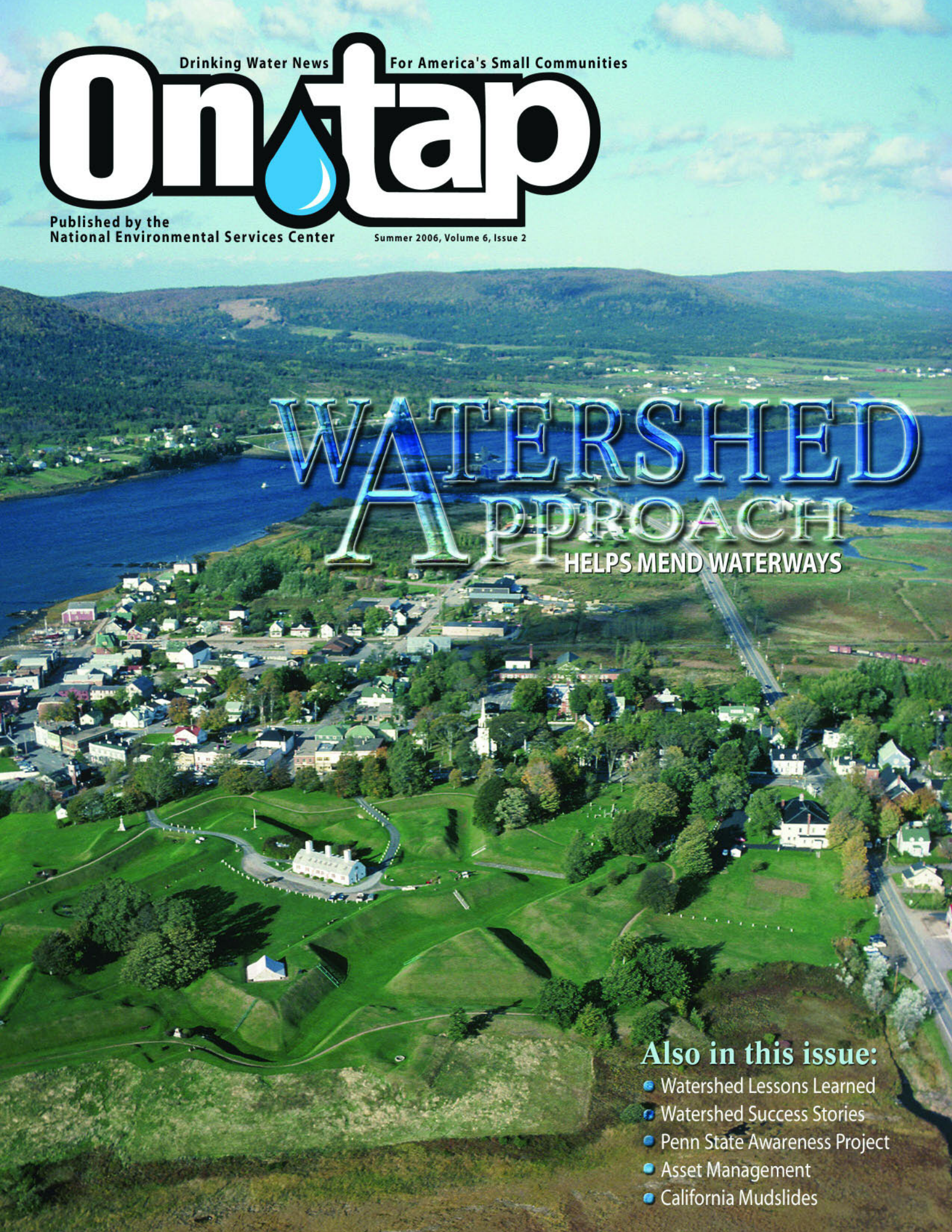
Summer 2006, Volume 6, Issue 2



WATERSHED APPROACH

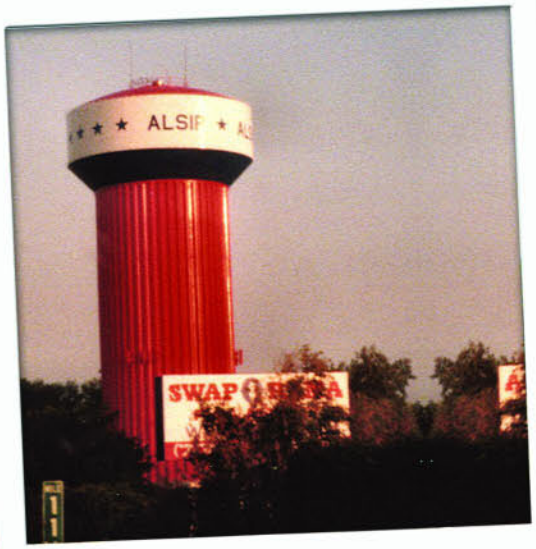
HELPS MEND WATERWAYS

Also in this issue:

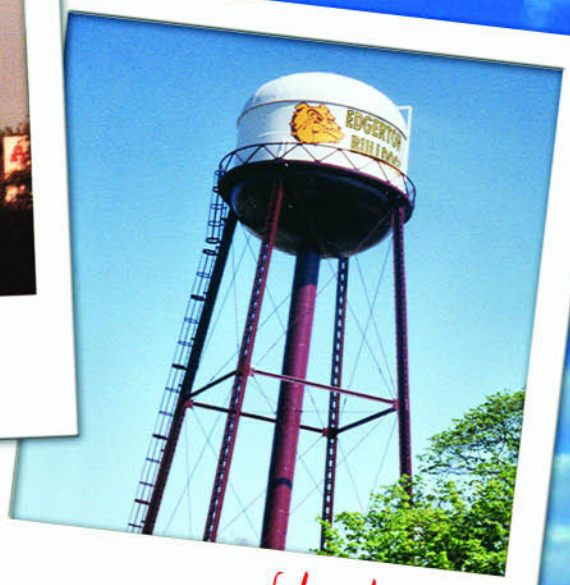
- Watershed Lessons Learned
- Watershed Success Stories
- Penn State Awareness Project
- Asset Management
- California Mudslides

TRUCKER MIKE

In two previous *On Tap* issues, we featured the work of Trucker Mike, a long-haul driver and photographer. We are pleased to report that he is still taking pictures of water towers. The photos on the inside covers of this *On Tap* are by Trucker Mike. View more of his work by logging on to his Web site at www.mikiemetric.cc/WaterTowers.html.



Alsip, IL



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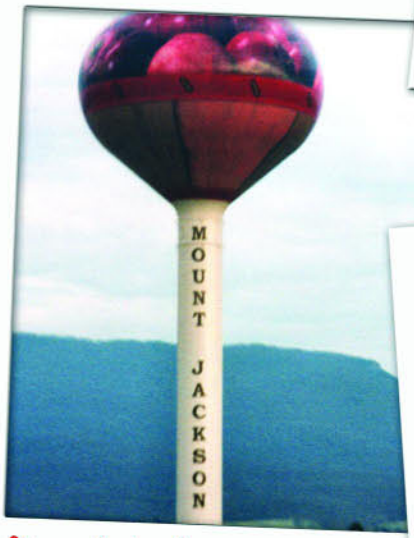
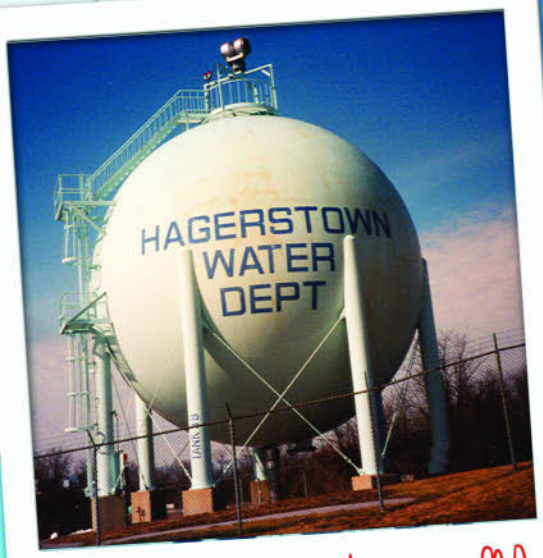


Mount Jackson, VA

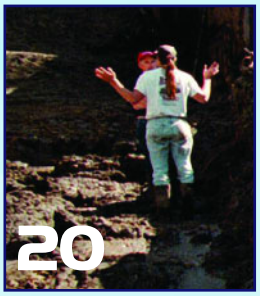


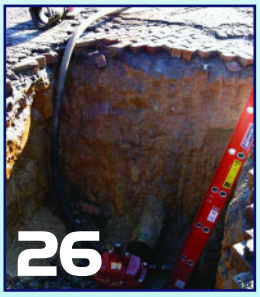
Hagerstown, MD

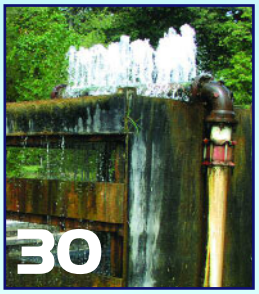
On tap MAGAZINE

Drinking Water News & Information for America's Small Communities

Summer 2006, Vol. 6, Issue 2







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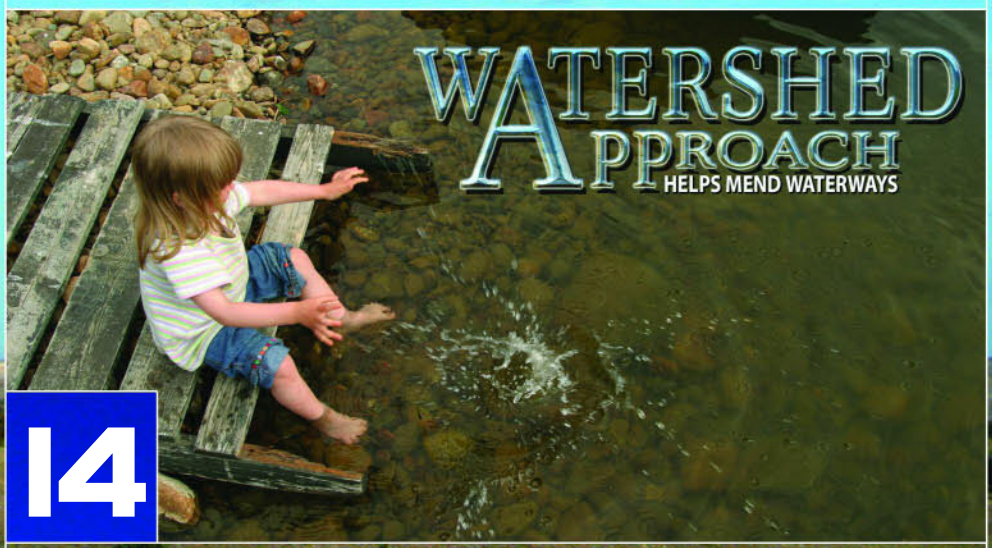

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Tear Out Insert

Tech Brief

Turbidity Control

One of the water treatment operator's primary jobs is controlling turbidity. Turbidity control is usually associated with surface water systems and groundwater systems under the direct influence of surface water. This *Tech Brief* examines turbidity control through the entire water treatment process from the raw water source to the clear well.

On Tap

Drinking Water News and Information
for America's Small Communities

Summer 2006 • Volume 6 • Issue 2

Sponsored by USDA Rural Development

James Andrew Administrator
Randy Plum Loan Specialist

Rural Development

USDA's Rural Development Utilities Service strives to serve a leading role in improving the quality of life in rural America by administering its electric, telecommunications, and water and waste programs in a service-oriented, forward-looking, and financially responsible manner. Founded in 1947 as the Farmer's Home Administration, Rural Development has provided more than $20 billion for water and wastewater projects. For more information, visit their Web site at *www.usda.gov/rus/*.

The National Environmental Services Center

The National Environmental Services Center (NESC) is a nonprofit organization providing technical assistance and information about drinking water, wastewater, infrastructure security, utility system management, solid waste, and environmental training to communities serving fewer than 10,000 people.

To achieve this mission, NESC offers a toll-free technical assistance hotline, hundreds of low-cost or free products, quarterly magazines and newsletters, and several searchable databases. We also sponsor conferences, workshops, and seminars. Visit the NESC Web site at *www.nesc.wvu.edu* or call toll-free (800) 624-8301 and request an information packet.

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

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From the Editor's DESK

One of my favorite activities as a kid was looking at maps. I spent hours engaged in this pastime and especially enjoyed the different shapes found on the U.S. map: The neat division made by the Mason-Dixon line, the familiar geometry of western states such as Wyoming and Colorado, the borders made by the great rivers like the Ohio and the Mississippi. As it turns out, the geo-political divisions that were so handy to early surveyors and explorers (and that were so fascinating to this budding geographer a few hundred years later) were not the best way to delineate space within our country for the environmental conditions of an industrial and post-industrial society.

A better way to divide and manage geography, many argue, is by watersheds. We all live in a watershed and small watersheds are part of bigger watersheds that are, in turn, parts of still bigger watersheds. From a drinking water perspective, this way of looking at the world is appealing in many ways. Among other things, it:

- Allows for management at a reasonable scale;
- Fosters public participation and gives residents an active voice in environmental issues;
- Protects water sources, improving both quality and quantity;
- Prevents pollution, making water and wastewater treatment less expensive; and
- Is friendly to wildlife.

Perhaps the biggest challenge to this approach is that communities have to work across and between existing political divisions—never an easy task. In the end, the watershed approach will, we hope, foster a transformation to a more holistic view of the world we inhabit. After all, we're all downstream (and upstream) from someone else.

We start the features section of this *On Tap* with three articles about watersheds. Caigan McKenzie, one of our staff writers here at the National Environmental Services Center (NESC), provides an overview of watersheds and then shares lessons learned and success stories from communities who have adopted a watershed perspective. Because we believe this is an important topic, we will explore additional topics related to watersheds—including an article about watershed planning and a more in-depth look at a community that recently undertook such a project—in future issues of the magazine.

