Kentucky Rural Water Association
Helping water and wastewater utilities help themselves

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JUL 09 2018
PUBLIC SERVICE COMMISSION

July 3, 2018

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

Dear Ms. Pinson:

Kentucky Rural Water Association (KRWA) will host its 39th Annual Conference and Exhibition, ***Water-The Natural Resource***, at the Galt House Hotel in Louisville, Kentucky, on August 27-29, 2018. The objective of the training portion of our conference is to provide useful information to attendees to help them better perform their roles and enhance the operations at their utility. Because we may have up to 300+ attendees in a given session, it is not feasible to have handouts of speaker presentations available on site. However, PowerPoint presentations are made available for downloading from the KRWA website at the conclusion of the conference.

Enclosed is the training summary/timed agenda which includes a description of each session, its benefit for commissioners, speaker information and copies of the outlines or presentations for the sessions. We have also included a copy of the "Application for Approval of Courses for Continuing Education Credit" which was submitted to the Kentucky Board of Certification of Water Treatment & Distribution System Operators and the Kentucky Board of Certification of Wastewater System Operators. Continuing education credit was not submitted to any other agency/group for approval of hours.

After reviewing the enclosed documents, KRWA respectfully requests approval of this training for continuing education credit for water district commissioners as referenced in regulation 807 KAR 5:070. The maximum number of credits that can be earned during the conference is twelve hours. If additional information is needed, please do not hesitate to contact our office.

Sincerely,

Janet Cole

Janet Cole
Education Coordinator
j.cole@krwa.org

Enclosures
(Original and 10 copies)

1151 Old Porter Pike · Bowling Green, KY 42103 · Phone 270.843.2291 · Fax 270.796.8623
www.krwa.org

Kentucky Rural Water Association's
39th Annual Conference and Exhibition – *Water, THE Natural Resource*
August 27-29, 2018
The Galt House Hotel & Suites, Louisville, Kentucky

Learning Objective: Kentucky Rural Water Association's Annual Conference is directed toward those involved in the decision-making at water and wastewater utilities: managers, commissioners, office personnel and operators. The expertise of peers, technical assistance providers, industry professionals, and government agencies will provide useful information to attendees to help them better perform their roles and enhance the operations at their facilities.

Many water districts, particularly smaller water districts, have difficulty attracting commissioners with relevant experience in the responsibilities of operating a utility. As they have accepted the position of Commissioner with a desire to serve their communities, most realize they must gain additional knowledge to be effective in this position. The training portion of KRWA's conference is focused on providing diverse sessions to enlighten attendees and expand their awareness of the overall operation of a water or wastewater utility. Such knowledge should aide in the decision-making process entrusted to commissioners.

Training Summary/Timed Agenda

Monday, August 27, 2018 Combined Water and Wastewater Training

8:30 a.m. – 9:30 a.m. (1 hr.)
Session 1: Utilizing App Technology for Asset and Maintenance Management
Presenter: Tim Moore, 64 Seconds
This session will demonstrate how to use the capabilities of an Asset and Maintenance Management Program App. The App demonstrated will show the ease with which it can be used, how to add and edit assets, how to document maintenance activities in real-time and how to export data to other software. Finally, this session will show how the technology can create work orders and integrate them with asset activity data.

Benefit for Commissioners (Preventative maintenance): Commissioners should be aware of new technologic advances so they can make informed decisions on which new tools will enhance the operations at their utility. New technologies and new applications can aid utilities by helping them to operate more efficiently and effectively. This particular talk will not have a PowerPoint style presentation, but will consist of a live demonstration of an iPad projected onto the screen for the entire audience to view. This will allow commissioners to directly view the application technology while in use.

9:40 a.m. – 10:40 a.m. (1 hr.)
Session 2: Mobile Work Order Development in Rural Water and Wastewater Utilities
Presenter: Kerry Zwierschke, Bennett & Williams Environmental Consultants
Work order systems traditionally rely on generating a work order in a central location and distributing them to field personnel. This session will demonstrate technologies that allow mobile work orders to be created. In addition, the technology will allow field personnel to identify future work orders in the field and notify the office, linking the entire process to a GIS system. This allows for work orders to become part of the asset management process linking maps, work orders, and the billing system all into one integrated system.

Benefit for Commissioners (Preventative maintenance): Commissioners should be aware of new advances so they can make informed decisions on which new tools will enhance the operations at their utility. New technologies and new applications can aid utilities by helping them to operate more efficiently and effectively. This presentation will show board members a way to modernize and streamline their work order procedures. This presentation does not use PowerPoint but will be shown via a website, so a word document with screen shots has been provided.

10:50 a.m. – 11:50 a.m. (1 hr.)
Session 3: Moving from Paper to Platform: The Transformation of Mapping in the Water and Wastewater Industry
Presenter: Robert Rodriguez, Environmental Systems Research Institute
Geographic Information Systems, or GIS, is a tool that is becoming commonly used by everyone in utility organizations to provide current information about system assets, enable efficient system planning, facilitate system operations and maintenance, and enhance customer services. This session will cover the advantages of transitioning from using paper or static maps to a Web GIS platform for managing water systems. Attendees will gain an understanding on how a Web GIS platform can help meet many of the common business challenges of water utilities such as aging infrastructure, water loss and recovery, emergency response, and communication and transparency with customers.

Benefit for Commissioners (Preventative maintenance): Commissioners should be aware of new technologic advances so they can make informed decisions on which new tools will enhance the operations at their utility. This session will help commissioners stay current on evolving mapping and information integration technologies.

11:50 a.m. – 1:00 p.m. Lunch

1:00 p.m. - 2:00 p.m. (1 hr.)
Session 4: When the Meteor Strikes, Will Your Project go Extinct?
Presenter: Robert Pickerill, Bell Engineering
Most projects experience challenges as they move from planning and design through construction. When there is a risk of failure due to unforeseen circumstances, knowing what to do, and conversely what not to do, can mean the difference between delivering a successful project, or your project going the way of the dinosaurs. Through case studies and past experience, this session will examine what you need to know when everything that can go wrong does.

Benefit for Commissioners (Preventative maintenance, Risk management): Commissioners' decision making processes are crucial to the success of major projects undertaken by their utility. This session will educate commissioners on how to handle projects when problems inevitably arise. Commissioners will see examples from case studies and real world experiences.

2:10 p.m. – 3:10 p.m. (1 hr.)
Session 5: Cyber Security is a Team Sport!
Presenter: Jeff Harlan, United Systems & Software
In today's world, going it alone when it comes to the security of your network creates extreme risks for your organization. Network security requires that departments work together to keep the customers and their data secure from outside threats. This presentation will identify threats and provide related strategies to help your utility become cyber resilient.

Benefit for Commissioners (Cybersecurity): This session will educate commissioners about cyber security threats their utility may face and how those threats can be minimized. Commissioners will ultimately have the final decision in which cyber security practices their utility adopts, thus maximizing their awareness of cyber security issues is vital.

2:10 p.m. – 4:20 p.m. (2 hrs.)
Session 6: *River to Faucet, A Tour of Louisville Water Company's Treatment Facilities*
Presenter: Kelley Dearing-Smith, Louisville Water Company
In 1860, Louisville Water began as Kentucky's first public water provider and today its treatment plants are rated as two of the top 16 in North America for outstanding quality by the Partnership for Safe Water. This two-hour tour combines history and current day operations to highlight how Louisville Water produces 117 million gallon per day of drinking water. The tour includes a look at the 1860 pumping station and water tower with the WaterWorks Museum, the Crescent Hill Reservoir and the Crescent Hill Water Treatment Plant. Participants will see renovations at the plant with filtration, lab research and chemical feeds and will also tour the 1879 Crescent Hill Gatehouse. Louisville Water Company'sstaff of engineers and scientists will be available to answer questions. As attendees are bused to and from the Galt House, videos will provide a glimpse of Louisville Water Company's contribution to safe drinking water through its innovations in science and engineering.

Benefit for Commissioners (Media & public relations, Water treatment basics): It is not unusual for commissioners to have little or no experience with utilities other than the one for which they have been appointed. This training session involves touring Louisville Water Company facilities and will provide commissioners with unique insights as to how one of the largest utilities in Kentucky grew and how it operates today.

3:20 p.m. – 4:20 p.m. (1 hr.)
Session 7: Safety Benefits of Hydro Excavation, and Preventative Maintenance on Pipes and Valves Using One Self Contained Trailer
Presenter: Dick Thompson, Vac-Tron Equipment
This session will explain hydro excavation, the process of removing or moving soil with pressurized water, which allows for a non-destructive, more accurate way to excavate soil and locate underground utilities. Discussion will include the pros and cons of this process and the safety benefits of this method versus the more traditional way of using a backhoe. This presentation will also address the importance of preventative maintenance programs and describe affordable equipment options for valve exercising and sewer jetting.

Benefit for Commissioners (Preventative maintenance): Commissioners should be aware of new technologic advances so they can make informed decisions on which new tools will enhance the operations at their utility. This session will explain a process that is much safer and less likely to cause costly damage to other buried assets. Other aspects of the presentation will highlight methods for preventative maintenance related to valves and sewer mains.

Tuesday, August 28, 2018 Concurrent Sessions

Concurrent Session A (Nunn Room)

1:30 p.m. – 2:30 p.m. (1 hr.)
Session 8A: A Framework to Evaluate Life Cycle Costs of Water Pipelines
Presenter: Roy Mundy, McWane Ductile
This session will demonstrate a model that allows utilities and engineers to evaluate the total life cycle cost associated with a water transmission pipeline. The model is designed to compare two of the most commonly used pipe materials: Ductile Iron (DI) and PVC pipe. In addition to the tangible cost comparisons, the model also includes an evaluation of environmental impacts that need to be considered by utilities when building or replacing a transmission pipeline.

Benefit for Commissioners (Preventative maintenance): This session will provide a tool for helping to determine the life cycle cost of ductile iron and PVC pipelines. Commissioners will gain valuable information for long term financial and operational planning.

2:40 p.m. – 3:40 p.m. (1 hr.
Session 9A: Lessons Learned: Fighting DBP Formations for Improved Water Quality
Presenter: Bob Cashion, S4 Water Sales and Service
Never before have there been so many chemical treatment options, equipment options and treatment approaches to improve water quality and meet new and challenging regulatory requirements. This session will look at the changing dynamics of chemical treatment applications, treatment schemes and how they affect water quality leaving the treatment facility and within the distribution system. Discussion will include new techniques in chemical applications, testing and analytical evidence of water quality improvements and regulatory compliance techniques.

Benefit for Commissioners (Water treatment basics): Commissioners are tasked with making decisions for a utility that will ultimately provide safe and potable drinking water to the public. This session will enhance a commissioner's understanding of Disinfection By Products and the challenges they bring to the utility.

3:50 p.m. – 4:50 p.m. (1 hr.)
Session 10A: Protecting Steel Potable Water Tanks
Presenter: Michael Barnhill, Tnemec (J.D. Petro & Associates)
Elevated and ground-level water storage tanks are an integral part of most water distribution systems. Steel water storage tanks are subject to corrosion on all of their external and internal surfaces. Today, new high-performance waterborne and high solids coating systems are available to help combat corrosion on tanks. This presentation will discuss updates to the AWWA D102-06 standards for coating steel water storage tanks. Discussion will include updates on new systems that are designed to maximize the life cycles and minimize the financial impacts to these tanks.

Benefit for Commissioners (Preventative maintenance): This session will enhance a commissioner's understanding of maintaining water storage tanks, an expensive component of a distribution system. Proper care of tanks helps maintain good water quality and protects the financial impact to the utility.

Concurrent Session B (Breathitt Room)

1:30 p.m. – 2:30 p.m. (1 hr.)
Session 11B: Now's Not the Time to Bulk Up: Filament Control
Presenter: Don Van Veldhuizen, USA BlueBook
Filaments can cause all sorts of headaches for wastewater operators that lead to violations in effluent limits and less efficient treatment. This session will show attendees the causes of most filament issues and different methods of control including short-term and long-term options and how to proceed before a violation occurs.

Benefit for Commissioners (Facility compliance): Commissioners who oversee wastewater systems should be aware of major problems which can lead to violations. Filamentous growth can cause major problems for plant operations which often lead to costly permit violations. Knowledge of this problem will aid commissioners in their decision-making process.

2:40 p.m. – 3:40 p.m. (1 hr.)
Session 12B: Tidbits for Industrial Wastewater Treatment
Presenter: Jim Collins, Brenntag Mid-South
The State of Kentucky is experiencing a lot of growth from the industrial community. Not only are new industries moving into the state, we are also seeing an expansion of current industry as well. The majority of these expansions occur in cities and towns where the industry often discharges its effluent into the publicly owned treatment works within the community. This presentation will help to educate superintendents & the industrial pre-treatment coordinators as to how

these industries treat their industrial waste before it is received by the collection system and is intended to help wastewater operators, managers, and pre-treatment coordinators during their inspection of industrial outfalls. Guidelines to aide wastewater personnel in determining whether these industries are in compliance with both federal, state and local standards for industrial dischargers will be discussed.

Benefit for Commissions (Facility compliance): This presentation will help provide an understanding of how industrial waste discharged into the wastewater collection system can impact a utility. Knowledge of this process will enhance a commissioner's grasp of the process thus providing insight for decision-making.

3:40 p.m. – 4:40 p.m. (1 hr.)
Session 13B: Gravity Sewer Rehabilitation
Presenter: Brenton Hasenour, Commonwealth Engineers
Ageing sewer systems have left many utilities with increasing inflow and infiltration (I/I) problems. In addition, tougher treatment and distribution regulations are making it more difficult to remain compliant during wet weather flows. This session will identify options for reducing I/I problems and the benefits of rehabilitation projects. Discussion will include some case studies of successful projects and unique scenarios.

Benefit for Commissioners (Preventative maintenance): Inflow and infiltration is one of the most difficult and costly challenges facing wastewater collection systems. Knowledge of this process will enhance a commissioner's grasp of the process thus providing insight for decision-making.

Concurrent Session C (Combs-Chandler Room)

1:30 p.m. – 2:30 p.m. (1 hr.)
Session 14C: Utility Legislative Updates
Presenter: Damon Talley, Stoll Keenon Ogden
This session will provide information on the pressing regulatory and legal issues facing water and wastewater utilities in Kentucky. Topics will include: territorial protection, 911 emergency call center funding for counties and municipalities, KY 811 (Call Before You Dig) and other issues of utility interest before the Kentucky General Assembly.

Benefit for Commissioners (Regulatory requirements): Commissioners must be aware of legislative and legal issues that may potentially affect their utility. This session will provide an update to regulatory and legal issues facing Kentucky utilities.

2:40 p.m. – 3:40 p.m. (1 hr.)
Session 15C: Rates Across Kentucky
Presenter: Andy Lange, Kentucky Rural Water Association
Rates for water and wastewater service are increasing as grant monies have dried up over the past decade. Cannon & Cannon Engineers have been conducting a Kentucky utility rate survey for several years and have now partnered with KRWA on this year's survey. This session will present the results of the survey and discuss other rate-related information available for utility managers and decision-makers as they grapple with providing quality service at increasingly higher cost to the customer.

Benefit for Commissioners (Ratemaking basics): Managers and commissioners must keep abreast of the rising cost associated with providing safe drinking water to their customers. This session will provide commissioners with a comparison of other rates across the state. Discussion will include rate-related information that could be helpful in this decision-making process.

3:50 p.m. – 4:50 p.m. (1 hr.)
Session 16C: PSC-related Utility Issues
Presenter: Gerald Wuetcher, Stoll Keenon Ogden
The Kentucky Public Service Commission has been focusing its attention on matters that past Commissions have not traditionally weighed in on. In recent rate cases involving water and sewer utilities, compensation and benefits have become a contentious issue. Water loss has received increased scrutiny, as has depreciation. In addition, several cases have found utilities in violation of the regulations regarding the borrowing of monies without prior PSC review and approval. This presentation will explore these issues from the perspective of a former PSC staff attorney who is now in private practice representing utilities as clients.

Benefit for Commissioners (Introduction to the PSC): This session will enhance a commissioner's understanding of the focus of the Public Service Commission and how it affects the decision-making process in utility matters.

Wednesday, August 29, 2018 General Session

General Session Benefit to Commissioners (Regulatory requirements, Physical asset management, Preventative maintenance): Commissioners are entrusted with making decisions as part of the Board to which they have been appointed. In order to make informed decisions, these individuals must be aware of local, state, and national influences affecting utilities in Kentucky. Presentations during the General Session will provide a broad range of perspectives from individuals involved in different facets of the water and wastewater industry. Although there will be no handouts from these speakers, the information they pass along will surely enhance the knowledge required to better execute their roles as commissioners.

8:30 a.m. – 9:00 a.m. (.5 hrs.)
Session 17: Water, THE Natural Resource: The View from National Rural Water
Presenter: Steve Fletcher, President, National Rural Water Association
This session will provide a message from the National Rural Water Association and will address national issues which face rural water and wastewater utilities.

9:00 a.m. – 9:30 a.m. (.5 hrs.)
Session 18: Water, THE Natural Resource: A Message from the Appalachian Regional Commission
Presenter: Tim Thomas, Federal Co-Chair, Appalachian Regional Commission
Tim Thomas was recently appointed by President Trump as the 12th Federal Co-Chair position with the Appalachian Regional Commission. This session will provide information about the ARC, how the ARC impacts utilities and communities within the Appalachian region of the United States, and what resources the ARC can bring to Kentucky water and wastewater utilities.

9:40 a.m. – 10:10 a.m. (.5 hrs.)
Session 19: Water, THE Natural Resource: The View from USDA Rural Development
Presenter: Hilda Legg, State Director, USDA Rural Development
This session will focus on the US Department of Agriculture, Rural Development (RD). RD provides funding to the majority of Kentucky utilities and their policies can influence projects, utility rates, as well as technical assistance provided to Kentucky utilities.

10:20 a.m. – 11:50 a.m. (1.5 hrs.)
Session 21: Qualifications Based Selection (QBS): The Established Standard for Procuring Architectural and Engineering Services
Presenters: Robert Pickerill, Bell Engineering, Mark Willis, Stantec, and Russ Romine, Kentucky Engineering Center
Qualifications-based selection is a procedure whereby service providers are retained on the basis of qualifications, rather than price factors. This presentation will define QBS and explain how it works, discuss the status of QBS and the resources that are available to utilities in Kentucky, and go over why utilities should use QBS standards in selecting a variety of services. The panel discussion will allow for a question and answer session.

Request for Continuing Education Credit

Kentucky Rural Water Association requests the approval of these sessions for continuing education credit for commissioners. The maximum credits that can be earned is twelve (12) hours (6 hours on Monday, 3 hours on Tuesday and 3 hours on Wednesday).

Credit will be granted to individuals for actual time attending a training session. An individual sheet will be provided to participants to record attendance at the classes. This sheet will be stamped by Kentucky Rural Water Association (KRWA) personnel after the completion of each session. Individuals must return the completed sheet to KRWA to receive continuing education credit.

Speaker Bios

Tim Moore with 64 Seconds has been involved in the potable water industry for more than eighteen years, with a focus on the development and implementation of new technologies in Water Leak Detection and Maintenance Management. Previous experience includes a background in the wastewater field with a primary focus on the design, implementation and support of Open Channel Flow Metering products.

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.

Robert Rodriguez is an Account Manager for the Global Water Practice with Environmental Systems Research Institute (ESRI). Robert has been a working professional in GIS for 6 years, starting his GIS career as a Geospatial Engineer for the Pennsylvania National Guard. Robert now supports the water industry by assisting users with GIS best practices and implementing the ArcGIS Platform. He is a graduate of West Chester University with a degree in Geography concentrating in GIS and Information Technology.

Bob Pickerill is a Principal at Bell Engineering and serves as the Regional Office Manager for Bell's Hopkinsville, Kentucky office. He has extensive experience in water, wastewater and stormwater design along with construction management and offers 38+ years of industry experience. Early in his career, Mr. Pickerill served as a consultant focusing on water, wastewater, stormwater and land development services before embarking on a construction career. After spending approximately 20 years in the construction industry, he returned to the consulting business as manager of Bell's Hopkinsville office in 2000. He has extensive training in construction scheduling softwares and quality control methods. These skills, combined with his unique background in both design and hands-on construction management, brings a vision to projects that increase the constructability and assists with controlling construction budgets and delivery schedules. (Sessions #4 and #21)

Jeff Harlan is the Business Development Manager for United Systems & Software. Jeff has over 25 years in the IT and software industry with certifications from Microsoft, Cisco, Citrix and others. Jeff has been responsible for well over 500 network installations including datacenter designs, which include dozens of servers and thousands of workstations. Jeff was the managing partner at WWL Network Solutions which was purchased in 2006 by WinScribe, a global company in the speech dictation space. He was subsequently added to WinScribe's board of directors and named CEO for U.S. operations. His technical and business management experience are an added benefit for our customers and partners when seeking best in class solutions for the problem resolutions they are working to solve.

Kelley Dearing Smith currently serves as the Manager of Strategic Communications for Louisville Water Company, a municipal utility that provides water to over 840,000 people in Louisville Metro and surrounding counties. She has extensive experience in creating community partnerships, developing communication and marketing initiatives and managing large-scale community education projects. Kelley's background includes a degree in Communications, nine years progressive broadcast media experience and nine years public relations experience in a major metropolitan public utility.

Dick Thompson has been providing equipment for the construction industry for over 25 years. Three years ago, Dick joined the Vac-Tron team, and is currently the Eastern Regional Manager. Vac-Tron Equipment, which has more than 30 industrial vacuum products and more than 50 wet and dry uses, has 115 dealer locations in North America. Vac-Tron offers a full line of industrial vacuums, potholing, daylighting, hydro-excavation, and air excavation equipment. Vac-Tron's equipment can also be used for directional drill slurry removal, power pole setting, manhole clean-out, culvert clean-out, lateral and storm drain clean-out, industrial cleanup, waste cleanup, lift-station cleanup, oil spill cleanup, as well as other natural disaster cleanup applications.

Roy Mundy is a Sales Engineer for McWane Ductile. Roy has extensive experience in the waterworks profession having spent 35 years working up through the ranks at American Water Company to reach the position of President and CEO of AWC's Kentucky-American Water Company. Roy then served as the Commissioner of the Kentucky Department of Vehicle Regulation in the Transportation Cabinet before becoming an instructor and Vice-President of Advancement with Midway College in Kentucky.

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 were 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.

Michael Barnhill of TNEMEC understands the importance of proper surface preparation and application, having spent more than eight years as a union painter and 25 years in the coatings industry. He also received sales training at the Xerox University in Leesburg, Va., and was employed by Induron Protective Coatings for two years prior to joining Tnemec, where he has been for 20 years. In addition to being a NACE Level I Coating Inspector, Michael is a member of the Evansville and Louisville Chapters of the Construction Specifications Institute (CSI). He earned his bachelor's degree from the University of Evansville, where he lettered in diving and earned a living as a commercial river diver.

Don Van Veldhulzen is the Senior Technical Support Representative/Technical Training Manager for USA Bluebook. He has been in the water/wastewater field for 30 years in various roles including operations, management, consulting and research. He advises and provides training for numerous water & Wastewater systems throughout the United States and overseas. Holding certifications in both water & Wastewater, he instructs from an operational standpoint using a variety of instructional tools to encourage class participation, including hands-on applications where appropriate. Don is a Certified Environmental Traininig (CET) with the National Environmental Training Association (NETA).

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.

Brenton Hasenour with Commonwealth Engineers has a Bachelor of Science Degree in Civil Engineering from the University of Evansville. He is a Professional Engineer registered in the states of Kentucky and Indiana. He has been working for Commonwealth Engineersfor 12 years. His primary focus is working with municipalities to solve various issues with wastewater systems, such as; capacity problems, inflow and infiltration reduction, and future planning. Brenton has led numerous projects through planning level stages, design, and construction.

Damon Talley joined Stoll Keenon Ogden PLLC (SKO) on May 1, 2015. He is a member of the Utility & Energy practice. He practices out of the Hodgenville, Louisville, and Lexington, Kentucky offices. Damon brings to SKO more than 35 years of experience working in private practice focusing on public utility work. He serves as General Counsel of the Kentucky Rural Water Association and has served in this capacity since 1979. Damon received his J.D. from the University of Kentucky College of Law in 1975, and earned his B.S.M.E. in 1972 from the University of Kentucky College of Engineering.

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.

Gerald E. Wuetcher joined the law firm of Stoll/Keenon/Ogden in March, 2014. He was employed from 1987- 2014 as a staff attorney with the Public Service Commission of Kentucky, where he represented the Public Service Commission in administrative and judicial proceedings involving the rates and service of electric, gas, telecommunications, water and sewer utilities. He was principally assigned to the electric, water and sewer utility areas. Jerry served as a judge advocate with the United States Army from September 1984 through July 1987. He is a graduate from John Hopkins University (May 1981) with a Bachelor of Arts Degree in History (with Honors). He received a Juris Doctorate Degree from Emory University Law School in May 1984 and was admitted to the State Bars of Georgia and Kentucky.

Steve Fletcher of Illinois was elected as the President of the National Rural Water Association during meetings held at the WaterPro Conference in Orlando, Florida, in September, 2016. Fletcher has been the Manager and Operator for the Washington County Water Company since November 1981. The WCWC is a not for profit rural water system that serves 5,800 customers in seven counties across southern Illinois. Fletcher has been a member of the Illinois Rural Water Association since 1986, and was elected as the state director to the NRWA board in 1999. He was elected to the NRWA executive board in 2008. In addition to his work in rural water, Fletcher has also been a police officer for Nashville, Illinois since 1987 and serves as the Chief Deputy Coroner for the County of Washington. As president of NRWA, the nation's largest water utility association with over 30,ooo members, Steve Fletcher will be one of the voices representing Rural Water at industry events, with government agencies, and in the halls of Congress.

After being nominated by President Donald Trump, **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, support small business and entrepreneurial development in rural Appalachia, and address the Region's opioid crisis. Thomas has a bachelor of science degree from Murray State University, and a law degree from the University of Louisville.

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.

Mark Willis, P.E. , joined Stantec in 2009 as a Principal in the Lexington, Kentucky office. Prior to Stantec, he was with Burgess & Niple rising from Project Manager to office leader and shareholder. Mark has over 30 years of professional experience and is an accomplished leader within the engineering and business communities of the commonwealth. Mark currently serves as Chair for the Joint KSPE/ACEC-KY QBS Committee and is an active member of the Northern Kentucky Chamber and its Environment and Infrastructure Committee. He is also active in the Louisville and Lexington Chambers of Commerce. Mark is a 1983 graduate of the University of Kentucky with a BS in Civil Engineering and is currently supporting the UK College of Engineering with its Senior Civil Engineering Design.

Russ Romine serves as the Executive Director for the Kentucky Engineering Center in Frankfort. The Engineering Center is home to the Kentucky Society of Professional Engineers, the American Council of Engineering Companies of Kentucky, and the Kentucky Engineering Foundation. Russ began his tenure with the Kentucky Engineering Center after a career in public service. Prior to his retirement, he served as Deputy Secretary for the Kentucky Transportation Cabinet and as the cabinet's Chief Financial Officer.

Monday, August 27, 2018

Combined Water and Wastewater Training

PowerPoints/Outlines for Sessions 1-7

Monday, August 27, 2018
Combined Water & Wastewater, Session #1, 8:30 a.m. - 9:30 a.m.

Utilizing App Technology for Asset and Maintenance Management

Presentation by: Tim Moore

Summary:

The presentation will focus on the ease of use and capabilities of App technology for Asset and Maintenance Management. Rather than using a PowerPoint presentation to talk about the technology, a live demonstration of an iPad based Asset and Maintenance Management system will be used.

The iPad screen will be mirrored with a laptop and projected onto a screen. This allows the iPad to be moved around the room so audience participants can have a hands-on experience in how the App technology functions.

Items To Be Covered:

Changing map views.

Selecting Utilities and adding assets.

Documenting maintenance activities such as:
- Hydrant Flushing;
- Valve Exercising;
- Manhole Inspections;
- Backflow Prevention;
- Meter Data and;
- Leak Detection.

Documenting potential Issues.

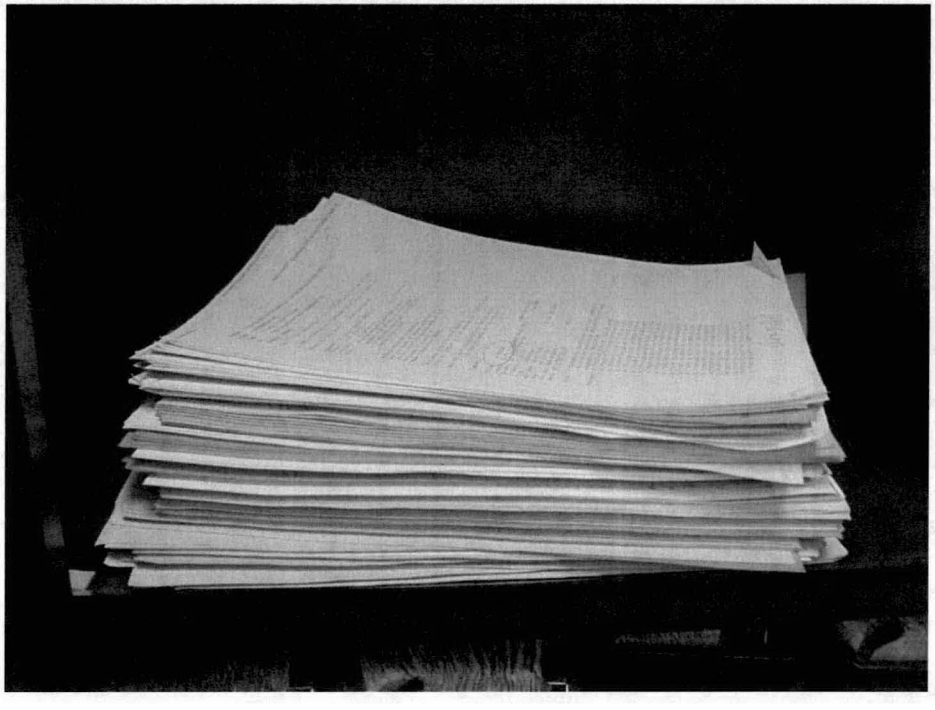
Work Orders.

Data Exporting:
- CSV Format;
- PDF Format and;
- Shape File Format.

Monday, August 27, 2018
Combined Water & Wastewater, Session #2, 9:40 a.m. – 10:40 a.m.

Mobile Work Order Development in Rural Water & Wastewater Utilities

Kerry Zwierschke, Bennett & Williams Environmental Consultants



WORK ORDERS BY TYPE 15:22:25

CHECKLIST/TYPE: CHECK WORK ORDER NO : 41601
SCHEDULED DATE: 09/08/15 SCHEDULED TIME: PM:
INSTRUCTIONS: VERIFY NUMBER OF SERVICES...POSSIBLY 2 SERVICES ON SAME TAP HERE.

METER LOCATION: 163 BURNS HLW RD 0000
IN: 06/06/14

ACCOUNT:104-13150-00 CITY:
NAME :RUCKER, RANDALL OWNER : RUCKER, RANDALL
S/ADDR :163 BURNS HOLLOW RD O/ADDR :8627 ST RT 335
PHONE :000 000 - 0000 MINFORD OH
OWNER PHONE: 000 000-0000 ID: 45653
ISSUED: 09/08/15 BY: KIM COMPLETED:

OLD METER INFORMATION NEW METER INFORMATION

SIZE: 5/8 in. TY: G USE: 6750 09/05

	MAKE	SERIAL	REMOTE	MXUID	CURRENT		MAKE	SERIAL	REMOTE	MXUID
1:		82083006		1482666644	79100	E				
2:										
3:										
4:										

HISTORY:	DATE	CURRENT	PREVIOUS	USAGE		PRIOR W/O	DATE	TYPE
	07/30/15	72350	65600	6750	A	22976	08/31/10	CHECK
	06/30/15	65600	58000	7600	A	40129	06/02/15	CHECK
	06/02/15	58000	49200	8800	A	39849	05/12/15	CHECK
	04/30/15	49200	44650	4550	A	34947	03/20/14	CHECK

CHECK

___READ METER
___CHECKED LEAK
___CHANGED METER
___TURNED OFF
___MARKED LINES

___INSTALLED METER
___INSTALLED TAP
___NEW RING & LID
___POSTED DELQ NOT
___REMOVED METER

SEP 21 2015

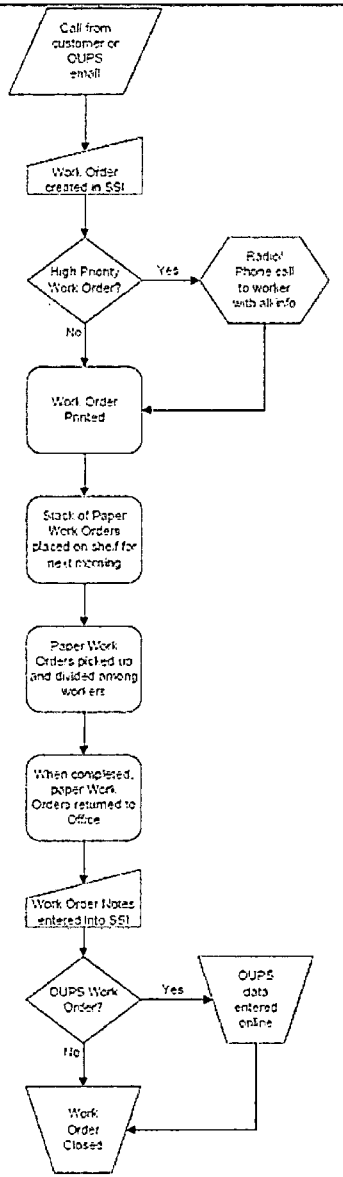
Work Completed:

New Set : _____ Serial No: _____ Remote: _____ Read: _____

Material- Item No Part Description Quantity

Comments: double Serve

Date Completed: 9-15-15 By: RDY Time: _____


Call from customer or OUPS email
Work Order created in SSI
High Priority Work Order?
Yes
Radio/ Phone call to worker with all info
No
Work Order Printed
Stack of Paper Work Orders placed on shelf for next morning
Paper Work Orders picked up and divided among workers
When completed, paper Work Orders returned to Office
Work Order Notes entered into SSI
OUPS Work Order?
Yes
OUPS data entered online
No
Work Order Closed

Disadvantages of paper work orders

1. Poor communication of information

2. Status of work orders is unknown when papers are in the field

3. Papers can get lost and must be physically transferred

4. Hand written notes can be difficult to read

5. Notes must be manually entered into billing system

6. No mapping data available in the field

How can we improve on a paper work order system?

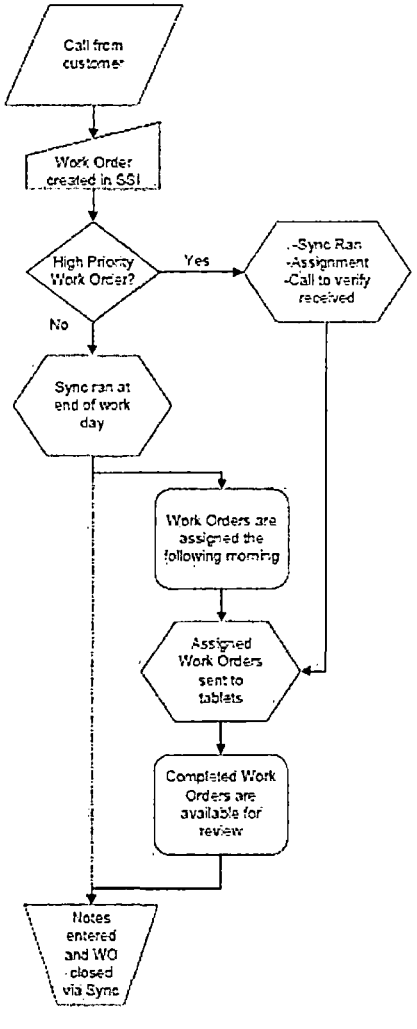
1. Small to mid-size (5,000 - 20,000 taps) rural utilities

2. Utilize existing software assets (billing system)

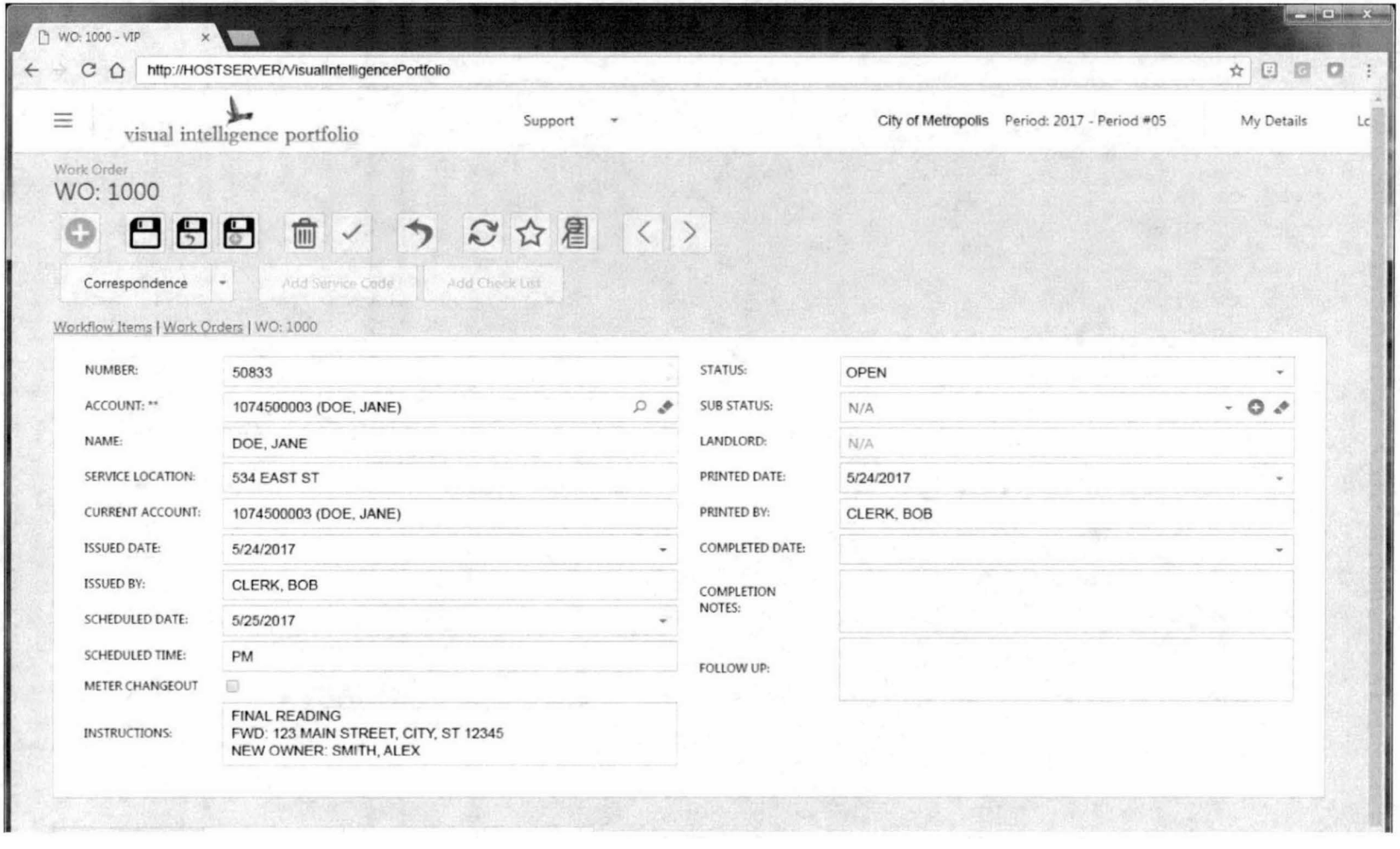
3. Add mobile dispatch component

4. Use the best pieces of the billing software and the best of ESRI (mobile dispatch and dashboards) to create a more complete work order system

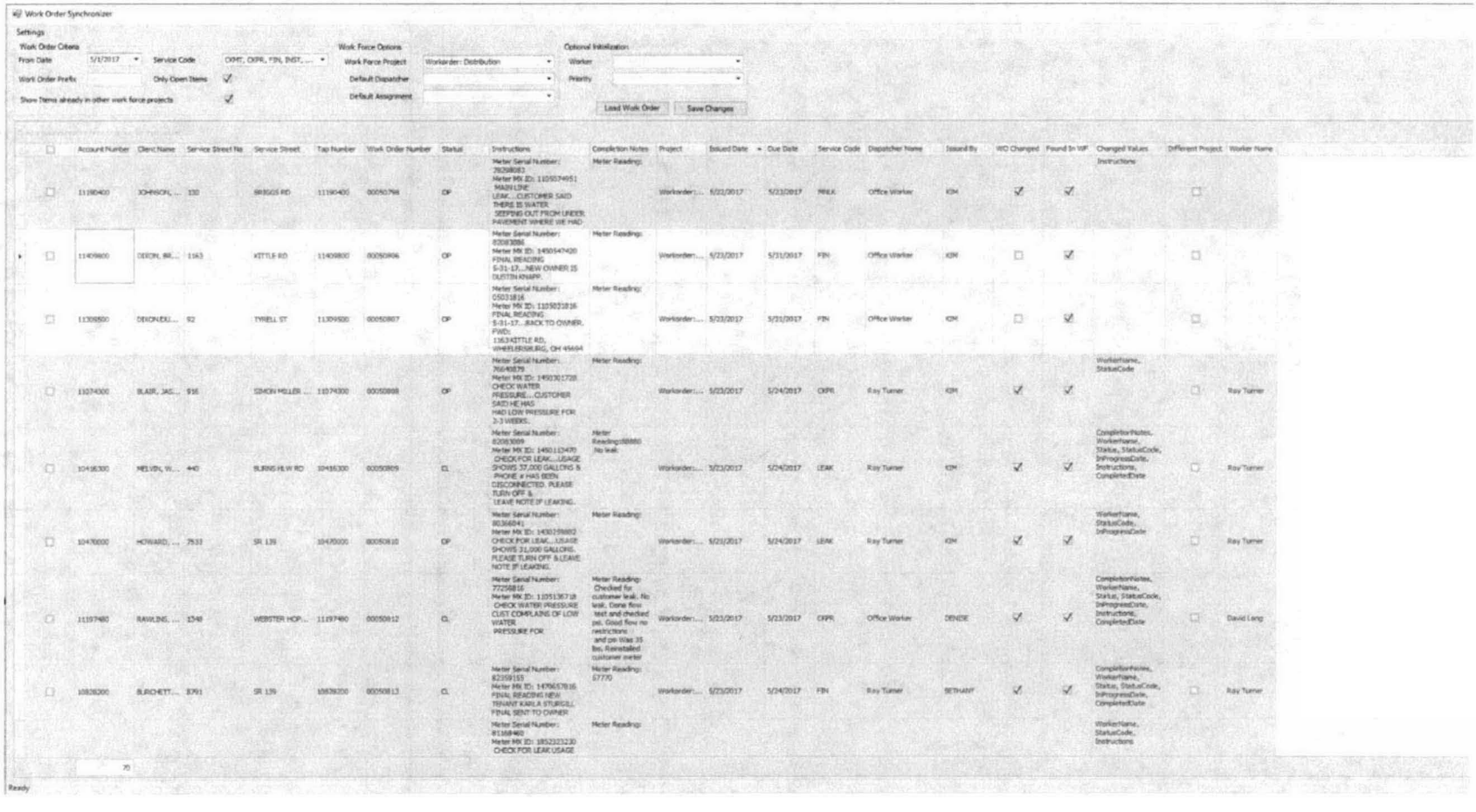
New Work Order System



Create work order in SSI



Send work order to ArcGIS Online



Work order in Workforce

My Projects › Workorder: Distribution

‹ Assignments Details

FIN-FINAL READING

534 EAST ST/10745000/M-1981

Edit ...

