

## Water and sewer infrastructure is a hot topic— made hotter by promise of stimulus funding

Municipalities, water utilities, contractors and engineers have warned for decades that the nation's water and sewer infrastructure is falling into disrepair and failing to keep pace with population growth. (For details see the American Society of Civil Engineers' Report Card on America's Infrastructure: <http://www.asce.org/reportcard/2009/grades.cfm>) A significant cause of environmental infrastructure neglect, they say, is huge reductions since the late 1970s in federal spending for water and sewer. According to the N.C. League of Municipalities, "thirty years ago, federal funding accounted for 75 percent of all new water and sewer construction. Today, it is about 5 percent." Moreover, over the last five years water and sewer funding has been targeted for further cuts, and proponents have been engaged in intense lobbying efforts just to hold the line on funding.

### Liquid Assets

In October 2008, the documentary "Liquid Assets" was launched on Penn State Public Broadcasting and was subsequently broadcast by public television stations across the nation. Funded primarily by the Colcom Foundation, Associated General Contractors of America, American Society of Civil Engineers, Insituform Technologies, Inc, and National Association of Clean Water Agencies, the documentary details the lack of maintenance of the nation's water, sewer, and stormwater infrastructure and the hundreds of billions of dollars needed to restore and make critical improvements to the systems.

According to the film, restoring and upgrading our environmental infrastructure would be "the single largest public works endeavor in our nation's history."

### Liquid Assets in North Carolina

In January, "Liquid Assets" and the locally produced "Liquid Assets in North Carolina" were broadcast on the North Carolina Center for Public Television. (Both can be viewed on the UNC-TV website: <http://www.unctv.org/liquidassets/index.html>.) WUNC and the Utilities Division of Carolinas Associated General Contractors sponsored a follow-up public discussion on water and sewer infrastructure in Raleigh. The discussion centered on the need for infrastructure improvements, how to pay for infrastructure, and—importantly the "economic stimulus" bill under discussion in Washington and what it might include for water and sewer infrastructure.

There was much discussion of the fact that most water and sewer systems in North Carolina do not set rates high enough to adequately maintain their infrastructure and encourage wise use of water. Yet, the NC League of Municipalities says that 75 percent of city utilities charge more than 1.5 percent of Median Household Income for water and sewer service, which is the threshold to receive state grants (as opposed to loans) for high unit-cost projects and which is currently considered the measure of "affordability." Moreover, representatives of the Orange Water and Sewer Authority said that OWASA sets its rates to fully cover all expenses but still is facing a budget problem because of drought-induced revenue shortfall. The issue of "who pays for growth" of water and sewer systems in rapidly growing areas such as Raleigh and Onslow County led to discussion of impact fees and the strong political opposition to them. While the need for funding seemed clear, the feasible sources seemed few.

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### Emerging Issues Forum

Infrastructure funding was also the focus of the Emerging Issues Forum held at N.C. State University on February 9 and 10. In his keynote address on Monday, Senator Christopher Dodd of Connecticut told the audience that while the federal government should have a larger role in supporting national infrastructure, it cannot provide all the funding needed. He discussed his idea for a national infrastructure bank, which would leverage private funds to rehab and build various kinds of essential infrastructure. A summary of Dodd's National Infrastructure Bank Act of 2007 can be found at [http://dodd.senate.gov/multimedia/2007/080107\\_InfrastructurePacket.pdf](http://dodd.senate.gov/multimedia/2007/080107_InfrastructurePacket.pdf). President Obama has also called for a national infrastructure bank: <http://thepage.time.com/obamas-economic-policy-speech-excerpts/>.

## The stimulus bill

The promise of an infusion of federal dollars for public infrastructure in the "American Recovery and Reinvestment Act of 2009" has brought about a flurry of activity aimed at compiling lists of "shovel ready" water and sewer projects that could begin to create jobs and fuel demand for construction materials within months.