A Most Valuable Resource

Of course I'm preaching to the choir when I point out that there is no more valuable resource than water. But, the simple fact is that many people take water for granted. A public outreach effort that Penn State Public Broadcasting is creating aims to change this by helping people understand the value of drinking water systems. *On Tap* Associate Editor Kathy Jesperson examines this project starting on page 30.

Whether you're developing an asset management program or thinking about watershed planning or dealing with all the challenges that go along with providing clean, safe drinking water to your community, NESC may have the information you need to do your job better. Give us a call toll free at (800) 624-8301 and ask to speak with one of our technical assistance specialists.

Regards,

Mark Kemp-Rye
On tap Editor

National Environmental Services Center
NESC Assistance. Solutions. Knowledge.

Who We Are

A number of people are responsible for putting *On Tap* magazine together each quarter. We encourage our readers to contact us with ideas and suggestions. An e-mail address is provided for each staff member below, as well as their phone extension. Call our main number toll free at (800) 624-8301 and enter the appropriate extension at the prompt.

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Student Worker:
Rachel Dunn

CALENDAR of EVENTS

SEPTEMBER

National Association of Towns and Townships Annual Conference

September 6–8, 2006
Hyatt Regency Capitol Hill
Washington, DC
Contact: Sharon Blanchard
Phone: (202) 624-3555
Fax: (202) 624-3554
www.natat.org

American Public Works Association Annual Conference

September 10–13, 2006
Kansas City Convention Center
Kansas City, KS
Contact: Dana Priddy
Phone: (800) 848-2792 or (816) 595-5241
Fax: (816) 472-1610
Email: dpriddy@apwa.net
www.apwa.net

Annual National Rural Water Association Convention

September 24–27, 2006
Hyatt Regency Reunion
Dallas, TX
Contact: Dawn Meyers
Phone: (580) 252-0629
Fax: (580) 255-4476
www.nrwa.org

OCTOBER

Association of State Drinking Water Administrators Annual Conference and Exposition

October 15–19, 2006
Tempe Mission Palms Hotel and Conference Center
Tempe, AZ
Contact: Tom Maves
Phone: (202) 293-7655
Fax: (202) 293-7656
www.asdwa.org

Water Environment Federation WEFTEC '06

October 21–25, 2006
Dallas Convention Center
Dallas, TX
Phone: (800) 666-0206 or (703) 684-2452
Fax: (703) 684-2492
www.weftec.org

2006 Watershed Institute Center for Watershed Protection

October 23–26, 2006
Deer Creek Resort and Conference Center
Columbus, OH
Contact: Rebecca Winer
E-mail: rrw@cwp.org
(410) 461-8323
www.cwp.org

NOVEMBER

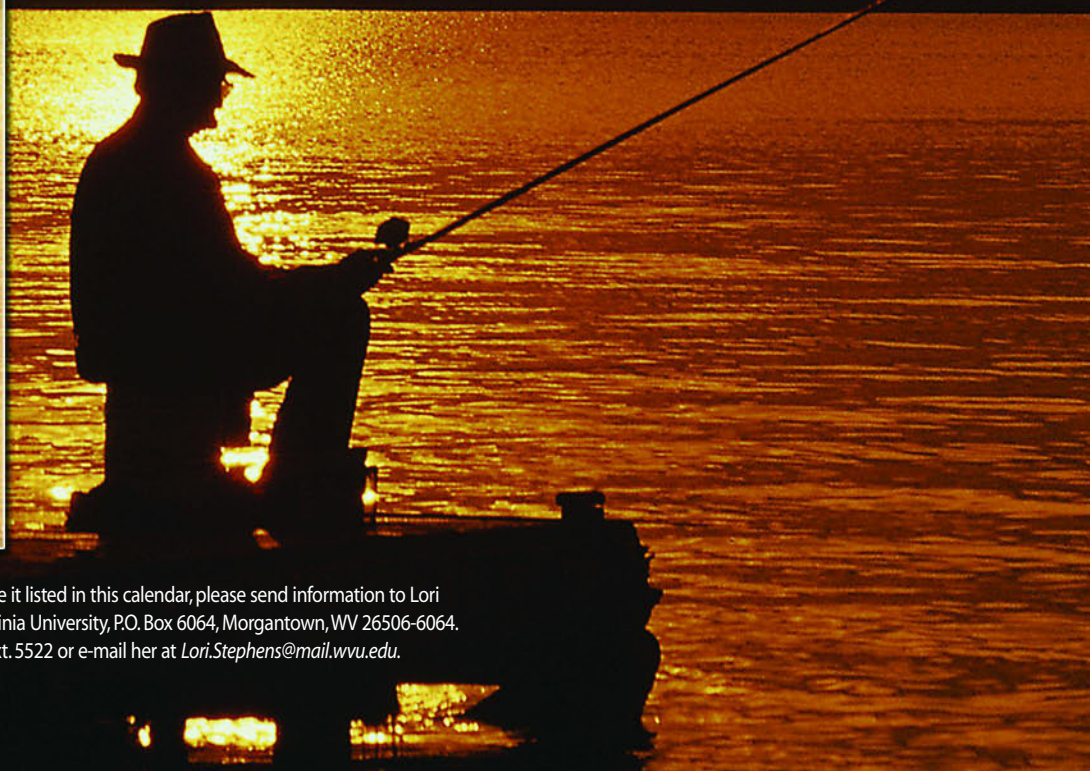
Groundwater Foundation Annual Groundwater Conference

November 1–3, 2006
Lansing, Michigan
Contact: Zoe McManaman
Phone: (800) 858-4844
Fax: (402) 434-2742
www.groundwater.org

DECEMBER

National Ground Water Association Annual Conference

December 5–8, 2006
Las Vegas Convention Center, Paradise Road
Las Vegas, NV
Contact: Kathy Butcher
Phone: (800) 551-7379
Fax: (614) 898-7786
www.ngwa.org



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

RCAP Offers Security Toolbox

The Rural Community Assistance Partnership (RCAP) now offers a resource to help small water and wastewater systems improve their security and prepare for disasters and other unforeseen events. The *Security and Emergency Response Planning Toolbox for Small Water and Wastewater Systems* consists of five core modules plus appendices:

1. a simple and practical vulnerability assessment (VA) guide for small water systems, which is also applicable to wastewater systems;
2. emergency response planning (ERP) instructions for small drinking water systems;
3. an emergency response planning template for small drinking water systems;
4. emergency response planning instructions for small wastewater systems; and
5. an emergency response planning template for small wastewater systems.

The instructions demonstrate how to conduct the procedures, and the templates are blank and identical to the forms in the instructions. The templates may be printed and completed by hand or saved on a computer and filled in by typing into the saved document. The templates also contain a page to certify that the process has been completed.

In addition, the appendices include resources, a glossary, an emergency notification and contact list, and training presentations.

Some state agencies now require that small water and wastewater systems (those serving populations of 3,300 or fewer) certify completion of a VA and ERP. Certification of completing a VA and ERP is also a prerequisite for funding from the U.S. Department of Agriculture. RCAP's security toolbox is designed to be a simple, user-friendly resource that can help small systems meet these requirements and operate and manage their water and wastewater systems securely and efficiently.

For more information about the Security and Emergency Response Planning Toolbox for Small Water and Wastewater Systems *call RCAP at (888) 321-7227 or download a free copy of from their Web site at* www.rcap.org.

Diagram courtesy of snrs.unl.edu

Making Water Through Cloud Seeding

Arizona and six other states are considering a cloud-seeding program to help replenish water in the Colorado River. Within three years, officials hope to create more snowfall in the Upper Rockies so that the snowmelt will increase flow in tributaries.

Seeding, which injects chemicals such as silver oxide into clouds, allows water droplets or ice crystals to form more easily. An experiment in cloud seeding in Utah resulted in a 10 percent snowfall increase. The Arizona Department of Water Resources estimates that the project will cost between $1 to $20 per acre-foot of water, although they aren't sure where they will obtain funding.

Photo courtesy of Wim Lendelson / FEMA

USDA Funds $115 Million for Infrastructure

U.S. Department of Agriculture (USDA) Secretary Mike Johanns announced $115 million for water and wastewater loans and grants at an April 21, 2006, press conference. The investment—$55.1 million in loans and $59.9 million in grants—will benefit 50 rural communities in 28 states.

The total includes $3.5 million in solid waste management grants, which are made to public and private nonprofit organizations for providing technical assistance and training to associations to reduce or eliminate pollution of water resources and improve planning and management of solid waste facilities.

Since 2001, USDA has provided loans and grants totaling more than $6.5 billion to assist with community water and wastewater infrastructure. Many of the 5,475 communities receiving the funding are struggling to address environmental concerns brought on by improper treatment of sewage or unsafe or unreliable water, and many are among our nation's poorest rural communities.

To learn more about USDA water and wastewater loans and grants, visit the USDA Rural Development Utilities Service Web site at www.rurdev.usda.gov/rus *or contact your state Rural Development office. For the phone number of your state Rural Development office, contact the National Environmental Services Center at (800) 624-8301 or (304) 293-4191. The list is also available on the Rural Development Web site at* www.rurdev.usda.gov/recd_map.html.

Concern for Environment Wanes

A Gallup poll of 1,000 adults taken March 13 through 16, 2006, shows that American's concern about environmental issues has decreased. Between 1990 and 2006, respondents who said they worried a great deal about drinking water pollution fell from 65 to 54 percent; concern for river, lake, and reservoir pollution fell from 72 to 51 percent; and toxic waste contamination dropped from 69 to 52 percent. The only issue that generated an increase during this time was global warming, which increased slightly from 35 to 36 percent of those polled.

NESC Reorganization Announced

Richard A. Bajura, executive director for the National Environmental Services Center (NESC) at West Virginia University, recently unveiled the NESC reorganization plan. "The new NESC will allow us to offer the same, quality drinking water and wastewater services for small communities with an eye to developing new services," Bajura said.

In addition to base funding from the U.S. Environmental Protection Agency and the U.S. Department of Agriculture, Bajura has secured additional funds from the university to ensure the center's success and expansion. "WVU and NESC are committed to serving the nation's small communities by providing the most comprehensive information and training available about environmental infrastructure," he said.

NESC's new project management and development directors include Pam Schade who will focus on state projects, Clement Solomon who will manage the National Small Flows Clearinghouse (NSFC) and National Drinking Water Clearinghouse (NDWC) projects, and Graham Knowles who will manage the National Environmental Training Center for Small Communities (NETCSC) project.

NESC's new services managers include Jennifer Hause for Technical Assistance, Sandra Fallon for Educational Services, Trina Wafle for Communications, Jeanne Allen for Product Distribution, Vernon Deal for Information Technology, and Frank Saus for Finance and Administration.

The reorganization also includes a realignment of staff positions within the service units made necessary by the reduced federal appropriations that have affected small community programs across the country. The affected NESC employees are eligible to continue their employment with other WVU departments.

"We thank our sponsors and the university for their support throughout the transition," said Bajura. "Through prudent management of existing and new resources, not only are we sustaining our efforts to serve small communities, we plan to expand our services for the long term."

RDUS Loans: Poverty Rate Unchanged; Others Up

The Rural Development Utilities Service (RDUS) recently announced interest rates for water and wastewater loans. RDUS 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, 2006, are:

- poverty line: 4.5 percent (unchanged from the previous quarter);
- intermediate: 4.5 percent (up 0.125 from the previous quarter); and
- market: 4.5 percent (up 0.125 percent from the previous quarter).

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

For the phone number of your state Rural Development office, contact the National Environmental Services Center at (800) 624-8301 or (304) 293-4191. The list is also available on the Rural Development Web site at www.rurdev.usda.gov/recd_map.html.

EPA Has Water Monitoring Tools

In May 2006, the U.S. Environmental Protection Agency (EPA) released a set of multimedia products to help small drinking water utilities determine federal monitoring requirements and prepare water compliance samples under the Safe Drinking Water Act.

The tool kit features an interactive Web site— Rule Wizard—that provides a complete list of all of the federal monitoring requirements for a selected type and size of public drinking water system, such as a community water system serving 3,300 people using groundwater as a source of supply. A companion tool, the *Interactive Sampling Guide for Drinking Water Operators*, features a CD-ROM with a video and a slide presentation that illustrates proper sampling procedures, which users can download to their local computer. Case studies are also presented on the CD-ROM to help public water system owners and operators work with state and local agencies when contaminants are detected.

The Rule Wizard may be accessed at www.RuleWizard.org. *The CD-ROM is available online at* www.epa.gov/safewater/smallsys/samplingcd.html *or through the National Service Center for Environmental Publications at (800) 490-9198.*

Benzene Found in Soft Drinks

U.S. Food and Drug Administration (FDA) tests have discovered benzene, a cancer-causing chemical, in soft drinks. Whether the level found in the beverages represents a health hazard is the topic of a debate between the FDA and the Environmental Working Group (EWG), a Washington D.C.-based research organization.

A 2003 FDA report, part of their ongoing "Total Diet Study," identified 79 percent of diet soda samples taken between 1995 and 2001 as having benzene above federal standards set for drinking water. The EWG has asked that the FDA require warning labels on soft drinks.

According to the FDA, a follow-up study found that the vast majority of the samples "contain either no detectable benzene or levels below the limit for drinking water and do not suggest a safety concern" and planned no immediate action on the matter.

"If they're so confident the situation is not a safety risk, they need to release the data to prove it," says Richard Wiles, EWG senior vice president in an April 6, 2006 Associated Press article. "The only data available to the public contradict their claim."

Benzene is an industrial chemical used to make plastics, rubber, detergents, and pesticides, and has been linked to leukemia. It forms in soft drinks when ascorbic acid (Vitamin C) and preservatives (sodium or potassium benzoate) interact, with heat and shelf life also playing a factor. U.S. Environmental Protection Agency classifies benzene as a human carcinogen and sets the maximum contaminant level for drinking water at five parts per billion.

For more information, visit the FDA Web site at www.fda.gov *and the EWG Web site at* www.ewg.org.