Due May 25, 2017 4:30 PM | Created May 24, 2017

COMPLETED RT Roy Turner

ID: 00050833

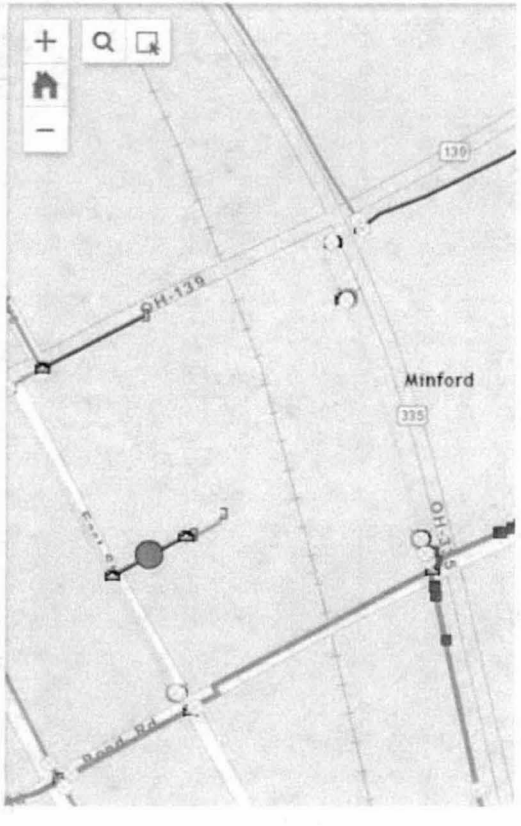
Meter Serial Number: 81168515
Meter MX ID: 1485061972
FINAL READING
FWD: 742 PIKETON RD, LUCASVILLE, OH 45648
NEW OWNER: MARTIN KUNTZMAN

Notes

Meter Reading:0020

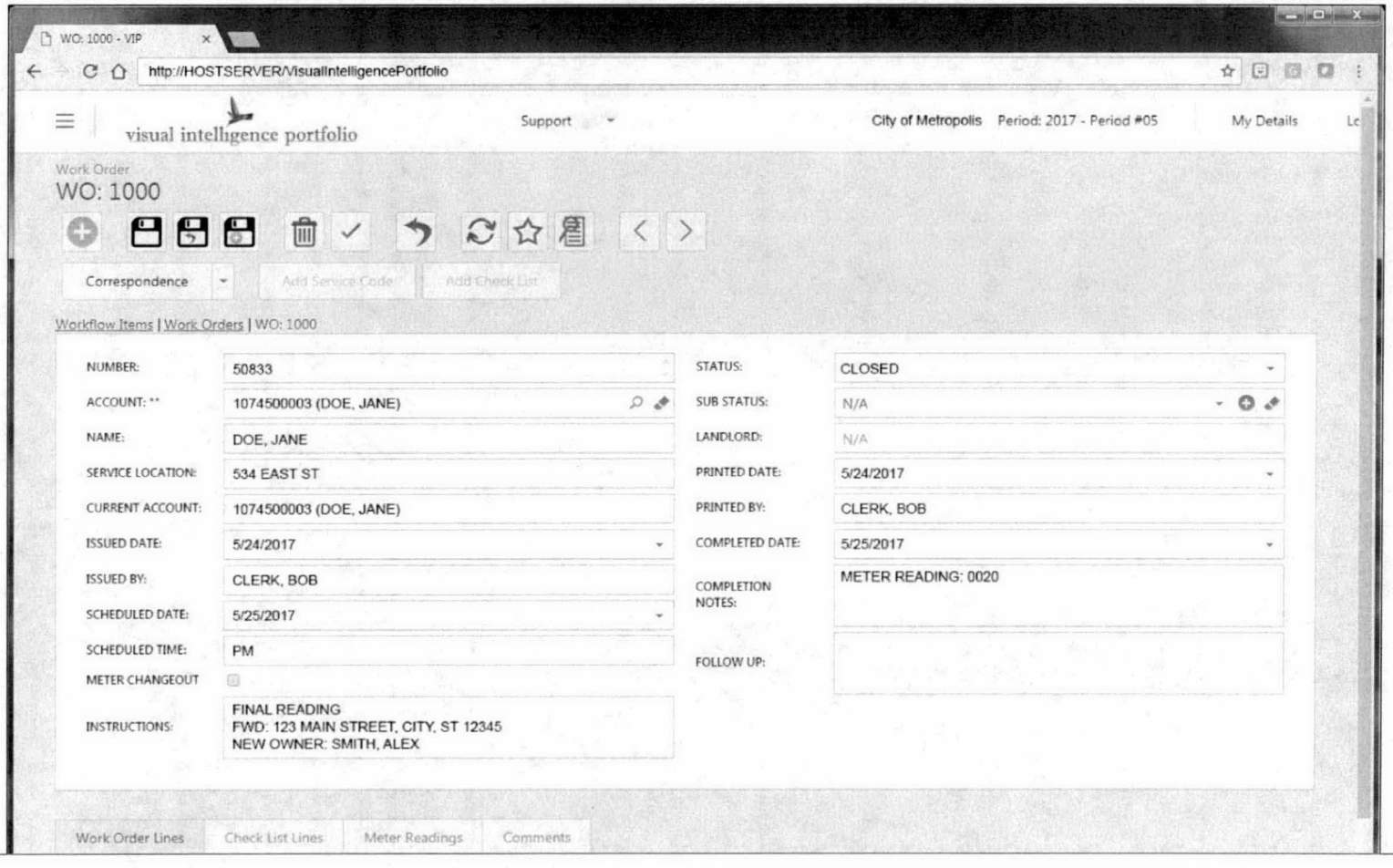
Attachments

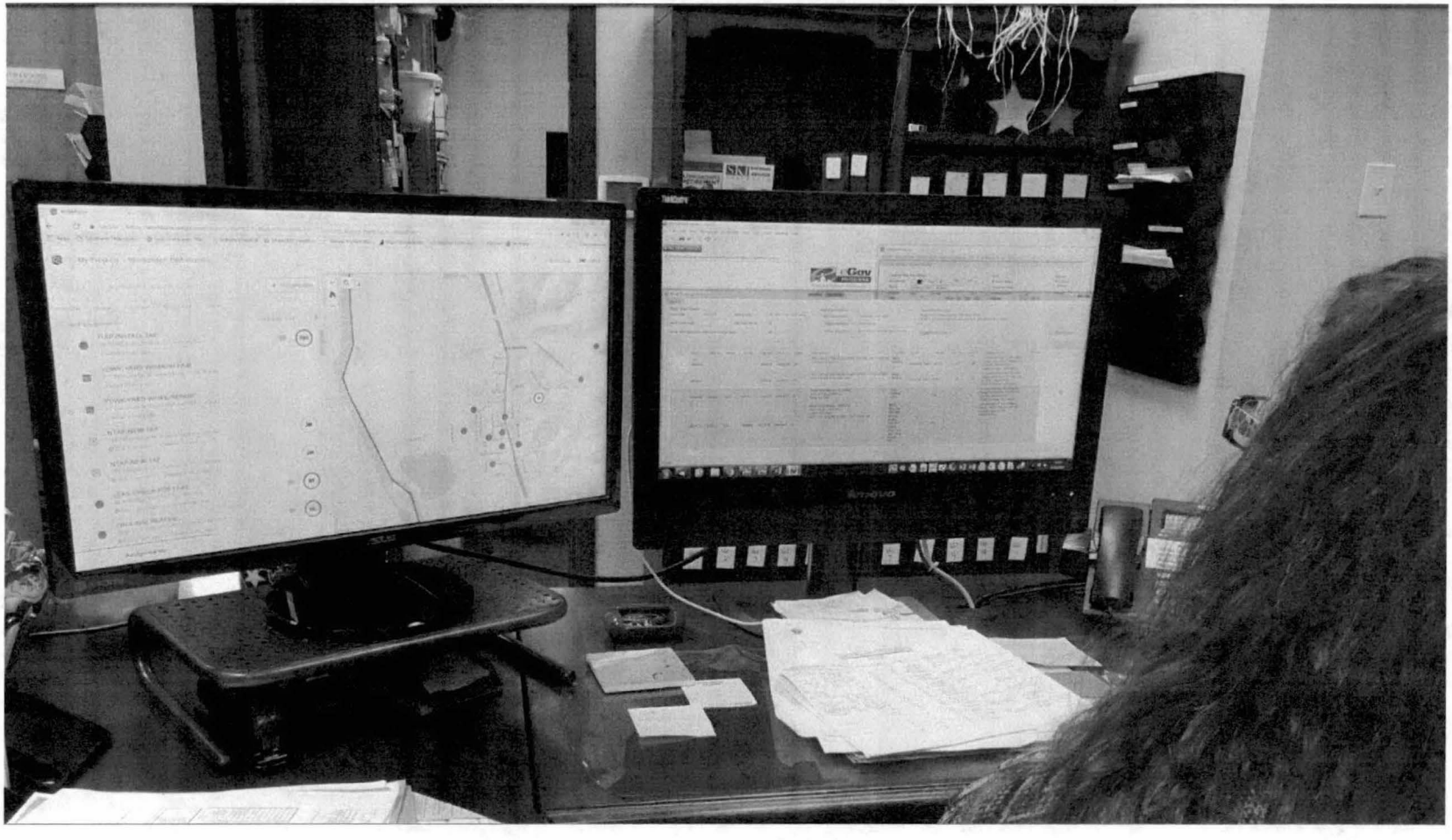
Add an attachment using drag and drop or by selecting a file.




WATER

Work order back in SSI





Advantages of new work order system

1. Good communication of information

2. Status of work orders is known at all times

3. No papers to get lost and work orders are transmitted electronically

4. Field notes are entered in electronically

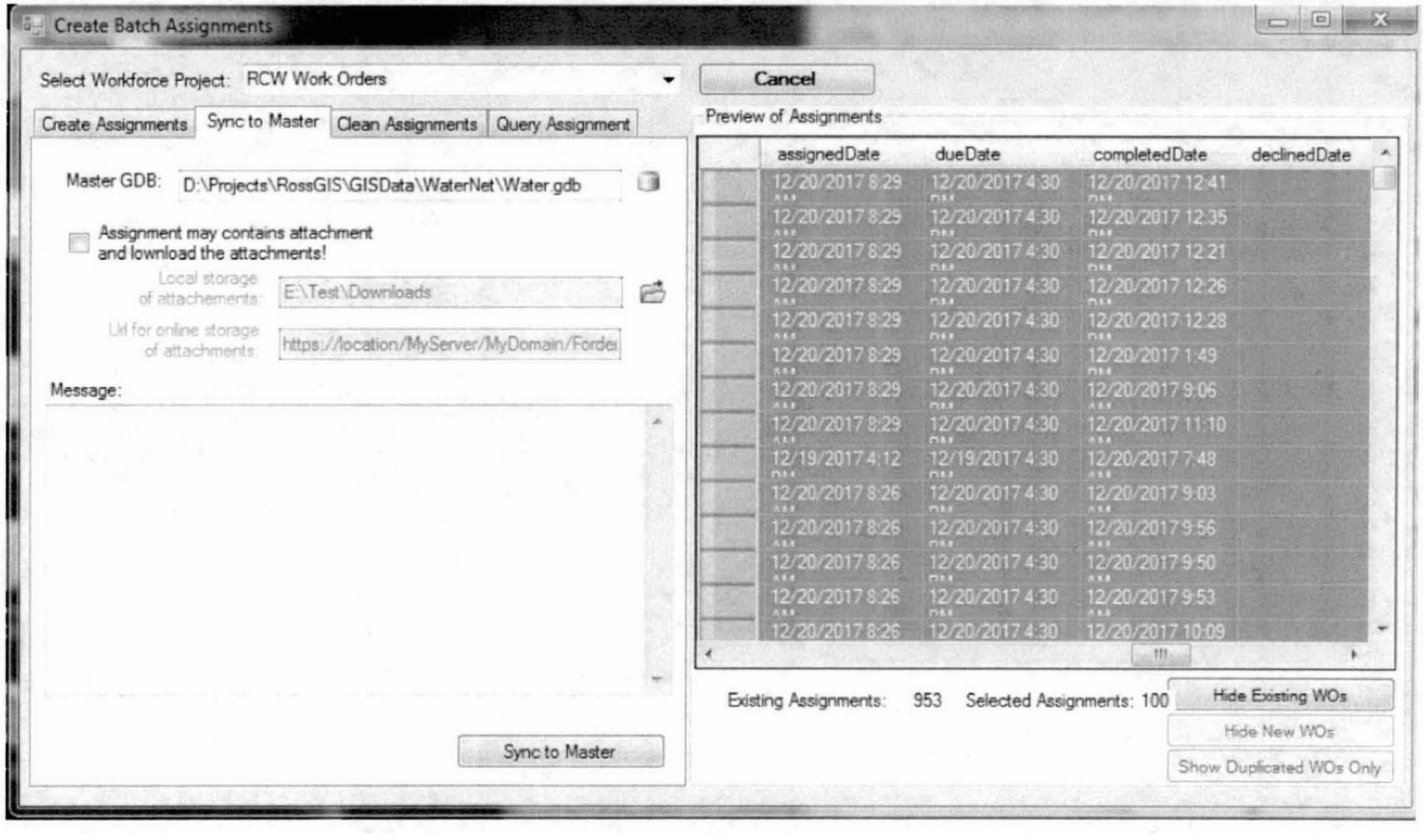
5. Field notes are automatically entered into billing system

6. Mapping data available in the field

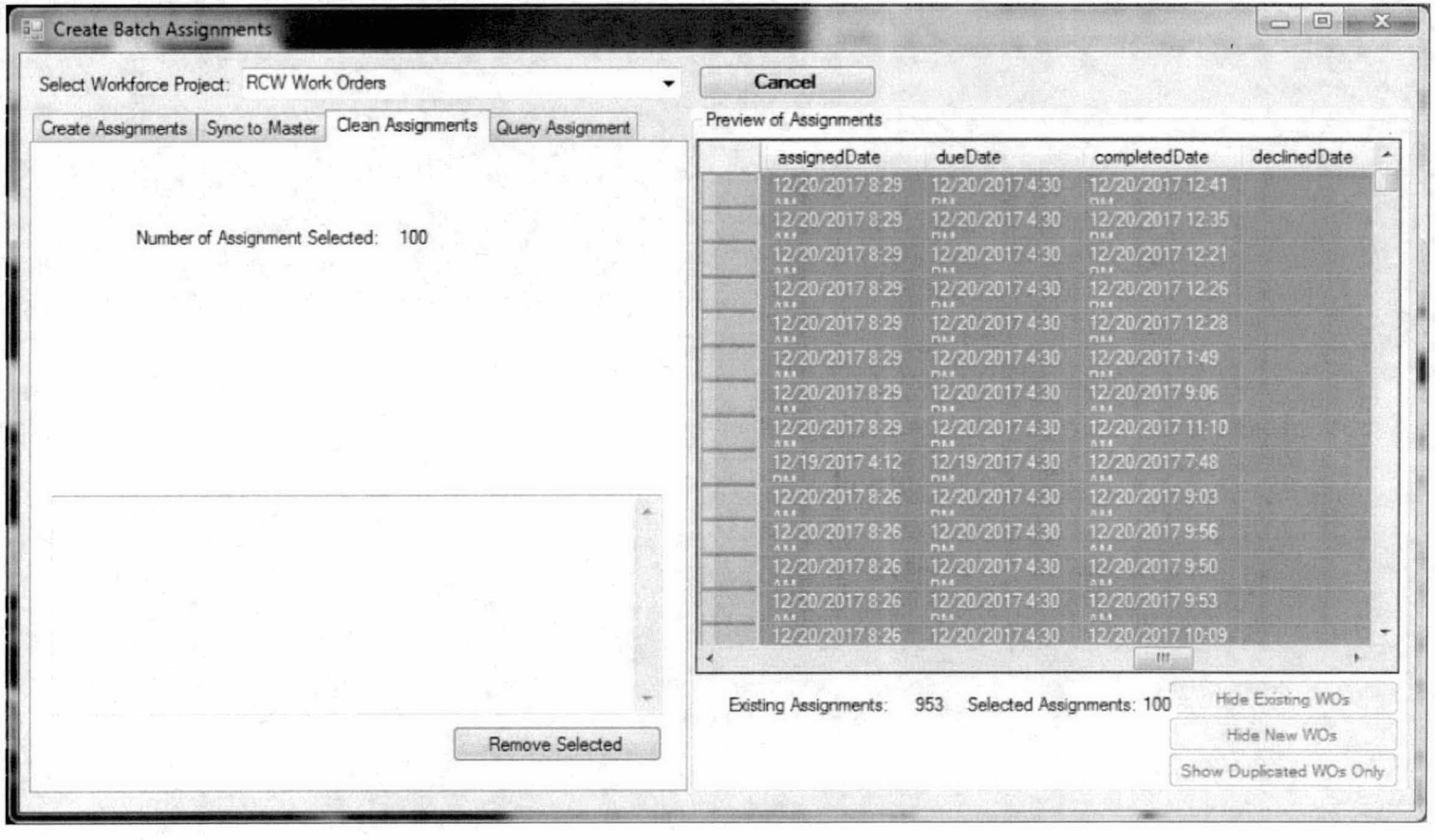
7. Ability to link to Collector and Survey123 to collect additional operational data

Additional Software Design

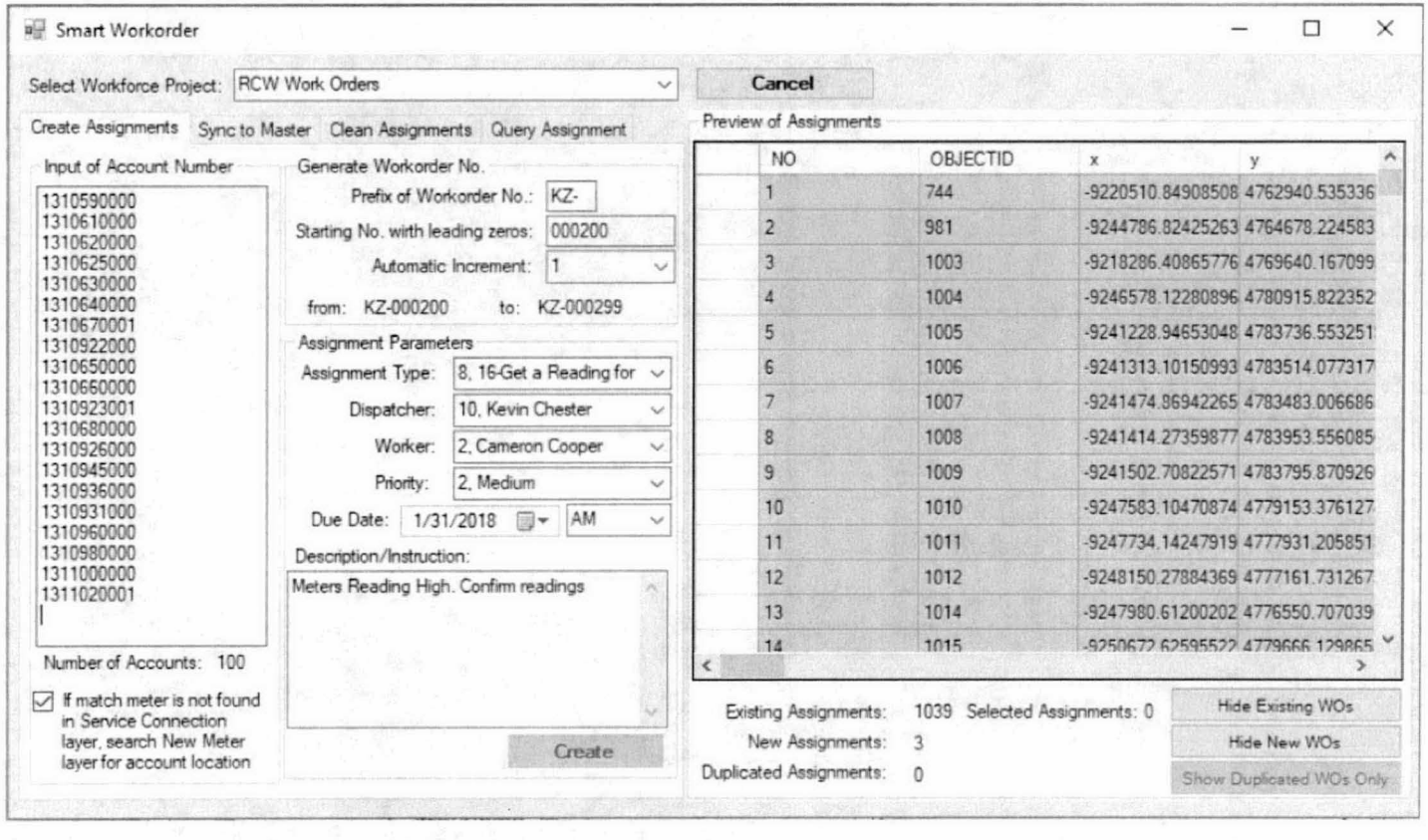
1. Download assignments and attachments to local geodatabase to create a back up (Workforce was designed for use on relatively short term projects)



2. Delete downloaded assignments from Workforce project



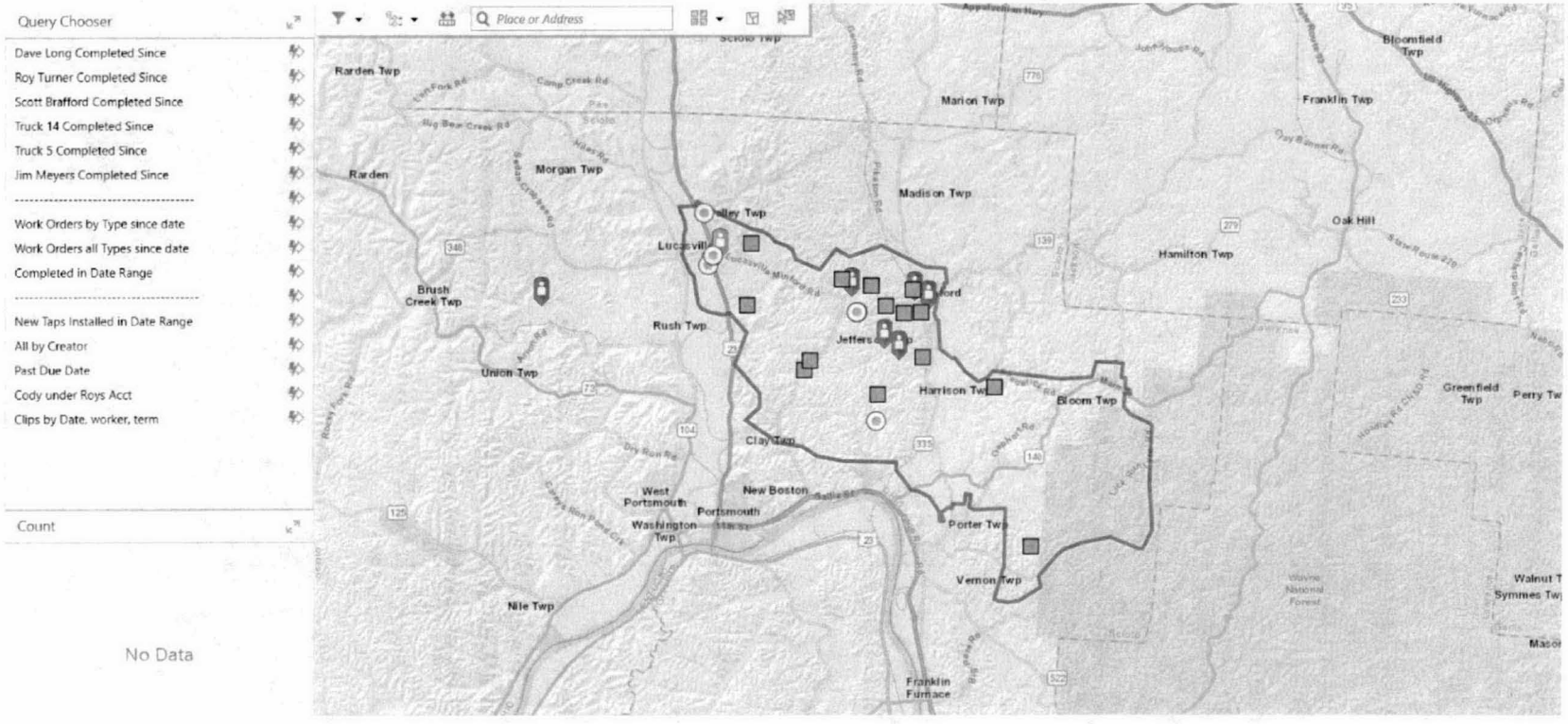
3. Batch creation of work orders



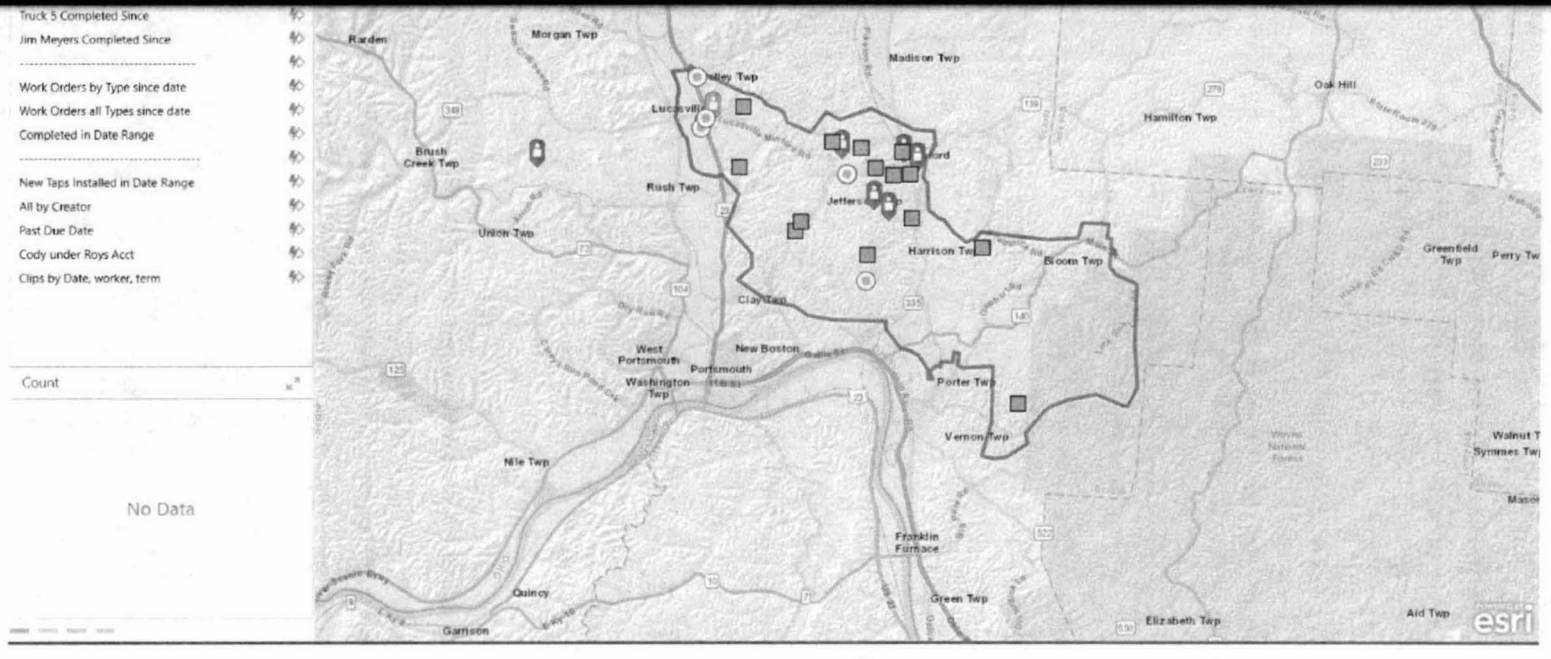
This can create assignments from meter software and/or billing software

Dashboards

Used by front office personnel, supervisors and management

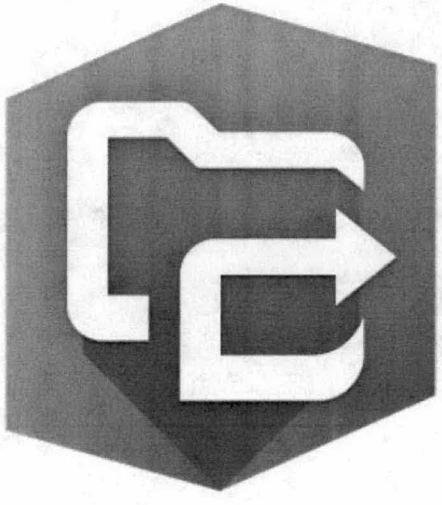


Integrating Billing Software with ESRI Workforce

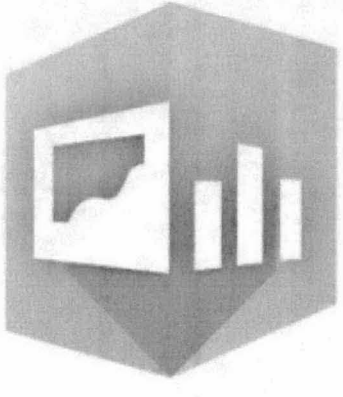


Track overdue work orders, types of work orders completed, number of new taps installed, number and type completed by different personnel, and main line leaks.

Live Demonstration of Workforce



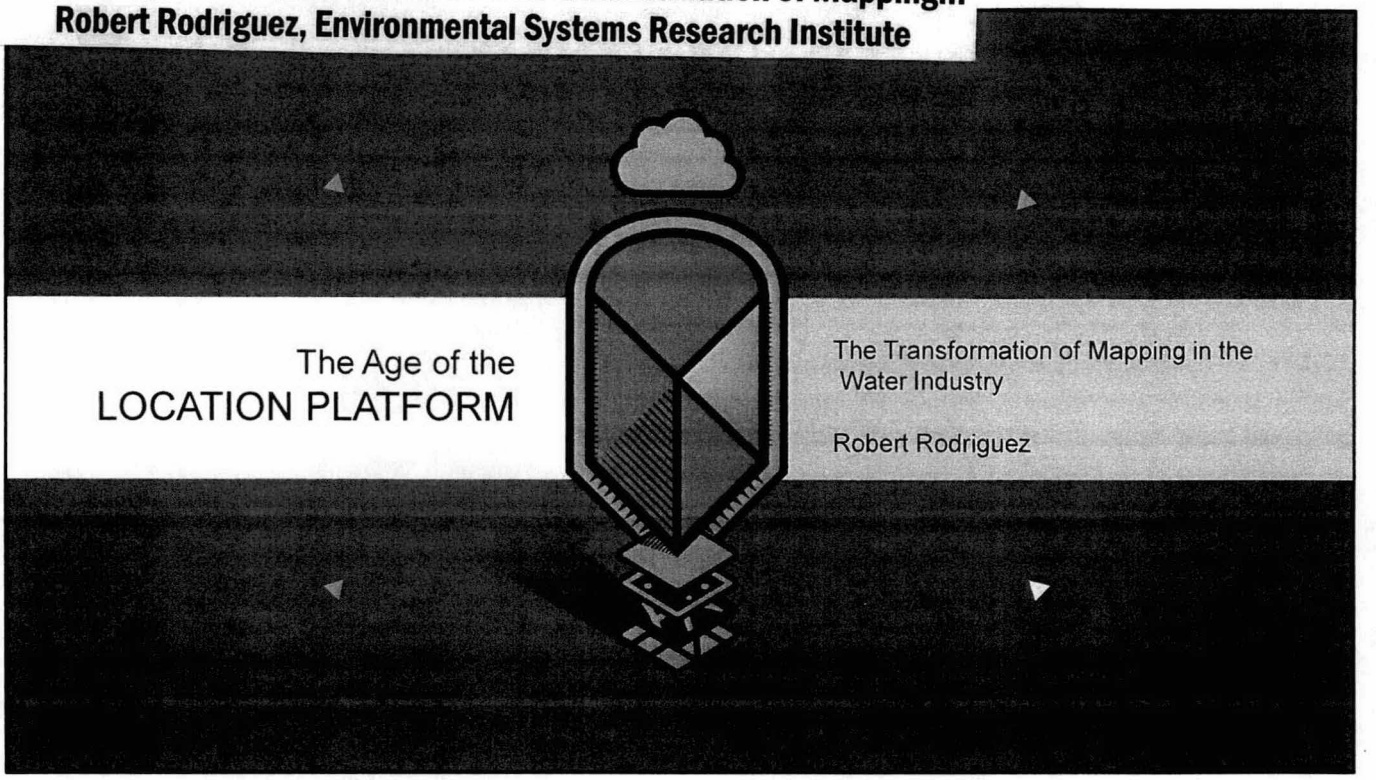
Live Demonstration of Dashboards



Monday, August 27, 2018
Combined Water & Wastewater, Session #3, 10:50 a.m. - 11:50 a.m.

Moving from Paper to Platform: The transformation of Mapping...

Robert Rodriguez, Environmental Systems Research Institute



We use maps everyday. To get directions when you're in a new town or city or to find a new restaurant. These maps tell you where you need to go. But what do your maps at work tell you? Do they tell you where to locate your assets? Manage resources? Analyze water consumption by customers? Help you prioritize projects? Or be prepared in the event of an incident?

To make and turn maps into actionable information in a water utility, a mapping and location platform is essential to help you get the most value out of your maps and data.

Let's start with a quick background on Esri and its role in the water industry.

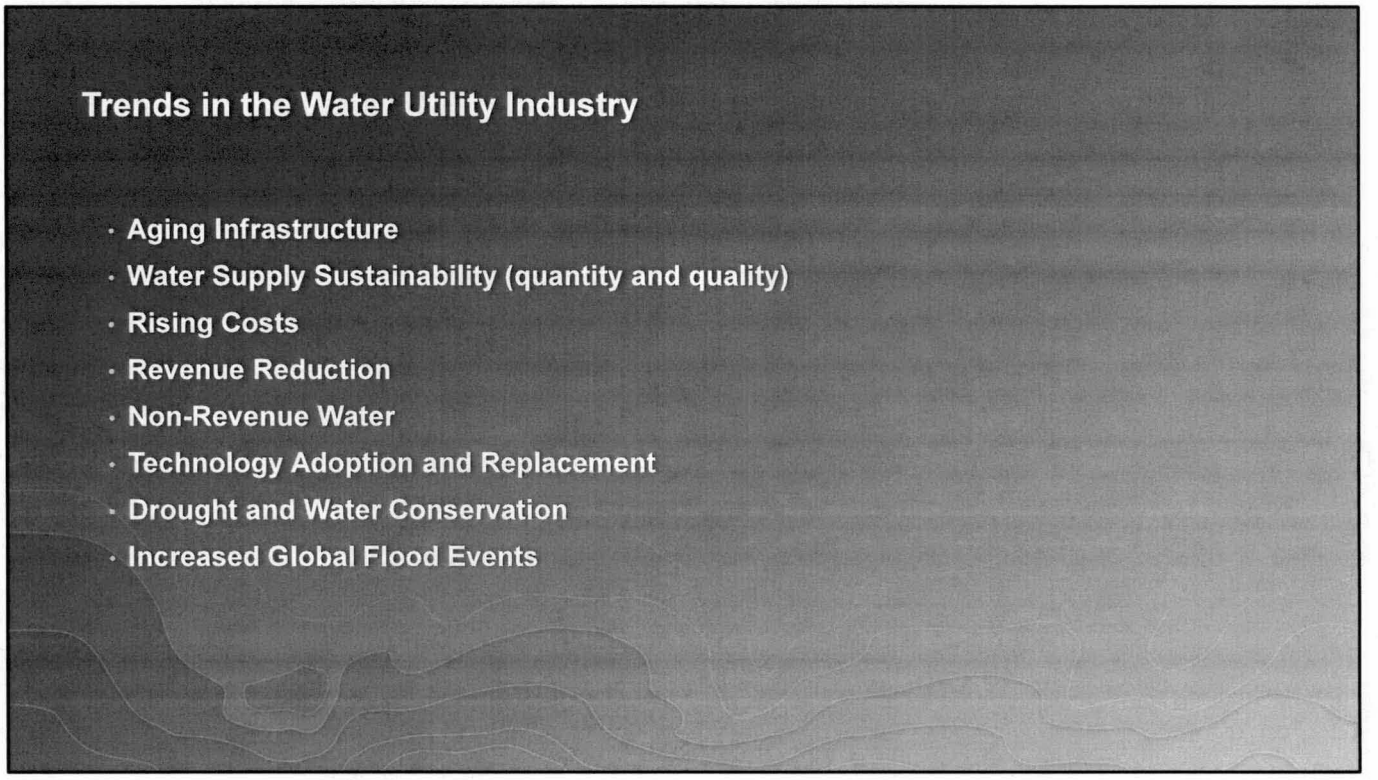
Esri has been providing water utility solutions for almost 40 years. Some of our first customers were water and wastewater utilities that needed a better solution for managing spatial information about their assets.

We have a dedicated team of experts across the country working with small, medium and large water utilities.

Esri has a true suite of integrated solutions for water utilities, you'll see that suite in action shortly

We participate heavily in industry associations and contribute knowledge and best practices.

Esri has numerous business partners that are focused on the water industry. These partners range from being able to help you with a strategy to implement your GIS, to assisting you with data conversion or offering specialized solutions built on top of our technology that increases your return on GIS investment.



Across the industry, water utilities are struggling with some common challenges:

Aging assets – many of your assets may be reaching the end or have already surpassed their life expectancy. You may be faced with critical decisions to maintain assets or start planning for their replacement.