HR 1 as passed by the Senate (and at this writing, agreed to in conference) includes \$4 billion for Clean Water State Revolving Funds (CWSRF—wastewater) and \$2 billion for Drinking Water State Revolving Funds (DWSRF—drinking water). The original House version included \$8.4 billion for the funds. These federal dollars are in addition to the regular EPA appropriation for those programs, which over the past few years has been about \$1.5 billion to \$2 billion annually. The funds will be distributed to states using the current EPA formulae, which are based on earlier needs surveys.

As U.S. Rep. Heath Shuler (NC

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### Infrastructure recommendations of the Water Allocation Study

In their final report to the N.C. General Assembly's Environmental Review Commission, the Water Allocation Study Team (led by Bill Holman of Duke and Richard Whisnant of UNC-Chapel Hill) recommends that the state improve its water supply by increasing water use efficiency. Critical to efficient use is maintenance of infrastructure, and in order to maintain infrastructure, the report says, systems must "practice true asset management, depreciate their assets, and set rates accordingly."

To encourage systems to adopt a more realistic business model the report recommends:

- that the legislature direct the Local Government Commission (LGC) to take a more active role in monitoring the financial side of local government's operation and maintenance of water infrastructure, and
- that the legislature direct DENR, in conjunction with the LGC, to monitor and regulate the ongoing financial and managerial capacities of water systems rather than just review system capacity where there are requests for expansion of new systems.

The final Water Allocation Study is available at: <http://sogweb.sog.unc.edu/Water/images/4/40/2008NCERCWaterAllocationStudyFinalReport.pdf>



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## Oversight agency for water and sewer infrastructure in N.C. is recommended

The Program Evaluation Division (PED) of the N.C. General Assembly has issued a report recommending establishment of an oversight agency and development of a comprehensive strategic plan for water and sewer infrastructure in the state.

According to the report, "Without an effective oversight agency or comprehensive strategic plan in place to coordinate activities among six funding entities, water and wastewater funding is provided in a complex and fragmented manner. ...As a result, there are no systematic data to provide an assessment of state investments across entities, to determine whether the state's needs are being met, and to prioritize North Carolina's water and wastewater infrastructure needs. Finally, state funding for projects is skewed in the direction of grants rather than loans, which limits the state's ability to optimize scarce state dollars.

The PED recommends:

- directing the State Water Infrastructure Commission to develop a state-wide strategic plan and needs assessment for water and wastewater infrastructure funding by May 1, 2010;
- requiring better oversight of water and wastewater funding by either authorizing the State Water Infrastructure Commission to coordinate and oversee the system or by establishing a single water and wastewater authority; and
- using state loan programs and relying less on grants when determining state appropriations for water and wastewater infrastructure.

The report, *North Carolina's Water and Wastewater Infrastructure Funding Lacks Strategic Focus and Coordination*, can be downloaded from the General Assembly website at: [http://www.ncleg.net/PED/Reports/documents/WWI/WWI\\_Report.pdf](http://www.ncleg.net/PED/Reports/documents/WWI/WWI_Report.pdf)

## Stimulus *continued*

11<sup>th</sup> District) pointed out at the Emerging Issues Forum, only 1.5 percent of the stimulus package is for water and sewer funding, and it will not go far.

## NC Clean Water State Revolving Fund (CWSRF)

According to Dan Blaisdell, head of the Construction Loans and Grants Section in the NC Division of Water Quality (<http://www.nccgl.net/>), under the bill passed by the Senate, North Carolina would get about \$73 million for the NC Clean Water State Revolving Fund, which largely funds wastewater projects. Over the last five years, North Carolina has gotten only \$20.5 million to capitalize that fund, so the stimulus funding will represent

a big increase but will still fall far short of needs. Blaisdell said that a request for letters of intent to apply for the stimulus funds went out from his section on Feb 6, and that by Feb 11, he had received letters totaling \$700 million in project cost. He said that he expected letters representing that much more may be sent by the February 20 deadline.

To be eligible for the funds, projects must be included on the CWSRF project list, and a public hearing will be held on the list in March. The next step in the process will be accepting full applications. No deadline for applications has been set.