Richard A. Bajura serves as the National Environmental Services Center executive director. He also directs the National Research Center for Coal and Energy at West Virginia University where he has had broad oversight of NESC programs for more than two decades. (photo taken at National Small Flows Clearinghouse 25th Anniversary celebration.)

New Training from the Montana Water Center

The Virtual System Explorer 2006, a new training program developed by the Montana Water Center, simulates small water system operations and can be used in workshops or by individuals on their computers. Users learn the basics of system operation, as well as how to recognize system deficiencies, perform a security risk assessment, and improve the financial and management capacity of a system.

The program features three systems: (1) an untreated groundwater system, (2) a treated groundwater system, and (3) a surface water system. The program features:

Exploration Activities—allows the user to experience system operation scenarios in a virtual environment.

Video Tours—showcases examples of actual small water systems from source to sink.

Exploration Basics—presents an overview of public water system operations.

Glossary—provides necessary terminology.

Virtual System Explorer is available in an online version (for those with high-speed Internet connections), as a downloadable program, or as a DVD that can be played on a computer or a television. To use on a personal computer, you'll need a DVD-ROM drive, a 1 GHz processor, 800x600 16-bit color display, and 256 MB of RAM. To run this on your TV, you'll need a DVD player and a remote control.

The online and downloadable versions of Virtual System Explorer are available on the Montana Water Center Web site at http://montana.water.edu/training/ve. *Product support information, including frequently asked questions, is available on the site as well. You may also learn more by e-mailing* watercenter@montana.edu *or calling (406) 994-6690.*

A limited number of the programs are available in DVD format through the National Environmental Services Center (NESC). Call NESC at (800) 624-8301 or e-mail info@mail.nesc.wvu.edu. *Request product #DWCDTR22 when ordering.*

EPA Site Offers Environmental Publications

http://nepis.epa.gov

The U.S. Environmental Protection Agency's National Service Center for Environmental Publications (NSCEP) announced that new digital services are available through its Web site.

More than 13,000 environmental publications are maintained in the center's archive. Interested people may now:

- search the full text of documents online and locate specific and related publications;
- use a new bookshelf feature to recall saved links to online documents for future visits; and
- create PDFs of scanned documents for downloading and printing.

Environmental publications may also be ordered from NSCEP in paper copy, DVD, CD-ROM, and video by calling (800) 490-9198.

LGEAN Provides Info for Government Officials

www.lgean.org

The Local Government Environmental Assistance Network (LGEAN) provides environmental management, planning, funding, and regulatory information for local government elected and appointed officials, managers, and staff. LGEAN enables local officials to interact with their peers and others online and also offers a toll-free telephone service at (877) 865-4326.

Managed by the International City/County Management Association, the LGEAN Web site has sections devoted to hot topics, regulatory information, tools and resources, a consultants directory, and a calendar of events. If you have a question related to environmental management, click on the "Ask LGEAN" feature.

National Environmental Health Association

www.neha.org

The National Environmental Health Association's (NEHA) mission is to improve the environment in cities, towns, and rural areas throughout the world to create a more healthful environment and quality of life for us all. NEHA's membership includes those in both pubic and private sectors, academics, and the uniformed services.

Because of its diverse membership, NEHA offers a forum for discussing issues from a variety of viewpoints. The site has information about continuing education and credential renewals, and also offers a series of Web-based courses. Articles from the *Journal of Environmental Health* may be purchased online. The site includes links to environmental health- and protection-related organizations and agencies.

Natural Resources Conservation Service

www.nrcs.usda.gov

The Natural Resources Conservation Service (NRCS), formerly called the Soil Conservation Service, provides a wealth of information for those involved in watershed planning and source water protection.

According to the NRCS Web site, "communities and local governments work with NRCS state offices and local USDA [U.S. Department of Agriculture] Service Centers to help them protect their natural resources. NRCS also provides information on climatology, water management, watershed planning, and flood control. A coalition of state conservation agencies, The National Association of State Conservation Agencies, provides guidance and operates state environmental, sediment control, and soil erosion prevention programs. The Resource Conservation and Development program focuses on improvement of quality of life achieved through natural resources conservation and community development. NRCS can provide grants for land conservation, water management, community development, and environmental needs in designated areas."

The site features information on community planning, water quality, water management, water supply, watershed protection, and flood prevention. Watershed planners will want to download the *National Watershed Manual* (*www.nrcs.usda.gov/programs/watershed/NWSM.html*). Those involved with source water protection should visit the National Water Management Center (*wmc.ar.nrcs.usda.gov*).

Center for Watershed Protection

www.cwp.org

The Center for Watershed Protection is a non-profit organization that provides local governments, activists, and watershed organizations around the country with the technical tools for protecting streams, rivers, and lakes. The center has created and distributed a multidisciplinary strategy for watershed protection that encompasses planning, restoration, research, site design, education, outreach, and training. The site includes a calendar of events, publications, listing of watershed projects, technical tools for assessing and protecting watersheds, and a watershed quiz.

Surf Your Watershed

www.epa.gov/surf/

The U.S. Environmental Protection Agency provides the "Surf Your Watershed" Web site. On the site you'll find tools to help you locate your watershed, a database of watershed groups across the nation, information about wetlands restoration projects, a directory of agencies, and links to additional information.

National Watershed Coalition

www.watershedcoalition.org

Formed in 1989, the National Watershed Coalition (succeeding the older Watershed Congress) is a membership organization 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. Their Web site provides information about watersheds, legislation affecting watersheds, and various brochures and reports.

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 NESC.

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Indian Health Service

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Peninsula Light Company, WA

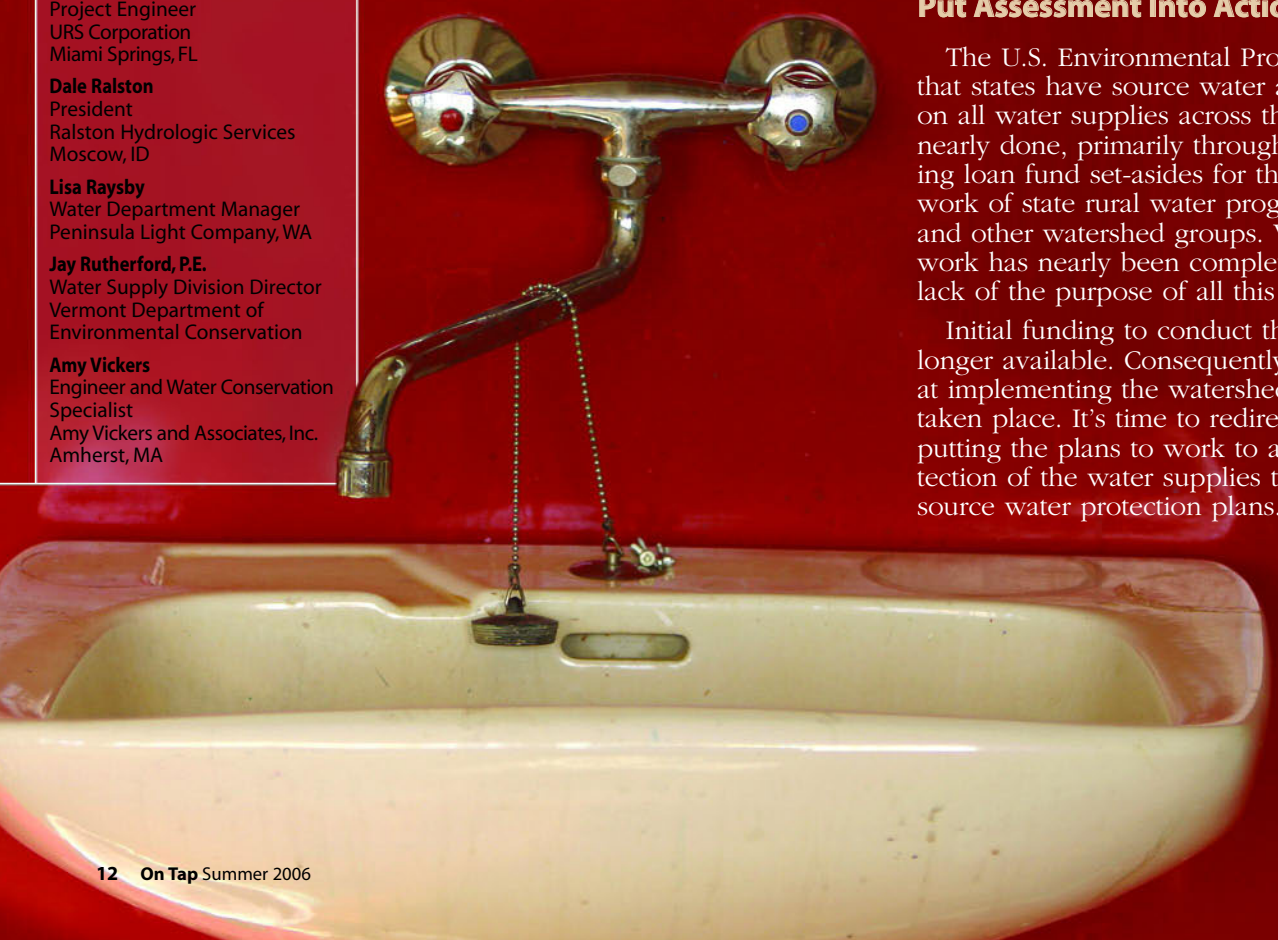
Jay Rutherford, P.E.
Water Supply Division Director
Vermont Department of Environmental Conservation

Amy Vickers
Engineer and Water Conservation Specialist
Amy Vickers and Associates, Inc.
Amherst, MA

The Center for Watershed Protection estimates that there are more than 4,000 watershed groups around the country. Advocates see the watershed approach as having numerous benefits and encourage water and wastewater personnel to work with them to protect water resources.

Q: Do drinking water professionals work with watershed groups in your area?

What do you see as being most beneficial about this approach?



Put Assessment Into Action

The U.S. Environmental Protection Agency requires that states have source water assessments completed on all water supplies across the country. This effort is nearly done, primarily through the use of state revolving loan fund set-asides for this purpose and the good work of state rural water programs, state agencies, and other watershed groups. While the assessment work has nearly been completed, there still is a major lack of the purpose of all this work—implementation.

Initial funding to conduct the assessment is no longer available. Consequently, not much effort aimed at implementing the watershed protection plans has taken place. It's time to redirect our efforts and begin putting the plans to work to achieve the actual protection of the water supplies that is the heart of source water protection plans.

Jerry Biberstine
Senior Environmental Engineer
National Rural Water Association

Lisa Raysby Hardcastle, P.E.
Water Engineer
Peninsula Light Company

State Legislation Spurs Action

In 1998, the Washington State legislature passed the Watershed Planning Act, which is overseen by the Department of Ecology (DoE). The purpose of this legislation was to establish a framework for developing local solutions to watershed issues. The state's commitment to the act can be seen in the funding provided—$11 million in operating funds and $12 million in capital funds—and in the growth of DoE from 12 to 42 full-time equivalent staff positions.

By the end of 2005, there were approximately 43 watershed planning units in various stages of completion that correspond to the 62 Water Resource Inventory Areas (WRIAs) in the state that follow geographic watershed boundaries, not governmental jurisdictional boundaries. These groups are comprised of various stakeholder interest groups, including local government officials (counties and cities); water utility representatives; Indian tribes; environmental groups; fisheries; and timber, agriculture, and other businesses. Stakeholders vary depending on local interests and issues in a particular WRIA.

The predominant driving factors behind the majority of participants in this effort are (1) support for the salmon and fisheries interests, (2) growth and development issues, and (3) associated water rights that watershed planning decisions can impact. For groundwater purveyors, I believe that the water rights issues are presently overshadowing the water quality issues. By contrast, those with a primary interest in fisheries are concerned about in-stream flows and water quality.

From the perspective of the utilities, the long-term benefits are to assure a sufficient quantity and quality of water supply to meet growth and less harm to the environment. We also hope it reduces the time and cost for the DoE to make water rights decisions.

Frank DeOrio
Director of Municipal Utilities
Auburn, New Yorkciation

Working Together Is Key

Whether it is surface or well water sources, those in charge of the water supply are often in charge of protecting the watershed. This can be a daunting task when left up to the utility. Ultimately, though, nothing is more beneficial for the protection of a water source and its watershed than to enlist the participation of stakeholders and drinking water professionals.

Watersheds come in all sizes and often cross political jurisdictions. To regulate their activities—whether it is land use, farming practices, or septic systems—is always a challenge. However, a common goal allows watershed groups and professional drinking water and wastewater people to come together with the unified purpose of resource protection and ideas about the best way to go about it.

The most beneficial aspect to this approach is that you bring together people with different, specific interests and concerns. We generally find that lakefront property owners are concerned about property values; town and village officials are concerned about assessments, taxes, and development; farmers are concerned about chemical use and soil erosion; and environmentalists are concerned about all of the above and more. Establishing meeting places, agendas, and active committees within the groups provides a much louder voice when dealing with regulating agencies and municipalities.

These various groups each can play an important role. The ability to dispel rumors, counteract undue concerns and provide knowledgeable personnel to answer questions from the public and disseminate correct information are some of the benefits available when working with these groups. We have also found the benefit of data management and information exchange to be a product of watershed group participation.

Watershed groups have demonstrated a willingness to participate in water quality education, information dissemination, and decision making. They realize that they have a direct stake in water quality concerns and should be a most welcomed resource for drinking water professionals. After all, don't we all live in a watershed?

Kevin Kundert
President and Chief Instructional Systems Mechanic
eTRAIN ONLINE, Inc.

Operators Have a Role to Play

In Montana, there are numerous watershed groups. Occasionally, operators of larger systems share their knowledge of the water system and watershed in meetings and workshops. These watershed groups, in turn, share information to educate the public so informed decisions can be made on how to properly manage water resources.

