Kentucky Rural Water Association
Helping water and wastewater utilities help themselves

July 12, 2019

Ms. Gwen R. Pinson, Executive Director
Public Service Commission
PO Box 615
Frankfort, KY 40602-0615

Dear Ms. Pinson:

Kentucky Rural Water Association (KRWA) is applying for approval of a proposed water district management training program pursuant to KRS 74.020 and 807 KAR 5:070. The proposed session, entitled "40th Annual Conference and Exhibition," will be conducted August 26-28, 2019, at the Hyatt Regency Hotel and Lexington Convention Center in Lexington, Kentucky. A copy of the proposed agenda is attached as **Exhibit 1**.

As reflected in Exhibit 1, the proposed training program for our Annual Conference is directed toward decision-makers of water and wastewater utilities. This year's conference will offer discussions on trends and ideas affecting our industry and will present ideas for planning and preparing for the future of drinking water and wastewater services in the Commonwealth. These presentations will enhance the attendees' understanding of relevant issues involved in the management, operation, and maintenance of utilities.

The proposed training offers six hours of instruction on Monday, three hours on Tuesday afternoon and three hours on Wednesday morning. With twelve as the maximum number of hours that can be earned, we request that this training be accredited and approved as water management training satisfying the requirements set forth in KRS 74.020(7) to establish a water district commissioner's eligibility for a maximum annual salary of $6,000. **KRWA is not requesting that the proposed training program be accredited as a program of instruction for newly appointed commissioners.**

A biographical statement containing the name and relevant qualifications and credentials for the presenters is attached as **Exhibit 2.**

The PowerPoint presentations, included as **Exhibit 3**, will be copied to a flash drive and provided to commissioners. Should the presenters revise or amend their presentations prior to the proposed session (or provide written materials to the attendees), KRWA will include a copy of the revised presentation with their sworn statement and report regarding the instruction.

KRWA has submitted this proposed training to the Kentucky Board of Certification of Drinking Water Treatment and Distribution System Operators and the Kentucky Board of Certification of Wastewater System Operators. A copy of their approval letter is enclosed as **Exhibit 4**. KRWA does not intend to submit this proposed training to additional agencies for accreditation.

Upon completion of the proposed training, KRWA will provide a sworn statement attesting the accredited instruction was performed, noting any changes in the presenters or proposed program curriculum which may occur after certification. A list of commissioners attending sessions, their water district and the number of hours they will have earned will be included.

With this letter and enclosed exhibits, the Kentucky Rural Water Association requests that the Commission approve and accredit the proposed training program entitled, "40th Annual Conference and Exhibition" for annual water district management continuing education credit.

Respectfully submitted,

Janet Cole

Janet Cole
Education Coordinator
j.cole@krwa.org

Enclosures
(Original and 10 packets)

EXHIBIT 1

EXHIBIT 1

Kentucky Rural Water Association
40th Annual Conference and Exhibition
August 26-28, 2019
Hyatt Regency Hotel and Lexington Convention Center
Lexington, Kentucky

PROPOSED AGENDA

Monday, August 26, 2019 **Combined Water and Wastewater Training**

8:30 a.m. – 9:30 a.m.
Session 1: The Kentucky Emergency Response Commission and Kentucky Water and Wastewater Utilities
Presenters: Jessica Miller and Tiffany Sizemore, Kentucky Emergency Response Commission
The Superfund Amendments and Reauthorization Act (SARA) was signed into federal law in 1986. Title III of SARA, is known as the Emergency Planning and Community Right-To-Know Act (EPCRA). EPCRA requires all owners or operators of facilities that are subject to the OSHA Hazard Communication Standard to report inventories of all on-site chemicals for which MSDSs exist to the SERC, LEPC, and local fire department. In Kentucky, the Kentucky Emergency Response Commission (KERC) is responsible for implementing the provisions of EPCRA. This session will cover the various duties of the KERC and how they work with drinking water and wastewater utilities to help ensure compliance with regards to hazardous substances they might have at their facilities.

9:40 a.m. – 10:40 a.m.
Session 2: GPS and GIS: A Utility's Perspective
Presenter: Kenny Ratliff, Oldham County Water District and Charles Altendorf, Hardin Co. Water District #1
This session will cover the use of GPS in water and wastewater utilities from a utility's perspective and will illustrate how a smaller utility can set up a GPS/GIS program, what information to gather, how to best use the information gathered, and how to ensure that the program is permanent (all too often utilities start, but don't finish gathering GPS data for their utility). This session will also include ways for utilities to get into GPS/GIS for a minimal cost.

10:50 a.m. – 11:50 a.m.
Session 3: ARC Flash and Electrical Safety
Presenter: Mark Mahler, Alliance Water Resources
Protecting workers from electrical hazards is a must, especially considering the amount of exposure in the water and wastewater profession. Many employers and employees are aware of the hazards associated with electricity but not so much arc flash and arc blast. This presentation will address electrical shock and arc flash hazards, NFPA 70E requirements, and ways to protect employees from injuries or worse, fatalities.

11:50 a.m. – 1:00 p.m. **Lunch**

1:00 p.m. - 2:00 p.m.
Session 4: Disinfection Today
Presenter: Jim Collins, Brenntag Mid-South
In today's world of sanitizing water there are many different treatment chemistries & processes to consider. Municipal water treatment plants & the local public owned treatment works often wonder if what they are doing for the sanitation process is the most cost-effective program needed for success. This presentation will focus on several options that the system should consider in any upgrades to their facilities or any new plants they may build to serve the growing population of Kentucky. This session will offer pros & cons of the sanitation process that is approved by the EPA & allow utilities to make better educated decisions as to what best fits their needs.

2:10 p.m. – 3:10 p.m.
Session 5: Asset Management
Presenter: Paul Lander, 64 Seconds
Each utility is responsible for making sure that its system stays in good working order, regardless of the age of its components or the availability of additional funds. Asset management programs with good data can be the most efficient method of meeting this challenge. A high-performing program includes detailed asset inventories, operation and maintenance tasks, and long-range financial planning. This session will detail the framework to consider when choosing an asset management program.

3:20 p.m. – 4:20 p.m.
Session 6: Using Technology to Improve Communication
Presenter: Kerry Zwierschke, Bennett & Williams Environmental Consultants
This presentation will review methods of integrating technology into the daily activities of a utility, including management, field, and office personnel. A case study at Georgetown Municipal Water and Sewer will show the use of electronic work orders and summary dashboards. In addition, the use of GIS data to create calling lists and publicly available maps will be demonstrated. Emphasis will be paid to creating useful and relevant data and disseminating this data in a timely manner.

Tuesday, August 27, 2019 — Concurrent Sessions

Concurrent Session A

1:30 p.m. – 2:30 p.m.
Session 7A: Water Audits and Water Loss Control for Public Utilities
Presenter: Jeff Merman, Automatic Controls Company
This class provides an introduction to water loss control. Sustainable methods for leak management using EPA guidelines and other sources of information will be discussed. The session will address a three-step process for controlling water loss: water audit is first, followed by intervention to identify losses and implement solutions, and then an evaluation of intervention measures and the need for further improvement.

2:40 p.m. – 3:40 p.m.
Session 8A: Danville Water Treatment Plant Expansion and Upgrade Project
Presenter: Brent Tippey, HDR Engineering
This session will cover the challenges faced and solutions required during the $25 million upgrade to the Danville water treatment plant. Much of the presentation will focus on the difficulty of rebuilding a modern water treatment plant within the footprint of an existing plant, changing the function of the facilities, all the while ensuring the continuity of the water production as well as meeting DOW and EPA compliance for drinking water quality.

3:50 p.m. – 4:50 p.m.
Session 9A: Attacking Water Loss – Supporting DMAs with Acoustical Leak Sensors
Presenters: John Dix and B. J. Malone, Warren, Butler and Simpson Co. Water Districts
Butler County Water System has historically managed its water loss with District Metered Areas with water loss ranging from 12% to 25%. In 2018, they began the installation of an Automated Meter Reading

system that included an option for adding an acoustical leak sensing device which was included on approximately 70% of their metered services. This presentation will detail the installation process, the development of new procedures in leak detection and investigation, and will demonstrate the improvements in water loss management for the system.

Concurrent Session B

1:30 p.m. – 2:30 p.m.
Session 10B: K.P.D.E.S. Sampling, Monitoring, and Laboratory Practices
Presenter: Johnny Osborne, McCoy & McCoy Laboratories
This session will cover the KPDES permit, what it contains, and what it can mean for wastewater utilities. Particular emphasis will be given to portions of the permit which are often overlooked by utility personnel. Also covered will be the sampling requirements, type of container, preservation requirements and hold times for wastewater samples that are typically required in wastewater permits.

2:40 p.m. – 3:40 p.m.
Session 11B: Sewer Shed Modeling Helps Bardstown Plan for Growth
Presenter: Richard Smith, HDR Engineering
The City of Bardstown's sewer system has been strained by recent growth. This presentation will discuss how existing mapping and extensive flow data were used in computerized modeling and design software to a sewer shed model of the Rowan Creek sewer system. The model was used to size and prioritize improvement for Bardstown to mitigate their SSO's, provide for existing and future development, and preserve the city's economic value by effectively handling wastewater.

3:40 p.m. – 4:40 p.m.
Session 12B: Wastewater Disinfection with Peracetic Acid
Presenter: Jim Pelton, Pelton Environmental
This session will provide an overview of peracetic acid for wastewater disinfection. This will include chemical characteristics, efficacy in wastewater, pumping & storing peracetic acid as well as application around Kentucky.
This presentation will also review the process for converting from existing disinfection systems: from jar testing to permit modifications.

Concurrent Session C

1:30 p.m. – 2:30 p.m.
Session 13C: Developing Leadership Skills in the Utility Industry
Presenter: Bob Cashion, S4 Water Sales & Service
Daren Thompson, Lebanon Water Works Company
The development of management and leadership skills must be an on-going process of events, study, soul searching and inter-personal relationships. Most people do not possess natural tendencies or instincts to be leaders and manage critical situations. This presentation will look at measurable methods to becoming more effective leaders no matter what current status one holds in the utility industry. This presentation will include interactive, informal polling and discussions with the audience on real world applications that managers and leaders deal with at utilities.

3:40 p.m. – 4:40 p.m.
Session 14C: Legal and Regulatory Aspects of Unaccounted-for Water

Presenter: Gerald Wuetcher, Stoll Keenon Ogden
As water utility officials struggle to reduce unaccounted-for water in their systems, many question the legal and regulatory implications of their utility's unaccounted-for water levels. This presentation will examine how the Public Service Commission has historically addressed unaccounted-for water for ratemaking and other regulatory purposes and its current regulatory stance towards unaccounted-for water.

2:40 p.m. – 3:40 p.m.
Session 15C: What's So Great About Kentucky?
Presenter: Andy Lange, Kentucky Rural Water Association
In many ways, Kentucky utilities lead the nation. This presentation will explore many factors that have gone into making this possible, from adequate financing allowing utilities to manage their capacity development to regulations stemming from the USEPA, KY Division of Water, and the Public Service Commission. These factors and other influences have allowed Kentucky's water and wastewater utilities to operate more efficiently and serve greater areas than utilities in other states.

Wednesday, August 2, 2019 — General Session

8:30 a.m. – 10:00 a.m.
Session 16: Celebrating 40 Years Serving Kentucky's Water and Wastewater Utilities and the Outlook for the Future
Presenters: John Dix, President, Kentucky Rural Water Association and Manager, Warren, Simpson and Butler County Water Districts
Kent Watson, President, National Rural Water Association
Gary Larimore, Executive Director, Kentucky Rural Water Association
The results of KRWA's hard work over the last four decades has had a significant impact on the drinking water and wastewater industry in Kentucky. John Dix will begin the session with a brief history of Kentucky Rural Water Association – how it has grown, challenges and successes.

Kent Watson will bring a national perspective to the session as he outlines how programs offered through NRWA and legislative efforts have contributed to the advancements made in Kentucky. He will also address the national outlook for water and wastewater utilities.

As the Executive Director of KRWA for 40 years, Gary Larimore can best recap the progress of the Association and Kentucky's utilities. The story of what makes Kentucky utilities so great will be told by exploring the changes made in the water and wastewater utilities of the Commonwealth. These changes have allowed them to operate more efficiently and serve greater areas. The future cannot be predicted, but technology, complex regulatory environment and population growth are a few of the issues that will be discussed as impacts for tomorrow.

10:00 a.m. to 10:15 a.m. BREAK

10:15 a.m. – 11:45 a.m.
Session 17: Kentucky's Public Water and Wastewater Utility Infrastructure Needs – Panel Discussion
Presenters: Moderator: Clay Kelly, P.E., Senior Associate, Strand Associates
Panel: Sandra Dunahoo, Commissioner, KY Department for Local Government
Bruce Scott, Deputy Secretary, KY Energy and Environment Cabinet
Michael Schmitt, Chariman, KY Public Service Commission
Hilda Legg, State Director, KY Rural Development
Tim Thomas, Federal Co-chair, Appalachian Regional Commission
In this session a panel, representing a variety of water and wastewater professionals, will discuss the current and future needs of Kentucky utilities. The discussion will focus on aging infrastructure as well as some regulatory and enforcement issues that have grown out of these problems. Potential solutions and the long-term goals necessary to achieve positive results will be addressed.

EXHIBIT 2

EXHIBIT 2

SPEAKER BIOS

Jessica Miller is the Extremely Hazardous Substance Planner for the Kentucky Emergency Response Commission. The Kentucky Emergency Response Commission (KERC) is responsible for implementing the provisions of the Emergency Planning and Community Right-to-Know Act. EPCRA requires all owners or operators of facilities that are subject to the OSHA Hazard Communication Standard to report and plan for both hazardous substances and extremely hazardous substances.

Tiffany Sizemore is the Program Coordinator for the Kentucky Emergency Response Commission. The Kentucky Emergency Response Commission (KERC) is responsible for implementing the provisions of the Emergency Planning and Community Right-to-Know Act. EPCRA requires all owners or operators of facilities that are subject to the OSHA Hazard Communication Standard to report and plan for both hazardous substances and extremely hazardous substances.

Kenny Ratliff is the GIS Manager for Oldham Co. Water District. Kenny has extensive knowledge of geographic information systems (GIS) and its application in many areas for more efficiency, sharing, and interoperability. His background includes experience and knowledge in a broad range of industries that include 10 years in Public Health, Emergency Response, Military/DoD, Transportation, Environmental Protection, Technology, Government and Natural Resources. Kenny has been employed with Oldham Co. Water District since July, 2016. He holds a BA from Morehead State University.

Charles Altendorf has been a GIS Planning Specialist with Hardin County Water District #1 since April, 2018. Charles has seven years of experience in GIS spanning 4 industries. These include working for the Bluegrass Area Development District under Shane New, a surveying company that supported the oil and gas industry, an engineering firm that supported the fiber industry, and now working in water with Hardin Co. Water District #1. Charles also has experience implementing digital mapping across a myriad of platforms. These include AutoCAD Civil 3D, AutoCAD MAP 3D, ArcMap, ArcGIS online, and increasingly ArcPro and QGIS. Charles hopes to continue to provide cutting-edge, cross-platform solutions to his district and industry.

Mark Mahler has been with Alliance Water Resources for 19 years and currently serves as the Director of Human Resources, Safety & Compliance. He has 32 years' experience in the water and wastewater field, with 20+ of those years being in some role of safety. Mark is an OSHA Certified Specialist in Safety and Health Trainer focusing on Safety Audits and Inspections, OSHA 10, Competent Person, and Safety Management Training. Mark holds Water and Wastewater licenses in Missouri and Tennessee.

Jim Collins is the Business Development Manager for Brenntag Mid-South, Inc. He has 37 years of experience in the industrial chemical industry. He is currently President of Indiana Industrial Operators Association, a Registered Industrial Waste Water Professional in Indiana, a Certified Electro Finisher, and is on the Board of Directors of the Indianapolis Branch of the National Association of Surface Finishers. Jim holds a Bachelors Degree from Indiana State University – major in marketing – minor in economics.

Paul Lander is the founder of 64seconds, Inc. and the former Flow Metrix, Inc. Since 1997 these companies have made significant contributions to the fields of acoustic leak detection and mobile GIS. Dr. Lander holds a bachelor's degree and a doctoral degree in electrical engineering. He is the author of 10 U.S. patents relating to pipeline signal processing and biomedical engineering
and over 70 papers in the academic literature.

Kerry Zwierschke is a Principal Engineer and project manager at Bennett & Williams Environmental Consultants, Inc. Bennett & Williams has over 20 years of experience focusing on the information barriers and challenges facing water and wastewater utilities as they implement GIS-based solutions. The GIS-based management systems supported by Bennett & Williams, provides the foundation for asset management, distribution and collection system mapping, compliance assessments, and water quality assessments and monitoring. Ms. Hughes currently leads the Bennett & Williams' team that develops and deploys GIS solutions for rural and small communities and trains end-users in both desktop and online applications of GIS.

JEFF MERMAN, President, Automatic Controls Co., has over 30 years of experience in Kentucky in the industrial instrumentation and controls business. Jeff holds an Associate's degree in Industrial Engineering from Northern Kentucky University.

Brent A. Tippey serves as HDR's Water Lead in Kentucky, Tennessee and Arkansas. Brent has been a professional engineer for 25 years, serving as project manager on over 150 projects for 45 communities in multiple states. Brent is a 1992 graduate of the University of Kentucky. He serves on the KY State Drinking Water Advisory Council and recently completed the officer rotation in the KY-TN AWWA section.

John M. Dix, P.E. is the General Manager of Warren County Water District, Butler County Water System, Inc. and Simpson County Water District. Mr. Dix also serves as President of the Board for the Kentucky Rural Water Association. John has been a part of Bowling Green and South Central Kentucky since 1992 when he first joined Warren Water. Dix's career also includes serving as Vice President of the regional engineering firm Cannon & Cannon, Inc., City Engineer for Bartlett, Tennessee, and as a Submarine Naval Architect for the Department of the Navy. John earned his Civil Engineering degree from Virginia Tech in 1982.

B. J. Malone is the GIS Coordinator at Warren County Water District. He has held this position since March 2006. Prior to his employment at WCWD he worked as GIS Project Manager at Barren River Area Development District (BRADD). B. J. is a 1999 graduate of Western Kentucky University, where he received a B.S. in Civil Engineering Technology.

Johnny Osborne has been with McCoy and McCoy Laboratories since March 2002. Mr. Osborne has numerous years of experience in scheduling and reporting of water, wastewater, and soil samples for analysis. He is responsible for marketing and maintaining client relations. As a certified wastewater operator he understands the responsibility involved with proper sampling procedures. Previous laboratory experience includes working for Appalachian States Analytical.

Richard K. Smith is a Professional Engineer and Water/Wastewater Project Manager in HDR's Lexington, KY office. Rich has over 30 years of varied experience in design and construction of water and wastewater facilities, including sanitary sewer design, pumping stations, wastewater treatment, industrial pretreatment, rate studies, water distribution, storage tanks, and booster pump stations. In his spare time Rich enjoys hiking, spectator sports (especially baseball), and travel.

Jim Pelton is an outside sales engineer for Pelton Environmental. He has worked as an engineer and a general contractor building public schools and healthcare facilities. His career in wastewater began in 2001 doing UV installations, startup, and maintenance. Jim graduated from Purdue University with a BS in Mechanical Engineering in 2005 and has worked fulltime in the water and wastewater industry since 2010. Pelton Environmental Products Inc. is a manufacturer's representative of water and wastewater equipment. In business since 1992, they currently provide equipment and service from over 25 principals to customers in Ohio, Indiana, and Kentucky and strive to find cost effective solutions to utilities' water and wastewater demands.

Robert K. (Bob) Cashion is a Nationally Certified Water Technologist, he holds class IV Water & Wastewater operators licenses in several states and has been providing water & wastewater related training for over 38 years, he is the Business Development Manager for S4 Water Sales & Services, and is involved extensively in operations and maintenance issues of filtration systems and water quality assessment projects. He is an active member in the AWWA and NRWA and various State associations where he has won several outstanding educational leadership awards. He has a BS degree in Environmental Health & Technology from Missouri Southern State University and a graduate of the Water & Wastewater Technical College, Neosho, MO.

Daren Thompson is the Operations & Management Superintendent for the Lebanon Water Works Company. Daren received a Master of Business Administration (MBA) and a Master of Public Management (MPM) from Sullivan University, and a Bachelor of Science in Construction Management from ITT Technical Institute. He is a 2017 graduate of the Kentucky Rural Water Association's Utility Management Institute program, and has earned his Utility Management Certification through National Rural Water Association's Water University. Daren holds certification as a Class 4 Distribution Operator, a Class 4 Wastewater Collections Operator and a Class 2 Wastewater Treatment Operator. He serves as a Board Member for the Kentuckiana Construction Users Council, the Kentucky Construction Career Choice Council and the ACE Mentor Program.

Gerald Wuetcher is a member of Stoll Keenon Ogden's Utility & Energy practice. He spent more than 26 years at the Kentucky Public Service Commission, serving as a staff attorney, deputy general counsel and executive advisor. Although he worked on matters involving electric, natural gas, water and sewer utility issues, he is known for his experience in water and wastewater issues. Jerry developed the PSC's training program for water utility officials in 1998 and served as one of its principal instructors during his tenure at the PSC. After 27 years of service as a judge advocate in the U.S. Army, Jerry retired with the rank of Colonel. He is a regular presenter at seminars on utility law and regulation.

Andy Lange is the Assistant Director for the Kentucky Rural Water Association (KRWA) and has been employed there since 1989. Prior to joining KRWA, Mr. Lange worked for the Barren River Area Development District for five (5) years, providing administrative and financial assistance to local governments in the ten-county BRADD region. Mr. Lange has earned a Bachelor of Science in Geography and a Master of Public Administration from Western Kentucky University in Bowling Green, Kentucky. Mr. Lange's duties include involvement with all management and administrative activities of the Association. Other responsibilities include: coordinating and monitoring internal membership activities, producing and editing KRWA printed publications, and assisting in the administration of KRWA finance programs. He has been involved in the production of operation and maintenance manuals for water systems, the final report for the KY River Authority Water Counts project, and Operation Review studies for utilities.

After serving on the National Rural Water Association (NRWA) Board of Directors since 2008, **Kent Watson** was elected President of the NRWA at their Annual Meeting in September, 2018. In this position he will lead the Executive Board for two years as one of the voices representing Rural Water at industry events, with government agencies and in the halls of Congress. Mr. Watson is the General Manager of the Wickson Creek Special Utility District in Bryan, Texas, where he has worked for 31 years. In addition to his work in rural water, he serves as the Brazos Valley Groundwater District Director and Deacon at Bethan Baptist Church.

Gary Larimore has been Executive Director of the Kentucky Rural Water Association since its formation in March, 1979. He received both Bachelor of Science and Master of Public Service Degrees from Western Kentucky University in Bowling Green, Kentucky. Mr. Larimore is responsible for the administration and day-to-day operation of the association's office. His duties include budgeting and financial management, personnel management, and acting as the primary representative with the membership, the board of directors, and other outside organizations. Other primary duties include representing the Association's legislative and regulatory interests as a full-time lobbyist and working with water-related groups and organizations.

Clay Kelly has been with Strand Associates since 1996. He serves as the Business Development/Project Engineer and Assistant Director of Marketing. Clay earned his B.S. in Mechanical Engineering from the University of Louisville in 1993. Before joining Strand, he served as the Water Development Engineer for the Baptist Mission of Ethiopia from 1993-1996.

Sandra Dunahoo was appointed by Governor Matt Bevin as the Commission of the Department for Local Government under the Office of the Governor on December 15, 2015. Dunahoo is a government relations veteran with involvement in hundreds of millions of dollars in local projects over the span of her career. Prior to her appointment, she served as project development specialist and funding consultant for Nesbitt Engineering. Prior to that, Dunahoo served ten years as marketing manager for Kenvirons in Frankfort and as marketing manager for Elrod Dunson Consulting Engineers in Nashville, Tennessee. From 1986 to 1994, she served as projects manager and local government Liaison to Congressman Hal Rogers, where she worked with local governments seeking federal funding. Ms. Dunahoo is a native of Beattyville, is a Leadership Kentucky Graduate, Class of 2008 and served as a Board member for 2 terms.

R. Bruce Scott was appointed as the Deputy Secretary of the Energy and Environment Cabinet on June 28, 2016. Scott, most recently served as the commissioner of the Department for Environmental Protection. He served the commonwealth for 33 years in the DEP. Scott began at the DEP in 1983 as an environmental engineer in the Division of Water. During his DEP career, Scott was manager of the Kentucky Pollutant Discharge Elimination System (KPDES) branch from 1994 to 2004 and director of the Division of Waste Management (DWM) from 2004 to 2008. He had served as commissioner of the Department for Environmental Protection (DEP) since January 2008.

Michael J. Schmitt was appointed to the Kentucky Public Service Commission (PSC) by Governor Matthew Bevin on June 21, 2016. Prior to joining the PSC, Chairman Schmitt was a partner in the law firm of Porter, Schmitt, Banks & Baldwin in Paintsville. He is a member of the Kentucky Bar Association, is admitted to practice before all federal courts, including the Supreme Court of the United States, and has served as a special justice on the Kentucky Supreme Court. He has also worked for the Kentucky League of Cities, the Kentucky Association of Counties and the Kentucky Department of Education. Chairman Schmitt received a Juris Doctorate, with distinction, from the University of Kentucky College of Law, where he was a member of the Order of the Coif and the Kentucky Law Journal. He holds a Bachelor of Arts in political science from the University of Kentucky.