Decisions on project funding will be based on priority ranking, with the ability to proceed to construction quickly being a major criterion. Proj-

ects that can start construction right away are likely to be those that require little or no permitting or for which permitting has already been done. HR1 requires that construction begin on stimulus-funded projects 180 days from enactment of the bill.

## Drinking Water State Revolving Fund (DWSRF)

The NC DWSRF is administered by the Loans and Grants Unit of the N.C. Public Water Supply Section. Unit chief Sid Harrell said that under the bill passed by the Senate, the NC DWSRF would receive about \$67 million in stimulus funding. The fund usually receives about \$28 million annually. He said his unit put out a call for letters of intent with a deadline of Feb 4 but had no estimate of the total value of letters received because of the huge response. To be eligible for stimulus funding, projects must be added to the DWSRF Intended Use Plan. For information on the process for applying for DWSRF money, go to website: <http://www.deh.enr.state.nc.us/pws/srf/Pages/CurrentNews.htm>

Harrell said that he does not anticipate holding a public hearing on the DWSRF plan but will make the plan public probably by email or through the State Clearinghouse bulletin (<http://www.doa.state.nc.us/clearing/ebulletin.aspx>).

## Likely projects?

Speaking at the Liquid Assets public discussion in January, Jim Lowry, Executive Director of the N.C. Utility Contractors Association, said that the best use of the stimulus funds would be for leak detection and repair. First, he said, "plugging the leaks" for both drinking water and sewer lines would save water and money and protect public health; second, local governments are required to have leak detection and repair programs in order to be eligible for loans and grants, and third, these programs require no permitting

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**Stimulus** *continued from page 3* and so could be launched immediately upon receipt of funds. The American Water Works Association has said that the largest category of projects being put forth by utilities for stimulus funding is water main and service line replacement, which in most cases would not require environmental permitting and could, therefore, be launched quickly.

### Efficiency and green infrastructure

The Senate version of the HR 1 requires that 15% of the water and sewer funds be used for “green infrastructure,” water efficiency, and other environmentally innovative projects. Presumably, “plugging the leaks” would be considered a water efficiency project. EPA’s interpreta-

tion of “green infrastructure” is practices that “can reduce, capture, and treat stormwater runoff at its source before it can reach the sewer system.” Blaisdell said that he has received no letters of intent for the “low-impact” kind of green infrastructure projects and that he expects water reuse projects will be considered green infrastructure. Harrell said that a range of projects would probably qualify as green infrastructure and efficiency projects, including water line replacement, “find and fix” projects, and others targeted by the “drought bill” (Session Law 2008-143 Section 9).

News reports anticipated that the stimulus bill would get through conference committee and be passed by Friday, Feb 13. It is the intent of Congress to make stimulus funding available quickly and requirements for cost sharing are waived.

## January action of the N.C. Environmental Management Commission

### Water Quality Committee

The EMC’s Water Quality Committee met on January 7, 2009, and took the following action:

- Approved recommending to the full EMC that it find that the City of Raleigh has made substantial progress towards compliance with the Water Supply Watershed Protection rules for the Upper Neuse River/Richland Creek watershed. In July, the EMC had directed the Division of Water Quality to notify Raleigh that it was not in compliance with state rules for protecting water supply sources. Raleigh adopted state minimum restrictions for the subject watershed in October 2008. However, Chairman Charles Peterson noted that Raleigh had not provided a report the committee asked for on development in the watershed between 2002, when the rules should have been adopted, and 2008, when they were adopted.
- Heard a report on the final draft of the Neuse River Basinwide Water Quality Plan and agreed to defer action until the committee meets in March so that the City of Raleigh can have additional time to review “strengthened recommendations.” Additional comments were to be taken from stakeholders until Feb 2, 2009, but no additional revisions were to be made. The plan is to be presented to the full EMC at its March meeting. In the report on the plan, the committee learned that DWQ has asked for the deadline for developing the Falls Lake nutrient management strategy be extended to 2010. The draft report can be accessed at <http://h2o.enr>.

