



Technical Assistance Center for Water Quality



Organizational Change

- Leadership
 - Andrew N.S. Ernest, Ph.D., P.E., DEE
- Roles
 - Director, Center for Water Resource Studies
 - Associate Dean, Ogden College of Science and Engineering
 - Professor, Civil Engineering
- Engineer-Educator
- M.S., B.S., Ph.D.
 - Civil Engineering
- Professional Engineer (P.E.)
 - Texas Board of Professional Engineers
 - Environmental Engineering
 - Experience & Examination
- Diplomate Environmental Engineer (DEE)
 - American Academy of Environmental Engineers
 - Specialty Certification: Water & Wastewater
 - Experience & Examination

Technical Capacity

- Water Resource Management
 - Water Quality Assessments
 - Total Maximum Daily Loads
 - Phase II Stormwater
 - BMP Design
- Water/Wastewater
 - POTW Improvements
 - On-Site/Small & Decentralized Systems
 - Constructed Wetlands
- Environmental Sustainability
 - Economic Development
 - Environmental Protection
- Environmental Informatics
 - Environmental Modeling
 - GIS/EIS
 - Rule-Based Decision Making
 - Multi-Objective Resource Management
- Risk Management
 - HAZWOPER (Train-The-Trainer)
 - Real Time Risk Assessment & Response Determination
- Remediation
 - Bioremediation
 - Phytoremediation

Professional Philosophy

- Integration of Professional Practice into Academic Training
- Research with Direct Community Service Applications
- Service to the Community through Training & Education
- Economic Development through Technology Incubation



Applied Research and Technology Program



- Industrial/Environmental Problem Solution
- Multidisciplinary Scientific/Technical Assistance
- Undergraduate/Graduate Students Research
- Student Transition: Graduate/Workplace

- Agricultural Research and Education Complex
- Applied Physics Institute
- Architectural and Manufacturing Science Institute
- Biotechnology Center
- Center for Biodiversity Studies
- Center for Cave and Karst Studies
- Center for Water Resource Studies
- Engineering Services
- Institute for Astrophysics and Space Science
- Institute for Rural Health Research and Development
- Kentucky Climate Center
- Materials Characterization Lab

CWRS Mission

“...conduct research, outreach, education and assistance for the protection of public health through the provision of safe drinking water and clean water”

CWRS Components

Ogden Environmental
Water Quality Laboratory



Hoffman Institute

Hoffman Environmental Research Institute



Serving the Public by Providing Innovative Wastewater Assistance

KCWR

Kentucky Center for Wastewater Research

Ogden Environmental Laboratory

A Certified Laboratory Providing Regulatory Grade Analytical Services through the Training of University Students

- Municipal & Private Drinking Water
- Wastewater Treatment Plans
- Industrial Wastewater
- Agricultural & Urban Runoff
- Recreational Waters

**Ogden Environmental
Water Quality Laboratory**



Hoffman Environmental Institute

A Consortium of Scientists and Students Dedicated to the Development of Innovative Basic and Applied Research Aimed at Understanding of the Human-Landscape-Atmosphere Interactions

- Geographical Information Systems
- Environmental Protection
- International Programs
- Environmental Change

Hoffman Institute

Hoffman Environmental Research Institute



Kentucky Center for Wastewater Research

Provides Technical Assistance with Treatment and Impacts of Wastewater

- Public Outreach and Assistance
- Small Systems Circuit Rider Program
- Wastewater Utility Management Training Courses
- Physical, Chemical, and Biological Monitoring and Assessment
- Environmental Risk Assessments
- Database Management & Environmental Modeling

Serving the Public by Providing Innovative Wastewater Assistance

KCWR

Kentucky Center for Wastewater Research

Technical Assistance Center for Water Quality

Serves to Assist Small Systems Throughout the Country
in Meeting the Requirements of the Safe Drinking
Water Act

Tasks:

- Water Utility Management Training Courses
- Small Water Systems Circuit Rider Program
- Source Water Protection Program
- Database Management System and Information Tools