Cost containment – You work within a rate structure and a rigid budget, so as the price of things like fuel, chemicals and raw construction materials increase you have to look across your entire operation for areas where you can contain costs. And if you do need to adjust your rates, it takes a significant amount of time and money to make a rate case…

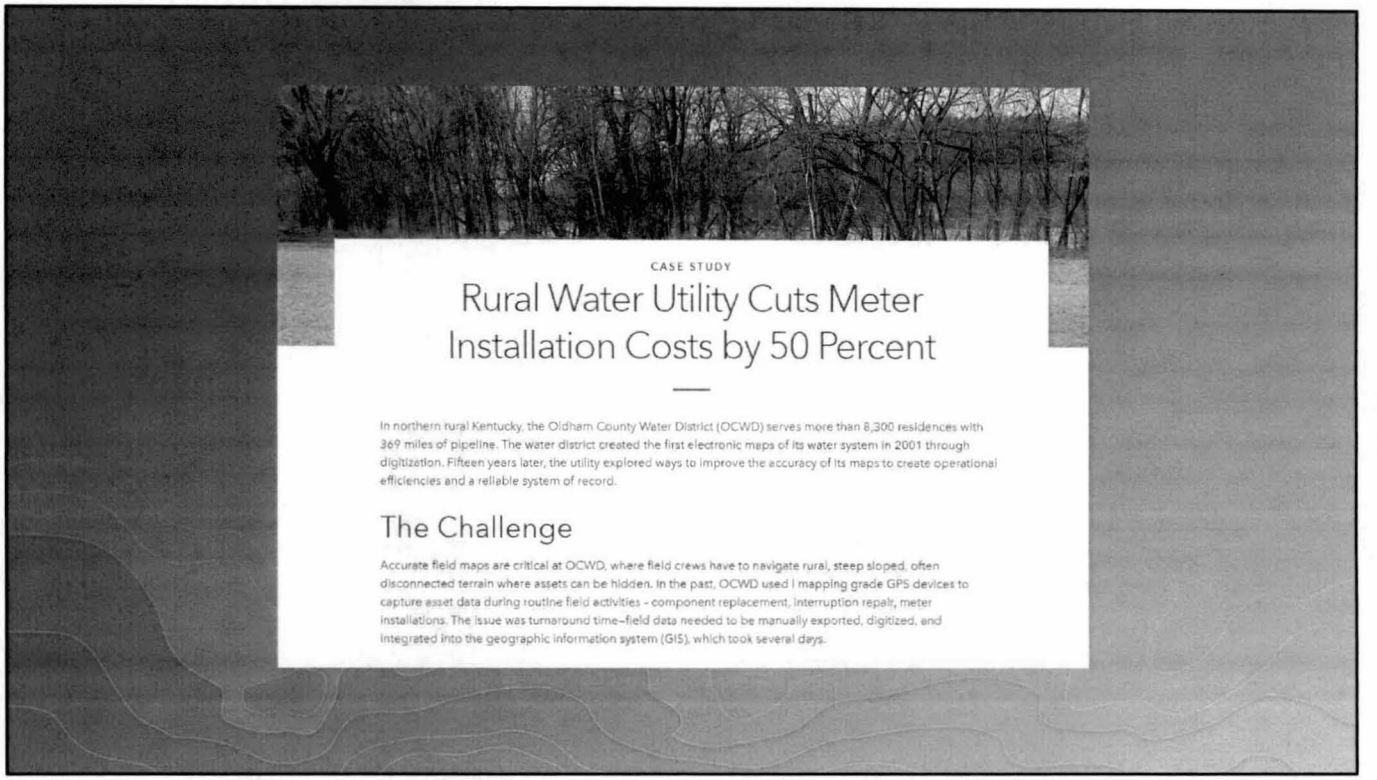
State and federal regulations continue to evolve – the rules you need to operate under continue to grow and does the amount of information you need to pass onto to regulatory bodies
Everyone

Aging Workforce – everyone recognizes the industry trend is toward large number of your senior employees retiring in the next few years. If you don't capture the information in their head now, a great deal of your organizational knowledge will be walking out the door. At the same time its difficult for you to attract new employees, working in the water industry isn't perceived as a high tech or glamorous job by younger generations.

Water Conservation - Whether facing a drought or not, everyone recognizes the importance of water conservation. As a utility, you can take many steps to conserve water, but you all know that increasing water conservation requires you to affect a change in your customer's behavior

Security – everyone recognizes the importance of homeland security in the post-911 world. I can't think of many things that are critically important as safeguarding our water systems. You've done vulnerability assessments and taken many steps to physically harden your water systems and facilities, you've also created things like emergency action plans and planned for how to communicate with your customers if there is contamination in the water system.

Public perception – the public is acutely aware of any problems with their utilities and anxious about the availability and quality of water.

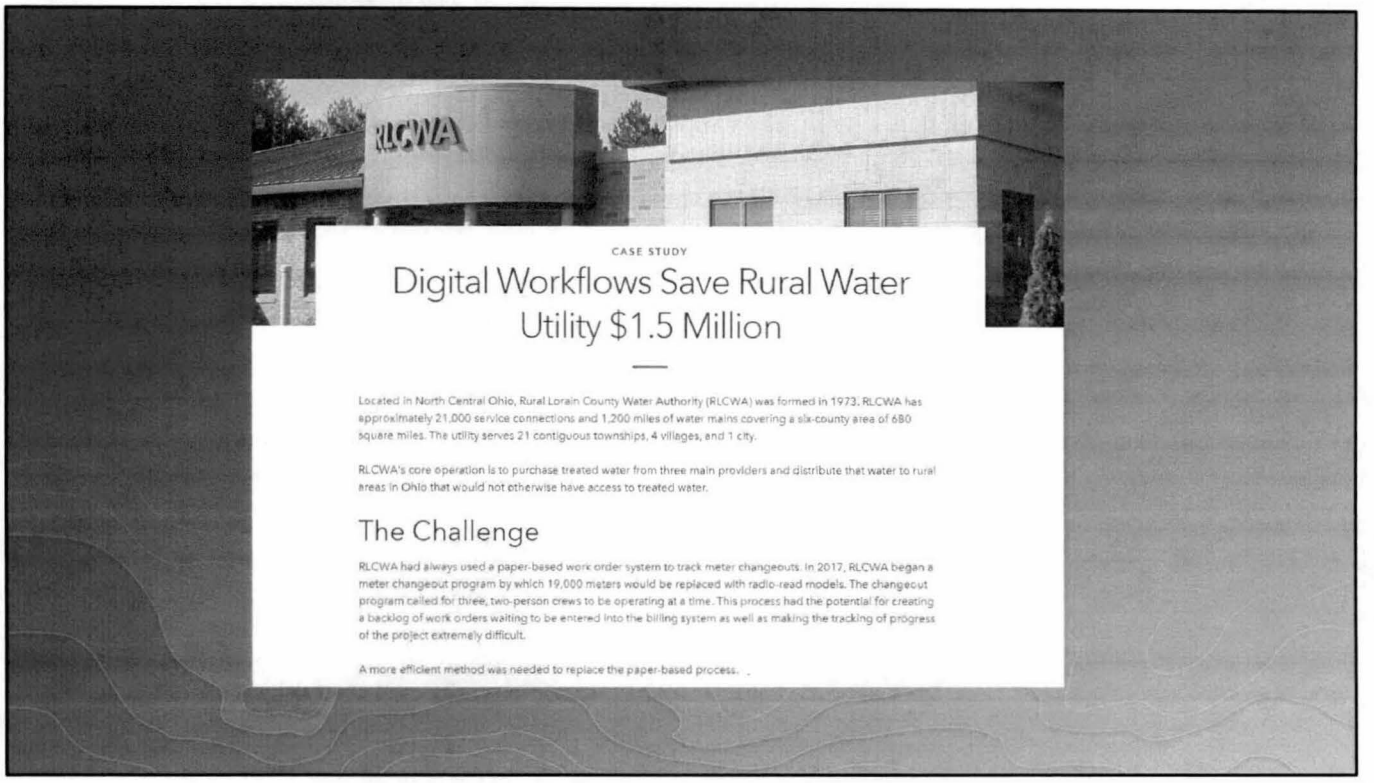


I'd like to share a few examples of how rural utilities are using GIS to overcome some of these challenges:

First, Oldham County Water District was challenged with maintaining accurate field maps. Like most utilities, OCWD relies on its maps to navigate it's service area and also to capture asset data during routine field activities – component replacement, service interruption repairs, meter installations, etc. The issue was turnaround time to add information to its maps. Field data needed to be manually exported, digitized, and integrated into the GIS, which took several days time.

OCWD leveraged its GIS to conduct real-time data collection by using iPads and Android devices paired with high-accuracy GPS devices OCWD was able to cut fuel costs and labor costs in half.

"Installing each meter used to cost us approximately $211.91 in labor and fuel. With the high-accuracy mobile GIS workflow, the cost per meter went down to $111.19." Kenny Ratliff – GIS Manager, OCWD



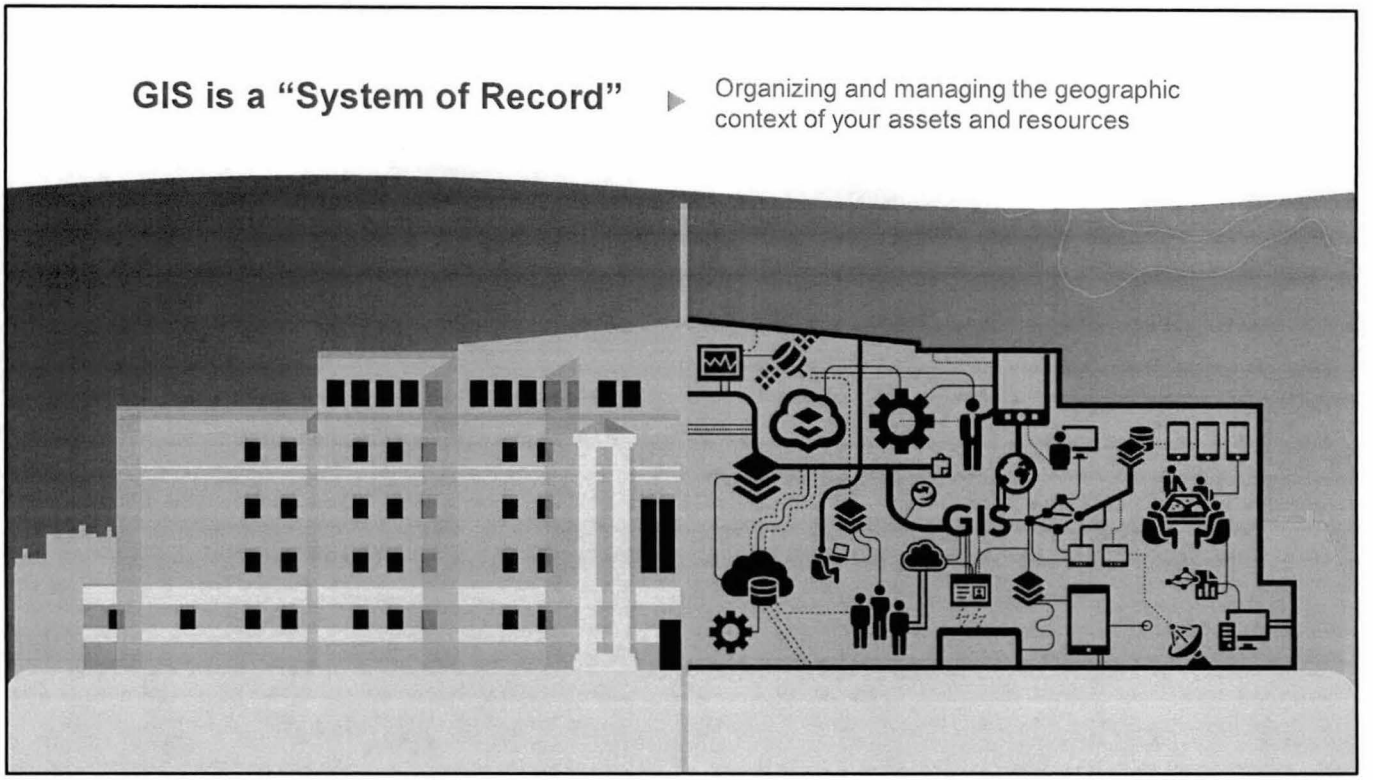
RLCWA saw an opportunity to leverage its GIS during a project of replacing 19,000 meters with radio-read models. The challenge was that each meter changeout required a piece of paper to document the work and this had potential of creating a backlog of work orders waiting to be entered in the billing system. The project also would have been difficult to track progress on using paper.

RLCWA leveraged its GIS by enabling field crews to use tablets to record customer data and enter new meter information. By pairing the tablets with GPS devices field crews could also accurately store the location for every new meter.

Data was displayed on a web map that provided a visual status report, allowing staff to easily track the progress of the meter changeouts.

Web dashboards also provided real-time status of the meters changed to date and the percentage of total meters completed, and it displayed comments on any issues during the meter changeout. It also identified work areas, enabling notifications to be sent out to customers.

This Web GIS implementation has saved RLCWA $1.5 million in contractor fees by doing this work in-house.



Let's take a step back and describe what GIS is at its core. GIS simply, is a system of record.

A system of record is a term for an information storage system that is the go to source for pieces of information. In other words, the GIS is the place to easily find information about a water utilities assets and resources.

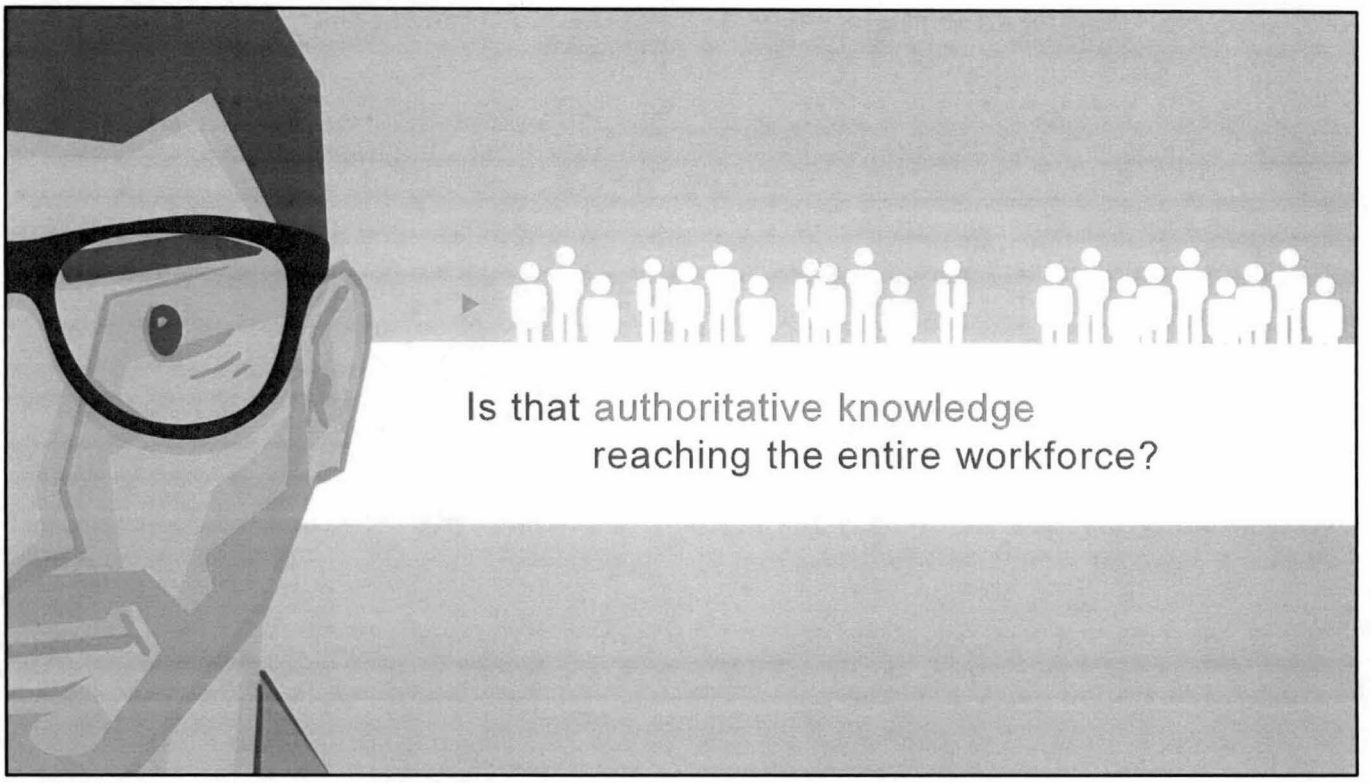
Both OCWD and RLCWA use GIS as a system of record and it has helped with their success.

Despite facing some difficult challenges, water utilities have to carry out your primary mission every single day. **To provide a reliable source of potable water to your customers or to collect, convey and treat wastewater.**

To carry out your mission every day requires a diverse operation that includes daily maintenance, customer service, planning, meter reading, engineering, and plant operations.

As a water or wastewater utility professional, geography and GIS play a critically important role for us and allowing us to connect together the utility through a system of record.

The information stored in the GIS is very valuable, however it's powers are hopeless if no one can effectively use the information.

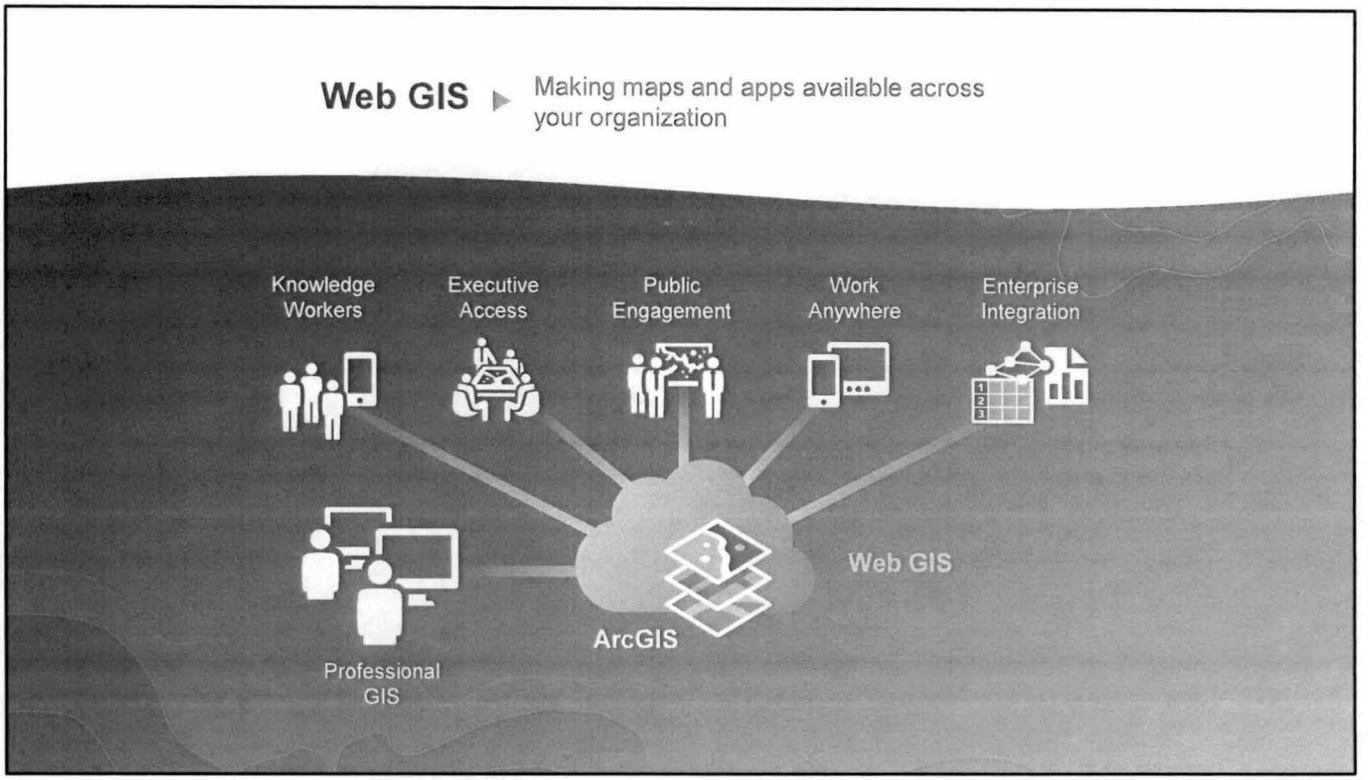


Having access to authoritative information is helpful for many reasons in a water utility -

It helps:

- Engineers needing access to age, material, work order history, performance information about assets to include in capital planning efforts
- Field crews have information about a main break scenario before arriving on site
- Managers understanding system performance through tracking Key Performance Indicators
- Customer Service understanding where a customer is calling from and potential issues in the area
- Customers having information that is relevant to them in their neighborhood

There are many other reasons and use cases, however the takeaway is that access to institutional knowledge will become critical as technology advances and a younger generation enters the workplace.



Web GIS makes it easier than ever before to share maps and apps to anyone, anytime, on any device. Web GIS is a new pattern for delivering GIS capabilities through maps on the web.

Now, I don't think it's feasible to make everyone a GIS specialist, but I do think it's possible to bring the benefits of GIS to everyone through Web GIS.

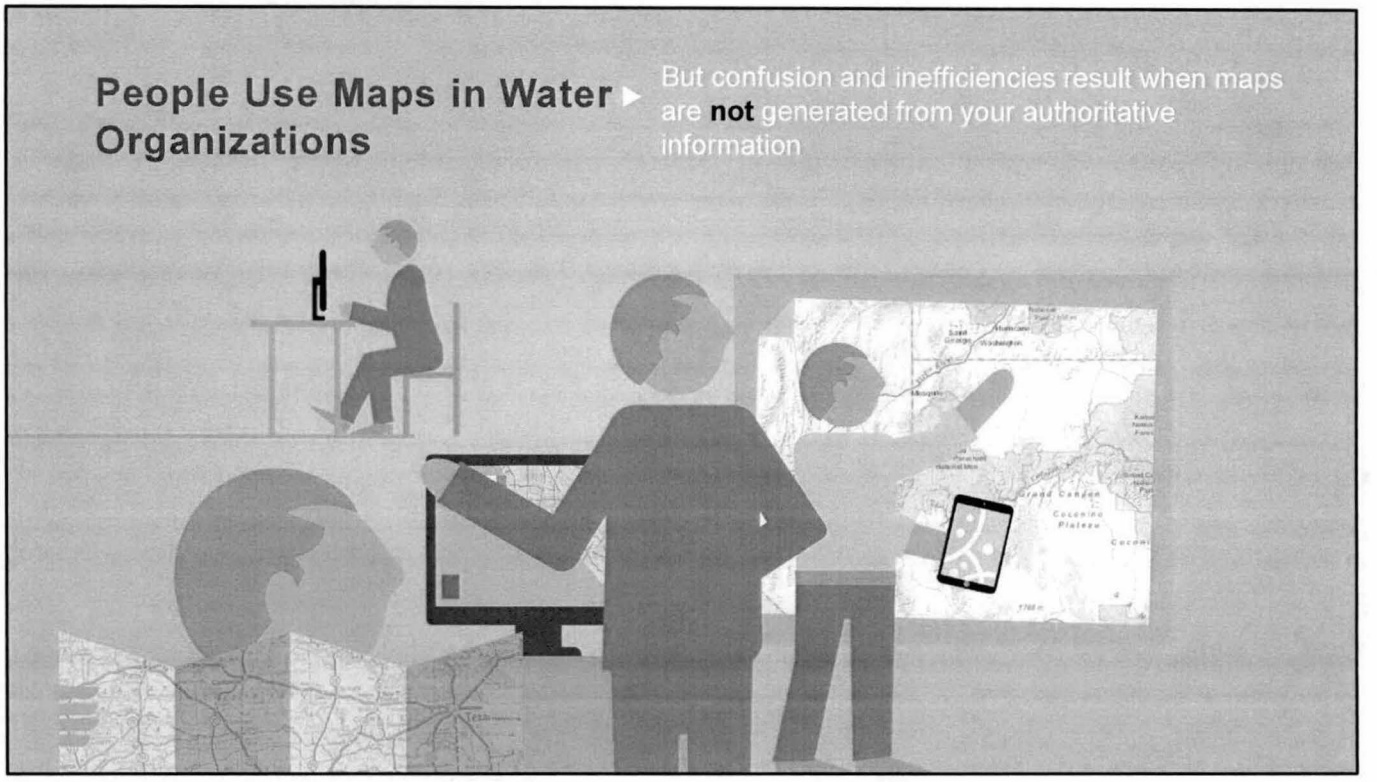
Field crews can reduce reliance on paper maps. Engineers/consultants can share and deliver actionable information to the organization. Customer Service representatives can be more aware of issues before customers call in.

Managers and supervisors can have operational awareness of activities, thus facilitating timely and accurate decision making.

By sharing and opening up the information in the system of record, everyone in an organization can benefit by improving workflows.

Web GIS allows you to work anywhere, online or offline, and also integrate with other common utility systems like billing, work order, and vehicle tracking.

The web has transformed the delivery of information and is unlocking the potential of GIS in the water industry.



Spatial information is crucial for water utilities because everything you own, operate or serve has a location.

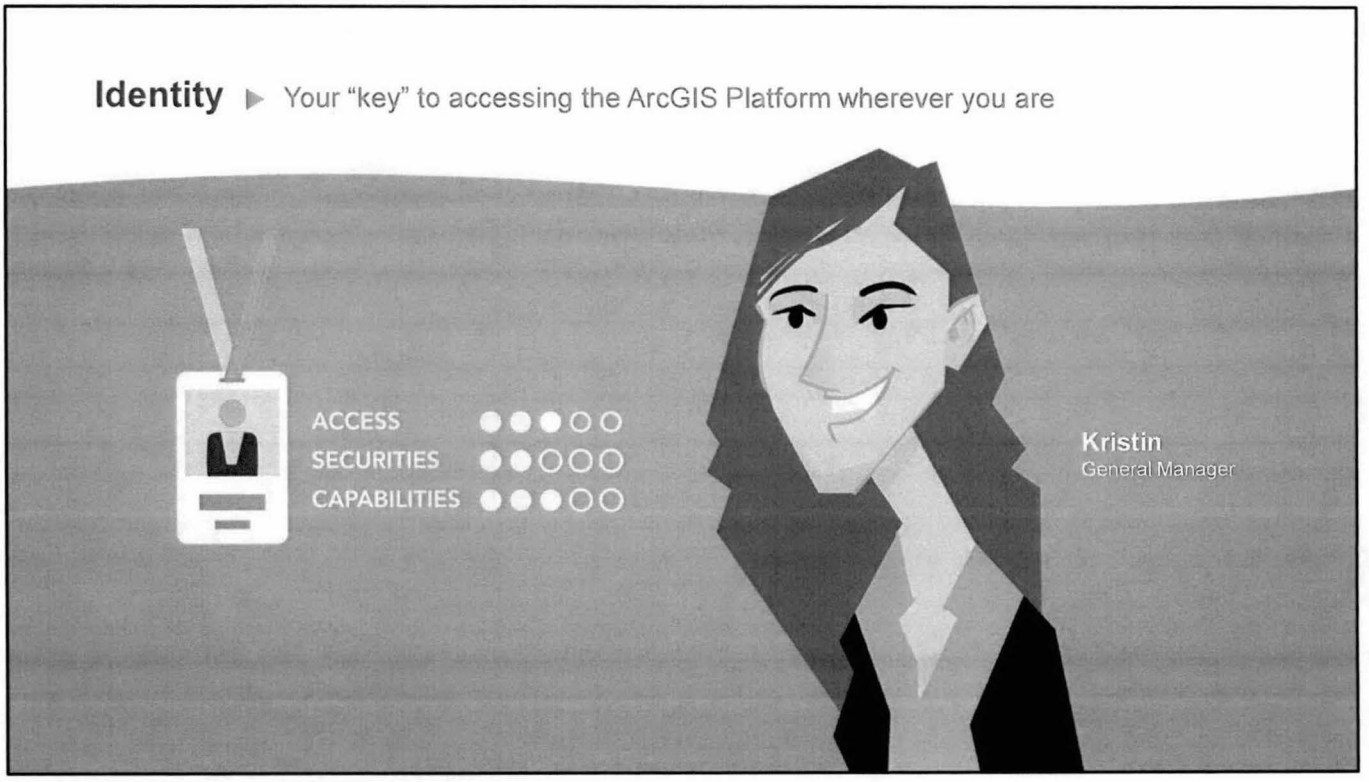
Water utilities have a strong map based culture, as an industry you've been using maps for years.

So what is the commonality among your work orders, fire hydrants and water mains? It's location.

Location is the common element among all of the data that a water utility has.

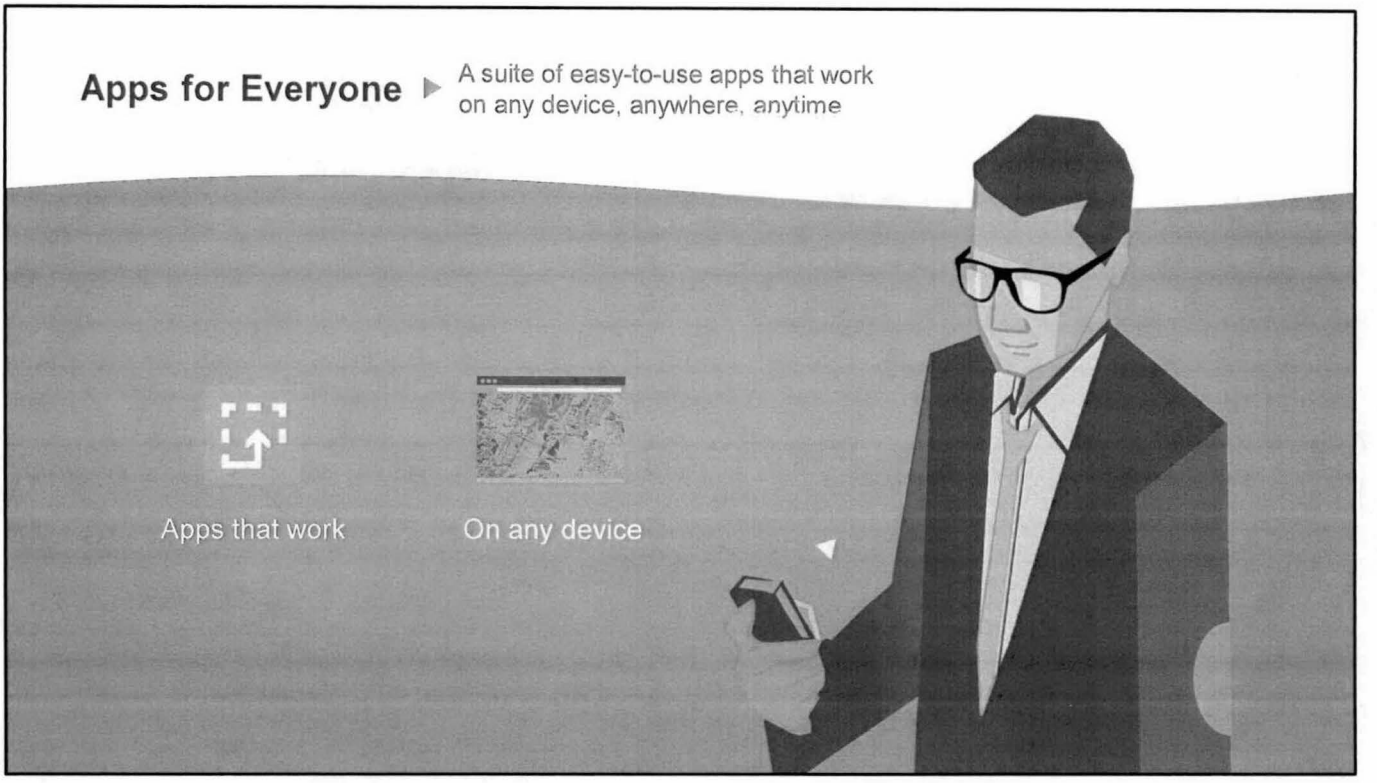
So through knowing the location of a water main, fire hydrants, customers and hydrant flushing workorders I now know why certain customers may make water quality complaints on an exact day. More importantly I know that I don't need to take any additional action because those complaints are caused by the hydrant flushing.

Simply put, spatial information provides a better context for understanding at water utilities and using maps generated from your system of record reduces confusion.



Just like Facebook, Twitter, Email, or any of your favorite apps, your identity is key to accessing the capabilities and services of the applications.

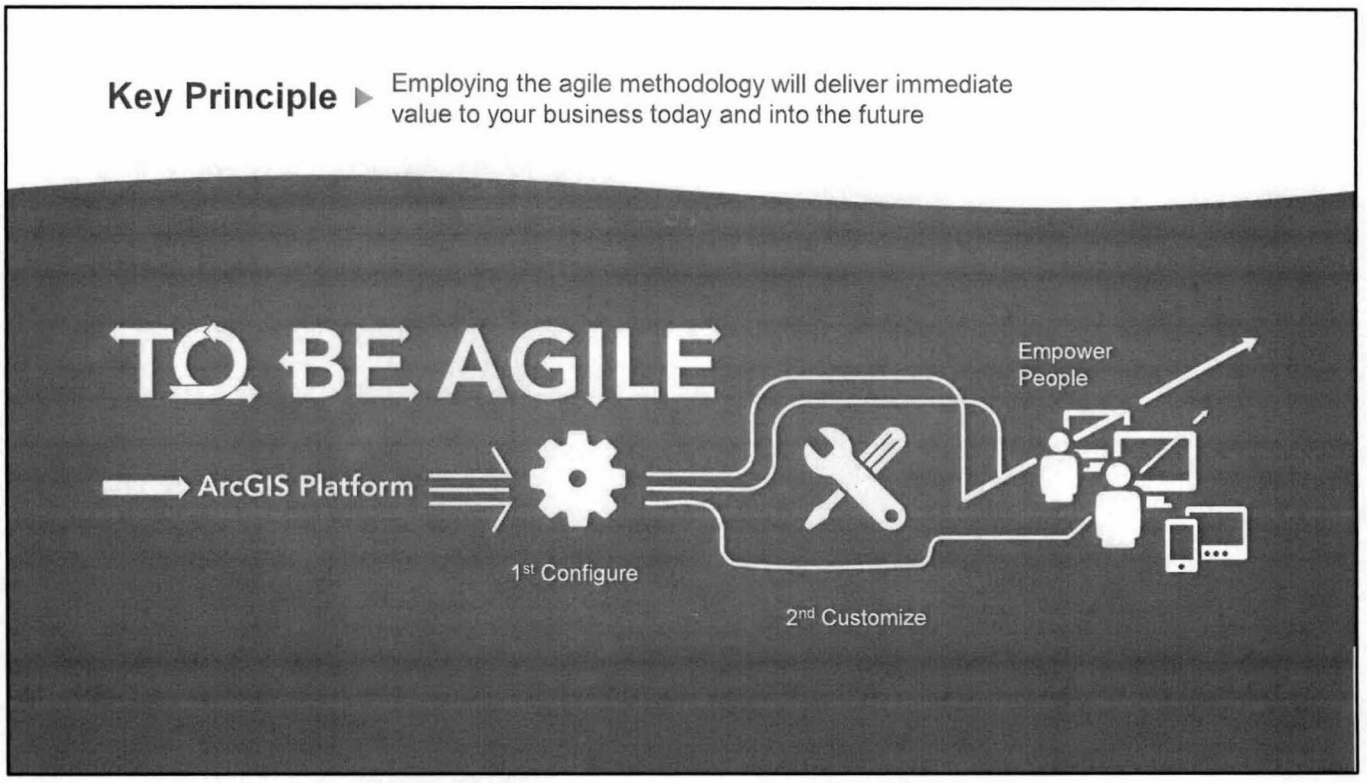
Your identity within the ArcGIS Platform is important because it makes it easy to control access and provides relevant information to your role within the organization.



The identity within the ArcGIS Platform includes a suite of applications that work on any smart device.

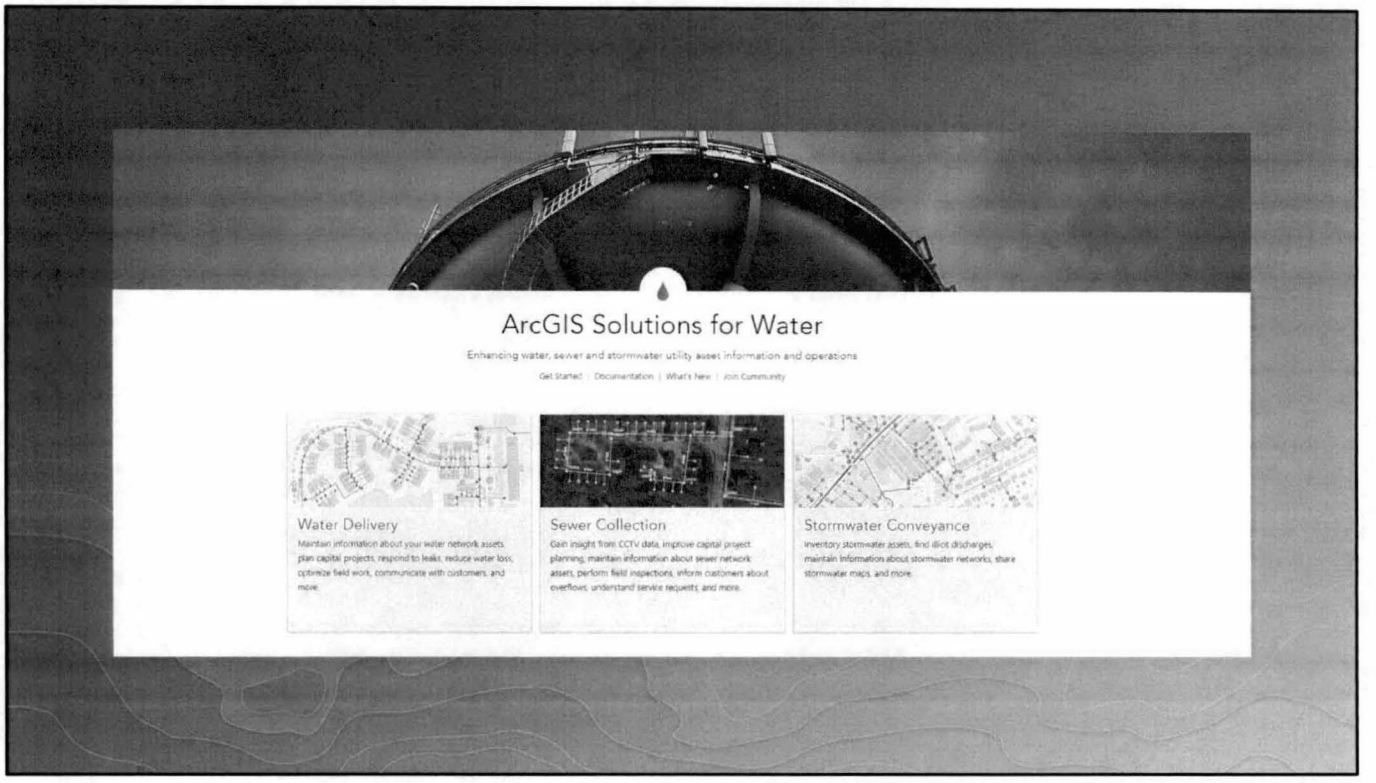
Applications are designed to help you find information and accomplish tasks without specialized formal training – just as you would with most other apps found on the apple store or the google play store.

Field crews can ditch paper maps and redundant data entry processes in favor of simple task-focused apps on smartphones and tablets.



A key idea is to employ a agile methodology to deliver immediate value to your water utility.

There are many ready to use apps including a suite of base maps that provide reference for your work and high-resolution imagery that allow you to visualize what is on the ground surrounding your infrastructure.



Over the years, Esri has collected requirements for common water utility workflows and has invested in developing solutions that anyone can leverage in their organization.

Preconfigured water utility solutions allow you to quickly put Web GIS into action.

Many of these solutions were developed by partnering with industry professionals that needed a GIS solution. These solutions are included with ArcGIS and reduce the cost, time, and complexity to solve common water utility probelems.

DEMO – Snap shot of these solutions in action and how you can get started with a few field applications.

Summary

- Web GIS helps solve common water utility challenges:
  - Sustainable management of infrastructure
  - Water loss and cost recovery
  - Emergency planning and response
  - Communication and transparency with customers
  - Capital planning and financing
- Ready to use data and maps
- Preconfigured Water Utility Solutions
- Flexible deployment
- Expert help


esri
THE
SCIENCE
OF
WHERE

Monday, August 27, 2018
Combined Water & Wastewater, Session #4, 1:00 p.m. - 2:00 p.m.

