



**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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**Quarterly Report
for the period
January 1 – March 31, 2007**

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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 investigations, 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.

The Center accomplishes its goals by relying on its diversified staff, in-house laboratory capabilities (WATERS), and subcontractors such as Kentucky Rural Water Association (KRWA) and Spatial Data Integrations (SDI). Below are the activities that were conducted toward these goals for the second quarter of the grant year, January 1-March 31, 2007.

Kentucky Rural Water Association

The Kentucky Rural Water Association (KRWA) provides training, technical assistance, advocacy, and a variety of other services and benefits to water districts, sanitation districts, water associations, and municipalities under 10,000 in population. KRWA's basic training and technical assistance services are provided to all utilities that request help, regardless of membership status.

Utility Management Institute

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by increasing the overall proficiency of community water system managers for providing safe water.

The Utility Management Institute (UMI) was created, in a collaborative effort between WKU and KRWA, 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 utility personnel. The Utility Management Institute rewards its participants with the Utility Management Professional (UMP) designation after completion of all six courses.

During the quarter, the course entitled "Utility Organization, Regulation & Law" was presented in Carrollton, Kentucky on March 28-29, 2007 at General Butler State Resort Park. There were thirty-six (36) students participating in this course. Course assessments for the course are available upon request.

UMI brochures were mailed during the quarter to promote the program and advertise the UMI class schedule for 2007.

The Utility Management Institute now claims a total of two hundred eighty-four (284) students. One hundred twenty-one (121) 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

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by providing on-site technical assistance to community water system operators.

The Small System Circuit Rider continues to provide quality technical assistance and training to management and personnel from small public water systems throughout Kentucky. This segment of public water systems, serving under 3,300 in population (especially those serving under 500 in population), is difficult to help through traditional means. These very small systems are often not eligible for assistance through our other Circuit Rider programs (USDA funded) because they are privately owned or are not credit worthy. Hands-on assistance delivered on-site, with active follow-up assistance, is the best way to help these systems comply with the ever-increasing complexities of the Safe Drinking Water Act (SDWA).

During the 2nd Quarter, the Circuit Rider position logged 635.75 hours. Of that time 63% of the total time was spent directly assisting systems or their personnel including 313.5 hours on-site working with systems, 11.0 hours developing plans and reports for systems, and 76.25 hours providing formal training and program outreach.

The majority of time this quarter was spent assisting systems during a water shortage. Activities for technical assistance included GPS-GIS mapping, source water protection and water quality monitoring. Compliance assistance included water system evaluation, monitoring plans and CCR preparation. Management/financial assistance included water accountability.

Significant Contacts

City of Hindman – Located in Knott County, Kentucky serving 780 water and 240 sewer customers.

Hindman is a rural mining and logging community in eastern Kentucky. The city provides drinking water to outside city customers and wholesales water to the Knott County Water and Sewer District. The city treats groundwater from two of three wells drilled into a sandstone aquifer. Their average daily production is 280,000 gpd. Beginning in November 2006 the well capacity began to diminish. Between November and December the wells needed to be rested periodically in order for the aquifer to recharge. During these times the city was able to purchase water from a neighboring county water district. The Circuit Rider was called to assess the third city well which had not operated in 13 years primarily due to high iron content. The Circuit Rider assisted the city in shock chlorinating the well in an attempt to reduce the iron content. The well was dosed at 500 ppm for 24 hours. The chlorination was successful and the city began using the well.

By the end of February 2007 the wells were unable to keep up with the demand of 1,000 customers between the city and water district customers. The Circuit Rider was again called for

assistance. The city was directed to contact the primacy agency and then declare a state of emergency. The KY National Guard was contacted and within a few days had mobilized to Hindman with four reverse osmosis purification units (ROPU) to provide water to the city. During this time the Circuit Rider was onsite assisting the city in securing bottled water delivery and coordinating emergency response with the primacy agency. It was almost two weeks before the National Guard could fill all of the storage tanks and sustain the water demand of the system without the limited production of the wells. Through this period the Circuit Rider provided leak detection and assisted in re-pressurizing the water lines.

