



**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”**

<http://water.wku.edu>
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**Quarterly Report
for the period
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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 Organization, Regulation and Law” was presented in Olive Hill, Kentucky on March 15-16, 2006 at Carter Caves State Resort Park. There were thirty-six (36) students participating in this course. Course assessments continue to show a high level of satisfaction with the training. Fourteen (14) of the assessors rated the session as very beneficial, and thirteen (13) 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-eight (238) students. Ninety (90) 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 2nd Quarter, the Circuit Rider position logged 545.5 hours. Of that time 46% of the total time was spent directly assisting systems or their personnel including 197.5 hours on-site working with systems, 20 hours developing plans and reports for systems, and 35.75 hours providing formal training and program outreach.

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

Significant Contact:

Livingston Municipal Waterworks – Located in Rockcastle County, Livingston serves 171 water and 92 sewer customers.

The City of Livingston is a rural residential community in southeastern Kentucky. The City Clerk contacted the Circuit Rider regarding a cost of service study following an 87% wholesale water rate increase. The rate increase had drained the city's already meager revenues to the point that they were behind three months to the supplier (approx. \$10,500). The Circuit Rider selected FY2005 as the "test year" and worked with the City Clerk to compile all of the financial records. This proved to be a challenge since there was no accounting system that could generate financial reports. Therefore, a year's worth of customer usage had to be entered manually along with reallocating expenses to their respective cost centers. The cost of service study also shows a 48% water loss. This becomes a primary factor in the city's decision to increase rates or request consolidation with a larger utility. At the old rate of \$1.24/1,000 gal, unaccounted for water cost the city over \$12,000. At the new wholesale rate of \$2.32/1,000 gal, projected water loss will cost \$23,000. For the city to set cost-based rates, the increase for a normal family usage of 5,000 gal will increase from \$31.25 to \$52.75.

The result of the study will allow the council to set appropriate rates based on cost of service or decide whether consolidation is in the best interest of the community. The study will be presented at the April 2006 council meeting.

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

The data needed from Springfield Water Company for the development of a predictive management tool to link disinfection byproduct (DBP) production with basic water quality parameters is now complete. The QA/QC on the data is also complete, and the modeling phase will begin next quarter.

Web-Based GIS

The Center for Water Resource Studies (CWRS) and Spatial Data Integrations (SDI) are developing 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.

During the 2nd quarter, a graduate student from the Computer Science Department at WKU was hired to fill the SDI intern position. Since this hiring, the software required for the web based GIS system has been installed and configured. These applications include ArcSDE, ArcServer and SQL server. SDI's custom Geodatabase used in its SDImaps standalone application has been converted over to the ArcSDE/SQL database format. With this task completed, a preliminary layout for the application using a set of sample data has also been created. This layout includes: a table of contents where features loaded into the GIS are displayed, basic map navigation tools (Zoom in/out, Pan, Identify, etc.), basic drop-down menu options and an editor toolbar control. The preliminary layout can currently be viewed at <http://12.180.241.9/water>.

This quarter SDI also provided CWRS students with assistance in GPS data collection and GIS creation for mapping Webster County Water District's water lines (population 4,386).

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. Six (6) of these systems have populations less than 3,300.

Source Water Assessment Analytical Method Development

WATERS is providing quantitative Real-Time PCR (qRT-PCR) DNA analysis for ammonia oxidizing bacteria (AOB) for the Louisville Water Company (LWC). LWC is carrying out research on control of the AOB in drinking water storage tanks, and WATERS is providing DNA analysis services to report the concentration of specific AOB genes in the drinking water. LWC uses chloramines as a disinfectant for which the optimum ratio of chlorine to ammonia must be maintained, otherwise excess ammonia encourages AOB to proliferate in the distribution system.

A total of 46 samples were analyzed during the quarter, and LWC considers the results vital to their research.