When the Meteor Strikes, Will Your Project Go Extinct?
Kentucky Rural Water Association 2018 Annual Conference
Robert L. Pickerill, PE, Bell Engineering

I. Introduction
   a. Many challenges/things that can go wrong from start to finish of a project
   b. Examine case studies for different scenarios and how to overcome them
II. Importance of the team
   a. Who is your team?
      i. Owner
      ii. Engineer
      iii. Funding agencies
      iv. Funding administrators
      v. Contractor
III. Scenario 1: Bids received are significantly over budget/exceed available funds
   a. Discuss options with Owner and Funding Agencies
      i. Identify rate impacts
      ii. Scope reduction while maintaining project goals
      iii. Satisfy funding guidelines
   b. Review sources of additional funds
   c. Rebid the project
   d. Negotiations
      i. Value Engineering/Negotiation
         1. With low bidder
         2. With all bidders
   e. Redesign and bid
IV. Scenario 2: Bids received are significantly under budget (Owner may be happy, but is this a good or a bad thing?)
   a. Determine if it was a bad budget or a bad bid
      i. Bad budget
         1. Not as concerning to overall project
      ii. Bad bid
         1. Can the contractor complete the work for the bid amount
         2. Is there concern of contractor cutting corners
         3. Change orders
         4. Contractor resources and financial stability
   b. Should you let a Contractor out of their bid
   c. Utilize best and most responsive bid to determine award
V. Scenario 3: Contractor files bankruptcy during construction
   a. Protection of site, stored materials and records
   b. Bonding company – friend or foe?
      i. Bonds are protection for the owner

ii. Bonding companies protect their own interest
    1. May hire independent engineer
    2. Selection of replacement contractor
    3. Handling "gray areas"

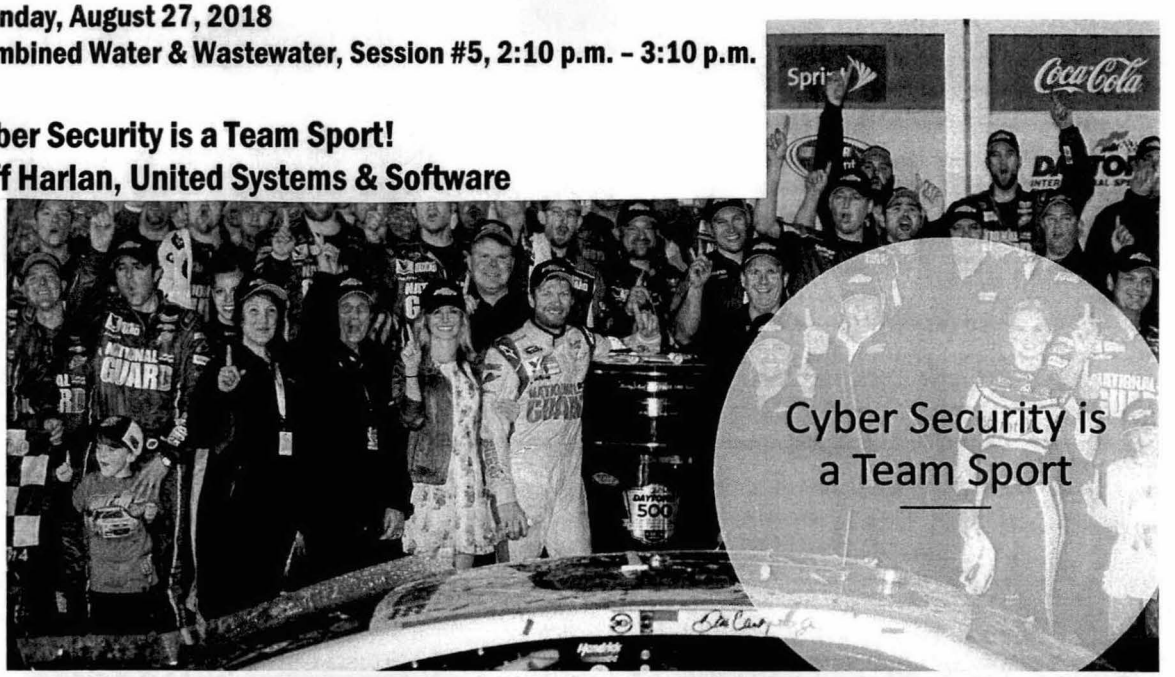
c. Time delays and liquidated damages
d. Engineering contract extension
e. Legal expenses incurred

VI. Closing

a. You may face one or more of these issues during a project
b. Knowledge and strength of team are critical to success
c. Questions?

Monday, August 27, 2018
Combined Water & Wastewater, Session #5, 2:10 p.m. – 3:10 p.m.

Cyber Security is a Team Sport!
Jeff Harlan, United Systems & Software



Leadership

Knowledge

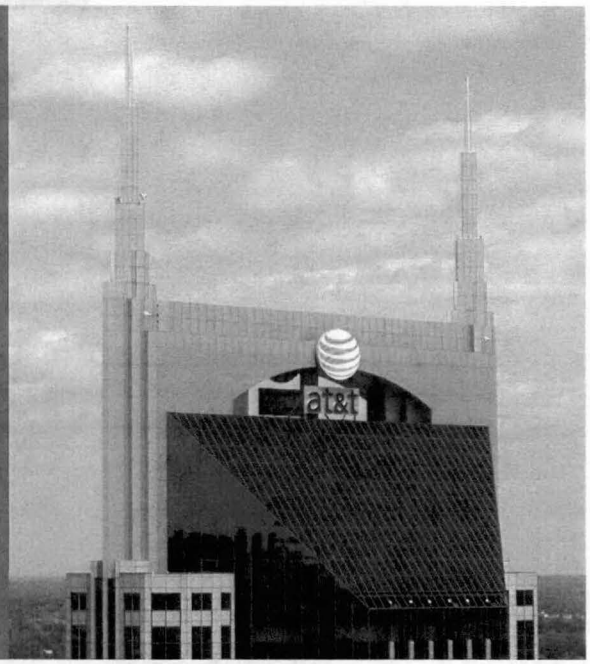
Practice

Leadership

"Everything rises and falls on leadership."

John C. Maxwell

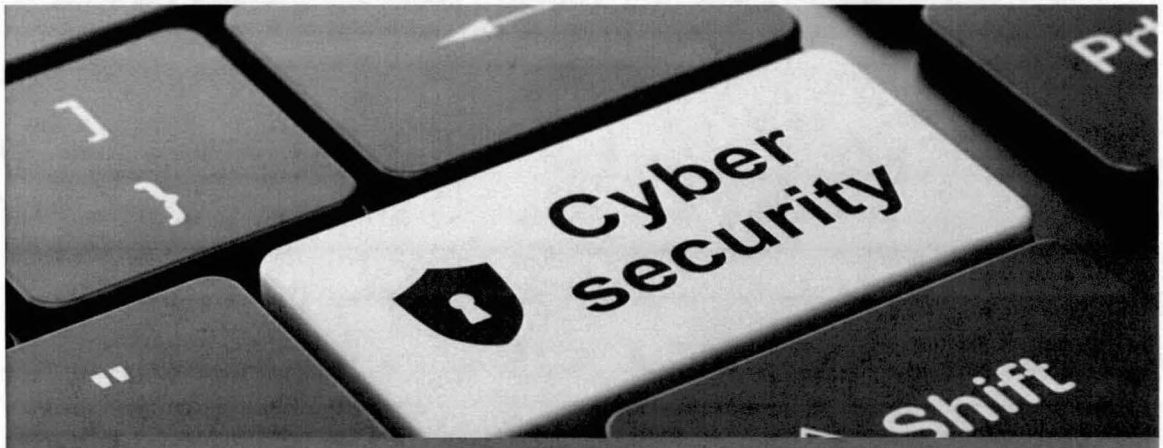
Cybersecurity is everyone's responsibility – and it starts at the TOP



Board of Directors

Superintendent / General Manager

Office Manager



Utilities don't talk about cybersecurity or know much about it

Does not believe it will happen to them

Never ask their IT vendor

BREACHES HAPPEN

Take responsibility

Ask their IT vendor

Because BREACHES HAPPEN

Knowledge

"If you think education is expensive, try estimating the cost of ignorance."

Howard Gardner

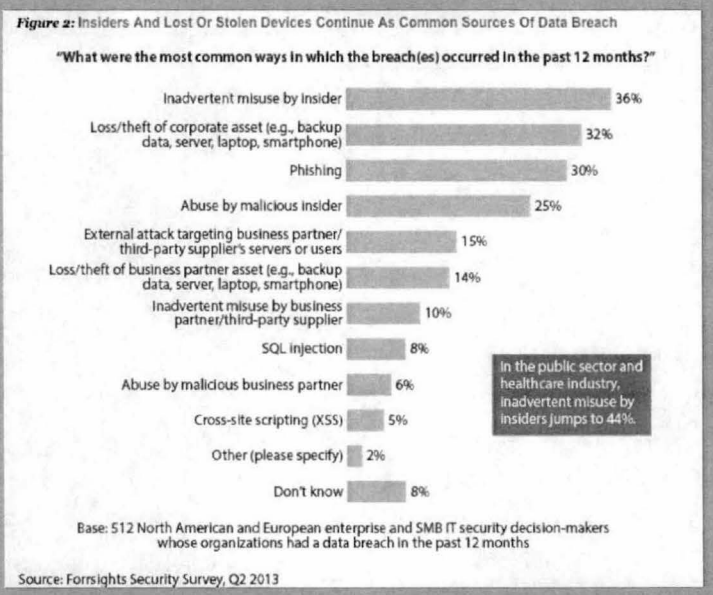
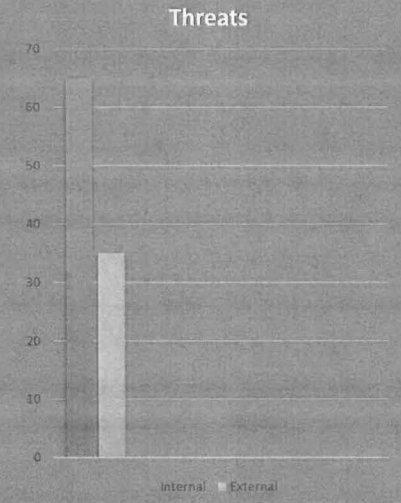
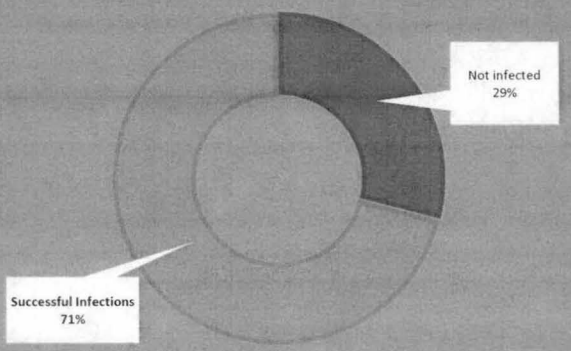


Figure 2: Insiders And Lost Or Stolen Devices Continue As Common Sources Of Data Breach
"What were the most common ways in which the breach(es) occurred in the past 12 months?"
Inadvertent misuse by insider 36%
Loss/theft of corporate asset (e.g., backup data, server, laptop, smartphone) 32%
Phishing 30%
Abuse by malicious insider 25%
External attack targeting business partner/ third-party supplier's servers or users 15%
Loss/theft of business partner asset (e.g., backup data, server, laptop, smartphone) 14%
Inadvertent misuse by business partner/third-party supplier 10%
SQL injection 8%
Abuse by malicious business partner 6%
Cross-site scripting (XSS) 5%
Other (please specify) 2%
Don't know 8%
In the public sector and healthcare industry, inadvertent misuse by insiders jumps to 44%.
Base: 512 North American and European enterprise and SMB IT security decision-makers whose organizations had a data breach in the past 12 months
Source: Forrsights Security Survey, Q2 2013


Threats
70
60
50
40
30
20
10
0
Internal
External


Nearly half of ransomware attacks infect at least 20 employees.
Not infected 29%
Successful Infections 71%

More than half (51 percent) of the data breaches analyzed in the report involved malware, 73 percent of the breaches were financially motivated, and 75 percent of security incidents were tracked back to outside actors. This year's report found that email was the No. 1 malware delivery vector, compared to last year, when it was web drive-by-download attacks.

Every year, Verizon's researchers point out that password insecurity is the biggest problem, and that hasn't changed. Verizon found that 81 percent of hacking-related breaches succeeded through stolen passwords or weak passwords. That's an 18 percent increase from last year's report, suggesting that rather than getting better, password security is getting worse.

Why it does not happen

- Utilities don't talk about cybersecurity or know much about it...we need to be talking about the basics. They are extremely vulnerable because they don't have any resources for cybersecurity.
- When it comes to IT security, research reveals a tepid commitment to investing in a strong security stance,

Practice

"Knowledge is of no value unless you put it into practice."

Anton Chekhov

Champion teams work at it.

Your team is your last line of defense. They need to be trained and remain on their toes with security top of mind.

The Five Generations of Security Awareness Training

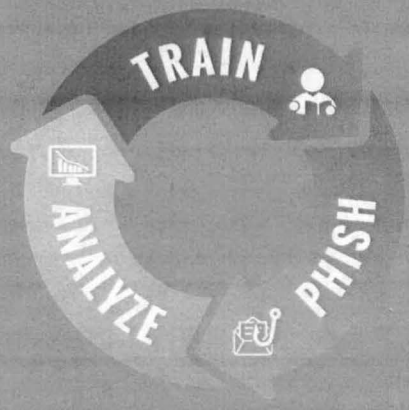
1. **Do Nothing:** Rely on tech solutions only.
2. **The Break Room:** Death-by-PowerPoint, coffee and donuts, usually in-house created.
3. **The Monthly Security Video:** Employees view monthly short security awareness training videos.
4. **The Phishing Test Approach:** Pre-select high risk groups of employees, send them a simulated phishing attack, and train them if they fail.
5. **The Human Firewall Approach:** Train all employees online and send frequent phishing attacks.

We provide baseline testing to assess the Phish-prone™ percentage of your users through a free simulated phishing attack.

The world's largest library of security awareness training content; including interactive modules, videos, games, posters and newsletters. Automated training campaigns with scheduled reminder emails.

Best-in-class, fully automated simulated phishing attacks, hundreds of templates with unlimited usage, and community phishing templates.

Enterprise-strength reporting, showing stats and graphs for both training and phishing, ready for management. Show the great ROI!



Leadership

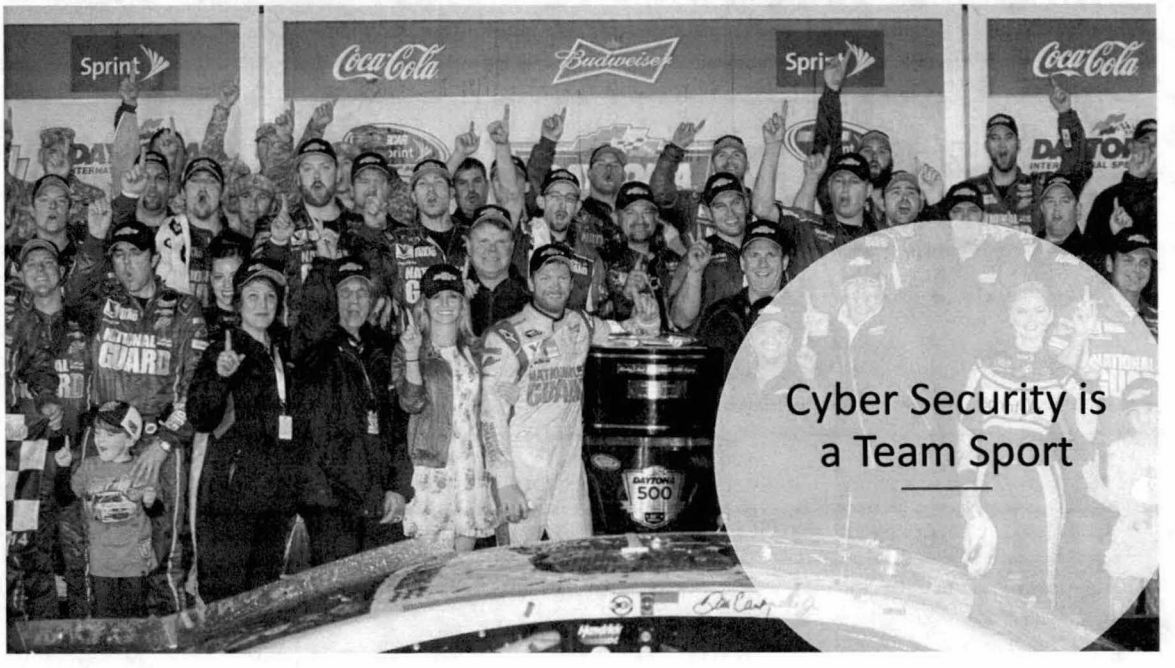
Knowledge

Practice

Leadership

"Everything rises and falls on leadership."

John C. Maxwell



Monday, August 27, 2018
Combined Water & Wastewater, Session #6, 2:10 p.m. – 4:20 p.m.

River to Faucet, A Tour of Louisville Water Company's Treatment Facilities

Kelley Dearing-Smith, Louisville Water Company

Although there will be no PowerPoint presentation for this session, participants will gain valuable insight into the operation of one of the largest utilities in Kentucky. This is a unique opportunity for those attending the KRWA conference.

Louisville Water Company will provide a guided tour of two of their facilities, the 1860 pumping station and water tower at the WaterWorks Museum and the Reservoir and Water Treatment Plant at Crescent Hill. Videos detailing the history and current day operations of Louisville Water Company will be played during the bus rides to the tours. Louisville Water Company employees will be on hand to answer questions and give additional details of the history of Louisville Water Company's contribution to safe drinking water in the state and nation.

Monday, August 27, 2018
Combined Water & Wastewater, Session #7, 3:20 p.m. – 4:20 p.m.

Safety Benefits of Hydro Excavation and Preventative Maintenance...
Dick Thompson, Vac-Tron Equipment

VAC-TRON® EQUIPMENT

Safety Benefits of Hydro Excavation and Preventative Maintenance on Pipes and Valves Using One Self-Contained Trailer

Presenter: Dick Thompson, Vac-Tron Equipment Company

Slide TBD: Data supporting the growing demand for hydro excavation

Applications for Vacuum Excavation

- Industrial plants
  - Tamko Roofing
  - Goodyear Tire
- Sign Companies
- Recycling plants
- Incinerators
- Power Plants
- Machine Shops
- Boat Yards
- Airports
- Agriculture/Food processing facilities
- Fence Builders
- Equine Centers
- Amusement Parks
- Car Wash
- Natural Disaster Cleanup
- Pressure Washings
  - Parking Garage cleanup
- Sewer Jetting
- Valve Exercising
- Meter Box cleanup
- Catch Basins
- Storm Drains

VAC-TRON EQUIPMENT

Slide TBD: Increased number of utilities sharing the same right of way area designated for utilities.

Slide TBD: Video showing proper way to expose utilities and excavate valve boxes using hydro excavation.

Slide TBD: Examples of older methods of exposing utilities which are less safe and less efficient.

Slide TBD: Data showing strike rates for each type of unapproved method of exposing utilities.

Slide TBD: Video or picture of explosion and devastation caused by locating utilities using unapproved methods.

Slide TBD: Video showing how hydro excavation is non-damaging to existing underground utilities but still removes the soil between the surface and the utility.

Slide TBD: Video showing the valve exercising process using a valve exerciser mounted on a vacuum excavation trailer, and the ease and benefit of cleaning the valve box.

Slide with pictures of valve boxes before and after cleaning with vacuum excavator.

Slide TBD: Video testimonial from City of Taveras, FL discussing the increased productivity and the safety benefits gained since acquiring a vacuum hydro excavator.

Slide TBD: Video testimonial from ECHO Utility Engineering and Surveying discussing the increased productivity and the safety benefits gained since acquiring a vacuum hydro excavator.

THE VAC-TRON FAMILY THANKS YOU!

Tuesday, August 28, 2018

Concurrent Sessions A, B and C

PowerPoints/Outlines for Sessions 8A - 16C

A Framework to Evaluate Life Cycle Costs of Water Pipelines

Roy Muncy, McWane Ductile

A Framework to Evaluate
Life Cycle Costs of
Water Pipelines

University of Michigan

Department of Civil and Environmental Engineering

August 28, 2018

1

Roy Mundy, P.E. ENV SP
Senior Regional Engineer
McWane Ductile
roy.mundy@mcwaneductile.com

2

U.S. EPA reports (EPA 2013):

- More than 1 million miles of water lines in the US
- 240,000 water breaks occur every year
- 4,000 to 5,000 miles of water mains are replaced annually

US needs to rebuild most of its water and wastewater infrastructure in the coming years

Source: http://i2.cdn.turner.com/

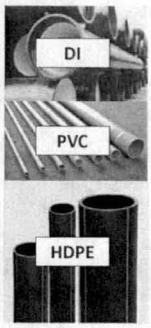
Source: http://a.abcnews.go.com/

Source: http://affordablehousinginstitute.org/

3

Key Factors That Should Be Considered

- Life Cycle Cost Analyses (LCCA) and Life Cycle Assessments (LCA) are widely used methods to evaluate
  - True Value - Cost effectiveness
  - Environmental Impact
- Economic value of two alternative materials
  - Economical factors – initial and operational costs over the design life of a pipeline
  - Environmental factors – evaluating the cost of environmental impact



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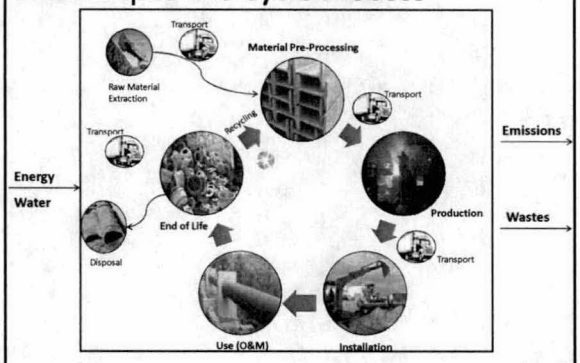
Water Pipes Life Cycle Process



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Objectives

LCC Module	Pipe Material Production	Installation	Operation and Maintenance	End Of Life
	PHASES - COST IMPACTS			
LCA Module	Pipe Material Production	Installation	Operation and Maintenance	End Of Life
	PHASES - ENVIRONMENTAL IMPACTS			

A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

6

Example Case Study

- Pipe materials considered
  - DI and PVC
- Analysis performed for
  - 8" and 24" diameter pipes
- LCCA
  - Total life cycle cost of ownership
  - LCC savings for comparison between DI and PVC
- LCA
  - Compare CO_2 emissions during production and operations phases
- Scenario Analysis
  - Evaluate impact of different costs on LCCA and LCA

7

Key Assumptions – General

Main Parameters		
Description	Units	Inputs
Location of the job site	NA	Michigan
Total length of pipe	Ft	1000
Diameter of the pipe	Inches	8 and 24
Project life Span	Years	100
Service Life (DI/PVC)	Years	100/50

8

Key Assumptions – Financial Inputs

Financial Inputs	
Description	Inputs
Initial pipe costs (DI/PVC) 8" dia	DI $12.91 PVC $ 6.33
Initial pipe costs (DI/PVC) 24" dia	DI $51.40 PVC $61.90
Discount rate	2%
Inflation rate	1.9%
Cost of Electricity	0.06 $/KWH

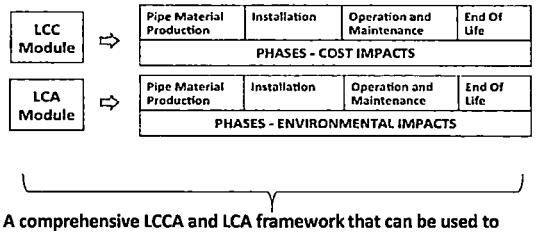
9

Key Assumptions – Design Inputs

Design Inputs	
Description	**Inputs**
DI (Pressure Class)	8" 350 (Pressure Rated 450 psi) 24" 200 (Pressure Rated 300 psi)
PVC (DR 18)	8" and 24" Pressure Rated 235 psi
Hazen William Factor (C) DI/PVC	DI = 140 PVC = 150
Efficiency of Pump (E)	70%
Q (Flow rate)	8" Pipe = 1000 gpm 24" Pipe = 6000 gpm
% of Pumping	Varied

10

Objectives



A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

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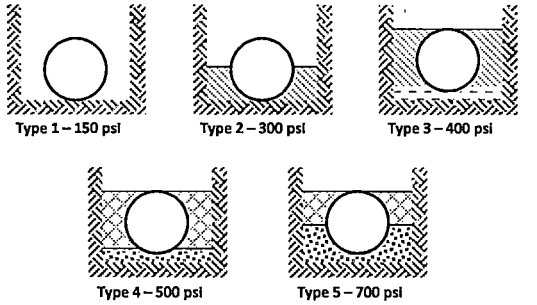
E' for PVC = 2,000 psi



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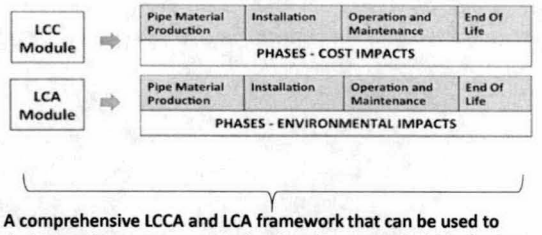
Bedding Requirements Calculation
(derived from discussion with Tom Friley, owner of TFH Construction)

Installation of 8" pipe
24" trench width
Bedding 8" beneath, 8" on either side, 8" on top of 8" PVC pipe
One ton of bedding covers 8 LF of pipe
Bedding cost is $22.00/ton
Two tons of waste material must be hauled away per 8" of pipe
Hauling cost for 25 ton tri-axial truck is $2.00 per mile—waste site 60mi. round trip
One 25 ton truck can provide select fill for 200' of pipe
Two 25 ton trucks required to remove waste on 200' of pipe

25 tons x $22.00/ton = $550.00 backfill for 200' of pipe; $550/200 =$2.75 / Ft.
(2) -25 ton trucks @ $2.00/mi hauling 60 mi. round trip = $240.00; $240/200 = $1.20/FT.

$2.75 + $1.20 = $3.95 per LF bedding requirement for 8" PVC pipe.

Objectives



A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

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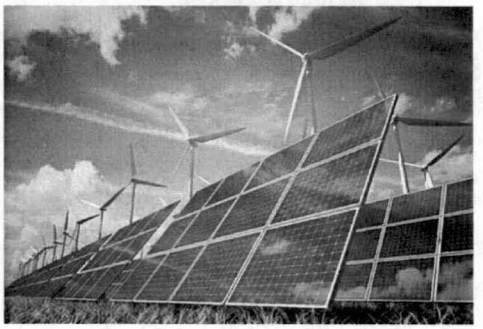
ENERGY—PUMPING COSTS



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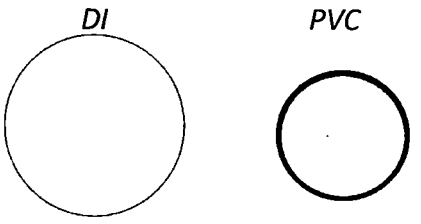
Ductile Iron Has A Larger Inside Diameter



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LCCA/LCA – Operation Phase (Pumping Costs)

$H_L = 1000\ [V/0.115\ C\ (d)^{0.63}]^{1.852}$

$V = Q / 448.8\ A$

$PC = 1.65\ H_L\ Q\ a / E$

$Energy = 1.65\ H_L\ Q / E$

H_L = Head Loss (ft/1000 ft)
V = Flow Velocity (fps)
C = Hazen-Williams Flow Constant
d = Actual inside diameter (in)
A = Cross-sectional Area of pipe (ft^2)

PC = Pumping Cost ($/year/1000 ft) based on 24 hr/day pump operation
Q = Flow (gpm)
a = Unit Cost of Electricity ($/KWH)
E = Pump Efficiency

Energy = KWH/year/1000 ft based on 24-hr/day pump operation

Source: AWWA M41

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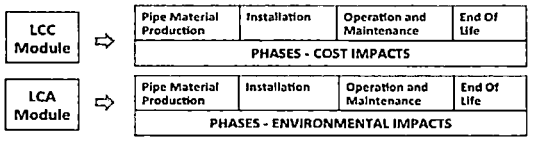
Objectives



A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

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END OF LIFE

Estimated Service Life—Nessie Model

Buried No Longer-AWWA

Ductile Iron Pipe-105 Years PVC Pipe- 55 Years

The AWWA Study "Buried No Longer" Projects That PVC Pipe Has Only One-Half of the Estimated Service Life of Ductile Iron Pipe in many regions of the country

19

Project and Service Life Assumptions

DI (in years)	PVC (in years)	References
~150		DIPRA (2015)
100-120		PWD (2015)
>100	<55	AWWA (2015)
100		DIPRA (2012)
100	50-100	EPA (2002a)
60-80	41-60	Folkman (2012)
	60	Swamee and Sharma (2008)
75		Paradkar (2013); Marques (2013)
	50	PPI (2015); AWWA (2007); JM Eagle (2010); Burn et al. (2005); McPherson et al. (2009)

- **Service Life DI = 100 years, Service Life PVC = 50 years**
- **Project Design Life = 100 years**

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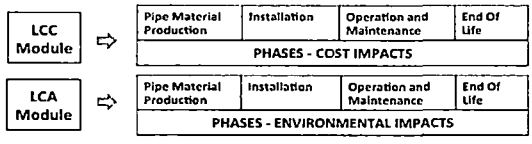
Objectives



A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

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Maintenance Costs

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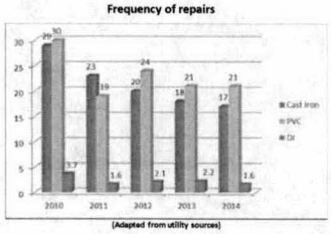
LCC – Operation Phase (Repair and Maintenance)



[Adapted from utility sources]

- Frequency and average cost information collected from utility sources
- The cost of individual repair and maintenance is obtained from literature (RSMeans 2015, Haas 2012)

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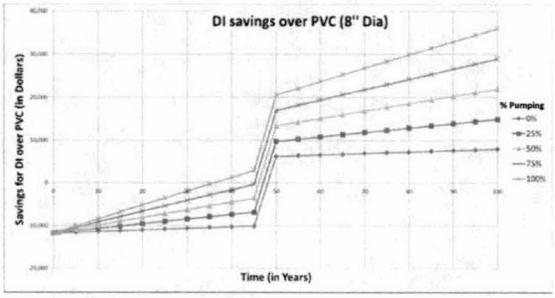
LCCA- Scenario Analysis- 8" diameter



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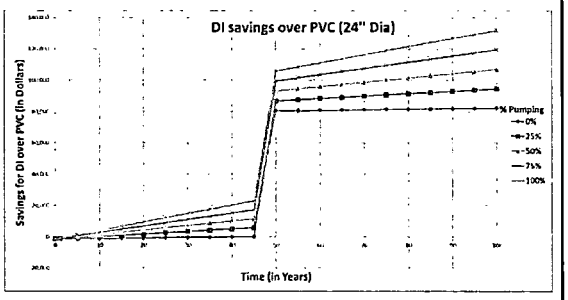
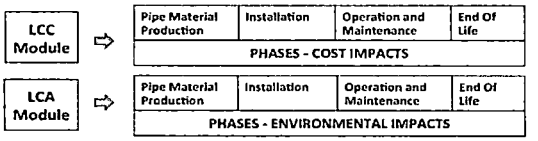
LCC- Scenario Analysis- 24" dia



25

Objectives



A comprehensive LCCA and LCA framework that can be used to decide on the most economical and environmentally friendly pipe material for water distribution networks

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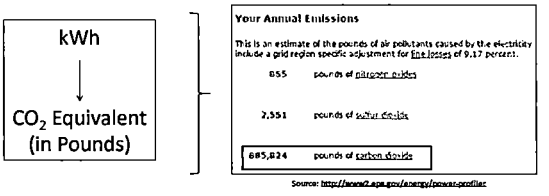
LCA-CO2 equivalent calculations



Embodied and Operation Energy required in (kWh) is converted to equivalent CO_2 emissions using an EPA calculator

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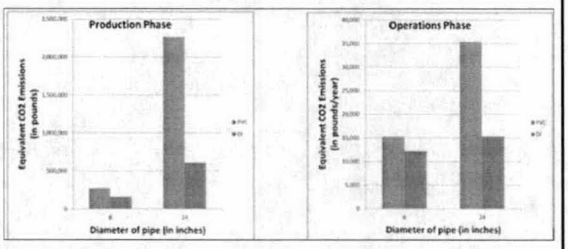
LCA - Production Phase

Description	Units	Value	Reference
Embodied Energy (PVC)	KWh/Lb	9.44	Piratla et al. (2012); Ambrose et al. (2003).
Embodied Energy (DI)	KWh/Lb	4.81	Piratla et al. (2012); Ambrose et al. (2003).

The embodied energy requirements during the production phase are based on the weight of the pipe

28

LCA for 8" and 24" diameter pipe



Total equivalent CO_2 emissions assuming 25 % pumping during operation phase

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Conclusions

- A framework capable of comparing the LCCA and LCA of alternative pipe materials factoring different service lives, pumping, and repair costs is presented
- Main conclusions from scenario analysis:
  - Rate of pumping significantly impacts the total life cycle costs and emissions for all pipe diameters
  - Initial cost of a material does not necessarily determine total cost.
  - Emissions during operation phase are more significant than during production phase
  - PVC pipes have the highest environmental impacts

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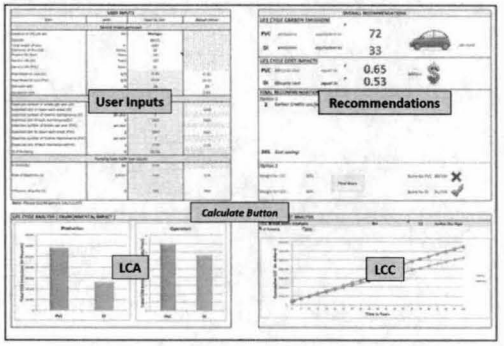
Framework-Overview



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RESEARCH AUTHORS

University of Michigan

Albert Thomas, Bharadwaj R. K. Mantha, and Carol C. Menassa

Tishman Construction Management Program

Department of Civil and Environmental Engineering

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Lessons Learned: Fighting DBP Formations for Improved Water Quality

Bob Cashion, S4 Water Sales and Service

Sustainable Approach to Managing DBPs in the Distribution System

By October 2013, all public water utilities will be required to comply with Stage 2 Disinfection By-Product (DBP) requirements. These regulations, set in place by the United States Environmental Protection Agency (USEPA), strengthen public health protection by tightening compliance monitoring requirements for total trihalomethanes (TTHMs) and haloacetic acids (HAA5s). Public water systems must now maintain locational rolling annual averages (LRAA) for each compliance sampling location at or below 80 ppb total TTHMs and 60 ppb HAA5s. Additionally, the new DBP rule requires all utilities to limit chlorine dosage to 4.0 mg/l and maintain a free chlorine disinfectant residual of 0.2 mg/l (chloramine of 0.5mg/l) at every sampling point within the water system.

In most situations, water leaving treatment facilities is under the maximum contaminant level ranges for TTHMs and HAA5s. Therefore, the biggest and nearly uncontrollable source of DBP formation is the water distribution system. DBPs not only form when free chlorine reacts with natural, organic materials found in treated water, but they also form when disinfectants react with the decades of scale buildup and biofilms already located throughout the distribution system.

Biological and mineral deposit buildup is inevitable within a given water distribution system. As scale accumulates on basin walls and pipe interiors, it becomes an excellent substrate for biofilm growth. Biofilms are covered with a slimy, polysaccharide layer that generally protects them from most primary disinfectants. These biofilms are constantly evolving and excreting all types of organic substrates into the water surrounding the biofilm. As free chlorine reacts with these excreted organic substrates, all types of DBPs can form within the distribution system.

Managing biofilm growth and organic content in the distribution system is a critical component to maintaining residuals and complying with Stage 2 regulations. With increasing regulatory pressures and stagnant revenue streams, it is important to find sustainable and economical

alternatives to achieving compliance. For many small water systems, costly infrastructure upgrades and replacements are not feasible. Emerging chemical cleaning technologies are gathering traction as cost-effective alternatives to meeting these more stringent regulations.

Managing DBPs in Water Storage Facilities

Water storage facilities are a major source of chlorine demand and DBPs. As water stagnates within storage facilities, the chlorine in the water has a longer residence time to react with organics and produce DBPs. Sediments accumulate and fall out of solution and biofilms and scales form on tank walls, surfaces and bottoms.

The AWWA recommends cleaning all water storage tanks every three years to remove sediments and reduce the risk of nitrification. These cleanings typically consist of removing the sediments, followed by pressure washing and disinfecting the surfaces. While these guidelines outline general best practices, it is not practical to remove all biofilm and organic deposits with pressure washing and disinfecting alone. Initially, the tank may look clean and test clean, but underlying scale that remains will allow the biofilms to return within a matter of weeks or months.

As an alternative, NSF 60 certified low pressure chemical solutions can be used to eliminate surface-borne chlorine demand by removing all biological growth and surface deposits. These chemical applications are specifically engineered to remove biofilm, stains and Fe/Mn deposits. They are safe on concrete, steel and fiberglass surfaces. Figure 1 shows a chemically cleaned tank compared to a tank that was cleaned by pressure washing.

Figure 1: A chemically cleaned tank (left) compared to a pressure washed tank (right).

Tanks and clearwells need to be taken out-of-service to be chemically cleaned, but the entire process can usually be completed within 24 hours. In addition to removing all surface films and deposits, chemical cleaning allows for a thorough infrastructure inspection. Concrete spalling, under-deposit corrosion, paint bubbles and other maintenance issues can be detected early and prevent future, more grievous infrastructure issues. Chemically cleaning the infrastructure not only controls biogrowth and chlorine demand, it lengthens the life of that infrastructure.

Studies have been conducted to demonstrate the superior benefits of chemical cleaning. A system in Oklahoma that was experiencing numerous boil orders and a 94% drop in chlorine residuals leaving their clearwell even after numerous washouts, resorted to using chemical cleaning solutions to clean their clearwell. After the procedure, chlorine demand was reduced by 80% and total chlorination was decreased from ≥ 4.0 ppm to ≤ 2.2 ppm. Figure 2 shows the clearwell before and after the chemical treatment. All surface deposits were removed, areas of corrosion were exposed and mended and water quality was restored. Boil orders became obsolete, and the water system experienced improved residuals long after the cleaning was performed.

Figure 2: The Oklahoma clearwell prior to chemical cleaning (left) and after cleaning (right). Biofilm and accumulated deposits were removed exposing areas of corrosion.

Reducing DBPs in Distribution Pipelines

After reducing chlorine demand in water storage facilities, problem areas in the distribution system need to be addressed. The water distribution system is a common cause of non-compliance. Even if the plant effluent was low in total organic carbon (TOC) and DBP levels, chlorine will still react with naturally occurring organics within the system. Source water

quality, distribution system design, infrastructure age, surface area, residence time and infrastructure degradation all impact how disinfection byproducts will form in the system. Generally, TTHMs and HAA5s form at higher rates in the older parts of a system, due to longer residence times and metal pipe materials that are more likely to harbor large quantities of mineral scale buildup and biofilm growth. As previously stated, operators are not just managing the demand in new water; they are effectively managing the water that passed through the distribution system for decades.

A traditional approach to managing DBPs in the distribution system has been to replace old water lines. This approach is costly, labor intensive and requires system downtime. Another conventional method is switching to a combined residual (chloramines) instead of a free chlorine system. Chloramines are more effective in penetrating biofilm slime layers; however, they are much less potent primary disinfectants and often cause nitrification issues. Additionally, chloramines can cause corrosion problems leading to non-compliance with lead and copper regulations. Recent studies have also connected chloramines with human cell damage and generation of N-nitrosodimethyamine (NDMA), a currently unregulated DBP that may prove to be significantly more cancer causing than regulated TTHMs and HAA5s. Public objection to the use of chloramines has been rising and will soon reach a crescendo that will cause operators to change treatment again in response to the political pressure.

An emerging approach to dealing with DBP formation in the distribution system is utilizing NSF 60 certified chemical solutions to penetrate and remove the organic deposits that react with disinfectants. These chemicals are used online and in conjunction with traditional disinfectants. They are specifically formulated to attack and remove the attachment mechanisms that keep biofilm and scale attached to pipe surfaces.

Advanced manufacturing techniques have been developed to produce oxidants with higher oxidation states than sodium hypochlorite (NaClO). Not only are these oxidants able to dissolve different molecules present in water distribution systems, but their higher oxidation states cause them to be more hydrophobic in nature allowing them to interact more strongly with biofilm and other organics present in the water system. The hydrophobic nature of these highly

oxidized chemicals enables them to penetrate slime layers and break away the organic and inorganic materials in pipelines. When dosed correctly, accumulations of scale and biofilm will be broken down and dissolved back in the solution. The deposits leave the pipelines in the same manner they arrived, through the water.