After the National Guard was able to provide all of the water without the wells the Circuit Rider began evaluating the wells by performing well pump and aquifer testing. The results showed that the aquifer was being over pumped. This was likely due to increased demand from new customers and sales to the water district. Although, diminished recharge may have occurred from mining operations. There are too many factors to consider to reliably determine the exact cause of the problem. The solution for the city is to reduce the pumping rate from the wells and drill two to three additional wells at greater distances in order to reduce the drawdown effect within the aquifer. The new wells were located by the Circuit Rider using lineament analysis and GPS mapping. So far two new wells have been drilled and the city is in the process of extending the raw water line to put the wells in production. Overall, the Circuit Rider has been involved in almost every aspect of the situation. Presently, the system savings just in hydrogeologic analysis exceeds \$25,000.

Spatial Data Integrations

Spatial Data Integrations, Inc. (SDI) is a full service geospatial firm offering a wide variety of mapping services and geographic applications, including imagery processing, natural resource data collection, photo interpretation, geospatial file management and Geographic Information Systems (GIS). SDI provides customized GIS applications and services to rural utilities and small municipalities. SDI has close ties to the rural water community and strives to be an industry innovator.

Asset Management

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by developing an asset management tool for water systems to more efficiently inventory and track their infrastructure and physical assets.

Many small water utilities in the United States have had infrastructure in the ground for over 50 years, much of which is now coming towards the end of its life cycle. Increasingly, utilities are looking for monies or best practices that will enable them to rehabilitate their aging infrastructure and to continue to offer one of America's most critical public health, economic and environmental assets. Asset management is one practice that small utilities can use to maintain their infrastructure and plan for upcoming rehabilitation or replacement in a more efficient and cost-effective manner.

Spatial Data Integrations (SDI) intends to develop a pilot web-based asset management system for small systems based upon the existing EPA guidance document “Asset Management: A Handbook for Small Water Systems” (EPA-816-R-03-16). This tool will show the utility personnel and community leaders the ‘big picture’ of their aging infrastructure and allow them to effectively plan capital improvements and/or needed repairs.

During the second quarter of the drinking water grant, SDI hired an intern to assist with the development of the web-based asset management program. The project has been divided into four phases:

1. Planning
2. Implementation
3. Documentation
4. Testing

Phase I which included gathering information about the requirements and specifications has been completed.

Phase II includes creating a user-friendly web-based interface, configuring the database and creating the linkage between the database and website. This phase has just begun and is expected to be finished around the first of June.

Phase III includes documentation creation. The documentation will be created to help in maintenance and troubleshooting the system. Expected completion date is mid-June.

Phase IV will be the beta testing stage. This stage will be used to thoroughly test the system for correctness, potential security issues and stability. A minimum of two water utilities will assist in the testing of the web-based asset management system. Any problems that are discovered during this phase will be corrected immediately.

Technical Assistance

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by providing TACWQ personnel with GIS expertise and capabilities, which will further the TACWQ’s mission of providing small water systems with infrastructure mapping assistance.

SDI has continued to provide approximately 300 square feet of office space and high-speed Internet access to TACWQ staff members and student workers. Assistance provided this quarter included: training on how to use the “Shape Correct” features that exist in GPS Pathfinder Office, and providing general consulting on various GIS tasks performed by TACWQ staff and student workers.

WATERS Laboratory

Water Analysis, Training, Education and Research Services (WATERS) is a water quality laboratory located on WKU's campus. WATERS espouses the following integrated goals through cooperation:

- a) **Water Analysis:** Certified drinking water laboratory for chemical and biological analyses.
- b) **Training:** Providing training of field, laboratory and environmental technicians serving an immediate need for the Commonwealth of Kentucky.
- c) **Education:** Student certification program, hands-on work experience for undergraduate students in the environmental science field.
- d) **Research:** Developing more accurate and cost-effective methods of analysis for microbial source tracking.
- e) **Service:** Enabling local, state and regional private and public sector entities to meet environmental management goals through the provision of high quality environmental data collection, management and analysis.

Small Systems Partnership for Compliance Monitoring

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by reducing the financial burden on small water systems of routine water quality analyses required under the SDWA.