New conflicts have arisen because of rapid growth in some of our towns and cities. Many of the folks attending meetings are landowners looking for assistance and possibly a source of funding for removal of contamination or for restoration projects. The effects of coalbed methane mining in this region are a big concern and there are also conflicts over open space versus development and the use of water for irrigation versus fishing. Any help that operators can provide would certainly be helpful.

Watershed Approach

Helps Mend Waterways

by **Caigan M. McKenzie**
NESC Staff Writer

"I want to be able to see my feet," declared former Maryland State Senator Bernie Fowler in 1988 as he stood chest high in the Patuxent River at Broomes Island, Maryland. He wanted to graphically illustrate the river's sediment problem.

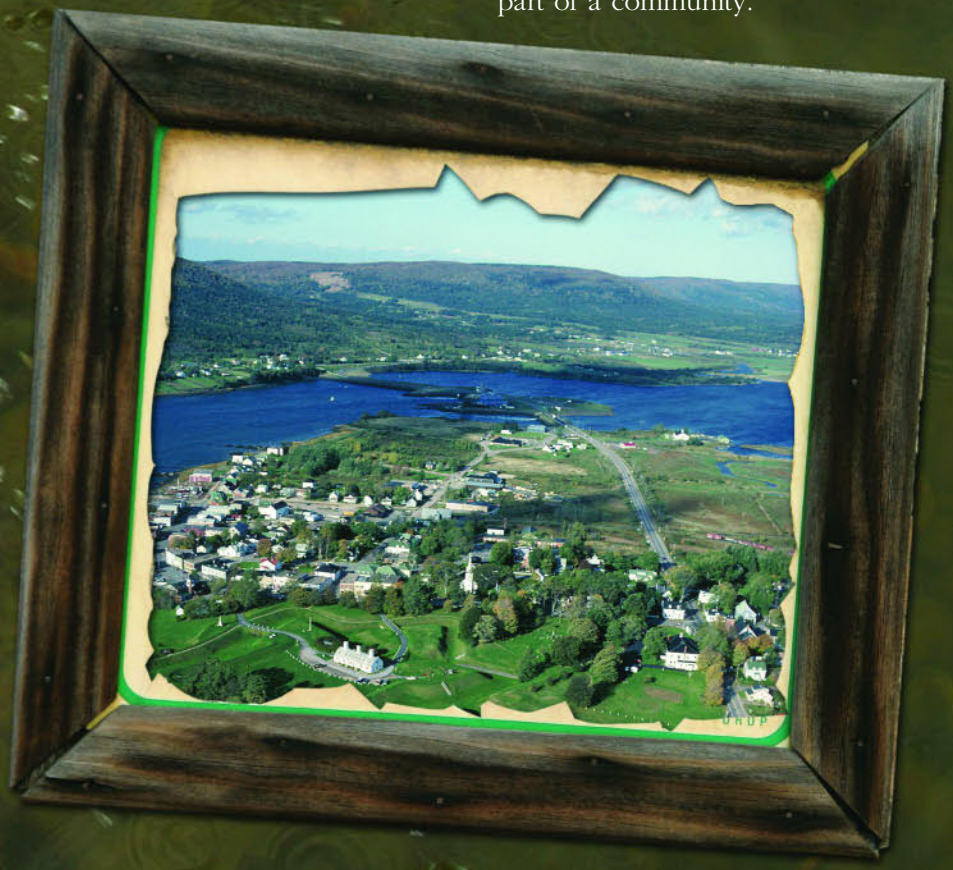
Hundreds of people lined up along the shoreline and waded into the Patuxent River with Fowler to the point where he could no longer see the tops of his white sneakers. He then measured the water line on his overalls and documented it in the "Sneaker Index." "Although this is not a scientific measure, it puts restoring the river on a human scale," Fowler said.

As a crabber and fisherman in the 1950s and 1960s, the six-foot-tall Fowler could see his feet, grass beds, and crabs while standing at shoulder depth in the Patuxent River. But this river, which flows through the middle of the Baltimore/Washington corridor and into southern Maryland, has suffered eutrophication from heavy and persistent loads of sediment and algal fertilizing nutrients, creating serious clarity problems over the past several decades.

Unbeknownst to Fowler, a leading voice on environmental issues, this "Wade-in," would become tradition in the Chesapeake Bay area. It has become so popular and successful in increasing public awareness about water quality problems in the Chesapeake Bay that similar wade-ins have been established in many of the more than 150 tributary basins throughout the 64,000 square-mile watershed.

What is a watershed?

No matter where you are, you are in a watershed. "A watershed is the area of land where all of the water that is under it or drains off of it goes to the same place," says Dale Kemery, press officer, U.S. Environmental Protection Agency (EPA). "John Wesley Powell, scientist geographer, put it best when he said that a watershed is 'that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community.'"



WATERSHED APPROACH HELPS MEND WATERWAYS

Watersheds include lakes, rivers, estuaries, wetlands, streams, and surrounding landscape; They come in all sizes and shapes, are found in all types of landscapes, and can cross county, state, and national boundaries. They supply our drinking water, provide a habitat for plants and animals, and provide water bodies for recreation and relaxation.

Causes of Watershed Pollution

Since the 1970s, many rivers have experienced the same water quality problems that the Patuxent River has experienced, and despite the successes of the Safe Drinking Water Act and the Clean Water Act, our nation's waters continue to be polluted. The *National Water Quality Inventory: 2000 Report* reported that half of the streams, lakes, and estuaries assessed were still not clean enough to support fishing and swimming.

In the past, most water quality problems were traced to point-source pollution, such as a pipe or disposal site. Technical and regulatory methods have been used to detect and control these problems over the past 30 years, yet the water quality in our watersheds continues to decline because of the cumulative effect of nonpoint source pollution. Runoff of lawn fertilizers and pesticides, drainage of farm and factory waste, oils and pollutants from roadways, failing septic systems, and construction sites are just some of the practices that can directly affect the physical, chemical, and biological health of a watershed.

Historically, approaches to water problems have been divided among multiple agencies. For the past decade, though, EPA has endorsed a watershed approach to restoring and protecting the nation's waters. According to EPA, a watershed approach is a community-based, consensus-building framework for decision making instead of the traditional agency-based command-and-control approach. This strategy depends on a broad coordinating process for prioritizing water resource problems, addressing not only water quality standards but also addressing pollutants that do not have numeric standards (including nutrients and clean sediments), healthy aquatic habitats, coastal and marine waters, and invasive species and other stressors.

According to the EPA, the benefits of a watershed approach include:

- Effectiveness and efficiency—encompassing the full range of problems in a cluster of impaired waters so that costs can be streamlined and core clean water programs can be delivered more efficiently (e.g., monitoring, TMDLs, permits, and nonpoint pollution control).
- Program integration—opening opportunities for cross delivery of water programs, including coordination of clean water programs with wetlands protection and other related efforts.
- Drinking water coordination—providing an opportunity to coordinate surface water protection with efforts to protect sources of drinking water to attain drinking water standards.
- Intergovernmental cooperation—creating opportunities to coordinate with watershed programs in other federal agencies (e.g., the U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration).
- Sustainable improvements—looking at groups of problem waters rather than individual waters so that pollution from a single water body is not carried downstream to restored waters.
- Innovations—investigating innovative approaches such as watershed trading and issuing coordinated permits on a watershed scale.
- Public involvement—promoting the full involvement of the public in clean water programs.
- Public communication—giving the public more meaningful information than they would have from single water body restoration.
- Maintaining clean waters in the watershed—helping to maintain the quality of all waters in the watershed, including clean waters.
- Early identification of additional impaired waters—using a coordinated effort to identify and solve impaired water problems.

Kemery points out that one major obstacle to a watershed approach is blending disparate goals, program procedures, and regulatory authorities (including funding) into a coherent set of watershed objectives and actions. Another obstacle Kemery sees is trying to reach watershed organizations (they have catalogued nearly 4,000 nationwide) and local leaders so that EPA can provide support needed to meet water quality resource goals through training and other tools.

EPA as Watershed Partner

Typically, EPA provides technical, financial, coordination, and enforcement support to a watershed approach. "Depending upon the watershed and the issue, EPA can play many different roles," Kemery says. "As a regulator, EPA can be involved in setting watershed goals through water quality standards or Total Maximum

Continued on Page 33

FIVE Parts to a Watershed Approach

According to EPA, a watershed approach has five key components. This approach:

1. focuses on hydrologically defined areas that converge to a common point of flow;
2. sees an iterative planning or adaptive management process to address priority water resource goals;
3. uses sound scientific data, tools, and techniques to develop and evaluate action plans;
4. involves partnerships/stakeholders, which may include representatives from federal, state, and local governments, public interest groups, industry, academic institutions, private landowners, and concerned citizens; and
5. breaks down barriers between plan development and implementation to increase the probability of success.

Source: U.S. Environmental Protection Agency

Photo courtesy of www.city.kelowna.bc.ca

by **Caigan M. McKenzie**
NESC Staff Writer

The U.S. Environmental Protection Agency and other groups involved in watershed protection have compiled a list of 10 important watershed lessons.

To obtain a copy of the EPA fact sheet "Top 10 Watershed Lessons Learned" (EPA-840-F-97-001), call (202) 566-1155 or download a copy from the EPA Web site at www.epa.gov/owow/lessons/lessonspdfs/top10.pdf.

1 *The Best Plans Have Clear Visions, Goals, and Action Items*

Visions must be scientifically accurate and be easily understood by the general public. They express what is to be accomplished over a specified period of time.

2 *Good Leaders are Committed and Empower Others*

Good leaders reflect the values of the community and know what will and will not work. They are good communicators, have the ability to bring about change, and are committed to making their group's vision a reality. They know how to engage, respect, and empower others and are able to find new or leverage existing resources.

3 *A Coordinator at the Watershed Level is Desirable*

Having a coordinator based within the watershed is important because it provides a focal point for the watershed effort and helps to ensure that someone is moving group activities along. The coordinator's role varies depending upon the needs of the watershed, but generally it includes maintaining contact with members of the watershed group; performing liaison with interested parties beyond the group; celebrating success; calling, facilitating, and summarizing meetings; helping to secure funding and training; and ensuring that watershed plans are developed and implemented; and achieving the desired outcomes.

4 *Environmental, Economic, and Social Values are Compatible*

Too often in the past, environmental, economic, and social issues have polarized people, making it impossible to achieve a common vision of sustainability. For the watershed approach to become a reality, there must be widespread recognition in the community that people and nature can coexist within the watershed. This can pave the way for partnerships of diverse interests to form around a sustainable vision.

5 *Plans Only Succeed if Implemented*

The greatest challenge associated with watershed planning is to ensure that the recommendations called for within a plan are implemented. A key element in implementing a plan is charging an individual or organization with the responsibility to follow through and work with key constituencies to take the actions laid out in the plan. It is also important to break things down to a manageable scale. This often involves a nested approach in which broad goals are set for large watersheds, but sub-watersheds are used to implement and achieve those goals.

6 *Partnerships Equal Power*

Essential ingredients for effective partnerships include: focusing on common interests, respecting each participant's view point, thanking each other, being willing to learn about others' needs and positions, and building trust. The important thing is to pull together a partnership that is of manageable size, creates synergy, and represents the key interests in the watershed.

7 *Good Tools Are Available*

Tools are broadly defined to include geographic information systems, how-to guides, funding sources, regulations (when appropriate), and monitoring and modeling programs. The sources of funds and technical assistance vary widely, from corporate and government to nonprofit organizations.

8 *Measure, Communicate, and Account for Progress*

Progress can be measured in many ways and communicated through meetings, brochures, Web sites, annual reports, news releases, and other ways. The important thing is to make sure that the appropriate measures of progress (often referred to as indicators) are selected and that information on these indicators is shared with relevant stakeholders.

9 Education and Involvement Drive Action

Public support depends upon public awareness, involvement, and education. Watershed awareness campaigns and education programs can help people who live, work, and play in a watershed understand what the problems are and how they can help remedy them.

10 *Build on Small Successes*

It is important, according to watershed practitioners, to start small and demonstrate success before working on a larger scale. For this reason, demonstration projects are often a popular choice in watershed work. In some states, small victories have been instrumental in prompting the implementation of the watershed approach statewide.

Watershed SUCCESS STORIES

by **Caigan M. McKenzie** • NESC Staff Writer

Editor's Note: A watershed approach to water quality problems has resulted in many improvements across the country. This article gives a brief description of three success stories. In an upcoming On Tap*, we will provide an in-depth look at a community currently working to improve its watershed.*

The Tar-Pamlico Basin Trading Watershed Project in North Carolina, the North Fork/Potomac River in West Virginia, and the Dungeness River/Matriotti Creek in Washington are three projects that have significantly improved water quality in their regions.

Tar-Pamlico Basin

In recent years, low dissolved oxygen levels, sporadic fish kills, loss of submerged vegetation, and other water quality problems have plagued North Carolina's Tar Pamlico basin. Studies have linked many of these problems to increased nitrogen and phosphorus loading to the watershed.

In 1989, the North Carolina Environmental Management Commission (EMC) designated the Tar-Pamlico basin as a Nutrient Sensitive Water. The classification, based on years of detailed nutrient loading studies, required the development and implementation of a strategy to manage both point and nonpoint nutrient sources to meet water quality goals.

The North Carolina Division of Environmental Management (NCDEM) developed stricter nitrogen and phosphorus effluent standards for dischargers in the basin, but dischargers were concerned about the high capital costs that might be required to achieve the nutrient reduction goals. Consequently, a coalition of dischargers, working in cooperation with the Environmental Defense Fund, the Pamlico-Tar River Foundation, and NCDEM, proposed a nutrient trading framework through which dischargers can pay for the development and implementation of agricultural best management practices to achieve all or part of the total nutrient reduction goals.

The EMC approved the program in December 1989, and the implementation phase is currently under way. As a condition of EMC's approval, the discharger coalition agreed to fund the development of an estuarine model. The model will be used as a tool to evaluate specific nutrient reduction strategies for the basin. This information will then be used to revise effluent nutrient standards.