Hilda Legg was appointed by the Trump administration as USDA Rural Development State Director for Kentucky in November 2017. Now serving under her fourth President, Hilda brings vast knowledge and a wide variety of skills from experience in public, non-profit and private industries. Ms. Legg previously served a key role at USDA Rural Development during the George W. Bush administration as Administrator for Rural Utilities Service. At the national level, Ms. Legg managed a budget of $6 billion in loan and grant money, where she prioritized investing portfolio assets in rural areas across the country critically needing broadband and other utility services.

Tim Thomas was sworn in as the Appalachian Regional Commission's twelfth federal co-chair on April 3, 2018. As federal co-chair, Thomas works directly with ARC's 13 member governors, their state alternates and program managers, and a network of local development districts to continue creating economic opportunities in the Appalachian Region's coal-impacted communities, and support small business and entrepreneurial development in rural Appalachia. Thomas has more than 20 years' experience in public infrastructure, workforce training, and regulatory issues. He most recently served on U.S. Senator Mitch McConnell's state staff from 2015 to 2018. In that role, Thomas fostered deep partnerships with state and local officials, community leaders, and constituent groups to support economic and community development initiatives. During the administration of Kentucky Governor Ernie Fletcher, Thomas served in key roles in the state environmental and public protection cabinet, including that of federal facility coordinator. He then became the executive director of the Kentucky Infrastructure Authority, overseeing an $800 million portfolio of loans and grants supporting water, wastewater, and broadband development. Thomas has a bachelor of science degree from Murray State University, and a law degree from the University of Louisville.

EXHIBIT 3

EXHIBIT 3

POWERPOINT PRESENTATIONS

Session 1	**The Kentucky Emergency Response Commission and Kentucky Water and Wastewater Utilities**
Session 2	**GPS and GIS: A Utility's Perspective**
Session 3	**ARC Flash and Electrical Safety**
Session 4	**Disinfection Today**
Session 5	**Asset Management**
Session 6	**Using Technology to Improve Communication**
Session 7A	**Water Audits and Water Loss Control for Public Utilities**
Session 8A	**Danville Water Treatment Plant Expansion and Upgrade Project**
Session 9A	**Attacking Water Loss – Supporting DMAs with Acoustical Leak Sensors**
Session 10B	**K.P.D.E.S. Sampling, Monitoring, and Laboratory Practices**
Session 11B	**Sewer Shed Modeling Helps Bardstown Plan for Growth**
Session 12B	**Wastewater Disinfection with Peracetic Acid**
Session 13C	**Developing Leadership Skills in the Utility Industry**
Session 14C	**Legal and Regulatory Aspects of Unaccounted-for Water**
Session 15C	**What's So Great About Kentucky?**
Session 16	**No PowerPoint will be used by speakers during this presentation**
Session 17	**No PowerPoint will be used by the panel during this presentation**

Session 1

Kentucky Emergency Response Commission and Tier 2 Reporting

KENTUCKY DIVISION OF EMERGENCY MANAGEMENT

Significant State Requirements of the Emergency Planning and Community Right-to-Know Act

EPCRA required:

- Every State to have a State Emergency Response Commission (SERC)
- SERCs designate Local Emergency Planning Districts
- Each District have a Local Emergency Planning Committee (LEPC)

KENTUCKY DIVISION OF EMERGENCY MANAGEMENT

Governing Body & Regulations

Established by law:
- Kentucky Revised Statute (KRS 39E)

Provisions implemented under:
- Kentucky Administrative Regulations (106 KAR Chapter 1)

KENTUCKY DIVISION OF EMERGENCY MANAGEMENT

Kentucky Emergency Response Commission

The KERC duties include:

- Implement all provisions of SARA Title III and regulations related to hazardous substances (HAZMAT);
- Develop policies related to the response to releases of HAZMAT;
- Develop planning standards for HAZMAT releases;
- Develop HAZMAT inventory reporting requirements;
- Provide information to the public concerning HAZMAT in the community;
- Develop HAZMAT exercise requirements.

In Kentucky, the SERC is known as the Kentucky Emergency Response Commission (KERC). Formally known as the KyERC & CERC.

KERC Membership

Commission membership includes representatives from:

- Kentucky Fire Commission,
- KY Department for Environmental Protection,
- Kentucky State Fire Marshal,
- Kentucky State Police,
- KY Attorney General's Office,
- Local Government,
- Local Emergency Management,
- Health Services,
- Industry, and
- Department of Agriculture

KERC Member Duties

- Appoint LEPCs;
- Develop guidance and standards, review and make recommendations for EHS Facility Emergency Response Plans;
- Develop policies relating to the training of LEPCs and persons subject to respond to hazardous material releases;
- Develop policies regarding exercising and testing of EHS Facility Emergency Response Plans; and
- Develop procedures for facilities to report EHSs and Tier II Inventories

KERC Member Duties Continued

The state commission shall, by administrative regulation promulgated by the Division of Emergency Management, establish warning and notification standards which shall include, but not be limited to:

- Establishment of twenty-four (24) hour warning points;
- Public warning; and
- Notification of local emergency response organizations.

KRS 39E.090- Local Emergency Planning Districts

Local emergency planning districts shall be consistent with county boundaries. The commission may authorize two (2) or more districts to combine, upon request of the committees of the affected districts. There shall be only one (1) LEPC within a district.

Kentucky's Local Emergency Planning Districts correspond to 116 of Kentucky's 120 counties. The counties of Boone, Campbell, Kenton, Gallatin, and Pendleton have chosen to combine to create the Northern Kentucky Emergency Planning Committee.

KRS 39E.100- LEPCs

Local Emergency Planning Committees are created as part of the state commission.

Local committee members shall be appointed by the commission, and shall be considered as agents of the state for all purposes, including purposes of liability protection.

Ultimate Goals of the LEPC

1. To create, review, and exercise response plans for EHS facilities in excess of the TPQ before incidents occur. Tier II facilities are encouraged to have representation on the LEPC.
2. To inform the citizens of the community of the dangerous chemicals around them and what actions would be necessary in the event of an incident.

New Tier II Reporting Process

Starting January 1, 2020, Kentucky will be using Tier II Manager for Tier II reporting from facilities

Facilities can submit chemical inventory online using a simple web-based browser

Previous year submissions will be imported into the new system for the coming year

Report updating, submission, payment and LEPC submission all done in one stop (will still need to submit copy to Fire Departments)

Tier IIs that require EHS Facility Response Plans will have additional questions for submission, to complete the plan

New Tier II Reporting Process Training

We will be providing Tier II Manager training to all facilities along with online training options

We hope to send out facility information within the next few months

Questions:

Call or email Jessica Miller
502-229-4780
Jessica.l.miller263.nfg@mail.mil

Questions?

GPS AND GIS: A UTILITY'S PERSPECTIVE

SIMPLEST WAYS TO START MAPPING YOUR UTILITY!

KRWA ANNUAL CONFERENCE 2019

TODAY'S SPEAKERS

- KENNY RATLIFF
  - GEOGRAPHY / GEOLOGY DEGREE, MSU
  - MAPPING (GIS) SINCE 1997
  - KY GEOGRAPHIC INFORMATION OFFICER 2007-2008
  - NGKY / KYEM GIS MANAGER 2008-2012
  - GIS SOLUTIONS ARCHITECT 2012-2016
  - OLDHAM COUNTY WATER GIS MANAGER 2016-PRESENT
- CHARLES ALTENDORF
  - GEOGRAPHY / GIS / URBAN PLANNING, UK
  - BLUEGRASS AREA DEVELOPMENT DISTRICT, GIS
  - GIS & CAD EXPERIENCE WITH SURVEYING AND ENGINEERING GROUPS
  - HARDIN COUNTY WATER DISTRICT NO. 1, GIS PLANNING SPECIALIST

TODAY'S PRESENTATION IS **NOT**...

- Promotion for any vendor or software
- A sales pitch
- The only way to go about it
- For every organization due to (fill in the blank)

TODAY'S PRESENTATION **IS**...

- An attempt to move from early false starts
- Awareness of the simplest means for starting down the path of mapping your water utility
- A lesson in mapping 101
- Exposure to different levels of workflows, tools
- Building on the community that is PWA

WHY EVEN CARE?

- ***DRAWINGS ONLY SHOP***
  - HOW LONG WILL THEY LAST?
  - HAVE A TENDENCY TO WALK OFF – NEVER COME BACK
- ***CORPORATE KNOWLEDGE***
  - WE CAN ASK _____, HE KNOWS WHERE EVERYTHING IS

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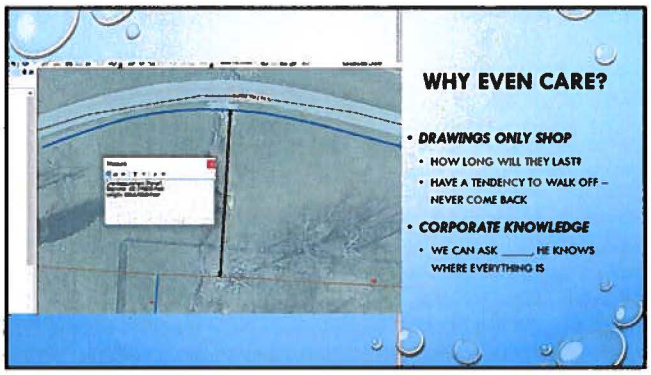

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WHY CONSIDER MAPPING WITH GIS?

SECURITY	FINANCIALLY	CUSTOMER
• EASIER TO BACK UP		
• EASIER TO SEARCH & INTERPRET		
• CONTROL OVER THE INFORMATION		

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• CONTROL OVER THE INFORMATION	• BETTER ASSET MANAGEMENT	

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FINANCIALLY

- LESS STAFF TIME FIND THINGS
- MORE ACCURATE SYSTEM REPRESENTATION
- BETTER ASSET MANAGEMENT

CUSTOMER

- FASTER / EFFICIENT RESPONSE
- PUBLIC FACING OPTIONS
- LIMIT CUSTOMER INTERRUPTIONS WITH ANALYSIS

*WHAT IF YOU COULD GET INTO MAPPING FOR – **FREE**?*

IMPLEMENTING QGIS/OPEN SOURCE

CHARLES ALTENDORF, HARDIN COUNTY WATER DISTRICT NO. 1

1. WHY QGIS

- DUE TO COST FOR OUR SIZE OF UTILITY AND THE SENSITIVE NATURE OF OUR FORT KNOX INFORMATION, IT WAS DECIDED TO LOOK INTO ALTERNATIVES FROM A "CLOUD" SOLUTION.
- TIME WAS ALSO BECOMING A FACTOR BECAUSE WE WERE RUNNING SOFTWARE THAT WAS A DECADE OUT OF DATE.
- WE ARE CURRENTLY PILOTING A PROGRAM WHERE SEVERAL USERS WILL BE QGIS AS THEIR GIS VIEWER.
- UPDATES THEN CAN BE EASILY SYNCED TO THE LOCAL DIRECTORY FROM THE SERVER ON A SYSTEMATIC BASIS OR AT USER DISCRETION.

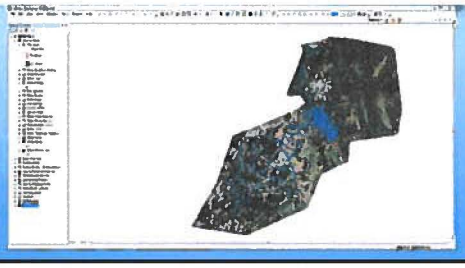
2. DOWNLOADING QGIS

- HTTPS://QGIS.ORG/EN/SITE/FORUSERS/DOWNLOAD.HTML

3. SETTING UP QGIS

- IN ORDER TO USE QGIS AS YOUR MAP VIEWER, YOU WILL HAVE TO CONVERT YOUR DATA.
- ALL LAYERS WILL HAVE TO BE SHAPEFILES AND ALL SYMBOLS WILL HAVE TO BE IN .SVG FORMAT.
- I HAVE WRITTEN MULTIPLE ARTICLES ON THE METHOD I USED AND THEY CAN BE VIEWED ON MY LINKED IN.

4. GIS HAS BEEN DUPLICATED INTO OPEN SOURCE



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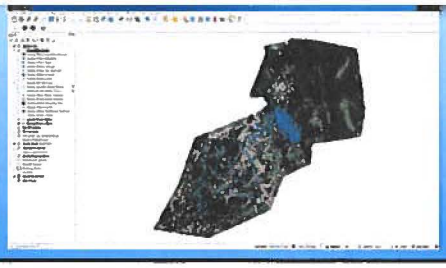


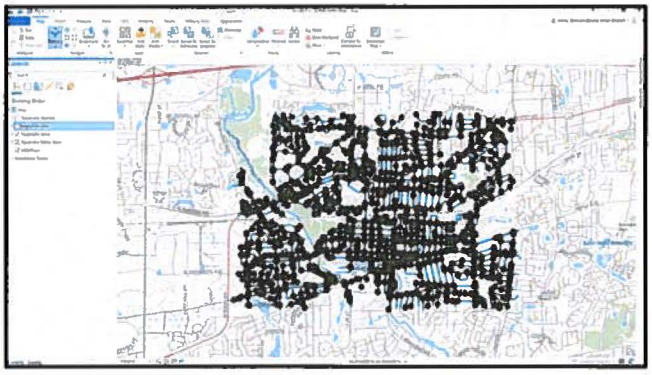
WHAT ABOUT NOT FREE, BUT CHEAP?

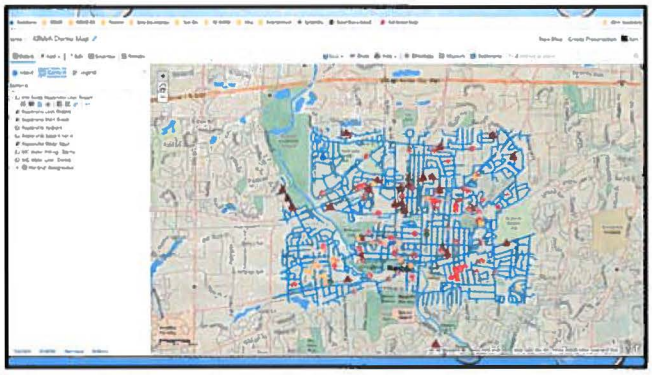
ARCGIS ONLINE – WHAT IS IT?

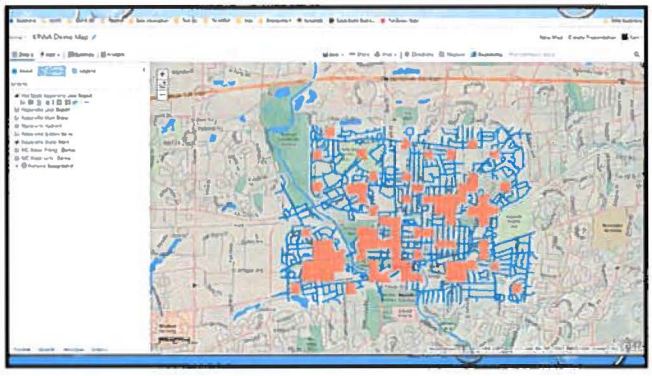
- HOSTED MAPPING ENVIRONMENT
  - NO LOCAL SERVERS
  - THERE IS A FREE VERSION WITH LIMITATIONS
  - IT IS SUBSCRIPTION BASED
    - OPTIONS IN PRICING
  - OFFERS A DESKTOP INTERFACE
  - SCALABLE BASED ON NEEDS, BUDGET

ARCGIS ONLINE DEMO

**NOTE – THE FOLLOWING SLIDES ARE EXAMPLES OF WHAT WILL BE DEMONSTRATED.
DEMO IS EXPECTED TO TAKE 10 MINUTES +/- AND INCLUDE –
- BASIC ARCGIS PRO USE
- USING MAP LAYERS IN ARCGIS ONLINE
- ENTERING LOCATIONS IN AGOL
- CAPTURING LOCATIONS WHILE IN THE FIELD







KYUUG?

- KENTUCKY UTILITY USERS GROUP
- SHARED SPACE FOR QUESTIONS, DISCUSSIONS
- INCLUDES MANAGEMENT, MAP STAFF, OTHER CONTRIBUTORS / RESOURCES
- MAP PLATFORM AGNOSTIC FORUM

SPEAKERS CONTACT INFORMATION

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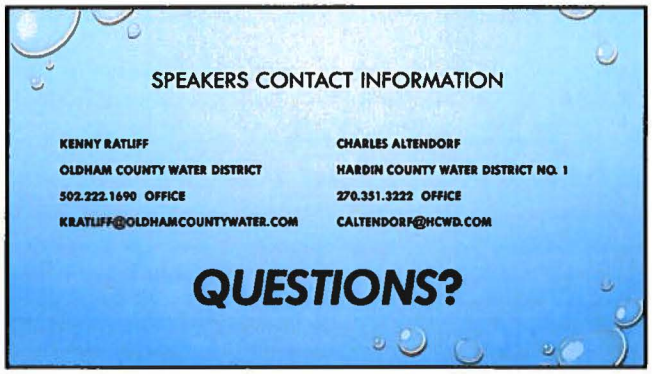
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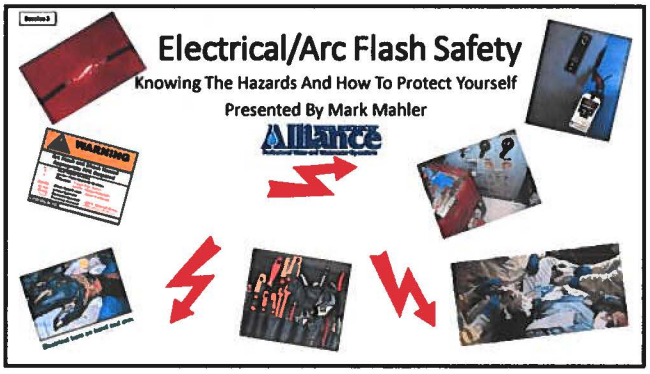


Lets Talk About,

- Electrical/Arc Flash Hazards
- Implementing Safe Work Practices
- Ways To Protect Yourself And Things To Look Out For

So That,

We Can Get On To More Important Things

National Safety Council Statistics

- 30,000 electrical shock accidents occur each year.
- 1,000 fatalities due to electrocution occur each year.
- 5 to 10 arc flash explosions occur in electrical equipment every day.
- 2,000 workers are sent to burn centers with severe injuries each year.

Standards

Institute of Electrical & Electronics Engineers -Standard 1584

IEEE

US Occupational Safety & Health Administration

OSHA

US National Fire Protection Association -Standard NFPA 70E

What is NFPA 70E?

National Fire Protection Association

"Standard for Electrical Safety in the Workplace"

- Standard for electrical safety in United Sates

What is IEEE 1584?

Institute of Electrical and Electronics Engineers

IEEE

- Offers a method for performing arc flash hazard calculations.

Ask Yourself Before Starting Job

1. Have we discussed the scope of work to be performed today?

3. Does everyone know & trained on the job procedures?

2. Are we familiar with the hazards associated with the job?

4. Do we have the right PPE for the job?

6. Do I know what to do & who to contact if there is a change?

5. What could change today?

7. How will I ensure I remain injury free today?

5 Types Of Electrical Injuries

- Electrical Shock
- Electrocution (death due to electrical shock)
  - Indirect Hazards = Blunt Trauma Injury From Fall Or Movement Into Machinery Due To Shock
- Burns
  - Electrical, Thermal, & Arc/Flash Burns
- Arc Flash
- Arc Blast
  - Thermal Radiation
  - Projectiles
  - Pressure Wave

Dangers of Electrical Shock

- Currents greater than 75 mA* can cause ventricular fibrillation (rapid, ineffective heartbeat)
- Will cause death in a few minutes unless a defibrillator is used
- 75 mA is not much current – a small power drill uses 30 times as much

* mA = milliampere = 1/1,000 of an ampere

Electrocution

- Accidental death by electric shock.
- An average of one worker is electrocuted on the job every day.
- NSCS states that 1,000 fatalities due to electrocution occur each year.

Electrical Burns

- Most common shock-related, nonfatal injury
- Occurs when you touch electrical wiring or equipment that is improperly used or maintained
- Typically occurs on the hands
- Very serious injury that needs immediate attention

What Is An Arc Flash?

- An Arc Is Produced By Flow Of Electrical Current Through Ionized Air After An Initial Flashover Or Short Circuit.
- Concentrated Energy Explodes Outward
- High-intensity Flash
- Instantaneous Arc Blast Pressure Wave

- Arcs Produce Some Of The Highest Temperatures Known To Occur On Earth – Up To 35,000 Degrees F. This Is Four Times The Surface Temperature Of The Sun In A Fraction Of A Second

Severity Factors

1. **Power** – amount of energy at the arc
2. **Distance** – of the worker to the arc
3. **Time** – duration of the arc exposure

Causes Of Arc Flash

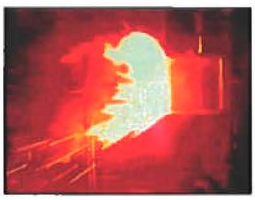
- Dropped Tools
- Accidental Contact With Electrical Systems
- Improper Work Procedures
- Insulation Failure
- Voltage Testing With Inappropriate Instrument

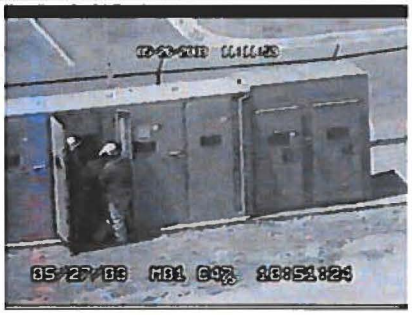
Causes Of Arc Flash

- Inattentiveness
- Buildup Of Dust, Impurities, And Corrosion On Insulating Surfaces
- Sparks Produced During Racking Of Breakers, Replacement Of Fuses, And Closing Into Faulted Lines
- Birds Or Rodents That Break Leads At Connections

Arc Flash Effects

- Burns From Intense Heat
- Trauma From Blast Pressure
- Toxic Gases From Vaporized Metal
- Sprayed Molten Metal Droplets
- Hearing Damage From Sound Pressure Wave
- Eye Damage
- Punctures And Lacerations





Safe Work Practices

1. Review The Operation
2. Determine The Hazards
3. Determine And Implement Protective Measures
4. Wear Appropriate PPE
5. Know How To Respond To An Arc Flash Incident

Safe Work Practices— De-energizing and Lockout

- Identify All Possible Sources Of Energy Supply
- Open Disconnecting Device(s)
- Verify Device Is Open
- Apply Lockout/Tag Out Devices
- Test Voltage—double Check Instrument Rating
- Apply Grounding Devices

Safe Work on Energized Parts

- Never Work On Live Equipment, Except When:
  - De-energizing Introduces Additional Or Increased Hazards
  - It Is Not Feasible To De-energize
  - The Proper Training And Safety Equipment Is Provided

Safe Work Practices— Determine the Hazards

- Identify And Inspect Energized Parts
- Respect The Arc Flash Boundary
- Inspect All Tools Prior To Use
- Have The Right PPE For The Job And Inspect Before Use

Safe Work Practices— Wear Appropriate PPE

- Helmet Or Headgear
- Arc Rated Face Shie d
- Safety Glasses
- Rated Gloves
- Rated Shoes/Boots
- Arc Rated Clothing

What is a Calorie?

- A calorie is the amount of heat needed to raise the temperature of one gram of water by 1°C.
- Thermal energy is measured in calories/cm².

1.2 calories/cm² = Holding your finger in the blue part of the flame for one second.

Take Other Precautions

- Only Qualified Persons
- Wear Only Nonconductive Apparel—No Jewelry
- Work Area Must Be Illuminated
- No Conductive Liquids Near Electrical Work Or Equipment
- Do Not Defeat Electrical Interlocks
- Double-check For The Right Tools

Don't Use/Report Damaged Equipment

- Stop Using And Report:
  - Broken Or Missing Covers
  - Damaged Tools
  - Damaged Equipment
  - Improper Equipment Placement

Ways To Protect Yourself(Things To Look Out For)

- Extension Cords
- GFCI'S
- Using A Electric Metering Device
- Electrical Rated Tools
- Rubber Mats
- Adequate Lighting
- Adequate PPE

Prevention Summary

1. Include Electrical Safety in your Occupational Health and Safety Management Program.
2. Use an electrical work permit system.
3. Conduct regular equipment maintenance and label equipment that poses a flash hazard.
4. Confirm single-line diagrams for accuracy and available fault current.
5. Maintain documentation process.
6. Provide training and job briefings.
7. Conduct periodic safety audits.

Questions

How Do I Get Started?

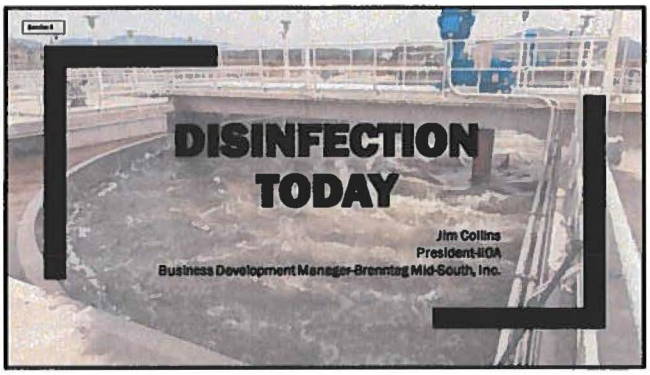
Is My Wedding Ring A Hazard?

What's The Difference Between "Work" And "Troubleshooting"?

Am I Required To Meet These Standards?

What's The Difference Between Qualified And Certified?

What's The Safest Type Of Clothing To Wear?