Utility Management Institute Partnership

- Kentucky Rural Water Association
 - Andy Lange, Assistant Director, Task Leader
 - Phillip East, Education Services Director

Program Background

August 1996	SDWA Appropriation
May 1997	Preliminary discussions w/ WKU
May 1997 – May 1998	UMI Concept Development
July 1998-Sept. 1999	Program Development & Testing
Oct. 1999 – Sept. 2000	Course Development & Presentation Introductory Course
Oct. 2000 – Sept. 2001	Course Development & Presentation Courses #2 and #3
Oct. 2001 – Sept. 2002	Course Development & Presentation Courses #4, #5 and #6
Oct. 2002 – Present	Course Enhancement & Delivery

UMI Courses

- Utility Management 101
- Utility Organization, Regulation & Law
- Utility Finance & Administration
- Human Resource Management for Utilities
- Modern Technology & Utility Management
- Public Relations in Utility Management

Leading to the Utility Management Professional (UMP)
Designation

Accomplishments

- 147 Students from 98 utilities/entities
- 35 have received UMP designation
- 25 expected to receive UMP in 2004
- Program funded next Fiscal Year

The Future

- College Degree Program
- Internet Availability
- Outreach to Other States

Small System Circuit Rider Partnership

- Kentucky Rural Water Association
 - Andy Lange, Assistant Director, Task Leader
 - Joe Burns, Circuit Rider

Program Goals

- Extend the success of the “Rural Water” Circuit Rider concept
- Concentrate technical assistance to small and very small public water systems

Systems Serving Fewer Than 3300 People

Concentration On Systems Serving Fewer Than 500 People*

*Systems Typically Ineligible for USDA Rural Development Assistance

Scope of Work:

Hands-On Technical Assistance

- Technical-Financial-Managerial Assistance
- Leak Detection
- Mapping & GIS Assistance
- Groundwater Protection Plans
- Consumer Confidence Reports
- Vulnerability Assessments
- Emergency Response Plans
- Analytical Reporting Requirements
- Rate Analysis and Cost of Service Studies
- Compliance Assistance
- Comprehensive System Evaluations

Accomplishments

- Over 900 On-site Contacts
- 1800+ Hours of on-site assistance
- Compliance for small and very small systems continues to improve
- Program funded next Fiscal Year

The Future

- Technology Assistance
 - Computerization, GIS, Mapping
- Vulnerability Assessment Assistance
- Assistance with Regionalization

Source Water Protection Program

- Western Kentucky University
 - Chris Groves, Ph.D., Task Leader
 - Ritchie Taylor, Ph.D.
 - John All, Ph.D., J.D.
 - Stephen Kenworthy, Ph.D.
- University of Louisville
 - Jeff Jack, Ph.D.

Program Goals

- **We are working to aid small water supply systems** with a program that is based on the idea that the better the quality of source water at the time it reaches a treatment facility, in many cases the **easier** and **cheaper** it is to treat.
- We do this with a combination of three interrelated efforts:
 - **Science:** water quality sampling and analysis, hydrology, geology, GIS, with a particular expertise in karst aquifers, which cover some 40% of the eastern US and are typically **very vulnerable to contamination**
 - **Communication:** developing stakeholder networks among source catchment residents, water suppliers, local utilities and governments, funding agencies
 - **Education:** developing and communicating information about human impacts on the water cycle, relationships between land use and source water quality, and developing source water protection programs

Accomplishments

- **Science:** demonstration watershed program that has provided information on sources and transport of contamination, relationships between land use and water quality, and remediation strategies in Kentucky, Tennessee, and Iowa; other work has sought to understand natural sources of disinfection byproducts to aid cost effective treatment strategies; papers and presentations at scientific conferences
- **Communication:** We have developed extensive relationships with farmers and other local landowners, appropriate local, state and federal agencies, chemical manufacturers, and farm groups; in **two water sources pesticide contaminant levels were lowered below MCL's in these collaborative efforts.**
- **Education:** We have developed educational modules on source water topics (the first two about 1. Karst Source Water and 2. Stakeholder Networks). We are currently developing an academic focus in these activities.