The nutrient trading program is proving to be a popular solution, largely because it achieves the state's nutrient reduction goals and addresses nonpoint loadings concurrent to reducing the economic burden to municipal dischargers.

North Fork/Potomac River, West Virginia

The North Fork of the South Branch of the Potomac River is a scenic trout stream in the headwaters of the Potomac River in northeastern West Virginia. Water in the North Fork had high levels of fecal coliform bacteria, primarily due to agricultural runoff from beef and poultry farms. More than 85 percent of farmers in the watershed worked together to construct animal waste storage facilities, establish riparian buffers, and implement a range of other best management practices at the farms. As a result, the stream now meets its designated use and is no longer impaired by fecal coliform bacteria.

Dungeness River and Matriotti Creek, Washington

Failing septic systems and inadequate management of livestock and pet wastes contribute high levels of bacteria to the Dungeness watershed, resulting in shellfish bed closures and causing the state to place the Dungeness River and Matriotti Creek (a tributary of the Dungeness) on its 303(d) list of impaired waters for fecal coliform contamination. Piping of irrigation ditches, pasture management, manure storage, investigation and repair of onsite septic systems, and outreach and education efforts with area residents are some of the practices implemented that have caused bacteria target levels set forth in the TMDL to be achieved at several monitoring sites.

For more information about these and other watershed success stories, visit the U.S. Environmental Protection Agency's Watershed Web site at www.epa.gov/owow/nps/Success319.

A member of NESC for more than eight years, **Caigan McKenzie**, has had a number of her water and wastewater articles reprinted in a variety of publications.

A Hard Rain's Gonna Fall

Regulations Help California Well Owners Weather the Storm

By **Michelle Moore**
On Tap Associate Editor

Sonoma County, California, best known for its endless miles of sun-drenched vineyards, comes very close to being paradise on Earth. An hour north of San Francisco, pristine beaches, regal redwood forests, rolling hills, and inland lakes add up to create the region's peaceful and enviable environment. But, come November, things change. The rains begin, and for the next four or five months, Sonoma County gets drenched.

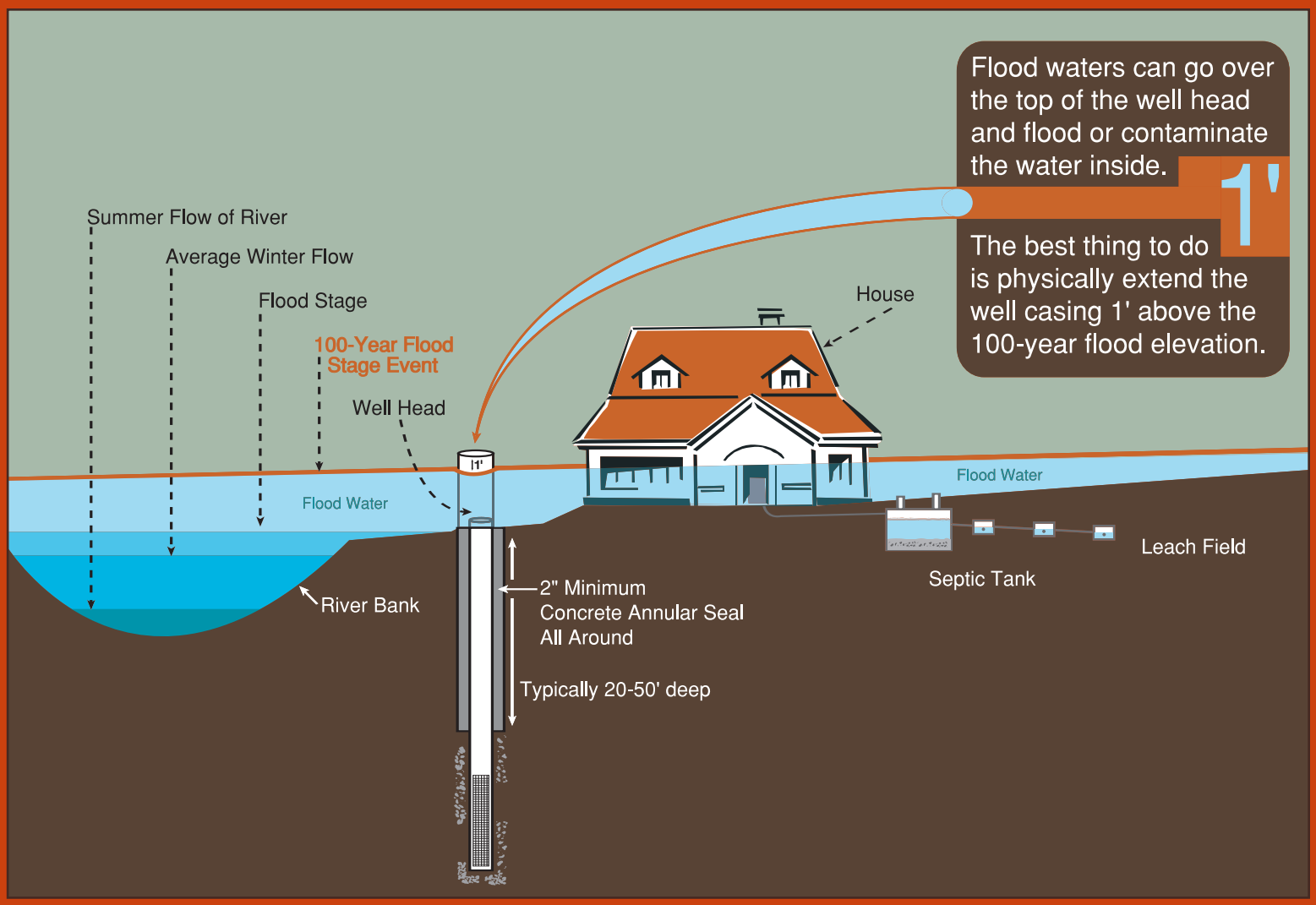
The Russian River runs through the region from the north in Mendocino County, wending its way to the Pacific Ocean. The Russian is wide and slow moving. When the rains are falling, instead of surging and pounding against its banks, the river creeps out over the land, rising to the height of roofs in some low-lying areas.

"Homes close to the river will be under water half or part of the way," says Ted Walker with the Sonoma County Health Department, " so there's mud intrusion, and structural damage will occur. New houses are restricted in the flood way, and the first floor elevation, according to FEMA, has to be one foot above the hundred-year event level."

Elevating a house is an effective way to protect the structure, but without some adjustments, a home's private water system is also at risk when the river rises over the banks. Dirty river water plus anything that is swept up into it can make its way into a well. With 40,000 or so wells operating in Sonoma County (serving about 25 percent of the population) there are plenty that may be vulnerable to flooding.

Walker says that the health department distributes handouts and flyers to private well owners, and public notices are posted during flooding to educate people about the potential hazards of contaminated well water. Many people with private water sources rely on bottled water, and some boil their drinking water. But, Walker says, most people don't use their well water for drinking during flood stage if they think the well has been affected.

Photo courtesy of DAVE GATLEY/FEMA News



Two Means of Contamination

Infiltration of wells by flood water can occur in two ways: water seeps down through the soil around the outside of the well casing to the intake perforations, or it rises high enough to flow directly into the wellhead and down the inside of the well. Either way, both the well and the underlying aquifer are at risk of contamination.

To remedy the first problem, Sonoma County created an ordinance in the early 1970s requiring that all new wells have a minimum of a 20-foot-deep annular seal around the outside of the casing. Prior to that time, annular seals were optional, and people frequently chose to have newly drilled wells backfilled with native soil instead. Unfortunately, the backfilled soil provides an easy avenue for water to make its way down the outside of the casing. A minimum two-inch annular seal, on the other hand, works well for excluding flood water.

Charlie Judson, president of Weeks Drilling and Pump Company, says the seals, which consist of cement grout or a bentonite clay mixture, are "by far the most effective thing that can be done to prevent surface contamination."

The bentonite clay mixture or the cement grout is pumped down a pipe into the annular space, and the pipe (known as a tremie pipe) is withdrawn as the material packs into the void. This practice helps avoid gaps that might form if the material was just poured around the well casing from the surface.

"We have a pretty good view here of how well these seals work because, generally, people who have wells drilled since 1974 do not have any issues with surface water contamination," Judson says. "But, people who have wells that were drilled prior to that, if they did not opt for one of these annular seals, they often do [have problems]."

Judson says that many people still have the old style of well, and that when it rains heavily, the turbidity or clarity of the water is degraded.

The second avenue for well contamination—infiltration via the wellhead—is difficult to prevent unless the height of the well casing reaches above the highest point of potential flood water. Although the county doesn't require it, Walker says the health department urges people to elevate the height of their well casing.

Determining how high a casing should be depends on knowing the potential maximum height of flooding, which is estimated by using the 100-year flood level. In 1986, flooding was severe, and that year's high water mark has become today's standard for the minimum a well casing should extend above ground level.

In a newly constructed well, the casing is made long enough to stand up out of the ground to that height. With an existing well, casing is added to reach that height. But, Judson adds, "We can still have a problem if the well doesn't have a proper annular seal, because then the water can be forced down the outside of the

casing and the net effect is the same, although it's not quite as dramatic."

Aquifer Contamination

Judson says that if a well is inundated by flood water, the flooding usually lasts for days, and the underlying aquifer "can be inoculated with the worst imaginable water." When an aquifer becomes contaminated during a flood, it takes a long time to clear up. Judson says that they sometimes have to pump a well for weeks before it returns to its original water quality. "It's hard to define when to call it a success," he says. "We normally base that on the results of a coliform bacteria test, and it can be really difficult to achieve that unless the well has been pumped for a long time after a flooding event."

Reliably sealing a well against surface inundation is difficult because "wells need to breathe," Judson says. If the well is sealed so tightly that water can't leak in, it is also sealed against air moving in and out. The water level in the well needs to fluctuate up and down for the pump to work properly, and air is required to make that happen. Raising the casing height is a much better solution for protecting the integrity of the well.

Private Wells at Risk

Private wells are more at risk than publicly owned wells for obvious reasons. Well upkeep and water quality depend entirely on the owner's motivation and pocketbook, whereas upkeep of public supply wells is supported through state and county regulations and through customer billing.

"The individual property owners are most affected because they don't have the financial resources to maintain their water supply and protect it as well as the public water systems," says Walker. "The public water wells are inspected by state engineers, and they do a lot to protect the wells from flood waters. But the individual wells, they typically don't have an elevated wellhead and can be influenced by flood waters. So the ones we're most concerned with are the private wells."

Public supply wells must be built with a minimum 50-foot seal, versus the 20-foot seal required for a private well, offering that much more barrier to contamination. Public well operations also have regulations in place that provide oversight and emergency procedures during times of flooding.

Judson says there are 500 small, public water systems in the area, 95 percent of which use groundwater, and some of them using multiple supply wells. These systems range from mobile home parks to hotels to very small communities.

Consumer fraud in well construction is rare, but Judson related a story of an inadequately sealed well that was only discovered following a mudslide. Heavy rain caused the hillside into which the well was drilled to slip, exposing about eight feet of the well casing. (See photo—lower right.) The line where the seal hit ground level is distinct, as is the line where the seal ends down on the pipe, a distance of about 18 inches.

"That grout seal is supposed to extend to a depth of 20 feet," Judson says. "And the homeowners would have no way to know that, because all they can see is a piece of casing sticking out of the ground."

This well, which serves a population of about 300 people, is located in the flood plain of the Russian River. The well was built so the casing terminates above the maximum expected flood level.
Photo by Charlie Judson

A mudslide exposed the fraudulent work of a well driller who left this well casing with an inadequate annular seal. The light-colored area shows the 18-inch seal, whereas the current California standard requires a 20-fool seal.
Photo by Charlie Judson

Disinfecting Contaminated Water

During and after a flood, Judson urges private well owners to boil their water if they suspect that flood water has contaminated it. "Public agencies recommend a formula for disinfecting water in a flood emergency by adding drops of bleach: "x" number of drops if the water is clear and "x" number if the water is cloudy," he says. "What we recommend is that people boil it. It's so easy to go wrong on the bleach count, and boiling works 100 percent of the time. When a customer calls, we don't try to talk him through a bleaching technique, we just tell him to boil it."

Judson, who is president of Weeks Drilling and Pump Company in Sebastopol, California, has been a certified operator since 1978. In addition to drilling wells and other water services the company performs, the Weeks Drilling's water treatment division operates 35 or so small public water systems in the surrounding region. Judson says these systems are "just small enough that they can't afford to hire their own staff." He also teaches an environmental technology course about operating public water systems at the Santa Rosa Junior College.

The well had never been able to pass a coliform bacteria test, and once the mudslide exposed the casing, anyone could see why. An unscrupulous well driller neglected to pour the annular seal to the proper depth.

"That's why public health authorities want to inspect the depth of the annular space before the seal is put in to make sure that this kind of thing doesn't happen," Judson says.

Permitting agencies have differing requirements for inspecting well construction. Depending on the county and its regulations, an inspector may need to be on site when the annular seal is completed to make sure that it's done properly. But other jurisdictions may only require the contractor to give the inspector a time when the seal is going to be done, and if the inspector doesn't show up, the well is sealed anyway.

Protecting Public Health

"Public education and outreach is number one," Walker says, to prevent people from getting sick from contaminated water. "When wells are constructed, the county standard requires a vertical annular seal around the well. Many times people go to a deeper seal, maybe 50 feet . . . and some water users voluntarily put on disinfection units. During the summer months, the well might be protected, but during flood stage they might get turbidity, and disinfection helps reduce total coliform."

Flooding of the Russian River varies from year to year. Private well owners can never be sure if this is the year they're going to be hit. When the rains start falling in November, the risk of flooding increases through December and January, and sometimes it continues through February and on into March. The 100-year flood event of 1986 occurred on Valentine's Day. With each year's flooding, more people become prepared for what to expect, especially when they live in the floodplain.