Disinfection at Home and at Work Today

- POTW
- Municipal drinking water production facility

Department of Homeland Security is Involved

- Facilities must ensure effective security
- Exemptions: wastewater and water treatment public utilities
- Section 1401 of the Safe Drinking Water Act
- Section 212 of the Federal Water Pollution Control Act

NPDES Permit

- Most municipal water treatment facilities have an NPDES Permit
- All municipal wastewater treatment plants have an NPDES Permit

Sewer Use Ordinance

- All POTW facilities have a Sewer Use Ordinance
- Sewer Use Ordinance dictates many parameters on an industry's pretreatment permit

CHLORINE GAS

Disinfection Options – Chlorine Gas

- ORP is an excellent way to feed chlorine
- Oxidant reaction
- Millivolts of 500 mv plus

Disinfection Options – Chlorine Gas

- Chlorine will destroy chelating amines in zinc-nickel alloy plating
- Chlorine will oxidize cyanide to cyanate
- Chlorine will oxidize cyanate to CO_2

Disinfection Options – Chlorine Gas

- Chlorine gas will need a scrubber system
- Wet scrubbers are preferred

Disinfection Options – Chlorine Gas

- Industry will need a Risk Management Plan if they use chlorine gas

Disinfection Options – Chlorine Gas

- If you chlorinate, you must dechlorinate!
- Sulfur must be used in this process

Dechlorination Options – Chlorine Gas

- Sulfur dioxide
- Sodium bisulfite
- Magnesium bisulfite
- Sodium thiosulfate

SODIUM HYPO-CHLORITE

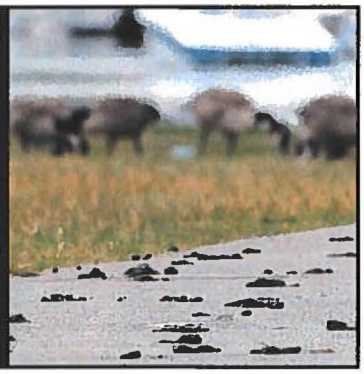
Disinfection Options – Sodium Hypochlorite

- Safer than gas chlorine
- 12.5% concentration
- 1 gallon of bleach = 1 pound of chlorine
- ORP can still be used

Disinfection Options – Sodium Hypochlorite

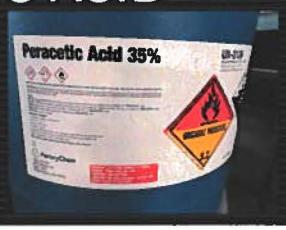
- Dechlorination must still occur
- Storage tanks need secondary containment
- Bleach will lose concentration
- No Risk Management Plan needed

Major Source of E.coli



Remedy of E.coli

PERACETIC ACID



Disinfection Options – Peracetic Acid

- Hydrotrope of hydrogen peroxide/acetic acid
- Strong oxidant
- Inactivates pathogenic microorganisms by disrupting the cell membrane

Disinfection Options – Peracetic Acid

- Contact time = 10 to 30 minutes
- Dose rate = 1 to 3 ppm
- Size system accordingly
- pH 7.0 to 7.5 ideal

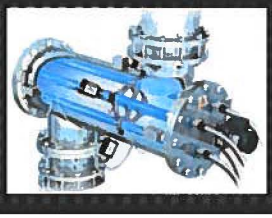
Disinfection Options – Peracetic Acid

- Oxidation potential is higher than bleach
- Oxidant demand is lower than chlorine
- PAA is highly corrosive and reactive

Disinfection Options – Peracetic Acid

- Destroy residual PAA with mols of sulfur
- Lab result will show up as acetic acid
- Use is increasing country wide

ULTRAVIOLET



Disinfection Options – Ultraviolet

- Transfers electromagnetic energy from an ultraviolet lamp to an organism's genetic make up

Disinfection Options – Ultraviolet

- No chemical program needed

Disinfection Options – Ultraviolet

- Be aware of
  - TSS
  - UV absorbing organics
  - pH
  - BOD – high levels

Disinfection Options – Ultraviolet

- Contact time
- Bulb cleaning/maintenance
- Radiation intensity
- Reactor configuration

Disinfection Options – Ultraviolet

- Very high energy consumption rate
- The operator/engineer must be qualified
- Needed in ultrapure water production

OZONE

Disinfection Options – Ozone

- Active biocide and strong oxidant when dissolved in water
- Destruction of cell wall occurs (cell lysis)
- Ozone concentration needed
- Target organism (E.coli)
- Contact time important

Disinfection Options – Ozone

- Power supply for air preparation
- Ozone generation unit
- Ozone contact chamber
- Liquid oxygen better than ambient air

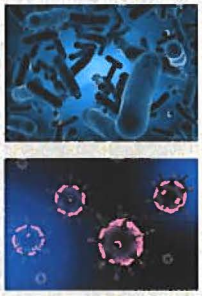
Disinfection Options – Ozone

- Excellent as a polishing step
- Destroys viruses and bacteria
- Short contact time
- No residual byproduct
- No major regulations

Disinfection Options – Ozone

- Need excellent dedicated operator
- Must be aware of all safety requirements
- Ozone is highly toxic and corrosive
- Capital cost – power consumption is high

Disinfection and destruction of all viruses, pollutants and bacteria that can cause illness is more important than ever!



Questions answered here...

even the silly ones!

Asset Management

Paul Lander
64seconds, Inc.

EPA: Asset Management For Water / Wastewater Utilities

Fundamentals

1. Efficient Operations and Maintenance (O&M)
2. Long-term budgeting for capital assets
3. A way to work smarter

EPA: Approach to Asset Management

5 Core Questions

1. What is the current state of assets?
2. What is the required "sustainable" level of service?
3. Which assets are critical?
4. What are minimum life-cycle costs?
5. What is the best long-term funding strategy?

1. Current State of Assets

- Asset inventory with condition assessments
- Asset risk assessment is a function of asset condition and the impact of failure
- O&M: Mobile platform takes info gathering into the field

2. Required Level of Service

Need FIG

- Customer service & regulatory requirements
- New technology raises the bar
- Track actual vs ideal performance
- O&M: Reported issues, like leaks, water quality / pressure

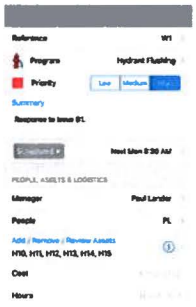
3. Critical Assets

better FIG

- Critical assets are identified by risk stratification:
  - Are more likely to fail
  - Have significant consequences of failure
  - High repair risk / costs
- O&M: Map visualization, maintenance summaries

4. Minimum Life-Cycle Cost

- A tactical approach to repairing or replacing assets
- Optimize the value of work by preventative vs reactive scheduling
- O&M: Work orders collect info about assets, activity, people & costs

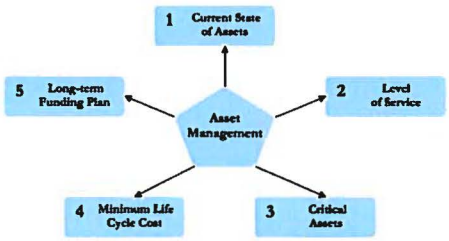


5. Long-Term Funding

Elements

- Revenues + Subsidies = Asset Cap Ex + Op Ex + Debt
- Financial Options:
  - Raise rates
  - Borrow money
  - Contributions from gov / developers
- O&M: Preferred Approaches:
  - Stretch useful asset life
  - Increase O&M efficiency

EPA: Asset Management Summary



EPA: Effective Utility Management (EUM)

O&M Centric View

Continuously Improving Everything

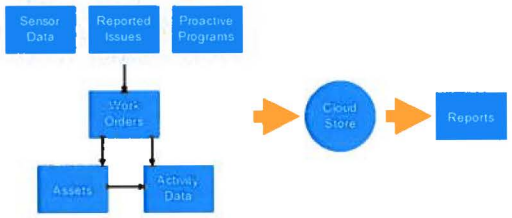
1. Building a geographically accurate inventory of assets
2. Defining proactive work programs, like a leak survey
3. Recording all work activity: proactive & reactive
4. Analyzing this data and repeating 2 - 4

O&M Management

Getting Actionable Insights

- Adopting software & new technology
- Learning new things continuously
- Good internal & external communication

Work & Data Flow



Reported Issues

- Issues occur spontaneously, but can be predicted:
  - Distribution pipe most likely to fail at 3 AM mid-January
  - Valves most likely to fail when exercised
- Response to issues is reactive by definition

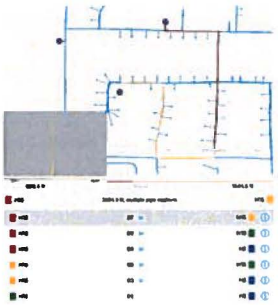
Proactive Programs

- Example Programs:
  - Leak survey
  - Hydrant flushing
  - Valve exercising
  - Water quality
  - Meter installations
- Programs are proactive by definition

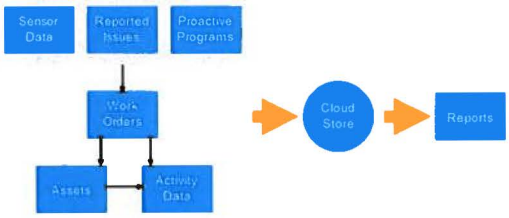
Sensor Data

Sensors Generate Significant Data

- Some examples:
  - Pressure monitoring
  - Leak noise correlation
  - Portable listening
- Saving sensor data separates acquisition from analysis



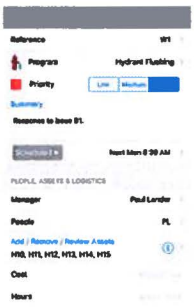
Work & Data Flow



Work Orders

Organizing Tool

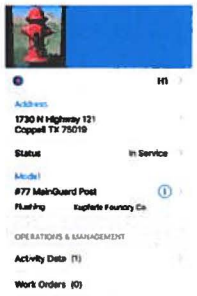
- Communicates effectively
- Identifies a program or issue
- Records a priority
- Sets dates: Scheduled, Opened, Closed
- References people, assets, costs, time, notes, photos



Assets

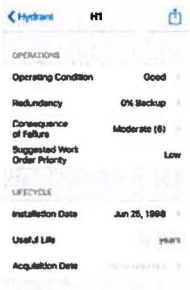
Unifying Foundation

- Unique identity & name
- Geocoded address
- Link to model & manufacturer
- References to Activities, Work Orders and Issues



Condition & Risk Assessment

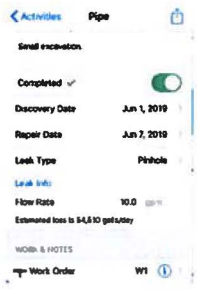
- Impact depends on:
  - Operating condition
  - Consequence of failure
  - Redundancy
- Capture enough data to:
  - Assess risk
  - Plan scheduled replacement
  - Record cost



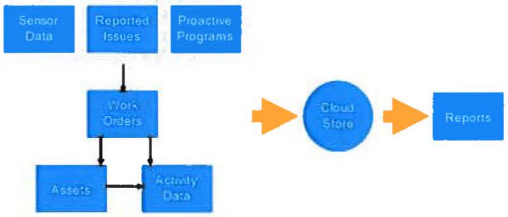
Activities

Data Produced By Work

- Always from an asset
- Reference to work order
- Capture enough data to:
  - Describe what was done
  - Report information



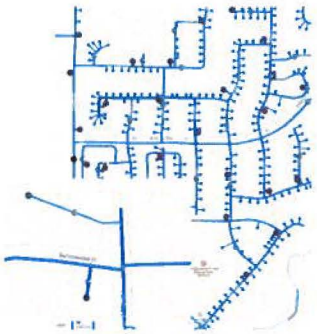
Work & Data Flow



Cloud Store

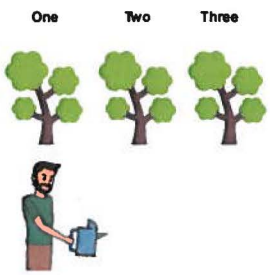
Key Elements

- Mobile / field-office / offline-first
- Data integrity
- Nexus for information:
  - Assets & sensor data
  - Issues, work orders & activities



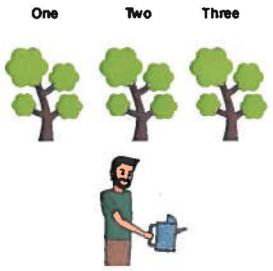
Data Integrity

- Essence of software:
  - while 'Next Tree': Water
  - if 'Last Tree': Save data
- Separate model from view
- No customization

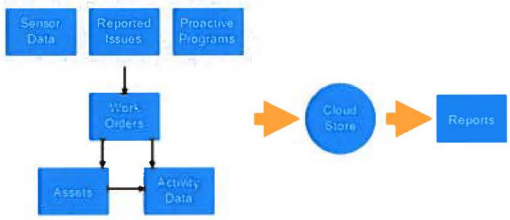


Data Integrity

- Essence of software:
  - while 'Next Tree': Water
  - if 'All Trees Watered': Save
- Separate database from user interface
- No customization



Work & Data Flow



Reports & Exports

Software Exchange

- Import from other databases
- Export to GIS, CSV (spreadsheets, other databases)
- Report PDFs

Start

Local Knowledge

- Define key problems
- Create proactive work programs
- Identify responsible individuals

Identifying Key Problems

Choose Problems From Local Knowledge; Examples:

1. Water loss (financial burden, scarcity)
2. Energy consumption
3. Water quality
4. Deferring Cap Ex on treatment plant & distribution pipes
5. Reducing stormwater / wastewater flows

Proactive Work Programs

Possible Solutions to Sample Problems

1. Leak survey
2. Meter upgrades
3. Pipe replacement
4. Pressure or flow monitoring
5. Plant upgrades:
   - Energy-efficient pumps
   - Sludge-to-biogas-plus-digestate -> CHP microturbines

Conclusion

Asset Management = Continuous Improvement

- Introducing software & new technology
- Working more effectively
- Improving the customers' and utility's work experience

USING TECHNOLOGY TO IMPROVE COMMUNICATION

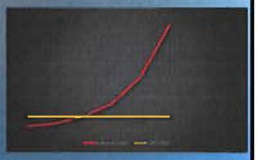
Kerry Zwiesler and Steven Derrington

BENNETT & WILLIAMS

Georgetown Municipal Water and Sewer Service

PREVALENCE OF TECHNOLOGY

- Technology and information is EVERYWHERE, all the time
- Communication of information is both easier and more difficult
  - More methods of communication
  - More competition for attention
  - More accessible and convenient
  - More affordable
  - Higher expectations of timely and relevant information at our fingertips



COMMUNICATION

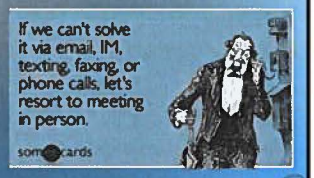
- It can facilitate great achievements
- Important communications in a utility
  - Between and within stakeholders
    - Employees (office, distribution, plant, administration)
    - Contractors
    - Boards/Councils
    - Consumers/Customers

"Wise men speak because they have something to say; Fools because they have to say something."

Plato

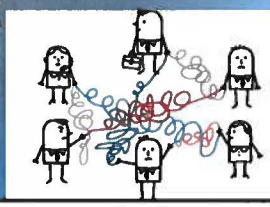
SO MANY CHOICES!

- HOW and WHEN to collect information
- HOW and WHEN to disseminate information
- WHAT platforms to use
- HOW to integrate communication into a utility
- WHO sees the information



CHALLENGES

- Data collection must be convenient, easy and consistent
- Information communicated must be relevant, timely and accurate
- Information must be curated so different stakeholders access different aspects of the information
- Mistakes in communication
  - Too little communication
  - Too much communication
  - Miscommunication
  - Timing of communication
  - Non-verbal aspects of communication



WATER OUTAGES/BOIL ALERTS/EMERGENCIES

- Many different ways to communicate these issues
  - Hang tags on doors
  - Radio
  - Automated calls/texts
  - Answering angry phone calls from customers
  - Facebook/Twitter
  - Live map on your website

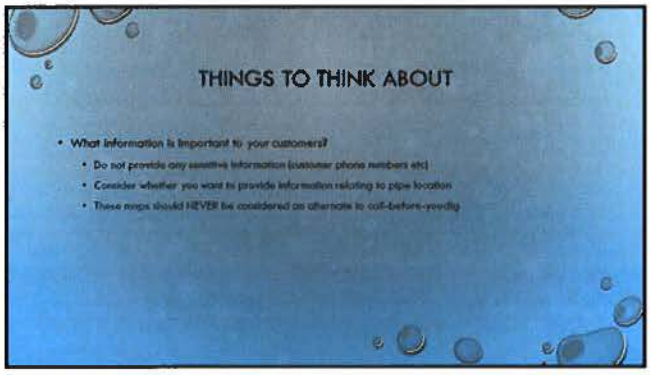
CUSTOMER NOTIFICATION FROM DESKTOP

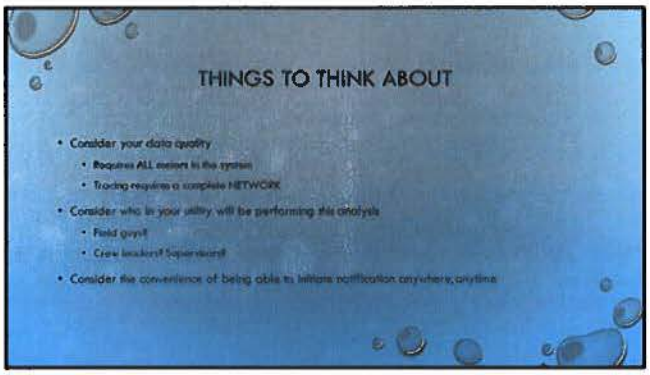
- Can use mapping to select impacted customers based on knowledge of the system
- It's possible to use a tracing program to show which customers are impacted
- Upload a text file to a calling company and notify customers
- Notifies customers in 1 way (phone call)
- Notifies internal stakeholders by word of mouth

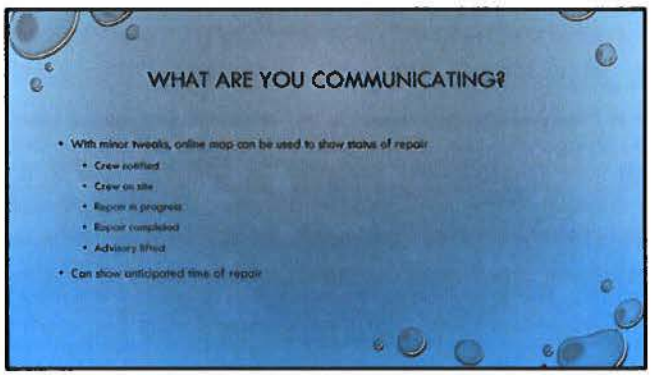
DESKTOP NOTIFICATION

CUSTOMER NOTIFICATION FROM THE FIELD

- Use a similar process
  - Field guys determine which customers are impacted
  - Draw a polygon around impacted customers
  - Generate calling list and upload to calling company
  - Store polygon online and make it immediately available through your website
  - Notify customers in at least 2 ways (phone call and website), and can also upload to FB/Twitter
  - All internal stakeholders can also see the online map
  - Demonstration of online notification using LHVWA maps


THINGS TO THINK ABOUT
• What information is important to your customers?
• Do not provide any sensitive information (customer phone numbers etc)
• Consider whether you want to provide information relating to pipe location
• These maps should NEVER be considered an alternate to call-before-you-dig


THINGS TO THINK ABOUT
• Consider your data quality
• Requires ALL assets in the system
• Tracing requires a complete NETWORK
• Consider who in your utility will be performing the analysis
• Field guys?
• Crew leaders? Supervisors?
• Consider the convenience of being able to initiate notification anywhere, anytime


WHAT ARE YOU COMMUNICATING?
• With minor tweaks, online map can be used to show status of repair
• Crew notified
• Crew on site
• Repair in progress
• Repair completed
• Advisory lifted
• Can show anticipated time of repair

INTERNAL COMMUNICATION

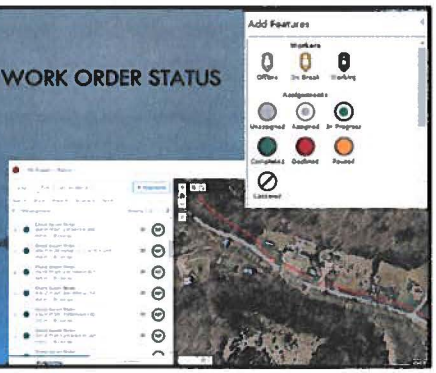
- Communication to external stakeholders is important
- Don't forget communication between groups in the utility
- Small utilities, word of mouth may be enough
  - It's typically the norm
  - Don't change the culture all at once, start introducing small ways of transferring information between groups.

COMMUNICATION REGARDING A LEAK

- How do you notify the plant?
- How do you notify the office (they are on the front-line dealing with your customer(s))?
- Can set up automated emails using webhooks to send an email or text to the plant when outages are reported in the GIS
- Get personnel used to looking at system maps that show outages

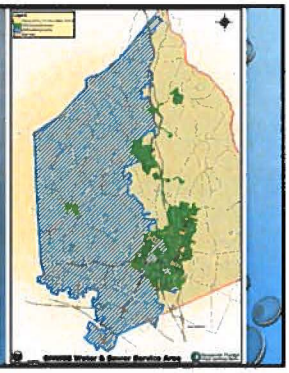
WORK ORDER STATUS

- Tracking mobile work orders
- Status maps show work orders assigned, in progress and completed
  - Staff can access notes and photographs for additional detail
  - Paper work orders make timely updates difficult



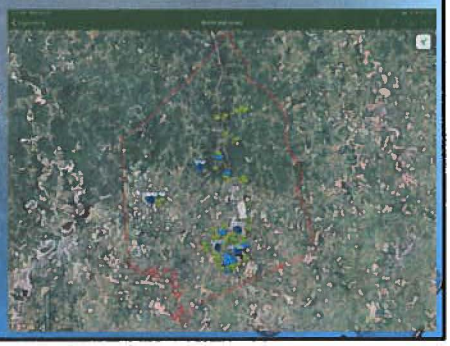
CASE STUDY: GMWSS

- 14,000 customers
- Water and Sewer Service
- Central Kentucky
- Continued growth
- History of using technology



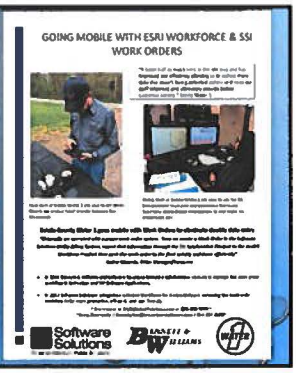
GMWSS AND GIS

- History of the GIS system
  - Started about 2003
  - Daryl Mulder and Fred Ballard
  - ArcReader
  - ArcGIS Online – 2016/2017



WORKORDERS AT GMWSS

- 800 work orders per month
- Paper work orders
- Tried emailing work orders
- 2017-SSI (Billing System) & ArcGIS Online Integration
- July 2018-started project
- November 2018-deployment



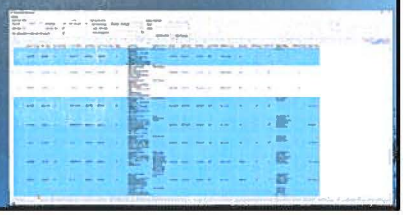
WHY INTEGRATE BILLING SYSTEM WITH WORK ORDERS?