### Other environment-related funds in the American Recovery and Reinvestment Act of 2009 (version 5 of HR1)

#### EPA

\$600 million to Hazardous Substance Superfund to carry out remedial actions  
\$200 million to Leaking Underground Storage Tank Trust Fund for cleanup activities

#### Natural Resources Conservation Service:

\$275 million for watershed and flood prevention operations  
\$65 million for watershed rehabilitation

#### USDA Rural Utilities Service

\$1.3 billion for rural water and wastewater

#### Corps of Engineers

\$25 million for investigations  
\$2 billion for construction, with \$200 million to go for water-related environmental infrastructure assistance

#### U. S. Geological Survey

\$135 million for surveys, investigations and research

#### National Park Service

\$158 million for operation

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[state.nc.us/basinwide/Neuse/2008/NeuseRiverBasinPlanDRAFT.htm](http://state.nc.us/basinwide/Neuse/2008/NeuseRiverBasinPlanDRAFT.htm). Recommendations can be found in the executive summary and include: evaluating the magnitude of nitrogen loading from existing development, assessing stormwater programs and reviewing erosion and sediment control compliance activities.

- Heard a report on a proposed flexible buffer mitigation program that addresses a legislative mandate to allow alternatives to restoring riparian buffers in the Neuse basin as long as the alternatives reduce nutrient loading as well or better than the riparian buffer that is lost. The guidance for flexible buffer mitigation can be found at: <http://h2o.enr.state.nc.us/admin/emc/documents/01wqc03.pdf>.

## Environmental Management Commission

At its meeting on January 8, 2009, the EMC took the following action:

- Found that substantial progress has been made by the City of Raleigh in implementing Water Supply Watershed rules in the Upper Neuse River/Richland Creek watershed. (For background on this issue see the May-October 2008 WRRRI News: [http://www.ncsu.edu/wrri/news/WRRINews\\_362.pdf](http://www.ncsu.edu/wrri/news/WRRINews_362.pdf))
- Approved a request to proceed to public hearings on changes to air quality permit noticing requirements.
- Heard an update on North Carolina's challenge to EPA's Clean Air Interstate Rule and the effect of its vacature on Air Quality's nitrogen oxide (NOx) State Implementation Plan.
- Heard an update on the draft heavy-

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## Trout Buffer Law and Rules

**Law:** Sedimentation Pollution Control Act of 1973 (As Amended through 2007)

North Carolina General Statutes Chapter 113A Article 4

§ 113A-57. Mandatory standards for land-disturbing activity

No land-disturbing activity subject to this Article shall be undertaken except in accordance with the following mandatory requirements:

(1) No land-disturbing activity during periods of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the twenty-five percent (25%) of the buffer zone nearest the land-disturbing activity. *Waters that have been classified as trout waters by the Environmental Management Commission shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the twenty-five percent (25%) of the buffer zone nearest the land-disturbing activity, whichever is greater. Provided, however, that the Sedimentation Control Commission may approve plans which include land-disturbing activity along trout waters when the duration of said disturbance would be temporary and the extent of said disturbance would be minimal.* This subdivision shall

not apply to a land-disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

**Rules:** NCAC Title 15, Chapter 4 Sedimentation Control

15A NCAC 04B .0125 BUFFER ZONE REQUIREMENTS

(a) Unless otherwise provided, the width of a buffer zone is measured from the edge of the water to the nearest edge of the disturbed area, with the 25 percent of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation.

(b) The 25 foot minimum width for an undisturbed buffer zone adjacent to designated trout waters shall be measured horizontally from the top of the bank.

(c) Where a temporary and minimal disturbance is permitted as an exception by G.S. 113A-57(1), land-disturbing activities in the buffer zone adjacent to designated trout waters shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 100 linear feet of disturbance in each 1000 linear feet of buffer zone. Larger areas may be disturbed with the written approval of the Director.

(d) No land-disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations, as set forth in 15A NCAC 2B .0211 "Fresh Surface Water Classification and Standards", in these waters.