WATERS continues to partner with small water systems in Kentucky for the purpose of establishing effective and economical methods for meeting compliance monitoring requirements. During the quarter, microbiological analyses were conducted for 8 drinking water systems with populations less than 10,000. Five of these systems have populations less than 3,300. A total of 125 analyses were conducted for these eight systems during the quarter. Bacteriological Analysis Report Forms were sent to the KY Division of Water electronically in compliance with state reporting requirements.

Microbial Source Tracking Analytical Method Development

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by establishing cost-effective methods of tracking source water contamination.

The ability to track bacterial contaminants in water to their source is a major focus of source water protection. Many research projects have been performed on the subject. However, the only conclusion that most research has reached is that each region of the research area possesses different microorganisms in its waters. This proposal is to study source tracking techniques in the Lower and Upper Green River Watershed region of the Commonwealth of Kentucky. The ultimate environmental outcome of the project is cleaner source water by identification and reduction or elimination of the sources of fecal contamination in source waters. An extension of

this work could lead to a reduction in the amount of treatment needed to make surface waters potable, thereby reducing costs.

Primers (oligonucleotides) were ordered from Sigma-Genosys in January. A *Bacteroides thetaiotaomicron* culture was obtained from USDA-ARS and DNA was extracted for use as a standard. Four fecal coliform samples with counts >200CFU/100mL were filtered and DNA was extracted for a test run. PCR analysis of samples and standards was performed. Equipment was ordered and received this quarter, including a transilluminator and a gel photodocumentation system.

LT2 Rule: Cryptosporidium Assistance

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by assisting water systems with implementation of the Long Term 2 Enhanced Surface Water Treatment (LT2) Rule.

On January 15, a WATERS Laboratory representative traveled to Pikeville, KY and helped prepare LT2 monitoring plans for seventeen customers of Appalachian States Analytical, LLC. The Kentucky Division of Water (KDOW) staff has been promoting the use of the monitoring plan template developed by WATERS.

Three presentations were given on the LT2 Rule this quarter in conjunction with KRWA training events. Presentations were in Owensboro, KY on January 24, at Carter Caves State Resort Park on February 22, and at Jenny Wiley State Resort Park on March 7. A total of 97 water treatment plant operators were in attendance, and continuing education credits were offered. In addition, a presentation was given at the Kentucky Water and Wastewater Operators Association (KWWOA) annual conference in Louisville, KY on March 28. Forty-eight (48) water treatment plant operators were in attendance.

Two engineering students are in the process of developing a self-contained, automatic source water filtration unit that works by its own internal processor. A formal design review was held with the students' faculty advisors on February 23, 2007. A final design has been established, and the needed electronic and mechanical parts have been ordered. The first prototype is expected to be completed by June.

Center for Water Resource Studies

Environmental Informatics

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by increasing the amount of information technology available to water systems, and presenting it in a format that is easy to understand.

Specific activities under this objective include:

Decision Support System

The Decision Support System (DSS) is a planning resource that serves to establish partnerships and assist stakeholder groups in minimizing the effects of agricultural, industrial, and municipal impacts on source water. The DSS will incorporate a rules based system to allow for a customizable schedule.

The GEOexpert.NET Rules Based System currently includes rules that will evaluate data for MCL violations. The system documentation is in the process of being posted on the TACWQ website. Next quarter, it is anticipated that work toward completing the addition of the GeoExpert.NET to the DSS will be conducted.

System Mapping Assistance

Many rural water systems lack the technology and skill required to digitally map their infrastructure. Rural systems without GIS data collecting capabilities will be assisted, through mapping efforts of the Center. Field crews will be deployed to collect GIS information that will be incorporated into the DSS and Asset Management tools. This data will also be provided to the systems in a digital format. A minimum of two rural water systems will be provided mapping assistance during the grant year. The systems in need of assistance will be identified through Kentucky Rural Water Association. TACWQ personnel are currently in the process of scheduling Adairville Water Works located in Logan County, KY (population: 1,307) as the first small water system that will be provided with mapping assistance.

Relational Database Tool

Large volumes of laboratory data from different sources have made data exchange between different applications very difficult. In this project, we plan to expand on software previously developed to facilitate data exchange.

