



**Western Kentucky University
Technical Assistance Center for Water Quality
Center for Water Resource Studies**

**“Supporting Small Water Systems in
Meeting the Goal of Public Health Protection”**

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Introduction

The Technical Assistance Center for Water Quality at Western Kentucky University (TACWQ WKU) serves to support capacity development of small drinking water systems through the Utility Management Institute, a circuit rider, source water protection activities, and information technology. The goal of the center is to help small systems meet the requirements of the Safe Drinking Water Act (SDWA) and ensure public health. While focused on solving local problems that can serve as national models, the TACWQ is impacting small systems throughout the country.

Activities and Outcomes

Utility Management Institute

The Utility Management Institute (UMI) was created to provide utility managers, and other utility personnel, with the opportunity to gain valuable knowledge and earn a university-based, professional designation in the field of management. These goals can be accomplished through the successful completion of six modern, practical management courses, specifically developed for public water and wastewater utility personnel.

The UMI offers training to managers—and those interested in becoming managers—through a set of courses designed to be practical and applicable to water and wastewater utilities, regardless of size. Courses include Utility Management 101; Utility Organization, Regulation and Law; Utility Finance and Administration; Human Resource Management for Utilities; Public Relations in Utility Management; and Modern Technology and Utility Management.

During the quarter, the course entitled “Utility Management 101” was presented in Cadiz, Kentucky on November 15-17, 2005 at Barkley Lake State Resort Park. There were forty-six (46) students participating in this course. Course assessments continue to show a high level of satisfaction with the training. Twenty-two (22) of the assessors rated the session as very beneficial, fourteen (14) rated the course as being beneficial. No student assessments rated the course as being “slightly beneficial” or “not beneficial.” Course assessments for this course are available upon request.

The Utility Management Institute now claims a total of two hundred thirty-six (236) students. Eighty-five (85) of our students have now completed all six of the courses in the UMI Series and have been awarded the Utility Management Professional designation.

Small System Circuit Rider

The "Circuit Rider" approach to providing a combination of on-site technical assistance and training is nationally recognized as the most effective method of assisting small public water systems to comply with state and federal environmental regulations. The Circuit Rider program

works in partnership with Kentucky Division of Water (DOW) to target the public water systems serving populations under 3,300, with particular emphasis on systems serving less than 500 people. Our "Circuit Rider" approach works to target those small systems experiencing profound difficulties in complying with SDWA provisions in order to enhance protection of public health.

During the 1st Quarter, the Circuit Rider position logged 465.5 hours. Of that time 28% of the total time was spent directly assisting systems or their personnel including 128.50 hours on-site working with systems, 13.25 hours developing plans and reports for systems, and 22.75 hours providing formal training and program outreach.

The majority of time this quarter was spent assisting systems with infrastructure mapping. Activities for technical assistance included GPS-GIS mapping, leak detection, source water protection and water quality monitoring. Compliance assistance included water system evaluation, monitoring plans and CCR preparation. Management/financial assistance included water accountability and cost of service analyses.

Significant Contacts: This quarter provided several opportunities to assist water utilities. The following is one example.

Centertown Water System – Located in Ohio County Kentucky serving 479 water and 197 sewer customers.

Centertown is a rural farming community in western Kentucky. Shane Snodgrass, the utility superintendent, contacted the KRWA office on a Friday afternoon to report several customers out of water and a tank that would not fill. The circuit rider was in contact with Mr. Snodgrass later that evening. Mr. Snodgrass had been searching for the leak most of week and thought he had it isolated, but still could locate the break. The Circuit Rider, Joe Burns, made the 3 ½ hour drive the next morning. Upon arrival, Mr. Burns reviewed system maps and the leak detection procedures of the past few days. After valving and pressure monitoring it was determined that the old valves were leaking and insufficient pressure from the tank would not cause the leak to be audible. By this time the majority of the town was either out of water or had low pressure. The boil water advisory had already been posted. One observation by the Circuit Rider was that water usage had not significantly increased. A review of master meter readings and system pressure showed that the problem was the pump station. There was also the possibility that a leak was exacerbating the problem, however the leak was not in the "isolated" area. Fortunately the utility had a spare pump which was installed late that afternoon. By Sunday night the tank had filled and service was restored, although customers at higher elevations were experiencing some pressure problems. The following week the Circuit Rider returned to find the utility staff searching for another leak. One customer was out of water. They had isolated the leak to a small area where a new sewer line had been installed the year before. Water was rising to the surface beside the road, but in an area too distant from the affected customer. The Circuit Rider used a listening device and located the leak about two blocks away from the water observed at the roadside. The problem was a service line broken in half. Water loss was estimated at 30+ gpm. The leak was repaired and the higher elevation pressure problems were eliminated as well.

Linking Aquatic Ecosystem Metabolism to the Formation of Drinking Water Contaminants: Implications for River and Reservoir Management

Sampling has been completed at the Springfield Water Company. The redox study has also been completed, and these data sets are currently being integrated. The data needed for the development of a model DBP assay for Springfield is now complete. QA/QC on the data is being completed in preparation for the Excel modeling. It is still unclear at this time whether or not the redox data will be able to be incorporated as planned.

A presentation regarding how ecological “bulk parameters” can provide useful information to plant managers is currently being compiled, and will be offered at the Kentucky Water Resources Research Institute (KWRI) annual meeting in February 2006.