Dosage rates are determined by the composition and volume of scale and biofilm within the distribution system. In heavily fouled systems, a system flushing program may be recommended to quickly remove deposits before going on a maintenance dose. Initial dosage rates range from 20 to 30 milligrams per liter (mg/l) of solution. Overtime, some utilities are able to use a lower dosage rate once the distribution system is cleaned. Every system is different and must be carefully assessed to determine the cleaning process. Dosage points and levels are adjusted as field data is compiled and evaluated.

Successful applications of these chemicals have been validated at various small water systems in the U.S. Significant decreases in DBPs and increased chlorine residuals have helped many water systems meet the new Stage 2 regulations. In one study, a water utility reduced TTHMs by 55% and HAA5s by 84% over a one-year timespan. Additionally, water plant personnel were able to decrease the chlorine feed by half and still maintain adequate residuals at the far ends of their system.

In another study, a utility struggling with built up iron deposits and loss of chlorine residuals used the chemicals to break apart the iron buildups, stabilize chlorine demand and maintain residuals in the system. Figure 3 shows the HAA5 levels within a distribution system before and after the addition of one NSF 60 certified chemical solution.

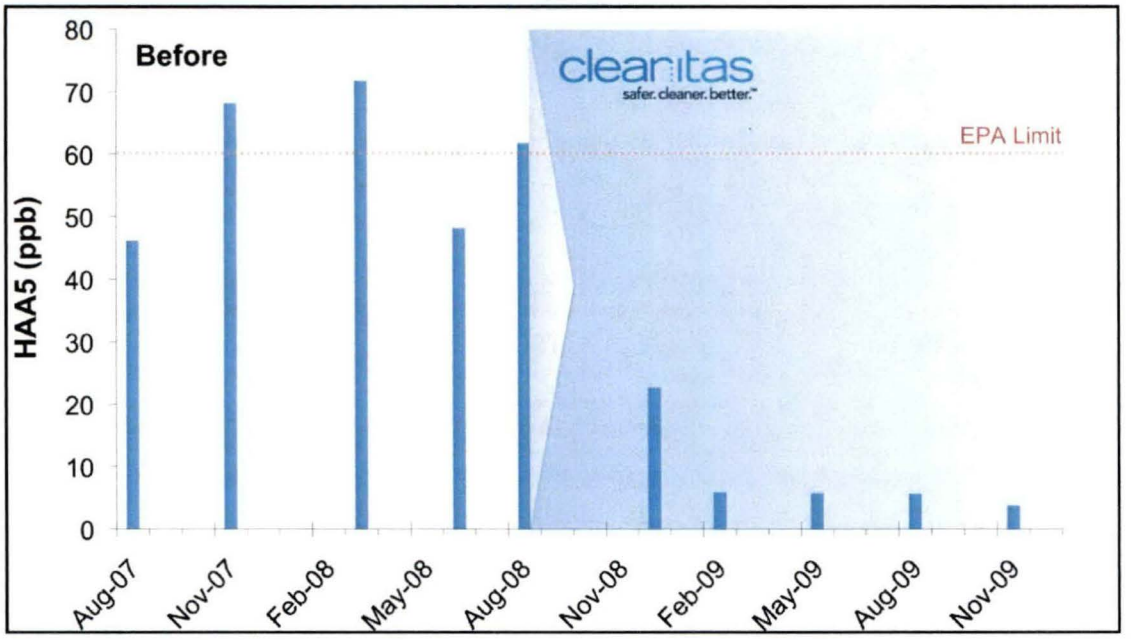


Figure 3: HAA5 levels within a distribution system before and after the addition of NSF 60 Clearitas, Blue Earth Labs' proprietary formulation of oxidized chlorine specifically engineered to remove organic and inorganic deposits within water distribution systems. Note, the system was out of compliance prior to the change in treatment.

Conclusion

As discussed, the new DBP regulations can cause many systems that were previously in compliance to be out of compliance. These issues will become major concerns for municipal water operators and city officials. Not only are they required to deal with the aging components of the water utility system and rate payer resistance to increasing costs to cover improvement and replacement expenditures, but they must also deal with the tightening of government regulations.

In economic downtimes, finding sustainable, economical and effective maintenance practices is key to staying above the curve. Chemical cleaning technologies can provide small water utilities strong advantages if utilized correctly.

Using Media Inspection & Maintenance for Filtration Optimization

Filtration remains one of the most important steps in water treatment today. With increasing regulations, the filtration process has become even more crucial to the overall water quality leaving the facility. In down economic times, new technologies such as granular activated carbon and membrane filters are often not feasible for small water systems due to cost constraints. Improved performance, longevity and reduced costs can be attained for existing filters with proper operations and maintenance of these systems, thus chemical cleaning solutions should be considered as a cost-effective alternative to expensive plant upgrades and treatment changes.

Filtration Systems Impacted by Regulatory Changes

The emerging EPA Long Term 2 Surface Water Rule requires additional filtration performance and the Stage 2 Disinfection Byproduct Rule makes it impractical to feed high dosages of chlorine to improve filterability. Both of these regulations entail improved performance requirements, while placing additional loading demands on the filter media. As a result, many systems have moved away from pre-chlorination and have begun utilizing pre-oxidants, such as potassium or sodium permanganate. The use of these pre-oxidants has in turn lead to a significant increase in organic and inorganic contaminant buildup on filter surfaces and filtration media. Moreover, overfeeding coagulants to improve total organic carbon (TOC) reduction affects the inorganic constituent levels and has a tendency to scale and encapsulate filter media, actually decreasing the media's ability to perform. Further, this buildup can change densities of the media, affecting backwash flow rates, expansion, turbidity break through, as well as reducing capacities to operate at designed filtration rates – all factors that increase operational costs due to lost water and excess energy consumption.

The Importance of Operation & Maintenance of Filtration Systems

Filtration systems are extremely complex pieces of equipment that provide results based on the physical and functional design of the process, as well as the influent water to be filtered. While state regulatory agencies require periodic inspections of all portions of the water treatment process, filtration systems by design and location are very difficult to inspect due to confined space limitations and operational complacency. For this reason, not only are they often overlooked, but the filtration media is rarely inspected until an issue arises with its performance. It should be noted that if severe conditions occur such as flooding, extremely high turbidity or unusual flow patterns during backwashing, the filter process should be investigated as soon as practical.

To remain most efficient and effective, filtration media, regardless of its type, should be inspected at least once a year. An annual inspection should include laboratory analysis of a core sample of the media to determine the viability of the media particles, as well as the depth and proper stratification of the layers. Media density, particle size and uniformity should also be thoroughly evaluated. Once this annual assessment has been performed, it is critical to keep this recorded to construct quality control benchmarks to compare past and present filter performance. This data will be foundational for water

plant personnel to determine inconsistencies and accurately diagnose problem sources within the filter before major issues arise and cause large-scale and cost prohibitive failures in the filtration system.

Additionally, each filter is a distinct piece of equipment and all filters will not operate the same due to hydraulics and mechanical configurations. Therefore, each filter should be individually assessed for best operational control.

Filter Media Sampling and Testing

The operating capacity of the media is the most critical component of the filter's overall performance. Overtime, media becomes fouled with organic and inorganic matter, reducing absorptive sites, altering media densities and causing media channeling. As this process of encapsulation continues, several problems can occur ranging from shorter filter run times, higher head loss, increased turbidity, lower filtration rates, increased risk of contaminant breakthrough and inadequate bed expansion during backwash. All of these negatively impact costs and can usually be avoided with diligent media management.

Encapsulation is often confused with rounding of the media, which leads many operators to incorrectly assume the media is worn-out and requires replacement. Figure 1 demonstrates that the apparent rounded media could be completely restored after being cleaned with a chemical solution. Therefore, proper testing of filtration media is an integral part of operating and maintaining filtration systems.

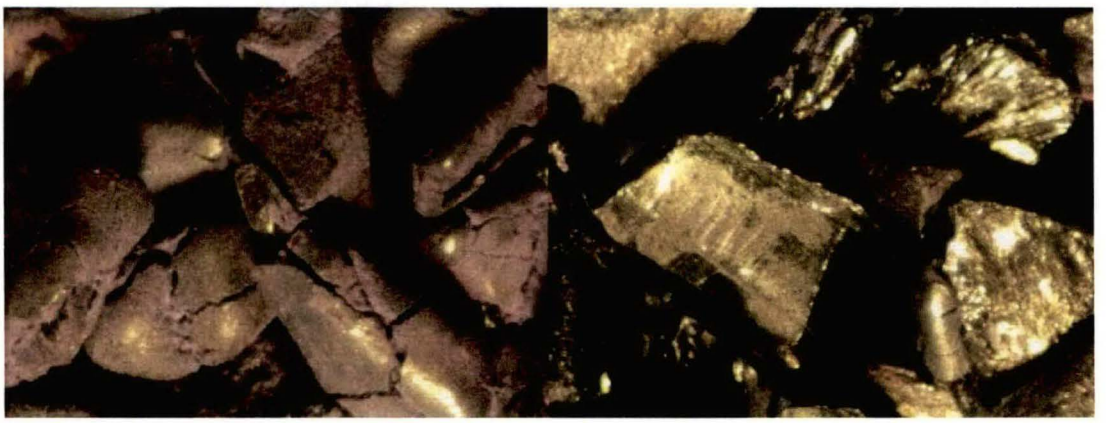


Figure 4: The sharp angles of apparently rounded media (l.) are restored after cleaning (r.)

To determine whether or not filter media can be chemically cleaned or if it has degraded to a point that replacement is more cost effective, controlled laboratory tests must be performed. For proper testing, samples taken from the filter bed should be representative of the particular media types and the physical size of the filter. In the lab, media will be tested for its current density in a dry state. Microscopic examinations reveal the angular surface areas of the media particles, and detailed sieve tests determine the effective size and uniformity coefficient ranges for the media. These tests allow for a comparison of the sampled media to accepted specifications of density, size and uniformity coefficients of standard media materials.

If preliminary lab testing concludes that the media can be effectively cleaned with a chemical solution, then additional tests can be performed to determine the composition of the contaminant buildup. Providing a complete analytical testing of the constituents attached to the media is the best way to decide which chemical solutions should be applied, the quantities of chemicals needed and how effective they will be at removing the deposits from the filter media.

Laboratory cleaning procedures will determine what constituents have been removed and the volumes of constituents removed. This is measured by the dry weight of the media before and after cleaning. The weight loss difference will be a direct correlation of the total constituents removed from the media. Laboratory cleaning results will be applied to the overall specifications of the filter media and provide an estimate of how many pounds of contaminants can be expected to be removed from the entire filter bed.

This is accomplished by examining the chemical solution and rinse water mixture to determine what constituents were removed from the media during the cleaning process. Often times, this process will reveal coagulant residuals, iron, manganese, calcium or other constituents that are found in the raw water supply that have been encapsulated around the media particles.

These analytical results are very important because they provide a baseline which will assist in determining the optimal intervals between media cleaning and inspection. Furthermore, they can provide a window into treatment that may suggest changes in coagulant feed rates to improve filter performance or treatment efficiencies of the sedimentation process and loading on the filtration system. The results can be analyzed from year to year to see the overall operation control of the filtration system (See Table 1).

Table 1: Amount and composition of the constituents removed during standard laboratory cleaning.

Filter ID Standard Cleaning	4
Anthracite	
Dry Weight Loss	4.0%
Total lbs removed	984
Mg removed (ppm)	448
Ca removed (ppm)	2,467
Sand	
Dry Weight Loss	0.8%
Total lbs removed	399
Mg removed (ppm)	112
Ca removed (ppm)	519
Combined	
Total lbs removed	1,383

Two-step Media Cleaning Application

Varying chemistries have been utilized to clean filtration media with less than stellar effects due to the lack of proper testing, application and experientially developed methodologies. New advancements in cleaning technologies and a more thorough understanding of chemistries has allowed for more

specialized chemical formulations to be generated. These formulations are NSF 60 certified and safe to use in-place – the filter media does not need to be removed from the filter. These chemical formulations are designed to clean several varying types of filtration media and can be utilized in all current filtration system configurations. They can also be used to remove surface stains from filter walls and troughs.

The most applicable approach is a two-step cleaning process which utilizes powdered chemistries that have slow dissolution rates and are applied with an activation catalyst. This approach is proven to be much more effective than traditional liquid cleaners.

In step one of the cleaning process, the powder formulation is mixed with water and pumped as slurry on top of the filter media bed. This step allows for coverage of the cleaner over the entire surface area of the filter and allows for penetration throughout the media depth. In step two, an activation catalyst is added to the mixture and allowed to mix utilizing air scourer or surface sweeps. The catalyst starts the reaction of the cleaning process and allows for organic breakdown to speed up the removal process. The amount of residence time that the cleaning chemistry stays in contact with the media is very important. The slurry must sit long enough to penetrate the depth of the media through to the underdrains. This can be accomplished in a 24 hour period on most projects, but is dependent on the severity of the fouling. As previously mentioned, the use of a catalyst increases the efficiency of the cleaning process and aids in the removal of organic and inorganic contaminants from the encapsulated media. Adding the catalyst at varying times can improve the cleaning process and is proven to be more effective with air agitation or mixing.

Typically, the chemical cleaning solution is left to sit overnight to ensure full removal of deposits. Once the solution has penetrated the media and soaked through to the underdrains, backwashing is performed until the backwash water runs clear. Often times, several short backwashes are better than Typically, the chemical cleaning solution is left to sit overnight to ensure full removal of deposits. Once the solution has penetrated the media and soaked through to the underdrains, backwashing is performed until the backwash water runs clear. Often times, several short backwashes are better than one extended wash. This allows for bed expansion and improved water contact with media particles. Depending on rinsate disposal methods, the backwash water may need to be neutralized before being discharged to a sludge lagoon or sanitary sewer system. Figure 2 shows what the backwash water normally looks like after a filter cleaning.

Figure 5: Typical backwash water after cleaning the filter

The entire cleaning process is much less labor intensive and time consuming compared to complete replacement. A typical filter cleaning requires a three man crew and can be completed within 24 hours. Cleaning process and instructions are provided in a step by step checklist to ensure proper cleaning and safety procedures and protocols are executed.

To demonstrate the effectiveness and longevity of chemical cleaning, a water treatment plant in the New Jersey area that was scheduled for media replacement in 2004 opted to clean their three filter pressure vessels. The original media was installed in 1992 and lab testing showed black crust and brown grainy deposits on the greensand and anthracite media. Nickel-sized mudballs and other solid aggregates were also present in the samples. After performing the two-step chemical treatment on all three filters, approximately 10,000 pounds of contaminants were removed and the 13-year-old greensand filters were restored to near new operating conditions for one-third of the price of media replacement saving the utility over $100,000. This cleaning was performed in 2005 and is still operating within specifications in 2010.

Benefits and Costs of Chemical Cleaning

Expected benefits of in-place media cleaning include reduced head loss, reduced effluent turbidity, improved media stratification, longer filter run times, improved backwash flow, reduced chlorine demand, removal of mudballs and other particulates, prevention and reversal of cementing and extended media life. In addition, while the media is being cleaned the entire vessel can be cleaned to remove contaminates that have accumulated on the side walls, troughs and wetted surfaces. This will allow for a much better inspection of all wetted surfaces and will enhance the appearance. It will also improve performance due to reducing disinfectant demand or prevent sloughing off of material into the filter bed. Figure 3 depicts a filter basin before and after applying the chemically cleaning solution to the walls and troughs.

Figure 3: The spray-on/rinse-off chemical cleaning solution makes it easy to remove unsightly surface stains from filter basins.

Furthermore, the application of the cleaning chemistries has proven to restore nearly any media back to original specifications at a significantly lower cost compared to replacement.

Table 2, based on actual cleaning projects, shows a cost comparison of media cleaning and full media change-out. For all media types, cleaning is less than half the cost of replacement.

Table 2: Replacement versus Media Master/ Catalyst Cleaning Costs for Various Media Types

Media Type	Replacement Cost*	Cleaning Cost**
Filter Sand	$40/ft^3	$23/ft^3
Anthracite	$55/ft^3	$23/ft^3
Greensand	$65/ft^3	$30/ft^3
GAC	$80/ft^3	$30/ft^3
Zeolite Resin	$110/ft^3	$30/ft^3

* Includes average labor and average shipping

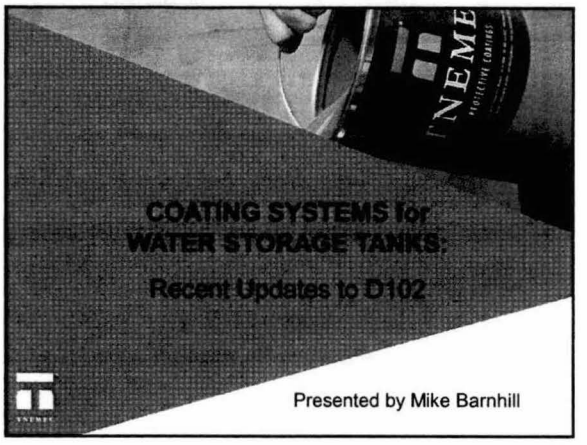
** Includes catalyst, neutralization process and average shipping

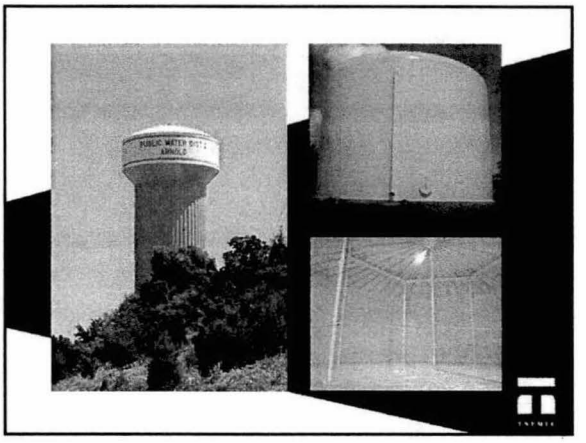
For example, a 320 square foot dual media filtration system utilizing Wheeler underdrains was recently cleaned at an average cost of $16,850 per filter. The cost to replace the media was bid at $43,320 per filter unit. Chemical cleaning of their filtration system provided a savings of $26,470 per filter unit. This savings was sufficient enough to allow the system to clean all four filter units in one year while remaining within their yearly maintenance budget. After cleaning, the system realized a 30% reduction in backwash flushing over the prior year's operation. Moreover, the cleaning allowed for more flow to be processed per filter unit, improved turbidity removal and increased filter run times.

Conclusion

Filtration is a critical step in potable water treatment and its effectiveness is directly proportionate to the condition of the filtration media. With more importance being placed on log reduction in the filtration process, the optimization of filter performance is critical to meeting the ever-increasing regulatory requirements. Annual filter assessments, including media sampling and analysis is more important than ever and should be a part of an optimization program to maintain superior performance. This can be accomplished at a much lower cost than complete media change out. With utilities facing strong economic pressures, filter media cleaning is an effective solution with near and long-term benefits that can and should be part of the maintenance budget instead of being treated as a capital expenditure. Through annual monitoring and inspections, optimization of filtration systems can be much less stressful and inexpensive compared to media replacement.

Protecting Steel Potable Water Tanks
Michael Barnhill, Tnemec (J.D. Petro & Associates)

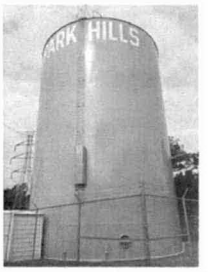


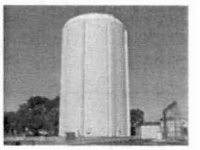


TYPES OF WATER STORAGE TANKS

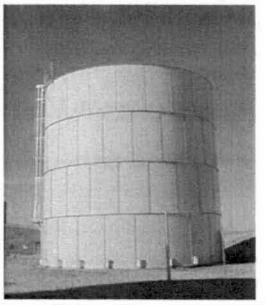
- Welded Steel
- Bolted Steel
- Concrete
- Composite

Welded Steel

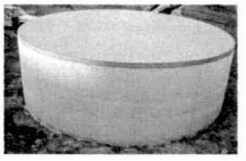


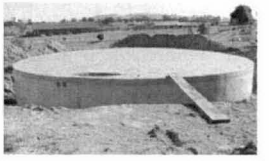


Bolted Steel

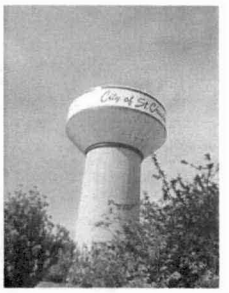


Concrete



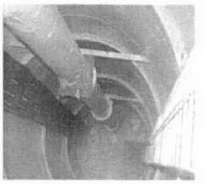


Composite



Areas that require protective coatings

Steel Tanks
- Exterior
- Interior (wet & dry)

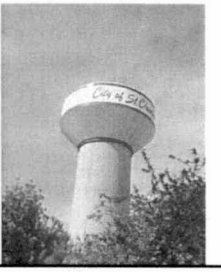


Areas that require protective coatings

Bolted Tanks
- Exterior
- Interior

Areas that require protective coatings

Composite Elevated Tank
- Steel (Exterior & Interior)
- Concrete (exterior)

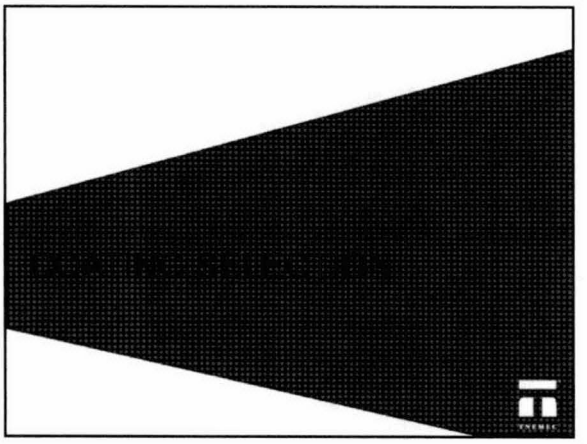


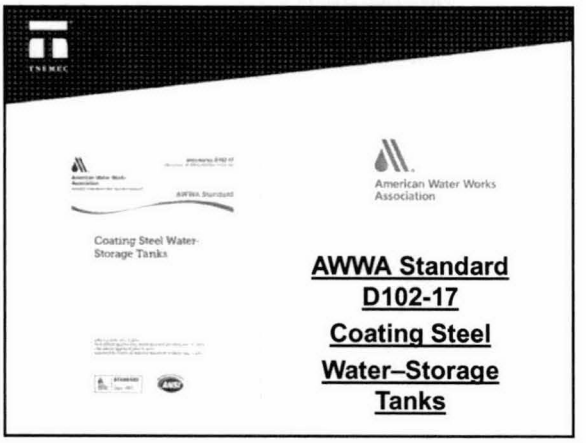
Areas that require protective coatings

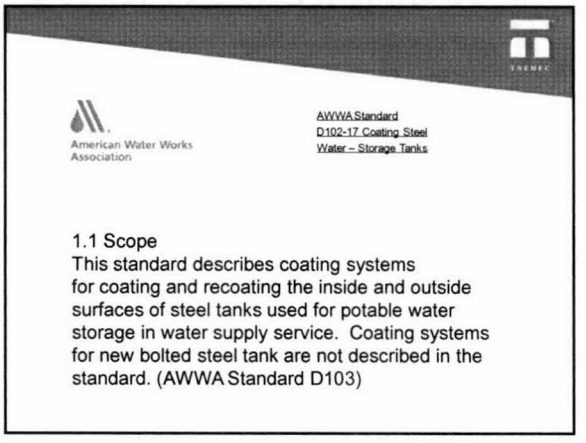
Concrete
- Interior
- Exterior (exposed or buried)

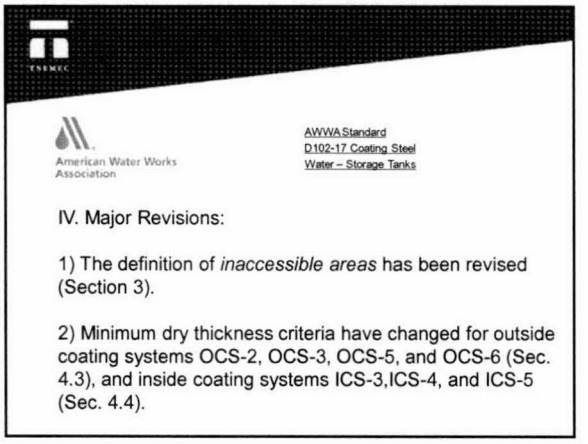
(3) Factors That Affect Coating Performance

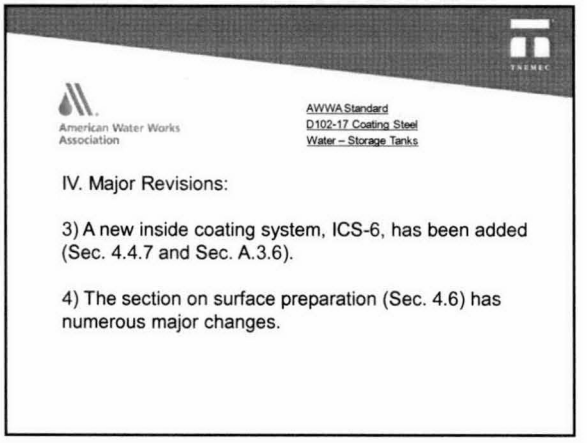
- Proper Coating Selection
- Proper Surface Preparation
- Proper Application

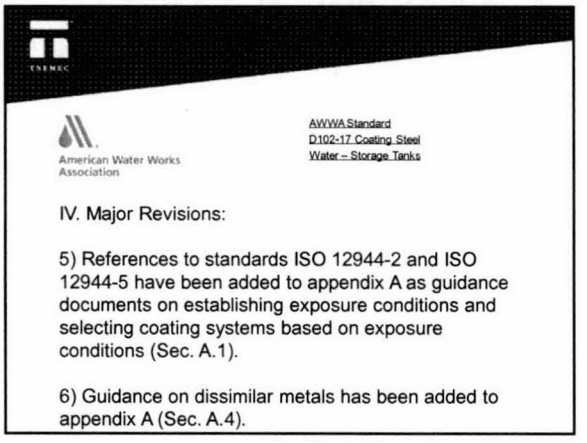



American Water Works Association
Coating Steel Water-Storage Tanks
AWWA Standard
D102-17
Coating Steel
Water–Storage
Tanks


American Water Works Association
AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks
1.1 Scope
This standard describes coating systems for coating and recoating the inside and outside surfaces of steel tanks used for potable water storage in water supply service. Coating systems for new bolted steel tank are not described in the standard. (AWWA Standard D103)


American Water Works Association
AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks
IV. Major Revisions:
1) The definition of *inaccessible areas* has been revised (Section 3).
2) Minimum dry thickness criteria have changed for outside coating systems OCS-2, OCS-3, OCS-5, and OCS-6 (Sec. 4.3), and inside coating systems ICS-3,ICS-4, and ICS-5 (Sec. 4.4).


American Water Works Association
AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks
IV. Major Revisions:
3) A new inside coating system, ICS-6, has been added (Sec. 4.4.7 and Sec. A.3.6).
4) The section on surface preparation (Sec. 4.6) has numerous major changes.


American Water Works Association
AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks
IV. Major Revisions:
5) References to standards ISO 12944-2 and ISO 12944-5 have been added to appendix A as guidance documents on establishing exposure conditions and selecting coating systems based on exposure conditions (Sec. A.1).
6) Guidance on dissimilar metals has been added to appendix A (Sec. A.4).

American Water Works Association

AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks

IV. Major Revisions:

7) Guidance on inaccessible areas has been expanded in appendix A (Sec. A.5).

8) Guidance on undersides of tank bottoms has been modified (Sec. A.5.4).

9) Roof construction options have changed (Sec. A.5.6 and Table A.1).

Outside Coating System

OCS No. 1 (three or four* coat, Alkyd)

1-A Aluminum
1-B colored (blue/green) Aluminum
1-C gloss Alkyd
1–D Silicone Alkyd

Total System DFT: 4.0-6.0 mils min

* Depending on number of prime coats used

Outside Coating System

OCS No. 2 (three-coat; Zn rich/MIO/MCU system)
Total System DFT: 7.0 mils

OCS No. 3 (three-coat, water based, acrylic emulsion)

Total System DFT: 6.5 mils min

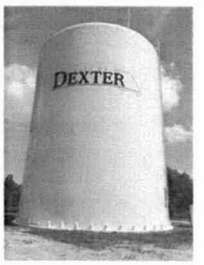
Dry-fall, not suggested for shop prime / field finish new tanks

Outside Coating System

OCS No. 4 (three-coat system, fluoropolymer urethane finish)

- Zinc primer (organic or inorganic)
- Polyurethane intermediate
- Fluoropolymer Finish

Total System DFT: 6.5 mils min

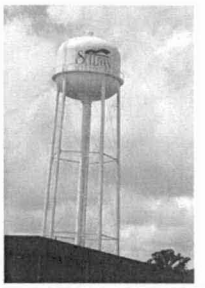


Outside Coating System

OCS No. 5
(three coat epoxy/epoxy/urethane)

- Epoxy Prime
- Epoxy Intermediate
- Polyurethane Finish

Total System DFT: 6.5 mils min

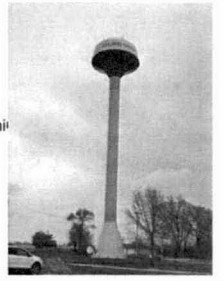


Outside Coating System

OCS No. 6
(three-coat zinc/epoxy/urethane)

- Zinc Prime Coat (organic or inorgani
- Epoxy Intermediate
- Polyurethane Finish

Total System DFT: 6.5 mils min



Outside Coating System

OCS No. 7 (three-coat system 2K water-based epoxy / 2K water-based Polyurethane

- 2K water-based epoxy Prime Coat
- 2K water-based epoxy Intermediate
- 2K water-based polyurethane Finish

Total System DFT: 6.0 mils min

AWWA D102-17 Coating Systems

INSIDE COATING SYSTEMS

ICS No. 1 (two-coat epoxy)
Used for interior wet or dry,
Total System DFT: 8.0 mils min

ICS No. 2 (three-coat epoxy)
Total System DFT: 12.0 mils min

Inside Coating System

ICS No. 3 (one or two-coat system)

- Optional Epoxy or Zinc primer (organic or inorganic)
- High Solids (min 96% volume solids) 2K epoxy topcoat

Total System DFT: 20.0-22.5 mils min

Inside Coating System

ICS No. 4 (one coat thermoset polymer)

- Optional Epoxy or Zinc primer (organic or inorganic)
- 100% solids polyurethane and/or polyurea topcoat

Total System DFT: 25.0-27.5 mils min

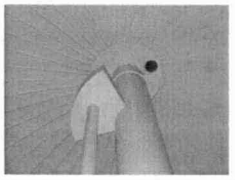
Inside Coating System

ICS No. 5
(three-coat zinc / epoxy / epoxy)

- Organic zinc-rich Primer
- Epoxy Intermediate
- Epoxy Topcoat

Wet or Dry areas of the tank

Total System DFT: 10.5 mils min



Inside Coating System

ICS No. 6
(two-coat, zinc / epoxy)

- Organic zinc-rich Primer
- Epoxy

Wet or Dry areas of the tank

Total System DFT: 12.5 mils min

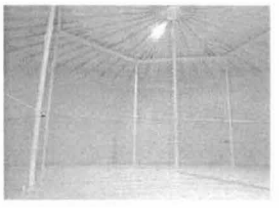
Organic Zinc-Rich

- Interior & Exterior
- 1K or 2K
- Prime Coat
  - shop and/or field
- Quick-cure
- Fast Recoat
- Extended Recoat Window
- Corrosion Resistance / Undercutting
- Galvanic Protection
- Dry-Fall
- Numerous Topcoat Options
- NSF-listed

Epoxy

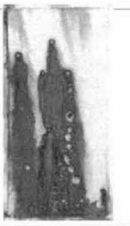
- Formulated up to 100% solids
- Barrier protection
- 2K
- Interior
- Prime, Intermediate & Finish
- Exterior
- Intermediate (can be used as a prime)

Chalks in sunlight!



PERFORMANCE TEST DATA
Salt Spray (ASTM B 117)

3 Coats Of 2-Component Epoxy	1 Coat Zinc-Rich Primer 2 Coats Of 2-Component Epoxy
10,000 Hours Salt-Fog	10,000 Hours Salt-Fog



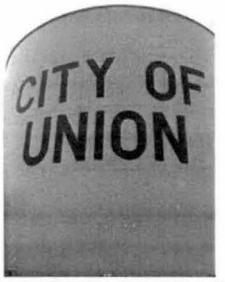
Acrylic Emulsion

- Good Exterior Durability
- 1K
- Flexibility
- Water-Based - Nonflammable
- Good Color & Gloss Retention
- Fast Drying – Dry-fall
- Excellent for Overcoating
- Can be formulated with Mildew Resistance

Polyurethane

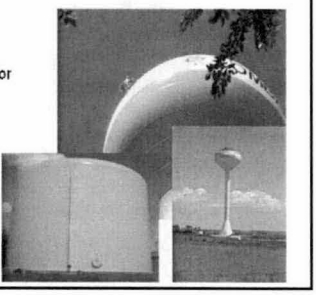
Exterior
Finish coat or intermediate

- Exterior Durability
- 2K
- UV Resistance
- Color Selection
- Graffiti Resistance

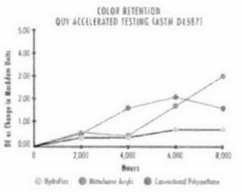


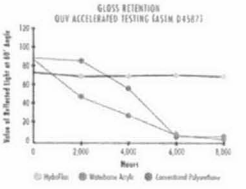
Fluoropolymer

- Unsurpassed Exterior Color & Gloss retention
- No clear coat required
- 2K
- Easy to touch up
- Color Selection
- Graffiti Resistance



Topcoat Color & Gloss Comparison





ANSI / NSF STANDARD 61

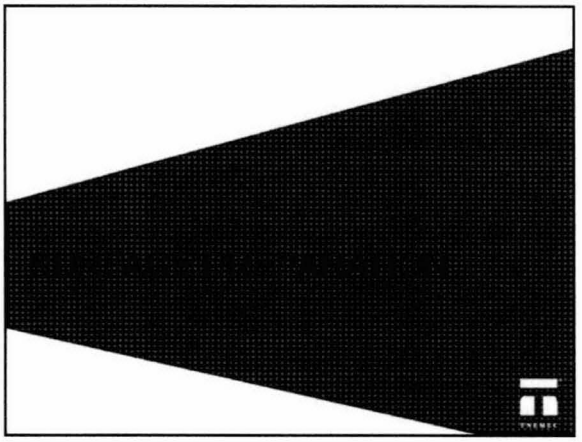
Drinking Water System Components – Health Effects

Section 5 - Protective (Barrier) Materials

VOC Regulations

NATIONAL AIM RULE*
NATIONAL ARCHITECTURAL AND INDUSTRIAL MAINTENANCE RULE

INTENDED USE	VOC (g/L)
FLAT COATINGS	250
INDUSTRIAL MAINTENANCE	450
HIGH HEAT INDUSTRIAL MAINTENANCE	420
METALLIC PIGMENTED	500
NON-FLAT COATINGS	380
NON-FLAT HIGH GLOSS	N/A
WATERPROOFING SEALERS	700



Why is surface preparation so important?

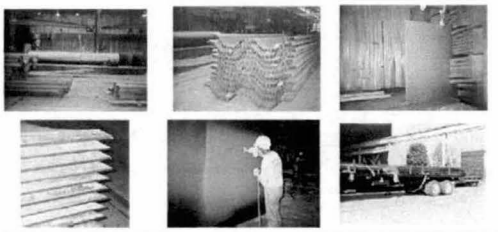
- Coating performance is dependent on adequate surface preparation
- Good coating systems fail prematurely due to inadequate surface preparation
- $ lost due to improper surface preparation

"Good surface prep can make a poor coating perform well, and poor surface prep can cause an excellent coating to fail."

-CoatingsPro Magazine
March 2004

New Tank Coating Steps

Shop Preparation & Priming

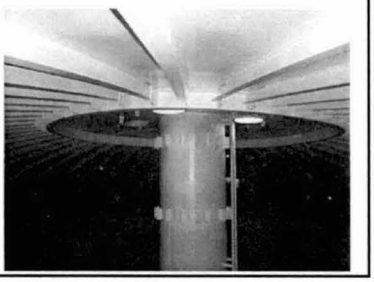


Field Surface Prep of Weld Seams

- SSPC SP-6 Exterior and Interior Dry
- SSPC SP-10 for Interior Wet

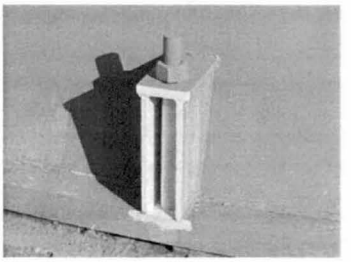
Stripe Coat

Applied to Welds & Edges



Stripe Coat

"Stripe Coat" applied to exterior anchor bolt chair (inaccessible area)

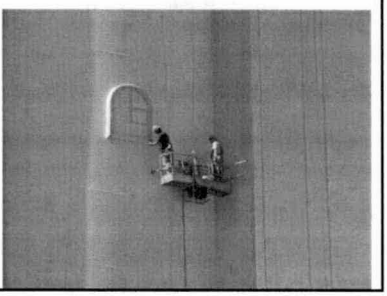


Intermediate Coat

Intermediate Coat over Zinc-Rich Primer

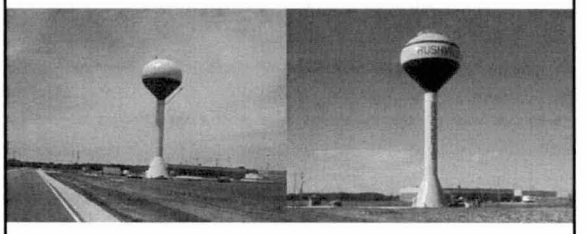
Finish Coat

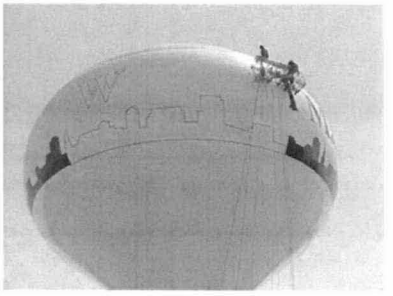
Finish coat being applied over intermediate coat



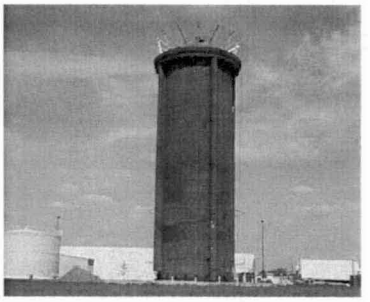
Intermediate Coat

Finish Coat

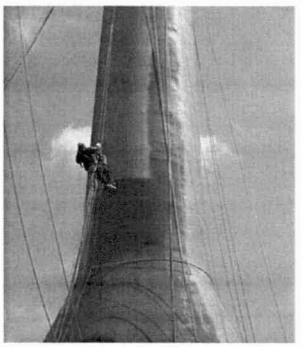




Logo /
Lettering
Application



Full Field
Blast & Paint



Full Field Applied
Coating System

Exterior SP6
Commercial Blast
Cleaning

American Water Works Association

AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks

5.0 Verification

5.1 Inspection & Testing

5.1.2 Film Thickness

"SSPC PA-2"

American Water Works Association

AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks

5.0 Verification

5.1 Inspection & Testing

5.1.3 Holiday Testing
- Inside coatings
- Below the TCL
- NACE SPO 188

American Water Works Association

AWWA Standard
D102-17 Coating Steel
Water – Storage Tanks

5.0 Verification

5.2 First Anniversary Inspection

5.2.1 General – "when specified"

5.2.2 Arrangements – 30 days in advance

5.2.3 Remedial work

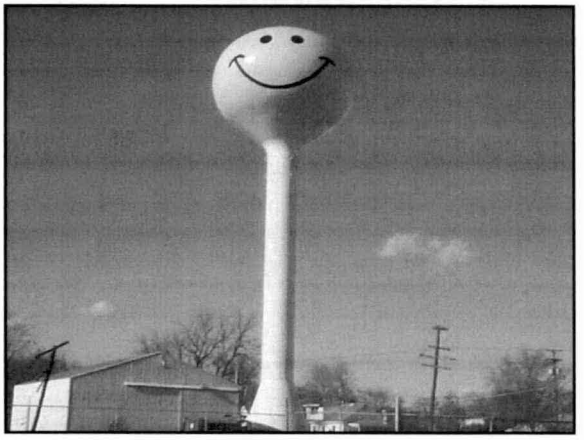
(3) Factors That Affect Coating Performance

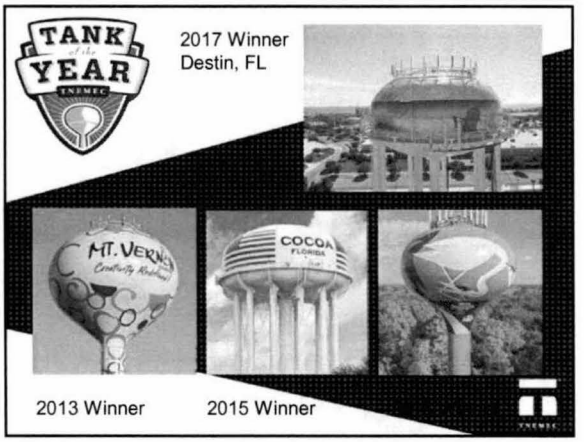
- Proper Coating Selection
- Proper Surface Preparation
- Proper Application

(3) Factors That Affect Coating Performance

- Proper Coating Selection
- Proper Surface Preparation
- Proper Application

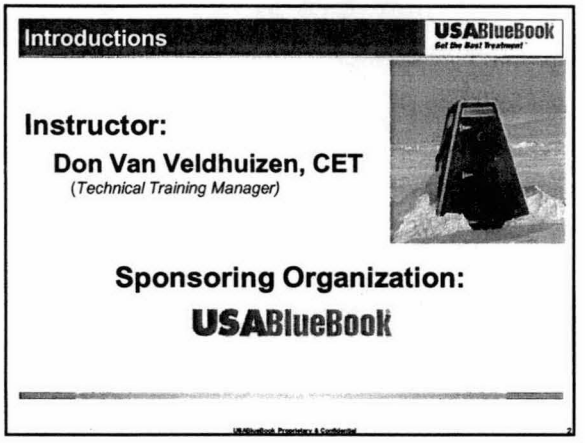
GOOD SPECIFICATION

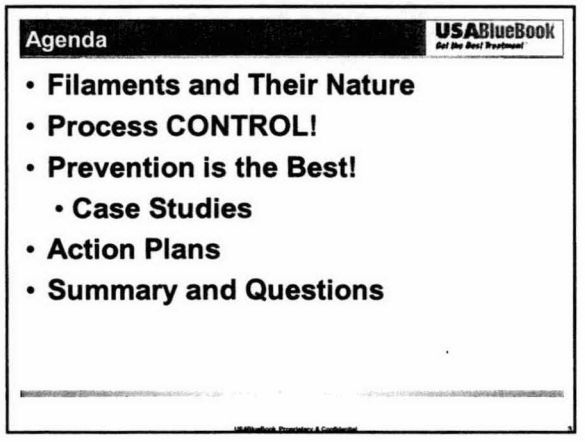



TANK of the YEAR
ENEMEC
2017 Winner
Destin, FL
MT. VERNON
COCOA
FLORIDA
2013 Winner
2015 Winner

Tuesday, August 28, 2018
Concurrent Session B, Session #11B, 1:30 p.m. – 2:30 p.m.