An XML format tool to convert OCR documents has been developed and is now available through the TACWQ website.

Web Page Hosting

Many small water systems do not have the financial or technical resources to develop and host their own websites, yet currently websites are one of the best tools to quickly disseminate information to the public. Using the website as a media to transmit information to clients within the rural water district, systems can quickly provide information about water quality (CCR reports), boil water advisories, meeting times and locations, and additional crucial information.

During the quarter, 278 small water systems throughout the state were contacted by direct mail to determine their need and interest for web page hosting and other services the TACWQ has to offer. Some rural water districts are hesitant to provide information needed to host their

websites, and view any web site availability as a security risk to their system. Additional avenues for web hosting and technology assistance are being researched.

Technology Training

As the use of technology develops, the need for technology training increases. A presentation for water districts will be provided at a local or state conference to help demystify the technology tools available to them. Areas to be included will be web site development, applicable software tools and basics of their use, and basic PC support. Topics covered will include tools previously developed by the TACWQ and other states. CDs of the available tools will be distributed to attendees of the presentation. Also covered will be basic computer terms, backup information, open source software that is available, viruses, firewalls, and other computer security issues. During the quarter, a discussion was started with AWWA to host a technology training workshop at an upcoming conference.

In addition to the conference presentation, a technology training manual is currently under development. It will include documentation on tools developed by the TACs, commercial software, and open source software that is available to water systems. Basic instructions on using technology for marketing, customer awareness, and system evaluation will also be included. This manual will be available in hard copy form or on a CD, and can be used by small water systems throughout the country.

During the quarter, DVDs containing information for technology assistance were distributed to water systems at the KRWA Management Conference.

Center Coordination

This project supports EPA Strategic Plan Goal 2 of Clean and Safe Water, Objective 2.1: Protect Human Health and Sub-Objective 2.1.1: Water Safe to Drink by providing outreach to small water systems, and maximum efficiency between all project team components and concurrent activities.

Specific activities under this objective include:

Quarterly Reports

The TACWQ will continue to provide quarterly technical and financial status reports to the EPA project officer. This is the second quarterly report for the current grant year, which covers the period January 1, 2007 to March 31, 2007.

Education and Outreach

During the quarter, the newly revised display was exhibited at the KRWA Management Conference in Bowling Green, KY on February 12-14, the Applied Research and Technology (ARTP) Expo in Bowling Green, KY on March 1, and the Kentucky Water and Wastewater Operators Association (KWWOA) 50th annual conference in Louisville, KY on March 26-28.

Dr. Ernest was recently elected as a member of the Board of Directors of the Southeast Watershed Forum for a two-year term, and as a member of the Kentucky Division of Water's newly formed Drinking Water Advisory Board. He is also a member of the State Environmental Quality Commission and the Barren River Area Development District (BRADD) Water Management Council.

Dr. Ernest and Jana Fattic attended the annual TACNet planning meeting at EPA Headquarters in Washington, DC from January 29-31. This meeting was a very productive gathering of the eight Technical Assistance Centers (TACs) and EPA to plan for next year's goals for the Centers. A new aspect of this year's meeting was a symposium on the first day of meetings that was open to all EPA employees. This informal setting allowed the TACs to share information about their Centers' activities and answer questions from EPA staff.