History Note: Authority G.S. 113A-54(b); 113A-54(c)(1); 113A-57(1); Eff. May 1, 1990;

Amended Eff. February 1, 1992.

The Trout Buffer Rules are administered by the Land Quality Section of the Division of Land Resources as part of the Erosion and Sedimentation Control Program.

**EMC** *continued*

duty idle restrictions approved for public hearing in November. The Rules Review Commission noted that the EMC does not have authority to require individuals to provide public education materials and signage, so a paragraph requiring such had to be deleted. The rule will be renoticed.

- Approved, with much discussion, the final drafts of the Yadkin Pee-Dee and Broad River Basinwide Water Quality Plans. A great deal of discussion centered on stream sedimentation and destruction of trout buffers in violation of state rules. Commissioner Forrest Westall suggested that a cross-agency initiative is needed to educate people about and enforce trout buffer rules.
- Approved a request to hold a public hearing on the proposed reclassification of the Dan River in Caswell County for water supply. The Town of Roxboro wants to draw drinking water from the Dan, but the Divi-

sion of Environmental Health says the river is not the best source for the town because a significant portion of the watershed is in Virginia. A public hearing is expected in early summer.

- Grudgingly postponed until March consideration of revisions to the well construction rules (15A NCAC 2C. 0100). Although stakeholders have been involved in development of the rules revisions from the beginning, a lawyer for the N.C. Ground Water Association was on hand to ask for a delay so they can review the 526 page document. The commission stipulated that no new information may be taken on the final rule, only suggestions on language.

*Committee and EMC agendas online at: <http://h2o.enr.state.nc.us/admin/emc/EMCAgenda2009.htm> include links to many presentations and/or documents presented. These materials will continue to be available on the EMC webpage.*

## Jackson is first African American EPA Administrator

President Obama nominated Lisa Perez Jackson to be Administrator of the U.S. Environmental Protection Agency in December 2008, and she was confirmed by the U.S. Senate in January 2009. She is the first African American to hold the post.

Jackson grew up in the Lower Ninth Ward of New Orleans. She graduated summa cum laude from the School of Chemical Engineering at Tulane University and earned a master's degree in chemical engineering from Princeton University. She served 16 years with EPA, first at headquarters in Washington, DC, then in the regional office in New York City, working primarily in the Superfund site remediation program and enforcement.

In 2002, she joined the New Jersey Department of Environmental Protection where she headed a number of programs. In 2006, she became New Jersey's Commissioner of Environmental Protection, leading a staff of nearly 3,000 and initiating a strong compliance and enforcement initiative. In October 2008, she became chief of staff and chief legislative liaison to the New Jersey governor.

Jackson is the second New Jerseyan to be EPA administrator, following Christy Todd Whitman, who served from 2001-2003. She immediately succeeds Stephen Johnson who served from 2005-2009.

While Jackson is highly praised by some for her enforcement zeal, her appointment is not without contro-

versy. A review of the controversy can be read in Scientific American: <http://www.sciam.com/article.cfm?id=likely-epa-pick-hit-for-new-jersey-record>

She has promised to review regulation of coal ash in the wake of spills in Alabama and Tennessee, and to make science the "backbone for EPA programs."

## Inter-agency report examines adaptive management of water resources in face of climate change

Climate change will likely affect fundamental drivers of the hydrological cycle and, therefore, all sectors of water resources management. It may require changed design and operational assumptions about resource supplies, system demands or performance requirements, and operational constraints.

A new report from NOAA, USGS, ASACE and the Bureau of Reclamation suggests processes that will improve tracking, anticipation, and response to climate change effects. A critical goal of this report is to develop effective coordinated, cross-agency early warning systems in support of adaptation as our climate changes.