Walker says that two lakes, Lake Pillsbury in Mendocino County and Lake Sonoma, are regulated by the Army Corps of Engineers and help control flooding of the Russian River. With these two reservoirs, flooding is predicted to be a lot less severe than before the dams were built. But, for well owners, it would be better to be safe than sorry when it comes to their drinking water supply.

For More Information

For more information about private wells and what steps to take to restore the water supply after a flood visit the U.S. EPA Web site at www.epa.gov/privatewells/whatdo.html.

On Tap Online

Several articles about wells and flooding, including the articles "Disinfecting Private Wells," "How Well is Your Well," and an entire newsletter devoted to private wells, are available on the NESC Web site at *www.nesc.wvu.edu/ndwc*.

Michelle Moore, *On Tap* associate editor, welcomes reader feedback—both positive and negative—on her articles. Contact her at *michelle.moore@mail.wvu.edu*.

The combination of an elevated a wellhead plus having the required depth of an annular seal work well to prevent contamination of water wells. The height of an elevated wellhead depends upon where the well is located and that area's expected maximum flood level.

Photo by Charlie Judson

ASSET MANAGEMENT: A New Frontier for Utilities

by **Cathleen Falvey**
NESC Contributing Writer

Photos by **Julie Black**

It's 2 a.m. on a cold, rainy fall morning. Leo, the public works director for the small rural community of Summerville, is waking up to another emergency phone call. A pump has failed at a local sewage lift station, and if he doesn't get there quickly, raw sewage could back up and pollute a nearby stream. He wonders if he'll have the parts he needs on hand to fix the problem. As he laces up his boots, Leo tries to recall just how many times over the past three years he's been forced to leave his bed for an emergency like this one. It seems to be happening more and more.

"Things have been breaking down right and left at the wastewater and water plants," he thinks to himself. "The equipment is getting old, so you'll have that. Still, it would be nice if we could predict which parts need to be replaced first so we can avoid a violation and so I can get some sleep." But Leo realizes there's only so much he can do with the time and money he has. It seems he only ever has enough of both to put out fires.

Meanwhile, down the road in the neighboring town of Quiet Dell, Judy, the water treatment plant supervisor, is also spending a sleepless night. Judy is worried because she's slated to go before town council later in the day to request money to upgrade the treatment works and distribution system. She's certain the investment is needed now to prevent future problems and save money in the long run, but she's not sure the council will agree. Money is tight right now in Quiet Dell. The treatment plant has been running smoothly for a long time, and the council even increased her budget slightly last year.

Although Judy could go into the meeting and scare everyone with worst-case scenarios of what could go wrong and speak in generalities about how waiting

could cost the town more money, she doubts she'll convince anyone. If only she had the time and the data to prepare a detailed estimate to show council members how much money the town could save by making the upgrades now, she knows they would make the right decision.

Leo and Judy are not alone in their worries. Many small treatment plant supervisors across the country face similar nightmares. Whether they serve 1,000 or 100,000 people, water and wastewater utilities are expected to provide continuous, high-quality service to their customers. Anything less can have dire consequences for public health and the environment. Typically, small system managers are expected to maintain this high level of service with a lot less money than their counterparts in the city. It's no wonder they're losing sleep.

Besides money, what Leo and Judy need most is information. They need to know more about their systems to manage them effectively. Imagine for a moment that Leo had, at his fingertips, data on the age of all his pumps, their expected life cycles, how recently they've been serviced, and what parts to keep in stock. Imagine that he had access to all the information for planning routine maintenance for all those pumps. If Leo were able to access data like that everyday at work—information that could help him plan and use his limited time and resources as efficiently as possible—system failures may be a lot less common in Summerville. Leo could move from putting out fires to preventing them.

Likewise, if Judy had access to detailed information about all of her system's physical assets, their cost, condition, and remaining years of service, she could compare the cost of operating, maintaining, and repairing them with the cost of replacing them with newer, more efficient models. This could give her a more meaningful argument to present to the council and a better chance of receiving the funding she needs. Another possibility, after analyzing all the data and prioritizing her assets, is that Judy may decide that extensive upgrades are not as icritical as she previously thought. This would allow her to budget for the upgrades and give the council advance warning about investments they will need to make in the plant over the next few years.

By gathering information about their systems' assets, and using that information to run the systems as cost-effectively and efficiently as possible, Judy and Leo would be practicing asset management.

What is asset management?

Asset management is a structured, "holistic," approach to system management, which relies on information about the condition, cost, and use of the system's physical assets. An asset is defined as a physical facility or a component of a physical facility that has value and that enables a service to be provided. Assets that communities should be concerned about managing typically have a useful life of more than a year.

Although asset management is not a new concept, its application to water and wastewater treatment facilities was pioneered in Australia and New Zealand and is relatively new in the U.S. All water and wastewater operators currently manage their assets in some way—the key is to do it well. The goal of asset management (also called advanced, strategic, or total asset management) is to minimize the cost of owning and operating assets over time while continuously delivering the required and desired customer service. In layman's terms, asset management is getting the most bang for the infrastructure buck.

Why is asset management important?

Asset management helps utilities save money both in the long and the short term. Saving money has always been especially important for small communities, but the need to manage assets wisely will be critical for all utilities in the future. Operating costs in the industry are increasing, as are costs of infrastructure improvements. EPA anticipates that the gap between drinking water and wastewater infrastructure needs and infrastructure spending and funding will widen significantly in the future.

In addition, the federal government recognizes the importance of asset management and is beginning to encourage utilities to implement programs. A bill approved in June 2004 by the Senate Committee on Environment and Public Works ties state revolving fund (SRF) eligibility to asset management

EPA Defines Asset Management

In the publication, *Asset Management: A Handbook for Small Water Systems*, the U.S. Environmental Protection Agency (EPA) outlines a simple asset management program. Although asset management programs vary in complexity, EPA suggests the following five steps for implementing asset management in a small utility:

1. Taking Inventory

Completing an inventory of system assets includes evaluating and reporting each asset's condition, its age, its service history, and its "adjusted useful life." Inventory is often the most labor-intensive part of the asset management process for utilities. Identifying, locating, and evaluating all of a system's assets can be time-consuming, although many systems have begun or completed this process to comply with GASB 34. The expected useful life of various system components can be found by using industry lists and cost indexes. Using this information, utilities can estimate an adjusted useful life for each asset by taking into account its service history and current condition. For example, the expected useful life of a given pipe may be 40 years, but if the pipe is in poor condition due to lack of maintenance or other conditions, a manager may decide to adjust the useful life by 10 years. Managers then subtract the age of the pipe (10 years) to determine its remaining useful life (20 years).

2. Prioritizing Assets

After taking inventory, utility managers need to devise a system for prioritizing their assets. The simplest way is to base priority on the remaining useful life, assigning the highest priority to assets with the shortest remaining useful life. Other, perhaps better, factors to take into account when prioritizing include the asset's importance to delivering a high-level of service (i.e., safe drinking water). The asset's necessity to the rest of the system and whether other assets in the system can do the same job (redundancy) are also considerations. Assets that are more important to the system's ability to protect public health should be given a higher priority, as should assets for which there is less redundancy.

3. Developing an Asset Management Plan

Now that the assets have been prioritized, utility managers need to plan for and schedule the future rehabilitation and/or replacement of each asset. In other words, they must formulate a capital improvement plan for the system. EPA suggests that utilities calculate the amount of money they will need to set aside each year in an annual reserve fund to pay for each asset.

4. Implementing the Plan

This step requires the utility manager to work out a detailed system budget. The manager will prepare a financial forecast by estimating the revenue the treatment plant expects for the next five years. Next, the manager compares the forecast with the scheduled upgrades in the plan to determine if the utility will need to put aside additional funds in reserve, find ways to save money (such as sharing assets with a neighboring community), find additional funding, or increase customer rates. This exercise is not meant to replace traditional accounting methods.

5. Reviewing and Revising the Plan

The plan can be updated if priorities change and as new information becomes available. EPA suggests reviewing the plan on at least an annual basis.

Source: *Asset Management: A Handbook for Small Water Systems*, U.S. Environmental Protection Agency Office of Water.

through a "priority system." The bill asks states to give more weight to applications for assistance from water and wastewater treatment works that include (1) an inventory of assets, including a description of the condition of those assets; (2) a schedule for asset replacement; and (3) a financing plan, indicating sources of revenue from rate payers, grants, bonds, and other loans and sources. Although the bill is not expected to become law this year, communities should take note. As with the Government Accounting Standards Board Statement (GASB 34) guidelines that came before it, asset management is not mandatory. However, in the future, communities may find it difficult to obtain funding or a good credit rating without good asset management practices.

Another incentive for utilities to embrace asset management is that it helps with GASB 34 compliance. GASB 34 is a method of accrual accounting and financial reporting that publicly owned utilities are encouraged to use to report historical costs and depreciation on all infrastructure assets. Although GASB 34 financial statements also include discussion and analysis of assets and future spending, the goal of asset management is broader. Operators and facility managers can use asset management to generate schedules for routine and preventative maintenance, for example. GASB 34 compliance can be seen as an important component of a utility's asset management program.

Another initiative closely related to asset management is capacity, management, operation, and maintenance or "CMOM." EPA has proposed that wastewater systems be required to submit CMOM plans to obtain National Pollutant Discharge Elimination System (NPDES) permits. CMOM is similar in many respects to asset management. Implementing asset management programs can only simplify CMOM compliance for wastewater facilities.

One clear advantage of asset management for utilities is its usefulness as a planning tool. Small communities around the country will find it indispensable

as they face population growth or decline or other changes, such as the need to increase security spending or comply with increasingly stringent environmental regulations. Asset management allows communities to be proactive, not reactive, to changing needs and helps them make better financial decisions.

Need more information about asset management?

The National Environmental Services Center (NESC) offers a 25-page Guide to Asset Management for Small Water Systems. *To obtain a printed copy of the guide, call NESC at (800) 624-8301 or e-mail* info@mail.nesc.wvu.edu. *Request item #TRBLMG06. The guide costs $5.00 plus shipping and handling. It may also be downloaded free from NESC's Web site located at* www.nesc.wvu.edu/netcsc/netcsc_index.htm.

The Water Environment Research Foundation (WERF) has a Web-based asset management program—SIMPLE [Sustainable Infrastructure Management Program Learning Environment]—designed for systems with a broad range of needs and requiring little asset management experience. It provides users the basic tools they need to begin an asset management program. Learn more about SIMPLE on the WERF Web site at www.werf.org. *Select "interactive tools" from the menu options.*

The U.S. Environmental Protection Agency (EPA) has developed Asset Management: A Handbook for Small Water Systems, *which is available on their Web site at* www.epa.gov/safewater/smallsys/pdfs/guide_smallsystems_asset_mgmnt.pdf *or by calling (800) 490-9198. For information about EPA-sponsored asset management training, visit* www.epa.gov/owm/asses_management.htm. *EPA's Environmental Finance Center (EFC) network also helps systems incorporate asset management principles; visit their site at* www.epa.gov/efinpage/efc.htm.

Cathy Falvey is the associate editor of *Small Flows Quarterly* published by the National Small Flows Clearinghouse, a partner organization in the National Environmental Services Center.

Estimated Equipment Life

The various components of a water system have different life expectancies. Here is the useful equipment life, according to EPA:

Asset	Expected Life (in years)
Intake Structures	35–45
Wells and Springs	25–35
Galleries and Tunnels	30–40
Chlorination Equipment	10–15
Storage Tanks	30–60
Pumps	10–15
Buildings	30–60
Electrical Systems	7–10
Transmission Mains	35–40
Distribution Pipes	35–40
Valves	35–40
Meters	10–15
Service Lines	30–50
Hydrants	40–60
Lab/Monitoring Equipment	5–7
Computers	5
Transportation Equipment	10

Source: U.S. Environmental Protection Agency, *Asset Management Guide for Small Water Systems.*

Free Asset Management Software Is Available

The Maryland Center for Environmental Training (MCET) at the College of Southern Maryland has created a free asset management software program for small communities. "Total Electronic Asset Management System" (TEAMS) was developed in partnership with Delaware Technical Community College under a grant from the U.S. Environmental Protection Agency. TEAMS works with Microsoft Office Suite version '97 and later.

According to Karen Brandt, MCET director, the software was developed and tested with help from four small communities in Maryland and Delaware. TEAMS helps systems to address five issues at the heart of an effective asset management program:

1) What is the current state of the assets?
2) What is the required level of service?
3) Which assets are critical to sustained performance?
4) What are the best minimum life cycle cost, capital improvement plan, and operation and maintenance strategies?
5) What is the best long-term funding strategy?

With TEAMS, communities can create an inventory of all system assets and input useful information about each asset, such as the name, date placed into service, manufacturer, supplier, part number, and costs. The program allows users to input an asset's condition using a scale of one to 10, and it helps operators to evaluate asset criticality, taking into account any redundancies in the system and the possible adverse impacts resulting from an asset's failure.

TEAMS also can help operators determine the historical and book value of assets, prepare maintenance schedules based on priority of repairs, and generate work order forms. In addition, systems can use the software to generate financial analyses and reports, and TEAMS meets GASB 34 requirements when using a modified approach for accounting.

The TEAMS software is free and can be requested from the MCET's Web site located at *www.mcet.org*.

RAISING WATER

INFRASTRUCTURE AWARENESS

New Project Tries to Explain the Value of Water

By **Kathy Jesperson**
OnTap Associate Editor

A nation that fails to plan intelligently for the development and protection of its precious waters will be condemned to wither because of its shortsightedness. The hard lessons of history are clear, written on the deserted sands and ruins of once proud civilizations. Lyndon B. Johnson

For decades, public works managers and engineers have been trying to warn us about an American water infrastructure crisis. But most of us have hardly noticed, and the reasons why are interesting. Not only is this infrastructure discreetly tucked away from the communities it serves or buried out-of-sight beneath our feet, it was built and paid for a long time ago.

According to the American Water Works Association (AWWA), previous generations originally built, installed, and paid for most of this infrastructure during the economic booms that characterized the last century's periods of growth and expansion. Today, most Americans have never known a time when water did not flow at the turn of a tap.