Now's Not the Time to Bulk Up: Filament Control
Don Van Veldhuizen, USA BlueBook

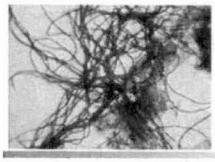


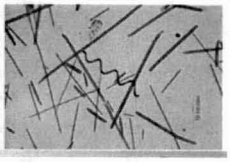


Filaments and Their Nature

USABlueBook
Get the Best Treatment

- Slow Growers
- Large Surface area
- Non-movers with few exceptions
- Value in activated sludge?





Filaments and Their Nature

USABlueBook
Get the Best Treatment

- Fats, Oil, Grease (FOG) Lovers
- Low Dissolved Oxygen (DO)
- Low organic/nutrient loading
- Septic Introductions

Filaments and Their Nature

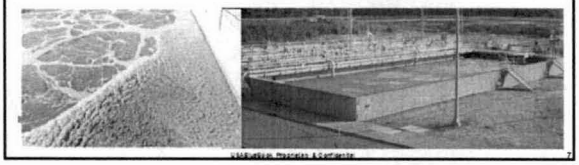
USABlueBook
Get the Best Treatment

- FOG Lovers
  - Influent characteristics
  - Typically cause foaming
  - Subsurface outfalls

Filaments and Their Nature

USABlueBook
Get the Best Treatment

- Low DO
  - Improper design
    - Extended Aeration, Oxidation Ditches
  - Organically overloaded
  - Dead spots (improper maintenance)



Filaments and Their Nature

USABlueBook
Get the Best Treatment

- Low organic/nutrient loading (F/M ratio)
  - Influent characteristic changes
    - Reduction in contributors
  - Solids balance issues
    - Too long MCRT/SRT
    - Low F/M

Filaments and Their Nature

USABlueBook
Get the Best Treatment

- Septic Introductions
  - Organic acids
  - Reduced sulfur

Process CONTROL!

USABlueBook Get the Best Treatment

- Flow Patterns
  - Are changes needed?

Consider Your

1. Organic loading
2. DO levels
3. Seasonal Flow fluctuations

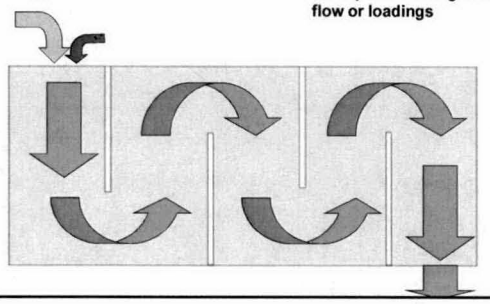
Process CONTROL!

USABlueBook Get the Best Treatment

Plug Flow

Standard Operation

No expected changes in flow or loadings



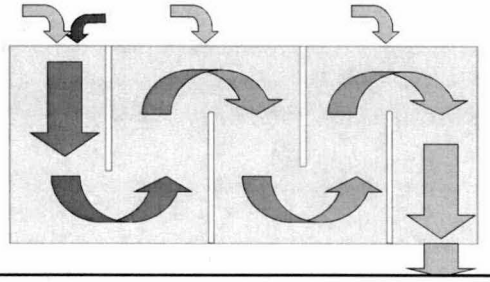
Process CONTROL!

USABlueBook Get the Best Treatment

Step Feed

Transitional pattern used prior to expected increase of hydraulic loading

Purpose: Solids retention



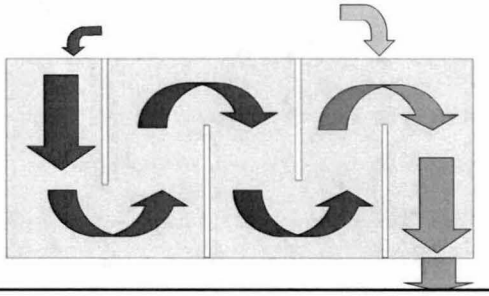
Process CONTROL!

USABlueBook
Get the Best Treatment

Contact Stabilization

Pattern for high flows

Purpose: Maximum solids retention



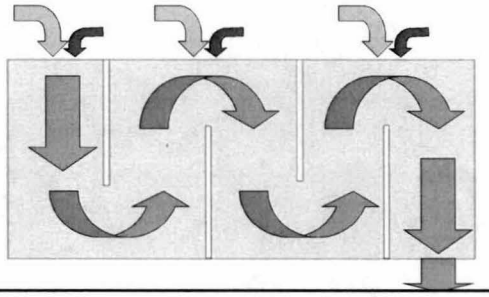
Process CONTROL!

USABlueBook
Get the Best Treatment

Complete Mix

Pattern for high organic loading

Purpose: Maximum BOD removal during organically overloaded conditions.



Process CONTROL!

USABlueBook
Get the Best Treatment

- **Dissolved Oxygen**
  - **Indicators**
    - **Too Much?**
    - **Too Little?**

Is Biological Nutrient Removal in Your future?

Process CONTROL!

USABlueBook
Get the Best Treatment

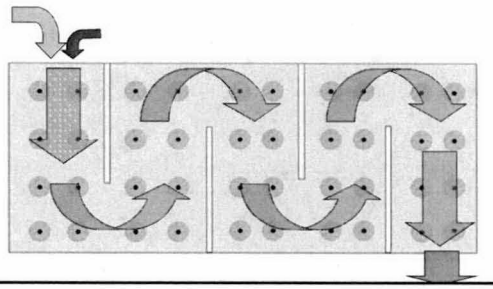
- **Standard Operation**
- **Filament Control**

Process CONTROL!

USABlueBook
Get the Best Treatment

Standard Operation

Typical DO throughout basin 1-3mg/L

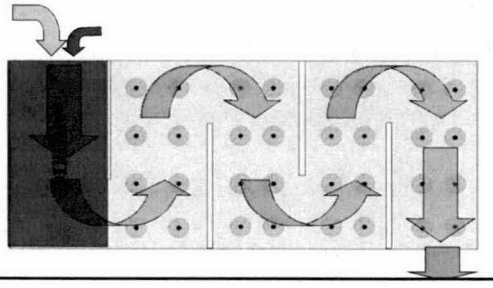


Process CONTROL!

USABlueBook
Get the Best Treatment

Filament Control

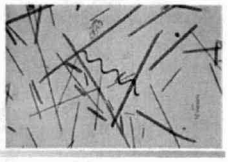
Anoxic zone (selector) give advantage to desirable treatment bacteria.



Process CONTROL!

USABlueBook
Get the Best Treatment

- Shearing Floc
  - A violent turbulence which breaks apart filaments resulting in pin floc.
  - Causes
    - Surface Aerators
    - Mixers
    - RAS Pumps



Process CONTROL!

USABlueBook
Get the Best Treatment

- Major control for the activated sludge process is the amount of sludge wasted.
- Wasting affects:
  - Effluent quality
  - Growth rate of microorganism
  - Oxygen consumption
  - MLSS settleability
  - Nutrient removal
  - Foaming/frothing
  - Nitrification

Process CONTROL!

USABlueBook
Get the Best Treatment

Maintain a balance between

- microorganisms (measured as MLVSS)
- food (measured as BOD)

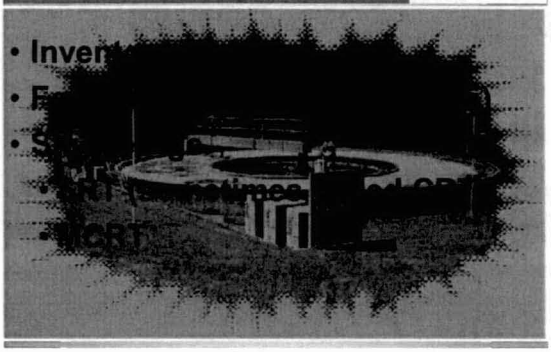
Wasting maintains balance by removing the amount of MOs grown each day (a "steady-state" situation), inorganics, non-metabolized organics.

Process CONTROL!

- **Wasting is typically accomplished by removing a portion of the RAS flow**
  - **Settled secondary clarifier sludge to solids handling**
  - **MLSS from aeration tank to solids handling (less concentrated, so requires more solids handling capacity)**

Solids Balance Control Techniques

- Inven
- F
- S
- MCRT



F:M Ratio

- **Based upon providing consistent proportion of bacteria for the amount of BOD/COD/TOC entering the Aeration Basin.**

$$\text{F:M} = \frac{\text{Influent BOD (lbs)}}{\text{MLVSS (lbs)}}$$

Typical F:M Ratios (for BOD)
Extended Aeration = .05 - .2
Conventional = .15 – 2.0

Best method to determine a low organic condition

F:M Ratio

USABlueBook

$$\text{Desired Inventory} = \frac{\text{(Current BOD/COD/TOC entering system, lbs)}}{\text{(Target F/M)}}$$

Wasting (lbs) = Current Inventory (lbs) – Desired Inventory (lbs)

Sludge Age (SRT/CRT or MCRT)

USABlueBook

- **Based upon the amount of time (days) a bacteria remains in the system before being wasted.**

$$\text{SRT} = \frac{\text{Aeration Basin MLSS (lbs.)}}{\text{Lbs. Wasted OR SS lbs. Influent}}$$

$$\text{MCRT} = \frac{\text{(MLVSS (lbs.) + Clarifier SS (lbs.))}}{\text{(Lbs. Wasted + Effluent (lbs.))}}$$

Sludge Age (SRT or CRT)

USABlueBook

Desired Aeration Inventory =

(Average lbs. Wasted from System) x Desired SRT

Wasting (lbs) =

Current Inventory (lbs.) – Desired Inventory (lbs.)

Sludge Age (MCRT)

USABlueBook Get the Best Treatment

Desired Inventory =

(Lbs. Leaving System) x Desired MCRT

Wasting (lbs) =

Current Inventory (lbs.) – Desired Inventory (lbs.)

Dealing with Digested Supernatant

USABlueBook Get the Best Treatment

Do Not re-seed your system with Filaments!

- **Cleanest Supernatant as possible**
  - **Avoid that last inch of clear (highest concentration)**
- **Disinfect if persistent**

Timberline Lodge (Case Study)

USABlueBook Get the Best Treatment

Case Study

USABlueBook Get the Best Treatment

Timberline Lodge

Nocardia

- Major foaming
  - Aeration basin
  - clarifier
  - primary digester
- Odor issues

Case Study

USABlueBook Get the Best Treatment

Timberline Lodge

- Challenges
  - Extended Aeration with disc tertiary treatment
  - Very high FOGS
  - Subsurface outfalls
  - Sludge handling
  - Pristine Area with special permit

Case Study

USABlueBook Get the Best Treatment

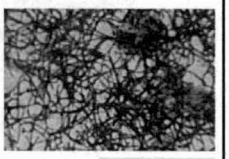
Timberline Lodge

- Advantages
  - Small distribution system
  - Established process control
  - Multiple treatment trains
  - Motivated workforce

Case Study

USABlueBook
Get the Best Treatment

Timberline Lodge



- Nocardia
  - FOG lover
  - Warmer temps
  - Older sludge ages

Process CONTROL!

USABlueBook
Get the Best Treatment

- Every system is unique!
  - Influent characteristics
  - Treatment design
  - Environmental factors
  - Interactions between the above

Get Creative

Prevention is the Best

USABlueBook
Get the Best Treatment

- Control at source
  - City ordinances
  - Public education

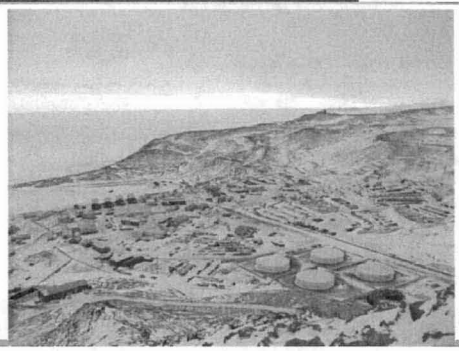
Prevention is the Best

USABlueBook
Get the Best Treatment

- Collection system control
  - Lift station cycling
  - Bio-augmentation
  - Auxiliary Air
  - Chemical addition

McMurdo Station (Case Study)

USABlueBook
Get the Best Treatment

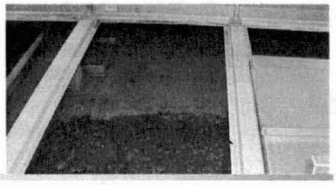


Case Study

USABlueBook
Get the Best Treatment

McMurdo Station

- Nocardia/Thiothrix
  - Occasional foam
  - Bulking



Case Study

USABlueBook
Get the Best Treatment

McMurdo Station

- Challenges
  - Extended aeration
  - Limited supply availability
  - Major population/staff changes
  - Very high organic loading
  - Short circuiting

Case Study

USABlueBook
Get the Best Treatment

McMurdo Station

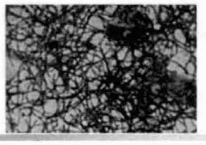
- Advantages
  - Newer system
  - Financial/staff support
  - No NPDES Permit

Case Study

USABlueBook
Get the Best Treatment

McMurdo Station

Nocardia	Thiothrix
FOG lover Warmer temps Older sludge ages	Septic Conditions



Prevention is the Best

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Get the Best Treatment

- Preliminary/Primary treatment
  - Proper maintenance
    - Short circuiting
    - Scum removal in primary clarifier
  - Engineered capital project

Prevention is the Best

USABlueBook
Get the Best Treatment

- Secondary Treatment

- Mechanical
  - Selector (designed or simulated)
  - Aeration dead spots
  - Oxygen diffuser type

Prevention is the Best

USABlueBook
Get the Best Treatment

- Secondary Treatment

- Biological
  - Process control program
  - Gravity thickener decant

Columbia Gorge (Case Study)

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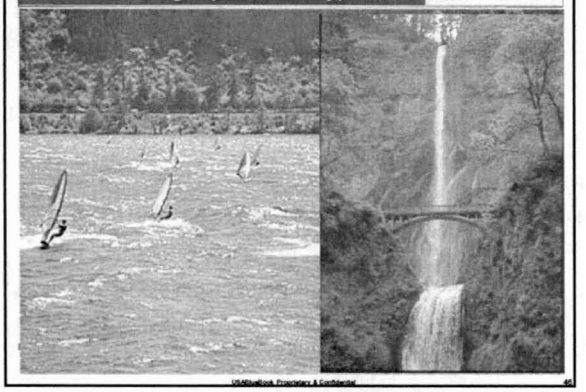
Get the Best Treatment



Case Study

USABlueBook
Get the Best Treatment

Columbia Gorge

- **Challenges**
  - **Sequencing Batch Reactor (SBR)**
  - **Severely under loaded**
  - **Pristine Area with special discharge permit**

Case Study

USABlueBook
Get the Best Treatment

Columbia Gorge

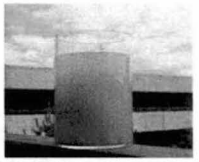
- **Advantages**
  - **Sequencing Batch Reactor (SBR)**
  - **Established process control program**
  - **Motivated city council**
  - **Contract operator**

Case Study

USABlueBook Get the Best Treatment

Columbia Gorge

- Microthrix Parvicella
  - Bulking Sludge
  - Foaming



Action Plans

USABlueBook Get the Best Treatment

- Chemical Additions
  - Indiscriminate killers
  - Special handling
  - Application
  - Permit considerations

Action Plans

USABlueBook Get the Best Treatment

- Chemical Additions
  - Application Rates
    - Direct to foam (300 mg/L)
    - Continuous Feed (10 mg/L)
    - Supernatant (5 mg/L)

Action Plans

USABlueBook
Get the Best Treatment

Creating an Environment

- Systematic Procedure
  1. Eliminate or reduce influent based causes
  2. Plant changes
  3. Process changes
  4. Chemical additions

Questions?

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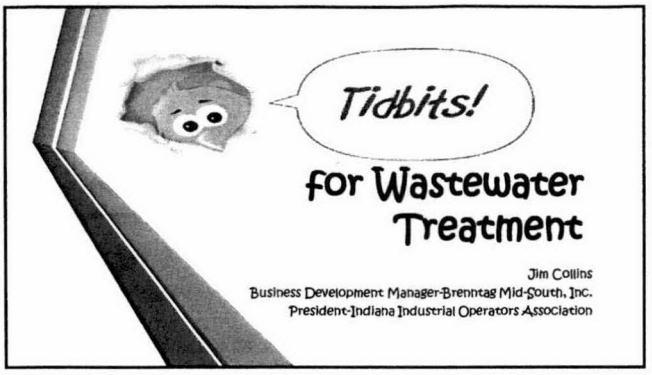
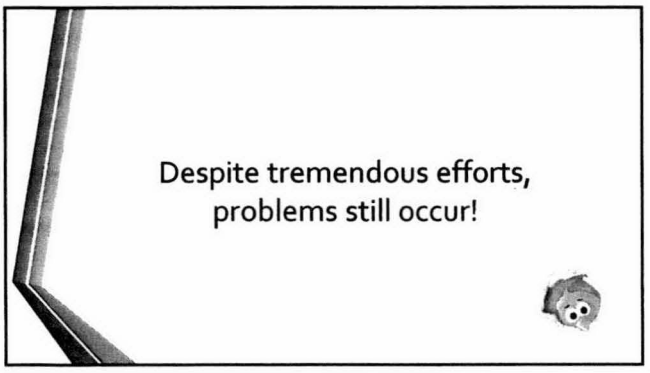
Don Van Veldhuizen, C.E.T.
dvanveldhuizen@usabluebook.com
(503) 544-0456

USABlueBook
www.usabluebook.com
(800) 548-1234

Tuesday, August 28, 2018
Concurrent Session B, Session #12B, 2:40 p.m. – 3:40 p.m.

Tidbits for Industrial Wastewater Treatment
Jim Collins, Brenntag Mid-South





City of Chicago vs. U.S. Steel - Portage, IN

- Alleged violation of the Clean Water Act
- Alleged violation of the NPDES Permit in place

View of Indiana steel mills from Promontory Point in Chicago's Hyde Park during subzero temperatures on Jan. 2, 2018

U.S. Steel's Portage, Indiana, plant released 56.7 pounds of chromium on Oct. 25.
That's nearly double the plant's allowable daily release of the potentially cancer-causing chemical.

Hexavalent Chrome is the Culprit

- Decorative finish
- Used for corrosion protection
- Used for wear resistance
- Has been around for years

How does industry treat hexavalent chrome?

Adopt Pollution Prevention Methods

- Minimize amount of soluble chromium entering the waste treatment plant
- Monitor chromium bath concentration
- Conductivity of rinse waters
- Counter flow rinse stages
- Installation of evaporators/ion exchange

Treatment of Hexavalent Chromium

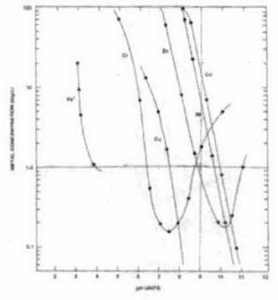
- Step 1: Reduce pH to 2.5 to 2.6.
- Step 2: Apply a source of sulfur.
  - Magnesium Bisulfite
  - Sulfur Dioxide
  - Sodium Bisulfite
- ORP will be a great benefit here!

Treatment of Hexavalent Chromium

- Step 3: Reaction time between mols of sulfur and hexavalent chrome must be <u>at least</u> 25 minutes.
- Step 4: Observe ORP for +250 mv. Observe color of the water. Blue? Yellow?

Treatment of Hexavalent Chromium

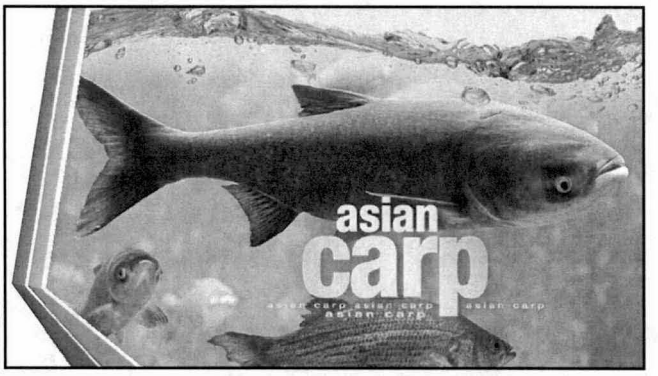
- Step 5: Increase pH with Lime or Caustic to 8.5 to 9.0.
- <u>Note</u>: *If pH is too high or low, you will fail!*



Treatment of Hexavalent Chromium

- Step 6: Add high charge density, high molecular weight anionic flocculant.
- Step 7: Mix time (medium speed) is 10 minutes.
- Step 8: Analyze effluent for chrome.

What is another problem for Lake Michigan?



Asian Carp

- Huge fear
- Really destroys fish
- Some have been found
- You can't take him to court!!

Tidbits - Q & A

(Not Kibbles and Bits!)

Q 1

"Any organic that has an affinity for minerals and/or soluble metals present in a solution"

A 1

Chelant or Sequestration Agent

Q 2

"Any organic that participates in a photo chemical reaction while emitting into the atmosphere"

A 2

Volatile Organic Compound

Q 3

The measure of a solution's ability to neutralize both <u>total</u> and <u>buffered</u> normality

A 3

Total Alkalinity

Q 4

What is an example of a buffer in a normal solution?

A 4

Boric Acid

Q 5

The measure of a solution's ability to neutralize both <u>total</u> and <u>buffered</u> alkalinity?

A 5

Total Normality

Q 6

Give example(s) of buffers present in an alkaline solution.

A 6

Phosphates
Carbonates
Hydroxides
Silicates
Amines

Q 7

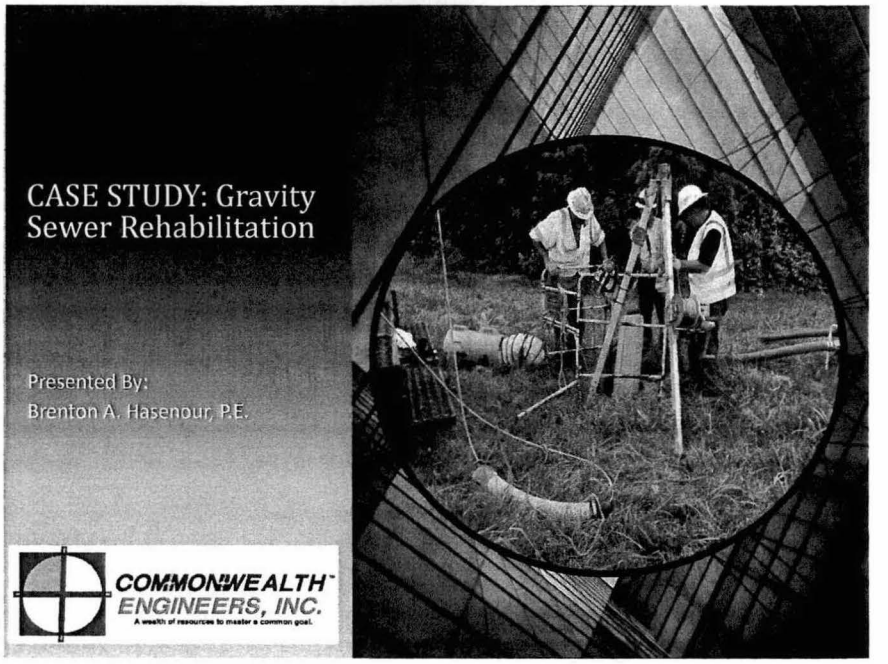
The measure of hydrogen relative to the presence of free hydroxide present in a solution.

A 7

pH

Tuesday, August 28, 2018
Concurrent Session B, Session #13B, 3:40 p.m. – 4:40 p.m.

Gravity Sewer Rehabilitation
Brenton Hasenour, Commonwealth Engineers



Presentation Outline:

- National General Aging Infrastructure Needs
- Case Study – Focus on Rural System
  - Town of Grandview
    - Background/Description of the Issue
    - Design Objective / Approach
    - Funding Utilized
    - Construction Cost / Construction
    - Performance
    - Acknowledgements
  - Town of Newburgh
    - Background -Project Similarity
    - Different Approach
    - Solution is Currently Underway

General Aging Infrastructure **Needs** – Future Demand

- Facts from ASCE's 2017 Wastewater Report
- United States Infrastructure Received a D+
- Currently 76% of the population rely on 14,748 Wastewater Treatment Plants for wastewater sanitation
- In US, its estimated that there are over 800,000 miles of public sewers and 500,000 miles of private sewer laterals
- More than 56 million new users are anticipated to be connected to a Wastewater Treatment Plant for wastewater sanitation; increasing demand on treatment plants will grow by more than 23% by 2032
- Needs over the next 20 years is expected to exceed $271 billion to support current and future needs

General Aging Infrastructure **Needs**

- Failure to Act: The Economic Impact of Current Investment Trends in Water and Wastewater Treatment Infrastructure - ASCE

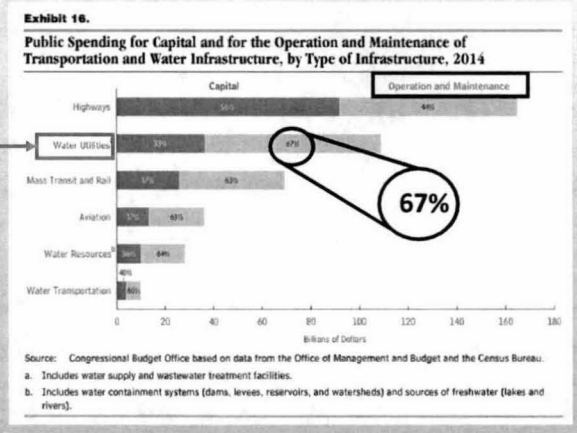
TABLE 1 ★ **Annual Capital Gap for Water Infrastructure in 2010, 2020, and 2040** *(billions of 2010 dollars)*

YEAR	SPENDING	NEED	GAP
2010	36.4	91.2	54.8
2020	41.5	125.9	84.4
2040	51.7	195.4	143.7

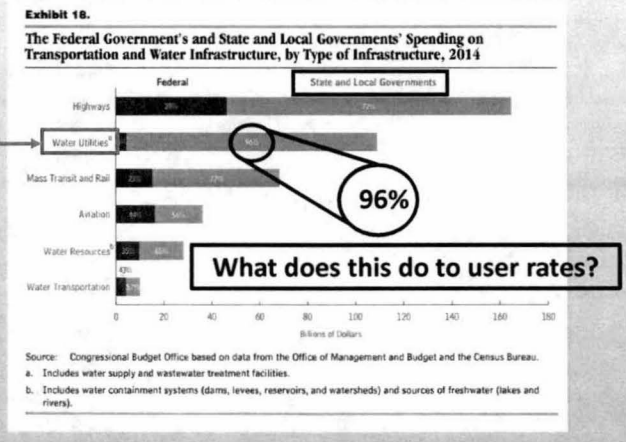
SOURCES: Needs calculated from EPA (1997a, 1997b, 2001, 2003, 2005, 2008, 2009, 2010). Spending calculated from CBO (2010) and USCB (2011a, 2011b).

General Aging Infrastructure **Needs** – Public Spending

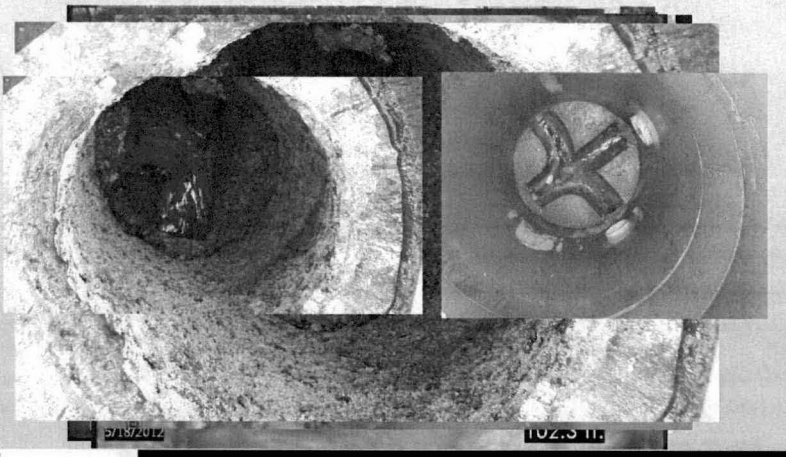
- Additional Interesting Facts from ASCE's 2017 Wastewater Report
- Local Governments spend $20 billion a year on capital sewer expenditures.
- Local Governments spend $30 billion annually on Operations and Maintenance



General Aging Infrastructure **Needs** - Funding



Why Present That Information?
Everyone has **Needs** – Not Just your City or Town



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A Wealth of Resources to Master a Common Goal

Needs of Aging Infrastructure is National Dilemma – What can we do?

- Don't Forget to Think Before you react.
- Get the Big Picture, Don't forget to Plan.
- Biggest Bang for the Buck.
- Cost Effective Solution Sets.
- Educate the customers.
  - "Plan Your Work and Work Your Plan" ~ Napolean Hill
  - "Work Smarter not Harder" ~ Allan F. Mogensen

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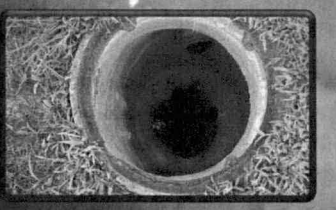
Grandview Case Study Agenda

- **Background**
- Design Objectives and Approach
- Utilization of Available Funding
- Construction Bidding
- Construction
- Performance
- Acknowledgements



FEET: 0035.6

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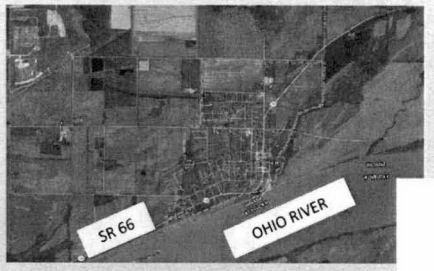
Background Information



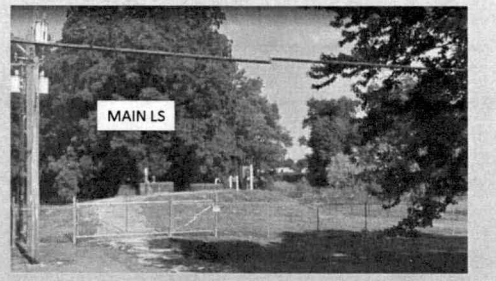
- Population: 749 (2010 Census)
- Location: South Central Indiana
- West of Lewisport KY, on the North side of the Ohio River
- Own and Operate Water, Sewer and Gas Utilities

Background – Treatment facility

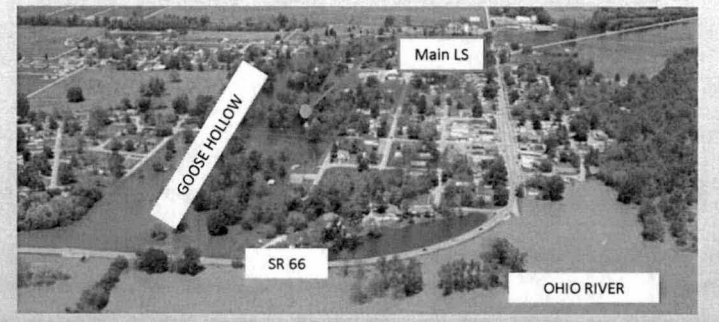
- Design Average flow: 120,000 Gallons
- Design Peak Flow: 400,000 Gallons
- Class I Two-Cell Lagoon Facility (Two-6 acres ponds), with headworks/screening.
- Currently utilize Liquid Chlorine for Disinfection.
- Discharges to Ohio River

Background – Collection System

- Separate Sanitary System
- Primarily constructed of Vitrified Clay Pipe in 1977, with very small portion of newer system constructed of PVC
- One Main Lift Station(IE Main Lift Station) Pumps to Treatment Facility – Reconstructed in 2007
- Main Ditch – Goose Hollow Runs Northeast Through Town, in which Town's Interceptor Follows – IE Goose Hollow Interceptor



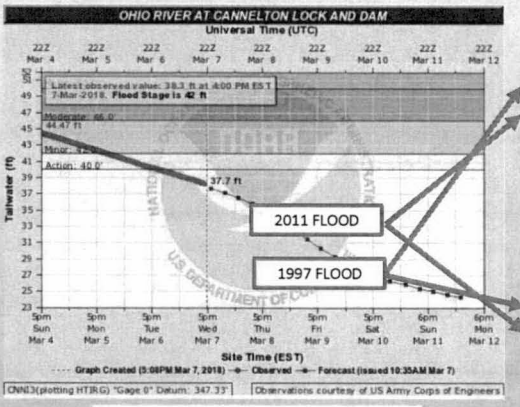
Background Information – Historical Floods



2011 Flood – Photo John Blair

- In April of 2011, Floods Hit Moderate Flood Levels from Ohio River

Background Information – Flood Stages



Flood Categories (in feet)	
Major Flood Stage:	50
Moderate Flood Stage:	46
Flood Stage:	42
Action Stage:	40

Historic Crests
(1) 60.80 ft on 01/27/1937
(2) 54.40 ft on 03/08/1945
(3) 53.90 ft on 03/08/1964
(4) 53.80 ft on 04/01/1913
(5) 52.42 ft on 03/08/1997
(6) 51.30 ft on 04/20/1948
(7) 49.30 ft on 04/28/2011
(8) 49.08 ft on 12/15/1978
(9) 48.90 ft on 03/24/1943
(10) 48.80 ft on 03/06/1962
Show More Historic Crests

National Weather Service
Advanced Hydrologic Prediction Service
Hydrograph
https://water.weather.gov/ahps/

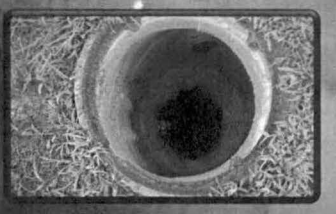
Background Information – Codes and Town's Dilemma

- For 2011:
  - Record Year Rainfall Total
  - Moderate Ohio River Floods
  - For the Year - Plant Capacity was 137% Over Avg. Design
- The Town had talks of potential development taking place and Town elected officials wanted to be proactive and seek options to reduce flow.

Grandview WWTP Lagoon

Grandview Case Study Agenda

- Background
- **Design Objectives and Approach**
- Utilization of Available Funding
- Construction Bidding
- Construction
- Performance
- Acknowledgements



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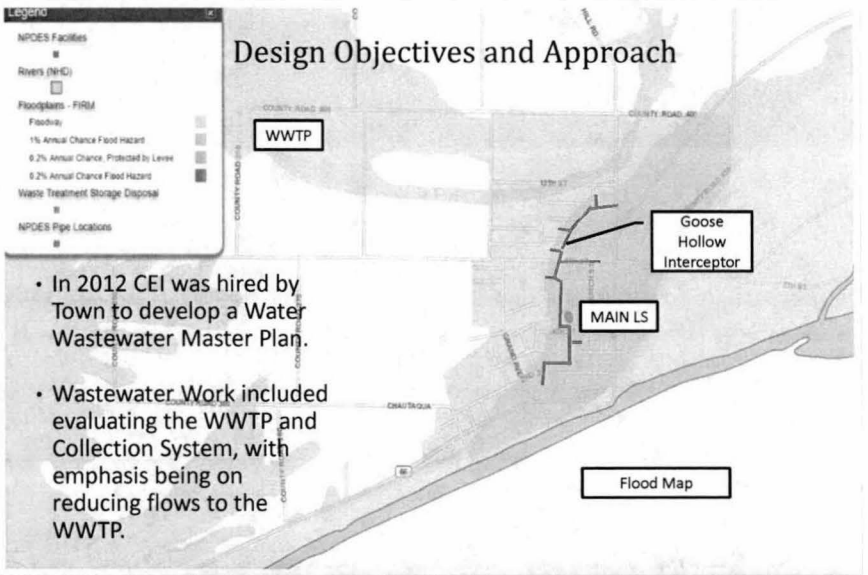
A Wealth of Resources to Master a Common Goal

Design Objectives and Approach



- In 2012 CEI was hired by Town to develop a Water Wastewater Master Plan.
- Wastewater Work included evaluating the WWTP and Collection System, with emphasis being on reducing flows to the WWTP.