**Climate Change and Water Resources Management: A Federal Perspective** By Levi D. Brekke, Julie E. Kiang, J. Rolf Olsen, Roger S. Pulwarty, David A. Raff, D. Phil Turnipseed, Robert S. Webb, and Kathleen D. White can be downloaded from the U.S. Geological Survey website at: <http://pubs.usgs.gov/circ/1331/Circ1331.pdf>

## Environmental Legislation Introduced in the N.C. General Assembly

Following are environment-related bills introduced as of Feb 11. This list is not comprehensive. Links to bill text are given.

H3 AN ACT TO DISAPPROVE RULES ADOPTED BY THE NC ENVIRONMENTAL MANAGEMENT COMMISSION AND APPROVED BY THE RULES REVIEW COMMISSION. This bill would disapprove rules adopted to implement the Jordan Lake Water Supply Nutrient Strategy. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H3v1.pdf>

H 54 AN ACT APPROPRIATING FUNDS FOR MONITORING AND EMERGENCY CLEANUP OF THE TEXFI SITE CONTAMINATION. Appropriates to Department of Environment and Natural Resources, Division of Waste Management \$50,000 for the 2009-2010 fiscal year to cost-share federal funds for the cleanup and monitoring of the groundwater and other contamination located at the Texfi site in Fayetteville and for any emergency cleanup activities needed at that site. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H54v1.pdf>

H86 (=S45) AN ACT TO REQUIRE ALL-TERRAIN VEHICLES AND MOTORCYCLES THAT ARE USED AS OFF-ROAD VEHICLES TO BE REGISTERED WITH THE DIVISION OF MOTOR VEHICLES, TO CREATE A NONREVERTING REVENUE FUND IN THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DESIGNATED AS THE OFF-ROAD VEHICLE TRUST FUND TO BE USED TO PROVIDE ALL-TERRAIN VEHICLE SAFETY TRAINING, ACQUIRE NEW LANDS, MANAGE LANDS, AND DEVELOP OFF-ROAD VEHICLE PARKS, TRAILS. Creates in DENR the North Carolina Off-Road Vehicle Recreation Program and requires it to review the inventory of public lands to determine the feasibility of providing public access for off-road vehicle recreation and trails and to report in 2010. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H86v1.pdf>

H28 AN ACT TO AUTHORIZE THE LEGISLATIVE RESEARCH COMMISSION TO STUDY THE FEASIBILITY AND ADVISABILITY OF EXTENDING CREDITS TO FARMING AS A BUSINESS IN ANY "CAP-AND-TRADE" PROGRAM FOR GREENHOUSE GAS EMISSIONS IN WHICH THE STATE PARTICIPATES. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H28v1.pdf>

S54, AN ACT TO AUTHORIZE CREATION OF MUNICIPAL SERVICE DISTRICTS FOR DRAINAGE. Drainage to include only "increasing the number of ditches within the corporate limits to handle the collection and drainage of stormwater and investing in other public work projects that will serve to reduce flooding within the corporate limits and improve the health, safety, and welfare of the real property owners and residents of the municipality. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S54v1.pdf>

S89 AN ACT TO AUTHORIZE THE ADDITION OF GRANDFATHER MOUNTAIN STATE PARK TO THE STATE PARKS SYSTEM. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S89v1.pdf>

S 97 AN ACT TO ALLOW PARKS AND RECREATION AS AUTHORIZED PURPOSES FOR SPECIAL ASSESSMENTS FOR CRITICAL INFRASTRUCTURE NEEDS. Adds parks and rec to list of projects for which counties may make special assessments against "benefited property within the county for the purpose of financing the capital costs of projects for which bonds may be issued." <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S97v0.pdf>

S101 AN ACT REQUIRING THE INTERCONNECTION OF PUBLIC WATER SYSTEMS OR WASTEWATER SYSTEMS TO REGIONAL SYSTEMS WHEN NECESSARY TO PROMOTE PUBLIC HEALTH, PROTECT THE ENVIRONMENT, AND ENSURE COMPLIANCE WITH DRINKING WATER RULES AND TO REQUIRE THAT AN ANALYSIS OF REASONABLE ALTERNATIVES BE DONE BEFORE CONSTRUCTING OR ALTERING A PUBLIC WATER SYSTEM. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S101v0.pdf>

## Research finds chloramination can control both haloacetic acids and trihalomethanes in North Carolina drinking water

The most recently published of a series of WRRI-sponsored projects on controlling disinfection by-products (DBPs) in drinking water identified chloramination as the most effective of the easier and less expensive methods available for controlling the two classes currently regulated. The research was conducted by the same scientist whose research the US EPA relied on to set regulations for DBPs, Dr. Philip Singer of UNC-Chapel Hill.