- Eliminate paper work orders
- Small-Mid-size utilities (3,000-20,000 taps)
- Use existing software assets (Billing and GIS)
- Add mobile dispatch
- Use the best pieces of Billing Software and ESRI software

WORKFLOW

In the Office:

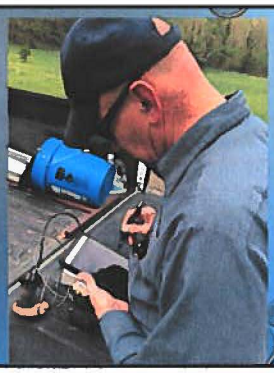
- Create work orders in billing software (as usual)
- Send work orders to ArcGIS Online Workforce
- Color-coded (blue ready to send out; green ready to import)
- Newest update to SSI will be integrated without this additional software



WORKFLOW

In the Field

- Workers receive assignments
- Respond to assignments
- Take notes and photos
- Link to Survey123 to collect additional data
- Complete assignment



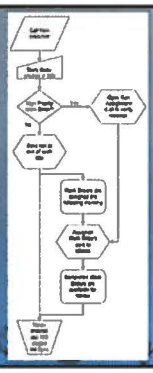
WORKFLOW

In the office

- Import completion notes into the billing system
- Use dashboards to access additional data collected in Survey123 and WorkForce
  - New meters and meter change outs
  - Final readings
  - Backflow

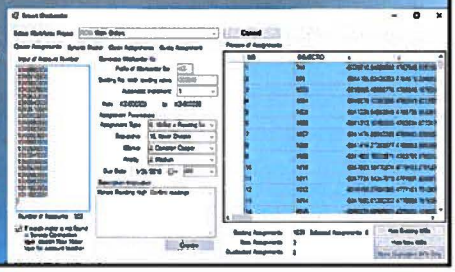
ADVANTAGES

- Good communication of information (status of work orders is known)
- No paper to get lost
- Field notes entered electronically and entered automatically into billing system (no handwriting issues)
- Linked to Survey123
- Use Dashboards for data display
- Provide spatial reference for office and field personnel



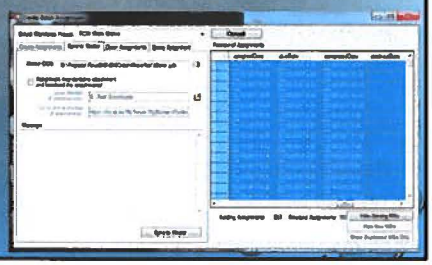
EXTENDING THE USEFULNESS OF ESRI WORKFORCE

- Batch creation of work orders
- Easily create the same type of work order multiple times for different meters/ hydrants/ valves
- Use for high or low meter readings, hydrant flushing, valve exercising, inspection of assets



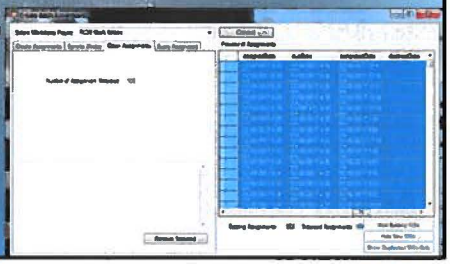
EXTENDING THE USEFULNESS OF ESRI WORKFORCE

- WorkForce is designed for a limited number of records (it starts to slow down at 5,000 + records)
- Need a way to archive (synchronize) work orders for storage
- Must include the archive of pictures
- Must link pictures to appropriate work order



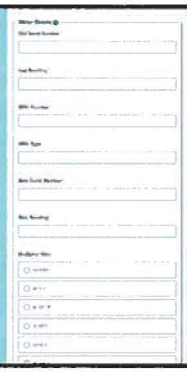
EXTENDING THE USEFULNESS OF ESRI WORKFORCE

- After archiving work orders need to delete them from the WorkForce project



INTEGRATION WITH SURVEY123

- Use Survey123 to collect additional data
  - WorkForce has limited fields
  - Use Survey123 for analysis



USING DASHBOARDS

- Used in the office
  - For extended data entry into billing system
  - Used by management to summarize activities in the utility at board meetings
  - Used by supervisors to track work performed and any overdue work orders
- Designed depending on use and requirements of personnel
- Can select date ranges or staff member to filter data

GMWSS DEPLOYMENT

- Trained Supervisors and Management in early November 2018
- November 14, 2018 – training for field and office personnel
- November 15, 2018 – went live
- No more paper work orders

RESPONSE FROM GMWSS PERSONNEL

- No complaints
- Field operators
- Customer service
- Supervisors
- Managers
- Survey123 and Dashboards

LEVELS OF COMMUNICATION

- Some stakeholders need detail
- Others don't care about details!
- Some want details but get stuck in the details
- Some just need the big picture
- Design your communication to address people's needs

BIG PICTURE COMMUNICATION

- Challenge – to distill large amount of data into a manageable and USEFUL format
- Can also use spreadsheets/Crystal Reports/other reporting software
- One option is using dashboards to summarize data

WAYS TO IMPROVE COMMUNICATION

- Link different software programs being used
  - Difficult and time-consuming but very helpful
    - GIS, billing, asset management, SCADA, inventory
- Make it a priority (easier said than done!) and real time and accurate
- Make it easy for the users, but this can make design and deployment behind-the-scenes more difficult
- Design your communication specifically for the group you are communicating with
- Harness the power of maps and visuals

THANK YOU

Kerry Zwierschke

Shawn Derrington, Operations Manager

Mobile: (614) 361-4479

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KRWA'S 2019 Annual Conference
August 27, 2019

WATER AUDITS AND WATER LOSS CONTROL FOR PUBLIC UTILITIES

2

Outline: Water Loss Control and Discussion

- Water Audit
- Intervention
- Evaluation

Water Loss Control and Discussion

3

EPA

WATER AUDITS AND WATER LOSS CONTROL FOR PUBLIC WATER SYSTEMS

Introduction

Water Loss Problem

4

- Commonwealth of Kentucky will need to spend $2.8 billion dollars on water systems over the next 20 years and $97 billion is water loss.
- Kentucky's Population 4,484,047 people
  - 1.4% of US total 328,231,337 people
  - Kentucky will pay about $30 /person based on 2019 data for water system improvements and $15/person for water loss
- Scope of the Problem
- Understanding Use and Loss
- Benefits of Control

Water Loss Problem

5

20 Year	US Water System Expenditure	KY Water System Expenditure	KY Cost / 1 Year	KY/Person
Water Systems	$200,000,000,000	$2,732,247,957	$136,612,398	**$30**
Water Loss	$97,000,000,000	$1,325,140,259	$66,257,013	**$15**
	US Population	**Ky Population**		
	328,231,337	4,484,047		
		% KY Population of US		
		1.37%		

Introduction

6

- Expectations & Materials
- Statistics
- Scope of the Problem
- Understanding Use and Loss
- Benefits of Control

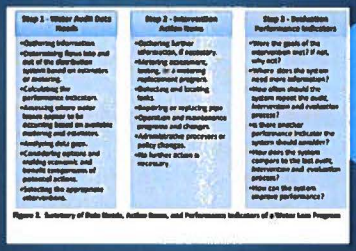
Basics of Water Control

7

- Audit
- Intervention
- Evaluation
- Importance of Metering

Basics of Water Control

8



The Water Audit

9

- Water Produced / Purchased **(WP)**
- Determine Authorized Consumption **(AC)**
  - Billed and Unbilled
- Calculate Water Loss **(WL)**
  - **WL= WP -AC**
- Top Down Audit
- Bottom Up Audit
- Data Resolution
- Methods

Intervention

10

- Preventive Measures
- Asset Management
- Meter Installation Testing and Replacement
- Leak Management
- Pipe Repair and Replacement
- Cost

Evaluation

11

Have Goals been Met?

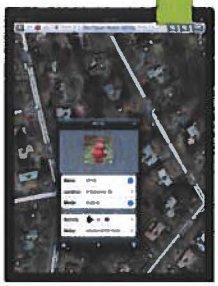
- Why-Why Not?
- More Data
- Frequency of Audit, Intervention and Evaluation
- Other Performance Indicators
- Verify Against Past Data
- Improve Operations

Using Benchmarking

- Using Standards that make sense
- What about Small Systems?

Develop a Plan

- AWWA Work Sheets
- Zone, Plan and Analyze
- Implement Accurate Methods
- Review Asset History



Time Table

13

- What is Plan for Completion?
  - Audit Time Line
  - Intervention
  - Time to Complete Actions
  - Time for Evaluation and Measurement of Success
- What is the ongoing plan and Time Line
- Frequency of Re-Evaluation

Resources Required

14

- Assign Co-Owners to the Process
- Collect and Evaluate Data
- Make Plans
- Resource the Work
- Track Leaks and Cost
- Prioritize Troublesome Areas
- Minimize Pressure Spikes w/ Good Hydraulic Design
- Pay attention to Maintenance

Action

15

- Read Master Meters Daily
  - Monday & Friday Minimum
- Intervention
- Read Customer Meters Monthly
  - ASAP: 3-5 Days Maximum
  - Same Time per Month
- Calculate Losses
- Routine Meter Checks of Working Order

Action

16

- Replace Meters as required for Accuracy
  - Customer Meters 1/10 years
  - >4" Annually
- Isolate Zones with Valves
- Install By-pass Meters or Test Meter Pits
  - 1/ 100 Customers
- Install 2" By-pass meters at Tanks for Night Audit
- Record Pressures
- Note all actions to Assets for Evaluation

Re-Evaluate Success

- Were the Goals Met?
- What is Water Loss?
- How much did the Loss Save?
- What was the Cost to Recover?
- Did the Repairs-Replacements Improve the Quality and Safety of the System?
- How can we Sustain the Success?

Conclusion

18

- 15% Water Loss
  - KPSC Issues Deficiency Tracking Report
    - DTS is unacceptable
- Requires Response
  - Water Loss Control Plan
  - Time Table for Corrections
  - Follow Up Plan
  - Get Started

TUIT


19
Get
Started

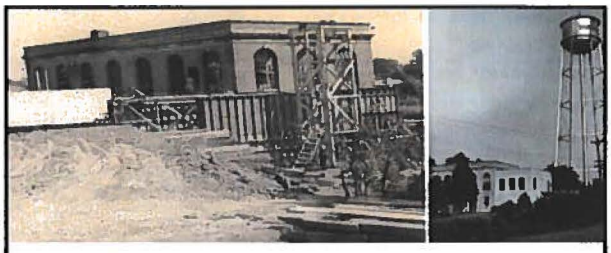

20
Round
Table
Discussions


21
Automatic Controls Company
Knowledgeable product and
application support

Danville Water Treatment Plant Expansion and Upgrade Project

Brent Tippey, HDR

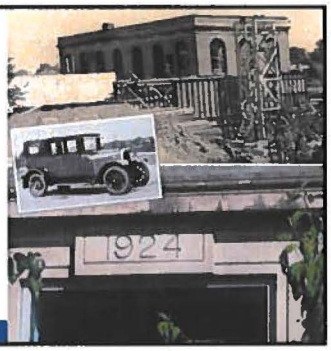
HDR



Project Background

Danville Water System History

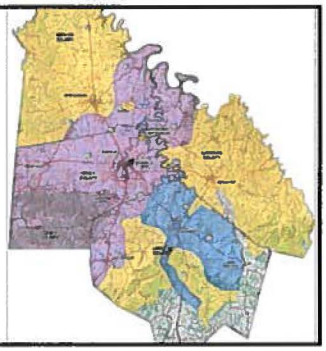
- Original Water System – 1890's
- Moved to Current location – 1924
- Intake Structure Built -1936
- Plant Capacity Expansions
- 1936, 1955, 1957, 1966
- Minor Improvement Projects – 1986, 1990



Area of Influence

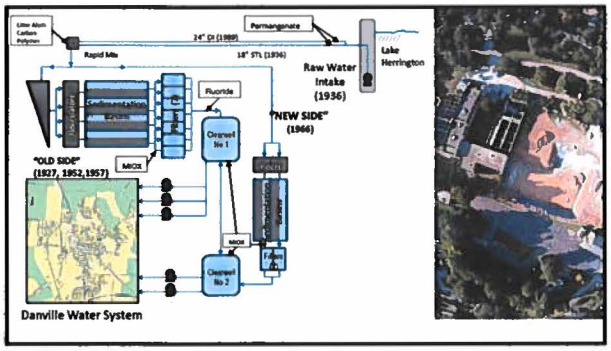
City of Danville Customers – 75k

- Danville Residents
- Junction City
- Hedgeville
- Perryville
- Lake Village WA
- Hustonville WD
- Parksville WD
- Garrard Co WA
- North Mercer WD
- City of Stanford



Danville WTP Details (2011)

- 10 MGD Capacity – Periodic Limitations to 8 MGD
- Conventional Treatment Process
- Pre-oxidation with KMNO4
- PAC Adsorption (~ 22 mg/l)
- Chemical coagulation - PACl
- Gravity sedimentation - 5 Different Basins on two HGLs
- Multi Media Filtration
- MIOX (0.8%) Disinfection
- Bin 1 System – No Crypto hits
- TOC Reduction – 33% - 57% during 2010-11
- Seasonal Fe/Mn in Lake

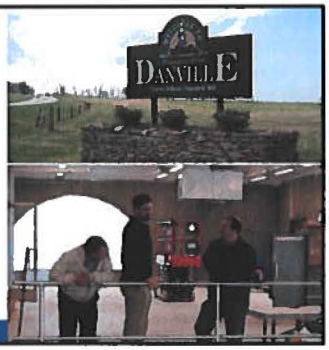


Danville Water System

Project Drivers

Drivers & Objectives

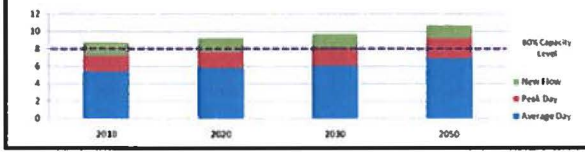
- Capacity To Meet Customers Needs Over 40 Years
- Reliability Of Facilities /Aging Infrastructure
- Compliance With Regulatory Requirements
  - Stage 2 D/DBP
  - Long Term 2
- Economy | Maximize Danville's Resources



Drivers & Objectives

CAPACITY TO MEET CUSTOMERS NEEDS - 40 YEARS

- Danville Usage (2010)
- 5.6 MGD Avg/7.3 MGD Max
- New Customer Sales Expected
- Regional Anchor Supply
- 1.5 MGD Avg of Interested Systems



Drivers & Objectives

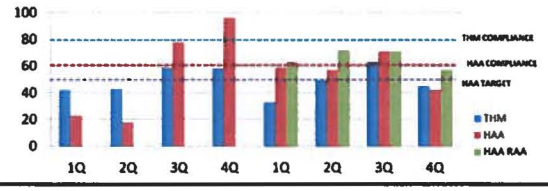
RELIABILITY OF FACILITIES

- Aging WTP Components (1924)
- Single Discharge Line – Intake
- Equipment Repair More Costly
- Ability to Recover – Lost Capacity
- Monitoring Interface for Operators
- Near Misses – Ice Storm

Drivers & Objectives

COMPLIANCE WITH REGULATIONS

- October 2014 Compliance Date – Stage 2 DBP
- WTP Needs to Produce High Quality | Compliant Water



Evaluation of Options

GAC Contactors

Pilot Columns Installed at WTP

- Spot Sampling (5) – 60 days of operation

RSSCT Columns – Univ of Colorado

- Predictive Assessment of Media Life
- Further Assess Effectiveness

Results

- Improvement over Coagulated
  - 45% on DBP formation
  - 50% on HAA formation

	Danville 2		
Untreated DOC	3.5 mg/L		
Coagulation conditions	Ferric 33 mg/L		
Coagulated DOC	1.9 mg/L		
Coagulated SUVA	2.02 L/mg/m		
Coagulated DBPs*		TTHM	HAA5
		104 ug/L	58 ug/L
Coagulated + GAC treated DBPs	@ Treated DOC =	TTHM	HAA5
	1.44 mg/L	64 ug/L	29 ug/L
	1.52 mg/L	66 ug/L	30 ug/L
	1.8 mg/L	68 ug/L	33 ug/L
Minimum Coagulated + GAC treated DOC concentration that meets DBP limit	1.7 mg/L		
Predicted days to breakthrough single contactor operation	EBCT = 10 minutes	260 days	
	EBCT = 20 minutes	250+ days	
	EBCT = 15 minutes (actual)	230 days	
Predicted days to breakthrough parallel contactor operation (Theoretical assessment)	>> 300 days		
Predicted days to breakthrough 4 parallel contactors in operation	300+ days		
Carbon utilization rate (15 minute EBCT, 4 contactors)	0.11 lb/1000 gal treated		

Selected Alternative

Selected Alternative

- Gravity GAC Contactor Selected for Organics Removal
- Process Details Included
  - 15 min EBCT/ 12x40 mesh
  - Post –filtration contactor
  - Water Only Backwash (Non-chlorinated)
  - Bypassing/Split Stream Capable
  - Staggered Operation
  - Capable of Biological Removal of HAA/T&O Precursors

Facility	Element	Capacity	Reliability	Compliance	Optimization
Intake	RW Pumps	✓	✓		✓
	2nd Transmission Main	✓	✓		✓
	Raw Chemical Feeders			✓	✓
WTP	Splitter Box			✓	✓
	Plate Settlers	✓	✓	✓	✓
	Filters	✓	✓	✓	✓
	Clearwell (Baffling)	✓	✓	✓	✓
	GAC			✓	
	Pumps	✓	✓		✓
	Chemical Feed Systems	✓		✓	✓
	Disinfection (Generation)	✓	✓	✓	✓
	Emergency Generator		✓		
	SCADA		✓		✓

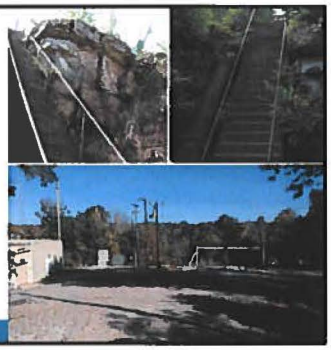
Project Bidding

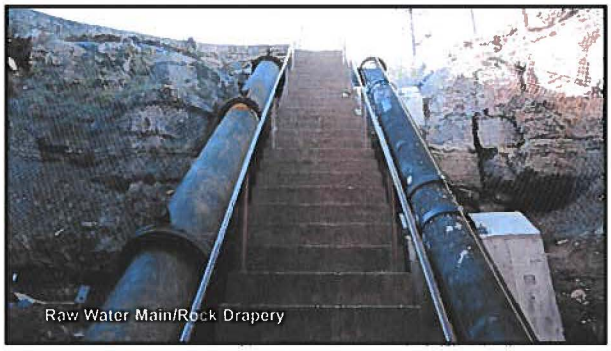
- Advertised Project – September 2013
- Maintenance of Operations Highlighted
- Complex Construction Project - 30 months
  - Every Ex Plant Facility Modified
  - Five New Buildings/ Major Components Added
- Engineer's Estimate - $ 24.5 million
- Eight Bidders
- Low Bid - $23.8 million – Judy Construction
- Construction Initiated - March 2014

Construction Phase

Raw Water Intake Details

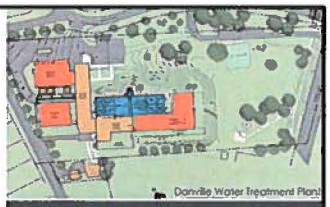
- Original Construction - 1928
- Replacement of Three RW Pumps
  - VFD Operations
- 2nd Transmission Main
  - Valve Interconnection Vault
- New Valves/Surge Devices
- Electrical Service Upgrades
- Sculpting of Rock to Mitigate Risk
- Extensive Sitework for Access




Raw Water Main/Rock Drapery

Water Treatment Plant Details

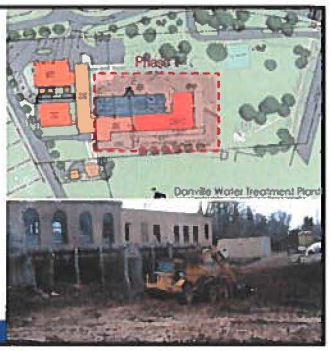
- Reduced Capacity Operations – 14 months
  - Two-Phase Construction/Maintenance of Operations/Temporary Operations
- Demolition of Clarifiers/Repurpose Filters/Chem Feed
- Five New Facilities
  - Splitter Box/Plate Settler Basins
  - Six New Filters/Filter Building
  - Expanded Clearwell/Pumping Upgrades
  - GAC Contactors
  - Chemical Storage and Feed Facilities

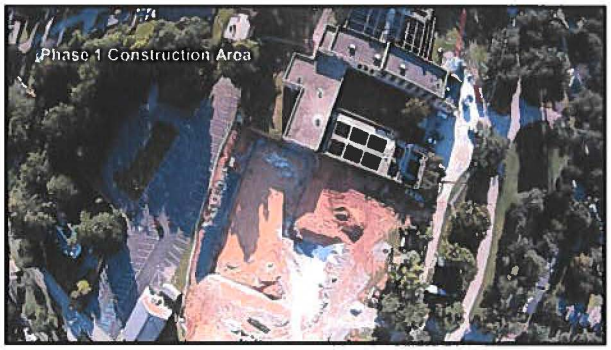


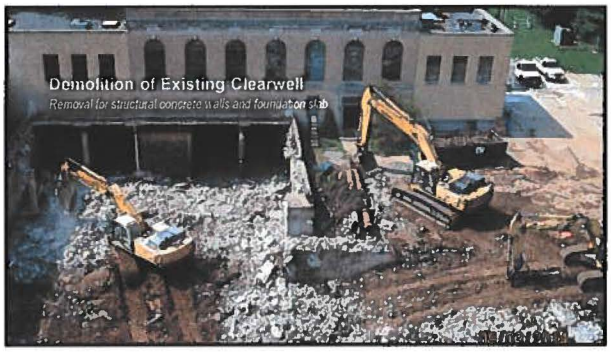
Phase 1 Construction

(March 2014 – Nov 2015)

- Splitter Box/Plate Settlers
- Six New Filters
- New Clearwell/Rehab Existing Clearwells
- New Pumps
- Control Room/Lab Areas

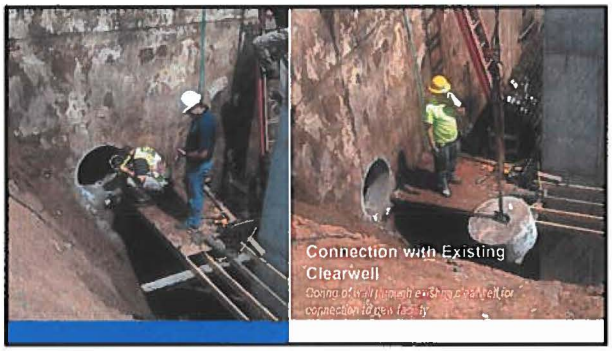


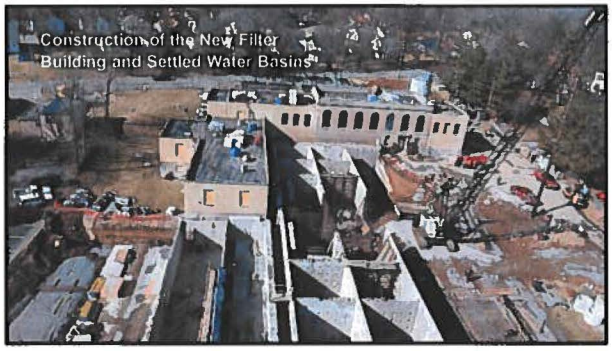


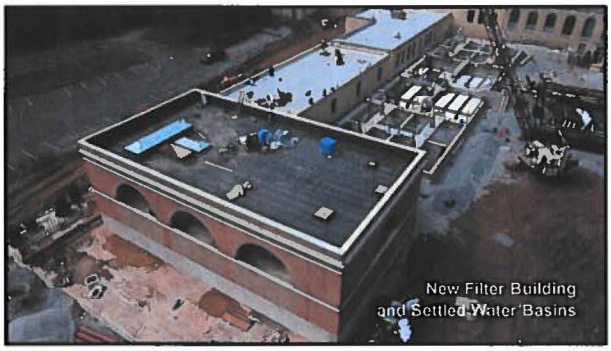

Demolition of Existing Clearwell
Removal for structural concrete walls and foundation slab


Excavation for New Clearwell
and Foundation Slab

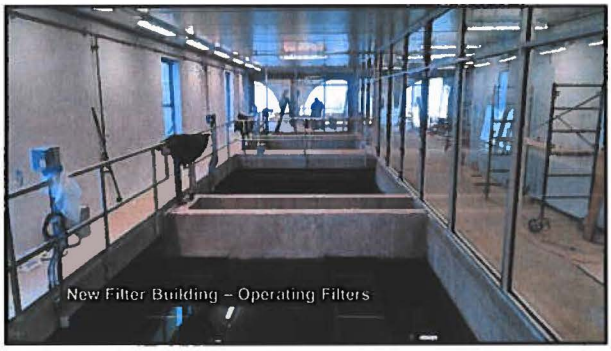

Clearwell Walls


Connection with Existing
Clearwell

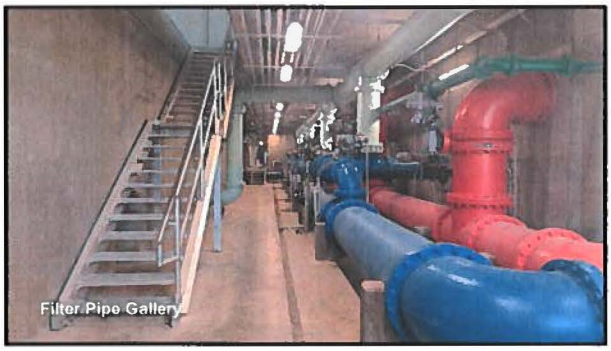

Construction of the New Filter
Building and Settled Water Basins


New Filter Building
and Settled Water Basins

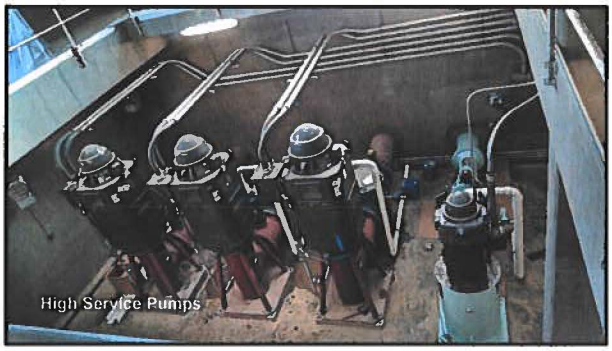
New Plate Settled Water Basins.