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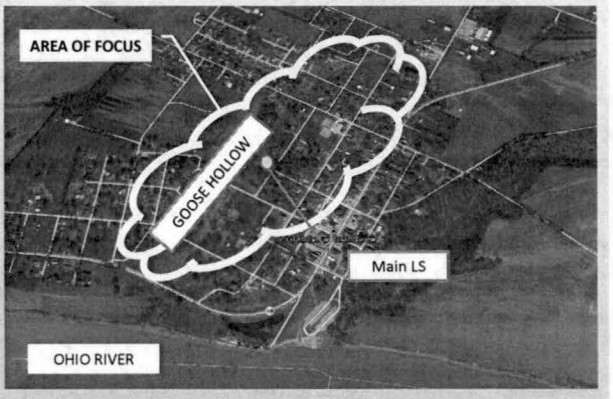
A Wealth of Resources to Master a Common Goal

FOCUS Reduce Flows: Goose Hollow Interceptor

- The Town's institutional knowledge of the system allowed CEI to focus on the priority within the collection system:

  Goose Hollow Interceptor

- Interceptor consist of 8" – 10" vitrified clay pipe.
- Many Inactive Laterals



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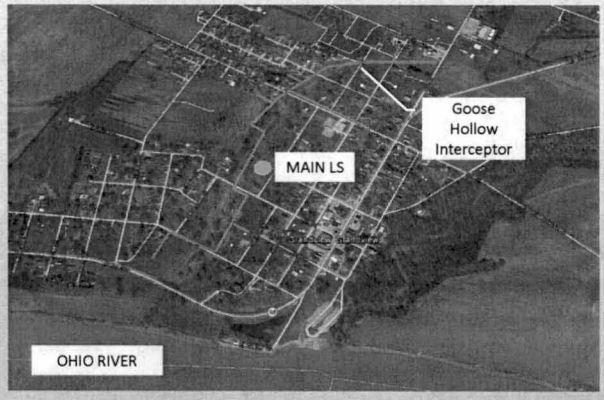
Goose Hollow Interceptor Work Included:



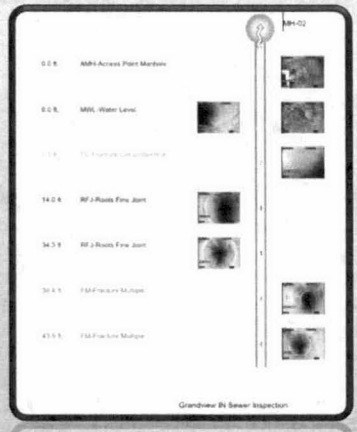
- Physical Evaluation:
  - Manhole &
  - Pipeline Inspection
- Flow Review for Overall System:
  - Flow Analysis utilized Town's Monthly Reports of Operation (MROs) &
  - Main Lift Station pump run data

Goose Hollow Interceptor
Physical Manhole and Pipeline Inspection

- Town elected to hire a company to provide Closed Circuit Television (CCTV) inspection for the project.
- Goal:
  - Clean the lines
  - Remove obstructions or roots
  - Observe and document pipe conditions
  - Provide line rating (Per NASSCO)
- NASSCO (National Association of Sewer Service Companies)

Goose Hollow Interceptor
Physical Manhole and Pipeline Inspection Documentation

- Pipe Inspection included:
  - Verification of pipe size, material and length.
  - Locating and documenting defects and laterals.
  - Inspection reports with images were provided.
- Manhole Inspections included:
  - Barrel and cone material and condition
  - Frame and frame seal material and condition
  - Channel / bench presence and condition
  - Look for Active Water Infiltration



Example Inspection Report

Goose Hollow Interceptor
Flow Analysis Review – BIG Picture

- CEI evaluated three years of MRO data from January 2011 to December 2013 with flow summary below:

WWTP INFLUENT FLOW SUMMARY – JANUARY 2011-DECEMBER 2013	
Average Daily Flow	0.107 MGD
Peak Monthly Averaged Daily Flow	0.426 MGD

- Recall Actual Design Peak Flow

~~Capacity of WWTP = 0.400 MGD~~
~~New Plant Capacity Rating = 0.408 MGD~~

Goose Hollow Interceptor
Flow Analysis Review – Diving into Details

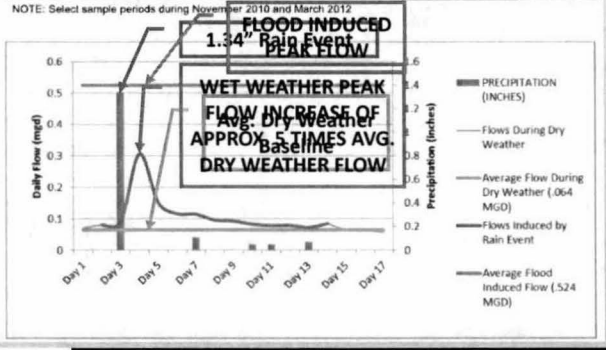
Detailed MRO Analysis Findings:

- Avg. Dry Weather Flow Calculation = 0.064 MGD
  - Based on no precipitation or increased level of flood waters
- Wet Weather Flow Calculation (from 1.34" rainfall event)
  - Flows increased by nearly 5X the average dry weather flow (0.3 MGD)
- Flood Water Induced Peak Flow Calculations (from April 2011 flood)
  - From April 12 – April 25 flows reached over (0.5 MGD) until flood receded

Goose Hollow Interceptor
Flow Analysis Detailed Summary:

COMPARISON OF RAIN & FLOOD INDUCED PEAK WASTEWATER FLOW	
Average Dry Weather Flow	0.064 MGD
Wet Weather Induced Peak Flow	0.306 MGD
Flood Water Induced Peak Flow	0.524 MGD

NOTE: Select sample periods during November 2010 and March 2012



Design Approach
Problem Identified: Solution Sets

- Goal: Reduce infiltration and inflow
  - Reduce Flood Induced Peak Flows; up to Ohio River Moderate Flood Stage Level
  - Additional Benefits, reduction of electrical and disinfection cost
- Solution has to be Cost Effective Solution
  - (Small Town with Small Budget – Biggest bang for the Buck)
  - Design must reduce construction risk for Contractor
- Town wanted to minimize service and traffic disruptions
- Town wanted to seek assistance to fund project

Design Approach – Sewer Pipe Solutions (General Methods)

- Traditional Open-Cut Replacement
- Mechanical Spot Repairs
- Sliplining
- Pipe Bursting/Splitting
- Fold and Form
- Cured-In-Place Pipe (CIPP)
- Shotcrete
- Geopolymer Mortar Sprays
- Grout Packing

Pipe Splitting Apparatus

Design Approach – Manhole Structure Solutions (General Methods)

- Complete Replacement
- Replacement Castings and Risers
- Hydrophilic Grout/Urethane Injections (Exterior of Structure)
- Various Internal Coatings
  - Cementitious/Grouts, epoxy, polymers, etc.
- Seals or Inserts
  - Concrete poured in place, fiberglass or PVC

Sauereisen – Epoxy Modified Cementitious Multi-Component System

Design Approach – Grandview Specific Sewer Pipe and Manhole Considerations

From Physical Data Collection:

- CCTV Pipe Inspection Reports
  - No collapsed pipe;
  - Lateral Connections were 95% Factory Installed;
  - No Major Sags were Encountered; and
  - Pipe was generally Structurally Sound
- Manhole Inspection Reports:
  - No fully deteriorated structures;
  - No major structural defects;
  - Castings/risers lacking seals or had open areas for water; and
  - Manhole Joints were leaking

Open Pick Hole in Casting

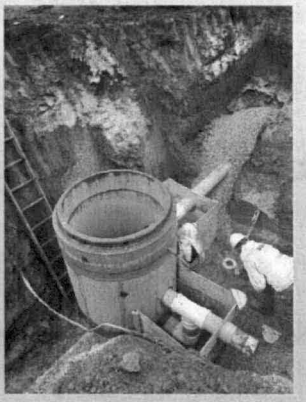
Design Approach – Grandview Specific Sewer Pipe and Manhole Alternatives

SEWER PIPE

- Traditional Open-Cut Replacement
- Mechanical Spot Repairs
- Cured-In-Place Pipe (CIPP)

MANHOLES

- Complete Replacement
- Replacement Castings and Risers
- Active Water Sealing
- Internal Coating



Replacement Manhole And Sewer Pipe

Design Approach – Selection of an Alternative Construction Cost Estimates

- Traditional Open-Cut Sewer and Manhole Replacement
  - Estimated Cost - $550,000
- Trenchless Methods (Mechanical Spot Repairs, CIPP Liner and Manhole Linings and Replacements
  - Estimated Cost - $364,000

1.5 X Cost Difference

TOWN'S BUDGET

Remediation Methods would be able to complete work throughout Goose Hollow

VS.

Traditional Methods would only be able to resolve half Goose Hollow to cover Moderate

Design Approach – Selected Alternative

SELECTED ALTERNATIVE

- Town Elected to Proceed with Rehabilitation Methods for Sewer and Manholes

NEXT DESIGN STEP

- Finalize Plans and Specifications and prepare for bidding.

Grandview Case Study Agenda

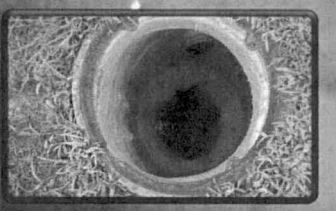
- Background
- Design Objectives and Approach
- **Utilization of Available Funding**
- Construction Bidding
- Construction
- Performance
- Acknowledgements

Utilization Of Available Funding

- Town Received a Grant in amount of $364,000 (with 10% match)
- Next Step: Obtain construction bids

Grandview Case Study Agenda

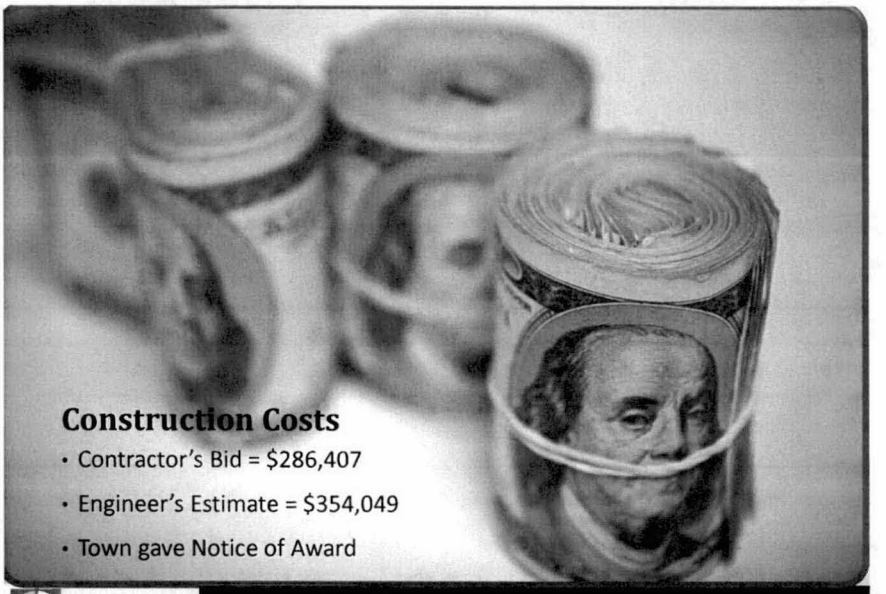
- Background
- Design Objectives and Approach
- Utilization of Available Funding
- **Construction Bidding**
- Construction
- Performance
- Acknowledgements



FEET: 0035.6

COMMONWEALTH ENGINEERS, INC.

A Wealth of Resources to Master a Common Goal



Construction Costs

- Contractor's Bid = $286,407
- Engineer's Estimate = $354,049
- Town gave Notice of Award

COMMONWEALTH ENGINEERS, INC.

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Grandview Case Study Agenda

- Background
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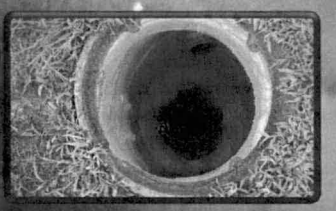

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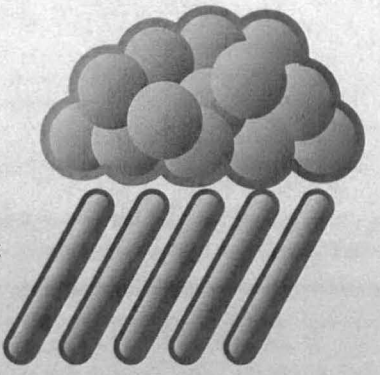
Construction

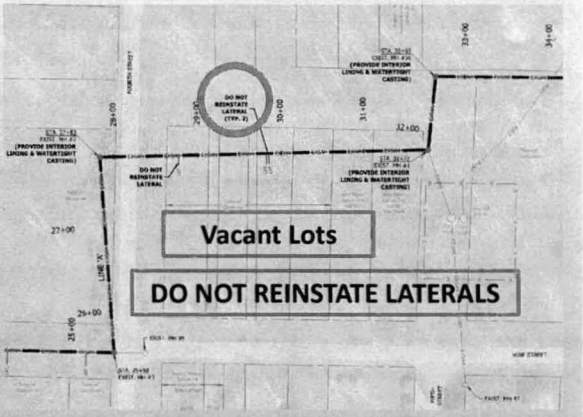
- Notice To Proceed – April 6, 2016
- Then, Wet Weather…
- Slight Delay
- Overall – 4 weeks for manhole work and additional 5 weeks for lining



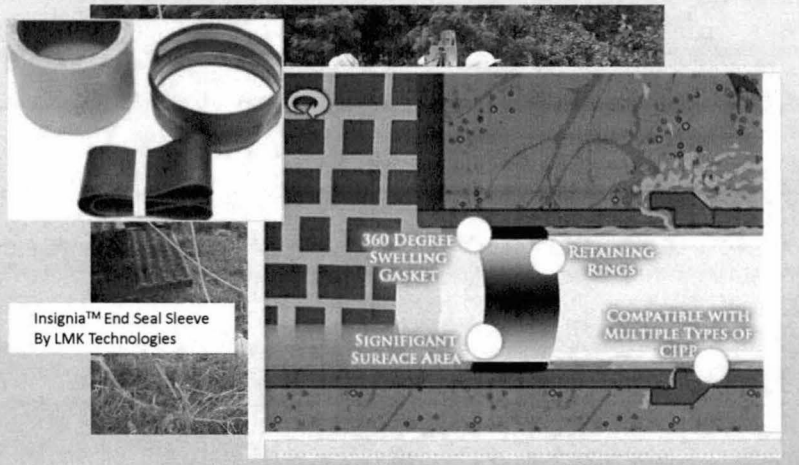
Construction Project

Work Included:

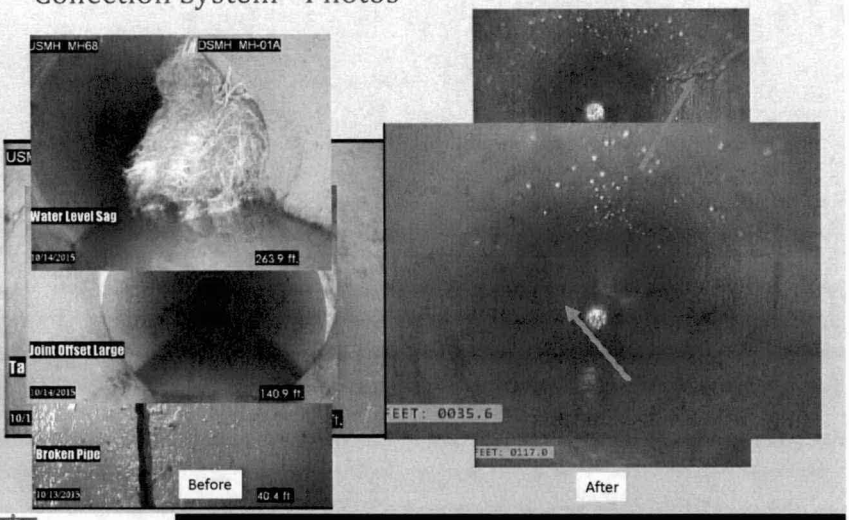
- Over 7,100 Linear Feet of 8" and 10" CIPP Liner Installation
- Target Manholes: Structures with Rims below Moderate Flood Stage Elevation
  - 16 Manholes Being Lined
  - 13 Manholes with Watertight Lids



Construction – CIPP Process Photos



Collection System - Photos



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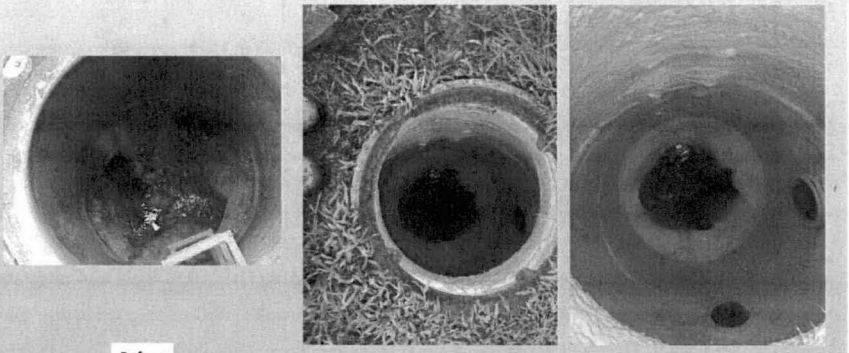
Manhole Rehabilitation - Photos



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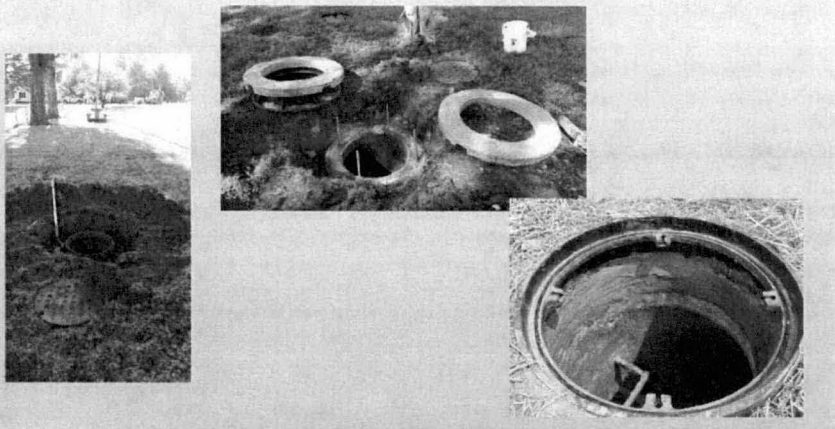
Manhole Rehabilitation – Installation of Casting



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Grandview Case Study Agenda

- Background
- Design Objectives and Approach
- Utilization of Available Funding
- Construction Bidding
- Construction
- **Performance**
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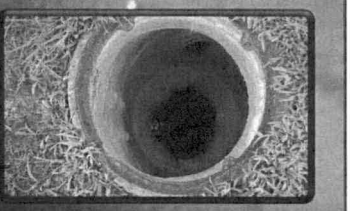

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Performance – As Seen at Treatment Facility

Summary Big Picture

Long Term Flow Data

- From 2011 – 2015 Pre-Project
  Avg. Influent Plant Flow = 0.103 MGD
- From August 2016 – January 2018 Post Project (18 month Duration)
  Avg. Influent Plant Flow = 0.044 MGD
  Reduction of 59,000 gallons / day or 32,155,000 gallons over the 18 month Duration

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Performance – As Seen at Treatment Facility

Summary Big Picture

Long Term Chemical Usage

- From 2011 – 2015 Pre-Project
  Chlorine (CL2) Usage: 3629 lbs / year
  Sulfur Dioxide (SO2) Usage: 6268 lbs / year
- Year 2017 Post Project
  Chlorine (CL2) Usage: 2317 lbs / year
  Sulfur Dioxide (SO2) Usage: 3299 lbs / year

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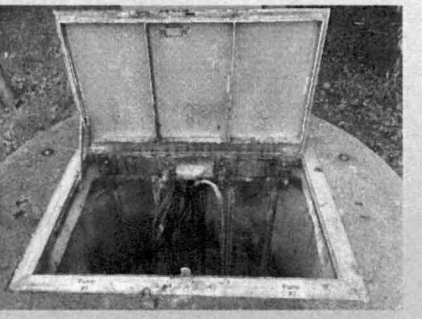
Other Benefits
Performance – Main Lift Station

Main Lift Station Collects Flow from Entire Grandview Collection System

Less flow, reduces electrical consumption and equipment wear!



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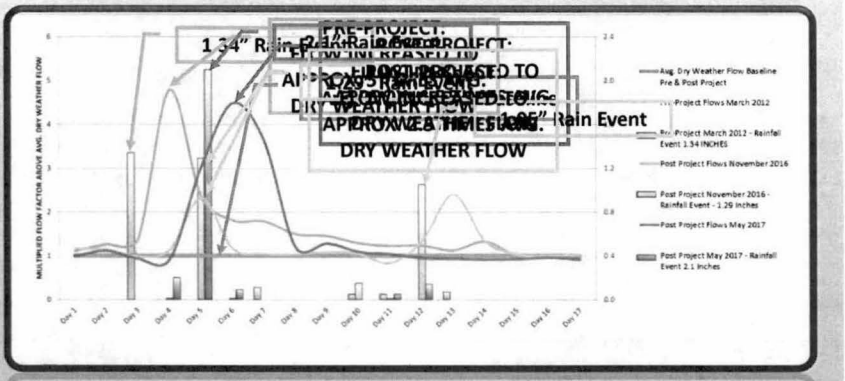
Performance – As Seen at Treatment Facility

Summary Wet Weather Pre and Post Project Flow Data



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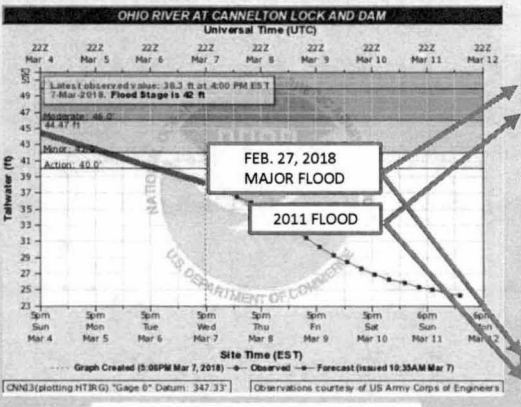
REMEMBER THIS SLIDE?



National Weather Service
Advanced Hydrologic Prediction Service
Hydrograph
https://water.weather.gov/ahps/

Flood Categories (in feet)	
Major Flood Stage:	50
Moderate Flood Stage:	46
Flood Stage:	42
Action Stage:	40

Historic Crests
(1) 60.80 ft on 01/27/1937
(2) 54.40 ft on 03/08/1945
(3) 53.90 ft on 03/08/1964
(4) 53.80 ft on 04/01/1913
(5) 52.42 ft on 03/08/1997
(6) 51.30 ft on 04/20/1948
(7) 50.68 ft on 02/27/2018 (P)
(8) 49.30 ft on 04/28/2011
(9) 49.08 ft on 12/15/1978
(10) 48.90 ft on 03/24/1943
Show More Historic Crests

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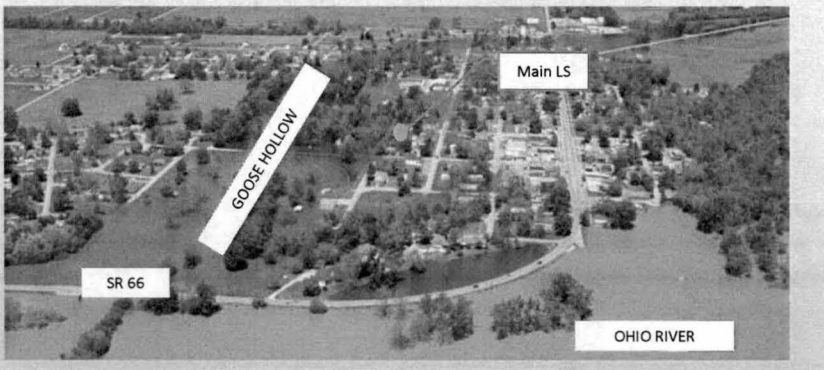
REMEMBER THIS 2011 FLOOD PICTURE?

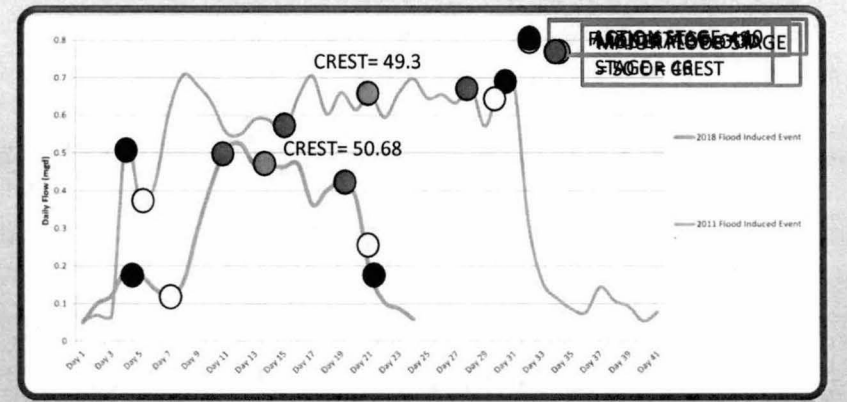


2011 Flood – Photo John Blair

FEBRUARY 2018 MAJOR FLOOD
(PICTURE TAKEN 4 DAYS PRIOR TO CREST)

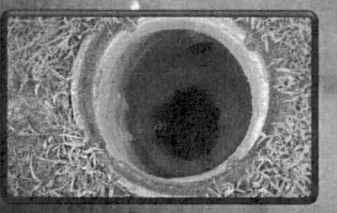
Performance – As Seen at Treatment Facility

Summary Flood Induced Flows From Action Stage to Major Flooding



Grandview Case Study Agenda

- Background
- Design Objectives and Approach
- Utilization of Available Funding
- Construction Bidding
- Construction
- Performance
- **Acknowledgements**



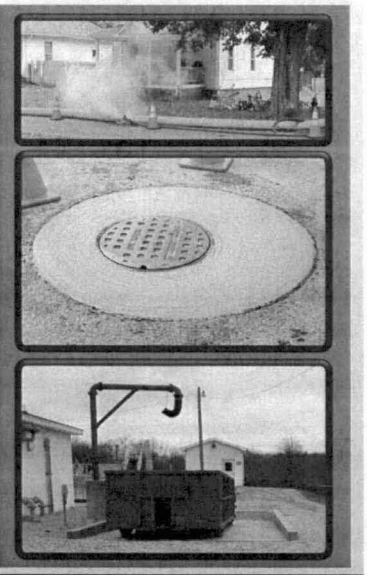
FEET: 0035.6

COMMONWEALTH ENGINEERS, INC.

A Wealth of Resources to Master a Common Goal

Newburgh, IN Case Study Agenda

- **Background – Project Similarity**
- Same Objective Different Design Approach
- Solution is Currently Underway



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Background Information

- **Service Area Population = 38,000 residents**
- **Location: Southwest Indiana along the Ohio River**
- **Own and Operate Sanitary Sewer**

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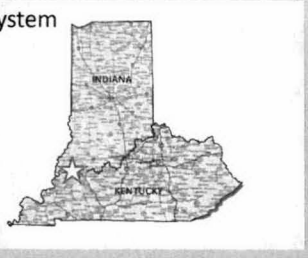
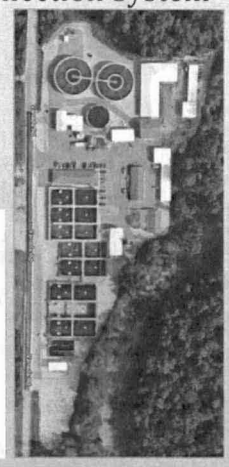
Background – Treatment facility & Collection System

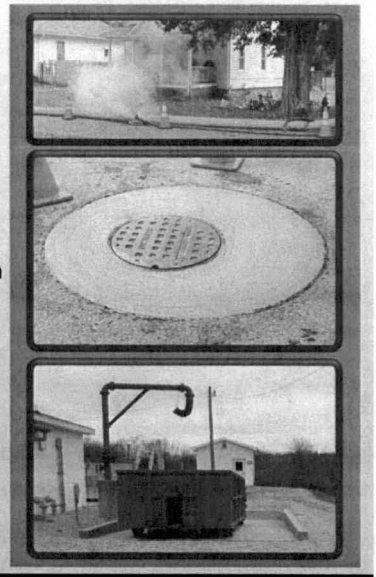
- Design Average flow: 7.36 mgd
- Design Peak Flow: 19.00 mgd
- Facility is a sequencing batch reactor treatment (SBR)
- Separate Sanitary System





Newburgh Case Study Agenda

- Background – Project Similarity
- Same Objective Different Design Approach
- Solution is Currently Underway



Design Objectives

- Reduce infiltration and inflow
- Reduce upgrades costs
- Reduce treatment costs

Design Approach

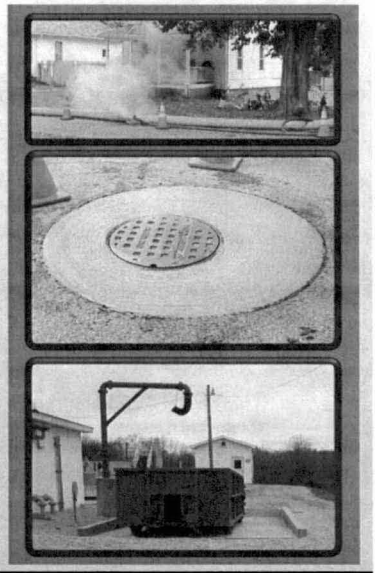
- Focused Approach
- Flow Metering and Hydraulic Modeling to Investigate Flows
- Completed Limited Smoke Testing

DESIGN APPROACH

SMOKE TESTING

Newburgh Case Study Agenda

- Background – Project Similarity
- Same Objective Different Design Approach
- Solution is Currently Underway



www.commonwealth-engineers.com

Questions?

Commonwealth Engineers, Inc.
Brenton A. Hasenour, P.E.
Project Manager
bhasenour@contactcei.com

COMMONWEALTH ENGINEERS, INC.

A Wealth of Resources to Master a Common Goal

Utility Legislative Updates
Damon Talley, Stoll, Keenon Ogden

HOT LEGAL TOPICS

Damon R. Talley
Stoll Keenon Ogden PLLC
damon.talley@skofirm.com

August 28, 2018

STOLL KEENON OGDEN PLLC

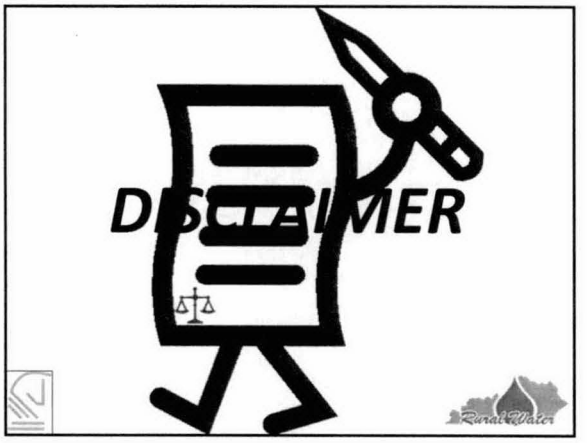
DISCUSSION TOPICS

1. Notice to PSC
2. Franchises & Contracts
3. Excessive Water Loss
4. Borrowing Money

Continued . . .

DISCUSSION TOPICS

5. Paying Bills
6. Budget
7. Recent PSC Orders
8. 2018 General Assembly
9. Prevailing Wages



PSA for PSC

Reporting Requirements

- Must Notify PSC if . . .
  - Vacancy Exists
  - Appointment Made
- When? Within 30 Days

Vacancy

- Inform CJE 60 Days Before Term Ends (KRS 65.008)
- CJE / Fiscal Court – 90 Days
- Then, PSC Takes Over
  - ➢ CJE Loses Right To Appoint

E-Mail Address Regs.

- All PSC Orders Served by E-mail
- Duty to Keep Correct E-mail Address on file with PSC
  - ➢Default Regulatory E-mail Address
- Duty to List E-mail Address in Application & All Other Papers
  - ➢Utility Official
  - ➢Its Attorney

E-Mail Address

- Who is Covered?
  - Water Districts
  - Water Associations
  - Investor Owned Utilities
  - **Municipal Utilities**

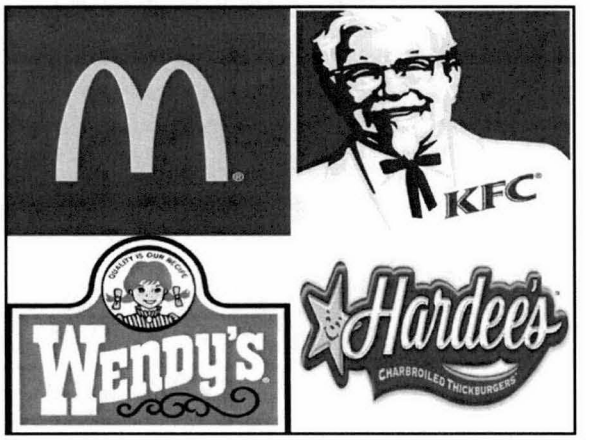
Default Regulatory E-mail Address

- Send E-mail to PSC
  - psc.reports@ky.gov
- Send Letter to PSC
  - Gwen R. Pinson, Executive Director

Franchises
and
Contracts

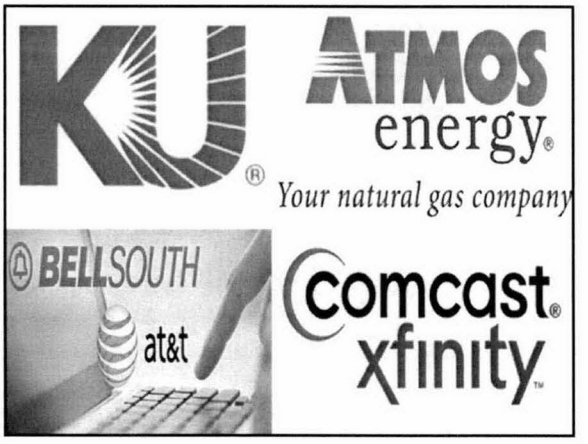
Franchise

- Definition
  - ➢ Private
    - Rights granted by company to individual or business to sell a product
    - Examples



Franchise

- Definition
  - ➢ Government
    - Privilege granted by government to utility to provide specific utility service
    - Permission to erect facilities over & under streets, alleys, & sidewalks
    - Fee: 3%
    - Examples



Livingston County Case

Ledbetter W.D.
vs.
Crittenden-Livingston WD

Circuit Court
Case No. 2015-CI-00079
Opinion Rendered: 1-25-17
Status: On Appeal

Franchise Case - Holding

40-year

Water Supply Contract
Between 2 Water Districts

Invalid

- Why? Contract = Franchise
- Over 20 Years
- Basis: Kentucky Constitution Section 164

Franchise Case

Crittenden - Livingston WD
vs.
Ledbetter WD

Court of Appeals
Case No. 2017-CA-000578
Briefs Filed: 7-31-17 & 9-21-17
Amicus Brief: 8-11-17
Status: Pending

Ky. Constitution Section 164

No **county, city, town, taxing district or other municipality** shall be authorized or permitted to grant any franchise or privilege, or make any contract in reference thereto, for a term exceeding **twenty years**. Before granting such franchise or privilege for a term of years, such municipality shall first, after due advertisement, receive bids therefor publicly, and award the same to the highest and best bidder; but it shall have the right to reject any or all bids.

Why?

- 340 Water Utilities
- 169 WTPs
- 50% Buy Water
- Need Water Supply Contract
- Long Term

. . .

How Long Is Long Term?

- Lender
  - ➢ RD: 40 years
  - ➢ KIA: 20 or 30 years
  - ➢ Bonds: Length of Bonds

Significance

- If Franchise . . . 20 Year Limit
  - ➢ Can't Borrow $ from RD
  - ➢ Other Sources – Only if < 20 years
    - KIA
    - Bonds
    - KRWFC

Legal Analysis

- Does Water District Have Franchising Authority?
  - ➢ Constitution: **NO**
  - ➢ Judge: **YES**
  - ➢ Damon: **NO**

Circuit Judge's Rationale

- Sovereign Power : Franchise
- Water District is Sovereign Power
- Water District : Franchise
- Problem
  - ➢ Ignored Wording of Constitution

Legal Analysis

- Is Water Purchase Agreement a Franchise?
  - Constitution: Silent
  - Case Law: Silent
  - AG Opinion: Yes 1981
  - Judge Yes
  - Damon: No

Circuit Judge's Rationale

- "The court concludes that the Water Purchase Contract is in fact a franchise . . ."
- Conclusion
- No Explanation

KRWA's Role

- Filed Amicus Brief
  - "Friend" of Court
- Protect Validity of Contracts
- Protect Ability to Obtain $

What's Next?

- All Briefs Filed
- Oral Arguments 4-24-18
- C/A Decision ? ? ?
- Ky. Supreme Court ? ? ?

Your Role

- Ruling Is Limited to Livingston County . . . for Now
- Don't Change Behavior . . . for Now
- Stay Tuned
- Alert KRWA

Excessive Water Loss

Unaccounted-for Water Loss

- **807 KAR 5:066, Section 6(3)**

". . . for **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."

Terms

- Unaccounted-for Water Loss
  - ➢ 15% Maximum
  - ➢ Allowance for Flushing, Etc.
- NRW – Non Revenue Water
  - ➢ No Allowance for Flushing
- Ray's Ratio

Ray's Ratio

$$\frac{\text{Water Produced \& Purchased}}{\text{Water Sold}}$$

$$\frac{1{,}436{,}000}{1{,}306{,}673} = 1.099$$

Ray's Ratio

- Ray's Ratio: 1.099
- For Every 1,000 Gallons Sold
- Produce or Purchase: 1,099 Gallons
- Extraordinary ! ! !

Water Loss Comparison

	Utility	Unaccounted For Water	NRW	Ray's Ratio
1	Oldham Co.	7.4 %	9.0 %	1.099
2	North Nelson	7.0 %	9.3 %	1.103
3	Grayson Co.	6.6 %	11.4 %	1.128
4	Hardin # 1	9.4 %	13.0 %	1.149

Water Loss Comparison

	Utility	Unaccounted For Water	NRW	Ray's Ratio
5	Hardin # 2 (Before)	11.6 %	14.4 %	1.169
6	Hardin # 2 (After)	18.8 %	21.4 %	1.272
7	Larue Co.	11.2 %	13.6 %	1.158
8	Meade Co.	15.8 %	18.3 %	1.224

Water Loss Comparison

	Utility	Unaccounted For Water	NRW	Ray's Ratio
9	MWL - 1	12.1 %	25.3 %	1.340
10	MWL - 2	14.4 %	28.3 %	1.395
11	EWL - 1	27.9 %	31.6 %	1.462
12	EWL - 2	14.9 %	31.7 %	1.545
13	EWL - 3	37.1 %	51.4 %	2.058

PSC Case No. 2016 - 068

Decided: 8-17-16

Utility: Water District

Type: ARF

Issue: Excessive Line Loss

PSC Held:

- Water Loss 39%
  - ➢ 15% Maximum Allowed
  - ➢ Disallowed 24% Excess
- Disallowed $135,000 Expenses Excess Water Loss (Cost to Purchase & Pump)

PSC Ordered:

"The Commission is concerned with **excessive water loss** and related costs and directs ____ District to **develop and formally adopt a written plan to reduce excessive water loss.** The plan should identify all sources of water loss and each corrective action ____ District will take to minimize water loss from each source."

Other Recent Water Loss Cases

PSC Case No. 2017-064

Decided: 3-09-2017

Utility: Water District

Type: CPCN Granted

Holding: Reprimand & Warning
Loss = 17%

PSC Ordered:

"Failure by _____ District to make **significant** progress towards **reducing** unaccounted-for water loss may cause the Commission to pursue **additional action** with the utility."

Actions by PSC

- Inspection Report
- ARF Case
- CPCN Case
- .023 Case
- PWA Case
- Financing Case
- Deviation Case
- Sewer CPCN Case

Actions by PSC

- Emphasis at Training
- Reduce Rates
- Reprimand & Warning
- PWA Cases
  - ➢ Dollars & Cents

Continued . . .

Actions by PSC

- Copy of Inspection Report
  - ➢ CJE & Fiscal Court
  - ➢ Utility Commissioners
  - ➢ Local Newspaper?
- PSC Website?

Borrowing Money

KRS 278.300(1)

No utility shall issue any securities or evidences of indebtedness . . . until it has been authorized to do so by order of the Commission.

Practical Effect

- Must Obtain PSC Approval Before Incurring Long-term Debt (Over 2 Years)
- Exception:
  - 2 Years or Less
  - 2 Renewals
    (3 X 2 = 6 Years)

Violation

Show Cause Case

Method of Resolution

- Historically . . .
  - Acknowledge Mistake
  - Settle Out of Court . . . . Very Quietly
  - Go to Training
  - Pay Small Fine
  - Stay Out of Trouble

Consequences

- Debt Service Expense Excluded From Rates
- Delay Implementation of New Rates
- Formal Hearing
- Must Hire Attorney (1 or 2)

Continued . . .

Consequences

- Must Advertise Hearing
  - ➢ Link to PSC Website
- Hearing Livestreamed
- Commissioners Resign
- Fine (Suspended?)
- Threaten Merger
- Go to Training

Who Is Affected?

- Utility
- Current Commissioners
- Former Commissioners
- Manager
- Attorney
- Lender ???

Talley's Take Aways

PSC Commissioners:

- PSC is **Serious** About . . .
  - ➢ Excessive Water Loss
  - ➢ Borrowing Money
  - ➢ Enforcing Its Orders

PSC Commissioners:

- Take Their Jobs Seriously
- Hands On
- Love Hearings
- Promote Transparency
- Oversight Means Oversight

Paying Bills

Paying Bills

- KRS 74.050 **Handout**
- Board Adopts Policy
- Minimum Requirement
  - Treasurer and
  - One Other Commissioner

Paying Bills

- Who Signs Checks?
  - KRS Is Silent
  - Board Has Discretion
- One or Two Signatures?
- Review by Full Board

Budget

Budget

- Required by KRS 65A.080(1)
- Post on DLG Website
- Periodic Review of Budget
- Amend as Necessary
- Post Amended Budget on DLG Website

Budget

"No moneys shall be expended from any source except as provided in the originally adopted or subsequently amended budget."