### Some background

In 1854 British scientist John Snow traced an outbreak of cholera to a water pump contaminated by sewage and used chlorine to purify the water, thus paving the way for water disinfection. In 1908 Jersey City, NJ, became the first U.S. public water supply to use chlorination. After the courts upheld a city's right to protect public health by disinfecting its water supply, chlorination—a cheap and reliable form of water purification—became common across the United States.

However, in 1971 the American scientist Thomas Bellar discovered the chemical chloroform (best known for its ability to induce anesthesia) in Cincinnati tap water but none in Ohio River water used to produce the city's drinking water. Soon after, a nationwide survey of drinking water revealed that the occurrence of chloroform in drinking water was widespread, and its production was traced to the reaction of chlorine with organic compounds naturally occurring in source water. By 1978, research had revealed a host of similarly produced "disinfection byproducts" in drinking water and the U.S. EPA started issuing rules to regulate the chemicals, beginning with a class called trihalomethanes (TTHMs) and following up with the class called haloacetic acids (HAAs).



Over the last three decades, millions of dollars of research has focused on the health effects of disinfection byproducts, ways of reducing their production in chlorinated water, and alternative ways of purifying drinking water. One of the principal researchers in the field has been Dr. Philip Singer, Dan Okun Professor of Environmental Engineering and Director of the Drinking Water Research Center at the University of North Carolina at Chapel Hill. Water systems in North Carolina have frequently cooperated on his research seeking ways to control DBPs.

### The research

In a 1995 study, Singer had found that—unlike the reported national norm—drinking water in North Carolina had higher levels of HAAs than TTHMs. Systems that had already adopted practices to control TTHMs would not be able to control HAAs using the same methods. In this study, Singer evaluated two relatively easy and cheap methods known to reduce HAAs—pH adjustment and chloramination—for their ability to reduce the production of these chemicals in North Carolina drinking water and at the same time control levels of TTHMs.

To evaluate pH adjustment, Singer collected settled water samples from six N.C. treatment plants, chlorinated them in the lab under a range of pH conditions and measured the extent of HAA and THM formation. He compared the lab results to actual HAA and THM levels found in the drinking water distribution system. The results showed that with increasing pH, HAA formation went down, but THM formation went up. Clearly, pH adjustment would not work for North Carolina systems.

To evaluate chloramination, Singer sampled water from two plants that used chloramination as a secondary disinfectant to determine how it affected HAA and THM formation. He also simulated the impact of chloramination in the lab by adding ammonia to samples of chlorinated filtered and finished water. Results showed that chloramination effectively stopped overall HAA formation as well as TTHM formation. Therefore, by switching from using only free chlorine to using combined chlorine (chlorine and ammonia) to accomplish chloramination, drinking water systems can maintain sufficient disinfecting power to protect against microbial contamination while reducing the formation of toxic disinfectant by-products.

However, Dr. Singer points out in his report that there are other ways of controlling DBPs in drinking water. One is to discourage algae growth in the source water by controlling nutrient enrichment through watershed protection.

The report on this research, *Control of Haloacetic Acid Formation in North Carolina Drinking Water*, WRRI Report 379, will soon be available on the WRRI website: <http://www.ncsu.edu/wrri/reports/>

## Upcoming Events

### Erosion & Sediment Control in the Mountains

March 3, 2009

Franklin, North Carolina

<http://www.ncsu.edu/waterquality/frenchbroad/erosion.html>

### 2009 IECA Southeast Chapter Muddy Water Blues

#### Providing Innovative Solutions to Complex Regulations

May 11-13, 2009

Asheville, North Carolina

Find the answers to your important questions: EPA Proposed Effluent Limit Guidelines: What will they look like, and when finalized, how can we meet them?