After successful performance in the ongoing precision and recovery (OPR) program administered quarterly by the EPA, WATERS Lab became eligible for an on-site audit as a final step toward becoming EPA certified for *Cryptosporidium* analysis. The on-site audit was carried out February 7-8, 2006 by a technical expert and a recordkeeping and QA specialist. Verbal results of their findings were positive, and immediately procedures were undertaken to comply with their recommendations and suggestions. By the time the written response from the EPA was received in March, all issues had been addressed. An official written response was returned on March 30, 2006. Upon approval by the EPA, WATERS Lab will be granted certification.

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.

Activity this quarter included finalization of land use/land cover classification data based on Kentucky Landscape Snapshot imagery. These data were combined with USDA-NRCS digital soils data for Green and Taylor counties to develop geospatial coverages of soil erodibility (K factor) and land cover (C factor) for the Greensburg, KY source water catchment area below Green River Lake. The soils and land cover data were used to parameterize a hybrid unit stream power – USLE erosion model (USPED) for the source water catchment. USGS digital elevation data were used to derive spatial coverages of upslope contributing area and local slopes as primary topographic and hydrologic model drivers. These data were integrated in the ESRI – ARCGIS environment, which was also used to implement the steady-state estimates of soil flux and areas of erosion and deposition.

Model outputs include soil flux rates and erosion-deposition rates on a 10 m spatial resolution. The source water catchment was segmented on the basis of HUC14 sub-basins, and distributions of estimated vulnerability to erosion were assessed on a mean-value basis. Additional work to develop indexes summarizing risk of sediment delivery to individual stream channel segments is ongoing. These results will be integrated with the review of erosion and sediment control practices to prioritize site survey planning implementation of best management practices for reducing the load of suspended solids to source waters. These procedures will be detailed in a final report and distributed to the Greensburg, KY water system administrators and operators.

Source Water Protection Education and Outreach

A Decision Support System (DSS) web site which will consolidate drinking water information and tools from multiple locations to allow the user to go to one location when making a decision regarding their water supply is under development. The current beta site is available for view at <http://water.wku.edu/dss/index.htm>. Currently, GIS coverages included on the ArcIMS server are being cataloged, and searchable metadata is being developed.

Laboratory Data Exchange System

Large volumes of laboratory data from different sources have made data exchange between different applications very difficult. This project involves the development of 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 method for electronically extracting data from paper records was developed. Simple lab report data is now able to be converted into a database. A more user-friendly program for processing complex reports is currently under construction. This will allow important information from historic paper records to easily be put into a database without reading through each report and manually entering every piece of data.

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. This quarter, web pages were modified to allow the small utilities to modify the special information included on their site. This special modification feature is password protected with unique passwords for each water district. Hosting sites are available to preview from: <http://water.wku.edu/hosting.htm>

Letters are being developed to mail in the coming quarter to additional small water systems that may be interested in having an individual website created and hosted for their system.

Technology Training

As the use of technology develops, the need for technology training increases. This quarter, a workshop for water districts was held in conjunction with the KWWOA annual conference in Owensboro, KY on March 20, 2006 to help demystify the technology tools available to them. Some of the tools covered included items developed by CWRS, USGS, EPA and SDI. CDs with these tools were made available to participants. Basic computer information including backup, security and GIS was also covered during the training.

Center Coordination

Five CWRS representatives attended the KY Water and Wastewater Operator's Association (KWWOA) annual conference in March in Owensboro, KY. CWRS hosted a booth at KRWA's Management Conference in Bowling Green, KY on February 13-15, 2006. Jana Fattic attended the KY Pesticide Workgroup Meeting held in Frankfort, KY on January 30, 2006.

Dr. Andrew Ernest and Jana Fattic attended the 2006 TAC Planning Meeting at EPA Headquarters in Washington, DC on February 7-8, 2006. This meeting involved representatives from each of the eight Technical Assistance Centers throughout the country, as well as EPA, NRWA, WSC, ASDWA and RCAP. This annual gathering allowed for ideas of collaborative projects between the TACs, and was a resource for sharing information between the entities for dissemination throughout the country.