KRS 65A.080(1)

Budget

- Review Actual $ to Budget $
- Amend Budget if Needed
- When?
  - October Meeting
  - December Meeting
- Upload to DLG Website

PSC Case No. 2016-432

Filed: 12-29-2016
Utility: Hardin Co. WD No. 2
Type: Deviation
Issue: 15 Year Meters
Sample Testing
Decided: 03-22-2018

PSC Case No. 2017-127

Filed: 3-10-2017
Utility: North Mercer WD
Type: Deviation
Issue: Office Open
4 Days a Week
Decided: 3-16-2018

PSC Case No. 2017-458

Filed: 12-22-2017
Utility: Southeast Daviess WD
Type: CPCN
Issue: Smart Meters
Decided: 02-27-2018

PSC Case No. 2017-459

Filed:	12-22-2017
Utility:	West Daviess WD
Type:	CPCN
Issue:	Smart Meters
Decided:	02-27-2018

PSC Case No. 2017-246

Filed:	6-30-2017
Utility:	McCreary Co. WD
Type:	Deviation
Issue:	Daily Inspection of Grinder Pumps
Decided:	2-01-2018

PSC Case No. 2016-394

Filed:	11-18-2016
Utility:	Ky. American
Type:	Deviation
Issue:	Annual Inspection of Meters & Valves
Decided:	12-12-2017

PSC Case No. 2016-427

Filed:	12-08-2016
Utility:	Northern KY WD
Type:	Deviation
Issue:	Annual Inspection of Meters & Valves
Decided:	02-01-2018

2018 General Assembly

Notable Bills

- SB 117 – Ky. 811 - Defeated
- SB 151 – Sewage (Pension)
- HB 513 – Private WWTPs
- HB 362 – Pension Cap
- HB 366 – CPCN Exemption

Prevailing Wages

Prevailing Wages

Prevailing Wages

- State PW Repealed
  - HB 3
  - When? 1-9-2017
- Federal PW
  - Davis - Bacon Act

Old Law

- State PW Triggered By:
  - Public Works Project
  - Public Authority and
  - Over $250,000
- Funding Source Immaterial

Davis - Bacon Wages

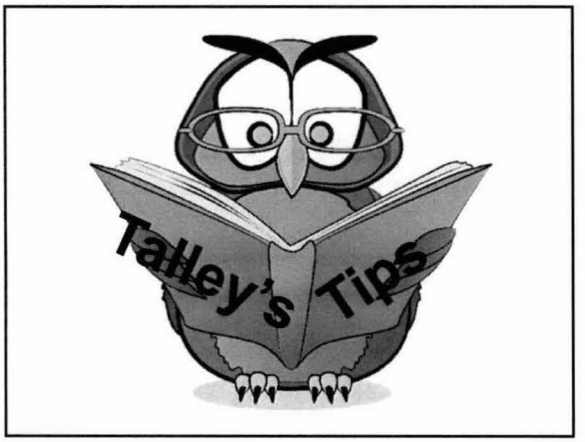
- DB Triggered By:
  - Public Works Project
  - Public Authority and
  - **Funding Source**

Davis - Bacon Wages ?

Funding Source	Yes	No
Reserve Funds		✓
RD		✓
KIA (Under Review)	✓	
CDBG	✓	
ARC	✓	
EDA	✓	

Davis - Bacon Wages ?

Funding Source	Yes	No
Tax Exempt Bonds		✓
KRWFC		✓
KLC		✓
KACo		✓
Multiple Sources	?	?



Davis - Bacon Wages

- Multiple Funding Sources
  - Does **Any** Funding Source Require DB Wages?
  - If Yes . . . Then Entire Project Requires DB Wages

damon.talley@skofirm.com

270-358-3187

STOLL KEENON OGDEN

Rates Across Kentucky
Andy Lange, Kentucky Rural Water Association

Rates Across Kentucky

August 28, 2018
Louisville, Kentucky

Utility rates are calculated based on cost of service considerations relative to the type of customer and the overall revenue needs of the utility.

Types of Customers

Residential (Inside City/Outside City)
Commercial
Industrial
Public
Raw Water
Bulk Sales
Wholesale
Others?

Rate Structures

- **Flat**

  Ex. $30 per month (regardless of use)

- **Uniform**

  Ex. $5 per 1000 gallons (regardless of use)

- **Block** (Ascending or Descending)

  Ex. $5 per 1000 (First 5000 gallons)

  $4 per 1000 (Next 5000 gallons)

Rate Structures

Minimum + uniform or block

$20.00	First 2000 gallons
$5.00/1000	Over 2000 gallons
$20.00	First 2000 gallons
$5.00/1000	Next 3000 gallons
$4.00/1000	Over 5000 gallons

Customer Charge + uniform or block

$20.00	No minimum usage
$5.00/1000	
$20.00	No minimum usage
$5.00/1000	First 5000 gallons
$4.00/1000	Over 5000 gallons

Rate Structures

Structure	Very Small	Small	Medium	Large	Very Large	ALL
Uniform	28%	53%	39%	39%	30%	36%
Declining	4%	19%	13%	15%	23%	10%
Increasing	11%	14%	14%	25%	27%	13%
Seasonal	0%	0%	0%	0%	5%	<1%
Flat (separate)	18%	17%	17%	18%	20%	17%
Flat (combined)	28%	1%	2%	4%	2%	16%
Other	8%	8%	2%	3%	9%	7%

Source: USEPA 2006 Community Water System Survey Report

Billing Minimums of Choice

(339 Utilities Surveyed)

Gallons	Count	Percentage
None	31	9%
750	4	1%
1000	67	20%
1500	13	4%
2000	215	63%
2500	4	1%
3000	5	1%

Wholesale Water Rates

(Water Producers)

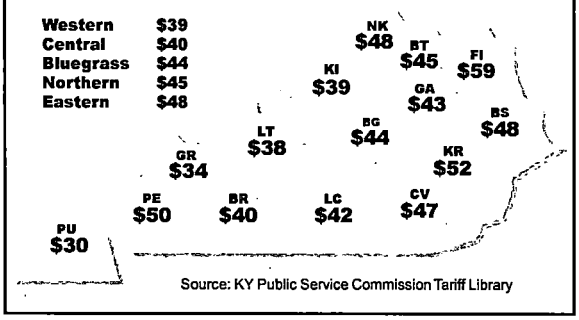
	Lowest	Average	Highest
Municipal/Private (79)	$1.36	$2.52	$4.57
WDs, WAs, WCs (26)	$1.63	$2.70	$3.91
Western Kentucky (21)	$1.49	$2.53	$4.39
Central Kentucky (23)	$1.36	$2.26	$3.34
Bluegrass (17)	$1.59	$2.68	$4.36
Southeastern Kentucky (25)	$1.72	$2.84	$4.57
Northeastern Kentucky (19)	$1.63	$2.48	$3.71
Groundwater Source (11)	$1.49	$2.10	$3.00
All Utilities (105)	$1.36	$2.56	$4.57

Average Residential Water Rates - 2016

Water Districts & Associations by Area Development District

(Based on 5000 gallons usage)

Kentucky	***$43***
Western	**$39**
Central	**$40**
Bluegrass	**$44**
Northern	**$45**
Eastern	**$48**



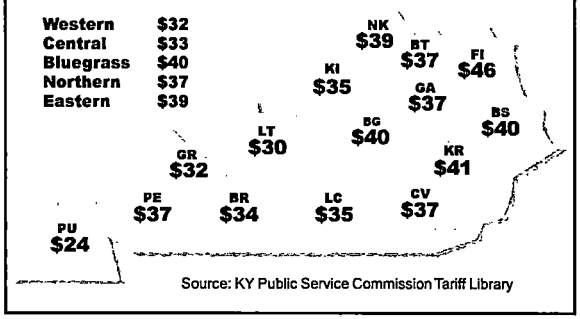
Source: KY Public Service Commission Tariff Library

Average Residential Water Rates - 2016

Water Districts & Associations by Area Development District

(Based on actual average usage of 4124 gallons)

Kentucky	***$36***
Western	**$32**
Central	**$33**
Bluegrass	**$40**
Northern	**$37**
Eastern	**$39**



Source: KY Public Service Commission Tariff Library

Last Rate Change?

Out of 133 Water Districts and Water Associations...

- **Over 50% have altered "rates" during the past 2 years**
- **93% have altered "rates" since 2010**
- **Three utilities have "rates" more than 10 years old!**

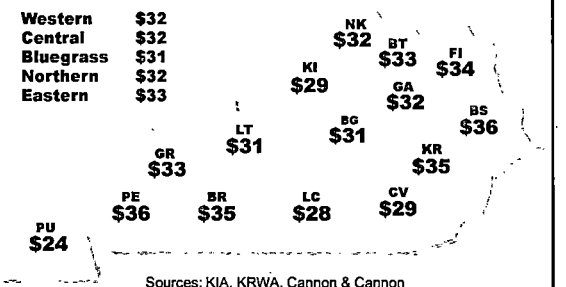
2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	Pre-2005
44	25	24	12	10	9	3	2	2	0	0	3
33%	51%	69%	78%	86%	93%	95%	96%	98%			100%

Average Residential Water Rates - 2015

Municipalities by Area Development District
(Based on 5000 gallons usage)

Kentucky ***$32***

Western	**$32**
Central	**$32**
Bluegrass	**$31**
Northern	**$32**
Eastern	**$33**



Sources: KIA, KRWA, Cannon & Cannon

Water Rate Comparisons - 2015

	5000 gallons		
	Average	Median	Outside
All Cities (186)	**$32**	**$31**	**$41**
Small Cities (90) (under 1,000)	**$37**	**$36**	**$48**
Medium Cities (53) (1,000 – 4,600)	**$31**	**$29**	**$40**
Large Cities (43) (over 4,600)	**$25**	**$23**	**$33**
Water Districts/Associations (133)	**$43**	**$43**	**-**
All Utilities (321)	**$36**	**$35**	**-**

Sources: KIA, KRWA, Cannon & Cannon

Municipal Water Rates - 2015

Top Ten (Highest)		**Bottom Ten** (Lowest)	
Drakesboro	$60.00	Corbin	$13.15
North Middletown	$59.63	Kevil	$13.41
Martin	$59.40	Manchester	$14.50
Russellville	$59.05	Mayfield	$16.00
Burgin	$56.97	Henderson	$16.45
Midway	$56.84	Calvert City	$16.62
Auburn	$56.09	Paris	$16.89
Burnside	$51.34	Owensboro	$17.43
Adairville	$50.70	Campbellsville	$17.68
Irvington	$49.28	Glasgow	$17.75

Based on cost for 5000 gallons

Rural Water Rates - 2017

Top Ten (Highest)		Bottom Ten (Lowest)	
Caldwell County	$74.89	Murray #2	$17.30
Corinth	$72.30	North Marshall	$19.67
Breathitt County	$71.99	SE Daviess	$19.73
Rattlesnake Ridge	$67.24	Warren County	$23.14
Todd County	$63.25	West Daviess	$23.65
Sandy Hook	$62.14	NE Woodford	$25.18
Letcher County	$61.97	Symsonia	$26.96
North Hopkins	$59.95	Oldham County	$27.34
South Eastern	$57.85	Graves County	$27.49
Lake Village	$57.15	Boone County	$27.65

Based on cost for 5000 gallons

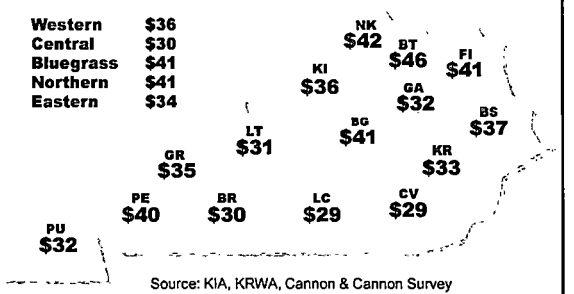
Average Residential Sewer Rates - 2015

All Utilities by Area Development District

(Based on 5000 gallons usage)

Kentucky $36

Western	**$36**
Central	**$30**
Bluegrass	**$41**
Northern	**$41**
Eastern	**$34**



Source: KIA, KRWA, Cannon & Cannon Survey

Sewer Rate Comparisons - 2015

	5000 gallons		
	Average	Median	Outside
All Cities (204)	$35	$33	$41
Small Cities (122) (under 1,050)	$37	$36	$44
Medium Cities (41) (1,051-2,799)	$32	$31	$39
Large Cities (40) (over 2,800)	$31	$29	$41
Other Utilities (89)	$37	$35	
All Utilities (293)	$35	$34	

Source: KIA, KRWA, Cannon & Cannon Survey

Sewer Rates - 2015

Top Ten (Highest)		Bottom Ten (Lowest)	
Dry Ridge	$76.83	Florence	$12.06
Nicholas Co. SD	$75.50	Middlesboro	$16.15
N. Madison SD	$69.95	Hyden	$17.50
W. Mason SD	$69.54	Somerset	$18.05
Williamstown	$64.43	Brownsville	$18.34
Ledbetter W&SD	$63.82	Nortonville	$18.68
Hanson	$63.72	Ft. Run WD	$18.80
Grand Rivers	$63.50	Elizabethtown	$19.20
Powell's Valley WD	$62.80	Corbin	$19.40
Drakesboro	$60.00	Monticello	$19.41

Based on cost for 5000 gallons

Rate Adjustments

- How often does a utility need one?
- Who approves my utility's rates?
- Who does the utility need to "sell" it to?
- How does a utility go about doing it?

Rate Adjustments

- How often does a utility need one?
  - It depends
  - Look at least every 3 – 5 years
    - Rate/Revenue Review
    - Cost of Service Study?
    - Are your rates cost-based?

Rate Adjustments

- Who approves my utility's rates?
  - It depends.
  - PSC (WD, WA, Investor-owned)
  - City Fathers/Mothers or Board

Rate Adjustments

- Who does the utility need to "sell" it to?
  - The utility board
  - The PSC
  - The utility customers

Rate Adjustments

- How does a utility go about doing it?
  - In-house (accountant)
  - Contract (accountant or engineer)
  - As part of a Project
  - Contract with KRWA
    - Andy does municipal rate studies
    - Alan Vilines does PSC rate studies

Rate Tips

- Rate adjustment or rate increase?
  - Rates do go down...sometimes!
- Use of percentages
  - I would rather use $ instead of %
- Adjust Rates Regularly
  - Use cost-of-living adjustments if you can.

QUESTIONS?

Tuesday, August 28, 2018
Concurrent Session C, Session #16C, 3:50 p.m. – 4:50 p.m.

PSC-related Utility Issues
Gerald Wuetcher, Stoll Keenon Ogden

PSC-Related Utility Issues

Gerald Wuetcher
Stoll Keenon Ogden PLLC
300 W. Vine Street, Suite 2100
Lexington, Kentucky 40507
gerald.wuetcher@skofirm.com
https://twitter.com/gwuetcher
(859) 231-3017

Public Service Commission: Current Situation

- Reduced Number of Staff
  - 2003: 135 Employees
  - 2018: 65 Employees
- Employee Turnover
  - Institutional Memory Lost/Less Continuity
  - Less Experienced Workforce
  - Fewer Specialists (e.g., no economists, engineers)
- Tighter Budgets – fewer training opportunities

Public Service Commission: Current Situation

- No Reduction In Number of Filings
  - 2015: 505
  - 2016: 540
  - 2017: 565
- Subject Matter Becoming More Complex
- Additional Statutory Duties
  - Water Training
  - Water District Commissioner Management/Tracking
  - Siting Board

Public Service Commission: Current Situation - CONSEQUENCES

- Suspension of Rates
- Rejection of Filings
- Increased Litigation Costs
- Lost Revenue – Delay in Adjusting Rates
- Loss of Favorable Bids
- Adverse Publicity

Purpose of Presentation

- Identify Available Resources To Assist In Preparing Filings
- Identify Common Mistakes
- Identify Utility Actions That May:
  - Reduce PSC Review Time
  - Speed Issuance of Final Decision
  - Avoid Potentially Unfavorable Publicity
  - Reduce Other Risks Associated with PSC Proceedings

AVAILABLE RESOURCES

- PSC Website (psc.ky.gov)
  - PSC Orders since 1980 SEARCHABLE
  - All Active Utility Tariffs SEARCHABLE
  - All Utility Tariff Filings since 2005 SEARCHABLE
  - Staff Opinions SEARCHABLE
  - Audits
  - Annual Reports since 1990
  - PSC Case Records Since 2005 SEARCHABLE
  - PSC Video Transcripts (Available online from 2011)
  - Listing of Daily Filings & Orders
- Statutes (http://www.lrc.ky.gov/Statutes/index.aspx)
- Regulations (http://www.lrc.ky.gov/Statutes/index.aspx)
- PSC Law (http://psc.ky.gov/agencies/psc/orders/PSCLaw.pdf)
- Sample Tariffs(http://www.psc.ky.gov/Home/Library?type=TariffSamples)

AVAILABLE RESOURCES

- Staff Contact List (http://psc.ky.gov/agencies/psc/reports/psc_staff.pdf)
- PSC Twitter Feed (https://twitter.com/KYPSC)
- Small Utilities Web Page (http://smallutilities.ky.gov/)
- PSC Regulations Web Page (http://psc.ky.gov/home/pscregulations)
- Other Resources
  - Kentucky Rural Water Association (http://www.krwa.org/)
  - Kentucky Division of Water (http://water.ky.gov/Pages/default.aspx)
  - Kentucky Association of Counties (http://www.kaco.org/)
  - Kentucky League of Cities (http://www.klc.org/)

COMMON MISTAKES

- Failure to Read Applicable Statutes and Regulations
- Failure To Review And Follow Filings Checklists
- Failure to Review Past PSC Decisions
- Failure To Provide PSC With Adequate Time For Review
- Assuming PSC Knows Past History/Relevant Facts

COMMON MISTAKES

- Assuming Documents From Another PSC Case Or Another Agency Are In The Record Or Are Available To PSC Staff
- Assuming the PSC Staff Is Aware of The Relevant Issues (Local/National/Industry)
- Failure To Give Proper Notice
- No Signature
- Insufficient Number of Copies
- No Attorney/Clueless Attorney

COMMON MISTAKES: **Tariff Filings**

- No Signature On Tariff Sheets
- No Effective Date
- Failure to Use Correct Tariff Format
- Failure To Give Proper Notice
- Failure to Adequately Explain Reasons for Proposed Rule Or Rate **AND** to Document Those Reasons **GOAL: AVOID SUSPENSION**

SUGGESTED ACTIONS: **Tariff Filings**

- Download/Use PSC Forms
- Provide Signature/**Effective Date**
- Request Staff Format Review
- Request Staff Notice Review
- Notice – Timing (Provide at least 30 days Notice)
- Cover Letter Should Provide Lengthy Explanation for Rate/Rule
- Provide Supporting Documents (**What Would Staff Want/Need To Know?**)

SUGGESTED ACTIONS: **Tariff Filings**

- Non-recurring Charges:
  - Document All Expenses/Show All Calculations
  - Receipts/Bids/Estimates
  - Case No. 2009-00540
  - **BEWARE:** 80% Increase Rule
- Research Prior Filings/PSC Orders For Potential Issues/Info Requests/3d Party Opposition – Adjust Filing Accordingly
- Inquire of PSC Staff/Others Re: Previous Similar Filings

Common Mistakes:
Certificates of Public Convenience And Necessity

- Insufficient Number of Plans and Specs
- Timing – "We need an Order By Next Week!"
- Failure to Explain the Need for the Construction
- Failure to Describe the Available Alternatives/Least Cost Alternative
- Failure to Explain Project's Financing
- Lack of Studies to Demonstrate Project is Technically Feasible
- No Certificate is Needed
- Compliance with Bidding Statutes

SUGGESTED ACTIONS:
Certificates of Public Convenience And Necessity

- Plans & Specs – 2 paper/1 electronic (Electronic Filing As Alternative)
- Advance Planning -- PSC Usually Requires At Least 30 days
  - Advise PSC Of Timing Requirements In Application
  - Coordinated DOW/PSC Approval
  - Considering Filing Application Before Bids Are Received/DOW Approval is obtained
- Application Should Explain the Need for the Construction/Describe the Alternatives/Explain Why Alternative Chosen
- Explain How Project Will Be Finance Even if Financing Approval Is Not Requested
- Provide Studies/Analyses/Reports That Were Provided to DOW
- Written Testimony of Engineer
- Be Aware of Budget Language/Request Staff Opinion on Need for CPCN
- Submit Bids
- State the effect of construction on rates

Common Mistakes:
PURCHASE WATER ADJUSTMENTS

- Lack of Evidence of Supplier Increase
- Lack of Evidence of Board Approval
- Lack of Schedule with Current/Proposed Rates
- Notice to Fiscal Court (if Water District)
- Improper Notice
- Timing Issues: Too Soon or Too Late
- Supplier Failed to Obtain PSC Approval for Increase
- Calculations

SUGGESTED ACTIONS: **PURCHASED WATER ADJUSTMENTS**

- Include Supplier's Notice
- Board **Resolution Approving Specific Rates**
- Provide Monthly Water Usage/Show Calculations for Adjustment
- Request Staff Review of Notice
- Notice – Timing (No earlier than 30 days before supplier's increase; No later than 20 days after increasing rates)
- If Supplier has not obtain PSC Approval, Contact PSC Staff **IMMEDIATELY**

Common Mistakes: **RATE ADJUSTMENTS**

- Failure to Scrub Application for Questionable Expenses
- Failure to Review PSC Order in Last Rate Case and Take Corrective Action
- Lack of Narrative/Explanation for Rate Adjustment
- Failure to Redact Confidential Information
- Failure to Submit/Sign Tariff Sheets
- Inadequate Notice to PSC

Common Mistakes: **RATE ADJUSTMENTS**

- Incorrect Number of Copies
- ARF: Failure to Have Records Ready for Review
- ARF: Failure to Complete Entire Application
- ARF: Failure to Submit Completed ARF Form 3 for all Commissioners/Manager

SUGGESTED ACTIONS: RATE ADJUSTMENTS

- Staff review of Public Notice prior to filing
- Scrub the Application
  - Identify Questionable Expenses
  - **DO NOT seek rate recovery** for those expenses
  - If rate recovery is sought, explain why rate recovery is warranted
  - Identify Questions/Criticisms Raise in Last Rate Proceeding & identify corrective action taken
  - Identify all confidential information (includes subsequent data requests)
- Consider providing written testimony that describes the utility's current financial condition and all extenuating circumstances

SUGGESTED ACTIONS: RATE ADJUSTMENTS

- Use Electronic Filing to reduce number of copies
- ARF: E-mail Copy of Application to AG
- Submit ARF Form-3 for all Bd Members/Management **(For either type)**
- Info Requests: If unclear, then seek clarification from Staff Attorney assigned to case & document that clarification
- Use Responses to Information Requests to Support Your Case
- If Staff Review of Records to be conducted, have records available (provide a copy if possible)
- ARF: Document contacts with Staff **(Build A Record)**
- Be prepared to address questions regarding depreciation practices

SUGGESTED ACTIONS: RATE ADJUSTMENTS

- ARF Cases/Cases In which Staff Report used:
  - Read the Staff Report Closely – Especially accounting recommendations
  - If Utility is not in agreement with all findings but agrees with rate recommendation, consider **conditional waiver of hearing**
  - Respond As Soon As Possible
- ARF: If Staff recommends a Higher Increase, Consider A Phased-In Increase or **only 110%**

GENERAL RECOMMENDATIONS

- Research before preparing application
  - How has PSC treated similar proposals?
  - What evidence has PSC sought in similar cases?
  - What policy arguments has PSC considered in similar cases?
  - How is your proposal similar/different?
  - Are there any reasons to suspect a different PSC position?
- Anticipate Problems & Objections
  - Who in community might take issue?
  - What is AG's position?
  - If a different utility made this proposal, would someone/PSC object?

GENERAL RECOMMENDATIONS

- Request An Informal Review from PSC Staff **(Form/Substance)**
- File Early Enough to Provide A Reasonable Time for PSC Review
- Make Your Timing Requirements Known Early & Often
  - Application/Letter to Executive Director
  - Follow-up if No visible movement in proceeding
  - Place Effective Date on Tariff Sheets
- Use Checklists
- Explain/Inform/Educate Staff
- Establish a Procedure for Electronic Receipt of PSC Orders/Documents/Notices

GENERAL RECOMMENDATIONS

- Make Maximum Use of Electronic Filing & Electronic Service Of Documents
  - Immediate
  - No Lost Filings
  - Increases Time Available
  - Reduces Costs
  - Allows for Better Organization of Case Files
- Make the Effort to Use Electronic Filing Correctly
- Retain Legal Counsel

QUESTIONS?

for Wastewater Treatment

Jim Collins
Business Development Manager-Brenntag Mid-South, Inc.
President-Indiana Industrial Operators Association

Efforts to Comply With Environmental Regulations Has Never Been Better

- Commitment from senior management
- Continuous operator training
- Willingness to purchase/install quality equipment
- ISO 15000 is coming!!

Despite tremendous efforts, problems still occur!

City of Chicago vs. U.S. Steel - Portage, IN

- Alleged violation of the Clean Water Act
- Alleged violation of the NPDES Permit in place

View of Indiana steel mills from Promontory Point in Chicago's Hyde Park during subzero temperatures on Jan. 2, 2018

U.S. Steel's Portage, Indiana, plant released 56.7 pounds of chromium on Oct. 25.
That's nearly double the plant's allowable daily release of the potentially cancer-causing chemical.

Hexavalent Chrome is the Culprit

- Decorative finish
- Used for corrosion protection
- Used for wear resistance
- Has been around for years

How does industry treat hexavalent chrome?

Adopt Pollution Prevention Methods

- Minimize amount of soluble chromium entering the waste treatment plant
- Monitor chromium bath concentration
- Conductivity of rinse waters
- Counter flow rinse stages
- Installation of evaporators/ion exchange

Treatment of Hexavalent Chromium

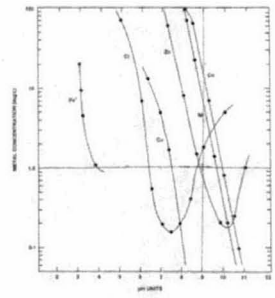
- Step 1: Reduce pH to 2.5 to 2.6.
- Step 2: Apply a source of sulfur.
  - Magnesium Bisulfite
  - Sulfur Dioxide
  - Sodium Bisulfite
- ORP will be a great benefit here!

Treatment of Hexavalent Chromium

- Step 3: Reaction time between mols of sulfur and hexavalent chrome must be <u>at least</u> 25 minutes.
- Step 4: Observe ORP for +250 mv. Observe color of the water. Blue? Yellow?

Treatment of Hexavalent Chromium

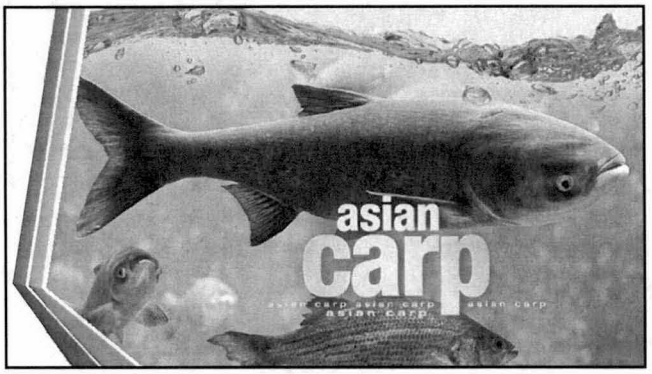
- Step 5: Increase pH with Lime or Caustic to 8.5 to 9.0.
- <u>Note</u>: *If pH is too high or low, you will fail!*



Treatment of Hexavalent Chromium

- Step 6: Add high charge density, high molecular weight anionic flocculant.
- Step 7: Mix time (medium speed) is 10 minutes.
- Step 8: Analyze effluent for chrome.

What is another problem for Lake Michigan?



Asian Carp

- Huge fear
- Really destroys fish
- Some have been found
- You can't take him to court!!

Tidbits - Q & A

(Not Kibbles and Bits!)

Q 1

"Any organic that has an affinity for minerals and/or soluble metals present in a solution"

A 1

Chelant or Sequestration Agent

Q 2

"Any organic that participates in a photo chemical reaction while emitting into the atmosphere"

A 2

Volatile Organic Compound

Q 3

The measure of a solution's ability to neutralize both <u>total</u> and <u>buffered</u> normality

A 3

Total Alkalinity

Q 4

What is an example of a buffer in a normal solution?

A 4

Boric Acid

Q 5

The measure of a solution's ability to neutralize both <u>total</u> and <u>buffered</u> alkalinity?

A 5

Total Normality

Q 6

Give example(s) of buffers present in an alkaline solution.

A 6

Phosphates
Carbonates
Hydroxides
Silicates
Amines

Q 7

The measure of hydrogen relative to the presence of free hydroxide present in a solution.

A 7

pH

Wednesday, August 29, 2018

General Session

PowerPoints/Outlines for Sessions 17 - 21

Wednesday, August 29, 2018
General Session, Session #21, 10:20 a.m. - 11:50 a.m.
Qualifications Based Selection
Robert Pickerill, Bell Engineering and others

Qualifications Based Selection (QBS)

The established standard for procuring A/E Services

Kentucky Qualifications Based Selection (QBS) Coalition

1

Kentucky QBS Coalition Goals

- Define and communicate the value of QBS.
- Serve as the "go-to organization" for information on selecting design professionals.
- Provide educational resources and assistance to communities desiring to implement QBS.

ACEC Kentucky | Kentucky Society of Professional Engineers | AIA Kentucky | KY ASLA

Russ Romine
Executive Director
(502) 695-5680
russ@kyengcenter.org

Janet Pike
Executive VP
(859) 223-8201
jpike@aiaky.org

2

Workshop Agenda

- What is QBS?
- Status of QBS in Kentucky
- Why use QBS?
- How QBS Works
- Resources Available
- Panel/Questions

3

If you needed an organ transplant, would you choose the cheapest doctor you can find? Or the most qualified?

If you needed to build a bridge, would you want it to be the cheapest design, or the best your money can buy?

In both cases, you want outcomes that last a lifetime!

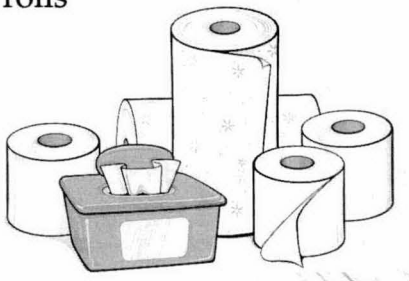
What is QBS?

QBS is a *competitive 2-step process* by which engineering and architectural firms are selected based on their *qualifications*, rather than low bid/price.

1-Step Procurement – Short Life Span

Buying paper towels and toilet paper based on low price makes sense. You can compare apples to apples – or rolls to rolls!

Price is usually an appropriate determining factor for products and other commodities of a disposable nature.



2-Step Procurement – Long Life Span

Obtaining design services is different. Public safety is our utmost priority.

Buildings and infrastructure last a long time, sometimes forever, and are not readily or easily replaced.

Qualifications, experience and creativity are just as – or more – important than price in achieving VALUE.

What is QBS? ...It is Federal Law

The Brooks Act (Public Law 92-582) provides for the selection of firms to perform architecture, engineering and related services on the basis of the competence, qualification, background and track record of competing firms, subject to negotiation of a fee that is fair and reasonable to the government.

Congressman Jack Brooks of Texas championed QBS in the early 1970s, leading to adoption of the Act in 1972.

What is QBS? ... It's the Established Standard

QBS is endorsed by the American Bar Association in its Model Procurement Code for State and Local Government. There is no law anywhere in the United States that requires bidding for A/E services.

More than 40 legislatures, including Kentucky's, have enacted "mini-Brooks Acts" as state laws.

Status of QBS in Kentucky

- Federal funding requires use of QBS
- Kentucky has QBS law for state-funded projects
- KY Transportation Cabinet, KY Finance Cabinet and the U.S. Army Corps of Engineers use QBS
- QBS is used sporadically among local agencies

Status of QBS in Kentucky

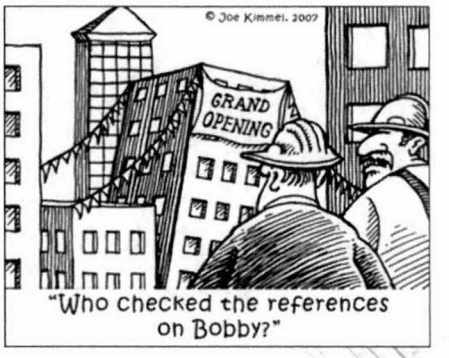
KRS 45A: Kentucky Model Procurement Code

- Procurement of A/E services… KRS 45A.730 – .759
- A/E services and procedures defined… KRS 45A.800 – .838
- For local governments and agencies, KRS 45A.735(1) is not mandatory: *"…each local public agency <u>may</u> adopt…"*

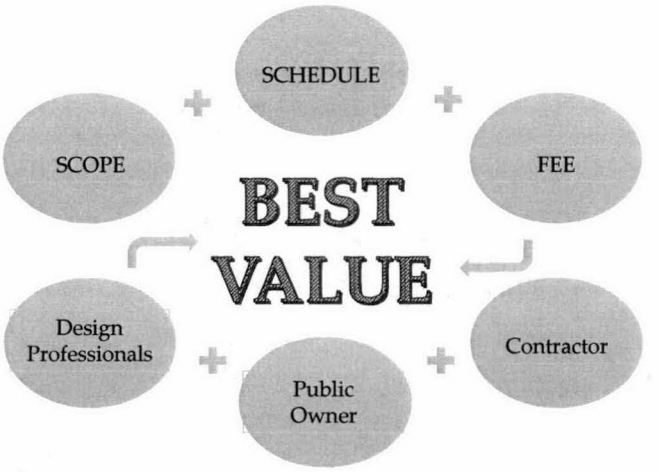
Why Use QBS?

The QBS process provides public owners – and those they serve - confidence that civic projects are designed in a manner that is:

- Safe
- Innovative
- Environmentally sound
- Cost-effective to construct
- Cost-effective to maintain over the *life cycle* of the facility.



Why Use QBS? – Finding Best Value



Why Use QBS? – Build to Last

- Public facilities are often built once-in-a-generation.
- Value will be measured over 20, 50, even 100 years.
- The right mix of creativity, expertise and experience leads to lower costs and higher performing buildings that last forever.

Why Use QBS? – Highly Competitive

- Fierce – but Fair – competition among firms
- Each puts forth their best ideas, their best people and their best experience as they go head-to-head to earn your business
- Each strives to develop a response that reflects the owner's vision for success

Why Use QBS? – Price IS Considered

- The QBS process is designed to identify the most qualified proposer.
- However, *price does enter the equation* before selection is finalized.
- If you cannot reach *a fair and reasonable price* vs. your estimate/budget, you move on to the next best proposal.

Why Use QBS? – Negotiated Fee

- Fee negotiations should begin with discussion and evaluation to establish a *clearly defined project scope and schedule.*
- The fee is then determined based on this mutual understanding, which *anticipates and minimizes the potential for surprise.*

How Does QBS Work? - Step 1

Request, Evaluate, Short-List, Interview, Rank

1. Public solicitation for architectural and engineering services
2. Receive statement of qualifications (SOQ), plus other relevant documentation, from responding firms
3. Evaluate submissions
4. Develop short-list of submitting firms (typically three or more)
5. Interview most qualified firms
6. Rank most qualified firms based on pre-established criteria

How Does QBS Work? - Step 2

Establish Scope & Schedule, Negotiate Fee

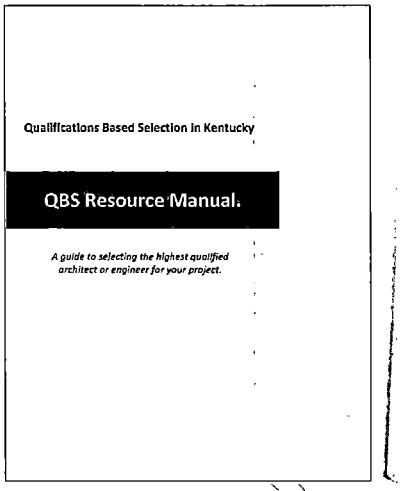
7. Clearly Define Project Scope and Schedule through dialogue and collaboration between the client and the top ranked firm.
8. Negotiate fee with the top ranked firm.

If negotiations are unsuccessful, move on to the next ranked firm.

How Does QBS Work?

A *step-by-step guide*, with easy to use forms, is available to assist from start to finish.

QBS provides both *methodology* and *documentation* for the public owner to use to ensure fair competition.

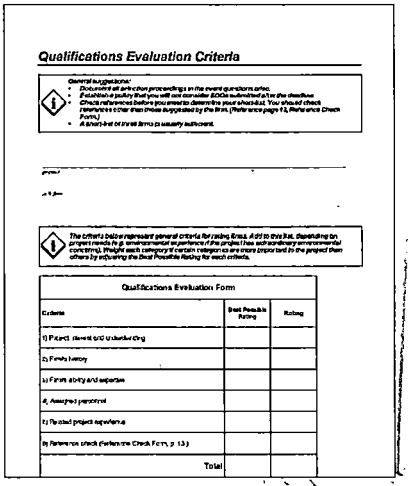


How Does QBS Work?

Determine evaluation criteria to be used, based on the specific project, and assign weight to each.

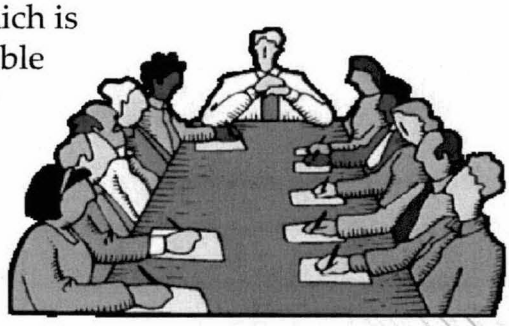
For example:

- Project interest and understanding
- Experience on similar projects
- Assigned Personnel
- References



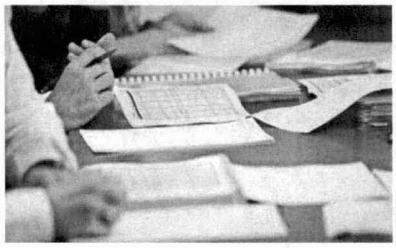
How Does QBS Work?

An essential element of the process is the use of a *selection committee*, which is made up of knowledgeable people that evaluate the submitted proposals.



How Does QBS Work?

The selection committee is charged by the public owner with fairly evaluating the *qualifications* and, often, the *ideas for project execution* offered by competing firms.

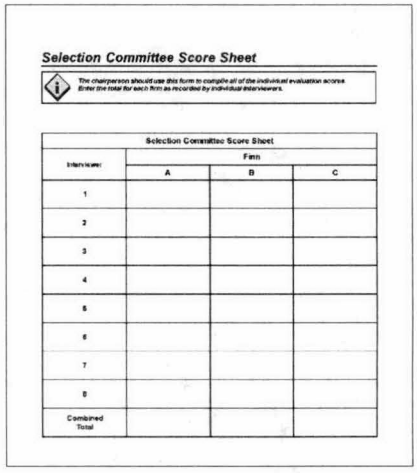


How Does QBS Work?

The selection committee will:

- Review Submissions
- Short List & Interview
- Rank Firms

Score sheets are public records, ensuring the transparency the public expects.



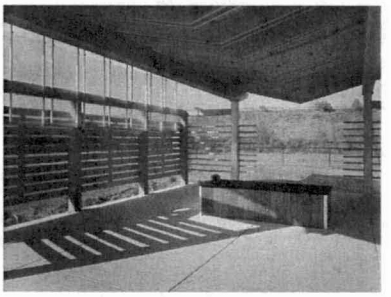
Selection Committee Score Sheet

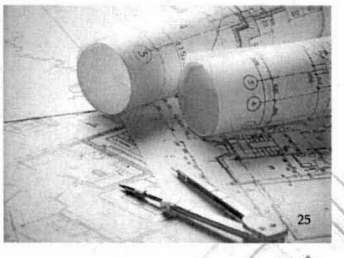
The chairperson should use this form to compile all of the individual evaluation scores. Enter the total for each firm as recorded by individual interviewers.

Selection Committee Score Sheet			
Interviewer	Firm		
	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
Combined Total			

QBS Bottom Line

Public Buildings and Facilities that Stand the Test of Time.





Resources

- QBS Resource Manual: *Now Available*
- QBS Coalition Web Site: www.QBS-Ky.org
- QBS Coalition Key Contacts:

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