In less than a century, our water and sewer systems have become something the average American can count on. The general consensus now seems to be that these things have always been there and always will be. And we did not have to pay for them, making them a free public service. Without public education efforts, these attitudes may not change.

"An environmental historian once told me there are two big things that make cities as we know them possible: (1) the fire code and (2) sanitary sewer and clean water systems," says Tom Keiter, creative director for Penn State Public Broadcasting. "The fact that human beings require water, coupled with the public health role of wastewater systems, makes this an important issue in my mind. As we look globally at water and nationally at water issues, the topic is certainly as critical (or more so) than energy. Infrastructure is essential for economic development. We might have a 'beyond oil' world, but 'beyond water' seems unlikely."

Public Education Raises Awareness

Keiter says that public education programs that spread awareness and understanding about America's buried and hidden assets will help create political will to invest in their rehabilitation. He also believes that the public will be receptive to an awareness program.

On Tap Online

To learn about building public awareness, see the article "Accentuate the Positive: How Social Marketing Makes a Difference" on the NESC Web site at *www.nesc.wvu.edu/ndwc*.

A 2000 survey conducted by the National Environmental Education and Training Foundation says that although widespread environmental illiteracy persists, this lack of knowledge is not reflected in most peoples' attitudes. In fact, there is increasing public concern about pollution of the environment, and Americans endorse government programs to protect water and air from pollution. This attitude could be duplicated for water infrastructure.

"Our discussions with many cities and municipal authorities revealed that they need significant public education around water infrastructure issues, particularly on the costs of maintaining systems," says Keiter. "Taxpayers and ratepayers may be affected, and many make decisions affecting infrastructure."

To help raise public awareness, Penn State Public Broadcasting is developing a public education program called *Liquid Assets*. "The goal with this project is to provide the public with a baseline awareness about the significance of water infrastructure," Keiter explains, "ideally, providing media-based tools useful to any entity—government, education, non-profit—that needs to educate people about this subject.

"The project came to us through a Penn State civil engineering faculty member who runs the Pipeline Infrastructure Research Center (PIRC), Professor Sunil Sinha," he says. "We were introduced to the Buried Asset Management Institute (BAMI) and Atlanta Mayor Shirley Jackson.

Engineers Grade Infrastructure

"As we learned about the circumstances facing many cities and learned of the American Society of Civil Engineering (ASCE) report card, we saw this to be an issue that required an educated public," Keiter says. "We thought an in-depth look at clean water infrastructure was an important topic to focus on.

"In its 2005 assessment of the nation's infrastructure, ASCE assigned the grade D– for water and wastewater infrastructure," he says. "Most of this infrastructure is aging and deteriorating. In addition, demand on these systems has increased. And the cost of rebuilding them is staggering."

The U.S. Environmental Protection Agency (EPA) produced "The Clean Water and Drinking Water Infrastructure Gap Analysis" in 2002, which notes that drinking water faces an annual shortfall of at least $11 billion to replace aging facilities that are near the end of their useful life and to comply with existing and future federal water regulations. The shortfall does not account for any growth in the demand for drinking water over the next 20 years.

"Aging wastewater management systems discharge billions of gallons of untreated sewage into U.S. surface waters each year," says Keiter. "EPA estimates that the nation must invest $390 billion over the next 20 years to replace existing systems and build new ones to meet increasing demands. Many systems have reached the end of their useful design lives. Older systems are plagued by chronic overflows during major rainstorms and heavy snowmelt and, intentionally or not, are bringing about the discharge of raw sewage into U.S. surface waters."

"Because federal assistance has not kept pace with needs," notes a House Transportation and Infrastructure Committee 2004 report, "in less than a generation, the U.S. could lose much of the gains it made thus far in improving water quality and wind up with dirtier water than existed prior to the enactment of the 1972 Clean Water Act."

Situation Seems Serious

"While there is likely some bias in the ASCE report card, this seems like a serious situation," says Keiter. "With the consent decrees that many cities face, the issue of how to finance clean water systems becomes a significant issue."

Added to that, some of the most important parts of this public infrastructure are pipes that we cannot see, says AWWA. Not only do we take these pipes for granted because we can't see them, we didn't pay for them initially. Added to that, most pipes last a long time, making them a huge capital expense that today's customers never had to bear. They've always been there and have always been invisible to us.

"This topic requires a media education program. Because we can't see it (unlike a highway for example), we take it for granted," Keiter says.

"We can't see its condition. But it makes sense that systems installed 100 years ago may be deteriorating. It could be a health issue. It also makes sense that capacity might be an issue."

Liquid Assets Increases Impact

According to Keiter, the *Liquid Assets* project will be designed to facilitate public education in multiple ways to increase impact, including:

- national broadcast for broad education efforts,
- an outreach grant program to provide funding to local public broadcast organizations for developing "town meetings" around the national broadcast, or producing local programs on the topic (like a talk show with local officials), and
- toolkits with DVDs (with short and segmented versions of the broadcast production) to facilitate public meetings, educational sessions with local government officials, etc. Local water authorities or local non-profits may use the toolkits.

"We want to maximize the use of the video story elements in multiple ways and ultimately to generate community discussion at the local level where action takes place," Keiter says.

"Seed funding for initial research and project development was supplied by the National Association of Sewer Service Companies (NASSCO)," says Keiter. "We are in the early stages of fundraising and project development. We have completed a research phase and have developed a project budget and plan. We are making presentations to organizations, agencies, and industry groups to develop the project, find funding (approximately $780,000), and identify an advisory board and an implementation board. We have commitments for approximately 30 percent of the budget to date. Once we secure 75 percent of the budget, we will begin production.

"The project will be shot in high definition video and will take about 16 months to produce with another two months for toolkit production and implementation," he explains. "We hope to raise the balance of funding in the next three months.

"I personally am interested in this topic because it gets at how we live on earth," Keiter says. "Ultimately our man-made systems need to integrate with nature. We are part of a natural system, not apart from nature."

Public Broadcasting Produces Project

Penn State Public Broadcasting will act as the *Liquid Assets* project's producers. However, they have recognized the need for partnerships. They have partnered with PIRC, BAMI, and NASSCO.

"Because a key element of the effort is helping the audience 'see the unseen,' extensive animations that explore the man-made, below-ground infrastructure, and its relationship to the natural watershed infrastructure will be developed," says Keiter. "Penn State Public Broadcasting is considering a number of potential partners to assist in animation/modeling, including organizations that specialize in spatial information management solutions for companies operating in the telecommunications, real estate, government, media, entertainment, architecture, engineering, and navigation sectors.

"The project will be developed as a documentary featuring stories of selected cities and regions engaged in rebuilding infrastructure," he continues. "We'll hear from people in planning, engineering, politics, economics, historians, public health, government, and others as we explore all sides of the issues surrounding our clean water infrastructure."

Keiter says that the project also includes the following elements:

The Fundamental Public Health System We Take For Granted

Essential to all life on earth, water is the provenance of civilization. Throughout history, thriving cities have had in common the presence of a water infrastructure. Much of the original American infrastructure, however, is still unchanged and in use today. This section will illuminate the integral role of water and wastewater infrastructures in our lives, offering a brief history of wastewater practices in addition to accounts of the burdens placed on and the neglect of our current system.

A Watershed Protection Approach

Understanding the risks of neglecting our buried assets means understanding our role in watersheds and hydrologic/geologic cycles. This section will follow the natural cycle of our water supply and will address the health and environmental hazards that our cities face when industrial and residential districts unsustainably interface with the water cycle.

An Engineering Marvel—Seeing the Unseen

Simply considering the complexity of constructing a system serving a city the size of Philadelphia or Atlanta is daunting, but the task of restoring a broken system is even more so. With the help of 3-D imaging and dynamic animation, this section will visually expose America's underground and will explore with engineers the technical complexity of our national infrastructure.

21st Century Solutions

The preceding section will dovetail into this section, which will explore the innovative solutions being developed by engineers to address infrastructure rehabilitation needs. Buried asset management, robotic pipe inspections, engineering research, pipe restoration and replacement technologies - these concepts along with the best practices from each of the cities will be explored, revealing a portrait of 21st century technology, economics, and solutions.

For more information about this project, contact Keiter at tek2@psu.edu.

On Tap Editor **Kathy Jesperson** is very interested in public health and is pursuing a master of public health degree at West Virginia University.

WATERSHED APPROACH HELPS MEND WATERWAYS

Continued from Page 17

Daily Loads and in implementation through National Pollutant Discharge Elimination System permits. As a partner, EPA can provide technical expertise on best management practices, water quality modeling, or monitoring. EPA also develops tools and training to support local watershed organizations and provides financial help to states through its Section 319 Nonpoint Source Program grants and its Targeted Watershed Grants Program."

EPA's Targeted Watershed Grant Program

EPA has awarded more than $40 million to various watershed organizations across the country since the Targeted Watershed Grant program began in 2003. Organizations were selected based on work plans that were most likely to quickly achieve environmental results.

In 2005, more than $9 million was awarded to 12 of the nation's most outstanding watershed coalitions for the following watersheds: Skagit River in Washington, Williamette River in Oregon, Trinity River/Lower Klamath in California, Upper Sevier River in Utah, Vermillion River in Minnesota, Huff Run in Ohio, Tuttle Creek Lake in Nebraska and Kansas, Lake Hopatcong in New Jersey, Cheat River in West Virginia, Little River in Tennessee, and Tangipahoa River in Louisiana.

The award to these 12 organizations brings the total number of watershed organizations given awards through the program to 34.

Watershed Groups

EPA's *Surf Your Watershed* Web site currently lists 6,615 watershed groups across the country that work to protect the nation's 3,059 watersheds. Some of these watershed groups are fluid–they exist for a specific purpose, and once that purpose is accomplished, they disband. Other watershed groups are in for the long haul, some even taking a parental role with smaller watershed groups.

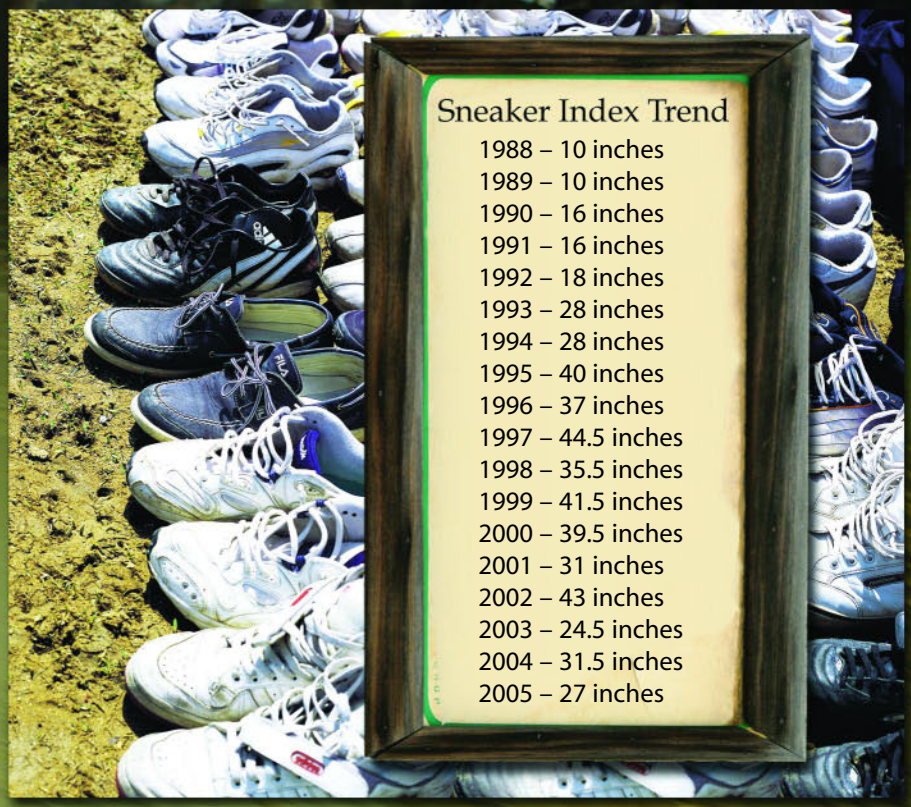
Founded in 1988, River Network began with the belief that every river and stream needs a group of local citizens organized to protect it. Since that time, River Network has emerged as a national leader in the river and watershed conservation movement and has assumed primary responsibility for building and supporting the river and watershed movement, which has grown from just a few hundred groups a decade ago to more than 4,000 organizations today. River Network has even been recognized by former President Jimmy Carter as some of the "unsung heroes of America's rivers."

Steps to Protect your Watershed:

- Prevent pollution from entering waterways by planting trees, especially along streams and shorelines.
- Conserve electricity and water and reduce the number of miles you drive.
- Plant native vegetation that requires the use of less fertilizer, pesticides, and water.
- Limit your use of fertilizer and apply at appropriate times.
- Use safer, nontoxic alternatives for cleaning and controlling pests and weeds.
- Properly dispose of household hazardous waste, antifreeze, oil, and boat waste.
- Prevent pollution by reducing, reusing, and recycling.
- Get involved in community groups and watershed organizations to develop and implement watershed management plans.

Source: U.S. Environmental Protection Agency

WATERSHED APPROACH
HELPS MEND WATERWAYS



"We are the only national group that supports local, state, and regional river groups throughout the country," says Katherine Luscher, River Network partnership program director. River Network works closely with local watershed protection groups, state river conservation organizations, Native American tribes, schools, and water-quality related organizations and agencies. "We provide our conservation partners with information, training, consultation, grants, and referrals to other service and peer organizations," she says.

After Hurricane Katrina, River Network is helping environmental groups rebuild through a grant program it established. The *New York Times* showcased this grant program, called River Network's Gulf Coast Watershed Recovery Fund, in its annual Giving Section. "The fund will make grants to groups that need to replace office space, and to support longer-term objectives, like monitoring water quality and advocating for a wetlands restoration effort to help safeguard against future hurricane destruction."