CALL for ABSTRACTS

Abstract Deadline: February 18, 2009

View Event Summary and Submit an

Abstract: <http://guest.cvent.com/i.aspx?5S,P1,AD0C0576-A14B-4480-8334-45A4A4F21FD2>

### Residential Rain Garden Certification

March 4, 2009 and August 4, 2009

New Hanover County Extension Center, Wilmington, NC

<http://www.bae.ncsu.edu/stormwater/training/raingarden.html>

### NCSU Biological and Agricultural Engineering Workshops

- Erosion and Sediment Control/Stormwater certification for NCDOT Projects
- Stormwater and Low-Impact Development Training
- Stream Restoration Program—River Course Series

[http://www.bae.ncsu.edu/training\\_and\\_credit/workshops.php](http://www.bae.ncsu.edu/training_and_credit/workshops.php)

### American Water Resources Association conferences

#### 2009 AWRA Spring Specialty Conference

#### Managing Water Resources and Development in a Changing Climate

Anchorage, AK May 4-6, 2009

<http://www.awra.org/meetings/Anchorage2009/index.html>

#### 2009 AWRA Summer Specialty Conference Adaptive Management of Water Resources II

Snowbird UT June 29-July 1, 2009

<http://www.awra.org/meetings/SnowBird2009/index.html>

#### American Public Works Association Conference on Sustainability in the Public Works Sector

Charlotte, NC March 26-27, 2009

<http://www.apwa.net/events/eventdetail.asp?ID=5181>

#### NC AWWA-WEA

#### 8<sup>th</sup> Annual Spring Conference

New Bern, NC April 5-7, 2009

[http://www.ncsafewater.org/index.php?option=com\\_content&task=view&id=47&Itemid=66](http://www.ncsafewater.org/index.php?option=com_content&task=view&id=47&Itemid=66)

#### 2009 Association of State Dam Safety Officials Annual Conference

September 27 - October 1

Hollywood, FL

<http://www.damsafety.org/conferences/?p=69691985-b8ad-4c6c-b8de-1114daa5f49e>



## NCWRA Forum and Luncheon

### *Economics of Water Resources: Conservation & Efficiency*

Dr. Laura Taylor  
Director, Center for  
Natural Resources and Environmental  
Policy (CEnREP), and Professor of  
Agricultural and Resource Economics  
NC State University

Monday, April 6, 2009  
11:30 am  
Jane S. McKimmon Center

Questions?  
Contact WRRRI at 919-515-2815 or  
[water\\_resources@ncsu.edu](mailto:water_resources@ncsu.edu)  
[www.ncsu.edu/wrri/events/ncwra](http://www.ncsu.edu/wrri/events/ncwra)



## Progress Energy Water Resources Seminar

SAVE THE DATE!  
April 16, 2009

N.C. State University McKimmon Center



Speaker:  
Chuck Clarke  
Chief Executive Officer  
of Cascade Water Alliance

## RESOURCES

### *NCDENR Permit Handbook*

Ever wish there was a one-stop, all encompassing site or reference for every NCDENR permit that exists? Ever spent time drilling down through one Division's web page to reference a single permit type (for yourself or to refer a DENR customer)? Wish to simply know the cost of a certain permit type or where to send an application?

If you answered 'yes' to any of these questions, please take a moment to peruse the New One-Stop NCDENR Permit Handbook and to bookmark this link for future reference: <http://portal.ncdenr.org/web/csc/start/overview>.

Cascade Water Alliance is a consortium of eight municipalities and water districts in the Puget Sound region of Washington. The consortium is embarking on a major regional planning process to best determine how to bring water to 370,000 residents and 22,000 businesses over the next several decades.

Check the WRRRI website:  
<http://www.ncsu.edu/wrri/>  
for additional information  
and a presentation abstract.