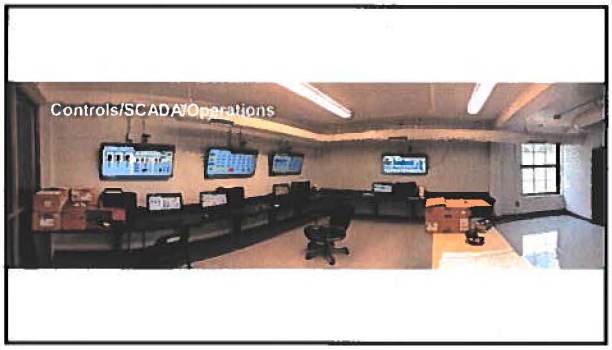
New Filter Building – Operating Filters



Filter Pipe Gallery

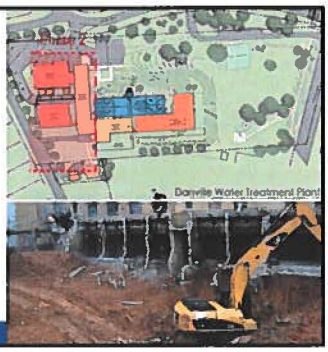

High Service Pumps

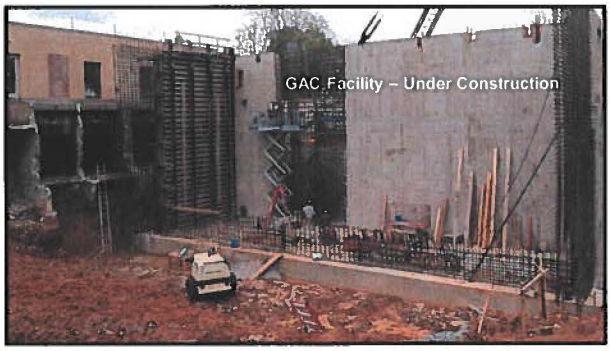

Lab/Operations


Controls/SCADA/Operations

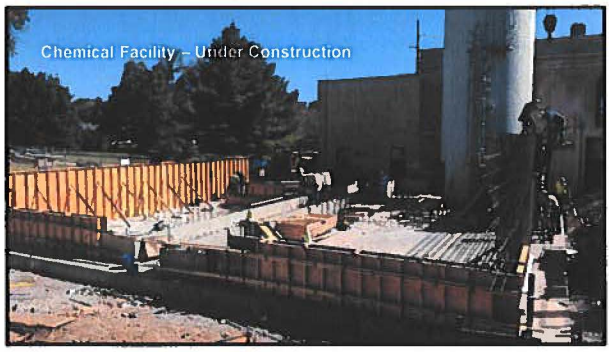
Phase 2 Construction
(Dec 2015 – June 2017)

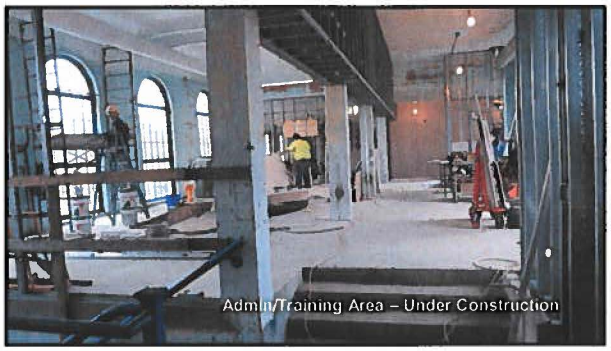
- GAC
- Chemical Feed & Storage
- Admin Building Repurpose
- Training Area
- Additional Laboratory Facilities



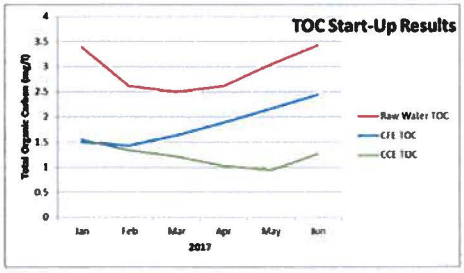



GAC /Chemical Building

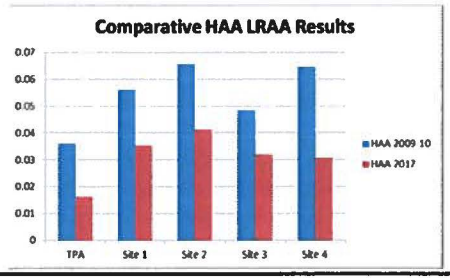

Chemical Facility – Under Construction



Plant Performance To Date



Plant Performance To Date



KY's City of Firsts Finishes a First-Class Treatment Plant

WPC 2017

Earl Coffey, City of Danville | Brent Tippey, HDR

HDR

Attacking Water Loss – Supporting DMAs with Acoustical Leak Sensors

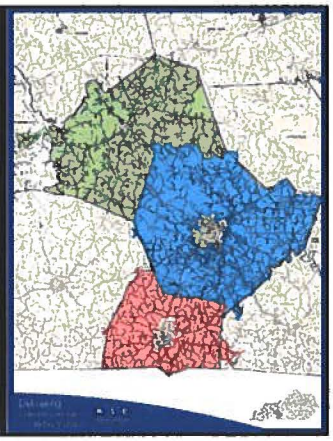
PRESENTED BY WARREN, BUTLER, AND SIMPSON COUNTY WATER DISTRICTS

JOHN DIX, P.E.

B. J. MALONE

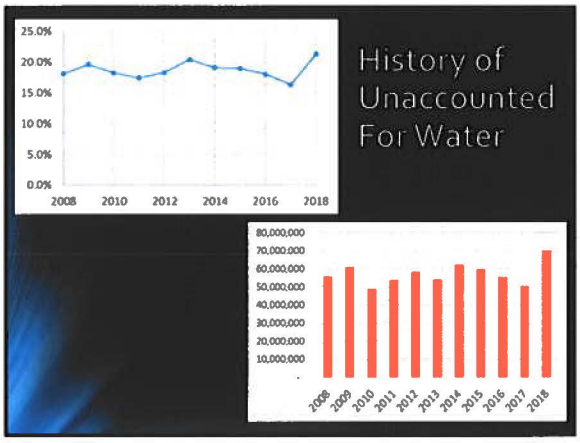
About Warren, Butler, & Simpson County Water Districts

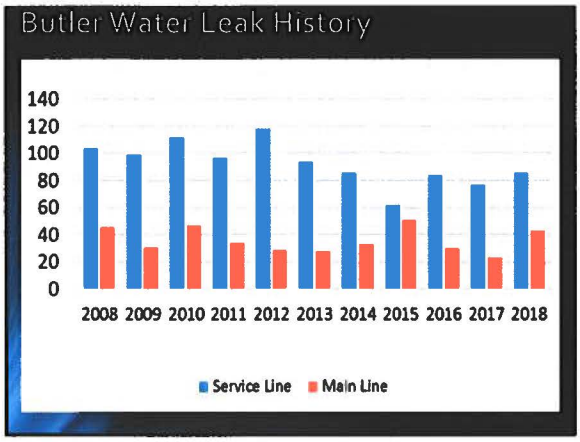
- Area Served – 1,155 sq mi
- Customers – 38,000 water and 7,000 sewer
- 2,050 miles of transmission & distribution lines, 175 miles of collection lines
- 52 Tanks, 58 Pump Stations, 110 Water & Sewer Master Meters, 63 Lift Stations, & 1 WTP
- 64 Full Time & 2 Part Time Employees at 3 Offices

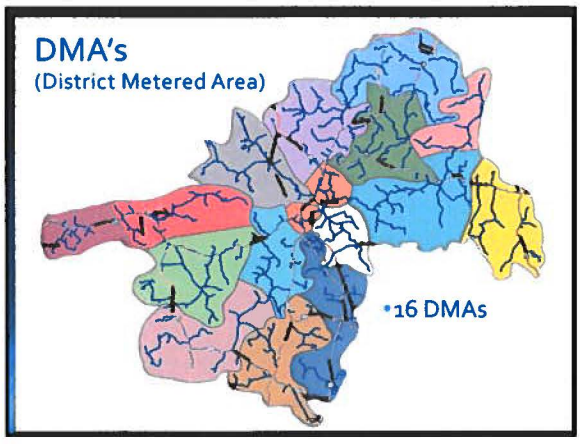


About Butler Water

- 4,900 Customers
- 518 miles of 2"-12" water mains
- 31 miles of service lines
- 2 MGD Water Plant
- 14 Water Tanks
- 15 Pumping Stations
- 1 Control Valve Station

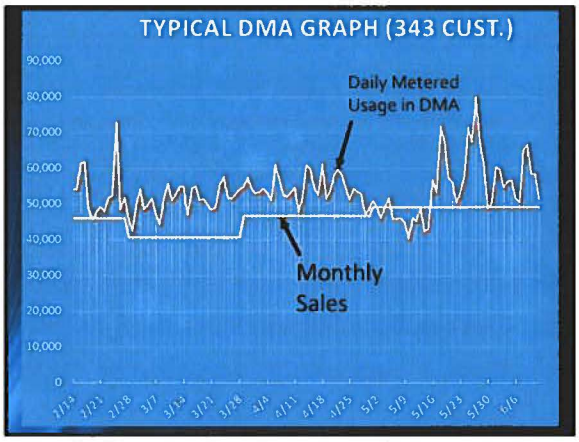

History of Unaccounted For Water
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
2008
2010
2012
2014
2016
2018
80,000,000
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Butler Water Leak History
140
120
100
80
60
40
20
0
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Service Line
Main Line


DMA's
(District Metered Area)
•16 DMAs

DMA Characteristics

- 100 – 500 customers
- 15 - 43 miles water mains
- 1 - 3 miles of service lines
- Each DMA Master Meter tested annually
- All DMA Master Meters read daily through SCADA



Butler Water Evaluation & Plan

- Goals:
  - Reduce Meter Reading & Leak Detection Hours
  - Improve efficiency in finding leaks
  - Reduce Unaccounted-For Water
- 2016-2017 - Evaluated various AMR & leak detection systems
- 2017-2018 – Applied for RD funding and bid project
- 2018 Pilot 2019 Installation

Selected Equipment

Itron Riva ERT

Itron OpenWay RivaLeak Sensor

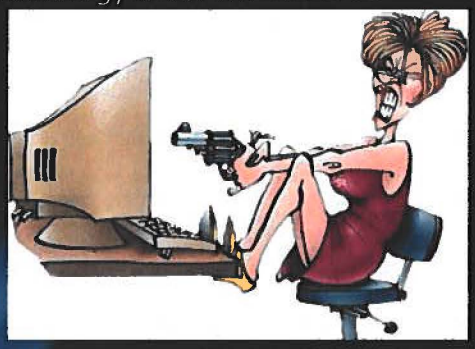
The Pilot Test Area

- 300 meters in most difficult area
- Installation of Pilot – April 2018
- Different models of Itron AMR unit and leak sensor
- Tested various methods of installation (Lid mount, box mount, rod mount)
- Test period originally planned for 1 year but was reduced to 6 months due to excellent performance

The Project

- Full installation – October, 2018 – February, 2019
- Project Managed thru GIS System
  - Planned spacing of leak sensors
  - Inspection and data management
- Used installation contractor
- Final numbers:
  - 5,018 Itron Endpoints
  - 3,754 Itron Leak Sensors

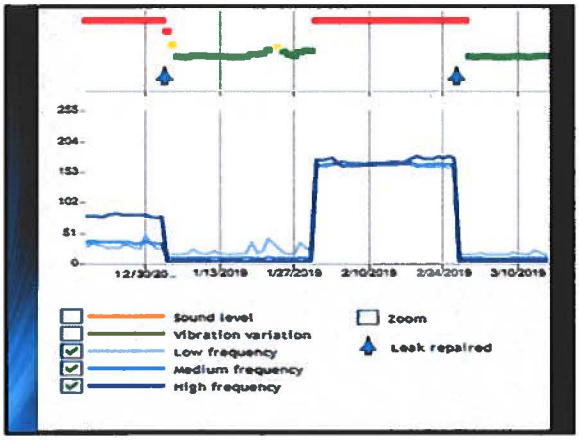
Technology is our friend . . . . .

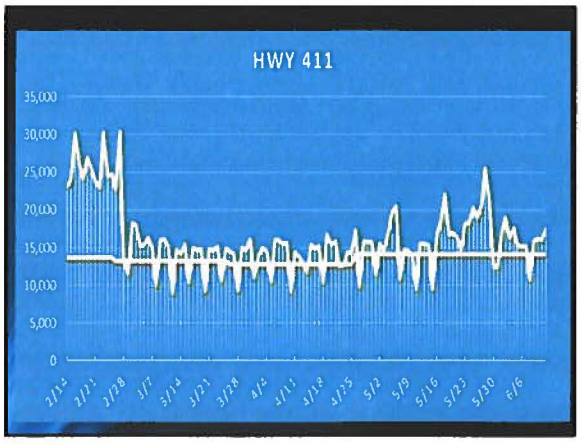


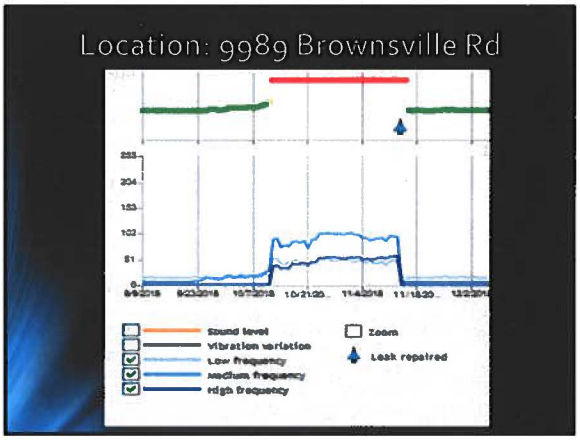
Or your *Worst Enemy*!

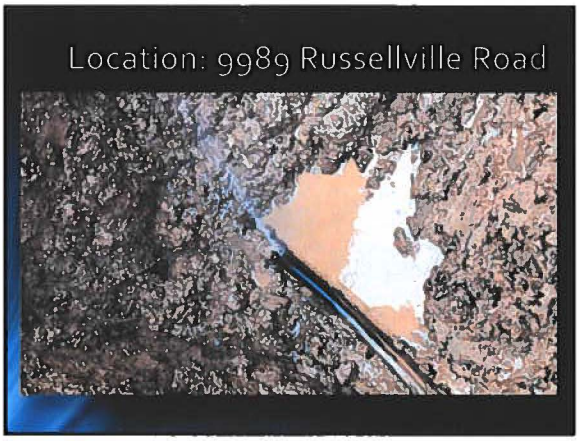
Change How We Do Business

- Initial Volume of Leaks Identified Overwhelming
- Evaluate how we investigate leaks
- New information – lots of customer leaks

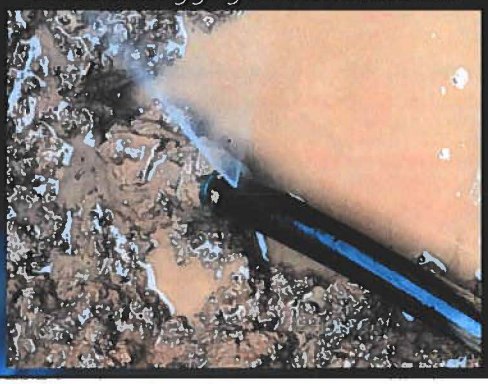



HWY 411
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0


Location: 9989 Brownsville Rd
Sound level
Vibration variation
Low frequency
Medium frequency
High frequency
Zoom
Leak repaired

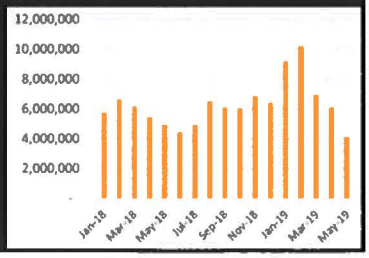

Location: 9989 Russellville Road

Location: 9989 Brownsville Rd



The Results So Far

- An estimated 362 gallons per minute in leaks found and repaired using the leak sensors
- Lowest gallons lost in years
- Net labor savings of $1,000-2,000 per month



More To Do

- Continue to develop an understanding of the acoustical analysis process
- Develop improved and more efficient read routes
- Create process to allow for frequent download of leak sensor data correlating to problem DMAs

Questions?

Thank you!

John Di:, PE – General Manager
johnd@warrenwater.com

B.J. Malone – Manager of IT/GIS
bjmalone@warrenwater.com

WARREN SIMPSON BUTLER
COUNTY WATER DISTRICTS

Kentucky Rural Water Association's 40th Annual Conference and Exhibition

August 27, 2019

K.P.D.E.S. SAMPLING, MONITORING, AND LABORATORY PRACTICES

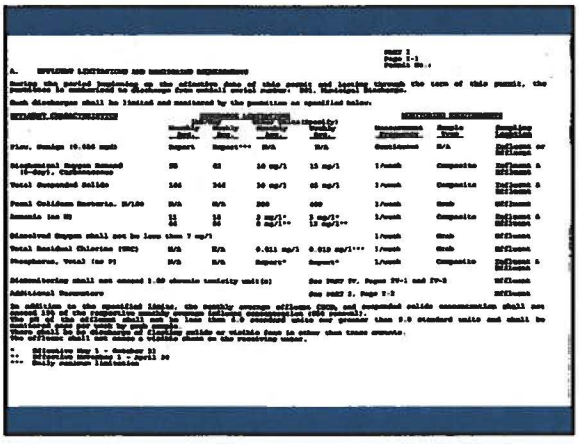
McCoy & McCoy Laboratories, Inc.
P.O. Box 907
Madisonville, KY 42431
www.mccoylabs.com

ACCREDITED IN ACCORDANCE WITH nelac

McCoy & McCoy Laboratories, Inc.

K.P.D.E.S. PERMIT

IT ALL BEGINS HERE
The Key to Your Compliance



Page 3
Page 3-1
PERMIT NO.:

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall serial number: 001, Municipal Discharge.

Such discharges shall be limited and monitored by the permittee as specified below.

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS Monthly Avg.	Weekly Avg.	Other Units (Specify) Monthly Avg.	Weekly Avg.	MONITORING REQUIREMENTS Measurement Frequency	Sample Type	Sample Location
Flow, Design 10.000 mgpd	Report	Report***	N/A	N/A	Continuous	N/A	Influent or Effluent
Dissolved Oxygen Record 15-Sept. Continuous	5%	4%	10 mg/l	15 mg/l	1/month	Composite	Influent & Effluent
Total Suspended Solids	366	366	30 mg/l	45 mg/l	1/month	Composite	Influent & Effluent
Fecal Coliform Bacteria, N/100	N/A	N/A	200	400	1/month	Grab	Effluent
Ammonia (as N)	11 15	16 23	3 mg/l* 4 mg/l**	5 mg/l* 6.5 mg/l**	1/month	Composite	Influent & Effluent
Dissolved Oxygen shall not be less than 7 mg/l					1/month	Grab	Effluent
Total Residual Chlorine (TRC)	N/A	N/A	0.011 mg/l	0.019 mg/l***	1/month	Grab	Effluent
Phosphorus, Total (as P)	N/A	N/A	Report*	Report*	1/month	Composite	Influent & Effluent
Biomonitoring shall not exceed 1.00 chronic toxicity unit(s)					See Part IV, Pages IV-1 and IV-2		Effluent
Additional Parameters					See PART I, Page I-2		Effluent

In addition to the specified limits, the monthly average effluent flows, and suspended solids concentration shall not exceed 130 of the respective monthly average influent concentration (BOD removal).
The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.
There shall be no discharge of floating solids or visible foam in other than trace amounts.
The effluent shall not cause a visible sheen on the receiving water.

*. Discharge May 1 - October 31
**. Discharge during November 1 - April 30
***. Daily maximum limitation

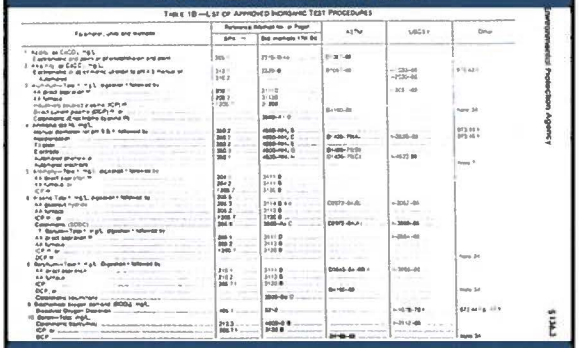
McCoy & McCoy Laboratories, Inc.

Roles of the Lab & Permitted Facility

- Sample Collection
  a. Who is responsible for collecting samples
  b. Collected according to permit (Grab or Composite)
  c. Composite (Manual or Mechanical)
  d. Proper containers, preserve, label, & Custody seals
  e. Field Measurements
- Chain of Custody Record
  a. Who is responsible for completion?
  b. Preprinted vs. Manual Completion
  c. Provide all pertinent information
  d. Signatures of Release & Receipt (Date & Time)
  e. Copy of COC for client

Approved Analytical Methods

(Complete information located in 40 CFR, Part 136)
This information is available on the internet



McCoy & McCoy Laboratories, Inc.

Roles of the Lab & Permitted Facility

- Discharge Monitoring Reports
  a. Prepared by either Lab or POTW
  b. What Information does the Lab need?

  Notify State lab will prepare DMR in writing
  Copy of the permit
  Flow Data
  - Water Meter vs. Flow Meter
  - Average & Maximum
  - Collection Date Flow
  - Rate of flow (GPD / MGD / GPM)

  c. Submit by dates required in the permit
  Lab must submit to POTW for review & POTW must make final submission to the state

McCoy & McCoy Laboratories, Inc.

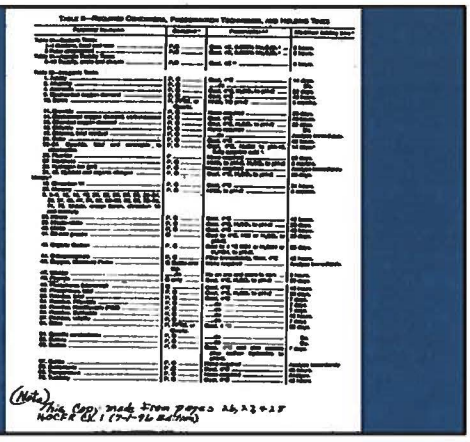
SAMPLE COLLECTION METHODS

- Composite – Over a period of time
- Grab – Instantaneous

Typical Influent / Effluent Sample Containers & Preservatives

(Complete information located in 40 CFR, Part 136)

Parameter	Container	Preservative	Hold Time
BOD	Liter Plastic	4° C	48 Hours
TSS	Liter Plastic	4° C	7 Days
Ammonia	500 ml Plastic	Sulfuric Acid	28 Days
Fecal Coliform	125 ml Plastic	Sodium Thiosulfate	6 Hours
Metals	500 ml Plastic	Nitric Acid	6 Months
Mercury (1631)	500 ml Glass	Hydrochloric Acid	90 Days
Phosphorus	500 ml Plastic	Sulfuric Acid	28 Days
Oil & Grease	Liter Glass	Sulfuric Acid	28 Days
Biomonitoring	Gallon Plastic	4° C	36 Hours



Composite Sample

Samples collected indicate the character of the wastewater over a period of time.

- BOD
- TSS
- Ammonia
- Metals
- Biomonitoring

Grab Sample

- Fecal Coliform / E-Coli
- pH
- Dissolved Oxygen
- Total Residual Chlorine
- Oil & Grease
- Volatile Organic Compounds (VOC)

Fecal Coliform: Coliforms found in the feces of various warm-blooded animals. The term "coliform" also includes other environmental sources. The human intestinal tract is one of the main habitats of coliform bacteria.

Volatile Organic Compounds (VOC)- samples should be collected from areas of low turbulence to reduce amount of entrapped air in the sample. VOC's could be driven off to the atmosphere (as outgas) in turbulent sections of the stream flow. This is a zero headspace sample.

Mercury (Methods 1631 & 1669)

- Sampling Protocol (Method 1669)
- Grab Sample / Clean Hands / 2 Person
- Analytical Method (1631)
- Detection Limit (ng/l or ppt)
- Effective July of 2003
- Required on Influent & Effluent and permitted Industrial Users

McCoy & McCoy Laboratories, Inc.

FIELD MEASUREMENTS

Analyses must be completed immediately after sample collection

pH
Dissolved Oxygen
Total Residual Chlorine

Field Instrument Kit

pH DETERMINATION

- Defines acidic or basic characteristics by hydrogen-ion activity
- Immediate determination
- 7 pH Neutral
- Above 7 is considered Basic
- Below 7 is considered Acidic

Instrument Calibration & Analysis

- 2 or 3 Point Calibration
- Proper Buffers
- Instrument Care
- Recordkeeping
  - Calibrations
  - Analysis Data

Recordkeeping
pH Logbook Data Entry

Date	Temp °C	pH 4.00	pH 7.00	pH 10.00	Sample Result	Analyst

Record all calibration data and analysis results in a bound notebook. A composition book or engineers field book are good examples.

All records should be kept in an organized manner and should be available for inspection by state and federal regulatory personnel.

Recordkeeping
Solution Logbook Data Entry

Date Rcvd.	By Whom	Solution Rcvd.	Lot #	Supplier	Date Opened	By Whom	Date of Disposal	By Whom

DISSOLVED OXYGEN DETERMINATION

- Immediate determination
- Measures the amount of gaseous oxygen dissolved in water or wastewater.
- Adequate dissolved oxygen is needed to allow life forms in the receiving water.

Instrument Calibration & Analysis

- Warm-Up / Polarize Probe
- Temperature Compensation
- Altitude Corrections
- Instrument Care
- Recordkeeping
  -Calibrations
  -Analysis Data

Recordkeeping Dissolved Oxygen Data Entry

Date	Temp °C	Elev.	DO Expected	DO Actual	Adjusted Reading to	Calibrated by	Membrane Changed	Analyst

Record all calibration data and analysis results in a bound notebook. A composition book or engineers field book are good examples.

All records should be kept in an organized manner and should be available for inspection by state and federal regulatory personnel.

Residual Chlorine Determination

- Immediate determination
- Indicates the amount of chlorine present after the dechlorination process
- Too Much vs. Too Little

COMPOSITE EXAMPLE TABLE

Time	Flow (mgd)	Factor ml	Vol. of
6 am	0.3	100	30
7 am	0.6	"	60
8 am	0.8	"	80
9 am	1.0	"	100
10 am	1.5	"	150
11 am	1.4	"	140
12 N	1.2	"	120
1 pm	1.0	"	100
2 pm	1.0	"	100
3 pm	0.9	"	90
4 pm	0.8	"	80
5 pm	0.8	"	80
			1,130

The rate of wastewater flow must be measured when each portion is taken and the volume of the portion adjusted to the flow by the use of a factor.

Composite Sample

Samples collected indicate the character of the wastewater over a period of time.

- BOD
- TSS
- Ammonia
- Metals
- Biomonitoring

SOLIDS DETERMINATIONS

Suspended Solids: Are those which are visible and in suspension in the water. They are the solids which can be removed from the wastewater by physical or mechanical means, such as sedimentation or filtration. Suspended Solids are approximately 70% organic solids and 30% inorganic solids, the latter being principally sand and grit. The suspended solids portion consist of settleable solids and colloidal solids.