In a November 16, 2005, River Network news release, Don Elder, president of the River Network, says, "The post-hurricane needs of the region's community-based conservation groups vary widely. We are helping these groups get back on their feet by assessing their needs, providing direct assistance, and investing in their recovery. The Gulf Coast Watershed Recovery Fund will help the region's conservation leaders address the myriad of immediate, water-related post-hurricane issues and chart a better course for watershed management in the region for the future. It will secure enormous benefits for water, people, and wildlife for generations to come."

On Tap Online

For more information about recovery efforts in the Gulf Coast region, see the article "Massive Recovery: Small Towns Still Rebuilding After 2005 Hurricanes" on the NESC Web site at *www.nesc.wvu.edu*.

Water Quality and the Watershed Approach

Clean Water Act programs administered by EPA are largely delegated to states and tribes. "Of the assessed waters, states are reporting 40 percent as meeting water quality standards," Kemery says. "It is not statistically possible to conclude that implementing watershed approaches has improved water quality, since the information that states report varies. What we can say, though, is that watershed approaches offer anecdotal evidence that these approaches provide innovative and more efficient and cost-saving means to address water quality problems and engage the many stakeholders at the local level in these decisions and actions."

To learn more about watersheds, visit the River Network Web site at www.rivernetwork.org *and the Chesapeake Bay Web site at* www.chesapeakebay.net.

The U.S. Environmental Protection Agency Web site has information about various aspects of the watershed approach:

- *Funding*— www.epa.gov/owow/funding.html
- *A discussion forum*— www.epa.gov/watershedforum/
- *Tools*— www.epa.gov/owow/watershed/tools/
- *Training*— www.epa.gov/owow/watershed/wacademy/
- *Targeted Watersheds Grants Program*— www.epa.gov/owow/watershed/initiative

Other Watershed Web sites are featured on pages 11 and 12 in this On Tap.

A member of NESC for more than eight years, **Caigan McKenzie**, has had a number of her water and wastewater articles reprinted in a variety of publications.

LETTER TO THE EDITOR

To the Editor,

I read with great interest Zane Satterfield's article, "Locating Distribution Lines" in the Winter, 2006 issue of *On Tap*. The Dillonvale Water Department has a system that is 96 percent PVC pipe with no tracer wires. The Board of Public Affairs accepted preconstruction drawings as as-built drawings. This was done prior to my term of service. As most are aware, preconstruction and as-built drawings can vary greatly. Locating lines here is a difficult task.

I have used the divining technique to locate many of the lines in our system. I prefer to use a 1/8-inch brazing rod, cut in half, making two pieces 18 inches in length. I then bend a 90-degree, six-inch leg on each one so that the long end is 12 inches. I hold the six-inch end loosely in each hand, with the 12-inch end pointing straight away from me. I prefer the brazing rods over coat hangers or steel welding rods strictly for cosmetic reasons. They all will work. Because of the simplicity of equipment required to do the job, I use the divining method as a first choice in locating lines.

When I walk across a water line, the two rods will cross, with the rods crossed back up heel to toe. When the rods uncross, the number of steps backwards will give you the approximate depth of the line. This works with pipe of any material. If the rods point to the outside, away from each other, I have found that this indicates that you have crossed an electrical conduit, gas, or air line (i.e., something that does not contain water).

I was with the contractor who installed an 8-inch PVC line in a road about 10 years prior to this occasion. He insisted that the line ran down the center of the street under the asphalt, and the as-built prints agreed with him. He wanted to start digging there. With two brass rods, I determined that the line was about 18 inches to the side of the asphalt, at a depth of about 42 inches. To humor me, he agreed to start digging at the edge of the asphalt. He located the line where I had pinpointed it. This saved a lot of unnecessary asphalt replacement. I don't understand why divining works, I just know that it works for me.

Lyle Zerla

Dillonvale Water Department
Dillonvale, Ohio

To the Editor,

I have noticed some errors in your *Tech Brief* about chlorination (*On Tap* Fall 2004). For example, your statement that mixing chlorine with petrochemicals forms an explosive is not true. Cylinders or regular black hypo tanks do not need to be protected from sunlight and if moisture causes problems with chlorine, how can we safely add it to water and how high a temperature is a problem? It is clear there is confusion between sodium hypochlorite and chlorine gas, and the result is a damagingly hyped impression of danger.

Dr. Tony Edmonds

Special Projects Manager, Water Quality
Ontario Clean Water Agency

Lorene Lindsay, author of the *Chlorination Tech Brief* responds:

Thank you for your interest in our *Tech Brief* about Chlorination. Your comments point out the differences in technology and practices in different countries. Regular black hypo tanks are not commonly used in the U.S., and the fusible plugs found on tanks in the U.S. are not commonly used in other countries. The *Tech Brief* does not specifically say that the tanks must be protected from sunlight, and you are quite correct that tanks can sit in the sunlight. But, dry forms of chlorine and chemical feed equipment should be protected from the elements. Water, if applied to a leak on a tank or in feed equipment, may increase corrosion and cause the leak to get worse. Dry forms of chlorine must be kept dry to prevent corrosion.

Although using sodium hypochlorite poses fewer safety hazards than using chlorine gas, the risk for violent reactions between organics such as greases, oils, and fuels is very serious and these materials should be kept apart. Chlorine is a very reactive substance and produces corrosive conditions in any application. A healthy respect for safe chemical handling practices provides the best protection against damaging accidents.

Lorene Lindsay

Laboratory Manager
Kansas City Water

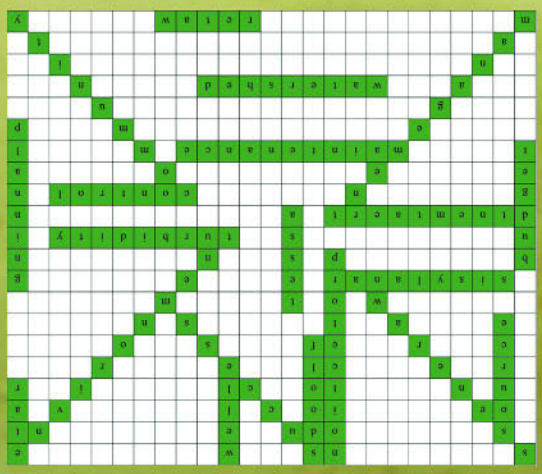
Looking for National Drinking Water Clearinghouse products?

For the last five years, we've printed a list of our products in *On Tap*. Like many other organizations, though, we've had to cut costs. So, we won't be running the product list here anymore.

Rest assured we still have hundreds of free and low-cost products. You may peruse these items on our Web site at *www.ndwc.wvu.edu*.

If you don't have Internet access or you'd like to discuss your particular situation, please call us toll free at (800) 624-8301 and select option "3" to talk with one of our technical assistance specialists.

Drinking Water Products List NOW ONLINE!



ANSWER

fun time

WORD PUZZLE*

Asset
Management
Watershed
Turbidity
Control
Budget
Rate
Analysis
Planning
Success
Awareness
Water
Floods
Well
Maintenance
Treatment
Protection
Environment
Source
Community

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

*Solution on page 36

Wordsearch by Sheila Anderson

WATER TRIVIA

In the U.S., how much water is used each day?

(a) One billion gallons

(b) 100 billion gallons

(c) 700 billion gallons

(d) One trillion gallons

Source: American Water Works Association

ANSWER

(c) People in the U.S. use as much as 700 billion gallons of water every day.

"My therapy is a little different. I don't make your problems disappear, I just teach you how to sleep through them!"

Hmmmm

Water was the first word that Helen Keller learned. Water was the last word uttered by Ulysses S. Grant

Source: American Water Works Association

QUOTES

Let him that would move the world, first move himself.

—Socrates (470?–399 BCE)

We must not squander our powers, helplessly and ignorantly, squirting half the house in order to water a single rose.

—Virginia Woolf (1882–1941)

We call upon the waters that rim the Earth, horizon to horizon, that flow in our rivers and streams, that fall upon our gardens and fields, and we ask that they teach us and show us the way.

—Chinook Indian Blessing

I'm not sure where I'm going but I'm making great time.

—Author Unknown

BUT, It's Not in the Budget

By **Carl Brown**
President, Carl Brown Consulting

If you make decisions for a water, sewer, stormwater, or other utility service, you need to be focused on making money—probably more than you are making right now, even if you think you are well funded. You must make more money than just enough to cover your operating costs because your operating costs are going up. And that doesn't even count the unexpected costs that are going to pop up and surprise you.

Let's put some numbers to this situation.

Say you have a water system with an annual operating budget of $75,000. (I'll get to you big guys later.) You're breaking even—code for "you have no money in the checking account after you pay this month's bills." Picture taking all of your ratepayers with you up on a high wire with no safety net. That's what breaking even is. You need a safety net of approximately $26,000. Your ratepayers might say they don't want a safety net, but trust me, they do. You probably need even more cushion than that to cover equipment replacement costs, and you need to make sure your rates are fair to all your customers. But let's keep it simple and only consider the $26,000.

You have about 315 customers paying an average bill of $20 per month. To raise the $26,000 in one year would require a rate increase of about $7 per customer per month. That won't be popular, and it may not be advisable depending on your situation. But it is do-able if you sell it right. After all, the ratepayers' affordability index will only go from about 0.8 percent now to 1.1 percent after the increase. That's close to the national average.

To successfully clear the $26,000 in a year your system needs to invest about $3,000 in a good rate study. What do you do? If your system is like most, you forgo the $26,000 net cash increase because you don't want to spend $3,000 to get it. As you view it, you are losing $3,000, not setting yourself up to gain $26,000.

Let's personalize this. Assuming there was no risk, would you give your stock broker $3,000 of your own money now if she would give you back $6,000 (your $3,000 plus $3,000 more) in one year? You probably would, because you would be doubling your money in a year. What if she would give you back $29,000 (your $3,000 plus $26,000 more)? Almost certainly. You would be multiplying your investment about nine times in one year—a remarkable rate of return. What if you didn't even have to give her the $3,000 to get started? If you could just wait for the results of her work to earn the first $3,000 for you, then would you pay her $3,000 after the fact to net the $26,000? Surely you said, "Yes." Well, you can have it that way with your rate analyst.

Back to your water system. You would spend about one-and-one-third months worth of your additional first-year revenues to pay your analyst, then you would pocket the rest. Saying that another way, every month you procrastinate in raising your rates costs you about $2,000 in lost revenues. A good rate analysis will carry you for about three years, and you will net about 96 percent of the new revenues after paying your analyst.

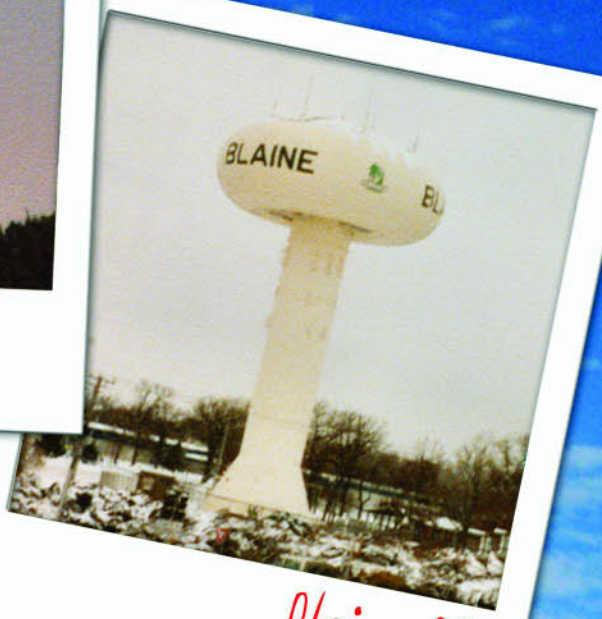
Now, to state the obvious: you're not giving your analyst $3,000 that he will invest in the market to earn your return. He's going to get it from your customers. Thus, what you pay him, in all fairness to your customers, should only be a small part of the increase in their rates. Otherwise, you should just figure out your funding shortfall percentage, boost everyone's bill by that percentage and hope that nothing bad happens. Keep it simple and cheap.

Now, back to you large-system guys. If your annual operating budget is five to 10 times that of the small system above, your return on investment is in the thousands of percent the first year. You spend maybe a quarter-of-a-month's worth of your additional revenue to pay your analyst, and then you pocket the rest. Every month you procrastinate and don't raise your rates costs you $10,000 to $20,000. You will net about 99 to 99.5 percent of the new revenues over three years after paying your analyst.

The early adopter in you says, "Let's go," but the timid side of you is looking for stop signs. You think first of the standard, "We can't fund a rate study because it's not in the budget." Remember that $26,000 gain waiting for you? You think, "We're too busy to mess with a rate study right now." Then, you are too busy! You think, "Let's save the $3,000 to $6,000 investment in having a specialist do a rate study, do it ourselves and net all the money." That is good thinking. Run the numbers, all the numbers, on doing it in-house versus having a specialist do it. Doing your own rate studies may be your best option. Even if it is, you may need the help of a specialist to get you started. You think, "Let's get a cheaper analyst." Yes, your analyst's fee is a cost. However, it is also an investment toward great rates for your system. Quality takes time and it costs money. Invest wisely.

Carl Brown is President of Carl Brown Consulting, LLC; specializing in water and sewer system rate analysis, asset management program development and training nationwide. Mr. Brown may be contacted at (573) 619-3411, E-mail *carlbrown@mchsi.com*.
Web site: www.carlbrownconsulting.com.

Darlington, SC



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Rose Tower, IL

Batavia, OH

The National Environmental Services Center (NESC) exists to help small and rural communities with their drinking water, wastewater, environmental training, solid waste, infrastructure security, and utility management needs and to help them find solutions to problems they face. Our staff of environmental specialists, engineers, certified operators, technical writers, editors, and trainers understand the latest technologies, regulations, and industry developments. Over the last 25 years, we've helped thousands of communities find solutions to their environmental problems. We've also helped thousands of individuals learn more about environmental issues.

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