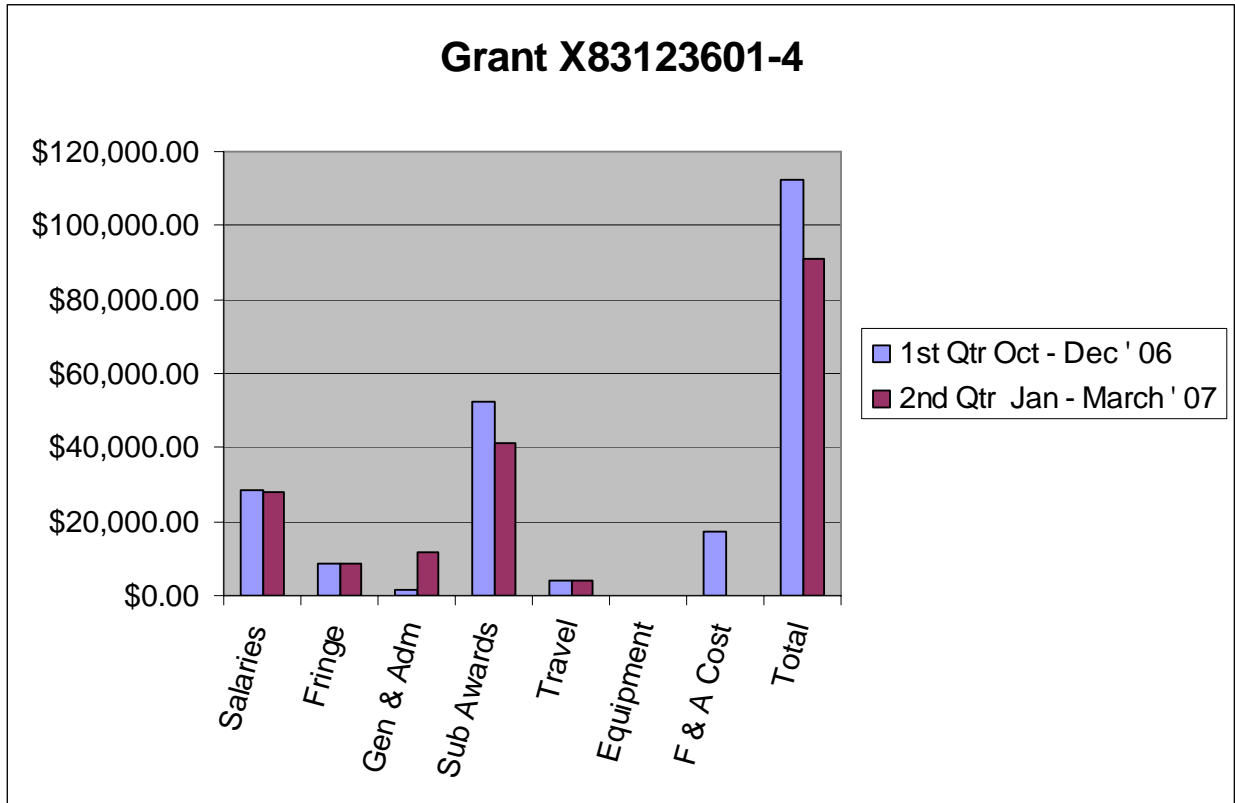
On February 1-2, Dr. Ernest attended the 2007 National Conference on Science, Policy and the Environment in Washington, DC. He also attended the Paying for Sustainable Water Infrastructure conference at EPA Region 4 in Atlanta, GA on March 21-23.

Stakeholder Advisory Council

A Stakeholder Advisory Council (SAC) meeting was held on March 1, 2007 in order to ensure that activities, proposed and ongoing, of the TACWQ accurately reflect the needs of its constituents. The SAC provides advice to the TACWQ Director on strategic issues related to the science and technology missions of the TACWQ including insights on research directions and policy, and perspectives from the broader community and political scene.

The meeting was held at WKU's Innovation and Commercialization Center (ICC). SAC members present were: Audwin Helton, Dale Reynolds, Judith Petersen, Tom Clevenger, Jeff Ballweber, and Ernest Collins. Presentations on current activities were given by each of the Center's contributors (WATERS Laboratory, IT Division, Field Division, SDI and KRWA). An open discussion was then held by the Council members to give feedback to the Director on the direction of the TAC. Overall, the Council members agreed that the Center is moving in the right direction, providing valuable training to students while generating useful tools and training for small water systems.

Budget



Expenditure	1st Qtr	2nd Qtr
Category	Oct - Dec '06	Jan - March '07
Salaries	\$28,609.81	\$28,047.95
Fringe	\$8,689.04	\$8,544.71
Gen & Adm	\$1,551.83	\$11,656.14
Sub Awards	\$52,361.44	\$41,395.39
Travel	\$3,916.99	\$4,234.49
Equipment	\$0.00	\$0.00
F & A Cost	\$17,156.65	-\$2,750.87
Total	\$112,285.76	\$91,127.81