Biochemical Oxygen Demand, BOD, or BOD_5 (as it is commonly abbreviated), CBOD- is one of the most important and useful parameters indicating the organic strength of the wastewater. B.O.D. measurement is the rate at which microorganisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. In decomposition, organic matter serves as food for the bacteria and energy reults from its oxidation.

Nitrogen Compounds: Domestic wastewaters will contain a number of nitrogen containing compounds. Nitrogen is a significant element in wastewater treatment since it is a necessary nutrient for satisfactory bacterial growth during biological treatment. Ammonia Nitrogen: an inorganic nitrogen compound, has several sources - humans as an excretory product and as a decomposition product from urea or from protein breakdown.

NUTRIENTS

- Nutrients are chemical elements that are essential to plant and animal nutrition. Nitrogen and phosphorus are nutrients that are important to aquatic life, but in high concentrations they can be contaminants in water. Both are affected by chemical and biological processes that can change their form and can transfer them to or from water, soil, biological organisms and the atmosphere.

PHOSPHORUS

- Phosphorus is a component of sewage, as the element is essential in metabolism, and is always present in animal metabolic waste. Nitrogen and phosphorus are essential nutrients for plant growth. Aquatic vegetation, such as algae, depends on dissolved nitrogen and phosphorus compounds for it nutrient supply.
- This requirement is being placed in Low Flow streams (cc: Ky River and the Green River Basins) per 401 KAR 5:031

ADDITIONAL PARAMETERS:

Metals (ie: Zinc, Lead): Effects of metals in wastewater range from beneficial through troublesome to toxic. Either as a annual analysis or as often as weekly. This could be due to a pretreatment discharger or as a toxicity check.

Sampling Records

All samples collected for K.P.D.E.S Monitoring should include the following:

* Sample date and time
* Sampler's name
* Location and Type of sample
* Permit number
* Any unusual observations

Records should list the time of the compositing period and specific time for the grab samples.

Calibration Records

Calibration records must be maintained for your flow meter, pH meter, D.O. meter, and analytical balance.

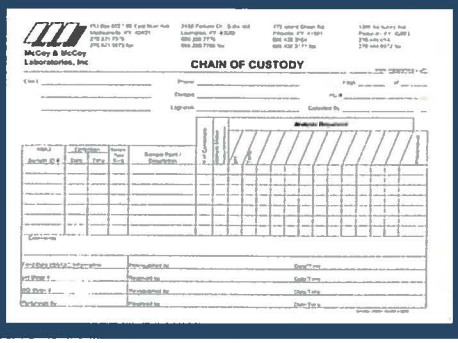
KEEP A DAILY LOG

- Normal daily observations
- Any Flooding or Bypassing
- Weather Conditions
- Regular maintenance performed
- Unusual maintenance performed
- Failure of Equipment
- Plant Upsets
- Accidents
- WHEN REPORTING BYPASSES LOG IT

COLLECTION AND TRANSPORTATION OF SAMPLES

- Chain of Custody Procedure is essential to ensure sample integrity from the collection of a sample to data reporting.
  - Sample labels: Use labels to prevent misidentification.
  - Sample seals: Use seals to detect unauthorized tampering.
  - Chain-of-custody report: Fill out record to accompany each sample or group of samples.
  - Sample delivery to laboratory: Deliver sample (s) as soon as practicable, with the proper preservatives and transported in cooler with ice.

Chain of Custody Document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CHAIN OF CUSTODY

Role of the Lab & Permitted Facility

- Transportation of Samples to the Lab
  a. Store on ice and cool to 4° C
     "Wet" ice is best for maintaining temperature
  b. Cooler needs temperature blank to be checked upon delivery to lab.

McCoy & McCoy Laboratories, Inc.

Role of the Lab & Permitted Facility

- Transportation of Samples to the Lab
  a. Store on ice and cool to 4° C
     "Wet" ice is best for maintaining temperature
  b. Cooler needs temperature blank to be checked upon delivery to lab.

Choosing a Laboratory

- Factors to Consider:
- Experience
- Capabilities
- Laboratory Capacity
- Customer Service
- Certifications
- Analytical Cost

New Corporate Laboratory Facility / Madisonville, KY

Virtual Tour of Madisonville Laboratory

Physical Chemistry Section

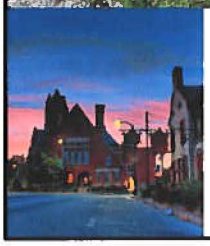
Microbiology Lab Section

Extraction Laboratory

GC/MS & HPLC Section

GC & GC/MS Section

Administrative Offices



Sewershed Modeling Helps Bardstown Plan for Growth

2019 Kentucky Rural Water Association Annual Conference
August 27, 2019

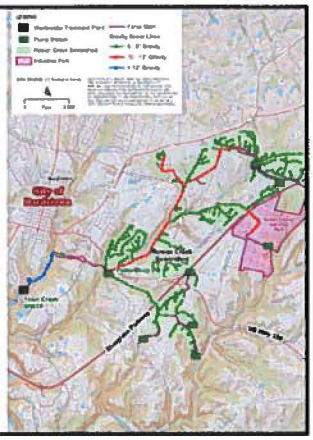
HDR BARDSTOWN

Bardstown, KY

- Seat of Nelson County
- 43 Miles South of Louisville
- Population 12,000
  - 8,000 Sewer Customers
  - 26 Industrial User Permits
- "Bourbon Capital of the World"
- "Most Beautiful Small Town in America" (Rand McNally, USA Today)
- My Old Kentucky Home State Park
- Downtown Historic District
- "Balance between Preservation and Progressiveness"

Rowan Creek Sewershed

- Roughly Parallel to Martha L. Collins Bluegrass Parkway
- Extends into Mill Creek watershed (little infrastructure)
- Multiple pumping stations
- Serves Nelson County Industrial Park
- 171,000 LF of gravity sewers
- Pottershop PS at lower end
  - Dual 8-inch and 12-inch force mains
  - Discharges to Town Creek interceptor and Town Creek WWTP

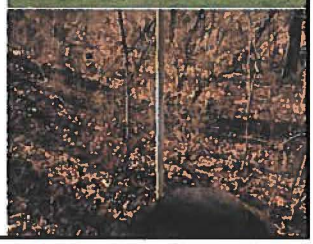


Trunk Sewer & Pump Station History

- Flow Metering Data
  - Numerous Metering Sites
  - Multi-Year Period
- CCTV Inspection Data
- SSES Reports
- Point Repairs
  - Defects/Failures in PVC Truss Pipe
- Sanitary Sewer Overflows (SSOs)
- Recurring at Pottershop PS
- Pump Station Upgrade 2006
- Second Force Main Constructed 2012
- Problem with Rags/Wipes at Pump Station

Project Drivers

- Continuing SSOs
- High Infiltration/Inflow (I/I)
- Poor Condition of Trunk Sewer Piping
- Maintenance Issues at Pump Station
- Development in Nelson County Industrial Park
  - Bardstown Bourbon Co.
  - Thai Summit
  - Takigawa Corp.
- Other Development within the Sewershed
  - Kentucky Owl Distillery
  - Lux Row
  - Hardin Memorial Health Center
- Undersized Trunk Sewer

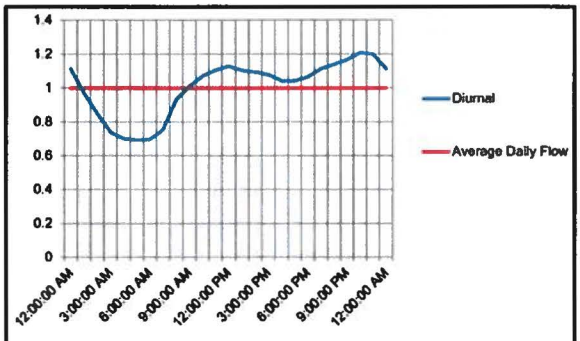


Project Approach

- Create Hydraulic Model of Rowan Creek Sewershed
  - Replicate Existing System
  - Plan for New Development
  - Size Trunk Sewer and Pump Station Upgrades
- Upgrade Pottershop pump station and optimize pump station/force main at current site
- Evaluate Town Creek WWTP for Increased Hydraulic Loading

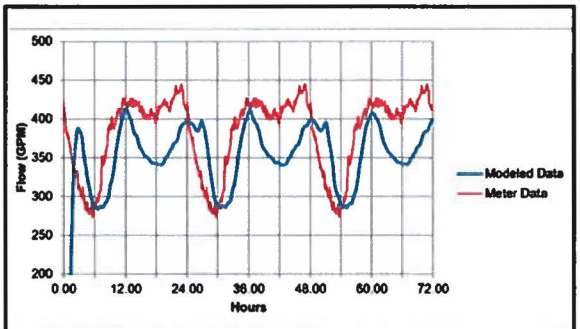
Trunk Sewer Model Development

- Selected Bentley SewerCAD V8i Program
- Utilize City's GIS Mapping and Flow Monitoring Data
  - Data Available from 11 Metering Sites within Sewershed
  - Checked for Good Hydraulics at Metering Sites
- Input Physical Features and Flows
  - Included Detailed Pump Station Data and Wetwell Volumes to Replicate Cycle Times
  - Checked PS Design Capacities Against Drawdown Tests
- Determine an Input Demand Pattern (Diurnal Curve) for Each Metering Site



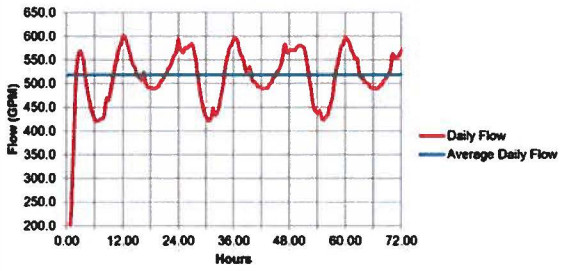
Dry Weather Flow Analysis

RC-49 to RC-48 Diurnal Curve



Dry Weather Flow Analysis

Modeled vs. Metered Flow, Site RC-12 to RC-11

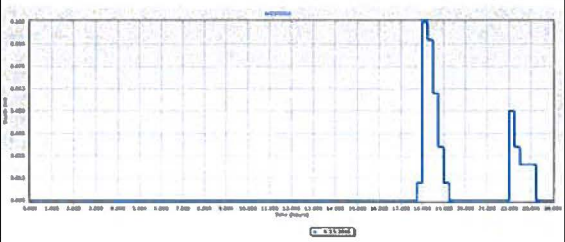


Dry Weather Flow Analysis

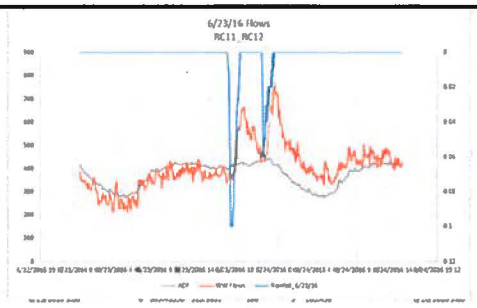
Modeled Dry Weather Flow to Pottershop Pump Station

Wet Weather Flows

- Includes Dry Weather Flow Plus I/I
- Approach Consistent with U.S. EPA Sanitary Sewer Overflow Analysis and Planning (SSOAP) Toolbox Version 2.0.0
  - Used RTK Method to Determine Rainfall-Derived Infiltration and Inflow (RDII) in Sewer System
  - R=Fraction of Rainfall Volume entering System as RDII, T=Time to Peak, K=Ratio of Time of Recession to Peak
  - Three Triangular Hydrographs Estimate Wide Range of Response Times to Event (Fast, Medium, Slow)
- Developed Unit Hydrographs from Dry Weather Flow, Rainfall Data, Flow During and After Rainfall Event, and Acreage of Drainage Area for Various Locations



Storm Event 6/23/2016

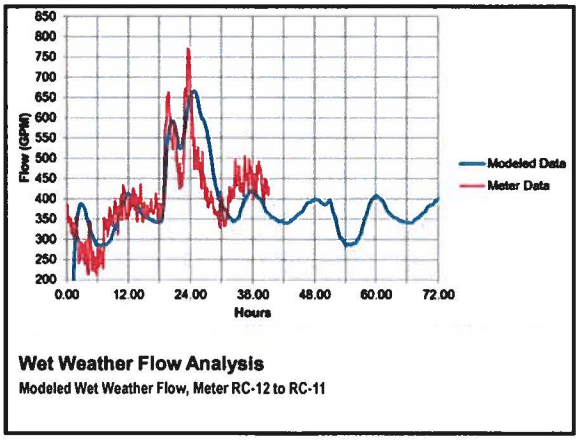


Flows During Storm Event

Site RC-12 to RC-11

Wet Weather Flow Analysis

- Based on Relatively Small Rainfall Events
  - 1-Year 24-Hour Storm (2.73 inches)
  - 2-Year 24-Hour Storm (3.26 inches)
- May Not Be Representative of System's Response to Larger Events
- Correlated with Five Typical Rainfall Events over a 15-Month Period, Each Smaller than 2-Year 24-Hour
- Events Selected to Coincide with Best Data Sets From Multiple Meters

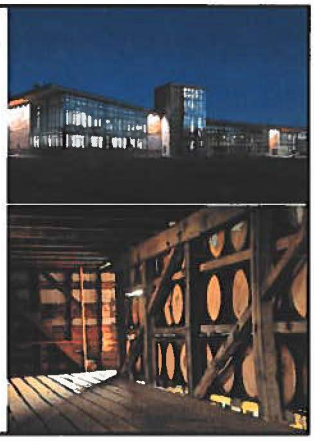


Wet Weather Flow Analysis

Modeled Wet Weather Flow, Meter RC-12 to RC-11

Future Flow Projections

- Analyzed Developable Land Within Sewershed
- Used Best Available Information for New Developments
  - Production Estimates
  - Flow Certification Provided to the City
- Followed Kentucky Division of Water (KDOW) Design Criteria for Commercial and Industrial Property
  - 5,000 gpd/acre Commercial
  - 2,500 gpd/acre Industrial
  - 400 gpd residential
- Used Realistic Estimates of Developable Acreage
- Wet Weather Analysis Applied to Future Dry Weather Flows



Flow Rates from Model Output

- Existing Pottershop Pump Station 525 to 670 gpm
- Model Indicates Surcharging/SSOs Consistent with Observation
- Peak Factor 4.1 to 4.7 for Modeled Storm Events

Item	Existing Flow, gpm (2017)	Developed Flow, gpm
Dry Weather Average Flow	519	1,295
Peak Flow, 1-Yr, 24-Hr, Storm	2,137	2,938
Peak Flow, 2-Yr, 24-Hr, Storm	2,462	3,256

Project Development

- Replace Approx. 17,000 LF of Trunk Sewer
  - 24-inch 6,500 LF
  - 18-inch 3,600 LF
  - 12-inch 6,800 LF
- Upgrade/Expand Pottershop pump station to 2,500-3,000 gpm capacity
  - Replace pumps and valve vault
  - Variable frequency drives
  - Screening and Generator
- Upgrades at Town Creek WWTP
  - Replace 950 LF of 24-inch influent sewer with 36-inch
  - Add Screening at Headworks

"Takeaways" from Limited Area Sewer Modeling

- Utilizes Data Already Available
  - GIS Mapping
  - Flow Meter Data
  - Quality In = Quality Out
- Be Cautious When Using Flow Data
  - Evaluate Site Hydraulics
  - Account for Surcharging/Overflows
- Extrapolation is Limited for Larger Storms (Different RTK Values)

"Takeaways" from Limited Area Sewer Modeling

- Useful Tool for Predicting Wet Weather System Response for Common Design Storms
- Easily Adaptable to Future Conditions
  - Pump Stations Added or Eliminated
  - Alignment and Pipe Size Changes
  - Actual Flow Inputs vs. Estimates
- Can Be Developed More Quickly and at Much Lower Cost than Complete System Models

Sewershed Modeling Helps Bardstown Plan for Growth

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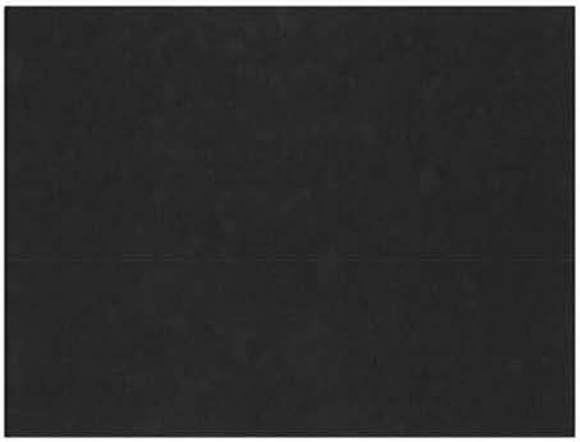
August 27, 2019

HDR BARDSTOWN



PeroxyChem

Wastewater Disinfection with Peracetic Acid (PAA)

2019 KRWA Conference
Jim Pelton – Pelton Environmental
JimPelton@PeltonEnv.com

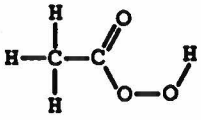
Table of Contents

PeroxyChem

PART 1

Peracetic Acid

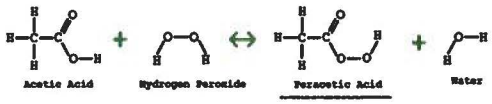
- Definition
- Disinfection
- Oxidation



PeroxyChem

Definition

An organic peroxide that results from the reaction between Acetic Acid, Hydrogen Peroxide and Water.



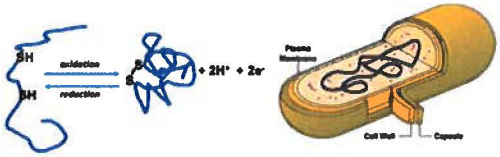
PAA exists only in equilibrium with the other components in aqueous solution.

PAA is a strong disinfectant and a strong oxidant.

PeroxyChem

Strong Disinfectant

PAA oxidizes enzymes (proteins) and nutrients inside bacteria cells, rendering them unviable.



These mechanisms enable PAA to disrupt bacteria effectively and efficiently (low doses, short contact times)

PeroxyChem

Strong Oxidant

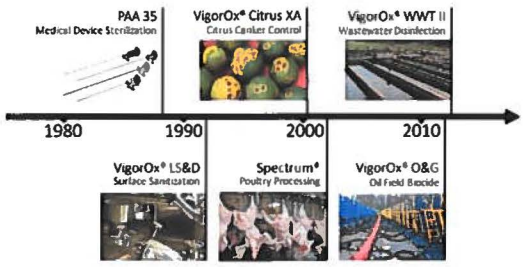
The standard oxidation potential (at pH 7) of PAA is higher than most common oxidants.

Oxidant	Standard Potential (V)
Hydroxyl Radical	2.80
Ozone	2.07
Peracetic Acid	1.81
Hydrogen Peroxide	1.78
Potassium Permanganate	1.68
Chlorine Dioxide	1.57
Chlorine	1.36

PAA is a strong and effective oxidant - readily attacks bacteria as well as organic pollutants

PeroxyChem

Uses in Microbial Control



PeroxyChem

PART 2

Wastewater Disinfection

- Formulation
- EPA Label
- Efficiency
- Kinetics in Wastewater
- Properties
- Drivers for Conversion
- Conversion Steps

PeroxyChem

Formulation

PeroxyChem's peracetic acid formulation for wastewater disinfection is registered and labeled as VigorOx® WWT II

VigorOx® WWT II
Wastewater Disinfection Technology

PeroxyChem

Formulation

Equilibrium can be achieved at different $PAA:H_2O_2:AA$ ratios

- Increasing H_2O_2
  - Helps reduce PAA demand, reduces overall usage
  - Increases Dissolved Oxygen (DO)
- Increasing Acetic Acid
  - Increases BOD

	VigorOx®	Other A	Other B
Peracetic Acid	15%	12%	22%
Hydrogen Peroxide	23%	18%	5%
Acetic Acid	16%	20%	45%
BOD (mg/L)	1.98	2.62	3.02
DO (mg/L)	0.93	0.94	0.32
Net BOD (mg/L)	1.05	1.68	2.70

PeroxyChem

US EPA Label

VigorOx® WWT II

EPA Registration No. 65402-8

- Dose range: 1 - 25 ppm
- Maximum Residual : 1 ppm ($DF < 12$)
  or
  $0.09 * DF$ ppm ($DF > 12$)

$$DF = \frac{plant\ effluent + receiving\ stream\ 7Q10}{plant effluent}$$

PeroxyChem

Properties

Formulation	VigorOx® WWT II
Normal State	Liquid
Odor	Pungent "vinegar" smell
Density	1.16 g/mL (9.67 lb/gal)
Freezing point	-56 °F
pH	< 1
Solubility	Completely soluble
Stability	1 year at T < 84 °F
NFPA	• Flammability: flashpoint above 200 °F • Health: short exposure cause injury • Reactivity: decomposition at high temperature • Oxidizer

PeroxyChem

Reactions in Wastewater

When VigorOx WWT II is added to wastewater, multiple reactions take place:

VigorOx® WWT II → Demand (reactions with organics)
VigorOx® WWT II → Inactivation (reactions with bacteria)

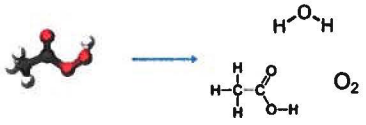
The inactivation and demand kinetics impacts the overall efficiency of PAA Disinfection (dose & contact time).

- Hydrogen Peroxide helps satisfy demand, improving efficiency
- TSS has little impact on efficiency
- Ammonia, nitrates and nitrites do not impact PAA performance or demand

PeroxyChem

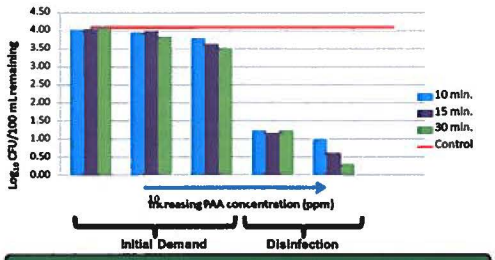
Peracetic Acid in Wastewater

- PAA breaks down to water, oxygen and acetic acid (vinegar) upon reaction with microbes, organics, TSS and auto-decomposition



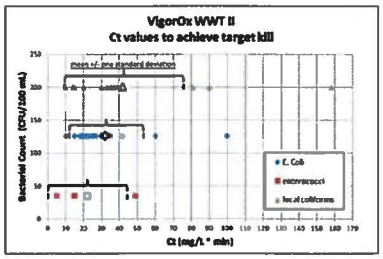
PeroxyChem VigorOx WWT II

Efficacy – Demand



PeroxyChem VigorOx WWT II

Disinfection Efficiency



Data from VigorOx WWT II on 57 secondary effluents.
Range of Ct values reflects site-specific PAA kinetics.

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Efficacy – Indicator Organism

Matrix	Organism	Inactivation (log)	Dose (mg/L)	Time (minutes)	Reference
Secondary effluent	Total coliform	2	1.5	20	Zanetti et al., 2007
Secondary effluent	Total coliform	2	2	16	Stampi et al. 2002
Secondary effluent	Total coliform	3	2	27	Koivunen et al., 2005
Secondary effluent	Total coliform	4	1.5	20	Stampi et al., 2001
Secondary effluent	Total coliform	4	3	15	Madoni et al., 1998
Secondary effluent	Fecal coliform	3	2	16	Stampi et al. 2002
Secondary effluent	*E. coli*	2	1.5	20	Zanetti et al., 2007
Secondary effluent	*E. coli*	3	2	16	Stampi et al. 2002
Secondary effluent	*E. coli*	4	1.5	20	Stampi et al., 2001
Secondary effluent	*E. coli*	3	4	10	Dell'Erba et al., 2004
Secondary effluent	Enterococci	4	3	15	Madoni et al., 1998
Secondary effluent	Enterococci	2	2	16	Stampi et al. 2002
Secondary effluent	Enterococci	4	1.5	20	Stampi et al., 2001

PAA's efficacy against bacteria has been well documented

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VigorOx WWT II

Drivers for Conversion

Cl_2 / NaOCl Toxicity	Peracetic Acid does not require quenching
Cl_2 / NaOCl DBPs	Peracetic Acid does not produce disinfection byproducts
Cl_2 Safety	Peracetic Acid does not require a Risk Management Plan
UV Performance	Peracetic Acid effective in low UVT and peak flows
UV Capital Cost	Peracetic Acid is a no-capital cost full service solution

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PART 3

Case Studies

- Florida
- New Jersey
- Tennessee
- Texas
- Illinois
- Oregon
- Kentucky

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St Augustine, FL

Plant Information	
Effluent Source	Municipal
Average Flow	3.5 MGD
Peak Flow	5.0 MGD
Previous Disinfection	Chlor/Dechlor

Conversion to VigorOx WWT II	
Conversion Driver	DBP Toxicity
Conversion Date	Sep 2011
VigorOx System	Bulk

Disinfection Performance	
Average Dose	1.5 ppm
Average Contact Time	30min
Indicator	FC. /Entero
Limit	200/35cfu/100ml

Toxicity	
Receiving water body	Matanzas River
Maximum Residual:	1.0 ppm

8 years of continuous use!