Kentucky Pesticide Workgroup

A major emphasis has been active participation with and support of the Kentucky Pesticide Workgroup, collaboration state and federal agencies (*i.e.* Kentucky Depts. of Agriculture and Conservation and Division of Water, NRCS, KRWA), chemical manufacturers (*i.e.* Syngenta, Bayer), and farm groups (*i.e.* Kentucky Corn Growers Assn., Kentucky Farm Bureau)

The TACWQ-WKU provided scientific support to the group (water sampling and analysis, hydrogeologic evaluation, GIS) and worked in a collaborative effort with local utilities and farmers at several supplies **impacted with the pesticide atrazine**. In the Marion and Lewisburg (Spa Lake) Kentucky water supplies pesticide levels **at the intake were lowered below the atrazine MCL** of 3 parts per billion. With this experience we are now expanding our efforts to other atrazine impacted watersheds

Current Effort

The current effort has four tasks:

- A. Source Water Protection Education: for source water program stakeholders, and academic emphasis (universities, scientific conferences (*i.e.* fall national GSA: *Rural Source Water Protection: Stakeholder Needs, Public Policy, and Hydrogeologic Realities for Small Systems*))
- B. Disinfection Byproducts: evaluation of aquatic ecosystem metabolism and its role in the generation of Haloacetic Acids (HAA's):
- C. Impaired Watersheds: technical assistance to the Kentucky Pesticide Workgroup on problems of pesticide contamination in small system source waters, developing utility based stakeholder networks
- D. Landuse and Source Water in Karst Regions: specific watershed studies in Kentucky and Iowa, to expand to other states

Database Management System and Information Tools

- Western Kentucky University
 - Ouida Meier, Ph.D., Task Leader
 - Many talented students, especially Shane Fryer, Seth Johnson, Trey Lyon, Maxx Lobo, Rupesh Mamidi, Harish Pratapani, Jenna Harbaugh, Tim Rink, Anupama Oruganti, and Naveen Midde
 - Brents Dickenson, P.E. (sanitary survey/rate calculation tools)

Program Goals

- Facilitate reporting of information by other Tasks
- Appropriately capture and store data and metadata
- Facilitate retrieval of information and materials by end users
- Provide products and services directly to the small water system community in the form of information and information tools

Accomplishments

- Website design and maintenance: critical information and links for small water systems
- Database structure and maintenance for information internal and external to the TACWQ
- Java-based internet interface for querying database
- Rehabilitation of donated computers for water systems
- Analysis of geographic, water quality, and SDWIS data
- Mapping water quality data and MCL violations in Kentucky / Southeast U.S. / United States: targeting problems, targeting solutions
- Education and science advisory service

Accomplishments

- Development and distribution of software and information tools for use by water providers:
 - “MOR Advisor”
 - “Water Loss Calculator” (online & stand-alone) with \$\$ loss
 - “ArcExplorer Watershed Mapping for Drinking Water Systems” – state GIS layers packaged with free mapping software for in-house mapping by small utilities
 - Sanitary Survey forms and guidance
 - Wholesale Rate calculation and guidance
 - Distributed on CD along with additional tools developed by collaborators: KRWA (CCR templates), KyDOW (revised MOR spreadsheets), EPA (CCR Writer), ASDWA/NRWA (Vulnerability Assessment)

The Future

- Completion and distribution of a national Tools CD (including assistance for developing and executing Emergency Response Plans not already provided in existing tools)
- Assessment of improvement in source water quality for water systems conferred by restoration of riparian corridor in an agricultural setting
- Additional analyses and publication of national drinking water quality patterns
- Explore potential for producing watershed mapping utilities for cooperating states

New Thrusts

- Expanding Geographic Scope
 - Regional: Tennessee, Indiana, Ohio...
 - National Venues: Academic/Educational Dissemination, Karst Technical Expertise, Spatial Analysis...
- ICERTS Consortium
 - Monitoring/Permit Compliance/Reporting/Source Water Assessments
 - Operator/Technician Training/Certification
- Small Systems Information Exchange
 - XML Data Exchange/Warehousing
 - Map Services
 - Small Systems Management/Decision Support