The work to develop an article on research and challenges associated with DBPs for the KRWA journal *Waterproof* is underway, but has been delayed pending the review of the new data set from Springfield Water Company.

Web-Based GIS

The Center for Water Resource Studies (CWRS) and Spatial Data Integrations (SDI) are proposing the development of a prototype system to determine the effectiveness of a web based GIS solution for small water utilities. The ability to host an entire GIS solution in one central location not only allows these utilities to share the cost involved in the creation of a GIS, it also reduces the amount of maintenance and manpower required by each individual utility. We believe that this new approach to GIS will prove to be a viable option for the small water systems in the U.S.

SDI's subgrant was not signed until mid-December 2005 due to discussions on intellectual property concerns. Work on the web-based GIS will begin next quarter. SDI is currently advertising for a WKU intern to assist in the web-based GIS project.

Small Systems Partnership for Compliance Monitoring

During the quarter, WATERS provided microbiological analytical services to eleven (11) public water systems in Kentucky with populations less than 10,000. Seven (7) of these systems have populations less than 3,300. WATERS also provided the analyses for several of the parameters in the Reservoir Monitoring Study, and provides ongoing research analyses for the National Park Service.

Source Water Assessment Analytical Method Development

Quantitative Real-Time PCR (qRT-PCR) DNA analysis was applied on a monthly schedule as part of the long-term ecological monitoring plan at Mammoth Cave National Park using techniques developed at WATERS. WATERS research was applied to the quantification of

green algae in a similar way to that in which parasites such as *Cryptosporidium* and *Giardia* (C&G) would be monitored by application of methods already published in the literature.

Published qRT-PCR technology was also applied in an ongoing contract with the Louisville Water Company (LWC) for the monitoring of eyewash stations for *Acanthamoeba*, a microorganism known to facilitate the transmission of many pathogens including corneal keratitis in those who wear contact lenses. The published qRT-pCR method was similar to that in which parasites such as C&G would be monitored.

Published qRT-PCR technology was also applied to LWC research in the effect of chlorite ions on the growth of ammonia oxidizing bacteria in drinking water storage tanks. The published qRT-pCR method was similar to that in which parasites such as C&G would be monitored.

We know from these studies and from further readings that spiking suspensions cannot be used for DNA extraction. Live organisms (available from the EPA) will be necessary for extraction of DNA that can be used for exploratory qRT-PCR with C&G.

Procedures for Assessing Source Water Vulnerability to Suspended Sediment and Prioritizing Implementation of Best Management Practices in Karst Environments

The goal of this project is to develop procedures for small water systems in karst regions to:

- a) assess source water vulnerability to suspended sediment and sediment-associated contaminants, and
- b) prioritize the implementation of best management practices (BMPs) for reducing the load of suspended solids to source waters.

During the quarter, a presentation was made at the Association of State Drinking Water Administrators' (ASDWA) 20th annual conference in St. Louis, MO. On October 19, Dr. Stephen Kenworthy presented "Assessment of Source Water Vulnerability to Suspended Sediment Loading in South Central Kentucky".

Analysis of landscape characteristics and land use patterns for Greensburg Water System's source water area also continued this quarter. In addition, maps indicating areas with a high potential of being fine sediment sources were produced.

Source Water Protection Education and Outreach

GIS Applications for Source Water Protection

To facilitate the development of GIS Applications for Source Water Protection, ArcSDE using MS SQL Server is being installed and upgraded. This will allow GIS coverages that are used on individual computers to be more efficiently shared through the use of internet and intranet. This

will also facilitate the conversion to ArcGIS Server using ArcIMS to allow water systems to access and edit data online, reducing the expense to the systems.

Laboratory Data Exchange System

Large volumes of laboratory data from different sources have made data exchange between different applications very difficult. In this project, we plan to develop a software system that consists of a set of tools to facilitate data exchange. Small water utilities will benefit from this system by being able to share information easily with reporting agencies and move data from one information management tool to another without the time and expense of data conversion. This will facilitate the sharing and reporting of data for purposes such as tracking trends in water quality.

This quarter, a subsystem for XML document structure analysis and classification was completed. This subsystem will help process large sets of XML documents. The specific interface that will help the water systems the most is in the process of being identified.

Web Page Hosting

Many small water systems do not have the financial or technical resources to develop and host their own websites. A template has been developed that allows small water systems to customize a site with pertinent information, such as CCRs, business hours, fee schedules, and contact information. Three small water systems are currently being hosted, and several more will be targeted next quarter at the Kentucky Water and Wastewater Operators Association's (KWWOA) annual conference.

Technology Training

As the use of technology develops, the need for technology training increases. This quarter, a workshop for water districts was created to help demystify the technology tools available to them. The first training session will be offered in conjunction with the KWWOA annual conference in Owensboro, KY in March 2006.

Center Coordination

During the quarter, CWRS and SDI hosted a booth at the National Rural Water Association's annual conference in Sacramento, CA. CWRS also hosted a booth at the Southeast Watershed Roundtable held in Bowling Green, KY on November 3-4.

Two CWRS representatives attended the ASDWA annual conference in St. Louis, MO on October 18-20. Dr. Andrew Ernest was invited to be on a panel at the International Conference on Safe Water in San Diego, CA on October 20. Dr. Ernest also attended the Governor's Conference on the Environment in Louisville, KY on November 4.

The Center is currently developing ideas for collaborations with the TAC at Mississippi State University. Dr. Ernest met with Dr. Jeff Ballweber of MSU on October 28 to discuss potential partnerships.