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Results – Aquatic toxicity

Chlorination & Dechlorination

	M. bahia		*M. beryllina*	
%	Survival	Growth	Survival	Growth
Control	97.5	0.390	100	2.096
6.25	85	0.375	97.5	1.986
12.5	97.5	0.415	97.5	2.333
25	90	0.372	100	2.226
50	77.5	0.414	100	2.562
100	82.5	0.377	97.5	2.506

PAA

	M. bahia		*M. beryllina*	
%	Survival	Growth	Survival	Growth
Control	92.5	0.353	100	2.374
6.25	90	0.383	100	2.487
12.5	95	0.380	100	2.491
25	95	0.398	100	2.426
50	90	0.377	100	2.563
100	97.5	0.358	97.5	2.337

- Slightly higher survival rate of *M. bahia* in the PAA treated effluent

7-Day Chronic Static Renewal definitive Toxicity Test conforming to NELAC Standards

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VigorOx WWT II

Results: THM formation

Volatiles [ppb]	Before Disinfection	After Chlor / Dechlor	After VigorOx
Bromodichloromethane	0.60	56.82	0.60
Bromoform	0.60	19.62	0.60
Chloroform	0.64	21.55	0.64
Dibromochloromethane	0.75	72.71	0.75
Total Trihalomethanes	0.60	170.70	0.60

-No THM formation observed with VigorOx

-THM formation observed with Chlorine even after dechlorination

PeroxyChem VigorOx WWT II

Hoboken, NJ

Plant Information	
Effluent Source	Municipal
Average Flow	10 MGD
Peak Flow	20 MGD
Previous Disinfection	UV
Conversion to VigorOx	WWT II
Conversion Driver	UV Performance
Conversion Date	Nov 2015
VigorOx System	Tote
Disinfection Performance	
Average Dose	2.5 ppm
Average Contact Time	2 min
Indicator	Fecal Coliform
Limit	200 cfu/100ml
Toxicity	
Receiving water body	Hudson River
Maximum Residual:	N/A

Achieved compliance after peracetic acid injected upstream aging UV

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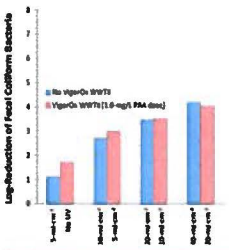
Efficacy – UV Synergies



Comparison between:

- Log inactivation achieved with UV only (blue)
- Log inactivation achieved with 50% of the UV dose plus 1 ppm VigorOx at 30min contact time (red)

A 50% reduction in required UV dose (potentially a 50% reduction in power consumption) was observed.

VigorOx showed synergistic effect with UV, potentially reducing cost

PeroxyChem VigorOx WWT II

Memphis, TN

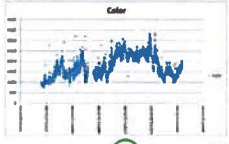
Plant Information	
Effluent Source	Muni + Industrial
Average Flow	90 MGD
Peak Flow	200 MGD
Previous Disinfection	-

Conversion to VigorOx WWT II	
Conversion Driver	Cost
Conversion Date	2017
VigorOx System	Bulk

Disinfection Performance	
Average Dose	12 ppm
Average Contact Time	45 min
Indicator	E. coli
Limit	126 cfu/100ml

Toxicity	
Receiving water body	Mississippi River
Maximum Residual:	2.0 ppm

Automated Demand Control



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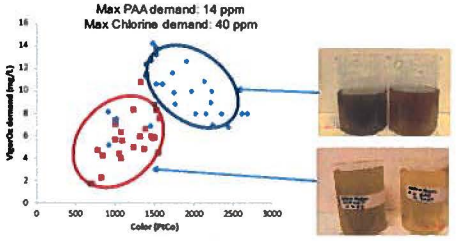
Efficacy – Demand (TN1)

Max PAA demand: 14 ppm
Max Chlorine demand: 40 ppm



In most high-demand sites, Color correlated better than TSS or BOD

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VigorOx WWT II

Tullahoma, TN

Plant Information	
Effluent Source	Municipal
Average Flow	3 MGD
Peak Flow	7 MGD
Previous Disinfection	Cl2 / SO2

Conversion to VigorOx WWT II	
Conversion Driver	Toxicity / Safety
Conversion Date	2016 (trial in 2014)
VigorOx System	Tote

Disinfection Performance	
Average Dose	0.75 ppm
Average Contact Time	45 min
Indicator	E. coli
Limit	126 cfu/100ml

Toxicity	
Receiving water body	Rock Creek (DF=1)
Maximum Residual	TBD

Low Toxicity in Small Stream

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Pasadena, TX

Plant Information	
Effluent Source	Industrial
Average Flow	15 MGD
Peak Flow	45 MGD
Previous Disinfection	Chlor / Dechlor

Conversion to VigorOx WWT II	
Conversion Driver	Contact Tank Cost
Conversion Date	2014
VigorOx System	Bulk

Disinfection Performance	
Average Dose	3.5 ppm
Average Contact Time	15 min
Indicator	E. coli
Limit	126 cfu/100ml

Toxicity	
Receiving water body	Bayou Channel
Maximum Residual	N/A

Shorter Contact Time

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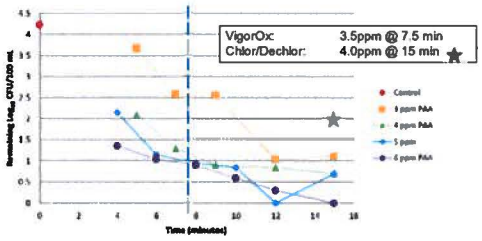
Efficacy – Contact Time



VigorOx proved effective at contact times shorter than chlorine

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VigorOx WWT II

Mundelein, IL

Plant Information	
Effluent Source	Municipal
Average Flow	1.0 MGD
Peak Flow	5.0 MGD
Previous Disinfection	Chlorination

Conversion to VigorOx WWT II	
Conversion Driver	Dechlor Cost
Conversion Date	2015
VigorOx System	Tote

Disinfection Performance	
Average Dose	0.5 ppm
Average Contact Time	120 min
Indicator	F. Coliforms
Limit	200 cfu/100ml

Toxicity	
Receiving water body	Des Plaines River
Maximum Residual	1.0 ppm

Avoid Cost and Complexity of De-chlorination

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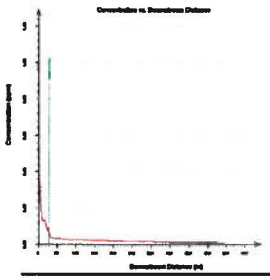
PAA disassociates quickly in the environment.



CorMix Study with MWH

- PAA concentration gradient post outflow point

PeroxyChem VigorOx

Mayport Naval Station, FL

Plant Information	
Effluent Source	Ships & Vessels
Average Flow	2 MGD
Peak Flow	4 MGD
Previous Disinfection	Chlor/Dechlor

Conversion to VigorOx WWT II	
Conversion Driver	DBPs
Conversion Date	2015
VigorOx System	Tote to Bulk

Disinfection Performance	
Average Dose	2.5 ppm
Average Contact Time	60 min
Indicator	FC./Enterococci
Limit	200/35 cfu/100ml

Toxicity	
Receiving water body	St. John's River
Maximum Residual:	1.0 ppm

Elimination of DBPs

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Bowling Green, KY

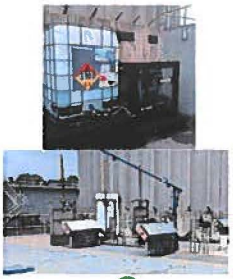
Plant Information	
Effluent Source	Municipal
Average Flow	7 MGD
Peak Flow	15 MGD
Previous Disinfection	UV

Conversion to VigorOx WWT II	
Conversion Driver	UV Operating Cost
Conversion Date	2015
VigorOx System	Tote

Disinfection Performance	
Average Dose	1.3 ppm
Average Contact Time	20 min
Indicator	E. coli
Limit	126 cfu/100ml

Toxicity	
Receiving water body	Barren River
Maximum Residual	1.0 ppm

Replaced UV System – O&M



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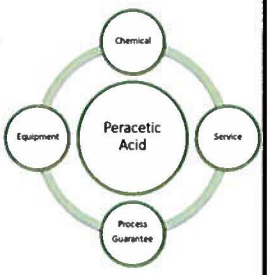
PART 4

Conversion Path

- Testing, Piloting and Trialing
- Process Modeling
- Compliance



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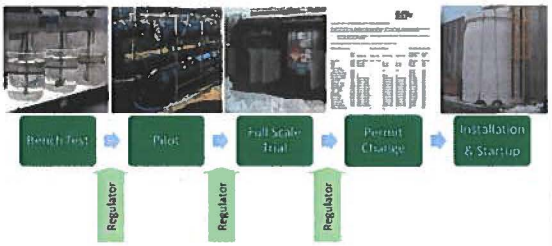
Conversion Steps



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Lab Testing

PeroxyChem's lab can perform disinfection kinetics bench testing on plant effluents utilizing: E. coli, Coliforms, Enterococci, MS2

Microbiology Lab in Tonawanda, NY

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Pilot Reactor Trialing

PeroxyChem's Disinfection Pilot Reactor (DPR) enables side-stream testing to measure effectiveness at different dose rates under varying effluent quality conditions.

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Full Scale Trialing

PeroxyChem can deploy equipment and field personnel to setup and run 30-day full scale trials that enable collection of data necessary for permit change.

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Hand-held Residual Analyzer

Colorimetric Analyzer enables operators to measure residual in a simple and reliable way

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On-line Residual Analyzer

Amperometric, Membrane-electrode Submersible Probe enables automatic PAA dose control.

Third-party validated.

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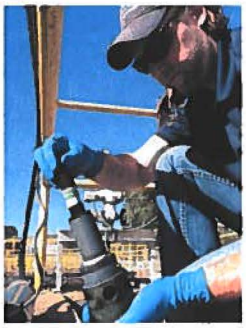
Field Service



- Installation Supervision
- Commissioning
- Startup
- Safety Training
- Operator Training
- O&M Procedures
- Preventive Maintenance Services
- Emergency Response Services

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PART 5

Equipment & Implementation

- Bulk Systems
- Tote Systems

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Implementation – Storage

Bulk Storage Considerations

- Acceptable materials include:
  - HDPE Linear (5yr max)
  - Passivated SS-304L
- Containment required (double wall acceptable)
- Product shelf life (C >15%)
  - 1 year, T < 86 °F
  - 4 months, T < 100 °F
  - 1 month, T < 110 °F
- Free-lift emergency relief manway and conservation vent
- Avoid overflow lines
- Unique quick connect for fill line (avoid contamination)
- Consider all local codes and regulations

Safety Considerations: containment, materials, venting, connections

PeroxyChem VigorOx

Implementation – Storage

Tote Storage Considerations

- Containment required
- Never store on wooden pallets
- Do not store near reducing agents or combustibles (20 ft minimum distance)
- Do not block vents
- Indoor Storage
  - Ventilation of 1 ft³/min/ft²
- NFPA classification
  - Class IV Organic Peroxide
  - Does not support a flame
- Electrical
  - Intrinsically safe recommended for areas that are not well ventilated

Safety Considerations: containment, materials, venting

PeroxyChem VigorOx

Implementation – Pumps

Pump Skid Considerations

- Duty and Redundant
- Peristaltic, Diaphragm or Solenoid acceptable
- Off-gas valve required at pump head for diaphragm solenoid pumps
- Wetted Materials
  - Passivated 304L SS
  - Teflon
  - Santoprene™ (peristaltic pumps)
- Controller
  - Flow-paced
  - Compound loop
- Containment Required

Safety considerations: redundancy, venting, containment, materials

PeroxyChem VigorOx

Implementation – Piping

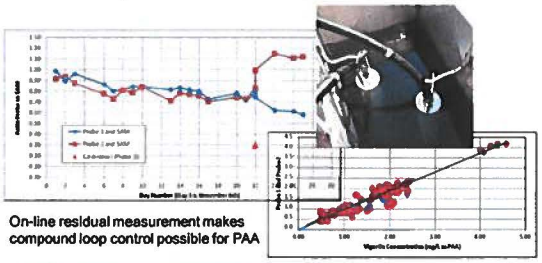
Piping Considerations

- Compatible wetted materials of construction (Teflon / 304SS)
- Vented ball valves
- Pressure relief valves to prevent PAA entrapment
- Dilution water / Flush line
- Flex Connections for Tanks / Totes / Pumps
- Gaskets
  - GORE-TEX®
  - Teflon
  - Garlock Gylon® Style 3504
- Thread sealant
  - White Teflon Tape (Do not use anti-galling tape)
  - Fluorolube®

Safety considerations: venting, materials, flushing, flex connections

PeroxyChem VigorOx WWT II

Implementation – Control



On-line residual measurement makes compound loop control possible for PAA

New generation submersible probes validated for VigorOx

PeroxyChem VigorOx WWT II

Implementation – Low Temp

Freezing Point:

- VigorOx WWT II -56°F
- Sodium Hypochlorite -20°F
- Sodium Bisulfate 43°F

No heat-tracing required with PAA

Low freezing point makes PAA ideal for cold weather applications

PeroxyChem VigorOx WWT II

Methods of Chemical Supply

- Bulk deliveries of 4,000 gallons
- 300 gallon IBC totes
- 55 gallon drums.

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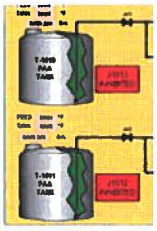
Whats New in PAA

- WERF Study – Over one year study in Texas to develop guidelines and recommendations for PAA usage and design.
- Larger cities using PAA: Memphis and Denver.
  - Production Facility in Memphis.
  - Driving Price down.
  - Availability is up.

PeroxyChem VigorOx

Methods of Supply



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PART 6

Experience

- Conversions
- Full Scale Trials
- Pilot Trials

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Experience

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Experience in KY.

- Experience with lagoons, oxidation ditches, fixed grid diffusers, & SBRs
  - (4) Replacements of chlorine gas.
  - (4) Replacement of hypochlorite.
  - (2) UV Replacements:
    - (1) Due to system age.
    - (1) Due to maintenance requirements.
  - (1) CSO Disinfection
  - (1) UV Supplementation
  - (1) Chlorine Tablet replacement

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Experience in KY - Lagoons

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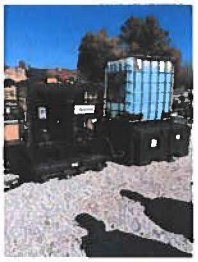
Experience in KY – Extended Air

- ~1 MGD facility.
- Chlorine Gas & Sodium Bisulfite.
- Large I&I problems.
  - 10:1 peaking factors

PeroxyChem VigorOx WWT

Experience in KY - Piloting

- Identified CL gas as a safety issue.
- UV was expensive due to peaking factor
- Moved forward with a 3 month peracetic acid pilot



PeroxyChem VigorOx WWT

Experience in KY - Piloting

- Pilot began in October of 2014.
- Ran for 3 months.
  - At the time required to meet KYDOW requirements.
- Determined their effective dosage to be 1.2 -1.5 mg/l

PeroxyChem VigorOx WWT

Experience in KY – Permanent Installation

- Submitted pilot data to KYDOW
- Granted new permit removing CL2 / SBS from permit.

PeroxyChem VigorOx WWT

Experience in KY – Real Time Residual Monitoring

- Due the unknown permit requirements real time residual monitoring was used during pilot.

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Experience in KY – Application Point

- No additional mixing
- No carrier water
- 1 MGD * 1.2 mg/l * 8.34 / .15% = 67 lbs per day = 7 gallons per day

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Experience in KY – SBR Facility

- 7 MGD ADF / 32 MGD Peak
- SBR facility designed for UV.
- Struggled with UV maintenance issues.

PeroxyChem VigorOx WWT

Experience in KY - Piloting

- SBR with UV design
  - Pilot tied into SCADA
  - Short Contact Time

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Experience in KY - Piloting

- 12 or 24 minutes of contact time.
- Initial Demand was very high
  - Algal buildup throughout basins
- Effective dosage determined as 1.5 mg/l

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Experience in KY – Permanent Installation

- 1 tote lasts 5 days. Decided to go with bulk installation

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Experience in KY – Oxidation Ditch

- 4 MGD ADF / 12 MGD Peak
- Oxidation Ditch
- 20+ year old UV failed.

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Experience in KY - Piloting

- Piloted to determine cost effectiveness.
- 2 month trial.

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Experience in KY – Permanent Installation

- Effective dosage determined to be as low as .9 mg/l
- Operate around at 1.2 mg/l.

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Experience in KY – Permanent Installation

PeroxyChem VigorOx

Questions? Comments?

Pelton Environmental Products
Email: JimPelton@PeltonEnv.com
Phone: 773-428-4499

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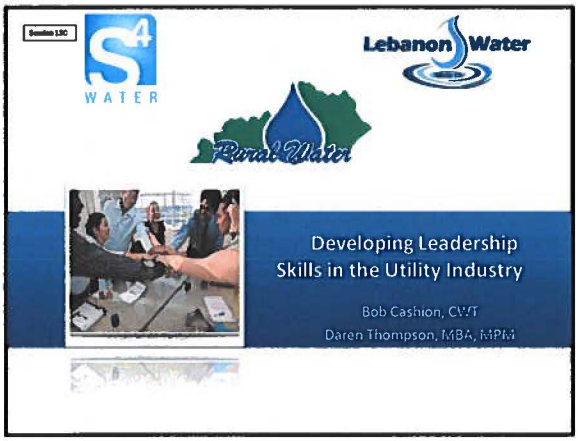


Take Home Message

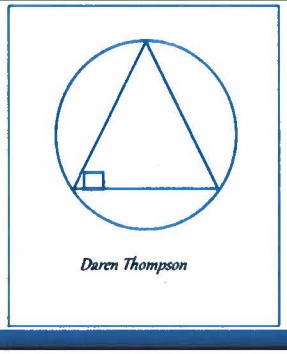
- Leadership must be an On Going process of events, study, personal relationships, and soul searching.
- Leadership in Utility Management needs training and follow-up to lead like professionals.
- Ten Primary Leadership Qualities.
- Traits that Identify Great & Noxious Leaders.
- Life's Guidelines for Good Leadership.
- Leadership is a Long Distant Run.
- How to Improve Leadership in Your Organization.

What is Leadership?

Leadership is a research area and a practical skill regarding the ability of an individual or an organization to "LEAD" or guide other individuals, teams or entire organizations.

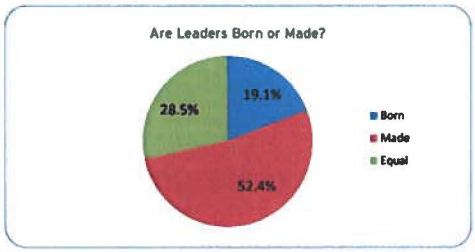
The art of motivating a group of people to act towards achieving a common goal. In the utility environment this can mean directing workers and colleagues with a strategy to meet the company's needs.

Time For an Exercise- Follow My Instructions



Daren Thompson

Born or Made?

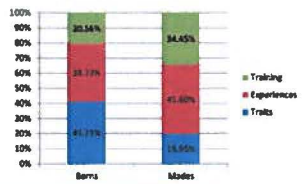


Center for Creative Leadership Study, 2012

Born or Made?

"Which is most important in creating a leader: Traits; Experiences, or Training?"

Mades and Borns agree that experience is important, but Borns believe that traits are slightly more important than are experiences, while Mades believe that experiences are substantially more important than are traits.



Leadership to Live By:

- "You are not here to merely make a living. You are here to enable the world to live more amply, with greater vison, with a finer spirit of hope and achievement. You are here to enrich the world, and you impoverish yourself if you forget the errand"
  -Woodrow Wilson

Greater Vision

Change of Heart & Mind

Having a True North Prospective

Great Leaders

- We see great leaders from History
- They too had leadership skills but their goals and purpose were off course with reality.
- Power can be corruptive.....

Hierarchy

Military Style Leadership

10 Leadership Qualities

- ✓ VISION
- ✓ MOTIVATION
- ✓ SERVING
- ✓ EMPATHY
- ✓ CREATIVITY
- ✓ THOROUGHNESS
- ✓ MANAGING
- ✓ TEAM BUILDING
- ✓ TAKING RISK
- ✓ IMPROVING

Courage to Make Decisions

Great Leaders

- Motivation
- The Greater Good
- Build Up Other Leaders

Utility Management

The management of water to provide a safe supply for domestic, industrial, commercial and agricultural use supplied through facilities called waterworks, or water utilities, water districts.

Leadership & Management

Good Leadership Traits

SOME OF THE COMMON TRAITS SHARED BY STRONG LEADERS ARE:

- **Being Able to Execute a Vision:** take a strategic vision and break it down into a roadmap to be followed by the team
- **Ability to Direct:** day-to-day work efforts, review resources needed and anticipate needs along the way
- **Process Management:** establish work rules, processes, standards and operating procedures
- **People Focused:** look after your people, their needs, listen to them and involve them

Traits That Identify Noxious Leaders

- ☐ They pay more attention to the problems than the solutions.
- ☐ They think they know everything.
- ☐ They are not usually accessible to their teams.
- ☐ They think of people as tools and/or machines.
- ☐ They do not know how to listen.
- ☐ They are distrustful.
- ☐ They never express gratitude.
- ☐ They do not delegate or let others make decisions.

Time For an Exercise

LEADERS

Are
- Selfless
- Available
- Role Models
- Listeners
- Communicators

Can
- Motivate
- Challenge
- Guide
- See Potential

Have
- Humility
- Confidence
- Passion
- Ability to See Big Picture
- Enthusiasm

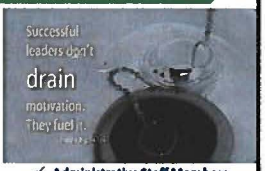
Act
- Intentionally
- With Courage
- With Integrity
- Proactively

Say
- The Right Things
- What They Mean
- The Truth
- Lets Go!

Think
- Positively
- With Purpose
- Ahead
- Strategically

Poll of Utility Workers of Various Ages and Tenures in the Workforce

Positives	Negatives
Good Communication	Poor Communication
Leads by Example	No Support
Sets Objectives & Goals	Lack of Empathy
Empowers Others	My Way or Highway
Knows the Work	Selfish Attitude
Integrity	Wants the Glory
Trustworthy	Causes Conflict
Good Attitude	Goes Behind Our Back
Motivates	Always Mad



- ✓ Administrative Staff Members
- ✓ Middle Management
- ✓ Senior Level Management
- ✓ Operational Staff
- ✓ Laboratory Staff
- ✓ Crew members

Leadership Traits

"The greatest leader is not necessarily the one who does the greatest things. He is the one that gets the people to do the greatest things."
- Ronald Regan

Good Leadership Guidelines

"Leadership is not about titles, positions , or flowcharts. It is about one life influencing another."
John C. Maxwell

- Be Humble-
- Communicate-
- Listen-
- Ask for Feedback-
- Think Strategically-
- Turn the Singular into the Plural-

Leadership is A Long Distance RUN.....

- Get Inspired, Recharge and Reload
- Think of Rest, Mind & Body
- Push Away the Negative
- Recruit Positive People
- Reward Your Team
- Trust & Delegate
- Team Up
- Develop the Potential of your Team
- Finish What You Start
- Don't Give Up

Strengthen self motivation, inspire others and improve your leadership Skills.

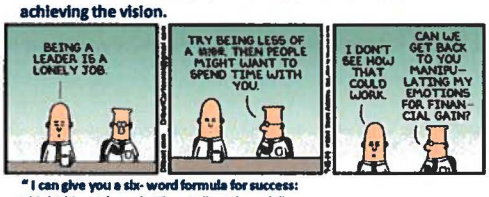
Finding a way to motivate yourself and convey that mood to Your Team is the key to moving forward.

Shocking Leadership Development Statistics:

- 10,000 Baby Boomers are retiring each day.
- 48% of workforce will be millennials by 2020.
- 67% of millennials are looking for a new job.
- 90% of millennials who are currently working plan on staying 3 years or less.
- 84% of organizations anticipate a shortfall of leaders in next 5 year.
- Only 5% of organizations have fully implemented leadership development at all managerial levels
- Only 10% of organizations have critical leadership ready with willing successors.
- 70% of Organization feel their leadership is not capable of leading into the future.

What is an Effective Leader?

- ❑Creates an inspiring vision of the future.
- ❑Motivates and inspires people to engage with that vision.
- ❑Manages delivery of the vision.
- ❑Coaches and builds a team, so the team is effective at achieving the vision.



"I can give you a six- word formula for success: Think Things Through- Then Follow Through."
-Edward Rickenbacker

Truth of Leadership

Leadership, is the ability to influence others, with or without authority.

All successful endeavors are the result of human effort; thus, the ability to influence others is a derivation of:

- Interpersonal Communications
- Conflict Management
- Problem solving

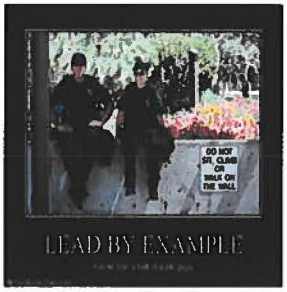
The Leadership Jigsaw

Leadership vs Management

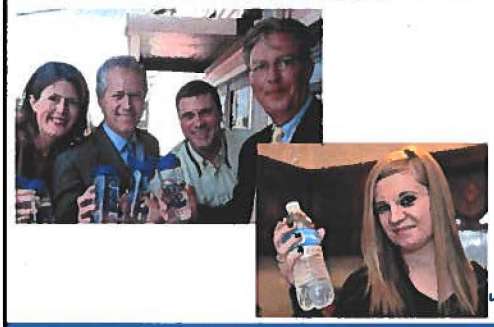
- Management seeks stability & predictability
  - *(order)*
- Leadership seeks improvement through change
  - *(disorder)*

"The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy"
-Dr. MLK Jr.

Lead By Example



Lead By Example- What is the difference?



Leadership & Management Skills

Leadership – soft skills
- Communications
- Motivation
- Stress Management
- Team Building
- Change Management

Management – hard skills
- Scheduling
- Staffing
- Activity Analysis
- Project Controls

How Can We Improve our Organizations in Leadership Development?

"True Leadership lies in guiding others to success—in ensuring that everyone is performing at their best, doing the work they pledged to do and doing it well."
-Bill Owens

- Leadership Development in Your Organization is Critical
- Building a Team Atmosphere
- Training Individuals with the Organizations Vision in Mind
- Open Communications, Good Bad & Ugly
- Set Up SOP's on all work to avoid confusion

Some of the Tools to Get There

- Internal Training
- External Training

utility management institute

- Personality Profiles
  - Myers Briggs Type Indicator
  - DISC Personality Profile

DISC Personality Profile

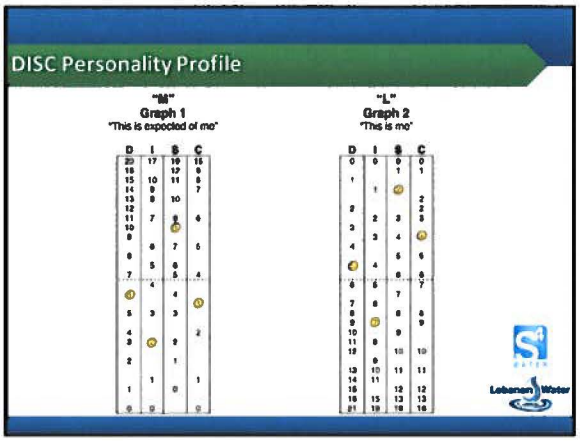
Dominance – **Direct and Decisive.** D's are strong willed, strong minded people who like accepting challenges, taking action, and getting

Influence – **Interactive, Optimistic and Outgoing.** I's are "people people" who like participating on teams, sharing ideas, and energizing and entertaining others

Steadiness – **Sympathetic and Cooperative.** S's are helpful people who like working behind the scenes, performing in consistent and predictable ways, and being good listeners

Conscientiousness – **Concerned and Correct.** C's are sticklers for quality and like planning ahead, employing systematic approaches, and checking and re-checking for accuracy

DISC Personality Profile



DISC Personality Profile

D	I	S	C
Driving	Inspiring	Relaxed	Cautious
Ambitious	Magnetic	Passive	Careful
Pioneering	Enthusiastic	Patient	Exacting
Strong-Willed	Persuasive	Possessive	Systematic
Determined	Convincing	Predictable	Accurate
Competitive	Poised	Consistent	Open-Minded
Decisive	Optimistic	Steady	Balanced Judgement
Venturesome	Trusting	Stable	Diplomatic
Dominance	Influencing	Steadiness	Compliance
Calculating	Reflective	Mobile	Firm
Cooperative	Factual	Active	Independent
Hesitant	Calculating	Restless	Self-Willed
Cautious	Skeptical	Impatient	Obstinate
Agreeable	Logical	Pressure-Orientated	Unsystematic
Modest	Suspicious	Eager	Uninhibited
Peaceful	Matter-of-Fact	Flexible	Arbitrary
Unobstructive	Incisive	Impulsive	Unbending

DISC Personality Profile

What is Your DISC Personality Type?

DISCover Your Style!

Effective Leadership & Management is the Key to Team Success

- Utility Management Requires Leaders
- Is Your Organization Growing Leaders?
- Does Your Utility Have a Team Environment?
- Do You Have Sufficient Data or Verification to make an Intelligent Decision?
- How are you training your teams?
- Who do your Team Members have as Leaders?

QUESTIONS or Comments?

Lebanon Water Works Co.
270-692-2491
Daren Thompson 502-648-0927
Daren.Thompson@lebanonwaterworks.com
www.lebanonwaterworks.com

S4 Water Sales & Service
270-781-0617
Bob Cashion 270-790-2726
RKCashion@S4Water.net
www.s4water.net

"It's not what you know, it's knowing where to find what you need."

LEGAL AND REGULATORY ASPECTS OF "UNACCOUNTED-FOR" WATER LOSS

Gerald Wuetcher
Stoll Keenon Ogden PLLC
gerald.wuetcher@skofirm.com
https://twitter.com/gwuetcher
(859) 231-3017

ORDER OF PRESENTATION

- Measuring Water Loss
- What is Unaccounted-For Water Loss?
- Unaccounted-For Water Loss & Utility Rates
- Addressing Unaccounted-For Water Loss in PSC Rate Proceedings
- Utility Liability for Excessive Unaccounted-For Water

WATER LOSS IN THE NEWS

- Heightened PSC emphasis on water loss
- KIA: loss water reduction a possible funding criteria
- Highly publicized water utility failures due to high water loss levels
- News reports of troubled water utilities & high rates of water loss

MEASURING WATER LOSS

- Non-revenue Water
- Line loss
- Unaccounted-For Water

What is Unaccounted-For Water?

"Unaccounted for water" means water that is withdrawn and not used for commercial, residential, industrial, or municipal purposes.

401 KAR 4:220

What is Unaccounted-For Water?

"Unaccounted for water" means the volumetric sum of all water purchased and produced less the volume of water: (a) Sold; (b) Provided to customers without charge as authorized by the utility's tariff; and (c) Used by the utility to conduct the daily operation and maintenance of its treatment, transmission, and distribution systems.

807 KAR 5:067

What is Unaccounted-For Water?

"[T]he difference of the total amount of water produced and purchased and the sum of water sold, water used for fire protection purposes, and water used in treatment and distribution operations (e.g., backwashing filters, line flushing)."

Case No. 2011-00233, Order of 11/3/11

What is Unaccounted-For Water?

"Generally speaking, the unaccounted-for water loss is the result of line breaks and leaks, inaccurate meters, tank overflows, excavation damages, and theft."

Case No. 2018-00394, Order of 12/18/18

What is Unaccounted-For Water?

Current PSC Annual Report Form:

Unaccounted For Water = Total Line Loss

Total Line Loss =
Tank Overflows + Line Breaks + Line Leaks + Other

What is Unaccounted-For Water?

Revised PSC Annual Report Form:

Unaccounted For Water = Total Line Loss

Total Line Loss =
Tank Overflows + Line Breaks + Line Leaks + Excavation Damages + Theft + Unknown Loss

UNACCOUNTED-FOR WATER AND UTILITY RATES

807 KAR 5:067, Section 6(3):

"[F]or rate making purposes a utility's unaccounted-for water loss shall not exceed fifteen (15) percent of total water produced and purchased, excluding water used by a utility in its own operations."

WHY 15 PERCENT?

- Current Officials Unable to Provide Source
- 1992 Regulation: No explanation
- 15 Percent limit in 807 KAR 5:067 when adopted in 1981
- 1980 PSC Orders note longstanding practice
- 1957 AWWA Committee Report

Effect of 807 KAR 5:066, §6(3)

- Water Utility may not recover cost of unaccounted-for water exceeding 15 percent of total water produced or purchased
- Disallowance based upon:
  - Total production cost of water
  - Water purchase costs
  - Pumping costs (purchased power)

REASONS FOR THE RULE

- Protect Ratepayers from excessive losses
- Encourage Management to take reasonable actions to control water loss

IS THE RULE WORKING?

- No profit incentives for non-profit water utilities
- Almost half of PSC-regulated water utilities have greater than 15% water loss
- Incentives to under-report or falsely report water usage
- Percentage based system misleading

RATE CASE ISSUES

- Water Service to Fire Departments
  - Enforcement of Reporting Requirements
  - Accuracy of Usage Reports
  - Measurement of Fire Department Use
  - Failure to Assess Penalties
- System Flushing
  - Overstatement of Flushing Usage
  - Accuracy of Reports
  - Measurement of Use

RATE CASE ISSUES

- Internal Water Use
  - Accuracy of Reports
  - Measurement of Use
- Measurement of Consumption
  - Compliance with Meter Testing of Utility Meters
  - Ensuring Suppliers' Meters are periodically tested
  - Verification of Purchases
- Proper Allocation of Power Costs to Pumping

RATE CASE ISSUES

- Is 15 Percent Appropriate Measure?
  - 807 KAR 5:066, § 6(3)
  - Utility may propose an alterative level of water loss
  - Proposal may be made in rate case or separate proceeding
  - Burden of proof on Utility to demonstrate alternative level is more reasonable

RATE CASE ISSUES

- Arguments for Alternative Level
  - Service Area Topography
  - Age/Condition of Facilities
  - Merged or Consolidated Systems with Legacy Problems
  - New management addressing legacy problems

WATER LOSS CONTROL SURCHARGE

- Excessive Water Loss requires $$ to implement control measures
- No funds to pay H2O Expense or take corrective measures
- Disallowance creates "Death Spiral"
- Q: How can corrective measures be funded if not through general rates?

WATER LOSS CONTROL SURCHARGE

Proposal:

- Collect Disallowed Water Expense as Surcharge
- Surcharge Proceeds used only for water loss control measures
- PSC must approve measures
- Strict accounting and reporting requirements

WATER LOSS CONTROL SURCHARGE

- PSC Water Loss Demonstration Project (1980s)
- Cannonsburg WD (2011-00220)
- Cannonsburg WD (2018-00376)
- Graves County WD (2018-00429)
- Estill County Water District (2019-00119) (Pending)

REGULATORY LIABILITY

Statute/Regulations Involving Water Loss Control

- KRS 278.030
- KRS 278.170
- 807 KAR 5:066
- 807 KAR 5:095

REGULATORY LIABILITY

KRS 278.030:

"Every utility shall furnish adequate, efficient and reasonable service, and may establish reasonable rules governing the conduct of its business and the conditions under which it shall be required to render service."

REGULATORY LIABILITY

807 KAR 5:066, Section § 7:

"The utility's facilities shall be designed, constructed and operated so as to provide adequate and safe service to its customers and shall conform to requirements of the Natural Resources Cabinet with reference to sanitation and potability of water."

REGULATORY LIABILITY

- PSC Inspection Reports: Water Loss over 15% is violation of 807 KAR 5:066, § 7
- Case No. 2019-00084:
  - Water Loss over 15% is violation of 807 KAR 5:066, § 6
  - Failure to limit water loss to no more than 15% is failure to provide adequate service
  - Violation of KRS 278.030
  - Violation of 807 KAR 5:066, § 7

REGULATORY LIABILITY

- Utility official may be penalized for the Utility's failure to maintain water loss below 15%?
- Case No. 2019-00084

WATER & FIRE PROTECTION

KRS 278.170(3)

- Permits free water service to fire depts for fire protection/training
- PSC approval of tariff required
- Tariff must require Fire Dept to maintain estimates of H2O usage
- Fire Dept to report on regular basis

WATER & FIRE PROTECTION

- 807 KAR 5:095 provides additional tariff requirements for free or reduced rate water service to fire depts
- Fire Departments must quarterly reports of H2O usage
- Provide for a penalty if failure to report H2O usage.

WATER & FIRE PROTECTION

- Permitting Fire Departments to withdraw water at no charge & without tariff provisions violates KRS 278.170(3)
- Permitting Fire Department to withdraw water without reports is a violation of KRS 278.160
- Failure to assess penalties is violation of KRS 278.160

AVOIDING VIOLATIONS

- Enforce the terms of tariff
- Require compliance with reporting requirements
- Fire Departments that fail to report must be charged for H2O withdrawn
- Consider a tariffed rate for fire departments
- Coordination/Education

QUESTIONS?

What's So Great About Kentucky...

...Water and Wastewater Utilities?

7 Contributing Factors

for

Kentucky's Water & Wastewater Utilities

to rank

Among the Best in America!

7 Contributing Factors

1

Climate/Geography

- Kentucky averages nearly 50 inches of rain each year
- Kentucky has the second most stream miles in U.S.?
  (Alaska – 1st)
- Kentucky relies more on surface water than groundwater
  The only state in the U.S.

7 Contributing Factors

2

Federal Laws

- The Safe Drinking Water Act (1974)
- The Clean Water Act (1972)
- State Primacy (SDWA-1977, GWA – 1983)

7 Contributing Factors

3

State Laws & Regs

- DOW has been "out front" of most federal regulations
- KRS Chapter 74 established a framework for success!
- PSC jurisdiction has contributed to mostly-solvent utilities

7 Contributing Factors

4

Federal Funding

- USDA Rural Development in Kentucky is GREAT!!!
- Our U. S. Congressional delegation is very supportive
- Kentucky typically receives more from Washington than we pay in taxes

7 Contributing Factors

5

State Funding/Planning

- Kentucky's 20/20 Plan has led to $900 million in funding
- SB 409 led to Planning and Project Profiles
- Kentucky Infrastructure Authority reorganized

7 Contributing Factors

6

KRWA

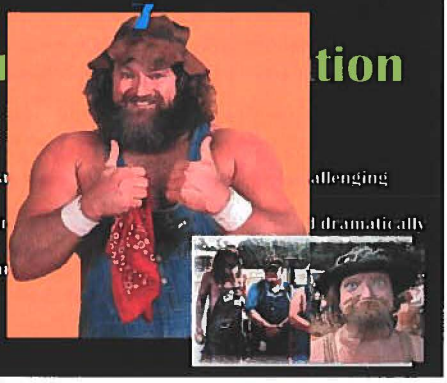
- Interim Loans - $574 Million for 417 projects
- Flexible Term Loans - $440 Million
- Trained - 80,000
- Assisted - 78,000
- 436 Utility Management Professionals

7 Contributing Factors

Climate/Geography
Federal Laws
State Laws & Regs
Federal Funding
State Funding/Planning
KRWA
Natural Consolidation

7 Contributing Factors

Natu tion



- Surface wa allenging
- Water distr dramatically
- We're sma

Public Water Systems

A system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals.

CWS - Community Water System (serves year-round)

Examples: Municipalities, Water Districts, Water Associations, Private, owned

TNCWS - Transient Non-Community Water System

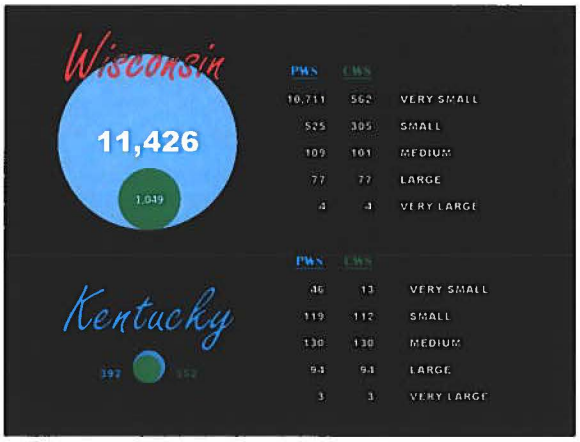
Examples: Resorts, Restaurants, Motels, Campgrounds, State Parks

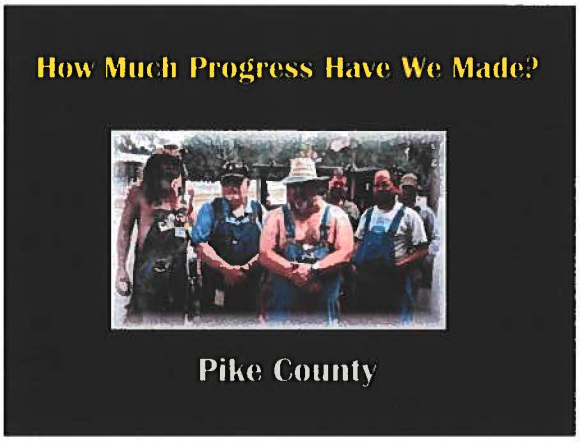
NTNCWS - Non-Transient Non-Community Water System

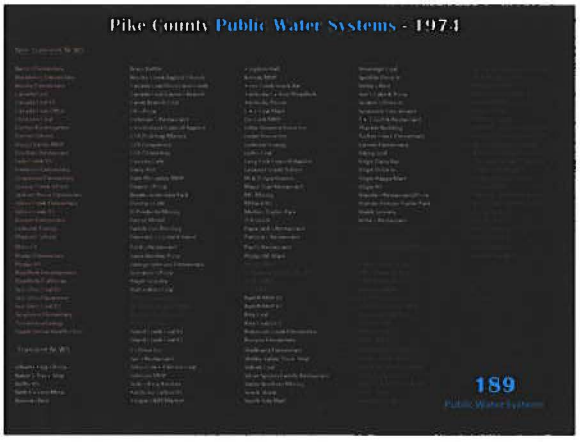
Examples: Schools, RV Parks, Industries, Senior Citizen Centers

Natural Consolidation *Kentucky*

YEAR	TNCWS	NTNCWS	CWS	PWS	CHANGE
1974	1066	254	868	2188	
1979	805	252	755	1812	-17 %
1989	400	215	639	1254	-31 %
1999	199	85	497	781	-38 %
2009	49	26	409	484	-38 %
2019	25	15	352	392	-19 %


Wisconsin
11,426
1,049
PWS CWS
10,711 562 VERY SMALL
525 305 SMALL
109 101 MEDIUM
77 77 LARGE
4 4 VERY LARGE
Kentucky
PWS CWS
46 13 VERY SMALL
119 112 SMALL
130 130 MEDIUM
94 94 LARGE
3 3 VERY LARGE


How Much Progress Have We Made?
Pike County


Pike County Public Water Systems - 1974
189

Pike County Public Water Systems - 2018

CLOSED

- 49 Restaurants/Motels
- 39 Mobile Home Parks
- 35 Coal Mines
- 28 Schools
- 5 State/Federal Properties
- 4 Churches

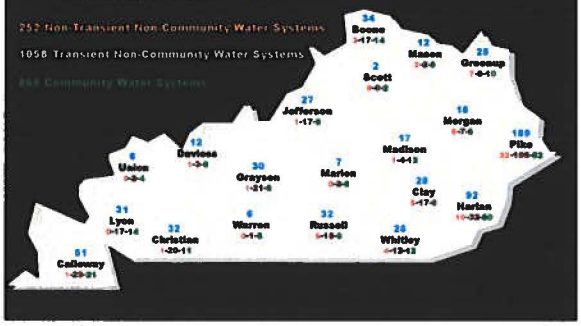
Pikeville City
Pikeville Water & Sewer Department
Mountain Water District

3 Active Public Water Systems

Public Water Systems By Selected Counties - 1974

Kentucky's Total = 2178

252 Non-Transient Non-Community Water Systems
1058 Transient Non-Community Water Systems
868 Community Water Systems



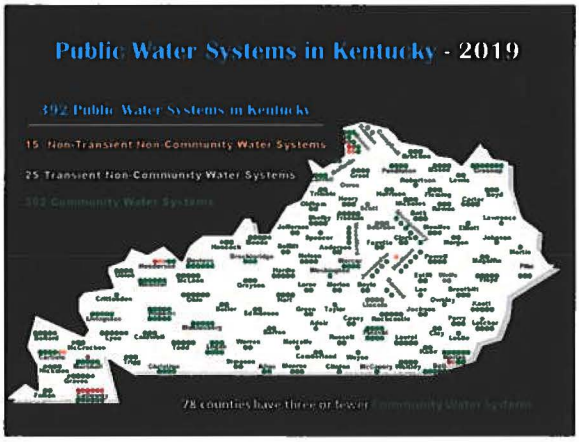
Public Water Systems By Selected Counties - 2019

Kentucky's Total = 392

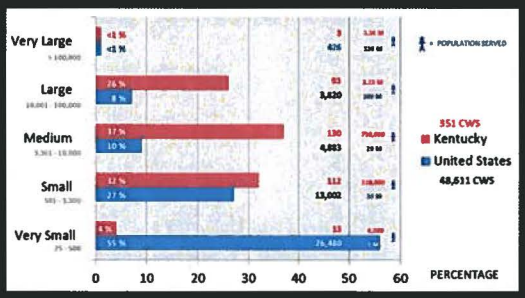
15 Non-Transient Non-Community Water Systems
25 Transient Non-Community Water Systems
352 Community Water Systems

Kentucky has reduced the number of PWSs by 82 %

Public Water Systems in Kentucky - 2019



- 2019



Percentage Served in Kentucky

- Average Population Served — 65.4%
- 103 out of 120 Counties — > 60% Serviceable
- Only 5 Counties — < 75% Serviceable

Least Served Counties

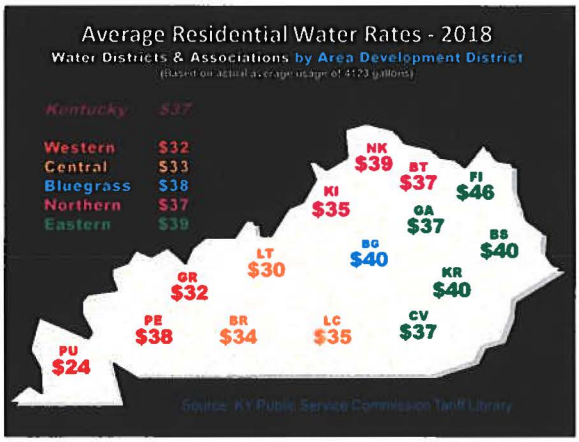
Carlisle	37.0%	1,921 out of 5,104 people
Hickman	38.0%	1,961 out of 4,902 people
Ballard	45.8%	3,356 out of 6,245 people
Graves	67.8%	25,174 out of 37,121 people
Calloway	68.1%	25,064 out of 37,151 people

All five counties are in the Purchase Region where groundwater is abundant

Average Residential Water Rates - 2018

Water Districts & Associations by Area Development District

(Based on actual average usage of 4123 gallons)



Water Rate Comparisons - 2018

	4,000 gallons		
	Average	Median	Outside
All Cities (200)	$29	$28	$36
Small Cities (97) (under 1,320)	$32	$32	$39
Medium Cities (54) (1,321 - 4,000)	$27	$27	$35
Large Cities (49) (over 4,000)	$23	$22	$31
Water Districts/Associations (133)	$37	$37	-
All Utilities (333)	$31	$31	-

Sources: PSC, KIA, KRWA, Cannon & Cannon

Sewer Rate Comparisons - 2018

	4,000 gallons		
	Average	Median	Outside
All Cities (201)	$31	$30	$36
Small Cities (113) (under 1,320)	$31	$32	$40
Medium Cities (35) (1,321 - 4,000)	$29	$29	$41
Large Cities (34) (over 4,000)	$26	$25	$37
Water Districts (54)	$36	$36	
Sanitation Districts (21)	$42	$41	
All Utilities (246)	$32	$31	

Source: KIA, KRWA

Session 16

Celebrating 40 Years Serving Kentucky's Water and Wastewater Utilities

- **John Dix will open the session by delivering a history of Kentucky Rural Water Association that includes the challenges and successes encountered during their 40 years of helping utilities...help themselves. (30 minutes)**

- **The National Rural Water Association is dedicated to training, supporting, and promoting the water and wastewater professionals that serve small communities across the United States. The mission of NRWA is to strengthen State Associations. In this segment, Kent Watson will provide a national perspective as he outlines the power of an association. Focus will be placed on the ongoing programs provided to support and strengthen water and wastewater utilities in Kentucky and what NRWA sees for the future. (30 minutes)**

- **During the 40-year existence of Kentucky Rural Water Association, there has been one Executive Director, Gary Larimore. Many changes have taken place during this time that has allowed water and wastewater utilities to operate more efficiently and serve greater areas. This segment will recap the story of these changes and illustrate how new technology, regulatory changes and population growth may impact the future of utilities in the Commonwealth. (30 minutes)**

Session 17

Kentucky's Public Water and Wastewater Utility Infrastructure Needs – A Panel Discussion

A variety of water and wastewater professionals will join forces during this presentation to discuss current and future needs of utilities in Kentucky. As moderator, Clay Kelly will focus the discussion on aging infrastructure as well as some regulatory and enforcement issues that have grown out of these problems. Each panel member will offer a brief statement toward the discussion of potential solutions and goals necessary to achieve positive results toward the solutions to these needs. Questions and input will be encouraged from those attending this session.

EXHIBIT 4

EXHIBIT 4

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

RECEIVED
JUN 21 2019
KY RURAL WATER ASSOCIATION

June 17, 2019

Kentucky Rural Water Assoc KRWA
Attn: Janet Cole
1151 Old Porter Pike
Bowling Green, Kentucky 42103

Agency Interest Number: 108571

RE: Operator Certification Training Approval for Continuing Education Hours

To Whom It May Concern:

Your training request has been received by the Division of Compliance Assistance, Certification and Licensing Branch. Course approvals are reviewed and approved based on core content outlined by the cabinet and the Kentucky Board of Certification of Wastewater System Operators and the Kentucky Board of Certification of Drinking Water Treatment and Distribution System Operators. The core content lists can be located on our website, dca.ky.gov/certification.

Your request was reviewed by the Kentucky Board of Certification of Wastewater System Operators and/or the Kentucky Board of Certification of Water Treatment and Distribution System Operators at their most recent board business meeting. This letter serves as notification of the board and/or cabinet determination for continuing education credit.

Course Title	Date	Hours & Type Approved	DCA Event ID#	Comments
40th Annual Conference & Exhibition	08/26/2019	WW - 15.0 Hours approved DW - 15.0 Hours approved	20046	One time Approval - (12.0 max per operator)
Northeast Regional Meeting	07/09/2019	DW - 2.0 Hours approved	20047	One time Approval
Western Regional Meeting	07/18/2019	DW - 2.0 Hours approved	20048	One time Approval

Upon completion of the approved training, the provider shall submit to the cabinet a completed Continuing Education Activity Report form. This form can be located on the program's website at dca.ky.gov/certification. The program will no longer accept rosters that are not submitted on the cabinet's Continuing Education Activity Report form or electronically through the cabinet's website. If a continuing education activity report was attached to the training approval request, please be aware that the operators will only receive credit for the number of hours approved by the board(s).

If you have any questions or need additional information, please contact the Division of Compliance Assistance, Certification and Licensing Branch at (502) 564-0323.

Sincerely,

Veronica Roland

Veronica Roland
Certification and Licensing Branch